, town- hall, cathedral and 9 churches, national college, episcopal seminary and schools of law and medicine, theatre, two hospitals, custom-house, and several asylums and charitable institutions. Guayaquil is also the seat of a university corporation with faculties of law and medicine. A peculiarity of Guayaquil is that the upper floors in the business streets project over the walks, forming covered arcades. The year is divided into a wet and dry season, the former from January to June, when the hot days are followed by nights of drenching rain. The mean annual temperature is about 82 to 83° F.; malarial and bilious fevers are common, the latter being known as " Guayaquil fever," and epidemics of yellow fever are frequent. The dry or summer season is considered pleasant and healthy. The water-supply is now brought in through iron mains from the Cordilleras 53 m. distant. The mains pass under the Guayas river and discharge into a large distributing reservoir on one of the hills N. of the city. The city is provided with tramway and telephone services, the streets are lighted with gas and

electricity, and telegraph communication with the outside world is maintained by means of the West Coast cable, which lands at the small port of Santa Elena, on the Pacific coast, about 65 m. W. of Guayaquil. Railway connexion with Quito (290 m.) was established in June 1908. There is also steamboat connexion with the producing districts of the province on the Guayas river and its tributaries, on which boats run regularly as far up as Bodegas (80 m.) in the dry season, and for a distance of 40 m. on the Daule. For smaller boats there are about 200 m. of navigation on this system of rivers. The exports of the province are almost wholly transported on these rivers, and are shipped either at Guayaquil, or at Puna, its deep-water port, 65 m. outside the Guayas bar, on the E. end of Puna Island. The Guayas river is navigable up to Guayaquil for steamers drawing 22 ft. of water; larger vessels anchor at Puna, 40 m. from Guayaquil, where cargoes and passengers are transferred to lighters and tenders. There is a cjuay on the river front, but the depth alongside does not exceed 18 ft. The principal exports are cacao, rubber, coffee, tobacco, hides, cotton, Panama hats, cinchona bark and ivory nuts, the value of all exports for the year 1905 being 14,148,877 sucres, in a total of 18,565,668 sucres for the whole republic. In 1908 the exports were: cacao, about 64,000,000 lb, valued at $6,400,000; hides, valued at $135,000; rubber, valued at $235,000; coffee, valued at $273,000; and vegetable ivory, valued at $102,000.

There are some small industries in the city, including a shipyard, saw-mills, foundry, sugar refineries, cotton and woollen mills, brewery, and manufactures of soap, cigars, chocolate, ice, soda- water and liqueurs.

Santiago de Guayaquil was founded on St James's day, the 25th of July 1535, by Sebastian de Benalcazar, but was twice abandoned before its permanent settlement in 1537 by Francesco de Orellana. It was captured and sacked several times in the 17th and 18th centuries by pirates and freebooters — -by Jacob Clark in 1624, by French pirates in 1686, by English freebooters under Edward David in 1687, by William Dampier in 1707 and by Clapperton in 1709. Defensive works were erected in 1730, and in 1763, when the town was made a governor's residence, a castle and other fortifications were constructed. Owing to the flimsy construction of its buildings Guayaquil has been repeatedly burned, the greater fires occurring in 1707, 1764, 1865, 1896 and 1899. The city was made the see of a bishopric in 1837.

GUAYAS, or El Guayas, a coast province of Ecuador, bounded N. by

Manabi and Pichincha, E. by Los Rios, Cafiar and Azuay, S. by El Oro and the Gulf of Guayaquil, and W. by the same gulf, the Pacific Ocean and the province of Manabi. Pop. (1893, estimate) 98,100; area, 11,504 sq. m. It is very irregular in form and comprises the low alluvial districts surrounding the Gulf of Guayaquil between the Western Cordilleras and the coast. It includes (since 1885) the Galapagos Islands, lying 600 m. off the coast. The province of Guayas is heavily forested and traversed by numerous rivers, for the most part tributaries of the Guayas river, which enters the gulf from the N. This river system has a drainage area of about 14,000 sq. m. and an aggregate of 200 m. of navigable channels in the rainy season. Its principal tributaries are the Daule and Babahoyo or Chimbo (also called Bodegas), and of the latter the Vinces and Yaguachi. The climate is hot, humid and unhealthy, bilious and malarial fevers being prevalent. The rainfall is abundant and the soil is deep and fertile. Agriculture and the collection of forest products are the chief industries. The staple products are cacao, coffee, sugar-cane, cotton, tobacco and rice. The cultivation of cacao is the principal industry, the exports forming about one-third the world's supply. Stock-raising is also carried on to a limited extent. Among forest products are rubber, cinchona bark, toquilla fibre and ivory nuts. The manufacture of so-called Panama hats from the fibre of the toquilla palm (commonly called jipijapa, after a town in Manabi famous for this industry) is a long-established domestic industry among the natives of this and other coast provinces, the humidity of the climate greatly facilitating the work of plaiting the delicate straws, which would be broken in a dry atmosphere. Guayas is the chief industrial and commercial province of the republic, about nineteen-twentieths of the commerce of Ecuador passing through the port of its capital, Guayaquil. There are no land transport routes in the province except the Quito & Guayaquil railway, which traverses its eastern half. The sluggish river channels which intersect the greater part of its territory afford excellent facilities for transporting produce, and a large number of small boats are regularly engaged in that traffic. There are no large towns in Guayas other than Guayaquil. Duran, on the Guayas river opposite Guayaquil, is the starting point of the Quito railway and contains the shops and offices of that line. The port of Santa Elena on a bay of the same name, about 65 m. W. of Guayaquil, is a landing-point of the West Coast cable, and a port of call for some of the regular steamship lines. Its exports are chiefly Panama hats and salt.

GUAYCURUS, a tribe of South American Indians on the Paraguay. The name has been used generally of all the mounted Indians of Gran Chaco. The Guaycurus are a wild, fierce people, who paint their bodies and go naked. They are fearless horse- men and are occupied chiefly in cattle rearing.

GUAYMAS, or San Jose de Guaymas, a seaport of Mexico, in the state of Sonora, on a small bay opening into the Gulf of California a few miles W. of the mouth of the Yaqui river, in lat. 27 58′ N., long. uo°s8'W. Pop. (1900) 8648. Theharbour

is one of the best on the W. coast of Mexico, and the port is a principal outlet for the products of the large state of Sonora. The town stands on a small, arid plain, nearly shut in by moun- tains, and has a very hot, dry climate. It is connected with the railways of the United States by a branch of the Southern Pacific from Benson, Arizona, and is 230 m. S. by W. of the frontier town of Nogales, where that line enters Mexico. The exports include gold, silver, hides and pearls.

GUBBIO (anc. Iguvium, q.v.; med. Eugubium), a town and episcopal see of Umbria, Italy, in the province of Perugia, from which it is 23 m. N.N.E. by road; by rail it is 13 m. N.W. of Fossato di Vico (on the line between Foligno and Ancona) and 70 m. E.S.E. of Arezzo. Pop. (1901) 5783 (town); 26,718 (commune). Gubbio is situated at the foot and on the steep slopes of Monte Calvo, from 1568 to 1735 ft. above sea-level, at the entrance to the gorge which ascends to Scheggia, probably on the site of the ancient Umbrian town. It presents a markedly medieval appearance. The most prominent building is the Palazzo dei Consoli, on the N. side of the Piazza della Signoria; it is a huge Gothic edifice with a tower, erected in 133 2-1346, according to tradition, by Matteo di Giovanello of Gubbio, the name of Angelo da Orvieto occurs on the arch of the main door, but his work may be limited to the sculptures of this arch. It has two stories above the ground floor, and, being on the slope of the hill, is, like the whole piazza, raised on arched substructures. On the S. side of the piazza is the Palazzo Pretorio, or della Podesta, begun in 1349 and now the municipal palace. It contains the famous Tabulae Iguvinae, and a collec- tion of paintings of the Umbrian school, of furniture and of majolica. On the E. side is the modern Palazzo Ranghiasci- Brancaleone, which until 1882 contained fine collections, now dispersed. Above the Piazza della Signoria, at the highest point of the town, is the Palazzo Ducale, erected by the dukes of Urbino in 1474-1480; the architect was, in all probability, Lucio da Laurana, to whom is due the palace at Urbino, which this palace resembles, especially in its fine colonnaded court. The Palazzo Beni, lower down, belongs to a somewhat earlier period of the 15th century. Pope Martin V. lodged here for a few days in 1420. The Palazzo Accoramboni, on the other hand, is a Renaissance structure, with a fine entrance arch. Here Vittoria Accoramboni was born in 1557. Opposite the Palazzo Ducale is the cathedral, dedicated to SS. Mariano e Jacopo, a structure of the 12th century, with a facade, adorned with contemporary sculptures, partly restored in 1514-1550. The interior contains some good pictures by Umbrian artists, a fine episcopal throne in carved wood, and a fine Flemish

cope given by Pope Marcellus II. (1555) in the sacristy. The ex- terior of the Gothic church of S. Francesco, in the lower part of the town, built in 1259, preserves its original style, but the in- terior has been modernized; and the same fate has overtaken the Gothic churches of S. Maria Nuova and S. Pietro. S. Agostino, on the other hand, has its Gothic interior better preserved. The whole town is full of specimens of medieval architecture, the pointed arch of the 13th century being especially prevalent. A remarkable procession takes place in Gubbio on the 15th of May in each year, in honour of S. Ubaldo, when three colossal wooden pedestals, each over 30 ft. high, and crowned by statues of SS: Ubaldo, Antonio and Giorgio, are carried through the town, and then, in a wild race, up to the church of S. Ubaldo on the mountain-side (2690 ft.). See H. M. Bower, The Elevation and Procession of the Ceri at Gubbio (Folk-lore Society, London,

1897).

After its reconstruction with the help of Narses (see Iguvium) the town remained subject to the exarchs of Ravenna, and, after the destruction of the Lombard kingdom in 774, formed part of the donation of Charlemagne to the pope. In the nth century the beginnings of its independence may be traced. In the struggles of that time it was generally on the Ghibelline side. In 1 15 1 it repelled an attack of several neighbouring cities, and formed from this time a republic governed by consuls. In n 55 it was besieged by the emperor Frederick I., but saved by the intervention of its bishop, S. Ubaldo, and was granted privileges

by the emperor. In 1 203 it had its first podesta, and from this period dates the rise of its importance. In 1387, after various political changes, it surrendered to Antonio da Montefeltro of Urbino, and remained under the dominion of the dukes of Urbino until, in 1624, the whole duchy was ceded to the pope.

Gubbio was the birthplace of Oderisio, a famous miniature painter (1240-1299), mentioned by Dante as the honour of his native town (Purg. xi. 80 " I' onor d' Agobbio "), but no authentic works by him exist. In the 14th and 15th centuries a branch of the Umbrian school of painting flourished here, the most famous masters of which were Guido Palmerucci (1 280-1345?) and several members of the Nelli family, particularly Ottaviano (d. 1444), whose best work is the " Madonna del Belvedere " in S. Maria Nuova at Gubbio (1404), extremely well preserved, with bright colouring and fine details. Another work by him is the group of frescoes

including a large " Last Judgment," and scenes from the life of St Augustine, in the church of S. Agostino, discovered in 1902 under a coating of whitewash. These painters seem to have been influenced by the contemporary masters of the Sienese school.

Gubbio occupies a far more important place in the history of majolica. In a decree of 1438 a vasarius vasorum pictorum is mentioned, who probably was not the first of his trade. The art was brought to perfection by Giorgio Andreoli, whose father had emigrated hither from Pavia, and who in 1498 became a citizen of Gubbio. The works by his hand are remarkable for their ruby tint, with a beautiful metallic lustre; but only one small tazsa remains in Gubbio itself. His art was carried on by his sons, Cencio and Ubaldo, but was afterwards lost, and only recovered in 1853 by Angelico Fabbri and Luigi Carocci.

Two miles outside Porta Metauro to the N.E. is the Bottac- cione, a large water reservoir, constructed in the 12th or 14th century; the water is collected in the bed of a stream by a massive dam.

See A. Colasanti, Gubbio (Bergamo, 1905) ; L. McCracken, Gubbio (London, 1905). (T. As.)

GUBEN, a town of Germany, in the kingdom of Prussia, at the confluence of the Lubis with the Neisse, 28 m. S.S.E. of Frankfort-on-Oder, at the junction of railways to Breslau, Halle and Forst. Pop. (1875) 23,704; (1905) 36,666. It pos- sesses three Evangelical churches, a Roman Catholic church, a synagogue, a gymnasium, a modern school, a museum and a theatre. The principal industries are the spinning and weaving of wool, dyeing, tanning, and the manufacture of pottery ware, hats, cloth, paper and machinery. The vine is cultivated in the neighbourhood to some extent, and there is also some trade in fruit and vegetables. Guben is of Wendish origin. It is men- tioned in 1207 and received civic rights in 1235. It was sur- rounded by walls in 1311, about which time it came into the possession of the margrave of Brandenburg, from whom it passed to Bohemia in 1368. It was twice devastated by the Hussites, and in 1631 and 1642 it was occupied by the Swedes. By the peace of Prague in 1635 it came into the possession of the elector of Saxony, and in 1815 it was, with the rest of Lower Lusatia, united to Prussia.

GUBERNATIS, ANGELO DE, Count (1840-), Italian man of letters, was born at Turin and educated there and at Berlin, where he studied philology. In 1862 he was appointed professor of Sanskrit at Florence, but having married a cousin of the Socialist Bakunin and become interested in his views he resigned his appointment and spent some years in travel. He was reappointed, however, in 1867; and in 1891 he was transferred to the

university of Rome. He became prominent both as an orientalist, a publicist and a poet. He founded the Italia letteraria (1862), the Rivista orientale (1867), the Civitta italmna and Rivista europea (1869), the Bolletlino italiano degli studii orientali (1876) and the Revue Internationale (1883), and in 1887 became director of the Giornale della sociela asiatica. In 1878 he started the Dizionario biografico degli scrittori contem- poranei. His Oriental and mythological works include the Piccola enciclopedia Indiana (1867), the Fonti vediche (1868), a famous work on zoological mythology (1872), and another on

plant mythology (1878). He also edited the encyclopaedic Storia universale della letteratura (1882-1885). His work in verse includes the dramas Cato, Romolo, II re Nala, Don Rodrigo, Savitri, &c.

GUDBRANDSDAL, a district in the midlands of southern Norway, comprising the upper course of the river Lougen or Laagen from Lillehammer at the head of Lake Mjosen to its source in Lake Lesjekogen and tributary valleys. Lillehammer, the centre of a rich timber district, is 114 m. N. of Christiania by rail. The railway continues through the well-wooded and cultivated valley to Otta (70 m.). Several tracks run westward into the wild district of the Jotunheim. From Otto good driving routes run across the watershed and descend the western slope, where the scenery is incomparably finer than in Gudbrandsdal itself — (a) past Sorum, with the 13th-century churches of Vaagen and Lorn (a fine specimen of the Stavekirke or timber- built church), Aanstad and Polfos, with beautiful falls of the Otta river, to Grotlid, whence roads diverge to Stryn on the Nordfjord, and to Marok on the Geirangerfjord; (b) past Domaas (with branch road north to Storen near Trondhjem, skirting the Dovrefjeld), over the watershed formed by Lesje- kogen Lake, which drains in both directions, and down through the magnificent Romsdal.

GUDE (Gtjditjs), MARQUARD (1635-1689), German archaeo- logist and classical scholar, was born at Rendsburg in Holstein on the rst of February 1635. He was originally intended for the law, but from an early age showed a decided preference for classical studies. In 1658 he went to Holland in the hope of finding work as a teacher of classics, and in the following year, through the influence of J. F. Gronovius, he obtained the post of tutor and travelling companion to a wealthy young Dutchman, Samuel Schars. During his travels Gude seized the opportunity of copying inscriptions and MSS. At the earnest request of his pupil, who had become greatly attached to him, Gude refused more than one professional appointment, and it was not until 1671 that he accepted the post of librarian to Duke Christian Albert of Holstein-Gottorp. Schars, who had accompanied Gude, died in 1675, and left him the greater part of his property. In 1678 Gude, having quarrelled with the duke, retired into

private life; but in 1682 he entered the service of Christian V. of Denmark as counsellor of the Schleswig-Holstein chancellery, and remained in it almost to the time of his death on the 26th of November 1689. Gude's great life-work, the collection of Greek and Latin inscriptions, was not published till 1731. Mention may also be made of his editio princeps (1661) of the treatise of Hippolytus the Martyr on Antichrist, and of his notes on Phaedrus (with four new fables discovered by him) published in P. Burmann's edition (1698).

His correspondence (ed. P. Burmann, 1697) is the most important authority for the events of Gude's life, besides containing valuable information on the learning of the times. See also J. Moller, Cimbria literata, iii., and C. Bursian in Allgemeine deutsche Biographie, x.

GUDEMAN, ALFRED (1862-), American classical scholar, was born in Atlanta, Georgia, on the 26th of August 1862. He graduated at Columbia University in 1883 and studied under Hermann Diels at the University of Berlin. From 1890 to 1893 he was reader in classical philology at Johns Hopkins University, from 1893 to 1902 professor in the University of Pennsylvania, and from 1902 to 1904 professor in Cornell University. In 1904 he became a member of the corps of scholars preparing the Wolfflin Thesaurus linguae Latinae — a unique distinction for an American Latinist, as was the publication of his critical edition, with German commentary, of Tacitus' Agricola in 1902 by the Weidmannsche Buchhandlung of Berlin. He wrote Latin Literature of the Empire (2 vols., Prose and Poetry, 1898-1899), a History of Classical Philology (1902) and Sources of Plutarch's Life of Cicero (1902); and edited Tacitus' Dialogus de oratoribus (text with commentary, 1894 and 1898) and Agricola (1899; with Germania, 1900), and Sallust's Catiline (1903).

GUDGEON (Gobio fluviatilis) , a small fish of the Cyprinid family. It is nearly related to the barbel, and has a small barbel or fleshy appendage .at each corner of the mouth. It is the

gobione of Italy, goujon of France (whence adapted in M. English as gojon), and Grassling or Griindling of Germany. Gudgeons thrive in streams and lakes, keeping to the bottom, and seldom exceeding 8 in. in length. In China and Japan there are varieties differing only slightly from the common European type.

GUDRUN (Kudrun), a Middle High German epic, written probably in the

early years of the 13th century, not long after the Nibelungenlied, the influence of which may be traced upon it. It is preserved in a single MS. which was prepared at the command of Maximilian I., and was discovered as late as 1820 in the Castle of Ambras in Tirol. The author was an unnamed Austrian poet, but the story itself belongs to the cycle of sagas, which originated on the shores of the North Sea. The epic falls into three easily distinguishable parts — the adventures of King Hagen of Ireland, the romance of Hettel, king of the Hegelingen, who woos and wins Hagen's daughter Hilde, and lastly, the more or less parallel story of how Herwig, king of Seeland, wins, in opposition to her father's wishes, Gudrun, the daughter of Hettel and Hilde. Gudrun is carried off by a king of Normandy, and her kinsfolk, who are in pursuit, are defeated in a great battle on the island of Wulpensand off the Dutch coast. The finest parts of the epic are those in which Gudrun, a prisoner in the Norman castle, refuses to become the wife of her captor, and is condemned to do the most menial work of the household. Here, thirteen years later, Herwig and her brother Ortwin find her washing clothes by the sea; on the following day they attack the Norman castle with their army and carry out the long-delayed retribution.

The epic of Gudrun is not unworthy to stand beside the greater Nibelungenlied, and it has been aptly compared with it as the Odyssey to the Iliad. Like the Odyssey, Gudrun is an epic of the sea, a story of adventure; it does not turn solely round the conflict of human passions; nor is it built up round one all-absorbing, all-dominating idea like the Nibelungenlied. Scenery and incident are more varied, and the poet has an opportunity for a more lyric interpretation of motive and character. Gudrun is composed in stanzas similar to those of the Nibelungenlied, but with the essential difference that the last line of each stanza is identical with the others, and does not contain the extra accented syllable characteristic of the Nibelungen metre.

Gudrun was first edited by von der Hagen in vol. i. of his Heldenbuch (1820). Subsequent editions by A. Ziemann and A. J. Vollmer followed in 1837 and 1845. The best editions are those by K. Bartsch (4th ed., 1880), who has also edited the poem for Kurschner's Deutsche Nationalliteratur (vol. 6, 1885), by B. Symons (1883) and by E. Martin (2nd ed., 1901). L. Ettmuller first applied Lachmann's ballad-theory to the poem (1841), and K. MullenhofT (Kudrun, die echten Teile des Gedichts, 1845) rejected more than three-quarters of the whole as " not genuine." There are many translations of the epic into modern German, the best known being that of K. Simrock (15th ed., 1884). A translation into English by M. P. Nichols appeared at Boston, U.S.A., in 1889.

See K. Bartsch, Beitrdge zur Geschichte und Krilik der Kudrun (1865); H.

Keck, Die Gudrunsage (1867); W. Wilmanns, Die Entwickelung der Kudrundichtung (1873); A. Fecamp, Le Poeme de Gudrun, ses origines, sa formation et son histoire (1892) ; F. Panzer, Hilde-Gudrun (1901). For later versions and adaptations of the saga see O. Benedict, Die Gudrunsage in der neueren Literatur (1902.) GUEBRIANT, JEAN BAPTISTE BUDES, Comte de (1602- 1643), marshal of France, was born at Plessis-Budes, near St Brieuc, of an old Breton family. He served first in Holland, and in the Thirty Years' War he commanded from 1638 to 1639 the French contingent in the army of his friend Bernard of Saxe- Weimar, distinguishing himself particularly at the siege of Breisach in 1638. Upon the death of Bernard he received the command of his army, and tried, in conjunction with J. Baner (1 596-1641), the Swedish general, a bold attack upon Regensburg (1640). His victories of Wolfenbuttel on the 29th of June 1641 and of Kempen in 1642 won for him the marshal's baton. Having failed in an attempt to invade Bavaria in concert with Torstensson he seized Rottweil, but was mortally wounded there on the 17th of November 1643.

A biography was published by Le Laboureur, Histoire du mareschal de Guebriant, in 1656. See A. Brinzinger in Wurttembergische Vierteljahrschrift für Landesgeschichte (1902).

GUELDER ROSE, so called from Guelderland, its supposed source, termed also marsh elder, rose elder, water elder (Ger. Wasserholder, Schneeball; Fr. viorne-obier , I'obier d' Europe) , known botanically as Viburnum Opulus, a shrub or small tree of the natural order Caprifoliaceae, a native of Britain, and widely distributed in the temperate and colder parts of Europe, Asia and North America. It is common in Ireland, but rare in Scotland. In height it is from 6 to 12 ft., and it thrives best in moist situations. The leaves are smooth, 2 to 3 in. broad, with 3 to s unequal serrate lobes, and glandular stipules adnate to the stalk. In autumn the leaves change their normal bright green for a pink or crimson hue. The flowers, which appear in June and July, are small, white, and arranged in cymes 2 to 4 in. in diameter. The outer blossoms in the wild plant have an enlarged corolla, J in. in diameter, and are devoid of stamens or pistils; in the common cultivated variety all the flowers are sterile and the inflorescence is globular, hence the term " snow- ball tree " applied to the plant, the appearance of which at the time of flowering has been prettily described by Cowper in his Winter Walk at Noon. The guelder rose bears juicy, red, elliptical berries, 3 in. long, which ripen in September, and contain each a single compressed seed. In northern Europe these are eaten, and in Siberia, after fermentation with flour, they are distilled for spirit. The plant has, however, emetic, purgative and nar- cotic properties; and Taylor {Med. Jurisp. i. 448, 2nd ed., 1873) has recorded an instance of the fatal poisoning of a child by the berries. Both they and the bark contain

valerianic acid. The woody shoots of the guelder rose are manufactured into various small articles in Sweden and Russia. Another member of the genus, Viburnum, Lantana, wayfaring tree, is found in dry copses and hedges in England, except in the north.

GUELPH, a city of Ontario, Canada, 45 m. W. of Toronto, on the river Speed and the Grand Trunk and Canadian Pacific railways. Pop. (1901) 11,496. It is the centre of a fine agri- cultural district, and exports grain, fruit and live-stock in large quantities. • It contains, in addition to the county and municipal buildings, the Ontario Agricultural College, which draws students from all parts of North and South America. The river affords abundant water-power for flour-mills, saw-mills, woollen-mills and numerous factories, of which agricultural implements, sewing machines and musical instruments are the chief.

GUELPHS AND GHIBELLINES. These names are doubtless Italianized forms of the German words Welf and Waiblingen, although one tradition says that they are derived from Guelph and Gibel, two rival brothers of Pistoia. Another theory derives Ghibelline from Gibello, a word used by the Sicilian Arabs to translate Hohenstaufen. However, a more popular story tells how, during a fight around Weinsberg in December 1140 between the German king Conrad III. and Welf, count of Bavaria, a member of the powerful family to which Henry the Lion, duke of Saxony and Bavaria, belonged, the soldiers of the latter raised the cry " Hie Welf!" to which the king's troops replied with " Hie Waiblingen ! " this being the name of one of Conrad's castles. But the rivalry between Welf and Hohenstaufen, of which family Conrad was a member, was anterior to this event, and had been for some years a prominent fact in the history of Swabia and Bavaria, although its introduction into Italy — in a slightly modified form, however — only dates from the time of the Italian expeditions of the emperor Frederick I. It is about this time that the German chronicler, Otto of Freising, says, " Duae in Romano orbe apud Galliae Germaniaeve fines famosae familiae actenus fuere, una Heinricorum de Gueibelinga, alia Guelforum de Aldorfo, altera imperatores, altera magnos duces producere solita." Chosen German king in 11 52, Frederick was not only the nephew and the heir of Conrad, he was related also to the Welfs; yet, although his election abated to some extent the rivalry between Welf and Hohenstaufen in Germany, it opened it upon a larger and fiercer scale in Italy.

During the long and interesting period covered by Frederick's Italian campaigns, his enemies, prominent among whom were the cities of the Lombard League, became known as Welfs, or Guelphs, while his partisans seized upon the rival term of

Waiblingen, or Ghibelline, and the contest between these two parties was carried on with a ferocity unknown even to the inhabitants of southern Germany. The distracted state of northern Italy, the jealousies between various pairs of towns, the savage hatred between family and family, were some of the causes which fed this feud, and it reached its height during the momentous struggle between Frederick II. and the Papacy in the 13th century. The story of the contest between Guelph and Ghibelline, however, is little less than the history of Italy in the middle ages. At the opening of the 13th century it was intensified by the fight for the German and imperial thrones between Philip, duke of Swabia, a son of Frederick I., and the Welf, Otto of Brunswick, afterwards the emperor Otto IV., a fight waged in Italy as well as in Germany. Then, as the heir of Philip of Swabia and the rival of Otto of Brunswick, Frederick II. was forced to throw himself into the arms of the Ghibellines, while his enemies, the popes, ranged themselves definitely among the Guelphs, and soon Guelph and Ghibelline became synonymous with supporter of pope and emperor.

After the death of Frederick II. in 1250 the Ghibellines looked for leadership to his son and successor, the German king, Conrad IV., and then to his natural son, Manfred, while the Guelphs called the French prince, Charles of Anjou, to their aid. But the combatants were nearing exhaustion, find after the execution of Conradin, the last of the Hohenstaufen, in 1268, this great struggle began to lose force and interest. Guelph a.nd Ghibelline were soon found representing local and family lather than papal and imperial interests; the names were taken with little or no regard for their original significance, and in the 15th century they began to die out of current politics. However, when Louis XII. of France conquered Milan at the beginning of the 16th century the old names were revived; the French king's supporters were called Guelphs and the friends of the emperor Maximilian I. were referred to as Ghibellines.

The feud of Guelph and Ghibelline penetrated within the walls of almost every city of northern Italy, and the contest between the parties, which practically makes the history of Florence during the 13th century, is specially noteworthy. First one side and then the other was driven into exile; the Guelph defeat at the battle of Monte Aperto in 1 260 was followed by the expulsion of the Ghibellines by Charles of Anjou in 1266, and on a smaller scale a similar story may be told of many other cities (see Florence).

The Guelph cause was buttressed by an idea, yet very nebulous, of Italian patriotism. Dislike of the German and the foreigner rather than any strong affection for the Papacy was the feeling which bound the Guelph to the

pope, and so enabled the latter to defy the arms of Frederick II. The Ghibelline cause, on the other hand, was aided by the dislike of the temporal power of the pope and the desire for a strong central authority. This made Dante a Ghibelline, but the hopes of this party, kindled anew by the journey of Henry VII. to Italy in 1310, were extinguished by his departure. J. A. Symonds thus de- scribes the constituents of the two parties: " The Guelph party meant the burghers of the consular Communes, the men of industry and commerce, the upholders of civil liberty, the friends of democratic expansion. The Ghibelline party in- cluded the naturalized nobles, the men of arms and idleness, the advocates of feudalism, the politicians who regarded constitu- tional progress with disfavour. That the banner of the church floated over the one camp, while the standard of the empire rallied to itself the hostile party, was a matterof comparatively superficial moment." In another passage the same writer thus describes the sharp and universal division between Guelph and .Ghibelline: " Ghibellines wore the feathers in their caps upon one side, Guelphs upon the other. Ghibellines cut fruit at table crosswise, Guelphs straight down . . . Ghibellines drank out of smooth and Guelphs out of chased goblets. Ghibellines wore white and Guelphs red roses." It is interesting to note that while Dante was a Ghibelline, Petrarch was a Guelph. See J. A. Symonds, The Renaissance in Italy, vol. i. (1875).

GUENEVERE (Lat. Guanhumara; Welsh, Gwenhwyfar; O. Eng. Gaynore), in Arthurian romance the wife of King Arthur. Geoffrey of Monmouth, who calls her Guanhumara, makes her a Roman lady, but the general tradition is that she was of Cornish birth and daughter to King Leodegrance. Wace, who, while translating Geoffrey, evidently knew, and used, popular tradition, combines these two, asserting that she was of Roman parentage on the mother's side, but cousin to Cador of Cornwall by whom she was brought up. The tradition relating to Guenevere is decidedly confused and demands further study. The Welsh triads know no fewer than three Gwenhwyfars; Giraldus Cambrensis, relating the discovery of the royal tombs at Glastonbury, speaks of the body found as that of Arthur's second wife; the prose Merlin gives Guenevere a bastard half-sister of the same name, who strongly resembles her; and the Lancelot relates how this lady, trading on the likeness, persuaded Arthur that she was the true daughter of Leodegrance, and the queen the bastard interloper. This episode of the false Guenevere is very perplexing.

To the majority of English readers Guenevere is best known in connexion with her liaison with Lancelot, a story which, in the hands of Malory and Tennyson, has assumed a form widely different from the original conception, and at once more pictur- esque and more convincing. In the French romances Lancelot is a late addition to the Arthurian cycle, his birth is not recorded till long after the marriage of Arthur and Guenevere,

and he is at least twenty years the junior of the queen. The relations between them are of the most conventional and courtly char- acter, and are entirely lacking in the genuine dramatic passion which marks the love story of Tristan and Iseult. The Lancelot- Guenevere romance took form and shape in the artificial atmo- sphere encouraged by such patronesses of literature as Eleanor of Aquitaine and her daughter Marie, Comtesse de Champagne (for whom Chretien de Troyes wrote his Chevalier de la Charrette), and reflects the low social morality of a time when love between husband and wife was declared impossible. But though Guene- vere has changed her lover, the tradition of her infidelity is of much earlier date and formed a part of the primitive Arthurian legend. Who the original lover was is doubtful; the Vita Gildae relates how she was carried off by Melwas, king of Aestiva Regis, to Glastonbury, whither Arthur, at the head of an army, pursued the ravisher. A fragment of a Welsh poem seems to confirm this tradition, which certainly lies at the root of her later abduction by Meleagaunt. In the Lanzelet of Ulrich von Zatzikhoven the abductor is Falerln. The story in these forms represents an other-world abduction. A curious fragment of Welsh dialogues, printed by Professor Rhys in his Studies on the Arthurian Legend, appears to represent Kay as the abductor, In the pseudo-Chronicles and the romances based upon them the abductor is Mordred, and in the chronicles there is no doubt that the lady was no unwilling victim. On the final defeat of Mordred she retires to a nunnery, takes the veil, and is no more heard of. Wace says emphatically —

Ne fu oie ne vine,

Ne fu trovte, ne siue

Por la vergogne del mesfait

Et del peeie qu ele avoitfait (11. 13627-30).

Layamon, who in his translation of Wace treats his original much as Wace treated Geoffrey, says that there was a tradition that she had drowned herself, and that her memory and that of Mordred were hateful in every land, so that none would offer prayer for their souls. On the other hand certain romances, e.g. the Perceval, give her an excellent character. The truth is probably that the tradition of his wife's adultery and treachery was a genuine part of the Arthurian story, which, neglected for a time, was brought again into prominence by the social con- ditions of the courts for which the later romances were com- posed ; and it is in this later and conventionalized form that the tale has become familiar to us (see also Lancelot).

See Studies on the Arthurian Legend by Professor Rhys; The Legend of Sir

Lancelot, Grimm Library, xii., Jessie L. Weston; Der Karrenritter, ed. Professor Foerster. (J. L. W.)

6UEN0N (from the French, = one who grimaces, hence an ape), the name applied by naturalists to the monkeys of the African genus Cercopithecus, the Ethiopian representative of the Asiatic macaques, from which they differ by the absence of a posterior heel to the last molar in the lower jaw.

GUlSRET, a town of central France, capital of the department of Creuse, situated on a mountain declivity 48 m. N.E. of Limoges on the Orleans railway. Pop. (1906), town, 6042; commune (including troops, &c), 8058. Apart from the Hotel desMonney- roux fused as prefecture), a picturesque mansion of the 15th and 1 6th centuries, with mansard roofs and mullioned windows, Gueret has little architectural interest. It is the seat of a prefect and a court of assizes, and has a tribunal of first instance, a chamber of commerce and lycees and training colleges, for both sexes. The industries include brewing, saw-milling, leather-making and the manufacture of basket-work and wooden shoes, and there is trade in agricultural produce and cattle. Gueret grew up round an abbey founded in the 7th century, and in later times became the capital- of the district of Marche.

GUEREZA, the native name of a long-tailed, black and white Abyssinian monkey, Colobus guereza (or C. abyssinicus), char- acterized by the white hairs forming a long pendent mantle. Other east African monkeys with a similar type of colouring, which, together with the wholly black west African C. satanas, collectively constitute the subgenus Guereza, may be included under the same title; and the name may be further extended to embrace all the African thumbless monkeys of the genus Colobus. These monkeys are the African representatives of the Indo-Malay langurs (Semnopitkecus) , with which they agree in their slender build, long limbs and tail, and complex stomachs, although differing by the rudimentary thumb. The members of the subgenus Guereza present a transition from a wholly black animal (C. satanas) to one (C. caudatus) in which the sides of the face are white, and the whole flanks, as well as the tail, clothed with a long fringe of pure white hairs.

GUERICKE, HEINRICH ERNST FERDINAND (1:803-1878), German theologian, was born at Wettin in Saxony on the 25th of February 1803 and studied theology at Halle, where he was appointed professor in 1829. He greatly disliked the union between the Lutheran and the Reformed

churches, which had been accomplished by the Prussian government in 1817, and in 1833 he definitely threw in his lot with the Old Lutherans. In 1 83 5 he lost his professorship, but he regained it in 1 840. Among his works were a Life of August Hermann Francke (1827, Eng. trans. 1837), Church History (1833, Eng. trans, by W. T. Shedd, New York, 1857-1863), Allgemeine christliche Symbolik (1839). In 1840 he helped to found the Zeitschrift fur die gesammte lutherische Theologie und Kirche, and he died at Halle on the 4th of February 1878.

GUERICKE, OTTO VON (1602-1686), German experimental philosopher, was born at Magdeburg, in Prussian Saxony, on the 20th of November 1602. Having studied law at Leipzig, Helmstadt and Jena, and mathematics, especially geometry and mechanics, at Leiden, he visited France and England, and in 1636 became engineer-in-chief at Erfurt. In 1627 he was elected alderman of Magdeburg, and in 1646 mayor of that city and a magistrate of Brandenburg. His leisure was devoted to scientific pursuits, especially in pneumatics. Incited by the discoveries of Galileo, Pascal and Torricelli, he attempted the creation of a vacuum. He began by experimenting with a pump on water placed in a barrel, but found that when the water was drawn off the air permeated the wood.- He then took a globe of copper fitted with pump and stopcock, and discovered that he could pump out air as well as water. Thus he became' the inventor of the air-pump (1650). He illustrated his discovery before the emperor Ferdinand III. at the imperial diet which assembled at Regensburg in 1654, by the experiment of the " Magdeburg hemispheres." Taking two hollow hemispheres of copper, the edges of which fitted nicely together, he exhausted the air from between them by means of his pump, and it is recorded that thirty horses, fifteen back to back, were unable

to pull them asunder until the air was readmitted. Besides investigating other phenomena connected with a vacuum, he constructed an electrical machine which depended on the excita- tion of a rotating ball of sulphur; and he made successful researches in astronomy, predicting the periodicity of the return of comets. In i68r he gave up office, and retired to Hamburg, where he died on the nth of May 1686.

His principal observations are given in his work, Experimenta nova, ut vocant, Magdeburgica de vacuo spatio (Amsterdam, 1672). He is also the author of a Geschichte der Belagerung und Eroberung von Magdeburg. See F. W. Hoffmann, Otto von Guericke (Magdeburg,

1874).

GUERIDON, a small table to hold a lamp or vase, supported by a tall column or a human or mythological figure. This piece of furniture, often

very graceful and elegant, originated in France towards the middle of the 17th century. In the beginning the table was supported by a negro or other exotic figure, and there is some reason to believe that it took its name from the generic appellation of the young African groom or " tiger," who was generally called " Gueridon," or as we should say in English " Sambo." The swarthy figure and brilliant costume of the " Moor " when reproduced in wood and picked out in colours produced a very striking effect, and when a small table was supported on the head by the upraised hands the idea of passive service was suggested with completeness. The gueridon is still occasionally seen in something approaching its original form; but it had.no sooner been introduced than the artistic instinct of the French designer and artificer converted it into a far worthier object. By the death of Louis XIV. there were several hundreds of them at Versailles, and within a generation or two they had taken an infinity of forms — columns, tripods, termini and mythological figures. Some of the simpler and more artistic forms were of wood carved with familiar decorative motives and gilded. Silver, enamel, and indeed almost any material from which furniture can be made, have been used for their con- struction. A variety of small " occasional " tables are now called in French gutridons.

GUERIN, JEAN BAPTISTE PAULIN (1783-1855), French painter, was born at Toulon, on the 25th of March 1783, of poor parents. He learnt, as a lad, his father's trade of a locksmith, whilst at the same time he followed the classes of the free school of art. Having sold some copies to a local amateur, Guerin started for Paris, where he came under the notice of Vincent, whose counsels were of material service. In 1810 Guerin made his first appearance at the Salon with some portraits, which had a certain success. In 1812 he exhibited " Cain after the murder of Abel " (formerly in Luxembourg), and, on the return of the Bourbons, was much employed in works of restoration and de- coration at Versailles. His " Dead Christ " (Cathedral, Baltimore) obtained a medal in 1817, and this success was followed up by a long series of works, of which the following are the more note- worthy: " Christ on the knees of the Virgin " (1819); " Anchises and Venus" (1822) (formerly in Luxembourg); "Ulysses and Minerva " (1824) (MuseedeRennes); " the Holy Family " (1829) (Cathedral, Toulon); and " Saint Catherine " (i838)(St Roch). In his treatment of subject, Guerin attempted to realize rococo graces of conception, the liveliness of which was lost in the strenuous effort to be correct. His chief successes were attained by portraits, and those of Charles Nodier and the Abbe Lamen- nais became widely popular. He died on the 19th of January

1855.

GUERIN, PIERRE NARCISSE, Baron (1774-1833), French painter, was born at Paris on the T3th of May 1774. Becoming a pupil of Jean Baptiste

Regnault, he carried off one of the three " grands prix " offered in 1796, in consequence of the competition not having taken place since 1793. The pension was not indeed re-established, but Guerin fulfilled at Paris the conditions imposed upon a pensionnaire, and produced various works, one of which brought him prominently before the public. This work, " Marcus Sextus " (Louvre), exhibited at the Salon of 1799, excited wild enthusiasm, partly due to the subject, — a victim of Sulla's proscription returning to Rome to find his wife dead and his house in mourning — in which an allusion was found to the actual

situation of the itnigris. Gu6rin on this occasion was publicly crowned by the president of the Institute, and before his departure for Rome (on the re-establishment of the Ecole under Suvee) a banquet was given to him by the most distinguished artists of Paris. In 1800, unable to remain in Rome on account of his health, he went to Naples, where he painted the " Grave of Amyntas." In 1802 Guerin produced "Phaedra and Hippolytus" (Louvre); in 1810, after his return to Paris, he again achieved a great success with " Andromache and Pyrrhus " (Louvre); and in the same year also exhibited " Cephalus and Aurora" (Collection Sommariva) and " Bonaparte and the Rebels of Cairo" (Versailles) . The Restoration brought to Guerin fresh honours; he had received from the first consul in 1803 the cross of the Legion of Honour, and in 181 5 Louis XVIII. named him Academician. The success of Guerin's " Hippolytus " of " Andromache," of " Phaedra " and of ' Clytaemnestra" (Louvre) had been ensured by the skilful selection of highly melodramatic situations, treated with the strained and pompous dignity proper to the art of the first empire; in " Aeneas relating to Dido the disasters of Troy" (Louvre), which appeared side by side with " Clytaemnestra " at the Salon of 181 7, the influence of the Restoration is plainly to be traced. In this work Guerin sought to captivate the public by an appeal to those sensuous charms which he had previously rejected, and by the introduction of picturesque elements of interest. But with this work Guerin's public successes came to a close. He was, indeed, commissioned to paint for the Madeleine a scene from the history of St Louis, but his health prevented him from accomplishing what he had begun, and in 1822 he accepted the post of director of the Ecole de Rome, which in 1816 he had refused. On returning to Paris in 1828, Guerin, who had pre- viously been made chevalier of the order of St Michel, was ennobled. He now attempted to complete " PyrrhusandPriam," a work which he had begun at Rome, but in vain; his health had finally broken down, and in the hope of improvement he returned to Italy with Horace Vernet. Shortly after his arrival at Rome Baron Guerin died, on the 6th of July 1833, and was*

buried in the church of La Trinita de' Monti by the side of Claude Lorraine.

A careful analysis and criticism of his principal works will be found in Meyer's Geschichte der franzosischen Malerei.

GUERIN DU CAYLA, GEORGES MAURICE DE (1810-1839), French poet, descended from a noble but poor family, was born at the chateau of Le Cayla in Languedoc, on the 4th of August 1810. He was educated for the church at a religious seminary at Toulouse, and then at the College Stanislas, Paris, after which he entered the society at La Chesnaye in Brittany, founded by Lamennais. It was only after great hesitation, and without being satisfied as to his religious vocation, that under the in- fluence of Lamennais he joined the new religious order in the autumn of 1832; and when, in September of the next year, Lamennais, who had come under the displeasure of Rome, severed connexion with the society, Maurice de Guerin soon followed his example. Early in the following year he went to Paris, where he was for a short time a teacher at the College Stanislas. In November 1838 he married a Creole lady of some fortune; but a few months afterwards he was attacked by consumption and died on the 19th of July 1839. In the Revue des deux mondes for May 15th, 1840, there appeared a notice of Maurice de Guerin by George Sand, to which she added two fragments of his writings — one a composition in prose entitled the Centaur, and the other a short poem. His Reliquiae (2 vols., 1861), including the Centaur, his journal, a number of his letters and several poems, was edited by G. S. Trebutien, and accom- panied with a biographical and critical notice by Sainte-Beuve; a new edition, with the title Journal, lettres et poemes, followed in 1862; and an English translation of it was published at New York in 1867. Though he was essentially a poet, his prose is more striking, and original than his poetry. Its peculiar and unique charm arises from his strong and absorbing passion for nature, a passion whose intensity reached almost to adoration and worship, but in which the pagan was more prominent than the moral element. According to Sainte-Beuve, "no French

poet or painter has rendered so well the feeling for nature — the feeling not so much for details as for the ensemble and the divine universality, the feeling for the origin of things and the sovereign principle of life."

The name of Eugenie de Guerin (1805-1848), the sister of Maurice, cannot be omitted from any notice of him. Her Journals (1861, Eng. trans., 1865) and her Lettres (1864, Eng. trans., 1865) indicated the possession of gifts of as rare an order as those of her brother, though of a somewhat different kind. In her case mysticism assumed a form more strictly religious, and she continued to mourn her brother's loss of his early Catholic faith. Five years older than he, she cherished a love for him which was blended with a

somewhat motherly anxiety. After his death she began the collection and publication of the scattered fragments of his writings. She died, however, on the 31st of May 1848, before her task was completed.

See the notices by George Sand and Sainte-Beuve referred to above; Sainte-Beuve, Causeries du lundi (vol. xii.) and Nouveaux Lundis (vol. iii.) ; G. Merlet, Causeries sur les femmes et les limes (Paris, 1865); Selden, L'Esprit des femmes de notre temps (Paris, 1864); Marelle, Eugenie et Maurice de Guerin (Berlin, 1869); Harriet Parr, M. and E. de Guerin, a monograph (London, 1870); and Matthew Arnold's essays on Maurice and Eug6nie de Guerin, in his Essays in Criticism.

GUERNIERI, or Werner, a celebrated mercenary captain who lived about the middle of the 14th century. He was a member of the family of the dukes of Urslingen, and probably a de- scendant of the dukes of Spoleto. From 1340 to 1343 he was in the service of the citizens of Pisa, but afterwards he col- lected a troop of adventurers which he called the Great Company, and with which he plundered Tuscany and Lombard}'. He then entered the service of Louis I. the Great, king of Hungary and Poland, whom he assisted to obtain possession of Naples; but when dismissed from this service his ravages became more terrible than ever, culminating in the dreadful sack of Anagni in 1358, shortly after which Guernieri disappeared from history. He is said to have worn a breastplate with the inscription, " The enemy of God, of pity and of mercy."

GUERNSEY (Fr. Guernesey), one of the Channel Islands, belonging to Britain, the second in size and westernmost of the important members of the group. Its chief town, St Peter Port, on the east coast, is in 2° 33′ W., 49 27′ N., 74 m. S. of Portland Bill on the English coast, and 30 m. from the nearest French coast to the east. The island, roughly triangular in form, is 9% m. long from N.E. to S.W. and has an extreme breadth of 5j m. and an area of 15,691 acres or 24-5 sq. m. Pop. (1901), 40,446, the density being thus 162 per sq. m.

The surface of the island rises gradually from north to south, and reaches its greatest elevation at Haut Nez (349 ft.) above Point Icart on the south coast. The coast scenery, which forms one of the principal attractions to the numerous summer visitors to the island, is finest on the south. This coast, between Jerbourg and Pleinmont Points, respectively at the south-eastern and south-western corners of the island, is bold, rocky and indented with many exquisite little bays. Of these the most notable are Moulin Huet, Saint's, and Petit Bot, all in the eastern half of the south coast. The cliffs, however, culminate in the neigh- bourhood of Pleinmont. Picturesque caves occur at several points, such as the Creux Mahie. On the west coast there is a succession of larger bays — Rocquaine Perelle, Vazon, and Cobo. Off the

first lies Lihou Island, the Hanois and other islets, and all three bays are sown with rocks. The coast,' however, diminishes in height, until at the north-eastern extremity of the island the land is so low across the Vale or Braye du Val, from shore to shore, that the projection of L'Ancresse is within a few feet of being isolated. The east coast, on which, besides the town and harbour of St Peter Port, is that of St Sampson, pre- sents no physical feature of note. The interior of the island is generally undulating, and gains in beauty from its rich vegeta- tion. Picturesque glens descend upon some of the southern bays (the two converging upon Petit Bot are notable), and the high-banked paths, arched with foliage, which follow the smalj

rills down to Moulin Huet Bay, are much admired under the name of water-lanes.

The soil is generally light sandy loam, overlying an angular gravel which rests upon the weathered granite. This soil requires much manure, and a large proportion of the total area (about three-fifths) is under careful cultivation, producing a considerable amount of grain, but more famous for market- gardening. Vegetables and potatoes are exported, with much fruit, including grapes and flowers. Granite is quarried and exported from St Sampson, and the fisheries form an important industry.

For administrative purposes Guernsey is united with Alderney, Sark, Herm and the adjacent islets to form the bailiwick of Guernsey, separate from Jersey. The peculiar constitution, machinery of administration and justice, finance, &c, are con- sidered under the heading Channel Islands. Guernsey is divided into the ten parishes of St Peter Port, St Sampson, Vale, Catel, St Saviour, St Andrew, St Martin, Forest, St Peter du Bois and Torteval. The population of St Peter Port in 1901 was 18,264; of the other parishes that of St Sampson was 5614 and that of Vale 5082. The population of the bailiwick of Guernsey nearly doubled between 1821 and 1901, and that of the island increased from 35,243 in 1891 to 40,446 in 1901. The island roads are excellent, Guernsey owing much in this respect to Sir John Doyle (d. 1834), the governor whose monu- ment stands on the promontory of Jerbourg. Like Jersey and the neighbouring part of France, Guernsey retains considerable traces of early habitation in cromlechs and menhirs, of which the most notable is the cromlech in the north at L'Ancresse. As regards ecclesiastical architecture, all the parish churches retain some archaeological interest. There is good Norman work in the church of St Michael, Vale, and the church of St Peter Port is a notable building of

various periods from the early 14th century. Small remains of monastic buildings are seen at Vale and on Lihou Island.

GUERRAZZI, FRANCESCO DOMENICO (1804-1873), Italian publicist, born at Leghorn, was educated for the law at Pisa, and began to practise in his native place. But he soon took to politics and literature, under the influence of Byron, and his novel, the Battagli di Benevento(i82j), brought him into notice. Mazzini made his acquaintance, and with Carlo Bini they started a paper, the Indicatore, at Leghorn in 1829, which was quickly suppressed. Guerrazzi himself had to endure several terms of imprisonment for his activity in the cause of Young Italy, and it was in Portoferrato in 1834 that he wrote his most famous novel Assidio di Firenze. He was the most powerful Liberal leader at Leghorn, and in 1848 became a minister, with some idea of exercising a moderating influence in the difficulties with the grand-duke of Tuscany. In 1849, when the latter fled, he was first one of the triumvirate with Mazzini and Montanelli, and then dictator, but on the restoration he was arrested and imprisoned for three years. His Apologia was published in 1852. Released from prison, he was exiled to Corsica, but subsequently was restored and was for some time a deputy at Turin (1862-1870), dying of apoplexy at Leghorn on the 25th of September 1873. He wrote a number of other works besides the novels already mentioned, notably Isabella Orsini (1845) and Beatrice Cenci (1854), and his Opere were collected at Milan (1868).

See the Life and Works by Bosio (1877), and Carducci's edition of his letters (1880).

GUERRERO, a Pacific coast state of Mexico, bounded N.W. by Michoacan, N. by Mexico (state) and Morelos, N.E. and E. by Puebla and Oaxaca, and S. and W. by the Pacific. Area, 24,996 sq. rri. Pop., largely composed of Indians and mestizos (1895), 417,886; (1900) 479,205. The state is roughly broken ' by the Sierra Madre and its spurs, which cover its entire surface with the exception of the low coastal plain (averaging about 20 m. in width) on the Pacific. The valleys are usually narrow, fertile and heavily forested, but difficult of access. The state is divided into two distinct zones — the tierras calientes of the coast and lower river courses where tropical conditions prevail,

and the tierras templadas of the mountain region where the conditions are subtropical. The latter is celebrated for its agreeable and healthy climate, and for the variety and character of its products. The principal river of the state is the Rio de las Balsas or Mescala, which, having its source in Tlaxcala, flows entirely across the state from W. to E., and then southward to the Pacific on the frontier of Michoacan. This river is 429 m. long and receives many affluents from the mountainous region through which it

passes, but its course is very precipitous and its mouth obstructed by sand bars. The agricultural products include cotton, coffee, tobacco and cereals, and the forests produce rubber, vanilla and various textile fibres. Mining is undeveloped, although the mineral resources of the state include silver, gold, mercury, lead, iron, coal, sulphur and precious stones. The capital, Chilpancingo, or Chilpancingo de los Bravos (pop. 7497 in 1900), is a small town in the Sierra Madre about no m. from the coast and 200 m. S. of the Federal capital. It is a healthy well-built town on the old Acapulco road, is lighted by electricity and is temporarily the western terminus of the Interoceanic railway from Vera Cruz. It is celebrated in the history of Mexico as the meeting-place of the revolutionary congress of 1813, which issued a declaration of independence. Chilpancingo was badly damaged by an earthquake in January 1902, and again on the 16th of April 1907. Other important towns of the state are Tixtla, or Tixtla de Guerrero, formerly the capital (pop. 6316 in 1900), 3 m. N.E. of Chilpancingo; Chilapa (8256 in 1895), the most populous town of the state, partially destroyed by a hurricane in 1889, and again by the earthquake of 1907; Iguala (6631 in 1895); and Acapulco. Guerrero was organized as a state in 1849, its territory being taken from the states of Mexico, Michoacan and Puebla.

GUERRILLA (erroneously written " guerilla," being the diminutive of the Span, guerra, war), a term currently used to denote war carried on by bands in any irregular and unorganized manner. At the Hague Conference of 1899 the position of irregular combatants was one of the subjects dealt with, and the rules there adopted were reaffirmed at the Conference of 1907. They provide that irregular bands in order to enjoy recognition as belligerent forces shall (a) have at their head a person responsible for bis subordinates, (b) wear some fixed distinctive badge recognizable at a distance, (c) carry arms openly, and (d) conform in their operations to the laws and customs of war. The rules, however, also provide that in case of invasion the inhabitants of a territory who on the approach of the invading enemy spontaneously take up arms to resist it, shall be regarded as belligerent troops if they carry arms openly and respect the laws and customs of war, although they may not have had time to become organized in accordance with the above provisions. These rules were borrowed almost word for word from the project drawn up at the Brussels international conference of 1874, which, though never ratified, was practically incorporated in the army regulations issued by the Russian government in connexion with the war of 1877-78. (T. Ba.)

GUERRINI, OLINDO (1845-), Italian poet, was born at Sant' Alberto, Ravenna, and after studying law took to a life of letters, becoming eventually librarian at Bologna Univer- sity. In 1877 he published Postuma, a volume of canzoniere, under the name of Lorenzo Stechetti,

following this with Polemica (1878), Canti popolari romagnoli (1880) and other poetical works, and becoming known as the leader of the " verist " school among Italian lyrical writers.

GUESDE, JULES BASILE (1845-), French socialist, was born in Paris on the nth of November 1845. He had begun his career as a clerk in the French Home Office, but at the outbreak of the Franco-German War he was editing Les Droits de I'homme at Montpellier, and had to take refuge at Geneva in 1871 from a prosecution instituted on account of articles which had appeared in his paper in defence of the Commune. In 1876 he returned to France to become one of the chief French apostles of Marxian collectivism, and was imprisoned for six months in 1878 for taking part in the first Parisian International Congress. He edited at different times

Les Droits de I'homme, Le Cri du peuple, Le Socialiste, but his best-known organ was the weekly Egalile. He had been in close association with Paul Laf argue, and through him with Karl Marx, whose daughter he married. It was in conjunction with Marx and Lafargue that he drew up the programme accepted by the national congress of the Labour party at Havre in 1880, which laid stress on the formation of an international labour party working by revolutionary methods. Next year at the Reims congress the orthodox Marxian programme of Guesde was opposed by the " possibilists," who rejected the intransigeant attitude of Guesde for the opportunist policy of Benoit Malon. At the congress of St-Etienne the difference developed into separation, those who refused all compromise with a capitalist government following Guesde, while the opportunists formed several groups. Guesde took his full share in the consequent discussion between the Guesdists, the Blanquists, the possibilists, &c. In 1893 he was returned to the Chamber of Deputies for Lille (7th circonscription) with alarge majority over the Christian Socialist and Radical candidates. He brought forward various proposals in social legislation forming the programme of the Labour party, without reference to the divisions among the Socialists, and on the 20th of November 1894 succeeded in raising a two days' discussion of the collectivist principle in the Chamber. In 1902 he was not re-elected, but resumed his seat in 1906. In 1903 there was a formal reconciliation at the Reims congress of the sections of the party, which then took the name of the Socialist party of France. Guesde, nevertheless, continued to oppose the opportunist policy of Jaures, whom he denounced for supporting one bourgeois party against another. His defence of the principle of freedom of association led him, incongruously enough, to support the religious Congregations against fimile

Combes. Besides his numerous political and socialist pamphlets he published in 1901 two volumes of his speeches in the Chamber of Deputies entitled Quatre ans de lutte de classe 18Q3-18Q8.

GUEST, EDWIN (1800-1880), English antiquary, was born in 1800. He was educated at King Edward's school, Birmingham, and at Caius College, Cambridge, where he graduated as eleventh wrangler, subsequently becoming a fellow of his college. Called to the bar in 1828, he devoted himself, after some years of legal practice, to antiquarian and literary research. In 1838 he published his exhaustive History of English Rhythms. He also wrote a very large number of papers on Roman-British history, which, together with a mass of fresh material for a history of early Britain, were published posthumously under the editorship of Dr Stubbs under the title Origines Celticae (1883). In 1852 Guest was elected master of Caius College, becoming LL.D. in the following year, and in 1854-1855 he was vice-chancellor of Cambridge University. Guest was a fellow of the Royal Society, and an honorary member of the Society of Antiquaries. He died on the 23rd of November 1880.

GUEST (a word common to Teutonic languages; cf. Ger. Gast, and Swed. gdst; cognate with Lat. hostis, originally a stranger, hence enemy; cf. " host "), one who receives hos- pitality in the house of another, his " host "; hence applied to a parasite.

GUETTARD, JEAN ETIENNE (1715-1786), French naturalist and mineralogist, was born at Etampes,on the 2 2nd of September 1 7 15. In boyhood he gained a knowledge of plants from his grandfather, who was an apothecary, and later he qualified as a doctor in medicine. Pursuing the study of botany in various parts of France and other countries, he began to take notice of the relation between the distribution of plants and the soils and subsoils. In this way his attention came to be directed to minerals and rocks. In 1746 he communicated to the Academy of Sciences in Paris a memoir on the distribution of minerals and" rocks, and this was accompanied by a map on which he had recorded his observations. He thus, as remarked by W. D. Conybeare, ' first carried into execution the idea, proposed by [Martin] Lister years before, of geological maps." In the course of his journeys he made a large collection of fossils and figured many of them, but he had no clear ideas about the sequence of strata. He made observations also on the degradation of XII. 22

mountains by rain, rivers and sea; and he was the first to ascertain the existence of former volcanoes in the district of Auvergne. He died in Paris on the 7th of January 1786.

His publications include: Observations sur les plantes (2 vols., 1747);

Histoire de la decouverte faite en France de matieres sem- blables a celles dont la porcelaine de la Chine est composee (1765); Memoires sur differentes parties des sciences et arts (5 vols., 1768- 1783); Memoire sur la mineralogie du Dauphine (2 vols., 1779). See The Founders of Geology, by Sir A. Geikie (1897).

GUEUX, LES, or " The Beggars," a name assumed by the confederacy of nobles and other malcontents, who in 1566 opposed Spanish tyranny in the Netherlands. The leaders of the nobles, who signed a solemn league known as " the Com- promise," by which they bound themselves to assist in defending the rights and liberties of the Netherlands against the civil and religious despotism of Philip II., were Louis, count of Nassau, and Henry, count of Brederode. On the 5th of April 1566 permission was obtained for the confederates to present a petition of grievances, called " the Request," to the regent, Margaret, duchess of Parma. About 250 nobles marched to the palace accompanied by Louis of Nassau and Brederode. The regent was at first alarmed at the appearance of so large a body, but one of her councillors, Berlaymont by name, was heard to exclaim, " What, madam, is your highness afraid of these beggars (ces gueux)?" The appellation was not forgotten. At a great feast held by some 300 confederates at the Hotel Culem- burg three days later, Brederode in a speech declared that if need be they were all ready to become " beggars " in their country's cause. The words caught on, and the hall resounded with loud cries of " Vivent les gueux!" The name became henceforward a party appellation. The patriot party adopted the emblems of beggarhood, the wallet and the bowl, as trinkets to be worn on their hats or their girdles, and a medal was struck having on one side the head of Philip II., on the other two clasped hands with the motto " Fidele au roy, jusques d porter la besace." The original league of " Beggars " was short-lived, crushed by the iron hand of Alva, but its principles survived and were to be ultimately triumphant.

In the year 1569 the prince of Orange, who had now openly placed himself at the head of the party of revolt, granted letters of marque to a number of vessels manned by crews of desperadoes drawn from all nationalities. These fierce corsairs under the command of a succession of daring and reckless leaders — the best-known of whom is William de la Marck, lord of Lumey — were called " Gueux de mer," or " Sea Beggars." At first they were content with plundering both by sea and land and carrying their booty to the English ports where they were able to refit and replenish their stores. This went on till 1572, when Queen Elizabeth suddenly refused to admit them to her harbours. Having no longer any refuge, the Sea Beggars in desperation made an attack upon Brill, which they seized by surprise in the absence of the Spanish garrison on the 1st of April 1572. En- couraged by their unhoped-for success, they now sailed to Flushing, which was also taken by a coup de main. The capture of these two towns gave the signal

for a general revolt of the northern Netherlands, and is regarded as the real beginning of the War of Dutch Independence.

GUEVARA, ANTONIO DE (c. 1490-1544), Spanish chronicler and moralist, was a native of the province of Alava, and passed some of his earlier years at the court of Isabella, queen of Castile. In 1528 he entered the Franciscan order, and afterwards accom- panied the emperor Charles V. during his journeys to Italy and other parts of Europe. After having held successively the offices of court preacher, court historiographer, bishop of Guadix and bishop of Mondoiiedo, he died in 1544. His earliest work, entitled Reloj de principes, published at Valladolid in 1529, and, according to its author, the fruit of eleven years' labour, is a didactic novel, designed, after the manner of Xenophon's Cyro- paedia, to delineate, in a somewhat ideal way for the benefit of modern sovereigns, the life and character of an ancient prince, Marcus Aurelius, distinguished for wisdom and virtue. It was often reprinted in Spanish; and before the close of the century had also been translated into Latin, Italian, French and English,

an English translation being by J. Bourchier (London, 1546) and another being by T. North. It is difficult now to account for its extraordinary popularity, its thought being neither just nor profound, while its style is stiff and affected. It gave rise to a literary controversy, however, of great bitterness and violence, the author having ventured without warrant to claim for it an historical character, appealing to an imaginary " manuscript in Florence." Other works of Guevara are the Decada de los Cesares (Valladolid, 1539), or "Lives of the Ten Roman Emperors," in imitation of the manner of Plutarch and Suetonius; and the Epistolas familiares (Valladolid, 1539-1545), sometimes called " The Golden Letters," often printed in Spain, and translated into all the principal languages of Europe. They are in reality a collection of stiff and formal essays which have long ago fallen into merited oblivion. Guevara, whose influence upon the Spanish prose of the 16th century was considerable, also wrote Libro de los inventores del arte de marear (Valladolid, 1539, and Madrid, 1895).

GUEVARA, LUIS VELEZ DE (1 579-1644), Spanish dramatist and novelist, was born at Ecija on the 1st of August 1579. After graduating as a sizar at the university of Osuna in 1596, he joined the household of Rodrigo de Castro, cardinal-arch- bishop of Seville, and celebrated the marriage of Philip II. in a poem signed " Velez de Santander," a name which he con- tinued to use till some years later. He appears to have served as a soldier in Italy and Algiers, returning to Spain in 1602 when he

entered the service of the count de Saldana, and dedicated himself to writing for the stage. He died at Madrid on the 10th of November 1644. He was the author of over four hundred plays, of which the best are Reinar despues de morir, Mas pesa el rey que la sangre, La Luna de la Sierra and El Diablo estd en Canlillana; but he is most widely known as the author of El Diablo cojuelo (1641), a fantastic novel which suggested to Le Sage the idea of his Diable boiteux.

GUGLIELMI, PIETRO (1727-1804), Italian composer, was born at Massa Carrara in May 1727, and died in Rome on the 19th of November 1804. He received his first musical education from his father, and afterwards studied under Durante at the Conservatorio di Santa Maria di Loreto at Naples. His first operatic work, produced at Turin in 1755, established his reputation, and soon his fame spread beyond the limits of his own country, so that in 1762 he was called to Dresden to con- duct the opera there. He remained for some years in Germany, where his works met with much success, but the greatest triumphs were reserved for him in England. He went to London, ac- cording to Burney, in 1768, but according to Florimo in 1772, returning to Naples in 1777. He still continued to produce operas at an astounding rate, but was unable to compete suc- cessfully with the younger masters of the day. In 1793 he became maestro di cappella at St Peter's, Rome. He was a very prolific composer of Italian comic opera, and there is in most of his scores a vein of humour and natural gaiety not surpassed by Cimarosa himself. In serious opera he was less successful. But here also he shows at least the qualities of a competent musician. Considering the enormous number of his works, his unequal workmanship and the frequent instances of mechanical and slip-shod writing in his music need not surprise us. The following are among the most celebrated of his operas: I Due Gemelli, La Serva inamorata, La Pastor ella nobile, La. Bella Pec- catrice, Rinaldo, Artaserse, Didone and Enea e Lavinia. He also wrote oratorios and miscellaneous pieces of orchestral and chamber music. Of his eight sons two at least acquired fame as musicians — Pietro Carlo (1763-1827), a successful imitator of his father's operatic style, and Giacomo, an excellent singer. GUIANA {Guyana, Guayana 1), the general name given in its

, ' The origin of the name is somewhat obscure, and has been variously interpreted. But the late Col. G. E. Church supplies the following note, which has the weight of his great authority: " I cannot confirm the suggestion of Schomburgk that Guayana ' re- ceived its name from a small river, a tributary of the Orinoco', supposed to be the Waini or Guainia. In South America, east of the Andes, it' was the common custom of any tribe occupying a length of river to call it simply ' the river ' ; but the other tribes

widest acceptation to the part of South America lying to the north-east

from 8° 40′ N. to 3 30′ S. and from 50 W. to 68° 30′ W. Its greatest length, from Cabo do Norte to the confluence of the Rio Xie and Rio Negro, is about 1250 m., its greatest breadth, from Barima Point in the mouth of the Orinoco to the confluence of the Rio Negro and Amazon, 800 m. Its area is roughly 690,000 sq. m. Comprised in this vast territory are Venezuelan (formerly Spanish) Guiana, lying on both sides of the Orinoco and extending S. and S.W. to the Rio Negro and Brazilian settlements; British Guiana, extending from Venez- uela to the left bank of the Corentyn river; Dutch Guiana

designated any section of it by the name of the people living on its banks. Many streams, therefore, had more than a dozen names. It is probable that no important river had one name alone through- out its course, prior to the time of the Conquest. The radical mini, waini, wayni, is found as a prefix, and very frequently as a termina- tion, to the names of numerous rivers, not only throughout Guayana but all over the Orinoco and Amazon valleys. For instance, Paymary Indians called the portion of the Purvis river which they occupied the Waini. It simply means water, or a fountain of water, or a river. The alternative suggestion that Guayana is an Indian word signify- ing ‘ wild coast,’ I also think untenable. This term, applied to the north-east frontage of South America between the Orinoco and the Amazon, is found on the old Dutch map of Hartsinck, who calls it ‘ Guiana Caribania of de Wilde Kust,’ a name which must have well described it when, in 1580, some Zealanders, of the Netherlands, sent a ship to cruise along it, from the mouth of the Amazon to that of the Orinoco, and formed the first settlement near the river Pomeroon. The map of Plrnao Vaz Dourado, 1564, calls the northern part of South America, including the present British Guiana, ‘ East Peru.’ An anonymous Spanish map, about 1566, gives Guayana as lying on the east side of the Orinoco just above its mouth. About 1660, Sebastien de Ruesta, cosmographer of the Casa de Contractacion de Seville, shows Guayana covering the British, French and Dutch Guayanas. According to the map of Nicolas de Fer, 1719, a tribe of Guayazis (Guyanas) occupied the south side of the Amazon river, front of the island of Tupinambara, east of the mouth of the Madeira. Aristides Rojas, an eminent Venezuelan scholar, says that the Mariches Indians, near Caracas, inhabited a site called Guayana long before the discovery of South America by the Spaniards. Coudreau in his Chez nos Indiens mentions that the Roucouyennes of Guayana take their name from a large tree in their forests, ‘ which appears to be the origin of the name Guayane.’ According to Michelana y Rojas, in their report to the Venezuelan government on their voyages in the basin of the Orinoco, ‘ Guyana derives its name from the Indians who live between the Caroni river and the Sierra de Imataca, called Guayanos.’ My own studies of aboriginal South America lead me to support the statement of Michelana y Rojas, but with the

following enlargement of it: The Portuguese, in the early part of the 16th century, found that the coast and mountain district of Rio de Janeiro, between Cape Sao Thome and Angra dos Reis, belonged to the formidable Tamoyos. South of these, for a distance of about 300 m. of the ocean slope of the coast range, were the Guayana tribes, called by the early writers Guiands, Goyand, Guayana, Goand and, plural, Goayndzes, Goayandzes and Guayandzes. _ They were constantly at feud with the Tamoyos and with their neighbours on the south, the Carijos, as well as with the vast Tapuya hordes of the Sertao of the interior. Long before the discovery, they had been forced to abandon their beautiful lands, but had recuperated their strength, returned and reconquered their ancient habitat. Meanwhile, however, many of them had migrated northward, some had settled in the Sertao back of Bahia and Pernambuco, others on the middle Amazon and in the valley of the Orinoco, but a large number had crossed the lower Amazon and occupied an extensive area of country to the north of it, about the size of Belgium, along the Tumuchumac range of highlands, and the upper Paron and Maroni rivers, as well as a large district on the northern slope of the above-named range. In their new home they became known as Roucouyennes, because, like the Mundurucus of the middle Amazon, they rubbed and painted themselves with roucou or urucu (Bixa Orellana) ; but other surrounding tribes called them Ouayanas, that is Guayanas — the Gua, so common to the Guarani-Tupi tongue, having become corrupted into Oua. Porto Seguro says of the so-called Tupis, ‘ at other times they gave themselves the name of Guayd or Guayana, which probably means ” brothers,” from which comes puayazes and ■ Guayanazes. . . . The latter occupied the country just south of Rio de Janeiro. . . . The masters of the Capitania of St Vincente called themselves Guianas.’ Guinila, referring to north-eastern South America (1745), speaks of five missions being formed to civilize the ‘ Nacion Guayana.’ In view of the above, it may be thought reasonable to assume that the vast territory now known as Guayana (British, Dutch, French, Brazilian and Venezuelan) derives its name from its aborigines who were found there at the time of the discovery, and whose original home was the region I have indicated.”

(or Surinam), from the Corentyn to the Maroni river; French Guiana (or Cayenne), from the Maroni to the Oyapock river; 1 Brazilian (formerly Portuguese) Guiana, extending from the southern boundaries of French, Dutch, British and part of Venezuelan Guiana, to the Amazon and the Negro. Of these divisions the first and last are now included in Venezuela

and Brazil respectively; British, Dutch and French Guiana are described in order below, and are alone considered here.

In their physical geography the three Guianas present certain common characteristics. In each the principal features are the rivers and their branch streams. In each colony the northern portion consists of a fluviomarine deposit extending inland and gradually rising to a height of 10 to 15 ft. above the sea. This alluvial plain varies in width from 50 m. to 18 m. and is traversed by ridges of sand and shells, roughly parallel to what is now the coast, indicating the trend of former shore lines. By the draining and diking of these lands the plantations have been formed along the coast and up the rivers. These low lands are attached to a somewhat higher plateau, which towards the coast is traversed by numerous huge sand-dunes and inland by ranges of hills rising in places to as much as 2000 ft. The greater part of this belt of country, in which the auriferous districts principally occur, is covered with a dense growth of jungle and high forest, but savannahs, growing only a long wiry grass and poor shrubs, intrude here and there, being in the S.E. much nearer to the coast than in the N.W. The hinterlands consist of undulating open savannahs rising into hills and mountains, some grass-covered, some in dense forest.

Geology 2 . — Guiana is formed almost entirely of gneiss and crystal-

1 This is the boundary generally accepted ; but it is in dispute.

1 See C. B. Brown and J. G. Sawkins, Reports on the Physical, Descriptive and Economic Geology of British Guiana (London, 1875) ; C. Velain, " Esquisse geologique de la Guyane francaise et des

Emery Walker tfr

line schists penetrated by numerous dikes of diorite, diabase, &c. The gold of the placer deposits appears to be derived, not from quartz reefs, but from the schists and intrusive rocks, the selvages of the diabase dikes sometimes containing as much as 5 oz. of gold to the ton. In British Guiana a series of conglomerates, red and white sandstone and red shale, rests upon the gneiss and forms the remarkable table-topped mountains Roraima, Kukenaam, &c. The beds are horizontal, and according to Brown and Sawkins, three layers of greenstone, partly intrusive and partly contemporaneous, are interstratified with the sedimentary deposits. The age of these beds is uncertain, but they evidently correspond with the similar series which occurs in Brazil, partly Palaeozoic and partly Cretaceous. In Dutch Guiana there are a few small patches supposed to belong to the Cretaceous period. Along the coast, and in the lower parts of the river valleys, are deposits which are mainly Quaternary but may also include beds of

Tertiary age.

History. — The coast of Guiana was sighted by Columbus in 1498 when he discovered the island of Trinidad and the peninsula of Paria, and in the following year by Alonzo de Ojeda and Amerigo Vespucci; and in r5oo Vincente Yaflez Pinzon ventured south of the equator, and sailing north-west along the coast discovered the Amazon; he is believed to have also entered some of the other rivers of Guiana, one of which, now called Oyapock, is marked on early maps as Rio Pinzon. Little, however, was known of Guiana until the fame of the fabled golden city Manoa or El Dorado tempted adventurers to explore its rivers and forests. From letters of these explorers found in

bassins du Parou et du Yari (affluents de l'Amazone) d'apres les explorations du Dr Crevaux," Bull. Soc. Geogr. ser. 7, vol. vi. (Paris, 1885), pp. 453-492 (with geological map) ; E. Martin, Geo- logische Studien ilber Niederldndisch-West-Indien, auf Grund eigener Untersuchungsreisen (Leiden, 1888); W. Bergt, " Zur Geologie des Coppename- und Nickerietales in Surinam (Hollandisch- Guyana)," Samml. d. Geol. Reichsmus. (Leiden), ser. 2, Bd. ii. Heft 2, pp. 93-163 (with 3 maps) ; and for British Guiana, the official reports on the geology of various districts, by J. B. Harrison, C. W. Anderson, H. I. Perkins, published at Georgetown.

captured ships, Sir Walter Raleigh was induced to ascend the Orinoco in search of El Dorado in 1595, to send Lawrence Keymis on the same quest in the following year, and in 161 7 to try once again, with the same intrepid lieutenant, an ex- pedition fraught with disaster for both of them. As early as 1580 the Dutch had established a systematic trade with the Spanish main, but so far as is known their first voyage to Guiana was in 1598. By 1613 they had three or four settlements on the coast of Demerara and Essequibo, and in about 1616 some Zeelanders settled on a small island, called by them Kyk ober al (" see over all "), in the confluence of the Cuyuni and Mazaruni rivers. While the Dutch traders were struggling for a footing in Essequibo and Demerara, English and French traders were endeavouring to form settlements on the Oyapock river, in Cayenne and in Surinam, and by 1652 the English had large interests in the latter and the French in Cayenne. In 1663 Charles II. issued letters patent to Lord Willoughby of Parham and Lawrence Hyde, second son of the earl of Clarendon, grant- ing them the district between the Copenam and Maroni rivers, a province described as extending from E. to

W. some 120 m. This colony was, however, formally ceded to the Netherlands in 1667 by the peace of Breda, Great Britain taking possession of New York. Meanwhile the Dutch West India Company, formed in 162 1, had taken possession of Essequibo, over which colony it exercised sovereign rights until 1791. In 1624 a Dutch settlement was effected in the Berbice river, and from this grew Berbice, for a long time a separate and independent colony. In 1657 the Zeelanders firmly established themselves in the Pomeroon, Monica and Demerara rivers, and by 1674 the Dutch were colonizing all the territory now known as British and Dutch Guiana. The New Dutch West Indian Company, founded in that year to replace the older company which had failed, received Guiana by charter from the states-general in 1682. In the following year the company sold one-third of their territory to the city of Amsterdam, and another third to Cornelis van Aerssens, lord of Sommelsdijk. The new owners and the company incorporated themselves as the Chartered Society of Surinam, and Sommelsdijk agreed to fill the post of governor of the colony at his own expense. The lucrative trade in slaves was retained by the West Indian Company, but the society could import them on its own account by paying a fine to the company. Sommelsdijk's rule was wise and energetic. He repressed and pacified the Indian tribes, erected forts and disciplined the soldiery, constructed the canal which bears his name, established a high court of justice and introduced the valuable cultivation of the cocoa-nut. But on the 17th of June 1688 he was massacred in a mutiny of the soldiers. The " third " which Sommelsdijk possessed was offered by his widow to William III. of England, but it was ultimately purchased by the city of Amsterdam for 700,000 fl. The settlements in Essequibo progressed somewhat slowly, and it was not until immigration was attracted in 1740 by offers to newcomers of free land and im- munity for a decade from taxation that anything like a colony could be said to exist there. In 1732 Berbice placed itself under the protection of the states-general of Holland and was granted a constitution, and in 1773 Demerara, till then a dependency of Essequibo, was constituted as a separate colony. In 1781 the three colonies, Demerara, Essequibo and Berbice, were captured by British privateers, and were placed by Rodney under the governor of Barbados, but in 1782 they were taken by France, then an ally of the Netherlands, and retained until the peace of 1783, when they were restored to Holland. In 1784 Essequibo and Demerara were placed under one governor, and Georgetown — then called Stabroek — was fixed on as the seat of government. The next decade saw a series of struggles between the colonies; and the Dutch West India company, which ended in the company ■ being wound up and in the three colonies being governed directly by the states-general. In 1796 the British again took possession, and retained the three colonies until the peace of Amiens in 1802, when they were once again restored to Holland, only to be recaptured by Great

Britain in 1803, in which year the history proper of British Guiana began.

I. British Guiana, the only British possession in S. America, was formally ceded in 1814-1815. The three colonies were in 1 83 1 consolidated into one colony divided into three counties, Berbice extending from the Corentyn river aalaJa, to the Abary creek, Demerara from the Abary to the Boerasirie creek, Essequibo from the Boerasirie to the Venez- uelan frontier. This boundary-line between British Guiana and Venezuela was for many years the subject of dispute. The Dutch, while British Guiana was in their possession, claimed the whole watershed of the Essequibo river, while the Venezuelans asserted that the Spanish province of Guayana had extended up to the left bank of the Essequibo. In 1840 Sir Robert Schomburgk had suggested a demarcation, afterwards known as the " Schomburgk line "; and subsequently, though no agreement was arrived at, certain modifications were made in this British claim. In 1886 the government of Great Britain declared that it would thenceforward exercise jurisdiction up to and within a boundary known as " the modified Schomburgk line." Outposts were located at points on this line, and for some years Guianese police and Venezuelan soldiers faced one another across the Amacura creek in the Orinoco mouth and at Yuruan up the Cuyuni river. In 1897 the dispute formed the subject of a message to congress from the president of the United States, and in consequence of this intervention the matter was sub- mitted to an international commission, whose award was issued at Paris in 1899 (see Venezuela). By this decision neither party gained its extreme claim, the line laid down differing but little from the original Schomburgk line. The demarcation was at once undertaken by a joint commission appointed by Venezuela and British Guiana and was completed in 1904. It was not found practicable, owing to the impassable nature of the country, to lay down on earth that part of the boundary fixed by the Paris award between the head of the Wenamu creek and the summit of Mt. Roraima, and the boundary commissioners suggested a deviation to follow the watersheds of the Caroni, Cuyuni and Mazaruni rivers, a suggestion accepted by the two governments. In 1902 the delimitation of the boundary between British Guiana and Brazil was referred to the arbitration of the king of Italy, and by his reward, issued in June 1904, the sub- stantial area in dispute was conceded to British Guiana. The work of demarcation has since been carried out.

Towns, &c. — The capital of British Guiana is Georgetown, at the mouth of the Demerara river, on its right bank, with a population of about 50,000. New Amsterdam, on the right bank of the Berbice river, has a population of about 7500. Each possesses a mayor and town council, with statutory powers to impose rates. There are nineteen incorporated villages, and ten other locally governed areas known as country districts, the affairs of which are controlled by local authorities, known as village councils and

country authorities respectively.

Population. — The census of 1891 gave the population of British Guiana as 278,328. There was no census taken in 1901. By official estimates the population at the end of 1904 was 301,923. Of these some 120,000 were negroes and 124,000 East Indians; 4300 were Europeans, other than Portuguese, estimated at about 11,600, and some 30,000 of mixed race. The aborigines— Arawaks, Caribs, Wapisianas, Warraws, &c. — who numbered about 10,000 in 1891, are now estimated at about 6500. In 1904 the birth-rate for the whole colony was 30-3 per 1000 and the death-rate 28-8.

Physical Geography. — The surface features of British Guiana may be divided roughly into four regions: first, the alluvial sea- board, flat and below the level of high-water; secondly, the forest belt, swampy along the rivers but rising into undulating lands and hills between them; thirdly, the savannahs in and inland of the forest belt, elevated table-lands, grass-covered and practically treeless; and fourthly, the mountain ranges. The eastern portion of the colony, from the source of its two largest rivers, the Corentyn and Essequibo, is a rough inclined plain, starting at some 900 ft. above sea-level at the source of the Takutu in the west, but only some 400 at that of the Corentyn in the west, and sloping down gradually to the low alluvial flats about 3 ft. below high-water line. The eastern part is generally forested; the western is an almost level savannah, with woodlands along the rivers, The

northern portion of British Guiana, the alluvial flats alluded to already, consists of a fluviomarine deposit extending inland from 25 m. to 30 m., gradually rising to about 12 ft. above high-water mark and ending against beds of sandy clay, the residua of igneous rocks decomposed in situ, which form an extensive undulating region rising to 150 ft. above the sea and stretching back to the forest-covered hills. Roughly parallel to the existing coast-line are narrow reefj of sand and sea-shells, which are dunes indicating the trend of former limits of the sea, and still farther back are the higher " sand hills," hills of granite or diabase with a thick stratum of coarse white sand superimposed. From the coast-line seawards the ocean deepens very gradually, and at low tide extensive flats of sand and of mixed clay and sand (called locally " caddy ") are left bare, these flats being at times covered with a deposit of thin drift mud.

Two great parallel mountain systems cross the colony from W. to E., the

greater being that of the Pacaraima and Merum6 Mts., and the lesser including the Kanuku Mts. (2000 ft.), while the Acarai Mts., a densely-wooded range rising to 2500 ft., form the southern boundary of British Guiana and the watershed between the Essequibo and the Amazon. These mountains rise generally in a succession of terraces and broad plateaus, with steep or even sheer sandstone escarpments. They are mostly flat-topped, and their average height is about 3500 ft. The Pacaraima Mts., how- ever, reach 8635 ft. at Roraima, and the latter remarkable mountain rises as a perpendicular wall of red rock 1500 ft. in height springing out of the forest-clad slopes below the summit, and was considered inaccessible until in December 1884 Messrs im Thurn and Perkins found a ledge by which the top could be reached. The summit is a table-land some 12 sq. m. in area. Mt. Kukenaam is of similar structure and also rises above 8500 ft. Other conspicuous summits (about 7000 ft.) are Iwalkarima, Eluwarima, Ilutipu and Waiaka- piapu. The southern portion of- the Pacaraima range comprises rugged hills and rock-strewn valleys, but to the N., where the sand- stone assumes the table-shaped form, there are dense forests, and the scenery is of extraordinary grandeur. Waterfalls frequently descend the cliffs from a great height (nearly 2000 ft. sheer at Roraima and Kukenaam). The sandstone formation can be traced from the northern Pacaraima range on the N.W. to the Corentyn in the S.E. It is traversed in places by dikes and sills of diabase or dolerite, while bosses of more or less altered gabbro rise through it. The surface of a large part of the colony is composed of gneiss, and of gneissose granite, which is seen in large water-worn bosses in the river beds. Intrusive granite is of somewhat rare occurrence; where found, it gives rise to long low rolls of hilly country and to cataracts in the rivers. Extensive areas of the country consist of quartz-porphyry, porphyrites and felstone, and of more or less schistose rocks derived from them. These rocks are closely con- nected with the gneissose granites and gneiss, and there are reasons for believing that the latter are the deep-seated portions of them and are only visible where they have been exposed by denudation. Long ranges of hills, varying in elevation from a few hundreds to from 2000 ft. to 3000 ft., traverse the plains of the gneissose districts. These are caused either by old intrusions of diabase and gabbro which have undergone modifications, or by later ones of dolerite. These ranges are of high importance, as the rocks comprising them are the main source of gold in British Guiana.

Rivers. — The principal physical features of British Guiana are its rivers and their branches, which form one vast network of waterways all over it, and are the principal, indeed practically the only, highways inland from the coast. Chief among them are the Waini, the Essequibo, and its tributaries the Mazaruni and Cuyuni, the Demerara, the Berbice and the Corentyn. The Essequibo rises in the Acarai Mts., in 0° 41′ N. and about 850 ft.

above the sea, and flows northwards for about 600 m. until it discharges itself into the ocean by an estuary nearly 15 m. in width. In this estuary are several large and fertile islands, on four of which sugar used to be grown. Now but one, Wakenaam, can boast of a factory. The Essequibo can be entered only by craft drawing less than 20 ft. and is navigable for these vessels for not more than 50 m., its subsequent course upwards being frequently broken by cataracts and rapids. Some 7 m. below the first series of rapids it is joined by the Mazaruni, itself joined by the Cuyuni some 4 m. farther up. It has a remarkable course from its source in the Merume Mountains, about 2400 ft. above the sea. It flows first south, then west, north- west, north.'and finally south-east to within 20 m. of its own source, forming many fine falls, and its course thereafter is still very tortuous. In 4 N. and 58° W., the Essequibo is joined by the Rupununi, which, rising in a savannah at the foot of the Karawaimento Mts., has a northerly and easterly course of fully 200 m. In 3 37′ N. the Awaricura joins the Rupununi, and by this tributary the Pirara, a tributary of the Amazon, may be reached, — an example of the interesting series of itabos connecting nearly all S. American rivers with one another. Another large tributary of the Essequibo is the Potaro, on which, at 1130 ft. above sea-level and in 5 8′ N. and 59° 19′ W., is the celebrated Kaieteur fall, discovered in 1870 by Mr C. Barrington Brown while engaged on a geological survey. This fall is produced by the river flowing from a tableland of sandstone and conglomerate into a deep valley 822 ft. below. For the first 741 ft. the water falls as a perpendicular column, thence as a sloping

cataract to the still reach below. The river 200 yds. above the fall is about 400 ft. wide, while the actual waterway of the fall itself varies from 120 ft. in dry weather to nearly 400 ft. in rainy seasons. The Kaieteur, which it took Mr Brown a fortnight to reach from the coast, can now be reached on the fifth day from Georgetown. Among other considerable tributaries of the Essequibo are the Siparuni, Burro-Burro, Rewa, Kuyuwini and Kassi-Kudji. The Demerara river, the head-waters of which are known only to Indians, rises probably near 5° N., and after a winding northerly course of some 200 m. enters the ocean in 6° 50′ N. and 58° 20′ W. A bar of mud and sand prevents the entrance of vessels drawing more than 19 ft. The river is from its mouth, which is nearly 2 m. wide, navigable for 70 m. to all vessels which can enter. The Berbice river rises in about 3° 40′ N., and in 3 53′ N. is within 9 m. of the Essequibo. At its mouth it is about 2j m. wide, and is navigable for vessels drawing not more than 12 ft. for about 105 m. and for vessels drawing not more than 7 ft. for fully 175 m. Thence upwards it is broken by great cataracts. The Canje creek joins the Berbice river close to the sea. The Corentyn river rises in 1° 48′ 30″ N., about 140 m. E. of the Essequibo, and flowing northwards enters the Atlantic by an

estuary some 14 m. wide. The divide between its head-waters and those of streams belonging to the Amazon system is only some 400 ft. in elevation. It is navigable for about 150 m., some of the reaches being of great width and beauty. The upper reaches are broken by a series of great cataracts, some of which, until the discovery of Kaieteur, were believed to be the grandest in British Guiana. Among other rivers are the Pomeroon, Moruca and Barima, while several large streams or creeks fall directly into the Atlantic, the largest being the Abary, Mahaicony and Mahaica, between Berbice and Demerara, and the Boerasirie between Demerara and Essequibo. The colour of the water of the rivers and creeks is in general a dark brown, caused by the infusion of vegetable matter, but where the streams run for a long distance through savannahs they are of a milky colour.

Climate. — The climate is, as tropical countries go, not unhealthy. Malarial fevers are common but preventible; and phthisis is pre- valent, not because the climate is unsuitable to sufferers from pulmonary complaints, but because of the ignorance of the common people of the elementary principles of hygiene, an ignorance which the state is endeavouring to lessen by including the teaching of hygiene in the syllabus of the primary schools. The temperature is uniform on the coast for the ten months from October to July, the regular N.E. trade winds keeping it down to an average of 80° F. In August and September the trades die away and the heat becomes oppressive. In the interior the nights are cold and damp. Hurri- canes, indeed even strong gales, are unknown; a tidal wave is an impossibility; and the nature of the soil of the coast lands renders earthquakes practically harmless. Occasionally there are severe droughts, and the rains are sometimes unduly prolonged, but usually the year is clearly divided into two wet and two dry seasons. The long wet season begins in mid- April and lasts until mid-August. The long dry season is from September to the last week in November. December and January constitute the short rainy season, and February and March the short dry season. The rainfall varies greatly in different parts of the colony; on the coast it averages about 80 in. annually.

Flora. — The vegetation is most luxuriant and its growth per- petual. Indigenous trees and plants abound in the utmost variety, while many exotics have readily adapted themselves to local con- ditions. Along the coast is a belt of courida and mangrove — the bark of the latter being used for tanning — forming a natural barrier to the inroads of the sea, but one which — very unwisely — has been in parts almost ruined to allow of direct drainage. The vast forests afford an almost inexhaustible supply of valuable timbers; green- heart and mora, largely used in shipbuilding and for wharves and dock and lock gates; silverbally, yielding magnificent planks for all kinds of boats; and cabinet woods, such as cedar and

crabwood. There may be seen great trees, struggling for life one with the other, covered with orchids — some of great beauty and value — and draped with falling lianas and vines. Giant palms fringe the river- banks and break the monotony of the mass of smaller foliage. Many of the trees yield gums, oils and febrifuges, the bullet tree being bled extensively for balata, a gum used largely in the manu- facture of belting. Valuable varieties of rubber have also been found in several districts, and since early in 1905 have attracted the attention of experts from abroad. On the coast plantains, bananas and mangoes grow readily and are largely used for food, while several districts are admirably adapted to the growth o£ limes. Oranges, pineapples, star-apples, granadillas, guavas are among the fruits; Indian corn, cassava, yams, eddoes, tannias, sweet potatoes ■and ochroes are among the vegetables, while innumerable varieties of peppers are grown and used in large quantities by all classes. The dainty avocado pear, purple and green, grows readily. In the lagoons and trenches many varieties of water-lilies grow wild, the largest being the famous Victoria regia.

Fauna. — Guiana is full of wild animals, birds, insects and reptiles. Among the wild animals, one and all nocturnal, are the mipourrie or tapir, manatee, acouri and labba (both ex- cellent eating), sloth, ant-eater, armadillo, several kinds of deer, baboons, monkeys and the puma and jaguar. The last is seen

frequently down on the coast, attracted from the forest by the cattle grazing on the front and back pasture lands of the estates. Among the birds may be mentioned the carrion crow (an invaluable scavenger), vicissi and muscovy ducks, snipe, teal, plover, pigeon, the ubiquitous kiskadee or qu'est que dit, a species of shrike — his name derive'd from his shrill call — the canary and the twa-twa, both charming whistlers. These are all found on the coast. In the forest are maam (partridge), maroudi (wild turkey), the beautiful bell-bird with note like a silver gong, the quadrille bird with its tuneful oft-repeated bar, great flocks of macaws and parrots, and other birds of plumage of almost indescribable richness and variety. On the coast the trenches and canals are full of alligators, but the great cayman is found only in the rivers of the interior. Among the many varieties of snakes are huge constricting camoudies, deadly bushmasters, labarrias and rattlesnakes. Among other reptiles are the two large lizards, the salumpenta (an active enemy of the barn-door fowl), and the. iguana, whose flesh when cooked resembles tender chicken. The rivers, streams and trenches abound with fishes, crabs and shrimps, the amount of the latter consumed being enormous, running into tons weekly as the coolies use them

in their curries and the blacks in their foo-foo.

Goiernment and Administration. — Executive power is vested in a governor, who is advised in all administrative matters by an executive council, consisting of five official and three un- official members nominated by the crown. Legislative authority is vested in the Court of Policy, consisting of the governor, who presides and without whose permission no legislation can be initiated, seven other official members and eight elected members. This body has, however, no financial authority, all taxation and expenditure being dealt with by the Combined Court, consisting of the Court of Policy combined with six financial representatives. The elected members of the Court of Policy and the financial representatives are elected by their several constituencies for five years. Qualification for the Court of Policy is the owner- ship, or possession under lease for a term of twenty-one years, of eighty acres of land, of which at least forty acres are under cultivation, or of house property to the value of $7500. A financial representative must be similarly qualified or be in receipt of a clear income of not less than £300 per annum. Every male is entitled to be registered as a voter who (in addition to the usual formal qualifications) owns (during six months prior to registration) three acres of land in cultivation or a house of the annual rental or value of £20; or is a secured tenant for not less than three years of six acres of land in cultivation or for one year of a house of £40 rental; or has an income of not less than £100 per annum; or has during the previous twelve months paid £4, 3s. 4d. in direct taxation. Residence in the electoral district for six months prior to registration is coupled with the last two alternative qualifications. Plural voting is legal but no plumping is allowed. The combined court is by this constitution, which was granted in 1891, allowed the use of all revenues due to the crown in return for a civil list voted for a term now fixed at three years. English is the official and common language. The Roman-Dutch law, modified by orders- in-council and local statutes, governs actions in the civil courts, but the criminal law is founded on that of England. Magis-trates have in civil cases jurisdiction up to £20, while an appeal lies from their decisions in any criminal or civil case. The supreme court consists of a chief justice and two puisne judges, and has various jurisdictions. The full court, consisting of the three judges or any two of them, has jurisdiction over all civil matters, but an appeal lies to His Majesty in privy council in cases involving £500 and upwards. A single judge sits in in- solvency, in actions involving not over £520, and in appeals from magistrates' decisions. The appeal full court, consisting of three judges, sits to hear appeals from decisions of a single judge in the limited civil, appellate and insolvency courts. Criminal courts are held four times a year in each county, a single judge presiding in each court. A court of crown cases reserved is formed by the three judges, of whom two form a quorum pro-

vided the chief-justice is one of the two. There are no imperial troops now stationed in British Guiana, but there is a semi- military police force, a small militia and two companies of volunteers. The Church of England and the Church of Scotland are both established, and grants-in-aid are also given to the

Roman Catholic and Wesleyan churches and to several other denominations.

The revenue and expenditure now each amount annually to an average of a little over £500,000. About one-half of the revenue is produced by import duties, and about £90,000 by excise. The public debt on the 31st of March 1905 stood at £989,620.

The system of primary education is denominational and is mainly supported from the general revenue. During 1904-1905, 213 schools received grants-in-aid amounting to £23,500, the average cost per scholar being a little over £1. These grants are calculated on the results of examinations held annually, an allowance varying from 4s, 4Jd. to is. o|d. being made for each pass in reading, writing, arithmetic, school-garden work, nature study, singing and drill, English, geography, elementary hygiene and sewing. Secondary education is provided in Georgetown at some private establishments, and for boys at Queen's College, an undenominational government institution where the course of instruction is the same as at a public school in England, and the boys are prepared for the Cambridge local examinations, on the result of which annually depend the Guiana scholarship — open to boysand girls, and carrying a university or professional training in England — and two scholarships at Queen's College.

Industries and Trade. — At the end of the third decade of the 19th century the principal exports were sugar, rum, molasses, cotton and coffee. In 1830, 9,500,000 ft of coffee were sent abroad, but after the emancipation of the slaves it almost ceased as an export, and the little that is now grown is practically entirely consumed in the colony. The cultivation of cotton ceased in 1844, and, but for a short revival during the American civil war, has never prospered since. Efforts have been made to resuscitate its growth, but the experiments of the Board of Agriculture have only shown that Sea Island cotton is not adaptable to local conditions, and that no other known variety can as yet be recommended. To-day the principal exports are sugar, rum, molasses, molascuit — a cattle food made from molasses — gold, timber, balata, shingles and cattle. The annual value of the total exports is just under £2,000,000, of which about two-thirds go to Great Britain and British possessions. The cultivation of rice has made great strides in recent years, and, where difficulties of drainage and irrigation can be

economically overcome, promises to increase rapidly. In 1873, 32,000,000 ft of rice were imported, whereas in 1904-1905, the quantity imported having fallen to 20,500,000 ft, there were over 18,000 acres under rice cultivation, and exportation, principally to the British West Indies, had commenced. The cultivation of the sugar-cane, and its manufacture into sugar and its by-products, still remains, in spite of numerous fluctuations, the staple industry. The provision of a trustworthy labour supply for the estates is of great importance, and local scarcity has made it necessary since 1840 to import it under a system of indenture. In that year and until 1867, liberated Africans were brought from Rio de Janeiro, Havana, Sierra Leone and St Helena, and in 1845 systematic immigration from India commenced and has since been carried on annually — save in 1849-1850. In 1853 immigration from China was tried, and was carried on by the government from 1859 to 1866, when it ceased owing to a convention arranged at Peking, stipulating that all immigrants should on the expiry of their term of indenture be entitled to be sent back at the expense of the colony, a liability it could not afford to incur. To reduce the cost of supervision and kindred expenses, and consequently of the cane and its manufacture into sugar, the policy of centralization has been universally adopted, and forty-six estates now produce as much sugar as three times that number did in 1875. During recent years Canada has come forward as a large buyer of Guiana's sugar, and in 1904-1905 the same amount went there as to the United States, in each case over 44,000 tons, whereas in 1901-1902 the United States took 85,000 tons and Canada under 8000 tons. Practically all the rum and molascuit go to England, and the molasses to Holland and Portuguese possessions. The lands on the coast and on the river banks up to the sand hills are of marked fertility, and can produce almost any tropical vegetable or fruit. Cultivation, however, save on the sugar, coffee and cocoa estates, and by a few exceptional small farmers, is carried on in a haphazard and half-hearted manner, and the problem of agricultural develop- ment is one of great difficulty for the government. Much of the privately-owned land is not beneficially occupied, and in many cases it is not possible even to learn to whom it belongs, and though there are vast tracts of uncultivated crown land where a large farm or a small homestead can be easily and cheaply acquired, the difficulties involved in clearing, draining, and in some cases of protecting it by dams, are prohibitive to all but the exceptionally determined.

Prospecting for gold began in 1880, and from 1884 to 1893-1894 the output, chiefly from alluvial workings, increased from 250 oz. to nearly 140,000 oz. annually. The industry then received a serious check by the failure of several mines, and for nearly a decade was almost entirely in the hands of the small tributor, known locally as a pork-knocker. There has been some revival, chiefly due to foreign enterprise. At Omai on the

Essequibo river a German syndicate worked a large concession on the hydraulic process of placer mining with considerable success, and more recently took to dredging on its

flats. In the Puruni (a tributary of the Mazaruni) American capita- lists, working the Peters' mine, have established their workings to a considerable depth, besides constructing a road, 60 m. in length, from Kartabo point, at the confluence of the Guyuni and Mazaruni, to the Puruni river opposite the mine. An English syndicate started dredging in the Conawarook, a tributary of the Essequibo. The principal gold districts are on the Essequibo and its tributaries — the chief being the Cuyuni, Mazaruni, Potaro and Conawarook — and on the Barima, Barama and Waini rivers in the north-west district. There have been smaller workings, mostly unsuccessful, in the Demerara and Berbice rivers.

Diamonds and other precious stones, have been found in small quantities, and since 1900 efforts have been made to extend the output, nearly 11,000 carats weight of diamonds being exported in 1904. But though the small stones found were of good water, the cost of transport to the diamond fields, on the Mazaruni river, was heavy, and after 1904 the industry declined. Laws dealing with gold and precious stones passed in 1880, 1886 and 1887, and regula- tions in 1899, were codified in 1902 and amended in 1905.

Timber is cut, and balata and rubber collected, from crown lands by licences issued from the department of Lands and Mines. Wood- cutting, save on concessions held by a local company owning an up-country line of railway connecting the Demerara and Essequibo rivers, is limited to those parts of the forest which are close to the lower stretches of the rivers and creeks, the overland haulage of the heavy logs being both difficult and costly, while transport through the upper reaches of the rivers is impossible on account of the many cataracts and rapids. The average annual value of im- ports is £1,500,000, of which about two-thirds are from Great Britain and British possessions. Of the vessels trading with the colony, most are under the British flag, the remainder being principally American and Norwegian.

The money of account is dollars and cents, but, with the exception of the notes of the two local banks, the currency is British sterling. The unit of land measure is the Rhynland rood, roughly equal to 12 ft. 4 in. A Rhynland acre contains 300 square roods.

Inland Communication, &c. — The public roads extend along the • coast from the Corentyn river to some 20 m. N. of the Essequibo mouth on the Aroabisci coast, and for a short distance up each of the principal rivers and creeks entering the sea between these points. A line of railway 6oj m. in length runs from Georgetown to Rosignol on the left bank of the Berbice river opposite New Amsterdam ; and another line 15 m. long starts from Vreed-en-hoop, on the left bank of the Demerara river opposite Georgetown, and runs to Greenwich Park on the right bank of the Essequibo river some 3 m. from its mouth. A light railway, metre gauge, l8| m. in length, connects Wismar (on the left bank of the Demerara river some 70 m. from its mouth) with Rockstone (on the right bank of the Essequibo, and above the first series of cataracts in that river). Steamers run daily to and from Georgetown and Wismar, and launches to and from Rockstone and Tumatumari Fall on the Potaro, and all expeditions for the goldfields of the Essequibo and its tributaries above Rockstone travel by this route. Another steamer goes twice a week to Bartica at the confluence of the Essequibo and Mazaruni, and another weekly to Mt. Everard on the Barima, from which termini expeditions start to the other gold and diamond fields. Steamers also run from Georgetown to New Amsterdam and up the Berbice river for about 100 m. Above the termini of these steamer routes all travelling is done in keelless bateaux, propelled by paddlers and steered when coming through the rapids at both bow and stern by certificated bowmen and steersmen. Owing to the extreme dangers of this inland travelling, stringent regulations have been framed as to the loading of boats, supply of ropes and qualifications of men in charge, and the shooting of certain falls is prohibited. Voyages up-country are of necessity slow, but the return journey is made with comparatively great rapidity, distances laboriously covered on the up-trip in three days being done easily in seven hours when coming back.

From England British Guiana is reached in sixteen days by the steamers of the Royal Mail Steam Packet Company, and in nineteen days by those of the direct line from London and Glasgow. There are also regular services from Canada, the United States, France and Holland.

History. — When taken over in 1803 the prospects of three British colonies were by no means promising, and during the next decade the situation became very critical. Owing to the increased output of sugar by conquered Dutch and French colonies the English market was glutted and the markets of the continent of Europe were not available, Bonaparte having closed the ports. The years 181 1 and 181 2 were peculiarly disastrous, especially to those engaged in the manufacture of sugar, and at a public meeting held in Georgetown early in the latter year it was stated that the produce of the colony ordinarily worth £1,860,000 had on account of deteriorated value decreased by fully one-third. At this meeting it was resolved to petition the

imperial parliament to allow the interchange of produce

with the United States; a resolution which was unfortunately rendered abortive by the outbreak of war between England and the States in 1812, the trade of British Guiana being instead actually harried by American privateers. In his address to the Combined Court on the 20th of October 181 2 the governor (General Carmichael) stated that a vessel with government stores had been captured by an American privateer, and in February 1813 the imperial government sent H.M.S. " Peacock" to protect the coast. On the 23rd of that month in cruising along the east coast of Demerara the " Peacock " met the American privateer " Hornet," and though, after a gallant struggle, in which Captain Peake, R.N., was killed, the English ship was sunk with nearly all her crew, the colony did not suffer from any further depredations. In the following years news of the agitation in England in favour of emancipation gradually became known to the slaves and caused considerable unrest among them, culminating in 1823 in a serious outbreak on the estates on the east coast of Demerara. Negroes, demanding their freedom, attacked the houses of several managers, and although at most points these attacks were repulsed with but little loss on either side, the situation was so serious as to neces- sitate the calling out of the military. The ringleaders were arrested and promptly and vigorously dealt with, while a special court-martial was appointed to try the Rev. John Smith, of the London Missionary Society, who it was alleged had fostered the rising by his teachings to the slave congregation at his chapel in Le Ressouvenir. This trial was stigmatized as unfair by the missionary party in England, but on the whole appears to have been conducted decently by an undoubtedly unbiassed court. It is difficult now to form any very definite conclusion. Mr Smith certainly had great influence over the slaves, and while his teaching prior to the outbreak was at least ill-advised, he made no efforts while the disturbances were going on to use his influence on the side of law and order; indeed all he could say in his own defence was that he was ignorant of what was going on, a statement it is impossible to believe to have been strictly veracious. He was found guilty and sentenced to be hanged. It is obvious that it was never intended to carry out this sentence, and on the 29th of November the governor an- nounced that he felt it imperative on him to transmit the findings of the court for His Majesty's consideration. The question of Smith's guilt or innocence created a great deal of feeling in England, the anti-slavery and missionary societies making it a basis for increased agitation in favour of the slaves; but the imperial government evidently agreed with the colonial executive in holding that he could not be exonerated of grave responsibility, as the order of the king was that while the sentence of death was remitted Mr Smith was to be dismissed from the colony and to enter into a recognizance in £2000 not to return to British Guiana or to reside in any other West Indian colony. This

order reached Georgetown in April 1824, but Mr Smith had died in the city jail on the 6th of February of a pul- monary complaint from which he had been suffering for some time.

Sir Benjamin d'Urban was governor from April 1824 to May 1833, the principal event of his administration being the con- solidation in 1 83 1 of the three colonies into one colony divided into three counties, Berbice, Demerara and Essequibo.

Governor d'Urban was succeeded in June 1833 by Sir James Carmichael Smyth, who began his administration by a pro- clamation to the slaves stating that while the king intended to improve their condition, the details of his plans were not as yet completed, and warning them against impatience or insub- ordination. When the resolutions foreshadowing emancipation, passed by the House of Commons on the 12th of June 1833, reached the colony, the planters, to whom the governor's pro- clamation had been most distasteful, were thunderstruck and even the government was surprised. Naturally the slaves were ■wildly jubilant. Emancipation brought troublous times through which the governor steered the colony with great tact and firm- ness, serious troubles being nipped in the bud solely by his great personality, and the subsequent conflicts with the apprentices

might have been obviated had he lived longer. He died at Camp House on the 4th of March 1838.

In the years following emancipation the colony was in a serious condition. The report of a commission in 1850 proved that it was virtually ruined, and only by the introduction of immigrants to provide a reliable labour supply were the sugar estates saved from total extinction. By 1853 the colony had begun to make headway, and Sir Henry Barkly, the then governor, was able to state in his speech to the Combined Court in January that its progress was in every way satisfactory. During Governor Barkly's administration the long series of struggles between the legislature and the executive terminated, and when he left in May 1853 he did so with the respect and good-will of all classes. The strengthening of the labour supply was not effected without troubles. In 1847 the negroes in Berbice attacked the persons and property of the Portuguese immigrants, the riots spreading to Demerara and Essequibo, and not until the military were called out were the disturbances quelled. Similar riots in 1862 were only stopped by the prompt and firm action of the new governor, Mr (afterwards Sir) Francis Hincks, while rows between negroes and Chinese and negroes and East Indians were frequent. Gradually, however, things quieted down, and until 1883 the estates as a whole did well. In 1884 the price of sugar fell so seriously as to make the pro- spects of the colony very gloomy, and for nearly two decades proprietors had to be content with a price kept artificially low by bounty-fed beet-sugar, many estates being ruined, while those that survived only did so by the application of every economy, and by their owners availing themselves of every new discovery in the sciences of cultivation and manufacture.

The year 1889 was marked by an outbreak on the part of a section of the negro population in Georgetown directed against the Portuguese residents there. A Portuguese had murdered his black paramour and had been convicted and sentenced to death. The governor commuted the sentence to penal servitude for life. Shortly after this a Portuguese stall-holder in the market assaulted a small black boy whom he suspected of pilfering, the latter having to be taken to a hospital, while the former, after being taken to a police station was, through some misunderstanding or informality, at once released. Almost immediately excitable and unreasoning negroes were rushing about loudly proclaiming that the boy was dead, that the Portuguese were allowed to kill black people and to go free, and calling on one another to take their own revenge. Mobs gathered quickly, attacked individual Portuguese and wrecked their shops and houses, and not until the city had been given up for two days to scenes of disgraceful disorder were the efforts of the police and special constables successful in quelling the disturb- ances. The damage done amounted to several thousands of dollars, the Portuguese owners being eventually compensated from general revenue.

In 1884 the dispute as to the boundary with Venezuela became acute. It was reported to the colonial government that the government of Venezuela had granted to an American syndicate a concession which covered much of the territory claimed by Great Britain, and although prompt investigation by an agent despatched by the governor did not then disclose any trace of interference with British claims, a further visit in January 1885, made in consequence of reports that servants of the Manoa Company had torn down notices posted by Mr McTurk on his former visit, discovered that the British notices had been covered over by Venezuelan ones and resulted in the government of Great Britain declaring that it would thence- forward exercise jurisdiction up to and within a boundary known as "the modified Schomburgk line." Outposts were located at points on this line, and for some years Guianese police and Venezuelan soldiers faced one another across the Amacura creek in the Orinoco mouth and at Yuruan up the Cuyuni river. Guianese officers were, however, presumably instructed not actively to oppose acts of aggression by the Venezuelan govern- ment, for in January 1895 Venezuelan soldiers arrested Messrs D. D. Barnes and A. H. Baker, inspectors of police in charge at

Yuruan station, conveyed them through Venezuela to Caracas, eventually allowing them to take steamer to Trinidad. For this act compensation was demanded and was eventually paid by Venezuela. The diplomatic question as to the boundary — the results of which are stated above — was passed out of the hands of the colony; see the account of the arbitration under Venezuela.

The last two months of 1905 were marked by serious dis- turbances in Georgetown, and in a lesser degree on the east and west banks of the Demerara river. On the 29th of November the dock labourers employed on the wharves in Georgetown struck for higher wages, and large crowds invaded the principal stores in the city, compelling men willing to work to desist and in some cases assaulting those who opposed them. By the evening of the 30th of November they had got so far out of hand as to necessitate the reading of the Riot Act and a pro- clamation by the governor (Sir F. M. Hodgson) forbidding all assemblies. On the morning of the 1st of December serious disturbances broke out at Ruimvelt, a sugar estate directly south of Georgetown, where the cane-cutters had suddenly struck for higher pay, and the police were compelled to fire on the mob, killing some and wounding others. All through that day mobs in all parts of the city assaulted any white man they met, houses were invaded and windows smashed, and on two further occasions the police had to fire. At night torrential rains forced the rioters to shelter, and enabled the police to get rest, their places being taken by pickets of militiamen and special constables. On Saturday, the 2nd of December, the police had got the upper hand, and the arrival that night of H.M.S. " Sappho " and on Sunday of

H.M.S. " Diamond " gave the government complete control of the situation. Threatened troubles on the sugar estates on the west bank were suppressed by the prompt action of the governor, and the arrest of large numbers of the rioters and their immediate trial by special courts restored thorough order.

Authorities. — See Raleigh's Voyages for the Discovery of Guiana 1595-1596, (" Hakluyt " series); Laurence Keymis' Relation of the second Voyage to Guiana {1596), (" Hakluyt " series); Sir R. H. Schomburgk, Description of British Guiana (London, 1840); C. Waterton, Wanderings in South America, 1812-1825 (London, 1828); J. Rodway, History of British Guiana (Georgetown, 1891-1894); H. G. Dalton, History of British Guiana (London, 1855) ; J. W. Boddam Whetham, Roraima and British Guiana (London, 1879) ; C. P. Lucas, Historical Geography of British Colonies; E. F. im Thurn, Among the Indians of Guiana (London, 1883); British Guiana Directory (Georgetown, 1906) ; G. D. Bayley, Handbook of British Guiana (Georgetown, 1909). (A. G. B.)*

II. Dutch Guiana, or Surinam, has an area of about 57,900 sq. m. British Guiana bounds it on the west and French on the east (the long unsettled question of the French boundary is dealt with in section III., French ouiaaa. Guiana). The various peoples inhabiting Surinam are distributed according to the soil and the products. The Indians (Caribs, Arawaks, Warrous) live on the savannahs, or on the upper Nickerie, Coppename and Maroni, far from the planta- tions, cultivating their fields of manioc or cassava, and for thf> rest living by fishing and hunting. They number about 2000, The bush negroes (Marrons) dwell between 3° and 4 N., neai the isles and cataracts. They are estimated at 10,000, and are employed in the transport of men and goods to the goldfields, the navigation of the rivers in trade with the Indians, and in the transport of wood to Paramaribo and the plantations. They are the descendants of runaway slaves, and before missionaries had worked among them their paganism retained curious traces of their former connexion with Christianity. Their chief god was Gran Gado (grand-god), his wife Maria, and his son Jesi Kist. Various minor deities were also worshipped, Ampuka the bush-god, Toni the water-god, &c. Their language was based on a bastard English, mingled with many Dutch, Portuguese and native elements. Their chiefs are called gramman or grand man; but the authority of these men, and the peculiarities of language and religion, have in great measure died out owing to modern intercourse with the Dutch and others. The in- habitants of Paramaribo and the plantations comprise a variety

of races, represented by Chinese, Javanese, coolies from India and the West Indies, negroes and about 2000 whites. Of non- Christian immigrants there are about 6000 Mahommedans and 12,000 Hindus; and Jews number about 1200. The total population was given in 1907 as 84,103, exclusive of Indians, &c, in the forests. Nearly one-half of this total are in Paramaribo and one-half in the districts. The population has shown a tendency to move from the districts to the town; thus in 1852 there were 6000 persons in the town and 32,000 in the districts.

The principal settlements have been made in the lower valley of the Surinam, or between that river and the Saramacca on the W. and the Commewyne on the E. The Surinam is the chief of a number of large rivers which rise in the Tumuc Humac range or the low hills between it and the sea, which they enter on the Dutch seaboard, between the Corentyn and the Maroni (Dutch Coranlijn and Marowijne), which form the boundaries with British and French territories respectively. Between the rivers of Dutch Guiana there are remarkable cross channels available during the floods at least. As the Maroni communi- cates with the Cottica, which is in turn a tributary of the Comme- wyne, a boat can pass from the Maroni to Paramaribo; thence by the Sommelsdijk canal it can reach the Saramacca; and from the Saramacca it can proceed up the Coppename, and by means of the Nickerie find its way to the Corentyn. The rivers are not navigable inland to any considerable extent, as their courses are interrupted by rapids. The interior of the country consists for the most part of low hills, though an extreme height of 3800 ft. is known in the Wilhelmina Kette, in the west of the colony, about 3 50′ to 4° N. The hinterland south of this latitude, and that part of the Tumuc Humac range along which the Dutch frontier runs, are, however, practically unex- plored. Like the other territories of Guiana the Dutch colony is divided physically into a low coast-land, savannahs and almost impenetrable forest.

Meteorological observations have been carried on at five stations (Paramaribo, Coronie, Sommelsdijk, Nieuw-Nickerie and Groningen). The mean range of temperature for the day, month and year shows little variation, being respectively 77-54°-88-38° F., 76- 1°- 78-62° F. and 70-52° – 90-14° F. The north-east trade winds prevail throughout the year, but the rainfall varies considerably; for December and January the mean is respectively 8-58 and 9-57 in., for May and June 11-26 and 103 1 in., but for February and March 7-2 and 6-8i in., and for September 2-48 and 2-0 in. The seasons comprise a long and a short dry season, and a period of heavy and of slight rainfall.

Products and Trade. — It has been found exceedingly difficult to exploit the produce of the forests. The most important crops and those supplying the chief exports are cocoa, coffee and sugar, all cultivated on the larger

plantations, with rice, maize and bananas on the smaller or coast lands. Most of the larger plantations are situated on the lower courses of the Surinam, Commewyne, Nickerie and Cottica, and on the coast lands, rarely in the upper parts. Goldficlds lie in the older rocks (especially the slate) of the upper Surinam, Saramacca and Maroni. The first section of a railway designed to connect the goldfields with Paramaribo was opened in 1906. The annual production of gold amounts in value to about £100,000, but has shown considerable fluctuation. Agriculture is the chief means of subsistence. About 42,000 acres are under cultivation. Of 30,000 persons whose occupation is given in official statistics, close upon 21,000 are engaged in agriculture or on the plantations, 2400 in gold-mining and only 1000 in trade. The exports increased in value from £200,800 in 1875 to £459,800 in 1899, and imports from £260,450 in 1875 to £510,180 in 1899; but the average value of exports over five years subsequently was only £414,000, while that of imports was £531,000.

Administration. — The colony is under a governor, who is president of an executive council, which also includes a vice-president and three members nominated by the crown. The legislative body is the states, the members of which are elected for six years by electors, of whom there is one for every 200 holders of the franchise. The colony is divided into sixteen districts. For the administration of justice there are three cantonal courts, two district courts, and the supreme court at Paramaribo, whose president and permanent members are nominated by the crown. The average local revenue (i9or-i9o6) was about £276,000 and theexpenditureabout £317,000; both fluctuated considerably, and a varying subvention is necessary

from the home government (£16,000 in 1902, £60,400 in 1906; the annual average is about £37,000). There are a civic guard of about 1800 men and a militia of 500, with a small garrison.

History. — The history of the Dutch in Guiana, and the compression of their influence within its present limits, belongs to the general history of Guiana (above). Surinam and the Dutch islands of the West Indies were placed under a common government in 1828, the governor residing at Paramaribo, but in 1845 they were separated. Slavery was abolished in 1863. Labour then became difficult to obtain, and in 1870 a convention was signed between Holland and England for the regulation of the coolie traffic, and a Dutch government agent for Surinam was appointed at Calcutta. The problem was never satisfactorily solved, but the interest of the mother-country in the colony greatly increased during the last twenty years of the 19th century, as shown by the establishment of the Surinam Associa- tion, of the Steam Navigation Company's service to Paramaribo, and by the formation of a botanical garden for experimental culture at that

town, as also by geological and other scientific expeditions, and the exhibition at Haarlem in 1898.

Authorities. — Among the older works on Surinam the first rank is held by Jan Jacob Hartsinck's masterly Beschryving van Guiana, of de Wilde Kust, in Zuid Amerika (2 vols., Amsterdam, 1770). Extracts from this work, selected for their bearing upon British boundary questions, were translated and annotated by J. A. J. de Villiers (London, 1897). A valuable Geschiedenis der Kolonie van Suriname, by a number of " learned Jews," was published at Amsterdam in 1791 ; and it was supplemented and so far superseded by Wolbers, Geschiedenis van Suriname (Amsterdam, 1861). See further W. G. Palgrave, Dutch Guiana (London, 1876); A. Kappler, Surinam, sein Land, &fc. (Stuttgart, 1887); Prince Roland Bonaparte, Les Habitants de Surinam (Paris, 1884) ; K. Martin, " Bericht liber eine Reise ins Gebiet des Oberen- Surinam," Bijdragen v. h. Inst, voor Taal Land en Volkenkunde, i. I. (The Hague); Westerouen van Meeteren, La Guyane neer- landaise (Leiden, 1884); H. Ten Kate, " Een en ander over Suriname," Gids (1888); G. Verschuur, "Voyages aux trois Guyanes, " Tour du monde (1893), pp. 1, 49, 65; W. L. Loth, Beknopte Aardrijkskundige beschrijving van Suriname (Amsterdam, 1898), and Tijdschrift van het Aardrijkskundig Genootschap (1878), 79> 93! Asch van Wyck, " La Colonie de Surinam," Les Pays-Bas (1898); L. Thompson, Overzicht der Geschiedenis van Suriname (The Hague, 1901); Calalogus der Nederl. W. I. ten Toonslelling te Haarlem (1899); Guide & tr avers la section des Indes neerlandaises, p. 323 (Amsterdam, 1899) ; Surinaamsche Almanak (Paramaribo, annually). For the language of the bush-negroes see Wullschlaegel, Kurzgefasste neger-englische Grammatik (Bautzen, 1854), and Deutsch neger-englisches Worterbuch (Lobau, 1865).

III. French Guiana (Guyane). — This colony is situated between Dutch Guiana and Brazil. A delimitation of the territory belonging to France and the Netherlands was arrived at in 1891, by decision of the emperor of aalaaa. Russia. This question originated in the arrangement of 1836, that the river Maroni should form the frontier. It turned on the claim of the Awa or the Tapanahoni to be recog- nized as the main head-stream of the Maroni, and the final decision, in indicating the Awa, favoured the Dutch. In 1905 certain territory lying between the upper Maroni and the Itany, the possession of which had not then been settled, was acquired by France by agreement between the French and Dutch govern- ments. The question of the exploitation of gold in the Maroni was settled by attributing alternate reaches of the river to France and Holland; while France obtained the principal islands in the lower Maroni. The additional territory thus attached to the French colony amounted to 965 sq. m. In December 1900 the Swiss government as arbitrators fixed the boundary between French Guiana and Brazil as the river Oyapock and the water- shed on the Tumuc

Humac mountains, thus awarding to France about 3000 of the 100,000 sq. m. which she claimed. This dispute was of earlier origin than that with the Dutch; dis- sensions between the French and the Portuguese relative to territory north of the Amazon occurred in the 17th century. In 1700 the Treaty of Lisbon made the contested area (known as the Terres du Cap du Nord) neutral ground. The treaty of Utrecht in 17 13 indicated as the French boundary a river which the French afterwards claimed to be the Araguary, but the Portuguese asserted that the Oyapock was intended. After

Brazil had become independent the question dragged on until in 1890-1895 there were collisions in the contested territory between French and Brazilian adventurers. This compelled serious action, and a treaty of arbitration, preliminary to the settlement, was signed at Rio de Janeiro in 1897. French Guiana, according to official estimate, has an area of about 51,000 sq. m. The population is estimated at about 30,000; its movement is not rapid. Of this total 12,350 live at Cayenne, 10,100 were in the communes, 5700 formed the penal population, 1500 were native Indians (Galibi, Emerillon, Oyampi) and 500 near Maroni were negroes. Apart from Cayenne, which was rebuilt after the great fire of 1888, the centres of population are un- important: Sinnamarie with 1500 inhabitants, Mana with 1750, Roura with 1200 and Approuague with n 50. In 1892 French Guiana was divided into fourteen communes, exclusive of the Maroni district. Belonging to the colony are also the three Safety Islands (Royale, Joseph and Du Diable — the last notable as the island where Captain Dreyfus was imprisoned) , the Enfant Perdu Island and the five Remire Islands.

A considerable portion of the low coast land is occupied by marshes, with a dense growth of mangroves or, in the drier parts, with the pinot or wassay palm (Euterpe oleracea). Settlements are confined almost entirely to the littoral and alluvial districts. The forest-clad hills of the hinterland do not generally exceed 1500 ft. in elevation; that part of the Tumuc Humac range which forms the southern frontier may reach an extreme elevation of 2600 ft. But the dense tropical forests attract so much moisture from the ocean winds that the highlands are the birthplace of a large number of rivers which in the rainy season especially pour down vast volumes of water. Not less than 15 are counted between the Maroni and the Oyapock. South-eastward from the Maroni the first of importance is the Mana, which is navigable for large vessels 10 m.from its mouth, and for smaller vessels 27 m. farther. Passing the Sinnamary and the Kourou, the Oyock is next

reached, near the mouth of which is Cayenne, the capital of the colony, and thereafter the Approuage. All these rivers take their rise in a somewhat elevated area about the middle of the colony; those streams which rise farther south, in the Tumuc Humac hills, are tributaries of the two frontier rivers, the Maroni on the one hand or the Oyapock on the other.

Climate and Products. — The rainy season begins in November or December, and lasts till the latter part of June; but there are usually three or four weeks of good weather in March. During the rest of the year there is often hardly a drop of rain for months, but the air is always very moist. At Cayenne the average annual rainfall amounts to fully 130 in., and it is naturally heavier in the interior. During the hotter part of the year — August, September, October — the temperature usually rises to about 86° F., but it hardly ever exceeds 88°; in the colder season the mean is 79° and it seldom sinks so low as 70°. Between day and night there is very little thermometric difference. The prevailing winds are the N.N.E. and the S.E. ; and the most violent are those of the N.E. During the rainy season the winds keep between N. and E., and during the dry season between S. and E. Hurricanes are unknown. In flora and fauna French Guiana resembles the rest of the Guianese region. Vegetation is excessively rich. Among leguminous trees, which are abundantly represented, the wacapou is the finest of many hard- wood trees. Caoutchouc and various palms are also common. The manioc is a principal source of food ; rice is an important object of cultivation; and maize, yams, arrowroot, bananas and the bread-fruit are also to be mentioned. Vanilla is one of the common wild plants of the country. The clove tree has been acclimatized, and in the latter years of the empire it formed a good source of wealth ; the cinnamon tree was also successfully introduced in 1772, but like that of the pepper-tree and the nutmeg its cultivation is neglected. A very small portion of the territory indeed is de- voted to agriculture, although France has paid some attention to the development of this branch of activity. In 1880 a colonial garden was created near Cayenne; since 1894 an experimental garden has been laid out at Baduel. About 8200 acres arecultivated, of which 5400 acres are under cereals and rice, the remaining being under coffee (introduced in 1716), cacao, cane and other cultures. The low lands between Cayenne and Oyapock are capable of bearing colonial produce, and the savannahs might' support large herds; cereals, root-crops and vegetables might easily be grown on the high grounds, and timber working in the interior should be pro- fitable.

Gold-mining is the most important industry in the colony. Placers of great wealth have been discovered on the Awa, on the Dutch frontier and at Carsevenne in the territory which formed the subject of the Franco-Brazilian dispute. But wages are high and transport is costly, and the amount of gold declared at Cayenne did not average more than 130,550

oz. annually in 190C-1905. Silver and iron have been found in various districts; kaolin is extracted in the plains of Montsinery; and phosphates have been discovered

at several places. Besides gold-workings, the industrial establish- ments comprise saw-mills, distilleries, brick-works and sugar- works.

Trade and Communications. — The commerce in 1885 amounted to £336,000 for imports and to £144,000 for exports; in 1897 the values were respectively £373,350 and £286,400, but in 1903, while imports had increased in value only to £418,720, exports had risen to £493,213. The imports consist of wines, flour, clothes, &c; the chief are gold, phosphates, timber, cocoa and rosewood essence. Cayenne is the oniy considerable port. One of the drawbacks to the development of the colony is the lack of labour. Native labour is most difficult to obtain, and attempts to utilize convict labour have not proved very successful. Efforts to supply the need by immigra- tion have not done so completely. The land routes are not numerous. The most important are that from Cayenne to Mana by way of Kourou, Sinnamarie and Iracoubo, and that from Cayenne along the coast to Kaw and the mouth of the Approuague. Towards the interior there are only foot-paths, badly made. By water, Cayenne is in regular communication with the Safety Islands (35 m.), and the mouth of the Maroni (80 m.), with Fort de France in the island of Martinique, where travellers meet the mail packet for France, and with Boston (U.S.A.). There is a French cable between Cayenne and Brest.

Administration. — The colony rs administered by a commissioner- general assisted by a privy council, including the secretary general and chief of the judicial service, the military, penitentiary and administrative departments. In 1879 an elective general council of sixteen members was constituted. There are a tribunal of first instance and a higher tribunal at Cayenne, besides four justices of peace, one of whom has extensive jurisdiction in other places. Of the £256,000 demanded for the colony in the colonial budget for 1906, £235,000 represented the estimated expenditure on the penal settlement, so that the cost of the colony was only about £21,000. The local budget for 1 901 balanced at £99,000 and in 1905 at £116,450. Instruction is given in the college of Cayenne and in six primary schools. At the head of the clergy is an apostolic prefect. The armed force consists of two companies of marine infantry, half a battery of artillery, and a detachment of gendarmerie, and com- prises about 380 men. The penal settlement was established by a decree of 1852. From that year until 1867, 18,000 exiles had been sent to Guiana, but for the next twenty years New Caledonia became the chief penal settlement in the French colonies. But in 1885- 1887 French Guiana was appointed as a place of banishment for confirmed criminals and for convicts sentenced to more than eight

years' hard labour. A large proportion of these men have been found unfit for employment upon public works.

History. — The Sieur La Revardiere, sent out in 1604 by Henry IV. to reconnoitre the country, brought back a favour- able report; but the death of the king put a stop to the projects of formal colonization. In 1626 a small body of traders from Rouen settled on the Sinnamary, and in 1635 a similar band founded Cayenne. The Compagnie du Cap Nord, founded by the people of Rouen in 1643 and conducted by Poncet de Bretigny, the Compagnie de la France Equinoxiale, established in 1645, and the second Compagnie de la France Equinoxiale, or Com- pagnie des Douze Seigneurs, established in 1652, were failures, the result of incompetence, mismanagement and misfortune. From 1654 the Dutch held the colony for a few years. The French Compagnie des Indes Occidentales, chartered in 1664 with a monopoly of Guiana commerce for forty years, proved hardly more successful than its predecessors; but in 1674 the colony passed under the direct control of the crown, and the able administration of Colbert began to tell favourably on its progress, although in 1686 an unsuccessful expedition against the Dutch in Surinam set back the advance of the French colony until the close of the century.

The year 1763 was marked by a terrible disaster. Choiseul, the prime minister, having obtained for himself and his cousin Praslin a concession of the country between the Kourou and the Maroni, sent out about 12,000 volunteer colonists, mainly from Alsace and Lorraine. They were landed at the mouth of the. Kourou, where no preparation had been made for their reception, and where even water was not to be obtained. Mis- management was complete; there was (for example) a shop for skates, whereas the necessary tools for tillage were wanting. By 1765 no more than 918 colonists remained alive, and these were a famished fever-stricken band. A long investigation in Paris resulted in the imprisonment of the incompetent leaders of the expedition. Several minor attempts at colonization in Guiana were made in the latter part of the century; but they

all seemed to suffer from the same fatal prestige of failure. During the revolution band after band of political prisoners were transported to Guiana. The fate of the royalists, nearly 600 in number, who were exiled on the 18th F'ructidor (1797), was especially sad. Landed on the Sinnamary without shelter or food, two-thirds of them perished miserably. In 1800 Victor Hugues was appointed governor, and he managed to put the colony in a better state; but in 1809 his work was brought to a close by the

invasion of the Portuguese and British.

Though French Guiana was nominally restored to the French in 1814, it was not really surrendered by the Portuguese till 181 7. Numerous efforts were now made to establish the colony firmly, although its past misfortunes had prejudiced the public mind in France against it. In 1822 the first steam sugar mills were introduced; in 1824 an agricultural colony (Nouvelle Angouleme) was attempted in the Mana district, which, after failure at first, became comparatively successful. The emanci- pation of slaves and the consequent dearth of labour almost ruined the development of agricultural resources about the middle of the century, but in 1853 a large body of African immigrants was introduced. The discovery of gold on the Approuague in 1855 caused feverish excitement, and seriously disturbed the economic condition of the country.

Authorities. — A detailed bibliography of French Guiana will be found in Ternaux-Compans, Notice historique de la Guyane francaise (Paris, 1843). Among more recent works, see E. Bassieres, Notice sur la Guyane, issued on the occasion of the Paris Exhibition (1900) ; Publications de la societe d'etudes pour la colonisation de la Guyane francaise (Paris, 1843-1844); H. A. Coudreau, La France equinoxiale (1887). Dialectes indiens de Guyane (1891), Dix ans de Guyane(i8g2) , and Chez nos Indiens (1893), all at Paris; G. Brousseau, Les Richesses de la Guyane francaise (Paris, 1901); L. F. Viala, Les Trois Guyanes (Montpellier, 1893).

GUIART (or Guiard), GUILLAUME (d. c. 1316), French chronicler and poet, was probably born at Orleans, and served in the French army in Flanders in 1304. Having been disabled by a wound he began to write, lived at Arras and then in Paris, thus being able to consult the large store of manuscripts in the abbey of St Denis, including the Grandes chroniques de France. Afterwards he appears as a menestrel de bouche. Guiart's poem Branche des royaulx lignages, was written and then rewritten between 1304 and 1307, in honour of the French king Philip IV., and in answer to the aspersions of a Flemish poet. Comprising over 21,000 verses it deals with the history of the French kings from the time of Louis VIII.; but it is only really important for the period after 1296 and for the war in Flanders from 1301 to 1304, of which it gives a graphic account, and for which it is a high authority. It was first published by J. A. Buchon (Paris, 1828), and again in tome xxii. of the Recueil des historiens des Gaules et de la France (Paris, 1865).

Sec A. Molinier, Les Sources de Vhistoire de France, tome iii. (Paris,

1903).

GUIBERT, or Wibert (c. 1030-1100), of Ravenna, antipope under the title of Clement III. from the 25th of June 1080 until September 1100, was born at Parma between 1020 and 1030 of the noble imperialist family, Corregio. He entered the priest- hood and was appointed by the empress Agnes, chancellor and, after the death of Pope Victor II. (1057), imperial vicar in Italy. He strove to uphold the imperial authority during Henry IV. 's minority, and presided over the synod at Basel (1061) which annulled the election of Alexander II. and created in the person of Cadalous, bishop of Parma, the antipope Honorius II. Guibert lost the chancellorship in 1062. In 1073, through the influence of Empress Agnes and the support of Cardinal Hilde- brand, he obtained the archbishopric of Ravenna and swore fealty to Alexander II. and his successors. He seems to have been at first on friendly terms with Gregory VII., but soon quarrelled with him over the possession of the city of Imola, and'henceforth was recognized as the soul of the imperial faction in the investiture contest. He allied himself with Cencius, Cardinal Candidus and other opponents of Gregory at Rome, and, on his refusal to furnish troops or to attend the Lenten synod of 1075, he was ecclesiastically suspended by the pope. He was probably excommunicated at the synod of Worms

(1076) with other Lombard bishops who sided with Henry IV., and at the Lenten synod of 1078 he was banned by name. The emperor, having been excommunicated for the second time in March 1080, convened nineteen bishops of his party at Mainz on the 31st of May, who pronounced the deposition of Gregory; and on the 25th of June he caused Guibert to be elected pope by thirty bishops assembled at Brixen. Guibert, whilst retaining possession of his archbishopric, accompanied his imperial master on most of the latter's military expeditions. Having gained Rome, he was installed in the Lateran and consecrated as Clement III. on the 24th of March 1084. One week later, on Easter Sunday, he crowned Henry IV. and Bertha in St Peter's. Clement survived not only Gregory VII. but also Victor III. and Urban II., maintaining his title to the end and in great measure his power over Rome and the adjoining regions. Excommunication was pronounced against him by all his rivals. He was driven out of Rome finally by crusaders in 1097, and sought refuge in various fortresses on his own estates. St Angelo, the last Guibertist stronghold in Rome, fell to Urban II. on the 24th of August 1098. Clement, on the accession of Paschal II. in 1099, prepared to renew his struggle but was driven from Albano by Norman troops and died at Civita Castellana in September 1100. His ashes, which were said by his followers to have worked miracles, were thrown into the water by Paschal II.

See J. Langen, Geschichte der romischen Kirche von Gregor VII. bis Innocenz III. (Bonn, 1893); Jaffe-Wattenbach, Regesta pontif. Roman. (2nd ed., 1885-1888); K. J. von Hefele, Conciliengeschichte, vol. v. (2nd

ed.); F. Gregorovius, Rome in the Middle Ages, vol. iv., trans, by Mrs G. W. Hamilton (London, 1900-1902) ; and O. Kohncke, Wibert von Ravenna (Leipzig, 1888). (C. H. Ha.),

GUIBERT (1053-1124), of Nogent, historian and theologian, was born of noble parents at Clermont-en-Beauvoisis, and dedicated from infancy to the church. He received his early education at the Benedictine abbey of Flavigny (Flaviacum) or St Germer, where he studied with great zeal, devoting himself at first to the secular poets, an experience which left its imprint on his works; later changing to theology, through the influence of Anselm of Bee, afterwards of Canterbury. In n 04, he was chosen to be head of the abbey of Notre Dame de Nogent and henceforth took a prominent part in ecclesiastical affairs. His autobiography (De vita sua, she monodiarum) , written towards the close of his life, gives many picturesque glimpses of his time and the customs of his country. The description of the com- mune of Laon is an historical document of the first order. The same local colour lends charm to his history of the first crusade (Gesta Dei per Francos) written about 11 10. But the history is largely a paraphrase, in ornate style, of the Gesta Francorum of an anonymous Norman author (see Crusades); and when he comes to the end of his authority, he allows his book to degenerate into an undigested heap of notes and anecdotes. At the same time his high birth and his position in the church give his work an occasional value.

Bibliography. — Guibert's works, edited by d'Achery, were first published in 1651, in 1 vol. folio, at Paris (Venerab'ilis Guiberti abbatis B. Mariae de Novigento opera omnia), and republished in Migne's Patrologia Latina, vols. clvi. and clxxxiv. They include, besides minor works, a treatise on homiletics (" Liber quo ordine sermo fieri debeat ") ; ten books of Moralia on Genesis, begun in 1084, but not'completed until 1116, composed on the model of Gregory the Great's Moralia in Jobum; five books of Tropologiae on Hosea, Amos and the Lamentations; a treatise on the Incarnation, against the Jews; four books De pignoribus sanctorum, a remarkably free criticism on the abuses of saint and relic worship ; three books of autobiography, De vita sua, sive monodiarum ; and eight books of the Historia quae dicitur Gesta Dei per Francos, sive historia Hiero- solymitana (the ninth book is by another author). Separate editions exist of the last named, in J. Bongars, Gesta Dei per Francos, L, and Recueil des historiens des croisades, hist. Occid., iv. 115-263. It has been translated into French in Guizot's Collection, ix. 1-338. See H. von Sybel, Geschichte des ersten Kreuzzuges (Leipzig, 1 881); B. Monod, Le Maine Guibert et son temps (Paris, 1905) ;and Guibert de Nogent; histoire de sa vie, edited byG. Bourgin (Paris, 1907).

GUIBERT, JACQUES ANTOINE HIPPOLYTE, Comte de (1743-1790),

French general and military writer, was born at Mohtauban, and at the age of thirteen accompanied his father, Charles Benoit, comte de Guibert (1715-1786), chief of staff to

Marshal de Broglie, throughout the war in Germany, and won the cross of St Louis and the rank of colonel in the expedition to Corsica (1767). In 1770 he published his Essai general de taclique in London, and this celebrated work appeared in numer- ous subsequent editions and in English, German and even Persian translations (extracts also in Liskenne and Sauvan, Bibl. historique et militaire, Paris, 1845). Of this work (for a detailed critique of which see Max Jahns, Gesch. d. Kriegswissen- schaften, vol. iii. pp. 2058-2070 and references therein) it may be said that it was the best essay on war produced by a soldier during a period in which tactics were discussed even in the salon and military literature was more abundant than at any time up to 1871. Apart from technical questions, in which Guibert's enlightened conservatism stands in marked contrast to the doctrinaire progressiveness of Menil Durand, Folard and others, the book is chiefly valued for its broad outlook on the state of Europe, especially of military Europe in the period 1763-1792. One quotation may be given as being a most remarkable prophecy of the impending revolution in the art of war, a revolution which the " advanced " tacticians themselves scarcely foresaw. " The standing armies, while a burden on the people, are inadequate for the achievement of great and decisive results in war, and meanwhile the mass of the people, untrained in arms, de- generates. . . . The hegemony over Europe will fall to that nation which . . . becomes possessed of manly virtues and creates a national army " — a prediction fulfilled almost to the letter within twenty years of Guibert's death. In 1773 he visited Germany and was present at the Prussian regimental drills and army manoeuvres; Frederick the Great, recognizing Guibert's ability, showed great favour to the young colonel and freely discussed military questions with him. Guibert's Journal d'un voyage en Allemagne was published, with a memoir, by Toulongeon (Paris, 1803). His Defense du systeme de guerre moderne, a reply to his many critics (Neuchatel, 1779) is a reasoned and scientific defence of the Prussian method of tactics, which formed the basis of his work when in 1 7 7 5 he began to co-operate with the count de St Germain in a series of much- needed and successful reforms in the French army. In 1777, however, St Germain fell into disgrace, and his fall involved that of Guibert who was promoted to the rank of marechal de camp and relegated to a provincial staff appointment. In his semi- retirement he vigorously defended his old chief St Germain against his detractors. On the eve of the Revolution he was recalled to the

War Office, but in his turn he became the object of attack and he died, practically of disappointment, on the 6th of May 1790. Other works of Guibert, besides those men- tioned, are: Observations sur la constitution politique et militaire des armies de S. M. Prussienne (Amsterdam, 1778), £loges of Marshal Catinat (1775), of Michel de l'Hopital (1778), and of Frederick the Great (1787). Guibert was a member of the Academy from 1786, and he also wrote a tragedy, Le ConnHable de Bourbon (1775) and a journal of travels in France and Switzer- land.

See Toulongeon, £loge veridique de Guibert (Paris, 1790) ; Madame de Stael, J&oge de Guibert; Bardin, Notice historique du general Guibert (Paris, 1836); Flavian d'Aldeguier, Discours sur la vie et les ecrits du comte de Guibert (Toulouse, 1855); Count Forestie, Biographie du comte de Guibert (Montauban, 1855); Count zur Lippe, " Friedr. der Grcsse und Oberst Guibert" (Militar-Wochenblatt, 1873, 9 and 10).

GUICCIARDINI, FRANCESCO (1483-1540), the celebrated Italian historian and statesman, was born at Florence in the year 1483, when Marsilio Ficino held him at the font of baptism. His family was illustrious and noble; and. his ancestors for many generations had held the highest posts of honour in the state, as may be seen in his own genealogical Ricordi autobio- grafici e di famiglia (Op. ined. vol. x.). After the usual educa- tion of a boy in grammar and elementary classical studies, his father, Piero, sent him to the universities of Ferrara and Padua, where he stayed until the year 1505. The death of an uncle, who had occupied the see of Cortona with great pomp, induced the young Guicciardini to hanker after an ecclesiastical career. He already saw the scarlet of a cardinal awaiting him, and to

this eminence he would assuredly have risen. His father, how- ever, checked this ambition, declaring that, though he had five sons, he would not suffer one of them to enter the church in its then state of corruption and debasement. Guicciardini, whose motives were confessedly ambitious (see Ricordi, Op. ined. x. 68), turned his attention to law, and at the age of twenty-three was appointed by the Signoria of Florence to read the Institutes in public. Shortly afterwards he engaged himself in marriage to Maria, daughter of Alamanno Salviati, prompted, as he frankly tells us, by the political support which an alliance with that great family would bring him (ib. x. 71). He was then practising at the bar, where he won so much distinction that the Signoria, in 151 2, entrusted him with an embassy to the court of Ferdinand the Catholic. Thus he entered on the real work of his life as a diplomatist and statesman. His conduct upon that legation was afterwards severely criticized; for his political antagonists accused him of betraying the true interests of the commonwealth, and using his influence for the restoration of the exiled house of Medici to power. His Spanish

correspond- ence with the Signoria (Op. ined. vol. vi.) reveals the extra-ordinary power of observation and analysis which was a chief quality of his mind; and in Ferdinand, hypocritical and pro- foundly dissimulative, he found a proper object for his scientific study. To suppose that the young statesman learned his frigid statecraft in Spain would be perhaps too simple a solution of the problem offered by his character, and scarcely fair to the Italian proficients in perfidy. It is clear from Guicciardini's autobiographical memoirs that he was ambitious, calculating, avaricious and power-loving from his earliest years; and in Spain he had no more than an opportunity of studying on a large scale those political vices which already ruled the minor potentates of Italy. Still the school was pregnant with in- structions for so apt a pupil. Guicciardini issued from this first trial of his skill with an assured reputation for diplomatic ability, as that was understood in Italy. To unravel plots and weave counterplots; to meet treachery with fraud; to parry force with sleights of hand; to credit human nature with the basest motives, while the blackest crimes were contemplated with cold enthusiasm for their cleverness, was reckoned then the height of political sagacity. Guicciardini could play the game to per- fection. In 1515 Leo X. took him into service, and made him governor of Reggio and Modena. In 1521 Parma was added to his rule, and in 1523 he was appointed viceregent of Romagna by Clement VII. These high offices rendered Guicciardini the virtual master of the papal states beyond the Apennines, during a period of great bewilderment and difficulty. The copious correspondence relating to his administration has recently been published (Op. ined. vols, vii., viii.). In 1526 Clement gave him still higher rank as lieutenant-general of the papal army. While holding this commission, he had the humiliation of witnessing from a distance the sack of Rome and the imprisonment of Clement, without being able to rouse the perfidious duke of Urbino into activity. The blame of Clement's downfall did not rest with him; for it was merely his duty to attend the camp, and keep his master informed of the proceedings of the generals (see the Correspondence, Op. ined. vols, iv., v.). Yet Guicciar- dini's conscience accused him, for he had previously counselled the pope to declare war, as he notes in a curious letter to himself written in 1527 (Op. ined.,x. 104). Clement did not, however, withdraw his confidence, and in 1531 Guicciardini was advanced to the governorship of Bologna, the most important of all the papallord -lieutenancies (Correspondence, Op. ined. vol. ix.) . This post he resigned in 1534 on the election of Paul III., preferring to follow the fortunes of the Medicean princes. It may here be noticed that though Guicciardini served three popes through a period of twenty years, or perhaps because of this, he hated the papacy with a deep and frozen bitterness, attributing the woes of Italy to the ambition of the church, and declaring he had seen enough of sacerdotal abominations to make him a Lutheran (see Op. ined. i. 27, 104, 96, and 1st. d' It., ed.

Ros., ii. 218). The same discord between his private opinions and his public actions may be traced in his conduct subsequent to 1534. As a

political theorist, Guicciardini believed that the best form of government was a commonwealth administered upon the type of the Venetian constitution (Op. ined. i 6; ii. 130 sq.); and we have ample evidence to prove that he had judged the tyranny of the Medici at its true worth (Op. ined. i. 171, on the tyrant; the whole Storia Fiorenlina and Reggimento di Firenee, ib. i. and iii., on the Medici). Yet he did not hesitate to place his powers at the disposal of the most vicious members of that house for the enslavement of Florence. In 1527 he had been declared a rebel by the Signoria on account of his well-known Medicean prejudices; and in 1530. deputed by Clement to punish the citizens after their revolt, he revenged himself with a cruelty and an avarice that were long and bitterly remembered. When, therefore, he returned to inhabit Florence in 1534, he did so as the creature of the dissolute Alessandro de' Medici. Guicciardini pushed his servility so far as to defend this in- famous despot at Naples in 1535, before the bar of Charles V., from the accusations brought against him by the Florentine exiles (Op. ined. vol. ix.). He won his cause; but in the eyes of all posterity he justified the reproaches of his contemporaries, who describe him as a cruel, venal, grasping seeker after power, eager to support a despotism for the sake of honours, offices and emoluments secured for himself by a bargain with the oppressors of his country. Varchi, Nardi, Jacopo Pitti and Bernardo Segni are unanimous upon this point; but it is only the recent publication of Guicciardini's private MSS. that has made us understand the force of their invectives. To plead loyalty or honest political conviction in defence of his Medicean partianship is now impossible, face to face with the opinions expressed in the Ricordi politici and the Storia Fiorenlina. Like Machiavelli, but on a lower level, Guicciardini was willing to " roll stones," or to do any dirty work for masters whom, in the depth of his soul, he detested and despised. After the murder of Duke Alessandro in 1537, Guicciardini espoused the cause of Cosimo de' Medici, a boy addicted to field sports, and unused to the game of statecraft. The wily old diplomatist hoped to rule Florence as grand vizier under this inexperienced princeling. He was mistaken, however, in his schemes, for Cosimo displayed the genius of his family for politics, and coldly dismissed his would-be lord protector. Guicciardini retired in disgrace to his villa, where he spent his last years in the com position of the Storia d' Italia. He died in 1540 without male heirs.

Guicciardini was the product of a cynical and selfish age, and his life

illustrated its sordid influences. Of a cold and worldly temperament, devoid of passion, blameless in his conduct as the father of a family, faithful as the servant of his papal patrons, severe in the administration of the provinces committed to his charge, and indisputably able in his conduct of affairs, he was at the same time, and in spite of these qualities, a man whose moral nature inspires a sentiment of liveliest re- pugnance. It is not merely that he was ambitious, cruel, revengeful and avaricious, for these vices have existed in men far less antipathetic than Guicciardini. Over and above those faults, which made him odious to his fellow-citizens, we trace in him a meanness that our century is less willing to condone. His phlegmatic and persistent egotism, his sacrifice of truth and honour to self-interest, his acquiescence in the worst conditions of the world, if only he could use them for his own advantage, combined with the glaring discord between his opinions and his practice, form a character which would be contemptible in our eyes were it not so sinister. The social and political decrepitude of Italy, where patriotism was unknown, and only selfishness survived of all the motives that rouse men to action, found its representative and exponent in Guicciardini. When we turn from the man to the author, the decadence of the age and race that could develop a political philosophy so arid in its cynical despair of any good in human nature forces itself vividly upon our notice. Guicciardini seems to glory in his disillusionment, and uses his vast intellectual ability for the analysis of the corruption he had helped to make incurable. If one single treatise of that century should be chosen to represent the spirit

of the Italian people in the last phase of the Renaissance, the historian might hesitate between the Principe of Machiavelli and the Ricordi politici of Guicciardini. The latter is perhaps preferable to the former on the score of comprehensiveness. It is, moreover, more exactly adequate to the actual situation, for the Principe has a divine spark of patriotism yet lingering in the cinders of its frigid science, an idealistic enthusiasm sur- viving in its moral aberrations; whereas a great Italian critic of this decade has justly described the Ricordi as " Italian corruption codified and elevated to a rule of life." Guicciardini is, however, better known as the author of the Storia d'ltalia, that vast and detailed picture of his country's sufferings between the years 1494 and 1532. Judging him by this masterpiece of scientific history, he deserves less commendation as a writer than as a thinker and an analyst. The style is wearisome and prolix, attaining to precision at the expense of circumlocution, and setting forth the smallest particulars with the same dis- tinctness as the main features of the narrative. The whole tangled skein of Italian politics, in that involved and stormy period, is unravelled with a patience and an insight that are above praise. It is the crowning merit of the author that he never ceases to be an impartial spectator — a cold and curious critic. We might compare him to an

anatomist, with knife and scalpel dissecting the dead body of Italy, and pointing out the symptoms of her manifold diseases with the indifferent analysis of one who has no moral sensibility. This want of feeling, while it renders Guicciardini a model for the scientific student, has impaired the interest of his history. Though he lived through that agony of the Italian people, he does not seem to be aware that he is writing a great historical tragedy. He takes as much pains in laying bare the trifling causes of a petty war with Pisa as in probing the deep-seated ulcer of the papacy. Nor is he capable of painting the events in which he took a part, in their totality as a drama. Whatever he touches, lies already dead on the dissecting table, and his skill is that of the analytical pathologist. Consequently, he fails to understand the essential magnitude of the task, or to appreciate the vital vigour of the forces contending in Europe for mastery. This is very noticeable in what he writes about the Reformation. Notwithstanding these defects, inevitable in a writer of Guicciardini's tempera- ment, the Storia d' Italia was undoubtedly the greatest historical work that had appeared since the beginning of the modern era. It remains the most solid monument of the Italian reason in the 1 6th century, the final triumph of that Florentine school of philosophical historians which included Machiavelli, Segni, Pitti, Nardi, Varchi, Francesco Vettori and Donato Giannotti. Up to the year 1857 the fame of Guicciardini as a writer, and the estimation of him as a man, depended almost entirely upon the History of Italy, and on a few ill-edited extracts from his aphor- isms. At that date his representatives, the counts Piero and Luigi Guicciardini, opened their family archives, and com- mitted to Signor Giuseppe Canestrini the publication of his hitherto inedited MSS. in ten important volumes. The vast mass of documents and finished literary work thus given to the world has thrown a flood of light upon Guicciardini, whether we consider him as author or as citizen. It has raised his re- putation as a political philosopher into the first rank, where he now disputes the place of intellectual supremacy with his friend Machiavelli; but it has coloured our moral judgment of his character and conduct with darker dyes. From the stores of valuable materials contained in those ten volumes, it will be enough here to cite (1) the Ricordi politici, already noticed, consisting of about 400 aphorisms on political and social topics ; (2) the observations on Machiavelli's Discorsi, which bring into remarkable relief the views of Italy's two great theorists on statecraft in the 16th century, and show that Guicciardini regarded Machiavelli somewhat as an amiable visionary or political enthusiast; (3) the Storia Fiorentina, an early work of the author, distinguished by its animation of style, brilliancy of portraiture, and liberality of judgment; and (4) the Dialogo del reggimento di Firenze, also in all probability an early work, in which the various forms of government suited to an Italian

commonwealth are discussed with infinite subtlety, contrasted, and illustrated from the vicissitudes of Florence up to the year 1494. To these may be added a series of short essays, entitled Discorsi politici, composed during Guicciardini's Spanish lega- tion. It is only after a careful perusal of these minor works that the student of history may claim to have comprehended Guicciardini, and may feel that he brings with him to the con- sideration of the Storia d' Italia the requisite knowledge of the author's private thoughts and jealously guarded opinions. Indeed, it may be confidently affirmed that those who desire to gain an insight into the true principles and feelings of the men who made and wrote history in the 16th century will find it here far more than in the work designed for publication by the writer. Taken in combination with Machiavelli's treatises, the Opere indite furnish a comprehensive body of Italian political philosophy anterior to the date of Fra Paolo Sarpi. (J. A. S.)

See Rosini's edition of the Storia d" Italia (10 vols., Pisa, 1819), and the Opere inedite, in 10 vols., published at Florence, 1857. A complete and initial edition of Guicciardini's works is now in preparation in the hands of Alessandro Gherardi of the Florence archives. Among the many studies on Guicciardini we may mention Agostino Rossi's Francesco Guicciardini e il governo Fiqrentino (2 vols., Bologna, 1896), based on many new documents; F. de Sanctis's essay " L'Uomo del Guicciardini," in his Nuovi Saggi critici (Naples, 1879), and many passages in Professor P. Villari's Machiavelli (Eng. trans., 1892); E. Benoist's Guichardin, historien et homme d'etat italien an XVI" siicle (Paris, 1862), and C. Gioda's Francesco Guicciardini e le sue opere inedite (Bologna, 1880) are not without value, but the authors had not had access to many im- portant documents since published. See also Geoffroy's article " Une Autobiographie de Guichardin d'apres ses oeuvres inddites," in the Revue des deux mondes (1st of February 1874).

GUICHARD, KARL GOTTLIEB (1724-1775), soldier and military writer, known as Quintus Icilius, was born at Magde- burg in 1724, of a family of French refugees. He was educated for the Church, and at Leiden actually preached a sermon as a candidate for the pastorate. But he abandoned theology for more secular studies, especially that of ancient history, in which his learning attracted the notice of the prince of Orange, who promised him a vacant professorship at Utrecht. On his arrival, however, he found that another scholar had been elected by the local authorities, and he thereupon sought and obtained a commission in the Dutch army. He made the campaigns of 1747-48 in the Low Countries. In the peace which followed, his combined military and classical training turned his thoughts in the direction of ancient military history. His notes on this subject grew

into a treatise, and in 1754 he went over to England in order to consult various libraries. In 1757 his Memoires militaires sur les Grecs et les Romains appeared at the Hague, and when Carlyle wrote his Frederick the Great it had reached its fifth edition. Coming back, with English introductions, to the Continent, he sought service with Ferdinand of Brunswick, who sent him on to Frederick the Great, whom he joined in January 1758 at Breslau. The king was very favourably impressed with Guichard and his works, and he remained for nearly 18 months in the royal suite. His Prussian official name of Quintus Icilius was the outcome of a friendly dispute with the king (see Nikolai, Anekdoten, vi. 129-145; Carlyle, Frederick the Great, viii. 113-114). Frederick in discussing the battle of Pharsalia spoke of a centurion Quintus Caecilius as Q. Icilius. Guichard ventured to correct him, whereupon the king said, " You shall be Quintus Icilius," and as Major Quintus Icilius he was forthwith gazetted to the command of a free battalion. This corps he commanded throughout the later stages of the Seven Years' War, his battalion, as time went on, becoming a regiment of three battalions, and Quintus himself recruited seven more battalions of the same kind of troops. His command was almost always with the king's own army in these campaigns, but for a short time it , fought in the western theatre under Prince Henry. When not on the march he was always at the royal headquarters, and it was he who brought about the famous interview between the king and Gellert (see Carlyle, Frederick the Great, ix. 109; Gellert, Briefwechsel mit Demoiselle Lucius, ed. Ebert, Leipzig, 1823, pp. 029-631) on the subject of national German literature. On 22nd January 1761 Quintus was ordered to sack the castle

of Hubertusburg (a task which Major-General Saldern had point- blank refused to undertake, from motives of conscience), and carried out his task, it is said, to his own very considerable profit. The place cannot have been seriously injured, as it was soon afterwards the meeting-place of the diplomatists whose work ended in the peace of Hubertusburg, but the king never ceased to banter Quintus on his supposed depredations. The very day of Frederick's triumphant return from the war saw the disbanding of most of the free battalions, including that of Quintus, but the major to the end of his life remained with the king. He was made lieutenant-colonel in 1765, and in 1773, in recognition of his work Memoires critiques et historiques sur plusieurs points d'antiquilSs militaires, dealing mainly with Caesar's campaigns in Spain (Berlin, i773),was promoted colonel. He died at Potsdam, 1775. •

GUICHEN, LUC URBAIN DE BOUEXIC, Comte de (1712- 1790), French admiral, entered the navy in 1730 as " garde de la Marine," the first rank in the corps of royal officers. His pro- motion was not rapid. It was not till 1748 that he became " lieutenant de vaisseau," which was, however, a somewhat higher rank than the lieutenant in the British navy, since it

carried with it the right to command a frigate. He was " capi- tainede. vaisseau," or post captain, in 1756. But his reputation must have been good, for he was made chevalier de Saint Louis in 1748. In 1775 he was appointed to the frigate "Terpsichore," attached to the training squadron, in which the due de Chartres, afterwards notorious as the due d'Orleans and as Philippe Egalite, was entered as volunteer. In the next year he was promoted chef d'escadre, or rear-admiral. When France had become the ally of the Americans in the War of Independence, he hoisted his flag in the Channel fleet, and was present at the battle of Ushant on the 27th of July 1779. In March of the following year he was sent to the West Indies with a strong squadron and was there opposed to Sir George Rodney. In the first meeting between them on the 17th of April to leeward of Martinique, Guichen escaped disaster only through the clumsy mariner in which Sir George's orders were executed by his captains. Seeing that he had to deal with a formidable opponent, Guichen acted with extreme caution, and by keeping the weather gauge afforded the British admiral no chance of bringing him to close action. When the hurricane months approached (July to September) he left the West Indies, and his squadron, being in a bad state from want of repairs , return ed home, reaching B rest in September. Throughout all this campaign Guichen had shown himself very skilful in handling a fleet, and if he had not gained any marked success, he had prevented the British admiral from doing any harm to the French islands in the Antilles. In December 1781 the comte de Guichen was chosen to command the force which was entrusted with the duty of carrying stores and reinforce- ments to the West Indies. On the 12th Admiral Kempenfelt, who had been sent out by the British Government with an unduly weak force to intercept him, sighted the French admiral in the Bay of Biscay through a temporary clearance in a fog, at a moment when Guichen 's warships were to leeward of the convoy, and attacked the transports at once. The French admiral could not prevent his enemy from capturing twenty of the transports, and driving the others into a panic-stricken flight. They returned to port, and the mission entrusted to Guichen was entirely defeated. He therefore returned to port also. He had no opportunity to gain any counterbalancing success during the short remainder of the war, but he was present at the final relief of Gibraltar by Lord Howe. His death occurred on the 13th of January 1790. The comte de Guichen was, by the testimony of his contemporaries, a most accomplished and high-minded gentleman. It is probable that he had more scientific knowledge than any of his English contemporaries and opponents. But as a commander in war he was notable chiefly for his skill in directing the orderly movements of a fleet, and seems to have been satisfied with forma) operations, which were possibly elegant but could lead to no substantial result. He had none of the combative instincts of his country- man Suffren, or of the average British admiral.

See vicomte de Noailles, Marins et soldats francais en AmSrique (1903) ; and E. Chevalier, Histoire de la marine francaise pendant la guerre de V independence americaine (1877). (D. H.)

GUIDE (in Mid. Eng. gyde, from the Fr. guide; the earlier French form was guie, English " guy," the d was due to the Italian form guida; the ultimate origin is probably Teutonic, the word being connected with the base seen in O. Eng. witan, to know), an agency for directing or showing the way, specifically a person who leads or directs a stranger over unknown or unmapped country, or conducts travellers and tourists through a town, or over buildings of interest. In European wars up to the time of the French Revolution, the absence of large scale detailed maps made local guides almost essential to the direction of military operations, and in the 18th century the general tendency to the stricter organization of military re-sources led in various countries to the special training of guide officers (called Feldjager, and considered as general staff officers in the Prussian army), whose chief duty it was to find, and if necessary establish, routes across country for those parts of the army that had to move parallel to the main road and as nearly as possible at deploying interval from each other, for in those days armies were rarely spread out so far as to have the use of two or more made roads. But the necessity for such precautions died away when adequate surveys (in which guide officers were, at any rate in Prussia, freely employed) were carried out, and, as a definite term of military organization to-day, "guide" possesses no more essential peculiarity than fusilier, grenadier or rifleman. The genesis of the modern " Guide " regiments is perhaps to be found in a short-lived Corps of Guides formed by Napoleon in Italy in 1796, which appears to have been a personal escort or body guard composed of men who knew the country. In the Belgian army of to-day the Guide regiments correspond almost to the Guard cavalry of other nations; in the Swiss army the squadrons of "Guides" act as divisional cavalry, arid in this role doubtless are called upon on occasion to lead columns. The " Queen's own Corps of Guides " of the Indian army consists of infantry companies and cavalry squadrons. In drill, a " guide " is an officer or non-commissioned officer told off to regulate the direction and pace of movements, the remainder of the unit maintaining their alignment and distances by him.

A particular class of guides are those employed in mountain- eering; these are not merely to show the way but stand in the position of professional climbers with an expert knowledge of rock and snowcraft, which they impart to the amateur, at the same time assuring the safety of the climbing

party in dangerous expeditions. This professional class of guides arose in the middle of the 19th century when Alpine climbing became re- cognized as a sport (see Mountaineering). It is thus natural to find that the Alpine guides have been requisitioned for mountaineering expeditions all over the world. In climbing in Switzerland, the central committee of the Swiss Alpine Club issues a guides' tariff which fixes the charges for guides and porters; there are three sections, for the Valais and Vaudois Alps, for the Bernese Oberland, and for central and eastern Switzerland. The names of many of the great guides have become historical. In Chamonix a statue has been raised to Jacques Balmat, who was the first to climb Mont Blanc in 1786. Of the more famous guides since the beginning of Alpine climbing may be mentioned Auguste Balmat, Michel Cros, Maquignay, J. A. Carrel, who went with E. Whymper to the Andes, the brothers Lauener, Christian Aimer and Jakob and Melchior Anderegg.

" Guide " is also applied to a book, in the sense of an ele- mentary primer on some subject, or of one giving full informa- tion for travellers of a country, district or town. In mechanical usage, the term " guide " is of wide application, being used of anything which steadies or directs the motion of an object, as of the "leading" screw of a screw-cutting lathe, of a loose pulley used to steady a driving-belt, or of the bars or rods in a steam-engine which keep the sliding blocks moving in a straight line. The doublet " guy " is thus used of a rope which steadies

a sail when it is being raised or lowered, or of a rope, chain or stay supporting a funnel, mast, derrick, &c.

GUIDI, CARLO ALESSANDRO (1650-1712), Italian lyric poet, was born at Pavia in 1650. As chief founder of the well- known Roman academy called " L'Arcadia," he had a con- siderable share in the reform of Italian poetry, corrupted at that time by the extravagance and bad taste of the poets Marini and Achillini and their school. The poet Guidi and the critic and jurisconsult Gravina checked this evil by their influence and example. The genius of Guidi was lyric in the highest degree; his songs are written with singular force, and charm the reader, in spite of touches of bombast. His most celebrated song is that entitled Alia Fortuna (To Fortune), which certainly is one of the most beautiful pieces of poetry of the 17 th century. Guidi was squint-eyed, humpbacked, and of a delicate constitu- tion, but possessed undoubted literary ability. His poems were printed at Parma in 1671, and at Rome in 1704. In 1681 he published at Parma his lyric tragedy Amalasunta in Italy, and two pastoral dramas Daphne and Endymion. The last had the honour of being mentioned as a model by the critic Gravina, in his treatise on poetry. Less fortunate was Guidi's poetical version of the six homilies of Pope Clement XL, first as having been severely criticized by the satirist Settano, and next as having proved to be

the indirect cause of the author 's death. A splendid edition of this version had been printed in 1712, and, the pope -being then in San Gandolfo, Guidi went there to present him with a copy. On the way he found out a serious typographical error, which he took so much to heart that he was seized with an apoplectic fit at Frascati and died on the spot. Guidi was honoured with the special protection of Ranuccio II., duke of Parma, and of Queen Christina of Sweden. GUIDICCIONI, GIOVANNI (1480-1541), Italian poet, was born at Lucca in 1480, and died at Macerata in 1541. He occupied a high position, being bishop of Fossombrone and president of Romagna. The latter office nearly cost him his life; a murderer attempted to kill him, and had already touched his breast with his dagger when, conquered by the resolute calmness of the prelate, he threw away the weapon and fell at his feet, asking forgiveness. The Rime and Letters of Guidiccioni are models of elegant and natural Italian style. The best editions are those of Genoa (1749), Bergamo (1753) and Florence (1878).

GUIDO OF AREZZO (possibly to be identified with Guido de St Maur des Fosses), a musician who lived in the nth century. He has by many been called the father of modern music, and a portrait of him in the refectory of the monastery of Avellana bears the inscription Beatus Guido, inventor musicae. Of his life little is known, and that little is chiefly derived from the dedicatory letters prefixed to two of his treatises and addressed respectively to Bishop Theodald (not Theobald, as Burney writes the name) of Arezzo, and Michael, a monk of Pomposa and Guido's pupil and friend. Occasional references to the cele- brated musician in the works of his contemporaries are, however, by no means rare, and from these it may be conjectured with all but absolute certainty that Guido was born in the last decade of the 10th century. The place of his birth is uncertain in spite of some evidence pointing to Arezzo; on the title-page of all his works he is styled Guido Aretinus, or simply Aretmus. At his first appearance in history Guido was a monk in the Benedictine monastery of Pomposa, and it was there that he taught singing and invented his educational method, by means of which, according to his own statement, a pupil might learn within five months what formerly it would have taken him ten years to acquire. Envy and jealousy, however, were his only reward, and by these he was compelled to leave his monastery — " inde est, quod me vides prolixis finibus exulatum," as he says himself in the second of the letters above referred to. According to one account, he travelled as far as Bremen, called there by Archbishop Hermann in order to reform the musical service. But this statement has been doubted. Certain it is that not long after his flight from Pomposa Guido was living at Arezzo, and it was here that, about 1030, he received an invitation to Rome from Pope John XIV. He obeyed the summons, and the

pope himself became his first and apparently one of his most proficient pupils. But in spite of his success Guido could not be induced to remain in Rome, the insalubrious air of which seems to have affected his health. In Rome he met again his former superior, the abbot of Pomposa, who seems to have repented of his conduct, and to have induced Guido to return to Pomposa; and here all authentic records of Guido's life cease. We only know that he died, on the 17th of May 1050, as prior of Avellana, a monastery of the Camaldulians; such at least is the statement of the chroniclers of that order. It ought, however, to be added that the Camaldulians claim the celebrated musician as wholly their own, and altogether deny his connexion with the Bene- dictines.

The documents discovered by Dom Germain Morin, the Belgian Benedictine, about 1888, point to the conclusion that Guido was a Frenchman and lived from his youth upwards in the Benedictine monastery of St Maur des Fosses where he invented his novel system of notation and taught the brothers to sing by it. In codex 763 of the British Museum the com- poser of the " Micrologus " and other works by Guido of Arezzo is always described as Guido de Sancto Mauro.

There is no doubt that Guido's method shows considerable progress in the evolution of modern notation. It was he who for the first time systematically used the lines. of the staff, and the intervals or spatia between them. There is also little doubt that the names of the first six notes of the scale, ut, re, mi, fa, sol, la, still in use among Romance nations, were introduced by Guido, although he seems to have used them in a relative rather than in an absolute sense. It is well known that these words are the first syllables of six lines of a hymn addressed to St John the Baptist, which may be given here: —

Ut queant laxis resonare fibris Mira. gestorum /amuli tuorum, Solve polluti labii reatum,

Sancte Joannes.

In addition to this Guido is generally credited with the intro- duction of the F clef. But more important than all this, perhaps, is the thoroughly practical tone which Guido assumes in his theoretical writings, and which differs greatly from the clumsy scholasticism of his contemporaries and predecessors.

The most important of Guido's treatises, and those which are generally

acknowledged to be^authentic, are Micrologus Guidonis de disciplina artis musicae, dedicated to Bishop Theodald of Arezzo, and comprising a complete theory of music, in 20 chapters; Musicae Guidonis regulae rhylhmicae in antiphonarii sui protogum prolatae, written in trochaic decasyllabics of anything but classical structure; Aliae Guidonis regulae de ignoto cantu, identidem in antiphonarii sui prologum prolatae; and the Epistola Guidonis Michaeli monacho de ignoto cantu, already referred to. These are published in the second volume of Gerbert's Scriptores ecclesiastici de musica sacra. A very important manuscript unknown to Gerbert (the Codex bibliothecae Uticensis, in the Paris library) contains, besides minor treatises, an antiphonarium and gradual undoubtedly belonging to Guido.

See also L. Angeloni, G. d' Arezzo (1811); Kiesewetter, Guido von Arezzo (1840); Kornmuller, " Leben und Werken Guidos von Arezzo," in Habert's Jahrb. (1876); Antonio Brandi, G. Aretino (1882) ; G. B. Ristori, Biografia di Guido monaco d' Arezzo (1868).

GUIDO OF SIENA. The name of this Italian painter is of considerable interest in the history of art, on the ground that, if certain assumptions regarding him could be accepted as true, he would be entitled to share with Cimabue, or rather indeed to supersede him in, the honour of having given the first onward impulse to the art of painting. The case stands thus. In the church of S. Domenico in Siena is a large painting of the " Virgin and Child Enthroned," with six angels above, and in the Bene- dictine convent of the same city is a triangular pinnacle, once a portion of the same composition, representing the Saviour in benediction, with two angels; the entire work was originaHy a triptych, but is not so now. The principal section of this picture has a rhymed Latin inscription, giving the painter's name as Gu . . . o de Senis, with the date 122 1: the genuine- ness of the inscription is not, however, free from doubt, and especially it is maintained that the date really reads as 1281. In the general treatment of the picture there is nothing to distinguish it particularly from other work of the same early

period; but the heads of the Virgin and Child are indisputably very superior, in natural character and graceful dignity, to anything to be found anterior to Cimabue. The question there- fore arises, Are these heads really the work of a man who painted in 1 221 ? Crowe and Cavalcaselle pronounce in the negative, concluding that the heads are repainted, and are, as they now stand, due to some artist of the 14th century, perhaps Ugolino da Siena; thus the claims of Cimabue would remain undisturbed and in their pristine vigour. Beyond this, little is known of Guido da Siena. There is in the Academy of Siena a picture assigned to him, a half-figure of the " Virgin and Child," with two angels, dating probably between 1250 and 1300; also in the church of S. Bernardino in the same city a Madonna

dated 1262. Milanesi thinks that the work in S. Domenico is due to Guido Graziani, of whom no other record remains earlier than 1278, when he is mentioned as the painter of a banner. Guido da Siena appears always to have painted on panel, not in fresco on the wall. He has been termed, very dubiously, a pupil of Pietrolino, and the master of " Diotisalvi," Mino da Turrita and Berlinghieri da Lucca.

GUIDO RENI (1575-1642), a prime master in the Bolognese school of painting, and one of the most admired artists of the period of incipient decadence in Italy, was born at Calvenzano near Bologna on the 4th of November 1575. His father was a musician of repute, a player on the flageolet; he wished to bring the lad up to perform on the harpsichord. At a very childish age, however, Guido displayed a determined bent towards the art of form, scribbling some attempt at a drawing here, there and everywhere. He was only nine years of age when Denis Calvart took notice of him, received him into his academy of design by the father's permission, and rapidly brought him forward, so that by the age of thirteen Guido had already at- tained marked proficiency. Albani and Domenichino became soon afterwards pupils in the same academy. With Albani Guido was very intimate up to the earlier period of manhood, but they afterwards became rivals, both as painters and as heads of ateliers, with a good deal of asperity on Albani's part; Domenichino was also pitted against Reni by the policy of Annibale Caracci. Guido was still in the academy of Calvart when he began frequenting the opposition school kept by Lodovico Caracci, whose style, far in advance of that of the Flemish painter, he dallied with. This exasperated Calvart. Him Guido, not yet twenty years of age, cheerfully quitted, transferring himself openly to the Caracci academy, in which he soon became prominent, being equally skilful and ambitious. He had not been a year with the Caracci when a work of his excited the wonder of Agostino and the jealousy of Annibale. Lodovico cherished him, and frequently painted him as an angel, for the youthful Reni was extremely handsome. After a while, however, Lodovico also felt himself nettled, and he patronized the competing talents of Giovanni Barbiere. On one occasion Guido had made a copy of Annibale's " Descent from the Cross"; Annibale was asked to retouch it, and, finding nothing to do, exclaimed pettishly, " He knows more than enough " (" Costui ne sa troppo "). On another occasion Lodovico, con- sulted as umpire, lowered a price which Reni asked for an early picture. This slight determined the young man to be a pupil no more. He left the Caracci, and started on his own account as a competitor in the race for patronage and fame. A renowned work, the story of " Callisto and Diana," had been completed before he left.

Guido was faithful to the eclectic principle of the Bolognese school of painting. He had appropriated something from Calvart, much more from

Lodovico Caracci; he studied with much zest after Albert Diirer; he adopted the massive, sombre and partly uncouth manner of Caravaggio. One day Annibale Caracci made the remark that a style might be formed reversing that of Caravaggio in such matters as the ponderous shadows and the gross common forms; this observation germinated in Guido's mind, and he endeavoured after some such style, aiming constantly at suavity. Towards 1602 he went to Rome with Albani. and Rome remained his headquarters for twenty years.

Here, in the pontificate of Paul V. (Borghese), he was greatly- noted and distinguished. In the garden-house of the Rospigliosi Palace he painted the vast fresco which is justly regarded as his masterpiece — " Phoebus and the Hours preceded by Aurora." This exhibits his second manner, in which he had deviated far indeed from the promptings of Caravaggio. He founded now chiefly upon the antique, more especially the Niobe group and the " Venus de' Medici, " modified by suggestions from Raphael, Correggio, Parmigiano and Paul Veronese. Of this last painter, although on the whole he did not get much from him, Guido was a particular admirer; he used to say that he would rather have been Paul Veronese than any other master — Paul was more nature than art. The " Aurora " is beyond doubt a work of pre-eminent beauty and attainment; it is stamped with pleasurable dignity, and, without being effeminate, has a more uniform aim after graceful selectness than can readily be traced in previous painters, greatly superior though some of them had been in impulse and personal fervour of genius. The pontifical chapel of Montecavallo was assigned to Reni to paint; but, being straitened in payments by the ministers, the artist made off to Bologna. He was fetched back by Paul V. with cere- monious eclat, and lodging, living and equipage were supplied to him. At another time he migrated from Rome to Naples, having received a commission to paint the chapel of ,S. Gennaro. The notorious cabal of three painters resident in Naples — Corenzio, Caracciolo and Ribera — offered, however, as stiff an opposition to Guido as to some other interlopers who preceded and succeeded him. They gave his servant a beating by the hands of two unknown bullies, and sent by him a message to his master to depart or prepare for death; Guido waited for no second warning, and departed. He now returned to Rome; but he finally left that city abruptly, in the pontificate of Urban VIII., in consequence of an offensive reprimand administered to him by Cardinal Spinola. He had received an advance of 400 scudi on account of an altarpiece for St Peter's, but after some lapse of years had made no beginning with the work. A broad reminder from the cardinal put Reni on his mettle; he returned the 400 scudi, quitted Rome

within a few days, and steadily resisted all attempts at recall. He now resettled in Bologna. He had taught as well as painted in Rome, and he left pupils behind him; but on the whole he did not stamp any great mark upon the Roman school of painting, apart from his own numerous works in the papal city.

In Bologna Guido lived in great splendour, and established a celebrated school, numbering more than two hundred scholars. He himself drew in it, even down to his latest years. On first returning to this city, he charged about £21 for a full-length figure (mere portraits are not here in question), half this sum for a half-length, and £5 for a head. These prices must be regarded as handsome, when we consider that Domenichino about the same time received only £10, 10s. for his very large and celebrated picture, the " Last Communion of St Jerome." But Guido's reputation was still on the increase, and in process of time he quintupled his prices. He now left Bologna hardly at all; in one instance, however, he went off to Ravenna, and, along with three pupils, he painted the chapel in the cathedral with his admired picture of the " Israelites gathering Manna." His shining prosperity was not to last till the end. Guido was dissipated, generously but indiscriminately profuse, and an inveterate gambler. The gambling propensity had been his from youth, but until he became elderly it did not noticeably damage his fortunes. It grew upon him, and in a couple of evenings he lost the enormous sum of 14,400 scudi. The vice told still more ruinously on his art than on his character. In his decline he sold his time at so much per hour to certain picture dealers; one of them, the Shylock of his craft, would stand by, watch in hand, and see him work. Half-heartedness, half-per- formance, blighted his product: self-repetition and mere mannerism, with affectation for sentiment and vapidity for beauty, became the art of Guido. Some of these trade-works, heads or half-figures, were turned out in three hours or even

nearly two years; at last he relapsed, and his relapse was followed not long afterwards by his death, caused by malignant fever. This event took place in Bologna on the r8th of August 1642; he died in debt, but was buried with great pomp in the church of S. Domenico.

Guido was personally modest, although he valued himself on his position in the art, and would tolerate no slight in that relation ; he was extremely upright, temperate in diet, nice in his person and his dress. He was fond of stately houses, but could feel also the charm of solitude. In his temper there was a large amount of suspiciousness; and the jealousy which his abilities and his suc- cesses excited, now from the Caracci, now from Albani, now from the monopolizing league of Neapolitan painters, may naturally have kept this feeling in active exercise. Of his numerous scholars, Simone Cantarini, named II Pesarese, counts as the most distin- guished ; he

painted an admirable head of Reni, now in the Bolognese Gallery. The portrait in the Uffizi Gallery of Florence is from Reni's own hand. Two other good scholars were Giacomo Semenza and Francesco Gessi.

The character of Guido's art is so well known as hardly to call for detailed analysis, beyond what we have already intimated. His most characteristic style exhibits a prepense ideal, of form rather than character, with a slight mode of handling, and silvery, some- what cold, colour. In working from the nude he aimed at perfec- tion of form, especially marked in the hands and feet. But he was far from always going to choice nature for his model ; he trans- muted ad libitum, and painted, it is averred, a Magdalene of de- monstrative charms from a vulgar-looking colour-grinder. His best works have beauty, great amenity, artistic feeling and high accomplishment of manner, all alloyed by a certain core of common- place; in the worst pictures the commonplace swamps everything, and Guido has flooded European galleries with trashy and empty pretentiousness, all the more noxious in that its apparent grace of sentiment and form misleads the unwary into approval, and the dilettante dabbler into cheap raptures. Both in Rome and wherever else he worked he introduced increased softness of style, which was then designated as the modern method. His pictures are mostly Scriptural or mythologic in subject, and between two and three hundred of them are to be found in various European col- lections — more than a hundred of these containing life-sized figures. The portraits which he executed are few — those of Sixtus V., Cardinal Spada and the so-called Beatrice Cenci being among the most noticeable. The identity of the last-named portrait is very dubious ; it certainly cannot have been painted direct from Beatrice, who had been executed in Rome before Guido ever resided there. Many etchings are attributed to him — some from his own works, and some after other masters; they are spirited, but rather negligent. Of other works not already noticed, the following should be named: — in Rome (the Vatican), the "Crucifixion of St Peter," an example of the painter's earlier manner; in S. Lorenzo in Lucina, "Christ Crucified"; in Forli, the "Conception"; in Bologna, the " Alms of St Roch " (early), the " Massacre of the Innocents," and the " Pieta, or Lament over the Body of Christ " (in the church of the Mendicanti), which is by many regarded as Guido's prime executive work; in the Dresden Gallery, an " Ecce Homo"; in Milan (Brera Gallery), "Saints Peter and Paul"; in Genoa (church of S. Ambrogio), the "Assumption of the Virgin"; in Berlin, " St Paul the Hermit and St Anthony in the Wilderness." The celebrated picture of " Fortune " (in the Capitol) is one of Reni's finest treatments of female form; as a specimen of male form, the " Samson Drinking from the Jawbone of an Ass " might be named beside it. One of his latest works of mark is the " Ariadne," which used to be in the Gallery of the Capitol. The Louvre contains twenty of his pictures, the National Gallery of London seven, and

others were once there, now removed to other public collections. The most interesting of the seven is the small " Coronation of the Virgin," painted on copper, an elegantly finished work, more pretty than beautiful. It was probably painted before the master quitted Bologna for Rome.

For the life and works of Guido Reni, see Bolognini, Vita di Guido Reni (1839); Passeri, Vite de' pittori; and Malvasia, Felsina. Pittrice; also Lanzi, Storia pittorica. (W. M. R.)

GUIENNE, an old French province which corresponded roughly to the Aquitania Secunda of the Romans and the arch- bishopric of Bordeaux. In the 12th century it formed with Gascony the duchy of Aquitaine, which passed under the dominion of the kings of England by the marriage of Eleanor of Aquitaine to Henry II.; but in the 13th, through the con- quests of Philip Augustus, Louis VIII. and Louis IX., it was confined within the narrower limits fixed by the treaty of Paris (1259). It is at this point that Guienne becomes distinct from Aquitaine. It then comprised the Bordelais (the old countship of Bordeaux), the Bazadais, part of Perigord, Limousin, Quercy and Rouergue, the Agenais ceded by Philip III. (the Bold) to

less. It is said that, tardily wise, Reni left off gambling for] Edward I. (1279), and (still united with Gascony) formed a

duchy extending from the Charente to the Pyrenees. This duchy was held on the terms of homage to the French kings, an onerous obligation; and both in 1296 and 1324 it was con- fiscated by the kings of France on the ground that there had been a failure in the feudal duties. At the treaty of Bretigny (1360) Edward III. acquired the full sovereignty of the duchy of Guienne, together with Aunis, Saintonge, Angoumois and Poitou. The victories of du Guesclin and Gaston Phcebus, count of Foix, restored the duchy soon after to its 13th-century limits. In 145 1 it was conquered and finally united to the French crown by Charles VII. In 1469 Louis XI. gave it in exchange for Champagne and Brie to his brother Charles, duke of Berry, after whose death in 1472 it was again united to the royal dominion. Guienne then formed a government which from the 17 th century onwards was united with Gascony. The government of Guienne and Gascony, with its capital at Bor- deaux, lasted till the end of the ancien regime. Under the Revolution the departments formed from Guienne proper were those of Gironde, Lot-et-Garonne, Dordogne, Lot, Aveyron and the chief part of Tarn-et-Garonne.

*GUIGNES, JOSEPH DE (1721-1800), French orientalist, was born at Pontoise on the 19th of October 1721. He succeeded Fourmont at the Royal Library as secretary interpreter of the Eastern languages. A Memoire historique sur I'origine des Huns et dts Turcs, published by de Guignes in 1748, obtained his admission to the Royal Society of London in 1752, and he became an associate of*he French Academy of Inscriptions in 1754. Two years later he began to publish his learned and laborious Hisloire generate des Huns, des Mongoles, des Turcs el des aulres Tartar es oceidentaux (1 756-1 758); and in 1757 he was appointed to the chair of Syriac at the College de France. He maintained that the Chinese nation had originated in Egyptian colonization, an opinion to which, in spite of every argument, he obstinately clung. He died in Paris in 1800. The Hisloire had been translated into German by Dahnert (1 768-1771). De Guignes left a son, Christian Louis Joseph (1759-1845), who, after learning Chinese from his father, went as consul to Canton, where he spent seventeen years. On his return to France he was charged by the government with the work of preparing a Chinese-French-Latin dictionary (1813). He was also the author of a work of travels {Voyages A Pekin, Manille, et I' tie de France, 1808).*

See Querard, La France litleraire, where a list of the memoirs contributed by de Guignes to the Journal des savants is given.

GUILBERT, YVETTE (1869-), French diseuse, was born in Paris. She served for two years until 1885 in the Magasin du Printemps, when, on the advice of the journalist, Edmond Stoullig, she trained for the stage under Landrol. She made her debut at the Bouffes du Nord, then played at the Varietes, and in 1890 she received a regular engagement at the Eldorado to sing a couple of songs at the beginning of the performance. She also sang at the Ambassadeurs. She soon won an immense vogue by her rendering of songs drawn from Parisian lower-class life, or from the humours of the Latin Quarter, " Quatre z'etudi- ants " and the " Hotel du numiro trois " being among her early triumphs. Her adoption of an habitual yellow dress and long black gloves, her studied simplicity of diction, and her ingenuous delivery of songs charged with risque meaning, made her famous. She owed something to M. Xanrof, who for a long time composed songs especially for her, and perhaps still more to Aristide Bruant, who wrote many of her argot songs. She made successful tours in England, Germany and America, and was in great request as an entertainer in private houses. In 1895 she married Dr M. Schiller. In later years she discarded something of her earlier manner, and sang songs of the " pompadour " and the " crino- line " period in costume. She published the novels. La Vedette and Les Demi-vieilles, both in 1902.

GUILDFORD, a market town and municipal borough, and the county town

of Surrey, England, in the Guildford parlia- mentary division, 29 m. S.W. of London by the London and South Western railway; served also by the London, Brighton, and South Coast and the South Eastern and Chatham railways.

Pop. (1901) 15,938. It is beautifully situated on an acclivity of the northern chalk Downs and on the river Wey. Its older streets contain a number of picturesque gabled houses, with quaint lattices and curious doorways. The ruins of a Norman castle stand finely above the town and are well preserved; while the ground about them is laid out as a public garden. Beneath the Angel Inn and a house in the vicinity are extensive vaults, apparently of Early English date, and traditionally connected with the castle. The church of St Mary is Norman and Early English, with later additions and considerably re- stored; its aisles retain their eastward apses and it contains many interesting details. The church of St Nicholas is a modern building on an ancient site, and that of Holy Trinity is a brick structure of 1763, with later additions, also on the site of an earlier church, from which some of the monuments are preserved, including that of Archbishop Abbot (1640). The town hall dates from 1683 and contains a number of interesting pictures. Other public buildings are the county hall, corn-market and institute with museum and library. Abbot's Hospital, founded by Archbishop Abbot in 16 19, is a beautiful Tudor brick building. The county hospital (1866) was erected as a memorial to Albert, Prince Consort. The Royal Free Grammar School, founded in 1509, and incorporated by Edwa«l VI., is an important school for boys. At Cranleigh,6 m. S.E., is a large middle-class county school. The town has flour mills, iron foundries and breweries, and a large trade in grain; while fairs are held for live stock. There is a manufacture of gunpowder in the neighbouring village of Chilworth. Guildford is a suffragan bishopric in the diocese of Winchester. The borough is under a mayor, 4 aldermen and 12 councillors. Area, 2601 acres.

Guildford (Gyldeford, Geldeford), occurs among the posses- sions of King Alfred, and was a royal borough throughout the middle ages. It probably owed its rise to its position at the junction of trade routes. It is first mentioned as a borough in 1 13 1. Henry III. granted a charter to the men of Guildford in 1256, by which they obtained freedom from toll throughout the kingdom, and the privilege of having the county court held always in their town. Edward III. granted charters to Guildford in 1340, 1346 and 1367; Henry VI. in 1423; Henry VII. in 1488. Elizabeth in 1580 confirmed earlier charters, and other charters were granted in 1603, 1626 and 1686. The borough was incorporated in i486 under the title of the mayor and good men of Guildford. During the middle ages the govern- ment of the town rested with a powerful merchant gild. Two members for Guildford sat in the parliament of 1295, and the borough continued to

return two representatives until 1867 when the number was reduced to one. By the Redistribution Act of 1885 Guildford became merged in the county for electoral purposes. Edward II. granted to the town the right of having two fairs, at the feast of St Matthew (21st of September) and at Trinity respectively. Henry VII. granted fairs on the feast of St Martin (nth of November) and St George (23rd of April). Fairs in May for the sale of sheep and in November for the sale of cattle are still held. The market rights date at least from 1276, and three weekly markets are still held for the sale of corn, cattle and vegetables respectively. The cloth trade which formed the staple industry at Guildford in the middle ages is now extinct.

GUILDHALL, the hall of the corporation of the city of London, England. It faces a courtyard opening out of Gresham Street. The date of its original foundation is not known. An ancient crypt remains, but the hall has otherwise undergone much alteration. It was rebuilt in 141 1, beautified by the muni- ficence of successive officials, damaged in the Great Fire of 1666, and restored in 1789 by George Dance; while the hall was again restored, with a new roof, in 1870. This fine chamber, 152 ft. in length, is the scene of the state banquets and enter- tainments of the corporation, and of the municipal meetings " in common hall." The building also contains a council chamber and various court rooms, with a splendid library, open to the public, a museum and art gallery adjoining. The hall contains several monuments and two giant figures of wood,

known as Gog and Magog. These were set up in 1708, but the appearance of giants in city pageants is of much earlier date.

GUILFORD, BARONS AND EARLS OF. Francis North, 1st Baron Guilford (1637-1685), was the third son of the 4th Baron North (see North, Barons), and was created Baron Guilford in 1683, after becoming lord keeper in succession to Lord Nottingham. He had been an eminent lawyer, solicitor- general (1671), attorney-general (1673), and chief-justice of the common pleas (1675), and in 1679 was made a member of the council of thirty and on its dissolution of the cabinet. He was a man of wide culture and a stanch royalist. In 1672 he married Lady Frances Pope, daughter and co-heiress of the earl of Downe, who inherited the Wroxton estate; and he was suc- ceeded as 2nd baron by his son Francis (1673-17 29), whose eldest son Francis (1704-1790), after inheriting first his father's title as 3rd baron, and then (in 1734) the barony of North from his kinsman the 6th Baron North, was in 1752 created 1st earl of Guilford. His first wife was a daughter of the earl of Halifax, and his son and successor Frederick

was the English prime minister, commonly known as Lord North, his courtesy title while the 1st earl was alive.

Frederick North, 2nd earl of Guilford, but better known by his courtesy title of Lord North (1732-1792), prime minister of England during the important years of the American War, was born on the 13th of April 1732, and after being educated at Eton and Christ Church, Oxford, was sent to make the grand tour of the continent. On his return he was, though only twenty-two years of age, at once elected M.P. for Banbury, of which town his father was high steward; and he sat for the same town in parliament for nearly forty years. In 1759 he was chosen by the duke of Newcastle to be a lord of the treasury, and continued in the same office under Lord Bute and George Grenville till 1765. He had shown himself such a ready debater that on the fall of the first Rockingham ministry in 1766 he was sworn of the privy council, and made paymaster-general by the duke of Grafton. His reputation for ability grew so high that in December 1767, on the death of the brilliant Charles Towns- hend, he was made chancellor of the exchequer. His popularity with both the House of Commons and the people continued to increase, for his temper was never ruffled, and his quiet humour perpetually displayed; and, when the retirement of the duke of Grafton was necessitated by the hatred he inspired and the attacks of Junius, no better successor could be found for the premiership than the chancellor of the exchequer. Lord North succeeded the duke in March 1770, and continued in office for twelve of the most eventful years in English history. George III. had at last overthrown the ascendancy of the great Whig families, under which he had so long groaned, and determined to govern as well as rule. He knew that he could only govern by obtaining a majority in parliament to carry out his wishes, and this he had at last obtained by a great expenditure of money in buying seats and by a careful exfercise of his patronage. But in addition to a majority he must have a minister who would consent to act as his lieutenant, and such a minister he found in Lord North. How a man of undoubted ability such as Lord North was could allow himself to be thus used as a mere in- strument cannot be explained; but the confidential tone of the king's letters seems to show that there was an unusual intimacy between them, which may account for North's compliance. The path of the minister in parliament was a hard one; he had to defend measures which he had not designed, and of which he had not approved, and this too in a House of Commons in which all the oratorical ability of Burke and Fox was against him, and when he had only the purchased help of Thurlow and Wedderburne to aid him. The most important events of his ministry were those of the American War of Independence. He cannot be accused of causing it, but one of his first acts was the retention of the tea-duty, and he it was also who introduced the Boston Port Bill in 1774. When the war had broken out he earnestly

counselled peace, and it was only the earnest solici- tations of the .king not to leave his sovereign again at the mercy of the Whigs that induced him to defend a war which from 1779

he knew to be both hopeless and impolitic. At last, in March 1782, he insisted on resigning after the news of Cornwallis's surrender at Yorktown, and no man left office more blithely. He had been well rewarded for his assistance to the king: his children had good sinecures; his half-brother, Brownlow North (1 741-1820), was bishop of Winchester; he himself was chan- cellor of the university of Oxford, lord-lieutenant of the county of Somerset, and had finally been made a knight of the Garter, an honour which has only been conferred on three other members of the House of Commons, Sir R. Walpole, Lord Castlereagh and Lord Palmerston. Lord North did not remain long out of office, but in April 1783 formed his famous coalition with his old subordinate, C. J. Fox (q.v.), and became secretary of state with him under the nominal premiership of the duke of Portland. He was probably urged to this coalition with his old opponent by a desire to show that he could act independently of the king, and was not a mere royal mouthpiece. The coalition ministry went out of office on Fox's India Bill in December 1783, and Lord North, who was losing his sight, then finally gave up political ambition. He played, when quite blind, a somewhat important part in the debates on the Regency Bill in 1 789, and in the next year succeeded his father as earl of Guilford. He did not long survive his elevation, and died peacefully on the 5th of August 1792. It is impossible to consider Lord North a great statesman, but he was a most good-tempered and humorous member of the House of Commons. In a time of unexampled party feeling he won the esteem and almost the love of his most bitter opponents. Burke finely sums up his character in his Letter to a Noble Lord: " He was a man of admirable parts, of general knowledge, of a versatile understanding, fitted for every sort of business; of infinite wit and pleasantry, of a delightful temper, and with a mind most disinterested. But it would be only to degrade myself," he continues, " by a weak adulation, and not to honour the memory of a great man, to deny that he wanted something of the vigilance and spirit of command which the times required."

By his wife Anne (d. 1797), daughter of George Speke of White Lackington, Somerset, Guilford had four sons, the eldest of whom, George Augustus (1757-1802), became 3rd earl on his father's death. This earl was a member of parliament from 1778 to 1792 and was a member of his father's ministry and also of the royal household; he left no sons when he died on the 20th of April 1802 and was succeeded in the earldom by his brother Francis (1761-1817), who also left no sons. The youngest brother, Frederick (1766-1827), who now became 5th earl of Guilford, was remarkable for his great knowledge and love of Greece and of the Greek

language. He had a good deal to do with the foundation of the Ionian university at Corfu, of which he was the first chancellor and to which he was very liberal. Guilford, who was governor of Ceylon from 1798 to 1805, died unmarried on the 14th of October 1827. His cousin, Francis (1772-1861), a son of Brownlow North, bishop of Winchester from 1781 to 1820, was the 6th earl, and the latter's descendant, Frederick George (b. 1876), became 8th earl in 1886.

On the death of the 3rd earl of Guilford in 1802 the barony of North fell into abeyance between his three daughters, the survivor of whom, Susan (1797-1884), wife of John Sidney Doyle, who took the name of North, was declared by the House of Lords in 1841 to be Baroness North, and the title passed to her son, William Henry John North, the nth baron (b. 1836) (see North, Barons).

For the Lord Keeper Guilford see the Lives by the Hon. R. North, edited by A. Jessopp (1890) ; and E. Foss, The Judges of England, vol. vii. (1848-1864). For the prime minister, Lord North, see Correspondence of George III. with Lord North, edited by W. B. Donne (1867) ; Horace Walpole, Journal of the Reign of George III. (1859), and Memoirs of the Reign of George III., edited by G. F. R. Barker (1894); Lord Brougham, Historical Sketches of Statesmen, vol. i. (1839); Earl Stanhope, History of England (1858); Sir T. E. May, Constitutional History of England (1863-1865); and W. E. H. Lecky, History of England in the 18th century (1878-1890).

GUILFORD, a township, including a borough of the same name, in New Haven county, Connecticut, U.S.A., on Long Island Sound and at the mouth of the Menunkatuck or West

river, about 16 m. E. by S. of New Haven. Pop. of the township, including the borough (1900), 2785, of whom 387 were foreign- born; (iqio) 3001; pop. of the borough (1910), 1608. The borough is served by the New York, New Haven & Hartford railroad. On a plain is the borough green of nearly 12 acres, which is shaded by some fine old elms and other trees, and in which there is a soldiers' monument. About the green are several churches and some of the better residences. On an eminence commanding a fine view of the Sound is an old stone house, erected in 1639 for a parsonage, meeting-house and fortification; it was made a state museum in 1898, when extensive alterations were made to restore the interior to its original appearance. The Point of Rocks, in the harbour, is an attractive resort during the summer season. There are about 12 ft. of water on the harbour bar at high tide. The principal industries of Guilford are coastwise trade,

the manufacture of iron castings, brass castings, wagon wheels and school furniture, and the canning of vegetables. Near the coast are quarries of fine granite; the stone for the pedestal of the Statue of Liberty on Bedloe's Island, in New York Harbour, was taken from them.

Guilford was founded in 1639 as an independent colony by a company of twenty-five or more families from Kent, Surrey and Sussex, England, under the leadership of Rev. Henry Whit- field (1597-1657). While still on shipboard twenty-five members of the company signed a plantation covenant whereby they agreed not to desert the plantation which they were about to establish. Arriving at New Haven early in July 1639, they soon began negotiations with the Indians for the purchase of land, and on the 29th of September a deed was signed by which the Indians conveyed to them the territory between East River and Stony Creek for "12 coates, 12 Fathoms of Wampam, 12 glasses (mirrors), 12 payer of shooes, 12 Hatchetts, 12 paire of Stockings, 12 Hooes, 4 kettles, 12 knives, 12 Hatts, 12 Por- ringers, 12 spoones, and 2 English coates." Other purchases of land from the Indians were made later. Before the close of the year the company removed from New Haven and established the new colony; it was known by the Indian name Menuncatuck for about four years and the name Guilford (from Guildford, England) was then substituted. As a provisional arrangement, civil power for the administration of justice and the preservation of the peace was vested in four persons until such time as a church should be organized. This was postponed until 1643 when considerations of safety demanded that the colony should become a member of the New Haven Jurisdiction, and then only to meet the requirements for admission to this union were the church and church state modelled after those of New Haven. Even then, though suffrage was restricted to church members, Guilford planters who were not church members were required to attend town meetings and were allowed to offer objections to any proposed order or law. From 1661 until the absorption of the members of the New Haven Jurisdiction by Connecticut, in 1664, William Leete (1611-1683), one of the founders of Guilford, was governor of the Jurisdiction, and under his leader- ship Guilford took a prominent part in furthering the sub- mission to Connecticut, which did away with the church state and the restriction of suffrage to freemen. Guilford was the birthplace of Fitz-Greene Halleck (1790-1867), the poet; of Samuel Johnson (1696-1771), the first president of King's College (now Columbia University) ; of Abraham Baldwin (1754-1807), prominent as a statesman and the founder of the University of Georgia; and of Thomas Chittenden, the first governor of Vermont. The borough was incorporated in 181 5.

See B. C. Steiner, A History of the Plantation of Menunca-Tuck and of the Original Town of Guilford, Connecticut (Baltimore, 1897), and Proceedings at the Celebration of the 250th Anniversary of the Settlement

of Guilford, Connecticut (New Haven, 1889).

GUILLAUME, JEAN BAPTISTE CLAUDE EUGENE (1822- 1905), French sculptor, was born at Montbard on the 4th of July 1822, and studied under Cavelier, Millet, and Barrias, at the Ecole des Beaux-Arts, which he entered in 1841, and where he gained the prix de Rome in 1845 with " Theseus finding on a

rock his Father's Sword." He became director of the Ecole des Beaux-Arts in 1864, and director-general of Fine Arts from 1878 to 1879, when the office was suppressed. Many of his works have been bought for public galleries, and his monuments are to be found in the public squares of the chief cities of France. At Rheims there is his bronze statue of " Colbert," at Dijon his " Rameau " monument. The Luxembourg Museum has his " Anacreon " (1852), " Les Gracques " (1853), " Faucheur " (1855), and the marble bust of " Mgr Darboy "; the Versailles Museum the portrait of " Thiers "; the Sorbonne Library the marble bust of " Victor le Clerc, doyen de la faculte des lettres." Other works of his are at Trinity Church, St Germain l'Auxerrois, and the church of St Clotilde, Paris. Guillaume was a prolific writer, principally on sculpture and architecture of the Classic period and of the Italian Renaissance. He was elected member of the Academie Francaise in 1862, and in 1891 was sent to Rome as director of the Academie de France in that city. He was also elected an honorary member of the Royal Academy, London, 1869, on the institution of that class.

GUILLAUME DE LORRIS (fl. 1230), the author of the earlier , section of the Roman de la rose, derives his surname from a small town about equidistant from Montargis and Gien, in the present department of Loiret. This and the fact of his authorship may be said to be the only things positively known about him. The rubric of the poem, where his own part finishes, attributes Jean de Meun's continuation to a period forty years later than William's death and the consequent interruption of the romance. Arguing backwards, this death used to be put at about 1260; but Jean de Meun's own work has recently been dated earlier, and so the composition of the first part has been thrown back to a period before 1 240. The author represents himself as having dreamed the dream which furnished the substance of the poem in his twentieth year, and as having set to work to " rhyme it " five years later. The later and longer part of the Roman shows signs of greater intellectual vigour and wider knowledge than the earlier and shorter, but Guillaume de Lorris is to all appearance more original. The great features of his four or five thousand lines are, in the first place, the extraordinary vividness and beauty of his word-pictures, in which for colour, freshness and individuality he has not many rivals except in the greatest masters, and, secondly, the fashion of allegorical presentation,

which, hackneyed and wearisome as it afterwards became, was evidently in his time new and striking. There are of course traces of it before, as in some romances, such as those of Raoul de Houdenc, in the troubadours, and in other writers; but it was unquestionably Guillaume de Lorris who fixed the style.

For an attempt to identify Guillaume de Lorris see L. Jarry, Guillaume de Lorris et le testament d'Alphonse de Poitiers (1881). Also Paulin Paris in the Hist. lift, de la France, vol. xxiii.

GUILLAUME DE PALERME (William of Palerne), hero of romance. The French verse romance was written at the desire of a Countess Yolande, generally identified with Yolande, daughter of Baldwin IV., count of Flanders. The English poem in alliterative verse was written about 1350 by a poet called William, at the desire of Humphrey Bohun, earl of Hereford, (d. 1 361). Guillaume, a foundling supposed to be of low degree, is brought up at the court of the emperor of Rome, and loves his daughter Melior who is destined for a Greek prince. The lovers flee into the woods disguised in bear-skins. Alfonso, who is Guillaume's cousin and a Spanish prince, has been changed into a wolf by his step-mother's enchantments. He provides food and protection for the fugitives, and Guillaume eventually triumphs over Alfonso's father, and wins back from him his kingdom. The benevolent werwolf is disenchanted, and marries Guillaume's sister.

See Guillaume de Palerne, ed. H. Michelant (Soc. d. anc. textes fr., 1876); Hist. litt. de la France, xxii. 829; William of Palerme, ed. Sir F. Madden (Roxburghe Club, 1832), and W. W. Skeat (E. E. Text Soc., extra series No. I, 1867); M. Kaluza, in Eng. Studien (Heilbronn, iv. 196). The prose version of the French romance, printed by N. Bonfons, passed through several editions.

GUILLAUME D'ORANGE (d. 812), also known as Guillaume Fierabrace, St Guillaume de Gellone, and the Marquis au court

nez, was the central figure of the southern cycle of French romance, called by the trouveres the geste of Garin de Monglane. The cycle of Guillaume has more unity than the other great cycles of Charlemagne or of Doon de Mayence, the various poems which compose it forming branches of the main story rather than independent epic poems. There exist numerous cyclic MSS. in which there is an attempt at presenting a con- tinuous histoire poelique of Guillaume and his family. MS. Royal 20 D xi. in the

British Museum contains eighteen chansons of the cycle. Guillaume, son of Thierry or Theodoric and of Aide, daughter of Charles Martel, was born in the north of France about the middle of the 8th century. He became one of the best soldiers and trusted counsellors of Charlemagne, and in 790 was made count of Toulouse, when Charles's son Louis the Pious was put under his charge. He subdued the Gascons, and defended Narbonne against the infidels. In 793 Hescham, the successor of Abd-al-Rahman II., proclaimed a holy war against the Christians, and collected an army of 100,000 men, half of which was directed against the kingdom of the Asturias, while the second invaded France, penetrating as far as Narbonne. Guillaume met the invaders near the river Orbieux, at Villedaigne, where he was defeated, but only after an obstinate resistance which so far exhausted the Saracens that they were compelled to retreat to Spain. He took Barcelona from the Saracens in 803, and in the next year founded the monastery of Gellorie (now Saint Guilhem-le Desert), of which he became a member in 806. He died there in the odour of sanctity on the 28th of May 812.

No less than thirteen historical personages bearing the name of William (Guillaume) have been thought by various critics to have their share in the formation of the legend. William, count of Provence, son of Boso II., again delivered southern France from a Saracen invasion by his victory at Fraxinet in 973, and ended his life in a cloister. William Tow-head (Tele d'eloupe), duke of Aquitaine (d. 983), showed a fidelity to Louis IV. paralleled by Guillaume d'Orange's service to Louis the Pious. The cycle of twenty or more chansons which form the geste of Guillaume reposes on the traditions of the Arab invasions of the south of France, from the battle of Poitiers (732) under Charles Martel onwards, and on the French conquest of Catalonia from the Saracens. In the Norse version of the Carolingian epic Guillaume appears in his proper historical environment, as a chief under Charlemagne; but he plays a leading part in the Couronnement Looys, describing the formal associations of Louis the Pious in the empire at Aix (813, the year after Guil- laume's death), and after the battle of Aliscans it is from the emperor Louis that he seeks reinforcements. This anachronism arises from the fusion of the epic Guillaume with the champion of Louis IV., and from the fact that he was the military and civil chief of Louis the Pious, who was titular king of Aquitaine under his father from the time when he was three years old. The inconsistencies between the real and the epic Guillaume are often left standing in the poems. The personages associated with Guillaume in his Spanish wars belong to Provence, and have names common in the south. The most famous of these are Beuves de Comarchis, Ernaud de Girone, Garin d'Anseun, Aimer le chetif , so called from his long captivity with the Saracens. The separate existence of Aimer, who refused to sleep under a roof, and spent his whole life in warring against the infidel, is proved. He was Hadhemar, count of

Narbonne, who in 809 and 810 was one of the leaders sent by Louis against Tortosa. No doubt the others had historical prototypes. In the hands of the trouveres they became all brothers of Guillaume, and sons of Aymeri de Narbonne, 1 the grandson of Garin de Monglane, and his wife Ermenjart. Nevertheless when Guillaume seeks help from Louis the emperor he finds all his relations in Laon, in accordance with his historic Frankish origin.

1 The poem of Aymeri de Narbonne contains the account of the young Aymeri's brilliant capture of Narbonne, which he then receives as a fief from Charlemagne, of his marriage with Ermenjart, sister of Boniface, king of the Lombards, and of their children. The fifth daughter, Blanchefleur, is represented as the wife of Louis the Pious. The opening of this poem furnished, though indirectly, the matter of the Aymerillot of Victor Hugo's Legende des si'ecles.

The central fact of the geste of Guillaume is the battle of the Archamp or Aliscans, in which perished Guillaume's heroic nephew, Vezian or Vivien, a second Roland. At the eleventh hour he summoned Guillaume to his help against the overwhelm- ing forces of the Saracens. Guillaume arrived too late to help Vivien, was himself defeated, and returned alone to his wife Guibourc, leaving his knights all dead or prisoners. This event is related in a Norman-French transcript of an old French chanson de geste, the Ckancun de Willame — which only was brought to light in 1901 at the sale of the books of Sir Henry Hope Edwardes — in the Covenant Vivien, a recension of an older French chanson and in Aliscans. Aliscans continues the story, telling how Guillaume obtained reinforcements from Laon, and how, with the help of the comic hero, the scullion Rainouart or Rennewart, he avenged the defeat of Aliscans and his nephew's death. Rainouart turns out to be the brother of Guillaume's wife Guibourc, who was before her marriage the Saracen princess and enchantress Orable. Two other poems are consecrated to his later exploits, La Bataille Loquifer, the work of a French Sicilian poet, Jendeu de Brie (fl. 1170), undLeMoniage Rainouart. The staring-point of Herbert le due of Dammartin (fl. n 70) in Foucon de Candie (Candie = Gandia in Spain ?) is the return of Guillaume from the battle; and the Italian compilation / Nerbonesi, based on these and other chansons, seems in some cases to represent an earlier tradition than the later of the French chansons, although its author Andrea di Barberino wrote towards the end of the 14th century. The minnesinger Wolfram von Eschenbach based his Willehalm on a French original which must have differed from the versions we have. The variations in the story of the defeat of Aliscans or the Archant, and the numerous inconsistencies of the narratives even when considered separately have occupied many critics. Aliscans (Aleschans, Alyscamps, Elysii Campi) was, however, generally taken to represent the battle of Villedaigne, and to take its name from the

famous cemetery outside Aries. Wolfram von Eschenbach even mentions the tombs which studded the field of battle. Indications that this tradition was not unassailable were not lacking before the discovery of the Chancunde Willame, which, although preserved in a very corrupt form, represents the earliest recension we have of the story, dating at least from the begin- ning of the 1 2th century. It seems probable that the Archant was situated in Spain near Vivien's headquarters at Tortosa, and that Guillaume started from Barcelona, not from Orange, to his nephew's help. The account of the disaster was modified by successive trouveres, and the uncertainty of their methods may be judged by the fact that in the Chancun de Willame two con- secutive accounts (n. 450-1326 and n. 1326-2420) of the fight appear to be set side by side as if they were separate episodes. Le Couronnement Looys, already mentioned, Le Charroi de Nfmes (12th century) in which Guillaume, who had been forgotten in the distribution of fiefs, enumerates his services to the terrified Louis, and Aliscans (12th century), with the earlier Chancun, are among the finest of the French epic poems. The figure of Vivien is among the most heroic elaborated by the trouveres, and the giant Rainouart has more than a touch of Rabelaisian humour.

The chansons de geste of the cycle of Guillaume are: Enfances Garin de Monglane (15th century) and Garin de Monglane (13th century), on which is founded the prose romance of Guerin de Monglane, printed in the 15th century by Jehan Trepperel and often later; Girars de Viane (13th century, by Bertrand de Bar- sur-Aube), ed. P. Tarbe (Reims, 1850); Hernaut de Beaulande (fragment 14th century) ; Renter de Gennes, which only survives in its prose form; Avmeri de Narbonne (c. 1 2 10) by Bertrand de Bar-sur-Aube, ed. L. Demaison (Soc. desanc. textes fr., Paris, 2 vols., 1S87); Les Enfances Guillaume (13th century); Les Narbonnais, ed. H. Suchier (Soc. des anc. textes fr., 2 vols., 1898), with a Latin fragment dating from the nth century, preserved at the Hague; Le Couronnement Looys (ed. E. Langlois, 1888), Le Charroi de Nimes, La Prise d' Orange, Le Covenant Vivien, Aliscans, which were edited by W. J. A. Jonckbloet in vol. i. of his Guillaume d'Orange (The Hague, 1854); a critical text of Aliscans (Halle, 1903, vol. i.) is edited by E. Wienbeck, W. Hartnacke and P. Rasch ; Loquifer and Le Moniage Rainouart (12th century) ; Bovon de Commarchis (13th century), recension of the earlier Siege de Barbastre, by Adenˆs li

Rois, ed. A. Scheler (Brussels, 1874); Guibert d'Andrenas (13th century); La Prise de Cordres (13th century); La Mort Aimeri de Narbonne, ed. J.

Couraye de Pare (Soc. des Anciens Textes francais, Paris, 1884); Foulque de Candle (ed. P. Tarbe\ Reims, i860); Le Montage Guillaume (12th century); Les Enfances Vivien (ed. C. Wahlund and H. v. Feilitzen, Upsala and Paris, 1895); Chancun de Willame (Chiswick Press, 1903), described by P. Meyer in Romania (xxxiii. 597-618). The ninth branch of the Karlamagnus Saga (ed. C. R. Unger, Christiania, i860) deals with the geste of Guillaume. I Nerbonesi is edited by J. G. Isola (Bologna, 1877, &c).

See C. ReVillout, Etude hist, et lilt, sur la vita sancti Willelmi (Montpellier, 1876); W. J. A. Jonckbloet, Guillaume d'Orange (2 vols., 1854, The Hague); L. Clarus (ps. for W. Volk), Herzog Wilhelm von Aquitanien (Miinster, 1865); P. Paris, in Hist. litt. de la France (vol. xxii., 1852); L. Gautier, Epopees francaises (vol. iv., 2nd ed., 1882); R. Weeks, The newly discovered Chancun de Willame (Chicago, 1904); A. Thomas, Lltudes romanes (Paris, 1891), on Vivien; L. Saltet, " S. Vidian de Martres-Tolosanes " in Bull, de litt. eccles. (Toulouse, 1902) ; P. Becker, Die altfrz. Wilhelmsage u. ihre Beziehung zu Wilhelm dem Heiligen (Halle, 1896), and Der siidfranzosische Sagenkreis und seine Probleme (Halle, 1898); A. Jeanroy, " Etudes sur le cycle de Guillaume au court nez " (in Romania, vols. 25 and 26, 1896-1897); H. Suchier, " Recherches sur . . . Guillaume d'Orange " (in Romania, vol. 32, 1903). The conclusions arrived at by earlier writers are combated by Joseph BeVlier in the first volume, " Le Cycle de Guillaume d'Orange " (1908), of his Legendes epiques, in which he constructs a theory that the cycle of Guillaume d'Orange grew up round the various shrines on the pilgrim route to Saint Gilles of Provence and Saint James of Compostella — that the chansons de geste were, in fact, the product of nth and 12th century trouveres, exploiting local ecclesiastical traditions, and were not developed from earlier poems dating back perhaps to the lifetime of Guillaume of Toulouse, the saint of Gellone.

GUILLEMOT (Fr. guillemot l), the name accepted by nearly all modern authors for a sea-bird, the Colymbus troile of Linnaeus and the Uria troile of Latham, which nowadays it seems seldom if ever to bear among those who, from their voca- tion, are most conversant with it, though, according to Willughby and Ray his translator, it was in their time so called " by those of Northumberland and Durham." Around the coasts of Britain it is variously known as the frowl, kiddaw or skiddaw, langy (cf. Ice. Langvia), lavy, marrock, murre, scout (cf. Coot), scuttock, strany, tinker or tinkershire and willock. In former days the guillemot yearly frequented the cliffs on many parts of the British coasts in countless multitudes, and this is still the case in the northern parts of the United Kingdom; but more to the southward nearly all its smaller settlements have been rendered utterly desolate by the wanton and cruel destruc- tion of their tenants during the breeding season, and even the inhabitants of those which were more crowded had become so thinned that, but for the intervention of the Sea

Birds Preserva- tion Act (32 & 33 Vict. cap. 17), which provided under penalty for the safety of this and certain other species at the time of year when they were most exposed to danger, they would un- questionably by this time have been exterminated so far as England is concerned.

Part of the guillemot's history is still little understood. We know that it arrives at its wonted breeding stations on its accustomed day in spring, that it remains there till, towards the end of the summer, its young are hatched and able, as they soon are, to encounter the perils of a seafaring life, when away go all, parents and progeny. After that time it commonly happens that a few examples are occasionally met with in bays and shallow waters. Tempestuous weather will drive ashore a large number in a state of utter destitution — many of them indeed are not unfrequently washed up dead — but what becomes of the bulk of the birds, not merely the comparatively few thousands that are natives of Britain, but the tens and hundreds of thousands, not to say millions, that are in summer denizens of more northern latitudes, no one can say. This mystery is not peculiar to the guillemot, but is shared by all the Alcidae that inhabit the Atlantic Ocean. Examples stray every season across the Bay of

1 The word, however, seems to be cognate with or derived from the Welsh and Manx Guillem, or Gwilym as Pennant spells it. The association may have no real meaning, but one cannot help com- paring the resemblance between the French guillemot and Guillaume with that between the English willock (another name for the bird) and William.

Biscay, are found off the coasts of Spain and Portugal, enter the Mediterranean and reach Italian waters, or, keeping farther south, may even touch the Madeiras, Canaries or Azores; but these bear no proportion whatever to the mighty hosts of whom they are literally the " scouts," and whose position and move- ments they no more reveal than do the vedettes of a well- appointed army. The common guillemot of both sides of the Atlantic is replaced farther northward by a species with a stouter bill, the U. arra or U. bruennichi of ornithologists, and on the west coast of North America by the U. calif ornica. The habits of all these are essentially the same, and the structural resem- blance between all of them and the Auks is so great that several systematists have relegated them to the genus Alca, confining the genus Uria to the guillemots of another group, of v/hich the type is the U. grylla, the black guillemot of British authors, the dovekey or Greenland dove of sailors, the tysty of Shetlanders. This bird assumes in summer an entirely black plumage with the exception of a white patch on each wing, while in winter it is beautifully marbled with white and black. Allied to it as species or geographical races are the U. mandti, U. columba and U. carbo. All these differ from the larger guillemots by laying two or three eggs, which are generally placed in some secure niche, while the

members of the other group lay but a single egg, which is invariably exposed on a bare ledge. (A. N.)

GUILLOCHE, a French word for an ornament, either painted or carved, which was one of the principal decorative bands employed by the Greeks in their temples or on their vases. Guilloches are single, double or triple; they consist of a series of circles equidistant one from the other and enclosed in a band which winds round them and interlaces. This guilloche is of Asiatic origin and was largely employed in the decoration of the Assyrian palaces, where it was probably copied from Chaldaean work, as there is an early example at Erech which dates from the time of Gudea (2294 B.C.). The ornament as painted by the Greeks has almost entirely disappeared, but traces are found in the temple of Nemesis at Rhamnus; and on the terra-cotta slabs by which the timber roofs of Greek temples were protected, it is painted in colours which are almost as brilliant as when first produced, those of the Treasury of Gela at Olympia being of great beauty. These examples are double guilloches, with two rows of circles, each with an independent interlacing band and united by a small arc with palmette inside; in both the single and double guilloches of Greek work there is a flower in the centre of the circles. In the triple guilloche, the centre row of circles comes half-way between the others, and the enclosing band crosses diagonally both ways, interlacing alternately. The best example of the triple guilloche is that which is carved on the torus mould- ing of the base and on the small convex moulding above the echinus of the capitals of the columns of the Erechtheum at Athens. It was largely employed in Roman work, and the single guilloche is found almost universally as a border in mosaic pavements, not only in Italy but throughout Europe. In the Renaissance in Italy it was also a favourite enrichment for borders and occasionally in France and England.

GUILLON, MARIE NICOLAS SYLVESTRE (1760-1847), French ecclesiastic, was born in Paris on the 1st of January 1760. He was librarian and almoner in the household of the princess de Lamballe, and when in 1792 she was executed, he fled to the provinces, where under the name of Pastel he practised medicine. A man of facile conscience, he afterwards served in turn under Napoleon, the Bourbons and the Orleanists, and became canon of St Denis, bishop of Morocco and dean of the Sorbonne.

Among his many literary works are a Collection, des brefs du pape Pie VI (1798), Bibliotheque choisie des peres gre.es et latins (1822, 26 vols.) and a French translation of Cyprian with notes (1837, 2 vols.).

GUILLOTINE, the instrument for inflicting capital punish- ment by decapitation, introduced into France at the period of the Revolution. It

consists of two upright posts surmounted by a cross beam, and grooved so as to guide an oblique-edged knife, the back of which is heavily weighted to make it fall swiftly and with force when the cord by which it is held aloft is let go. Some

ascribe the invention of the machine to the Persians; and previous to the period when it obtained notoriety under its present name it had been in use in Scotland, England and various parts of the continent. There is still preserved in the antiquarian museum of Edinburgh the rude guillotine called the " maiden " by which the regent Morton was decapitated in 1581. The last persons decapitated by the Scottish " maiden " were the marquis of Argyll in 1661 and his son the earl of Argyll in 1685. It would appear that no similar machine was ever in general use in England; but until 1650 there existed in the forest of Hardwick, which was coextensive with the parish of Halifax, West Riding, Yorkshire, a mode of trial and execution called the gibbet law, by which a felon convicted of theft within the liberty was sentenced to be decapitated by a machine called the Halifax gibbet. A print of it is contained in a small book called Halifax and its Gibbet Law (1708), and in Gibson's edition of Camden's Britannia (1722). In Germany the machine was in general use during the middle ages, under the name of the Diele, the Hobel or the Dolabra. Two old German engravings, the one by George Penez, who died in 1550, and the other by Heinrich Aldegrever, with the date 1553, represent the death of a son of Titus Manlius by a similar instrument, and its employment for the execution of a Spartan is the subject of the engraving of the eighteenth symbol in the volume entitled Symbolicae quaesliones de universo genere, by Achilles Bocchi (1555). From the 13th century it was used in Italy under the name of Mannaia for the execution of criminals of noble birth. The Chronique de Jean d' Anton, first published in 1835, gives minute details of an execution in which it was employed at Genoa in 1507; and it is elaborately described by Pere Jean Baptiste Labat in his Voyage en Espagne et en Italie en 1730. It is mentioned by Jacques, viscomte de Puysegur, in his Memoires as in use in the south of France, and he describes the execution by it of Marshal Mont- morency at Toulouse in 1632. For about a century it had, how- ever, fallen into general disuse on the continent; and Dr Guillotine, who first suggested its use in modern times, is said to have obtained his information regarding it from the description of an execution that took place at Milan in 1702, contained in an anonymous work entitled Voyage historique et politique de Suisse, d'ltalie, et d'Allemagne.

Guillotine, who was born at Saintes, May 28, 1738, and elected to the

Constituent Assembly in 1780, brought forward on the 1 st December of that year two propositions regarding capital punishment, the second of which was that, " in all cases of capital punishment it shall be of the same kind — that is, decapita- tion — and it shall be executed by means of a machine." The reasons urged in support of this proposition were that in cases of capital punishment the privilege of execution by decapitation should no longer be confined to the nobles, and that it was desirable to render the process of execution as swift and painless as possible. The debate was brought to a sudden termination in peals of laughter caused by an indiscreet reference of Dr Guillotine to his machine, but his ideas seem gradually to have leavened the minds of the Assembly, and after various debates decapitation was adopted as the method of execution in the penal code which became law on the 6th October 1791. At first it was intended that decapitation should be by the sword, but on account of a memorandum by M. Sanson, the executioner, pointing out the expense and certain other inconveniences attending that method, the Assembly referred the question to a committee, at whose request Dr Antoine Louis, secretary to the Academy of Surgeons, prepared a memorandum on the subject. Without mentioning the name of Guillotine, it recommended the adoption of an instrument similar to that which was formerly suggested by him. The Assembly decided in favour of the report, and the contract was offered to the person who usually provided the instruments of justice; but, as his terms were considered exorbitant, an agreement was ultimately come to with a German of the name of Schmidt, who, under the direction of M. Louis, furnished a machine for each of the French departments. After satisfactory experiments had been made with the machine on several dead bodies in the hospital of Bicetre, it was erected on

the Place de Greve for the execution of the highwayman Pelletier on the 25th April 1792. While the experiments regarding the machine were being carried on, it received the name Louisette or La Petite Louison, but the mind of the nation seems soon to have reverted to Guillotine, who first suggested its use; and in the Journal des revolutions de Paris for 28th April 1702 it is mentioned as la guillotine, a name which it thenceforth bore both popularly and officially. In 1795 the question was much debated as to whether or not death by the guillotine was in- stantaneous, and in support of the negative side the case of Charlotte Corday was adduced whose countenance, it is said, blushed as if with indignation when the executioner, holding up the head to the public gaze, struck it with his fist. The connexion of the instrument with the horrors of the Revolution has hindered its introduction into other countries, but in 1853 it was adopted under the name of Fallschwert or Fallbeil by the kingdom of Saxony; and it is used for the execution of sentences of death in France, Belgium and some parts of Germany. It has often been stated that Dr Guillotine perished by

the instrument which bears his name, but it is beyond question that he survived the Revolution and died a natural death in 18 14.

See Sˆdillot, Reflexions historiques et physiologiques sur le supplice de la guillotine (1795) ; Sue, Opinion sur le supplice de la guillotine, (1796); ReVeill<5-Parise, Htude biographique sur Guillotine (Paris, 1 851); Notice historique et physiologique sur le supplice de la guil- lotine (Paris, 1830) ; Louis Dubois, Recherches historiques et physio- logiques sur la guillotine et details sur Sanson (Paris, 1843); and a paper by J. W. Croker in the Quarterly Review for December 1843, reprinted separately in 1850 under the title The Guillotine, a historical Essay.

GUILT, a lapse from duty, a crime, now usually the fact of wilful wrong-doing, the condition of being guilty of a crime, hence conduct deserving of punishment. The O. Eng. form of the word is gylt. The New English Dictionary rejects for phonetic reasons the usually accepted connexion with the Teutonic root gold-, to pay, seen in Ger. gelten, to be of value, Geld, money, payment, English " yield."

GUIMARAES (sometimes written Guimaraens) , a town of northern Portugal, in the district of Braga, formerly included in the province of Entre-Minho-e-Douro; 36 m. N.E. of Oporto by the Trofa-Guimara.es branch of the Oporto-Corunna railway. Pop. (1900) 9104. Guimaraes is a very ancient town with Moorish fortifications; and even the quarters which are locally described as " new " date partly from the 15th century. It occupies a low hill, skirted on the north-west by a small tributary of the river Ave. The citadel, founded in the nth century by Count Henry of Burgundy, was in 1094 the birthplace of his son Alphonso, the first king of Portugal. The font in which Alphonso was baptized is preserved, among other interesting relics, in the collegiate church of Santa Maria da Oliveira, " St Mary of the Olive," a Romanesque building of the 14th century, which occupies the site of an older foundation. This church owes its name to the legend that the Visigothic king Wamba (672-680) here declined the crown of Spain, until his olive wood spear-shaft blossomed as a sign that he should consent. The convent of Sao Domingos, now a museum of antiquities, has a fine i2th-i3th century cloister; the town hall is built in the blend of Moorish and Gothic architecture known as Manoelline. Guimaraes- has a flourishing trade in wine and farm produce; it also manufactures cutlery, linen, leather and preserved fruits. Near the town are Citania, the ruins of a prehistoric Iberian city, and the hot sulphurous springs of Taipas, frequented since the 4th century, when Guimaraes itself was founded.

GUIMARD, MARIE MADELEINE (1743-1816), French dancer, was born in Paris on the 10th of October 1743. For twenty-five years she was the

star of the Paris Opera. She made herself even more famous by her love affairs, especially by her long liaison with the prince de Soubise. She bought a magnificent house at Pantin, and built a private theatre connected with it, where Colle's Partie de chasse de Henri IV which was prohibited in public, and most of the Proverbes of Carmontelle (Louis Carrogis, 17 17-1806), and similar licentious performances were given to the delight of high society. In 1772, in defiance of the

archbishop of Paris, she opened a gorgeous house with a theatre seating five hundred spectators in the Chaussee d'Antin. In this Temple of Terpsichore, as she named it, the wildest orgies took place. In 1786 she was compelled to get rid of the property, and it was disposed of by lottery for her benefit for the sum of 300,000 francs. Soon after her retirement in 1789 she married Jean Etienne Despreaux (1748-1820), dancer, song-writer and playwright.

GUIMET, JEAN BAPTISTE • (1795-1871), French industrial chemist, was born at Voiron on the 20th of July 1795. He studied at the Ecole Poly technique in Paris, and in 181 7 entered the Administration des Poudres et Salpetres. In 1828 he was awarded the prize offered by the Societe d'Encouragement pour l'lndustrie Nationale for a process of making artificial ultramarine with all the properties of the substance prepared from lapis lazuli; and six years later he resigned his official position in order to devote himself to the commercial production of that material, a factory for which he established at Fleurieux sur Saone. He died on the 8th of April 1871.

His son Emile Etienne Guimet, born at Lyons on the 26th of June 1836, succeeded him in the direction of the factory, and founded the Musee Guimet, which was first located at Lyons in 1879 and was handed over to the state and transferred to Paris in 1885. Devoted to travel, he was in 1876 commissioned by the minister of public instruction to study the religions of the Far East, and the museum contains many of the fruits of this expedition, including a fine collection of Japanese and Chinese porcelain and many objects relating not merely to the religions of the East but also to those of Ancient Egypt, Greece and Rome. He wrote Lettres sur I'AlgSrie (1877) and Promenades japonaises (1880), and also some musical compositions, including a grand opera, Ta'i-Tsoung (1894).

GUINEA, the general name applied by Europeans to part of the western coast region of equatorial Africa, and also to the gulf formed by the great

bend of the coast line eastward and then southward. Like many other geographical designations the use of which is controlled neither by natural nor political boundaries, the name has been very differently employed by different writers and at different periods. In the widest accepta- tion of the term, the Guinea coast may be said to extend from 13 N. to 16 S., from the neighbourhood of the Gambia to Cape Negro. Southern or Lower Guinea comprises the coasts of Gabun and Loango (known also as French Congo) and the Portu- guese possessions on the south-west coast, and Northern or Upper Guinea stretches from the river Casamance to and inclusive of the Niger delta, Cameroon occupying a middle position. In a narrower use of the name, Guinea is the coast only from Cape Palmas to the Gabun estuary. Originally, on the other hand, Guinea was supposed to begin as far north as Cape Nun, opposite the Canary Islands, and Gomes Azurara, a Portuguese historian of the 1 3th century, is said to be the first authority who brings the boundary south to the Senegal. The derivation of the name is uncertain, but is probably taken from Ghinea, Ginnie, Genni or Jenne, a town and kingdom in the basin of the Niger, famed for the enterprise of its merchants and dating from the 8th century a.d. The name Guinea is found on maps of the middle of the 14th century, but it did not come into general use in Europe till towards the close of the 15 th century. 1

1 Guinea may, however, be derived from Ghana (or Ghanata) the name of the oldest known state in the western Sudan. Ghana dates, according to some authorities, from the 3rd century A.D. From the 7th to the 12th century it was a powerful empire, its dominions extending^ apparently, from the Atlantic to the Niger bend. At one time Jenne was included within its borders. Ghana was finally conquered by the Mandingo kings of Melle in the 13th century. Its capital, also called Ghana, was west of the Niger, and is generally placed some 200 m. west of Jenn6. In this district L. Desplagnes discovered in 1907 numerous remains of a once extensive city, which he identified as those of Ghana. The ruins lie 25 m. W. of the Niger, on both banks of a marigot, and are about 40 m. N. by E. of Kulikoro (see La Geographie, xvi. 329). By some writers Ghana city is, however, identified with Walata, which town is men- tioned by Arab historians as the capital of Ghanata. The identifica- tion of Ghana city with Jenne is not justified, though Idrisi seems to be describing Jenn6 when writing of " Ghana the Great."

Although the term Gulf of Guinea is applied generally to that part of the coast south of Cape Palmas and north of the mouth of the Congo, particular indentations have their peculiar designa- tions. The bay formed by the configuration of the land between Cape St Paul and the Nun mouth of the Niger is known as the Bight of Benin, the name being that of the once powerful native state whose territory formerly extended over the

whole district. The Bight of Biafra, or Mafra (named after the town of Mafra in southern Portugal), between Capes Formosa and Lopez, is the most eastern part of the Gulf of Guinea; it contains the islands Fernando Po, Prince's and St Thomas's. The name Biafra — as indicating the country — fell into disuse in the later part of the 19th century.

The coast is generally so low as to be visible to navigators only within a very short distance, the mangrove trees being their only sailing marks. In the Bight of Biafra the coast forms an exception, being high and bold, with the Cameroon Mountains for background. At Sierra Leone also there is high land. The coast in many places maintains a dead level for 30 to 50 m. inland. Vegetation is exceedingly luxuriant and varied. The palm-oil tree is indigenous and abundant from the river Gambia to the Congo. The fauna comprises nearly all the more remark- able of African animals. The inhabitants are the true Negro stock.

By the early traders the coast of Upper Guinea was given names founded on the productions characteristic of the different parts. The Grain coast, that part of the Guinea coast extending for 500 m. from Sierra Leone eastward to Cape Palmas received its name from the export of the seeds of several plants of a peppery character, called variously grains of paradise, Guinea pepper and melegueta. The name Grain coast was first applied to this region in 1455. It was occasionally styled the Windy or Windward coast, from the frequency of short but furious tornadoes throughout the year. Towards the end of the 18th century, Guinea pepper was supplanted in Europe by peppers from the East Indies. The name now is seldom used, the Grain coast being divided between the British colony of Sierra Leone and the republic of Liberia. The Ivory coast extends from Cape Palmas to 3 W., and obtained its name from the quantity of ivory exported therefrom. It is now a French possession. East- wards of the Ivory coast are the Gold and Slave coasts. The Niger delta was for long known as the Oil rivers. To two regions only of the coast is the name Guinea officially applied, the French and Portuguese colonies north of Sierra Leone being so styled.

Of the various names by which the divisions of Lower Guinea were known, Loango was applied to the country south of the Gabun and north of the Congo river. It is now chiefly included in French Congo. Congo was used to designate the country immediately south of the river of the same name, usually spoken of until the last half of the 19th century as the Zaire. Congo is now one of the subdivisions of Portuguese West Africa (see Angola). It must not be confounded with the Belgian Congo.

Few questions in historical geography have been more keenly discussed than that of the first discovery of Guinea by the navigators of modern Europe. Lancelot Malocello, a Genoese, in 1270 reached at least as far as

the Canaries. The first direct attempt to find a sea route to India was, it is said, also made by Genoese, Ugolino and Guido de Vivaldo, TedisioDoria and others who equipped two galleys and sailed south along the African coast "in 1291. Beyond the fact that they passed Cape Nun there is no trustworthy record of their voyage. In 1346 a Catalan expedition started for " the river of gold " on the Guinea coast; its fate is unknown. The French claim that between 1364 and 1410 the people of Dieppe sent out several expeditions to Guinea; and Jean de Bethencourt, who settled in the Canaries about 1402, made explorations towards the south. At length the consecutive efforts of the navigators employed by Prince Henry of Portugal — Gil Eannes, Diniz Diaz, Nuno Tristam, Alvaro Fernandez, Cadamosto, Usodimare and Diego Gomez — made known the coast as far as the Gambia, and by the end

of the 15th century the whole region was familiar to Europeans.

For further information see Senegal, Gold Coast, I vsry Coast, French Guinea, Portuguese Guinea, Liberia, &c. For the history of European discoveries, consult G. E. de Azurara, Chronica de descobrimento e conquista de Guine, published, with an intro- duction, by Barros de Santarern (Paris, 1841), English translation, The Discovery and Conquest of Guinea, by C. R. Beazley and E. Prestage (Hakluyt Society publications, 2 vols., London, 1 896-1899), vol. ii. has an introduction on the early history of African explora- tion, &c. with full bibliographical notes). L. fistancelin, Recherches sur les voyages et decouvertes des navigateurs normands en Afrique (Paris, 1832); Villault de Bellefond, Relation des costes d' Afrique appellees Guinee (Paris, 1669) ; Pere Labat, Nouvelle Relation de V Afrique occidenlale (Paris, 1728); Desmarquets, Mem. chron. pour servir & I'hist. de Dieppe (1875); Santarem, Priorite de la decouverte des pays situes sur la cole occidenlale d' Afrique (Paris, 1842) ; R. H. Major, Life of Prince Henry the Navigator (London, 1868) ; and the elaborate review of Major's work by M. Codine in the Bulletin de la Soc. de Gcog. (1873); A. E. Nordenskiold, Periplus (Stockholm, 1897); The Story of Africa, vol. i. (London, 1892), edited by Dr Robert Brown.

GUINEA, a gold coin at one time current in the United Kingdom. It was first coined in 1663, in the reign of Charles II., from gold imported from the Guinea coast of West Africa by a company of merchants trading under charter from the British crown — hence the name. Many of the first guineas bore an elephant on one side, this being the stamp of the company; in 1675 a castle was added. Issued at the same time as the guinea were

five-guinea, two-guinea and half-guinea pieces. The current value of the guinea on its first issue was twenty shillings. It was subsidiary to the silver coinage, but this latter was in such an unsatisfactory state that the guinea in course of time became over-valued in relation to silver, so much so that in 1694 it had risen in value to thirty shillings. The rehabilita- tion of the silver coinage in William III.'s reign brought down the value of the guinea to 21s. 6d. in 1698, at which it stood until 171 7, when its value was fixed at twenty-one shillings. This value the guinea retained until its disappearance from the coinage. It was last coined in 1813, and was superseded in 181 7 by the present principal gold coin, the sovereign. In 1718 the quarter-guinea was first coined. The third-guinea was first struck in George III.'s reign (1787). To George III.'s reign also belongs the " spade-guinea," a guinea having the shield on the reverse pointed at the base or spade-shaped. It is still customary to pay subscriptions, professional fees and honoraria of all kinds, in terms of " guineas," a guinea being twenty-one shillings.

GUINEA FOWL, a well-known domestic gallinaceous bird, so called from the country whence in modern times it was brought to Europe, the Meleagris and Avis or Gallina Numidica of ancient authors. 1 Little is positively known of the wild stock to which we owe our tame birds, nor can the period of its re- introduction (for there is apparently no evidence of its domestica- tion being continuous from the time of the Romans) be assigned more than roughly to that of the African discoveries of the Portuguese. It does not seem to have been commonly known till the middle of the 16th century, when John Caius sent a description and figure, with the name Gattus Maurilanus, to Gesner, who published both in his Paralipomena in 1555, and in the same year Belon also gave a notice and woodcut under the name of Poulle de la Guinee; but while the former authors properly referred their bird to the ancient Meleagris, the latter confounded the Meleagris and the turkey.

The ordinary guinea fowl of the poultry-yard (see also Poultry and Poultry-Farming) is the Numida meleagris of ornitho- logists. The chief or only changes which domestication seems to have induced in its appearance are a tendency to albinism generally shown in the plumage of its lower parts, and frequently, though not always, the conversion of the colour of its legs and

', Columella {De re rustica, viii. cap. 2) distinguishes the Melea- gris from the Gallina Africana or Numidica, the latter having, he says, a red wattle (palea, a reading obviously preferable to galea), while it was blue in the former. This would look as if the Meleagris had sprung from what is now called Numida ptilorhyncha, while the Gallina Africana originated in the JV. meleagris, species which have a different range, and if so the fact would point to two distinct introductions — one by Greeks, the other by

Latins.

feet from dark greyish-brown to bright orange. That the home of this species is West Africa from the Gambia 2 to the Gaboon is certain, but its range in the interior is quite unknown. It appears to have been imported early into the Cape Verd Island?, where, as also in some of the Greater Antilles and in Ascension, it has run wild. Representing the species in South Africa we have the N. coronata, which is very numerous from the Cape Colony to Ovampoland, and the N. cornuta of Drs Finsch and Hartlaub, which replaces it in the west as far as the Zambesi. Madagascar also has its peculiar species, distinguishable by its red crown, the N. mitrata of Pallas, a name which has often been misapplied to the last. This bird has been introduced to Rodriguez, where it is now found wild. Abyssinia is inhabited by another species, the iV. ptilorhyncha, 3 which differs from all the foregoing by the absence of any red colouring about the head. Very different from all of them, and the finest species known, is the N. vulturina of Zanzibar, conspicuous by the bright blue in its plumage, the hackles that adorn the lower part of its neck, and its long tail. By some writers it is thought to form a separate genus, Acryllium. All these guinea fowls except the last are characterized by having the crown bare of feathers and elevated into a bony " helmet," but there is another group (to which the name Guttera has been given) in which a thick tuft of feathers ornaments the top of the head. This contains four or five species, all inhabiting some part or other of Africa, the best known being the N. cristata from Sierra Leone and other places on the western coast. This bird, apparently mentioned by Marcgrave more than 200 years ago, but first described by Pallas, is remark- able for the structure — unique, if not possessed by its represen- tative forms — of its furcula, where the head, instead of being the thin plate found in all other Gallinae, is a hollow cup opening upwards, into which the trachea dips, and then emerges on its way to the lungs. Allied to the genus Numida, but readily distinguished theref orm among other characters by the possession of spurs and the absence of a helmet, are two very rare forms, Agelasles and Phasidus, both from western Africa. Of their habits nothing is known. All these birds are beautifully figured in Elliot's Monograph of the Phasianidae, from drawings by Wolf. (A. N.)

GUINEA-WORM (Dracontiasis), a disease due to the Filar ia medinensis, or Dracunculus, or Guinea- worm, a filarious nematode like a horse-hair, whose most frequent habitat is the subcutaneous and intramuscular tissues of the legs and feet. It is common on the Guinea coast, and in many other tropical and subtropical regions and has been familiarly known since ancient times. The condition of dracontiasis due to it is a very common one, and sometimes amounts to an epidemic. The black races are most liable, but Europeans of almost any social rank and of either sex are not altogether exempt. The worm lives in water, and, like the Filaria sanguinis

hominis, appears to have an intermediate host for its larval stage. It is doubtful whether the worm penetrates the skin of the legs directly; it is not impossible that the intermediate host (a cyclops) which contains the larvae may be swallowed with the water, and that the larvae of the Dracunculus may be set free in the course of digestion.

GUINES, a town in the interior of Havana province, Cuba, about 30 m. S.E. of Havana. Pop. (1907) 8053. It is situated on a plain, in the midst of a rich plantation district, chiefly devoted to the cultivation of tobacco. The first railway in Cuba was built from Havana to Guines between 1835 and 1838. One of the very few good highways of the island also connects Guines with the capital. The pueblo of Guines, which was built on a great private estate of the same name, dates back to about 1735. The church dates from 1850. Guines became a " villa " in 1814, . and was destroyed by fire in 1817.

GUINGAMP, a town of north-western France, capital of an arrondissement in the department of C6tes-du-Nord, on the

2 Specimens from the Gambia are said to be smaller, and have been described as distinct under the name of N. rendalli.

3 Darwin (Anim. and PI. under Domestication, i. 294), gives this as the original stock of the modern domestic birds, but obviously by an accidental error. As before observed, it may possibly have been the true peXeaypls of the Greeks.

right bank of the Trieux, 20 m. W.N.W. of St Brieuc on the railway to Brest. Pop. (1906), town 6937, commune 9212. Its chief church, Notre-Dame de Bon-Secours, dates from the 14th to the 16th centuries; two towers rise on each side of the richly sculptured western portal and a third surmounts the crossing. A famous statue of the Virgin, the object of one of the most important " pardons'" or religious pilgrimages in Brittany, stands in one of the two northern porches. The central square is decorated by a graceful fountain in the Renais- sance style, restored in 1743. Remains of the ramparts and of the chateau of the dukes of Penthievre, which belong to the 15th century, still survive. Guingamp is the seat of a sub- prefect and of a tribunal of first instance. It is an important market for dairy-cattle, and its industries include flour-milling, tanning and leather-dressing. Guingamp was the chief town of the countship (subsequently the duchy) of Penthievre. The Gothic chapel of Graces, near Guingamp, contains fine

sculptures.

GUINNESS, the name of a family of Irish brewers. The firm was founded by Arthur Guinness, who about the middle of the 18th century owned a modest brewing-plant at Leixlip, a village on the upper reaches of the river Liffey. In or about 1759 Arthur Guinness, seeking to extend his trade, purchased a small porter brewery belonging to a Mr Rainsford at St James's Gate, Dublin. By careful attention to the purity of his product, coupled with a shrewd perception of the public taste, he built up a considerable business. But his third son, Benjamin Lee Guinness (1798-1868), may be regarded as the real maker of the firm, into which he was taken at an early age, and of which about 1825 he was given sole control. Prior to that date the trade in Guinness's porter and stout had been confined to Ireland, but Benjamin Lee Guinness at once established agencies in the United Kingdom, on the continent, in the British colonies and in America. The export trade soon assumed huge proportions; the brewery was continually enlarged, and when in 1855 his father died, Benjamin Lee Guinness, who in 1851 was elected first lord mayor of Dublin, found himself sole proprietor of the business and the richest man in Ireland. Between i860 and 1865 he devoted a portion of this wealth to the restoration of St Patrick's cathedral, Dublin. The work, the progress of which he regularly superintended himself, cost £160,000. Benjamin Lee Guinness represented the city of Dublin in parlia- ment as a Conservative from 1865 till his death, and in 1867 was created a baronet. He died in 1868, and was succeeded in the control of the business by Sir Arthur Edward Guinness (b. 1840), his eldest, and Edward Cecil Guinness (b. 1847), his third, son. Sir Arthur Edward Guinness, who for some time repre- sented Dublin in parliament, was in 1880 raised to the peerage as Baron Ardilaun, and about the same time disposed of his share in the brewery to his brother Edward Cecil Guinness. In 1886 Edward Cecil Guinness disposed of the brewery, the products of which were then being sent all over the world, to a limited company, in which he remained the largest share- holder. Edward Cecil Guinness was created a baronet in 1885, and in 1891 was raised to the peerage as Baron Iveagh.

The Guinness family have been distinguished for their philan- thropy and public munificence. Lord Ardilaun gave a recreation ground to Dublin, and the famous Muckross estate at Killarney to the nation. Lord Iveagh set aside £250,000 for the creation of the Guinness trust (1889) for the erection and maintenance of buildings for the labouring poor in London and Dublin, and was a liberal benefactor to the funds of Dublin university.

GUINOBATAN, a town of the province of Albay, Luzon, Philippine Islands, on the Inaya river, 9 m. W. by N. of the town of Albay. Pop. (1903), 20,027. Its chief interest is in hemp, which is grown in large quantities in

the neighbouring country.

GUIPUZCOA, a maritime province of northern Spain, included among the Basque provinces, and bounded on the N. by the Bay of Biscay; W. by the province of Biscay (Vizcaya); S. and S.E. by. Alava and Navarre: and N.E. by the river Bidassoa, 1

1 A small island in the Bidassoa, called La Isla de los Faisanes, or l'lsle de la Conference, is celebrated as the place where the marriage

which separates it from France. Pop. (1900), 195,850; area, 728 sq. m. Situated on the northern slope of the great Can- tabrian chain at its junction with the Pyrenees, the province has a great variety of surface in mountain, hill and valley; and its scenery is highly picturesque. The coast is much indented, and has numerous harbours, but none of very great importance; the chief are those of San Sebastian, Pasajes, Guetaria, Deva and Fuenterrabia. The rivers (Deva, Urola, Oria, Urumea, Bidassoa) are all short, rapid and unnavigable. The mountains are for the most part covered with forests of oak, chestnut or pine; holly and arbutus are also common, with furze and heath in the poorer parts. The soil in the lower valleys is generally of hard clay and unfertile; it is cultivated with great care, but the grain raised falls considerably short of what is required for home consumption. The climate, though moist, is mild, pleasant and healthy; fruit is produced in considerable quantities, especially apples for manufacture into zaragua or cider. The chief mineral products are iron, lignite, lead, copper, zinc and cement. Ferruginous and sulphurous springs are very common, and are much frequented every summer by visitors from all parts of the kingdom. There are excellent fisheries, which supply the neighbouring provinces with cod, tunny, sardines and oysters ; and the average yearly value of the coast- ing trade exceeds £400,000. By Irun, Pasajes and the frontier roads £4,000,000 of imports and £3,000,000 of exports pass to and from France, partly in transit for the rest of Europe. Apart from the four Catalan provinces, no province has witnessed such a development of local industries as Guipuzcoa. The principal industrial centres are Irun, Renteria, Villabona, Vergara and Azpeitia for cotton and linen stuffs; Zumarraga for osies; Eibar, Plasencia and Elgoibar for arms and cannon and gold incrustations; Irun for soap and carriages; San Sebastian, Irun and Onate for paper, glass, chemicals and saw-mills; Tolosa for paper, timber, cloths and furniture; and the banks of the bay of Pasajes for the manufacture of liqueurs of every kind, and the preparation of wines for export and for consumption in the interior of Spain. This last industry occupies several thousand French and Spanish workmen. An arsenal was established at Azpeitia during the Carlist rising of 1870-1874; but the manufacture of ordnance and gunpowder was subse- quently discontinued. The main line of the northern railway from Madrid to France

runs through the province, giving access, by a loop line, to the chief industrial centres. The custom-house through which it passes on the frontier is one of the most important in Spain. Despite the steep gradients, where traffic is hardly possible except by ox-carts, there are over 350 m. of admirably engineered roads, maintained solely by the local tax-payers. After San Sebastian, the capital (pop. 1900, 37,812), the chief towns are Fuenterrabia (4345) and Irun (9912). Other towns with more than 6000 inhabitants are Azpeitia (6066), Eibar (6583), Tolosa (8111) and Vergara (6196). Guipuzcoa is the smallest and one of the most densely peopled provinces of Spain; for its constant losses by emigration are counterbalanced by a high birth-rate and the influx of settlers from other districts who are attracted by its industrial prosperity.

For an account of its inhabitants and their customs, language and history, see Basques and Basque Provinces.

GUIRAUD, ERNEST (1837-1892), French composer, was born at New Orleans on the 26th of June 1837. He studied at the Paris Conservatoire, where he won the grand prix de Rome. His father had gained the same distinction many years previously, this being the only instance of both father and son obtaining this prize. Ernest Guiraud composed the following operas: Sylvie (1864), Le Kobold (1870), Madame ‘ Turlupin (1872), Piccolino (1876), Galante Aventure (1882), and also the ballet Gretna Green, given at the Opera in 1873. His opera Fredegonde was left in an unfinished condition and was completed by Camille Saint-Saens. Guiraud, who was a fellow-student and intimate

of the duke of Guienne was arranged between Louis XI. and Henry IV. in 1463, where Francis I., the prisoner of Charles V., was exchanged for his two sons in 1526, and where in 1659 ” the Peace of the Pyrenees ” was concluded between D. Luis de Haro and Cardinal Mazarin.

friend of Georges Bizet, was for some years professor of composi- tion at the Conservatoire. He was the author of an excellent treatise on instrumentation. He died in Paris on the 6th of May 1892.

GUISBOROUGH, or Guisbeough, a market town in the Cleveland parliamentary division of the North Riding of York- shire, England, 10 m. E.S.E. of Middlesbrough by a branch of the North-Eastern railway. Pop. of urban district (1901), 5645. It is well situated in a narrow, fertile valley at the N. foot of the Cleveland Hills. The church of St Nicholas is

Perpendicular, greatly restored. Other buildings are the town hall, and the modern buildings of the grammar school founded ini56i. Ruins of an Augustinian priory, founded in n 29, are beautifully situated near the eastern extremity of the town. The church contains some fine Decorated work, and the chapter house and parts of the conventual buildings may be traced. Considerable fragments of Norman and transitional work remain. Among the historic personages who were buried within its walls was Robert Bruce, lord of Annandale, the competitor for the throne of Scotland with John Baliol, and the grandfather of King Robert the Bruce. About 1 m. S.E. of the town there is a sulphurous spring discovered in 1S22. The district neighbouring to Guisborough is rich in iron-stone. Its working forms the chief industry of the town, and there are also tanneries and breweries.

GUISE, a town of northern France, in the department of Aisne, on the Oise, 31 m. N. of Laon by rail. Pop. (1906), 7562. The town was formerly the capital of the district of Thierache and afterwards of a countship (see below). There is a chateau dating in part from the middle of the 16th century. Camille Desmoulins was in 1762 born in the town, which has erected a statue to him. The chief industry is the manufacture of iron stoves and heating apparatus, carried on on the co-operative system in works founded by J. B. A. Godin, who built for his workpeople the huge buildings known as the familislere, in front of which stands his statue. A board of trade-arbitration is among the public institutions.

GUISE, HOUSE OF, a cadet branch of the house of Lorraine (q.v.). Rene II., duke of Lorraine (d. 1508), united the two branches of the house of Lorraine. From his paternal grand- mother, Marie d'Harcourt, Rene inherited the countships of Aumale, Mayenne, Elbeuf, Lillebonne, Brionne and other French fiefs, in addition to the honours of the elder branch, which included the countship of Guise, the dowry of Marie of Blois on her marriage in 1333 with Rudolph or Raoul of Lorraine. Rene's eldest surviving son by his marriage with Philippa, daughter of Adolphus of Egmont, duke of Gelderland, was Anthony, who succeeded his father as duke of Lorraine (d. 1544), while the second, Claude, count and afterwards duke of Guise, received the French fiefs. The Guises, though naturalized in France, continued to interest themselves in the fortunes of Lorraine, and their enemies were always ready to designate them as foreigners. The partition between the brothers Anthony and Claude was ratified by a further agreement in 1530, reserving the lapsed honours of the kingdoms of Jerusalem, Sicily, Aragon, the duchy of Anjou and the countships of Provence and Maine to the duke of Lorraine. Of the other sons of Rene II., John (1498-1550) became the first cardinal of Lorraine, while Ferri, Louis and Francis fell fighting in the French armies at Marignano (1515), Naples (1528) and Pavia (1525) respectively.

Claude of Lorraine, count and afterwards 1st duke of Guise (1496-1550), was born on the 20th of October 1496. He was educated at the French court, and at seventeen allied himself to the royal house of France by a marriage with Antoinette de Bourbon (1493-1583) daughter of Francois, Count of Venddme. Guise distinguished himself at Marignano (15 15), and was long in recovering from the twenty-two wounds he received in the battle; in 1521 he fought at Fuenterrabia, when Louise of Savoy ascribed the capture of the place to his efforts; in 1522 he defended northern France, and forced the English to raise the siege of Hesdin; and in 1 523 he obtained the government of Champagne and Burgundy, defeating at Neufchateau the

imperial troops who had invaded his province. In 1525 he destroyed the Anabaptist peasant army, which was overrunning Lorraine, at Lupstein, near Saverne (Zabern). On the return of Francis I. from captivity, Guise was erected into a duchy in the peerage of France, though up to this time only princes of the royal house had held the title of duke and peer of France. The Guises, as cadets of the sovereign house of Lorraine and descendants of the house of Anjou, claimed precedence of the Bourbon princes. Their pretensions and ambitions inspired distrust in Francis I., although he rewarded Guise's services by substantial gifts in land and money. The duke distinguished himself in the Luxemburg campaign in 1542, but for some years before his death he effaced himself before the growing fortunes of his sons. He died on the 12th of April 1550.

He had been supported in all his undertakings and intrigues by his brother John, cardinal of Lorraine (1498-1550), who had been made coadjutor of Metz at the age of three. The cardinal was archbishop of Reims, Lyons and Narbonne, bishop of Metz, Toul, Verdun, Therouanne, Lucon, Albi, Valence, Nantes and Agen, and before he died had squandered most of the wealth which he had derived from these and other benefices. Part of his ecclesiastical preferments he gave up in favour of his nephews. He became a member of the royal council in 1 530, and in 1536 was entrusted with an embassy to Charles V. Although a complaisant helper in Francis I.'s pleasures, he was disgraced in 1542, and retired to Rome. He died at Nogent- sur-Yonne on the 18th of May 1550. He was extremely dis- solute, but as an open-handed patron of art and learning, as the protector and friend of Erasmus, Marot and Rabelais he did something to counter-balance the general unpopularity of his calculating and avaricious brother.

*Claude of Guise had twelve children, among them Francis, 2nd duke of Guise; Charles, 2nd cardinal of Lorraine (1524-1574), who became archbishop of Reims in 1538 and cardinal in 1547; Claude, marquis of Mayenne, duke of Aumale (1526-1573), governor of * Burgundy, who married Louise de Breze\ daughter of Diane de Poitiers, thus securing a*

po'werful ally for the family; Louis (1527- 1578)1 bishop of Troyes, archbishop of Sens and cardinal of Guise; Rene, marquis of Elbeuf (1536-1566), from whom descended the families of Harcourt, Armagnac, Marsan and Lillebonne; Mary of Lorraine (q.v.), generally known as Mary of Guise, who after the death of her second husband, James V. of Scotland, acted as regent of Scotland for her daughter Mary, queen of Scots; and Francis ('SM-tSˆS), grand prior of the order of the Knights of Malta. The solidarity of this family, all the members of which through three generations cheerfully submitted to the authority of the head of the house, made it a formidable factor in French politics.

Francis of Lorraine, 2nd duke of Guise (1 519-1563), " le grand Guise," was born at Bar on the 17th of February 1519. As count of Aumale he served in the French army, and was nearly killed at the siege of Boulogne in 1545 by a wound which brought him the name of "Balafre." Aumale was made (1547) a peerage-duchy in his favour, and on the accession of Henry II. the young duke, who had paid assiduous court to Diane de Poitiers, shared the chief honours of the kingdom with the constable Anne de Montmorency. Both cherished ambitions for their families, but the Guises were more unscrupulous in subordinating the interests of France to their own. Mont- morency's brutal manners, however, made enemies where Guise's grace and courtesy won him friends. Guise was a suitor for the hand of Jeanne d'Albret, princess of Navarre, who refused, however, to become a sister-in-law of a daughter of Diane de Poitiers and remained one of the most dangerous and persistent enemies of the Guises. He married in December 1548 Anne of Este, daughter of Ercole II., duke of Ferrara, and through her mother RenSe, a granddaughter of Louis XII. of France. In the same year he had put down a peasant rising in Saintonge with a humanity that compared very favourably with the cruelty shown by Montmorency to the town of Bordeaux. He made preparations in Lorraine for the king's German campaign of 1551-52. He was already governor of Dauphine, and now became grand chamberlain, prince of Joinville, and hereditary seneschal of Champagne, with large additions to his already considerable revenues. He was charged with the defence of Metz, which Henry II. had entered in 1551. He reached the

city in August 1552, and rapidly gave proof of his great powers as a soldier and organizer by the skill with which the place, badly fortified and unprovided with artillery, was put in a state of defence. Metz was invested by the duke of Alva in October with an army of 60,000 men, and the emperor joined his forces in November. An army of brigands commanded

by Albert of Brandenburg had also to be reckoned with. Charles was obliged to raise the siege on the 2nd of January 1533, having lost, it is said, 30,000 men before the walls. Guise used his victory with rare moderation and humanity, providing medical care for the sick and wounded left behind in the besiegers' camp. The subsequent operations were paralysed by the king's suspicion and carelessness, and the constable's inactivity, and a year later Guise was removed from the command. He followed the con- stable's army as a volunteer, and routed the army of Charles V. at the siege of Renty on the 12th of August 1554. Mont- morency's inaction rendered the victory fruitless, and a bitter controversy followed between Guise and the constable's nephew Coligny, admiral of France, which widened a breach already existing.

The conclusion of a six years' truce at Vaucelles (1556) dis- appointed Guise's ambitions, and he was the main mover in the breach of the treaty in 1558, when he was sent at the head of a French army to Italy to the assistance of Pope Paul IV. against Spain. Guise, who perhaps had in view the restoration to his family of the Angevin dominion of Naples and Sicily, crossed the Alps early in 1557 and after a month's delay in Rome, where he failed to receive the promised support, marched on the kingdom of Naples, then occupied by the Spanish troops under Alva. He seized and sacked Campli (April 17 th), but was compelled to raise the siege of Civitella. Meanwhile the pope had veered round to a Spanish alliance, and Guise, seeing that no honour was to be gained in the campaign, wisely spared his troops, so that his army was almost intact when, in August, he was hastily summoned home to repel the Spanish army which had invaded France from the north, and had taken St Quentin. On reaching Paris in October Guise was made lieutenant-general of the kingdom, and proceeded to prepare for the siege of Calais. The town was taken, after six days' fighting, on the 6th of January 1558, and this success was followed up by the capture of Guines, Thionville and Arlon, when the war was ended by the treaty of Cateau Cambresis (1559)- Although his brother, the cardinal of Lorraine, was one of the negotiators, this peace was concluded against the wishes of Guise, and was regarded as a triumph of the constable's party. The Guises were provided with a weapon against Montmorency by the bishop of Arras (afterwards Cardinal Granvella) , who gave to the cardinal of Lorraine at an interview at Peronne in 1558 an intercepted letter proving the Huguenot leanings of the constable's nephews.

On the accession in 1559 of Francis II., their nephew by marriage with Mary Stuart, the royal authority was practically delegated to Guise and the cardinal, who found themselves beyond rivalry for the time being. They had, however, to cope with a new and dangerous force in Catherine de' Medici, who was now for the first time free to use her political ability. The incapacity, suspicion and cruelty of the cardinal, who controlled the

internal administration, roused the smaller nobility against the Lorraine princes. A conspiracy to overturn their government was formed at Nantes, with a needy Perigord nobleman named La Renaudie as its nominal head, though the agitation had in the first instance been fostered by the agents of Louis I., prince of Conde. The Guises were warned of the conspiracy while the court was at Blois, and for greater security removed the king to Amboise. La Renaudie, nothing daunted, merely postponed his plans; and the conspirators assembled in small parties in the woods round Amboise. They had, how- ever, been again betrayed and many of them were surrounded and taken before the coup could be delivered; one party, which had seized the chateau of Noizay, surrendered on a promise of amnesty given " on his faith as a prince " by James of Savoy, duke of Nemours, a promise which, in spite of the duke's protest, was disregarded. On the 19th of March 1560, La Renaudie and

the rest of the conspirators openly attacked the chateau of Amboise. They were repelled; their leader was killed; and a large number were taken prisoners. The merciless vengeance of the Guises was the measure of their previous fears. For a whole week the torturings, quarterings and hangings went on, the bodies being cast into the Loire, the young king and queen witnessing the bloody spectacle day by day from a balcony of the chateau.

The cruel repression of this " conspiracy of Amboise " inspired bitter hatred of the Guises, since they were avenging a rising rather against their own than the royal authority. They now entrenched themselves with the king at Orleans, and the Bourbon princes, Anthony, king of Navarre, and his brother Conde, were summoned to court. The Guises convened a special commission to try Conde, who was condemned to death; but the affair was postponed by the chancellor, and the death of Francis II. in December saved Conde. Guise then made common cause with his old rival Montmorency and with the Marshal de Saint Andre against Catherine, the Bourbons and Coligny. This alliance, constituted on the 6th of April 1561, and known as the trium- virate, aimed at the annulment of the concessions made by Catherine to the Huguenots. The cardinal of Lorraine fomented the discord which appeared between the clergy of the two religions when they met at the colloquy of Poissy in 1561, but in spite of the extreme Catholic views he there professed, he was at the time in communication with the Lutheran princes of Germany/ and in February 1562 met the duke of Wiirttemberg at Zabern to discuss the possibility of a religious compromise.

The signal for civil war was given by an attack of Guise's escort on a Huguenot congregation at Vassy (1st of March 1562). Although Guise did not initiate the massacre, and although, when he learned what was going on, he even tried to restrain his soldiers, he did not disavow their action.

When Catherine de' Medici forbade his entry into Paris, he accepted the challenge, and on the 16th of March he entered the city, where he was a popular hero, at the head of 2000 armed nobles. The provost of the merchants offered to put 20,000 men and two million livres at his disposal. In September he joined Montmorency in besieging Rouen, which was sacked as if it had been a foreign city, in spite of Guise's efforts to save it from the worst horrors. At the battle of Dreux (19th of December 1562) he commanded a reserve army, with which he saved Montmorency's forces from destruction and inflicted a crushing defeat on the Huguenots. The prince of Conde was his prisoner, while the capture of Montmorency by the Huguenots and the assassination of the Marshal de Saint-Andre after the battle left Guise the undisputed head of the Catholic party. He was appointed lieutenant-general of the kingdom, and on the 5th of February 1563 he appeared with his army before Orleans. On the 19th, however, he was shot by the Huguenot Jean Poltrot de Mere as he was returning to his quarters, and died on the 24th of the effects of the wound. Guise's splendid presence, his generosity and humanity and his almost unvarying success on the battlefield made him the idol of his soldiers. He attended personally to the minutest details, and Monluc complains that he even wrote out his own orders, The mistakes and cruelties associated with his name were partly due to the evil counsels of his brother Charles, the cardinal, whose cowardice and insincerity were the scorn of his contem- poraries. The negotiations of the Guises with Spain dated from the interview with Granvella at Peronne, in 1558, and after the death of his brother the cardinal of Lorraine was constantly in communication with the Spanish court, offering, in the event of the failure of direct heirs to the Valois kings, to deliver up the frontier fortresses and to acknowledge Philip II. as king of France. His death in 1574 temporarily weakened the extreme Catholic party.

Of the children of Francis " le Balafrti " five survived him: Henry, 3rd duke of Guise; Charles, duke of Mayenne (1554-1611) (q.v.), who consolidated the League; Catherine (1 552-1 596), who married Louis of Bourbon, duke of Montpensier, and encouraged the fanaticism of the Parisian leaguers ; Louis, second cardinal of Guise, afterwards of Lorraine (1555-1588), who was assassinated with his brother Henry; and Francis (1558-1573).

GUISE

701

Henry or Lorraine, 3rd duke of Guise (1550-1588), born on the 31st of December 1550, was thirteen years old at the time of his father's death, and grew up under the domination of a passionate desire for revenge.

Catherine de' Medici refused to take steps against Coligny, who was formally accused by the duchess of Guise and her brothers-in-law of having incited the murder. In 1566 she insisted on a formal reconciliation at Moulins between the Guises and Coligny, at which, however, none of the sons of the murdered man was present. Henry and his brothers were, however, compelled in 1572 to sign an ambiguous assent to this agreement. Guise's widow married James of Savoy, duke of Nemours, and the young duke at sixteen went to fight against the Turks in Hungary. On the fresh outbreak of civil war in 1567 he returned to France and served under his uncle Aumale. In the autumn of 1 568 he received a considerable command, and speedily came into rivalry with Henry of Valois, duke of Anjou. He had not inherited his father's generalship, and his rashness and headstrong valour more than once brought disaster on his troops, but the showy quality of his fighting brought him great popularity in the army. In the defence of Poitiers in 1569 with his brother, the duke of Mayenne, he showed more solid abilities as a soldier. On the conclusion of peace in 1570 he returned to court, where he made no secret of his attach- ment to Margaret of Valois. His pretensions were violently resented by her brothers, who threatened his life, and he saved himself by a precipitate marriage with Catherine of Cleves (daughter of Francis of Cleves, duke of Nevers, and Margaret of Bourbon), the widow of a Huguenot nobleman, Antoine de Crog, prince of Porcien. Presently he ended his disgrace by an apparent reconciliation with Henry of Valois and an alliance with Catherine de' Medici. He was an accomplice in the first attack on Coligny's life, and when permission for the massacre of Saint Bartholomew had been extorted from Charles IX. he roused Paris against the Huguenots, and satisfied his personal vengeance by superintending the murder of Coligny. He was now the acknowledged chief of the Catholic party, and the power of his family was further increased by the marriage (1575) of Henry III. with Louise of Vaudemont, who belonged to the elder branch of the house of Lorraine. In a fight at Dormans (10th of October 1575), the only Catholic victory in a disastrous campaign, Guise received a face wound which won for him his father's name of Balafre and helped to secure the passionate attachment of the Parisians. He refused to acquiesce in the treaty of Beaulieu (5th of May 1576), and with the support of the Jesuits proceeded to form a " holy league " for the defence of the Roman Catholic Church. The terms of enrolment enjoined offensive action against all who refused to join. This association had been preceded by various provincial leagues among the Catholics, notably one at Peronne. Cond6 had been imposed on this town as governor by the terms of the peace, and the local nobility banded together to resist him. This, like the Holy League itself, was political as well as religious in its aims, and was partly inspired by revolt against the royal authority. In the direction of the League Guise was hampered by Philip of Spain, who subsidized the movement, while he also had to submit to the

dictation of the Parisian democracy. Ulterior ambitions were freely ascribed to him. It was asserted that papers seized from his envoy to Rome, Jean David, revealed a definite design of substituting the Lorraines, who represented themselves as the successors of Charlemagne, for the Valois; but these papers were probably a Huguenot forgery. Henry III. eventually placed himself at the head of the League, and resumed the war against the Huguenots; but on the conclusion of peace (September 1577) he seized the opportunity of disbanding the Catholic associations. The king's jealousy of Guise increased wit;h the duke's popularity, but he did not venture on an open attack , nor did he dare to avenge the murder by Guise's partisans of one of his personal favourites, Saint-Megrin, who had been set on by the court to compromise the reputation of the duchess of Guise. 1

1 This incident supplied Alexandre Dumas pbre with the subject of his Henri III et sa cour C1829).

Meanwhile the duke had entered on an equivocal alliance with Don John of Austria. He was also in constant correspondence with Mary of Lorraine, and meditated a descent on Scotland in support of the Catholic cause. But the great riches of the Guises were being rapidly dissipated, and in 1578 the duke became a pensioner of Philip II. When in 1 584 the death of the duke of Anjou made Henry of Navarre the next heir to the throne, the prospect of a Huguenot dynasty roused the Catholics to forget their differences, and led to the formation of a new league of the Catholic nobles. At the end of the same year Guise and his brother, the duke of Mayenne, with the assent of other Catholic nobles, signed a treaty at Joinville with Philip II., fixing the succession to the crown on Charles, cardinal of Bourbon, to the exclusion of the Protestant princes of his house. In March 1585 the chiefs of the League issued the Declaration of Peronne, exposing their grievances against the government and announcing their intention to restore the dignity of religion by force of arms. On the refusal of Henry III. to accept Spanish help against his Huguenot subjects, war broke out. The chief cities of France declared for the League, and Guise, who had recruited his forces in Germany and Switzerland, took up his headquarters at Chalons, while Mayenne occupied Dijon, and his relatives, the dukes of Elbeuf, Aumale and Mercceur, 2 roused Normandy and Brittany. Henry III. accepted, or feigned to accept, the terms imposed by the Guises at Nemours (7th of July 1585). The edicts in favour of the Huguenots were immediately revoked. Guise added to his reputation as the Catholic champion by defeating the German auxiliaries of the Huguenots at Vimory (October 1587) and Auneau (November 1587). The protestations of loyalty to Henry III. which had marked the earlier manifestoes of the League were modified. Obedience to the king was now stated to depend on his giving proof of Catholic Zealand showing no favour to heresy. In April 1588 Guise arrived in Paris, where he put himself at the head of the

Parisian mob, and on the 1 2th of May, known as the Day of the Barricades, he actually had the crown within his grasp. He refused to treat with Catherine de' Medici, who was prepared to make peace at any cost, but restrained the populace from revolution and permitted Henry to escape from Paris. Henry came to terms with the League in May, and made Guise lieutenant-general of the royal armies. The estates-general, which were assembled at Blois, were devoted to the Guise interest, and alarmed the king by giving voice to the political as well as the religious aspirations of the League. Guise remained at the court of Blois after receiving repeated warnings that Henry meditated treason. On the 25th of December he was summoned to the king's chamber during a sitting of the royal council, and was murdered by assassins carefully posted by Henry III. himself. The cardinal of Lorraine was murdered in prison on the next day. The history of the Guises thenceforward centres in the duke of

Mayenne (q.v.).

By his wife, Catherine of Cleves, the third duke had fourteen children: among them Charles, 4th duke of Guise (1571-1640); Claude, duke of Chevreuse (1578-1657), whose wife, Marie de Rohan, duchess of .Chevreuse, became famous for her intrigues; Louis(i585- 162 1), 3rd cardinal of Guise, archbishop of Reims, remembered for his liaison with Charlotte des Essarts, mistress of Henry IV.

Charles, 4th duke of Guise (1 571-1640), was imprisoned for three years after his father's death. He married Henriette Catherine de Joyeuse, widow of the duke of Montpensier. His eldest son predeceased him, and he was succeeded by his second son Henry (1614-1664), who had been archbishop of Reims, but renounced the ecclesiastical estate and became 5th duke. He made an attempt (1647) on the crown of Naples, and was a prisoner in Spain from 1648 to 1652. A second expedition to Naples in 1654 was a fiasco. He was succeeded by his nephew, Louis Joseph (1650-167 i), as 6th duke. With his son, Francis Joseph (1670-1675), the line failed; and the title and estates passed to his great-aunt, Marie of Lorraine, duchess of Guise

2 Philippe-Emmanuel of Lorraine, duke of Mercoeur, a cadet of Lorraine and brother of Louise de Vaudemont, Henry III.'s queen. His wife, Mary of Luxemburg, descended from the dukes of Brittany, and he was made governor of the province in 1582. He aspired to separate sovereignty, and called his son prince and duke of Brittany.

JQ2

GUISE

2

J5

W

J BQ

<

<

U

a

O

rt en

O.U

a u

-a S?

^S

■0-° c

WO

- Si

e a

p

•a S

o

2 S

fcu,

o

,3 =

M-H U

W ■

O 3

o

en

ojC;

^

3-0

O

T3 e

K

- rt

X

.S o

cs O

H O

.1-5

o

■S£

o

.fi

<

05 .

u

o2

£

S°

w o

O ”

S

+j =D

«3

■C w

4-) CD

■ofi

.ti-o c 2

3J=

O

J3

OS

• C Dh C w

w 0)

a – tS

= 55

o

c a a bo

o

CD

c o

05

jj o

!/) 3

CD O

n«3

*.■°*i*

.‘3

cu »-< _ —

3

o

bfn/j II o-s

.2 8

to T3 •— »

J2

3

CD

u S ˆ

1

arles, f Elb

605.

5 o«.

i’.s-Z-

JB 04I

3

U i>

O”

.M

u

3

m

■*O*

s

QJ. ˆ “J

fi-g

U. CS

3

O

■*p*

. IS

< ˆ

-a

-a m

_3ˆ O10 .

•3

o

►J

( )

tnj*

-1 3

rr-a

*-o

S ts

“5

D 3 h

.id

3 13

feci- +-* a w

tn g

cu t: c °

ctJ 1 -)

o

►J

liO . (U— ■ ‘*

<3 S –

-a

c

f^ -W

- o

V

>

C

<

CI

II

O

.a

1-

3

pa

C

a

4> C O

OJ IS

u

01

-a

‘3

V,

-J

3

T3

3

O

3 g , -O.C »-5 TJ H

c

en” >i .

o cS •-(

QJ

CD

3

X)

0)

J3

CD

U c»2

II > j-

kToo CD O

■&K3 2—

- OT3

T3 •— ‘

‘3

‘3

- fl r

CD

.O

«4-l

OJ to

- en

e >

- O •

U3 3

J3‘3

a,

Louis rdinal

|l62I

ouis, of Gui f Joyei

1654.

1

i-Josep e of G [671.

> -i3s

cS

J u O-H-

.K-Mh—

Franci nd last

t:

u

CD CD

3 3

c

CSC? S cSi-1

So o

CD >0- JJ

■a ° „-^

-3J=«3

-o II ^

o

T3

3

O CD **” O

■c ° *

T3 C

<

SN3»

■3 ^,■ t – , ^ ,

.2 r z<

u 3-

■a cd a 3

^t3t3 bo

cs S c3 uurt

CD CD

rt

O)

rO

GUITAR

703

(1615-1688), daughter of the 4th duke, and with her the title became extinct. The title is now vested in the family of the Bourbon-Orleans princes.

Authorities. — A number of contemporary documents relating to the Guises are included by L. Cimber and F. Danjou in their Archives curieuses de I'histoire de France (Paris, 1834, &<:.)• Vol. iii. contains a soldier's diary of the siege of Metz, first published in Italian (Lyons, 1553), accounts of the sieges of Calais (Tours, 1558), of Thionville (Paris, 1558) ; vol. iv. an account of the tumult of Amboise from the Memoires of Conde, and four accounts of the affair of Vassy; vol. v. four accounts of the battle of Dreux, one dictated by Guise, and accounts of the murder of Guise; vol. xi. accounts of the Parisian revolution of 1558; and vol. xii. numerous pamphlets and pieces dealing with the murder of Henry of Guise and his brother. An account of the murder of Guise and of the subsequent measures taken by Mayenne, which was supplied by the Venetian ambassador, G. Mocenigo, to his government, is printed by H. Brown in the Eng. Hist. Rev. (April 1895). For the foreign policy of the Guises, and especially their relations with Scotland, there is abundant material in the English Calendar of State Papers of Queen Elizabeth (Foreign Series) and in the correspondence of Cardinal Granvella. The memoirs of Francis, duke of Guise, covering the years 1547 to 1563, were published by Michel and Poujoulat in series 1, vol. iv. of their Coll. de memoires. Among contemporary memoirs see especially those of the prince of Conde, of Blaise de Monluc and of Gaspard de Saulx- Tavannes. See also La Vie de F. de Lorraine, due de Guise (Paris, 1681), by J. B. H. du Trousset de Valincourt; A. de Ruble, L'As- sassinal de F. de Lorraine, due de Guise (1897), where there is a list of the MS. sources available for a history of the house; R. de Bouille, Hist, des dues de Guise (4 vols., 1849); H. Forneron, Les Guise el leur epoque (2 vols., 1887).

GUITAR (Fr. guitarre, Ger. Guitarre, Ital. chitarra, Span. guitarra), a

musical instrument strung with gut strings twanged by the fingers, having a body with a fiat back and graceful incurvations in complete contrast to the members of the family of lute (q.v.), whose back is vaulted. The construction of the instrument is of paramount importance in assigning to the guitar its true position in the history of musical instruments, midway between the cithara (q.v.) and the violin. The medieval stringed instruments With neck fall into two classes, characterized mainly by the construction of the body: (1) Those which, like their archetype the cithara, had a body composed of a flat or delicately arched back and soundboard joined by ribs. (2) Those which, like the lyre, had a body consisting of a vaulted back over which was glued a flat soundboard without the inter-mediary of ribs; this method of construction predominates among Oriental Instruments and is greatly inferior to the first. A striking proof of this inferiority is afforded by the fact that instruments with vaulted backs, such as the rebab or rebec, although extensively represented during the middle ages in all parts of Europe by numerous types, have shown but little or no development during the course of some twelve centuries, and have dropped out one by one from the realm of practical music without leaving a single survivor. The guitar must be referred to the first of these classes.

The back and ribs of the guitar are of maple, ash or cherry- wood, frequently inlaid with rose-wood, mother-of-pearl, tortoise-shell, &c, while the soundboard is of pine and has one large ornamental rose sound hole. The bridge, to which the strings are fastened, is of ebony with an ivory nut which deter- mines the one end of the vibrating strings, while the nut at the end of the fingerboard determines the other. The neck and fingerboard are made of hard wood, such as ebony, beech or pear. The head, bent back from the neck at an obtuse angle contains two parallel barrels or long holes through which the pegs or metal screws pass, three on each side of the head. The correct positions for stopping the intervals are marked on the fingerboard by little metal ridges called frets. The modern guitar has six strings, three of gut and three of silk covered with silver wire, tuned as

Notation.

Real Souads.

**?^:=t-:i=*

t^r.

Guitar with seven Strings. 1555. Vihuela da Mano.

shown. To the thumb are assigned the three deepest strings while the first, second and third fingers are used to twang the highest strings. It is generally

stated that the sixth or lowest string was added in 1790 by Jacob August Otto of Jena, who was the first in Germany to take up the construction of guitars

after their introduction from Italy in 1788 by the duchess Amalie of Weimar. Otto 1 states that it was Capellmeister Naumann of Dresden who requested him to make him a guitar with six strings by adding the low E, a spun wire string. The original guitar brought from Italy by the duchess Amalie had five strings, 2 the lowest A being the only one covered with wire. Otto also covered the D in order to increase the fulness of the tone. In Spain six-stringed guitars and vihuelas were known in the 16th century; they are described by Juan Bermudo 3 and others. 4 The lowest string was tuned to G. Other' Spanish guitars of the same period had four, five cr seven strings or courses of strings in pairs of unisons. They were always twanged by the fingers.

The guitar is derived from the cithara 5 both structurally and etymologically. It is usually asserted that the guitar was introduced into Spain by the Arabs, but this statement is open to the gravest doubts. There is no trace among the instruments of the Arabs known to us of any similar to the guitar in construction or shape, although a guitar (fig. 2) with slight incurva- tions was known to the ancient Egyptians. 9 There is also extant a fine example of the guitar, with ribs and incurvations and a long neck provided with numerous frets, on a Hittite bas-relief on the dromos at Euyuk (c. 1000 B.C.) in Cappadocia. 7 Unless other monuments of much later date should come to light showing guitars with ribs, we shall be justified in assuming that the instrument, which required skill in construction, died out in Egypt and in Asia before the days of classic Greece, and had to be evolved anew from the cithara by the Greeks of Asia Minor. That the evolution should take place within the Byzantine Empire From Juan Bermudo. or in Syria would be quite consistent with the Fig. I. — Spanish traditions of the Greeks and their veneration " ' for the cithara, which would lead them to adapt the neck and other improvements to it, rather than adopt the rebab, the tanbur or the barbiton from the Persians or Arabians. This is, in fact, what seems to have taken place. It is true that in the 14th century in an enumeration of musical instruments by the Archipreste de Hita, a guitarra morisca is mentioned and unfavourably compared with the guitarra latina; moreover, the Arabs of the present day still use an instrument called kuitra (which in N.Africa would be guithara), but it has a vaulted back, the body being like half a pear with a long neck; the strings are twanged by means of a quill. The Arab instrument therefore belongs to a different class, and to admit the instrument as the ancestor of the Spanish guitar would be tanta- mount to deriving the guitar from the lute. 8

By piecing together various indications given by Spanish writers, we obtain a clue to the identity of the medieval instruments, which, in the absence of absolute proof, is entitled to serious con- sideration. From Bermudo's work, quoted above, we learn that the guitar and the vihuela da mano were practically identical, differ- ing only in accordance and occasionally in the number of strings. 9 Three kinds of vihuelas were known in Spain during the middle ages, distinguished by the qualifying phrases da ara > (with bow), da mano (by hand), da penola (with quill). Spanish scholars 10 who have inquired into this question of identity state that the guitarra latinawas after- wards known as the vihuela da mano, a statement fully supported by

1 Uber den Bau der Bogeninstrumente (Jena, 1828), pp. 94 and 95.

2 See Pietro Millioni, Vero e jacil modo a" imparare a sonare et accordare da se medesimo la chitarra spagnola, with illustration (Rome, 1637).

3 Declaration de instruments musicales (Ossuna, 1555), fol. xciii. b and fol. xci. a. See also illustration of vihuela da mano.

4 See also G. G. Kapsperger, Libro primo di Villanelle con V in- favolutura del chitarone et alfabeto per la chitarra spagnola (three books, Rome, 1610-1623).

5 See Kathleen Schlesinger, The Instruments of the Orchestra, part ii. " Precursors of the Violin Family," pp. 230-248.

6 See Denon's Voyage in Egypt (London, 1807, pi. 55).

' 7 Illustrated from a drawing in Perrot and Chipiez, " Judee Sardaigne, Syrie, Cappadoce." Vol. iv. of Hist, de I'art dans Vantiquite, Paris, 1887, p. 670. Also see plate from a photograph by Prof. John Garstang, in Kathleen Schlesinger, op. cit.

8 See Biernath, Die Guitarre (1908).

9 See also Luys Milan, Libro de musica de vihuela da mano, Intitulado II Maestro, where the accordance is D, G, C, E, A, D from bass to treble.

10 Mariano Soriano, Fuertes Historia de la musica espaHola (Madrid, 1855), i. 105, and iv. 208, &c.

other evidence. As the Arab kuitra was known to be played by means of a quill, we shall not be far wrong in identifying it with the vihuela da penola. The word vihuela or vigola is connected with the Latin fidicula or fides, a stringed instrument mentioned by Cicero 1 as being made from the wood of the plane-tree and having many strings. The remaining link in the chain of identification is afforded by St Isidore, bishop of Seville in the 7th century, who states that fidicula was another name for cithara, " Veteres aut citharas fidicula vel fidice nominaverunt." 2 The fidicula there- fore was the cithara, either in its original classical form or in one of the transitions which transformed it into the guitar. The existence of a superior guitarra latina side by side with the guitarra morisca is thus explained. It was derived directly from the classical cithara intro- duced by the Romans into Spain, the archetype of the structural beauty which formed the basis of the perfect proportions and delicate structure of the violin. In an inventory 3 made by Philip van Wilder of the musical instruments which had belonged to Henry VIII. is the following item bearing on the question: " foure gitterons with iiii. cases they are called Spanishe Vialles. ' ' Vial or viol was the English equivalent of vihuela. The transitions whereby the cithara acquired a neck and became a guitar are shown in the miniatures (fig. 3) of a single MS., the celebrated Utrecht Psalter, which gave rise to so many discussions. The Utrecht Psalter was executed in the diocese of Reims in the 9th century, and the miniatures, drawn by an Anglo- Saxon artist attached to the Reims school, are unique, and illustrate

From Denon's Voyage in Egypt.

Fig. 2. — Ancient Egyptian Guitar. 1700 to 1200 B.C.

Fig. 3. — Instrumentalists from the Utrecht Psalter, 9th century: (a) The bass rotta, first transition of cithara in © ; (b, c, d), Transi- tions showing the addition of neck to the body of the cithara.

the Psalter, psalm by psalm. It is evident that the Anglo-Saxon artist, while endowed with extraordinary talent and vivid imagina- tion, drew his inspiration from an older Greek illustrated Psalter from the Christian East, 4 where the evolution of the guitar took place.

One of the earliest representations (fig. 4) of a guitar in Western Europe occurs in a Passionale from Zwifalten A.D. 1 180, now in the

1 De natura deorunt, ii. 8, 22.

2 See Etymologiarium, lib. iii., cap. 21.

J See British Museum, Harleian MS. 1419, fol. 200.

4 The literature of the Utrecht Psalter embraces a large number of books and pamphlets in many languages of which the principal are here given : Professor J. O. Westwood, Facsimiles of the Miniatures and Ornaments of Anglo-Saxon and Irish MSS. (London, 1868); Sir Thos. Duffus-Hardy, Report on the Athanasian Creed in connection with the Utrecht Psalter (London, 1872) ; Report on the Utrecht Psalter, addressed to the Trustees of the British Museum (London, 1874); Sir Thomas Duffus-Hardy, Further Report on the Utrecht Psalter (London, 1874) ; Walter de Gray Birch, The History, Art and Palaeography of the MS. styled the Utrecht Psalter (London, 1876) ; Anton Springer, " Die Psalterillustrationen im friihen Mittelalter mit besonderer Riicksicht auf den Utrecht Psalter," Abhandlungen der kgl. sachs. Ges. d. Wissenschaften, phil.hist. Klasse, Bd. viii. pp. 187 296, with 10 facsimile plates in autotype from the MS.; Adclf Goldschmidt, " Der Utrecht Psalter," in Repertorium fur Kunst-■wissenschaft, Bd. xv. {Stuttgart, 1892), pp. 156-166; Franz Friedrich L^itschuh, Geschichte der karolingischen Malerei, ihr Bilderkreis und seine Quellen (Berlin, 1894), pp. 321-330; Adolf Goldschmidt, Der Albani Psalter in Hildesheim, &c. (Berlin, 1895); Paul Durrieu, L'Origine du MS. celebre dit le Psatdtier d' Utrecht (Paris, 1895) '< Hans Graeven, " Die Vorlage des Utrecht Psalters," paper read before th.e XI. International Oriental Congress, Paris, 1897. See also Reper- torium fur Kunstwissenschaft (Stuttgart, 1898), Bd. xxi. pp. 28-35; J. J. Tikkanen, Abendldndische Psalter-Illustration im Mittelalter, part iii. " Der Utrecht Psalter " (Helsingfors, 1900), 320 pp. and 77 ills. (Professor Tikkanen now accepts the Greek or Syrian origin of the Utrecht Psalter) ; Georg Swarzenski, " Die karolingische Malerei und Plastik in Reims." in Jahrbuch d. kgl. preussischen Kunstsammlungen, Bd. xxiii. (Berlin, 1902), pp. 81-100; Ormonde M. Dalton, " The Crystal of Lothair," in Archdologie, vol. lix. (1904) ;

From Dr H. Janitschek's Geschichte der deutschen

-Representation of a European Guitar. A.D. 1 180.

Royal Library at Stuttgart. 6 St Pelagia seated on an ass holds a

rotta, or cithara in transition, while one of the men-servants leading

her ass holds her guitar. Both instruments have three strings and the

characteristic guitar outline with incurvations, the rotta differing

in having no neck. Mersenne 6 writing early in the 17th century

describes and figures two

Spanish guitars, one with

four, the other with five

strings; the former had

a cittern head, the latter

the straight head bent

back at an obtuse angle

from the neck, as in the

modern instrument; he

gives the Italian, French

and Spanish tablatures

which would seem to

show that the guitar already enjoyed a certain , vogue in France and Italy as well as in Spain. Mersenne states that the proportions of the guitar Malerei. demand that the length Fig. 4.- of the neck from shoulder to nut shall be equal to the length of the body from the centre of the rose to the tail end. From this time until the middle of the 19th century the guitar enjoyed great popularity on the continent, and became the fashionable instrument in England after the Peninsular War, mainly through the virtuosity of Ferdinand Sor, who also wrote compositions for it. This popularity of the guitar was due less . to its merits as a solo instrument than to the ease with which it could be mastered sufficiently to accompany the voice. The advent of the Spanish guitar in England led to the wane in the popularity of the cittern, also known at tnat time in contradistinc- tion as the English or wire-strung guitar, although the two instru- ments differed in many particulars. As further evidence of the great popularity of the guitar all over Europe may be instanced the extra- ordinary number of books extant on the instrument, giving instruc- tions how to play the guitar and read the tablature. 7 (K. S.)

GUITAR FIDDLE {Troubadour Fiddle), a modern name bestowed retrospectively upon certain precursors of the violin possessing characteristics of both guitar and fiddle. The name ” guitar fiddle ” is intended to emphasize the fact that the instrument in the shape of the guitar, which during the middle ages represented the most perfect principle of construction for stringed instruments with necks, adopted at a certain

period the use of the bow from instruments of a less perfect type, the rebab and its hybrids. The use of the bow with the guitar entailed certain constructive changes in the instrument: the large central rose sound-hole was replaced by lateral holes of various shapes; the flat bridge, suitable for instruments whose strings were plucked, gave fZZ,.

place to the arched bridge required in order to enable the bow to vibrate each string separ- ately; the arched bridge, by raising the strings higher

above the sound- OiK ~\C

*board, made the ^ /^/^*

Stopping of From Ruhlmann's Geschichte der Bogeninstrumente. strings on the FlG – I- — Typical Alto Guitar Fiddle, 15th neck extremely century (Pinakothek, Munich).

difficult if not impossible; this matter was adjusted by the addition of a finger-board of suitable shape and dimensions (fig. 1). At this stage the guitar fiddle possesses the essential features of

Kathleen Schlesinger, The Instruments of the Orchestra, part ii. " The Precursors of the Violin Family," chap. viii. " The Question of the Origin of the Utrecht Psalter," pp. 352-382 (with illustrations), where all the foregoing are summarized.

6 Reproduced in Hubert Janitschek's Geschichte der deutschen Malerei, Bd. iii. of Gesch. der deutschen Kunst (Berlin, 1890), p. 118.

6 Harmonie universelle (Paris, 1636), livre ii. prop. xiv.

7 See C. F. Becker, Darstellung der musik. Literatur (Leipzig, 1836); and Wilhelm Tappert, " Zur Geschichte der Guitarre," in Monatshefte filr Musikgeschichte (Berlin, 1882), No. 5. pp. 77-85),

*the violin, and may justly claim to be its immediate predecessor * not so much through the viols which were the outcome of the Minnesinger fiddle with sloping shoulders, as through the inter- mediary of the Italian lyra, a guitar-shaped bowed instrument with from 7 to 12 strings.*

From such evidence as we now possess, it would seem that the evolution of the early guitar with a neck from the Greek cithara took place under Greek

influence in the Christian East. The various stages of this transition have been definitely established by the re- markable miniatures of the Utrecht Psalter. 2 Two kinds of citharas are shown: the antique rectangular, 3 and the later design with rounded body having at the point where the arms are added indica- tions of the waist or incurvations characteristic of the outline of the Spanish guitar. 4 The first stage in the transition is shown by a cithara or rotta 5 in which arms and transverse bar are replaced by a kind of frame repeating the outline of the body and thus completing the second lobe of the Spanish guitar. The next stages in the transi- tion are concerned with the addition of a neck 6 and of frets. 7 All these instruments are twanged by the fingers. One may conclude that the use of the bow was either unknown at this time (c. 6th century a.d.), or that it was still confined to instruments of the rebab type. The earliest known representation of a guitar fiddle complete with bow 8 (fig. 2) occurs in a Greek Psalter written and illuminated in Caesarea by the archpriest Theodorus in 1066 (British Museum, Add. MS. 19352). Instances of perfect guitar fiddles abound in the 13th century MSS. and monu- ments, as for instance in a picture by Cimabue (1240-1302), in the Pitti Gallery in Florence. 9

An evolution on parallel line's appears also to have taken place from the antique rectangular cithara 10 of the citharoedes, which was afavourite in Romano-Christian art. 11 In this case examples illustrative of the transitions are found repre- sented in great variety in Europe. The old German rotta 12 of the 6th century preserved in the Volker Museum, Berlin, and the instru- ments played by King David in two early Anglo-Saxon illuminated MSS., one a Psalter (Cotton MS. Vesp. A. i. British Museum) finished in A.D. 700, the other " A Commentary on the Psalms by Cassiodorus manu Bedae " of the 8th century preserved in the Cathedral Library at Durham 13 form examples of the first stage of transition. From such types as these the rectangular crwth or crowd was evolved by the addition of a finger-board and the reduc- tion in the number of strings, which follows as a natural consequence as soon as an extended compass can be obtained by stopping the strings. By the addition of a neck we obtain the clue to the origin of rectangular citterns with rounded corners and of certain instruments played with the bow whose bodies or sound-chests have an outline based upon the rectangle with various modifications. We may not look upon this type of guitar fiddle as due entirely to western or southern European initiative; its origin like that of the type approximating to the violin is evidently Byzantine. It is found among the frescoes which cover walls and barrel vaults in the palace of Kosseir 'Amra, 14 believed to be that of Caliph Walid II. (a.d. 744) of the Omayyad dynasty, or of Prince

From a Byzantine MS. in the British Museum.

Fig. 2.— Earliest example of the Guitar Fiddle, a.d.

1066.

1 See " The Precursors of the Violin Family," by Kathleen Schlesinger, part ii. of An Illustrated Handbook on the Instruments of the Orchestra (London, 1908), chs. ii. and x.

2 See Kathleen Schlesinger, op. cit. part ii., the " Utrecht Psalter," pp. 127-135, and the " Question of the Origin of the Utrecht Psalter," pp. 136-166, where the subject is discussed and illustrated.

I Idem, see pi. vi. (2) to the right centre.

4 Idem, see pi. iii. centre and figs. 118 and 119. 6 Idem, see fig. 117, p. 341, and figs. 172 and 116. 6 Idem, see fig. 121, p. 246, figs. 122, 123, 125 and 126 pi. iii. vi. (1) and (2).

' Idem, see fig. 126, p. 350, and pi. iii. right centre. 8 Idem, see fig. 173, p. 448. 9 Idem, see fig. 205, p. 480.

10 See Museo Pio Clemenlino, by Visconti (Milan, 1818).

II See for example Georgics, iv. 471-475 in the Vatican Virgil (Cod. 3225), in facsimile (Rome, 1899) (British Museum press-mark 8, tab. f. vol. ii.).

12 This rotta was found in an Alamannic tomb of the 4th to the 7th centuries at Oberflacht in the Black Forest. A facsimile is preserved in the collection of the Kgl. Hochschule, Berlin, illustrations in " Grabfunde am Berge Lupfen bei Oberflacht, 1846," Jahresberichle d. t Wtirttemb. Altertums-Vereins, iii. (Stuttgart, 1846), tab. viii. also Kathleen Schlesinger, op. cit. part ii. fig. 168 (drawing from the facsimile).

13 Reproductions of both miniatures are to be found in Professor J. O. West wood's Facsimiles of the Miniatures and Ornaments of Anglo-Saxon and Irish MSS. (London, 1868).

14 An illustration occurs in the fine publication of the Austrian Academy of Sciences, Ktisejr 'Amra (Vienna, 1907, pi. xxxiv.).

Xil. 23

Ahmad, the Abbasid (862-866). The instrument, a cittern with four strings, is being played by a bear. Other examples occur in the Stuttgart Carolingian Psalter 16 (10th century); in MS. 1260 (Bibl. Imp. Paris) Tristan and Yseult; as guitar fiddle in the Liber Regalis preserved in

Westminster Abbey (14th century) ; in the Sforza Book 16 (1444-1476), the Book of Hours executed for Bona of Savoy, wife of Galeazzo Maria Sforza; on one of the carvings of the 13th century in the Cathedral of Amiens. It has also been painted by Italian artists of the 15th and 16th centuries. (K. S.)

GUITRY, LUCIEN GERMAIN (i860-), French actor, was born in Paris. He became prominent on the French stage at the Porte Saint-Martin theatre in 1900, and the Varietes in 1901, and then became a member of the Comˆdie Francaise, but he resigned very soon in order to become director of the Renaissance, where he was principally associated with the actress Marthe Brandes, who had also left the Comedie. Here he established his reputation, in a number of plays, as the greatest contemporary French actor in the drama of modern reality.

GUIZOT, FRANCOIS PIERRE GUILLAUME (1787-1874), historian, orator and statesman, was born at Nimes on the 4th of October 1787, of an honourable Protestant family belonging to the bourgeoisie of that city. It is characteristic of the cruel disabilities which still weighed upon the Protestants of France before the Revolution, that his parents, at the time of their union, could not be publicly or legally married by their own pastors, and that the ceremony was clandestine. The liberal opinions of his family did not, however, save it from the sanguinary intolerance of the Reign of Terror, and on the 8th April 1794 his father perished at Nimes upon the scaffold. Thenceforth the education of the future minister devolved entirely upon his mother, a woman of slight appearance and of homely manners, but endowed with great strength of character and clearness of judgment. Madame Guizot was a living type of the Huguenots of the 16th century, stern in her principles and her faith, immovable in her convictions and her sense of duty. She formed the character of her illustrious son and shared every vicissitude of his life. In the days of his power her simple figure, always clad in deep mourning for her martyred husband, was not absent from the splendid circle of his political friends. In the days of his exile in 1848 she followed him to London, and there at a very advanced age closed her life and was buried at Kensal Green. Driven from Nimes by the Revolution, Madame Guizot and her son repaired to Geneva, where he received his education. In spite of her decided Calvinistic opinions, the theories of Rousseau, then much in fashion, were not without their influence on Madame Guizot. She was a strong Liberal, and she even adopted the notion inculcated in the Entile that every man ought to learn a manual trade or craft. Young Guizot was taught to be a car- penter, and he so far succeeded in his work that he made a table with his own hands, which is still preserved. Of the progress of his graver studies little is known, for in the work which he entitled Memoirs of my own Times Guizot omitted all personal details of his earlier life. But his literary attainments must have

been precocious and considerable, for when he arrived in Paris in 1805 to pursue his studies in the faculty of laws, he entered at eighteen as tutor into the family of M. Stapfer, formerly Swiss minister in France, and he soon began to write in a journal edited by M. Suard, the Publiciste. This connexion introduced him to the literary society of Paris. In October 1809, being then twenty-two, he wrote a review of M. de Chateau- briand's Martyrs, which procured for him the approbation and cordial thanks of that eminent person, and he continued to contribute largely to the periodical press. At Suard 's he had made the acquaintance of Pauline Meulan, an accomplished lady of good family, some fourteen years older than himself, who had been forced by the hardships of the Revolution to earn her living by literature, and who also was engaged to contribute a series of articles to Suard's journal. These contributions were

15 See reproduction of some of the miniatures in Jacob and H. von Hefner-Alteneck, Trachten des christlichen Mittelalters (Darmstadt. 1840-1854, 3 vols.), and in Trachten, Kunstwerke und Gerdtschaften vom fruhen Mittelalter (Frankfort-on-Main, 1879-1890).

16 Add. MS. 34294, British Museum, vol. ii. fol. 83, 161, vol. iii. fol. 402, vol. iv. fols. 534 and 667.

interrupted by her illness, but immediately resumed and con- tinued by an unknown hand. It was discovered that Francois Guizot had quietly supplied the deficiency on her behalf. The acquaintance thus begun ripened. into friendship and love, and in 1812 Mademoiselle de Meulan consented to marry her youthful ally. She died in 1827; she was the author of many esteemed works on female education. An only son, born in 1819, died in 1837 of consumption. In 1828 Guizot married Elisa Dillon, niece of his first wife, and also an author. She died in 1833, leaving a son, Maurice Guillaume (1833-1892), who attained some reputation as a scholar and writer.

During the empire, Guizot, entirely devoted to literary pursuits, published a collection of French synonyms (1809), an essay on the fine arts (181 1), and a translation of Gibbon with additional notes in 181 2. These works recommended him to the notice of M. de Fontanes, then grand-master of the university of France, who selected Guizot for the chair of modern history at the Sorbonne in 18 12. His first lecture (which is reprinted in his Memoirs) was delivered on the nth of December of that year. The customary compliment to the all-powerful emperor he declined to insert in

it, in spite of the hints given him by his patron, but the course which followed marks the beginning of the great revival of historical research in France in the 19th century. He had now acquired a considerable position in the society of Paris, and the friendship of Royer-Collard and the leading members of the liberal party, including the young due de Broglie. Absent from Paris at the moment of the fall of Napoleon in 1814, he was at once selected, on the recommenda- tion of Royer-Collard, to serve the government of Louis XVIII. in the capacity of secretary-general of the ministry of the interior, under the abbe de Montesquiou. Upon the return of Napoleon from Elba he immediately resigned, on the 25th of March 1815 (the statement that he retained office under General Carnot is incorrect), and returned to his literary pursuits. After the Hundred Days, he repaired to Ghent, where he saw Louis XVIII. , and in the name of the liberal party pointed out to his majesty that a frank adoption of a liberal policy could alone secure the duration of the restored monarchy — advice which was ill-received by M. de Blacas and the king's confidential advisers. This visit to Ghent, at the time when France was a prey to a second invasion, was made a subject of bitter reproach to Guizot in after life by his political opponents, as an unpatriotic action. " The Man of Ghent " was one of the terms of insult frequently hurled against him in the days of his power. But the reproach appears to be wholly unfounded. The true interests of France were not in the defence of the falling empire, but in establishing a liberal policy on a monarchical basis and in combating the reactionary tendencies of the ultra-royalists. It is at any rate a remarkable circumstance that a young professor of twenty-seven, with none of the advantages of birth or political experience, should have been selected to convey so important a message to the ears of the king of France, and a proof , if any were wanting, that the Revolution had, as Guizot said, " done its work."

On the second restoration, Guizot was appointed secretary- general of the ministry of justice under M. de Barbe-Marbois, but resigned with his chief in 1816. Again in 1819 he was appointed general director of communes and departments in the ministry of the interior, but lost his office with the fall of Decazes in February 1820. During these years Guizot was one of the leaders of the Doctrinaires, a small party strongly attached to the charter and the crown, and advocating a policy which has become associated (especially by Faguet) with the name of Guizot, that of the juste milieu, a via media between absolutism and popular government. Their opinions had more of , the rigour of a sect than the elasticity of a political party. Ad- hering to the great principles of liberty and toleration, they were sternly opposed to the anarchical traditions of the Revolution. They knew that the elements of anarchy were still fermenting in the country; these they hoped to subdue, not by reactionary measures, but by the firm application of the power of a limited constitution, based on the suffrages of the middle class

and

defended by the highest literary talent of the times. Their motives were honourable. Their views were philosophical. But they were opposed alike to the democratical spirit of the age, to the military traditions of the empire, and to the bigotry and absolutism of the court. The fate of such a party might be foreseen. They lived by a policy of resistance; they perished by another revolution (1830). They are remembered more for their constant opposition to popular demands than by the services they undoubtedly rendered to the cause of temperate freedom.

In 1820, when the reaction was at its height after the murder of the due de Berri, and the fall of the ministry of the due Decazes, Guizot was deprived of his offices, and in 1822 even his course of lectures were interdicted. During the succeeding years he played an important part among the leaders of the liberal opposition to the government of Charles X., although he had not yet entered parliament, and this was also the time of his greatest literary activity. In 1822 he had published his lectures on representative government (Histoire des origines du gouvernement represenlatif, 1821-1822, 2 vols.; Eng. trans. 1852); also a work on capital punishment for political offences and several important political pamphlets. From 1822 to 1830 he published two important collections of historical sources, the memoirs of the history of England in 26 volumes, and the memoirs of the history of France in 31 volumes, and a revised translation, of Shakespeare, and a volume of essays on the history of France. The most" remarkable work from his own pen was the first part of his Histoire de la revolution d' Angleterre depuis Charles I" a Charles II. (2 vols., 1826-1827; Eng. trans., 2 vols., Oxford, 1838), a book of great merit and im- partiality, which he resumed and completed during his exile in England after 1848. The Martignac administration restored Guizot in 1828 to his professor's chair and to the council of state. Then it was that he delivered the celebrated courses of lectures which raised his reputation as an historian to the highest point of fame, and placed him amongst the best writers of France and of Europe. These lectures formed the basis of his general Histoire de la civilisation en Europe (1828; Eng. trans, by W. Hazlitt, 3 vols., 1846), and of his Histoire de la civilisation en France (4 vols., 1830), works which must ever be regarded as classics of modern historical research.

Hitherto Guizot's fame rested on his merits as a writer on public affairs and as a lecturer on modern history. He had attained the age of forty-three before he entered upon the full display of his oratorical strength. In January 1830 he was elected for the first time by the town of Lisieux to the chamber of deputies, and he retained that seat during the whole of his political life. Guizot immediately assumed an important position in the representative assembly, and the first speech he delivered was in defence of

the celebrated address of the 221, in answer to the menacing speech from the throne, which was followed by the dissolution of the chamber, and was the precursor of another revolution. On his returning to Paris from Nimes on the 27th of July, the fall of Charles X. was already imminent. Guizot was called upon by his friends Casimir-Perier, Laffitte, Villemain and Dupin to draw up the protest of the liberal deputies against the royal ordinances of July, whilst he applied himself with them to control the revolutionary character of the late contest. Personally, Guizot was always of opinion that it was a great misfortune for the cause of parliamentary government in France that the infatuation and ineptitude of Charles X. and Prince Polignac rendered a change in the hereditary line of succession inevitable. But, though convinced that it was inevitable, he became one of the most ardent supporters of Louis- Philippe. In August 1830 Guizot was made minister of the interior, but resigned in November. He had now passed into the ranks of the conservatives, and for the next eighteen years was the most determined foe of democracy, the unyielding champion of " a monarchy limited by a limited number of bourgeois."

In 1 83 1 Casimir-Perier formed a more vigorous and compact administration, which was terminated in May 1832 by his death;

the summer of that year was marked by a formidable republican rising in Paris, and it was not till the nth of October 1832 that a stable government was formed, in which Marshal Soult was first minister, the due de Broglie took the foreign office, Thiers the home department, and Guizot the department of public instruction. This ministry, which lasted for nearly four years, was by far the ablest that ever served Louis Philippe. Guizot, however, was already marked with the stigma of un- popularity by the more advanced liberal party. He remained unpopular all his life, " not," said he, " that I court unpopularity, but that I think nothing about it." Yet never were his great abilities more useful to his country than whilst he filled this office of secondary rank but of primary importance in the department of public instruction. The duties it imposed on him were entirely congenial to his literary tastes, and he was master of the subjects they concerned. He applied himself in the first instance to carry the law of the 28th of June 1833, and then for the next three years to put it into execution. In establishing and organizing primary education in France, this law marked a distinct epoch in French history. In fifteen years, under its influence, the number of primary schools rose from ten to twenty-three thousand; normal schools for teachers, and a general system of inspection, were introduced; and boards of education, under mixed lay and clerical authority, were

created. The secondary class of schools and the university of France were equally the subject of his enlightened protection and care, and a prodigious impulse was given to philosophical study and historical research. The branch of the Institute of France known as the " Academie des Sciences Morales et Politiques," which had been suppressed by Napoleon, was revived by Guizot. Some of the old members of this learned body — Talleyrand, Sieyes, Roederer and Lakanal — again took their seats there, and a host of more recent celebrities were added by election for the free discussion of the great problems of political and social science. The " Societe de l'Histoire de France " was founded for the publication of historical works; and a vast publication of medieval chronicles and diplomatic papers was undertaken at the expense of the state (see History; and France, History, section Sources).

The object of the cabinet of October 1832 was to organize a conservative party, and to carry on a policy of resistance to the republican faction which threatened the existence of the monarchy. It was their pride and their boast that their measures never exceeded the limits of the law, and by the exercise of legal power alone they put down an insurrection amounting to civil war in Lyons and a sanguinary revolt in Paris. The real strength of the ministry lay not in its nominal heads, but in the fact that in this government and this alone Guizot and Thiers acted in cordial co-operation. The two great rivals in French parliamentary eloquence followed for a time the same path; but neither of them could submit to the supremacy of the other, and circum- stances threw Thiers almost continuously on a course of opposition, whilst Guizot bore the graver responsibilities of power.

Once again indeed, in 1839, they were united, but it was in opposition to M. Mole, who had formed an intermediate govern- ment, and this coalition between Guizot and the leaders of the left centre and the left, Thiers and Odilon Barrot, due to his ambition and jealousy of Mole, is justly regarded as one of the chief inconsistencies of his life. Victory was secured at the expense of principle, and Guizot's attack upon the government gave rise to a crisis and a republican insurrection. None of the three chiefs of that alliance took ministerial office, however, and Guizot was not sorry to accept the post of ambassador in London, which withdrew him for a time from parliamentary contests. This was in the spring of 1840, and Thiers succeeded shortly afterwards to the ministry of. foreign affairs.

Guizot was received with marked distinction by the queen and by the society of London. His literary works were highly esteemed, his character was respected, and France was never more worthily represented abroad than by one of her greatest orators. He was known to be well versed in the history and the

literature of England, and sincerely attached to the alliance of the two nations and the cause of peace. But, as he himself remarked, he was a stranger to England and a novice in diplom- acy; and unhappily the embroiled state of the Syrian question, on which the French government had separated itself from the joint policy of Europe, and possibly the absence of entire con- fidence between the ambassador and the minister of foreign affairs, placed him in an embarrassing and even false position. The warnings he transmitted to Thiers were not believed. The warlike policy of Thiers was opposed to his own convictions. The treaty of the 1 5th of July was signed without his knowledge and executed in the teeth of his remonstrances. For some weeks Europe seemed to be on the brink of war, until the king put an end to the crisis by refusing his assent to the military preparations of Thiers, and by summoning Guizot from London to form a ministry and to aid his Majesty in what he termed " ma lutte tenace contre l'anarchie." Thus began, under dark and adverse circumstances, on the 29th of October 1840, the important administration in which Guizot remained the master-spirit for nearly eight years. He himself took the office of minister for foreign affairs, to which he added some years later, on the retirement of Marshal Soult, the ostensible rank of prime minister. His first care was the maintenance of peace and the restoration of amicable relations with the other powers of Europe. If he succeeded, as he did succeed, in calming the troubled elements and healing the wounded pride of France, the result was due mainly to the indomitable courage and splendid eloquence with which he faced a raging opposition, gave unity and strength to the conservative party, who now felt that they had a great leader at their head, and appealed to the thrift and prudence of the nation rather than to their vanity and their ambition. In his pacific task he was fortunately seconded by the formation of Sir Robert Peel's administration in England, in the autumn of 1841. Between Lord Palmerston and Guizot there existed an incompatibility of character exceedingly dangerous in the foreign ministers of two great and in some respects rival countries. With Lord Palmerston in office, Guizot felt that he had a bitter and active antagonist in every British agent throughout the world; the combative element was strong in his own disposition; and the result was a system of perpetual conflict and counter-intrigues. Lord Palmerston held (as it appears from his own letters) that war between England and France was, sooner or later, inevitable. Guizot held that such a war would be the greatest of all calamities, and certainly never contemplated it. In Lord Aberdeen, the foreign secretary of Sir Robert Peel, Guizot found a friend and an ally perfectly congenial to himself. Their acquaintance in London had been slight, but it soon ripened into mutual regard and confidence. They were both men of high principles and honour; the Scotch Presbyterianism which had moulded the faith of Lord Aberdeen was reflected in the Huguenot minister of France; both were men of extreme simplicity of taste, joined to

the refinement of scholarship and culture; both had an intense aversion to war and felt themselves ill-qualified to carry on those adventurous operations which inflamed the imagination of their respective opponents. In the eyes of Lord Palmerston and Thiers their policy was mean and pitiful; but it was a policy which secured peace to the world, and united the two great and free nations of the West in what was termed the entente cordiale. Neither of them would have stooped to snatch an advantage at the expense of the other; they held the common interest of peace and friendship to be paramount; and when differences arose, as they did arise, in remote parts of the world, — in Tahiti, in Morocco, on the Gold Coast, — they were reduced by this principle to their proper insignificance. The opposition in France denounced Guizot's foreign policy as basely subservient to England. He replied in terms of unmeasured contempt, — " You may raise the pile of calumny as high as you will; vous n'arriverez jamais a. la hauteur de mon dedain !" The opposition in England attacked Lord Aberdeen with the same reproaches, but in vain. King Louis Philippe visited Windsor. The queen of England (in 1843) stayed at the Chateau d'Eu. In 1845 British and

French troops fought side by side for the first time in an expedi- tion to the River Plate.

The fall of Sir Robert Peel's government in 1846 changed these intimate relations; and the return of Lord Palmerston to the foreign office led Guizot to believe that he was again exposed to the passionate rivalry of the British cabinet. A friendly understanding had been established at Eu between the two courts with reference to the future marriage of the young queen of Spain. The language of Lord Palmerston and the conduct of Sir Henry Bulwer (afterwards Lord Dalling) at Madrid led Guizot to believe that this understanding was broken, and that it was intended to place a Coburg on the throne of Spain. Determined to resist any such intrigue, Guizot and the king plunged headlong into a counter-intrigue, wholly inconsistent with their previous engagements to England, and fatal to the happiness of the queen of Spain. By their influence she was urged into a marriage with a despicable offset of the house of Bourbon, and her sister was at the same time married to the youngest son of the French king, in direct violation of Louis Philippe's promises. This transaction, although it was hailed at the time as a triumph of the policy of France, was in truth as fatal to the monarch as it was discreditable to the minister. It was accomplished by a mixture of secrecy and violence. It was defended by subterfuges. By the dispassionate judgment of history it has been universally condemned. Its immediate effect was to destroy the Anglo-French alliance, and to throw

Guizot into closer relations with the reactionary policy of Metternich and the Northern courts.

The history of Guizot's administration, the longest and the last which existed under the constitutional monarchy of France, bears the stamp of the great qualities and the great defects of his political character, for he was throughout the master-spirit of that government. His first object was to unite and discipline the conservative party, which had been broken up by previous dissensions and ministerial changes. In this he entirely succeeded by his courage and eloquence as a parliamentary leader, and by the use of all those means of influence which France too liberally supplies to a dominant minister. No one ever doubted the purity and disinterestedness of Guizot's own conduct. He despised money; he lived and died poor; and though he encouraged the fever of money-getting in the French nation, his own habits retained their primitive simplicity. But he did not disdain to use in others the baser passions from which he was himself free. Some of his instruments were mean; he employed them to deal with meanness after its kind. Gross abuses and breaches of trust came to light even in the ranks of the govern- ment, and under an incorruptible minister the administration was denounced as corrupt. Licet uti alieno vitio is a proposition as false in politics as it is in divinity.

Of his parliamentary eloquence it is impossible to speak too highly. It was terse, austere, demonstrative and commanding, — not persuasive, not humorous, seldom adorned, but condensed with the force of a supreme authority in the fewest words. He was essentially a ministerial speaker, far more powerful in defence than in opposition. Like Pitt he was the type of authority and resistance, unmoved by the brilliant charges, the wit, the gaiety, the irony and the discursive power of his great rival. Nor was he less a master of parliamentary tactics and of those sudden changes and movements in debate which, as in a battle, sometimes change the fortune of the day. His confidence in himself, and in the majority of the chamber which he had moulded to his will, was unbounded; and long success and the habit of authority led him to forget that in a country like France there was a people outside the chamber elected by a small constituency, to which the minister and the king himself were held responsible.

A government based on the principle of resistance and re- pression and marked by dread and distrust of popular power, a system of diplomacy which sought to revive the traditions of the old French monarchy, a sovereign who largely exceeded the bounds of constitutional power and whose obstinacy augmented with years, a minister who, though far removed from the servility

of the courtier, was too obsequious to the personal influence of the king,

were all singularly at variance with the promises of the Revolution of July, and they narrowed the policy of the adminis- tration. Guizot's view of politics was essentially historical and philosophical. His tastes and his acquirements gave him little insight into the practical business of administrative govern- ment. Of finance he knew nothing; trade and commerce were strange to him; military and naval affairs were unfamiliar to him; all these subjects he dealt with by second hand through his friends, P. S. Dumon (1797-1870), Charles Marie Tanneguy, Comte Duchatel (1803-1867), or Marshal Bugeaud. The con- sequence was that few measures of practical improvement were carried by his administration. Still less did the government lend an ear to the cry for parliamentary reform. On this subject the king's prejudices were insurmountable, and his ministers had the weakness to give way to them. It was impossible to defend a system which confined the suffrage to 200,000 citizens, and returned a chamber of whom half were placemen. Nothing would have been easier than to strengthen the conservative party by attaching the suffrage to the possession of land in France, but blank resistance was the sole answer of the govern- ment to the just and moderate demands of the opposition. Warning after warning was addressed to them in vain by friends and by foes alike; and they remained profoundly unconscious of their danger till the moment when it overwhelmed them. Strange to say, Guizot never acknowledged either at the time or to his dying day the nature of this error; and he speaks of himself in his memoirs as the much-enduring champion of liberal government and constitutional law. He utterly fails to perceive that a more enlarged view of the liberal destinies of France and a less intense confidence in his own specific theory might have preserved the constitutional monarchy and averted a vast series of calamities, which were in the end fatal to every principle he most cherished. But with the stubborn conviction of absolute truth he dauntlessly adhered to his own doctrines to the end.

The last scene of his political life was singularly characteristic of his inflexible adherence to a lost cause. In the afternoon of the 23rd of February 1848 the king summoned his minister from the chamber, which was then sitting, and informed him that the aspect of Paris and the country during the banquet agitation for reform, and the alarm and division of opinion in the royal family, led him to doubt whether he could retain his ministry. That doubt, replied Guizot, is decisive of the question, and instantly resigned, returning to the chamber only to announce that the administration was at an end and that Mole had been sent for by the king. Mole failed in the attempt to form a govern- ment, and between midnight and one in the morning Guizot, who had according to his custom retired early to rest, was again sent for to the Tuileries. The king asked his advice. " We are no longer the ministers of your Majesty," replied Guizot; " it rests

with others to decide on the course to be pursued. But one thing appears to be evident: this street riot must be put down; these barricades must be taken; and for this purpose my opinion is that Marshal Bugeaud should be invested with full power, and ordered to take the necessary military measures, and as your Majesty has at this moment no minister, I am ready to draw up and countersign such an order." The marshal, who was present, undertook the task, saying, " I have never been beaten yet, and I shall not begin to-morrow. The barricades shall be carried before dawn." After this display of energy the king hesitated, and soon added: " I ought to tell you that M. Thiers and his friends are in the next room forming a government!" Upon this Guizot rejoined, " Then it rests with them to do what they think fit," and left the palace. Thiers and Barrot decided to withdraw the troops. The king and Guizot next met at Claremont. This was the most perilous conjuncture of Guizot's life, but fortunately he found a safe refuge in Paris for some days in the lodging of a humble miniature painter whom he had befriended, and shortly afterwards effected his escape across the Belgian frontier and thence to London, where he arrived on the 3rd of March. His mother and daughters

had preceded him, and he was speedily installed in a modest habitation in Pelham Crescent, Brompton.

The society of England, though many persons disapproved of much of his recent policy, received the fallen statesman with as much distinction and respect as they had shown eight years before to the king's ambassador. Sums of money were placed at his disposal, which he declined. A professorship at Oxford was spoken of, which he was unable to accept. He stayed in England about a year, devoting himself again to history. He published two more volumes on the English revolution, and in 1854 his Histoire de la republique d' Angleterre et de Cromwell (2 vols., 1854), then his Histoire du protectorat de Cromwell et du ritablissement des Stuarts (2 vols., 1856). He also published an essay on Peel, and amid many essays on religion, during the ten years 1858-1868, appeared the extensive Memoires pour servir a V histoire de mon temps, in nine volumes. His speeches were included in 1863 in his Histoire parlementaire de la France (5 vols, of parliamentary speeches, 1863).

Guizot survived the fall of the monarchy and the government he had served twenty-six years. He passed abruptly from the condition of one of the most powerful and active statesmen in Europe to the condition of a philosophical and patriotic spectator of human affairs. He was aware that the link between himself and public life was broken for ever; and he never made the slightest attempt to renew it. He was of no party, a member of no political

body; no murmur of disappointed ambition, no language of asperity, ever passed his lips; it seemed as if the fever of oratorical debate and ministerial power had passed from him and left him a greater man than he had been before, in the pursuit of letters, in the conversation of his friends, and as head of the patriarchal circle of those he loved. The greater part of the year he spent at his residence at Val Richer, an Augustine monastery near Lisieux in Normandy, which had been sold at the time of the first Revolution. His two daughters, who married two descendants of the illustrious Dutch family of De Witt, so congenial in faith and manners to the Huguenots of France, kept his house. One of his sons-in-law farmed the estate. And here Guizot devoted his later years with undiminished energy to literary labour, which was in fact his chief means of subsistence. Proud, independent, simple and contented he remained to the last; and these years of retirement were perhaps the happiest and most serene portion of his life.

Two institutions may be said even under the second empire to have retained their freedom — the Institute of France and the Protestant Consistory. In both of these Guizot continued to the last to take an active part. He was a member of three of the five academies into which the Institute of France is divided. The Academy of Moral and Political Science owed its restoration to him, and he became in 1832 one of its first associates. The Academy of Inscriptions and Belles Lettres elected him in 1833 as the successor to M. Dacier; and in 1836 he was chosen a member of the French Academy, the highest literary distinction of the country. In these learned bodies Guizot continued for nearly forty years to take a lively interest and to exercise a powerful influence. He was the jealous champion of their independence. His voice had the greatest weight in the choice of new candidates; the younger generation of French writers never looked in vain to him for encouragement; and his constant aim was to maintain the dignity and purity of the profession of letters.

In the consistory of the Protestant church in Paris Guizot exercised a similar influence. His early education and his experience of life conspired to strengthen the convictions of a religious temperament. He remained through life a firm believer in the truths of revelation, and a volume of Meditations on the Christian Religion was one of his latest works. But though ,he adhered inflexibly to the church of his fathers and combated the rationalist tendencies of the age, which seemed to threaten it with destruction, he retained not a tinge of the intolerance or asperity of the Calvinistic creed. He respected in the Church of Rome the faith of the majority of his countrymen; and the writings of the great Catholic prelates, Bossuet and Bourdaloue,

were as familiar and as dear to him as those of his own persuasion, and were commonly used by him in the daily exercises of family worship.

In these literary pursuits and in the retirement of Val Richer years passed smoothly and rapidly away; and as his grand- children grew up around him, he began to direct their attention to the history of their country. From these lessons sprang his last and not his least work, the Histoire de France racontee a mes petits enfants, for although this publication assumed a popular form, it is not less complete and profound than it is simple and attractive. The history came down to 1789, and was continued to 1870 by his daughter Madame Guizot de Witt from her father's notes.

Down to the summer of 1874 Guizot's mental vigour and activity were unimpaired. His frame, temperate in all things, was blessed with a singular immunity from infirmity and disease ; but the vital power ebbed away, and he passed gently away on the 12th of September 1874, reciting now and then a verse of Corneille or a text of Scripture.

Bibliography. — See his own Memoires pour servir d. I'histoire de mon temps (8 vols., 1858-1861) ; Lettres de M. Guizot a sa famille et d, ses amis (1884) ; C. A. Sainte-Beuve, Causeries du lundi (vol. i., 1857) and Ncuveaux Lundis (vols. i. and ix., 1863-1872); E. Scherer, Htudes critiques sur la litterature contemporaine (vol. iv., 1873); Mme de Witt, Guizot dans sa famille (1880); Jules Simon, Thiers, Guizot et Remusat (1885) ; E. Faguet, Politiques et moralistes au XIX' siecle (1891); G. Bardoux, Guizot (1894) in the series of " Les Grands Ecrivains frangais "; Maurice Guizot, Les Annees de retraite de M. Guizot (1901); and for a long list of books and articles on Guizot in periodicals see H. P. Thie'me, Guide bibliographique de la litterature francaise de 1800 d. IQ06 (s.v. Guizot, Paris, 1907). For a notice of his first wife see C. A. Sainte-Beuve, Portraits de femmes (1884), and Ch. de Rdmusat, Critiques et etudes littlraires (vol. ii., 1847). (H. R.; J. T. S.)*

GUJARAT or Guzerat, a region of India, in the Bombay Presidency. In the widest sense of the name it includes the whole of the country where the Gujarati language is spoken, i.e. the northern districts and states of the Presidency from Palanpur to Damaun, with Kathiawar and Cutch. But it is more properly confined to the country north of the Nerbudda and east of the Rann of Cutch and Kathiawar. In this sense it has an area of 29,071 sq. m., with a population in 1901 of 4,798,504. It includes the states distributed among the agencies of Palanpur, Mahi Kantha, Rewa Kantha and Cambay, with most of Baroda and the British districts of Ahmedabad, Kaira, Panch Mahals and Broach. Less than one-fourth is British territory. The region takes its name from the Gujars, a tribe who passed into India from the north-west, established a kingdom in Rajputana, and spread south

in a.d. 400-600. The ancient Hindu capital was Anhilvada; the Mahommedan dynasty, which ruled from 1396 to 1572, founded Ahmedabad, which is still the largest city; but Gujarat owed much of its historical importance to the seaports of Broach, Cambay and Surat. Its fertile plain, with a regular rainfall and numerous rivers, has caused it to be styled the " garden of India." It suffered, however, severely from the famine of 1899-1901. For an account of the history, geography, &c, of Gujarat seethe articles on the various states and districts. Gujarat gives its name to the vernacular of northern Bombay, viz. Gujarati, one of the three great languages of that Presidency, spoken by more than 9 millions. It has an ancient literature and a peculiar character. As the language of the Parsis it is prominent in the Bombay press; and it is also the commercial language of Bombay city, which lies outside the territorial area of Gujarat.

See J. Campbell, History of Gujarat (Bombay, 1896); Sir E. C. Bayley, The Muhammedan Kingdom of Gujarat (1886); A. K. Forbes, Ras Mala (1856).

GUJARATI and RAJASTHANI, the names of two members of the western sub-group of the Intermediate Group of Indo- Aryan languages (q.v.) . The remaining member of this sub-group is Panjabi or Punjabi (see Hindostani). In 1901 the speakers of those now dealt with numbered: Gujarati, 9,439,925, and Rajasthani, 10,917,712. The two languages are closely connected and might almost be termed co-dialects of the same form of speech. Together they occupy an almost square block of country,

some 400 m. broad, reaching from near Agra and Delhi on the river Jumna to the Arabian Sea. Gujarati (properly Gujardti) is spoken in Gujarat, the northern maritime province of the Bombay Presidency, and also in Baroda and the native states adjoining. Rajasthani (properly Rajasthani, from " Rdjasthdn," the native name for Rajputana) is spoken in Rajputana and the adjoining parts of Central India.

In the articles Indo-Aryan Languages and Prakrit the history of the earlier stages of the Indo-Aryan vernaculars is given at some length. It is there shown that, from the most ancient times, there were two main groups of these forms of speech— one, the language of the Midland, spoken in the country near the Gangetic Doab, and the other, the so-called " Outer Band," containing the Midland on three sides, west, north and south. The country to the west and south-west of the Midland, in which this outer group of languages was spoken, included the modern Punjab, Rajputana

and Gujarat. In process of time the population of the Midland expanded and carried its language to its new homes. It occupied the eastern and central Punjab, and the mixed (or " intermediate ") language which there grew up became the modern Panjabi. To the west it spread into Rajputana, till its progress was stopped by the Indian desert, and in Rajputana another intermediate language took rise and became Rajasthani. As elsewhere explained, the language-wave of the Midland exercised less and less influence as it travelled farther from its home, so that, while in eastern Rajputana the local dialect is now almost a pure midland speech, in the west there are many evident traces of the old outer language still surviving. To the south-west of Rajputana there was no desert to stop the wave of Midland expansion, which therefore rolled on. unobstructed into Gujarat, where it reached the sea. Here the survivals of the old outer language are stronger still. The old outer Prakrit of north Gujarat was known as " Saurastri," while the Prakrit of the Midland invaders was called " Saurasenl," and we may therefore describe Gujarati as being an intermediate la/iguage derived (as explained in the articles Prakrit) from a mixture of the Apabhramsa forms of Saurastri and Saurasenl, in which the latter predominated.

It will be observed that, at the present day, Gujarati breaks the continuity of the outer band of Indo-Aryan languages. To its north it has Sindhi and to its south Marathi, both outer languages with which it has only a slight connexion. On the other hand, on the east and north-east it has Rajasthani, into which it merges so gradually and imperceptibly that at the conventional border-line, in the state of Palanpur, the inhabitants of Rajputana say that the local dialect is a form of Gujarati, while the inhabitants of Gujarat say that it is Rajasthani.

Gujarati has no important local dialects, but there is consider- able variation in the speeches of different classes of the com- Laaguage. munitv – Parsees and Mussulmans (when the latter use the language— as a rule the Gujarat Mussulmans speak Hindostani) have some striking peculiarities of pronuncia- tion, the most noticeable of which is the disregard by the latter of the distinction between cerebral and dental letters. The uneducated Hindus do not pronounce the language in the same way as their betters, and this difference is accentuated in northern Gujarat, where the lower classes substitute e for I, c for k, ch for kit, s for c and ch, h for s, and drop h as readily as any cockney. There is also (as in the case of the Mussulmans) a tendency to confuse cerebral and dental consonants, tc substitute r for d and /, to double medial consonants, and to pronounce the letter d as a, something like the a in " all." The Bhils of the hills east of Gujarat also speak a rude Gujarati, with special dialectic peculiarities of their own, probably due to' the fact that the tribes are of Dravidian origin. These Bhil peculiarities are further mixed with corruptions of Marathi

idioms in Nimar and Khandesh, where we have almost a new language.

Rajasthani has numerous dialects, each state claiming one or more of its own. Thus, in the state of Jaipur there have been catalogued no less than ten dialects among about 1,688,000 people. All Rajasthani dialects can, however, be easily classed in four well-defined groups, a north-eastern, a southern, a

western and an east-central. The north-eastern (Mewatl) is that form of Rajasthani which is merging into the Western Hindi of the Midland. It is a mixed form of speech, and need not detain us further. Similarly, the southern (Malvl) is much mixed with the neighbouring Bundeli form of Western Hindi. The western (Marwan) spoken in Marwar and its neighbourhood, and the east-central (Jaipurl) spoken in Jaipur and its neighbour- hood, may be taken as the typical Rajasthani dialects. In the following paragraphs we shall therefore confine ourselves to Gujarati, Marwari and Jaipuri.

We know more about the ancient history of Gujarati than we do about that of any other Indo-Aryan language. The one native grammar of Apabhramsa Prakrit which we possess in a printed edition, was written by Hemacandra (12th century A.D.), who lived in what is now north Gujarat, and who naturally described most fully the particular vernacular with which he was personally familiar. It was known as the Nagara Apabhramsa, closely connected (as above explained) with Saurasenl, and was so named after the Nagara Brahmans of the locality. These men carried on the tradition of learning inherited from Hema- candra, and we see Gujarati almost in the act of taking birth in a work called the Mugdhavabodhamauktika, written by one of them only two hundred years after his death. Formal Gujarati literature is said to commence with the poet Narsingh Meta in the 15th century. Rajasthani literature has received but small attention from European or native scholars, and we are as yet unable to say how far back the language goes.

Both Gujarati and Rajasthani are usually written in current scripts related to the well-known Nagarl alphabet (see Sanskrit). The form employed in Rajputana is known all over northern India as the " MahajanI " alphabet, being used by bankers or Mahdjans, most of whom are Marwaris. It is noteworthy as possessing two distinct characters for d and r. The Gujarati character closely resembles the Kaithi character of northern India (see Bihari). The Nagarl character is also freely used in Rajputana, and to a less extent in Gujarat, where it is employed by the Nagara Brahmans, who claim that their tribe has given the alphabet its name.

In the following description of the main features of our two languages, the

reader is presumed to be familiar with the leading facts stated in the articles Indo-Aryan Languages and Prakrit. The article Hindostani may also be perused with advantage.

(Abbreviations. Skr. = Sanskrit. Pr. = Prakrit. Ap. = Apabh- ramsa. G. = Gujarati. R. = Rajasthani. H. = Hindostani.)

Vocabulary— The vocabulary of both Gujarat and Raiasthani is very tree from tatsama words. The great mass of both vocabularies is tadbhava (see Indo-Aryan Languages). Rajputana was from an early period brought into close contact with the Mogul court at Agra and Delhi, and even in the 13th century a.d. official documents ot the Kajput princes contained many borrowed Persian and Arabic words. Gujarati, under the influence of the learned Nagara Brah- mans, has perhaps more tatsama words than Raiasthani, but their employment is not excessive. On the other hand, Parsees and Mussulmans employ Persian and Arabic words with great freedom • while, owing to its maritime connexions, the language has also borrowed occasional words from other parts of Asia and from Europe, this is specially marked in the strange dialect of the Kathiawar boatmen who travel all over the world as lascars on the great steam- ships. Their language is a mixture of Hindostani and Gujarati with a heterogeneous vocabulary.

Phonetics.— With a few exceptions to be mentioned below, the sound-system of the two languages is the same as that of Sanskrit, and is represented in the same manner in the Roman character (see Sanskrit). The simplest method for considering the subject in regard to Gujarati is to compare it with the phonetical system of Hindostani (q.v.). As a rule, Rajasthani closely follows Gujarati and need not be referred to except in special cases. G. invariably simplifies a medial Pr. double consonant, lengthening the preceding vowel in compensation. Thus Skr. mraksanam, Ap. makkhanu, H. makkhan, but G. makhan, butter. In H. this rule is generally observed, but in G. it is universal, while, on the other hand, in Panjabi the double consonant is never simplified, but is retained as in Ap. In G. (and sometimes in R.) when a is followed by h it is changed to e, as in H. shahr, G. seher, a city. As in other outer languages H. ai and au are usually represented by a short e and by d (sounded like the a in " all ") respectively. Thus H. baipha. G. befho, seated; H. cautha, G. cdtho (written cotho), fourth. In R. this e is often further weakened to the sound of a in " man," a change

*which is also common in Bengali. Many words which have i in H. have a in G. and R., thus, H. likhe, G. lakhe, he writes; H. din, G. and R. dan, a day. Similarly we have a for u, as in H. turn, G., R. lame, you. In colloquial G. a often becomes a, and i becomes e; thus, pant for pant, water; mares for maris, I shall strike. As in most I ndo-Aryan vernaculars an o after an accented syllable is very lightly pronounced, and is here represented by a small < * above the line.*

The Vedic cerebral I and the cerebral n are very common as medial letters in both G. and R. (both being unknown to literary H.). The rule is, as elsewhere in western and southern intermediate and outer languages, that when n and / represent a double nn (or nn) or a double 11 in Pr. they are dental, but when they represent single medial letters they are cerebralized. Thus Ap. sonnau, G. sonu, gold; Ap. ghanaii, G. ghanii, dense; Ap. cattai, G. call, he goes; Ap. calai, G. cale, he moves. In northern G. and in some caste dialects dental and cerebral letters are absolutely interchangeable, as in dah a do or dahado, a day; til or til, thou ; didho or didho, given. In G. and R. medial d is pronounced as a rough cerebral r, and is then so transcribed. We have seen that in the Marwari alphabet there are actually distinct letters for these two sounds. In colloquial G. c a.nd_ch are j>ronounced s, especially in the north, as in pas for pac, five; pusyo for puchyo, he asked. Similarly, in the north, j and jh become z, as in zad for jhad, a tree. In some localities (as in Marathi) we have ts and dz for these sounds, as in Tsarotar (name of a tract of country) for Carotar. On the other hand, k, kh and g, especially when preceded or followed by i, e or y, become in the north c, ch and j respectively ; thus, diCro for dik a ro, a son ; chetar for khetar, a field ; lajyo for lagyo, begun. A similar change is found in dialectic Marathi, and is, of course, one of the commonplaces of the philology of the Romance languages. The sibilants i and s are colloquially pro- nounced h (as in several outer languages), especially in the north. Thus deh {or des, a country ; kit for su, what ;ham a – jdvyo for sam"jdvyd, he explained. An original aspirate is, however, often dropped, as in 'u for hil, I ; 'ate for hdthe, on the hand. Standard G. is at the same time fond of pronouncing an h where it is not written, as in ami, we, pronounced ahme. In other respects both G. and R. closely agree in their phonetical systems with the Apabhrarhsa form of SaurasenI Prakrit from which the Midland language is derived.

Declension. — Gujarati agrees with Marathi (an outer language) as against Hindostani in retaining the neuter gender of Sanskrit and Prakrit. Moreover, the neuter gender is often employed to indicate living beings of which the sex is uncertain, as in the case of dik"ru, a child, compared with dik"ro, a son, and dik"rl, a daughter. In R. there are only sporadic instances of the neuter, which grow more and more rare as we approach the Midland. Nouns in both G. and R. may be weak or strong as is fully

explained in the article Hindostani. We have there seen that the strong form of masculine nouns in Western Hindi generally ends in au, the a of words like the Hindostani ghora, a horse, being an accident due to the fact that the Hindostani dialect of Western Hindi borrows this termination from Panjabi. G. and R. follow Western Hindi, for their masculine strong forms end in 0. Feminine strong forms end in J as elsewhere. Neuter strong forms in G. end in U, derived as follows: Skr, svar- nakam, Ap. sonnau, G. sonu, gold. As an example of the three genders of the same word we may take G. chok"ro (masc), a boy; chok'ri (fern.); a girl; chdk a ru (neut.), a child. Long forms corre- sponding to the Eastern Hindi ghor"wd, a horse, are not much used, but we not infrequently meet another long form made by suffixing the pleonastic termination do or ro (fem. di or rl; G. neut. du or ru) which is directly descended from the Ap. pleonastic termination daii, dai, dau. We come across this most often in R., where it is used contemptuously, as in Turuk-ro, a Turk.

In the article Hindostani it is shown that all the oblique cases of each number in Sanskrit and Prakrit became melted down in the modern languages into one general oblique case, which, in the Mid- land, is derived in the singular from the Ap. termination hi or hi, and that even this has survived only in the case of strong masculine nouns; thus, ghora, obi. ghore. In G. and R. this same termination has also survived, but for all nouns as the case sign of the agent and locative cases. The general oblique case is the same as the nomina- tive, except in the case of strong masculine and neuter nouns in and u respectively, where it ends in a, not e. This a-termination is characteristic of the outer band of languages, and is one of the sur- vivals already referred to. It is derived from the Apabhrarhsa genitive form in -aha, corresponding to the MagadhI Pr. (an outer ' Prakrit) termination -aha. Thus, G. chok"ro, a son ; chok'ru, a child; obi. sing. ch6k"ra.

In G. the nominative and oblique plural for all nouns are formed by adding to the oblique form singular, but in the neuter strong forms the oblique singular is nasalized. The real plural is the same in form as the oblique singular in the case of masculines, and as a nasalized oblique singular in the case of neuter strong forms, as in

other modern Indo-Aryan vernaculars, and the added is a further plural termination (making a double plural, exactly as it does in the Ardhamagadhi Prakrit putld-o, sons) which is often dropped. The nasalization of the strong neuter plurals is inherited from Ap., in which the neuter nom. plural of such nouns ended in aai In R. the nominative plural of masculine nouns is the same in form as the oblique case singular, and the oblique plural ends in a. The feminine has 3 both in the nominative and in the oblique plural. These are all explained in the article Hindostani. We

thus get the following paradigms of the declension of nouns.

Apabhrarhsa.

Gujarati.

Rajasthani.

Strong Noun Masc. —

" A horse." Sing. Nom.

ghodaii

ghodo

ghodo

Obi.

ghodaaha

ghoda

ghoda

Ag.-Loc.

ghodaaki

ghode, ghodae

ghodai

Plur. Nom.

ghddaa

ghodd-d

ghoda

Obi.

ghodaaha

ghoda-d

ghoda

Ag.-Loc.

ghodaahi

ghoda-o-e

ghoda

Strong Noun Neut. — ” Gold.” Sing. Nom.

sonnau

sonu

Obi.

sonnaaha

sona

Ag.-Loc.

sonnaahi

sone, sonde

Plur. Nom.

sonnaai

sdne

Obi.

sonnaaha

sona-6

Ag.-Loc.

sonnaahi

sona-o-e

Strong Noun Fem. — •

” A mare.” Sing. Nom.

ghodia

ghodi

ghodi.

Obi.

ghodiahi

ghodi

ghodi

Ag.-Loc.

ghodiae

ghodie

ghodi _

Plur. Nom.

ghodia-o

ghodi-o

ghodya

- Obi.

ghodiahu

ghodi-o

ghodya

Ag.-Loc.

ghodiahi

ghodl-o-e

ghodya

Weak Noun Masc. or Neut. —

" A house." Sing. Nom.

gharu (neut.)

ghar

ghar

Obi.

gharaha

ghar

ghar

Ag.-Loc.

gharahi

ghare

gharai

Plur. Nom.

ghardt

ghar-o

ghar

Obi.

gharaha

ghar-o

ghara

Ag.-Loc.

gharahX

ghar-o-e

ghara

Weak Noun Fem. —

” A word.” Sing. Nom.

vattd

wat

bat

Obi.

vattahi

mat

bat

Ag.-Loc.

vattae

wale,

bat _

Plur. Nom.

vattd-o

wat-o

bata

Obi.

vattahu

wdl-o

bata

Ag.-Loc.

vattahi

wdl-o-e

bata

The general oblique case can be employed for any case except the nominative, but, in order to define the meaning, it is customary to add postpositions as in Hindostani. These are:

Genitive.

Dative.

Ablative.

Locative.

Gujarati . Rajasthani

no ro, ko

ne nai, rai, kai

(hi su

ma mat

The suffix no of the genitive is believed to be a contraction of land, which is found in old Gujarati poetry, and which, under the form tanas in Sanskrit and tanaii in Apabhrarhsa, mean " belonging to." It is an adjective, and agrees in gender, number and case with the thing possessed. Thus, rdjd-no dik"ro, the king's son; rdjd-ni dik"ri, the king's daughter; raja-nil ghar, the king's house; rdjd-na dik a ra-ne, to the king's son (na is in the oblique case masculine to agree with dik a rd) ; rajd-ne ghare, in the king's house. The ro and ko of R. are similarly treated, but, of course, have no neuter. The dative postpositions are simply locatives of the genitive ones, as in all modern Indo-Aryan languages (see Hindostani). Thi, the post-position of the G. ablative, is connected with thawu, to be, one of the verbs substantive in that language. The ablative suffix is made in this way in many modern Indo-Aryan languages (e.g. Bengali, §.».). It means literally " having been " and is to be ultimately referred to the Sanskrit root, sthd, stand. The derivation of the other postpositions is discussed in the article Hindostani.

Strong adjectives agree with the nouns they qualify in gender, number and case, as in the examples of the genitive above. Weak adjectives are immutable.

Pronouns closely agree with those found in Hindostani In the table on following page we give the first two personal pronouns, and the demonstrative pronoun ” this.”

Similarly are formed the remaining pronouns, viz. G. a, R. it, he, that; G. te, R. so (obi. sing, li), that; G. je, R. jo, who; G. kan (obi. kdn, ko, or ke), R. kun (obi. hm), who?; G. sil, R. kit, what ?; G.,R. koi, anyone, someone, km anything, something. G. has two other demonstratives, pelo and olyo, both meaning ” that.” The derivation of these and of su has been discussed without any decisive result. The rest are explained in the article Hindostani. The

Apabhramsa.

Gujarati.

Rajasthani.

I

Nom.

hau

hu

hu, mhu, mat

Obi.

max, mahu, majjhu

ma, maj

ma, mha, mu

MY

mahdraii

maro

maro, mhard

WE

Nom.

amhe

ami

mhe

Obi.

amhahd

am-d

mha

OUR

amhdrail

amaro

mhd-ro, mha-kd

THOU

Nom.

tuhu

til

tu

Obi.

tat, tuha, tujjhu

la, tuj

la, tha, tu

THY

tuharail

tdro

thdro

YOU

Nom.

tumhe

tame

the, tame

Obi.

tumhahd

tam-d

tha, tamd

YOUR

tumhdrau

tamdro

tha-rd, tha-kd

THIS, HE

Nom.

eho

e

yo

Obi.

(?) ehaha, imaha

e

I

THESE, THEY Nom.

ei

e-o

e, ye

Obi.

eammi, ehdna

em

ind, ya.

reflexive pronoun is G. dp”ne, R. dpa. It is generally employed as a plural of the first personal pronoun including the person addressed; thus G. dp”ne, we (including you), but ami, we (excluding you). In G. pote, obi. pdtd, is used to mean ” self.”

Conjugation, — The old present has survived as in Hindostani and other Indian languages. Taking the base call or cat, go, as our model, we have :

Apabhramsa.

Gujarati.

Rajasthani.

Sing.

I

callau

cdlU

ca{u

2

callahi

cdle

cafai

3 • •

callai

cdle

ca\ai

Plur.

i

callahu

cdlle

cafl

2

callahu

calo

calo

3 ■ ■

callahi

call

ca\ai

The derivation of the G. I plural is unknown. That of the other G. and R. forms is manifest. The imperative closely follows this, but as usual has no termination in the second person singular.

In R. the future may be formed by adding go (cf. Hindostani go), Id, or Id to the old present. Thus, calu-gd, ca}U-lo or calU-ld I shall go. The go and Id agree in gender and number with the subject, but la is immutable. The termination with / is also found in Bhojpuri (see Bihari), in Marathi and in Nepali. For go see Hindostani. Another form of the future has s ox k for its characteristic letter, and is the only one employed in G. Thus, Ap. callisau or callihau, G. calls, R. (Jaipuri) cahsyu, (Marwari) cal a hu. The other personal terminations differ considerably from those of the old present, and closely follow Ap. Thus, Ap. 3 sing, cattisai or callihi, G. cal a se, Marwari

cal'hl.

The participles and infinitive are as follows:

Apabhramsa.

Gujarati.

Rajasthani.

Pres. Part. Active . Past. Part. Passive Future Part. Passive . Infinitive ….

callantau

calliau

calliavvau

cdl a ld calyo cdl”vd cdl”vil

cal”td calyo ca\ a bo cal”bo

In G. the infinitive is simply the neuter of the future passive participle. The participles are employed to form finite tenses; thus G. hucal a to, I used to go; hit calyo, I went. If the verb is transitive (see Hindostani) the passive meaning of the past participle comes into force. The subject is put into the case of the agent, and the participle inflects to agree with the object, or, if there is no object, is employed impersonally in the neuter (in G.) or in the masculine (in R.). In Hindostani, if the object is expressed in the dative, the participle is also employed impersonally, in the masculine; thus rajd-ne shernl-kd mdrd [masc, not marl, (fern.], by-the-king, with reference-to-the-tigress, it-(impersonal)-was-killed, i.e. the king killed the tigress. But in G. and R., even if the object is in the dative, the past participle agrees with it; thus, G. rcjae wdghan-ne marl, by-the-king, with-reference-to-the-tigress, she-was-killed. Other examples from G. of this ‘passive construction are me kahyil, by me it was said, I said; tene ci{thl lakhl, by him a letter was written, he wrote a letter; e bale vag”dd-mi, dahddd kddyd, by this lady, in the wilderness, days were passed, i.e. she passed her days in the wilderness; rdjae vicdryil, the king considered. The idiom of R. is exactly the same in these cases, except that the masculine must be used where G. has the neuter; thus, rdjdai vicdryo. The future passive participle is construed in much the same way, but (as in Latin) the subject may be put into the dative. . Thus, mare d cdp”dl vdc”vi, mihi ille liber (est) legendus, I must read that book, but also tene (agent case) e kdm kar”vii, by him this business is to be done.

G. also forms a past participle in eld (caleld), which is one of the many survivals of the outer language. This / participle is typical of most of the languages of the outer band, including Marathi, Oriya, Bengali, Bihari and Assamese. It is formed bv the addition of the

Prakrit pleonastic suffix ilia, which was not used by the Prakrit of the Midland, but was common elsewhere. Compare, for instance, the Ardhamagadhi past participle passive an-illia-, brought.

The usual verbs substantive are as follows: G. chu, R. hu or chu, I am, which are conjugated regularly as old presents, and G. halo, R. ho or chd,

was, which is a past participle, like the Hindostani (q.v.) tha. Hu, hato and ho are explained in the article on that language. Chu is for Skr. rcchdmi, Ap. acchau. The use of this base is one of the outer band survivals. Even in Prakrit; it is not found (so far as the present writer is aware) in the Sauraseni of the Midland. Using these as auxiliaries the finite verb makes a whole series of periphrastic tenses. A present definite is formed by conjugating the old present tense (not the present participle) with the present tense of the verb substantive. Thus, G. cdlu chu, I am going. A similar idiom is found in some Western Hindi dialects, but Hindostani employs the present participle; thus, caltd hu. In G. and R., however, the imperfect is formed with the present participle as in H. Thus, G. hu cal"td hato, I was going. So, as in H., we have a perfect hu calyd (or caleld) chu, I have gone, and a pluperfect hli cCilyd (or caleld) hato, I had gone. The R. periphrastic tenses are made on the same principles. With the genitive of theG. future passive participle, cal a vd-nd, we have a kind of gerundive, as in hu cal"vdno chu, I am to be gone, i.e. I am about to go; hu cdl"vano halo, I was about to go.

The same series of derivative verbs occurs in G. and R. as in H. Thus, we have a potential passive (a simple passive in G.) formed by adding a to the base, as in G. lakh"vu, to write, lakhdvu, to be written ; and a causal by adding dv or dd, as in lakhav a vu, to cause to write; bes a vu, to sit, besdd"vu, to seat. A new passive may be formed in G. from the causal, as in tap a vu, to be hot; tapdvvii, to cause to be hot; to heat; tapdvavu, to be heated.

Several verbs have irregular past participles. These must be learnt from the grammars. So also the numerous compound verbs, such as (G,) call sak a vu, to be able to go; call cuk"vil, to have com- pleted going; calyd kar"vu, to be in the habit of going, and so on.

Very little is known about the literature of Rajputana, except that it is of large extent. It includes a number of bardic chronicles of which only one has been partially edited, but the contents of which have been described by Tod in his admired Rajasthan. It also includes a considerable religious literature, but the whole mass of this is still in MS. From those specimens which the present writer has examined, it would appear that most of the authors wrote in Braj Bhasha, the Hindu literary dialect of Hindostani (q.v.) In Marwar it is an acknowledged fact that the literature falls into two branches, one called Pingal and couched in Braj Bhasha, and the other called Dingal and couched in Rajasthani. The most admired work in Dingal is the Raghunath Rupak written by Mansa. Ram in the beginning of the 19th century. It is nominally a treatise on prosody, but, like many other works of the same kind, it contrives to pay a double debt, for the examples of the metres are so arranged as to form a complete epic poem celebrating

the deeds of the hero Rama.

The earliest writer of importance in Gujarati, and its most admired poet, was Narsingh Meta, who lived in the 15th century a.d. Before him therewerewritersonSanskrit grammar, rhetoric and the like, who employed an old form of Gujarati for their explanations. Narsingh does not appear to have written any considerable work, his reputation depending on his short songs, many of which exhibit much felicity of diction. He had several successors, all admittedly his inferiors. Perhaps the most noteworthy of these was Rewa Sankar, the translator of the Mahdbharala (see Sanskrit: Literature). A more important side of Gujarati literature is its bardic chronicles, the contents of which have been utilized by Forbes in his Rds Maid. Modern Gujarati literature mostly consists of translations or imitations of English works.

Authorities. — Volume ix. of the Linguistic Survey of India contains a full and complete account of Gujarati and Rajasthani, including their various dialectic forms.

For Rajasthani, see S. H. Kellogg, Grammar of the Hindi Language (2nd ed., London, 1893). In this are described several dialects of Rajasthani. See also Ram Karn Sarma, Marwari Vydkarana (Jodhpur, 1901) (a Marwari grammar written in that language), and G. Macalister, Specimens of the Dialects spoken in the State of Jaipur (contains specimens, vocabularies and grammars) (Allahabad,

1898).

For Gujarati, there are numerous grammars, amongst which we may note W. St C. Tisdall, Simplified Grammar of the Gujarati Language (London, 1892) and (the most complete) G. P. Taylor, The Student's Gujarati Grammar (2nd ed., Bombay, 1908). As for dictionaries, the most authoritative is the Narma-kds of Narmada

Sankar (Bhaunagar and Surat, 1873), in Gujarati throughout. For English readers we may mention Shahpurji Edalji's (2nd ed., Bombay, 1868), the introduction to which contains an account of Gujarati literature by J. Glasgow, Belsare's (Ahmedabad, 1895), and Karbhari's (Ahmedabad, 1899). (G. A. Gr.)

GUJRANWALA, a town and district of British India, in the Lahore division of the Punjab. The town is situated 40 m. N. of Lahore by rail. It is of

modern growth, and owes its import- ance to the father and grandfather of Maharaja Ranjit Singh, whose capital it formed during the early period of the Sikh power. Pop. (1901) 29,224. There are manufactures of brass-ware, jewellery, and silk and cotton scarves.

The District comprises an area of 3198 sq. m. In 1901 the population was 756,797, showing an increase of 29% in the decade. The district is divided between a low alluvial tract along the rivers Chenab and Degh and the upland between them, which forms the central portion of the Rechna Doab, inter- mediate between the fertile submontane plains of Sialkot and the desert expanses of Jhang. Part of the upland tract has been brought under cultivation by the Chenab canal. The country is very bare of trees, and the scenery throughout is tame and in the central plateau becomes monotonous. It seems likely that the district once contained the capital of the Punjab, at an epoch when Lahore had not begun to exist. We learn from the Chinese Buddhist pilgrim, Hsuan Tsang, that about the year 630 he visited a town known as Tse-kia (or Taki), the metropolis of the whole country of the five rivers. ' A mound near the modern village of Asarur has been identified as the site of the ancient capital. Until the Mahommedan invasions little is known of Gujranwala, except that Taki had fallen into oblivion and Lahore had become the chief city. Under Mahommedan rule the district flourished for a time; but a mysterious depopulation fell upon the tract, and the whole region seems to have been almost entirely abandoned. On the rise of Sikh power, the waste plains of Gujranwala were seized by various military adventurers. Charat Singh took- possession of the village of Gujranwala, and here his grandson the great Maharaja Ranjit Singh was born. The Sikh rule, which was elsewhere so disastrous, appears to have been an unmitigated benefit to this district. Ranjit Singh settled large colonies in the various villages, and encouraged cultivation throughout the depopulated plain. In 1847 the district came under British influence in connexion with the regency at Lahore; and in 1849 it was included in the territory annexed after the second Sikh war. A large export trade is carried on in cotton, wheat and other grains. The district is served by the main line and branches of the North-Western railway.

GUJRAT, a town and district of British India, in the Rawal- pindi division of the Punjab, lying on the south-western border of Kashmir. The town stands about 5 m. from the right bank of the river Chenab, 70 m. N. of Lahore by rail. Pop. (1901) 19,410. It is built upon an ancient site, formerly occupied, according to tradition, by two successive cities, the second of which is supposed to have been destroyed in 1303, the year of a Mongol invasion. More than 200 years later either Sher Shah or Akbar founded the existing town. Though standing in the midst of a Jat neighbourhood, the fort was first garrisoned by Gujars, and took the name of Gujrat. Akbar's fort, largely improved by Gujar Singh, stands in the

centre of the town.' The neighbouring shrine of the saint Shah Daula serves as a kind of native asylum for lunatics. The town has manu- factures of furniture, inlaid work in gold and iron, brass-ware, boots, cotton goods and shawls.

The District of Gujrat comprises a narrow wedge of sub- Himalayan plain country, possessing few natural advantages. From the basin of the Chenab on the south the general level rises rapidly towards the interior, which, owing to the great distance of the water beneath the surface, assumes a dreary and desert aspect. A range of low hills, known as the Pabbi, traverses the northern angle of Gujrat. They are composed of a friable Tertiary sandstone and conglomerate, destitute of vegetation, and presenting a mere barren chaos of naked rock, deeply scored with precipitous ravines. Immediately below the

Pabbi stretches a high plateau, terminating abruptly in a pre- cipitous bluff some 200 ft. in height. At the foot of this plateau is a plain, which forms the actual valley of the Chenab and participates in the irrigation from the river bed.

Numerous relics of antiquity stud the surface of the district. Mounds of ancient construction yield early coins, and bricks are found whose size and type prove them to belong to the pre- historic period. A mound now occupied by the village of Moga or Mong has been identified as the site of Nicaea, the city built by Alexander the Great on the field of his victory over Porus. The Delhi empire established its authority in this district under Bahlol Lodi (1451-1489). A century later it was visited by Akbar, who founded Gujrat as the seat of government. During the decay of the Mogul power, the Ghakkars of Rawalpindi overran this portion of the Punjab and established themselves in Gujrat about 1741. Meanwhile the Sikh power had been assert- ing itself in the eastern Punjab, and in 1765 the Ghakkar chief was defeated by Sirdar Gujar Singh, chief of the Bhangi con- federacy. On his death, his son succeeded him, but after a few months' warfare, in 1798, he submitted himself as vassal to the Maharaja Ranjit Singh. In 1846 Gujrat first came under the supervision of British officials. Two years later the district became the theatre for the important engagements which decided the event of the second Sikh war. After several bloody battles in which the British were unsuccessful, the Sikh power was irretrievably broken at the engagement which took place at Gujrat on the 22nd of February 1849. The Punjab then passed by annexation under British rule.

The district comprises an area of 2051 sq. m. In 1901 the population was 750,548, showing a decrease of 1%, compared with an increase of 10% in the previous decade. The district has a large export trade in wheat and

other grains, oil, wool, cotton and hides. The main line and the Sind-Sagar branch of the North-Western railway traverse it.

GULA, a Babylonian goddess, the consort of Ninib. She is identical with another goddess, known as Bau, though it would seem that the two were originally independent. The name Bau is more common in the oldest period and gives way in the post- Khammurabic age to Gula. Since it is probable that Ninib (g.v.) has absorbed the cults of minor sun-deities, the two names may represent consorts of different gods. However this may be, the qualities of both are alike, and the two occur as synonymous designations of Ninib's female consort. Other names borne by this goddess are Nin-Karrak, Ga-tum-dug and Nin-din-dug, the latter signifying " the lady who restores to life." The designation well emphasizes the chief trait of Bau-Gula which is that of healer. She is often spoken of as " the great physician," and accordingly plays a specially prominent role in incantations and incantation rituals intended to relieve those suffering irom disease. She is, however, also invoked to curse those who trample upon the rights of rulers or those who do wrong with poisonous potions. As in the case of Ninib, the cult of Bau-Gula is prominent in Shirgulla and in Nippur. While generally in close association with her consort, she is also invoked by herself, and thus retains a larger measure of independence than most of the goddesses of Babylonia and Assyria. She appears in a prominent position on the designs accompanying the Kudurrus boundary-stone monuments of Babylonia, being represented by a statue, when other gods and goddesses are merely pictured by their shrines, by sacred animals or by weapons. In neo- Babylonian days her cult continues to occupy a prominent position, and Nebuchadrezzar II. speaks of no less than three chapels or shrines within the sacred precincts of E-Zida in the city of Borsippa, besides a temple in her honour at Babylon. (M. J a.)

GULBARGA, an ancient city of India, situated in the Nizam's dominions, 70 m. S.E. of Sholapur. Pop. (1901) 29,228. Origin- ally a Hindu city, it was made the capital of the Bahmani kings when that dynasty established their independence in the Deccan in 1347, and it remained such until 1422. The palaces, mosques and tombs of these kings still stand half-ruined. The most notable building is a mosque modelled after that of Cordova

in Spain, covering an area of 38,000 sq. ft., which is almost unique in India as being entirely covered in. Since the opening of a station on the Great India Peninsula railway, Gulbarga has become a centre of trade,

with cotton-spinning and weaving mills. It is also the headquarters of a district and division of the same name. The district, as recently reconstituted, has an area of 6004 sq. m.; pop. (1901), 1,041,067.

GULF STREAM, 1 the name properly applied to the stream current which issues from the Gulf of Mexico and flows north- eastward, following the eastern coast of North America, and separated from it by a narrow strip of cold water (the Cold Wall), to a point east of the Grand Banks off Newfoundland. The Gulf Stream is a narrow, deep current, and its velocity is esti- mated at about 80 m. a day. It is joined by, and often indis- tinguishable from, a large body of water which comes from outside the West Indies and follows the same course. The term was formerly applied to the drift current which carries the mixed waters of the Gulf Stream and the Labrador current eastwards across the Atlantic. This is now usually known as the " Gulf Stream drift," although the name is not altogether appropriate. See Atlantic.

GULFWEED, in botany, a popular name for the seaweed Sargassum bacciferum, one of the brown seaweeds (Phaeophyceae) , large quantities of which are found floating in the Gulf of Mexico, whence it is carried northwards by the Gulf Stream, small portions sometimes being borne as far as the coasts of the British Isles. It was observed by Columbus, and is remarkable among seaweeds for its form, which resembles branches bearing leaves and berries; the latter, to which the species-name bacciferum refers, are hollow floats answering the same purpose as the bladders in another brown seaweed, Fucus vesiculosus, which is common round the British Isles between high and low water.

GULL, SIR WILLIAM WITHEY, 1st Bart. (1816-1890), English physician, was the youngest son of John Gull, a barge- owner and wharfinger of Thorpe-le-Soken, Essex, and was born on the 31st of December 1816 at Colchester. He began life as a schoolmaster, but in 1837 Benjamin Harrison, the treasurer of Guy's Hospital, who had noticed his ability, brought him up to London from the school at Lewes where he was usher, and gave him employment at the hospital, where he also gained permission to attend the lectures. In 1843 he was made a lecturer in the medical school of the hospital, in 1851 he was chosen an assistant physician, and in 1856 he became full physician. In 1847 he was elected Fullerian professor of physiology in the Royal Institution, retaining the post for the usual three years, and in 1848 he delivered the Gulstonian Lectures at the College of Physicians, where he filled every office of honour but that of president. He died in London on the 29th of January 1890 after a series of paralytic strokes, the first of which had occurred nearly three years previously. He was created a baronet in 1872, in recognition of the skill and care he had shown in attending the prince of Wales during his attack

of typhoid in 187 1. Sir William Gull's fame rested mainly on his success as a clinical practitioner; as he said himself, he was " a clinical physician or nothing." This success must be largely ascribed to his remarkable powers of observation, and to the great opportunities he enjoyed for gaining experience of disease. He was sometimes accused of being a disbeliever in drugs. That was not the case, for he prescribed drugs like other physicians when he considered them likely to be beneficial. He felt, however, that their administration was only a part of the physician's duties, and his mental honesty and outspokenness prevented him from deluding either himself or his patients with unwarranted notions of what they can do. But though he regarded medicine as primarily an art for the relief of physical suffering, he was far from disregarding the scientific side of his

1 The word " gulf," a portion of the sea partially enclosed by the coast-line, and usually taken as referring to a tract of water larger than a bay and smaller than a sea, is derived through the Fr. golfe, from Late Gr. k6X0os, class. Gr. koXttos, bosom, hence bay, cf. Lat. sinus. I.n University slang, the term is used of the position of those who fail to obtain a place in the honours list at a public examination, but are allowed a "pass."

profession, and he made some real contributions to medical science. His papers were printed chiefly in Guy's Hospital Reports and in the proceedings of learned societies: among the subjects he wrote about were cholera, rheumatic fever, taenia, paraplegia, and abscess of the brain, while he distinguished for the first time (1873) the disease now known as myxoedema, describing it as a " cretinoid state in adults."

GULL (Welsh gwylan, Breton, goelann, whence Fr. goeland), the name commonly adopted, to the almost entire exclusion of the O. Eng. Mew (Icel. mdfur, Dan. maage, Swedish mase, Ger. Meve, Dutch meeuw, Fr. mouette), for a group of sea-birds widely and commonly known, all belonging to the genus Larus of Linnaeus, which subsequent systematists have broken up in a very arbitrary and often absurd fashion. The family Laridae is composed of two chief groups, Larinae and Steminae — the gulls and the terns, though two other subfamilies are frequently counted, the skuas (Stercorariinae) , and that formed by the single genus Rhynchops, the skimmers; but there seems no strong reason why the former should not be referred to the Larinae and the latter to the Steminae.

Taking the gulls in their restricted sense, Howard Saunders, who has subjected the group to a rigorous revision (Proc. Zool. Society, 1878, pp. 155-211), admits forty-nine species of them, which he places in five genera instead of the many which some prior investigators had sought to establish. Of the genera recognized by him, Pagophila and Rhodostethia have but one species each, Rissa and Xenta two, while the rest belong to Larus. The

Pagophila is the so-called ivory-gull, P. eburnea, names which hardly do justice to the extreme whiteness of its plumage, to which its jet-black legs offer a strong contrast. The young, however, are spotted with black. An inhabitant of the most " northern seas, examples, most commonly young birds of the year, find their way in winter to more temperate shores. Its breeding-place has seldom been discovered, and the first of its eggs ever seen by ornithologists was brought home by Sir L. M'Clintock in 1853 from Cape Krabbe (Journ. R. Dubl. Society, i. 60, pi. 1) ; others were subsequently obtained by Dr Malmgren in Spitsbergen. Of the species of Rissa, one is the abundant and well-known kittiwake, R. tridactyla, of circumpolar range, breeding, however, also in comparatively low latitudes, as on the coasts of Britain, and in winter frequenting southern waters. The other is R. brevirostris, limited to the North Pacific, between Alaska and Kamchatka. The singular fact requires to be noticed that in both these species the hind toe is generally deficient, but that examples of each are occasionally found in which this functionless member has not wholly disappeared. We have then the genus Larus, which ornithologists have attempted most unsuccessfully to subdivide. It contains the largest as well as the smallest of gulls. In some species the adults assume a dark- coloured head every breeding-season, in others any trace of dark colour is the mark of immaturity. The larger species prey fiercely on other kinds of birds, while the smaller content themselves with a diet of small animals, often insects and worms. But however diverse be the appearance, structure or habits of the extremities of the series of species, they are so closely connected by intermediate forms that it is hard to find a gap between them that would justify a generic division. Forty-three species of this genus are recognized by Saunders. About fifteen belong to Europe and fourteen to North America, of which (excluding stragglers) some five only are common to both countries. Our knowledge of the geographical distribution of several of them is still incomplete. Some have a very wide range, others very much the reverse, as witness L. fidiginosus, believed to be confined to the Galapagos, and L. scopulinus and L. bulleri to New Zealand, — the last indeed perhaps only to the South Island. The largest species of the group are the glaucous gull and greater black-backed gull, L. glaucus and L. marinus, of which the former is circumpolar, and the latter nearly so — not being hitherto found between Labrador and Japan. The smallest species is the European L. minutus, though the North American L. Philadelphia does not much exceed it in size. Many of the gulls congregate I in vast numbers to breed, whether on rocky cliffs of the sea-coast

or on healthy islands in inland waters. Some of the settlements of the

black-headed or " peewit " gull, L. ridibundus, are a source of no small profit to their proprietors, — the eggs, which are rightly accounted a great delicacy, being taken on an orderly system up to a certain day, and the birds carefully protected. Ross's or the roseate gull, Rhodostethia rosea, forms a well-marked genus, distinguished not so much by the pink tint of its plumage (for that is found in other species) but by its small dove-like bill and wedge-shaped tail. It is an exceedingly scarce bird, and beyond its having an Arctic habitat, little has yet been ascertained about it. More rare still is one of the species of Xema, X. furcalum, of which only two specimens, both believed to have come from the Galapagos, have been seen. Its smaller congener Sabine's gull, X. sabinii, is more common, and has been found breeding both in Arctic America and in Siberia, and several examples, chiefly immature birds, have been obtained in the British islands. Both species of Xema are readily distinguished from all other gulls by their forked tails. (A. N.)

GULLY, JOHN (1783-1863), English sportsman and politician, was born at Wick, near Bath, on the 21st of August 1783, the son of an innkeeper. He came into prominence as a boprer, and in 1805 he was matched against Henry Pearce, the " Game Chicken," before the duke of Clarence (afterwards William IV.) and numerous other spectators, and after fighting sixty-four rounds, which occupied an hour and seventeen minutes, was beaten. In 1807 he twice fought Bob Gregson, the Lancashire giant, for two hundred guineas a side, winning on both occasions. As the landlord of the " Plough " tavern in Carey Street, London, he retired from the ring in 1808, and took to horse-racing. In 1827 he lost £40,000 by backing his horse " Mameluke " (for which he had paid four thousand guineas) for the St Leger. In partnership with Robert Ridskale, in 1832, he made £85,000 by winning the Derby and St Leger with " St Giles " and " Margrave. " In partnership with John Day he won the Two Thousand Guineas with " Ugly Buck " in 1844, and two years later he took the Derby and the Oaks with " Pyrrhus the First " and " Mendicant," in 1854 the Two Thousand Guineas with "Hermit," and in the same year, in partnership with Henry Padwick, the Derby with " Andover." Having bought Ack- worth Park near Pontefract he was M.P. from December 1832 to July 1837. In 1862 he purchased the Wingate Grange estate and collieries. Gully was twice married and had twelve children by each wife. He died at Durham on the 9th of March 1863. He appears to have been no relation of the subsequent Speaker, Lord Selby.

GULPAlGAN (Jerbddegan of the Arab geographers), a district and city in Central Persia, situated N.W. of Isfahan and S.E. of Irak. Together with Khunsar it forms a small province, paying a yearly revenue of about £6000. The city of Gulpaigan is situated 87 m. N.W. of Isfahan, at an elevation of 5875 ft. in 33° 24′ N. and 50 20′ E., and has a population of

about 5000. The district is fertile and produces much grain and some opium. Sometimes it is under the governor-general of the Isfahan province, at others it forms part of the province of Irak, and at times, as in 1906, is under a governor appointed from Teheran.

GUM (Fr. gomme, Lat. gommi, Gr. kojxixi, possibly a Coptic word; distinguish " gum," the fleshy covering of the base of a tooth, in O. Eng. gdma, palate, cf. Ger. Gaumen, roof of the mouth; the ultimate origin is probably the root gha, to open wide, seen in Gr. xo-' LV ˆ v i to gape, cf. "yawn"), the generic name given to a group of amorphous carbo-hydrates of the general formula (CeHioOs),,, which exist in the juices of almost all plants, and also occur as exudations from stems, branches and fruits of plants. They are entirely soluble or soften in water, and form with it a thick glutinous liquid or mucilage. They yield mucic and oxalic acids when treated with nitric acid. In'structure the gums are quite amorphous, being neither organ- ized like starch nor crystallized like sugar. They are odourless and tasteless, and some yield clear aqueous solutions — the real gums — while others swell up and will not percolate filter paper — the vegetable mucilages. The acacias and the Rosaceae yield their gums most abundantly when sickly and in an abnormal

state, caused by a fulness of sap in the young tissues, whereby the new cells are softened and finally disorganized; the cavities thus formed fill with liquid, which exudes, dries and constitutes the gum.

Gum arable may be taken as the type of the gums entirely soluble in water. Another variety, obtained from the Prosopis dulcis, a leguminous plant, is called gum mesquite or mezquite; it comes from western Texas and Mexico, and is yellowish in colour, very brittle and quite soluble in water.

Gum arabic occurs in pieces of varying size, and some kinds are full of minute cracks. The specific gravity of Turkey picked gum (the purest variety) is 1-487, or, when dried at 100° C, 1-525. It is soluble in water to an indefinite extent; boiled with dilute sulphuric acid it is converted into the sugar galactose. Moderately strong nitric acid changes it into mucic, saccharic, tartaric and oxalic acids. Under the influence of yeast it does not enter into the alcoholic fermentation, but M. P. E. Berthelot, by digesting with chalk and cheese, obtained from it 12 % of its weight of alcohol, along with calcium lactate, but no appreciable quantity of sugar. Gum arabic may be regarded as a potassium and calcium salt of gummic or arabic acid. T. Graham (Chemical and Physical Researches) recommended dialysis as the best mode of preparing gummic acid, and stated that the power of gum to penetrate the parchment septum is 400 times less than that of sodium chloride, and, further, that by mixing the gum with substances of the crystalloid class the diffusibility is lowered, and

may be even reduced to nothing. The mucilage must be acidu- lated with hydrochloric acid before dialysing, to set free the gummic acid. By adding alcohol to the solution, the acid is precipitated as a white amorphous mass, which becomes glassy at 100 . Its formula is (CsHioOsˆHsO, and it forms compounds with nearly all bases which are easily soluble in water. Gummic acid reddens litmus, its re- action being about equal to carbonic acid. When solutions of gum arabic and gelatin are mixed, oily drops of a compound of the two are precipitated, which on standing form a nearly colourless jelly, melting at 25 ° C, or by the heat of the hand. This substance can be washed without decomposition. Gummic acid is soluble in water; when well dried at 100° C, it becomes transformed into metagummic acid, which is insoluble, but swells up in water like gum tragacanth.

Gum arabic, when heated to 150° C. with two parts of acetic anhydride, swells up to a mass which, when washed with boiling water, and then with alcohol, gives a white amorphous insoluble powder called acetyl arabin CeHsCCaHaOJsOs. It is saponified by alkalies, with reproduction of soluble gum. Gum arabic is not precipitated from solution by alum, stannous chloride, sulphate or nitrate of copper, or neutral lead acetate; with basic lead acetate it forms a white jelly, with ferric chloride it yields a stiff clear gelatinoid mass, and its solutions are also precipitated by borax.

The finer varieties are used as an emollient and demulcent in medicine, and in the manufacture of confectionery; the commoner qualities are used as an adhesive paste, for giving lustre to crape, silk, &c, in cloth finishing to stiffen the fibres, and in calico-printing. For labels, &c, it is usual to mix sugar or glycerin with it to prevent it from cracking.

Gum Senegal, a variety of gum arabic produced by Acacia Verek, occurs in pieces generally rounded, of the size of a pigeon's egg, and of a reddish or yellow colour, and specific gravity 1.436. It gives with water a somewhat stronger mucilage than gum arabic, from which it is distinguished by its clear interior, fewer cracks and greater toughness. It is imported from the river Gambia, and from Senegal and Bathurst.

Chagual gum, a variety brought from Santiago, Chile, resembles gum Senegal. About 75% is soluble in water. Its solution is not thickened by borax, and is precipitated by neutral lead acetate; and dilute sulphuric acid converts it into d-glucose.

Gum tragacanth, familiarly called gum dragon, exudes from the stem, the lower part especially, of the various species of Astragalus, especially A. gummijer, and is collected in Asia Minor, the chief port of shipment being Smyrna. Formerly only what exuded spontaneously was gathered; this was often of a brownish colour; but now the flow of the gum is aided by

incisions cut near the root, and the product is the fine, white, flaky variety so much valued in commerce. The chief flow of gum takes place during the night, and hot and dry weather is the most favourable for its production.

In colour gum tragacanth is of a dull white; it occurs in horny, flexible and tough, thin, twisted flakes, translucent, and with peculiar wavy lines on the surface. When dried at temperatures under ioo° C. it loses about 14% of water, and is then easily powdered. Its specific gravity is 1 384. With water it swells by absorption, and

with even fifty times its weight of that liquid forms a thick mucilage. Part of it only is soluble in water, and that resembles gummic acid in being precipitated by alcohol and ammonium oxalate, but differs from it in giving a precipitate with neutral lead acetate and none with borax. The insoluble part of the gum is a calcium salt of bassorin (C12H20O10), which is devoid of taste and smell, forms a gelatinoid mass with water, but by continued boiling is rendered soluble.

Gum tragacanth is used in calico-printing as a thickener of colours and mordants; in medicine as a demulcent and vehicle for insoluble powders, and as an excipient in pills; and for setting and mending beetles and other insect specimens. It is medicinally superior to gum acacia, as it does not undergo acetous fermentation. The best pharmacopeial preparation is the Mucilago Tragacanthae. The compound powder is a useless preparation, as the starch it contains is very liable to ferment.

Gum kuteera resembles in appearance gum tragacanth, for which the attempt has occasionally been made to substitute it. It is said to be the product of Sterculia urens, a plant of the natural order Sterculiaceae.

Cherry tree gum is an exudation from trees of the genera Prunus and Cerasus. It occurs in shiny reddish lumps, resem- bling the commoner kinds of gum arabic. With water, in which it is only partially soluble, it forms a thick mucilage. Sulphuric acid converts it into /-arabinose; and nitric acid oxidizes it to oxalic acid (without the intermediate formation of mucic acid as in the case of gum arabic).

Gum of Bassora, from Bassora or Bussorah in Asia, is some- times imported into the London market under the name of the hog tragacanth. It is insipid, crackles between the teeth, occurs in variable-sized pieces, is tough, of a yellowish-white colour, and opaque, and has properties similar to gum tragacanth. Its specific gravity is 1-36. It contains only 1% of

soluble gum or arabin. Under the name of Caramania gum it is mixed with inferior kinds of gum tragacanth before exportation.

Mucilage. — Very many seeds, roots, &c, when infused in boiling water, yield mucilages which, for the most part, consist of bassorin. Linseed, quince seed and marshmallow root yield it in large quantity. In their reactions the different kinds of mucilage present differences; e.g. quince seed yields only oxalic acid when treated with nitric acid, and with a solution of iodine in zinc iodide it gives, after some time, a beautiful red tint. Linseed does not give the latter reaction; by treatment with boiling nitric acid it yields mucic and oxalic acids.

Cum Resins. — This term is applied to the inspissated milky juices of certain plants, which consist of gum soluble in water, resin and essential oil soluble in alcohol, other vegetable matter and a small amount of mineral matter. They are generally opaque and solid, and often brittle. When finely powdered and rubbed down with water they form emulsions, the undissolved resin being suspended in the gum solution. Their chief uses are in medicine. Examples are ammoniacum, asafetida, bdellium, euphorbium, gamboge, myrrh, sagapanum and scammony.

GUMBEL, KARL WILHELM VON, Baron (1823-1808), German geologist, was born at Dannenfels, in the Palatinate of the Rhine, on the nth of February 1823, and is known chiefly by his researches on the geology of Bavaria. He received a practical and scientific education in mining at Munich and Heidelberg, taking the degree of Ph.D. at Munich in 1862; and he was engaged for a time at the colliery of St Ingbert and as a surveyor in that district. In 1851, when the Geological Survey of Bavaria was instituted, Giimbel was appointed chief geologist; in 1863 he was made honorary professor of geognosy and surveying at the university of Munich, and ini87Q, Oberberg director of the Bavarian mining department with which the Geological Survey was incorporated. His geological map of Bavaria appeared in 1858, and the official memoir descriptive of the detailed work, entitled Geognostische Beschreibung des Konigreichs Bayern was issued in three parts (1861, 1868 and 1879). He subsequently published his Geologie von Bayern in 2 vols. (1884-1894), an elaborate treatise on geology, with special reference to the geology of Bavaria. In the course of his long and active career he engaged in much palaeontological work: he studied the fauna of the Trias, and in 1861 introduced the

term Rhaetic for the uppermost division of that system; he supported at first the view of the organic nature of Eozoon (1866 and 1876), he devoted special attention to Foraminifera, and described those of the Eocene strata of the northern Alps (1868); he dealt also with Receptaculites (1875) which he regarded as a genus belonging to the Foraminifera. He died on the

18th of June 1898.

GUMBINNEN, a town of Germany, in the Prussian province of East Prussia, on the Pissa, an affluent of the Pregel, 22 m. by rail S.W. of Eydtkuhnenon the line to Konigsberg. Pop. (1905), 14,194. The surrounding country is pleasant and fruitful, and the town has spacious and regular streets shaded by linden trees. It has a Roman Catholic and three Evangelical churches, a synagogue, a gymnasium, two public schools, a public library, a hospital and an infirmary. In the market square there is a statue of the king of Prussia Frederick William I., who in 1724 raised Gumbinnen to the rank of a town, and 'in 1732 brought to it a number of persons who had been driven from Salzburg by religious persecution. On the bridge over the Pissa a monument has been erected to the soldiers from the neighbourhood who fell in the Franco-German war of 1870-71. Iron founding and the manufacture of machinery, wool, cotton, and linen weaving, stocking-making, tanning, brewing and distilling are the principal industries. There are horse and cattle markets, and some trade in corn and linseed.

See J. Schneider, Aus Gumbinnens Vergangenheit (Gumbinnen,

1904).

GUMBO, or Okra, termed also Okro, Ochro, Ketmia, Gubbo and Syrian mallow (Sans. Tindisa, Bengali Dheras, Pers. Bamiyah — the Bammia of Prosper Alpinus ; Fr. Gombaut, or better Gombo, and Kelmie comestible), Hibiscus esculentus, a herbaceous hairy annual plant of the natural order Malvaceae, probably of African origin, and now naturalized or cultivated in all tropical countries. The leaves are cordate, and 3 to s-lobed, and the flowers yellow, with a crimson centre; the fruit or pod, the Bendi-Kai of the Europeans of southern India, is a tapering, 10-angled capsule, 4 to 10 in. in length, except in the dwarf varieties of the plant, and contains numerous oval dark-coloured seeds, hairy at the base. Three distinct varieties of the gumbo {Quiabo and Quimgombo) in Brazil have been described by Pacheco. The unripe fruit is eaten either pickled or prepared like asparagus. It is also an ingredient in various dishes, e.g. the gumbo of the Southern United States and the calalou of Jamaica; and on account of the large amount of mucilage it contains, it is extensively consumed, both fresh and in the form of the prepared powder, for the thickening of broths and soups. For winter use it is salted or sliced and dried. The fruit is grown on a very large scale in the vicinity of Con- stantinople. It was one of the esculents of Egypt in the time of Abul-Abbas el-Nebati, who journeyed to Alexandria in 1216 (Wustenfeld, Gesch. d. arab. Ante, p. 118, Gott., 1840), and is still cultivated by the Egyptians, who called it Bammge.

The seeds of the gumbo are used as a substitute for coffee. From their demulcent and emollient properties, the leaves and immature fruit have long been in repute in the East for the preparation of poultices and fomentations. Alpinus (1592) mentions the employment of their decoction in Egypt in oph- thalmia and in uterine and other complaints.

The musk okra (Sans., Latdkasturikd, cf. the Gr. naarup; Bengali, Latdkasturi ; Ger. Bisamkbrnerstrauch ; Fr. Ketmie musquee), Hibiscus Abelmoschus {Abelmoschus moschatus) , indigenous to India, and cultivated in most warm regions of the globe, is a suffruticose plant, bearing a conical 5-ridged pod about 3 in. in length, within which are numerous brown reniform seeds, smaller, than those of H. esculentus. The seeds possess a musky odour, due to an oleo-resin present in the integument, and are known to perfumers under the name of ambrette as a substitute for musk. They are said to be used by the Arabs for scenting coffee. The seeds (in the Fantee language, Incromahom) are used in Africa as beads; and powdered and steeped in rum they are valued in the West Indies as a remedy for snake- bites. The plant yields an excellent fibre, and, being rich in mucilage, is employed in Upper India for the clarifying of sugar. The best- perfumed seeds are reported to come from Martinique.

See P. Alpinus, De plantis Aegypti, cap. xxvii. p. 38 (Venice, 1592) ; J. Sontheimer's Abd. Allah ibn Ahmad, &c, i. 118 (Stuttgart,

1 840- 1 842); P. P. Pacheco, " La Ketmie potagere ou comestible," La Belgique horticole, iv. 63 (1853); Delia Sudda, " De l'emploi a Constantinople de la racine de l'Hibiscus esculentus," Repert. de pharm., January i860, ,.p. 229; E. J. Waring, Pharm. of India, p. 35 (1868); O. Popp, " fiber die Aschenbestandteile der Samen von Acacia nilotica und Hibiscus esculentus in Agypten," Arch, der Pharm. cxcv. p. 140 (1871); Drury, The Useful Plants of India, pp. 1, 2 (2nd ed., 1873); U. C. Dutt, The Mat. Med. of the Hindus, pp. 123, 321 (1877); Lanessan, Hist, des drogues, i. 181-184 (1878); G. Watt, Dictionary of the Economic Products of India (1890).

GUMTI, a river of northern India. It rises in a depression in the Pilibhit district of the United Provinces, and after a sinuous but generally south-easterly course of 500 m. past Lucknow and Jaunpur joins the Ganges in Ghazipar district. At Jaunpur it is a fine stream, spanned by a 16th-century bridge of sixteen arches, and is navigable by vessels of 17 tons burden. There is also a small river of the same name in the Tippera district

of eastern Bengal and Assam.

GUMULIINA, or Gumuedjina, a town of European Turkey, in the vilayet of Adrianople. Pop. (1905), about 8000, of whom three-fourths are Turks and the remainder Greeks, Jews or Armenians. Gumuljina is situated on the river Karaja-Su, south of the eastern extremity of the Rhodope range of mountains and 13 m. inland from the Aegean Sea. It has a station on the railway between Salonica and Dedeagatch. The district produces wheat, maize, barley and tobacco; sericulture and viticulture are both practised on a limited scale. A cattle fair is held annually on Greek Palm Sunday. Copper and antimony are found in the neighbourhood.

GUMUS, or Gumz, Negroes of the Shangalla group of tribes, dwelling in the mountainous district of Fazogli on the Sudan- Abyssinian frontier. They live in independent groups, some being mountaineers while others are settled on the banks of the Blue Nile. Gumz in the native tongue signifies " people," and the sub-tribes have distinctive names. The Gumus are nature-worshippers, God and the sun being synonymous. On ceremonial occasions they carry parasols of honour (see Shangalla).

GUMUSH-KHANEH, the chief town of a sanjak of the same name in the Trebizond vilayet of Asiatic Turkey, situated on high ground. (4400 ft.) in the valley of the Kharshut Su, about 5 m. to south of the Trebizond-Erzerum chaussie. The silver mines from which the place takes its name were noted in ancient times and are mentioned by Marco Polo. Pop. about 3000, chiefly Greeks, who are in the habit of emigrating to great distances to work in mines. They practically supply the whole lead- and silver-mining labour in Asiatic Turkey, and in conse- quence the Greek bishop of Gumush-Khaneh has under his jurisdiction all the communities engaged in this particular class of mines.

GUN, a general term for a weapon, tubular in form, from which a projectile is discharged by means of an explosive. When applied to artillery the word is confined to those pieces of ordnance which have a direct as opposed to a high-angle fire, in which case the terms " howitzer " and " mortar " are used (see Ordnance and Machine-Gun). " Gun " as applied to firearms which are carried in the hand and fired from the shoulder, the old " hand gun," is now chiefly used of the sporting shot-gun, with which this article mainly deals; in military usage this type of weapon, whether rifle, carbine, &c, is known collectively as " small arms " (see Rifle and Pistol). The origin of the word, which in Mid. Eng. is gonne or gunne, is obscure, but it has been suggested by Professor W. W. Skeat that it conceals a female name, Gunnilde or Gunhilda. The names; e.g. Mons Meg at Edinburgh Castle and faule Grete (heavy Peg), known to readers of Carlyle's Frederick the Great, will be familiar parallel- isms. " Gunne "

would be a shortened ” pet name ” of Gunn- hilde. The New English Dictionary finds support for the sugges- tion in the fact that in Old Norwegian gunne and hilde both mean ” war,” and quotes an inventory of war material at Windsor Castle in 1330-1331, where is mentioned “una magna balista de cornu quae vocatur Domina Gunilda.” Another suggestion for the origin of the word is that the word represents

— JT -6 r””*

a shortened form, gonne, of a supposed French mangonne, a mangonel, but the French word is mangonneau.

Firearms are said to have been first used in European warfare in the 14th century. The hand gun (see fig. 1) came into practical use in 1446 and was of very rude (l^l)”) ‘

construction. It con- ^-^L-Wvk

sisted of a simple iron or brass tube with a touch-hole at the top fixed in a straight stock of wood, the end of which passed under the ‘jy£.

right armpit when the

” gonne ” was about to TflS?^-?;

be fired. A similar ‘ ” ”

weapon (see fig. 2) was Fig. i. — Hand Gun.

also used by the horse-soldier, with a ring at the end of the

stock, by which it was suspended by a cord round the neck;

a forked rest, fitted by a ring to the saddlebow, served to steady

the gun. This rest, when not in use, hung down in front of the

right leg. A match was made of cotton or hemp spun slack,

and boiled in a strong solution of saltpetre or in the lees of

wine. The touch-hole was first placed on the top of the barrel,

but afterwards at the side, with a

small pan underneath to hold the

priming, and guarded by a cover

moving on a pivot.

An improvement in firearms took place in the first year of the reign of Henry VII., or at the close of Edward IV., by fixing a cock (Fr. serpentine) on the hand gun to hold the match, which was brought down to the priming by a trigger, whence the term matchlock. This weapon is still in use among the Chinese, Tatars, Sikhs, Persians and Turks. An improvement in the stock was also made during this period by forming it with a wide butt end to be placed against the right breast. Subsequently the stock was bent, a German invention, and the arm was called a hackbutt or hagbut, and the smaller variety a demihague. The arquebus and hackbutt were about a yard in length, including barrel and stock, and the demihague was about half the size and weight, the forerunner of the pistol. The arquebus was the standard infantry firearm in Europe from the battle of Pavia to the introduction of the heavier and more powerful musket. It did not as a rule require a rest, as did the musket. The wheel-lock,

ˆ, From General Hardy de Perim's Turenne et Condi 1626-1675.

on the match- FlG 3 ._Musketeer, 1626.

lock, was in- vented in Nuremberg in 1517; was first used at the siege of Parma in 1521; was brought to England in 1530, and con- tinued in partial use there until the time of Charles II. This wheel-lock consisted of a fluted or grooved steel wheel which protruded into the priming pan, and was connected with a strong spring. The cock, also regulated by a spring, was fitted with a piece of iron pyrites. In order to discharge the gun the

Fig. 2. — MountedMan with Hand Gun.

lock was wound up by a key, the cock was let down on the priming pan, the pyrites resting on the wheel; on the trigger being pressed the wheel was released and rapidly revolved, emitting sparks, which ignited the powder in the pan. The complicated and expensive nature of this lock, with its liability to injury, no doubt prevented its general adoption.

About 1540 the Spaniards constructed a larger and heavier firearm (matchlock), carrying a ball of 10 to the pound, called a musket. This weapon was introduced into England before the middle of the 16th century, and soon came into general use throughout Europe. The snaphance was

invented about this period in Germany, and from its comparative cheapness was

From General Hardy Je Perini's Turenne el Conde, 1626-167$.

Figs. 4 and 5. — Musketeers, 1675.

much used in England, France and Holland. It held a flint instead of the pyrites of the wheel or firelock, which ignited the powder in the pan by striking on a piece of furrowed steel, when released by the trigger, and emitting sparks.

As a sporting weapon the gun may be said to date from the invention of the wheel-lock in the beginning of the 16th century, though firearms were used for sporting purposes in Italy, Spain, Germany, and to some extent in France, in the 15th century. Before that period the longbow in England and the crossbow on the Continent were the usual weapons of the chase. In Great Britain little use appears to have been made of firearms for game shooting until the latter half of the 17th century, and the arms then used for the purpose were entirely of foreign make.

The French gunmakers of St-Etienne claim for their town that it is the oldest centre of the firearms industry. They do not appear to have made more than the barrels of the finest sporting arms, and these even were sometimes made in Paris. The production of firearms by the artists of Paris reached its zenith about the middle of the 17 th century. The Italian, German, Spanish and Russian gunsmiths also showed great skill in the elegance and design of their firearms, the Spaniards in particular being makers of fine barrels. The pistol (q.v.) is understood to have been made for the first time about 1540 at Pistoia in Italy. About 1635 the modern firelock or flint-lock was invented, which only differed from the snaphance by the cover of the pan forming part of the furrowed steel struck by the flint. Originally the priming was put into the pan from a flask contain- ing a fine-grained powder called serpentine powder. Later the top of the cartridge was bitten off and the pan filled therefrom before loading. The mechanism of the flint-lock musket rendered all this unnecessary, as, in loading, a portion of the charge passed through the vent into the pan, where it was held by the cover or hammer. The matchlock, as a military weapon, gradually gave way to the firelock, which came into general use in the last half of the 17th century, and was the weapon of Marlborough's and Wellington's armies. This was the famous " Brown Bess " of the British army. The highest development of the flint-lock is found in the fowling-pieces of the end of the 18th and beginning of the 19th centuries, particularly those made by Joseph Manton, the celebrated English gunsmith and inventor. The Napoleonic wars afforded English gunmakers an

opportunity, which they fully utilized, of gaining the supremacy over their foreign competitors in the gunmaking trade. English gunmakers reduced the weight,

fa

improved the shooting powers, and perfected the lock mechanism of the sporting gun, and increased the range and efficiency of the rifle. This transference of the gunmaking craft from the Continent

to England was also assisted by the tyranny of the foreign gunmaking gilds. In 1637 the

London gunmakers obtained their charter of

incorporation. The important gunmaking

industry of Birmingham dates from 1603, and

soon rivalled that of London. Double shot- guns do not appear to have been generally

used until the 19th century.

The first successful double

guns were built with the

barrels over and under, and

not side by side, and were

invented about 1616 by

one Guilliano Bossi of

Rome. In 1784 double

shot guns were described as

a novelty. Joseph Manton

patented the elevated rib

which rested on the barrels.

The general success of the

double gun was eventually

due to the light weight

which the better material

and workmanship of tne

best gunmakers made pos- sible, and to the quickness

and certainty of ignition of

the modern cartridge. The objections to the

flint-lock were that it did

not entirely preserve, the

priming from wet, and that

the flint sparks sometimes

failed to ignite the charge.

In 1807 the Rev. Alexander

John Forsyth obtained a

patent for priming with a |jj(t, £jrg fc,

fulminating powder made

of chlorate of potash, sul- phur and charcoal, which

exploded by concussion.

This important improve- ment in firearms was not

recognized and adopted by the military authorities until more than thirty years later. In the mean- time it was gradually de- veloped, and the copper percussion cap invented, by various gunmakers and private individuals. Thomas Shaw of Phila- delphia first used fulminate in a steel cap in 1814, which he changed to a copper cap in 1816. It was not until the introduction of the copper cap that the per- cussion gun could be con- sidered in every way superior to the flint. In 1 834, in the reign of William IV., Forsyth's invention was tested at Woolwich by firing 6000 rounds from six flint-lock muskets, and a similar number from six percussion muskets,

in all weathers

This trial established the percussion principle. The shooting was found to be more accurate, the recoil less, the charge of powder having been reduced from 6 to 4.5 drs., the rapidity of firing greater and the number of miss-fires much reduced, being as 1 to 26 nearly in favour of the percussion

system. In consequence of this successful trial the military flint-lock in 1839 was altered to suit the percussion principle. This was easily accomplished by replacing the hammer and pan by a nipple with a hole through its centre to the vent or touch- hole, and by replacing the cock which held the flint by a smaller cock or hammer with a hollow to fit on the nipple when released by the trigger. On the nipple was placed the copper cap contain- ing the detonating composition, now made of three parts of chlorate of potash, two of fulminate of mercury and one of powdered glass.

In 1840 the Austrian army was supplied with the percussion musket, and in 1842 a new model percussion musket with a block or back-sight for 150 yds. was issued to the British army, n lb 6 oz. in weight, 4 ft. 6f in. in length without bayonet, 6 ft. with bayonet and with a barrel 3 ft. 3 in. in length, firing a bullet of 14ˆ to the lb with 4! drs. of powder. This musket was larger in bore than that of France, Belgium, Russia and Austria, and thus had the advantage of being able to fire their balls, while the English balls could not be fired from their barrels. But the greater weight and momentum of the English ball was counteracted by the excess of windage. This percussion musket of 1842, the latest development of the renowned Brown Bess, continued in use in the British army until partially superseded in 1851 by the Minie rifle, and altogether by the Enfield rifle

in 1855. For further information as to the history and develop- ment of military, target and sporting rifles see Rifle.

Illustrations are given herewith of a German carbine of the 16th century, with double wheel-lock (fig. 8) ; a snaphance (fig. 9) ; several forms of the Brown Bessor flint-lock military musket(English, William III., fig. 10; George II., fig. 11; George III., fig. 12; French, Napoleon, fig. 13) ; and of the percussion musket adopted in the British service in 1839 (fig. 14).

Examples of non-European firearms are shown in figs. 6 and 7, representing a Moorish flint-lock and an Indian matchlock respectively. Figs. 15-18 represent various carbines, musketoons and blunderbusses, fig. 15 showing a small blunderbuss or musketoon of the early 18th century, fig. 16 a large blunderbuss of 1750, fig. 17 a flint-lock cavalry carbine of about 1825 and fig. 18 a percussion carbine of 1830. All these are drawn from arms in the museum of the Royal United Service Institution, London.

Modern Shot Guns. — The modern sporting breech-loaders may be said to have originated with the invention of the cartridge- case containing its own means of ignition. The breech-loading mechanism antedated the cartridge by many years, the earliest breech-loading hand guns dating back to 1537. Another distinct type of breech-loader was invented in France about the middle of the 17th century. During the 17th and 18th centuries breech-loading arms were very numerous and of considerable variety. The original cartridge, a charge of powder and bullet in a paper envelope, dates from 1 586. These were used with .muzzle-loaders, the base of the cartridge being ripped or bitten off by the soldier before placing in the barrel. It was only when the detonating cap came into use that the paper cartridge answered well in breech-loaders. The modern breech-loader has resulted from a gradual series of improvements, and not from any one great invention. Its essential feature is the prevention of all escape of gas at the breech when the gun is fired by means of an expan- sive cartridge-case containing its own means of ignition. The earlier breech-loaders were not gas-tight, because the cartridge- cases were either consumable or the load was placed in a strong non-expansive breech-plug. The earliest efficient modern cartridge-case was the pin-fire, patented by Houiller, a Paris gunsmith, in 1847, with a thin weak shell which expanded by the force of the explosion, fitted perfectly in the barrel, and thus formed an efficient gas check. Probably no invention connected with firearms has wrought such changes in the principle of gun- construction as those effected by the expansive cartridge-case. This invention has completely revolutionized the art of gun-making, has been successfully applied to all descriptions of firearms, and has produced a new and important industry — that of cartridge manufacture.

About 1836, C. Lefaucheux, a Paris gunsmith, improved the old Pauly system of breech-loading, but its breech action was a crude mechanism, with single grip worked by a bottom lever. The double grip for the barrels was the subsequent invention of a Birmingham gunmaker. The central-fire cartridge, practically as' now in use, was introduced into England in 1861 by Daw. It is said to have been the invention of Pottet, of Paris, improved upon by Schneider, and gave rise to considerable litigation in respect of its patent rights. Daw, who controlled the English patents, was the only exhibitor of central-fire guns and cartridges at the International Exhibition

of 1862. In his system the barrels work on a hinge joint, the bottom lever withdraws the holding-down bolt; the cartridge is of the modern type, the cap being detonated by a striker passing through the standing breech to the inner face. The cartridge-case is with- drawn by a sliding extractor fitted to the breech ends of the barrels. Daw was subsequently defeated in his control of the patents by Eley Bros., owing to the patent not having been kept in force in France. The modern breech-loading gun has been gradually and steadily improved since i860. Westley Richards adopted and improved Matthews' top-lever mechanism. About ' 1866 the rebounding lock was introduced, and improved in 1869. The treble wedge-fast mechanism for holding down the barrels was originated by W. W. Greener in 1865, and perfected in 1873. A very important improvement was the introduction of the hammerless gun, in which the mechanism for firing is placed entirely within the gun. This was made possible by the introduc-

tion of the central-fire cartridge. In 1862 Daw, and in i86(i Green, introduced hammerless guns in which the cocking was effected by the under lever. These guns did not attain popularity. In 187 1 T. Murcott patented a hammerless gun, the first to obtain distinct success. This also was a lever-cocking gun. About the same time Ncedham introduced the principle of utilizing the weight of the barrels to assist in cocking. In 1875 Anson and Deeley utilized the fore-end attached to the barrels to cock the locks. From this date hammerless guns became really popular. Subsequently minor improvements were made by many other gun-makers, including alternative movements introduced by Purdey and Rogers. Improvements were also introduced by Westley Richards, Purdey and others, including cocking by means of the mainspring. In 1874 J. Needham introduced the ejector mechanism, by which each empty cartridge-case is separately and automatically thrown out of the gun when the breech is opened, the necessary force being provided by the mainspring of the lock. W. W. Greener and some other gun- makers have since introduced minor modifications and improve- ments of this mechanism. Next in turn came Perks and other inventors, who separated the ejector mechanism from the lock work. This very decided improvement is universal to-day. A later innovation in the modern breech-loader is the single trigger mechanism introduced by some of the leading English gun-makers, by which both barrels can be fired in succession by a single trigger. This improvement enables both barrels to be rapidly fired without altering the grip of the right hand, but deprives the shooter of the power of selecting his barrel.

Repeating or magazine shot-guns on the principle of the repeating rifle, with a magazine below the single firing barrel, are also made by some American and continental gun-makers, but as yet have not come into general use, being comparatively cumbersome and not well balanced. The difficulty of a shifting balance as each cartridge is fired has also yet to be overcome.

Several varieties of a combination rifle and shot-gun are also made, for a description of which see Rifle.

The chief purposes for which modern shot-guns are required are game-shooting, trap-shooting at pigeons and wild-fowling. The game gun may be any bore from 32 to 10 gauge. The usual standard bore is 12 gauge unless it be for a boy, when it is 20 gauge. The usual weight of the 12-bore double-barrelled game gun is from 6 to 7 lb with barrels 30 in. long, there, however, being a present tendency to barrels of a shorter length. These barrels are made of steel, as being a stronger and more homo- geneous material than the barrels formerly produced, which were mostly of Damascus pattern, a mixture of iron and steel. Steel barrels, drilled from the solid block, were originally produced by Whitworth. To-day the makers of steel for this purpose are many. The standard charge for the 12-bore is 42 grains of smokeless powder and 1 oz. to ijth oz. of shot. Powder of a lighter gravimetric density is occasionally employed, when the weight of the charge is reduced to 33 grains. This charge of powder corresponds to the 3 drams of black powder formerly used. The ordinary game gun should have a killing circle of 30 in. at 30 yds. with the first barrel and at 40 yds. with the second. Improved materials and methods of manufacture, and what is known as " choke " boring of the barrels, have enabled modern gun-makers to regulate the shooting of guns to a nicety. Choke-boring is the constriction of the diameter of the barrel near the muzzle, and was known in America in the early part of the 19th century. In 1875 Pape of Newcastle was awarded a prize for the invention of choke-boring, there being no other claimant. The methods of choke-boring have since been varied and improved by the leading English gun-makers. The pigeon gun is usually heavier than the game gun and more choked. It generally weighs from 7 to 8 lb. Its weight, by club rules, is frequently restricted to 7J lb and its bore to 12 gauge. The standard wild-fowling gun is a double 8-bore with 30-in. barrels weighing 15 lb. and firing a charge of 7 drams of powder and 2f to 3 oz. of shot. These guns are also made in both smaller and larger varieties, including a single barrel 4-bore, which is the largest gun that can be used from the shoulder, and single

barrel punt guns of i|-in. bore, weighing 100 lb. While no conspicuous advance in improved gun-mechanism and invention has been made during the last few years, the materials and methods of manufacture, and the quality and exactitude of the gun-maker's work, have continued gradually and steadily to improve. English, and particularly London-made, guns stand pre-eminent all over the world. (H. S.-K.)

GUNA, a town and military station in Central India, in the state of Gwalior. Pop. (1901) 11,452. After the Mutiny, it became the headquarters of the Central India Horse, whose commanding officer acts as ex-officio assistant to the resident of Gwalior; and its trade has developed rapidly since the opening of a station on a branch of the Great Indian Peninsula railway in 1899.

GUNCOTTON, an explosive substance produced by the action of strong nitric acid on cellulose at the ordinary temperature; chemically it is a nitrate of cellulose, or a mixture of nitrates, according to some authorities. The first step in the history of guncotton was made by T. J. Pelouze in 1838, who observed that when paper or cotton was immersed in cold concentrated nitric acid the materials, though not altered in physical appearance, became heavier, and after washing and drying were possessed of self-explosive properties. At the time these products were thought to be related to the nitrated starch obtained a little previously by Henri Braconnot and called xyloidin; they are only related in so far as they are nitrates. C. F. Schonbein of Basel published his discovery of guncotton in 1846 {Phil. Mag. [3], 3!> P- 7)i an d this was shortly after followed by investigations by R. R. Bottger of Frankfort and Otto and Knop, all of whom added to our knowledge of the subject, the last-named introducing the use of sulphuric along with nitric acid in the nitration process. The chemical composition and constitution of guncotton has been studied by a considerable number of chemists and many divergent views have been put forward on the subject. W. Crum was probably the first to recognize that some hydrogen atoms of the cellulose had been replaced by an oxide of nitrogen, and this view was supported more or less by other workers, especially Hadow, who appears to have distinctly recognized that at least three compounds were present, the most violently explosive of which constituted the main bulk of the product commonly obtained and known as guncotton. This particular product was insoluble in a mixture of ether and alcohol, and its composition could be expressed by the term tri-nitrocellulose. Other products were soluble in the ether-alcohol mixture: they were less highly nitrated, and constituted the so-called collodion gun-cotton.

The smallest empirical formulafor cellulose (q.v.) may certainly be written CeHioOs. How much of the hydrogen and oxygen are in the hydroxylic (OH) form cannot be absolutely stated, but from the study of the acetates at least three hydroxyl groups may be assumed. The oldest and perhaps most reasonable idea represents guncotton as cellulose trinitrate, but this has been much disputed, and various formulae, some based on cellulose as C12H20O10, others on a still more complex molecule, have been proposed. The constitution of guncotton is a difficult matter to investigate, primarily on account of the very insoluble nature of cellulose itself, and also from the

fact that comparatively slight variations in the concentration and temperature of the acids used produce considerable differences in the products. The nitrates are also very insoluble substances, all the so-called solvents merely converting them into jelly. No method has yet been devised by which the molecular weight can be ascertained. 1 The products of the action of nitric acid on cellulose are not nitro compounds in the sense that picric acid is, but are nitrates or nitric esters.

Guncotton is made by immersing cleaned and dried cotton waste in a mixture of strong nitric and sulphuric acids. The

1 The composition of the cellulose nitrates was reviewed by G. Lunge (Jour. Amer. Chem. Soc, 1901, 23, p. 527), who, assuming the formula CuHˆOa) for cellulose, showed how the nitrocelluloses described by different chemists may be expressed by the formula CmH«_»02o(NOs)x, where x has the values 4, 5, 6, . . . 12.

relative amounts of the acids in the mixture and the time of duration of treatment of the cotton varies somewhat in different works, but the underlying idea is the same, viz. employing such an excess of sulphuric over nitric that the latter will be rendered anhydrous or concentrated and maintained as such in solution in the sulphuric acid, and that the sulphuric acid shall still be suffi- ciently strong to absorb and combine with the water produced during the actual formation of the guncotton. In the recent methods the cotton remains in contact with the acids for two to four hours at the ordinary air temperature (15° C), m which time it is almost fully nitrated, the main portion, say 90%, having a composition represented by the formula 2 CeH70 2 (N03)3, the remainder consisting of lower nitrated products, some oxidation products and traces of unchanged cellulose and cellulose sulphates. The acid is then slowly run out by an opening in the bottom of the pan in which the operation is conducted, and water distributed carefully over its surface displaces it in the interstices of the cotton, which is finally subjected to a course of boiling and washing with water. This washing is a most important part of the process. On its thoroughness depends the removal of small quantities of products other than the nitrates, for instance, some sulphates and products from impurities contained in the original cellulose. Cellulose sulphates are one, and possibly the main, cause of instability in guncotton, and it is highly desirable that they should be completely hydrolysed and removed in the washing process. The nitrated product retains the outward form of the original cellulose. In the course of the washing, according to a method introduced by Sir F. Abel, the cotton is ground into a pulp, a process which greatly facilitates the complete removal of acids, &c. This pulp is finally drained, and is then either compressed, while still moist, into slabs or blocks when required for blasting purposes, or it is dried when required for the manufacture of

propellants. Sometimes a small quantity of an alkali (e.g. sodium carbonate) is added to the final washing water, so that quantities of this alkaline substance ranging from o- 5 % to a little over 1 % are retained by the guncotton. The idea is that any traces of acid not washed away by the washing process or produced later by a slow decomposition of the substance will be thereby neutralized and rendered harmless. Guncotton in an air-dry state, whether in the original form or after grinding to pulp and compressing, burns with very great rapidity but does not detonate unless confined. , Immediately after the discovery of guncotton Schonbein proposed its employment as a substitute for gunpowder, and General von Lenk carried out a lengthy and laborious series of experiments intending to adapt it especially for artillery use. All these and many subsequent attempts to utilize it, either loose or mechanically compressed in any way, signally failed. How- ever much compressed by mechanical means it is still a porous mass, and when it is confined as in a gun the flame and hot gases from the portion first ignited permeate the remainder, generally causing it actually to detonate, or to burn so rapidly that its action approaches detonation. The more closely it is confined the greater is the pressure set up by a small part of the charge burning, and the more completely will the explosion of the remainder assume the detonating form. The employment of guncotton as a propellant was possible only after the discovery that it could be gelatinized or made into a colloid by the action of so-called solvents, e.g. ethylacetate and other esters, acetone and a number of like substances (see Cordite).

When quite dry guncotton is easily detonated by a blow on an anvil or hard surface. If dry and warm it is much more sensitive.to percussion or friction, and also becomes electrified by friction under those conditions. The amount of contained moisture exerts a con- siderable effect on its sensitiveness. With about 2 % of moisture it can still be detonated on an anvil, but the action is generally confined to the piece struck. As the quantity of contained water increases it becomes difficult or even impossible to detonate by an ordinary blow. Compressed dry guncotton is easily detonated by an initiative detonator such as mercuric fulminate. Guncotton containing more than 15% of water is uninflammable, may be compressed or worked without danger and is much more difficult to detonate by a fulminate

2 This formula is retained mainly on account of its simplicity. It also expresses all that is necessary in this connexion.

detonator than when dry. 1 A small charge of dry guncotton will, however,

detonate the wet material, and this peculiarity is made use of in the employment of guncotton for blasting purposes. A charge of compressed wet guncotton may be exploded, even under water, by the detonation of a small primer of the dry and water- proofed material, which in turn can be started by a small fulminate detonator. The explosive wave from the dry guncotton primer is in fact better responded to by the wet compressed material than the dry, and its detonation is somewhat sharper than that of the dry. It is not necessary for the blocks of wet guncotton to be actually in contact if they be under water, and the peculiar explosive wave can also be conveyed a little distance by a piece of metal such as a railway rail. The more nearly the composition of guncotton approaches that represented by C e H 7 2 (N0 3)3, the more stable is it as regards storing at ordinary temperatures, and the higher the igniting temperature. Carefully prepared guncotton after washing with alcohol-ether until nothing more dissolves may require to be heated to 180-185 C. before inflaming. Ordinary commercial gun- cottons, containing from 10 to 15% of lower nitrated products, will ignite as a rule some 20-25 lower.

Assuming the above formula to represent guncotton, there is sufficient oxygen for internal combustion without any carbon being left. The gaseous mixture obtained by burning guncotton in a vacuum vessel contains steam, carbon monoxide, carbon dioxide, nitrogen, nitric oxide, and methane. When slowly heated in a vacuum vessel until ignition takes place, some nitrogen dioxide, N0 2 , is also produced. When kept for some weeks at a temperature of ioo° in steam, a considerable number of fatty acids, some bases, and glucose-like substances result. Under different pressures the relative amounts of the combustion products vary considerably. Under very great pressures carbon monoxide, steam and nitrogen are the main products, but nitric oxide never quite disappears.

Dilute mineral acids have little or no action on guncotton. Strong sulphuric acid in contact with it liberates first nitric acid and later oxides of nitrogen, leaving a charred residue or a brown solution according to the quantity of acid. It sometimes fires on contact with strong sulphuric acid, especially when slightly warmed. The alkali hydroxides (e.g. sodium hydroxide) will in a solid state fire it on contact. Strong or weak solutions of these substances also decom- pose it, producing some alkali nitrate and nitrite, the cellulose molecule being only partially restored, some quantity undergoing oxidation. Ammonia is also active, but not quite in the same manner as the alkali hydroxides. Dry guncotton heated in ammonia gas detonates at about 70 , and ammonium hydroxide solutions of all strengths slowly decompose it, yielding somewhat complex products. Alkali sulphohydrates reduce guncotton, or other nitrated celluloses, completely to cellulose. The production of the so-called " artificial silk " depends on this action.

A characteristic difference . between guncotton and collodion cotton is the insolubility of the former in ether or alcohol or a mixture of these liquids. The so-called collodion cottons are nitrated celluloses, but of a lower degree of nitration (as a rule) than guncotton. They are sometimes spoken of as " lower " or " soluble " cottons or nitrates. The solubility in ether-alcohol may be owing to a lower degree of nitration, or to the temperature conditions under which the process of manufacture has been carried on. If guncotton be correctly represented by the formula C 6 H 7 02(N03)3, it should contain a little more than 14% of nitrogen. Guncottons are examined for degree of nitration by the nitrometer, in which apparatus they are decom- posed by sulphuric acid in contact with mercury, and all the nitrogen is evolved as nitric oxide, NO, which is measured and the weight of its contained nitrogen calculated. Ordinary guncottons seldom contain more than 13% of nitrogen, and in most cases the amount does not exceed 12-5 "■',,. Generally speaking, the lower the nitrogen content of a guncotton, as found by the nitrometer, the higher the percentage of matters soluble in a mixture of ether-alcohol. These soluble matters are usually considered as " lower " nitrates.

Guncottons are usually tested by the Abel heat test for stability (see Cordite). Another heat test, that of Will, consists in heating a weighed quantity of the guncotton in a stream of carbon dioxide to 130° C, passing the evolved gases over some red-hot copper, and finally collecting them over a solution of potassium hydroxide which retains the carbon dioxide and allows the nitrogen, arising from the guncotton decomposition, to be measured. This is done at definite time intervals so that the rate of decomposition can be followed. The relative stability is then judged by the amount of nitrogen gas collected in a certain time. Several modifications of this and of the Abel heat test are also in use. (See Explosives.) (W.R. E. H.)

GUNDULICH, IVAN (1 588-1638), known also as Giovanni Gondola, Servian poet, was born at Ragusa on the 8th of January 1588. His father, Franco Gundulich, once the Ragusan envoy to Constantinople and councillor of- the republic, gave him an excellent education. He studied the " humanities " with the Jesuit, Father Muzzi, and philosophy with Father Ricasoli. After that he studied Roman law and jurisprudence in general. He was member of the Lower Council and once served as the 1 Air-dried guncotton will contain 2 % or less of moisture.

chief magistrate of the republic. He died on the 8th of December 1638. A born poet, he admired much the Italian poets of his time, from whom he made many translations into Servian. It is believed that he so translated Tasso's Gerusalemme liberata. He is known to have written eighteen works, of which eleven were dramas, but of these only three have been fully

preserved, others having perished during the great earthquake and fire in 1667. Most of those dramas were translations from the Italian, and were played, seemingly with great success, by the amateurs furnished by the noble families of Ragusa. But his greatest and justly celebrated work is an epic, entitled Osman, in twenty cantos. It is the first political epic on the Eastern Question, glorifying the victory of the Poles over Turks and Tatars in the campaign of 162 1, and encouraging a league of the Christian nations, under the guidance of Vladislaus, the king of Poland, for the purpose of driving away the Turks from Europe. The fourteenth and fifteenth cantos are lost. It is generally believed that the Ragusan government suppressed them from considera- tion for the Sultan, the protector of the republic, those two cantos having been violently anti-Turkish.

Osman was printed for the first time in Ragusa in 1826, the two missing cantos being replaced by songs written by Pietro Sorgo (or Sorkochevich). From this edition the learned Italian, Francesco Appending made an Italian translation published in 1827. Since that time several other editions have been made. The best are con- sidered to be the edition of the South Slavonic Academy in Agram (1877) and the edition published in Semlin (1889) by Professor Yovan Boshkovich. In the edition of 1844 (Agram) the last cantos, fourteen and fifteen, were replaced by very fine compositions of the Serbo-Croatian poet, Mazhuranich (Mazuranic). The complete works of Gundulich have been published in Agram, 1847, by V. Babukich and by the South Slavonic Academy of Agram in 1889.

(C. Mi.)

GUNG'L, JOSEF (1810-1889), Hungarian composer and conductor, was born on the 1st of December 1810, at Zsambek, in Hungary. After starting life as a school-teacher, and learning the elements of music from Ofen, the school-choirmaster, he became first oboist at Graz, and, at twenty-five, bandmaster of the 4th regiment of Austrian artillery. His first composition, a Hungarian march, written in 1836, attracted some notice, and in 1843 he was able to establish an orchestra in Berlin. With this band he travelled far, even (in 1849) to America. It is worth recording that Mendelssohn's complete Midsummer Night's Dream music is said to have been first played by Gung'l's band. In 1853 he became bandmaster to the 23rd Infantry Regiment at Briinn, but in 1864 he lived at Munich, and in 1876 a"t Frankfort, after (in 1873) having conducted with great success a series of promenade concerts at Covent Garden, London. From Frankfort Gung'l went to Weimar to live with his daughter, a well-known German opera singer and local prima donna. There he died, on the 31st of January 1889. Gung'l's dances number over 300, perhaps the most popular being the " Amor- etten," "Hydropaten," "Casino," "Dreams on the Ocean" waltzes;

“In Stiller Mitternacht ” polka, and ” Blue Violets ” mazurka. His Hungarian march was transcribed by Liszt. His music is characterized by the same -easy flowing melodies and well-marked rhythm that distinguish the dances of Strauss, to whom alone he can be ranked second in this kind of com- position.

GUNNER, or Master Gunner, in the navy, the warrant officer who has charge of the ordnance and ammunition, and of the training of the men at gun drill. His functions in this respect are of less relative importance than they were in former times, when specially trained corps of seamen gunners had not been formed.

GUNNING, PETER (1614-1684), English divine, was born at Hoo, in Kent, and educated at the King’s School, Canterbury, and Clare College, Cambridge, where he became a fellow in 1633. Having taken orders, he advocated the royalist cause from the pulpit with much eloquence. In 1644 he retired to Oxford, and held a chaplaincy at New College until the city surrendered to the parliamentary forces in 1646. Subsequently he was chaplain, first to the royalist Sir Robert Shirley of Eatington (1629-1656), and then at the Exeter House chapel. After the

Restoration in 1660 he returned to Clare College as master, and was appointed Lady Margaret professor of divinity. He also received the livings of Cottesmore, Rutlandshire, and Stoke Bruerne, Northamptonshire. In 1661 he became head of St John’s College, Cambridge, and was elected Regius professor of divinity. He was consecrated bishop of Chichester in 1669, and was translated to the see of Ely in 1674-1675. Holding moderate religious views, he deprecated alike the extremes represented by Puritanism and Roman Catholicism.

His works are chiefly reports of his disputations, such as that which appears in the Scisme Unmask’t (Paris, 1658), in which the definition of a schism is discussed with two Romanist opponents.

GUNNY, a sort of cloth, the name of which is supposed to be derived from ganga or gania of Rumphius, or from gonia, a vernacular name of the Crololaria juncea — a plant common in Madras. One of the first notices of the term itself is to be found in Knox’s Ceylon, in which he says: ” The filaments at the bottom of the stem (coir from the coco-nut husk, Cocos nucifera) may be made into a coarse cloth called gunny, which is used for bags and similar purposes.”

Warden, in The Linen Trade, says:

" A very large proportion of the jute grown in Bengal is made into cloth in the districts where it is cultivated, and this industry forms the grand domestic manufacture of all the populous eastern districts of Bengal. It pervades all classes, and penetrates into every house- hold, almost every one, man, woman and child, being in some way engaged in it. Boatmen, husbandmen, palankeen carriers, domestic servants, everyone, in fact, being Hindu — forMussulmans spin cotton only — pass their leisure moments, distaff in hand, spinning gunny twist. It is spun by the takur and dhara, the former being a kind of spindle, which is turned upon the thigh or the sole of the foot, and the latter a reel, on which the thread, when sufficiently twisted, is wound up. Another kind of spinning machine, called a ghurghurea, is occasionally used. A bunch of the raw material is hung up in every farmer's house, or on the protruding stick of a thatched roof, and every one who has leisure forms with these spindles some coarse pack-thread, of which ropes are twisted for the use of the farm. The lower Hindu castes, from this pack-thread, spin a finer thread for being made into cloth, and, there being a loom in nearly every house, very much of it is woven by the women of the lower class of people. It is especially the employment of the Hindu widow, as it enables her to earn her bread without being a burden on her family. The cloth thus made is of various qualities, such as clothing for the family (especially the women, a great proportion of whom on all the eastern frontier wear almost nothing else), coarse fabrics, bedding, rice and sugar bags, sacking, pack-sheet, &c. Much of it is woven into short lengths and very narrow widths, two or three of which are sometimes sewed into one piece before they are sold. That intended for rice and sugar bags is made about 6 feet long, and from 24 to 27 inches wide, and doubled. A considerable quantity of jute yarn is dyed and woven into cloth for various local purposes, and some of it is also sent out of the district. The principal places where chotee, or jute cloth for gunny bags is made are within a radius of perhaps 150 to 200 miles around Dacca, and there both labour and land are remark- ably cheap. The short, staple, common jute is generally consumed in the local manufacture, the finer and long stapled being reserved for the export trade. These causes enable gunny cloth and bags to be sold almost as cheaply as the raw material, which creates an immense demand for them in nearly every market of the world."

Such appeared to be the definition of gunny cloth at the time the above was written — between 1850 and i860. Most of the Indian cloth for gunny bags is now made by power, and within about 20 m. of Calcutta. In many respects the term gunny cloth is still applied to all and sundry, but there is no doubt that the original name was intended for cloth which was similar to what is now known as " cotton bagging." This particular type of cloth is still largely made in the hand loom, even in Dundee, this method of

manufacture being considered, for certain reasons, more satisfactory than the power loom method ‘ (see Jute and Bagging).

GUNPOWDER, an explosive composed of saltpetre, charcoal and sulphur. Very few substances have had a greater effect on civilization than gunpowder. Its employment altered the whole art of war, and its influence gradually and indirectly permeated and affected the whole fabric of society. Its direct effect on the arts of peace was but slight, and had but a limited range, which could not be compared to the modern extended employment of high explosives for blasting in mining and engineering work.

,

It is probably quite incorrect to speak of the discovery of gunpowder. From modern researches it seems more likely and more just to think of it as a thing that has developed, passing through many stages — mainly of improvement, but some undoubtedly retrograde. There really is not sufficient solid evidence on which to pin down its invention to one man. As Lieutenant-Colonel H. W. L. Hime (Gunpowder and Ammunition, 1904) says, the invention of gunpowder was impossible until the properties of nearly pure saltpetre had become known. The honour, however, has been associated with two names in par- ticular, Berthold Schwartz, a German monk, and Friar Roger Bacon. Of the former Oscar Guttmann writes (Monumenta pulveris pyrii, 1904, p. 6): “Berthold Schwartz was generally considered to be the inventor of gunpowder, and only in England has Roger Bacon’s claim been upheld, though there are English writers who have pleaded in favour of Schwartz. Most writers are agreed that Schwartz invented the first fire-arms, and as nothing was known of an inventor of gunpowder, it was perhaps considered justifiable to give Schwartz the credit thereof. There is some ambiguity as to when Schwartz lived. The year 1354 is sometimes mentioned as the date of his invention of powder, and this is also to be inferred from an inscription on the monument to him in Freiburg. But considering there can be no doubt as to the .manufacture in England of gunpowder and cannon in 1344, that we have authentic information of guns in France in 1338 and in Florence in 1326, and that the Oxford MS. De officiis regum of 1325 gives an illustration of a gun, Berthold Schwartz must have lived long before 1354 to have been the inventor of gunpowder or guns.” In Germany also there were powder- works at Augsburg in 1340, in Spandau in 1344, and Liegnitz in 1348.

Roger Bacon, in his De mirabili potestate artis et naturae (1242), makes the most important communication on the history of gunpowder. Reference is made to an explosive mixture as known before his time and employed for ” diversion, producing a noise like thunder and flashes like lightning.” In one passage Bacon speaks of saltpetre as a violent explosive, but there is no doubt that he knew it was not a self-explosive substance, but only so when

mixed with other substances, as appears from the statement in De secretis operibus artis et naturae, printed at Hamburg in 1618, that " from saltpetre and other ingredients we are able to make a fire that shall burn at any distance we please." A great part of his three chapters, 9, 10, n, long appeared without meaning until the anagrammatic nature of the sentences was realized. The words of this anagram are (chap. 11) : " Item ponderis totum 30 sed tamen salis petrae luru vopo vir can utri x et sulphuris ; et sic fades tonitruum et corusca- tionem, si scias artificium. Videas tamen utrum loquar aenig- mate aut secundum veritatem." Hime, in his chapter on the origin of gunpowder, discusses these chapters at length, and gives, omitting the anagram, the translation: "Let the total weight of the ingredients be 30, however, of saltpetre … of sulphur; and with such a mixture you will produce a bright flash and a thundering noise, if you know the trick. You may find (by actual experiment) whether I am writing riddles to you or the plain truth." The anagram reads, according to Hime, " salis petrae r(ecipe) vii part(es), v nov(ellae) corul(i), v et sulphuris " (take seven parts of saltpetre, five of young hazel-wood, and five of sulphur). Hime then goes on to show that Bacon was in possession of an explosive which was a considerable advance on mere incendiary compositions. Bacon does not appear to have been aware of the projecting power of gunpowder. He knew that it exploded and that perhaps people might be blown up or frightened by it; more cannot be said. The behaviour of small quantities of any explosive is hardly ever indicative of its behaviour in large quantities and especially when under con- finement. Hime is of opinion that Bacon blundered upon gunpowder whilst playing with some incendiary composition, such as those mentioned by Marcus Graecus and others, in which

1 These words were emended by some authors to read luru mope can ubre, the letters of which can be arranged to give pulvere car bonum.*

he employed Lis comparatively pure saltpetre instead of crude nitrum. It has been suggested that Bacon derived his. knowledge of these fiery mixtures from the MS. Liber ignium, ascribed to Marcus Graecus, in the National Library in Paris (Dutens, Enquiry into Origin of Discoveries attributed to Moderns). Certainly this Marcus Graecus appears to have known of some incendiary composition containing the gunpowder ingredients, but it was not gunpowder. Hime seems to doubt the existence of any such person as Marcus Graecus, as he says: " The Liber ignium was written from first to last in the period of literary forgeries and pseudographs . . . and we may reasonably conclude that Marcus Graecus is

as unreal as the imaginary Greek original of the tract which bears his name." Albertus Magnus in the De mirabilibus mundi repeats some of the receipts given in Marcus Graecus, and several other writers give receipts for Greek fire, rockets, &c. Dutens gives many passages in his work, above-named, from old authors in support of his view that a composition of the nature of gunpowder was not unknown to the ancients. Hime's elaborate arguments go to show that these compositions could only have been of the incendiary type and not real explosives. His arguments seem to hold good as regards not only the Greeks but also the Arabs, Hindus and Chinese (see also Fireworks).

There seems no doubt that incendiary compositions, some perhaps containing nitre, mostly, however, simply combustible substances as sulphur, naphtha, resins, &c, were employed and projected both for defence and offence, but they were projected or blown by engines and not by themselves. It is quite incon- ceivable that a real propelling explosive should have been known in the time of Alexander or much later, and not have immediately taken its proper place. In a chapter discussing this question of explosives amongst the Hindus, Hime says: "It is needless to enlarge the list of quotations: incendiaries pursued much the, same course in Upper India as in Greece and Arabia." No trustworthy evidence of an explosive in India is to be found until the 21st of April 1526, the date of the decisive battle of Panipat, in which Ibrahim, sultan of Delhi, was killed and his army routed by Baber the Mogul, who possessed both great and small fire-arms.

As regards also the crusader period (1097-1201ˆ sc strange and deadly an agent of destruction as gunpowder could not possibly have been employed in the field without the full know- ledge of both parties, yet no historian, Christian or Moslem, alludes to an explosive of any kind, while all of them carefully record the use of incendiaries. The employment of rockets and " wildfire " incendiary composition seems undoubtedly of very old date in India, but the names given to pieces of artillery under the Mogul conqueror of Hindustan point to a European, or at least to a Turkish origin, and it is quite certain that Europeans were retained in the service of Akbar and Aurangzeb. The composition of present day Chinese gunpowder is almost identical with that employed in Europe, so that in all probability the knowledge of it was obtained from Western sources.

In the writings of Bacon there is no mention of guns or the use of powder as a propellant, but merely as an explosive and destructive power. Owing perhaps to this obscurity hanging over the early history of gunpowder, its employment as a propelling agent has been ascribed to the Moors or Saracens. J. A. Conde (Historic de la domination de los Arabes en Espana) states that Ismail Ben Firaz, king of Granada, who in 1325 besieged Boza, had among his machines " some that cast globes of fire," but there is not

the least evidence that these were guns. The first trustworthy document relative to the use of gun- powder in Europe, a document still in existence, and bearing date February n, 1326, gives authority to the council of twelve of 1 Florence and others to appoint persons to superintend the manufacture of cannons of brass and iron balls, for the defence of the territory, &c, of the republic. John Barbour, arch- deacon of Aberdeen, writing in 1375, states that cannons (crakys of war) were employed in Edward III.'s invasion of Scotland in 1327. An indenture first published by Sir N. H. Nicolas in his History of the Royal Navy (London, 1846), and again by

Lieutenant-Colonel H. Brackenbury (Proc. R.A. Inst., 1865), stated to be 1338, contains references to small cannon as among the stores of the Tower, and also mentions " un petit barrell de gonpoudre le quart' plein." If authentic, this is possibly the first mention of gunpowder as such in England, but some doubts have been thrown upon the date of this MS. From a contem- porary document in the National Library in Paris it seems that in the same year (1338) there existed in the marine arsenal at Rouen an iron weapon called pot de feu, for propelling bolts, together with some saltpetre and sulphur to make powder for the same. Preserved in the Record Office in London are trust- worthy accounts from the year 1345 of the purchase of ingredients for making powder, and of the shipping of cannon to France. In 1346 Edward III. appears to have ordered all available saltpetre and sulphur to be bought up for him. In the first year of Richard II. (1377) Thomas Norbury was ordered to buy, amongst other munitions, sulphur, saltpetre and charcoal, to be sent to the castle of Brest. In 1414 Henry V. ordered that no gunpowder should be taken out of the kingdom without special licence, and in the same year ordered twenty pipes of willow charcoal and other articles for the use of the guns.

The manufacture of gunpowder seems to have been carried on as a crown monopoly about the time of Elizabeth, and regulations respecting gunpowder and nitre were made about 1623 (James I.). Powder-mills were probably in existence at Waltham Abbey about the middle or towards the end of the 1 6th century.

Ingredients and their Action. — Roger Bacon in his anagram gives the first real recipe for gunpowder, viz. (according to Hime, ch. xii.) saltpetre 41-2, charcoal 29-4, sulphur 29-4. Dr John Arderne of Newark, who began to practise about 1350 and was later surgeon to Henry IV., gives a recipe (Sloane MSS. 335, 795), saltpetre 66-6, charcoal 22-2, sulphur ii-i, " which are to be thoroughly mixed on a marble and then sifted through a cloth. " This powder is nominally of the same composition as one given in a MS. of Marcus Graecus, but the saltpetre of this formula by Marcus Graecus was undoubtedly answerable for the difference in behaviour of the two compositions. Roger Bacon had not only refined and obtained pure

nitre, but had appreciated the importance of thoioughly mixing the components of the powder. Most if not all the early powder was a ” loose ” mixture of the three ingredients, and the most important step in connexion with the development of gunpowder was undoubtedly the introduc- tion of wet mixing or ” incorporating.” Whenever this was done, the improvement in the product must have been immediately evident. In the damp or wetted state pressure could be applied with compara- tive safety during the mixing. The loose powder mixture came to be called ” serpentine “; after wet mixing it was more or less granu- lated or corned and was known as ” corned “powder. Corned powder seems to have been gradually introduced. It is mentioned in the Fire Book of Conrad von Schongau (in 1429), and was used for hand- guns in England long before 1560. It would seem that corned powder was used for hand-guns or small arms in the 15th century, but cannon were not made strong enough to withstand its explosion for quite another century (Hime). • According to the same writer, in the period 1 250-1450, when serpentine only was used, one powder could differ from another in the proportions of the ingredients; in the modern period — say 1 700-1 886 — the powders in use (in each state)dirfered only as a general rule in the size of the grain, whilst during the transi- tion period — 1450-1700 — they generally differed both in composi- tion and size of grain.

Corned or grained powder was adopted in France in 1525, and in 1540 the French utilized an observation that large-grained powder was the best for cannon, and restricted the manufacture to three sizes of grain or corn, possibly of the same composition. Early in the 18th century two or three sizes of grain and powder of one composition appear to have become common. The composition of English powder seems to have settled down to 75 nitre, 15 charcoal, and 10 sulphur, somewhere about the middle of the 18th century.

The composition of gunpowders used in different countries at different times is illustrated in the following tables: —

English Powders (Hime).

1250.

1350.

1560.

1647.

1670.

1742.

1781.

Saltpetre . Charcoal . Sulphur

41-2 29-4 29-4

66-6

22-2

II-I

50-0

3.V3

16-6

66-6 16-6 16-6

71-4

H-3

14-3

75-0

12-5

12-5

75-0 15-0

io-o 1

1 This represents the composition of English powder at present, and no doubt it has remained the same for a longer time ttan fv» above date indicates.

Foreign Powders (Hime).

France.

Sweden.

Germany.

Denmark.

France.

Sweden.

Germany.

1338.

1560.

1595-

1608.

1650.

1697.

1882.

Saltpetre . Charcoal . Sulphur

5° ?

25

66-6 16-6 166

52-2 26-1 21-7

68-3 23-2

8-5

75-6 136

io-8

73 17 10

1 Brown or coco-powder for large charges in guns. The charcoal is until brown, and is made from some variety of straw, not wood.

When reasonably pure, none of the ingredients of gunpowder absorbs any material quantity of moisture from the atmosphere, and the nitre only is a soluble substance. It seems extremely probable that for a long period the three substances were simply mixed dry, indeed sometimes kept separate and mixed just before being required ; the consequence must have been that, with every' care as to weighing out, the proportions of any given quantity would alter on carriage. Saltpetre is considerably heavier than sulphur or charcoal, and would tend to separate out towards the bottom of the containing vessel if subjected to jolting or vibration. When pure there can only be one kind of saltpetre or sulphur, because they are chemical individuals, but charcoal is not. Its com- position, rate of burning, &c, depend not only on the nature of the woody material from which it is made, but quite as much on the temperature and time of heating employed in the making. The woods from which it is made contain carbon, hydrogen and oxygen, and the two latter are never thoroughly expelled in charcoal-making. If they were, the resulting substance would be of no use for gun-powder. 1-3% of hydrogen and 8-15% of oxygen generally remain in charcoals suitable for gunpowder. A good deal of the fieriness and violence of explosidn of a gunpowder depends on the mode of burning of the charcoal as well as on the wood from which it is made.

Properties of Ingredients. — Charcoal is the chief combustible in powder. It must burn freely, leaving as little ash or residue as possible; it must be friable, and grind into a non-gritty powder. The sources from which powder charcoal is made are dogwood {Rhamnus frangula), willow {Salix alba), and alder (Betula alnus). Dogwood is mainly used for small-arm powders. Powders made from dogwood charcoal burn more rapidly than those from willow, &c. The wood after cutting is stripped of bark and allowed to season for two or three years. It is then picked to uniform size and charred in cylindrical iron cases or slips, which can be introduced into slightly larger cylinders set in a furnace. The slips are provided with openings for the escape of gases. The rate of heating as well as the absolute temperature attained have an effect on the product, a slow rate of heating yielding more charcoal, and a high temperature reducing the hydrogen and oxygen in the final product. When heated for seven hours to about 800° C. to 900° C. the remaining hydrogen and oxygen amount to about 2 % and 12 % respectively. The time of charring is as a rule from 5 to 7 hours. The slips are then removed from the furnace and placed in a larger iron vessel, where they are kept comparatively air-tight until quite cold. The charcoal is then sorted, and stored for some time before grinding. The charcoal is

ground, and the powder sifted on a rotating reel or cylinder of fine mesh copper-wire gauze. The sifted powder is again stored for some time before use in closed iron vessels.

Sicilian sulphur is most generally employed for gunpowder, and for complete purification is first distilled and then melted and cast into moulds. It is afterwards ground into a fine powder and sifted as in the case of the charcoal.

Potassium nitrate is eminently suitable as an oxygen-provider, not being deliquescent. Nitrates are continually being produced in surface soils, &c, by the oxidation of nitrogenous substances. Nitric and nitrous acids are also produced by electric discharges through the atmosphere, and these are found eventually as nitrates in soils, &c. Nitre is soluble in water, and much more so in hot than in cold. Crude nitre, obtained from soils or other sources, is purified by recrystallization. The crude material is dissolved almost to saturation in boiling water: on filtering and then cooling this liquor to about 30 C. almost pure nitre crystallizes out, most of the usual impurities still remaining in solution. By rapidly cooling and agitat- ing the nitre solution crystals are obtained of sufficient fineness for the manufacture of powder without special grinding. Nitre contains nearly 48 % of oxygen by Weight, five-sixths of which is available for combustion purposes. Nearly all the gases of the powder explosion are derived from the nitre. The specific gravity of nitre is 2-2: 200 grams will therefore occupy about 100 cubic centimetres volume. This quantity on its decomposition by heat alone yields 28 grams or '22,400 c.c. of nitrogen, and 80 grams or 56,000 c.c. of oxygen as gases, and 94 grams of potassium oxide, a fusible solid which vaporizes at a very high temperature.

Incorporation. — The materials are weighed out separately, mixed by passing through a sieve, and then uniformly moistened with a certain quantity of water, whilst on the bed of the incorporating mill. This consists of two heavy iron wheels mounted so as to run in a circular bed. The incorporation requires about four hours.

The mechanical action of rollers on the powder paste is a double one: not only crushing but mixing by pushing forwards and twisting side- ways. The pasty mass is deflected so that it repeatedly comes under first one roller and then the next by scrapers, set at an angle to the bed, which follow each wheel.

Although the charge is wet it is not burnt black but roasted possible for it to be fired either by the heat developed by the roller friction, by sparks from foreign matters, as bits of stone, &c, or possibly by heat generated by oxidation of the materials. The mills are provided with a drenching

apparatus so arranged that in case of one mill firing it and its neigh- bours will be drowned by water from a cistern or tank immediately above the mill. The product from the incorporation is termed " mill-cake."

After this incorporation in the damp state the ingredients never completely separate on drying, however much shaken, because each particle of nitre is surrounded by a thin layer of water containing nitre in solution in which the particles of charcoal and sulphur are entangled and retained. After due incorporation, powders are pressed to a certain extent whilst still moist. The density to which a powder is pressed is an important matter in regard to the rate of burning. The effect of high density is to slow down the initial rate of burning. Less dense powders burn more rapidly from the first and tend to put a great strain on the gun. Fouling is usually less with denser powders; and, as would be expected, such powders bear transport better and give less dust than light powders. Up to a certain pressure, hardness, density, and size of grain of a powder have an effect on the rate of burning and therefore on pressure. Glazing or polishing powder grains, also exerts a slight retarding action on burning and enables the powders to resist atmospheric moisture better. Excess of moisture in gunpowder has a marked effect in reducing the explosiveness. All powders are liable to absorb moisture, the quality and kind of charcoal being the main determinant in this respect; hard burnt black charcoal is least absorbent. The material employed in brown powders absorbs moisture somewhat readily. Powder kept in a very damp atmo- sphere, and especially in a changeable one, spoils rapidly, the salt- pptre coming to the surface in solution and then crystallizing out. The pieces also break up owing to the formation of large crystals of nitre in the mass. After the pressing of the incorporated powder into a " press-cake," it is broken up or granulated by suitable machines, and the resulting grains separated and sorted by sifting through sieves of determined sizes of mesh. Some dust is formed in this operation, which is sifted away and again worked up under the rollers (for sizes of grains see fig. 1). These grains, cubes, &c, are then either polished by rotating in drums alone or with graphite, which adheres to and coats the surfaces of the grains. This process is generally followed with powders intended for small-army or moderately small ordnance.

Shaped Powders. — Prisms or prismatic powder are made by breaking up the press-cake into a moderately fine state, whilst still moist, and pressing a certain quantity in a mould. The moulds generally employed consist of a thick plate of bronze in which are a number of hexagonal perforations. Accurately fitting plungers are so applied to these that one can enter at the top and the other at the bottom. The lower plunger being withdrawn to the bottom of the plate the hexagonal hole is charged with the powder and the two plungers set in motion, thus compressing the pdwder between them. After the desired pressure has been applied the top plunger is withdrawn,

and the lower one pushed upward to eject the prism of powder. The axial perforations in prism powders are made by small bronze rods which pass through the lower plunger and fit into corresponding holes in the upper one. If these prisms are made by a steadily applied pressure a density throughout of about 1-78 may be obtained. Further to regulate the rate of burning so that it shall be slow at first and more rapid as the powder is con- sumed, another form of machine was devised, the cam press, in which the pressure is applied very rapidly to the powder. It receives in fact one blow, which compresses the powder to the same dimensions, but the density of the outer layers of substance of the prism is much greater than in the interior.

The leading idea in connexion with all shaped powder grains, and with the very large sizes, was to regulate the rate of burning so as to avoid extreme pressure when first ignited and to keep up the pressure in the gun as more space was provided in the chamber or tube by the movement of the shot towards the muzzle. In the perforated prismatic powder the ignition is intended to proceed through the perforations; since in a charge the faces of the prisms fit pretty closely together, it was thought that this arrangement would prevent unburnt cores or pieces of powder from being blown out. These larger grain powders necessitated a lengthened bore to take advantage of the slower production of gases and complete combustion of the powder. General T. J. Rodman first suggested and employed the perforated cake cartridge in i860, the cake having nearly the diameter of the bore and a thickness of 1 to 2 in.

with perforations running parallel with the gun axis. The burning would then start from the comparatively small surfaces of the perforations, which would become larger as the powder burnt away. Experiments bore out this theory perfectly. It was found that small prisms were more convenient to make than large disks, and as the prisms practically fit together into a disk the same result was obtained. This effect of mechanical density on rate of burning is good only up to a certain pressure, above which the gases are driven through the densest form of granular material. After granulating or pressing into shapes, all powders must be dried. This is done by heating in specially ventilated rooms heated by steam pipes. As a rule this drying is followed by the finishing or polishing process. Powders are finally blended, i.e. products from different batches or " makes " are mixed so that identical proof results are obtained.

Sizes and Shapes of Powders. — In fig. I, a to k show the relative sizes and

shapes of grain as formerly employed for military purposes, except that the three largest powders, e-f-g and h are figured half- size to save space; whereas the remainder indicate the actual dimen- sions of the grains, a is for small-arms, all the others are for cannon of various sizes.

%

•5 >

+

m. m

,...0.38-),

0.75

power. For military purposes the ” muzzle ” velocity produced by a. powder is ascertained by a chronograph which measures the exact time the bullet or other projectile takes to traverse a known distance between two wire screens. By means of ” crusher gauges ” the exact pressure per square inch upon certain points in the interior of the bore can be found.

In the chemical examination of gunpowder the points to be ascertained are, in addition to moisture, freedom from chlorides or sulphates, and correct proportion of nitre and sulphur to charcoal.

Products of Fired Powder and Changes taking place on Explosion. — With a mixture of the complexity of gunpowder it is quite impossible to say beforehand what will be the relative amounts of products. The desired products are nitrogen and carbon dioxide as gases, and potassium sulphate and carbonate as solids. But the ingredients of the mixture are not in any simple chemical proportion. Burning in contact with air under one atmosphere pressure, and burning in a closed or partially closed vessel under a considerable number of atmospheres pressure, may produce quite different results. The temperature of a reaction always rises with increased pressure. Although the main function of the nitre is to give up oxygen and nitrogen, of the charcoal to produce carbon dioxide and most of the heat, and of the sulphur by vaporizing to accelerate the rate of burning, it is quite impossible to represent the actions taking place on explosion by any simple or single chemical equation. Roughly speaking, the gases from black powder burnt in a closed vessel have a volume at o° C. and 760 mm. pressure of about 280 times that of the original powder. The temperature produced under one atmo- sphere is above 2000° C, and under greater pressures considerably higher.

Experiments have been made by Benjamin Robins (1743), Charles Hutton (1778), Count Rumford (1797), Gay-Lussac (1823), R. Bunsen and L. SchiskofT (1857), T. J. Rodman (1861), C. Karolyi (1863), and later many researches by Sir Andrew Noble and Sir F. A. Abel, and by H. Debus and others, all with the idea of getting at the precise mechanism of the explosion. Debus {Ann., 1882, vols. 212, 213; 1891, vol. 265) discussed

at great length the results of researches by Bunsen, Karolyi, Noble and Abel, and others on the combustion of powder in closed vessels in such manner that all the products could be collected and examined and the pressures registered. A Waltham Abbey powder, according to an experiment by Noble and Abel, gave when fired in a closed vessel the following quantities of products calculated from one gram of powder : —

Fractions of Fractions of a

Potassium carbonate .

Potassium sulphate

,, thiosulphate

,, sulphide

Sulphur

Carbon dioxide

Carbon monoxide

Nitrogen

Hydrogen

Hydrogen sulphide

Potassium thiocyanate

Nitre

Ammonium carbonate

Fig. 1.

a gram.

molecule or atom.

•2615

•00189 molecule

•1268

•00072 „

•1666

•00087 »

•0252

•00017 „

•0012

•00004 atom

•2678

•00608 molecule

•0339

•00121 ,,

•1071

•00765 atom

•0008

•0008 ,,

•0080

•00023 molecule

•0004

•0005

•0002

Proof of Powder. — In addition to chemical examination powder is passed through certain mechanical tests: —

1 . For colour, glaze, texture and freedom from dust.

2. For proper incorporation.

3. For shape, size and proportion of the grains. — The first is judged by eye, and grains of the size required are obtained by the use of sieves of different sizes.

4. Density. — The density is generally obtained in some form of mercury densimeter, the powder being weighed in air and then under mercury. In some forms of the instrument the air can be pumped out so that the weighing takes place in vacuo.

5. Moisture and absorption of moisture. — The moisture and hygroscopic test consists in weighing a sample, drying at 100 C. . for a certain time, weighing again, &c, until constant. The dried weighed sample can then be exposed to an artificial atmosphere of known moisture and temperature, and the gain in weight per hour similarly ascertained by periodic weighings.

6. Firing proof. — The nature of this depends upon the purpose for which the powder is intended. For sporting powders it consists in the " pattern " given by the shot upon a target at a given distance, or, if fired with a bullet, upon the " figure of merit," or mean radial deviation of a certain number of rounds; also upon the penetrative

From this, and other results, Debus concluded that Waltham Abbey powder could be represented by the formula 16KN0 3 +21-18C 6.63S and that on combustion in a closed vessel the end results could be fairly expressed (rounding off fractions) by I6KNO3 21C+5S = 5K 2 C03 + K 2 S0 4 +2K 2 S 2 +13C0 2 -r-3CO-r-8N 2 . Some of the sulphur is lost, part combining with the metal of the apparatus and part with hydrogen in 'the charcoal. The military powders of most nations can be represented by the formula I6KNO3 +21-2C-(-6-6S, proportions which are reasonably near to a theoreti- cal mixture, that is one giving most complete combustion, greatest gas volume and temperature. The combustion of powder consists of two processes: (i.) oxidation, during which potassium carbonate and sulphate, carbon dioxide and nitrogen are mainly formed, and (ii.) a reduction process in which free carbon acts on the potassium sulphate and free sulphur on the potassium carbonate, producing potassium sulphide and carbon monoxide respectively. Most powders contain more carbon and sulphur than necessary, hence the second stage. In this second stage heat is lost. The potassium sulphide is also the most objectionable constituent as regards fouling.

The energy of a powder is given, according to Berthelot, by multiplying the gas volume by the heat (in calories) produced during burning; Debus shows that a powder composed of I6KNO3 to 8C and 8S would have the least, and one of composition I6KNO3 + 24C+16S the greatest, when completely burnt. The greatest capability with the lowest proportion of carbon and sulphur to nitre would be obtained from the mixture M6KN0 3 +22C|-8S.

Smokeless and even noiseless powders seem to have been sought for during

the whole gunpowder period. In 1756 one was experi- mented with in France, but was abandoned owing to difficulties in manufacture. Modern smokeless powders are certainly less noisy than the black powders, mainly because of the absence of metallic i salts which although they may be gaseous whilst in the gun are

certainly ejected as solids or become solids at the moment of contact with air.

Brown Powders. — About the middle of the 19th century guns and projectiles were made much larger and heavier than previously, and it was soon found that the ordinary black powders of the most dense form burnt much too rapidly, straining or bursting the pieces. Powders were introduced containing about 3% sulphur and 17-19% of a special form of charcoal made from slightly charred straw, or similar material. This" brown charcoal " contains a considerable amount of the hydrogen and oxygen of the original plant substance. The mechanical processes of manufacture of these brown powders is the same as for black. They, however, differ from black by burning very slowly, even under considerable pressure. This comparative slowness is caused by (1) the presence of a small amount of water even when air-dry; (2) the fact that the brown charcoal is practically very slightly altered cellulosic material, which before it can burn completely must undergo a little further resolution or charring at the expense of some heat from the portion of charge first ignited ; and (3) the lower content of sulphur. An increase of a few per cent in the sulphur of black powder accelerates its rate of burning, and it may become almost a blasting powder. A decrease in sulphur has the reverse effect. It is really the sulphur vapour that in the early period of combustion spreads the flame through the charge.

Many other powders have been made or proposed in which nitrates or chlorates of the alkalis or of barium, &c, are the oxygen providers and substances as sugar, starch, and many other organic compounds as the combustible elements. Some of these compositions have found employment for blasting or even as sporting powders, but in most cases their objectionable properties of fouling, smoke and mode of exploding have prevented their use for military purposes. The adoption by the French government of the comparatively smokeless nitrocellulose explosive of Paul Vieille in 1887 practically put an end to the old forms of gunpowders. The first smokeless powder was made in 1865 by Colonel E. Schultze (Ding. Pol. Jour. 174, p. 323; 175, p. 453) by nitrating wood meal and adding

potassium and barium nitrates. It is somewhat similar in composition to the E. C. sporting powder. F. Uchatius, in Austria, proposed a smoke- less powder made from nitrated starch, but it was not adopted owing to its hygroscopic nature and also its tendency to detonate.

Bibliography. — Vanucchio Biringuccio, De la pirotechnia (Venice, 1540) ; Tartaglia, Quesiti e invenzioni diversi (lib. iii.) (Venice, 1546) ; Peter Whitehorne, How to make Saltpetre, Gunpowder, &c. (London, T 573); Nic. Macchiavelli, The Arte of Warre, trans, by White- horne (London, 1588); Hanzelet, Recueil de plusiers machines mili- taires (Paris, 1620); Boillet Langrois, Modelles artifices de feu (1620); Kruger, Chemical Meditations on the Explosion of Gun- powder (in Latin) (1636); Collado, On the Invention of Gunpowder (Spanish) (1641); The True Way to make all Sorts of Gunpowder and Matches (1647); Hawksbee, On Gunpowder (1686); Winter, On Gunpowder (in Latin) ; Robins, New Principles of Gunnery (London, 1742) (new ed. by Hutton, 1805); D'Antoni, Essame della polvere (Turin, 1765) (trans, by Captain Thomson, R.A., London, 1787); Count Rumford, "Experiments on Fired Gunpowder," Phil. Trans. Roy. Soc. (1797) ; Charles Hutton, Mathematical Tracts, vol. iii. (1812); Sir W. Congreve, A Short Account of Improvements in Gunpowder made by (London, 1818); Bunsen and Schiskoff, " On the Chemical Theory of Gunpowder," Pogg. Ann., 1857, vol. cii. ; General Rodman, Experiments on Metal for Cannon, and Qualities of Cannon Powder (Boston, 1861); Napoleon III., iLtudes sur le passe el Vavenir de I'artillerie, vol. iii. (Paris, 1862) ; Von Karolyi, " On the Products of the Combustion of Gun Cotton and Gun- powder," Phil. Mag. (October 1863); Captain F. M. Smith, Hand- book of the Manufacture and Proof of Gunpowder at Waltham Abbey (London, 1870); Noble and Abel, Fired Gunpowder (London, 1875, 1880); Noble, Artillery and Explosives (1906); H. W. L. Hime, Gunpowder and Ammunition, their Origin and Progress (1904); O. Guttmann, The Manufacture of Explosives (1895), Monumenta pulveris pyrii (1906) ; Notes on Gunpowder and Gun Cotton, published by order of the secretary of state for war (London, 1907). (See also Explosives.) (W. R. E. H.)

GUNPOWDER PLOT, the name given to a conspiracy for blowing up King James I. and the parliament on the 5th of November 1605.

To understand clearly the nature and origin of the famous conspiracy, it is necessary to recall the political situation and the attitude of the Roman Catholics towards the government at the accession of James I. The Elizabethan administration had successfully defended its own existence and the Protestant faith against able and powerful antagonists, but this had not been accomplished without enforcing severe measures of re- pression and punishment upon those of the opposite faith. The beginning of a happier era, however, was expected with the opening of the new reign. The right of

James to the crown could be more readily acknowledged by the Romanists than that of Elizabeth: Pope Clement VIII. appeared willing to

meet the king half-way. James himself was by nature favour- able to the Roman Catholics and had treated the Roman Catholic lords in Scotland with great leniency, in spite of their constant plots and rebellions. Writing to Cecil before his accession he maintained, " I am so far from any intention of persecution as I protest to God I reverence their church as our mother church, although clogged with many infirmities and corruptions, besides that I did ever hold persecution as one of the infallible notes of a false church." He declared to North- umberland, the kinsman and master of Thomas Percy, the conspirator, " as for the Catholics, I will neither persecute any that will be quiet and give but an outward obedience to the law, neither will I spare to advance any of them that will be of good service and worthily deserved." It is probable that these small but practical concessions would have satisfied the lay Roman Catholics and the secular priests, but they were very far from contenting the Jesuits, by whom the results of such leniency were especially feared: " What rigour of laws would not compass in so many years," wrote Henry Tichborne, the Jesuit, in 1598, " this liberty and lenity will effectuate in 20 days, to wit the disfurnishing of the seminaries, the disanimating of men to come and others to return, the expulsion of the society and confusion as in Germany, extinction of zeal and favour, disanimation of princes from the hot pursuit of the enterprise. . . . We shall be left as a prey to the wolves that will besides drive our greatest patron [the king of Spain] to stoop to a peace which will be the utter ruin of our edifice, this many years in building." Unfortunately, about this time the Jesuits, who thus thrived on political intrigue, and who were deeply impli- cated in treasonable correspondence with Spain, had obtained a complete ascendancy over the secular priests, who were for obeying the civil government as far as possible and keeping free from politics. The time, therefore, as far as the Roman Catholics themselves were concerned, was not a propitious one for intro- ducing the moderate concessions which alone James had promised: James, too, on his side, found that religious tolera- tion, though clearly sound in principle, was difficult in practice. During the first few months of the reign all went well. In July 1603 the fines for recusancy were remitted. In January 1604 peaceable Roman Catholics could live unmolested and " serve God according to their consciences without any danger." But James's expectations that the pope would prevent dangerous and seditious persons from entering the country were unful- filled and the numbers of the Jesuits and the Roman Catholics greatly increased. Rumours of plots came to hand. Cecil, though like his master naturally in favour of toleration, with his experience gained in the reign of Elizabeth, was alarmed at the policy pursued and its results, and great anxiety was aroused in the government

and nation, which was in the end shared by the king. It was determined finally to return to the earlier policy of repression. On the 22nd of February 1604 a proclamation was issued banishing priests; on the 28th of November 1604, recusancy fines were demanded from 13 wealthy persons, and on the 10th of February 1605 the penal laws were ordered to be executed. The plot, however, could not have been occasioned by these measures, for it had been already conceived in the mind of Robert Catesby. It was aimed at the repeal of the whole Elizabethan legislation against the Roman Catholics and perhaps derived some impulse at first from the leniency lately shown by the administration, afterwards gaining support from the opposite cause, the return of the government to the policy of repression.

It was in May 1603 that Catesby told Percy, in reply to the latter's declaration of his intention to kill the king, that he was '" thinking of a most sure way." Subsequently, about the 1st of November 1603, Catesby sent a message to his cousin Robert Winter at Huddington, near Worcester, to come to London, which the latter refused. On the arrival of a second urgent summons shortly afterwards he obeyed, and was then at a house at Lambeth, probably in January 1604, initiated by Catesby together with John Wright into the plot to blow up the parlia- ment house. Before putting this plan into execution, however,

it was decided to try a " quiet way "; and Winter was sent over to Flanders to obtain the good offices of Juan de Velasco, duke of Frias and constable of Castile, who had arrived there to conduct the negotiations for a peace between England and Spain, in order to obtain the repeal of the penal laws. Winter, having secured nothing but vain promises from the constable, returned to England about the end of April, bringing with him Guy Fawkes, a man devoted to the Roman Catholic cause and recommended for undertaking perilous adventures. Subsequently the three and Thomas Percy, who joined the conspiracy in May, met in a house behind St Clement's and, having taken an oath of secrecy together, heard Mass and received the Sacrament in an adjoining apartment from a priest stated by Fawkes to have been Father Gerard. Later several other persons were included in the plot, viz. Winter's brother Thomas, John Grant, Ambrose Rokewood, Robert Keyes, Sir Everard Digby, Francis Tresham, a cousin of Catesby and Thomas Bates Catesby's servant, all, with the exception of the last, being men of good family and all Roman Catholics. Father Greenway and Father Garnet, the Jesuits, were both cognisant of the plot (see Garnet, Henry). On the 24th of May 1604 a house was hired in Percy's name

adjoining the House of Lords, from the cellar of which they proposed to work a mine. They began on the nth of December 1604, and by about March had got half-way through the wall. They then discovered that a vault immediately under the House of Lords was available. This was at once hired by Percy, and 36 barrels of gunpowder, amounting to about 1 ton and 12 cwt., were brought in and concealed under coal and faggots. The preparations being completed in May the conspirators separated. Fawkes was despatched to Flanders, where he imparted the plot to Hugh Owen, a zealous Romanist intriguer. Sir Edmund Baynham was sent on a mission to Rome to be at hand when the news came to gain over the pope to the cause of the successful conspirators. An understanding was arrived at with several officers levied for the service of the archduke, that they should return at once to England when occasion arose of defending the Roman Catholic cause. A great hunting match was organized at Danchurch in Warwickshire by Digby, to which large numbers of the Roman Catholic gentry were invited, who were to join the plot after the successful accomplishment of the explosion of the 5th of November, the day fixed for the opening of parliament, and get possession of the princess Elizabeth, then residing in the neighbourhood; while Percy was to seize the infant prince Charles and bring him on horseback to their meeting-place. Guy Fawkes himself was to take ship immediately for Flanders, spread the news on the continent and get supporters. The conspirators imagined that a terrorized and helpless government would readily agree to all their demands. Hitherto the secret had been well kept and the preparations had been completed with extra- ordinary success and without a single drawback; but a very serious difficulty now confronted the conspirators as the time for action arrived, and disturbed their consciences. The feelings of ordinary humanity shrunk from the destruction of so many persons guiltless of any offence. But in addition, among the peers to be assassinated were included many Roman Catholics and some lords nearly connected in kinship or friendship with the plotters themselves. Several appeals, however, made to Catesby to allow warning to be given to certain individuals were firmly rejected.

On the 26th of October Lord Monteagle, a brother-in-law of Francis Tresham, who had formerly been closely connected with some of the other conspirators and had engaged in Romanist plots against the government, but who had given his support to the new king, unexpectedly ordered supper to be prepared at his house at Haxton, from which he had been absent for more than a- year. While at supper about 6 o'clock an anonymous letter was brought by an unknown messenger which, having glanced at, he handed to Ward, a gentleman of his service and an intimate friend of Winter, the conspirator, to be read aloud. The cele- brated letter ran as follows: —

" My lord, out of the love I bear to some of your friends, I have a care for your preservation. Therefore I would advise you, as you

tender your life, to devise some excuse to shift of your attendance of this Parliament, for God and man hath concurred to punish the wickedness of this time. And think not slightly of this advertise- ment, but retire yourself into your country, where you may expect the event in safety, for though there be no appearance of any stir, yet I say they shall receive a terrible blow the Parliament, and yet they shall not see who hurts them. This counsel is not to be contemned, because it may do you good and can do you no harm, for the danger is past as soon as you have burnt the letter: and i hope God will give you the grace to make good use of it, to whose holy protection I commend you."

The authorship of the letter has never been disclosed or proved, but all evidence seems to point to Tresham, and to the proba- bility that he had some days before warned Monteagle and agreed with him as to the best means of making known the plot and preventing its execution, and at the same time of giving the conspirators time to escape (see Tresham, Francis).

Monteagle at once started for Whitehall, found Salisbury and other ministers about to sit down to supper, and showed the letter, whereupon it was decided to search the cellar under the House of Lords before the meeting of parliament, but not too soon, so that the plot might be ripe and be fully disclosed. Meanwhile Ward, on the 27th of October, as had evidently been intended, informed Winter that the plot was known, and on the 28th Winter informed Catesby and begged him to give up the whole project. Catesby, however, after some hesitation, finding from Fawkes that nothing had been touched in the cellar, and prevailed upon by Percy, determined to stand firm, hoping that the government had put no credence in Monteagle's letter, and Fawkes returned to the cellar to keep guard as before. On the 4th the king, having been shown the letter, ordered the earl of Suffolk, as lord chamberlain, to examine the buildings. He was accompanied by Monteagle. On arriving at the cellar, the door was opened to him by Fawkes. Seeing the enormous piles of faggots he asked the name of their owner, to which Fawkes replied that they belonged to Percy. His name immediately aroused suspicions, and accordingly it was ordered that a further search should be made by Thomas Knyvett, a Westminster magistrate who, coming with his men at night, discovered the gunpowder and arrested Fawkes on the threshold.

The opinion that the whole plot was the work of Salisbury, that he acted as an agent provocateur and lured on his victims to destruction, repeated by some contemporary and later writers and recently formulated and urged with great ability, has no solid foundation. Nor is it even probable that he

was aware of its existence till he received Monteagle's letter. Even after its reception complete belief was not placed in the warning. A search was made only to make sure that nothing was wrong and guided only by Monteagle's letter, while no attempt was made to seize the conspirators. The steps taken by Salisbury after the discovery of the gunpowder do not show the possession of any information of the plot or of the persons who were its chief agents outside Fawkes's first statement, and his knowledge is seen to develop according to the successive disclosures and confessions of the latter. Thus on the 7th of November he had no knowledge of the mine, and it is only after Fawkes's examination by torture on the oth, when the names of the conspirators were drawn from him, that the government was able to classify them according to their guilt and extent of their participation. The inquiry was not conducted by Salisbury alone, but by several commissioners, some of whom were Roman Catholics, and many rivals and secret enemies. To conceal his intrigue from all these would have been impossible, and that he should have put himself in their power to such an extent is highly improbable. Again, the plan agreed upon for disclosing the plot was especially designed to allow the conspirators to escape, and therefore scarcely a method which would have been arranged with Salisbury. Not one of the conspirators, even when all hope of saving life was gone, made any accusation against Salisbury or the government and all died expressing contrition for their crime. Lastly Salisbury had no conceivable motive in concocting a plot of this description. His political power and position in the new reign had been already secured and by very different methods. He was now at the height of his influence, having been created Viscount Cranborne

in August 1604 and earl of Salisbury in May 1605; and James had already, more than 16 months before the discovery of the plot, consented to return to the repressive measures against the Romanists. The success with which the conspirators concealed their plot from Salisbury's spies is indeed astonishing, but is probably explained by its very audacity and by the absence of incriminating correspondence, the medium through which the minister chiefly obtained his knowledge of the plans of his enemies.

On the arrest of Fawkes the other conspirators, except Tresham, fled in parties by different ways, rejoining each other in Warwick- shire, as had been agreed in case the plot had been successful. Catesby, who with some others had covered the distance of So m. between London and his mother's house at Ashby St Legers in eight hours, informed his friends in Warwickshire, who had been awaiting the issue of the plot, of its failure,

but suc- ceeded in persuading Sir Everard Digby, by an unscrupulous falsehood, to further implicate himself in his hopeless cause by assuring him that both James and Salisbury were dead; and, according to Father Garnet, this was not the first time that Catesby had been guilty of lies in order to draw men into the plot. He pushed on the same day with his companions in the direction of Wales, where, it was hoped, they would be joined by bands of insurgents. They arrived at Huddington at 2 in the afternoon. On the morning of the 7th the band, numbering about 36 persons, confessed and heard Mass, and then rode away to Holbeche, 2 m. from Stourbridge, in Staffordshire, the house of Stephen Littleton, who had been present at the hunting at Danchurch (see Digby, Everard), where they arrived at 10 o'clock at night, having on their way broken into Lord Windsor's house at Hewell Grange and taken all the armour they found there. Their case was now desperate. None had joined them : " Not one came to take our part," said Sir Everard Digby, " though we had expected so many." They were being followed by the sheriff and all the forces of the county. All spurned them from their doors when they applied for succour. One by one their followers fled from the house in which the last scene was to be played out. They now began to feel themselves abandoned not only by man but by God; for an explosion of some of their gunpowder, on the morning of the 8th, by which Catesby and some others were scorched, struck terror into their hearts as a judgment from heaven. The assurance of innocence and of a just cause which till now had alone supported them was taken away. The great- ness of their crime, its true nature, now struck home to them, and the few moments which remained to them of life were spent in prayer and in repentance. The supreme hour had now arrived. About 1 1 o'clock the sheriff and his men came up and immediately began firing into the house. Catesby, Percy and the two Wrights were killed, Winter and Rokewood wounded and taken prisoners with the men who still adhered to them. In all eight of the con- spirators, including the two Winters, Digby, Fawkes, Rokewood, Keyes and Bates, were executed, while Tresham died in the Tower. Of the priests involved, Garnet was tried and executed, while Greenway and Gerard succeeded in escaping.

So ended the strange and famous Gunpowder Plot. However atrocious its conception and its aims, it is impossible not to feel, together with horror for the deed, some pity and admiration for the guilty persons who took part in it. " Theirs was a crime which it would never have entered into the heart of any man to commit who was not raised above the lowness of the ordinary criminal." They sinned not against the light but in the dark. They erred from ignorance, from a perverted moral sense rather than from any mean or selfish motive, and exhibited extraordinary courage and self-sacrifice in the pursuit of what seemed to them the cause of God and of their country. Their punishment was terrible. Not only had they risked and lost all in the

attempt and drawn upon themselves the frightful vengeance of the state, but they saw themselves the means of injuring irretrievably the cause for which they felt such devotion. Nothing could have been more disastrous to the cause of the Roman Catholics than their crime. The laws against them were immediately increased in severity, and the gradual advance towards religious toleration

was put back for centuries. In addition a new, increased and long-enduring hostility was aroused in the country against the adherents of the old faith, not unnatural in the circumstances, but unjust and undiscriminating, because while some of the Jesuits were no doubt implicated, the secular priests and Roman Catholic laity as a whole had taken no part in the conspiracy.

Bibliography. — The recent controversy concerning the nature and origin of the plot can be followed in What was the Gunpowder Plot? by John Gerard, S.J. (1897); What Gunpowder Plot was, by S. R. Gardiner (a rejoinder) (1897); The Gunpowder Plot . . . in reply to Professor Gardiner, by John Gerard, S.J. (1897); Thomas Winter's Confession and the Gunpowder Plot, by John Gerard, S.J. (with facsimiles of his writing) (1898); Eng. Hist. Rev. iii. 510 and xii. 791; Edinburgh Review, clxxxv. 183; Athenaeum 1897, ii. 149, 785, 855; 1898, i. 23, ii. 352, 420; Academy, vol. 52 p. 84; The Nation, vol. 65 p. 400. A considerable portion of the controversy centres round the question of the authenticity of Thomas Winter's confession, the MS. of which is at Hatfield, sup- ported by Professor Gardiner, but denied by Father Gerard princi- pally on account of the document having been signed " Winter " instead of " Wintour," the latter apparently being the conspirator's usual style of signature. The document was deposited by the 3rd Marquess of Salisbury for inspection at the Record Office, and was pronounced by two experts, one from the British Museum and another from the Record Office, to be undoubtedly genuine. The cause of the variation in the signature still remains unexplained, but ceases to have therefore any great historical importance. The bibliography of the contemporary controversy is given in the article on Henry Garnet in the Dictionary of National Biography and in The Gunpowder Plot by David Jardine (1857), the latter work still remaining the principal authority on the subject; add to these Gardiner's Hist, of England, i., where an excellent account is given; History of the Jesuits in England, by Father Ethelred Taunton (1901); Father Gerard's Narrative in Condition of the Catholics under James I. (1872), and Father Greenway 's Narrative in Troubles of our Catholic Forefathers, 1st series (1872), interesting as con- temporary accounts, but not to be taken as complete or infallible authorities, of the same nature being Historia Provinciae Anglicanae Societatis Jesu, by Henry More, S.J. (1660), pp. 309 et seq.; also History of Great Britain, by John Speed (161 1), pp. 839 et seq.;

Archaeologia, xii. 200, xxviii. 422, xxix. 80; Harleian Miscellany (1809), iii. 1 19-135, or Somers Tracts (1809), ii. 97-117; M. A. Tierney's ed. of Dodd's Church History, vol. iv. (1841); Treason and Plot, by Martin Hume (1901); Notes and Queries, 7 ser. vi., 8 ser. iv. 408, 497, v. 55, xii. 505, 9 ser. xi. 115; Add. MSS. Brit. Mus. 6178; State Trials, ii.; Calendar of State Pap. Dom. (1603-1610), and the official account, A True and Perfect Relation of the Whole Proceedings against the late most Barbarous Traitors (1606), a neither true nor complete narrative however, now superseded as an authority, reprinted as The Gunpowder Treason . . . with ad- ditions in 1679 by Thomas Barlow, bishop of Lincoln. A large number of letters and papers in the State Paper Office relating to the plot were collected in one volume in 1819, called the Gunpowder Plot Book; these are noted in their proper place in the printed calendars of State Papers, Domestic Series; see also articles on Fawkes, Guy; Tresham, Francis; Monteagle, William Parker, 4TH Baron; Percy, Thomas; Catesby, Robert; Garnet, Henry; Digby, Sir Everard. (P. C. Y.)

GUN-ROOM, a ship cabin occupied by the officers below the rank of lieutenant, but who are not warrant officers of the class of the boatswain, gunner or carpenter. In the wooden sailing ships it was on the lower deck, and was originally the quarters of the gunner.

GUNTER, EDMUND (1581-1626), English mathematician, of Welsh extraction, was born in Hertfordshire in 1581. He was educated at Westminster school, and in 1599 was elected a student of Christ Church, Oxford. He took orders, became a preacher in 1614, and in 1615 proceeded to the degree of bachelor in divinity. Mathematics, however, which had been his favourite study in youth, continued to engross his attention, and on the 6th of March 1619 he was appointed professor of astronomy in Gresham College, London. This post he held till his death on the 10th of December 1626. With Gunter's name are associated several useful inventions, descriptions of which are given in his treatises on the Sector, Cross-staff, Bow, Quadrant and other Instruments. He contrived his sector about the year 1606, and wrote a description of it in Latin, but it was more than sixteen years afterwards before he allowed the book to appear in English. In 1620 he published his Canon triangulorum (see Logarithms). There is reason to believe that Gunter was the first to discover (in 1622 or 1625) that the magnetic needle does not retain the same declination in the same place at all times. By desire of

James I. he published in 1624 The Description and Use of His Majestie's

Dials in Whitehall Garden, the only one of his works which has not been reprinted. He introduced the words cosine and cotangent, and he suggested to Henry Briggs, his friend and colleague, the use of the arithmetical complement (see Brigg's A rithmetica Logarithmica, cap. xv.) • His practical inventions are briefly noticed below:

Gunter's Chain, the chain in common use for surveying, is 22 yds. long and is divided into 100 links. Its usefulness arises from its decimal or centesimal division, and the fact that 10 square chains make an acre.

Gunter's Line, a logarithmic line, usually laid down upon scales, sectors, &c. It is also called the line of lines and the line of numbers, being only the logarithms graduated upon a ruler, which therefore serves to solve problems instrumentally in the same manner as logarithms do arithmetically.

Gunter's Quadrant, an instrument made of wood, brass or other substance, containing a kind of stereographic projection of the sphere on the plane of the equinoctial, the eye being supposed to be placed in one of the poles, so that the tropic, ecliptic, and horizon form the arcs of circles, but the hour circles are other curves, drawn by means of several altitudes of the sun for some particular latitude every year. This instrument is used to find the hour of the day, the sun's azimuth, &c, and other common problems of the sphere or globe, and also to take the altitude of an object in degrees.

Gunter's Scale (generally called by seamen the Gunter) is a large plane scale, usually 2 ft. long by about i| in. broad, and engraved with various lines of numbers. On one side are placed the natural lines (as the line of chords, the line of sines, tangents, rhumbs, &c), and on the other side the corresponding artificial or logarithmic ones. By means of this instrument questions in navigation, trigono- metry, &c, are solved with the aid of a pair of compasses.

GUNTHER, JOHANN CHRISTIAN (1695-1723), German poet, was born at Striegau.in Lower Silesia on the 8th of April 1695. After attending the gymnasium at Schweidnitz, he was sent in 1715 by his father, a country doctor, to study medicine at Wittenberg; but he was idle and dissipated, had no taste for the profession chosen for him, and came to a complete rupture with his family. In 171 7 he went to Leipzig, where he was befriended by J. B. Mencke (1674-1732), who recognized his genius; and there he published a poem on the peace of Passarowitz (concluded between the German emperor and the Porte in 1718) which acquired him reputation. A recommendation from Mencke to Frederick Augustus II. of Saxony, king of Poland, proved worse than useless, as Giinther appeared at the audience drunk. From that time he led an unsettled and dissipated life, sinking ever deeper into the slough of misery, until he died at Jena on the

15th of March 1723, when only in his 28th year. Goethe pro- nounces Günther to have been a poet in the fullest sense of the term. His lyric poems as a whole give evidence of deep and lively sensibility, fine imagination, clever wit, and a true ear for melody and rhythm; but an air of cynicism is more or less present in most of them, and dull or vulgar witticisms are not infrequently found side by side with the purest inspirations of his genius.

Günther's collected poems were published in'f our volumes (Breslau, 1 723-1 735) . They are also included in vol. vi. of Tittmann's Deutsche Dichter des ijten Jahrh. (Leipzig, 1874), and vol. xxxviii. of Kürschner's Deutsche Nationalliteratur (1883). A pretended auto- biography of Günther appeared at Schweidnitz in 1732, and a life of him by Siebrand at Leipzig in 1738. See Hoffmann von Fallers- leben, J. Ch. Günther (Breslau, 1833) ; O. Roquette, Leben und Dichten J. Ch. Günthers (Stuttgart, i860); M. Kalbeck, Neue Beitrage zur Biographie des Dichters C. Günther (Breslau, 1879).

GUNTHER OF SCHWARZBURG (1304-1349) , German king, was a descendant of the counts of Schwarzburg and the younger son of Henry VII., count of Blankenburg. He distinguished himself as a soldier, and rendered good service to the emperor Louis IV., on whose death in 1347 he was offered the German throne, after it had been refused by Edward III., king of England. He was" elected German king at Frankfort on the 30th of January 1349 by four of the electors, who were partisans of the house of Wittels- bach and opponents of Charles of Luxemburg, afterwards the emperor Charles IV. Charles, however, won over many of Günther's adherents, defeated him at Eltville, and Günther, who was now seriously ill, renounced his claims for the sum of 20,000 marks of silver. He died three weeks afterwards at Frankfort,

and was buried in the cathedral of that city, where a statue was erected to his memory in 1352.

See Graf L. fjtterodt zu Scharffenberg, Günther, Graf von Schwarz- burg, erwdhlter deutscher Kbnig (Leipzig, 1862); and K. Janson, Das Kbnigtum Günthers von Schwarzburg (Leipzig, 1880).

GUNTRAM, or Gontean (561-592), king of Burgundy, was one of the sons of Clotaire I. On the death of his father (561) he and his three brothers divided the Frankish realm between them, Guntram receiving as his share the valleys of the Saone and Rhone, together with Berry and the town of Orleans, which he made his capital. On the death of Charibert (567), he further obtained the civitates of Saintes, Angoul6me and Perigueux. During the civil war which broke out between the kings of Neustriaand Austrasia, his policy was to try to maintain a state of equilibrium. After the

assassination of Sigebert (575), he took the youthful Childebert II. under his protection, and, thanks to his assistance against the intrigues of the great lords, the latter was able to maintain his position in Austrasia. After the death of Chilperic (584) he protected the young Clotaire II. in the same way, and prevented Childebert from seizing his dominions. His course was rendered easier by the fact that his own sons had died; consequently, having an inheritance at his disposal, he was able to offer it to whichever of his nephews he wished. The danger to the Frankish realm caused by the expedition of Gundobald (585), and the anxiety which was caused him by the revolts of the great lords in Austrasia finally decided him in favour of Childebert. He adopted him as his son, and recognized him as his heir at the treaty of Andelot (587); he also helped him to crush the great lords, especially Ursion and Berthefried, who were conquered in la Woevre. From this time on he ceased to play a prominent part in the affairs of Austrasia. He died in 592, and Childebert received his inheritance without opposition. Gregory of Tours is very indulgent to Guntram, who showed himself on occasions generous towards the church; he almost always calls him " good king Guntram," and in his writings are to be found such phrases as "good king Guntram took as his servant a concu- bine Veneranda " (iv. 25); but Guntram was really no better than the other kings of his age; he was cruel and licentious, putting his cubicularius Condo to death, for instance, because he was suspected of having killed a buffalo in the Vosges. He was moreover a coward, and went in such constant terror of assassina- tion that he always surrounded himself with a regular body- guard.

See Krusch, " Zur Chronologie der merowingischen Konige," in the Forschungen zur deutschen Geschichte, xxii. 451-490; Ulysse Chevalier, Bio-bibliographie (2nd ed.), s.v. " Guntram." (C. Pf.)

GUNTUR, a town and district of British India, in the Madras presidency. The town (pop. in 1901 , 30,833) has a station on the Bellary-Bezwada branch of the Southern Mahratta railway. It is situated east of the Kondavid hills, and is very healthy. It appears to have been founded in the 18th century by the French. At the time of the cession of the Circars to the English in 1765, Guntur was specially exempted during the life of Basalat Jang, whose personal jagir it was. In 1788 it came into British possession, the cession being finally confirmed in 1823. It has an important trade in cotton, with presses and ginning factories. There is a second-grade college supported by the American Lutheran Mission. Until 1859, Guntur was the headquarters of a district of the same name, and in 1904 a new District or Guntur was constituted, covering territory which till then had been divided between Kistna and Nellore. Area, 5733 sq. m. The population on this area in 1901 was 1,490,635. The district is bounded on the E. and N. by the river Kistna; in the W. a considerable part of the boundary is formed by the Gundlakamma river. The greater part consists of a fertile plain irrigated by

canals from the Kistna, and producing cotton, rice and other crops.

GUPTA, an empire and dynasty of northern India, which lasted from about a.d. 320 to 480. The dynasty was founded by Chandragupta I., who must not be confounded with his famous predecessor Chandragupta Maurya. He gave his name to the Gupta era, which continued in use for several centuries, dating

from the 26th of February, a.d. 320. Chandragupta was suc- ceeded by Samudragupta (c. a.d. 326-375), one of the greatest of Indian kings, who conquered nearly the whole of India, and whose alliances extended from the Oxus to Ceylon; but his name was at one time entirely lost to history, and has only been recovered of recent years from coins and inscriptions. His empire rivalled that of Asoka, extending from the Hugli on the east to the Jumna and Chambal on the west, and from the foot of the Himalayas on the north to the Nerbudda on the south. His son Chandragupta II. (c. a.d. 375-413) was also known as Vikra- Maditya (q.v.), and seems to have been the original of the mythical Hindu king of that name. About 388 he conquered the Saka satrap of Surashtra (Kathiawar) and penetrated to the Arabian Sea. His administration is described in the work of Fa-hien, the earliest Chinese pilgrim, who visited India in a.d. 405-411. Pataliputra was the capital of the dynasty, but Ajodhya seems to have been sometimes used by both Samudragupta and Chandra- gupta II. as the headquarters of government. The Gupta dynasty appears to have fostered a revival of Brahmanism at the expense of Buddhism, and to have given an impulse to art and literature. The golden age of the empire lasted from a.d. 330 to 455, beginning to decline after the latter date. WhenSkandagupta came to the throne in 455, India was threatened with an irruption of the White Huns, on whom he inflicted a severe defeat, thus saving his kingdom for a time; but about 470 the White Huns (see Ephthalites) returned to the attack, and the empire was gradually destroyed by their repeated inroads. When Skanda- gupta died about 480, the Gupta empire came to an end, but the dynasty continued to rule in the eastern provinces for several generations. The last known prince of the imperial line of Guptas was Kamaragupta II. (c. 535), after whom it passed " by an obscure transition " into a dynasty of eleven Gupta princes, known as " the later Guptas of Magadha," who seem for the most part to have been merely local rulers of Magadha. One of them, however, Adityasena, after the death of the paramount sovereign in 648, asserted his independence. The last known Gupta king was Jivitagupta II., who reigned early in the 8th century. About the middle of the century Magadha passed under the sway of the Pal kings

of Bengal.

See J. F. Fleet, Gupta Inscriptions (1888); and Vincent A. Smith, The Early History 0} India (2nd ed., Oxford, 1908), pp. 264-295.

GURA, EUGEN (1842-1906), German singer, was born near Saatz in Bohemia, and educated at first for the career of a painter at Vienna and Munich; but later, developing a fine baritone voice, he took up singing and studied it at the Munich Conserva- torium. In 1865 he made his debut at the Munich opera, and in the following years he gained the highest reputation in Germany, being engaged principally at Leipzig till 1876 and then at Ham- burg till 1883. He sang in 1876 in the Ring at Bayreuth, and was famous for his Wagnerian roles; and his Hans Sachs in Meister- singer, as performed in London in 1882, was magnificent. In later years he showed the perfection of art in his singing of German Lieder. He died in Bavaria on the 26th of August 1906.

GURDASPUR, a town and district of British India, in the Lahore division of the Punjab. The town had a population in 1901 of 5764. It has a fort (now containing a Brahman monastery) which was famous for the siege it sustained in 171 2 from the Moguls. The Sikh leader, Banda, was only reduced by starvation, when he and his men were tortured to death after capitulating.

The District comprises an area of 1889 sq. m. It is bounded on the N. by the native states of Kashmir and Chamba, on the E. by Kangra district and the river Beas, on the S.W. by Amritsar district, and on the W. by Sialkot, and occupies the submontane portion of the Bari Doab, or tract between the Beas and the Ravi. An intrusive spur of the British dominions runs north- ward into the lower Himalayan ranges, to include the mountain sanatorium of Dalhousie, 7687 ft. above sea-level. This station, which has a large fluctuating population during the warmer months, crowns the most westerly shoulder of a magnificent snowy range, the Dhaoladhar, between which and the plain two minor ranges intervene. Below the hills stretches a picturesque

and undulating plateau covered with abundant timber, made green by a copious rainfall, and watered by the streams of the Bari Doab, which, diverted by dams and embankments, now empty their waters into the Beas directly, in order that their channels may not interfere with the Bari Doab canal. The district contains several large jhils or swampy lakes, and is famous for its snipe-shooting. It is historically important in connexion with the rise of the Sikh confederacy. The whole of the Punjab was then distributed among the Sikh chiefs who triumphed over the imperial governors. In the course of a few years, however, the maharaja Ranjit

Singh acquired all the territory which those chiefs had held. Pathankot and the neighbouring villages in the plain, together with the whole hill portion of the district, formed part of the area ceded by the Sikhs to the British after the first Sikh war in 1846. In 1862, after receiving one or two additions, the district was brought into its present shape. In 1901 the population was 940,334, showing a slight decrease, compared with an increase of 15% in the previous decade. A branch of the North-Western railway runs through the district. The largest town and chief commercial centre is Batala. There are important woollen mills at Dhariwal, and besides their products the district exports cotton, sugar, grain and oil-seeds.

GURGAON, a town and district of British India, in the Delhi division of the Punjab. The town (pop. in 1901, 4765) is the headquarters of the district, but is otherwise unimportant. The district has an area of 1984 sq. m. It is bounded on the N. by Rohtak, on the W. and S.W. by portions of the Alwar, Nabha and Jind native states, on the S. by the Muttra district of the United Provinces, on the E. by the river Jumna and on the N.E. by Delhi. It comprises the southernmost corner of the Punjab province, stretching away from the level plain towards the hills of Rajputana. Two low rocky ranges enter its borders from the south and run northward in a bare and unshaded mass toward the plain country. East of the western ridge the valley is wide and open, extending to the banks of the Jumna. To the west lies the subdivision of Rewari, consisting of a sandy plain dotted with isolated hills. Numerous torrents carry off the drainage from the upland ranges, and the most important among them empty themselves at last into the Najaigarh_/7wZ. This swampy lake lies to the east of the civil station of Gurgaon, and stretches long arms into the neighbouring districts of Delhi and Rohtak. Salt is manufactured in wells at several villages. The mineral products are iron ore, copper ore, plumbago and ochre.

In 1803 Gurgaon district passed into the hands of the British after Lord Lake's conquests. On the outbreak of the Mutiny in May 1857, the nawab of Farukhnagar, the principal feudatory of the district, rose in rebellion. The Meos and many Rajput families followed his example. A faithful native officer preserved the public buildings and records at Rewari from destruction; but with this exception, British authority became extinguished for a time throughout Gurgaon. After the fall of the rebel capital, a force marched into the district and either captured or dispersed the leaders of rebellion. The territory of the nawab was confiscated on account of his participation in the Mutiny. Civil administration was resumed under orders from the Punjab government, to which province the district was formally annexed on the final pacification of the country. The population in 1901 was 746,208, showing an increase of 11% in the decade. The largest town and chief trade centre is Rewari. The district is now traversed by several lines of railway, and irrigation is provided by the Agra canal. The chief

trade is in cereals, but hardware is also exported.

GURKHA (pronounced goorka; from Sans, gau, a cow, and 'raks, to protect), the ruling Hindu race in Nepal (q.v.). The Gurkhas, or Gurkhalis, claim descent from the rajas of Chitor in Rajputana. When driven out of their own country by the Mahommedan invasion, they took refuge in the hilly districts about Kumaon, whence they gradually invaded the country to the eastward as far as Gurkha, Noakote and ultimately to the valley of Nepal and even Sikkim. They were stopped by the English in an attempt to push south, and the treaty of Segauii,

which ended the Gurkha War of 1814, definitely limited their territorial growth. The Gurkhas of the present day remain Hindus by religion, but show in their appearance a strong admixture of Mongolian blood. They make splendid infantry soldiers, and by agreement with their government about 20,000 have been recruited for the Gurkha regiments of the Indian army. As a rule they are bold, enduring, faithful, frank, independent and self-reliant. They despise other Orientals, but admire and fraternize with Europeans, whose tastes in sport and war they share. They strongly resemble the Japanese, but are of a sturdier build. Their national weapon is the kukri, a heavy curved knife, which they use for every possible purpose.

See Capt. Eden Vansittart, Notes on the Gurkhas (1898); and P. D. Bonarjee, The Fighting Races of India (1899).

GURNALL, WILLIAM (161 7-1679), English author, was born in 161 7 at King's Lynn, Norfolk. He was educated at the free grammar school of his native town, and in 1631 was nominated to the Lynn scholarship in Emmanuel College, Cambridge, where he graduated B.A. in 1635 and M.A. in 1639. He was made rector of Lavenham in Suffolk in 1644; an d before he received that appointment he seems to have officiated, perhaps as curate, at Sudbury. At the Restoration he signed the declaration required by the Act of Uniformity, and on this account he was the subject of a libellous attack, published in 1665, entitled Covenant- Renouncers Desperate Apostates. He died on the 12th of October 1679. Gurnall is known by his Christian in Complete Armour, published in three volumes, dated 1655, 1658 and 1662. It consists of a series of sermons on the latter portion of the 6th chapter of Ephesians, and is described as a " magazine from whence the Christian is furnished with spiritual arms for the battle, helped on with his armour, and taught the use of his weapon; together with the happy issue of the whole war." The work is more practical than

theological; and its quaint fancy, graphic and pointed style, and its fervent religious tone render it still popular with some readers.

See also An Inquiry into the Life 0} the Rev. W. Gurnall, by H. M'Keon (1830), and a biographical introduction by Bishop Ryle to the Christian in Complete Armour (1865).

GURNARD (Trigla), a genus of fishes forming a group of the family of " mailed cheeks " (Triglidae) , and easily recognized by three detached finger-like appendages in front of the pectoral fins, and by their large, angular, bony head, the sides of which are protected by strong, hard and rough bones. The pectoral appendages are provided with strong nerves, and serve not only as organs of locomotion when the fish moves on the bottom, but also as organs of touch, by which it detects small animals on which it feeds. Gurnards are coast-fishes, generally distributed over the tropical and temperate areas; of the forty species known six occur on the coast of Great Britain, viz. the red

Trigla pleuracanthica.

gurnard (T. pint), the streaked gurnard (T.lineatq), the sapphirine gurnard (T. hirundo), the grey gurnard (T. gurnardus), the piper (T. lyra) and the long finned gurnard (T. obscura or T. lucerna). Although never found very far from the coast, gurnards descend to depths of several hundred fathoms; and as they are bottom fish they are caught chiefly by means of the trawl. Not rarely, however, they may be seen floating on the surface of the water, with their broad, finely coloured pectoral fins spread out like fans. In very young fishes, which abound in certain localities on the coast in the months of August and September, the pectorals

are comparatively much longer than in the adult, extending to the end of the body; they are beautifully coloured and kept expanded, the little fishes looking like butterflies. When caught and taken out of the water, gurnards emit a grunting noise, which is produced by the vibrations of a diaphragm situated transversely across the cavity of the bladder and perforated in the centre. This grunting noise gave rise to the name " gur- nard," which is probably an adaptation or variation of the Fr. grognard, grumbler, cf. the Fr. grondin, gurnard, from gronder, and Ger. Knurrfisch. Their flesh is very white, firm and whole- some.

GURNEY, the name of a philanthropic English family of bankers and merchants, direct descendants of Hugh de Gournay, lord of Gournay, one of the Norman noblemen who accompanied William the Conqueror to England. Large grants of land were made to Hugh de Gournay in Norfolk and Suffolk, and Norwich has since that time been the headquarters of the

family, the majority of whom were Quakers. Here in 1770 the brothers John and Henry Gurney founded a banking-house, the business passing in 1779 to Henry's son, Bartlett Gurney. On the death of Bartlett Gurney in 1802 the bank became the property of his three cousins, of whom John Gurney (1750-1809) was the most remarkable. One of his daughters was Elizabeth Fry; another married Sir Thomas Fowell Buxton. Of his sons one was Joseph John Gurney (1788-1847), a well-known philanthropist of the day; another, Samuel Gurney (1786-1856) assumed on his father's death the control of the Norwich bank. Samuel Gurney also took over about the same time the control of the London bill- broking business of Richardson, Overend & Company, in which he was already a partner. This business had been founded in 1 800 by Thomas Richardson, clerk to a London bill-discounter, and John Overend, chief clerk in the bank of Smith, Payne & Company at Nottingham, the Gurneys supplying the capital. At that time bill-discounting was carried on in a spasmodic fashion by the ordinary merchant in addition to his regular business, but Richardson considered that there was room for a London house which should devote itself entirely to the trade in bills. This, at that time, novel idea proved an instant success. The title of the firm was subsequently changed to Overend, Gurney & Company, and for forty years it was the greatest discounting-house in the world. During the financial crisis of 1825 Overend, Gurney & Company were able to make short loans to many other bankers. The house indeed became known as " the bankers' banker," and secured many of the previous clients of the Bank of England. Samuel Gurney died in 1856. He was a man of very charitable disposition, and during the latter years of his life charitable and philanthropic undertakings almost monopolized his attention. In 1865 the business of Overend, Gurney & Company, which had come under less competent control, was converted into a joint stock company, but in 1866 the firm suspended payment with liabilities amounting to eleven millions sterling.

GURNEY, EDMUND (1847-1888), English psychologist, was born at Hersham, near Walton-on-Thames, on the 23rd of March 1847. He was educated at Blackheath and at Trinity College, Cambridge, where he took a high place in the classical tripos and obtained a fellowship. His work for the schools was done, says his friend F. W. H. Myers, " in the intervals of his practice on the piano." Dissatisfied with his own executive skill as a musician, he wrote The Power of Sound (1880), an essay on the philosophy of music. He then studied medicine with no intention of practising, devoting himself to physics, chemistry and physiology. In 1 880 he passed the second M.B. Cambridge examination in the science of the healing profession. These studies, and his great logical powers and patience in the investigation of evidence, he devoted to that outlying field of psychology which is called " Psychical Research." He asked whether, as

universal tradition declares, there is an unexplored region of human faculty trans- cending the normal limitations of sensible knowledge. That there is such a region it was part of the system of Hegel to declare, and the subject had been metaphysically treated by Hartmann, Schopenhauer, Du Prel, Hamilton and others, as the philosophy

of the Unconscious or Subconscious. But Gurney's purpose was to approach the subject by observation and experiment, especially in the hypnotic field, whereas vague and ill-attested anecdotes had hitherto been the staple of the evidence of metaphysicians. The tendency of his mind was to investigate whatever facts may give a colour of truth to the ancient belief in the persistence of the conscious human personality after the death of the body. Like Joseph Glanvill's, the natural bent of Gurney's mind was sceptical. Both thought the current and traditional reports of supernormal occurrences suggestive and worth investigating by the ordinary methods of scientific observation, and inquisition into evidence at first hand. But the method of Gurney was, of course, much more strict than that of the author of Sadducismus Triumphatus, and it included hypnotic and other experiments unknown to Glanvill. Gurney began at what he later saw was the wrong end by studying, with Myers, the " seances " of professed spiritualistic " mediums " (1874-1878). Little but detection of imposture came of this, but an impression was left that the subject ought not to be abandoned. In 1882 the Society for Psychical Research was founded. (See Psychical Research.) Paid mediums were discarded, at least for the time, and experiments were made in " thought-transference " and hypnotism. Personal evidence as to uninduced hallucinations was also collected. The first results are embodied in the volumes of Phantasms of the Living, a vast collection (Podmore, Myers and Gurney), and in Gurney's remarkable essay, Hallucinations. The chief consequence was to furnish evidence for the process called "telepathy," involving the provisional hypothesis that one human mind can affect another through no recognized channel of sense. The fact was supposed to be established by the experiments chronicled in the Proceedings of the Society for Psychical Research, and it was argued that similar experiences occurred spontaneously, as, for example, in the many recorded instances of " deathbed wraiths " among civilized and savage races. (Tylor, Primitive Culture, i. chapter xi., especially pp. 449-450, 1873. Lang, Making of Religion, pp. 120-124, 1898.) The dying man is supposed to convey the hallucination of his presence as one living person experimentally conveys his thought to another, by " thought – transference." Gurney's hypnotic experiments, marked by great exactness, patience and ingenuity, were under- taken in 1885-1888. Their tendency

was, in Myers's words, ' ' to prove — so far as any one operator's experience in this protean subject can be held to prove anything — that there is sometimes, in the induction of hypnotic phenomena, some agency at work which is neither ordinary nervous stimulation (monotonous or sudden) nor suggestion conveyed by any ordinary channel to the subject's mind." These results, if accepted, of course corroborate the idea of telepathy. (SeeGurney, "Hypnotism and Telepathy," Proceedings S. P. R. vol. iv.) Experiments by MM. Gibert, Janet, Richet, Hericourt and others are cited as tending in the same direction. Other experiments dealt with " the relation of the memory in the hypnotic state to the memory in another hypnotic state, and of both to the normal or waking memory." The result of Gurney's labours, cut short by his early death, was to raise and strengthen the presumption that there exists an unexplored region of human faculty which ought not to be neglected by science as if the belief in it were a mere survival of savage super- stition. Rather, it appears to have furnished the experiences which, misinterpreted, are expressed in traditional beliefs. That Gurney was credulous and easily imposed upon those who knew him, and knew his penetrating humour, cannot admit; nor is the theory likely to be maintained by those whom bias does not prevent from studying with care his writings. In con- troversy " he delighted in replying with easy courtesy to attacks envenomad with that odium plus quam theologicum which the very allusion to a ghost or the human soul seems in some philo- sophers to inspire." In discussion of themes unpopular and obscure Gurney displayed the highest tact, patience, good temper, humour and acuteness. There never was a more dis- interested student. In addition to his work on music and his psychological writings, he was the author of Tertium Quid (1887), a collection of essays, on the whole a protest against one-

sided ideas and methods of discussion. He died at Brighton on 23rd June 1888, from the effects of an overdose of narcotic medicine. , (A. L.)

GURWOOD, JOHN (1790-1845), British soldier, began his career in a merchant's office, but soon obtained an ensigncy in the 52nd (1808). With his regiment he served in the " Light Division " of Wellington's army throughout the earlier Penin- sular campaigns, and at Ciudad Rodrigo (19th Jan. 1812) he led one of the forlorn hopes and was severely wounded. For his gallant conduct on this occasion Wellington presented Gurwood with the sword of the French governor of Ciudad Rodrigo. A little later, transferring to the 9th Light Dragoons, he was made brigade-major to the Guards' cavalry which had just arrived in the Peninsula. In the latter part of the war he served as brigade- major to Lambert's brigade of the sixth infantry division, and was present at the various actions in which that division played a conspicuous part — the Nivelle, the Nive, Orthes and Toulouse. At Waterloo Captain Gurwood was for the third time severely wounded. In the first twelve years of the peace he was pro- moted up to the

grade of lieut. -colonel, and in 1841 became brevet colonel. He was for many years the duke of Wellington's private secretary, and was entrusted by him with the collection and editing of the Wellington Despatches, which occupied Gur wood from 1837 to the end of his life. This work is a monument of industrious skill, and earned its author a Civil List Pension of £200. But overwork and the effects of his wounds had broken his health, and he committed suicide on Christmas day 1845. He was a C.B. and deputy-lieutenant of the Tower.

GUSLA, or Gusli, an ancient stringed instrument still in use among the Slavonic races. The modern Servian gusla is a kind of tanbur (see Pandtjra), consisting of a round, concave body covered with a parchment soundboard; there is but one horse- hair string, and the peg for tuning it is inserted in oriental fashion in the back of the head. The gusla is played with a primitive bow called goudalo. The gouslars or blind bards of Servia and Croatia use it to accompany their chants. C. G. Anton 1 men- tions an instrument of that name in the shape of a half-moon strung with eighteen strings in use among the Tatars. Prosper Merimee 2 has taken the gusla as the title for a book of Servian poems, which are supposed to have been collected by him among the peasants, but which are thought to have been inspired by the Viaggio in Dalmazia of Albarto Fortis.

Among the Russians, the gusli is an instrument of a different type, a kind of psaltery having five or more strings stretched across a flat, shallow sound-chest in the shape of a wing. In the gusli the strings, of graduated length, are attached to little nails or pins at one end, and at the other they are wound over a rod having screw attachments for increasing and slackening the tension. There is no bridge to determine the vibrating length of the strings. The body of the instrument is shaped roughly like the tail of the grand piano, following the line of the strings; the longest being at the left of the instrument. Matthew Guthrie gives an illustration of the gusli. 3 (K. S.)

GUSTAVUS I. ERIKSSON (1496-1560), king of Sweden, was born at his mother's estate at Lindholm on Ascension Day 1496. He came of a family which had shone conspicuously in 15th- century politics, though it generally took the anti-national side. His fatheT, Erik Johansson of Rydboholm, " a merry and jocose gentleman," but, like all the Swedish Vasas, liable to sudden fierce gusts of temper, was one of the senators who voted for the deposition of Archbishop Trolle, at the riksdag of 1517 (see Sweden, History), for which act of patriotism he lost his head. Gustavus's mother, Cecilia Mansdatter, was closely connected by marriage with the great Sture family. Gustavus's youthful 'experiences impressed him with a life-long distrust of everything Danish. In his eighteenth year he was sent to the court of his cousin Sten Sture. At the battle of Brannkyrka, when Sture

1 Erste Linien eines Versuchs tiler den Ursprung der alien Slaven (Leipzig, 1783-1789), p. 145.

2 La Guzla, ou choix de poesies lyriques recueillies dans la Dalmatie, la Bosnie, la Croatie, &fc. (Paris, 1827).

3 Dissertations sur les antiquites de Russie (St Petersburg, 1795), pi. ii. No. 9, p. 31.

defeated Christian II. of Denmark, the young Gustavus bore the governor's standard, and in the same year (1518) he was delivered with five other noble youths as a hostage to King Christian, who treacherously carried him prisoner to Denmark. He was detained for twelve months in the island fortress of Kalo, on the east coast of Jutland, but contrived to escape to Liibeck in September 15 19. There he found an asylum till the 20th of May 1520, when he chartered a ship to Kalmar, one of the few Swedish fortresses which held out against Christian II.

It was while hunting near Lake Malar that the news of the Stockholm massacre was brought to him by a peasant fresh from the capital, who told him, at the same time, that a price had been set upon his head. In his extremity, Gustavus saw only one way of deliverance, an appeal for help to the sturdy yeomen of the dales. How the dalesmen set Gustavus on the throne and how he and they finally drove the Danes out of Sweden (1521-1523) is elsewhere recorded (see Sweden: History). But his worst troubles only began after his coronation on the 6th of June 1523. The financial position of the crown was the most important of all the problems demanding solution, for upon that everything else depended. By releasing his country from the tyranny of Denmark, Gustavus had made the free independent development of Sweden a possibility. It was for him to realize that possibility. First of all, order had to be evolved from the chaos in which Sweden had been plunged by the disruption of the Union; and the shortest, perhaps the only, way thereto was to restore the royal authority, which had been in abeyance during ninety years. But an effective reforming monarchy must stand upon a sound financial basis; and the usual revenues of the crown, always inadequate, were so diminished that they did not cover half the daily expenses of government. New taxes could only be imposed with extreme caution, while the country was still bleeding from the wounds of a long war. And men were wanted even more than money. The lack of capable, trustworthy administrators in Sweden was grievous. The whole burden of government weighed exclusively on the shoulders of the

new king, a young man of seven and twenty. Half his time was taken up in travelling from one end of the kingdom to the other, and doing purely clerical work for want of competent assistance. We can form some idea of his difficulties when we learn that, in 1533, he could not send an ambassador to Liibeck because not a single man in his council, except himself, knew German. It was this lack of native talent which compelled Gustavus frequently to employ the services of foreign adventurers like Berent von Mehlen, John von Hoja, Konrad von Pyhy and others.

It was not the least of Gustavus's many anxieties that he had constantly to be on the watch lest a formidable democratic rival should encroach on his prerogative. That rival was the Swedish peasantry. He succeeded indeed in putting down the four formidable rebellions which convulsed the realm from 1525 to 1542, but the. consequent strain upon his resources was very damaging, and more than once he was on the point of abdicating and emigrating, out of sheer weariness. Moreover he was in con stant fear of the Danes. Necessity compelled him indeed (1534- 1536) to take part in Grevens fejde (Counts' War) (see Denmark, History), as the ally of Christian III., but his exaggerated distrust of the Danes was invincible. " We advise and exhort you," he wrote to the governor of Kalmar, " to put no hope or trust in the Danes, or in their sweet scribbling, inasmuch as they mean nothing at all by it except how best they may deceive and betray us Swedes." Such instructions were not calculated to promote confidence between Swedish and Danish negotiators. A fresh cause of dispute was generated in 1548, when Christian III.'s daughter was wedded to Duke Augustus' of Saxony. On that occasion, apparently by way of protest against the decree of the diet of Vesteras (15th of January 1544), declaring the Swedish crown hereditary in Gustavus's family, the Danish king caused to be quartered on his daughter's shield not only the three Danish lions and the Norwegian lion with the axe of St Olaf , but also '" the three crowns " of Sweden. Gustavus, naturally suspicious, was much perturbed by the innovation, and warned all his border officials to be watchful and prepare for the worst.

In 1557 he even wrote to the Danish king protesting against the placing of " the three crowns " in the royal Danish seal beneath the arms of Denmark. Christian III. replied that " the three crowns " signified not Sweden in especial, but the three Scan- dinavian kingdoms, and that their insertion in the Danish shield was only a reminiscence of the union of Kalmar. But Gustavus was not satisfied, and this was the beginning of " the three crowns " dispute which did so much damage to both kingdoms.

The events which led to the rupture of Gustavus with the Holy See are set forth in the proper place (see Sweden: History). Here it need only be added that it was a purely political act, as Gustavus, personally, had no strong

dogmatic leanings either way. He not unnaturally expressed his amazement when that very juvenile reformer Olavus Petri confidently informed him that the pope was antichrist. He consulted the older and graver Laurentius Andreae, who told him how " Doctor Martinus had clipped the wings of the pope, the cardinals and the big bishops," which could not fail to be pleasing intelligence to a monarch who was never an admirer of episcopacy, while the rich revenues of the church, accumulated in the course of centuries, were a tempting object to the impecunious ruler of an impoverished people. Subsequently, when the Protestant hierarchy was forcibly established in Sweden, matters were much complicated by the absolutist tendencies of Gustavus. The incessant labour, the constant anxiety, which were the daily portion of Gustavus Vasa during the seven and thirty years of his reign, told at last even upon his magnificent constitution. In the spring of 1560, conscious of an ominous decline of his powers, Gustavus sum- moned his last diet, to give an account of his stewardship. On the 16th of June 1560 the assembly met at Stockholm. Ten days later, supported by his sons, Gustavus greeted the estates in the great hall of the palace, when he took a retrospect of his reign, reminding them of the misery of the kingdom during the union and its deliverance from " that unkind tyrant, King Christian." Four days later the diet passed a resolution confirming the hereditary right of Gustavus's son, Prince Eric, to the throne. The old king's last anxieties were now over- and he could die in peace. He expired on the 29th of September 1560.

Gustavus was thrice married. His first wife, Catherine, daughter of Magnus I., duke of Saxe-Lauenburg, bore him in 1 533 his eldest son Eric. This union was neither long nor happy, but the blame for its infelicity is generally attributed to the lady, whose abnormal character was reflected and accentuated in her unhappy son. Much more fortunate was Gustavus's second marriage, a year after the death of his first consort, with his own countrywoman, Margaret Lejonhufvud, who bore him five sons and five daughters, of whom three sons, John, Magnus and Charles, and one daughter, Cecilia, survived their childhood. Queen Margaret died in 1551; and a twelvemonth iater Gustavus wedded her niece, Catharine Stenbock, a handsome girl of sixteen, who survived him more than sixty years.

Gustavus's outward appearance in the prime of life is thus described by a contemporary: " He was of the middle height, with a round head, light yellow hair, a fine long beard, sharp eyes, a ruddy countenance . . . and a body as fitly and well proportioned as any painter could have painted it. He was of a sanguine-choleric temperament, and when untroubled and un vexed. a bright and cheerful gentleman, easy to get on with, and however many people happened to be in the same room with him, he was never at a loss for an answer to every one of them." Learned he was not, but he had naturally bright and clear under- standing, an unusually good memory,

and a marvellous capacity for taking pains. He was also very devout, and his morals were irreproachable. On the other hand, Gustavus had his full share . of the family failings of irritability and suspiciousness, the latter quality becoming almost morbid under the pressure of adverse circumstances. His energy too not infrequently degenerated into violence, and when crossed he was apt to be tyrannical.

See A. Alberg, Gustavus Vasa and his Times (London, 1882) ; R. N. Bain, Scandinavia, chaps, iii. and v. (Cambridge, 1905); P. B. Watson, The Swedish Revolution under Gustavus Vasa (London, 1889); O. Sjogren, Gustaf Vasa (Stockholm, 1896); C. M. Butler,

The Reformation in Sweden (New York, 1883) ; Sveriges Historia (Stockholm, 1877-1881); J. Weidling, Schwedische Geschichte im Zeitalter der Reformation (Gotha, 1882). (R. N. B.)

GUSTAVUS II. ADOLPHUS (1594-163 2), king of Sweden, the eldest son of Charles IX. and of Christina, daughter of Adolphus, duke of Holstein-Gottorp, was born at Stockholm castle on the 9th of December 1594. From the first he was carefully nurtured to be the future prop of Protestantism by his austere parents. Gustavus was well grounded in the classics, and his linguistic accomplishments were extraordinary. He may be said to have grown up with two mother-tongues, Swedish and German; at twelve he had mastered Latin, Italian and Dutch; and he learnt subsequently to express himself in Spanish, Russian and Polish. But his practical father took care that he should grow up a prince, not a pedant; So early as his ninth year he was introduced to public life; at thirteen he received petitions and conversed officially with the foreign ministers; at fifteen he administered his duchy of Vestmanland and opened the Orebro diet with a speech from the throne; indeed from 1610 he may be regarded as his father's co-regent. In all martial and chivalrous accomplishments he was already an adept; and when, a year later, he succeeded to supreme power, his superior ability was as uncontested as it was incontestable.

The first act of the young king was to terminate the frat- ricidal struggle with Denmark by the peace of Knared (28th of January 1613). Simultaneously, another war, also an heritage from Charles IX., had been proceeding in the far distant regions round lakes Ilmen, Peipus and Ladoga, with Great Novgorod as its centre. It was not, however, like the Danish War, a national danger, but a political speculation meant to be remunerative and compensatory, and.was concluded very advantageously

for Sweden by the peace of Stolbova on the 27th of February 16 17 (see Sweden : History) . By this peace Gustavus succeeded in exclud- ing Muscovy from the Baltic. " I hope to God," he declared to the Stockholm diet in 1617, when he announced the conclusion of peace, " that the Russians will feel it a bit difficult to skip over that little brook." The war with Poland which Gustavus re- sumed in 16 2 1 was a much more difficult affair. It began with an attack upon Riga as the first step towards conquering Livonia. Riga was invested on the 13th of August and surrendered on the 15th of September; on the 3rd of October Mitau was occupied; but so great were the ravages of sickness during the campaign that the Swedish army had to be reinforced by no fewer than 10,000 men. A truce was thereupon concluded and hostilities were suspended till the summer of 1625, in the course of which Gustavus took Kokenhusen and invaded Lithuania. In January 1626 he attacked the Poles at Walhof and scattered the whole of their army after slaying a fifth part of it. This victory, remark- able besides as Gustavus's first pitched battle, completed the conquest of Livonia. As, however, it became every year more difficult to support an army in the Dvina district, Gustavus now resolved to transfer the war to the Prussian provinces of Poland with a view to securing the control of the Vistula, as he had already secured the control of the Dvina. At the end of 1626, the Swedish fleet, with 14,000 men on board, anchored in front of the chain of sand-dunes which separates the Friscbe-Haff from the Baltic. Pillau, the only Baltic port then accessible to ships of war, was at once occupied, and Konigsberg shortly afterwards was scared into an unconditional neutrality. July was passed in conquering the bishopric of Ermeland. The surrender of Elbing and Marienburg placed Gustavus in possession of the fertile and easily defensible delta of the Vistula, which he treated as a permanent conquest, making Axel Oxenstjerna its first governor- general. Communications between Danzig and the sea were cut off by the erection of the first of Gustavus's famous entrenched camps at Dirschau. From the end of August 1626 the city was ■ blockaded, and in the meantime Polish irregulars, under the capable Stanislaus Koniecpolski, began to harass the Swedes. But the object of the campaign, a convenient basis of operations, was won; and in October the king departed to Sweden to get reinforcements. He returned in May 1627 with 7000 men, which raised his forces to 14,000, against which Koniecpolski

could only oppose 9000. But his superior strategy frustrated all the efforts of the Swedish king, who in the course of the year was twice dangerously wounded and so disabled that he could never wear armour again. Gustavus had made extensive preparations for the ensuing campaign and took the field with 32,000 men. But once again, though far outnumbered, and unsupported by his own government, the Polish grand-hetman proved more

than a match for Gustavus, who, on the 10th of September, broke up his camp and returned to Prussia; the whole autumn campaign had proved a failure and cost him 5000 men. During the ensuing campaign of 1629 Gustavus had to contend against the combined forces of Koniecpolski and 10,000 of Wallenstein's mercenaries. The Polish commander now showed the Swedes what he could do with adequate forces. At Stuhm, on the 29th of June, he defeated Gustavus, who lost most of his artillery and narrowly escaped capture. The result of the campaign was the conclusion of the six years' truce of Altmark, which was very advantageous to Sweden.

And now Gustavus turned his attention to Germany. The motives which induced the Swedish king to intervene directly in the Thirty Years' War are told us by himself in his correspondence with Oxenstjerna. Here he says plainly that it was the fear lest the emperor should acquire the Baltic ports and proceed to build up a sea-power dangerous to Scandinavia. For the same reason, the king rejected the chancellor's alternative of waging a simply defensive war against the emperor by means of the fleet, with Stralsund as his base. He was convinced by the experience of Christian IV. of Denmark that the enemies' harbours could be wrested from them only by a successful offensive war on land; and, while quite alive to the risks of such an enterprise in the face of two large armies, Tilly's and Wallenstein's, each of them larger than his own, he argued that the vast extent of territory and the numerous garrisons which the enemy was obliged to maintain, more than neutralized his numerical superiority. Merely to blockade all the German ports with the Swedish fleet was equally impossible. The Swedish fleet was too weak for that; it would be safer to take and fortify the pick of them. In Germany itself, if he once got the upper hand, he would not find himself without resources. It is no enthusiastic crusader, but an anxious and farseeing if somewhat speculative statesman who thus opens his mind to us. No doubt religious considerations largely influenced Gustavus. He had the deepest sympathy for his fellow-Protestants in Germany; he regarded them as God's peculiar people, himself as their divinely appointed deliverer. But his first duty was to Sweden; and, naturally and rightly, he viewed the whole business from a predominantly Swedish point of view. Lutherans and Calvinists were to be delivered from a " soul-crushing tyranny "; but they were to be delivered by a foreign if friendly power; and that power claimed as her reward the hegemony of Protestant Europe and all the political privileges belonging to that exalted position.

On the 19th of May 1630 Gustavus solemnly took leave of the estates of the realm assembled at Stockholm. He appeared before them holding in his arms his only child and heiress, the little princess Christina, then in her fourth year, and tenderly committed her to the care of his loyal and devoted people. Then he solemnly took the estates to witness, as he stood there " in the sight of the. Almighty," that he had begun hostilities " out of

no lust for war, as many will certainly devise and imagine," but in self-defence and to deliver his fellow- Christians from oppression. On the 7th of June 1630 the Swedish fleet set sail, and two days after midsummer day, the whole army, 16,000 strong, was disembarked at Peenemunde. Gustavus's plan was to take possession of the mouths of the Oder Haff, and, resting upon Stralsund in the west and Prussia in the east, penetrate into Germany. In those days rivers were what railways now are, the great military routes; and Gustavus's German war was a war waged along river lines. The opening campaign was to be fought along the line of the Oder. Stettin, the capital of Pomerania, and the key of the Oder line, was occupied and converted into a first-class fortress. He then proceeded to clear Pomerania of the piebald imperial host composed of every nationality under

heaven, and officered by Italians, Irishmen, Czechs, Croats, Danes, Spaniards and Walloons. Gustavus's army has often been described by German historians as an army of foreign invaders; in reality it was far more truly Teutonic than the official defenders of Germany at that period. Gustavus's political difficulties (see Sweden: History) chained him to his camp for the remainder of the year. But the dismissal of Wallenstein and the declaration in Gustavus's favour of Magde- burg, the greatest city in the Lower Saxon Circle, and strate- gically the strongest fortress of North Germany, encouraged him to advance boldly. But first, honour as well as expediency moved him to attempt to relieve Magdeburg, now closely invested by the imperialists, especially as his hands had now been con- siderably strengthened by a definite alliance with France (treaty of Barwalde, 13 th of January 1631). Magdeburg, therefore, became the focus of the whole campaign of 1631; but the obstructive timidity of the electors of Brandenburg and Saxony threw insuperable obstacles in his way, and, on the very day when John George I. of Saxony closed his gates against Gustavus the most populous and prosperous city in North Germany became a heap of smoking ruins (20th of May). Gustavus, still too weak to meet the foe, entrenched himself at Werben, at the confluence of the Havel and Elbe. Only on the 1 2th of September did the elector of Saxony, alarmed for the safety of his own states, now invaded by the emperor, place himself absolutely at the disposal of Gustavus; and, five dayslater, at the head of the combined Swedish-Saxon army, though the Swedes did all the fighting, Gustavus routed Tilly at the famous battle of Breiten- feld, north of Leipzig.

The question now was: In what way should Gustavus utilize his advantage?

Should he invade the Austrian crown lands, and dictate peace to Ferdinand II. at the gates of Vienna? Or should he pursue Tilly westwards and crush the league at its own hearth and home ? Oxenstjerna was the first alternative, but Gustavus decided in favour of the second. His decision has been greatly blamed. More than one modern historian has argued that if Gustavus had done in 1631 what Napoleon did in 1805 and 1809, there would have been a fifteen instead of a thirty years' war. But it should be borne in mind that, in the days of Gustavus, Vienna was by no means so essential to the existence of the Habsburg monarchy as it was in the days of Napoleon; and even Gustavus could not allow so dangerous an opponent as Tilly time to recover himself. Accordingly, he set out for the Rhine, taking Marienberg and Frankfort on his way, and on the 20th of December entered Mainz, where he remained throughout the winter of 1631-1632. At the beginning of 1632, in order to bring about the general peace he so earnestly desired, he proposed to take the field with an overwhelming numerical majority. The signal for Gustavus to break up from the Rhine was the sudden advance of Tilly from behind the Danube. Gustavus pursued Tilly into Bavaria, forced the passage of the Danube at Donau-worth and the passage of the Lech, in the face of Tilly's strongly entrenched camp at Rain, and pursued the flying foe to the fortress of Ingolstadt where Tilly died of his wounds a fortnight later. Gustavus then liberated and garrisoned the long-oppressed Protestant cities of Augsburg and Ulm, and in May occupied Munich. The same week Wallenstein chased John George from Prague and manoeuvred the Saxons out of Bohemia. Then, armed as he was with plenipotentiary power, he offered the elector of Saxony peace on his own terms. Gustavus suddenly saw himself exposed to extreme peril. If Tilly had made John George such an offer as Wallenstein was now empowered to make, the elector would never have become Gustavus's ally; would he remain Gustavus's ally now? Hastily quitting his quarters in Upper Swabia, Gustavus hastened towards Nurem-" berg on his way to Saxony, but finding that Wallenstein and ■ Maximilian of Bavaria had united their forces, he abandoned the attempt to reach Saxony, and both armies confronted each other at Nuremberg which furnished Gustavus with a point of support of the first order. He quickly converted the town into an entrenched and fortified camp. Wallenstein followed the king's example, and entrenched himself on the western bank of

the Regnitz in a camp twelve English miles in circumference. His object was to pin Gustavus fast to Nuremberg and cut off his retreat northwards. Throughout July and August the two armies faced each other immovably. On the 24th of August, after an unsuccessful attempt to storm Alte Veste, the key of Wallenstein's position, the Swedish host retired southwards.

Towards the end of October, Wallenstein, after devastating Saxony, was preparing to go into winter quarters at Liitzen, when the king surprised him

as he was crossing the Rippach (1st of November) and a rearguard action favourable to the Swedes ensued. Indeed, but for nightfall, Wallenstein's scattered forces might have been routed. During the night, however, Wallenstein re-collected his host for a decisive action, and at day- break on the 6th of November, while an autumn mist still lay over the field, the battle began. It was obviously Gustavus's plan to drive Wallenstein away from the Leipzig road, north of which he had posted himself, and thus, in case of success, to isolate, 'and subsequently, with the aid of the Saxons in the Elbe fortresses, annihilate him. The king, on the Swedish right wing, succeeded in driving the enemy from the trenches and capturing his cannon. What happened after that is mere conjecture, for a thick mist now obscured the autumn sun, and the battle became a colossal melee the details of which are indistinguishable. It was in the midst of that awful obscurity that Gustavus met his death — how or where is not absolutely certain; but it would seem that he lost his way in the darkness while leading the Smaland horse to the assistance of his infantry, and was despatched as he lay severely wounded on the ground by a hostile horseman.

By his wife, Marie Eleonora, a sister of the elector of Branden- burg, whom he married in 1620, Gustavus Adolphus had one daughter, Christina, who succeeded him on the throne of Sweden.

See Sveriges Historia (Stockholm, 1877, 81), vol. iv. ; A. Oxen- stjerna, Skrifter och Brefvexling (Stockholm, 1900, &c.) ; G. Bjorlen, Gustaf Adolf (Stockholm, 1890); R. N. Bain, Scandinavia (Cam- bridge, 1905); C. R. L. Fletcher, Gustavus Adolphus (London, 1892); J. L. Stevens, History of Gustavus Adolphus (London, 1885); J. Mankell, Om Gustaf II. Adolf s politik (Stockholm, 1881); E. Bluemel, Gustav Adolf, Kdnig von Schweden (Eisleben, 1894); A. Rydfors, De diplomatiska foroindelserna mellan Sverige och England 1624-1630 (Upsala, 1890). (R. N. B.)

GUSTAVUS HI. (1 746-1 792), king of Sweden, was the eldest son of Adolphus Frederick, king of Sweden, and Louisa Ulrica of Prussia, sister of Frederick the Great, and was born on the 24th of January 1746. Gustavus was educated under the care of two governors who were amongst the most eminent Swedish states- men of the day, Carl Gustaf Tessin and Carl Scheffer; but he owed most perhaps to the poet and historian Olof von Dalin. The interference of the state with his education, when he was quite a child, was, however, doubly harmful, as his parents taught him to despise the preceptors imposed upon him by the diet, and the atmosphere of intrigue and duplicity in which he grew up made him precociously experienced in the art of dissimu-

tion. But even his most hostile teachers were amazed by the lliance of his natural gifts, and, while still a boy, he possessed that charm of manner

which was to make him so fascinating and so dangerous in later life, coupled with the strong dramatic instinct which won for him his honourable place in Swedish literature. On the whole, Gustavus cannot be said to have been well educated, but he read very widely; there was scarce a French author of his day with whose works he was not intimately acquainted; while his enthusiasm for the new French ideas of enlightenment was as sincere as, if more critical than, his mother's. On the 4th of November 1766, Gustavus married Sophia Magdalena, daughter of Frederick V. of Denmark, The match was an unhappy one, owing partly to incompatibility of temper, but still more to the mischievous interference of the jealous queen-mother.

Gustavus first intervened actively in politics in 1768, at the time of his father's interregnum, when he compelled the dominant Cap faction to summon an extraordinary diet from which he hoped for the reform of the constitution in a monarchical direction. But the victorious Hats refused to redeem the pledges which they had given before the elections. " That we should have lost the

constitutional battle does not distress us so much," wrote Gustavus, in the bitterness of his heart; "but what does dismay me is to see my poor nation so sunk in corruption as to place its own felicity in absolute anarchy." From the 4th of February to the 25th of March 1771, Gustavus was at Paris, where he carried both the court and the city by storm. The poets and the philo- sophers paid him enthusiastic homage, and all the distinguished women of the day testified to his superlative merits. With many of them he maintained a lifelong correspondence. But his visit to the French capital was no mere pleasure trip; it was also a political mission. Confidential agents from the Swedish court had already prepared the way for him, and the due de Choiseul, weary of Swedish anarchy, had resolved to discuss with him the best method of bringing about a revolution in Sweden. Before he departed, the French government undertook to pay the out- standing subsidies to Sweden unconditionally, at the rate of one and a half million livres annually; and the comte de Vergennes, one of the great names of French diplomacy, was transferred from Constantinople to Stockholm. On his way home Gustavus paid a short visit to his uncle, Frederick the Great, at Potsdam. Frederick bluntly informed his nephew that, in concert with Russia and Denmark, he had guaranteed the integrity of the existing Swedish constitution, and significantly advised the young monarch to play the part of mediator and abstain from violence.

On his return to Sweden Gustavus made a sincere and earnest attempt to mediate between the Hats and Caps who were ruining the country between them (see Sweden: History). On the 21st of June 1 771 he opened his first parliament in a speech which awakened strange and deep emotions in all who heard it. It was the first time for more than a century that a Swedish king had addressed a Swedish diet from the throne in its native tongue. The orator laid especial stress on the necessity of the sacrifice of all party animosities to the common weal, and volunteered, as " the first citizen of a free people," to be the mediator between the contending factions. A composition committee was actually formed, but it proved illusory from the first, the patriotism of neither of the factions being equal to the puniest act of self- denial. The subsequent attempts of the dominant Caps still further to limit the prerogative, and reduce Gustavus to the condition of a rot faineant, induced him at last to consider the possibility of a revolution. Of its necessity there could be no doubt. Under the sway of the Cap faction, Sweden, already the vassal, could not fail to become the prey of Russia. She was on the point of being absorbed in that northern system, the invention of the Russian vice-chancellor, Count Nikita Panin, Vv-hich that patient statesman had made it the ambition of his nfe to realize. Only a swift and sudden coup d'etat could save the independence of a country isolated from the rest of Europe by a hostile league. At this juncture Gustavus was approached by Jakob Magnus Sprengtporten, a Finnish nobleman of determined character, who had incurred the enmity of the Caps, with the project of a revolution. He undertook to seize the fortress of Sveaborg by a coup de main, and, Finland once secured, Sprengt- porten proposed to embark for Sweden, meet the king and his friends near Stockholm, and surprise the capital by a night attack, when the estates were to be forced, at the point of the bayonet, to accept a new constitution from the untrammelled king. The plotters were at this juncture reinforced by an ex- ranger from Scania (Skane), Johan Kristoffer Toll, also a victim of Cap oppression. Toll proposed that a second revolt should break out in the province of Scania, to confuse the government still more, and undertook personally to secure the southern fortress of Kristianstad. After some debate, it was finally arranged that, a few days after the Finnish revolt had begun, Kristianstad should openly declare against the government. Prince Charles, the eldest of the king's brothers, was thereupon hastily to mobilize the garrisons of all the southern fortresses, for the ostensible purpose of crushing the revolt at Kristianstad; but on arriving before the fortress he was to make common cause with the rebels, and march upon the capital from the south, while Sprengtporten attacked it simultaneously from the east. On the 6th of August xii. 24

1772 Toll succeeded, by sheer bluff, in winning the fortress of Kristianstad. On the 16th Sprengtporten succeeded in surprising Sveaborg. But contrary

winds prevented him from crossing to Stockholm, and in the meanwhile events had occurred which made his presence there unnecessary.

On the 16th of August the Cap leader, Ture Rudbeck, arrived at Stockholm with the news of the insurrection in the south, and Gustavus found himself isolated in the midst of enemies. Sprengtporten lay weather-bound in Finland, Toll was five hundred miles away, the Hat leaders were in hiding. Gustavus thereupon resolved to strike the decisive blow without waiting for the arrival of Sprengtporten. He acted with military promptitude. On the evening of the 18th all the officers whom he thought he could trust received secret instructions to assemble in the great square facing the arsenal on the following morning. At ten o'clock on the 19th Gustavus mounted his horse and rode straight to the arsenal. On the way his adherents joined him in little groups, as if by accident, so that by the time he reached his destination he had about two hundred officers in his suite. After parade he reconducted them to the guard-room of the palace and unfolded his plans to them. He then dictated a new oath of allegiance, and every one signed it without hesitation. It absolved them from their allegiance to the estates, and bound them solely to obey their lawful king, Gustavus III. Meanwhile the senate and the governor-general, Rudbeck, had been arrested and the fleet secured. Then Gustavus made a tour of the city and was everywhere received by enthusiastic crowds, who hailed him as a deliverer. On the evening of the 20th heralds perambulated the streets proclaiming that the estates were to meet in the Rikssaal on the following day; every deputy absenting himself would be regarded as the enemy of his country and his king. On the 21st, a few moments after the estates had assembled, the king in full regalia appeared, and taking his seat on the throne, delivered that famous philippic, one of the masterpieces of Swedish oratory, in which he reproached the estates for their unpatriotic venality and licence in the past. A new constitution was recited by the estates and accepted by them unanimously. The diet was then dissolved.

Gustavus was inspired by a burning enthusiasm for the great- ness and welfare of Sweden, and worked in the same reformatory direction as the other contemporary sovereigns of the " age of enlightenment." He took an active part in every department of business, but relied far more on extra-official counsellors of his own choosing than upon the senate. The effort to remedy the frightful corruption which had been fostered by the Hats and Caps engaged a considerable share of his time and he even found it necessary to put the whole of a supreme court of justice (Gola Hofrdtt) on its trial. Measures were also taken to reform the administration and the whole course of judicial procedure, and torture as an instrument of legal investigation was abolished. In 1774 an ordinance providing for the liberty of the press was even issued. The national defences were at the same time developed on a " Great Power " scale, and the navy was so enlarged as to

become one of the most formidable in Europe. The dilapidated finances were set in good order by the " currency realization ordinance " of 1777. Gustavus also introduced new national economic principles. In 1775 free trade in corn was promoted and a number of oppressive export-tolls were abolished. The poor law was also amended, absolute religious liberty was proclaimed, and he even succeeded in inventing and popularizing a national costume which was in general use from 1778 till his death. His one great economic blunder was the attempt to make the sale of spirits a government monopoly, which was an obvious infringement upon the privileges of the estates. His foreign policy, on the other hand, was at first both wise and wary. Thus, when the king summoned the estates to assemble at Stockholm on the 3rd of September 1778, he could give a brilliant account of his six years' stewardship. Never was a parliament more obsequious or a king more gracious. " There was no room for a single No during the whole session." Yet, short as the session was, it was quite long enough to open the eyes of the deputies to the fact that their political supremacy had

departed. They had changed places with the king. He was now indeed their sovereign lord; and, for all his gentleness, the jealousy with which he guarded, the vigour with which he enforced the prerogative, plainly showed that he meant to remain so. Even the few who were patriotic enough to acquiesce in the change by no means liked it. The diet of 1778 had been obsequious; the diet of 1786 was mutinous. The consequence was that nearly all the royal propositions were either rejected outright or so modified that Gustavus himself withdrew them.

The diet of 1786 marks a turning-point in Gustavus's history. Henceforth we observe a determination on his part to rule with- out a parliament; a passage, cautious and gradual, yet un- flinching, from semi-constitutionalism to semi-absolutism. His opportunity came in 1788, when the political complications arising out of his war with Catherine II. of Russia enabled him by the Act of Unity and Security (on the 17th of February 1789) to override the opposition of the rebellious and grossly unpatriotic gentry, and, with the approbation of the three lower estates, establish a new and revolutionary constitution, in which, though the estates still held the power of the purse, the royal authority largely predominated. Throughout 1789 and 1790 Gustavus, in the national interests, gallantly conducted the unequal struggle with Russia, finally winning in the

Svensksund (gth-ioth July) the most glorious naval victory ever gained by the Swedish arms, the Russians losing one-third of their fleet and 7000 men. A month later, on the 14th of August 1790, peace was signed between Russia and Sweden at Varala. Only eight months before, Catherine had haughtily declared that " the odious and revolting aggression " of the king of Sweden would be " for- given " only if he " testified his repentance " by agreeing to a peace granting a general and unlimited amnesty to all his rebels, and consenting to a guarantee by the Swedish diet (" as it would be imprudent to confide in his good faith alone ") for the obser- vance of peace in the future. The peace of Varala saved Sweden from any such humiliating concession, and in October 1791 Gustavus took the bold but by no means imprudent step of con- cluding an eight years' defensive alliance with the empress, who thereby bound herself to pay her new ally annual subsidies amounting to 300,000 roubles.

Gustavus now aimed at forming a league of princes against the Jacobins, and every other consideration was subordinated thereto. His profound knowledge of popular assemblies enabled him, alone among contemporary sovereigns, accurately to gauge from the first the scope and bearing of the French Revolution. But he was hampered by poverty and the jealousy of the other European Powers, and, after showing once more his unrivalled mastery over masses of men at the brief Gefle diet (22nd of January-24th of February 1792), he fell a victim to a widespread aristocratic conspiracy. Shot in the back by Anckarstrom at a midnight masquerade at the Stockholm opera-house, on the 16th of March 1792, he expired on the 29th.

Although he may be charged with many foibles and extrava- gances, Gustavus III. was indisputably one of the greatest sovereigns of the 18th century. Unfortunately his genius never had full scope, and his opportunity came too late. Gustavus was, moreover, a most distinguished author. He may be said to have created the Swedish theatre, and some of the best acting dramas in the literature are by his hand. His historical essays, notably the famous anonymous eulogy on Torstenson crowned by the Academy, are full of feeling and exquisite in style, — his letters to his friends are delightful. Every branch of literature and art interested him, every poet and artist of his day found in him a most liberal and sympathetic protector.

See R. N. Bain, Gustavus III. and his Contemporaries (London, 1904); E. G. Geijer, Konung Gustaf III.'s efterlemna.de papper ' (Upsala, 1843-1845) ; C. T. Odhner, Sveriges politiska historia under Konung Gustaf III.'s regering (Stockholm, 1885-1896); B. von Beskow, Om Gustaf III. s&som Konung och manniska (Stockholm, 1860-1861); O. Levertin, Gustaf III. som dramatisk fbrfattare (Stockholm, 1894) ; Gustaf III.'s bref

till G. M. Armfelt (Fr.) (Stock- holm, 1883); Y. K. Grot, Catharine II. and Gustavus III. (Russ.) (St Petersburg, 1884}. (R. N. B.)

GUSTAVUS IV. (1778-1837), king of Sweden, the son of Gustavus III. and Queen Sophia Magdalena, was born at Stock- holm on the 1st of November 1778. Carefully educated under the direction of Nils von Rosenstein, he grew up serious and, conscientious. In August 1 796 his uncle the regent Charles, duke of Sudermania, visited St Petersburg for the purpose of arranging a marriage between the young king and Catherine II. 's grand-daughter, the grand-duchess Alexandra. The betrothal was actually fixed for the 22nd of September, when the whole arrangement foundered on the obstinate refusal of Gustavus to allow his destined bride liberty of worship according to the rites of the Greek Orthodox Church — a rebuff which undoubtedly accelerated the death of the Russian empress. Nobody seems to have even suspected at the time that serious mental derangement lay at the root of Gustavus's abnormal piety. On the contrary, there were many who prematurely congratulated themselves on the fact that Sweden had now no disturbing genius, but an economical, God-fearing, commonplace monarch to deal with. Gustavus's prompt dismissal of the generally detested Gustaf Reuterholm added still further to his popularity. On the 31st of October 1797 Gustavus married Frederica Dorothea, daughter of Charles Frederick, grand-duke of Baden, a marriage which might have led to a war with Russia but for the fanatical hatred of the French republic shared by the emperor Paul and Gustavus IV., which served as a bond of union between them. Indeed the king's horror of Jacobinism was morbid in its intensity, and drove him to adopt all sorts of reactionary measures and to postpone his coronation for some years, so as to avoid calling together a diet; but the disorder of the finances, caused partly by the continental war and partly by the almost total failure of the crops in 1798 and 1799, compelled him to summon the estates to Norrkoping in March 1800, and on the 3rd of April Gustavus was crowned. The notable change which now took place in Sweden's foreign policy and its fatal consequences to the country are else- where set forth (see Sweden, History) . By the end of 1808 it was obvious to every thinking Swede that the king was insane. His violence had alienated his most faithful supporters, while his obstinate incompetence paralysed the national efforts. To remove a madman by force was the one remaining expedient; and this was successfully accomplished by a conspiracy of officers of the western army, headed by Adlersparre, the Anckarsvards, and Adlercreutz, who marched rapidly from Skane to Stockholm. On the 13th of March 1809 seven of the conspirators broke into the royal apartments in the palace unannounced, seized the king, and conducted him to the chateau of Gripsholm; Duke Charles was easily persuaded to accept the leadership of a provisional government, which was proclaimed the same day; and a diet, hastily summoned, solemnly

approved of the revolution. On the 29th of March Gustavus, in order to save the crown for his son, voluntarily abdicated; but on the 10th of May the estates, dominated by the army, declared that not merely Gustavus but his whole family had forfeited the throne. On the 5th of June the duke regent was proclaimed king under the title of Charles XIII. , after accepting the new liberal constitution, which was ratified by the diet the same day. In December Gustavus and his family were transported to Germany. Gustavus now assumed the title of count of Gottorp, but subsequently called himself Colonel Gustafsson, under which pseudonym he wrote most of his works. He led, separated from his family, an erratic life for some years; was divorced from his consort in 1812; and finally settled at St Gall in Switzerland in great loneliness and indigence. He died on the 7th of February 1837, and, at the suggestion of King Oscar II. his body was brought to Sweden and interred in the Riddarholmskyrka. From him descend both the Baden and the Oldenburg princely houses on the female side.

See H. G. Trolle-Wachtmeister, Anteckningar och minnen (Stock- holm, 1889); B. von Beskow, Lefnadsminnen (Stockholm, 1870); K. V. Key-Aberg, De diplomatiska forbindelserna mellan Sverige och Storbrittannien under Gustaf IV. 's Krig emot Napoleon (Upsala, 1 890) ; Colonel Gustafsson, La Jourme du treize mars, &c. (St Gall, 1835); Memorial des Obersten Gustafsson (Leipzig, 1829). (R. N. B.)

GUSTAVUS V. (1858-), king of Sweden, son of Oscar II., king of Sweden and Norway, and Queen Sophia Wilhelmina, was

born at Drottningholm on the 16th of June 1858. He entered the army, and was, like his father, a great traveller. As crown prince he held the title of duke of Warmland. He married in 1881 Victoria (b. 1862), daughter of Frederick William Louis, grand duke of Baden, and of Louise, princess of Prussia. The duchess of Baden was the granddaughter of Sophia, princess of Sweden, and the marriage of the crown prince thus effected a union between the Bernadotte dynasty and the ancient Swedish royal house of Vasa. During the absence or illness of his father Gustavus repeatedly acted as regent, and was therefore already thoroughly versed in public affairs when he succeeded to the Swedish throne on the 8th of December 1907, the crown of Norway having been separated from that of Sweden in 1905. He took as his motto " With the people for the Fatherland."

The crown prince, Oscar Frederick William Gustavus Adolphus, duke of

Scania (b. 1882), married in 1905 Princess Margaret of Connaught (b. 1882), niece of King Edward VII. A son was born to them at Stockholm on the 22nd of April 1906, and another son in the following year. The king's two younger sons were William, duke of Sudermania (b. 1884), and Eric, duke of Westmanland (b. 1889).

GUSTAVUS ADOLPHUS UNION (Gtjstav-Adolf-Stiftung, Gustav-Adolf-Verein, Evangelischer Verein der Gustav- Adolf-Stiftung), a society formed of members of the Evangelical Protestant churches of Germany, which has for its object the aid of feeble sister churches, especially in Roman Catholic countries. The project of forming such a society was first broached in connexion with the bicentennial celebration of the battle of Liitzen on the 6th of November 1832; a proposal to collect funds for a monument to Gustavus Adolphus having been agreed to, it was suggested by Superintendent Grossmann that the best memorial to the great champion of Protestantism would be the formation of a union for propagating his ideas. For some years the society was limited in its area and its operations, being practically confined to Leipzig and Dresden, but at the Reformation festival in 1 84 1 it received a new impulse through the energy and elo- quence of Karl Zimmermann (1803-1877), court preacher at Darmstadt, and in 1843 a general meeting was held at Frankfort- on-the-Main, where no fewer than twenty-nine branch associations belonging to all parts of Germany except Bavaria and Austria were represented. The want of a positive creed tended to make many of the stricter Protestant churchmen doubtful of the usefulness of the union, and the stricter Lutherans have always held aloof from it. On the other hand, its negative attitude in relation to Roman Catholicism secured for it the sympathy of the masses. At a general convention held in Berlin in September 1846 a keen dispute arose about the admission of the Konigsberg delegate, Julius Rupp (1809-1884), who in 1845 had been deprived for publicly repudiating the Athanasian Creed and became one of the founders of the " Free Congregations "; and at one time it seemed likely that the society would be completely broken up. Amid the political revolutions of the year 1848 the whole movement fell into stagnation; but in 1849 another general convention (the seventh), held at Breslau, showed that, although the society had lost both in membership and income, it was still possessed of considerable vitality. From that date the Gustav-Adolf-Verein has been more definitely " evangelical " in its tone than formerly; and under the direction of Karl Zimmermann it greatly increased both in numbers and in wealth. It has built over 2000 churches and assisted with some two million pounds over 5000 different communities. Apart from its influence in maintaining Protestantism in hostile areas, there can be no doubt that the union has had a great effect in helping the various Protestant churches of Germany to realize the number and importance of their common interests.

See K. Zimmermann, Geschichte des Gustav-Adolf-Vereins (Darm- stadt, 1877).

GUSTROW, a town of Germany, in the grand duchy of Mecklenburg-Schwerin, on the Nebel and the railway from Lubeck to Stettin, 20 m. S. of Rostock. Pop. (1875), 10,923; (1905) 17,163. . The principal buildings are the castle, erected in the middle of the 16th century and now used asia workhouse;

the cathedral, dating from the 13th century and restored in 1868, containing many fine monuments and possessing a square tower 100 ft. high; the Pfarrkirche, with fine altar-paintings; the town hall (Rathaus), dating from the 16th century; the music hall, and the theatre. Among the educational establish- ments are the ducal gymnasium, which possesses a library of 15,000 volumes, a modern and a commercial school. The town is one of the most prosperous in the duchy, and has machine works, foundries, tanneries, sawmills, breweries, distilleries, and manufactories of tobacco, glue, candles and soap. There is also a considerable trade in wool, corn, wood, butter and cattle, and an annual cattle show and horse races are held.

Giistrow, capital of the Mecklenburg duchy of that name, or of the Wend district, was a place of some importance as early as the 1 2th century, and in 12 19 it became the residence of Henry Borwin II., prince of Mecklenburg, from whom it received Schwerin privileges. From 13 16 to 1436 the town was the residence of the princes of the Wends, and from 1 556 to 1695 of the dukes of Mecklenburg- Giistrow. In 1628 it was occupied by the imperial troops, and Wallenstein resided in it during part of the years 1628 and 1629.

GUTENBERG, JOHANN (c. 1398-1468), German printer, is supposed to have been born c. 1398-1399 at Mainz of well-to-do parents, his father being Friele zum Gensfleisch and his mother Elsgen Wyrich (or, from her birthplace, zu Gutenberg, the name he adopted). He is assumed to be mentioned under the name of " Henchen " in a copy of a document of 1420, and again in a document of c. 1427-1428, but it is not stated where he then resided. On January 16, 1430, his mother arranged with the city of Mainz about an annuity belonging to him; but when, in the same year, some families who had been expelled a few years before were permitted to return to Mainz, Gutenberg appears not to have availed himself of the privilege, as he is described in the act of reconciliation (dated March 28) as " not being in Mainz." It is therefore assumed that the family had taken refuge in Strassburg, where Gutenberg was residing later. There he is said to have been in 1434, and to have seized and imprisoned the town clerk of Mainz for a debt due to him by the corporation of that city, releasing him,

however, at the representations of the mayor and councillors of Strassburg, and relinquishing at the same time all claims to the money (310 Rhenish guilders = about 2400 mark). 1 Between 1436 and 1439 certain documents 1 It is difficult to know which of the Gutenberg documents can be trusted and which not. Schorbach, in his recent biography of Gutenberg, accepts and describes 27 of them (Festschrift, 1900, p. 163 sqq.), 17 of which are known only from (not always accurate) copies or transcripts. Under ordinary circumstances history might be based on them. But it is certain that some so-called Gutenberg documents, not included in the above 27, are forgeries. Fr. J. Bodmann (1754-1820), for many years professor and librarian at Mainz, forged at least two; one (dated July 20, 1459) he even provided with four forged seals ; the other (dated Strassburg, March 24, 1424) purported to be an autograph letter of Gutenberg to a fictitious sister of his named Bertha. Of these two documents French and German texts were published about 1800-1802; the forger lived for twenty years afterwards but never undeceived the public. He enriched the Gutenberg literature with other fabrications. In fact Bodmann had trained himself for counterfeiting MSS. and documents; he openly boasted of his abilities in this respect, and used them, sometimes to amuse his friends who were searching for Gutenberg documents, sometimes for himself to fill up gaps in Gutenberg's life. (For two or three more specimens of his capacities see A. Wyss in Zeitschr. fur Altert. u. Gesch. Schlesiens, xv. 9 sqq.) To one of his friends (Professor Gotthelf Fischer, who preceded him as librarian of Mainz) one or two other fabrications may be ascribed. There are, moreover, serious misgivings as to documents said to have been discovered about 1740 (when the citizens of Strassburg claimed the honour of the invention for their city) by Jacob Wencker (the then archivist of Strassburg) and J. D. Schoepflin (professor and canon of St Thomas's at Strassburg). For instance, of the above document of 1434 no original has ever come to light ; while the draft of the transaction, alleged to have been written at the time in a register of contracts, and to have been found about 1 740 by Wencker, has also disappeared with the register itself. The document (now only known from a copy said to have been taken by Wencker from the draft) is upheld as genuine by Schorbach, who favours an in- vention of printing at Strassburg, but Bockenheimer, though supporting Gutenberg and Mainz, declares it to be a fiction (Guten- be.rg-Feier, Mainz, 1900, pp. 24-33). Again, suspicions are justified

represent him as having been engaged there in some experiments requiring money, with Andreas Dritzehn, a fellow-citizen, who became not only security for him but his partner to carry out Gutenberg's plan for polishing

stones and the manufacture of looking-glasses, for which a lucrative sale was expected at the approaching pilgrimage of 1440 (subsequently postponed, accord- ing to the documents, although there is no evidence for this postponement) to Aix-la-Chapelle. Money was lent for this purpose by two other friends. In 1438 another partnership was arranged between Gutenberg, Andreas Dritzehn, and Andreas and Anton Heilmann, and that this had in view the art of printing has been inferred from the word " drucken " used by one of the witnesses in the law proceedings which soon after followed. An action was brought, after the death of Dritzehn, by his two brothers to force Gutenberg to accept them as partners in their brother's place, but the decision was in favour of the latter. In 1441 Gutenberg became surety to the St Thomas Chapter at Strassburg for Johann Karle, who borrowed 100 guilders (about £16) from the chapter, and on November 17, 1442, he himself borrowed 80 livres through Martin Brechter (or Brehter) from the same chapter. Of his whereabouts from the 12th of March 1444 (when he paid a tax at Strassburg) to the 17th of October 1448 nothing certain is known. But on the latter date we find him at Mainz, borrowing 1 50 gold guilders of his kinsman, Arnold Gelthus, against an annual interest of i\ gold guilders. We do not know whether the interest on this debt has ever been paid, but the debt itself appears never to have been paid off, as the contract of this loan was renewed (vidimused) on August 23, 1503, for other parties. It is supposed that soon afterwards Gutenberg must have been able to show some convincing results of his work, for it appears that about 1450 Johann Fust (q.v.) advanced him 800 guilders to promote it, on no security except that of " tools " still to be made. Fust seems also to have undertaken to advance him 300 guilders a year for expenses, wages, house-rent, parchment, paper, ink, &c, but he does not appear to have ever done so. If at any time they disagreed, Gutenberg was to return the 800 guilders, and the " tools " were to cease to be security. It is not known to what purpose Gutenberg devoted the money advanced to him. In the minutes of the law-suit of 1455 he himself says that he had to make his " tools " with it. But he is presumed to have begun a large folio Latin Bible, and to have printed during its progress some smaller books 1 and likewise the Letter of Indulgence (granted on the 12th of April 1451 by Pope Nicholas V. in aid of John II., king of Cyprus, against the Turks) , of 31 lines, having the earliest printed date 1454, of which several copies are preserved in various European libraries. A copy of the 1455 issue of the same Indulgence is in the Rylands Library at Manchester (from the Althorp Library).

It is not known whether any books were printed while this partnership between Gutenberg and Fust lasted. Trithemius (Ann. Hirsaug. ii. 421) says they first printed, from wooden

with respect to the documents recording Gutenberg's lawsuit of 1439 at

Strassburg. Bockenheimer explains at great length (I.e. pp. 41-72) that they are forgeries. He even explains (ibid. pp. 97-107) that the so-called Helmasperger document of November 6, 1455, may be a fabrication of the Faust von Aschaffenburg family, who endeavoured to claim Johann Fust as their ancestor. There are also (1) a fragment of a fictitious " press," said to have been constructed by Gutenberg in 1441, and to have been discovered (!) at Mainz in 1856; (2) a forged imprint with the date 1458 in a copy of Pope Gregory's Dialogues, really printed at Strassburg about 1470; (3) a forged rubric in a copy of the Tractatus de celebratione missarum, from which it would appear that Johann Gutenberg and Johann Num- meister had presented it on June 19, 1463, to theCarthusian monastery near Mainz; (4) four forged copies of the Indulgence of 1455, in the Culemann Collection in the Kastner Museum at Hanover, &c. (see further, Hessels, " The so-called Gutenberg Documents," in The Library, J909).

1 Among these were perhaps (1) one or two editions of the work of • Donatus, De oeto parlibus orationis, 27 lines to a page, of one of v/hich two leaves, now in the Paris National Library, were discovered at Mainz in the original binding of an account book, one of them having, but in a later hand, the year 1451 (?); (2) the Turk-Kalendar for 1455 (preserved in the Hof-Bibliothek at Munich) ; (3) the Cisianus (preserved, in the Cambridge Univ. Libr.), and perhaps others now lost.

blocks, a vocabulary called Catholicon, which cannot have been the Catholicon of Johannes de Janua, a folio of 748 pages in two columns of 66 lines each, printed in 1460, but was perhaps a small glossary now lost. 2 The Latin Bible of 42 lines, a folio of 1282 printed pages, in two columns with spaces left for illuminated initials (so called because each column contains 42 lines, and also known as the Mazarin Bible, because the first copy described wasfound in the library of Cardinal Mazarin), was finished before the 15th of August 1456 ; 3 German biblio- graphers now claim this Bible for Gutenberg, but, according to bibliographical rules, it must be ascribed to Peter Schoffer, perhaps in partnership with Fust. It is in smaller type than the Bible of 36 lines, which latter is called either (a) the Bamberg Bible, because nearly all the known copies were found in the neighbourhood of Bamberg, or (b) Schelhorn's Bible, because J. G. Schelhorn was the first who described it in 1760, or © Pfister's Bible, because its printing is ascribed to Albrecht Pfister of Bamberg, who used the same type for several small German books, the chief of which is Boner's Edelstein (1461, 4to), 88 leaves, with 85 woodcuts, a book of fables in German rhyme. Some bibliographers believe this 36-line Bible to have been begun, if not entirely printed, by Gutenberg during hispartnership with Fust, as its type occurs in the 3 i-line Letters of Indulgence of 1454, was used for the 27-line Donatus (of 1451?), and, finally, when found in Pfister's possession in 1461, appears to be old and worn, except the additional

letters k, w, z required for German, which are clear and sharp like the types used in the Bible. Again, others profess to prove (Dziatzko, Gutenberg's friiheste Druckerpraxis) that B 30 was a reprint of B 42 .

Gutenberg's work, whatever it may have been, was not a commercial success, and in 1452 Fust had to come forward with another 800 guilders to prevent a collapse. But some time before November 1455 the latter demanded repayment of his advances (see the Helmasperger Notarial Document of November 6, 1455, in Dziatzko's Beitrdge zur Gulenbergfrage, Berlin, 1889), and took legal proceedings against Gutenberg. We do not know the end of these proceedings, but if Gutenberg had prepared any printing materials it would seem that he was compelled to yield up the whole of them to Fust; that the latter removed them to his own house at Mainz, and there, with the assistance of Peter Schoffer, issued various books until the sack of the city in 1462 by Adolphus II. caused a suspension of printing for three years, to be resumed again in 1465.

We have no information as to Gutenberg's activity, and very little of his whereabouts, after his separation from Fust. In a document dated June 21, 1457, he appears as witness on behalf of one of his relatives, which shows that he was then still at Mainz. Entries in the registers of the St Thomas Church at Strassburg make it clear that the annual interest on the money which Gutenberg on the 17th of November 1442 (see above) had borrowed from the chapter of that church was regularly paid till the nth of November 1457, either by himself or by his

2 Ulric Zell states, in the Cologne Chronicle of 1499, that Gutenberg and Fust printed a Bible in large type like that used in missals. It has been said that this description applies to the 42-line Bible, as its type is as large as that of most missals printed before 1500, and that the size now called missal type (double pica) was not used in missals until late in the 1 6th century. This is no doubt true of the smaller missals printed before 1500, some of which are in even smaller type than the 42-line Bible. But many of the large folio missals, as that printed at Mainz by Peter Schoffer in 1483, the Carthusian missal printed at Spires by Peter Drach about 1490, and the Dominican missal printed by Andrea de Torresanis at Venice in 1496, are in as large type as the 36-line Bible. Peter Schoffer (1425-1502) of Gernsheim, between Mainz and Mannheim, who was a copyist in Paris in 1449, and whom Fust called his servant (famulus), is said by Trithemius to have discovered an easier way of founding characters, whence Lambinet and others concluded that Schoffer invented the punch. Schoffer himself, in the colophon of the Psalter of 1457, a work which some suppose to have been planned and partly printed by Gutenberg, claims only the mode of printing rubrics and coloured capitals.

3 The Leipzig copy of this Bible (which formerly belonged to Herr Klemm of Dresden) has at the end the MS. year 1453 in old Arabic numerals. But certain circumstances connected with this date make it look very suspicious.

surety, Martin Brechter. But the payment due on the latter date appears to have been delayed, as an entry in the register of that year shows that the chapter had incurred expenses in taking steps to have both Gutenberg and Brechter arrested. This time the difficulties seem to have been removed, but on and after the nth of November 1458 Gutenberg and Brechter remained in default. The chapter made various efforts, all recorded in their registers, to get their money, but in vain. Every year they recorded the arrears with the expenses to which they were put in their efforts to arrest the defaulters, till at last in 1474 (six years after Gutenberg's death) their names are no longer mentioned.

Meantime Gutenberg appears to have been printing, as we learn from a document dated February 26, 1468, that a syndic of Mainz, Dr Conrad Homery (who had formerly been in the service of the elector Count Diet her of Ysenburg), had at one time supplied him, not with money, but with some formes, types, tools, implements and other things belonging to printing, which Gutenberg had left after his death, and which had, and still, belonged to him (Homery); this material had come into the hands of Adolf, the archbishop of Mainz, who handed or sent it back to Homery, the latter undertaking to use it in no other town but Mainz, nor to sell it to any person except a citizen of Mainz, even if a stranger should offer him a higher price for the things. This material has never yet been identified, so that we do not know what types Gutenberg may have had at his disposal; they could hardly have included the types of the Catholicon of 1460, as is suggested, this work being probably executed by Heinrich Bechtermunze (d. 1467), who afterwards removed to Eltville, orperhaps by Peter Schoffer, who, about 1470, advertises the book as his property (see K. Burger, Buchhandler-Anzeigen). It is uncertain whether Gutenberg remained in Mainz or removed to the neighbouring town of Eltville, where he may have been engaged for a while with the brothers Bechtermunze, who printed there for some time with the types of the 1460 Catholicon. On the 17th of January 1465 he accepted the post of salaried courtier from the archbishop Adolf, and in this capacity received annually a suit of livery together with a fixed allowance of corn and wine. Gutenberg seems to have died at Mainz at the beginning of 1468, and was, according to tradition, buried in the Franciscan church in that city. His relative Arnold Gelthus erected a

monument to his memory near his supposed grave, and forty years afterwards Ivo Wittig set up a memorial tablet at the legal college at Mainz. No books bearing the name of Gutenberg as printer are known, nor is any genuine portrait of him known, those appearing upon medals, statues or engraved plates being all fictitious.

In 1 898 the firm of L. Rosenthal, at Munich, acquired a Missale speciale on paper, which Otto Hupp, in two treatises published in 1898 and 1902, asserts to have been printed by Gutenberg about 1450, seven years before the 1457 Psalter. Various German bibliographers, however, think that it could not have been printed before 1480, and, judging from the fac- similes published by Hupp, this date seems to be approximately correct.

On the 24th of June 1900 the five-hundredth anniversary of Gutenberg's birth was celebrated in several German cities, notably in Mainz and Leipzig, and most of the recent literature on the invention of printing dates from that time.

So we may note that in 1902 a vellum fragment of an Astro- nomical Kalendar was discovered by the librarian of Wiesbaden, Dr G. Zedler (Die dlteste Gutenbergtypc, Mainz, 1902), apparently printed in the 36-line Bible type, and as the position of the sun, moon and other planets described in this document suits the years 1429, 1448 and 1467, he ascribes the printing of this Kalendar to the year 1447. A paper fragment of a poem in German, entitled Weltgericht, said to be printed in the 36-line Bible type, appears to have come into the possession of Herr Eduard Beck at Mainz in 1892, and was presented by him in 1903 to the Gutenberg Museum in that city. Zedler published a facsimile of it in 1904 (for the Gutenberg Gesellschaft) , with a description, in which he places it before the 1447 Kalendar,

c. 1444-1447. Moreover, fragments of two editions of Donatus different from that of 1451 (?) have recently been found; see Schwenke in Centralbl. fur Bibliothekwesen (1908).

The recent literature upon Gutenberg's life and work and early printing in general includes the following: A. von der Linde, Geschichle und Erdichtung (Stuttgart, 1878); id. Geschichte der Buchdruckerkunst (Berlin, 1886); J. H. Hessels, Gutenberg, Was he the Inventor of Printing ? (London, 1882) ; id. Haarlem, the Birthplace of Printing, not Mentz (London, 1886) ; O. Hartwig, Festschrift zum funfhundertjahrigen Geburtstag von Johann Gutenberg (Leipzig, 1900), which includes various treatises by Schenk zu Schweinsberg, K. Schorbach, &c. ; P. Schwenke, Vntersuchungen zur Geschichte des ersten Buchdrucks (Berlin, 1900) ; A. Borckel, Gutenberg, sein Leben, &c. (Giessen, 1897) ; id. Gutenberg und seine beriihinten

Nachfolger im ersten Jahrhundert der Typographic (Frankfort, 1900); F. Schneider, Mainz und seine Drucker (1900); G. Zedler, Gutenberg-Forschungen (Leipzig, 1901) ; J. H. Hessels, The so-called Gutenberg Documents (London, 1910). For other works on the subject see Typography. (J. H. H.)

GUTERSLOH, a town of Germany, in the Prussian province of Westphalia, n m. S.W. from Bielefeld by the railway to Dort- mund. Pop. (1905), 7375. It is a seat of silk and cotton in- dustries, and has a la rge trade in Westphalian hams and sausages. Printing, brewing and distilling are also carried on, and the town is famous for its rye-bread (Pumpernickel) . Gütersloh has two Evangelical churches, a Roman Catholic church, a synagogue, a school and other educational establishments.

See Eickhoff, Geschichte der Stadt und Gemeinde Gütersloh (Gütersloh, 1904).

GUTHRIE, SIR JAMES (1S59-), Scottish painter, and one of the leaders of the so-called Glasgow school of painters, was born at Greenock. Though in his youth he was influenced by John Pettie in London, and subsequently studied in Paris, his style, which is remarkable for grasp of character, breadth and spontaneity, is due to the lessons taught him by observation of nature, and to the example of Crawhall, by which he benefited in Lincolnshire in the early 'eighties of the last century. In his early works, such as " The Gipsy Fires are Burning, for Daylight is Past and Gone " (1882), and the " Funeral Service in the Highlands," he favoured a thick impasto, but with growing experience he used his colour with greater economy and reti- cence. Subsequently he devoted himself almost exclusively to portraiture. Sir James Guthrie, like so many of the Glasgow artists, achieved his first successes on the Continent, but soon found recognition in his native country. He was elected associate of the Royal Scottish Academy in 1888, and full member in 1892, succeeded Sir George Reid as president of the Royal Scottish Academy in 1902, and was knighted in 1903. His painting " Schoolmates " is at the Ghent Gallery. Among his most successful portraits are those of his mother, Mr R. Garroway, Major Hotchkiss, Mrs Fergus, Professor Jack, and Mrs Watson.

GUTHRIE, THOMAS (1803-1873), Scottish divine, was born at Brechin, Forfarshire, on the 12th of July 1803. He entered the university of Edinburgh at the early age of twelve, and continued to attend classes there for more than ten years. On the 2nd of February 1825 the presbytery of Brechin licensed him as a preacher in connexion with the Church of Scotland, and in 1826 he was in Paris studying natural philosophy, chemistry, and comparative anatomy. For two years he acted as manager of his father's bank, and in 1830 was inducted to his first charge, Arbirlot,

in Forfarshire, where he adopted a vivid dramatic style of preaching adapted to his congregation of peasants, farmers and weavers. In 1837 he became the colleague of John Sym in the pastorate of Old Greyfriars, Edinburgh, and at once attracted notice as a great pulpit orator. Towards the close of 1840 he became minister of St John's church, Victoria Street, Edinburgh. He declined invitations both from London and from India. He was an enthusiastic supporter of the move- ment which led to the Disruption of 1843; ar >d his name is thenceforth associated with the Free Church, for which he collected £116,000 from July 1845 to June 1846 to provide manses for the seceding ministers. In 1844 he became a teetotaller. In 1847 he began the greatest work of his life by the publication of his first " Plea for Ragged Schools." This

pamphlet elicited a beautiful and sympathetic letter from Lord Jeffrey. A Ragged School was opened on the Castle Hill, which has been the parent of many similar institutions elsewhere, though Guthrie's relation to the movement is best described as that of an apostle rather than a founder. He insisted on bringing up all the children in his school as Protestants; and he thus made his schools proselytizing as well as educational institutions. This interference with religious liberty led to some controversy; and ultimately those who differed from Guthrie founded the United Industrial School, giving combined secular and separate religious instruction. In April 1847 the degree of D.D. was conferred on Guthrie by the university of Edinburgh; and in 1850 William Hanna (1808-1882), the biographer and son-in-law of Thomas Chalmers, was inducted as his colleague in Free St John's Church.

In 1850 Guthrie published A Plea on behalf of Drunkards and against Drunkenness, which was followed by The Gospel in Ezekiel (1855); The City: its Sins and Sorrows (1857); Christ and the Inheritance of the Saints (1858) ; Seedtime and Harvest of Ragged Schools (i860), consisting of his three Pleas for Ragged Schools. These works had an enormous sale, and portions of them were translated into French and Dutch. His advocacy of temperance had much to do with securing the passing of the Forbes Mackenzie Act, which secured Sunday closing and shortened hours of sale for Scotland. Mr Gladstone specially quoted him in support of the Light Wines Bill (i860). In 1862 he was moderator of the Free Church General Assembly; but he seldom took a prominent part in the business of the church courts. His remarkable oratorical talents, rich humour, genuine pathos and inimitable power of story-telling, enabled him to do good service to the total abstinence movement. He was one of the vice-presidents

of the Evangelical Alliance. In 1864, his health being seriously impaired, he resigned public work as pastor of Free St John's (May 17), although his nominal connexion with the congregation ceased only with his death. Guthrie had occasionally contributed papers to Good Words, and, about the time of his retirement from the ministry, he became first editor of the Sunday Magazine, himself contribut- ing several series of papers which were afterwards published separately. In 1865 he was presented with £5000 as a mark of appreciation from the public. His closing years were spent mostly in retirement ; and after an illness of several months' dura- tion he died at St Leonards-on-Sea on the 24th of February 1873.

In addition to the books mentioned above he published a number of books which had a remarkable circulation in Englandand America, such as Speaking to the Heart (1862) ; The Way to Life (1862) ; Man and the Gospel (1865) ; The Angel's Song (1865) ; The Parables (1866) ; Our Father's Business (1867); Out of Harness (1867); Early Piety (1868); Studies of Character from the Old Testament (1868-1870); Sundays Abroad (1871).

See Autobiography of Thomas Guthrie, D.D., and Memoir, by his sons (2 vols., London, 1874-1875).

GUTHRIE, THOMAS ANSTEY (1856-), known by the pseudonym of F. Anstey, English novelist, was born in Kensing- ton, London, on the 8th of August 1856. He was educated at King's College, London, and at Trinity Hall, Cambridge, and was called to the bar in 1880. But the popular success of his story Vice-Versa (1882) with its topsyturvy substitution of a father for his schoolboy son, at once made his reputation as a humorist of an original type. He published in 1883 a serious novel, The Giant's Robe; but, in spite of its excellence, he discovered (and again in 1889 with The Pariah) that it was not as a serious novelist but as a humorist that the public insisted on regarding him. As such his reputation was further confirmed by The Black Poodle (188.4), The Tinted Venus (1885), A Fallen Idol (1886), and other works. He became an important member of the staff of Punch, in which his " Voces populi " and his humorous parodies of a reciter's stock-piece (" Burglar Bill," &c.) represent his best work. In 1901 his successful farce The Man from Blankley's, based on a story which originally appeared in Punch, was first produced at the Prince of Wales's Theatre, in London.

GUTHRIE, the capital of Oklahoma, U.S.A., and the county- seat of Logan county, extending on both sides of Cottonwood

creek, and lying one mile south of the Cimarron river. Pop. (1890) 5333, (1900) 10,006, (1907) 11,652 (2871 negroes); (1010) 11,654. It is

served by the Atchison, Topeka & Santa F6, the Chicago, Rock Island & Pacific, the Missouri, Kansas & Texas, the Fort Smith & Western, and the St Louis, El Reno & Western railways. The city is situated about 940 ft. above the sea, in a prairie region devoted largely to stock-raising and the cultivation of Indian corn, wheat, cotton and various fruits, particularly peaches. Guthrie is one of the headquarters of the Federal courts in the state, the other being Muskogee. The principal public buildings at Guthrie are the state Capitol, the Federal building, the City hall, the Carnegie library, the Methodist hospital and a large Masonic temple. Among the schools are St Joseph's Academy and a state school for the deaf and dumb. Guthrie has a considerable trade with the surround- ing country and has cotton gins, a cotton compress, and foundries and machine shops; among its manufactures are cotton-seed oil, cotton goods, flour, cereals, lumber, cigars, brooms and furniture. The total value of the factory product in 1905 was $1,200,662. The municipality owns and operates the water-works. The city was founded in 1889, when Oklahoma was opened for settlement; in 1890 it was made the capital of the Territory, and in 1907 when Oklahoma was made a state, it became the state capital.

GUTHRUM (Godrum) (d. 890), king of East Anglia, first appears in the English Annals in the year 875, when he is mentioned as one of three Danish kings who went with the host to Cambridge. He was probably engaged in the campaigns of the next three years, and after Alfred's victory at Edington in 878, Guthrum met the king at Aller in Somersetshire and was baptized there under the name of ./Ethelstan. He stayed there for twelve days and was greatly honoured by his godfather Alfred. In 890 Guthrum-ˆthelstan died: he is then spoken of as " se norSerna cyning" (probably) "the Norwegian king," referring to the ultimate origin of his family, and we are told that he was the first (Scandinavian) to settle East Anglia. Guthrum is perhaps to be identified with Gormr (= Guthrum) hinn heimski or hinn riki of the Scandinavian sagas, the foster- father of Horo'aknutr, the father of Gorm the old. There is a treaty known as the peace of Alfred and Guthrum.

GUTSCHMID, ALFRED, Baron von (1835-1887), German historian and Orientalist, was born on the 1st of July at Losch- witz (Dresden). After holding chairs at Kiel (i866),K6nigsberg (1873), and Jena (1876), he was finally appointed professor of history at Tubingen, where he died on the 2nd of March 1887. He devoted himself to the study of Eastern language and history in its pre-Greek and Hellenistic periods and contributed largely to the literature of the subject.

Works. — Uber die Fragmente des Pompeius Trogus (supple- mentary vol. of Jahrbiicher fur klass. Phil., 1857) ; Die makedonische A nagraphe (1 864) ; Beitrdge zur Gesch. des alien Orients (Leipzig, 1858) ; Neue

Beitrdge zur Gesch. des alt. Or., vol. i., Die Assyriologie in Deutschland (Leipzig, 1876); Die Glaubwiirdigkeit der armenischen Gesch. des Moses von Khoren (1877); Untersuchungen uber die syrische Epitome des eusebischen Canones (1886); Untersuch. uber die Gesch. des Konigreichs Osraene (1887); Gesch. Irans (Alexander the Great to the fall of the Arsacidae) (Tubingen, 1887). He wrote on Persia and Phoenicia in the 9th edition of the Ency. Brit. A collection of minor works entitled Kleine Schriften was published by F. Rtihl at Leipzig (1889-1894, 5 vols.), with complete list of his writings. See article by Rtihl in Allgemeine deutsche Biographie, xlix. (1904).

GUTS-MUTHS, JOHANN CHRISTOPH FRIEDRICH (1759- 1839), German teacher and the principal founder of the German school system of gymnastics, was born at Quedlinburg on the 9th of August 1759. He was educated at the gymnasium of his native town and at Halle University; and in 1785 he went to Schnep- f enthal, where he taught geography and gymnastics. His method of teaching gymnastics was expounded by him in various handbooks; and it was chiefly through them that gymnastics very soon came to occupy such an important position in the school system of Germany. He also did much to introduce a better method of instruction in geography. He died on the 21st of May 1839.

His principal works are Gymnastik fur die Jugend (1793) ; Spiele zur Vbung und Erholung des Korpers und Geistes fiir die Jugend (1796); Turnbuch (1817); Handbuch der Geographie (1810); and a number of books constituting a Bibliothek fiir Padagogik, Schulwesen, und die gesammte padagogische Literatur Deutscklands. He also con- tributed to the Vollstdndiges Handbuch der neuesten Erdbeschreibung, and along with Jacobi published Deutsches Land und deulsches Volk, the first part, Deutsches Land, being written by him.

GUTTA (Latin for "drop"), an architectural term given to the small frusta of conical or cylindrical form carved below the triglyph and under the regula of the entablature of the Doric Order. They are sometimes known as "trunnels," a corruption of "tree-nail," and resemble the wooden pins which in framed timber work or in joinery are employed to fasten together the pieces of wood; these are supposed to be derived from the original timber construction of the Doric temple, in which the pins, driven through the regula, secured the latter to the taenia, and, according to C. Chipiez and F. A. Choisy, passed through the taenia to hold the triglyphs in place. In the earliest examples of the Doric Order at Corinth and Selinus, the

guttae are com- pletely isolated from the architrave, and in Temple C. at Selinus the guttae are 3 or 4 in. in front of it, as if to enable the pin to be driven in more easily. In later examples they are partly attached to the architrave. Similar guttae are carved under the mutules of the Doric cornice, representing the pins driven through the mutules to secure the rafters. In the temples at Bassae, Paestum and Selinus, instances have been found where the guttae had been carved separately and sunk into holes cut in the soffit of the mutules and the regula. Their constant employment in the Doric temples suggests that, although originally of constructive origin, they were subsequently employed as decorative features.

GUTTA PERCHA, the name applied to the evaporated milky fluid or latex furnished by several trees chiefly found in the islands of the Malay Archipelago. The name is derived from two Malay words, getah meaning gum, and pertja being the name of the tree — probably a Bassia — from which the gum was (errone- ously) supposed to be obtained.

Botanical Origin and Distribution. — The actual tree is known to the Malays as taban, and the product as getah laban. The best gutta percha of Malaya is chiefly derived from two trees, and is known as getah taban merah (red) or getah taban sutra (silky). The trees in question, which belong to the natural order Sapotaceae, have now been definitely identified, the first as Dichopsis gutta (Bentham and Hooker), otherwise Isonandra gutta (Hooker) or Palaquium gutta (Burck), and the second as Dichopsis oblongijolia (Burck). Allied trees of the same genus and of .the same natural order yield similar but usually inferior products. Among them may be mentioned species of Payena {getah soondie).

Gutta percha trees often attain a height of 70 to 100 ft. and the trunk has a diameter of from 2 to 3 ft. They are stated to be mature when about thirty years old. The leaves of Dichopsis, which are obovate-lanceolate, with a distinct pointed apex, occur in clusters at the end of the branches, and are bright green and smooth on the upper surface but on the lower surface are yellowish-brown and covered with silky hairs. The leaves are usually about 6 in. long and about 2 in. wide at the centre. The flowers are white, and the seeds are contained in an ovoid berry about 1 in. long.

The geographical distribution of the gutta percha tree is almost entirely confined to the Malay Peninsula and its immediate neighbourhood. It includes a region within 6 degrees north and south of the equator and 93°-ii9° longitude, where the tem- perature ranges from 66° to 90° F. and the atmosphere is exceed- ingly moist. The trees may be grown from seeds or from cuttings. Some planting has taken place in Malaya, but little has so far b,een done to acclimatize the plant in other regions. Recent information seems to point to the possibility of growing the tree in Ceylon and on the

west coast of Africa.

Preparation of Gutta Percha. — The gutta is furnished by the greyish milky fluid known as the latex, which is chiefly secreted in cylindrical vessels or cells situated in the cortex, that is, between the bark and the wood (or cambium). Latex also

occurs in the leaves of the tree to the extent of about 9 % of the dried leaves, and this may be removed from the powdered leaves by the use of appropriate solvents, but the process is not practic- able commercially. The latex flows slowly where an incision is made through the bark, but not nearly so freely, even in the rainy season, as the india-rubber latex. On this account the Malays usually fell the tree in order to collect the latex, which is done by chopping off the branches and removing circles of the bark, forming cylindrical channels about an inch wide at various points about a foot apart down the trunk. The latex exudes and fills these channels, from which it is removed and converted into gutta by boiling in open vessels over wood fires. The work is usually carried on in the wet season when the latex is more fluid and more abundant. Sometimes when the latex is thick water is added to it before boiling.

The best results are said to be obtained from mature trees about thirty years old, which furnish about 2 to 3 lb of gutta. Older trees do not appear to yield larger amounts of gutta, whilst younger trees are said to furnish less and of inferior quality. The trees have been so extensively felled for the gutta that there has been a great diminution in the total number during recent years, which has not been compensated for by the new plantations which have been established.

Uses of Gutta Percha. — The Chinese and Malays appear to have been acquainted with the characteristic property of gutta percha of softening in warm water and of regaining its hardness when cold, but this plastic property seems to have been only utilized for ornamental purposes, the construction of walking-sticks and of knife handles and whips, &c.

The brothers Tradescant brought samples of the curious material to Europe about the middle of the 17th century. It was then regarded as a form of wood, to which the name of " mazer " wood was given on account of its employment in making mazers or goblets. A description of it is given in a book published by John Tradescant in 1656 entitled Musaeum Trades- cantianum or a Collection of Rarities preserved at South Lambeth near London. Many of the curiosities collected from all parts of the world by the Tradescants subsequently formed the nucleus of the Ashmolean Museum at Oxford which was opened in 1683, but the specimen of " mazer wood " no longer exists.

In 1843 samples of the material were sent to London by Dr William Montgomerie of Singapore, and were exhibited at the Society of Arts, and in the same year Dr Jose d' Almeida sent samples to the Royal Asiatic Society. Gutta percha was also exhibited at the Great Exhibition of 1851.

Dr Montgomerie's communication to the Society of Arts led to many experiments being made with the material. Casts of medals were successfully produced, and Sir William Siemens, in conjunction with Werner von Siemens, then made the first experiments with the material as an insulating covering for cable and telegraph wires, which led to the discovery of its important applications in this connexion and to a considerable commercial demand for the substance.

The value of gutta percha depends chiefly on its quality, that is its richness in true gutta and freedom from resin and other impurities which interfere with its physical characters, and especially its insulating power or inability to conduct electricity. The chief use of gutta percha is now for electrical purposes. Other minor uses are in dentistry and as a means of taking impressions of medals, &c. It has also found application in the preparation of belting for machinery, as well as for the construction of the handles of knives and surgical instruments, whilst the inferior qualities are used for waterproofing. „ Commercial Production. — The amount of gutta percha exported through Singapore from British and Dutch possessions in the East is subject to considerable fluctuation, depending chiefly on the demand for cable and telegraph construction. In 1886 the total export from Singapore was 40,411 cwt., of which Great Britain took 31,666 cwt.; in 1896 the export was 51,982 cwt. of which 29,722 cwt. came to Great Britain; while in 1905, 42,088 cwt. were exported (19,517 cwt. to Great Britain). It has to be remembered that the official returns include not only

gutta percha of various grades of quality but also other inferior products sold under the name of gutta percha, some of which are referred to below under the head of substitutes. The value of gutta percha cannot therefore be correctly gauged from the value of the imports. In the ten years 1806-1006 the best qualities of gutta percha fetched from 4s. to about 7s. per ib. Gutta percha, however, is used for few and special purposes, and there is no free market, the price being chiefly a matter of arrangement between the chief producers and consumers.

Characters and Properties. — Gutta percha appears in commerce in the form of blocks or cakes of a dirty greyish appearance, often exhibiting a

reddish tinge, and just soft enough to be indented by the nail. It is subject to considerable adulteration, various materials, such as coco-nut oil, being added by the Malays to improve its appear- ance. The solid, which is fibrous in texture, hard and inelastic but not brittle at ordinary temperature, becomes plastic when immersed in hot water or if otherwise raised to a temperature of about 65 ° — 66 ° C. in the case of gutta of the first quality, the temperature of softening being dependent on the quality of the gutta employed. In this condition it can be drawn out into threads, but is still inelastic. On cooling again the gutta resumes its hardness without becoming brittle. In this respect gutta percha differs from india-rubber or caoutchouc, which does not become plastic and unlike gutta percha is elastic. This property of softening on heating and solidifying when cooled again, without change in its original properties, enables gutta percha to be worked into various forms, rolled into sheets or drawn into ropes. The specific gravity of the best gutta percha lies between 0-96 and 1. Gutta percha is not dissolved by most liquids, although some remove resinous constituents; the best solvents are oil of turpentine, coal-tar oil.jcarbon bisulphide and chloroform, and light petroleum when hot. Gutta percha is not affected by alkaline solutions or by dilute acids. Strong sulphuric acid chars it when warm, and nitric acid effects complete oxidation.

When exposed to air and light, gutta percha rapidly deteriorates, oxygen being absorbed, producing a brittle resinous material.

Chemical Composition. — Chemically, gutta percha is not a single substance but a mixture of several constituents. As the proportions of these constituents in the crude material are not constant, the properties of gutta percha are subject to variation. For electrical purposes it should have a high insulating power and dielectric strength and a low inductive capacity; the possession of these properties is influenced by the resinous constituents present.

The principal constituent of the crude material is the pure gutta, a hydrocarbon of the empirical formula CioHie. It is therefore isomeric with the hydrocarbon of caoutchouc and with that of oil of turpentine. Accompanying this are at least two oxygenated resinous constituents — albane CioHkO and fluavil C20H32O — which can be separated from the pure gutta by the use of solvents. Pure gutta is not dissolved by ether and light petroleum in the cold, whereas the resinous constituents are removed by these liquids. The true gutta exhibits in an enhanced degree the valuable properties of gutta percha, and the commercial value of the raw material is frequently determined by ascertaining the proportion of true gutta present, the higher the proportion of this the more valuable is the gutta percha. The following are the results of analyses of gutta percha from trees of the genus Dichopsis or Palaquium : —

Gutta per cent.

Resin per cent.

Dichopsis (<

*11 **

}r Palaquium) oblongifolia ,, gutta ,, polyantha ,, pustulata . ,, Maingayi .

88-8 82-0 49-3 47‘8 24-4

II-2

18-0

507 52-2

75-6

The hydrocarbon of gutta percha, gutta, is closely related in chemical constitution to caoutchouc. When distilled at a high temperature both are resolved into a mixture of two simpler hydro- carbons, isoprene (CsH 8) and caoutchoucine or dipentene (CioHi 6), and the latter by further heating can be resolved into isoprene, a hydrocarbon of known constitution which has been produced synthetically and spontaneously reverts to caoutchouc. The precise relationship of isoprene to gutta has not been ascertained, but recently Harries has further elucidated the connexion between gutta and caoutchouc by showing that under the action of ozone both break up into laevulinic aldehyde and hydrogen peroxide, but differ in the proportions of these products they furnish. The two materials must therefore be regarded as very closely related in chemical , constitution. Like caoutchouc, gutta percha is able to combine with sulphur, and this vulcanized product has found some commercial applications.

Manufacture of Gutta Percha. — Among the earliest patents taken out for the manufacture of gutta percha were those of Charles Hancock, the first of which is dated 1843.

Before being used for technical purposes the raw gutta percha is cleaned by machinery whilst in the plastic state. The chopped or

sliced material is washed by mechanical means in hot water and forced through a’ sieve or strainer of fine wire gauze to remove dirt. It is then kneaded or ” masticated ” by machinery to remove the enclosed water, and is finally transferred whilst still hot and plastic to the rolling-machine, from

which it emerges in sheets of different thickness. Sometimes chemical treatment of the crude gutta percha is resorted to for the purpose of removing the resinous constituents by the action of alkaline solutions or of light petroleum.

Substitutes for Gutta Percha. — For some purposes natural and artificial substitutes for gutta percha have been employed. The similar products furnished by other plants than those which yield gutta percha are among the more important of the natural substitutes, of which the material known as " balata " or " Surinam gutta percha," is the most valuable. This is derived from a tree, Mimusops balata (bullet tree), belonging to the same natural order as gutta percha trees, viz. Sapotaceae. It is a large tree, growing to a height of 80 to 100 ft. or more, which occurs in the West Indies, in South America, and is especially abundant in Dutch and British Guiana. The latex which furnishes balata is secreted in the cortex between the bark and wood of the tree. As the latex flows freely the trees are tapped by making incisions in the same fashion as in india-rubber trees, and the balata is obtained by evaporating the milky fluid. Crude balata varies in composition. It usually contains nearly equal proportions of resin and true gutta. The latter appears to be identical with the chief constituent of gutta percha. The properties of balata correspond with its composition, and it may therefore be classed as an inferior gutta percha. Balata fetches from is. 6d. to 2s. 8d. per lb.

Among the inferior substitutes for gutta percha may be mentioned the evaporated latices derived from Butyrospermum Parkii (shea- butter tree of West Africa or karite of the Sudan), Calotropis gigantea (Madar tree of India), and Dyera costulata of Malaya and Borneo, which furnishes the material known as " Pontianac." All these contain a small amount of gutta-like material associated with large quantities of resinous and other constituents. They fetch only a few pence per lb, and are utilized for waterproofing purposes.

Various artificial substitutes for gutta percha have been invented chiefly for use as insulating materials. These often consist of mixtures of bitumen with linseed and other oils, resins, &c, in some cases incorporated with inferior grades of gutta percha.

For further information respecting gutta percha, and for figures of the trees, the following works may be consulted: Jumelle, Les Plantes d caoutchouc et d gutta (Paris, Challamel, 1903) ; Obach, " Cantor Lectures on Gutta Percha," Journal of the Society of Arts, 1898. (W. R. D.)

GUTTER (0. Fr. goutiere, mod. gouttiere, from Lat. gutta, drop), in architecture, a horizontal channel or trough contrived to carry away the

water from a flat or sloping roof to its discharge down a vertical pipe or through a spout or gargoyle; more specifically, but loosely, the similar channel at the side of a street, below the pavement. In Greek and Roman temples the cymatium of the cornice was the gutter, and the water was discharged through the mouths of lions, whose heads were carved on the same. Sometimes the cymatium was not carried along the flanks of a temple, in which case the rain fell off the lower edge of the roof tiles. In medieval work the gutter rested partly on the top of the wall and partly on corbel tables, and the water was discharged through gargoyles. Sometimes, however, a parapet or pierced balustrade was carried on the corbel table enclosing the gutter. In buildings of a more ordinary class the parapet is only a continuation of the wall below, and the gutter is set back and carried in a trough resting on the lower end of the roof timbers. The safest course is to have an eaves gutter which projects more or less in front of the wall and is secured to and carried by the rafters of the roof. In Renaissance archi- tecture generally the pierced balustrade of the Gothic and transi- tion work was replaced by a balustrade with vertical balusters. In France a compromise was effected, whereby instead of the horizontal coping of the ordinary balustrade a richly carved cresting was employed, of which the earliest example is in the first court of the Louvre by Pierre Lescot. This exists throughout the French Renaissance, and it is one of its chief characteristic features.

GUTZKOW, KARL FERDINAND (1811-1878), German novelist and dramatist, was born on the 17th of March 1811 at Berlin, where his father held a clerkship in the war office. After leaving school he studied theology and philosophy at the university of his native town, and while still a student, began his literary career by the publication in 1831 of a periodical entitled Forum der Joumallileratur. This brought him to the notice of Wolfgang

Menzel, who invited him to Stuttgart to assist in the editorship of the Literaturblatt. At the same time he continued his uni- versity studies at Jena, Heidelberg and Munich. In 1832 he published anonymously at Hamburg Briefe eines Narren an eine Ndrrin, and in 1833 appeared at Stuttgart Maha-Guru, Geschichle eines Goltes, a fantastic and satirical romance. In 1835 he went to Frankfort, where he founded the Deutsche Revue. In the same year appeared Watty, die Zweiflerin, from the publication of which may be said to date the school of writers who, from their opposition to the literary, social and religious traditions of romanticism, received the name of " Young Germany." The work was

directed specially against the institution of marriage and the belief in revelation; and what- ever interest it might have attracted from its own merits was enhanced by the action of the German federal diet, which condemned Gutzkow to three months' imprisonment, decreed the suppression of all he had written or might yet write, and prohibited him from exercising the functions of editor within the German confederation. During his term of imprisonment at Mannheim, Gutzkow employed himself in the composition of his treatise Zur Philosophie der Geschichle (1836). On obtaining his freedom he returned to Frankfort, whence he went in 1837 to Hamburg. Here he inaugurated a new epoch of his literary activity by bringing out his tragedy Richard Savage (1839), which immediately made the round of all the German theatres. Of his numerous other plays the majority are now neglected; but a few have obtained an established place in the repertory of the German theatre — especially the comedies Zopfund Schwert (1844), Das Urbild des Tartiijfe (1847), Der Konigsleutnant (1849) and the blank verse tragedy, Uriel Acosta (1847). In 1847 Gutzkow went to Dresden, where he succeeded Tieck as literary adviser to the court theatre. Mean- while he had not neglected the novel. Seraphine (1838) was followed by Blasedow und seine Sohne, a satire on the educational theories of the time. Between 1850 and 1852 appeared Die Ritter vom Geisle, which may be regarded as the starting-point for the modern German social novel. Der Zauberer von Rom is a powerful study of Roman Catholic life in southern Germany. The success of Die Ritter vom Geiste suggested to Gutzkow the establishment of a journal on the model of Dicken's Household Words, entitled Unterhaltungen am hauslichen Herd, which first appeared in 1852 and was continued till 1862. In 1864 he had an epileptic fit, and his productions show henceforth decided traces of failing powers. To this period belong the historical novels Hohenschwangau (1868) and Fritz Ellrodt (1872), Lebensbilder (1870-1872), consisting of autobiographic sketches, and Die Sohne Pestalozzis (1870), the plot of which is founded on the story of Kaspar Hauser. On account of a return of his nervous malady, Gutzkow in 1873 made a journey to Italy, and on his return took up his residence in the country near Heidelberg, whence he removed to Frankfort-on-Main, dying there on the r6th of December 1878. With the exception of one or two of his comedies, Gutzkow's writings have fallen into neglect. But he exerted a powerful influence on the opinions of modern Germany ; and his works will always be of interest as the mirror in which the intellectual and social struggles of his time are best reflected.

An edition of Gutzkow's collected works appeared at Jena (1873- 1876, new ed., 1879). E. Wolff has published critical editions of Gutzkow's Meislerdramen (1892) and Watty die Zweiflerin (1905). His more important novels have been frequently reprinted. For Gutzkow's life see his various autobiographical writings such as Aus der Knabenzeit (1852),

Riickblicke auf mein Leben (1876), &c. For an estimate of his life and work see J. Proelss, Das junge Deutsch- land (1892); also H. H. Houben, Studien uber die Dramen Gutzkows (1898) and Gutzkow-Funde (1901).

GUTZLAFF, KARL FRIEDRICH AUGUST (1803-1851), German missionary to China, was born at Pyritz in Pomerania on the 8th of July 1803. When still apprenticed to a saddler in Stettin, he made known his missionary inclinations to the king of Prussia, through whom he went to the Padagogium at Halle, and afterwards to the mission institute of Janike in Berlin. In 1826, under the auspices of the Netherlands Missionary .Society, be weac to Java, where he was able to learn Chinese.

Leaving the society in 1828, he went to Singapore, and in August of the same year removed to Bangkok, where he translated the Bible into Siamese. In 1829 he married an English lady, who aided him in the preparation of a dictionary of Cochin Chinese, but she died in August 1831 before its completion. Shortly after her death he sailed to Macao in China, where, and subse- quently at Hong Kong, he worked at a translation of the Bible into Chinese, published a Chinese monthly magazine, and wrote in Chinese various books on subjects of useful knowledge. In 1834 he published at London a Journal of Three Voyages along the Coast of China in 1831, 1832 and 1833. He was appointed in 1835 joint Chinese secretary to the English commission, and during the opium war of 1840-42 and the negotiations connected with the peace that followed he rendered valuable service by his knowledge of the country and people. The Chinese author- ities refusing to permit foreigners to penetrate into the interior, Gutzlaff in 1844 founded an institute for training native mis- sionaries, which was so successful that during the first four years as many as forty-eight Chinese were sent out from it to work among their fellow-countrymen. He died at Hong Kong on the 9th of August 1851.

Gutzlaff also wrote A Sketch of Chinese History, Ancient and Modern (London, 1834), and a similar work published in German at Stuttgart in 1847; China Opened (1838); and the Life of Taow- Kwang (1851; German edition published at Leipzig in 1852). A complete collection of his Chinese writings is contained in the library at Munich.

GUY OF WARWICK, English hero of romance. Guy, son of Siward or Seguard of Wallingford, by his prowess in foreign wars wins in marriage Felice (the Phyllis of the well-known ballad), daughter and heiress of Roalt, earl of Warwick. Soon after his marriage he is seized with remorse for the violence of his past life, and, by way of penance, leaves his wife and fortune to make a pilgrimage to the Holy Land. After years of absence he returns in time to deliver Winchester for King ˆEthelstan from the invading northern kings, Anelaph (Anlaf or Olaf) and Gonelaph, by slaying in single

fight their champion the giant Colbrand. Local tradition fixes the duel at Hyde Mead near Winchester. Making his way to Warwick he becomes one of his wife's bedesmen, and presently retires to a hermitage in Arden, only revealing his identity at the approach of death. The versions of the Middle English romance of Guy which we possess are adaptations from the French, and are cast in the form of a roman d'aventures, opening with a long recital of Guy's wars in Lombardy, Germany and Constantinople, and embellished with fights with dragons and surprising feats of arms. The kernel of the tradition evidently lies in the fight with Colbrand, which represents, or at least is symbolic 1 of an historical fact. The religious side of the legend finds parallels in the stories of St Eustachius and St Alexius, 2 and makes it probable that the Guy-legend, as we have it, has passed through monastic hands. Tradition seems to be at fault in putting Guy's adventures under /Ethelstan. The Anlaf of the story is probably Olaf Tryggvason, who, with Sweyn of Denmark, harried the southern counties of England in 993 and pitched his winter quarters in Southampton. Winchester was saved, however, not by the valour of an English champion, but by the payment of money. This Olaf was not unnaturally confused with Anlaf Cuaran or Havelok (q.v.).

The name Guy (perhaps a Norman form of A. S. wig = war) may be fairly connected with the family of Wigod, lord of Wallingford under Edward the Confessor, and a Filicia, who belongs to the 1 2th century and was perhaps the Norman poet's patroness, occurs in the pedigree of the Ardens, descended from Thurkill of Warwick and his son Siward. Guy's Cliffe, near Warwick, where in the 14th century Richard de Beauchamp, earl of Warwick, erected a chantry, with a statue of the hero, does not correspond with the site of the hermitage as described in the

1 Some writers have supposed that the fight with Colbrand symbolizes the victory of Brunanburh. Anelaph and Gonelaph would then represent the cousins Anlaf Sihtricson and Anlaf Godfreyson (see Havelok).

2 See the English legends in C. Horstmann, Altenglische Legenden, Neue Folge (Heilbronn, 1881).

romance. The bulk of the legend is obviously fiction, even though it may be vaguely connected with the family history of the Ardens and the Wallingford family, but it was accepted as authentic fact in the chronicle of Pierre de Langtoft (Peter of Langtof t) written at the end of the 13th century. The adventures of Reynbrun, son of Guy, and his tutor Heraud of Arden, who had also educated Guy, have much in common with his father's history, and form an interpolation sometimes treated as a separate romance. There is a certain connexion between Guy and Count Guido of Tours (fl. 800), and Alcuin's advice to the count is transferred to the English hero in the Speculum Gy of Warewyke (c. 1327), edited for the Early English Text Society by G. L. Morrill, 1898.

The French romance (Brit.. Mus. Harl. MS. 3775) has not been printed, but is described by Emile Littrti in Hist. lilt, de la France (xxii., 841-851, 1852). A French prose version was printed in Paris, 1525, and subsequently (see G. Brunet, Manuel du libraire, s. v. " Guy de Warvich ") ; the English metrical romance exists in four versions, dating from the early 14th century; the text was edited by J. Zupitza (1875-1876) for the E.E.T.S. from Cambridge University Lib. Paper MS. Ff. 2, 38, and again (3 pts. 1883-1891, extra series, Nos. 42, 49, 59), from the Auchinleck and Caius College MSS. The popularity of the legend is shown by the numerous versions in English: Guy of Warwick, translated from the Latin of Girardus Cornubiensis (fl. 1350) into English verse by John Lydgate between 1442 and 1468; Guy of Warwick, a poem (written in 1617 and licensed, but not printed) by John Lane, the MS: of which (Brit. Mus.) contains a sonnet by John Milton, father of the poet; The Famous Historie of Guy, Earl oj 'Warwickic. 1607) , by SamuelRowlands ; The Booke of the Moste Vicloryous Prince Guy of Warwicke (William Copland, no date) ; other editions by J. Cawood and C. Bates; chap- books and ballads of the 17th and 18th centuries: The Tragical History, Admirable Achievements and Curious Events of Guy, Earl of Warwick, a tragedy (1661) which may possibly be identical with a play on the subject Written by John Day and Thomas Dekker, and entered at Stationers' Hall on the igth of January 1618/19; three verse fragments are printed by Hales and Furnivall in their edition of the Percy Folio MS. vol. ii. ; an early French MS. is described by J. A. Herbert {An Early MS. of Gui de Warwick, London, 1905).

See also M. Weyrauch Die mittelengl. Fassungen der Sage von Guy (2 pts., Breslau, 1899 and 1901); J. Zupitza in Sitzungsber. d. phil.- hist. Kl. d. kgl. Akad. d. Wiss. (vol. lxxiv., Vienna, 1874), and Zur Literalurgeschichte des Guy von Warwick (Vienna, 1873); a learned discussion of the whole subject by H. L. Ward, Catalogue of Romances (i. 471-501, 1883); and an

article by S. L. Lee in the Dictionary of National Biography.

GUY, THOMAS (1644-1724), founder of Guy's Hospital, London, was the son of a lighterman and coal-dealer at South- wark. After serving an apprenticeship of eight years with a bookseller, he in 1668 began business on his own account. He dealt largely in Bibles, which had for many years been poorly and incorrectly printed in England. These he at first imported from Holland, but subsequently obtained from the university of Oxford the privilege of printing. Thus, and by an extremely thrifty mode of life, and more particularly by investment in government securities, the subscription of these into the South Sea Company, and the subsequent sale of his stock in 1720, he became master of an immense fortune. He died unmarried on the 17th of December 1724. In 1707 he built three wards of St Thomas's Hospital, which institution he otherwise subse- quently benefited; and at a cost of £18,793, 16s. he erected Guy's Hospital, leaving for its endowment £219,499; he also endowed Christ's Hospital with £400 a year, and in 1678 endowed almshouses at Tamworth, his mother's birthplace, which was represented by him in parliament from 1695 to 1707. The residue of his estate, which went to distant relatives, amounted to about £80,000.

See A True Copy of the Last Will and Testament of Thomas Guy, Esq. (London, 1725); J. Noorthouck, A New Hist, of London, bk. iii. ch. i. p. 684 (1773); Nichols, Literary Anecdotes, iii. 599 (1812); Charles Knight, Shadows of the Old Booksellers, pp. 3-23 (1865); and A Biographical History of Guy's Hospital, by S. Wilkes and G. T. Bettany (1892).

GUYON, JEANNE MARIE BOUVIER DE LA MOTHE

(1648-1717), French quietist writer, was born at Montargis, where her family were persons of consequence, on the 13th of April 1648. If her somewhat hysterical autobiography may be trussed she was much neglected in her youth; most of her time

was spent as a boarder in various convent schools. Here she went through all the religious experiences common to neurotic young women; these were turned in a definitely mystical direction by the duchesse de Bethune, daughter of the disgraced minister, Fouquet, who spent some years at Montargis after her father's fall. In 1664 Jeanne Marie was married to a rich invalid of the name of Guyon, many years her senior. Twelve years later he died, leaving his widow with three small children and a considerable fortune. All through her unhappy married life the mystical attraction had grown steadily in violence; it now attached itself to a certain Father Lacombe, a Barnabite monk of weak character and unstable intellect. In 1681 she left her family and joined him; for five years the two rambled about together in Savoy and the south-east of France, spreading

their mystical ideas. At last they excited the suspicion of the authorities; in 1686 Lacombe was recalled to Paris, put under surveillance, and finally sent to the Bastille in the autumn of 1687. He was presently transferred to the castle of Lourdes, where he developed softening of the brain and died in 17 15. Meanwhile Madame Guyon had been arrested in January 1688, and been shut up in a convent as a suspected heretic. Thence she was delivered in the following year by her old friend, the duchesse de Bethune, who had returned from exile to become a power in the devout court-circle presided over by Madame de Maintenon. Before long Madame Guyon herself was introduced into this pious assemblage. Its members were far from critical; they were intensely interested in religion; and even Madame Guyon's bitterest critics bear witness to her charm of manner, her imposing appearance, and the force and eloquence with which she explained her mystical ideas. So much was Madame de Maintenon impressed, that she often invited Madame Guyon to give lectures at her girls' school of St Cyr. But by far the greatest of her conquests was Fenelon, now a rising young director of consciences, much in favour with aristocratic ladies. Dissatisfied with the formalism of average Catholic piety, he was already thinking out a mystical theory of his own; and between 1689 and 1693 they corresponded regularly. But as soon as ugly reports about Lacombe began to spread, he broke off all connexion with her. Meanwhile the reports had reached the prudent ears of Madame de Maintenon. In May 1693 she asked Madame Guyon to go no more to St Cyr. In the hope of clearing her orthodoxy, Madame Guyon appealed to Bossuet, who decided that her books contained " much that was intoler- able, alike in form and matter." To this judgment Madame Guyon submitted, promised to " dogmatize no more," and disappeared into the country (1693). In the next year she again petitioned for an inquiry, and was eventually sent, half as a prisoner, half as a penitent, to Bossuet's cathedral town of Meaux. Here she spent the first half of 1695; but in the summer she escaped without his leave, bearing with her a certificate of orthodoxy signed by him. Bossuet regarded this flight as a gross act of disobedience; in the winter Madame Guyon was arrested and shut up in the Bastille. There she remained till 1703. In that year she was liberated, on condition she went to live on her son's estate near Blois, under the eye of a stern bishop. Here the rest of her life was spent in charitable and pious exercises; she died on the 9th of June 1717. During these latter years her retreat at Blois became a regular place of pilgrimage for admirers, foreign quite as often as French. Indeed, she is one of the many prophetesses whose fame has stood highest out of their own country. French critics of all schools of thought have generally reckoned her an hysterical degenerate; in England and Germany she has as often roused enthusiastic admiration.

Authorities.—— Fie de Madame Guyon, ecrite par elle-mime (really a

compilation made from various fragments) (3 vols., Paris, 1791). There is a life in English by T. C. Upham (New York, 1854) ; and an elaborate study by L. Guerrier (Paris, 1881). For a remark- able review of this latter work see Brunetiere, Nouvelles Etudes critiques, vol. ii. The complete edition of Madame Guyon's works, including the autobiography and five volumes of letters, runs to _fefty volumes (1767-1791) ; the most important works are published separately, Opuscules spirituels (2 vols., Paris, 1790). They have

been several times translated into English. See also the literature of the article on Quietism; and H. Delacroix, Etudes sur le mysticisme (Paris, 1908). ' (St C.)

GUYON, RICHARD DEBAUFRE (1803-1856), British soldier, general in the Hungarian revolutionary army and Turkish pasha, was born at Walcot, near Bath, in 1803. After receiving a military education in England and in Austria he entered the Hungarian hussars in 1823, in which he served until after his marriage with a daughter of Baron Spleny, a general officer in the imperial service. At the outbreak of the Hungarian War in 1848, he re-entered active service as an officer of the Hungarian Honveds, and he won great distinction in the action of Sukoro (September 29, 1848) and the battle of Schwechat (October 30). He added to his reputation as a leader in various actions in the winter of 1848-1840, aiid after the battle of Kapolna was made a general officer. He served in important and sometimes independent commands to the end of the war, after which he escaped to Turkey. In 1852 he entered the service of the sultan. He was made a pasha and lieutenant-general without being required to change his faith, and rendered distinguished service in the campaign against the Russians in Asia Minor (1854-55). General Guyon died of cholera at Scutari on the 12th of October 1856.

See A. W. Kinglake, The Patriot and the Hero General Guyon (1856).

GUYOT, ARNOLD HENRY (1807-1884), Swiss-American geologist and geographer, was born at Boudevilliers, near Neuchatel, Switzerland, on the 28th of September 1807. He studied at the college of Neuchatel and in Germany, where he began a lifelong friendship with Louis Agassiz. He was professor of history and physical geography at the short-lived Neuchatel " Academy " from 1839 to 1848, when he removed, at Agassiz's instance, to the United States, settling in Cambridge, Massachusetts. For several years he was a lecturer for the Massachusetts State Board of Education, and he

was professor of geology and physical geography at Princeton from 1854 until his death there on the 8th of February 1884. He ranked high as a geologist and meteorologist. As early as 1838, he undertook, at Agassiz's suggestion, the study of glaciers, and was the first to announce, in a paper submitted to the Geological Society of France, certain important observations relating to glacial motion and structure. Among other things he noted the more rapid flow of the centre than of the sides, and the more rapid flow of the top than of the bottom of glaciers; described the laminated or " ribboned " structure of the glacial ice, and ascribed the movement of glaciers to a gradual molecular displacement rather than to a sliding of the ice mass as held by de Saussure. He subsequently collected important data concerning erratic boulders. His extensive meteorological observations in America led to the establishment of the United States Weather Bureau, and his Meteorological and Physical Tables (1852, revised ed. 1884) were long standard. His graded series of text-books and wall-maps were important aids in the extension and populariza- tion of geological study in America. In addition to text-books, his principal publications were: Earth and Man, Lectures on Comparative Physical Geography in its Relation to the History of Mankind (translated by Professor C. C. Felton, 1849); A Memoir of Louis Agassiz (1883); and Creation, or the Biblical Cosmogony in the Light of Modern Science (1884).

See James D. Dana's " Memoir " in the Biographical Memoirs of the National Academy of Science, vol. ii. (Washington, 1886).

GUYOT, YVES (1843-), French politician and economist, was born at Dinan on the 6th of September 1843. Educated at Rennes, he took up the profession of journalism, coming to Paris in 1867. He was for a short period editor-in-chief of L'Independant du midi of Nimes, but joined the staff of Lu Rappel on its foundation, and worked subsequently on other ' journals. He took an active part in municipal life, and waged a keen campaign against the prefecture of police, for which he suffered six months' imprisonment. He entered the chamber of deputies in 1885 as representative of the first arrondissement of Paris and was rapporteur giniral of the budget of 1888. He became minister of public works under the premiership of P. E.

Tirard in 1889, retaining his portfolio in the cabinet of C. L. de Freycinet until 1892. Although of strong liberal views, he lost his seat in the election of 1893 owing to his militant attitude against socialism. An uncompromising free-trader, he published La Comedie protectionniste (1905; Eng. trans. The Comedy of Protection); La Science economique (1st ed. 1881; 3rd ed. 1907); La Prostitution (1882); La Tyrannic socialiste (1893), all three translated into English; Les Conflits du travail et leur

solution (1903); La Democratic individual! ste (1907).

GUYTON DE MORVEAU, LOUIS BERNARD, Baron (1737- 1816), French chemist, was born on the 4th of January 1737, at Dijon, where his father was professor of civil law at the univer- sity. As a boy he showed remarkable aptitude for practical mechanics, but on leaving school he studied law in the university of Dijon, and in his twenty-fourth year became advocate-general in the parlement of Dijon. This office he held till 1782. Devot- ing his leisure to the study of chemistry, he published in 1772 his Digressions academiques, in which he set forth his views on phlogiston, crystallization, &c, and two years later he established in his native town courses of lectures on materia medica, mineralogy and chemistry. An essay on chemical nomenclature, which he published in the Journal de physique for May 1782, was ultimately developed with the aid of A. L. Lavoisier, C. L. Berthollet and A. F. Fourcroy, into the Methode d'une nomen- clature chimique, published in 1787, the principles of which were speedily adopted by chemists throughout Europe. Constantly in communication with the leaders of the Lavoisierian school, he soon became a convert to the anti-phlogistic doctrine; and he published his reasons in the first volume of the section " Chymie, Pharmacie et Metallurgie " of the Encyclopedic methodique (1786), the chemical articles in which were written by him, as well as some of those in the second volume (1792). In 1794 he was appointed to superintend the construction of balloons for military purposes, being known as the author of some aeronautical experiments carried out at Dijon some ten years previously. In 1 791 he became a member of the Legislative Assembly, and in the following year of the National Convention, to which he was re-elected in 1795, but he retired from political life in 1797. In 1798 he acted as provisional director of the Polytechnic School, in the foundation of which he took an active part, and from 1800 to 1814 he held the appointment of master of the mint. In 181 1 he was made a baron of the French Empire. He died in Paris on the 2nd of January 1816.

Besides being a diligent contributor to the scientific periodicals of the day, Guyton wrote Memoire sur I' Education publique (1762) ; a satirical poem entitled Le Rat iconoclaste, ou le Jesuite croque (1763); Discours publics et eloges (1775-1782); Plaidoyers sur plusieurs questions de droit (1785) ; and Traite des moyens de desin- fecter Vair (1801), describing the disinfecting powers of chlorine, and of hydrochloric acid gas which he had successfully used at Dijon in 1773. With Hugues Maret (1726-1,785) and Jean Francois Durande (d. 1794) he also published the Elemens de chymie theorique et pratique (1776-17ˆ7).

GUZMICS, IZIDOR (1786-1839), Hungarian theologian, was born on the 7th of April 1786 at Vamos-Csalad, in the county of Sopron. At Sopron (Oedenburg) he was instructed in the art of poetry by Paul Horvath. In

October 1805 he entered the Benedictine order, but left it in August of the following year, only again to assume the monastic garb on the 10th of November 1 806. At the monastery of Pannonhegy he applied himself to the study of Greek under Farkas Toth and in 181 2 he was sent to Pesth to study theology. Here he read the best German and Hungarian authors, and took part in the editorship of the Nemzeti (National) Plutarkus, and in the translation of Johann Hiibner's Lexicon. On obtaining the degree of doctor of divinity in 181 6, he returned to Pannonhegy, where he devoted himself to dogmatic theology and literature, and contributed largely to Hungarian periodicals. The most important of his theological works are: A hath, anyaszentegyhdznak hitbeli tanitdsa (The Doctrinal Teaching of the Holy Catholic Church) , and A kereszten- yeknek valldsbeli egyesulesokrol (On Religious Unity among Christians), both published at Pesth in 1822; also a Latin treatise entitled Theologia Christiana fundamentalis et theologia dogmatica (4 vols., Gyor, 1828-1829). His translation of

Theocritus in hexameters was published in 1824. His versions of the Oedipus of Sophocles and of the Iphigenia of Euripides were rewarded by the Hungarian Academy, of which in 1838 he was elected honorary member. In 1832 he was appointed abbot of the wealthy Benedictine house at Bakonybel, a village in the county of Veszprem. There he built an asylum for 150 children, and founded a school of harmony and singing. He died on the 1 st of September 1839.

GWADAR, a port on the Makran coast of Baluchistan, about 290 m. W. of Karachi. Pop. (1903), 435c. In the last half of the 1 8th century it was handed over by the khan of Kalat to the sultan of Muscat, who still exercises sovereignty over the port, together with about 300 sq. m. of the adjoining country. It is a place of call for the steamers of the British India Navigation Company.

GWALIOR, a native state of India, in the Central India agency, by far the largest of the numerous principalities com- prised in that area. It is the dominion of the Sindhia family. The state consists of two well-defined parts which may roughly be called the northern and the southern. The former is a compact mass of territory, bounded N. and N.W. by the Chambal river, which separates it from the British districts of Agra and Etawah, and the native states of Dholpur, Karauli and Jaipur of Rajputana; E. by the British districts of Jalaun, Jhansi, Lalitpur and Saugor; S. by the states of Bhopal, Tonk, Khil- chipur and Rajgarh; and W. by those of Jhalawar, Tonk and Kotah of Rajputana. The southern, or Malwa, portion is made up of

detached or semi-detached districts, between which are interposed parts of other states, which again are mixed up with each other in bewildering intricacy. The two portions together have a total area of 25,041 sq. m. Pop.(i90i), 2,933,001, showing a decrease of 13 % in the decade.

The state may be naturally divided into plain, plateau and hilly country. The plain country extends from the Chambal river in the extreme southwards for about 80 m., with a maximum width from east to west of about 120 m. This plain, though broken in its southern portion by low hills, has generally an elevation of only a few hundred feet above sea-level. In the summer season the climate is very hot, the shade temperature rising frequently to 112 F., but in the winter months (from November to February inclusive) it is usually temperate and for short periods extremely cold. The average rainfall is 30 in., but the period 1891-1901 was a decade of low rainfall, and distress was caused by famine. South of this tract there is a gradual ascent to "he Central India plateau, and at Sipri the general level is 1500 ft. above the sea. On this plateau lies the remainder of the state, with the exception of the small district of Amjhera in the extreme south. The elevation of this region gives it a moderate climate during the summer as compared with the plain country, while the winter is warmer and more equable. The average rainfall is 28 in. The remaining portion of the state, classed as hilly, comprises only the small district of Amjhera. This is known as the Bhil country, and lies among the Vindhya mountains with a mean elevation of about 1800 ft. The rainfall averages 23 in. In the two years 1899 and 1900 the monsoon was very weak, the result being a severe famine which caused great mortality among the Bhil population. Of these three natural divisions the plateau possesses the most fertile soil, generally of the kind known as " black cotton," but the low-lying plain has the densest population. The state is watered by numerous rivers. The Nerbudda, flowing west, forms the southern boundary. The greater part of the drainage is dis- charged into the Chambal, which forms the north-western and northern and eastern boundary. The Sind, with its tributaries the Kuwari, Asar and Sankh, flows through the northern division." , The chief products are wheat, millets, pulses of various kinds, maize, rice, linseed and other oil-seeds; poppy, yielding the Malwa opium; sugar-cane, cotton, tobacco, indigo, garlic, tur- meric and ginger. About 60 % of the population are employed in agricultural and only 15% in industrial occupations, the great majority of the latter being home workers. There is a leather -factory at Morar; cotton-presses at Morena, Baghana

and Ujjain; ginning factories at Agar, Nalkhera, Shajapur and Sonkach; and a cotton-mill at Ujjain. The cotton industry alone shows possibilities of considerable development, there being 55,000 persons engaged in it at the time of the census of 1901. The population is composed of many elements, among which Brahmans and Rajputs are specially numerous. The

prevailing religion is Hinduism, 84% of the people being Hindus and only 6% Mahommedans. The revenue of the state is about one million sterling; and large reserves have been accumulated, from which two millions were lent to the government of India in 1887, and later on another million for the construction of the Gwalior-Agra and Indore-Neemuch railways. The railways undertaken by the state are: (1) from Bina on the Indian Midland to Goona; (2) an extension of this line to Baran, opened in 1899; (3) from Bhopal to Ujjain; (4) two light railways, from Gwalior to Sipri and Gwalior to Bhind, which were opened by the viceroy in November 1899. On the same occasion the viceroy opened the Victoria College, founded to commemorate the Diamond Jubilee; and the Memorial Hospital, built in memory of the maharaja's father. British currency has been introduced instead of Chandori rupees, which were much depreciated. The state maintains three regiments of Imperial Service cavalry, two battalions of infantry and a transport corps.

History. — The Sindhia family, the rulers of the Gwalior state, belong to the Mahratta nation and originally came from the neighbourhood of Poona. Their first appearance in Central India was early in the 18th century in the person of Ranoji (d. 1745), a scion of an impoverished branch of the family, who began his career as the peshwa's slipper-carrier and rose by his military abilities to be commander of his bodyguard. In 1726, together with Malhar Rao Holkar, the founder of the house of Indore, he was authorized by the peshwa to collect tribute (chauth) in the Malwa districts. He established his headquarters at Ujjain, which thus became the first capital of Sindhia's dominions.

Ranoji's son and successor, Jayapa Sindhia, was killed at Nagaur in 1759, and was in his turn succeeded by his son Jankoji Sindhia. But the real founder of the state of Gwalior was Mahadji Sindhia, a natural son of Ranoji, who, after narrowly escaping with his life from the terrible slaughter of Panipat in 1 76 1 (when Jankoji was killed), obtained with some difficulty from the peshwa a re-grant of his father's possessions in Central India (1769). During the struggle which followed the death of Madhu Rao Peshwa in 1772 Mahadji seized every occasion for extending his power and possessions. In 1775, however, when Raghuba Peshwa threw himself on the protection of the British, the reverses which Mahadji encountered at their hands — Gwalior being taken by Major Popham in 1780 — opened his eyes to their power. By the treaty of Salbai (1782) it was agreed that Mahadji should withdraw to Ujjain, and the British retire north of the Jumna. Mahadji, who undertook to open negotiations with the other belligerents, was recognized as an independent ruler, and a British resident was established at his court. Mahadji, aided by the British policy of neutrality, now set to work to establish his supremacy over Hindustan proper. Realizing the superiority of European methods of warfare, he

availed himself of the services of a Savoyard soldier of fortune, Benoit de Boigne, whose genius for military organization and command in the field was mainly instrumental in establishing the Mahratta power. Mahadji's disciplined troops made him invincible. In 1785 he re-established Shah Alam on the imperial throne at Delhi, and as his reward obtained for the peshwa the title of vakil-ul-mutlak or vicegerent of the empire, contenting himself with that of his deputy. In 1788 he took advantage of the cruelties practised by Ghulam Kadir on Shah Alam, to occupy Delhi, where he established himself as the protector of the aged emperor. Though nominally a deputy of the peshwa he was now ruler of a vast territory, including the greater part of Central India and Hindustan proper, while his lieutenants exacted tribute from the chiefs of Rajputana. There can be no doubt that he looked with apprehension on the growing power of

the British; but he wisely avoided any serious collision with them.

Mahadji died in 1794, and was succeeded by his adopted son, Daulat Rao Sindhia, a grandson of his brother Tukoji. When, during the period of unrest that followed the deaths of the peshwa, Madhu Rao II., in 1795 and of Tukoji Holkar in 1797, the Mahratta leaders fought over the question of supremacy, the peshwa, Baji Rao II., the titular head of the Mahratta confederation, fled from his capital and placed himself under British protection by the treaty of Bassein (December 31, 1802). This . interposition of the British government was resented by the confederacy, and it brought on the Mahratta War of 1803. In the campaign that followed a combined Mahratta army, in which Daulat Rao's troops furnished the largest contingent, was defeated by General Arthur Wellesley at Assaye and Argaum in Central India; and Lord Lake routed Daulat Rao's European- trained battalions in Northern India at Agra, Aligarh and Laswari. Daulat Rao was then compelled to sign the treaty of Sarji Anjangaon (December 30, 1803), which stripped him of his territories between the Jumna and Ganges, the district of Broach in Gujarat and other lands in the south. By the same treaty he was deprived of the forts of Gwalior and Gohad; but these were restored by Lord Cornwallis in 1805, when the Chambal river was made the northern boundary of the state. By a treaty signed at Burhanpur in 1803 Daulat Rao further agreed to maintain a subsidiary force, to be paid out of the revenues of the territories ceded under the treaty of Sarji Anjangaon. When, however, in 1816 he was called upon to assist in the suppression of the Pindaris, though by the treaty of Gwalior (181 7) he promised his co-operation, his conduct was so equivocal that in 1818 he was forced to sign a fresh treaty by which he

ceded Ajmere and other lands.

Daulat Rao died without issue in 1827, and his widow,Baiza Bai (d. 1862), adopted Mukut Rao, a boy of eleven belonging to a dis- tant branch of the family, who succeeded as Jankoji Rao Sindhia. His rule was weak; the state was distracted by interminable palace intrigues and military mutinies, and affairs went from bad to worse when, in 1843, Jankoji Rao, who left no heir, was succeeded by another boy, adopted by his widow, Tara Bai, under the name of Jayaji Rao Sindhia. The growth of turbulence and misrule now induced Lord Ellenborough to interpose, and a British force under Sir Hugh Gough advanced upon Gwalior (December 1843). The Mahratta troops were defeated simul- taneously at Maharajpur and Punniar (December 29), with the result that the Gwalior government signed a treaty ceding territory with revenue sufficient for the maintenance of a con- tingent force to be stationed at the capital, and limiting the future strength of the Gwalior army, while a council of regency was appointed during the minority to act under the resident's advice. In 1857 the Gwalior contingent joined the mutineers; but the maharaja himself remained loyal to the British, and fled from his capital until the place was retaken and his authority restored by Sir Hugh Rose (Lord Strathnairn) on the 19th of June 1858. He was rewarded with the districts of Neemuch and Amjhera, but Gwalior fort was occupied by British troops and was only restored to his son in 1886 by Lord Dufferin. Jayaji Rao, who died in 1886, did much for the development of his state. He was created a G. C.S.I, in 1861, and subsequently became a counsellor of the empress, a G.C.B. and CLE.

His son, the maharaja, Madhava Rao Sindhia, G.C.S.I., was born in 1877. During his minority the state was administered for eight years by a council of regency. He was entrusted with ruling powers in 1894, and in all respects continued the reforming policy of the council, while paying personal attention to every /department, being a keen soldier, an energetic administrator, and fully alive to the responsibilities attaching to his position. He was created an honorary aide-de-camp to the king-emperor and an honorary colonel in the British army. He went to China as orderly officer to General Gaselee in 1901, and provided the expedition with a hospital ship at his own expense, while his Imperial Service Transport Corps proved a useful auxiliary to the British army in the Chitral and Tirah expeditions.

The City of Gwalior is 76 m. by rail S. of Agra, and had a population in 1901 of 119,433. This total includes the new town of Lashkar or " the Camp " which is the modern capital of the state and old Gwalior. The old town has a threefold interest: first as a very ancient seat of Jain worship; secondly for its example of palace architecture of the best Hindu period (1486- 1516); and thirdly as an historic fortress. There are several

remarkable Hindu temples within the fort. One, known as the Sas Baku, is beautifully adorned with bas-reliefs. It was finished in a.d. 1093, and, though much dilapidated, still forms a most picturesque fragment. An older Jain temple has been used as a mosque. Another temple in the fortress of Gwalior is called the Teli-Mandir, or " Oilman's Temple." This building was originally dedicated to Vishnu, but afterwards converted to the worship of Siva. The most striking part of the Jain remains at Gwalior is a series of caves or rock-cut sculptures, excavated in the rock on all sides, and numbering nearly a hundred, great and small. Most of them are mere niches to contain statues, though some are cells that may have been originally intended for residences. One curious fact regarding them is that, according to inscriptions, they were all excavated within the short period of about thirty-three years, between 1441 and 1474. Some of the figures are of colossal size; one, for instance, is 57 ft. high, which is taller than any other in northern India.

The palace built by Man Singh (1486-1516) forms the most interesting example of early Hindu work of its class in India. Another palace of even greater extent was added to this in 1516; both Jehangir and Shah Jahan added palaces to these two — the whole making a group of edifices unequalled for picturesqueness and interest by anything of their class in Central India. Among the apartments in the palace was the celebrated chamber, named the Baradari, supported on 12 columns, and 45 ft. square, with a stone roof, forming one of the most beautiful palace-halls in the world. It was, besides, singularly interesting from the expedients to which the Hindu architect was forced to resort to imitate the vaults of the Moslems. Of the buildings, however, which so excited the admiration of the emperor Baber, probably little now remains. The fort of Gwalior, within which the above buildings are situated, stands on an isolated rock. The face is perpendicular and where the rock is naturally less precipitous it has been scarped. Its greatest length from north-east to south-west is a mile and a half, and the greatest breadth 900 yds. The rock attains its maximum height of 342 ft. at the northern end. A rampart, accessible by a steep road, and farther up by huge steps cut out of the rock, surrounds the fort. The citadel stands at the north-eastern corner of the enclosure, and presents a very picturesque appearance. The old town of Gwalior, which is of considerable size, but irregularly built, and extremely dirty, lies at the eastern base of the rock. It contains the tomb of Mahcm- med Ghaus, erected during the early part of Akbar's reign. The fort of Gwalior was traditionally built by one Surya Sen, the raja of the neighbouring country. In n 96 Gwalior was captured by Mahommed Ghori; it then passed into the hands of several chiefs until in 1559 Akbar gained possession of it, and made it a state prison for captives of rank. On the dismemberment of the Delhi empire, Gwalior was seized by the Jat rana of Gohad. Subsequently

it was garrisoned by Sindhia, from whom it was wrested in 1780 by the forces of the East India Company, and to whom it was finally restored by the British in 1886. The modern town contains the palace of the chief, a college, a high school, a girls' school, a service school to train officials, a law school, hospitals for men and for women, a museum, paper-mills, and a printing-press issuing a state gazette.

- Gwalior Residency, an administrative unit in the Central India agency, comprises Gwalior state and eleven smaller states and estates. Its total area is 17,825 sq. m., and its population in 1901 was 2,187,612. Of the area, 17,020 sq. m. belong to Gwalior State, and the agency also includes the small states of Raghugarh, Khaniadhana, Paron, Garha, Umri and Bhadaura, with the Chhabra pargana of Tonk.

GWEEDORE, a hamlet and tourist resort of Co. Donegal, I Ireland, on the Londonderry & Lough Swilly & Letterkenny

railway. The river Clady, running past the village from the Nacung Loughs, affords salmon and trout fishing. The fine surrounding scenery culminates to the east in the wild mountain Errigal (2466 ft.) at the upper end of the loughs. The place owes its popularity as a resort to Lord George Hill (d. 1879), who also laboured for the amelioration of the conditions of the peasantry on his estate, and combated the Rundale system of minute repartition of property. In 1889, during the troubles which arose out of evictions, Gweedore was the headquarters of the Irish constabulary, when District Inspector Martin was openly murdered on attempting to arrest a priest on his way to Mass.

GWILT, JOSEPH (1 784-1863), English architect and writer, was the younger son of George Gwilt, architect surveyor to the county of Surrey, and was born at Southwark on the nth of January 1784. He was educated at St Paul's school, and after a short course of instruction in his father's office was in 1801 admitted a student of the Royal Academy, where in the same year he gained the silver medal for his drawing of the tower and steeple of St Dunstan-in-the-East. In 181 1 he published a Treatise on the Equilibrium of Arches, and in 1815 he was elected F.S.A. After a visit to Italy in 1816, he published in 1818 Notilia archilectonica italiana, or Concise Notices of the Buildings and Architects of Italy. In 1825 he published an edition of Sir William Chambers's Treatise on Civil Architecture; and among his other principal contributions to the literature of his profession are a translation of the Architecture of Vitruvius (1826),

a Treatise on the Rudiments of Architecture, Practical and Theoretical (1826), and his valuable Encyclopaedia of Architecture (1842), which was published with additions by Wyatt Papworth in 1867. In recognition of Gwilt's advocacy of the importance to architects of a knowledge of mathematics, he was in 1833 elected a member of the Royal Astronomical Society. He took a special interest in philology and music, and was the author of Rudiments of the Anglo-Saxon Tongue (1829), and of the article " Music " in the Encyclopaedia metropolitana. His principal works as a practical architect were Markree Castle near Sligo in Ireland, and St Thomas's church at Charlton in Kent. He died on the 14th of September 1863.

GWYN, NELL [Eleanor] (1650-1687), English actress, and mistress of Charles II., was born on the 2nd of February 1650/1, probably in an alley off Drury Lane, London, although Hereford also claims to have been her birthplace. Her father, Thomas Gwyn, appears to have been a broken-down soldier of a family of Welsh origin. Of her mother little is known save that she lived for some time with her daughter, and that in 1679 she was drowned, apparently when intoxicated, in a pond at Chelsea. Nell Gwyn, who sold oranges in the precincts of Drury Lane Theatre, passed, at the age of fifteen, to the boards, through the influence of the actor Charles Hart and of Robert Duncan or Dungan, an officer of the guards who had interest with the management: Her first recorded appearance on the stage was in 1665 as Cydaria, Montezuma's daughter, in Dryden's Indian Emperor, a serious part ill-suited to her. In the following year she was Lady Wealthy in the Hon. James Howard's comedy The English Monsieur. Pepys was delighted with the playing of " pretty, witty Nell, "but when he saw her as Florimel in Dryden's Secret Love, or the Maiden Queen, he wrote " so great a per- formance of a comical part was never, I believe, in the world before " and, " so done by Nell her merry part as cannot be better done in nature " {Diary, March 25, 1667). Her success brought her other leading roles — Bellario, in Beaumont and Fletcher's Philaster; Flora, in Rhodes's Flora's Vagaries; Samira, in Sir Robert Howard's Surprisal; and she remained a member of the Drury Lane company until 1669, playing con- tinuously save for a brief absence in the summer of 1667 when she lived at Epsom as the mistress of Lord Buckhurst, afterwards ' 6th earl of Dorset (q.v.). Her last appearance was as Almahide to the Almanzor of Hart, in Dryden's The Conquest of Granada (1670), the production of which had been postponed some months for her return to the stage after the birth of her first son by the king.*

As an actress Nell Gwyn was largely indebted to Dryden, who

seems to have made a special study of her airy, irresponsible personality, and who kept her supplied with parts which suited her. She excelled in the

delivery of the risky prologues and epilogues which were the fashion, and the poet wrote for her some specially daring examples. It was, however, as the mistress of Charles II. that she endeared herself to the public. Partly, no doubt, her popularity was due to the disgust inspired by her rival, Louise de Keroualle, duchess of Portsmouth, and to the fact that, while the Frenchwoman was a Catholic, she was a Protestant. But very largely it was the result of exactly those personal qualities that appealed to the monarch himself. ' She was piquante rather than pretty, short of stature, and her chief beauty was her reddish-brown hair. She was illiterate, and with difficulty scrawled an awkward E. G. at the bottom of her letters, written for her by others. But her frank recklessness, her generosity, her invariable good temper, her ready wit, her infectious high spirits and amazing indiscretions appealed irresistibly to a generation which welcomed in her the living antithesis of Puritanism. " A true child of the London streets," she never pretended to be superior to what she was, nor to inter- fere in matters outside the special sphere assigned her; she made no ministers, she appointed to no bishoprics, and for the high issues of international politics she had no concern. She never forgot her old friends, and, as far as is known, remained faithful to her royal lover from the beginning of their intimacy to his death, and, after his death, to his memory.

Of her two sons by the king, the elder was created Baron Hedington and earl of Burford and subsequently duke of St Albans; the younger, James, Lord Beauclerk, died in 1680, while still a boy. The king's death-bed request to his brother, " Let not poor Nelly starve," was faithfully carried out by James II., who paid her debts from the Secret Service fund, provided her with other moneys, and settled on her an estate with reversion to the duke of St Albans. But she did not long survive her lover's death. She died in November 1687, and was buried on the 17 th, according to her own request, in the church of St Martin-in-the-Fields, her funeral sermon being preached by the vicar, Thomas Tenison, afterwards archbishop of Canterbury, who said " much to her praise." Tradition credits the founda- tion of Chelsea Hospital to her influence over the king.

See Peter Cunningham, The Story of Nell Gwyn, edited by Gordon Goodwin (1903) ; Waldron's edition of John Downes's Roscius Anglicanus (1789); Osmund Airy, Charles II. (1904); Pepys, Diary; Evelyn, Diary and Correspondence; Origin and Early History of the Royal Hospital at Chelsea, edited by Major-General G. Hutt (1872) ; Memoirs of the Life of Eleanor Gwinn (1752); Burnet, History of My Own Time, part i., edited by Osmund Airy (Oxford, 1897); Louise de Keroualle, Duchess of Portsmouth, by H. Forneron, trans- lated by Mrs Crawford (1887).

GWYNIAD, the name given to a fish of the genus Coregonus or White fish (C clupeoides), inhabiting the large lakes of North Wales and the north of

England. At Ullswater it is known by the name of " schelly," at Loch Lomond by that of " powen." It is tolerably abundant in Lake Bala, keeping to the deepest portion of the lake for the greater part of the year, but appearing in shoals near the shores at certain seasons. It is well flavoured, like all the species of Coregonus, but scarcely attains to the weight of a pound. The name gwyniad is a Welsh word, and signifies- " shining "; and it is singular that a similar fish in British Columbia, also belonging to the family of Salmonoids, is called by the natives "quinnat," from the silvery lustre of its scales, the word having in their language the same meaning as the Welsh " gwyniad."

GYANTSE, one of the large towns of Tibet. It lies S.E. of Shigatse, 130 m. from the Indian frontier and 145 m. from Lhasa. Its central position at the junction of the roads from India and Bhutan with those from Ladakh and Central Asia leading to Lhasa makes it a considerable distributing trade centre. Its market is the third largest in Tibet, coming after Lhasa and Shigatse, and is especially celebrated for its woollen cloth and carpet manufactures. Here caravans come from Ladakh, Nepal and upper Tibet, bringing gold, borax, salt, wool, musk and furs, to exchange for tea, tobacco, sugar, cotton goods.

broadcloth and hardware. The town is compactly built of stone houses, with wooden balconies facing the main street, whence narrow lanes strike off into uninviting slums, and contains a fort and monastery. In the British expedition of 1904 Gyantse formed the first objective of the advance, and the force was besieged here in the mission post of Changlo for some time. The Tibetans made a night attack on the post, and were beaten off with some difficulty, but subsequently the British attacked and stormed the fort or jong. Under the treaty of 1904 a British trade agent is stationed at Gyantse.

GYGES, founder of the third or Mermnad dynasty of Lydian kings, he reigned 687-652 b.c. according to H. Gelzer, 690-657 b.c. according to H. Winckler. The chronology of the Lydian kings given by Herodotus has been shown by the Assyrian inscriptions to be about twenty years in excess. Gyges was the son of Dascylus, who, when recalled from banishment in Cappa- docia by the Lydian king Sadyattes — called Candaules " the Dog-strangler " (a title of the Lydian Hermes) by the Greeks — sent his son back to Lydia instead of himself. Gyges soon became a favourite of Sadyattes and was despatched by him to fetch Tudo, the daughter of Arnossus of Mysia, whom the Lydian king wished to make his queen. On

the way Gyges fell in love with Tudo, who complained to Sadyattes of his conduct. Forewarned that the king intended to punish him with death, Gyges assas- sinated Sadyattes in the night and seized the throne with the help of Arselis of Mylasa, the captain of the Carian bodyguard, whom he had won over to his cause. Civil war ensued, which was finally ended by an appeal to the oracle of Delphi and the confirmation of the right of Gyges to the crown by the Delphian god. Further to secure his title he married Tudo. Many legends were told among the Greeks about his rise to power. That found in Herodotus, which may be traced to the poet Archilochus of Paros, described how " Candaules " insisted upon showing Gyges his wife when unrobed, which so enraged her that she gave Gyges the choice of murdering her husband and making himself king, or of being put to death himself. Plato made Gyges a shepherd, who discovered a magic ring by means of which he murdered his master and won the affection of his wife (Hdt. i. 8-14; Plato, Rep. 359; Justin i. 7; Cicero, De of. iii. 9). Once established on the throne Gyges devoted himself to con- solidating his kingdom and making it a military power. The Troad was conquered, Colophon captured from the Greeks, Smyrna besieged and alliances entered into with Ephesus and Miletus. The Cimmerii, who had ravaged Asia Minor, were beaten back, and an embassy was sent to Assur-bani-pal at Nineveh (about 650 B.C.) in the hope of obtaining his help against the barbarians. The Assyrians, however, were otherwise engaged, and Gyges turned to Egypt, sending his faithful Carian troops along with Ionian mercenaries to assist Psammetichus in shaking off the Assyrian yoke (660 B.C.). A few years later he fell in battle against the Cimmerii under Dugdamme (called Lygdamis by Strabo i. 3. 21), who took the lower town of Sardis. Gyges was succeeded by his son Ardys.

See Nicolaus Damascenus, quoting from the Lydian historian Xanthus, in C. Muller, Fragmenta historicorum Graecorum, iii.; R. Schubert, Geschichle der Kbnige von Lydien (1884); M. G. Radet, La Lydie el le monde grec au temps de Mermnades (1892- 1893); H. Gelzer, " Das Zeitalter des Gyges " (Rhein. Mus., 1875); H. Winckler, Aliorientalische Forschungen, i. (1893); Macan's edition of Herodotus. (A. H. S.)

GYLIPPUS, a Spartan general of the 5th century B.C.; he was the son of Cleandridas, who had been expelled from Sparta for accepting Athenian bribes (446 b.c.) and had settled at Thurii. His mother was probably a helot, for Gylippus is said to have been, like Lysander and Callicratidas, a mothax (see Helot). When Alcibiades urged the Spartans to send a general to lead the Syracusan resistance against the Athenian expedition, Gylippus was appointed, and his arrival was undoubtedly the turning point of the struggleˆ 14-4 1 3). Though at first his long hair, his thread- bare cloak and his staff furnished the subject of many a jest, and his harsh and overbearing manner caused grave discontent, yet the rapidity and

decisiveness of his movements, won the sympathy and respect of the Syracusans. Diodorus (xiii. 28-32),

probably following Timaeus, represents him as inducing the Syracusans to pass sentence of death on the captive Athenian generals, but we need have no hesitation in accepting the state- ment of Philistus (Plutarch, Nicias, 28), a Syracusan who himself took part in the defence, and Thucydides (vii. 86), that he tried, though without success, to save their lives, wishing to take them to Sparta as a signal proof of his success Gylippus fell, as his father had done, through avarice; entrusted by Lysander with an immense sum which he was to deliver to the ephors at Sparta, he could not resist the temptation to enrich himself and, on the discovery of his guilt, went into exile.

Thucydides vi. 93. 104, vii.; Plutarch, Nicias, 19, 21, 27, 28, Lysander, 16, 17; Diodorus xiii. 7, 8, 28-32; Polyaenus i. 39. 42). See Syracuse (for the siege operations), commentaries onThucydides and the Greek histories.

GYLLEMBOURG-EHRENSVARD, THOMASINE CHRISTINE,

Baroness (1773-1856), Danish author, was born on the 9th of November 1773, at Copenhagen. Her maiden name wasBuntzen. Her great beauty early attracted notice, and before she was seventeen she married the famous writer Peter Andreas Heiberg. To him she bore in the following year a son, afterwards illustrious as the poet and critic Johan Ludvig Heiberg. In 1800 her husband was exiled, and she obtained a divorce, marrying in December 1801 the Swedish Baron K. F. Ehrensvard, himself a political fugitive. Her second husband, who presently adopted the name of Gyllembourg, died in 1815. In 1822 she followed her son to Kiel, where he was appointed professor, and in 1825 she returned with him to Copenhagen. In 1827 she first appeared as an author by publishing her romance of The Polonius Family in her son's newspaper Flyvende Post. In 1828 the same journal contained The Magic Ring, which was immediately followed by En Hverdags historie {An Everyday Story). The success of this anonymous work was so great that the author adopted until the end of her career the name of " The Author of An Everyday Story." In 1833-1834 she published three volumes of Old and New Novels. New Stories followed in 1835 and 1836. In 1839 appeared two novels, Montanus the Younger and Ricida; in 1840, One in All; in 1841, Near and Far; in 1843, A Correspondence; in 1844, The Cross Ways; in 1845, Two Generations. From 1849 to 1851 the Baroness Ehrensvard Gyllembourg was engaged in bringing out a library edition of her collected works in twelve volumes. On the 2nd of July 1856 she died in her son's house at Copenhagen. Not until then did the secret of her authorship transpire; for throughout her life she had preserved the closest reticence on the subject even with her nearest

friends. The style of Madame Ehrensvard Gyllembourg is clear and sparkling; for English readers no closer analogy can be found than between her and Mrs Gaskell, and Cranford might well have been written by the witty Danish authoress.

See J. L. Heiberg, Peter Andreas Heiberg og Thomasine Gyllembourg (Copenhagen, 1882), and L. Kornelius-Hybel, Nogle Bemaerkninger om P. A. Heiberg og Fru Gyllembourg (Copenhagen, 1883).

GYLLENSTJERNA, JOHAN, Count (1635-1680), Swedish statesman, completed his studies at Upsala and then visited most of the European states and laid the foundations of that deep insight into international politics which afterwards distinguished him. On his return home he met King Charles X. in the Danish islands and was in close attendance upon him till the monarch's death in 1660. He began his political career at the diet which assembled in the autumn of the same year. An aristocrat by birth and inclination, he was nevertheless a true patriot and demanded the greatest sacrifices from his own order in the national interests. He was therefore one of those who laboured most zealously for the recovery of the crown lands. In the Upper House he was the spokesman of the gentry against the magnates, whose inordinate privileges he would have curtailed or abolished. His adversaries vainly endeavoured to gain him by favour, for as court-marshal and senator he was still more hostile to the dominant patricians who followed the adventurous policy of Magnus de la Gardie. Thus he opposed the French alliance which de la Gardie carried through in 1672, and con- sistently advocated economy in domestic and neutrality in foreign affairs. On the outbreak of the war in 1675 he was the

most loyal and energetic supporter of the young Charles XI., and finally his indispensable counsellor. Indeed, it may be said, that the political principles which he instilled into the youthful monarch were faithfully followed by Charles during the whole of his reign. In 1679 Gyllenstjerna was appointed the Swedish plenipotentiary at the peace congress of Lund. The alliance which he then concluded with Denmark bound the two northern realms together in a common foreign policy, and he sought besides to facilitate their harmonious co-operation by every means in his power. In 1680, after bringing home Charles XL's Danish bride from ■ Copenhagen, he was appointed governor- general of Scania (Skane), but expired a few weeks later.

See M. Hojer, Ofversigt af Sveriges yttre politik under aren 1676- 1680

(Upsala, 1875). (R. N. B.)

GYMKHANA, a display of miscellaneous sports, originally at the military stations of India. The word would seem to be a colloquial remodelling of the Hindustani gend-khana, ball- house or racquet-court, by substituting for gend the first syllable of the English word " gymnastics." The definition given in Yule's Glossary is as follows: "A place of public resort at a station, where the needful facilities for athletics and games . . . are provided." The name of the place was afterwards applied to the games themselves, and the word is now used almost exclusively in this sense. According to Yule the first use of it that can be traced was, on the authority of Major John Trotter, at Rurki in the year 1861, when a gymkhana was instituted there. Gymkhana sports were invented to relieve the monotony of Indian station life, and both officers and men from the ranks took part in them. The first meetings consisted of promiscuous horse and pony races at catch weights. To these were soon added a second variety, originally called the pdgdl (funny races) , the one generally known outside India, which consisted of miscellaneous races and competitions of all kinds, some serious and some amusing, on horseback, on foot and on bicycles. Among these may be mentioned the usual military sports; such as tent-pegging, lemon-cutting and obstacle racing; rickshaw racing; tilting at the ring sack, pillion, hurdle, egg-and-spoon, blindfold, threading-the-needle and many other kinds of races depending upon the inventive powers of the committees in charge. GYMNASTICS AND GYMNASIUM, terms signifying respec- tively a system of physical exercises practised either for recrea- tion or for the purpose of promoting the health and development of the body, and the building where such exercises are carried on. The gymnasium of the Greeks was originally the school where competitors in the public games received their training, and was so named from the circumstance that these competitors exercised naked (yvyvos). The gymnasium was a public in- stitution as distinguished from the palaestra, which was a private school where boys were trained in physical exercises, though the term palaestra is also often used for the part of a gymnasium specially devoted to wrestling and boxing. The athletic contests for which the gymnasium supplied the means of training and practice formed part of the social life of the Greeks from the earliest times. They were held in honour of heroes and gods; sometimes forming part of a periodic festival, sometimes of the funeral rites of a deceased chief. In course of time the Greeks grew more attached to such sports; their free active life, spent to a great extent in the open air, fostered the liking almost into a passion. The victor in any athletic contest, though he gained no money prize, was rewarded with the honour and respect of his fellow citizens; and a victory in the great religious festivals was counted an honour for the whole state. In these circumstances the training of competitors for the greater contests became a matter of public

concern; and accordingly special buildings were provided by the state, and their management entrusted to public officials. The regulation of the gymnasium at Athens is attributed by Pausanias (i. 39. 3) to Theseus. Solon made several laws on the subject; but according to Galen it was reduced to a system in the time of Cleisthenes. Ten gymnasiarchs, one from each tribe, were appointed annually. These performed in rotation the duties of their office, which were to maintain and pay the persons who

were training for public contests, to conduct the games at the great Athenian festivals, to exercise general supervision over the morals of the youths, and to adorn and keep up the gym- nasium. This office was one of the ordinary \uTovpyiai. (public services), and great expense was entailed on. the holders. Under them were ten sophronistae, whose duty was to watch the conduct of the youths at all times, and especially to be present at all their games. The practical teaching and selecting of the suitable exercises for each youth were in the hands of the paedotribae and gymnastae, the latter of whom also superintended the effect on the constitution of the pupils, and prescribed for them when they were unwell. The aleiptae oiled and rubbed dust on the bodies of the youths, acted as surgeons, and administered the drugs prescribed. According to Galen there was also a teacher of the various games of ball. The gymnasia built to suit these various purposes were large buildings, which contained not merely places for each kind of exercise, but also a stadium, baths, covered porticos for practice in bad weather, and outer porticos where the philosophers and men of letters read public lectures and held disputations.

The gymnasium of the Greeks did not long remain an institu- tion exclusively devoted to athletic exercises. It soon began to be applied to other uses even more important. The develop- ment arose naturally through the recognition by the Greeks of the important place in education occupied by physical culture, and of the relation between exercise and health. The gymnasium accordingly became connected with education on the one hand and with medicine on the other. Due training of the body and maintenance of the health and strength of children were the chief part of earlier Greek education. Except the time devoted to letters and music, the education of boys was conducted in the gymnasia, where provision was made, as already mentioned, for their moral as well as their physical training. As they grew older, conversation and social intercourse took the place of the more systematic discipline. Philosophers and sophists assembled to talk and to lecture in the gymnasia, which thus became places of general resort for the purpose of all less systematic intellectual pursuits, as well as for physical exercises. In Athens there were three great public gymnasia — Academy, Lyceum and Cynosarges — each of which was consecrated to a special deity with whose statue it was adorned; and each was rendered famous by association with a celebrated school of philosophy. Plato's

teaching in the Academy has given immortality to that gym- nasium; Aristotle conferred lustre on the Lyceum; and the Cynosarges was the resort of the Cynics. Plato when treating of education devotes much consideration to gymnastics (see especially Rep. iii. and various parts of Laws); and according to Plato it was the sophist Prodicus who first pointed out the connexion between gymnastics and health. Having found such exercises beneficial to his own weak health, he formulated a method which was adopted generally, and which was improved by Hippocrates. Galen lays the greatest stress on the proper use of gymnastics, and throughout ancient medical writers we find that special exercises are prescribed as the cure for special diseases.

The Greek institution of the gymnasium never became popular with the Romans, who regarded the training of boys in gymnastics with contempt as conducive to idleness and immorality, and of little use from a military point of view; though at Sparta gymnastic training had been chiefly valued as encouraging warlike tastes and promoting the bodily strength needed for the use of weapons and the endurance of hardship. Among the Romans of the republic, the games in the Campus Martius, the duties of camp life, and the enforced marches and other hard- ships of actual warfare, served to take the place of the gymnastic exercises required by the Greeks. The first public gymnasium at Rome was built by Nero and another by Commodus. In the middle ages, though jousts and feats of horsemanship and field sports of various kinds were popular, the more systematic training of the body which the Greeks had associated with the gymnasium fell into neglect; while the therapeutic value of special exercises as understood by Hippocrates and Galen appears to have been lost sight of. Rousseau, in his £mile, was the first in modern times to call attention to the injurious consequences of such

indifference, and he insisted on the importance of physical culture as an essential part of education. It was probably due in some measure to his influence that F. L. Jahn and his followers in Germany, encouraged by the Prussian minister Stein, estab- lished the Turnpldtze, or gymnastic schools, which played an important part during the War of Liberation, and in the political agitations which followed the establishment of the German confederation by the Congress of Vienna. The educational reformers Pestalozzi and Froebel emphasized the need for systematic physical training in any complete scheme of education.

The later development of the classical gymnasium (when it had become the

school of intellectual culture rather than of ex- clusively physical exercise), and not the original idea, has been perpetuated in the modern use of the word in Germany, where the name " gymnasium " is given to the highest grade of second- ary school, and the association of the word with athleticism has been entirely abandoned. On the other hand, in England, France and elsewhere in Europe, as well as in America, the history of the word has been precisely the reverse; the con- nexion of the gymnasium with philosophy and mental culture has been dropped, and it indicates a building exclusively intended for the practice of physical exercises. But whereas the Greeks received training in the gymnasium for contests which are now designated as athletic sports {q.v.), gymnastics in the modern sense is a term restricted to such exercises as are usually practised indoors, with or without the aid of mechanical appliances, as distinguished from sports or games practised in the open air.

It was not until near the end of the 19th century that gym- nastics were recognized in England as anything more than a recreation; their value as a specifically therapeutic agent, or as an article in the curriculum of elementary schools, was not realized. More recently, however, educationists have urged with increasing insistence the need for systematic physical training, and their views received greater attention when evidence of deterioration in the physique of the people began to accumulate. During the first decade of the 20th century more than one com- mission reported to parliament in England in favour of more systematic and general physical training being encouraged or even made compulsory by public authority. Voluntary associa- tions were formed for encouraging such training and providing facilities for it. Gymnastics had already for several years been an essential part of the training of army recruits with exceedingly beneficial results, and gymnasia had been established at Alder- shot and other military centres. Physical exercises, although not compulsory, obtained a permanent place in the code for elementary schools in Great Britain; and much care has been taken to provide a syllabus of exercises adapted for the improve- ment of the physique of the children. These exercises are partly gymnastic and partly of the nature of drill; they do not in most cases require the use of appliances, and are on that account known as " free movements," which numbers of children go through together, accompanied whenever possible by music. On the other hand at the larger public schools and universities there are elaborate gymnasia equipped with a great variety of apparatus, the skilful use of which demands assiduous practice; and this is encouraged by annual contests between teams of gymnasts representing rival institutions.

The appliances vary to some extent in different gymnasia, some of the more complicated requiring a greater amount of space and involving a larger cost than is often practic- a} """ able. But where these considerations are

negligible,

apparatus, substantial uniformity is to be found in the equipment of gymnasia not designed for specifically medical purposes. The simplest, and in many respects the most generally useful, of all gymnastic apparatus is the dumb-bell. It was in use in England as early as the time of Elizabeth, and it has the advantage that it admits of being exactly proportioned to the individual strength of each learner, and can be adjusted in weight as his strength increases. The exercises that may be performed with the dumb-bell, combined with a few simple drill-like movements, give emnloyment to all parts of the body and to both sides equally. Dumb-bell exercises, therefore, when

arranged judiciously and with knowledge, are admirably suited for developing the physique, and are extensively employed in schools both for boys and girls. The bar-bell is merely a two- handed dumb-bell, and its use is similar in principle. The Indian club js also in use in most gymnasia; but the risk of overstraining the body by its unskilful handling makes it less generally popular than the dumb-bell. All these appliances may be, and often are, used either in ordinary schoolrooms or elsewhere outside the gymnasium. The usual fixed sorts of apparatus, the presence of which (or of some of them) in a building may be said to constitute it a gymnasium, are the following: a leaping- rope; a leaping-pole; a vaulting-horse; a horizontal bar, so mounted between two upright posts that its height from the ground may be adjusted as desired; parallel bars, used for exercises to develop the muscles of the trunk and arms; the trapeze consisting of a horizontal bar suspended by ropes at a height of 4 to s ft. from the ground; the bridge ladder; the plank; the inclined plane; the mast; swinging rings; the prepared wall; the horizontal beam.

Before the end of the 19th century the therapeutic value of gymnastics was fully realized by the medical profession; and a number of medical or surgical gymnasia came into existence, provided with specially devised apparatus for the treatment of different physical defects or weaknesses. The exercises practised in them are arranged upon scientific principles based on anatomical and physiological knowledge; and these principles have spread thence to influence largely the practice of gym- nastics in schools and in the army. A French medical writer enumerates seven distinct groups of maladies, each including a number of different complaints, for which gymnastic exercises are a recognized form of treatment; and there are many mal- formations of the human body, formerly believed to be incurable, which are capable of being greatly remedied if not entirely corrected by regular gymnastic exercises practised under medical direction.

The value of gymnastics both for curing defects, and still more for

promoting health and the development of normal physique, is recognized even more clearly on the continent of Europe than in Great Britain. In Germany the government not only controls the practice of gymnastics but makes it compulsory for every child and adult to undergo a prescribed amount of such physical training. In France also, physical training by gymnastics is under state control; in Sweden, Denmark, Switzer- land, Italy, Russia, systems more or less distinct enjoy a wide popularity; and in Finland gymnastics are practised on lines that exhibit national peculiarities. The Finns intro- duce an exceptional degree of variety into their exercises as well as into the appliances devised to assist them; women are scarcely less expert than men in the performance of them; and the enthusiasm with which the system is supported produces the most beneficial results in the physique of the people. Inter- national gymnastic contests have become a feature of the revived Olympic Games (see Athletic Sports), and in those held at Athens in 1906 a team of Danish ladies took part in the competition and proved by their skilful performance that gymnastics may be practised with as much success by women as by men.

The chief work on the ancient gymnastics is Krause, Gymnastik und Agonistik der Hellenen (1841); of more recent works mention may be made of Jager, Gymnastik der Hellenen (1881) ; L. Grasberger, Erziehung und Unterricht im klassischen Altertum (1881); J. P. Mahaffy, Old Greek Education (1883) ; A. S. Wilkins, National Education in Greece (1873); E. Paz, Histoire de la gymnastique (1886) ; Wickenhagen, Antike und moderne Gymnastik (1891) ; Becker- Goll, Charicles ii. ; Brugsma, Gymnasiorum apud Graecos descriptio (1855); Petersen, Das Gymnasium der Griechen (1858). See also N. • Laisnˆ, Gymnastique pratique (Paris, 1879); CoIIineau, La Gymnastique (Paris, 1884); L'Hygihne d I'ecole (Paris, 1889); P. de Coubertin, La Gymnastique utilitaire (Paris, 1905) ; H. Nissen, Rational Home Gymnastics (Boston, 1903). (R. J. M.)

GYMNOSOPHISTS (Lat. gymnosophistae, from Gr. yvfivos, ao4>icTris, " naked philosophers "), the name given by the Greeks to certain ancient Hindu philosophers who pursued asceticism to the point of regarding food and clothing as detri- mental to purity of thought. From the fact that they often

lived as hermits in forests, the Greeks also called them Hylobioi (cf. the Vdna-prasthas in Sanskrit writings). Diogenes Laertius (ix. 61 and 63) refers to them, and asserts that Pyrrho of Elis, the founder of pure scepticism, came under their influence, and on his return to Elis imitated

their habits of life, to what extent does not appear. Strabo (xv. 711, 714) divides them into Brahmans and Sarmans (or Shamans). See Jains.

GYMNOSPERMS, in Botany. The Gymnosperms, with the Angiosperms, constitute the existing groups of seed-bearing plants or Phanerogams: the importance of the seed as a dis- tinguishing feature in the plant kingdom may be emphasized by the use of the designation Spermophyta for these two groups, in contrast to the Pteridophyta and Bryophyta in which true seeds are unknown. Recent discoveries have, however, estab- lished the fact that there existed in the Palaeozoic era fern- like plants which produced true seeds of a highly specialized type; this group, for which Oliver and Scott proposed the term Pteridospermae in 1904, must also be included in the Sper- mophyta. Another instance of the production of seeds in an extinct plant which further reduces the importance of this character as a distinguishing feature is afforded by the Palaeozoic genus Lepidocarpon described by Scott in 1901; this lycopodia- ceous type possessed an integumented megaspore, to which the designation seed may be legitimately applied (see Palaeo- botany: Palaeozoic).

As the name Gymnosperm (Gr. yvfivds, naked, airkpixa, seed) implies, one characteristic of this group is the absence of an ovary or closed chamber containing the ovules. It was the English botanist Robert Brown who first recognized this important distinguishing feature in conifers and cycads in 1825; he estab- lished the gymnospermy of these seed-bearing classes as distinct from the angiospermy of the monocotyledons and dicotyledons. As Sachs says in his history of botany, " no more important discovery was ever made in the domain of comparative mor- phology and systematic botany." As Coulter and Chamberlain express it, " the habitats of the Gymnosperms to-day indicate that they either are not at home in the more genial conditions affected by Angiosperms, or have not been able to maintain themselves in competition with this group of plants."

These naked-seeded plants are of special interest on account of their great antiquity, which far exceeds that of the Angio- sperms, and as comprising different types which carry us back to the Palaeozoic era and to the forests of the coal period. The best known and by far the largest division of the Gymnosperms is that of the cone-bearing trees (pines, firs, cedars, larches, &c), which play a prominent part in the vegetation of the present day, especially in the higher latitudes of the northern hemisphere; certain members of this class are of considerable antiquity, but the conifers as a whole are still vigorous and show but little sign of decadence. The division known as the Cycadophyta is represented by a few living genera of limited geographical range and by a large number of extinct types which in the Mesozoic era (see Palaeobotany: Mesozoic) played a coispicuous part in the vegetation of the world. Among existing Cycado- phyta we find

surviving types which, in their present isolation, their close resemblance to fossil forms, and in certain morpho- logical features, constitute links with the past that not only connect the present with former periods in the earth's history, but serve as sign-posts pointing the way back along one of the many lines which evolution has followed.

It is needless to discuss at length the origin of the Gymno- sperms. The two views which find most favour in regard to the Coniferales and Cycadophyta are: (1) that both have been derived from remote filicinean ancestors; (2) that the cycads are the descendants of a fern-like stock, while conifers have been evolved from lycopodiaceous ancestors. The line of descent of recent cycads is comparatively clear in so far as they have undoubted affinity with Palaeozoic plants which combined cycadean and filicinean features; but opinion is much more divided as to the nature of the phylum from which the conifers are derived. The Cordaitales (see Palaeobotany: Palaeozoic) are represented by extinct forms only, which occupied a prominent

III.

IV.

V.

position in the Palaeozoic period; these plants exhibit certain features in common with the living Araucarias, and others which invite a comparison with the maidenhair tree {Ginkgo biloba), the solitary survivor of another class of Gymnosperms, the Ginkgoales (see Palaeobotany: Mesozoic). The Gnetales are a class apart, including three living genera, of which we know next to nothing as regards their past history or line of descent. Although there are several morphological features in the three genera of Gnetales which might seem to bring them into line with the Angiosperms, it is usual to regard these resemblances as parallel developments along distinct lines rather than to interpret them as evidence of direct relationship.

Gymnospermae. — Trees or shrubs; leaves vary considerably in size and form. Flowers unisexual, except in a few cases (Gnetales) without a perianth. Monoecious or dioecious. Ovules naked, rarely without carpellary leaves, usually borne on carpophylls, which assume various forms. The single megaspore enclosed in the nucellus is filled with tissue (prothallus) before fertilization, and contains two or more archegonia, consisting usually of a large egg-cell and a small neck, rarely of an egg-cell only and no neck (Gnetum and Welwitschia). Microspore spherical or oval, with or without a bladder-like extension of the exine, containing a prothallus of two or more cells, one of which produces two non-motile or motile male

cells. Cotyledons two or several. Secondary xylem and phloem produced by a single cambium, or by successive cambial zones; no true vessels (except in the Gnetales) in the wood, and no companion- cells in the phloem.

I. Pteridospermae (see Palaeobotany, Palaeozoic).

II. Cycadophyta.

A. Cycadales (recent and extinct).

B. Bennettitales (see Palaeobotany: Mesozoic). Cordaitales (see Palaeobotany: Palaeozoic). Ginkgoales (recent and extinct). Coniferales.

A. Taxaceae.

B. Pinaceae.

There is no doubt that the result of recent research and of work now in progress will be to modify considerably the grouping of the conifers. The family Araucarieae, represented by Araucaria and Agathis, should perhaps be separated as a special class and a re- arrangement of other genera more in accord with a natural system of classification will soon be possible; but for the present its twofold subdivision may be retained. VI. Gnetales.

A. Ephedroideae.

B. Gnetoideae.

C. Welwitschioideae (Tumboideae). Cycadophyta. — A. Cycadales. — Stems tuberous or columnar, not

infrequently branched, rarely epiphytic (Peruvian species of Zamia) ; fronds pinnate, bi-pinnate in the Australian genus Bowenia. Dioeci- ous; flowers in the form of cones, except the female flowers of Cycas, which consist of a rosette of leaf-like carpels at the apex of the stem. Seeds albuminous, with one integument ; the single embryo, usually bearing two partially fused cotyledons, is attached to a long tangled suspensor. Stems and roots increase in diameter by secondary thickening, the secondary wood being produced by one cambium or developed from successive cambium-rings.

The cycads constitute a homogeneous group of a few living members confined to tropical and sub-tropical regions. As a fairly typical and well-known example of the Cyca- daceae, a species of the genus Cycas (e.g. C. circinalis, C. revoluta, &c.) is briefly de- scribed. The stout columnar stem may reach a height of 20 metres, and a diameter of half a metre; it

remains either unbranched or divides near the summit into several short and thick branches, each branch terminating in a crown of long pinnate leaves. The sur- face of the stem is covered with rhomboidal areas, which represent the persistent bases of foliage- and scale- leaves. In some species of Cycas there is a well-defined alternation of transverse zones on the stem, consisting of larger areas representing foliage-leaf bases, and similar but smaller areas formed by the bases of scale-leaves (F and S, fig. 1). The scale-leaves clothing the terminal bud are linear-lanceolate in form, and of a brown or yellow colour; they are pushed aside as the stem-axis elongates and becomes shrivelled, finally falling off, leaving projecting bases which are eventually cut off at a still lower level. Similarly, the dead fronds fall off .leaving a ragged petiole, which is_ afterwards separated from the stem by an absciss-layer a short distance above the base. In some species of Cycas the leaf-bases do not persist as a permanent covering to the stem, but the surface

Fig. 1. — Stem of Cycas. F, foliage- leaf bases; 5, scale- leaf bases.

Fig. 2. — Cycas siamensis.

is covered with a wrinkled bark, as in Cycas siamensis, which has a stem of unusual form (fig. 2). Small tuberous shoots, comparable on a large scale with the bulbils of Lycopodium Selago, are occasionally produced in the axils of some of the persistent leaf-bases; these are characteristic of sickly plants, and serve as a means of vegetative reproduction. In the genus Cycas the female flower is peculiar among cycads in consisting of a terminal crown of separate leaf-like carpels several inches in length ; the apical portion of each carpellary leaf may be broadly triangular in form, and deeply dissected on the margins into narrow woolly appendages like rudimentary pinnae.

From the lower part of a carpel are produced several laterally placed ovules, which become bright red or orange on ripening; the bright neshy seeds, which in some species are as large as a goose's egg, and the tawny spreading carpels produce a pleasing com- bination of colour in the midst of the long dark-green fronds, which curve grace- fully upwards and outwards from the summit of the columnar stem. In Cycas the stem apex, after produc- ing a cluster of carpellary leaves, continues to elongate and produces more bud- scales, which are afterwards pushed aside as a fresh crown of fronds is developed. The young leaves of Cycas consist of a straight rachis bearing numer- ous linear pinnae, traversed by a single

midrib; the pinnae are circinately coiled like the leaf of a fern (fig. 3). The mala flower of Cycas conforms to the type of structure characteristic of the cycads, and consists of a long cone of numerous sporophylls bearing many oval pollen-sacs on their lower faces. The type described serves as a convenient representative of its class. There are eight other living genera, which may be classified as follows: —

Classification. — A. Cycadeae. — Characterized by (a) the alternation of scale- and foliage-leaves (fig. 1) on the branched or unbranched stem; (b) the growth of the main stem through the female flower; (c) the presence of a prominent single vein in the linear pinnae; (d) the structure of the female flower, which is peculiar in not having the form of a cone, but consists of numerous independent carpels, each of which bears two or more lateral ovules. Represented by a single genus, Cycas. (Tropical Asia, Australia, &c).

B. Zamieae. — The stem does not grow through the female flower; both male and female flowers are in the form of cones. (a) Stangerieae. — Characterized by the fern-like venation of the pinnae, which have a prominent midrib, giving off at a wide angle simple or forked and occasionally anastomosing lateral veins. A single genus, Slangeria, confined to South Africa, (b) Euzamieae. — The pinnae are traversed by several parallel veins. Bowenia, an Australian cycad, is peculiar in having bi-pinnate fronds (fig. 5). The various genera are distinguished from one another by the shape and manner of attachment of the pinnae, the form of the carpellary scales, and to some extent by anatomical characters. Encepha- lartos (South and Tropical Africa). — Large cones; the carpellary scales terminate in a peltate distal expansion. Macrozamia (Australia). — Similar to Encephalartos except in the presence of a spinous projection from the swollen distal end of the carpels. Zamia (South America, Florida, &c). — Stem short and often divided into several columnar branches. Each carpel terminates in a peltate head. Cerato zamia (Mexico). — Similar in habit to Macrozamia, Fig. 3. — Cycas. but distinguished by the presence of two horn-like Young Frond, spinous processes on the apex of the carpels. Microcycas (Cuba). — Like Zamia, except that the ends of the stamens are flat, while the apices of the carpels are peltate. Dioon (Mexico) (fig. 4). — Characterized by the woolly scale-leaves and carpels; the latter terminate in a thick laminar expan- sion of triangular form, bearing two placental cushions, on which the ovules are situated. Bowenia (Australia). — Bi-pinnate fronds; stem short and tuberous (fig. 5).

The stems of cycads are often described as unbranched ; it is true that in comparison with conifers, in which the numerous branches, springing from the main stem, give a characteristic form to the tree, the tuberous or

columnar stem of the Cyca- daceae constitutes a striking distinguishing feature. Branching, however, occurs not infrequently; in Cycas the tall stem often Droduces several candelabra-like arms ; in Zamia

the main axis may break up near the base into several cylindrical branches; in species of Dioon (fig. 4) lateral branches are occasion- ally produced. The South African Encephalartos frequently produces several branches. Probably the oldest example of this genus in cultivation is in the Botanic Garden of Amsterdam, its age is considered by Pro- fessor de Vries to be about two thousand years: although an accurate deter- mination of age is impos- sible, there is no doubt that many cycads grow very slowly and are remarkable for longevity. The thick armour of petiole-bases en- veloping the stem is a characteristic Cycadean feature; in Cycas the alter- nation of scale-leaves and fronds is more clearly shown than in other cycads; in

Encephalartos, Dioon, &c, From a photograph of a plant in the Peradeniya the persistent scale -leaf Gardens, Ceylon, by Professor R. H. Yapp.

Fig. a. — Dioon edule.

bases are almost equal in size to those of the foliage- leaves, and there is no
.

regular alternation of zones sucn as characterizes some species of Cycas. Another type of stem is illustrated by Stangeria and Zamia, also by a few forms of Cycas (fig. 2), in which the fronds fall off

Stem

and

leaf.

Fig. 5. — Bowenia spectabilis : frond.

completely, leaving a comparatively smooth stem. The Cyas type of frond, except as regards the presence of a midrib in each pinna, characterizes the cycads generally, except Bowenia and Stangeria. In the monotypic genus Bowenia the large fronds, borne singly on the short and thick stem, are bi-pinnate (fig. 5) ; the segments, which are broadly ovate or rhomboidal, have several forked spreading veins, and resemble the large pinnules of some species of Adiantum. In Stangeria, also a genus represented by one species (5. paradoxa of South Africa), the long and comparatively broad pinnae, with an entire or irregularly incised margin, are very fern-like, a cir- cumstance which led Kunze to describe the plant in 1835 as a species of the fern Lomaria. In rare cases the pinnae of cycads are lobed or

branched : in Dioon spinu- losum (Central America) the margin of the segments bears numerous spinous pro- cesses; in some species of Encephalartos, e.g. E. horridus, the lamina is deeply lobed ;

and in a species of the Australian genus 'frond; B, sing'le'pinna, Macrozamia, M. heteromera, the narrow

pinnae are dichotomously branched almost to the base (fig. 6) , and re- semble the frond of some species of the fern Schizaea, or the fossil genus Baiera (Ginkgoales). An interesting specie? of Cycas, C.Micholitzii, has recently been described by Sir William Thiselton-Dyer from Annam, where it was collected by one of Messrs Sanders & Son's collectors, in which the pinnae instead of being of the usual simple type are

Fig. 6. — Macrozamia heteromera. A, part of

dichotomously branched as in Macrozamia heteromera. In Cerato- zamia the broad petiole-base is characterized by the presence of two lateral spinous processes, suggesting stipular appendages, com- parable, on a reduced scale, with the large stipules of the Marattiaceae among Ferns. The vernation varies in different genera; in Cycas the rachis is straight and the pinnae circinately coiled (fig. 3) ; in Encephalartos, Dioon, &c, both rachis and segments are straight; in Zamia the rachis is bent or slightly coiled, bearing straight pinnae. The young leaves arise on the stem-apex as conical protuberances with winged borders, on which the pinnae appear as rounded humps, usually in basipetal order; the scale-leaves in their young condition resemble fronds, but the lamina remains undeveloped. A feature of interest in connexion with the phylogeny of cycads is the presence of long hairs clothing the scale-leaves, and forming a cap on the summit of the stem-apex or attached to the bases of petioles ; on some fossil cycadean plants these outgrowths have the form of scales, and are identical in structure with the ramenta (paleae) of the majority of ferns. The male flowers of cycads are constructed on a uniform plan, and in all cases consist of an axis bearing crowded, spirally dis- Flower. posed sporophylls. These are often wedge-shaped and angular ;_ in some cases they consist of a short, thick stalk, terminating in a peltate expansion, or prolonged upwards in the form of a triangular lamina. The sporangia (pollen-sacs), which occur on the, under-side of the stamens, are often arranged in more or less definite groups or sori, interspersed with hairs (paraphyses) ; dehiscence takes place along a line marked out by the occurrence of smaller and thinner-walled cells bounded by larger and thicker- walled elements, which form a

fairly prominent cap-like " annulus " near the apex of the sporangium, not unlike the annulus characteristic of the Schizaeaceae among ferns. The sporangial wall, consisting of several layers of cells, encloses a cavity containing numerous oval spores (pollen-grains). In structure a cycadean sporangium recalls those of certain ferns (Marattiaceae, Osmundaceae and Schizaeaceae). but in the development of the spores there are certain peculiarities not met with among the Vascular Cryptogams. With the exception of Cycas, the female flowers are also in the form of cones, bearing numerous carpellary scales. In Cycas revolula and jC. circinalis each leaf-like carpel may produce several laterally attaThed ovules, but in C. Normanbyand the carpel is shorter and the ovules are reduced to two ; this latter type brings us nearer to the carpels of Dioon, in which the flower has the form of a cone, and the distal end of the carpels is longer and more leaf-like than in the other genera of the Zamieae, which are characterized by shorter carpels with thick peltate heads bearing two ovules on the morphologically lower surface. The cones of cycads attain in some cases (e.g. Encephalartos) a considerable size, reaching a length of more than a foot. Cases have been recorded (by Thiselton-Dyer in Encephalartos and by Wieland in Zamia) in which the short carpellary cone-scales exhibit a foliace- ous form. It is interesting that no monstrous cycadean cone has been described in which ovuliferous and staminate appendages are borne on the same axis : in the Bennettitales (see Palaeobotany : Mesozoic) flowers were produced bearing on the same axis both androecium and gynoecium.

The pollen-grains when mature consist of three cells, two small and one large cell ; the latter grows into the pollen-tube, as in the Micro-Coniferales, and from one of the small cells two large ciliated spermatozoids are eventually produced. A remarkable exception to this rule has recently been recorded by Caldwell, who found that in Microcycas Calocoma the body-cells may be eight or even ten in number and the sperm-cells twice as numerous. One of the most important discoveries made during the latter part of the 19th century was that by Ikeno, a Japanese botanist, who first demonstrated the existence of motile male cells in the genus Cycas. Similar spermatozoids were observed in some species of Zamia by H. J. Webber, and more recent work enables us to assume that all cycads produce ciliated male gametes. Before following the growth of the pollen-grain after pollination, we will briefly describe the structure of a cycadean ovule. An ovule consists of a conical nucellus surrounded by a single integument. At an early stage of develop- ment a large cell makes its appearance in the central region of the nucellus; this increases in size and eventually forms three cells; the lowest of these grows vigorously and constitutes the megaspore (embryo-sac) .which ultimately absorbs the greater part of the nucellus. The megaspore-nucteus divides repeatedly, and

cells are produced from the peripheral region inwards, which eventually fill the sporc- cayity with a homogeneous tissue (prothallus) ; some of the super- ficial cells at the micropylar end of the megaspore increase in size and divide by a tangential wall into two, an upper- cell which gives rise to the short two-celled neck of the archegonium, and a lower cell which develops into a large egg-cell. Each megaspore may contain 2 to 6 archegonia. During the growth of the ovum nourishment is supplied from the contents of the cells immediately surrounding the egg-cell, as in the development of the ovum of Pinus and other conifers. Meanwhile the tissue in the apical region of the nucellus has been undergoing disorganization, which results in the formation of a pollen-chamber (fig. 7, C) immediately above the mega- spore. Pollination in cycads has always been described as anemophilous, but according to recent observations by Pearson on South African species it seems probable that, at least in some

spores and mega- spores.

Fig. 7. — Zamia. Part of Ovule in longi

tudinal section. (After Webber.) P, Prothallus. Pt, Pollen-tube.

Archegonia. Pg,

Nucellus. G,

Pollen-chamber.

A, N, C,

Pollen-grain.

Generative cell (second cell of pollen-tube).

cases, the pollen is conveyed to the ovules by animal agency. The pollen-grains find their way between the carpophylls, which at the time of pollination are slightly apart owing to the elongation of the internodes of the flower-axis, and pass into the pollen-chamber; the large cell of the pollen-grain grows out into a tube (Pt), which penetrates the nucellar tissue and often branches repeatedly; the pollen-grain itself, with the prothallus-cells, projects freely into the pollen-chamber (fig. 7). The nucleus of the outermost (second small cell (fig. 7, G) divides, and one of the daughter-nuclei passes out of the cell, and may enter the lowest (first) small cell. The outermost cell, by the division of the remaining nucleus, produces two large spermatozoids (fig. 8, a, a). In Micro- cycas 16 sperm-cells are produced. In the course of division two bodies ap- pear in the cytoplasm, and behave as centro- somes during the karyo- kinesis; they gradually become

threadlike and coil round each daughter nucleus. This thread gives rise to a spiral cili- ated band lying in a de- pression on the body of each spermatozoid ; the large spermatozoids eventually escape from the pollen-tube, and are able to perform ciliary movements in the watery liquid which occurs be- tween the thin papery remnant of nucellar tissue and the archegonial necks. Before fertilization a neck-canal cell is formed by the division of the ovum-nucleus. After the body of a spermatozoid has coalesced with the egg-nucleus the latter divides repeatedly and forms a mass of tissue which grows more vigorously in the lower part of the fertilized ovum, and extends upwards towards the apex of the ovum as a peripheral layer of paren- chyma surrounding a central space. By further growth this tissue gives rise to a proembryo, which consists, at the micro-pylar end, of a sac; the tissue at the chalazal end grows into a long and tangled suspensor, terminating in a mass of cells, which is eventually differentiated into a radicle, plumule and two cotyledons. In the ripe seed the integument assumes the form of a fleshy envelope, succeeded internally by a hard woody shell, internal to which is a thin papery membrane — the apical portion of the nucellus — which is easily dissected out as a conical cap covering the apex of the endosperm. A thorough examination of cyca-dean seeds has recently been made by Miss Stopes, more particularly with a view to a comparison of their vascular supply with that in Palaeozoic gymnospermous seeds (Flora, 1904). The first leaves borne on the seedling axis are often scale- like, and these are followed by two or more larger laminae, which foreshadow the pinnae of the adult frond.

The anatomical structure of the vegetative organs of recent cycads is of special interest as affording important evidence of rela- . tionship with extinct types, and with Anatom y- other groups of recent plants. Brongniart, who was the first to investigate in detail the anatomy of a cycadean stem, recognized an agreement, as regards the secondary wood, with Dicotyledons and Gymnosperms, rather than with Monoco- tyledons. He drew attention also to certain structural similarities between Cycas and Ginkgo. The main anatomical features of a cycad stem may be summarized as follows: the centre is occupied by a large parenchymatous pith traversed by numerous secretory canals, and in some genera by cauline vascular bundles (e.g. Encephalartos and Macrozamia). In addition to these cauline strands (confined to the stem and not connected with the leaves), collateral bundles are often

Fig. 8. — Zamia. Proximal end of Pollen-tube, a, a, Spermatozoids from G of fig. 7 ; Pg,pollen-grain ; c, proximal cell (first cell). (After Webber.)

.. — met with in the

pith, which form the vascular supply of terminal flowers borne at intervals

on the apex of the stem. These latter bundles may be seen in sections of old stems to pursue a more or less horizontal course, passing outwards through the main woody cylinder. This lateral course is due to the more vigorous growth of the axillary branch formed near the base of each flower, which is a terminal structure, and, except in the female flower of Cycas, puts a limit to the apical growth of the stem. The vigorous lateral branch therefore continues the line of the main axis. The pith is encircled by a cylinder of secondary wood, consisting of single or multiple radial rows of tracheids separated by broad medullary rays composed of large parenchymatous cells; the tracheids bear numerous bordered

Fig. 9. — Macrozamia. Diagrammatic transverse section of part of Stem. (After Worsdcll.) pd. Periderm in leaf-bases. //, Leaf-traces in cortex. ph, Phloem. x, Xylem.

m, Medullary bundles. c. Cortical bundles.

pits on the radial walls. The large medullary rays give to the wood a characteristic parenchymatous or lax appearance, which is in marked contrast to the more compact wood of a conifer. The protoxylem-elements are situated at the extreme inner edge of the secondary wood, and may occur as small groups of narrow, spirally- pitted elements scattered among the parenchyma which abuts on the main mass of wood. Short and reticulately-pitted tracheal cells, similar to tracheids, often occur in the circummedullary region of cycadean stems. In an old stem of Cycas, Encephalartos or Macro- zamia the secondary wood consists of several rather unevenly concentric zones, while in some other genera it forms a continuous mass as in coni- fers and normal dicotyledons. These concentric rings of secondary xylem and phloem (fig. 9) afford a character- istic cycadean feature. After the cambium has been active for some time producing secondary xylem and phloem, the latter consisting of sieve-tubes, phloem-parenchyma and fre- quently thick-walled fibres, a second cambium is developed in the peri- cycle ; this produces a second vascular zone, which is in turn followed by a third cambium, and so on, until several hollow cylinders are developed. It has been recently shown that several cambium-zones may remain in a state of activity, so that the formation of a new cambium does not necessarily mark a cessation of growth in the more internal meristematic rings. It occasionally happens that groups of xylem and phloem are developed internally to some of the vascular rings; these are characterized by an inverse orientation of the tissues, the xylem being centrifugal and the phloem centripetal in its

development. The broad cortical region, which con- tains many secretory canals, is tra- versed by numerous vascular bundles (fig. 9, c) some of which pursue a more or less vertical course, and by frequent anastomoses with one another form a loose reticulum of vascular strands; others are leaf- traces on their way from the stele of the stem to the leaves. Most of these cortical bundles are collateral in structure, but in some the xylem and phloem are concentrically arranged ; the secondary origin of these bundles from procambium-strands was described by Mettenius in his classical paper of i860. During the increase in thickness of a cycadean stem successive layers of cork-tissue are formed by phello- gens in the persistent bases of leaves (fig. 9, pd), which increase in size to adapt themselves to the growth of the vascular zones. The leaf- traces of cycads are remarkable both on account of their course and their anatomy. In a transverse section of a stem (fig. 9) one sees some vascular bundles following a horizontal or slightly oblique

course in the cortex, stretch-

gafr r\ S~\r^~. ‘ n ^ ^ or a l° n S er or shorter

JpK / ^V j V St distance in a direction con-

^ 1 2_ f \ centric with the woody

q ■ — — ‘ \ > cylinder. From each leaf-

^^^^K /^ V base two main bundles

^V . j — s. 11 /~y spread right and left

1 \^ \ H /s: – through the cortex of the

I C – ^^ ^ ~f7 stem (hg- 9> “) > an d as they*

J _^- — ■ > /• —^> curve gradually towards the

vascular ring they present the appearance of two rather flat ogee curves, usually spoken of as the leaf -trace girdles (fig. 9, //). The distal ends of these girdles give off several branches, which traverse the petiole and rachis as numerous collateral bundles. The complicated girdle-like course is characteristic of the leaf-traces of most recent cycads, but in some cases, e.g. in Zamia floridana, the traces are described by Wieland in his recent monograph on American fossil cycads (Carnegie Institu- tion Publications, 1906) as possessing a more direct course similar to that in Mesozoic genera. A leaf-trace, as it passes through the cortex, has a collateral structure, the protoxylem being situated at the inner edge. of the xylem;

when it reaches the leafrbase the position of the spiral tracheids is gradually altered, and the endarch arrangement (protoxylem internal) gives place to a mesarch structure (protoxylem more or less central and not on the edge of the xylem strand). In a bundle examined in the basal portion of a leaf the bulk of the xylem is found to be centrifugal in position, but internally to the protoxylem there is a group of centripetal tracheids; higher up in the petiole the xylem is mainly centripetal, the centrifugal wood being represented

Fig. 10. — Ginkgo biloba. Leaves.

^

*i£&**

J

Fig. 1 1 . — Ginkgo adiantoides. Fossil (Eocene) leaf from the Island of Mull.

by a small arc of tracheids external to the protoxylem and separated from it by a few parenchymatous elements. Finally, in the pinnae of the frond the centrifugal xylem may disappear, the protoxylem being now exarch in position and abutting on the phloem. Similarly in the sporophylls of some cycads the bundles are endarch near the base and mesarch near the distal end of the stamen or carpel. The vascular system of cycadean seedlings presents some features worthy of note; centripetal xylem occurs in the cotyledonary bundles associated with transfusion-tracheids. The bundles from the cotyledons pursue a direct course to the stele of the main axis, and do not assume the girdle-form char- acteristic of the adult plant. This is of interest from the point of view of the comparison of recent cycads with extinct species (Bennettites) , in which the leaf-traces follow a much more direct course than in modern cycads. The mesarch structure of the leaf-bundles is met with in a less pronounced form in the flower ped- uncles of some cycads. This fact is of importance as showing that the type of vascular structure, which characterized the stems of many Palaeozoic genera, has not entirely disappeared from the stems of modern cycads ; but the mesarch bundle is now confined to the leaves and peduncles. The roots of some cycads resemble the stems in producing several cambium- „ ,

rings; they possess 2 to 8 protoxylem-groups, and are s '

characterized by a broad pericyclic zone. A common phenomenon in cycads is the production of roots which grow upwards (apogeotropic), and appear as coralline branched . structures above the level of the ground ; some of the cortical cells of these roots are hypertrophied, and contain

numerous filaments of blue-green Algae (Nostocaceae), which live as endoparasites in the cell-cavities.

Ginkgoales. — This class-designation has been recently proposed to give emphasis to the isolated position of the genus Ginkgo (Salisburia) among the Gymnosperms. Ginkgo biloba, the maiden- hair tree, has usually been placed by botanists in the Taxeae in the neighbourhood of the yew (Taxus), but the proposal by Eichler in 1852 to institute a special family, the Salisburieae , indicated a recognition of the existence of special characteristics which dis- tinguish the genus from other members of the Coniferae. The discovery by the Japanese botanist Hirase of the development of ciliated spermatozoids in the pollen-tube of Ginkgo, in place of the non-motile male cells of typical conifers, served as a cogent argument in favour of separating the genus from the Coniferales and placing it in a class of its own. In 1712 Kaempfer published a drawing of a Japanese tree, which he described under the name Ginkgo; this term was adopted in 1771 by Linnaeus, who spoke of Kaempfer's plant as Ginkgo biloba. In 1797 Smith proposed to use the name Salisburia adiantifolia in preference to the " un- couth " genus Ginkgo and " incorrect " specific term biloba. Both names are still in common use. On account of the resemblance of the leaves to those of some species of Adiantum, the appellation maiden-hair tree has long been given to Ginkgo biloba. Ginkgo is of special interest on account of its isolated position among existing plants, its restricted geographical distribution, and its great antiquity (see Palaeobotany : Mesozoic). This solitary survivor of an ancient stock is almost ex- tinct, but a few old and pre- sumably wild trees are re- corded by travellers in parts of China. Ginkgo is common as a sacred tree in the gardens of temples in the Far East, and often cultivated in North America and Europe. Ginkgo biloba, which may reach a height of over 30 metres, forms a tree of pyramidal shape with a smooth grey bark. The leaves (figs. 10 and II) have a long, slender petiole terminating in a fan- shaped lamina, which may be entire, divided by a median incision into two wedge-shaped lobes, or subdivided into several narrow segments. The venation is like that of many ferns, e.g. Adiantum; the lowest vein in each half of the lamina follows a course parallel to the edge, and gives off numerous branches, which fork repeatedly as they spread in a palmate manner towards the leaf margin. The foliage- leaves occur either scattered on long shoots of unlimited growth, or at the apex of short shoots (spurs), which may eventually elongate into long shoots.

ˆJS»

B

Fig. 12. — Ginkgo biloba. A, Male flower; B, C, single stamens; D, female

flower.

Fig. 13. — Ginkgo.

Pollen-grain. (After Hirase.) Pollen-tube (proximal end). Pollen-chamber.

Upward prolongation of megaspore. Archegonia. Pollen-grain. Exine.

P,

c,

e,

a,

Pg,

Ex

The flowers are dioecious. The male flowers (fig. 12), borne in the axil of scale-leaves, consist of a stalked central axis bearing loosely Flowers disposed stamens; each stamen consists of a slender filament terminating in a small apical scale, which bears usually two, but not infrequently three or four pollen-sacs (fig. 12, C). The axis of the flower is a shoot bearing leaves in the form of stamens. A mature pollen-grain contains a prothallus of 3 to 5 cells (Fig. 13, Pg) ; the exine extends over two-thirds of the circumference, leaving

a thin portion of the wall, which on collapsing pro- duces a longitudinal groove similar to the median depression on the pollen-grain of a cycad. The ordinary type of female flower has the form of a long, naked peduncle bearing a single ovule on either side of the apex (fig. 12), the base of each being enclosed by a small, collar-like rim, the nature of which has been vari- ously interpreted. A young ovule consists of a conical nucellus sur- rounded by a single in- Apex of Ovule, and tegument terminating as a • – --- – two-hpped micropyle. A

large pollen-chamber occupies the apex of the nucellus; immediately below this, two or more archegonia (fig. 13, a) are developed in the upper region of the megaspore, each consisting of a large egg-cell surmounted by two neck-cells and a canal-cell which is cut off shortly before fertilization. After the entrance of the pollen- grain the pollen-chamber becomes roofed over

by a blunt pro- tuberance of nucellar tissue. The megaspore (embryo-sac) con- tinues to grow after pollination until the greater part of the nucellus is gradually destroyed; it also gives rise to a vertical outgrowth, which projects from the apex of the megaspore as a short, thick column (fig. 13, e) supporting the remains of the nucellar tissue which forms the roof of the pollen-chamber (fig. 13, c). Surround- ing the pitted wall of the ovum there is a definite layer of large cells, no doubt representing a tapetum, which, as in cycads and conifers, plays an important part in nourishing the growing egg-cell. The endosperm detached from a large Ginkgo ovule after fertilization bears a close resemblance to that of a cycad ; the apex is occupied by a depression, on the floor of which two small holes mark the position of the archegonia, and the outgrowth from the megaspore apex projects from the centre as a short peg. After pollination the pollen- tube grows into the nucellar tissue, as in cycads, and the pollen-grain itself (fig. 13, Pg) hangs down into the pollen-chamber; two large spirally ciliated spermatozoids are produced, their manner of de- velopment agreeing very closely with that of the corresponding cells in Cycas and Zamia. After fertilization the ovum-nucleus divides and cell-formation proceeds rapidly, especially in the lower part of the ovum, in which the cotyledon and axis of the embryo are differ- entiated; the long, tangled suspensor of the cycadean embryo is not found in Ginkgo. It is often stated that fertilization occurs after the ovules have fallen, but it has been demonstrated by Hirase that this occurs while the ovules are still attached to the tree. The ripe seed, which grows as large as a rather small plum, is enclosed by a thick, fleshy envelope covering a hard woody shell with two or rarely three longitudinal keels. A papery remnant of nucellus lines the inner face of the woody shell, and, as in cycadean seeds, the apical portion is readily separated as a cap covering the summit of the endosperm.

The morphology of the female flowers has been variously inter- preted by botanists; the peduncle bearing the ovules has been described as homologous with the petiole of a foliage-leaf and as a shoot-structure, the collar-like envelope at the base of the ovules being referred to as a second integument or arillus, or as the repre- sentative of a carpel. The evidence afforded by normal and abnormal flowers appears to be in favour of the following interpretation: The peduncle is a shoot bearing two or more carpels. Each ovule is enclosed at the base by an envelope or collar homologous with the lamina of a leaf ; the fleshy and hard coats of the nucellus constitute a single integument. The stalk of an ovule, considerably reduced in normal flowers and much larger in some abnormal flowers, is homo- logous with a leaf-stalk, with which it agrees in the structure and number of vascular bundles. The facts on which this description is based are derived partly from anatomical evidence, and in part from an account given by a Japanese botanist, Fujii, of several abnormal female flowers; in

some cases the collar at the base of an ovule, often described as an arillus, is found to pass gradually into the lamina of a leaf bearing marginal ovules (tig. 14, B). The occurrence of more than two ovules on one peduncle is by no means rare; a

particularly striking example is described by Fujii, in which an unusually thick peduncle bearing several stalked ovules terminates in a scaly bud (fig. 14, A t b). The frequent occurrence of more than two pollen-sacs and the equally common occurrence of additional ovules have been regarded by some authors as evidence in favour of the view that ancestral types normally possessed a greater number of these organs than are usually found m the recent species. This view receives support from fossil evidence. Close to the . apex of a shoot the vascular bundles of a leaf make their Anatom y- appearance as double strands, and the leaf-traces in the upper part of a shoot have the form of distinct bundles, which in the older part of the shoot form a continuous ring. Each double leaf-trace passes through four internodes before becoming a part of the stele; the double nature of the trace is a characteristic feature. Secretory sacs occur abundantly in the leaf- lamina, where they appear as short lines between the veins; they are abundant also in the cortex and pith of the shoot, in the fleshy integument of the ovule, and elsewhere. The secondary wood- of the shoot and root conforms in the main to the coni- ferous type; in the short shoots the greater breadth Fig. 14. — Ginkgo. Abnormal female of the medullary rays in Flowers. A , Peduncle ; b, scaly bud ; the more internal part of B, leaf bearing marginal ovule. (After the xylem recalls the Fujii.) cycadean type. The

secondary phloem contains numerous thick-walled fibres, parenchy- matous cells, and large sieve-tubes with plates on the radial walls; swollen parenchymatous cells containing crystals are commonly met with in the cortex, pith and medullary-ray tissues. The wood consists of tracheids, with circular bordered pits on their radial walls, and in the late summer wood pits are un- usually abundant on the tangential walls. A point of anatomical interest is the occurrence in the vascular bundles of the cotyledons, scale-leaves, and elsewhere of a few centripetally developed tracheids, which give to the xylem-strands a mesarch structure such as char- acterizes the foliar bundles of cycads. The root is diarch in structure, but additional protoxylem-strands may be present at the base of the main root ; the pericycle consists of several layers of cells.

This is not the place to discuss in detail the past history of Ginkgo (see Pal aeobotany : Mesozoic) . Among Palaeozoic genera there are some which bear a close resemblance to the recent type in Qeologkal the form of the leaves; and petrified Palaeozoic seeds, history. almost identical with those of the maidenhair tree, have been described from French and English

localities. During the Triassic and Jurassic periods'the genus Baiera — no doubt a repre- sentative of the Ginkgoales — was widely spread throughout Europe and in other regions; Ginkgo itself occurs abundantly in Mesozoic and Tertiary rocks, and was a common plant in the Arctic regions as elsewhere during the Jurassic and Lower Cretaceous periods. Some unusually perfect Ginkgo leaves have been found in the Eocene leaf- beds between the lava-flows exposed in the cliffs of Mull (fig. 11). From an evolutionary point of view, it is of interest to note the occurrence of filicinean and cycadean characters in the maidenhair tree. The leaves at once invite a comparison with ferns; the numerous long hairs which form a delicate woolly covering on young leaves recall the hairs of certain ferns, but agree more closely with the long filamentous hairs of recent cycads. The spermatozoids constitute the most striking link with both cycads and ferns. The structure of the seed, the presence of two neck-cells in the archegonia, the late development of the embryo, the partially-fused cotyledons and certain anatomical characters, are features common to Ginkgo and the cycads. "The maidenhair tree is one of the most interesting survivals from the past ; it represents 3 type which, in the Palaeozoic era, may have been merged into the extinct class Cordaitales. Through the succeeding ages the Ginkgoales were represented by numerous forms, which gradually became more restricted in their distribution and fewer in number during the Cretaceous and Tertiary periods, terminating at the present day in one solitary survivor.

Coniferales. — Trees and shrubs characterized by a copious branching of the stem and frequently by a regular pyramidal form. Leaves simple, small, linear or short and scale-like, usually persisting for more than one year. Flowers monoecious or dioecious, unisexual, without a perianth, often in the form of cones, but never terminal on the main stem.

The plants usually included in the Coniferae constitute a less homogeneous class than the Cycadaceae. Some authors use the term Coniferae in a restricted sense as including those External genera which have the female flowers in the form of cones, features. the other genera, characterized by flowers of a different type, being placed in the Taxaceae, and often spoken of as Taxads.

In order to avoid confusion in the use of the term Coniferae, we may adopt as a class-designation the name Coniferales, including both the Coniferae — using the term in a restricted sense — and the Taxaceae. The most striking characteristic of the majority of the Coniferales is the regular

manner of the monopodial branching and the pyramidal shape. Araucaria imbricata, the Monkey-puzzle tree, A. excelsa, the Norfolk Island pine, many pines and firs, cedars and other genera illustrate the pyramidal form. The mammoth redwood tree of California, Sequoia (Wellingtonia) gigantea, which represents the tallest Gymnosperm, is a good example of the regular tapering main stem arid narrow pyramidal form. The cypresses afford instances of tall and narrow trees similar in habit to Lombardy poplars. The common cypress (Cupressus sempervirens), as found wild in the mountains of Crete and Cyprus, is characterized by long and spreading branches, which give it a cedar-like habit. A pendulous or weeping habit is assumed by some conifers, e.g. Picea excelsa var. virgata represents a form in which the main branches attain a considerable horizontal extension, and trail themselves like.snakes along the ground. Certain species of Pinus, the yews (Taxus) and some other genera grow as bushes, which in place of a main mast-like stem possess several repeatedly-branched leading shoots. The unfavourable conditions in Arctic regions have produced a dwarf form, in which the main shoots grow close to the ground. Artificially induced dwarfed plants of Pinus, Cupressus, Sciadopitys (umbrella pine) and other genera are commonly cultivated by the Japanese. The dying off of older branches and the vigorous growth of shoots nearer the apex of the stem produce a form of tree illustrated by the stone pine of the Mediterranean region (Pinus Pinea), which Turner has rendered familiar in his " Childe Harold's Pilgrimage " and other pictures of Italian scenery. Conifers are not infrequently seen in which a lateral branch has bent sharply upwards to take the place of the injured main trunk. An upward tendency of all the main lateral branches, known as fastigiation, is common in some species, producing well- marked varieties, e.g. Cephalotaxus pedunculata var. fastigiata; this fastigiate habit may arise as a sport on a tree with spreading branches. Another departure from the normal is that in which the juvenile or seedling form of shoot persists in the adult tree; the numerous coniferous plants known as species of Retinospora are examples of this. The name Retinospora, therefore, does not stand for a true genus, but denotes persistent young forms of Juniperus, Thuja, Cupressus, &c, in which the small scaly leaves of ordinary species are replaced by the slender, needle-like leaves, which stand out more or less at right angles from the branches. The flat branchlets of Cupressus, Thuja (arbor vitae), Thujopsis dolabrata (Japanese arbor vitae) are characteristic of certain types of conifers; in some cases the horizontal extension of the branches induces a dorsiventral structure. A characteristic feature of the genus Agathis (Dammara) the Kauri pine of New Zealand, is the deciduous habit of the branches; these become detached from the main trunk leaving a well-defined absciss-surface, which appears as a depressed circular scar on the stem. A new genus of conifers, Taiwania, has recently been described from the island of Formosa; it is said to agree in habit with the Japanese Cryptomeria, but the

cones appear to have a structure which distinguishes them from those of any other genus.

With a few exceptions conifers are evergreen, and retain the leaves for several years (10 years in Araucaria imbricata, 8 to 10 in Picea Leaves excelsa, 5 in Taxus baccata-, in Pinus the needles usually fall in October of their third year). The larch (Larix) sheds its leaves in the autumn, in the Chinese larch (Pseudo- larix Kaempferi) the leaves turn a bright yellow colour before falling. In the swamp cypress (Taxoiium distichum) the tree assumes a rich brown colour in the autumn, and sheds its leaves together with the branchlets which bear them ; deciduous branches occur also in some other species, e.g. Sequoia sempervirens (redwood), Thuja occidentalis, &c. The leaves of conifers are characterized by their small size, e.g. the needle-form represented by Pinus, Cedrus, Larix, &c, the linear flat or angular leaves, appressed to the branches, of Thuja, Cupressus, Libocedrus, &c. The flat and comparatively broad leaves of Araucaria imbricata, A. Bidwillii, and some species of the southern genus Podocarpus are traversed by several parallel veins, as are also the still larger leaves of Agathis, which may reach a length of several inches. In addition to the foliage-leaves several genera also possess scale-leaves of various kinds, represented by bud- scales in Pinus, Picea, &c, which frequently persist for a time at the base of a young shoot which has pushed its way through the yielding cap of protecting scales, while in some conifers the bud-scales adhere together, and after being torn near the base are carried up by the growing axis as a thin brown cap. The cypresses, araucarias and some other genera have no true bud-scales; in some species, e.g. Araucaria Bidwillii, the occurrence of small foliage-leaves, which have functioned as bud-scales, at intervals on the shoots affords a measure of seasonal growth. The occurrence of long and short shoots is a characteristic feature of many conifers. In Pinus the needles occur in pairs, or in clusters of 3 or 5 at the apex of a small and incon- spicuous short shoot of limited growth (spur), which is enclosed at its base by a few scale-leaves, and borne on a branch of unlimited growth in the axil of a scale-leaf. In the Californian Pinus mono- phylla each spur bears usually one needle, but two are not un- common; it would seem that rudiments of two needles are always produced, but, as a rule, only one develops into a needle. In

Sciadopitys similar spurs occur, each bearing a single needle, which in its grooved surface and in the possession of a double vascular bundle bears traces of an origin from two needle-leaves. A peculiarity of these leaves is the inverse orientation of the vascular tissue ; each of the two veins has its phloem next the upper and the xylem towards the lower surface of the leaf; this unusual position of the xylem and phloem may be explained by regarding the needle of Sciadopitys as being composed of a pair of leaves borne on a short axillary shoot and fused by their margins (fig. 15, A).

Long and short shoots occur also in Cedrus and Larix, but in these genera the spurs are longer and stouter, and are not shed with the leaves; this kind of short shoot, by accelerated apical growth, often passes into the condition of a long shoot on which the leaves are scattered and separated by comparatively long internodes, instead of being crowded into tufts such as are borne on the ends of the spurs. In the genus Phyllocladus (New Zealand, &c.) there are no green foliage-leaves, but in their place flattened branches (phylloclades) borne in the axils of small scale- leaves. The cotyledons are often two in number, but sometimes (e.g. Pinus) as many as fifteen; these leaves are usually succeeded by foliage-leaves in the form of delicate spreading needles, and these primordial leaves are followed, sooner or later, by the adult type of leaf, except in Retinosporas, which retain the juvenile foliage. In addition to the first foliage-leaves and the adult type of leaf, there are often produced leaves which are intermediate both in shape and structure between the seedling and adult foliage. Dimorphism or heterophylly is fairly common. One of the best known examples is the Chinese juniper (Juniperus chinensis), in which branches with spinous, leaves, longer and more spreading than the ordinary adult leaf, are often found associated with the normal type of branch. In some cases, e.g. Sequoia sempervirens, the fertile branches bear leaves which are less spreading than those on the vegetative shoots. Certain species of the southern hemisphere genus Dacrydium afford particu- larly striking instances of heterophylly, e.g. D. Kirkii of New Zealand, in which some branches bear small and appressed leaves, while in others the leaves are much longer and more spreading. A well- known fossil conifer from Triassic strata — Voltzia heterophylla — also illustrates a marked dissimilarity in the leaves of the same shoot. The variation in leaf-form and the tendency of leaves to arrange themselves in various ways on different branches of the same plant are features which it is important to bear in mind in the identifica- tion of fossil conifers. In this connexion we may note the striking resemblance between some of the New Zealand Alpine Veronicas, e.g. Veronica Hectori, V . cupressoides , &c. (also Polycladuscupressinus, a Composite), and some of the cypresses and other conifers with small appressed leaves. The long linear leaves of some species of Podocarpus, in which the lamina is traversed by a single vein, recall the pinnae of Cycas; the branches of some Dacrydiums and other forms closely resemble those of lycopods; these superficial re- semblances, both between different genera of conifers and between conifers and other plants, coupled with the usual occurrence of fossil coniferous twigs without cones attached to them, render the deter- mination of extinct types a very unsatisfactory and frequently an impossible task.

A typical male flower consists of a central axis bearing numerous spirally-arranged sporophylls (stamens), each of which consists of a slender stalk

(filament) terminating distally in a more pi over s. or less prominent knob or triangular scale, and bearing two or more pollen-sacs (microsporangia) on its lower surface. The pollen-grains of some genera (e.g. Pinus) are furnished with bladder- like extensions of the outer wall, which serve as aids to wind-dispersal. The stamens of Araucaria and Agathis are peculiar in bearing several long ,and narrow free pollen-sacs ; these may be compared with the sporangiophores of the horsetails (Equisetum) ; in Taxus (yew) the filament is attached to the centre of a large circular distal expansion, which bears several pollen-sacs on its under surface. In the conifers proper the female reproductive organs have the form of cones, which may be styled flowers or inflorescences according to different inter-pretations of their morphology. In the Taxaceae the flowers have a simpler structure. The female flowers of the Abietineae may be taken as representing a common type. A pine cone reaches maturity in two years ; a single year suffices for the full development in Larix and several other genera. The axis of the cone bears numerous spirally disposed flat scales (cone-scales), each of which, if examined in a young cone, is found to be double, and to consist of a lower and an upper portion. The latter is a thin flat scale bearing a median ridge or keel (e.g. Abies), on each side of which is situated an inverted ovule, consisting of a nucellus surrounded by a single integument. As the cone grows in size and becomes woody the lower half of the Cone-scale, which we may call the carpellary scale, may remain small, and is so far outgrown by the upper half (seminiferous scale) that it is hardly recognizable in the mature cone. In many species of Abies (e.g. Abies pectinata, &c.) the ripe cone differs from those of Pinus, Picea and Cedrus in the large size of the carpellary scales, which project as conspicuous thin appendages beyond the distal margins of the broader and more woody seminiferous scales ; the long carpellary scale is a prominent feature also in the cone of the Douglas pine (Pseudotsuga Douglasii). The female flowers (cones) vary consider- ably in size; the largest are the more or less spherical cones of Araucaria — a single cone of A. imbricata may produce as many as 300 seeds, one seed to each fertile cone-scale — and the long pendent

Morpho- logy ol female Bower.

cones, I to 2 ft. in length, of the sugar pine of California (Pinus Lambertiana) and other species. Smaller cones, less than an inch long, occur in the larch, Athrotaxis (Tasmania), Fitzroya (Patagonia and Tasmania), &c. In the Taxodieae and Araucarieae the cones are similar in appearance to those of the Abietineae, but they differ in the fact that the

scales appear to be single, even in the young con- dition ; each cone-scale in a genus of the Taxodiinae (Sequoia, &c.) bears several seeds, while in the Araucariinae (Araucaria and Agathis) each scale has one seed. The Cupressineae have cones composed of a few scales arranged in alternate whorls; each scale bears two or more seeds, and shows no external sign of being composed of two distinct portions. In the junipers the scales become fleshy as the seeds ripen, and the individual scales fuse together in the form of a berry. The female flowers of the Taxaceae assume another form ; in Microcachrys (Tasmania) the reproductive structures are spirally disposed, and form small globular cones made up of red fleshy scales, to each of which is attached a single ovule enclosed by an integument and partially invested by a# arillus; in Dacrydium the carpellary leaves are very similar to the foliage leaves — each bears one ovule with two integuments, the outer of which constitutes an arillus. Finally in the yew, as a type of the family Taxeae, the ovules occur singly at the apex of a lateral branch, enclosed when ripe by a con- spicuous red or yellow fleshy arillus, which serves as an attraction to animals, and thus aids in the dispersal of the seeds.

It is important to draw attention to some structural features exhibited by certain cone-scales, in which there is no external sign indicative of the presence of a carpellary and a seminiferous scale. In Araucaria Cookii and some allied species each scale has a small pointed projection from its upper face near the distal end ; the scales of Cunninghamia (China) are characterized by a somewhat ragged membranous projection extending across the upper face between the seeds and the distal end of the scale; in the scales of Athrotaxis (Tasmania) a prominent rounded ridge occupies a corresponding position. These projections and ridges may be homologous with the seminiferous scale of the pines, firs, cedars, &c. The simplest interpretation of the cone of the Abietineae is that which regards it as a flower consisting of an axis bearing several open carpels, which in the adult cone may be large and prominent or very small , the scale bearing the ovules being regarded as a placental outgrowth from the flat and open carpel. In Araucaria the cone-scale is regarded as consisting of a flat carpel, of which the placenta has not grown out into the scale-like structure. The seminiferous scale of Pinus, &c, is also spoken of sometimes as a ligular outgrowth from the carpellary leaf. Robert Brown was the first to give a clear description of the morphology of the Abietineous cone in which carpels bear naked ovules ; he recognized gymnospermy as an important distinguishing feature in conifers as well as in cycads. Another view is to regard the cone as an inflorescence, each carpellary scale being a bract bearing in its axil a shoot the axis of which has not been developed ; the seminiferous scale is believed to represent either a single leaf or a fused pair of leaves belonging to the partially suppressed axillary shoot. In 1869

van Tieghem laid stress on anatomical evidence as a key to the morphology of the cone-scales; he drew attention to the fact that the collateral vascular bundles of the seminiferous scale are inversely orientated as compared with those of the carpellary scale ; in the latter the xylem of each bundle is next the upper surface, while in the seminiferous scale the phloem occupies that position. The conclusion drawn from this was that the seminiferous scale (fig. 15, B, Sc) is the first and only- leaf of an axillary shoot (ft) borne on that side of the shoot, the axis of which is suppressed, opposite the subtending bract (fig. 15, A, B, C, Br). Another view is to apply to the seminiferous scale an explana- tion similar to that suggested by von Mohl in the case of the double needle of Sciadopitys, and to consider the seed-bearing scale as being made up of a pair of leaves (fig. 15, A, a, a) of an axillary shoot (ft) fused into one by their posterior margins (fig. 15, A). The latter view receives support from abnormal cones in which carpellary scales subtend axillary shoots, of which the first two leaves (fig. 15, C, l l , l l) are often harder and browner than the others; forms have been described transitional between axillary shoots, in which the leaves are separate, and others in which two of the leaves are more or less completely fused. In a young cone the seminiferous scale appears as a hump of tissue at the base or in the axil of the carpellary scale, but Celakovsky, a strong supporter of the axillary-bud theory, attaches little or no importance to this kind of evidence, regarding the present manner of development as being merely an example of a short cut adopted in the course of evolution, and replacing the original pro- duction of a branch in the axil of each carpellary scale. Eichler, one of the chief supporters of the simpler view, does not recognize in the inverse orientation of the vascular bundles an argument in support of the axillary-bud theory, but points out that the seminiferous scale, being an outgrowth from the surface of the carpellary scale, would, like outgrowths from an ordinary leaf, naturally have its bundles inversely orientated. In such cone-scales as show little or no external indication of being double in origin, e.g. Araucaria (fig. 15, D) Sequoia, &c, there are always two sets of bundles; the upper set, having the phloem uppermost, as in the seminiferous scale of Abies or Pinus, are regarded as belonging to the outgrowth from the carpellary scale and specially developed to supply the ovules. Monstrous cones are fairly common; these in some instances lend

support to the axillary-bud theory, and it has been said that this theory owes its existence to evidence furnished by abnormal cones. It is difficult to estimate the value of abnormalities as evidence bearing on morphological interpretation; the chief danger lies perhaps in attaching undue weight to them, but there is also a risk of minimizing their importance. Monstrosities at least demonstrate possible lines of development, but when the abnormal forms of growth in various directions are fairly evenly balanced,

trustworthy de- ductions become difficult. The occurrence of buds in the axils of carpellary scales may, however, simply mean that buds, which are

(C and D after Worsdell.)

Fig. 15. — Diagrammatic treatment of:

A, Double needle of Sciadopitys (a, a, leaves ; ft, shoot; Br, bract).

B, seminiferous scale as leaf of axillary shoot (6, shoot ; Sc, semi-

niferous scale ; Br, bract).

C, seminiferous scale as fused pair of leaves (/', l", I 3 , first, second

and- third leaves; ft, shoot; Br, bract),

D, cone-scale of Araucaria (n, nucellus; i, integument; x,

xylem).

usually undeveloped in the axils of sporophylls, occasionally afford evidence of their existence. Some monstrous cones lend no support to the axillary-bud theory. In Larix the axis of the cone often continues its growth ; similarly in Cephalotaxus the cones are often proliferous. (In rare cases the proliferated portion produces male flowers in the leaf-axils.) In Larix the carpellary scale may become leafy, and the seminiferous scale may disappear. Androgynous cones may be produced, as in the cone of Pinus rigida (fig. 16), in which the lower part bears stamens and the upper portion carpellary and seminiferous scales. An interesting case has been figured by Masters, in which scales of a cone of Cupressus Lawsoniana bear ovules on the upper surface and stamens on the lower face. One argument that has been adduced in support of the axillary bud theory is derived from the Palaeozoic type Cordaites, in which each ovule occurs on an axis borne in the axil of a bract. The whole question is still un- solved, and perhaps insoluble. It may be that the interpretation of the female cone of the Abietineae as an inflorescence, which finds favour with many botanists, cannot be applied to the cones of Agathis and Araucaria. Without ex- pressing any decided opinion as to the morpho- logy of the double cone-scale of the Abietineae, preference may be felt in favour of regard- ing the cone-scale of the Araucarieae as a simple carpellary leaf bearing a single ovule. A discussion of this question may be found in a paper on the Araucarieae by Seward and Ford, _ published in the Transactions of the Royal Society Fig. 16 Ab- of London (1906). Cordaites is an extinct type normal Cone of which in certain respects resembles Ginkgo, cycads Pinus rigida. and the Araucarieae, but its agreement with

true (After Masters.) conifers is probably too remote to justify our attributing much weight to the bearing of the morphology of its female flowers on the interpretation of that of the Coniferae. The greater simplicity of the Eichler theory may prejudice us in its favour; but, on the other hand, the arguments advanced in favour of the axillary-bud theories are perhaps not sufficiently cogent to lead us to accept an explanation based chiefly on the uncertain evidence of monstrosities.

*A pollen-grain when first formed from its mother-cell consists of a single cell ; in this condition it may be carried to the nucellus 0) the ovule (e.g. Taxus, Cupressus, &c), or more usually „. (Pinus, Larix, &c.) it reaches maturity before the dehis- Mlcrom cence of the microsporangium. The nucleus of the sp " res (microspore divides and gives rise to a small cell within f!!™'** the large cell, a second small cell is then produced; this is the structure of the ripe pollen-grain in some conifers (Taxus, &c). The large cell grows out as a pollen-tube; the second of the two small cells (body-cell) wanders into the tube, followed by the nucleus of the first small cell (stalk-cell). In Taxus the body-cell eventually divides into two, in which the products of division are of unequal size, the larger constituting the male generative cell, which fuses with the nucleus of the egg-cell. In Juniperus the products of division of the*

body-cell are equal, and both function as male generative cells. In the Abietineae cell-formation in the pollen-grain is carried farther. Three small cells occur inside the cavity of the microspore; two of them collapse and the third divides into two, forming a stalk-cell and a larger body-cell. The latter ultimately divides in the apex of the pollen-tube into two non- motile generative cells. Evidence has lately been adduced of the existence of numerous nuclei in the pollen-tubes of the Araucarieae, and it seems probable that in this as in several other respects this family is distinguished from other members of the Coniferales. The precise method of fertilization in the Scots Pine was followed by V. H. Blackman, who also succeeded in showing that the nuclei of the sporophyte generation contain twice as many chromosomes as the nuclei of the gametophyte. Other observers have in recent years demonstrated a similar relation in other genera between the number of chromosomes in the nuclei of the two genera- tions. The ovule is usually surrounded by one integument, which projects beyond the tip of the nucellus as a wide-open lobed funnel, which at the time of pollination folds inwards, and so assists in bring- ing the pollen-grains on to the nucellus. In some conifers (e.g. Taxus, Cephalotaxus , Dacrydium, &c.) the ordinary integument is partially enclosed by an arillus or second integument. It is

held by some botanists (Celakovsky) that the seminiferous scale of the Abietineae is homologous with the arillus or second integument of the Taxaceae, but this view is too strained to gain general acceptance. In Araucaria and Saxegothaea the nucellus itself projects beyond the open micropyle and receives the pollen-grains direct. During the growth of the cell which forms the megaspore the greater part of the nucellus is absorbed, except the apical portion, which persists as a cone above the megaspore ; the partial disorganization of some of the cells in the centre of the nucellar cone forms an irregular cavity, which may be compared with the larger pollen-chamber of Ginkgo and the cycads. In each ovule one megaspore comes to maturity, but, exceptionally, two may be present {e.g. Pinus sylvestris). It has been shown by Lawson that in Sequoia sempervirens (Annals of Botany, 1904) and by other workers in the genera that several megaspores may attain a fairly large size in one prothallus. The megaspore becomes filled with tissue (prothallus), and from some of the super- ficial cells archegonia are produced, usually three to five in number, but in rare cases ten to twenty or even sixty may be present. In the genus Sequoia there may be as many as sixty archegonia (Arnoldi and Lawson) in one megaspore; these occur either separately or in some parts of the prothallus they may form groups as in the Cupressineae; they are scattered through the prothallus instead of being confined to the apical region as in the majority of conifers. Similarly in the Araucarieae and in Widdringtonia the archegonia are numerous and scattered and often sunk in the prothallus tissue. In Libocedrus decurrens (Cupressineae) Lawson describes the archegonia as varying in number from 6 to 2\(Annals of Botany xxi.,1907). An archegonium consists of a large oval egg-cell surmounted by a short neck composed of one or more tiers of cells, six to eight cells in each tier. Before fertilization the nucleus of the egg-cell divides and cuts off a ventral canal-cell ; this cell may represent a second egg-cell. The egg-cells of the archegonia may be in lateral contact (e.g. Cupressineae) or separated from one another by a few cells of the prothallus, each ovum being immediately surrounded by a layer of cells distinguished by their granular contents and large nuclei. During the develop- ment of the egg-cell, food material is transferred from these cells through the pitted wall of the ovum. The tissue at the apex of the megaspore grows slightly above the level of the archegonia, so that the latter come to lie in a shallow depression. In the process of fertilization the two male generative nuclei, accompanied by the pollen-tube nucleus and that of the stalk-cell, pass through an open pit at the apex of the pollen-tube into the protoplasm of the ovum. After fertilization the nucleus of the egg divides, the first stages of karyokinesis being apparent even before complete fusion of the male and female nuclei has occurred. The result of this is the production of four nuclei, which eventually take up a position at the bottom of the ovum and become separated from one another by vertical cell- walls; these nuclei

divide again, and finally three tiers of cells are produced, four in each tier. In the Abietineae the cells of the middle tier elongate and push the lowest tier deeper into the endosperm; the cells of the bottom tier may remain in lateral contact and produce together one embryo, or they may separate (Pinus, Juniperus, &c.) and form four potential embryos. The ripe albuminous seed contains a single embryo with two or more cotyledons. The seeds of many conifers are provided with large thin wings, consisting in some genera (e.g. Pinus) of the upper cell-layers of the seminiferous scale, which have become detached and, in some cases, adhere loosely to the seed as a thin membrane ; the loose attachment may be of use to the seeds when they are blown against the branches of trees, in enabling them to fall away from the wing and drop to the ground. The seeds of some genera depend on animals for dispersal, the carpellary scale (Micro- cachrys) or the outer integument being brightly coloured and attractive. In some Abietineae (e.g. Pinus and Picea) — in which the cone-scales persist for some time after the seeds are ripe — the cones hang down and so facilitate the fall of the seeds; in Cedrus, Arau- caria and Abies the scales become detached and fall with the seeds, leaving the bare vertical axis of the cone on the tree. In all cases, except some species of Araucaria (sect. Colymbea) the germination is epigean. The seedling plants of some Conifers (e.g. Araucaria

imbricata) are characterized by a carrot-shaped hypocotyl, which doubtless serves as a food-reservoir.

The roots of many conifers possess a narrow band of primary xylem-tracheids with a group of narrow spiral protoxylem-elements at each end (diarch). A striking feature in the roots of several genera, excluding the Abietineae, is the occur- Anatomy. rence of thick and somewhat irregular bands of thickening on the cell-walls of the cortical layer next to the endodermis. These bands, which may serve to strengthen the central cylinder, have been com- pared with the netting surrounding the delicate wall of an inflated balloon. It is not always easy to distinguish a root from a stem; in some cases (e.g. Sequoia) the primary tetrarch structure is easily identified in the centre of an old root, but in other cases the primary elements are very difficult to recognize. The sudden termination of the secondary tracheids against the pith-cells may afford evidence of root-structure as distinct from stem-structure, in which the radial rows of secondary tracheids pass into the irregularly-arranged primary elements next the pith. The annual rings in a root are often less clearly marked than in the stem, and the xylem-elements are frequently larger and thinner. The primary vascular bundles in a' young conifer stem are collateral, and, like those of a Dicotyledon, they are arranged in a circle round a central pith and enclosed by a common endodermis. It is in the nature of the secondary xytem that the Coniferales are most readily distinguished from the Dicotyledons and Cycadaceae; the wood is homogeneous in structure,

consisting almost entirely of tracheids with circular or polygonal bordered pits on the radial walls, more particularly in the late summer wood. In many genera xylem-parenchyma is present, but never in great abundance. A few Dicotyledons, e.g. Drimys (Magnoliaceae) closely resemble conifers in the homogeneous character of the wood, but in most cases the presence of large spring vessels, wood-fibres and abundant parenchyma affords an obvious distinguishing feature.

The abundance of petrified coniferous wood in rocks of various ages has led many botanists to investigate the structure of modern genera with a view to determining how far anatomical characters may be used as evidence of generic distinctions. There are a few well-marked types of wood which serve as convenient standards of comparison, but these cannot be used except in a few cases to dis- tinguish individual genera. The genus Pinus serves as an illustration of wood of a distinct type characterized by the absence of xylem- parenchyma, except such as is associated with the numerous resin- canals that occur abundantly in the wood, cortex and medullary rays; the medullary rays are composed of parenchyma and of horizontal tracheids with irregular ingrowths from their walls. In a radial section of a pine stem each ray is seen to consist in the median part of a few rows of parenchymatous cells with large oval simple pits in their walls, accompanied above and below by horizontal tracheids with bordered pits. The pits in the radial walls of the ordinary xylem-tracheids occur in a single row or in a double row, of which the pits are not in contact, and those of the two rows are placed on the same level. The medullary rays usually consist of a single tier of cells, but in the Pinus type of wood broader medullary rays also occur and are traversed by horizontal resin-canals. In the wood of Cypressus, Cedrus, A bies and several other genera, parenchy- matous cells occur in association with the xylem-tracheids and take the place of the resin-canals of other types. In the Araucarian type of wood (Araucaria and Agathis) the bordered pits, which occur in two or three rows on the radial walls of the tracheids, are in mutual contact and polygonal in shape, the pits of the different rows are alternate and not on the same level ; in this type of wood the annual rings are often much less distinct than in Cupressus, Pinus and other genera. In Taxus, Torreya (California and the Far East) and Cephalo- taxus the absence of resin-canals and the presence of spiral thickening- bands on the tracheids constitute well-marked characteristics. An examination of the wood of branches, stems and roots of the same species or individual usually reveals a fairly wide variation in some of the characters, such as the abundance and size of the medullary rays, the size and arrangement of pits, the presence of wood-parenchyma — characters to which undue importance has often been attached in systematic anatomical work. The phloem consists of sieve-tubes, with pitted areas on the lateral as well as on the

inclined terminal walls, phloem-parenchyma and, in some genera, fibres. In the Abietineae the phloem consists of parenchyma and sieve-tubes only, but in most other forms tangential rows of fibres occur in .regular alternation with the parenchyma and sieve-tubes. The characteristic companion-cells of Angiosperms are represented by phloem-parenchyma cells with albuminous contents-; other paren- chymatous elements of the bast contain starch or crystals of calcium oxalate. When tracheids occur in the medullary rays of the xylem these are replaced in the phloem-region by irregular parenchymatous cells" known as albuminous cells. Resin-canals, which occur abund- antly in the xylem, phloem or cortex, are not found in the wood of the yew. Cephalotaxus (Taxeae) is also peculiar in having resin-canals in the pith (cf. Ginkgo). One form of Cephalotaxus is characterized by the presence of short tracheids in the pith, in shape like ordinary parenchyma, but in the possession of bordered pits and lignified walls agreeing with ordinary xylem-tracheids; it is probable that these short tracheids serve as reservoirs for storing rather than for conducting water. The vascular bundle entering the stem from a leaf with a single vein passes by a more or less direct course into the

central cylinder of the stem, and does not assume the girdle-like form characteristic of the cycadean leaf -trace. In species of which the leaves have more than one vein (e.g. Araucaria imbricata, &c.) the leaf-trace leaves the stele of the stem as a single bundle which splits up into several strands in its course through the cortex. In the wood of some conifers, e.g. Araucaria, the leaf traces persist for a consider able time, perhaps indefinitely, and may be seen in tangential sections of the wood of old stems. The leaf-trace in the Coniferales is simple in its course through the stem, differing in this respect from the double leaf-trace of Ginkgo. A detailed account of the ana- tomical characters of conifers has been published by Professor D. P. Penhallow of Montreal and Dr. Gothan of Berlin which will be found useful for diagnostic purposes. The characters of leaves most useful for diagnostic purposes are the position of the stomata, the presence and arrangement of resin-canals, the structure of the mesophyll and vascular bundles. The presence of hypodermal fibres is another feature worthy of note, but the occurrence of these elements is too closely connected with external conditions to be of much systematic value. A pine needle grown in continuous light differs from one grown under ordinary conditions in the absence of hypodermal fibres, in the absence of the characteristic infoldings of the mesophyll cell-walls, in the smaller size of the resin-canals, &c. The endodermis in Pinus, Picea and many other genera is usually a well-defined layer of cells enclosing the vascular

bundles, and separated from them by a tissue consisting in part of ordinary par- enchyma and to some extent of isodiametric tracheids; but this tissue, usually spoken of as the pericycle, is in direct continuity with other stem-tissues as well as the pericycle. The occurrence of short tracheids in close proximity to the veins is a characteristic of conifer- ous leaves; these elements assume two distinct forms — (1) the short isodiametric tracheids (transfusion-tracheids) closely associated with the veins; (2) longer tracheids extending across the mesophyll at right angles to the veins, and no doubt functioning as representatives of lateral veins. It has been suggested that transfusion-tracheids represent, in part at least, the centripetal xylem, which forms a distinctive feature of cycadean leaf-bundles; these short tracheids form conspicuous groups laterally attached to the veins in Cunning- hamia, abundantly represented in a similar position in the leaves of Sequoia, and scattered through the so-called pericycle in Pinus, Picea, &c. It is of interest to note the occurrence of precisely similar elements in the mesophyll of Lepidodendron leaves. An anatomical peculiarity in the veins of Pinus and several other genera is the con- tinuity of the medullary rays,- which extend as continuous plates from one end of the leaf to the other. The mesophyll of Pinus and Cedrus is characterized by its homogeneous character and by the presence of infoldings of the cell-walls. In many leaves, e.g. Abies, Tsuga, Larix, &c, the mesophyll is heterogeneous, consisting of palisade and spongy parenchyma. In the leaves of Araucaria imbricata, in which palisade-tissue occurs in both the upper and lower part of the mesophyll, the resin-canals are placed between the veins; in some species of Podocarpus (sect. Nageia) a canal occurs below each vein; in Tsuga, Torreya, Cephalotaxus, Sequoia, &c, a single canal occurs below the midrib; in Larix, Abies, &c, two canals run through the leaf parallel to the margins. The stomata are frequently arranged in rows, their position being marked by two white bands of wax on the leaf-surface.

The chief home of the Coniferales is in the northern hemisphere, where certain species occasionally extend into the Arctic circle and penetrate beyond the northern limit of dicotyledon- ous trees. Wide areas are often exclusively occupied by conifers, which give the landscape a sombre aspect, a comparison with the forest vegetation of the Coal South of the tree-limit a belt of conifers stretches across north Europe, Siberia and Canada. In northern Europe this belt is characterized by such species as Picea excelsa (spruce), which extends south to the mountains of the Mediterranean region ; Pinus sylvestrii (Scottish fir), reaching from the far north to western Spain, Persia and Asia Minor; Juniperus communis, &c. In north Siberia Pinus Cembra (Cembra or Arolla Pine) has a wide range; also Abies sibirica (Siberian silver fir) , Larix sibirica and Juniperus Sabina (savin) . In the North American area Picea alba, P. nigra, Larix americana, Abies balsamea (balsam fir), Tsuga canadensis (hemlock

spruce), Pinus Strobus (Weymouth pine), Thuja occidentalis (white cedar), Taxus canadensis are characteristic species. In the Mediterranean region occur Cupressus sempervirens , Pinus Pinea (stone pine), species of juniper, Cedrus atlantica, C. Libani, Callitris quadrivalvis , Pinus montana, &c. Several conifers of economic importance are abundant on the Atlantic side of North America — Juniperus virginia- na (red cedar, used in the manufacture of lead pencils, and extending as far south as Florida), Taxodium distichum (swamp cypress), Pinus rigida (pitch pine), P. mitis (yellow pine), P. taeda,P. palustris, &c. On the west side of the American continent conifers play a still more striking r61e ; among them are Chamaecyparis nutkaensis, Picea sitchensis, Libocedrus decurrens, Pseudotsuga Douglasii (Douglas fir), Sequoia sempervirens, S. gigantea (the only two surviving species of this generic type are now confined to a few localities in California, but were formerly widely spread in Europe and elsewhere), Pinus Coulteri, P. Lambertiana, &c. Farther south, a few representatives of such genera as Abies, Cupressus, Pinus and juniper are found in the Mexican Highlands, tropical America and the West Indies. In

Distribu- tion.

suggesting period.

the far East conifers are richly represented; among them occur Pinus densiflora,Cryptomeria japonica, Cephalotaxus, species of Abies, Larix, Thujopsis, Sciadopitys verticillata, Pseudolarix Kaempferi, &c. In the Himalaya occur Cedrus deodara, Taxus, species of Cupressus, Pinus excelsa, Abies Webbiana, &c. The continent of Africa is singularly poor in conifers. Cedrus atlantica, a variety of Abies Pinsapo, Juniperus thurifera, Callitris quadrivalvis, occur in the north-west region, which may be regarded as the southern limit of the Mediterranean region. The greater part of Africa north of the equator is without any representatives of the conifers; Juniperus procera flourishes in Somaliland and on the mountains of Abyssinia ; a species of Podocarpus occurs on the Cameroon mountains, and P. milanjiana is widely distributed in east tropical Africa. Widdring- tonia Whytei, a species closely allied to W. juniperoides of the Cedar- berg mountains of Cape Colony , is recorded from Nyassaland and from N.E. Rhodesia; while a third species, W. cupressoides, occurs in Cape Colony. Podocarpus elongata and P. Thunbergii (yellow wood) form the principal timber trees in the belt of forest which stretches from the coast mountains of Cape Colony to the north-east of the Transvaal. Libocedrus tetragona, Fitzroya patagonica, Araucaria brasiliensis , A. imbricata, Saxegothaea and others are met with in the Andes and other regions in South America. Athrotaxis and Microcachrys are characteristic Australian types. Phyllocladus occurs also in New Zealand, and species of Dacrydium, Araucaria, Agathis and Podocarpus are represented in Australia, New

Zealand and the Malay regions.

Gnetales. — These are trees or shrubs with simple leaves. The flowers are dioecious, rarely monoecious, provided with one or two perianths. The wood is characterized by the presence of vessels in addition to tracheids. There are no resin-canals. The three existing genera, usually spoken of as members of the Gnetales, differ from one another more than is consistent with their inclusion in a single family ; we may therefore better express their diverse characters by regarding them as types of three separate families — (1) Ephedroideae, genus Ephedra; (2) Welwitschioideae, genus Welivitschia ; (3) Gnetoideae, genus Gnetum. Our knowledge of the Gnetales leaves much to be desired, but such facts as we possess would seem to indicate that this group is of special importance as foreshadowing, more than any other Gymnosperms, the Angiospermous type. In the more heterogeneous structure of the wood and in the possession of true vessels the Gnetales agree closely with the higher flowering plants. It is of interest to note that the leaves of Gnetum, while typically Dicotyledonous in appearance, possess a Gymnospermous character in the continuous and plate-like medullary rays of their vascular bundles. The presence of a perianth is a feature suggestive of an approach to the floral structure of Angiosperms; the prolonga- tion of the integument furnishes the flowers with a substitute for a stigma and style. The genus Ephedra, with its prothallus and arche- gonia, which are similar to those of other Gymnosperms, may be safely regarded as the most primitive of the Gnetales. In Welivitschia also the megaspore is filled with prothallus-tissue, but single egg-cells take the place of archegonia. In certain species of Gnetum described by Karsten the megaspore contains a peripheral layer of protoplasm, in which scattered nuclei represent the female reproductive cells; in Gnetum Gnemon a similar state of things exists in the upper half of the megaspore, while the lower half agrees with the megaspore of Welivitschia in being full of prothallus-tissue, which serves merely as a reservoir of food. Lotsy has described the occurrence of special cells at the apex of the prothallus of Gnetum Gnemon, which he regards as imperfect archegonia (fig. 17, C, o) ; he suggests they may represent vestigial structures pointing back to some ancestral form beyond the limits of the present group. The Gnetales probably had a separate origin from the other Gymnosperms; they carry us nearer to the Angiosperms, but we have as yet no satisfactory evidence that they represent a stage in the direct line of Angiospermic evolution. It is not improbable that the three genera of this ancient phylum survive as types of a blindly-ending branch of the Gymnosperms; but be that as it may, it is in the Gnetales more than in any other Gymno- sperms that we find features which help us to obtain a dim prospect of the lines along which the Angiosperms may have been evolved.

Ephedra. — This genus is the only member of the Gnetales repre- sented in

Europe. Its species, which are characteristic of warm temperate latitudes, are usually much-branched shrubs. The finer branches are green, and bear a close resemblance to the stems of Equisetum and to the slender twigs of Casuarina ; the surface of the long internodes is marked by fine longitudinal ribs, and at the nodes are borne pairs of inconspicuous scale-leaves. The flowers are small, and borne on axillary shoots. A single male flower consists of an axis enclosed at the base by an inconspicuous perianth formed of two concrescent leaves and terminating in two, or as many as eight, shortly stalked or sessile anthers. The female flower is enveloped in a closely fitting sac-like investment, which must be regarded as a perianth ; within this is an orthotropous ovule surrounded by a single integument prolonged upwards as a beak-like micropyle. The flower may be described as a bud bearing a 'pair of leaves which become fused and constitute a perianth, the apex of the shoot forming an ovule. In function the perianth may be compared with a unilocular ovary containing a single ovule ; the projecting integument, which at the time of pollination secretes a drop of liquid, serves the same purpose as the style and stigma of an angiosperm. The megaspore

is filled with tissue as in typical Gymnosperms, and from some of the superficial cells 3 to 5 archegonia are developed, characterized by long multicellular necks. The archegonia are separated from one another, as in Pinus, by some of the prothallus-tissue, and the cells next the egg-cells (tapetal layer) contribute food-material to their development. After fertilization, some of the uppermost bracts below each flower become red and fleshy ; the perianth develops into a woody shell, while the integument remains membranous. In some species of Ephedra, e.g. E. altissima, the fertilized eggs grow into tubular proembryos, from the tip of each of which embryos begin to be developed, but one only comes to maturity. In Ephedra helvetica, as described by Jaccard, no proembryo or suspensor is formed; but the most vigorous fertilized egg, after undergoing several divisions, becomes attached to a tissue, termed the columella, which serves the purpose of a primary suspensor; the columella appears to be formed by the lignification of certain cells in the central region of the em- bryo-sac. At a later stage some of the cells in the upper (micropylar) end of the embryo divide and undergo considerable elongation, serving the purpose of a secondary suspensor. The secondary wood of Ephedra consists of tracheids, vessels and parenchyma; the vessels are characterized by their wide lumen and by the large simple or slightly-bordered pits on their oblique end-walls.

Gnetum. — This genus is represented by several species, most of which are

climbing plants, both in tropical America and in warm regions of the Old World. The leaves, which are borne in pairs at the tumid nodes, are oval in form and have a Dicotyledonous type of venation. The male and female inflorescences have the form of simple or paniculate spikes. The spike of an inflorescence bears whorls of flowers at each node in the axils of concrescent bracts accompanied by numerous sterile hairs (paraphyses) ; in a male inflorescence numerous flowers occur at each node, while in a female inflorescence the number of flowers at each node is much smaller. A male flower consists of a single angular perianth, through the open apex of which the flower-axis projects as a slender column terminating in two anthers. The female flowers, which are more complex in

Fig. 17. — Gnetum Gnemon. (After Lotsy.)

pc

A, Female Flower n, Nucellus.

Pollen-chamber.

Integument.

p', Inner Perianth.

p" , Outer Perianth.

B, C, Megaspore.

Imperfect Archegonia. e, Partially developed Megaspore. F, Fertile half. 5, Sterile half. pt, Pollen-tube. z, Zygote. z', Prothallus.

structure, are of two types, complete and incomplete; the latter occur in association with male flowers in a male inflorescence. A complete female flower consists of a nucellus (fig. 17, A, n), surrounded by a single integument (fig. 17, A, i), prolonged upwards as a narrow tube and succeeded by an inner and an outer perianth (fig. 17, A, p' and p"). The whole flower may be looked upon as an adventitious bud bearing two pairs of leaves; each pair becomes concrescent and forms a perianth, the apex of the shoot being converted into an orthotropous ovule. The incomplete female flowers are character- ized by the almost complete suppression of the inner perianth. Several embryo-sacs (megaspores) are present in the nucellus of a young ovule, but one only attains full size, the smaller and partially developed megaspores (fig. 17, B and C, e) being usually found in close association with the surviving and fully-grown megaspore. In Gnetum Gnemon, as described by Lotsy, a mature embryo-sac con- tains in the upper part a large central vacuole and a peripheral layer of protoplasm,

including several nuclei, which take the place of the archegonia of Ephedra; the lower part of the embryo-sac, separated from the upper by a constriction, is full of parenchyma. The upper part of the megaspore may be spoken of as the fertile half (fig. 17, B and C, F). and the lower part, which serves only as food-reservoir for the growing embryo, may be termed the sterile half (fig. 17, B and C, S). (Coulter, Bot. Gazette, xlvi., 1908, regards this tissue as belong- ing to the nucellus.) At the time of pollination the long tubular

integument secretes a drop of fluid at its apex, which holds the pollen-grains, brought by the wind, or possibly to some extent by insect agency, and by evaporation these are drawn on to the top of the nucellus, where partial disorganization of the cells has given rise to an irregular pollen-chamber (fig. 17, A, pc). The pollen-tube, containing two generative and one vegetative nucleus, pierces the wall of the megaspore and then becomes swollen (fig. 17, B and C, pt) ; finally the two generative nuclei pass out of the tube and fuse with two of the nuclei in the fertile half of the megaspore. As the result of fertilization, the fertilized nuclei of the megaspore become surrounded by a cell-wall, and constitute zygotes, which may attach themselves either to the wall of the megaspore or to the end of a pollen-tube (fig. 17, C, z and z') ; they then grow into long tubes or proembryos, which make their way towards the prothallus (C, z'), and eventually embryos are formed from the ends of the proembryo tubes. One embryo only comes to maturity. The embryo of Gnetum forms an out-growth from the hypocotyl, which serves as a feeder and draws nourishment from the prothallus. The fleshy outer portion of the seed is formed from the outer perianth, the woody shell being derived from the inner perianth. The climbing species of Gnetum are characterized by the production of several concentric cylinders of secondary wood and bast, the additional cambium-rings being products of the pericycle, as in Cycas and Macrozamia. The structure of the wood agrees in the main with that of Ephedra.

Welwitschia {Tumboa). — This is by far the most remarkable member of the Gnetales, both as regards habit and the form of its flowers. In a supplement to the systematic work of Engler and Prantl the well-known name Welwitschia, instituted by Hooker in 1864 in honour of Welwitsch, the discoverer of the plant, is super- seded by that of Tumboa, originally suggested by Welwitsch. The genus is confined to certain localities in Damaraland and adjoining territory on the .west coast of tropical South Africa. A well-grown plant projects less than a foot above the surface of the ground ; the stem, which may have a circumference of more than 12 ft., terminates in a depressed crown resembling a circular table with a median groove across the centre and prominent broad ridges concentric with the margin. The thick tuberous stem becomes rapidly narrower, and passes gradually downwards into a tap-root. A pair of small strap- shaped leaves

succeed the two cotyledons of the seedling, and persist as the only leaves during the life of the plant ; they retain the power of growth in their basal portion, which is sunk in a narrow groove near the edge of the crown, and the tough lamina, 6 ft. in length, becomes split into narrow strap-shaped or thong-like strips which trail on the ground. Numerous circular pits occur on the concentric ridges of the depressed and wrinkled crown, marking the position of former inflorescences borne in the leaf-axil at different stages in the growth of the plant. An inflorescence has the form of a dichotomously-branched cyme bearing small erect cones; those containing the female flowers attain the size of a fir-cone, and are scarlet in colour. Each cone consists of an axis, on which numerous broad and thin bracts are arranged in regular rows ; in the axil of each bract occurs a single flower; a male flower is enclosed by two opposite pairs of leaves, forming a perianth surrounding a central sterile ovule en- circled by a ring of stamens united below, but free distally as short filaments, each of which terminates in a trilocular anther. The integument of the sterile ovule is prolonged above the nucellus as a spirally-twisted tube expanded at its apex into a flat stigma-like organ. A complete and functional female flower consists of a single ovule with two integuments, the inner of which is prolonged into a narrow tubular micropyle, like that in the flower of Gnetum. The megaspore of Welwitschia is filled with a prothallus-tissue before fertilization, and some of the prothallus-cells function as egg-cells; these grow upwards as long tubes into the apical region of the nucellus, where they come into contact with the pollen-tubes. After the egg-cells have been fertilized by the non-motile male cells they grow into tubular proembryos, producing terminal embryos. The stem is traversed by numerous collateral bundles, which have a limited growth, and are constantly replaced by new bundles de- veloped from strands of secondary meristem. One of the best- known anatomical characteristics of the genus is the occurrence of numerous spindle-shaped or branched fibres with enormously- thickened walls studded with crystals of calcium oxalate. Additional information has been published by Professor Pearson of Cape Town based on material collected in Damaraland in 1904 and 1906-1907. In 1906 he gave an account of the early stages of development of the male and female organs and, among other interesting statements in regard to the general biology of Welwitschia, he expressed the opinion that, as Hooker suspected, the ovules are pollinated by insect-agency. In a later paper Pearson considerably extended our ■knowledge of the reproduction and gametophyte of this genus.

Authorities. — General: Bentham and Hooker, Genera Plan- tarum (London, 1862-1883); Engler and Prantl, Die naturlichen Pflanzenfamilien (Leipzig, 1889 and 1897); Strasburger, Die Coniferen und Gnetaceen (Jena, 1872); Die Angiospermen und die Gymnospermen (Jena, 1879); Histologische Beitrdge, iv. (Jena, 1892); Coulter and Chamberlain,

Morphology of Spermatophytes (New York, 1901); Rendle, The Classification of Flowering Plants, vol. i. (Cam- bridge, 1904); "The Origin of Gymnosperms" (A discussion at the Linnean Society; New Phytologist, vol. v., 1906). Cycadales: Mettenius, " Beitrage zur Apatomie der Cycadeen," Abh. k. sdchs.

Ges. Wiss. (i860); Treub, " Recherches sur les Cycadees," Ann. Bot. Jard. Buitenzorg, ii. (1884); Solms-Laubach, " Die Sprossfolge der Stangeria, &c," Bot. Zeit. xlviii. (1896); Worsdell, "Anatomy of Macrozamia," Ann. Bot. x. (1896) (also papers by the same author, Ann. Bot., 1898, Trans. Linn. Soc. v., 1900) ; Scott, " The Ana- tomical Characters presented by the Peduncle of Cycadaceae," Ann. Bot. xi. (1897) ; Lang, " Studies in the Development and Morphology of Cycadean Sporangia, No. I.," Ann. Bot. xi. (1897); No. II., Ann. Bot. xiv. (1900); Webber, "Development of the Antherozoids of Zamia," Bot. Gaz. (1897); Ikeno, " Untersuchungen ilber die Entwickelung, &c, bei Cycas revoluta," Journ. Coll. Sci. Japan, xii. (1898); Wieland, " American Fossil Cycads," Carnegie Institu- tion Publication (1906); Stopes, "Beitrage zur Kenritnis der Fortpflanzungsorgane der Cycadeen," Flora (1904); Caldwell, " Microcycas Calocoma," Bot. Gaz. xliv., 1907 (also papers on this and other Cycads in the Bot. Gaz., 1907-1909); Matte, Re- cherches sur I'appareil libero-ligneux des Cycadacees (Caen, 1904). Ginkgoales; Hirase, " Etudes sur la fecondation, &c, de Ginkgo biloba," Journ. Coll. Sci. Japan, xii. (1898); Seward and Gowan, " Ginkgo biloba," Ann. Bot. xiv. (1900) (with bibliography) ; Ikeno, " Contribution a l'etude de la fecondation chez le Ginkgo biloba," Ann. Sci. Nat. xiii. (1901); Sprecher, Le Ginkgo biloba (Geneva, 1907). Coniferales: " Report of the Conifer Conference " (1891) Journ. R. llort. Soc. xiv. (1892); Beissner, Handbuch der Nadelholz-kitnde (Berlin, 1891); Masters, " Comparative Morphology of the Coniferae," Journ. Linn. Soc. xxvii. (1891); ibid. (1896), &c. ; Penhallow, " TheGenericCharactersof theNorth American Taxaceae and Coniferae," Proc. and Trans. R. Soc. Canada, ii. (1896); Black- man, " Fertilization in Pinus sylvestris," Phil. Trans. (1898) (with bibliography) ; Worsdell, " Structure of the Female Flowers in Conifers," Ann. Bot. xiv. (1900) (with bibliography); ibid. (1899); Veitch, Manual of the Coniferae (London, 1900) ; Penhallow, " Anatomy of North American Coniferales," American Naturalist (1904); Engler and Pilger, Das Pflanzenreich, Taxaceae (1903); Seward and Ford, " The Araucarieae, recent and extinct," Phil. Trans. R. Soc. (1906) (with bibliography); Lawson, "Sequoia sempervirens," Annals of Botany (1904); Robertson, " Torreya California," Ne\ν Phytologist (1904); Coker, " Gametophyte and Embryo of Taxodium," Bot. Gazette

(1903); E. C. Jeffrey, "The Comparative Anatomy and Phylogeny of the Coniferales, part i. The Genus Sequoia," Mem. Boston Nat. Hist. Soc. v. No. 10 (1903) ; Gothan, " Zur Anatomie lebender und fossiler Gymnospermen- H61zer,"if. Preiiss. Geol. Landes. (Berlin, 1905) (for more recent papers, see Ann. Bot., New Phytologist, andBot. Gazette, 1906-1909). Gnetales: Hooker, " On Welwitschia mirabilis," Trans. Linn. Soc. xxiy. (1864) ; Bower, " Germination, &c, in Gnetum," Journ. Mic. Sci. xxii. (1882) ; ibid. (1881); Jaccard, "Recherches embryologiques sur l' Ephedra helvetica," Diss. Inaug. Lausanne (1894); Karsten, " Zur Entwicke- lungsgeschichte der Gattung Gnetum," Cohn's Beitrage, vi. (1893); Lotsy, " Contributions to the Life-History of the genus Gnetum," A nn. Bot. Jard. Buitenzorg, xvi. (1899); Land, " Ephedra trifurca," Bot. Gazette (1904); Pearson, " Some observations on Welwitschia mira- bilis," Phil. Trans. R. Soc. (1906); Pearson, " Further Observations on Welwitschia," Phil. Trans. R. Soc. vol. 200 (1909). (A. C. Se.)

GYMNOSTOMACEAE, an order of Ciliate Infusoria (q.v.), characterized by a closed mouth, which only opens to swallow food actively, and body cilia forming a general or partial invest- ment (rarely represented by a girdle of membranellae), but not differentiated in different regions. With the Aspirotrochaceae (q.v.) it formed the Holotricha of Stein.

GYMPIE, a mining town of March county, Queensland, Australia, 107 m. N. of Brisbane, and 61 m. S. of Maryborough by rail. Pop. (1901) 11,959. Numerous gold mines are worked in the district, which also abounds in copper, silver, antimony, cinnabar, bismuth and nickel. Extensive undeveloped coal-beds lie 40 m. N. at Miva. Gympie became a municipality in 1880.

GYNAECEUM (Gr. yvvcuKtiov, iromyvvij, woman), that part in a Greek house which was specially reserved for the women, in contradistinction to the " andron," the men's quarters; in the larger houses there was an open court with peristyles round, and as a rule all the rooms were on the same level; in smaller houses the servants were placed in an upper storey, and this seems to have been the case to a certain extent in the Homeric house of the Odyssey. " Gynaeconitis " is the term given by Procopius to the space reserved for women in the Eastern Church, and this separation of the sexes was maintained in the early Christian churches where there were separate entrances and accommodation for the men and women, the latter being placed in the triforium gallery, or, in its absence, either on one. side of the church, the men being on the other, or occasion- ally in the aisles, the nave being occupied by the men.

GYNAECOLOGY (from Gr. yvvq, 7wcuk6s, a woman, and

X670S, discourse), the name given to that branch of medicine which concerns the pathology and treatment of affections peculiar to the female sex.

Gynaecology may be said to be one of the most ancient branches of medicine. The papyrus of Ebers, which is one of the oldest known works on medicine and dates from 1550 B.C., contains references to diseases of women, and it is recorded that specialism in this branch was known amongst Egyptian medical practitioners. The Vedas contain a list of therapeutic agents used in the treatment of gynaecological diseases. The treatises on gynaecology formerly attributed to Hippocrates (460 B.C.) are now said to be spurious, but the wording of the famous oath shows that he was at least familiar with the use of gynaeco- logical instruments. Diocles Carystius, of the Alexandrian school (4th century B.C.), practised this branch, and Praxagoras of Cos, who lived shortly after, opened the abdomen by laparotomy. While the Alexandrine school represented Greek medicine, Greeks began to practise in Rome, and in the first years of the Christian era gynaecologists were much in demand (Haser). A speculum for gynaecological purposes has been found in the ruins of Pompeii, and votive offerings of anatomical parts found in the temples show that various gynaecological malformations were known to the ancients. Writers who have treated of this branch are Celsus (50 b.c.-a.d. 7) and Soranus of Ephesus (a.d. 98-138), who refers in his works to the fact that the Roman midwives frequently called to their aid practi- tioners who made a special study of diseases of women. These midwives attended the simpler gynaecological ailments. This was no innovation, as in Athens, as mentioned by Hyginus, we find one Agnodice, a midwife, disguising herself in man's attire so that she might attend lectures on medicine and diseases of women. After instruction she practised as a gynaecologist. This being contrary to Athenian law she was prosecuted, but was saved by the wives of some of the chief men testifying on her behalf. Besides Agnodice we have Sotira, who wrote a work on menstruation which is preserved in the library at Florence, while Aspasia is mentioned by Aetius as the author of several chapters of his work. It is evident that during the Roman period much of the gynaecological work was in the hands of women. Martial alludes to the " feminae medicae" in his epigram on Leda. These women must not be confounded with the midwives who on monuments are always described as " obstetrices." Galen devotes the sixth chapter of his work De locis affectis to gynaecological ailments. During the Byzantine period may be mentioned the work of Oribasius (a.d. 325) and Moschion (2nd century a.d.) who wrote a book in Latin for the use of matrons and midwives ignorant of Greek. In modern times James Parsons (1705-17 70) published his Elenchus gynaicopathologicus et obstetricarius, and in 1755 Charles Perry published his Mechanical account and explication of the hysterical passion

and of all other nervous disorders incident to the sex, with an appendix on cancers. In the early part of the 19th century fresh interest in diseases of women awakened. Joseph Recamier (1774-1852) by his writings and teachings advocated the use of the speculum and sound. This was followed in 1840 by the writings of Simpson in England and Huguier in France. In 1845 John Hughes Bennett published his great work on inflammation of the uterus, and in 1850 Tilt published his book on ovarian inflammation. The credit of being the first to perform the operation of ovariotomy is now credited to McDowell of Kentucky in 1809, and to Robert Lawson Tait (1845-1899) in 1883 the first operation for ruptured ectopic gestation.

Menstruation. — -Normal menstruation comprises the escape of from 4 to 6 oz. of blood together with mucus from the uterus at intervals of twenty-eight days (more or less). The flow begins at the age of puberty, the average age of which in England is between fourteen and sixteen years. It ceases between forty-five and fifty years of age, and this is called the menopause or climacteric period, commonly spoken of as " the change of life." Both the age of puberty and that of the menopause may supervene earlier or later according to local conditions. At both times the menstrual flow may be replaced by haemorrhage from distant organs (epistaxis, haematemesis, hae- moptysis) ; this is called vicarious menstruation. Menstruation is usually but not necessarily coincident with ovulation. The usual

disorders of menstruation are: (i) amenorrhoea (absence of flow), (2) dysmenorrhoea (painful flow), (3) Menorrhagia (excessive flow), (4) metrorrhagia (excessive and irregular flow). Amenorrhoea may arise from physiological causes, such as pregnancy, lactation, the menopause; constitutional causes, such as phthisis, anaemia and chlorosis, febrile disorders, some chronic intoxications, such as morphinomania, and some forms of cerebral disease; local causes, which include malformations or absence of one or more of the genital parts, such as absence of ovaries, uterus or vagina, atresia of vagina, imperforate cervix, disease of the ovaries, or sometimes imperforate hymen. The treatment of amenorrhoea must be directed towards the cause. In anaemia and phthisis menstruation often returns after improvement in the general condition, with good food and good sanitary conditions, an outdoor life and the administration of iron or other tonics. In local conditions of imperforate hymen, imperforate cervix or ovarian disease, surgical interference is necessary. Amenorrhoea is permanent when due to absence of the genital parts. The causes of dysmenorrhoea are classified as follows; (1) ovarian, due to

disease of the ovaries or Fallopian tubes; (2) obstructive, due to some obstacle to the flow, as stenosis, flexions and mal- positions of the uterus, or malformations; (3) congestive, due to subinvolution, chronic inflammation of the uterus or its lining membrane, fibroid growths and polypi of the uterus, cardiac or hepatic disease ; (4) neuralgic ; (5) membranous. The foremost place in the treatment of dysmenorrhoea must be given to aperients and purgatives administered a day or two before the period is ex- pected. By this means congestion is reduced. Hot baths are useful, and various drugs such as hyoscyanus, cannabis indica, phenalgin, ammonol or phenacetin have been prescribed. Medicinal treatment is, however, only palliative, and flexions and malpositions of the uterus must be corrected, stenosis treated by dilatation, fibroid growths if present removed, and endometritis when present treated by local applications or curetting according to its severity. Menor- rhagia signifies excessive bleeding at the menstrual periods. Consti- tutional causes are purpura, haemophilia, excessive food and alcoholic drinks and warm climates; while local causes are congestion and displacements of the uterus, endometritis, subinvolution, retention of the products of conception, new growths in the uterus such as mucous and fibroid polypi, malignant growths, tubo-ovarian inflam- mation and some ovarian tumours. Metrorrhagia is a discharge of blood from the uterus, independent of menstruation. It always arises from disease of the uterus or its appendages. Local causes are polypi, retention of the. products of conception, extra uterine gesta- tion, haemorrhages in connexion with pregnancy, and new growths in the uterus. In the treatment of both menorrhagia and metror- rhagia the local condition must be carefully ascertained. When pregnancy has been excluded, and constitutional causes treated, efforts should be made to relieve congestion. Uterine haemostatics, as ergot, ergotin, tincture of hydrastis or hamamelis, are of use, together with rest in bed. Fibroid polypi and other new growths must be removed. Irregular bleeding in women over forty years of age is frequently a sign of early malignant disease, and should on no account be neglected.

Diseases of the External Genital Organs. — The vulva comprises several organs and structures grouped together for convenience of description (see Reproductive System). The affections to which these structures are liable may be classified as follows: (1) Injuries to the vulva, either accidental or occurring during parturition; these are generally rupture of the perinaeum. (2) Vulvitis. Simple vulvitis is due to want of cleanliness, or irritating discharges, and in children may result from threadworms. The symptoms are heat, itching and throbbing, and the parts are red and swollen. The treatment consists of rest, thorough cleanliness and fomentations. Infective vulvitis is nearly always due to gonorrhoea. Thesymptoms are the same as in simple vulvitis, with the addition of mucopurulent yellow discharge and

scalding pain on micturition; if neglected, extension of the disease may result. The treatment consists of rest in bed, warm medicated baths several times a day or fomentations of boracic acid. The parts must be kept thoroughly clean and discharges swabbed away. Diphtheritic vulvitis occasionally occurs, and erysipelas of the vulva may follow wounds, but since the use of antiseptics is rarely seen. (3) Vascular disturbances may occur in the vulva., including varix, haematoma, oedema and gangrene; the treatment is the same as for the same disease in other parts. (4) The vulva is likely to be affected by a number of cutaneous affections, the most important being erythema, eczema, herpes, lichen, tubercle, elephantiasis, vulvitis pruriginosa, syphilis and kraurosis. These affections present the same characters as in other parts of the body. Kraurosis vulvae, first described by LawsonTait in 1875, ' s an atrophic change accompanied by pain and a yellowish discharge; the cause is unknown. Pruritis vulvae is due to parasites, or to irritating discharges, as leucorrhoea, and is frequent in diabetic subjects. The hymen may be occasionally imperforate and require incision. Cysts and painful carunculae may occur on the clitoris. Any part of the vulva may be the seat of new growths, simple or malignant.

Diseases of the Vagina. — (1) Malformations. The vagina may be absent in whole or in part or may present a septum. Stenosis of the vagina may be a barrier to menstruation. (2) Displacements of the vagina ; (a) cystocele, which is a hernia of the bladder into the vagina; (b) rectocele, a hernia of the rectum into the vagina. The

cause of these conditions is relaxation of the tissues due to parturition. The palliative treatment consists in keeping up the parts by the insertion of a pessary; when this fails operative interference is called for. (3) Fistulae may form between'the vagina and bladder or vagina and rectum; they are generally caused by injuries during parturition or the late stages of carcinoma. Persistent fistulae require operative treatment. The vagina normally secretes a thin opalescent acid fluid derived from the lymph serum and the shedding of squamous epithelium. This fluid normally contains the vagina bacillus. In pathological conditions of the vagina this secretion undergoes changes. For practical purposes three varieties of vaginitis may be described : (a) simple catarrhal vaginitis is due to the same causes as simple vulvitis, and occasionally in children is important from a medico-legal aspect when it is complicated by vulvitis. The symptoms are heat and discomfort with copious mucopurulent discharge. The only treatment required is rest, with vaginal douches of warm unirritating lotions such as boracic acid or subacetate of lead, (b) Gonorrhoeal vaginitis is most common in adults. The patient complains of pain and burning, pain on passing water and discharge which is generally green or yellow. The results of untreated gonorrhoeal vaginitis are serious and far-reaching. The disease may spread up the genital passages, causing

endometritis, salpingitis and septic peritonitis, or may extend into the bladder, causing cystitis. Strict rest should be enjoined, douches of carbolic acid (1 in 40) or of perchloride of mercury (1 in 2000) should be ordered morning and evening, the vagina being packed with tam- pons of iodoform gauze. Saline purgatives and alkaline diuretics should be given, ic) Chronic vaginitis (leucorrhoea or "the whites") may follow acute conditions and persist indefinitely. The vagina is rarely the seat of tumours, but cysts are common.

Diseases of the Uterus. — The uterus undergoes important changes during life, chiefly at puberty and at the menopause. At puberty it assumes the pear shape characteristic of the mature uterus. At the menopause it shares in the general atrophy of the reproductive organs. It is subject to various disorders and misplacements, (a) Displacements of the Uterus. — The normal position of the uterus, when the bladder is empty, is that of anteversion. We have there- fore to consider the following conditions as pathological: ante- flexion, retroflexion, retroversion, inversion, prolapse and pro- cidentia. Slight anteflexion or bending forwards is normal; when exaggerated it gives rise to dysmenorrhoea, sterility and reflex nervous phenomena. This condition is usually congenital and is often associated with under-development of the uterus, from which the sterility results. The treatment is by dilatation of the canal or by a plastic operation. Retroflexion is a bending over of the uterus backwards, and occurs as a complication of retroversion (or dis- placement backwards). The causes are (1) any cause tending to make the fundus or upper part of the uterus extra heavy, such as tumours or congestion, (2) loss of tone of the uterine walls, (3) ad- hesions formed after cellulitis, (3) violent muscular efforts, (4) weakening of the uterine supports from parturition. The symptoms are dysmenorrhoea, pain on defaecation and constipation from the pressure of the fundus on the rectum; the patient is often sterile. The treatment is the replacing of the uterus in position, where it can be kept by the insertion of a pessary; failing this, operative treat- ment may be required. Retroversion when pathological is rarer than retroflexion. It may be the result of injury or is associated with pregnancy or a fibroid. The symptoms are those of retroflexion with feeling of pain and weight in the pelvis and desire to micturate followed by retention of urine due to the pressure of the cervix against the base of the bladder. The uterus must be skilfully re- placed in position ; when pessaries fail to keep it there the operation of hysteropexy gives excellent results.

Inversion occurs when the uterus is turned inside out. It is only possible when the cavity is dilated, either after pregnancy or by a polypus. The greater number of cases follow delivery and are acute. Chronic inversions are generally due to the weight of a polypus. The symptoms are menorrhagia, metrorrhagia and bladder troubles; on examination a

tumour-like mass occupies the vagina. Reduction of the condition is often difficult, particularly when the condition has lasted for along time. The tumour which has caused the inversion must be excised. Prolapse and procidentia are different degrees of the same variety of displacement. When the uterus lies in the vagina it is spoken of as prolapse, when it protrudes through the vulva it is procidentia. The causes are directly due to increased intra-abdominal pressure, increased weight of the uterus by fibroids, violent straining, chronic cough and weakening of the supporting structures of the pelvic floor, such as laceration of the vagina and perinaeum. Traction on the uterus from below (as a cervical tumour) may be a cause; advanced age, laborious occupations and frequent pregnancies are indirect causes. The symptoms are a " bearing down " feeling, pain and fatigue in walking, trouble with micturition and defaecation. The condition is generally obvious on examination. As a rule the uterus is easy to replace in position. A rubber ring pessary will often serve to keep it there. If the perinaeum is very much torn it may be necessary to repair it. Various operations for retaining the uterus in position are described, (b) Enlargements af the Uterus (hypertrophy or hyperplasia). This condition may some- times involve the uterus as a whole or may be most marked in the body or in the cervix. It follows chronic congestion or inflammatory

prolapse, or any condition interfering with the circulation. The symptoms comprise local discomfort and sometimes dysmenorrhoea, leucorrhoea or menorrhagia. When the elongation occurs in the cervical portion the only possible treatment is amputation of the cervix. Atrophy of the uterus is normal after the menopause. It may follow the removal of the tubes and ovaries. Some consti- tutional diseases produce the same result, as tuberculosis, chlorosis, chronic morphinism and certain diseases of the central nervous system.

(c) Injuries and Diseases resultant from Pregnancy. — The most frequent of these injuries is laceration of the cervix uteri, which is frequent in precipitate labour. Once the cervix is torn the raw surfaces become covered by granulations and later by cicatricial tissue, but as a rule they do not unite. The torn lips may become unhealthy, and the congestion and oedema spread to the body of the uterus. A lacerated cervix does not usually give rise to symptoms ; these depend on the accompanying endometritis, and include leucorrhoea, aching and a feeling of weight. Lacerations are to be felt digitally. As lacerations predispose to abortion the operation of trachelorraphy or repair of the cervix is indicated. Perforation of the uterus may occur from the use of the sound in diseased conditions of the uterine

walls. Superinvolution means premature atrophy following parturition. Subinvolution is a condition in which the uterus fails to return to its normal size and remains enlarged. Retention of the products of conception may cause irregular haemorrhages and may lead to a diagnosis of tumour. The uterus should be carefully explored.

(d) Inflammations Acute and Chronic. — The mucous membrane lining the cervical canal and body of the uterus is called the en- dometrium. Acute inflammation or endometritis may attack it. The chief causes are sepsis following labour or abortion, extension of a gonorrhoeal vaginitis, or gangrene or infection of a uterine myoma. The puerperal endometritis following labour is an avoidable disease due to lack of scrupulous aseptic precautions.

Gonorrhoeal endometritis is an acute form associated with copious purulent discharge and well-marked constitutional disturbance. The temperature. ranges from 99° to 105 F., associated with pelvic pain, and rigors are not uncommon. The tendency is to recovery with more or less protracted convalescence. The most serious com- plications are extension of the disease and later sterility. Rest in bed and intrauterine irrigation, followed by the introduction of iodoform pencils into the uterine cavity, should be resorted to, while pain is relieved by hot fomentations and sitz baths. Chronic endometritis may be the sequela of the acute form, or may be septic in origin, or the result of chronic congestion, acute retroflection or subinvolution following delivery or abortion. The varieties are glandular, interstitial, haemorrhagic and senile. The symptoms are disturbance of the menstrual function, headache, pain and pelvic discomfort, and more or less profuse thick leucorrhoeal discharge. The treatment consists in attention to the general health, with suit- able laxatives and local injections, and in obstinate cases curettage is the most effectual measure. The disease is frequently associated with adenomatous disease of the cervix, formerly called erosion. In this disease there is a new formation of glandular elements, which enlarge and multiply, forming a soft velvety areola dotted with pink spots. This was formerly erroneously termed ulceration. The cause is unknown. It occurs in virgins as well as in mothers, but it often accompanies lacerations of the cervix. The symptoms are indefinite pain and leucorrhoea. The condition is visible on inspec- tion with a speculum. The treatment is swabbing with iodized phenol or curettage. The body of the uterus may also be the seat of adenomatous disease. Tuberculosis may attack the uterus; this usually forms part of a general tuberculosis.

(e) New Growths in the Uterus. — The uterus is the most common seat of new growths. From the researches of von Gurlt, compiled from the Vienna Hospital Reports, embracing 15,880 cases of tumour, females exceed males in the proportion of seven to three, and of this large majority uterine

growths account for 25 % . When we consider its periodic monthly engorgements and the alternate hypertrophy and involution it undergoes in connexion with pregnancy, we can anticipate the special proneness of the uterus to new growths. Tumours of the uterus are divided into benign and malignant. The benign tumours known as fibroids or myomata are very common. They are stated by Bayle to occur in 20 % of women over 35 years of age, but happily in a great number of cases they are small and give rise to no symptoms. They are definitely associated with the period of sexual activity and occur more frequently in married women than in single, in the proportion of two to one (Winckel). It is doubtful if they ever originate after the menopause. Indeed if uncomplicated by changes in them they share in the general atrophy of the sexual organs which then takes place. They are divided according to their position in the tissues into intramural, subserous and submucous (the last when it has a pedicle forms a polypus), or as to the part of the uterus in which they develop into fibroids of the cervix and fibroids of the body. Intramural and submucous fibroids give rise to haemorrhage. The menses may be so increased that the patient. is scarcely ever free from haemorrhage. The pressure of the growth may cause dysmenorrhoea, or pressure on the bladder and rectum may cause dysuria, retention or rectal tenesmus. The uterus may be displaced by the weight of the tumour. Secondary

changes take place in fibroids, such as mucous degeneration, fatty metamorphosis, calcification, septic infection (sloughing fibroid) and malignant (sarcomatous) degeneration.

The modes in which fibroids imperil life are haemorrhage (the commonest of all), septic infection, which is one of the most danger- ous, impaction when it fits the true pelvis so tightly that the tumour cannot rise, twisting of the pedicle by rotation, leading to sloughing and intestinal and urinary obstruction. When fibroids are compli- cated by pregnancy, impaction and consequent abortion may take place, or a cervical myoma may offer a mechanical obstacle to delivery or lead to serious post partem haemorrhage. In the treat- ment of fibroids various drugs (ergot, hamamelis, hydrastis cana- densis) may be tried to control the haemorrhage, and repose and the injection of hot water (120° F.) are sometimes successful, together with electrical treatment. Surgical measures are needed, however, in severe recurrent haemorrhage, intestinal obstruction, sloughing and the co-existence of pregnancy. An endeavour must be made if possible to enucleate the fibroid, or hysterectomy (removal of the uterus) may be required. The operation of removal of the ovaries to precipitate the menopause has fallen into disuse.

(/) Malignant Disease of the Uterus. — The varieties of malignant disease met with in the uterus are sarcoma, carcinoma and chorion- epithelioma

malignum. Sarcomata may occur in the body and in the neck. They occur at an earlier age than carcinOmata. Marked enlargement and haemorrhage are the symptoms. The differential diagnosis is microscopic. Extirpation of the uterus is the only chance of prolonging life. The age at which women are most subject to carcinoma (cancer) of the uterus is towards the decline of sexual life. Of 3385 collected cases of cancer of the uterus 1169 occurred between 40 and 50, and 856 between 50 and 60. In contradistinction to fibroid tumours it frequently arises after the menopause. It may be divided into cancer of the body and cancer of the neck (cervix). Cancer of the neck of the uterus is almost exclusively confined to women who have been pregnant (Bland-Sutton) . Predisposing causes may be injuries during delivery. The symptoms which induce women to seek medical aid are haemorrhage, foetid discharge, and later pain and cachexia. An unfortunate belief amongst the public that the menopause is associated with irregular bleeding and offensive dis- charges has prevented many women from seeking medical advice until too late. It cannot be too widely understood that cancer of the cervix is in its early stages a purely local disease, and if removed in this stage usually results in cure. So important is the recognition of this fact in the saving of human life that at the meeting of the British Medical Association in April 1909 the council issued for publication a special appeal to medical practitioners, midwives and nurses, and directed it to be published in British and colonial medical and nursing journals. It will be useful to quote here a part of the appeal directed to midwives and nurses: " Cancer may occurˆat any age and in a woman who looks quite well, and who may have no pain, no wasting, no foul discharge and no profuse bleeding. To wait for pain, wasting, foul discharge or profuse bleeding is to throw away the chance of successful treatment. The early symptoms of cancer of the womb are : — (1) bleeding which occurs after the change of life, (2) bleeding after sexual intercourse or after a vaginal douche, (3) bleeding, slight or abundant, even in young women, if occurring between the usual monthly periods, and especially when accompanied by a bad-smelling or watery blood-tinged discharge, (4) thin watery- discharge occurring at any age." On examination the cervix presents certain characteristic signs, though these may be modified according to the variety of cancer present. Hard nodules or definite loss of substance, extreme friability and bleeding after slight manipu- lation, are suspicious. Epithelial cancer of the cervix may assume a proliferating ulcerative type, forming the well-known " cauliflower" excrescence. The treatment of cancer of the cervix is free removal at the earliest possible moment. Cancer of the body of the uterus is rare before the 45th year. It is most frequent at or subsequent to the menopause. The majority of the patients are nulliparae (Bland- Sutton). The signs are fitful haemorrhages after the menopause, followed by profuse and offensive discharges. The uterus on ex- amination often feels enlarged. The diagnosis

being made, hyster- ectomy (removal of the uterus) is the only treatment. Cancer of the body of the uterus may complicate fibroids. Chorion-epithelioma malignum (deciduoma) was first described in 1889 by Sanger and Pfeiffer. It is a malignant disease presenting microscopic characters resembling decidual tissue. It occurs in connexion with recent pregnancy, and particularly with the variety of abortion termed hydatid mole. In many cases it destroys life with a rapidity un- equalled by any other kind of growth. It quickly ulcerates and infiltrates the uterine tissues, forming metastatic growths in the lung and vagina. Clinically it is recognized by the occurrence after pregnancy of violent haemorrhages, progressive cachexia and fever with rigors. Recent suggestions have been made as to chorion-epithelioma being the result of pathological changes in the lutein tissue of the ovary. The growth is usually primary in the uterus, but may be so in the Fallopian tubes and in the vagina. A few cases have been recorded unconnected with pregnancy. The virulence of chorion-epithelioma varies, but in the present state of our knowledge immediate removal of the primary growth along with the affected organ is the only treatment.

Diseases of the Fallopian Tubes.— The Fallopian tubes or oviducts

are liable to inflammatory affections, tuberculosis, sarcomata, cancer, chorion-epithelioma and tubal pregnancy. Salpingitis (inflammation of the oviducts) is nearly always secondary to septic infection of the genital tract. The chief causes are septic endome- tritis following labour or abortion, gangrene of a myoma, gonorrhoea, tuberculosis and cancer of the uterus; it sometimes follows the specific fevers. When the pus escapes from the tubes into the coelom it sets up pelvic peritonitis. When the inflammation is adjacent to the ostium it leads to the matting together of the tubal fimbriae and glues them to an adjacent organ. This seals the ostium. The occluded tube may now have an accumulation of pus in it (pyosal- pinx). When in consequence of the sealing of the ostium the tube becomes distended with serous fluid it is termed hydrosalpinx. Haematosalpinx is a term applied to the non-gravid tube distended with blood; later the tubes may become sclerosed. Acute septic salpingitis is ushered in by a rigor, the temperature rising to 103 , 104° F., with severe pain and constitutional disturbance. The symptoms may become merged in those of general peritonitis. In chronic disease there is a history of puerperal trouble followed by sterility, with excessive and painful menstruation. Acute salpingitis requires absolute rest, opium suppositories and hot fomentations. With urgent symptoms removal of the inflamed adnexa must be resorted to. Chronic salpingitis often renders a woman an invalid. Permanent relief can only be afforded

by surgical intervention. Tuberculous salpingitis is usually secondary to other tuberculous infections. The Fallopian tubes may be the seat of malignant disease. This is rarely primary. By far the most important of the conditions of the Fallopian tubes is tubal pregnancy (or ectopic gestation). It is now known that fertilization of the human ovum by the spermatozoon may take place even when the ovum is in its follicle in the ovary, for oosperms have been found in the ovary and Fallopian tubes as well as in the uterus. Belief in ovarian pregnancy is of old standing, and had been regarded as possible but unproved, no case of an early embryo in its membranes in the sac of an ovary being forthcoming, until the remarkable case published by Dr Catherine van Tussenboek of Amsterdam in 1899 (Bland-Sutton). Tubal pregnancy is most frequent in the left tube; it sometimes complicates uterine pregnancy ; rarely both tubes are pregnant. When the oosperm lodges in the ampulla or isthmus it is called tubal gestation ; when it is retained in the portion traversing the uterine wall it is called tubo-uterine gestation. Wherever the fertilized ovum remains and implants its villi the tube becomes turgid and swollen, and the abdominal ostium gradually closes. The ovum in this situation is liable to apoplexy, forming tubal mole. When the abdominal ostium remains pervious the ovum may escape into the coelomic cavity (tubal abortion); death from shock and haemorr- hage into the abdominal cavity may result. When neither of these occurrences has taken place the ovum continues to grow inside the tube, the rupture of the distended tube usually taking place between the sixth and the tenth week. The rupture of the tube may be intraperitoneal or extraperitoneal. The danger is death from haemorrhage occurring during the rupture, or adhesions may form, the retained blood forming a haematocele. The ovum may be de- stroyed or may continue to develop. In rare cases rupture may not occur, the tube bulging into the peritoneal cavity; and the foetus may break through the membranes and lie free among the intestines, where it may die, becoming encysted or calcified. The tubal placenta possesses foetal structures, the true decidua forming in the uterus. The signs suggestive of tubal pregnancy before rupture are missed periods, pelvic pains and the presence of an enlarged tube. When rupture takes place it is attended in both varieties with sudden and severe pain and more or less marked collapse, and a tumour may or may not be felt according to the situation of the rupture. There is a general " feeling of something having given way." If diagnosed before rupture, the sac must be removed by abdominal section. In intraperitoneal rupture immediate operation affords the only chance of saving life. In extraperitoneal rupture the foetus may occasion- ally remain alive until full term and be rescued by abdominal section, if the condition is recognized, or a false labour may take place accompanied by death of the foetus. '

Diseases of the Ovaries and Parovarium. — The ovaries undergo striking

changes at puberty, and again at the menopause, after which there is a gradual shrinkage. One or both may be absent or mal- formed or they are subject to displacements, being either un- descended, contained in a hernia or prolapsed. Either of these conditions, if a source of pain, may necessitate their removal. The ovary is also subject to haemorrhage or apoplexy. Acute inflam- mations (oophorites) are constantly associated with salpingitis or other septic conditions of the genital tract or with an attack of mumps. The relation of oophoritis to mumps is at present unknown. Acute oophoritis may culminate in abscess but more usually adhesions are formed. The surgical treatment is that of pyosalpinx. Chronic inflammation may follow acute or be consequent on pelvic cellulitis. Its constant features are more or less pain followed by sterility. The ovary may be the seat of tuberculosis, which is generally secondary to other lesions. Suppuration and abscess of the ovary also occur. Perioophoritis, or chronic inflammation in the neighbourhood, may also involve the gland. The cause of cirrhosis of the ovaries is unknown, though it may be associated with cirrhotic liver. The change is met with in women between 20 and

40 years of age, the ovaries being in a shrunken, hard, wrinkled con- dition. Under ovarian neuralgia are grouped indefinite painful symptoms occurring frequently in neurotic and alcoholic subjects, and often worse during menstruation. The treatment, whether local or operative, is usually unsatisfactory. The ovary is frequently the seat of tumours, dermoids and cysts. Cysts may be simple, unilocular or multilocular, and may attain an enormous size. The largest on record was removed by Dr Elizabeth Reifsnyder of Shanghai, and contained 100 litres of fluid, and the patient recovered. The opera- tion is termed ovariotomy. Dermoid cysts containing skin, bones, teeth and hair, are of frequent growth in the ovary, and have attained the weight of from 20 to 40 kilogrammes. In one case a girl weighed 27 kilogrammes and her tumour 44 kilogrammes (Keen). Papillo- matous cysts also occur in the ovary. Parovarian and Gartnerian cysts are found, and adenomata form 20% of all ovarian cysts. Occasionally the tunic of peritoneum surrounding the ovary becomes distended with serous fluid. This is termed ovarian hydrocele. Ovarian fibroids occur, and malignant disease (sarcoma and carcin- oma) is fairly frequent, sarcoma being the most usual ovarian tumour occurring before puberty. Carcinoma of the ovary is rarely primary, but it is a common situation for secondary cancer to that of the breast, gall-bladder or gastro-intestinal tract. The treatment of all rapidly-growing tumours of the ovary is removal.

Diseases of the Pelvic Peritoneum and Connective Tissue. — Women are excessively liable to peritoneal infections. (1) Septic infection often follows acute salpingitis and may give rise to pelvic peritonitis (perimetritis), which may be adhesive, serous or purulent. It may follow the rupture of ovarian or dermoid cysts, rupture of the uterus, extra uterine pregnancy or

extension from pyosalpinx. The symptoms are severe pain, fever, 103 F. and higher, marked consti- tutional disturbances, vomiting, restlessness, even delirium. The abdomen is fixed and tympanitic. Its results are the formation of adhesions causing abnormal positions of the organs, or chronic peritonitis may follow. The treatment is rest in bed, opium, hot stupes to the abdomen and quinine. (2) Epithelial infections take place in the peritoneum in connexion with other malignant growths. (3) Hydroperitoneum, a collection of free fluid in the abdominal cavity, may be due to tumours of the abdominal viscera or to tuberculosis of the peritoneum. (4) Pelvic cellulitis (parametritis) signifies the inflammation of the connective tissue between the folds of the broad ligament (mesometrium). The general causes are septic changes following abortion, delivery at term (especially instrumental delivery), following operations on the uterus or salpingitis. The symptoms are chill followed by severe intrapelvic pain and tension, fever ioo° to 102 F. There may be nausea and vomiting, diarrhoea, rectal tenseness and dysuria. If consequent on parturition the lochia cease or become offensive. On examination there is tender- ness and swelling in one flank and the uterus becomes fixed and immovable in the exudate as if embedded in plaster of Paris. The illness may go to resolution if treated by rest, opium, hot stupes or icebags and glycerine tampons, or may go on to suppuration forming pelvic abscess, which signifies a collection of pus between the layers of the broad ligament. The pus in a pelvic abscess may point and escape through the walls of the vagina, rectum or bladder. It occasionally points in the groin. If the pus can be localized an incision should be made and the abscess drained. The tumours which arise in the broad ligament are haematocele, solid tumours (as myomata, hpomata and sarcomata), and echinnococcus colonies (hydatids).

Bibliography.— Albutt, Playfair and Eden, System of Gynae- cology (1906) ; McNaughton Jones, Manual of Diseases of Women (1904); Bland-Sutton and Giles, Diseases of Women (1906); C. Lockyer, " Lutein Cysts in association with Chorio-Epithelioma," Journal of Obstetrics and Gynaecology (January, 1905) ; W. Stewart McKay, History of Ancient Gynaecology; Hart and Barbour, Diseases of Women ; Howard Kelly, Operative Gynaecology. (H L H)

GYONGYOSI, ISTVAN [Stephen] (1620-1704), Hungarian poet, was born of poor but noble parents in 1620. His abilities early attracted the notice of Count Ferencz Wesselenyi, who in 1640 appointed him to a post of confidence in Fiilek castle. Here ■ he remained till 1653, when he married and became an assessor of the judicial board. In 1681 he was elected as a representative of his county at the diet held at Soprony (Oedenburg). From 1686 to 1693, and again from 1700 to his death in 1704, he was deputy lord-lieutenant of the county of Gomor. Of his literary works the most famous is the epic poem M urdnyi Venus (Caschau, 1664), in honour of his benefactor's wife Maria Szecsi, the heroine of Murany. Among his later productions the best known are Rozsa-Koszoru, or Rose-Wreath (1690), Kemeny-Jdnos (1693), Cupido (1695), Palinodia (1695) and Chariklia (1700).

The earliest edition of his collected poetical works is by Dugonics (Pressburg and Pest, 1796); the best modern selection is that of Toldy, entitled Gyongyosi Istvdn vdlogatott poetai munkdi (Select poetical works of Stephen Gyongyosi, 2 vols., 1 864-1 865).

GYOR (Ger. Raab), a town of Hungary, capital of a county of the same name, 88 m. W. of Budapest by rail. Pop. (1900)

27,758. It is situated at the confluence of the Raab with the Danube, and is composed of the inner town and three suburbs. Gyor is a well-built town, and is the seat of a Roman Catholic bishop. Amongst its principal buildings are the cathedral, dating from the 12th century, and rebuilt in 1639-1654; the bishop's palace; the town hall; the Roman Catholic seminary for priests and several churches. There are manufactures of cloth, machinery and tobacco, and an active trade in grain and horses. Twenty miles by rail W.S.W. of the town is situated Csorna, a village with a Premonstratensian abbey, whose archives contain numerous valuable historical documents.

Gyor is one of the oldest towns in Hungary and occupies the site of the

Roman Arabona. It was already a place of some importance in the 10th century, and its bishopric was created in the nth century. It was a strongly fortified town which resisted successfully the attacks of the Turks, into whose hands it fell by treachery in 1594, but they retained possession of it only for four years. Montecucculi made Gyor a first-class fortress, and it remained so until 1783, when it was abandoned. At the beginning of the 10th century, the fortifications were re-erected, but were easily taken by the French in 1809, and were again stormed by the Austrians on the 28th of June 1849. About n m. S.E. of Gyor on a spur of the Bakony Forest lies the famous Benedictine abbey of Pannonhalma (Ger. St Martinsberg; Lat. Mons Sancti Martini), one of the oldest and wealthiest abbeys of Hungary. It was founded by King St Stephen, and the original deed from 1001 is preserved in the archives of the abbey. The present building is a block of palaces, containing a beautiful church, some of its parts dating from the 12th century, and lies on a hill 1200 ft. high. The church has a tower 130 ft. high. In the convent there are a seminary for priests, a normal school, a gymnasium and a library of 120,000 vols. The chief abbot has the rank of a bishop, and is a member of the Upper House of the Hungarian parliament, while in spiritual matters he is subordinate immedi- ately to the Roman curia.

GYP, the pen name of Sibylle Gabrielle Marie Antoinette Riqueti de Mirabeau, Comtesse de Martel de Janville (1850-) French writer, who was born at the chateau of Koetsal in the Morbihan. Her father, who was the grandson of the vicomte de Mirabeau and great-nephew of the orator, served in the Papal Zouaves, and died during the campaign of i860. Her mother, the comtesse de Mirabeau, in addition to some graver composi- tions, contributed to the Figaro and the Vie parisienne, under various pseudonyms, papers in the manner successfully developed by her daughter. Under the pseudonym of " Gyp " Madame de Martel, who was married in 1869, sent to the Vie parisienne, and later to the Revue des deux mondes, a large number of social sketches and dialogues, afterwards reprinted in volumes. Her later work includes stories of a more formal sort, essentially differing but little from tfle shorter studies. The following list includes some of the best known of Madame de Martel's publica- tions, nearly seventy in number: Petit Bob (1882); Autour du mariage (1883); Ce que femme veut (1883); Le Monde d cote (1884), Sans voiles (1885); Autour du divorce (1886); Dans le train (1886); Mademoiselle Loulou (1888); Bob au salon (1888-1889); L' Education d'un prince (1890); Passionette (1891); Oht! la grande vie (1891); Une Election a Tigre-sur-mer (1890), an account of " Gyp's " experiences in support of a Boulangist candidate; Mariage civil (1892); Ces bons docteurs (1892); Du haul en bas (1893); Mariage de chiffon (1894); Leurs dines (1895); Le Cceur d'Ariane (1895); Le Bonheur de Gineite (1896); Totole (1897); Lune de mid (1898); Israel

(1898); L'Entrevue (1899); Le Pays des champs (1900); Trop de chic (1900); Le Friquet (1901); La Fte (1902); Un Mariage chic , (1903); Un Menage dernier cri (1903); Maman (1904); Le Coeur de Pierrette (1905). From the first " Gyp," writing of a society to which she belonged, displayed all the qualities which have given her a distinct, if not pre-eminent, position among writers of her class. Those qualities included an intense faculty of observation, much skill in innuendo, a mordant wit combined with some breadth of humour; and a singular power of animating

ordinary dialogues without destroying the appearance of reality. Her Parisian types of the spoiled child, of the precocious school- girl, of the young bride, and of various masculine figures in the gay world, have become almost classical, and may probably survive as faithful pictures of luxurious manners in the 19th century. Some later productions, inspired by a violent anti- Semitic and Nationalist bias, deserve little consideration. An earlier attempt to dramatize Autour du mariage was a failure, not owing to the audacities which it shares with most of its author's works, but from lack of cohesion and incident. More successful was Mademoiselle Eve (1895), but indeed " Gyp's " successes are all achieved without a trace of dramatic faculty. In 1901 Madame de Martel furnished a sensational incident in the Nationalist campaign during the municipal elections in Paris. She was said to have been the victim of a kidnapping outrage or piece of horseplay provoked by her political attitude, but though a most circumstantial account of the outrages committed on her and of her adventurous escape was published, the affair was never clearly explained or verified.

GYPSUM, a common mineral consisting of hydrous calcium sulphate, named from the Gr. yvˆos, a word used by Theo- phrastus to denote not only the raw mineral but also the pro- duct of its calcination, which was employed in ancient times, as it still is, as a plaster. When crystallized, gypsum is often called selenite, the o-eXijPmp of Dioscorides, so named from (reXijiT?, " the moon," probably in allusion to the soft moon-like reflection of light from some of its faces, or, according to a legend,, because it is found at night when the moon is on the increase. The granular, marble-like gypsum is termed alabaster (q.v.).

Gypsum crystallizes in the monoclinic system, the habit of the crystals being usually either prismatic or tabular; in the latter case the broad planes are parallel to the faces of the clinopinacoid. The crystals may become lenticular by curvature of certain faces. In the characteristic type represented in fig. 1, / repre- sents the prism, / the hemi-pyramid and P the clinopinacoid. Twins are common, as in fig. 2, forming in some cases arrow-headed and swallow- tailed crystals. Cleavage is perfect parallel to the clino- pinacoid, yielding thin plates, often diamond-shaped, with pearly

lustre; these flakes are usually flexible, but may be brittle, as in the gypsum of Montmartre. Two other cleavages are recognized, but they are imperfect. Crystals of gypsum, when occurring

in clay, may enclose much muddy matter; in other cases a large proportion of sand may be mechanically entangled in the crystals without serious disturbance of form; whilst certain crystals occasionally enclose cavities with liquid and an air-bubble. Gypsum not infrequently becomes fibrous. This variety occurs in veins, often running through gypseous marls, with the fibres disposed at right angles to the direction of the vein. Such gypsum when cut and polished has a pearly opalescence, or satiny sheen, whence it is called satin-spar (q.v.). Gypsum is so soft as to be scratched even by the finger-nail (H = 1 • 5 to 2) . Its specific gravity is about 2 • 3 . The mineral is slightly soluble in water, one part of gypsum being soluble, according to G. K. Cameron, in 372 parts of pure water at 26 C. Waters percolating through gypseous strata, like the Keuper marls, dissolve the calcium sulphate and thus become per- manently hard or " selenitic." Such water has special value for brewing pale ale, and the water used by the Burton breweries is of this character; hence the artificial dissolving of gypsum in water for brewing purposes is known as " burtonization." Deposits of gypsum are formed in boilers using selenitic water. Pure gypsum is colourless or white, but it is often tinted, especially in the alabaster variety, grey, yellow or pink. Gypsum crystallizes with two molecules of water, equal to about 21 % by

Fig. 1.

Fig. 2.

weight, and consequently has the formula CaS04-2H 2 0. By exposure to strong heat all the water may be expelled, and the substance then has the composition of anhydrite (q.v.). When the calcination, however, is conducted at such a temperature that only about 75% of the water is lost, it yields a white pulverulent substance, known as " plaster of Paris," which may readily be caused to recombine with water, forming a hard cement. The gypsum quarries of Montmartre, in the north of Paris, were worked in Tertiary strata, rich in fossils. Gypsum is largely quarried in England for conversion into plaster of Paris, whence it is sometimes known as " plaster stone," and since much is sent to the Staffordshire potteries for making moulds it is also termed " potter's stone." The chief workings are in the Keuper marls near Newark in Nottinghamshire, Fauld in Staffordshire and

Chellaston in Derbyshire. It is also worked in Permian beds in Cumberland and Westmorland, and in Purbeck strata near Battle in Sussex.

Gypsum frequently occurs in association with rock-salt, having been deposited in shallow basins of salt water. Much of the calcium in sea-water exists as sulphate; and on evaporation of a drop of sea-water under the microscope this sulphate is deposited as acicular crystals of gypsum. In salt-lagoons the deposition of the gypsum is probably effected in most cases by means of micro-organisms. Waters containing sulphuretted hydrogen, on exposure to the air in the presence of limestone, may yield gypsum by the formation of sulphuric acid and its interaction with the calcium carbonate. In volcanic districts gypsum is produced by the action of sulphuric acid, resulting from the oxidation of sulphurous vapours, on lime-bearing minerals, like labradorite and augite, in the volcanic rocks: hence gypsum is common around solfataras. Again, by the oxidation of iron-pyrites and the action of the resulting sulphuric acid on limestone or on shells, gypsum may be formed; whence its origin in most clays. Gypsum is also formed in some cases by the hydration of anhydrite, the change being accompanied by an increase of volume to the extent of about 60%. Conversely gypsum may, under certain conditions, be dehydrated or reduced to anhydrite. Some of the largest known crystals of selenite have been found in southern Utah, where they occur in huge geodes, or crystal- lined cavities, in deposits from the old salt-lakes. Fine crystals, sometimes curiously bent, occur in the Permian rocks of Fried- richroda, near Gotha, where there is a grotto called the Marien- glashohle, close to Rheinhardsbrunn. Many of the best localities for selenite are in the New Red Sandstone formation (Trias and Permian), notably the salt-mines of Hall and Hallein, near Salzburg, and of Bex in Switzerland. Excellent crystals, usually of a brownish colour arranged in groups, are often found in the brine-chambers and the launders used in salt-works. Selenite also occurs in fine crystals in the sulphur-bearing marls of Girgenti and other Sicilian localities; whilst in Britain very bold crystals are yielded by the Kimeridge clay of Shotover Hill near Oxford. Twisted crystals and rosettes of gypsum found in the Mammoth Cave, Kentucky, have been called " oulopholites " (o5Xos, " woolly "; (poiXeos, " cave ").

In addition to the use of gypsum in cement-making, the mineral finds application as an agricultural agent in dressing land, and it has also been used in the manufacture of porcelain and glass. Formerly it was employed, in the form of thin cleavage-plates, for glazing windows, and seems to have been, with mica, called lapis specularis. It is still known in Germany as Marienglas and Fraueneis. Delicate cleavage-plates of gypsum are used in microscopic petrography for the deter- mination of certain optical constants in the rock-forming minerals. (F. W. R.)*

GYROSCOPE AND GYROSTAT. These are scientific models or instruments designed to illustrate experimentally the dynamics of a rotating body such as the spinning-top, hoop and bicycle, and also the precession of the equinox and the rotation of the earth.

The gyroscope (Gr. yvpos, ring, aKoreLV, to see) may be dis- tinguished from the gyrostat (yvpos, and otcltlkos, stationary) as an instrument in which the rotating wheel or disk is mounted

xn. 25

in gimbals so that the principal axis of rotation always passes through a fixed point (fig. 1). It can be made to imitate the motion of a spinning-top of which the point is placed in a smooth agate cup as in Maxwell's dynamical top (figs. 2, 3). {Collected Works, i. 248.) A bicycle wheel, with a prolongation of the axle placed in a cup, can also be made to serve (fig. 4).

The gyrostat is an instrument designed by Lord Kelvin {Natural Philosophy, § 345) to illustrate the more corn-

Fig. 1. Fig. 2.

plicated state of motion of a spinning body when free to wander about on a horizontal plane, like a top spun on the pavement, or a hoop or bicycle on the road. It consists essentially of a massive fly-wheel concealed in a metal casing, and its behaviour on a table, or with various modes of suspension or support, described in Thomson and Tait, Natural Philosophy, serves to illustrate the curious reversal of the ordinary laws of statical equilibrium due to the gyrostatic domination of the interior invisible fly- wheel, when rotated rapidly (fig. 5).

The toy shown in figs. 6 and 7, which can be bought for a shilling, is acting as a gyro- scope in fig. 6 and a gyrostat in fig. 7.

The gyroscope, as repre- sented in figs. 2 and 3 by Max- well's dynamical top, is pro- vided with screws by which the centre of gravity can be brought into coincidence with the point of support. It can

Fig. 3. Fig. 4.

then be used to illustrate Poinsot's theory of the motion of a body under no force, the gyroscope being made kinetically unsymmetrical by a setting of the screws. The discussion of this movement is required for Jacobi's theorems on the allied motion of a top and of a body under no force (Poinsot, Thiorie nouvelle de la rotation des corps, Paris, 1857; Jacobi,

Werke, ii. Note B, p. 476).

To imitate the movement of the top the centre of gravity is displaced from the point of support so as to give a preponderance. When the motion takes place in the neighbourhood of the down- ward vertical, the bicycle wheel can be made to serve again

n

77°

GYROSCOPE AND GYROSTAT

mounted as in fig. 8 by a stalk in the prolongation of the axle, suspended from a universal joint at 0; it can then be spun by hand and projected in any manner.

The first practical application of the gyroscopic principle was invented and carried out (1744) by Serson, with a spinning top

Fig. 6.

Fig. 5.

Fig. 7.

u

n

with a polished upper plane surface for giving an artificial horizon at sea, undisturbed by the motion of the ship, when the real horizon was obscured. The instrument has been perfected by Admiral Georges Ernest Fleuriais (fig. 9), and is interesting

theoretically as Jh showing the cor-

rection required practically for the rotation of the earth. Gilbert's barogyroscope is devised for the same purpose of showing the earth's rotation; a de- scription of it, and of the latest form employed by Foppl, is given in the Ency. d. math. Wiss., 1904, with bibliographical references in the article "Mechanics of Physical Appar- atus." The rota- tion of the fly - wheel is maintained here by an electric motor, as devised by G.M. Hopkins, and describedin the Scientific American, 1878. To demonstrate the rotation of the earth by the constancy in direction ot the axis of a gyroscope is a suggestion that has often

been made; by E. Sang in 1836, and

others. The experiment was first carried out with success by Foucault in _cˆ 1851, by a simple pendulum swung in the dome of the Pantheon, Paris, and) it has been repeated frequently (Memoires sur le pendule, 188?).

A gyroscopic fly-wheel will pre- serve its original direction in spaed only when left absolutely free in all directions, as required ‘ in the experiments above. If employed in steering, as of a torpedo, the gyroscope must act through the intermediary of a light relay; but if direct-acting, the reaction will cause pre- cession of the axis, and the original direction is lost.

The gyrostatic principle, in which one degree of freedom is suppressed in the axis, is useful for imparting steadiness and

/ c,

*iˆ§«l *

— \1/’

K.

F

ˆˆC

ˆˆkT

c,

M

R

L

Fig. 8.

Fig

stability in a moving body; it is employed by Schlick to mitigate the rolling of a ship and to maintain the upright position of Brennan’s monorail car.

Lastly, as an application of gyroscopic theory, a stretched chain of fly-wheels in rotation was employed by Kelvin as a mechanical model of the rotary polarization of light in an electro- magnetic field; the apparatus may

be constructed of bicycle wheels connected by short links, and suspended vertically.

Theory of the Symmetrical Top.

1 . The physical constants of a given symmetrical top, expressed in C.G.S. units, which are employed in the subsequent formulae, are denoted by M, ft, C and A. M is the weight in grammes (g) as given by the number of gramme weights which equilibrate the top when weighed in a balance ; h is the distance OG in centimetres (cm.) between G the centre of gravity and O the point of support, and Mh may be called the preponderance in g.-ctn. ; Mh and M can be measured by a spring balance holding up in a horizontal position the axis OC in fig. 8 suspended at O. Then gMh (dyne-cm. or ergs) is the moment of gravity about O when the axis OG is horizontal, gMh sin being the moment when the axis OG makes an angle with the vertical, and g = 98i (cm./s 2) on the average; C is the moment of inertia of the top about OG, and A about any axis through O at right angles to OG, both measured in g-cm. 2 .

To measure A experimentally, swing the top freely about O in small plane oscillation, and determine the length, / cm., of the equivalent simple pendulum ; then

(1) Z = A/MA, A = MR

Next make the top, or this simple pendulum, perform small conical revolutions, nearly coincident with the downward vertical position of equilibrium, and measure n, the mean angular velocity of the conical pendulum in radians / second ; and T its period in seconds ; then

(2) 4× 2 /T 2 = » 2 = g// = g]VU/A;

and f=n/2ir is the number of revolutions per second, called the frequency, T = 2ir/n is the period of a revolution, in seconds.

*2. In the popular explanation of the steady movement of the top at a constant inclination to the vertical, depending on the com- position of angular velocity, such as given in Perry's „. . Spinning Tops, or Worthington's Dynamics of Rotation, i>tc *"y it is asserted that the moment of gravity is always *J!° ? a generating an angular velocity about an axis OB per- op '*

pendicular to the vertical plane COC' through the axis of the top OC'; and this angular velocity, compounded with the resultant angular velocity about an axis 01, nearly coincident with OC', causes the axes 01 and OC to keep taking up a new position by moving at right angles to the plane COC, at a

constant precessional angular velocity, say m rad./sec, round the vertical OC (fig. 4).

If, however, the axis OC is prevented from taking up this pre- cessional velocity, the top at once falls down; thence all the in- genious attempts — for instance, in the swinging cabin of the Bessemer ship — to utilise the gyroscope as a mechanical directive agency have always resulted in failure {Engineer, October 1874), unless restricted to actuate a light relay, which guides the mechanism, as in steering a torpedo.

An experimental verification can be carried out with the gyro- scope in fig. 1 ; so long as the vertical spindle is free to rotate in its socket, the rapidly rotating wheel will resist the impulse of tapping on the gimbal by moving to one side ; but when the pinch screw prevents the rotation of the vertical spindle in the massive j pedestal, this resistance to the tapping at once disappears, provided [the friction of the table prevents the movement of the pedestal; and if the wheel has any preponderance, it falls down.

Familiar instances of the same principles are observable in the movement of a hoop, or in the steering of a bicycle; it is essential that the handle of the bicycle should be free to rotate to secure the stability of the movement.

The bicycle wheel, employed as a spinning top, in fig. 4, can also be held by the stalk, and will thus, when rotated rapidly, convey a distinct muscular impression of resistance to change of direction, if brandished.

3 A demonstration, depending on the elementary principles of dynamics, of the exact conditions required for the p . axis OC of a spinning top to spin steadily at a constant ˆ iemen ™0′ inclination to the vertical OC, is given here before pro- tiTaofthe ceeding to the more complicated question of the general MBiJ y motion, when 0, the inclination of the axis, is varying o/s

It is a fundamental principle in dynamics that if OH is a vector representing to scale the angular momentum of a system, and if Oh is the vector representing the axis of the impressed couple or torque, then OH will vary so that the velocity of H is represented to scale by the impressed couple Oh, and if the top is moving freely about 0, Oh is at right angles to the vertical plane COC, and

(1) Oh = gMh sin0.

In the case of the steady motion of the top, the vector OH lies in the

vertical plane COC, in OK suppose (fig. 4), and has a com- ponent OC = G about the vertical and a component OC' = G', sup- pose, about the axis OC; and G' = CR, if R denotes the angular velocity of the top with which it is spun about OC.

If m denotes the constant precessional angular velocity of the vertical plane COC, the components of angular velocity and momen- tum about OA are m sin and Am sin 6, OA being perpendicular to OC in the plane COC; so that the vector OK has the com- ponents

(2) OC = G',andCK=AMsin0,

and the horizontal component

(3) CK = OC'sin0-CK cos0

= G' sin —Am sin cos 0.

The velocity of K being equal to the impressed couple Oh,

(4) gM/ssin0=M-CK = sin0 (G'm-Am 2 cos0), and dropping the factor sin 0,

(5) AM 2 cos0-G'M+gM/i = o,or AM 2 cos0-CRM+An 2 = o, the condition for steady motion.

Solving this as a quadratic in m, the roots mi, w are given by

(6)

C

= 2A :

sec i=fV(i —

4AV

>»)]:

and the minimum value of G' = CR for real values of m is given by

(7)

G' 2

= cos

CR

:2V (cos 0);

4 AW~ tA ” l/, Are

for a smaller value of R the top cannot spin steadily at the inclina tion to the upward vertical.

Interpreted geometrically in fig. 4

(8) n = gJVU sin 0/CK = An 2 /KN, and M = C’K/A sin = KM/A,

(9) KM.KN=A 2 « 2 ,

so that K lies on a hyperbola with OC, OC as asymptotes.

4. Suppose the top or gyroscope, instead of moving freely about the point O, is held in a ring or frame which is com- pelled to rotate about the vertical axis OC with con- stant angular velocity m; then if N denotes the couple of reaction of the frame keeping the top from falling, acting in the plane COC, equation (4) § 3 becomes modified into

Con- strained motion of the gyro- scope.

(I)

(2)

-Am 2 cos0),

gMfc sin 0-N=/i.CK = sinfl (G’m N =sin0 (Am 2 cos 0-GV+gM/j) = Asin0cos0(M— mi) (ju— M2) ;

and hence, as m increases through in and mi> the sign of N can be determined, positive or negative, according as the tendency of the axis is to fall or rise.

When G’ = CR is large, M2 is large, and

(3) -/ii^gMA/G’-An’/CR,

the same for all inclinations, and this is the precession observed in the spinning top and centrifugal machine of fig. ie. This is true accurately when the axis OC is horizontal, and then it agrees with the result of the popular explanation of §2.

If the axis of the top OC is point- ing upward, the precession is in the same direction as the rotation, and an increase of m from mi makes N negative, and the top rises; con- versely a decrease of the procession m causes the axis to fall (Perry, Spinning Tops, p. 48).

If the axis points downward, as in the centrifugal machine with upper support, the precession is in the oppo- site direction to the rotation, and to make the axis approach the vertical position the precession must be re- duced.

This is effected automatically in the

Weston centrifugal machine (fig. 10)

used for the separation of water and

friction of the indiarubber cushions above the

Fig. 10.

*Centri- fugal machine**

molasses, by the _

support ; or else the spindle is produced downwards below the drum a short distance, and turns in a hole in a weight resting on the bottom of the case, which weight is dragged round until the spindle is upright ; this second arrangement is more effective when a liquid is treated in the drum, and

wave action is set up (The Centrifugal Machine, C. A. Matthey). Similar considerations apply to the stability of the whirling

bowl in a cream-separating machine. We can write equation (1)

(4) N = (A 5 sin 0-m.CK = (AW-KM.KN) sin0/A, so that N is negative or positive, and the axis tends to rise or fall according as K moves to the inside or outside of the hyperbola of free motion. Thus a tap on the axis tending to hurry the precession is*

Gyro- scopic action of railway wheels.

equivalent to an impulse couple giving an increase to C'K, and will make K move to the interior of the hyperbola and cause the axis to rise ; the steering of a bicycle may be explained in this way ; but Ki will move to the exterior of the hyperbola, and so the axis will fall in this second more violent motion.

Friction on the point of the top. may be supposed to act like a tap in the direction opposite to the precession; and so the axis of a top spun violently rises at first and up to the vertical position, but falls away again as the motion dies out. Friction considered as acting in retarding the rotation may be compared to an impulse couple tending to reduce OC, and so make K and Ki both move to the exterior of the hyperbola, and the axis falls in both cases. The axis may rise or fall according to the direction of the frictional couple, depending on the shape of the point ; an analytical treatment of the varying motion is very intractable ; a memoir by E. G. Gallop may be consulted in the Trans. Camb. Phil. Soc, 1903.

The earth behaves in precession like a large spinning top, of which the axis describes a circle round the pole of the ecliptic of mean angular radius 0, about 23i°, in a period of 26,000 years, so that R/m = 26000X365; and the mean couple producing precession is

(5) CR/x sin0 = CR 2 sin 23 1 726000X365,

one 12 millionth part of iCR 2 , the rotation energy of the earth.

5. If the preponderance is absent, by making the C.G coincide ‘ with O, and if Am is insensible compared with G’,

(1) . N= -Cm sin0,

the formula which suffices to explain most gyroscopic action.

Thus a carriage running round a curve experiences, in consequence of the rotation of the wheels, an increase of pressure Z on the outer track, and a diminution Z on the inner, giving a couple, if a is the gauge,

(2) Za = GV, tending to help the centrifugal force to upset the train; and if c is the radius of the curve, b of the wheels, C their moment of inertia, and v the velocity of the train,

(3) M =»/c, G’ = Cv/b,

(4) Z — Cv’jabc (dynes) ,

so that Z is the fraction C/Mab of the centrifugal force M» 2 /c, or the fraction C/Mh of its transference of weight, with h the height of the centre of gravity of the carriage above the road. A Brennan carriage on a monorail would lean over to the inside of the curve at an angle a, given by

(6) tan a = G’nlgMh = G’vlgMhc.

The gyroscopic action of a dynamo, turbine, and other rotating machinery on a steamer, paddle or screw, due to its rolling and pitch- ing, can be evaluated in a similar elementary manner (Worthington, Dynamics of Rotation) , and Schlick's gyroscopic apparatus is intended to mitigate the oscillation.

6. If the axis OC in fig. 4 is inclined at an angle a to the vertical, the equation (2) 8 4 becomes

(1) N = sin0 (AM 2 cos0-G'M) + gMAsin (a-0). Suppose, for instance, that OC is parallel to the earth's axis,

and that the frame is fixed in the meridian ; then o is the co-latitude, and m is the angular velocity of the earth, the square of which may be neglected ; so that, putting N = o, a — = E,

(2) gMh sin E — G'm sin (a — E) =0,

, \ r- G'm sin ^- G'm .

(3) tan h= T,,, , n , «5~irj7Sin a.*

vo gMft+G m cos a gM«

This is the theory of Gilbert's barogyroscope, described in Appell's Mecanique rationnelle, ii. 387 : it consists essentially of a rapidly rotated fly-wheel, mounted on knife-edges by an axis perpendicular to its axis of rotation and pointing east and Tne ban- west; spun with considerable angular momentum G', sy rosco P e – and provided with a slight preponderance Mh, it should tilt to an angle E with the vertical, and thus demonstrate experimentally the rotation of the earth.

In Foucault's gyroscope (Comptes rendus, 1852; Perry, p. 105) the preponderance is made zero, and the axis points to the pole, .when free to move in the meridian. Foucault's

Generally, if constrained to move in any other plane, syoscope. the axis seeks the position nearest to the polar axis, like a dipping needle with respect to the magnetic pole. (A gyrostatic working model of the magnetic compass, by Sir W. Thomson. British Associa- tion Report, Montreal, 1884. A. S. Chessin, St Louis Academy of Science, January 1902.)

A spinning top with a polished upper plane surface will provide an artificial horizon at sea, when the real horizon is obscured. The first instrument of this kind was constructed by Serson, and is described in the Gentleman's Magazine, Gyroscopic vol. xxiv., 1754; also by Segner in his Specimen

theoriae ao ” zoa ‘ turbinnm (Halae, 1755). The inventor was sent to sea by the Ad- miralty to test his instrument, but he was lost in the wreck of the ” Victory,” 1744. A copy of the Serson top, from the royal collection, is now in the Museum of King’s College, London. Troughton’s Nautical Top (1819) is intended for the same purpose.

The instrument is in favour with French navigators, perfected by

Admiral Fleuriais (fig. 9) ; but it must be noticed that the horizon given by the top is inclined to the true horizon at the angle E given by equation (3) above; and if mi is the precessional angular velocity as given by (3) § 4, and T = 2it/m> its period in seconds, . „ ,, u 1 . T cos lat t~ T cos lat

(4) tan E= -cos lat = 53ˆ35, or E= 8x •

if E is expressed in minutes, taking m = 2ˆ/86400; thus making the true latitude E nautical miles to the south of that given by the top {Revue maritime, 1890; Comptes renins, 1896).

This can be seen by elementary consideration of the theory above, for the velocity of the vector OC of the top due to the rotation of the earth is

(5)

M . OC cos lat = gMh sin E = in . OC sin E,

■ *t- M 1 x rr T cos lat*

sin E = — cos lat, fc. = 5 >

Mt

Enter’s

coordinate

angles.

in which 8ir can be replaced by 25, in practice; so that the Fleuriais gyroscopic horizon is an illustration of the influence of the rotation of

the earth and of the need for its allowance.

7. In the ordinary treatment of the general theory of the gyro- scope, the motion is referred to two sets of rectangular axes; the one Ox, Oy, Oz fixed in space, with Oz vertically up- ward; and the other OX, OY, OZ fixed in the rotating wheel with OZ in the, axis of figure OC.

The relative position of the two sets of axes is given by means of Euler's unsymmetrical angles 0, 4>, about OZ, brings them into coincidence with OX, OY, OZ, as shown in fig. 1 1 , representing the concave side of a spherical surface. The component angular velocities about OD, OE, OZ are

(1) +if' cos 0;

so that, denoting the components about OX, OY, OZ by P, Q, R,

(2) P = cos k sin sin <£, Q = -0 sin 4>j sin cos (j>, R = 4+ cos 6.

Consider, for instance, the motion of a fly-wheel of preponderance Mh, and equatoreal moment of inertia A, of which the axis OC is held in a light ring ZCX at a constant angle 7 with OZ, while OZ is held by another ring zZ, which constrains it to move round the vertical Oz at a constant inclination with constant angular velocity ix, so that

*(3) 0=0. *=m;*

(4) P=/i sin sin , Q = M sin cos , R=<£ +M cos 0. _ With CXF a quadrant, the components of angular velocity and

momentum about OF, OY, are

(5) P cos 7-R sin 7, Q, and A(P cos y — R sin 7), AQ,

so that, denoting the components of angular momentum of the fly-wheel about OC, OX, OY, OZ by K or G', hi, h 2 , h 3 ,

(6) h= A (P cos 7 — R sin 7) cos 7+ K sin 7,

(7) hi= AQ,

(8) h-s = — A(P cos 7 — R sin 7) sin 7+K cos y; and the dynamical equation

(9)

^-hQ+hP-

•N,

with K constant, and with preponderance downward

(10) N = gM/t cos zY sin y=gMh sin 7 sin cos ,

reduces to

A-575 sin 7+ Am 2 sin 7 sin 2 sin >j> cos $

(»)

+Am 2 cos 7 sin cos cos 4>— (K/x+gMh) sin cos £=0. The position of relative equilibrium is given by , , , . , Ku+eMk— Am'cos7Cos9

(12) cos = o,ands.n* = V sin 7 sin B '*

For small values of 11 the equation becomes

(13) A^ sin y-(Kfi+gUh) sin cos <> =o,*

1 sin 2

The first integral of (11) gives

(17) JA(||) ,, sin7+jAM 2 3in7sin 2 0!

— An 2 cos 7 sin cos sin +(Kn+gMh) sin sin — H =0, and putting tan (|t-H«2>) =z, this reduces to

dz

(18)

dt

=«vz

where Z is a quadratic in z 2 , so that z is a Jacobian elliptic function of (, and we have

*(19) tan (|ir-|-££)=C(tn, dn, nc, or cn)nt, according as the ring ZC performs complete revolutions, or oscillates about a sidelong position of equilibrium, or oscillates about the stable position of equilibrium < £= = *= Jir.*

Suppose Oz is parallel to the earth's axis, and m is the diurnal rotation, the square of which may be neglected, then if Gilbert's barogyroscope of § 6 has the knife-edges turned in azimuth to make an angle (3 with E. and W.,

so that OZ lies in the horizon at an angle E./S.N., we must put 7 = Jir, cos, = sin a sin 0; and putting = Jjr— S+E, where 5 denotes the angle between Zz and the vertical plane Zj" through the zenith f,

(20) sin cos 8 = cos a, sin sin S = sin a cos ;

so that equations (9) and (10) for relative equilibrium reduce to

(21) gMfe sin E = KQ = Km sin cos <£ = Km sin sin (S— E), and will change (3) § 6 into

, , p- Km sin a cos /8

(22) tan E= ,r, 1 „ —,

v ' gmh+Kii cos o

a multiplication of (3) § 6 by cos |3 (Gilbert, Comptes rendus, 1882). Changing the sign of K or h and E and denoting the revolu- tions/second of the gyroscope wheel by F, then in the preceding notation, T denoting the period of vibration as a simple pendulum,

P _ Km sin a cos ff F sin a cos ft

^"gMh-Kii cos a ~ 86400 A/T 2 C-F cos a'

(23)

tan ,

so that £ = jjt gives the position of stable equilibrium, and the period of a small oscillation is 2W {A sin 7/(KM+gMA) sin 0j.

In the general case, denoting the periods of vibration about • $ = 4-, — i*-, and the sidelong position of equilibrium by 2ir/(«i, »n, or n>), we shall find*

(H) i-7ra£j eMA+Km-Am 2 cos (7-0)1

so that the gyroscope would reverse if it were possible to make F cos o> 86400 A/T 2 C (Foppl, Munch. Ber., 1904).

A gyroscopic pendulum is made by the addition to it of a fly- wheel, balanced and mounted, as in Gilbert's barogyroscope, in a ring movable about an axis fixed in the pendulum, in the vertical plane of motion.

As the pendulum falls away to an angle with the upward vertical, and the

axis of the fly-wheel makes an angle $ with the vertical plane of motion, the three components of angular momentum are

(24) hi = K cos <£, fe=A0+K sin , A 3 =A0,

where h 3 is the component about the axis of the ring and K of the fly-wheel about its axis; and if L, M', N denote the components of the couple of reaction of the ring, L may be ignored, while N is zero, with P = o, Q=0,R=o, so that

(25) M'=fc 2 . =A0"+K

(26) o=ˆ8— &i0 = A.

For the motion of the pendulum, including the fly-wheel,

(27) MK 2 = gMH sin 0-M'

= gMH sin 0— A0'— K0 cos . If and remain small,

(28) A<£ = K0", A<£ = K(0-a),

(29) (MK 2 -fA)0+(K 2 /A) (0-a)-gMH0=O;

so that the upright position will be stable if K 2 >gMHA, or the rotation energy of the wheel greater than JA/C times the energy acquired by the pendulum in falling between the vertical and horizontal position ; and the vibration will synchronize with a simple pendulum of length

(30) _ (MK 2 +A)/[(K 2 /gA)-MH].

This gyroscopic pendulum may be supposed to represent a ship .among waves, or a carriage on a monorail, and so affords an explana- tion of the gyroscopic action essential in the apparatus of Schlick and Brennan.

8. Careful scrutiny shows thai the steady motion of a top is not steady absolutely; it reveals a small nutation General superposed, so that a complete investigation requires motion of a return to the equations of unsteady motion, and for the the top. small oscillation to consider them in a penultimate form.

In the general motion of the top the vector OH of resultant angular momentum is no longer compelled to lie in the vertical plane COC (fig. 4), but since the axis Oh of the gravity couple is always hori- zontal, H will describe a curve in a fixed horizontal plane through C. The vector OC of angular momentum about the axis will be constant in length, but vary in direction; and OK will be the component

(15) (16)

ni 2 = -i — -■ — Asini

sin

«« * = ■;

A sin 7 »s = »i Ml/* 4 »ia0.

|-gMfc-KM+AM a cos (7+»))>

angular momentum in the vertical plane COC, if the planes through C and C perpendicular to the lines OC and OC' intersect in the line KH ; and if KH is the component angular momentum perpendicular to the plane COC, the resultant angular momentum OH has the three components OC', C'K, KH, represented in Euler's angles by

(1) KH = Ade/dt, C'K = A sin Bdfldt, OC = G'. Drawing KM vertical and KN parallel to OC, then

(2) KM =Ad*/dt, KN = CR-A cos Od+ldt = (C-A)R+Ad*ldt so that in the spherical top, with C=A, KNˆAdf/dt.

GYROSCOPE AND GYROSTAT

773′

The velocity of H is in the direction KH perpendicular to the plane COC, and equal to gM/t sin 8 or An 2 sin 8, so that if a point in the axis OC at a distance An 2 from O is projected on the horizontal plane through C in the point P on CK, the curve described by P, turned forwards through a right angle, will be the hodograph of H ; this is expressed by

(3) An ! sin Bel***"* = iAnhin Be* 1 – j t (/**»")

where pe*™ is the vector CH ; and so the curve described by P and the motion of the axis of the top is derived from the curve described by H by a differentiation.

Resolving the velocity of H in the direction CH,

(4) d.CH/dt = An* sin 8 sin KCH=An 2 sin9 KH/CH,

(5) d . iCH 1 Idt = AVsin 8d8/dt. and integrating

(6) iCH 2 = AW(E-cos 0),

(7) §OH 2 = A 2 n 2 (F-cos0),

(8) §C'H 2 = A 2 n 2 (D-cos 8), where D, E, F are constants, connected by

(9) F = E+G 2 /2A 2 n 2 = D+G' 2 /2A 2 n 2 . Then

(10) KH 2 =OH 2 -OK 2 ,

(11) OK 2 sin 2 8 = CC' 2 = G 2 -2GG' cos 8+G",

(12) A 2 sin 2 eW*) 2 = 2A 2 re 2 (F-cos9) sin 2 0-G 2 +2GG'cos9-G' 2 ; and putting cos 8=z,

(13) (§) * =2» 2 (F-z) (1-z 2) – (G^GG'z+G'^/A 2

= 2 n 2 (E-z) (1-z 2) – (G' – Gz) 2 /A 2 = 2n 2 (D-z) (1-z 2) – (G – G'z) 2 /A 2 . = 2n 2 Z suppose. Denoting the roots of Z = by z u z%, z 3 , we shall have them arranged in the order

(14) Zi>I>Zs>Z>2,>-I.

(15) {.dzldiy = 2tl\z l -Z) {Zi-Z) (2-8,).

(16) nl= C' dzN (2Z),

J '3

an elliptic integral of the first kind, which with

(17) w-*\/ a ^ 1 .*.

The curve described by H can be identified as a Poinsot herpolhode, that is, the curve traced out by rolling a quadric surface with centre fixed at O on the horizontal plane through C; and Darboux has shown also that a deformable hyperboloid made of the generating lines, with O and H at opposite ends of a diameter and one generator fixed in OC, can be moved so as to describe the curve H ; the tangent plane of the hyperboloid at H being normal to the curve of H ; and then the other generator through O will coincide in the movement with OC, the axis of the top ; thus the Poinsot herpolhode curve H is also the trace made by rolling a line of curvature on an ellipsoid confocal to the hyperboloid of one sheet, on the plane through C.

Kirchhoff's Kinetic Analogue asserts also that the curve of H is the projection of a tortuous elastica, and that the spherical curve of C is a hodograph of the elastica described with constant velocity.

Writing the equation of the focal ellipse of the Darboux hyper- boloid through H, enlarged to double scale so that O is the centre,

(30) r7a 2 +3-V/S 2 +2V0 = 1 ,

with a 2 +X, jfP+X, X denoting the squares of the semiaxes of a con- focal ellipsoid, and X changed into /1 and v for a confocal hyper- boloid of one sheet and of two sheets.

(31) \>o>n>-0 t >v>-a.*

then in the deformation of the hyperboloid, X and v remain constant at H; and utilizing the theorems of solid geometry on confocal quadrics, the magnitudes may be chosen so that

(32) a 2 X/3 2 P. = OH 2 = P 2 (F-z) = p 2 +OC 2 ,*

Z l -Zj'

can be expressed, when normalized by the factor V (zi-3«)/2, by the inverse elliptic function in the form

*(18) *«=(' ,, , V(Z ,7^, ..*

J r,V [4 (zi-z) (sr-z) (-)]

= sn – 1 A/ z ^ = cn l A/ z -^L=dn-i fJ z ± V Zi-z, V Z2-Z3 V z 2 –

(19) 2-83 = (z2-z 3)sn 2 rn{, z% – z = (zj – z 3)cn 2 w(,

z 3

Zi – z = (zi – Zi)dn?mt

(20) z = z 2 sn 2 »n<-r'Z5cn 2 mf.

Interpreted dynamically, the axis of the top keeps time with the beats of a simple pendulum of length

(21) L=//i(zi-2»)>

suspended from a point at a height i(zi+z 3)l above O, in such a manner that a point on the pedulum at a distance

(22) i(Zl -Z3)/=/ 2 /L

from the point of suspension moves so as to be always at the same level as the centre ot oscillation of the top.

The polar co-ordinates of H are denoted by p, ot- in the horizontal plane through C ;' and, resolving the velocity of H perpendicular to CH,

(23) pd-nr/dt = A» 2 sin $ cos KCH.

*(24) pH-*ldt = An* sin 8 . CK*

= A» 2 (G'-Gcos0) , . , fG'-Gz dt ((G'-Gz)/2An dz

*(25) — *J-E^T A=J7, E^i 1W)'*

an elliptic integral, of the third kind, with pole at z = E; and then

*(26) *-KCH =tan- 1 KH/CH*

= tan

,, A sin Bdeldt

•tan”

G’ — GcosS which determines ˆ.

Otherwise, from the geometry of fig. 4,

(27) CK sin 8 =OC-OC cos 0,

(28) A sin 2 Bdˆ/dt = G-G’ cos B, , fG-G’zdt . fG-G’dt,, (G

+ -) “TTir X = i J -7T7 X +i J -+■«

V(2Z)

(G’-Gz)/An’

(29)

+ G’dt

A’

the sum of two elliptic integrals of the third kind, with pole at 2= ± 1 ; and the relation in (25) (26) shows the addition of these two integrals into a single integral, with pole at z = E.

The motion of a sphere, rolling and spinning in the interior of a spherical bowl, or on the top of a sphere, is found to be of the same character as the motion of the axis of a spinning top about a fixed point.

(33) (34) (35) (36) (37) (38)

(39)

a 2 + M = P 2 (z 1 -z)=p 2 -pi 2 , -z)=p 2 -p 2 2 ,

/3 2 +A. = P 2 (z 2 –

Jl» = i& 2 (z3-Z)=p 2 -P3 2 , P 1 2 <0< P 2 2

F=z I +Z2+z 3 , -2H + v = k’ i Z, -r = k\ X-/i_I+z /t-i>_I-« X-x — 2 X-y 2 with z = cos 0, 8 denoting the angle between the generating lines through H ; and with OC =8, OC = *’, the length k has been chosen so

that in the preceding equations

(40) ilk = G/2 An, S'/k = G'/2An ;

and 6, 5', k may replace G, G', 2Are; then

2Z i/\ 2 _4_KH 2 i-z 2= "*

(41)

while from (33-39)

(42)

*2Z _ 4(a 2 +p.)()3 2 +MV I-Z 2 *V-X) (jjl-v) ' which verifies that KH is the perpendicular from O on the tangent plane of the hyperboloid at H, and so proves Darboux's theorem.*

Planes through O perpendicular to the generating lines cut off a constant length HQ = 5, HQ' = 5', so the line of curvature described by H in the deformation ot the hyperboloid, the intersection of the fixed confocal ellipsoid X and hyperboloid of two sheets v, rolls on a horizontal plane through C and at the same time on a plane through C perpendicular to OC'.

Produce the generating line HQ to meet the principal planes of the confocal system in V, T, P; these will also be fixed points on the generator; and putting

(43) (HV, HT, HP,)/HQ = D/(A, B, C,) then

(44) A« 2 +Br ! +Cz 2 = Do 2

is a quadric surface with the squares of the semiaxes given by H V . HQ, HT . HQ, HP . HQ, and with HQ the normal line at H, and so touching the horizontal plane through C; and the direction cosines of the normal being

*(45) */HV, y/HT, z/HP,*

(46) A V + By + CV = D 2 « 2 ,

the line of curvature, called the polhode curve by Poinsot, being the intersection of the quadric surface (44) with the ellipsoid (46).

There is a second surface associated with (44), which rolls on the plane through C, corresponding to the other generating line HQ' through H, so that the same line of curvature rolls on two planes at a constant distance from O, 5 and 6'; and the motion of the top is made up of the combination.

This completes the statement of Jacobi's theorem (Werke, ii. 480) that the motion of a top can be resolved into two movements of a body under no force.

Conversely, starting with Poinsot's polhode and herpolhode given in (44) (46), the normal plane is drawn at H, cutting the principal axes of the rolling quadric in X, Y, Z; and then

*(47) o 2 +m= *.OX, /S 2 +p. = y.OY, p. = z.OZ,*

this determines the deformable hyperboloid of which one generator through H is a normal to the plane through C ; and the other generator is inclined at an angle 8, the inclination of the axis of the top, while the normal plane or the parallel plane through O revolves with angular velocity dtl//dt.

The curvature is useful in drawing a curve of H ; the diameter of curvature D is given by

774

(48)

GYROSCOPE AND GYROSTAT

T) _dp 2 _ jk 1 sin 3 e dp 5-5'cos0'

jfe 8

'KM. KN'

The curvature is zero and H passes through a point of inflexion when C' comes into the horizontal plane through C; 4 1 will then be stationary and the curve described by C will be looped.

In a state of steady motion, z oscillates between two limits z-i and z 3 which are close together; so putting 22 =Zs the coefficient of z in Z is

(49) (50)

. , ,GG' T , (OMcos0+ON)(OM+ONcos0) 2z l z s z\= -1⁵= -1 +' T mu nw i '

2Z l Z 3 =

OM 2 +ON 2

(51) 2(Zi-Z 3) =

With Z2 = z 3 , i the axis is

OM.ON OMˆOM

cos 0, Zi :

OM.ON OM 2 +ON 2

2OM.ON' ONcos0+ON 2 _ MN !

OM.ON OM.ON –

= 0, K= =|ir; and the number of beats per second of

, , m_n /zi-z 3 _

MN

V (OM.ON) 2 beating time with a pendulum of length

L _ I _4QM.ON

(53)

-I.

f(zi-zj) MN 2 The wheel making R/2x revolutions per second,

beats/second _ MN «_ = C

~A"

(54)

revolutions/second "" V (OM . ON) R from (8) (9) § 3 ; and the apsidal angle is

15 = Am -n_. x ON 2 V (OM.ON)

MN

MN 0~C""

(55)mˆ-=£'—3t = :

57T

ON

“MN”

m An m a V (OM.ON) and the height of the equivalent conical pendulum X is given by . X_ g _«‘_OM_KC _OL

(56; l~lf M 2_ “ON KC’ OC”

if OR drawn at right angles to OK cuts KC in R, and RL is drawn horizontal to cut the vertical CO in L; thus if OC represents I to scale, then OL will represent .

9. The gyroscope motion in fig. 4 comes to a stop when the rim of the wheel touches the ground; and to realize the motion when the axis is inclined at a greater angle with the upward vertical, the stalk is pivoted in fig. 8 in a lug screwed to the axle of a bicycle hub, fastened vertically in a bracket bolted to a beam. The wheel can now be spun by hand, and projected in any manner so as to produce a desired gyroscopic motion, undulating, looped, or with cusps if the stalk of the wheel is dropped from rest.

As the principal part of the motion takes place now in the neigh- bourhood of the lowest position, it is convenient to measure the angle 8 from the downward vertical, and to change the sign of z and G.

Equation (18) § 8 must be changed to

Z = (z-F) (i-z’)-(G 2 -2GG’z+G’ 2)/2A 2 n 2 = (z-D) (i-z 2)-(G-G’z) 2 /2A 2 rc 2 = (z-E) (i-z 2)-(G’-Gz) 2 /2A 2 » 2

= {Z 3 -Z) (Z-Zi) (z-zi),

I>Z3>Z>Z2>-I,D,E>01,

zi+Z2+z 3 =F = D-G’ 2 /2A 5 n 2 = E-G 2 /2A 2 » 2 , ancfexpressed by the inverse elliptic function

(1) (2)

(3)

(4)

(5)

m/ = sn

cn\l-5=?- 2 = dn-\/:

2 \Z 3 -Z 2 .

I Z-Zl Z 3 -Z!'

Zz-Z \Z 3 -Zi

(6) z=z i sri i mt+z 3 cn 2 mt, k = (z 3 -Z2)/(z 3 -Zi). Equation (25) and (29) § 8 is changed to*

1 fG'-Gz dt _ j fG'-GE dt Gt

(7) "sJˆE-A-ˆJ"

(8)

-E A fG'+G dt A"

2A'

fG'z-G~dt_ l f G'+G dt _ , fG'-G dt '-JTˆ~ A _ V i-z A V'i+z A'

(13)

II +i

GT_ fz 3 V (-2Z E)

1. j ■

*2A Jz 2 z-E V(2Z)' = *»-/+ Kzn/K', in accordance with the theory of the complete elliptic integral of the third kind.*

Interpreted geometrically on the deformable hyperboloia, flattened in the plane of the focal ellipse, if OQ is the perpendicular from the centre on the tangent HP, AOQ = am/K', and the eccentric angle of P, measured from the minor axis, is am(l-/)K', the eccentricity of the focal ellipse being the comodulus k'.

A point L is taken in QP such that

(14)

(15)

and with

(16)

(17)

(18)

(9)

v= r^ip£L dz =(zs + (*

J E V (4Z) J Zi J I

V(4 Z) where / is a real fraction,

do) <-/> K -/Ul

r E vfa z ,) dz 4Z 1

/E-zi

-K+(i-f)Ki\

(11)

'Z;V(z 3 -Zl)

- 4 Z)

dz,

= sn -i JEz!l =cn t /?I± = dn

\Z2-Z1 ^z 2 -zi

QL/OA = zn/K', QV, QT, QP = OA(zs, zc, zd)/K';

while \l/ and a change places in (26).

The Jacobian elliptic parameter of the third elliptic integral in (7) can be given by v, where

r Zs 1 f Z 2

E

-1 F*

Zl \Z2-Z1 '\/Z 3 -Zi

with respect to the comodulus «'.

Then, with z = E, and

(12) 2Ze = -((G'-GE)/A»j 2 ,

if II denotes the apsidal angle of ss, and T the time of a single beat of'the axle, up or down,

otT

V(z8-zi)/2=OA/fe, k

K, m/n = GT_ G 7ft"

H-M+Syˆ K-W+nrK.

K=2«K

2AmOA OA '

h

OA 1V 2 " J r OA

By choosing for / a simple rational fraction, such as £ _ _ _ . . . an algebraical case of motion can be constructed (Annals of Mathematics, 1904).

Thus with G'-GE=o, we have E=zi or Z2, never z 3 ; f=o or 1; and P is at A or B on the focal ellipse; and then

(19) Zi=-pt,p = G/2A,

(20)

*r * ip (z-E)'*

Zl =

z 2 =

*(21) sin 9 exp (■/'+ˆ0i = *V[(-z 2 -z 3)(z-Zi)]+V[(z3-z) (z-sfe)], 1 +Z2Z 3 j-Z2-Z3 _ G _p _ G' Qr Z2+z 3 ' \ 2 2 Are n 2Anzi*

(22) sin 8 exp('p+pt)i = H[(-Zi-Zs)(.z~Z2)} + ˆ[(z 3 -z)(z-z 1)], . r +zjZj j ~zi-z 3 _ G _p _ G'

zi+z 3 ' V 2 2A» n 2A»z 2 "

Thus z 2 = o in (22) makes G'=o; so that if the stalk is held out horizontally and projected with angular velocity 2p about the vertical axis OC without giving any spin to the wheel, the resulting motion of the stalk is like that of a spherical pendulum, and given by

(23) sin exp(t+pt)i = iJ(?fcose)+ J (sin 2 0- 2 gcos o),

= isin aV (sec a cos0) +V[(sec a +cos0)(cos a-cos0)], if the axis falls in the lowest position to an angle a with the down- ward vertical.

With z 3 = o in (21) and z 2 = – cos ft and changing to the upward vertical measurement, the motion is given by

(24) sin0e i =e in, V2 OO! 73[V(I -cos /Jcos0)-H'V (cos0cos0-cos 2 0)], and the axis rises from the horizontal position to a series of cusps; and the mean precessional motion is the same as in steady motion with the same rotation and the axis horizontal. _*

The special case of /= \ may be stated here; it is found that

L.„ˆ,«w. / (!)(«) !,- ;(!-)(«*)*

(25) (26) (27)

-exp (Zi-pt)i =

-4

+i

p 2 = a 2 (K -x 2), |X 2 sin exp(ip-pt)i = (L-

V 1

I +K ~ X)

:) K r -).(«+ *)*

*i { L-i K +x)J (l + x lˆ- x *

(28) L = h(i-K)+\pln,

so that p = and the motion is made algebraical by taking L = J(l K)

The stereoscopic diagram of fig. 12 drawn by T. I. Dewar shows these curves for k = ||, I, and \ (cusps).

10. So far the motion of the axis OC of the top has alone been considered ; for the specification of any point of the body, Euler's third angle cf> must be introduced, representing the angular displace- ment of the wheel with respect to the stalk. This is given by

(1)

Tt+ C ° st

*W «*Jfi-(i->ˆ*

G'+G

ˆHK«I

+ COS0)'

G'-G

dt \ A/ A(i-cos0)'

It will simplify the formulas by cancelling a secular term if we make C = A, and the top is then called a spherical top; OH becomes the axis of instantaneous angular velocity, as well as of resultant angular momentum.

When this secular term is restored in the general case, the axis 01 of angular velocity is obtained by producing Q'H to I, making HI A-C HI A-C

(3)

Q'H C ' Q'l A

and then the four vector components OC', C'K, KH, HI give a re- sultant vector OI, representing the angular velocity w, such that

(4) OI/Q'I=«/R.

The point I is then fixed on the generating line Q'H of the de- formable hyperboloid, and the other generator through I will cut the fixed generator OC of the opposite system in a fixed point O',

Fig. 12.

such that 10′ is of constant length, and may be joined up by a link, which constrains I to move on a sphere. In the spherical top then,

depending on the two elliptic integrals of the third kind, with pole at :=tI; and measuring from the downward vertical, their elliptic parameters are :
—

(8) /lK –) , V(-4Z) –

\ I- Zi \I— 2l \I— Zi'

*.(9) (i-tfK'-p^*

)cfc

4 Z)

/ — I— Zl . J T+Zt

\ zi — zi \z%— Zl

\Z 3 — Zi

Then if d' = K+(i— f')K'i is the parameter corresponding to s = D, we find

(10) /=/-/!, /=/!+/!,*

(il) f=l'l+I'2, »'=»l— »J.

The most symmetrical treatment of the motion of any point fixed in the top will be found in Klein and Sommerfeld, Theorie des Kreisels, to which the reader is referred for details; four new functions, a, /3, y, 5, are introduced, defined in terms of Euler's angles, 0, \j/, , by

(12) a— cos J0 exp J(0+^K

(13) 0=t sin J0 exp i(-+*

(14) 7=1 sin J0 exp J(4>—\//)i,

(15) 5= cos J0 exp |(<#>-i/')i.

Next Klein takes two functions or co-ordinates X and A, defined by

(16)

. x+yi r+z

r — z x — yi

and A the same function of X, Y, Z, so that /-, A play the part of stereographic representations of the same point (x, y, z) or (X, Y, Z) on a sphere of radius r, with respect to poles in which the sphere is intersected by Oz and OZ.

These new functions are shown to be connected by the bilinear relation

(17)

X = «±i?. o5 .*

-07 = I,

YA-H'

in accordance with the annexed scheme of transformation of co- ordinates —

V

II

z

£

a 2

/3 2

2a;8

V

7 2

5 2

2 T 5

f

07

/S8

a5 4-187

= dn-

where

(18) £= x+yi, ri = —x+yi, f=-z, S = X+Yi, H=-X+Yi, Z=-Z;

and thus the motion in space of any point fixed in the body defined by A is determined completely by means of a, (3, 7, 8; and in the case of the symmetrical top these functions are elliptic transcendants, to which Klein has given the name of multiplicative elliptic functions ; and

(19) a5=cos 2 |0, /37=-sin 2 |0, a5— 187 = 1, aS-f/37=cos0,

V(— 40/378)= sin 0; while, for the motion of a point on the axis, putting A = o, or 00 ,

*(20) X = /3/S = i tan J0eˆ«, or X = a/7 = — i cot \M *, and*

(21) a/S = ii sin Beˆi, ay = \i sin 0e»,*

giving orthogonal projections on the planes GKH, CHK; and , n dj3 da„ p
■

(22 > a dt-dtP= n F m '

the vectorial equation in the plane GKH of the herpolhode of H for a spherical top.

When /1 and fo in (9) are rational fractions, these multiplicative elliptic functions can be replaced by algebraical functions, qualified by factors which are exponential functions of the time t; a series of quasi-algebrakal cases of motion can thus be constructed, which become purely algebraical- when the exponential factors are can- celled by a suitable arrangement of the constants.

Thus, lor example, with /=o, f' = i, fi — i, /2 = |, as in (24) §9, where P and P' are at A and B on the focal ellipse, we have for the spherical top

(23) (i-fcos-fl) exp (4> +

= V (sec/3— cos0) V (cos/3 — cos0)+i(Vscc /3+Vcos/3) Vcos0,

(24) (1— cos0) exp (4,— ip— q't)i

*= V (sec/3— cos 0)V (cos /S— cos0) + *(V sec /S — V cos /3) V cos 0,*

(25) g,.g'=«V (2 sec/3) ±wV (2 cos/3) ; and thence a, /3, 7, 8 can be inferred.

The physical constants of a given symmetrical top have been denoted in § 1 by M, h, A, C, and I, re, T; to specify a given state of general motion we have G, G' or CR, D, E, or F, which may be called the dynamical constants; or k, v, id, Vi, vi, or/, /', f lt f 2 , the analytical constants; or the geometrical constants, such as a, fj, 5, 8', k of a given articulated hyperboloid.

There is thus a triply infinite series of a state of motion; the choice of a typical state can be made geometrically on the hyper- boloid, flattened in the plane of the local ellipse, of which k is the ratio of the semiaxes a and /3, and am(i — /) K' is the eccentric angle from the minor axis of the point of contact P of the generator HQ, so that two analytical constants are settled thereby ; and the point H may be taken arbitrarily on the tangent line PQ, and HQ' is then the other tangent of the focal ellipse; in which case 3 and 02 are the angles between the tangents HQ, HQ', and between the focal distances HS, HS', and V- will be HS.HS', while HQ, HQ' are 6, S'.

of states of

Fig. 13.

As H is moved along the tangent line HQ, a series motion can be determined, and drawn with accuracy.

11. Equation (5) § 3 with slight modification will serve with the same notation for the steady rolling motion at a constant inclination a to the vertical of a body of revolution, such as a disk, hoop, wheel, cask, wine-glass, plate, dish, bowl, spinning top, gyrostat, or bicycle, on a horizontal plane, or a surface of revolution, as a coin in a conical lamp-shade.

The point O is now the intersection of the axis GC with the vertical through the centre B of the horizontal circle described by the centre of gravity, and through the centre M of the horizontal circle described by P, the point of contact (fig. 13). Collected into

a particle at G, the

_A . 1 R. body swings round

the vertical OB as a conical pendu- lum, of height AB or GL equal to g/p = X, and GA would be the di- rection of the thread, of tension gM(GA/ GL) dynes. The reaction with the plane at P will be an equal parallel force ; and its moment round G will provide the couple which causes the velocity of the vector of angular momen- tum appropriate to the steady motion ; and this moment will be gM.Gm dyne-cm. or ergs, if the reaction at P cuts GB in m.*

Draw GR perpendicular to GK to meet the horizontal AL in R, and draw RQC'K perpendicular to the axis Gz, and KC perpendicular toLG.

The velocity of the vector GK of angular momentum is it times the horizontal component, and

(1) horizontal component [Ap. sin a = KC/KC,

so that " (2) gM.Gm = Aju 8 sin a(KC/KC),

W M=lc"?-^Gm = GQ.Gw.

The instantaneous axis of rotation of the case of a gyrostat would be OP; drawing GI parallel to OP, and KK' parallel to OG, making tan K'GC = (A/C) tan IGC'i ; then if GK represents the resultant angular momentum, K'K will represent the part of it due to the rotation of the fly-wheel. Thus in the figure for the body rolling as a solid, with the fly-wheel clamped, the points m and Q move to the other side of G. The gyrostat may be supposed swung round the vertical at the end of a thread PA fastened at A' where Pm produced cuts the vertical AB, and again at the point where it crosses the axis GO. The discussion of the small oscillation super- posed on the state of steady motion requisite for stability is given in the next paragraph.

12. In the theoretical discussion of the general motion of a gyrostat rolling on a horizontal plane the safe and shortest plan apparently is to write down the most general equations of motion, and afterwards to introduce any special condition.

Drawing through G the centre of gravity any three rectangular axes Gx, Gy, Gz, the notation employed is u, v, w, the components of linear velocity of G ;

the components of angular velocity about the axes ,

the components of angular momentum ;

the components of angular velocity of the co-ordinate

axes; the co-ordinates of the point of contact with the hori- zontal plane; the components of the reaction of the plane ; the direction cosines of the downward vertical. The geometrical equations, expressing that the point of contact is at rest on the plane, are

(1) u-ry+qz = o,

(2) v— pz+rx = 0, ‘ (3) . w—qx+py = o.

The dynamical equations are

(4) du/dt-eaV+6iw=ga+X/M,*

(5) dv/dt-etW+B&ˆgP+YIM,

(6) dw/dt-etu+dtf =g7+Z/M, and

(7) dhtldt-eJu+ethiˆyZ-zY,

(8) . dh t /dt-0 l h, +0 s h l =zX-xZ,

(9) dh,/dt-e i hi+e l hi=xY-yX.

General motion of a gyrostat rolling on a plane.

P< ?. r, hi, hi, kz,

01, 02, 3,

x, y, z,

X, Y,Z, ,P, y,

In the special case of the gyrostat where the surface is of revolu- tion round Gz, and the body is kinetically symmetrical about Gz, we take Gy horizontal and Gzx through the point of contact so that y = o; and denoting the angle between Gz and the downward vertical by (fig. 13)

(10) a = sin0, /3 = o, t=cos0. The components of angular momentum are

(11) h=Ap, /t 2 = Ao,_ h, = Cr+K,

where A, C denote the moment of inertia about Gx, Gz, and K is the angular momentum of a fly-wheel fixed in the interior with its axis parallel to Gz ; K is taken as constant during the motion. The axis Gz being fixed in the body,

(12) 0i=p, e 2 = q=-d8!dt, z = pcot0. With y = o, (1), (2), (3) reduce to

(13) _ u— —qz, v=pz—rx, w = qx;

and, denoting the radius of curvature of the meridian curve of the rolling surface by p,

dx __ n d9 _ _. „ dz . -d8 ■ .

(I 4) ˆ = PCOS

so that

(15)

ˆ—gpcos _ˆ2,

du

dt ~~ ~d(

z—q 2 p sin 0,

(16) (17)

dv dp dr , . ■ n , • „

Tt = Si z ~Tt x+pqp sin 0+qrp sm ”’

dw dq , .

-T7=ˆ-S 2 pcos0.

dt dt The dynamical equations (4) . . » (9) can now be reduced to

m = ~-J, z ~P iz cot 0+2 2 (*-p sin 6)+prx cot -g sin 9,

M Y

dt’

M

yi = -dt z ~-£ x ~pQ(*+ z cot e ~ p sin s)+q.rp cos e,

■*-,*=-$x+q i {z—p cos 6)+p 2 z— prx— g cos 0,

-zY=Ai£-Apq cot 0+qh„

zX*Z=A^+Ap2cot e-ph 3 , „v _ dhi _ r dr _ nn d

xY di c ir- Cq de-

(18) (19)

(20) (21) (22) (23)

Eliminating Y between (19) and (23),

^\^[+ x2)-£ t – xz ^ t +P^ x (x + zcote -psme)-qrxpcose=Q,

^\M^ X Jdl)~ xz ~d$~l' x (x+scot e_ P sin0)+ ”*PCos0=o.
Eliminating Y between (19) and (21)

— pqz(x+zcot — p sin0) --qrzp cos0 = 0,

< B > S+(H+‘)S+H*«t.-g

+pz(x+z cot — p sin 0) —rzp cos.0 = 0. In the special case of a gyrostat rolling on the sharp edge of a circle passing through G, z = o, p = o, (A) and (B) reduce to

(26)

(27) (28)

P \Mx* + l)d8 ~ (m^+C,) dd' dp 1 j. ,. „ ^ d.*sin0_fe 3 sin0

-de+P cote= A' ds A -5

d?h s ,dh, _ CM *» . 3er+ d jcote= A(Mx2+C) h i ,

a differential equation of a hypergeometric series, of the form of Legendre's zonal harmonic of fractional order n, given by

(29) «(» + i) = CM* ! /A(Mf ! +C).

For a sharp point, * = o, p = o, and the previous equations are obtained of a spinning top.

The elimination of X and Z between (18) (20) (22), expressed symbolically as

(30) (22)-z(l8)-hc(20)=0,

gives

(C) (+ +z^-4 3 +(A 2 ^cot0^z

+q 2 p(x cos 0— z sin 0) — prx{x+z cot 0) — g{x cose— z sin 0) =0, and this combined with (A) and (B) will lead to an equation the integral of which is the equation of energy.

13. The equations (A) (B) (C) are intractable in this general form; but the restricted case may be considered when the axis moves in steady motion at a constant inclination a to the vertical ; and the stability is secured if a small nutation of the axis can be superposed.

It is convenient to put £=fisih0, so that £2 is the angular velocity of the plane Gz about the vertical ; (A) (B) (C) become*

< A > (£+)!-» sin 4?*

-&c(z sin 9-22 cos 9 – p sin 2 9) + rxp cos 9 = o,

< B > ->4+(m+) ^-m+ 2 «(m+ 22) cos9

fiz sin 9(x-p sin 9) – rzp cos = o, (C) (M :c2 + zi!) 3?+2^(* cos ** sin) – "M sin e +Q2 (m +22) sin cos 9 + fta sin 2 9 -Qrx(x sin 0+z cos 9)-g(# cos 0-z sin 9) =0. The steady motion and nutation superposed may be expressed by*

(1) 9 = a+L, sin 9 = sin a+L cos a, cos 9 = cos a-L sin a, Q=M + N, r = R+Q,

where L, N, Q are small terms, involving a factor e nli , to express the periodic nature of the nutation; and then if a, c denote the mean value of x, z, at the point of contact

*(2) * = a+Lp cos a, z=c-hp sin a,*

(3) x sin 8+z cos = a sin a+c cos a+L(a cos a-c sin a),

*(4) * cos. 0-z sin 9 = o cos a-c sin a-L(a sin a+c cos a-p). Substituting these values in (C*) with dg/dt = -*

and ignoring products of the small terms, such as L 2 , LN, . . .

(C**) (tf+^+c*) L»*-G«+N) (^j~+7$) («n a+L cos a)

+ (/* 2 +2mN) I j-s+c^Lpc sin 0) (sin o cos a+L cos aj

+ (/* 2 +2yuN) [ac-Lp(a sin a-c sin a)] (sin 2 a+L sin 2a) -ti+N)(R +Q)(a+Lpcosa)[asina+ccosa+L(acosa-csina)] -g(a cos a-c sin a)+gL(a sin a+c cos a-p) =o, which is equivalent to

, , CR+K . , . / A , A .

(5) V — M S1 ” a+p? (jyj +C l j sin a COS a

+M 2 ac sin 2 a-p.Ra(a sin a+c cos a)-g(a cos a-c sin a) =0, the condition of steady motion ; and

(6) DL+EQ+FN=o, where

CK+K

cos a – 2p?pC sin 2 a COS a

(7) D=(A f +a 2 +c 2)» 2 – M – 1 ^

+/n 2 (fcf+c 2) cos a-ju 2 p(a sin a-C cos a) sin 2 a

+p?ac sin 2a-pRp cos a(a sin a+c cos a) -/iKa(a cos a-c sin a)+g(a sin a+c cos a-p),

C

(8) E = -m , o sm a-p.a{a sin a+c cos a),

. , „ CR+K . , /A A .

(9) F= j^j — sina+2Ml m+c 2) sin a cos a

+2mOC sin 2 a-Ra(a sin a+c cos a). With the same approximation (A*) and (B*) are equivalent to

(A**) I yT+a 2) ^—acsina-p-Ma(o sin a+2c cos a-p sin 2 a)

+Rtfp cos a = o,

(B “> -e+(m+ c2)

N CR+K

+ 2 “(m+ c2) 1

+mc sin a(a-p sin a)-Rcp cos a=o.

The elimination of L, Q, N will lead to an equation for the deter- mination of n 2 , and rt 2 must be positive for the motion to be stable.

If 6 is the radius of the horizontal circle described by G in steady motion round the centre B,

(10) &=u//i = (cP-aR)/M=c sin a-aR/ji,

and drawing GL vertically upward of length X = g/,u 2 , the height of the equivalent conical pendulum, the steady motion condition may be written

(11) (CR+K)/x sin a-p? sin a cos o=-|M(a cos a-c sin a)

+ M(/i 2 c sin a-p.Ra) (a sin a+c cos a) = gM[iX- l (a sin a+c cos a) - a cos a+c sin a] = gM. PT, LG produced cuts the plane in T.

Interpreted dynamically, the left-hand side of this equation represents the velocity of the vector of angular momentum about G, so that the right-hand side represents the moment of the applied force about G, in this case the reaction of the plane, which is parallel to GA, and equal to gM.GA/GL; and so the angle AGL must be less than the angle of friction, or slipping will take place. Spinning upright, with a=o, a = o, we find F=o, Q=o, and

(13) (u+ c2) " ! ="n? y (m+ c2) + *r*-«(*-p),

"4> GH v '(^ + HXh + ')<<'>-

o,

"Thus for a top spinning upright on a rounded point, with K the stability requires that

(15) R>2fc'Vig(c : p))/(* 2 +cp),

where k, k' are the radii of gyration about the axis Gz, and a per- pendicular axis at a distance c from G; this reduces to the preceding case of § 3 (7) when p = o.

Generally, with a=o, but a±o, the condition (A) and (B) becomes

(16) (jj +a^j J* = 2p.ac-Rap,

Q C R + K , _ /A , A

so that, eliminating Q/L,

[()(-)-«‘4=(§+«-)(t)+§k~

(17)

the condition when a coin or platter is rolling nearly flat on the table. Rolling along in a straight path, with a = §jr, C = 0, ju = °. E = o; and

(18) (19)

(20)

N/L = (CR+K)/A, D=($i+G 2)r. 2 +g(a-p), CR+K

F=—

M

-Ra 2 ,

N P _ (m+° 2) w2 +g (a ~ p) L ~ r /C, .\ DJ K

{u +a) R +

Thus with K=o, and rolling with velocity V = Ra, stability requires

(22)

2g

a-p

>iA.

A\Mo !+ V Ma> +1

or the body must have acquired velocity greater than attained by rolling down a plane through a vertical height j(a-p)A/C.

On a sharp edge, with p = o, a thin uniform disk or a thin ring requires

(23) V 2 /2g>a/6ora/8.

The gyrostat can hold itself upright on the plane without advance when R = o, provided

(24) K 2 /AM-g(a-p) is positive.

For the stability of the monorail carriage of § 5 (6), ignoring the rotary

inertia of the wheels by putting C =0, and replacing K by G' the theory above would require

*(25) x (aV+ A-) >**•*

For further theory and experiments consult Routh, Advanced Rigid Dynamics, chap, v., and Thomson and Tait, Natural Philo- sophy, § 345; also Bourlet, TraitS des bicycles (analysed in Appell, Mecanique rationnelle, ii. 297, and Carvallo, Journal de V&cole poly- technique, 1900); Whipple, Quarterly Journal of Mathematics, vol. xxx., for mathematical theories of the bicycle, and other bodies.

14. Lord Kelvin has studied theoretically and experi- mentally the vibration of a chain of stretched gyrostats t v r ° sts " c (Proc. London Math. Soc, 1875; J. Perry, Spinning Tops, cha,a – for a diagram). Suppose each gyrostat to be equivalent dynamically to a fly-wheel of axial length 20, and that each connecting link is a light cord or steel wire of length 2l, stretched to a tension T.

Denote by x, y the components of the slight displacement from the central straight line of the centre of a fly-wheel ; and let p, q, I denote the direction cosines of the axis of a fly-wheel, and r, s, I the direction cosines of a link, distinguishing the different bodies by a suffix.

Then with the previous notation and to the order of approximation required,

(1) Bi=-da!dt,e 2 =dpldt,

(2) hi=A9 h A 2 =A9 2 , hz = K, to be employed in the dynamical equations

(3) -gj-e 3 ht+eih 3 = L, . . .

in which 3 h and 8 s h 2 can be omitted. For the kth fly-wheel

(4) -Aqic+Kpk = Ta(qtc -Sk)+Ta(q k -Sh+i),

(5) Afit+Kqkˆ-Taipk-rˆ-Taipk-rk+i) ; and for the motion of translation

(6) M t =T(r k+1 -r*), Mj>»=T(j kf i-it); while the geometrical relations are*

(7) Xki-i-Xk = a(pk+i+pk)+2lri c +i,

(8) yk+i-yk = a(q k+ i+qk)+2ls k+ i. Putting

(9) x+yi=w, p+qi = a. r+si —

these three pairs of equations may be replaced by the three equations

(10) Aa k -KtSki+2TaZS k -Ta("k+i+"k) =o,

(n) M%-T("n.i-o-*)=o,

(12) _ _ Wk+i-TVk-a(&k+l+&k)-2l< r M-l=0.

For a vibration of circular polarization assume a solution

(13) Wk, 3*, "k = (L, P, Q) exp (nt+kc)i,

so that c/n is the time-lag between the vibration of one fly-wheel and the next; and the wave velocity is

(14) U=2(a+l)nlc. Then

(15) P(r An* + Kn+2Ta)-QTa(e ci + i)=o, ;

(16) -LMn 2 -QT(e"-i)=o,

(17) L(e c '-i)-Pa(e" + i)-2Qfe ci =o, leading, on elimination of L, P, Q, to

. (2 Ta + Kn-An 2) (i-M« i i/T)-M«a i

(18) cose- 2 Ta + Kn-A» 2 + Mna 2 Mb' 2Ta(a+l)+Knl-AnH

GYROSCOPE AND GYROSTAT

(19)

2 sin 2 c T 2 Ta-t-Kn-A» 2 + M» 2 a 2 –

With K=0, A = o, this reduces to Lagrange's condition in the vibration of a string of beads. Putting

(20) p = M/2(o+0i the mass per unit length of the

chain,

(21) ic = K/2 (o +/) , the gyrostatic angular momentum

per unit length,

(22) a = A /2(a +/)> the transverse moment of inertia

per unit length,

(23) ic = (a+/)n/U, equation (19) can be written

(24 (sin (o-H)»/U) 2

- fa+zwe. Ta+Kn/-an 2 /

ˆ\ (<*+*)" ? 2 ra \ sin (a+/)«/U \

= T . T + JKn-an 2) (i+//a)+ P n 2 a(a-H)

— p T + (xM-aM 2)//a

In a continuous chain of such gyrostatic links, with a and I in- finitesimal,

(26) uˆij I+ «”-*»;,

v ‘ _ p / T-f-(/

for the vibration of helical nature like circular polarization.

Changing the sigh of n for circular polarization in the opposite direction

(27)

u

“=?! :

K» + a» 2

lja-

T-(K«-(-a7l 2)i/i

In this way a mechanical model is obtained of the action of a mag- netized medium on polarized light, k representing the equivalent of the magnetic field, while a may be ignored as insensible (J. Larmor, Proc. Lond. Math. Soc, 1890; Aether and Matter, Appendix E).

We notice that U z in (26) can be positive, and the gyrostatic chain stable, even when T is negative, and the chain is supporting a thrust, provided xn is large enough, and the thrust does not exceed

(28) {Kti-anˆii+l/a);

while U' 2 in (27) will not be positive and the straight chain will be unstable unless the tension exceeds

(29) (K «+a» 2)(i+Z/a).

15. Gyrostat suspended by a Thread. — In the discussion of the small vibration of a single gyrostat fly-wheel about the vertical position when suspended by a single thread of length 2l = b, the suffix k can be omitted in the preceding equations of § 14, and we can write

(1) As^-KcJi +Taffi-Ta

(2) Mw+T

(3) w-aZZ-bcr = o. Assuming a periodic solution of these equations

(4) vi, 8,

(5) HW+Kn+gMa) (g-n 2 6)-gMn 2 a 2 =0,

and the frequency of a vibration in double beats per second is M,'2ir, where » is a root of this quartic equation.

For upright spinning on a smooth horizontal plane, take b = oo and change the sign of a, then

(6) An 2 -Kn+gMa = o, so that the stability requires

(7) K 2 >4gAMa.

Here A denotes the moment of inertia about a diametral axis through the centre of gravity; when the point of the fly-wheel is held in a small smooth cup, 6 = 0, and the condition becomes

(8) _ (A+Ma 2)n 2 r Kn+gMa = o, requiring for stability, as before in § 3,

(9) K 2 >4g(A+Ma 2)Ma..

For upright spinning inside a spherical surface of radius b, the

sign of a must be changed to obtain the condition at the lowest point, as in the gyroscopic horizon of Fleuriais.

For a gyrostat spinning upright on the summit of a sphere of radius b, the signs of a and b must be changed in (5), or else the sign of g, which amounts to the same thing.

Denoting the components of horizontal displacement of the point of the fly-wheel by £, 17, then

(10) br = i, bs = ri, 6<7 = f+r)i = X (suppose),

(11) w = aa+.

If the point is forced to take the motion ({, 17, f) by components of force X, Y, Z, the equations of motion become

(12) -Aq+Kp = Ya-Zaq,

(13) Ap+Kq = – Xa+Zap,

(14) M«i = X +Yi, M(f-g)=Z; so that

(15) At5-K&"+gMac3+Ma = Mac3f, or*

*(16) (A+Ma 2)t3-K*J+gMaS+MaX = Maaf.*

Thus if the point of the gyrostat is made to take the periodic motion given by X = R exp nti, f = 0, the forced vibration of the axis is given by 25 =P exp nti, where

(17) P» 2 +K«)-gMa!-RMM 2 a = o;

and so the effect may be investigated on the Fleuriais gyroscopic horizon of the motion of the ship.

Suppose the motion X is due to the suspension of the gyrostat from a point on the axis of a second gyrostat suspended from a fixed point.

Distinguishing the second gyrostat by a suffix, then \ = b& 1 , if b denotes the distance between the points of suspension of the two gyrostats ; and the motion of the second gyrostat influenced by the reaction of the first, is given by

*(18) . (A 1 + Mifci 2)&-Ki&**

= -g(Mife + M6)Si-6(X+Yi) = -g(Mife + M6)ai-M6(o»+X); so that, in the small vibration,

(19) ^J -(A 1 +M 1 ^, 2)re 2 +K 1 »+g(M 1 fe 1 + M6) I =Mra 2 6(oP+R),

(20) Rj-(A 1 +M 1 /j 1 2 +M6 2)» 2 +K 1 ra+g(M 1 A 1 -t-M&)j-PM» 2 a6 2 =o. Eliminating the ratio of P to R, we obtain

(21) {-(A+Ma 2)n 2 +Kre+gMal

X[-(Ai+Mi/H 2 + M6 2)n 2 + KiW+g(M 1 fe 1 +MJ)!-M 2 M 4 a 2 ?) 2 = o, a quartic for n, giving the frequency nJ2ir of a fundamental vibration.

Change the sign of g for the case of the gyrostats spinning upright, one on the top of the other, and so realize the gyrostat on the top of a gyrostat described by Maxwell.

In the gyrostatic chain of § 14, the tension T may change to a limited pressure, and U 2 may still be positive, and the motion stable; and so a motion is realized of a number of spinning tops, superposed in a column.

16. The Flexure Joint. — In Lord Kelvin's experiment the gyrostats are joined up by equal light rods and short lengths of elastic wire with rigid attachment to the rod and case of a gyrostat, so as to keep the system still, and free from entanglement and twisting due to pivot friction of the fly-wheels.

When this gyrostatic chain is made to revolve with angular velocity n in relative equilibrium as a plane polygon passing through Oz the axis of rotation, each gyrostatic case moves as if its axis produced was attached to Oz by a flexure joint. The instantaneous axis of resultant angular velocity bisects the angle t-B, if the axis of the case makes an angle 6 with Oz, and, the components of angular velocity being n about Oz, and n about the axis, the re sultant angular velocity is 2n cos %(r-ti) =2n sin |9; and the components of this angular velocity are

(1) -2m sin \B sin |fl= -n(i-cos 8), along the axis, and

(2) -2» sin \9 cos \8— -n sin 9, perpendicular to the axis of the case. The flexure joint behaves like a pair of equal bevel wheels engaging.

The component angular momentum in the direction Ox is therefore

(3) L= -An sin 6 cos – Cra(i-cos B) sin Q+K. sin B, and Ln is therefore the couple acting on the gyrostat.

If a denotes the angle which a connecting link makes with Oz, and T denotes the constant component of the tension of a link parallel to Oz, the couple acting is

(4) Ta cos 9t(tan <« +I +tan aj)-2Ta sin 8k, which is to be equated to Ln, so that

(5) – An 2 sin 8k cos 0,t-Cn(i-cos 8 k) sin 8k+Kn sin 8 k -Ta cos 9j;(tan a^+i+tan at) +2Ta sin 0jt = o.

In addition

(6) Mn 2 xib+T(tan at+i-tan at) =0, with the geometrical relation

(7) x t+ i-«t-a(sin 0/t + i+ sin 8 k)-2l sin a k+ i = 0. When the polygon is nearly coincident with Oz, these equations

can be replaced by

GYTHIUM— GYULA-FEHERVAR

779

(8) (-An i + Kn+2Ta)0 k -Ta(a.k +i + a k) =o,

(9) Mn 2 x k +T(a k+1 -a t)=o, (10) Xh+i— Xk — a(B k+1 +8 k) — 2la k = o,

and the rest of the solution proceeds as before in § 14, putting

(n) x k ,6 k , a* = (L, P, Q) exp cki.

A half wave length of the curve of gyrostats is covered when ck = r, so that t/c is the number of gyrostats in a half wave, which is therefore of wave length 2ir(a-t-l)/c.

A plane polarized wave is given when exp cki is replaced by exp (nt+ck')i, and a wave circularly polarized when w, vs, a of § 14 replace this x, 8, a.

Gyroscopic Pendulum. — The elastic flexure joint is useful for supporting a rod, carrying a fly-wheel, like a gyroscopic pendulum.

Expressed by Euler's angles, 8, , ip, the kinetic energy is

(12) T = iA((? 2 +sin 2 0

The elimination of 4* between the equation of conservation of angular momentum about the vertical, viz.

(13) Asin 2

(14) T— gMA cos0 = H, a constant, with 8 measured from the downward vertical, and

(15) 0+ˆcos0 = R, a constant, will lead to an equation for ddjdt, or dz/dt, in terms of cos 8 or z, the integral of which is of hyper- elliptic character, except when A =C

In the suspension of fig. 8, the motion given by is suppressed in the stalk, and for the fly-wheel gives the rubbing angular velocity of the wheel on the stalk ; the equations are now

(16) T = |A(9 2 +sin 2 8&) + iC cos 2 9ˆ 2 +|CR 2 = H+gM/s cos 8,

(17) AsinW+C'cos 2 eˆ+CRcos9 = G,

and the motion is again of hyperelliptic character, except when A = C, or C' = o. To realize a motion given completely by the elliptic function, the suspension of the stalk must be made by a smooth ball and socket, or else a Hooke universal joint.

Finally, there is the case of the general motion of a top with a spherical rounded point on a smooth plane, in which the centre of gravity may be supposed to rise and fall in a vertical line. Here

(18) T = KA + M/j 2 sin 2 9)9 2 tAsin 2 9ˆˆCR 2 = H-gMftcose, with 8 measured from the upward vertical, and

(19) ■ A sin 2 0ˆ+CRcos9 = G,

where A now refers to a transverse axis through the centre of gravity. The elimination of pleads to an equation for z, = cos 8, of the form

(20)

\dt) hi-

___ – „g (zi-z) fa-z) (Za-z) z 2 +A/M/; 2 h (zt-e) (z-z 6) '

with the arrangement

(21) Z], Z4>/>Z 2 >Z>Z 3 > — />Z 6 ;

so that the motion is hyperelliptic.

Authorities. — In addition to the references in the text the follow- ing will be found useful: — Ast. Notices, vol. i. ; Comptes rendus, Sept. 1852; Paper by Professor Magnus translated in Taylor's Foreign Scientific Memoirs, n.s., pt. 3, p. 210; Ast. Notices, xiii. 221-248; Theory of PoucaulCs Gyroscope Experiments, by the Rev. Baden Powell, F.R.S. ; Ast.

Notices, vol. xv. ; articles by Major J. G. Barnard in Silliman's Journal, 2nd ser., vols. xxiv. and xxv. ; E. Hunt on " Rotatory Motion," Proc. Phil. Soc. Glasgow, vol. iv.; J. Clerk Maxwell, " On a Dynamical Top," Trans. R.S.E. vol. xxi. ; Phil'. Mag. 4th ser. vols. 7, 13, 14; Proc. Royal Irish Academy, vol. viii. ; Sir William Thomson on " Gyrostat," Nature, xv. 297; G. T. Walker, "The Motion of a Celt," Quar. Jour. Math., 1896; G. T. Walker, Math. Ency. iv. I, xi. 1; Gallop, Proc. Camb. Phil. Soc. xii. 82, pt. 2, 1903, " Rise of a Top"; Price's Infinitesimal Calculus, vol. iv. ; Worms, The Earth and its Mechanism ; Routh, Rigid Dynamics; A. G. Webster, Dynamics (1904); H. Crabtree, Spinning Tops and Gyroscopic Motion (1909). For a com- plete list of the mathematical works on the subject of the Gyroscope and Gyrostat from the outset, Professor Cayley's Report to the British Association (1862) on the Progress of Dynamics should be con- sulted. Modern authors will be found cited in Klein and Sommerf eld, Theorie des Kreisels (1897), and in the Encyclopddie der mathe- matischen Wissenschaften. (G. G.)

GYTHIUM, the harbour and arsenal of Sparta, from which it was some 30 m. distant. The town lay at the N.W. extremity of the Laconian Gulf, in a small but fertile plain at the mouth of the Gythius. Its reputed founders were Heracles and Apollo, who frequently appear on its coins: the former of these names may

point to the influence of Phoenician traders, who, we know, visited the Laconian shores at a very early period. In classical times it was a community of perioeci, politically dependent on Sparta, though doubtless with a municipal life of its own. In 455 B.C., during the first Peloponnesian War, it was burned by the Athenian admiral Tolmides. In 370 B.C. Epaminondas besieged it unsuccessfully for three days. Its fortifications were strengthened by the tyrant Nabis, but in 195 B.C. it was invested and taken by Titus and Lucius Quintius Flamininus, and, though recovered by Nabis two or three years later, was re- captured immediately after his murder (1 9 2 B.C.) by Philopoemen and Aulus Atilius and remained in the Achaean League until its dissolution in 146 B.C. Subsequently it formed the most im- portant of the Eleutherolaconian towns, a group of twenty-four, later eighteen, communities leagued together to maintain their autonomy against Sparta and declared free by Augustus. The highest officer of the confederacy was the general (

Pausanias (iii. 21 f.) has left us a description of the town as it existed in the reign of Marcus Aurelius, the agora, the Acropolis, the island of Cranae (Marathonisi) where Paris celebrated his nuptials with Helen, the Migonium or precinct of Aphrodite Migonitis (occupied by the modern town of

Marathonisi or Gythium), .and the hill Larysium (Koumaro) rising above it. The numerous remains extant, of which the theatre and the buildings partially submerged by the sea are the most note-worthy, all belong to the Roman period.

The modern town is a busy and flourishing port with a good harbour protected by Cranae, now connected by a mole with the mainland: it is the capital of the prefecture (vofws) of AaKuvucr) with a population in 1907 of 61,522.

See G. Weber, De Gytheo et Lacedaemoniorum rebus navalibus (Heidelberg, 1833) ; W. M. Leake, Travels in the Morea, i. 244 foil. ; E. Curtius, Peloponnesos, ii. 267 foil. Inscriptions: Le Bas-Foucart, Voyage archcologique, ii. Nos. 238-248 f. ; Collitz-Bechtel, Sammlung d. griech. Dialekt-Inschriften, iii. Nos. 4562-4573 ; British School Annual, x. 179 foil. Excavations: 'A. 2/aas, Upa/ iTud. t^s 'Apx- 'Ercupdas, 1891, 69 foil. (M. N. T.)

GYULA-FEH_RVAR (Ger. Karlsburg), a town of Hungary, in Transylvania, in the county of Als6-Feher, 73 m. S. of Kolozsvar by rail. Pop. (1900) 11,507. It is situated on the right bank of the Maros, on the outskirts of the Transylvanian Erzgebirge or Ore Mountains, and consists of the upper town, or citadel, and the lower town. Gyula-Fehervar is the seat of a Roman Catholic bishop, and has a fine Roman Catholic cathedral, built in the nth century in Romanesque style, and rebuilt in 1443 by John Hunyady in Gothic style. It contains among other tcmbs that of John Hunyady. Near the cathedral is the episcopal palace, and in the same part of the town is the Batthyaneum, founded by Bishop Count Batthyany in 1794. It contains a valuable library with many incunabula and old manuscripts, amongst which is one of the Nibelungenlied, an astronomical observatory, a collection of antiquities, and a mineral collection. Gyula-Fehervar carries on an active trade in cereals, wine and cattle.

Gyula-Fehervar occupies the site of the Roman colony A pulum. Many Roman relics found here, and in the

vicinity, are preserved in the museum of the town. The bishopric was founded in the nth century by King Ladislaus I. (1078-1095). In the 16th century, when Transylvania separated from Hungary, the town became the residence of the Transylvanian princes. From this period dates the castle, and also the buildings of the university, founded by Gabriel Bethlen, and now used-as barracks. After the reversion of Transylvania in 1 7 13 to the Habsburg monarchy the actual strong fortress was built in 17 16-173 5 by the emperor Charles VI., whence the German name of the town.

H— HAAKON

HThe eighth symbol in the Phoenician alphabet, as in its descendants, has altered less in the course of ages than most alphabetic symbols. From the beginning of Phoenician records it has consisted of two uprights connected by transverse bars, at first either two or three in number. The uprights are rarely perpendicular and the cross bars are not so precisely arranged as they are in early Greek and Latin inscriptions. In these the symbol takes the form of two rectangles Q out of which the ordinary H develops by the omission of the cross bars at top and bottom. It is very excep- tional for this letter to have more than three cross bars, though as many as five are occasionally found in N.W. Greece. Within the same inscription the appearance of the letter often varies considerably as regards the space between and the length of the uprights. When only one bar is found it regularly crosses the uprights about the middle. In a few cases the rectangle is closed at top and bottom but has no middle cross bar D. The Phoenician name for the letter was Heth (Het). According to Semitic scholars it had two values, (1) a glottal spirant, a very strong //, (2) an unvoiced velar spirant like the German ch in ach. The Greeks borrowed it with the value of the ordinary aspirate and with the name fjra. Very early in their history, however, most of the Greeks of Asia Minor lost the aspirate

altogether, and having then no further use for the symbol with this value they adopted it to represent the long e-sound, which was not originally distinguished by a different symbol from the short sound (see E). With this value its name has always been ifra in Greek. The alphabet of the Asiatic Greeks was gradually adopted elsewhere. In official documents at Athens H repre- sented the rough breathing or aspirate ' till 403 B.C.; henceforth it was used for tj. The Western Greeks, however, from whom the Romans obtained their alphabet, retained their aspirate longer than those of Asia Minor, and hence the symbol came to the Romans with the value not of a long vowel but of the aspirate, which it still preserves. The Greek aspirate was itself the first or left-hand half of this letter I" , while the smooth breathing ' was the right-hand portion - I. At Tarentum I" is found for H in inscriptions. The Roman aspirate was, however, a very slight sound which in some words where it was etymologically correct disappeared at an early date. Thus the cognate words of kindred languages show that the Lat. anser " goose " ought to begin with h, but nowhere is it so found. In none of the Romance languages is there any trace of initial or medial h, which shows that vulgar Latin had ceased to have the aspirate by 240 B.C. The Roman grammarians were guided to its presence by the Sabine forms where / occurred; as the Sabines said fasena (sand) , it was recognised that the Roman form ought to be harena, and so for haedus (goat), hordeum (barley), &c. Between vowels h was lost very early, for ne-hemo (no man) is throughout the literature nemo, bi-himus (two winters old) bimus. In the Ciceronian age greater attention was paid to reproducing the Greek aspirates in borrowed words, and this led to absurd mistakes in Latin words, mistakes which were satirized by Catullus in his epigram (84) upon Arrius, who said chommoda for commoda and hinsidias for insidias. In Umbrian h was often lost, and also used without etymological value to mark length, as in comohota (= Lat. commola) , a practice to which there are some doubtful parallels in Latin.

In English the history of h is very similar to that in Latin. While the parts above the glottis are in position to produce a vowel, an aspirate is produced without vibration of the vocal , chords, sometimes, like the pronunciation of Arrius, with considerable effort as a reaction against the tendency to " drop the h's." Though h survives in Scotland, Ireland and America as well as in the speech of cultivated persons, the sound in most of the vulgar dialects is entirely lost. . Where it is not ordinarily lost, it disappears in unaccented syllables, as " Give it 'im " and the like. Where it is lost, conscious attempts to restore it on

the part of uneducated speakers lead to absurd misplacements of h and to its restoration in Romance words when it never was pronounced, as humble (now recognized as standard English), humour and even honour. (P. Gi.)

HAAG, CARL (1820-), a naturalized British painter, court painter to the duke of Saxe-Coburg and Gotha, was born in Bavaria, and was trained in the academies at Nuremburg and Munich. He practised first as an illustrator and as a painter, in oil, of portraits and architectural subjects; but after he settled in England, in 1847, he devoted himself to water colours, and was elected associate of the Royal Society of Painters in Water Colours in 1850 and member in 1853. He travelled much, especially in the East, and made a considerable reputation by his firmly drawn and carefully elaborated paintings of Eastern subjects. Towards the end of his professional career Carl Haag quitted England and returned to Germany.

See A History of the " Old Water-Colour " Society, now the Royal Society of Painters in Water Colours, by John Lewis Roget (2 vols., London, 189 1).

HAAKON (Old Norse H&kon), the name of several kings of Norway, of whom the most important are the following: —

Haakon I., surnamed " the Good " (d. 961), was the

youngest son of Harald Haarfager. He was fostered by King Aethelstan of England, who brought him up in the Christian religion, and on the news of his father's death in 933 provided him with ships and men for an expedition against his half-brother Erik, who had been proclaimed king. On his arrival in Norway Haakon gained the support of the landowners by promising to give up the rights of taxation claimed by his father over inherited real property. Erik fled, and was killed a few years later in England. His sons allied themselves with the Danes, but were invariably defeated by Haakon, who was successful in everything he undertook except in his attempt to introduce Christianity, which aroused an opposition he did not feel strong enough to face. He was killed at the battle of Fitje in 961, after a final victory over Erik's sons. So entirely did even his immediate circle ignore his religion that a court skald composed a poem on his death representing his welcome by the heathen gods into Valhalla.

Haakon IV., surnamed " the Old " (1 204-1 263), was declared to be the son of Haakon III., who died shortly before the former's birth in 1204. A year later the child was placed under the protection of King Inge, after whose death in 12 17 he was chosen king; though until 1223 the church refused to recognize him, on the ground of illegitimacy, and the Pope's dispensation for his coronation was not gained until much later. In the earlier part of his reign much of the royal power was in the hands of Earl Skule, who intrigued against the king until 1239, when he proceeded to open hostility and was put to death. From this time onward Haakon's reign was marked by more peace and prosperity than Norway had known for many years, until in 1263 a dispute with the Scottish king concerning the Hebrides, a Norwegian possession, induced Haakon to undertake an expedition to the west of Scotland. A division of his army seems to have repulsed a large Scottish force at Largs (though the later Scottish accounts claim this battle as a victory),- and, having won back the Norwegian possessions in Scotland, Haakon

was wintering in the Orkneys, when he was taken ill and died on the 1 5th of December 1 263 . A great part of his fleet had been scattered and destroyed by storms. The most important event in his reign was the voluntary submission of the Icelandic commonwealth. Worn out by internal strife fostered by Haakon's emissaries, the Icelandic chiefs acknowledged the Norwegian king as overlord in 1 262. Their example was followed by the colony of Greenland.

Haakon VII. (1872-), the second son of Frederick VIII. , king of Denmark, was born on the 3rd of August 1872, and was usually known as Prince Charles of Denmark. When in 1905 Norway decided to separate herself from Sweden the Norwegians

offered their crown to Charles, who accepted it and took the name of Haakon VII., being crowned at Trondhjem in June 1906. The king married Maud, youngest daughter of Edward VII., king of Great Britain, their son, Prince Olav, being born in 1903.

HAARLEM, a town of Holland in the province of North Holland, on the Spaarne, having a junction station 11 m. by rail W. of Amsterdam. It is connected by electric and steam tramways with Zandvoort, Leiden, Amsterdam and Alkmaar. Pop. (1900) 65,189. Haarlem is the seat of the governor of the province of North Holland, and of a Roman Catholic and a Jansenist bishopric. In appearance it is a typical Dutch town, with numerous narrow canals and quaintly gabled houses. Of the ancient city gates the Spaarnewouder or Amsterdam gate alone remains. Gardens and promenades have taken the place of the old ramparts, and on the south the city is bounded by the Frederiks and the Flora parks, between which runs the fine avenue called the Dreef, leading to the Haarlemmer Hout or wood. In the Frederiks Park is a pump-room supplied with a powerful chalybeate water from a spring, the Wilhelmina- bron, in the Haarlemmer Polder not far distant, and in connexion

with this there is an orthopaedic institution adjoining. In the great market place in the centre of the city are gathered together the larger number of the most interesting buildings, including the quaint old Fleshers' Hall, built by Lieven de Key in 1603, and now containing the archives; the town hall; the old Stadsdoelen, where the burgesses met in arms; the Groote Kerk, or Great Church; and the statue erected in 1856 to Laurenz Janszoon Koster, the printer. The Great Church, dedicated to St Bavo, with a lofty tower (255 ft.), is one of the most famous in Holland, and dates from the end of the 15th and the beginning of the 16th centuries. Its great length (460 ft.) and the height and steepness of its vaulted cedar-wood roof (1538) are very impressive. The choir-stalls and screen (1510) are finely carved, and of further interest are the ancient pulpit sounding-board (1432), some old stained glass,, and the small models of ships, copies dating from 1638 of yet earlier models originally presented by the Dutch-Swedish Trading Company. The church organ was long considered the largest and finest in existence. It was constructed by Christian Muller in 1738, and has 4 keyboards, 64 registers and 5000 pipes, the largest of which is 15 in. in diameter and 32 ft. long. Among the monuments in the church are those of the poet Willem Bilderdyk (d. 1831) and the engineer Frederik Willem Conrad (d. 1808), who designed the sea-sluices at Katwyk. In the belfry are the damiaatjes, small bells presented to the town, according to tradition, by William I., count of Holland (d. 1222), the crusader. The town hall was originally a palace of the counts of Holland, begun in the 12th century, and some old 13th-century beams still remain; but the building was remodelled in the beginning of the 1 7th century. It contains a collection of antiquities (including some beautiful goblets) and a picture gallery which, though small, is celebrated for its fine collection of paintings by Frans Hals. The town library contains several incunabula and an interesting collection of early Dutch literature. At the head of the scientific institutions of Haarlem may be placed the Dutch Society of Sciences (Hol-

land sche Maatschappij van Wetenschappen), founded in 1752, which possesses valuable collections in botany, natural history and geology. Teyler's Stichting (i.e. foundation), enlarged in modern times, was instituted by the will of Pieter Teyler van derHulst (d. 1778), a wealthy merchant, for the study of theology, natural science and art, and has lecture-theatres, a large library, and a museum containing a physical and a geological cabinet, as well as a collection of paintings, including many modern pictures, and a valuable collection of drawings and engravings by old masters. The Dutch Society for the Promotion of Industry (N cderlaandsche Maatschappij ter Bevordering van Nijverheid), founded in 1777, has its seat in the Pavilion Welgelegen, a villa on the south side of the Frederiks Park, built by the Amsterdam banker John Hope in 1778, and afterwards acquired by Louis Bonaparte, king of Holland- The colonial museum and the museum of industrial art were established in thiS villa by the society in 1871 and 1877 respectively. Besides these there

are a museum of ecclesiastical antiquities, chiefly relating to the bishopric of Haarlem; the old weigh -house (1598) and the orphanage for girls (1608), originally an almshouse for old men, both built by the architect Lieven de Key of Ghent.

The staple industries of Haarlem have been greatly modified in the course of time. Cloth weaving and brewing, which once flourished exceedingly, declined in the beginning of the 16th century. A century later, silk, lace and damask weaving were introduced by French refugees, and became very important industries. But about the close of the 18th century this remark- able prosperity had also come to an end, and it was not till aftei the Belgian revolution of 1830-1831 that Haarlem began to develop the manufactures in which it is now chiefly engaged. Cotton manufacture, dyeing, printing, bleaching, brewing, type-founding, and the manufacture of tram and railway carriages are among the more important of its industries. One of the printing establishments has the reputation of being

the oldest in the Netherlands, and publishes the oldest Dutch paper, De Opragte Haarlemmer Courant. Market-gardening, especially horticulture, is extensively practised in the vicinity, so that Haarlem is the seat of a large trade in Dutch bulbs, especially hyacinths, tulips, fritillaries, spiraeas and japonicas.

Haarlem, which was a prosperous place in the middle of the 1 2th century, received its first town charter from William II., count of Holland and king of the Romans, in 1245. It played a considerable part in the wars of Holland with the Frisians. In 1492 it was captured by the insurgent peasants of North Holland, was re-taken by the duke of Saxony, the imperial stadholder, and deprived of its privileges. In 1572 Haarlem joined the revolt of the Netherlands against Spain, but on the 13th of July 1573, after a seven months' siege, was forced to surrender to Alva's son Frederick, who exacted terrible vengeance. In 1 57 7 it was again captured by William of Orange and perman- ently incorporated in the United Netherlands.

See Karl Hegel, Stadte und Gilden (Leipzig, 1891); Allan, Geschie- denis en beschrijving van Haarlem (Haarlem, 1871-1888).

HAARLEM LAKE (Dutch Harlemmer Meer), a commune of the province of North Holland, constituted by the law of the 16th of July 1855. It has an area of about 46,000 acres, and its population increased from 7237 in i860 to 16,621 in 1900. As its name indicates, the commune was formerly a lake, which is said to have been a relic of a northern arm of the Rhine which passed through the district in the time of the Romans. In 1 53 1 the Haarlemmer Meer had an area of 6430 acres, and in its vicinity were three smaller sheets of water — the Leidsche Meer or Leiden Lake, the Spiering Meer, and the Oude Meer or Old Lake, with a united area of about 7600 acres. The four lakes were formed into one by successive inundations, whole villages disappearing in the process, and by 1647 the new Haarlem Lake had an area of about 37,000 acres, which a century later

had increased to over 42,000 acres. As early as 1643 J an Adriaans- zoon Leegh water proposed to endike and drain the lake; and similar schemes, among which those of Nikolaas Samuel Cruquius in 1742 and of Baron van Lijnden van Hemmen in 1820 are worthy of special mention, were brought forward from time to time. But it was not till a furious hurricane in November 1836 drove the waters as far as the gates of Amsterdam, and another on Christmas Day sent them in the opposite direction to sub- merge the streets of Leiden, that the mind of the nation was seriously turned to the matter. In August 1837 the king ap- pointed a royal commission of inquiry; the scheme proposed by the commission received the sanction of the Second Chamber in March 1839, and in the following May the work was begun. A canal was first dug round the lake for the reception of the water and the accommodation of the great traffic which had previously been carried on. This canal was 38 m. in length, 123-146 ft. wide, and 8 ft. deep, and the earth which was taken out of it was used to build a dike from 30 to 54 yds. broad containing the lake. The area enclosed by the canal was rather more than 70 sq. m., and the average depth of the lake 13 ft. ij in., and as the water had no natural outfall it was calculated that probably 1000 million tons would have to be raised by mechanical means.

This amount was 200 million tons in excess of that actually discharged. Pumping by steam-engines began in 1848, and the lake was dry by the 1st of July 1852. At the first sale of the highest lands along the banks on the 16th of August 1853, about £28 per acre was paid; but the average price afterwards was less. The whole area of 42,096 acres recovered from the waters brought in 9,400,000 florins, or about £780,000, exactly covering the cost of the enterprise; so that the actual cost to the nation was only the amount of the interest on the capital, or about £368,000. The soil is of various kinds, loam, clay, sand and peat; most of it is

sufficiently fertile, though in the lower portions there are barren patches where the scanty vegetation is covered with an ochreous deposit. Mineral springs occur containing a very high percentage (3-245 grams per litre) of common salt; and in 1893 a company was formed for working them. Corn, seeds, cattle, butter and cheese are the principal produce. The roads which traverse the commune are bordered by pleasant-looking farm-houses built after the various styles of Holland, Friesland or Brabant. Hoofddorp, Venneperdorp or Nieuw Vennep, Abbenes and the vicinities of the pumping- stations are the spots where the population has clustered most thickly. The first church was built in 1855; in 1877 there were seven. In 1854 the city of Leiden laid claim to the possession of the new territory, but the courts decided in favour of the nation. HAASE, FRIEDRICH (1827-), German actor, was born on the 1st of November 1827, in Berlin, the son of a valet to King Frederick William IV., who became his godfather. He was educated for the stage under Ludwig Tieck and made his first appearance in 1846 in Weimar, afterwards acting at Prague (1849-1851) and Karlsruhe (1852-1855). From i860 to 1866 he played in St Petersburg, then was manager of the court theatre in Coburg, and in 1869 (and again in 1882-1883) visited the United States. He was manager of the Stadt Theater in Leipzig from 1870 to 1876, when he removed to Berlin, where he devoted his energies to the foundation and management of the Deutsches Theater. He finally retired from the stage in 1898. Haase's aristocratic appearance and elegant manner fitted him specially to play high comedy parts. His chief roles were those of Rocheferrier in the Partie Piquet; Richelieu; Savigny in Der feiner Diplomat, and der Furst in Der geheime Agent. He is the author of Ungeschminkte Briefe and Was ich erlebte 1846- 1898 (Berlin, 1898).

See Simon, Friedrich Haase (Berlin, 1898). HAASE, FRIEDRICH GOTTLOB (1808-1867), German classical scholar, was born at Magdeburg on the 4th of January 1808. Having studied at Halle, Greifswald and Berlin, he obtained in 1834 an appointment at

Schulpforta, from which he was suspended and sentenced to six years' imprisonment for identifying himself with the Burschenschaften (students' associa- tions). Having been released after serving one year of his sentence, he visited Paris, and on his return in 1840 he was appointed professor at Breslau, where he remained till his death on the 16th of August 1867. He was undoubtedly one of the most successful teachers of his day in Germany, and exercised great influence upon all his pupils.

He edited several classic authors: Xenophon (AaKtbai^ovluv woXiTtla, 1833); Thucydides (1840); Velleius Paterculus (1858); Seneca the philosopher (2nd ed., 1872, not yet superseded); and Tacitus (1855), the introduction to which is a masterpiece of Latinity. His Vorlesungen uber lateinische Sprachwissenschaft was published after his death by F. A. Eckstein and H. Peter (1874-1880). See C. Bursian, Geschichte der klassischen Philologie in Deutschland (1883) ; G. Fickert, Friderici Haasii memoria (1868), with a list of works; T. Oelsner in Rubezahl {Schlesische Provinzialbldtter), vii. Heft 3 (Breslau, 1868).

HAAST, SIR JOHANN FRANZ JULIUS VON (1824-1887), German and British geologist, was born at Bonn on the 1st of May 1824. He received his early education partly in that town and partly in Cologne, and then entered the university at Bonn, where he made a special study of geology and mineralogy. In 1858 he started for New Zealand to report on the suitability of the colony for German emigrants. He then became acquainted with Dr von Hochstetter, and rendered assistance to him in the preliminary geological survey which von Hochstetter had under-

taken. Afterwards Dr Haast accepted offers from the govern- ments of Nelson and Canterbury to investigate the geology of those districts, and the results of his detailed labours greatly enriched our knowledge with regard to the rocky structure, the glacial phenomena and the economic products. He dis- covered gold and coal in Nelson, and he carried on important researches with reference to the

occurrence of Dinornis and other extinct wingless birds (Moas). His Geology of the Provinces of Canterbury and Westland, N.Z., was published in 1879. He was the founder of the Canterbury museum at Christchurch, of which he became director, and which he endeavoured to render the finest collection in the southern hemisphere. He was surveyor-general of Canterbury from 1861 to 1871, and professor of geology at Canterbury College. He was elected F.R.S. in 1867; and he was knighted for his services at the time of the colonial exhibition in London in 1887. He died at Wellington, N.Z., on the 15th of August 1887.

HABABS (Az-Hibbehs), a nomadic pastoral people of Hamitic stock, living in the coast region north-west of Massawa. Physic- ally they are Beja, by language and traditions Abyssinians. They were Christians until the 19th century, but are now Mahommedans. Their sole wealth consists in cattle.

HABAKKUK, the name borne by the eighth book of the Old Testament " Minor Prophets." It occurs twice in the book itself (i. 1, iii. 1) in titles, but nowhere else in the Old Testament. The meaning of the name is uncertain. If Hebrew, it might be derived from the root pin (to embrace) as an intensive term of affection. It has also been connected more plausibly with an Assyrian plant name, hambakiifcu (Delitzsch, Assyrisches Handworterbuch, p. 281). The Septuagint has 'Afxpamvu. Of the person designated, no more is known than may be inferred from the writing which bears his name. Various legends are connected with him, of which the best known is given in the Apocryphal story of "Bel and the Dragon" (v. 33-39); but none of these has any historic value. 1

The book itself falls into three obvious parts, viz. (1) a dialogue between the prophet and God (i. 2-ii. 4); (2) a series of five woes pronounced on wickedness (ii. 5-ii. 20); (3) a poem describing the triumphant manifestation of God (iii.). There is considerable difficulty in regard to the interpretation of (1), on which that of (2) will

turn; while (3) forms an independent section, to be considered separately.

In the dialogue, the prophet cries to God against continued violence and injustice, though it is not clear whether this is done within or to Israel (i. 2-4). The divine answer declares that God raises up the Chaldaeans, whose formidable resources are invincible (i. 5-11). The prophet thereupon calls God's attention to the tyranny which He apparently allows to triumph, and declares his purpose to wait till an answer is given to his complaint (i. 1 2-ii. 2). God answers by demanding patience, and by declaring that the righteous shall live by his faithfulness (ii. 3-4). The interpretation of this dialogue which first suggests itself is that the prophet is referring to wickedness within the nation, which is to be punished by the Chaldaeans as a divine instrument ; in the process, the tyranny of the instrument itself calls for punishment, which the prophet is bidden to await in patient fidelity. On this view of the dialogue, the subsequent woes will be pronounced against the Chaldaeans, and the date assigned to the prophecy will be about 600 B.C., i.e. soon after the battle of Carchemish (605 B.C.), when the Chaldaean victory over Egypt inaugurated a period of Chaldaean supremacy which lasted till the Chaldaeans themselves were overthrown by Cyrus in 538 B.C. Grave objections, however, confront this interpretation, as is admitted even by such recent defenders of it as Davidson and Driver. Is it likely that a prophet would begin a complaint against Chaldaean tyranny (admittedly central in the prophecy) by complaining of that wickedness of his fellow-countrymen which seems partly to justify it? Are not the terms of reference in

1 These legends are collected in Hastings, D. B. vol. ii. p. 272. He is the watchman of Is. xxi. 6 (cf. Hab. ii. 1); the son of the Shunammite (2 Kings iv. 16) ; and is miraculously lifted by his hair to carry his own dinner to Daniel in the lions' den (supra).

i. 2 f. and 1. 12 f. too similar for the supposition that two distinct, even contradictory, complaints are being made (cf. ” wicked ” and ” righteous ” in i. 4 and i. 13, interchanged in regard to Israel, on above theory)? And if i. 5–11 is a genuine prophecy of the raising up of the Chaldaeans, whence comes that long experience of their rule required to explain the detailed denunciation of their tyranny? To meet the last objection, Davidson supposes i. 5–1 1 to be really a reference to the past, prophetic in form only, and brings down the whole section to a later period of Chaldaean rule, ” hardly, one would think, before the deportation of the people under Jehoiachin in 597 ” (p. 49). Driver prefers to bisect the dialogue by supposing i. 2–1 1 to be written at an earlier period than i. 12 f. (p. 57). The other objections, however, remain, and have provoked a variety of theories from Old Testament scholars, of which three call for special notice. (i)The first of these, represented by Giesebrecht, 1 Nowack and Wellhausen, refers i. 2–4 to Chaldaean oppression of Israel, the same subject being continued in i. 12 f. Obviously, the reference to the Chaldaeans as a divine instrument could not then stand in its present place, and it is accordingly regarded as a misplaced earlier prophecy. This is the minimum of critical procedure required to do justice to the facts. (2) Budde, followed by Cornill, also regards i. 2–4 as referring to the oppression of Israel by a foreign tyrant, whom, however, he holds to be Assyria. He also removes i. 5–1 1 from its present place, but makes it part of the divine answer, following ii. 4. On this view, the Chaldaeans are the divine instrument for punishing the tyranny of the Assyrians, to whom the following woes will therefore refer. The date would fall between Josiah’s reformation (621) and his death (609). This is a plausible and even attractive theory; its weakness seems to lie in the absence of any positive evidence in the prophecy itself, as is illustrated by the fact that even G. A. Smith, who

follows it, suggests ” Egypt from 608-605 ” as an alternative to Assyria (p. 124). (3) Marti (1904) abandons the attempt to explain the prophecy as a unity, and analyses it into three elements, viz. (a) The original prophecy by Habakkuk, consisting of i. 5-10, 14 f., belonging to the year 605, and representing the emergent power of the Chaldaeans as a divine scourge of the faithless people; (6) Woes against the Chaldaeans, presupposing not only tyrannous rule over many peoples, but the beginning of their decline and fall, and therefore of date about 540 B.C. (ii. 5-19); (c) A psalm of post-exilic origin, whose fragments, i. 2-4, 12 a, 13, ii. 1-4, have been incorporated into the present text from the margins on which they were written, its subject being the suffering of the righteous. Each of these three theories 2 encounters difficulties of detail; none can be said to have secured a dominant position. The great variety of views amongst competent critics is significant of the difficulty of the problem, which can hardly be regarded as yet solved; this divergence of opinion perhaps points to the im- possibility of maintaining the unity of chs. i. and ii., and throws the balance of probability towards some such analysis as that of Marti, which is therefore accepted in the present article.

In regard to the poem which forms the third and closing chapter of the present book of Habakkuk, there is much more general agreement. Its most striking characteristic lies in the superscription (” A prayer of Habakkuk the prophet, set to Shigionoth “), the subscription (” For the chief musician, on my stringed instruments “), and the insertion of the musical term ” Selah ” in three places (v. 3, 9, 13). These liturgical notes make extremely probable the supposition that the poem has been taken from some collection like that of our present book of Psalms, probably on the ground of the authorship asserted by the superscription there attached to it. It cannot, however, be said that the poem itself supports this assertion,

_ J Followed by Peake in The Problem of Suffering,

pp. 4 f., 151 f., to whose appendix (A) reference may be made for further details of recent criticism.

– For the less probable theories of Rothstein, Lauterburg, Happel and Peiser (amongst others), cf. Marti's Commentary, pp. 328 f. and 332. Stevenson (Tke Expositor, 1902) states clearly the difficulties for those who regard ch. i. as a unity. He sees two independent sections, 2–4 + 12–13, and 5–11 +14–17.

which carries no more intrinsic weight than the Davidic titles of the Psalms. The poem begins with a prayer that God will renew the historic manifestation of the exodus, which inaugurated the national history and faith; a thunderstorm moving up from the south is then described, in which God is revealed (3–7); it is asked whether this manifestation, whose course is further described, is against nature only (8–1 1) ; the answer is given that it is for the salvation of Israel against its wicked foes (12–15); the poet describes the effect in terror upon himself (16) and declares his confidence in God, even in utter agricultural adversity (17–19). As Wellhausen says (p. 171): "The poet appears to believe that in the very act of describing enthusiastically the ancient deed of deliverance, he brings home to us the new; we are left sometimes in doubt whether he speaks of the past to suggest the new by analogy, or whether he is concerned directly with the future, and simply paints it with the colours of the past." In any case, there is nothing in this fine poem to connect it with the conception of the Chaldaeans as a divine instrument. It is the nation that speaks through the poet (cf. v. 14), but at what period of its post-exilic history we have no means of inferring.

Our estimate of the theological teaching of this book will naturally be influenced by the particular critical theory which is adopted. The reduction of the book to four originally inde- pendent sections requires that the point of each be stated separately. When this is done, it will, however, be found that there is a broad unity of subject, and of

natural development in its treatment, such as to some extent justifies the instinct or the judgment of those who were instrumental in effecting the combination of the separate parts. (1) The poem (iii.), though possibly latest in date, 3 claims first consideration, because it avowedly moves in the circle of primitive ideas, and supplicates a divine intervention, a direct and immediate manifestation of the transcendent God. He is conceived as controlling or overcoming the forces of nature; and though an earlier mythology has supplied some of the ideas, yet, as with the opening chapters of Genesis, they are transfigured by the moral purpose which animates them, the purpose to subdue all things that could frustrate the destiny of God's anointed (v. 13). The closing verses strike that deep note of absolute dependence on God, which is the glory of the religion of the Old Testament and its chief contribution to the spirit of the Gospels. (2) The prophecy of the Chaldaeans as the instruments of the divine purpose involves a different, yet related, conception of the divine providence. The philosophy of history, by which Hebrew prophets could read a deep moral significance into national disaster and turn the flank of resistless attack, became one of the most important elements in the nation's faith. If the world- powers were hard as flint in their dealings with Israel, the people of God were steeled to such moral endurance that each clash of their successive onsets kindled some new flame of devotion. Through the Chaldaeans God worked a work which required centuries of life and literature to disclose its fulness (i. 5). (3) When we turn from this view of the Chaldaeans to the denuncia- tion of their tyranny in " taunt songs " (ii. 5-20), we have simply a practical application of the doctrine of divine government. God being what He is, at once moral and all-powerful, the immoral life is doomed to overthrow, whether the immorality consist in grasping rapacity, proud self-aggrandizement, cruel exaction, exulting triumph or senseless idolatry. (4) Yet, because the doom so often tarries, there arises the problem of the suffering of the innocent

and the upright. How can God look down with tolerance that seems favour on so much that conflicts with His declared will and character ? This is the great problem of Israel, finding its supreme expression for all time in the book of Job (q.v.). In that book the solution of the problem of innocent suffering lies hidden from the sufferer, even to the end, for he is not admitted with the reader to the secret of the prologue; it is the practical solution of faithfulness resting on faith which is offered to us. So here, with the principle of ii. 4, ” the “righteous shall live by his faithfulness.” The different application of these words in the New Testament to ” faith ”

3 Earlier, however, than Ps. lxxvii. 17–20, which is drawn from it.

is well known (Rom. i. 17; Gal. iii. 11; Heb. x. 38) though the difference is apt to be exaggerated by those who forget how much of the element of “W. lies in Paul’s conception of irians. In G. A. Smith’s words, ” as Paul’s adaptation, ‘ the just shall live by faith,’ has become the motto of evangelical Christianity, so we may say that Habakkuk’s original of it has been the motto and the fame of Judaism: ‘ the righteous shall live by his faithfulness.’ ”

The Hebrew text of this impressive and varied book is unfor- tunately corrupt in many places; even so cautious a critic as Driver accepts or favourably notices eighteen textual emendations in the three chapters, and suspects the text in at least seven other cases. For the interpretation of the book in detail, the English reader will find Driver’s commentary (1906) the most useful.

References to earlier literature will be found in the following note- worthy studies of recent date: Davidson, ” Nahum, Habakkuk and Zephaniah,” in Cambridge Bible (1896); Nowack, Die kleinen

Propheten (Hdkr.) (1897); Wellhausen, Die kleinen Propheten 3 (1898); G. A. Smith, "The Book of the Twelve Prophets," in The Expositor's Bible, vol. ii. (1898); Driver, article " Habakkuk " in Hastings' Dictionary of the Bible, vol. ii. pp. 269-272 (1900); Budde, article " Habakkuk " in Ency. Biblica, vol. ii., c. 1921-1928 (1901); Stevenson, "The Interpretation of Habakkuk," in The Expositor (1902), pp. 388-401; Peake, The Problem of Suffering in the Old Testament (1904), pp. 4-1 1 and app. A, " Recent Criticism of Habakkuk"; Marti, Dodekapropheton (K. H. C.) (1904); Driver, " Minor Prophets," vol. ii., in Century Bible (1906); Duhm, Das Buch Habakkuk (Text, tJbersetzung und Efklarung), 1906 (regards the book as a unity belonging to the time of Alexander the Great). MaxL. Margolis discusses the anonymous Greek versionof Habakkuk iii. in a volume of Old Test, and Semitic Studies: in Memory of William Rainey Harper (Chicago, 1908). (H. W. R.*)

HABDALA (lit. " separation "), a Hebrew term chiefly appropriated to ceremonies at the conclusion of Sabbath and festivals, marking the separation between times sacred and secular. On the Saturday night the ceremony consists of three items: (a) benediction over a cup of wine (common to many other Jewish functions); (b) benediction over a lighted taper, of which possibly the origin is utilitarian, as no light might be kindled on the Sabbath day, but the rite may be symbolical; and © benediction over a box of sweet-smelling spices. The origin of the latter has been traced to the bowl of burning spice which in Talnrudic times was introduced after each meal. But here too symbolic ideas must be taken into account. Both the light and the spices would readily fit into the conception of the Sabbath " Over-soul " of the mystics. (I. A.)

HABEAS CORPUS, in English law, a writ issued out of the High Court of Justice commanding the person to whom it is directed to bring the body of a person in his custody before that or some other court for a specified purpose.

There are various forms of the writ, of which the most famous is that known as habeas corpus ad subjiciendum, the well-estab- lished remedy for violation of personal liberty. From the earliest records of the English law no free man could be detained in custody except on a criminal charge or conviction or for a civil debt. That right is expressed in the Great Charter in the words: " Nullus liber homo capiatur vel imprisonetur aut dissaisietur aut utlagetur, aut exuletur aut aliquo modo destruatur nee super eum ibimus nee super eum mittemus, nisi per legale judicium parium suorum, vel per legem terrae." 1 The writ is a remedial mandatory writ of right existing by the common law, i.e. it is one of the extraordinary remedies — such as mandamus, certiorari and prohibitions, which the superior courts may grant. While " of right," it is not " of course," and is granted only on application to the High Court or a judge thereof, supported by a sworn statement of facts setting up at least a probable case of illegal confinement. It is addressed to the person in whose custody another is detained, and commands him to bring his prisoner before the court immediately after the receipt of the writ, together with the day and cause of his being taken and detained, to undergo and receive (ad subjiciendum et recipiendum) whatsoever the court awarding the writ " may consider of concerning him in that behalf."

It is often stated that the writ is founded on the article of the Great Charter already quoted; but there are extant instances 1 See Hallam, Const. Hist. vol. i., c. vii. (12th ed.) p. 384.

of the issue of writs of habeas corpus before the charter. Other writs having somewhat similar effect were in use at an early date, e.g. the writ de odio et alia, used as early as the 12th century to prevent imprisonment on vexatious appeals of felony, and the writ of mainprise (de manucaptione) , long obsolete if not abolished in England but which it was attempted to use in India so late as 1870. In the case of imprisonment on accusation of crime the writ issued from the court of king's bench (or from

the chancery), and on its return the court judged of the legality of the imprison- ment, and discharged the prisoner or admitted him to bail or remanded him to his former custody according to the result of the examination.

By the time of Charles I. the writ was fully established as the appropriate process for checking illegal imprisonment by inferior courts or by public officials. But it acquired its full and present constitutional importance by legislation.

In Darnel's case (1627) the judges held that the command of the king was a sufficient answer to a writ of habeas corpus. The House of Commons thereupon passed resolutions to the contrary, and after a conference with the House of Lords the measure known as the Petition of Right was passed (1627,3 Gar. I. c. i.) which, inter alia, recited (s. 5) that, contrary to the Great Charter and the good laws and statutes of the realm, divers of the king's subjects had of late been imprisoned without any cause shown, and when they were brought up on habeas corpus ad subjiciendum-, and no cause was shown other than the special command of the king signified by the privy council, were never- theless remanded to prison, and enacted " that no freeman in any such manner as is before mentioned be imprisoned or detained." The Petition of Right was disregarded in Selden's case (1629), when it was successfully returned to a habeas corpus that Selden and others were committed by the king's special command " for notable contempts against the king and his government and for stirring up sedition against him." 2 This led to legislation in 1640 by which, after abolishing the Star Chamber, the right to a habeas corpus was given to test the legality of commitments by command or warrant of the king or the privy council. 3

The reign of Charles II. was marked by further progress towards securing the freedom of the subject from wrongful imprisonment. Lord Clarendon was impeached, inter alia, for causing many persons to be imprisoned against law and to be conveyed in

custody to places outside England. In 1668 a writ of habeas corpus was issued to test the legality of an imprisonment in Jersey. Though the authority of the courts had been strengthened by the Petition of Right and the act of 1640, it was still rendered insufficient by reason of the insecurity of judicial tenure, the fact that only the chancellor (a political as well as a legal officer) and the court of king's bench had undoubted right to issue the writ, and the inability or hesitation of the competent judges to issue the writ except during the legal term, which did not cover more than half the year. A series of bills was passed through the Commons between 1668 and 1675, only to be rejected by the other House. In Jenkes's case (1676) Lord Chancellor Nottingham refused to issue the writ in vacation in a case in which a man had been committed by the king in council for a speech at Guildhall, and could get neither bail nor trial. In 1679, but rather in consequence of Lord Clarendon's arbitrary proceedings 4 than of Jenkes's case, a fresh bill was introduced which passed both Houses (it is said the upper House by the counting of one stout peer as ten) and became the famous Habeas Corpus Act of 1679 (31 Car. II. c. 2). The passing of the act was largely due to the experience and energy of Lord . Shaftesbury, after whom it was for some time called. The act, while a most important landmark in the constitutional history of England, in no sense creates any right to personal freedom, but is essentially a procedure act for improving the legal mechan- ism by means of which that acknowledged right may be enforced. s

2 Hallam, Const. Hist. vol. ii., c. viii. (12th ed.) p. 2.

3 Ibid. c. ix. (12th ed.) p. 98.

4 Ibid. vol. iii., c. xiii. (12th ed.) p. 12. 6 Dicey, Law of the Constitution (6th ed.), p. 217.

It declares no principles and defines no rights, but is for practical purposes worth a hundred articles guaranteeing constitutional liberty. 1

In the manner characteristic of English legislation the act is limited to the particular grievances immediately in view and is limited to imprisonment for criminal or supposed criminal matters, leaving untouched imprisonment on civil process or by private persons. It recites that great delays have been used by sheriffs and gaolers in making returns of writs of habeas corpus directed to them; and for the prevention thereof, and the more speedy relief of all persons imprisoned for criminal or supposed criminal matters, it enacts in substance as follows: (1) When a writ of habeas corpus is directed to a sheriff or other person in charge of a prisoner, he must within 3, 10 or 20 days, according to the distance of the place of commitment, bring the body of his prisoner to the court, with the true cause of his detainer or imprisonment — unless the commitment was for treason or felony plainly expressed in the warrant of commitment. (2) If any person be committed for any crime — unless for treason or felony plainly expressed in the warrant — it shall be lawful for such person or persons (other than persons convicted or in execution by legal process) in time of vacation, to appeal to the lord chancellor as a judge, who shall issue a habeas corpus returnable immediately, and on the return thereof shall discharge the prisoner on giving security for his appearance before the proper court — unless the party so committed is detained upon a legal process or under a justice's warrant for a non-bailable offence. Persons neglecting for two terms to pray for a habeas corpus shall have none in vacation. (3) Persons set at large on habeas corpus shall not be recommitted for the same offence unless by the legal order and process of the court having cognizance of the case. (4) A person committed to prison for treason or felony shall, if he requires it, in the first week of the next term or the first day of the next session of oyer and terminer, be indicted in that term or session or else admitted to bail,

unless it appears on affidavit that the witnesses for the crown are not ready; and if he is not indicted and tried in the second term or session after commitment, or if after trial he is acquitted, he shall be discharged from imprisonment. (5) No inhabitant of England (except persons contracting, or, after conviction for felony, electing to be transported) shall be sent prisoner to Scotland, Ireland, Jersey, &c, or any place beyond the seas. Stringent penalties are provided for offences against the act. A judge delaying habeas corpus forfeits £500 to the party aggrieved. Illegal imprisonment beyond seas renders the offender liable in an action by the injured party to treble costs and damages to the extent of not less than £500, besides subjecting him to the penalties of praemunire and to other disabilities. " The great rank of those who were likely to offend against this part of the statute was," says Hallam, " the cause of this unusual severity." Indeed as early as 1591 the judges had complained of the difficulty of enforcing the writ in the case of imprisonment at the instance of magnates of the realm. The effect of the act was to impose upon the judges under severe sanction the duty of protecting personal liberty in the case of criminal charges and of securing speedy trial upon such charges when legally framed; and the improvement of their tenure of office at the revolution, coupled with the veto put by the Bill of Rights on excessive bail, gave the judicature the independence and authority necessary to enable them to keep the executive within the law and to restrain administrative development of the scope or penalties of the criminal law; and this power of the judiciary to control the executive, coupled with the limitations on the right to set up " act of state " as an excuse for infringing individual liberty is the special characteristic of English constitutional law.

It is to be observed that neither at common law nor under the act of 1679 was the writ the appropriate remedy in the case of a person convicted either on indictment or summarily. It properly applied to

persons detained before or without trial or sentence; and for convicted persons the proper remedy was by writs of 1 Dicey, Law of the Constitution (6th ed.), p. 195.

error or certiorari to which a writ of habeas corpus might be used as ancillary.

As regards persons imprisoned for debt or on civil process the writ was available at common law to test the legality of the detention: but the practice in these cases is unaffected by the act of 1679, and is of no present interest, since imprisonment on civil process is almost abolished. As regards persons in private custody, e.g. persons not sui juris detained by those not entitled to their guardianship or lunatics, or persons kidnapped, habeas corpus ad subjiciendum seems not to have been the ordinary common law remedy. The appropriate writ for such cases was that known as de homine replegiando. The use of this writ in most if not all criminal cases was forbidden in 1553; but it was used in the 17th century in a case of kidnapping (Designy's case, 1682), and against Lord Grey for abducting his wife's sister (1682), and in the earl of Banbury's case to recover his wife (1 704) . The latest recorded instance of its use is Trebilcock's case (1736), in which a ward sought to free himself from the custody of his guardian.

Since that date the habeas corpus ad subjiciendum has been used in cases of illegal detention in private custody. In 1758 questions arose as to its application to persons in naval or military custody, including pressed men, which led to the introduction of a bill in parliament and to the consultation by the House of Lords of the judges (see Wilmot's Opinions, p. 77). In the same year the writ was used to release the wife of Earl Eerrers from his custody and maltreatment, and was unsuccessfully applied for by John Wilkes to get back his wife, who was separated from him by mutual agreement. But perhaps the most interesting instances of that period are the case of the negro Somerset (1771), who was released from a claim to hold him as a slave in

England: and that of the Hottentot Venus (1810), where an alien woman on exhibition in England was brought before the court by Zachary Macaulay in order to ascertain whether she was detained against her will.

The experience of the 18th century disclosed defects in the procedure for obtaining liberty in cases not covered by the act of i67y. But it was not till 1816 that further legislation was passed for more effectually securing the liberty of the subject. The act of 1816 (56 Geo. III. c. 100), does not touch cases covered by the act of 1679. It enacts (1) that a writ of habeas corpus shall be issued in vacation time in favour of a person restrained of his liberty otherwise than for some criminal or supposed criminal matter (except persons imprisoned for debt or by civil process); (2) that though the return to the writ be good and sufficient in law, the judge shall examine into the truth of the facts set forth in such return, and if they appear doubtful the prisoner shall be bailed; (3) that the writ shall run to any port, harbour, road, creek or bay on the coast of England, although not within the body of any county. The last clause was intended to meet doubts on the applicability of habeas corpus in cases of illegal detention on board ship, which had been raised owing to a case of detention on a foreign ship in an English port.

It will appear from the foregoing statement that the issue and enforcement of the writ rests on the common law as strengthened by the acts of 1627, 1640, 1679 and 1816, and subject also to the regulations as to procedure contained in the Crown Office Rules, 1906. The effect of the statutes is to keep the courts always open for the issue of the writ. It is available to put an end to all forms of illegal detention in public or private custody. In the case of the Canadian prisoners (1839) it was used to obtain the release of persons sentenced in Canada for participating in the rebellion of 1837, who were being conveyed throughout England in custody on their way to imprisonment in another part of the empire, and it is matter of frequent

experience for the courts to review the legality of commitments under the Extradition Acts and the Fugitive Offenders Act 1 881, of fugitives from the justice of a foreign state or parts of the king's dominions outside the British Islands.

In times of public danger it has occasionally been thought necessary to " suspend " the Habeas Corpus Act 1679 by special and temporary legislation. This was done in 1794 (by an act

annually renewed until 1801) and again in 1817, as to persons arrested and detained by his majesty for conspiring against his person and government. The same course was adopted in Ireland in 1866 during a Fenian rising. It has been the practice to make such acts annual and to follow their expiration by an act of indemnity. In cases where martial law exists the use of the writ is ex hypothesi suspended during conditions amounting to a state of war within the realm or the British possession affected (e.g. the Cape Colony and Natal during the South African War), and it would seem that the acts of courts martial during the period are not the subject of review by the ordinary courts. The so-called " suspension of the Habeas Corpus Act " bears a certain similarity to what is called in Europe " suspending the constitutional guarantees " or " proclaiming a state of siege," but " is not in reality more than suspension of one particular remedy for the protection of personal freedom."

There are various other forms of the writ according to the purpose for which it is granted. Thus habeas corpus ad respondendum is used to bring up a prisoner confined by the process of an inferior court in order to charge him in another proceeding (civil or criminal) in the superior court or some other court. As regards civil proceedings, this form of the writ is now rarely used, owing to the abolition of arrest on mesne process and the

restriction of imprisonment for debt, or in execution of a civil judgment. The right to issue the writ depends on the common law, supplemented by an act of 1802. It is occasionally used for the purpose of bringing a person in custody for debt or on a criminal charge before a criminal court to be charged in respect of a criminal proceeding: but the same result may be obtained by means of an order of a secretary of state, made under s. 11 of the Prison Act 1898, or by the written order of a court of criminal jurisdiction before which he is required to take his trial on indictment (Criminal Law Amendment Act 30 & 31 Vict. c. 35, s.

Other forms are ad satisfaciendum; ad faciendum et recipiendum, to remove intoa superior court proceedingsunderwhichthedcfendant is in custody: ad testificandum, where a prisoner is required as a witness, issued under an act of 1804 (s. 11), which is in practice replaced by orders under s. 11 of the Prison Act 1898 {supra) or the order of a judge under s. 9 °f the Criminal Procedure Act 1853: and ad deliberandum et recipias, to authorize the transfer from one custody to another for purposes of trial, which is in practice super- seded by the provisions of the Prison Acts 1865, 1871 and 1898, and the Criminal Law Amendment Act 1867 (supra).*

The above forms are now of little or no importance; but the procedure for obtaining them and the forms of writ are included in the Crown Office Rules 1906.

Ireland. — The common law of Ireland as to the writs of habeas cordis is the same as that in England. The writ has in past times been issued from the English court of king's bench into Ireland ; but does not now so issue. The acts of 1803 and 1816 already mentioned apply to Ireland. The Petition of Right is not in terms applicable to Ireland. The Habeas Corpus Act 1679 does not apply to Ireland; but its equivalent is supplied by an act of 1781-1782 of the Irish parliament (21 & 22 Geo. III. c. 11). Sec. 16 contains a provision empowering the chief governor and privy council of Ireland by a proclamation under the great seal of Ireland to suspend the act during

such time only as there shall be an actual invasion or rebellion in Ireland; and it is enacted that during the currency of the pro- clamation no judge or justices shall bail or try any person charged with being concerned in the rebellion or invasion without an order from the lord lieutenant or lord deputy and senior of the privy council. In Ireland by an act of 1881 the Irish executive was given an absolute power of arbitrary and preventive arrest on suspicion of treason or of an act tending to interfere with the maintenance of law and order: but the warrant of arrest was made conclusive. This act continued by annual renewals until 1906, when it expired.

Scotland. — The writ of habeas corpus is unknown to Scots law, nor will it issue from English courts into Scotland. Under a Scots act of 1 70 1 (c. 6) provision is made for preventing wrongous imprison- ment and against undue delay in trials. It was applied to treason felony in 1848. The right to speedy trial is now regulated by s. 43 of the Criminal Procedure Scotland Act 1887. These enactments are as to Scotland equivalent to the English Act of 1679. Under the Court of Exchequer Scotland Act 1856 (19 & 20 V. c. 56) provision is made for bringing before the court of session persons and proceed- ings before inferior courts and public officers — which is analogous to the powers to issue habeas corpus in such cases out of the English ■ court of exchequer (now the revenue side of the king's bench division).

British Possessions. — The act of 1 679 expressly applies to Wales, Berwick-on-Tweed, Jersey and Guernsey, and the act of 1816 also extends to the Isle of Man. The court of king's bench has also issued the writ to the king's foreign dominions beyond seas, e.g. to St Helena, and so late as 1861 to Canada (Anderson's case 1861, 30 L.J.Q.B. 129). In consequence of the last decision it was provided

by the Habeas Corpus Act 1862 that no writ of habeas corpus should issue out of England by authority of any court or judge " into any colony or foreign

dominion of the crown where the crown has a law- fully established court of justice having authority to grant or issue the writ and to ensure its due execution in the 'colony' or do- minion " (25 & 26 V. c. 20). The expression •" foreign dominion " is meant to apply to places outside the British Islands, and does not include the Isle of Man or the Channel Islands (see re Brown [1864], 33 L.J.Q.B. 193).

In Australasia and Canada and in most if not all the British possessions whose law is based on the common law, the power to issue and enforce the writ is possessed and is freely exercised by colonial courts, under the charters or statutes creating and regulating the courts. The writ is freely resorted to in Canada, and in 1905, 1906, two appeals came to the privy council from the dominion, one with reference to an extradition case, the other with respect to the right to expel aliens.

Under the Roman-Dutch law as applied in British Guiana the writ was unknown and no similar process existed (2nd report of West Indian law commissioners). But by the Supreme Court Ordinance of 1893 that court possesses (inter alia) all the authorities, powers and functions belonging to or incident to a superior court of record in England, which appears to include the power to issue the writ of habeas corpus. Under the Roman-Dutch law as applied to South Africa free persons appear to have a right to release under a writ de libero homine exhibendo, which closely resembles the writ of habeas corpus, and the procedure described as " manifestation " used in the kingdom of Aragon (Hallam, Middle Ages, vol. ii., c. iv.). The writ of habeas corpus has not been formally adopted or the Habeas Corpus Acts formally extended to South Africa; but in the Cape Colony, under the charter of justice and colonial legislation, the supreme court on petition grants a remedy equivalent to that obtained in England by writ of habeas corpus; and the remedy is sometimes so described (Koke v. Balie, 1879, 9 Buchanan, 45, 64, arising out of a rising in Griqualand). During and after the South African War

of 1899-1902 many attempts were made by this procedure to challenge or review the sentences of courts martial ; see re Fourie (1900), 18 Cape Rep. 8.

The laws of Ceylon being derived from the Roman-Dutch law, the writ of habeas corpus is not indigenous: but, under s. 49 of the Supreme Court Ordinance 1889, the court or a judge has .power to grant and issue " mandates in the nature of writs of habeas corpus." The chartered high courts in India have power to issue and enforce the writ of habeas corpus. The earliest record of its use was in 1775, when it was directed to Warren Hastings. It has been used to test the question whether Roman Catholic religious orders could enter India, and in 1870 an attempt was made thereby to challenge the validity of a warrant in the nature of a lettre de cachet issued by the viceroy (Ind. L. Rep. 6 Bengal, 392, 456, 498), and it has also been applied to settle controversies between: Hindus and missionaries as to the custody of a young convert (R. v. Vaughan, 1870, 5 Bengal, 418), and between a Mahommedan husband and his mother-in-law as to the custody of a girl-wife (Khatija Bibi, 1870, 5 Bengal, 557).

United States. — Before the Declaration of Independence some of the North American colonies had adopted the act of 1679; and the federal and the other state legislatures of the United States have founded their procedure on that act. The common law as to the writ of habeas corpus has been inherited from England, and has been generally made to apply to commitments and detentions of all kinds. Difficult questions, unknown to English law, have arisen from the peculiar features of the American state-system. Thus the constitution provides that " the privilege of the writ of habeas corpus shall not be suspended unless when, in cases of rebellion or invasion, the public safety may require it "; and it has been the subject of much dispute whether the power of suspension under this provision is vested in the president or the congress. The weight of opinion seems to lean to the latter alternative. Again, conflicts have arisen between the courts of

individual states and the courts of the union. It seems that a state court has no right to issue a habeas corpus for the discharge of a person held under the authority of the federal government. On the other hand, the courts of the union issue the writ only in those cases in which the power is expressly conferred on them by the constitution.

Authorities. — Paterson, Liberty of the Subject (1877); Short and Mellor, Crown Practice (1890); American: Church on Habeas Corpus (2nd ed. 1893). (W. F. C.)

HABERDASHER, a name for a tradesman who sells by retail small articles used in the making or wearing of dress, such as sewing cottons or silks, tapes, buttons, pins and needles and the like. The sale of such articles is not generally carried on alone, and a " haberdashery counter " usually forms a department of

drapers' shops. The word, found in Chaucer, and even earlier (131 1), is of obscure origin; the suggestion that it is connected with an Icelandic haprtask, " haversack," is, according to the New English Dictionary, impossible. Haperlas occurs in an early Anglo-French customs list, which includes articles such as were sold by haberdashers, but this word may itself have been a misspelling of " haberdash." The obscurity of origin has left room for many conjectures such as that of Minsheu that " haber- dasher " was perhaps merely a corruption of the German Habt ihr das? " Have you that?" or Habe das, Herr, " Have that, sir," used descriptively for a general dealer in miscellaneous wares. The Haberdashers' Company is one of the greater Livery Companies of the City of London. Originally a branch of the mercers, the fraternity took over the selling of " small wares," which included not only articles similar to those sold as " haber- dashery " now, but such things as gloves, daggers, glass, pens,

lanterns, mousetraps and the like. They were thus on this side connected with the Milliners. On the other hand there was early a fusion with the old gild of the " Hurers," or cap makers, and the hatters, and by the reign of Henry VII. the amalgama- tion was complete. There were long recognized two branches of the haberdashers, the haberdashers of " small wares," and the haberdashers of hats (see further Livery Companies). The haberdashers are named, side by side with the .capellarii, in the White Book {Liber Albus) of the city of London (see Muni- menta Gildhallae Londiniensis, ed. H. T. Riley, Rolls Series, 12, 1850-186-2), and a haberdasher forms one of the company of pilgrims in the Canterbury Tales (Prologue, 361).

HABINGTON, WILLIAM (1605-1654), English poet, was born at Hfendlip Hall, Worcestershire, on the 4th of November 1605. He belonged to a well-known Catholic family. His father, Thomas Habington (1560-1647), an antiquary and historical scholar, had been implicated in the plots on behalf of Mary queen of Scots; his uncle, Edward Habington, was hanged in 1586 on the charge of conspiring against Elizabeth in connexion with Anthony Babington; while to his mother, Mary Habington, was attributed the revelation of the Gunpowder Plot. The poet was sent to the college at St Omer, but, pressure being brought to bear on him to induce him to become a Jesuit, he removed to Paris. He married about 1632 Lucy, second daughter of Sir William Herbert, first Baron Powys. This lady he had addressed in the volume of lyrical poems arranged in two parts and entitled Castara, published anonymously in 1634. In 1635 appeared a second edition enlarged by three prose characters, fourteen new lyrics and eight touching elegies on his friend and kinsman, George Talbot. The third edition (1640) contains a third part consisting of a prose character of " A Holy Man " and twenty- two devotional poems. Habington's lyrics are full of the far- fetched " conceits " which were fashionable at court, but his verse is quite free from the prevailing looseness of morals. Indeed his reiterated praises of Castara's virtue

grow wearisome. He is at his best in his reflective poems on the uncertainty of human life and kindred topics. He also wrote a Historie of Edward the Fourth (1640), based on notes provided by his father; a tragi-comedy, TheQueene of Arragon (1640), published without his consent by his kinsman, the earl of Pembroke, and revived at the Restoration; and six essays on events in modern history, Observations upon History (1641). Anthony a Wood insinuated that during the Commonwealth the poet "did run with the times, and was not unknown to Oliver the usurper." He died on the 30th of November 1654.

The works of Habington have not been collected. The Queene of Arragon was reprinted in DodsleyV'Old Plays," vol. ix. (1825) ; Castara was edited by Charles Elton (1812), and by E. Arber with a compact and comprehensive introduction (1870) for his " English Reprints."

HABIT (through the French from Lat. habitus, from habere, to have, hold, or, in a reflective sense, to be in a certain condition; in many of the English senses the French use habitude, not habit), condition of body or mind, especially one that has become permanent or settled by custom or persistent repetition, hence custom, usage. In botany and zoology the term is used both in the above sense of instinctive action of animals and tendencies

of plants, and also of the manner of growth or external appear- ance of a plant or animal. From the use of the word for external appearances comes its use for fashion in dress, and hence as a term for a lady's riding dress and for the particular form of garment adopted by the members of a religious order, like " cowl " applied as the mark of a monk or nun.

HABITAT (a French word derived from habiter, Lat. habitare, to dwell), in botany and zoology, the term for the locality in which a particular species of plants or animals thrives.

HABSBURG, or Hapsburg, the name of the famous family

from which have sprung the dukes and archdukes of Austria from 1282, kings of Hungary and Bohemia from 1526, and emperors of Austria from 1804. They were also Roman emperors and German kings from 1438 to 1806, and kings of Spain from 1 5 16 to 1700, while the minor dignities held by them at different times are too numerous to mention.

The name Habsburg, a variant of an older form, Habichtsburg (hawk's castle), was taken from the castle of Habsburg, which was situated on the river Aar not far from its junction with the Rhine. The castle was built about 1020 by Werner, bishop of Strassburg, and his brother, Radbot, the founder of the abbey of Muri. These men were grandsons of a certain Guntram, who, according to some authorities, is identical with a Count Guntram who flourished during the reign of the emperor Otto the Great, and whose ancestry can be traced back to the time of the Mero- vingian kings. This conjecture, however, is extremely pro- blematical. Among Radbot's sons was one Werner, and Werner and his son Otto were called counts of Habsburg, Otto being probably made landgrave of upper Alsace late in the nth or early in the 12th century. At all events Otto's son Werner (d. 1167), and the latter's son Albert (d. 1199), held this dignity, and both landgraves increased the area of the Habsburg lands. Albert became count of Zurich and protector of the monastery of Sackingen, and obtained lands in the cantons of Unterwalden and Lucerne; his son Rudolph, having assisted Frederick of Hohenstaufen, afterwards the emperor Frederick II., against the emperor Otto IV., received the county of Aargau. Both counts largely increased their possessions in the districts now known as Switzerland and Alsace, and Rudolph held an influential place among the Swabian nobility. After his death in 1232 his two sons, Albert and Rudolph, divided his lands and founded the lines of Habsburg-Habsburg and Habsburg-Laufenburg. Rudolph's descendants, counts of Habsburg-Laufenburg, were soon divided into two branches, one of which became extinct in 1408 and the other seven years later. Before this date, however, Laufenburg and some other

districts had been sold to the senior branch of the family, who thus managed to retain the greater part of the Habsburg lands.

Rudolph's brother Albert (d. 1239), landgrave of Alsace, married Hedwig of Kyburg (d. 1260), and from this union there was born in 12 18 Rudolph, the founder of the greatness of the house of Habsburg, and the first of the family to ascend the German throne. Through his mother he inherited a large part of the lands of the extinct family of Zahringen; he added in other ways to his possessions, and was chosen German king in September 1 2 73 . Acting vigorously in his new office, he defeated and killed his most formidable adversary, Ottakar II., king of Bohemia, in 1278, and in December 1282 he invested his sons, Albert and Rudolph, with the duchies of Austria and Styria, which with other lands had been taken from Ottakar. This was an event of supreme moment in the history of the Habsburgs, and was the first and most important stage in the process of transferring the centre of their authority from western to eastern Europe, from the Rhine to the Danube. On Rudolph's death in July 1291 the German crown passed for a time away from the Habsburgs, but in July 1298 it was secured by his son, Albert, whose reign, however, was short and uneventful. But before 1308, the year of Albert's death, the long and troubled connexion of the Habsburgs with Bohemia had already begun. In 1306 Wenceslas III., the last Bohemian king of the Pfemyslide dynasty, was murdered. Seizing the opportunity and declaring that the vacant kingdom was an imperial fief, King Albert

bestowed it upon his eldest son, Rudolph, and married this prince to Elizabeth, widow of Wenceslas II. and stepmother of Wenceslas III. But Rudolph died in 1307, and his father's attempt to keep the country in his own hands was ended by his murder in 1308.

Albert's successor as German king was Henry of Luxemburg (the emperor Henry VII.), and this election may be said to initiate the long rivalry between the houses of Habsburg and Luxemburg. But the immediate enemy of the Habsburgs was not a Luxemburg but a Wittelsbach. Without making any definite partition, Albert's five remaining sons spent their time in governing their lands until 1314, when one of them, Frederick called the Fair, forsook this comparatively uneventful occupation and was chosen by a minority of the electors German king in succession to Henry VII. At the same time the Wittelsbach duke of Bavaria, Louis, known to history as the emperor Louis the Bavarian, was also chosen. War was inevitable, and the battle of Muhldorf, fought in September 1322, sealed the fate of Frederick. Louis was victorious: his rival went into an honourable captivity, and the rising Habsburg sun underwent a temporary eclipse.

For more than a century after Frederick's death in 1330 the Habsburgs were exiles from the German throne. But they were not inactive. In 1335 his two surviving brothers, Albert and Otto, inherited Carinthia and part of Carniola by right of their mother, Elizabeth; in 1363 Albert's son Rudolph received Tirol; and during the same century part of Istria, Trieste and other districts were acquired. All King Albert's six sons had died without leaving male issue save Otto, whose family became extinct in 1344, and Albert, the ancestor of all the later Habs- burgs. Of Albert's four sons two also left no male heirs, but the remaining two, Albert III. and Leopold III., were responsible for a division of the family which is of some importance. By virtue of a partition made upon their brother Rudolph's death in 1365 Albert and his descendants ruled over Austria, while Leopold and his sons took Styria, Carinthia and Tirol, Alsace remaining undivided as heretofore.

Towards the middle of the 15th century the German throne had been occupied for nearly a hundred years by members of the Luxemburg family. The reigning emperor Sigismund, who was also king of Hungary and Bohemia, was without sons, and his daughter

Elizabeth was the wife of Albert of Habsburg, the grandson and heir of Duke Albert III., who had died in 1395. Sigismund died in December 1437, leaving his two kingdoms to his son-in-law, who was crowned king of Hungary in January

1438 and king of Bohemia in the following June. Albert was also chosen and crowned German king in succession to Sigismund, thus beginning the long and uninterrupted connexion of his family with the imperial throne, a connexion which lasted until the dissolution of the Holy Roman Empire in 1806. He did not, however, enjoy his new dignities for long, as he died in October

1439 while engaged in a struggle with the Turks. Albert left no sons, but soon after his death one was born to him, called Ladislaus, who became duke of Austria and king of Hungary and Bohemia. Under the guardianship of his kinsman, the emperor Frederick III., the young prince's reign was a troubled one, and when he died unmarried in 1457 his branch of the family became extinct, and Hungary and Bohemia passed away from the Habsburgs, who managed, however, to retain Austria.

Leopold III., duke of Carinthia and Styria, who was killed in 1386 at the battle of Sempach, had four sons, of whom two only, Frederick and Ernest, left male issue. Frederick and his only son, Sigismund, confined their attention mainly to Tirol and Alsace, leaving the larger destinies of the family in the hands of Ernest of Carinthia and Styria (d. 1424) and his sons, Frederick and Albert and after the death of King Ladislaus in 1457 these two princes and their cousin Sigismund were the only representatives of the Habsburgs. In February 1440 Frederick of Styria was chosen German king in succession to his kinsman Albert. He was a weak and incompetent ruler, but a stronger and abler man might have shrunk from the task of administering his heterogeneous and unruly realm. Although very important

in the history of the house of Habsburg, Frederick's

long reign was a period of misfortune, and the motto which he assumed, A.E.I.O.U. (Austriae est imperare orbi universo), seemed at the time a particularly foolish boast. He acted as guardian both to Ladislaus of Hungary, Bohemia and Austria, and to Sigismund of Tirol, and in all these countries his difficulties were increased by the hostility of his brother Albert. Having disgusted the Tirolese he gave up the guardianship of their prince in 1446, while in Hungary and Bohemia he did absolutely nothing to establish the authority of his ward; in 1452 the Austrians besieged him in Vienna Neustadt and compelled him to surrender the person of Ladislaus, thus ending even his nominal authority. When the young king died in 1457 the Habsburgs lost Hungary and Bohemia, but they retained Austria, which, after some disputing, Frederick and Albert divided between themselves, the former taking lower and the latter upper Austria. This arrangement was of short duration. In 1461 Albert made war upon his brother and forced him to resign lower Austria, which, however, he recovered after Albert's death in December 1463. Still more unfortunate was the German king in Switzerland. For many years the Swiss had chafed under the rule of the Habs- burgs; during the reign of Rudolph I. they had shown signs of resentment as the kingly power increased; and the struggle which had been carried on for nearly two centuries had been almost uniformly in their favour. It was marked by the victory of Morgarten over Duke Leopold I. in 1315, and by that of Sempach over Leopold III. in 1386, by the conquest of Aargau at the instigation of the emperor Sigismund early in the 15th century, and by the final struggle for freedom against Frederick III. and Sigismund of Tirol. Taking advantage of some dissensions among the Swiss, the king saw an opportunity to recover his lost lands, and in 1443 war broke out. But his allies, the men of Zurich, were defeated, and when in August 1444 some French mercenaries, who had advanced to his aid, suffered the same fate at St Jakob, he was compelled to give up the struggle. A few years later Sigismund became involved in a war with the same formidable foemen; he too was worsted,

and the ” Per- petual Peace ” of 1474 ended the rule of the Habsburgs in Switzerland. This humiliation was the second great step in the process of removing the Habsburgs from western to eastern Europe. In 14S3, just after his coronation as emperor at Rome, Frederick legalized the use of the title archduke, which had been claimed spasmodically by the Habsburgs since 1361. This title is now peculiar to the house of Habsburg.

The reverses suffered by the Habsburgs during the reign of Frederick III. were many and serious, but an improvement was at hand. The emperor died in August 1493, and was followed on the imperial throne by his son Maximilian I., perhaps the most versatile and interesting member of the family. Before his father’s death Maximilian had been chosen German king, or king of the Romans, and had begun to repair the fortunes of his house. He had married Mary, daughter and heiress of Charles the Bold, duke of Burgundy; he had driven the Hun- garians from Vienna and the Austrian archduchies, which Frederick had, perforce, allowed them to occupy; and he had received Tirol on the abdication of Sigismund in 1490. True it is that upon Mary’s death in 1482 part of her inheritance, the rich and prosperous Netherlands, held that her husband’s authority was at an .end, while another part, the two Burgundies and Artois, had been seized by the king of France; nevertheless, after a protracted struggle the German king secured almost the whole of Charles the Bold’s lands for his son, the archduke Philip, the duchy of Burgundy alone remaining in the power of France after the conclusion of the peace of Senlis in 1493. Maximilian completed his work by adding a piece of Bavaria, Gorz and then Gradiska to the Habsburg lands.

After Sigismund’s death in 1496 Maximilian and Philip were the only living male members of the family. Philip married Joanna, daughter of Ferdinand and Isabella of Spain, and died in 1506 leaving two sons, Charles and Ferdinand. Charles succeeded his father in the Netherlands; he followed one grand- father, Ferdinand, as king of Spain in 1516, and

when the other,

Maximilian, died in 1519 he became the emperor Charles V., and succeeded to all the hereditary lands of the Habsburgs. But provision had to be made for Ferdinand, and in 1521 this prince was given the Austrian archduchies, Austria, Styria, Carinthia and Carniola; in the same year he married Anne, daughter of Wladislaus, king of Hungary and Bohemia, and when his childless brother-in-law, King Louis, was killed at the battle of Mohacs in August 1526 he claimed the two kingdoms, both by right of his wife and by treaty. After, a little trouble Bohemia passed under his rule, but Hungary was more recal- citrant. A long war took place between Ferdinand and John Zapolya, who was also crowned king of Hungary, but in 1538 a treaty was made and the country was divided, the Habsburg prince receiving the western and smaller portion. However, he was soon confronted with a more formidable foe, and he spent a large part of his subsequent life in defending his lands from the attacks of the Turks.

The Habsburgs had now reached the summit of their power. The prestige which belonged to Charles as head of the Holy Roman Empire was backed by the wealth and commerce of the Netherlands and of Spain, and by the riches of the Spanish colonies in America. In Italy he ruled over Sardinia, Naples and Sicily, which had passed to him with Spain, and the duchy of Milan, which he had annexed in 1535; to the Netherlands he had added Friesland, the bishopric of Utrecht, Groningen and Gelderland, and he still possessed Franche-Comte and the fragments of the Habsburg lands in Alsace and the neighbour- hood. Add to this Ferdinand's inheritance, the Austrian arch- duchies and Tirol, Bohemia with her dependent provinces, and a strip of Hungary, and the two brothers had under their sway a part of Europe the extent of which was great, but the wealth and importance of which were immeasurably greater. Able

to scorn the rivalry of the other princely houses of Germany, the Habsburgs saw in the kings of the house of Valois the only foemen worthy of their regard.

When Charles V. abdicated he was succeeded as emperor, not by his son Philip, but by his brother Ferdinand. Philip became king of Spain, ruling also the Netherlands, Franche-Comte, Naples, Sicily, Milan and Sardinia, and the family was definitely divided into the Spanish and Austrian branches. For Spain and the' Spanish Habsburgs the 17th century was a period of loss and decay, the seeds of which were sown during the reign of Philip II. The northern provinces of the Netherlands were lost practically in 1609 and definitely by the treaty of Westphalia in 1648; Roussillon and Artois were annexed to France by the treaty of the Pyrenees in 1659, while Franche-Comte and a number of towns in the Spanish Netherlands suffered a similar fate by the treaty of Nijmwegen in 1678. Finally Charles II., the last Habsburg king of Spain, died childless in November 1700, and his lands were the prize of the War of the Spanish Succession. The Austrian Habsburgs fought long and valiantly for the kingdom of their kinsman, but Louis XIV. was too strong for them, and by the peace of Rastatt Spain passed from the Habsburgs to the Bourbons. However, the Austrian branch of the family received in 1714 the Italian possessions of Charles II., except Sicily, which was given to the duke of Savoy, and also the southern Netherlands, which are thus often referred to as the Austrian Netherlands; and retained the duchy of Mantua, which it had seized in 1708.

Ferdinand I., the founder of the line of the Austrian Habs- burgs, arranged a division of his lands among his three sons before his death in 1564. The eldest, Maximilian II., received Austria, Bohemia and Hungary, and succeeded his father as emperor; he married Maria, a daughter of Charles V., and though he had a large family his male line became extinct in 1619. The younger sons were Ferdinand, ruler of Tirol, and Charles, archduke of Styria. The emperor Maximilian II. left five sons, two of whom, Rudolph and Matthias, succeeded in turn

to the imperial throne, but, as all the brothers were without male issue, the family was early in the 17th century threatened with a serious crisis. Rudolph died in 161 2, the reigning emperor Matthias was old and ill, and the question of the succession to

the Empire, to the kingdoms of Hungary and Bohemia, and to the hereditary lands of the Habsburgs became acute. Turning to the collateral branches of the family, the sons of the archduke Ferdinand were debarred from the succession owing to their father's morganatic marriage with Philippine Welser, and the only hope of the house was in the sons of Charles of Styria. To prevent the Habsburg monarchy from falling to pieces the emperor's two surviving brothers renounced their rights, and it was decided that Ferdinand, a son of Charles of Styria, should succeed his cousin Matthias. The difficulties which impeded the completion of this scheme were gradually overcome, and the result was that when Matthias died in 1619 the whole of the lands of the Austrian Habsburgs was united under the rule of the emperor Ferdinand II. Tirol, indeed, a few years later was separated from the rest of the monarchy and given to the emperor's brother, the archduke Leopold, but this separation was ended when Leopold's son died in 1665.

The arbitrary measures which followed Ferdinand's acquisition of the Bohemian crown contributed to the outbreak of the Thirty Years' War, but in a short time the Bohemians were subdued, and in 1627, following a precedent set in 1547, the emperor declared the throne hereditary in the house of Habsburg. The treaty of Westphalia which ended this war took compara- tively little from the Habsburgs, though they ceded Alsace to France; but the Empire was greatly weakened, and its ruler was more than ever compelled to make his hereditary lands in the east of Europe the base of his authority, finding that he derived more strength from his position as archduke of Austria than from that of emperor. Ferdinand III. succeeded his father Ferdinand II., and during the long reign of the former's son,

Leopold I., the Austrian, like the Spanish, Habsburgs were on the defensive against the aggressive policy of Louis XIV., and in addition they had to withstand the assaults of the Turks. In two ways they sought to strengthen their position. The unity of the Austrian lands was strictly maintained, and several marriages kept up a close and friendly connexion with Spain. A series of victories over the sultan during the later part of the 17th century rolled back the tide of the Turkish advance, and the peace of Karlowitz made in 1699 gave nearly the whole of Hungary to the Habsburgs. Against France Austria was less suc- cessful, and a number of humiliations culminated in 1714 in the failure to secure Spain, to which reference has already been made. The hostility of Austria and France, or rather of Habsburg and Bourbon, outlived the War of the Spanish Succession. In 1 71 7 Spain conquered Sardinia, which was soon exchanged by Austria for Sicily; other struggles and other groupings of the European powers followed, and in 1735, by the treaty of Vienna, Austria gave up Naples and Sicily and received the duchies of Parma and Piacenza. These surrenders were doubtless inevit- able, but they shook the position of the house of Habsburg in Italy. However, a domestic crisis was approaching which threw Italian affairs into the shade. Charles VI., who had succeeded his brother, Joseph I., as emperor in 171 1, was without sons, and his prime object in life was to secure the succession of his elder daughter, Maria Theresa, to the whole of his lands and dignities. But in 1 7 13, four years before the birth of Maria Theresa, he had first issued the famous Pragmatic Sanction, which declared that the Habsburg monarchy was indivisible and that in default of male heirs a female could succeed to it. Then after the death of his only son and the birth of Maria Theresa the emperor bent all his energies to securing the acceptance of the Pragmatic Sanction. Promulgated anew in 1724, it was formally accepted by the estates of the different Habsburg lands; in 1731 it was guaranteed by the imperial diet. By subordinating every other interest to this, Charles at length procured the assent of

the various powers of Europe to the proposed arrangement; he married the young princess to Francis Stephen, duke of Lorraine, afterwards grand-duke of Tuscany, and when he died on the 20th of October 1740 he appeared to have realized his great ambition. With the emperor's death the house of Habsburg, strictly speaking, became extinct, its place being taken by the house of Habsburg-Lorraine, which sprang from the union of

<

OS

OS

o

I

o

OS

£>

CQ

co

CQ

<

s

O

W in

O

a

H

b O

J

CQ

<

H

<

U

o o

<

w z w o

c aa

_o

"o U

l. o O 00

u T

a; 10

.IT 00 _ O i-

•01

300

0S£

- o

co

Coo

CO co

OS oo

- c I Km

co

OS

5 on .2 J>

lo°°

On

4J ON

«<>

D M

-c I

to C cu •V O

ONO

XI ^^

r- "H

b

x>

00

o°o ■$■■

aj

CO

•Jo c to

— «) 00

c ►-<

fcoo b£

5 ^

co *n :CCo3

- E

to

>-3£

l-i m t*-

b-£.£.

3

x>

a on 5 oo

XI ON C ■*

cooo

CO

- c .

>-o £

.2^ioo

- u^i v

go*

Ll cu oo

^-M «

3^

•a

co

_c H

03

1)

E n

o !-■

o

ao

C ON

J3 ►

a—

^,

J

00

,_c

io

>nco

COO

- o «

*-> 1

M *~^

C O

3 m

<°°

— "en Os

«5

3

4->

JO

f^

»o

- " i —

a

o

3 /del>

3 1^

7"

— <

00

o no

o

CO

"— >t-

►— ,

rO

J3

1^

OO

a-Q

in

"o

u>

O

•—l

_H *°

XI on •-4 tN.

J3 M

o

t— 1

'

,^

r->.

W3 *3"

O 00

b 7-

_^00 u: i-i

3*0

o

n»

J

00

ffl

I

_0J

CO rO

03°0

X

u

O

CJ

a

x,

•2 Si :3 oo

— 6*0 7

55 a

E

■£'£

w 3 w

_ ";oo tn o ^ ■

03 OJ ¯

,<- a

■a c

03

b i

00

en i-h ^ioo

03 ~—

U

- en On ^ CD 00

2*-J no

_.H »oo

xi <" M

fe J=N^ U

o S 1

T3

c

0)

c

SnO

OJ3

03

1)

- bfi°3

3

J3

-CD

oo-

CU

03

U

CU

03 Ov ;2. oo

-M o\

E M O lO

aoo

a o

.i5 CO ---- _ U l>NO CUf_H 10_

X r ^ 00

CU •—! *M

b cU-Q

3

T3

03 ON —Coo

U «

Oj3

<00

se

J3 U

.8 on

<

U

CO

3

H

M-l

o

CU XJ C4

S i -

d ON ^ \T!1

XI

c

03

c

CO^v

•M O 3 >^

■^ «

03 On J- 1^

bo hi

o

a o

c

CU bo

3 .

C On

3 . 65.

J3

a

en ^

Coo _ u

CO

u

03 M > On

fi h- CO | en On CU cc

~« CO^,

u

CO^O

> ON

*3°°

_ 15 -,

co |

CU 00

^3 HI

-CO oo -

2£.

o

•

>

cO

^t-

I/I

o

^j

ON

c

M

CO

"3 on

CO o*

'oo

' CU HI

1 u o

V

J3

^-5

CO ON CO oo

CU-Q

03

CO^ en co

cu c^ •Coo

03 ″

J3 .

a

cu

O

o

en

ON

CJ

c

CO

-u

_COOO

CO i-i

■ 2j3

O J

c

CO . CJ

>cn

3

I C^n CO

CO °00

I C CU HI -

"B 3J2

CU X! *-^ fex!

C

CO

u

bo

- On Q.00

"oo

OS oo

XI

c

CO C

, cu ^

H^ b_|

X)

c

CO

"3 S"

u t^

- cuoo- b hi

cu;

fU

cu '

o

2-K

O ON

- aoo o « u .

JJ2

^00 « .

CO^ - '

os

X!

e

CO

c -fe

1

Maria Theresa and Francis Stephen; and it is interesting to note that the present Habsburgs are only descended in the female line from Rudolph I. and Maximilian I.

Immediately after the death of Charles the Pragmatic Sanction was forgotten. A crowd of claimants called for various parts of the Habsburg lands; Frederick the Great, talking less but acting more, invaded and conquered Silesia, and it seemed likely that the dissolution of the Habsburg monarchy would at no long interval follow the extinction of the Habsburg race. A Wittels- bach prince, Charles Albert, elector of Bavaria, the emperor Charles VII., and not Francis Stephen, was chosen emperor in January 1742, and by the treaty of Breslau, made later in the same year, nearly all Silesia was formally surrendered to Prussia. But the worst was now over, and when in 1748 the peace of Aix-la-Chapelle, which practically confirmed the treaty of Breslau, had cleared away the dust of war, Maria Theresa and her consort were found to occupy a strong position in Europe. In the first place, in September 1745, Francis had been chosen emperor; then the imperial pair ruled Hungary and Bohemia, although the latter kingdom was shorn of Silesia; in spite of French conquests the Austrian Netherlands remained in their hands; and in Italy Francis had added Tuscany to his wife's heritage, although Parma and Piacenza had been surrendered to Spain and part of Milan to the king of Sardinia, The diplo- matic volte-face and the futile attempts of Maria Theresa to recover Silesia which followed this treaty belong to the

general history of Europe.

The emperor Francis I. died in 1765 and was succeeded by his son Joseph II., an ambitious and able prince, whose aim was to restore the Habsburgs and the Empire to their former great positions in Europe, and whose pride did not prevent him from learning from Frederick the Great,- the despoiler of his house. His projects, however, including one of uniting Bavaria with Austria, which was especially cherished, failed completely, and when he died in February 1790 he left his lands in a state of turbulence which reflected the general condition of Europe. The Netherlands had risen against the Austrians, and in January 1790 had declared themselves independent; Hungary, angered by Joseph's despotic measures, was in revolt, and the other parts of the monarchy were hardly more contented. But the 18th century saw a few successes for the Habsburgs. In 1 7 1 8 a success- ful war with Turkey was ended by the peace of Passarowitz, which advanced the Austrian boundary very considerably to the east, and although by the treaty of Belgrade, signed twenty-one years later, a large part of this territory was surrendered, yet a residuum, the banate of Temesvar, was permanently incor- porated with Hungary. The struggle over the succession to Bavaria, which was concluded in 1779 by the treaty of Teschen, was responsible for adding Innviertel, or the quarter of the Inn, to Austria; the first partition of Poland brought eastern Galicia and Lodomeria, and in 1777 the sultan ceded Bukovina. Joseph II. was followed by his brother, Leopold II., who restored the Austrian authority in the Netherlands, and the latter by his son Francis II., who resigned the crown of the Holy Roman Empire in August 1806, having two years before taken the title of emperor of Austria as Francis I.

Before the abdication of the emperor Francis in 1806 Austria had met and suffered from the fury of revolutionary France, but the cessions of territory made by her at the treaties of Campo Formio (1797), of Luneville (1801) and of Pressburg (1805) were of no enduring importance. This, however, cannot be

said for the treaties of Paris and of Vienna, which in 1814 and 1 81 5 arranged the map of Europe upon the conclusion of the Napoleonic wars. These were highly favourable to the Habsburgs. In eastern and central Europe Austria regained her former position, the lands ceded to Bavaria and also eastern Galicia, which had been in the hands of Russia since 1809, being restored; she gave up the Austrian Netherlands, soon to be known as Belgium, to the new kingdom of the Netherlands, and acquiesced in the arrangement which had taken from her the Breisgau and the remnant of the Habsburg lands upon the Rhine. In return for these losses Austria became the dominant

power in Italy. A mass of northern Italy, including her former possessions in Milan and the neighbourhood, and also the lands recently forming the republic of Venice, was made into the kingdom of Lombardy-Venetia, and this owned the emperor of Austria as king. Across the Adriatic Dalmatia was added to the Habsburg monarchy, the population of which, it has been estimated, was increased at this time by over four millions.

The illiberal and oppressive character of the Austrian rule in Italy made it very unpopular; it was hardly less so in Hungary and Bohemia, and the advent of the year 1848 found the subject kingdoms eager to throw off the Habsburg yoke. The whole monarchy was quickly in a state of revolution, in the midst of which the emperor Ferdinand, who had succeeded his father Francis in 1835, abdicated, and his place was taken by his young nephew Francis Joseph. The position of the Habsburg monarchy now seemed desperate. But it was strong in its immemorial tradition, which was enough to make the efforts of the Frankfort parliament to establish German unity under Prussian hegemony abortive; it was strong also in the general loyalty to the throne of the imperial army; and its counsels were directed by statesmen who knew well how to exploit in the interests of the central power the national rivalries within the monarchy. With the crushing of the Hungarian revolt by the emperor Nicholas I. of

Russia in 1849 the monarchy was freed from the most formidable of its internal troubles; in 1850 the convention of Olmiitz restored its influence in Germany.

Though the status quo was thus outwardly re-established, the revolutions of 1848 had really unchained forces which made its maintenance impossible. In Germany Prussia was steadily pre-paring for the inevitable struggle with Austria for the mastery; in France Napoleon III. was preparing to pose as the champion of the oppressed nationalities which had once more settled down sullenly under the Habsburg yoke. The alliance of the French emperor and the king of Sardinia, and the Italian war of 1859 ended in the loss of Lombardy to the Habsburgs. Seven years later the crushing defeat of Koniggratz not only ended their long rule in Italy, based on the tradition of the medieval empire, by leading to the cession of Venetia to the new Italian kingdom > but led to their final exclusion from the German confederation, soon to become, under the headship of Prussia, the German empire.

By the loss of the predominance in Germany conceded to it by the treaties of Vienna, and by the shifting of its ” centre of gravity ” eastward, the Habsburg monarchy, however, perhaps gained more than it lost. One necessary result, indeed, was the composition {Ausgleich) with Hungary in 1867, by which the latter became an independent state (Francis Joseph being crowned king at Pest in June 1867) bound to the rest of the monarchy only by the machinery necessary for the carrying out of a common policy in matters of common interest. This at least restored the loyalty of the Hungarians to the Habsburg dynasty; it is too soon yet to say that it secured permanently the essential unity of the Habsburg monarchy. By the system of the Dual Monarchy the rest of the Austrian emperor’s dominions (Cis-Leithan) were consolidated under a single central government, the history of which has been mainly that of the rival races within the empire struggling for political predomin- ance. Since the development

of the constitution has been consistently in a democratic direction and the Slavs are in a great majority, the tendency has been for the German element — strong in its social status and tradition of predominance — to be swamped by what it regards as an inferior race; and a con- siderable number of Austrian " Germans " have learned to look not to their Habsburg rulers, but to the power of the German empire for political salvation. The tendency eastwards of the monarchy was increased when in 1878 the congress of Berlin placed Bosnia and Herzegovina under Austrian rule. Old ambitions were now revived at the expense of the Ottoman empire, the goal of which was the port of Salonica; and not the least menacing aspect of the question of the near East has been that the rivalry of Italy and the Habsburg monarchy has been transferred to the Balkan peninsula. Yet, in spite of internal

dissensions arising out of questions fundamentally insoluble, and in spite of the constant threat of external complications that may lead to war, the Habsburg monarchy as the result of the changes in the 19th and 20th centuries is seemingly stronger than ever. The shadow of universal claims to empire and sonorous but empty titles have vanished, but so have the manifold rivalries and entanglements which accompanied the Habsburg rule in Italy and the Netherlands and Habsburg preponderance in Germany. The monarchy is stronger because its sphere is more defined; because as preserving the pax Romana among the jostling races of eastern Europe, it is more than ever recognized as an essential element in the maintenance of European peace, and is recognized as necessary and beneficial even by the ambitious and restless nationalities that chafe under its rule.

A few words must be said about the cadet branches of the Habsburg family. When, in 1765, Francis I. died and Joseph II. became emperor, the grand-duchy of Tuscany passed by special arrangement not to Joseph,

but to his younger brother Leopold. Then in 1791, after Leopold had succeeded Joseph as emperor, he handed over the grand-duchy to his second son, Ferdinand (1769-1824). In 1801 this prince was deposed by Napoleon and Tuscany was seized by France. Restored to the Habsburgs in the person of Ferdinand in 1814, it remained under his rule, and then under that of his son Leopold (1797-1870), until the rising of 1859, when the Austrians were driven out and the grand-duchy was added to the kingdom of Sardinia. A similar fate attended the duchy of Modena, which had passed to the Habsburgs through the marriage of its heiress Mary Beatrice of Este (d. 1829) with the archduke Ferdinand (1754-1806), brother of the emperor Leopold II. From 1814 to 1846 this duchy was governed by Ferdinand's son, Duke Francis IV., and from 1846 to 1859 by his grandson, Francis V. This family became extinct on the death of Francis V. in 1875.

In addition to his successor Francis II., and to Ferdinand, grand-duke of Tuscany, the emperor Leopold II. had eight sons, five of whom, including the archduke John (1782-1859), who saw a good deal of service during the Napoleonic Wars and was chosen regent (Reichsverweser) of Germany in 1848, have now no living male descendants. Thus the existing branches of the family are descended from Leopold's five other sons. The descendants of Leopold, the dispossessed grand-duke of Tuscany, were in 1909 represented by his son, Ferdinand (b. 1835), who still claimed the title of grand-duke of Tuscany, and his son and grandsons; by the numerous descendants of the archduke Charles Salvator (1839-1892); and by the archduke Louis Salvator (b. 1847), a great traveller and a voluminous writer. The grand-duke's fourth son was the archduke John Nepomuck Salvator, who, after serving in the Austrian army, resigned all his rights and titles and under the name of Johann Orth took command of a sailing vessel. He is supposed to have been drowned off the coast of South America in 1891, but reports of his continued existence were circulated from time to time after that date. Of the emperor Leopold's

other sons the archduke Charles, perhaps the most distinguished soldier of the family, left four sons, including Albert, duke of Teschen (1817–1895), who inherited some of his father's military ability. Charles's family was in 1909 represented by his grandsons, the sons of the archduke Charles Ferdinand (1818–1874). The archduke Joseph (1 7 76–1 847) , palatine of Hungary, was represented by a grandson, Joseph Augustus (b. 1872), and the archduke Rainer (1783– 1853), viceroy of Lombardy-Venetia, by a son Rainer (b. 1827), and by several grandsons.

The eldest and reigning branch of the family was in 1909 represented by the emperor Francis Joseph, whose father was the archduke Francis Charles (1802–1878), and whose grandfather ,was the emperor Francis II. Francis Joseph's only son Rudolph died in 1889; consequently the heir to the Habsburg monarchy was the emperor's nephew Francis Ferdinand (b. 1863), the eldest of the three sons of his brother Charles Louis (1833–1896). In 1875 Francis Ferdinand inherited the wealth of the Este family and took the title of archduke of Austria-Este; in 1900 he contracted a morganatic marriage with Sophia, countess of

Chotek, renouncing for his sons the succession to the monarchy. Thus after Francis Ferdinand this would pass to the sons of his brother, the archduke Otto (1865–1906). One of the emperor's three brothers was Maximilian, emperor of Mexico from 1863 to 1867.

With the exception of Charles V. the Habsburgs have produced no statesmen of great ability, while several members of the family have displayed marked traces of insanity. Nevertheless they secured, and for over 350 years they kept, the first place among the potentates of Europe; a dignity in origin and theory elective becoming in practice hereditary in their house. This position they owe to some extent to the tenacity with which they have clung to the various lands and dignities which have passed into their possession, but they owe it much more to a

series of fortunate marriages and opportune deaths. The union of Maximilian and Mary of Burgundy, of Philip the Handsome and Joanna of Spain, of Ferdinand and Anna of Hungary and Bohemia; the death of Ottakar of Bohemia, of John, the only son of Ferdinand and Isabella of Spain, of Louis of Hungary and Bohemia — these are the corner-stones upon which the Habsburg monarchy has been built.

*For the origin and early history of the Habsburgs see G. de Roo, Annates rerum ab Aus triads Habsburgicae gentis principibus a Rudolpho I. usque ad Carolum V. gestarum (Innsbruck, 1592, fol.); M. Herrgott, Genealogia diplomatica augustae gentis Habsburgicae (Vienna, 1737-1738); E. M. Ftlrst von Lichnowsky, Geschichte des Hauses Habsburg (Vienna, 1 836-1 844); A. Schulte, Geschichte der Habsburger in den ersten drei Jahrhunderten (Innsbruck, 1887); T. von Liebenau, Die Anfange des Hauses Habsburg (Vienna, 1883) ; W. Merz, Die Habsburg (Aarau, 1896); W. Gisi, Der Vr sprung der Hduser Zdhringen und Habsburg (1888) ; and F. Weihrich, Siammtafel zur Geschichte des Hauses Habsburg (Vienna, 1893). For the history of the Habsburg monarchy see Langl, Die Habsburg und die denk- wiirdigen Stdtten ihrer Umgebung (Vienna, 1895) ; and E. A. Freeman, Historical Geography of Europe (1881). Two English books on the subject are J. Gilbart-Smith, The Cradle of the Hapsburgs (1907) ; and A. R. and E. Colquhoun, The Whirlpool of Europe, Austria- Hungary and the Hapsburgs (1906). (A. W. H. *)*

HACHETTE, JEAN NICOLAS PIERRE (1769-1834), French mathematician, was born at Mezieres, where his father was a bookseller, on the 6th of May 1769. For his early education he proceeded first to the college of Charleville, and afterwards to that of Reims, in 1788 he returned to Mezieres, where he was attached to the school of engineering as draughtsman to the professors of physics and chemistry. In 1793 he became professor of hydrography at Collioure and Port-Vendre. While there he sent several papers, in which some questions of naviga- tion were treated geometrically, to Gaspard Monge, at that time minister of marine, through whose influence he

obtained an appointment in Paris. Towards the close of 1794, when the Ecole Polytechnique was established, he was appointed along with Monge over the department of descriptive geometry. There he instructed some of the ablest Frenchmen of the day, among them S. D. Poisson, F. Arago and A. Fresnel. Accom- panying Guyton de Morveau in his expedition, earlief in the year, he was present at the battle of Fleurus, and entered Brussels with the French army. In 1816, on the accession of Louis XVIII. , he was expelled from his chair by government. He retained, however, till his death the office of professor in the faculty of sciences in the Ecole Normale, to which he had been appointed in 1810. The necessary royal assent was in 1823 refused to the election of Hachette to the Academie des Sciences, and it was not till 1831, after the Revolution, that he obtained that honour. He died at Paris on the 16th of January 1834. Hachette was held in high esteem for his private worth, as well as for his scientific attainments and great public services. His labours were chiefly in the field of descriptive geometry, with its application to the arts and mechanical engineering. It was left to him to develop the geometry of Monge, and to him also is due in great measure the rapid advancement which France made soon after the establishment of the Ecole Polytechnique in the construction of machinery .

Hachette's principal works are his Deux Supplements d, la Giometrie descriptive de Monge (181 1 and 1818); Elements de geometrie ct trois dimensions (18 17); Collection des epures de g&ometrie, &c.

(1795 and 1817); Applications de giometrie descriptive (1817); Traite de giometrie descriptive, &c. (1822); Traite elementaire des machines (181 1); Correspondance sur I'&cole Poly technique (1804- 1815). He also contributed many valuable papers to the leading scientific journals of his time.

For a list of Hachette's writings see the Catalogue of Scientific Papers of the Royal Society of London ; also F. Arago, CEuvres (1855) ; and Silvestre, Notice sur J. N. P. Hachette (Bruxelles, 1836).

HACHETTE, JEANNE, French heroine. Jeanne Laine, or Fourquet, called Jeanne Hachette, was born about 1454. We have no precise information about her family or origin. She is known solely for her act of heroism which on the 27th of June 1472 saved Beauvais when it was on the point of being taken by the troops of Charles the Bold, duke of Burgundy. The town was defended by only 300 men-at-arms, commanded by Louis de Balagny. The Burgundians were making an assault, and one of their number had actually planted a flag upon the battlements, when Jeanne, axe in hand, flung herself upon him, hurled him into the moat, tore down the flag, and revived the drooping courage of the garrison. In gratitude for this heroic deed, Louis XI. instituted a procession in Beauvais called the Proces- sion of the Assault, and married Jeanne to her chosen lover Colin Pilon, loading them with favours.

See Georges Vallat, Jeanne Hachette (Abbeville, 1898). HACHETTE, LOUIS CHRISTOPHE FRANCOIS. (1 800-1 864), French publisher, was born at Rethel in the Ardennes on the 5th of May 1800. After studying three years at a normal school with the view of becoming a teacher, he was in 1822 on political grounds expelled from the seminary. He then studied law, but in 1826 he established in Paris a publishing business for the issue of works adapted to improve the system of school instruction, or to promote the general culture of the community. He published manuals in various departments of knowledge, dic- tionaries of modern and ancient languages, educational journals, and French, Latin and Greek classics annotated with great care by the most eminent authorities. Subsequently to 1850 he, in conjunction with other partners, published a cheap railway library, scientific and miscellaneous libraries, an illustrated library for the young, libraries of ancient literature, of modern foreign literature, and of modern foreign romance, a series

of guide-books and a series of dictionaries of universal reference. In 1855 he also founded Le Journal pour tous, a publication with a circulation of 1 50,000 weekly. Hachette also manifested great interest in the formation of mutual friendly societies among the working classes, in the establishment of benevolent institutions, and in other questions relating to the amelioration of the poor, on which subjects he wrote various pamphlets; and he lent the weight of his influence towards a just settlement of the question of international literary copyright. He died on the 31st of July 1864.

HACHURE (French for ” hatching “), the term for the con- ventional lines used in hill or mountain shading upon a map (q.v.) to indicate the slope of the surface, the depth of shading being greatest where the slope is steepest. The method is less accurate than that of contour lines, but gives an indication of the trend and extent of a range or mountain system, especially upon small-scale maps.

HACIENDA (O. Span, facienda, from the Latin, meaning ” things to be done “), a Spanish term for a landed estate. It is commonly applied in Spanish America to a country estate, on which stock-raising, manufacturing or mining may be cairied on, usually with a dwelling-house for the owner’s residence upon it. It is thus used loosely for a country house.

HACKBERRY, a name given to the fruit of Celtis occidentalis, belonging to the natural botanical order Ulmaceae, to which also belongs the elm (Ulmus). It is also known under the name of “sugar- berry,” ” beaver- wood ” and “nettle-tree.” The hackberry tree is of middle size, attaining from 60 to 80 ft. in height (though sometimes reaching 130 ft.), and with the aspect of an elm. The leaves are ovate in shape, with a very long taper point, rounded and usually very oblique at the base, usually glabrous above and soft-pubescent beneath. The soft filmy flowers appear early in the spring before the expansion of the

leaves. The fruit is oblong, about half to three-quarters of an inch long, of a reddish or yellowish colour when young, turning to a dark purple in autumn. This tree is distributed through the deep shady forests bordering river banks from Canada (where it is very rare) to the southern states. The fruit has a sweetish and slightly astringent taste, and is largely eaten in the United States. The seeds contain an oil like that of almonds. The bark is tough and fibrous like hemp, and the wood is heavy, soft, fragile and coarse-grained, and is used for making fences and furniture. The root has been used as a dye for linens.

HACKENSACK, a town and the county-seat of Bergen county, New Jersey, U.S.A., on the Hackensack river, 13 m. N. of Jersey City. Pop. (1890), 6004; (1900), 9443, of whom 2009 were foreign- born and 515 were negroes; (1905) 11,098; (1910) 14,050: It is served by the New York, Susquehanna & Western, and the New Jersey & New York railways, both being controlled by the Erie Company; and indirectly by the West Shore (at Bogota, \ m. S.E.). Electric lines connect Hackensack with Newark, Passaic and Paterson, and with New York ferries. The town extends from the low bank of the river W. to the top of a ridge, about 40 ft. higher up, from which there are good views to the S. and E. Hackensack is principally a residential town, though there are a number of manufacturing establishments in and near it. Silk and silk goods and wall-paper are the principal manu- factures. In 1905 the value of the town's factory product was $1,488,358, an increase of 90-3% since 1900. There are an historic mansion-house and an interesting old Dutch church, both erected during the 18th century; and a monument marks the grave of General Enoch Poor (1736-1780), an officer in the War of Independence, who was born at Andover, Mass., entered the Continental Army from New Hampshire, and took part in the campaign against Burgoyne, in the battle of Monmouth and in General Sullivan's expedition against the Iroquois. Hackensack was settled by the Dutch about 1640, and was named after the Hackensack Indians, a division of the TJnami

Dela- wares, who lived in the valleys of the Hackensack and Passaic rivers, and whose best-known chief was Oritany, a friend of the whites. Hackensack is coextensive with the township of New Barbadoes, first incorporated with considerably larger territory in 1693.

HACKET, JOHN (1 592-1670), bishop of Lichfield and Coventry, was born in London and educated at Westminster and Trinity College, Cambridge. On taking his degree he was elected a fellow of his college, and soon afterwards wrote the comedy of Loiola (London, 1648), which was twice performed before James I. He was ordained in 1618, and through the influence of John Williams (1582-1650) became rector in 1621 of Stoke Hammond, Bucks, and Kirkby Underwood, Lincolnshire. In 1623 he was chaplain to James, and in 1624 Williams presented him to the livings of St Andrew's, Holborn, and Cheam, Surrey. When the so-called " root-and-branch bill " was before parliament in 1641, Hacket was selected to plead in the House of Commons for the continuance of cathedral establishments. In 1645 his living of St Andrew's was sequestered, but he was allowed to retain the rectory of Cheam. On the accession of Charles II. his fortunes improved; he frequently preached before the king, and in 1661 was consecrated bishop of Lichfield and Coventry. His best-known book is the excellent biography of his patron, Archbishop Williams, entitled Scrinia reserala: a Memorial offered to the great Deservings of John Williams, D.D. (London, 1693). <■■ ■

HACKETT, HORATIO BALCH (1808-1875), American biblical scholar, was born in Salisbury, Massachusetts, on the 27th of December 1808. He was educated at Phillips-Andover Academy, at Amherst College, where he graduated as valedictorian in 1830, and at Andover Theological Seminary, where he graduated in 1834. He was adjunct professor of Latin and Greek Languages and Literature at Brown University in 1835-1838 and professor of Hebrew Literature there in 1838-1839, was ordained to the Baptist ministry in 1839 — he had become a Baptist at Andover as the result of preparing a paper on

baptism in the New Testa- ment and the Fathers — and in 1839-1868 he was professor of

Biblical literature and interpretation in Newton Theological Institution where his most important work was the introduction of the modern German methods of Biblical criticism, which he had learned from Moses Stuart at Andover and with which he made himself more familiar in Germany (especially under Tholuck at Halle) in 1841. He travelled in Egypt and Palestine in 1852, and in 1858-1859 in Greece, becoming proficient in modern Greek. From 1870 until his death in Rochester, New York, on the 2nd of November 1875, he was professor of Biblical literature and New Testament exegesis in the Rochester Theo- logical Seminary. He was a great teacher but a greater critical and exegetical scholar.

He wrote Christian Memorials of the War (1864); an English version of Winer's Grammar of the Chaldee Language (1844) ; Exercises in Hebrew Grammar (1847); and various articles on the Semitic language and literature in periodicals ; but his best-known work was in general commentary on the Bible and translation, and in the special text study of the New Testament. Under these two headings fall : Illustrations of Scripture; suggested by a Tour through the Holy Land (1855) ; the American revision, with Ezra Abbot, of Smith's Diction- ary of the Bible, to the British edition of which he had contributed about thirty articles; Commentary on the Original Text of the Acts of the Apostles (1852; 2nd edition, 1858), for many years the best English commentary; Notes on the Greek Text of the Epistle of Paul to Philemon, and a Revised Version of Philemon, both published in i860; the English versions, in Schaff's edition of Lange's Com- mentaries, of Van Oosterzee's Philemon and Brailne's Philippians; and for the American Bible Union Version of the Bible he translated the books of Ruth

and Judges, and aided T. J. Conant in editorial revision ; and he was one of the American translators for the English Bible revision.

See Memorials of Horatio Batch Hackett (Rochester, N.Y., 1876), edited by G. H. Whittemore.

HACKETT, JAMES HENRY (1800–1871), American actor, was born in New York. After an unsuccessful entry into busi- ness, in 1826 he went on the stage, where he soon established a reputation as a player of eccentric character parts. As Falstaff he was no less successful in England than in America. At various times he went into management, and he was the author of Notes and Comments on Shakespeare (1863).

His son, James Keieltas Hackett (1869–), born at Wolfe Island, Ontario, and educated at the College of the City of New York, also became an actor. He came into prominence at the Lyceum in Daniel Frohman's company, and afterwards had considerable success in romantic parts. As a manager he stood outside the American syndicate of theatres, and organized several companies to play throughout the United States. In 1897 he married Mary Mannering, the Anglo-American actress.

HACKLANDER, FRIEDRICH WILHELM VON (1816–1877), German novelist and dramatist, was born at Burtscheid near Aix-la-Chapelle on the 1st of November 1816. Having served an apprenticeship in a commercial house, he entered the Prussian artillery, but, disappointed at not finding advancement, returned to business. • A soldier's life had a fascination for him, and he made his debut as an author with Bilder aus dem Soldatenlebcn im Frieden (1841). After a journey to the east, he was appointed secretary to the crown prince of Wiirttemberg, whom he accom- panied on his travels. Wachlstubenabenteuer, a continuation of his first work, appeared in 1845, and it was followed by Bilder aus dem Soldatenleben im Kriege (1849–1850). As a result of a tour in Spain in 1854, appeared Ein Winter in Spanien (1855). In 1857 he founded, in

conjunction with Edmund von Zoller, the illustrated weekly, Uber Land und Meer. In 1859 Hacklander was appointed director of royal parks and public gardens at Stuttgart, and in this post did much towards the embellishment of the city. In 1859 he was attached to the headquarters staff of the Austrian army during the Italian war; in 1861 he was raised to an hereditary knighthood in Austria; in 1864 he retired into private life, and died on the 6th of July 1877. Hacklander's ' literary talent is confined within narrow limits. There is much in his works of lively, adventurous and even romantic description, but the character-drawing is feeble and superficial.

Hacklander was a voluminous writer; the most complete edition of his works is the third, published at Stuttgart in 1876, in 60 volumes. There is also a good selection in 20 volumes (1 88 i) . Among his novels, Namenlose Geschichten (1851); Eugen Stillfried (1852); Krieg und

Frieden (1859), and the comedies Der geheime Agent (1850) and Magnetische Kuren (1851) may be specially mentioned. His auto- biography appeared in 1878 under the title, Der Roman meines Lebens (2 vols.). See H. Morning, Erinnerungen an F. W. Hacklander

(1878).

HACKNEY, a north-eastern metropolitan borough of London, England, bounded W. by Stoke Newington and Islington, and S. by Shoreditch, Bethnal Green and Poplar, and extending N. and E. to the boundary of the county of London. Pop. (1901), 219,272. It is a poor and populous district, in which the main thoroughfares are Kingsland Road, continued N. as Stoke Newington Road and Stamford Hill; Mare Street, continued N.W. as Clapton Road to join Stamtord Hill; and Lea Bridge . Road running N.E. towards Walthamstow and Low Leyton. The borough includes the districts of Clapton in the north, Homerton in the east, and Dalston and part of Kingsland in the west. On the east lies the open flat valley of the Lea, which flows in several branches, and is bordered, immediately outside the confines of the borough, by

the extensive reservoirs of the East London water-works. In these low lands lie the Hackney Marshes (338 acres; among several so-called marshes in the Lea valley), and the borough also contains part of Victoria Park and a number of open spaces collectively called the Hackney Commons, including Mill Fields, Hackney Downs, London Fields, &c. The total area of open spaces exceeds 500 acres. The tower of the ancient parish church of St Augustine, with the chapel of the Rowe family, .still stands, and is the only historic building of importance. Among institutions are the German hospital, Dalston, Metropolitan hospital, Kingsland Road, and Eastern Fever hospital, Homerton; and the Hackney polytechnic institute, with which is incorporated the Sir John Cass institute. Cass (1666-1718), a merchant of the city of London, also a member of parliament and sheriff, bequeathed £1000 for the foundation of a free school; in 1732 the bequest was increased in accordance with an unfinished codicil to his will; and the income provided from it is now about £6000, some 250 boys and girls being educated. The parliamentary borough of Hackney comprises north, central and south divisions, each returning one member; and the northern division includes the metropolitan borough of Stoke Newington. The metropolitan borough of Hackney includes part of the Hornsey parliamentary division of Middlesex. The borough council consists of a mayor, 10 alder- men and 60 councillors. Area, 3288-9 acres.

In the 13th century the name appears as Hackenaye or Hacquenye, but no certain derivation is advanced. Roman and other remains have been found in Hackney Marshes. In 1290 the bishop of London was lord of the manor, which was so held until 1550, when it was granted to Thomas, Lord Wentworth. In 1697 it came into the hands of the Tyssen family. Extensive property in the parish also belonged to the priory of the Knights Hospitallers of St John of Jerusalem at Clerken- well. ' From the 16th to the early 19th century there were many fine residences in Hackney. The neighbourhood of Hackney had at one time an evil reputation as the haunt of highwaymen. HACKNEY (from

Fr. haquenSe, Lat. equus, an ambling horse or mare, especially for ladies to ride; the English ” hack ” is simply an abbreviation), originally a riding-horse. At the present day, however, the hackney (as opposed to a thorough- bred) is bred for driving as well as riding (see Horse: Breeds). From the hiring-out of hackneys, the word came to be associated with employment for hire (so ” a hack,” as a general term for ” drudge “), especially in combination, e.g. hackney-chair, hackney-coach, hackney-boat. The hackney-coach, a coach with four wheels and two horses, was a form of hired public conveyance (see Carriage).

HADAD, the name of a Syrian deity, is met with in the Old Testament as the name of several human persons; it also occurs in compound forms like Benhadad and Hadadezer. The divinity primarily denoted by it is the storm-god who was known also as Ramman, Bir and Dadda. The Syrian kings of Damascus seem to have habitually assumed the title of Benhadad, or son of Hadad (three of this name are mentioned in Scripture), just as a series of Egyptian monarchs are known to have been

accustomed to call themselves sons of Amon-Ra. The word Hadadrimmon, for which the inferior reading Hadarrimmon is found in some MSS. in the phrase ” the mourning of (or at) Hadadrimmon ” (Zech. xii. n), has been a subject of much discussion. According to Jerome and all the older Christian interpreters, the mourning for something that occurred at a place called Hadadrimmon (Maximianopolis) in the valley of Megiddo is meant, the event alluded to being generally held to be the death of Josiah (or, as in the Targum, the death of Ahab at the hands of Hadadrimmon); but more recently the opinion has been gaining ground that Hadadrimmon is merely another name for Adonis (q.v.) or Tammuz, the allusion being to the mournings by which the Adonis festivals were usually accom- panied (Hitzig on Zech. xii. n, Isa.

xvii. 8; Movers, Phonizier, i. 196). T. K. Cheyne (Encycl. Bibl. s.v.) points out that the Septuagint reads simply Rimmon, and argues that this may be a corruption of Migdon ('Megiddo), in itself a corruption of Tammuz-Adon. He would render the verse, " In that day there shall be a great mourning in Jerusalem, as the mourning of the women who weep for Tammuz-Adon " (Adon means lord).

HADDINGTON, EARL OF, a Scottish title bestowed in 1627 upon Thomas Hamilton, earl of Melrose (1563-1637). Thomas, who was a member of the great family of Hamilton, being a son of Thomas Hamilton of Priestfield, was a lawyer who became a lord of session as Lord Drumcairn in 1592. He was on very friendly terms with James VI., his legal talents being useful to the king, and he was one of the eight men who, called the Oc- tavians, were appointed to manage the finances of Scotland in 1506. Having also become king's advocate in 1596, Hamilton was entrusted with a large share in the government of his country when James went to London in 1603; in 161 2 he was appointed secretary of state for Scotland, and in 1613 he was created Lord Binning and Byres. In 1616 he became lord president of the court of session, and three years later was created earl of Melrose, a title which he exchanged in 1627 for that of earl of Haddington. After the death of James I. the earl resigned his offices of president of the court of session and secretary of state, but he served Charles I. as lord privy seal. He died on the 29th of May 1637. Haddington, who was both scholarly and wealthy, left a large and valuable collection of papers, which is now in the Advocates' library at Edinburgh. James referred familiarly to his friend as Tarn 0' the Cowgate, his Edinburgh residence being in this street.

The earl's eldest son Thomas, the 2nd earl (1 600-1640), was a covenanter and a soldier, being killed by an explosion at Dun- glass castle on the 30th of August 1640. His sons, Thomas (d. 1645) and John (d. 1669), became respectively the 3rd and 4th earls of Haddington, and John's grandson Thomas (1679- 1735) succeeded his father Charles (c.

1650–1685), as 6th earl in 1685, although he was not the eldest but the second son. This curious circumstance arose from the fact that when Charles married Margaret (d. 1700), the heiress of the earldom of Rothes, it was agreed that the two earldoms should be left separate; thus the eldest son John became earl of Rothes while Thomas became earl of Haddington. Thomas was a supporter of George I. during the rising of 1715, and was a representative peer for Scotland from 1716 to 1734. He died on the 28th of November

The 6th earl was a writer, but in this direction his elder son, Charles, Lord Binning (1697–1732), is perhaps more celebrated. After fighting by his father's side at Sheriffmuir in 1715 and serving as member of parliament for St Germans, Binning died at Naples on the 27th of December 1732. His eldest son, Thomas (c. 1720–1794), became the 7th earl in 1735, and the latter's grandson Thomas (1780–1858) became the 9th earl in 1828. The gth earl had been a member of parliament from 1802 to 1827, when he was made a peer of the United Kingdom as Baron Melros of Tyninghame, a title which became extinct upon his death. In 1834 he became lord-lieutenant of Ireland under Sir Robert Peel, leaving office in the following year, and in Peel's second administration (1841–1846) he served as first lord of the admiralty and then as lord privy seal. When he died without

sons on the 1st of December 1858 the earldom passed to his kinsman, George Baillie (1802–1870), a descendant of the 6th earl. This nobleman took the name of Baillie-Hamilton, and his son George (b. 1827) became nth earl of Haddington in 1870.

See State Papers of Thomas, Earl of Melrose, published by the Abbotsford Club in 1837, and Sir W. Fraser, Memorials of the Earls of Haddington (1889).

HADDINGTON, a royal, municipal and police burgh, and county town of Haddingtonshire, Scotland. Pop. (1901), 3993. It is situated on the Tyne, 18 m. E. of Edinburgh by the North British railway, being the terminus of a branch line from Long- niddry

Junction. Five bridges cross the river, on the right bank of which lies the old and somewhat decayed suburb of Nungate, interesting as having contained the Giffordgate, where John Knox was born, and where also are the ruins of the pre-Reforma- tion chapel of St Martin. The principal building in the town is St Mary's church, a cruciform Decorated edifice in red sandstone, probably dating from the 13th century. It is 210 ft. long, and is surmounted by a square tower 90 ft. high. The nave, restored in 1892, is used as the parish church, but the choir and transepts are roofless, though otherwise kept in repair. In a vault is a fine monument in alabaster, consisting of the re- cumbent figures of John, Lord Maitland of Thirlestane (1545- 1 595)> chancellor of Scotland, and his wife. The laudatory sonnet composed by James VI. is inscribed on the tomb. In the same vault John, duke of Lauderdale (1616-1682), is buried. In the choir is the tombstone which Carlyle erected over the grave of his wife, Jane Baillie Welsh (1801-1866), a native of the town. Other public edifices include the county buildings in the Tudor style, in front of which stands the monument to George, 8th marquess of Tweeddale (1787-1876), who was such an expert and enthusiastic coachman that he once drove the mail from London to Haddington without taking rest; the corn exchange, next to that of Edinburgh the largest in Scotland; the town house, with a spire 150 ft. high, in front of which is a monument to John Home, the author of Douglas; the district asylum to the north of the burgh; the western district hospital; the Tenterfield home for children; the free library and the Knox Memorial Institute. This last-named building was erected in 1879 to replace the old and famous grammar school, where John Knox, William Dunbar, John Major and possibly George Buchanan and Sir David Lindsay were educated. John Brown (1722-1787), a once celebrated dissenting divine, author of the Self -Interpreting Bible, ministered in the burgh for 36 years and is buried there; his son John the theologian (17 54-183 2), and his grandson Samuel (1817-1856), the chemist, noted for his inquiries into the atomic theory, were natives.

Samuel Smiles (18 12-1904), author of Character, Self Help and other works, was also born there, and Edward Irving was for years mathematical master in the grammar school. In Hardgate Street is " Bothwell Castle," the town house of the earl of Both well, where Mary Queen of Scots rested on her way to Dunbar. The ancient market cross has been restored. The leading industries are the making of agricultural implements, manu- factures of woollens and sacking, brewing, tanning and coach- building, besides corn mills and engineering works.

The burgh is the retail centre for a large district, and its grain markets, once the largest in Scotland, are still of considerable importance. Haddington was created a royal burgh by David I. It also received charters from Robert Bruce, Robert II. and James VI. In 1139 it was given as a dowry to Ada, daughter of William de Warenne, earl of Surrey, on her marriage to Prince Henry, the only son of David I. It was occasionally the residence of royalty, and Alexander II. was born there in 1198. Lying in the direct road of the English invaders, the town was often ravaged. It was burned by King John in 12 16 and by Henry III. in 1244. Fortified in 1548 by Lord Grey of Wilton, the English commander, it was besieged next year by the Scots and French, who forced the garrison to withdraw. So much slaughter had gone on during that period of storm and stress that it was long impossible to excavate in any direction without coming

on human remains. The town has suffered much periodically from floods. One of the most memorable of these occurred on the 4th of October 1775, when the Tyne rose 8 ft. 9 in. above its bed and inundated a great part of the burgh. An inscription in the centre of the town records the event and marks the point to which the water rose.

There are many interesting places within a few miles

of Haddington. Five miles E. is Whittingehame House, and 5 m. N.E. is the thriving village of East Linton (pop. 919). About2j m. N. liesAthelstaneford (locally, Elshinford), so named from the victory of Hungus, king of the Picts, in the 8th century over the Northumbrian Athelstane. On a hill near Drem, 3J m. N. by W., are traces of a Romano-British settlement, and the remains of the priest's house of the Knights Templars, to whom the barony once belonged. On the coast is the pretty village of Aberlady on a fine bay, and in the neighbourhood are some of the finest golf links in Scotland, such as Luff ness, Gullane, Archerfield and Muirfield. On Gosford Bay is Gosford House, an 18th-century mansion, the seat of the earl of Wemyss. At Gladsmuir, 3 1 m. \V. of Haddington, alleged by some to have been the birthplace of George Heriot, Principal Robertson was minister and wrote most of his History of Scotland. Of the old seat of the Douglases at Longniddry few traces remain, and in the chapel, now in ruins, at the eastern end of the village, John Knox is said to have.preached oc- casionally. At Gifford,4m. to the S., John Witherspoon (1 722-1 794), president of the College of New Jersey (Princeton) , and Charles Nisbet (1736-1804), president of Dickinson College, Carlisle, Pennsylvania, were born. A little to the south of Gifford are Yester House, a seat of the marquess of Tweeddale, finely situated in a park of old trees, and the ruins of Yester Castle. The cavern locally known as Hob- goblin Hall is described in Marmion> and is associated with all kinds of manifestations of the black art. Lennoxlove, if m. to the S., a seat of Lord Blantyre, was originally called Lethington, and for a few centuries was associated with the Maitlands. Amisfield, adjoining Haddington on the N.E., is another seat of the earl of Wemyss.

HADDINGTONSHIRE, or East Lothian, a south-eastern county of Scotland, bounded N. by the Firth of Forth, N.E. by the North Sea, E., S.E. and S. by Berwickshire, and S.W. and W. by Edinburghshire. It covers an area of 171,011 acres, or 267 sq. m. Its

sea-coast measures 41 m. The Bass Rock and Fidra Isle belong’to the shire, and there are numerous rocks and reefs off the shore, especially between Dunbar and Gullane Bay. Broadly speaking, the northern half of the shire slopes gently to the coast, and the southern half is hilly. Several of the peaks of the Lammermuirs exceed 1500 ft., and the more level tract is broken by Traprain Law (724) in the parish of Prestonkirk, North Berwick Law (612), and Garleton Hill (590) to the north of the county town. The only important river is the Tyne, which rises to the south-east of Borthwick in Mid-Lothian, and, taking a generally north-easterly direction, reaches the sea just beyond the park of Tynninghame House, after a course of 28 m., for the first 7 m. of which it belongs to its parent shire. It is noted for a very fine variety of trout, and salmon are sometimes taken below the linn at East Linton. The Whiteadder rises in the parish of Whittingehame, but, flowing towards the south-east, leaves the shire and at last joins the Tweed near Berwick. There are no natural lakes, but in the parish of Stenton is found Pressmennan Loch, an artificial sheet of water of somewhat serpentine shape, about 2 m. in length, with a width of some 400 yds., which was constructed in 1819 by damming up the ravine in which it lies. The banks are wooded and picturesque, and the water abounds with trout.

Geology. — The higher ground in the south, including the Lammer- muir Hills, is formed by shales, greywackes and grits of Ordovician and Silurian age; a narrow belt of the former lying on the north-western side of the latter, the strike being S.W. to N.E. The granitic mass of Priestlaw and other felsitic rocks have been intruded into these strata. The lower Old Red Sandstone has not been observed in this county, but the younger sandstones and conglomerates fill up ancient depressions in the Silurian and Ordovician, such as that running northward from Oldhamstocks towards Dunbar and the valley of Lauderdale. A faulted-in tract of the same formation, about 1 m. in breadth, runs westward from Dunbar to near Gifford. Carboniferous rocks form the

remainder of the county. The Calci- ferous Sandstone series, shales,' thin limestones and sandstones, is exposed on the south-eastern coast ; but between Gifford and North Berwick and from Aberlady to Dunbar it is represented by a great thickness of volcanic rocks consisting of tuffs and coarse breccias in the lower beds, and of porphyritic and andesitic lavas above. These rocks are well exposed on the coast, in the Garleton Hills and Traprain Law ; the latter and North Berwick Law are volcanic

necks or vents. The Carboniferous Limestone series which succeeds the Calciferous Sandstone consists of a middle group of sandstones, shales, coals and ironstones, with a limestone group above and below. The coal-field is synclinal in structure, Port Seton being about the centre; it contains ten seams of coal, and the area covered by it is some 30 sq. m. Glacial boulder clay lies over much of the lower ground, and ridges of gravel and sand flank the hills and form extensive sheets. Traces of old raised sea-beaches are found at several points along the coast. At North Berwick, Tynninghame and elsewhere there are stretches of blown sand. Limestone is worked at many places, and hematite was formerly obtained from the Garleton Hills.

Climate and Agriculture. — Though the county is exposed to the full sweep of the east wind during March, April and May, the climate is on the whole mild and equable. The rainfall is far below the average of Great Britain, the mean for the year being 25 in., highest in midsummer and lowest in spring. The average temperature for the year is 47°-5 F., for January 38 and for July 59 . Throughout nearly the whole of the 19th century East Lothian agriculture was held to be the best in Scotland, not so much in consequence of the natural fertility of the soil as because of the enterprise of the cultivators, several of whom, like George Hope of Fenton Barns (1811-1876), brought scientific farming almost to perfection. Mechanical appliances were adopted with exceptional alacrity, and indeed some that afterwards came into general use were first employed in Haddington. Drill sowing of

turnips dates from 1734. The threshing machine was introduced by Andrew Meikle (1719- 1811) in 1787, the steam plough in 1862, and the reaping machine soon after its invention, while tile draining was first extensively used in the county. East Lothian is famous for the richness of its grain and green crops, the size of its holdings (average 200 acres) and the good housing of its labourers. The soils vary. Much of the Lammermuirs is necessarily unproductive, though the lower slopes are cultivated, a considerable tract of the land being very good. In the centre of the shire occurs a belt of tenacious yellow clay en a tilly subsoil which is not adapted for agriculture. Along the coast the soil is sandy, but farther inland it is composed of rich loam and is very fertile. The land about Dunbar is the most productive, yielding a potato — the "Dunbar red " — which is highly esteemed in the markets. Of the grain crops oats and barley are the principal, and their acreage is almost a constant, but wheat, after a prolonged decline, has experienced a revival. Turnips and potatoes are cultivated extensively, and with marked success, and constitute nearly all the green crops raised. Although pasture-land is below the average, live-stock are reared profitably. About one-sixteenth of the total area is under wood.

Other Industries. — Fisheries are conducted from Dunbar, North Berwick, Port Seton and Prestonpans, the catch consisting chiefly of cod, haddock, whiting and shellfish. Fireclay as well as limestone is worked, and there are some stone quarries, but the manufactures are mainly agricultural implements, pottery, woollens, artificial manures, feeding-stuffs and salt, besides brewing. Coal of a very fair quality is extensively worked at Tranent, Ormiston, Macmerry and near Prestonpans, the coal-field having an area of about 30 sq. m. Limestone is found throughout the greater part of the shire. A vein of hematite of a peculiarly fine character was discovered in 1866 at Garleton Hill, and wrought for some years. Ironstone has been mined at Macmerry.

The North British Company possess the sole running

powers in the county, through which is laid their main line to Berwick and the south. Branches are sent off at Drem to North Berwick, at Longniddry to Haddington and also to Gullane, at Smeaton (in Mid-Lothian) to Macmerry, and at Ormiston to Gifford.

Population and Government. — The population was 37,377 in 1891, and 38,665 in 1901, when 459 persons spoke Gaelic and English, and 7 spoke Gaelic only. The chief towns are Dunbar (pop. in 1901, 3581), Haddington (3993), North Berwick (2899), Prestonpans (2614) and Tranent (2584). The county, which returns one member to Parliament, forms part of the sheriffdom of the Lothians and Peebles, and there is a resident sheriff- substitute at Haddington, who sits also at Dunbar, Tranent

and North Berwick. The shire is under school-board jurisdiction, and besides high schools at Haddington and North Berwick, some of the elementary schools earn grants for higher educa- tion. The county council spends a proportion of the " residue " grant in supporting short courses of instruction in technical subjects (chiefly agriculture), in experiments in the feeding of cattle and the growing of crops, and in defraying the travelling expenses of technical students.

History. — Of the Celts, who were probably the earliest in- habitants, traces are found in a few place names and circular camps (in the parishes of Garvald and Whittinghame) and hill forts (in the parish of Bolton). After the Roman occupation, of which few traces remain, the district formed part of the Saxon kingdom of Northumbria until 1018, when it was joined to Scotland by Malcolm II. It was comparatively prosperous till the wars of Bruce and Baliol, but from that period down to the union of the kingdoms it suffered from its nearness to the Border and from civil strife. The last battles fought in the county were those of Dunbar (1650) and Prestonpans (1745).

See J. Miller, History of Haddington (1844); D. Croal, Sketches of East Lothian (Haddington, 1873); John Martine, Reminiscences of the County of Haddington (Haddington, 1890, 1894); Dr Wallace James, Writs and Charters of Haddington (Haddington, 1898).

HADDOCK (Gadus aeglefinus), a fish which differs from the cod in having the mental barbel very short, the first anal fin with 22 to 25 rays, instead of 17 to 20, and the lateral line dark instead of whitish; it has a large blackish spot above each pectoral fin — associated in legend with the marks of St Peter's finger and thumb, the haddock being supposed to be the fish from whose mouth he took the tribute-money. It attains to a weight of 15 lb. and is one of the most valuable food fishes of Europe, both fresh and smoked, the " finnan haddie " of Scotland being famous. It is common round the British and Irish coasts, and generally distributed along the shores of the North Sea, extending across the Atlantic to the coast of North America.

HADDON HALL, one of the most famous ancient mansions in England. It lies on the left bank of the river Wye, 2 m. S.E. of Bakewell in Derbyshire. It is not now used as a residence, but the fabric is maintained in order. The building is of stone and oblong in form, and encloses two quadrangles

separated by the great banqueting-hall and adjoining chambers. The greater part is of two storeys, and surmounted by battlements. To the south and south-east lie terraced gardens, and the south front of the eastern quadrangle is occupied by the splendid ball-room or long gallery. At the south-west corner of the mansion is the chapel; at the north-east the Peveril tower. The periods of building represented are as follows. Norman work appears in the chapel (which also served as a church for the neighbouring villagers), also in certain fundamental parts of the fabric, notably the Peveril tower. There are Early English and later additions to the chapel; the banqueting-hall, with the great kitchen adjacent to it, and part of the Peveril tower are of the 14th century. The eastern range of rooms, including the state-room, are of the 15th century; the western and north-western parts were built shortly after 1500. The ball-room is of early 17th- century construction, and the terraces and gardens were laid out at this time. A large number of interesting contemporary fittings are preserved, especially in the banqueting-hall and kitchen; and many of the rooms are adorned with tapestries of the 16th and 17th centuries, some of which came from the famous works at Mortlake in Surrey.

A Roman altar was found and is preserved here, but no trace of Roman inhabitants has been discovered. Haddon was a manor which before the Conquest and at the time of the Domes- day Survey belonged to the king, but was granted by William the Conqueror to William Peverel, whose son, another William Peverel, forfeited it for treason on the accession of Henry II. Before that time, however, the manor of Haddon had been granted to the family of Avenell, who continued to hold it until one William Avenell died without male issue and his property was divided between his two daughters and heirs, one of whom married Richard Vernon, whose successors acquired

the other half of the manor in the reign of Edward III. Sir George Vernon, who died in 1561, was known as the " King of the Peak " on account of his hospitality. His daughter Dorothy married John

Manners, second son of the earl of Rutland, who is said to have lived for some time in the woods round Haddon Hall, disguised as a gamekeeper, until he persuaded Dorothy to elope with him. On Sir George's death without male issue Haddon passed to John Manners and Dorothy, who lived in the Hall. Their grandson John Manners succeeded to the title of earl of Rutland in 1641, and the duke of Rutland is still lord of the manor.

See Victoria County History, Derbyshire; S. Rayner, History and Antiquities of Haddon Hall (1836-1837) ; Haddon Hall, History and Antiquities of Haddon Hall (1867) ; G. le Blanc Smith, Haddon, the Manor, the Hall, its Lords and Traditions (London, 1906).

HADEN, SIR FRANCIS SEYMOUR (1818-1910), English surgeon and etcher, was born in London on the 16th of September 1818, his father, Charles Thomas Haden, being a well-known doctor and amateur of music. He was educated at University College school and University College, London, and also studied at the Sorbonne, Paris, where he took his degree in 1840. He was admitted as a member of the College of Surgeons in London in 1842. Besides his many-sided activities in the scientific world, during a busy and distinguished career as a surgeon, he followed the art of original etching with such vigour that he became not only the foremost British exponent of that art but was the principal cause of its revival in England. By his strenuous efforts and perseverance, aided by the secretarial ability of Sir W. R. Drake, he founded the Royal Society of Painter-Etchers and Engravers. As president he ruled the destinies of that society with a strong hand from its first beginnings in 1880. In 1 843-1 844, with his friends Duval, Le Cannes and Col. Guibout, he had travelled in Italy and made his first sketches from nature. Haden attended no art school and had no art teachers, but in 1845, 1846, 1847 and 1848 he studied portfolios of prints belonging to an old second-hand dealer named Love, who had a shop in Bunhill Row, the old Quaker quarter of London. These port- folios he would carry home, and arranging the prints in chrono- logical order, he studied the

works of the great original engravers, Diirer, Lucas van Leyden and Rembrandt. These studies, besides influencing his original work, led to his important mono- graph on the etched work of Rembrandt. By lecture and book, and with the aid of the memorable exhibition at the Burlington Fine Arts Club in 1877, he endeavoured to give a just idea of Rembrandt's work, separating the true from the false, and giving altogether a nobler idea of the master's mind by taking away from the list of his works many dull and unseemly plates that had long been included in the lists. His reasons are founded upon the results of a study of the master's works in chronological order, and are clearly expressed in his monograph, The Etched Work of Rembrandt critically reconsidered, privately printed in 1877, and in The Etched Work of Rembrandt True and False (1895). Notwithstanding all this study of the old masters of his art, Haden 's own plates are perhaps more individual than any artist's, and are particularly noticeable for a fine original treatment of landscape subjects, free and open in line, clear and well divided in mass, and full of a noble and dignified style of his own. Even when working from a picture his personality dominates the plate, as for example in the large plate he etched after J. M. W. Turner's " Calais Pier," which is a classical example of what interpretative work can do in black and white. Of his original plates, more than 250 in number, one of the most notable was the large " Breaking up of the Agamemnon." An early plate, rare and most beautiful, is " Thames Fisherman." " Mytton Hall " is broad in treatment, and a fine rendering of a shady avenue of yew trees leading to an old manor-house in sunlight. " Sub Tegmine " was etched in Greenwich Park in 1859; and " Early Morning — Richmond," full of the poetry and freshness of the hour, was done, the artist has said, actually at sunrise. One of the rarest and most beautiful of his plates is " A By-Road in Tipperary "; " Combe Bottom " is another; and " Shere Mill Pond " (both the small study and the larger plate), " Sunset in

Ireland," " Penton Hook," " Grim Spain " and " Evening Fishing, Longparish," are also notable examples of his genius. A catalogue of his works was begun by Sir William Drake and completed by Mr N. Harrington (1880). During later years Haden began to practise the sister art of mezzotint engraving, with a measure of the same success that he had already achieved in pure etching and in dry-point. Some of his mezzotints are: " An Early Riser," a stag seen through the morning mists, " Grayling Fishing " and " A Salmon Pool on the Spey." He also produced some remarkable drawings of trees and park -like country in charcoal.

Other books by Haden not already mentioned are — Etudes a I'eau forte (Paris, 1865); About Etching (London, 1878-1879); The Art of the Painter- Etcher (London, 1890); The Relative Claims of Etching and Engraving to rank as Fine Arts and to be represented in the Royal Academy (London, 1883); Address to Students of Winchester School of Art (Winchester, 1888); Cremation: a Pamphlet (London, 1875); and The Disposal of the Dead, a Plea for Legislation (London, 1888). As the last two indicate, he was an ardent champion of a system of " earth to earth " burial.

Among numerous distinctions he received the Grand Prix, Paris, in 1889 and 1900, and was made a member of the Institut de France, Academie des Beaux-Arts and Societe des Artistes Francais. He was knighted in 1894, and died on the 1st of June 1910. He married in 1847 a sister of the artist J. A. M. Whistler; and his elder son, Francis Seymour Haden (b. 1850), had a distinguished career as a member of the government in Natal from 1881 to 1893, being made a C.M.G. in 1890. (C.H.*)

HADENDOA (from Beja Hada, chief, and endowa, people) , a nomad tribe of Africans of " Hamitic " origin. They inhabit that part of the eastern Sudan extending from the Abyssinian frontier northward nearly to Suakin. They belong to the Beja people, of

which, with the Bisharin and the Ababda, they are the modern representatives. They are a pastoral people, ruled by a hereditary chief who is directly responsible to the (Anglo- Egyptian) Sudan government. Although the official capital of the Hadendoa country is Miktinab, the town of Fillik on an affluent of the Atbara is really their headquarters. A third of the total population is settled in the Suakin country. Osman Digna, one of the best-known chiefs during the Madhia, was a Hadendoa, and the tribe contributed some of the fiercest of the dervish warriors in the wars of 1883-98. So determined were they in their opposition to the Anglo-Egyptian forces that the name Hadendoa grew to be nearly synonymous with " rebel." But this was the result of Egyptian misgovernment rather than religious enthusiasm; for the Hadendoa are true Beja, and Mahommedans only in name. Their elaborate hairdressing gained them the name of " Fuzzy-wuzzies " among the British troops. They earned an unenviable reputation during the wars by their hideous mutilations of the dead on the battlefields. After the reconquest of the Egyptian Sudan (1896-98) the Hadendoa accepted the new order without demur.

See Anglo-Egyptian Sudan, edited by Count Gleichen (London, 1905) ; Sir F. R. Wingate, Mahdism and the Egyptian Sudan (London, 1891); G. Sergi, Africa: Anthropology of the Hamitic Race (1897); A. H. Keane, Ethnology of the Egyptian Sudan (i~~

HADERSLEBEN (Dan. Haderslev), a town of Germany, in the Prussian province of Schleswig-Holstein, 31 m. N. from Flensburg. Pop. (1905) 9289. It lies in a pleasant valley on the Hadersleben fjord, which is about 9 m. in length, and com- municates with the Little Belt, and at the junction of the main line of railway from Woyens with three vicinal lines. The principal buildings are the beautiful church of St Mary, dating from the 13th century, the theological seminary established ia 1870, the gymnasium and the hospital. The industries include , iron-founding, tanning, and the manufacture of machines, tobacco and gloves. The harbour is only accessible to small vessels.

Hadersleben is first mentioned in 1228, and received municipal rights from Duke Waldemar II. in 1292. It suffered considerably during the wars between Schleswig and Holstein in the 15th

century. In November 1864 it passed with Schleswig to Prussia. Two Danish kings, Frederick II. and Frederick III., were born at Hadersleben.

See A. Sach, Der Ursprung der Stadt Hadersleben (Hadersleben,

1892).

HADING, JANE (1859-), French actress, whose real name was Jeanne Alfredine Trefouret, was born on the 25th of November 1859 at Marseilles, where her father was an actor at the Gymnase. She was trained at the local Conservatoire and was engaged in 1873 for the theatre at Algiers, and afterwards for the Khedivial theatre at Cairo, where she played, in turn, coquette, soubrette and ingenue parts. Expectations had been raised by her voice, and when she returned to Marseilles she sang in operetta, besides acting in Ruy Bias. Her Paris debut was in La Chaste Suzanne at the Palais Royal, and she was again heard in operetta at the Renaissance. In 1883 she had a great success at the Gymnase in Le Maitre de forges. In 1884 she married Victor Koning (1842-1894), the manager of that theatre, but divorced him in 1887. In 1888 she toured America with Coquelin, and on her return helped to give success to Lavedan's Prince d'Aurec, at the Vaudeville. Her reputation as one of the leading actresses of the day was now established not only in France but in America and England. Her later repertoire included Le Demi-monde, Capus's La Chatelaine, Maurice Donnay's Retour de Jerusalem, La Princesse Georges by Dumas fils, and fimile Bergerat's Plus que reine.

HADLEIGH, a market town in the Sudbury parliamentary division of Suffolk, England; 70 m. N.E. from London, the terminus of a branch of the Great Eastern railway. Pop. of yrban district (1901),

3245. It lies pleasantly in a well-wooded country on the small river Brett, a tributary of the Stour. The church of St Mary is of good Perpendicular work, with Early English tower and Decorated spire. The Rectory Tower, a turreted gate-house of brick, dates from c. 1495. The gild-hall is a Tudor building, and there are other examples of this period. There are a town-hall and corn exchange, and an industry in the manufacture of matting and in malting. Hadleigh was one of the towns in which the woollen industry was started by Flemings, and survived until the 18th century. Among the rectors of Hadleigh several notable names appear, such as Rowland Taylor, the martyr, who was burned at the stake outside the town in 15.55, an d Hugh James Rose, during whose tenancy of the rectory an initiatory meeting of the leaders of the Oxford Movement took place here in 1833.

Hadleigh, called by the Saxons Heapde-leag, appears in Domesday Book as Hetlega. About 885 /Ethelflaed, lady of the Mercians, with the consent of ^thelred her husband, gave Hadleigh to Christ Church, Canterbury. The dean and chapter of Canterbury have held possession of it ever since the Dissolution. In the 17th century Hadleigh was famous for the manufacture of cloth, and in 1618 was sufficiently important to receive incorporation. It was constituted a free borough under the title of the mayor, aldermen and burgesses of Hadleigh. In 1635, in a list of the corporate towns of Suffolk to be assessed for ship money, Hadleigh is named as third in importance. In 1636, owing to a serious visitation of the plague, 200 families were thrown out of work, and in 1687 so much had its importance declined that it was deprived of its charter. An unsuccessful attempt to recover it was made in 1701. There is evidence of the existence of a market here as early as the 13th century. James L, in his charter of incorporation, granted fairs on Monday and Tuesday in Whitsun week, and confirmed an ancient fair at Michaelmas and a market on Monday.

HADLEY, ARTHUR TWINING (1856-), American political economist and educationist, president of Yale University, was born in New Haven, Connecticut, on

the 23rd of April 1856. He was the son of James Hadley, the philologist, from whom, as from his mother — whose brother, Alexander Catlin Twining (1801-1884), was an astronomer and authority on constitutional law — he inherited unusual mathematical ability. He graduated at Yale in 1876 as valedictorian, having taken prizes in English, classics and astronomy; studied political

science at Yale (1876-1877) and at Berlin (1878-1879); was a tutor at Yale in 1879-1883, instructor in political science in 1883-1886, professor of political science in 1886-1891, professor of political economy in 1891-1899, and dean of the Graduate School in 1892-1895; and in 1899 became president of, Yale University — the first layman to hold that office. He was commissioner of the Connecticut bureau of labour statistics in 1885-1887. As an economist he first became widely known through his investigation of the railway question and his study of railway rates, which antedated the popular excitement as to rebates. His Railroad Transportation, its History and Laws (1885) became a standard work, and appeared in Russian (1886) and French (1887); he testified as an expert on transportation before the Senate committee which drew up the Interstate Commerce Law; and wrote on railways and, transportation for the Ninth and Tenth Editions (of which he was one of the editors) of the Encyclopaedia Britannica, for Lalor's Cyclopaedia of Political Science, Political Economy, and Political History of the United Stales (3 vols., 1881-1884), for The American Railway (1888), and for The Railroad Gazette in 1884-1891, and for other periodicals. His idea of the broad scope of economic science, especially of the place of ethics in relation to political economy and business, is expressed in his writings and public addresses. In 1 907-1908 he was Theodore Roosevelt professor of American History and Institutions in the university of Berlin.

Among his other publications are: Economics: an Account of the Relations between Private Property and Public Welfare (1896); The Education of the American Citizen (1901); The Relations between Freedom and Responsibility in the Evolution of Democratic Government (1903, in Yale Lectures on the Responsibilities of Citizenship); Baccalaureate Addresses (1907); and Standards of Public Morality (1907), being the Kennedy Lectures for 1906.

HADLEY, JAMES (1821–1872), American scholar, was born on the 30th of March 1821 in Fairfield, Herkimer county, New York, where his father was professor of chemistry in Fairfield Medical College. At the age of nine an accident lamed him for life. He graduated from Yale in 1842, having entered the Junior class in 1840; studied in the Theological Department of Yale, and in 1844–1845 was a tutor in Middlebury College. He was tutor at Yale in 1845–1848, assistant professor of Greek in 1 848–1 85 1, and professor of Greek, succeeding President Woolsey, from 1851 until his death in Hew Haven on the 14th of November 1872. As an undergraduate he showed himself an able mathematician, but the influence of Edward Elbridge Salisbury, under whom Hadley and W. D. Whitney studied Sanskrit together, turned his attention toward the study of language. He knew Greek, Latin, Sanskrit, Hebrew, Arabic, Armenian, several Celtic languages and the languages of modern Europe; but he published little, and his scholarship found scant outlet in the college class-room. His most original written work was an essay on Greek accent, published in a German version in Curtius's Studien zur griechischen und lateinischen Grammatik. Hadley's Greek Grammar (i860; revised by Frederic de Forest Allen, 1884) was based on Curtius's Schul grammatik (1852, 1855, 1857, 1859), and long held its place in American schools. Hadley was a member of the American Committee for the revision of the New Testament, was president of the American Oriental Society (1871–1872), and contributed to Webster's dictionary an essay on the History of the English Language. In 1873 were published his Introduction to Roman Law (edited by

T. D. Woolsey) and his Essays, Philological and Critical (edited by W. D. Whitney).

See the memorial by Noah Porter in The New Englander, vol. xxxii. (Jan. 1873), pp. 35-55; and the sketch by his son, A. T. Hadley, in Biographical Memoirs of the National Academy of Sciences, vol. v.' (1905), pp. 247-254.

HADLEY, a township of Hampshire county, Massachusetts, U.S.A., on the Connecticut river, about 20 m. N. of Springfield, served by the Boston & Maine railway. Pop. (1900), 1789; (1905, state census), 1895 ; (1910) 1999. Area, about 20 sq. m. The principal villages are Hadley (or Hadley Center) and North Hadley. The level country along the river is well adapted to tobacco culture, and the villages are engaged in the manufacture of tobacco and brooms. Hadley was settled in 1659 by members

of the churches in Hartford and Wethersfield, Connecticut, who were styled " Strict Congregationalists " and withdrew from these Connecticut congregations because of ecclesiastical and doctrinal laxity there. At first the town was called Norwottuck, but within a year or two it was named after Hadleigh in England, and was incorporated under this name in 1661. Hopkins Academy (1815) developed from Hopkins school, founded here in 1664. The English regicides Edward Whalley and his son-in-law William Goffe found a refuge at Hadley from 1664 apparently until their deaths, and there is a tradition that Goffe or Whalley in 1675 led the people in repelling an Indian attack. From 1675 to 1713 Hadley, being in almost constant danger of attack from the Indians, was protected by a palisade enclosure and by stockades around the meeting-house. From Hadley, Hatfield was set apart in 1670, South Hadley in 1753, and Amherst in

I7S9-

See Alice M. Walker, Historic Hadley (New York, 1906); and Sylvester Judd, History of Hadley

(Northampton, 1863; new ed., I905).

HADRAMUT, a district on the south coast of Arabia, bounded W. by Yemen, E. by Oman and N. by the Dahna desert. The modern Arabs restrict the name to the coast between Balhaf and Sihut, and the valley of the Wadi Hadramut in the interior; in its wider and commonly accepted signification it includes also the Mahra and Gara coasts extending eastwards to Mirbat; thus defined, its limits are between 14 and i8 c N. and 47 30' to 55 E., with a total length of 550 m. and a breadth of 150 m.

The coastal plain is narrow, rarely exceeding 10 m. in width, and in places the hills extend to the seashore. The principal ports are Mukallct and Shihr, both considerable towns, and Kusair and Raida, small fishing villages; inland there are a few villages near the foot of the hills, with a limited area of cultivation irrigated by springs or wells in the hill torrent beds. Behind the littoral plain a range of mountains, or rather a high plateau, falling steeply to the south and more gently to the north, extends continuously from the Yemen highlands on the west to the mouth of the Hadramut valley, from which a similar range extends with hardly a break to the border of Oman. Its crest-line is generally some 30 m. from the coast, and its average height between 4000 and 5000 ft. A number of wadis or ravines cutting deeply into the plateau run northward to the main Wadi Hadramut, a broad valley lying nearly east and west, with a total length from its extreme western heads on the Yemen highlands to its mouth near Sihut of over 500 m. Beyond the valley and steadily encroaching on it lies the great desert extending for 300 m. to the borders of Nejd. The most westerly village in the main valley is Shabwa, in ancient days the capital, but now almost buried by the advancing desert. Lower down the first large villages are Henan and Ajlania, near which the wadis 'Amd, Duwan and el 'Ain unite, forming the W. Kasr. In the W. Duwan and its branches are the villages of Haura, el Hajren, Kaidun and al Khureba. Below Haura for some 60 m. there is a succession of villages with fields,

gardens and date groves; several tributaries join on either side, among which the W. bin Ali and W. Adim from the south contain numerous villages. The principal towns are Shibam, al Ghurfa, Saiyun, Tariba, el Ghuraf, Tarim, formerly the chief place, 'Ainat and el Kasm. Below the last-named place there is little cultivation Or settled population. The shrines of Kabr Salih and Kabr Hud are looked on as specially sacred, and are visited by numbers of pilgrims. The former, which is in the Wadi Ser about 20 m. N.W. of Shibam, was explored by Theodore Bent in 1894; the tomb itself is of no interest, but in the neighbourhood there are extensive ruins with Himyaritic inscriptions on the stones. Kabr Hud is in the main valley some distance east of Kasm; not far from it is Bir Borhut, a natural grotto, where fumes of burning sulphur issue from a number of volcanic vents; al-Masudi mentions it in the 10th century as an active volcano. Except after heavy rain, there is no running water in the Hadramut valley, the cultivation therefore depends on artificial irrigation from wells. The principal crops are wheat, millet, indigo, dates and tobacco; this latter, known as Hamumi tobacco, is of excellent quality.

Hadramut has preserved its name from the earliest times; it occurs in Genesis as Hazarmaveth and Hadoram, sons of Joktan; and the old Greek geographers mention Adramytta and Chadramotites in their accounts of the frankincense country. The numerous ruins discovered in the W. Duwan and Adim, as well as in the main valley, are evidences of its former prosperity and civilization.

The people, known as Hadrami (plural Hadarim), belong generally to the south Arabian stock, claiming descent from Ya'rab bin Kahtan. There is, however, a large number of

Seyyids or descendants of the Prophet, and of

townsmen of northern origin, besides a considerable class of African or mixed descent. Van den Berg estimates the total population of Hadramut (excluding the Mahra and Gara) at 150,000, of which he locates 50,000 in the valley between Shibam and Tarim, 25,000 in the W. Duwan and its tributaries, and 25,000 in Mukalla, Shihr and the coast villages, leaving 50,000 for the non- agricultural population scattered over the rest of the country, probably an excessive estimate.

The Seyyids, descendants of rlosain, grandson of Mahomet, form a numerous and highly respected aristocracy. They are divided into families, the chiefs of which are known as Munsibs, who are looked on as the religious leaders of the people, and are even in some cases venerated as saints. Among the leading families are the Sheikh Abu Bakr of Ainat, the el-Aidrus of Shihr and the Sakkaf of Saiyun. They do not bear arms, nor occupy themselves in trade or manual labour or even agriculture; though owning a large proportion of the land, they employ slaves or hired labourers to cultivate it. As compared with the other classes, they are well educated, and are strict in their observance of religious duties, and owing to the respect due to their descent, they exercise a strong influence both in temporal and spiritual affairs.

The tribesmen, as in Arabia generally, are the predominant class in the population; all the adults carry arms; some of the tribes have settled towns and villages, others lead a nomadic life, keeping, however, within the territory which is recognized as belonging to the tribe. They are divided into sections or families, each headed by a chief or abu (lit. father), while the head of the tribe is called the mukaddam or sultan; the authority of the chief depends largely on his personality: he is the leader in peace and in war, but the tribesmen are not his subjects; he can only rule with their support. The most powerful tribe at present in Hadramut is the Kaiti, a branch of the Yafa tribe whose settlements lie farther west. Originally invited by the Seyyids to protect the settled districts from the attacks of

marauding tribes, they have established themselves as practically the rulers of the country, and now possess the coast district with the towns of Shihr and Mukalla, as well as Haura, Hajren and Shibam in the interior. The head of the family has accumulated great wealth, and risen to the highest position in the service of the nizam of Hyderabad in India, as Jamadar, or commander of an Arab levy composed of his tribesmen, numbers of whom go abroad to seek their fortune. The Kathiri tribe was formerly the most powerful; they occupy the towns of Saiyun, Tarim and el-Ghuraf in the richest part of the main Hadramut valley. The chiefs of both the Kaiti and Kathiri are in political relations with the British government, through the resident at Aden (q.v.). The 'Amudi in the W. Duwan, and the Nahdi, Awamir and Tamimi in the main valley, are the principal tribes possessing permanent villages; the Saiban, Hamumi and Manahil occupy the mountains between the main valley and coast.

The townsmen are the free inhabitants of the towns and villages as distinguished from the Seyyids and the tribesmen: they do not carry arms, but are the working members of the community, merchants, artificers, cultivators and servants, and are entirely dependent on the tribes and chiefs under whose protection they live. The servile class contains a large African element, brought over formerly when the slave trade flourished on this coast; as in all Mahommedan countries they are well treated, and often rise to positions of trust.

As already mentioned, a large number of Arabs from Hadramut go abroad; the Kaiti tribesmen take service in India in the irregular troops of Hyderabad; emigration on a large scale has also gone on, to the Dutch colonies in Java and Sumatra, sinoe the beginning of the 19th century. According to the census of 1885, quoted by Van den Berg in his Report published by the government of the Dutch East Indies in 1886, the number of Arabs in those colonies actually born in Arabia was 2500, while those born in the colonies exceeded 20,000; nearly all of the former are from the towns in the Hadramut valley

between Shibam »nd Tarim. Mukalla and Shihr have a considerable

trade with the Red Sea and Persian Gulf ports, as well as with the ports of Aden, Dhafar and Muscat; a large share of this is in the hands of Parsee and other British Indian traders who have established themselves in the Hadramut ports. The principal imports are wheat, rice, sugar, piece goods and hard- ware. The exports are small; the chief items are honey, tobacco and sharks' fins. In the towns in the interior the principal industries are weaving and dyeing.

The Mahra country adjoins the Hadramut proper, and extends along the coast from Sihut eastwards to the east of Kamar Bay, where the Gara coast begins and stretches to Mirbat. The sultan of the Mahra, to whom Sokotra also belongs, lives at Kishin, a poor village consisting of a few scattered houses about 30 m. west of Ras Fartak. Sihut is a similar village 20 m. farther west. The mountains rise to a height of 4000 ft. within a short distance of the coast, covered in places with trees, among which are the myrrh- and frankincense-bearing shrubs. These gums, for which the coast was celebrated in ancient days, are still produced ; the best quality is obtained in the Gara country, on the northern slope of the mountains. Dhafar and the mountains behind it were visited and surveyed by Mr Bent's party in 1894. There are several thriving villages on the coast, of which el-Hafa is the principal port of export for frankin- cense; 9000 cwt. is exported annually to Bombay.

Ruins of Sabaean buildings were found by J. T. Bent in the neigh- bourhood of Dhafar, and a remarkable cove or small harbour was discovered at Khor Rori, which he identified with the ancient port of Moscha.

Authorities. — L. Van den Berg, Le Hadramut et les colonies arabes (Batavia, 1885) ; L. Hirsch, Reise in Siidarabien (Leiden, 18 97); J- T. Bent, Southern Arabia (London, 1895); A. von Wrede, Reise in Hadhramut (Brunswick, 1870) ; H. J. Carter, Trans.

Bombay As. Soc. (1845), 47–51 ; Journal R.G.S. (1837). (R. A. W.)

HADRIA [mod. Atri (q.v.)], perhaps the original terminal, point of the Via Caecilia, Italy. It belonged to the Praetutii. It became a colony of Rome in 290 B.C. and remained faithful to Rome. The coins which it issued (probably during the Punic Wars), are remarkable. The crypt of the cathedral of the modern town was originally a large Roman cistern; another forms the foundation of the ducal palace; and in the eastern portion of the town there is a complicated system of underground passages for collecting and storing water.

See Notizze degli scam (1902), 3. (T. As.) '

HADRIAN (Publius Aelius Hadrianus), Roman emperor a.d. 1 1 7–138, was born on the 24th of January a.d. 76, at Italica in Hispania Baetica (according to others, at Rome), where his ancestors, originally from Hadria in Picenum, had been settled since the time of the Scipios. On his father's death in 85 or 86 he was placed under the guardianship of two fellow- countrymen, his kinsman Ulpius Trajanus (afterwards the emperor Trajan), and Caelius Attianus (afterwards prefect of the praetorian guard). He spent the next five years at Rome, but at the age of fifteen he returned to his native place and entered upon a military career. He was soon, however, recalled to Rome by Trajan, and appointed to the offices of decemvir stlitibus judicandis, praefectus jeriarum Laiinarum, and sevir turmae equitum Romanorum. About 95 he was military tribune in lower Moesia. In 97 he was sent to upper Germany to convey the congratulations of the army to Trajan on his adoption by Nerva; and, in January of the following year, he hastened to announce the death of Nerva to Trajan at Cologne. Trajan, who had been set against Hadrian by reports of his extravagance, soon took him into favour again, chiefly owing to the goodwill of the empress Plotina, who brought about the marriage of Hadrian with (Vibia) Sabina, Trajan's great-niece. In 101 Hadrian was quaestor, in 105 tribune of the people, in 106 praetor. He

served with distinction in both Dacian campaigns: in the second Trajan presented him with a valuable ring which he himself had received from Nerva, a token of regard which seemed to designate Hadrian as his successor. In 107 Hadrian was legatus praetorius of lower Pannonia, in 108 consul suffectus, in 112 archon at Athens, legatus in the Parthian campaign (113- 117), in 117 consul designatus for the following year, in 119 consul for the third and last time only for four months. When Trajan, owing to a severe illness, decided to return home from the East, he left Hadrian in command of the army and governor of Syria. On the 9th of August 117, Hadrian, at Antioch, was informed

of his adoption by Trajan, and, on the nth, of the death of the latter at Selinus in Cilicia. According to Dio Cassius (lxix. i) the adoption was entirely fictitious, the work of Plotina and Attianus, by whom Trajan's death was concealed for a few days in order to facilitate the elevation of Hadrian. Whichever may have been the truth, his succession was confirmed by the army and the senate. He hastened to propitiate the former by a donative of twice the usual amount, and excused his hasty acceptance of the throne to the senate by alleging the impatient zeal of the soldiers and the necessity of an imperator for the welfare of the state.

Hadrian's first important act was to abandon as untenable the conquests of Trajan beyond the Euphrates (Assyria, Meso- potamia and Armenia), a recurrence to the traditional policy of Augustus. The provinces were unsettled, the barbarians on the borders restless and menacing, and Hadrian wisely judged that the old limits of Augustus afforded the most defensible frontier. Mesopotamia and Assyria were given back to the Parthians, and the Armenians were allowed a king of their own. From Antioch Hadrian set out for Dacia to punish the Roxolani, who, incensed by a reduction of the tribute hitherto

paid them, had invaded the Danubian provinces. An arrangement was patched up, and while Hadrian was still in Dacia he received news of a conspiracy against his life. Four citizens of consular rank were accused of being concerned in it, and were put to death by order of the senate before he could interfere. Hurrying back to Rome, Hadrian endeavoured to remove the unfavourable impression produced by the whole affair and to gain the goodwill of senate and people. He threw the responsibility for the executions upon the prefect of the praetorian guard, and swore that he would never punish a senator without the assent of the entire body, to which he expressed the utmost deference and consideration. Large sums of money and games and shows were provided for the people, and, in addition, all the arrears of taxation for the last fifteen years (about £10,000,000) were cancelled and the bonds burnt in the Forum of Trajan. Trajan's scheme for the " alimentation " of poor children was carried out upon a larger scale under the superintendence of a special official called praefectus alimentorum.

The record of Hadrian's journeys 1 through all parts of the empire forms the chief authority for the events of his life down to his final settlement in the capital during his last years. They can only be briefly touched upon here. His first great journey probably lasted from 121 to 126. After traversing Gaul he visited the Germanic provinces on the Rhine, and crossed over to Britain (spring, 122), where he built the great rampart from the Tyne to the Solway, which bears his name (see Britain: Roman). He returned through Gaul into Spain, and then proceeded to Mauretania, where he suppressed an insurrection. A war with the Parthians was averted by a personal interview with their king (123). From the Parthian frontier he travelled through Asia Minor and the islands of the Aegean to Athens (autumn, 125), where he introduced various political and com- mercial changes, was initiated at the Eleusinia, and presided at the celebration of the greater Dionysia. After visiting Central Greece and Peloponnesus, he

returned by way of Sicily to Rome (end of 126). The next year was spent at Rome, and, after a visit to Africa, he set out on his second great journey (September 128). He travelled by way of Athens, where he completed and dedicated the buildings (see Athens) begun during his first visit, chief of which was the Olympieum or temple of Olympian Zeus, on which occasion Hadrian himself assumed the name of Olympius. In the spring of 129 he visited Asia Minor and Syria, where he invited the kings and princes of the East to a meeting (probably at Samosata). Having passed the winter at i^tioch, he set out for the south (spring, 130). He ordered Jerusalem to be rebuilt (see Jerusalem) under the name of Aelia Capitolina, and made his way through Arabia to Egypt, where he restored

1 The chronology of Hadrian's journeys — indeed, of the whole reign — is confused and obscure. In the above the article by von Rohden in Pauly-Wissowa's Realencyclopadie has been followed. Weber's (see Bibliog.) is the most important discussion.

the tomb of Pompey at Pelusium with great magnificence. After a short stay at Alexandria he took an excursion up the Nile, during which he lost his favourite Antinous. On the 21st of November 130, Hadrian (or at any rate his wife Sabina) heard the music which issued at sunrise from the statue of Memnon at Thebes (see Memnon). From Egypt Hadrian returned through Syria to Europe (his movements are obscure), but was obliged to hurry back to Palestine (spring, 133) to give his personal attention (this is denied by some historians) to the revolt of the Jews, which had broken out (autumn, 131, or spring, 132) after he had left Syria. The founding of a Roman colony on the site of Jerusalem (Dio Cass. lxix. 12) and the prohibition of circumcision (Spartianus, Hadrianus, 14) are said to have been the causes of the war, but authorities differ considerably as to this and as to the measures which followed the revolt (see art. Jews; also E. Schiirer, Hist, of the Jewish People, Eng. tr., div.

1, vol. ii. p. 288; and S. Krauss in Jewish Encyc. s.v. " Hadrian "), which lasted till 135. Leaving the conduct of affairs in the hands of his most capable general, Julius Severus, in the spring of 134 Hadrian returned to Rome. The remaining years of his life were spent partly in the capital, partly in his villa at Tibur. His health now began to fail, and it became necessary for him to choose a successor, as he had no children of his own. Against the advice of his relatives and friends he adopted L. Ceionius Commodus under the name of L. Aelius Caesar, who was in a feeble state of health and died on the 1st of January 138, before he had an opportunity of proving his capabilities. Hadrian then adopted Arrius Antoninus (see Antoninus Pius) on condition that he should adopt M. Annius Verus (afterwards the emperor Marcus Aurelius) and the son of L. Aelius Caesar, L. Ceionius Commodus (after- wards the emperor Commodus). Hadrian died at Baiae on the 10th of July 138.

He was without doubt one of the most capable emperors who ever occupied the throne, and devoted his great and varied talents to the interests of the state. One of his chief objects was the abolition of distinctions between the provinces and the mother country, finally carried out by Caracalla, while at the same time he did not neglect reforms that were urgently called for in Italy. Provincial governors were kept under strict super- vision; extortion was practically unheard of; the jus Latii was bestowed upon several communities; special officials were instituted for the control of the finances; and the emperor's interest in provincial affairs was shown by his personal assumption of various municipal offices. New towns were founded and old ones restored; new streets were laid out, and aqueducts, temples and magnificent buildings constructed. In Italy itself the ad- ministration of justice and the finances required special attention. Four legati juridici (or simply juridici) of consular rank were appointed for Italy, who took over certain important judicial functions formerly exercised by local magistrates (cases of fideicommissa, the nomination

of guardians). The judicial council (consiliarii Augusti, later called consistorium) , composed of persons of the highest rank (especially jurists), became a permanent body of advisers, although merely consultative. Roman law owes much to Hadrian, who instructed Salvius Julianus to draw up an edictum perpeluum, to a great extent the basis of Justinian's Corpus juris (see M. Schanz, Geschichte der romischen Literatur, iii. p. 167). In the administration of finance, in addition to the remission of arrears already mentioned, a revision of claims was ordered to be made every fifteen years, thereby anticipating the " indictions " (see Calendar; Chron- ology). Direct collection of taxes by imperial procurators was substituted for the system of farming, and a special official (advocatus fisei) was instituted to look after the interests of the imperial treasury. The gift of " coronary gold " (aurum coro- narium), presented to the emperor on certain occasions, was entirely remitted in the case of Italy, and partly in the case of the provinces. The administration of the postal service throughout the empire was taken over by the state, and municipal officials were relieved from the burden of maintaining the imperial posts. ' Humane regulations as to the treatment of slaves were strictly

enforced; the master was forbidden to put his slave to death, but was obliged to bring him before a court of justice; if he ill-treated him it was a penal offence. The sale of slaves (male and female) for immoral and gladiatorial purposes was forbidden; the custom of putting all the household to death when their master was murdered was modified. The public baths were kept under strict supervision; the toga was ordered to be worn in public by senators and equites on solemn occasions; extravagant banquets were prohibited; rules were made to prevent the congestion of traffic in the streets. In

military matters Hadrian was a strict disciplinarian, but his generosity and readiness to share their hardships endeared him to the soldiers. He effected a material and moral improvement in the conditions of service and mode of life, but in other respects he does not appear to have introduced any important military reforms. During his reign an advance was made in the direction of creating an organ- ized body of servants at the disposal of the emperor by the appointment of equites to important administrative posts, without their having performed the miliiiae equestres (see Equites). Among these posts were various procuratorships (chief of which was that of the imperial fisc), and the offices ab epistidis, a rationibus and a libellis (secretary, accountant, receiver of petitions). The prefect of the praetorian guard was now the most important person in the state next to the emperor, and subsequently became a supreme judge of appeal. Among the magnificent buildings erected by Hadrian mention may be made of the following: In the capital, the temple of Venus and Roma; his splendid mausoleum, which formed the groundwork of the castle of St Angelo; the pantheon of Agrippa; the Basilica Neptuni; at Tibur the great villa 8 m. in extent, a kind of epi- tome of the world, with miniatures of the most celebrated places in the provinces. Athens, however, was the favourite site of his architectural labours; here he built the temple of Olympian Zeus, the Panhellenion, the Pantheon, the library, a gymnasium and a temple of Hera.

Hadrian was fond of the society of learned men — poets, scholars, rhetoricians and philosophers — whom he alternately humoured and ridiculed. In painting, sculpture and music he considered himself the equal of specialists. The architect Apollodorus of Damascus owed his banishment and death to his outspoken criticism of the emperor's plans. The sophist Favorinus was more politic; when reproached for yielding too readily to the emperor in some grammatical discussion, he replied that it was unwise to contradict the master of thirty legions. The Athenaeum (q.v.) owed its foundation to Hadrian.

He was a man of considerable intellectual attainments, of prodigious memory, master of both Latin and Greek, and wrote prose and verse with equal facility. His taste, however, was curious; he preferred Cato the elder, Ennius and Caelius Antipater to Cicero, Virgil and Sallust, the obscure poet Antimachus to Homer and Plato. As awriter he displayed great versatility. He composed an autobiography, published under the name of his freedman Phlegon; wrote speeches, fragments of two of which are preserved in inscriptions (a panegyric on his mother-in-law Matidia, and an address to the soldiers at Lambaesis in Africa). In imitation of Antimachus he wrote a work called Catachannae, probably a kind of miscellanea. The Latin and Greek anthologies contain about a dozen epigrams under his name. The letter of Hadrian to the consul Servianus (in Vopiscus, Vita Satumini, 8) is no longer considered genuine. Hadrian's celebrated dying address to his soul may here be quoted: —

" Animula vagula, blandula, Hospes comesque corporis, Quae nunc abibis in loca Pallidula, rigida, nudula; Nee, ut soles, dabis iocos?"

The character of Hadrian exhibits a mass of contradictions, well summed up by Spartianus (14. n). He was grave and gay, affable and dignified, cruel and gentle, mean and generous, eager for fame yet not vain, impulsive and cautious, secretive and open. He hated eminent qualities in others, but gathered round him the most distinguished men of the state; at one time affectionate

towards his friends, at another he mistrusted and put them to death. In fact, he was only consistent in his inconsistency {semper in omnibus varius). Although he endeavoured to win the popular favour, he was more feared than loved. A man of unnatural passions and grossly superstitious, he was an ardent lover of nature. But, with all his faults, he devoted himself so indefatigably to the service of the state, that the period of his reign could be characterized as a " golden age."

The chief ancient authorities for the reign of Hadrian are: the life by Aelius Spartianus in the Scriptores historiae Augustae (see Augustan History and bibliography) ; the epitome of Dio Cassius (lxix.) by Xiphilinus; Aurelius Victor, Epit. 14, probably based on Marius Maximus; Eutropius viii. 6; Zonaras xi. 23; Suidas, s.v. 'ASptaros: and numerous inscriptions and coins. The autobio- graphy was used by both Dio Cassius and Marius Maximus. Modern authorities: C. Merivale, Hist, of the Romans under the Empire, ch. Ixvi.; H. Schiller, Geschichte der rbmischen Kaiserzeit, i. 2, p. 602 (1883); J. B. Bury, The Student's Roman Empire (1893), where a concise table of the journeys is given; P. von Rohden, s.v. " Aelius " (No. 64) in Pauly-Wissowa's Realencyclopddie, i. 1 (1894); J. Diirr, Die Reisen des Kaisers Hadrian (1881) ; F. Gregorovius, The Emperor Hadrian (Eng. tr. by Mary E. Robinson, 1898); A. Hausrath, Neutestamentliche Zeitgeschichte, iii. (1874); W. Schurz, De muta- tionibus in imperio ordinando ab imp. Hadr. factis, i. (Bonn, 1883); J. Plew, Quellenuntersuchungen zur Geschichte des Kaisers Hadrian (Strassburg, 1890); O. T. Schulz, " Leben des Kaisers Hadrian," Quellenanalysen [of Spartianus' Vita] (1904) ; E. Kornemann, Kaiser Hadrian und der letzte grosse Historiker von Rom (1905); W. Weber, Untersuchungen zur Geschichte des Kaisers Hadrianus (1908) ; H. F. Hitzig, Die Stellung Kaiser Hadrians in der romischen Rechts geschichte (1892); C. Schultess, Baulen des Kaisers Hadrian (1898); G. Doublet, Notes sur les ceuvres litteraires de I'empereur Hadrien (Toulouse, 1893); J. B. Lightfoot, Apostolic Fathers, ii. I, 476 seq.; Sir VV. M. Ramsay, Church in the Roman Empire, pp. 320 seq. ; V. Schultze, in Herzog-Hauck's Realencyklopddie, vii. 315; histories of Roman literature by Teuffel-Schwabe and Schanz. On Aelius Caesar, see Class. Quart., 1908, i. (T. K. ; J. H. F.)

HADRIAN'S WALL, the name usually given to the remains of the Roman fortifications which defended the northern frontier of the Roman province of Britain, between the TyneandtheSolway. The works

consisted of (1) a continuous defensive rampart with a ditch in front and a road behind; (2) various forts, blockhouses and towers along the rampart; and (3) an earthwork to the south of it, generally called the Vallum, of uncertain use. The defensive wall was probably first erected by Hadrian about a.d. 122 as a turf wall, and rebuilt in stone by Septimius Severus about a.d. 208. See further Britain: Roman.

HADRUMETUM, a town of ancient Africa on the southern extremity of the sinus N eapolitanus (mod. Gulf of Hammamet) on the east coast of Tunisia. The site is partly occupied by the modern town of Susa (q.v.). The form of the name Hadru- metum varied much in antiquity; the Greeks called it 'ASpujUTjs, 'ASpvfirjros, 'ASpafivr-qs, 'Adpafxryros: the Romans Adrumetum, Adrimetum, Hadrumetum, Hadrymetum, &c; inscriptions and coins gave Hadrumetum. The town was originally a Phoenician colony founded by Tyrians long before Carthage (Sallust, Jug. 19). It became subject to Carthage, but lost none of its prosperity. Often mentioned during the Punic Wars, it was captured by Agathocles in 310, and was the refuge of Hannibal and the remnants of his army after the battle of Zama in 202. During the last Punic War it gave assistance to the Romans; after the fall of Carthage in 146 it received an accession of territory and the title of civitas libera (Appian, Punica, xciv.; C.I.L. i. p. 84). Caesar landed there in 46 B.C. on his way to the victory of Thapsus (De hello Afric. iii.; Suetonius, Div. Jul. lix.).

In the organization of the African provinces Hadrumetum became a capital of the province of Byzacena. Its harbour was extremely busy and the surrounding country unusually fertile. Traja^made it a Latin colony under the title of Colonia Concordia Ulpia Trajana Augusta Frugifera Hadrumetina; a dedication to the emperor Gordian the Good, found by M. Cagnat at Susa in 1883 gives these titles to the town, and at the same time identifies it with Susa. Quarrels arose between Hadrumetum and its neighbour Thysdrus in connexion with the temple of Minerva

situated on the borders of their respective territories (Frontinus, Growa^«,ed.Lachmannus,p.57) ;Vespasian

when pro-consul of Africa had to repress a sedition among its inhabitants (Suetonius, Vesp. iv.; Tissot, Fastes de la prov. d' Afrique, p. 66); it was the birthplace of the emperor Albinus. At this period the metropolis of Byzacena was after Carthage the most important town in Roman Africa. It was the seat of a bishopric, and its bishops are mentioned at the councils of 258, 348, 393 and even later. Destroyed by the Vandals in 434 it was rebuilt by Justinian and renamed Justinianopolis (Procop. De aedif. vi. 6). The Arabic invasion at the end of the 7th century destroyed the Byzantine towns, and the place became the haunt of pirates, protected by the Kasbah (citadel); it was built on the substructions of the Punic, Roman and Byzantine acropolis, and is used by the French for military purposes. The Arabic geographer Bakri gave a description of the chief Roman buildings which were standing in his time (Bakri, Descr. de V Afrique, tr. by de Slane, p. 83 et seq.). The modern town of Susa, despite its commercial prosperity, occupies only a third of the old site.

In 1863 the French engineer, A. Daux, discovered the jetties and the moles of the commercial harbour, and the line of the military harbour (Cothon); both harbours, which were mainly artificial, are entirely silted up. There remains a fragment of the fortifications of the Punic town, which had a total length of 6410 metres, and remains of the substructions of the Byzantine acropolis, of the circus, the theatre, the water cisterns, and of other buildings, notably the interesting Byzantine basilica which is now used as an Arab cafe (Kahwat-el-Kubba). In the ruins there have been found numerous columns of Punic in- scriptions, Roman inscriptions and mosaic, among which is one

representing Virgil seated, holding the Aeneid in his hand; another represents the Cretan labyrinth with Theseus and the Minotaur (Heron de Villefosse, Revue de I' Afrique francaise, v., December 1887, pp. 384 and 394; Comptes rendus de I' Acad. dcs Inscr. et Belles-Lettres, 1892, p. 318; other mosaics, ibid., 1896, p. 578; Revue archeol., 1897). In 1904 Dr Carton and the abbe Leynaud discovered huge Christian catacombs with several miles of subterranean galleries to which access is obtained by a small vaulted chamber. In these catacombs we find numerous sarcophagi and inscriptions painted or engraved of the Roman and Byzantine periods {Comptes rendus de P Acad, des Inscr. et Belles-Lettres, 1904-1907; Carton and Leynaud, Les Catacombes d'Hadrumete, Susa, 1905). We can recognize also the Punic and Pagan-Roman cemeteries (C. R. de I' Acad, des Inscr. et Belles- Lettres, 1887; Bull, archeol. du Comite, 1885, p. 149; 1903, p. 157). The town had no Punic coins, but under the Roman domination there were coins from the time of the Republic. These are of bronze and bear the name of the city in abbreviations, Hadr or Hadrvm accompanying the head of Neptune or the Sun. We find also the names of local duumvirs. Under Augustus the coins have on the obverse the imperial effigy, and on the reverse the names and often the effigies of the pro-consuls who governed the province, P. Quintilius Varus, L. Volusius Saturninus and Q. Fabius Maximus Africanus. After Augustus the mint was finally closed.

Authorities. — A. Daux, Recherches sur Vorigine et I 'emplacement des emporia pheniciens dans le Zeugis et le Byzacium (Paris, 1869); Ch. Tissot, Geographic comparee de la province romaine d' Afrique, ii. p. 149; Cagnat, Explorations archeol. en Tunisie (2nd and 3rd fasc., 1885); Lud. Milller, Numismatique de V Afrique ancienne, ii. p. 51; M. Palat, in the Bulletin arch, du Comite des travaux historiques (1885), pp. 121 and 150; Revue archeologique (1884 and 1897) ; Bulletin des antiquites africaines (1884 and 1885); Bulletin de la Societe archeologique de Sousse (first published in 1903); Atlas archeol. de Tunisie (4th fascicule, with the plan of

Hadrumetum). (E. B.) .*

HAECKEL, ERNST HEINRICH (1834-), German biologist, was born at Potsdam on the 16th of February 1834. He studied medicine and science at Wiirzburg, Berlin and Vienna, having for his masters such men as Johannes Miiller, R. Virchow and R. A. Kolliker, and in 1857 graduated at Berlin as M.D. and M.Ch. At the wish of his father he began to practise as a doctor in that city, but his patients were few in number, one reason being that he did not wish them to be many, and after a short time he turned to more congenial pursuits. In 1861, at the

instance of Carl Gegenbaur, he became Privatdozent at Jena: in the succeeding year he was chosen extraordinary professoi of comparative anatomy and director of the Zoological Institute in the same university; in 1865 he was appointed to a chair of zoology which was specially established for his benefit. This last position he retained for 43 years, in spite of repeated invita- tions to migrate to more important centres, such as Strassburg or Vienna, and at Jena he spent his life, with the exception of the time he devoted to travelling in various parts of the world, whence in every case he brought back a rich zoological harvest. As a field naturalist Haeckel displayed extraordinary power and industry. Among his monographs may be mentioned those on Radiolaria (1862), Siphonophora (1869), Monera (1870) and Calcareous Sponges (1872), as well as several Challenger reports, viz. Deep-Sea Medusae (1881), Siphonophora (1888), Deep-Sea Keralosa (1889) and Radiolaria (1887), the last beingaccompanied by 140 plates and enumerating over four thousand new species. This output of systematic and descriptive work would alone have constituted a good life's work, but Haeckel in addition wrote copiously on biological theory. It happened that just when he was beginning his scientific career Darwin's Origin of Species was published (1859), and such was the influence it exercised over him that he became the apostle of Darwinism in Germany. He was, indeed, the first German biologist to give a whole-hearted adherence to the doctrine of organic

evolution and to treat it as the cardinal conception of modern biology. It was he who first brought it prominently before the notice of German men of science in his first memoir on the Radiolaria, which was com- pletely pervaded with its spirit, and later at the congress of naturalists at Stettin in 1863. Darwin himself has placed on record the conviction that Haeckel's enthusiastic propagandism of the doctrine was the chief factor of its success in Germany. His book on General Morphology (1866), published when he was only thirty-two years old, was called by Huxley a suggestive attempt to work out the practical application of evolution to its final results; and if it does not take rank as a classic, it will at least stand out as a landmark in the history of biological doctrine in the 19th century. Although it contains a statement of most of the views with which Haeckel's name is associated, it did not attract much attention on its first appearance, and accordingly its author rewrote much of its substance in a more popular style and published it a year or two later as the Natural History of Creation (Natiirliche Schopfungsgeschichte) , which was far more successful. In it he divided morphology into two sections — tectology, the science of organic individuality; and promorphology, which aims at establishing a crystallography of organic forms. Among other matters, he laid particular stress on the " fundamental biogenetic law " that ontogeny re- capitulates phylogeny, that the individual organism in its development is to a great extent an epitome of the form-modifica- tions undergone by the successive ancestors of the species in the course of their historic evolution. His well-known " gastraea " theory is an outcome of this generalization. He divided the whole animal creation into two categories — the Protozoa or unicellular animals, and the Metazoa or multicellular animals, and he pointed out that while the former remain single- celled throughout their existence, the latter are only so at the beginning, and are subsequently built up of innumerable cells, the single primitive egg- cell (ovum) being transformed by cleavage into a

globular mass of cells (morula), which first becomes a hollow vesicle and then changes into the gastrula. The simplest multi- cellular animal he conceived to resemble this gastrula with its two primary layers, ectoderm and endoderm, and the earliest hypothetical form of this kind, from which the higher animals might be supposed to be actually descended, he called the " gastraea." This theory was first put forward in the memoir on the calcareous sponges, which in its sub-title was described as an attempt at an analytical solution of the problem of the origin of species, and was subsequently elaborated in various Studies on the Gastraea Theory (1873-1884). Haeckel, again, was the first to attempt to draw up a genealogical tree (Stammbaum) exhibiting the relationship between the various orders of animals

with regard both to one another and their common origin. His earliest attempt in the General Morphology was succeeded by many others, and his efforts in this direction may perhaps be held to culminate in the paper he read before the fourth Inter- national Zoological Congress, held at Cambridge in 1898, when he traced the descent of the human race in twenty-six stages from organisms like the still-existing Monera, simple structureless masses of protoplasm, and the unicellular Protista, through the chimpanzees and the Pithecanthropus ereclus, of which a few fossil bones were discovered in Java in 1894, and which he held to be undoubtedly an intermediate form connecting primitive man with the anthropoid apes.

Not content with the study of the doctrine of evolution in its zoological aspects, Haeckel also applied it to some of the oldest problems of philosophy and religion. What he termed the in- tegration of his views on these subjects he published under the title of Die Wellratsel (1899), which in 1901 appeared in English as The Riddle of

the Universe. In this book, adopting an un- compromising monistic attitude, he asserted the essential unity of organic and inorganic nature. According to his " carbon- theory," which has been far from achieving general acceptance, the chemico- physical properties of carbon in its complex albu- minoid compounds are the sole and the mechanical cause of the specific phenomena of movement which distinguish organic from inorganic substances, and the first development of living proto- plasm, as seen in the Monera, arises from such nitrogenous carbon-compounds by a process of spontaneous generation. Psychology he regarded as merely a branch of physiology, and psychical activity as a group of vital phenomena which depend solely on physiological actions and material changes taking place in the protoplasm of the organism in which it is manifested. Every living cell has psychic properties, and the psychic life of multicellular organisms is the sum-total of the psychic functions of the cells of which they are composed. Moreover, just as the highest animals have been evolved from the simplest forms of life, so the highest faculties of the human mind have been evolved from the soul of the brute-beasts, and more remotely from the simple cell-soul of the unicellular Protozoa. As a consequence of these views Haeckel was led to deny the im- mortality of the soul, the freedom of the will, and the existence of a personal God.

Haeckel's literary output was enormous, and at the time of the celebration of his sixtieth birthday at Jena in 1894 he had produced 42 works with 13,000 pages, besides numerous scientific memoirs. In addition to the works already mentioned, he wrote Freie Wissenschaft und freie Lehre (1877) in reply to a speech in which Virchow objected to the teaching of the doctrine of evolution in schools, on the ground that it was an unproved hypothesis; Die systematische Phylogenie (1894), which has been pronounced his best book; Anthropogenie (1874, 5th and enlarged edition 1903), dealing with the evolution of man; Uber unsere gegenwdrtige Kenninis vom Ursprung des Menschen (1898, translated into

English as The Last Link, 1898); Der Kampf urn den Entwickelungsgedanken (1905, English version, Last Words on Evolution, 1906); Die Lebenswunder (1904), a supple- ment to the Riddle of the Universe; books of travel, such as Indische Reisebriefe (1882) and Aus Insulinde (1901), the fruits of journeys to Ceylon and to Java; Kunstformen der Natur (1904), with plates representing beautiful marine animal forms; and Wanderbilder (1905), reproductions of his oil-paintings and water-colour landscapes.

There are biographies by W. Bolsche (Dresden, 1900, translated into English by Joseph McCabe, with additions, London, 1906) and by Breitenbach (Odenkirchen, 1904). See also-Walther May, Ernst Haeckel; Versuch einer Chronih seines Lebens und Werkens (Leipzig,

1909).

HAEMATITE, or Hematite, a mineral consisting of ferric 1 oxide (Fe20 3), named from the Greek word 'al/xa, " blood," in allusion to its typical colour, whence it is called also red iron ore. When crystallized, however, haematite often presents a dark colour, even iron-black; but on scratching the surface, the powder of the streak shows the colour of dried blood. Haematite crystallizes in the rhombohedral system, and is isomorphous

Fig. 1.

Fig. 2.

with corundum (AI2O3). The habit of the crystals may be

rhombohedral, pyramidal or tabular, rarely prismatic. In fig. 1

the crystal, from Elba, shows a combination of the fundamental

rhombohedron ®, an obtuse rhom-

bohedron (s), and the hexagonal bi-

pyramid («). Fig. 2 is a tabular crystal in which the basal pinacoid (0) predominates. Haematite has no distinct cleavage, but may show, in consequence of a lamellar structure, a tendency to parting along certain planes.

Crystallized haematite, such as that from the iron-mines of Elba, presents a steel-grey or iron- black colour, with a brilliant metallic lustre, sometimes beauti- fully iridescent. The splendent surface has suggested for this mineral such names as specular iron ore, looking-glass ore, and iron glance (fer oligisle of French writers). The hardness of the crystallized haematite is about 6, and the specific gravity 5-2. The so-called " iron roses " (Eisenrosen) of Switzerland are rosette-like aggregates of hexagonal tabular crystals, from fissures in the gneissose rocks of the Alps. Specular iron ore occurs in the form of brilliant metallic scales on many lavas, as at Vesuvius and Etna, in the Auvergne and the Eifel, and notably in the Island of Ascension, where the mineral forms beautiful tabular crystals. It seems to be a sublimation-product formed in volcanoes by the interaction of the vapour of ferric chloride and steam.

Specular haematite forms a constituent of certain schistose rocks, such as the Brazilian itabirite. In the Marquette district of Michigan (Lake Superior) schistose specular ore occurs in important deposits, associated with a jasper rock, in which the ore alternates with bands of red quartzite. Micaceous iron ore consists of delicate steel-grey scales of specular haematite, unctuous to the touch, used as a lubricant and also as a pigment. It is worked in Devonshire under the name of shining ore. Very thin laminae of haematite, blood-red by transmitted

light, occur as microscopic enclosures in certain minerals, such as carnallite and sun-stone, to which they impart colour and lustre. Much haematite occurs in a compact or massive form, often mammillary, and presenting on fracture a fibrous structure. The reniform masses are known as kidney ore. Such red ore is generally neither so dense nor so hard as the crystals. It often passes into an earthy form, termed soft red ore, and when mixed with more or less clay constitutes red ochre, ruddle or reddle (Ger. Rotel).

The hard haematite is occasionally cut and polished as an ornamental stone, and certain kinds have been made into beads simulating black pearls. It was worked by the Assyrians for their engraved cylinder-seals, and was used by the gnostics for amulets. Some of the native tribes in the Congo basin employ it as a material for axes. The hard fibrous ore of Cumberland is known as pencil ore, and is employed for the burnishers used by bookbinders and others. Santiago de Compostela in Spain furnishes a considerable supply of haematite burnishers.

Haematite is an important ore of iron (q.v.), and is extensively worked in Elba, Spain (Bilbao), Scandinavia, the Lake Superior region and elsewhere. In England valuable deposits occur in the Carboniferous Limestone of west Cumberland (Whitehaven district) and north Lancashire (Ulverston district). The hard ore is siliceous, and fine crystallized specimens occur in associa- tion with smoky quartz. The ore is remarkably free from phosphorus, and is consequently valued for the production of pig- iron to be converted into Bessemer steel. (F. W. R.)*

HAEMATOCELE (Gr. alfia, blood, and (£17X17, tumour), the medical term for a localized collection of blood in the tunica vaginalis or cord. It is usually the result of a sudden blow or severe strain, but may arise from disease. At first it forms a smooth, fluctuating, opaque swelling, but later becomes hard and firm. In chronic cases the walls of the tunica vaginalis

undergo changes. The treatment of a case seen soon after the injury is directed towards keeping the patient at rest, elevating the parts, and applying an evaporating lotion or ice-bag. In chronic cases it may be necessary to lay open the cavity and remove the coagulum.

HAEMOPHILIA, the medical term for a condition of the vascular system, often running in families, the members of which are known as " bleeders," characterized by a disposition towards bleeding, whether with or without the provocation of an injury to the tissue. When this, bleeding is spontaneous it comes from the mucous membranes, especially from the nose, but also from the mouth, bowel and bronchial tubes. Slight bruises are apt to be followed by extravasations of blood into the tissues; the swollen joints (knee especially) of a bleeder are probably due, in the first instance, to the escape of blood into the joint cavity or synovial membrane. It is always from the smallest vessels that the blood escapes, and may do so in such quantities as to cause death in a few hours.

HAEMORRHAGE (Gr. al/ia, blood, and fayvvvai, to burst), a general term for any escape of blood from a blood-vessel (see Blood). It commonly results from injury, as the tearing or cutting of a blood-vessel, but certain forms result from disease, as in scurvy and purpura. The chief varieties of haemorrhage are arterial, venous and capillary. Bleeding from an artery is of a bright red colour, and escapes from the end of the vessel nearest the heart in jets synchronous with the heart's beat. Bleeding from a vein is of a darker colour; the flow is steady, and the bleeding is from the distal end of the vessel. Capillary bleeding is a general oozing from a raw surface. By extravasation of blood is meant the pouring out of blood into the areolar tissues, which become boggy. This is termed a bruise or ecchymosis. Epislaxis is a term given to bleeding from the nose.

Haemat- emesis is vomiting of blood, the colour of which may be altered by digestion, as is also the case in melaena, or passage of blood with the faeces, in which the blood becomes dark and tarry-looking from the action of the intestinal fluids. Haemoptysis denotes an escape of blood from the air-passages, which is usually bright red and frothy from admixture with air. Haematuria means passage of blood with the urine.

Cessation of bleeding may take place from natural or from artificial means. Natural arrest of haemorrhage arises from (1) the coagulation of the blood itself, (2) the diminution of the heart's action as in fainting, (3) changes taking place in the cut vessel causing its retraction and contraction. In the surgical treatment of haemorrhage minor means of arresting bleeding are: cold, which is most valuable in general oozing and local extravasations; very hot water, 130 to 160 F., a powerful haemostatic; position, such as elevation of the limb, valuable in bleeding from the extremities; styptics or astringents, applied locally, as perchloride of iron, tannic acid and others, the most valuable being suprarenal extract. In arresting haemorrhage temporarily the chief thing is to press directly on the bleeding part. The pressure to be effectual need not be severe, but must be accurately applied. If the bleeding point cannot be reached, the pressure should be applied to the main artery between the bleeding point and the heart. In small blood-vessels pressure will be sufficient to arrest haemorrhage permanently. In large vessels it is usual to pass a ligature round the vessel and tie it with a reef-knot. Apply the ligature, if possible, at the bleeding point, tying both ends of the cut vessel. If this cannot be done, the main artery of the limb must be exposed by dissection at the most accessible point between the wound and the heart, and there ligatured.

Haemorrhage has been classified as — (1) primary, occurring at the time of the injury; (2) reactionary, or within twenty-four hours of the accident, during the stage of reaction; (3)

secondary, occurring at a later period and caused by faulty application of a ligature or septic condition of the wound. In severe haemor- rhage, as from the division of a large artery, the patient may collapse and death ensue from syncope. In this case stimulants and strychnine may be given, but they should be avoided until it is certain the bleeding has been properly controlled, as they

tend to increase it. Transfusion of blood directly from the vein of a healthy person to the blood-vessels of the patient, and infusion of saline solution into a vein, may be practised (see Shock). In a congenital condition known as haemophylia (g.v.) it is difficult to stop the flow of blood.

The surgical procedure for the treatment of an open wound is — (1) arrest of haemorrhage; (2) cleansing of the wound and removal of any foreign bodies; (3) careful apposition of its edges and surfaces — the edges being best brought in contact by sutures of aseptic silk or catgut, the surfaces by carefully applied pressure; (4) free drainage, if necessary, to prevent accumulation either of blood or serous effusion; (5) avoidance of sepsis; (6) perfect rest of the part. These methods of treat- ment require to be modified for wounds in special situations and for those in which there is much contusion and laceration. When a special poison has entered the wound at the time of its infliction or at some subsequent date, it is necessary to provide against septic conditions of the wound itself and blood-poisoning of the general circulation.

HAEMORRHOIDS, or Hemorrhoids (from Gr. alua, blood, and peiv, to flow), commonly called piles, swellings formed by the dilatation of veins of the lowest part of the bowel, or of those just outside the margin of its aperture. The former, internal piles, are covered by mucous membrane; the latter, external piles, are just beneath the skin. As the veins of the lining of the bowel become dilated they form definite bulgings within the bowel, and, at last increasing in size, escape through the anus when a motion is being passed. Growing still larger, they

may come down spontaneously when the individual is standing or walking, and they are apt to be a grave source of pain or annoyance. Eventually they may remain constantly protruded — nevertheless, they are still internal piles because they arise from the interior of the bowel. Though a pile is sometimes solitary, there are usually several of them. They are apt to become inflamed, and the inflammation is associated with heat, pain, discharge and general uneasiness; ulceration and bleeding are also common symptoms, hence the term " bleeding piles." The external pile is covered by the thin dark-coloured skin of the anal margin. Severe pressure upon the large abdominal veins may retard the upward flow of blood to the heart and so give rise to piles; this is apt to happen in the case of disease of the liver, malignant and other tumours, and pregnancy. General weakness of the constitution or of the blood-vessels and habitual constipation may be predisposing causes of piles. The exciting cause may be vigorous straining at stool or exposure to damp, as from sitting on the wet ground. Piles are often only a symptom, and in their treatment this fact should be kept in view; if the cause is removed the piles may disappear. But in some cases it may be impossible to remove the cause, as when a widely-spreading cancerous growth of the rectum, or of the interior of the pelvis or abdomen, is blocking the upward flow of blood in the veins. Sometimes when a pile has been protruded, as during defaecation, it is tightly grasped by spasmodic contraction of the circular muscular fibres which guard the outlet of the bowel, and it then becomes swollen, engorged and extremely painful; the strangu- lation may be so severe that the blood in the vessels coagulates and the pile mortifies. This, indeed, is nature's attempt at curing a pile, but it is distressing, and, as a rule, it is not entirely successful.

The palliative treatment of piles consists in obtaining a daily and easy action of the bowels, in rest, cold bathing, astringent injections, lotions and ointments. The radical treatment consists in their removal by operation, but this should not be

contemplated until palliative treatment has failed. The operation consists in drawing the pile well down, and strangling the vessels entering and leaving its base, either by a strong ligature tightly applied, by crushing, or by cautery. Before dealing with the pile the anus is vigorously dilated in order that the pile may be dealt with with greater precision, and also that the temporary paralysis of the sphincter muscle, which follows the stretching, may prevent the occurrence of painful and spasmodic contractions subsequently. The ligatures by which the base of the piles are strangulated

slough ofE with the pile in about ten days, and in about ten days more the individual is, as a rule, well enough to return to his work. If, for one reason or another, no operation is to be under-taken, and the piles are troublesome, relief may be afforded by warm sponging and by sitz-baths, the pile being gently dried afterwards by a piece of soft linen, smeared with vaseline, and carefully returned into the bowel. Under surgical advice, cocaine or morphia may be brought in contact with the tender parts, either in the form of lotion, suppository or ointment. In operating upon internal piles it is undesirable to remove all the external piles around the anus, lest the contraction of the circumferential scar should cause permanent narrowing of the orifice. If, as often happens, blood clots in the vein of an external pile, the small, hard, tender swelling may be treated with anodyne fomentations, or it may be rendered insensitive by the ether spray and opened by a small incision, the clot being turned out. (E. O.*)

HAEMOSPORIDIA, in zoology, an order of Ectospora, which although comparatively few in number and very inconspicuous in size and appearance, have of late years probably attracted greater attention and been more generally studied than any other Sporozoa ; the

reason being that they include the organ- isms well known as malarial parasites. In spite, however, of much and careful recent research — to a certain extent, rather, as a result of it— it remains the case that the Haemosporidia are, in some respects, the group of the Ectospora about which our knowledge is, for the time being, in the most unsatisfactory condition. Such important questions, indeed, as the scope and boundaries of the group, its exact origin and affinities, the rank and interclassification of the forms admittedly included in it, are answered quite differently by different workers. For example, one well-known Sporozoan authority (M. Luhe) has recently united the two groups, Haemosporidia and Haemoflagellates, bodily into one, while others {e.g. Novy and McNeal) deny that there is any connexion whatever between ” Cytozoa ” and Trypanosomes. Again, the inclusion or exclusion of forms like Piroplasma and Halteridium is also the subject of much discus- sion. The present writer accepts here the view that the Haemo- sporidia are derived from Haemoflagellates which have developed a gregariniform (Sporozoan) phase at the expense, largely or entirely, of the flagelliform one. The not inconsiderable differ- ences met with among different types are capable of explanation on the ground that certain forms have advanced farther than others along this particular line of evolution. In other words, it is most probable that the Haemosporidia are to be regarded as comprising various parasites which represent different stages intermediate between, on the one side, a Flagellate, and on the other, a typical chlamydospore-forming Ectosporan parasite. While, however, it is easy enough sharply to separate off all Haemosporidia from other Ectospora, it is a very difficult matter to define their limits on the former side. Two principal criteria which a doubtful haemal parasite might very well be required to satisfy in order to be considered as a Haemosporidian rather than a Haemoflagellate are (a) the occurrence of schizogony during the ” corpuscular ” phase in the Vertebrate host, and (b) the formation of many germs (” sporozoites “) from the zygote; so long as these

conditions were complied with, the present writer, at all events, would not feel he was countenancing any protozoological heresy in allowing for the possibility of a Flagel- late (perhaps trypaniform) phase or features being present at some period or other in the life-cycle. 1 To render this article complete, however, one or two well-known parasites, hitherto referred to this order, must also be mentioned, which, judged by the above (arbitrary) standard, are, it may be, on the Haemo- flagellate side of the dividing line (e.g. Halteridium, according to Schaudinn).

The chief characters which distinguish the Haemosporidia from other Ectospora are the following. They are invariably blood parasites, and for part or all of the trophic period come into intimate relation with the cellular elements in the blood. There

1 Compare, for example, the flagellated granules of certain Coocidia, which point unmistakably to a Flagellate ancestry.

is always an alternation of hosts and of generations, an In- vertebrate being the definitive host, in which sexual conjugation is undergone and which is to be regarded as the primary one, a Vertebrate being the intermediate or secondary one. The zygote or sporont is at first capable of movement and known as an ookinete. No resistant spores (chlamydospores) are formed, the ultimate germs or sporozoites always being free in the oocyst and not enclosed by sporocysts.

To Sir E. Ray Lankester is due the honour of discovering the first Haemosporidian, a discovery which did not take place until after most of the other kinds of Sporozoa were known. In 1871 this author described the parasite of the frog, which he later termed Drepanidium ranarum. The next discovery was the great and far-reaching one of Laveran, who in 1883 described all the characteristic phases of the malarial parasite which are met with in human blood. While regarding the organism as the cause of

the disease, Laveran did not at once recognize its animal and Sporozoan nature, but considered it rather as a vegetable, and termed it Oscillaria malariae. As in the case of the Trypano- somes, we owe to Danilewsky (1885-1889) the first serious attempts to study the comparative anatomy and life-history of these parasites, from a zoological point of view. Danilewsky first named them Haemosporidia, and distinguished between Haemocytozoa and Leucocytozoa. To the brilliant researches of R. Ross and Grassi in the closing years of the 19th century is due the realization of the essential part played by the gnat or mosquito in the life-cycle and transmission of the parasites; and to MacCallum belongs the credit of first observing the true sexual conjugation, in the case of a Halteridium. Since then, thanks to the labours of Argutinsky and Schaudinn, our know- ledge of the malarial parasites has steadily increased. Until quite recently, however, very little was known about the Haemo- sporidia of cold-blooded Vertebrates ; but in 1903 Siegel and Schaudinn demonstrated that the same role is performed in their case by a leech or a tick, and since then many new forms have been described.

The Haemosporidia are widely distributed and of very general occurrence among the chief classes of Vertebrates. Among In- vertebrates they are apparently limited to blood- _^ sucking insects, ticks and leeches. 1 As already stated, rence: the universal habitat of the parasites in the Vertebrate habitat; is the blood; as a result, of course, they are to be met e Jt^ctson with in the capillaries of practically all the important organs of the body; and it is to be noted that while certain phases (e.g. growing trophozoites, mature gametocytes) are found in the peripheral circulation, others (e.g. schizogonous " rosettes," young gametocytes) occur in the internal organs, liver, kidneys, &c, where the circulation is sluggish. The relation of the para- sites to the blood-cells varies greatly. Most attack, probably exclusively, the red blood corpuscles (haematids); a few, how- ever, select the leucocytes, and are therefore known as Leuco-

cytozoa. In the case of Mammalian and Avian forms (malarial parasites) Schaudinn and Argutinsky have shown that the trophic and schizogonic phases are not really endoglobular but closely attached to the corpuscle, hollowing out a depression or space into which they nestle; the gametocytes, on the other hand, are actually intercellular. Forms parasitic in cold- blooded Vertebrates, on the contrary, are always, so far as is known, endoglobular when in relation with the corpuscles; and the same is apparently the case with the Mammalian parasite, Piroplasma. Although in no instance so far described is the parasite actually intranuclear (as certain Coccidia are), in one or two cases (e.g. Karyolysus of lizards and certain species of Haemogregarina) it reacts markedly upon the nucleus and soon causes its disintegration. While many Haemosporidia (e.g. malarial parasites, with the exception of Halteridium) remain in connexion with the same corpuscle throughout the whole period of growth and schizogony, the new generation of merozoites first being set free from the broken-down cell, others (the Haemo-

1 A possible exception is a doubtful species of Haemogregarina, which has been described from the walls of the blood-vessels of an I Annelid.

gregarines, broadly speaking, and also Haltcridium) leave one corpuscle after a short time, wander about free in the plasma, and then seek out another; and this may be repeated until the parasite is ready for schizogony, which generally occurs in the corpuscle.

As in the case of Trypanosomes (

A very general symptom is anaemia, which is sometimes present to a marked extent, when it may lead to a fatal termina- tion. This is the result of the very considerable destruction of the blood-corpuscles which takes place, the haemoglobin of

which Is absorbed by the parasites as nutriment. A universal feature connected with this mode of nutrition is the production, in the cytoplasm of the parasite, of a brown pigment, termed melanin; this does not represent reserve material, but is an excreted bye- product derived from the haemoglobin. These pigment-grains are at length liberated into the blood-stream and become de- posited in the various organs, spleen, liver, kidneys, brain, causing pronounced pigmentation.

Another type of fever, more acute and more generally fatal, is that produced by forms belonging to the genus Piroplasma, in cattle, dogs, horses and other domestic animals in different regions of the globe; and recently Wilson and Chowning have stated that the " spotted fever of the Rockies " is a human piroplasmosis caused by P. hominis. The disease of cattle is known variously as Texas-fever, Tristeza, Red-water, Southern cattle-fever, &a In this type of illness the endogenous multipli- cation of the parasites is very great and rapid, and brings about an enormous diminution in the number of healthy red blood corpuscles. Their sudden destruction results in the liberation of large quantities of haemoglobin in the plasma, which turns deep-red in colour; and hence haemoglobinuria, which occurs only rarely in malaria, is a constant symptom in piroplasmosis.

The parasite of pernicious malaria, here termed Laverania malariae, will serve very well as a type of the general life-cycle (fig. 1) . Slight differences shown by the other malarial parasites {Plasmodium) will be mentioned in passing, but the B oTthelite- main divergences which other Haemosporidian types history. exhibit are best considered separately. With the bite of an infected mosquito, the minute sickle-like sporo- zoites are injected into the blood. They rapidly penetrate into the blood corpuscles, in which they appear as small irregular, more or less amoeboid trophozoites. A vacuole next arises in the cytoplasm, which increases greatly in size, and gives rise to the well-known, much discussed ring-form of the parasite, in which it resembles a signet-ring, the

nucleus -forming a little thickening to one side. Some authorities (e.g. Argutinsky) have regarded this structure as being really a greatly distended vesicular nucleus, and, to a large extent, indeed, an artifact, resulting from imperfect fixation; but Schaudinn considers it is a true vacuole, and explains it on the ground of the rapid nutrition

1 For an interesting account of the biological relations between parasites and their hosts, and the penalty Man pays for his roving propensities, the reader should see Lankester's article in the Quarterly Review, July 1904.

and growth. Later on this vacuole disappears, and the grains of pigment make their appearance. The trophozoite is now large and full-grown, and has become rounded and ready for schizogony. The nucleus of the schizont divides several times (more or less directly, by simple or multiple fission) to form a number of daughter-nuclei, which take up a regular position near the periphery. Around these the cytoplasm becomes seg- mented, giving rise to the well-known corps en rosace. Eventu- ally the merozoites, in the form of little round uninuclear bodies, are liberated from the now broken-down corpuscle, leaving behind a certain amount of residual cytoplasm containing the pigment grains. Besides the difference in the time taken by the complete process of schizogony in the various species (see above), there are distinctions in the composition of the rosettes. Thus, in Lave- rania, the number of merozoites formed is very variable; in Plasmodium vivax (the tertian parasite) there are only few (9 to 1 2) merozoites, but in P. malariae (the quartan form) they are more numerous, from 12 to 24. The liberated merozoites proceed to infect fresh blood corpuscles and a new endogenous cycle is started.

After asexual multiplication has gone on for some time, sexual forms become developed. According to Schaudinn, the stimulus which determines the production of gametocytes instead of schizonts is the reaction of the host (at the height of a fever

period) upon the parasites. A young trophozoite which is becoming a gametocyte is distinguished from one which gives rise to a schizont by its much slower rate of growth, and the absence of any vacuoles in its cytoplasm. The gametocytes themselves are characterized by their peculiar shape, like that of a sausage, whence they are very generally known as " crescents." Male and female gametocytes are distinguished (roughly) by the arrangement of the pigment- grains; in the former, they are fairly evenly scattered throughout the cytoplasm, but in the megagametocytes the pigment tends to be aggregated centrally, around the nucleus. As they become full-grown and mature, however, the gametocytes lose their crescentic form and assume that of an oval, and finally of a sphere. At the same time, they are set free from the remains of the blood corpuscle. The spherical stage is practically the limit of development in the Vertebrate host, although, sometimes, the nucleus of the microgametocyte may proceed to division. The " crescents " of. the pernicious parasite afford a very important diagnostic difference from the gametocytes of both species of Plasmodium, which have the ordinary, rounded shape of the schizonts. In the case of the latter, points such as their slower growth, their less amoeboid character, and their size furnish the means of distinction.

When a gnat or mosquito sucks blood, all phases of the parasite in the peripheral circulation at that point may succeed in passing into the insect. If this occurs all trophic and schizogonic phases are forthwith digested, and the survival of the sexual phases depends entirely upon whether the insect is a gnat or mosquito. Only in the latter case can further development of the gametocytes go on; in other words, only the genus Anopheles, and not the genus Culex, furnishes specific hosts for the malarial parasites. This is a biological fact of considerable importance in connexion with the prophylactic measures against malaria. In the stomach of an Anopheles, the gametocytes quickly proceed to gamete-formation. The nucleus of the

microgameto- cyte divides up, and the daughter-nuclei pass to the periphery. The surface of the body grows out into long, whip-like processes, of which there are usually 6 to 8 (probably the typical number is 8); each is very motile, in this respect strongly resembling a flagellum. This phase may also develop in drawn blood, which has, of course, become suddenly cooled by the exposure; and it seems evident that it is the change in temperature, from the warm to the cold-blooded host, which brings about the development of the actual sexual elements. Earlier observers regarded the phase just described as representing another parasite altogether, of a Flagellate nature — whence the well- known term, Polymitus-iorm; and even more recent workers, such as Labb6 who connected it with the malarial parasite,

failed to appreciate its true significance, and considered it rather as a degeneration-appearance. The micro-gametes soon liberate themselves from the residual cytoplasm of the parent and swim away in search of a megagamete; each, is a very slender, wavy filament, composed largely of chrom- atic substance. The finer details of structure of the microgamete of a malarial parasite cannot be said, however, to be thoroughly known, and it is by no means impossible that its structure is really trypaniform, as, according to Schaudinn's great work, is the case with the merozoites and sporozoites.

The megagametocyte becomes a megagamete

directly after a process of maturation, which

consists in the expulsion of a certain amount of

nuclear substance. The actual conjugation is quite

similar to the process in Coccidia, and the resulting

zygote perfectly homologous. In the present case,

i V1H h however, the zygote does not at once secrete an

ItflgH oocyst, with a thick resistant wall; on the contrary,

M$y, ^ changes its shape, and becomes markedly gre-

I gariniform and active, and is known for this

/*«~tt*/ >r reason as an ookinete. The ookinete passes through

IX a fi&'fhp %0$&r^K IX h *^ e epithelial layer of the stomach, the thinner and

wiV'&'Jy y t'l : S§?& i • more pointed end leading the way, and comes to

rest in the connective tissue forming the outer layer

of the stomach- wall (fig. 2). Here it becomes

rounded and cyst-like, and grows considerably;

for only a thin, delicate cyst-membrane is secreted,

which does not impede the absorption of nutriment.

Meanwhile, the nucleus has divided into several.

From Lancaster's Treatise on Zoology.

Fig. i. — Diagram of the complete life-cycle of the parasite of pernicious malaria, Laverania malariae, Gr. et Fel. The stages on the upper side of the dotted line are those found in human blood ; below the dotted line are seen the phases through which the parasite passes in the intermediate host, the mosquito. Plan and arrangement chiefly after Neveu-Lemaire ; details of the figures founded on those of Grassi, Schaudinn (Leuckart's Zoologische Wandtafeln), Ross and others.

IX., a and b, Spherical gametocytes; in the male (IX. a) the nucleus has divided up.

I.-V. and 6-10 show the schizogony. VI. -XII., The sexual generation. XIII., The motile zygote. XIV.-XIX., Sporogony. I. III., Young amoebulae in blood corpuscles. IV., Older, actively amoeboid tropho- zoite. V., Still older, less amoeboid tropho- zoite. Mature schizont. Schizont, with nucleus dividing up. Young rosette stage. Fully formed rosette stage.

Merozoites free in the blood by breaking down of the corpuscle. VI., Young indifferent gametocyte. VII., a, Male crescent. VII., b, Female crescent. VIII., a and b, The gametocytes becom- ing oval.

6,

7.

9. 10,

X., a and b, Formation of gametes; in the male (X. a) the so-called flagella or male gametes [fl) are thrown out, one of them is seen detached; in the female (X. b) a portion of the nucleus has been expelled.

XI., A male gamete penetrating a female gamete at a cone of re- ception formed near the nucleus.

XII., Zygote with two pronuclei in proximity.

XIII., Zygote in the motile stage (vermicule or ookinete).

XIV., Encysted zygote (oocyst).

XV., Commencing multiplication of the nuclei in the oocyst.

XVI., Oocyst with numerous sporo- blasts.

From Lankester's Treatise on Zoology.

Fig. 2. — Stomach of a mosquito, with cysts of Haemosporidia. (After Ross.)

oes, Oesophagus. Mt, Malpighlan st, Stomach. tubules.

cy, Cysts. int, Intestine.

around each of which the cytoplasm becomes seg- mented. Each of these segments (" blastophores," " zoidophores ") is entirely comparable to a sporo- blast in the Coccidian oocyst, the chief difference being that it never forms a spore; moreover the segments or sporoblasts in the oocyst of a malarial parasite are irregular in shape and do not become completely separated from one another, but remain connected by thin cytoplasmic strands. Repeated multiplication of the sporoblast-nuclei next takes place, with the result that a great number of little nuclei are found all round the periphery. A corresponding number of fine cyto- plasmic processes grow out from the surface, each carrying a nucleus with it, and in this manner a

XVII., Commencing for- mation of sporo- zoites.

XVI 1 1 . , Full-grown ocey st crammed with ripe

XIX., Free sporozoites, showing their changes of form.

n, Nucleus of the parasite.

p, Melanin pigment.

sporozoites; on one fl, " Flagella." side the cyst has burst sp. bl., Sporoblasts. and the sporozoites r. n., Residual nuclei, are escaping. r. p., Residual protoplasm.

huge number of slender, slightly sickle-shaped germs or sporo- zoites (" blasts," " zoids," &c.) are formed. Each oocyst may contain from hundreds to thousands of sporozoites.

When the sporogony (which lasts about 10 days) is completed, the oocyst ruptures and the sporozoites are set free into the body-cavity, leaving behind a large quantity of residual cyto- plasm, including pigment grains, &c. The sporozoites are carried about by the blood-stream; ultimately, however, apparently by virtue of some chemotactic attraction, they practically all collect in the salivary glands, filling the secretory cells and also invading the ducts. When the mosquito next bites a man, numbers of them are injected, together with the minute drop of saliva, into his blood, where they begin a fresh endogenous cycle.

There is only one other point with regard to the life-history that need be mentioned. With the lapse of time all trophic and schizogonic (asexual) phases of the parasite in the blood die off. But it has long been known that malarial patients, apparently quite cured, may suddenly exhibit all the symptoms again, without having incurred a fresh infection. Schaudinn has investigated the cause of this recurrence, and finds that it is due to the power of the megagametocytes, which are very resistant and long-lived, to undergo a kind of parthenogenesis under favourable conditions and give rise to the ordinary asexual schizonts, which in turn can repopulate the host with all the other phases. Microgametocytes, on the other hand, die off in time if they cannot pass into a mosquito.

Various types of form are to be met with among the Haemo- sporidia. In one, characteristic of most (though not of absolutely all) parasites of warm-blooded Vertebrates, the tropho- zoites are of irregular amoeboid shape; hence this section is generally known as the Haemamoebidae. In another type, characteristic of the parasites of cold-blooded Vertebrates, the body possesses a definite, vermiform, i.e. cycle where gregariniform shape, which is retained during the intra- kaowa. corpuscular as well as during the free condition; this section comprises the Haemogregarinidae. Allied to this latter type of form are the trophozoites of Piroplasma, which are normally pear-shaped; they

differ, however, in being very minute, and, moreover, exhibit considerable polymorphism, rod-like (so- called bacillary) and ring-forms being of common occurrence. It is important to note that in a certain species of Haemogregarina (fig. 3)

bodies. Schaudinn was the first to notice this character, in Piro- plasma canis, and his observation has since been confirmed by Luhe. 1 Moreover, Brumpt has also noticed nuclear dimorphism in the ookinete of a species of Haemogregarina in a leech (as the Inverte- brate host) — a highly important observation.

As regards the life-history, the endogenous (schizogonous) cycle is known in many cases. Sometimes schizogony takes the primitive form of simple binary (probably) longitudinal fission; this is the case in Piroplasma (fig. 4) and also in Haemogregarina bigemina just referred to. From this result the pairs of individuals (" twins ") so often found in the corpuscles. In addition, however, at any rate in Piroplasma, it is probable that multiple division (more allied to ordinary schizogony) also takes place; such is the case, according to Laveran, in P. equi, and the occurrence at times of four parasites in a corpuscle, arranged in a cruciform manner, is most likely to be thus explained. Labb6 has described schizogony in Halteridium

Compara- tive Mor- phology; variations la the life-

From Lankester's Treatise on Zoology.

Fig. 4. — Development and schizogony of Piroplasma bigeminum in the blood-corpuscles of the ox. (After Laveran and Nicolle.)

Various forms of the twin parasite.

Doubly infected cor- puscles.

a b c. d. e f

From Lankester's Treatise on Zoology.

Fig. 3. — Haemogregarina bigemina, Laveran, from the blood of blennies

(After Laveran, magnified about 1800 diameters.)

The form of the parasite found free in the blood-plasma.

Parasite within a blood-cor- puscle, preparing for division; the nucleus has already divided.

The parasite has divided into two rounded corpuscles,

which assume the form of the free parasite, as seen in d, e and /.

N, Nucleus of the blood - cor- puscle.

n, Nucleus of the parasite. The outline of the blood-corpuscle is indicated by a thick black line.

the young trophozoites markedly resemble Piroplasma in their pyriform appearance ; and a further point of agreement between the two forms is mentioned below. Lastly there is the Avian genus Halteridium, the trophozoites of which are characteristically bean- shaped or reniform. True HaemogregarLnes also differ in other slight pointsfrom" Haemamoebae." Thus the young endoglobular tropho- zoite does not exhibit a ring (vacuolar) phase; and the cytoplasm never contains, at any period, the characteristic melanin pigment above noted, in some species of Haemogregarina the parasite, while intracorpuscular, becomes surrounded by a delicate membrane, the cytocyst; on entering upon an active, "free" period, the cytocyst is ruptured and left behind with the remains of the corpuscle. A very interesting cytological feature is the occurrence, in one or two Haemosporldia, of nuclear dimorphism, i.e. of a larger and smaller chromatic body, probably comparable to the trophic and kinetic nuclei of a. Trypanosoma; or of the " Leishman-Donovan "

o, Youngest form. g, h, i, j,

b, Slightly older.

c and d. Division of the nucleus. k and /, e and/, Division of the body of the parasite.

danilewskyi as taking place in a rather peculiar manner ; the parasite becomes much drawn-out and halter-like, and the actual division is restricted to its two ends, two clumps of merozoites being formed, at first connected by a narrow strand of unused cytoplasm, which subsequently disappears. Some doubt, however, attaches to this account, as no, one else appears to have seen the process. For the rest, schizogony takes place more or less in the customary way, allowing for variations in the mode of arrangement of the merozoites. It remains to be noted that in Karyolysus lacertarum, according to Labb6, two kinds of schizont are developed, which give rise, respec- tively, to micromerozoites and megamerozoites, in either case enclosed in a delicate cytocyst. This probably corresponds to an early sexual differentiation (such as is found among certain Coccidia (q.v.), the micromerozoites producing eventually micro- gametocytes, the others megagametocytes.

It has now been recognized for some time that the sexual (exogenous) part of the life-cycle of all the Haemamoebidae takes place in an Invertebrate (Insectan) host, and is fundamentally similar to that above described in those cases where it has been followed. In contradistinction to the malarial parasites, this host, in the Avian forms (Haemoproteus and Halteridium), 1 is a species of Culex and not of Anopheles; in other words, gamete-formation, conjugation and subsequent sporozoite-formation in these cases will only go on in the former. On the other hand, in the case of the Haemogregarines, it was thought until quite lately that the entire life-history, including conjugation and sporogony, went on in the Vertebrate host; and only in 1902 Hintze described what purported to be the complete life-history of Lankesterella (Drepanidium) ranarum undergone in the frog. This view was rendered obsolete by the work of Siegel and

Schaudinn, who demonstrated the occurrence of an alternation of hosts and of generations in the case of Haemogregarina stepanovi, parasitic in a tortoise, and in Karyolysus lacertarum; the Invertebrate hosts, in which, in both cases, the sexual process is undergone, being respectively a leech (Placobdella) and a tick {Ixodes). With this discovery the main distinction (as supposed) between the Haemosporidia of warm and of cold-blooded Vertebrates vanished. It was further acknowledged by Schaudinn (under whom Hintze

1 This does away with one of the principal reasons on account of which some authorities consider Piroplasma (Leishmania) donovani as quite distinct from other Piroplasmata (see Trypanosomes).

3 It must not be forgotten that one species of Halteridium (H. [Trypanomorpha] noctuae) is said to have well-marked trypaniform phases in its life-cycle; these are preferably considered under Trypanosomes (q.v.), and therefore, to avoid repetition, are only thus alluded to here. Whether H. danilewskyi also becomes trypani- form in certain phases, and how far it really agrees with the criteria of a Haemosporidian above postulated, are matters which are not yet definitely known.

had worked) that the latter had been misled by Coccidian cysts and spores, which he took for those of Lankeslerella. The gametogony and sporogony of Haemogregarina stepanovi in the leech agree in essential particulars with the process above described. The micro- gametes are extremely minute, and the sporozoites, which are developed in the salivary glands, where the motile ookinetes finally come to rest, are extremely " spirochaetiform " — the full significance of this latter fact being, perhaps, not appreciated.

Christophers recently described some remarkable phases which he regarded as belonging to the cycle of Haemogregarina gerbilli (one of the few Mammalian Haemogregarines known) in a louse (Haematopinus) . In a private communication, however, the author states that he has probably mistaken phases in the development of an ordinary gregarine parasite in the louse for part of the life-cycle of this Haemo-gregarine.

The Mammalian parasite Piroplasma is the one about whose life-history our knowledge is most vague. Besides the typical and generally occurring forms, others have also been observed in the blood, but it is doubtful how far these are to be looked upon as normal; for instance, Bowhill and Le Doux have described, in various species, a phase in which a long, slender pseudopodial-like outgrowth is present, with a swelling at the distal end. It is, moreover, quite uncertain which are the sexual forms, comparable to gametocytes. Doflein regards large pear-shaped forms as such (megagametocytes?), which become spherical when maturing; and Nocard and Motas have figured amoeboid, irregular forms, with the nucleus fragmented and possessing flagella-like processes (possibly microgametes ?). The Invertebrate host is well known to be, in the case of all species, a tick; thus bovine piroplasmosis (P. bigeminum) in America is conveyed by Rhipicephalus annulatus (Boophilus bovis), canine piroplasmosis {P. canis) in South Africa by Haemaphysalis leachi (and perhaps Dermacentor reticulatus), and so on. The manner in which the infection is transmitted by the tick varies greatly. In some cases {e.g. P. bigeminum _ and P. canis) only the generation subsequent to that which receives the infection (by feeding on an infected ox) can transmit it back again to another ox: in other words, true hereditary infection of the ova in the mother-tick is found to occur. The actual period in the life of the daughter-tick at which it can convey the infection apparently varies. On the other hand, in the case of East African coast-fever, Theiler found that hereditary infection does not

occur, the same generation transmitting the parasite (P. parvum) at different periods of life. Little is certainly known regarding the phases of the parasite which are passed through in the tick. Lignieres has observed a kind of multiple fission in the stomach, several very minute bodies, consisting mostly of chromatin, being formed, which may serve for endogenous reproduction. Koch has published an account of certain curious forms of P. bigeminum, in which the body is produced into many stiff, ray-like processes, giving the appearance of a star; according to him fusion of such forms takes place, and the resulting zygote becomes rounded, perhaps transitional to the pear-shaped forms.

The classification and nomenclature of the Haemosporidia are in a very unsettled condition. For an account of the various systems Classifies- anc ' modifications hitherto adopted, the article of Minchin Hon ' (see un d e r Sporozoa : Bibliography) should be consulted. With the realization that the life-history in the case of the " Haemamoebae " and the Haemogregarines is fundamentally similar in type, the chief reason for grouping them as distinct sub- orders has disappeared. It is most convenient to regard them as separate, but closely allied families, the Plasmodidae (" Haem- amoebidae ") and the Haemogregarinidae. The Piroplasmata, on the other hand, constitute another family, which is better placed in a distinct section or sub-order. ' In addition there are, as already noted, two or three genera whose systematic position must be con- sidered as quite uncertain. One is the well-known Halteridium of Labb6, parasitic in various birds; the type-species is H. danilewskyi (Gr. and Fel.). Another is the much-debated parasite of white blood- corpuscles (leucocytes), originally described in birds by Danilewsky under the name of Leucocytozoon, a form of which has been recently observed in Mammals.

In conclusion, the chief members of the above- mentioned families may be enumerated.

Fam. Plasmodidae (" Haemamoebidae "). Genus Laverania, Gr. and Fel. (syn. Haemamoenas, Ross), for L. malariae, Gr. and Fel. (synn. L. s. Plasmodium, s. " Haemamoeba," &c, praecox s. immaculatum, &c), the parasite of pernicious malaria. Genus Plasmodium, March, and Celli (syn. " Haemamoeba ") for P. vivax and P. malariae, the tertian and quartan parasite, respec- tively. There is also a form known in apes, P. kochi. Genus Haemo- proteus, Kruse (syn. Proteosoma), for H. danilewskyi (syn. Proteosoma grassi, Plasmodium praecox, &c), parasitic in numerous birds. Recently, another form has been described, from reptiles, which Castellani and Willey have termed Haemocystidium simondi.

Remarks. — The distinguishing characters of the malarial parasites

have been mentioned above. Some authorities would include Laverania in the genus Plasmodium, as differing only specifically from the other two forms. It has, moreover, been suggested by Sergent that all three are merely different phases of the same parasite, predominating at different seasons; this idea cannot be regarded, however, as in any way proved so far.

From what is known of the

From Lankester's Treatise on Zoology.

Fig. 5. — Haemoproteus danilewskyi, Kruse (parasite of various birds). X about 1200. a, b, c and /from the chaffinch; d and e from the lark. (After Labb<3.)

Young trophozoite in a blood- corpuscle. b and c, Older trophozoite. d and e, Sporulation.

d, Precocious sporulation with few merozoites.

e, Sporulation of a full-grown

N,

r.p,

schizont, with numerous mero- zoites.

Gametocyte.

Nucleus of blood-corpuscle.

Nucleus of parasite.

Pigment.

Merozoites.

Residual protoplasm.

morphology and mode of manifestation of these forms, the differences between Laverania and the two soecies of Plasmodium are consider- ably more pronounced than those between P. vivax and P. malariae; if the latter are to be considered as distinct species, the first-named is probably generically distinct. Liihe, it may be noted, in his recent comprehensive account of the Haematozoa, also takes this view. Lastly, whatever be the correct solution of the above problem, there is certainly not sufficient justification for including the Avian genus Haemoproteus, as also only a species of Plasmodium, which is done by some. Its different Vertebrate habitat, and also the fact that its Insectan definitive host is Culex and not Anopheles, differ- entiate it sharply from Laverania and Plasmodium.

Fam. Haemogregarinidae. — The different genera are characterized

f. g- h.

From Lankester's Treatise on Zoology. '

Fig. 6. — Haemogregarina stepanovi, Danilewsky (par. Emys and Cistudo), phases of the schizogony, (a-e and j after Laveran; f-i after Borner.) Xipoo to 1200 diameters.

which the parasite grows into the |J shaped Haemo- gregarine without increase of body-mass.

Commencement of sporula- tion ; the nucleus has divided into eight nuclei, and the body of the parasite is beginning to divide up into as many merozoites within a blood-corpuscle.

Nucleus of the blood-cor- puscle.

Nucleus of the parasite.

a, Blood-corpuscle with young

trophozoite.

b, Older trophozoite.

c, Full-grown trophozoite, ready

to leave the corpuscle. d and e, Trophozoites free in the

blood-plasma, showing

changes of form. f-i, Trophozoites, still within the

blood-corpuscle (not drawn) ,

showing the structure of the

nucleus, the coarse chroma-

toid granules in the proto- plasm and the manner in

chiefly by their size relative to the blood-corpuscles, and their dis- position in the latter. Here, again, it has been suggested to unite the various types all in one genus, Haemogregarina, but this seems at least premature when it is remembered how little is known in most cases of the life-cycle, which may prove to exhibit important divergences.

Genus Haemogregarina, Danilewsky (syn. Danilewskya, Labb6).

N.

The body of the parasite exceeds the blood-corpuscle in length, when adult, and is bent upon itself, like a|J. A very great number of species are known, mostly from reptiles and fishes; among them may be mentioned H. stepanovi (fig. 6), from Emys and Cisludo, whose sexual-cycle in a leech has been worked out by Siegel (see above), H. delagei, from Raja, II. bigemina, from blennies, and II . simondi, from soles. Recently one or two Mammalian forms have been observed, H. gerbilli, from an Indian rat (Gerbillus), and H. jaculi, from the jerboa.

Genus Lankesterella, Labbe (syn. Drepanidium, Lankester). The parasite is not more than three-quarters the length of the corpuscle. L. ranarum from Rana is the type-species ; another, recently described by Fantham, is L. tritonis, from the newt.

Genus Karyolysus, Labbe. The parasite does not exceed the cor- puscle in length; the forms included in this genus, moreover,

>-v<5

From Lankester's Treatise on Zoology.

Fig. 7. — Karyolysus lacertarum (Danil.), in the blood-corpuscles of Lacerta muralis, showing the effects of the parasite upon the nucleus of the corpuscle. In c and d the nucleus is broken up. N, Nucleus of the corpuscle; w, nucleus of the parasite, seen as a number of masses of chromatin, not enclosed by a distinct membrane. (After Marceau.)

although not actually intranuclear, have a marked karyolytic and disintegrating action upon the nucleus of the corpuscle. The type- species is the well-known K. lacertarum, of lizards; another is K. (Haemogregarina) viperini, from Tropidonotus.

In the section of- the Piroplasmata there is only

the genus Piro- plasma, Patton (synn. Babesia, Starcovici, Pyrosoma, Smith and Kilborne), the principal species of which are as follows: P. bi- geminum, the cause of Texas cattle-fever, tick-fever (Rinder- malaria) of South Africa, and P. bovis, causing haemoglobinuria of cattle in Southern Europe ; there is some uncertainty as to whether these two are really distinct; P. canis, P. ovis and P. equi associated, respec- tively, with those animals. Lately, a very small form, P. parvum, has been described by Theiler in Rhodesia, which causes East-African coast-fever; and another, P. muris, has been observed in white rats by Fantham.

Bibliography. — (The older literature is enumerated in most treatises on Sporozoa — see bibliography under Sporozoa). P. Argutinsky, " Malariastudien," Arch. mikr. Anat. 59, p. 315, pis. 18-21 (1901), and op. cit. 61, p. 331, pi. 18 (1902); A. Balfour, " Haemogregarine of Mammals," J. Trop. Med. 8, p. 241, 8 figs. (1905); C. A. Bentley, " Leucocytozoan of the Dog," B.M.J. (i9°5). 1.. PP- 988 and 1078; N. Berestneff, " t)ber einen neuen Blutparasiten der indischen Frosche," Arch. Protistenk. 2, p. 343, pi. 8 (1903); " Uber das 'Leucocytozoan' danilewskyi," op. cit. 3, p. 376, pi. 15 (1904); A. Billet, " Contribution a l'etude du palu- disme et de son h6matozoaire en Algerie," Ann. Inst. Pasteur, 16, p. 186 (1902) ; (Notes on various Haemogregarines), C. R. Soc. Biol. 56, pp. 482, 484, 607 and 741 (1904); C. Borner, " Untersuchungen uber Hamosporidien," Zeitschr. wiss. Zool. 69, p. 398, 1 pi. (1901); T. Bowhill, " Equine piroplasmosis," &c, J. Hyg. 5, p. 7, pis. 1-3 (1905); Bowhill and C. le Doux, "Contribution to the Study of ' Piroplasmosis canis,' " op. cit. 4, p. 217, pi. 11 (1904); E. Brumpt and C. Lebailly, " Description de quelques nouvelles especes de trypanosomes et d'hemogregarines," &c, C. R. Ac. Sci. 139, p. 613 (1904); A. Castellani and A. Willey, " Observations on the Haema- tozoa of Vertebrates in Ceylon," Spolia Zeylan. 2, p. 78, 1 pi. (1904), and Q. J. Micr. Sci. 49, p. 383, pi. 24 (1905) ; S. R. Christophers, " Haemogregarina gerbilli," Sci. Mem.

India, 18, 15 pp., 1 pi. (1905); H. B. Fantham, "Lankesterella tritonis, n. sp., " &c, Zool. Anz. 29, p. 257, 17 figs. (1905); " Piroplasma muris," &c, Q. J. Micr. Sci. 50, p. 493, pi. 28 (1906); C. Graham-Smith, " A new Form of Parasite found in the Red Blood-Corpuscles of Moles," J. Hyg. 5, P-. 453> P's- 13 an d 14 (1905); R- Hintze, " Lebenswcise und Ent- wickelung von Lankesterella minima," Zool. Jahrb. Anat. 15, p. 693, pi. 36 (1902); S. James, " On a Parasite found .in the White Blood- Corpuscles of Dogs," Sci. Mem. India, 14, 12 pp. 1 pi. (1905); R. Koch, "Vorlaufige Mitteilungen uber die Ergebnisse einej Forschungsreise nach Ostafrika," Deutsch. med, Wochenschr., 1905, p. 1865, 24 figs.; A. Labbe, " Recherches sur les parasites cndo-globulaires du sang des vertebres," Arch. zool. exp. (3) ii. p. 55, 10 pis. (1894); A. Laveran, "Sur quelques hemogregarines des ophidiens," C. R. Ac. Sci. 135, p. 1036, 13 figs. (1902); "Sur une Haemamoeba d'une mesange (Parus major)," C. R. Soc. Biol. 54, p. 1121, 10 figs. (1902); " Sur la piroplasmose bovine bacilliforme," C. R. Ac. Sci. 138, p. 648, 18 figs. (1903); " Contribution a l'etude de Haemamoeba ziemanni," C. R. Soc. Biol. 55, p. 620, 7 figs. (1903) ;

" Sur une hemogrggarine des gerboises," C. R. Ac. Sci. 141, p. 295, 9 figs. (1905) ; (On different Haemogregarines) C. R. Soc. Biol. 59, PP- 175. 176. with figs. (1905) ; " Haemocytozoa. Essai de classifica- tion," Bull. Inst. Pasteur, 3, p. 809 (1905); Laveran and F. Mesnil, "Sur les hematozoaires des poissons marins," C. R. Ac. Sci. 135, P- 5 6 7 (1902); "Sur quelques protozoaires parasites d'une tortue d'Asie," t.c. p. 609, 14 figs. (1902); Laveran and Negre, " Sur un protozoaire parasite de Hyalomma aegyptium," C. R. Soc. Biol. 58, p. 964, 6 figs. (1905) ; (for various earlier papers by these authors! reference should be made to the C. R. Ac. Sci. and C. R. Soc. Biol. for previous years); C. Lebailly (On Piscine Haemogregarines) C. R. Ac. Sci. 139, p. 576 (1904), and C. R. Soc. Biol. 59, p. 304 U9°5); J- Lignieres, "Sur la ' Tristeza,' " Ann. Inst. Pasteur, 15, p.

121, pi. 6 (1901); "La Piroplasmose bovine; nouvelles re- cherches," &c, Arch, parasit. 7, p. 398, pi. 4 (1903) ; M. Luhe, "Die 1m Blute schmarotzenden Protozoen," in Mense's Handbuch der Tropenkrankheiten (Leipzig, 1906), 3, 1 ; F. Marceau, " Note sur le Karyolysus lacertarum," Arch, parasitol. 4, p. 135, 46 figs. (1901); W. MacCallum, " On the Haematozoan Infection of Birds," /. Exp Med. 3, p. 117, pi. 12 (1898); G. Mauser, " Die Malaria perniciosa," Centrbl. Bakter. (1) 32, Orig. p. 695, 3 pis. (1902); C. Nicolle (On various Reptilian Haemogregarines), C. R. Soc. Biol. 56, pp. 330, 608 and 912, with figs. (1904); Nicolle and C. Comte, " Sur le r&e . . . de Hyalomma . . . dans l'infection hemogregarinienne," op. cit. 58, p. 1045 (1905) ; Norcard and Motas, " Contribution a l'etude de la piroplasmose canine," Ann. Inst. Pasteur, 16, p. 256, pis. 5 and 6 (1902); G. Nuttall and G. Graham-Smith, "Canine piro- plasmosis," J. Hygiene, p. 237, pi. 9 (1905); F. Schaudinn, " Der Generationswechsel der Coccidien und Hamosporidien," Zool. Centrbl. 6, p. 675 (1899); " Studien uber krankheitserregende Protozoen — II. Plasmodium vivax," Arb. Kais. Gesundheitsamte, 19, p. 169, pis. 4-6 (1902); E. and E. Sergent (On different Haemo- gregarines), C. R. Soc. Biol. 56, pp. 130, 132 (1904), op. cit. 58, pp. 56, 57, 670 (1905); J. Siegel, "Die geschlechtliche Entwickelung von Haemogregarina," &c, Arch. Protistenk. 2, p. 339, 7 figs. (1903); P. L. Simond, " Contribution a l'etude des hematozoaires endo- globulaires des reptiles," Ann. Inst. Pasteur, 15, p. 319, 1 pi. (1901); T. Smith and F. Kilborne, " Investigations into the Nature, Causation and Prevention of Texas Cattle Fever," Rep. Bureau Animal In- dustry, U.S.A., 9 and 10, p. 177, pis. (1893); A. Theiler, "The Piroplasma bigeminum of the Immune Ox," /. Army Med. Corps, 3, PP- 469, 599- 1 pl. (1904) ; J- Vassal, " Sur une hematozoaire endoglobulaire nouveau d'un mammifere," Ann. Inst. Pasteur 19 p. 224, pl. 10 (1905); L. B. Wilson and W. Chowning, " Studies iii Piroplasmosis hominis," J. Infect. Diseases, 1, p. 31,2 pis. (1904)

(H. M. Wo.) HAETZER, or Hetzer, LUDWIG (d. 1529), Swiss divine, was born in Switzerland, at Bischofszell, in Thurgau. He studied at Freiburg-im-Breisgau, and began his career in a chaplaincy at Wadenswil, on the Lake of Zurich. At this time his attachment to the old faith was tempered by a mystical turn, and by a devotion to the prophetical writings of the Old Testa- ment, which he studied in the original. By 1523 we find him in Zurich, where he published, at first anonymously and in Latin {Judicium Dei), later with his name and in German (Sept. 24, 1523), a small tract against the religious use of images, and bearing the motto attached to all his subsequent works, ” O Got erlosz die (or dein) Gefangnen ” (” O God, set the prisoners free "). An attempt to give effect to the teaching of this (frequently reprinted) tract was followed by a public religious disputation, of which Haetzer drew up the official account. In 1524 he brought out a tract on the conversion of the Jews, and published a German version of Johann Bugenhagen’s brief exposition of the epistles of St Paul (Ephesians to Hebrews) ; in the dedication (dated Zurich, June 29, 1524) he undertakes to translate Bugenhagen’s comment on the Psalter. He then went to Augsburg, bearing Zwingli’s introduction to Johann Frosch. Here he came for a time under the influence of Urbanus Regius, and was for a short time the guest of Georg Regel. Returning to Zurich, he was in intercourse with leading Ana-baptists (though his own position was simply the disuse of infant baptism) till their expulsion in January 1525. Again resorting to Augsburg, and resuming work as corrector of the press for his printer Silvan Ottmar, he pushed his views to the extreme of rejecting all sacraments, reaching something like the mystical standpoint of the early Quakers. He was expelled from Augs- burg in the autumn of 1525, and made his way through Constance to Basel, where Oecolampadius received him kindly. He trans- lated into German the first treatise of Oecolampadius on the Lord’s Supper (in which the words of institution are taken figuratively), and proceeding to Zurich in November, published

his version there in February 1526, with a preface disclaiming connexion with the Anabaptists. His relations with Zwingli were difficult; returning to Basel he published (July 18, 1526) his translation of Malachi, with Oecolampadius's exposition, and with a preface reflecting on Zwingli. This he followed by a version of Isaiah xxxvi.xxxvii. He next went to Strassburg, and was received by Wolfgang Capito. At Strassburg in the late autumn of 1526 he fell in with Hans Dengk or Denck, who collaborated with him in the production of his opus magnum, the translation of the Hebrew Prophets, Alle Propheten nach hebraischer Sprach verluetscht. The preface is dated Worms, 3 April 1527; and there are editions, Worms, 13 April 1527, folio; Augsburg, 22 June 1527, folio; Worms, 7 Sept. 1527, 1 6°; and Augsburg, 1528, folio. It was the first Protestant version of the prophets in German, preceding Luther's by five years, and highly spoken of by him. Haetzer and Denck now entered on a propagandist mission from place to place, with some success, but of short duration. Denck died at Basel in November 1527. Haetzer was arrested at Constance in the summer of 1528. After long imprisonment and many examina tions he was condemned on the 3rd of February 1529 to die by the sword, and the sentence was executed on the following day. His demeanour on the scaffold impressed impartial witnesses, Hans Zwick and Thomas Blaurer, who speak warmly of his fervour and courage. The Dutch Baptist Martyrology describes him as " a servant of Jesus Christ." The Moravian Chronicle says " he was condemned for the sake of divine truth." His papers included an unpublished treatise against the essential deity of Christ, which was suppressed by Zwingli; the only extant evidence of his anti-trinitarian views being contained in eight quaint lines of German verse preserved in Sebastian Frank's Chronica. The discovery of his heterodox Christology (which has led modern Unitarians to regard him as their proto-martyr) was followed by charges of loose living,

never heard of in his lifetime, and destitute of evidence or probability.

See Breitinger, ” Anecdota quaedam de L. H.” in Museum Hel- veticum (1746), parts 21 and 23; Wallace, Antitrinitarian Biography (1850); Dutch Martyrology (Hanserd Knollys Society) (1856); Th. Keim, in Hauck’s Realencyklopddie (1899). (A. Go.*)

HAFIZ. Shams-ud-din Mahommed, better known by his takhallus or nom de plume of Hafiz, was one of the most celebrated writers of Persian lyrical poetry. He was born at Shiraz, the capital of Fars, in the early part of the 8th century of the Mahommedan era, that is to say, in the 14th of our own. The exact date of his birth is uncertain, but he attained a ripe old age and died in 791 a.h. (a.d. 1388). This is the date given in the chronogram which is engraved on his tomb, although several Persian biographers give a different year. Very little is actually known about his life, which appears to have been passed in retirement in Shiraz, of which he always speaks in terms of affectionate admiration. He was a subject of the Muzaff ar princes, who ruled in Shiraz, Yazd, Kirman and Ispahan, until the dynasty was overthrown by Timur (Tamerlane). Of these princes his especial patrons were Shah Shuja’ and Shah Mansur. He early devoted himself to the study of poetry and theology, and also became learned in mystic philosophy, which he studied under Shaik MahmQd ‘Attar, chief of an order of dervishes. Hafiz afterwards enrolled himself in the same order and became a professor of Koranic exegesis in a college which his friend and patron Haji Kiwam-ud-din, the vizier, specially founded for him. This was probably the reason of his adopting the sobriquet of Hafiz (” one who remembers “), which is technic- ally applied to any person who has learned the Koran by heart. The restraints of an ascetic life seem to have been very little to Hafiz’s taste, and his loose conduct and wine-bibbing propensities drew upon him the severe censure of his monastic colleagues. In revenge he satirizes them unmercifully in his verses, and seldom loses an opportunity of alluding to their hypocrisy. Hafiz’s

fame as a poet was soon rapidly spread throughout the Mahom- medan world, and several powerful monarchs sent him presents and pressing invitations to visit them. Amongst others he was invited by Mahmud Shah Bahmani, who reigned in the south

of India. After crossing the Indus and passing through Lahore he reached Hurmuz, and embarked on board a vessel sent for him by the Indian prince. He seems, however, to have been a bad sailor, and, having invented an excuse for being put ashore, made the best of his way back to Shiraz. Some biographies narrate a story of an interview between Hafiz and the invader Timur. The latter sent for him and asked angrily, " Art thou he who was so bold as to offer my two great cities Samarkand and Bokhara for the black mole on thy mistress's cheek?" alluding to a well-known verse in one of his odes. " Yes, sire," replied Hafiz, " and it is by such acts of generosity that I have brought myself to such a state of destitution that I have now to solicit your bounty." Timur was so pleased at his ready wit that he dismissed the poet with a handsome present. Unfortunately for the truth of this story Timur did not capture Shiraz till a.d. 1393, while the latest date that can be assigned to Hafiz's death is 1391. Of his private life little or nothing is known. One of his poems is said to record the death of his wife, another that of a favourite unmarried son, and several others speak of his love for a girl called Shakh i Nabat, " Sugar-cane branch," and this is almost all of his personal history that can be gathered from his writings. He was, like most Persians, a Shi'ite by religion, believing in the transmission of the office of Imam (head of the Moslem Church) in the family of Ali, cousin of the prophet, and rejecting the Hadith (traditional sayings) of Mahomet, which form the Sunna or supplementary code of Mahommedan ceremonial law. One of his odes which contains a verse in praise of Ali is engraved on the poet's tomb, but is omitted by Sudi, the Turkish editor and commentator, who was himself a rigid Sunnite. Hafiz's heretical opinions and dissipated life caused difficulties to be raised by the ecclesiastical authorities on his death as to his interment in consecrated ground. The question was at length settled by Hafiz's own works, which had then already begun to be used, as they are now throughout the East, for the purposes of divination,

in the same manner as Virgil was employed in the middle ages for the divina- tion called Sortes Virgilianae. Opening the book at random after pronouncing the customary formula asking for inspiration, the objectors hit upon the following verse — " Turn not away thy foot from the bier of Hafiz, for though immersed in sin, he will be admitted into Paradise." He was accordingly buried in the centre of a small cemetery at Shiraz, now included in an enclosure called the Hafiziyeh.

His principal work is the Diwan, that is, a collection of short odes or sonnets called ghazals, and consisting of from five to sixteen baits or couplets each, all the couplets in each ode having the same rhyme in the last hemistich, and the last couplet always introducing the poet's own nom de plume. The whole of these are arranged in alphabetical order, an arrangement which certainly facilitates reference but makes it absolutely impossible to ascertain their chronological order, and therefore detracts from their value as a means of throwing light upon the growth and development of his genius or the incidents of his career. They are often held together by a very slender thread of con- tinuous thought, and few editions agree exactly in the order of the couplets. Still, a careful study of them, especially from the point of view indicated by the Sufiistic system of philosophy, will always show that a single idea does run throughout the whole. The nature of these poems has been the subject of much discussion in the West, some scholars seeing in their anacreontic utterances nothing but sensuality and materialism, while others, following the Oriental school, maintain that they are wholly and entirely mystic and philosophic. Something between the two would probably be nearer the truth. It must be remembered that Hafiz was a professed dervish and Sufi, and that his ghazals were in all probability published from a takia, and arranged with at least a view to Sufiistic interpretation. At the same time it is ridiculous to suppose that the glowing imagery, the gorgeous and often tender descriptions of natural beauties, the fervent love passages, and

the roystering drinking songs were composed in cool blood or with deliberate ascetic purpose. The beauty of Hafiz's poetry is that it is natural. It is the outcome

of a fervent soul and a lofty genius delighting in nature and enjoying life; and it is the poet's misfortune that he lived in an age and amongst a people where rigid conventionality demanded that his free and spontaneous thoughts should be recast in an artificial mould.

Besides the Dlwdn, Hafiz wrote a number of other poems; the Leipzig edition of his works contains573 ghazals (forming theDiwan), 42 kifas or fragments, 69 ruba'iyat or tetrastics, 6 masnaviydt or poems in rhyming couplets, 2 kasaid, idylls or panegyrics, and 1 mukhammes or poem in five-line strophes. Other editions contain several tarji'band or poems with a refrain. The whole Diwan was translated into English prose by H. Wilberforce Clarke in 1 89 1, with introduction and exhaustive commentary and bibliography ; a few rhyming versions of single poems by Sir William Jones, J. Nott, J. Hindley, Falconer, &c, are to be found scattered through the pages of the Oriental Miscellany and other periodicals, and a fine edition containing a verse rendering of the principal poems by H. Bicknell appeared in 1875. Other selections by S. Robinson (1875), A. Rogers (1889), J. H. M'Carthy (1893), and Gertrude L. Bell (1897). The principal German versions are by von Hammer Purgstall (1812), which gave the first impulse to Goethe's Westostlicher Diwan ■ a rhyming and rhythmical translation of a large portion of Hafiz's works by Vincenz von Rosenzweig of Vienna (Vienna, 1858), which contains also the Persian text and notes; Der Diwan des Schems eddin Muhammed Hafis, by G. H. F. Nesselmann (Berlin, 1865), in which the rhyming system of the original is imitated. Besides these, the reader may consult d'Herbelot, Bibliothhque orientale, article

"Hafiz"; Sir William Ouseley's Oriental Collections (1797-J798); A Specimen of Persian Poetry, or Odes of Hafiz, by John Richardson (London, 1802); Biographical Notices of Persian Poets, by Sir Gore Ouseley (Oriental Translation Fund, 1846); and an excellent article by Professor E. B. Cowell in Macmillan's Magazine (No. 177, July 1874); J. A. Vullers, Vitae poetarum Persicorum (1839, translated from Daulatshah); S. Robinson, Persian Poetry for English Readers (1883). The best edition of the text is perhaps that edited by Her- mann Brockhaus of Leipzig (1854-1856), which is based on the re- cension of the Turkish editor Sudi, and contains his commentary in Turkish on the first eighty ghazals. See also H. Eth6 in Grundriss der iranischen Philologie, ii. (Strassburg, 1896); P. Horn, Geschichle der persischen Literatur (Leipzig, 1901). (E. H. P.)

HAG. (1) (Probably a shortened form of the O. Eng. hcegtesse, hegtes, cognate with Ger. Hexe, witch, Dutch hecse), a word common during the 16th and 17th centuries for a female demon or evil spirit, and so particularly applied to such supernatural beings as the harpies and fairies of classical mythology, and also to witches. In modern usage the word is generally used of a hideous old woman whose repulsive exterior is accompanied by malice or wickedness. The name is also used of an eel-like parasitic fish, Myxine glulinosa, allied to the lamprey.

(2) A word common in Scottish and northern English dialects for an enclosed piece of wood, a copse. This is the same word as " hedge " (see Hedges) and " haw." " Hag " also means " to cut," and is used in Scotland of an extent of woodland marked out for felling, and of a quantity of felled wood. This word is also used of a cutting in the peat of a " moss " or " bog," and hence applied to the small plots of firm ground or heather in a bog; it is common in the form " moss-hags."

HAGEDORN, FRIEDRICH VON (1708-1754), German poet, was born on the 23rd of April 1708 at Hamburg, where

his father, a man of scientific and literary taste, was Danish minister. He was educated at the gymnasium of Hamburg, and later (1726) became a student of law at Jena. Returning to Hamburg in 1729, he obtained the appointment of unpaid private secretary to the Danish ambassador in London, where he lived till 1731. Hagedorn's return to Hamburg was followed by a period of great poverty and hardship, but in 1733 he was appointed secretary to the so-called " English Court " (Englischer Hof) in Hamburg, a trading company founded in the 13th century. He shortly afterwards married, and from this time had sufficient leisure to pursue his literary occupations till his death on the 28th of October 1754. Hagedorn is the first German poet who bears unmistakable testimony to the nation's recovery from the devastation wrought by the Thirty Years' War. He is eminently a social poet. His light and graceful love-songs and anacreontics, with their undisguised joie de vivre, introduced a new note into the German lyric; his fables and tales in verse are hardly inferior in form and in delicate persiflage to those of his master La Fontaine, and his moralizing poetry re-echoes the philosophy

of Horace. He exerted a dominant influence on the German lyric until late in the 18th century.

The first collection of Hagedorn's poems was published at Ham- burg shortly after his return from Jena in 1729, under the title Versuch einiger Gedichte (reprinted by A. Sauer, Heilbronn, 1883). In 1738 appeared Versuch in poetischen Fabeln und Erzahlungen ; in 1742 a collection of his lyric poems, under the title Sammlung neuer Oden und Lieder; and his Moralische Gedichte in 1750. A collection of his entire works was published at Hamburg after his death in 1757. The best is J. J. Eschenburg's edition (5 vols., Hamburg, 1800). Selections of his poetry with an excellent intro- duction in F. Muncker's Anakreontiker und preussisch-patriotische Lyriker (Stuttgart, 1894). See also H. Schuster, F. von Hagedorn und seine Bedeutung fur die deutsche Literatur (Leipzig, 1882); W. Eigenbrodt, Hagedorn und die Erzdhlung in

Reimversen (Berlin,

1884).

HAGEN, FRIEDRICH HEINRICH VON DER (1780–1856), German philologist, chiefly distinguished for his researches in Old German literature, was born at Schmiedeberg in Branden- burg on the 19th of February 1780. After studying law at the university of Halle, he obtained a legal appointment in the state service at Berlin, but in 1806 resigned this office in order to devote himself exclusively to letters. In 1 8 10 he was appointed professor extraordinarius of German literature in the university of Berlin; in the following year he was transferred in a similar capacity to Breslau, and in 1821 returned to Berlin as professor ordinarius. He died at Berlin on the nth of June 1856. Although von der Hagen's critical work is now entirely out of date, the chief merit of awakening an interest in old German poetry belongs to him.

His principal publications are the Nibelungenlied, of which he issued four editions, the first in 1810 and the last in 1842; the Minnesinger (Leipzig, 1 838–1 856, 4 vols, in 5 parts); Lieder der altern Edda (Berlin, 1812); Gottfried von Strassburg (Berlin, 1823); a collection of Old German tales under the title Gesamtabenteuer (Stuttgart, 1850, 3 vols.) and Das Heldenbuch (Leipzig, 1 855). He also published liber die altesten Darstellungen der Faustsage (Berlin, 1844) ; and from 1835 he edited Das neue Jahrbuch der Berlinischen Gesellschaft fur deutsche Sprache und Altertumskunde. His corre- spondence with C. G. Heyne and G. F. Benecke was published by K. Dziatzko (Leipzig, 1893).

HAGEN, a town of Germany, in the Prussian province of Westphalia. Pop. (1905), 77, 498. It lies amid well-wooded hills at the confluence of the Ennepe with the Volme, 15 m. N.E. of Elberfeld, on the main line to Brunswick and Berlin, and at the junction of important lines of railway, connecting it with the principal towns of the Westphalian iron district. It has five Evangelical churches, a Roman Catholic

church, an Old Catholic church, a synagogue, a gymnasium, realgymnasium, and a technical school with special classes for machine-building. There are also a museum, a theatre, and a prettily arranged municipal park. Hagen is one of the most flourishing commercial towns in Westphalia, and possesses extensive iron and steel works, large cotton print works, woollen and cotton factories, manu- factures of leather, paper, tobacco, and iron and steel wares, breweries and distilleries. There are large limestone quarries in the vicinity and also an alabaster quarry.

HAGENAU, a town of Germany, in the imperial province of Alsace-Lorraine, situated in the middle of the Hagenau Forest, on the Moder, and on the railway from Strassburg to Weissen- burg, 10 m. N.N.E. of the former city. Pop. (1905), 18,500. It has two Evangelical and two ancient Catholic churches (one dating from the 12th, the other from the 13th century), a gymnasium, a public library, a hospital, and a theatre. The principal industries are wool and cotton spinning, and the manufacture of porcelain, earthenware, boots, soap, oil, sparkling wines and beer. There is also considerable trade in hops and vegetables. Hagenau is an important military centre and has a large garrison, including three artillery battalions.

Hagenau dates from the beginning of the 12th century, and owes its origin to the erection of a hunting lodge by the dukes of Swabia. The emperor Frederick I. surrounded it with walls and gave it town rights inn 54. Oh the site of the hunting lodge he founded an imperial palace, in which were preserved the jewelled imperial crown, sceptre, imperial globe, and sword of Charlemagne. Subsequently it became the seat of the Landvogt

of Hagenau, the imperial advocatus in Lower Alsace. Richard of Cornwall, king of the Romans, made it an

imperial city in 1257. In 1648 it came into the possession of France, and in 1673 Louis XIV. caused the fortifications to be razed. In 1675 it was captured by imperial troops, but in 1677 it was retaken by the French and nearly all destroyed by fire. In 1871 it fell, with the rest of Alsace-Lorraine, into the possession of Germany.

HAGENBACH, KARL RUDOLF (1801-1874), German church historian, was born on the 4th of March 1801 at Basel, where his father was a practising physician . His preliminary education was received at a Pestalozzian school, and afterwards at the gym- nasium, whence in due course he passed to the newly reorganized local university. He early devoted himself to theological studies and the service of the church, while at the same time cherishing and developing broad " humanistic " tendencies which found expression in many ways and especially in an enthusiastic admiration for the writings of Herder. The years 1820-1823 were spent first at Bonn, where G. C. F. Lucke (1 791-1855) exerted a powerful influence on his thought, and afterwards at Berlin, where Schleiermacher and Neander became his masters. Returning in 1823 to Basel, where W. M. L. de Wette had re- cently been appointed to a theological chair, he distinguished himself greatly by his trial-dissertation, Observationes hislorico-hermeneuticae circa Origenis methodum inter pretcndae sacrae Scriplurae; in 1824 he became professor extraordinarius, and in 1829 professor ordinarius of theology. Apart from his academic labours in connexion with the history of dogma and of the church, he lived a life of great and varied usefulness as a theologian, a preacher and a citizen; and at his " jubilee " in 1873, not only the university and town of Basel but also the various churches of Switzerland united to do him honour. He died at Basel on the 7th of June 1874.

Hagenbach was a voluminous author in many departments, but he is specially distinguished as a writer on church history. Though neither so learned and condensed as the contributions of Gieseler, nor so original and profound as those of Neander, his

lectures are clear, attractive and free from narrow sectarian prejudice. In dogmatics, while avowedly a champion of the ” mediation theology ” (V ‘ crmittelungstheologie) , based upon the fundamental conceptions of Herder and Schleiermacher, he was much less revolutionary than were many others of his school. He sought to maintain the old confessional documents, and to make the objective prevail over the purely subjective manner of viewing theological questions. But he himself was aware that in the endeavour to do so he was not always successful, and that his delineations of Christian dogma often betrayed a vacillating and uncertain hand.

His works include Tahellarische ubersicht der Dogmengeschichte (1828); Encyclopadie u. Methodologie der theol. Wissenschaften (1833) ; Vorlesungen iiber Wesen u. Geschichte der Reformation u. des Protestan- tismus (1834–1843); Lehrbuch der Dogmengeschichte (1840–1841, 5th ed., 1867; English transl., 1850); Vorlesungen iiber die Geschichte der alien Kirche (1 853–1 855); Vorlesungen iiber die Kirchengeschichte des Mittelalters (1860–1861); Grundlinien der Homiletik u. Liturgik (1863); biographies of Johannes Oecolampadius (1482–1564) and Oswald Myconius (1488–1552) and a Geschichte der theol. Schule Basels (i860); his Predigtcn (1858–1875), two volumes of poems entitled Luther u. seine Zeit (1838), and Gedichte (1846). The lectures on church history under the general title Vorlesungen iiber die Kirchengeschichte von der altesten Zeit bis zum iglen Jahrhundert were reissued in seven volumes (1868–1872).

See especially the article in Herzog–Hauck, Realencyklopadie.

HAGENBECK, CARL (1844–), wild-animal collector and dealer, was born at Hamburg in 1844. In i&4& his father purchased some seals and a Polar bear brought to Hamburg by a whaler, and subsequently acquired many other wild animals. At the age of twenty-one Carl Hagenbeck was given the whole collection, and before long had greatly extended the business, so

that in 1873 he had to erect large buildings in Hamburg to house his animals. In 1S75 he began to exhibit a collection of the representative animals of many countries, accompanied by troupes of the natives of the respective countries, throughout all the large- cities of Europe. The educational value of these exhibitions was officially recognized by the French government,

which in 1891 awarded Hagenbeck the diploma of the Academy. Most of the wild animals exhibited in music-halls and other popular places of entertainment throughout the world have come from Hagenbeck's collection at Stellingen, near Hamburg.

HAGERSTOWN, a city and the county-seat of Washington county, Maryland, U.S.A., near Antietam Creek, about 86 m. by rail W.N.W. from Baltimore. Pop. (1890), 10,118; (1900), 13,591, of whom 1277 were negroes; (1910, census), 16,507. Hagerstown is served by the Baltimore & Ohio, the Western Maryland, the Norfolk & Western, and the Cumberland Valley railways, and by an interurban electric line. It lies in a fertile valley overlooked by South Mountain to the E. and North Mountain, more distant, to the W. The city is the seat of Kee Mar College (1852; non-sectarian) for women. Hagerstown is a business centre for the surrounding agricultural district, has good water power, and as a manufacturing centre ranked third in the state in 1905, its factory products being valued in that year at $3,026,901, an increase of 66-3% over their value in 1900. Among the manufactures are flour, shirts, hosiery, gloves, bicycles, automobiles, agricultural implements, print paper, fertilizers, sash, doors and blinds, furniture, carriages, spokes and wheels. The municipality owns and operates its electric lighting plant. Hagerstown was laid out as a town in 1762 by Captain Jonathan Hager (who had received a patent to 200 acres here from Lord Baltimore in 1739), and was incor- porated in 1 79 1. It was an important station on the old National (or Cumberland) Road. General R. E. Lee concentrated his forces at Hagerstown before the battle of Gettysburg.

HAG-FISH, Glutinous Hag, or Borer (Myxine), a marine fish which forms with the lampreys one of the lowest orders of vertebrates (Cyclostomata). Similar in form to a lamprey, it is usually found within the body of dead cod or haddock, on the flesh of which it feeds after having buried itself in the abdomen. When caught, it secretes a thick glutinous slime in such quantity that it is commonly believed to have the power of converting water into glue. It is found in the North Atlantic and other temperate seas of the globe, being taken in some localities in large numbers, e.g. off the east coast of Scotland and the west coast of California (see Cycxostomata).

HAGGADA, or 'Agada (literally "narrative"), includes the more homiletic elements of rabbinic teaching. It is not logically distinguishable from the halakha (q.v.), for the latter or forensic element makes up with the haggada the Midrash (q.v.), but, being more popular than the halakha, is often itself styled the Midrash. It may be described as the poetical and ethical element as contrasted with the legal element in the Talmud (q.v.), but the two elements are always closely connected. From one point of view the haggada, amplifying and developing the contents of Hebrew scripture in response to a popular religious need, may be termed a rabbinical commentary on the Old Testament, containing traditional stories and legends, sometimes amusing, sometimes trivial, and often beautiful. The haggada abounds in parables. The haggadic passages of the Talmud were collected in the Eye of Jacob, a very popular compilation completed by Jakob ibn Habib in the 16th century.

HAGGAI, in the Bible, the tenth in order of the " minor prophets," whose writings are preserved in the Old Testament. The name Haggai ('an, Gr. 'AyyaTos, whence Aggeus in the Eng- lish version of the Apocrypha) perhaps means " born on the feast day," "festive." But Wellhausen 1 is probably right in taking the word as a contraction for Hagariah (" Yahweh hath girded "), just as Zaccai (Zacchaeus) is known to be a contraction of Zechariah.

The book of Haggai contains four short prophecies

delivered between the first day of the sixth month and the twenty-fourth day of the ninth month — that is, between September and December — of the second year of Darius the king. The king in question must be Darius Hystaspis (521-485 B.C.). The language of the prophet in ii. 3 suggests the probability that he was himself one of those whose memories reached across the seventy years of the captivity, and that his prophetic work began in extreme 1 In Bleek's Einleitung, 4th ed., p. 434.

old age. This supposition agrees well with the shortness of the period covered by his book, and with the fact that Zechariah, who began to prophesy in the same autumn and was associated with Haggai's labours (Ezra v. 1), afterwards appears as the leading prophet in Jerusalem (Zech. vii. 1-4). We know nothing further of the personal history of Haggai from the Bible. Later traditions may be read in Caxpzov's, Intreductio, pars 3, cap. xvi. Epiphanius (Vitae prophctarum) says that he came up from Babylon while still young, prophesied the return, witnessed the building of the temple and received an honoured burial near the priests. Haggai's name is mentioned in the titles of several psalms in the Septuagint (Psalms cxxxvii., cxlv.-cxlviii.) "and other versions, but these titles are without value, and moreover vary in MSS. Eusebius did not find them in the Hexaplar Septuagint. 1

In his first prophecy (i. 1-11) Haggai addresses Zerubbabel and Joshua, rebuking the people for leaving the temple unbuilt while they are busy in providing panelled houses for themselves. The prevalent famine and distress are due to Yahweh's indigna- tion at such remissness. Let them build the house, and Yahweh will take pleasure in it and acknowledge the honour paid to Him. The rebuke took effect, and the people began to work at the temple, strengthened by the prophet's assurance that the Lord was with them (i. 1 2-1 5). In a second

prophecy (ii. 1–9) delivered in the following month, Haggai forbids the people to be dis- heartened by the apparent meanness of the new temple. The silver and gold are the Lord's. He will soon shake all nations and their choicest gifts will be brought to adorn His house. Its glory shall be greater than that of the former temple, and in this place He will give peace. A third prophecy (ii. 10–19) contains a promise,- enforced by a figure drawn from the priestly ritual, that God will remove famine and bless the land from the day of the foundation of the temple onwards. Finally, in ii. 20–23, Zerubbabel is assured of God's special love and protection in the impending catastrophe of kingdoms and nations to which the prophet had formerly pointed as preceding the glorification of God's house on Zion. In thus looking forward to a shaking of all nations Haggai agrees with earlier prophecies, especially Isa. xxiv.xxvii., while his picture of the glory and peace of the new Zion and its temple is drawn from the great anonymous prophet who penned Isa. lx and lxvi. The characteristic features of the book are the importance assigned to the person ality of Zerubbabel, who, though a living contemporary, is marked out as the Messiah; and the almost sacramental significance attached to the temple. The hopes fixed on Zerub- babel, the chosen of the Lord, dear to Him as His signet ring (cf. Jer. xxii. 24), are a last echo in Old Testament prophecy of the theocratic importance of the house of David. In the book of Zechariah Zerubbabel has already fallen into the background and the high priest is the leading figure of the Judean com- munity. 2 The stem of David is superseded by the house of Zadok, the kingship has yielded to the priesthood, and the extinction of national hopes gives new importance to that strict organization of the hierarchy for which Ezekiel had prepared the way by his sentence of disfranchisement against the non- Zadokite priests.

The indifference of the Jews to the desolate conditions of their sanctuary opens up a problem of some difficulty. It is strange that neither Haggai nor his contemporary Zechariah mentions or implies

any return of exiles from Babylon, and the suggestion has accordingly been made that the return under Cyrus described in Ezra i.-iv. is unhistorical, and that the community addressed by Haggai consisted of the remnant that had been left in Jerusalem and its neighbourhood after the majority had gone into exile or fled to Egypt (Jer. xliii.). Such a remnant, amongst whom might be members of the priestly and royal families, ' would gather strength and boldness as the troubles of Babylon

1 See the note on Ps. cxlv. I in Field's Hexapla; Kohler, Weis- sagungen Haggai's, 32 ; Wright, Zechariah and his Prophecies, xix.

2 After the foundation of the temple Zerubbabel disappears from history and lives only in legend, which continued to busy itself with his story, as we see from the apocryphal book of Esdras (cf. Deren- bourg, Hist, de la Palestine, chap, i.).

increased and her vigilance was relaxed, and might receive from Babylon and other lands both refugees and some account at least of the writings of Ezekiel and the Second Isaiah. Stimulated by such causes and obtaining formal permission from the Persian government, they would arise as a new Israel and enter on a new phase of national life and divine revelation.

In spite, however, of the plausibility of this theory, it seems preferable to adhere to the story of Ezra i.-iv. Apart from the weighty objections that the Edomites would have frustrated such a recrudescence of the remnant Jews as has been described, it must be remembered that the main stream of Jewish life and thought had been diverted to Babylon. Thence, when the opportunity came under Cyrus, some 50,000 Jews, the spiritual heirs of the best elements of the old Israel, returned to found the new community. With them were all the resources, and the only people they found at Jerusalem were hostile gentiles and Samaritans. Full of enthusiasm, they set about rebuilding the temple and realizing

the glowing promises about the prosperity and dominance of Zion that had fallen from the lips of the Second Isaiah (xlix. 14-26, xlv. 14). Bitter disappoint- ment, however, soon overcame them, the Samaritans were strong enough to thwart and hinder their temple-building, and it seemed as though the divine favour was withdrawn. Apathy took the place of enthusiasm, and sordid worries succeeded to high hopes. " The like collapse has often been experienced in history when bands of religious men, going forth, as they thought, to freedom and the immediate erection of a holy commonwealth, have found their unity wrecked and their enthusiasm dissipated by a few inclement seasons on a barren and hostile shore." 3

From this torpor they were roused by tidings which might well be interpreted as the restoration of divine favour. Away in the East Cyrus had been succeeded in 529 B.C. by Cambyses, who had annexed Egypt and on whose death in 522 a Magian impostor, Gaumata, had seized the throne. The fraud was short-lived, and Darius I. became king and the founder of a new dynasty. These events shook the whole Persian empire; Babylon and other subject states rose in revolt, and to the Jews it seemed that Persia was tottering and that the Messianic era was nigh. It was therefore natural that Haggai and Zechariah should urge the speedy building of the temple, in order that the great king might be fittingly received.

It is sometimes levied as a reproach against Haggai that he makes no direct reference to moral duties. But it is hardly fair to contrast his practical counsel with the more ethical and spiritual teaching of the earlier Hebrew prophets. One thing was needful — the temple. " Without a sanctuary Yahweh would have seemed a foreigner to Israel. The Jews would have thought that He had returned to Sinai, the holy mountain; and that they were deprived of the temporal blessings which were the gifts of a God who literally dwelt in the midst of his people." Haggai argued that material prosperity was conditioned by zeal in worship; the prevailing

distress was an indication of divine anger due to the people's religious apathy. Haggai's reproofs touched the conscience of the Jews, and the book of Zechariah enables us in some measure to follow the course of a religious revival which, starting with the restoration of the temple, did not confine itself to matters of ceremony and ritual worship. On the other hand, Haggai's treatment of his theme, practical and effective as it was for the purpose in hand, moves on a far lower level than the aspirations of the prophet who wrote the closing chapters of Isaiah. To the latter the material temple is no more than a detail in the picture of a work of restoration eminently ideal and spiritual, and he expressly warns his hearers against attaching intrinsic importance to it (Isa. lxvi. 1). To Haggai the temple appears so essential that he teaches that while it lay waste, the people and all their works and offerings were unclean (Hag. ii. 14). In this he betrays his affinity with Ezekiel, who taught that it is by the possession of the sanctuary that Israel is sanctified (Ezek. xxxvii. 28). In truth the new movement of religious thought and feeling which started from the fall of the Hebrew state took two distinct lines, of which Ezekiel and the anonymous 3 G. A. Smith, Minor Prophets, ii. 235.

authors of Isa. xl.-lxvi. are the respective representatives. While the latter developed their great picture of Israel the mediatorial nation, the systematic and priestly mind of Ezekiel had shaped a more material conception of the religious vocation of Israel in that picture of the new theocracy where the temple and its ritual occupy the largest place, with a sanctity which is set in express contrast to the older conception of the holiness of the city of Jerusalem (cf. Ezek. xliii. 7 seq. with Jer. xxxi. 40, Isa. iv. 5), and with a supreme significance for the religious life of the people which is expressed in the figure of the living waters issuing from under the threshold of the house (Ezek. xlvii.). It

was the conception of Ezekiel which permanently influenced the citizens of the new Jerusalem, and took final shape in the institutions of Ezra. To this consummation, with its necessary accompaniment in the extinction of prophecy, the book of Haggai already points. Authorities. — The elaborate and valuable German commentary of A. Kohler (Erlangen, i860) forms the first part of his work on the Nachexilische Propheten. Reinke's Commentary (Miinster, 1868) is the work of a scholarly Roman Catholic. Haggai has generally been treated in works on all the prophets, as by Ewald (2nd ed., 1868; Eng. trans., vol. iii., 1878); or along with the other minor prophets, as by Hitzig (3rd ed., by H. Steiner, Leipzig, 1881), Keil (1866, 3rd ed., 1888, Eng. trans., Edinburgh, 1868), and Pusey (1875), S. R. Driver. (1906), W. Nowack (2nd ed., 1905), K. Marti (1904), J. Wellhausen (3rd ed., 1898); or with the other post-exile prophets, as by Kohler, Pressel (Gotha, 1870), Dods (1879) and others. The older literature will be found in books of introduction or in Rosenmuller's Scholia. The learned commentary of Marckius may be specially mentioned. On the place of Haggai in the history of Old Testament prophecy, see Duhm, Theologie der Propheten (Bonn, 1875); A. B. Davidson, The Theology of- the Old Testament (1904); A. F. Kirkpatrick, The Doctrine of the Prophets; G. A. Smith, The Book of the Twelve Prophets, vol. 2 (1903) ; Tony Andree, Le Prophete Aggee; Ed. Meyer, Entstehung des Judentums (1896).

(W. R. S. ; A. J. G.)

HAGGARD, HENRY RIDER (1856-), English novelist, was born at Bradenham Hall, Norfolk, on the 22nd of June 1856. When he was nineteen he went to South Africa as secretary to Sir Henry Bulwer, governor of Natal. At the time of the first annexation of the Transvaal (1877), he was on the staff of the special commissioner, Sir Theophilus Shepstone; and he sub-sequently became a master of the high court of the Transvaal. He married in 1879 a Norfolk heiress, Miss Margitson, but returned to the Transvaal in time to witness its surrender to the Boers and the overthrow of the policy of his former chief. He

returned to England and read for the bar, but soon took to literary work; he published Ceiywayo and his White Neighbours (1882), written in defence of Sir T. Shepstone's policy. This was followed by the novels Dawn (1884), The Witch's Head (1885), which contains an account of the British defeat at Isandhlwana; and in 1886 King Solomon's Mines, suggested by the Zimbabwe ruins, which first made him popular. She (1887), another fantastic African story, was also very successful, a sequel, Ayesha, or the Return of She, being published in 1905. The scene of Jess (1887) and of 'Allan Qualermain (1888) was also laid in Africa. In 1895 he unsuccessfully contested the East Norfolk parlia- mentary division in the Unionist interest; he showed great interest in rural and agricultural questions, being a practical gardener and farmer on his estate in Norfolk. In his Rural England (2 vols., 1902) he exposed the evils of depopulation in country districts. In 1905 he was commissioned by the colonial office to inquire into the Salvation Army settlements at Fort Romie, S. California, and Fort Amity, Colorado, with a view to the establishment of similar colonies in South Africa. His report on the subject was first published as a blue book, and afterwards, in an enlarged form, as The Poor and the Land (1905), with suggestions for a scheme of national land settlement in Great Britain itself.

His other books include Maiwa's Revenge (1888), Mr Meeson's Will (1888), Colonel Quaritch, V.C. (1888), Cleopatra (1889), Eric Brighteyes (J891), The World's Desire (1890), a romance of Helen of Troy, written with Mr Andrew Lang; Nada the Lily (1892), Montezuma's Daughter (1894), The People of the Mist (1894), Joan Haste (1895), Heart of the World (1896), Dr Theme (1898), A Farmer's Year (1899), The Nevi South Africa (1900), Lysbeth, A Tale of the Dutch (1901), Stella Fregelius (1903), A Gardener's Year (1905), A Farmer's Year (1899, revised ed., 1906), The Way of the Spirit (1906).

HAGGIS, a dish consisting of a calf's, sheep's or other animal's heart, liver and lungs, and also sometimes of the smaller intestines, boiled in the

stomach of the animal with seasoning of pepper, salt, onions, &c, chopped fine with suet and oatmeal. It is considered peculiarly a Scottish dish, but was common in England till the 18th century. The derivation of the word is obscure. The Fr. hachis, English ” hash,” is of later appearance than ” haggis.” It may be connected with a verb ” to hag,” meaning to cut in small pieces, and would then be cognate ultimately with ” hash.”

HAGIOLOGY (from Gr. aytos, saint, X670S, discourse), that branch of the historical sciences which is concerned with the lives of the saints. If hagiology be considered merely in the sense in which the term has come to be understood in the later stages of its development, i.e. the critical study of hagiographic remains, there would be no such science before the 17th century. But the bases of hagiology may fairly be said to have been laid at the time when hagiographic documents, hitherto dispersed, were first brought together into collections. Theoldest collection of this kind, the avvayuyfj rdv apxa-‘uiiv ixaprvpuav of Eusebius, to which the author refers in several passages in his writings (Hist. Eccl., v. proem 2; v. 20, 5), and which has left more than one trace in Christian literature, is unfortunately lost in its entirety. The Martyrs of Palestine, as also the writings of Theodoret, Palladius and others, on the origins of the monastic life, and, similarly, the Dialogues of St Gregory (Pope Gregory I.), belong to the category of sources rather than to that of hagiologic collections. The In gloria martyrum and In gloria confessorum of Gregory of Tours are valuable for the sources used in their compilation. The most important collections are those which comprise the Acts of the Martyrs and the lives of saints, arranged in the order of the calendar. In the Greek Church these are called menologies (from Gr. \xr\v, month, X070S, discourse), and their existence can be traced back with certainty to the 9th century (Theodore of Studium, Epist. i. 2). One of them, the menology of Metaphrastes, compiled in the second half of the 10th century, enjoyed a universal vogue (see Symeon

Meta- phrastes) . The corresponding works in the Western Church are the passionaries or legendaries, varieties of which are dispersed in libraries and have not been studied collectively. They generally draw from a common source, the Roman legendary, and the lives of the local saints, i.e. those specially honoured in a church, a province or a country. One of the best known is the Austrian legendary (De magno legendario Austriaco in the Analecta Bollandiana, xvii. 24-264). From the menologies and legendaries various compilations were made: in the Greek Church, the Synaxaria (see Synaxarium); in the Western Church, abridgments and extracts such as the Speculum historiale of Vincent de Beauvais; the Legenda aurea of Jacobus de Voragine; the Sanctorale of Bernard Guy [d. 133 1] (see L. Delisle, Notice sur les manuscrits de Bernard Guy, Paris, 1879); the Sanctilogium of John of Tynemouth (c. 1366), utilized by John Capgrave, and published in 15 16 under the name of Nova legenda Angliae (new edition by C. Horstman, Oxford, 1901); and the Catalogus sanctorum of Petrus de Natalibus (c. 1375), published at Vicenza in 1493, and many times reprinted. The Sanctuarium of B. Mombritius, published at Milan about 1480, is particularly valuable because it gives a faithful reproduction of the ancient texts according to the manuscripts. One of the most zealous collectors of lives of saints was John Gielemans of Brabant (d. 1487), whose work is of great value (Bollandists, De codicibus hagiographicis Iohannis Gielemans, Brussels, 1895), and with him must be associated Anton Geens, or Gentius, of Groenendael, who died in 1543 (Analecta Bollandiana, vi. 31-34). . Hagiology entered on a new development with the publication of the Sanctorum priscorum patrum vitae (Venice and Rome, I55i _ i5 6 °) of Aloysius Lipomanus (Lippomano), bishop of Verona. As a result of the co-operation of humanist scholars a great number of Greek hagiographic texts became for the first time accessible to the West in a Latin translation. The Carthusian, Laurentius Surius, carried on the work of Lippomano, completed it, and arranged the materials strictly in the order

of the calendar (De probatis sanctorum historiis, Cologne, 1570- IS7S)- What prevents the work of Surius from being regarded as an improvement upon Lippomano's is that Surius thought it necessary to retouch the style of those documents which appeared to him badly written, without troubling himself about the consequent loss of their documentary value.

The actual founder of hagiologic criticism was the Flemish Jesuit, Heribert Rosweyde (d. 1629), who, besides his important works on the martyrologies (see Martyrology), published the celebrated collection of the Vitae patrum (Antwerp, 1615), a veritable masterpiece for the time at which it appeared. It was he, too, who conceived the plan of a great collection of lives of saints, compiled from the manuscripts and augmented with notes, from which resulted the collection of the Acta sanctorum (see Bollandists). This last enterprise gave rise to others of a similar character but less extensive in scope.

Dom T. Ruinart collected the best Acta of ihe martyrs in his Acta martyrum sincera (Paris, 1689). The various religious orders collected the Acta of their saints, often increasing the lists beyond measure. The best publication of this kind, the Acta sanctorum ordinis S. Benedicti (Paris, 1668-1701) of d'Achery and Mabillon, does not entirely escape this reproach. Countries, provinces and dioceses also had their special hagiographic collections, conceived according to various plans and executed with more or less historical sense. Of these, the most important collections are those of O. Caietanus, Vitae sanctorum Siculorum (Palermo, .1657); G. A. Lobineau, Vie des saints de Bretagne (Rennes, 1725); and J. H. Ghesquiere, Acta sanctorum Belgii (Brussels and Tongerloo, 1783- 1794). The principal lives of the German saints are published in the Monumenta Germaniae, and a special section of the

Scriptores rerum Merovingicarum is devoted to the lives of the saints. For Scotland and Ireland mention must be made of T. Messingham's Florilegium insulae sanctorum (Paris, 1624); '• Colgan's Acta sanctorum veteris et maioris Scotiae seu Hiberniae (Louvain, 1645-1647) ; John Pinkerton's Vitae antiquae sanctorum . . . (London, 1789, of which a revised and enlarged edition was published byW. M. Metcalfe at Paisley in 1889, under the title of Lives of the Scottish Saints) ; W. J. Rees's Lives of the Cambro- British Saints (Llandovery, 1853); Acta sanctorum Hiberniae (Edinburgh, 1888); Whitley Stokes's Lives of Saints from the Book of Lismore (Oxford, 1890) ; and J. O'Hanlon's Lives of the Irish Saints (Dublin, 1875-1904). Towards the 13th century vernacular collections of lives of saints began to increase- This literature is more interesting from the linguistic than from the hagiologic point of view, and comes rather within the domain of the philologist.

The hagiography of the Eastern and the Greek church also has been the subject of important publications. The Greek texts are very much scattered. Of them, however, may be mentioned J. B. Malou's " Symeonis Metaphrastae opera omnia " {Patrologia Graeca, 114, 115, 116) and Theophilos Ioannu, Mirrmtia. ayioXoytxa (Venice, 1884). For Syriac, there are S. E. Assemani's Acta sanctorum martyrum orientalium (Rome, 1748) and P. Bedjan's Acta martyrum et sanctorum (Paris, 1890-1897): for Armenian, the acts of martyrs and lives of saints, published in two volumes by the Mechitharist community of ^Venice in 1874; f° r Coptic, Hyvernat's Les Actes des martyrs de I'Egypte (Paris, 1886); for Ethiopian, K. Conti Rossini's Scriptores Aethiopici, vitae sanctorum (Paris, 1904 seq.); and for Georgian, Sabinin's Paradise of the Georgian Church (St Petersburg,. 1882).

In addition to the principal collections must be mentioned the innumerable works in which the hagiographic texts have been sub- jected to detailed critical study.

To realize the present state of hagiology, the Bibliotheca hagio- graphica, both Latin and Greek, published by the Bollandists, and the Bulletin hagiographique, which appears in each number of the Analecta Bollandiana (see Bollandists), must be consulted. Thanks to the combined efforts of a great number of scholars, the classi- fication of the hagiographic texts has in recent years made notable progress. The criticism of the sources, the study of literary styles, and the knowledge of local history now render it easier to discrimi- nate in this literature between what is really historical and what is merely the invention of the genius of the people or of the imagina- tion of pious writers (see H. Delehaye, Les Legendes hagiographiques, 2nded., pp. 121-141, Brussels, 1906). " Though the lives of saints," says a recent historian, " are filled with miracles and incredible stories, they form a rich mine of information concerning the life and customs Of the people. Some of them are ' memorials of the best men of the time written by the best scholars of the time,' " (C. Gross, The Sources and Literature of English History, p. 34, London, 1900).

(H.De.)

HAGIOSCOPE (from Gr. iiytos, holy, and aKoirelv, to see),

in architecture, an opening through the wall of a church in an

oblique direction, to enable the worshippers in the transepts or

other parts of the church, from which the altar was not visible,

to see the elevation of the Host. As a rule these hagioscopes, or " squints " as they are sometimes called, are found on one or both sides of the chancel arch. In some cases a series of openings has been cut in the walls in an oblique line to enable a person standing in the porch (as in Bridgewater church, Somerset) to see the altar; in this case and

in other instances such openings were sometimes provided for an attendant, who had to ring the Sanctus bell when the Host was elevated. Though rarely met with on the continent of Europe, there are occasions where they are found, so as to enable a monk in one of the vestries to follow the service and communicate with the bell-ringers.

HAGONOY, a town of the province of Bulacan, Luzon, Philippine Islands, on Manila Bay and on the W, branch and the delta of the Pampanga Grande river, about 25 m. N.W. of Manila. Pop. (1903), 21,304. Hagonoy is situated in a rich agricultural region, producing rice, Indian corn, sugar. and a little coffee. Alcohol is made in considerable quantities from the fermented juice of the nipa palm, which grows in the neighbouring swamps, and from the leaves of which the nipa thatch is manufactured. There is good fishing. The women of the town are very skilful in weaving the native fabrics. The language is Tagalog. Hagonoy was founded in 1581.

HAGUE, THE (in Dutch, 's Gravenhage, or, abbreviated, den Haag; in Fr. La Haye; and in Late Lat. Haga Comitis), the chief town of the province of South Holland, about i\ m. from the sea, with a junction station g| m. by rail S.W. by S. of Leiden. Steam tramways connect it with the seaside villages of Scheveningen, Kykduin and 's Gravenzande, as well as with Delft, Wassenaar and Leiden, and it is situated on a branch of the main canal from Rotterdam to Amsterdam. Pop. (1900), 212,211. The Hague is the chief town of the province, the usual residence of the court and diplomatic bodies, and the seat of the government, the states-general, the high council of the Netherlands, the council of state, the chamber of accounts and various other administrative bodies. The characteristics of the town are quite in keeping with its political position; it is as handsome as it is fashionable, and was rightly described by de Amicis in his Olanda as half Dutch, half French. The Hague has grown very largely in modern times, especially on its western side, which is situated on the higher and more sandy soil, the south-eastern half of the town comprising

the poorer and the business quarters. The main features in a plan of the town are its fine streets and houses and extensive avenues and well- planted squares; while, as a city, the neighbourhood of an attractive seaside resort, combined with the advantages and importance of a large town, and the possession of beautiful and wooded surroundings, give it a distinction all its own.

The medieval-looking group of government buildings situated in the Binnenhof (or "inner court"), their backs reflected in the pretty sheet of water called the Vy ver, represent both historically and topographically the centre of the Hague. On the opposite side of the Vyver lies the parallelogram formed by the fine houses and magnificent avenue of trees of the Lange Voorhout, the Kneuterdyk and the Vyverburg, representing the fashionable kernel of the city. Close by lies the entrance to the Haagsche Bosch, or the wood, on one side of which is situated the deer- park, and a little beyond on the other the zoological gardens (1862). Away from the Lange Voorhout the fine Park Straat stretches to the " 1813 Plein " or square, in the centre of which rises the large monument (1869) by Jaquet commemorating the jubilee of the restoration of Dutch independence in 1813. Beyond this is the Alexander Veld, used as a military drill ground, and close by is the entrance to the beautiful road called the Scheven- ingensche Weg, which leads through the " little woods " to . Scheveningen. Parallel to the Park Straat is the busy Noord- einde, in which is situated the royal palace. The palace was purchased by the States in 1595, rebuilt by the stadtholder William III., and extended by King William I. in the beginning of the 19th century. In front of the building is an equestrian statue of William I. of Orange by Count Nieuerkerke (1845), and behind are the gardens and extensive stables. The Binnen- hof, which has been already mentioned, was once surrounded by

a moat, and is still entered through ancient gateways. The oldest portion was founded in 1249 by William II., count of Holland, whose son, Florens V., enlarged it and made it his residence. Several centuries later the stadtholders also lived here. The fine old hall of the knights, built by Florens, and now containing the archives of the home office, is the historic chamber in which the states of the Netherlands abjured their allegiance to Philip II. of Spain, and in front of which the grey-headed states- man Johan van Oldenbarneveldt was executed in 1610. Close by on the one side are the courts of justice, and on the other the first and second chambers of the states-general, containing some richly painted ceilings and the portraits of various stadt- holders. Government offices occupy the remainder of the build- ings, and in the middle of the court is a fountain surmounted by a statuette of William II. , count of Holland (1 2 2 7-1 2 56) . In the adjoining Buitenhof, or " outer court," is a statue of King William II. (d. 1849), and the old Gevangen Poort, or prison gate (restored 1875), consisting of a tower and gateway. It was here that the brothers Cornelis and Jan de Witt were killed by the mob in 1672. On the opposite side of the Binnenhof is the busy square called the Plein, where all the tram-lines meet. Round about it are the buildings of the ministry of justice and other government buildings, including one to contain the state archives, the large club-house of the Witte Societeit, and the Mauritshuis. The Mauritshuis was built in 1633-1644 by Count John Maurice of Nassau, governor of Brazil, and contains the famous picture gallery of the Hague. The nucleus of this collec- tion was formed by the princes of Orange, notably by the stadtholder William V. (1748-1806). King William I. did much to restore the losses caused by the removal of many of the pictures during the French occupation. Other artistic collections in the Hague are the municipal museum (Gernsente Museum) , con- taining paintings by both ancient and modern Dutch artists, and some antiquities ; the fine collection of pictures in the Steengracht gallery, belonging to Jonkheer Steengracht; the museum Meermanno-

Westreenianum, named after Count Meermann and Baron Westreenen (d. 1850), containing some interesting MSS. and specimens of early typography and other curiosities; and the Mesdag Museum, containing the collection of the painter H. W. Mesdag (b. 1831) presented by him to the state. The royal library (1798) contains upwards of 500,000 volumes, including some early illuminated MSS., a valuable collection of coins and medals and some fine antique gems. In addition to the royal palace already mentioned, there are the palaces of the queen-dowager, of the prince of Orange (founded about 1720 by Count Unico of Wassenaar Twiekels) and of the prince von Wied, dating from 1825, and containing some good early Dutch and Flemish masters. There are numerous churches of various denominations in the Hague as well as an English church, a Russian chapel and two synagogues, one of which is Portuguese. The Groote Kerk of St James (15th and 16th centuries) has a fine vaulted interior, and contains some old stained glass, a carved wooden pulpit (1550), a large organ and interesting sepulchral monuments, and some escutcheons of the knights of the Golden Fleece, placed here after the chapter of 1456. The Nieuwe Kerk, or new church (first half 17th century), contains the tombs of the brothers De Witt and of the philosopher Spinoza. Spinoza is further commemorated by a monument in front of the house in which he died in 1677. The picturesque town hall (built in 1565 and restored and enlarged in 1882) contains a historical picture gallery. The principal other buildings are the provincial government offices, the royal school of music, the college of art, the large building (1874) of the society for arts and sciences, the ethnographical institute of the Netherlands Indies with fine library, the theatres, civil and military hospitals, orphanage, lunatic asylum and other charitable institutions; the fine modern railway station (1892), the cavalry and artillery and the infantry barracks, and the cannon foundry. The chief industries of the town are iron casting, copper and lead smelting, cannon founding, the manufacture of furniture and carriages, liqueur distilling, lithographing and

printing.

The Hague wood has been described as the city's finest

ornament. It is composed chiefly of oaks and alders and magnifi- cent avenues of gigantic beech-trees. Together with the Haarlem wood it is thought to be a remnant of the immense forest which once extended along the coast. At the end of one of the avenues which penetrates into it from the town is the large summer club- house of the Witte Societeit, under whose auspices concerts are given here in summer. Farther into the wood are some pretty little lakes, and the famous royal villa called the Huis ten Bosch, or " house in the wood." This villa was built by Pieter Post for the Princess Amelia of Solms, in memory of her husband the stadtholder, Frederick Henry of Orange (d. 1647), an< i wings were added to it by Prince William IV. in 1748. The chief room is the Orange Saloon, an octagonal hall 50 ft. high, covered with paintings by Dutch and Flemish artists, chiefly of incidents in the life of Prince Frederick. In this room the International Peace Conference had its sittings in the summer of 1899. The collections in the Chinese and Japanese rooms, and the grisailles in the dining-room painted by Jacobus de Wit (1695-1754), are also noteworthy.

The history of the Hague is in some respects singular. In the 13 th century it was no more than a hunting-lodge of the counts of Holland, and though Count Floris V. (b. 12 54-1 296) made it his residence and it thus became the seat of the supreme court of justice of Holland and the centre of the administration, and from the time of William of Orange onward the meeting-place of the states-general, it only received the status of a town, from King Louis Bonaparte, early in the 19th century.

In the latter part of the 17th and the first half of the 18th century the Hague was the centre of European diplomacy. Among the many treaties and conventions signed here may be mentioned the treaty of the Triple Alliance (January 23, 1688) between

England, Sweden and the Netherlands; the concert of the Hague (March 31, 17 10) between the Emperor, England and Holland, for the maintenance of the neutrality of the Swedish provinces in Germany during the war of the northern powers against Sweden; the Triple Alliance (January 4, 171 7) between France, England and Holland for the guarantee of the treaty of Utrecht; the treaty of peace (Feb. 17, 17 17) between Spain, Savoy and Austria, by which the first-named acceded to the principles of the Triple Alliance; the treaty of peace between Holland and France (May 16, 1795); the first " Hague Convention," the out- come of the " peace conference " assembled on the initiative of the emperor Nicholas II. of Russia (July 27, 1899), and the series of conventions, the results of the second peace conference (June 1 5- October 18, 1907). The international court of arbitration or Hague Tribunal was established in 1899 (see Europe: History; Arbitration, International). The Palace of Peace designed to be completed in 1913 as the seat of the tribunal, on the Sche- veningen avenue, is by a French architect, L. M. Cordonnier, and A. Carnegie contributed £300,000 towards its cost.

HAHN, AUGUST (1792-1863), German Protestant theologian, was born on the 27th of March 1792 at Grossosterhausen near Eisleben, and studied theology at the university of Leipzig. In 181 9 he was nominated professor exlraordinarius of theology and pastor of Altstadt in Konigsberg, and in 1820 received a superin tendency in that city. In 1822 he became professor ordinarius. In 1826 he removed as professor of theology to Leipzig, where, hitherto distinguished only as editor of Bar- desanes, Marcion (Marriott's Evangelium in seiner urspriinglichen Geslall, 1823), and Ephraem Syrus, and the joint editor of a Syrische Chrestomathie (1824), he came into great prominence as the author of a treatise, De ratio nalismi qui dicitur vera indole et qua cum naluralistno coniineatur ratione (1827), and also of an OJfene Erkldrung an die Evangelische Kirche zundchst in Sachsen 11. Preussen (1827), in which, as a member of the school of E. W.

Hengstenberg, he endeavoured to convince the rationalists that it was their duty voluntarily and at once to withdraw from the national church. In 1833 Hahn's pamphlet against K. G. Bretschneider (Uber die Lage des Christenthums in unserer Zeit, 1832) having attracted the notice of Friedrich Wilhelm III., he was called to Breslau as theological professor and consistorial councillor, and in 1843 became " general superintendent " of

ihe province of Silesia. He died at Breslau on the 13th of May 1863. Though uncompromising in his " supra-naturalism," he did not altogether satisfy the men of his own school by his own doctrinal system. The first edition of his Lehrbuch des christ- lichen Glanbens (1828) was freely characterized as lacking in consistency and as detracting from the strength of the old positions in many important points. Many of these defects, however, he is considered to have remedied in his second edition (1857). Among his other works are his edition of the Hebrew Bible (1833), his Bibliothek der Symbole und Glaubensregcln dcr apostolisch-katholischen Kirche (1842; 2nd ed. 1877) and Predigten (1852).

His eldest son, Heinrich August Hahn (1821-1861), after studying theology at Breslau and Berlin, became successively Privatdozent at Breslau (1845), professor ad interim (1846) at Konigsberg on the death of Heinrich Havernick, professor extraordinarius (1851) and professor ordinarius (i860) at Greifs- wald. Amongst his published works were a commentary on the Book of Job (1850), a translation of the Song of Songs (1852), an exposition of Isaiah xl.-lxvi. (1857) and a commentary on the Book of Ecclesiastes (i860).

See the articles in Herzog-Hauck, Realencyklopadie, and the Allgcmeine deutsche Biographic

HAHNEMANN, SAMUEL CHRISTIAN FRIEDRICH (1755- 1843),

German physician and founder of "homoeopathy," was born at Meissen in Saxony on the 10th of April 1755. He was educated at the " elector's school " of Meissen, and studied medicine at Leipzig and Vienna, taking the degree of M.D. at Erlangen in 1779. After practising in various places, he settled in Dresden in 1784, and thence removed to Leipzig in 1789. In the following year, w r hile translating W. Cullen's Materia medica into German, he was struck by the fact that the symptoms pro- duced by quinine on the healthy body were similar to those of the disordered states it was used to cure. He had previously felt dissatisfied with the state of the science of medicine, and this observation led him to assert the truth of the " law of similars," similia similibus curantur or curentur — i.e. diseases are cured (or should be treated) by those drugs which produce symptoms similar to them in the healthy. He promulgated his new principle in a paper published in 1796 in C. W. Hufeland's Journal, and four years later, convinced that drugs in much smaller doses than were generally employed effectually exerted their curative powers, he advanced his doctrine of their potenti- zation or dynamization. In 1810 he published his chief work, Organon dcr rationelle.n Heilkunde, containing an exposition of his system, which he called homoeopathy (q.v.), and in the following years appeared the six volumes of his Reine Arzneimittellehrc, which detailed the symptoms produced by "proving" a large number of drugs, i.e. by systematically administering them to healthy subjects, In 182 1 the hostility of established interests, and especially of the apothecaries, whose services were not required under his system, forced him to leave Leipzig, and at the invitation of the grand-duke of Anhalt-Cothen he went to live at Cothen. Fourteen years later he removed to Paris, where he practised with great success until his death on the 2nd of July 1843. Statues were erected to his memory at Leipzig in 1851 and at Cothen in 1855. He also wrote, in addition to the works already mentioned, Fragmenta de viribus medicamentorum positivis (1805) and Die chronischen Krankheiten

(1828–1830).

See the article Homoeopathy ; also Albrecht, Hahnemann's Leben und Werken (Leipzig, 1875); Bradford, Hahnemann's Life and Letters (Philadelphia, 1895).

HAHN-HAHN, IDA, Countess von (1805–1880), German author, was born at Tressow, in Mecklenburg-Schwerin, on the 22nd of June 1805, daughter of Graf (Count) Karl Friedrich- von Hahn (1782–1837), well known for his enthusiasm for the stage, upon which he squandered a large portion of his fortune. She married in 1826 her wealthy cousin Count Adolf von Hahn- Hahn. With him she had an extremely unhappy life, and in 1820 her husband's irregularities led to a divorce. The countess travelled, produced some volumes of poetry indicating true

lyrical feeling, and in 1838 appeared as a novelist with Aus der Gesellschaft, a title which, proving equally applicable to her subsequent novels, was retained as that of a series, the book originally so entitled being renamed Ida Schonholm. For several years the countess continued to produce novels bearing a certain subjective resemblance to those of George Sand, but less hostile to social institutions, and dealing almost exclusively with aristocratic society. The author's patrician affectations at length drew upon her the merciless ridicule of Fanny Lewald in a parody of her style entitled Diogena (1847), ar >d this and the revolution of 1848 together seem tc have co-operated in inducing her to embrace the Roman Catholic religion in 1S50. She justified her step in a polemical work entitled Von Babylon nach Jerusalem (1851), which elicited a vigorous reply from H. Abeken. In 1852 she retired into a convent at Angers, which she, however, soon left, taking up her residence at Mainz where she founded a nunnery, in which she lived without joining the order, and continued her literary labours. For many years her novels were the most popular works of fiction in aristocratic circles; many of her later publications, however, passed unnoticed as mere

party manifestoes. Her earlier works do not deserve the neglect into which they have fallen. If their sentimentalism is some- times wearisome, it is grounded on genuine feeling and expressed with passionate eloquence. Ulrich and Grafin Faustine, both published in 1841, mark the culmination of her power; but Sigismund Forster (1843), Cecil (1844), Sibylle (1846) and Maria Regina (i860) also obtained considerable popularity. She died at Mainz on the 12th of January 1880.

Her collected works, Gesammelte Werke, with an introduction by O. von Schaching, were published in two series, 45 volumes in all (Regensburg, 1903-1904). See H. Keiter, Grafin Hahn-Hahn (Wiirzburg, undated) ; P. Haffner, Grafin Ida Hahn-Hahn, eine psychologische Studie (Frankfort, 1880); A. Jacoby, Ida Grafin Hahn-Hahn (Mainz, 1894).

HAI (939-1038), Jewish Talmudical scholar, was born in 939. He was educated by his father Sherira, gaon of Pombeditha (Pumbedita), whom he afterwards assisted in his work. They were cast into prison for a short time by the caliph Qadir, and subsequently on Sherira's death Hai was appointed gaon in his place (998). This office he held till his death on the 28th of March 1038. He is famous chiefly for his answers to problems of ritual and civil law. He composed important treatises on Talmudic law and the Mishnah; many poems are also attributed to him on doubtful authority. In his responsa he laid stress on custom and tradition provided no infringement of the law were involved, and was essentially conservative in theology. He had considerable knowledge not only of religious movements within the Jewish body, but also of Mahommedan theology and controversial method, and frequently consulted theologians of other beliefs.

See Steinschneider, Hebr. Ubersetz. p. 910, and article in Jewish Encyclopedia, vi. 153.

HAIBAK, a town and khanate of Afghan Turkestan. The valley of Haibak, which is 3100 ft. above sea level, is fertile and richly cultivated. The town, which is

famed in Persian legend, consists now of only a couple of streets, containing many Hindu shops and a small garrison. The inhabitants call themselves Jagatais, a Turki race, though now generally mixed with Tajiks and speaking Persian. In the neighbourhood of Haibak are some very typical Buddhist ruins. Haibak derives its import- ance from its position on the main line of communication between Kabul and Afghan Turkestan.

HAIDA, a tribe of North American Indians of Skittagetan stock. They still occupy their original home, the Queen Char- lotte islands, British Columbia. They are skilful seamen, making long fishing expeditions in cedarwood canoes. They are noted for their carving and basket-work. They formerly made raids on the coast tribes. Slavery was hereditary, the slaves being prisoners of war. The population, some 7000 in the middle of the 19th century, is now reduced to a few hundreds.

See Handbook of American Indians (Washington, 1907). Foj " Haida Texts and Myths," see Bull.29 Smithsonian Institution Bure-ti Amer, Ethnol. (1905).

HAIDINGER, WILHELM KARL, Ratter von (1795-1871), Austrian mineralogist, geologist and physicist, was born at Vienna on the 5th of February 1795. His father, Karl Haidinger, contributed largely to the development of mineralogical science in the latter half of the 18th century. Having studied at the normal school of St Anne, and attended classes at the university, Wilhelm, at the age of seventeen, joined Professor F. Mohs at Gratz, and five years later accompanied the professor to Freiberg on the transfer of his labours to the mining academy of that town.

In 1822 Haidinger visited France and England with Count Breunner, and, journeying northward, took up

his abode in Edinburgh. He translated into English, with additions of his own, Mohs's Grundriss der Mineralogie, published at Edinburgh in three volumes under the title Treatise on Mineralogy (1825). After a tour in northern Europe, including the Scandinavian mining districts, he undertook the scientific direction of the porcelain works at Elbogen, belonging to his brothers. In 1840 he was appointed counsellor of mines (Bergrat) at Vienna in the place of Professor Mohs, a post which included the charge of the imperial cabinet of minerals. He devoted himself to the re- arrangement and enrichment of the collections, and the museum became the first in Europe. Shortly after (1843) Haidinger commenced a series of lectures on mineralogy, which was given to the world under the title Handbuch der beslimmenden Minera- logie (Vienna, 1845; tables, 1846). On the establishment of the imperial geological institute, he was chosen director (1849); and this important position he occupied for seventeen years. He was elected a member of the imperial board of agriculture and mines, and a member of the imperial academy of sciences of Vienna. He organized the society of the Freunde der Natur- wissenschaften. As a physicist Haidinger ranked high, and he was one of the most active promoters of scientific progress in Austria. He was the discoverer of the interesting orjtical appearances which have been called after him " Haidinger's brushes." Knighted in 1865, the following year he retired to his estate at Dornbach near Vienna, where he died on the 19th of March 1871.

In addition to the works already named, Haidinger published Anfangsgriinde der Mineralogie (Leipzig, 1829); Geognostische Xjber- sichtskarte der osterreich. Monarchie (Vienna, 1847); Bemerkungen uber die Anordnung der kleinsten Theilchen in Christallen (Vienna, 1853); Inter jerenzlinien am Glimmer (Vienna, 1855); Vergleichun- gen von Augit und Amphibol (Vienna, 1855). He also edited the Naturwissenschaftliche Abhandlungen (Vienna, 1847) ; the Berichte uber die Mittheilungen von Freunden der

Naturwissenschaften in Wien (Vienna, 1847–1851); and the Jahrbuch of the Vienna K. K. Geologische Reichsanstalt (1850), &c. Some of his papers will be found in the Transactions of the Royal Society of Edinburgh (vol. x.) and of the Wernerian Society (1822–1823), Edinburgh Phil. Journal, Brewster's Journal of Science, and Poggendorff's Annalen. (H. B. Wo.)

HAIDUK (also written Hayduk, Heiduc, Heyduke and Hey- duque), a term which appears originally to have meant " robber " or " brigand," a sense it retains in Servia and some other parts of the Balkan Peninsula. It is probably derived from the Turkish haidud, " marauder," but its origin is not absolutely certain. Most of the European races with which the Turks came into close contact during the 1 5th and 16th centuries seem to have adopted it as a loan-word, and it appears in Magyar as hajdii (plural hajduk), in Serbo-Croatian, Rumanian, Polish and Cech as hajduk, in Bulgarian as hajdutin and in Greek as xaxprowrts. By the beginning of the 17th century its use had spread north and west as far as Sweden and Great Britain. In Hungary it was applied to a class of mercenary foot-soldiers of Magyar stock. In 1605 these haiduks were rewarded for their fidelity to the, Protestant party (see Hungary: History) with titles of nobility . and territorial rights over a district situated on the left bank of the river Theiss, known thenceforward as the Haiduk region. This was enlarged in 1876 and converted into the county of Hajdu (Ger. Hajduken). Hajdii is also a common prefix in Hungarian place-names, e.g. Hajdu-Szoboszlo, Hajdu-Namas. In Austria-Hungary, Germany, Poland, Sweden and some other countries, haiduk came to mean an attendant in a court of law,

or a male servant, dressed in Hungarian semi-military costume. It is also occasionally used as a synonym for " footman " or " lackey."

HAIFA, a town of Palestine at the foot of Mt. Carmel, on the south of the Bay of Acre. It represents the classical Sycaminum, but the present town is entirely modern. It has developed since

about 1890 into an important port, and is connected by railway with Damascus. The population is estimated at 12,000 (Mos- lems 6000, Christians 4000, Jews 1500, Germans 500; the last belong for the greater part to the Unitarian sect of the " Templars," who have colonies also at Jaffa and Jerusalem). The exports (grain and oil) were valued at £178,738 in 1900. Much of the trade that formerly went to Acre has been attracted to Haifa. This port is the best natural harbour on the Palestine coast.

HAIK (an Arabic word, from hak, to weave), a piece of cloth, usually of coarse hand-woven wool, worn by Arabs, Moors and other Mahommedan peoples. It is generally 6 to 65 yds. long, and about 2 broad. It is either striped or plain, and is worn equally by both sexes, usually as an outer covering; but it is often the only garment of the poorer classes. By women the " haik " is arranged to cover the head and, in the presence of men, is held so as to conceal the face. A thin " haik " of silk, like a veil, is used by brides at their marriage.

HAIL (O. Eng. hazgl and hagol, 1 cf . the cognate Teutonic hagel, as in German, Dutch, Swedish, &c; the Gr. koxXtjJ, pebble, is probably allied), the name for rounded masses or single pellets of ice falling from the clouds in a shower. True hail has a con- centric structure caused by the frozen particles of moisture first descending into a warm cloud, whence they are carried upwards on an ascending current of heated air into a cold stratum where the fresh coating of water vapour deposited in the cloud is frozen. The hailstone descends again, receives a fresh coating, is carried up once more, refrozen, and again descends. Thus the hailstone grows until the current is no longer strong enough to support it when it falls to the ground. At times masses of hail are frozen together, and a very sudden cooling will sometimes result in the formation of ragged masses of ice that fall with disastrous results. Hail must be distinguished from the frozen snow, " soft-hail " or " graupel," that often falls at the rear of a spring cyclone, since true hail is almost entirely a summer phenomenon,

and falls most frequently in thunderstorms which are produced under the conditions that are favourable to the formation of hail, i.e. great heat, a still atmosphere, the production of strong local convection currents in consequence, and the passage of a cold upper drift.

HAILES, DAVID DALRYMPLE, Lord (1726-1792), Scottish lawyer and historian, was born at Edinburgh on the 28th of October 1726. His father, Sir James Dalrymple, Bart., of Hailes, in the county of Haddington, auditor-general of the exchequer of Scotland, was a grandson of James, first Viscount Stair; and his mother, Lady Christian Hamilton, was a daughter of Thomas, 6th earl of Haddington. David was the eldest of sixteen children. He was educated at Eton, and studied law at Utrecht, being intended for the Scottish bar, to which he was admitted shortly after his return to Scotland in 1748. As a pleader he attained neither high distinction nor very extensive practice, but he rapidly established a well-deserved reputation for sound knowledge, unwearied application and strict probity ; and in r766 he was elevated to the bench, when he assumed the title of Lord Hailes. Ten years later he was appointed a lord of justiciary. He died on the 29th of November 1792. He was twice married, and had a daughter by each wife. The baronetcy to which he had succeeded passed to the son of his brother John, provost of Edinburgh. Another brother was Alexander -Dalrymple (r737-i8o8), the first admiralty hydrographer, who distinguished himself in the East India Company's service and as a geographer. Lord Hailes's younger daughter married Sir

1 " Hail," a call of greeting or salutation, a shout to attract attention, must, of course, be distinguished. This word represents the Old Norwegian heill, prosperity, cognate with O. Eng. hal, whence " hale," " whole," and had, whence " health," " heal. "

James Fergusson; and their grandson, Sir Charles Dalrymple, 1st Bart. (cr. 1887), M.P. for Bute from 1868 to 1885, afterwards came into Lord Hailes's estate and took his family name.

Lord Hailes's most important contribution to literature was the Annals of Scotland, of which the first volume, " From the accession of Malcolm III., surnamed Canmore, to the accession of Robert I.," appeared in 1776, and the second, " From the accession of Robert I., surnamed Bruce, to the accession of the house of Stewart," in 1779. It is, as Dr Johnson justly described this work at the time of its appearance, a " Dictionary " of carefully sifted facts, which tells all that is wanted and all that is known, but without any laboured splendour of language or affected subtlety of conjecture. The other works of Lord Hailes include Historical Memoirs concerning the Provincial Councils of the Scottish Clergy (1769); An Examination of some of the Arguments for the High Antiquity of Regiam Majestatem (1769); three volumes entitled Remains of Christian Antiquity (" Account of the Martyrs of Smyrna and Lyons in the Second Century," 1776; "The Trials of Justin Martyr, Cyprian, &c," 1778; " The History of the Martyrs of Palestine, translated from Eusebius," 1780); Disquisitions concerning the Antiquities of the Christian Church (1783); and editions or translations of portions of Lactantius, Tertullian and Minucius Felix. In 1786 he published An Inquiry into the Secondary Causes which Mr Gibbon has assigned for the Rapid Growth of Christianity (Dutch transla- tion, Utrecht, 1793), one of the most respectable of the very many replies which were made to the famous 15th and 16th chapters of the Decline and Fall of the Roman Empire.

A " Memoir " of Lord Hailes is prefixed to the 1808 reprint of his Inquiry into the Secondary Causes.

HAILSHAM, a market-town in the Eastbourne parliamentary division of Sussex, England, 54 m. S.S.E. from London by the London, Brighton & South Coast railway. Pop. (1901), 4197. The church of St Mary is Perpendicular. The picturesque Augustinian

priory of Michelham lies 2 m. W. by the Cuckmere river; it is altered into a dwelling house, but retains a gate- house, crypt and other portions of Early English date. There was also a Premonstratensian house at Otham, 3 m. S., but the remains are scanty. Hailsham has a considerable agricultural trade, and manufactures of rope and matting are carried on.

HAINAN, or, as it is usually called in Chinese, K'iung-chow-fu, a large island belonging to the Chinese province of Kwang-tung, and situated between the Chinese Sea and the Gulf of Tong-king from 20 8' to 17 52' N., and from 108 32' to in° 15' E. It measures 160 m. from N.E. to S.W., and the average breadth is about 90 m. The area is estimated at from 1200 to 1400 sq. m., or two-thirds the size of Sicily. From the peninsula of Lei- chow on the north it is separated by the straits of Hainan, which have a breadth of 15 or 20 m.

With the exception of a considerable area in the north, and broad tracts on the north-east and north-west sides, the whole island is occupied by jungle-covered mountains, with rich valleys between. The central range bears the name of Li-mou shan or Wu-tchi shan (the Five-Finger Mountain), and attains a height of 6000 or 7000 ft. Its praises are celebrated in a glowing ode by Ch'iu, a native poet. The island appears to be well watered, and some of its rivers are not without importance as possible highways of commerce; but the details of its hydrography are very partially ascertained. A navigable channel extends in an irregular curve from the bay of Hoi-how (Hai-K'ow) in the north to Tan-chow on the west coast. Being exposed to the winter monsoon, the northern parts of the island enjoy much the same sort of temperate climate as the neighbouring provinces of the mainland, but in the southern parts, protected from the monsoon by the mountain ranges, the climate is almost or entirely tropical. Snow falls so rarely that its appearance in 1684 is reported in the native chronicles as a remarkable event. Earthquakes are a much more familiar phenomenon, having occurred, according to

the same authority, in 1523, 1526, 1605, 1652, 1677, 1681, 1684, 1702, 1704, 1725, 1742, 1816, 1817 and 1822. Excellent timber of various kinds — eagle-wood, rose-wood, liquidambar, &c. — is one of the principal products of the island, and has even

been specially transported to Peking for imperial purposes. The coco palm flourishes freely even in the north, and is to be found growing in clumps with the Pinus sinensis. Rice, cotton, sugar, indigo, cinnamon, betel-nuts, sweet potatoes, ground-nuts and tobacco are all cultivated in varying quantities. The aboriginal inhabitants collect a kind of tea called t'ien ch'a, or celestial tea, which looks like the leaves of a wild camellia, and has an earthy taste when infused. Lead, silver, copper and iron occur in the Shi-lu shan or " stone-green-hill "; the silver at least was worked till 1850. Gold and lapis lazuli are found in other parts of the island.

The ordinary cattle of Hainan are apparently a cross between the little yellow cow of south China and the zebu of India. Buffaloes are common, and in the neighbourhood of Nanlu at least they are frequently albinos. Horses are numerous but small. Hogs and deer are both common wild animals, and of the latter there are three species, Cervus Eldi, Cervus hippelaphus and Cervus vaginalis. Among the birds, of which 172 species are described by Mr Swinhoe in his paper in The Ibis (1870), there are eagles, notably a new species Spilornis Rutherfordi, buzzards, harriers, kites, owls, goatsuckers and woodpeckers. The Upupa ceylonensis-\s> familiar to the natives as the " bird of the Li matrons," and the Palaeornis javanica as the " sugar-cane bird." Hainan forms a fu or department of the province of Kwang- tung, though strictly it is only a portion of the island that is under Chinese administration, the remainder being still occupied by unsubjugated aborigines. The department contains three chow and ten hien districts. K'iuhg-chow-hien, in which the capital is situated; Ting-an-hien, the only inland district; Wen-ch'ang-hien, in the north-east of the island; Hui-t'ung- hien, Lo-hui-hien, Ling-shu-hien,

Wan-chow, Yai-chow (the southmost of all), Kan-en-hien Ch'ang-hwa-hien, Tan-chow, Lin-kao-hien and Ch'eng-mai-hien. The capital K'iung-chow-fu is situated in the north about 10 li (or 3 m.) from the coast on the river. It is a well-built compact city, and its temples and examination halls are in good preservation. Carved articles in coco-nuts and scented woods are its principal industrial product. In 1630 it was made the seat of a Roman Catholic mission by Benoit de Mathos, a Portuguese Jesuit, and the old cemetery still contains about 113 Christian graves. The port of K'iung- chow-fu at the mouth of the river, which is nearly dry at low water, is called simply Hoi-how, or in the court dialect Hai-K'ow, i.e. seaport. The two towns are united by a good road, along which a large traffic is maintained partly by coolie porters but more frequently by means of wheel-barrows, which serve the purpose of cabs and carts. The value of the trade of the port has risen from £670,600 in 1899 to £719,333 in 1904. In the same year 424 vessels, representing a tonnage of 312,554, visited the port. This trade is almost entirely with the British colony of Hong-Kong, with which the port is connected by small coasting steamers, but since 1893 it has had regular steamboat com- munication with Haiphong in Tongking. The population of K'iung-chow, including its shipping port of Hoi-how, is estimated at 52,000. The number of foreign residents in 1900 was about 30, most of them officials or missionaries.

The inhabitants of Hainan may be divided into three classes, the Chinese immigrants, the civilized aborigines or Shu-li and the wild aborigines or Sheng-li. The Chinese were for the most part originally from Kwang-si and the neighbouring provinces, and they speak a peculiar dialect, of which a detailed account by Mr Swinhoe was given in The Phoenix, a Monthly Magazine for China, &c. (1870). The Shu-li as described by Mr Taintor are almost of the same stature as the Chinese, but have a mor decided copper colour, higher cheek-bones and more angular features, while their eyes are not*

oblique. Their hair is long, straight and black, and their beards, if they have any, are very scanty. They till the soil and bring rice, fuel, timber, grass-cloth, &c, to the Chinese markets. The Sheng-li or Li proper, called also La, Le or Lauy, are probably connected with the Laos of Siam and the Lolos of China. Though not gratuitously aggressive, they are highly intractable, and have given great trouble to the Chinese authorities. Among themselves they carry on

deadly feuds, and revenge is a duty and an inheritance. Though they are mainly dependent on the chase for food, their weapons are still the spear and the bow, the latter being made of wood and strung with bamboo. In marriage no avoidance of similarity of name is required. The bride's face is tattooed according to a pattern furnished by the bridegroom. Their funeral mourning consists of abstaining from drink and eating raw beef, and they use a wooden log for a coffin. When sick they sacrifice oxen. In the spring-time there is a festival in which the men and women from neighbouring settlements move about in gay clothing hand in hand and singing songs. The whole population of the island is estimated at about 2j millions. At its first conquest 23,000 families were introduced from the mainland. In 1300 the Chinese authorities assign 166,257 inhabitants; in 1370, 291,000; in 1617, 250,524; and in 1835, 1,350,000.

It was in 1 1 1 B.C. that Lu-Po-Teh, general of the emperor Wu- ti, first made the island of Hainan subject to the Chinese, who divided it into the two prefectures, Tan-urh or Drooping Ear in the south, so-called from the long ears of the native " king," and Chu-yai or Pearl Shore in the north. During the decadence of the elder branch of the Han dynasty the Chinese supremacy was weakened, but in a.d. 43 the natives were led by £he success of Ma-yuan in Tong-king to make a new tender of their allegiance. About

this time the whole island took the name of Chu-yai. In a.d. 627 the name of K'iung-chow came into' use. On its con- quest by the generals of Kublai Khan in 1278 the island was incorporated with the western part of the province of Kwang- tung in a new satrapy, Hai-peh Hai-nan Tao, i.e. the circuit north of the sea and south of the sea. It was thus that Hai-nan-Tao, or district south of the sea or strait, came into use as the name of the island, which, however, has borne the official title of K'iung-chow-fu, probably derived from the Kiung shan or Jade Moun- tains, ever since 1370, the date of its erection into a department of Kwang-tung. For a long time Hainan was the refuge of the turbulent classes of China and the place of deportation for delinquent officials. It was there, for example, that Su-She or Su-Tung-po was banished in 1097. From the 15th to the 19th century pirates made the intercourse with the mainland danger- ous, and in the 17th they were considered so formidable that merchants were allowed to convey their goods only across the narrow Hainan Strait. Since 1863 the presence of English men- of-war has put an end to this evil. According to the treaty of Tientsin, the capital K'iung-chow and the harbour Hoi-how (Hai-Kow) were opened to European commerce; but it was not till 1876 that advantage was taken of the permission.

HAINAU (officially Haynatj), a town of Germany, in the Prussian province of Silesia, on the Schnelle Deichsa and the railway from Breslau to Dresden, 12 m. N.W. of Liegnitz. Pop. 10,500. It has an Evangelical and a Roman Catholic church, manufactories of gloves, patent leather, paper, metal ware and artificial manures, and a considerable trade in cereals. Near Hainau the Prussian cavalry under Bliicher inflicted a defeat on the French rearguard on the 26th of May 1813.

HAINAUT (Flem. Henegouwen, Ger. Hennegau), a province of Belgium formed out of the ancient county of Hainaut. Modern Hainaut is famous as containing the chief coal and iron mines of Belgium. There are about 150,000 men and women employed in the mines, and about as many more in the iron and steel works

of the province. About 1880 these numbers were not more than half their present totals. The principal towns of Hainaut are Mons, the capital, Charleroi, Tournai, Jumet and La Louviere. The province is watered by both the Scheldt and the Sambre, and is connected with Flanders by the Charleroi-Ghent canal. The area of the' province is computed at 930,405 acres or 1453 sq. m. In 1904 the population was 1,192,967, showing an average of 821 per square mile.

Under the successors of Cloyis Hainaut formed part, first of the kingdom of Metz, and then of that of Lotharingia. It afterwards became part of the duchy of Lorraine. The first to bear the title of count of Hainaut was Reginar " Long-Neck " {c. 875), who, later on, made himself master of the duchy of Lorraine and died in 916. His eldest son inherited Lower

Lorraine, the younger, Reginar II., the countship of Hainaut, which remained in the male line of his descendants, all named Beginar, until the death of Reginar V. in 1036. His heiress, Richildis, married en secondes noces Baldwin VI. of Flanders, and, by him, became the ancestress of the Baldwin (VI. of Hainaut) who in 1 204 was raised by the Crusaders to the empire of Constantinople. The emperor Baldwin's elder daughter Jeanne brought the countship of Hainaut to her husbands Ferdinand of Portugal (d. 1233) and Thomas of Savoy (d. 1259). On her death in 1244, however, it passed to her sister Margaret, on whose death in 1279 it was inherited by her grandson, John of Avesnes, count of Holland (d. 1304). The countship of Hainaut remained united with that of Holland during the 14th and 15th centuries. It was under the counts William I. " the Good " (i3°4 -I 337), whose daughter Philippa married Edward III. of England, and William II. (1337-1345) that the communes of Hainaut attained great political importance. Margaret, who succeeded her brother William II. in 1345, by her marriage with the emperor Louis IV. brought Hainaut with the rest of her dominions to the house of Wittelsbach. Finally, early in the 15th century, the countess

Jacqueline was dispossessed by Philip the Good of Burgundy, and Hainaut henceforward shared the fate of the rest of the Netherlands.

Authorities. — The Chronicon Hanoniense or Chronica Honnoniae of Giselbert of Mons (d. 1223–1225), chancellor of Count Baldwin V., covering the period between 1040 and 1195, is published in Pertz, Monum. Germ. (Hanover, 1.840, &c). The Chronicon Hanoniense, ascribed to Baldwin, count of Avesnes (d. 1289), and written between 1278 and 1281, was published under the title Hist, genealogica comitum Hannoniae, &c, at Antwerp (1691 and 1693) an d Brussels (1722). The Annals of Jacques de Guise (b. 1334; d. 1399) were published by de Fortia d' Urban under the title, Histoire de Hai- nault par Jacques de Guyse, in 19 vols. (Paris, 1826–1838); C. Delacourt, " Bibliographie de l'hist. du Hainaut," in the Annates du cercle archeologique de Mons, vol. v. (Mons, 1864); T. Bernier, Diet, geograph. historique, &c, de Hainault (Mons, 1891). See also Ulysse Chevalier, Repertoire des sources s.v.

HAINBURG, or Haimburg, a town of Austria, in Lower Austria, 38 m. E.S.E of Vienna by rail. Pop. (1900), 5134. It is situated on the Danube, only 2j m. from the Hungarian frontier, and since the fire of 1827 Hainburg has been much improved, being now»a handsomely built town. It has one of the largest tobacco manufactories in Austria, employing about 2000 hands, and a large needle factory. It occupies part of the site of the old Celtictown Carnuntum (q.v.). It is still surrounded by ancient walls, and has a gate guarded by two old towers. There are numerous Roman remains, among which may be mentioned the altar and tower at the town-house, on the latter of which is a statue, said to be of Attila. A Roman aqueduct is still used to bring water to the town. On the neighbouring Hainberg is an old castle, built of Roman remains, which appears in German tradition under the name of Heimburc; it was wrested from the Hungarians in 1042 by the emperor Henry III. At the foot of the same hill is a castle of the 12th century, where Ottakar of Bohemia was married to Margaret of Austria in 1252; earlier it was the

residence of the dukes of Babenberg. Outside the town, on an island in the Danube, is the ruined castle of Rothel- stein or Rothenstein, held by the Knights Templars. Hainburg was besieged by the Hungarians in 1477, was captured by Matthias Corvinus in 1482, and was sacked and its inhabitants massacred by the Turks in 1683.

HAINICHEN, a town of Germany, in the kingdom of Saxony, on the Kleine Striegis, 15 m. N.E. of Chemnitz, on the rail- way to Rosswein. Pop. (1905), 7752. It has two Evangelical churches, a park, and commercial and technical schools. Hainichen is a place of considerable industry. Its chief manu- facture is that of flannels, baize, and similar fabrics; indeed it may be called the centre of this industry in Germany. The special whiteness and excellence of the flannel made in Hainichen are due to the peculiar nature of the water used in the manu- facture. There are also large dye-works and bleaching estab- lishments. Hainichen is the birthplace of Gellert, to whose memory a bronze statue was erected in the market-place in 1865. The Gellert institution for the poor was erected in 181 5.

HAI-PHONO, a seaport of Tongking, French Indo-China, on the Cua-Cam, a branch of the Song-koi (Red river) delta. The population numbers between 21,000 and 22,000, of whom 12,500 are Annamese, 7500 Chinese (attracted by the rice trade of the port) and 1 200 Europeans. It is situated about 20 m. from the Gulf of Tongking and 58 m. E. by S. of Hanoi, with which it communicates by river and canal and by railway. It is the second commercial port of French Indo-China, is a naval station, and has government and private ship-building yards. The harbour is accessible at all times to vessels drawing 19 to 20 ft., but is obstructed by a bar. Hai-phong is the seat of a resident who performs the functions of mayor, and the residency is the chief building of

the town. A civil tribunal, a tribunal of com- merce and a branch of the Bank of Indo-China are also among its institutions. It is the headquarters of the river steamboat service {Messageries fluviales) of Tongking, which plies as far as Lao-kay on the Song-koi, to the other chief towns of Tongking and northern Annam, and also to Hong-kong. Cotton-spinning and the manufacture of cement are carried on.

HAIR (a word common to Teutonic languages), the general term for the characteristic outgrowth of the epidermis forming the coat of mammals. The word is also applied by analogy to the filamentous outgrowths from the body of insects, &c, plants, and metaphoiically to anything of like appearance.

For anatcmy, &c. of animal hair see Skin and Exoskeleton; Fibres and allied articles; Fur, and Leather.

Anthropology. — The human hair has an important place among the physical criteria of race. While its general structure and quantity vary comparatively little, its length in individuals and relatively in the two sexes, its form, its colour, its general consistency and the. appearance under the microscope of its transverse section show persistent differences in the various races. It is the persistence of these differences and specially in regard to its colour and texture, which has given to hair its ethnological importance. So obvious a racial differentiation had naturally long ago attracted the attention of anthropologists. But it was not until the 19th century that microscopic examination showed the profound difference in structure between the hair character- istic of the great divisions of mankind. It was in 1863 that Dr Pruner-Bey read a paper before the Paris Anthropological Society entitled ” On the Human Hair as a Race Character, examined by aid of the Microscope.” This address established the importance of hair as a racial criterion. He demonstrated that the structure of the hair is threefold: —

(1) Short and crisp, generally termed " woolly," elliptical or kidney-shaped in section, with no distinguishable medulla or pith. Its colour is almost always jet black, and it is character- istic of all the black races except the Australians and aborigines of India. This type of hair has two varieties. When the hairs are relatively long and the spiral of the curls large, the head has the appearance of being completely covered, as with some of the Melanesian races and most of the negroes. Haeckel has called this " eriocomous " or " woolly " proper. In some negroid peoples, however, such as the Hottentots and Bushmen, the hair grows in very short curls with narrow spirals and forms little tufts separated by spaces which appear bare. The head looks as if it were dotted over with pepper-seed, and thus this hair has gained the name of " peppercorn-growth." Haeckel has called it " lophocomous " or " crested." Most negroes have this type of hair in childhood and, even when fully grown, signs of it around the temples. The space between each tuft is not bald, as was at one time generally assumed. The hair grows, uniformly over the head, as in all races.

2. Straight, lank, long and coarse, round or nearly so in section, with the medulla or pith easily distinguishable, and almost without exception black. This is the hair of the yellow races, the Chinese, Mongols and Indians of the Americas.

3. Wavy and curly, or smooth and silky, oval in section, with medullary tube but no pith. This is the hair of Europeans, and is mainly fair, though black, brown, red or towy varieties are found.

There is a fourth type of hair describable as " frizzy." It is

easily distinguishable from the Asiatic and European types, but not from the negroid wool. It is always thick and black, and is characteristic of the Australians, Nubians, and certain of the Mulattos. Generally hair curls in proportion to its flatness. The rounder it is the stiffer and lanker. These

extremes are respectively represented by the Papuans and the Japanese. Of all hair the woolly type is found to be the most persistent, as in the case of the Brazilian Cafusos, negro and native hybrids. Quatrefages quotes the case of a triple hybrid, " half negro, quarter Cherokee, quarter English," who had short crisp furry- looking hair.

Wavy types of hair vary most in colour: almost the deepest hue of black being found side by side with the most flaxen and towy. Colour varies less in the lank type, and scarcely at all in the woolly. The only important exception to the uniform blackness of the negroid wool is to be found among the Wochuas, a tribe of African pigmies whose hair is described by Wilhelm Junker (Travels in Africa, iii. p. 82) as " of a dark, rusty brown hue." Fair hair in all its shades is frequent among the popula- tions of northern Europe, but much rarer in the south. According to Dr John Beddoe there are sixteen blonds out of every hundred Scotch, thirteen out of every hundred English, and two only out of a hundred Italians. The percentage of brown hair is 75% among Spaniards, 39 among French and 16 only in Scandinavia. Among the straight-haired races fair hair is far rarer; it is, however, found among the western Finns. Among those races with frizzy hair, red is almost as common as among those with wavy hair. Red hair, however, is an individual anomaly associ- ated ordinarily with freckles. There are no red-haired races.

A certain correlation appears to exist between the nature of hair and its absolute or relative length in the two sexes. Thus straight hair is the longest (Chinese, Red Indians), while woolly is shortest. Wavy hair holds an intermediate position. In the two extremes the difference of length in man and woman is scarcely noticeable. In some lank-haired races, men's tresses are as long as women's, e.g. the Chinese pigtail, and the hair of Redskins which grows to the length sometimes of upwards of 9 ft. In the frizzy-haired peoples, men and women have equally short growths. Bushwomen, the female Hottentot and negresses have hair no longer than

men's. It is only in the wavy, and now and again in the frizzy types, that the difference in the sexes is marked. Among European men the length rarely exceeds 12 to 16 in., while with women the mean length is between 25 and 30 in. and in some cases has been known to reach 6 ft. or more. The growth of hair on the body corresponds in general with that on the head. The hairiest races are the Australians and Tasmanians, whose heads are veritable mops in the thickness and unkempt luxuriance of the locks. Next to them are the Todas, and other hill-tribesmen of India, and the Hairy Ainu of Japan. Traces, too, of the markedly hairy race, now extinct, supposed to be the ancestor of Toda and Ainu alike, are to be found here and there in Europe, especially among the Russian peasantry. The least hairy peoples are the yellow races, the men often scarcely having rudimentary beards, e.g. Indians of America and the Mongols. Negroid peoples may be said to be intermediate, but usually incline to hairlessness. The wavy- haired populations hold also an intermediate position, but somewhat incline to hairiness. Among negroes especially no rule can be formulated. Bare types such as the Bushmen and western negroes are found contiguous to hairy types such as the inhabitants of Ashantee. Neither is there any rule as to baldness. From statistics taken in America it would seem that it is ten times less frequent among negroes than among whites between the ages of thirty-three and forty-five years, and thirty times less between twenty-one and thirty-two years. Among Mulattos it is more frequent than among negroes but less than among whites. It is rarer among Redskins than among negroes. The lanugo or downy hairs, with which the human foetus is covered for some time before birth and which is mostly shed in the womb, and the minute hairs which cover nearly every part of the adult human body, may be regarded as rudimentary remains of a complete hairy covering in the ancestors of mankind. The Pliocene, or

at all events Miocene precursor of man, was a furred creature. The discovery of Egyptian mummies six thousand years old or more has proved that this physical criterion remains unchanged, and that it is to-day what it was so many scores of centuries back. Perhaps, then, the primary divisions of mankind were distinguished by hair the same in texture and colour as that which characterizes to-day the great ethnical groups. The wavy type bridges the gulf between the lank and woolly types, all in turn derived from a common hair-covered being. In this connexion it is worth mention, as pointed out by P. Topinard, that though the regions occupied by the negroid races are the habitat of the anthropoid apes, the hair of the latter is real hair, not wool. Further in the eastern section of the dark domain, while the Papuan is still black and dolichocephalic, his presumed pro- genitor, the orang-utan, is brachycephalic with decidedly red hair. Thus the white races are seen to come nearest the higher apes in this respect, yellow next, and black farthest removed.

No test has proved, on repeated examination, to be a safer one of racial purity than the quality of hair, and Pruner-Bey goes so far as to suggest that " a single hair presenting the average form characteristic of the race might serve to define it." At any rate a hair of an individual bears the stamp of his origin.

See Dr Pruner-Bey in Mimoires de la sociite d' anthropologic, ii. P. A. Brown, Classification of Mankind by the Hair; P. Topinard, L'Homme dans la nature (1891), chap. vi.

Commerce. — Hair enters into a considerable variety of manu- factures. Bristles are the stout elastic hairs obtained from the backs of certain breeds of pigs. The finest qualities, and the greatest quantities as well, are obtained from Russia, where a variety of pig is reared principally on account of its bristles. The best and most costly bristles are used by shoemakers, secondary qualities being employed for toilet and clothes-brushes, while

inferior qualities are worked up into the commoner kinds of brushes used by painters and for many mechanical purposes. For artists' use and for decorative painting, brushes or pencils of hair from the sable, camel, badger, polecat, &c, are prepared. The hair of various animals which is too short for spinning into yarn is utilized for the manufacture of felt. For this use the hair of rabbits, hares, beavers and of several other rodents is largely employed, especially in France, in making the finer qualities of felt hats. Cow hair, obtained from tanneries, is used in the preparation of roofing felts, and felt for covering boilers or steam-pipes, and for other similar purposes. It is also largely used by plasterers for binding the mortar of the walls and roofs of houses; and it is to some extent being woven up into coarse friezes, horse-cloths, railway rugs and inferior blankets. The tail hair of oxen is also of value for stuffing cushions and other up- holstery work, for which purpose, as well as for making the official wigs of law officers, barristers, &c, the tail and body hair of the yak or Tibet ox is also sometimes imported into Europe. The tail and mane hair of horses is in great demand for various purposes. The long tail hair is especially valuable for weaving into hair-cloth, mane hair and the short tail hair being, on the other hand, principally prepared and curled for stuffing the chairs, sofas and couches which are covered with the cloth manufactured from the long hair. The horse hair used in Great Britain is principally obtained from South America, Germany and Russia, and its sorting, cleaning and work- ing up into the various manufactures dependent on the material are industries of some importance. In addition to the purposes already alluded to, horse hair is woven into crinoline for ladies' bonnets, plaited into fishing lines, woven into bags for oil and cider pressers, and into straining cloths for brewers, &c, and for numerous other minor uses. The manufactures which arise in connexion with human hair are more peculiar than important, although occasionally fashions arise which cause a large demand for human hair. The fluctuations of such fashions determine

the value of hair; but at all times long tresses are of considerable value. Grey, light, pale and auburn hair are distinguished as extra colours, and command much higher prices than the common shades. The light-coloured hair is chiefly obtained in Germany and Austria, and the south of France is the principal source of the darker shades. In the south of France the cultivation and sale of heads of hair by peasant girls is a common practice ; and hawkers attend fairs for the special purpose of engag- ing in this traffic. Hair 5 and even 6 ft. long is sometimes obtained. Scarcely any of the " raw material " is obtained in the United King- dom except in the form of ladies' " combings." Bleaching of hair by means of peroxide of hydrogen is extensively practised, with the view of obtaining a supply of golden locks, or of preparing white hair for mixing to match grey shades; but in neither case is the result very successful. Human hair is worked up into a great variety of wigs, scalps, artificial fronts, frizzets and curls, all for supplementing the scanty or failing resources of nature. The plait- ing of human hair into articles of jewellery, watch-guards, &c, forms a distinct branch of trade.

HAIR-TAIL (Trichiurus) , a marine fish belonging to the Acanthopterygii scombriformes, with a long band-like body terminating in a thread-like tail, and with strong prominent teeth in both jaws. Several species are known, of which one, common in the tropical Atlantic, not rarely reaches the British Islands.

HAITI [Haiti, Hayti, San Domingo, or Hispaniola], an island in the West Indies. It lies almost in the centre of the chain and, with the exception of Cuba, is the largest of the group. Its greatest length between Cape Engano on the east and Cape des Irois on the west is 407 m., and its greatest breadth between Cape Beata on the south and Cape Isabella on the north 160 m. The area is 28,000 sq. m., being rather less than that of Ireland. From Cuba, 70 m. W.N.W., and from Jamaica, 130 m. W.S.W., it is separated by the Windward Passage; and from Porto Rico, 60 m. E., by the Mona Passage. It lies between

17 37' and 20 o' N. and 68° 20' and 74° 28' W. From the west coast project two peninsulas. The south-western, of which Cape Tiburon forms the extremity, is the larger. It is 150 m. long and its width varies from 20 to 40 m. Columbus landed at Mole St Nicholas at the point of the north-western peninsula, which is 50 m. long, with an average breadth of 40 m. Between these lies the Gulf of Gona'ive, a triangular bay, at the apex of which stands the city of Port-au-Prince. The island of Gona'ive, opposite the city at a distance of 27 m., divides the entrance to

Longitude West »"of Greenwich

L A N

A T

T I

(J) HMeScNIcho! »*.s.J — - -^ -..'

HAITI

English Miles

20 40 60 80

•son"""",

Port-au-Prince into two fine channels, and forms an excellent harbour, 200 sq. m. in extent, the coral reefs along the coast being its only defect. On the north-east coast is the magnificent Bay of Samana, formed by the peninsula of that name, a mountain range projecting into the sea; its mouth is protected by a coral reef stretching 85m. from the south coast. There is however, a good passage for ships, and within lies a safe and beautiful expanse of water 300 sq. m. in extent. Beyond Samana, with the exception of the poor harbour of Santo Domingo, there are no inlets on the east and south coasts until the Bays of Ocoa and Neyba are reached. The south coast of the Tiburon peninsula has good harbours at Jacmel, Bainet, Aquin and Les Cayes or

Aux Cayes. The only inlets of any importance between Aux Cayes and Port-au-Prince are Jeremie and the Bay of Baraderes. The coast line is estimated at 1250 m.

Haiti is essentially a mountainous island. Steep escarpments, leading to the rugged uplands of the interior, reach almost every- where down to the shores, leaving only here and there a few strips of beach. There are three fairly distinct mountain ranges, the northern, central and southern, with parallel axes from E. to W. ; while extensive and fertile plains lie between them. The northern range usually called the Sierra de Monti Cristi, extends from Cape Samana on the east to Cape Fragata on the west. It has a mean elevation of 3000 ft., culminating in the Loma Diego Campo (3855 ft.), near the centre of the range. The central range runs from Cape Engano to Cape St Nicholas, some 400 m. in an oblique direction from E. to W. Towards the centre of the island it broadens and forms two distinct chains; the northern, the Sierra del Cibao, con- stituting the backbone of Haiti; the southern curving first S.W., then N.W., and reaching the sea near St Marc. In addition to these there are a number of secondary crests, difficult to trace to the back- bone of the system, since the loftiest peaks are usually on some lateral ridge. Such for instance is Loma Tina (10,300 ft.) the highest

elevation on the island, which rises as a spur N.W. of the dty of Santo Domingo. In the Sierra del Cibao, the highest summit is the Pico del Yaqui (9700 ft.). The southern range runs from the Bay of Neyba due W. to Cape Tiburon. Its highest points are La Selle (8900 ft.) and La Hotte (7400 ft.). The plain of Seybo or Los Llanos is the largest of the Haitian plains. It stretches eastwards from the river Ozama for 95 m. and has an average width of 16 m. It is perfectly level, abundantly watered, and admirably adapted for the rearing of cattle. But perhaps the grandest is the Vega Real, or Royal

Plain, as it was called by Columbus, which lies between the Cibao and Monti Cristi ranges. It stretches from Samana Bay to Manzanillo Bay, a distance of 140 m., but is interrupted in the centre by a range of hills in which rise the rivers which drain it. The northern part of this plain, however, is usually known as the Valley of Santiago. Most of the large valleys are in a state of nature, in part savanna, in part wooded, and all very fertile.

There are four large rivers. The Yaqui, rising in the Pico del Yaqui, falls, after a tortuous north-westerly course through the valley of Santiago, into Manzanillo Bay; its mouth is obstructed by shallows, and it is navigable only for canoes. The Neyba, or South Yaqui, also rises in the Pico del Yaqui and flows S. into the Bay of Neyba. In the mountains within a few miles from the sources of these rivers, rise the Yuna and the Artibonite. The Yuna drains the Vega Real, flows into Samana Bay, and is navigable by light-draught vessels for some distance from its mouth. The Artibonite flows through the valley of its name into the Gulf of Gona'ive. Of the smaller rivers the Ozama, on which the city of Santo Domingo stands, is the most important. The greatest lake is that of Enriquillo or Xaragua, at a height of 300 ft. above sea- level. It is 27 m. long by 8 m. broad and very deep. Though 25 m. from the sea its waters are salt, and the Haitian negroes call it Etang Sale. After heavy rains it occasionally forms a continuous sheet of water with another lake called Azuey, or Etang Saumatre, which is 16 m. long by 4 m. broad ; on these occasions the united lake has a total length of 60 m. and is larger than the Lake of Geneva. Farther S. is the Icoten de Limon, 5 m. long by 2 m. broad, a fresh-water lake with no visible outlet. Smaller lakes are Rincon and Miragoane. There are no active volcanoes, but earthquakes are not infrequent.

Geology. — The geology of Haiti is still very imperfectly known, and large tracts of the island have never been examined by a geolo- gist. It is possible that the schists that have been observed in some parts of the island may be of Pre-cretaceous

age, but the oldest rocks in which fossils have yet been found belong to the Cretaceous System, and the geological sequence is very similar to that of Jamaica. Excluding the schists of doubtful age, the series begins with sandstones and conglomerates, containing pebbles of syenite, granite, diorite, &c. ; and these are overlaid by marls, clays and limestones containing Hippurites. Then follows a series of sand- stones, clays and limestones with occasional seams of lignite, evidently of shallow-water origin. These are referred by R. T. Hill to the Eocene, and they are succeeded by chalky beds which were laid down in a deeper sea and which probably correspond with the Mont- pelier beds of Jamaica (Oligocene). Finally, there are limestones and marls composed largely of corals and molluscs, which are probably of very late Tertiary or Post-tertiary age. Until, however, the island has been more thoroughly examined, the correlation of the various Tertiary and Post-tertiary deposits must remain doubtful. Some of the beds which Hill has placed in the Eocene have been referred by earlier writers to the Miocene. Tippenhauer describes extensive eruptions of basalt of Post-pliocene age.

Fauna and Flora. — The fauna is not extensive. The agouti is the largest wild mammal. Birds are few, excepting water-fowl and pigeons. Snakes abound, though few are venomous. Lizards are numerous, and insects swarm in the low parts, with tarantulas, scorpions and centipedes. Caymans are found in the lakes and rivers, and the waters teem with fish and other sea food. Wild cattle, hogs and dogs, descendants of those brought from Europe, roam at large on the plains and in the forests. The wild hogs furnish much sport to the natives, who hunt them with dogs trained for the purpose.

In richness and variety of vegetable products Haiti is not excelled by any other country in the world. All tropical plants and trees grow in perfection, and nearly all the vegetables and fruits of tem- perate climates may be successfully cultivated in the highlands. Among indigenous products are cotton, rice, maize, tobacco, cocoa, ginger, native indigo

{indigo matron or saicvage), arrowroot, manioc or cassava, pimento, banana, plantain, pine-apple, artichoke, yam and sweet potato. Among the important plants and fruits are sugar- cane, coffee, indigo (called indigo franc, to distinguish it from the native), melons, cabbage, lucerne, guinea grass and the breadfruit, mango, caimite, orange, almond, apple, grape, mulberry and fig. Most of the imported fruits have degenerated from want of care, but the mango, now spread over nearly the whole island, has become almost a necessary article of food; the bread-fruit has likewise become common, but is not so much esteemed. Haiti is also rich in woods, especially in cabinet and dye woods ; among the former are mahogany, manchineel, satinwood, rosewood, cinnamon wood (Canella alba), yellow acoma (Sideroxylon mastichodendron) and gri-gri; and among the latter are Brazil wood, logwood, fustic and sassafras. On the mountains are extensive forests of pine and a

species of oak; and in various parts occur the locust, ironwood, cypress or Bermuda cedar, palmetto and many kinds of palms.

Climate. — Owing to the great diversity of its relief Haiti presents a wider range of climate than any other part of the Antilles. The yearly rainfall is abundant, averaging about 120 in., but the wet and dry seasons are clearly divided. At Port-au-Prince the rainy season lasts from April to October, but varies in other parts of the island, so that there is never a season when rain is general. The mountain districts are constantly bathed in dense mists and heavy dews, while other districts are almost rainless. Owing to its sheltered position the heat at Port-au-Prince is greater than elsewhere. In summer the temperature there ranges between 80° and 95° F. and in winter between 70° and 80° F. Even in the highlands the mercury never falls below 45 F. Hurricanes are not so frequent as in the Windward Isles, but violent gales often occur. The prevailing winds are from the east.

The Republic of Haiti. — Haiti is divided into two

parts, the negro republic of Haiti owning the western third of the island, while the remainder belongs to Santo Domingo (q.v.) or the Dominican Republic. Between these two governments there exists the strongest political antipathy.

Although but a small state, with an area of only 10,204 sq. m., the republic of Haiti is, in many respects, one of the most interesting communities in the world, as it is the earliest and most successful example of a state peopled, and governed on a constitutional model, by negroes. At its head is a president assisted by two chambers, the members of which are elected and hold office under a constitution of 1889. This constitution, thoroughly republican in form, is French in origin, as are also the laws, language, traditions and customs of Haiti. In practice, however, the government resolves itself into a military despotism, the power being concentrated in the hands of the president. The Haitians seem to possess everything that a progressive and civilized nation can desire, but corruption is spread through every portion and branch of the government. Justice is venal, and the police are brutal and inefficient. Since 1869 the Roman Catholic has been the state religion, but all classes of society seem to be permeated with a thinly disguised adherence to the horrid rites of Voodoo (q.v.), although this has been strenuously denied. The country is divided into 5 departements, 23 arron- dissements and 67 communes. Each departement and arrondisse- ment is governed by a general in the army. The army numbers about 7000 men, and the navy consists of a few small vessels. Elementary education is free, and there are some 400 primary schools; secondary education is mainly in the hands of the church. The Sisters of Charity and the Christian Brothers have schools at Port-au-Prince, where there is also a lyceum, a medical and a law school. The children of the wealthier classes are usually sent to France for their education. The unit of money is the gourde, the nominal value of which is the same as the American dollar, but it is subject to great fluctuations. The revenue is almost

entirely derived from customs, paid both on imports and exports. There being a lack of capital and enter- prise, the excessive customs dues produce a very depressed con- dition of trade. Imports are consequently confined to bare necessaries, the cheapest sorts of dry and fancy goods, matches, flour, salt beef and pork, codfish, lard, butter and similar pro- visions. The exports are coffee, cocoa, logwood, cotton, gum, honey, tobacco and sugar. The island is one of the most fertile in the world, and if it had an enlightened and stable government, an energetic people, and a little capital, its agricultural possi- bilities would seem to be endless. Communications are bad; the roads constructed during the French occupation have degenerated into mere bridle tracks. There is a coast service of steamers, maintained since 1863, and 26 ports are regularly visited every ten days. Foreign communication is excellent, more foreign steamships visiting this island than any other in the West Indies. A railway from Port-au-Prince runs through the Plain of Cul de Sac for 28 m. to Manneville on the Etang Saumatre, another runs from Cap Haitien to La Grande Riviere, 15 m. distant.

The people are almost entirely pure-blooded negroes, the mulattoes, who form about 10% of the population, being a rapidly diminishing and much-hated class. The negroes are a kindly, hospitable people, but ignorant and lazy. They have

a passion for dancing weird African dances to the accompaniment of the tom-tom. Marriage is neither frequent nor legally prescribed, since children of looser unions are regarded by the state as legitimate. In the interior polygamy is frequent. The people generally speak a curious but not unattractive patois of French origin, known as Creole. French is the official language, and by a few of the educated natives it is written and spoken in its purity. On the whole it must be owned that,

after a century of independence and self-government, the Haitian people have made no progress, if they have not actually shown signs of retrogression. The chief towns are Port-au-Prince (pop. 75.000), Cap Haitien (29,000), Les Cayes (25,000), Gonaive (18,000), and Port de Paix (10,000). Jeremie was the birthplace of the elder Dumas. The ruins of the wonderful palace of Sans- Souci and of the fortress of La Ferriere, built by King Henri Christophe (1807-1825), can be seen near Millot, a town 9 m. inland from Cap Haitien. Plaisance (25,000), Gros Morne (22,000) and La Croix des Bouquets (20,000) are the largest towns in the interior. The entire population of the republic is about 1,500,000.

History. — The history of Haiti begins with its discovery by Columbus, who landed from Cuba at Mole St Nicholas on the 6th of December 1492. The natives called the country Haiti (mountainous country) , and Quisquica (vast country) . Columbus named it Espagnola (Little Spain), which was latinized into Hispaniola. At the time of its discovery, the island was inhabited by about 2,000,000 Indians, who are described by the Spaniards as feeble in intellect and physically defective. They were, however, soon exterminated, and their place was supplied (as early as 151 2) by slaves imported from Africa, the descendants of whom now possess the land. Six years after its discovery Columbus had explored the interior of the island, founded the present capital, and had established flourishing settlements at Isabella, Santiago, La Vega, Porto Plata and Bonao. Mines had been opened up, and advances made in agriculture. Sugar was introduced in 1506, and in a few years became the staple product. About 1630, a mixed company of French and English, driven by the Spaniards from St Kitts, settled on the island of Tortuga, where they became formidable under the name of Buccaneers. They soon obtained a footing on the mainland of Haiti, and by the treaty of Ryswick, 1697, the part they occupied was ceded to France. This new colony, named Saint Dominique, subsequently attained a high degree of prosperity, and was in a flourishing state when the French Revolution broke

out in 1789. The population was then composed of whites, free coloured people (mostly mulattoes) and negro slaves. The mulattoes demanded civil rights, up to that time enjoyed only by the whites; and in 1791 the National Convention conferred on them all the privileges of French citizens. The whites at once adopted the most violent measures, and petitioned the home government to reverse . the decree, which was accordingly revoked. In August 1 791, the plantation slaves broke out into insurrection, and the mulattoes threw in their lot with them. A period of turmoil followed, lasting for several years, during which both parties were responsible for acts of the most revolting cruelty. Commissioners were sent out from France with full powers to settle the dispute, but although in 1793 they proclaimed the abolition of slavery, they could effect nothing. To add further to the troubles of the colony, it was invaded by a British force, which, in spite of the climate and the opposition of the colonists, succeeded in maintaining itself until driven out in 1798 by Toussaint l'Ouverture. By treaty with Spain, in 1795, France had acquired the title to the entire island.

By 1801, Toussaint l'Ouverture, an accomplished negro of remarkable military genius, had succeeded in restoring order. He then published, subject to the approval of France, a form of constitutional government, under which he was to be governor for life. This step, however, roused the suspicions of Bonaparte, then first consul, who determined to reduce the colony and restore slavery. He sent out his brother-in-law, General Leclerc, with 25,000 troops; but the colonists offered a determined, and often ferocious, resistance. At length, wearied of the struggle, Leclerc

proposed terms, and Toussaint, induced by the most solemn guarantees on the part of the French, laid down his arnjs. He was seized and sent to France, where he died in prison in 1803. The blacks, infuriated by this act of treachery, renewed the struggle, under Jean Jacques Dessalines (1758-1806), with a barbarity unequalled in previous contests.

The French, further embarrassed by the appearance of a British fleet, were only too glad to evacuate the island in November 1803.

The opening of the following year saw the declaration of independence, and the restoration of the aboriginal name of Haiti. Dessalines, made governor for life, inaugurated his rule with a bloodthirsty massacre of all the whites. In October 1804, he proclaimed himself emperor and was crowned with great pomp; but in 1806 his subjects, growing tired of his tyranny, assassinated him. His position was now contended for by several chiefs, one of whom, Henri Christophe (1767–1820), established himself in the north, while Alexandre Sabes Petion (1770–1818) took possession of the southern part. The Spaniards re-established themselves in the eastern part of the island, retaining the French name, modified to Santo Domingo. Civil war now raged between the adherents of Christophe and Petion, but in 1810 hostilities were suspended. Christophe declared himself king of Haiti under the title of Henry I.; but his cruelty caused an insurrection, and in 1820 he committed suicide. Petion was succeeded in i8i8by General Jean Pierre Boyer (1776–1850), who, after Christophe's death, made himself master of all the French part of the island. In 1821 the eastern end of the island proclaimed its independence of Spain, and Boyer, taking ad- vantage of dissensions there, invaded it, and in 1822 the dominion of the whole island fell into his hands. Boyer held the presidency of the new government, which was called the republic of Haiti, until 1843, when he was driven from the island by a revolution. In 1844 the people at the eastern end of the island again asserted their independence. The republic of Santo Domingo was established, and from that time the two political divisions have been maintained. Meanwhile in Haiti revolution followed re- volution, and president succeeded president, in rapid succession. Order, however, was established in 1849, when Soulouque, who had previously obtained the presidency, proclaimed himself emperor, under the title of Faustin I. After a reign of nine years he

was deposed and exiled, the republic being restored under the mulatto president Fabre Geffrard. His firm and enlightened rule rendered him so unpopular that in 1867 he was forced to flee to Jamaica. He was succeeded by Sylvestre Salnave, who, after a presidency of two years, was shot. Nissage- Saget (1870), Dominique (1874), and Boisrond-Canal (1876) followed, each to be driven into exile by revolution. The next president, Salomon, maintained himself in office for ten years, but he too was driven from the country and died in exile. Civil war raged in 1888-1889 between Generals Legitime and Hip- polyte, and the latter succeeded in obtaining the vacant pre- sidency. He ruled with the most absolute authority till his death in 1896. General Tiresias Simon Sam followed and ruled till his flight to Paris in 1902. The usual civil war ensued, and after nine months of turmoil, order was restored by the election of Nord Alexis in December 1902.

Alexis' administration was unsuccessful, and was marked by many disturbances, culminating in his expulsion. In 1904 there was an attack by native soldiery on the French and German representatives, and punishment was exacted by these powers. In December 1904 ex-president Sam, his wife and members of his ministry were sentenced to long terms of imprisonment for fraudulently issuing bonds. In December 1907 a conspiracy against the government was reported and the ringleaders were sentenced to death. But in January 1908 the revolution spread, and Gonaive and St Marc and other places were reported to be in the hands of the insurgents. Prompt measures were taken, the rising was checked, and Alexis announced the pardon of the revolutionaries. In March, however, this pacific policy was reversed by a new ministry; some suspects were summarily executed, and the attitude of the government was only modified when the powers sent war-ships to Port-au-Prince. In September

the criminal court at the capital sentenced to death, by default, a large number of persons implicated in the risings earlier in the year, and in November revolution broke out again. General Antoine Simon raised his standard at Aux Cayes. Disaffection was rife among the government troops, who deserted to him in great numbers. On the .2nd of December Port-au-Prince was occupied without bloodshed by the revolutionaries, and Alexis took to flight, escaping violence with some difficulty, and finding refuge on a French ship. General Simon then assumed the presidency. At the end of April 1910 Alexis died in Jamaica, in circumstances of some obscurity; it had just been discovered that a plot was on foot to depose Simon, and further trouble was threatened.

Authorities. — B. Edwards, Hist. Survey of the Island of S. Domingo (London, 1801) ; Jordan, Ceschichte der Insel Haiti (Leipzig, 1846) ; Linstant Pradin, Recueil general des lots et actes du gouverne- ment d'Haiti (Paris, 1851-1865); Monte y Tejada, Historia de Santo Domingo (Havana, 1853); Saint Amand, Hist, des revolutions d'Haiti (Paris, 1859); Sam. Hazard, Santo Domingo, Past and Present (London, 1873), with bibliography; Sir Spencer St John, Haiti, or the Black Republic (London, 1889) ; L. Gentil Tippenhauer, Die Insel Haiti (Leipzig, 1893); Marcelin, Haiti, etudes economiaues, sociales, et politiques; and Haiti, ses guerres civiles, leurs causes (Faris, 1893); Hesketh Pritchard, Where Black Rules White (London, 1900). For geology, see W. M. Gabb, " On the Topo- graphy and Geology of Santo Domingo," Trans. Amer. Phil. Soc, Philadelphia, new series, vol. xv. (1881), pp. 49-259, with map; L. G. Tippenhauer, Die Insel Haiti (Leipzig, 1893); see also several articles by L. G. Tippenhauer in Peterm. Mitt. 1899 and 1901. A comparison with the Jamaican succession will be found in R. T. Hill, " The Geology and Physical Geography of Jamaica," Bull. Mus. Contp. Zool., Harvard, vol. xxxiv. (1899).

HAJIPUR, a town of British India, in the Muzaffarpur district of Bengal, on the Gandak, just above its

confluence with the Ganges opposite Patna. Pop. (1901), 21,398. Hajipur figures conspicuously in the history of the struggles between Akbar and his rebellious Afghan governors of Bengal, being twice besieged and captured by the imperial troops, in 1572 and 1574. Within the limits of the old fort is a small stone mosque, very plain, but of peculiar architecture, and attributed to Hajl Ilyas, its traditional founder (c. 1350). Its command of water traffic in three directions makes the town a place of considerable commercial importance. Hajipur has a station on the main line of the Bengal and North-western railway.

HAJJ or Hadj, the Arabic word, meaning literally a " setting out," for the greater pilgrimage of Mahommedans to Mecca, which takes place from the 8th to the 10th of the twelfth month of the Mahommedan year; the lesser pilgrimage, called umrah or omra, may be made' to the mosque at Mecca at any time other than that of the hajj proper, and is also a meritorious act. The term hajji or hadji is given to those who have performed the greater pilgrimage. The word hajj is sometimes loosely used of any Mahommedan pilgrimage to a sacred place or shrine, and is also applied to the. pilgrimages of Christians of the East to the Holy Sepulchre at Jerusalem (see Mecca; Mahommedan Religion).

HAJJI KHALIFA [in full Mustafa ibn "Abdallah Katib Chelebl Hajji Khalifa] (ca. 1599-1658), Arabic and Turkish author, was born at Constantinople. He became secretary to the commissariat department of the Turkish army in Anatolia, was with the army in Bagdad in 1625, was present at the siege of Erzerum, and returned to Constantinople in 1628. In the following year he was again in Bagdad and Hamadan, and in 1633 at Aleppo, whence he made the pilgrimage to Mecca (hence his title Hajji). The following year he was in Erivan and then returned to Constantinople. Here he obtained a post in the head office of the commissariat department, which afforded him time for study. He seems to have attended the lectures of great teachers up to the time of his death, and made a practice of visiting

bookshops and noting the titles and contents of all books he found there. His largest work is the Bibliographical Encyclopaedia written in Arabic. In this work, after five chapters dealing with the sciences generally, the titles of Arabian, Persian and Turkish books written up to his own time are arranged in alphabetical order. With the titles are given, where possible, short notes on the author, his date, and sometimes the intro-

ductory words of his work. It was edited by G. Flugel with Latin translation and a useful appendix (7 vols. Leipzig, 1835- 1858). The text alone of this edition has been reproduced at Constantinople (1893).

Hajji Khalifa also wrote in Turkish: a chronological conspectus of general history (translated into Italian by G. R. Carli, Venice, 1697); a history of the Turkish empire from 1594 to 1655 (Con-stantinople, 1870); a history of the naval wars of the Turks (Constantinople, 1729; chapters 1-4 translated by J. Mitchell, London, 1831); a general geography published at Constantinople, 1732 (Latin trans, by M. Norberg, London and Gotha, 1818 ; German trans, of part by J. von Hammer, Vienna, 1812; French trans, of part by V. de St Martin in his Geography of Asia Minor, vol. 1).

For his life see the preface to Fliigel's edition; list of his works in C. Brockelmann's Gesch. d. arabischen Literatur (Berlin, 1902), vol. ii., pp. 428-429. (G. W. T.)

HAKE, EDWARD (fl. 1579), English satirist, was educated under John Hopkins, the part-author of the metrical version of the Psalms. He resided in Gray's Inn and Barnard's Inn, London. In the address " To the Gentle Reader " prefixed to his Newes out of Powles Churchyard . . . Otherwise entitled Syr Nummus (2nd ed., 1579) he mentions the " first three yeeres which I spent in the Innes of Channcery, being now about a dosen of yeeres passed." In 1585 and 1586 he was mayor of New Windsor, and in 1 588 he represented the borough in parlia- ment. His last

work was published in 1604. He was protected by the earl of Leicester, whose policy it was to support the Puritan party, and who no doubt found a valuable ally in so vigorous a satirist of error in clerical places as was Hake. Newes out of Paules Churchyarde, A Trappe for Syr Monye, first appeared in 1567, but no copy of this impression is known, and it was re-issued in 1579 with the title quoted above. The book takes the form of a dialogue between Bertulph and Paul, who meet in the aisles of the cathedral, and is divided into eight " satyrs," dealing with the corruption of the higher clergy and of judges, the greed of attorneys, the tricks of physicians and apothecaries, the sumptuary laws, extravagant living, Sunday sports, the abuse of St Paul's cathedral as a meeting-place for business and conversation, usury, &c. It is written in rhymed fourteen-syllable metre, which is often more comic than the author intended. It contains, amid much prefatory matter, a note to the " carping and scornefull Sicophant," in which he attacks his enemies with small courtesy and much alliteration. One is described as a " carping careless cankerd churle."

He also wrote a translation from Thomas a Kempis, The Imitation, or Following of Christ (1567, 1568); A Touchstone for this Time Present (1574), a scurrilous attack on the Roman Catholic Church, followed by a treatise on education ; A Commemoration of the . . . Raigne of . . . Elizabeth (1575), enlarged in 1578 to ^4 Joyfull Con- tinuance of the Commemoration, &c. ; and of Gold's Kingdom, and this Vnhelping Age (1604), a collection of pieces in prose and verse, in which the author inveighs against the power of gold. A bibliography of these and of Hake's other works was compiled by Mr Charles Edmonds for his edition in 1872 of the Newes (Isham Reprints, No. 2, 1872).

HAKE, THOMAS GORDON (1809-1895), English poet, was born at Leeds, of an old Devonshire family, on the 10th of March 1809. His mother was a Gordon of the Huntly branch. He studied medicine at St George's hospital and at Edinburgh and Glasgow, but had given

up practice for many years before his death, and had devoted himself to a literary life. In 1839 he published a prose epic Vates, republished in Ainsworth's magazine as Valdarno, which attracted the attention of D. G. Rossetti. In after years he became an intimate member of the circle of friends and followers gathered round Rossetti, who so far departed from his usual custom as to review Hake's poems in the Academy and in the Fortnightly Review. In 187 1 he published .Madeline; 1872, Parables and Tales; 1883, The Serpent Play; 1890, New Day Sonnets; and in 1892 his Memoirs of Eighty Years. Dr Hake's works had much subtlety and felicity of expression, and were warmly appreciated in a somewhat restricted literary circle. In his last published verse, the sonnets, he shows an advance in facility on the occasional harshness of his earlier work. He was given a Civil List literary pension in 1893, and died on the nth of January 1895.

HAKE (Merluccius vulgaris), a fish which differs from the cod in having only two dorsal fins, and one anal. It is very common on the coasts of Europe and eastern North America, but its flesh is much less esteemed than that of the true Gadi. Specimens 4 ft. in length are not scarce. There are local variations in the use of " hake " as a name; in America the " silver hake " (Merluccius bilinearis), sometimes called "whiting," and " Pacific hake " {Merluccius productus) are also food -fishes of inferior quality.

HAKKAS (" Guests," or " Strangers "), a people of S.W. China, chiefly found in Kwang-Tung, Fu-Kien and Formosa. Their origin is doubtful, but there is some ground for believing that they may be a cross between the aboriginal Mongolic element of northern China and the Chinese proper. According to their tradition, they were in Shantung and northern China as early as the 3rd century B.C. In disposition, appearance and customs they differ from the true

Chinese. They speak a distinct dialect. Their women, who are prettier than the pure Chinese, do not compress their feet, and move freely about in public. The Hakkas are a most industrious people and furnish at Canton nearly all the coolie labour employed by Europeans. Their intelligence is great, and many noted scholars have been of Hakka birth. Hung Sin-tsuan, the leader in the Taiping rebellion, was a Hakka. In Formosa they serve as intermediaries between the Chinese and European traders and the natives. From time immemorial they seem to have been persecuted by the Chinese, whom they regard as " foreigners," and with whom their means of communication is usually " pidgin English." The earliest persecution occurred under the " first universal emperor " of China, Shi-Hwang-ti (246-210 B.C.). From this time the Hakkas appear to have become wanderers. Sometimes for generations they were permitted to live unmolested, as under the Han dynasty, when some of them held high official posts. During the Tang dynasty (7th, 8th, and 9th centuries) they settled in the mountains of Fu-kien and on the frontiers of Kwang-Tung. On the invasion of Kublai Khan, the Hakkas distinguished themselves by their bravery on the Chinese side. In the 14th century further persecutions drove them into Kwang-Tung.

See " An Outline History of the Hakkas," China Review (London, 1873-1874), vol. ii.; Pitou, "On the Origin and History of the Hakkas," ib.; Dyer Ball, Easy Lessons in the Hakka Dialect (1884), Things Chinese (London, 1893); Schaub, " Proverbs in Daily Use among the Hakkas," in China Review (London, 1894-1895), vol. xxi. ; Rev. J. Edkins, China's Place in Philology; Girard de Rialle, Rev. d. anthrop. (Jan. and April, 1885); G. Taylor, " The Aborigines of Formosa," China Review, xiv. p. 198 seq., also xvi. No. 3, " A Ramble through Southern Formosa."

HAKLUYT, RICHARD (c. 1553-1616), British geographer, was born of good family in or near London about 1553. The Hakluyts were of Welsh extraction, not Dutch as has been supposed. They appear to have

settled in Herefordshire as early as the 13th century. The family seat was Eaton, 2 m. S.E. of Leominster. Hugo Hakelute was returned M.P. for that borough in 1304/5. Richard went to school at West-minster, where he was a queen's scholar; while there his future bent was determined by a visit to his cousin and namesake, Richard Hakluyt of the Middle Temple. His cousin's discourse, illustrated by " certain bookes of cosmographie, an universall mappe, and the Bible," made young Hakluyt resolve to "pro-secute that knowledge and kind of literature." Entering Christ Church, Oxford, in 1570, " his exercises of duty first performed," he fell to his intended course of reading, and by degrees perused all the printed or written voyages and discoveries that he could find. He took his B.A. in 1573/4. It is probable that, shortly after taking his M.A. (1577), he began at Oxford the first- public lectures in geography that " shewed both the old im-' perfectly composed and the new lately reformed mappes, globes, spheares, and other instruments of this art." That this was not in London is certain, as we know that the first lecture of the kind was delivered in the metropolis on the 4th of November 1588 by Thomas Hood. Hakluyt 's first published work was his Divers Voyages touching

the Discoverie of America (London, 1582, 4to.). This brought him to the notice of Lord Howard of Effingham, and so to that of Sir Edward Stafford, Lord Howard's brother-in-law; accord- ingly at the age of thirty, being acquainted with " the chief est captaines at sea, the greatest merchants, and the best mariners of our nation," he was selected as chaplain to accompany Stafford, now English ambassador at the French court, to Paris (r583). In accordance with the instructions of Secretary Walsingham, he occupied himself chiefly in collecting information of the Spanish and French movements, and " making diligent inquirie of such things as might yield any light unto our westerne discoverie in America." The first-fruits of Hakluyt's labours in Paris are embodied in his important work entitled A particuler discourse

concerning Westerne discoveries written in the yere 1584, by Richarde Hackluyt of Oxforde, at the requeste and direction of the righte worshipfull Mr Walter Raghly before the comynge home of his twoo barkes. This long-lost MS. was-at last printed in 1877. Its object was to recommend the enterprise of planting the English race in the unsettled parts of North America. Hakluyt's other works consist mainly of translations and compilations, relieved by his dedications and prefaces, which last, with a few letters, are the only material we possess out of which a biography of him can be framed. Hakluyt revisited England in 1584, laid before Queen Elizabeth a copy of the Discourse " along with one in Latin upon Aristotle's Politicks," and obtained, two days before his return to Paris, the grant of the next vacant prebend at Bristol, to which he was admitted in 1586 and held with his other preferments till his death.

While in Paris Hakluyt interested himself in the publication of the MS. journal of Laudonniere, the Hisloire notable de la Florida, edited by Bassanier (Paris, 1586, 8vo.). This was translated by Hakluyt and published in London under the title of A notable historie containing foure voyages made by certayne French captaynes into Florida (London, 1587, 4to.). The same year De orbe novo Petri Martyris Anglerii decades oclo illuslratae labore et industria Richardi Hackluyti saw the light at Paris. This work contains the exceedingly rare copperplate map dedicated to Hakluyt and signed F. G. (supposed to be Francis Gualle) ; it is the first on which the name of " Virginia " appears. In 1588 Hakluyt finally returned to England with Lady Stafford, after a residence in France of nearly five years. In 1 589 he published the first edition of his chief work, The Principall Navigations, Voiages and Discoveries of the English Nation (fol., London, 1 vol.). In the preface to this we have the announcement of the intended publication of the first terrestrial globe made in England by Molyneux. In 1 598-1600 appeared the final, reconstructed and greatly enlarged edition of The Principal Navigations, Voyages,

Traffiques and Discoveries of the English Nation (fol., 3 vols.). Some few copies contain an exceedingly rare map, the first on the Mercator projection made in England according to the true principles laid down by Edward Wright. Hakluyt's great collection, though but little read, has been truly called the " prose epic of the modern English nation." It is an invaluable treasure of material for the history of geographical discovery and colonization, which has secured for its editor a lasting reputation. In 1601 Hakluyt edited a translation from the Portuguese of Antonio Galvano, The Discoveries of the World (4to., London). In the same year his name occurs as an adviser to the East India Company, supplying them with maps, and informing them as to markets. Meantime in 1590 (April 20th) he had been instituted to the rectory of Withering- sett-cum-Brockford, Suffolk. In 1602, on the 4th of May, he was installed prebendary of Westminster, and in the following year he was elected archdeacon of Westminster. In the licence of his second marriage (30th of March 1604) he is also described as one of the chaplains of the Savoy, and his will contains a reference to chambers occupied by him there up to the time of his death; in another official document he is styled D.D. In 1605 he secured the prospective living of James Town, the intended capital of the intended colony of Virginia. This benefice he supplied, when the colony was at last established in 1607, by a curate, one Robert Hunt. In 1606 he appears as one

of the chief promoters of the petition to the king for patents to colonize Virginia. He was also a leading adventurer in the London or South Virginia Company. His last publication was a translation of Fernando de Soto's discoveries in Florida, entitled Virginia richly valued by the description of Florida her next neighbour (London, 1609, 4to). This work was intended to encourage the young colony of Virginia; to Hakluyt, it has been said, " England is

more indebted for its American possession than to any man of that age." We may notice that it was at Hakluyt's suggestion that Robert Parke translated Mendoza's History of China (London, 1 588-1 589) and John Pory made his version of Leo Africanus {A Geographical History of Africa, London, 1600). Hakluyt died in 1616 (November 23rd) and was buried in Westminster Abbey (November 26th); by an error in the abbey register his burial isrecorded under the year 1626. Out of his various emoluments and preferments (of which the last was Gedney rectory, Lincolnshire, in 161 2) he amassed a small fortune, which was squandered by a son. A number of his MSS., sufficient to form a fourth volume of his collections of 1 598-1600, fell into the hands of Samuel Purchas, who inserted them in an abridged form in his Pilgrimes (1625-1626, fol.). Others are preserved at Oxford (Bib. Bod. MS. Seld. B. 8). which consist chiefly of notes gathered from contemporary authors.

Besides the MSS. or editions noticed in the text {Divers Voyages (1582); Particnler Discourse (1584); Laudonniere's Florida (1587); Peter Martyr, Decades (1587) ; Principal Navigations (1589 and 1598-1600); Galvano's Discoveries (1601); De Soto's Florida record, the Virginia richly valued (1609, &c), we may notice the Hakluyt Society's London edition of the Divers Voyages in 1850, the edition of the Particuler Discourse, by Charles Deane in the Collections of the Maine Historical Society (Cambridge, Mass., 1870, with an intro- duction by Leonard Woods) ; also, among modern issues of the Principal Navigations, those of 1809 (5 vols., with much additional matter), and of 1903-1905 (Glasgow, 12 vols.). The new title-page issued for the first volume of the final edition of the Principal Navigations, in 1599, merely cancelled the former 1598 title with its reference to the Cadiz expedition of 1596; but from this has arisen the mistaken supposition that a new edition was then (1599) published. Hakluyt's Galvano was edited for the Hakluyt Society by Admiral C. R. D. Bethune in 1862. This Society, which was founded in 1846 for

printing rare and unpublished voyages and travels, includes the Glasgow edition of the Principal Navigations in its extra series, as well as C. R. Beazley's edition of Carpini, Rubruquis, and other medieval texts from Hakluyt (Cambridge, 1903, I vol.). Reckoning in these and an issue of Purchas's.Pj/gm»e.s by the Glasgow publisher of the Hakluyt of 1903-1905, the society has now published or " fathered " 150 vols. See also Voyages of the Elizabethan Seamen to America, being Select Narratives from the Principal Navigations, by E. J. Payne (Oxford, 1880; 1893; ne w edition by.C. R. Beazley, 1907).

For Hakluyt's life the dedications of the 1589 and 1598 editions of the Principal Navigations should be especially consulted; also Winter Jones's introduction to the Kakluyt Society edition of the Divers Voyages; Fuller's Worthies of England, "Herefordshire"; Oxford Univ. Reg. (Oxford Hist. Soc), ii., iii. 39; Historical MSS. Commission, 4th report, appendix, p. 614, the last giving us the Towneley MSS. referring to payments (prizes?) awarded to Hakluyt when at Oxford, May 12th and June 4th, 1575. (C. H. C. ; C. R. B.)

HAKODATE, a town on the south of the island of Yezo, Japan, for many years regarded as the capital of the island until Sapporo was officially raised to that rank. Pop. (1903) 84,746. Its position, as has been frequently remarked, is not unlike that of Gibraltar, as the town is built along the north-western base of a rocky promontory (11 57 ft. in height) which forms the eastern boundary of a spacious bay, and is united to the mainland by a narrow sandy isthmus. The summit of the rock, called the Peak, is crowned by a fort. Hakodate is one of the ports originally opened to foreign trade. The Bay of Hako- date, an inlet of Tsugaru Strait, is completely land-locked, easy of access and spacious, with deep water almost up to the shore, and good holding-ground. The Russians formerly used Hakodate as a winter port. The staple exports are beans, pulse and peas, marine products, sulphur, furs and timber; the staple imports, comestibles (especially

salted fish), kerosene and oil-cake. The town is not situated so as to profit largely by the development of the resources of Yezo, and as a port of foreign trade its out- look is indifferent. Frequent steamers connect Hakodate and Yokohama and other ports, and there is daily communication with Aomori, 56 rn. distant, whence there is rail-connexion with

Tokyo. Hakodate was opened to American commerce in 1854. In the civil war of 1868 the town was taken by the rebel fleet, but it was recovered by the mikado in 1869.

HAL, a town of Brabant, Belgium, about 9 m. S.W. of Brussels, situated on the river Senne and the Charleroi canal. Pop. (1904) 13,541. The place is interesting chiefly on account of its fine church of Notre Dame, formerly dedicated to St Martin. This church, a good example of pure Gothic, was begun in 1341 and finished in 1409. Its principal ornament is the alabaster altar, by J. Mone, completed in 1533. The bronze font dates from 1446. Among the monuments is one in black marble to the dauphin Joachim, son of Louis XL, who died in 1460. In the treasury of the church are many costly objects presented by illustrious personages, among others by the emperor Charles V., King Henry VIII. of England, Charles the Bold of Burgundy, and several popes. The church is chiefly celebrated, however, for its miraculous image of the Virgin. Legend says that during a siege the bullets fired into the town were caught by her in the folds of her dress. Some of these are still shown in a chest that stands in a side chapel. In consequence of this belief a great pilgrimage, attended by many thousands from all parts of Belgium, is paid annually to this church. The hotel de ville dates from 16 16 and has been restored with more than ordinary good taste.

HALA, or Halla (formerly known as Murtazabad), a town of British India in Hyderabad district, Sind. Pop. (1901) 4985. It has long been famous for its glazed pottery and tiles, made from a fine clay obtained from the Indus, mixed with powdered flints. The town has also a manufacture of susis or striped

trouser-cloths.

HALAESA, an ancient town on the north coast of Sicily ; about 14 m. E. of Cephaloedium [Cefalu], to the east of the modern Castel di Tusa, founded in 403 B.C. by Archonides, tyrant of Herbita, whose name it sometimes bore: we find, e.g. Halaisa Archonida on a coin of the time of Augustus {Corp. inscrip. Lai. x., Berlin, 1883, p. 768). It was the first town to surrender to the Romans in the First Punic War, and was granted freedom and immunity from tithe. It became a place of some importance in Roman days, especially as a port, and entirely outstripped its mother city. Halaesa is the only place in Sicily where an inscription dedicated to a Roman governor of the republican period (perhaps in 93 B.C.) has come to light. (T. As.)

HALAKHA, or Halacha (literally " rule of conduct "), the rabbinical development of the Mosaic law; with the haggada it makes up the Talmud and Midrash {q.v.). As the haggada is the poetic, so the halakha is the legal element ot the Talmud {q.v.), and arose out of the faction between the Sadducees, who disputed the traditions, and the Pharisees, who strove to prove their derivation from scripture. Among the chief attempts to codify the halakha were the Great Rules {Halakhoth Gedoloth) of Simon Kayyara (9th century), based on the letters written by the Gaonim, the heads of the Babylonian schools, to Jewish inquirers in many lands, the work of Jacob Alfassi (1013-1103), the Strong Hand of Maimonides (1180), and the Table Prepared {Shulhan Aruch) of Joseph Qaro (1565), which from its practical scope and its clarity as a work of general reference became the universal handbook of Jewish life in many of its phases. (LA.)

HALBERSTADT, a town of Germany, in the Prussian province of Saxony, 56 m. by rail N.W. of Halle, and 29 S.W. of Magde- burg. It lies in a fertile country to the north of the Harz Mountains, on the Holzemme, at the junction of railways to Halle, Goslar and Thale. Pop. (1905) 45,534. The town has a medieval appearance, many old houses decorated with beautiful

wood-carving still surviving. The Gothic cathedral (now Pro- testant), dating from the 13th and 14th centuries, is remarkable for the majestic impression made by the great height of the interior, with its slender columns and lofty, narrow aisles. The treasure, preserved in the former chapter-house, is rich in reliquaries, vestments and other objects of medieval church art. The beautiful spires, which had become unsafe, were rebuilt in 1890-1895. Among the other churches the only one of special interest is the Liebfrauenkirche (Church of Our Lady).

a basilica, with four towers, in the later Romanesque style, dating from the 12th and 13th centuries and restored in 1848, containing old mural frescoes and carved figures. Remarkable among the other old buildings are the town-hall, of the 14th century and restored in the 17th century, with a crypt, and the Petershof, formerly the episcopal palace, but now utilized as law courts and a prison. The principal educational establish- ment is the gymnasium, with a library of 40,000 volumes. Close to the cathedral lies the house of the poet Gleim (q.v.), since 1899 the property of the municipality and converted into a museum. It contains a collection of the portraits of the friends of the poet-scholar and some valuable manuscripts. The principal manufactures of the town are sugar, cigars, paper, gloves, chemical products, beer and machinery. About a mile and a half distant are the Spiegelsberge, from which a fine view of the surrounding country is obtained, and the Klusberge, with pre- historic cave-dwellings cut out in the sandstone rocks.

The history of Halberstadt begins with the transfer to it, by Bishop Hildegrim I., in 820 of the see founded by Charlemagne at Seligenstadt. At the end of the 10th century the bishops were granted by the emperors the right to exercise temporal jurisdiction over their see, which became one of the most

considerable of the ecclesiastical principalities of the Empire. As such it survived the introduction of the Reformation in 1542; but in 1566, on the death of Sigismund of Brandenburg (also archbishop of Madgeburg from 1552 to 1566), the last Catholic bishop, the chapter from motives of economy elected the infant Henry Julius of Brunswick-Luneburg. In 1589 he became duke of Brunswick, and two years later he abolished the Catholic rites in Halberstadt. The see was governed by lay bishops until 1648, when it was formally converted by the treaty of Westphalia into a secular principality for the elector of Brandenburg. By the treaty of Tilsit in 1807 it was annexed to the kingdom of Westphalia, but came again to Prussia on the downfall of Napoleon.

The town received a charter from Bishop Arnulf in 998. In 1 1 13 it was burnt by the emperor Henry V., and in n 79 by Henry the Lion. During the Thirty Years' War it was occupied alternately by the Imperialists and the Swedes, the latter of whom handed it over to Brandenburg.

See Lucanus, Der Dom zu Halberstadt (1837), Wegweiser durch Halberstadt (2nd ed., 1866) and Die Liebfrauenkirche zu Halberstadt (1872); Scheffer, Inschriften und Legenden halberstddtischer Bauten (1864); Schmidt, Urkundenbuch der Stadt Halberstadt (Halle, 1878); and Zschiesche, Halberstadt, sonst undjetzi (1882).

HALBERT, Halberd or Halbard, a weapon consisting of an axe-blade balanced by a pick and having an elongated pike-head at the end of the staff, which was usually about 5 or 6 ft. in length. The utility of such a weapon in the wars of the later middle ages lay in this, that it gave the foot soldier the means of dealing with an armoured man on horseback. The pike could do no more than keep the horseman at a distance. This ensured security for the foot soldier but did not enable him to strike a mortal blow, for which firstly a long-handled and secondly a powerful weapon, capable of striking a heavy cleaving blow, was required. Several different forms

of weapon responding to these requirements are described and illustrated below; it will be noticed that the thrusting pike is almost always combined with the cutting-bill hook or axe-head, so that the individual billman or halberdier should not be at a disadvantage if caught alone by a mounted opponent, or if his first descending blow missed its object. It will be noticed further that, concurrently with the disuse of complete armour and the development of firearms, the pike or thrusting element gradually displaces the axe or cleaving element in these weapons, till at last we arrive at the court halberts and partizans of the late 16th and early 17th centuries and the so-called " halbert " of the infantry officer and sergeant in the 18th, which can scarcely be classed even as partizans.

Figs. 1-6 represent types of these long cutting, cut and thrust weapons of the middle ages, details being omitted for the sake of clearness. The most primitive is the voulge (fig. 1), which is simply a heavy cleaver on a pole, with a point added. The next form, the gisarme or guisarme (fig. 2), appears in infinite variety but is always distinguished from voulges, &c. by the hook, which was used to pull down mounted men, and generally resembles the agricultural bill-hook of to-day. The glaive (fig. 3 is late German) is a broad, heavy, slightly curved sword-

blade on a stave; it is often combined with the hooked gisarme as a glaive-gisarme (fig. 4, Burgundian, about 1480). A gisarme- voulge is shown in fig. 5 (Swiss, 14th century).

The weapon best known to Englishmen is the bill, which was originally a sort of scythe-blade, sharp on the concave side (whereas the glaive has the cutting edge on the convex side), but in its best-known form it should be called a bill-gisarme (fig. 6) . The partizans, ran- seurs and halberts proper developed naturally from the earlier types. The feature common to all, as has been said, is the combination of spear and axe. predominates, as the examples

Figs. 1-6.

In (fig.

the

10,

halberts the axe Swiss, early 15th

Figs. 7-12.

century; fig. n, Swiss, middle 16th century; and fig. 12, German court halbert of the same period as fig. n) show. In the partizan the pike is the more important, the axe-heads being reduced to little more than an ornamental feature. A south German specimen (fig. 9, 161 5) shows how this was compensated by the broadening of the spear-head, the edges of which in such weapons were sharpened. Fig. 8, a service weapon of simple form, merely has projections on either side, and from this developed the ranseur (fig. 7), a partizan with a very long and narrow point, like the blade of a rapier, and with fork-like pro- jections intended to act as " sword-breakers," instead of the atrophied axe-heads of the partizan proper.

The halbert played almost as conspicuous a part in the military history of Middle Europe during the 15th and early 16th centuries as the pike. But,

even in a form A II A

distinguishable from the voulge and the glaive, it dates from the early part of the 13th century, and for many genera- tions thereafter it was the special weapon of the Swiss. Fauchet, in his Origines des dignitez, printed in 1600, states that Louis XL of France ordered certain new weapons of war called hallebardes to be made at Angers and other places in 1475. The Swiss had a mixed armament of pikes and halberts at the battle of Morat in 1476. In the 15th and 16th cen- turies the halberts became larger, and the blades were formed in many varieties of shape, often engraved, inlaid, or pierced in open work, and

exquisitely finished as works of art. This weapon was in use in England from the reign of Henry VII. to the reign of George III., when it was still carried (though in shape it had certainly lost its original characteristics, and had become half partizan and half pike) by sergeants in the guards and other infantry regiments. It is still retained as the symbol of authority borne before the magistrates on public occasions in some of the burghs of Scotland. The Lochaber axe may be called a species of halbert furnished with a hook on the end of the staff at the back of the blade. The godendag (Fr. godendart) is the Flemish name of the halbert in its original form.

The derivation of the word is as follows. The O. Fr. hallebarde, of which the English ” halberd,” ” halbert,” is an adaptation, was itself adapted from the M.H.G. helmbarde, mod. Hellebarde; the second part is the O.H.G. barta or parta, broad-axe, probably the same word as Bart, beard, and so called from its shape; the first part is either helm, handle, cf. ” helm,” tiller of a ship, the word meaning ” hafted axe,” or else helm, helmet, an axe for smiting the helmet. A common derivation was to take the word as representing a Ger. halb-barde, half -axe; the early German form shows this to be an erroneous guess.

HALDANE, JAMES ALEXANDER (1768-1851), Scottish divine, the younger son of Captain James Haldane of Airthrey House, Stirlingshire, was born at Dundee on the 14th of July 1768. Educated first at Dundee and afterwards at the high school and university of Edinburgh, at the age of seventeen he joined the ” Duke of Montrose ” East Indiaman as a midship- man. After four voyages to India he was nominated to the command of the “Melville Castle” in the summer of 1793; but having during a long and unexpected detention of his ship begun a careful study of the Bible, and also come under the evangelical influence

of David Bogue of Gosport, one of the founders of the London Missionary Society, he abruptly resolved to quit the naval profession for a religious life, and returned to Scotland before his ship had sailed. About the year 1796 he became acquainted with the celebrated evangelical divine, Charles Simeon of Cambridge, in whose society he made several tours through Scotland, endeavouring by tract-distribution and other means to awaken others to some of that interest in religious subjects which he himself so strongly felt. In May 1797 he preached his first sermon, at Gilmerton near Edinburgh, with encouraging success. In the same year he established a non-sectarian organization for tract distribution and lay preach- ing called the " Society for the Propagation of the Gospel at Home." During the next few years he made repeated missionary journeys, preaching wherever he could obtain hearers, and generally in the open air. Not originally disloyal to the Church of Scotland, he was gradually driven by the hostility of the Assembly and the exigencies of his position into separation. In 1799 he was ordained as pastor of a large Independent con- gregation in Edinburgh. This was the first congregational church known by that name in Scotland. In 1801 a permanent building replaced the circus in which the congregation had at first met. To this church he continued to minister gratuitously for more than fifty years. In 1808 he made public avowal of his conversion to Baptist views. As advancing years compelled him to withdraw from the more exhausting labours of itineracy and open-air preaching, he sought more and more to influence the discussion of current religious and theological questions by means of the press. He died on the 8th of February 1851.

His son, Daniel Rutherford Haldane (1824-1887), by his second wife, a daughter of Professor Daniel Rutherford, was a prominent Scottish physician, who became president of the Edinburgh College of Physicians.

Among J. A. Haldane's numerous contributions to current theo- logical discussions were: The Duty of

Christian Forbearance in Regard to Points of Church Order (1 8 1 1) ; Strictures on a Publication upon Primitive Christianity by Mr John Walker (1819); Reftitation of Edward Irving's Heretical Doctrines respecting the Person and Atonement of Jesus Christ. His Observations on Universal Pardon, &c, was a contribution to the controversy regarding the views of Thomas Erskine of Linlathen and Campbell of Row; Man's Re- sponsibility (1842) is a reply to Howard Hinton on the nature and extent of the Atonement. He also published: Journal of a Tour in the North; Early Instruction Commended (1801); Views of the Social Worship of the First Churches (1805); The Doctrine and Duty of Self -Examination (1806); The Doctrine of the Atonement (1845); Exposition of the Epistle to the Galatians (1848).

HALDANE, RICHARD BURDON (1856-), British states- man and philosopher, was the third son of Robert Haldane of Cloanden, Perthshire, a writer to the signet, and nephew of J. S. Burdon-Sanderson. He was a grand-nephew of the Scottish divines J. A. and Robert Haldane. He was educated at Edin- burgh Academy and the universities of Edinburgh and Gottingen, where he studied philosophy under Lotze. He took first-class honours in philosophy at Edinburgh, and was Gray scholar and Ferguson scholar in philosophy of the four Scottish Universities (1876). He was called to the bar in 1879, and so early as 1890 became a queen's counsel. In 1885 he entered parliament as liberal member for Haddingtonshire, for which he was re-elected continuously % up to and including 10/10. He was included in 1905 in Sir H. Campbell-Bannerman's cabinet as secretary for war, and was the author of the important scheme for the re- organization of the British army, by which the militia and the volunteer forces were replaced by a single territorial force.

Though always known as one of the ablest men of the Liberal party and conspicuous during the Boer War of 1899-1902 as a Liberal Imperialist, the choice of Mr Haldane for the task of thinking out a new army organization on business lines had struck many people as curious. Besides being a chancery lawyer,

he was more particularly a philosopher, conspicuous for his knowledge of Hegelian metaphysics. But with German philo- sophy he had also the German sense of thoroughness and system, and his scheme, while it was much criticized, was recognized as the best that could be done with a voluntary army. Mr Haldane's chief literary publications were: Life of Adam Smith (1887); Education and Empire (1902); The Pathway to Reality (1903). He also translated, jointly with J. Kemp, Schopen- hauer's Die Welt als Wille und Vorstellung (The World as Will and Idea, 3 vols., 1883-1886).

HALDANE, ROBERT (1 764-1842), Scottish divine, elder brother of J. A. Haldane (q.v.), was born in London on the 28th of February 1764. After attending classes in the Dundee grammar school and in the high school and university of Edin- burgh in 1780, he joined H.M.S. " Monarch," of which his uncle Lord Duncan was at that time in command, and in the following year was transferred to the " Foudroyant," on board of which, during the night engagement with the " Pegase," he greatly distinguished himself. Haldane was afterwards present at the relief of Gibraltar, but at the peace of 1783 he finally left the navy, and soon afterwards settled on his estate of Airthrey, near Stirling. He put himself under the tuition of David Bogue of Gosport and carried away deep impressions from his academy. The earlier phases of the French Revolution excited his deepest sympathy, a sympathy which induced him to avow his strong disapproval of the war with France. As his over-sanguine visions of a new order of things to be ushered in by political change disappeared, he began to direct his thoughts to religious subjects. Resolving to devote himself and his means wholly to the advance- ment of Christianity, his first proposal for that end, made in 1796, was to organize a vast mission to Bengal, of which he was to provide the entire expense; with this view the greater part of his estate was sold, but the East India Company refused to sanction the scheme, which therefore had to be abandoned. In December 1797 he joined his brother and some others in the formation of the "

Society for the Propagation of the Gospel at Home," in building chapels or " tabernacles " for congregations, in supporting missionaries, and in maintaining institutions for the education of young men to carry on the work of evangeliza- tion. He is said to have spent more than £70,000 in the course of the following twelve years (1798-1810). He also initiated a plan for evangelizing Africa by bringing over native children to be trained as Christian teachers to their own countrymen. In 18 1 6 he visited the continent, and first at Geneva and after- wards in Montauban (1817) he lectured and interviewed large numbers of theological students with remarkable effect; among them were Malan, Monod and Merle d'Aubigne. Returning to Scotland in 1819, he lived partly on his estate of Auchengray and partly in Edinburgh, and like his brother took an active part, chiefly through the press, in many of the religious controversies of the time. He died on the 12th of December 1842.

In 18 16 he published a work on the Evidences and Authority of Divine Revelation, and in 1 8 19 the ,substance of his theological prelections in a Commentaire sur I'Epitre aux Romains. Among his later writings, besides numerous pamphlets on what was known as " the Apocrypha controversy," are a treatise On the Inspiration of Scripture (1828), which has passed through many editions, and a later Exposition of the Epistle to the Romans (1835), which has been frequently reprinted, and has been translated into French and German.

See Memoirs of R. and J. A. Haldane, by Alexander Haldane

(1852).

HALDEMAN, SAMUEL STEHMAN (1812-1880), American naturalist and philologist, was born on the 12th of August 181 2 at Locust Grove, Pa. He was educated at Dickinson College, and in 185 1 was appointed professor of the natural sciences in the university of Pennsylvania. In 1855 he went to Delaware College, where he filled the same position, but in

1869 he returned to the university of Pennsylvania as professor of

comparative philology and remained there till his death, which occurred at Chickies, Pa., on the ioth of September 1880. His writings include Freshwater Univalve Mollusca of the United States (1840); Zoological Contributions (1842-1843); Analytic Orthography (i860); Tours of a Chess Knight (1864); Penn- sylvania Dutch, a Dialect of South German with an Infusion of English (1872); Outlines of Etymology (1877); and Word- Building (1881).

HALDIMAND, SIR FREDERICK (1718-1791), British general and administrator, was born at Yverdun, Neuchatel, Switzerland, on the nth of August 1718, of Huguenot descent. After serving in the armies of Sardinia, Russia and Holland, he entered British service in 1754, and subsequently naturalized as an English citizen. During the Seven Years' War he served in America, was wounded at Ticonderoga (1758) and was present at the taking of Montreal (1760). After filling with credit several administrative positions in Canada, Florida and New York, in 1778 he succeeded Sir Guy Carleton (afterwards Lord Dor- chester) as governor-general of Canada. His measures against French sympathizers with the Americans have incurred extravagant strictures from French-Canadian historians, but he really showed moderation as well as energy. In 1785 he re- turned to London. He died at his birthplace on the 5th of June 1 791.

His life has been well written by Jean Mcllwraith in the " Makers of Canada " series (Toronto, 1904). His Correspondence and Diary fill 262 volumes in the Canadian Archives, and are catalogued in the Annual Reports (1884-1889).

HALE, EDWARD EVERETT (182 2-1909), American author, was born in Boston on the 3rd of April 1822, son of Nathan Hale (1784-1863), proprietor and editor of

the Boston Daily Advertiser, nephew of Edward Everett, the orator and statesman, and grand- nephew of Nathan Hale, the martyr spy. He graduated from Harvard in 1839; was pastor of the church of the Unity, Worcester, Massachusetts, in 1846-1856, and of the South Congregational (Unitarian) church, Boston, in 1856-1899; and in 1903 became chaplain of the United States Senate. He died at Roxbury (Boston), Massachusetts, on the ioth of June 1909. His forceful personality, organizing genius, and liberal practical theology, together with his deep interest in the anti-slavery movement (especially in Kansas), popular education (especially Chautauqua work 1), and the working-man's home, were active in raising the tone of American life for half a century. He was a constant and voluminous contributor to the newspapers and magazines. He was an assistant editor of the Boston Daily Advertiser, and edited the Christian Examiner, Old and New (which he assisted in founding in 1869; in 1875 it was merged in Scribner's Magazine), Lend a Hand (founded by him in 1886 and merged in the Charities Review in 1897), and the Lend a Hand Record; and he was the author or editor of more than sixty books — fiction, travel, sermons, biography and history.

He first came into notice as a writer in 1859, when he con- tributed the short story " My Double and How He Undid Me " to the Atlantic Monthly. He soon published in the same periodical other stories, the best known of which was " The Man Without a Country " (1863), which did much to strengthen the Union cause in the North, and in which, as in some of his other non-romantic tales, he employed a minute realism which has led his readers to suppose the narrative a record of fact. The two stories mentioned, and such others as " The Rag-Man and the Rag- Woman " and " The Skeleton in the Closet," gave him a prominent position among the short-story writers of America. The story Ten Times One is Ten (1870), with its hero Harry Wadsworth, and its motto, first enunciated in 1869 in his Lowell Institute lectures, " Look up and not'down, look forward and not back, look out and not in, and lend

a hand," led to the formation among young people of " Lend-a-Hand Clubs," " Look-up Legions " and " Harry Wadsworth Clubs." Out of the romantic Waldensian story In His Name (1873) there similarly grew several other organizations for religious work, such as " King's Daughters," and " King's Sons."

Among his other books are Kansas and Nebraska (1854); The Ingham Papers (1869); His Level Best, and Other Stories (1870);

Sybaris and Other Homes (1871); Philip Nolan's Friends (1876), his best-known novel, and a sequel to The Man Without a Country; The Kingdom of God (1880); Christmas at Narragansett (1885); East and West, a novel (1892); For Fifty Years (poems, 1893); Ralph Waldo Emerson (1899); We, the People (1903); Prayers Offered in the Senate of the United States (1904), and Tarry-at-Home Travels (1906). He edited Lingard's History of England (1853), ar >d con-tributed to Winsor's Memorial History of Boston (1880-1881), and to his Narrative and Critical History of America (1886-1889). With his son, Edward Everett Hale, Jr., he published Franklin in France (2 vols., 1887-1888), based largely on original research. The most charming books of his later years were A New England Boyhood (1893), James Russell Lowell and His Friends (1899), and Memories of a Hundred Years (1902)

A uniform and revised edition of his principal writings, in ten volumes, appeared in 1899-1901.

HALE, HORATIO (181 7-1896), American ethnologist, was born in Newport, New Hampshire, on the 3rd of May 1817. He was the son of David Hale, a lawyer, and of Sarah Josepha Hale (1790-1879), a popular poet, who, besides editing Godey's Lady's Magazine for many years and publishing some ephemeral books, is supposed to have written the verses " Mary had a little lamb," and to have been the first to suggest the national observance of Thanksgiving Day. The son graduated in 1837 at Harvard, and during 1838-1842 was philologist to the United States Exploring Expedition, which under Captain Charles Wilkes

sailed around the world. Of the reports of that expedition Hale prepared the sixth volume, Ethnography and Philology (1846), which is said to have " laid the foundations of the ethnography of Polynesia." He was admitted to the Chicago bar in 1855, and in the following year removed to Clinton, Ontario, Canada, where he practised his profession, and where on the 28th of December 1896 he died. He made many valuable contributions to the science of ethnology, attracting attention particularly by his theory of the origin of the diversities of human languages and dialects — a theory suggested by his study of " child- languages," or the languages invented by little children. He also emphasized the importance of languages as tests of mental capacity and as " criteria for the classification of human groups." He was, moreover, the first to discover that the Tutelos of Virginia belonged to the Siouan family, and to identify the Cherokee as a member of the Iroquoian family of speech. Besides writing numerous magazine articles, he read a number of valuable papers before learned societies. These include: Indian Migrations as Evidenced by Language (1882); The Origin of Languages and the Antiquity of Speaking Man (1886); The Development of Language (1888); and Language as a Test of Mental Capacity : Being an Attempt to Demonstrate the True Basis of Anthropology (1891). He also edited for Brinton's " Library of Aboriginal Literature," the Iroquois Book of Rites (1883).

HALE, JOHN PARKER (1806-1873), American statesman, was born at Rochester, New Hampshire, on the 31st of March 1806. He graduated at Bowdoin College in 1827, was admitted to the New Hampshire bar in 1830, was a member of the state House of Representatives in 1832, and from 1834 to 1841 was United States district attorney for New Hampshire. In 1843-1845 he was a Democratic member of the national House of Repre- sentatives, and, though his earnest co-operation with John Quincy Adams in securing the repeal of the " gag rule " directed against the presentation to Congress of anti-slavery petitions estranged him from the leaders of his party, he was

renominated without opposition. In January 1845, however, he refused in a public statement to obey a resolution (28th of December 1844) of the state legislature directing him and his New Hampshire associates in Congress to support the cause of the annexation of Texas, a Democratic measure which Hale regarded as being distinctively in the interest of slavery. The Democratic State convention was at once reassembled, Hale was denounced, and his nomination withdrawn. In the election which followed Hale ran independently, and, although the Democratic candidates were elected in the other three congressional districts of the state, his vote was large enough to prevent any choice (for which a majority was necessary) in his own. Hale then set out in the face of apparently hopeless odds to win over his state to the anti- slavery cause. The remarkable canvass which he conducted

is known in the history of New Hampshire as the " Hale Storm of 1845." The election resulted in the choice of a legislature controlled by the Whigs and the independent Democrats, he himself being chosen as a member of the state House of Repre- sentatives, of which in 1846 he was speaker. He is remembered, however, chiefly for his long service in the United States Senate, of which he was a member from 1847 to 1853 and again from 1855 to 1865. At first he was the only out-and-out anti-slavery senator, — he alone prevented the vote of thanks to General Taylor and General Scott for their Mexican war victories from being made unanimous in the Senate (February 1848) — but in 1849 Salmon P. Chase and William H. Seward, and in 1851 Charles Sumner joined him, and the anti-slavery cause became for the first time a force to be reckoned with in that body. In October 1847 he had been nominated for president by the Liberty party, but he withdrew in favour of Martin Van Buren, the Free Soil candidate, in 1848. In 1851 he was senior counsel for the rescuers of the slave Shadrach in Boston. In 1852 he was the Free Soil

can- didate for the presidency, but received only 156,149 votes. In 1850 he secured the abolition of flogging in the U.S. navy, and through his efforts in 1862' the spirit ration in the navy was abolished. He was one of the organizers of the Republican party, and during the Civil War was an eloquent supporter of the Union and chairman of the Senate naval committee. From 1865 to 1869 he was United States minister to Spain. He died at Dover, New Hampshire, on the 19th of December 1873. A statue of Hale, presented by his son-in-law William Eaton Chandler (b. 1835), U.S. senator from New Hampshire in 1887-1901, was erected in front of the Capitol in Concord, New Hampshire, in 1892.

HALE, SIR MATTHEW (1609-1676), lord chief justice of England, was born on the 1st of November 1609 at Alderley in Gloucestershire, where his father, a retired barrister, had a small estate. His paternal grandfather was a rich clothier of Wotton-under-Edge; on his mother's side he was connected with the noble family of the Poyntzes of Acton. Left an orphan when five years old, he was placed by his guardian under the care of the Puritan vicar of Wotton-under-Edge, with whom he remained till he attained his sixteenth year, when he entered Magdalen Hall, Oxford. At Oxford, Hale studied for several terms with a view to holy orders, but suddenly there came a change. The diligent student, at first attracted by a company of strolling players, threw aside his studies, and plunged care- lessly into gay society. He soon decided to change his profession ; and resolved to trail a pike as a soldier under the prince of Orange in the Low Countries. Before going abroad, however, Hale found himself obliged to proceed to London in order to give instructions for his defence in a legal action which threatened to deprive him of his patrimony. His leading counsel was the celebrated Serjeant Glanville (1586-1661), who, perceiving in the acuteness and sagacity of his youthful client a peculiar fitness for the legal profession, succeeded, with much difficulty, in inducing him to renounce his military for a legal career, and on the

8th of November 1629 Hale became a member of the honour- able society of Lincoln's Inn.

He immediately resumed his habits of intense application. The rules which he laid down for himself, and which are still extant in his handwriting, prescribe sixteen hours a day of close application, and prove, not only the great mental power, but also the extraordinary physical strength he must have possessed, and for which indeed, during his residence at the university, he had been remarkable. During the period allotted to his preliminary studies, he read over and over again all the year- books, reports, and law treatises in print, and at the Tower of London and other antiquarian repositories examined and care- fully studied the records from the foundation of the English monarchy down to his own time. But Hale did not confine himself to law. He dedicated no sfnall portion of his time to the study of pure mathematics, to investigations in physics and chemistry, and even to anatomy and architecture; and there can be no doubt that this varied learning enhanced considerably the value of many of his judicial decisions. xii. 27

*Hale was called to the bar in 1637, * n d almost at once found himself in full practice. Though neither a fluent speaker nor bold pleader, in a very few years he was at the head of his profession. He entered public life at perhaps the most critical period of English history. Two parties were contending in the state, and their obstinacy could not fail to produce a most direful collision. But amidst the confusion Hale steered a middle course, rising in reputation, and an object of solicitation from both parties. Taking Pomponius Atticus as his political model, he was persuaded that a man, a lawyer and a judge could best serve his country and benefit his countrymen by holding aloof from partisanship and its violent prejudices, which are so apt to distort and confuse the judgment. But he is best vindicated from the charges of selfishness and cowardice by the thoughts and meditations ■ contained in his private diaries and papers, where*

the purity and honour of his motives are clearly seen. It has been said, but without certainty, that Hale was engaged as counsel for the earl of Strafford; he certainly acted for Arch- bishop Laud, Lord Maguire, Christopher Love, the duke of Hamilton and others. It is also said that he was ready to plead on the side of Charles I. had that monarch submitted to the court. The parliament having gained the ascendancy, Hale signed the Solemn League and Covenant, and was a member of the famous assembly of divines at Westminster in 1644; but although he would undoubtedly have preferred a Presbyterian form of church government, he had no serious objection to the system of modified Episcopacy, proposed by Usher. Consistently with his desire to remain neutral, Hale took the engagement to the Commonwealth as he had done to the king, and in 1653, already Serjeant, he became a judge in the court of common pleas. Two years afterwards he sat in Cromwell's parliament as one of the members for Gloucestershire. After the death of the pro- tector, however, he declined to act as a judge under Richard Cromwell, although he represented Oxford in Richard's parlia- ment. At the Restoration in 1660 Hale was very graciously received by Charles II., and in the same year was appointed chief baron of the exchequer, and accepted, with extreme reluctance, the honour of knighthood. After holding the office of chief baron for eleven years he was raised to the higher dignity of lord chief justice, which he held till February 1676, when his failing health compelled him to resign. He retired to his native Alderley, where he died on the 25th of December of the same year. He was twice married and survived all his ten children save two.

As a judge Sir Matthew Hale discharged his duties with resolute independence and careful diligence. His sincere piety made him the intimate friend of Isaac Barrow, Archbishop Tillotson, Bishop Wilkins and Bishop Stillingfleet, as well as of the Nonconformist leader, Richard Baxter. He is charge- able, however, with the condemnation and execution of two poor women tried before him for witchcraft in

1664, a kind of judicial murder then falling under disuse. He is also reproached with having hastened the execution of a soldier for whom he had reason to believe a pardon was preparing.

Of Hale's legal works the only two of importance are his Historia placitorum coronae, or History of the Pleas of the Crown (1736); and the History of the Common Law of England, with an Analysis of the Law, &c. (1713): Among his numerous religious writings the Contemplations , Moral and Divine, occupy the first place. Others are The Primitive Origination of Man (1677) ; Of the Nature of True Religion, &c. (1684) ; A Brief Abstract of the Christian Religion (1688). One of his most popular works is the collection of Letters of Advice to his Children and Grandchildren. He also wrote an Essay touching the Gravitation or Nongravitation of Fluid Bodies (1673); Difjiciles Nugae, or Observations touching the Torricellian Experiment, &c. (J 675); and a translation of the Life of Pomponius Atticus, by Cornelius Nepos (1677). His efforts in poetry were inauspicious. He left his valuable collection of MSS. and records to the library of Lincoln's Inn. His life has been written by G. Burnet (1682); by J. B. Williams (1835); by H. Rosroe, in his Lives of Eminent Lawyers, in 1838; by Lord Campbell, in his Lives of the Chief Justices, in 1849; and by E. Foss in his Lives of the Judges (1848-

1870).

HALE, NATHAN (1756-1776), American hero of the War of Independence, was born at Coventry, Conn., and educated

it

at Yale, then becoming a school teacher. He joined a Con- necticut regiment after the breaking out of the war, and served in the siege of Boston, being

commissioned a captain at the opening of 1 7 76. When Heath's brigade departed for New York he went with them, and the tradition is that he was one of a small and daring band who captured an English provision sloop from under the very guns of a man-of-war. But on the 2 1 st of September, having volunteered to enter the British lines to ol.tain information concerning the enemy, he was captured in his disguise of a Dutch school-teacher and on the 22nd was hanged. The penalty was in accordance with military law, but young Hale's act was a brave one, and he has always been glorified as a martyr. Tradition attributes to him the saying that he only regretted that he had but one life to lose for his country; and it is said that his request for a Bible and the services of a minister was refused by his captors. There is a fine statue of Hale by Macmonnies in New York.

See H. P. Johnston, Nathan Hale (1901).

HALE, WILLIAM GARDNER (1849-), American classical scholar, was born on the 9th of February 1849 in Savannah, Georgia. He graduated at Harvard University in 1870, and took a post-graduate course in philosophy there in 1874-1876; studied classical philology at Leipzig and Gottingen in 1876- 1877; was tutor in Latin at Harvard from 1877 to 1880, and professor of Latin in Cornell University from 1880 to 1892, when he became professor of Latin and head of the Latin depart- ment of the University of Chicago. From 1894 to 1899 he was chairman and in 1895-1896 first director of the American School of Classical Studies at Rome. He is best known as an original teacher on questions of syntax. In The Cum-Constructions: Their History and Functions, which appeared in Cornell Uni- versity Studies in Classical Philology (1888-1889; and in German version by Neizert in 1891), he attacked Hoffmann's distinction between absolute and relative temporal clauses as published in Lateinische Zeitpartikeln (1874); Hoffmann replied in 1 89 1, and the best summary of the controversy is in Wetzel's Der Streit zwischen Hoffmann und Hale (1892). Hale wrote also The Sequence of Tenses in Latin (1887-1888), The

Anticipatory Subjunctive in Greek and Latin (1894), and a Latin Grammar (1903), to which the parts on sounds, inflection and word- formation were contributed by Carl Darling Buck.

HALEBID, a village in Mysore state, southern India; pop. (1901), 1524. The name means ” old capital,” being the site of Dorasamudra, the capital of the Hoysala dynasty founded early in the nth century. In 13 10 and again in 1326 it was taken and plundered by the first Mahommedan invader of southern India. Two temples, still standing, though never completed and greatly ruined, are regarded as the finest examples of the elaborately carved Chalukyan style of architecture.

HALES, or Hayles, JOHN (d. 1571), English writer and politician, was a son of Thomas Hales of Hales Place, Halden, Kent. He wrote his Highway to Nobility about 1543, and was the founder of a free school at Coventry for which he wrote Inlroductiones ad grammaticam. In political life Hales, who was member of parliament for Preston, was specially concerned with opposing the enclosure of land, being the most active of the commissioners appointed in 1548 to redress this evil; but he failed to carry several remedial measures through parliament. When the protector, the duke of Somerset, was deprived of his authority in 1550, Hales left England and lived for some time at Strassburg and Frankfort, returning to his own country on the accession of Elizabeth. However he soon lost the royal favour by writing a pamphlet, A Declaration of the Succession of the Crowne Imperiall of Inglande, which declared that the recent marriage between Lady Catherine Grey and Edward Seymour, earl of Hertford, was legitimate, and asserted that, failing direct heirs to Elizabeth, the English crown should come to Lady Catherine as the descendant of Mary, daughter of Henry VII. The author was imprisoned, but was quickly released, and died on the 28th of December 1571. The Discourse of the Common Weal, described as ” one of the most informing documents of the age,” and written about 1549, has been attributed

to Hales. This has been edited by E. Lan.ond (Cambridge,

1893)-

Hales is often confused with another John Hales, who was clerk of the hanaper under Henry VIII. and his three immediate successors.

HALES, JOHN (1584-1656), English scholar, frequently referred to as " the ever memorable," was born at Bath on the 19th of April 1584, and was educated at Corpus Christi College, Oxford. He was elected a fellow of Merton in 1605, and in 1612 he was appointed public lecturer on Greek. In 1613 he was made a fellow of Eton. Five years later he went to Holland, as chaplain to the English ambassador, Sir Dudley Carleton, who despatched him to Dort to report upon the proceedings of the synod then sitting. In 1619 he returned to Eton and spent his time among his books and in the company of literary men, among whom he was highly reputed for his common sense, his erudition and his genial charity. Andrew Marvell called him " one of the clearest heads and best-prepared breasts in Christen- dom." His eirenical tract entitled Schism and Schismalicks (1636) fell into the hands of Archbishop Laud, and Hales, hearing that he had disapproved of it, is said to have written to the prelate a vindication of his position. This led to a meeting, and in 1639 Hales was made one of Laud's chaplains and also a canon of Windsor. In 1642 he was deprived of his canonry by the parliamentary committee, and two years later was obliged to hide in Eton with the college documents and keys. In 1649 he refused to take the "Engagement" and was ejected from his fellowship. He then retired to Buckinghamshire, where he found a home with Mrs Salter, the sister of the bishop of Salisbury (Brian Duppa), and acted as tutor to her son. The issue of the order against harbouring malignants led him to return to Eton. Here, having sold his valuable library at great sacrifice, he lived in poverty until his death on the 19th of May 1656.

His collected works (3 vols.) were edited by Lord Hailes, and published in 1765.

HALES, STEPHEN (1677–1761), English physiologist, chemist and inventor, was born at Bekesbourne in Kent on the 7th or 17th of September 1677, the fifth (or sixth) son of Thomas Hales, whose father, Sir Robert Hales, was created a baronet by Charles II. in 1670. In June 1696 he was entered as a pensioner of Benet (now Corpus Christi) College, Cambridge, with the view of taking holy orders, and in February 1703 was admitted to a fellowship. He received the degree of master of arts in 1703 and of bachelor of divinity Li 1711. One of his most intimate friends was William Stukeley (1687–1765) with whom he studied anatomy, chemistry, &c. In 1 708–1 709 Hales was presented to the perpetual curacy of Teddington in Middlesex, where he remained all his life, notwithstanding that he was subsequently appointed rector of Porlock in Somerset, and later of Faringdon in Hampshire. In 1717 he was elected fellow of the Royal Society, which awarded him the Copley medal in 1739. In 1732 he was named one of a committee for establishing a colony in Georgia, and the next year he received the degree of doctor of divinity from Oxford. He was appointed almoner to the princess- dowager of Wales in 1750. On the death of Sir Hans Sloane in 1753, Hales was chosen foreign associate of the French Academy of Sciences. He died at Teddington on the 4th of January 1761.

Hales is best known for his Statical Essays. The first volume, Vegetable Staticks (1727), contains an account of numerous experiments in plant-physiology — the loss of water in plants by evaporation, the rate of growth of shoots and leaves, variations in root-force at different times of the day, &c. Considering it very probable that plants draw ” through their leaves some part of their nourishment from the air,” he Undertook experi- ments to show in ” how great a proportion air is wrought into the composition of animal, vegetable and mineral substances “; though this ” analysis of the air ” did not lead him to any very clear ideas about the composition of the atmosphere, in the course of his

inquiries he collected gases over water in vessels separate from those in which they were generated, and thus used what was to all intents and purposes a " pneumatic trough." The second volume (1733) on Haemostaticks, containing experiments

on the " force of the blood " in various animals, its rate of flow, the capacity of the different vessels, &c, entitles him to be regarded as one of the originators of experimental physiology. But he did not confine his attention to abstract inquiries. The quest of a solvent for calculus in the bladder and kidneys was pursued by him as by others at the period, and he devised a form of forceps which, on the testimony of John Ranby (1703-1773), sergeant-surgeon to George II., extracted stones with " great ease and readiness." His observations of the evil effect of vitiated air caused him to devise a " ventilator " (a modified organ- bellows) by which fresh air could be conveyed into gaols, hospitals, ships'-holds, &c; this apparatus was successful in reducing the mortality in the Savoy prison, and it was introduced into France by the aid of H. L. Duhamel du Monceau. Among other things Hales invented a " sea-gauge " for sounding, and processes for distilling fresh from sea water, for preserving corn from weevils by fumigation with brimstone, and for salting animals whole by passing brine into their arteries. His Admoni- tion to the Drinkers of Gin, Brandy, &c, published anonymously in 1734, has been several times reprinted.

HALESOWEN, a market town in the Oldbury parliamentary division of Worcestershire, England, on a branch line of the Great Western and Midland railways, 65 m. W.S.W. of Birming- ham. Pop. (1901), 4057. It lies in a pleasant country among the eastern foothills of the Lickey Hills. There are extensive iron and steel manufactures. The church of SS Mary and John the Baptist has rude Norman portions; and the poet William Shenstone, buried in

1763 in the churchyard, has a memorial in the church. His delight in landscape gardening is exemplified in the neighbouring estate of the Leasowes, which was his property. There is a grammar school founded in 1652, and in the neighbourhood is the Methodist foundation of Bourne College (1883). Close to the town, on the river Stour, which rises in the vicinity, are slight ruins of a Premonstratensian abbey of Early English date. Within the parish and 2 m. N.W. of Halesowen is Cradley, with iron and steel works, fire-clay works and a large nail and chain industry.

HALEVI, JUDAH BEN SAMUEL (c. io8s-c. 1140), the greatest Hebrew poet of the middle ages, was born in Toledo c. 1085, and died in Palestine after 1 140. In his youth he wrote Hebrew love poems of exquisite fancy, and several of his Wedding Odes are included in the liturgy of the Synagogue. The mystical connexion between marital affection and the love of God had, in the view of older exegesis, already expressed itself in the scriptural Song of Songs and Judah Halevi used this book as his model. In this aspect of his work he found inspiration also in Arabic predecessors. The second period of his literary career was devoted to more serious pursuits. He wrote a philosophical dialogue in five books, called the Cuzari, which has been translated into English by Hirschfeld. This book bases itself on the historical fact that the Crimean Kingdom of the Khazars adopted Judaism, and the Hebrew poet-philosopher describes what he conceives to be the steps by which the Khazar king satisfied himself as to the claims of Judaism. Like many other medieval Jewish authors, Judah Halevi was a physician. His real fame depends on his liturgical hymns, which are the finest written in Hebrew since the Psalter, and are extensively used in the Septardic rite. A striking feature of his thought was his devotion to Jerusalem. To the love of the Holy City he devoted his noblest genius, and he wrote some memorable Odes to Zion, which have been commemorated by Heine, and doubly appreciated recently under the impulse of Zionism (q.v.). He

started for Jerusalem, was in Damascus in 1140, and soon afterwards died. Legend has it that he was slain by an Arab horserrian just as he arrived within sight of what Heine called his ” Woebegone poor darling, Desolation’s very image, — Jerusalem.”

Excellent English renderings of some of Judah Halevi’s poems may be read in Mrs H. Lucas’s The Jewish Year, and Mrs R. N. Solomon’s Songs of Exile. (I. A.)

HALEVY, JACQUES FRANCOIS FROMENTAL EUE (1799-

. 1862), French composer, was born on the 27th of May 1799, at

Paris, of a Jewish family. He studied at the Paris Conservatoire

under Berton and Cherubini, and in 1819 gained the grand prix de Rome with his cantata Herminie. In accordance with the conditions of his scholarship he started for Rome, where he devoted himself to the study of Italian music, and wrote an opera and various minor works. In 1827 his opera L' Artisan was performed at the Theatre Feydeau in Paris, apparently without much success. Other works of minor importance, and now forgotten, followed, amongst which Manon Lescaut, a ballet, produced in 1830, deserves mention. In 1834 the Opera-Comique produced Ludovic, the score of which had been begun by Herold and had been completed by Halevy. In 1835 Halevy composed the tragic opera La Juive and the comic opera L' Eclair, and on these works his fame is mainly founded. The famous air of Eleazar and the anathema of the cardinal in La Juive soon became popular all over France. L'Eclair is a curiosity of musical literature. It is written for two tenors and two soprani, without a chorus, and displays the composer's mastery over the most refined effects of instrumentation and vocalization in a favourable light. After these two works he wrote numerous operas of various genres, amongst which only La Reine de Chypre, a spectacular piece analyzed by Wagner in one of his Paris letters (1841), and La Tempesta, in three acts, written for Her Majesty's theatre, London (1850), need be mentioned. In addition to his productive work Halevy also rendered valuable services as a teacher. He was professor at the Conservatoire from 1827 till his death — some of the most successful amongst the younger composers in France, such as Gounod, Victor Masse and Georges Bizet, the author of Carmen, being amongst his pupils. He was maestro al cembalo at the Theatre Italien from 1827 to 1829; then director of singing

at the Opera House in Paris until 1845, and in 1836 he succeeded Reicha at the Institut de France. Halevy also tried his hand at literature. In 1857 he became permanent secretary to the Academie des Beaux Arts, and there exists an agreeable volume of Souvenirs et portraits from his pen. He died at Nice, on the 17th of March 1862.

HALEVY, LUDOVIC (1834-1908), French author, was born in Paris on the 1st of January 1834. His father, Leon Halevy (1 802-1 883), was a clever and versatile writer, who tried almost every branch of literature — prose and verse, vaudeville, drama, history — without, however, achieving decisive success in any. His uncle, J. F. Fromental E. Halevy {q.v.), was for many years associated with the opera ; hence the double and early connexion of Ludovic Halevy with the Parisian stage. At the age of six he might have been seen playing in that Foyer de la danse with which he was to make his readers so familiar, and, when a boy of twelve, he would often, of a Sunday night, on his way back to the College Louis le Grand, look in at the Odeon, where he had free admittance, and see the first act of the new play. At eighteen he joined the ranks of the French administration and occupied various posts, the last being that of secretaire-r6dacteur to the Corps Legislatif. In that capacity he enjoyed the special favour and friendship of the famous duke of Morny, then pre- sident of that assembly. In 1865 Ludovic Halevy's increasing popularity as an author enabled him to retire from the public service. Ten years earlier he had become acquainted with the musician Offenbach, who was about to start a small theatre of his own in the Champs Elysees, and he wrote a sort of prologue, Entrez, messieurs, mesdames, for the opening night. Other little productions followed, Ba-ta-clan being the most noticeable among them. They were produced under the pseudonym of Jules Servieres. The name of Ludovic Halevy appeared for the first time on the bills on the 1st of January 1856. Soon after- wards the unprecedented run of Orphee aux enfers, a musical parody, written in collaboration with Hector Cremieux, made hi& name

famous. In the spring of i860 he was commissioned to write a play for the manager of the Variet6s in conjunction with another vaudevillist, Lambert Thiboust. The latter having abruptly retired from the collaboration, Halevy was at a loss how to carry out the contract, when on the steps of the theatre hemet Henri Meilhac(i83i-i897),thencomparativelyastranger to him. He proposed to Meilhac the task rejected by Lambert Thiboust, and the proposal was immediately accepted. Thus

began a connexion which was to last over twenty years, and which proved most fruitful both for the reputation of the two authors and the prosperity of the minor Paris theatres. Their joint works may be divided into three classes: the opireites, the farces, the comedies. The opereiies afforded excellent opportunities to a gifted musician for the display of his peculiar humour. They were broad and lively libels against the society of the time, but savoured strongly of the vices and follies they were supposed to satirize. Amongst the most celebrated works of the joint authors were La Belle Hilene (1864), Barbe Bleue (1866), La Grande Duchesse de Gerolstein (1867), and La Pirichole (1868). After 1870 the vogue of Parody rapidly declined. The decadence became still more apparent when Offenbach was no longer at hand to assist the two authors with his quaint musical irony, and when they had to deal with interpreters almost destitute of singing powers. They wrote farces of the old type, consisting of complicated intrigues, with which they cleverly interwove the representation of contemporary whims and social oddities. They generally failed when they attempted comedies of a more serious character and tried to introduce a higher sort of emotion. A solitary exception must be made in the case of Frou-frou (1869), which, owing perhaps to the admirable talent of Aimee Desclee, remains their unique succcs de larmes.

Meilhac and Halevy will be found at their best in light sketches of Parisian life, Les Sonnettes, Le Roi Candaule, Madame attend Monsieur, Toto chez Tata. In that intimate association between the two men who had met so opportunely on the perron des varieles, it was often asked who was the leading partner. The question was not answered until the connexion was finally severed and they stood before the public, each to answer for his own work. It was then apparent that they had many gifts in common. Both had wit, humour, observation of character. Meilhac had a ready imagination, a rich and whimsical fancy; Halevy had taste, refinement and pathos of a certain kind. Not less clever than his brilliant comrade, he was more human. Of this he gave evidence in two delightful books, Monsieur et Madame Cardinal (1873) and Les Pctites Cardinal, in which the lowest orders of the Parisian middle class are faithfully described. The pompous, pedantic, venomous Monsieur Cardinal will long survive as the true image of sententious and self-glorifying immorality. M. Halevy's peculiar qualities are even more visible in the simple and striking scenes of the Invasion, published soon after the conclusion of the Franco-German War, in Criquelte (1883) and U Abbe Constantin (1882), two novels, the latter of which went through innumerable editions. Zola had presented to the public an almost exclusive combination of bad men and women; in U Abbe Constantin all are kind and good, and the change was eagerly welcomed by the public. Some enthusiasts still main- tain that the Abbe will rank permanently in literature by the side of the equally chimerical Vicar of Wakefield. At any rate, it opened for M. Ludovic Halevy the doors of the French Academy, to which he was elected in 1884.

Halevy remained an assiduous frequenter of the Academy, the Conservatoire, the Comedie Franchise, and the Society of Dramatic Authors, but, when he died in Paris on the 8th of May 1 90S, he had produced practically nothing new for many years. His last romance, Kari Kari, appeared in 1892.

The TU&ire of MM. Meilhac and HaleVy was published

in 8 vols.

(1900–1902).

HALFPENNY, WILLIAM, English 18th-century architectural designer — he described himself as ” architect and carpenter.” He was also known as Michael Hoare; but whether his real name was William Halfpenny or Michael Hoare is uncertain. His books, of which he published a score, deal almost entirely with domestic architecture, and especially with country houses in those Gothic and Chinese fashions which were so greatly in vogue in the middle of the 18th century. His most important publications, from the point of view of their effect upon taste, were New Designs for Chinese Temples, in four parts (1750–1752); Rural Architecture in the Gothic Taste (1752); Chinese and Gothic Architecture Properly Ornamented (1752); and Rural Architecture in the Chinese Taste (1750–1752). These four books were produced in

collaboration with John Halfpenny, who is said to have been hi3 son. New Designs for Chinese Temples is a volume of some significance in the history of furniture, since, having been pub- lished some years before the books of Thomas Chippendale and Sir Thomas Chambers, it disproves the statement so often made that those designers introduced the Chinese taste into this country. Halfpenny states distinctly that “the Chinese manner ” had been ” already introduced here with success.” The work of the Halfpennys was by no means all contemptible. It is sometimes distinctly graceful, but is marked by little originality. HALF-TIMBER WORK, an architectural term given to those buildings in which the framework is of timber with vertical studs and cross pieces filled in between with brickwork, rubble masonry or plaster work on oak laths; in the first two, brick nogging or nogging are the terms occasionally employed (see Carpentry). Sometimes the timber structure is raised on a stone or brick foundation, as at Ledbury town hall in Herefordshire, where the lower storey is open on all sides; but more often it is raised on a ground

storey, either in brick or stone, and in order to give additional size to the upper rooms projects forward, being carried on the floor joists. Sometimes the masonry or brickwork rises through two or three storeys and the half-brick work is confined to the gables. There seems to be some difference of opinion as to whether the term applies to the mixture of solid walling with the timber structure or to the alternation of wood posts and the filling in, but the latter definition is that which is generally understood. The half- timber throughout England is of the most picturesque description, and the earliest examples date from towards the close of the 15th century. In the earliest example, Newgate House, York (c. 1450), the timber framing is raised over the ground floor. The finest specimen is perhaps that of Moreton Old Hall, Cheshire (1570), where there is only a stone foundation about 12 in. high, and the same applies to Bramall Hall, near Manchester, portions of which are very early. Among other examples are Speke Hall, Lancashire; Park Hall, Shrop- shire (1553-1558); Hall i' th' Wood, Lancashire (1591); St Peter's Hospital, Bristol (1607); the Ludlow Feather's Inn (1610); many of the streets at Chester and Shrewsbury; the Sparrowe's Home, Ipswich; and Staple Inn, Holborn, from which in recent years the plaster coat which was put on many years ago has been removed, displaying the ancient woodwork. A similar fate has overtaken a very large number of half-timber buildings to keep out the driving winds; thus in Lewes nearly all the half-timbered houses have had slates hung on the timbers, others tiles, the greater number having been v,wvered with plaster or stucco. Although there are probably many more half-timber houses in England than on the continent of Europe, in the north of France and in Germany are examples in many of the principal towns, and in some cases in better preservation than in England. They are also enriched with carving of a purer and better type, especially in France; thus at Chartres, Angers, Rouen, Caen, Lisieux, Bayeux, St L6 and Beauvais, are many extremely fine examples of late Flamboyant and early Transitional examples. Again on the borders of the

Rhine in all the small towns most of the houses are in half-timber work, the best examples being at Bacharach, Rhense and Boppart. Far more elaborate examples, however, are found in the vicinity of the Harz Mountains; the supply of timber from the forests there being very abundant ; thus at Goslar, Wernigerode and Quedlingburg there is an endless variety, as also farther on at Gelnhausen and Hameln, the finest series of all being at Hildesheim. In Bavaria at Nuremberg, Rothenburg and Dinkelsbiihl, half-timber houses dating from the 16th century are still well preserved; and throughout Switzerland the houses constructed in timber and plaster are the most characteristic features of the country.

HALFWAY COVENANT, an expedient adopted in the Congregational churches of New England between 1657 and 1662. Under its terms baptized persons of moral life and orthodox belief might receive the privilege of baptism for their children and other church benefits, without the full enrolment in membership which admitted them to the communion of the Lord's Supper.

See Congregationalism: American.

HALHED, NATHANIEL BRASSEY (1751–1830), English Orientalist and philologist, was born at Westminster on the 25th of May 1751. He was educated at Harrow, where he began his intimacy with Richard Brinsley Sheridan (see Sheridan Family) continued after he entered Christ Church, Oxford, where, also, he made the acquaintance of Sir William Jones, the famous Orientalist, who induced him to study Arabic. Accepting a writership in the service of the East India Company, Halhed went out to India, and here, at the suggestion of Warren Hastings, by whose orders it had been compiled, translated the Gentoo code from a Persian version of the original Sanskrit. This translation was published in 1776

under the title A Code of Gentoo Laws. In 1778 he published a Bengali grammar, to print which he set up, at Hugh, the first press in India. It is claimed for him that he was the first writer to call attention to the philological connexion of Sanskrit with Persian, Arabic, Greek and Latin. In 1785 he returned to England, and from 1 790-1 795 was M.P. for Lymington, Hants. For some time he was a disciple of Richard Brothers (q.v), and his unwise speech in parliament in defence of Brothers made it impossible for him to remain in the House, from which he resigned in 1795. He subsequently obtained a home appointment under the East India Company. He died in London on the 18th of February

1830.

His collection of Oriental manuscripts was purchased by the British Museum, and there is an unfinished translation by him of the Mahabharala in the library of the Asiatic Society of Bengal.

HALIBURTON, THOMAS CHANDLER (1796-1865), British writer, long a judge of Nova Scotia, was born at Windsor, Nova Scotia, in 1796, and received his education there, at King's College. He was called to the bar in 1820, and became a member of t he House of Assembly. He distinguished himself as a barrister, and in 1828 was promoted to the bench as a chief-justice of the common pleas. In 1829 he published An Historical and Statistical Account of Nova Scotia. But it is as a brilliant humourist and satirist that he is remembered, in connexion with his fictitious character " Sam Slick." In 1835 he con- tributed anonymously to a local paper a series of letters professedly depicting the peculiarities of the genuine Yankee. These sketches, which abounded in clever picturings of national and individual character, drawn with great satirical humour, were collected in 1837, and published under the title of The Clockmaker, or Sayings and Doings of Samuel Slick of Slickville. A second series followed in 1838, and a third in 1840. The Attache, or Sam Slick in England (1843-51844), was the result of a visit there in 1841. His other works include:

The Old Judge, or Life in a Colony (1843); The Letter Bag of the Great Western (1839); Rule and Misrule of the English in America (1851); Traits of American Humour (1852); and Nature and Human Nature (1855).

Meanwhile he continued to secure popular esteem in his judicial capacity. In 1840 he was promoted to be a judge of the supreme court; but within two years he resigned his seat on the bench, removed to England, and in 1859 entered parliament as the representative of Launceston, in the Conservative interest. But the tenure of his seat for Launceston was brought to an end by the dissolution of the parliament in 1865, and he did not again offer himself to the constituency. He died on the 27th of August of the same year, at Gordon House, Isleworth, Middlesex.

A memoir of Haliburton, by F. Blake Crofton, appeared in 1889.

HALIBUT, or Holibut (Hippoglossus vulgaris), the largest of all flat-fishes, growing to a length of 10 ft. or more, specimens of 5 ft. in length and of 100 lb. in weight being frequently exposed for sale in the markets. Indeed, specimens under 2 ft. in length are very rarely caught, and singularly enough, no instance is known of a very young specimen having been obtained. Small ones are commonly called ” chicken halibut.” The halibut is much more frequent in the higher latitudes of the temperate zone than in its southern portion; it is a circumpolar species, being found on the northern coasts of America, Europe and Asia, extending in the Pacific southwards to California. On the British coasts it keeps at some distance from the shore, and is

generally caught in from 50 to 1 50 fathoms. Its flesh is generally considered coarse, but it is white and firm, and when properly served is excellent for the table. The name is derived from ” holy ” (M.E. haly), and recalls its use for food on holy days.

HALICARNASSUS (mod. Budrum), an ancient Greek city on the S.W. coast of Caria, Asia Minor, on a picturesque and advantageous site on the Ceramic Gulf or Gulf of Cos. It originally occupied only the small island of Zephyria close to the shore, now occupied by the great castle of St Peter, built by the Knights of Rhodes in 1404; but in course of time this island was united to the mainland and the city extended so as to incorporate Salmacis, an older town of the Leleges and Carians. About the foundation of Halicarnassus various traditions were current; but they agree in the main point as to its being a Dorian colony, and the figures on its coins, such as the head of Medusa, Athena and Poseidon, or the trident, support the statement that the mother cities were Troezen and Argos. The inhabitants appear to have accepted as their legendary founder Anthes, mentioned by Strabo, and were proud of the title of Antheadae. At an early period Halicarnassus was a member of the Doric Hexapolis, which included Cos, Cnidus, Lindus, Camirus and Ialysus; but one of the citizens, Agasicles, having taken home the prize tripod which he had won in the Triopian games instead of dedicating it according to custom to the Triopian Apollo, the city was cut off from the league. In the early 5th century Halicarnassus was under the sway of Artemisia, who made herself famous at the battle of Salamis. Of Pisindalis, her son and successor, little is known; but Lygdamis, who next attained to power, is notorious for having put to death the poet Panyasis and caused Herodotus, the greatest of Halicarnassians, to leave his native city (c. 457 B.C.). In the 5th century B.C. Halicarnassus and other Dorian cities of Asia were to some extent absorbed by the Delian League, but the peace of Antalcidas in 387 made them subservient to Persia; and it was under Mausolus, a Persian satrap who assumed independent authority, that Halicarnassus attained its highest prosperity. Struck by the natural strength and beauty of its position, Mausolus removed to Halicarnassus from Mylasa, increasing the population of the city by the inhabitants of six towns of the Leleges. He was succeeded by Artemisia, whose military ability was

shown in the stratagem by which she captured the Rhodian vessels attacking her city, and whose magnificence and taste have been perpetuated by the " Mausoleum," the monument she erected to her husband's memory (see Mausolus). Oneof hersuccessors, Pixodarus, tried to ally himself with the rising power of Macedon, and is said to have gained the momentary consent of the young Alexander to wed his daughter. The marriage, however, was forbidden by Philip. Alexander, as soon as he had reduced Ionia, summoned Halicarnassus, where Memnon, the paramount satrap of Asia Minor, had taken refuge with the Persian fleet, to sur- render; and on its refusal took the city after hard fighting and devastated it, but not being able to reduce the citadel, was forced to leave it blockaded. He handed the government of the city back to the family of Mausolus, as represented by Ada, sister of the latter. Not long afterwards we find the citizens receiving the present of a gymnasium from Ptolemy, and building in his honour a stoa or portico; but the city never recovered altogether from the disasters of the siege, and Cicero describes it as almost deserted. The site is now occupied in part by the town of Budrum; but the ancient walls can still be traced round nearly all their circuit, and the position of several of the temples, the theatre, and other public buildings can be fixed with certainty.

From the ruins of the Mausoleum sufficient has been recovered by the excavations carried out in 1857 by C. T. Newton to enable a fairly complete restoration of its design to be made. The building consisted of five parts — a basement or podium, a pteron or enclosure of columns, a pyramid, a pedestal and a chariot group. The basement, covering an area of 114 ft. by 92, was built of blocks of greenstone and cased with marble. Round the base of it were probably disposed groups of statuary. The

pteron consisted (according to Pliny) of thirty-six

columns of the Ionic order, enclosing a square cella. Between the columns probably stood single statues. From the portions that have been recovered, it appears that the principal frieze of the pteron represented combats of Greeks and Amazons. In addition to these, there are also many life-size fragments of animals, horse- men, &c, belonging probably to pedimental sculptures, but formerly supposed to be parts of minor friezes. Above the pteron rose the pyramid, mounting by 24 steps to an apex or pedestal. On this apex stood the chariot with the figure of Mausolus himself and an attendant. The height of the statue of Mausolus in the British Museum is 9 ft. aj in. without the plinth. The hair rising from the forehead falls in thick waves on each side of the face and descends nearly to the shoulder; the beard is short and close, the face square and massive, the eyes deep set under overhanging brows, the mouth well formed with settled calm about the lips. The drapery is grandly com- posed. All sorts of restorations of this famous monument have been proposed. The original one, made by Newton and Pullan, is obviously in error in many respects; and that of Oldfield, though to be preferred for its lightness (the Mausoleum was said anciently to be " suspended in mid-air "), does not satisfy the conditions postulated by the remains. The best on the whole is that of the veteran German architect, F. Adler, published in 1900; but fresh studies have since been made (see below).

See C. T. Newton and R. P. Pullan, History of Discoveries at Halicarnassus (1862-1863); J. Fergusson, The Mausoleum at Halicarnassus restored (1862); E. Oldfield, "The Mausoleum," in Archaeologia (1895); F. Adler, Mausoleum zu Halikarnass (1900); J. P. Six in Journ. Hell. Studies (1905); W. B. Dinsmoor, in Amer. Journ. of Arch. (1908); J. J. Stevenson, A Restoration of the Mauso- leum of Halicarnassus (1909); J. B. K. Preedy, "The Chariot Group of the Mausoleum," in Journ. Hell. Stud., 1910. (D.G. H.)

HALICZ, a town of Austria, in Galicia, 70 m. by rail

S.S.E. of Lemberg. • Pop. (1900), 4809. It is situated at the confluence of the Luckow with the Dniester and its principal resources are the recovery of salt from the neighbouring brine wells, soap- making and the trade in timber. In the neighbourhood are the ruins of the old castle, the seat of the ruler of the former kingdom from which Galicia derived its Polish name. Halicz, which is mentioned in annals as early as n 13, was from 1141 to 1255 the residence of the princes of that name, one of the principalities into which western Russia was then divided. The town was then much larger, as is shown by excavations in the neighbour- hood made during the 19th century, and probably met its doom during the Mongol invasion of 1240. In 1349 it was incorporated in the kingdom of Poland.

HALIFAX, CHARLES MONTAGUE, Earl of (1661-1715), English statesman and poet, fourth son of the Hon. George Montague, fifth son of the first earl of Manchester, was born at Horton, Northamptonshire, on the 16th of April 1661. In his fourteenth year he was serrt to Westminster school, where he was chosen king's scholar in 1677, and distinguished himself in the composition of extempore epigrams made according to custom upon theses appointed for king's scholars at the time of election. In 1679 he entered Trinity College, Cambridge, where he acquired a solid knowledge of the classics and surpassed all his contemporaries at the university in logic and ethics. Lat terly, however, he preferred to the abstractions of Descartes the practical philosophy of Sir Isaac Newton; and he was one of the small band of students who assisted Newton in forming the Philosophical Society of Cambridge. But it was his facility in verse-writing, and neither his scholarship nor his practical ability, that first opened up to him the way to fortune. His clever but absurdly panegyrical poem on the death of Charles II. secured for him the notice of the earl of Dorset, who invited Kim to town and introduced him to the principal wits of the time; and in 1687 his joint authorship with Prior of the Hind and Panther transversed to the Story of the Country Mouse and

the City Mouse, a parody of Dryden's political poem, not only increased his literary reputation but directly helped him to political influence.

In 1689, through the patronage of the earl of Dorset, he entered

parliament as member for Maldon, and sat in the convention which resolved that William and Mary should be declared king and queen of England. About this time he married the countess- dowager of Manchester, and it would appear, according to Johnson, that it was still his intention to take orders; but after the coronation he purchased a clerkship to the council. On being introduced by Earl Dorset to King William, after the publication of his poetical Epistle occasioned by his Majesty's Victory in Ireland, he was ordered to receive an immediate pension of £500 per annum, until an opportunity should present itself of "making a man of him." In 1691 he was chosen chairman of the committee of the House of Commons appointed to confer with a committee of the Lords in regard to the bill for regulating trials in cases of high treason; and he displayed in these conferences such tact and debating power that he was made one of the commissioners of the treasury and called to the privy council. But his success as a politician was less due to his oratorical gifts than to his skill in finance, and in this respect he soon began to manifest such brilliant talents as completely eclipsed the painstaking abilities of Godolphin. Indeed it may be affirmed that no other statesman has initiated schemes which have left a more permanent mark on the financial history of England. Although perhaps it was inevitable that England should sooner or later adopt the continental custom of lightening the annual taxation in times of war by contracting a national debt, the. actual introduction of the expedient was due to Montague, who on the 15th of December 1692 proposed to raise a million of money by way of loan. Previous to this the Scotsman William Paterson (q.v.) had submitted to the government his plan of a national bank, and when in the spring of 1694 the prolonged contest

with France had rendered another large loan absolutely necessary, Montague introduced a bill for the incorporation of the Bank of England. The bill after some opposition passed the House of Lords in May, and immediately after the prorogation of parliament Montague was rewarded by the chancellorship of the exchequer. In 1695 he was trium- phantly returned for the borough of Westminster to the new parliament, and succeeded in passing his celebrated measure to remedy the depreciation which had taken place in the currency on account of dishonest manipulations. To provide for the expense of recoinage, Montague, instead of reviving the old tax of hearth money, introduced the window tax, and the difficulties caused by the temporary absence of a metallic currency were avoided by the issue for the first time of exchequer bills. His other expedients for meeting the emergencies of the financial crisis were equally successful, and the rapid restoration of public credit secured him a commanding influence both in the House of Commons and at the board of the treasury; but although Godolphin resigned office in October 1696, the king hesitated for some time between Montague and Sir Stephen Fox as his successor, and it was not till 1697 that the former was appointed first lord. In 1697 he was accused by. Charles Duncombe, and in 1698 by a Col. Granville, of fraud, but both charges broke down, and Duncombe was shown to have been guilty of extreme dishonesty himself. In 1698 and 1699 he acted as one of the council of regency during the king's absence from England. With the accumulation of his political successes his vanity, and arrogance became, however, so offensive that latterly they utterly lost him the influence he had acquired by his adminis- trative ability and his masterly eloquence; and when his power began to be on the wane he set the seal to his political overthrow by conferring the lucrative sinecure office of auditor of the exchequer on his brother in trust for himself should he be compelled to retire from power. This action earned him the offensive nickname of " Filcher," and for some time afterwards, in attempting to lead the House of

Commons, he had to submit to constant mortifications, often verging on personal insults. After the return of the king in 1699 he resigned his offices in the government and succeeded his brother in the auditorship.

On the accession of the Tories to power he was removed in 1 701 to the House of Lords by the title of Lord Halifax. In the same year he was impeached for malpractices along with Lord

Somers and the earls of Portland and Oxford, but all the charges were dismissed by the Lords; and in 1703 a second attempt to impeach him was still more unsuccessful. He continued out of office during the reign of Queen Anne, but in 1706 he was named one of the commissioners to negotiate the union with Scotland; and after the passing of the Act of Settlement in favour of the house of Hanover, he was appointed ambassador to the elector's court to convey the insignia of order of the garter to George I. On the death of Anne (1714) he was appointed one of the council of regency until the arrival of the king from Hanover; and after the coronation he received the office of first lord of the treasury in the new ministry, being at the same time created earl of Halifax and Viscount Sunbury. He died on the 1 9th of May 1 7 1 5 and left no issue. He was buried in the vault of the Albemarle family in Westminster Abbey. His nephew George (d. 1739) succeeded to the barony, and was created Viscount Sunbury and earl of Halifax in 1715.

Montague's association with Prior in the travesty of Dryden's Hind and Panther has no doubt largely aided in preserving his literary reputation; but he is perhaps indebted for it chiefly to his subsequent influential position and to the fulsome flattery of the men of letters who enjoyed his friendship, and who, in return for his liberal donations and the splendid banqueting which they occasionally enjoyed

at his villa on the Thames, " fed him," as Pope says, " all day iong with dedications." Swift says he gave them nothing but " good words, and good dinners." That, however, his beneficence to needy talent, if sometimes attributable to an itching ear for adulation, was at others prompted by a sincere appreciation of intellectual merit, is sufficiently attested by the manner in which he procured from Godolphin a commissionership for Addison, and also by his life-long intimacy with Newton, for whom he obtained the mastership of the mint. The small fragments of poetry which he left behind him, and which were almost solely the composition of his early years, display a certain facility and vigour of diction, but their thought and fancy are never more than commonplace, and not unfrequently in striving to be eloquent and impressive he is only grotesquely and extravagantly absurd. In administrative talent he was the superior of all his contemporaries, and his only rival in parliamentary eloquence was Somers; but the skill with which he managed measures was superior to his tact in dealing with men, and the effect of his brilliant financial successes on his reputation was gradually almost nullified by the affected arrogance of his manner and by the eccentricities of his sensitive vanity. So eager latterly was his thirst for fame and power that perhaps Marlborough did not exaggerate when he said that " he had no other principle but his ambition, so that he would put all in distraction rather than not gain his point."

Among the numerous notices of Halifax by contemporaries may be mentioned the eulogistic reference which concludes Addison's account of the " greatest of English poets " ; the dedications by Steel to the second volume of the Spectator and to the fourth of the Taller; Pope's laudatory mention of him in the epilogue to his Satires and in the preface to the Iliad, and his portrait of him as " Full-blown Bufo " in the Epistle to Arouthnot. Various allusions to him are to be found in Swift's works and in Marlborough's Letters. See also Burnet's History of his Own Times; The Parliamentary

History; Howell's State Trials; Johnson's Lives of the Poets; and Macaulay's History of England. His Miscellaneous Works were published at London in 1704; his Life and Miscellaneous Works in 1715; and his Poetical Works, to which also his " Life " is attached, in 1716. His poems were reprinted in the 9th volume of Johnson's English Poets.

HALIFAX, GEORGE MONTAGU DUNK, 2nd Earl of (1716-1771), son of George Montagu, ist earl of Halifax (of the second creation), was born on the 5th or 6th of October 1716, becoming earl of Halifax on his father's death in 1739. Educated at Eton and at Trinity College, Cambridge, he was married in 1741 to Anne Richards (d. 1753), a lady who had inherited a great fortune from Sir Thomas Dunk, whose name was taken by Halifax. After having been an official in the household of Frederick, prince of Wales, the earl was made master of the buck- hounds, and in 1748 he became president of the Board of Trade."

While filling this position he helped to found Halifax, the capital of Nova Scotia, which was named after him, and in several ways he rendered good service to trade, especially with North America. About this time he sought to became a secretary of state, but in vain, although he was allowed to enter the cabinet in 1757. In March 1761 Halifax was appointed lord-lieutenant of Ireland, and during part of the time which he held this office he was also first lord of the admiralty. He became secretary of state for the northern department under the earl of Bute in October 1762, retaining this post under George Grenville and being one of the three ministers to whom George III. entrusted the direction of affairs. He signed the general warrant under which Wilkes was arrested in 1763, for which action he was mulcted in damages by the courts of law in 1769, and he was mainly responsible for the exclusion of the name of the king's mother, Augusta, princess of Wales, from the Regency Bill of 1765. With his colleagues the earl left office in July 1765, returning to the cabinet as lord privy seal under his nephew, Lord North, in January 1770. He had just been transferred to his former position of

secretary of state when he died on the 8th of June 1 771. Halifax, who was lord-lieutenant of Northamp- tonshire and a lieutenant-general in the army, showed some disinterestedness in money matters, but was very extravagant. He left no children, and his titles became extinct on his death Horace Walpole speaks slightingly of the earl, and says he and his mistress, Mary Anne Faulkner, " had sold every employment in his gift."

See the Memoirs of his secretary, Richard Cumberland (1807). HALIFAX, GEORGE SAVILE, ist Marquess of (1633-1695), English statesman and writer, great- grandson of Sir George Savile of Lupset and Thornhill in Yorkshire (created baronet in 1611), was the eldest son of Sir William Savile, 3rd baronet, who distinguished himself in the civil war in the royalist cause and who died in 1644, and of Anne, eldest daughter of Lord Keeper Coventry. He was thus nephew of Sir William Coventry, who is said to have influenced his political opinions, and of Lord Shaftesbury, afterwards his most bitter opponent, and great-nephew of the earl of Strafford; by his marriage with the Lady Dorothy Spencer, he was brother-in-law to Lord Sunderland. He entered public life with all the advantages of lineage, political connexions, great wealth and estates, and uncommon abilities. He was elected member of the Convention parliament for Pontefract in 1660, and this was his only appear- ance in the Lower House. A peerage was sought for him by the duke of York in 1665, but was successfully opposed by Clarendon, on the ground of his " ill-reputation amongst men of piety and religion," the real motives of the chancellor's hostile attitude being probably Savile's connexion with Buckingham and Coventry. The honours were, however, only deferred for a short time and were obtained after the fall of Clarendon on the 31st of December 1667, 1 when Savile was created Baron Savile of Eland and Viscount Halifax.

He supported zealously the anti-French policy formulated in the Triple Alliance of January 1668. He was at this time in favour at court, was created a privy councillor in 1672, and, while ignorant of

the disgraceful secret clauses in the treaty of Dover, was chosen envoy to negotiate terms of peace with Louis XIV. and the Dutch at Utrecht. His mission was still further deprived of importance by Arlington and Buckingham, who were in the king's counsels, and who anticipated his arrival and took the negotiations out of his hands; and though he signed the compact, he had no share in the harsh terms imposed upon the Dutch, and henceforth became a bitter opponent of the policy of subservience to French interests and of the Roman Catholic claims.

He took an active part in passing through parliament the great Test Act of 1673 a and forfeited in consequence his friend- ship with James. In 1674 he brought forward a motion for

1 Cal. State Papers, Dom. (Nov. 1667–Sep. 1668), p. 106.

2 Lords' Journals, 12, p. 567 ; Savile Correspondence, ed. by W. D. Cooper, p. 136; " Character of a Trimmer,"' in Life of Sir C Savile, by H. C. Foxcroft, ii. 316.

disarming " popish recusants," and supported one by Lord Carlisle for restricting the marriages in the royal family to Protestants; but he opposed the bill introduced by Lord Danby (see Leeds, ist Duke or) in 1675, which imposed a test oath on officials and members of parliament, speaking " with that quickness, learning and elegance that are inseparable from all his discourses," and ridiculing the multiplication of oaths, since " no man would ever sleep with open doors . . . should all the town be sworn not to rob." He was now on bad terms with Danby, and a witty sally at that minister's expense caused his dismissal from the council in January 1676. In 1678 he took an active part in the investigation of the "Popish Plot," to which he appears to have given excessive credence, but

opposed the bill which was passed on the 30th of October 1678, to exclude Roman Catholics from the House of Lords.

In 1679, as a consequence of the fall of Danby, he became a member of the newly constituted privy council. With Charles, who had at first ” kicked at his appointment,” he quickly became a favourite, his lively and ” libertine ” (i.e. free or sceptical) conversation being named by Bishop Burnet as his chief attrac- tion for the king. His dislike of the duke of York and of the Romanist tendencies of the court did not induce him to support the rash attempt of Lord Shaftesbury to substitute the illegiti- mate duke of Monmouth for James in the succession. He feared Shaftesbury’s ascendancy in the national councils and foresaw nothing but civil war and confusion as a result of his scheme. He declared against the exclusion of James, was made an earl in 1679, and was one of the ” Triumvirate ” which now directed public affairs. He assisted in passing into law the Habeas Corpus Bill. According to Sir. W. Temple he showed great severity in putting into force the laws against the Roman Catholics, but this statement is considered a misrepresentation. 1 In 1680 he voted against the execution of Lord Stafford.

Meanwhile (1679) his whole policy had been successfully directed towards uniting all parties with the object of frustrating Shaftesbury’s plans. Communications were opened with the prince of Orange, and the illness of the king was made the occasion for summoning James from Brussels. Monmouth was compelled to retire to Holland, and Shaftesbury was dismissed. On the other hand, while Halifax was so far successful, James was given an opportunity of establishing a new influence at the court. It was with great difficulty that his retirement to Scotland was at last effected; the ministers lost the confidence and support of the ” country party,” and Halifax, fatigued and ill, at the close of this year, retired to Rufford Abbey, the country home of the Saviles since the destruction of Thornhill Hall in 1648, and for some time took little part in

affairs. He returned in September 1680 on the occasion of the introduction of the Exclusion Bill in the Lords. The debate which followed, one of the most famous in the whole annals of parliament, became a duel of oratory between Halifax and his uncle Shaftesbury, the finest two speakers of the day, watched by the Lords, the Commons at the bar, and the king, who was present. It lasted seven hours. Halifax spoke sixteen times, and at last, regardless of the menaces of the more violent supporters of the bill, who closed round him, vanquished his opponent. The rejection of the bill by a majority of 33 was attributed by all parties entirely to the eloquence of Halifax. His conduct transformed the allegiance to him of the Whigs into bitter hostility, the Commons immediately petitioning the king to remove him from his councils for ever, while any favour which he might have regained with James was forfeited by his subsequent approval of the regency scheme.

He retired to Rufford again in January 1681, but was present at the Oxford parliament, and in May returned suddenly to public life and held for a year the chief control of affairs. The arrest of Shaftesbury on the 2nd of July was attributed to his influence, but in general, during the period of Tory reaction, he seems to have urged a policy of conciliation and moderation upon the king. He opposed James's return from Scotland and, about this time (Sept.), made a characteristic but futile attempt

1 Foxcroft i. 160, where Hallam is quoted to this effect.

to persuade the duke to attend the services of the Church of England and thus to end all difficulties. He renewed relations with the prince of Orange, who in July paid a visit to England to seek support against the French designs upon Luxemburg. The influence of Halifax procured for the Dutch a formal assurance from Charles of his support; but the king informed the French ambassador that he had no intention of fulfilling his engagements, and made

another secret treaty with Louis. Halifax opposed in 1682 James's vindictive prosecution of the earl of Argyll, arousing further hostility in the duke, while the same year he was challenged to a duel by Monmouth, who attributed tc him his disgrace.

His short tenure of power ended with the return of James in May. Outwardly he still retained the king's favour and was advanced to a marquisate (Aug. 17) and to the office of lord privy seal (Oct. 25). Being still a member of the administration he must share responsibility for the attack now made upon the municipal franchises, a violation of the whole system of representative government, especially as the new charters passed his office. In January 1684 he was one of the commissioners " who supervise all things concerning the city and have turned out those persons who are whiggishly inclined " (N. Luttrell's Diary, i. 295). He made honourable but vain endeavours to save Algernon Sidney and Lord Russell. " My Lord Halifax," declared Tillotson in his evidence before the later inquiry, " showed a very compassionate concern for my Lord Russell and all the readiness to serve them that could be wished." 2 The Rye-House Plot, in which it was sought to implicate them, was a disastrous blow to his policy, and in order to counteract its consequences he entered into somewhat perilous negotiations with Monmouth, and endeavoured to effect his reconciliation with the king. On the 1 2 th of February 1684, he procured the release of his old antagonist, Lord Danby. Shortly afterwards his influence at the court revived. Charles was no longer in receipt of his French pension and was beginning to tire of James and Rochester. The latter, instead of becoming lord treasurer, was, according to the epigram of Halifax which has become proverbial, " kicked upstairs," to the office of lord president of the council. Halifax now worked to establish intimate relations between Charles and the prince of Orange and opposed the abrogation of the recusancy laws. In a debate in the cabinet of November 1684, on the question of the grant of a fresh constitution to the New England colonies, he

urged with great warmth " that there could be no doubt whatever but that the same laws which are in force in England should also be established in a country inhabited by Englishmen and that an absolute government is neither so happy nor so safe as that which is tempered by laws and which sets bounds to the authority of the prince," and declared that he could not " live under a king who should have it in his power to take, whenever he thought proper, the money he has in his pocket." The opinions thus expressed were opposed by all the other ministers and highly censured by Louis XIV., James and Judge Jeffreys.

At the accession of James he was immediately deprived of all power and relegated to the presidency of the council. He showed no compliance, like other Lords, with James's Roman Catholic preferences. He was opposed to the parliamentary grant to the king of a revenue for life; he promoted the treaty of alliance with the Dutch in August 1685; he expostulated with the king on the subject of the illegal commissions in the army given to Roman Catholics; and finally, on his firm refusal to support the repeal of the Test and Habeas Corpus Acts, he was dismissed, and his name was struck out of the list of the privy council (Oct. 1685). He corresponded with the prince of Orange, conferred with Dykveldt, the latter's envoy, but held aloof from plans which aimed at the prince's personal interference in English affairs. In 1687 he published the famous Letter to a Dissenter, in which he warns the Nonconformists against being beguiled by the " Indulgence " into joining the court party, sets in a clear light the fatal results of such a step, and reminds them that under their next sovereign their grievances would in ' 2 Hist. MSS. Comm. House of Lords MSS. 1689–1690, p. 287.

all probability be satisfied by the law. The tract, which has received general and unqualified

admiration, must be classed amongst the few known writings which have actually and immediately altered the course of history. Copies to the number of 20,000 were circulated through the kingdom, and a great party was convinced of the wisdom of remaining faithful to the national traditions and liberties. He took the popular side on the occasion of the trial of the bishops in June 1688, visited them in the Tower, and led the cheers with which the verdict of " not guilty " was received in court; but the same month he refrained from signing the invitation to William, and publicly repudiated any share in the prince's plans. On the contrary he attended the court and refused any credence to the report that the prince born to James was supposititious. After the landing of William he was present at the council called by James on the 27th of November. He urged the king to grant large concessions, but his speech, in contrast to the harsh and overbearing attitude of the Hydes, was " the most tender and obliging . . . that ever was heard." He accepted the mission with Nottingham and Godolphin to treat with William at Hungerford, and succeeded in obtaining moderate terms from the prince. The negotiations, however, were abortive, for James had from the first resolved on flight. In the crisis which ensued, when the country was left without a government, Halifax took the lead. He presided over the council of Lords which assembled and took immediate measures to maintain public order. On the return of James to London on the 16th of November, after his capture at Faversham, Halifax repaired to William's camp and hence- forth attached himself unremittingly to his cause. On the 17th he carried with Lords Delamere and Shrewsbury a message from William to the king advising his departure from London, and, after the king's second flight, directed the proceedings of the executive. On the meeting of the convention on the 22nd of January 1689, he was formally elected speaker of the House of Lords. He voted against the motion for a regency (Jan. 20), which was only defeated by two votes. The moderate and comprehensive character of the settlement at the revolution plainly shows his guiding hand, and it

was finally through his persuasion that the Lords yielded to the Commons and agreed to the compromise whereby William and Mary were declared joint sovereigns. On the 13th of February in the Banqueting House at Whitehall, he tendered tiie crown to them in the name of the nation, and conducted the proclamation of their accession in the city.

At the opening of the new reign he had considerable influence, was made lord privy seal, while Danby his rival was obliged to content himself with the presidency of (,he council, and con- trolled the appointments to the new cabinet which were made on a " trimming " or comprehensive basis. His views on religious toleration were as wide as those of the new king. He championed the claims of the Nonconformists as against the high or rigid' Church party, and he was bitterly disappointed at the miscarriage of the Comprehension Bill. He thoroughly approved also at first of William's foreign policy; but, having excited the hostility of both the Whig and Tory parties, he now became exposed to a series of attacks in parliament which finally drove him from power. He was severely censured, as it seems quite unjustly, for the disorder in Ireland, and an attempt was made to impeach him for his conduct with regard to the sentences on the Whig leaders. The inquiry resulted in his favour; but notwithstand- ing, and in spite of the king's continued support, he determined to retire. He had already resigned the speakership of the House of Lords, and he now (Feb. 8, 1690) quitted his place in the cabinet. He still nominally retained his seat in the privy council, but in parliament he became a bitter critic of the administration; and the rivalry of Halifax (the Black Marquess) with Danby, now marquess of Carmarthen (the White Marquess) threw the former at this time into determined opposition. He disapproved of William's total absorption in European politics, and his open partiality for his countrymen. In January 1691 Halifax had an interview with Henry Bulkeley, the Jacobite agent, and is said to have promised " to do everything that lay

in his power to serve the king." This Was probably merely a measure of precaution, for he had no serious Jacobite leanings. He entered bail for Lord Marlborough, accused wrongfully of complicity in a Jacobite plot in May 1692, and in June, during the absence of the king from England, his name was struck off the privy council.

He spoke in favour of the Triennial Bill (Jan. 12, 1693) which passed the legislature but was vetoed by William, suggested ,a proviso in the Licensing Act, which restricted its operation to anonymous works, approved the Place Bill (1694), but opposed, probably on account of the large sums he had engaged in the traffic of annuities, the establishment of the bank of England in 1694. Early in 1695 he delivered a strong attack on the administration in the House of Lords, and, after a short illness arising from a neglected complaint, he died on the 5th of April at the age of sixty-one. He was buried in Henry VII. 's chapel in Westminster Abbey.

The influence of Halifax, both as orator and as writer, on the public opinion of his day was probably unrivalled. His in- tellectual powers, his high character, his urbanity, vivacity and satirical humour made a great impression on his contemporaries, and many of his witty sayings have been recorded. But the superiority of his statesmanship could not be appreciated till later times. Maintaining throughout his career a complete detachment from party, he never acted permanently or con- tinuously with either of the two great factions, and exasperated both in turn by deserting their cause at the moment when their hopes seemed on the point of realization. To them he appeared weak, inconstant, untrustworthy. They could not see what to us now is plain and clear, that Halifax was as consistent in his principles as the most rabid Whig or Tory. But the principle which chiefly influenced his political action, that of compromise, differed essentially from those of both parties, and his attitude with regard to the Whigs or Tories was thus by necessity con- tinually changing. Measures, too, which in certain circumstances appeared to him

advisable, when the political scene had changed became unwise or dangerous. Thus the regency scheme, which Halifax had supported while Charles still reigned, was opposed by him with perfect consistency at the revolution. He readily accepted for himself the character of a " trimmer," desiring, he said, to keep the boat steady, while others attempted to weigh it down perilously on one side or the other; and he concluded his tract with these assertions: " that our climate is a Trimmer between that part of the world where men are roasted and the other where they are frozen; that our Church is a Trimmer between the frenzy of fanatic visions and the lethargic ignorance of Popish dreams; that our laws are Trimmers between the excesses of unbounded power and the extravagance of liberty not enough restrained; that true virtue hath ever been thought a Trimmer, and to have its dwelling in the middle between two extremes; that even God Almighty Himself is divided between His two great attributes, His Mercy and His Justice. In such company, our Trimmer is not ashamed of his name. . . ." 1

His powerful mind enabled him to regard the various political problems of his time from a height and from a point of view similar to that from which distance from the events enables us to consider them at the present day; and the superiority of his vision appears sufficiently from the fact that his opinions and judgments on the political questions of his time are those which for the most part have ultimately triumphed and found general acceptance. His attitude of mind was curiously modern. 2 Reading, writing and arithmetic, he thinks, should be taught to all and at the expense of the state. His opinions again on the constitutional relations of the colonies to the mother country, already cited, were completely opposed to those of his own period. For that view of his character which while allowing him the merit of a brilliant political theorist denies him the qualities of a man of action and of a practical politician, there is no solid b|.sis. The truth is that while his political ideas are founded upon great moral or philosophical

generalizations, often vividly

1 Character of a Trimmer, conclusion.

2 Saviliana quoted by Foxcroft i. 115.

recalling and sometimes anticipating the broad conceptions of Burke, they are at the same time imbued with precisely those practical qualities which have ever been characteristic of English statesmenship, and were always capable of application to actual conditions. He was no star-gazing philosopher, with thoughts superior to the contemplation of mundane affairs. He had no taste for abstract political dogma. He seems to venture no further than to think that "men should live in some competent state of freedom," and that the limited monarchical and aristocratic government was the best adapted for his country. " Circumstances," he writes in the Rough Draft of a New Model at Sea, " must come in and are to be made a part of the matter of which we are to judge; positive decisions are always dangerous, more especially in politics." Nor was he the mere literary student buried in books and in contemplative ease. He had none of the " indecisiveness which commonly renders literary men of no use in the world " (Sir John Dalrymple) . The incidents of his career show that there was no backwardness or hesitation in acting when occasion required. The constant tendency of his mind towards antithesis and the balancing of opinions did not lead to paralysis in time of action. He did not shrink from responsibility, nor show on any occasion lack of courage. At various times of crisis he proved himself a great leader. He returned to public life to defeat the Exclusion Bill. At the revolution it was Halifax who seized the reins of government, flung away by James, and maintained public security. His subsequent failure in collaborating with William is, it is true, disappointing. But the cause was one that has not perhaps received sufficient attention.

Party government had come to the birth during the struggles over the Exclusion Bill, and there had been unconsciously introduced into politics a novel element of which the nature and importance were not understood or suspected. Halifax had consistently ignored and neglected party; and it now had its revenge. Detested by the Whigs and by the Tories alike, and defended by neither, the favour alone of the king and his own transcendent abilities proved insufficient to withstand the constant and violent attacks made upon him in parliament, and he yielded to the superior force. He seems indeed himself to have been at last convinced of the necessity in English political life of party government, for though in his Cautions to electors he warns them against men " tied to a party," yet in his last words he declares " If there are two parties a man ought to adhere to that which he disliked least though in the whole he doth not approve it; for whilst he doth not list himself in one or the other party, he is looked upon as such a straggler that he is fallen upon by both. . . . Happy those that are convinced so as to be of the general opinions " (Political Thoughts and Reflections of Parties).

The private character of Lord Halifax was in harmony with the greatness of his public career. He was by no means the " voluptuary " described by Macaulay. He was on the contrary free from self-indulgence; his manner of life was decent and frugal, and his dress proverbially simple. He was an affectionate father and husband. " His heart," says Burnet (i. 492-493, ed. 1833), " was much set on raising his family " — his last concern even while on his deathbed was the remarriage of his son Lord Eland to perpetuate his name; and this is probably the cause of his acceptance of so many titles for which he himself affected a philosophical indifference. He was estimable in his social relations and habits. He showed throughout his career an honourable independence, and was never seen to worship the rising sun. In a period when even great men stooped to accept bribes, Halifax was known to be incorruptible; at a time when animosities were

especially bitter, he was too great a man to harbour resentments. " Not only from policy," says Reresby (Mem. p. 231), " (which teaches, that we ought to let no man be our enemy when we can help it), but from his disposition I never saw any man more ready to forgive than himself." Few were insensible to his personal charm and gaiety. He excelled especially in quick repartee, in " exquisite nonsense," and in spontaneous humour. When quite a young man, just entering upon political life he is described by Evelyn as " a witty gentle-

man, if not a little too prompt and daring." The latter cha- racteristic was not moderated by time but remained through life. He was incapable of controlling his spirit of raillery, from jests on Siamese missionaries to sarcasms at the expense of the heir to the throne and ridicule of hereditary monarchy, and his brilliant parodoxes, his pungent and often profane epigrams were received by graver persons as his real opinions and as evidences of atheism. This latter charge he repudiated, assuring Burnet that he was " a Christian in submission," but that he could not digest iron like an ostrich nor swallow all that the divines sought to impose upon the world.

The speeches of Halifax have not been preserved, and his political writings on this account have all the greater value. The Character of a Trimmer (1684 or 1685), the authorship of which, long doubtful, is now established, 1 was his most ambitious production, written seemingly as advice to the king and as a manifesto of his own opinions. In it he discusses the political problems of the time and their solution on broad principles. He supports the Test Act and, while opposing the Indulgence, is not hostile to the repeal of the penal laws against the Roman Catholics by parliament. Turning to foreign affairs he contem- plates with consternation the growing power of France and the humiliation of England, exclaiming indignantly at the sight of the " Roses blasted and discoloured while lilies triumph and grow insolent upon the comparison." The whole is a masterly and comprehensive summary of the actual

political situation and its exigencies; while, when he treats such themes as liberty, or discusses the balance to be maintained between freedom and government in the constitution, he rises to the political idealism of Bolingbroke and Burke. The Character of King Charles II. (printed 1750), to be compared with his earlier sketch of the king in the Character of a Trimmer, is perhaps from the literary point of view the most admirable of his writings. The famous Letter to a Dissenter (1687) was thought by Sir James Mackintosh to be unrivalled as a political pamphlet. The Lady's New Year's Gift: or Advice to a Daughter, refers to his daughter Elizabeth, afterwards wife of the 3rd and mother of the celebrated 4th earl of Chesterfield (1688). In The Anatomy of an Equivalent (1688) he treats with keen wit and power of analysis the proposal to grant a " perpetual edict " in favour of the Established Church in return for the repeal of the test and penal laws. Maxims of State appeared about 1692. The Rough Draft of a New Model at Sea (c. 1694), though apparently only a fragment, is one of the most interesting and characteristic of his writings. It opens with the question: " 'What shall we do to be saved in this world?' There is no other answer but this, ' Look to your moat.' The first article of an Englishman's political creed must be that he believeth in the sea." He discusses the naval establishment, not from the naval point of view alone, but from the general aspect of the constitution of which it is a detail, and is thus led on to consider the nature of the constitution itself, and to show that it is not an artificial structure but a growth and product of the natural character. We may also mention Some Cautions to the electors of the parliament (1694), and Political, Moral and Miscellaneous Thoughts and Reflections (n.d.), a collection of aphorisms in the style of the maxims of La Rochefoucauld, inferior in style — but greatly excelling the French author in breadth of view and in moderation. (For other writings attributed to Halifax, see Foxcroft, Life of Sir G. Savile, ii. 529 sqq.).

Halifax was twice married, first in 1656 to the Lady Dorothy Spencer — daughter of the ist earl of Sunderland and of Dorothy Sidney, ” Sacharissa ” — who died in 1670, leaving a family; and secondly, in 1672, to Gertrude, daughter of William Pierrepont of Thoresby, who survived him, and by whom he had one daughter, Elizabeth, Lady Chesterfield, who seems to have in- herited a considerable portion of her father’s intellectual abilities. On the death of his son William, 2nd marquess of Halifax, in August 1700 without male issue, the peerage became extinct, and the baronetcy passed to the Saviles of Lupset, the whole

‘Foxcroft, ii. 273 et seq., and Hist. MSS. Comm. MSS. of F. W. Leyborne-Popham, p. 264.

male line of the Savile family ending in the person of Sir George Savile, 8th baronet, in 1784. Henry Savile, British envoy at Versailles, who died unmarried in 1687, was a younger brother of the first marquess. Halifax has been generally supposed to have been the father of the illegitimate Henry Carey, the poet,

but this is doubtful.

See Life and Letters of Sir George Savile, 1st Marquis of Halifax (2 vols., 1898), by Miss H. C. Foxcroft, who has collected and made excellent use of all the material available at that date, including hitherto unexplored Savile MSS., at Devonshire House, in the Spencer Archives, in the Longleat and other collections, and who has edited the works of Halifax and printed a memorandum of conversations with King William of 1688-1690, left in MS. by Halifax. Macaulay, in his History of England, misjudged Halifax on some points, but nevertheless understood and did justice to the greatness of his statesmanship, and pronounced on him a well-merited and eloquent eulogy (iv. 545).

Contemporary characters of Halifax which must be accepted with caution are Burnet's in the History of His Own Times (ed. 1833, vol. i. pp. 491-493, and iv. 268), that by the author of " Savilianal," identified as William Mompesson, and " Sacellum Apollinare," a panegyric in verse by Elkanah Settle (1695). (P- C Y.)

HALIFAX, a city and port of entry, capital of the province of Nova Scotia, Canada. It is situated in 44° 59' N. and 63 35' W., on the south-east coast of the province, on a fortified hill, 225 ft. in height, which slopes down to the waters of Chebucto Bay, now known as Halifax Harbour. The harbour, which is open all the year, is about 6 m. long by 1 m. in width, and has excellent anchorage in all parts; to the north a narrow passage connects it with Bedford Basin, 6 m. in length by 4 m., and deep enough for the largest men-of-war. At the harbour mouth lies McNab's Island, thus forming two entrances; the eastern passage is only employed by small vessels, though in 1862 the Confederate cruiser, " Tallahassee," slipped through by night, and escaped the northern vessels which were watching off the western entrance. The population in 1901 was 40,832.

The town was originally built of wood, plastered or stuccoed, but though the wooden houses largely remain, the public buildings are of stone. Inferior in natural strength to Quebec alone, the city and its approaches have been fortified till it has become the strongest position in Canada, and one of the strongest in the British Empire. Till 1906 it was garrisoned by British troops, but in that year, with Esquimalt, on the Pacific coast, it was taken over by the Canadian government, an operation necessitat- ing a large increase in the Canadian permanent military force. At the same time, the royal dockyard, containing a dry-dock 610 ft. in length, and the residences in connexion, were also taken over for the use of the department of marine and fisheries. Till 1905 Halifax was the summer station of the British North American squadron. In that year, in consequence of a redis- tribution of

the fleet, the permanent North American squadron was withdrawn; but Halifax is still visited periodically by powerful squadrons of cruisers.

Though, owing to the growth of Sydney and other outports, it no longer monopolizes the foreign trade of the province, Halifax is still a thriving town, and has the largest export trade of the Dominion in fish and fish products, the export of fish alone, in 1904, amounting to over three-fifths that of the entire Dominion. Lumber (chiefly spruce deals) and agricultural pro- ducts (especially apples) are also exported in large quantities. The chief imports are manufactures from Great Britain and the United States, and sugar, molasses, rum and fruit from the West Indies. Its industrial establishments include foundries, sugar refineries, manufactures of furniture and other articles of wood, a skate factory and rope and cordage works, the produce of which are all exported. It is the Atlantic terminus of the Intercolonial, Canadian Pacific and several provincial railways, and the chief winter port of Canada, numerous steamship lines connecting it with Great Britain, Europe, the West Indies and the' United States. The public gardens, covering 14 acres, and Point Pleasant Park, left to a great extent in its natural state, are extremely beautiful. Behind the city is an arm of the sea (known as the North- West Arm) , 5 m. in length and 1 m. in breadth, with high, well-wooded shores, and covered in summer with canoes and sailing craft. The educational institutions mclude

a ladies' college, several convents, a Presbyterian theological college and Dalhousie University, with faculties of arts, law, medicine and science. Established by charter in 1818 by the earl of Dalhousie, then lieutenant governor, and reorganized in 1863, it has since become much the most important seat of learning in the maritime provinces. Other prominent buildings are Government House, the provincial parliament and library, and the Roman Catholic cathedral. St Paul's church (Anglican) dates from 1750, and though not striking architecturally, is interesting from the memorial

tablets and the graves of celebrated Nova Scotians which it contains. The city is the seat of the Anglican bishop of Nova Scotia and Prince Edward Island, and of the Roman Catholic bishop of Halifax.

Founded in 1749 by the Flon. Edward Cornwallis as a rival to the French town of Louisburg in Cape Breton, it was named after the 2nd earl of Halifax, president of the board of trade and plantations. In the following year it superseded Annapolis as capital of the province. Its privateers played a prominent part in the war of 1812-15 with the United States, and during the American Civil War it was a favourite base of operations for Confederate blockade-runners. The federation of the North American provinces in 1867 lessened its relative importance, but its merchants have gradually adapted themselves to the altered conditions.

HALIFAX, a municipal, county and parliamentary borough in the West Riding of Yorkshire, England, 194 m. N.N.W r . from London and 7 m. S.W. from Bradford, on the Great Northern and the Lancashire & Yorkshire railways. Pop. (1891), 97,714; (1901) 104,936. It lies in a bare hilly district on and above the small river Hebble near its junction with the Calder. Its appear- ance is in the main modern, though a few picturesque old houses remain. The North Bridge, a fine iron structure, spans the valley, giving connexion between the opposite higher parts of the town. The principal public building is the town hall, completed in 1863 after the designs of Sir Charles Barry; it is a handsome Palladian building with a tower. Of churches the most noteworthy is that of St John the Baptist, the parish church, a Perpendicular building with lofty western tower. Two earlier churches are traceable on this side, the first perhaps pre-Norman, the second of the Early English period. The old woodwork is fine, part being Perpendicular, but the greater portion dates from 1621. All Souls' church was built in 1859 from the designs of Sir Gilbert Scott, of whose work it is a good example, at the expense of Mr Edward Akroyd. The style is early Decorated, and a rich ornamentation is carried out in Italian

marble, serpentine and alabaster. A graceful tower and spire 236 ft. high rise at the north-west angle. The Square chapel, erected by the Congregationalists in 1857, is a striking cruciform building with a tower and elaborate crocketed spire. Both the central library and museum and the Akroyd museum and art gallery occupy buildings which were formerly residences, the one of Sir Francis Crossley (1817-1872) and the other of Mr Edward Akroyd. Among charitable institutions the principal is the handsome royal infirmary, a Renaissance building. The Heath grammar school was founded in 1585 under royal charter for instruction in classical languages. It possesses close scholarships at Oxford and Cambridge universities. The Waterhouse charity school occupies a handsome set of buildings forming three sides of a quadrangle, erected in 1855. The Crossley almshouses were erected and endowed by Sir Francis and Mr Joseph Crossley, who also endowed the Crossley orphan home and school. Technical schools are maintained by the corporation. Among other public buildings may be noted the Piece-Hall, erected in 1799 for the lodgment and sale of piece goods, now used as a market, a great quadrangular structure occupying more than two acres; the bonding warehouse, court-house, and mechanics' institute. There are six parks, of which the People's Park of 125 acres, presented by Sir Francis Crossley in 1858, is laid out in ornate style from designs by Sir Joseph Paxton.

Halifax ranks with Leeds, Bradford and Huddersfield as a seat of the woollen and worsted manufacture. The manufacture of carpets is a large industry, one establishment employing some

5000 hands. The worsted, woollen and cotton industries, and the iron, steel and machinery manufactures are very ex- tensive. There are collieries and freestone quarries in the neighbourhood.

The parliamentary borough returns two members. The county borough was created in 1888. The municipal borough is under a mayor, 15 aldermen and 45 councillors. Area, 13,967 acres.

At the time of the Conquest Halifax formed part of the extensive manor of Wakefield, which belonged to the king, but in the 13th century was in the hands of John, earl Warrenne (e. 1 245–1305). The prosperity of the town began with the introduction of the cloth trade in the 1 5th century, when there are said to have been only thirteen houses, which before the end of the 16th century had increased to 520. Camden, about the end of the 17th century, wrote that " the people are very in- dustrious, so that though the soil about it be barren and improfit- able, not fit to live on, they have so flourished … by the clothing trade that they are very rich and have gained a reputa- tion for it above their neighbours." The trade is said to have been increased by the arrival of certain merchants driven from the Netherlands by the persecution of the duke of Alva. Among the curious customs of Halifax was the Gibbet Law, which was probably established by a prescriptive right to protect the wool trade, and gave the inhabitants the power of executing any one taken within their liberty, who, when tried by a jury of sixteen of the frith- burgesses, was found guilty of the theft of any goods of the value of more than 13d. The executions took place on market days on a hill outside the town, the gibbet somewhat resembling a guillotine. The first execution recorded under this law took place in 1541, and the right was exercised in Halifax longer than in any other town, the last execution taking place in 1650. In 1635 the king granted the inhabitants of Halifax licence to found a workhouse in a large house given to them for that purpose by Nathaniel Waterhouse, and incorporated them under the name of the master and governors. Nathaniel Water- house was appointed the first master, his successors being elected every year by the twelve governors from among themselves. Halifax was a borough by prescription, its privileges

growing up with the increased prosperity brought by the cloth trade, but it was not incorporated until 1848. Since the Reform Act of 1832 the burgesses have returned two members to parliament. In 1607 David Waterhouse, lord of the manor of Halifax, obtained a grant of two markets there every week on Friday and Saturday and two fairs every year, each lasting three days, one beginning on the 24th of June, the other on the nth of November. Later these fairs and markets were confirmed with the addition of an extra market on Thursday to Sir William Ayloffe, baronet, who had succeeded David Waterhouse as lord of the manor. The market rights were sold to the Markets Company in 1810 and purchased from them by the corporation in 1853.

During the Civil War Halifax was garrisoned by parliament, and a field near it is still called the Bloody Field on account of an engagement which took place there between the forces of parliament and the Royalists.

See Victoria County History, " Yorkshire " ; T. Wright, The Antiquities of the Town of Halifax (Leeds, 1738); John Watson, The History and Antiquities of the Parish of Halifax (London, 1775) ; John Crabtree, A Concise History of the Parish and Vicarage of Halifax (Halifax and London, 1836).

HALI$AH (Hebrew, ^rhi! "untying"), the ceremony by which a Jewish widow releases her brother-in-law from the obligation to marry her in accordance with Deuteronomy xxv. 5-10, and obtains her own freedom to remarry. By the law of Moses it became obligatory upon the brother of a man dying childless to take his widow as wife. If he refused, " then shall his brother's wife come unto him in the presence of the elders and loose his shoe from off his foot, and spit in his face, and shall answer and say, So shall it be done unto that man that will not build up his brother's house." By Rabbinical law the ceremony was later made more complex. The parties appear

before a court of three elders with two assessors. The place is usually the synagogue house, or that of

the Rabbi, sometimes that of the widow. After inquiry as to the relationship of the parties and their status (for if either be a minor or deformed, halisah cannot take place), the shoe is produced. It is usually the property of the community and made entirely of leather from the skin of a ” clean ” animal. It is of two pieces, the upper part and the sole, sewn together with leathern threads. It has three small straps in front, and two white straps to bind it on the leg. After it is strapped on, the man must walk four cubits in the presence of the court. The widow then loosens and removes the shoe, throwing it some distance, and spits on the ground, repeating thrice the Biblical formula ” So shall it be done,” &c. Halisah, which is still common among orthodox Jews, must not take place on the Sabbath, a holiday, or the eve of either,! or in the evening. To prevent brothers-in-law from extorting money from a widow as a price for releasing her from perpetual widowhood, Jewish law obliges all brothers at the time of a marriage to sign a document pledging themselves to submit to halisah without payment. (Compare Levirate).

HALKETT, HUGH, Freiherr von (1783-1863), British soldier and general of infantry in the Hanoverian service, was the second son of Major-General F. G. Halkett, who had served many years in the army, and whose ancestors had for several generations distinguished themselves in foreign services. With the ” Scotch Brigade ” which his father had been largely instru- mental in raising, Hugh Halkett served in India from 1798 to 1 801 . In 1803 his elder brother Colin was appointed to command a battalion of the newly formed King’s German Legion, and in this he became senior captain and then major. Under his brother’s command he served with Cathcart’s expeditions to Hanover, Riigen and Copenhagen, where his bold initiative on outpost duty won commendation. He was in the Peninsula in 1808-1809, and at Walcheren. At Albuera, Salamanca, &c, he commanded the 2nd Light Infantry Battalion, K.G.L., in suc- cession to his brother, and at Venta del Pozo in the Burgos retreat he greatly

distinguished himself. In 1813 he left the Peninsula and was subsequently employed in the organization of the new Hanoverian army. He led a brigade of these troops in Count Wallmoden's army, and bore a marked part in the battle of Gohrde and the action of Schestedt, where he took with his own hand a Danish standard. In the Waterloo campaign he commanded two brigades of Hanoverian militia which were sent to the front with the regulars, and during the fight with the Old Guard captured General Cambronne. After the fall of Napoleon he elected to stay in the Hanoverian service, though he retained his half-pay lieutenant-colonelcy in the English army. He rose to be general and inspector-general of infantry. In his old age he led the Xth Federal Army Corps in the Danish War of 1848, and defeated the Danes at Oversee. He had the G.C.H., the C.B. and many foreign orders, including the Prussian order of the Black Eagle and pour le Me'rite and the Russian St Anne.

See Knesebeck. Leben des Freiherrn Hugh von Halkett (Stuttgart,

1865).

His brother, Sir Colin Halkett (1774-1856), British soldier, began his military career in the Dutch Guards and served in various " companies " for three years, leaving as a captain in 1795. From 1800 to the peace of Amiens he served with the Dutch troops in English pay in Guernsey. In August 1803 Halkett was one of the first officers assigned to the service of raising the King's German Legion, and he became major, and later lieutenant-colonel, commanding the 2nd Light Infantry Battalion. His battalion was employed in the various expedi- tions mentioned above, from Hanover to Walcheren, and in 181 1 Colin Halkett succeeded Charles Alten in the command of the Light Brigade, K.G.L., which he held throughout the Peninsula War from Albuera to Toulouse. In 1 81 5 Major-General Sir Colin Halkett commanded the 5th British Brigade of Alten's division, and at Waterloo he received four wounds. Unlike his brother, he remained in the British

service, in which he rose to general. At the time of his death he was governor of Chelsea

hospital. He had honorary general's rank in the Hanoverian service, the G.C.B. and G.C.H., as well as numerous foreign orders.

For information about both the Halketts, see Beamish, History of the King's German Legion (1832).

HALL, BASIL (1788-1844), British naval officer, traveller and miscellaneous writer, was born at Edinburgh on the 31st of December 1788. His father was Sir James Hall of Dunglass, the geologist. Basil Hall was educated at the High School, Edinburgh, and in 1802 entered the navy, where he rose to the rank of post- captain in 1817, after seeing active service in several fields. By observing the ethnological as well as the physical peculiarities of the countries he visited, he collected the materials for a very large number of scientific papers. In 1816 he commanded the sloop " Lyra," which accompanied Lord Amherst's embassy to China; and he described his cruise in An Account of a Voyage of Discovery to the West Coast of Corea and the Great Loo-choo Island in the japan Sea (London, 1 8 1 8) . In 1 8 20 he held a command on the Pacific coast of America, and in 1824 published two volumes of Extracts from a Journal written on the Coasts of Chili, Peru and Mexico in the Years 1820-21-22. Retiring on half-pay in 1824, Hall in 1825 married Margaret, daughter of Sir John Hunter, and in her company travelled (1827-1828) through the United States. In 1829 he published his Travels in North America in the Years 1827 and 1828., which was assailed by the American press for its views of American society. Schloss Hainfeld, or a Winter in Lower Styria (1836), is partly a romance, partly a description of a visit paid by the author to the castle of the countess Purg- stall. Spain and the Seat of War in Spain appeared in 1837. The Fragments

of Voyages and Travels (9 vols.) were issued in three detachments, between 183 1 and 1840. Captain Hall was a fellow of the Royal Societies of London and Edinburgh, and of the Royal Astronomical, Royal Geographical and Geological Societies. His last work, a collection of sketches and tales under the name of Patchwork (1841) ,. had not been long published before its author became insane, and he died in Haslar hospital, Ports- mouth, on the nth of September 1844.

HALL, CARL CHRISTIAN (1812-1888), Danish statesman, son of the highly respected artisan and train-band colonel Mads Hall, was born at Christianshavn on the 25th of February 181 2. After a distinguished career at school and college, he adopted the law as his profession, and in 1837 married the highly gifted but eccentric Augusta Marie, daughter of the philologist Peter Oluf Brondsted. A natural conservatism indisposed Hall at first to take any part in the popular movement of 1848, to which almost all his friends had already adhered ; but the moment he was con- vinced of the inevitability of popular government, he resolutely and sympathetically followed in the new paths. Sent to the Rigsforsamling of 1848 as member for the first district of Copen- hagen, a constituency he continued to represent in the Folketing till 1 88 1, he. immediately took his place in the front rank of Danish politicians. From the first he displayed rare ability as a debater, his inspiring and yet amiable personality attracted hosts of admirers, while his extraordinary tact and temper disarmed opposition and enabled him to mediate between extremes without ever sacrificing principles.

Hall was not altogether satisfied with the fundamental law of June; but he considered it expedient to make the best use possible of the existing constitution and to unite the best con- servative elements of the nation in its defence. The aloofness and sulkiness of the aristocrats and landed proprietors he deeply deplored. Failing to rally them to the good cause he determined anyhow to organize the great cultivated middle class into a

•political party. Hence the "June Union," whose programme was progress and reform in the spirit of the constitution, ; and at the same time opposition to the one-sided democratism ,and party-tyranny of the Bondevenner or peasant party. The " Union " exercised an essential influence on the elections of 1852, and was, in fact, the beginning of the national Liberal party, which found its natural leader in Hall. During the years 1852-1854 the burning question of the day was the connexion between the various parts of the monarchy. Hall was " eider-

dansk " by conviction. He saw in the closest possible union between the kingdom and a Schleswig freed from all risk of German interference the essential condition for Denmark's independence; but he did not think that Denmark was strong enough to carry such a policy through unsupported, and he was therefore inclined to promote it by diplomatic means and international combinations, and strongly opposed to the Con- ventions of 1851-1852 (See Denmark: History), though he was among the first, subsequently, to accept them as an established fact and the future basis for Denmark's policy.

Hall first took office in the Bang administration (12th of December 1854) as minister of public worship. In May 1857 he became president of the council after Andrae, Bang's suc- cessor, had retired, and in July 1858 he exchanged the ministry of public worship for the ministry of foreign affairs, while still retaining the premiership.

Hall's programme, " den Konstitutionelle Helstat," i.e. a single state with a common constitution, was difficult enough in a monarchy which included two nationalities, one of which, to a great extent, belonged to a foreign and hostile jurisdiction. But as this political monstrosity had already been guaranteed by the Conventions of 1851-1852, Hall could not rid himself of it, and the attempt to establish this " Helstat " was made accordingly by the Constitution of the 13th of November 1863. The failure of the attempt and its disastrous

consequences for Denmark are described elsewhere. Here it need only be said that Hall himself soon became aware of the impossibility of the " Helstat," and his whole policy aimed at making its absurdity patent to Europe, and substituting for it a constitutional Den- mark to the Eider which would be in a position to come to terms with an independent Holstein. That this was the best thing possible for Denmark is absolutely indisputable, and " the diplomatic Seven Years' War " which Hall in the meantime conducted with all the powers interested in the question is the most striking proof of his superior statesmanship. Hall knew that in the last resort the question must be decided not by the pen but by the sword. But he relied, ultimately, on the pro- tection of the powers which had guaranteed the integrity of Denmark by the treaty of London, and if words have any meaning at all he had the right to expect at the very least the armed support of Great Britain. 1 But the great German powers and the force of circumstances proved too strong for him. On the accession of the new king, Christian IX., Hall resigned rather than repeal the November Constitution, which gave Denmark something to negotiate upon in case of need. But he made matters as easy as he could for his successors in the Monrad administration, and the ultimate catastrophe need not have been as serious as it was had his advice, frankly given, been intelligently followed.

After 1864 Hall bore more than his fair share of the odium and condemnation which weighed so heavily upon the national Liberal party, making no attempt to repudiate responsibility and refraining altogether from attacking patently unscrupulous opponents. But his personal popularity suffered not the slightest diminution, while his clear, almost intuitive, outlook and his unconquerable faith in the future of his country made him, during those difficult years, a factor of incalculable importance in the public life of Denmark. In 1870 he joined the Holstein-Holsteinborg ministry as minister of public worship, and in that capacity passed many useful educational reforms, but on the fall of the administration, in

1873, he retired altogether from public life. In the summer of 1879 Hall was struck down by apoplexy, and for the remaining nine years of his life he was practically bedridden. He died on the 14th of August 1888. In politics Hall was a practical, sagacious " opportunist," in the best sense of that much abused word, with an eye rather for things than for persons. Moreover, he had no very pronounced political ambition, and was an utter stranger to that longing for power, which drives so many men of talent to adopt extreme expedients. His urbanity and perfect

1 On this head see the 3rd marquess of Salisbury's Political Essays, reprinted from the Quarterly Review.

equilibrium at the very outset incited sympathy, while his wit and humour made him the centre of every circle within which he moved.

See Vilhelm Christian Sigurd Topsoe, Polit. Portraetstudier (Copen- hagen, 1878); Scholler Parelius Vilhelm Birkedal, Personlige Ople- velser (Copenhagen, 1890-1891). (R. N. B.)

HALL, CHARLES FRANCIS (1821-1871), American Arctic explorer, was born at Rochester, New Hampshire. After following the trade of blacksmith he became a journalist in Cincinnati; but his enthusiasm for Arctic exploration led him in 1859 to volunteer to the American Geographical Society to " go in search for the bones of Franklin." With the proceeds of a public subscription he was equipped for his expedition and sailed in May i860 on board a whaling vessel. The whaler being ice-bound, Hall took up his abode in the regions to the north of Hudson Bay, where he found relics of Frobisher's 16th-century voyages, and living with the Eskimo for two years he acquired a considerable knowledge of their habits and lan- guage. He published an account of these

experiences under the title of Arctic Researches, and Life among the Esquimaux (1864). Determined, however, to learn more about the fate of the Franklin expedition he returned to the same regions in 1864, and passing five years among the Eskimo was successful in obtaining a number of Franklin relics, as well as information pointing to the exact fate of 76 of the crew, whilst also performing some geographical work of interest. In 1871 he was given command of the North Polar expedition fitted out by the United States Government in the " Polaris." Making a remarkably rapid passage up Smith Sound at the head of Baffin Bay, which was found to be ice-free, the " Polaris " reached on the 30th of August the lat. of 82° n', at that time, and until the English expedition of 1876 the highest northern latitude attained by vessel. The expedition went into winter quarters in a sheltered cove on the Greenland coast. . On the 24th of October, Hail on his return from a successful sledge expedition to the north was suddenly seized by an illness of which he died on the 8th of November. Capt. S. O. Buddington (1823-1888) assumed command, and although the " Polaris " was subsequently lost after breaking out of the ice, with only part of the crew aboard, the whole were ultimately rescued, and the scientific results of the expedition proved to be of considerable importance.

HALL, CHRISTOPHER NEWMAN (1816-1902), English Nonconformist divine, was born at Maidstone on the 22nd of May 1816. His father was John Vine Hall, proprietor and printer of the Maidstone Journal, and the author of a popular evangelical work called The Sinner's Friend. Christopher was educated at University College, London, and took the London B.A. degree. His theological training was gained at Highbury College, whence he was called in 1842 to his first pastorate at the Albion Congregational Church, Hull. During the twelve years of his ministry there the membership was greatly increased, and a branch chapel and school were opened. At Hull Newman Hall first began his active work in temperance reform, and in defence of his position

wrote The Scriptural Claims of Teetotalism. In 1854 he accepted a call to Surrey chapel, London, founded in 1783 by the Rev. Rowland Hill. A considerable sum had been bequeathed by Hill for the perpetuation of his work on the expiration of the lease; but, owing to some legal flaw in the will, the money was not available, and Newman Hall undertook to raise the necessary funds for a new church. By weekly offertories and donations the money for the beautiful building called Christ Church at the junction of the Kennington and Westminster Bridge Roads was collected, and within four years of opening (1876) the total cost (£63,000) was cleared. In 1892 Newman Hall resigned his charge and devoted himself to general evangelical work. Most of his writings are small booklets or tracts of a distinctly evangelical character. The best known of these is Come to Jesus, of which over four million copies have been circulated in forty different languages. Newman Hall visited the United States during the Civil War, and did much to promote a friendly understanding between England and America. A Liberal in politics, and a keen admirer of John

Bright, few preachers of any denomination have exercised so far-reaching an influence as the " Dissenters' Bishop," as he came to be termed. He died on the 18th of February 1902.

See his Autobiography (1898); obituary notice in The Congrega- tional Year Book for 1903.

HALL, EDWARD (c. 1498-1547), English chronicler and lawyer, was born about the end of the 15th century, being a son of John Hall of Northall, Shropshire. Educated at Eton and King's College, Cambridge, he became a barrister and after- wards filled the offices of common sergeant of the city of London and judge of the sheriff's court. He was also member of parlia- ment for Bridgnorth. Hall's great work, The Union of the Noble and Illustre Famelies of Lancastre and York, commonly called Hall's Chronicle, was first published in 1542. Another edition was issued by Richard Grafton in 1548, the year after Hall's death, and another in 1550; these

include a continuation from 1532 compiled by Grafton from the author's notes. In 1809 an edition was published under the supervision of Sir Henry Ellis, and in 1904 the part dealing with the reign of Henry VIII. was edited by C. Whibley. The Chronicle begins with the accession of Henry IV. to the English throne in 1399; it follows the strife between the houses of Lancaster and York, and with Grafton's continuation carries the story down to the death of Henry VIII. in 1547. Hall presents the policy of this king in a very favourable light and shows his own sympathy with the Protestants. For all kinds of ceremonial he has all a lawyer's respect, and his pages are often adorned and encumbered with the pageantry and material garniture of the story. The value of the Chronicle in its early stages is not great, but this increases when dealing with the reign of Henry VII. and is very consider- able for the reign of Henry VIII. Moreover, the work is not only valuable, it is attractive. To the historian it furnishes what is evidently the' testimony of an eye-witness on several matters of importance which are neglected by other narrators; and to the student of literature it has the exceptional interest of being one of the prime sources of Shakespeare's historical plays.

See J. Gairdner, Early Chroniclers of Europe; England (1879).

HALL, FITZEDWARD (1825-1901), American Orientalist, was born in Troy, New York, on the 21st of March 1825. He graduated with the degree of civil engineer from the Rensselaer Polytechnic Institute at Troy in 1842, and entered Harvard in the class of 1846; just before his class graduated he left college and went to India in search of a runaway brother. In January 1850 he was appointed tutor, and in 1853 professor of Sanskrit and English, in the government college at Benares; and in 1855 was made inspector of public instruction in Ajmere-Merwara and in 1856 in the Central Provinces. He settled in England in 1862 and received the appointment to the chair of Sanskrit, Hindustani and Indian jurisprudence in King's College, London, and to the librarianship of the

India Office. He died at Maries- ford, Suffolk, on the 1st of February 1901. Hall was the first American to edit a Sanskrit text, the Vishnupurana; his library of a thousand Oriental MSS. he gave to Harvard University.

His works include: in Sanskrit, Atmabodha (1852), Sankhya- pravachana (1856), Saryasiddhanta (1859), Vdsavadattu (1859), Sankhyasara (1862) and Dasarupa (1865); in Hindi, Ballantynes' Hindi Grammar (1868) and a Reader (1870); on English philology, Recent. Exemplifications of False Philology (1872), attacking Richard Grant White, Modern English (1873), " On English Adjectives in -able, with Special Reference to Reliable " {Am. Jour. Philology, 1877), Doctor Indoctus (1880).

HALL, ISAAC HOLLISTER (1837-1896), American Orientalist, was born in Norwalk, Connecticut, on the 12th of December 1837. He graduated at Hamilton College in 1859, was a tutor there in 1859-1863, graduated at the Columbia Law School in 1865, practised law in New York City until 1875, and in 1875- 1877 taught in the Syrian Protestant College at Beirut, where he discovered a valuable Syriac manuscript of the Philoxenian version of a large part of the New Testament, which he published in part in facsimile in 1884. He worked with General di Cesnola in classifying the famous Cypriote collection in the Metropolitan Museum of New York City, and was a curator of that museum from 1885 until his death in Mount Vernon, New York, on the

2nd of July 1896. He was an eminent authority on Oriental inscriptions. Following the scanty clues given by George Smith and Samuel Birch, and working on the data furnished by the di Cesnola collection, he succeeded about 1874 in decipher- ing an entire Cypriote inscription, and in establishing the

Hellenic character of the dialect and the syllabic nature of the script.

His work in Cypriote epigraphy is described in his articles in Scribner's Magazine, vol. 20 (June, 1880), pp. 205–211 and in the Journal of the American Oriental Society, vol. 10, No. 2 (1880), pp. 201–218. He published in facsimile the Antilegomena epistles (1886), which he deciphered from the W. F. Williams manuscript, and edited A Critical Bibliography of the Greek New Testament as Published in America (1884).

HALL, SIR JAMES (1 761–183 2), Scottish geologist and physicist, eldest son of Sir John Hall, Bart., was born at Dun- glass on the 17th of January 1761; and became distinguished as the first to establish experimental research as an aid to geo- logical investigation. He was intimately acquainted with James Hutton and John Playfair, and having studied rocks in various parts of Europe he was eventually led to accept and to demon- strate the truth of Hutton's views with regard to intrusive rocks. He commenced a series of experiments to illustrate the fusion of rocks, their vitreous and crystalline characters, and the influence of molten rocks in altering adjacent strata. He thus assisted in proving that granitic veins had been injected into overlying deposits after their consolidation. He studied the volcanic rocks in Italy and recognized that the old lava flows and the numerous dikes in Scotland must have had a similar origin. He made further experiments to illustrate the contortions of rocks. The results were brought before the Royal Society of Edinburgh. He died at Edinburgh on the 23 rd of June 1832. He represented in parliament (1807–1812) the old borough of Michael in Corn- wall; he also wrote an Essay on the Origin, History and Principles of Gothic Architecture (1813).

His eldest son, John Hall (1787–1860), who succeeded him, was a Fellow of the Royal Society; the second son, Captain Basil Hall (q.v.), was the distinguished traveller; the third son, James Hall (1800–1854), was a painter, art-patron, and a friend

of Sir David Wilkie.

HALL, JAMES (1793–1868), American judge and man of letters, was born at Philadelphia on the 19th of August 1793. After for some time prosecuting the study of law, he in 181 2 joined the army, and in the war with Great Britain distinguished himself in engagements at Lundy's Lane, Niagara and Fort Erie. On the conclusion of the war he accompanied an expedition against Algiers, but in 1818 he resigned his commission, and continued the study of law at Pittsburg. In 1820 he removed to Shawnee- town, Illinois, where he commenced practice at the bar and also edited the Illinois Gazette. Soon after he was appointed public prosecutor of the circuit, and in 1824 state circuit judge. In 1827 he became state treasurer, and held that office till 1 831, but he continued at the same time his legal practice and also edited the Illinois Intelligencer. Subsequently he became editor of the Western Souvenir, an annual publication, and of the Illinois Monthly Magazine, afterwards the Western Monthly Magazine. He died near Cincinnati on the 5th of July 1868.

The following are his principal works: — Letters from the West, originally contributed to the Portfolio, and collected and published in London in 1828; Legends of the West (1832); The Soldier's Bride and other Tales (1832); The Harpe's Head, a Legend of Kentucky (1833); Sketches of the West (2 vols., 1835); Tales of the Border ('835); Notes on the Western States (1838); History of the Indian Tribes, in conjunction with T. L. M'Keeney (3 vols., 1838–1844); The Wilderness and the War-Path (1845); Romance of Western History (1857).

HALL, JAMES (1811–1898), American geologist and palaeon- tologist, was born at Hingham, Massachusetts, on the 12th of September 181 1. In early life he became attached to the study of natural history, and he completed his education at the poly- technic institute at Troy in New York, where he graduated in 1832, and afterwards became professor of chemistry and natural science, and subsequently of geology. In 1836 he was appointed

one of the geologists on the Geological Survey of the state of

New York, and he was before long charged with the palaeonto- logical work. Eventually he became state geologist and director of the museum of natural history at Albany. His published papers date from 1836, and include numerous reports on the geology and palaeontology of various portions of the United States and Canada. He dealt likewise with physical geology, and in 1859 discussed the connexion between the accumulation of sedimentary deposits and the elevation of mountain-chains. His chief work was the description of the invertebrate fossils of New York — in which he dealt with the graptolites, brachio- pods, mollusca, trilobites, echini and crinoids of the Palaeozoic formations. The results were published in a series of quarto volumes entitled Palaeontology of New York (1847-1894), in which he was assisted in course of time by R. P. Whitfield and J. M. Clarke. He published also reports on the geology of Oregon and California (1845), Utah (1852), Iowa (1859) and Wisconsin (1862). He received the Wollaston medal from the Geological Society of London in 1858. He was a man of great energy and untiring industry, and in 1897, when in his eighty-sixth year, he journeyed to St Petersburg to take part in the International Geological Congress, and then joined the excursion to the Ural mountains. He died at Albany on the 7th of August 1898.

See Life and Work of James Hall, by H. C. Hovey, Amer. Geol. xxiii., 1899, p. 137 (portraits).

HALL, JOSEPH (1574-1656), English bishop and satirist, was born at Bristow park, near Ashby de la Zouch, Leicester- shire, on the 1st of July 1574. His father, John Hall, was agent in the town for Henry, earl of Huntingdon, and his mother, Winifred Bambridge, was a pious lady, whom her son compared to St Monica. Joseph Hall received his early education at the local school, and was sent (1589) to Emmanuel College, Cam- bridge. Hall was chosen for two years in succession to read the public

lecture on rhetoric in the schools, and in 1595 became fellow of his college. During his residence at Cambridge he wrote his Virgidemiarum (1597), satires written after Latin models. The claim he put forward in the prologue to be the earliest English satirist : —

" I first adventure, follow me who list And be the second English satirist " —

gave bitter offence to John Marston, who attacks him in the satires published in 1598. The archbishop of Canterbury gave an order (1599) that Hall's satires should be burnt with works of John Marston, Marlowe, Sir John Davies and others on the ground of licentiousness, but shortly afterwards Hall's book, certainly unjustly condemned, was ordered to be " staied at the press," which may be interpreted as reprieved (see Notes and Queries, 3rd series, xii. 436). Having taken holy orders, Hall was offered the mastership of Blundell's school, Tiverton, but he refused it in favour of the living of Halsted, Essex, to which he was presented (1601) by Sir Robert Drury. In his parish he had an opponent in a Mr Lilly, whom he describes as " a witty and bold atheist." In 1603 he married; and in 1605 he accompanied Sir Edmund Bacon to Spa, with the special aim, he says, of acquainting himself with the state and practice of the Romish Church. At Brussels he disputed at the Jesuit College on the authentic character of modern miracles, and his inquiring and argumentative disposition more than once threatened to produce serious results, so that his patron at length requested him to abstain from further discussion. His devotional writings had attracted the notice of Henry, prince of Wales, who made him one of his chaplains (1608). In 1612 Lord Denny, afterwards earl of Norwich, gave him the curacy of Waltham-Holy-Cross, Essex, and in the same year he received the degree of D.D. Later he received the prebend of Willenhall in the collegiate church of Wolverhampton, and in 1616 he accompanied James Hay, Lord Doncaster, afterwards earl of Carlisle, to France, where he was sent to congratulate Louis XIII. on his marriage, but Hall

was compelled by illness to return. In his absence the king nominated him dean of Worcester, and in 1 61 7 he accompanied James to Scotland, where he defended the five points of ceremonial which the king desired to impose upon the Scots. In the next year he was one of the English

deputies at the synod of Dort. In 1624 he refused the see of Gloucester, but in 1627 became bishop of Exeter.

He took an active part in the Arminian and Calvinist contro- versy in the English church. He did his best in his Via media, The Way of Peace, to persuade the two parties to accept a com- promise. In spite of his Calvinistic opinions he maintained that to acknowledge the errors which had arisen in the Catholic Church did not necessarily imply disbelief in her catholicity, and that the Church of England having repudiated these errors should not deny the claims of the Roman Catholic Church on that account. This view commended itself to Charles I. and his episcopal advisers, but at the same time Archbishop Laud sent spies into Hall's diocese to report on the Calvinistic tend- encies of the bishop and his lenience to the Puritan and low- church clergy. Hall says he was thrice down on his knees to the King to answer Laud's accusations and at length threatened to " cast up his rochet " rather than submit to them. He was, however, amenable to criticism, and his defence of the English Church, entitled Episcopacy by Divine Right (1640), was twice revised at Laud's dictation. This was followed by An Humble Remonstrance to the High Court of Parliament (1640 and 1641), an eloquent and forceful defence of his order, which produced a retort from the syndicate of Puritan divines, who wrote under the name of " Smectymnuus," and was followed by a long controversy to which Milton contributed five pamphlets, virulently attacking Hall and his early satires.

In 1641 Hall was translated to the see of Norwich, and in the same year sat on the Lords' Committee on religion. On the 30th of December he was, with other bishops, brought before the bar of the House of Lords to answer a charge of high treason of which the Commons had voted them guilty. They were finally convicted of an offence against the Statute of Praemunire, and condemned to forfeit their estates, receiving a small main- tenance from the parliament. They were immured in the Tower from New Year to Whitsuntide, when they were released on finding bail for £5000 each. On his release Hall proceeded to his new diocese at Norwich, the revenues of which he seems for a time to have received, but in 1643, when the property of the " malignants " was sequestrated, Hall was mentioned by name. Mrs Hall had difficulty in securing a fifth of the maintenance (£400) assigned to the bishop by the parliament; they were eventually ejected from the palace, and the cathedral was dismantled. Hall retired to the village of Higham, near Norwich, where he spent the time preaching and writing until " he was first forbidden by man, and at last disabled by God." He bore his many troubles and the additional burden of much bodily suffering with sweetness and patience, dying on the 8th of September 1656. Thomas Fuller says: " He was commonly called our English Seneca, for the purenesse, plainnesse, and fulnesse of his style. Not unhappy at Controversies, more happy at Comments, very good in his Characters, better in his Sermons, best of all in his Meditations."

Bishop Hall's polemical writings, although vigorous and effective, were chiefly of ephemeral interest, but many of his devotional writings have been often reprinted. It is by his early work as the censor of morals and the unsparing critic of contemporary literary extravagance and affectations that he is best known. Virgi- demiarum. Sixe Bookes. First three Bookes. Of Toothlesse Satyrs. (1) Poeticall, (2) Academicall, (3) Morall (1597) was followed by an amended edition in 1598, and in the same year by Virgidemiarum. The three last bookes. Of byting Satyres (reprinted 1599). His claim to be reckoned

the earliest English satirist, even in the formal sense, cannot be justified. Thomas Lodge, in his Fig for Momus (1593), had written four satires in the manner of Horace, and John Marston and John Donne both wrote satires about the same time, although the publication was in both cases later than that of Virgidemiae. But if he was not the earliest, Hall was certainly one of the best. He writes in the heroic couplet, which he manoeuvres with great ease and smoothness. In the first book of his satires (Poeticall) he attacks the writers whose verses were devoted to licentious subjects, the bombast of Tamburlaine and tragedies built on similar lines, the laments of the ghosts of the Mirror for Magistrates, the metrical eccentricities of Gabriel Harvey and Richard Stanyhurst, the extravagances of the sonneteers, and the sacred poets (Southwell is aimed at in " Now good St Peter weeps pure Helicon, And both the Mary's make a music moan "). In Book II. Satire 6 occurs the well-

known description of the trencher-chaplain, who is tutor and hanger- on in a country manor. Among his other satirical portraits is that of the famished gallant, the guest of " Duke Humfray." 1 Book VI. consists of one long satire on the various vices and follies dealt with in the earlier books. If his prose is sometimes antithetical and obscure, his verse is remarkably free from the quips and conceits which mar so much contemporary poetry.

He also wrote The King's Prophecie; or Weeping Joy (1603), a gratulatory poem on the accession of James I. ; Epistles, both the first and second volumes of which appeared in 1608 and a third in 161 1 ; Characters of Virtues and Vices (1608), versified by Nahum Tate (1691); Solomons Divine Arts . . . (1609); and, probably Mundus alter et idem sive Terra Australis antehac semper incognita

. . . lustrata (1605? and 1607), by " Mercurius Britannicus," translated into English by John Healy (1608) as The Discovery of a New World or A Description of the South Indies . . . by an English Mercury. Mundus alter is an excuse for a satirical

descrip- tion of London, with some criticism of the Romish church, its manners and customs, and is said to have furnished Swift with hints for Gulliver's Travels. It was not ascribed to him by name until 1674, when Thomas Hyde, the librarian of the Bodleian, identified " Mercurius Britannicus " with Joseph Hall. For the question of the authorship of this pamphlet, and the arguments that may be advanced in favour of the suggestion that it was written by Alberico Gentili, see E. A. Petherick, Mundus alter et idem, reprinted from the Gentleman's Magazine (July 1896). His controversial writings, not already mentioned, include: — A Common Apology . . . against the Brownists (1610), in answer to John Robinson's Censorious Epistle; The Olde Religion: A treatise, wherein is laid downe the true state of the difference betwixt the Reformed and the Romane Church; and the blame of this schisme is cast upon the true Authors … (1628) ; Columba Noae olivam adferens . . ., a sermon preached at St Paul's in 1623; Episcopacie by Divine Right (1640); A Short Answer to the Vindication of Smectymnuus (1641) ; A Modest Confutation of . . . (Milton's) Animadversions (1642).

His devotional works include : — Holy Observations Lib. I. Some few of David's Psalmes Metaphrased (1607 and 1609) ; three centuries of Meditations and Vowes, Divine and Morall (1606, 1607, 1609), edited by Charles Sayle (1901); The Arte of Divine Meditation (r607); Heaven upon Earth, or of True Peace and Tranquillitie of Mind (1606), reprinted with some of his letters in John Wesley's Christian Library, j vol. iv. (1819); Occasional Meditations . . . (1630), edited by his son Robert Hall ; Henochisme; or a Treatise showing how to walk with God (1639), translated from Bishop Hall's Latin by Moses Wall ; The Devout Soul; or Rules of Heavenly Devotion (1644), often since reprinted; The Balm of Gilead . . . (1646, 1752); Christ Mysticall; or the blessed union of Christ and his Members (1647), of which General Gordon was a student (reprinted from Gordon's copy, 1893) I Susurrium cum Deo (1659) ; The Great Mysterie of Godliness (1650) ; Resolutions

and Decisions of Divers Practicall cases of Conscience

(1649, 1650, 1654).

Authorities. — The chief authority for Hall's biography is to be found in his autobiographical tracts : Observations of some Specialities of Divine Providence in the Life of Joseph Hall, Bishop of Norwich, Written with his own hand ; and his Hard Measure, a reprint of which may be consulted in Dr Christopher Wordsworth's Ecclesiastical Biography. The best criticism of his satires is to be found in Thomas Warton's History of English Poetry, vol. iv. pp. 363-409 (ed. Hazlitt,

1871), where a comparison is instituted between Marston and Hall. In 161 5 Hall published A Recollection of such treatises as have been

. . . published . . . (1615, 1617, 1621); in 1625 appeared his Works

(reprinted 1627, 1628, 1634, 1662). The first complete Works ap-

E eared in 1808, edited by the Rev. Josiah Pratt. Other editions are y Peter Hall (1837) and by Philip Wynter (1863). See also Bishop Hall, his Life and Times (1826), by Rev. John Jones; Life of Joseph Hall, by Rev. George Lewis (1886) ; A. B. Grosart, The Complete Poems of Joseph Hall… with introductions, &c. (1879); Satires, &c. (Early English Poets, ed. S. W. Singer, 1824). Many of Hall's works were translated into French, and some into Dutch, and there have been numerous selections from his devotional works.

HALL, MARSHALL (1790-1857), English physiologist, was born on the 18th of February 1790, at Basford, near Nottingham, where his father, Robert Hall, was a cotton manufacturer. Having attended the Rev. J. Blanchard's academy at Notting- ham, he entered a chemist's shop at Newark, and in 1809 began to study medicine at Edinburgh University. In 181 1 he was

elected senior president of the Royal Medical Society; the following year he took the M.D. degree, and was immediately appointed resident house physician to the Royal Infirmary, Edinburgh. This appointment he resigned after two years, when he visited Paris and its medical schools, and, on a walking

>The tomb of Sir John Beauchamp (d. 1358) in old St Paul's was commonly known, in error, as that of Duke Humphrey of Glou- cester. " To dine with Duke Humphrey " was to go hungry among the debtors and beggars who frequented " Duke Humphrey's Walk " in the cathedral.

tour, those also of Berlin and Gottingen. In 181 7, when he settled at Nottingham, he published his Diagnosis, and in 1818 he wrote the Mimoses, a work on the affections denominated bilious, nervous, &c. The next year he was elected a fellow of the Royal Society of Edinburgh, and in 1825 he became physician to the Nottingham general hospital. In 1826 he removed to London, and in the following year he published his Commentaries on the more important diseases of females. In 1830 he issued his Observations on Blood-letting, founded on researches on the morbid and curative effects of loss of blood, which were acknow- ledged by the medical profession to be of vast practical value, and in 1831 his Experimental Essay on the Circulation of the Blood in the Capillary Vessels, in which he showed that the blood-channels intermediate between arteries and veins serve the office of bringing the fluid blood into contact with the material tissues, of the system. In the following year he read before the Royal Society a paper "On the inverse ratio which subsists between Respiration and Irritability in the Animal Kingdom." His most important work in physiology was concerned with the theory of reflex action, embodied in a paper " On the reflex Function of the Medulla Oblongata and the Medulla Spinalis "

(1 83 2), which wa's supplemented in 1 83 7 by another " On the True Spinal Marrow, and the Excito-motor System of Nerves." The " reflex function " excited great attention on the continent of Europe, though in England some of his papers were refused publication by the Royal Society. Hall thus became the authority on the multiform deranged states of health referable to an abnormal condition of the nervous system, and he gained a large practice. His " ready method " for resuscitation in drowning and other forms of suspended respiration has been the means of saving innumerable lives. He died at Brighton of a throat affection, aggravated by lecturing, on the nth of August

i857-

A list of his works and details of his " ready method," &c, are given in his Memoirs by his widow (London, 1861).

HALL, ROBERT (1764-1831), English Baptist divine, was born on the 2nd of May 1764, at Arnesby near Leicester, where his father, Robert Hall (1728-1791), a man whose cast of mind in some respects resembled closely that of the son, was pastor of a Baptist congregation. Robert was the youngest of a family of fourteen. While still at the dame's school his passion for books absorbed the greater part of his time, and in the summer it was his custom after school hours to retire to the churchyard with a volume, which he continued to peruse there till nightfall, making out the meaning of the more difficult words with the help of a pocket dictionary. From his sixth to his eleventh year he attended the school of Mr Simmons at Wigston, a village four miles from Arnesby. There his precocity assumed the exceptional form of an intense interest in metaphysics, partly perhaps on account of the restricted character of his father's library; and before he was nine years of age he had read and re-read Jonathan Edwards's Treatise on the Will and Butler's Analogy. This incessant study at such an early period of life seems, however, to have had an injurious influence on his health. After he

left Mr Simmons's school his appearance was so sickly as to awaken fears of the presence of phthisis. In order, therefore, to obtain the benefit of a change of air, he stayed for some time in the house of a gentleman near Kettering, who with an impro- priety which Hall himself afterwards referred to as "egregious," prevailed upon the boy of eleven to give occasional addresses at prayer meetings. As his health seemed rapidly to recover, he was sent to a school at Northampton conducted by the Rev. John Ryland, where he remained a year and a half, and " made great progress in Latin and Greek." On leaving school he for some time studied divinity under the direction of his father, and in October 1778 he entered the Bristol academy for the pre- paration of students for the Baptist ministry. Here the self-possession which had enabled him in his twelfth year to address unfalteringly various audiences of grown-up people seems to have strangely forsaken him; for when, in accordance with the arrangements of the academy, his turn came to deliver an address in the vestry of Broadmead chapel, he broke down on

two separate occasions and was unable to finish his discourse. On the 13 th of August 1780 he was set apart to the ministry, but he still continued his studies at the academy; and in 1781, in accordance with the provisions of an exhibition which he held, he entered King's College, Aberdeen, where he took the degree of master of arts in March 1 785. At the university he was without a rival of his own standing in any of the classes, dis- tinguishing himself alike in classics, philosophy and mathematics. He there formed the acquaintance of Mackintosh (afterwards Sir James), who, though a year his junior in age; was a year his senior as a student. While they remained at Aberdeen the two were inseparable, reading together the best Greek authors, especially Plato, and discussing, either during their walks by the sea-shore and the banks of the Don or in their rooms until early morning, the most perplexed questions in philosophy and religion.

During the vacation between his last two sessions at Aberdeen, Hall acted as assistant pastor to Dr Evans

at Broadmead chapel, Bristol, and three months after leaving the university he was appointed classical tutor in the Bristol academy, an office which he held for more than five years. Even at this period his extra- ordinary eloquence had excited an interest beyond the bounds of the denomination to which he belonged, and when he preached the chapel was generally crowded to excess, the audience includ- ing many persons of intellectual tastes. Suspicions in regard to his orthodoxy having in 1789 led to a misunderstanding with his colleague and a part of the congregation, he in July 1790 accepted an invitation to make trial of a congregation at Cam- bridge, of which he became pastor in July of the following year. From a statement of his opinions contained in a letter to the congregation which he left, it would appear that, while a firm believer in the proper divinity of Christ, he had at this time disowned the cardinal principles of Calvinism — the federal headship of Adam, and the doctrine of absolute election and reprobation; and that he was so far a materialist as to " hold that man's thinking powers and faculties are the result of a certain organization of matter, and that after death he ceases ,to be conscious till the resurrection." It was during his Cam- bridge ministry, which extended over a period of fifteen years, that his oratory was most brilliant and mSst immediately power- ful. At Cambridge the intellectual character of a large part of the audience supplied a stimulus which was wanting at Leicester and Bristol.

His first published compositions had a political origin. In 1791 appeared Christianity consistent with the Love of Freedom, in which he defended the political conduct of dissenters against the attacks of the Rev. John Clayton, minister of Weighhouse, and gave eloquent expression to his hopes of great political and social ameliorations as destined to result nearly or remotely from the subversion of old ideas and institutions in the maelstrom of the French Revolution. In 1793 he expounded his political sentiments in a powerful and more extended pamphlet entitled an Apology for the Freedom of the

Press. On account, however, of certain asperities into which the warmth of his feelings had betrayed him, and his conviction that he had treated his subject in too superficial a manner, he refused to permit the publication of the pamphlet beyond the third edition, until the references of political opponents and the circulation of copies without his sanction induced him in 1821 to prepare a new edition, from which he omitted the attack on Bishop Horsley, and to which he prefixed an advertisement stating that his political opinions had undergone no substantial change. His other publications while at Cambridge were three sermons — On Modern Infidelity (1801), Reflections on War (1802), and Sentiments proper to the present Crisis (1803). He began, however, to suffer from mental derangement in November 1804. He recovered so speedily that he was able to resume his duties in April 1805, but a recur- rence of the malady rendered it advisable for him on his second recovery to resign his pastoral office in March 1806.

On leaving Cambridge he paid a visit to his relatives in Leicestershire, and then for some time resided at Enderby, preaching occasionally in some of the neighbouring villages.

Latterly he ministered to a small congregation in Harvey Lane, Leicester, from whom at the close of 1806 he accepted a call to be their stated pastor. In the autumn of 1807 he changed his residence from Enderby to Leicester, and in 1808 he married the servant of a brother minister. His proposal of marriage had been made after an almost momentary acquaintance, and, according to the traditionary account, in very abrupt and peculiar terms; but, judging from his subsequent domestic life, his choice did sufficient credit to his penetration and sagacity. His writings at Leicester embraced various tracts printed for private circulation; a number of contributions to the Eclectic Review, among which

may be mentioned his articles on " Foster's Essays " and on " Zeal without Innovation "; several sermons, including those On the Advantages of Knowledge to the Lower Classes (1810), On the Death of the Princess Charlotte (181 7), and On the Death of Dr Ryland (1825); and his pamphlet on Terms of Communion, in which he advocated intercommunion with all those who acknowledged the " essentials " of Christianity. In 1819 he published an edition in one volume of his sermons formerly printed. On the death of Dr Ryland, Hall was invited to return to the pastorate of Broadmead chapel, Bristol, and as the peace of the congregation at Leicester had been to some degree disturbed by a controversy regarding several cases of discipline, he resolved to accept the invitation, and removed there in April 1826. The malady of renal calculus had for many years rendered his life an almost continual martyrdom, and henceforth increasing infirmities and sufferings afflicted him. Gradually the inability to take proper exercise, by inducing a plethoric habit of body and impeding the circulation, led to a diseased condition of the heart, which resulted in his death on the 21st of February 1831. He is remembered as a great pulpit orator, of a somewhat laboured, rhetorical style in his written works, but of undeniable vigour in his spoken sermons.

See Works of Robert Hall, A.M., with a Brief Memoir of his Life, by Olinthus Gregory, LL.D., and Observations on his Character as Preacher by John Foster, originally published in 6 vols. (London, 1832) ; Reminiscences of the Rev. Robert Hall, A.M., by John Greene, (London, 1832); Biographical Recollections of the Rev. Robert Hall, by J. W. Morris (1848); Fifty Sermons of Robert Hall from Notes, taken at the time of their Delivery, by the Rev. Thomas Grinfield, M.A. (1843); Reminiscences of College Life in Bristol during the Ministry of the Rev. Robert Hall, A.M., by Frederick Trestrail (1879).

HALL, SAMUEL CARTER (1800–1880), English journalist, was born at Waterford on the 9th of May 1800, the son of an army officer. In 1821 he went to London,

and in 1823 became a parliamentary reporter. From 1826 to 1837 he was editor of a great number and variety of public prints, and in 1839 he founded and edited The Art Journal. His exposure of the trade in bogus " Old Masters " earned for this publication a consider- able reputation. Hall resigned the editorship in 1880, and was granted a Civil List pension " for his long and valuable services to literature and art." He died in London on the 16th of March 1889. His wife, Anna Maria Fielding (1800-1881), became well known as Mrs S. C. Hall, for her numerous novels, sketches of Irish life, and plays. Two of the last, The Groves of Blarney and The French Refugee, were produced in London with success. She also wrote a number of children's books, and was practically interested in various London charities, several of which she helped to found.

HALL, WILLIAM EDWARD (1835-1894), English writer on international law, was the only child of William Hall, M.D., a descendant of a junior branch of the Halls of Dunglass, and of Charlotte, daughter of William Cotton, F.S.A. He was born on the 22nd of August 1835, at Leatherhead, Surrey, but passed his childhood abroad, Dr Hall having acted as physician to the king of Hanover, and subsequently to the British legation at , Naples. Hence, perhaps, the son's taste in after life for art and modern languages. He was educated privately till, at the early age of seventeen, he matriculated at Oxford, where in 1856 he took his degree with a first class in the then recently instituted school of law and history, gaining, three years afterwards, the chancellor's prize for an essay upon " the effect upon Spain of the discovery of the precious metals in America." In 1861 he was

called to the bar at Lincoln's Inn, but devoted his time less to any serious attempt to obtain practice than to the study of Italian art, and to travelling over a great part of Europe, always bringing home admirable water-colour drawings of buildings and scenery. He was an early and enthusiastic member of the Alpine Club, making several first ascents,

notably that of the Lyskamm. He was always much interested in military matters, and was under fire, on the Danish side, in the war of 1864. In 1867 he published a pamphlet entitled " A Plan for the Reorganization of the Army," and, many years afterwards, he saw as much as he was permitted to see of the expedition sent for the rescue of Gordon. He would undoubtedly have made his mark in the army, but in later life his ideal, which he realized, with much success, first at Llanfihangel in Monmouthshire, and then at Coker Court in Somersetshire, was, as has been said, " the English country gentleman, with cosmopolitan experiences, encyclopaedic knowledge, and artistic feeling." His travels took him to Lapland, Egypt, South America and India. He had done good work for several government offices, in 1871 as inspector of returns under the Elementary Education Act, in 1877 by reports to the Board of Trade upon Oyster Fisheries, in France as well as in England ; and all the time was amassing materials for ambitious undertakings upon the history of civilization, and of the colonies. His title to lasting remembrance rests, however, upon his labours in the realm of international law, recognized by his election as. associe in 1875, and as membre in 1882, of the Institut de Droit International. In 1874 he published a thin 8vo upon the Rights and Duties of Neutrals, and followed it up in 1880 by his magnum opiti, the Treatise on International Law, unquestionably the best book upon the subject in the English language. It is well planned, free from the rhetorical vagueness which has been the besetting vice of older books of a similar character, full of information, and everywhere bearing traces of the sound judgment and statesmanlike views of its author. In 1894 Hall published a useful monograph upon a little-explored topic, " the Foreign Jurisdictions of the British Crown," but on the 30th of November of the same year, while apparently in the fullest enjoyment of bodily as well as mental vigour, he suddenly died. He married, in 1866, Imogen, daughter of Mr (afterwards Mr Justice) Grove, who died in 1886; and in 1891, Alice,

daughter of Colonel Hill of Court Hill, Shropshire, but left no issue.

See T. E. Holland in Law Quarterly Review, vo. xi. p. 113; and in Studies in International Law, p. 302. (T. E. H.)

HALL, or Bad-Hall, a market-place and spa of Austria, in Upper Austria, 25 m. S. of Linz by rail. Pop. (1900) 984. It is renowned for its saline springs, strongly impregnated with iodine and bromine, which are considered very efficacious in scrofulous affections and venereal skin diseases. Although the springs are known since the 8th century, Hall attained its actual importance only since 1855, when the springs became the property of the government. The number of visitors in 1901 was 4300.

HALL (generally known as Schwabisch-Hall, tc distinguish it from the small town of Hall in Tirol and Bad-Hall, a health resort in Upper Austria), a town of Germany, in the kingdom of Wiirttemberg, situated in a deep valley on both sides of the Kocher; and on the railway from Heilbronn to Krailsheim, 35 m. N.E. of Stuttgart. Pop. (1905) 9400. It possesses four Evangelical churches (of which the Michaeliskirche dates from the 15th century and has fine medieval carving), a Roman Catholic church, a handsome town hall and classical and modern schools. A short distance south from the town is the royal castle of Komburg, formerly a Benedictine abbey and now used as a garrison for invalid soldiers, with a church dating from the 1 2th century. The town is chiefly known for its production of salt, which is converted into brine and piped from Wilhelmsgluck mine, 5 m. distant. Connected with the salt-works there is a salt-bath and whey-diet establishment. The industries of the town also include cotton-spinning, iron founding, tanning, and the manufacture of soap, starch, brushes, machines, carriages and metal ware.

Hall was early of importance on account of its salt-mines, which were held as a fief of the Empire by the so-called Salzgrafen (Salt-graves), of whom the earliest known, the counts of West- heim, had their seat in the castle of Hall. Later the town belonged to the Knights Templars. It was made a free imperial city in 1276 by Rudolph of Habsburg. In 1802 it came into the possession of Wiirttemberg.

HALL (O.E. heall, a common Teutonic word, cf. Ger. Halle), a term which has two significations in England and is applied sometimes to the manor house, the residence of the lord of the manor, which implied a territorial possession, but more often to the entrance hall of a mansion. In the latter case it was the one large room in the feudal castle up to the middle of the 15th century, when it served as audience chamber, dining-room, and dormitory. The hall was generally a parallelogram on plan, with a raised dais at the farther end, a large bow window on one side, and in one or two cases on both sides. At the entrance end was a passage, which was separated from the hall by a partition screen often elaborately decorated, and over which was provided a minstrels' gallery; on the opposite side of the passage were the hatches communicating with the serveries. This arrangement is still found in some of the colleges at Oxford and Cambridge, such as those of New College, Christchurch, Wadham and Magdalen, Oxford, and in Trinity College, Cambridge. In private mansions, however, the kitchen and offices have been removed to a greater distance, and the great hall is only used for banquets. Among the more remarkable examples are the halls of Audley End; Hatfield; Brougham Castle; Hard wick; Knole Stanway in Gloucestershire; Wollaton, where it is situated in the centre of the mansion and lighted by clerestory windows; Burton Agnes in Yorkshire; Canons Ashley, North- amptonshire; West wood Park, Worcestershire; Fountains, Yorkshire; Sydenham House, Devonshire; Cobham, Kent; Montacute, Somersetshire; Bolsover Castle, Derbyshire (vaulted and with two columns in the centre of the hall to

carry the vault); Longford Castle, Wiltshire; Barlborough, Derbyshire; Rushton Hall, Northamptonshire, with a bow window at each end of the dais and a third bow window at the other end; Knole, Kent ; and at Mayfield, Sussex (with stone arches across to carry the roof), now converted into a Roman Catholic chapel. Many of these halls have hammer-beam roofs, the most remark- able of which is found in the Middle Temple Hall, London, where both the tie and collar beams have hammer-beams. Of other halls, Westminster is the largest, being 238 ft. long; followed by the Banqueting Hall, Whitehall, no ft; Wolsey's Hall, Hampton Court, 106 ft; the Egyptian Hall at the Mansion House; the hall at Lambeth, now the library; Crosby Hall; Gray's Inn Hall; the Guildhall; Charterhouse; and the following halls of the London City Companies — Clothworkers, Brewers, Goldsmiths, Fishmongers. The term hall is also given to the following English mansions: — Haddon, Hardwick, Apethorpe, Aston, Blickling, Brereton, Burton Agnes, Cobham, Dingley, Rushton, Kirby, Litford and Wollaton; and it was the name of some of the earlier colleges at Oxford and Cambridge, most of which have now been absorbed in other colleges, so that there remain only St Edmund's Hall, Oxford, and Trinity Hall, Cambridge.

HALLAM, HENRY (1777-1859), English historian, was the only son of John Hallam, canon of Windsor and dean of Bristol, and was born on the 9th of July 1777. He was educated at Eton and Christ Church, Oxford, where he graduated in 1 799. Called to the bar, he practised for some years on the Oxford circuit; but his tastes were literary, and when, on the death of his father in 181 2, he inherited a small estate in Lincolnshire, he gave himself up wholly to the studies of his life. He had early becorrte connected with the brilliant band of authors and politicians who then led the Whig party, a connexion to which he owed his appointment to the well-paid and easy post of commissioner of stamps; but in practical politics, for which he was by nature unsuited, he took no active share. But he was an active sup- porter of many popular movements —

particularly of that which ended in the abolition of the slave trade; and he was throughout

his entire life sincerely and profoundly attached to the political principles of the Whigs, both in their popular and in their aristocratic aspect.

Hallam's earliest literary work was undertaken in connexion with the great organ of the Whig party, the Edinburgh Review, where his review of Scott's Dryden attracted much notice. His first great work, The View of the State of Europe during the Middle Ages, was produced in 1818, and was followed nine years later by the Constitutional History of England. In 1838-1839 appeared the Introduction to the Literature of Europe, in the 15th, 16th and jyth Centuries. These are the three works on which the fame of Hallam rests. They at once took a place in English literature which has never been seriously challenged. A volume of supplemental notes to his Middle Ages was published in 1848. These facts and dates represent nearly all the events of Hallam's career. The strongest personal interest in his life was the affliction which befell him in the loss of his children, one after another. His eldest son, Arthur Henry Hallam, — the " A.H.H." of Tennyson's In Memoriam, and by the testimony of his con-temporaries a man of the most brilliant promise, — died in 1833 at the age of twenty-two. Seventeen years later, his second son, Henry Fitzmaurice Hallam, was cut off like his brother at the very threshold of what might have been a great career. The premature death and high talents of these young men, and the association of one of them with the most popular poem of the age, have made Hallam's family afflictions better known than any other incidents of his life. He survived wife, daughter and sons by many years. In 1834 Hallam published The Remains in Prose and Verse of Arthur Henry Hallam, with a Sketch of his Life. In 1852 a selection of Literary Essays and Characters from the Literature of Europe was published. Hallam was a fellow of the Royal Society, and a trustee of the British Museum, and enjoyed many other appropriate distinctions. In 1830 he received the gold medal for history, founded

by George IV. He died on the 21st of January 1859.

The Middle Ages is described by Hallam himself as a series of historical dissertations, a comprehensive survey of the chief circumstances that can interest a philosophical inquirer during the period from the 5th to the 15th century. The work consists of nine long chapters, each of which is a complete treatise in itself. The history of France, of Italy, of Spain, of Germany, and of the Greek and Saracenic empires, sketched in rapid and general terms, is the subject of five separate chapters. Others deal with the great institutional features of medieval society — the development of the feudal system, of the ecclesiastical system, and of the free political system of England. The last chapter sketches the general state of society, the growth of commerce, manners, and literature in the middle ages. The book may be regarded as a general view of early modern history, preparatory to the more detailed treatment of special lines of inquiry carried out in his subsequent works, although Hallam's original intention was to continue the work on the scale on which it had been begun.

The Constitutional History of England takes up the subject at the point at which it had been dropped in the View of the Middle Ages, viz. the accession of Henry VII., 1 and carries it down to the accession of George III. Hallam stopped here for a characteristic reason, which it is impossible not to respect and to regret. He was unwilling to excite the prejudices of modern politics which seemed to him to run back through the whole period of the reign of George III. As a matter of fact they ran back much farther, as Hallam soon found. The sensitive impartiality which withheld him from touching perhaps the most interesting period in the history of the constitution did not save him from the charge of partisanship. The Quarterly Review for 1828 contains an article on the Constitutional History, written by Southey, full of railing and reproach. The work, he says, is the " production of a decided partisan," who " rakes in the ashes of long-forgotten and a thousand times buried slanders,

1 Lord Brougham, overlooking the constitutional chapter in the Middle Ages, censured Hallam for making an arbitrary beginning at this point, and proposed to write a more complete history himself.

for the means of heaping obloquy on all who supported the established institutions of the country." No accusation made by a critic ever fell so wide' of the mark. Absolute justice is the standard which Hallam set himself and maintained. His view of constitutional history was that it should contain only so much of the political and general history of the time as bears directly on specific changes in the organization of the state, including therein judicial as well as ecclesiastical institutions. But while abstaining from irrelevant historical discussions, Hallam dealt with statesmen and policies with the calm and fearless impartiality of a judge. It was his cool treatment of such sanctified names as Charles, Cranmer and Laud that provoked the indignation of Southey and the Quarterly, who forgot that the same impartial measure was extended to statesmen on the other side. If Hallam can ever be said to have deviated from perfect fairness, it was in the tacit assumption that the 19th-century theory of the constitution was the right theory in previous centuries, and that those who departed from it on one side or the other were in the wrong. He did unconsciously antedate the constitution, and it is clear from incidental allusions in his last work that he did not regard with favour the democratic changes which he thought to be impending. Hallam, like Macaulay, ultimately referred all political questions to the standard of Whig con- stitutionalism. But though his work is thus, like that of many historians, coloured by his opinions, this was not the outcome of a conscious purpose, and he was scrupulously conscientious in collecting and weighing his materials. In this he was helped by his legal training, and it was doubtless this fact which made the Constitutional

History one of the text-books of English politics, to which men of all parties appealed, and which, in spite of all the work of later writers, still leaves it a standard authority.

Like the Constitutional History, the Introduction to the Literature of Europe continues one of the branches of inquiry which had been opened in the View of the Middle Ages. In the first chapter of the Literature, which is to a great extent supplementary to the last chapter of the Middle Ages, Hallam sketches the state of literature in Europe down to the end of the 14th century: the extinction of ancient learning which followed the fall of the Roman empire and the rise of Christianity; the preservation of the Latin language in the services of the church; and the slow revival of letters, which began to show itself soon after the 7th century — " the nadir of the human mind " — had been passed. For the first century and a half of his special period he is mainly occupied with a review of classical learning, and he adopts the plan of taking short decennial periods and noticing the most remarkable works which they produced. The rapid growth of literature in the 16th century compels him to resort to a classifica- tion of subjects. Thus in the period 1520-1550 we have separate chapters on ancient literature, theology, speculative philosophy and jurisprudence, the literature of taste, and scientific and miscellaneous literature; and the subdivisions of subjects is carried further of course in the later periods. Thus poetry, the drama and polite literature form the subjects of separate chapters. One inconvenient result of this arrangement is that the same author is scattered over many chapters, according as his works fall within this category or that period of time. Names like Shakespeare, Grotius, Bacon, Hobbes appear in half a dozen different places. The individuality of great authors is thus dissipated except when it has been preserved by an occasional sacrifice of the arrangement — and this defect, if it is to be esteemed a defect, is increased by the very sparing references to personal history and character with

wh.ich Hallam was obliged to content himself. His plan excluded biographical history, nor is the work, he tells us, to be regarded as one of reference. It is rigidly an account of the books which would make a complete library of the period, ^arranged according to the date of their publication and the nature of their subjects. The history of institutions like universities and academies, and that of great popular movements like the Reformation, are of course

1 Technical subjects like painting or English law have been ex- cluded by Hallam, and history and theology only partially treated.

noticed in their immediate connexion with literary results; but Hallam had little taste for the spacious generalization which such subjects suggest. The great qualities displayed in this work have been universally acknowledged — conscientiousness, accuracy, judgment and enormous reading. Not the least striking testimony to Hallam's powers is his mastery over so many diverse forms of intellectual activity. In science and theology, mathematics and poetry, metaphysics and law, he is a competent and always a fair if not a profound critic. The bent of his own mind is manifest in his treatment of pure literature and of political speculation — which seems to be inspired with stronger personal interest and a higher sense of power than other parts of his work display. Not less worthy of notice in a literary history is the good sense by which both his learning and his tastes have been held in control. Probably no writer ever possessed a juster view of the relative importance of men and things. The labour devoted to an investigation is with Hallam no excuse for dwelling on the result , unless that is in itself important. He turns away contemptuously from the mere curiosities of literature, and is never tempted to make a display of trivial erudition. Nor do we find that his interest in special studies leads him to assign them a disproportionate place in his general view of the literature of a period.

; Hallam is generally described as a " philosophical historian." The description is justified not so much by any philosophical quality in his method as by the nature of his subject and his own temper. Hallam is a philosopher to this extent that both in political and in literary history he fixed his attention on results rather than on persons. His conception of history embraced the whole movement of society. Beside that conception the issue of battles and the fate of kings fall into comparative insignificance. " We can trace the pedigree of princes," he reflects, " fill up the catalogue of towns besieged and provinces desolated, describe even the whole pageantry of coronations and festivals, but we cannot recover the genuine history of mankind." But, on the other hand, there is no trace in Hallam of anything like a philosophy of history or society. Wise and generally melancholy reflections on human nature and political society are not infrequent in his writings, and they arise naturally and incidentally out of the subject he is discussing. His object is the attainment of truth in matters of fact. Sweeping theories of the movement of society, and broad characterizations of particular periods of history seem to have no attraction for him. The view of mankind on which such generalizations are usually based, taking little account of individual character, was highly distasteful to him. Thus he objects to the use of statistics because they favour that tendency to regard all men as mentally and morally equal which is so unhappily strong in modern times. At the same time Hallam by no means assumes the tone of the mere scholar. He is even solicitous to show that his point of view is that of the cultivated gentleman and not of the specialist of any order. Thus he tells us that Montaigne is the first French author whom an English gentleman is ashamed not to have read. In fact, allusions to the necessary studies of a gentleman meet us constantly, reminding us of the unlikely erudition of the schoolboy in Macaulay. Hallam's prejudices, so far as he had any, belong to the same character. His criticism is apt to assume a tone of moral censure when he has to deal with certain extremes of human

thought — scepticism in philosophy, atheism in religion and democracy in politics.

Hallam's style is singularly uniform throughout all his writings. It is sincere and straightforward, and obviously innocent of any motive beyond that of clearly expressing the writer's meaning. In the Literature of Europe there are many passages of great imaginative beauty. (E. R.)

HALLAM, ROBERT (d. 141 7), bishop of Salisbury and English representative at the council of Constance, was educated at Oxford, and was chancellor of the university from 1403 to 1405. In the latter year the pope nominated him to be arch- bishop of York, but the king objected. However, in 1407 he was consecrated by Gregory XII. at Siena as bishop of Salis- bury. At the council of Pisa in r409 he was one of the English

representatives. On the 6th of June 1411 Pope John XXIII. made Hallam a cardinal, but there was some irregularity, and his title was not recognized. At the council of Constance (g.v .) , which met in November 1414, Hallam was the chief English envoy. There he at once took a prominent position, as an advocate of the cause of Church reform, and of the superiority of the council to the pope. In the discussions which led up to the deposition of John XXIII. on the 29th of May 1415 he had a leading share. With the trials of John Hus and Jerome of Prague he had less concern. The emperor Sigismund, through whose influence the council had been assembled, was absent during the whole of 14 16 on a diplomatic mission in France and England; but when he returned to Constance in January 141 7, as the open ally of the English king, Hallam as Henry's trusted representative obtained increased importance. Hallam contrived skilfully to emphasize English prestige by delivering the address of welcome to Sigismund on his formal reception.

Afterwards, under his master's direction, he gave the emperor vigorous support in the endeavour to secure a reform of the Church, before the council proceeded to the election of a new pope. This matter was still undecided when Hallam died suddenly, on the 4th of September 1417. After his death the direction of the English nation fell into less skilful hands, with the result that the cardinals were able to secure the immediate election of a new pope (Martin V., elected on the 1 ith of November): It has been supposed that the abandonment of the reformers by the English was due entirely to Hallam's death; but it is more likely that Henry V., foreseeing the possible need for a change of front, had given Hallam discretionary powers which the bishop's successors used with too little judgment. Hallam himself, who had the confidence of Sigismund and was generally respected for his straightforward independence, might have achieved a better result. Hallam was buried in the cathedral at Constance, where his tomb near the high altar is marked by a brass of English workmanship.

For the acts of the council of Constance see H. von der Hardt's Concilium Constantiense, and H. Finke's Acta concilii Constanciensis . For a modern account seeMandell Creighton's History of the Papacy (6 vols., London, 1897). (C. L. K.)

HALLE, SIR CHARLES (originally Karl Halle) (1819–1895), English pianist and conductor, German by nationality, was born at Hagen, in Westphalia, on the nth of April 1819. He studied under Rink at Darmstadt in 1835, and as early as 1836 went to Paris, where for twelve years he lived in constant inter- course with Cherubini, Chopin, Liszt and other musicians, and enjoyed the friendship of such great literary figures as Alfred de Musset and George Sand. He had started a set of chamber concerts with Alard and Franchomme with great success, and had completed one series of them when the revolution of 1848 drove him from Paris, and he settled, with his wife and two children, in London. His pianoforte recitals, given at first from 1850 in his own house, and from 1861 in St James's Hall,

were an important feature of London musical life, and it was due in great measure to them that a knowledge of Beethoven's piano- forte sonatas became general in English society. At the Musical Union founded by John Ella, and at the Popular Concerts from their beginning, Halle was a frequent performer, and from 1853 was director of the Gentlemen's Concerts in Manchester, where, in 1857, he started a series of concerts of his own, raising the orchestra to a pitch of perfection quite unknown at that time in England. In 1888 he married Madame Norman Neruda (b. 1839), <-he violinist, widow of Ludwig Norman, and daughter of Josef Neruda, members of whose family had long been famous for musical talent. In the same year he was knighted; and in 1890 and 1891 he toured with his wife in Australia and else- where. He died at Manchester on the 25th of October 1895. Halle exercised an important influence in the musical education of England; if his pianoforte-playing, by which he was mainly known to the public in London, seemed remarkable rather for precision than for depth, for crystal clearness rather than for warmth, and for perfect realization of the written text rather than for strong individuality, it was at least of immense value

as giving the composer's idea with the utmost fidelity. Those who were privileged to hear him play in private, like those who could appreciate the power, beauty and imaginative warmth of his conducting, would have given a very different verdict; and they were not wrong in judging Halle to be a man of the widest and keenest artistic sympathies, with an extraordinary gift of insight into music of every school, as well as a strong sense of humour. He fought a long and arduous battle for the best music, and never forgot the dignity of his art. In spite of the fact that his technique was that of his youth, of the period before Liszt, the ease and certainty he attained in the most modern music was not the less wonderful because he concealed the mechanical means so completely.

Lady Halle, who from 1864 onwards had been one of the leading solo violinists of the time, was

constantly associated with her husband on the concert stage till his death; and in 1896 a public subscription was organized in her behalf, under royal patronage. She continued to appear occasionally in public, notably as late as 1907, when she played at the Joachim memorial concert. In 1901 she was given by Queen Alexandra the title of "violinist to the queen." A fine classical player and artist, frequently associated with Joachim, Lady Halle was the first of the women violinists who could stand comparison with men.

HALLE (known as Halle-an-der-Saale, to distinguish it from the small town of Halle in Westphalia), a town of Germany, in the Prussian province of Saxony, situated in a sandy plain on the right bank of the Saale, which here divides into several arms, 21 m. N.W. from Leipzig by the railway to Magdeburg. Pop.

(1875), 60,503; (1885) 81,982; (1895) 116,304; (1905) 160,031.

Owing to its situation at the junction of six important lines of railway, bringing it into direct communication with Berlin, Breslau, Leipzig, Frankfort-on-Main, the Harz country and Hanover, it has greatly developed in size and in commercial and industrial importance. It consists of the old, or inner, town surrounded by promenades, which occupy the site of the former fortifications, and beyond these of two small towns, Glaucha in the south and Neumarkt in the north, and five rapidly in- creasing suburbs. The inner town is irregularly built and presents a somewhat unattractive appearance, but it has been much improved and modernized by the laying out of new streets. The centre of the town proper is occupied by the imposing market square, on which stand the fine medieval town hall (restored in 1883) and the handsome Gothic Marienkirche, dating mainly from the 16th century, with two towers connected by a bridge. In the middle of the square are a clock-tower (Der rote Turm) 276 ft. in height, and a bronze statue of Handel, the composer, a native of Halle. West of the market-square lies the Halle, or the Tal, where the brine springs (see below) issue.

Among the eleven churches, nine Protestant and two Roman Catholic, may also be mentioned the St Moritzkirche, dating from the 12th century, with fine wood carvings and sculptures, and the cathedral (belonging since 1689 to the Reformed or Calvinistic church), built in the 16th century and containing an altar-piece representing Duke Augustus of Saxony and his family. Of secular buildings the most noticeable are the ruins of the castle of Moritzburg, formerly a citadel and the residence of the archbishops of Magdeburg, destroyed by fire in the Thirty Years' War, with the exception of the left wing now used for military purposes, the university buildings, the theatre and the new railway station. The famous university was founded by the elector Frederick III. of Brandenburg (afterwards king of Prussia), in 1694, on behalf of the jurist, Christian Thomasius (1655-17 28), whom many students followed to Halle, when he was expelled from Leipzig through the enmity of his fellow professors. It was closed by Napoleon in 1806 and again in 181 3, but in 18 15 was re-established and augmented by the removal to it of the university of Wittenberg, with which it thus became united. It has faculties of theology, law, medicine and philosophy. From the first it has been recognized as one of the principal seats of Protestant theology, originally of the pietistic and latterly of the rationalistic and critical school. In connexion with the university there are a botanical garden, a theological seminary,

anatomical, pathological and physical institutes, hospitals, an agricultural institute — one of the foremost institutions of the kind in Germany — a meteorological institute, an observatory and a library of 180,000 printed volumes and 800 manuscripts. Among other educational establishments must be mentioned the Francke'sche Stiftungen, founded in 1691 by August Hermann Francke (1663-1727), a bronze statue of whom by Rauch was erected in, 1829 in the inner court of the building.

They embrace an orphanage, a laboratory where medicines are prepared and distributed, a Bible press from which Bibles are issued at a cheap rate, and eight schools of various grades, attended in all by over 3000 pupils. The other principal institutions are the city gymnasium, the provincial lunatic asylum, the prison, the town hospital and infirmary, and the deaf and dumb institute. The salt-springs of Halle have been known from a very early period. Some rise within the town and others on an island in the Saale; and together their annual yield of salt is about 8500 tons.

The workmen employed at the salt-works are of a peculiar race and are known as the Halloren. They have been usually regarded as descendants of the original Wendish inhabitants, or as Celtic immigrants, with an admixture of Frankish elements. They wear a distinct dress, the ordinary costume of about 1700, observe several ancient customs, and enjoy certain exemptions and privileges derived from those of the ancient Pfannerschaft (community of the salt-panners).

Among the other industries of Halle are sugar refining, machine building, the manufacture of spirits, malt, chocolate, cocoa, confectionery, cement, paper, chicory, lubricating and illuminating oil, wagon grease, carriages and playing cards, printing, dyeing and coal mining (soft brown coal). The trade, which is supervised by a chamber of commerce, is very considerable, the principal exports being machinery, raw sugar and petroleum. Halle is also noted as the seat of several important publishing firms. The Bibelanstalt (Bible institution) of von Castein is the central authority for the revision of Luther's Bible, of which it sells annually from 60,000 to 70,000 copies.

Halle is first mentioned as a fortress erected on the Saale in 806 by Charles, son of Charlemagne, during his expedition against the Sorbs. The place was, however, known long before, and owes its origin as well as its name to the salt springs (Halts). In 968 Halle, with the valuable salt works, was given

by the emperor Otto I. to the newly founded archdiocese of Magdeburg, and in 981 Otto II. gave it a charter as a town. The interests of the archbishop were watched over by a Vogt (advocatus) and a burgrave, and from the first there were separate jurisdictions for the Halloren and the German settlers in the town, the former being under that of the Salzgraf (comes salis), the latter of a Schultheiss or bailiff, both subordinate to the burgrave. The conflict of interests and juris- dictions led to the usual internecine strife during the middle ages. The panners (Pfdnner) of the Tal, feudatories or officials, became a close hereditary aristocracy in perpetual rivalry with the gilds in the town ; and both resisted the pretensions of the archbishops. At the beginning of the 12th century Halle had attained considerable im- portance, and in the 13th and 14th centuries as a member of the Hanseatic League it carried on successful wars with the archbishops of Magdeburg; and in 1435 it resisted an army of 30,000 men under the elector of Saxony. Its liberty perished, however, as a result of the internal feud between the democratic gilds and the patrician panners. On the 20th of September 1478 a demagogue and cobbler named Jakob Weissak, a member of the town council, with his confederates opened the gates to the soldiers of the archbishop. The townsmen were subdued, and to hold them in check the archbishop, Ernest of Saxony, built the castle of Moritzburg. Notwithstanding the efforts of the archbishops of Mainz and Magdeburg, the Refor- mation found an entrance into the city in 1522; and in 1541 a Lutheran superintendent was appointed. After the peace of West- phalia in 1648 the city came into the possession of the house of Brandenburg. In 1806 it was stormed and taken by the French, after which, at the peace of Tilsit, it was united to the new kingdom of Westphalia. After the battle between the Prussians and French, in May 1813, it was taken by the Prussians. The rise of Leipzig was for a long time hurtful to the prosperity of Halle, and its present rapid increase in population and trade is principally due to its position as the centre of a network of railways.

See Dreyhaupt, Ausfiihrliche Beschreibung des Saalkreises (Halle, 2 vols., 1755; 3rd edition, 1842-1844); Hoffbauer, Geschichte der Lniversildl zu Halle (1806); Halle in Vorzeit und Gegenwart (1851); Knauth, Kurze Geschichte und Beschreibung der Stadt Halle (3rd ed., 1861); vom Hagen, Die Stadt Halle (1866-1867); Hertzberg,

Geschichte der Vereinigung der Universitdten von Wittenberg und Halle (1867); Voss, Zur Geschichte der Autonomie der Stadt Halle (1874); Schrader, Geschichte der Friedrichs-Universitat zu Halle (Berlin, 1894); Karl Hegel, Slddte und Gilden der germanischen Volker (Leipzig, 189I). ii. 444-449.

HALLECK, FITZ-GREENE (1790-1867), American poet, was born at Guilford, Connecticut, on the 8th of July 1790. By his mother he was descended from John Eliot, the " Apostle to the Indians." At an early age he became clerk in a store at Guil- ford, and in 181 1 he entered a banking-house in New York. Having made the acquaintance of Joseph Rodman Drake, in 1819 he assisted him under the signature of "Croaker junior" in contributing to the New York Evening Post the humorous series of " Croaker Papers." In 1821 he published his longest poem, Fanny, a satire on local politics and fashions in the measure of Byron's Don Juan. He visited Europe in 1822-1823, and after his return published anonymously in 1827 Alnwick Castle, with other Poems. From 1832 to 1841 he was confidential agent of John Jacob Astor, who named him one of the trustees of the Astor library. In 1864 he published in the New York Ledger a poem of 300 lines entitled " Young America." He died at Guilford, on the 19th of November 1867. The poems of Halleck are written with great care and finish, and manifest the possession of a fine sense of harmony and of genial and elevated sentiments.

His Life and Letters, by James Grant Wilson, appeared in 1869. His Poetical Writings, together with extracts from those of Joseph Rodman Drake, were edited by Wilson in the same year.

HALLECK, HENRY WAGER (1815-1872), American general

and jurist, was born at Westernville, Oneida county, N.Y., in 181 5, entered the West Point military academy at the age of twenty, and on graduating in 1839 was appointed to the engineers, becoming at the same time assistant professor of engineering at the academy. In the following year he was made an assistant to the Board of Engineers at Washington, from 1841 to 1846 he was employed on the defence works at New York, and in 1845 he was sent by the government to visit the principal military establishments of Europe. After his return, Halleck delivered a course of lectures on the science of war, published in 1846 under the title Elements of Military Art and Science. A later edition of this work was widely used as a text-book by volunteer officers during the Civil War. On the outbreak of the Mexican War in 1846, he served with the expedition to California and the Pacific coast, in which he distinguished himself not only as an engineer, but by his skill in civil administration and by his good conduct before the enemy. He served for several years in California as a staff officer, and as secretary of state under the military government, and in 1849 he helped to frame the state constitution of California, on its being admitted into the Union. In 1852 he was appointed inspector and engineer of lighthouses, and in 1853 was employed in the fortification of the Pacific coast. In 1854 Captain Halleck resigned his commission and took up the practice of law with great success. He was also director of a quicksilver mine, and in 1855 he became president of the Pacific & Atlantic railway. On the outbreak of the Civil War he returned to the army as a major-general, and in November 1861 he was charged with the supreme command in the western theatre of war. There can be no question that his administrative skill was mainly instrumental in bringing order out of chaos in the hurried formation of large volunteer armies in 1861, but the strategical and tactical successes of the following spring were due rather to the skill and activity of his subordinate generals Grant, Buell and Pope, than to the plans of the supreme commander, and when he assumed command of the united

forces of these three generals before Corinth, the methodical slowness of his advance aroused much criticism. In July, however, he was called to Washington as general-in-chief of the armies. At headquarters his administrative powers were conspicuous, but he proved to be utterly wanting in any large grasp of the military problem ; the successive reverses of Generals McClellan, Pope, Burnside and Hooker in Virginia were not infrequently traceable to the defects of the general-in-chief. No co-ordination of the military efforts of the Union was seriously undertaken by Halleck, and eventually in March 1864 Grant was appointed to

replace him, Major-General Halleck becoming chief of staff at Washington. This post he occupied with credit until the end of the war. In April 1865 he held the command of the military division of the James and in August of the same year of the military division of the Pacific, which he retained till June 1869, when he was transferred to that of the South, a position he held till his death at Louisville, Ky., on the 9th of January 1872. Halleck's position as a soldier is easily defined by his uniform success as an administrative official, his equally uniform want of success as an officer at the head of large armies in the field, and the popularity of his theoretical writings on war. His influence, for good or evil, on the course of the greatest war of modern times was greater than that of any soldier on either side save Grant and Lee, and whilst his interference with the dispositions of the commanders in the field was often dis- astrous, his services in organizing and instructing the Union forces were always of the highest value, and in this respect he was indispensable.

Besides Military Art and Science, Halleck wrote Bitumen, its Varieties, Properties and Uses (1841); The Mining Laws of Spain and Mexico (1859);

International Law (1861; new edition, 1908); and Treatise on International Law and the Laws of War, prepared for the use of Schools and Colleges, abridged from the larger work. He translated Jomini's Vie politique et militaire de Napoleon (1864) and de Fooz On the Law of Mines (i860). The works on international law mentioned above entitle General Halleck to be considered as one of the great jurists of the 19th century.

HALLEFLINTA (a Swedish word meaning rock-flint), a white, grey, yellow, greenish or pink, fine-grained rock consisting of an intimate mixture of quartz and felspar. Many examples are banded or striated; others contain porphyritic crystals of quartz which resemble those of the felsites and porphyries. Mica, iron oxides, apatite, zircon, epidote and hornblende may also be present in small amount. The more micaceous varieties form transitions to granulite and gneiss. Halleflinta under the microscope is very finely crystalline, or even cryptocrystalline, resembling the felsitic matrix of many acid rocks. It is essentially metamorphic and occurs with gneisses, schists and granulites, especially in the Scandinavian peninsula, where it is regarded as being very characteristic of certain horizons. Of its original nature there is some doubt, but its chemical composition and the occasional presence of porphyritic crystals indicate that it has affinities to the fine-grained acid intrusive rocks. In this group there may also have been placed metamorphosed acid tuffs and a certain number of adinoles (shales, contact altered by intrusions of diabase). The assemblage is not a perfectly homogeneous one but includes both igneous and sedimentary rocks, but the former preponderate. Rocks very similiar to the typical Swedish halleflintas occur in Tirol, in Galicia and eastern Bohemia.

HALLEL (Heb. ^ a Mishnic derivative from ^17 hillel, " to praise "), a term in synagogal liturgy for (a) Psalms cxiii.-cxviii., often called " the Egyptian Hallel " because of its recitation during the paschal meal on the night of the Passover, (b) Psalm cxxxvi. "the Great Hallel." C. A. Briggs 1 points

out that the term " Hallelujah " (Praise ye Yah) is found at the close of Pss. civ., cv., cxv., cxvi., cxvii., at the beginning of Pss. cxi., cxii. and at both ends of Pss. cvi., cxiii., cxxxv., cxlvi. to cl. The Septuagint also gives it at the beginning of Pss. cv., cvii., cxiv., cxvi. to cxix.. cxxxvi. There are thus four groups of Hallel psalms: — civ.-cvii. (a tetralogy on creation, the patriarchal age, the Exodus, and the Restoration); cxi. -cxvii. which includes most of the ''Egyptian Hallel"; cxxxv.-cxxxvi. ; cxlvi. -cl. All of these Hallels (except cxlvii. and cxlix. which are Maccabean) belong to the Greek period, forming a collection of sixteen psalms composed for public use by the choirs, especially at the great feasts. Their distribution into four groups was the work of the final editor of the psalter. Later liturgical use regarded Pss. cxviii. and even cxix. as Hallels, as well as Pss. cxx. to cxxxiv.

It will be observed that the extent of the official Hallel varied from time to time. It would appear that in the time of Gamaliel

1 International Critical Commentary, " Psalms," Intro. Ixxviii.

{Pesahim x. 5) the custom of its recitation at the paschal meal was still of recent innovation. While the school of Shammai advised only Ps. cxiii., the school of Hillel favoured Pss. cxiii. and cxiv. 2 The further extension so as to include Pss. cxv. to cxviii. probably dates from the first half of the 2nd century a.d., and these four psalms were recited after the pouring out of the fourth cup, the two earlier ones being taken at the beginning of the meal. From the 3rd century the use of the Hallel was extended to other occasions, and was gradually incorporated into the liturgy of eighteen festal days.

The " Great Hallel " (Ps. cxxxvi. and its later extension to cxx.-cxxxvi.) always served the wider purpose of a more general thanksgiving. According to Rabbi Johanan it derived its name from the allusion

in v. 25 to the Holy One who sits in heaven and thence distributes food to all his creatures.

HALLER, ALBRECHT VON (1708–1777), Swiss anatomist and physiologist, was born of an old Swiss family at Bern, on the 1 6th of October 1708. Prevented by long-continued ill-health from taking part in boyish sports, he had the more opportunity for the development of his precocious mind. At the age of four, it is said, he used to read and expound the Bible to his father's servants; before he was ten he had sketched a Chaldee grammar, prepared a Greek and a Hebrew vocabulary, compiled a collection of two thousand biographies of famous men and women on the model of the great works of Bayle and Moreri, and written in Latin verse a satire on his tutor, who had warned him against a too great excursiveness. When still hardly fifteen he was already the author of numerous metrical translations from Ovid, Horace and Virgil, as well as of original lyrics, dramas, and an epic of four thousand lines on the origin of the Swiss confedera- tions, writings which he is said on one occasion to have rescued from a fire at the risk of his life, only, however, to burn them a little later (1729) with his own hand. Haller's attention had been directed to the profession of medicine while he was residing in the house of a physician at Biel after his father's death in 1 721; and, following the choice then made, he while still a sickly and excessively shy youth went in his sixteenth year to the university of Tubingen (December 1723), where he studied under Camerarius and Duvernoy. Dissatisfied with his progress, he in 1725 exchanged Tubingen for Leiden, where Boerhaave was in the zenith of his fame, and where Albinus had already begun to lecture in anatomy. At that university he graduated in May 1727, undertaking successfully in his thesis to prove that the so-called salivary duct, claimed as a recent discovery by Coschwitz, was nothing more than a blood-vessel. Haller then visited London, making the acquaintance of Sir Hans Sloane, Cheselden, Pringle, Douglas and other scientific men; next, after a short stay in Oxford, he visited Paris, where he studied under

Ledran and Winslow; and in 1728 he proceeded to Basel, where he devoted himself to the study of the higher mathematics under John Bernoulli. It was during his stay there also that his first great interest in botany was awakened; and, in the course of a tour (July–August, 1828), through Savoy, Baden and several of the Swiss cantons, he began a collection of plants which was afterwards the basis of his great work on the flora of Switzerland. From a literary point of view the main result of this, the first of his many journeys through the Alps, was his peom entitled Die Alpen, which was finished in March 1729, and appeared in the first edition (1732) of his Gedichte. This poem of 490 hexameters is historically important as one of the earliest signs of the awakening appreciation of the mountains (hitherto generally regarded as horrible monstrosities), though it is chiefly designed to contrast the simple and idyllic life of the inhabitants of the Alps with the corrupt and decadent existence of the dwellers in the plains.

In 1729 he returned to Bern and began to practise as a physician; his best energies, however, were devoted to the botanical and anatomical researches which rapidly gave him a European reputation, and procured for him from George II.

2 The reference to a hymn at the institution of the Eucharist (Matt. xxvi. 30, Mark xiv. 26) must be interpreted in the light of this inceptive stage of the Hallel.

in 1736 a call to the chair of medicine, anatomy, botany and surgery in the newly founded university of Gottingen. He became F.R.S. in 1743, and was ennobled in 1749. The quantity of work achieved by Haller in the seventeen years during which he occupied his Gottingen professorship was immense. Apart from the ordinary work of his classes, which entailed upon him the task of newly organizing a

botanical garden, an anatomical theatre and museum, an obstetrical school, and similar institu- tions, he carried on without interruption those original investiga- tions in botany and physiology, the results of which are preserved in the numerous works associated with his name; he continued also to persevere in his youthful habit of poetical composition, while at the same time he conducted a monthly journal (the Gottingische gelehrte Anzeigen), to which he is said to have contributed twelve thousand articles relating to almost every branch of human knowledge. He also warmly interested himself in most of the religious questions, both ephemeral and permanent, of his day; and the erection of the Reformed church in Gottingen was mainly due to his unwearied energy. Not- withstanding all this variety of absorbing interests he never felt at home in Gottingen; his untravelled heart kept ever turning towards his native Bern (where he had been elected a member of the great council in 1745), and in 1753 he resolved to resign his chair and return to Switzerland.

The twenty-one years of his life which followed were largely occupied in the discharge of his duties in the minor political post of a Rathhausammann which he had obtained by lot, and in the preparation of his Bibliotheca medica, the botanical, surgical and anatomical parts of which he lived to complete; but he also found time to write the three philosophical romances — Usong (1771), Alfred (1773) and Fabius and Calo (1774), — in which his views as to the respective merits of despotism, of limited monarchy and of aristocratic republican government are fully set forth. About 1773 the state of his health rendered necessary his entire withdrawal from public business; for some time he supported his failing strength by means of opium, on the use of which he communicated a paper to the Proceedings of the Gottingen Royal Society in 1776; the excessive use of the drug is believed, however, to have hastened his death, which occurred on the 17th of December 1777. Haller, who had been three times married, left eight children, the eldest of whom. Gottlieb

Emanuel, attained to some distinction as a botanist and as a writer on Swiss historical bibliography (1785–1788, 7 vols.).

Subjoined is a classified but by no means an exhaustive list of his very numerous works in various branches of science and literature (a complete list, up to 1775, numbering 576 items, including various editions, was published by Haller himself, in 1775, at the end of vol. 6 of the correspondence addressed to him by various learned friends): — (1) Anatomical: — Icones anatomicae (1743–1754); Dis- putationes anatomicae selectiores (1746–1752); and Opera acad. minora anatomici argumenti (1762–1768). (2) Physiological: — De respiratione experimenta anatomica (1747) ; Primae lineae physiologiae (1747); and Elementa physiologiae corporis humani (1757–1760). (3) Pathological and surgical: — Opuscula patkologica (17 54) ; Dis- putationnm chirurg. collectio (1777); also careful editions of Boer- haave's Praelectiones academicae in suas instituliones ret medicae (1739), and of the Arlis medicae principia of the same author (1769- 1774). (4) Botanical : — Enumeratio methodica stirpium Helveticarum (1742); Opuscula botanica (1749); Bibliotheca botanica (1771). (5) Theological : — Briefe iiber die wichtigsten Wahrheiten der Offenbarung (1772): and Briefe zur Vertheidigung der Offenbarung (1775–1777). (6) Poetical: — Gedichte (1732, 12th ed., 1777). His three romances have been already mentioned. Several volumes of lectures and " Tagebucher " or journals were published posthumously.

See J. G. Zimmermann, Das Leben des Herrn von Haller (1755), and the articles by Forster and Seiler in Ersch and Gruber's Encyklo- pddie, and particularly the detailed biography (over 500 pages) by L. Hirzel, printed at the head of his elaborate edition (Frauenfeld, 1882) of Haller's Gedichte.

HALLER, BERTHOLD (1492–1536), Swiss reformer, was born at Aldingen in Wiirttemberg, and after studying at Pforzheim, where he met Melanchthon, and at Cologne, taught in the gymnasium at Bern. He was

appointed assistant preacher at the church of St Vincent in 151 5 and people's priest in 1520. Even before his acquaintance with Zwingli in 1521 he had begun to preach the Reformation, his sympathetic character and his

eloquence making him a great force. In 1526 he was at the abortive conference of Baden, and in January 1528 drafted and defended the ten theses for the conference of Bern which established the new religion in that city. He left no writings except a few letters which are preserved in Zwingli's works. He died on the 25th of February 1536. Life by Pestalozzi (Elberfeld, 1861).

HALLEY, EDMUND (1656-1742), English astronomer, was born at Haggerston, London, on the 29th of October 1656. His father, a wealthy soapboiler, placed him at St Paul's school, where he was equally distinguished for classical and mathe- matical ability. Before leaving it for Queen's College, Oxford, in 1673, he had observed the change in the variation of the compass, and at the' age of nineteen, he supplied a new and improved method of determining the elements of the planetary orbits (Phil. Trans, xi. 683). His detection of considerable errors in the tables then in use led him to the conclusion that a more accurate ascertainment of the places of the fixed stars was indispensable to the progress of astronomy; and, finding that Flamsteed and Hevelius had already undertaken to catalogue those visible in northern latitudes, he assumed to himself the task of making observations in the southern hemisphere. A recommendation from Charles II. to the East India Company procured for him an apparently suitable, though, as it proved, ill-chosen station, and in November 1676 he embarked for St Helena. On the voyage he noticed the retardation of the pendu- lum in approaching the equator; and during his stay on the island he observed, on the 7th of November 1677, a transit of Mercury, which suggested to him the important idea of employing similar phenomena for determining the sun's distance. He returned to England in November 1678, having by the registra-

tion of 341 stars won the title of the ” Southern Tycho,” and by the translation to the heavens of the ” Royal Oak,” earned a degree of master of arts, conferred at Oxford by the king’s command on the 3rd of December 1678, almost simultaneously with his election as fellow of the Royal Society. Six months later, the indefatigable astronomer started for Danzig to set at rest a dispute of long standing between Hooke and Hevelius as to the respective merits of plain or telescopic sights; and towards the end of 1680 he proceeded on a continental tour. In Paris he observed, with G. D. Cassini, the great comet of 1680 after its perihelion passage; and having returned to England, he married in 1682 Mary, daughter of Mr Tooke, auditor of the exchequer, with whom he lived harmoniously for fifty-five years. He now fixed his residence at Islington, engaged chiefly upon lunar observations, with a view to the great desideratum of a method of finding the longitude at sea. His mind, however, was also busy with the momentous problem of gravity. Having reached so far as to perceive that the central force of the solar system must decrease inversely as the square of the distance, and applied vainly to Wren and Hooke for further elucidation, he made in August 1684 that journey to Cambridge for the purpose of consulting Newton, which resulted in the publication of the Principia. The labour and expense of passing this great work through the press devolved upon Halley, who also wrote the prefixed hexameters ending with the well-known line — Nee fas est propius mortali attingere divos.

In 1696 he was, although a zealous Tory, appointed deputy comptroller of the mint at Chester, and (August 19, 1698) he received a commission as captain of the ” Paramour Pink ” for the purpose of making extensive observations on the con- ditions of terrestrial magnetism. This task he accomplished in a voyage which lasted two years, and extended to the 52nd degree of S. latitude. The results were published in a General Chart of the Variation of the Compass in 1701; and immediately afterwards he executed by royal command a careful survey of the

tides and coasts of the British Channel, an elaborate map of which he produced in 1702. On his return from a journey to Dalmatia, for the purpose of selecting and fortifying the port of Trieste, he was nominated, November 1703, Savilian professor of geometry at Oxford, and received an honorary degree of

doctor of laws in 1710. Between 1713 and 1721 he acted as secretary to the Royal Society, and early in 1720 he succeeded Flamsteed as astronomer-royal. Although in his sixty-fourth year, he undertook to observe the moon through an entire revolution of her nodes (eighteen years), and actually carried out his purpose. He died on the 14th of January 1742. His tomb is in fine old graveyard of St Margaret'schurch,Lee, Kent. Halley's most notable scientific achievements were — his detection of the " long inequality " of Jupiter and Saturn, and of the acceleration of the moon's mean motion (1693), his dis- covery of the proper motions of the fixed stars (17 18), his theory of variation (1683), including the hypothesis of four magnetic poles, revived by C. Hansteen in 1819, and his suggestion o'f the magnetic origin of the aurora borealis; his calculation of the orbit of the 1682 comet (the first ever attempted), coupled with a prediction of its return, strikingly verified in 1759; and his indication (first in 1679, and again in 1716, Phil. Trans., No. 348) of a method extensively used in the 18th and 19th centuries for determining the solar parallax by means of the transits of Venus.

His principal works are Catalogus stellarum australium (London, 1679), the substance of which was embodied in vol. iii. of Flamstced's Historia coelestis (1725); Synopsis astronomiae cometicae (Oxford, 1705); Astronomical Tables (London, 1752) ; also eighty-one mis- cellaneous papers of considerable interest, scattered through the Philosophical Transactions. To these should be added

his version from the Arabic (which language he acquired for the purpose) of the treatise of Apollonius De sectione rationis, with a restoration of his two lost books De sectione spatii, both published at Oxford in 1706; also his fine edition of the Conies of Apollonius, with the treatise by Serenus De sectione cylindri et coni (Oxford, 1710, folio). His edition of the Spherics of Menelaus was published by his friend Dr Costard in 1758. See also Biographia Britannica, vol. iv. (1757); Cent. Mag. xvii. 455, 503; A. Wood, Athenae Oxon. (Bliss), iv. 536; J. Aubrey, Lives, ii. 365; F. Baily, Account of Flamsteed; Sir D. Brewster, Life of Newton; R. Grant, History of Astronomy, p. 477 and passim; A. J. Rudolph, Bulletin of Bibliography, No. 14 (Boston, 1904); E. F. McPike, "Bibliography of Halley's Comet," Smith- sonian Misc. Collections, vol. xlviii. pt. i. (1905); Notes and Queries, 9th series, vols. x. xi. xii., 10th series, vol. ii. (E. F. McPike). A collection of manuscripts regarding Halley is preserved among the Rigaud papers in the Bodleian library, Oxford; and many of his unpublished letters exist at the Record Office and in the library of the Royal Society. (A. M. C.)

HALLGRfMSSON, J6NAS (1807–1844), the chief lyrical poet of Iceland, was born in 1807 at SteinsstaSir in EyjafjarSarsy'sla in the north of that island, and educated at the famous school of Bessastaor. In 1832 he went to the university of Copenhagen, and shortly afterwards turned his attention to the natural sciences, especially geology. Having obtained pecuniary assist- ance from the Danish government, he travelled through all Iceland for scientific purposes in the years 1837–1842, and made many interesting geological observations. Most of his writings on geology are in Danish. His renown was, however, not acquired by his writings in that language, but by his Icelandic poems and short stories. He was well read in German literature, Heine and Schiller being his favourites, and the study of the German masters and the old classical writers of Iceland opened his eyes to the corrupt state of Icelandic poetry and showed him the way to

make it better. The misuse of the Eddie metaphors made the lyrical and epical poetry of the day hardly intelligible, and, to make matters worse, the language of the poets was mixed up with words of German and Danish origin. The great Danish philologist and friend of Iceland, Rasmus Rask, and the poet Bjarni Thorarensen had done much to purify the language, but Jonas Hallgrimsson completed their work by his poems and tales, in a purer language than ever had been written in Iceland since the days of Snorri Sturlason. The excesses of Icelandic poetry were specially seen in the so-called rimur, ballads of heroes, &c, which were fiercely attacked by Jonas Hallgrimsson, who at last succeeded in converting the educated to his view. Most of the principal poems, tales and essays of Jonas Hall-grimsson appeared in the periodical Fjolnir, which he began publishing at Copenhagen in 1835, together with KonraSGislason, a well-known philologist, and the patriotic Thomas Saemunds- son. Fjolnir had in the beginning a hard struggle against old prejudices, but as the years went by its influence became

enormous; and when it at last ceased, its programme and spirit still lived in Ny FUagsrit and other patriotic periodicals which took its place. Jonas Hallgrimsson, who died in 1844, is the father of a separate school in Icelandic lyric poetry. He intro-duced foreign thoughts and metres, but at the same time revived the metres of the Icelandic classical poets. Although his poetical works are all comprised in one small volume, he strikes every string of the old harp of Iceland. (S. Bl.)

HALLIDAY, ANDREW [Andrew Halliday Duff] (1830-1877), British journalist and dramatist, was born at Marnoch, Banffshire, in 1830. He was educated at Marischal College, Aberdeen, and in 1849 he came to London, and discarding the name of Duff , devoted himself to literature. His first engagement was with the daily papers, and his work having attracted the notice of Thackeray, he was invited to write for the Cornhill Magazine. From 1861 he contributed largely to All the Year Round, and many of his articles were

republished in collected form. He was also the author, alone and with others, of a great number of farces, burlesques and melodramas and a peculiarly successful adapter of popular novels for the stage. Of these Little Em'ly (1869), his adaptation of David Copperfield, was warmly approved by Dickens himself, and enjoyed a long run at Drury Lane. Halliday died in London on the 10th of April

1877.

HALLIWELL-PHILLIPPS, JAMES ORCHARD (1820-1889), English Shakespearian scholar, son of Thomas Halliwell, was born in London, on the 21st of June 1820. He was educated privately and at Jesus College, Cambridge. He devoted himself to antiquarian research, particularly in early English literature. In 1839 he edited Sir John Mandeville's Travels; in 1842 pub- lished an Account of the European MSS. in the Chetham Library, besides a newly discovered metrical romance of the 15th century (Torrent of Portugal). He became best known, however, as a Shakespearian editor and collector. In 1848 he brought out his Life of Shakespeare, which passed through several editions; in 1853-1865 a sumptuous edition, limited to 150 copies, of Shakespeare in folio, with full critical notes; in 1863 a Calendar of the Records at Stratford-on-Avon; in 1864 a History of New Place. After 1870 he entirely gave up textual criticism, and devoted his attention to elucidating the particulars of Shake- speare's life, tie collated all the available facts and documents in relation to it, and exhausted the information to be found in local records in his Outlines of the Life of Shakespeare. He was mainly instrumental in the purchase of New Place for the corporation of Stratford-on-Avon, and in the formation there of the Shakespeare museum. His publications in all numbered more than sixty volumes. He assumed the name of Phillipps in 1872, under the will of the grandfather of his first wife, a daughter of Sir Thomas Phillipps the antiquary. He took an active interest in the Camden Society, the Percy Society and the Shakespeare Society, for which he edited many early English and Elizabethan works.

From 1845 Halliwell was excluded from the library of the British Museum on account of the suspicion attaching to his possession of some manuscripts which had been removed from the library of Trinity College, Cambridge. He published privately an explanation of the matter in 1845. His house, Hollingbury Copse, near Brighton, was full of rare and curious works, and he generously gave many of them to the Chetham library, Manchester, to the town library of Penzance, to the Smithsonian Institute, Washington, and to the library of Edinburgh university. He died on the 3rd of January 1889.

HALLOWE'EN, or All Hallows Eve, the name given to the 31st of October as the vigil of Hallowmas or All Saints' Day. Though now known as little else but the eve of the Christian festival, Hallowe'en and its formerly attendant ceremonies long antedate Christianity. The two chief characteristics of ancient Hallowe'en were the lighting of bonfires and the belief that of all nights in the year this is the one during which ghosts and witches are most likely to wander abroad. Now on or about the 1st of November the Druids held their great autumn festival and lighted fires in honour of the Sun-god in thanksgiving for the harvest. Further, it was a Druidic belief that on the eve of

this festival Saman, lord of death, called together the wicked souls that within the past twelve months had been condemned to inhabit the bodies of animals. Thus it is clear that the main celebrations of Hallowe'en were purely Druidical, and this is further proved by the fact that in parts of Ireland the 31st of October was, and even still is, known as Oidhche Shamhna, " Vigil of Saman." On the Druidic ceremonies were grafted some of the characteristics of the Roman festival in honour of Pomona held about the 1st of November, in which nuts and apples, as representing the winter store of fruits, played an important part. Thus the roasting of nuts and the

sport known as ” apple- ducking ” — attempting to seize with the teeth an apple floating in a tub of water, — were once the universal occupation of the young folk in medieval England on the 31st of October. The custom of lighting Hallowe’en fires survived until recent years in the highlands of Scotland and Wales. In the dying embers it was usual to place as many small stones as there were persons around, and next morning a search was made. If any of the pebbles were displaced it was regarded as certain that the person represented would die within the twelve months.

For details of the Hallowe’en games and bonfires see Brand’s Antiquities of Great Britain; Chambers’s Book of Days; Grimm’s Deutsche Mythologie, ch. xx. (Elemente) and ch. xxxiv. (Aberglaube) ; and J. G. Frazer’s Golden Bough, vol. iii. Compare also Beltane and Bonfire.

HALLSTATT, a market-place of Austria, in Upper Austria, 67 m. S.S.W. of Linz by rail. Pop. (1900) 737. It is situated on the shore of the Hallstatter-see and at the foot of the Hall- statter Salzberg, and is built in amphitheatre with its houses clinging to the mountain side. The salt mine of Hallstatt, which is one of the oldest in existence, was rediscovered in the 14th century. In the neighbourhood is the celebrated Celtic burial ground, where a great number of very interesting anti- quities have been found. Most of these have been removed to the museums at Vienna and Linz, but some are kept in the local museum.

The excavations (1847-1864) revealed a form of culture

hitherto unknown, and accordingly the name Hallstatt has

been applied to objects of like form and decoration since found

in Styria, Carniola, Bosnia (at Glasinatz and Jezerin), Epirus,

north Italy, France, Spain and Britain (see Celt). Everywhere

else the change from iron weapons to bronze is immediate, but

at Hallstatt iron is seen gradually superseding bronze, first for

ornament, then for edging cutting instruments, then replacing

fully the old bronze types, and finally taking new forms of its

own. There can be no doubt that the use of iron first developed

in the Hallstatt area, and that thence it spread southwards into

Italy, Greece, the Aegean, Egypt and Asia, and northwards

and westwards in Europe. At Noreia, which gave its name to

Noricum (q.v.) less than 40 m. from Hallstatt, were the most

famous iron mines of antiquity, which produced the Noric iron

and Noric swords so prized and dreaded by the Romans (Pliny,

Hist. Nat. xxxiv. 145; Horace, Epod. 17. 71). This iron needed

no tempering, and the Celts had probably found it ready smelted

by nature, just as the Eskimo had learned of themselves to use

telluric iron embedded in basalt. The graves at Hallstatt were

partly inhumation partly cremation; they contained swords,

daggers, spears, javelins, axes, helmets, bosses and plates of

shields and hauberks, brooches, various forms of jewelry, amber

and glass beads, many of the objects being decorated with animals

and geometrical designs. Silver was practically unknown.

The weapons and axes are mostly iron, a few being bronze. The

swords are leaf-shaped, with blunt points intended for cutting,

not for thrusting; the hilts differ essentially from those of the

Bronze Age, being shaped like a crescent to grasp the blade,

with large pommels, or sometimes with antennae (the latter

found also in Bavaria, Wurttemberg, Baden, Switzerland, the

Pyrenees, Spain, north Italy) : only six arrowheads (bronze)

were found. Both flanged and socketed celts occurred, the iron

being much more numerous than the bronze. The flat axes are

distinguished by the side stops and in some cases the transition

from palstave to socketed axe can be seen. The shields were

round as in the early Iron Age of north Italy (see Villanova). Greaves were found at Glasinatz and Jezerin, though not at Hallstatt; two helmets were found at Hallstatt and others in Bosnia; broad bronze belts were numerous, adorned in repoussS with beast and geometric ornament. Brooches are found in great numbers, both those derived from the primitive safety-pin (" Peschiera " type) and the " spectacle " or " Hallstatt " type found all down the Balkans and in Greece. The latter are formed of two spirals of wire, sometimes four such spirals being used, whilst there were also brooches in animal forms, one of the latter being found with a bronze sword. The Hallstatt culture is that of the Homeric Achaeans (see Achaeans), but as the brooch (along with iron, cremation of the dead, the round shield and the geometric ornament) passed down into Greece from central Europe, and as brooches are found in the lower town at Mycenae, 1350 B.C., they must have been invented long before that date in central Europe. But as they are found in the late Bronze Age

and early Iron Age, the early iron culture of Hallstatt must have originated long before 1350 B.C., a conclusion in accord with the absence of silver at Hallstatt itself.

See Baron von Sacken, Das Grabfeld von Hallstatt; Bertrand and S. Reinach, Les Celtes dans les vallees du Po et du Danube ; W. Ridge- way, Early Age of Greece; Archaeology (plate). (W. Ri.)

HALLUCINATION (from Lat. alucinari or allucinari, to wander in mind, Gr. aXwo-eiv or aKvuv, from ixkq, wandering), a psychological term which has been the subject of much con- troversy, and to which, although there is now fair agreement as to its denotation, it is still impossible to give a precise and entirely satisfactory definition. Hallucinations constitute one of the two great classes of all false sense-perceptions, the other class consisting of the " illusions," and the difficulty of definition is clearly to mark the boundary between the two classes. Illusion may be defined as the misinterpretation of sense-impression, while hallucination, in its typical instances, is the experiencing of a sensory presentation, i.e. a presentation having the sensory vividness that distinguishes perceptions from representative imagery, at a time when no stimulus is acting on the correspond- ing sense-organ. There is, however, good reason to think that in many cases, possibly in all cases, some stimulation of the sense-organ, coming either from without or from within the body, plays a part in the genesis of the hallucination. This being so, we must be content to leave the boundary between illusions and hallucinations ill-defined, and to regard as illusions those false perceptions in which impressions made on the sense- organ play a leading part in determining the character of the percept, and as hallucinations those in which any such impression is lacking, or plays but a subsidiary part and bears no obvious relation to the character of the false percept.

As in the case of illusion, hallucination may or may not involve delusion, or belief in the reality of

the object falsely perceived. Among the sane the hallucinatory object is fre- quently recognized at once as unreal or at least as but quasi-real ; and it is only the insane, or persons in abnormal states, such as hypnosis, who, when an hallucination persists or recurs, fail to recognize that it corresponds to no physical impression from, or object in, the outer world. Hallucinations of all the senses occur, but the most commonly reported are the auditory and the visual, while those of the other senses seem to be comparatively rare. This apparent difference of frequency is no doubt largely due to the more striking character of visual and auditory hal- lucinations, and to the relative difficulty of ascertaining, in the case of perceptions of the lower senses, e.g. of taste and smell, that no impression adequate to the genesis of the percept has been made upon the sense-organ; but, in so far as it is real, it is probably due in part to the more constant use of the higher senses and the greater strain consequently thrown upon them, in part also to their more intimate connexion with the life of ideas.

The hallucinatory perception may involve two or more senses, e.g., the subject may seem to see a human being, to hear his voice and to feel the touch of his hand. This is rarely the case in spontaneous hallucination, but in hypnotic hallucination the

subject is apt to develop the object suggested to him, as present to one of his senses, and to perceive it also through other senses.

Among visual hallucinations the human figure, and among auditory hallucinations human voices, are the objects most commonly perceived. The figure seen always appears localized more or less definitely in the outer world. In many cases it appears related to the objects truly seen in just the same way as a real object; e.g. it is no longer seen if the eyes

are closed or turned away, it does not move with the movements of the eyes, and it may hide objects lying behind it, or be hidden by objects coming between the place that it appears to occupy and the eye of the percipient. Visual hallucinations are most often experienced when the eyes are open and the surrounding space is well or even brightly illuminated. Less frequently the visual hallucination takes the form of a self-luminous figure in a dark place or appears in a luminous globe or mist which shuts out from view the real objects of the part of the field of view in which it appears.

Auditory hallucinations, especially voices, seem to fall into two distinct classes — (1) those which are heard as coming from without, and are more or less definitely localized in outer space, (2) those which seem to be within the head or, in some cases, within the chest, and to have less definite auditory quality. It seems probable that the latter are hallucinations involving principally kinaesthetic sensations, sensations of movement of the organs of speech.

Hallucinations occur under a great variety of bodily and mental conditions, which may conveniently be classified as follows.

I. Conditions which imply normal waking Consciousness and no

distinct Departure from bodily and mental Sanity.

a. It would seem that a considerable number of perfectly healthy persons occasionally experience, while in a fully waking state, hallucinations for which no cause can be assigned. The census of hallucinations conducted by the Society for Psychical Research showed that about 10 % of all sane persons can remember having experienced at least one hallucination while they believed themselves to be fully awake and in normal health. These sporadic hallucinations of waking healthy persons are far more frequently visual than

auditory, and they usually take the form of some familiar person in ordinary attire. The figure in many cases is seen, on turning the gaze in some new direction, fully developed and lifelike, and its hallucinatory character may be revealed only by its noiseless movements, or by its fading away in situ. A special interest attaches to hallucinations of this type, owing to the occasional coincidence of the death of the person with his hallucinatory appearance. The question raised by these coincidences will be discussed in a separate paragraph below.

b. A few persons, otherwise normal in mind and body, seem to experience repeatedly some particular kind of hallucination. The voice (daiftbvuov) so frequently heard by Socrates, warning or advising him, is the most celebrated example of this type.

II. Conditions more or less unusual or abnormal but not implying

distinct Departure from Health.

a. A kind of hallucination to which perhaps every normal person is liable is that known technically as " recurrent sensa- tion." This kind is experienced only when some sense-organ has been continuously or repeatedly subjected to some one kind of impression or stimulation for a considerable period; e.g. the microscopist, after examining for some hours one particular kind of object or structure, may suddenly perceive the object faithfully reproduced in form and colour, and lying, as it were, upon any surface to which his gaze is directed. Perhaps the commonest experience of this type is the recurrence of the sensations of movement at intervals in the period following a sea voyage or long railway journey.

b. A considerable proportion of healthy sane persons can induce hallucinations of vision by gazing fixedly at a polished

surface or into some dark translucent mass; or of hearing, by applying a large shell or similar object

to the ear. These methods of inducing hallucinations, especially the former, have long been practised in many countries as modes of divination, various objects being used, e.g. a drop of ink in the palm of the hand, or a polished finger-nail. The object now most commonly used is a polished sphere of clear glass or crystal (see Crystal-Gazing) . Hence such hallucinations go by the name of crystal visions. The crystal vision often appears as a picture of some distant or unknown scene lying, as it were, in the crystal; and in the picture figures may come and go, and move to and fro, in a perfectly natural manner. In other cases, written or printed words or sentences appear. The percipient, seer or scryer, commonly seems to be in a fully waking state as he observes the objects thus presented. He is usually able to describe and discuss the appearances, successively discriminating details by attentive observation, just as when observing an objective scene; and he usually has no power of controlling them, and no sense of having produced them by his own activity. In some cases these visions have brought back to the mind of the scryer facts or incidents which he could not voluntarily recollect. In other cases they are asserted by credible witnesses to have given to the scryer information, about events distant in time or place, that had not come to his knowledge by normal means. These cases have been claimed as evidence of telepathic communication or even of- clairvoyance. But at present the number of well- attested cases of this sort is too small to justify acceptance of this conclusion by those who have only secondhand knowledge of them.

c. Prolonged deprivation of food predisposes to hallucina- tions, and it would seem that, under this condition, a large proportion of otherwise healthy persons become liable to them, especially to auditory hallucinations.

d. Certain drugs, notably opium, Indian hemp, and mescal predispose to hallucinations, each tending to produce a peculiar type. Thus Indian hemp and mescal, especially the latter, produce in many cases

visual hallucinations in the form of a brilliant play of colours, sometimes a mere successibn of patches of brilliant colour, sometimes in architectural or other definite spatial arrangement.

e. The states of transition from sleep to waking, and from waking to sleep, seem to be peculiarly favourable to the appear- ance of hallucinations. The recurrent sensations mentioned above are especially prone to appear at such times, and a considerable proportion of the sporadic hallucinations of persons in good health are reported to have been experienced under these conditions. The name " hypnagogic " hallucinations, first applied by Alfred Maury, is commonly given to those experienced in these transition states.

/. The presentations, predominantly visual, that constitute the principal content of most dreams, are generally described as hallucinatory, but the propriety of so classing them is very questionable. The present writer is confident that his own dream-presentations lack the sensory vividness which is the essential mark of the percept, whether normal or hallucinatory, and which is the principal, though not the only, character in which it differs from the representation or memory-image. It is true that the dream-presentation, like the percept, differs from the representative imagery of waking life in that it is relatively independent of volition; but that seems to be merely because the will is in abeyance or very ineffective during sleep. The wide currency of the doctrine that classes dream-images with hallucinations seems to be due to this independence of volitional control, and to the fact that during sleep the representative imagery appears without that rich setting of undiscriminated or marginal sensation which always accompanies waking imagery, and which by contrast accentuates for introspective reflection the lack of sensory vividness of such imagery.

g. Many of the subjects who pass into the deeper stages of hypnosis (see Hypnotism) show themselves, while in that condition, extremely liable to

hallucination, perceiving whatever object is suggested to them as present, and failing to perceive

any object of which it is asserted by the operator that it is no longer present. The reality of these positive and negative hallucinations of the hypnotized subject has been recently questioned, it being maintained that the subject merely gives verbal assent to the suggestions of the operator. But that the hypnotized subject does really experience hallucinations seems to be proved by the cases in which it is possible to make the hallucination, positive or negative, persist for some time after the termination of hypnosis, and by the fact that in some of these cases the subject, who in the post-hypnotic state seems in every other respect normal and wide awake, may find it difficult to distinguish between the hallucinatory and real objects. Further proof is afforded by experiments such as those by which Alfred Binet showed that a visual hallucination may behave for its percipient in many respects like a real object, e.g. that it may appear reflected in a mirror, displaced by a prism and coloured when a coloured glass is placed before the patient's eyes. It was by means of experiments of this kind that Binet showed that hypnotic hallucinations may approximate to the type of the illusion, i.e. that some real object affecting the sense-organ (in the case of a visual hallucination some detail of the surface upon which it is projected) may provide a nucleus of peripherally excited sensation around which the false percept is built up. An object playing a part of this sort in the genesis of an hal- lucination is known as a " point de repere." It has been main- tained that all hallucinations involve seme such point de repere or objective nucleus; but there are good reasons for rejecting this view.

h. In states of ecstasy, or intense emotional

concentration of attention upon some one ideal object, the object contemplated seems at times to take on sensory vividness, and so to acquire the character of an hallucination. In these cases the state of mind of the subject is probably similar in many respects to that of the deeply hypnotized subject, and these two classes of hallucination may be regarded as very closely allied.

III. Hallucinations which occur as symptoms of both bodily and mental diseases.

a. Dr H. Head has the credit of having shown for the first time, in the year iooi, that many patients, suffering from more or less painful visceral diseases, disorders of heart, lungs, abdominal viscera, &c, are liable to experience hallucinations of a peculiar kind. These ” visceral ” hallucinations, which are constantly accompanied by headache of the reflected visceral type, are most commonly visual, more rarely auditory. In all Dr Head’s cases the visual hallucination took the form of a shrouded human figure, colourless and vague, often incomplete, generally seen by the patient standing by his bed when he wakes in a dimly lit room. The auditory ” visceral ” hallucina- tion was in no instance vocal, but took such forms as sounds of tapping, scratching or rumbling, and were heard only in the absence of objective noises. In a few cases the ” visceral ” hallucination was bisensory, i.e. both auditory and visual.

In all these respects the ” visceral ” hallucination differs markedly from the commoner types of the sporadic hallucination of healthy persons.

b. Hallucinations are constant symptoms of certain general disorders in which the nervous system is involved, notably of the delirium tremens, which results from chronic alcohol poisoning, and of the delirium of the acute specific fevers. The hallucinations of these states are generally of a distressing or even terrifying character. Especially is this the rule with those of delirium tremens, and in the hallucinations of this disease certain kinds

of objects, e.g. rats and snakes, occur with curious frequency.

c. Hallucinations occasionally occur as symptoms of certain nervous diseases that are not usually classed with the insanities, notably in cases of epilepsy and severe forms of hysteria. In the former disorder, the sensory aura that so often precedes the epileptic convulsion may take the form of an hallucinatory object, which in some cases is very constant in character. Unilateral hallucinations, an especially interesting class, occur

in severe cases of hysteria, and are usually accompanied by hemi-anaesthesia of the body on the side on which the hallucin- atory object is perceived.

d. Hallucinations occur in a large, but not accurately definable, proportion of all cases of mental disease proper. Two classes are recognized: (i) those that are intimately connected with the dominant emotional state or with some dominant delusion; (2) those that occur sporadically and have no such obvious relation to the other symptoms of disease. Hallucinations of the former class tend to accentuate, and in turn to be confirmed by, the congruent emotional or delusional state; but whether these are to be regarded as primary symptoms and as the cause of the hallucinations, or vice versa, it is generally impossible to say. Patients who suffer delusions of persecution are very apt to develop later in the course of their disease hallucinations of the voices of their persecutors; while in other cases hallucinatory voices, which are at first recognized as such, come to be regarded as real and in these cases seem to be factors of primary importance in the genesis of further delusions. Hallucinations occur in almost every variety of mental disease, but are commonest in the forms characterized by a cloudy dream-like condition of consciousness, and in extreme cases of this sort the patient (as in the delirium of chronic alcohol-poisoning) seems to move waking through a world consisting largely of the images of his own

creation, set upon a background of real objects.

In some cases hallucinations are frequently experienced for long periods in the absence of any other symptom of mental disorder, but these no doubt usually imply some morbid condition of the brain.

Physiology 0} Hallucination. — There has been much discussion as to the nature of the neural process in hallucination. It is generally and rightly assumed that the hallucinatory perception of any object has for its immediate neural correlate a state of excitement which, as regards its characters and its distribution in the elements of the brain, is entirely similar to the neural correlate of the normal perception of the same object. The hallucination is a perception, though a false perception. In the perception of an object and in the representation of it, introspective analysis discovers a number of presentative elements. In the case of the representation these elements are memory images only (except perhaps in so far as actual kin-aesthetic sensations enter into its composition); whereas, in the case of the percept, some of these elements are sensations, sensations which differ from images in having the attribute of sensory vividness; and the sensory vividness of these elements lends to the whole complex the sensory vividness or reality, the possession of which character by the percept constitutes its principal difference from the representation. Normally, sensory vividness attaches only to those presentative elements which are excited through stimulations of the sense-organs. The normal percept, then, owes its character of sensory reality to the fact that a certain number of its presentative elements are sensations peripherally excited by impressions made upon a sense-organ. The problem is, then, to account for the fact that the hallucination contains presentative elements that have sensory vividness, that are sensations, although they are not excited by impressions from the external world falling upon a sense-organ. Most of the discussions of this subject suffer from the neglect of this preliminary definition of the

problem. Many authors, notably W. Wundt and his disciples, have been content to assume that the sensation differs from the memory-image only in having a higher degree of intensity; from which they infer that its neural correlate in the brain cortex also differs from that of the image only in having a higher degree of intensity. For them an hallucination is therefore merely a representation whose neural correlate involves an intensity of excitement of certain brain-elements such as is normally produced only by peripheral stimulation of sensory nerves in the sense-organs. But this view, so attractively simple, ignores an insuperable objection. Sensory vividness is not to be identified with superior intensity; for while the least intense sensation has it, the memory image of the most intense sensation lacks it completely.

And, since intensity of sensation is a function of the intensity of the underlying neural excitement, we may not assume that sensory vividness is also the expression in consciousness of that intensity of excitement. If Wundt's view were true a progressive diminution of the intensity of a sensory stimulus should bring the sensation to a point in the scale of diminishing intensity at which it ceases to be sensation, ceases to have sensory vividness and becomes an image merely. But this is not the case; with diminishing intensity of stimulation, the sensation declines to a minimal intensity and then disappears from consciousness. This objection applies not only to Wundt's view of hallucinations, but also to H. Taine's explanation of them by the aid of his doctrine of " reductives," for this too identifies sensory vividness with intensity. (H. Taine, D.e I' intelligence, tome i. p. 108.)

Another widely current explanation is based on the view that the representation and the percept have their anatomical bases in different element-groups or " centres " of the brain, the " centre " of the

representation being assigned to a higher level of the brain than that of the percept (the latter being sometimes assigned to the basal ganglia of the brain, the former to the cortex). It is then assumed that while the lower perceptual centre is normally excited only through the sense-organ, it may occasionally be excited by impulses playing down upon it from the corresponding centre of representation, when hallucination results.

This view also is far from satisfactory, because the great additions recently made to our knowledge of the brain tend very strongly to show that both sensations and memory- images have their anatomical bases in the same sensory areas of the cerebral cortex; and many considerations converge to show that their anatomical bases must be, in part at least, identical.

The views based on the assumptions of complete identity, and of complete separateness, of the anatomical bases of the percept and of the representation are then alike untenable; and the alternative — that their anatomical bases are in part identical, in part different, which is indicated by this conclusion — renders possible a far more satisfactory doctrine. We have good reason to believe that the neural correlate of sensation is the trans- mission of the nervous impulse through a sensori-motor arc of the cortex, made up of a chain of neurones; and the view suggests itself that the neural correlate of the corresponding memory- image is the transmission of the impulse through a part only of this chain of cortical elements, either the efferent motor part of this chain or the afferent sensory part of it. Professor W. James's theory of hallucinations is based on the latter assump- tion. He suggests that the sensory vividness of sensation and of the percept is due to the discharge of the excitement of the chain of elements in the forward or motor direction; and that, in the case of the image and of the representation, the discharge takes place, not in this direction through the efferent channel of the centre, but laterally into other centres of the cortex. Hal- lucination may then be

conceived as caused by obstruction, or abnormally increased resistance, of the paths connecting such a cortical centre with others, so that, when it becomes excited in any way, the tension or potential of its charge rises, until discharge takes place in the motor direction through the efferent limbs of the sensori-motor arcs which constitute the centre.

It is a serious objection to this view that, as James himself, in common with most modern authors, maintains, every idea has its motor tendency which commonly, perhaps always, finds expression in some change of tension of muscles, and in many cases issues in actual movements. Now if we accept James's theory of hallucination, we should expect to find that whenever ,a representation issues in bodily action it should assume the sensory vividness of an hallucination; and this, of course, is not the case.

The alternative form of the view that assumes partial identity of the anatomical bases of the percept and the representation of an object, would regard the neural correlate of the sensation as the transmission of the nervous impulse throughout the length

of the sensori-motor arc of the cortex, from sensory inlet to motor outlet; and that of the image as its transmission through the efferent part of this arc only; that is to say, in the case of the image, it would regard the excitement of the arc as being initiated at some point between its afferent inlet and its motor outlet, and as spreading, in accordance with the law of forward conduction, towards the motor outlet only, so that only the part of the arc distal or efferent to this point becomes excited.

This view of the neural basis of sensory vividness, which correlates the difference between the sensation and the image with the only known difference between their physiological conditions, namely the peripheral initiation of the one and the central initiation of the other, enables us to formulate a satis- factory theory of the physiology

of hallucinations.

The anatomical basis of the perception and of the representa- tion of any object is a functional system of nervous elements, comprising a number of sensori-motor arcs, whose excitement by impulses ascending to them by the sensory paths from the sense- organs determines sensations, and whose excitement in their efferent parts only determines the corresponding images. In the case of perception, some of these arcs are excited by impulses ascending from the sense-organs, others only by the spread of the excitement through the system from these peripherally excited arcs; while, in the case of the representation, all alike are excited by impulses that reach the system from other parts of the cortex and spread throughout its efferent parts only to its motor outlets.

If then impulses enter this system by any of the afferent limbs of its sensori-motor arcs, the presentation that accompanies its excitement will have sensory vividness and will be a true perception, an illusion, or an hallucination, according as these impulses have followed the normal course from the sense-organ, or have been diverted, to a lesser or greater degree, from their normal paths. If any such neural system becomes abnormally excitable, or becomes excited in any way with abnormal intensity, it is thereby rendered a path of exceptionally low-resistance capable of diverting to itself, from their normal path, any streams of impulses ascending from the sense-organ; which ascending impulses, entering the system by its afferent inlets, excite sensations that impart to the presentation the character of sensory vividness; the presentation thus acquires the character of a percept in spite of the absence of the appropriate impression on the sense-organ, and we call it an hallucination.

This view renders intelligible the modus operandi of many of the predisposing causes of hallucination; e.g. the pre-occupation with certain representations of the ecstatic, or of the sufferer from delusions

of persecution; the intense expectation of a particular sense impression, the generally increased excitability of the cortex in states of delirium: in all these conditions the abnormally intense excitement of the cortical systems may be supposed to give them an undue directive and attractive influence upon the streams of impulses ascending from the sense-organs, so that sensory impulses may be diverted from their normal paths. Again, it renders intelligible the part played by chronic irritation of a sense-organ, as when chronic irritation of the internal ear leads on to hallucinations of hearing; perhaps also the chronic irritation of sensory nerves that must accompany the states of visceral disease, shown by Head to be so frequently accompanied by a liability to hallucinations; for any such chronic irritation supplies a stream of disorderly impulses rising constantly from the sense-organ, for the reception of which the brain has nc appropriate system, and which, therefore, readily enters any organized cortical system that at any moment constitutes a path of low-resistance. A similar explanation applies to the influence of fixed gazing upon a crystal, or the placing of a shell over the ear, in inducing visual and auditory hallucinations. The " recurrent sensations " experienced after prolonged occupation with some one kind of sensory object may be regarded as due to an abnormal excitability of the cortical system con- cerned, resulting from its unduly prolonged exercise. The hypothesis renders intelligible also the liability to hallucination of persons in the hysterical and hypnotic states, in whose brains

the cortical neural systems, are in a state of partial dissociation, which renders possible an unduly intense and prolonged excite- ment of some one system at the expense of all other systems (cf. Hypnotism).

Coincidental Hallucinations. — It would seem that, in well- nigh all countries and in all ages, apparitions of persons known to be in distant places have been occasionally observed. Such appearances have usually been regarded as due to the presence, before the bodily eye of the seer, of the ghost, wraith, double or soul of the person who thus appears; and, since the soul has been very commonly supposed to leave the body, permanently at death and temporarily during sleep, trance or any period of unconsciousness, however induced, it was natural to regard such an appearance as evidence that the person whose wraith was thus seen was in some such condition. Such apparitions have probably played a part, second only to that of dreams, in generating the almost universal belief in the separability of soul and body.

In many parts of the world traditional belief has connected such apparitions more especially with the death of the person so appearing, the apparition being regarded as an indication that the person so appearing has recently died, is dying or is about to die. Since death is so much less common an event than sleep, trance, or other form of temporary unconsciousness, the wide extension of this belief suggests that such apparitions may coincide in time with death, with disproportionate frequency. The belief in the significance of such apparitions still survives in civilized communities, and stories of apparitions coinciding with the death of the person appearing are occasionally reported in the newspapers, or related as having recently occurred. The Society for Psychical Research has sought to find grounds for an answer to the question " Is there any sufficient justification for the belief in a causal relation between the apparition of a person at a place distant from his body and his death or other exceptional and momentous event in his experience?" The problem was attacked in a thoroughly scientific spirit, an extensive inquiry was made, and the results were presented and fully discussed in two large volumes, Phantasms of the Living, published in the year 1886, bearing on the

title-page the names of Edmund Gurney, F. W. H. Myers and F. Podmore. Of the three collaborators Gurney took the largest share in the planning of the work, in the collection of evidence, and in the elaboration and discussion of it.

Gurney set out with the presumption that apparitions, whether coincidental or not, are hallucinations in the sense defined above; that they are false perceptions and are not excited by any object or process of the external world acting upon the sense-organs of the percipient in normal fashion; that they do not imply the presence, in the place apparently occupied by them, of any wraith or any form of existence emanating from, or specially connected with, the person whose phantasm appears. This initial assump- tion was abundantly justified by an examination of a large number of cases for it, which showed that, in all important respects, mcst of these apparitions of persons at a distance, whether coincidental or not, were similar to other forms of hallucination.

The acceptance of this conclusion does not, however, imply a negative answer to the question formulated above. The Society for Psychical Research had accumulated an impressive and, to almost all those who had first-hand acquaintance with it, a convincing mass of experimental evidence of the reality of telepathy (q.v.), the influence of mind on mind otherwise than through the recognized channels of sense. The successful experiments had for the most part been made between persons in close proximity, in the same room or in adjoining rooms; , but they seemed to show that the state of consciousness of one person may induce directly (i.e. without the mediation of the organs of expression and sense-perception) a similar state of consciousness in another person, especially if the former, usually called the "agent," strongly desired or "willed" that this effect should be produced on the other person, the " percipient."

The question formulated above thus resolved itself for Gurney into the more definite form, " Can we

find any good reason for believing that coincidental hallucinations are sometimes veridical, that the state of mind of a person at some great crisis of his experience may telepathically induce in the mind of some distant relative or friend an hallucinatory perception of himself ? ” It was at once obvious that, if coincidental apparitions can be proved to occur, this question can only be answered by a statistical inquiry; for each such coincidental hallucination, considered alone, may always be regarded as most educated persons of the present time have regarded them, namely, as merely accidental coincidences. That the coincidences are not merely accidental can only be proved by showing that they occur more frequently than the doctrine of chances would justify us in expecting. Now, the death of any person is a unique event, and the probability of its occurrence upon any particular day may be very simply calculated from the mortality statistics, if we assume that nothing is known of the individual’s vitality. On the other hand, hallucinatory perceptions of persons, occurring to sane and healthy individuals in the fully waking state, are comparatively rare occurrences, whose frequency we may hope to determine by a statistical inquiry. If, then, we can obtain figures expressing the frequency of such hallucinations, we can deduce, by the help of the laws of chance, the proportion of such hallucinations that may be expected to coincide with (or, for the purposes of the inquiry, to fall within twelve hours of) the death of the person whose apparition appears, if no causal relation obtains between the coinciding events. If, then, it appears that the proportion of such coincidental hallucinations is greater than the laws of probability will account for, a certain presumption of a causal relation between the coinciding events is thereby established; and the greater the excess of such coincidences, the stronger does this presumption become. Gurney attempted a census of hallucinations in order to obtain data for this statistical treatment, and the results of it, embodied in Phantasms of the Living, were considered by the authors of that work to justify the belief

that some coincidental hallucina- tions are veridical. In the year 1889 the Society for Psychical Research appointed a committee, under the chairmanship of the late Henry Sidgwick, to make a second census of hallucinations on a more extensive and systematic plan than the first, in order that the important conclusion reached by the authors of Phant- asms of the Living might be put to the severer test rendered possible by a larger and more carefully collected mass of data. Seventeen thousand adults returned answers to the question, " Have you ever, when believing yourself to be completely awake, had a vivid impression of seeing or being touched by a living being or inanimate object, or of hearing a voice; which impres- sion, so far as you could discover, was not due to any external physical cause ? " Rather more than two thousand persons answered affirmatively, and to each of these were addressed careful inquiries concerning their hallucinatory experiences. In this way it was found that of the total number, 381 apparitions of persons living at the moment (or not more than twelve hours dead) had been recognized by the percipients, and that, of these, 80 were alleged to have been experienced within twelve hours of the death of the person whose apparition had appeared. A careful review of all the facts, conditions and probabilities, led the committee to estimate that the former number should be enlarged-to 1300 in order to make ample allowance for forgetful- ness and for all other causes that might have tended to prevent the registration of apparitions of this class. On the other hand, a severe criticism of the alleged death-coincidences led them to reduce the number, admitted by them for the purposes of their calculation, to 30. The making of these adjustments gives us about 1 in 43 as the proportion of coincidental death-apparitions to the total number of recognized apparitions among the 17,000 persons reached by the census. Now the death-rate being just over 19 per thousand, the probability that any person taken at random will die on a given day is about 1 in 19,000; or, more strictly speaking, the average probability that any person will die within

any given period of twenty-four hours duration

is about 1 in 19,000. Hence the probability that any other particular event, having no causal relation to his death, but occurring during his lifetime (or not later than twelve hours after his death) will fall within the same twenty-four hours as his death is 1 in 19,000; i.e. if an apparition of any individual is seen and recognized by any other person, the probability of its being experienced within twelve hours of that individual's death is 1 in 19,000, if no causal relation obtains between the two events. Therefore, of all recognized apparitions of living persons, 1 only in 19,000 may be expected to be a death-coincidence of this sort. But the census shows that of 1300 recognized appari- tions of living persons 30 are death-coincidences and that is equivalent to 440 in 19,000. Hence, of recognized hallucinations, those coinciding with death are 440 times more numerous than we should expect, if no causal relation obtained; therefore, if neither the data nor the reasoning can be destructively criticized, we are compelled to believe that some causal relation obtains; and, since good evidence of telepathic communication has been experimentally obtained, the least improbable explanation of these death-apparitions is that the dying person exerts upon his distant friend some telepathic influence which generates an hallucinatory perception of himself.

These death-coincidences constitute the main feature of the argument in favour of telepathic communication between distant persons, but the census of hallucinations afforded other data from which a variety of arguments, tending to support this conclusion, were drawn by the committee; of these the most important are the cases in which the hallucinatory percept embodied details that were connected with the person perceived and which could not have become known to the percipient by any

normal means. The committee could not find in the results of the census any evidence sufficient to justify a belief that hallucinations may be due to telepathic influence exerted by personalities surviving the death of the body.

The critical handling of the cases by the committee seems to be above reproach. Those who do not accept their conclusion based on the death-coincidences must direct their criticism to the question of the reliability of the reports of these cases. It is to be noted that, although only those cases are reckoned in which the percipient had no cause to expect the death of the person whose apparition he experienced, and although, in nearly all the accepted cases, some record or communication of the hallucination was made before hearing of the death, yet in very few cases was any contemporary written record of the event forthcoming for the inspection of the committee. (W. McD.)

HALLUIN, a frontier town of northern France, in the depart- ment of Nord, near the right bank of the Lys, 14 m. N. by E. of Lille by rail. Pop. (1906) town, 11,670; commune, 16,158. Its church is of Gothic architecture. The manufactures comprise linen and cotton goods, chairs and rubber goods, and brewing and tanning are carried on ; there is a board of trade arbitration. The family of Halluin is mentioned as early as the 13th century. In 1587 the title of duke and peer of the realm was granted to it, but in the succeeding century it became extinct.

HALM, CARL FELIX (1809-1882), German classical scholar and critic, was born at Munich on the 5th of April 1809. In 1849, after having held appointments at Spires and Hadamar, he became rector of the newly founded Maximiliansgymnasium at Munich, and in 1856 director of the royal library and professor in the university. These posts he held till his death on the 5th of October 1882. It is chiefly as the editor of Cicero and other Latin prose authors that Halm is known, although in early years he also devoted considerable attention to Greek. After the death of J. C. Orelli, he joined J. G. Baiter in the

preparation, of a revised critical edition of the rhetorical and philosophical , writings of Cicero (1854–1862). His school editions of some of the speeches of Cicero in the Haupt and Sauppe series, with notes and introductions, were very successful. He also edited a number of classical texts for the Teubner series, the most important of which are Tacitus (4th ed., 1883); Rhetores Latini mmores (1863); Quintilian (1868); Sulpicius Severus (1866); Minucius Felix together with Firmicus Maternus De errore

(1867); Salvianus (1877) and Victor Vitensis's Historia per- secutionis Africanae provinciae (1878). He was also an enthusiastic collector of autographs.

See articles by W. Christ and G. Laubmann in Allgemeine deutsche Biographie and by C. Bursian in Biographisches Jahrbuch; and J. E. Sandys, Hist, of Classical Scholarship, iii. 195 (1908).

HALMA (Greek for " jump "), a table game, a form of which was known to the ancient Greeks, played on a board divided into 256 squares with wooden men, resembling chess pawns. In the two-handed game 19 men are employed on each side, coloured respectively black and white; in the four-handed each player has 13, the men being coloured white, black, red and green. At the beginning of the game the men are drawn up in triangular formation in the enclosures, or yards, diagonally opposite each other in the corners of the board. The object of each player is to get all his men into his enemy's yard, the player winning who first accomplishes this. The moves are made alternately, the mode of progression being by a step, from one square to another immediately adjacent, or by a jump (whence the name), which is the jumping of a man from a square in front of it into an empty square on the other side of it. This corre- sponds to jumping in draughts, except that, in halma, the hop may be in any direction, over friendly as well as hostile men, and the men jumped over are not taken but remain on the board.

In the four-handed game either each player plays for himself, or two adjacent players play against the other two.

See Card and Table Games, by Professor Hoffmann (London, 1903) . HALMAHERA [" great land " ; also Jilolo or Gilolo], an island of the Dutch East Indies, belonging to the residency of Ternate, lying under the equator and about 128° E. Its shape is extremely irregular, resembling that of the island of Celebes. It consists of four peninsulas so arranged as to enclose three great bays (Kayu, Bicholi, Weda), all opening towards the east, the northern peninsula being connected with the others by an isthmus only 5 m. wide. On the western side of the isthmus lies another bay, that of Dodinga, in the mouth of which are situated the two islands Ternate and Tidore, whose political importance exceeds that of the larger island (see these articles). Of the four peninsulas of Halmahera the northern and the southern are reckoned to the sultanate of Ternate, the north-eastern and south-eastern to that of Tidore; the former having eleven, the latter three districts. The distance between the extremities of the northern and southern peninsulas, measured along the curve of the west coast, is about 240 m. ; and the total area of the island is 6700 sq. m. Knowledge of the island is very incomplete. It appears that the four peninsulas are traversed in the direction of their longitudinal axis by mountain chains 3000 to 4000 ft. high, covered with forest, without a central chain at the nucleus of the island whence the peninsulas diverge. The mountain chains are frequently interrupted by plains, such as those of Weda and Kobi. The northern part of the mountain chain of the northern peninsula is volcanic, its volcanoes con- tinuing the line of those of Makian, Ternate and Tidore. Coral formations on heights in the interior would indicate oscillations of the land in several periods, but a detailed geology of the island is wanting. To the north-east of the northern peninsula is the considerable island of Morotai (635 sq. m.), and to the west of the southern peninsula the more important island of Bachian (q.v.) among

others. Galela is a considerable settlement, situated on a bay of the same name on the north-east coast, in a well cultivated plain which extends southward and inland. Vegeta- tion is prolific. Rice is grown by the natives, but the sago tree is of far greater importance to them. Dammar and coco-nuts are also grown. The sea yields trepang and pearl shells. A little trade is carried on by the Chinese and Macassars of Ternate, who, crossing the narrow isthmus of Dodinga, enter the bay of Kayu on the east coast. The total population is estimated at

100,000.

The inhabitants are mostly of immigrant Malayan stock. In the northern peninsula are found people of Papuan type, probably representing the aborigines, and a tribe around Galela,

who are Polynesian in physique, possibly remnants, much mixed by subsequent crossings with the Papuan indigenes, of the Caucasian hordes emigrating in prehistoric times across the Pacific. M. Achille Raffray gives a description of them in Tour du monde (1879) where photographs will be found. " They are as unlike the Malays as we are, excelling them in tallness of stature and elegance of shape, and being perfectly distinguished by their oval face, with a fairly high and open brow, their aquiline nose and their horizontally placed eyes. Their beards are sometimes thick; their limbs are muscular; the colour of their skins is cinnamon brown. Spears of iron-wood, abundantly barbed, and small bows and bamboo arrows free from poison are their principal weapons." They are further described as having temples (sabuas) in which they suspend images of serpents and other monsters as well as the trophies procured by war. They believe in a better life hereafter, but have no idea of a hell or a devil, their evil spirits only tormenting them in the present state.

The Portuguese and Spaniards were better acquainted with Halmahera than with many other parts of the archipelago; they called it sometimes Batu China and sometimes Moro. It was circumnavigated by one of their vessels in 1525, and the general outline of the coasts is correctly given in their maps at a time when separate portions of Celebes, such as Macassar and Menado, are represented as distinct islands. The name (Jilolo) was really that of a native state, the sultan of which had the chief rank among the princes of the Moluccas before he was supplanted by the sultan of Ternate about 1380. His capital, Jilolo, lay on the west coast on the first bay to the north of that of Dodinga. In 1876 Danu Hassan, a descendant of the sultans of Jilolo, raised an insurrection in the island for the purpose of throwing off the authority of the sultans of Tidore and Ternate; and his efforts would probably have been successful but for the intervention of the Dutch. In 1878 a Dutch expedition was directed against the pirates of Tobalai, and they were virtually extirpated. Slavery remains in the interior. Missionary work, carried on in the northern peninsula of Halmahera since 1866, has been fairly successful among the heathen natives, but less so among the Mahommedans, who have often incited the others against the missionaries and their converts.

HALMSTAD, a seaport of Sweden, chief town of the district (liiti) of Halland, on the E. shore of the Cattegat, 76 m. S.S.E. of Gothenburg by the railway to Helsingborg. Pop. (1900), 15,362. It lies at the mouth of the river Nissa, having an inner harbour (15 ft. depth), an outer harbour, and roads giving anchorage (24 to 36 ft.) exposed to S. and N.W. winds. In the neighbourhood there are quarries of granite, which is exported chiefly to Germany. Other industries are engineering, ship- building and brewing, and there are cloth, jute, hat, wood-pulp and paper factories. The principal exports are granite, timber and hats; and butter through Helsingborg and Gothenburg. The imports are coal, machinery and grain. Potatoes are largely grown in

the district, and the salmon fisheries are valuable. The castle is the residence of the governor of the province. There are both mineral and sea-water baths in the neighbourhood.

Mention of the church of Halmstad occurs as early as 1462, and the fortifications are mentioned first in 1225. The latter were demolished in 1734. There were formerly Dominican and Franciscan monasteries in the town. The oldest town-privileges date from 1307. During the revolt of the miner Engelbrekt, it twice fell into the hands of the rebels — in 1434 and 1436. The town appears to have been frequently chosen as the meeting- place of the rulers and delegates of the three northern kingdoms; and under the union of Kalmar it was appointed to be tne place for the election of a new Scandinavian monarch whenever • necessary. The Ian of Halland formed part of the territory of Denmark in Sweden, and accordingly,, in 1534, during his war with the Danes, Gustavus Vasa assaulted and took its chief town. In 1660, by the treaty of Copenhagen, the whole district was ceded to Sweden. In 1676 Charles XII. defeated near Halmstad a Danish army which was attempting to retake the district, and since that time Halland has formed part of Sweden.

HALO, a word derived from the Gr. SXws, a threshing-floor, and afterwards applied to denote the disk of the sun or moon, probably on account of the circular path traced out by the oxen threshing the corn. It was thence applied to denote any luminous ring, such as that viewed around the sun or moon, or portrayed about the heads of saints.

In physical science, a halo is a luminous circle, surrounding the sun or moon, with various auxiliary phenomena, and formed by the reflection and refraction of light by ice-crystals suspended in the atmosphere. The optical phenomena produced by atmospheric water and ice may be divided into two classes, according to the relative position of the luminous ring and the source of light. In the first class we have halos, and coronae, or ” glories,” which encircle the luminary; the second class

includes rainbows, fog-bows, misl-kalos, anlhelia and mountain- spectres, whose centres are at the anti-solar point. Here it is only necessary to distinguish halos from coronae. Halos are at definite distances (22 and 46) from the sun, and are coloured red on the inside, being due to refraction; coronae closely surround the sun at variable distances, and are coloured red on the outside, being due to diffraction.

The phenomenon of a solar (or lunar) halo as seen from the earth is represented in fig. 1 ; fig. 2 is a diagrammatic sketch showing the appearance as viewed from the zenith; but it is only in exceptional circumstances that all the parts are seen. Encircling the sun or moon (S), there are two circles, known as

Fig. 1.

Fig. 2.

the inner halo I, and the outer halo 0, having radii of about 22 and 46°, and exhibiting the colours of the spectrum in a confused manner, the only decided tint being the red on the inside. Passing through the luminary and parallel to the horizon, there is a white luminous circle, the parhelic circle (P), on which a number of images of the luminary appear. The most brilliant are situated at the- intersections of the inner halo and the parhelic circle; these are known as parhelia (denoted by the letter p in the figures) (from the Gr. trapa, beside, and 77X105, the sun) or " mock-suns," in the case of the sun, and as paraselenae (from irapa and creXiji^, the moon) or " mock-moons," in the case of the moon. Less brilliant are the parhelia of the outer halo. The parhelia are most brilliant when the sun is near the horizon. As the sun rises, they pass a little beyond the halo and exhibit flaming tails. The other images on the parhelic circle are the paranthelia (q) and the anthelion (a) (from the Greek kvri, opposite, and jjXtos, the sun). The former are situated at from 90° to 140° from the sun; the latter is a white patch of light situated at the

anti-solar point and often exceeding in size the apparent diameter of the luminary. A vertical circle passing through the sun may also be seen. From the parhelia of the inner halo two oblique curves (L) proceed. These are known as the " arcs of Lowitz," having been first described in 1794 by Johann Tobias Lowitz (17 5 7-1 804). Luminous arcs (T), tangential to the upper and lower parts of each halo, also occur, and in the case of the inner halo, the arcs may be prolonged to form a quasi-elliptic halo. 1

The physical explanation of halos originated with Rene Descartes, who ascribed their formation to the presence of ice- crystals in the atmosphere. This theory was adopted by Edm6 Mariotte, Sir Isaac Newton and Thomas Young; and, although

certain of their assumptions were somewhat arbitrary, yet the general validity of the theory has been demonstrated by the researches of J. G. Galle and A. Bravais. The memoir of the last-named, published in the Journal de I'Ecole royale poly- tcchnique for 1847 (xviii., 1-270), ranks as a classic on the subject; it is replete with examples and illustrations, and dis- cusses the various phenomena in minute detail.

The usual form of ice-crystals in clouds is a right hexagonal prism, which may be elongated as a needle or foreshortened like a thin plate. There are three refracting angles possible, one of 1 20° between two adjacent prism faces, one of 60° between two alternate prism faces, and one of 90° between a prism face and the base. If innumerable numbers of such crystals fall in any manner between the observer and the sun, light falling upon these crystals will be refracted, and the refracted rays will be crowded together in the position of minimum deviation (see Refraction of Light). Mariotte explained the inner halo as being due to refraction through a pah of alternate faces, since the minimum

deviation of an ice-prism whose refracting angle is 6o° is about 22 . Since the minimum deviation is least for the least refrangible rays, it follows that the red rays will be the least refracted, and the violet the more refracted, and therefore the halo will be coloured red on the inside. Similarly, as explained by Henry Cavendish, the halo of 46 is due to refraction by faces inclined at 90 . The impurity of the colours (due partly to the sun's diameter, but still more to oblique refraction) is more marked in halos than in rainbows; in fact, only the red is at all pure, and as a rule, only a mere trace of green or blue is seen, the external portion of each halo being nearly white.

The two halos are the only phenomena which admit of explanation without assigning any particular distribution to the ice-crystals. But it is obvious that certain distributions will predominate, for the crystals will tend to fall so as to offer the least resistance to their motion; a needle-shaped crystal tending to keep its axis vertical, a plate-shaped crystal to keep its axis horizontal. Thomas Young explained the parhelic circle (P) as due to reflection from the vertical faces of the long prisms and the bases of the short ones. If these vertical faces become very numerous, the eye will perceive a colourless horizontal circle. Reflection from an excess of horizontal prisms gives rise to a vertical circle passing through the sun.

The parhelia (p) were explained by Mariotte as due to refrac- tion through a pair of alternate faces of a vertical prism. When the sun is near the horizon the rays fall upon the principal section of the prisms; the minimum deviation for such rays is 22 , and consequently the parhelia are not only on the inner halo, but also on the parhelic circle. As the sun rises, the rays enter the prisms more and more obliquely, and the angle of minimum deviation increases; but since the emergent ray makes the same angle with the refracting edge as the incident ray, it follows that the parhelia will remain on the parhelic circle, while receding from the inner halo. The different values of the angle of minimum

deviation for rays of different refrangibilities give rise to spectral colours, the red being nearest the sun, while farther away the overlapping of the spectra forms a flaming colourless tail sometimes extending over as much as io° to 20 . The ” arcs of Lowitz ” (L) are probably due to small oscillations of the vertical prisms.

The ” tangential arcs ” (T) were explained by Young as being caused by the thin plates with their axes horizontal, refraction taking place through alternate faces. The axes will take up any position, and consequently give rise to a continuous series of parhelia which touch externally the inner halo,’ both above and below, and under certain conditions (such as the requisite altitude of the sun) form two closed elliptical curves; generally, however, only the upper and lower portions are seen. Similarly, the tangential arcs to the halo of 46° are due to refraction through faces inclined at 90 ,

The paranthelia (q) may be due to two internal or two external reflections. A pair of triangular prisms having a common face, or a stellate crystal formed by the symmetrical interpenetration of two triangular prisms admits of two internal reflections by

xn. 28

faces inclined at 1 20 , and so give rise to two colouiless images each at an angular distance of 120° from the sun. Double internal reflection by a triangular prism would form a single coloured image on the parhelic circle at about 98 from the sun. These angular distances are attained only when the sun is on the horizon, and they increase as it rises.

The anthelion (a) may be explained as caused by two internal reflections of the solar rays by a hexagonal lamellar crystal, having its axis horizontal and one of the diagonals of its base vertical. The emerging rays are parallel to their original direction and form a colourless image on

the parhelic circle opposite the sun.

References. — Auguste Bravais's celebrated memoir, " Sur les halos et les phteomenes optiques qui les accompagnent " (Journ. £cole poly. vol. xviii., 1847), contains a full account of the geometrical theory. See also E. Mascart, Traite d'optiquc ; J. Pernter, Meteoro- logische Optik (1902-1905) ; and R. S. Heath, Geometrical Optics.

HALOGENS. The word halogen is derived from the Greek ciXs (sea-salt) and ytvvav (to produce), and consequently means the sea-salt producer. The term is applied to the four elements fluorine, chlorine, bromine and iodine, on account of the great similarity of their sodium salts to ordinary sea-salt. These four elements show a great resemblance to one another in their general chemical behaviour, and in that of their com- pounds, whilst their physical properties show a gradual transition. Thus, as the atomic weight increases, the state of aggregation changes from that of a gas in the case of fluorine and chlorine, to that of a liquid (bromine) and finally to that of the solid (iodine); at the same time the melting and boiling points rise with increasing atomic weights. The halogen of lower atomic weight can displace one of higher atomic weight from its hydrogen compound, or from the salt derived from such hydrogen com- pound, while, on the other hand, the halogen of higher atomic weight can displace that of lower atomic weight, from the halogen oxy-acids and their salts; thus iodine will liberate chlorine from potassium chlorate and also from perchloric acid. All four of the halogens unite with hydrogen, but the affinity for hydrogen decreases as the atomic weight increases, hydrogen and fluorine uniting explosively at very low temperatures and in the dark, whilst hydrogen and iodine unite only at high temperatures, and even then the resulting compound is very readily decomposed by heat. The hydrides of the halogens are all colourless, strongly fuming gases, readily soluble in water and possessing a strong acid reaction; they react readily with basic oxides, forming in most cases well defined crystalline salts

which resemble one another very strongly. On the other hand the stability of the known oxygen compounds increases with the atomic weight, thus iodine pentoxide is, at ordinary temperatures, a well-defined crystalline solid, which is only decomposed on heating strongly, whilst chlorine monoxide, chlorine peroxide, and chlorine heptoxide are very unstable, even at ordinary temperatures, decomposing at the slightest shock. Compounds of fluorine and oxygen, and of bromine and oxygen, have not yet been isolated. In some respects there is a very marked difference between fluorine and the other members of the group, for, whilst sodium chloride, bromide and iodide are readily soluble in water, sodium fluoride is much less soluble; again, silver chloride, bromide and iodide are practically insoluble in water, whilst, on the other hand, silver fluoride is appreciably soluble in water. Again, fluorine shows a great tendency to form double salts, which have no counterpart among the compounds formed by the other members of the family.

HALS, FRANS (i58o?i666), Dutch painter, was born at Antwerp according to the most recent authorities in 1580 or ,.1581, and died at Haarlem in 1666. As a portrait painter second only to Rembrandt in Holland, he displayed extraordinary talent and quickness in the exercise of. his art coupled with improvidence in the use of the means which that art secured to him. At a time when the Dutch nation fought for independence and won it, Hals appears in the ranks of its military gilds. He was also a member of the Chamber of Rhetoric, and (1644) chair man of the Painters' Corporation at Haarlem. But as a man he had failings. He so ill-treated his first wife, Anneke Hermansz,

that she died prematurely in 1616; and he barely saved the character of his second, Lysbeth Reyniers, by marrying her in 161 7. Another defect was partiality to drink, which led him into low company.

Still he brought up and supported a family of ten children with success till 1652, when the forced sale of his pictures and furniture, at the suit of a baker to whom he was indebted for bread and money, brought him to absolute penury. The inventory of the property seized on this occasion only mentions three mattresses and bolsters, an armoire, a table and five pictures. This humble list represents all his worldly posses- sions at the time of his bankruptcy. Subsequently to this he was reduced to still greater straits, and his rent and firing were paid by the municipality, which afterwards gave him (1664) an annuity of 200 florins. We may admire the spirit which enabled him to produce some of his most striking works in his unhappy circumstances: we find his widow seeking outdoor relief from the guardians of the poor, and dying obscurely in a hospital.

Hals's pictures illustrate the various strata of society into which his misfortunes led him. His banquets or meetings of officers, of sharpshooters, and gildsmen are the most interesting of his works. But they are not more characteristic than his low-life pictures of itinerant players and singers. His portraits of gentlefolk are true and noble, but hardly so expressive as those of fishwives and tavern heroes.

His first master at Antwerp was probably van Noort, as has been suggested by M. G. S. Davies, but on his removal toHaarlem Frans Hals entered the atelier of van Mander, the painter and historian, of whom he possessed some pictures which went to pay the debt of the baker already alluded to. But he soon improved upon the practice of the time, illustrated by J. van Schoreel and Antonio Moro, and, emancipating himself gradually from tradition, produced pictures remarkable for truth and dexterity of hand. We prize in Rembrandt the golden glow of effects based upon artificial contrasts of low light in immeasurable gloom. Hals was fond of daylight of silvery sheen. Both men were painters of touch, but of touch on different keys — Rem- brandt was the bass, Hals the treble. The latter is perhaps more expressive than the former. He seizes with rare

intuition a moment in the life of his sitters. What nature displays in that moment he reproduces thoroughly in a very delicate scale of colour, and with a perfect mastery over every form of expression. He becomes so clever at last that exact tone, light and shade, and modelling are all obtained with a few marked and fluid strokes of the brush.

In every form of his art we can distinguish his earlier style from that of later years. It is curious that we have no record of any work produced by him in the first decade of his independent activity, save an engraving by Jan van de Velde after a lost portrait of " The Minister Johannes Bogardus," who died in 1614. The earliest works by Frans Hals that have come down to us, " Two Boys Playing and Singing " in the gallery of Cassel, and a " Banquet of the officers of the 'St Joris Doele' " or Arquebusiers of St George (1616) in the museum of Haarlem, exhibit him as a careful draughtsman capable of great finish, yet spirited withal. His flesh, less clear than it afterwards becomes, is pastose and burnished. Later he becomes more effective, displays more freedom of hand, and a greater command of effect. At this period we note the beautiful full- length of " Madame van Beresteyn " at the Louvre in Paris, and a splendid full-length portrait of " Willem van Heythuysen " leaning on a sword in the Liechtenstein collection at Vienna. Both these pictures are equalled by the other " Banquet of the officers, of the Arquebusiers of St George " (with different portraits) and the " Banquet of the officers of the ' Cloveniers , Uoelen ' " or Arquebusiers of St Andrew of 1627 and an " Assembly of the officers of the Arquebusiers of St Andrew " of 1633 in the Haarlem Museum. A picture of the same kind in the town hall of Amsterdam, with the date of 1637, suggests some study of the masterpieces of Rembrandt, and a similar influence is apparent in a picture of 1641 at Haarlem, representing Vhe " Regents of the Company of St Elizabeth " and in the

portrait of " Maria Voogt " at Amsterdam. But Rembrandt's example did not create a lasting

impression on Hals. He gradu- ally dropped more and more into grey and silvery harmonies of tone; and two of his canvases, executed in 1664, "The Regents and Regentesses of the Oudemannenhuis " at Haarlem, are masterpieces of colour, though in substance all but mono- chromes. In fact, ever since 1641 Hals had shown a tendency to restrict the gamut of his palette, and to suggest colour rather than express it. This is particularly noticeable in his flesh tints which from year to year became more grey, until finally the shadows were painted in almost absolute black, as in the " Tymane Oosdorp," of the Berlin Gallery. As this tendency coincides with the period of his poverty, it has been suggested that one of the reasons, if not the only reason, of his predilection for black and white pigment was the cheapness of these colours as compared with the costly lakes and carmines.

As a portrait painter Frans Hals had scarcely the psychological insight of a Rembrandt or Velazquez, though in a few works, like the " Admiral de Ruyter," in Earl Spencer's collection, the " Jacob Olycan " at the Hague Gallery, and the " Albert van der Meer " at Haarlem town hall, he reveals a searching analysis of character which has little in common with the instantaneous expression of his so-called " character " portraits. In these he generally sets upon the canvas the fleeting aspect of the various stages of merriment, from the subtle, half ironic smile that quivers round the lips of the curiously misnamed " Laughing Cavalier " in the Wallace Collection to the imbecile grin of the " Hille Bobbe " in the Berlin Museum. To this group of pictures belong Baron Gustav Rothschild's " Jester," the " Bohemienne " at the Louvre, and the "Fisher Boy" at Antwerp, whilst the " Portrait of the Artist with his second Wife " at the Ryks Museum in Amsterdam, and the somewhat confused group of the " Beresteyn Family " at the Louvre show a similar tendency. Far less scattered in arrangement than this Beresteyn group, and in every respect one of the most masterly of Frans Hals's achievements is the group called " The Painter and his Family " in

the possession of Colonel Warde, which was almost unknown until it appeared at the winter exhibition at the Royal Academy in 1906.

Though a visit to Haarlem town hall, which contains the five enormous Doejen groups and the two Regenten pictures, is as necessary for the student of Hals's art as a visit to the Prado in Madrid is for the student of Velazquez, good examples of the Dutch master have found their way into most of the leading public and private collections. In the British Isles, besides the works already mentioned, portraits from his brush are to be found at the National Gallery, the Edinburgh Gallery, the Glasgow Corporation Gallery, Hampton Court, Buckingham Palace, Devonshire House, and the collections of Lord North- brooke, Lord Ellesmere, Lord Iveagh and Lord Spencer.

At Amsterdam is the celebrated " Flute Player," once in the Dupper collection at Dort; at Brussels, the patrician "Heyt- huysen "; at the Louvre, " Descartes "; at Dresden, the painter " Van der Vinne." Hals's sitters were taken from every class of society — admirals, generals and burgomasters pairing with merchants, lawyers, clerks. To register all that we find in public galleries would involve much space. There are eight portraits at Berlin, six at Cassel, five at St Petersburg, six at the Louvre, two at Brussels, five at Dresden, two at Gotha. In private collections, chiefly in Paris, Haarlem and Vienna, we find an equally important number. Amongst the painter's most successful representations of fishwives and termagants we should distinguish the " Hille Bobbe " of the Berlin Museum, and the " Hille Bobbe with her Son " in the Dresden Gallery. Itinerant players are best illustrated in the Neville-Goldsmith collection at the Hague, and the Six collection at Amsterdam. Boys and girls singing, playing or laughing, or men drinking, are to be found in the gallery of Schwerin, in the Arenberg collection, and in the royal palace at Brussels.

For two centuries after his death Frans Hals was held in such poor esteem that some of his paintings,

which are now among the proudest possessions of public galleries, were sold at auction

for a few pounds or even shillings. The portrait of " Johannes Acronius," now at the Berlin Museum, realized five shillings at the Enschede sale in 1786. The splendid portrait of the man with the sword at the Liechtenstein gallery was sold in 1800 for £4, 5s. With his rehabilitation in public esteem came the enormous rise in values, and, at the Secretan sale in 1889, the portrait of " Pieter van de Broecke d'Anvers " was bid up to £4420, while in 1908 the National Gallery paid £25,000 for the large group from the collection of Lord Talbot de Malahide.

Of the master's numerous family none has left a name except Frans Hals the Younger, born about 1622, who died in 1669. His pictures represent cottages and poultry; and the " Vanitas " at Berlin, a table laden with gold and silver dishes, cups, glasses and books, is one of his finest works and deserving of a passing glance.

Quite in another form, and with much of the freedom of the elder Hals, Dirk Hals, his brother (born at Haarlem, died 1656), is a painter of festivals and bali-rooms. But Dirk had too much of the freedom and too little of the skill in drawing which characterized his brother. He remains second on his own ground to Palamedes. A fair specimen of his art is a " Lady playing a Harpsichord to a Young Girl and her Lover " in the van der Hoop collection at Amsterdam, now in the Ryks Museum. More characteristic, but not better, is a large company of gentle-folk rising from dinner, in the Academy at Vienna.

Literature. — See W. Bode, Frans Hals und seine Schule (Leipzig, 1871); W. Unger and W. Vosmaer, Etchings after Frans Hals (Leyden, 1873); Percy Rendell Head, Sir Anthony Van Dyck and Frans Hals

(London, 1879); D. Knackfuss, Frans Hals (Leipzig, 1896) ■; G. S. Davies, Frans Hals (London, 1902). (P. G. K.)

HALSBURY, HARDINGE STANLEY GIFFARD, ist Earl of (1825-), English lord chancellor, son of Stanley Lees Giffard, LL.D., was born in London on the 3rd of September 1825. He was educated at Merton College, Oxford, and was called to the bar at the Inner Temple in 1850, joining the North Wales and Chester circuit. Afterwards he had a large practice at the central criminal court and the Middlesex sessions, and he was for several years junior prosecuting counsel to the treasury. He was engaged in most of the celebrated trials of his time, including the Overend and Gurney and the Tichborne cases. He became queen's counsel in 1865, and a bencher of the Inner Temple. Mr Giffard twice contested Cardiff in the Conservative interest, in 1868 and 1874, but he was still without a seat in the House of Commons when he was appointed solicitor-general by Disraeli in 1873 and received the honour of knighthood. In 1877 he succeeded in obtaining a seat, when he was returned for Launceston, which borough he continued to represent until his elevation to the peerage in 1885. He was then created Baron Halsbury and appointed lord chancellor, thus forming a remark- able exception to the rule that no criminal lawyer ever reaches the woolsack. ■ Lord Halsbury resumed the position in 1886 and held it until 1892 and again from 1895 to 1905, his tenure of the office, broken only by the brief Liberal ministries of 1886 and 1 89 2- 1 89 5, being longer than that of any lord chancellor since Lord Eldon. In 1898 he was created earl of Halsbury and Viscount Tiverton. Among Conservative lord chancellors Lord Halsbury must always hold a high place, his grasp of legal principles and mastery in applying them being pre-eminent among the judges of his day.

HALSTEAD, a market-town in the Maldon parliamentary division of Essex, England, on the Colne, 17 m. N.N.E. from Chelmsford; served by the Colne Valley railway from Chappel Junction on the Great Eastern

railway. Pop. of urban district (1901), 6073. It lies on a hill in a pleasant wooded district. The church of St Andrew is mainly Perpendicular. It contains a monument supposed to commemorate Sir Robert Bourchier (d. 1349), lord chancellor to Edward III. The Lady Mary Ramsay grammar school dates from 1594. There are large silk and crape works. Two miles N. of Halstead is Little Maplestead, where the church is the latest in date of the four churches with round naves, extant in England, being perhaps of 12th-century foundation, but showing early Decorated work in the main. The chancel, which is without aisles, terminates in an apse.

Three miles N.W. from Halstead are the large villages of Sible Hedingham (pop. 1701) and Castle Hedingham (pop. 1097). At the second is the Norman keep of the de Veres, of whom Aubrey de Vere held the lordship from William I. The keep dates from the end of the nth century, and exhibits much fine Norman work. The church of St Nicholas, Castle Hedingham, has fine Norman, Transitional and Early English details, and there is a black marble tomb of John de Vere, 15th earl of Oxford (d. 1540), with his countess.

There are signs of settlement at Halstead (Halsteda,Halgusted, Halsted) in the Bronze Age; but there is no evidence of the causes of its growth in historic times. Probably its situation on the river Colne made it to some extent a local centre. Throughout the middle ages Halstead was unimportant, and never rose to the rank of a borough.

HALT. (1) An adjective common to Teutonic languages and still appearing in Swedish and Danish, meaning lame, crippled. It is also used as a verb, meaning to limp, and as a substantive, especially in the term ” string-halt ” or ” spring-halt,” a nervous disorder affecting the muscles of the hind legs of horses. (2) A pause or stoppage made on a march or a journey. The word came into English in the form ” to make alto ” or “alt,” and was taken from the French faire alte or Italian far alto. The origin is a

German military term, Halt machen, Halt meaning " hold."

HALUNTIUM (Gr. 'KUvtiov, mod. S. Marco d'Alunzio), an ancient city of Sicily, 6 m. from the north coast and 25 m. E.N.E. of Halaesa. It was probably of Sicel origin, though its foundation was ascribed to some of the companions of Aeneas. It appears first in Roman times as a place of some importance, and suffered considerably at the hands of Verres. The abandoned church of S. Mark, just outside the modern town, is built into the cella of an ancient Greek temple, which measures 62 ft. by 18. A number of ancient inscriptions have been found there.

HALYBURTON, JAMES (1518-1589), Scottish reformer, was born in 1 5 1 8, and was educated at St Andrews, where he graduated M.A. in 1538. From 1553 to 1586 he was provost of St Andrews and a prominent figure in the national life. He was chosen as one of the lords of the congregation in 1557, and commanded the contingents sent by Forfar and Fife against the queen regent in 1559. He took part in the defence of Edinburgh, and in the battles of Langside (1568) and Restalrig (1571). He had stoutly opposed the marriage of Mary with Darnley, and when, after Restalrig, he was captured by the queen's troops, he narrowly escaped execution. He represented Morton at the conference of 1578, and was one of the royal commissioners to the General Assembly in 1582 and again in 1588. He died in February 1589.

HALYBURTON, THOMAS (1674-1712), Scottish divine, was born at Dupplin, near Perth, on the 25th of December 1674. His father, one of the ejected ministers, having died in 1682, he was taken by his mother in 1685 to Rotterdam to escape persecution, where he for some time attended the school founded by Erasmus. On his return to his native country in 1687 he completed his elementary education at Perth and Edinburgh, and in 1696 graduated at the university of St Andrews. In 1700 he was ordained minister of the parish of Ceres, and in 17 10 he was recommended by the synod of Fife for the chair of theology in St Leonard's College, St Andrews, to which accord-

ingly he was appointed by Queen Anne. After a brief term of active professorial life he died from the effects of overwork in

1712.

The works by which he continues to be known were all of them published after his death. Wesley and Whitefield were accustomed to commend them to their followers. They were published as follows: Natural Religion Insufficient, and Revealed Religion Necessary, to Man's Happiness in his Present State (1714), an able statement of the orthodox Calvinistic criticism of the deism of Lord Herbert of Cherbury and Charles Blount; Memoirs of the Life of Mr Thomas Halyburton (1715), three parts by his own hand, the fourth from his diary by another hand; The Great Concern of Salvation (172 1), with a word of commendation by I. Watts; Ten Sermons Preached Before and After the Lord's Supper (1722); The Unpardonable Sin Against the Holy Ghost (1784). See Halyburton's Memoirs (1714).

HAM, in the Bible, (i) an, Ham, in Gen. v. 32, vi. 10, vii. 13, ix. 18, x. 5, 1 Chron. i. 4, the second son of Noah; in Gen. ix. 24, the youngest son (but cf . below) ; and in Gen. x. 6, 1 Chron. i. 8, the father of Cush (Ethiopia), Mizraim ^ Egypt), Phut and Canaan. Genesis x. exhibits in the form of genealogies the political, racial and geographical relations of the peoples known to Israel; as it was compiled from various sources and has been more than once edited, it does not exactly represent the situation at any given date, 1 but Ham seems to stand roughly for the south-western division of the world as known to Israel, which division was regarded as the natural sphere of influence of Egypt. Ham is held to be the Egyptian word Khem (black) which was the native name of Egypt; thus in Pss. lxxviii. 51, cv. 23, 27, cvi. 22, Ham = Egypt. In Gen. ix. 20-26 Canaan was originally the third

son of Noah and the villain of the story. Ham is a later addition to harmonize with other passages.

(2) en, Ham, 1 Chron. iv. 40, apparently the name of a place or tribe. It can hardly be identical with ®; nothing else is known of this second Ham, which may be a scribe's error; the Syriac version rejects the name.

(3) en, Ham, Gen. xiv. 5; the place where Chedorlaomer defeated the Zuzim, apparently in eastern Palestine. The place is unknown, and the name may be a scribe's error, perhaps for Ammon. • (W. H. Be.)

HAM, a small town of northern France, in the department of Somme, 36 m. E.S.E. of Amiens on the Northern railway between that city and Laon. Pop. (1906), 2957. It stands on the Somme in a marshy district where market-gardening is carried on. From the 9th century onwards it appears as the seat of a lordship which, after the extinction of its hereditary line, passed in succession to the houses of Coucy, Enghien, Luxembourg, Rohan, Vendome and Navarre, and was finally united to the French crown on the accession of Henry IV. Notre-Dame, the church of an abbey of canons regular of St Augustin, dates from the 1 2th and 13th centuries, but in 1760 all the inflammable portions of the building were destroyed by a conflagration caused by lightning, and a process of restoration was subsequently carried out. Of special note are the bas-reliefs of the nave and choir, executed in the 17th and 18th centuries, and the crypt of the 1 2th century, which contains the sepulchral effigies of Odo IV. of Ham and his wife Isabella of Bethencourt. The castle, founded before theioth century, was rebuilt early in the 13th, and extended in the 14th; its present appearance is mainly due to the constable Louis of Luxembourg, count of St Pol, who between 1436 and 1470 not only furnished it with outworks, but gave such a thickness to the towers and curtains, and more especially to the great tower or donjon which still bears his motto Mon Myeulx, that the great engineer and architect Viollet-le-Duc considered

them, even in the 19th century, capable of resisting artillery. It forms a rectangle 395 ft. long by 263 ft. broad, with a round tower at each angle and two square towers protecting the curtains. The eastern and western sides are each defended by a demi-lune. The Constable's Tower, for so the great tower is usually called in memory of St Pol, has a height of about 100 ft., and the thickness of the walls is 36 ft.; the interior is occupied by three large hexagonal chambers in as many stories. The castle of Ham, which now serves as barracks, has frequently been used as a state prison both in ancient and modern times, and the list of those who have sojourned there is an interesting one, including as it does Joan of Arc, Louis of Bourbon, the ministers of Charles X., Louis Napoleon, and Generals Cavaignac and Lamoriciere. Louis Napoleon was there for six years, and at last' effected his escape in the disguise of a workman. During 1870-1871 Ham was several times captured and recaptured by the belligerents. A , statue commemorates the birth in the town of General Foy

(1775-1825).

See J. G. Cappot, Le Ch&leau de Ham (Paris, 1842); and Ch. Gomart, Ham, son chdteau el ses prisonniers (Ham, 1864).

1 A. Jeremias, Das A.T. im Lichte des alien Orients, p. 145, holds that it represents the situation in the 8th century B.C.

HAMADAN, a province and town of Persia. The province is bounded N. by Gerrus and Khamseh, W. by Kermanshah, S. by Malayir and Irak, E. by Savah and Kazvin. It has many well-watered, fertile plains and more than four hundred flourish- ing villages producing much grain, and its population, estimated at 350,000 — more than half being Turks of the Karaguzlu (black-eyed) and Shamlu (Syrian) tribes — supplies several battalions of infantry to the army, and pays, besides, a yearly revenue of about £18,000.

Hamadan, the capital of the province, is situated 188 m. W.S.W. of Teheran, at an elevation of 5930 ft., near the foot of Mount Elvend (old Persian Arvand, Gr. Oronies), whose granite peak rises W. of it to an altitude of 11,900 ft. It is a busy trade centre with about 40,000 inhabitants (comprising 4000 Jews and 300 Armenians), has extensive and well-stocked bazaars and fourteen large and many small caravanserais. The principal industries are tanning leather and the manufacture of saddles, harnesses, trunks, and other leather goods, felts and copper utensils. The leather of Hamadan is much esteemed throughout the country and exported to other provinces in great quantities. The streets are narrow, and by a system called Kucheh-bandi (street-closing) established long ago for impeding the circulation of crowds and increasing general security, every quarter of the town, or block of buildings, is shut off from its neighbours by gates which are closed during local disorders and regularly at night. Hamadan has post and telegraph offices and two churches, one Armenian, the other Protestant (of the American Presbyterian Mission).

Among objects of interest are the alleged tombs of Esther and Mordecai in an insignificant domed building in the centre of the town. There are two wooden sarcophagi carved all over with Hebrew inscriptions. That ascribed to Mordecai has the verses Isaiah lix. 8; Esther ii. 5; Ps. xvi. 9, 10, n, and the date of its erection a.m. 4318 (a.d. 557). The inscriptions on the other sarcophagus consist of the verses Esther ix. 29, 32, x. 1; and the statement that it was placed there A.M. 4602 (a.d. 841) by ” the pious and righteous woman Gemal Setan.” A tablet let into the wall states that the building was repaired a.m. 4474 (a.d. 713). Hamadan also has the grave of the cele- brated physician and philosopher Abu Ali ibn Sina, better known as Avicenna (d. 1036). It is now generally admitted that Hamadan is the Hagmatana (of the inscriptions), Agbatana or Ecbatana (?.»., of the Greek writers), the ” treasure city ” of the Achaemenian kings which was taken and plundered by Alexander the Great, but

very few ancient remains have been discovered. A rudely carved stone lion, which lies on the roadside close to the southern extremity of the city, and by some is supposed to have formed part of a building of the ancient city, is locally regarded as a talisman against famine, plague, cold, &c, placed there by Pliny, who is popularly known as the sorcerer Balinas (a corruption of Plinius).

Five miles S.W. from the city in a mountain gorge of Mount Elvend is the so-called Ganjnama (treasure-deed), which consists of two tablets with trilingual cuneiform inscriptions cut into the rock and relating the names and titles of Darius I. (521- 485 B.C.) and his son Xerxes I. (485-465 B.C.). (A. H.-S.)

HAMADHANI, in full Abu-l Fadl Ahmad ibn ul-Husain ul-Hamadhani (967-1007), Arabian writer, known as Badi' uz-Zaman (the wonder of the age), was born and educated at Hamadhan. In 990 he went to Jorjan, where he remained two years; then passing to Nlshapur, where he rivalled and surpassed the learned Khwarizml. After journeying through Khorasan and Sijistan, he finally settled in Herat under the protection of the vizir of Mahmvid, the Ghaznevid sultan. There he died at the age of forty. He was renowned for a remarkable memory and for fluency of speech, as well as for the purity of his language. He was one of the first to renew the use of rhymed prose both in letters and maqdmas (see Arabia: Literature, section " Belles Lettres "). His letters were published at Constantinople (1881), and with commentary at Beirut (1890); his maqamas at Constantinople (1881), and with commentary at Beirut (1889). A good idea of the

latter may be obtained from S. de Sacy's edition of six of the maqamas with French translation and notes in his Chrestomathie arabe, vol. iii. (2nd ed.,

Paris, 1827). A specimen of the letters is translated into German in A. von Kremer's Culturgeschichte des Orients, ii. 470 sqq. (Vienna, 1877). (G. W. T.)

HAMAH, the Hamath of the Bible, a Hittite royal city, situated in the narrow valley of the Orontes, no English miles N. (by E.) of Damascus. It finds a place in the northern boundaries of Israel under David, Solomon and Jeroboam II. (2 Sam. viii. 9; 1 Kings viii. 65; 2 Kings xiv. 25). The Orontes flows winding past the city and is spanned by four bridges. On the south-east the houses rise 150 ft. above the river, and there are four other hills, that of the Kalah or castle being to the north 100 ft. high. Twenty-four minarets rise from the various mosques. The houses are principally of mud, and the town stands amid poplar gardens with a fertile plain to the west. The castle is ruined, the streets are narrow and dirty, but the bazaars are good, and the trade with the Bedouins considerable. The numerous water- wheels (naurah,) of enormous dimension, raising water from the Orontes are the most remarkable features of the view. Silk, woollen and cotton goods are manufactured. The population is about 40,000.

In the year 854 B.C. Hamath was taken by Shalmaneser II., king of Assyria, who defeated a large army of allied Hamathites, Syrians and Israelites at Karkor and slew 14,000 of them. In 738 B.C. Tiglath Pileser III. reduced the city to tribute, and another rebellion was crushed by Sargon in 720 B.C. The down- fall of so ancient a state made a great impression at Jerusalem (Isa. x. 9). According to 2 Kings xvii. 24, 30, some of its people were transported to the land of N. Israel, where they made images of Ashima or Eshmun (probably Ishtar). After the Macedonian conquest of Syria Hamath was called Epiphania by the Greeks in honour of Antiochus IV., Epiphanes, and in the early Byzantine period it was known by both its Hebrew and its Greek name. In a.d. 639 the town surrendered to Abu 'Obeida, one of Omar's generals, and the church was turned into a mosque. In a.d. 1108 Tancred captured

the city and massacred the Ism'aileh defenders. In n 15 it was retaken by the Moslems, and in n 78 was occupied by Saladin. Abulfeda, prince of Hamah in the early part of the 14th century, is well known as an authority on Arab geography.

HAMANK, JOHANN GEORG (1730–1788), German writer on philosophical and theological subjects, was born at Konigsberg in Prussia on the 27th of August 1730. His parents were of humble rank and small means. The education he received was comprehensive but unsystematic, and the want of definiteness in this early training doubtless tended to aggravate the peculiar instability of character which troubled Hamann's after life. In 1746 he began theological studies, but speedily deserted them and turned his attention to law. That too was taken up in a desultory fashion and quickly relinquished. Hamann seems at this time to have thought that any strenuous devotion to " bread-and-butter " studies was lowering, and accordingly gave himself entirely to reading, criticism and philological inquiries. Such studies, however, were pursued without any definite aim or systematic arrangement, and consequently were productive of nothing. In 1752, constrained to secure some position in the world, he accepted a tutorship in a family resident in Livonia, but only retained it a few months. A similar situation in Courland he also resigned after about a year. In both cases apparently the rupture might be traced to the curious and unsatisfactory character of Hamann himself. After leaving his second post he was received into the house of a merchant at Riga named Johann Christoph Behrens, who' contracted a great friendship for him and selected him as his companion for a tour through Danzig, Berlin, Hamburg, Amsterdam and London. ■ Hamann, however, was quite unfitted for business, and when left in London, gave himself up entirely to his fancies, and was quickly reduced to a state of extreme poverty and want. It was at this period of his life, when his inner troubles of spirit harmonized with the unhappy external conditions of his lot, that he began an earnest and prolonged study of

the Bible; and from this time dates the tone of extreme pietism which is characteristic

of his writings, and which undoubtedly alienated many of his friends. He returned to Riga, and was well received by the Behrens family, in whose house he resided for some time. A quarrel, the precise nature of which is not very clear though the occasion is evident, led to an entire separation from these friends. In 1759 Hamann returned to Konigsberg, and lived for several years with his father, filling occasional posts in Konigsberg and Mitau. In 1767 he obtained a situation as translator in the excise office, and ten years later a post as storekeeper in a mercantile house. During this period of comparative rest Hamann was able to indulge in the long correspondence with learned friends which seems to have been his greatest pleasure. In 1784 the failure of some commercial speculations greatly reduced his means, and about the same time he was dismissed with a small pension from his situation. The kindness of friends, however, supplied provision for his children, and enabled him to carry out the long-cherished wish of visiting some of his philosophical allies. He spent some time with Jacobi at Pempel- fort and with Buchholz at Walbergen. At the latter place he was seized with illness, and died on the 21st of June 1788.

Hamann's works resemble his life and character. They are en- tirely unsystematic so far as matter is concerned, chaotic and dis- jointed in style. To a reader not acquainted with the peculiar nature of the man, which led him to regard what commended itself to him as therefore objectively true, they must be, moreover, entirely unintelligible and, from their peculiar, pietistic tone and scriptural jargon, probably offensive. A place in the history of philosophy can be yielded to Hamann only because he expresses in uncouth, barbarous fashion an idea to which other writers have given more effective shape. The fundamental thought is with him the unsatisfactoriness of abstraction or one-sidedness. The Auf kid- rung, with its rational theology, was

to him the type of abstraction. Even Epicureanism, which might appear concrete, was by him rightly designated abstract. Quite naturally, then, Hamann is led to object strongly to much of the Kantian philosophy. The sepa- ration of sense and understanding is for him unjustifiable, and only paralleled by the extraordinary blunder of severing matter and form. Concreteness, therefore, is the one demand which Hamann expresses, and as representing his own thought he used to refer to Giordano Bruno's conception (previously held by Nicolaus Curanus) of the identity of contraries. The demand, however, remains but a demand. Nothing that Hamann has given can be regarded as in the slightest degree a response to it. His hatred of system, incapacity for abstract thinking, and intense personality rendered it impossible for him to do more than utter the disjointed, oracular, obscure dicta which gained for him among his friends the name of " Magus of the North. ' ' Two results only appear throughout his writings — first, the accentuation of belief ; and secondly, the transference of many philosophical difficulties to language. Belief is, according to Hamann, the groundwork of knowledge, and he accepts in all sincerity Hume's analysis of experience as being most helpful in constructing a theo- logical view. In language, which he appears to regard as somehow acquired, he finds a solution for the problems of reason which Kant had discussed in the Krilik der reinen Vernunft. On the application of these thoughts to the Christian theology one need not enter.

None of Hamann's writings is of great bulk; most are mere pamphlets of some thirty or forty pages. A complete collection has been published by F. Roth [Schriften, 8vo, 1821-1842), and by C. H. Gildemeister (Leben und Schriften, 6 vols., 1851-1873). See also M. Petri, Hamanns Schriften u. Briefe, 4 vols., 1872-1873); J. Poel, Hamann, der Magus im Nor den, sein Leben u. Mitteilungen aus seinen Schriften (2 vols., 1874-1876); J. Claassen, Hamanns Leben und Werke (1885). Also H. Weber, Neue Hamanniana (1905). A very comprehensive essay on

Hamann is to be found in Hegel's

Vermischte Schriften, ii. (Werke, Bd. xvii.). On Hamann's influence on German literature, see J. Minor, /. G. Hamann in seiner Bedeu-

tungfur die Sturm- und Drang-Periode (1881).

HAMAR, or Storehammer (Great Hamar), a town of Norway in Hedemarken amt (county), 78 m. by rail N. of Christiania. Pop. (1900), 6003. It is pleasantly situated between two bays of the great Lake Mjosen, and is the junction cf the railways to Trondhjem (N.) and to Otta in Gudbrandsdal (N.W.). The existing town was laid out in 1849, and made a. bishop's see in 1864. Near the same site there stood an older town, which, together with a bishop's see, was founded in 1 1 52 by the English- man Nicholas Breakspeare (afterwards Pope Adrian IV.); but both town and cathedral were destroyed by the Swedes in 1567. Remains of the latter include a nave-arcade with rounded arches. The town is a centre for the local agricultural and timber trade.

IJAMiSA (Hamasah), the name of a famous Arabian anthology compiled by Habib ibn Aus at-Ta'I, surnamed Abu Tammam (see Abu Tammam). The collection is so called from the title of its first book, containing poems descriptive of constancy and valour in battle, patient endurance of calamity, steadfastness in seeking vengeance, manfulness under reproach and temptation, all which qualities make up the attribute called by the Arabs hamasah (briefly paraphrased by at-TibrizI as ash-shiddah fi-l-amr). It consists of ten books or parts, containing in all 884 poems or fragments of poems, and named respectively — (1) al-Hamdsa, 261 pieces; (2) al-Mardthi, " Dirges," 169 pieces; (3) al-Adab, " Manners," 54 pieces; (4) an-Nasib, " The Beauty and Love of Women," 139 pieces; (5) al-Hijd, "Satires," 80 pieces; (6) al-'Adydf wa-l-Madih, "Hospitality

and Panegyric," 143 pieces; (7) as-Sifdi, " Miscellaneous Descriptions," 3 pieces; (8) as-Sair wa-n-Nu'ds, "Journeying and Drowsiness," 9 pieces; (9) al-Mulah, " Pleasantries," 38 pieces; and (10) Madhammat-an-nisd, "Dispraise of Women," 18 pieces. Of these books the fir'st is by far the longest, both in the number and extent of its poems, and the first two together make up more than half the bulk of the work. The poems are for the most part fragments selected from longer compositions, though a considerable number are probably entire. They are taken from the works of Arab poets of all periods down to that of Abu Tammam himself (the latest ascertainable date being a.d. 832), but chiefly of the poets of the Ante-Islamic time (J dhiliyyun) , those of the early days of Al-Islam (Mukha-dritnun), and those who flourished during the reigns of the Omayyad caliphs, a.d. 660-749 (Isldmiyyun). Perhaps the oldest in the collection are those relating to the war of Bastts, a famous legendary strife which arose out of the murder of Kulaib, chief of the combined clans of Bakr and Taghlib, and lasted for forty years, ending with the peace of Dhu-1-Majaz, about a.d. 534. Of the period of the Abbasid caliphs, under whom Abu Tammam himself lived, there are probably not more than sixteen fragments.

Most of the poems belong to the class of extempore or occasional utterances, as distinguished from qasidas, or elabor- ately finished odes. While the latter abound with comparisons and long descriptions, in which the skill of the poet is exhibited with much art and ingenuity, the poems of the flamasa are short, direct and for the most part free from comparisons; the transi- tions are easy, the metaphors simple, and the purpose of the poem clearly indicated. It is due probably to the fact that this style of composition was chiefly sought by Abu Tammam in compiling his collection that he has chosen hardly anything from the works of the most famous poets of antiquity. Not a single piece from Imra 'al-Qais (Amru-ul-Qais) occurs in the ffamdsa, nor are there any from 'Alqama, Zuhair or A'sha;

Nabigha is represented only by two pieces (pp. 408 and 742 of Freytag's edition) of four and three verses respectively; 'Antara by two pieces of four verses each (id. pp. 206, 209) ; Tarafa by one piece of five verses (id. p. 632); Labld by one piece of three verses (id. p. 468) ; and 'Amr ibn Kulthum by one piece of four verses (id. p. 236). The compilation is thus essentially an anthology of minor poets, and exhibits (so far at least as the more ancient poems are concerned) the general average of poetic utterance at a time when to speak in verse was the daily habit of every warrior of the desert.

To this description, however, there is an important exception in the book entitled an-Nasib, containing verses relating to women and love. In the classical age of Arab poetry it was the established rule that all qasidas, or finished odes, whatever their purpose, must begin with the mention of women and thek charms (tashbib), in order, as the old critics said, that the hearts of the hearers might be softened and inclined to regard kindly the theme which the poet proposed to unfold. The fragments included in this part of the work are therefore generally taken from the opening verses of qasidas; where this is not the case, they are chiefly compositions of the early Islamic period, when the school of exclusively erotic poetry (of which the greatest representative was 'Omar ibn Abl Rabi'a) arose.

The compiler was himself a distinguished poet in the style of his day, and wandered through many provinces of the Moslem empire earning money and fame by his skill in panegyric. About 220 a.h. he betook himself to Khorasan, then ruled by 'Abdallah ibn Tahir, whom he praised and by whom he was rewarded; on his journey home to 'Irak he passed through Hamadhan, and was there detained /or many months a guest of Abu-1-Waf a, son of Salama, the road onward being blocked by heavy falls of snow. During his residence at Hamadhan, Abu Tammam is said to have compiled or composed, from the materials which he found in Abu-1-Wafa's library, five

poetical works, of which one was the ffamdsa. This collection remained as a precious heirloom in the family of Abu-1-Waf a until their fortunes decayed, when it fell into the hands of a man of Dlnawar named Abu-1- 'Awadhil, who carried it to Isfahan and made it known to the learned of that city.

The worth of the Hamasa as a store-house of ancient legend, of faithful detail regarding the usages of the pagan time and early simplicity of the Arab race, can hardly be exaggerated. The high level of excellence which is found in its selections, both as to form and matter, is remarkable, and caused it to be said that Abu Tammam displayed higher qualities as a poet in his choice of extracts from the ancients than in his own compositions. What strikes us chiefly in the class of poetry of which the flamasa is a specimen, is its exceeding truth and reality, its freedom from artificiality and hearsay, the evident first-hand experience which the singers possessed of all of which they sang. For historical purposes the value of the collection is not small; but most of all there shines forth from it a complete portraiture of the hardy and manful nature, the strenuous life of passion and battle, the lofty contempt of cowardice, niggardliness and servility, which marked the valiant stock who bore Islam abroad in a flood of new life over the outworn civilizations of Persia, Egypt and Byzantium. It has the true stamp of the heroic time, of its cruelty and wantonness as of its strength and beauty.

No fewer than twenty commentaries are enumerated by Hajji Khalifa. Of these the earliest was by Abu Riyash (otherwise ar- Riyashi), who died in 257 A.H.; excerpts from it, chiefly in eluci- dation of the circumstances in which the poems were composed, are frequently given by at-Tibrizi (Tabriz!) . He was followed by the famous grammarian Abu-1-Fath ibn al-Jinni (d. 392 A.H.), and later by Shihab ad-Din Ahmad al-Marzuql of Isfahan (d. 421 A.H.). Upon al-Marzuqi's commentary is chiefly founded that of Abu Zakariya Yahya at-Tibrizi (b. 421 A.H., d. 502), which has been published by the late Professor G. W. Freytag of Bonn, together with a Latin translation

and notes (1828–1851). This monumental work, the labour of a life, is a treasure of information regarding the classical age of Arab literature which has not perhaps its equal for extent, accuracy, and minuteness of detail in Europe. No other complete edition of the Hamasa has been printed in the West; but in 1856 one appeared at Calcutta under the names of Maulavi Ghulam Rabbani and Kabiru-d-din Ahmad. Though no acknowledgment of the fact is contained in this edition, it is a simple reprint of Pro- fessor Freytag's text (without at-Tibrizi's commentary), and follows its original even in the misprints (corrected by Freytag at the end of the second volume, which being in Latin the Calcutta editors do not seem to have consulted). It contains in an appendix of 12 pages a collection of verses (and some entire fragments) not found in at-Tibrizi's recension, but stated to exist in some copies consulted by the editors; these are, however, very carelessly edited and printed, and in many places unintelligible. Freytag's text, with at-Tibrizi's commentary, has been reprinted at Bulaq (1870). In 1882 an edition of the text, with a marginal commentary by Munshi 'Abdul-Qadir ibn Shaikh Luqman, was published at Bombay.

The Hamasa has been rendered with remarkable skill and spirit into German verse by the illustrious Friedrich Rtickert (Stuttgart, 1846), who has not only given translations of almost all the poems proper to the work, but has added numerous fragments drawn from other sources, especially those occurring in the scholia of at-Tibrizi, as well as the Mu'allaqas of Zuhair and 'Antara, the Lamiyya of Ash-Shanfara, and the Banat Su'ad of Ka'b, son of Zuhair. A small collection of translations, chiefly in metres imitating those of the original, was published in London by Sir Charles Lyall in 1885.

When the Hamasa is spoken of, that of Abu Tammam, as the first and most famous of the name, is meant ; but several collections of a similar kind, also called Hamasa, exist. The best-known and earliest of these is the Hamasa of Buhturi (d. 284 a.h.), of which the unique MS. now in the Leiden University

Library, has been repro- I duced by photo-lithography (1909) ; a critical edition has been

prepared by Professor Chlikho at Beyreuth. Four other works of the same name, formed on the model of Abu Tammam's compilation, are mentioned by Hajjl Khalifa. Besides these, a work entitled Hamasat ar-Rah (" the IJamasa of wine ") was composed of Abu-1-'Ala al-Ma'arri (d. 429 A.H.). (C. J. L.)

HAMBURG, a state of the German empire, on the lower Elbe, bounded by the Prussian provinces of Schleswig-Holstein and Hanover. The whole territory has an area of 160 sq. m., and consists of the city of Hamburg with its incorporated suburbs and the surrounding district, including several islands in the Elbe, five small enclaves in Holstein; the communes of Moorburg in the Liineburg district of the Prussian province of Hanover and Cuxhaven-Ritzebiittel at the mouth of the Elbe, the island of Neuwerk about 5 m. from the coast, and the bailiwick (ami) of Bergedorf, which down to 1867 was held in common by Lubeck and Hamburg. Administratively the state is divided into the city, or metropolitan district, and four rural domains (or Landherrenschaften) , each under a senator as praeses, viz. the domain of the Geestlande, of the Marschlande, of Bergedorf and of Ritzebiittel with Cuxhaven. Cuxhaven-Ritzebiittel and Bergedorf are the only towns besides the capital. The Geest- lande comprise the suburban districts encircling the city on the north and west; the Marschlande includes various islands in the Elbe and the fertile tract of land lying between, the northern and southern arms of the Elbe, and with it's pastures and market gardens supplying Hamburg with large quantities of country produce. In the Bergedorf district lies the Vierlande, or Four Districts (Neuengamme, Kirchwarder, Altengamme and Curs- lack), celebrated for its fruit gardens and the picturesque dress of the inhabitants. Ritzebuttel with Cuxhaven, also a

watering- place, have mostly a seafaring population. Two rivers, the Alster and the Bille, flow through the city of Hamburg into the Elbe, the mouth of which, at Cuxhaven, is 75 m. below the city.

Government. — As a state of the empire, Hamburg is repre- sented in the federal council (Bundesrat) by one plenipotentiary, and in the imperial diet (Reichstag) by three deputies. Its present constitution came into force on the 1st of January 1861, and was revised in 1879 and again in 1906. According to this Hamburg is a republic, the government (Staatsgewalt) residing in two chambers, the Senate and the House of Burgesses. The Senate, which exercises the greater part of the executive power, is composed of eighteen members, one half of whom must have studied law or finance, while at least seven of the remainder must belong to the class of merchants. The members of the Senate are elected for life by the House of Burgesses; but a senator is free to retire from office at the expiry of six years. A chief (ober-) and second (zweiter-) burgomaster, the first of whom bears the title of " Magnificence," chosen annually in secret ballot, preside over the meetings of the Senate, and are usually jurists. No burgomaster can be in office for longer than two years consecutively, and no member of the Senate may hold any other public office. The House of Burgesses consists of 160 members, of whom 80 are elected in secret ballot by the direct suffrages of all tax-paying citizens, 40 by the owners of house-property within the city (also by ballot), and the remaining 40, by ballot also, by the so-called " notables," i.e. active and former members of the law courts and administrative boards. They are elected for a period of six years, but as half of each class retire at the end of three years, new elections for one half the number take place at the end of that time. The House of Burgesses is represented by a Biirgerausschuss (committee of the house) of twenty deputies whose duty it is to watch over the proceedings of the Senate and the constitution generally. The Senate can interpose a veto in all matters of legislation, saving taxation,

and where there is a collision between the two bodies, provision is made for reference to a court of arbitration, consist- ing of members of both houses in equal numbers, and also to the supreme court of the empire (Reichsgericht) sitting at Leipzig. The law administered is that of the civil and penal codes of the German empire, and the court of appeal for all three Hanse towns is the common Oberlandesgericht, which has its seat in Hamburg.

There is also a special court of arbitration in commercial disputes and another for such as arise under accident insurance.

Religion. — The church in Hamburg is completely separated from the state and manages its affairs independently. The ecclesiastical arrangements of Hamburg have undergone great modifications since the general constitution of i860. From the Reformation to the French occupation in the beginning of the 19th century, Hamburg was a purely Lutheran state; according to the " Recess " of 1529, re-enacted in 1603, non- Lutherans were subject to legal punishment and expulsion from the country. Exceptions were gradually made in favour of foreign residents; but it was not till 1785 that regular inhabitants were allowed to exercise the religious rites of other denominations, and it was not till after the war of freedom that they were allowed to have buildings in the style of churches. In i860 full religious liberty was guaranteed, and the identification of church and state abolished. By the new constitution of the Lutheran Church, published at first in 1870 for the city only, but in 1876 extended to the rest of the Hamburg territory, the parishes or communes are divided into three church-districts, and the general affairs of the whole community are entrusted to a synod of S3 members and to an ecclesiastical council of 9 members which acts as an executive. Since 1887 a church rate has been levied on the Evangelical-Lutheran communities, and since 1904 upon the Roman Catholics also. The German Reformed Church, the French Reformed, the English Episcopal, the English Reformed, the Roman Catholic, and the Baptist are all recognized by the state.

Civil marriages have been permissible in Hamburg since 1866, and since the introduction of the imperial law in January 1876 the number of such marriages has greatly increased.

Finance. — The jurisdiction of the Free Port was on the 1st of January 1882 restricted to the city and port by the extension of the Zollverein to the lower Elbe, and in 1888 the whole of the state of Hamburg, with the exception of the so-called " Free Harbour " (which comprises the port proper and some large warehouses, set apart for goods in bond), was taken into the Zollverein.

Population. — The population increased from 453,000 in 1880 to 622,530 in 1890, and in 1905 amounted to 874,878. The population of the country districts (exclusive of the city of Hamburg) was 72,085 in 1905. The crops raised in the country districts are principally vegetables and fruit, potatoes, hay, oats, rye and wheat. For manufactures and trade statistics see Hamburg (city).

The military organization of Hamburg was arranged by convention with Prussia. The state furnishes three battalions of the 2nd Hanseatic regiment, under Prussian officers. The soldiers swear the oath of allegiance to the senate.

HAMBURG, a seaport of Germany, capital of the free state of Hamburg, on the right bank of the northern arm of the Elbe, 75 m. from its mouth at Cuxhaven and 178 m. N.W. from Berlin by rail. It is the largest and most important seaport on the continent of Europe and (after London and New York) the third largest in the world. Were it not for political and municipal boundaries Hamburg might be considered as forming with Altona and Ottensen (which lie within Prussian territory) one town. The view of the three from the south, presenting a continuous river frontage of six miles, the river crowded with shipping and the densely packed houses surmounted by church towers — of which three are higher than the dome of St Paul's in London — is one of great magnificence.

The city proper lies on both sides of the little river Alster, which, dammed up a short distance from its mouth, forms a lake, of which the southern portion within the line of the former fortifications bears the name of the Inner Alster (Binnen Alster), and the other and larger portion (2500 yards long and 1300 yards at the widest) that of the Outer Alster (Aussen Alster). The fortifications as such were removed in 1815, but they have left their trace in a fine girdle of green round the city, though too many inroads on its completeness have been made by railways and roadways. The oldest portion of the city is that which lies

to the east of the Alster; but, though it still retains the name of Altstadt, nearly all trace of its antiquity has disappeared, as it was rebuilt after the great fire of 1842. To the west lies the new town (Neustadt), incorporated in 1678; beyond this and contiguous to Altona is the former suburb of St Pauli, incor- porated in 1876, and towards the north-east that of St Georg, which arose in the 13th century but was not incorporated till 1868. \

The old town lies low, and it is traversed by a great number of narrow canals or ” fleets ” (Flecten) — for the same word which has left its trace in London nomenclature is used in the ‘Low German city — which add considerably to the picturesqueness of the meaner quarters, and serve as convenient channels for the transport of goods. They generally form what may be called the back streets, and they are bordered by warehouses, cellars and the lower class of dwelling-houses. As they are subject to the ebb and flow of the Elbe, at certain times they run almost dry. As soon as the telegram at Cuxhaven announces high tide three shots are fired from the harbour to warn the inhabitants of the ” fleets “; and if the progress of the tide up the

river gives indication of danger, other three shots follow. The ” fleets ” with their quaint medieval warehouses, which come sheer down to the water, and are navigated by barges, have gained for Hamburg the name of ” Northern Venice.” They are, however, though antique and interesting, somewhat dismal and unsavoury. In fine contrast to them is the bright appearance of the Binnen

Efcle/yWaiker sc.

Alster, which is enclosed on three sides by handsome rows of buildings, the Alsterdamm in the east, the Alter Jungfernstieg in the south, and the Neuer Jungfernstieg in the west, while it is separated from the Aussen Alster by part of the rampart gardens traversed by the railway uniting Hamburg with Altona and crossing the lakes by a beautiful bridge — the Lombards- Briicke. Around the outer lake are grouped the suburbs Harvestehude and Posseldorf on the western shore, and Uhlen- horst on the eastern, with park-like promenades and villas surrounded by well-kept gardens. Along the southern end ol the Binnen Alster runs the Jungfernstieg with fine shops, hotels and restaurants facing the water. A fleet of shallow-draught screw steamers provides a favourite means of communication between the business centre of the city and the outlying colonies of villas.

The streets enclosing the Binnen Alster are fashionable promenades, and leading directly from this quarter are the main business thoroughfares, the Neuer-Wall, the Grosse Bleichen and the Hermannstrasse. The largest of the public squares in Hamburg is the Hopfenmarkt, which contains the church ot St Nicholas (Nikolaikirche) and is the principal market for vegetables and fruit. Others of importance are the Gansemarkt, the Zeughausmarkt and the Grossneumarkt. Of the thirty-five churches existing in Hamburg (the old cathedral had to be taken down in 1805), the St Petrikirche, Nikolaikirche, St Katharinen- kirche, St Jakobikirche and St Michaeliskirche are those that

give their names to the five old city parishes. The Nikolaikirche is especially remarkable for its spire, which is 473 ft. high and ranks, after those of Ulm and Cologne, as the third highest ecclesiastical edifice in the world. The old church was destroyed in the great fire of 1842, and the new building, designed by Sir George Gilbert Scott in 13th century Gothic, was erected 1845- 1874. The exterior and interior are elaborately adorned with sculptures. Sandstone from Osterwald near Hildesheim was used for the outside, and for the inner work a softer variety from Postelwitz near Dresden. The Michaeliskirche, which is built on the highest point in the city and has a tower 428 ft. high, was erected (1750-1762) by Ernst G. Sonnin on the site of the older building of the 17th century destroyed by lightning; the interior, which can contain 3000 people, is remarkable for its bold construction, there being no pillars. The St Petrikirche, originally consecrated in the 12th century and rebuilt in the 14th, was the oldest church in Hamburg; it was burnt in 1842 and rebuilt in its old form in i844-i84g. It has a graceful tapering spire 402 ft. in height (completed 1878); the granite columns from the old cathedral, the stained glass windows by Kellner of Nuremberg, and H. Schubert's fine relief of the entombment of Christ are worthy of notice. The St Katharinenkirche and the St Jakobikirche are the only surviving medieval churches, but neither is of special interest. Of the numerous other churches, Evangelical, Roman Catholic and Anglican, none are of special interest. The new synagogue was built by Rosengarten between 1857 and 1859, and to the same architect is due the sepulchral chapel built for the Hamburg merchant prince Johann Heinrich, Freiherr von Schroder (1 784-1883), in the churchyard of the Petrikirche. The beautiful chapel of St Gertrude was unfortu- nately destroyed in 1842.

Hamburg has comparatively few secular buildings of

great architectural interest, but first among them is the new Rathaus, a huge German Renaissance building, constructed of sandstone in 1886–1897, richly adorned with sculptures and with a spire 330 ft. in height. It is the place of meeting of the municipal council and of the senate and contains the city archives. Immediately adjoining it and connected with it by two wings is the exchange. It was erected in 1836–1841 on the site of the convent of St Mary Magdalen and escaped the conflagration of 1842. It was restored and enlarged in 1904, and shelters the commercial library of nearly 100,000 vols. During the business hours (1–3 p.m.) the exchange is crowded by some 5000 merchants and brokers. In the same neighbourhood is the Johanneum, erected in 1834 and in which are preserved the town library of about 600,000 printed books and 5000 MSS. and the collection of Hamburg antiquities. In the courtyard is a statue (1885) of the reformer Johann Bugenhagen. In the Fischmarkt, immediately south of the Johanneum, a handsome fountain was erected' in 1890. Directly west of the town hall is the new Stadthaus, the chief police station of the town, in front of which is a bronze statue of the burgomaster Karl Friedrich Petersen (1809–1892), erected in 1897. A little farther away are the headquarters of the Patriotic Society (Patriotische Gesellschafi) , founded in 1765, with fine rooms for the meetings of artistic and learned societies. Several new public buildings have been erected along the circuit of the former walls. Near the west extremity, abutting upon the Elbe, the moat was filled in in 1894–1897, and some good streets were built along the site, while the Kersten Miles-Briicke, adorned with statues of four Hamburg heroes, was thrown across the Helgolander Allee. Farther north, along the line of the former town wall, are the criminal law courts (1879–1882, enlarged 1893) an d the civil law courts (finished in 1901). Close to the latter stand the new supreme court, the old age and accident state insurance offices, ^he chief custom house, and the concert hall, founded by Karl Laeisz, a former Hamburg wharfinger. Farther on are the chemical and the physical laboratories and the Hygienic In-

stitute. Facing the botanical gardens a new central post-office, in the Renaissance style, was built in 1887. At the west end of the Lombards-Brucke there is a monument by Schilling, com- memorating the war of 1870-71. A few streets south of that is

a monument to Lessing (1881) ; while occupying a commanding site on the promenades towards Altona is the gigantic statue of Bismarck which was unveiled in June 1906. The Kunst-Halle (the picture gallery), containing some good works by modern masters, faces the east end of Lombards-Brucke. The new Natural History Museum, completed in 1891, stands a little distance farther south. To the east of it comes the Museum for Art and Industry, founded in 1878, now one of the most important institutions of the kind in Germany, with which is connected a trades school. Close by is the Hansa-fountain (65 ft. high), erected in 1878. On the north-east side of the suburb of St Georg a botanical museum and laboratory have been established. There is a new general hospital at Eppendorf, outside the town on the north, built on the pavilion principle, and one of the finest structures of the kind in Europe; and at Ohlsdorf, in the same direction, a crematorium was built in 1891 in conjunction with the town cemeteries (370 acres). There must also be mentioned the fine public zoological gardens, Hagenbeck's private zoological gardens in the vicinity, the schools of music and navigation, and the school of commerce. In 1900 a high school for shipbuilding was founded, and in 1901 an institute for seamen's and tropical diseases, with a laboratory for their physiological study, was opened, and also the first public free library in the city. The river is spanned just above the Frei Hafen by a triple-arched railway bridge, 1339 ft. long, erected in 1868-1873 and doubled in width in 1894. Some 270 yds. higher up is a magnificent iron bridge (1888) for vehicles and foot passengers. The southern arm of the Elbe, on the south side of the island of Wilhelmsburg, is crossed by another railway bridge of four arches and 2050 ft. in length.

Railways. — The through railway traffic of Hamburg

is practic- ally confined to that proceeding northwards — to Kiel and Jutland — and for the accommodation of such trains the central (terminus) station at Altona is the chief gathering point. The Hamburg stations, connected with the other by the Verbindungs-Bahn (or metropolitan railway) crossing the Lombards-Brucke, are those of the Venloer (or Hanoverian, as it is often called) Bahnhof on the south-east, in close proximity to the harbour, into which converge the lines from Cologne and Bremen, Hanover and Frankfort-on-Main, and from Berlin, via Nelzen; the Klostertor-Bahnhof (on the metropolitan line) which temporarily superseded the old Berlin station, and the Liibeck station a little to the north-east, during the erection of the new central station, which occupies a site between the Klostertor-Bahnhof and the Lombards-Brucke. Between this central station and Altona terminus runs the metropolitan railway, which has been raised several feet so as to bridge over the streets, and on which lie the important stationsDammtorandSternschanze. An excellent service of electric trams interconnect the towns of Hamburg, Altona and the adjacent suburbs, and steamboats provide communication on the Elbe with the riparian towns and villages; and so with Blankenese and Harburg, with Stade, Gluckstadt and Cuxhaven.

Trade and Shipping. — Probably there is no place which during the last thirty years of the 19th century grew faster commercially than Hamburg. Its commerce is, however, almost entirely of the nature of transit trade, for it is not only the chief distributing centre for the middle of Europe of the products of all other parts of the world, but is also the chief outlet for German, Austrian, and even to some extent Russian (Polish) raw products and manufactures. Its principal imports are coffee (of which it is the greatest continental market), tea, sugar, spices, rice, wine (especially from Bordeaux), lard (from Chicago), cereals, sago, , dried fruits, herrings, wax (from Morocco and Mozambique), tobacco, hemp, cotton (which of late years shows. a large increase), wool, skins,

leather, oils, dyewoods, indigo, nitrates, phosphates and coal. Of the total importations of all kinds of coal to Ham- burg, that of British coal, particularly from Northumberland and Durham, occupies the first place, and despite some falling off in late years, owing to the competition made by Westphalian coal, amounts to more than half the total import. The increase of the trade of Hamburg is most strikingly shown by that of

the shipping belonging to the port. Between 1876 and 1880 there were 475 sailing vessels with a tonnage of 230,691, and no steam-ships with a tonnage of 87,050. In 1907 there were (exclusive of fishing vessels) 470 sailing ships with a tonnage of 271,661, and 610 steamers with a tonnage of 1,256,449. In 1870 the crews numbered 6900 men, in 1907 they numbered

29,536.

Industries. — The development of manufacturing industries at Hamburg and its immediate vicinity since 1880, though not so rapid as that of its trade and shipping, has been very remarkable, and more especially has this been the case since the year r888, when Hamburg joined the German customs union, and the barriers which prevented goods manufactured at Hamburg from entering into other parts of Germany were removed. Among the chief industries are those for the production of articles of food and drink. The import trade of various cereals by sea to Hamburg is very large, and a considerable portion of this corn is converted into flour at Hamburg itself. There are also, in this connexion, numerous bakeries for biscuit, rice-peeling mills and spice mills. Besides the foregoing there are cocoa, chocolate, confectionery and baking-powder factories, coffee-roasting and ham-curing and smoking establishments, lard refineries, mar- garine manufactories and fish-curing, preserving and packing factories. There are

numerous breweries, producing annually about 24,000,000 gallons of beer, spirit distilleries and factories of artificial waters. Yarns, textile goods and weaving industries generally have not attained any great dimensions, but there are large jute-spinning mills and factories for cotton-wool and cotton driving-belts. Among other important articles of domestic industry are tobacco and cigars (manufactured mainly in bond, within the free harbour precincts), hydraulic machinery, electro-technical machinery, chemical products (including artificial manures), oils, soaps, india-rubber, ivory and celluloid articles and the manufacture of leather.

Shipbuilding has made very important progress, and there are at present in Hamburg eleven large shipbuilding yards, employing nearly 10,000 hands. Of these, however, only three are of any great extent, and one, where the largest class of ocean-going steamers and of war vessels for the German navy are built, employs about 5000 persons. There are also two yards for the building of pleasure yachts and rowing-boats (in both which branches of sport Hamburg takes a leading place in Germany). Art industries, particularly those which appeal to the luxurious taste of the inhabitants in fitting their houses, such as wall-papers and furniture, and those which are included in the equipment of ocean-going steamers, have of late years made rapid strides and are among the best productions of this character of any German city.

Harbour. — It was the accession of Hamburg to the customs union in 1888 which gave such a vigorous impulse to her more recent com- mercial development. At the same time a portion of the port was set apart as a free harbour, altogether an area of 750 acres of water and 1750 acres of dry land. In anticipation of this event a gigantic system of docks, basins and quays was constructed, at a total cost of some £7,000,000 (of which the imperial treasury contributed £2,000,000), between the confluence of the Alster and the railway bridge (1868-1873), an entire quarter of the town inhabited by some 24,000

people being cleared away to make room for these accessories of a great port. On the north side of the Elbe there are the Sandtor basin (3380 ft. long, 295 to 427 ft. wide), in which British and Dutch steamboats and steamboats of the Sloman (Mediterranean) line anchor. South of this lies the Grasbrook basin (quayage of 2100 ft. and 1693 ft. alongside), which is used by French, Swedish and trans- atlantic steamers. At the quay point between these two basins there are vast state granaries. On the outer (i.e. river) side of the Gras- brook dock is the quay at which the emigrants for South America embark, and from which the mail boats for East Africa, the boats of the Woermann (West Africa) line, and the Norwegian tourist boats depart. To the east of these two is the small Magdeburg basin, penetrating north, and the Baaken basin, penetrating east, i.e. parallel to the river. The latter affords accommodation to the trans- atlantic steamers, including the emigrant ships of the Hamburg- America line, though their " ocean mail boats " generally load and unload at Cuxhaven. On the south bank of the stream there follow in succession, going from east to west, the Moldau dock for river craft, the sailing vessel dock (SegelschifT Hafen, 3937 ft. long, 459 to 886 ft. wide, 26$ ft. deep), the Hansa dock, India dock, petroleum dock,

several swimming and dry docks; and in the west of the free port area three other large docks, one of 77 acres for river craft, the others each 56 acres in extent, and one 23I ft. deep, the other 26J ft. deep, at low water, constructed in 1900-1901. In 1897 Hamburg was provided with a huge floating dock, 558 ft. long' and 84 ft. in maxi- mum breadth, capable of holding a vessel of 17,500 tons and draught not exceeding 29 ft., so constructed and equipped that in time of need (war) it could be floated down to Cuxhaven. During the last 25 years of the 19th century the channel of the Elbe was greatly improved and deepened, and during the last two years of the 19th century some £360,000 was spent by Hamburg alone in regulating and correcting this lower course of the river. The new Kuhwarder-

basin, on the left bank of the river, as well as two other large dock basins (now leased to the Hamburg-American Company), raise the number of basins to twelve in all.

Emigration. — Hamburg is one of the principal continental ports for the embarkation of emigrants. In 1881-1890, on an average they numbered 90,000 a year (of whom 60,000 proceeded to the United States). In 1900 the number was 87,153 (and to the United States 64,137). The number of emigrant Germans has enormously decreased of late years, Russia and Austria-Hungary now being most largely represented. For the accommodation of such passengers large and convenient emigrant shelters have been recently erected close to the wharf of embarkation.

Health and Population. — The health of the city of Hamburg and the adjoining district may be described as generally good, no epidemic diseases having recently appeared to any serious degree. The malady causing the greatest number of deaths is that of pul- monary consumption; but better housing accommodation has of late years reduced the mortality from this disease very considerably. The results of the census of 1905 showed the population of the city (not including the rural districts belonging to the state of Hamburg) to be 802,793.

Hamburg is well supplied with places of amusement, especially of the more popular kind. Its Stadt-Theater, rebuilt in 1874, has room for 1750 spectators and is particularly devoted to operatic performances; the Thalia-Theater dates from 1 84 1, and holds 1700 to 1800 people, and the Schauspielhaus (for drama) from 1900 people, and there are some seven or eight minor establishments. Theatrical performances were introduced into the city in the 17th century, and 1678 is the date of the first opera, which was played in a house in the Gansemarkt. Under Schroder and Lessing the Hamburg stage rose into importance. Though contributing few names of the highest rank to German literature, the city has been intimately associated with the

literary movement. The historian Lappenberg and Friedrich von Hagedorn were born in Hamburg; and not only Lessing, but Heine and Klopstock lived there for some time.

History. — Hamburg probably had its origin in a fortress erected in 808 by Charlemagne, on an elevation between the Elbe and Alster, as a defence against the Slavs, and called Hammaburg because of the surrounding forest (Hamme). In 811 Charlemagne founded a church here, perhaps on the site of a Saxon place of sacrifice, and this became a great centre for the evangelization of the north of Europe, missionaries from Hamburg introducing Christianity into Jutland and the Danish islands and even into Sweden and Norway. In 834 Hamburg became an archbishopric, St Ansgar, a monk of Corbie and known as the apostle of the North, being the first metropolitan. In 845 church, monastery and town were burnt down by the Norsemen, and two years later the see of Hamburg was united with that of Bremen and its seat transferred to the latter city. The town, rebuilt after this disaster, was again more than once devastated by invading Danes and Slavs. Archbishop Unwan of Hamburg-Bremen (1013-^29) substituted a chapter of canons for the monastery, and in 1037 Archbishop Bezelin (or Alebrand) built a stone cathedral and a palace on the Elbe. In 1 1 10 Hamburg, with Holstein, passed into the hands of Adolph I., count of Schauenburg, and it is with the building of the Neustadt (the present parish of St Nicholas) by his grand- son, Adolph III. of Holstein, that the history of the commercial city actually begins. In return for a contribution to the costs of a crusade, he obtained from the emperor Frederick I. in n 89 a charter granting Hamburg considerable franchises, including exemption from tolls, a separate court and jurisdiction, and the rights of fishery on the Elbe from the city to the sea. The city council (Rath), first mentioned in 1190, had jurisdiction over both the episcopal and the new town. Craft gilds were already in existence, but these had no share in the government; for, though the Liibeck rule excluding craftsmen from the

Rath did not obtain, they vrere excluded in practice. The counts, of

course, as over-lords, had their Vogt (advocatus) in the town, but this official, as the city grew in power, became subordinate to the Rath, as at Liibeck.

The wealth of the town was increased in 1 189 by the destruction of the flourishing trading centre of Bardowieck by Henry the Lion; from this time it began to be much frequented by Flemish merchants. In 1 201 the city submitted to Valdemar of Schleswig, after his victory over the count of Holstein, but in 1225, owing to the capture of King Valdemar II. of Denmark by Henry of Schwerin, it once more exchanged the Danish over-lordship for that of the counts of Schauenburg, who established themselves here and in 1231 built a strong castle to hold it in check. The defensive alliance of the city with Liibeck in 1241, extended for other purpose by the treaty of 1255, practically laid the foundations of the Hanseatic League (q.v.), of which Hamburg continued to be one of the principal members. The internal organization of the city, too, was rendered more stable by the new constitution of 1270, and the recognition in 1292 of the complete internal autonomy of the city by the count of Schauen- burg. The exclusion of the handicraftsmen from the Rath led, early in the 15th century, to a rising of the craft gilds against the patrician merchants, and in 1410 they forced the latter to recognize the authority of a committee of 48 burghers, which concluded with the senate the so-called First Recess; there were, however, fresh outbursts in 1458 and 1483, which were settled by further compromises. In 1461 Hamburg did homage to Christian I. of Denmark, as heir of the Schauenburg counts; but the suzerainty of Denmark was merely nominal and soon repudiated altogether; in 15 10 Hamburg was made a free imperial city by the emperor Maximilian I.

In 1529 the Reformation was definitively established in Hamburg by the Great Recess of the 19th of February, which at the same time vested the government of the city in the Rath, together with the three colleges of the Oberalten, the Forty-eight (increased to 60 in 1685) and the Hundred and Forty-four (increased to 180). The ordinary burgesses consisted of the freeholders and the master- workmen of the gilds. In 1536 Hamburg joined the league of Schmalkalden, for which error it had to pay a heavy fine in 1547 when the league had been defeated. During the same period the Lutheran zeal of the citizens led to the expulsion of the Mennonites and other Pro- testant sects, who founded Altona. The loss this brought to the city was, however, compensated for by the immigration of Protestant refugees from the Low Countries and Jews from Spain and Portugal. In 1549, too, the English merchant adventurers removed their staple from Antwerp to Hamburg.

The 17th century saw notable developments. Hamburg had established, so early as the 16th century, a regular postal service with certain cities in the interior of Germany, e.g. Leipzig and Breslau; in 161 5 it was included in the postal system of Turn and Taxis. In 1603 Hamburg received a code of laws regulating exchange, and in 1619 the bank was established. In 1615 the Neustadt was included within the city walls. During the Thirty Years' War the city received no direct harm; but the ruin of Germany reacted upon its prosperity, and the misery of the lower orders led to an agitation against the Rath. In 1685, at the invitation of the popular leaders, the Danes appeared before Hamburg demanding the traditional homage; they were repulsed, but the internal troubles continued, culminating in 1708 in the victory of the democratic factions. The imperial government, however, intervened, and in 1712 the " Great Recess " established durable good relations between the Rath and the commonalty. Frederick IV. of Denmark, who had seized the opportunity to threaten the city (1712), was bought off with a ransom of 246,000 Reichsthaler. Denmark, however,

only finally renounced her claims by the treaty of Gottorp in 1768, and in 1770 Hamburg was admitted for the first time to a repre- sentation in the diet of the empire.

The trade of Hamburg received its first great impulse in 1783, when the United States, by the treaty of Paris, became an in- dependent power. From this time dates its first direct mari- time communication with America. Its commerce was further

extended and developed by the French occupation of Holland in 179S, when the Dutch trade was largely directed to its port. The French Revolution and the insecurity of the political situation, however, exercised a depressing and retarding effect. The wars which ensued, the closing of continental ports against English trade, the occupation of the city after the disastrous battle of Jena, and pestilence within its walls brought about a severe commercial crisis and caused a serious decline in its prosperity. Moreover, the great contributions levied by Napoleon on the city, the plundering of its bank by Davoust, and the burning of its prosperous suburbs inflicted wounds from which the city but slowly recovered. Under the long peace which followed the close of the Napoleonic wars, its trade gradu- ally revived, fostered by the declaration of independence of South and Central America, with both of which it energetically opened close commercial relations, and by the introduction of steam navigation. The first steamboat was seen on the Elbe on the 17th of June 1816; in 1826 a regular steam communication was opened with London; and in 1856 the first direct steamship line linked the port with the United States. The great fire of 1842 (5th-8th of May) laid in waste the greatest part of the business quarter of the city and caused a temporary interruption of its commerce. The city, however, soon rose from its ashes, the churches were rebuilt and new streets laid out on a scale of considerable magnificence. In 1866 Hamburg joined the North German Confederation, and in 1871, while remaining outside the Zollverein, became a constituent state of the German empire. In 1883-1888 the works for the

Free Harbour were completed, and on the 18th of October 1888 Hamburg joined the Customs Union (Zollverein). In 1892 the cholera raged within its walls, carried off 8500 of its inhabitants, and caused considerable losses to its commerce and industry; but the visitation was not without its salutary fruits, for an improved drainage system, better hospital accommodation, and a purer water-supply have since combined to make it one of the healthiest commercial cities of Europe.

Further details about Hamburg will be found in the following works : O. C. Gaedechens, Historische Topographie der Freien und Hansestadt Hamburg (1880) ; E. H. Wichmann, Heimatskunde von Hamburg (1863); W. Melhop, Historische Topographie der Freien und Hansestadt Hamburg von 1880-1895 (1896) ; Wulff, Hamburgische Gesetze und Verordnungen (1889-1896) ; and W. von Melle, Das ham- burgische Staatsrecht (1891). There are many valuable official publications which may be consulted, among these being: Statistik des hamburgischen Staates (1867-1904) ; Hamburgs Handel und Schiffahrt (1847-1903); the yearly Hamburgischer Staatskalender ; and Jahrbuch der Hamburger wissenschaftlichen Anstalten. See also Hamburg und seine Bauten (1890); H. Benrath, Lokalfiihrer durch Hamburg und Umgebungen (1904) ; and the consular reports by Sir William Ward, H.B.M.'s consul-general at Hamburg, to whom the author is indebted for great assistance in compiling this article.

For the history of Hamburg see the Zeitschrift des Vereins fiir hamburgische Geschichte (1841, fol.) ; G. Dehio, Geschichte des Erz- bistums Hamburg-Bremen (Berlin, 1877); the Hamburgisches Urkundenbuch (1842), the Hamburgische Chroniken (1852-1861), and the Chronica der Stadt Hamburg bis 1557 of Adam Tratziger (1865), all three edited by J. M. Lappenberg; the Briefsammlung des hamburgischen Superintendenten Joachim Westphal 1530-1575, edited by C. H. W. Sillem (1903) ; Gallois, Geschichte der Stadt Hamburg (1853-1856); K. Koppmann, Aus Hamburgs Vergangenheit (1885), and Kammereirechnungen der Stadt Hamburg (1 869-1 894); H. W. C. Hubbe,

Beitrage zur Geschichte der Stadt Hamburg (1897) ; C. Monckeberg, Geschichte der Freien und Hansestadt Hamburg (1885); E. H. Wichmann, Hamburgische Geschichte in Darstellungen aus alter und neuer Zeit (1889); and R. Bollheimer, Zeittafeln der hamburgischen Geschichte (1895).

HAMDANI, in full Abu Mahommed ul-Hasan ibn Ahmad ibn Ya'qub ul-Hamdani (d. 945), Arabian geographer, also known as Ibn ul-Ha'ik. Little is known of him except that he belonged to a family of Yemen, was held in repute as a grammarian in his own country, wrote much poetry, compiled astronomical tables, devoted most of his life to the study of the ancient history and geography of Arabia, and died in prison at San'a in 945. His Geography of the Arabian Peninsula {Kitab Jazirat ul- Arab) is by far the most important work on the subject. After being used in manuscript by A. Sprenger in his Post- und Reiser outen des Orients (Leipzig, 1864) and further

in his Alte Geographie Arabiens (Bern, 1875), it was edited by D. H. Miiller (Leiden, 1884; cf. A. Sprenger's criticism in Zeitschrift der deutschen morgenlandischen Gesellschaft, vol. 45, pp. 361-394). Much has also been written on this work by E. Glaser in his various publications on ancient Arabia. The other great work of HamdanI is the Iklil (Crown) concerning the genealogies of the Himyaritcs and the wars of their kings in ten volumes. Of this, part 8, on the citadels and castles of south Arabia, has been edited and annotated by D. H. Miiller in Die Burgen und Schlosser Sudarabiens (Vienna, 1879-1881).

For other works said to have been written by HamdanI cf. G. Fliigel's Die grammatischen Schulen der Araber (Leipzig, 1862), pp. 220-221. (G. W. T.)

HAMELIN, FRANCOIS ALPHONSE (1796-1864), French admiral, was born at Pont l'Eveque on the 2nd of

September 1796. He went to sea with his uncle, J. F. E. Hamelin, in the " Venus " frigate in 1806 as cabin boy. The " Venus " was part of the French squadron in the Indian Ocean, and young Hamelin had an opportunity of seeing much active service. She, in company with another and a smaller vessel, captured the English frigate " Ceylon " in 1810, but was immediately afterwards captured herself by the " Boadicea," under Com- modore Rowley (1765-1842). Young Hamelin was a prisoner of war for a short time. He returned to France in 181 1. On the fall of the Empire he had better fortune than most of the Napoleonic officers who were turned ashore. In 1821 he became lieutenant, and in 1823 took part in the French expedition under the duke of Angouleme into Spain. In 1828 he was appointed captain of the " Acteon," and was engaged till 1831 on the coast of x \lgiers and in. the conquest of the town and country. His first command as flag officer was in the Pacific, where he showed much tact during the dispute over the Marquesas Islands with England in 1844. He was promoted vice-admiral in 1848. During the Crimean War he commanded in the Black Sea, and co-operated with Admiral Dundas in the bombardment of Sevastopol 17th of October 1854. His relations with his English colleague were not very cordial. On the 7th of December 1854 he was promoted admiral. Shortly afterwards he was recalled to France, and was named minister of marine. His administra- tion lasted till i860, and was remarkable for the expeditions to Italy and China organized under his directions; but it was even more notable for the energy shown in adopting and developing the use of armour. The launch of the " Gloire " in 3^59 .*at . the example of constructing sea-going ironclads. The first English ironclad, the " Warrior," was designed as an answer to the " Gloire." When Napoleon III. made his first concession to Liberal opposition, Admiral Hamelin was one of the ministers sacrificed. He held no further command, and died on the 10th of January 1864.

HAMELN, a town of Germany, in the Prussian province of Hanover, at the confluence of the Weser and

Hamel, 33 m. S.W. of Hanover, on the line to Altenbeken, which here effects a junction with railways to Lohne and Brunswick. Pop. (1905) 20,736. It has a venerable appearance and has many interesting and picturesque houses. The chief public buildings of interest are the minster, dedicated to St Boniface and restored in 1870- 1875; the town hall; the so-called Rattenfangerhaus (rat- catcher's house) with mural frescoes illustrating the legend (see below) ; and the Hochzeitshaus (wedding house) with beautiful gables. There are classical, modern and commercial schools. The principal industries are the manufacture of paper, leather, chemicals and tobacco, sugar refining, shipbuilding and salmon fishing. By the steamboats on the Weser there is communication with Karlshafen and Minden. In order to avoid the dangerous part of the river near the town a channel was cut in 1734, the repairing and deepening of which, begun in 1868, was completed in 1873. The Weser is here crossed by an iron suspension bridge 830 ft. in length, supported by a pier erected on an island in the middle of the river.

The older name of Hameln was Hameloa or Hamelowe, and the town owes its origin to an abbey. It existed as a town as early as the nth. century, and in 1259 it was sold by the abbot

of Fulda to the bishop of Minden, afterwards passing under the protection of the dukes of Brunswick. About 1 540 the Reforma- tion gained an entrance into the town, which was taken by both parties during the Thirty Years' War. In 1757 it capitulated to the French, who, however, vacated it in the following year. Its fortifications were strengthened in 1766 by the erection of Fort George, on an eminence to the west of the town, across the river. On the capitulation of the Hanoverian army in 1803 Hameln fell into the hands of the French; it was retaken by the Prussians in 1806, but, after the battle of Jena, again passed to the French, who dismantled the fortifications and incorporated the town in the kingdom of Westphalia. In 1814 it again became Hanoverian, but in 1866 fell with that

kingdom to Prussia.

Legend of the Pied Piper. — Hameln is famed as the scene of the myth of the piper of Hameln. According to the legend, the town in the year 1284 was infested by a terrible plague of rats. One day there appeared upon the scene a piper clad in a fantastic suit, who offered for a certain sum of money to charm all the vermin into the Weser. His conditions were agreed to, but after he had fulfilled his promise the inhabitants, on the ground that he was a sorcerer, declined to fulfil their part of the bargain, whereupon on the 26th of June he reappeared in the streets of the town, and putting his pipe to his lips began a soft and curious strain. This drew all the children after him and he led them out of the town to the Koppelberg hill, in the side of which a door suddenly opened, by which he entered and the children after him, all but one who was lame and could not follow fast enough to reach the door before it shut again. Some trace the origin of the legend to the Children's Crusade of 1211; others to an abduction of children; and others to a dancing mania which seized upon some of the young people of Hameln who left the town on a mad pilgrimage from which they never returned. For a considerable time the town dated its public documents from the event. The story is the subject of a poem by Robert Browning, and also of one by Julius Wolff. Curious evidence that the story rests on a basis of truth is given by the fact that the Koppelberg is not one of the imposing hills by which Hameln is surrounded, but no more than a slight elevation of the ground, barely high enough to hide the children from view as they left the town.

See C. Langlotz, Geschichte der Stadt Hameln(Ha.meln, 1888 fol.); Sprenger, Geschichte der Stadt Hameln (1861); O. Meinardus, Der historische Kern der Rattenfdngersage (Hameln, 1882); Jostes, Der Rattenfdnger von Hameln (Bonn, 1885); and S. Baring-Gould, Curious Myths of the Middle Ages (1868).

HAMERLING, ROBERT (1830-1889), Austrian poet, was

born at Kirchenberg-am-Walde in Lower Austria, on the 24th of March 1830, of humble parentage. He early displayed a genius for poetry and his youthful attempts at drama excited the interest and admiration of some influential persons. Owing to their assistance young Hamerling was enabled to attend the gymnasium in Vienna and subsequently the university. In 1848 he joined the student's legion, which played so conspicuous a part in the revolutions of the capital, and in 1849 shared in the defence of Vienna against the imperialist troops of Prince Windischgratz, and after the collapse of the revolutionary movement he was obliged to hide for a long time to escape arrest. For the next few years he diligently pursued his studies in natural science and philosophy, and in 1855 was appointed master at the gymnasium at Trieste. For many years he battled with ill-health, and in 1866 retired on a pension, which in acknow- ledgment of his literary labours was increased by the government to a sum sufficient to enable him to live without care until his death at his villa in Stiftingstal near Graz, on the 13th of July 1889. Hamerling was one of the most remarkable of the poets of the modern Austrian school; his imagination was rich and his poems are full of life and colour. His most popular poem, Ahasver in Rom (1866), of which the emperor Nero is the central figure, shows at its best the author's brilliant talent for descrip- tion. Among his other works may be mentioned Venus im Exil (1858); Der Konig von Sion (1869), which is generally regarded as his masterpiece; Die sieben Todsiinden (1872); Blatter im Winde (1887); Homunculus (1888); Amor und

Psyche (1882). His novel, Aspasia (1876) gives a finely-drawn description of the Periclean age, but like his tragedy Danton und Robespierre (1870), is somewhat stilted, showing that Hamerling's genius, though rich in imagination, was ill-suited for the realistic presentation of character.

A popular edition of Hamerling's works in four volumes was published by M. M. Rabenlechner (Hamburg, 1900). For the poet's life, see his autobiographical writings, Stationen meiner Lebenspilger- schaft (1889) and Lehrjahre der Liebe (1890); also M. M. Raben- lechner, Hamerling, sein Leben und seine Werke, i. (Hamburg, 1896) ; a short biography by the same (Dresden, 1901); R. H. Kleinert, R. Hamerling, ein Dichter der Schbnheit (Hamburg, 1889) ; A. Polzer, Hamerling, sein Wesen und Wirken (Hamburg, 1890).

HAMERTON, PHILIP GILBERT (1834-1894), English artist and author, was born at Laneside, near Shaw, close to Oldham, on the 10th of September 1834. His mother died at his birth, and having lost his father ten years afterwards, he was educated privately under the direction of his guardians. His first literary attempt, a volume of poems, proving unsuccessful, he devoted himself for a time entirely to landscape painting, encamping out of doors in the Highlands, where he eventually rented the island of Innistrynych, upon which he settled with his wife, a French lady, in 1858. Discovering after a time that his qualifica- tions were rather those of an art critic than of a painter he removed to the neighbourhood of his wife's relatives in France, where he produced his Painter's Camp in the Highlands (1863), which obtained a great success and prepared the way for his standard work on Etching and Etchers (1866). In the following year he published a book, entitled Contemporary French Painters, and in 1868 a continuation, Painting in France after the Decline of Classicism. He had meanwhile become art critic to the Saturday Review, a position which, from the burden it laid upon him of frequent visits to England, he did not long retain. He proceeded (1870) to establish an art journal of his own, The Portfolio, a monthly periodical, each number of which consisted of a monograph uponsome artist or group of artists, frequently written and always edited by him. The discontinuance of his active work as a painter gave him time for more general literary composition, and

he successively produced The Intellectual Life (1873), perhaps the best known and most valuable of his writings; Round my House (1876), notes on French society by a resident; and Modern Frenchmen (1879), admirable short biographies. He also wrote two novels, Wenderholme (1870) and Marmorne (1878). In 1884 Human Intercourse, another valuable volume of essays, was published, and shortly afterwards Hamerton began to write his autobiography, which he brought down to 1858. In 1882 he issued a finely illustrated work on the technique of the great masters of various arts, under the title of The Graphic Arts, and three years later another splendidly illustrated volume. Landscape, which traces the influence of landscape upon the mind of man. His last books were: Portfolio Papers (1889) and French and' English (1889). In 1891 he removed to the neighbourhood of Paris, and died suddenly on the 4th of November 1894, occupied to the last with his labours on The Portfolio and other writings on art.

In 1896 was published Philip Gilbert Hamerton: an Auto- biography, 1834-1858; and a Memoir by his Wife, 1858-1894.

HAMI, a town in Chinese Turkestan, otherwise called Kamil, Komul or Kamul, situated on the southern slopes of the Tian- Shan mountains, and on the northern verge of the Great Gobi desert, in 42 48' N., 93 28' E., at a height above sea-level of 3150 ft. The town is first mentioned in Chinese history in the 1st century, under the name I-wu-lu, and said to be situated 1000 lis north of the fortress Yii-men-kuan, and. to be the key to the western countries. This evidently referred to its advanta- geous position, lying as it did in a fertile tract, at the point of convergence of two main routes running north and south of the Tian-Shan and connecting China with the west. It was taken by the Chinese in a.d. 73 from the Hiungnu (the ancient inhabitants of Mongolia), and made a military station. It next fell into the hands of the Uighurs or Eastern Turks, who made it one of their chief towns and held it for several centuries, and whose

descendants are said to live there now. From the 7th

to the nth century I-wu-lu is said to have borne the name of Igu or I-chu, under the former of which names it is spoken of by the Chinese pilgrim, Hsiian tsang, who passed through it in the 7 th century. The name Hami is first met in the Chinese Yuan-shi or " History of the Mongol Dynasty," but the name more generally used there is Homi-li or Komi-li. Marco Polo, describ- ing it apparently from hearsay, calls it Camul, and speaks of it as a fruitful place inhabited by a Buddhist people of idolatrous and wanton habits. It was visited in 1341 by Giovanni de Marignolli, who baptized a number of both sexes there, and by the envoys of Shah Rukh (1420), who found a magnificent mosque and a convent of dervishes, in juxtaposition with a fine Buddhist temple. Hadji Mahommed (Ramusio's friend) speaks of Kamul as being in his time (c. 1550) the first Mahommedan city met with in travelling from China. When Benedict Goes travelled through the country at the beginning of the 17 th century, the power of .the king Mahommed Khan of Kashgar extended over nearly the whole country at the base of the Tian-Shan to the Chinese frontier, including Kamil. It fell under the sway of the Chinese in 1720, was lost to them in 1865 during the great Mahommedan rebellion, and the trade route through it was consequently closed, but was regained in 1873. Owing to its commanding position on the principal route to the west, and its exceptional fertility, it has very frequently changed hands in the wars between China and her western neighbours. Hami is now a smalj town of about 6000 inhabitants, and is a busy trading centre. The Mahommedan population consists of immigrants from Kashgaria, Bokhara and Samarkand, and of descendants of the Uighurs.

HAMILCAR BARCA, or Barcas (Heb. barak " lightning"), Carthaginian general and statesman, father of Hannibal, was born soon after 270 B.C. He distinguished himself during the First Punic War in 247, when he took over the chief command in Sicily, which at this time was almost entirely in the hands of the Romans. Landing suddenly on the north-west of

the island with a small mercenary force he seized a strong position on Mt. Ercte (Monte Pell egrino, near Palermo), and not only maintained himself against all attacks, but carried his raids as far as the coast of south Italy. In 244 he transferred his army to a similar position on the slopes of Mt. Eryx (Monte San Giuliano), from which he was able to lend support to the besieged garrison in the neighbouring town of Drepanum (Trapani). By a. provision of the peace of 241 Hamilcar's unbeaten force was allowed to depart from Sicily without any token of submission. On return- ing to Africa his troops, which had been kept together only by his personal authority and by the promise of good pay, broke out into open mutiny when their rewards were withheld by Hamilcar's opponents among the governing aristocracy. The serious danger into which Carthage was brought by the failure of the aristocratic generals was averted by Hamilcar, whom the government in this crisis could not hut reinstate. By the power of his personal influence among the mercenaries and the surrounding African peoples, and by superior strategy, he speedily crushed the revolt (237). After this success Hamilcar enjoyed such influence among the popular and patriotic party that his opponents could not prevent him being raised to a virtual dictatorship. After recruiting and training a new army in some Numidian forays he led on his own responsibility an expedition into Spain, where he hoped to gain a new empire to compensate Carthage for the loss of Sicily and Sardinia, and to serve as a basis for a campaign of vengeance against the Romans (236). In eight years by force of arms and diplomacy he secured an extensive territory in Spain, but his premature death in battle (228) prevented him from completing the conquest. Hamilcar stood out far above the Carthaginians of his age in military and diplomatic skill and in strength of patriotism; in these qualities he was surpassed only by his son Hannibal, whom he had imbued with his own deep hatred of Rome and trained to be his successor in the conflict.

This Hamilcar has been confused with another general

who succeeded to the command of the Carthaginians in the First Punic War, and after successes at Therma and Drepanum was defeated at

Ecnomus (256 b. c). Subsequently, apart from unskilful operations against Regulus, nothing is certainly known of him. For others of the name see Carthage, Sicily, Smith's Classical Dictionary. So far as the name itself is concerned, Milcar is perhaps the same as Melkarth, the Tyrian god.

See Polybius i.-iii. ; Cornelius Nepos, Vita Hamilcaris; Appian, Res Hispanicae, chs. 4, 5, Diodorus, Excerpta, xxiv., xxv. ; 0. Meltzer, Geschichte der Karthager (Berlin, 1877), ii. also Punic Wars. (M. 0. B. C.)

HAMILTON, the name of a famous Scottish family. Chief among the legends still clinging to this important family is that which gives a descent from the house of Beaumont, a branch of which is stated to have held the manor of Hamilton in Leicestershire; and it is argued that the three cinquefoils of the Hamilton shield bear some resemblance to the single cinque- foil of the Beaumonts. In face of this it has been recently shown that the single cinquefoil was also borne by the Umfravilles of Northumberland, who appear to have owned a place called Hamilton in that county. It may be pbinted out that Simon de Montfort, the great earl of Leicester, in whose veins flowed the blood of the Beaumonts, obtained about 1245 the wardship of Gilbert de Umfraville, second earl of Angus, and it is con- ceivable that this name Gilbert may somehow be responsible for the legend of the Beaumont descent, seeing that the first authentic ancestor of the Hamiltons is one Walter FitzGilbert. He first appears in 1294-1295 as one of the witnesses to a charter by James, the high steward of Scotland, to the monks of Paisley; and in 1296 his name appears in the Homage Roll as Walter

FitzGilbert of " Hameldone." Who this Gilbert of " Hamel- done " may have been is uncertain, " but the fact must be faced," Mr John Anderson points out (Scots Peerage, iv. 340) " that in a charter of the 12th of December 1272 by Thomas of Cragyn or Craigie to the monks of Paisley of his church of Craigie in Kyle, there appears as witness a certain ' Gilbert de Hameldun clericus,' whose name occurs along with the local clergy of Inverkip, Blackhall, Paisley and Dunoon. He was therefore probably also a cleric of the same neighbourhood, and it is significant that ' Walter FitzGilbert ' appears first in that district in 1294 and in 1296 is described as son of Gilbert de Hameldone. . . ." Walter FitzGilbert took some part in the affairs of his time. At first he joined the English party but after Bannockburn went over to Bruce, was knighted and subse- quently received the barony of Cadzow. His younger son John was father of Alexander Hamilton who acquired the lands of Innerwick by marriage, and from him descended a certain Thomas Hamilton, who acquired the lands of Priestfield early in the 16th century. Another Thomas, grandson of this last, who had with others of his house followed Queen Mary and with them had been restored to royal favour, became a lord of session as Lord Priestfield. Two of his younger sons enjoyed also this legal distinction, while the eldest, Thomas, was made an ordinary lord of session as early as 1592 and was eventually created earl of Haddington (q.v.). It is interesting to note that the 5th earl of Haddington by his marriage with Lady Margaret Leslie brought for a time the earldom of Rothes to the Hamiltons to be added to their already numerous titles.

Sir " David FitzWalter FitzGilbert," who carried on the main line of the Hamiltons, was taken prisoner at the battle of Neville's Cross (1346) and treated as of great importance, being ransomed, it is stated, for a large sum of money; in 1371 and 1373 he was one of the barons in the parliament. Of the four sons attributed to him David succeeded in the representation of the family, Sir John Hamilton of Fingaltoun was ancestor of the Hamiltons of Preston,

and Walter is stated to have been progenitor of the Hamiltons of Cambuskeith and Sanquhar in Ayrshire.

David Hamilton, the first apparently to describe himself as lord of Cadzow, died before 1392, leaving four or five sons, from whom descended the Hamiltons of Bathgate and of Bardowie, and perhaps also of Udstown, to which last belong the lords Belhaven.

Sir John Hamilton of Cadzow, the eldest son, was twice a prisoner in England, but beyond this little is known of him;

even the date of his death is uncertain. His two younger sons are stated to have been founders of the houses of Dalserf and Raploch. His eldest son, James Hamilton of Cadzow, like his father and great-grandfather, visited England as a prisoner, being one of the hostages for the king's ransom. From him the Hamiltons of Silvertonhill and the lords Hamilton of Dalzell claim descent, among the more distinguished members of the former branch being General Sir Ian Hamilton, K.C.B. James Hamilton was succeeded by his eldest son Sir James Hamilton of Cadzow, who was created in 1445 an hereditary lord of parlia- ment, and was thereafter known as Lord Hamilton. He had allied himself some years before with the great house of Douglas by marriage with Euphemia, widow of the 5th earl of Douglas, and was at first one of its most powerful supporters in the struggle with James II. Later, however, he obtained the royal favour and married about 1474 Mary, sister of James III. and widow of Thomas Boyd, earl of Arran. Of this marriage was born James, second Lord Hamilton, who as a near relative took an active part in the arrangements at the marriage of James IV. with Margaret Tudor; being rewarded on the same day (the 8th of August 1503) with the earldom of Arran. A champion in the lists he was scarcely so successful as a leader of men, his struggle with the Douglases being destitute of any great martial achievement. Of his many illegitimate children Sir James Hamilton of Finnart, beheaded in 1540, was ancestor of the Hamiltons.of Gilkerscleugh; and John, archbishop of St Andrews, hanged by his

Protestant enemies, was ancestor of the Hamiltons of Blair, and is said also to have been ancestor of Hamilton of London, baronet. James, second earl of Arran, son of the first earl by his second wife Janet Beaton, was chosen governor to the little Queen Mary, being nearest of kin to the throne through his grandmother, though the question of the validity of his mother's marriage was by no means settled. He held the governorship till 1554, having in 1549 been granted the duchy of Chatellerault in France. In his policy he was vacillating and eventually he retired to France, being absent during the three momentous years prior to the deposition of Mary. On his return he headed the queen's party, his property suffering in consequence. He was succeeded in the title in 1 579 by his eldest son James, whose qualities were such that he was even proposed as a husband for Queen Elizabeth, but unfortunately he soon after became insane, his brother John, afterwards first marquess of Hamilton, administering the estates. From the third son, Claud, descends the duke of Abercorn, heir male of the house of Hamilton.

The first marquess of Hamilton had a natural son, Sir John Hamilton of Lettrick, who was legitimated in 1600 and' was ancestor of the lords Bargany. His two legitimate sons were James, 3rd marquess and first duke of Hamilton, and William, who succeeded his brother as 2nd duke and was in turn succeeded under the special remainder contained in the patent' of dukedom, by his niece Anne, duchess of Hamilton, who was married in 1656 to William Douglas, earl of Selkirk. The history of the descendants of this marriage belongs to the great house of Douglas, the 7th duke of Hamilton becoming the male representative and chief of the house of Douglas, earls of Angus.

The above mentioned Claud Hamilton, who with his brother, the first marquess, had taken so large a part in the cause of Queen Mary, was created a lord of parliament as Lord Paisley in 1587. He had five sons, of whom three settled in Ireland, Sir Claud being ancestor of the Hamiltons of Beltrim and Sir

Frederick, distinguished in early life in the Swedish wars, being ancestor of the viscounts Boyne.

James, the eldest son of Lord Paisley, found favour with James VI. and was created in 1603 Lord of Abercorn, and three years later was advanced in the peerage as earl of Abercorn and lord of Paisley, Hamilton, Mountcastell and Kilpatrick. His eldest son James, 2nd earl of Abercorn, eventually heir male of the house of Hamilton and successor to the dukedom of Chatel- lerault, was created in his father's lifetime lord of Strabane in Ireland, but he resigned this title in 1633 m favour of his brother Claud, whose grandson, Claud, 5th Lord Strabane, succeeded

eventually as 4th earl of Abercorn. This earl, taking the side of James II., was with him in Ireland, his estate and title being afterwards forfeited, while his kinsman Gustavus Hamilton, afterwards first Lord Boyne, raised several regiments for William III., and greatly distinguished himself in the service of that monarch. His brother Charles, 5th earl of Abercorn, who obtained a reversal of the attainder, died without issue surviving in 1 701 when the titles passed to his kinsman James Hamilton, grandson of Sir George Hamilton of Donalong in Ireland and great-grandson of the first earl. This branch, most faithful to the house of Stuart, counted among its many members distinguished in military annals Count Anthony Hamilton, author of the Memoires du comte de Gramont and brother of " la belle Hamilton." James, 6th earl of Abercorn (whose brother William was ancestor of Hamilton of the Mount, baronet), was a partizan of William III., and obtained in 1701 the additional Irish titles of lord of Mountcastle and viscount of Strabane.

The 8th earl of Abercorn, who was summoned to the Irish house of peers in his father's lifetime as

Lord Mountcastle, was created a peer of Great Britain in 1786 as Viscount Hamilton of Hamilton in Leicestershire, and renewed the family's connexion with Scotland by repurchasing the barony of Duddingston and later the lordship of Paisley. His nephew and successor was created marquess of Abercorn in 1790, and was father of James, 1st duke of Abercorn.

See the article Hamilton and other articles on the different branches of the family (e.g. Haddington and Belhaven) in Sir J. B. Paul's edition of Sir R. Douglas's Peerage of Scotland; and also G. Marshall, Guide to Heraldry and Genealogy.

HAMILTON, MARQUESSES AND DUKES OF. The holders of these titles descended from Sir James Hamilton of Cadzow, who was made an hereditary lord of parliament in 1445, his lands and baronies at the same time being erected into the " lordship " of Hamilton. His first wife Euphemia, widow of the 5th earl of Douglas, died in 1468, and probably early in 1474 he married Mary, daughter of King James II. and widow of Thomas Boyd, earl of Arran; the consequent nearness of the Hamiltons to the Scottish crown gave them very great weight in Scottish affairs. The first Lord Hamilton has been frequently confused with his father, James Hamilton of Cadzow, who was one of the hostages in England for the payment of James I.'s ransom, and is sometimes represented as surviving until 1451 or even 1479, whereas he certainly died, according to evidence brought forward by J. Anderson in The Scots Peerage, before May 1441. James, 2nd Lord Hamilton, son of the 1st lord and Princess Mary, was created earl of Arran in 1503; and his son James, who was regent of Scotland from 1542 to 1554, received in February 1549 a grant of the duchy of Chatellerault in Poitou.

John, 1st marquess of Hamilton (c. 1 542-1604), third son of James Hamilton, 2nd earl of Arran (q.v.) and duke of Chatel- lerault, was given the abbey of Arbroath in 1551. In politics he was largely under the influence of his energetic and un-scrupulous younger brother Claud, afterwards Baron

Paisley (c. 1 543-1622), ancestor of the dukes of Abercorn. The brothers were the real heads of the house of Hamilton, their elder brother Arran being insane. At first hostile to Mary, they later became her devoted partisans. Their uncle, John Hamilton, archbishop of St Andrews, natural son of the 1st earl of Arran, was restored to his consistorial jurisdiction by Mary in 1566, and in May of the next year he divorced Bothwell from his wife. Lord Claud met Mary on her escape from Lochleven and escorted her to Hamilton palace. John appears to have been in France in 1 568 when the battle of Langside was fought, and it was probably Claud who commanded Mary's vanguard in the battle. With others of the queen's party they were forfeited by the parliament and sought their revenge on the regent Murray. Although the Hamiltons disavowed all connexion with Murray's murderer, James Hamilton of Bothwellhaugh, he had been provided with horse and weapons by the abbot of Arbroath, and it was" at Hamil- ton that he sought refuge after the deed. Archbishop Hamilton was hanged at Stirling in 1571 for alleged complicity in the

murder of Darnley, and is said to have admitted that he was a party to the murder of Murray. At the pacification of Perth in 1573 the Hamiltons abandoned Mary's cause, and a recon- ciliation with the Douglases was sealed by Lord John's marriage with Margaret, daughter of the 7th Lord Glamis, a cousin of the regent Morton. Sir William Douglas of Lochleven, however, persistently sought his life in revenge for the murder of Murray until, on his refusal to keep the peace, he was imprisoned. On the uncertain evidence extracted from the assassin by torture, the Hamiltons had been credited with a share in the murder of the regent Lennox in 1571. In 1579 proceedings against them for these two crimes were resumed, and when they escaped to England their lands and titles were seized by their political enemies, James Stewart becoming earl of Arran. John Hamilton presently dissociated himself from the policy of his brother Claud, who continued to plot for Spanish intervention on behalf of Mary; and

Catholic plotters are even said to have suggested his murder to procure the succession of his brother. Hamilton had at one time been credited with the hope of marrying Mary; his desires now centred on the peaceful enjoyment of his estates. With other Scottish exiles he crossed the border in 1585 and marched on Stirling; he was admitted on the 4th of November and formally reconciled with James VI., with whom • he was thenceforward on the friendliest terms. Claud returned to Scotland in 1586, and the abbey of Paisley was erected into a temporal barony in his favour in 1 587. Much of his later years was spent in strict retirement, his son being authorized to act for him in 1 598. John was created marquess of Hamilton and Lord Evan in 1599, and died on the 6th of April 1604.

His eldest surviving son James, 2nd marquess of Hamilton (c. 1 589–1625), was created baron of Innerdale and earl of Cambridge in the peerage of England in 1619, and these honours descended to his son James, who in 1643 was created duke of Hamilton (q.v.). William, 2nd duke of Hamilton (1616–1651), succeeded to the dukedom on his brother's execution in 1649. He was created earl of Lanark in 1639, and in the next year became secretary of state in Scotland. Arrested at Oxford by the king's orders in 1643 for " concurrence " with Hamilton, he effected his escape and was temporarily reconciled with the Presbyterian party. He was sent by the Scottish committee of estates to treat with Charles I. at Newcastle in 1646, when he sought in vain to persuade the king to consent to the establishment of Presbyterianism in England.. On the 26th of September 1647 he signed on behalf of the Scots the treaty with Charles known as the " Engagement " at Carisbrooke Castle, and helped to organize the second Civil War. In 1648 he fled to Holland, his succession in the next year to his brother's dukedom making him an important personage among the Royalist exiles. He returned to Scotland with Prince Charles in 1650, but, finding a reconciliation with Argyll impossible, he refused to prejudice Charles's cause by pushing his claims, and lived in retirement

chiefly until the Scottish invasion of England, when he acted as colonel of a body of his dependants. He died on the 12th of September 1651 from the effects of wounds received at Worcester. He left no male heirs, and the title devolved on the 1st duke's eldest surviving daughter Anne, duchess of Hamilton in her own right.

Anne married in 1656 William Douglas, earl of Selkirk (1635- 1694), who was created duke of Hamilton in 1660 on his wife's petition, receiving also several of the other Hamilton peerages, but for his life only. The Hamilton estates had been declared forfeit by Cromwell, and he himself had been fined £1000. He supported Lauderdale in the early stages of his Scottish policy, in which he adopted a moderate attitude towards the Presby-terians, but the two were soon alienated, through the influence of the countess of Dysart, according to Gilbert Burnet, who spent much time at Hamilton Palace in arranging the Hamilton papers. With other Scottish noblemen who resisted Lauderdale's measures Hamilton was twice summoned to London to present his case at court, but without obtaining any result. He was dismissed from the privy council in 1676, and on a subsequent visit to London Charles refused to receive him. On the accession

of James II. he received numerous honours, but he was one of the first to enter into communication with the prince of Orange. He presided over the convention of Edinburgh, summoned at his request, which offered the Scottish crown to William and Mary in March 1689. His death took place at Holyrood on the 18th of April 1694. His wife survived until 17 16.

James Douglas, 4th duke of Hamilton (1658-1712), eldest son of the preceding and of Duchess Anne, succeeded his mother, who resigned the dukedom to him in 1698, and at the accession of Queen Anne he

was regarded as leader of the Scottish national party. He was an opponent of the union with England, but his lack of decision rendered his political conduct ineffective. He was created duke of Brandon in the peerage of Great Britain in 1711; and on the 15th of November in the following year he fought the celebrated duel with Charles Lord Mohun, narrated in Thackeray's Esmond, in which both the principals were killed. His son, James (1703–1743), became 5th duke, and his grandson James, 6th duke of Hamilton and Brandon (1724–1758), married the famous beauty, Elizabeth Gunning, afterwards duchess of Argyll. James George, 7th duke (1755–1769), became head of the house of Douglas on the death in 1761 of Archibald, duke of Douglas, whose titles but not his estates then devolved on . the duke of Hamilton as heir-male. Archibald's brother Douglas (1756–1799) was the 8th duke, and when he died childless the titles passed to his uncle Archibald (1740–1819). His son Alexander, 10th duke (1767–1852), who as marquess of Douglas was a great collector and connoisseur of books and pictures (his collections realized £397,562 in 1882), was ambassador at St Petersburg in 1806–1807. His sister, Lady Anne Hamilton, was lady-in-waiting and a faithful friend to Queen Caroline, wife of George IV. ; she did not write the Secret History of the Court of England . . . (1832) to which her name was attached. William Alexander, nth duke of Hamilton (1811–1863), married Princess Marie Arnelie, daughter of Charles, grand-duke of Baden, and, on her mother's side, a cousin of Napoleon III. The title of duke of Chatellerault, granted to his remote ancestor in 1548, and claimed at different times by various branches of the Hamilton family, was conferred on the nth duke's son, William Alexander, 12th duke of Hamilton (1845–1895), by the emperor of the French in 1864. His sister, Lady Mary Douglas-Hamilton, married in 1869 Albert, prince of Monaco, but their marriage was declared invalid in 1880. She subsequently married Count Tassilo Festetics, a Hungarian noble. The 12th duke left no male issue and was succeeded in 1895 by his kinsman, Alfred Douglas, a descendant of the 4th duke. Claud Hamilton, 1st Baron Paisley,

brother of the 1st marquess of Hamilton, was, as mentioned above, ancestor of the Abercorn branch of the Hamiltons. His son, who became earl of Abercorn in 1606, received among a number of other titles that of Lord Hamilton. This title, and also that of Viscount Hamilton, in the peerage of Great Britain, conferred on the 8th earl of Abercorn in 1786, are borne by the dukes of Abercorn, whose eldest son is usually styled by courtesy marquess of Hamilton, a title which was added to the other family honours when the 2nd marquess of Abercorn was raised to the dukedom in 1868.

See John Anderson, The House of Hamilton (1825); Hamilton Papers, ed. J. Bain (2 vols., Edinburgh, 1 890–1892) ; Gilbert Burnet, Lives of James and William, dukes of Hamilton (1677) ; The Hamilton Papers relative to 1638–1650, ed. S. R. Gardiner for the Camden Society (1880); G. E. Qokayne], Complete Peerage (1887–1898); an article by the Rev. J. Anderson in Sir J. B. Paul's edition of the Scots Peerage, vol. iv. (1907).

HAMILTON, ALEXANDER (1757–1804), American statesman and economist, was born, as a British subject, on the island of Nevis in the West Indies on the nth of January 1757. He came of good family on both sides. His father, James Hamilton, a Scottish merchant of St Christopher, was a younger son of Alexander Hamilton of Grange, Lanarkshire, by Elizabeth, daughter of Sir R. Pollock. His mother, Rachael Fawcett (Faucette), of French Huguenot descent, married when very young a Danish proprietor of St Croix, John Michael Levine, with whom she lived unhappily and whom she soon left, sub- sequently living with James Hamilton; her husband procured

a divorce in 1759, but the court forbade her remarriage. 1 Such unions as hers with James Hamilton were long not uncommon in the West Indies. By her James Hamilton had two sons, Alexander and James. Business misfortunes having caused his father's bankruptcy, and his mother dying in 1768, young Hamilton was thrown upon the care of maternal relatives at St Croix, where, in his twelfth year,

he entered the counting- house of Nicholas Cruger. Shortly afterward Mr Cruger, going abroad, left the boy in charge of the business. The extra- ordinary specimens we possess of his mercantile correspondence and friendly letters, written at this time, attest an astonishing poise and maturity of mind, and self-conscious ambition. His opportunities for regular schooling must have been very scant; but he had cultivated friends who discerned his talents and en- couraged their development, and he early formed the habits of wide reading and industrious study that were to persist through his life. An accomplishment later of great service to Hamilton, common enough in the Antilles, but very rare in the English continental colonies, was a familiar command of French. In 1772 some friends, impressed by a description by him of the terrible West Indian hurricane in that year, made it possible for him to go to New York to complete his education. Arriving in the autumn of 1772, he prepared for college at Elizabethtown, N.J., and in 1774 entered King's College (now Columbia Uni- versity) in New York City. His studies, however, were inter- rupted by. the War of American Independence.

A visit to Boston seems to have thoroughly confirmed the conclusion, to which reason had already led him, that he should cast in his fortunes with the colonists. Into their cause he threw himself with ardour. In 1774-1775 he wrote two influential anonymous pamphlets, which were attributed to John Jay; they show remarkable maturity and controversial- ability, and rank high among the political arguments of the time. 2 He organized an artillery company, was awarded its captaincy on examination, won the interest of Nathanael Greene and Washington by the proficiency and bravery he displayed in the campaign of 1776 around New York City, joined Washington's staff in March 1777 with the rank of lieutenant-colonel, and during four years served as his private secretary and confidential aide. The important duties with which he was entrusted attest Washington's entire confidence in his abilities and character; then and

afterwards, indeed, reciprocal confidence and respect took the place, in their relations, of personal attachment. 3 But Hamilton was ambitious for military glory- — it was an ambition he never lost; he became impatient of detention in what he regarded as a position of unpleasant dependence, and (Feb. 1781) he seized a slight reprimand administered by Wash- ington as an excuse for abandoning his staff position. 4 Later he secured a field command, through Washington, and won laurels at Yorktown, where he led the American column in the

1 These facts were first definitely determined by Mrs Gertrude Atherton from the Danish Archives in Denmark and the West Indies; see article in North American Review, Aug. 1902, vol. 175, p. 229 ; and preface to her A Few of Hamilton's Letters (New York,

1903)-

2 These were written in answer to the widely read pamphlets published over the nom de plume of "A Westchester Farmer," and now known to have been written by Samuel Seabury (q.v.). Hamilton's pamphlets were entitled " A Full Vindication of the Measures of the Congress from the Calumnies of their Enemies," and " The Farmer Refuted." Concerning them George Ticknor Curtis {Constitutional History of the United States, i. 274) has said, " There are displayed in these papers a power of reasoning and sarcasm, a knowledge of the principles of government and of the English constitution, and a grasp of the merits of the whole contro- versy, that would have done honour to any man at any age. To say that they evince precocity of intellect gives no idea of their main characteristics. They show great maturity — a more remarkable maturity than has ever been exhibited by any other person, at so early an age, in the same department of thought."

3 George Bancroft was the first to point out that there is small evidence that Hamilton ever really appreciated Washington's great qualities; but on the score of personal and Federalist indebtedness he

left explicit recognition.

4 For Hamilton's letter to General Schuyler on this episode — one of the most important letters, in some ways, that he ever wrote — see the Works, ix. 232 (8 : 35).

final assault on the British works. In 1780 he married Elizabeth, daughter of General Philip Schuyler, and thus became allied with one of the most distinguished families in New York.

Meanwhile, he had begun the political efforts upon which his fame principally rests. In letters of 1779–1780 1 he correctly diagnoses the ills of the Confederation, and suggests with admirable prescience the necessity of centralization in its governmental powers; he was, indeed, one of the first, if not to conceive, at least to suggest adequate checks on the anarchic tendencies of the time. After a year's service in Congress in 1 78 2–1 783, in which he experienced the futility of endeavouring to attain through that decrepit body the ends he sought, he settled down to legal practice in New York. 2 The call for the Annapolis Convention (1786) was Hamilton's opportunity. A delegate from New York, he supported Madison in inducing the Convention to exceed its delegated powers and summon the Federal Convention of 1787 at Philadelphia (himself drafting the call); he secured a place on the New York delegation; and, when his anti-Federal colleagues withdrew from the Convention, he signed the Constitution for his state. So long as his colleagues were present his own vote was useless, and he absented himself for some time from the debates after making one remarkable speech (June 18th, 1787). In this he held up the British govern- ment as the best model in the world. 3 Though fully conscious that monarchy in America was impossible, he wished to obtain the next best solution in an aristocratic, strongly

centralized, coercive, but representative union, with devices to give weight to the influence of class and property. 4 His plan had no chance of success; but though unable to obtain what he wished, he used his great talents to secure the adoption of the Constitution.

To this struggle was due the greatest of his writings, and the greatest individual contribution to the adoption of the new government, The Federalist, which remains a classic commentary on American constitutional law and the principles of government, and of which Guizot said that " in the application of elementary principles of government to practical administration " it was the greatest work known to him. Its inception, and much more than half its contents were Hamilton's (the rest Madison's and Jay's). 5 Sheer will and reasoning could hardly be more bril-

1 Especially the letter of September 1780 to James Duane, Works, i. 213 (1 : 203) ; also the " Continentalist " papers of 1781.

2 His most famous case at this time (Rutgers v. Waddington) was one that well illustrated his moral courage. Under a " Trespass Law " of New York, Elizabeth Rutgers, a widow, brought suit against one Joshua Waddington, a Loyalist, who during the war of American Independence, while New York was occupied by the British, had made use of some of her property. In face of popular clamour, Hamilton, who advocated a conciliatory treatment of the Loyalists, represented Waddington, who won the case, decided in

1784.

3 As Mr Oliver points out {Alexander Hamilton, p. 156), Hamilton's idea of the British constitution was not a correct picture of the British constitution in 1787, and still less of that of the 20th century. " What he had in mind was the British constitution as George III. had tried to make it." Hamilton's ideal was an elective monarchy, and his guiding principle a proper balance of authority.

4 Briefly, he proposed a governor and two chambers — an Assembly elected by the people for three years, and a Senate — the governor and senate holding office for life or during good behaviour, and chosen, through electors, by voters qualified by property; the governor to have an unqualified veto on federal legislation; state governors to have a similar veto on state legislation, and to be appointed by the federal government; the federal government to control all militia. See Works, i. 347 (1 : 331); and cf. his corre- spondence, which is scanty, passim in later years, notably x. 446, 431. 329 (8: 606, 596, 517), and references below.

5 Nearly all the papers in The Federalist first appeared (between October 1787 and April 1788) in New York journals, over the signa- ture " Publius." Jay wrote only five. The authorship of twelve of them is uncertain, and has been the subject of much controversy between partisans of Hamilton and Madison. Concerning The Federalist Chancellor James Kent [Commentaries, i. 241) said: " There is no work on the subject of the Constitution, and on re- publican and federal government generally, that deserves to be more thoroughly studied. I know not indeed of any work on the principles of free government that is to be compared, in instruction and intrinsic value, to this small and unpretending volume. ... It is equally admirable in the depth of its wisdom, the comprehensiveness of its views, the sagacity of its reflections, and the fearlessness, patriotism,

liantly and effectively exhibited than they were by Hamilton in the New York convention of 1788, whose

vote he won, against the greatest odds, for the ratification of the Constitution. It was the judgment of Chancellor James Kent, the justice of which can hardly be disputed, that " all the documentary proof and the current observation of the time lead us to the conclusion that he surpassed all his contemporaries in his exertions to create, recommend, adopt and defend the Constitution of the United States."

When the new government was inaugurated, Hamilton became secretary of the treasury in Washington's cabinet. 6 Congress immediately referred to him a press of queries and problems, and there came from his pen a succession of papers that have left the strongest imprint on the administrative organization of the national government — two reports on public credit, upholding an ideal of national honour higher than the prevalent popular principles; a report on manufactures, advocating their encouragement (e.g. by bounties paid from surplus revenues amassed by tariff duties) — a famous report that has served ever since as a storehouse of arguments for a national protective policy; 7 a report favouring the establishment of a national bank, the argument being based on the doctrine of " implied powers " in the Constitution, and on the application that Con- gress may do anything that can be made, through the medium of money, to subserve the " general welfare " of the United States — doctrines that, through judicial interpretation, have revolutionized the Constitution; and, finally, a vast mass of detailed work by which order and efficiency were given to the national finances. In 1793 he put to confusion his opponents who had brought about a congressional investigation of his official accounts. The success of his financial measures was ici> mediate and remarkable. They did not, as is often but loosely said, create economic prosperity; but they did prop it, in an all-important field, with order, hope and confidence. His ultimate purpose was always the strengthening of the union; but before particularizing his political theories, and the political import of his financial measures, the

remaining events of his life may be traced.

His activity in the cabinet was by no means confined to the finances. He regarded himself, apparently, as premier, and sometimes overstepped the limits of his office in interfering with other departments. The heterogeneous character of the duties placed upon his department by Congress seemed in fact to reflect the English idea of its primacy. Hamilton's influence was in fact predominant with Washington (so far as any man could have predominant influence). Thus it happens that in foreign affairs, whatever credit properly belongs to the Federalists as a party (see also the article Federalist Party) for the adoption of that principle of neutrality which became the traditional policy of the United States must be regarded as largely due to Hamilton. But allowance must be made for the mere advantage of initiative which belonged to any party that organized the government — the differences between Hamilton and Jefferson, in this question of neutrality, being almost purely factitious. 8 On domestic policy their differences were vital,

candour, simplicity, and elegance, with which its truths are uttered and recommended."

6 The position was offered first to Robert Morris, who declined it, expressing the opinion that Hamilton was the man best fitted to meet its problems.

7 Hamilton's Report on Manufactures (1791) by itself entitles him to the place of an epoch-maker in economics. It was the first great revolt from Adam Smith, oh whose Wealth of Nations (1776) he is said to have already written a commentary which is lost. In his criticism on Adam Smith, and his arguments for a system of moderate protective duties associated with the deliberate policy of promoting national interests, his work was the inspiration of Fried- rich List, and so the foundation of the economic system of Germany in a later day, and again, still later, of the policy of Tariff Reform and Colonial Preference in England, as advocated by

Mr Chamber- lain and his supporters. See the detailed account given in the article Protection.

8 That is, while Jefferson hated British aristocracy and sym- pathized with French democracy, Hamilton hated French demo- cracy and sympathized with British aristocracy and order; but

and in their conflicts over Hamilton's financial measures they organized, on the basis of varying tenets and ideals which have never ceased to conflict in American politics, the two great parties of Federalists and Democrats (or Democratic-Republicans). On the 31st of January 1795 Hamilton resigned his position as secretary of the treasury and returned to the practice of law in New York, leaving it for public service only in 1 798-1 800, when he was the active head, under Washington (who insisted that Hamilton should be second only to himself), of the army organized for war against France. But though in private life he remained the continual and chief adviser of Washington — notably in the serious crisis of the Jay Treaty, of which Hamilton approved. Washington's Farewell Address (1796) was written for him by Hamilton.

After Washington's death the Federalist leadership was divided (and disputed) between John Adams, who had the prestige of a varied and great career, and greater strength than any other Federalist with the people, and Hamilton, who con- trolled practically all the leaders of lesser rank, including much the greater part of the most distinguished men of the country, so that it has been very justly said that " the roll of his followers is enough of itself to establish his position in American history " (Lodge). But Hamilton was not essentially a popular leader. When his passions were not involved, or when they were repressed by a crisis, he was far-sighted, and his judgment of men was excellent. 1 But as Hamilton himself once said, his heart was ever the

master of his judgment. He was, indeed, not above intrigue, 2 but he was unsuccessful in it. He was a fighter through and through, and his courage was superb; but he was indiscreet in utterance, impolitic in management, opinionated, self-confident, and uncompromising in nature and methods. His faults are nowhere better shown than in his quarrel with John Adams. Three times, in order to accomplish ends deemed by him, person- ally, to be desirable, Hamilton used the political fortunes of John Adams, in presidential elections, as a mere hazard in his manoeuvres; moreover, after Adams became president, and so the official head of the party, Hamilton constantly advised the members of the president's cabinet, and through them endeavoured to control Adams's policy; and finally, on the eve of the crucial election of 1800, he wrote a bitter personal attack on the president (containing much confidential cabinet informa- tion), which was intended for private circulation, but which was secured and published by Aaron Burr, his legal and political rival.

The mention of Burr leads us to the fatal end of another great political antipathy of Hamilton's life. He read Burr's character correctly from the beginning; deemed it a patriotic duty to thwart him in his ambitions; defeated his hopes successively of a foreign mission, the presidency, and the governorship of New York; and in his conversations and letters repeatedly and unsparingly denounced him. If these denunciations were known to Burr they were ignored by him until his last defeat. After that he forced a quarrel on a trivial bit of hearsay (that Hamilton had said he had a "despicable" opinion of Burr); and Hamilton, believing as he explained in a letter he left before going to his death — that a compliance with the duelling prejudices of the time was inseparable from the ability to be in future

neither wanted war; and indeed Jefferson, throughout life, was the more peaceful of the two. Neutrality was in the line of common- place American thinking of that time, as may be seen in the writings of all

the leading men of the day. The cry of ” British Hamilton ” had no good excuse whatever.

1 e.g. his prediction in 1789 of the course of the French Revolu- tion; his judgments of Burr from 1792 onward, and of Burr and Jefferson in 1800.

1 After the Democrats won New York in 1799, Hamilton proposed to Governor John Jay to call together the out-going Federalist legislature, in order to choose Federalist presidential electors, a suggestion which Jay simply endorsed: ” Proposing a measure for party purposes which it would not become me to adopt.” — Works, x. 371 (8 : 549). Compare also with later developments of ward politics in New York City, Hamilton’s curious suggestions as to Federalist charities, &c, in connexion with the Christian Consti- tutional Society proposed by him in 1802 to combat irreligion and democracy (Works, x. 432 (8 : 596).

useful in public affairs, accepted a challenge from him. The duel was fought at Weehawken on the Jersey shore of the Hudson opposite the City of New York. At the first fire Hamilton fell, mortally wounded, and he died on the following day, the 12 th of July 1804. Hamilton himself did not intend to fire, but his pistol went off as he fell. The tragic close of his career appeased for the moment the fierce hatred of politics, and his death was very generally deplored as a national calamity. 3

No emphasis, however strong, upon the mere consecutive personal successes of Hamilton’s life is sufficient to show the measure of his importance in American history. That import- ance lies, to a large extent, in the political ideas for which he stood. His mind was eminently ” legal.” He was the unrivalled controversialist of the time. His writings, which are distin- guished by clarity, vigour and rigid reasoning, rather than by any show of scholarship — in the extent of which, however solid in character Hamilton’s might have been, he was surpassed by several of his contemporaries — are in general strikingly empirical in basis. He drew

his theories from his experiences of the Revolutionary period, and he modified them hardly at all through life. In his earliest pamphlets (1774-1775) he started out with the ordinary pre-Revolutionary Whig doctrines of natural rights and liberty; but the first experience of semi-anarchic states'rights and individualism ended his fervour for ideas so essentially alien to his practical, logical mind, and they have no place in his later writings. The feeble inadequacy of concep tion, infirmity of power, factional jealousy, disintegrating particularism, and vicious finance of the Confederation were realized by many others; but none other saw so clearly the concrete nationalistic remedies for these concrete ills, or pursued remedial ends so constantly, so ably, and so con-sistently. An immigrant, Hamilton had no particularistic ties; he was by instinct a " continentalist " or federalist. He wanted a strong union and energetic government that should " rest as much as possible on the shoulders of the people and as little as possible on those of the state legislatures"; that should have the support of wealth and class; and that should curb the states to such an " entire subordination " as nowise to be hindered by those bodies. At these ends he aimed with extraordinary skill in all his financial measures. As early as 1776 he urged the direct collection of federal taxes by federal agents. From 1779 onward we trace the idea of supporting government by the interest of the propertied classes; from 1781 onward the idea that a not-excessive public debt would be a blessing 4 in giving cohesiveness to the union: hence his device by which the federal government, assuming the war debts of the states, secured greater resources, based itself on a high ideal of nationalism, strengthened its hold on the individual citizen, and gained the support of property. In his report on manufactures his chief avowed motive was to strengthen the union. To the same end he conceived the constitutional doctrines of liberal construction, " implied powers," and the " general welfare," which were later embodied in the decisions

of John Marshall. The idea of nationalism pervaded and quickened all his life and works. With one great exception, the dictum of Guizot is hardly an exaggeration, that ” there is not in the Constitution of the United States an element of order, of force; of duration, which he did not powerfully contribute to introduce into it and to cause to predominate.”

3 Hamilton’s widow, who survived him for half a century, dying at the age of ninety-seven, was left with four sons and four daughters. He had been an affectionate husband and father, though his devotion to his wife had been consistent with occasional lapses from strict marital fidelity. One intrigue into which he drifted in 1791, with a Mrs Reynolds, led to the blackmailing of Hamilton by her husband ; and when this rascal, shortly afterwards, got into trouble for fraud, his relations with Hamilton were un- scrupulously misrepresented for political purposes by some of Hamilton’s opponents. But Hamilton faced the necessity of revealing the true state of things with conspicuous courage, and the scandal only reacted on his accusers. One of them was Monroe, whose re- putation comes very badly out of this unsavoury affair.

4 In later years he said no debt should be incurred without provid- ing simultaneously for its payment.

The exception, as American history showed, was American democracy. The loose and barren rule of the Confederation seemed to conservative minds such as Hamilton’s to presage, in its strengthening of individualism, a fatal looseness of social restraints, and led him on to a dread of democracy that he never overcame. Liberty, he reminded his fellows, in the New York Convention of 1788, seemed to be alone considered in govern- ment, but there was another thing equally important: ” a principle of strength and stability in the organization . . .

and of vigour in its operation." But Hamilton's governmental system was in fact repressive. 1 He wanted a system strong enough, he would have said, to overcome the anarchic tendencies loosed by war, and represented by those notions of natural rights which he had himself once championed; strong enough to overbear all local, state and sectional prejudices, powers or influence, and to control — not, as Jefferson would have it, to be controlled by — the people. Confidence in the integrity, the self-control, and the good judgment of the people, which was the content of Jefferson's political faith, had almost no place in Hamilton's theories. " Men," said he, " are reasoning rather than reasonable animals." The charge that he laboured to introduce monarchy by intrigue is an under-estimate of his good sense. 2 Hamilton's thinking, however, did carry him foul of current democratic philosophy; as he said, he presented his plan in 1787 " not as attainable, but as a model to which we ought to approach as far as possible "; moreover, he held through life his belief in its principles, and in its superiority over the government actually created; and though its inconsistency with American tendencies was yearly more apparent, he never ceased to avow on all occasions his aristocratic-monarchical partialities. Moreover, his preferences for at least an aristocratic republic were shared by many other men of talent. When it is added that Jefferson's assertions, alike as regards Hamilton's talk 3 and the intent and tendency of his political measures, were, to the extent of the underlying basic fact — but discounting Jefferson's somewhat intemperate interpretations — unquestion- ably true, 4 it cannot be accounted strange that Hamilton's Democratic opponents mistook his theoretic predilections for positive designs. Nor would it be a strained inference from much that he said, to believe that he hoped and expected that in the " crisis " he foresaw, when democracy should have caused the ruin of the country, a new government might be formed that should approximate to his own ideals. 5 From the beginning of the excesses of the French Revolution he was possessed by the persuasion that

American democracy, likewise, might at any moment crush the restraints of the Constitution to enter on a career of licence and anarchy. To this obsession he sacri-

1 He warmly supported the Alien and Sedition Laws of 1798 (in their final form).

2 The idea, he wrote to Washington, was " one of those visionary things none but madmen could undertake, and that no wise man will believe " (1792). And see his comments on Burr's ambitions, Works, x. 417, 450 (8:585, 610). We may accept as just, and applicable to his entire career, the statement made by himself in 1803 of his principles in 1787 : " (1) That the political powers of the people of this continent would endure nothing but a representative form of government. (2) That, in theactual situation of the country, it was itself right and proper that the representative system should have a full and fair trial. (3) That to such a trial it was essential that the government should be so constructed as to give it all the energy and the stability reconcilable with the principles of that theory."

3 Cf. Gouverneur Morris, Diary and Letters, ii. 455, 526, 531.

- Cf. even Mr Lodge's judgments, pp. 90-92, 115-116, 122, 130, 140. When he says (p. 140) that " In Hamilton's successful policy there were certainly germs of an aristocratic republic, there were certainly limitations and possibly dangers to pure democracy," this is practi- cally Jefferson's assertion (1792) that " His system flowed from principles adverse to liberty"; but Jefferson goes on to add: " and was calculated to undermine and demolish the republic." As to the intent of Hamilton to secure through his financial measures the political support of property, his own words are honest and clear ; and in fact he succeeded. Jefferson merely had exaggerated fears of a moneyed political engine, and seeing

that Hamilton's measures of funding and assumption did make the national debt politically useful to the Federalists in the beginning he concluded that they would seek to fasten the debt on the country for ever.

- Cf. Gouv. Morris, op. cit. ii. 474.

ficed his life. 6 After the Democratic victory of 1800, his letters, full of retrospective judgments and interesting outlooks, are but rarely relieved in their sombre pessimism by flashes of hope and courage. His last letter on politics, written two days before his death, illustrates the two sides of his thinking already emphasized: in this letter he warns his New England friends against dismemberment of the union as " a clear sacrifice of great positive advantages, without any counterbalancing good; administering no relief to our real disease, which is democracy, the poison of which, by a subdivision, will only be more con- centrated in each part, and consequently the more virulent." To the end he never lost his fear of the states, nor gained faith in the future of the country. He laboured still, in mingled hope and apprehension, "to prop the frail and worthless fabric," 7 but for its spiritual content of democracy he had no under- standing, and even in its nationalism he had little hope. Yet probably to no one man, except perhaps to Washington, does American nationalism owe so much as to Hamilton.

In the development of the United States the influence of Hamiltonian nationalism and Jeffersonian democracy has been a reactive union; but changed conditions since Hamilton's time, and particularly since the Civil War, are likely to create misconceptions as to Hamilton's position in his own day. Great constructive statesman as he was, he was also, from the American point of view, essentially a reactionary. He was the leader of reactionary forces — constructive forces, as it happened — in the critical period after the War of American Independence, and in the period of Federalist supremacy. He was in sympathy with the

dominant forces of public life only while they took, during the war, the predominant impress of an imperfect nation- alism. 8 Jeffersonian democracy came into power in 1800 in direct line with colonial development; Hamiltonian Federalism was a break in that development; and this alone can explain how Jefferson could organize the Democratic Party in face of the brilliant success of the Federalists in constructing the govern- ment. Hamilton stigmatized his great opponent as a political fanatic; but actualist as he claimed to be, 9 Hamilton could not see, or would not concede, the predominating forces in American life, and would uncompromisingly have minimized the two great political conquests of the colonial period — local self- government and democracy.

Few Americans have received higher tributes from foreign authorities. Talleyrand, personally impressed when in America with Hamilton's brilliant qualities, declared that he had the power of divining without reasoning, and compared him to Fox and Napoleon because he had " devine l'Europe." Of the judgments rendered by his countrymen, Washington's con- fidence in his ability and integrity is perhaps the most significant. Chancellor James Kent, and others only less competent, paid remarkable testimony to his legal abilities. Chief-justice Marshall ranked him second to Washington alone. No judgment

6 He dreamed of saving the country with an army in this crisis of blood and iron, and wished to preserve unweakened the public confidence in his personal bravery.

7 His own words in 1802. In justification of the above state- ments see the correspondence of 1800-1804 passim — Works, vol. ix.- x. (or 7-8) ; especially x. 363, 425, 434, 440, 445 (or 8 :543, 591, 596,

602, 605).

8 Cf. Anson D. Morse, article cited below, pp. 4,

18-21.

9 Chancellor Kent tells us {Memoirs and Letters, p. 32) that in 1804 Hamilton was planning a co-operative Federalist work on the history and science of government on an inductive basis. Kent always speaks of Hamilton's legal thinking as deductive, however (ibid, p. 290, 329), and such seems to have been in fact all his political reasoning: i.e. underlying them were such maxims as that of Hume, that in erecting a stable government every citizen must be assumed a knave, and be bound by self-interest to co-operation for the public

• good. Hamilton always seems to be reasoning deductively from such principles. He went too far and fast for even such a Federalist disbeliever in democracy as Gouverneur Morris; who, to Hamilton's assertion that democracy must be cast out to save the country, replied that " such necessity cannot be shown by a political ratio- cination. Luckily, or, to speak with a reverence proper to the occasion, providentially, mankind are not disposed to embark the blessings they enjoy on a voyage of syllogistic adventure to obtain something more beautiful in exchange.' They must feel before they will act (op. cit. ii. 531).

is more justly measured than Madison's (in 1831): "That he possessed intellectual powers of the first order, and the moral qualities of integrity and honour in a captivating degree, has been awarded him by a suffrage now universal. If his theory of government deviated from the republican standard he had the candour to avow it, and the greater merit of co-operating faithfully in maturing and supporting a system which was not his choice."

In person Hamilton was rather short and slender; in carriage, erect, dignified and graceful. Deep-set, changeable, dark eyes vivified his mobile features, and set off his light hair and fair, ruddy complexion. His head in the famous Trumbull portrait

is boldly poised and very striking. The captivating charm of his manners and conversation is attested by all who knew him, and in familiar life he was artlessly simple. Friends he won readily, and he held them in devoted attachment by the solid worth of a frank, ardent, generous, warm-hearted and high-minded character. Versatile as were his intellectual powers, his nature seems comparatively simple. A firm will, tireless energy, aggressive courage and bold self-confidence were its leading qualities; the word " intensity " perhaps best sums up his character. His Scotch and Gallic strains of ancestry are evident; his countenance was decidedly Scotch; his nervous speech and bearing and vehement temperament rather French; in his mind, agility, clarity and penetration were matched with logical solidity. The remarkable quality of his mind lay in the rare combination of acute analysis and grasp of detail with great comprehensiveness of thought. So far as his writings show, he was almost wholly lacking in humour, and in imagination little less so. He certainly had wit, but it is hard to believe he could have had any touch of fancy. In public speaking he often combined a rhetorical effectiveness and emotional intensity that might take the place of imagination, and enabled him, on the coldest theme, to move deeply the feelings of his auditors.

Bibliography. — Hamilton's V/orks have been edited by H. C. Lodge (New York, 9 vols., 1885-1886, and 12 vols., 1904); all references above are first to the latter edition, secondly (in brackets) to the former. There are various additional editions of The Federal- ist, notably those of H. B. Dawson (1863), H. C. Lodge (1888), and — the most scholarly — P. L. Ford (1898); cf. American Historical Review, ii. 413, 675. See also James Bryce, " Predictions of Hamil- ton and de Tocqueville," in Johns Hopkins University Studies, vol. 5 (Baltimore, 1887); and the capital essay of Anson D. Morse in the Political Science Quarterly, v. (1890), pp. 1-23. For a biblio- graphy of the period see the Cambridge Modern History, vol. vii. pp. 780-810. The

unfinished Life of Alexander Hamilton, by his Son, J. C. Hamilton, going only to 1787 (New York, 2 vols., 1834- 1840), was superseded by the same author's valuable, but partisan and uncritical History of the Republic . . . as traced in the Writings of Alexander Hamilton (New York, 7 vols., 1857-1864; 4th ed., Boston, 1879). Professor W. G. Sumner's Alexander Hamilton (Makers of America series, New York, 1890) is appreciative, and important for- its criticism from the point of view of an American free-trader; see also, on Hamilton's finance and economic views, Prof. C. F. Dunbar, Quarterly Journal of Economics, iii. (1889), p. 32 ; E. G. Bourne in ibid. x. (1894), p. 328; E. C. Lunt in Journal of Political Economy, iii. (1895), p. 289. Among modern studies must also be mentioned J. T. Morse's able Life (1876); H. C. Lodge's (in the American Statesmen series, 1882); and G. Shea's two books, his Historical Study (1877) and Life and Epoch (1879). C. J. Riethmuller's Hamilton and his Contemporaries (1864), written during the Civil War, is sympathetic, but rather speculative. The most vivid account of Hamilton is in Mrs Gertrude Atherton's historical romance, The Conqueror (New York, 1902), for the writing of which the author made new investigations into the biographical details, and elucidated some points previously obscure; see also her A Few of Hamilton's Letters (1903). F. S. Oliver's brilliant Alexander Hamilton: An Essay on American Union (London, 1906), which uses its subject to illustrate the necessity'of British imperial federatipn, is strongly anti-Jeffersonian, but no other work by a non-American author brings out so well the wider issues involved" in Hamilton's economic policy. (F. S. P. ; H. Ch.)

HAMILTON, ANTHONY, or Antoine (1646-1720), French classical author, was born about 1646. He is especially note- worthy from the fact that, though by birth he was a foreigner, his literary characteristics are more decidedly French than those of many of the most indubitable Frenchmen. His father was George Hamilton, younger brother of James, 2nd earl of

Abercorn, and head of the family of Hamilton in the, peerage of Scotland, and 6th duke of Chatellerault in the peerage of France; and his mother was Mary Butler, sister of the 1st duke of Ormonde. According to some authorities he was born at Drogheda, but according to the London edition of his works in 181 1 his birthplace was Roscrea, Tipperary. From the age of four till he was fourteen the boy was brought up in France, whither his family had removed after the execution of Charles I. The fact that, like his father, he was a Roman Catholic, prevented his receiving the political promotion he might otherwise have expected on the Restoration, but he became a distinguished member of that brilliant band of courtiers whose chronicler he was to become. He took service in the French army, and the marriage of his sister Elizabeth, " la belle Hamilton," to Philibert, comte de Gramont (q.v.) rendered his connexion with France more intimate, if possible, than before. On the accession of James II. he obtained an infantry regiment in Ireland, and was appointed governor of Limerick and a member of the privy council. But the battle of the Boyne, at which he was present, brought disaster on all who were attached to the cause of the Stuarts, and before long he was again in France — an exile, but at home. The rest of his life was spent for the most part at the court of St Germain and in the chdteaux of his friends. With Ludovise, duchesse du Maine, he became an especial favourite, and it was at her seat at Sceaux that he wrote the Mimoires that made him famous. He died at St Germain-en-Laye on the 2 1 st of April 1720.

It is mainly bythe Memoires ducomte de Gramonttha.tH&rmlton takes rank with the most classical writers of France. It was said to have been written at Gramont's dictation, but it is very evident that Hamilton's share is the most considerable. The work was first published anonymously in 17 13 under the rubric of Cologne, but it was really printed in Holland, at that time the great patroness of all questionable authors. An English trans- lation by Boyer appeared in 1714.

Upwards of thirty editions have since appeared, the best of the French being Renouard's (1812), forming part of a collected edition of Hamilton's works, and Gustave Brunet's (1859), and the best of the English; Edwards's (1793), with 78 engravings from portraits in the royal collections at Windsor and elsewhere, A. F. Bertrand de Mole- ville's (2 vols., 1811), with 64 portraits by E. Scriven and others, a,nd Gordon Goodwin's (2 vols., 1903). The original edition was reprinted by Benjamin Pifteau in 1876. In imitation and satiric parody of the romantic tales which Antoine Galland's translation of The Thousand and One Nights had brought into favour in France, Hamilton wrote, partly for the amusement of Henrietta Bulkley, sister of the duchess of Berwick, to whom he was much attached, four ironical and extravagant conies, Le Belier, Fleur d'epine, Zen&yde, and Les Quatre Facardins. The saying in Le Belier' " Belier, mon ami, tu me ferais plaisir si tu voulais commencer par le commencement," has passed into a proverb. These tales were circulated privately during Hamilton's lifetime, and the first three appeared in Paris in 1730, ten years after the death of the author; a collection of his (Euvres diverses in 1731 contained the unfinished Zineyde. Hamilton was also the author of some songs as exquisite in their way as his prose, and interchanged amusing verses with the duke of Berwick. In the name of his niece, the countess of Stafford, Hamilton maintained a witty correspondence with Lady Mary Wortley Montagu.

See notices of Hamilton in Lescure's edition (1873) of the Contes, Sainte-Beuve's Causeries du lundi, tome i., Sayou's Histoire de la litteralure francaise a Vetranger (1853), and by L. S. Auger in the CEuvres completes (1804).

HAMILTON, ELIZABETH (1758-1816), British author, was born at Belfast, of Scottish extraction, on the 21st of July 1758. Her father's death in 1759 left his wife so embarrassed that Elizabeth was adopted in 1762 by her paternal aunt, Mrs Marshall, who lived in Scotland, near Stirling. In 1788 Miss Hamilton went to live with her brother Captain Charles

Hamilton (1753–1792), who was engaged on his translation of the Hedaya. Prompted by her brother's associations, she produced her

Letters of a Hindoo Rajah in 1796. Soon after, with her sister Mrs Blake, she settled at Bath, where she published in 1800 the Memoirs of Modern Philosophers, a satire on the admirers of the French Revolution. In 1801–1802 appeared her Letters on Education. After travelling through Wales and Scotland for nearly two years, the sisters took up their abode in 1803 at Edinburgh. In 1804 Mrs Hamilton, as she then preferred to be called, published her Life of Agrippina, wife of Germanicus; and in the same year she received a pension from government. The Cottagers of Glenburnie (1808), which is her best-known work, was described by Sir Walter Scott as " a picture of the rural habits of Scotland, of striking and impressive fidelity." She also published Popular Essays on the Elementary Principles of the Human Mind (1812), and Hints addressed to the Patrons and Directors of Public Schools (1815). She died at Harrogate on the 23rd of July 1816.

Memoirs of Mrs Elizabeth Hamilton, by Miss Benger, were pub- lished in 1818.

HAMILTON, EMMA, Lady (c. 1765–1815), wife of Sir William Hamilton {q.v.), the British envoy at Naples, and famous as the mistress of Nelson, was the daughter of Henry Lyon, a blacksmith of Great Neston in Cheshire. The date of her birth cannot be fixed with certainty, but she was baptized at Great Neston on the 12th of May 1765, and it is not improbable that she was born in that year. Her baptismal name was Emily. As her father died soon after her birth, the mother, who was dependent on parish relief, had to remove to her native village, Ha warden in Flintshire. Emma's early life is very obscure. She was certainly illiterate, and it

appears that she had a child in 1780, a fact which has led some of her biographers to place her birth before 1765. It has been said that she was first the mistress of Captain Willet Payne, an officer in the navy, and that she was employed in some doubtful capacity by a notorious quack of the time, Dr Graham. In 1781 she was the mistress of a country gentleman, Sir Harry Featherstonhaugh, who turned her out in December of that year. She was then pregnant, and in her distress she applied to the Hon. Charles Greville, to whom she was already known. At this time she called herself Emily Hart. Greville, a gentleman of artistic tastes and well known in society, entertained her as his mistress, her mother, known as Mrs Cadogan, acting as housekeeper and partly as servant. Under the protection of Greville, whose means were narrowed by debt, she acquired some education, and was taught to sing, dance and act with professional skill. In 1782 he introduced her to his friend Romney the portrait painter, who had been established for several years in London, and who admired her beauty with enthusiasm. The numerous famous portraits of her from his brush may have somewhat idealised her apparently robust and brilliantly coloured beauty, but her vivacity and powers of fascination cannot be doubted. She had the tempera- ment of an artist, and seems to have been sincerely attached to Greville. In 1784 she was seen by his uncle, Sir William Hamilton, who admired her greatly. Two years later she was sent on a visit to him at Naples, as the result of an understanding between Hamilton and Greville — the uncle paying his nephew's debts and the nephew ceding his mistress. Emma at first resented, but then submitted to the arrangement. Her beauty, her artistic capacity, and her high spirits soon made her a great favourite in the easy-going society of Naples, and Queen Maria Carolina became closely attached to her. She became famous for her " attitudes," a series of poses plasliques in which she represented classical and other figures. On the 6th of September 1 79 1, during a visit to England, she was married to Sir W. Hamilton. The ceremony was required in order' to justify her public reception

at the court of Naples, where Lady Hamilton played an important part as the agent through whom the queen communicated with the British minister — sometimes in opposi- tion to the will and the policy of the king. The revolutionary wars and disturbances which began after 1792 made the services of Lady Hamilton always useful and sometimes necessary to the British government. It was claimed by her, and on her behalf , that she secured valuable information in 1796, and was

of essential service to the British fleet in 1798 during the Nile campaign, by enabling it to obtain stores and water in Sicily. These claims have been denied on the rather irrelevant ground that they are wanting in official confirmation, which was only to be expected since they were ex hypothesi unofficial and secret, but it is not improbable that they were considerably exaggerated, and it is certain that her stories cannot always be reconciled with one another or with the accepted facts. When Nelson returned from the Nile in September 1798 Lady Hamilton made him her hero, and he became entirely devoted to her. Her influence over him indeed became notorious, and brought him much official displeasure. Lady Hamilton undoubtedly used her influence to draw Nelson into a most unhappy participation in the domestic troubles of Naples, and when Sir W. Hamilton was recalled in 1800 she travelled with him and Nelson ostenta- tiously across Europe. In England Lady Hamilton insisted on making a parade of her hold over Nelson. Their child, Horatia Nelson Thompson, was born on the 30th of January 1801. The profuse habits which Emma Hamilton had contracted in Naples, together with a passion for gambling which grew on her, led her into debt, and also into extravagant ways of living, against which her husband feebly protested. On his death in 1803 she received by his will a liferent of £800, and the furniture of his house in Piccadilly. She then lived openly with Nelson at his house at Merton. Nelson tried repeatedly to secure her a pension for the services rendered at Naples, but did not succeed. On his death she received Merton, and an annuity of £500, as well as the

control of the interest of the £4000 he left to his daughter. But gambling and extravagance kept her poor. In 1808 her friends endeavoured to arrange her affairs, but in 1813 she was put in prison for debt and remained there for a year. A certain Alderman Smith having aided her to get out, she went over to Calais for refuge from her creditors, and she died there in distress if not in want on the 15th of January 1815.

Authorities. — The Memoirs of Lady Hamilton (London, 1815) were the work of an ill-disposed but well-informed and shrewd observer whose name is not given. Lady Hamilton and Lord Nelson, by J, C. Jefferson (London, 1888) is based on authentic papers. It is corrected in some particulars by the detailed recent life written 'by Walter Sichel, Emma, Lady Hamilton (London, 1905). See also the authorities given in the article Nelson. (D, H.)

HAMILTON, JAMES (1769-1831), English educationist, and author of the Hamiltonian system of teaching languages, was born in 1769. The first part of his life was spent in mercantile pursuits. Having settled in Hamburg and become free of the city, he was anxious to become acquainted with German and accepted the tuition of a French emigre, General d'Angelis. In twelve lessons he found himself able to read an easy German book, his master having discarded the use of a grammar and translated to him short stories word for word into French. As a citizen of Hamburg Hamilton started a business in Paris, and during the peace of Amiens maintained a lucrative trade with England; but at the rupture of the treaty he was made a prisoner of war, and though the protection of Hamburg was enough to get the words efface de la liste des prisonniers de guerre inscribed upon his passport, he was detained in custody till the close of hostilities. His business being thus ruined, he went in 1814 to America, intending to become a farmer and manufacturer of potash; but, changing his plan before he reached his " location," he started as a teacher in New York. Adopting his old tutor's method, he attained remarkable success in New York, Baltimore,

Washington, Boston, Montreal and Quebec. Returning to England in July 1823, he was equally fortunate in Manchester and elsewhere. The two master principles of his method were that the language should be presented to the scholar as a living organism, and that its laws should be learned from observation and not by rules. His system attracted general attention, and was vigorously attacked and defended. In 1826 Sydney Smith devoted an article to its elucidation in the Edinburgh Review. As textbooks for his pupils Hamilton printed interlinear translations of the Gospel of John, of an Epitome historiae sacrae, of Aesop's Fables, Eutropius, Aurelius Victor, Phaedrus, &c, and many books were issued as Hamiltonian with which he

had nothing personally to do. He died on the 31st of October

1831-

See Hamilton's own account, The History, Principles, Practice and Results of the Hamiltonian System (Manchester, 1829; new ed., 1831); Alberte, Uber die Hamilton' sche Methode; C. F. Wurm, Hamilton und Jacotot (1831).

HAMILTON, JAMES HAMILTON, ist Duke or (1606-1649), Scottish nobleman, son of James, 2nd marquess of Hamilton, and of the Lady Anne Cunningham, daughter of the earl of Glencairn, was born on the 19th of June 1606. As the descendant and representative of James Hamilton, ist earl of Arran, he was the heir to the throne of Scotland after the descendants of James VI. 1 He married in his fourteenth year May Feilding, aged seven, daughter of Lord Feilding, afterwards ist earl of Denbigh, and was educated at Exeter College, Oxford, where he matriculated on the 14th of December 1621. He succeeded to his father's titles on the latter's death in 1625. In 1628 he was made master of the horse and was also appointed

gentleman of the bedchamber and a privy councillor. In 1631 Hamilton took over a force of 6000 men to assist Gustavus Adolphus in Germany. He guarded the fortresses on the Oder while Gustavus fought Tilly at Breitenfeld, and afterwards occupied Magdeburg, but his army was destroyed by disease and starvation, and after the complete failure of the expedition Hamilton returned to England in September 1634. He now became Charles I.'s chief adviser in Scottish affairs. In May 1638, after the outbreak of the revolt against the English Prayer-Book, he was appointed commissioner for Scotland to appease the discontents. He described the Scots as being " possessed by the devil," and instead of doing his utmost to support the king's interests was easily intimidated by the covenanting leaders and persuaded of the impossibility of resisting their demands, finally returning to Charles to urge him to give way. It is said that he so far forgot his trust as to encourage the Scottish leaders in their resistance in order to gain their favour. 2 On the 27th of July Charles sent him back with new proposals for the election of an assembly and a parliament, episcopacy being safeguarded but bishops being made responsible to future assemblies. After a wrangle concerning the mode of election he again returned to Charles: Having been sent back to Edinburgh on the 1 7th of September, he brought with him a revocation of the prayer-book and canons and another covenant to be substituted for the national covenant. On the 2 ist of November Hamilton presided over the first meeting of the assembly in Glasgow cathedral, but dissolved it on the 28th on its declaring the bishops responsible to its authority. The assembly, however, continued to sit notwithstanding, and Hamilton returned to England to give an account of his failure, leaving the enemy triumphant and in possession. War was now decided upon, and Hamilton was chosen to command an expedition to the Forth to menace the rear of the Scots. On arrival on the istof May 1639 he found the plan impossible, despaired of success, and was recalled in June. On the 8th of July, after a hostile reception at Edinburgh, he resigned his

commissionership. He supported Strafford's proposal to call the Short Parliament, but otherwise opposed him as strongly as he could, as the chief adversary of the Scots; and he aided the elder Vane, it was 1 James, Lord Hamilton = Princess Mary Stuart, (d. 1479). I daughter of James II.

James, Lord Hamilton and Ist earl of Arran (d. c. 1529).

James, duke of Chatelherault, and 2nd earl of Arran

(d. 1575)-

James, 3rd earl of Arran (d. 1609).

John, 1st marquess of Hamilton (d. 1604).

James, 2nd marquess of Hamilton (d. 1625).

James, 3rd marquess and 1st duke of Hamilton. 1 See S. R. Gardiner in the Diet, of Nat. Biography.

believed, in accomplishing Strafford's destruction by sending for him to the Long Parliament. Hamilton now supported the parliamentary party, desired an alliance with his nation, and persuaded Charles in February 1641 to admit some of their leaders into the council. On the death of Strafford Hamilton was confronted by a new antagonist in Montrose, who detested both his character and policy and repudiated his supremacy in Scotland. On the 10th of August 1641 he accompanied Charles on his last visit to Scotland. His aim now was to effect an alliance between the king and Argyll, the former accepting Presbyterianism and receiving the help of the Scots against the English parliament, and when this failed he abandoned Charles and adhered to Argyll. In consequence he received a challenge from Lord Ker, of which he gave the king information, and obtained from Ker an apology. Montrose wrote to Charles declaring he could prove Hamilton to be a traitor. The king himself spoke of him as being " very active in his own pre- servation." Shortly afterwards the plot — known as the " Incident " — to seize Argyll, Hamilton and the latter's brother, the earl of

Lanark, was discovered, and on the 1 2th of October they fled from Edinburgh. Hamilton returned not long after- wards, and notwithstanding all that had occurred still retained Charles's favour and confidence. He returned with him to London and accompanied him on the 5th of January 1642 when he went to the city after the failure to secure the five members. In July Hamilton went to Scotland on a hopeless mission to prevent the intervention of the Scots in the war, and a breach then took place between him and Argyll. When in February 1643 proposals of mediation between Charles and the parliament came from Scotland, Hamilton instigated the " cross petition ■" which demanded from Charles the surrender of the annuities of tithes in order to embarrass Loudoun, the chief promoter of the project, to whom they had already been granted. This failing, he promoted a scheme for overwhelming the influence and votes of Argyll and his party by sending to Scotland all the Scottish peers then with the king, thereby preventing any assistance to the parliament coming from that quarter, while Charles was to guarantee the establishment of Presbyterianism in Scotland only. This foolish intrigue was strongly opposed by Montrose, who was eager to strike a sudden blow and antici- pate and annihilate the plans of the Covenanters. Hamilton, however, gained over the queen for his project, and in September was made a duke, while Montrose was condemned to inaction. Hamilton's scheme, however, completely failed. He had no control over the parliament. He was unable to hinder the meeting of the convention of the estates which assembled without the king's authority, and his supporters found themselves in a minority. Finally, on refusing to take the Covenant, Hamilton and Lanark were obliged to leave Scotland. They arrived at Oxford on the 16th of December. Hamilton's conduct had at last incurred Charles's resentment and he was sent, in January 1644, a prisoner to Pendennis Castle, in 1645 being removed to St Michael's Mount, where he was liberated by Fairfax's troops on the 23rd of April 1646. Subsequently he showed great activity in the futile negotiations between the Scots and

Charles at Newcastle. In 1648, in consequence of the seizure of Charles by the army in 1647, Hamilton obtained a temporary influence and- authority in the Scottish parliament over Argyll, and led a large force into England in support of the king on the 8th of July. He showed complete incapacity in military command; was kept in check for some time by Lambert; and though out- numbering the enemy by 24,000 to about 9000 men, allowed his troops to disperse over the country and to be defeated in detail by Cromwell during the three days August i7th-i9th at the so-called battle of Preston, being himself taken prisoner on the 25th. He was tried on the 6th of February 1649, condemned to death on the 6th of March and executed on the 9th.

Hamilton, during his unfortunate career, had often been suspected of betraying the king's cause, and, as an heir to the Scottish throne, of intentionally playing into the hands of the Covenanters with a view of procuring the crown for himself. The charge was brought against him as early as 1631 when he was

levying men in Scotland for the German expedition, but Charles gave no credence to it and showed his trust in Hamilton by causing him to share his own room. The charge, however, always clung to him, and his intriguing character and hopeless manage- ment of the king's affairs in Scotland gave colour to the accusa- tion. There seems, however, to be no real foundation for it. His career is sufficiently explained by his thoroughly weak and egotistical character. He took no interest whatever in the great questions at issue, was neither loyal nor patriotic, and only desired peace and compromise to avoid personal losses. " He was devoid of intellectual or moral strength, and was therefore easily brought to fancy all future tasks easy and all present obstacles insuperable." 1 A worse choice than Hamilton could not possibly have been made in such a crisis, and his want of principle, of firmness and

resolution, brought irretrievable ruin upon the royal cause.

Hamilton's three sons died young, and the dukedom passed by special remainder to his brother William, earl of Lanark. On the latter's death in 1651 the Scottish titles reverted to the 1st duke's daughter, Anne, whose husband, William Douglas, was created (third) duke of Hamilton.

Bibliography. — Article in the Diet, of Nat. Biog. by S. R. Gardiner; History of England and of the Civil War, by the same author ; Memoirs of the Dukes of Hamilton, by G. Burnet ; Lauder- dale Papers (Camden Society, 1884-1885); The Hamilton Papers, ed. by S. R. Gardiner (Camden Society, 1880) and addenda (Camden Miscellany, vol. ix., 1895) ; Thomason Tracts in the British Museum, 550 (6), 1948 (30) (account of his supposed treachery), and 546 (21) (speech on the scaffold). (P. C. Y.)

HAMILTON, JOHN (c. 1511-1571), Scottish prelate and politician, was a natural son of James Hamilton, 1st earl of Arran. At a very early age he became a monk and abbot of Paisley, and after studying in Paris he returned to Scotland, where he soon rose to a position of power and influence under his half-brother, the regent Arran. He was made keeper of the privy seal in 1543 and bishop of Dunkeld two years later; in 1 546 he followed David Beaton as archbishop of St Andrews, and about the same time he became treasurer of the kingdom. He made vigorous efforts to stay the growth of Protestantism, but with one or two exceptions " persecution was not the policy of Archbishop Hamilton," and in the interests of the Roman Catholic religion a catechism called Hamilton's Catechism (published with an introduction by T. G. Law in 1884) was drawn up and printed, possibly at his instigation. Having incurred the displeasure of the Protestants, now the dominant party in Scotland, the archbishop was imprisoned in 1563. After his release he was an active partisan of Mary queen of Scots; he baptized the infant James, afterwards King James VI., and pronounced the divorce of the queen from Bothwell. He was present

at the battle of Langside, and some time later took refuge in Dumbarton Castle. Here he was seized, and on the charge of being concerned in the murders of Lord Darnley and the regent Murray he was tried, and hanged on the 6th of April 1 571. The archbishop had three children by his mistress, Grizzel Sempill.

HAMILTON, PATRICK (1 504–1 528), Scottish divine, second son of Sir Patrick Hamilton, well known in Scottish chivalry, and of Catherine Stewart, daughter of Alexander, duke of Albany, second son of James II. of Scotland, was born in the diocese of Glasgow, probably at his father's estate of Stanehouse in Lanarkshire. He was educated probably at Linlithgow. In 1 5 1 7 he was appointed titular abbot of Feme, Ross-shire; and it was probably about the same year that he went to study at Paris, for his name is found in an ancient list of those who graduated there in 1520. It was doubtless in Paris, where Luther's writings were already exciting much discussion, that he received the germs of the doctrines he was afterwards to uphold. From Alexander Ales we learn that Hamilton subse- quently went to Louvain, attracted probably by the fame of Erasmus, who in 1521 had his headquarters there. Returning to Scotland, the young scholar naturally selected St Andrews, the capital of the church and of learning, as his residence. On 1 See S. R. Gardiner in the Diet, of Nat. Biography.

the 9th of June 1523 he became a member of the university of St Andrews, and on the 3rd of October 1524 he was admitted to its faculty of arts. There Hamilton attained such influence that he was permitted to conduct as precentor a musical mass of his own composition in the cathedral. But the reformed doctrines had now obtained a firm hold on the young abbot, and he was eager to communicate them to his fellow-country- men. Early in 1527 the attention of James Beaton, archbishop of St Andrews, was directed to the heretical preaching of the young priest, whereupon he ordered that Hamilton should be formally summoned and accused. Hamilton fled to Germany, first visiting Luther at Wittenberg, and afterwards enrolling himself as a student, under

Franz Lambert of Avignon, in the new university of Marburg, opened on the 30th of May 1527 by Philip, landgrave of Hesse. Hermann von dem Busche, one of the contributors to the Epistolae obscurorum virorum, John Frith and Tyndale were among those whom he met there. Late in the autumn of 1527 Hamilton returned to Scotland, bold in the conviction of the truth of his principles. He went first to his brother's house at Kincavel, near Linlithgow, in which town he preached frequently, and soon afterwards he married a young lady of noble rank, whose name has not come down to us. Beaton, avoiding open violence through fear of Hamilton's high connexions, invited him to a conference at St Andrews. The reformer, predicting that he was going to confirm the pious in the true doctrine by his death, resolutely accepted the invita- tion, and for nearly a month was permitted to preach and dispute, perhaps in order to provide material for accusation. At length, however, he was summoned before a council of bishops and clergy presided over by the archbishop; there were thirteen charges, seven of which were based on the doctrines affirmed in the Loci communes. On examination Hamilton maintained that these were undoubtedly true. The council condemned him as a heretic on the whole thirteen charges. Hamilton was seized, and, it is said, surrendered to the soldiery on an assurance that he would be restored to his friends without injury. The council convicted him, after a sham disputation with Friar Campbell, and handed him over to the secular power. The sentence was carried out on the same day (February 29, 1528) lest he should be rescued by his friends, and he was burned at the stake as a heretic. His courageous bearing attracted more attention than ever to the doctrines for which he suffered, and greatly helped to spread the Reformation in Scotland. The " reek of Patrick Hamilton infected all it blew on." His martyrdom is singular in this respect, that he represented in Scotland almost alone the Lutheran stage of the Reformation. His only book was entitled Loci communes, known as " Patrick's Places." It set forth the doctrine of justification by faith and the

contrast between the gospel and the law in a series of clear-cut propositions. It is to be found in Foxs's Acts and Monuments. HAMILTON, ROBERT (1743-1829), Scottish economist and mathematician, was born at Pilrig, Edinburgh, on the nth of June 1743. His grandfather, William Hamilton, principal of Edinburgh University, had been a professor of divinity. Having completed his education at the university of Edinburgh, where he was distinguished in mathematics, Robert was induced to enter a banking-house in order to acquire a practical knowledge of business, but his ambition was really academic. In 1769 he gave up business pursuits and accepted the rectorship of Perth academy. In 1779 he was presented to the chair of natural philosophy at Aberdeen University. For many years, however, by private arrangement with his colleague Professor Copland, Hamilton taught the class of mathematics. In 181 7 he was presented to the latter chair.

Hamilton's most important work is the Essay on the National Debt, which appeared in 1813 and was undoubtedly the first to expose the economic fallacies involved in Pitt's policy of a sinking fund. It is still of value. A posthumous volume published in 1830, The Progress of Society, is also of great ability, and is a very effective treatment of economical principles by tracing their natural origin and position in the development of social life. Some minor works of a practical character (Introduction to Merchandise, 1777; Essay on War and Peace, 1790) are now forgotten.

HAMILTON, THOMAS (1789-1842), Scottish writer, younger brother of the philosopher, Sir William Hamilton, Bart., was born in 1789. He was educated at Glasgow University, where he made a close friend of Michael Scott, the author of Tom Cringle's Log. He entered the army in 18 10, and served throughout the Peninsular and American campaigns, but continued to cultivate his literary tastes. On the

conclusion of peace he withdrew, with the rank of captain, from active service. He contributed both prose and verse to Blackwood's Magazine, in which appeared his vigorous and popular military novel, Cyril Thornton (1827). His Annals of the Peninsular Campaign, published originally in 1829, and republished in 1849 with additions by Frederick Hardman, is written with great clearness and impartiality. His only other work, Men and Manners in America, published originally in 1833, is somewhat coloured by British prejudice, and by the author's aristocratic dislike of a democracy. Hamilton died at Pisa on the 7th of December

1842.

HAMILTON, WILLIAM (1704–1754), Scottish poet, the author of "The Braes of Yarrow," was born in 1 704 at Bangour in Linlith- gowshire, the son of James Hamilton of Bangour, a member of the Scottish bar. As early as 1724 we find him contributing to Allan Ramsay's Tea Table Miscellany. In 1745 Hamilton joined the cause of Prince Charles, and though it is doubtful whether he actually bore arms, he celebrated the battle of Prestonpans in verse. After the disaster of Culloden he lurked for several months in the Highlands and escaped to France; but in 1749 the influence of his friends procured him permission to return to Scotland, and in the following year he obtained possession of the family estate of Bangour. The state of his health compelled him, however, to live abroad, and he died at Lyons on the 25th of March 1754. He was buried in the Abbey Church of Holyroodhouse, Edinburgh. He was twice married — " into families of distinction " says the preface of the authorized edition of his poems.

Hamilton left behind him a considerable number of poems, none of them except " The Braes of Yarrow " of striking origin- ality. The collection is composed of odes, epitaphs, short pieces of translation, songs, and occasional verses. The longest is "Contemplation, or the Triumph of Love" (about 500 lines). The first edition was published

without his permission by Foulis (Glasgow, 1748), and introduced by a preface from the pen of Adam Smith. Another edition with corrections by himself was brought out by his friends in 1760, and to this was prefixed a portrait engraved by Robert Strange.

In 1850 James Paterson edited The Poems and Songs of William Hamilton. This volume contains several poems till then unpublished, and gives a life of the author.

HAMILTON, SIR WILLIAM (1730–1803), British diplomatist and archaeologist, son of Lord Archibald Hamilton, governor of Greenwich hospital and of Jamaica, was born in Scotland on the 13th of December 1730, and served in the 3rd Regiment of Foot Guards from 1747 to 1758. He left the army after his marriage with Miss Barlow, a Welsh heiress from whom he inherited an estate near Swansea upon her death in 1782. Their only child, a daughter, died in 1775. From 1761 to 1764 he was member of parliament for Midhurst, but in the latter year he was appointed envoy to the court of Naples, a post which he held for thirty-six years — until his recall in 1800. During the greater part of this time the official duties of the minister were of small importance. It was enough that the representative of the British crown should be a man of the world whose means enabled him to entertain on a handsome scale. Hamilton was admirably qualified for these duties, being an amiable and accomplished man, who took an intelligent interest in science and art. In 1766 he became a member of the Royal Society, and between that year and 1780 he contributed to its Philosophical Transactions a series of observations on the action of volcanoes, which he had made, or caused to be made, at Vesuvius and Etna. He employed a draftsman named Fabris to make studies of the eruption of 1775 and 1776, and a Dominican, Resina, to make observations at a later period. He published

several treatises on earthquakes and volcanoes between 1776 and 1783. He was a fellow of the Society of Antiquaries and of the Dilettanti, and a notable collector. Many of his treasures went to

enrich the British Museum. In 1772 he was made a knight of the Bath. The last ten years of his life presented a curious contrast to the elegant peace of those which had preceded them. In 1791 he married Emma Lyon (see the separate article on Lady Hamilton). The outbreak of the French Revolution and the rapid extension of the revolutionary movement in Western Europe soon overwhelmed Naples. It was a misfortune for Sir William that he was left to meet the very trying political and diplomatic conditions which arose after 1793. His health had begun to break down, and he suffered from bilious fevers. Sir William was in fact in a state approaching dotage before his recall, a fact which, combined with his senile devotion to Lady Hamilton, has to be considered in accounting for his extraordinary complaisance in her relations with Nelson. He died on the 6th of April 1803.

See E. Edwards, Lives of the Founders of the British Museum (London, 1870); and the authorities given in the article on Emma, Lady Hamilton.

HAMILTON, SIR WILLIAM, Bart. (1788–1856), Scottish meta- physician, was born in Glasgow on the 8th of March 1788. His father, Dr William Hamilton, had in 1781, on the strong recom- mendation of the celebrated William Hunter, been appointed to succeed his father, Dr Thomas Hamilton, as professor of anatomy in the university of Glasgow; and when he died in 1790, in his thirty-second year, he had already gained a great reputation. [William Hamilton and a younger brother (after- wards Captain Thomas Hamilton, q.v.) were thus brought up under the sole care of their mother. William received his early education in Scotland, except during two years which he spent in a private school near London, and went in 1807, as a Snell exhibitioner, to Balliol College, Oxford. He obtained a first- class in Uteris humanioribus and took the degree of B.A. in 1811, M.A. in 1814. He had been intended for the medical profession, but soon after leaving Oxford he gave up this idea, and in 1813 became a member of the Scottish bar. His life, however, was mainly that of a student; and the following years, marked by

little of outward incident, were filled by researches of all kinds, through which he daily added to his stores of learning, while at the same time he was gradually forming his philosophic system. Investigation enabled him to make good his claim to represent the ancient family of Hamilton of Preston, and in .1816 he took up the baronetcy, which had been in abeyance since the death of Sir Robert Hamilton of Preston (1650-1 701), well known in his day as a Covenanting leader.

Two visits to Germany in 1817 and 1820 led to his taking up the study of German and later on that of contemporary German philosophy, which was then almost entirely neglected in the British universities. In 1820 he was a candidate for the chair of moral philosophy in the university of Edinburgh, which had fallen vacant on the death of Thomas Brown, colleague of Dugald Stewart, and the latter's consequent resignation, but was defeated on political grounds by John Wilson (1785-1854), the " Christopher North " of Blackwood's Magazine. Soon afterwards (1821) he was appointed professor of civil history, and as such delivered several courses of lectures on the history of modern Europe and the history of literature. The salary was £100 a year, derived from a local beer tax, and was dis-continued after a time. No pupils were compelled to attend, the class dwindled, and Hamilton gave it up when the salary ceased. In January 1827 he suffered a severe loss in the death of his mother, to whom he had been a devoted son. In March 1828 he married his cousin Janet Marshall.

In 1829 his career of authorship began with the appearance of the well-known essay on the " Philosophy of the Unconditioned " (a critique of Comte's Cours de philosophic) — the first of a series of articles contributed by him to the Edinburgh Review. He was elected in 1836 to the Edinburgh chair of logic and metaphysics, and from this time dates the influence which, during the next I twenty years, he exerted over the thought of the younger

generation in Scotland. Much about the same time he began the preparation of an annotated edition of Reid's works, intending to annex to it a number of dissertations. Before, however, this design had been carried out, he was struck (1844) with paralysis of the right side, which seriously crippled his bodily powers, though it left his mind wholly unimpaired. The edition of Reid appeared in 1846, but with only seven of the intended disserta- tions — the last, too, unfinished. It was his distinct purpose to complete the work, but this purpose remained at his death unfulfilled, and all that could be done afterwards was to print such materials for the remainder, or such notes on the subjects to be discussed, as were found among his MSS. Considerably before this time he had formed his theory of logic, the leading principles of which were indicated in the prospectus of " an essay on a new analytic of logical forms " prefixed to his edition of Reid. But the elaboration of the scheme in its details and applications continued during the next few years to occupy much of his leisure. Out of this arose a sharp controversy with Augustus de Morgan. The essay did not appear, but the results of the labour gone through are contained in the appendices to his Lectures on Logic. Another occupation of these years was the preparation of extensive materials for a publication which he designed on the personal history, influence and opinions of Luther. Here he advanced so far as to have planned and partly carried out the arrangement of the work; but it did not go further, and still remains in MS. In 1852-1853 appeared the first and second editions of his Discussions in Philosophy, Literature and Education, a reprint, with large additions, of his contributions to the Edinburgh Review. Soon after, his general health began to fail. Still, however, aided now as ever by his devoted wife, he persevered in literary labour; and during 1854- 1855 he brought out nine volumes of a new edition of Stewart's works. The only remaining volume was to have

contained a memoir of Stewart, but this he did not live to write. He taught his class for the last time in the winter of 1855–1856. Shortly after the close of the session he was taken ill, and on the 6th of May 1856 he died in Edinburgh.

Hamilton's positive contribution to the progress of thought is comparatively slight, and his writings, even where reinforced by the copious lecture notes taken by his pupils, cannot be said to present a comprehensive philosophic system. None the less he did consider- able service by stimulating a spirit of criticism in his pupils, by insist- ing on the great importance of psychology as opposed to the older metaphysical method, and not least by his recognition of the import- ance of German philosophy, especially that of Kant. By far his most important work was his "Philosophy of the Unconditioned," the development of the principle that for the human finite mind there can be no knowledge of the Infinite. The basis of his whole argu- ment is the thesis, " To think is to condition." Deeply impressed with Kant's antithesis between subject and object, the knowing and the known, Hamilton laid down the principle that every object is known only in virtue of its relations to other objects (see Relativity of Knowledge). From this it follows limitless time, space, power and so forth are humanly speaking inconceivable. The fact, how- ever, that all thought seems to demand the idea of the infinite or absolute provides a sphere for faith, which is thus the specific faculty of theology. It is a weakness characteristic of the human mind that it cannot conceive any phenomenon without a beginning: hence the conception of the causal relation, according to which every phenomenon has its cause in preceding phenomena, and its effect in subsequent phenomena. The causal concept is, therefore, only one of the ordinary necessary forms of the cognitive Consciousness limited, as we have seen, by being confined to that which is relative or conditioned. As regards the problem of the nature of objectivity, Hamilton simply accepts the evidence of consciousness as to the separate existence of the

object: "the root of our nature cannot be a lie." In virtue of this assumption Hamilton's philosophy becomes a " natural realism." In fact his whole position is a strange compound of Kant and Reid. Its chief practical corollary is the denial of philosophy as a method of attaining absolute knowledge and its relegation to the academic sphere of mental training. The transition from philosophy to theology, i.e. to the sphere of faith, is presented by Hamilton under the analogous relation between the mind and the body. As the mind is to the body, so is the uncon- ditioned Absolute or God to the world of the conditioned. Conscious- ness, itself a conditioned phenomenon, must derive from or depend on some different thing prior to or behind material phenomena. Curiously enough, however, Hamilton does not explain how it comes about that God, who in the terms of the analogy bears to the con- ditioned mind the relation which the conditioned mind bears to its

objects, can Himself be unconditioned. He can be regarded only as related to consciousness, and in so far is, therefore, not absolute or unconditioned. Thus the very principles of Hamilton's philo- sophy are apparently violated in his theological argument.

Hamilton regarded logic as a purely formal science; it seemed to him an unscientific mixing together of heterogeneous elements to treat as parts of the same science the formal and the material conditions of knowledge. He was quite ready to allow that on this view logic cannot be used as a means of discovering or guaranteeing facts, even the most general, and expressly asserted that it has to do, not with the objective validity, but only with the mutual relations, of judgments. He further held that induction and deduction are correlative processes of formal logic, each resting on the necessities of thought and deriving thence its several laws. The only logical laws which he recognized were the three axioms of identity, non- contradiction, and excluded middle, which he regarded as severally phases of one general condition of the possibility of existence and, therefore, of thought. The law of reason and

consequent he con- sidered not as different, but merely as expressing metaphysically what these express logically. He added as a postulate — which in his theory was of importance — " that logic be allowed to state explicitly what is thought implicitly."

In logic, Hamilton is known chiefly as the inventor of the doctrine of the " quantification of the predicate," i.e. that the judgment " All A is B " should really mean " All A is all M," whereas the ordinary universal proposition should be stated " All A is some B." This view, which was supported by Stanley Jevons, is fundamentally at fault since it implies that the predicate is thought of in its ex- tension; in point of fact when a judgment is made, e.g. about men, that they are mortal (" All men are mortal "), the intention is to attribute a quality {i.e. the predicate is used in connotation). In other words, we are not considering the question " what kind are men among the various things which must die?" (as is implied in the form " all men are some mortals ") but " what is the fact about men?" We are not stating a mere identity (see further, e.g., H. W. B. Joseph, Introduction to Logic, 1906, pp. 198 foil.).

The philosopher to whom above all others Hamilton professed allegiance was Aristotle. His works were the object of his profound and constant study, and supplied in fact the mould in which his whole philosophy was cast. With the commentators on the Aris- totelian writings, ancient, medieval and modern, he was also familiar; and the scholastic philosophy he studied with care and appreciation at a time when it had hardly yet begun to attract attention in his country. His wide reading enabled him to trace many a doctrine to the writings of forgotten thinkers; and nothing gave him greater pleasure than to draw forth such from their ob- scurity, and to give due acknowledgment, even if it chanced to be of the prior possession of a view or argument that he had thought out for himself. Of modern German philosophy he was a diligent, if not always a sympathetic, student. How profoundly his

thinking was modified by that of Kant is evident from the tenor of his specu- lations; nor was this less the case because, on fundamental points, he came to widely different conclusions.

Any account of Hamilton would be incomplete which regarded him only as a philosopher, for his knowledge and his interests em- braced all subjects related to that of the human mind. Physical and mathematical science had, indeed, no attraction for him; but his study of anatomy and physiology was minute and experimental. In literature alike ancient and modern he was widely and deeply read; and, from his unusual powers of memory, the stores which he had acquired were always at command. If there was one period with the literature of which he was more particularly familiar, it was the 1 6th and 17th centuries. Here in every department he was at home. He had gathered a vast amount of its theological lore, had a critical knowledge especially of its Latin poetry, and was minutely acquainted with the history of the actors in its varied scenes, not only as narrated in professed records, but as revealed in the letters, table-talk, and casual effusions of themselves or their contemporaries (cf. his article on the Epistolae obscurorum virorum, and his pam- phlet on the Disruption of the Church of Scotland in 1843). Among his literary projects were editions of the works of George Buchanan and Julius Caesar Scaliger. His general scholarship found expression in his library, which, though mainly, was far from being exclusively, a philosophical collection. It now forms a distinct portion of the library of the university of Glasgow.

His chief practical interest was in education — an interest which he manifested alike as a teacher and as a writer, and which had led him long before he was either to a study of the subject both theoretical and historical. He thence adopted views as to the ends and methods of education that, when afterwards carried out or advocated by him, met with general recognition; but he also expressed in one of his articles an unfavourable view of the study of mathematics as a mental gymnastic, which excited

much opposition, but which he never saw reason to alter. As a teacher, he was zealous and successful, and his writings on university organization and reform had, at the time of their appearance, a decisive practical effect, and contain much that is of permanent value.

His posthumous works are his Lectures on Metaphysics and Logic, 4 vols., edited by H. L. Mansel, Oxford, and John Veitch {Metaphysics,

1858; Logic, i860); and Additional Notes to Reid's Works, from Sir W. Hamilton's MSS., under the editorship of H. L. Mansel, D.D. (1862). A Memoir of Sir W. Hamilton, by Veitch, appeared in

1869.

HAMILTON, WILLIAM GERARD (1729-1796), English statesman, popularly known as " Single Speech Hamilton," was born in London on the 28th of January 1729, the son of a Scottish bencher of Lincoln's Inn. He was educated at Winchester and at Oriel College, Oxford. Inheriting his father's fortune he entered political life and became M.P. for Petersfield, Hampshire. His maiden speech, delivered on the 13th of November 1755, during the debate on the address, which excited Walpole's admiration, is generally supposed to have been his only effort in the House of Commons. But the nickname " Single Speech " is undoubtedly misleading, and Hamilton is known to have spoken with success on other occasions, both in the House of Commons and in the Irish parliament. In 1 756 he was appointed one of the commissioners for trade and plantations, and in 1761 he became chief secretary to Lord Halifax, the lord-lieutenant of Ireland, as well as Irish M. P. for Killebegs and English M. P. for Pontefract. He was chancellor of the exchequer in Ireland in 1763, and subsequently filled various other administrative offices. Hamilton was thought very highly of by Dr

Johnson, and it is certain that he was strongly opposed to the British taxation of America. He died in London on the 16th of July 1796, and was buried in the chancel vault of St Martin's-in-the- fields.

Two of his speeches in the Irish House of Commons, and some other miscellaneous works, were published after his death under the title Parliamentary Logick.

HAMILTON, SIR WILLIAM ROWAN (1805-1865), Scottish mathematician, was born in Dublin on the 4th of August 1805. His father, Archibald Hamilton, who was a solicitor, and his uncle, James Hamilton (curate of Trim) , migrated from Scotland in youth. A branch of the Scottish family to which they belonged had settled in the north of Ireland in the time of James I., and this fact seems to have given rise to the common impression that Hamilton was an Irishman.

His genius first displayed itself in the form of a wonderful power of acquiring languages. At the age of seven he had already made very considerable progress in Hebrew, and before he was thirteen he had acquired, under the care of his uncle, who was an extraordinary linguist, almost as many languages as he had years of age. Among these, besides the classical and the modern European languages, were included Persian, Arabic, Hindustani, Sanskrit and even Malay. But though to the very end of his life he retained much of the singular learning of his childhood and youth, often reading Persian and Arabic in the intervals of sterner pursuits, he had long abandoned them as a study, and employed them merely as a relaxation.

His mathematical studies seem to have been undertaken and carried to their full development without any assistance what- ever, and the result is that his writings belong to no particular " school," unless indeed we consider them to form, as they are well entitled to do, a school by themselves. As an arithmetical calculator he was not only wonderfully expert, but he seems to have occasionally found a positive delight in working out to an enormous

number of places of decimals the result of some irksome calculation. At the age of twelve he engaged Zerah Colburn, the American " calculating boy," who was then being exhibited as a curiosity in Dublin, and he had not always the worst of the encounter. But, two years before, he had accidentally fallen in with a Latin copy of Euclid, which he eagerly devoured; and at twelve he attacked Newton's Arithmetica universalis. This was his" introduction to modern analysis. He soon com- menced to read the Principia, and at sixteen he had mastered a great part of that work, besides some more modern works on analytical geometry and the differential calculus.

About this period he was also engaged in preparation for entrance at Trinity College, Dublin, and had therefore to devote a portion of his time to classics. In the summer of 1822, in his seventeenth year, he began a systematic study of Laplace's

Mecanique Celeste. Nothing could be better fitted to call forth such mathematical powers as those of Hamilton; for Laplace's great work, rich to profusion in analytical processes alike novel and powerful, demands from the most gifted student careful and often laborious study. It was in the successful effort to open this treasure-house that Hamilton's mind received its final temper, " Des- lors il commenca a marcher seul," to use the words of the biographer of another great mathematician. From that time he appears to have devoted himself almost wholly to original investigation (so far at least as regards mathe- matics), though he ever kept himself well acquainted with the progress of science both in Britain and abroad.

Having detected an important defect in one of Laplace's demonstrations, he was induced by a friend to write out his remarks, that they might be shown to Dr John Brinkley (1763- 1835), afterwards bishop of Cloyne, but who was then the first royal astronomer for Ireland, and an accomplished mathe- matician. Brinkley seems at once to have perceived the vast talents of young Hamilton, and to have encouraged him in the kindest manner. He is said to

have remarked in 1823 of this lad of eighteen: ” This young man, I do not say will be, but is, the first mathematician of his age.”

Hamilton’s career at College was perhaps unexampled. Amongst a number of competitors of more than ordinary merit, he was first in every subject and at every examination. He achieved the rare distinction of obtaining an optime for both Greek and for physics. How many more such honours he might have attained it is impossible to say; but he was expected to win both the gold medals at the degree examination, had his career as a student not been cut short by an unprecedented event. This was his appointment to the Andrews professorship of astronomy in the university of Dublin, vacated by Dr Brinkley in 1827. The chair was not exactly offered to him, as has been sometimes asserted, but the electors, having met and talked over the subject, authorized one of their number, who was Hamilton’s personal friend, to urge him to become a candidate, a step which his modesty had prevented him from taking. Thus, when barely twenty-two, he was established at the Observatory, Dunsink, near Dublin. He was not specially fitted for the post, for although he had a profound acquaintance with theoretical astronomy, he had paid but little attention to the regular work of the practical astronomer. And it must be said that his time was better employed in original investigations than it would have been had he spent it in observations made even with the best of instruments, — infinitely better than if he had spent it on those of the observatory, which, however good originally, were then totally unfit for the delicate requirements of modern astronomy. Indeed there can be little doubt that Hamilton was intended by the university authorities who elected him to the professorship of astronomy to spend his time as he best could for the advancement of science, without being tied down to any particular branch. Had he devoted himself to practical astronomy they would assuredly have furnished him with modern instruments and an adequate staff of assistants.

In 1835 , being secretary to the meeting of the British Associa- tion which was held that year in Dublin, he was knighted by the lord-lieutenant. But far higher honours rapidly succeeded, among which we may merely mention his election in 1837 to the president's chair in the Royal Irish Academy, and the rare distinction of being made corresponding member of the academy of St Petersburg. These are the few salient points (other, of course, than the epochs of his more important discoveries and inventions presently to be considered) in the uneventful life of this great man. He retained his wonderful faculties unimpaired to the very last, and steadily continued till within a day or two of his death, which occurred on the 2nd of September 1865, the task (his Elements of Quaternions) which had occupied the last six years of his life.

The germ of his first great discovery was contained in one of those early papers which in 1823 he communicated to Dr Brinkley, by whom, under the title of " Caustics," it was presented in 1824 to the Royal Irish Academy. It was referred as usual to a committee. Their report, while acknowledging the novelty and value of its

contents, and the great mathematical skill of its author, recommended that, before being published, it should be still further developed and simplified. During the next three years the paper grew to an immense bulk, principally by the additional details which had been inserted at the desire of the committee. But it also assumed a much more intelligible form, and the grand features of the new method were now easily to be seen. Hamilton himself seems not till this period to have fully understood either the nature or the importance of his discovery, for it is only now that we find him announcing his intention of applying his method to dynamics. The paper was finally entitled " Theory of Systems of Rays," and the first part was printed in

1828 in the Transactions of the Royal Irish Academy. It is understood that the more important contents of the second and third parts appeared in the three voluminous supplements (to the first part) which were published in the same Transactions, and in the two papers " On a General Method in Dynamics," which ap- peared in the Philosophical Transactions in 1834-1835. The principle of " Varying Action " is the great feature of these papers; and it is strange, indeed, that the one particular result of this theory which, perhaps more than anything else that Hamilton has done, has rendered his name known beyond the little world of true philosophers, should have been easily within the reach of Augustin Fresnel and others for many years before, and in no way required Hamilton's new conceptions or methods, although it was by them that he was led to its discovery. This singular result is still known by the name " conical refraction," which he proposed for it when he first pre- dicted its existence in the third supplement to his " Systems of Rays," read in 1832.

The step from optics to dynamics in the application of the method of " Varying Action " was made in 1827, and communicated to the Royal Society, in whose Philosophical Transactions for 1834 and 1835 there are two papers on the subject. These display, like the " Systems of Rays," a mastery over symbols and a flow of mathe- matical language almost unequalled. But they contain what is far more valuable still, the greatest addition which dynamical science had received since the grand strides made by Sir Isaac Newton and Joseph Louis Lagrange. C. G. J. Jacobi and other mathematicians have developed to a great extent, and as a question of pure mathe- matics only, Hamilton's processes, and have thus made extensive additions to our knowledge of differential equations. But there can be little doubt that we have as yet obtained only a mere glimpse of the vast physical results of which they contain the germ. And though this is of course by far the more valuable aspect in which any such contribution to science can be looked at, the other

must not be despised. It is characteristic of most of Hamilton's, as of nearly all great discoveries, that even their indirect consequences are of high value.

The other great contribution made by Hamilton to mathematical science, the invention of Quaternions, is treated under that heading. The following characteristic extract from a letter shows Hamilton's own opinion of his mathematical work, and also gives a hint of the devices which he employed to render written language as expressive as actual speech. His first great work, Lectures on Quaternions (Dublin, 1852), is almost painful to read in consequence of the frequent use of italics and capitals.

" I hope that it may not be considered as unpardonable vanity or presumption on my part, if, as my own taste has always led me to feel a greater interest in methods than in results, so it is by methods, rather than by any theorems, which can be separately quoted, that I desire and hope to be remembered. Nevertheless it is only human nature, to derive some pleasure from being cited, now and then, even about a '.Theorem'; especially where … the quoter can enrich the subject, by combining it with researches of his own."

The discoveries, papers and treatises we have mentioned might well have formed the whole work of a long and laborious life. But not to speak of his enormous collection of MS. books, full to over- flowing with new and original matter, which have been handed over to Trinity College, Dublin, the works we have already called atten- tion to barely form the greater portion of what he has published. His extraordinary investigations connected with the solution of algebraic equations of the fifth degree, and his examination of the results arrived at by N. H. Abel, G. B. Jerrard, and others in their researches on this subject, form another grand contribution to science. There is next his great paper on Fluctuating Functions, a subject which, since the time of J. Fourier, has been of immense

and ever increasing value in physical applications of mathematics. There is also the extremely ingenious invention of the hodograph. Of his extensive investigations into the solution ' (especially by numerical approximation) of certain classes of differential equations which constantly occur in the treatment of physical questions, only a few items have been published, at intervals, in the Philosophical Magazine. Besides all this, Hamilton was a voluminous corre- spondent. Often a single letter of his occupied from fifty to a hundred or more closely written pages, all devoted to the minute consideration of every feature of some particular problem; for it was one of the peculiar characteristics of his mind never to be satisfied with a general understanding of a question; he pursued it until he knew it in all its details. He was ever courteous and kind in answering applications for assistance in the study of his works,

even when his compliance must have cost him much time. He was excessively precise and hard to please with reference to the final polish of his own works for publication; and it was probably for this reason that he published so little compared with the extent of his investigations.

Like most men of great originality, Hamilton generally matured his ideas before putting pen to paper. " He used to carry on," says his elder son, William Edwin Hamilton, " long trains of algebraical and arithmetical calculations in his mind, during which he was unconscious of the earthly necessity of eating; we used to bring in a ' snack ' and leave it in his study, but a brief nod of recognition of the intrusion of the chop or cutlet was often the only result, and his thoughts went on soaring upwards."

For further details about Hamilton (his poetry and his association with poets, for instance) the reader is referred to the Dublin Univer- sity Magazine (Jan. 1842), the Gentleman' s Magazine (Jan. 1866), and the Monthly Notices of the Royal Astronomical Society (Feb. 1866) ; and also to an article by the

present writer in the North British Review (Sept. 1866), from which much of the above sketch has been taken. His works have been collected and published by R. P. Graves, Life of Sir W. R. Hamilton (3 vols., 1882, 1885, 1889).

(P. G. T.)

HAMILTON, a town of Dundas and Normanby counties, Victoria, Australia, on the Grange Burne Creek, 1975 m. by rail W. of Melbourne. Pop. (1901) 4026. Hamilton has a number of educational institutions, chief among which are the Hamilton and Western District College, one of the finest buildings of its kind in Victoria, the Hamilton Academy, and the Alexandra ladies' college, a state school, and a Catholic college. It has a fine racecourse, and pastoral and agricultural exhibitions are held annually, as the surrounding district is mainly devoted to sheep-farming. Mutton is frozen and exported. Hamilton became a borough in 1859.

HAMILTON (Grand or Ashuanipi), the chief river of Labrador, Canada. It rises in the Labrador highlands at an elevation of 1700 ft., its chief sources being Lakes Attikonak and Ashuanipi, between 65° and 66° W. and 52 and 53 N. After a precipitous course of 600 m. it empties into Melville Lake (90 m. long and 18 wide), an extension of Hamilton inlet, on the Atlantic. About 220 m. from its mouth occur the Grand Falls of Labrador. Here in a distance of 1 2 m. the river drops 760 ft., culminating in a final vertical fall of 316 ft. Below the falls are violent rapids, and the river sweeps through a deep and narrow canyon. The country through which it passes is for the most part a wilderness of barren rock, full of lakes and lacustrine rivers, many of which are its tributaries. In certain portions of the valley spruce and poplars grow to a moderate size. From the head of Lake Attikonak a steep and rocky portage of less than a mile leads to Burnt Lake, which is drained into the St Lawrence by the Romaine river.

HAMILTON, one of the chief cities of Canada, capital

of Wentworth county, Ontario. It occupies a highly picturesque situation upon the shore of a spacious land-locked bay at the western end of Lake Ontario. It covers the plain stretching between the water-front and the escarpment (called ” The Mountain “), this latter being a continuation of that over which the Falls of Niagara plunge 40 m. to the west. Founded about 1778 by one Robert Land, the growth of Hamilton has been steady and substantial, and, owing to its remarkable industrial development, it has come to be called ” the Birmingham of Canada.” This development is largely due to the use of electrical energy generated by water-power, in regard to which Hamilton stands first among Canadian cities. The electricity has not, however, been obtained from Niagara Falls, but from De Cew Falls, 35 m. S.E. of the city. The entire electrical railway system, the lighting of the city, and the majority of the factories are operated by power obtained from this source. The manufactur- ing interests of Hamilton are varied, and some of the establish- ments are of vast size, employing many thousands of hands each, such as the International Harvester Co. and the Canadian Westinghouse Co. In addition Hamilton is the centre of one of the finest fruit-growing districts on the continent, and its open- air market is a remarkable sight. The municipal matters are managed by a mayor and board of aldermen. Six steam rail- roads and three electric radial roads afford Hamilton ample facili- ties for transport by land, while during the season of navigation

a number of steamboat lines supply daily services to Toronto and other lake ports. Entrance into the broad bay is obtained through a short canal intersecting Burlington Beach, which is crossed by two swing bridges, whereof one — that of the Grand Trunk railway — is among the largest of its kind in the world. Burlington Beach is lined with cottages occupied by the city residents during the hot summer months. Hamilton is rich in public institutions. The

educational equipment comprises a normal college, collegiate institute, model school and more than a score of public schools, for the most part housed in handsome stone and brick buildings. There are four hospitals, and the asylum for the insane is the largest in Canada. There is an excellent public library, and in the same building with it a good art school. Hamilton boasts of a number of parks, Dundurn Castle Park, containing several interesting relics of the war of 1812, being the finest, and, as it is practically within the city limits, it is a great boon to the people. Gore Park, in the centre of the city, is used for concerts, given by various bands, one of which has gained an international reputation. Since its incor- poration in 1833 the history of Hamilton has shown continuous growth. In 1836 the population was 2846; in 1851, 10,248; in 1861, 19,096; in 1871, 26,880; in 1881, 36,661; in 1891, 48,959; and in 1901, 52,634. The Anglican bishop of Niagara has his seat here, and also a Roman Catholic bishop. Hamilton returns two members to the Provincial parliament and two to the Dominion.

HAMILTON, a municipal and police burgh of Lanarkshire, Scotland. Pop. (1891), 24,859; (1901), 32,775- It is situated about 1 m. from the junction of the Avon with the Clyde, iof m. S.E. of Glasgow by road, and has stations on the Caledonian and North British railways. The town hall in the Scottish Baronial style has a clock-tower 130 ft. high, and the county buildings are in the Grecian style. Among the subjects of antiquarian interest are Queenzie Neuk, the spot where Queen Mary rested on her journey .to Langside, the old steeple and pillory built in the reign of Charles I., the Mote Hill, the old Runic cross, and the carved gateway in the palace park. In the churchyard there is a monument to four covenanters who suffered at Edin- burgh, on the 7th of December 1600, whose heads were buried here. Among the industries are manufactures of cotton, lace and embroidered muslins, and carriage-building, and there are also large market gardens, the district being famed especially for its

apples, and some dairy-farming; but the prosperity of the town depends chiefly upon the coal and ironstone of the surrounding country, which is the richest mineral field in Scot- land. Hamilton originated in the 15th century under the protecting influence of the lords of Hamilton, and became a burgh of barony in 1456 and a royal burgh in 1548. The latter rights were afterwards surrendered and it was made the chief burgh of the regality and dukedom of Hamilton in 1668, the third marquess having been created duke in 1643. It unites with Airdrie, Falkirk, Lanark and Linlithgow to form the Falkirk district of burghs, which returns one member to parliament.

Immediately east of the town is Hamilton palace, the seat of the duke of Hamilton and Brandon, premier peer of Scotland. It occupies most of the site of the original burgh of Netherton. The first mansion was erected at the end of the 16th century and rebuilt about 1710, to be succeeded in 1822-1829 by the present palace, a magnificent building in the classical style. Its front is a specimen of the enriched Corinthian architecture, with a projecting pillared portico after the style of the temple of Jupiter Stator at Rome, 264 ft. in length and 60 ft. in height. Each of the twelve pillars of the portico is a single block of stone, quarried at Dalserf, midway between Hamilton and Lanark, and required thirty horses to draw it to its site. The interior is richly decorated and once contained the finest collection of paintings in Scotland, but most of them, together with the Hamilton and Beckford libraries, were sold in 1882. Within the grounds, which comprise nearly 1500 acres, is the mausoleum erected by the 10th duke, a structure resembling in general design that of the emperor Hadrian at Rome, being a circular building springing from a square basement, and enclosing a decorated octagonal chapel, the door of which is a copy in bronze of Ghiberti's gates at Florence. At Barncluith, 1 m. S.E. of the town, may be seen the Dutch gardens which were laid down in terraces on the steep banks of the Avon. Their quaint shrubbery and old-

fashioned setting render them attractive. They were planned in 1583 by

John Hamilton, an ancestor of Lord Belhaven, and now belong to Lord Ruthven. About 2 m. S.E. of Hamilton, within the western High Park, on the summit of a precipitous rock 200 ft. in height, the foot of which is washed by the Avon, stand the ruins of Cadzow Castle, the subject of a spirited ballad by Sir Walter Scott. The castle had been a royal residence for at least two centuries before Bannockburn (1314), but immediately after the battle Robert Bruce granted it to Sir Walter FitzGilbert Hamilton, the son of the founder of the family, in return for the fealty. Near it is the noble chase with its ancient oaks, the remains of the Caledonian Forest, where are still preserved some of the aboriginal breed of wild cattle. Opposite Cadzow Castle, in the eastern High Park, on the right bank of the Avon, is Chatelherault, consisting of stables and offices, and imitating in outline the palace of that name in France.

HAMILTON, a village of Madison county, New York, U.S.A., about 29 m. S.W. of Utica. Pop. (1890), 1744; (1900), 1627; (1905)1522; (1910) 1689. It is served by the New York, Ontario & Western railway. Hamilton is situated in a productive agricultural region, and has a large trade in hops; among its manufactures are canned vegetables, lumber and knit goods, There are several valuable stone quarries in the vicinity. The village owns and operates its water-supply and electric-lighting system. Hamilton is the seat of Colgate University, which was founded in 1819, under the name of the Hamilton Literary and Theological Institution, as a training school for the Baptist ministry, was chartered as Madison University in 1846, and was renamed in 1890 in honour of the Colgate family, several of whom, especially William (1783-1857), the soap manufacturer, -and his sons, James Boorman (1818-1904), and Samuel (1822-1897), were its liberal benefactors. In 1908-1909 it had a university faculty of 33 members, 307 students in the college, 60 in the theological department, and 134 in the

preparatory department, and a library of 54,000 volumes, including the Baptist Historical collection (about 5000 vols.) given by Samuel Colgate. The township in which the village is situated and which bears the same name (pop. in 1910, 3825) was settled about 1790 and was separated from the township of Paris in 1795. The village was incorporated in 1812.

HAMILTON, a city and the county-seat of Butler county, Ohio, U.S.A., on both sides of the Great Miami river, 25 m. N. of Cincinnati. Pop. (1890), 17,565; (1900), 23,914, of whom 2949 were foreign-born; (1910 census), 35,279. It is served by the Cincinnati, Hamilton & Dayton, and the Pittsburg, Cincinnati, Chicago & St Louis railways, and by interurban electric lines connecting with Cincinnati, Dayton and Toledo. The valley in which Hamilton is situated is noted for its fertility. The city has a fine public square and the Lane free library (1866) ; the court house is its most prominent public building. A hydraulic canal provides the city with good water power, and in 1905, in the value of its factory products ($13,992,574, being 31-3% more than in 1900), Hamilton ranked tenth among the cities of the state. Its most distinctive manufactures are paper and wood pulp; more valuable are foundry and machine shop products; other manufactures are safes, malt liquors, flour, woollens, Corliss engines, carriages and wagons and agricultural implements. The municipality owns and operates the water-works, electric-lighting plant and gas plant. A stockade fort was built here in 1791 by General Arthur Saint Clair, but it was abandoned in 1796, two years after the place had been laid out as a town and named Fairfield. The town was renamed, in honour of Alexander Hamilton, about 1796. In 1803 Hamilton was made the county-seat; in 18 10 it was incorporated as a village; in 1854 it annexed the town of Rossville on the opposite side of the river; and in 1857 it was made a city. In 1908, by the annexation of suburbs, the area and the population of Hamilton were considerably increased. Hamilton was the early home of William Dean Howells, whose recollections of

it are to be found in his A Boy's Town; his father's anti-slavery sentiments made it necessary for him to sell his printing office, where the son had learned to set type in his teens, and to remove to Dayton.

HAMIRPUR, a town and district of British India, in the Allahabad division of the United Provinces. The town stands on a tongue of land near the confluence of the Betwa and Jumna,

no m. N.W. of Allahabad. Pop. (1901), 6721. It was founded, according to tradition, in the nth century by Hamir Deo, a Karchuli Rajput expelled from Alwar by the Mahommedans.

The district has an area of 2289 sq. m., and encloses the native states of Sarila, Jigni and Bihat, besides portions of Charkhari and Garrauli. Hamirpur forms part of the great plain of Bun- delkhand, which stretches from the banks of the Jumna to the central Vindhyan plateau. The district is in shape an irregular parallelogram, with a general slope northward from the low hills on the southern boundary. The scenery is rendered picturesque by the artificial lakes of Mahoba. These magnificent reservoirs were constructed by the Chandel rajas before the Mahommedan conquest, for purposes of irrigation and as sheets of ornamental water. Many of them enclose craggy islets or peninsulas, crowned by the ruins of granite temples, exquisitely carved and decorated. From the base of this hill and lake country the general plain of the district spreads northward in an arid and treeless level towards the broken banks of the rivers. Of these the principal are the Betwa and its tributary the Dhasan, both of which are unnavigable. There is little waste land, except in the ravines by the river sides. The deep black soil of Bundel khand, known as mar, retains the moisture under a dried and rifted surface, and renders the district fertile. The staple pro- duce is grain of various sorts, the

most important being gram. Cotton is also a valuable crop. Agriculture suffers much from the spread of the kans grass, a noxious weed which overruns the fields and is found to be almost ineradicable wherever it has once obtained a footing. Droughts and famine are unhappily common. The climate is dry and hot, owing to the absence of shade and the bareness of soil, except in the neighbourhood of the Mahoba lakes, which cool and moisten the atmosphere.

In 1901 the pop. was 458,542, showing a decrease of 11% in the decade, due to the famine of 1895-1897. Export trade is chiefly in agricultural produce and cotton cloth. Rath is the principal commercial centre. The Midland branch of the Great Indian Peninsula railway passes through the south of the district.

From the gth to the 12th century this district was the centre of the Chandel kingdom, with its capital at Mahoba. The rajas adorned the town with many splendid edifices, remains of which still exist, besides constructing the noble artificial lakes already described. At the end of the 12th century Mahoba fell into the hands of the Mussulmans. In 1680 the district was conquered by Chhatar Sal, the hero of the Bundelas, who assigned at his death one-third of his dominions to his ally the peshwa of the Mahrattas. Until Bundelkhand became British territory in 1803 there was constant warfare between the Bundela princes and the Mahratta chieftains. On the outbreak of the Mutiny in 1857, Hamirpur was the scene of a fierce rebellion, and all the principal towns were plundered by the surrounding chiefs. After a short period of desultory guerrilla warfare the rebels were effectually quelled and the work of reorganization began. The district has since been subject to cycles of varying agri- cultural .prosperity.

HAMITIC RACES AND LANGUAGES. The questions in- volved in a consideration of Hamitic races and Hamitic languages are independent of one another and call for separate treatment.

I. Hamitic Races. — The term Hamitic as applied to race is not only extremely vague but has been much abused by anthro- pological writers. Of the few who have attempted a precise definition the most prominent is Sergi, 1 and his classification may be taken as representing one point of view with regard to this difficult question.

Sergi considers the Hamites, using the term in the racial sense, as a branch of his "Mediterranean Race"; and divides them as follows: —

I. Eastern Branch —

(a) Ancient and Modern Egyptian (excluding the Arabs).

(b) Nubians, Beja.

(c) Abyssinians.

(d) Galla, Danakil, Somali.

1 G. Sergi, The Mediterranean Race. A Study of the Origin of European Peoples (London, 1901); idem, Africa, Antropologia delta stirpe camitica (Turin, 1897).

(e) Masai.

(J) Wahuma or Watusi. Northern Branch — (a) Berbers of the Mediterranean, (i) Tibbu.

(c) Fula.

(d) Guanches (extinct).

Atlantic and Sahara.

With regard to this classification the following conclusions may be regarded as comparatively certain : that the members of groups d, e and / of the first branch appear to be closely inter-connected by ties of blood, and also the members of the second branch. The Abyssinians in the south have absorbed a certain amount of Galla blood, but the majority are Semitic

or Semito-Negroid. The question of the racial affinities of the Ancient Egyptians and the Beja are still a matter of doubt, and the relation of the two groups to each other is still controversial. Sergi, it is true, arguing from physical data believes that a close connexion exists; but the data are so extremely scanty that the finality of his conclusion may well be doubted. His " Northern Branch " corresponds with the more satisfactory term " Libyan Race," represented in fair purity by the Berbers, and, mixed with Negro elements, by the Fula and Tibbu. This Libyan race is distinctively a white race, with dark curly hair ; the Eastern Hamites are equally distinctively a brown people with frizzy hair. If, as Sergi believes, these brown people are themselves a race, and not a cross between white and black in varying propor- tions, they are found in their greatest purity among the Somali and Galla, and mixed with Bantu blood among the Ba-Hima (Wahuma) and Watussi. The Masai seem to be as much Nilotic Negro as Hamite. This Galla type does not seem to appear farther north than the southern portion of Abyssinia, and it is not unlikely that the Beja are very early Semitic immigrants with an aboriginal Negroid admixture. It is also possible that they and the Ancient Egyptians may contain a common element. The Nubians appear akin to the Egyptians but with a strong Negroid element.

To return to Sergi's two branches, besides the differences in skin colour and hair-texture there is also a cultural difference of great importance. The Eastern Hamites are essentially a pastoral people and therefore nomadic or semi-nomadic; the Berbers, who, as said above, are the purest representatives of the Libyans, are agri- culturists. The pastoral habits of the Eastern Hamites are of importance, since they show the utmost reluctance to abandon them. Even the Ba-Hima and Watussi, for long settled and partly intermixed with the agricultural Bantu, regard any pursuit but that of cattle-tending as absolutely beneath their dignity.

It would seem therefore that, while sufficient data have not been collected to decide whether, on the

evidence of exact anthropological measurements, the Libyans are connected racially with the Eastern Hamites, the testimony derived from broad " descriptive character- istics " and general culture is against such a connexion. To regard the Libyans as Hamites solely on the ground that the languages spoken by the two groups show affinities would be as rash and might be as false as to aver that the present-day Hungarians are Mon- golians because Magyar is an Asiatic tongue. Regarding the present state of knowledge it would be safer therefore to restrict the term " Hamites " to Sergi's first group; and call the second by the name " Libyans." The difficult question of the origin of the ancient Egyptians is discussed elsewhere.

As to the question whether the Hamites in this restricted sense are a definite race or a blend, no discussion can, in view of the paucity of evidence, as yet lead to a satisfactory conclusion, but it might be suggested very tentatively that further researches may possibly connect them with the Dravidian peoples of India. It is sufficient for present purposes that the term Hamite, using it as coextensive with Sergi's Eastern Hamite, has a definite connotation. By the term is meant a brown people with frizzy hair, of lean and sinewy physique, with slender but muscular arms and legs, a thin straight or even aquiline nose with delicate nostrils, thin lips and no trace of prognathism. (T. A. J.)

II. Hamitic Languages. — The whole north of Africa was once inhabited by tribes of the Caucasian race, speaking languages which are now generally called, after Genesis x., Hamitic, a term introduced principally by Friedrich Miiller. The linguistic coherence of that race has been broken up especially by the' intrusion of Arabs, whose language has exercised a powerful influence on all those nations. This splitting up, and the immense distances over which those tribes were spread, have made those

1 languages diverge more widely than do the various tongues of the Indo-European stock, but still their

affinity can easily be traced by the linguist, and is, perhaps, greater than the corre- sponding anthropologic similarity between the white Libyan, red Galla and swarthy Somali. The relationship of these languages to Semitic has long been noticed, but was at first taken for descent from Semitic (cf. the name ” Syro- Arabian ”

j proposed by Pri chard). Now linguists are agreed that the

Proto-Semites and Proto-Hamites once formed a unity, probably in Arabia. That original unity has been demonstrated especially by Friedrich Miiller (Reise der osterreichischen Fregatte Novara, p. 51, more fully, Grundriss der Sprachwissenschaft, vol. iii. fasc. 2, p. 226); cf. also A. H. Sayce, Science of Language, ii. 178; R. N. Cust, The Modern Languages of Africa, i. 94, &c. The comparative grammars of Semitic (W. Wright, 1S90, and especially H. Zimmern, 1898) demonstrate this now to everybody by comparative tables of the grammatical elements.

*The classification of Hamitic languages is as follows : * —*

1. The Libyan Dialects (mostly misnamed ” Berber languages,” after an unfortunate, vague Arabic designation, barabra, ” people of foreign language “). The representatives of this large group extend from the Senegal river (where they are called Zenaga; im- perfect Grammaire by L. Faidherbe, 1877) and from Timbuktu (dialect of the Auelimmiden, sketched by Heinrich Barth, Travels, vol. v., 1857) to the oases of Aujila (Bengazi) and of Siwa on the western border of Egypt. Consequently, these ” dialects ” differ more strongly from each other than, e.g. the Semitic languages do between themselves. The purest representative seems to be the language of the Algerian mountaineers (Kabyles), especially that of the Zuawa (Zouaves) tribe,

described by A. Hanoteau, Essai de grammaire kabyle (1858); Ben Sedira, Cours de langue kab. (1887); Dictionnaire by Olivier (1878). The iearned little Manuel de langue kabyle, by R. Basset (1887) is an introduction to the study of the many dialects with full bibliography, cf. also Basset's Notes de lexicographie berbere (188,3 foil.). (The dictionaries by Brosselard and Venture de Paradis are imperfect.) The best now described is Shilb(a), a Moroccan dialect (H. Stumme, Handbuchdes Schilhischen, 1899), but it is an inferior dialect. That of Ghat in Tripoli under- lies the Grammar of F. W. Newman (1845) and the Grammaire Tamashek of Hanoteau (i860); cf. also the Dictionnaire of Cid Kaoui (1900). Neither medieval reports on the language spoken by the Guanches of the Canary Islands (fullest in A. Berthelot, Antiquites canariennes, 1879; akin to Shilha; by no means primitive Libyan untouched by Arabic), nor the modern dialect of Siwa (still little known; tentative grammar by Basset, 1890), have justified hopes of finding a pure Libyan dialect. Of a few literary attempts in Arabic letters the religious Poeme de Cabi (ed. Basset, Journ. asiatique, vii. 476) is the most remarkable. The imperfect native writing (named tifinaghen), a derivation from the Sabaean alphabet (not, as Halevy claimed, from the Punic), still in use among the Sahara tribes, can be traced to the 2nd century B.C. (bilingual in- scription of Tucca, &c. ; cf. J. Halevy, Essai d'epigraphie libyque, 1875), but hardly ever served for literary uses.

2. The Cushitic or Ethiopian Family. — The nearest relative of Libyan is not Ancient Egyptian but the language of the nomadic Bisharin or Beja of the Nubian Desert (cf. H. Almkvist, Die Bischari Sprache, 1881 [the northern dialect], and L. Reinisch, Die Bedauye Sprache, 1893, Wbrterbuch, 1895). The speech of the peoples occupy- ing the lowland east of Abyssinia, the Saho (Reinisch, grammar in Zeitschrift d. deutschen morgenldnd. Gesellschaft, 32, 1878; Texte, 1889; Wbrterbuch, 1890; cf. also Reinisch, Die Sprache der Irob Saho,

1878), and the Afar or Danakil (Reinisch, Die Afar Sprache, 1887; G. Colizza, Lingua Afar, 1887), merely dialects of one language, form the connecting link with the southern Hamitic group, i.e. Somali (Reinisch, Somali Sprache, 1900–1903, 3 vols. ; Larajasse und de Sampont, Practical Grammar of the Somali Language, 1897; imperfect sketches by Hunter, 1880, and Schleicher, 1890), and Galla (L. Tutscheck, Grammar, 1845, Lexicon, 1844; Massaja, Lectiones, 1877; G. F. F. Praetorius, Zur Grammalik der Gallasprache, 1893, &c). All these Cushitic languages, extending from Egypt to the equator, are separated by Reinisch as Lower Cushitic from the High Cushitic group, i.e. the many dialects spoken by tribes dwelling in the Abyssinian highlands or south of Abyssinia. Of the original inhabitants of Abyssinia, called collectively Agau (or Agau) by the Abyssinians, or Falashas (this name principally for Jewish tribes), Reinisch considers the Bilin or Bogos tribe as preserving the most archaic dialect (Die Bilin Sprache, Texts, 1883; Grammalik, 1882; Wbrterbuch, 1887); the same scholar gave sketches of the Khamir (1884) and Quara (1885) dialects. On other dialects, struggling against the spreading Semitic tongues (Tigre, Amharic, &c), see Conti Rossini, ” Appunti sulla lingua Khamta,” in Giorn. soc. orient. (1905); Waldmeyer, Wbrtersammlung (1868); J. HaleVy, “Essai sur la langue Agaou ” (Actes soc. philologique , 1873), &c. Similar dialects are those of the Sid(d)ama tribes, south of Abyssinia, of which only Kaf(f)a (Reinisch, Die Kafa Sprache, 1888) is known at all fully. Of the various other dialects (Kuljo, Tambaro, &c.) r – vocabularies only are known ; cf. Borelli, Ethiopie meridionale (1890). (On Hausa see below.)

There is no question that the northernmost Hamitic languages have preserved best the original wealth of inflections which reminds us so strongly of the formal riches of southern Semitic. Libyan

1 Only works of higher linguistic standing are quoted here ; many vocabularies and imperfect attempts of travellers cannot be enumerated.

and Beja are the best-preserved types, and the latter especially may be called the Sanskrit of Hamitic. The other Cushitic tongues exhibit increasing agglutinative tendencies the farther we go south, although single archaisms are found even in Somali. The early isolated High Cushitic tongues (originally branched off from a stock common with Galla and Somaii) diverge most strongly from the original type. Already the Agau dialects are full of very peculiar developments; the Hamitic character of the Sid(d)ama languages can be traced only by lengthy comparisons.

The simple and pretty (Haus(s)a language, the commercial lan- guage of the whole Niger region and beyond (Schoen, Grammar, 1862, Dictionary, 1876; Charles H. Robinson, 1897, in Robinson and Brookes's Dictionary) has fairly well preserved its Hamitic grammar, though its vocabulary was much influenced by the surrounding Negro languages. It is no relative of Libyan (though it has experienced some Libyan influences), but comes from the (High ?) Cushitic family; its exact place in this family remains to be determined. Various languages of the Niger region were once Hamitic like Haus(s)a, or at least under some Hamitic influence, but have now lost that character too far to be classified as Hamitic, e.g. the Muzuk or Musgu language (F. Miiller, 1886). The often-raised question of some (very remote) relationship between Hamitic and the great Bantu family is still undecided ; more doubtful is that with the inter- esting Ful (a) language in the western Sudan, but a relationship with the Nilotic branch of negro languages is impossible (though a few of these, e.g. Nuba, have borrowed some words from neighbouring Hamitic peoples). The development of a grammatical gender, this principal characteristic of Semito-Hamitic, in Bari and Masai, may be rather accidental than borrowed; certainly, the same pheno- menon in Hottentot does not justify the attempt often made to classify this with Hamitic.

3. Ancient Egyptian, as we have seen, does not form the connect- ing link between Libyan and Cushitic

which its geographical posi- tion would lead us to expect. It represents a third independent branch, or rather a second one, Libyan and Cushitic forming one division of Hamitic. A few resemblances with Libyan (M. de Rochemonteix in Memoires du congres internal, des orientalistes, Paris, 1873; elementary) are less due to original relationship than to the general better preservation of the northern idioms (see above). Frequent attempts to detach Egyptian from Hamitic and to attri- bute it to a Semitic immigration later than that of the other Hamites cannot be proved. Egyptian is, in many respects, more remote from Semitic than the Libyan-Cushitic division, being more agglu- tinative than the better types of its sister branch, having lost the most characteristic verbal flection (the Hamito-Semitic imperfect), forming the nominal plural in its own peculiar fashion, &c. The advantage of Egyptian, that it is represented in texts of 3000 B.C., while the sister tongues exist only in forms 5000 years later, allows us, e.g. to trace the Semitic principle of triliteral roots more clearly in Egyptian; but still the latter tongue is hardly more character- istically archaic or nearer Semitic than Beja or Kabylic.

All this is said principally of the grammar. Of the vocabulary it must not be forgotten that none of the Hamitic tongues remained untouched by Semitic influences after the separation of the Hamites and Semites, say 4000 or 6000 B.C. Repeated Semitic immigrations and influences have brought so many layers of loan-words that it is questionable if any modern Hamitic language has now more than 10% of original Hamitic words. Which Semitic resemblances are due to original affinity, which come from pre-Christian immigrations, which from later influences, are difficult questions not yet faced by science; e.g. the half- Arabic numerals of Libyan have often been quoted as a proof of primitive Hamito-Semitic kinship, but they are probably only a gift of some Arab invasion, prehistoric for us. Arab tribes seem to have repeatedly swept over the whole area of the Hamites, long before the time of Mahomet, and to

have left deep impressions on races and languages, but none of these migrations stands in the full light of history (not even that of the Geefe tribes of Abyssinia). Egyptian exhibits constant influences from its Canaan- itish neighbours; it is crammed with such loan-words already in 3000 B.C. ; new affluxes can be traced, especially c. 1600. (The Punic influences on Libyan are, however, very slight, inferior to the Latin.) Hence the relations of Semitic and Hamitic still require many investi- gations in detail, for which the works of Reinisch and Basset have merely built up a basis. (W. M. M.)

HAMLET, the hero of Shakespeare's tragedy, a striking figure in Scandinavian romance.

The chief authority for the legend of Hamlet is Saxo Gram- maticus, who devotes to it parts of the third and fourth books of his Historia Danica, written at the beginning of the 13th century. It is supposed that the story of Hamlet, Amleth or AmloSi, 2 was contained in the lost Skjoldunga saga, but we have no means of determining whether Saxo derived his information in this case from oral or written sources. The close parallels between the

2 The word is used in modern Icelandic metaphorically of an imbecile or weak-minded person (see Cleasby and Vigfusson, Icelandic- English Dictionary, i86q).

tale of Hamlet and the English romances of Havelok, Horn and Bevis of Hampton make it not unlikely that Hamlet is of British rather than of Scandinavian origin. His name does in fact occur in the Irish Annals of the Four Masters (ed. O'Donovan, 1851) in a stanza attributed to the Irish Queen Gormflaith, who laments the death of her husband, Niall Glundubh, at the hands of Amhlairfe in 919 at the battle of Ath-Cliath. The slayer of Niall Glundubh is by other authorities stated to have been Sihtric.

Now Sihtric was the father of that Olaf or Anlaf Cuaran who was the prototype of the English Havelok, but nowhere else does he receive the nickname of Amhlai

1 ” ‘Tis said that far out, off yonder ness, the Nine Maids of the Island Mill stir amain the host — cruel skerry-quern — they who in ages past ground Hamlet’s meal. The good Chieftain furrows the hull’s lair with his ship’s beaked prow.” This passage may be com- pared with some examples of Hamlet’s cryptic sayings quoted by Saxo: “Again, as he passed along the beach, his companions found the rudder of a ship which had been wrecked, and said

‘ they had discovered a huge knife. ‘ This,’ said he, ‘ was the right thing to carve such a huge ham . . . . ‘ Also, as they passed the sand-hills, and bade him look at the meal, meaning the sand, he replied that it had been ground small by the hoary tempests of the ocean.”

2 Books iii. and iv., chaps. 86-106, Eng. trans, by O. Elton (London,

1894)-

the dead men of the day before with stakes, and thus terrifying the enemy. He then returned with his two wives to Jutland, where he had to encounter the enmity of Wiglek, Rorik’s suc- cessor. He was slain in a battle against Wiglek, and Hermuth- ruda, although she had engaged to die with him, married the victor.

The other Scandinavian versions of the tale are: the Hrolfssaga Kraka, 3 where the brothers Helgi and Hroar take the place of the hero; the tale of Harald and Half dan, as related in the 7th book of Saxo Grammaticus; the modern Icelandic Ambales Saga, 4 a romantic tale the earliest MS. of which dates from the 17th century; and the folk-tale of Brjam 5 which was put in writing in 1707. Helgi and Hroar, like Harald and Half dan, avenge their father’s death on their uncle by burning him in his palace. Harald and

Halfdan escape after their father's death by being brought up, with dogs' names, in a hollow oak, and subsequently by feigned madness; and in the case of the other brothers there are traces of a similar motive, since the boys are called by dogs' names. The methods of Hamlet's madness, as related by Saxo, seem to point to cynanthropy. In the Ambales Saga, which perhaps is collateral to, rather than derived from, Saxo's version, there are, besides romantic additions, some traits which point to an earlier version of the tale.

Saxo Grammaticus was certainly familiar with the Latin historians, and it is most probable that, recognizing the similarity between the northern Hamlet legend and the classical tale of Lucius Junius Brutus as told by Livy, by Valerius Maximus, and by Dionysius of Halicarnassus (with which he was probably acquainted through a Latin epitome), he deliberately added circumstances from the classical story. The incident of the gold- filled sticks could hardly appear fortuitously in both, and a comparison of the harangues of Amleth (Saxo, Book iv.) and of Brutus (Dionysius iv. 77) shows marked similarities. In both tales the usurping uncle is ultimately succeeded by the nephew who has escaped notice during his youth by a feigned madness. But the parts played by the personages who in Shakespeare became Ophelia and Polonius, the method of revenge, and the whole narrative of Amleth's adventure in England, have no parallels in the Latin story.

Dr. O. L. Jiriczek 6 first pointed out the striking similarities existing between the story of Amleth in Saxo and the other northern versions, and that of Kei Chosro in the Shahnameh (Book of the King) of the Persian poet Firdausi. The comparison was carried farther by R. Zenker (Boeve Amlelhus, pp. 207–268, Berlin and Leipzig, 1904), who even concluded that the northern saga rested on an earlier version of Firdausi's story, in which indeed nearly all the individual elements of the various northern versions are to be found. Further resemblances exist in the Ambales Saga with the tales of Bellerophon, of Heracles, and of Servius

Tullius. That Oriental tales through Byzantine and Arabian channels did find their way to the west is well known, and there is nothing very surprising in their being attached to a local hero.

The tale of Hamlet's adventures in Britain forms an episode so distinct that it was at one time referred to a separate hero. The traitorous letter, the purport of which is changed by Her- muthruda, occurs in the popular Dit de I'empereur Constant? and in Arabian and Indian tales. Hermuthruda's cruelty to her wooers is common in northern and German mythology, and close

3 Printed in Fornaldar Sogur NorStrlanda (vol. i. Copenhagen, 1829), analysed by F. Detter in Zeitschr. fur deutsches Altertum (vol. 36, Berlin, 1892).

4 Printed with English translation and with other texts germane to the subject by I. Gollancz (Hamlet in Iceland, London, 1898).

6 Professor I. Gollancz points out (p. lxix.) that Brjam is a varia- tion of the Irish Brian, that the relations between Ireland and the Norsemen were very close, and that, curiously enough, Brian Boroimhe was the hero of that very battle of Clontarf (1014) where the device (which occurs in Havelok and Hamlet) of bluffing the enemy by tying the wounded to stakes to represent active soldiers was used.

6 " Hamlet in Iran," in Zeitschrift des Vereins fur Volkskunde, x. (Berlin, 1900).

' See A. B. Gough, The Constance Saga (Berlin, 1902).

parallels are afforded by Thrytho, the terrible bride of Offa I., who figures in Beowulf, and by Brunhilda in the Nibelungen- lied.

The story of Hamlet was known to the Elizabethans in Francois de Belleforest's Histoires tragiques (1559), and found its supreme expression in Shakespeare's tragedy. That as early as 1587 or 1589 Hamlet had appeared on the English stage is shown by Nash's preface to Greene's Menaphon: " He will afford you whole Hamlets, I should say, handfulls of tragical speeches." The Shakespearian Hamlet owes, however, little but the outline of his story to Saxo. In character he is dia- metrically opposed to his prototype. Amleth's madness was certainly altogether feigned; he prepared his vengeance a year beforehand, and carried it out deliberately and ruthlessly at every point. His riddling speech has little more than an outward similarity to the words of Hamlet, who resembles him, however, in his disconcerting penetration into his enemies' plans. For a discussion of Shakespeare's play and its immediate sources see Shakespeare.

See an appendix to Elton's trans, of Saxo Grammaticus; I. Gollancz, Hamlet in Iceland (London, 1898) ; H. L. Ward, Catalogue of Romances, under " Havelok," vol. i. pp. 423 seq. ; English His- torical Review, x. (1895); F. Detter, " Die Hamletsage," Zeitschr. f. deul. Alter, vol. 36 (Berlin, 1892); O. L. Jiriczek, " Die Amleth- sage auf Island," in Germanistische Abhandlungen, vol. xii. (Breslau), and " Hamlet in Iran," in Zeitschr. des Vereins fiir Volkskunde, x. (Berlin, 1900) ; A. Olrik, Kilderne til Sakses Oldhistorie (Copenhagen, 2 vols., 1892-1894).

HAMLEY, SIR EDWARD BRUCE (1824-1893), British general and military writer, youngest son of Vice-Admiral William Hamley, was born on the 27th of April 1824 at Bodmin, Cornwall, and entered the Royal Artillery in 1843. He was promoted captain in 1850, and in 1851 went to Gibraltar, where he com- menced his literary career by contributing articles to magazines. He served throughout the Crimean campaign as aide-de-camp to Sir Richard Dacres, commanding the artillery, taking part in all the operations with distinction, and becoming successively major and lieutenant-colonel by brevet.

He also received the C.B. and French and Turkish orders. During the war he con- tributed to Blackwood' s Magazine an admirable account of the progress of the campaign, which was afterwards republished. The combination in Hamley of literary and military ability secured for him in 1859 the professorship of military history at the new Staff College at Sandhurst, from which in 1866 he went to the council of military education, returning in 1870 to the Staff College as commandant. From 1879 to 1881 he was British commissioner successively for the delimitation of the frontiers of Turkey and Bulgaria, Turkey in Asia and Russia, and Turkey and Greece, and was rewarded with the K.C.M.G. Promoted colonel in 1863, he became a lieutenant-general in 1882, when he commanded the 2nd division of the expedition to Egypt under Lord Wolseley, and led his troops in the battle of Tell-el-Kebir, for which he received the K.C.B., the thanks of parliament, and 2nd class of Osmanieh. Hamley considered that his services in Egypt had been insufficiently recognized in Lord Wolseley's despatches, and expressed his indignation freely, but he had no sufficient ground for supposing that there was any intention to belittle his services. From 1885 until his death on the 12th of August 1893 he represented Birkenhead in parliament in the Conservative interest.

Hamley was a clever and versatile writer. His principal work, The Operations of War, published in 1867, became a text-book of military instruction. He published some pamphlets on national defence, was a frequent contributor to magazines, and the author of several novels, of which perhaps the best known is Lady Lee's Widowhood.

HAMLIN, HANNIBAL (1809-1891), vice-president of the United States (1861-1865), was born at Paris, Maine, on the 27th of August 1809. After studying in Hebron Academy, he conducted his father's farm for a time, became schoolmaster, and later managed a weekly newspaper at Paris. He then studied law, was admitted to the bar in 1833, and rapidly acquired a reputation as an able lawyer and a . good public speaker. Entering politics as an anti-slavery

Democrat, he was a member

of the state House of Representatives in 1836- 1840, serving as its presiding officer during the last four years. He was a representative in Congress from 1843 to 1847, and was a member of the United States Senate from 1848 to 1856. From the very beginning of his service in Congress he was prominent as an opponent of the extension of slavery; he was a conspicuous supporter of the Wilmot Proviso, spoke against the Compromise Measures of- 1850, and in 1856, chiefly because of the passage in 1854 of the Kansas-Nebraska Bill, which repealed the Missouri Compromise, and his party's endorsement of that repeal at the Cincinnati Convention two years later, he withdrew from the Democrats and joined the newly organized Republican party. The Republicans of Maine nominated him for governor in the same year, and having carried the election by a large majority he was inaugurated in this office on the 8th of January 1857. In the latter part of February, however, he resigned the governor- ship, and was again a member of the Senate from 1857 to January 1861. From 1861 to 1865, during the Civil War, he was Vice-President of the United States. While in this office he was one of the chief advisers of President Lincoln, and urged both the Emancipation Proclamation and the arming of the negroes. After the war he again served in the Senate (1869-1881), was minister to Spain (1881-1883), and then retired from public life. He died at Bangor, Maine, on the 4th of July 1891.

See Life and Times of Hannibal Hamlin (Cambridge, Mass., 1899), by C. E. Hamlin, his grandson.

HAMM, a town of Germany, in the Prussian province of Westphalia, on the Lippe, 19 m. by rail N.E. from Dortmund on the main line Cologne-Hanover. Pop. (1905) 38.430. It is surrounded by pleasant promenades occupying the site of the former engirdling fortifications. The principal buildings are four Roman Catholic and three Evangelical churches, several schools and an infirmary. The town is flourishing and rapidly increasing, and possesses

very extensive wire factories (in connexion with which there are puddling and rolling works), machine works, and manufactories of gloves, baskets, leather, starch, chemicals, varnish, oil and beer. Near the town are some thermal baths.

Hamm, which became a town about the end of the 12th century, was originally the capital of the countship of Mark, and was fortified in 1226. It became a member of the Hanseatic League. In 16 14 it was besieged by the Dutch, and it was several times taken and retaken during the Thirty Years' War. In 1666 it came into the possession of Brandenburg. In 1761 and 1762 it was bombarded by the French, and in 1763 its fortifications were dismantled.

HAMMAD AR-RAWIYA [Abu-1-Qasim Hammad ibn Abi Laila Sapur (or ibn Maisara)] (8th century a.d.), Arabic scholar, was of Dailamite descent, but was born in Kufa. The date of his birth is given by some as 694, by others as 714. He was reputed to be the most learned man of his time in regard to the "days of the Arabs" {i.e. their chief battles), their stories, poems, genealogies and dialects. He is said to have boasted that he could recite a hundred long qasidas for each letter of the alphabet (i.e. rhyming in each letter) and these all from pre-Islamic times, apart from shorter pieces and later verses. Hence his name Hammad ar-Rawiya, " the reciter of verses from memory." The Omayyad caliph Walld is said to have tested him, the result being that he recited 2900 qasidas of pre- Islamic date and Walid gave him 100,000 dirhems. He was favoured by Yazid II. and his successor Hisham, who brought him up from Irak to Damascus. Arabian critics, however, say that in spite of his learning he lacked a true insight into the genius of the Arabic language, and that he made more than thirty — some say three hundred — mistakes of pronunciation in reciting the Koran. To him is ascribed the collecting of the Mo'allakat (q.v.). No diwan of his is extant, though he composed verse of his own and probably a good deal of what he ascribed to earlier poets.

Biography in McG. de Slane's trans, of Ibn Khallikan, vol. i. pp. 470-474, and many stories are told of him in the Kitab ul-Aghani, vol. v. pp. 164-175. (G. W T.)

HAMMER, FRIEDRICH JULIUS (1810-1862), German poet, was born on the 7th of June r8io at Dresden. In 1831 he went to Leipzig to study law, but devoted himself mainly to philosophy and belles lettres. Returning to Dresden in 1 834 a small comedy, Das seltsame Friihstuck, introduced him to the literary society of the capital, notably to Ludwig Tieck, and from this time he devoted himself entirely to writing. In 1837 he returned to Leipzig, and, coming again to Dresden, from 1851 to 1859 edited the feuilleton of Sdchsische konstitutionelle Zeitung, and took the lead in the foundation in 1855 of the Schiller Institute in Dresden. His marriage in 1851 had made him independent, and he bought a small property at Pillnitz, on which, soon after his return from a residence of several years at Nuremberg, he died, on the 23rd of August 1862,

Hammer wrote, besides several comedies, a drama Die Brtider (1856), a number of unimportant romances, and the novel Einkehr und Umkehr (Leipzig, 1856); but his reputation rests upon his epigrammatic and didactic poems. His Schau' um dich, und schau' in dich (1851), which made his name, has passed through more than thirty editions. It was followed by Zu alien guten Stunden (1854), Fester Grund (1857), Auf stillen Wegen (1859), and Lerne, Hebe, lebe (1862). Besides these he wrote a book of Turkish songs, Unter dem Ha},bmond (Leipzig, i860), and rhymed versions of the psalms (1861), and compiled the popular religious anthology Leben und Heimat in Gott, of which a 14th edition was published in 1900.

See C. G. E. Am Ende, Julius Hammer (Nuremberg, 1872).

HAMMER, an implement consisting of a shaft or handle with head fixed transversely to it. The head, usually of metal, has one flat face, the other may be shaped to serve various purposes, e.g. with a claw, a pick, &c. The implement is used for breaking, beating, driving nails, rivets, &c, and the word is applied to heavy masses of metal moved by machinery, and used for similar purposes. (See Tool.) ” Hammer ” is a word common to Teutonic languages. It appears in the same form in German and Danish, and in Dutch as hamer, in Swedish as hammare. The ultimate origin is unknown. It has been connected with the root seen in the Greek Kanirrav, to bend; the word would mean, therefore, something crooked or bent. A more illuminating suggestion connects the word with the Slavonic kamy, a stone, cf. Russian kamen, and ultimately with Sanskrit acman, a pointed stone, a thunderbolt. The legend of Thor’s hammer, the thunderbolt, and the probability of the primitive hammer being a stone, adds plausibility to this derivation. The word is applied to many objects resembling a hammer in shape or function. Thus the ” striker ” in a clock, or in a bell, when it is sounded by an independent lever and not by the swinging of the ” tongue,” is called a ” hammer “; similarly, in the ” action ” of a pianoforte the word is used of a wooden shank with felt- covered head attached to a key, the striking of which throws the “hammer” against the strings. In the mechanism of a fire-arm, the ” hammer ” is that part which by its impact on the cap or primer explodes the charge. (See Gun.) The hammer, more usually known by its French name of martel de fer, was a medieval hand-weapon. With a long shaft it was used by infantry, especially when acting against mounted troops. With a short handle and usually made altogether of metal, it was also used by horse-soldiers. The martel had one part of the head with a blunted face, the other pointed, but occasionally both sides were pointed. There are 16th century examples in which a hand-gun forms the handle. The name of ” hammer,” in Latin malleus, has been frequently applied to men, and also to books, with reference to destructive power. Thus on the tomb of

Edward I. in Westminster Abbey is inscribed his name of Scotorum Malleus, the " Hammer of the Scots." The title of " Hammer of Heretics," Malleus Haereticorum, has been given to St Augustine and to Johann Faber, whose tract against Luther is also known by the name. Thomas Cromwell was styled Malleus Monachorum. The famous text-book of procedure in cases of witchcraft, published by Sprenger and Kramer in 1489, was called Hexenhammer or Malleus Maleficarum (see Witch- craft).

xii. 29

The origin of the word "hammer-cloth," an ornamental cloth covering the box-seat on a state-coach, has been often explained from the hammer and other tools carried in the box-seat by the coachman for repairs, &c. The New English Dictionary points out that while the word occurs as early as 1465, the use of a box-seat is not known before the 17 th century. Other suggestions are that it is a corruption of " hamper-cloth," or of " hammock- cloth," which is used in this sense, probably owing to a mistake. Neither of these supposed corruptions helps very much. Skeat connects the word with a Dutch word hemel, meaning a canopy. In the name of the bird, the yellow-hammer, the latter part should be " ammer." This appears in the German name, Emmerling, and the word probably means the " chirper," cf. the Ger. jammern, to wail, lament.

HAMMERBEAM ROOF, in architecture, the name given to a Gothic open timber roof, of which the finest example is that over Westminster Hall (i39S~i399)- In order to give greater height in the centre, the ordinary tie beam is cut through, and the portions remaining, known as hammerbeams, are supported by curved braces from the wall; in Westminster Hall, in order to give greater strength to the framing, a large arched piece of timber is carried across the hall, rising from the bottom of the wall piece to the centre of the collar beam, the latter being also supported by curved braces rising from the end of the hammer- beam. The span of Westminster Hall is 68 ft. 4 in., and the opening between the ends of the

hammerbeams 25 ft. 6 in. The height from the paving of the hall to the hammerbeam is 40 ft., and to the underside of the collar beam 63 ft. 6 in., so that an additional height in the centre of 23 ft. 6 in. has been gained. Other important examples of hammerbeam roofs exist over the halls of Hampton Court and Eltham palaces, and there are numerous examples of smaller dimensions in churches throughout England and particularly in the eastern counties. The ends of the hammerbeams are usually decorated with winged angels holding shields; the curved braces and beams are richly moulded, and the spandrils in the larger examples filled in with tracery, as in Westminster Hall. Sometimes, but rarely, the collar beam is similarly treated, or cut through and supported by additional curved braces, as in the hall of the Middle Temple, London.

HAMMERFEST, the most northern town in Europe. Pop. (1900) 2300. It is situated on an island (Kvalo) off the N.W. coast of Norway, in Finmarken amt (county), in 70 40' 11" N., the latitude being that of the extreme north of Alaska. Its position affords the best illustration of the warm climatic influence of the north-eastward. Atlantic drift, the mean annual temperature being 36 F. (January 31°, July 57). Hammerfest is 674 m. by sea N.E. of Trondhjem, and 78 S.W. from the North Cape. The character of this coast differs from the southern, the islands being fewer and larger, and of table shape. The narrow strait Strommen separates Kvalo from the larger Seiland, whose snow-covered hills with several glaciers rise above 3500 ft., while an insular rampart of mountains, Soro, protects the strait and harbour from the open sea. The town is timber-built and modern; and the Protestant church, town-hall, and schools were all rebuilt after fire in 1 890. There is also a Roman Catholic church. The sun does not set at Hammerfest from the 13th of May to the 29th of July. This is the busy season of the towns-folk. Vessels set out to the fisheries, as far as Spitsbergen and the Kara Sea; and trade is brisk, not only Norwegian and Danish but British, German and particularly Russian vessels engaging in it.

Cod-liver oil and salted fish are exported with some reindeer-skins, fox-skins and eiderdown; and coal and salt for curing are imported. In the spring the great herds of tame reindeer are driven out to swim Strommen and graze in the summer pastures of Seiland; towards winter they are called home again. From the 18th of November to the 23rd of January the sun is not seen, and the enforced quiet of winter prevails. Electric light was introduced in the town in 1891. On the Fuglenaes or Birds' Cape, which protects the harbour on the north, there stands a column with an inscription in Norse and Latin, stating that Hammerfest was one of the stations of the

expedition for the measurement of the arc of the meridian in 1816-1852. Nor is this its only association with science; for it was one of the spots chosen by Sir Edward Sabine for his series of pendulum experiments in 1823. The ascent of the Sadlen or the Tyven in the neighbourhood is usually undertaken by travellers for the view of the barren, snow-clad Arctic land- scape, the bluff indented coast, and the vast expanse of the Arctic Ocean.

HAMMER-KOP, or Hammerhead, an African bird, which has been regarded as a stork and as a heron, the Scopus umbretta of ornithologists, called the " Umbre " by T. Pennant, now placed in a separate family Scopidae between the herons and storks. It was discovered by M. Adanson, the French traveller, in Senegal about the middle of the 19th century, and was described by M. J. Brisson in 1760. It has since been found to inhabit nearly the whole of Africa and Madagascar, and is the " hammerkop " (hammerhead) of the Cape colonists. Though not larger than a raven, it builds an enormous nest, some six feet in diameter, with a flat-topped roof and a small hole for entrance and exit, and placed either on a tree

or a rocky ledge. The bird, of an almost uniform brown colour, slightly glossed with purple and its tail barred with black, has a long occipital crest, generally borne horizontally, so as to give rise to its common name. It is some- what sluggish by day, but displays much activity at dusk, when it will go through a series of strange performances. (A. N.)

HAMMER-PURGSTALL, JOSEPH, Freiherr von (1774- 1856), Austrian orientalist, was born at Graz on the 9th of June 1774, the son of Joseph Johann von Hammer, and received his early education mainly in Vienna. Entering the diplomatic service in 1796, he was appointed in 1799 to a position in the Austrian embassy in Constantinople, and in this capacity he took part in the expedition under Admiral Sir William Sidney Smith and General Sir John Hely Hutchinson against the French. In 1807 he returned home from the East, after which he was made a privy councillor, and, on inheriting in 1835 the estates of the countess Purgstall in Styria, was given the title of " freiherr." In 1847 he was elected president of the newly- founded academy, and he died at Vienna on the 23rd of November

1856.

For fifty years Hammer-Purgstall wrote incessantly on the most diverse subjects and published numerous texts and transla- tions of Arabic, Persian and Turkish authors. It was natural that a scholar who traversed so large a field should lay himself open to the criticism of specialists, and he was severely handled by Friedrich Christian Diez (1794-1876), who, in his Unfug und Bclrug (1815), devoted to him nearly 600 pages of abuse. Von Hammer-Purgstall did for Germany the same work that Sir William Jones (q.v.) did for England and Silvestre de Sacy for France. He was, like his younger but greater English con- temporary, Edward William Lane, with whom he came into friendly conflict on the subject of the origin of The Thousand and One Nights, an assiduous worker, and in spite of many faults did more for oriental studies than most of his critics put together.

Von Hammer's principal work is his Geschichte des osmanischen Reiches (10 vols., Pesth, 1827–1835). Another edition of this was published at Pesth in 1834–1835, and it has been translated into French by J. }. Hellert (1835–1843). Among his other works are Constantinopolis und der Bosporos (1822); Sur les origines russes (St Petersburg, 1825); Geschichte der osmanischen Dichtkunst (1836); Geschichte der Goldenen Horde in Kiptschak (1840); Ge- schichte der Chane der Krim (1856); and an unfinished Litteratur- geschichte der Araber (1850–1856). His Geschichte der Assassinen (1818) has been translated into English by O. C. Wood (1835). Texts and translations — Eth-Thaalabi, Arab, and Ger. (1829); Jbn Wahshiyah, History of the Mongols, Arab, .and Eng. (1806); El - Wassaf, Pers. and Ger. (1856); Esch - Schebistani's' Rosenflor des Geheimnisses, Pers. and Ger. (1838); Ez - Zamakhsheri, Goldene Halsb&nder, Arab, and Germ. (1835) ; El-Ghazzali, Huf jet-el- J slam, Arab, and Ger. (1838); El-Hamawi, Das arab. Hohe Lied der Liebe, Arab, and Ger. (1854). Translations of — El-Mutanebbi's Poems; Er-Resmi's Account of his Embassy (1809); Contes inedils des 1001 nuits (1828). Besides these and smaller works, von Hammer contributed numerous essays and criticisms to the Fundgruben des Orients, which he edited ; to the Journal asiatique ; and to many other learned journals; above all to the Transactions of the " Aka- demie der Wissenschaften " of Vienna, of which he. was mainly the

founder; and he translated Evliya Effendi's Travels in Europe, for the English Oriental Translation Fund. For a fuller list of his works, which amount in all to nearly 100 volumes, see Comptes rendus of the Acad, des Inscr. et des Belles-Lettres (1857). See also Schlottman, Joseph von Hammer-Purgstall (Zurich, 1857).

HAMMERSMITH, a western metropolitan borough of London, England, bounded E. by Kensington and S. by Fulham and the river Thames, and extending N. and W. to the boundary of the county of London. Pop. (1901) 112,239. The name appears in the early forms of Hermodewode and Hamer smith; the deriva- tion is

probably from the Anglo-Saxon, signifying the place with a haven (hythe). Hammersmith is mentioned with Fulham as a winter camp of Danish invaders in 879, when they occupied the island of Hame, which may be identified with Chiswick Eyot. Hammersmith consists of residential streets of various classes. There are many good houses in the districts of Brook Green in the south-east, and Ravenscourt Park and Starch Green in the west. Shepherd's Bush in the east is a populous and poorer quarter. Boat-building yards, lead-mills, oil mills, distilleries, coach factories, motor works, and other industrial establish- ments are found along the river and elsewhere in the borough. The main thoroughfares are Uxbridge Road and Goldhawk Road, from Acton on the west, converging at Shepherd's Bush and continuing towards Notting Hill; King Street from Chiswick on the south-west, continued as Hammersmith Broadway and Road to Kensington Road; Bridge Road from Hammersmith Bridge over the Thames, and Fulham Palace Road from Fulham, converging at the Broadway. Old Hammersmith Bridge, designed by Tierney Clark (1824), was the earliest suspension bridge erected near London. This bridge was found insecure and replaced in 1884-1887. Until 1834 Hammersmith formed part of Fulham parish. Its church of St Paul was built as a chapel of ease to Fulham, and consecrated by Laud in 1631. The existing building dates from 1890. Among the old monu- ments preserved is that of Sir Nicholas Crispe (d. 1665), a prominent royalist during the civil wars and a benefactor of the parish. Schools and religious houses are numerous. St Paul's school is one of the principal public schools in England. It was founded in or about 1509 by John Colet, dean of St Paul's, under the shadow of the cathedral church. But it appears that Colet actually refounded and reorganized a school which had been attached tp the cathedral of St Paul from very early times; the first mention of such a school dates from the early part of the 1 2 th century (see an article in The Times, London, July 7, 1909, on the occasion of the celebration of the quatercentenary of Colet's foundation). The school was moved to its present site in Hammersmith Road in

1883. The number of foundation scholars, that is, the number for which Colet's endowment provided, is 153, according to the number of fishes taken in the miraculous draught. The total number of pupils is about 600. The school governors are appointed by the Mercers' Company (by which body the new site was acquired), and the universities of Oxford, Cambridge and London. Close to the school is St Paul's preparatory school, and at Brook Green is a girls' school in connexion with the main school. There are, besides, the Edward Latymer foundation school for boys (1624), part of the income of which is devoted to general charitable purposes; the Godolphin school, founded in the 16th century and remodelled as a grammar school in 1861; Nazareth House of Little Sisters of the Poor, the Convent of the Sacred Heart, and other convents. The town hall, the West London hospital with its post-graduate college, and Wormwood Scrubbs prison are noteworthy buildings. Other institutions are the Hammer- smith school of art and a Roman Catholic training college. Besides the picturesque Ravenscourt Park (31 acres) there are extensive recreation grounds in the north of the borough at Wormwood Scrubbs (193 acres), and others of lesser extent. An important place of entertainment is Olympia, near Hammer- smith Road and the Addison Road station on the West London railway, which includes a vast arena under a glass roof; while at Shepherd's Bush are the extensive grounds and buildings first occupied by the Franco-British Exhibition of 1908, including

a huge stadium for athletic displays. In the extreme north of the borough is the Kensal Green Roman Catholic cemetery, in which Cardinal Manning and many other prominent members of this faith are buried. In the neighbourhood of the Mall, bordering the river, are the house where Thomson wrote his poem " The Seasons," and Kelmscott House, the residence of William Morris. The parliamentary borough of Hammersmith returns one member. The

borough council consists of a mayor, 5 aldermen, and 30 councillors. Area, 2286-3 acres.

HAMMER-THROWING, a branch of field athletics which consists of hurling to the greatest possible distance an instrument with a heavy head and slender handle called the hammer. Throwing the hammer is in all probability of Keltic origin, as it has been popular in Ireland and Scotland for many centuries. The missile was, however, not a hammer, but the wheel of a chariot attached to a fixed axle, by which it was whirled round the head and cast for distance. Such a sport was undoubtedly cultivated in the old Irish games, a large stone being substituted for the wheel at the beginning of the Christian era. In the Scottish highlands the missile took the form of a smith's sledge- hammer, and in this form the sport became popular in England in early days. Edward II. is said to have fostered it, and Henry VIII. is known to have been proficient. At the beginning of the 19th century two standard hammers were generally recognized in Scotland, the heavy hammer, weighing about 21 lb, and the light hammer, weighing about 16 lb. These were in general use until about 1885, although the light hammer gradually attained popularity at the expense of the heavy. Although originally an ordinary blacksmith's sledge with a handle about 3 ft. long, the form of the head was gradually modified until it acquired its present spherical shape, and the stiff wooden handle gave place to one of flexible whalebone about f in. in diameter. The Scottish style of throwing, which also obtained in America, was to stand on a mark, swing the hammer round the head several times and hurl it backwards over the shoulder, the length being measured from the mark made by the falling hammer to the nearest foot of the thrower, no run or follow being allowed. Such men as Donald Dinnie, G. Davidson and Kenneth McRae threw the light hammer over no ft., and Dinnie's record was 132 ft. 8 in., made, however, from a raised mount. Meanwhile the English Amateur Athletic Association had early fixed the weight of the hammer at 16 lb, but the length of the handle and the run varied widely, the

restrictions being few. Under these conditions S. S. Brown, of Oxford, made in 1873 a throw of 120 ft., which was considered extraordinary at the time. In 1875 the throw was made from a 7-ft. circle without run, head and handle of the missile weighing together exactly 16 lb. In 1887 the circle was enlarged to 9 ft., and in 1896 a handle of flexible metal was legalized. The throw was made after a few rapid revolutions of the body, which added an impetus that greatly added to the distance attained. It thus happened that the Scottish competitors at the English games, who clung to their standing style of throwing, were, although athletes of the very first class, repeatedly beaten; the result being that the Scottish association was forced to introduce the English rules. This was also the case in America, where the throw from the 7-ft. circle, any motions being allowed within it, was adopted in 1888, and still obtains. The Americans still further modified the handle, which now consists of steel wire with two skeleton loops for the hands, the wire being joined to the head by means of a ball-bearing swivel. Thus the greatest mechanical advantage, that of having the entire weight of the missile at the end, as well as the least friction, is obtained. . In England the Amateur Athletic Association in 1908 enacted that " the head and handle may be of any size, shape and material, provided that the complete implement shall not be more than 4 ft. and its weight not less than 16 lb. The competitor may assume any position he chooses, and use either one or both hands. All throws shall be made from a circle 7 ft. in diameter." The modern hammer-thrower, if right-handed, begins by placing the head on the ground at his right side. He then lifts and swings it round his head with increasing rapidity, his whole

body finally revolving with outstretched arms twice, in some cases three times, as rapidly as possible, the hammer being released in the desired direction. During the " spinning," or revolving of the body, the athlete must be constantly, "ahead of the hammer," i.e. he must be drawing it after him with

continu- ally increased pressure up to the very moment of delivery. The muscles chiefly called into play are those of the shoulders, back and loins. The adoption of the hand-loops has given the thrower greater control over the hammer and has thus rendered the sport much less dangerous than it once was.

With a wooden handle the longest throw made in Great Britain from a 9-ft. circle was that of W. J. M. Barry in 1892, who won the championship in that year with 133 ft. 3 in. With the flexible handle, " unlimited run and follow " being permitted, the record was held in 1909 by M. J. McGrath with 175 ft. 8 in., made in 1907; a Scottish amateur, T. R. Nicholson, held the British record of 169 ft. 8 in. The world's record for throw from a 7-ft. circle was 172 ft. II in. by J. Flanagan in 1904 in America ; the British record from 9-ft. circle being also held by Flanagan with a throw of 163 ft. I in. made in 1900. Flanagan's Olympic record (London, 1908) was 170 ft. 4* in.

See Athletics in the Badminton library; Athletes' Guide in Spald- ing's Athletic library; " Hammer-Throwing " in vol. xx. of Outing.

HAMMER-TOE, a painful condition in which a toe is rigidly bent and the salient angle on its upper aspect is constantly irritated by the boot. It is treated surgically, not as formerly by amputation of the toe, but the toe is made permanently to lie flat by the simple excision of the small digital joint. Even in extremely bad cases of hammer-toe the operation of resection of the head of the metatarsal phalanx is to be recommended rather than amputation.

HAMMOCK, a bed or couch slung from each end. The word is said to have been derived from the hamack tree, the bark of which was used by the aboriginal natives of Brazil to form the nets, suspended from trees, in which they slept. The hammock may be of matting, skin or textiles, lined with cushions or filled with bedding. It is much used in hot climates.

HAMMOND, HENRY (1605-1660), English divine, was born at Chertsey in Surrey on the 18th of August 1605. He was edu- cated at Eton and at Magdalen College, Oxford, becoming demy or scholar in 1619, and fellow in 1625. He took orders in 1629, and in 1633 in preaching before the court so won the approval of the earl of Leicester that he presented him to the living of Penshurst in Kent. In 1643 he was made archdeacon of Chi- chester. He was a member of the convocation of 1640, and was nominated one of the Westminster Assembly of divines. Instead of sitting at Westminster he took part in the unsuccessful rising at Tunbridge in favour of King Charles I., and was obliged to flee in disguise to Oxford, then the royal headquarters. There he spent much of his time in writing, though he accom- panied the king's commissioners to London, and afterwards to the ineffectual convention at Uxbridge in 1645, where he disputed with Richard Vines, one of the parliamentary envoys. In his absence he was appointed canon of Christ Church and public orator of the university. These dignities he relinquished for a time in order to attend the king as chaplain during his captivity in the hands of the parliament. When Charles was deprived of all his loyal attendants at Christmas 1647, Hammond returned to Oxford and was made subdean of Christ Church, only, however, to be removed from all his offices by the parlia- mentary- visitors, who imprisoned him for ten weeks. After- wards he was permitted, though still under quasi-confinement, to retire to the house of Philip Warwick at Clapham in Bedford- shire. In 1650, having regained his full liberty, Hammond betook himself to the friendly mansion of Sir John Pakington, at Westwood, in Worcestershire, where he died on the 25th of April 1660, just on the eve of his preferment to the see of Worcester. Hammond was held in high esteem even by his opponents. He was handsome in person and benevolent in disposition. He was an excellent preacher; Charles I. pro- nounced him the most natural orator he had ever heard. His range of reading was extensive, and he was a most diligent scholar and writer.

His writings, published in 4 vols. fol. (1674–1684), consist for the most part of controversial sermons and tracts. The Anglo- Catholic

Library contains four volumes of his Miscellaneous Theological Works (1847–1850). The best of them are his Practical Catechism, first published in 1644; his Paraphrase and Annotations on the New Testament; and an incomplete work of a similar nature on the Old Testament. His Life, a delightful piece of biography, written by Bishop Fell, and prefixed to the collected Works, has been re- printed in vol. iv. of Wordsworth's Ecclesiastical Biography. See also Life of Henry Hammond, by G. G. Perry.

HAMMOND, a city of Lake county, Indiana, U.S.A., about 18 m. S.E. of the business centre of Chicago, on the Grand Calumet river. Pop. (1890), 5428; (1900) 12,376, of whom 3156 were foreign-born; (1910, census) 20,925. It is served by no fewer than eight railways approaching Chicago from the east, and by several belt lines. As far as its industries are concerned, it is a part of Chicago, to which fact it owes its rapid growth and its extensive manufacturing establishments, which include slaughtering and packing houses, iron and steel works, chemical works, piano, wagon and carriage factories, printing establish- ments, flour and starch mills, glue works, breweries and dis- tilleries. In 1900 Hammond was the principal slaughtering and meat-packing centre of the state, but subsequently a large establishment removed from the city, and Hammond's total factory product (all industries) decreased from $25,070,551 in 1900 to $7,671,203 in 1905; after 1905 there was renewed growth in the city's manufacturing interests. It has a good water-supply system which is owned by the city. Hammond was first settled about 1868, was named in honour of Abram A. Hammond (acting governor of the state in 1860–1861) and was chartered as a city in 1883.

HAMON, JEAN LOUIS (1821-1874), French painter, was born at Plouha on the 5th of May 1821. At an early age he was intended for the priesthood, and placed under the care of the brothers Lamennais, but his strong desire to become a painter finally triumphed over family opposition, and in 1840 he courage- ously left Plouha for Paris — his sole resources being a pension of five hundred francs, granted him for one year only by the municipality of his native town. At Paris Hamon received valu- able counsels and encouragement from Delaroche and Gleyre, and in 1848 he made his appearance at the Salon with " Le Tombeau du Christ " (Musee de Marseille) , and a decorative work, " Dessus de Porte." The works which he exhibited in 1849 — " Une Affiche romaine," " L'Egalite au serail," and " Perroquet jasant avec deux jeunes filles " — obtained no marked success. Hamon was therefore content to accept a place in the manu- factory of Sevres, but an enamelled casket by his hand having attracted notice at the London International Exhibition of 1851, he received a medal, and, reinspired by success, left his post to try his chances again at the Salon of 1852. " La Comedie humaine," which he then exhibited, turned the tide of his fortune, and " Ma sceurn'y est pas" (purchased by the emperor) obtained for its author a third-class medal in 1853. At the Paris International Exhibition of 1855, when Hamon re- exhibited the casket of 1851, together with several vases and pictures of which " L'Amour et son troupeau," " Ce n'est pas moi," and " Une Gardeuse d'enfants" were the chief, he received a medal of the second class, and the ribbon of the legion of honour. In the following year he was absent in the East, but in 1857 he reappeared with " Boutique a. quatre sous," " Papillon en- chalne," " Cantharide esclave," " Devideuses," &c, in all ten pictures; " L'Amour en visite " was contributed to the Salon of 1859, and " Vierge de Lesbos," " Tutelle," " La Voliere," "L'Escamoteur" and"La Sceur ainee" were all seen in 1861. Hamon now spent some time in Italy, chiefly at Capri, whence in 1864 he sent to Paris " L'Aurore " and " Un Jour de fiancailles." The influence of Italy was also evident in " Les

Muses a Pompei," his sole contribution to the Salon of 1866, a work which enjoyed- great popularity and was re-exhibited at the International , Exhibition of 1867, together with " La Promenade" and six other pictures of previous years. His last work, " Le Triste Rivage," appeared at the Salon of 1873. It was painted at St Raphael, where Hamon had finally settled in a little house on the shores of the Mediterranean, close by Alphonse Karr's famous garden. In this house he died on the 29th of May 1874.

HAMPDEN, HENRY BOUVERIE WILLIAM BRAND, ist

Viscount 1 (1812-1892), speaker of the House of Commons, was the second son of the 21st Baron Dacre, and descended from John Hampden, the patriot, in the female line; the barony of Dacre devolved on him in 1890, after he had been created Viscount Hampden in 1 884. He entered parliament as a Liberal in 1852, and for some time was chief whip of his party. In 1872 he was elected speaker, and retained this post till February 1884. It fell to him to deal with the systematic obstruction of the Irish Nationalist party, and his speakership is memorable for his action on the 2nd of February 1881 in refusing further debate on W. E. Forster's Coercion Bill — a step which led to the formal introduction of the closure into parliamentary procedure. He died on the 14th of March 1892, being succeeded as 2nd viscount by his son {b. 1841), who was governor of New South Wales, 1895-1899.

HAMPDEN, JOHN (c. 1 595-1643), English statesman, the eldest son of William Hampden, of Great Hampden in Bucking- hamshire, a descendant of a very ancient family of that place, said to have been established there before the Conquest, and of Elizabeth, second daughter of Sir Henry Cromwell, and aunt of Oliver, the future protector, was born about the year 1595. By his father's death, when he was but a child, he became the owner of a good estate and a ward of the crown. He was educated at the grammar school at Thame, and on the 30th of March 16 10 became a commoner of Magdalen College at Oxford. In

i6i3hewasadmitted a student of the Inner Temple. He first sat in parliament for the borough of Grampound in 162 1, repre- senting later Wendover in the first three parliaments of Charles I., Buckinghamshire in the Short Parliament of 1640, and Wendover again in the Long Parliament. In the early days of his parlia- mentary career he was content to be overshadowed by Eliot, as in its later days he was content to be overshadowed by Pym and to be commanded by Essex. Yet it is Hampden, and not Eliot or Pym, who lives in the popular imagination as the central figure of the English revolution in its earlier stages. It is Hampden whose statue rather than that of Eliot or Pym has been selected to take its place in St Stephen's Hall as the noblest type of the parliamentary opposition, as Falkland's has been selected as the noblest type of parliamentary royalism.

Something of Hampden's fame no doubt is owing to the position which he took up as the opponent of ship-money. But it is hardly possible that even resistance to ship-money would have so distinguished him but for the mingled massiveness and modesty of his character, his dislike of all pretences in himself or others, his brave contempt of danger, and his charitable readiness to shield others as far . as possible from the evil consequences of their actions. Nor was he wanting in that skill which enabled him to influence men towards the ends at which he aimed, and which was spoken of as subtlety by those who disliked his ends.

During these first parliaments Hampden did not, so far as we know, open his lips in public debate, but he was increasingly employed in committee work, for which he seems to have had a special aptitude. In 1626 he took an active part in the prepara- tion of the charges against Buckingham. In January 16 2 7 he was bound over to answer at the council board for his refusal to pay the forced loan. Later in the year he was committed to the gate- house, and then sent into confinement in Hampshire, from which he was liberated just before the meeting of the third parliament of the reign, in which he once more

rendered useful but un- obtrusive assistance to his leaders.

When the breach came in 1629 Hampden is found in epis- tolary correspondence with the imprisoned Eliot, discussing with him the prospects of the Massachusetts colony, 2 or rendering

1 An earlier viscountcy was bestowed in 1776 on Robert Hampden- Trevor, 4th Baron Trevor (1706-1783), a great-grandson of the daughter of John Hampden, the patriot; it became extinct in 1824 by the death of the 3rd viscount.

2 Hampden was one of the persons to whom the earl of Warwick granted land in Connecticut, but for the anecdote which relates his attempted emigration with Cromwell there is no foundation (v. under John Pym).

hospitality and giving counsel to the patriot's sons now that they were deprived of a father's personal care. It was not till 1637, however, that his resistance to the payment of ship-money gained for his name the lustre which it has never since lost. (See Ship-Money.) Seven out of the twelve judges sided against him, but the connexion between the rights of property and the parliamentary system was firmly established in the popular mind. The tax had been justified, says Clarendon, who expresses his admiration at Hampden's " rare temper and modesty " at this crisis, " upon such grounds and reasons as every stander- by was able to swear was not law " {Hist. i. 150, vii. 82).

In the Short Parliament of 1640 Hampden stood forth amongst the leaders. He guided the House in the debate on the 4th of May in its opposition to the grant of twelve subsidies in return for the surrender of ship-money. Parliament was dissolved the next day, and on the 6th an unsuccessful search was made among the papers of Hampden and of other

chiefs of the party to discover incriminating correspondence with the Scots. During the eventful months which followed, when Strafford was striv- ing in vain to force England, in spite of its visible reluctance, to support the king in his Scottish war, rumour has much to tell of Hampden's activity in rousing opposition. It is likely enough that the rumour is in the main true, but we are not possessed of any satisfactory evidence on the subject.

In the Long Parliament, though Hampden was by no means a frequent speaker, it is possible to trace his course with sufficient distinctness. His power consisted in his personal influence, and as a debater rather than as an orator. " He was not a man of many words," says Clarendon, " and rarely began the discourse or made the first entrance upon any business that was assumed, but a very weighty speaker, and after he had heard a full debate and observed how the House was likely to be inclined, took up the argument and shortly and clearly and craftily so stated it that he commonly conducted it to the conclusion he desired; and if he found he could not do that, he never was without the dexterity to divert the debate to another time, and to prevent the determining anything in the negative which might prove incon- venient in the future " (Hist. iii. 31). Unwearied in attendance' upon committees, he was in all things ready to second Pym, whom he plainly regarded as his leader. Hampden was one of the eight managers of Strafford's prosecution. Like Pym, he was in favour of the more legal and regular procedure by im- peachment rather than by attainder, which at the later stage was supported by the majority of the Commons; and through his influence a compromise was effected by which, while an attainder was subsequently adopted, Strafford's counsel were heard as in the case of an impeachment, and thus a serious breach between the two Houses, which threatened to cause the break- down of the whole proceedings, was averted.

There was another point on which there was no agreement. A large minority wished to retain Episcopacy, and to keep the common Prayer Book

unaltered, whilst the majority were at least willing to consider the question of abolishing the one and modifying the other. On this subject the parties which ulti- mately divided the House and the country itself were fully formed as early as the 8th of February 1641. It is enough to say that (v. under Pym) Hampden fully shared in the counsels of the opponents of Episcopacy. It is not that he was a theoretical Presbyterian, but the bishops had been in his days so fully engaged in the imposition of obnoxious ceremonies that it was difficult, if not impossible, to dissociate them from the cause in which they were embarked. Closely connected with Hampden's distrust of the bishops was his distrust of monarchy as it then existed. The dispute about the church therefore soon attained the form of an attack upon monarchy, and, when the majority of, the House of Lords arrayed itself on the side of Episcopacy and the Prayer Book, of an attack upon the House of Lords as well.

No serious importance therefore can be attached to the offers of advancement made from time to time to Hampden and his friends. Charles would gladly have given them office if they had been ready to desert their principles. Every day Hampden's

conviction grew stronger that Charles would never aWnd

When the Civil War began, Hampden was appointed a member of the committee for safety, levied a regiment of Buckingham- shire men for the parliamentary cause, and in his capacity of deputy-lieutenant carried out the parliamentary militia ordinance in the county. In the earlier operations of the war he bore him- self gallantly and well. He took no actual part in the battle of Edgehill. His troops in the rear, however, arrested Rupert's charge at Kineton, and he urged Essex to renew the attack here, and also after the disaster at Brentford. In 1643 he was present at the siege and capture of Reading. But it is not on his skill as a regimental officer that Hampden's fame rests. In war as in peace his distinction lay in his power of

disentangling the essential part from the non-essential. In the previous con- stitutional struggle he had seen that the one thing necessary was to establish the supremacy of the House of Commons. In the military struggle which followed he saw, as Cromwell saw afterwards, that the one thing necessary was to beat the enemy. He protested at once against Essex's hesitations and com- promises. In the formation of the confederacy of the six associated counties, which was to supply a basis for Cromwell's operations, he took an active part. His influence was felt alike in parliament and in the field. But he was not in supreme command, and he had none of that impatience which often leads able men to fail in the execution of orders of which they disapprove. His precious life was a sacrifice to his unselfish devotion to the call of discipline and duty. On the 18th of June 1643, when he was holding out on Chalgrove Field against the superior numbers of Rupert till reinforcements arrived, he received two carbine balls in the shoulder. Leaving the field he reached Thame, survived six days, and died on the 24th.

Hampden married (1) in 1619 Elizabeth, daughter of Edmund Symeon of Pyrton, Oxfordshire, and (2) Letitia, daughter of Sir Francis Knollys and widow of Sir Thomas Vachell. By his first wife he had nine children, one of whom, Richard (1631-1695) was chancellor of the exchequer in William III.'s reign; from two of his daughters are descended the families of Trevor- Hampden and Hobart-Hampden, the descent in the male line becoming apparently extinct in 1754 in the person of John Hampden.

John Hampden the younger (c. 1656-1696), the second son of Richard Hampden, returned to England after residing for about two years in France, and joined himself to Lord William Russell and Algernon Sidney and the party opposed to the arbitrary government of Charles II. With Russell and Sidney he was arrested in 1683 for alleged complicity in the Rye House Plot, but more fortunate than his colleagues his life was spared, although as he was unable to pay the fine of £40,000 which was imposed upon him he

remained in prison. Then in 1685, after the failure of Monmouth's rising, Hampden was again brought to trial, and on a charge of high treason was condemned to death. But the sentence was not carried out, and having paid £6000 he was set at liberty. In the Convention parliament of 1689 he represented Wendover, but in the subsequent parliaments he

failed to secure a seat. He died by his own hand on the 12th of December 1696. Hampden wrote numerous pamphlets, and Bishop Burnet described him as "one of the learnedest gentlemen I ever knew."

See S. R. Gardiner's Hist, of England and of the Great Civil War; the article on Hampden in the Diet, of Nat. Biography, by C. H. Firth, with authorities there collected ; Clarendon's Hist, of the Rebellion; Sir Philip Warwick's Mems. p. 239; Wood's Ath. Oxon. iii. 59; Lord Nugent's Memorials of John Hampden (1831); Macaulay's Essay on Hampden (1831). The printed pamphlet announcing his capture of Reading in December 1642 is shown by Mr Firth to be spurious, and the account in Mercurius Aulicus, January 27 and 29, 1643, of Hampden commanding an attack at Brill, to be also false, while the published speech supposed to be spoken by Hampden on the 4th of January 1642, and reproduced by Forster in the Arrest of the Five Members (1660), has been proved by Gardiner to be a forgery (Hist, of England, x. 135). Mr Firth has also shown in The Academy for 1889, November 2 and 9, that " the belief that we possess the words of Hampden's last prayer must be abandoned."

HAMPDEN, REKN DICKSON (1793-1868), English divine, was born in Barbados, where his father was colonel of militia, in 1793, and was educated at Oriel College, Oxford. Having taken his B.A. degree with first-class honours in both classics and mathematics in 1813, he next year obtained the chancellor's prize for a Latin essay, and shortly afterwards was

elected to a fellowship in his college, Keble, Newman and. Arnold being among his contemporaries. Having left the university in 1816 he held successively a number of curacies, and in 1827 he pub- lished Essays on the Philosophical Evidence of Christianity, followed by a volume of Parochial Sermons illustrative of the Importance of the Revelation of God in Jesus Christ (1828). In 1829 he returned to Oxford and was Bampton lecturer in 1832. Notwithstanding a charge of Arianism now brought against him by the Tractarian party, he in 1833 passed from a tutorship at Oriel to the principalship of St Mary's Hall. In 1834 he was appointed professor of moral philosophy, and despite much university opposition, Regius professor of divinity in 1836. There resulted a widespread and violent though ephemeral controversy, after the subsidence of which he published a Lecture on Tradition, which passed through several editions, and a volume on The Thirty-nine Articles of the Church of England. His nomination by Lord John Russell to the vacant see of Hereford in December 1847 was again the signal for a violent and organized opposition; and his consecration in March 1848 took place in spite of a remonstrance by many of the bishops and the resistance of Dr John Merewether, the dean of Hereford, who went so far as to vote against the election when the congi d'elire reached the chapter. As bishop of Hereford Dr Hampden made no change in his long-formed habits of studious seclusion, and though he showed no special ecclesiastical activity or zeal, the diocese certainly prospered in his charge. Among the more important of his later writings were the articles on Aristotle, Plato and Socrates, contributed to the eighth edition of the Encyclopaedia Britannica, and afterwards reprinted with additions under the title of The Fathers of Greek Philosophy (Edinburgh, 1862). In 1866 he had a paralytic seizure, and died in London on the 23rd of April 1868.

His daughter, Henrietta Hampden, published Some Memorials of R. D. Hampden in 1871.

HAMPDEN-SIDNEY, a village of Prince Edward county,

Virginia, U.S.A., about 70 m. S.W. of Richmond. Pop. about 350. Daily stages connect the village with Farmville (pop. in 1910, 2971), the county-seat, 6 m. N.E., which is served by the Norfolk & Western and the Tidewater & Western railways. Hampden-Sidney is the seat of HampdenrSidney College, founded by the presbytery of Hanover county as Hampden- Sidney Academy in 1 7 76, and named in honour of John Hampden and Algernon Sidney. It was incorporated as Hampden-Sidney College in 1783. The incorporators included James Madison, Patrick Henry (who is believed to have drafted the college charter), Paul Carrington, William Cabell, Sen., and Nathaniel Venable. The Union Theological School was established in connexion with the college in 181 2, but in 1898 was removed to Richmond, Virginia. In 1907-1908 the college had 8 in-

structors, 125 students, and a library of 11,000 volumes. The college has maintained a high standard of instruction, and many of its former students have been prominent as public men, educationalists and preachers. Among them were President William Henry Harrison, William H. Cabell (1772-1853), president of the Virginia Court of Appeals; George M. Bibb (1772-1859), secretary of the treasury (1844-1845) in President Tyler's cabinet; William B. Preston (1805-1862), secretary of the navy in 1849-1850; William Cabell Rives and General Sterling Price (1809-1867).

HAMPSHIRE (or County of Southampton, abbreviated Hants) , a southern county of England, bounded N. by Berkshire, E. by Surrey and Sussex, S. by the English Channel, and W. by Dorsetshire and Wiltshire. The area is 1623-5 sq. m. From the coast of the mainland, which is for the most part low and irregular, a strait, known in its western part as the Solent, and in its eastern as Spithead, separates the Isle of Wight. This island is included in the county. The inlet of Southampton Water opens from this strait, penetrating inland in a north-westerly direction for 12 m. The easterly part of the coast forms a large shallow bay containing Hayling and Portsea Islands, which divide it into

Chichester Harbour, Langston Harbour and Portsmouth Harbour. The westerly part forms the more regular indentations of Christchurch Bay and part of Poole Bay. In its general aspect Hampshire presents a beautiful variety of gently rising hills and fruitful valleys, adorned with numerous mansions and pleasant villages, and interspersed with extensive tracts of woodland. Low ranges of hills, included in the system to which the general name of the Western Downs is given, reach their greatest elevation in the northern and eastern parts of the county, where there are many picturesque eminences, of which Beacon, Sidown and Pilot hills near Highclere in the north-west, each exceeding 850 ft., are the highest. The portion of the county west of Southampton Water is almost wholly included in the New Forest, a sequestered district, one of the few remaining examples of an ancient afforested tract. The river Avon in the south-west rises in Wiltshire, and passing Fordingbridge and Ringwood falls into Christchurch Bay below Christchurch, being joined close to its mouth by the Stour. The Lymington or Boldre river rises in the New Forest, and after collecting the waters of several brooks falls into the Solent through Lymington Creek. The Beaulieu in the eastern part of the forest also enters the Solent by way of a long and picturesque estuary. The Test rises near Overton in the north, and after its junction with the Anton at Fullerton passes Stockbridge and Romsey, and enters the head of Southampton Water. The Itchen rises near Alresford, and flowing by Winchester and Eastleigh falls into Southampton Water east of Southampton. The Hamble rises near Bishops Waltham, and soon forms a narrow estuary opening into Southampton Water. The Wey, the Loddon and the Black- water, rising in the north-eastern part of the county, bring that part into the basin of the Thames. The streams from the chalk hills run clear and swift, and the trout-fishing in the county is famous. Salmon are taken in the Avon.

Geology. — Somewhat to the north of the centre of the county is a broad expanse of hilly chalk country about 21 m. wide; the whole of it has been bent up

into a great fold so that the strata on the north dip northward steeply in places, while those on the south dip in the opposite direction more gently. In the north the chalk disappears beneath Tertiary strata of the " London Basin," and some little distance south of Winchester it runs in a similar manner beneath the Tertiaries of the " Hampshire Basin." Scattered here and there over the chalk are small outlying remnants which remain to show that the two Tertiary areas were once continuous, before the agencies of denudation had removed them from the chalk. These same agencies have exposed the strata beneath the chalk over a small area on the eastern border.

The oldest formation in Hampshire is the Lower Greensand in the neighbourhood of Woolmer Forest and Petersfield; it is represented by the Hythe beds, sandstones and limestones which form the high ridge which runs pn towards Hind Head, then by the sands and clays of the Sandgate beds which lie in the low ground west of the ridge, and finally by the Folkestone beds; all these dip westward beneath the Gault. The last-named formation, a clay, worked here and there for bricks, crops out as a narrow band from Fareham through Worldham and Stroud common to Petersfield.

Between the Gault and the chalk is the Upper Greensand with a hard bed of calcareous sandstone, the Malm rock, which stands up in places as a prominent escarpment. The Upper Greensand is also exposed at Burghclere as an inlier; the rocks are bent into a sharp anticline and the chalk, having been denuded from its crest, the older sandy strata are brought to light. A much more gentle anticline brings up the chalk through the Tertiary rocks in the neigh- bourhood of Fareharn. Besides occupying the central region already mentioned, which includes Basingstoke, Whitchurch, Andover, Alresford and Winchester, the chalk appears also in a small patch

round Rockbourne. The Te.rtiary rocks of the north (London basin) about Farnborough, Aldershot and Kingsclere, comprise the Reading beds, London clay and the more sandy Bagshot beds which cover the latter in many places, giving rise to heathy commons. The southern Tertiary rocks of the Hampshire basin include the Lower Eocene Reading beds — used for brick-making — and the London clay which extend from the boundary of the chalk by Romsey, Bishop's Waltham, to Havant. These are succeeded towards the south by the Upper Eocene beds, the Bracklesham beds and the Barton clay. The Barton ciays are noted for their abundant fossils and the Bagshot beds at Bournemouth contain numerous remains of subtropical plants. A series of clays and sands of Oligocene age (unknown in the London basin) are found in the vicinity of Lymington, Brockenhurst and Beaulieu; they include the Headon beds, with a fluvio-marine fauna, well exposed at Hord- well cliffs, and the marine beds of Brockenhurst. Numerous small outliers of Tertiary rocks are scattered over the chalk area, and many of the chalk and Tertiary areas are obscured by patches of Pleistocene deposits of brick earth and gravel.

Agriculture and Industries. — Nearly seven-tenths of the total area is undercultivation (an amountbelowtheaverage of English counties) and of this area about two- fifths is in permanent pasture. The acreage under oats is roughly equal to that under wheat and barley. Small quantities of rye and hops are cultivated. Barley is usually sown after turnips, and is more grown in the uplands than in the lower levels. Beans, pease and potatoes are only grown to a small extent. On account of the number of sheep pastured on the uplands a large acreage of turnips is grown. Rotation grasses are grown chiefly in the uplands, arid their acreage is greater than in any other of the southern counties of England. Sanfoin is the grass most largely grown, as it is best adapted to land with a calcareous subsoil. In the lower levels no sanfoin and scarcely any clover is grown, the hay being supplied from the rich water meadows, which are managed with great skill arid

attention, and give the best money' return of any lands in the county. Where a rapid stream of water can be passed over them during the winter it seldom becomes frozen, and the grasses grow during the cold weather so as to be fit for pasture before any traces of vegetation appear in the surrounding fields. Hops are grown in the eastern part of the county bordering on Surrey. Farm- ing is generally conducted on the best modern principles, but owing to the varieties of soil there is perhaps no county in England in which ' the rotation observed is more diversified, or the processes and methods more varied. Most of the farms are large, and there are a number of model farms. The waste land has been mostly brought under tillage, but a very large acreage of the ancient forests is still occupied by wood. In addition to the New Forest there are in the east Woolmer Forest and Alice Holt, in the south-east the Forest of Bere and Waltham Chase, and in the Isle of Wight Parkhurst Forest. Thg honey of the county is especially celebrated. Much attention is paid to the rearing of sheep and cattle. The original breed of sheep was white-faced with horns, but most of the flocks are now of a Southdown variety which have acquired certain distinct peculiari- ties, and are known as " short wools " or " Hampshire downs." Cattle are of no distinctive breed, and are kept largely for dairy purposes, especially for the supply of milk. The breeding and rear- ing of horses is widely practised, and the fattening of pigs has long been an important industry. The original breed of pigs is crossed with Berkshire, Essex and Chinese pigs. In the vicinity of the forest the pigs are fed on acorns and beechmast, and the flesh of those so reared is considered the best, though the reputation of Hampshire bacon depends chiefly on the skilful manner in which it is cured.

The manufactures are unimportant, except those carried on at Portsmouth and Gosport in connexion with the royal navy. South- ampton is one of the principal ports in the kingdom. In many of the towns there are breweries and tanneries, and paper is

manufactured at several places. Fancy pottery and terra-cotta are made at Fareham and Bishop's Waltham ; and Ringwood is celebrated for its knitted gloves. At most of the coast towns fishing is carried on, and there are oyster beds at Hayling Island. Cowes in the Isle of Wight is the station of the Royal Yacht Squadron, and has building yards for yachts and large vessels. The principal seaside resorts besides those in the Isle of Wight are Bournemouth, Milford, Lee-on- the-Solent, Southsea and South Hayling. Aldershot is the principal military training centre in the British Isles.

Communications. — Communications are provided mainly by the lines of the London & South-Western railway company, which also owns the docks at Southampton. The main line serves Farnborough, Basingstoke, Whitchurch and Andover, and a branch diverges southward' from Basingstoke for Winchester, Southampton and the New Forest and Bournemouth. An alternative line from eastward

to Winchester serves Aldershot, Alton and Alresford. The main Portsmouth line skirts the south-eastern border by Petersfield ta Havant, where it joins the Portsmouth line of the London, Brighton & South Coast railway. The South-Western system also connects Portsmouth and Gosport with Southampton, has numerous branches in the Southampton and south-western districts, and large work shops at Eastleigh near Southampton. The Great Western company serves Basingstoke from Reading and Whitchurch, Winchester and Southampton from Didcot (working the Didcot, Newbury & South- ampton line) ; the Midland & South-Western Junction line connects Andover with Cheltenham ; and the Somerset & Dorset (also a Midland & South-Western joint line) connects Bournemouth with Bath — all these affording through communications between South- ampton, Bournemouth, and the midlands and north of England. None of the rivers, except in the estuarine parts, is navigable.

Population and Administration. — The area of the ancient county is 1,039,031 acres, including the Isle of Wight. The population was 690,097 in 1891 and 797,634 in 1901. The area of the adminis- trative county of Southampton is 958,742 acres, and that of the ad- ministrative county of the Isle of Wight 94,068 acres. The county is divided for parliamentary purposes into the following divisions: Northern or Basingstoke, Western or Andover, Eastern or Petersfield, Southern or Fareham, New Forest, and Isle of Wight, each return- ing one member. It also includes the parliamentary boroughs of Portsmouth and Southampton, each returning two members, and of Christchurch and Winchester, each returning one. There are 1 1 municipal boroughs: Andover (pop. 6509), Basingstoke (9793), Bournemouth (59,762), Christchurch (4204), Lymington (4165), Portsmouth (188,133), Romsey (4365), Southampton (104,824), Winchester (20,929), and in the Isle of Wight, Newport (10,911) and Ryde (11,043). Bournemouth, Portsmouth and Southampton are county boroughs. The following are urban districts : Aldershot (30,974), Alton (5479)7 Eastleigh and Bishopstoke (9317), Fareham (8246), Farnborough (11,500), Gosport and

Alverstoke (28,884), Havant (3837), Itchen (13,097), Petersfield (3265), Warblington (3639); and in the Isle of Wight, Cowes (8652), East Cowes (3196), St Helen's (4652), Sandown (5006), Shanklin (4533), Ventnor (5866). The county is in the western circuit, and assizes are held at Winchester. It has one court of quarter sessions, and is divided into 14 petty sessional divisions. The boroughs of Andover, Basing- stoke, Bournemouth, Lymington, Newport, Portsmouth, Romsey, Ryde, Southampton (a county in itself) and Winchester have separate commissions of the peace, and the boroughs of Andover, Bournemouth, Portsmouth, Southampton and Winchester have in addition separate courts of quarter sessions. There are 394 civil parishes. Hampshire is in the diocese of Winchester, excepting small parts in those of Oxford and Salisbury, and contains 411 ecclesiastical parishes or districts wholly or in part.

History. — The earliest English settlers in the district which is now Hampshire were a Jutish tribe who occupied the northern parts of the Isle of Wight and the valleys of the Meon and the Hamble. Their settlements were, however, unimportant, and soon became absorbed in the territory of the West Saxons who in 495 landed at the mouth of the Itchen under the leadership of Cerdic and Cynric, and in 508 slew 5000 Britons and their king. But it was not until after another decisive victory at Charford in 519 that the district was definitely organized as West Saxon territory under the rule of Cerdic and Cynric, thus becoming the nucleus of the vast later kingdom of Wessex. The Isle of Wight was subjugated in 530 and bestowed on Stuf and Wihtgar, the nephews of Cerdic. The Northmen made their first attack on the Hampshire coast in 835, and for the two centuries following the district was the scene of perpetual devastations by the Danish pirates, who made their headquarters in the Isle of Wight, from which they plundered the opposite coast. Hamp- shire suffered less from the Conquest than almost any English county, and was a favourite resort of the Norman kings. The alleged destruction of property for the

formation of the New Forest is refuted by the Domesday record, which shows that this district had never been under cultivation.

In the civil war of Stephen's reign Baldwin de Redvers, lord of the Isle of Wight, supported the empress Matilda, and Win- chester Castle was secured in her behalf by Robert of Gloucester, while the neighbouring fortress of Wolvesey was held for Stephen by Bishop Henry de Blois. In 12 16 Louis of France, having arrived in the county by invitation of the barons, occupied Winchester Castle, and only met with resistance at Odiham Castle, which made a brave stand against him for fifteen days. During the Wars of the Roses Anthony Woodville, 2nd earl Rivers, defeated the duke of Clarence at Southampton, and in 147 1, after the battle of Barnet, the countess of Warwick took

sanctuary at Beaulieu Abbey. The chief events connected with Hampshire in the Civil War of the 17th century were the gallant resistance of the cavalier garrisons at Winchester and Basing House; a skirmish near Cheriton in 1644 notable as the last battle fought on Hampshire soil; and the concealment of Charles at Titchfield in 1647 before his removal to Carisbrooke. The duke of Monmouth, whose rebellion met with considerable support in Hampshire, was captured in 1685 near Ringwood.

Hampshire was among the earliest shires to be created, and must have received its name before the revival of Winchester in the latter half of the 7th century. It is first mentioned in the Saxon chronicle in 755, at which date the boundaries were practically those of the present day. The Domesday Survey mentions 44 hundreds in Hampshire, but by the 14th century the number had been reduced to 37. The hundreds of East Medina and West Medina in the Isle of Wight are mentioned in 13 16. Constables of the hundreds were first appointed by the Statute of

Winchester in 1285, and the hundred court continued to elect a high constable for Fordingbridge until 1878. The chief court of the Isle of Wight was the Knighten court held at Newport every three weeks. The sheriff's court and the assizes and quarter sessions for the county were formerly held at Winchester, but in 1831 the county was divided into 14 petty sessional divisions; the quarter sessions for the county were held at Andover; and Portsmouth, Southampton and Win- chester had separate jurisdiction. Southampton was made a county by itself with a separate sheriff in 1447.

In the middle of the 7 th century Hampshire formed part of the West Saxon bishopric of Dorchester-on-Thames. On the transference of the episcopal seat to Winchester in 676 it was included in that diocese in which it has remained ever since. In 1 29 1 the archdeaconry of Winchester was coextensive with the county and comprised the ten rural deaneries of Alresford, Alton, Andover, Basingstoke, Drokinsford, Fordingbridge, Isle of Wight, Sombou'rne, Southampton and Winchester. In 1850 the Isle of Wight was subdivided into the deaneries of East Medina and West Medina. In 1856 the deaneries were increased to 24. In 1871 the archdeaconry of the Isle of Wight was constituted, and about the same time the deaneries were reduced to 21. In 1892 the deaneries were reconstituted and made 18 in number, and the archdeaconry of the Isle of Wight was divided into the deaneries of East Wight and West Wight.

After the Conquest the most powerful Hampshire baron was William Fitz-Osbern, who in addition to the lordship of the Isle of Wight held considerable estates on the mainland. At the time of the Domesday Survey the chief landholders were Hugh de Port, ancestor of the Fitz- Johns; Ralf de Mortimer; William Mauduit whose name is preserved in Hartley Mauditt; and Waleran, called the Huntsman, ancestor of the Waleraund family. Hursley near Winchester was the seat of Richard Cromwell; and Gilbert White, the naturalist, was curate of Farringdon near Selborne.

Apart from the valuable foreign and shipbuilding trade which grew up with the development of its ports, Hampshire has always been mainly an agricultural county, the only important manufacture being that of wool and cloth, which prospered at Winchester in the 12th century and survived till within recent years. Salt-making and the manufacture of iron from native ironstone also flourished in Hampshire from pre-Norman times until within the 19th century. In the 14th century Southampton had a valuable trade with Venice, and from the 15th to the 18th century many famous warships were constructed in its docks. Silk-weaving was formerly carried on at Winchester, Andover, Odiham, Alton, Whitchurch and Overton, the first mills being set up in 1684 at Southampton by French refugees. The paper manufacture at Laverstoke was started by the Portals, a family of Huguenot refugees, in 1685, and a few years later Henri de Portal obtained the privilege of supplying the bank-note paper to the Bank of England.

Hampshire returned four members to parliament in 1295, when the boroughs of New Alresford, Alton, Andover, Basingstoke, Overton, Portsmouth, Southampton, Winchester, Yarmouth

and Newport were also represented. After this date the county was represented by two members, but most of the boroughs ceased to make returns. Odiham and the Isle of Wight were represented in 1300, Fareham in 1306, and Peters- field in 1307. From 1311 to 1547 Southampton, Portsmouth, and Winchester were the only boroughs represented. By the end of the 16th century Petersfield, Newport, Yarmouth, and Andover had regained representation, and Stockbridge, Christchurch, Lymington, Newtown and Whitchurch returned two members each, giving the county with its boroughs a total representation of 26 members. Under the Reform Act of 1832 the county returned four members in four divisions; Christchurch and Petersfield lost one member each; and Newtown, Yarmouth, Stockbridge and Whitchurch were disfranchised. By the act of 1868 Andover, Lymington and Newport were deprived of one member

each.

Antiquities. — Hampshire is rich in monastic remains. Those considered under separate headings include the monastery of Hyde near Winchester, the magnificent churches at Christchurch and Romsey, the ruins of Netley Abbey, and of Beaulieu Abbey in the New Forest, the fragments of the priory of St Denys, Southampton, the church at Porchester and the slight ruins at Titchfield, near Fareham, and Quarr Abbey in the Isle of. Wight. Other foundations, of which the remains are slight, were the Augustinian priory of Southwick near Fareham, founded by William of Wykeham; that of Breamore, founded by Baldwin de Redvers,' and that of Mottisfont near Romsey, endowed soon after the Conquest. There are many churches of interest, apart from the cathedral church of Winchester and those in some of the towns in the Isle of Wight, or already mentioned in con-nexion with monastic foundations. Pre-Conquest work is well shown in the churches of Corhampton and Breamore, and very early masonry is also found in Headbourne Worthy church, where is also a brass of the 1 5th century to a scholar of Winchester College in collegiate dress. The most noteworthy Norman churches are at Chilcombe and Kingsclere and (with Early English additions) at Brockenhurst, Upper Clatford, which has the unusual arrangement of a double chancel arch, Hambledon, Milford and East Meon. Principally Early English are the churches of Cheriton, Grately, which retains some excellent contemporary stained glass from Salisbury cathedral; Sopley, which is partly Perpendicular; and Thruxton, which contains a brass to Sir John Lisle (d. 1407), affording a very early example of complete plate armour. Specimens of the later styles are generally less remarkable. The frescoes in Bramley church', ranging in date from the 13th to the 15th century, include a representation of the murder of Thomas a Beckett. A fine series of Norman fonts in black marble should be mentioned; they occur in Winchester cathedral and the churches of St Michael, Southampton, East Meon and St Mary Bourne.

The most notable old castles are Carisbrooke in the

Isle of Wight; Porchester, a fine Norman stronghold embodying Roman remains, on Portsmouth Harbour; and Hurst, guarding the mouth of the Solent, where for a short time Charles I. was imprisoned. Henry VIII. built several forts to guard the Solent, Spithead and Southampton Water; Hurst Castle was one, and others remaining, but adapted to various purposes, are at Cowes,- Calshot and Netley. Fine mansions are unusually numerous. That of Stratfieldsaye or Strathfieldsaye, which belonged to the Pitt family, was purchased by parliament for presentation to the duke of Wellington in 181 7, his descendants holding the estate from the Crown in consideration of the annual tribute of a flag to the guard-room at Windsor. A statue of the duke stands in the grounds, and his war-horse " Copenhagen " is buried here. The name of Tichborne Park, near Alresford, is well known in connexion with the famous claimant of the estates whose case was heard in 1871. Among ancient mansions the Jacobean Bramshill is conspicuous, lying near Stratfieldsaye in the north of the county. It is built of stone and is highly decorated, and though the complete original design was not carried out the house is among the finest of its type in England. At Bishops Waltham, a small town 10 m. S.S.E. of Winchester,

Henry de Blois, bishop of Winchester, erected a palace, which received additions from William of Wykeham, who died here in 1404, and from other bishops. The ruins are picturesque but not extensive.

See Victoria County History, " Hampshire," R.Warner, Collections for the History of Hampshire; &c. (London, 1789); H. Moody, Hampshire in 1086 (1862), and the same author's Antiquarian and Topographical Sketches (1846), and Notes and Essays relating to the Counties of Hants and Wilts (1851); R. Mudie, Hampshire, &c. (3 vols., Winchester, 1838); B. B. Woodward, T. C. Wilks and C. Lockhart, General

History of Hampshire (1861–1869) ; G. N. Godwin, The Civil War in Hampshire, 1642–164$ (London, 1882); H. M. Gilbert and G. N. Godwin, Bibliotheca Hantoniensis (Southampton, 1891). See also various papers in Hampshire Notes and Queries (Winchester, 1883 et seq.).

HAMPSTEAD, a north-western metropolitan borough of London, England, bounded E. by St Pancras and S. by St Marylebone, and extending N. and W. to the boundary of the county of London. Pop. (1901), 81,942. The name, Hamstede, is synonymous with " homestead," and the manor is first named in a charter of Edgar (957–975), and was granted to the abbey of Westminster by Ethelred in 986. It reverted to the Crown in 1550, and had various owners until the close of the 18th century, when it came to Sir Thomas Spencer Wilson, whose descendants retain it. The borough includes the sub-manor of Belsize and part of the hamlet of Kilburn.

The surface of the ground is sharply undulating, an elevated spur extending south-west from the neighbourhood of Highgate, and turning south through Hampstead. It reaches a height of 443 ft. above the level of the Thames. The Edgware Road bounds Hampstead on the west; and the borough is intersected, parallel to this thoroughfare, by Finchley Road, and by Haver- stock Hill, which, continued under the names of Rosslyn Hill, High Street, Heath Street, and North End, crosses the Heath for which Hampstead is chiefly celebrated. This is a fine open space of about 240 acres, including in its bounds the summit of Hampstead Hill. It is a sandy tract, in parts well wooded, diversified with several small sheets of water, and to a great extent preserves its natural characteristics unaltered. Beautiful views, both near and distant, are commanded from many points. Of all the public grounds within London this is the most valuable to the populace at large; the number of visitors on a Bank holiday in August is generally, under favourable conditions, about 100,000; and strenuous efforts are always forthcoming from either public or private bodies

when the integrity of the Heath is in any way menaced. As early as 1829 attempts to save it from the builder are recorded. In 1871 its preservation as an open space was insured after several years' dispute, when the lord of the manor gave up his rights. An act of parliament transferred the ownership to the Metropolitan Board of Works, to which body the London County Council succeeded. The Heath is continued eastward in Parliament Hill (borough of St Pancras), acquired for the public in 1890; and westward outside the county boundary in Golders Hill, owned by Sir Spenser Wells, Bart., until 1898. A Protection Society guards the preservation of the natural beauty and interests of the Heath. It is not the interests of visitors alone that must be consulted, for Hampstead, adding to its other attractions a singularly healthy climate, has long been a favourite residential quarter, especially for lawyers, artists and men of letters. Among famous residents are found the first earl of Chatham, John Constable, George Romney, George du Maurier, Joseph Butler, author of the Analogy, Sir Richard Steele, John Keats, the sisters Joanna and Agnes Baillie, Leigh Hunt and many others. The parish church of St John (1747) has several monuments of eminent persons. Chatham's residence was at North End, a picturesque quarter yet preserving characteristics of a rural village; here also Wilkie Collins was born. Three old-established inns, the Bull and Bush, the Spaniards, and Jack Straw's Castle (the name of which has no historical significance), claim many great names among former visitors; while the Upper Flask Inn, now a private house, was the meeting-place of the Kit-Cat Club. Chalybeate springs were discovered at Hampstead in the 17th century, and early in the 18th rivalled those of

Tunbridge Wells and Epsom. The name 6f Well Walk recalls them, but their fame is lost. There are others at Kilburn.

In- the south-east Hampstead includes the greater part of Primrose Hill, a public ground adjacent to the north side of Regent's Park. The borough has in

all about 350 acres of open spaces. The name of the sub-manor of Belsize is preserved in several streets in the central part. Kilburn, which as a district extends outside the borough, takes name from a stream which, as the Westbourne, entered the Thames at Chelsea. Fleet Road similarly recalls the more famous stream which washed the walls of the City of London on the west. Hampstead has numerous charitable institutions, amongst which are the North London consumptive hospital, the Orphan Working School, Haverstock Hill (1758), the general hospital and the north-western fever hospital. In Finchley Road are the New and Hackney Colleges, both Congregational. The parliamentary borough of Hampstead returns one member. The borough council consists of a mayor, 7 aldermen and 42 councillors. Area, 2265 acres.

HAMPTON, WADE (1818–1902), American cavalry leader was born on the 28th of March 1818 at Columbia, South Carolina, the son of Wade Hampton (1791–1858), one of the wealthiest planters in the South, and the grandson of Wade Hampton (1 754–1835), a captain in the War of Independence and a brigadier-general in the War of 1812. He graduated (1836) at South Carolina College, and was trained for the law. He devoted himself, however, to the management of his great plantations in South Carolina and in Mississippi, and took part in state politics and legislation. Though his own views were opposed to the prevailing state-rights tone of South Carolinian opinion, he threw himself heartily into the Southern cause in 1861, raising a mixed command known as " Hampton's Legion," which he led at the first battle of Bull Run. During the Civil War he served in the main with the Army of Northern Virginia in Stuart's cavalry corps. After Stuart's death Hampton distinguished himself greatly in opposing Sheridan in the Shenandoah Valley, and was made lieutenant-general to command Lee's whole force of cavalry. In 1865 he assisted Joseph Johnston in the attempt to prevent Sherman's advance through the Carolinas. After the war his attitude was conciliatory and he recommended a frank acceptance by the South of the

war's political consequences. He was governor of his state in 1876-1879, being installed after a memorable contest; he served in the United States Senate in 1879-1891, and was United States commissioner of Pacific railways in 1893-1897. He died on the nth of April 1902.

See E. L. Wells, Hampton and Reconstruction (Columbia, S. C,

1907).

HAMPTON, an urban district in the Uxbridge parliamentary division of Middlesex, England, 15 m. S.W. of St Paul's cathedral, London, on the river Thames, served by the London & South Western railway. Pop. (1901), 6813. Close to the river, a mile below the town, stands Hampton Court Palace, one of the finest extant specimens of Tudor architecture, and formerly a royal residence. It was erected by Cardinal Wolsey, who in 1515 received a lease of the old mansion and grounds for 99 years. As the splendour of the building seemed to awaken the cupidity of Henry VIII., Wolsey in 1526 thought it prudent to make him a present of it. It became Henry's favourite residence, and he made several additions to the building, including the great hall and chapel in the Gothic style. Of the original five quad- rangles only two now remain, but a third was erected by Sir Christopher Wren for William III. In 1649 a great sale of the effects of the palace took place by order of parliament, and later the manor itself was sold to a private owner but immedi- ately after came into the hands of Cromwell; and Hampton Court continued to be one of the principal residences of the English sovereigns until the time of George II. It was the birthplace of Edward VI., and the meeting-place (1604) of the conference held in the reign of James I. to settle the dispute between the Presbyterians and the state clergy. William III., riding in the grounds, met with the accident which resulted in his death. It is now partly occupied by persons of rank in reduced circumstances; but the state apartments and picture

galleries are open to the public, as is the home park. The gardens, with their ornamental waters, are beautifully laid out in the Dutch style favoured by William III., and contain a magnificent vine planted in 1768. In the enclosure north of the palace, called the Wilderness, is the Maze, a favourite resort. North again lies Bushey Park, a royal demesne exceeding 1000 acres in extent. It is much frequented, especially in early summer, when its triple avenue of horse-chestnut trees is in blossom.

Among several residences in the vicinity of Hampton is Garrick Villa, once, under the name of Hampton House, the residence of David Garrick the actor. Sir Christopher Wren and Sir Richard Steele are among famous former residents. Hampton Wick, on the river E. of Bushey Park, is an urban district with a population (1901) of 2606.

See E. Law, History of Hampton Court Palace (London, 1890).

HAMPTON, a city and the county-seat of Elizabeth City county, Virginia, U.S.A., at the mouth of the James river, on Hampton Roads, about 15 m. N.W. of Norfolk. Pop. (1890), 2513; (1900) 2764, including 1249 negroes; (1910) 5505. It is served by the Chesapeake & Ohio railway, and by trolley lines to Old Point Comfort and Newport News. Hampton is an agricultural shipping point, ships fish, oysters and canned crabs, and manufactures fish oil and brick. In the city are St John’s church, built in 1727; a national cemetery, a national soldiers’ home (between Phoebus and Hampton), which in 1907-1908 cared for 4093 veterans and had an average attendance of 2261; and the Hampton Normal and Agricultural Institute (co- educational), which was opened by the American Missionary Association in 1868 for the education of negroes. This last was chartered and became independent of any denominational control in 1870, and was

superintended by Samuel Chapman Armstrong (q.v.) from 1868 to 1893. The school was opened in 1878 to Indians, whose presence has been of distinct advantage to the negro, showing him, says Booker T. Washington, the most famous graduate of the school, that the negro race is not alone in its struggle for improvement. The National government pays $167 a year for the support of each of the Indian students. The underlying idea of the Institute is such industrial training as will make the pupil a willing and a good workman, able to teach his trade to others; and the school's graduates include the heads of other successful negro industrial schools, the organizers of agricultural and industrial departments in Southern public schools and teachers in graded negro schools. The mechanism of the school includes three schemes: that of "work students," who work during the day throughout the year and attend night school for eight months; that of day school students, who attend school for four or five days and do manual work for one or two days each week; and that of trade students, who receive trade instruction in their daily eight-hours' work and study in night school as well. Agriculture in one or more of its branches is taught to all, including the four or five hundred children of the Whittier school, a practice school with kindergarten and primary classes. Graduate courses are given in agriculture, business, domestic art and science, library methods, " matrons' " training, and public school teaching. The girl students are trained in every branch of housekeeping, cooking, dairying and gardening. The institute publishes The Southern Workman, a monthly magazine devoted to the interests of the Negro and the Indian and other backward races. In 1908 the Institute had more than 100 buildings and 188 acres of land S.W. of the national cemetery and on Hampton river and Jones Creek, and 600 acres at Shellbanks, a stock farm 6 m. away; the enrolment was 21 in graduate classes, 372 in day school, 489 in night school and 524 in the Whittier school. Of the total, 88 were Indians.

Hampton was settled in 1610 on the site of an Indian

village, Kecoughtan, a name it long retained, and was represented at the first meeting (1619) of the Virginia House of Burgesses. It was fired by the British during the War of 18.12 and by the Confederates under General J. B. Magruder in August 1861. During the Civil War there was a large Union hospital here, the building of the Chesapeake Female College, erected in 1857,

being used for this purpose. Hampton was incorporated as a^town in 1887, and in 1908 became a city of the second class.

HAMPTON ROADS, a channel through which the waters of the James, Nansemond and Elizabeth rivers of Virginia, U.S.A., pass (between Old Point Comfort to the N. and Sewell's Point to the S.) into Chesapeake Bay. It is an important highway of commerce, especially for the cities of Norfolk, Portsmouth and Newport News, and is the chief rendezvous of the United States navy. For a width of 500 ft. the Federal government during 1902-1905 increased its minimum depth at low water from 255 ft. to 30 ft. The entrance from Chesapeake Bay is defended by Fortress M°nroe on Old Point Comfort and by Fort Wood on a small island called the Rip Raps near the middle of the channel; and at Portsmouth, a few miles up the Elizabeth river, is an important United States navy-yard.

Hampton Roads is famous in history as the scene of the first engagement between iron-clad vessels. In the spring of 1861 the Federals set fire to several war vessels in the Gosport navy yard on the Elizabeth river and abandoned the place. In June the Confederates set to work to raise one of these abandoned vessels, the frigate " Merrimac " of 3500 tons and 40 guns, and to rebuild it as an iron-clad. The vessel (renamed the " Virginia" though it is generally known in history by its original name) was first cut down to the water-line and upon her hull was built a rectangular casemate, constructed of heavy timber (24 in. in thickness),. covered with bar-jron 4 in. thick, and rising from the water on each side at an angle of about 35 . The iron plating

extended 2 ft. below the water line; and beyond the casemate, toward the bow, was a cast-iron pilot house, extending 3 ft. above the deck. The reconstruction of the vessel was completed on the 5th of March 1862. The vessel drew 22 ft. of water, was equipped with poor engines, so that it could not make more than 5 knots, and was so unwieldy that it could not be turned in less than 30 minutes. It was armed with 10 guns — 2 (rifled) 7 in., 2 (rifled) 6 in., and 6 (smooth bore Dahlgren) 9 -in. Her most powerful equipment, however, was her 18 in. cast-iron ram. In October 1861 Captain John Ericsson, an engineer, and a Troy (N.Y.) firm, as builders, began the construction of the iron-clad " Monitor " for the Federals, at Greenpoint, Long Island. With a view to enable this vessel to carry at good speed the thickest possible armour compatible with buoyancy, Ericsson reduced the exposed surface to the least possible area. Accordingly, the vessel was built so low in the water that the waves glided easily over its deck except at the middle, where was constructed a revolving turret 1 for the guns, and though the vessel's iron armour had a thickness of 1 in. on the deck, 5" in. on the side, and 8 in. on the turret, its draft was only 10 ft. 6 in., or less than one-half that of the " Merrimac." Its turret, 9 ft. high and 20 ft. in inside diameter, seemed small for its length of 172 ft. and its breadth of 41 ft. 6 in., and this, with the lowness of its freeboard, caused the vessel to be called the " Yankee cheese-box on a raft." Forward of the turret was the iron pilot house, square in shape, and rising about 4 ft. above the deck. The ' ' Monitor's " displacement was about 1 200 tons and her armament- was two 11 in. Dahlgren guns; her crew numbered 58, while that of the" Merrimac "numbered about 300. She was seaworthy in the shallow waters off the southern coasts and steered fairly well. The " Monitor " was launched at Greenpoint, Long Island, on the 30th of January, and was turned over to the government on the 19th of the following month. The building of the two vessels was practically a race between the two combatants.

On the 8th of March about 1 p.m., the " Merrimac,"

com- manded by Commodore Franklin Buchanan (1795-1871), steamed down the Elizabeth accompanied by two one-gun gun-boats, to engage the wooden fleet of the Federals, consisting of the frigate " Congress," 50 guns, and the sloop " Cumberland," 30 guns, both sailing vessels, anchored off Newport News, and

1 For the idea of the low free-board and the revolving turret Ericsson was indebted to Theodore R. Timby (1819-1909), who in 1843 had filed a caveat for revolving towers for offensive or defensive warfare whether placed on land or water, and to whom the company building the " Monitor " paid $5000 royalty for each turret.

the steam frigates " Minnesota," and " Roanoke," the sailing frigate " St Lawrence," and several gun-boats, anchored off Fortress Monroe. Actual firing began about 2 o'clock, when the " Merrimac " was nearly a mile from the " Congress " and the " Cumberland." Passing the first of these vessels with terrific broadsides, the " Merrimac " rammed the " Cumberland " and then turned her fire again on the " Congress," which in an attempt to escape ran aground and was there under fire from three other Confederate gun-boats which had meanwhile joined the " Merrimac." About 3.30 p.m. the " Cumberland," which, while it steadily careened, had been keeping up a heavy fire at the Confederate vessels, sank, with " her pennant still flying from the topmast above the waves." Between 4 and 4.30 the " Congress," having been raked fore and aft for nearly an hour by the " Merrimac," was forced to surrender. While directing a fire of hot shot to burn the " Congress," Commodore Buchanan of the " Merrimac " was severely wounded and was succeeded in the command by Lieutenant Catesby ap Roger Jones. The Federal steam frigates, " Roanoke," " St Lawrence " and " Minnesota " had all gone aground in their trip from Old Point Comfort toward the scene of battle,

and only the ” Minnesota ” was near enough (about 1 m.) to take any part in the fight. She was in such shallow water that the Confederate iron-clad ram could not get near her at ebb tide, and about 5 o’clock the Confederates postponed her capture until the next day and anchored off Sewell’s Point.

The ” Monitor,” under Lieut. John Lorimer Worden (1818- 1897), had left New York on the morning of the 6th of March; after a dangerous passage in which she twice narrowly escaped sinking, she arrived at Hampton Roads during the night of the 8th, and early in the morning of the 9th anchored near the ” Minnesota.” When the ” Merrimac ” advanced to attack the ’’ Minnesota,” the ” Monitor ” went out to meet her, and the battle between the iron-clads began about 9 a.m. on the 9th. Neither vessel was able seriously to injure the other, and not a single shot penetrated the armour of either. The ” Monitor” had the advantage of being able to out-manceuvre her heavier and more unwieldy adversary; but the revolving turret made firing difficult and communications were none too good with the pilot house, the position of which on the forward deck lessened the range of the two turret-guns. The machinery worked so badly that the revolution of the turret was stopped. After two hours’ fighting, the ” Monitor ” was drawn off, so that more ammunition could be placed in her turret. When the battle was renewed (about 11.30) the “Merrimac” began firing at the ” Monitor’s ” pilot house; and a little after noon a shot struck the sight-hole of the pilot house and blinded Lieut. Worden. The ” Monitor ” withdrew in the confusion consequent upon the wounding of her commanding officer; and the ” Merrimac ” after a short wait for her adversary steamed back to Norfolk. There were virtually no casualties on either side. After the evacuation of Norfolk by the Confederates on the 9th of May Commodore Josiah Tattnall, then in command of the ” Merrimac,” being unable to take her up the James, sank her. The ” Monitor ” was lost in a gale off Cape Hatteras on the 31st of December 1862.

Though the battle between the two vessels was

indecisive, its effect was to " neutralize " the " Merrimac," which had caused great alarm in Washington, and to prevent the breaking of the Federal blockade at Hampton Roads; in the history of naval warfare it may be regarded as marking the opening of a new era — the era of the armoured warship. On the 3rd of February 1865 near Fortress Monroe on board a steamer occurred the meeting of President Lincoln and Secretary Seward with Confederate commissioners which is known as the Hampton Roads Conference (see Lincoln, Abraham). At Sewell's Point, On Hampton Roads, in 1907 was held the Jamestown Ter- centennial Exposition.

See James R. Soley, The Blockade and the Cruisers (New York, 1883); Battles and Leaders of the Civil War, vol. i. (New York, 1887); chap. ii. of Frank M. Bennett's The Monitor and the Navy under Steam (Boston, 1900); and William Swinton, Twelve Decisive Battles of the War (New York, 1867).

HAMSTER, a European mammal of the order Rodentia, scientifically known as Cricetus frumentarius (or C. cricetus), and belonging to the mouse tribe, Muridae, in which it typifies the sub-family Cricetinae. The essential characteristic of the Cricetines is to be found in the upper cheek-teeth, which (as shown in the figure of those of Cricetus in the article Rodentia) have their cusps arranged in two longitudinal rows separated by a groove. The hamsters, of which there are several kinds, are short-tailed rodents, with large cheek-pouches, of which the largest is the common C. frumentarius. Their geographical distribution comprises a large portion of Europe and Asia north of the Himalaya. All the European hamsters show more or less black on the under-parts, but the small species from Central Asia, which constitute distinct subgenera, are uniformly grey. The common species is specially interesting on account of its habits. It constructs elaborate burrows containing several chambers, one of which is employed as a granary, and filled with corn, frequently of several kinds, for winter use. As a rule, the males, females, and young of the first year occupy separate burrows. During the

winter these animals retire to their burrows, sleeping the greater part of the time, but awakening about February or March, when they feed on the garnered grain. They are very prolific, the female producing several litters in the year, each consisting of over a dozen blind young; and these, when not more than three weeks old, are turned out of the parental burrow to form underground homes for themselves. The burrow of the young hamster is only about a foot in depth, while that of the adult descends 4 or 5 ft. beneath the surface. On retiring for the winter the hamster closes the various entrances to its burrow, and becomes torpid during the coldest period. Although feeding chiefly on roots, fruits and grain, it is also to some extent carnivorous, attacking and eating small quadrupeds, lizards and birds. It is exceedingly fierce and pugnacious, the males especi- ally fighting with each other for possession of the females. The numbers of these destructive rodents are kept in check by foxes, dogs, cats and pole-cats, which feed upon them. The skin of the hamster is of some value, and its flesh is used as food. Its burrows are sought after in the countries where it abounds, both for capturing the animal and for rifling its store. America, especially North America, is the home of by far the great majority of Cricetinae, several of which are called white-footed or deer- mice. They are divided into numerous genera and the number of species is very large indeed. Both in size and form consider- able variability is displayed, the species of Holochilus being some of the largest, while the common white-footed mouse (Eligmodon leucopus) of North America is one of the smaller forms. Some kinds, such as Oryzomys and Peromyscus have long, rat-like tails, while others, like Acodon, are short-tailed and more vole- like in appearance. In habits some are partially arboreal, others wholly terrestrial, and a few more or less aquatic. Among the latter, the most remarkable are the fish-eating rats (Jchthyomys) of North-western South America, which frequent streams and feed on small fish. The Florida rice-rat {Sigmodon hispidus) is another well-known representative of the group. In the Old

World the group is represented by the Persian Calomyscus, a near relative of Peromyscus. (R. L.)*

HANAPER, properly a case or basket to contain a " hanap " (O. Eng. hncep: cf. Dutch nap), a drinking vessel, a goblet with a foot or stem; the term which is still used by antiquaries for medieval stemmed cups. The famous Royal Gold Cup in the British Museum is called a " hanap " in the inventory of Charles VI. of France. The word " hanaper " (Med. Lat. hanaperium) was used particularly in the English chancery of a wicker basket in which were kept writs and other documents, and hence it became the name of a department of the chancery, now abolished, under an officer known as the clerk or warden of the hanaper, into which were paid fees and other moneys for the sealing of charters, patents, writs, &c, and from which issued certain writs under the great seal (S. R. Scargill-Bird, Guide to the Public Records (1908). In Ireland it still survives in the office of the clerk of the crown and hanaper, from which are issued writs for the return of members of parliament for Ireland.

From " hanaper " is derived the modern " hamper," a wieker or rush basket used for the carriage of game, fish, wine, &c. The verb " to hamper," to entangle, obstruct, hinder, especially used of disturbing the mechanism of a lock or other fastening so as to prevent its proper working, is of doubtful origin. It is probably connected with a root seen in the Icel. hemja, to restrain, and Ger. hemmen, to clog.

HANAU, a town of Germany, in the Prussian province of Hesse-Nassau, on the right bank of the Main, 14 m. by rail E. from Frankfort and at the junction of lines to Friedberg, Bebra and Aschaffenburg. Pop. (1905) 31,637. It consists of an old and a new town. The streets of the former are narrow and irregular, but the latter, founded at the end of the 16th century by fugitive Walloons and Netherlanders, is

built in the form of a pentagon with broad streets crossing at right angles, and possesses several fine squares, among which may be mentioned the market-place, adorned with handsome fountains at the four corners. Among the principal buildings are the ancient castle, formerly the residence of the counts of Hanau; the church of St John, dating from the 17th century, with a handsome tower; the old church of St Mary, containing the burial vault of the counts of Hanau; the church in the new town, built by the Walloons in the beginning of the 17th century in the form of two intersecting circles; the Roman Catholic church, the synagogue, the theatre, the barracks, the arsenal and the hospital. Its educational establishments include a classical school, and a school of industrial art. There is a society of natural history and an historical society, both of which possess considerable libraries and collec- tions. Hanau is the birthplace of the brothers Grimm, to whom a monument was erected here in 1896. In the neighbourhood of the town are the palace of Philippsruhe, with an extensive park and large orangeries, and the spa of Wilhelmsbad.

Hanau is the principal commercial and manufacturing town in the province, and stands next to Cassel in point of population. It manufactures ornaments of various kinds, cigars, leather, paper, playing cards, silver and platina wares, chocolate, soap, woollen cloth, hats, silk, gloves, stockings, ropes and matches. Diamond cutting is carried on and the town has also foundries, breweries, and in the neighborhood extensive powder-mills. It carries on a large trade in wood, wine and corn, in addition to its articles of manufacture. . .

From the number of urns, coins and other antiquities found near Hanau it would appear that it owes its origin to a Roman settlement. It received municipal rights in 1393, and in 1528 it was fortified by Count Philip III. who rebuilt the castle. At the end of the 16th century its prosperity received considerable impulse from the accession of the Walloons and Netherlanders. During the Thirty Years'

War it was in 1631 taken by the Swedes, and in 1636 it was besieged by the imperial troops, but was relieved on the 13th of June by Landgrave William V. of Hesse-Cassel, on account of which the day is still commemor- ated by the inhabitants. Napoleon on his retreat from Leipzig defeated the Germans under Marshal Wrede at Hanau, on the 30th of October 1813; and on the following day the allies vacated the town, when it was entered by the French. Early in the 1 5th century Hanau became the capital of a principality of the Empire, which on the death of Count Reinhard in 145 r was partitioned between the Hanau-Miinzenberg and Hanau- Lichtenberg lines, but was reunited in 1642 when the elder line became extinct. The younger line received princely rank in 1696, but as it became extinct in 1736 Hanau-Miinzenberg was joined to Hesse-Cassel and Hanau-Lichtenberg to Hesse-Darm- stadt. In 1785 the whole province was united to Hesse-Cassel, and in 1803 it became an independent principality. In 181 5 it again came into the possession of Hesse-Cassel, and in 1866 it was joined to Prussia.

See R. Wille, Hanau im dreissigjafirigen Krieg (Hanau, 1886) ; and Junghaus, Geschichte der Stadt und des Kreises Hanau (1887).

HANBURY WILLIAMS, SIR CHARLES (1708^759), English diplomatist and author, was a son of Major John Hanbury (1664-1734), of Pontypool, Monmouthshire, and a scion of an ancient Worcestershire family. His great-great-great-grand-

father, Capel Hanbury, bought property at Pontypool and begaB the family iron- works there in 1565. His father John Hanbury was a wealthy iron-master and member of parliament, who inherited another fortune from his friend Charles Williams of Caerleon, his son's godfather, with which he bought the Cold-brook estate, Monmouthshire. Charles accordingly took the name of Williams in ^29. He went to Eton, and there made friends with Henry Fielding, the novelist, and, after marrying in 1732 the heiress of Earl Coningsby, was elected M.P. for Monmouthshire (1734-1747) and subsequently for Leominster

(1754–1759). He became known as one of the prominent gallants and wits about town, and following Pope he wrote a great deal of satirical light verse, including Isabella, or the Morning (1740), satires on Ruth Darlington and Pulleney (1741–1742), The Country Girl (1742), Lessons for the Day (1742), Letter to Mr Dodsley (1743), &c. A collection of his poems was published in 1763 and of his Works in 1822. In 1746 he was sent on a diplomatic mission to Dresden, which led to further employment in this capacity; and through Henry Fox's influence he was sent as envoy to Berlin (1750), Dresden (1751), Vienna (1753), Dresden (1754) and St Petersburg (^SS^TS?); in the latter case he was the instrument for a plan for the alliance between England, Russia and Austria, which finally broke down, to his embarrassment. He returned to England, and committed suicide on the 2nd of November 1759, being buried in West- minster Abbey. He had two daughters, the elder of whom married William- Capel, 4th earl of Essex, and was the mother of the 5th earl. The Coldbrook estates went to Charles's brother, George Hanbury-Williams, to whose heirs it descended.

See William Coxe's Historical Tour in Monmouthshire (1801), and T. Seccombe's article in the Diet. Nat. Biog. with bibliography.

HANCOCK, JOHN (1737–1793), American Revolutionary statesman, was born in that part of Braintree, Massachusetts, now known as Quincy, on the 23rd of January 1737. After graduating from Harvard in 1754, he entered the mercantile house of his uncle, Thomas Hancock of Boston, who had adopted him, and on whose death, in 1764, he fell heir to a large fortune and a prosperous business. In 1765 he became a selectman of Boston, and from 1766 to 1772 was a member of the Massa- chusetts general court. An event which is thought to have greatly influenced Hancock's subsequent career was the seizure of the sloop " Liberty " in 1768 by the customs officers for dis- charging, without paying the duties, a cargo of Madeira wine consigned to Hancock. Many suits were thereupon entered against Hancock, which, if successful, would have caused the confiscation of

his estate, but which undoubtedly enhanced his popularity with the Whig element and increased his resentment against the British government. He was a member of the committee appointed in a Boston town meeting immediately after the " Boston Massacre " in 1770 to demand the removal of British troops from the town. In 1774 and 1775 he was president of the first and second Provincial Congresses respect- ively, and he shared with Samuel Adams the leadership of the Massachusetts Whigs in all the irregular measures preceding the War of American Independence. The famous expedition sent by General Thomas Gage of Massachusetts to Lexington and Concord on the i8th-i9th of April 1775 had for its object, besides the destruction of materials of war at Concord, the capture of Hancock and Adams, who were temporarily staying at Lexington, and these two leaders were expressly excepted in the proclamation of pardon issued on the 12th of June by Gage, their offences, it was said, being " of too flagitious a nature to admit of any other consideration than that of condign punish- ment." Hancock was a member of the Continental Congress from 1775 to 1780, was president of it from May 1775 to October 1777, being the first to sign the Declaration of Independence, and was a member of the Confederation Congress in 1785-1786'. In 1778 he commanded, as major-general of militia, the Massa- chusetts troops who participated in the Rhode Island expedition. He was a member of the Massachusetts Constitutional Convention of 1779-1780, became the first governor of the state, and served from 1780 to 1785 and again from 1787 until his death. Although

at first unfriendly to the Federal Constitution as drafted by the convention at Philadelphia, he was finally won over to its support, and in 1788 he presided over the Massachusetts convention which ratified the instrument. Hancock was not by nature a leader, but he wielded great influence on account of his wealth and social position, and was liberal,

public-spirited, and, as his repeated election — the elections were annual — to the governor- ship attests, exceedingly popular. He died at Quincy, Mass., on the 8th of October 1793.

See Abram E. Brown, John Hancock, His Book (Boston, 1898), a work consisting largely of extracts from Hancock's letters.

HANCOCK, WINFIELD SCOTT (1824-1886), American general, was born on the 14th of February 1824, in Montgomery county, Pa. He graduated in 1844 at the United States Military Academy, where his career was creditable but not distinguished. On the 1st of July 1844 he was breveted, and on the 18th of June 1846 commissioned second lieutenant. He took part in the later movements under Winfield Scott against the city of Mexico, and was breveted first lieutenant for " gallant and meritorious conduct." After the Mexican war he served in the West, in Florida and elsewhere; was married in 1850 to Miss Almira Russell of St Louis; became first lieutenant in 1833, and assistant-quartermaster with the rank of captain in 1855. The outbreak of the Civil War found him'in California. At his own request he was ordered east, and on the 23rd of September 1861 was made brigadier-general of volunteers and assigned to command a brigade in the Army of the Potomac. He took part in the Peninsula campaign, and the handling of his troops in the engagement at Williamsburg on the 5th of May 1862, was so brilliant that McClellan reported " Hancock was superb," an epithet always afterwards applied to him. At trie battle of Antietam he was placed in command of the first division of the II. corps, and in November he was made major- general of volunteers, and about the same time was promoted major in the regular army. In the disastrous battle of Fredericks- burg {q.v.), Hancock's division was on the right among the troops that were ordered to storm Marye's Heights. Out of the 5006 men in his division 2013 fell. At Chancellorsville his division received both on the 2nd and the 3rd of May the brunt of the attack of Lee's main army. Soon after the battle he was appointed commander of the II.

corps.

The battle of Gettysburg (q.v.) began on the 1st of July with the defeat of the left wing of the Army of the Potomac and the death of General Reynolds. About the middle of the afternoon Hancock arrived on the field with orders from Meade to assume command and to decide whether to continue the fight there or to fall back. He decided to stay, rallied the retreating troops, and held Cemetery Hill and Ridge until the arrival of the main body of the Federal army. During the second day's battle he commanded the left centre of the Union army, and after General Sickles had been wounded, the whole of the left wing. In the third day's battle he commanded the left centre, upon which fell the full brunt of Pickett's charge, one of the most famous incidents of the war. Hancock's superb presence and power over men never shone more clearly than when, as the 150 guns of the Confederate army opened the attack he calmly rode along the. front of his line to show his soldiers that he shared the dangers of the cannonade with them. His corps lost in the battle 4350 out of less than 10,000 fighting men. But it had captured twenty-seven Confederate battle flags and as many prisoners as it had men when the fighting ceased. Just as the Confederate troops reached the Union line Hancock was struck in the groin by a bullet, but continued in command until the repulse of the attack, and as he was at last borne off the field earnestly recommended Meade to make a general attack on the beaten Confederates. The wound proved a severe one, so that some six months passed before he resumed command.

In the battles of the year 1864 Hancock's part was as important and striking as in those of 1863. At the Wilderness he com- manded, during the second day's fighting, half of the Union army; at Spottsylvania he had charge of the fierce and successful attack on the " salient "; at Cold Harbor his corps formed the

left wing in the unsuccessful assault on the Confederate lines. In August he was promoted to

brigadier-general in the regular army. In November, his old wound troubling him, he obtained a short leave of absence, expecting to return to his corps in the near future. He was, however, detailed to raise a new corps, and later was placed in charge of the " Middle Division." It was expected that he would move towards Lynchburg, as part of a combined movement against Lee's communications. But before he could take the field Richmond had fallen and Lee had sur- rendered. It thus happened that Hancock, who for three years had been one of the most conspicuous figures in the Army of the Potomac did not take part in its final triumph.

After the assassination of Lincoln, Hancock was placed in charge of Washington, and it was under his command that Booth's accomplices were tried and executed. In July 1866 he was appointed major-general in the regular army. A little later he was placed in command of the department of the Missouri, and the year following assumed command of the fifth military division, comprising Louisiana and Texas. His policy, however, of discountenancing military trials and conciliating the conquered did not meet with approval at Washington, and he was at his own request transferred. Hancock had all his life been a Democrat. His splendid war record and his personal popularity caused his name to be considered as a candidate for the Presidency as early as 1868, and in 1880 he was nominated for that office by the Democrats; but he was defeated by his Republican opponent, General Garfield, though by the small popular plurality of seven thousand votes. He died at Governor's Island, near New York, on the 9th of February 1886. Hancock was in many respects the ideal soldier of the Northern armies. He was quick, energetic and resourceful, reckless of his own safety, a strict disciplinarian, a painstaking and hard-working officer. It was on the field of battle, and when the fighting was fiercest, that his best qualities came to the front. He was a born commander of men, and it is doubtful if any other officer in the Northern army could get more fighting and more marching out of his men. Grant said of him, " Han-

cock stands the most conspicuous figure of all the general officers who did not exercise a separate command. He commanded a corps longer than any other, and his name was never mentioned as having committed in battle a blunder for which he was responsible."

A biography of him has been written by General Francis A. Walker (New York, 1894). See also History of the Second Corps, by the same author (1886). (F. H. H.)

HANCOCK, a city of Houghton county, Michigap, U.S.A., on Portage Lake, opposite Houghton. Pop. (1890) 1772; (1900) 4050, of whom 1409 were foreign-born; (1904) 6037; (1910) 8981. Hancock is served by the Mineral Range, the Copper Range, the Chicago, Milwaukee & St Paul, and the Duluth, South Shore & Atlantic railways (the last two send their trains in over the Mineral Range tracks), and by steamboats through the Portage Lake Canal which connects with Lake Superior. Hancock is connected by a bridge and an electric line with the village of Houghton (pop. in 1910, 5113), the county-seat of Houghton county and the seat of the Michigan College of Mines (opened in 1886). Hancock has three parks, and a marine and general hospital. The city is the seat of a Finnish Lutheran Seminary — there are many Finns in and near Hancock, and a Finnish newspaper is published here. Hancock is in the Michigan copper region — the Quincy, Franklin and Hancock mines are in or near the city — and the mining, working and shipping of copper are the leading industries; afrnong the city's manufactures are mining machinery, lumber, bricks and beer. The municipality owns and operates the water- works. The electric-lighting plant, the gas plant and the street railway are owned by private corporations. Hancock was settled in 1859, was incorporated as a village in 1875, and was chartered as a city in 1903.

HAND, FERDINAND GOTTHELF (1786-1851), German classical scholar, was born at Plauen in Saxony on the 15th of February 1786. He studied at Leipzig, in 18 10 became professor

at the Weimar gymnasium, and in 1817 professor of philosophy and Greek literature in the university of Jena, where he remained till his death on the 14th of March 1851. The work by which Hand is chiefly known is his (unfinished) edition of the treatise of Horatius Tursellinus (Orazio Torsellino, 1545–1599) on the Latin particles (Tursellinus, seu de particulis Latinis com- mentarii, 18 29–1 845). Like his treatise on Latin style (Lehrbuch des lateinischen Stils, 3rd ed. by H. L. Schmitt, 188.0), it is too abstruse and philosophical for the use of the ordinary student. Hand was also an enthusiastic musician, and in his Asthetik der Tonkunst (1837–1841) he was the first to introduce the subject of musical aesthetics.

The first part of the last-named work has been translated into English by W. E. Lawson (Aesthetics of Musical Art, or The Beautiful in Music, 1880), and B. Sears's Classical Studies (1849) contains a " History of the Origin and Progress of the Latin Language," abridged from Hand's work on the subject. There is a memoir of his life and work by G. Queck (Jena, 1852).

HAND (a word common to Teutonic languages; cf. Ger. Hand, Goth, handus), the terminal part of the human arm from below the wrist, and consisting of the fingers and the palm. The word is also used of the prehensile termination of the limbs in certain other animals (see Anatomy: Superficial and artistic; Skeleton: Appendicular, and such articles, as Muscular System and Nervous System). There are many transferred applications of "hand," both as a substantive and in various adverbial phrases. The following may be mentioned: charge or authority, agency, source, chiefly in such expressions as "in the hands of," "by hand," "at first hand." From the position of the hands at the side of the body, the word means " direction," e.g., on the right, left hand, cf. " at hand." The hand as given in betrothal

or marriage has been from early times the symbol of marriage as it also is of oaths. Other applications are to labourers engaged in manual occupations, the members of the crew of a ship, to a person who has some special skill, as in the phrase, " old parliamentary hand," and to the pointers of a clock or watch and to the number of cards dealt to each player in a card game. As a measure of length the term " hand " is now only used in the measurement of horses, it is equal to 4 in. The name " hand of glory," is given to a hand cut from the corpse of a hanged criminal, dried in smoke, and used as a charm or talisman, for the finding of treasures, &c. The expres- sion is the translation of the Fr. main de gloire, a corruption of the O. Fr. mandegloire, mandegoire, i.e. mandragore, mandragora, the mandrake, to the root of which many magical properties are attributed.

HANDEL, GEORGE FREDERICK (1685-1759), English musical composer, German by origin, was born at Halle in Lower Saxony, on the 23rd of February 1685. His name was Handel, but, like most 18th-century musicians who travelled, he compromised with its pronunciation by foreigners, and when in Italy spelt it Hendel, and in England (where he became naturalized) accepted the version Handel, which is therefore correct for English writers, while Handel remains the correct version in Germany. His father was a barber-surgeon, who disapproved of music, and wished George Frederick to become a lawyer. A friend smuggled a clavichord into the attic, and on this instrument, which is inaudible behind a closed door, the little boy practised secretly. Before he was eight his father went to visit a son by a former marriage who was a valet-de-chambre to the duke of Saxe-Weissenfels. The little boy begged in vain to go also, and at last ran after the carriage on foot so far that he had to be taken, He made acquaintance with the court musicians and contrived to practise on the organ when he could be overheard by the duke, who, immediately recognizing his talent, spoke seriously to the father, who had to yield to his arguments. On returning to Halle Handel became a

pupil of Zachau, the cathedral organist, who gave him a thorough training as a composer and as a performer on keyed instruments, the oboe and the violin. Six very good trios for two oboes and bass, which Handel wrote at the age of ten, are extant; and when he himself was shown them by an English admirer who had discovered them, he was much amused

Lite.

and remarked, ” I wrote like the devil in those days, and chiefly for the oboe, which was my favourite instrument.” His master also of course made him write an enormous amount of vocal music, and he had to produce a motet every week. By the time he was twelve Zachau thought he could teach him no more, and accordingly the boy was sent to Berlin, where he made a great impression at the court.

His father, however, thought fit to decline the proposal of the elector of Brandenburg, afterwards King Frederick I. of Prussia, to send the boy to Italy in order afterwards to attach him to the court at Berlin. German court musicians, as late as the time of Mozart, had hardly enough freedom to satisfy a man of independent character, and the elder Handel had not yet given up hope of his son’s becoming a lawyer. Young Handel, therefore, returned to Halle and resumed his work with Zachau. In 1697 his father died, but the boy showed great filial piety in finishing the ordinary course of his education, both general and musical, and even entering the university of Halle in 1702 as a law student. But in that year he succeeded to the post of organist at the cathedral, and after his ” probation ” year in that capacity he departed to Hamburg, where the only German opera worthy of the name was flourishing under the direction of its founder, Reinhold Keiser. Here he became friends with Matheson, a prolific composer and writer on music. On one occasion they set out together to go to Liibeck, where a successor was to be appointed to the post left vacant by the great organist Buxtehude, who was retiring on account of his extreme age. Handel and Matheson made much music on this occasion, but did not compete,

because they found that the successful candidate was required to accept the hand of the elderly daughter of the retiring organist.

Another adventure might have had still more serious con- sequences. At a performance of Matheson's opera Cleopatra at Hamburg, Handel refused to give up the conductor's seat to the composer when the latter returned to his usual post at the harpsichord after singing the part of Antony on the stage. The dispute led to a duel outside the theatre, and, but for a large button on Handel's coat which intercepted Matheson's sword, there would have been no Messiah or Israel in Egypt. But the young men remained friends, and Matheson's writings are full of the most valuable facts for Handel's biography. He relates in his Ehrenpforle that his friend at that time used to compose " interminable cantatas " of no great merit; but of these no traces now remain, unless we assume that a Passion according to St John, the manuscript of which is in the royal library at Berlin, is among the works alluded to. But its authen- ticity, while strongly upheld by Chrysander, has recently been as strongly assailed on internal evidence. .

On the 8th of January 1705, Handel's first opera, Almira, was performed at Hamburg with great success, and was followed a few weeks later by another work, entitled Nero. Nero is lost, but Almira, with its mixture of Italian and German language and form, remains as a valuable example of the tendencies of the time and of Handel's eclectic methods. It contains many themes used by Handel in well-known later works; but the current statement that the famous aria in Rinaldo, " Lascia ch'io pianga," comes from a saraband in Almira, is based upon nothing more definite than the inevitable resemblance between the simplest possible forms of saraband-rhythm.

In 1706 Handel left Hamburg for Italy, where he remained for three years, rapidly acquiring the smooth Italian vocal style which hereafter always characterized his work. He had before this refused

offers from noble patrons to send him there, but had now saved enough money, not only to support his mother at home, but to travel as his own master. He divided his time in Italy between Florence, Rome, Naples and Venice; and many anecdotes are preserved, of his meetings with Corelli, Lotti, Alessandro Scarlatti and Domenico Scarlatti, whose wonderful harpsichord technique still has a direct bearing on some of the most modern features of pianoforte style. Handel soon became famous as II Sassone ("the Saxon"), and it is said that Domenico on first hearing him play incognito exclaimed,

" It is either the devil or the Saxon ! " Then there is a story of Corelli's coming to grief over a passage in Handel's overture to 77 Trionfo del tempo, in which the violins went up to A in altissimo. Handel impatiently snatched the violin to show Corelli how the passage ought to be played, and Corelli, who had never written or played beyond the third position in his life (this passage being in the seventh), said gently, " My dear Saxon, this music is in the French style, which I do not understand." In Italy Handel produced two operas, Rodrigo and Agrippina, the latter a very important work, of which the splendid overture was remodelled forty-four years afterwards as that of his last original oratorio, Jephtha. He also produced two oratorios. La Resurrezione, and 27 Trionfo del tempo. This, forty-six years afterwards, formed the basis of his last work. The Triumph of Time and Truth, which contains no original matter. All Handel's early works contain material that he used often with very little alteration later on, and, though the famous " Lascia ch'io pianga " does not occur in Almira, it occurs note for note in Agrippina and the two Italian oratorios. On the other hand the cantata Aci, Galattea e Polifemo has nothing in common with Acts and Galatea. Besides these larger works there are several choral and solo cantatas of which the earliest, such as the great Dixit Dominus, show in

their extra- vagant vocal difficulty how radical was the change which Handel's Italian experience so rapidly effected in his methods.

Handel's success in Italy established his fame and led to his receiving at Venice in 1 709 the offer of the post of Kapellmeister to the elector of Hanover, transmitted to him by Baron Kiel- mansegge, his patron and staunch friend of later years. Handel at the time contemplated a visit to England, and he accepted this offer on condition of leave of absence being granted to him for that purpose. To England accordingly Handel journeyed after a short stay at Hanover, arriving in London towards the close of 1 7 10. He came as a composer of Italian opera, and earned his first success at the Haymarket with Rinaldo, com- posed, to the consternation of the hurried librettist, in a fortnight, and first performed on the 24th of February 1711. In this opera the aria " Lascia ch'io pianga" found its final home. The work was produced with the utmost magnificence, and Addison's delightful reviews of it in the Spectator poked fun at it from an unmusical point of view in a way that sometimes curiously foreshadows the criticisms that Gluck might have made on such things at a later period. The success was so great, especially for Walsh the publisher, that Handel proposed that Walsh should compose the next opera, and that he should publish it. He returned to Hanover at the close of the opera season, and com- posed a good deal of vocal chamber music for the princess Caroline, the step-daughter of the elector, besides the instru- mental works known to us as the oboe concertos. In 171 2 Handel returned to London and spent a year with Andrews, a rich musical amateur, in Barn Elms, Surrey. Three more years were spent in Burlington, in the neighbourhood of London. He evidently was but little inclined to return to Hanover, in spite of his duties to the court there. Two Italian operas and the Utrecht Te Deum written by the command of Queen Anne are the principal works of this period. It was somewhat awkward for the composer when his deserted master came to London in 1 714 as George I. of

England. For some time Handel did not venture to appear at court, and it was only at the intercession of Baron Kielmansegge that his pardon was obtained. By his advice Handel wrote the Water Music which was performed at a royal water party on the Thames, and it so pleased the king that he at once received the composer into his good graces and granted him a salary of £400 a year. Later Handel became music master to the little princesses and was given an additional £200 by the princess Caroline. In 1716 he followed the king to Germany, where he wrote a second German Passion to the popular poem of Brockes, a text which, divested of its worst features, forms the basis of several of the arias in Bach's Passion according to St John. This was Handel's last work to a German text.

On nis return to England he entered the service of the duke

of Chandos as conductor of his concerts, receiving a thousand pounds for his first oratorio Esther. The music which Handel wrote for performance at " Cannons," the duke of Chandos's residence at Edgware, is comprised in the first version of Esther, Acis and Galatea, and the twelve Chandos Anthems, which are compositions approximately in the same form as Bach's church cantatas but without any systematic use of chorale tunes. The fashionable Londoner would travel 9 miles in those days to the little chapel of Whitchurch to hear Handel's music, and all that now remains of the magnificent scene of these visits is the church, which is the parish church of Edgware. In 1720 Handel appeared again in a public capacity as impresario of the Italian opera at the Haymarket theatre, which he managed for the institution called the Royal Academy of Music. Senesino, a famous singer, to engage whom Handel especially journeyed to Dresden, was the mainstay of the enterprise, which opened with a highly successful performance of Handel's opera Radamisto. To this time belongs the famous rivalry between Handel and Buononcini, a melodious Italian composer whom many thought to be the greater of the two. The controversy has been per- petuated in John Byrom's

lines:

" Some say, compared to Buononcini

That Mynheer Handel's but a ninny;

Others aver that he to Handel

Is scarcely fit to hold a candle.

Strange all this difference should be . Twixt tweedle-dum and tweedle-dee."

It must be remembered that at this time Handel had not yet asserted his greatness as a choral writer; the fashionable ideas of music and musicianship were based entirely upon success in Italian opera, and the contest between the rival composers was waged on the basis of works which have fallen into almost as complete an oblivion in Handel's case as in Buononcini's. None of Handel's forty-odd Italian operas can be said to survive, except in some two or three detached arias out of each opera; arias which reveal their essential qualities far better in isolation than when performed in groups of between twenty and thirty on the stage, as interruptions to the action of a classical drama to which nobody paid the slightest attention. But even within these limits Handel's artistic resources were too great to leave the issue in doubt; and when Handel wrote the third act of an opera Muzio Scevola, of which Buononcini and Ariosti 1 wrote the other two, his triumph was decisive, especially as Buononcini soon got into discredit by failing to defend himself against the charge of producing as a prize-madrigal of his own a composition which proved to be by Lotti. At all events Buononcini left London, and Handel for the next ten years was without a rival in his ventures as an operatic composer. He was not, however, without a rival as an impresario; and the hostile competition of a rival company which obtained the services of the great Farinelli and also induced Senesino to desert him, led to his bankruptcy in 1737, and to an attack of paralysis caused by anxiety and overwork. The rival company

also had to be dissolved from want of support, so that Handel's misfortunes must not be attributed to any failure to maintain his position in the musical world. Handel's artistic conscience was that of the most easy-going opportunist, or he would never have continued till 1741 to work in a field that gave so little scope for his genius. But the public seemed to want operas, and, if opera had no scope for his genius, at all events he could supply better operas with greater rapidity and ease than any three other living composers working together. And this he naturally continued to do so long as it seemed to be the best way to keep up his reputation. But with all this artistic opportunism he was not a man of tact, and there are numerous stories of the type of his holding the great prima donna Cuzzoni at arm's-length out of a window and threatening to drop her unless she consented to sing a song which she had declared unsuitable to her style.

Already before his last opera, Deidamia, produced in 1741, Handel had been making a growing impression with his oratorios. 1 Chrysander says Mattei instead of Ariosti.

In these, freed from the restrictions of the stage, he was able to give scope to his genius for choral writing, and so to develop, or rather revive, that art of chorus singing which is the normal outlet for English musical talent. In 1726 Handel had become a naturalized Englishman, and in 1733 he began his public career as a composer of English texts by producing the second and larger version of Esther at the King's theatre. This was followed early in the same year by Deborah, in which the share of the chorus is much greater. In July he produced Athalia at Oxford, the first work in which his characteristic double choruses appear. The share of the chorus increases in Saul (1738); and Israel in Egypt (also 1738) is practically entirely a choral work, the solo movements, in spite of their fame,

being as perfunctory in character as they are few in number. It was not unnatural that the public, who still considered Italian opera the highest, because the most modern form of musical art, obliged Handel at subsequent performances of this gigantic work to insert more solos.

The Messiah was produced at Dublin on the 13th of April 1 742. Samson (which Handel preferred to the Messiah) appeared at Covent Garden on the 2nd of March 1744; Belshazzar at the King's theatre, 27th of March 1745; the Occasional Oratorio (chiefly a compilation of the earlier oratorios, but with a few important new numbers), on the 14th of February 1746 at Covent Garden, where all his later oratorios were produced; Judas Maccabaeus on the 1st of April 1747; Joshua on the 9th of March 1748; Alexander Balus on the 23rd of March 1748; Solomon on the 17th of March 1749; Susanna, spring of '1749; Theodora, a great favourite of Handel's, who was much dis- appointed by its cold reception, on the 16th of March 1750; Jephtha (strictly speaking, his last work) on the 26th of February 1752, and The Triumph of Time and Truth (transcribed from 77 Trionfo del tempo with the addition of many later favourite numbers), 1757. Other important works, indistinguishable in artistic form from oratorios, but on secular subjects, are Alex- ander's Feast, 1736; Ode for St Cecilia's Day (words by Dryden); V Allegro, il pensieroso ed il moderato (the words of the third part by Jennens), 1740; Semele, 1744; Hercules, 174s; and The Choice of Hercules, 17 51.

By degrees the enmity against Handel died away, though he had many troubles. In 1745 he had again become bankrupt; for, although he had no rival as a composer of choral music it was possible for his enemies to give balls and banquets on the nights of his oratorio performances. As with his first bank- ruptcy, so in his later years, he showed scrupulous sense of honour in discharging his debts, and he continued to work hard to the end of his life. He had not only completely recovered his financial position by the year 1750, but he must have made a good deal of money, for he then presented an organ

to the Foundling Hospital, and opened it with a performance of the Messiah on the 1 5th of May. In 1 7 5 1 his sight began to trouble him; and the autograph of Jephtha, published in facsimile by the Hdndelgesellschaft, shows pathetic traces of this in his handwriting, 1 and so affords a most valuable evidence of his methods of composition, all the accompaniments, recitatives, and less essential portions of the work being evidently filled in long after the rest. He underwent unsuccessful operations, one of them by the same surgeon who had operated on Bach's eyes. There is evidence that he was able to see at intervals during his last years, but his sight practically never returned after May 1752. He continued superintending performances of his works and writing new arias for them, or inserting revised old ones, and he attended a performance of the Messiah a week before his death, which took place, according to the Public Advertiser of the 16th of April, not on Good Friday, the 13th of April, according to his own pious wish and according to common report, but on the 14th of April 1759. He was buried in Westminster Abbey; and his monument is by L. F. Roubilliac,

1 By a dramatic coincidence Handel's blindness interrupted him during the writing of the chorus, " How dark, oh Lord, are Thy decrees, ... all our joys to sorrow turning … as the night succeeds the day."

the same sculptor who modelled the marble statue erected in 1739 in Vauxhall Gardens, where his works had been frequently performed.

Handel was a man of high character and intelligence, and his interest was not confined to his own art exclusively. He liked the society of politicians and literary men, and he was also a collector of pictures and articles of vertu. His power of work was enormous, and the Hdndelgesellschaft' s edition of his complete works fills one hundred volumes, forming a total bulk almost equal to the works of Bach and Beethoven together. (F. H. ; D. F. T.)

No one has more successfully popularized the

greatest artistic ideals than Handel; no artist is more disconcerting to critics who imagine that a great man's mental development is easy to follow. Not even Wagner effected a greater composer. transformation in the possibilities of dramatic music than Handel effected in oratorio, yet we have seen that Handel was the very opposite of a reformer. He was not even conser- vative, and he hardly took the pains to ascertain what an art- form was, so long as something externally like it would convey his idea. But he never failed to convey his idea, and, if the hybrid forms in which he conveyed it had no historic influence and no typical character, they were none the less accurate in each individual case. The same aptness and the same absence of method are conspicuous in his style. The popular idea that Handel's style is easily recognizable comes from the fact that he overshadows all his predecessors and contemporaries, except Bach, and so makes us regard typical 18th-century Italian and English style as Handelian, instead of regarding Handel's style as typical Italian 18th-century. Nothing in music requires more minute expert knowledge than the sifting of the real peculiarities of Handel's style from the mass of contemporary formulae which in his inspired pages he absorbed, and which in his uninspired pages absorbed him.

His easy mastery was acquired, like Mozart's, in childhood. The later sonatas for two oboes and bass which he wrote in his eleventh year are, except in their diffuseness and an occasional slip in grammar, indistinguishable from his later works, and they show a boyish inventiveness worthy of Mozart's work at the same age. Such early choral works, as the Dixit Dominus (1707), show the ill-regulated power of his choral writing before he assimilated Italian influences. Its practical diffi- culties are at least as extravagant as Bach's, while they are not accounted for by any corresponding originality and necessity of idea; but the grandeur of the scheme and nobility of thought is already that for which Handel so often in later years found the simplest

and easiest adequate means of expression that music has ever attained. His eminently practical genius soon formed his vocal style, and long before the period of his great oratorios, such works as The Birthday Ode for Queen Anne (1713) and the Utrecht Te Deum show not a trace of German extra- vagance. The only drawback to his practical genius was that it led him to bury perhaps half of his finest melodies, and nearly all the secular features of interest in his treatment of instruments and of the aria forms, in that deplorable limbo of vanity, the 18th-century Italian opera. It is not true, as has been alleged against him, that his operas are in no way superior to those of his contemporaries; but neither is it true that he stirred a finger to improve the condition of dramatic musical art. He was no slave to singers, as is amply testified by many anecdotes. Nor was he bound by the operatic conventions of the time. In Teseo he not only wrote an opera in five acts when custom prescribed three, but also broke a much more plausible rule in arranging that each character should have two arias in succession. He also showed a feeling for expression and style which led him to write arias of types which singers might not expect. But he never made any innovation which had the slightest bearing upon the stage-craft of opera, for he never concerned himself with any artistic question beyond the matter in hand; and the matter in hand was not to make dramatic music, or to make the story interesting or intelligible, but simply to provide a concert of between some twenty and thirty Italian arias and duets, wherein singers could display their abilities and spectators find distraction from the monotony of so large a dose of the aria form (which

was then the only possibility for solo vocal music) in the gorgeous- ness of the dresses and scenery.

When the question arose how a musical entertainment of this kind could be managed in Lent without

protests from the bishop of London, Handelian oratorio came into being as a matter of course. But though Handel was an opportunist he was not shallow. His artistic sense seized upon the natural possibilities which arose as soon as the music was transferred from the stage to the concert platform; and his first English oratorio, Esther (1720), beautifully shows the transition. The subject is as nearly secular as any that can be extracted from the Bible, and the treatment was based on Racine's Esther, which was much discussed at the time. Handel's oratorio was reproduced in an enlarged version in 1732 at the King's theatre: the princess royal wished for scenery and action, but the bishop of London protested. And the choruses, of which in the first version there are already no less than ten, are on the one hand operatic and unecclesiastical in expression, until the last, where polyphonic work on a large scale first appears; but on the other hand they are all much too long to be sung by heart, as is necessary in operas. In fact, the turning-point in Handel's development is the emancipation of the chorus from theatrical limitations. This had as great effect upon his few but important secular English works as upon his other oratorios. Acts and Galatea, Semele and Hercules, are in fact secular oratorios; the choral music in them is not ecclesiastical, but it is large, independent and polyphonic.

We must remember, then, that Handel's scheme of oratorio is operatic in its origin and has no historic connexion with such principles as might have been generalized from the practice of the German Passion music of the time; and it is sufficiently astonishing that the chorus should have so readily assumed its proper place in a scheme which the public certainly regarded as a sort of Lenten biblical opera. And, although the chorus owes its freedom of development to the disappearance of theatrical necessities, it becomes no less powerful as a means of dramatic expression (as opposed to dramatic action) than as a purely musical resource. Already in Athalia the " Hallelujah " chorus at the

end of the first act is a marvel of dramatic truth. It is sung by Israelites almost in despair beneath usurping tyranny; and accordingly it is a severe double fugue in a minor key, expressive of devout courage at a moment of depression. On purely musical grounds it is no less powerful in throwing into the highest possible relief the ecstatic solemnity of the psalm with which the second act opens. Now this sombre " Hallelujah " chorus is a very convenient illustration of Handel's originality, and the point in which hig creative power really lies. It was not originally written for its situation in Athalia, but it was chosen for it. It was originally the last chorus of the second version of the anthem, As pants the Hart, from the autograph of which it is missing because Handel cut out the last pages in order to insert them into the manuscript of Athalia. The inspiration in Athalia thus lies not in the creation of the chorus itself, but in the choice of it.

In choral music Handel made no more innovation than he made in arias. His sense of fitness in expression was of little use to him in opera, because opera could not become dramatic until musical form became capable of developing and blending emotions in all degrees of climax in a way that may be described as pictorial and not merely decorative (see Music; Sonata- Forms; and Instrumentation). But in oratorio there was not the least necessity for reforming any art-forms. The ordinary choral resources of the time had perfect expressive possibilities where there were no actors to keep waiting, and where no dresses and scenery need distract the attention of the listener. When lastly, ordinary decorum dictated an attitude of reverent attention towards the subject of the oratorio, then the man of genius could find such a scope for his real sense of dramatic fitness as would make his work immortal.

In estimating Handel's greatness we must think away all orthodox musical and progressive prejudices, and learn to apply the lessons critics of architecture and some critics of literature

seem to know by nature. Originality, in music as in

other arts, lies in the whole, and in a sense of the true meaning of every part. When Handel wrote a normal double fugue in a minor key on the word "Hallelujah" he showed that he at all events knew what a vigorous and dignified thing an 18th-century double fugue could be. In putting it at the end of a melancholy psalm he showed his sense of the value of the minor mode. When he put it in its situation in Athalia he showed as perfect a sense of dramatic and musical fitness as could well be found in art. Now it is obvious that in works like oratorios (which are dramatic schemes vigorously but loosely organized by the putting together of some twenty or thirty complete pieces of music) the proper conception of originality will be very different from that which animates the composer of modern lyric, operatic or symphonic music. When we add to this the characteristics of a method like Handel's, in which musical technique has become a masterly automatism, it becomes evident that our conception of originality must be at least as broad as that which we would apply in the criticism of architecture. The disadvantages of the want of such a conception have been aggravated by the dearth of general knowledge of the structure of musical art; a knowledge which shows that the parallel we have suggested between music and architecture, as regards the nature of originality, is no mere figure of speech.

In every art there is an antithesis between form and matter, which becomes reconciled only when the work of art is perfect in its execution. And, whatever this perfection, the antithesis must always remain in the mind of the artist and critic to this extent, that some part of the material seems to be the special subject of technical rule rather than another. In the plastic and literary arts one type of this antithesis is more or less permanently maintained in the relation between subject and treatment. The mere fact that these arts express themselves by representing things that have some previous independent existence, helps us to look for originality rather in the things that make for

perfection of treatment than in novelty of subject. But in music we have no permanent means of deciding which of many aspects we shall call the subject and which the treatment. In the 16th century the a priori form existed mainly in the practice of basing almost every melodic detail of the work on phrases of Gregorian chant or popular song, treated for the most part in terms of very definitely regulated polyphonic design, and on harmonic principles regulated in almost every detail by the relation between the melodic aspects of the church modes and the necessity for occasional alterations of the strict mode to secure finality at the close. In modern music such a relation between form and matter, prescribing as it does for every aspect at every moment both of the shape and the texture of the music, would exclude the element of invention altogether. In 16th-century music it by no means had that effect. An inventive 16th-century com- poser is as clearly distinguishable from a dull one as a good architect from a bad. The originality of the composer resides, in 16th-century music as in all art, in his whole work; but naturally his conception of property and ideas will not extend to themes or isolated passages. That man is entitled to an idea who can show what it means, or who can make it mean what he likes. Let him wear the giant's robe if it fits him. And it is merely a local difference in point of view which makes us think that there is property in themes and no property in forms. Nowadays we happen to regard the shape of a whole composition as its form, and its theme as its matter. And, as artistic organization becomes more complex and heterogeneous, the need of the broadest and most forcible possible outline of design is more pressingly felt; so that in what we choose to call form we are willing to sacrifice all conception of originality for the sake of general intelligibility, while we insist upon complete originality in those thematic details which we are pleased to call matter. But, if this explains, it does not excuse our setting up a criterion for musical originality which can be accepted by no intelligent critics of other arts, and which is completely upset by the

study of any music earlier than the beginning of the 19th century.

9H

HANDEL

The difficulty many writers have found in explaining the subject of Handel's " plagiarisms " is not entirely accounted for by mere lack of these considerations; but the grossest con- fusion of ideas as to the difference between cases in point prevails to this day, and many discussions which have been raised in regard to the ethical aspect of the question are frankly absurd. 1 It has been argued, for instance, that great injustice was done to Buononcini over his unfortunate affair with the prize madrigal, while his great rival was allowed the credit of Israel in Egypt, which contains a considerable number of entire choruses (besides hosts of themes) by earlier Italian and German writers. But the very idea of Handelian oratorio is that of some three hours of music, religious or secular, arranged, like opera, in the form of a colossal entertainment, and with high dramatic and emotional interest imparted to it, if not by the telling of a story, at all events by the nature and development of the subject. It seems, moreover, to be entirely overlooked that the age was an age of pasticcios. Nothing was more common than the organization of some such solemn entertainment by the skilful grouping of favourite pieces. Handel himself never revived one of his oratorios without inserting in it favourite pieces from his other works as well as several new numbers; and the story is well known that the turning point in Gluck's career was his perception of the true possibilities of dramatic music from the failure of a pasticcio in which he had reset some rather definitely expressive music to situations for which it was not originally designed. The success of an oratorio was due to the appropriateness of its contrasts, together of course with the mastery of its detail, whether that detail were new or old; and there are many gradations between a rechauffe of an early work like The

Triumph of Time and Truth, or a pasticcio with a few original numbers like the Occasional Oratorio, and such works as Samson, which was entirely new except that the " Dead March " first written for it was immediately replaced by the more famous one imported from Saul. That the idea of the pasticcio was extremely familiar to the age is shown by the practice of announcing an oratorio as " new and original," a term which would obviously be meaningless if it were as much a matter of course as it is at the present day, and which, if used at all, must obviously so apply to the whole work without forbidding the composer from gratifying the public with the reproduction of one or two favourite arias. But of course the question of originality becomes more serious when the imported numbers are not the composer's own. And here it is very noticeable that Handel derived no credit, either with his own public or with us, from whole movements that are not of his own designing. In Israel in Egypt, the choruses " Egypt was glad when they departed," " And I will exalt Him," " Thou sentest forth Thy Wrath " and " The Earth swallowed them," are without exception the most colourless and unattractive pieces of severe counterpoint to be found among Handel's works; and it is very difficult to fathom his motive in copying them from obscure pieces by Erba and Kaspar Kerl, unless it be that he wished to train his audiences to a better understanding of a polyphonic style. He certainly felt that the greatest possibilities of music lay in the higher choral poly- phony, and so in Israel in Egypt he designed a work consisting almost entirely of choruses, and may have wished in these instances for severe contrapuntal movements which he had not time to write, though he could have done them far better himself. Be this as it may, these choruses have certainly added nothing 'The "moral" question has been raised afresh in reviews of Mr Sedley Taylor's admirable volume of analysed illustrations {The Indebtedness of Handel to works of other Composers, Cambridge, 1906). The latest argument is that Handel shows moral obliquity in borrow- ing " regrettably " from sources no one could know at the time. This reasoning makes it

mysterious' that a man of such moral qbliquity should ever have written a note of his own music in England when he could have stolen the complete choral works of Bach and most of the hundred operas of Alessandro Scarlatti with the certainty that the sources would not be printed for a century after his death, even if his own name did not then check curiosity among antiquarians. Of course Handel's plagiarisms would have damaged his reputation if contemporaries had known of them. His polyphonic scholarship was more " antiquated " in the 18th century than it is in the 20th.

to the popularity of a work of which the public from the outset complained that there was not enough solo music; and what effect they have is merely to throw Handel's own style into relief. To draw any parallel between the theft of such unat- tractive details in the grand and intensely Handelian scheme of Israel in Egypt and Buononcini's alleged theft of a prize madrigal is merely ridiculous. Handel himself, if he had any suspicion that contemporaries did not take a sane architect's view of the originality of large musical schemes, 2 probably gave himself no more trouble about their scruples on this matter than about other forms of musical banality.

The History of Music by Burney, the cleverest and most refined musical critic of the age, shows in the very freshness of its musical scholarship how completely unscholarly were the musical ideas of the time. Burney was incapable of regarding choral music as other than a highly improving academic exercise in which he himself was proficient; and for him Handel is the great opera-writer whose choral music will reward the study of the curious. If Handel had attempted to explain his methods to the musicians of his age, he would probably have found himself alone in his opinions as to the property of musical ideas. He did not trouble to explain, but he made no concealment of his sources. He left his whole musical library to his copyist, and it was from this that the sources of his work were discovered. And when the whole series of plagiarisms is- studied, the fact forces itself upon us that nothing except

themes and forms which are common property in all 18th-century music, has yet been discovered as the source of any work of Handel's which is not felt as part of a larger design. Operatic arias were never felt as parts of a whole. The opera was a concert on the stage, and it stood or fell, not by a dramatic propriety which it notoriously neglected to consider at all, but by the popularity of its arias. There is no aria in Handel's operas which is traceable to another composer. Even in the oratorios there is no solo number in which more than the themes are pilfered, for in oratorios the solo work still appealed to the popular criterion of novelty and individual attractiveness. And when we leave the question of copying of whole movements and come to that of the adaptation of passages, and still more of themes, Handel shows himself to be simply on a line with Mozart. Jahn compares the opening of Mozart's Requiem with that of the first chorus in Handel's Funeral Anthem. Mozart recreates at least as much from Handel's already perfect frame- work as Handel ever idealized from the inorganic fragments of earlier writers. The double counterpoint of the Kyrie in Mozart's Requiem is still more indisputably identical with that of the last chorus of Handel's Joseph, and if the themes are common property their combination certainly is not. But the true plagiarist is the man who does not know the meaning of the ideas he copies, and the true creator is he in whose hands they remain or become true ideas. The theme " He led them forth like sheep " in the chorus " But as for his people " is one of the most beautiful in Handel's works, and the bare statement that it comes from a serenata by Stradella seems at first rather shocking. But, to any one who knew Stradella's treatment of it first, Handel's would come as a revelation actually greater than if he had never heard the theme before. Stradella makes nothing more of it, and therefore presumably sees nothing more in it than an agreeable and essentially frivolous little tune which lends itself to comic dramatic purpose by a wearisome repetition throughout eight pages of patchy aria and instrumental ritornello at an ever-increasing pace.

What Handel sees in it is what he makes of it, one of the most solemn and poetic things in music. .. Again, it may be very shocking to discover that the famous opening of the " Hailstone chorus " comes from the patchy and facetious overture to this same serenata, with which it is identical for ten bars all in the tonic chord (representing, according to Stradella, someone knocking at a door). And it is no doubt yet more shocking that the chorus " He spake the word, and

2 Much light would be thrown on the subject if some one sufficiently ignorant of architecture were to make researches into Sir Christopher Wren's indebtedness to Italian architects !

HANDFASTING— HANDICAP

*9*5*

there came all manner of flies " contains no idea of Handel's own except the realistic swarming violin-passages, the general structure, and the vocal colouring; whereas the rhythmic and melodic figures of the voice parts come from an equally patchy sinfonia concertata in Stradella's work. The real interest of these things ought not to be denied either by the misstatement that the materials adapted are mere common property, nor by the calumny that Handel was uninventive.

The effects of Handel's original inspiration upon foreign material are really the best indication of the range of his style. The comic meaning of the broken rhythm of Stradella's overture becomes indeed Handel's inspiration in the light of the gigantic tone-picture of the " Hailstone chorus." In the theme of " He led them forth like sheep " we have already cited a particular case where Handel perceived great solemnity in a theme originally intended to be frivolous. The converse process is equally instructive. In the short Carillon choruses in Saul where the Israelitish women welcome David after his victory over Goliath, Handel uses a delightful instrumental tune which stands at the

beginning of a Te Deum by Urio, from which he borrowed an enormous amount of material in Saul, V Allegro, the Dettingen Te Deum and other works. Urio's idea is first to make a jubilant and melodious noise from the lower register of the strings, and then to bring out a flourish of high trumpets as a contrast. He has no other use for his beautiful tune, which indeed would not bear more elaborate treatment than he gives it. The ritornello falls into statement and counterstatement, and the counterstatement secures one repetition of the tune, after which no more is heard of it. It has none of the solemnity of church music, and its value as a contrast to the flourish of trumpets depends, not upon itself, but upon its position in the orchestra. Handel did not see in it a fine opening for a great ecclesiastical work, but he saw in it an admirable expression of popular jubilation, and he understood how to bring out its character with the liveliest sense of climax and dramatic interest by taking it at its own value as a popular tune. So he uses it as an instrumental interlude accompanied with a jingle of carillons, while the daughters of Israel sing to a square-cut tune those praises of David which aroused the jealousy of Saul. But now turn to the opening of the Dettingen Te Deum and see what splendid use is made of the other side of Urio's idea, the contrast between a jubilant noise in the lowest part of the scale and the blaze of trumpets at an extreme height. In the fourth bar of the Dettingen Te Deum we find the same florid trumpet figures as we find in the fifth bar of Urio's, but at the first moment they are on oboes. The first four bars beat a tattoo on the tonic and dominant, with the whole orchestra, including trumpets and drums, in the lowest possible position and in a stirring rhythm with a boldness and simplicity characteristic only of a stroke of genius. Then the oboes appear with Urio's trumpet flourishes;' the momentary contrast is at least as brilliant as Urio's; and as the oboes are immediately followed by the same figures on the trumpets themselves the contrast gains incalculably in subtlety and climax. Moreover, these flourishes are more melodious than

the broad and massive opening, instead of being, as in Urio's scheme, incomparably less so. Lastly, Handel's primitive opening rhythmic figures inevitably underlie every subsequent inner part and bass that occurs at every half close and full close throughout the movement, especially where the trumpets are used. And thus every detail of his scheme is rendered alive with a rhythmic significance which the elementary nature of the theme prevents from ever becoming obtrusive.

No other great composer has ever so overcrowded his life with occasional and mechanical work as Handel, and in no other artist are the qualities that make the difference between inspired and uninspired pages more difficult to analyse. The libretti of his oratorios are full of absurdities, except when they are derived in every detail from Scripture, as in the Messiah and Israel hi Egypt, or from the classics of English literature, as in Samson and V Allegro. These absurditie's, and the obvious fact that in every oratorio Handel writes many more numbers than

are desirable for one performance, and that he was continually in later performances adding, transferring and cutting out solo numbers and often choruses as well — all this may seem at first sight to militate seriously against the view that Handel's originality and greatness consists in his grasp of the works as wholes, but in reality it strengthens that view. These things militate against the perfection of the whole, but they would have been absolutely fatal to a work of which the whole is not (as in all true art) greater than the sum of its parts. That they are felt as absurdities and defects already shows that Handel created in English oratorio a true art-form on the largest possible scale.

There never has been a time when Handel has been overrated, except in so far as other composers have been neglected. But no composer has suffered so much from pious misinterpretation and the popular admiration of misleading externals. It is not the

place here to dilate upon the burial of Handel's art beneath the " mammoth " performances of the Handel Festivals at the Crystal Palace; nor can we give more than a passing reference to the effects of " additional accompaniments " in the style of an altogether later age, started most unfortunately by Mozart (whose share in the work has been very much misinterpreted and corrupted) and continued in the middle of the 19th century by musicians of every degree of intelligence and refinement, until all sense of unity of style has been lost and does not seem likely to be recovered as a general element in the popular appreciation of Handel for "some time to come. But in spite of this, Handel will never cease to be revered and loved as one of the greatest of composers, if we value the criteria of architectonic power, a perfect sense of style, and the power to rise to the most sublime height of musical climax by the simplest means.

Handel's important works have all been mentioned above with their dates, and a separate detailed list does not seem necessary. He was an extremely rapid worker, and his later works are dated almost day by day as they proceed. From this we learn that the Messiah was sketched and scored within twenty-one days, and that even Jephtha, with an interruption of nearly four months besides several other delays caused by Handel's failing sight, was begun and finished within seven months, representing hardly five weeks' actual writing. Handel's extant works may be roughly summarized from the edition of the Handelgesellschaft as 41 Italian operas, 2 Italian oratorios, 2 German Passions, 18 English oratorios, 4 English secular oratorios, 4 English secular cantatas, and a few other small works, English and Italian, of the type of oratorio or incidental dramatic music; 3 Latin settings of the Te Deum; the (English) Dettingen Te Deum and Utrecht Te Deum and Jubilate ; 4 coronation anthems ; 3 volumes of English anthems (Chandos Anthems); I volume of Latin church music; 3 volumes of Italian vocal chamber-music; I volume of clavier works; 37 instrumental ducts and trios (sonatas), and 4 volumes of

orchestral music and organ concertos (about 40 works). Precise figures are impossible as there is no means of draw- ing the line between pasticcios and original works. The instrumental pieces especially are used again and again as overtures to operas and oratorios and anthems.

The complete edition of the German Handelgesellschaft suffers from being the work of one man who would not recognize that his task was beyond any single man's power. The best arrangements of the vocal scores are undoubtedly those published by Novello that are not based on " additional accompaniments." None is absolutely trustworthy, and those of the editor of the German Handelgesellschaft are sad proofs of the uselessness of expert library-scholarship without a sound musical training. Yet Chrysander's services in the restoration of Plandel are beyond praise. We need only mention his discovery of authentic trombone parts in Israel in Egypt as one among many of his priceless contributions to musical history and aesthetics. (D. F. T.)

HANDFASTING (A.S. kandfcestnung, pledging one's hand), primarily the O. Eng. synonym for betrothal (q.v.), and later a peculiar form of temporary marriage at one time common in Scotland, the only necessary ceremony being the verbal pledge of the couple while holding hands. The pair thus handfasted were, in accordance with Scotch law, entitled to live together for a year and a day. If then they so wished, the temporary marriage could be made permanent: if not, they could go their several ways without reproach, the child, if any, being supported by the party who objected to further cohabitation.

HANDICAP (from the expression hand in cap, referring to drawing lots), a disadvantageous condition imposed upon the

superior competitor in sports and games, or an advantage allowed the inferior, in order to equalize the chances of both. The character of the handicap depends upon the nature of the sport. Thus in horse-racing the better horse must carry the heavier weight. In foot races the inferior runners are allowed to start at certain distances in advance of the best (or " scratch ■") man, according to their previous records. In distance competi- tions (weights, fly-casting, jumping, &c.) the inferior contestants add certain distances to their scores. In time contests (yachting, canoe-racing, &c.) the weaker or smaller competitors subtract certain periods of time from that actually made, reckoned by the mile. In stroke contests (e.g. golf) a certain number of strokes are subtracted from or added to the scores, according to the strength of the players. In chess and draughts the stronger competitor may play without one or more pieces. In court games (tennis, lawn-tennis, racquets, &c.) and in billiards certain points, or percentage of points, are accorded the weaker players.

Handicapping was applied to horse-racing as early as 1680, though the word was not used in this connexion much before the middle of the 18th century. A " Post and Handy-Cap Match " is described in Pond's Racing Calendar for 1754. A reference to something similar in Germany and Scandinavia, called Freimarkt, may be found in Germania, vol. xix. •

Competitions in which handicaps are given are called handicap- events or handicaps. There are many systems which depend upon the whim of the individual competitors. 'Thus a tennis player may offer to play against his inferior with a selzer-bottle instead of a racquet; or a golfer to play with only one club; or a chess-player to make his moves without seeing the board.

The name " handicap " was taken from an ancient English game, to which Pepys, in his Diary under the date of the 18th of September 1660, .thus refers: " Here some of us fell to handi- cap, a sport that I never knew before, which was very good." This game,

which became obsolete in the 19th century, was described as early as the 14th in Piers the Plowman under the name of " New Faire." It was originally played by three persons, one of whom proposed to " challenge," or exchange, some piece of property belonging to another for something of his own. The challenge being accepted an umpire was chosen, and all three put up a sum of money as a forfeit. The two players then placed their right hands in a cap, or in their pockets, in which there was loose money, while the umpire proceeded to describe the two objects of exchange, and to declare what sum of money the owner of the inferior article should pay as a bonus to the other. This declaration was made as rapidly as possible and ended with the invitation, " Draw, gentlemen!" Each player then withdrew and held out his hand, which he opened. If both hands contained money the exchange was effected according to the conditions laid down by the umpire, who then took the forfeit money for himself. If neither hand contained money the exchange was declined and the umpire took the forfeit money. If only one player signified his acceptance of the exchange by holding money in his hand, he was entitled to the forfeit-money, though the exchange was not made.

Handicap was also the name of an old game at cards, now obsolete. It resembled the game of Loo, and probably derived its name from the ancient sport described above.

HANDSEL, the O. Eng. term for earnest money; especially in Scotland the first money taken at a market or fair. The termination sel is the modern " sell." " Hand " indicates, not a bargain by shaking hands, but the actual putting of the money into the hand. Handsels were also presents or earnests of good- will in the North; thus Handsel Monday, the first Monday in •the year, an occasion for universal tipping, is the equivalent of the English Boxing day.

HANDSWORTH. (1) An urban district in the Handsworth parliamentary division of Staffordshire, England,

suburban to Birmingham on the north-west. Pop. (1891), 32,756; (1901) 52,021. (See Birmingham.) (2) An urban district in the Hallamshire parliamentary division of Yorkshire, 4 m. S.E.

of Sheffield. Pop. (1901), 13,404. In this neighbourhood are extensive collieries and quarries.

HANDWRITING. Under Palaeography and Writing, the history of handwriting is dealt with. Questions of handwriting come before legal tribunals mainly in connexion with the law of evidence. In Roman law, the authenticity of documents was proved first by the attesting witnesses; in the second place, if they were dead, by comparison of handwritings. It was necessary, however, that the document to be used for purposes of comparison either should have been executed with the for- malities of a public document, or should have its genuineness proved by three attesting witnesses. The determination was apparently, in the latter case, left to experts, who were sworn to give an impartial opinion (Code 4, 21. 20). Proof by com- parison of handwritings, with a reference if necessary to three experts as to the handwriting which is to be used for the purposes of comparison, is provided for in the French Code of Civil Procedure (arts. 193 et seq.); and in Quebec (Code Proc. Civ. arts. 392 et seq.) and St Lucia (Code Civ. Proc. arts. 286 et seq.), the French system has been adopted with modifications. Com- parison by witnesses of disputed writings with any writing proved to the satisfaction of the judge to be genuine is accepted in England and Ireland in all legal proceedings whether criminal or civil, including proceedings before arbitrators (Denman Act, 28 & 29 Vict. c. 18, 55. 1, 8); and such writings and the evidence of witnesses respecting the same may be submitted to the court and jury as evidence of the genuineness or otherwise of the writing in dispute. It is admitted in Scotland (where the term comparatio literarum is in use) and in most of the American states, subject to the same conditions. In England, prior to the Common Law Procedure Act of 1854 (now superseded by* the act of 1866), documents irrelevant to the matter in issue

were not admissible for the sole purpose of comparison, and this rule has been adopted, and is still adhered to, in some of the states in America. In England, as in the United States, and in most legal systems, the primary and best evidence of hand writing is that of the writer himself. Witnesses who saw him write the writing in question, or who are familiar with his handwriting either from having seen him write or from having corresponded with him, or otherwise, may be called. In cases of disputed handwriting the court will accept the evidence of experts in handwriting, i.e. persons who have an adequate knowledge of handwriting, whether acquired in the way of their business or not, such as solicitors or bank cashiers (R. v. Silverlock, 1894, 2 Q.B. 766). In such cases the witness is required to compare the admitted handwriting of the person whose writing is in question with the disputed document, and to state in detail the similarities or differences as to the formation of words and letters, on which he bases his opinion as to the genuineness or otherwise of the disputed document. By the use of the magnifying glass, or, as in the Parnell case, by enlarged photographs of the letters alleged to have been written by Mr Parnell, the court and jury are much assisted to appreciate the grounds on which the conclusions of the expert are founded. Evidence of this kind, being based on opinion and theory, needs to be very carefully weighed, and the dangers of implicit reliance on it have been illustrated in many cases (e.g. the Beck case in 1904; and see Seaman v. Netherclift, 1876, 1 C.P.D. 540). Evidence by comparison of handwriting comes in principally either in default, or in corroboration, of the other modes of proof.

Where attestation is necessary to the validity of a document, e.g. wills and bills of sale, the execution must be proved by one or more of the attesting witnesses, unless they are dead or cannot be produced, when it is sufficient to prove the signature of one of them to the attesting clause (28 & 29 Vict. c. 18, s. 7). Signatures to certain public and official documents need not in general be

proved (see e.g. Evidence Act, 1845, ss. 1, 2).

See Taylor, Law of Evidence (10th ed., London, 1906); Erskine. Principles of the Law of Scotland (20th ed., Edinburgh, 1903); Bouvier, Law Dicty. (Bcston and London, 1897); Harris, Identi- fication (Albany, 1892); Hagan, Disputed Handwriting (New York, 1894) ; also the article Identification. (A. W. R.)

HANG-CHOW-FU, a city of China, in the province of Cheh- Kiang, 2 m. N.W. of the Tsien*tang-Kiang, at the southern terminus of the Grand canal, by which it communicates with Peking. It lies about 100 m. S.W. of Shanghai, in 30 20' 20" N., 1 20° 7'. 2 7" E. Towards the west is the Si-hu or Western Lake, a beautiful sheet of water, with its banks and islands studded with villas, monuments and gardens, and its surface traversed by gaily-painted pleasure boats. Exclusive of exten- sive and flourishing suburbs, the city has a circuit, of 12 m.; its streets are well paved and clean; and it possesses a large number of arches, public monuments, temples, hospitals and colleges. It has long ranked as one of the great centres of Chinese commerce and Chinese learning. In 1869 the silk manufactures alone were said to give employment to 60,000 persons within its walls, and it has an extensive production of gold and silver work and tinsel paper. On one of the islands in the lake is the great Wen-lan-ko or pavilion of literary assemblies, and it is said that at the examinations for the second degree, twice every three years, from 10,000 to 15,000 candidates come together. In the north-east corner of the city is the Nestorian church which was noted by Marco Polo, the facade being " elaborately carved and the gates covered with elegantly wrought iron." There is a Roman Catholic mission in Hang- chow, and the Church Missionary Society, the American Presby- terians, and the Baptists have stations. The local dialect differs from the Mandarin mainly in

pronunciation. The population, which is remarkable for gaiety of clothing, was formerly reckoned at 2,000,000, but is now variously estimated at 300,000, 400,000 or 800,000. Hang-chow-fu was declared open to foreign trade in 1896, in pursuance of the Japanese treaty of Shimonoseki. It is connected with Shanghai by inland canal, which is navigable for boats drawing up to 4 ft. of water, and which might be greatly improved by dredging. The cities of Shanghai, Hang- chow and Suchow form the three points of a triangle, each being connected with, the other by canal, and trade is now open by steam between all three under the inland navigation rules. These canals pass through the richest and most populous districts of China, and in particular lead into the great silk-producing districts. They have for many centuries been the highway of commerce, and afford a cheap and economical means of transport. Hangchow lies at the head of the large estuary of that name, which is, however, too shallow for navigation by steamers. The estuary or bay is funnel-shaped, and its con- figuration produces at spring tides a " bore " or tidal wave, which at its maximum reaches a height of 15 to 20 ft. The ' value of trade passing through the customs in 1899 was £1,729,000; in 1904 these figures had risen to £2,543,831.

Hang-chow-fu is the Kinsai of Marco Polo, who describes it as the finest and noblest city in the world, and speaks enthusi- astically of the number and splendour of its mansions and the wealth and luxuriance of its inhabitants. According to this authority it had a circuit of 100 m., and no fewer than 12,000 bridges and 3000 baths. The name Kinsai, which appears in Wassaf as Khanzai, in Ibn Batuta as Khansa, in Odoric of Pordenone as Camsay, and elsewhere as Campsay and Cassay, is really a corruption of the Chinese King-sze, capital, the same word which is still applied to Peking. From the 10th to the 13th century (960-1272) the city, whose real name was then Ling-nan, was the capital of southern China and the seat of the Sung dynasty, which was dethroned by the Mongolians shortly before

Marco Polo's visit. Up to 1861, when it was laid in ruins by the T'aip'ings, Hangchow continued to maintain its position as one of the most flourishing cities in the empire.

HANGING, one of the modes of execution under Roman law {ad furcam domnatio) , and in England and some other countries the usual form of capital punishment. It was derived by the Anglo-Saxons from their German ancestors (Tacitus, Germ. 12). Under William the Conqueror this mode of punishment is said to have been disused in favour of mutilation: but Henry I. decreed that all thieves taken should be hanged (i.e. summarily without trial), and by the time of Henry II. hanging was fully established as a punishment for homicide; the " right of pit

and gallows " was ordinarily included in the royal grants of jurisdiction to lords of manors and to ecclesiastical 1 and municipal corporations. In the middle ages every town, abbey, and nearly all the more important manorial lords had the right of hanging. The clergy had rights, too, in respect to the gallows. Thus William the Conqueror invested the abbot of Battle Abbey with authority to save the life of any criminal. From the end of the 1 2th century the jurisdiction of the royal courts gradually became exclusive; as early as 121 2 the king's justices sentenced offenders to be hanged (Seld. Soc. Publ. vol. i. ; Select Pleas of the Crown, p. in), and in the Gloucester eyre of 1 221 instances of this sentence are numerous (Maitland, pi. 72, 101, 228). In 1 241 a nobleman's son, William Marise, was hanged for piracy. In the reign of Edward I. the abbot of Peterborough set up a gallows at Collingham, Notts, and hanged a thief. In 1279 two hundred and eighty Jews were hanged for clipping coin. The mayor and the porter of the South Gate of Exeter were hanged for their neglect in leaving the city gate open at night, thereby aiding the escape of a murderer. Hanging in time superseded all other forms of capital punishment for felony. It was substituted in 1790 for burning as a punishment of female traitors and in 1814 for beheading as a punishment for male traitors. The older and more

primitive modes of carrying out the sentence were by hanging from the bough of a tree ("the father to the bough, the son to the plough ") or from a gallows. Formerly in the worst cases of murder it was customary after execution to hang the criminal's body in chains near the scene of his crime. This was known as " gibbeting," and, though by no means rare in the earliest times, was, according to Blackstone, no part of the legal sentence. Holinshed is the authority for the statement that sometimes culprits were gibbeted alive, but this is doubtful. It was not until 1752 that gibbeting was recognized by statute. The act (25 Geo. II. c. 37) empowered the judges to direct that the dead body of a murderer should be hung in chains, in the manner practised for the most atrocious offences, or given over to surgeons to be dissected and anatomized, and forbade burial except after dissection (see Foster, Crown Law, 107, Earl Ferrers' case, 1760). The hanging in chains was usually on the spot where the murder took place. Pirates were gibbeted on the sea shore or river bank. The act of 1752 was repealed in 1828, but the alternatives of dissection or hanging in chains were re-enacted and continued in use until abolished as to dissection by the Anatomy Act in 1832, and as to hanging in chains in 1834. The last murderer hung in chains seems to have been James Cook, executed at Leicester on the 10th of August 1832. The irons used on that occasion are preserved in Leicester prison. Instead of chains, gibbet irons, a framework to hold the limbs together, were sometimes used. At the town hall, Rye, Sussex, are preserved the irons used in 1742 for one John Breeds who murdered the mayor.

The earlier modes of hanging were gradually disused, and the present system of hanging by use of the drop is said to have been inaugurated at the execution of the fourth Earl Ferrers in 1760. The form of scaffold now in use 2 has under the gallows a drop constructed on the principle of the trap-doors on a theatrical stage, upon which the convict is placed under the gallows, a white cap is placed over his head, and when the halter has been properly adjusted

the drop is withdrawn by a mechanical contrivance worked by a lever, much like those in use on railways for moving points and signals. The convict falls into a pit,

1 See Pollock and Maitland vol. i. 563. The sole survival of these grants is the jurisdiction of the justices of the Soke of Peterborough to try for capital offences at their quarter sessions.

2 In most counties in Ireland the scaffold used (in 1852) to consist in an iron balcony permanently fixed outside the gaol wall. There was a small door in the wall commanding the balcony and opening out upon it. The bottom of the iron balcony or cage was so con- structed that on the withdrawal of a pin or bolt which could be managed from within the gaol, the trap-door upon which the culprit stood dropped from under bis feet. The upper end of the rope was fastened to a strong iron bar, which projected over the trap-door. There were usually two or three trap-doors on the same balcony, so that, if required, two or more men could be hanged simultaneously. (Trench, Realities of Irish Life (1869), 280.)

Ihe length of the fall being regulated by his height and weight. Death results not from real hanging and strangulation, but from a fracture of the cervical vertebrae. Compression of the windpipe by the rope and the obstruction of the circulation aid in the fatal result. Recently the noose has had imbedded in its fibre a metal eyelet which is adjusted tightly beneath the ear and considerably expedites death. The convict is left hanging until life is extinct.

It was long considered essential that executions, like trials, should be public, and be carried out in a manner calculated to impress evil-doers. Partly to this idea, partly to notions of revenge and temporal punishment of sin, is probably due the rigour of the administration of the English law. But the methods

of execution were unseemly, as delineated in Hogarth's print of the execution of the idle apprentice, and were ineffectual in reducing the bulk of crime, which was augmented by the in- efficiency of the police and the uncertainty and severity of the law, which rendered persons tempted to commit crime either reckless or confident of escape. The scandals attending public executions led to an attempt to alter the law in 1841, although many protests had been made long before, among them those of the novelist Fielding. But perhaps the most forcible and effectual was that of Charles Dickens in his letters to The Times written after mixing in the crowd gathered to witness the execu- tion of the Mannings at Horsemonger Lane gaol in 1849. After his experiences he came to the conclusion that public executions attracted the depraved and those affected by morbid curiosity; and that the spectacle had neither the solemnity nor the salutary effect which should attend the execution of public justice. His views were strongly resisted in some quarters; and it was not until 1868 (31 & 32 Vict. c. 24) that they were accepted. The last public hanging in England was that of Michael Barrett for murder by causing an explosion at Clerkenwell prison with the object of releasing persons confined there for treason and felony (Ann. Reg., 1868, p.. 63). Under the act of 1868 (31 & 32 Vict, c. 24), which was adapted from similar legislation already in force in the Australian colonies convicted murderers are hanged within the walls of a prison. The sentence of the court is that the convict " be hanged by the neck until he is dead." The execution of the sentence devolves on the sheriff of the county (Sheriffs Act 1887, s. 13). As a general rule the sentence is carried out in England and Ireland at 8 a.m. on a week-day (not being Monday), in the week following the third Sunday after sentence was passed. In old times prisoners were often hanged on the day after sentence was passed; and under the act of 1752 this was made the rule in cases of murder. A public notice of the date and hour of execution must be posted on the prison walls not less than twelve hours before the execution and must remain until the

inquest is over. The persons required to be present are the sheriff, the gaoler, chaplain and surgeon of the prison, and such other officers of the prison as the sheriff requires; justices of the peace for the jurisdiction to which the prison belongs, and such of the relatives, or such other persons as the sheriff or visiting justices allow, may also attend. It is usual to allow the attendance of some representatives of the press. The death of the prisoner is certified by the prison surgeon, and a declaration that judgment of death has been executed is signed by the sheriff. An inquest is then held on the body by the coroner for the jurisdiction and a jury from which prison officers are excluded. The certificate and declaration, and a duplicate of the coroner's inquiry also, are sent to the home office, or in Ireland to the lord-lieutenant, and the body of the prisoner is interred in quicklime within the prison walls if space is available. It is also the practice to toll the bell of the parish or other neigh- bouring church, for fifteen minutes before and fifteen minutes after the execution. The hoisting of the black flag at the moment of execution was abolished in 1902. The regulations as to execution are printed in the Statutory Rules and Orders, Revised ed. 1904, vol. x. (tits. Prison E. and Prison I). The act of 1868 applies only to executions for murder; but since the passing of the act there have been no executions for any other crime within the United Kingdom. (See further Capital Punishment.)

In Scotland execution by hanging is carried out in the same manner as in England and Ireland, but under the supervision of the magistrates of the burgh in which it is decreed to take place, and in lieu of the inquest required in England and Ireland an inquiry is held at the instance of the procurator-fiscal before a sheriff or sheriff substitute (act of 1868, s. 13). The procedure at the execution is governed by the act of 1868 and the Scottish Prison Rules, rr. 465-469 (Stat. Rules and Orders, Revised ed. 1904, tit. Prison S).

British Dominions beyond the Seas. — Throughout the

King's dominions hanging is the regular method of executing sentence of death. In India the Penal Code superseded the modes of punishment under Mahommedan law, and s. 368 of the Criminal Procedure Code of 1898 provides that sentence of death is to be executed by hanging by the neck.

In Canada the sentence is executed within a prison under conditions very similar to those in England (Criminal Code, 1892 ; ss. 936-945). In Australia the execution takes place within the prison walls, at a time and place appointed by the governor of the state. See Queensland Code, 1899, s. 664; Western Australia Code, 1 901 , s. 663 ; in these states no inquest is held. In Western Australia the governor may cause an aboriginal native to be executed outside a prison. In New Zealand the only mode of execution is by hanging within a prison (Act of 1883).

United States.- — In all the states except New York, Massa- chusetts, New Jersey, North Carolina, Mississippi, Virginia, and Ohio (see Exectrocution) persons sentenced to death are hanged. In Utah the criminal may elect to be shot instead.

The only countries, whose law is not of direct English origin, which inflict capital punishment by hanging are Japan, Austria, Hungary and Russia. (W. F. C.)

HANGO, a port and sea-bathing resort situated on the pro- montory of Hangoudd, to the extreme south-west of Finland. Hango owes its commercial importance to the fact that it is practically the only winter ice-free port in Finland, and is thus of value both to the Finnish and the Russian sea-borne trade. When incorporated in 1874 it had only a few hundred inhabitants; in 1900 it had 2501 and it has now over six thousand (5986 in 1904). It is connected by railway with Helsingfors and Tam- merfors, and is the centre of the Finnish butter export, which now amounts to over £1,000,000 yearly. There is a considerable import of coal, cotton, iron and breadstuffs, the chief exports being butter, fish,

timber and wood pulp. . During the period of emigration, owing to political troubles with Russia, over 12,000 Finns sailed from Hango in a single year (1901), mostly for the United States and Canada. Hango now takes front rank as a fashionable watering-place, especially for wealthy Russians, having a dry climate and a fine strand.

HANKA, WENCESLAUS (1791-1861), Bohemian philologist, was born at Horeniowes, a hamlet of eastern Bohemia, on the 10th of June 1791. He was sent in 1807 to school at Koniggratz, to escape the conscription, then to the university of Prague, where he founded a society for the cultivation of the Czech language. At Vienna, where he afterwards studied law, he established a Czech periodical; and in 18 13 he made the acquaintance of Josepl Dobrowsky, the eminent philologist. On the 1 6th of September 181 7 Hanka alleged that he had discovered some ancient Bohemian manuscript poems (the Koniginhof MS.) of the 13th and 14th century in the church tower of the village of Kralodwor, or Koniginhof. These were published in 1818, under the title Kralodwor sky Rukopis, with a German translation by Swoboda. Great doubt, however, was felt as to their genuineness, and Dobrowsky, by pronounc- ing The Judgment of Libussa, another manuscript found by Hanka, an "obvious fraud," confirmed the suspicion. Some years afterwards Dobrowsky saw fit to modify his decision, but by modern Czech scholars the MS. is regarded as a forgery. A translation into English, The Manuscript of the Queen's Court, was made by Wratislaw in 1852. The originals were presented by the discoverer to the Bohemian museum at Prague, of which he was appointed librarian in 1818. In 1848 Hanka, who was an ardent Panslavist, took part in the Slavonic congress and

other peaceful national demonstrations, being the founder of the political society Slovanska Lipa. He was elected to the imperial diet at Vienna, but

declined to take his seat. In the winter of 1848 he became lecturer and in 1849 professor of Slavonic languages in the university of Prague, where he died on the 1 2th of January 1861.

His chief works and editions are the following: Hankowy Pjsne (Prague, 1815), a volume of poems; Starobyla Skladani (1817–1826), in 5 vols. — a collection of old Bohemian poems, chiefly from un-published manuscripts; A Short History of the Slavonic Peoples (1818); A Bohemian Grammar (1822) and A Polish Grammar (1839) — these grammars were composed ona plan suggested by Dobrowsky ; Igor (1821), an ancient Russian epic, with a translation into Bohemian; a part of the Gospels from the Reims manuscript in the Glagolitic character (1846); the old Bohemian Chronicles of Dalimil (1848) and the History of Charles IV., by Procop Lupac (1848); Evangelium Ostromis (1853).

HANKOW (" Mouth of the Han "), the great commercial centre of the middle portion of the Chinese empire, and since 1858 one of the principal places opened to foreign trade. It is situated on the northern side of the Yangtsze-kiang at its junction with the Han river, about 600 m. W. of Shanghai in 30 32' 51" N., 114 19' 55" E., at a height of 150 ft. By the Chinese it is not considered a separate city, but as a suburb of the now decadent city of Hanyang; and it may almost be said to stand in a similar relation to Wu-chang the capital of the province of Hupeh, which lies immediately opposite on the southern bank of the Yangtsze-kiang. Hankow extends for about a mile along the main river and about two and a half along the Han. It is protected by a wall 18 ft. high, which was erected in 1863 and has a circuit of about 4 m. Within recent years the port has made rapid advance in wealth and importance. The opening up of the upper waters of the Yangtsze to steam navigation has made it a commercial entrepdt second only to Shanghai. It is the terminus of a railway between Peking and the Yangtsze, the northern' half of the trunk line from Peking to Canton. There is daily communication by regular lines of steamers with Shanghai, and smaller steamers ply on the upper

section of the river between Hankow and Ich'ang. The principal article of export continues to be black tea, of which staple Hankow has always been the central market. The bulk of the leaf tea, however, now goes to Russia by direct steamers to Odessa instead of to London as formerly, and a large quantity goes overland via Tientsin and Siberia in the form of brick tea. The quantity of brick tea thus exported in 1904 was upwards of 10 million lb. The exports which come next in value are opium, wood-oil, hides, beans, cotton yarn and raw silk. The population of Hankow, together with the city of Wuchang on the opposite bank, is estimated at 800,000, and the number of foreign residents is about 500. Large iron-works have been erected by the Chinese authorities at Hanyang, a couple of miles higher up the river, and at Wuchang there are two official cotton mills. The British concession, on which the business part of the foreign settlement is built, was obtained in 1861 by a lease in perpetuity from the Chinese authorities in favour of the crown. By 1863 a great embankment and a roadway were completed along the river, which may rise as much as 50 ft. or more above its ordinary levels, and not infrequently, as in 1849 and 1866, lays a large part of the town under water. On the former occasion little was left uncovered but the roofs of the houses. In 1864 a public assay office was established. Sub-leases for a term of years are granted by the crown to private individuals; local control, including the policing of the settlement, is managed by a municipal council elected under regulations promulgated by the British minister in China, acting by authority of the sovereign's orders in council. Foreigners, i.e. non-British, are admitted to become lease-holders on their submitting to be bound by the municipal regulations. The concession, however, gives no territorial jurisdiction. All foreigners, of whatever nationality, are justiciable only before their own consular authorities by virtue of the extra-territorial clauses of their treaties with China. In 1895 a concession, on similar terms to that under which the British is held, was obtained by Germany,

and this was followed by concessions to France and Russia.

These three concessions all lie on the north bank of the river and immediately below the British. An extension of the British concession backwards was granted in 1898. The Roman Catholics, the London Missionary Society and the Wesleyans have all missions in the town; and there are two missionary hospitals. The total trade in 1904 was valued at £15,401,076 (£9,042,190 being exports and £6,358,886 imports) as compared with a total of £17,183,400 in 1891 and £11,628,000 in 1880.

HANLEY, a market town and parliamentary borough of Staffordshire, England, in the Potteries district, 148 m. N.W. from London, on the North Staffordshire railway. Pop. (1891) 54,946; (1901) 61,599. The parliamentary borough includes the adjoining town of Burslem. The town, which lies on high ground, has handsome municipal buildings, free library, technical and art museum, elementary, science and art schools, and a large park. Its manufactures include porcelain, encaustic tiles, and earthenware, and give employment to the greater part of the population, women and children being employed almost as largely as men. In the neighbourhood coal and iron are obtained. Hanley is of modern development. Its municipal constitution dates from 1857, the parliamentary borough from 1885, and the county borough from 1888. Shelton, Hope, Northwood and Wellington are populous ecclesiastical parishes included within its boundaries. That of Etruria, adjoining on the west, originated in the Ridge House pottery works of Josiah Wedgwood and Thomas Bentley, who founded them in 1769, naming them after the country of the Etruscans in Italy. Etruria Hall was the scene of Wedgwood's experiments. The parliamentary borough of Hanley returns one member. The town was governed by a mayor, 6 aldermen, and 18 councillors until under the " Potteries federation " scheme (1908) it became part of the borough of Stoke-on-Trent (q.v.) in 1910.

HANNA, MARCUS ALONZO (1837-1904), American

politician, was born at New Lisbon (now Lisbon) Columbiana county, Ohio, on the 24th of September 1837. In 1852 he removed with his father to Cleveland, where the latter established himself in the wholesale grocery business, and the son received his education in the public schools of that city, and at the Western Reserve University. Leaving college before the completion of his course, he became associated with his father in business, and on his father's death (1862) became a member of the firm. In 1867 he entered into partnership with his father-in-law, Daniel P. Rhodes, in the coal and iron business. It was largely due to Hanna's progressive methods that the business of the firm, which became M. A. Hanna & Company in 1877, was extended to include the ownership of a fleet of lake steamships constructed in their own shipyards, and the control and operation of valuable coal and iron mines. Subsequently he became largely interested in street railway properties in Cleveland and elsewhere, and in various banking institutions. In early life he had little time for politics, but after 1880 he became prominent in the affairs of the Republican party in Cleveland, and in 1884 and 1888 was a delegate to the Republican National Convention, in the latter year being associated with William McKinley in the management of the John Sherman canvass. It was not, however, until 1896, when he personally managed the canvass that resulted in securing the Republican presidential nomination for William McKinley at the St Louis Convention (at which he was a delegate), that he became known throughout the United States as a political manager of great adroitness, tact and resourcefulness. Subsequently he became chairman of the Republican National Committee, and managed with consummate skill the campaign of 1896 against William Jennings Bryan and " free-silver." In March 1897 he was appointed, by Governor Asa S.^Bushnell (1834-1904) United States senator from Ohio, to succeed John Sherman. In the senate, to which in January 1898 he was elected for the short term ending on the 3rd of March 1899 and for the succeeding full term, he took little part in the debates, but was recognized as

one of the principal advisers of the McKinley administration, and his influence was large in consequence. Apart from politics he took a deep and active interest in the problems of capital and labour, was one of the

organizers (1901) and the first president of the National Civic Federation, whose purpose was to solve social and industrial problems, and in December 1901 became chairman of a per- manent board of conciliation and arbitration established by the Federation. After President Roosevelt's policies became defined, Senator Hanna came to be regarded as the leader of the conservative branch of the Republican party and a possible presidential candidate in 1904. He died at Washington on the 15th of February 1904.

HANNAY, JAMES (1827–1873), Scottish critic, novelist and publicist, was born at Dumfries on the 17th of February 1827. He came of the Hannays of Sorbie, an ancient Galloway family. He entered the navy in 1840 and served till 1845, when he adopted literature as his profession. He acted as reporter on the Morning Chronicle and gradually obtained a connexion, writing for the quarterly and monthly journals. In 1857 Hannay contested the Dumfries burghs in the Conservative interest, but without success. He edited the Edinburgh C our ant from i860 till 1864, when he removed to London. From 1868 till his death on the 8th of January 1873 ne was British consul at Barcelona. His letters to the Pall Mall Gazette " From an Englishman in Spain " were highly appreciated. Hannay's best books are his two naval novels, Singleton Fontenoy (1–85°) and Eustace Conyers (1855); Satire and Satirists (1854); and Essays from the Quarterly Review (1861). Satire not only shows loving appreciation of the great satirists of the past, but is itself instinct with wit and fine satiric power. The book sparkles with epigrams and apposite classical allusions, and

contains admirable critical estimates of Horace (Hannay's favourite author), Juvenal, Erasmus, Sir David Lindsay, George Buchanan, Boileau, Butler, Dryden, Swift, Pope, Churchill, Burns, Byron and Moore.

Among his other works are Biscuits and Grog, Claret Cup, and Hearts are Trumps (1848); King Dobbs (1849); Sketches in Ultra- marine (1853) ; an edition of the Poems of Edgar Allan Poe, to which he prefixed an essay on the poet's life and genius (1852) ; Characters and Criticisms, consisting mainly of his contributions to the Edin- burgh Couranl (1865); A Course of English Literature (1866); Studies on Thackeray (1869); and a family history entitled Three Hundred Years of a Norman House (the Gurneys) (1867).*

HANNEN, JAMES HANNEN, Baron (1821-1894), English judge, son of a London merchant, was born at Peckham in 1821, He was educated at St Paul's school and at Heidelberg Univer- sity, which was famous as a school of law. Called to the bar at the Middle Temple in 1848, he joined the home circuit. At this time he also wrote for the press, and supplied special reports for the Morning Chronicle. Though not eloquent in speech, he was clear, accurate and painstaking, and soon advanced in his profession, passing many more brilliant competitors. He appeared for the claimant in the Shrewsbury peerage case in 1858, when the 3rd Earl Talbot was declared to be entitled to the earldom of Shrewsbury as the descendant of the 2nd earl; was principal agent for Great Britain on the mixed British and American commission for the settlement of outstanding claims, 1853-1855; and assisted in the prosecution of the Fenian prisoners at Manchester. In 1868 Hannen was appointed a judge of the Court of Queen's Bench. In many cases he took a strong position of his own, notably in that of Farrar v. Close (1869), which materially affected the legal status of trade unions and was regarded by unionists as a severe blow to their interests. Hannen became judge of the Probate and Divorce Court in 1872, and in 1875 he was appointed president of the probate and admiralty

division of the High Court of Justice. Here he showed himself a worthy successor to Cresswell and Penzance. Many important causes came before him, but he will chiefly be remembered for the manner in which he presided oyer the , Parnell special commission. His influence pervaded the whole proceedings, and it is understood that he personally penned a large part of the voluminous report. Hannen's last public service was in connexion with the Bering Sea inquiry at Paris, when he acted as one of the British arbitrators. In January 1 89 1 he was appointed a lord of appeal in ordinary (with the dignity of a life peerage), but in that capacity he had few oppor-

tunities for displaying his powers, and he retired at the close of the session of 1893. He died in London, after a prolonged illness, on the 29th of March 1894.

HANNIBAL (" mercy " or " favour of Baal "), Carthaginian general and statesman, son of Hamilcar Barca (q.v.), was born in 249 or 247 b.c. Destined by his father to succeed him in the work of vengeance against Rome, he was taken to Spain, and while yet a boy gave ample evidence of his military aptitude. Upon the death of his brother-in-law Hasdrubal (221) he was acclaimed commander-in-chief by the soldiers and confirmed in his appointment by the Carthaginian government. After two years spent in completing the conquest of Spain south of the Ebro, he set himself to begin what he felt to be his life's task, the conquest and humiliation of Rome. Accordingly in 219 he seized some pretext for attacking the town of Saguntum (mod. Murviedro), which stood under the special protection of Rome, and disregarding the protests of Roman envoys, stormed it after an eight months' siege. As the home government, in view of Hannibal's great popularity, did not venture to repudiate this action, the declaration of war which he desired took place at the end of the year.

Of the large army of Libyan and Spanish mercenaries which he had at his disposal Hannibal selected the

most trustworthy and devoted contingents, and with these determined to execute the daring plan of carrying the war into the heart of Italy by a rapid march through Spain and Gaul. Starting in the spring of 218 he easily fought his way through the northern tribes to the Pyrenees, and by conciliating the Gaulish chiefs on his passage contrived to reach the Rhone before the Romans could take any measures to bar his advance. After outmanoeuvring the natives, who endeavoured to prevent his crossing, Hannibal evaded a Roman force sent to operate against him in Gaul; he proceeded up the valley of one of the tributaries of the Rhone (Isere or, more probably, Durance), and by autumn arrived at the foot of the Alps. His passage over the mountain-chain, at a point which cannot be determined with certainty, though the balance of the available evidence inclines to the Mt Genevre pass, and fair cases can be made out for the Col d'Argentiere and for Mt Cenis, was one of the most memorable achievements of any military force of ancient times. Though the opposition of the natives and the difficulties of ground and climate cost Hannibal half his army, his perilous march brought him directly into Roman territory and entirely frustrated the attempts of the enemy to fight out the main issue on foreign ground. His sudden appearance among the Gauls, moreover, enabled him to detach most of the tribes from their new allegiance to the Romans before the latter could take steps to check rebellion. After allowing his soldiers a brief rest to recover from their exertions Hannibal first secured his rear by subduing the hostile tribe of the Taurini (mod. Turin), and moving down the Po valley forced the Romans by virtue of his superior cavalry to evacuate the plain of Lombardy. In December of the same year he had an opportunity of showing his superior military skill when the Roman commander attacked him on the river Trebia (near Placentia) ; after wearing down the excellent Roman infantry he cut it to pieces by a surprise attack from an ambush in the flank. Having secured his position in north Italy by this victory, he quartered his troops for the winter on the Gauls, whose zeal in his cause thereupon

began to abate.- Accordingly in spring 217 Hannibal decided to find a more trustworthy base of operations farther south; he crossed the Apennines without opposition, but in the marshy lowlands of the Arno he lost a large part of his force through disease and himself became blind in one eye. Advancing through the uplands of Etruria he provoked the main Roman army to a hasty pursuit, and catching it in a defile on the shore of Lake Trasimenus destroyed it in the waters or on the adjoining slopes (see Trasimene). He had now disposed of the only field force which could check his advance upon Rome, but realizing that without siege engines he could not hope to take the capital, he preferred to utilize his victory by passing into central and southern Italy and exciting a general revolt against the sovereign power. Though closely watched

by a force under Fabius Maximus Cunctator, he was able to carry his ravages far and wide through Italy: on one occasion he was entrapped in the lowlands of Campania, but set himself free by a stratagem which completely deluded his opponent. For the winter he found comfortable quarters in the Apulian plain, into which the enemy dared not descend. In the campaign of 217 Hannibal had failed to obtain a following among the Italians; in the following year he had an opportunity of turning the tide in his favour. A large Roman army advanced into Apulia in order to crush him, and accepted battle on the site of Cannae. Thanks mainly to brilliant cavalry tactics, Hannibal, with much inferior numbers, managed to surround and cut to pieces the whole of this force; moreover, the moral effect of this victory was such that all the south of Italy joined his cause. Had Hannibal now received proper material reinforcements from his countrymen at Carthage he might have made a direct attack upon Rome; for the present he had to content himself with subduing the fortresses which still held out against

him, and the only other notable event of 216 was the defection of Capua, the second largest city of Italy, which Hannibal made his new base.

In the next few years Hannibal was reduced to minor opera- tions which centred mainly round the cities of Campania. He failed to draw his opponents into a pitched battle, and in some slighter engagements suffered reverses. As the forces detached under his lieutenants were generally unable to hold their own, and neither his home government nor his new ally Philip V. of Macedon helped to make good his losses, his position in south Italy became increasingly difficult and his chance of ultimately conquering Rome grew ever more remote. In 212 he gained an important success by capturing Tarentum, but in the same year he lost his hold upon Campania, where he failed to prevent the concentration of three Roman armies round Capua. Hannibal attacked the besieging armies with his full force in 211, and attempted to entice them away by a sudden march through Samnium which brought him within 3 m. of Rome, but caused more alarm than real danger to the city. But the siege continued, and the town fell in the same year. In 210 Hannibal again proved his superiority in tactics by a severe defeat inflicted at Herdoniae (mod. Ordona) in Apulia upon a proconsular army, and in 208 destroyed a Roman force engaged in the siege of Locri Epizephyrii. But with the loss of Tarentum in 209 and the gradual reconquest by the Romans of Samnium and Lucania his hold on south Italy was almost lost. In 207 he succeeded in making his way again into Apulia, where he waited to concert measures for a combined march upon Rome with his brother Hasdrubal (q.v.). On hearing, however, of his brother’s defeat and death at the Metaurus he retired into the mountain fastnesses of Bruttium, where he maintained himself for the ensuing years. With the failure of his brother Mago (q.v.) in Liguria (205-203) and of his own negotiations with Philip of Macedon, the last hope of recovering his ascendancy in Italy was lost. In 203, when Scipio was carrying all before him in Africa and the Carthaginian peace-party were arranging an

armistice, Hannibal was recalled from Italy by the " patriot " party at Carthage. After leaving a record of his expedition, engraved in Punic and Greek upon brazen tablets, in the temple of Juno at Crotona, he sailed back to Africa. His arrival immediately restored the predominance of the war-party, who placed him in command of a combined force of African levies and of his mercenaries from Italy. In 202 Hannibal, after meeting Scipio in a fruitless peace conference, engaged him in a decisive battle at Zama. Unable to cope with his indifferent troops against the well-trained and confident Roman soldiers, he experienced a crushing defeat which put an end to all resistance on the part of Carthage. Hannibal was still only in his forty-sixth year. He soon showed ■ that he could be a statesman as well as a soldier. Peace having been concluded, he was appointed chief magistrate (suffetes, sofet). The office had become rather insignificant, but Hannibal restored its power and authority. The oligarchy, always jealous of him, had even charged him with having betrayed the interests of his country while in Italy, and neglected to take Rome when

he might have done so. The dishonesty and incompetence of these men had brought the finances of Carthage into grievous disorder. So effectively did Hannibal reform abuses that the heavy tribute imposed by Rome could be paid by instalments without additional and extraordinary taxation.

Seven years after the victory of Zama, the Romans, alarmed at this new prosperity, demanded Hannibal's surrender. Hannibal thereupon went into voluntary exile. First he journeyed to Tyre, the mother-city'of Carthage, and thence to Ephesus, where he was honourably received by Antiochus III. of Syria, who was then preparing for war with Rome. Hannibal soon saw that the king's army was no match for the Romans. He advised him to equip a fleet and throw a body of troops on the south of Italy, adding that he would himself take the command. But he could not make much impression on Antiochus, who listened more willingly to courtiers and flatterers, and would not entrust Hannibal with any important charge. In 190

he was placed in command of a Phoenician fleet, but was defeated in a battle off the river Eurymedon.

From the court of Antiochus, who seemed prepared to surrender him to the Romans, Hannibal fled to Crete, but he soon went back to Asia, and sought refuge with Prusias, king of Bithynia. Once more the Romans were determined to hunt him out, and they sent Flaminius to insist on his surrender. Prusias agreed to give him up, but Hannibal did not choose to fall into his enemies' hands. At Libyssa, on the eastern shore of the Sea of Marmora, he took poison, which, it was said, he had long carried about with him in a ring. The precise year of his death was a matter of controversy. If, as Livy seems to imply, it was 183, he died in the same year as Scipio Africanus.

As to the transcendent military genius of Hannibal there cannot be two opinions. The man who for fifteen years could hold his ground in a hostile country against several powerful armies and a succession of able generals must have been a commander and a tactician of supreme capacity. In the use of stratagems and ambuscades he certainly surpassed all other generals of antiquity. Wonderful as his achievements were, we must marvel the more when we take into account the grudging support he received from Carthage. As his veterans melted away, he had to organize fresh levies on the spot. We never hear of a mutiny in his army, composed though it was of Africans, Spaniards and Gauls. Again, all we know of him comes for the most part from hostile sources. The Romans feared and hated him so much that they could not do him justice. Livy speaks of his great qualities, but he adds that his vices were equally great, among which he singles out his " more than Punic perfidy " and " an inhuman cruelty." For the first there would seem to be no further justification than that he was consummately skilful in the use of ambuscades. For the latter there is, we believe, no more ground than that at certain crises he acted in the general spirit of ancient warfare. Sometimes he contrasts most favourably with his enemy. No such brutality stains his name as that perpetrated by Claudius Nero on the vanquished

Hasdrubal. Polybius merely says that he was accused of cruelty by the Romans and of avarice by the Carthaginians. He had indeed bitter enemies, and his life was one continuous struggle against destiny. For steadfastness of purpose, for organizing capacity and a mastery of military science he has perhaps never had an equal.

Authorities. — Polybius iii.-xy., xxi.-ii., xxiv. ; Livy xxi.-xxx. ; Cornelius Nepos, Vita Hannibalis; Appian, Bellum Hannibalicum; E. Hennebert, Histoire d'Annibal (Paris, 187c— 1891, 3 vols.); F. A. Dodge, Great Captains, Hannibal (Boston and New York, 1891); D. Grassi, Annibale giudicato da Polibio e Tito Livio (Vicenza, 1896) ; W. How, Hannibal and the Great War 'between Rome and Carthage (London, 1899) ; T. Montanari, Annibale, down to 217 B.C. (Rovigo, 1901); K. Lehmann, Die Angriffe der drei Barkiden auf Italten (Leipzig, 1905), with bibliograpny. See also Punic Wars and articles on the chief battle sites. On Hannibal's passage through Gaul and the Alps see T. Arnold, The Second Punic War (ed. W. T. Arnold, London, 1886), Appendix B, pp. 362-373, with bibliography; D. Freshfield in Alpine Journal (1883), pp. 267-300; L. Montlahuc, Le Vrai Chemin d'Annibal d travers les Alpes (Paris, 1896) ; J. Fuchs, Hannibals Alpeniibergang (Vienna, 1897) ; G. E. Marindin in Classical Review (1899), pp. 238-249; W. Osiander, Der Hannibalweg neu

untersucht (Berlin, 1900) ; P. Azan, Annibal dans les Alpes (Paris, 1902); J. L. Colin, Annibal en Gaule (Paris, 1904); E. Hesselmeyer, Hannibals Alpenilbergang im Lichte der neueren Kriegsgeschichte, (1906); Kromyer, in N. Jahrb.f. kl. Alt. (1907). (M. O. B. C.)

HANNIBAL, a city of Marion county, Missouri, U.S.A., on the Mississippi river, about 120 m. N.W. of Saint Louis. Pop. (1800), 12,857; (igoo),i2,78o, including 920 foreign-born and 1836 negroes; (1910) 18,341. It

is served by the Wabash, the Missouri, Kansas & Texas, the Chicago, Burlingtgn & Quincy, and the St Louis & Hannibal railways, and by boat lines to Saint Louis, Saint Paul and intermediate points. The business section is in the level bottom-lands of the river, while the residential portion spreads up the banks, which afford fine building sites with beautiful views. Mark Twain's boyhood was spent at Hannibal, which is the setting of Life on the Mississippi, Huckle- berry Finn and Tom Sawyer; Hannibal Cave, described in Tom Sawyer, extends for miles beneath the river and its bluffs. Hannibal has a good public library (1889; the first in Missouri); other prominent buildings are the Federal building, the court house, a city hospital and the high school. The river is here spanned by a long iron and steel bridge connecting with East Hannibal, 111. Hannibal is the trade centre of a rich agricultural region, and has an important lumber trade, railway shops, and manufactories of lumber, shoes, stoves, flour, cigars, lime, Portland cement and pearl buttons (made from mussel shells); the value of the city's factory products increased from $2,698,720 in 1900 to $4,442,099 in 1905, or 64-6%. In the vicinity are valuable deposits of crinoid limestone, a coarse white building stone which takes a good polish. The electric-lighting plant is owned and operated by the municipality. Hannibal was laid out as a town in 18 19 (its origin going back to Spanish land grants, which gave rise to much litigation) and was first chartered as a city in 1839. The town of South Hannibal was annexed to it in 1843.

HANNINGTON, JAMES (1847-1885), English missionary, was born at Hurstpierpoint, in Sussex, on the 3rd of September 1847. From earliest childhood he displayed a love of adventure and natural history. At school he made little progress, and left at the age of fifteen for his father's counting-house at Brighton. He had no taste for office work, and much of his time was occupied in commanding a battery of volunteers and in charge of a steam launch. At twenty-one he decided on a clerical career and entered St Mary's Hall, Oxford, where he exercised a remarkable influence over his fellow-undergraduates.

He was, however, a desultory student, and in 1870 was advised to go to the little village of Martinhoe, in Devon, for quiet reading, but distinguished himself more by his daring climbs after sea- gulls' eggs and his engineering skill in cutting a pathway along precipitous cliffs to some caves. In 1872 the death of his mother made a deep impression upon him. He began to read hard, took his B.A. degree, and in 1873 was ordained deacon and placed in charge of the small country parish of Trentishoe in Devon. Whilst curate in charge at Hurstpierpoint, his thoughts were turned by the murder of two missionaries on the shores of Victoria Nyanza to mission work. He offered himself to the Church Missionary Society and sailed on the 17th of May 1882, at the head of a party of six, for Zanzibar, and thence set out for Uganda; but, prostrated by fever and dysentery, he was obliged to return to England in 1883. On his recovery he was consecrated bishop of Eastern Equatorial Africa (June 1884), and in January 1885 started again for the scene of his mission, and visited Palestine on the way. On his arrival at Freretown, near Mombasa, he visited many stations in the neighbourhood. Then, filled with the idea of opening a new route to Uganda, he set out and reached a spot near Victoria Nyanza in safety. His arrival, however, roused the suspicion of the natives, and under King Mwanga's orders he was lodged in a filthy hut swarming with rats and vermin. After eight days his men were murdered, and on the 29th of October 1885 he himself was speared in both sides, his last words to the soldiers appointed to kill him being, " Go, tell Mwanga I have purchased the road to Uganda with my blood."

His Last Journals were edited in 1888. See also Life by E. C. Dawson (1887); and W. G. Berry, Bishop Hannington (1908).

HANNINGTON, a lake of British East Africa in the eastern rift-valley just south of the equator and in the shadow of the Laikipia escarpment. It is 7 m. long by 2 m. broad. The water is shallow and brackish. Standing in the lake and along its shores

are numbers of dead trees, the remains of an ancient forest, which serve as eyries for storks, herons and eagles. The banks and flats at the north end of the lake are the resort of hundreds of thousands of flamingoes. The places where they cluster are dazzling white with guano deposits. The lake is named after Bishop James Hannington.

HANNO, the name of a large number of Carthaginian soldiers and statesmen. Of the majority little is known; the most important are the following 1 : —

1. Hanno, Carthaginian navigator, who probably flourished about 500 B.C. It has been conjectured that he was the son of the Hamilcar who was killed at Himera (480) , but there is nothing to prove this. He was the author of an account of a coasting voyage on the west coast of Africa, undertaken for the purpose of exploration and colonization. The original, inscribed on a tablet in the Phoenician language, was hung up in the temple of Melkarth on his return to Carthage. What is generally sup- posed to be a Greek translation of this is still extant, under the title of Periplus, although its authenticity has been questioned. Hanno appears to have advanced beyond Sierra Leone as far as Cape Palmas. On the island which formed the terminus of his voyage the explorer found a number of hairy women, whom the interpreters called Gorillas (TopiWas).

Valuable editions by T. Falconer (1797, with translation and defence of its authenticity) and C. W. Milller in Geographici Graeci minores, i. ; see also E. H. Bunbury, History of Ancient Geography, L, and treatise by C. T. Fischer (1893), with bibliography.

2. Hanno (3rd century B.C.), called ” the Great,” Carthaginian statesman and general, leader of the aristocratic party and the chief opponent of Hamilcar and Hannibal. He appears to have gained his title from military successes in Africa, but of these nothing is known. In 240 B.C. he drove Hamilcar’s veteran mercenaries to rebellion by

withholding their pay, and when invested with the command against them was so unsuccessful that Carthage might have been lost but for the exertions of his enemy Hamilcar (q.v.). Hanno subsequently remained at Carthage, exerting all his influence against the democratic party, which, however, had now definitely won the upper hand. During the Second Punic War he advocated peace with Rome, and according to Livy even advised that Hannibal should be given up to the Romans. After the battle of Zama (202) he was one of the ambassadors sent to Scipio to sue for peace. Remarkably little is known of him, considering the great influence he undoubtedly exercised amongst his countrymen.

Livy xxi. 3 ff., xxiii. 12; Polybius i. 67 ff. ; Appian, Res His- panicae, 4, 5, Res Punicae, 34, 49, 68.

HANOI, capital of Tongking and of French Indo-China, on the right bank of the Song-koi or Red river, about 80 m. from its mouth in the Gulf of Tongking. Taking in the suburban population the inhabitants numbered in 1905 about 110,000, including 103,000 Annamese, 2289 Chinese and 2665 French, exclusive of troops. Hanoi resembles a European city in the possession of wide well-paved streets and promenades, systems of electric light and drainage and a good water-supply. A crowded native quarter built round a picturesque lake lies close to the river with the European quarter to the south of it. The public buildings include the palace of the governor-general, situated in a spacious botanical and zoological garden, the large military hospital, the cathedral of St Joseph, the Paul Bert college, and the theatre. The barracks and other military buildings occupy the site of the old citadel, an area of over 300 acres, to the west of the native town. The so-called pagoda of the Great Buddha is the chief native building. The river is embanked and is crossed by the Pont Doumer, a fine railway bridge over 1 m. long. Vessels drawing 8 or 9 ft. can reach the town. Hanoi is

1 For others of the name see Carthage; Hannibal;

Punic Wars. Smith's Classical Dictionary has notices of some thirty of the name.

the seat of the general government of Indo-China, of the resident- superior of Tongking, and of a bishop, who is vicar-apostolic of central Tongking. It is administered by an elective municipal council with a civil service administrator as mayor. It has a chamber of commerce, the president of which has a seat on the superior council of Indo-China; a chamber of the court of appeal of Indo-China, a civil tribunal of the first order, and is the seat of the chamber of agriculture of Tongking. Its industries include cotton-spinning, brewing, distilling, and the manufacture of tobacco, earthenware and matches; native industry pro- duces carved and inlaid furniture, bronzes and artistic metal- work, silk embroidery, &c. Hanoi is the junction of railways to Hai-Phong, its seaport, Lao-Kay, Vinh, and the Chinese frontier via Lang-Son. It is in frequent communication with Hai-Phong by steamboat.

See C. Madrolle, Tonkin du sud: Hanoi (Paris, 1907).

HANOTAUX, ALBERT AUGUSTE GABRIEL (1853-), French statesman and historian, was born at Beaurevoir in the department of Aisne. He received his historical training in the ficole des Chartes, and became maitre de conferences in the Ecole des Hautes Etudes. His political career was rather that of a civil servant than of a party politician. In 1879 he entered the ministry of foreign affairs as a secretary, and rose step by step through the diplomatic service. In 1886 he was elected deputy for Aisne, but, defeated in 1880, he returned to his diplo- matic career, and on the 31st of May 1894 was chosen by Charles Dupuy to be minister of foreign affairs. With one interruption (during the Ribot ministry, from the 26th of January to the 2nd of November 1895) he held this portfolio until the 14th

of June 1898. During his ministry he developed the rapproche- ment of France with Russia — visiting St Petersburg with the president, Felix Faure — and sent expeditions to delimit the French colonies in Africa. The Fashoda incident of July 1898 was a result of this policy, and Hanotaux's distrust of England is frankly stated in his literary works. As an historian he pub- lished Origines de V institution des intendants de provinces (1884), which is the authoritative study on the intendants; Etudes his- toriques sur les XVI'et XVII e siecles en France (1886); Histoire de Richelieu (2 vols., 1888); and Histoire de la Troisieme RSpub- lique (1904, &c), the standard history of contemporary France. He also edited the Instructions des ambassadeurs de France & Rome, depuis les traiUs de Westphalie (1888). He was elected a member of the French Academy on the 1st of April 1897.

HANOVER (Ger. Hannover), formerly an independent kingdom of Germany, but since 1866 a province of Prussia. It is bounded on the N. by the North Sea, Holstein, Hamburg and Mecklen- burg-Schwerin, E. and S.E. by Prussian Saxony and the duchy of Brunswick, S.W. by the Prussian provinces of Hesse-Nassau and Westphalia, and W. by Holland. These boundaries include the grand-duchy of Oldenburg and the free state of Bremen, the former stretching southward from the North Sea nearly to the southern boundary of Hanover. A small portion of the province in the south is separated from Hanover proper by the inter- position of part of Brunswick. On the 23rd of March 1873 the province was increased by the addition of the Jade territory (purchased by Prussia from Oldenburg), lying south-west of the Elbe and containing the great naval station and arsenal of Wilhelmshaven. The area of the province is 14,870 sq. m.

Physical Features. — The greater part of Hanover is a plain with sandhills, heath and irioor. The most fertile districts lie on the banks of the Elbe and near the North Sea, where, as in Holland, rich meadows are preserved from encroachment of the sea by broad dikes and deep ditches, kept in repair at

great expense. The main feature of the northern plain is the so-called Luneburger Heide, a vast expanse of moor and fen, mainly covered with low brushwood (though here and there are oases of fine beech and oak woods) and intersected by shallow valleys, and extending almost due north ' from the city of Hanover to the southern arm of the Elbe at Harburg. The southern portion of the province is hilly, and in the district of Klausenburg, containing the Harz, mountainous. The higher elevations are covered by dense forests of fir and larch, and the lower slopes with deciduous trees. The eastern portion of the northern plain is covered with forests of fir. The whole of Hanover dips from the Harz Mountains to the north, and the rivers conse- quently flow in that direction. The three chief rivers of the province

are the Elbe in the north-east, where it mainly forms the boundary and receives the navigable tributaries Jeetze, Ilmenau, Seve, Este, Ltihe, Schwinge and Medem ; the Weser in the centre, with its important tributary the Aller (navigable from Celle downwards) ; and in the west the Ems, with its tributaries the Aa and the Lcda. Still farther West is the Vecht, which, rising in Westphalia, flows to the Zuider Zee. Canals are numerous and connect the various river systems.

The principal lakes are the Steinhuder Meer, about 4 m. long and 2 m. broad, and 20 fathoms deep, on the borders of Schaumburg- Lippe; the Dtimmersee, on the borders of Oldenburg, about 12 m. in circuit ; the lakes of Bederkesa and some others in the moorlands of the north ; the Seeburger See, near Duderstadt ; and the Oder- teich, in the Harz, 2100 ft. above the level of the sea.

Climate. — The climate in the low-lying districts near the coast is moist and foggy, in the plains mild, on the Harz mountains severe and variable. In spring the prevailing winds blow from the N.E. and E., in summer from the S.W. The mean annual temperature is about 46° Fahr. ; in the town of Hanover it is higher. The average annual rainfall is

about 23-5 in. ; but this varies greatly in different districts. In the west the Herauch, a thick fog arising from the burning of the moors, is a plague of frequent occurrence.

Population; Divisions. — The province contains an area of 14,869 sq. m., and the total population, according to the census of 1905, was 2,759,699 (1,384,161 males and 1,375,538 females). In this con- nexion it is noticeable that in Hanover, almost alone among German states and provinces, there is a considerable proportion of male births over female. The density of the population is 175 to the sq. m. (English), and the proportion of urban to rural population, roughly, as 1 to 3 of the inhabitants. The province is divided into the six Regierungsbezirke (or departments) of Hanover, Hildesheim, Liineburg, Stade, Osnabriick and Aurich, and these again into Kreise (circles, or local government districts) — 76 in all. The chief towns— containing more than 10,000 inhabitants — are Hanover, Linden, Osnabriick, Hildesheim, Geestemunde, Wilhelmshaven, Harburg, Liineburg, Celle, Gottingen and Emden. Religious statis- tics show that 84% of the inhabitants belong to the Evangelical- Lutheran Church, 17 to the Roman Catholic and less than I % to the Jewish communities. The Roman Catholics are mostly gathered around the episcopal sees of Hildesheim and Osnabriick and close to Miinster (in Westphalia) on the western border, and the Jews in the towns. A court of appeal for the whole province sits at Celle, and there are eight superior courts. Hanover returns 19 members to the Reichstag (imperial diet) and 36 to the Abgeordnetenhaus (lower house) of the Prussian parliament {Landtag).

Education. — Among the educational institutions of the province the university of Gottingen stands first, with an average yearly attendance of 1500 students. There are, besides, a technical college in Hanover, an academy of forestry in M linden, a mining college in Clausthal, a military school and a veterinary college (both in Hanover), 26 gymnasia (classical schools), 18 semi-classical, and 14

commercial schools. There are also two naval academies, asylums for the deaf and dumb, and numerous charitable institutions.

Agriculture. — Though agriculture constitutes the most important branch of industry in the province, it is still in a very backward state. The greater part of the soil is of inferior quality, and much that is susceptible of cultivation is still lying waste. Of the entire area of the country 28-6 % is arable, 16‘2 in meadow or pasture land, 14% in forests, 37-2% in uncultivated moors, heaths, &c. ; from 17 to 18% is in possession of the state. The best agriculture is to be found in the districts of Hildesheim, Calenberg, Gottingen and Grubenhagen, on the banks of the Weser and Elbe, and in East Friesland. Rye is generally grown for bread. Flax, for which much of the soil is admirably adapted, is extensively cultivated, and forms an important article of export, chiefly, however, in the form of yarn. Potatoes, hemp, turnips, hops, tobacco and beet are also extensively grown, the latter, in connexion with the sugar industry, showing each year a larger return. Apples, pears, plums and cherries are the principal kinds of fruit cultivated, while the wild red cranberries from the Harz and the black bilberries from the Luneburger Heide form an important article of export.

Live Stock. — Hanover is renowned for its cattle and live stock generally. Of these there were counted in 1900 1,115,022 head of horned cattle, 824,000 sheep, 1,556,000 pigs, and 230,000 goats. The Luneburger Heide yields an excellent breed of sheep, the Heid-schnucken, which equal the Southdowns of England in delicacy of flavour. Horses famous for their size and quality are reared in the marshes of Aurich and Stade, in Hildesheim and Hanover ; and, for breeding purposes, in the stud farm of Celle. Bees are principally kept on the Luneburger Heide, a nd the annual yield of honey is very considerable. Large flocks of geese are kept in the moist lowlands ; their flesh is salted for domestic consumption during the winter, and their feathers are prepared for sale. The rivers yield trout, salmon (in the

Weser) and crayfish. The sea fisheries are important and have their chief centre at Geestemunde.

Mining. — Minerals occur in great variety and abundance. The Harz Mountains are rich in silver, lead, iron and copper; coal is found around Osnabriick, on the Deister, at Osterwald, &c, lignite in various places ; salt-springs of great richness exist at Egestorfshall

and Neuhall near Hanover, and at Liineburg; and petroleum may be obtained south of Celle. In the cold regions of the northern low- lands peat occurs in beds of immense thickness.

Manufactures.. — Works for the manufacture of iron, copper, silver, lead, vitriol and sulphur are carried on to a large extent. The iron works are very important: smelting is carried on in the Harz and near Osnabriick ; there are extensive foundries and machine factories at Hanover, Linden, Osnabriick, Hameln, Geestemunde, Harburg, Osterode, &c, and manufactories of arms at Herzberg, and of cutlery in the towns of the Harz and in the Sollinger Forest. The textile industries are prosecuted chiefly in the towns. Linen yarn and cloth are largely manufactured, especially in the south about Osnabriick and Hildesheim, and bleaching is engaged in extensively ; woollen cloths are made to a considerable extent in the south about Einbeck, Gottingen and Hameln; cotton-spinning and weaving have their principal seats at Hanover and Linden. Glass houses, paper-mills, potteries, tile works and tobacco-pipe works are numer- ous. Wax is bleached to a considerable extent, and there are numerous tobacco factories, tanneries, breweries, vinegar works and brandy distilleries. Shipbuilding is an important industry, especially at Wilhelmshaven, Papenburg, Leer, Stade and Harburg ; and at Miinden river-barges are built.

Commerce. — Although the carrying trade of Hanover is to a great extent absorbed by Hamburg and Bremen, the shipping of the province counted, in 1903, 750 sailing vessels and 86 steamers of, together, 55,498 registered tons. The natural port is Bremen-Geestemunde and to it is directed the river traffic down the Weser, which practically forms the chief commercial artery of the province.

Communications. — The roads throughout are, on the whole, well laid, and those connecting the principal towns macadamized. Hanover is intersected by important trunk lines of railway; notably the lines from Berlin to Cologne, from Hamburg to Frankfort-on- Main, from Hamburg to Bremen and Cologne, and from Berlin to Amsterdam.

History. — The name Hanover (Hohenufer = high bank), originally confined to the town which became the capital of the duchy of Liineburg-Calenberg, came gradually into use to designate, first, the duchy itself, and secondly, the electorate of Brunswick-Luneburg; and it was officially recognized as the name of the. state when in 1814 the electorate was raised to the rank of a kingdom.

The early history of Hanover is merged in that of the duchy of Brunswick (q.v.), from which the duchy of Brunswick-Liine- burg and its offshoots, the duchies of Luneburg-Celle and LUneburg-Calenberg have sprung. Ernest I. (1497-1546), duke of Brunswick-Luneburg, who introduced the reformed doctrines into Liineburg, obtained the whole of this duchy in 1539; and in 1569 his two surviving sons made an arrangement which was afterwards responsible for the birth of the kingdom of Hanover. By this agreement the greater part of the duchy, with its capital at Celle, came to William (1535-1592), the younger of the brothers, who gave laws to his land and added to its area; and this duchy of Luneburg-Celle was subsequently ruled in turn by four of his sons: Ernest II. (1564-1611), Christian (1 566-1633), Augustus (d. 1636) and Frederick (d. 1648). • In addition to these four princes Duke William left three other sons, and in 1610 the seven

brothers entered into a compact that the duchy should not be divided, and that only one of them should marry and continue the family. Casting lots to determine this question, the lot fell upon the sixth brother, George (1582–1641), who was a prominent soldier during the period of the Thirty Years' War and saw service in almost all parts of Europe, fighting successively for Christian IV. of Den- mark, the emperor Ferdinand II., and for the Swedes both before and after the death of Gustavus Adolphus. In 161 7 he aided his brother, Duke Christian, to add Grubenhagen to Liineburg, and after the extinction of the family of Brunswick-Wolfenbiittel in 1634, he obtained Calenberg for himself, making Hanover the capital of his small dukedom! In 1648, on Duke Frederick's death, George's eldest son, Christian Louis (d. 166,5), became duke of Liineburg-Celle; and at this time he handed over Calenberg, which he had ruled since his father's death, to his second brother, George William (d. 1 705). When Christian Louis died George William succeeded him in Liineburg-Celle; but the duchy was also claimed by a younger brother, John Frederick, a cultured and enlightened prince who had forsaken the Lutheran faith of his family and had become a Roman Catholic. Soon, however, by an arrangement John Frederick

received Calenberg and Grubenhagen, which he ruled in absolute fashion, creating a standing army and modelling his court after that of Louis XIV., and which came on his death in 1679 to his youngest brother, Ernest Augustus (1630–1698), the Protestant bishop of Osnabriick. During the French wars of aggression the Liineburg princes were eagerly courted by Louis XIV. and by his opponents; and after some hesitation George William, influenced by Ernest Augustus, fought among the Imperialists, while John Frederick was ranged on the side of France. In 1689 George William was one of the claimants for the duchy of Saxe-Lauenburg, which was left without a ruler in that year; and after a struggle with John George III., elector of Saxony, and other rivals, he was invested with the duchy by

the emperor Leopold I. It was, however, his more ambitious brother, Ernest Augustus, who did most for the prestige and advancement of the house. Having introduced the principle of primogeniture into Calenberg in 1682, Ernest determined to secure for himself the position of an elector, and the condition of Europe and the exigencies of the emperor favoured his pre- tensions. He made skilful use of Leopold's difficulties; and in 1692, in return for lavish promises of assistance to the Empire and the Habsburgs, the emperor granted him the rank and title of elector of Brunswick-Luneburg with the office of standard- bearer in the Holy Roman Empire. Indignant protests followed this proceeding. A league was formed to prevent any addition to the electoral college; France and Sweden were called upon for assistance; and the constitution of the Empire was reduced to a state of chaos. This agitation, however, soon died away; and in 1708 George Louis, the son and successor of Ernest Augustus, was recognized as an elector by the imperial diet. George Louis married his cousin Sophia Dorothea, the only child of George William of Liineburg-Celle; and on his uncle's death in 1705 he united this duchy, together with Saxe-Lauenburg, with his paternal inheritance of Calenberg or Hanover. His father, Ernest Augustus, had taken a step of great importance in the history of Hanover when he married Sophia, daughter of the elector palatine, Frederick V., and grand-daughter of James I. of England, for, through his mother, the elector George Louis became, by the terms of the Act of Settlement of 1701, king of Great Britain and Ireland in 17 14.

From this time until the death of William IV. in 1837, Liine- burg or Hanover, was ruled by the same sovereign as Great Britain, and this personal union was not without important- results for both countries. Under George I. Hanover joined the alliance against Charles XII. of Sweden in 1715; and by the peace of Stockholm in November 1719 the elector received the duchies of Bremen and Verden, which formed an important addition to the

electorate. His son and successor, George II., who founded the university of Gottingen in 1737, was on bad terms with his brother-in-law Frederick William I. of Prussia, and his nephew Frederick the Great; and in 1729 war between Prussia and Hanover was only just avoided. In 1743 George took up arms on behalf of the empress Maria Theresa; but in August 1745 the danger in England from the Jacobites led him to sign the convention of Hanover with Frederick the Great, although the struggle with France raged around his electorate until the peace of Aix-la-Chapelle in 1748. Induced by political exigencies George allied himself with Frederick the Great when the Seven Years' War broke out in 1756; but in September 1757 his son William Augustus, duke of Cumberland, was compelled after his defeat at Hastenbeck to sign the convention of Kloster- zeven and to abandon Hanover to the French. English money, however, came to the rescue; in 1758 Ferdinand, duke of Brunswick, cleared the electorate of the invader; and Hanover suffered no loss of territory at the peace of 1763. Both George I. and George II. preferred Hanover to England as a place of residence, and it was a frequent and perhaps justifiable cause of complaint that the interests of Great Britain were sacrificed to those of the smaller country. But George III. was more British than either his grandfather or his great-grandfather, and owing to a variety of causes the foreign policies of the two countries began to diverge in the later years of his reign. Two

main considerations dominated the fortunes of Hanover during the period of the Napoleonic wars, the jealousy felt by Prussia at the increasing strength and prestige of the electorate, and its position as a vulnerable outpost of Great Britain. From 1 793 the Hanoverian troops fought for the Allies against France, until the treaty of Basel between France and Prussia in 1795 imposed a forced neutrality upon Hanover. At the instigation of Bona-parte Hanover was occupied by the Prussians for a

few months in 1801, but at the settlement which followed the peace of Luneville the secularized bishopric of Osnabriick was added to the electorate. Again tempting the fortune of war after the rupture of the peace of Amiens, the Hanoverians found that the odds against them were too great; and in June 1803 by the convention of Sulingen their territory was occupied by the French. The formation of the third coalition against France in 1805 induced Napoleon to purchase the support of Prussia by allowing her. troops to seize Hanover; but in 1807, after the defeat of Prussia at Jena, he incorporated the southern part of the electorate in the kingdom of Westphalia, adding the northern portion to France in 18 10. The French occupation was costly and aggressive; and the Hanoverians, many of whom were found in the allied armies, welcomed the fall of Napoleon and the return of the old order. Represented at the congress of Vienna by Ernest, Count Munster, the elector was granted the title of king; but the British ministers wished to keep the interests of Great Britain distinct from those of Hanover. The result of the congress, however, was not unfavourable to the new kingdom, which received East Friesland, the secularized bishopric of Hildesheim, the city of Goslar, and some smaller additions of territory, in return for the surrender of the greater part of the duchy of Saxe-Lauenburg to Prussia.

Like those of the other districts of Germany, the estates of the different provinces which formed the kingdom of Hanover had met for many years in an irregular fashion to exercise their varying and ill-defined authority; and, although the elector Ernest Augustus introduced a system of administrative councils into Celle, these estates, consisting of the three orders of prelates, nobles and towns, together with a body somewhat resembling the English privy council, were the only constitution which the country possessed, and the only check upon the power of its ruler. When the elector George Louis became king of Great Britain in 1714 he appointed a representative, or statthalter, to govern the

electorate, and thus the union of the two countries was attended with constitutional changes in Hanover as well as in Great Britain. Responsible of course to the elector, the Statthalter, aided by the privy council, conducted the internal affairs of the electorate, generally in a peaceful and satisfactory fashion, until the welter of the Napoleonic wars. On the con- clusion of peace in 18 14 the estates of the several provinces of the kingdom were fused into one body, consisting of eighty-five members, but the chief power was exercised as before by the members of a few noble families. In 1819, however, this feudal relic was supplanted by a new constitution. Two chambers were established, the one formed of nobles and the other of elected representatives; but although they were authorized to control the finances, their power with regard to legislation was very circumscribed. This constitution was sanctioned by the prince regent, afterwards King George IV.; but it was out of harmony with the new and liberal ideas which prevailed in Europe, and it hardly survived George's decease in 1830. The revolution of that year compelled George's brother and successor, William, to dismiss Count Munster, who had been the actual ruler of the country, and to name his own brother, Adolphus Frederick, duke of Cambridge, a viceroy of Hanover; one of the viceroy's earliest duties being to appoint a commission to draw up a new constitution. This was done, and after William had insisted upon certain alterations, it was accepted and promulgated in 1833. Representation was granted to the peasants; the two chambers were empowered to initiate legislation; ministers were made responsible for all acts of government; a civil list was given to the king in return for the surrender of the crown lands; and, in short, the new constitution was similar to that of Great

Britain. These liberal arrangements, however, did not entirely allay the discontent. A strong and energetic party endeavoured to thwart the working of the new order, and matters came to a climax on the death of William IV. in 1837.

By the law of Hanover a woman could not ascend the

throne, and accordingly Ernest Augustus, duke of Cumberland, the fifth son of George III., and not Victoria, succeeded William as sovereign in 1837, thus separating the crowns of Great Britain and Hanover after a union of 123 years. Ernest, a prince with very autocratic ideas, had disapproved of the constitution of 1833, and his first important act as king was to declare it invalid. He appears to have been especially chagrined because the crown lands were not his personal property, but the whole of the new arrangements were repugnant to him. Seven Gdttingen pro- fessors who protested against this proceeding were deprived of their chairs; and some of them, including F. C. Dahlmann and Jakob Grimm, were banished from the country for publishing their protest. To save the constitution an appeal was made to the German Confederation, which Hanover had joined in 1815; but the federal diet declined to interfere, and in 1840 Ernest altered the constitution to suit his own illiberal views. Recover- ing the crown lands, he abolished the principle of ministerial responsibility, the legislative power of the two chambers, and other reforms, virtually restoring affairs to their condition beforf 1833. The inevitable crisis was delayed until the stormy year 1848, when the king probably saved his crown by hastily giving back the constitution of 1833. Order, however, having been restored, in 1850 he dismissed the Liberal ministry and attempted to evade his concessions; a bitter struggle had just broken out when Ernest Augustus died in November 1851. During this reign the foreign policy of Hanover both within and without Germany had been coloured by jealousy of Prussia and by the king's autocratic ideas. Refusing to join the Prussian Zollverein, Hanover had become a member of the rival commercial union, the Steuerverein, three years before Ernest's accession; but as this union was not a great success the Zollverein was joined in 1851. In 1849, after the failure of the German parliament at Frankfort, the king had joined with the sovereigns of Prussia and Saxony to form the "three kings' alliance"; but this union with Prussia was unreal, and with the king of Saxony he soon

transferred his support to Austria and became' a member of the " four kings' alliance."

George V., the new king of Hanover, who was unfortunately blind, sharing his father's political ideas, at once appointed a ministry whose aim was to sweep away the constitution of 1848. This project, however, was resisted by the second chamber of the Landtag, or parliament; and after several changes of government a new ministry advised the king in 1855 to appeal to the diet of the German Confederation. This was done, and the diet declared the constitution of 1848 to be invalid. Acting on this verdict, not only was a ministry formed tc restore the constitution of 1840, but after some trouble a body of members fully in sympathy with this object was returned to parliament in 1857. But these members were so far from repre- senting the opinions of the people that popular resentment compelled George to dismiss his advisers in 1862. But the more liberal government which succeeded did not enjoy his complete confidence, and in 1865 a ministry was once more formed which was more in accord with his own ideas. This contest soon lost both interest and importance owing to the condition of affairs in Germany. Bismarck, the director of the policy of Prussia, was devising methods for the realization of his schemes, and it became clear after the war over the duchies of Schleswig and Holstein that the smaller German states would soon be obliged to decide definitely between Austria and Prussia. After a period of vacillation Hanover threw in her lot with Austria, the decisive step being taken when the question of the mobilization of the federal army was voted upon in the diet on the 14th of June 1866. At once Prussia requested Hanover to remain unarmed and neutral during the war, and with equal promptness King George refused to assent to these demands. Prussian troops then crossed his frontier and took possession of his capital.

The Hanoverians, however, were victorious at the battle of Langensalza on the 27th of June 1866, but the advance of fresh bodies of the enemy compelled them to capitulate two days later. By the terms of this surrender the king was not to reside in Hanover, his officers were to take no further part in the war, and his ammunition and stores became the property of Prussia. The decree of the 20th of September 1866 formally annexed Hanover to Prussia, when it became a province of that kingdom, while King George from his retreat at Hietzing appealed in vain to the powers of Europe. Many of the Hanoverians remained loyal to their sovereign; some of them serving in the Guelph Legion, which was maintained largely at his expense in France, where a paper, La Situation, was founded by Oskar Meding (1829–1903) and conducted in his interests. These and other elaborate efforts, however, failed to bring about the return of the king to Hanover, though the Guelph party continued to agitate and to hope even after the Franco-German War had immensely increased the power and the prestige of Prussia. George died in June 1878. His son, Ernest Augustus, duke of Cumberland, continued to maintain his claim to the crown of Hanover, and refused to be reconciled with Prussia. Owing to this attitude the German imperial government refused to allow him to take possession of the duchy of Brunswick, which he inherited on the extinction of the elder branch of his familyin 1884, and again in 1906 when the same subject came up for settlement on the death of the regent, Prince Albert of Prussia.

In 1867 King George had agreed to accept Prussian bonds to the value of about £1 ,600,000 as compensation for the confiscation of his estates in Hanover. In 1868, however, on account of his continued hostility to Prussia, the Prussian government sequestrated this property; and, known as the Welfenfonds, or Reptilienfonds, it was employed as a secret service fund to combat the intrigues of the Guelphs in various parts of Europe; until in 1892 it was arranged that the interest should be paid to the duke of Cumberland. In 1885 measures

were taken to incorporate the province of Hanover more thoroughly in the kingdom of Prussia, and there is little doubt but that the great majority of the Hanoverians have submitted to the inevitable, and are loyal subjects of the king of Prussia.

Authorities. — A. Hiine, Geschichte des Konigreichs Hannover und des Herzogtums Braunschweig (Hanover, 1824-1830); A. F. H. Schaumann, Handbuch der Geschichte der Lande Hannover und Braunschweig (Hanover, 1864); G. A. Grotefend, Geschichte der allgemeinen landstdndischen Verfassung des Konigreichs Hannover, 1814-1848 (Hanover, 1857); H. A. Oppermann, Zur Geschichte des Konigreichs Hannover, 1832-1860 (Berlin, 1868); E. von Meier, Hannoversche Verfassungs- und Verwaltungsgeschichte (Leipzig, 1 898- 1 899); W. von Hassell, Das Kurfiirstenlum Hannover vom Baseler Frieden bis zur preussischen Okkupation (Hanover, 1894) ; and Geschichte des Konigreichs Hannover (Leipzig, 1898-1901); H. von Treitschke, Der Herzog von Cumberland und das hannoversche Staatsgrundgesetz von 1833 (Leipzig, 1888); M. Bar, tibersicht uber die Bestdnde des kbniglichen Staatsarchivs zu Hannover (Leipzig, 1900); Hannoversches Portfolio (Stuttgart, 1839-1841); and the authorities given for the history of Brunswick.

HANOVER, the capital of the Prussian province of thesame name, situated in a sandy but fertile plain on the Leine, which here receives the Ihme, 38 m. N.W. from Brunswick, 78 S.E. of Bremen, and at the crossing of the main lines of railway, Berlin to Cologne and Hamburg to Frankfort-on-Main. Pop. (1885) 139,731; (1900) 23S.666; (1905) 250,032. On the north and east the town is half encircled by the beautiful woods and groves of the Eilenriede and the List which form the public park. The Leine flows through the city, having the old town on its right and the quaint Calenberger quarter between its left bank and the Ihme. The old town is irregularly built, with narrow streets and old-fashioned gabled houses. In its centre lies the Markt Kirche, a red-brick edifice of the 14th century, containing interesting monuments and some fine stained-glass

windows, and with a steeple 310 ft. in height (the highest in Hanover). Its interior was restored in 1855. Close by, on the market square, is the red-brick medieval town-hall (Rathaus), with an historical wine cellar beneath. It has been superseded for municipal business by a new building, and now contains the civic archives and museum. The new town, surrounding the

old on the north and east, and lying between it and the woods referred to, has wide streets, handsome buildings and beautiful squares. Among the last-mentioned are the square at the railway station — the Ernst August-Platz — with an equestrian statue of King Ernest Augustus in bronze; the triangular Theater-Platz, with statues of the composer Marschner and others; and the Georgs-Platz, with a statue of Schiller. To the south of the old town, on the banks of the Ihme, lies the Waterloo-Platz, with a column of victory, 154 ft. high, having inscribed on it the names of 800 Hanoverians who fell at Waterloo. In the adjacent gardens an open rotunda encloses a marble bust of the philosopher Leibnitz, and near it is a monument to General Count von Alten, the commander of the Hanoverian troops at Waterloo. Among the other churches the most noticeable are the Neustadterkirche, with a graceful shrine containing the tomb of Leibnitz, the Kreuzkirche, built about 1300, with a curious steeple, and the Aegidienkirche among ancient edifices, and among modern ones the Christuskirche, a gift of King George V., the Lukaskirche, the Lutherkirche, and the Roman Catholic church of St Mary, with a tower 300 ft. high, containing the grave of Ludwig Windthorst, " his little excellency," for many years leader of the Ultramontane (Centre) party in the imperial diet. Of secular buildings the most remarkable is the royal palace— Schloss — built 1636-1640, with a grand portal and handsome quadrangle. In its chapel are preserved the relics of saints which Henry the Lion brought from Palestine. The new provincial museum built in 1897-1902 contains the Cumberland Gallery and the Guelph Museum; and the Kestner Museum also

contains interesting and valuable collections of works of art. The other principal public buildings are the royal archives and library, containing a library of 200,000 volumes and 3500 manuscripts; the old provincial museum, which houses a variety of collections, such as natural, historical and ethnographical, and a collec- tion of modern paintings; the theatre (built 1845-1852), one of the largest in Germany, the archaeological museum, the railway station, and, in the west, close to Herrenhausen (see below) , the magnificent Welf enschloss (Guelph-palace) . The last , begun in 1859, was almost completed in 1866, but was never occupied by the Hanoverian royal family. Since 1875 it has been occupied by the technical high school, an academy with university privileges. Close to it lies the famous Herrenhausen, the summer palace of the former kings of Hanover, with fine gardens, an open-air theatre, a museum and an orangery, and approached by a grand avenue over a mile in length.

Hanover has a number of colleges and schools, and is the seat of several learned societies. It is largely frequented by foreign students, especially English, attracted by the educational facilities it offers and by the reputed purity of the German spoken. Hanover is the headquarters of the X. Prussian army corps, has a large garrison of nearly all arms and a famous military riding school. It occupies a leading position among the industrial and commercial .towns of the empire, and ofjrecent years has made rapid progress in prosperity. It is connected by railway with Berlin, Hamburg, Bremen, Hameln, Cologne, Altenbeken and Cassel, and the facilities of intercourse have, under the fostering care of the Prussian government, enormously developed its trade and manufactures. Almost all industries are repre- sented; chief among them are machine-building, the manu- facture . of india-rubber, linen, cloth, hardware, chemicals, tobacco, pianos, furniture and groceries. The commerce consists principally in wine, hides, horses, coal, wood and cereals. There are extensive printing establishments. Hanover was the first German town that was lighted with gas. It

is the birthplace of Sir William Herschel, the astronomer, of the brothers Schlegel, of Iffland and of the historian Pertz. The philosopher Leibnitz died there in 1716.

Close by, on the left bank of the Leine, lies the manufacturing town of Linden, which, though practically forming one town with Hanover, is treated under a separate heading.

The town of Hanover is first mentioned during the 12th centu -y. It belonged to the family of Welf, then to the bishops of Hildesheim, and then, in 1369, it came again into the possession

of the Welfs, now dukes of Brunswick. It joined the Kanseatic League, and was later the residence of the branch of the ducal house, which received the title of elector of Hanover and ascended the British throne in the person of George I. One or two important treaties were signed in Hanover, which from 1810 to 1813 was part of the kingdom of Westphalia, and in 1866 was annexed by Prussia, after having been the capital of the kingdom of Hanover since its foundation in 181 5.

See O. Ulrich, Bilder aus Hannovers Vergangenheit (1891) ; Hoppe, Geschichte der Stadt Hannover (1845); Hirschfeld, Hannovers Gross- industrie und Grosshandel (Leipzig, 1891); Frensdorff, Die Stadt- verfassune Hannovers in alter und neuer Zeit (Leipzig, 1883); W. Bahrdt, Geschichte der Reformation der Stadt Hannover (1891) ; Hart- mann, Geschichte von Hannover mit besonderer Riicksichtnahme auf die Entwickelung der Residenzstadt Hannover (1886); Hannover und Umgegend, Entwickelung und Zustdnde seiner Industrie und Gewerbe (1874); and the Urkundenbuch der Stadt Hannover (i860, fol.).

' HANOVER, a town of Jefferson county, Indiana,

U.S.A., on the Ohio river, about 5 m. below Madison. Pop. (1900) 377; (1910) 356. It is served by boats on the Ohio river and by stages to Madison, the nearest railway station. Along the border of the town and on a bluff rising about 500 ft. above the river is Hanover College, an institution under Presbyterian control, embracing a college and a preparatory department, and offering classical and scientific courses and instruction in music; there is no charge for tuition. In 1908-1909 there were 211 students, 75 being in the Academy. The institution was opened in a log cabin in 1827, was incorporated as Hanover Academy in 1828, was adopted as a synodical school by the Presbyterian Synod of Indiana in 1829 on condition that a Theological depart- ment be added, and in 1833 was incorporated under its present name. In 1840, however, the theological department became a separate institution and was removed to New Albany, whence in 1859 it was removed to Chicago, where it was named, first, the Presbyterian Theological Seminary of the North-west, and, in 1886, the McCormick Theological Seminary. In the years immediately after its incorporation in 1833 Hanover College introduced the " manual labor system " and was for a time very prosperous, but the system was not a success, the college ran into debt, and in 1843 the trustees attempted to surrender the charter and to acquire the charter of a university at Madison. This effort was opposed by a strong party, which secured a more liberal charter for the college. In 1880 the college became coeducational.

HANOVER, a township of Grafton county, New Hampshire, U.S.A., on the Connecticut river, 75 m. by rail N.W. of Concord. Pop. (1900) 1884; (1910) 2075. No railway enters this town- ship; the Ledyard Free Bridge (the first free bridge across the Connecticut) connects it with Norwich, Vt., which is served by the Boston & Maine railway. Ranges of rugged hills, broken by deep narrow gorges and by the wider valley of Mink Brook, rise near the river and culminate in the E. section in Moose Mountain, 2326 ft. above the sea. Near the foot of Moose Mountain is the birthplace of Laura D. Bridgman.

Agriculture, dairying and lumbering are the chief pursuits of the inhabitants. The village of Hanover, the principal settlement of the township, occupies Hanover Plain in the S.W. corner, and is the seat of Dartmouth College (q.v.), which has a strikingly beautiful campus, and among its buildings several excellent examples of the colonial style, notably Dartmouth Hall. The Mary Hitchcock memorial hospital, a cottage hospital of 36 beds, was erected in 1890–1893 by Hiram Hitchcock in memory of his wife. The charter of the township was granted by Gov. Benning Went- worth on the 4th of July 1761, and the first settlement was made in May ^65. The records of the town meetings and selectmen, 1761–1818, have been published by E. P. Storrs (Hanover, 1905).

See Frederick Chase, A History of Dartmouth College and the Town of Hanover (Cambridge, 1891).

HANOVER, a borough of York county, Pennsylvania, U.S.A., 36 m. S. by W. of Harrisburg, and 6 m. from the S. border of the state. Pop. (1890) 3746; (1900) 5302, (133 foreign-born); (1910) 7057. It is served by the Northern Central and the Western Maryland railways. The borough is built on nearly

level ground in the fertile valley of the Conewago, at the point of intersection of the turnpike roads leading to Baltimore, Carlisle, York and Frederick, from which places the principal streets — ■ sections of these roads — are named. Among its manufaotures are foundry and machine-shop products, flour, silk, waggons, shoes, gloves, furniture, wire cloth and cigars. The settlement of the place was begun mostly by Germans during the middle of the 18th century. Hanover was laid out in 1763 or 1764 by Col. Richard MacAUister; and in 1815 it was incorporated. On the 30th of June 1863 there was a cavalry engagement in and near Hanover between the forces of Generals H. J. Kilpatrick (Union) and J. E. B. Stuart (Confederate) preliminary to the battle of Gettysburg. This engagement is commemorated by an equestrian statue erected in Hanover by the state.

HANRIOT, FRANCOIS (1761-1794), French revolutionist, was born at Nanterre (Seine) of poor parentage. Having lost his first employment — with a procureur — through dishonesty, "he obtained a clerkship in the Paris octroi in 1789, but was dismissed for abandoning his post when the Parisians burned the octroi barriers on the night of the i2th-i3th of July 1789. After leading a hand-to-mouth existence for some time, he became one of the orators of the section of the sans-culottes, and com- manded the armed force of that section during the insurrection on the 10th of August 1792 and the massacres of September. But he did not come into prominence until the night of the 30th~3ist of May 1793, when he was provisionally appointed commandant- general of the armed forces of Paris by the council general of the Commune. On the 3 1st of May he was one of the delegates from the Commune to the Convention demanding the dissolution of the Commission of Twelve and the proscription of the Girondists (q.v.), and he was in command of the insurrectionary forces of the Commune during the emeute of the 2nd of June (see French Revolution). On the nth of June he resigned his command, declaring that order had been restored. On the 13th he was impeached in the Convention; but the motion was not carried, and on the 1st of July he was elected by the Commune permanent commander of the armed forces of Paris. This position, which gave him enormous power, he retained until the revolution of the 9th Thermidor (July 27, 1794). His arrest was decreed; but he had the generate sounded and the tocsin rung, and tried to rescue Robespierre, who was under arrest in the hall of the Comite de Sttrete" Generate. Hanriot was himself arrested, but was rescued by his adherents, and hastened to the Hotel de Ville. After a vain attempt to organize resistance he fled and hid in a secluded yard, where he was discovered the next day. He was arrested, sentenced to death, and guillotined with Robespierre and his friends on the 10th Thermidor of the year II. (the 28th of July 1794).

HANSARD, LUKE (1752-1828), English printer, was born on the 5th of July 1752 in St Mary's parish, j

Norwich. He was educated at Boston grammar school, and was apprenticed to Stephen White, a Norwich printer. As soon as his apprenticeship had expired Hansard started for London with only a guinea in his pocket, and became a compositor in the office of John Hughs (1703–1771), printer to the House of Commons. In 1774 he was made a partner, and undertook almost the entire conduct of the business, which in 1800 came completely into his hands. On the admission of his sons the firm became Luke Hansard & Sons. Among those whose friendship Hansard won in the exercise of his profession were Robert Orme, Burke and Dr Johnson; while Porson praised him as the most accurate printer of Greek. He printed the Journals of the House of Commons from 1774 till his death. The promptitude and accuracy with which Hansard printed parliamentary papers were often of the greatest service to government — notably on one occasion when the proof-sheets of the report of the Secret Committee on the French Revolution were submitted to Pitt twenty-four hours after the draft had left his hands. On the union with Ireland in i8or, the increase of parliamentary printing compelled Hansard to give up all private printing except when parliament was not sitting. He devised numerous expedients for reducing the expense of publish- ing the reports; and in 1805, when his workmen struck at a time

of great pressure, he and his sons themselves set to work as compositors. Luke Hansard died on the 29th of October 1828. His son, Thomas Curson Hansard (1776–1833), established a press of his own in Paternoster Row, and began in 1803 to print the Parliamentary Debates, which were not at first inde- pendent reports, but were taken from the newspapers. After 1889 the debates were published by the Hansard Publishing Union Limited. T. C. Hansard was the author of Typographia, an Historical Sketch of the Origin and Progress of the Art of Printing (1825). The original business remained in the hands of his

younger brothers, James and Luke Graves Hansard (1777–1851). The firm was prosecuted in 1837 by John Joseph Stockwell for printing by order of the House of Commons, in an official report of the inspector of prisons, statements regarded by the plaintiff as libellous. Hansard sheltered himself on the ground of privilege, but it was not until after much litigation that the security of the printers of government reports was guaranteed by statute in 1840.

HANSEATIC LEAGUE. It is impossible to assign any precise date for the beginning of the Hanseatic League or to name any single factor which explains the origin of that loose but effective federation of North German towns. Associ- ated action and partial union among these towns can be traced back to the 13th century. In 1241 we find Liibeck and Hamburg agreeing to safeguard the important road connect- ing the Baltic and the North Sea. The first known meeting of the " maritime towns," later known as the Wendish group and including Liibeck, Hamburg, Liineburg, Wismar, Rostock and Stralsund, took place in 1256. The Saxon towns, during the following century, were joining to protect their common interests,' and indeed at this period town confederacies in Germany, both North and South, were so considerable as to call for the declara- tion against them in the Golden Bull of 1356. The decline of the imperial power and the growing opposition between the towns and the territorial princes justified these defensive town alliances, which in South Germany took on a peculiarly political character. The relative weakness of territorial power in the North, after the fall of Henry the Lion of Saxony, diminished without however removing this motive for union, but the comparative immunity from princely aggression on land left the towns freer to combine in a stronger and more permanent union for the defence of their commerce by sea and for the control of the Baltic.

While the political element in the development of the Hanseatic League must not be underestimated, it was not so formative as the economic. The foundation

was laid for the growth of German towns along the southern shore of the Baltic by the great movement of German colonization of Slavic territory east of the Elbe. This movement, extending in time from about the middle of the nth to the middle of the 13th century and carrying a stream of settlers and traders from the Northwest, resulted not only in the Germanization of a wide territory but in the extension of German influence along the sea-coast far to the east of actual territorial settlement. The German trading towns, at the mouths of the numerous streams which drain the North European plain, were stimulated or created by the unifying impulse of a common and long-continued advance of conquest and colonization.

The impetus of this remarkable movement of expansion not only carried German trade to the East and North within the Baltic basin, but reanimated the older trade from the lower Rhine region to Flanders and England in the West. Cologne and the Westphalian towns, the most important of which were Dortmund, Soest and Munster, had long cjntrolled this commerce but now began to feel the competition of the active traders of the Baltic, opening up that direct communication by sea from the Baltic ,to western Europe which became the essential feature in the history of the League. The necessity of seeking protection from the sea-rovers and pirates who infested these waters during the whole period of Hanseatic supremacy, the legal customs, substantially alike in the towns of North Germany, which governed the groups of traders in the outlying trading posts, the establishment of common factories, or ” counters "(Komtors)

at these points, with aldermen to administer justice and to secure trading privileges for the community of German merchants — such were some of the unifying influences which preceded the gradual formation of the League. In the century of energetic commercial development before 1350 the German merchants abroad led the way.

Germans were early pushing as permanent settlers

into the Scandinavian towns, and in Wisby, on the island of Gothland, the Scandinavian centre of Baltic trade, equal rights as citizens in the town government were possessed by the German settlers as early as the beginning of the 13th century. There also came into existence at Wisby the first association of German traders abroad, which united the merchants of over thirty towns, from Cologne and Utrecht in the West to Reval in the East. We find the Gothland association making in 1229 a treaty with a Russian prince and securing privileges for their branch trading station at Novgorod. According to the " Skra," the by-laws of the Novgorod branch, the four aldermen of the community of Germans, who among other duties held the keys of the common chest, deposited in Wisby, were to be chosen from the merchants of the Gothland association and of the towns of Liibeck, Soest and Dortmund. The Gothland association received in 1237 trading rights in England, and shortly after the middle of the century it also secured privileges in Flanders. It legislated on matters relating to common trade interests, and, in the case of the regulation of 1287 concerning shipwrecked goods, we find it imposing this legislation on the towns under the penalty of exclusion from the association. But with the extension of the East and West trade beyond the confines of the Baltic, this association by the end of the century was losing its position of leadership. Its inheritance passed to the gradually forming union of towns, chiefly those known as Wendish, which looked to Liibeck as their head. In 1293 the Saxon and Wendish merchants at Rostock decided that all appeals from Novgorod be taken to Liibeck instead of to Wisby, and six years later the Wendish and Westphalian towns, meeting at Liibeck, ordered that the Gothland association should no longer use a common seal. Though Liibeck's right as court of appeal from the Hanseatic counter at Novgorod was not recognized by the general assembly of the League until 1373, the long-existing practice had simply accorded with the actual shifting of commercial power. The union of merchants abroad was beginning to come under the control of the partial

union of towns at home.

A similar and contemporary extension of the influence of the Baltic traders under Liibeck's leadership may be witnessed in the West. As a consequence of the close commercial relations early existing between England and the Rhenish-Westphalian towns, the merchants of Cologne were the first to possess a gild- hall in London and to form a " hansa " with the right of admitting other German merchants on payment of a fee. The charter of 1226, however, by which Emperor Frederick II. created Liibeck a free imperial city, expressly declared that Liibeck citizens trading in England should be free from the dues imposed by the merchants of Cologne and should enjoy equal rights and privileges. In 1266 and 1267 the merchants of Hamburg and Liibeck received from Henry III. the right to establish their own hansas in London, like that of Cologne. The situation thus created led by 1282 to the coalescence of the rival associations in the " Gild-hall of the Germans," but though the Baltic traders had secured a recognized foothold in the enlarged and unified organization, Cologne retained the controlling interest in the London settlement until 1476. Liibeck and Hamburg, however, dominated the German trade in the ports of the east coast, notably in Lynn and Boston, while they were strong in the organized trading settlements at York, Hull, Ipswich, Norwich, Yarmouth and Bristol. The counter at London, first called the Steelyard in a parliamentary petition of 1422, claimed jurisdiction over the other factories in England.

In Flanders, also, the German merchants from the West had long been trading, but here had later to endure not only the rivalry but the pre-eminence of those from the East. In 1252 the first treaty privileges for German trade in Flanders show

two men of Liibeck and Hamburg heading the

"Merchants of the Roman Empire," and in the later organization of the counter at Bruges four or five of the six aldermen were chosen from towns east of the Elbe, with Liibeck steadily predominant. The Germans recognized the staple rights of Bruges for a number of commodities, such as wool, wax, furs, copper and grain, and in return for this material contribution to the growing commercial importance of the town, they received in 1309 freedom from the compulsory brokerage which Bruges imposed on foreign mer- chants. The importance and independence of the German trading settlements abroad was exemplified in the statutes of the " Company of German merchants at Bruges," drawn up in 1347, where for the first time appears the grouping of towns in three sections (the "Drittel"), the Wendish-Saxon, the Prussian-Westphalian, and those of Gothland and Livland. Even more important than the assistance which the concentra- tion of the German trade at Bruges gave to that leading mart of European commerce was the service rendered by the German counter of Bruges to the cause of Hanseatic unity. Not merely because of its central commercial position, but because of its width of view, its political insight, and its constant insistence on the necessity of union, this counter played a leading part in Hanseatic policy. It was more Hanse than the Hanse towns.

The last of the chief trading settlements, both in importance and in date of organization, was that at Bergen in Norway, where in 1343 the Hanseatics obtained special trade privileges. Scandinavia had early been sought for its copper and iron, its forest products and its valuable fisheries, especially of herring- at Schohen, but it was backward in its industrial development and its own commerce had seriously declined in the 14th century. It had come to depend largely upon the Germans for the import- ation of all its luxuries and of many of its necessities, as well as for the exportation of its products, but regular trade with the three kingdoms was confined for the most part to the Wendish towns, with Liibeck steadily asserting an exclusive ascendancy. The fishing centre at Schonen

was important as a market, though, like Novgorod, its trade was seasonal, but it did not acquire the position of a regularly organized counter, reserved alone, in the North, for Bergen. The commercial relations with the North cannot be regarded as an important element in the union of the Hanse towns, but the geographical position of the Scandinavian countries, especially that of Denmark, commanding the Sound which gives access to the Baltic, compelled a close attention to Scandinavian politics on the part of Liibeck and the League and thus by necessitating combined political action in defence of Hanseatic sea-power exercised a unifying influence.

Energetic and successful though the scattered trading settle- ments had been in establishing German trade connexions and in securing valuable trade privileges, the middle of the 14th century found them powerless to meet difficulties arising from internal dissension and still more from the political rivalries and trade jealousies of nascent nationalities. Flanders became a battle-field in the great struggle between France and England, and the war of trade prohibitions led to infractions of the German privileges in Bruges. An embargo on trade with Flanders, voted in 1358 by a general assembly, resulted by 1360 in the full restoration of German privileges in Flanders, but reduced the counter at Bruges to an executive organ of a united town policy. It is worth noting that in a document connected with this action the union of towns, borrowing the term from English usage, was first called the " German Hansa." In 1361 representatives from Liibeck and Wisby visited Novgorod to recodify the by-laws of the counter and to admonish it that new statutes required the consent of Liibeck, Wisby, Riga, Dorpat and Reval. This action was confirmed in 1366 by an assembly of the Hansa which at the same time, on the occasion of a regulation made by the ' Bruges counter and of statutes drawn up by the young Bergen counter, ordered that in future the approval of the towns must be obtained for all new regulations.

The counter at London was soon forced to follow the example of the other counters at Bruges, Novgorod and Bergen. After the failure of the Italians, the Hanseatics remained the strongest

xii. 30

group of alien merchants in England, and, as such, claimed the exclusive enjoyment of the privileges granted by the Carta Mercatoria of 1303. Their highly favoured position in England, contrasting markedly with their refusal of trade facilities to the English in some of the Baltic towns and their evident policy of monopoly in the Baltic trade, incensed the English mercantile classes, and doubtless influenced the increases in customs-duties which were regarded by the Germans as contrary to their treaty rights. Unsuccessful in obtaining redress from the. English government, the German merchants finally, in 1374, appealed for aid to the home towns, especially to Liibeck. The result of Hanseatic representations was the confirmation by Richard II. in 1377 of all their privileges, which accorded them the pre- ferential treatment they had claimed and became the foundation of the Hanseatic position in England.

In the meanwhile, the conquest of Wisby by Waldemar IV. of Denmark in 1361 had disclosed his ambition for the political control of the Baltic. He was promptly opposed by an alliance of Hanse towns, led by Liibeck. The defeat of the Germans at Helsingborg only called into being the stronger town and territorial alliance of 1367, known as the Cologne Confederation, and its final victory, with the peace of Stralsund in 1370, which gave for a limited period the four chief castles on the Sound into the hands of the Hanseatic towns, greatly enhanced the prestige of the League.

The assertion of Hanseatic influence in thetwo decades, 135610 1377) marks the zenith of the League's power and the completion of the long process of unification. Under the pressure of com- mercial and political necessity, authority was

definitely trans- ferred from the , Hansas of merchants abroad to the Hansa of towns at home, and the sense of unity had become such that in 1380 a Liibeck official could declare that ” whatever touches one town touches all.” But even at the time when union was most important, this statement went further than the facts would warrant, and in the course of the following century it became less and less true. Dortmund held aloof from the Cologne Confederation on the ground that it had no concern in Scandinavian politics. It became, indeed, increasingly difficult to obtain the support of the inland towns for a policy of sea- power in the Baltic. Cologne sent no representatives to the regular Hanseatic assemblies until 1383, and during the 15th century its independence was frequently manifested. It rebelled at the authority of the counter at Bruges, and at the time of the war with England (1469-1474) openly defied the League. In the East, the German Order, while enjoying Hanseatic privileges, frequently opposed the policy of the League abroad, and was only prevented by domestic troubles and its Hinterland enemies from playing its own hand in the Baltic. After the fall of the order in 1467, the towns of Prussia and Livland, especially Dantzig and Riga, pursued an exclusive trade policy even against their Hanseatic confederates. Liibeck, however, supported by the Bruges counter, despite the disaffection and jealousy on all sides hampering and sometimes thwarting its efforts, stood steadfastly for union and the necessity of obedience to the decrees of the assemblies. Its headship of the League, hitherto tacitly accepted, was definitely recognized in 1418.

The governing body of the Hansa was the assembly of town representatives, the “Hansetage,” held irregularly as occasion required at the summons of Liibeck, and, with few exceptions, attended but scantily. The delegates were bound by instruc- tions from their towns and had to report home the decisions of the assembly for acceptance or rejection. In 1469 the League declared that the English use of the terms ” societas,” ” col- legium

” and ” universitas ” was inappropriate to so loose an organization. It preferred to call itself a “firma confederatio ” for trade purposes only. It had no common seal, though that of Liibeck was accepted, particularly by foreigners, in behalf of the League. Disputes between the confederate towns were brought for adjudication before the general assembly, but the League had no recognized federal judiciary. Liibeck, with the counters abroad, watched over the execution of the measures voted by the assembly, but there was no regular administrative

organization. Money for common purposes was raised from time to time, as necessity demanded, by the imposition on Hanse merchandise of poundage dues, introduced in 1361, while the counters relied upon a small levy of like nature and upon fines to meet current needs. Even this slender financial provision met with opposition. The German Order in 1398 converted the Hanseatic poundage to a territorial tax for its own purposes, and one of the chief causes for Cologne’s disaffection a half- century later was the extension from Flanders to other parts of the Netherlands of the levy made by the counter at Bruges. Since the authority of the League rested primarily on the moral support of its members, allied in common trade interests and acquiescing in the able leadership of Lubeck, its only means of compulsion was the ” Verhansung,” or exclusion of a recalcitrant town from the benefits of the trade privileges of the League. A conspicuous instance was the exclusion of Cologne from 1471 until its obedience in 1476, but the penalty had been earlier imposed, as in the case of Brunswick, on towns which overthrew their patrician governments. It was obviously, however, a measure to be used only in the last resort and with extreme reluctance.

The decisive factor in determining membership in the League was the historical right of the citizens of a

town to participate in Hanseatic privileges abroad. At first the merchant Hansas had shared these privileges with almost any German merchant, and thus many little villages, notably those in Westphalia, ultimately claimed membership. Later, under the Hansa of the towns, the struggle for the maintenance of a coveted position abroad led to a more exclusive policy. A few new members were admitted, mainly from the westernmost sphere of Hanseatic influence, but membership was refused to some important applicants. In 1447 it was voted that admission be granted only by unanimous consent. No complete list of members was ever drawn up, despite frequent requests from foreign powers. Contemporaries usually spoke of 70, 72, 73 or 77 members, and perhaps the list is complete with Daenell's recent count of 72, but the obscurity on so vital a point is significant of the amorphous character of the organization.

The towns of the League, stretching from Thorn and Krakow on the East to the towns of the Zuider Zee on the West, and from Wisby and Reval in the North to Gottingen in the South, were arranged in groups, following in the main the territorial divisions. Separate assemblies were held in the groups for the discussion both of local and Hanseatic affairs, and gradually, but not fully until the 1 6th century, theigroups became recognized as the lowest stage of Hanse organization. The further grouping into " Thirds," later "Quarters," under head-towns, was also more emphasized in that century.

In the 15th century the League, with increasing difficulty, held a defensive position against the competition of strong rivals and new trade-routes. In England the inevitable conflict of interests between the new mercantile power, growing conscious of its national strength, and the old, standing insistant on the letter of its privileges, was postponed by the factional discord out of which the Hansa in 1474 dexterously snatched a renewal of its rights. Under Elizabeth, however, the English Merchant Adventurers could finally rejoice at the withdrawal of privileges from the Hanseatics and their concession to England, in return for the

retention of the Steelyard, of a factory in Hamburg. In the Netherlands the Hanseatics clung to their position in Bruges until 1 540, while trade was migrating to the ports of Antwerp and Amsterdam. By the peace of Copenhagen in 1441 , after the unsuccessful war of the League with Holland, the attempted monopoly of the Baltic was broken, and, though the Hanseatic trade regulations were maintained on paper, the Dutch with their larger ships increased their hold on the herring fisheries, the French salt trade, and the Baltic grain trade. For the Russian trade new competitors were emerging in southern Germany. The Hanseatic embargo against Bruges from 1451 to 1457, its later war and embargo against England, the Turkish advance closing the Italian Black Sea trade with southern Russia, all were utilized by Nuremberg and its fellows to secure a land- trade outside the sphere of Hanseatic influence. The fairs of

Leipzig and Frankfort-on-Main rose in importance as Novgorod, the stronghold of Hanse trade in the East, was weakened by the attacks of Ivan III. The closing of the Novgorod counter in 1494 was due not only to the development of the Russian state but to the exclusive Hanseatic policy which had stimulated the opening of competing trade routes.

Within the League itself increasing restiveness was shown under the restrictions of its trade policy. At the Hanseatic assembly of 1469, Dantzig, Hamburg and Breslau opposed the maintenance of a compulsory staple at Bruges in the face of the new conditions produced by a widening commerce and more advantageous markets. Complaint was made of South German competition in the Netherlands. ” Those in the Hansa,” pro- tested Breslau, ” are fettered and must decline and those outside the Hansa are free and prosper.” By 1477 even Lubeck had become convinced that a continuance of the effort to maintain the compulsory staple against Holland was futile and should be abandoned. But while it was found impossible to enforce the staple or to close the Sound against the Dutch, other features of the monopolistic system of trade regulations were still

upheld. It was forbidden to admit an outsider to partnership or to co-ownership of ships, to trade in non-Hanseatic goods, to buy or sell on credit in a foreign mart or to enter into contracts for future delivery. The trade of foreigners outside the gates of Hanse towns or with others than Hanseatics was forbidden in 1417, and in the Eastern towns the retail trade of strangers was strictly limited. The whole system was designed to suppress the competition of outsiders, but the divergent interests of individuals and towns, the pressure of competition and changing commercial conditions, in part the reactionary character of the legislation, made enforcement difficult. The measures were those of the late-medieval town economy applied to the wide region of the German Baltic trade, but not supported, as was the analogous mercantilist system, by a strong central govern- ment.

Among the factors, economic, geographic, political and social, which combined to bring about the decline of the Hanseatic League, none was probably more influential than the absence of a German political power comparable in unity and energy with those of France and England, which could quell particularism at home, and abroad maintain in its vigour the trade which these towns had developed and defended with their imperfect union. Nothing was to be expected from the declining Empire. Still less was any co-operation possible between the towns and the territorial princes. The fatal result of conflict between town autonomy and territorial power had been taught in Flanders. The Hanseatics regarded the princes with a growing and ex- aggerated fear and found some relief in the formation in 141 8 of a thrice-renewed alliance, known as the " Tohopesate," against princely aggression. But no territorial power had as yet arisen in North Germany capable of subjugating and utilizing the towns, though it could detach the inland towns from the League. The last wars of the League with the Scandinavian powers in the 16th century, which left it shorn of many of its privileges and of any pretension to control of the Baltic basin eliminated it as a factor in the later

struggle of the Thirty Years' War for that control. At an assembly of 1629, Lubeck, Bremen and Hamburg were entrusted with the task of safeguarding the general welfare, and after an effort to revive the League in the last general assembly of 1669, these three towns were left alone to preserve the name and small inheritance of the Hansa which in Germany's disunion had upheld the honour of her commerce. Under their protection, the three remaining counters lingered on until their buildings were sold at Bergen in 1775, at London in 1852 and at Antwerp in 1863.

Bibliography. — Hansisches Vrkundenbuch, bearbeitet von K. Hohlbaum, K. Kunze und W. Stein (10 vols., Halle und Leipzig, 1876–1907) ; Hanserecesse, erste Abtheilung, 1256–1430 (8 vols., Leipzig, 1870–1897), zweite Abtheilung, 1431–1476 (7 vols., 1876" 1892) ; dritte Abtheilung, 1477–1530 (7 vols., 1881–1905) ; Hansieche Geschichtsquetten (7 vols., 1875–1894; 3 vols., 1897–1906); In ventare hansischer Archive des sechzehiften Jahrkunderts (vols. I and 2, 1896–1903).; Hansische GeschiMMiMUr (14 vols., 1871–19'oS). All

the above-mentioned chief sources have been issued by the Verein fiir hansische Geschichte. Of the secondary literature, the following histories and monographs should be named. G. F. Sartorius, Geschichte des hanseatischen Bundes (3 vols., Gottingen, 1 802–1 808), Urkundliche Geschichte des Ursprunges der deutschen Hanse, herausge- geben von J. M. Lappenberg (2 vols., Hamburg, 1830); F. W. Barthold, Geschichte der deutschen Hansa (3 vols., 2nd ed., Leipzig, 1862); D. Schafer, Die Hansestddte und Konig Waldemar von Ddnemark (Jena, 1879) ; W. Stein, Beitrdge zur Geschichte der deutschen Hanse bis um die Mitte desfiinfzehnten Jahrhunderts (Giessen, 1900); E. Daenell, Die Blutezeit de' deutschen Hanse. Hansische Geschichte von der zweiten Halfte des XIV. bis zum letzten Viertel des XV. Jahrhunderts (2 vols., Berlin, 1905–1906) ; J. M. Lappenberg, Urkundliche Geschichte des hansischen Stahlhofes zu London (Hamburg, 1 851) ; F. Keutgen, Die Beziehungen der Hanse zu England im letzten Drittel des vierzehnten Jahrhunderts (Giessen, 1890) ; R. Ehrenberg, Hamburg und England im Zeitalter der Konigin Elisabeth (Jena, 1896); W. Stein, Die Genossenschaft der deutschen Kaufleute zu Brugge in Flandern (Berlin, 1890) ; H. Rogge, Der Stapelzwang des hansischen Kontors zu Brugge im funfzehnten Jahrhundert (Kiel, 1903) ; A. Winckler, Die deutsche Hansa in Russland (Berlin, 1886).

(E. F. G.)

HANSEN, PETER ANDREAS (1795–1874), Danish astronomer, was born on the 8th of December 1795, at Tondern, in the duchy of Schleswig. The son of a goldsmith, he learned the trade of a watchmaker at Flensburg, and exercised it at Berlin and Tondern, 1818–1820. He had, however, long been a student of science; and Dr Dircks, a physician practising at Tondern, prevailed with his father to send him in 1820 to Copenhagen, where he won the patronage of H. C. Schumacher, and attracted the personal notice of King Frederick VI. The Danish survey was then in progress, and he acted as Schumacher's assistant in work connected with it, chiefly at the new observatory of Altona, 1821–1825. Thence he passed on to Gotha as director of the Seeberg observatory; nor could he be tempted to relinquish the post by successive invitations to replace F. G. W. Strove at Dorpat in 1829, and F. W. Bessel at Konigsberg in 1847. The problems of gravitational astronomy engaged the chief part of Hansen's attention. A research into the mutual perturbations of Jupiter and Saturn secured for him the prize of the Berlin Academy in 1830, and a memoir on cometary disturbances was crowned by the Paris Academy in 1850. In 1838 he published a revision of the lunar theory, entitled Fundamenta nova investi- gationis, &c, and the improved Tables of the Moon based upon it were printed in 1857, at the expense of the British government, their merit being further recognized by a grant of £1000, and by their immediate adoption in the Nautical Almanac, and other Ephemerides. A theoretical discussion of the disturbances embodied in them (still familiarly known to lunar experts as the Darlegung) appeared in the Abhandlungen of the Saxon Academy of Sciences in 1862–1864. Hansen twice visited England and was twice (in 1842 and i860) the recipient of the Royal Astronomical Society's gold medal. He communicated to that society in 1847 an able paper on a long-period lunar inequality (Memoirs Roy. Astr. Society, xvi. 465), and in 1854 one on the moon's figure, advocating the mistaken hypothesis of its deforma-

tion by a huge elevation directed towards the earth (lb. xxiv. 29). He was awarded the Copley medal by the Royal Society in 1850, and his Solar Tables, compiled with the assistance of Christian Olufsen, appeared in 1854. Hansen gave in 1854 the first intimation that the accepted distance of the sun was too great by some millions of miles (Month. Notices Roy. Astr. Soc. xv. 9), the error of J. F. Encke's result having been rendered evident through his investigation of a lunar inequality. He died on the 28th of March 1874, at the new observatory in the town of Gotha, erected under his care in 1857.

See Vierteljahrsschrift astr. Gesellschaft, x. 1 33; Month. Notices Roy. Astr. Society, xxxv. 168; Proc. Roy. Society, xxv. p. v.; R. Wolf, Geschichte der Asironomie, p. 526; Wochenschrift fiir Astra-' nomie, xvii. 207 (account of early years by E. Heis) ; Allgemeine .deutsche Biographie (C. Bruhns). (A. M. C.)

HANSI, a town of British India, in the Hissar district of the Punjab, on a branch of the Western Jumna canal, with a station on the Rewari-Ferozepore railway, 16 m. E. of Hissar. Pop. (1901) 16,523. Hansi is one of the most ancient towns in northern India, the former capital of the tract called Hariana.

At the end of the 18th century it was the headquarters of the famous Irish adventurer George Thomas; from 1803 to 1857 it was a British cantonment, and it became the scene of a murderous outbreak during the Mutiny. A ruined fort overlooks the town, which is still surrounded by a high brick wall, with bastions and loop holes. It is a centre of local trade, with factories for ginning and pressing cotton.

HANSOM, JOSEPH ALOYSIUS (1803-1882), English architect and inventor, was born in York on the 26th of October 1803. Showing an aptitude for designing and construction, he was taken from his father's joinery shop and apprenticed to an architect in York, and, by 1831, his designs for the Birmingham

town hall were accepted and followed — to his financial undoing, as he had become bond for the builders. In 1834 he registered the design of a " Patent Safety Cab," and subsequently sold the patent to a company for £10,000, which, however, owing to the company's financial difficulties, was never paid. The hansom cab as improved by subsequent alterations, nevertheless, took and held the fancy of the public. There was no back seat for the driver in the original design, and there is little beside the sus- pended axle and large wheels in the modern hansom to recall the early ones. In 1834 Hansom founded the Builder newspaper, but was compelled to retire from this enterprise owing to in- sufficient capital. Between 1854 and 1879 he devoted himself to architecture, designing and erecting a great number of important buildings, private and public, including churches, schools and convents for the Roman Catholic church to which he belonged. Buildings from his designs are scattered all over the United Kingdom, and were even erected in Australia and South America. He died in London on the 29th of June 1882.

HANSON, SIR RICHARD DAVIES (1805-1876), chief justice of South Australia, was born in London on the 6th of December 1805. Admitted a solicitor in 1828, he practised for some time in London. In 1838 he went with Lord Durham to Canada as assistant-commissioner of inquiry into crown lands and immi- gration. In 1840, on the death of Lord Durham, whose private secretary he had been, he settled in Wellington, New Zealand. He there acted as crown prosecutor, but in 1846 removed to South Australia. In 1851 he was appointed advocate-general of that colony and took an active share in the passing of many important measures, such as the first Education Act, the District Councils Act of 1852, and the Act of 1856 which granted con- stitutional government to the colony. In 1856 and again from 1857 to i860 he was attorney-general and leader of the govern- ment. In 1861 he was appointed chief justice of the supreme court of South Australia and was knighted in 1869. He died in Australia on the 4th of March 1876.

HANSTEEN, CHRISTOPHER (1784-1873), Norwegian astro- nomer and physicist, was born at Christiania, on the 26th of September 1784. From the cathedral school he went to the university at Copenhagen, where first law and afterwards mathematics formed his main study. In 1806 he taught mathe- matics in the gymnasium of Frederiksborg, Zeeland, and in the following year he began the inquiries in terrestrial magnetism with which his name is especially associated. He took in 181 2 the prize of the Danish Royal Academy of Sciences for his reply to a question on the magnetic axes. Appointed lecturer in 1814, he was in 181 6 raised to the chair of astronomy and applied mathematics in the university of Christiania. In 1819 he pub- lished a volume of researches on terrestrial magnetism, which was translated into German by P. T. Hanson, under the title of Untersuchungen iiber den Magnetismus der Erde, with a supple- ment containing Beobachtungen der Abweichung und Neigung der Magnetnadel and an atlas. By the rules there framed for the observation of magnetical phenomena Hansteen hoped to accumulate analyses for determining the number and position of the magnetic poles of the earth. In prosecution of his researches he travelled over Finland and the greater part of his own country; and in 1828-1830 he undertook, in company with G. A. Erman,and with the co-operation of Russia, a govern- ment mission to Western Siberia. A narrative of the expedition soon appeared (Reise-Erinnerungen aus Sibirien, 1854; Souvenirs

4' un voyage en Sibirie, 1857); but the chief work was not issued till 1863 (Residtate magneHscker Beobacktungen, &c). Shortly after the return of the mission, an observatory was erected in the park of Christiania (1833), and Hansteen was appointed director. On his representation a magnetic observatory was added in 1830; In 1835-1838 he published text-books on geometry and mechanics; and in 1842 he wrote his Disquisitiones de mulatimUbus

quas patitur momentum acus magneticae, &c. He alsoifontributed various papers to different scientific journals, espe^aUy the Magazin for Naturvidenskaberne, of which he became joint-editor in 1823. He superintended the trigono- metrical and topographical survey of Norway, begun in 1837. ; In 1861 he retired from active work, but still pursued his studies, his Observations de V inclination magnttique and Sur les variations seculaires du magnetisme appearing in 1865. He died at Christiania on the nth of April 1873.

HANTHAWADDY, a district in the Pegu division of Lower Burma, the home district of Rangoon, from which the town was detached to make a separate district in 1880. It has an area of 3023 sq. m., with a population in root of 484, 8ir, showing an increase of 22% in the decade. Hanthawaddy and Henzada are the two most densely populated districts in the province. It consists of a vast plain stretching up from the sea between the To or China Bakir mouth of the Irrawaddy and the Pegu Yomas. Except the tract lying between the Pegu Yomas on the east and the Hlaing river, the country is intersected by numerous tidal creeks, many navigable by large boats and some by steamers. The headquarters of the district are in Rangoon, which is alsc ..he sub-divisional headquarters. The second sub-division has its headquarters at Insein, where there are large railway works. Cultivation is almost wholly confined to rice, but there are many vegetable and fruit gardens.

HANUKKAH, a Jewish festival, the " Feast of Dedication " (cf. John x. 22) or the " Feast of the Maccabees," beginning on the 25th day of the ninth month Kislev (December), of the Hebrew ecclesiastical year, and lasting eight days. It was instituted in 165 B.C. in commemoration of, and thanksgiving for, the purification of the temple at Jerusalem on this day by Judas Maccabaeus after its pollution by Antiochus Epiphanes, king of Syria, who in 168 B.e. set up a pagan altar to Zeus Olympius. The Talmudic sources say that when the perpetual lamp of the temple was to be relighted only one

flask of holy oil sufficient for the day remained, but this miraculously lasted for the eight days (cf. the legend in 2 Mace. i. 18). In memory of this the Jews burn both in synagogues and in houses on the first night of the festival one light, on the second two, and so on to the end (so the Hillelites), or vice versa eight lights on the first, and one less on each succeeding night (so the Shammaites). From the prominence of the lights the festival is also known as the " Festival of Lights " or " Illumination " (Talmud}. It is said that the day chosen by Judas for the setting up of the new altar was the anniversary of that on which Antiochus had set up the pagan altar; hence it is suggested (e.g. by Wellhausen) that the 25th of Kislev was an old pagan festival, perhaps the day of the winter solstice.

For further details and illustrations of Hanukkah lamps see Jewish Encyc, s.v.

HANUMAN, in Hindu mythology, a monkey-god, who forms a central figure in ihe-Ramayana. He was the child of a nymph by the god of the wind. His exploits, as the ally of Rama (incarna- tion of Vishnu) in the latter's recovery of his wife Sita from the clutches of the demon Ravana, include the bridging of the straits between India and Ceylon with huge boulders carried away from the Himalayas. He is the leader of a host of monkeys who aid in these supernatural deeds. Temples in his honour are frequent throughout India.

HANWAY, JONAS (1712-1786), English traveller and philan- thropist, was born at Portsmouth in 171 2. While still a child, his father, a victualler, died, and the family moved to London. In 1729 Jonas was apprenticed to a merchant in Lisbon. In 1743, after he had been some time in business for himself in London, he became a partner with Mr Dingley, a merchant in

St Petersburg, and in this way was led to travel in Russia and Persia. Leaving St Petersburg on the 10th of September 1743, and passing south by Moscow,

Tsaritsyn and Astrakhan, he embarked on the Caspian on the 2 2nd of November, and arrived at Astrabad on the 18th of December. Here his goods were seized by Mohammed Hassan Beg, and it was only after great privations that he reached the camp of Nadir Shah, under whose protection he recovered most (85%) of his property. His return journey was embarrassed by sickness (at Resht), by attacks from pirates, and by six weeks' quarantine; and he only reappeared at St Petersburg on the 1st of January 1745. He again left the Russian capital on the gth of July 1750 and travelled through Germany and Holland to England (28th of October). The rest of his life was mostly spent in London, where the narrative of his travels (published in 1753) soon made him a man of note, and where he devoted himself to philanthropy and good citizenship. In 1756 he founded the Marine Society, to keep up the supply of British seamen; in 1758 he became a governor of the Foundling, and established the Magdalen, hospital; in 1761 he procured a better system of parochial birth-registration in London; and in 1762 he was appointed a commissioner for victualling the navy (10th of July); this office he held till October 1783. He died, unmarried, on the 5th of September 1786. He was the first Londoner, it is said, to carry an umbrella, and he lived to triumph over all the hackney coachmen who tried to hoot and hustle him down. He attacked " vail-giving," or tipping, with some temporary success; by his onslaught upon tea-drinking he became involved in con- troversy with Johnson and Goldsmith. His last efforts were on behalf of little chimney-sweeps. His advocacy of solitary confinement for prisoners and opposition to Jewish naturaliza- tion were more questionable instances of his activity in social matters.

Hanway left seventy-four printed works, mostly pamphlets; the only one of literary importance is the Historical Account of British Trade over the Caspian Sea, with a Journal of Travels, &c. (London, 1753). On' his life, see also Pugh, Remarkable Occurrences in the Life of Jonas Hanway (London, 1787) ; Gentleman's Magazine, vol. xxxii. p. 342;

vol. lvi. pt. ii. pp. 812–814, 1090, 1143–1144; vol. Ixv. pt. ii. pp. 721–722, 834–835 ; Notes and Queries, 1st series, i. 436, ii. 25; 3rd series, vii. 311; 4th series, viii. 416.

HANWELL, an urban district in the Brentford parliamentary division of Middlesex, England, 10J m. W. of St Paul's cathedral, London, on the river Brent and the Great Western railway. Pop. (1801) 6139; (rpoi) 10,438. It ranks as an outer residential suburb of London. The Hanwell lunatic asylum of the county of London has been greatly extended since its erection 1831, and can accommodate over 2500 inmates. The extensive cemeteries of St Mary Abbots, Kensington, and St George, Hanover Square, London, are here. In the churchyard of St Mary's church was buried Jonas Hanway (d. 1786), traveller, philanthropist, and by repute, introducer of the umbrella into England. The Roman Catholic Convalescent Home for women and children was erected in 1865. Before the Norman period the manor of Hanwell belonged to Westminster Abbey.

HAPARANDA (Finnish Haaparanta, " Aspen Shore "), a town of Sweden in the district (Ian) of Norbotten, at the head of the Gulf of Bothnia. Pop. (1900) 1568. It lies about 1 J m. from the mouth of the Torne river, on the frontier with Russia (Finland), opposite the town of Tornea which has belonged to Russia since 1809. The towns are divided by a marshy channel, formerly the bed of the Torne, but the main stream is now east of the Russian town. Haparanda was founded in 1812, and at first bore the name of Karljohannstad. It received its municipal constitution in 1842. Shipbuilding is prosecuted. Sea-going vessels load and unload at Salmio, 7 m. from Haparanda. Since 1859 the town has been the seat of an im- portant meteorological station. Annual mean temperature, 32-4° Fahr.; February 10-5°; July 58-8°. Rainfall, 16-5 in. annually. Up the Torne valley (54 m.) is the hill Avasaxa, whither pilgrimages were formerly made in order to stand in the light of the sun at midnight on St John's day (June 24).

HAPLODRILI (so called by Lankester), often called Archian- oelida (Hatschek), the name provisionally given to a number of

k *. l.m ^=SSS=?S^S:

fit-.

Fig. i.

A, Polygordius neapolitanus. (From Fraipont.)

B, Transverse section of Poly- gordius. (From Fraipont.)

C, Trochophore of Polygordius. and D, later stage of the same, showing the development of the trunk. (From Hatschek.)

E, Dorsal view of Dinophilus taeniatus.

F, Male apparatus of the sa ne (From Harmer.) a, Anus. ap. Apical organ. c, Coelom. c.o, Ciliated pit. c.t, Cuticle. d.v, Dorsal vessel. e. Eye. ep, Epidermis. g,f, Genital funnel.

interesting lowly-organized marine worms, whose affinities are very doubtful (see Chaetopoda). Polygordius and Protodrilus

h,

"Head kidney," with second nephridium just

below it.

i,

Intestine.

l.m,

Longitudinal muscles.

m,

Mouth.

m.o

Muscular pharyngeal organ.

m.p

, Male pore.

n,

Nephridium.

o.m

Oblique muscles.

ov,

Ovary.

P,

Penis.

Pr,

Prototroch.

pi,

Prostornial tentacle.

sp,

Sperm-sac.

spd, Sperm-duct.

si,

Stomach.

t,

Testes.

tr,

Trunk segment.

11,

Telotroch.

v.n,

Ventral nerve cord.

v.v,

Ventral vessel.

live in sand, but while the former moves by means of the contrac- tion of its body-wall muscles, Protodrilus can progress by the action of the bands of cilia surrounding its segments, and of the longitudinal ciliated ventral groove. Saccocirrus, which also lives in sand, and more closely resembles the Polychaeta, has throughout the greater length of its body on each segment a pair of small uniramous parapodia bearing a bunch of simple setae. No other member of the group is known to have any trace of setae or parapodia at any stage of development.

These three genera have the following characters in common. The body is composed of a large number of segments; the pro- stomium bears a pair of tentacles; the nervous system consists of a brain and longitudinal ventral nerve cords closely connected with the epidermis (without distinct ganglia), widely separated in Saccocirrus, closely approximated in 'Protodrilus, fused together in Polygordius; the coelom is well developed, the septa are distinct, and the dorsal and ventral longitudinal mesenteries are complete; the nephridia are simple, and open into the coelom. Polygordius differs from Protodrilus and Saccocirrus in the absence of a distinct suboesophageal muscular pouch,

and in the absence of a peculiar closed cavity in the head region, which is especially well developed in Saccocirrus, and probably represents the specialized coelom of the first segment. Moreover, in Saccocirrus the genital organs,

*nejk**

riditai,

i'A'iu"

Sberm - &ac

Fig. 2. — Diagram of a transverse section of Saccocirrus showing on the left side the organs in a genital segment of a male, and on the right side the organs in a genital segment of a female. (From Goodrich.)

present in the majority of the trunk segments, have become much complicated (fig. 2). In the female there is in every fertile seg- ment a pair of spermathecae opening at the nephridiopores. In the male there are a right and a left protrusible penis in every genital segment, into which opens the nephridium and a sperm-sac. The wide funnels of the nephridia of this region are possibly of coelomic origin.

Dinophilus is a free-swimming form without tentacles, and with segmental bands of cilia (fig. 1). The parasitic Histriodritus (Histrio- bdella) feeds on the eggs of the lobster. , It resembles Dinophilus in the possession of a ventral pharyngeal pouch (which bears teeth in Histriodrilus only), the small number of segments, and absence of distinct septa, the absence of a vascular system, the presence of distinct ganglia on the ventral nerve cords, and of small nephridia which do not appear to open internally. Histriodrilus resembles Saccocirrus in the possession of two posterior adhesive processes, and to some extent in the structure of the complex genital organs, which, however, are restricted to a single segment. In*

Dinophilus. there is also only a single pair of genital ducts behind ; and in the male there are sperm-sacs and a median penis. In some species of Dinophilus there is pronounced sexual dimorphism (the male being small. and without gut) as in the Rotifera. The resemblance of Dinophilus to the Rotifera is, however, quite superficial, and the general structure of this genus with distinct traces of segmenta- tion, especially in the embryo, points to its close affinity, if not to Polygordius in particular, at all events to the Annelida.

That Polygordius, Protodrilus and Saccocirrus are on the whole primitive forms, and related to each other, there can be little doubt, but their place amongst the Annelida is difficult to deter- mine. The development of Polygordius alone is well known, having been studied by Hatschek, Fraipont and others. The larva (fig. I, C and D) is a typical but very specialized form of trochophore, provided with a branching nephridium bearing solenocytes. The trunk develops on the lower surface of the disk-like larva, which undergoes a more or less sudden metamorphosis into the young worm (fig. 1). There appears to be little either in the development or in the structure of the Haplodrili to warrant the view held by Hatschek and Fraipont that Polygordius and Protodrilus are exceed- ingly primitive forms, ancestral to the whole group of seta-bearing Annelids (Oligochaeta, Polychaeta, Hirudinea and Echiuroidea).

Whatever may be the conclusion as to the position of Dino- philus and Histriodrilus, it seems only reasonable to suppose that Polygordius and Protodrilus, so far from representing a stage in the phylogeny of the Annelida before setae were developed, have lost the setae, which are already in a reduced state in Saccocirrus.

Authorities. — Hatschek, ” Studien z. Entw. der

Anneliden," Arb. Zool. Inst. Wien, vol. i., 1878; "Protodrilus," ibid. vol. iii. (1881); Fraipont, " Le Genre Polygordius," Fauna u. Flora d. Golfes v. Neapel., xiv., 1887; Weldon, " Dinophilus gigas," Quart. Journ. Micr. Sci. vol. xxvii., 1886; Harmer, " Dinophilus," Journ. Mar. Biol. N.S. vol. i., 1889; Schimkewitsch, " Entwickl. .des Dinophilus" Zeit. f. wiss. Zool. vol. lix., 1895; Korschelt, " tlber Bau u. Entw. des Dinophilus," Zeit. f. wiss. Zool. vol. xxxvii., 1882; Foettinger, " Histriobdella," Arch. Biol. vol. v., 1884; Goodrich, " On Saccocirrus," Quart. Journ. Micr. Sci. vol. xliv., 1901. (E. S. G.)

HAPTARA (lit. conclusion)., the Hebrew title given to the prophetic lessons with which the ancient Synagogue service concluded. In the time of Christ these prophetic lessons were already in vogue, and Christ himself read the lessons and dis- coursed on them in the synagogues of Galilee. In the modern synagogue these readings from the prophets are regularly included in the ritual of Sabbaths, festivals and some other occasions.

A list of the current lessons is given in the Jewish Encyclopedia, vol. vi. pp. 136-137. (I. A.)

HAPUR, a town of British India in the Meerut district of the United Provinces, 18 m. S. of Meerut. Pop. (1901) 17,796. It is said to have been founded in the 10th century, and was granted by Sindhia to his French general Perron at the end of the 1 8th century. Several fine groves surround the town, but the wall and ditch have fallen out of repair, and only the names of the five gates remain. Considerable trade is carried on in sugar, grain, cotton, timber, bamboos and brass utensils.

HARA-KIRI (Japanese hara, belly, and kiri, cutting), self- disembowelment, primarily the method of suicide permitted to offenders of the noble class in feudal Japan, and later the national form of honourable suicide. Hara-kiri has been often translated as " the happy dispatch " in confusion with a native euphemism for the act. More usually

the Japanese themselves speak of hara-kiri by its Chinese synonym, Seppuku. Hara-kiri is not an aboriginal Japanese custom. It was a growth of medieval militarism, the act probably at first being prompted by the desire of the noble to escape the humiliation of falling into an enemy's hands. By the end of the 14th century the custom had become a much valued privilege, being formally established as such under the Ashi-Kaga dynasty. Hara-kiri was of two kinds, obligatory and voluntary. The first is the more ancient. An official or noble, who had broken the law or been disloyal, received a message from the emperor, couched always in sympathetic and gracious tones, courteously intimating that he must die. The mikado usually sent a jewelled dagger with which the deed might be done. The suicide had so many days allotted to him by immemorial custom in which to make dignified preparations for the ceremony, which was attended by the utmost formality. In his own baronial hall or in a temple a dais 3 or 4 in. from the ground was constructed. Upon this was laid a rug of red felt. The suicide, clothed in his ceremonial dress as an hereditary noble, and accompanied by his second or " Kaishaku," took his place on the mat, the officials and his friends ranging themselves in a semicircle round the dais. After a minute's prayer the weapon was handed to him with many obeisances by the mikado's representative, and he then made a public confession of his fault. He then stripped to the waist. Every movement in the grim ceremony- was governed by precedent, and he had to tuck his wide sleeves under his knees to prevent himself falling backwards, for a Japanese noble must die falling forward. A moment later he plunged the dagger into his stomach below the waist on the left side, drew it across to the right and, turning it, gave a slight cut upward. At the same moment the Kaishaku who crouched at his friend's side, leaping up, brought his sword down on the outstretched neck. At the conclusion of the ceremony the bloodstained dagger was taken to the mikado as a proof of the consummation of the heroic

act. The performance of hara-kiri carried with it

certain privileges. If it was by order of the mikado half only of a traitor's property was forfeited to the state. If the gnawings of conscience drove the disloyal noble to voluntary suicide, his dishonour was wiped out, and his family inherited all his fortune.

Voluntary hara-kiri was the refuge of men rendered desperate by private misfortunes, or was committed from loyalty to a dead superior, or as a protest against what was deemed a false national policy. This voluntary suicide still survives, a characteristic case being that of Lieutenant Takeyoshi who in i89i.gave himself the " belly-cut " in front of the graves of his ancestors at Tokyo as a protest against what he considered the criminal lethargy of the government in not taking precautions against possible Russian encroachments to the north of Japan. In the Russo- Japanese War, when faced by defeat at Vladivostock, the officer in command of the troops on the transport " Kinshu Maru " committed hara-kiri. Hara-kiri has not been uncommon among women, but in their case the mode is by cutting the throat. The popularity of this self-immolation is testified to by the fact that for centuries no fewer than 1500 hara-kiris are said to have taken place annually, at least half being entirely voluntary. Stories of amazing heroism are told in connexion with the performance of the act. One noble, barely out of his teens, not content with giving himself the customary cuts, slashed himself thrice horizontally and twice vertically. Then he stabbed himself in the throat until the dirk protruded on the other side with the sharp edge to the front, and with a supreme effort drove the knife forward with both hands through his neck. Obligatory hara-kiri was obsolete in the middle of the 19th century, and was actually abolished in 1868.

See A. B. Mitford, Tales of Old Japan ; Basil Hall Chambertain, Things Japanese (1898).

HARALD, the name of four kings of Norway.

Harald I. (850-933), surnamed Haarfager (of the

beautiful hair), first king over Norway, succeeded on the death of his father Halfdan the Black in a.d. 860 to the sovereignty of several small and somewhat scattered kingdoms, which had come into his father's hands through conquest, and inheritance and lay chiefly in south-east Norway (see Norway). The tale goes that the scorn of the daughter of a neighbouring king induced Harald to take a vow not to cut nor comb his hair until he was sole king of Norway, and that ten years later he was justified in trimming it; whereupon he exchanged the epithet " Shockhead " for the one by which he is usually known. In 866 he made the first of a series of conquests over the many petty kingdoms which then composed Norway; and in 872, after a great victory at Hafrsf jord near Stavanger, he found himself king over the whole country. His realm was, however, threatened by dangers from without, as large numbers of his opponents had taken refuge, not only in Iceland, then recently discovered, but also in the Orkneys, Shetlands, Hebrides and Faeroes, and in Scotland itseit; and from these winter quarters sallied forth to harry Norway as well as the rest of northern Europe. Their numbers were increased by malcontents from Norway, who resented Harald's claim of rights of taxation over lands which the possessors appear to have previously held in absolute ownership. At last Harald was forced to make an expedition to the west to clear the islands and Scottish mainland of Vikings. Numbers of them fled to Iceland, which grew into an independent commonwealth, while the Scottish isles fell under Norwegian rule. The latter part of Harald's reign was disturbed by the strife of his many sons. He gave them all the royal title and assigned lands to them which they were to govern as his representatives; but this arrangement did not put an end to the discord, which continued into the next reign. When he grew old he handed over the supreme power to his favourite son Erik " Bloody Axe," whom he intended to be his successor. Harald died in 933, in his eighty-fourth year.

Harald II., surnamed Graafeld, a grandson of Harald

*I., became, with his brothers, ruler of the western part of Norway in 961; he was murdered in Denmark in 969. *■*

Harald III. (1015-1066), king of Norway, surnamed Haar- draade, which might be translated "ruthless," was the son of King Sigurd and half-brother of King Olaf the Saint. At the age of fifteen he was obliged to flee from Norway, having taken part in the battle of Stiklestad (1030), at which King Olaf met his death. He took refuge for a short time with Prince Yaroslav of Novgorod (a kingdom founded by Scandinavians), and thence went to Constantinople, where he took service under the empress Zoe, whose Varangian guard he led to frequent victory in Italy, Sicily and North Africa, also penetrating to Jerusalem. In the year 1042 he left Constantinople, the story says because he was refused the hand of a princess, and on his way back to his own country he married Ellisif or Elizabeth, daughter of Yaroslav of Novgorod. In Sweden he allied himself with the defeated Sven of Denmark against his nephew Magnus, now king of Norway, but soon broke faith with Sven and accepted an offer from Magnus of half his kingdom. In return for this gift Harald is said to have shared with Magnus the enormous treasure which he had amassed in the East. The death of Magnus in 1047 put an end to the growing jealousies between the two kings, and Harald turned all his attention to the task of subjugating Denmark, which he ravaged year after year; but he met with such stubborn resistance from Sven that in 1064 he gave up the attempt and made peace. Two years afterwards, possibly instigated by the banished Earl Tostig of Northumbria, he attempted the conquest of England, to the sovereignty of which his predecessor had advanced a claim as successor of Harthacnut. In September 1066 he landed in Yorkshire with a large army, reinforced from Scotland, Ireland and the Orkneys; took Scarborough by casting flaming brands into the town from the high ground above it;

defeated the Northumbrian forces at Fulford; and entered York on the 24th of September. But the following day the English Harold arrived from the south, and the end of the long day's fight at Stamford Bridge saw the rout of the Norwegian forces after the fall of their king (25th of September 1066). He was only fifty years old, but he was. the first of the six kings who had ruled Norway since the death of Harald Haarfager to reach that age. As a king he was unpopular on account of his harshness and want of good faith, but his many victories in the face of great odds prove him to have been a remarkable general, of never-failing resourcefulness and indomit- able courage.

Harald IV. (d. 1136), king of Norway, surnamed Gylle (probably from Gylle Krist, i.e. servant of Christ), was born in Ireland about 1103. About n 27 he went to Norway and declared he was a son of King Magnus III. (Barefoot), who had visited Ireland just before his death in 1103, and consequently a half-brother of the reigning king, Sigurd. He appears to have submitted successfully to the ordeal of fire, and the alleged relationship was acknowledged by Sigurd on condition that Harald did not claim any share in the government of the kingdom during his lifetime or that of his son Magnus. Living on friendly terms with the king, Harald kept this agreement until Sigurd's death in 1 1 ^o. Then war broke out between himself and Magnus, and after several battles the latter was captured in 1134, his eyes were put out, and he was thrown into prison. Harald now ruled the country until 1136, when he was murdered by Sigurd Slembi- Diakn, another bastard son of Magnus Barefoot. Four of Harald's sons, Sigurd, Ingi, Eysteinn and Magnus, were subse- quently kings of Norway.

HARBIN, or Kharbin, town of Manchuria, on the right bank of the river Sungari. Pop. about 20,000. Till 1896 there was only a small village here, but in that year the town was founded in connexion with surveys for the Chinese Eastern railway company, at a point which subsequently became the junction of the main line of the Manchurian railway with the

branch line southward to Port Arthur. Occupying such a position, Harbin became an important Russian military centre during the Russo-Japanese War. The portion of the town founded in 1896 is called Old Harbin, but the centre has shifted to New Harbin, where the chief public buildings and offices of the railway administration are situated. The river-port forms

a third division of the town, industrially the most important; here are railway workshops, factories and mercantile establish- ments. Trade is chiefly in the hands of the Chinese.

HARBINGER, originally one who provides a shelter or lodging for an army. The word is derived from the M.E. and O.Fr. herbergere, through the Late Lat. heribergator, formed from the O.H.Ger. heri, mod. Ger. Heer, an army, and bergen, shelter or defence, cf. " harbour." The meaning was soon enlarged to include any place where travellers could be lodged or entertained, and also by transference the person who provided lodgings, and so one who goes on before a party to secure suitable lodgings in advance. A herald sent forward to announce the coming of a king. A Knight Harbinger was an officer in the royal household till 1846. In these senses the word is now obsolete. It is used chiefly in poetry and literature for one who announces the immediate approach of something, a forerunner. This is illus- trated in the " harbinger of spring," a name given to a small plant belonging to the Umbelliferae, which has a tuberous root, and small white flowers; it is found in the central states of North America, and blossoms in March.

HARBOUR (from M.E. hereberge, here, an army; cf. Ger. Heer and -beorg, protection or shelter. Other early forms in English were herberwe and harborow, as seen in various place names, such as Market Harborough.. The French auberge, an inn, derived through heberger, is thus the same word), a place of refuge or shelter. It is thus used for an asylum for criminals, and particularly for a place of shelter for ships.

Sheltered sites along exposed sea-coasts are essential for pur- poses of trade, and very valuable as refuges for vessels from storms. In a few places, natural shelter is found in combination with ample depth, as in the Bay of Rio de Janeiro, New York Harbour (protected by Long Island), Portsmouth Harbour and Southampton Water (sheltered by the Isle of Wight), and the land-locked creeks of Milford Haven and Kiel Harbour. At various places there are large enclosed areas which have openings into the sea; but these lagoons for the most part are very shallow except in the main channels and at their outlets. Access to them is generally obstructed by a bar as at the lagoon harbour of Venice (fig. 1), and similar harbours, like those of Poole and Wexford; and such harbours usually require works to prevent their deterioration, and to increase the depth near their outlet. Generally, however,harbours are formed where shelter is provided to a certain extent by a bay, creek or projecting headland, but requires to be rendered complete by one or more breakwaters (see Breakwater), or where the approach to a river, a ship- canal or a seaport, needs protection. A refuge harbour is occasionally constructed where a long length of stormy coast, near the ordinary track of vessels, is entirely devoid of natural shelter. Naval harbours are required by maritime powers as stations for their fleets, and dockyards for construction and repairs, and also in some cases as places of shelter from the night attacks of torpedoes. Commercial harbours have to be provided for the formation of ports within their shelter on important trade routes, or for the protection of the approaches from the sea of ports near the sea-coast, or maritime waterways running inland, in some cases at points on the coast devoid of all natural shelter. A greater latitude in the selection of suitable sites is, indeed,possible for refuge and naval harbours than for commercial harbours; but these three classes of harbours are very similar in their general outline and the works protecting them, only differing in size and internal arrangements according to the pur- pose for which they have been constructed, the chief differences being due to the

local conditions.

Harbours may be divided into three distinct groups, namely, lagoon harbours, jetty harbours and sea-coast harbours, pro- tected by breakwaters, including refuge, naval and commercial harbours.

Lagoon Harbours. — A lagoon, consisting of a sort of large shallow lake separated from the sea by a narrow belt of coast, formed of deposit from a deltaic river or of sand dunes heaped up by on-shore winds along a sandy shore, possesses good natural shelter; and, owing to the large expanse which is filled and emptied at each tide, even when the tidal range is quite srriall, together with the dFscharge

from any rivers flowing into the lagoon, one or more fairly deep outlets are maintained through the fringe of coast, which afford navigable access to the lagoon; whilst channels formed inside by

MlLEW

I 1_

O

5MILE8.

Fig. i. — Venetian Lagoon Harbour.

the currents lead to ports on its banks. Lagoons, however, are liable to be gradually silted up, if rivers flowing into them bring down considerable quantities of alluvium, which is readily deposited in their fairly still waters; and their outlet channels are in danger of becoming shallower, by the sea in storms forming additional outlets by breaking through the narrow barrier separating them from the sea. Moreover, the approach from the sea to these channels through the fringe of coast is generally impeded by a bar, owing to the scour of the issuing

current through these outlet channels becoming gradually too en- feebled, on entering the open sea, to overcome the heaping-up action of the waves along the shore, which tends to form a continuous beach across these openings. Rivers, accord- ingly, whose discharge is very valu- able in maintaining a lagoon if their waters are free from sediment, must, if possible, be diverted from a lagoon if they bring down large amounts of silt; whilst the narrow belt of land in front of the lagoon must be pro- tected from erosion by the waves, on its sea face, by groynes or revetments. The depth over the bar in front of an outlet can be improved by concentrating the current through the outlet by jetties on each side, and prolonging the jetties, and consequently the scour, out to the bar so as to lower it, and by supplementing the scouring action, if necessary, by dredging.

Jetty Harbours. — Several small ports were formed on the sea-coast long ago at points where flat marshy ground lying below the level of high-water, and shut off from the sandy beach by dikes or sand dunes, was connected with the sea by a small creek or river. Such ports presented in their original condition a slight resemblance to iagoons on a very small scale. Several examples are to be found on the sandy shores of the English Channel and North Sea, such as Dieppe, Boulogne, Calais, Dunkirk, Nieuport and Ostend, where the influx and efflux of the water from these enclosed tide-covered areas, through a narrow opening, sufficed to maintain a shallow channel to the sea across the beach, deep enough near high-water for vessels of small draught. When the increase in draught necessi- tated the provision of an improved channel, the scour of the issuing current was concentrated and prolonged by erecting parallel jetties across the beach, raised solid to a little above low water of neap tides, with open timber-work above to indicate the channel and guide the vessels. Even this low obstruction, however, to the littoral drift of sand caused an advance of the low water line as the jetties were carried out, so that further extensions of the jetties had

eventually to be abandoned, as occurred at Dunkirk (see Dock). Moreover, re- clamation of the low-lying areas was gradually effected, thus reducing the tidal scour; and sluicing basins were excavated in part of the low ground, into which the tide flowed through the entrance channel, and the water being shut in at high tide by gates at the outlet of the basin, was released at low water, producing a rapid current through the channel as a compensation for the loss of the former natural scour. The current, however, from the sluicing basin gradually lost its velocity in passing down the channel, and besides, being most effective near the outlet of the basin, could only scour the channel down to a moderate depth below low water, on account of the increase in the volume of still water in the channel at low tide as its deepening progressed. Lastly, about 1880, improve- ments in suctipn dredgers (see Dredge and Dredging) led to the adoption of sand-pump dredging in the outer part of the channel, and across the foreshore in front to deep water; and at Dunkirk, docks were formed on the site of the sluicing basin ; whilst at Calais sluicing was abandoned in favour of dredging. Ostend is the only jetty habour in which a large sluicing basin has been recently con- structed, but it can only provide for the maintenance of deep-water quays in its vicinity; and dredging is relied upon to an increasing extent, both for the maintenance and further deepening of the outer portion of the approach channel, and for maintaining the direct channel dredged to deep water across the Stroombank extending in front of Ostend (fig. 2).

Similar methods of improving the entrance channel to ports possessing an extensive backwater have been adopted on a large scale in the United States. For instance at Charleston, converging jetties, about 2J m. long, have been extended across the bar to con- centrate the scour due to a small tidal range expanding over the enclosed backwater, 15 sq. m. in extent, and to protect the channel from littoral drift; but these jetties have caused an advance of the foreshore, and a progression seawards of the

bar, necessitating dredging beyond the ends of the jetties to maintain the requisite depth.

Parallel jetties, moreover, across the beach, combined with exten- sive sand-pump dredging, have been employed with success at some of the ports situated at the outlet of rivers, enclosed bays, or lagoons, on the sandy shores of

J*o$

00 FZ

Fig. 2. — Ostend Harbour and Jetty Channel.

south-east Africa, for improving the access to them across en- cumbering shoals, where the littoral drift is too great to allow of the projection of breakwaters from the shore to shelter an approach channel.

Harbours Protected by Breakwaters. — The design for a harbour on

the sea-coast must depend on the configuration of the adjacent coast-line, the extent and direction of the exposure, the amount of sheltered area required and the depth obtainable, the prospect of the accumulation of drift or the occurrence of scour from the pro- posed works, and . the best position for an entrance in respect of shelter and depth of approach.

Completion of Shelter of Harbours in Bays. — In the case of a deep, fairly landlocked bay, a detached breakwater across the outlet completes the necessary shelter, leaving an entrance between each extremity and the shore, provided there is deep enough water near the shore, as effected at Plymouth harbour, and also across the wider but shallower bay forming Cherbourg harbour. A breakwater may

>°+,

Fig. 3. — Genoa Harbour and Extensions.

instead be extended across the outlet from each shore, leaving a single central entrance between the ends of the breakwaters; and if one breakwater placed somewhat farther out is made to overlap an inner one, a more sheltered entrance is obtained. This arrange- ment has been adopted at the existing Genoa harbour within the bay (fig. 3), and for the harbour at the mouth of the Nervion (see River Engineering). The adoption of a bay with deep water for a harbour does not merely reduce the shelter to be provided arti- ficially, but it also secures a site not exposed to silting up, and where the sheltering works do not interfere with any littoral drift along the open coast. A third method of sheltering a deep bay is that

a slight curve or bend inwards near its' outer end, suffices to afford the necessary shelter. As examples of this form of harbour con- struction may be mentioned Newhaven breakwater, protecting the approach to the port from the west, and somewhat sheltered from the moderate easterly storms by Beachy Head, and Table Bay breakwater, which shelters the harbour from the north-east, and is somewhat protected on the opposite side by the wide sweep of the coast-line known as Table Bay. Generally, however, some partial embayment, or abrupt projection from the coast, is utilized as providing shelter from one quarter, which is completed by break- waters enclosing the site, of which Dover and Colombo (fig. 5) harbours furnish typical and somewhat similar examples.

Harbours formed on quite Open Seacoasts. — Occasionally harbours have to be constructed for some special purpose where no natural shelter exists, and where on an open, sandy shore considerable littoral drift may occur. Breakwaters, carried out from the shore at some distance apart, and converging to a central entrance of suitable width, provide the requisite shelter, as for

instance the harbour constructed to form a sheltered approach to the river Wear and the Sunderland docks (fig. 6). If there is little littoral drift from the most exposed quarter, the amount of sand brought in during storms, which is smaller in proportion to the depth into which the entrance is carried, can be readily removed by dredging; whilst the scour across the projecting ends of the break- waters tends to keep the outlet free from deposit. Where there is littoral drift in both directions on an open, sandy coast, due to winds blowing alternately from opposite quarters, sheltered angles outside the harbour breakwater and the shore. This has

b

*"*V.*

Fig. 4. — Peterhead Harbour of Refuge.

adopted for forming a refuge harbour at Peterhead (fig. 4), where a single breakwater is extended out from one shore for 3250 ft. across the outlet of the bay, leaving a single entrance between its extremity and the opposite shore and enclosing an area of about 250 acres at low tide, half of which has a depth of over 5 fathoms.

Harbours possessing partial Natural Shelter.— The most common form of harbour is that in which one or more breakwaters supple ment a certain amount of natural shelter. Sometimes, where the exposure is from one direction only, approximately parallel with the coast-line at the site, and there is more or less shelter from a pro- jecting headland or a curve of the coast in the opposite direction, a single breakwater extending out at right angles to the shore, with

sand accumulates in the between each converging happened at Ymuiden harbour at the entrance to the Amsterdam ship-canal on the North Sea, but there the advance of the shore appears to have reached its limit only a short distance out from the old shore- line on each side; and the only evidence of drift

consists in the advance seawards of the lines of soundings alongside, and in the considerable amount of sand which enters the harbour and has to be removed by dredging. The worst results occur where the littoral drift is almost wholly in one direction, so that the projection of a solid breakwater out from the shore causes a very large accretion on the side facing the ex- posed quarter; whilst owing to the arrest of the travel of sand, erosion of the beach occurs beyond the second breakwater enclosing the harbour on its comparatively shel- tered side. These effects have been produced at Port Said harbour at the entrance to the Suez Canal from the Medi- terranean, formed by two converging breakwaters, where, owing to the prevalent north-westerly winds, the drift is from / west to east, and is aug- mented by the alluvium . issuing from the Nile. Accordingly, the shore has advanced consider- ably against the outer face of the western break- water; and erosion of the beach has occurred at the shore end of the eastern breakwater, cut- ting it off from the land. The advance of the shore-line during recent years;

COLOMBO.

Fig. 5. — Colombo Harbour.

however, has been much slower and though the progress seawards of the lines of soundings close to and in front of the harbour continues, the advance is checked by the sand and silt coming from the west passing through some apertures purposely left in the western break- water, and falling into the approach channel, from which it is readily dredged and taken away. Madras harbour, begun in 1875, consists of two breakwaters, 3000 ft. apart, carried straight out to sea at right angles to the shore for 3000 ft., and completed by two return

arms inclined slightly seawards, enclosing an area

of 220 acres and leaving a central entrance, 550 ft. wide, facing the Indian Ocean in a depth of about 8 fathoms. The great drift, however, of sand along the coast from south to north soon produced an advance of the shore against the outside of the south breakwater, and erosion beyond the north breakwater; and the progression of the foreshore has extended so far seawards as to produce shoaling at the entrance. Accordingly, the closing of the entrance, and the formation of a new entrance through the outer part of the main north breakwater,

facing north and sheltered by an arm starting from the angle of the northern return arm and running north parallel to the shore, round the end of which vessels would turn to enter, have been recommended, to pro- vide a deep entrance beyond the influence of the ad- vancing foreshore.

Proposals have been made from time to time to evade this advance of the foreshore against a solid obstacle, by extending an open viaduct across the zone of littoral drift, and forming a closed harbour, or a sheltering breakwater against which vessels can lie, beyond the influence of accretion. This principle was carried out on a large scale at the port of call and sheltering breakwater constructed in front of the entrance to the Bruges ship-canal, at Zeebrugge on the sandy North Sea coast, where a solid breakwater, provided with a wide quay furnished with sidings and sheds, and curving round so as to overlap thoroughly the entrance to the canal and shelter a certain water- area, is approached by an open metal viaduct extend- ing out 1007 ft. from low water into a depth of 20 ft. (fig. 7). It is hoped that by thus avoiding interference with the littoral drift close to the shore, coming mainly from the west, the accumulation of silt to the west of the harbour, and also in the harbour itself, will be prevented ; and though it appears probable that some accretion will occur within the area sheltered by the breakwater, it will to some

Fig. 6. — Sunderland Harbour.

Fig. 7. — Zeebrugge Harbour.

extent be disturbed by the wash of the steamers approaching and leaving the quays, and can readily be removed under shelter by dredging.

Entrances to Harbours. — Though captains of vessels always wish for wide entrances to harbours as affording greater facility of safe access, it is important to keep the width as narrow, as practicable, consistent with easy access, to exclude waves and swell as much as possible and secure tranquillity inside. At Madras, the width of 550 ft. proved excessive for the great exposure of the entrance, and moderate size of the harbour, which does not allow of the adequate expansion of the entering swell. Where an adequately easy and safe approach can be secured, it is advantageous to make the entrance

face a somewhat sheltered quarter by the overlapping of the end of one of the breakwaters, as accomplished at Bilbao and Genoa harbours (fig. 3), and at the southern entrance to Dover harbour. Occasionally, owing to the comparative shelter afforded by a bend in the adjacent coast-line, a very wide entrance can be left between a breakwater and the shore; typical examples are furnished by the former open northern entrance to Portland harbour, now closed against torpedoes, and the wide entrances at Holyhead and Zee- brugge (fig. 7). With a large harbour and the adoption of a detached breakwater, it is possible to gain the advantage of two entrances facing different quarters, as effected at Dover and Colombo, which enables vessels to select their entrance according to the state of the wind and weather; where there is a large tidal rise they reduce the current through the entrances, and they may, under favourable conditions, create a circulation of the water in the harbour, tending to check the deposit of silt. (L. F. V.-H.)

HARBURG, a seaport town of Germany, in the Prussian

province of Hanover, on the left bank of the southern arm of the Elbe, 6 m. by rail S. of Hamburg. Pop. (1885), 26,320; (1905) — the area of the town having been increased since 1895 — 55,676. It is pleasantly situated at the foot of a lofty range of hills, which here dip down to the river, at the junction of the main lines of railway from Bremen and Hanover to Hamburg, which are carried to the latter city over two grand bridges crossing the southern and the northern arms of the Elbe. It possesses a Roman Catholic and two Protestant churches, a palace, which from 1524 to 1642 was the residence of the Harburg line of the house of Brunswick, a high-grade modern school, a commercial school arid a theatre. The leading industries are the crushing of palm-kernels and linseed and the manufacture of india-rubber, phosphates, starch, nitrate and jute. Machines are manufactured here; beer is brewed, and shipbuilding is carried on. The port is accessible to vessels drawing 18 ft. of water, and, despite its proximity to Hamburg, its trade has of late years shown a remarkable development. It is the chief mart in the empire for resin and palm-oil. The Prussian govern- ment proposes establishing here a free port, on the lines of the Freihafen in Hamburg.

Harburg belonged originally to the bishopric of Bremen, and received municipal rights in 1297. In 1376 it was united to the principality of Liineburg, along with which it fell in 1705 to Hanover, and in 1806 to Prussia. In 1813 and 1814 it suffered considerably from the French, who then held Hamburg, and who built a bridge between the two towns, which remained standing till 1816.

See Ludewig, Geschichte des Schlosses und der Stadt Harburg (Harburg, 1845); and Hoffmeyer, Harburg und die nachste Um- gegend (1885).

HARCOURT, a village in Normandy, now a commune in the department of Eure, arrondissement of Bernay and canton of Brionne, which gives its name to a noble family distinguished in French history, a branch of which was early established in England. Of the lords

of Harcourt, whose genealogy can be traced back to the nth century, the first to distinguish himself was Jean II. (d. 1302) who was marshal and admiral of France. Godefroi d'Harcourt, seigneur of Saint Sauveur le Vicomte, surnamed " Le boiteux " (the lame), was a marshal in the English army and was killed near Coutances in 1356. The fief of Harcourt was raised to the rank of a countship by Philip of Valois, in favour of Jean IV., who was killed at the battle of Crecy (1346). His son, Jean V. (d. 1355) married Blanche, heiress of Jean II., count of Aumale, and the countship of Harcourt passed with that of Aumale until, in 1424, Jean VIII., count of Aumale and Mortain and lieutenant-general of Normandy, was killed at the battle of Verneuil, and with him the elder branch became extinct in the male line. The heiress, Marie, by her marriage with Anthony of Lorraine, count of Vaudemont, brought the countship of Harcourt into the house of Lorraine. The title of count of Harcourt was borne by several princes of this house. The most famous instance was Henry of Lorraine, count of Harcourt, Brionne, and Armagnac, and nicknamed " Cadet la perle "(1601-1666). He distinguished himself in several campaigns against Spain, and later played an active part in the civil wars of the Fronde. He took the side of the princes, and fought against the

government in Alsace; but was defeated by Marshal de la Ferte, and made his submission in 1654.

The most distinguished among the younger branches of the family are those of Montgomery and of Beuvron. To the former belonged Jean d'Harcourt, bishop of Amiens and Tournai, archbishop of Narbonne and patriarch of Antioch, who died in 1452; and Guillaume d'Harcourt, count of Tancarville, and viscount of Melun, who was head of the administration of the woods and forests in the royal domain (souverain mattre et reformateur des eaux et forMs de France) and died in 1487.

From the branch of the marquises of Beuvron sprang

Henri d'Harcourt, marshal of France, and ambassador at the Spanish court, who was made duke of Harcourt (1700) and a peer of France (1709); also Francois Eugene Gabriel, count, and afterwards duke, of Harcourt, who was ambassador first in Spain, and later at Rome, and died in 1865. This branch of the family is still in existence.

See G. A. de la Rogne, Histoire genealogique de la maison d'Har- court (4 vols., Paris, 1662); P. Anselme, Histoire ginealogique de la maison de France, v. 114, &c. ; and Dom le Noir, Preuves genealo- giques et historiques de la maison de Harcourt (Paris, 1907).

(M. P.)*

HARCOURT, SIMON HARCOURT, ist Viscount (c. 1661-1727), lord chancellor of England, only son of Sir Philip Harcourt of Stanton Harcourt, Oxfordshire, by his first wife, Anne, daughter of Sir William Waller, was born about 1661 at Stanton Harcourt, and was educated at a school at Shilton, Oxfordshire, and at Pembroke College, Oxford. He was called to the bar in 1683, and soon afterwards was appointed recorder of Abingdon, which borough he represented as a Tory in parliament from 1600 to 1705. In 1 701 he was nominated by the Commons to conduct the impeachment of Lord Somers; and in 1702 he became solicitor-general and was knighted by Queen Anne. He was elected member for Bossiney in 1705, and as commis- sioner for arranging the union with Scotland was largely instru- mental in promoting that measure. Harcourt was appointed attorney-general in 1707, but resigned office in the following year when his friend Robert Harley, afterwards earl of Oxford, was dismissed. He defended Sacheverell at the bar of the House of Lords in 17 10, being then without a seat in parliament; but in the same year was returned for Cardigan, and in September again became attorney-general. In October he was appointed lord keeper of the great seal, and in virtue of this office he presided in the House of Lords for some months without a peerage, until, on the 3rd of September 1711, he was created Baron Harcourt of

Stanton Harcourt; but it was not till April 1 7 13 that he received the appointment of lord chancellor. In 1 7 10 he had purchased the Nuneham-Courtney estate in Oxford- shire, but his usual place of residence continued to be at Coke- thorpe near Stanton Harcourt, where he received a visit in state from Queen Anne. In the negotiations preceding the peace of Utrecht, Harcourt took an important part. There is no sufficient evidence for the allegations of the Whigs that Harcourt entered into treasonable relations with the Pretender. On the accession of George I. he was deprived of office and retired to Cokethorpe, where he enjoyed the society of men of letters, Swift, Pope, Prior and other famous writers being among his frequent guests. With Swift, however, he had occasional quarrels, during one of which the great satirist bestowed on him the sobriquet of " Trim- ming Harcourt." He exerted himself to defeat the impeach- ment of Lord Oxford in 1717, and in 1723 he was active in obtaining a pardon for another old political friend, Lord Boling- broke. In 1721 Harcourt was created a viscount and returned to the privy councils; and on several occasions during the king's absences from England he was on the council of regency. He died in London on the 23rd of July 1727. Harcourt was not a great lawyer, but he enjoyed the reputation of being a brilliant orator; Speaker Onslow going so far as to say that Harcourt " had the greatest skill and power of speech of any man I ever knew in a public assembly." He was a member of the famous Saturday Club, frequented by the chief literati and wits of the period, with several of whom he corresponded. Some letters to

him from Pope are preserved in the Harcourt Papers. His portrait by Kneller is at Nuneham.

Harcourt married, first, Rebecca, daughter of Thomas Clark, his father's chaplain, by whom he had five children; secondly, Elizabeth, daughter of Richard Spencer; and thirdly, Elizabeth, daughter of Sir Thomas Vernon. He left issue by his first wife only. His son, Simon (1684-1720), married Elizabeth, sister of Sir John Evelyn of Wotton, by whom he had

one son and four daughters, one of whom married George Venables Vernon, afterwards Lord Vernon (see Harcourt, Sir William — foot- note). Simon Harcourt predeceased his father, the lord chan- cellor, in 1720, leaving a son Simon Harcourt (1714-1777), ist Earl Harcourt, who succeeded his grandfather in the title of viscount in 1727. He was educated at Westminster school. In 1745, having raised a regiment, he received a commission as a colonel in the army; and in 1749 he was created Earl Harcourt of Stanton Harcourt. He was appointed governor to the prince of Wales, afterwards George III., in 1751; and after the acces- sion of the latter to the throne he was appointed, in 1761, special ambassador to Mecklenburg-Strelitz to negotiate a marriage between King George and the princess Charlotte, whom he conducted to England. After holding a number of appointments at court and in the diplomatic service, he was promoted to the rank of general in 1772; and in October of the same year he succeeded Lord Townsend as lord lieutenant of Ireland, an office which he held till 1777. His proposal to impose a tax of 10% on the rents of absentee landlords had to be abandoned owing to opposition in England; but he succeeded in conciliating the leaders of Opposition in Ireland, and he persuaded Henry Flood to accept office in the government. Resigning in January 1777, he retired to Nuneham, where he died in the following September. He married, in 1735, Rebecca, daughter and heiress of Charles Samborne Le Bas, of Pipewell Abbey, Northamptonshire, by whom he had two daughters and two sons, George Simon and William, who succeeded him as 2nd and 3rd earl respectively.

See Lord Campbell, Lives of the Lord Chancellors, vol. v. (London, 1846) ; Edward Foss, The Judges of England, vol. viii. (London, 1848); Gilbert Burnet, Hist, of his own Time (with notes by earls of Dartmouth and Hardwicke, &c, Oxford, 1833); Earl Stanhope, Hist, of England, comprising the reign of Queen Anne until the Peace of Utrecht (London, 1870). In addition to the above-mentioned authorities many particulars concerning the 1st Viscount Harcourt, and also of his grandson, the 1st

earl, will be found in the Harcourt Papers. For the earl, see also Horace Walpole, Memoirs of the Reign of George II. (3 vols., 2nd ed., London, 1847), Memoirs of the Reign of George III. (4 vols., London, 1845, 1894); also, for his vice- royalty of Ireland, see Henry Grattan, Memoirs of the Life and Times of the Right Hon. H. Grattan (5 vols., London, 1839–1846); Francis Hardy, Memoirs of J. Caulfield, Earl of Charlemont (2 vols., London, 1812); and for his genealogy, see Sir John Bernard Burke, Genealogical History of Dormant and Extinct Peerages (London, 1883). (R. J. M.)

HARCOURT, SIR WILLIAM GEORGE GRANVILLE VENABLES VERNON (1827–1904), English statesman, second son of the Rev. Canon William Vernon Harcourt (q.v.), of Nuneham Park, Oxford, was born on the 14th of October 1827. Canon Harcourt was the fourth son and eventually heir of Edward Harcourt (1757–1847), archbishop of York, who was the son of the ist Lord Vernon (d. 1780), and who took the name of Harcourt alone instead of Vernon on succeeding to the pro- perty of his cousin, the last Earl Harcourt, in 1 83 1 . 1 The subject

1 William, 3rd and last Earl Harcourt (1743–1830), who suc- ceeded his brother in the title, was a soldier who distinguished him- self in the American War of Independence by capturing General Charles Lee, and commanded the British forces in Flanders in 1794, eventually becoming a field-marshal. He was a son of Simon, 1st earl (1714–1777), created viscount and earl in 1749, a soldier, and from 1772 to 1777 viceroy of Ireland, who was grandson and heir of Simon, Viscount Harcourt (1661–1727), lord chancellor — the ” trimming Harcourt ” of Swift— the purchaser of the Nuneham- Courtney estates in Oxfordshire, and son of Sir Philip Harcourt of Stanton Harcourt. The knights of Stanton Harcourt, from the 13th century onwards, traced their descent to the Norman de Har- courts, a branch of that family having come over with the Conqueror; and the pedigree claims to go back to Bernard of Saxony, who in 876 acquired the lordships of Harcourt, Castleville and Beauficel in Normandy. Viscount

Harcourt's second son Simon, who was father of the ist earl, was also father of Martha, who married George

of this biography was therefore born a Vernon, and by his connexion with the old families of Vernon and Harcourt was related to many of the great English houses, a fact which gave him no little pride. Indeed, in later life his descent from the Plantagenets 1 was a subject of some banter on the part of his political opponents. He was educated at Trinity College, Cambridge, graduating with first-class honours in the classical tripos in 1851. He was called to the bar in 1854, became a Q.C. in 1866, and was appointed Whewell professor of international law, Cambridge, 1869. He quickly made his mark in London society as a brilliant talker; he contributed largely to the Saturday Review, and wrote some famous letters (1862) to The Times over the signature of " Historicus," in opposition to the recognition of the Southern States as belligerents in the American Civil War. He entered parliament as Liberal member for Oxford, and sat from 1868 to 1880, when, upon seeking re-election after acceptance of office, he was defeated by Mr Hall. A seat was, however, found for him at Derby, by the voluntary retirement of Mr Plimsoll, and he continued to represent that constituency until 1895, when, having been defeated at the general election, he found a seat in West Monmouthshire. He was appointed solicitor-general and knighted in 1873; and, although he had not shown himself a very strenuous supporter of Mr Gladstone during that statesman's exclusion from power, he became secretary of state for the home department on the return of the Liberals to office in 1880. His name was connected at that time with the passing of the Ground Game Act (1880), the Arms (Ireland) Act (1881), and the Explosives Act (1883). As home secretary at the time of the dynamite outrages he had to take up a firm attitude, and the Explosives

Act was passed through all its stages in the shortest time on record. Moreover, as champion of law and order against the attacks of the Parnell- ites, his vigorous speeches brought him constantly into conflict with the Irish members. In 1884 he introduced an abortive bill for unifying the municipal administration of London. He was indeed at that time recognized as one of the ablest and most effective leaders of the Liberal party; and when, after a brief interval in 1885, Mr Gladstone returned to office in 1886, he was made chancellor of the exchequer, an office which he again filled from 1892 to 1895.

Between 1880 and 1892 Sir William Harcourt acted as Mr Gladstone's loyal and indefatigable lieutenant in political life. A first-rate party fighter, his services were of inestimable value; but in spite of his great success as a platform speaker, he was generally felt to be speaking from an advocate's brief, and did not impress the country as possessing much depth of conviction. It was he who coined the phrase about " stewing in Parnellite juice," and, when the split came in the Liberal party on the Irish question, even those who gave Mr Gladstone and Mr Morley the credit of being convinced Home Rulers could not be per- suaded that Sir William had followed anything but the line of party expediency. In 1894 he introduced and carried a memor- able budget, which equalized the death duties on real and personal property. After Mr Gladstone's retirement in 1894 and Lord Rosebery's selection as prime minister Sir William became the leader of the Liberal party in the House of Commons, but it was never probable that he would work comfortably in the new conditions. His title to be regarded as Mr Gladstone's successor had been too lightly ignored, and from the first it was evident that Lord Rosebery's ideas of Liberalism and of the policy of the Liberal party were not those of Sir William Harcourt. Their differences were patched up from time to time, but the

Venables Vernon, of Sudbury, created 1st Baron Vernon in 1762. The latter was a descendant of Sir

Richard Vernon (d. 1451), speaker of the Leicester parliament (1425) and treasurer of Calais, a member' of a Norman family which came over with the Conqueror.

1 The Plantagenet descent (see The Blood Royal of Britain, by the marquis of Ruvigny, 1903, for tables) could be traced through Lady Anna Leveson Gower (wife of Archbishop Harcourt) to Lady Frances Stanley, the wife of the 1st earl of Bridgewater (1579-1649), and so to Lady Eleanor Brandon, wife of the earl of Cumberland (1517-1570), and daughter of Mary Tudor (wife of Charles Brandon, duke of Suffolk, 1484-1545), the daughter of Henry VII. and grand- daughter of Edward IV.

combination could not last. At the general election of 1895 it was clear that there were divisions as to what issue the Liberals were fighting for, and the effect of Sir William Harcourt's abortive Local Veto Bill on the election was seen not only in his defeat at Derby, which gave the signal for the Liberal rout, but in the set-back it gave to temperance legislation. Though returned for West Monmouthshire (1895, 1900), his speeches in debate only occasionally showed his characteristic spirit, and it was evident that for the hard work of Opposition he no longer had the same motive as of old. In December 1898 the crisis arrived, and with Mr John Morley he definitely retired from the counsels of the party and resigned his leadership of the Opposition, alleging as his reason, in letters exchanged between Mr Morley and himself, the cross-currents of opinion among his old supporters and former colleagues. The split excited con- siderable comment, and resulted in much heart-burning and a more or less open division between the section of the Liberal party following Lord Rosebery (q.v.) and those who disliked that statesman's Imperialistic views.

Though now a private member, Sir William Harcourt still continued to vindicate his opinions in his independent position, and his attacks on the government were no longer restrained by even the

semblance of deference to Liberal Imperialism. He actively intervened in 1899 and 1900, strongly condemning the government's financial policy and their attitude towards the Transvaal; and throughout the Boer War he lost no opportunity of criticizing the South African developments in a pessimistic vein. One of the readiest parliamentary debaters, he savoured his speeches with humour of that broad and familiar order which appeals particularly to political audiences. In 1 898-1 900 he was conspicuous, both on the platform and in letters written to The Times, in demanding active measures against the Ritualistic party in the Church of England; but his attitude on that subject could not be dissociated from his political advocacy of Dis-establishment. In March 1904, just after he had announced his intention not to seek election again to parliament, he succeeded, by the death of his nephew, to the family estates at Nuneham. But he died suddenly there on the 1st of October in the same year. He married, first, in 1859, Therese (d. 1863), daughter of Mr T. H. Lister, by whom he had one son, Lewis Vernon Harcourt (b. 1863), afterwards first commissioner of works both in Sir Henry Campbell-Bannerman's 1905 ministry (included in the cabinet in 1907) and in Mr Asquith's cabinet (1908); and secondly, in 1876, Elizabeth, widow of Mr T. Ives and daughter of Mr. J. L. Motley, the historian, by whom he had another son, Robert (b. 1878).

Sir William Harcourt was one of the great parliamentary figures of the Gladstonian Liberal period. He was essentially an aristocratic type of late 19th century Whig, with a remarkable capacity for popular campaign fighting. He had been, and remained, a brilliant journalist in the non-professional sense. He was one of those who really made the Saturday Review in its palmy days, and in the period of his own most ebullient vigour, while Mr Gladstone was alive, his sense of political expediency and platform effectiveness in controversy was very acute. But though he played the game of public life with keen zest, he never really touched

either the country or his own party with the faith which creates a personal following, and in later years he found himself somewhat isolated and disappointed, though he was free to express his deeper objections to the new develop- ments in church and state. A tall, fine man, with the grand manner, he was, throughout a long career, a great personality in the life of his time. (H. Ch.)

HARCOURT, WILLIAM VERNON (1789–1871), founder of the British Association, was born at Sudbury, Derbyshire, in 1789, a younger son of Edward Vernon [Harcourt], archbishop of York (see above). Having served for five years in the navy he went up to Christ Church, Oxford, with a view to taking holy orders. He began his clerical duties at Bishopthorpe, Yorkshire, in 181 1, and having developed a great interest in science while at the university, he took an active part in the foundation of the Yorkshire Philosophical Society, of which he

was the first president. The laws and the plan of proceedings for the British Association for the Advancement of Science were drawn up by him; and Harcourt was elected president in 1839. In 1824 he became canon of York and rector of Wheldrake in Yorkshire, and in 1837 rector of Bolton Percy. The Yorkshire school for the blind and the Castle Howard reformatory both owe their existence to his energies. His spare time until quite late in life was occupied with scientific experiments. Inheriting the Harcourt estates in Oxfordshire from his brother in 1861, he removed to Nuneham, where he died in April 1871.

HARDANGER FJORD, an inlet on the west coast of Norway, penetrating the mainland for 70 m. apart from the deep fringe of islands off its mouth, the total distance from the open sea to the head of the fjord being 1 14 m. Its extreme depth is about 350 fathoms. The entrance at Toro is 50 m. by water

south of Bergen, 6o° N., and the general direction is N.E.from that point. The fjord is flanked by magnificent mountains, from which many waterfalls pour into it. The main fjord is divided into parts under different names, and there are many fine branch fjords. The fjord is frequented by tourists, and the principal stations have hotels. The outer fjord is called the Kvindherreds- fjord, flanked by the Melderskin (4680 ft.); then follow Silde- fjord and Bonde Sund, separated by Varalds island. Here Mauranger-fjord opens on the east; from Sundal on this inlet the great Folgefond snowfield may be crossed, and a fine glacier (Bondhusbrae) visited. Bakke and Vikingnaes are stations on Hisfjord, Nordheimsund and Ostenso on Ytre Samlen, which throws off a fine narrow branch northward, the Fiksensund. There follow Indre Samlen and Utnef jord, with the station of Utne opposite Oxen (4120 ft.), and its northward branch, Gravenfjord, with the beautiful station of Eide at its head, whence a road runs north-west to Vossevangen. From the Utne terminal branches of the fjord run south and east; the Sorfjord, steeply walled by the heights of the Folgefond, with the fre- quented resort of Odde at its head; and the Eidfjord, with its branch Osefjord, terminating beneath a tremendous rampart of mountains, through which the sombre Simodal penetrates, the river flowing from Daemmevand, a beautiful lake among the fields, and forming with its tributaries the fine falls of Skykje and Rembesdal. Vik is the principal station on Eidfjord, and Ulvik on a branch of the Ose, with a road to Vossevangen. At Vik is the mouth of the Bjoreia river, which, in forming the Voringfos, plunges 520 ft. into a magnificent rock-bound basin. A small stream entering Sorfjord forms in its upper course the Skjaeggedalsfos, of equal height with the Voringfos, and hardly less beautiful. The natives of Hardanger have an especially picturesque local costume.

HARDEE, WILLIAM JOSEPH (1815-1873), American soldier, was born in Savannah, Georgia, on the 10th of November 181 5 and graduated from West Point in

1838. As a subaltern of cavalry he was employed on a special mission to Europe to study the cavalry methods in vogue (1839). He was promoted captain in 1844 an d served under Generals Taylor and Scott in the Mexican War, winning the brevet of major for gallantry in action in March 1847 and subsequently that of lieut .-colonel. After the war he served as a substantive major under Colonel Sidney Johnston and Lieut.-Colonel Robert Lee in the 2nd U.S. cavalry, and for some time before 1856 he was engaged in compiling the official manual of infantry drill and tactics which, familiarly called " Hardee's Tactics," afterwards formed the text-book for the infantry arm in both the Federal and the Confederate armies. From 1856 to 1861 he was commandant of West Point, resigning his commission on the secession of his state in the latter year. Entering the Confederate service as a colonel, he was shortly promoted brigadier-general. He distinguished himself very greatly by his tactical leadership on ' the field of Shiloh, and was immediately promoted major-general. As a corps commander he fought under General Bragg at Perry-ville and Stone River, and for his distinguished services in these battles was promoted lieutenant-general. He served in the latter part of the campaign of 1863 under Bragg and in that of 1864 under J. E. Johnston. When the latter officer was superseded

by Hood, Hardee was relieved at his own request, and for the remainder of the war he served in the Carolinas. When the Civil War came to an end in 1865 he retired to his plantation near Selma, Alabama. He died at Wytheville, Virginia, on the 6th of November 1873.

HARDENBERG, KARL AUGUST VON, Prince (i 750-1822), Prussian statesman, was born at Essenroda in Hanover on the 31st of May 1750. After studying at Leipzig and Gottingen he entered the Hanoverian civil service in 1770 as councillor of the board of domains (Kammerrat) ; but, finding his advance- ment slow, he set out — on the advice of King George III. — on a course of travels, spending some time at

Wetzlar, Regensburg (where he studied the mechanism of the Imperial government), Vienna and Berlin. He also visited France, Holland and England, where he was kindly received by the king. On his return he married, by his father's desire, the countess Reventlow. In 1778 he was raised to the rank of privy councillor and created a count. He now again went to England, in the hope of obtaining the post of Hanoverian envoy in London; but, his wife becoming entangled in an amour with the prince of Wales, so great a scandal was created that he was forced to leave the Hanoverian service. In 1782 he entered that of the duke of Brunswick, and as president of the board of domains displayed a zeal for reform, in the manner approved by the enlightened despots of the century, that rendered him very unpopular with the orthodox clergy and the conservative estates. In Brunswick, too, his position was in the end made untenable by the conduct of his wife, whom he now divorced; he himself, shortly after- wards, marrying a divorced woman. Fortunately for him, this coincided with the lapsing of the principalities of Ansbach and Bayreuth to Prussia, owing to the resignation of the last margrave, Charles Alexander, in 1701. Hardenberg, who happened to be in Berlin at the time, was on the recommendation of Herzberg appointed administrator of the principalities (1792). The position, owing to the singular overlapping of territorial claims in the old Empire, was one of considerable delicacy, and Harden- berg filled it with great skill, doing much to reform traditional anomalies and to develop the country, and at the same time labouring to expand the influence of Prussia in South Germany. After the outbreak of the revolutionary wars his diplomatic ability led to his appointment as Prussian envoy, with a roving commission to visit the Rhenish courts and win them over to Prussia's views; and ultimately, when the necessity for making peace with the French Republic had been recognized, he was appointed to succeed Count Goltz as Prussian plenipotentiary at Basel (February 28, 1795), where he signed the treaty of peace. In 1797, on the

accession of King Frederick William III., Hardenberg was summoned to Berlin, where he received an important position in the cabinet and was appointed chief of the departments of Magdeburg and Halberstadt, for Westphalia, and for the principality of Neuchatel. In 1793 Hardenberg had struck up a friendship with Count Haugwitz, the influential minister for foreign affairs, and when in 1803 the latter went away on leave (August-October) he appointed Hardenberg his locum tenens. It was a critical period. Napoleon had just occupied Hanover, and Haugwitz had urged upon the king the necessity for strong measures and the expediency of a Russian alliance; During his absence, however, the king's irresolution continued; he clung to the policy of neutrality which had so far seemed to have served Prussia so well; and Hardenberg contented himself with adapting himself to the royal will. By the time Haugwitz returned, the unyielding attitude of Napoleon had caused the king to make advances to Russia; but the mutual declarations of the 3rd and 25th of May 1804 only pledged the two powers to take up arms in the event of a French attack upon Prussia or of further aggressions in North Germany. Finally, Haugwitz, unable to persuade the cabinet to a more vigorous policy, resigned, and on the 14th of April 1804 Hardenberg succeeded him as foreign minister.

If there was to be war, Hardenberg would have preferred the French alliance, which was the price Napoleon demanded for the cession of Hanover to Prussia; for the Eastern powers would

scarcely have conceded, of their free will, so great an augment- ation of Prussian power. But he still hoped to gain the coveted prize by diplomacy, backed by the veiled threat of an armed neutrality. Then occurred Napoleon's contemptuous violation of Prussian territory by marching three French corps through Ansbach; King Frederick William's pride overcame his weakness, and on the 3rd of November he

signed with the tsar Alexander the terms of an ultimatum to be laid before the French emperor. Haugwitz was despatched to Vienna with the document; but before he arrived the battle of Austerlitz had been fought, and the Prussian plenipotentiary had to make the best terms he could with the conqueror. Prussia, indeed, by the treaty signed at Schonbrunn on the 15th of December 1805, received Hanover, but in return for all her territories in South Germany. One condition of the arrangement was the retirement of Hardenberg, whom Napoleon disliked. He was again foreign minister for a few months after the crisis of 1806 (April- July 1807); but Napoleon's resentment was implacable, and one of the conditions of the terms granted to Prussia by the treaty of Tilsit was Hardenberg's dismissal.

After the enforced retirement of Stein in 1810 and the unsatis- factory interlude of the feeble Altenstein ministry, Hardenberg was again summoned to Berlin, this time as chancellor (June 6, 1810). The campaign of Jena and its consequences had had a profound effect upon him; and in his mind the traditions of the old diplomacy had given place to the new sentiment of nationality characteristic of the coming age, which in him found expression in a passionate desire to restore the position of Prussia and crush her oppressors. During his retirement at Riga he had worked out an elaborate plan for reconstructing the monarchy on Liberal lines; and when he came into power, though the circumstances of the time did not admit of his pursuing an independent foreign policy, he steadily prepared for the struggle with France by carrying out Stein's far-reaching schemes of social and political reorganization. The military system was completely reformed, serfdom was abolished, municipal institu- tions were fostered, the civil service was thrown open to all classes, and great attention was devoted to the educational needs of every section of the community.

When at last the time came to put these reforms to the test, after the Moscow campaign of 181 2, it was Hardenberg who, supported by the influence of the

noble Queen Louise, determined Frederick William to take advantage of General Yorck's loyal disloyalty and declare against France. He was rightly regarded by German patriots as the statesman wh6 had done most to encourage the spirit of national independence; and immediately after he had signed the first peace of Paris he was raised to the rank of prince (June 3, 1814) in recognition of the part he had played in the War of Liberation.

Hardenberg now had an assured position in that close corporation of sovereigns and statesmen by whom Europe, during the next few years, was to be governed. He accompanied the allied sovereigns to England, and at the congress of Vienna (1814-1815) was the chief plenipotentiary of Prussia. But from this time the zenith of his influence, if not of his fame, was passed. In diplomacy he was no match for Metternich, whose influence soon overshadowed his own in the councilsof Europe, of Germany, and ultimately even of Prussia itself. At Vienna, in spite of the powerful backing of Alexander of Russia, he failed to secure the annexation of the whole of Saxony to Prussia; at Paris, after Waterloo, he failed to carry through his views as to the further dis- memberment of France; he had weakly allowed Metternich to forestall him in making terms with the states of the Confederation of the Rhine, which secured to Austria the preponderance in the German federal diet; on the eve of the conference of Carlsbad (1819) he signed a convention with Metternich, by which — to quote the historian Treitschke — " like a penitent sinner, without any formal quid, pro quo, the monarchy of Frederick the Great yielded to a foreign power a voice in her internal affairs. " At the congresses of Aix-la-Chapelle, Troppau, Laibach and Verona the voice of Hardenberg was but an echo of that of Metternich.

The cause lay partly in the difficult circumstances of the

loosely-knit Prussian monarchy, but partly in Hardenberg's character, which, never well balanced, had deteriorated with age. He continued amiable,

charming and enlightened as ever; but the excesses which had been pardonable in a young diplo- matist were a scandal in an elderly chancellor, and could cot but weaken his influence with so pious a Landesvater as Frederick William III. To overcome the king's terror of Liberal experi- ments would have needed all the powers of an adviser at once wise and in character wholly trustworthy. Hardenberg was wise enough; he saw the necessity for constitutional reform; but he clung with almost senile tenacity to the sweets of office, and when the tide turned strongly against Liberalism he allowed himself to drift with it. In the privacy of royal commissions he continued to elaborate schemes for constitutions that never saw the light; but Germany, disillusioned, saw only the faithful henchman of Metternich, an accomplice in the policy of the Carlsbad Decrees and the Troppau Protocol. He died, soon after the closing of the congress of Verona, at Genoa, on the 26th of November 1822.

See L. v. Ranke, Denkwurdigkeiten des Staatskanzlers Fursien von Hardenberg (5 vols., Leipzig, 1877) ; J. R. Seeley, The Life and Times of Stein (3 vols., Cambridge, 1878) ; E. Meier, Reform der Verwal- tungsorganisation unter Stein und Hardenberg (ib., 1881); Chr. Meyer, Hardenberg und seine Verwaltung der Fiirstentilmer Ansbach und Bayreuth (Breslau, 1892); Koser, Die Neuordnung des preus- sischen Archivwesens durch den Staatskanzler Fiirsten v. Hardenberg (Leipzig, 1904).

HARDERWYK, a seaport in the province of Gelderland, Holland, on the shores of the Zuider Zee, 17 m. by rail N.N.E. of Amersfoort. Pop. (1900) 7425. It is a quaint old town, approached by a fine avenue of trees, and standing in the midst of a patch of fertile ground. Harderwyk is chiefly important as being the depot for recruits for the Dutch colonial army. It contains a small fort and large barracks. The principal buildings are the town hall, with some ancient furniture, a large 15th century church with a notable square tower, a municipal orphan- age, and the Nassau- Veluwe gymnasium. Agriculture, fishing, and a few domestic industries form the only

employment of the inhabitants. As a seaport its trade is now confined exclusively to the Zuider Zee.

HARDICANUTE [more correctly Hardacnut] (c. 1019–1042), son of Canute, king of England, by his wife ^Elfgifu or Emma, was born about 1019. In the contest for the English crown which followed the death of Canute in 1035 the claims of Hardi- canute were supported by Emma and her ally, Godwine, earl of the West Saxons, in opposition to those of Harold, Canute's illegitimate son, who was backed by the Mercian earl Leofric and the chief men of the north. At a meeting of the witan at Oxford a compromise was ultimately arranged by which Harold was temporarily elected regent of all England, pending the final settlement of the question on the return of Hardicanute from Denmark. The compromise was strongly opposed by Godwine and Emma, who for a time forcibly held Wessex in Hardicanute's behalf. But Harold's party rapidly increased; and early in 1037 he was definitely elected king. Emma was driven out and took refuge at Bruges. In 1039 Hardicanute joined her, and together they concerted an attack on England. But next year Harold died; and Hardicanute peacefully succeeded. His short reign was marked by great oppression and cruelty. He caused the dead body of Harold to be dug up and thrown into a fen; he exacted so heavy a geld for the support of his foreign fleet that great discontent was created throughout the kingdom, and in Worcestershire a general uprising took place against those sent to collect the tax, whereupon he burned the city of Worcester to the ground and devastated the surrounding country; in 1041 he permitted Edwulf, earl of Northumbria, to be treacherously murdered after having granted him a safe- conduct. While " he stood at his drink " at the marriage feast of one of his flegns he was suddenly seized with a fit, from which he died a few days afterwards on the 8th of June 1042.

HARDING, CHESTER (1792–1866), American portrait painter, was born at Conway, Massachusetts, on the 1st of September 1792. Brought up in the wilderness of New York state, Harding,

as a lad of splendid physique, standing over 6 ft. 3 in., marched as a drummer with the militia to the St Lawrence in 1813. He became subsequently chairmaker, peddler, inn-keeper, and house-painter, painting signs in Pittsburg, Pa., and eventually going on the road, self-taught, as an itinerant portrait painter. He made enough money to take him to the schools at the Phil- adelphia Academy of Design, and he soon became proficient enough to gain a competency, so that later he went to England and set up a studio in London. There he met with great success, painting royalty and the nobility, and, despite the lackings of an early education and social experience, he became a favourite in all circles. Returning to the United States, he settled in Boston and painted portraits of many of the prominent men and women of his time. He died on the 1st of April 1866.

HARDING, JAMES DUFFIELD (1798–1863), English land- scape painter, was the son of an artist, and took to the same vocation at an early age, although he had originally been destined for the law. He was in the main a water-colour painter and a lithographer, but he produced various oil-paintings both at the beginning and towards the end of his career. He frequently contributed to the exhibitions of the Water-Colour Society, of which he became an associate in 1821, and a full member in 1822. He was also very largely engaged in teaching, and published several books developing his views of art — amongst others, The Tourist in Italy (1831); The Tourist in France (1834); The Park and the Forest (1841); The Principles and the Practice of Art (1845); Elementary Art (1846); Scotland Delineated in a Series of Views (1847); Lessons on Art (1849). He died at Barnes on the 4th of December 1863. Harding was noted for facility, sureness of hand, nicety of touch, and the various qualities which go to make up an elegant, highly trained, and accomplished sketcher from nature, and composer of picturesque landscape material; he was particularly skilful in

the treatment of foliage.

HARDINGE, HENRY HARDINGE, Viscount (1785-1856), British field marshal and governor-general of India, was born at Wrotham in Kent on the 30th of March 1785. After being at Eton, he entered the army in 1799 as an ensign in the Queen's Rangers, a corps then stationed in Upper Canada. His first active service was at the battle of Vimiera, where he was wounded; and at Corunna he was by the side of Sir John Moore when he received his death-wound. Subsequently he received an appointment as deputy-quartermaster-general in the Portu- guese army from Marshal Beresford, and was present at nearly all the battles of the Peninsular War, being wounded again at Vittoria. At Albuera he saved the day for the British by taking the responsibility at a critical moment of strongly urging General Cole's division to advance. When peace was again broken in 1815 by Napoleon's escape from Elba, Hardinge hastened into active service, and was appointed to the important post of commissioner at the Prussian headquarters. In this capacity he was present at the battle of Ligny on the 16th of June 181 5, where he lost his left hand by a shot, and thus was not present at Waterloo, fought two days later. For the loss of his hand he received a pension of £300; he had already been made a K.C.B., and Wellington presented him with a sword that had belonged to Napoleon. In 1820 and 1826 Sir Henry Hardinge was returned to parliament as member for Durham; and in 1828 he accepted the office of secretary at war in Wellington's ministry, a post which he also filled in Peel's cabinet in 1841-1844. In 1830 and 1834-1835 he was chief secretary for Ireland. In 1844 he succeeded Lord Ellenborough as governor-general of India. During his term of office the first Sikh War broke out; and Hardinge, waiving his right to the supreme command, magnani- mously offered to serve as second in command under Sir Hugh Gough; but disagreeing with the latter's plan of campaign at Ferozeshah, he temporarily reasserted his authority as governor- general (see Sikh Wars). After the successful termination of the campaign at

Sobraon he was created Viscount Hardinge of Lahore and of King's Newton in Derbyshire, with a pension of £3000 for three lives; while the East India Company voted him an annuity of £5000, which he declined to accept. Hardinge's term of office in India was marked by many social and educational

reforms. He returned to England in 1848, and in 1852 succeeded the duke of Wellington as commander-in-chief of the British army. While in this position he had the home management of the Crimean War, which he endeavoured to conduct on Wellington's principles — a system not altogether suited to the changed mode of warfare. In 1855 he was promoted to the rank of field marshal.' Viscount Hardinge resigned his office of commander-in-chief in July 1856, owing to failing health, and died on the 24th of September of the same year at South Park near Tunbridge Wells. His elder son, Charles Stewart (1822- 1894), who had been his private secretary in India, was the 2nd Viscount Hardinge; and the latter's eldest son succeeded to the title. The younger son of the 2nd Viscount, Charles Hardinge (b. 1858), became a prominent diplomatist (see Edward VII.), and was appointed governor-general of India in 1910, being created Baron Hardinge of Penshurst.

See C. Hardinge, Viscount Hardinge (Rulers of India series, 1891); and R. S. Rait, Life and Campaigns of Viscount Gough (1903).

HARDOI, a town and district of British India, in the Lucknow division of the United Provinces. The town is 63 m. N.E. of Lucknow by rail. Pop. (1901) 12,174. It has a wood-carving industry, saltpetre works, and an export trade in grain.

The District of Hardoi has an area of 233 1 sq. m. It is a level district watered by the Ganges, Ramganga, Deoha or Garra, Sukheta, Sai, Baita and Gumti — the three rivers first named being navigable by country boats. Towards the Ganges the land is uneven, and often rises in hillocks of sand cultivated at the base, and their slopes covered with lofty munj grass. Several large jhils or swamps

are scattered throughout the district, the largest being that of Sandi, which is 3 m. long by from 1 to 2 m. broad. These jhils are largely used for irrigation. Large tracts of forest jungle still exist. Leopards, black buck, spotted deer, and nilgai are common; the mallard, teal, grey duck, common goose, and all kinds of waterfowl abound. In 1901 the population of the district was 1,092,834, showing a decrease of nearly 2 % in the decade. The district contains a larger urban population than any other in Oudh, the largest town being Shahabad, 20,036 in 1901. It is traversed by the Oudh and Rohilkhand railway from Lucknow to Shahjahanpur, and its branches. The chief exports are grain, sugar, hides, tobacco and saltpetre.

The first authentic records of Hardoi are connected with the Mussulman colonization. Bawan was occupied by Sayyid Salar Masaud in 1028, but the permanent Moslem occupation did not begin till 1217. Owing to the situation of the district, Hardoi formed the scene of many sanguinary battles between the rival Afghan and Mogul empires. Between Bilgram and Sandi was fought the great battle between Humayun and Sher Shah, in which the former was utterly defeated. Hardoi, along with the rest of Oudh, became British territory under Lord Dalhousie's proclamation of February 1856.

HARDOUIN, JEAN (1646-1 729), French classical scholar, was born at Quimper in Brittany. Having acquired a taste for literature in his father's book-shop, he sought and obtained about his sixteenth year admission into the order of the Jesuits. In Paris, where he went to study theology, he ultimately became librarian of the College Louis le Grand in 1683, and he died there on the 3rd of September 1729. His first published work was an edition of Themistius (1684), which included no fewer than thirteen new orations. On the advice of Jean Gamier (1612-1681) he undertook to edit the Natural History of Pliny for the Delphin series, a task which he completed in five years. His attention having been turned to numismatics as auxiliary to his great editorial labours, he published several

learned works in that department, marred, however, as almost everything he did was marred, by a determination to be at all hazards different from other interpreters. It is sufficient to mention his Numnti antiqui populorum et urbium illustrati (1684), Antirrheticus de nummis antiquis coloniarum et municipiorum (1689), and Chrono- logia Veteris Testamenti ad vulgatam versionem exacta et nummis illustrata (1696). By the ecclesiastical authorities Hardouin was appointed to supervise the Conciliorum collectio regia maxima

(17 1 5); but he was accused of suppressing, important documents [and foisting in apocryphal matter, and by the order of the parlement of Paris (then at war with the Jesuits) the publication of the work was delayed. It is really a valuable collection, much cited by scholars. Hardouin declared that all the councils supposed to have taken place before the council of Trent were fictitious. It is, however, as the originator of a variety of para- doxical theories that Hardouin is now best remembered. The most remarkable, contained in his Chronologiae ex nummis antiquis restitutae (1696) and Prolegomena ad censuram veterum scriptorum, was to the effect that, with the exception of the works of Homer, Herodotus and Cicero, the Natural History of Pliny, the Georgics of Virgil, and the Satires and Epistles of Horace, all the ancient classics of Greece and Rome were spurious, having been manufactured by monks of the 13th century, under the direction of a certain Severus Archontius. He denied the genuineness of most ancient works of art, coins and inscriptions, and declared that the New Testament was originally written in Latin.

See A. Debacker, Bibliotheque des ecrivains de la Compagnie de Jesus (1853).

HARDT, HERMANN VON DER (1 660-1 746), German

historian and orientalist, was born at Melle, in Westphalia, on the 15th of November 1660. He studied oriental languages in Jena and in Leipzig, and in 1690 he was called to the chair of oriental languages at Helmstedt. He resigned his position in 1727, but lived at Helmstedt until his death on the 28th of February 1746. Among his numerous writings the following deserve mention: Autographa Lutheri aliorumque celebriutn virorum, ab anno 1517 ad annum 1546, Reformationis aetatem et historiam egregie illustrantia (1690— 1691); Magnum oecumenicum Constantiense concilium (1697-1700) Hebraeae linguae fundamenta (1694); Syriacae linguae fundamenta (1694); Elementa Ckaldaica (1693); Historia litteraria reformationis (171 7); Enigmata prisci orbis (1723). Hardt left in manuscript a history of the Reformation which is preserved in the Helmstedt Juleum.

See F. Lamey, Hermann von der Hardt in seinen Brief en (Karlsruhe,

1891).

HARDT, THE, a mountainous district of Germany, in the Bavarian palatinate, forming the northern end of the Vosges range. It is, in the main, an undulating high plateau of sandstone formation, of a mean elevation of 1300 ft., and reaching its highest point in the Donnersberg (2254 ft.). The eastern slope, which descends gently towards the Rhine, is diversified by deep and well-wooded valleys, such as those of the Lauter and the Queich, and by conical hills surmounted by the ruins of frequent feudal castles and monasteries. Noticeable among these are the Madenburg near Eschbach, the Trifels (long the dungeon of Richard I. of England), and the Maxburg near Neustadt. Three- fifths of the whole area is occupied by forests, principally oak, beech and fir. The lower eastern slope is highly cultivated and produces excellent wine.

HARDWAR, or Hurdwar, an ancient town of British India, and Hindu place of pilgrimage, in the Saharanpur district of the United Provinces, on the

right bank of the Ganges, 17 m. N.E. of Rurki, with a railway station. The Ganges canal here takes off from the river. A branch railway to Dehra was opened in 1900. Pop. (1901), 25,597. The town is of great antiquity, and has borne many names. It was originally known as Kapila from the sage Kapila. Hsuan Tsang, the Chinese Buddhist pilgrim, in the 7th century visited a city which he calls Mo-yu-lo, the remains of which still exist at Mayapur, a little to the south of the modern town. Among the ruins are a fort and three temples, decorated with broken stone sculptures. The great object of attraction at present is the Hari-ka-charan, or bathing ghat, with the adjoining temple of Gangadwara. The charan or foot-mark of Vishnu, imprinted on a stone let into the upper wall of the ghat, forms an object of special reverence. A great assemblage of people takes place annually, at the beginning of the Hindu solar year, when the sun enters Aries; and every twelfth year a feast of peculiar sanctity occurs, known as a Kumbh-mela. The ordinary number of pilgrims at the annual fair

amounts to 100,000, and at the Kumbh-mela to 300,000; in 1903 there were 400,000 present. Since 1892 many sanitary improvements have been made for the benefit of the annual concourse of pilgrims. In early days riots and also outbreaks of cholera were of common occurrence. The Hardwar meeting also possesses mercantile importance, being one of the principal horse-fairs in Upper India. Commodities of all kinds, Indian and European, find a ready sale, and the trade in grain and food-stuffs forms a lucrative traffic.

HARDWICKE, PHILIP YORKE, ist Earl or (1690-1764), English lord chancellor, son of Philip Yorke, an attorney, was born at Dover, on the ist of December 1690. Through his mother, Elizabeth, daughter and co-heiress of Richard Gibbon of Rolvenden, Kent, he was connected with the family of Gibbon the historian. At the age of fourteen, after a not very thorough education at a private school at Bethnal Green, where, however, he showed exceptional promise, he entered an attorney's office in London.

Here he gave some attention to literature and the classics as well as to law; but in the latter he made such progress that his employer, Salkeld, impressed by Yorke's powers, entered him at the Middle Temple in November 1708; and soon after- wards recommended him to Lord Chief Justice Parker (after- wards earl of Macclesfield) as law tutor to his sons. In 171 5 he was called to the bar, where his progress was, says Lord Campbell, " more rapid than that of any other debutant in the annals of our profession," his advancement being greatly furthered by the patronage of Macclesfield, who became lord chancellor in 1718, when Yorke transferred his practice from the king's bench to the court of chancery, though he continued to go on the western circuit. In the following year he established his reputation as an equity lawyer in a case in which Sir Robert Walpole's family was interested, by an argument displaying profound learning and research concerning the jurisdiction of the chancellor, on lines which he afterwards more fully developed in a celebrated letter to Lord Karnes on the distinction between law and equity. Through Macclesfield's influence with the duke of Newcastle Yorke entered parliament in 17 19 as member for Lewes, and was appointed solicitor-general, with a knighthood, in 1720, although he was then a barrister of only four years' standing. His conduct of the prosecution of Christopher Layer in that year for treason as a Jacobite further raised Sir Philip Yorke's reputation as a forensic orator; and in 1723, having already become attorney-general, he passed through the House of Commons the bill of pains and penalties against Bishop Atterbury. He was excused, on the ground of his personal friendship, from acting for the crown in the . impeachment of Macclesfield in 1725, though he did not exert himself to save his patron from disgrace largely brought about by Macclesfield's partiality for Yorke himself. He soon found a new and still more influential patron in the duke of Newcastle, to whom he henceforth gave his political support. He rendered valuable service to Walpole's government by his support of the bill for prohibiting loans to foreign powers (1730), of the

increase of the army (1732) and of the excise bill ^733). In 1733 Yorke was appointed lord chief justice of the king's bench, with the title of Lord Hardwicke, and was sworn of the privy council; and in 1737 he succeeded Talbot as lord chancellor, thus becoming a member of Sir Robert Walpole's cabinet. One of his first official acts was to deprive the poet Thomson of a small office conferred on him by Talbot.

Hardwicke's political importance was greatly increased by his removal to the House of Lords, where the incompetency of Newcastle threw on the chancellor the duty of defending the measures of the government. He resisted Carteret's motion to reduce the army in 1738, and the resolutions hostile to Spain over the affair of Captain Jenkins's ears. But when Walpole bent before the storm and declared war against Spain, Hardwicke advocated energetic measures for its conduct; and he tried to keep the peace between Newcastle and Walpole. There is no sufficient ground for Horace Walpole's charge that the fall of Sir Robert was brought about by Hardwicke's treachery. No one was more surprised than himself when he retained the

chancellorship in the following administration, and he resisted the proposal to indemnify witnesses against Walpole in one of bis finest speeches in May 1 742. He exercised a leading influence in the Wilmington Cabinet; and when Wilmington died in August 1743, it was Hardwicke who put forward Henry Pelham for the vacant office against the claims of Pulteney. For many years from this time he was the controlling power in the govern- ment. During the king's absences on the continent Hardwicke was left at the head of the council of regency; it thus fell to him to concert measures for dealing with the Jacobite rising in 1745. He took a just view of the crisis, and his policy for meeting it was on the whole statesmanlike. After Culloden he presided at

the trial of the Scottish Jacobite peers, his conduct of which, though judicially impartial, was neither dignified nor generous; and he must be held partly responsible for the unnecessary severity meted out to the rebels, and especially for the cruel, though not illegal, executions on obsolete attainders of Charles Radcliffe and (in 1753) of Archibald Cameron. He carried, however, a great reform in 1746, of incalculable benefit to Scotland, which swept away the grave abuses of feudal power surviving in that country in the form of private heritable juris- dictions in the hands of the landed gentry. On the other hand his legislation in 1748 for disarming the Highlanders and pro- hibiting the use of the tartan in their dress was vexatious without being effective. Hardwicke supported Chesterfield's reform of the calendar in 1751; in 1753 his bill for legalizing the natural- ization of Jews in England had to be dropped on account of the popular clamour it excited; but he successfully carried a salutary reform of the marriage law, which became the basis of all subsequent legislation on the subject.

On the death of Pelham in 1754 Hardwicke obtained for Newcastle the post of prime minister, and for reward was created earl of Hardwicke and Viscount Royston; and when in November 1756 the weakness of the ministry and the threatening aspect of foreign affairs compelled Newcastle to resign, Hard- wicke retired with him. He played an important and dis- interested part in negotiating the coalition between Newcastle and Pitt in 1757, when he accepted a seat in Pitt's cabinet without returning to the woolsack. After the accession of George III. Hardwicke opposed the ministry of Lord Bute on the peace with France in 1762, and on the cider tax in the following year. In the Wilkes case Hardwicke condemned general warrants, and also the doctrine that seditious libels published by members of parliament were protected by parlia- mentary privilege. He died in London on the 6th of March

1764.

Although for a lengthy period Hardwicke was an influential minister, he was not a statesman of the first rank. On the other hand he was one of the greatest judges who ever sat on the English bench. He did not, indeed, by his three years' tenure of the chief- justiceship of the king's bench leave any impress on the common law; but Lord Campbell pronounces him " the most consum- mate judge who ever sat in the court of chancery, being dis- tinguished not only for his rapid and satisfactory decision of the causes which came before him, but for the profound and enlightened principles which he laid down, and for perfecting English equity into a systematic science." He held the office of lord chancellor longer than any of his predecessors, with a single exception; and the same high authority quoted above asserts that as an equity judge Lord Hardwicke's fame " has not been exceeded by that of any man in ancient or modern times. His decisions have been, and ever will continue to be, appealed to as fixing the limits and establishing the principles of the great juridical system called Equity, which now not only in this country and in our colonies, but over the whole extent of the United States of America, regulates property and personal rights more than the ancient common law." 1 Hardwicke had prepared himself for this great and enduring service to English jurisprudence by study of the historical foundations of the chancellor's equitable jurisdiction, combined with profound

1 Lord Campbell, Lives of the Lord Chancellors, v. 43 (London,

1846).

insight into legal principle, and a thorough knowledge of the Roman civil law, the principles of which he scientifically incor- porated into his administration of English equity in the absence of precedents bearing on the causes submitted to his judgment. His decisions on particular points in dispute were based on general principles, which were neither so wide as to prove in- applicable to future circumstances, nor too restricted to serve as the

foundation for a coherent and scientific system. His recorded judgments— which, as Lord Campbell observes, ” certainly do come up to every idea we can form of judicial excellence ” — combine luminous method of arrangement with elegance and lucidity of language.

Nor was the creation of modern English equity Lord Hard- wicke’s only service to the administration of justice. Born within two years of the death of Judge Jeffreys his influence was powerful in obliterating the evil traditions of the judicial bench under the Stuart monarchy, and in establishing the modern conception of the duties and demeanour of English judges. While still at the bar Lord Chesterfield praised his conduct of crown prosecutions as a contrast to the former ” bloodhounds of the crown ” ; and he described Sir Philip Yorke as ” naturally humane, moderate and decent.” On the bench he had complete control over his temper; he was always urbane and decorous and usually dignified. His exercise of legal patronage deserves unmixed praise. As a public man he was upright and, in comparison with most of his contemporaries, consistent. His domestic life’ was happy and’ virtuous. His chief fault was avarice, which perhaps makes it the more creditable that, though a colleague of Walpole, he was never suspected of corrup- tion. But he had a keen and steady eye to his own advantage, and he” was said to be jealous of all who might become his rivals for power. His manners, too, were arrogant. Lord Waldegrave said of Hardwicke that ” he might have been thought a great man had he been less avaricious, less proud, less unlike a gentle- man.” Although in his youth he contributed to the Spectator over the signature ” Philip Homebred,” he seems early to have abandoned all care for literature, and he has been reproached by Lord Campbell and others with his neglect of art and letters. He married, on the 16th of May 1710, Margaret, daughter of Charles Cocks (by his wife Mary, sister of Lord Chancellor Somers), and widow of John Lygon, by whom he had five sons and two daughters. His eldest daughter, Elizabeth, married

Lord Anson; and the second, Margaret, married Sir Gilbert Heathcote. Three of his younger sons attained some distinction. Charles Yorke (q.v.), the second son, became like his father lord chancellor; the third, Joseph, was a diplomatist, and was created Lord Dover; while James, the fifth son, became bishop of Ely.

Hardwicke was succeeded in the earldom by his eldest son, Philip Yorke (1720–1705), 2nd earl of Hardwicke, born on the 19th of March 1720, and educated at Cambridge. In 1741 he became a fellow of the Royal Society. With his brother, Charles Yorke, he was one of the chief contributors to Athenian Letters; or the Epistolary Correspondence of an agent of the King of Persia residing at Athens during the.Peloponnesian War (4 vols., London, 1 741), a work that for many years had a considerable vogue and went through several editions. He sat in the House of Commons as member for Reigate (1741–1747), and afterwards for Cambridgeshire; and he kept notes of the debates which were afterwards embodied in Cobbett's Parliamentary History. He was styled Viscount Royston from 1754 till 1764, when he succeeded to the earldom. In politics he supported the Rocking- ham Whigs. He held the office of teller of the exchequer, and was lord-lieutenant of Cambridgeshire and high steward of Cambridge University. He edited a quantity of miscellaneous state papers and correspondence, to be found in MSS. collections in the British Museum. He died in London, on the 16th of May 1790. He married Jemima Campbell, only daughter of John, 3rd earl of Breadalbane, and granddaughter and heiress of Henry de Grey, duke of Kent, who became in her own right marchioness de Grey.

In default of sons, the title devolved on his nephew, Philip

Yorke (i 757–1834), 3rd earl of Hardwicke, eldest

son of Charles Yorke, lord chancellor, by his first wife, Catherine Freman, who was born on the 31st of May 1757 and was educated at Cambridge. He was M.P. for- Cambridgeshire, following the Whig traditions of his family; but after his succession to the earldom in 1790 he supported Pitt, and took office in 1801 as lord lieutenant of Ireland (1801-1806), where he supported Catholic emancipa- tion. He was created K.G. in 1803, and was a fellow of the Royal Society. He married Elizabeth, daughter of James Lindsay, 5th earl of Balcarres, in 1782, but left no son.

He was succeeded in the peerage by his nephew, Charles Philip Yorke (1799-1873), 4th earl of Hardwicke, English admiral, eldest son of Admiral Sir Joseph Sydney Yorke (1768- 183 1), who was second son of Charles Yorke, lord chancellor, by his second wife, Agneta Johnson. Charles Philip was born at Southampton on the 2nd of April 1799 and was educated at Harrow. He entered the royal navy in 1815, and served on the North American station and in the Mediterranean, attaining the rank of captain in 1825. He represented Reigate (1831) and Cambridgeshire (1832-1834) in the House of Commons; and after succeeding to the earldom in 1834, was appointed a lord in waiting by Sir Robert Peel in 1841. In 1858 he retired from the active list with the rank of rear-admiral, becoming vice-admiral in the same year, and admiral in 1863. He was a member of Lord Derby's cabinet in 1852 as postmaster-general and lord privy seal in 1858. In 1833 he married Susan, daughter of the 1 st Lord Ravens worth, by whom he had five sons and three daughters. His eldest son, Charles Philip Yorke (1836- 1897), sth earl of Hardwicke, was comptroller of the household of Queen Victoria (1866- 1868) and master of the buckhounds 1874-1880). He married in 1863, Sophia Georgiana, daughter of the 1st Earl Cowley. He was succeeded by his only son Albert Edw.ard Philip Henry Yorke (1867-1904), 6th earl of Hardwicke, who, after holding the posts of under-seeretary of state for India (1900-1902) and for war (1902-1903), died unmarried on the 29th of November

1904; the title then went to his uncle, John Manners Yorke (1840–1909), 7th earl of Hardwicke, second son of Charles Philip, the 4th earl, who joined the royal navy and served in the Baltic and in the Crimea (1854– 1855). This earl died on the 13th of March 1909 and was suc– ceeded by his son Charles Alexander (b. 1869) as 8th earl.

The contemporary authorities for the life of Lord Chancellor Hardwicke are voluminous, being contained in the memoirs of the period and in numerous collections of correspondence in the British Maseum. See, especially, the Hardwicke Papers; the Stowe MSS.; Hist. MSS. Commission (Reports 2, 3, 4, 6, 8, 9, 11); Horace Wal– pole, Letters (ed. by P. Cunningham, 9 vols., London, 1857–1859); Letters to Sir H. Mann (ed. by Lord Dover, 4 vols., London, 1843– 1844), Memoirs of the Reign of George II. (ed. by Lord Holland, 2nd ed. revised, London, 1847); Memoirs of the Reign of George III. jed. by G. F. R. Barker, 4 vols., London, 1894); Catalogtie of Royal and Noble Authors of England, Scotland and Ireland (ed. by T. Park, ■ 5 vols., London, 1806). Horace Walpole was violently hostile to Hardwicke, and his criticism, therefore, must be taken with extreme reserve. See also the earl Waldegrave, Memoirs 1754–1758 (London, 1821); Lord Chesterfield, Letters" {ed. by Lord Mahon, 5 vols., London, 1892); Richard Cooksey, Essay on John, Lord Somers, and Philip, Earl of Hardwicke (Worcester, 1791); William Coxe, Memoirs of Sir R. Walpole (4 vols., London, 1816); Memoirs of the Administration of Henry Pelham (2 vols., London, 1829); Lord Campbell, Lives of the Lord Chancellors, vol. v. (8 vols., London, 1845); Edward Foss, The Judges of England, vols. vii. and viii. (9 vols., London, 1848–1864); George Harris, Life of Lord Chan– cellor Hardwicke; with Selections from his Correspondence, Diaries, Speeches and Judgments (3 vols., London, 1847). The last–named work may be consulted for the lives of the 2nd and 3rd earls. For the 3rd earl see also the duke of Buckingham, Memoirs of the Court and Cabinets of George III. (4 vols., London, 1853–1855). For the 4th earl sec Charles Philip Yorke, by his daughter,

Lady Biddulph of Ledbury (1910). (R. J. M.)

HARDY, ALEXANDRE (is69?-i63i), French dramatist, was born in Paris. He was one of the most fertile of all dramatic authors, and himself claimed to have written some six hundred plays, of which, however, only thirty-four are preserved. He seems to have been connected all his life with a troupe of actors headed by a clever comedian named Valleran-Lecomte, whom he provided with plays. Hardy toured the provinces with this

company, which gave some representations in Paris in 1599 at the H6tel de Bourgogne. Valleran-Lecomte occupied the same theatre in 1600-1603, and again in 1607, apparently for some years. In consequence of disputes with the Confrerie de la Passion, who owned the privilege of the theatre, they played elsewhere in Paris and in the provinces for some years; but in 1628, when they had long borne the title of " royal," they were definitely established at the Hotel de Bourgogne. Hardy's numerous dedications never seem to have brought him riches or patrons. His most powerful friend was Isaac de Laffemas (d. 1657), one of Richelieu's most unscrupulous agents, and he was on friendly terms with the poet Theophile, who addressed him in some verses placed at the head of his Thialre (1632), and Tristan l'Hermite had a similar admiration for him. Hardy's plays were written for the stage, not to be read; and it was in the interest of the company that they should not be printed and thus fall into the common stock. But in 1623 he published Les Chastes et loyales amours de Theagene et CaricUe, a tragi-comedy in eight " days " or dramatic poems; and in 1624 he began a collected edition of his works, Le Thedtre d' Alexandre Hardy, parisien, of which five volumes (1624-1628) were published, one at Rouen and the rest in Paris. These comprise eleven tragedies: Diaon se sacrifiant, Scedase ou I'hospitalite violee, Panthee, Meleagre, LaMort d'Achille, Coriolan, Marianne, a trilogy on the history of Alexander, Alcmeon, ou la vengeance feminine; five mythological pieces; thirteen tragi-comedies, among them Gesippe, drawn from Boccaccio; Phraarte, taken

from Giraldi's Cent excellentes nouvelles (Paris, 1584); Cornelie, La Force du sang, Felismene, La Belle Egyptienne, taken from Spanish subjects; and five pastorals, of which the best is Alphee, ou la justice d'amour. Hardy's importance in the history of the French theatre can hardly be over-estimated. Up to the end of the 16th century medieval farce and spectacle kept their hold on the stage in Paris. The French classical tragedy of fitienne Jodelle and his followers had been written for the learned, and in 1628 when Hardy's work was nearly over and Rotrou was on the threshold of his career, very few literary dramas by any other author are known to have been publicly represented. Hardy educated the popular taste, and made possible the dramatic activity of the 17 th century. He had abundant practical experience of the stage, and modified tragedy accordingly, suppressing chorus and monologue, and providing the action and variety which was denied to the literary drama. He was the father in France of tragi-comedy, but cannot fairly be called a disciple of the romantic school of England and Spain. It is impossible to know how much later dramatists were indebted to him in detail, since only a fraction of his work is preserved, but their general obligation is amply established. He died in 1631 or 1632.

The sources for Hardy's biography are extremely limited. The account given by the brothers Parfaict in their Hist, du theatre francais (1745, &c, vol. iv. pp. 2-4) must be received with caution, and no documents are forthcoming. Many writers have identified him with the provincial playwright picturesquely described in chap. xi. of Le Page disgr&cie (1643), the autobiography of Tristan l'Hermite, but if the portrait is drawn from life at all, it is more probably drawn from Theophile. See Le Thedtre d' Alexandre Hardy, edited by E.. Stengel (Marburg and Paris, 1883-1884, 5 vols.); E. Lombard, " Etude sur Alexandre Hardy," in Zeitschr. fur neufrarz. Spr. u. Lit. (Oppeln and Leipzig, vols. i. and ii., 1880-1881); K. Nagel, A. Hardy's Einfluss auf Pierre Corneille (Marburg, 1884); and especially

E. Rigal, Alexandre Hardy . . . (Paris, 1889) and Le Thedtre francais avantda periode classique (Paris, 1901.)

HARDY, THOMAS (1840-), English novelist, was born in Dorsetshire on the 2nd of June 1840. His family was one of the branches of the Dorset Hardys, formerly of influence in and near the valley of the Frome, claiming descent from John Le Hardy of Jersey (son of Clement Le Hardy, lieutenant-governor of that island in 1488), who settled in the west of England. His maternal ancestors were the Swetman, Childs or Child, and kindred families, who before and after 1635 were small landed proprietors in Melbury Osmond, Dorset, and adjoining parishes. He was educated at local schools, 1848-1854, and afterwards privately, and in 1856 was articled to Mr John Hicks, an

ecclesiastical architect of Dorchester. In 1859 he began writing verse and essays, but in 1861 was compelled to apply himself more strictly to architecture, sketching and measuring many old Dorset churches with a view to their restoration. In 1862 he went to London (which he had first visited at the age of nine) and became assistant to the late Sir Arthur Blomfield, R.A. In 1863 he won the medal of the Royal Institute of British Architects for an essay on Coloured Brick and Terra-cotta Architecture, and in the same year won the prize of the Archi- tectural Association for design. In March 1865 his first short story was published in Chambers's Journal, and during the next two or three years he wrote a good deal of verse, being somewhat uncertain whether to take to architecture or to literature as a profession. In 1867 he left London for Weymouth, and during that and the following year wrote a " purpose " story, which in 1869 was accepted by Messrs Chapman and Hall. The manuscript had been read by Mr George Meredith, who asked the writer to call on him, and advised him not to print

it, but to try another, with more plot. The manuscript was withdrawn and re-written, but never published. In 1870 Mr Hardy took Mr Meredith's advice too literally, and constructed a novel that was all plot, which was published in 1871 under the title Desperate Remedies. In 1872 appeared Under the Greenwood Tree, a " rural painting of the Dutch school," in which Mr Hardy had already " found himself," and which he has never surpassed in happy and delicate perfection of art. A Pair of Blue Eyes, in which tragedy and irony come into his work together, was published in 1873. In J 874 Mr Hardy married Emma Lavinia, daughter of the late T. Attersoll Gifford of Plymouth. His first popular success was made by Far from the Madding Crowd r (i&74), which, on its appearance anonymously in the Cornhill Magazine, was attributed by many to George Eliot. Then came The Hand of Ethelberta (1876), described, not inaptly, as "a comedy in chapters "; The Return of the Native (1878), the most sombre and, in some ways, the most powerful and characteristic of Mr Hardy's novels; The Trumpet-Major (1880); A Laodicean (1881); Two on a Tower (1882), a long excursion in constructive irony; The Mayor of Casterbridge (1886); The Woodlanders (1887); Wessex Tales (1888); A Group of Noble Dames (1891); Tess of the D' Urbervilles (1891), Mr Hardy's most famous novel; Life's Little Ironies (1894); Jude the Obscure (1.895), his most thoughtful and least popular book; The Well-Beloved, a reprint, with some revision, of a story originally published in the Illus- trated London News in 1892 (1897); Wessex Poems, written during the previous thirty years, with illustrations by the author (1898); and The Dynasts (2 parts, 1904-1906). In 1909 appeared Time's Laughing-stocks and other Verses. In all his work Mr Hardy is concerned with one thing, seen under two aspects; not civilization, nor manners, but the principle of life itself, invisibly realized in humanity as sex, seen visibly in the world as what we call nature. He is a fatalist, perhaps rather a determinist, and he studies the workings of fate or law (ruling through inexorable moods or humours), in the chief vivifying

and disturbing influence in life, women. His view of women is more French than English; it is subtle, a little cruel, not as tolerant as it seems, thoroughly a man's point of view, and not, as with Mr Meredith, man's and woman's at once. He sees all that is irresponsible for good and evil in a woman's character, all that is untrustworthy in her brain and will, all that is alluring in her variability. He is her apologist, but always with a reserve of private judgment. No one has created more attractive women of a certain class, women whom a man would have been more likely to love or to regret loving. In his earlier books he is somewhat careful over the reputation of his heroines; gradually he allows them more liberty, with a franker treatment of instinct and its consequences. Jude the Obscure is perhaps the most unbiassed consideration in English fiction of the more com- plicated questions of sex. There is almost no passion in his work, neither the author nor his characters ever seeming able to pass beyond the state of curiosity, the most intellectually interesting of limitations, under the influence of any emotion. In his feeling for nature, curiosity sometimes seems to broaden into a more

intimate communion. The heath, the village with its peasants, the change of every hour among the fields and on the roads of that English countryside which he has made his own — the Dorsetshire and Wiltshire " Wessex " — mean more to him, in a sense, than even the spectacle of man and woman in their blind and painful and absorbing struggle for existence. His knowledge of woman confirms him in a suspension of judgment; his know- ledge of nature brings him nearer to the unchanging and consoling element in the world. All the entertainment which he gets out of life comes to him from his contemplation of the peasant, as himself a rooted part of the earth, translating the dumbness of the fields into humour. His peasants have been compared with Shakespeare's; he has the Shakespearean sense of their placid vegetation by the side of hurrying animal life, to which they act the part of chorus, with an unconscious wisdom in their close, narrow and

undistracted view of things. The order of merit was conferred upon Mr Hardy in July 19 10.

See Annie Macdonell, Thomas Hardy (London, 1894) ; Lionel P.- Johnson, The Art of Thomas Hardy (London, 1894). (A. Sy.)

HARDY, SIR THOMAS DUFFUS (1804-1878), English anti- quary, was the third son of Major Thomas Bartholomew Price Hardy, and belonged to a family several members of which had distinguished themselves in the British navy. Born at Port Royal in Jamaica on the 22nd of May 1804, he crossed over to England and in 1819 entered the Record Office in the Tower of London. Trained under Henry Petrie (1768-1842) he gained a sound knowledge of palaeography, and soon began to edit selections of the public records. From 1861 until his death on the 15th of June 1878 he was deputy-keeper of the Record Office, which just before his appointment had been transferred to its new London headquarters in Chancery Lane. Hardy, who was knighted in 1873, had much to do with the appointment of the Historical Manuscripts Commission in 1869.

Sir T. Hardy edited the Close Rolls, Rotuli litterarum clausarum, 1204-1237 (2 vols., 1 833-1 844), with an introduction entitled " A Description of the Close Rolls, with an Account of the early Courts of Law and Equity " ; and the Patent Rolls, Rotuli litterarum patentium, 1201-1216 (1835), with introduction, " A Description of the Patent Rolls, to which is added an Itinerary of King John." He also edited the Rotuli de oblatis etfinibus (1835), which deal also with the time of King John ; the Rotuli Normanniae, 1 200-1205, and 1417-1418 (1835), containing letters and grants of the English kings concerning the duchy of Normandy; the Charter Rolls, Rotuli chartarum, 1100- 1216 (1837), giving with this work an account of the structure of charters; the Liberate Rolls, Rotuli de liberate ac de misis et praestitis regnante Johanne (1844); and the Modus tenendi parliamentum, with a translation (1846). He wrote A Catalogue of Lords Chan- cellors, Keepers of the Great Seal, Masters of the Rolls and Officers of

the Court of Chancery (1843); the preface to Henry Petrie's Monu- menta historica Britannica (1848); and Descriptive Catalogue of Materials relating to the History of Great Britain and Ireland (3 vols., 1862–1871). He edited William of Malmesbury's De gestis regum anglorum (2 vols., 1840) ; he continued and corrected John le Neve's Fasti ecclesiae Anglicanae (3 vols., Oxford, 1854); and with C. T. Martin he edited and translated L'Estorie des Engles of Geoffrey Gaimar (1888–1889). He wrote Syllabus in English of Documents in Rymer's Foedera (3 vols., 1869–1885), and gave an account of the history of the public records from 1837 to 1851 in his Memoirs of the Life of Henry, Lord Langdale (1852), Lord Langdale (1783–1851), master of the rolls from 1836 to 1 851, being largely responsible for the erection of the new Record Office. Hardy took part in the controversy about, the date of the Athanasian creed, writing The Athanasian Creed in connection with the Utrecht Psalter (1872); and Further Report on the Utrecht Psalter (1874).

His younger brother, Sir William Hardy (1807–1887), was also an antiquary. He entered the Record Office in 1823, leaving it in 1830 to become keeper of the records of the duchy of Lancaster. In 1868, when these records were presented by Queen Victoria to the nation, he returned –to the Record Office as an assistant keeper, and in 1878 he succeeded his brother Sir Thomas as deputy-keeper, resigning in 1886. He died on the 17th of March 1887.

Sir W. Hardy edited Jehan de Waurin's Recueil des croniques et anchiennes istories de la Grant Bretaigne (5 vols., 1864–1891) ; and he translated and edited the Charters of the Duchy of Lancaster (1845).

HARDY, SIR THOMAS MASTERMAN, Bart. (1769–1839), British vice-admiral, of the Portisham (Dorsetshire) family of Hardy, was born on the 5th of April 1769, and in 1781 began

his career as a sailor. He became lieutenant in 1793, and in 1796, being then attached to the " Minerve " frigate, attracted the attention of Nelson by his gallant conduct. He continued to serve with distinction, and in 1798 was promoted to be captain of the " Vanguard," Nelson's flagship. In the " St George " he did valuable work before the battle of Copenhagen in 1801, and his association with Nelson was crowned by his appointment in 1803 to the " Victory " as flag-captain, in which capacity he was engaged at the battle of Trafalgar in 1805, witnessed Nelson's will, and was in close attendance on him at his death. Hardy was created a baronet in 1806. He was then employed on the North American station, and later (18 19), was made commodore and commander-in-chief on the South American station, where his able conduct came prominently into notice. In 1825 he became rear-admiral, and in December 1826 escorted the expeditionary force to Lisbon. In 1830 he was made first sea lord of the admiralty, being created G.C.B. in 1831. In 1834 he was appointed governor of Greenwich hospital, where thence-forward he devoted himself with conspicuous success to the charge of the naval pensioners; in 1837 he became vice-admiral. He died at Greenwich on the 20th of September 1839. In 1807 he had married Anne Louisa Emily, daughter of Sir George Cranfield Berkeley, under whom he had served on the North American station, and by her he had three daughters, the baronetcy becoming extinct.

See Marshall, Royal Naval Biography, ii. and iii. ; Nicolas, De- spatches of Lord Nelson] Broadley and Bartelot, The Three Dorset Captains at Trafalgar (1906), and Nelson's Hardy, his Life, Letters and Friends (1909).

HARDYNG or HARDING, JOHN (1378-1465), English

chronicler, was born in the north, and as a boy entered the

service of Sir Henry Percy (Hotspur), with whom he

was present

at the battle of Shrewsbury (1403). He then passed into the

service of Sir Robert Umfraville, under whom he was constable

of Warkworth Castle, and served in the campaign of Agincourt

in 141 5 and in the sea-fight before Harfleur in 1416. In 1424

he was on a diplomatic mission at Rome, where at the instance

of Cardinal Beaufort he consulted the chronicle of Trogus

Pompeius. Umfraville, who died in 1436, had made Hardyng

constable of Kyme in Lincolnshire, where he probably lived till

his death about 1465. Hardyng was a man of antiquarian

knowledge, and under Henry V. was employed to investigate

the feudal relations of Scotland to the English crown. For this

purpose he visited Scotland, at much expense and hardship.

For his services he says that Henry V. promised him the manor

of Geddington in Northamptonshire. Many years after, in 1439,

he had a grant of £10 a year for similar services. In 1457 there

is a record of the delivery of documents relating to Scotland by

Hardyng to the earl of Shrewsbury, and his reward by a further

pension of £20. It is clear that Hardyng was well acquainted

with Scotland, and James I. is said to have offered him a bribe

to surrender his papers. But the documents, which are still

preserved in the Record Office, have been shown to be forgeries,

and were probably manufactured by Hardyng himself. Hardyng

spent many years on the composition of a rhyming chronicle

of England. His services under the Percies and Umfravilles

gave him opportunity to obtain much information of value for

15th century history. As literature the chronicle has no merit.

It was written and rewritten to suit his various patrons. The

original edition ending in 1436 had a Lancastrian bias and was

dedicated to Henry VI. Afterwards he prepared a version for

Richard, duke of York (d. 146.0), and the chronicle in its final

form was presented to Edward IV. after his marriage to Elizabeth

Woodville in 1464.

The version of 1436 is preserved in Lansdowne MS. 204, and the beat of the later versions in Harley MS. 661, both in the British Museum. Richard Grafton printed two editions in January 1543, which differ much from one another and from the now extant manuscripts. Stow, who was acquainted with a different version, censured Grafton on this point somewhat unjustly. Sir Henry Ellis published the longer version of Grafton with some additions from the Harley MS. in 1812.

See Ellis' preface to Hardyng's Chronicle, and Sir F. Palgrave's Documents illustrating the History of

Scotland (for an account of Hardyng's forgeries). (C. L. K.)

HARE, AUGUSTUS JOHN CUTHBERT (1834-1903), English writer and traveller, was born at Rome in 1 834. He was educated at Harrow school and at University College, Oxford. His name is familiar as the author of a large number of guide-books to the principal countries and towns of Europe, most of which were written to order for John Murray. They were made up partly of the author's own notes of travel, partly of quotations from others' books taken with a frankness of appropriation that disarmed criticism. He also wrote Memorials of a Quiet Life — that of his aunt by whom he had been adopted when a baby (1872), and a tediously long autobiography in six volumes, The Story of My Life. He died at St Leonards-on-Sea on the 22nd of January 1903.'

HARE, SIR JOHN (1844-), English actor and manager, was born in Yorkshire on the 16th of May 1844, and was educated at Giggleswick school, Yorkshire. He made his first appearance on the stage at Liverpool in 1864, coming to London in 1865, and acting for ten years with the Bancrofts. He soon made his mark, particularly in T. W. Robertson's comedies, and in 1875 became manager of the Court theatre. But it was in association- with Mr and Mrs Kendal at the St James's theatre from 1879 to 1888 that he established his popularity in London, in important " character " and " men of the world " parts, the joint manage- ment of Hare and Kendal making this theatre one of the chief centres of the dramatic world for a decade. In 1889 he became lessee and manager of the Garrick theatre, where (though he was often out of the cast) he produced several important plays, : such as Pinero's The Profligate and The Notorious Mrs Ebbsmilh, and had a remarkable personal success in the chief part ' in Sydney Grundy's A Pair of Spectacles. In 1897 he took the Globe theatre, where his acting in Pinero's Gay Lord Quex was another personal triumph. He became almost as well known in the United States as in England, his last tour in America being in 1900 and 1901. He was knighted in 1907. " HARE, JULIUS CHARLES

(1795–1855), English theological writer, was born at Valdagno, near Vicenza, in Italy, on the 13th of September 1795. He came to England with his parents in 1799, but in 1804–1805 spent a winter with them at Weimar, where he met Goethe and Schiller, and received a bias to German literature which influenced his style and sentiments throughout his whole career. On the death of his mother in 1806, Julius was sent home to the Charterhouse in London, where he remained till 181 2, when he entered Trinity College, Cambridge. There he became fellow in 181 8, and after some time spent abroad he began to read law in London in the following year. From 1822 to 1832 he was assistant-tutor at Trinity College. Turning his attention from law to divinity, Hare took priest's orders in 1826; and, on the death of his uncle in 1832, he succeeded to the rich family living of Hurstmonceaux in Sussex, where he accumulated a library of some 12,000 volumes, especially rich in German literature. Before taking up residence in his parish he once more went abroad, and made in Rome the acquaintance of the Chevalier Bunsen, who afterwards dedicated to him part of his work, Hippolytus and his Age. In 1840 Hare was appointed archdeacon of Lewes, and in the same year preached a course of sermons at Cambridge (The Victory of Faith), followed in 1846 by a second, The Mission of the Comforter. Neither series when published attained any great popularity. Archdeacon Hare married in 1844 Esther, a sister of his friend Frederick Maurice. In 1851 he was collated to a prebend in Chichester; and in 1853 he became one of Queen Victoria's chaplains. He died on the 23rd of January 1855.

Julius Hare belonged to what has been called the " Broad Church party," though some of his opinions approach very closely to those of the Evangelical Arminian school, while others again seem vague and undecided. He was one of the first of his countrymen to recognize and come under the influence of German thought and speculation, and, amidst an exaggerated alarm of German heresy, did much to vindicate the authority of the sounder German critics. His

writings, which are chiefly theological and controversial, are largely formed of charges to his clergy, and sermons on different topics; but, though valuable and full of thought, they lose some of their force by the cumbrous German structure of the sentences, and by certain orthographical peculiarities in which the author

indulged. In 1827 Guesses at Truth by Two Brothers' appeared'^ Hare assisted Tfiirlwall, afterwards bishop of St David's, in the translation of the 1st and 2nd volumes of Niebuhr's History of Rome (1828 and 1832), and published a Vindication of Niebuhr's History in 1829. He wrote many similar works, among which is a Vindica tion of Luther against his recent English Assailants (1854). In 1848 he edited the Remains of John Sterling, who had formerly been his curate. Carlyle's Life of John Sterling was written through dis- satisfaction with the " Life " prefixed to Archdeacon Hare's book. Memorials of a Quiet Life, published in 1872, contain accounts of the Hare family.

HARE, the name of the well-known English rodent now designated Lepus europaeus (although formerly termed, incor- rectly, L. timidus). In a wider sense the name includes all the numerous allied species which do not come under the designation of rabbits (see Rabbit). Over the greater part of Europe, where the ordinary species (fig. 1) does not occur, its place is taken by the closely allied Alpine, or mountain hare (fig. 2), the true L. timidus of Linnaeus, and the type of the genus Lepus and the family Leporidae (see Rodentia). The second is a smaller animal than the first, with a more rounded and relatively smaller head; and the ears, hind-legs and tail shorter. In Ireland and the southern districts of Sweden it is permanently of a light fulvous grey colour, with black tips to the ears, but in more northerly districts the fur — except the black ear-tips — changes to white in winter, and

still farther north the animal appears to be white at all seasons of the year. The range of the common or brown hare, inclusive of its local races, extends from England across southern and central Europe to the Caucasus; while that of the blue or mountain species, likewise inclusive of local races, reaches from Ireland, Scotland and Scandinavia through northern Europe and Asia to Japan and Kamchatka, and thence to Alaska.

The brown hare is a night-feeding animal, remaining during the day on its " form," as the slight depression is called which it makes in the open. field, usually among grass. This it leaves at nightfall to seek fields of young wheat and other cereals whose tender herbage forms its favourite food. It is also fond of gnawing the bark of young trees, and thus often does great damage to plantations. In the morning it returns to its form, where it finds protection in the close approach which the colour of its fur makes to that of its surroundings; should it thus fail, however, to elude observation it depends for safety on its extra-

tfae Sea about i. mile in "width. Hares are remarkably prolific, pairing when scarcely a year old, and the female bringing forth several broods in the year, each consisting of from two to five leverets (from the Fr. li'evre) , as the young are called. These are born covered with hair and with the eyes open, and after being suckled for a month are able to look after themselves. In Europe this species has seldom bred in confinement, although an instance has recently been recorded. It will interbreed with the blue hare. Hares (and rabbits) have a cosmopolitan distribution with the exception of Madagascar and Australasia; and are now divided into numerous genera and subgenera, mentioned in the article

Fig. 1. — The Hare {Lepus europaeus).

ordinary fleetness. On the first alarm of danger it sits erect to reconnoitre, when it either seeks concealment by clapping close to the ground, or

takes to flight. In the latter case its great speed, and the cunning endeavours it makes to outwit its canine pursuers, form the chief attractions of coursing. The hare takes readily to the water, where it swims well; an instance having been recorded in which one was observed crossing an arm of

1 Julius Hare's co-worker in this book was his brother Augustus William Hare (1 792-1 834), who, after a distinguished career at Oxford, was appointed rector of Alton Barnes, Wiltshire. He died prematurely at Rome in 1834. He was the author of Sermons to a Country Congregation, published in 1837.

Fig. 2. — The Blue or Mountain Hare (Lepus timidus) in winter dress.

Rodentia. Reference may here be made to a few species. Asia is the home of numerous species, of which the common Indian L. ruficaudatus and the black-necked hare L. nigricollis, are inhabitants of the plains of India; the latter taking its name from a black patch on the neck. In Assam there is a small spiny hare {Caprolagus hispidus), with the habits of a rabbit; and an allied species (Nesolagus nitscheri) inhabits Sumatra, and a, third (Pentaiagus furnessi) the Liu-kiu Islands. The plateau of Tibet is very rich in species, among which L- hypsibius is very common.

Of African species, the Egyptian Hare (L. aegyptius) is a small animal, with long ears and pale fur; and in the south there are the Cape hare (L. capensis) , the long-eared rock-hare (L. saxatilis) and the diminutive Pronolagus crassicaudatus, characterized by its thick red tail.

North America is the home of numerous hares, some of which are locally known as " cotton-tails " and others as "jack- rabbits." The most northern are the Polar hare (L. arcticus), the Greenland hare (L. groenlandicus) and the Alaska hare (L. timidus tschuktschorum) , all allied to the blue hare. Of the others, two, namely the large prairie-hare (L.

campestris) and the smaller varying hare (L. [Poecilolagus] americanus) , turn white in winter; the former having long ears and the whole tail white, whereas in the latter the ears are shorter and the upper surface of the tail is dark. Of those which do not change colour, the wood-hare, grey-rabbit or cotton-tail, Sylvilagus floridanus, is a southern form, with numerous allied kinds. Distantly allied to the prairie-hare or white- tailed jack-rabbit, are several forms distinguished by having a more or less distinct black stripe on the upper surface of the tail. These include a buff bellied species found in California, N. Mexico and S.W. Oregon (L [Macroto-' lagus] calif ornicus) , a large, long-legged form from S. Arizona and Sonora (L. [M.] alleni), the Texan jack-rabbit (L.[M.] tpxanus) and the black-eared hare (L. [M.] melanolis) of the Great Plains, which differs from the third only by its shorter ears and richer coloration. In S. America, the small tapiti or Brazilian hare (Sylvilagus brasiliensis) is nearly allied to the wood-hare, but has a yellowish brown under surface to the tail. See also Coursing. (R. L.)*

HAREBELL (sometimes wrongly written Hairbell), known also as the blue-bell of Scotland, and witches' thimbles, a well-known perennial wild flower, Campanula rotundifolia, a

Harebell (Campanula rotund if olia).

member of the natural order Campanulaceae. The harebell has a very slender slightly creeping root-stock, and a wiry, erect stem. The radical leaves, that is, those at the base of the stem, to which the specific name rotundifolia refers, have long stalks, and are roundish or heart-shaped with crenate or serrate margin; the lower stem leaves are ovate or lanceolate, and the upper ones linear, subsessile, acute and entire, rarely pubescent. The flowers are

slightly drooping, arranged in a panicle, or in small specimens single, having a smooth calyx, with narrow pointed erect segments, the corolla bell-shaped, with slightly recurved segments, and the capsule nodding, and opening by pores at the base. There are two varieties: — (a) genuina, with slender stem leaves, and (b) montana, in which the lower stem-leaves are broader and somewhat elliptical in shape. The plant is found on heaths and pastures throughout Great Britain and flowers in late summer and in autumn; it is widely spread in the north temperate zone. The harebell has ever been a great favourite with poets, and on account of its delicate blue colour has been considered as an emblem of purity.

HAREM, less frequently Haram or Harim (Arab harim — commonly but wrongly pronounced harem — "that which is illegal or prohibited "), the name generally applied to that part of a house in Oriental countries which is set apart for the women; it is also used collectively for the women themselves. Strictly the women's quarters are the haremlik (lik, belonging to), as opposed to selamlik the men's quarters, from which they are in large houses separated by the mabein, the private apartments of the householder. The word harem is strictly applicable to Mahom- medan households only, but the system is common in greater or less degree to all Oriental communities, especially where polygamy is permitted. Other names for the women's quarters are Seraglio (Ital. serraglio, literally an enclosure, from Lat. sera, a bar; wrongly narrowed down to the sense of harem through confusion with Turkish serai or sarai, palace or large building, cf . caravan-serai); Zenana (strictly zanana, from Persian zan, woman, allied with Gr. yvvrj), used specifically of Hindu harems; Andarun (or Anderoon), the Persian word for the " inner part " (sc. of a house). The Indian harem system is also commonly known as pardah or purdah, literally the name of the thick curtains or blinds which are used instead of doors to separate the women's quarters from the rest of the house. A male doctor attending a zenana lady would

put his hand between the purdah to feel her pulse.

The seclusion of women in the household is fundamental to the Oriental conception of the sex relation, and its origin must, therefore, be sought far earlier than the precepts of Islam as set forth in the Koran, which merely regulate a practically universal Eastern custom. 1 It is inferred from the remains of many ancient Oriental palaces (Babylonian, Persian, &c.) that kings and wealthy nobles devoted a special part of the palace to their womankind. Though in comparatively early times there were not wanting men who regarded polygamy as wrong (e.g. the prophets ^of Israel), nevertheless in the East generally there has never been any real movement against the conception of woman as a chattel of her male relatives. A man may have as many wives and concubines as he can support, but each of these women must be

1 In Africa also, among the non-Mahommedan negroes of the west coast and the Bahima of the Victoria Nyanza, the seclusion of women of the upper classes has been practised in states (e.g. Ashanti and Buganda) possessing a considerable degree of civilization.

his exclusive property. The object of this insistence upon female chastity is partly the maintenance of the purity of the family with special reference to property, and partly to protect women from marauders, as was the case with] the| people of India when the Mahommedans invaded the country and sought for women to fill their harems. In Mahommedan countries theoreti- cally a woman must veil her face to all men except her father, her brother and her husband; any violation of this rule is still regarded by strict Mahommedans as the gravest possible offence, though among certain Moslem communities (e.g. in parts of Albania) women of the poorer classes may appear in public unveiled. If any other man make his way into a harem he may lose his life; the attempted escape of a harem woman is a capital offence, the husband having absolute power of life and death, to such an extent that,

especially in the less civilized parts of the Moslem world, no one would think of questioning a man's right to mutilate or kill a disobedient wife or concubine.

Turkish Harems. — A good deal of misapprehension, due to ignorance combined with strong prejudice against the whole system, exists in regard to the system in Turkey. It is often assumed, for example, that the sultan's seraglio is typical, though on a uniquely large scale, of all Turkish households, and as a consequence that every Turk is a polygamist. This is far from being the case, for though the Koran permits four wives, and etiquette allows the sultan seven, the man of average possessions is perforce eontent with one, and a small number of female servants. It is, therefore, necessary to take the imperial seraglio separately.

Though the sultan's household in modern times is by no means as numerous as it used to be, it is said that the harem of Abdul Hamid contained about iooo women, all of whom were of slave origin. This body of women form an elaborately organized community with a complete system of officers, disciplinary and administrative, and strict distinctions of status. The real ruler of this society is the sultan's mother, the Sultana Valide, who exercises her authority through a female superintendent, the Kyahya Khatun. She has also a large retinue of subordinate officials (Kalfas) ranging downwards from the Hasnadar ousta (" Lady of the Treasury ") to the " Mistress of the Sherbets " andthe" Chief Coffee Server." Each of these officials has under her a number of pupil-slaves (alaiks) ,whom she trains to succeed her if need be, and from whom the service is recruited. After the sultana valide (who frequently enjoys considerable political power and is a mistress of intrigue) ranks the mother of the heir- apparent; she is called the Bash Kadin Effendi (" Her excellency the Chief Lady"), and also hasseki or kasseky, and is distin- guished from the other three chief wives who only bear the title Kadin Effendi. Next come the ladies who have borne the younger children of the sultan, the Hanum Efehdis,

and after them the so-called Odalisks or Odalisques (a perversion of odalik, from odah, chamber). These are subdivided, according to the degree of favour in which they stand with the sultan or padishah, into Ikbals (" Favourites ") and Geuzdes (literally the " Eyed " ones), those whom the sultan has favourably noticed in the course of his visits to the apartments of his wives or his mother. All the women are at the disposal of the sultan, though it is contrary to etiquette for him actually to select recruits for his harem. The numbers are kept up by his female relatives and state officials, the latter of whom present girls annually on the evening before the 15th of Ramadan.

Every odalisk who has been promoted to the royal couch receives a daira, consisting of an allowance of money, a suite of apartments, and a retinue, in proportion to her status. It should be noted that, since all the harem women are slaves, the sultans, with practically no exceptions, have never entered into legal marriage contracts. Any slave, in however menial a position, may be promoted to the position of a kadin effendi. Hence all the slaves who have any pretension to beauty are carefully trained, from the time they enter the harem, in deportment, dancing, music and the arts of the toilette: they are instructed in the Moslem religion and learn the daily prayers (namaz); a certain number are specially trained in reading and writing

for secretarial work. Discipline is strict, and continued dis- obedience leads to corporal punishment by the eunuchs. All the women of the harem are absolutely under the control of the sultana valide (who alone of the harem of her dead husband is not sent away to an older palace when her son succeeds), and owe her the most profound respect, even to the point of having to obtain permission to leave their own apartments. Her financial secretary, the Haznadar Ousta, succeeds to

her power if she dies. The sultan's foster-mother also is a person of import- ance, and is known as the Taia Kadin.

The security of the harem is in the hands of a body of eunuchs both black and white. The white eunuchs have charge of the outer gates of the seraglio, but they are not allowed to approach the women's apartments, and obtain no posts of distinction, their chief, however, the kapu aghast (" master of the gates ") has part control over the ecclesiastical possessions, and even the vizier cannot enter the royal apartments without his permission. The black eunuchs have the right of entering the gardens and chambers of the harem. Their chief, usually called the kislar aghasi (" master of the maidens "), though his true title is darns skadet aga (" chief of the abode of felicity "), is an official of high importance. His appointment is for life. If he is deprived of his post he receives his freedom; and if he resigns of his own accord he is generally sent to Egypt- with a pension of 100 francs a day. His secretary keeps count of the revenues of the mosques built by the sultans. He is usually succeeded by the second eunuch, who bears the title of treasurer, and has charge of the jewels, &c, of the women. The number of eunuchs is always a large one. The sultana valide and the sultana hasseki have each fifty at their service, and others are assigned to the kadins and the favourite odalisks.

The ordinary middle-class household is naturally on a very different scale. The selamlik is on the ground floor with a separate entrance, and there the master of the house receives his male guests; the rest of the ground floor is occupied by the kitchen and perhaps the stables. The haremlik is generally (in towns at least) on the upper floor fronting on and slightly overhanging the street; it has a separate entrance, courtyard and garden. The windows are guarded by lattices pierced with circular holes through which the women may watch without being seen. Communication with the haremlik is effected by a locked door, of which the Effendi keeps the key

and also by a sort of revolving cupboard (dutap) for the conveyance of meals. The furniture, of the old-fashioned harems at least, is confined to divans, rugs, carpets and mirrors. For heating purposes the old brass tray of charcoal and wood ash is giving way to American stoves, and there is a tendency to import French furniture and decoration without regard to their suitability.

The presence of a second wife is the exception, and is generally attributable to the absence of children by the first wife. The expense of marrying a free woman leads many Turks to prefer a slave woman who is much more likely to be an amenable partner. If a slave woman bears a child she is often set free and then the marriage ceremony is gone through.

The harem system is, of course, wholly inconsistent with any high ideal of womanhood. Certain misapprehensions, however, should be noticed. The depravity of the system and the vapid idleness of harem life are much exaggerated by observers whose sympathies are wholly against the system. In point of fact much depends on the individuals. In many households there exists a very high degree of mutual consideration and the standard of conduct is by no means degraded. Though a woman may not be seen in the streets without the yashmak which covers her face except for her eyes, and does not leave her house except by her husband's permission, none the less in ordinary households the harem ladies frequently drive into the country and visit the shops and public baths. Their seclusion has very considerable compensations, and legally they stand on a far better basis in relation to their husbands than do the women of monogamous Christian communities. From the moment when a woman, free or slave, enters into any kind of wifely relation with a man, she has a legally enforceable right against him both for her own

and for her children's maintenance. She has absolute control over her personal property whether iu money, slaves or goods; and, if divorce is far easier in Islam than in Christendom, still the marriage

settlement must be of such amount as will provide suitable maintenance in that event.

On the other hand, of course, the system is open to the gravest abuse, and in countries like Persia, Morocco and India, the life of Moslem women and slaves is often far different from that of middle class women of European Turkey, where law is strict and culture advanced. The early age at which girls are secluded, the dulness of their surroundings, and the low moral standard which the system produces react unfavourably not only upon their moral and intellectual growth but also upon their capacity for motherhood and their general physique. A harem woman is soon passee, and the lot of a woman past her youth, if she is divorced or a widow, is monotonous and empty. This is true especially of child-widows.

Since the middle of the 19th century familiarity with European customs and the direct influence of European administrators has brought about a certain change in the attitude of Orientals to the harem system. This movement is, however, only in its infancy, and the impression is still strong that the time is not ripe for reform. The Oriental women are in general so accus- tomed to their condition that few have any inclination to change it, while men as a rule are emphatically opposed to any alteration of the system. The Young Turkish party, the upper classes in Egypt, as also the Babists in Persia, have to some extent pro- gressed beyond the orthodox conception of the status of women, but no radical reform has been set on foot.

In India various attempts have been made by societies, missionary and other, as well as by private individuals, to improve the lot of the zenana women. Zenana schools and hospitals have been founded, and a few women have been trained as doctors and lawyers for the special purposes of pro- tecting the women against their own ignorance and inertia. Thus in 1905 a Parsee Christian lady, Cornelia Sorabjee, was appointed by the Bengal government as legal adviser to the court of wards, so that she might give advice to the widowed mothers

of minors within the harem walls. Similarly trained medical women are introduced into zenanas and harems by the Lady Dufferin Association for medical aid to Indian women. Gradually native Christian churches are making provision for the attendance of women at their services, though the sexes are rigorously kept apart. In India, as in Turkey, the introduction of Western dress and education has begun to create new ideas and ambitions, and not a few Eastern women have induced English women to enter the harems as companions, nurses and governesses. But training and environment are extremely powerful, and in some parts of the Mahommedan world, the supply of Asiatic, European and even American girls is so steady, that reform has touched only the fringe of the system.

Among the principal societies which have been formed to better the condition of Indian and Chinese women in general with special reference to the zenana system are the Church of England Zenana Missionary Society and the Zenana Bible and MedicafMission. Much information as to the medical, industrial and educational work done by these societies will be found in their annual reports and other publications. Among these are J. K. H. Denny's Toward the Uprising; Irene H. Barnes, Behind the Pardah (1897), an account of the former society's work; the general condition of Indian women is described in Mrs Marcus B. Fuller's Wrongs of Indian Womanhood (1900), and Maud Dover's The Englishwoman in India (1909); see also article Missions.

Authorities.— The literature of the subject is very large, though a great deal of it is naturally based on insufficient evidence, and coloured by Western prepossessions. Among useful works are A. van Sommer and Zwerner, Our Moslem. Sisters (1907), a collection of essays by authors acquainted with various parts of the Mahom- medan world and strongly opposed to the whole harem system ; Mrs W. M. Ramsay, Everyday Life in Turkey (1897), cc. iv. and v., containing an account of a day in a harem near Afium-Kara-Hissar; cf. e.g. art. "Harem" in Hughes, Dictionary of Islam; Mrs S. Harvey's Turkish Harems

and Circassian Homes (1871); for

Mahomet's regulations, see R. Bosworth Smith's Mohammed and Mohammedanism (1889); for Egypt, Lane, Manners and Customs of the Modern Egyptians (1837) ; and E. Lott, Harem Life in Egypt and Constantinople (1869); for the sultan's household in the 18th cen- tury, Lady Wdrtley Montagu's Letters, with which may be compared S. Lane-Poole, Turkey (ed. 1909); G. Dorys, La Femme turque (1902); especially Lucy M. J. Garnett (with J. S. Stuart-Glennie), The Women of Turkey (London, 1901), and The Turkish People (London, 1909). For the attempts which have been made to modify and improve the Indian zenana system, see e.g. the reports of the Dufferin Association and other official publications. Other infor- mation will be found in Hoffman's article in Ersch and Gruber's Encyclopddie; Flandin in Revue des deux mondes (1852) on the harem of the Persian prince Malik Kasim Mirza; the count de Beauvoir, in Voyage round the World (1870), on Javanese and Siamese harems- Hantzsche in Zeitschrift fur allgemeine Erdkunde (Berlin, 1864). (J- M - M -)

HARFLEUR, a port of France in the department of Seine- Inferieure, about 6 m. E. of Havre by rail. Pop. (1906) 2864. It lies in the fertile valley of the Lezarde, at the foot of wooded hills not far from the north bank of the estuary of the Seine. The port, which had been rendered almost inaccessible owing to the deposits of the Lezarde, again became available on the opening of the Tancarville canal (1887) connecting it with the port of Havre and with the Seine. Vessels drawing 18 ft. can moor alongside the quays of the new port, which is on a branch of the canal, has some trade in coal and timber, and carries on fishing. The church of St Martin is the most remark- able building in the town, and its lofty stone steeple forms a landmark for the pilots of the river. It dates from the 15th and 1 6th centuries, but the great portal is the work of the

17th, and the whole has undergone modern restoration. Of the old castle there are only insignificant ruins, near which, in a fine park, stands the present castle, a building of the 17th century. The old ramparts of the town are now replaced by manufactories, and the fosses are transformed into vegetable gardens. There is a statue of Jean de Grouchy, lord of Monterollier, under whose leadership the English were expelled from the town in 1435. The industries include distilling, metal founding and the manu- facture of oil and grease.

Harfleur is identified with Caracotinum, the principal port of the ancient Calates. In the middle ages, when its name, Herosfloth, Harofluet or Hareflot, was still sufficiently uncor- rupted to indicate its Norman derivation, it was the principal seaport of north-western' France. In 1415 it was captured by Henry V. of England, but when in 1435 the people of the district of Caux rose against the English, 104 of the inhabitants opened the gates of the town to the insurgents, and thus got rid of the foreign yoke. The memory of the deed was long perpetuated by the bells of St Martin's tolling 104 strokes. Between 1445 and 1449 the English were again in possession; but the town was recovered for the French by Dunois. In the 16th century the port began to dwindle in importance owing to the silting up of the Seine estuary and the rise of Havre. In 1562 the Huguenots put Harfleur to pillage, and its registers and charters perished in the confusion; but its privileges were restored by Charles IX. in 1568, and it was not till 17 10 that it was subjected to the " taille."

HARIANA, a tract of country in the Punjab, India, once the seat of a flourishing Hindu civilization. It consists of a level upland plain, interspersed with patches of sandy soil, and largely overgrown with brushwood. The Western Jumna canal irrigates the fields of a large number of its villages. Since the 14th century Hissar has been the local capital. During the troubled period which followed on the decline of the Mogul empire, Hariana formed the

battlefield where the Mahrattas, Bhattis and Sikhs met to settle their territorial quarrels. The whole country was devastated by the famine of 1783. In 1 797–1 798 Hariana was overrun by the famous Irish adventurer George Thomas, who established his capital at Hansi; in 1801 he was dispossessed by Sindhia's French general Perron; in 1803 Hariana passed under British rule. On the conquest of the Punjab Hariana was broken up into the districts of Hissar, Rohtak and Sirsa, which last has in its turn been divided between Hissar and Ferozepore–

HARINGTON, SIR JOHN (1561–1612), English writer, was born at Kelston, near Bath, in 1561. His father, John Harington, acquired considerable estates by marrying Etheldreda, a natural daughter of Henry VIII., and after his wife's death he was attached to the service of the Princess Elizabeth. He married Isabella Markham, one of her ladies, and on Mary's accession he and his wife were imprisoned in the Tower with the princess. John, the son of the second marriage, was Elizabeth's godson. He studied at Eton and at Christ's College, Cambridge, where he took the degree of M.A., his tutor being John Still, afterwards bishop of Bath and Wells, formerly reputed to be the author of Gammer Gurton's Needle. He came up to London about 1583 and was entered at Lincoln's Inn, but his talents marked him out for success at court rather than for a legal career. Tradition relates that he translated the story of Giocondo from Ariosto and was reproved by the queen for acquainting her ladies with so indiscreet a selection. He was to retire to his seat at Kelston until he completed the translation of the entire work. Orlando Furioso in English heroical verse was published in 1591 and reprinted in 1607 and 1634. Harington was high sheriff of Somerset in 1392 and received Elizabeth at his house during her western progress of 1591. In 1596 he published in succession The Metamorphosis of Ajax, An Anatomie of the Metamorphosed Ajax, and Ulysses upon Ajax, the three forming collectively a very absurd and indecorous work of a Pantagruelistic kind. An allusion to Leicester in this book threw the writer into

temporary disgrace, but in 1598 he received a commission to serve in Ireland under Essex. He was knighted on the field, to the annoyance of Elizabeth. Harington saved himself from being involved in Essex's disgrace by writing an account of the Irish campaign which increased Elizabeth's anger against the unfortunate earl. Among some papers found in the chapter library at York was a Tract on the Succession to the Crown (1602), written by Harington to secure the favour of the new king, to whom he sent the gift of a lantern constructed to symbolize the waning glory of the late queen and James's own splendour. This pamphlet, which contains many details of great interest about Elizabeth and gives an unprejudiced sketch of the religious question, was edited for the Roxburghe Club in 1880 by Sir Clements Markham. Harington's efforts to win favour at the new court were unsuccess- ful. In 1605 he even asked for the office of chancellor of Ireland and proposed himself as archbishop. The document in which he preferred this extraordinary request was published in 1879 with the title of A Short View of the State of Ireland written in 1605. Harington was before his time in advocating a policy of generosity and conciliation towards that country. He eventually succeeded in obtaining a position as one of the tutors of Prince Henry, for whom he annotated Francis Godwin's De praesulibus Angliae. Harington's grandson, John Chetwind, found in this somewhat scandalous production an argument for the Presby- terian side, and published it in 1653, under the title of A Brief e ' View of the State of the Church, &c.

Harington died at Kelston on the 20th of November 1612. His Epigrams were printed in a collection entitled Alcilia in 1613, and separately in 1615. The translation of the Orlando Furioso was carried out with skill and perseverance. It is not to be supposed that Harington failed to realize the ironic quality of his original, but he treated it as a serious allegory to suit the temper of Queen Elizabeth's court. He was neither a very exact scholar nor a very poetical translator, and he

cannot be named in the same breath with Fairfax. The Orlando Furioso was sumptuously illustrated, and to it was prefixed an Apologie of Poetrie, justifying the subject matter of the poem, and, among other technical [matters, the author's use of disyllabic and trisyllabic rhymes, also a life of Ariosto compiled by Harington from various Italian sources. Harington's Rabelaisian pamphlets show that he was almost equally endowed with wit and indelicacy, and his epigrams are sometimes smart and always easy. His works include The Englishman's Doctor, Or the School of Salerne (1 608) , and Nugae antiquae, miscellaneous papers collected in 1 7 79.

A biographical account of Harington is prefixed to the Roxburghe Club edition of his tract on the succession mentioned above.

HARIRI— BARENESS; K.

953

QARlRl [Abu Mahommed ul-Qasim ibn 'Ali ibn Mahommed al-Hariri, i.e. " the manufacturer or seller of silk "] (1054-1122), Arabian writer, was born at Basra. He owned a large estate with 18,000 date-palms at Mashan, a village near Basra. He is said to have occupied a government position, but devoted his life to the study of the niceties of the Arabic language. On this subject he wrote a grammatical poem the Mulhat ul-Irdb (French trans. Les Recreations grammaticales with notes by L. Pinto, Paris 1885-1889; extracts in S. de Sacy's Anthologie arabe, pp. 145-151, Paris, 1829); a work on the faults of the educated called Durrat ul-Ghawwds (ed. H. Thorbecke, Leipzig, 1871), and some smaller treatises such as the two letters on words containing the letters sin and shin (ed. in Arnold's Chrestomathy, pp. 202-9). But his fame rests chiefly on his fifty maqamas (see Arabia: Literature, section "Belles Lettres "). These were written in rhymed prose like those of HamadhanI, and are full of allusions to Arabian history, poetry and tradition, and discussions of difficult points of Arabic grammar and rhetoric.

The Maqamas have been edited with Arabic commentary by S. de Sacy (Paris, 1822, 2nd ed. with French notes by Reinaud and J. Derenbourg, Paris, 1853); with English notes by F. Steingass (London, 1896). An English translation with notes was made by T. Preston (London, 1850), and another by T. Chenery and F. Steingass (London, 1867 and 1898). Many editions have been published in the East with commentaries, especially with that of Sharishi (d. 1222). . (G. W. T.)

HARI-RUD, a river of Afghanistan. It rises in the northern slopes of the Koh-i-Baba to the west of Kabul, and finally loses itself in the Tejend oasis north of the Trans-Caspian railway and west of Merv. It runs a remarkably straight course west- ward through a narrow trough from Daolatyar to Obeh, amidst the bleak wind-swept uplands of the highest central elevations in Afghanistan. From Obeh to Kuhsan 50 m. west of Herat, it forms a valley of great fertility, densely populated and highly cultivated; practically all its waters being drawn off for purposes of irrigation. It is the contrast between the cultivated aspect of the valley of Herat and the surrounding desert that has given Herat its great reputation for fertility. Three miles to the south of Herat the Kandahar road crosses the river by a masonry bridge of 26 arches now in ruins. A few miles below Herat the river begins to turn north-west, and after passing through a rich country to Kuhsan, it turns due north and breaks through the Paro- pamisan hills. Below Kuhsan it receives fresh tributaries from the west. Between Kuhsan and Zulfikar it forms the boundary between Afghanistan and Persia, and from Zulfikar to Sarakhs between Russia and Persia. North of Sarakhs it diminishes rapidly in volume till it is lost in the sands of the Turkman desert. The Hari-Rud marks the only important break existing in the continuity of the great central water-parting of Asia. It is the ancient Arius. (T. H. H.)*

HARISCHANDRA, in Hindu mythology, the 28th king of the Solar race. He was renowned for his piety and justice. He is the central figure of legends in the

Aitareyabrahmana, Maha- bharata and the Markandeyapurana. In the first he is repre- sented as so desirous of a son that he vows to Varuna that if his prayer is granted the boy shall be eventually sacrificed to the latter. The child is born, but Harischandra, after many delays, arranges to purchase another's son and make a vicarious sacrifice. According to the Mahabharata he is at last promoted to Paradise as the reward for his munificent charity.

HARITH IBN HILLIZA UL-YASHKURl, pre-Islamic Arabian poet of the tribe of Bakr, famous as the author of one of the poems generally received among the Mo 'allakdt (q.v.). Nothing is known of the details of his life.

HARIZI, JUDAH BEN SOLOMON (13th cent.), called also al-Harizi, a Spanish Hebrew poet and traveller. He translated., from the Arabic to Hebrew some of the works of Maimonides ■ (q.v.) and^lso of the Arab poet Hariri. His own most consider- able work was the Tahkemoni, composed between 1218 and 1220. This is written in Hebrew in unmetrical rhymes, in what is commonly termed " rhymed prose." It is a series of humorous episodes, witty verses, and quaint applications of Scriptural texts. The episodes are bound together by the presence of the

hero and of the narrator, who is also the author. Harizi not only brought to perfection the art of applying Hebrew to secular satire, but he was also a brilliant literary critic and his makame on the Andalusian Hebrew poets is a fruitful source of infor- mation.

See, on the Tahkemoni, Kaempf, Nicht-andalusische Poesie anda- lusischer Dichter (Prague, 1858). In that work a considerable section of the Tahkemoni is translated into German. (I. A.)

HARKNESS, ALBERT (1822-1907), American classical scholar, was born at Mendon, Massachusetts, on the 6th of October 1822. He graduated at Brown University in 1842, taught in the Pro- vidence high

school in 1843–1853, studied in Berlin, Bonn (where in 1854 he was the first American to receive the degree of Ph.D.) and Gottingen, and was professor of Greek language and literature in Brown University from 1855 to 1892, when he became professor emeritus. He was one of the founders in 1869 of the American Philological Association, of which he was president in 1875–1876, and to whose Transactions he made various contributions; was a member of the Archaeological Institute's committee on founding the American School of Classical Studies at Athens, and served as the second director of that school in 1883–1884. He studied English and German university methods during trips to Europe in 1870 and 1883, and introduced a new scholarly spirit into American teaching of Latin in secondary schools with a series of Latin text-books, which began in 1851 with a First Latin Book and continued for more than fifty years. His Latin Grammar (1864, 1881) and Complete Latin Grammar (1898) are his best-known books. He was a member of the board of fellows of Brown University from 1904 until his death, and in 1904–1905 was president of the Rhode Island Historical Society. He died in Providence, Rhode Island, on the 27th of May 1907.

His son, Albert Granger Harkness (1857–), also a classical scholar, was born in Providence, Rhode Island, on the 19th of November 1857. He graduated at Brown University in 1879, studied in Germany in 1879–1883, and was professor of German and Latin at Madison (now Colgate) University from 1883 to 1889, and associate professor of Latin at Brown from 1889 to 1893, when he was appointed to the chair of Roman literature and history there. He was director of the American School of Classical Studies in Rome in 1902–1903.

HARKNESS, ROBERT (1816–1878), English geologist, was born at Ormskirk, Lancashire, on the 28th of July 1816. He was educated at the high school, Dumfries, and afterwards (1833–1834) at the university of Edinburgh where he acquired an interest in geology from the teachings of Robert Jameson and J. D. Forbes. Returning to Ormskirk he worked zealously at

the local geology, especially on the Coal-measures and New Red Sandstone, his first paper (read before the Manchester Geol. Soc. in 1843) being on The Climate of the Coal Epoch. In 1848 his family went to reside in Dumfries and there he com- menced to work on the Silurian rocks of the S.W. of Scotland, and in 1849 he carried his investigations into Cumberland. In these regions during the next few years he added much to our knowledge of the strata and their fossils, especially grap- tolites, in papers read before the Geological Society of London. He wrote also on the New Red rocks of the north of England and Scotland. In 1853 he was appointed professor of geology in Queen's College, Cork, and in 1856 he was elected F.R.S. During this period he wrote some articles on the geology of parts of Ireland, and exercised much influence as a teacher, but he returned to England during his vacations and devoted himself assiduously to the geology of the Lake district. He was also a constant attendant at the meetings of the British Association. In 1876 the syllabus for the Queen's Colleges in Ireland was altered, and Professor Harkness was required to lecture not only on geology, palaeontology, mineralogy and physical geography, but also on zoology and botany. The strain of the extra work proved too much, he decided to relinquish his post, and had retired but a short time when he died, on the 4th of October

1878.

" Memoir," by J. G. Goodchild, in Trans. Cumberland Assoc. No.

viii. (with portrait). In memory of Professor Harkness his sister established two Harkness scholarships. One scholarship (of the value of about £35 a year, tenable for three years) for women, tenable at either Girton or Newnham College, Cambridge, is awarded triennially to the best

candidate in an examination in geology and palaeontology, provided that proficiency be shown; the other, for men, is vested in the hands of the university of Cambridge, and is awarded annually, any member of the university being eligible who has graduated as a B.A., " provided that not more than three years have elapsed since the 19th day of December next following his final examination for the degree of bachelor of arts."

HARLAN, JAMES (1820–1899), American politician, was born in Clark county, Illinois, on the 26th of August 1820. He graduated from Indiana Asbury (now De Pauw) University in 1845, was president (1846–1847) of the newly founded and short-lived Iowa City College, studied law, was first super- intendent of public instruction in Iowa in 1847–1848, and was president of Iowa Wesleyan University in 1853–1855. He took a prominent part in organizing the Republican party in Iowa, and was a member of the United States Senate from 1855 to 1865, when he became secretary of the interior. He had been a delegate to the peace convention in 1861, and from 1861 to 1865 was chairman of the Senate committee on public lands. He disapproved of President Johnson's conservative reconstruc- tion policy, retired from the cabinet in August 1866, and from 1867 to 1873 was again a member of the United States Senate. In 1866 he was a delegate to the loyalists' convention at Phila- delphia. One of his principal speeches in the Senate was that which he made in March 1871 in reply to Sumner's and Schurz's attack on President Grant's Santo Domingan policy. He was presiding judge of the court of commissioners of Alabama claims (1882–1885). He died in Mount Pleasant, Iowa, on the 5th of October 1899.

HARLAN, JOHN MARSHALL (1833–), American jurist, was born in Boyle county, Kentucky, on the 1st of June 1833. He graduated at Centre College, Danville, Ky., in 1850, and at the law department of Transylvania University, Lexington, in 1853. He was county judge of Franklin county in 1858–1859, was an unsuccessful candidate for Congress on the Whig ticket in 1859, and was elector on the Constitutional Union ticket

in i860. On the outbreak of the Civil War he recruited and organized the Tenth Kentucky United States Volunteer Infantry, and in 1861–1863 served as colonel. Retiring from the army in 1863, he was elected by the Union party attorney-general of the state, and was re-elected in 1865, serving from 1863 to 1867, when he removed to Louisville to practise law. He was the Republican candidate for governor in 1871 and in 1875, and was a member of the commission which was appointed by President Hayes early in 1877 to accomplish the recog- nition of one or other of the existing state governments of Louisiana (q.v.); and he was a member of the Bering Sea tribunal which met in Paris in 1893. On the 29th of November 1877 he became an associate justice of the United States Supreme Court. In this position he showed himself a liberal construc- tionist. In opinions on the Civil Rights cases and in the inter- pretation of the 13th, 14th and 15th Amendments to the Constitution, he dissented from the majority of the court and advocated increasing the power of the Federal government. He supported the constitutionality of the income tax clause in the Wilson Tariff Bill of 1894, and he drafted the decision of the court in the Northern Securities Company Case, which applied to railways the provisions of the Sherman Anti-Trust Law. In 1889 he became a professor in the Law School of the Columbian University (afterwards George Washington University) in Washington, D.C.

HARLAND, HENRY (1861–1905), American novelist, was born in St Petersburg, Russia, in March 1861, and was educated in New York and at Harvard. He went to Europe as a journalist, and, after publishing several novels, mainly of American-Jewish life (under the name of Sidney Luska), first made his literary reputation in London as editor of the Yellow Book in 1894. His association with this clever publication, and his own con- tributions to it, brought his name into prominence, but it was not till he published The Cardinal's Snuff-box (1900), followed

by The Lady Paramount (1902), that his lightly humorous touch and picturesque style as a novelist

brought him any real success. His health was always delicate, and he died at San Remo on the 20th of December 1905.

HARLAY DE CHAMPVALLON, FRANQOIS DE (1625-1695),

5th archbishop of Paris, was born in that city on the 14th of

August 1625. Nephew of Francois de Harlay, archbishop of

Rouen, he was presented to the abbey of Jumieges immediately

on leaving the College de Navarre, and he was only twenty-six

when he succeeded his uncle in the archiepiscopal see. He was

transferred to the see of Paris in 1671, he was nominated by the

king for the cardinalate in 1690, and the domain of St Cloud was

erected into a duchy in his favour. He was commander of the

order of the Saint Esprit and a member of the French Academy.

During the early part of his political career he was a firm adherent

of Mazarin, and is said to have helped to procure his return from

exile. His private life gave rise to much scandal, but he had

a great capacity for business, considerable learning, and was an

eloquent and persuasive speaker. He definitely secured the

favour of Louis XIV. by his support of the claims of the Gallican

Church formulated by the declaration made by the clergy in

assembly on the 19th of March 1682, when Bossuet accused him

of truckling to the court like a valet. One of the three witnesses

of the king's marriage with Madame de Maintenon, he was hated

by her for using his influence with the king to keep the matter

secret. He had a weekly audience of Louis XIV. in company

with Pere la Chaise on the affairs of the Church in Paris, but his

influence gradually declined, and Saint-Simon, who bore him no

good will for his harsh attitude to the Jansenists. says that his

friends deserted him as the royal favour waned, until at last

most of his time was spent at Conflans in company with the

duchess of Lesdiguieres, who alone was faithful to him. He

urged the revocation of the edict of Nantes, and showed great

severity to the Huguenots at Dieppe, of which he was temporal

and spiritual lord. He died suddenly, without having received

the sacraments, on the 6th of August 1695. His funeral discourse

was delivered by the Pere Gaillard, and Mme de Sevigne made

on the occasion the severe comment that there were only two

trifles to make this a difficult matter — his life and his death.

_ See Abb6 Legendre, Vita Francisci de Harlay (Paris, 1720) and Eloge de Harlay (1695) ; Saint-Simon, Memoires (vol. ii., ed. A. de Boislisle, 1879), and numerous references in the Lettres of Mme de Sevignfi.

HARLECH (perhaps for Hardd lech, fair slate, or Harleigh, an

Anglicized variant), a town of Merionethshire, Wales, 38 m.

from Aberystwyth, and 29 from Carnarvon on the Cambrian

railway. Pop. 900. Ruins of a fortress crown the rock of

Harlech, about half a mile from the sea. Discovery of Roman

coins makes it probable that it was once occupied by the Romans.

In the 3rd century Bronwen (white bosom), daughter of Bran

Fendigaid (the blessed), is said to have stayed here, perhaps

by force; and there was here a tower, called Twr Bronwen,

and replaced about a.d. 550 by the building of Maelgwyn

Gwynedd, prince of North Wales. In the early 10th century,

Harlech castle was, apparently, repaired by Colwyn, lord of

Ardudwy, founder of one of the fifteen North Wales tribes, and

thence called Caer Colwyn. The present structure dates, like

many others in the principality, from Edward I., perhaps even

from the plans of the architect of Carnarvon and Conway castles,

but with the retention of old portions. It is thought to have

been square, each side measuring some 210 ft., with towers and

turrets. Glendower held it for four years. Here, in 1460,

Margaret, wife of Henry VI., defeated at Northampton, took

refuge. Dafydd ap Ieuan ap Einion held it for the Lancastrians,

until famine, rather than Edward IV., made him surrender.

From this time is said to date the air ” March of the men of

Harlech ‘ ‘ (Rhyfelgerdd gwyr Harlech) . The castle was alternately

Roundhead and Cavalier in the civil war. Edward I. made

Harlech a free borough, and it was formerly the county town.

It is in the parish of Llandanwg (pop. in 1901, 931). Though

interesting from an antiquarian point of view, the district around,

especially Dyffryn Ardudwy (the valley), is dreary and desolate,

e.g. Drws (the door of) Ardudwy, Rhinog fawr and Rhinog fach (cliffs) ; an exception is the verdant Cwm bychan (little combe or hollow). The Meini gwyr Ardudwy (stones of the men of Ardudwy) possibly mark the site of a fight.

HARLEQUIN, in modern pantomime, the posturing and acrobatic character who gives his name to the " harlequinade," attired in mask and parti-coloured and spangled tights, and provided with a sword like a bat, by which, himself invisible, he works wonders. It has generally been assumed that Harlequin was transferred to France from the "Arlecchino" of Italian medieval and Renaissance popular comedy; but Dr Driesen in his Ur sprung des Harlekins (Berlin, 1904) shows that this is incorrect. An old French " Harlekin " (Herlekin, Hellequin and other variants) is found in folk-literature as early as 1100; he had already become proverbial as a ragamuffin of a demoniacal appearance and character; in 1262 a number of harlekins appear in a play by Adam de la Halle as the intermediaries of King Hellekin, prince of Fairyland, in courting Morgan le Fay; and it was not till much later that the French Harlekin was transformed into the Italian Arlecchino. In his typical French form down to the time of Gottsched, he was a spirit of the air, deriving thence his invisibility and his characteristically light and aery whirlings. Subsequently he returned from the Italian to the French stage, being imported by Marivaux into light comedy; and his various

attributes gradually became amal- gamated into the latter form taken in pantomime.

HARLESS (originally Harles), GOTTLIEB CHRISTOPH (1 7 3 8- 1 8 1 5), German classical scholar and bibliographer, was born at Culmbach in Bavaria on the 2 1st of June 1738. He studied at Halle, Erlangen and Jena. In 1765 he was appointed professor of oriental languages and eloquence at the GymnasiumCasimirianum in Coburg, in 17 70 professor of poetry and eloquence at Erlangen, and in 1 7 76 librarian of the university. He held his professorship for forty-five years till his death on the 2nd of November 1815. Harless was an extremely prolific writer. His numerous editions of classical authors, deficient in originality and critical judgment, although valuable at the time as giving the student the results of the labours of earlier scholars, are now entirely superseded. But he will always be remembered for his meritorious work in connexion with the great Bibliotheca Graeca of J. A. Fabricius, of which he published a new and revised edition (12 vols., 1790- 1809, not quite completed), — a task for which he was peculiarly qualified. He also wrote much on the history and bibliography of Greek and Latin literature.

His life was written by his son, Johann Christian Friedrich Harless

(1818).

HARLESS, GOTTLIEB CHRISTOPH ADOLF VON (1806- 1879), German divine, was born at Nuremberg on the 21st of November 1806, and was educated at the universities of Erlangen and Halle. . He was appointed professor of theology at Erlangen in 1836 and at Leipzig in 1845. He was a strong Lutheran and exercised a powerful influence in that direction as court preacher in Dresden and as president of the Protestant consistory at Munich. His chief works were Theologischc Encyklopddie und Methodologie (1837) and Die christliche Ethik (1842, Eng. trans. 1868). He died on the 5th of September 1879, having, a few years earlier, written an autobiography under

the title Bruch- sliicke aus dem Leben eines siiddeulschen Theologen.

HARLINGEN, a seaport in the province of Friesland, Holland, on the Zuider Zee, and the terminus of the railway and canal from Leeuwarden (1 5! m. E.). It is connected by steam tramway by way of Bolswaard with Sneek. Pop. (1900) 10,448. Har- lingen has become the most considerable seaport of Friesland since the construction of the large outer harbour in 1870-1877, and in addition to railway and steamship connexion with Bremen, Amsterdam, and the southern provinces there are regular sailings to Hull and London. Powerful sluices protect the inner harbour from the high tides. The only noteworthy buildings are the town hall (1730-1733), the West church, which consists of a part of the former castle of Harlingen, the Roman Catholic church, the Jewish synagogue and the schools of navigation and of design. The chief trade of Harlingen is the

exportation of Frisian produce, namely, butter and cheese, cattle, sheep, fish, potatoes, flax, &c. There is also a considerable import trade in timber, coal, raw cotton, hemp and jute for the Twente factories. The local industries are unimportant, con- sisting of saw-mills, rope-yards, salt refineries, and sail-cloth and margarine factories.

HARMATTAN, the name of a hot dry parching wind that blows during December, January and February on the coast of Upper Guinea, bringing a high dense haze of red dust which darkens the air. The natives smear their bodies with oil or fat while this parching wind is blowing.

HARMODIUS, a handsome Athenian youth, and the intimate friend of Aristogeiton. Hipparchus, the younger brother of the tyrant Hippias, endeavoured to supplant Aristogeiton in the good graces of Harmodius, but, failing in the attempt, revenged himself by putting a public affront on Harmodius's sister at a solemn festival. Thereupon the two friends conspired with a few others to murder both the tyrants during the armed procession at the

Panathenaic festival (514 B.C.), when the people were allowed to carry arms (this licence is denied by Aristotle in Ath. Pol.). Seeing one of their accomplices speaking to Hippias, and imagining that they were being betrayed, they prematurely attacked and slew Hipparchus alone. Harmodius was cut down on the spot by the guards, and Aristogeiton was soon captured and tortured to death. When Hippias was expelled (510), Harmodius and Aristogeiton became the most popular of Athenian heroes; their descendants were exempted from public burdens, and had the right of public entertainment in the Prytaneum, and their names were celebrated in popular songs and scolia (after-dinner songs) as the deliverers of Athens. One of these songs, attributed to a certain Callistratus, is preserved in Athenaeus (p. 695). Their statues by Antenor in the agora were carried off by Xerxes and replaced by new ones by Critius and Nesiotes. Alexander the Great afterwards sent back the originals to Athens. It is not agreed which of these was the original of the marble tyrannicide group in the museum at Naples, for which see article Greek Art, PL I. fig. 50. See Kopp in Neue Jahrb. f. Mass. Altert. (1902), p. 609.

HARMONIA, in Greek mythology, according to one account the daughter of Ares and Aphrodite, and wife of Cadmus. When the government of Thebes was bestowed upon Cadmus by Athena, Zeus gave him Harmonia to wife. All the gods honoured the wedding with their presence. Cadmus (or one of the gods) presented the bride with a robe and necklace, the work of Hephaestus. This necklace brought misfortune to all who possessed it. With it Polyneices bribed Eriphyle to persuade her husband Amphiaraus to undertake the expedition against Thebes. It led to the death of Eriphyle, of Alcmaeon, of Phegeus and his sons. Even after it had been deposited in the temple of Athena Pronoia at Delphi, its baleful influence continued. Phayllus, one of the Phocian leaders in the Sacred War (352 B.C.) carried it off and gave it to his mistress. After she had worn it for a time, her son was seized with madness and set fire to the house, and she perished in the flames. According to another account, Harmonia belonged to

Samothrace and was the daughter of Zeus and Electra, her brother Iasion being the founder of the mystic rites celebrated on the island (Diod. Sic. v. 48). Finally, Harmonia is rationalized as closely allied to Aphrodite Pandemos, the love that unites all people, the personification of order and civic unity, corresponding to the Roman Concordia.

Apollodorus iii. 4–7; Diod. Sic. iv. 65, 66; Parthenius, Erotica, 25 ; L. Preller, Griech. Mythol. ; Crusius in Roscher's Lexikon.

HARMONIC. In acoustics, a harmonic is a secondary tone which accompanies the fundamental or primary tone of a vibrat- ing string, reed, &c; the more important are the 3rd, 5th, 7th, and octave (see Sound; Harmony). A harmonic proportion in arithmetic arid algebra is such that the reciprocals of the proportionals are in arithmetical proportion; thus, if a, b, c be in harmonic proportion then 1/0, ifb, i/c are in arithmetical proportion; this leads to the relation 2/& = ac/(a+c)- A har- monic progression or series consists of terms whose reciprocals form an arithmetical progression; the simplest example is:

i + 2 + I + z + • • ■ (see Algebra and Arithmetic). The occur- rence of a similar proportion between segments of lines is the foundation of such phrases as harmonic section, harmonic ratio, harmonic conjugates, &c. (see Geometry: II. Projective). The connexion between acoustical and mathematical harmonicals is most probably to be found in the Pythagorean discovery that a vibrating string when stopped at § and f of its length yielded the octave and 5th of the original tone, the numbers, 1 |, 5 being said to be, probably first by Archytas, in harmonic pro- portion. The mathematical investigation of the form of a vibrating string led to such phrases as harmonic curve, har- monic motion, harmonic function, harmonic analysis, &c.

(see Mechanics and Spherical Harmonics).

HARMONICA, a generic term applied to musical instruments in which sound is produced by friction upon glass bells. The word is also used to designate instruments of percussion of the Glockenspiel type, made of steel and struck by hammers (Ger. Stahlharmonika) .

The origin of the glass-harmonica tribe is to be found in the fashionable 18th century instrument known as musical glasses (Fr. verrillon), the principle of which was known already in the 17th century. 1 The invention of musicai glasses is generally ascribed to an Irishman, Richard Pockrich, who first played the instrument in public in Dublin in 1743 and the next year in England, but Eisel 2 described the verrillon and gave an illustra- tion of it in 1738. The verrillon or Glassspiel consisted of 18 beer glasses arranged on a board covered with cloth, water being poured in when necessary to alter the pitch. The glasses were struck on both sides gently with two long wooden sticks in the shape of a spoon, the bowl being covered with silk or cloth. Eisel states that the instrument was used for church and other solemn music. Gluck gave a concert at the " little theatre in the Haymarket " (London) in April 1746, at which he performed on musical glasses a concerto of his composition with full orchestral accompaniment. E. H. Delaval is also credited with the invention. When Benjamin Franklin visited London in 1757, he was so much struck by the beauty of tone elicited by Delaval and Pockrich, and with the possibilities of the glasses as musical instruments, that he set to work on a mechanical application of the principle involved, the eminently successful result being the glass harmonica finished in 1762. In this the glass bowls were mounted on a rotating spindle, the largest to the left, and their under-edges passed during each revolution through a water-trough. By applying the fingers to the moistened edges, sound was produced varying in intensity with the pressure, so that a certain amount of expression was at the command of a good player. It is said that the timbre was extremely enervat- ing, and, together

with the vibration caused by the friction on the finger-tips, exercised a highly deleterious effect on the nervous system. The instrument was for many years in great vogue, not only in England but on the Continent of Europe, and more especially in Saxony, where it was accorded a place in the court orchestra. Mozart, Beethoven, Naumann and Hasse composed music for it. Marianne Davies and Marianna Kirchgessner were celebrated virtuosi on it. The curious vogue of the instru- ment, as sudden as it was ephemeral, produced emulation in a generation unsurpassed for zeal in the invention of musical instruments. The most notable of its offspring were Carl Leopold Rollig's improved harmonica with a keyboard in 1786, Chladni's euphon in 1791 and clavicylinder in 1799, Ruffelsen's melodicon in 1800 and 1803, Franz Leppich's panmelodicon 1810, Buschmann's uranion in the same year, &c. Of most of these nothing now remains but the name and a description in the Allgemeine musikalische Zeilung, but there are numerous- specimens of the Franklin type in the museums for musical 'instruments of Europe. One specimen by Emanuel Pohl, a Bohemian maker, is preserved in the Victoria and Albert Museum, London.

For the steel harmonica see Glockenspiel. (K. S.)

1 See G. P. Harsdorfer, Math, und philos. Erquickstunden (Nurem- berg, 1677), ii. 147.

- Musicu? ni-roSlSaKTos (Erfurt, 1738), p. 70.

HARMONIC ANALYSIS, in mathematics, the name given by Sir William Thomson (Lord Kelvin) and P. G. Tait in their treatise on Natural Philosophy to a general method of investigat- ing physical questions, the earliest applications of which seem to have been suggested by the study of the vibrations of strings and the analysis of these vibrations into their fundamental tone and its harmonics or overtones.

The motion of a uniform stretched string fixed at both ends is a periodic motion; that is to say, after a certain interval of time, called the

fundamental period of the motion, the form of the string and the velocity of every part of it are the same as before, provided that the energy of the motion has not been sensibly dissipated during the period.

There are two distinct methods of investigating the motion of a uniform stretched string. One of these may be called the wave method, and the other the harmonic method. The wave method is founded on the theorem that in a stretched string of infinite length a wave of any form may be propagated in either direction with a certain velocity, V, which we may define as the " velocity of propagation." If a wave of any form travelling in the positive direction meets another travelling in the opposite direction, the form of which is such that the lines joining corresponding points of the two waves are all bisected in a fixed point in the line of the string, then the point of the string corresponding to this point will remain fixed, while the two waves pass it in opposite directions. If we now suppose that the form of the waves travelling in the positive direction is periodic, that is to say, that after the wave has travelled forward a distance /, the position of every particle of the string is the same as it was at first, then / is called the wave-length, and the time of travelling a wave-length is called the periodic time, which we shall denote by T, so that / = VT.

If we now suppose a set of waves similar to these, but reversed in position, to be travelling in the opposite direction, there will be a series of points, distant 5/ from each other, at which there will be no motion of the string; it will therefore make no difference to the motion of the string if we suppose the string fastened to fixed supports at any two of these points, and we may then suppose the parts of the string beyond these points to be removed, as it cannot affect the motion of the part which is between them. We have thus arrived at the case of a uniform string stretched between two fixed supports, and we conclude that the motion of the string may be completely represented as the

resultant of two sets of periodic waves travelling in opposite directions, their wave-lengths being either twice the distance between the fixed points or a submultiple of this wave-length, and the form of these waves, subject to this condition, being perfectly arbitrary.

To make the problem a definite one, we may suppose the initial displacement and velocity of every particle of the string given in terms of its distance from one end of the string, and from these data it is easy to calculate the form which is common to all the travelling waves. The form of the string at any subsequent time may then be deduced by calculating the positions of the two sets of waves at that time, and compounding their displacements.

Thus in the wave method the actual motion of the string; is con- sidered as the resultant of two wave motions, neither of which is of itself, and without the other, consistent with the condition that the ends of the string are fixed. Each of the wave motions is periodic with a wave-length equal to twice the distance between the fixed points, and the one set of waves is the reverse of the other in respect of displacement and velocity and direction of propagation; but, subject to these conditions, the form of the wave is perfectly arbitrary. The motion of a particle of the string, being determined by the two waves which pass over it in opposite directions, is of an equally arbitrary type.

In the harmonic method, on the other hand, the motion of the string is regarded as compounded of a series of vibratory motions (normal modes of vibration), which may be infinite in number, but each of which is perfectly definite in type, and is in fact a particular solution of the problem of the motion of a string with its ends fixed.

A simple harmonic motion is thus defined by Thomson and Tait (§ 53) : — When a point Q moves uniformly in a circle, the perpen- dicular QP, drawn from its position at any instant to a fixed diameter AA′ of the circle, intersects the diameter in a point P

whose position changes by a simple harmonic motion.

The amplitude of a simple harmonic motion is the range on one side or the other of the middle point of the course.

The period of a simple harmonic motion is the time which elapses from any instant until the moving-point again moves in the same direction through the same position.

The phase of a simple harmonic motion at any instant is the fraction of the whole period which has elapsed since the moving- point last passed through its middle position in the positive direction.

In the case of the stretched string, it is only in certain particular cases that the motion of a particle of the string is a simple harmonic motion. In these particular cases the form of the string at any instant is that of a curve of sines having the line joining the fixed

points for its axis, and passing through these two points, and there- fore having for its wave-length either twice the length of the string or some submultiple of this wave-length. The amplitude of the curve of sines is a simple harmonic function of the time, the period being either the fundamental period or some submultiple of the fundamental period. Every one of these modes of vibration is dynamically possible by itself, and any number of them may coexist independently of each other.

By a proper adjustment of the initial amplitude and phase of each of these modes of vibration, so that their resultant shall repre- sent the initial state of the string, we obtain a new representation of the whole motion of the string, in which it is seen to be the resultant of a series of simple harmonic vibrations whose periods are the fundamental period and its submultiples. The determination of the

amplitudes and phases of the several simple harmonic vibrations so as to satisfy the initial conditions is an example of harmonic analysis.

We have thus two methods of solving the partial differential equation of the motion of a string. The first, which we have called the wave method, exhibits the solution in the form containing an arbitrary function, the nature of which must be determined from the initial conditions. The second, or harmonic method, leads to a series of terms involving sines and cosines, the coefficients of which have to be determined. The harmonic method may be defined in a more general manner as a method by which the solution of any actual problem may be obtained as the sum or resultant of a number of terms, each of which is a solution of a particular case of the problem. The nature of these particular cases is defined by the condition that any one of them must be conjugate to any other.

The mathematical test of conjugacy is that the energy of the system arising from two of the harmonics existing' together is equal to the sum of the energy arising from the two harmonics taken separately. In other words, no part of the energy depends on the product of the amplitudes of two different harmonics. When two modes of motion of the same system are conjugate to each other, the existence of one of them does not affect the other.

The simplest case of harmonic analysis, that of which the treat- ment of the vibrating string is an example, is completely investigated in what is known as Fourier's theorem.

Fourier's theorem asserts that any periodic function of a single variable period p, which does not become infinite at any phase, can be expanded in the form of a series consisting of a constant term, together with a double series of terms, one set involving cosines and the other sines of multiples of the phase.

Thus if 0(£) is a periodic function of the 'variable

£ having a period p, then it may be expanded as follows:

0(0 = Ao+S * Aicos^+s] Bisin^.

(i)

where the periods 2jr/rei-, 2v/tti, . . . of the various simple-harmonic constituents are aheady known with sufficient accuracy, although they may have no very simple relations to one another. The problem of determining the most probable values of the constants Ao, Ai, Bi, A2, B2, ... by means of a series of recorded values of the function f(t) is then in principle a fairly simple one, although the actual numerical work may be laborious (see Tide). A much more difficult and delicate question arises when, as in various questions of meteorology and terrestrial magnetism, the periods 27r/»i, 2!r/»2, . . . are themselves unknown to begin with, or are at most conjectural. Thus, it may be desired to ascertain whether the magnetic declination contains a periodic element synchronous with the sun's rotation on its axis, whether any periodicities can be detected in the records of the prevalence of sun-spots, and so on. From a strictly mathematical standpoint the problem is, indeed, indeterminate, for when all the symbols are at our disposal, the representation of the observed values of a function, over a finite range of time, by means of a series of the type (2), can be effected in an infinite variety of ways. Plausible inferences can, however, be drawn, provided the proper precautions are observed. This question has been treated most systematically by Professor A. Schuster, who has devised a remarkable mathematical method, in which the action of a diffraction-grating in sorting out the various periodic constituents of a heterogeneous beam of light is closely imitated. He has further applied the method to the study of the variations of the magnetic declination, and of sun-spot records.

The question so far chiefly considered has been that of the repre^ sentation of an arbitrary function of the time in terms of functions of a special type,

viz. the circular functions cos nt, sin nt. This is important on dynamical grounds; but when we proceed to consider the problem of expressing an arbitrary function of space-co-ordinates in terms of functions of specified types, it appears that the preceding is only one out of an infinite variety of modes of representation which are equally entitled to consideration. Every problem of mathematical physics which leads to a linear differential equation supplies an instance. For purposes of illustration we will here take the simplest of all, viz. that of the transversal vibrations of a tense string. The equation of motion is of the form

The part of the theorem which is most frequently required, and which also is the easiest to investigate, is the determination of the values of the coefficients Ao, Ai, Bi. These are

A. = ^**(£)« ! Ai =!J%(0cos2H!d£; Bi =|jV)sin?.j%

This part of the theorem may be verified at once by multiplying both sides of (1) by d£, by cos (2i7r£/p)/d£ or by sin (2iir£/p))/d£, and in each case integrating from o to p.

The series is evidently single-valued for any given value of £. It cannot therefore represent a function of £ which has more than one value, or which becomes imaginary for any value of £. It is convergent, approaching to the true value of c£(£) for all values of £ such that if £ varies infinitesimally the function also varies infinitesimally.

Lord Kelvin, availing himself of the disk, globe and cylinder integrating machine invented by his brother, Professor James Thomson, constructed a machine by which eight of the integrals required for the expression of Fourier's series can be obtained simul- taneously from the recorded trace of any periodically variable quantity, such as the height of the tide, the temperature or pressure of the atmosphere, or the intensity of the different components of terrestrial magnetism. If it were not on account of the waste of time, instead of having a

curve drawn by the action of the tide, and the curve afterwards acted on by the machine, the time axis of the machine itself might be driven by a clock, and the tide itself might work the second variable of the machine, but this would in- volve the constant presence of an expensive machine at every tidal station. . (J. C. M.)

For a discussion of the restrictions under which the expansion of a periodic function of £ in the form (1) is valid, see Fourier's Series. An account of the contrivances for mechanical calcula- tion of the coefficients Ai, Bj . . . is given under Calculating Machines.

A more general form of the problem of harmonic analysis presents itself in astronomy, in the theory of the tides, and in various magnetic and meteorological investigations. It may happen, for instance, that a variable quantity /(/) is known theoretically to be of the form

f(t) =A<,+AiCosnit+Bisinnit+AiCosnrf+B2SMnit+ ... (2)

d 2 y

where T is the tension, and p the line-density, of vibration y will vary as e int , so that

(3)

In a " normal mode "

(4)

where &=n* P IT. (5)

If p, and therefore k, is constant, the solution of (4) subject to the condition that y = o for x = o and x=l is

y = B sin kx (6)

provided kl=sr, [s = i, 2, 3, . . .]. (7)

This determines the various normal modes of free vibration, the corre- sponding periods (2-ir/n) being given by (5) and (7). By analogy with the theory of the free vibrations of a system of finite freedom it is inferred that the most general free motions of the string can be obtained by superposition of the various normal modes, with suitable amplitudes and phases ; and in particular that any arbitrary initial form of the string, say y=f(x), can be reproduced by a series of the type

,, , t, . irX . ~ . 2irx . t, . $irx . }{x) =BiSin- j-+B 2 sin— 7 — (Basing — (. .

(8)

So far, this is merely a restatement, in mathematical language, of an argument given in the first part of this article. The series (8) may, moreover, be arrived at otherwise, as a particular case of Fourier's theorem. But if we no longer assume the density p of the string to be uniform, we obtain an endless variety of new expansions, corresponding to the various laws of density which may be pre- scribed. The normal modes are in any case of the type

= Cu{x)e int

(9)

where u is a solution of the equation

W+T u=0 - (10)

The condition that u{x) is to vanish for x — o and x — 1 leads to a transcendental equation in n (corresponding to sin £/=o in the previous case). If the forms of u(x) which correspond to the various roots of this be distinguished by suffixes, we infer, on physical grounds alone, the possibility of the expansion of an arbitrary initial form of the string in a series

f(x)=C 1 u 1 (x)+C 2 u i (x)+C 3 u 3 (x) + . . . (11)

It may be shown further that if r and s are different we have the conjugate or orthogonal relation

Jo

pUr{x)U,(x)dx =

(12)

95 8

HARMONICHORD— HARMONIUM

This enables us to determine the coefficients, thus

C,= I pf(x)Ur(x)dx-i- (p{Ur(x)} 2 dx. (13)

Jo Jo

The extension to spaces of two or three dimensions, or to cases where there is more than one dependent variable, must be passed over. The mathematical theories of acoustics, heat-conduction, elasticity, induction of electric currents, and so on, furnish an in- definite supply of examples, and have suggested in some cases methods which have a very wide application. Thus the transverse vibrations of a circular membrane lead to the theory of Bessel's Functions; the oscillations of a spherical sheet of air suggest the theory of expansions in spherical harmonics, and so forth. The

Chysical, or intuitional, theory of such methods has naturally always een in advance of the mathematical. From the latter point of view only a few isolated questions of the kind had, until quite recently, been treated in a rigorous and satisfactory manner. A more general and comprehensive method, which seems to derive some of its inspiration from physical considerations, has, however, at length been inaugurated, and has been vigorously cultivated in recent years by D. Hilbert, H. Poincare, I. Fredholm, E. Picard and others.

References. — Schuster's method for detecting hidden

periodi- cities is explained in Terrestrial Magnetism (Chicago, 1898), 3, p. 13; Camb. Trans. (1900), 18, p. 107; Proc. Roy. Soc. (1906), 77, p. 136. The general question of expanding an arbitrary function in a series of functions of special types is treated most fully from the physical point of view in Lord Rayleigh's Theory of Sound (2nd ed., London, 1 894- 1 896). An excellent detailed historical account of the matter from the mathematical side is given by H. Burkhardt, Entwicklungen nach oscillierenden Funktionen (Leipzig, 1901). A sketch of the more recent mathematical developments is given by H. Bateman, Proc. Land. Math. Soc. (2), 4, p. 90, with copious references.

(H. Lb.)

HARMONICHORD, an ingenious kind of upright piano, in which the strings were set in vibration not by the blow of the hammer but by indirectly transmitted friction. The harmoni- chord, one of the many attempts to fuse piano and violin, was invented by Johann Gottfried and Johann Friedrich Kaufmann (father and son) in Saxony at the beginning of the 19th century, when the craze for new and ingenious musical instruments was at its height. The case was of the variety known as giraffe. The space under the keyboard was enclosed, a knee-hold being left in which were two pedals used to set in rotation a large wooden cylinder fixed just behind the keyboard over the levers, and covered with a roll-top similar to those of modern office desks. The cylinder (in some specimens covered with chamois leather) tapered towards the treble-end. When a key was depressed, a little tongue of wood, one end of which stopped the string, was pressed against the revolving cylinder, and the vibrations produced by friction were transmitted to the string and reinforced as in piano and violin by the soundboard. The adjustment of the parts and the velocity of the cylinder required delicacy and great nicety, for if the little wooden tongues rested too lightly upon the cylinder or the strings, harmonics were produced, and the note jumped to the octave or twelfth. Some- times when

chords were played the touch became so heavy that two performers were required, as in the early medieval organ- istrum, the prototype of the harmonichord. Carl Maria von Weber must have had some opinion of the possibilities of the harmonichord, which in tone resembled the glass harmonica, since he composed for it a concerto with orchestral accom- paniment. (K. S.)

HARMONIUM (Fr. harmonium, orgue expressif; Ger. Phys- harmonika, Harmonium), a wind keyboard instrument, a small organ without pipes, furnished with free reeds. Both the harmonium and its later development, the American organ, are known as free-reed instruments, the musical tones being produced by tongues of brass, technically termed " vibrators " (Fr. anche litre; Ger. dtirchschlagende Zunge; Ital. ancia or lingua . libera). The vibrator is fixed over an oblong, rectangular frame, through which it swings freely backwards and forwards like a pendulum while vibrating, whereas the beating reeds (similar to those of the clarinet family), used in church organs, cover the entire orifice, beating against the sides at each vibration. A reed or vibrator, set in periodic motion by impact of a current of air, produces a corresponding successi<^» of air puffs, the

rapidity of which determines the pitch of the musical note. There is an essential difference between the harmonium and the American organ in the direction of this current; in the former the wind apparatus forces the current upwards, and in the latter sucks it downwards, whence it becomes desirable to separate in description these varieties of free-reed instruments.

The harmonium has a keyboard of five octaves compass when

:g: 8va.

complete, ^f =

and a simple action controlling the

valves, &c. The necessary pressure of wind is generated by bellows worked by the feet of the performer upon foot-boards or treadles. The air is thus forced up the wind-trunks into an air-chamber called the wind-chest, the pressure of it being equalized by a reservoir, which receives the excess of wind through an aperture, and permits escape, when above a certain pressure, by a discharge valve or pallet. The aperture admitting air to the reservoir may be closed by a drawstop named " expression." The air being thus cut off, the performer depends for his supply entirely upon the management of the bellows worked by the treadles, whereby he regulates the compression of the wind. The character of the in- strument is then entirely changed from a mechanical response to the player's touch to an expressive one, rendering what emotion may be communicated from the player by increase or diminution of sound through the greater or less pressure of wind to which the reeds may be submitted. The drawstops bearing the names of the different registers in imitation of the organ, admit, when drawn, the wind from the wind-chest to the corresponding reed compartments, shutting them off when closed. These com- partments are of about two octaves and a half each, there being a division in the middle of the keyboard scale dividing the stops into bass and treble. A stop being drawn and a key pressed down, wind is admitted by a corresponding valve to a reed or vibrator (fig. 1). Above each reed in the so-called sound-board or pan is a channel, a small air- chamber or cavity, the shape and capacity of which have greatly to do with the colour of tone of the note it reinforces. The air in this resonator is highly compressed at an even or a varying pressure as the expression-stop may not be or may be drawn. The wind finally escapes by a small pallet-hole opened by pressing down the corresponding key. In Mustel and other good harmoniums, the reed compartments that form the scheme of the instrument are eight in number, four bass and four treble, of three different pitches of octave and double octave distance. The front bass and treble rows are the " diapason " of the pitch

known as 8 ft., and the bourdon (double diapason), 16 ft. These may be regarded as the foundation stops, and are technically the front organ. The back organ has solo and combination stops, the principal of 4 ft. (octave higher than diapason), and bassoon (bass) and oboe (treble), 8 ft. These may be mechanically combined by a stop called full organ. The French maker, Mustel, added other registers for much-admired effects of tone, viz. " harpe eolienne," two bass rows of 2 ft. pitch, the one tuned a beat too sharp, the other a beat too flat, to produce a waving tremulous tone that has a certain charm; "musette" and " voix celeste," 16 ft.; and " baryton," a treble stop 32 ft., or two octaves lower than the normal note of the key. The " back organ" is usually covered by a swell box, containing louvres or shutters similar to a Venetian blind, and divided into fortes corresponding with the bass and treble division of the registers. The fortes are governed by knee pedals which act by pneumatic pressure. Tuning the reeds is effected by scraping them at the point to sharpen them, or near the shoulder or heel to flatten them in pitch. Air pressure affects the pitch but slightly, being noticeable only in the larger reeds, and harmoniums long retain their tuning, a decided advantage over the organ and the pianoforte. Mechanical contrivances in the harmonium, of frequent or occasional employment, besides those already referred to, are the " percussion," a small pianoforte action of hammer and escapement which, acting upon the reeds of the diapason rows at the moment air is admitted to them, gives prompter response to the depression of the key, or quicker speech; the " double expression," a pneumatic balance of great delicacy in the wind reservoir, exactly maintaining by gradation equal pressure of the wind; and the "double touch," by which the back organ registers speak sooner than those of the front that are called upon by deeper pressure of the key, thus allowing prominence or accentuation of certain parts by an expert performer. " Prolongement " permits selected notes

By courtesy of Metzlei & Co.
Fig. I. — Free Reed

to be sustained after the fingers have quitted

their keys. Dawes's " melody attachment " is to give prominence i to an air or treble part by shutting off in certain registers all notes | below it. This notion has been adapted by inversion to a " pedal j substitute " to strengthen the lowest bass notes. The " tremolo " < affects the wind in the vicinity of the reeds by means of small bellows ! which increase the velocity of the pulsation according to pressure; and the " sourdine " diminishes the supply of wind by controlling its admission to the reeds.

The American Organ acts by wind exhaustion. A vacuum is practically created in the air-chamber by the exhausting power of the footboards, and a current of air thus drawn downwards passes through any reeds that are left open, setting them in vibration. This instrument has therefore exhaust instead of force bellows. Valves in the board above the air-chamber give communication to reeds (fig. 2) made more slender than those of the harmonium and

more or less bent, while the frames in which

they are fixed are also differently shaped, being hollowed rather in spoon fashion. The channels, the resonators above the reeds, are not varied in size or shape as in the har- monium; they exactly correspond with the reeds, and are collectively known as the " tube- board." The swell " fortes " are in front of the openings of these tubes, rails that open or close by the action of the knees upon what may be called knee pedals. The American organ has a softer tone than the harmonium; this is sometimes aided by the use of extra resonators, termed pipes or qualifying tubes, as, for instance, in Clough & Warren's (of Detroit, Michigan, U.S.). The blowing being also easier, ladies find it much less fatiguing. The expression stop can have little power in the American organ, and is generally

absent; the ” automatic swell ” in the instruments of Mason & Hamlin (of Boston, U.S.) is a contrivance that comes the nearest to it, By courtesy of Metzler th °ugh far inferior. By it a swell shutter or & Co. rail is kept in constant movement, proportioned

|7 IG 2 . Free Reed t0 tne Iorce of the air-current. Another very

Vibrator Mason & clever improvement introduced by these Hamlin ‘ American makers, who were the originators of the instru- Organ. ment itself, is the ” vox hurnana,” a smaller

rail or fan, made to revolve rapidly by wind pressure; its rotation, disturbing the air near the reeds, causes interferences of vibration that produce a tremulous effect, not unlike the beatings heard from combined voices, whence the name. The arrangement of reed compartments in American organs does not essentially differ from that of har- moniums; but there are often two keyboards, and then the solo and combination stops are found on the upper manual. The diapason treble register is known as ” melodia “; different makers occasionally vary the use of fancy names for other stops. The ” sub- bass,” however, an octave of 16 ft. pitch and always apart from the other reeds, is used with great advantage for pedal effects on the manual, the compass of American organs being usually down to F (FF, 5 octaves). In large instruments there are sometimes foot pedals as in an organ, with their own reed boxes of 8 and 16 ft., the lowest note being then CC. Blowing for pedal instruments has to be done by hand, a lever being attached for that purpose. The ” celeste ” stop is managed as in the harmonium, by rows of reeds tuned not quite in unison, or by a shade valve that alters the air- current and flattens one row of reeds thereby.

Harmoniums and American organs are the result of many experi- ments in the application of free reeds to keyboard instruments. The principle of the free reed became widely known in Europe through the introduction of the Chinese cheng l during the

second half of the 1 8th century, and culminated in the invention of the harmonium and kindred instruments. The first step in the invention of the harmonium is due to Professor Christian Gottlieb Kratzenstein of Copenhagen, who had had the opportunity of examining a cheng sent to his native city and of testing its merits. 2 In 1779 the Academy of Science of St Petersburg had offered a prize for an essay on the formation of the vowel sounds on an instrument similar to the ” vox humana ” in the organ, which should be capable of reproducing these sounds faithfully. Kratzenstein made as a demonstration of his invention a small pneumatic organ fitted with free reeds, and presented it to the Academy of St Petersburg. 3 His essay was crowned and was republished with diagrams in Paris 4 in

1 See Allg. musik. Ztg. (Leipzig, 1821), Bd. xxiii. pp. 369–374. The cheng was made known in France by Pere Amiot, who published a careful description of the instrument in Memoire sur la musique des Chinois, p. 80 seq., with excellent diagrams.

2 lb., Bd. xxv. p. 152.

3 The essay was published in Acta Acad. Petrop. (1780).

4 ” Essai sur la naissance et sur la formation des voyelles ” in Rozier’s Observations sur la physique (Paris, 1782), Supplement, xxi. 358 sec>, with two plates. The description of the instrument begins on p. 374, § xxii.

1782. Meanwhile, in 1780, a countryman of Kratzenstein’s, an organ-builder named Kirsnick, established in St Petersburg, adapted these reed pipes to some of his organs and to an instrument of his invention called organochordium, an organ combined with piano. When Abt Vogler visited St Petersburg in 1788, he was so delighted with these reeds that in 1790 he induced Rackwitz, an assistant of Kirsnick’s, to come to him and adapt some to an organ he was having built in Rotterdam. Three years

later Abt Vogler's orchestrion, a chamber organ containing some 900 pipes, was com- pleted, and, according to Rackwitz, 6 was fitted with free-reed pipes. Vogler himself, however, does not mention the free reed when describing this wonderful instrument and his system of " simplifi- cation " for church organs. 6 To Abt Vogler, who travelled all over Germany, Scandinavia and the Netherlands, exhibiting his skill on his orchestrion and reconstructing many organs, is due the credit of making Kratzenstein's invention known and inducing the musical world to appreciate the capabilities of the free reed. The intro- duction of free-reed stops into the organ, however, took a secondary place in his scheme for reform. 7 Friedrich Kaufmann 8 of Dresden states that Vogler told him he had imparted to J. N. Malzel of Vienna particulars as to the construction of free-reed pipes, and that the latter used them in his panharmonicon, 3 which he exhibited during his stay in Paris from 1805 to 1807. Kaufmann suggests.that it was through him that G. J. Grenie obtained the knowledge which led to his experiments with free reeds in organs. It is more likely that Grenie had read Kratzenstein's essay and had experimented in dependently with free reeds. In 18 12 his first orgue expressif was finished. It was a small organ with one register of free reeds — the expression stop, in fact, added to the pipe organ and having a separate wind-chest and. bellows. It would seem from his description of the orchestrion in Data zur Akustik that Vogler knew of no such device. He used the swell shutter borrowed from England and a threefold Screen of canvas covered with a blanket arranged outside the instrument, neither of which is capable of increasing the volume of sound from the organ, or at least only after having first damped the sound to a pianissimo. Vogler explains minutely the apparatus used to conceal the working of the screen from the eyes of the public. 10 The credit of discovering in the free reed the capability of dynamic expression was undoubtedly due to Grenie, although Abt Vogler claims to have used compression in 1796, 11 and Kaufmann in his choraulodion in 1816. A larger orgue

expressif was begun by Grenie 1 for the Conservatoire of Paris in 1812, the construction of which was interrupted and then continued in 1816. Descriptions of Grenie's instrument have been published in French and German. 12 The organ of the Conservatoire had a pedal free-reed stop of 16 ft., with vibrators 0-240 m. long, 0-035 m - wide, and 0-003 m. thick. 13 Two compressors, one for the treble and the other for the bass, worked by treadles, enabled the performer to regulate the pressure of wind on the reeds and therefore to obtain the gradations of forte and piano which gained for his instrument the name of orgue expressif. Grenie's instrument was a pipe organ, the pipes terminating in a cone with a hemispherical cap in the top of which was a small hole. There were eight registers including the pedal, and the positive on the first keyboard had reed stops furnished with

6 See " Uber die Erfindung der Rohrwerke mit durchschlagenden Zungen," by Wilke, in Allg. musik. Ztg. (Leipzig, 1823), Bd. xxv. pp. 152-153 and Bd. xxvii. p. 263; also Thos. Ant. Kunz, "Orchestrion," id., Bd. i. p. 88 and Bd. ii. pp. 514, 542; and Dr Karl Emil von Schafhautl, Abt Georg Joseph Vogler (Augsburg, 1888), p. 37-

6 Data zur Akustik, eine Abhandlung vorgelesen bey der Sitzung der naturforschenden Freunde in Berlin, den i$ten Dezember 1800 (Offenbach, 1801); also published in Allg. musik. Ztg. (1801), Bd. iii. pp. 517, 533, 565. See also an excellent article by the Rev. J. H. Mee on Vogler in Grove's Dictionary of Music and Musicians.

7 See Data zur Akustik,_ and a pamphlet by Vogler, " Uber die Umschaffung der St Marien Orgel in Berlin nach dem Voglerschen Simplifikations-System, eine Nachahmung des Orchestrion " (Berlin) ; also " Kurze Beschreibung der in der Stadtpfarrkirche zu St Peter zu Milnchen nach dem Voglerschen Simplifikations-System neuerbauten Orgel " (Munich, 1809).

8 See Allg. musik. Ztg. (1823), Bd. xxv. pp. 153 and

154 note, and 117-118 note.

9 A description of Malzel's panharmonicon before the addition of the clarinet and oboe stops with free reeds is to be found in the Allg. musik. Ztg. (1800), Bd. ii. pp. 414-415.

10 In the article in Grove's Dictionary the screen is said to have been in the wind-trunk.

11 See Allg. musik. Ztg. Bd. iii. p. 523.

12 See J. B. Biot, Precis elementaire de physique expirimentale (Paris, 1817), tome i. p. 386, andhis Traite de physique (Paris, 1816), tome ii. p. 172 et seq., pi. ii. ; " Uber die Crescendo und Diminuendo Ztige an Orgeln," by Wilke and Kaufmann, Allg. musik. Ztg. (1823), Bd. xxv. pp. 1 13-122; and Allg. musik. Ztg. Bd. xxiii. pp. 133- 139 and 149-154, with diagrams on p. 167 which are not absolutely correct in small details.

13 J. B. Biot, Traite, tome ii. p. 174.

beating reeds. Biot insists on the importance of the regulating wires (Fr. rasettes; Ger. Kruchen) for determining the vibrating length of the reed tongue and maintaining it invariable. These are clearly shown in his diagram (see article Free Reed Vibrator, fig. 1) ; they do not essentially differ from those used with the beating-reed stops in his organ (fig. 76, pi. II.),*or indeed from those figured by Praetorius.

Isolated specimens of the cheng must have found their way to Europe during the 15th and 16th centuries, for Mersenne 1 depicts part of one showing the free reed. It would seem that still earlier in the 17th century there was an organ in a monastery in Hesse with free reeds for the Posaune stop, for Praetorius gives a description of the "extraordinary " reed (p. 169); there is no record

of the inventor in this case.

During the first half of the 19th century various tentative efforts in France and Germany, and subsequently in England, were made to produce new keyboard instruments with free reeds, the most notable of these being the physharmonica 2 of Anton H&ckel, invented in Vienna in 1818, which, improved and enlarged, has retained its hold on the German people. The modern physharmonica is a harmonium without stops or percussion action; it does not therefore speak readily or clearly. It has a range of five to six octaves. Other instruments of similar type are the French melo-

Chone and the English seraphine, a keyboard harmonica with ellows but no channels for the tongues, for which a patent was granted to Myers and Storer in 1839; the aeoline or aelodicon 3 of Eschenbach ; the melodicon 4 of Dietz ; the melodica 6 of Rieff elson ;

1 Harmonie universelle (Paris, 1636), livre v., prop. xxxv.

2 Wien. musik. Ztg. Bd. v. Nos. 30 and 87.

3 Allg. musik. Ztg. Bd. xxii. p. 505, and Bd. xxxv. p. 354.

4 Id. Bd. viii. pp. 526 and 715. 6 Id. Bd. xi. p. 625.

the apollonicon ; 6 the new cheng * of Reichstein ; the terpodion 8 of Buschmann, &c. None of these has survived to the present day.

The inventor of the harmonium was indubitably Alexandre Debain, who took out a patent for it in Paris in 1840. He produced varied timbre registers by modifying reed channels, and brought these registers on to one keyboard. Unfortunately he patented too much, for he secured even the name harmonium, obliging con- temporary and future experimenters to shelter their improvements under other names, and the venerable name of organ

becoming impressed into connexion with an inferior instrument, we have now to distinguish between reed and pipe organs. The compromise of reed organ for the harmonium class of instruments must therefore be accepted. Debain's harmonium was at first quite mechanical; it gained expression by the expression-stop already described. The Alexandres, well-known French makers, by the ingenuity of one of their workmen, P. A. Martin, added the percussion and the pro- longement. The melody attachment was the invention of an English engineer; the introduction of the double touch, now used in the harmoniums of Mustel, Bauer and others — also in American organs — was due to Tamplin, an English professor.

The principle of the American organ originated with the Alex- andres, whose earliest experiments are said to have been made with the_ view of constructing an instrument to exhaust air. The reali- zation of the idea proving to be more in consonance with the genius of the American people, to whom what we may call the devotional tone of the instrument appealed, the introduction of it by Messrs Mason and Hamlin in 1861 was followed by remarkable success. They made it generally known in Europe by exhibiting it at Paris in 1867, and from that time instruments have been exported in large numbers by different makers. (A. J. H.; K. S.)

6 Allg. musik. Ztg. Bd. ii. p. 767, and Wien. musik. Ztg. Bd. i. No. 501.

7 Id. Bd. xxxi. p. 489.

8 Id. Bd. xxxiv. pp. 856 and 858 ; and Cdcilia, Bd. xiv. p. 259.

PRINTED IN U.S.A.

VOL13_HARMONY-HURST

Britannica

THE

ENCYCLOPEDIA BRITANNICA

ELEVENTH EDITION

FIRST

edition,

published in three volumes,

1768— 1771.

SECOND

99

» ten

99

1777— 1784.

THIRD

>»

,, eighteen

99

1788— 1797.

FOURTH

>»

„ twenty

99

l80I l8lO.

FIFTH

IS

,, twenty

99

l8lS—l8l7.

SIXTH

99

„ twenty

99

l823 1824.

SEVENTH

99

„ twenty-one

99

183O 1842.

EIGHTH

99

„ twenty-two

99

l8S3 — l860.

NINTH

99

„ twenty-five

91

I875— 1889.

TENTH-

99

ninth edition and eleven supplementary volumes,

I902 I9O3.

ELEVENTH

1)

published in twenty-nine volumes,

I9IO I9II.

COPYRIGHT

in all countries subscribing to the

Bern Convention

by

THE CHANCELLOR, MASTERS AND SCHOLARS

, of the UNIVERSITY OF CAMBRIDGE

All rights reserved

THE

ENCYCLOPAEDIA BRITANNICA

A

DICTIONARY

OF

ARTS, SCIENCES, LITERATURE AND GENERAL

INFORMATION

ELEVENTH EDITION

VOLUME XIII

HARMONY to HURSTMONCEAUX

New York

Encyclopaedia Britannica, Inc.

342 Madison Avenue

Copyright, in the United States of America, 1910,

by

The Encyclopaedia Britannica Company.

INITIALS USED IN VOLUME XIII. TO IDENTIFY INDIVIDUAL

CONTRIBUTORS, 1 WITH THE HEADINGS OF THE

ARTICLES IN THIS VOLUME SO SIGNED.

A. E. G.* Rev. Alfred Ernest Garvie, M.A., D.D. f

Principal of New College, Hampstead. Member of the Board of Theology and J Heresv (in 6ar£\ the Board of Philosophy, London University. Author of Studies in the Inner Life | pan),

of Jesus, &c. L

Henry Austin Dobson, LL.D. I Hogarth.

See the biographical article, Dobson, H. A. L

Alfred Edward Thomas Watson. f w n rc« Bo»imr c * ,\

Editor of the Badminton Library and Badminton Magazine. Formerly Editor J « or5 «;-Kacing \m part); of the Illustrated Sporting and Dramatic News. Author of The Racing World and Hunting. its Inhabitants: &c.

Algernon Charles Swinburne. J Hugo Victor.

See the biographical article, Swinburne, A. C. I ‘

Arthur Ernest Cowley, M.A., Litt.D. / Hebrew Language;

Sub-Librarian of the Bodleian Library, Oxford. Fellow of Magdalen College. \ Hebrew Literature.

Albert Frederick Pollard, M.A., F.R.Hist.S. (“Heath, Nicholas;

Professor of English History in the University of London. Fellow of All Souls Henry VIII. of England* College, Oxford. Assistant Editor of the Dictionary of National Biography, 1893- -\ rr nnn -, t}! C \,,,,,. ‘

iqoi. Lothian Prizeman (Oxford), 1892, Arnold Prizeman, 1898. Author of England cooper, msaof, under the Protector Somerset; Henry VIII. ; Life of Thomas Cranmer; &c. I Humphrey, Lawrence.

A. Go.* Rev. Alexander Gordon, M.A. J Hofmann, Melchior;

Lecturer on Church History in the University of Manchester. I Hotman.

A. H. S. Rev. Archibald Henry Sayce; D.D. , Litt.D., LL.D. /Humboldt Karl W. Von.

See the biographical article, Sayce, A. H. \ ‘

A. H.-S. Sir A. Houtum-Schindler, CLE. f „__,,_ , . .

General in the Persian Army. Author of Eastern Persian Irak. \ Hormuz (m part).

A. J. H. Alfred J. Hipkins, F.S.A. (1826-1003). r

Formerly Member of Council and Hon. Curator of the Royal College of Music, London. Member of Committee of the Inventions and Music Exhibition, 1885; of -j Harp {in part). the Vienna Exhibition, 1892; and of the Paris Exhibition, 1900. Author of Musical I Instruments; &c.

A.

D.

A.

E. T.

w

A.

C.S.

A.

cy.

A. P. P.

A. L.

Andrew Lang. J Hauntings.

See the biographical article, Lang, Andrew. I

A. M. C. Agnes Mary Clerke.

See the biographieal article, Clerke, A. M.

A. N. Alfred Newton, F.R.S.

See the biographical article, Newton, Alfred.

A. SI. Arthur Shadwell, M.A., M.D.', LL.D., F.R.CP.

Herschel, Sir F. W. (in part); Herschel, Sir J. F. W.

(in part). Hevelius; Hipparehus; Horrocks; Huggins; Humboldt.

Harpy; Harrier; Hawfinch; Hawk; Heron; Hoactzin; Honeyeater; Honey Guide; Hoopoe; Hornbill; Humming-Bird.

IUR SHADWELL, 1VI. A., 1V1.JJ., L,L,.D., r.K.U.r. r

Member of Council of Epidemiological Society. Author of Industrial Efficiency ; J Housing. The London Water Supply; Drink, Temperance and Legislation. |

A. W. H.* Arthur William Holland. f Henry IV.: Roman Emperor;

Formerly Scholar of St John's College, Oxford. Bacon Scholar of Gray's Inn, 1900. < Hide; Hohenzollern;

[Honorius II.; Anti-Pope.

A. W. W. Adolphus William Ward, Litt.D., LL.D. r

See the biographical article, Ward, A. W. \ Hrosvitha.

C. A. M. F. Charles Augustus Maude Fennell, M.A., Litt.D. f

Formerly Fellow of Jesus College, Cambridge. Editor of Pindar's Odes and Frag- -j Hercules. ments; and of the Stanford Dictionary of Anglicised Words and Phrases. [

1 A complete list, showing all individual contributors, appears in the final- volume.

VI

C. B.* C. El.

C. F. A. C. H. Ha. C. J. L.

C. L. K.

C. Mo. C. P.

INITIALS AND HEADINGS OF ARTICLES

Charles Bemont, Litt.D. (Oxon.). JHavet;

See the biographical article, Bemont, C. \ Hozier.

Sir Charles Norton Edgcumbe Eliot, K.C.M.G., C.B., M.A., LL.D., D.C.L. r

Vice-Chancellor of Sheffield University. Formerly Fellow of Trinity College, HlSSar (in part); Oxford. H.M.‘s Commissioner and Commander-in-Chief for the British East -j Hungary: Language; Africa Protectorate; Agent and Consul-General at Zanzibar; and Consul-General Huns. for German East Africa, 1900-1904. I

Charles Francis Atkinson,

Formerly Scholar of Queen’s College, Oxford. Captain, 1st (Royal Fusiliers). Author of The Wilderness and Cold Harbour.

Carlton Huntley Hayes, A.M., Ph.D.

Assistant Professor of History in Columbia University, New York City, of the American Historical Association. ‘

City of London 1 Hohenlohe (in part).

Member] Honorius II., III., IV.

L

Hindostani Literature.

J Henry IV., V., VI.:

[of England.

1 Hunt, W. Holman.

Herschel, Sir P. W.

(in part) ; Herschel, Sir J. F,

(in part).

c.

PI.

c.

R.

B.

c.

s.

c.

w.

W

Author i Hunald.

Hayton; Henry the Navigator.

Hayes, Rutherford B.

D. B. M. D. F. T.

D. Gi.

D. G. H.

D. H. D. Mn.

D. S.*

E. C. B. E. D. B.

Sir Charles James Lyall, K.C.S.I., CLE., LL.D. (Edin.).

Secretary Judicial and Public Department, India Office. Fellow of King's College London. Secretary to Government of India, Home Department, 1889-1894. " Chief Commissioner, Central Provinces, India, 1895-1898. Author of Translations of Ancient Arabic Poetry; &c.

Charles Lethbridge Kingsford, M.A., F.R.Hist.S., F.S.A.

Assistant Secretary to the Board of Education. Author of Life of Henry V. Editor of Chronicles of London, and Stow's Survey of London.

William Cosmo Monkhouse.

See the biographical article, Monkhouse, W. C.

Rev. Charles Pritchard, M.A.

See the biographical article, Pritchard, Charles.

Christian Pfister, D.-es-L.

Professor at the Sorbonne, Paris. Chevalier of the Legion of Honour, of Etudes sur le regne de Robert le Pieux.

Charles Raymond Beazley, M.A., D.Litt.

Professor of Modern History in the University of Birmingham. Formerly Fellow of Merton College, Oxford, and University Lecturer in the History of Geography. Author of Henry the Navigator; The Dawn of Modern Geography; &c.

Carl Schurz, LL.D.

See the biographical article, Schurz, Carl. '

Sir Charles William Wilson, K.C.B., K.C.M.G., F.R.S, (1836-1907).

Major-General, Royal Engineers. Secretary to the North American Boundary- Commission, 1858-1862. British Commissioner on the Servian Boundary Com- mission. Director-General of the Ordnance Survey, 1886-1894. Director-General" of Military Education, 1895-1898. Author of From Korti to Khartoum; Life of Lord Clive ; &c.

David Binning Monro, M.A., Ltrr.D.

See the biographical article, Monro, David Binning.

Donald Francis Tovey. f

Author of Essays in Musical Analysis: comprising The Classical Concerto, The< Harmony. Goldberg Variations, and analyses of many other classical works. |_

Sis David Gill, K.C.B., LL.D., F.R.S., F.R.A.S., D.Sc.

H.M. Astronomer at Cape of Good Hope, 1879-1907. Served in Geodetic Survey of Egypt, and on the expedition to Ascension Island to determine the Solar Parallax by observations of Mars. Directed Geodetic Survey of Natal, 1 Cape Colony and Rhodesia. Author of Geodetic Survey of South Africa ; Catalogues of Stars for the Equinoxes (1850, i860, 1885, 1890, 1900); &c.

David George Hogarth, M.A.

Keeper of the Ashmolean Museum, Oxford. Fellow of Magdalen College, Oxford. Fellow of the British Academy. Excavated at Paphos, 1888; Naucratis, 1899 and 1903; Ephesus, 1904-1905; Assiut, 1906-1907. Director, British School at Athens, 1897-1900. Director, Cretan Exploration Fund, 1899.

David Hannay.

Formerly British Vice-Consul at Barcelona. Author of Short History' of the Royal Navy ; Life of Emilio Castelar ; &c.

w.

Hierapolis (in part).

{

Homer.

Heliometer.

Heraclea (in part); Hierapolis (in part); Hittites.

Heyn; Hood, Viscount; Howe, Earl; Humour.

Rev. Dugald Macfadyen, M.A.

Minister of South Grove Congregational Church, Highgate. Congregational Ideals ; &c.

. ^, , „ . , . f Henderson, Alexander Author of Constructive < , . '

(in part).

David Sharp, M.A., M.B., F.R.S., F.Z.S.

Editor of the Zoological Record. Formerly Curator of Museum of Zoology, Univer- J Hexapoda (in part). sity of Cambridge. President of Entomological Society of London. Author of | ” Insecta ” (Cambridge Natural History) ; &c. ‘ I

Rt. Rev. Edward Cuthbert Butler, O.S.B., M.A., D.Litt.

Abbot of Downside Abbey, Bath. Author of ” The Lausiac History of Palladius ‘ in Cambridge Texts and Studies, vol. vi.

Edwin Dampier Brickwood. Author of Boat-Racing; &c.

Hierony mites; Hilarion, Saint.

f Horse: History;

\ Horse-Racing (in part).

INITIALS AND HEADINGS OF ARTICLES

Vll

E. D. Bu.

E. E. S.

E. F. S.

E.

G.

Ed

. M.

E.

M. W

E.

0.*

E. Pr.

E.

Re

-

E.

R.

B.

F.

B.

F.

C.

C.

F.

G.

M.

B

F.

G.

P.

F. G. S.

F.

H. B.

F.

LI. G.

F.

0. B.

F

Px.

G. A. Gr.

G. C. R. G. C. W.

Hungary: Literature (in part).

Edward Dundas Butler.

Formerly Assistant in the Department of Printed Books, British Museum. Foreign Member of the Hungarian Academy of Sciences. Author of Hungarian Poems and Fables for English Readers ; &c. *-

Ernest Edward Sikes, M.A. f „„.„.,„.

Fellow, Tutor and Lecturer, St John's College, Cambridge. Newton Student at J nepnaesius, Athens, 1890. Editor of the Prometheus Vinctus of Aeschylus, and of The Homeric] Hera; Hermes. Hymns. L

Edward Fairbrother Strange. f

Assistant- Keeper, Victoria and Albert Museum, South Kensington. Member of J Hiroshige;

Council, Japan Society. Author of numerous works on art subjects. Joint-editor | Hokusai. of Bell's " Cathedral " Series. I

Edmund Gosse, LL.D.

See the biographical article, Gosse, Edmund, W.

f Heroic Romances; i Heroic Verse; [Herrick; Holberg.

Eduard Meyer, Ph.D., D.Litt. (Oxon.), LL.D. f"

Professor of Ancient History in the University of Berlin. Author of Geschichte < Hormizd. des Alterthums ; Geschichte des alien Aegyptens ; Die Israeliten und ihre Nachbarstdmme. {

Herodotus (in part).

Heart: Surgery; Hernia.

■I Hungary: Literature (in part),

Rev. Edward Mewburn Walker, M.A. J

Fellow, Senior Tutor and Librarian of Queen's College, Oxford. I

Edmund Owen, M.B., F.R.C.S., LL.D., D.Sc.

Consulting Surgeon to St Mary's Hospital, London, and io the Children's Hospital, Great Ormond Street, London. Chevalier of the Legion of Honour. Late Examiner " in Surgery at the Universities of Cambridge, London and Durham. Author of A Manual of Anatomy for Senior Students.

Edgar Prestage. ~ r

Special Lecturer in Portuguese Literature at the University of Manchester. Com- J Herculano de CarvalnO 6 mendador, Portuguese Order of S. Thiago. Corresponding Member of Lisbon | Araiyo. Royal Academy of Sciences and Lisbon Geographical Society. I

Emil Reich, Doc.Juris., F.R. Hist. S.

Author of Hungarian Literature ; History of Civilization ; &c.

Edwyn Robert Bevan, M.A. f

New College, Oxford. Author of Tlie House of Seleucus ; Jerusalem under the High -j Hellenism. Priests. I

Felice Barnabei, Litt.D. f „

Formerly Director of Museum of Antiquities at Rome. Author of archaeological "j HeTCUlaneum. papers in Italian reviews and in the Athenaeum. I

Frederick Cornwallis Conybeare, M.A., D.Th. (Giessen). f

Fellow of the British Academy. Formerly Fellow pf University College, Oxford. -{ Holy Water. Author of The Ancient Armenian Texts of Aristotle; Myth, Magic and Morals; &c. I

Frederick George Meeson Beck, M.A.

Fellow and Lecturer of Clare College, Cambridge.

Frederick Gymer Parsons, F.R.C.S., F.Z.S., F.R.Anthrop.Inst.

Vice-President, Anatomical Society of Great Britain and Ireland. Lecturer on Anatomy at St Thomas's Hospital and the London School of Medicine for Women. Formerly Hunterian Professor at the Royal College of Surgeons.

F. G. Stephens.

Formerly art critic of the Athenaeum. Author of Artists at Home; George Cruik- shank; Memorials of W. Mulready; French and Flemish Pictures; Sir E. Landseer; T. C. Hook, R.A.; &c.

■i Heruli.

-j Heart: Anatomy.

Holl, Frank.

f Honey; Hunter, John; \ Hunter, William.

Francis Henry Butler, M.A.

Worcester College, Oxford. Associate of the Royal School of Mines.

Francis Llewellyn Griffith, M.A. , Ph.D., f.S. A. f Heliopolis-

Reader in Egyptology, Oxford University. Editor of the Archaeological Survey J w „ pm£ . c Tricmoaicfiic and Archaeological Reports of the Egypt Exploration Fund. Fellow of Imperial 1 ” ermes msmeglSlUS, German Archaeological Institute. l_ Horus.

Frederick Orpen Bower, D.Sc, F.R.S. r

Regius Professor of Botany in the University of Glasgow. Author of Practical } Hofmeister. Botany for Beginners. [

Frank Puaux. r

President of the Societe de l'Histoire du Protestantisme frangais. Author of J _ .

Les Precurseurs francais de la tolerance ; Hisloire de I'ctablissement des protestants 1 Huguenots. franQais en Suede ; L'Eglise reformee de France ; &c. [

George Abraham Grierson, CLE. Ph.D., D.Litt.

Member of the Indian Civil Service, 1873-1903. In charge of Linguistic Survey

of India, 1898-1902. Gold Medallist, Asiatic Society, 1909. Vice-President of ˆ HindostariT.

the Royal Asiatic Society Formerly Fellow of Calcutta University. Author of

The Languages of India ; &c.

George Croom Robertson, M.A.

See the biographical article, Robertson, G.

George Charles Williamson, Litt.D.

Hobbes, Thomas (in part).

Chevalier of the Legion of Honour. Author of Portrait Miniatures; Life of Richard J I r-„. a _j' H -„ k .i,.. nˆi,;.. Cos-way, R.A.; George Engleheart; Portrait Drawings; &c. Editor of new edition] " ima ™> Hicnoias, H0SK1DS. of Bryan's Dictionary of Printers and Engravers.

f Hilliard, Lawrence; A Hilliard, Nicholas [Humphry, Ozias.

vlii

6. G. S.

G. E.

G. H. C.

G. J. T.

G. K.

G. R. G. W. T.

H. H.Br.

H. Bt

H. Cta.

H. De.

H. L. H. L. C.

H. M. V. H. W. C. D. H. W. R.*

H. W. S.

INITIALS AND HEADINGS OF ARTICLES

H

Y.

I.

A.

J.

A.

C.

J.

A.

R.

I. Bt

George Gregory Smith, M.A.

Professor of English Literature, Queen's University of Belfast. Author of The- Days of James IV.; The Transition Period; Specimens of Middle Scots; &c.

Rev. George Edmundson, M.A., F.R.Hist.S.

Formerly Fellow and Tutor of Brasenose College, Oxford. Ford's Lecturer, 1909. . Hon. Member, Dutch Historical Society, and Foreign Member, Netherlands Associa- tion of Literature.

Henryson.

Holland: History. Holland: County and Province of.

George Herbert Carpenter, B.Sc. f n.miMoM •

Professor of Zoology in the Royal College of Science, Dublin. President of the) nemipiera. Association of Economic Biologists. Member of the Royal Irish Academy. Author] Hexapoda {-in part). of Insects: their Structure and Life ; &c.

George James Turner.

Barrister-at-Law, Lincoln's Inn. Editor of Select Pleas for the Forests for the Selden Society.

Gustav Kruger.

Professor of Church History in Papsttum; &c.

Rev. George Rawlinson, M.A.

See the biographical article, Rawlinson, George.

the University of Giessen. Author

Hundred.

of r(M |HIppolytUB.

Rev. Grifeithes Wheeler Thatcher, M.A., B.D.

Warden of Camden College, Sydney, N.S.W. Formerly Tutor in Hebrew and Old Testament History at Mansfield College, Oxford.

Lord Houghton.

See the biographical article, Houghton, ist Baron.

Henry Bradley, M.A., Ph.D. J „ .. .

Joint-editor of the New English Dictionary (Oxford). Fellow of the British Academy. 1 "euano. Author of The Story of the Goths ; The Making of English ; &c. *•

Sir Henry Burdett, K.C.B., K.C.V.O. _ f

Founder and Editor of The Hospital. Formerly Superintendent of the Queen's – Hospital, Birmingham, and the Seamen's Hospital, Greenwich. Author of Hospitals and Asylums of the World; &c.

Hugh Chisholm, M.A.

Formerly Scholar of Corpus Christi College, Oxford. Editor of the nth edition" of the Encyclopaedia Britannica; Co-editor of the 10th edition.

Herodotus (in part).

Hasan-ul-Basn; Hassan ibn Thabit; Hisham ibn al-Kalbi.

i Hood, Thomas.

Hospital.

Howe, Samuel Gridley.

HlPPOLYTE DELEHAYE, S.J.

Assistant in the compilation of the Bollandist publications: Analecta Bollandiana ' and Acta sanctorum.

Henri Labrosse.

Assistant Librarian at the Bibliotheque Nationale, Paris. Officer of the Academy

Hugh Longbourne Callendar, F.R.S., LL.D.

Professor of Physics, Royal College of Science, London. Formerly Professor of Physics in McGill College, Montreal, and in University College, London.

Herbert M. Vaughan, F.S.A.

Keble College, Oxford. Author of The Last of the Royal Stuarts; The Medici Popes; The Last Stuart Queen.

Helena, St; Hubert, St.

J Hugh of

Heat.

St Cher.

Henry, Stuart (Cardinal York).

Henry I., II., Ill,:

Of England. Henry of Huntingdon.

Henry William Carless Davis, M.A.

Fellow and Tutor of Balliol College, Oxford. Fellow of All Souls College, Oxford, 1895-1902. Author of England under the Normans and Angevins; Charlemagne.

Rev. Henry Wheeler Robinson, M.A. f

Professor of Church History in Rawdon College, Leeds. Senior Kennicott Scholar, j Hosea (in part). Oxford, 1901. Author of Hebrew Psychology in Relation to Pauline Anthropology \ (in Mansfield College Essays) ; &c. <■

H. Wickham Steed. [

Correspondent of The Times at Vienna. Correspondent of The Times at Rome, i Humbert, King. 1 897-1902. L

Sir Henry Yule, K.C.S.I., C.B.

See the biographical article, Yule, Sir H.

Israel Abrahams, M.A.

Reader in Talmudicrand Rabbinic Literature in the University of Cambridge. J Herzl;

Hormuz (in part); Hsttan Tsang (in part). Hasdai ibn Shaprut;

Formerly President, Jewish Historical Society of England. Author of A Short History of Jewish Literature; Jewish Life in the Middle Ages; Judaism; &c.

Sir Joseph Archer Crowe, K.C.M.G.

See the biographical article, Crowe, Sir J. A.

Very Rev. Joseph Armitage' Robinson, D.D. __

Dean of Westminster. Fellow of the British Academy.ˆ Hon. Fellow of Christ's College, Cambridge. Formerly Fellow of Christ's College, Cambridge, and Norris- ian Professor of Divinity in the University. Author of Some Thoughts on the Incarnation; &c.

James Bartlett. f

Lecturer on Construction, Architecture, Sanitation, Quantities, &c, at King's J Heating. College, London. Member of Societv Of Architects., Member of Institute of j Junior Engineers. I

Hirsch, Samson R. Hobbema; Holbein.

Hippolytus, The Canons of.

INITIALS AND HEADINGS OF ARTICLES

IX

J. B. T. J. Da.

J. E. J. F. F. J. F. H. B.

J. G.*

J. Ga. J. G. M.

J. G. R.

J. Hn.

J. H. A. H. J. H. F. J. H. Mu.

J. H. R.

J. J. F. J. K. L.

J. M. M.

J. P.-B. J. P. Pe.

J. S. Co. J. S. F. h T. Be.

Sir John Batty Tuke, M.D., F.R.S. (Edin.), D.Sc, LL.D. f

President of the Neurological Society of the United Kingdom. Medical Director J HiDDOcrates of New Saughton Hall Asylum, Edinburgh. M. P. for the Universities of Edinburgh | vv and St Andrews, 1900-1910. I

Rev. James Davies, M.A. (1820-1883). f

Formerly Head Master of Ludlow Grammar School and Prebendary of Hereford . Cathedral. Translated classical authors for Bohn's " Classical Library." Author of volumes in Collins's Ancient Classics for English Readers.

Hesiod {in part).

H. Julius Eggeling, Ph.D.

Professor of Sanskrit and Comparative Philology, University of Formerly Secretary and Librarian to Royal Asiatic Society.

Edinburgh, i Hinduism.

John Faithfull Fleet, CLE.

Commissioner of Central and Southern Divisions of Bombay, 1891-1897. Author'! Hindu Chronology. of Inscriptions of the Early Gupta Kings; &c.

Sir John Francis Harpin Broadbent, Bart., M.A., M.D. r

Physician to Out-Patients, St Mary's Hospital, London, and to the Hampstead I Tr oar *. rr , n- General Hospital. Assistant Physician to the London Fever Hospital. Author 1 Hearl – Heart Disease. of Heart Disease and Aneurysm ; &c. |_

Rev. James Gow, M.A., Litt.D. r

Head Master of Westminster School. Fellow of King's College, London. Formerly] „ , . .

Fellow of Trinity College, Cambridge. Editor of Horace's Odes and Satires. Author] uoraee \™ part). of A Companion to the School Classics; &c. I.

Henry VII.: of England.

James Gairdner, C.B.

See the biographical article, Gairdner, J.

John Gray McKendrick, M.D. , LL.D., F.R.S., F.R.C.P. (Edin.) fHearine-

Emeritus Professor of Physiology at" the University of Glasgow. Author of Life •{ „ , . ,. in Motion ; Life of Helmholtz ; &c. [HelmnoltZ.

John George Robertson, M. A., Ph.D. f Heine (in part);

Professor of German at the University of London. Formerly Lecturer on the English -| Hiidebrand, Lay of" Language, Strassburg University.

Author of History of German Literature ; &c. Hoffmann E T W

Justus Hashagen, Ph.D.

Privatdozent in Medieval and Modern History, University of Bonn. Author of- Das Rheinland unter der franzosischen Herrschdft.

John Henry Arthur Hart, M.A.

Fellow, Theological Lecturer and Librarian, St John's College, Cambridge.

John Henry Freese, M.A.

Formerly Fellow of St John's College, Cambridge.

John Henry Muirhead, M.A. , LL.D. r „ . „ ,. .

Professor of Philosophy in the University of Birmingham. Author of Elements J Me & el – Hegelianism m of Ethics; Philosophy and Life; &c. Editor of Library of Philosophy. } England.

John Horace Round, M.A., LL.D. (Edin.). r

Author of Feudal England; Studies in Peerage and Family History; Peerage and J Hereward. Pedigree. 1

Hecker, F. F. K.; Hertzberg, Count Von; I Hormayr.

-j Herod; Herodians.

4 Herald; Hesiod {in part).

Hecker, I. T.

Hood of Avalon.

Heraclitus;

Hume, David {in part).

Rev. James J. Fox.

St Thomas's College, Brookland, D.C., U.S.A.

Sir John Knox Laughton, M.A., Litt.D.

Professor of Modern History, King's College, London, Secretary of the

Navy Records Society. Served in the Baltic, 1854-1855; in China, 1856-1859. Honorary Fellow, Gonville and Caius College, Cambridge. Fellow, King's College, London. Author of Physical Geography in its Relation to the Prevailing Winds and Currents; Studies in Naval History; Sea Fights and Adventures; &c.

John Malcolm Mitchell.

Sometime Scholar of Queen's College, Oxford. Lecturer in Classics, East London College (University of London). Joint-editor of Grote's History of Greece.

James George Joseph Penderel-Brodhurst. Editor of the Guardian (London).

Rev. John Punnett Peters, Ph.D., D.D.

Canon Residentiary, Cathedral of New York. Formerly Professor of Hebrew in the University of Pennsylvania. Director of the University Expedition to Babylonia, 1888-1895. Author of Nippur, or Explorations and Adventures on the Euphrates.

James Sutherland Cotton, M.A. ,

Editor of The Imperial Gazetteer of India. Hon. Secretary of the Egyptian Explora- J „ ,. „.

tion Fund. Formerly Fellow and Lecturer of Queen's College, Oxford. Author | Hastings, Warren.

of India in the " Citizen " Series; &c. [

John Smith Flett, D.Sc, F.G.S. r

Petrographer to the Geological Survey. Formerly Lecturer on Petrology in Edinburgh University. Neill Medallist of the Royal Society of Edinburgh. Bigsby Medallist of the Geological Society of London. L

John T. Bealby. r

Joint-author of Stanford's Europe. Formerly Editor of the Scottish Geographical \ Hissar (in part). Magazine. Translator of Sven Hedin's Through Asia, Central Asia and Tibet; &c. L

-j Hepplewhite.

Hillah; Hit.

Hornfels.

X

J.

T. C.

J.

T. Mo.

J.

T. S.*

J.

v.*

J.

V. B.

J.

Ws.

J.

W.*

J.

W. F.

J

W. Fo

INITIALS AND HEADINGS OF ARTICLES

K. S.

L H. B. L J. S.

L. W

M. G.

M. Ha. M. H. C.

M. N. T. M. 0. B. C. M. T. M.

N. D. M. 0. Ba. O.Br.

Herring.

Joseph Thomas Cunningham, M.A. ,F.Z.S.

Lecturer on Zoology at the South- Western Polytechnic, London. Formerly Fellow . of University College, Oxford. Assistant Professor of Natural History in the University of Edinburgh and Naturalist to the Marine Biological Association.

John Torrey Morse, Jr.

Author of The Life and Letters of Oliver Wendell Holmes.

James Thomson Shotwell, Ph.D.

Professor of History in Columbia University, New York City.

Jules Viard. . %

Archivist at the National Archives, Paris. Officer of Public Instruction. Author 1 WUnared Years War.

of La France sous Philippe VI. de Valois ; &c.

James Vernon Bartlet, M.A., D.D. (St Andrews).

Professor of Church History, Mansfield College, Oxford. Author of The Apostolic Age; &c.

John Weathers, F.R.H.S.

Lecturer on Horticulture to the Middlesex County Council. Guide to Garden Plants; French Market Gardening; &c.

James Ward, D.Sc, LL.D. f

Professor of Mental Philosophy and Logic in the University of Cambridge. Fellow J „ . , of Trinity College, Cambridge. Fellow of the British Academy. Fellow of the | “““a”- New York Academy of

Sciences. I

J. Walter Ferrier. f

Translated George Eliot and Judaism from the German of Kaufmann. Author of A Heine (in Part) Mottisclijfe. I r ”

The Hon. John Watson Foster, A-M., LL.D. f

Professor of American Diplomatics, George Washington University, Washington, i Harrison, Benjamin. U.S.A. Formerly U.S. Secretary of State. Author of Diplomatic Memoirs; &c. I

Author of Practical

i Holmes, Oliver WendelL -| History.

Hebrews, Epistle to the; Hermas, Shepherd of.

Hippeastrum; Honeysuckle; Horticulture (in part).

Kathleen Schlesinger.

Editor of The Portfolio of Musical Archaeology. Orcliestra.

Author of The Instruments of the

Harp (in part); Harp-Lute; Harpsichord; Holztrorr.pete; L Horn; Hurdy-Gurdy.

. J Horticulture:

Chairman of Roosevelt “i

Calendar

Liberty Hyde Bailey, LL.D.

Director of the College of Agriculture, Cornell University Commission on Country Life.

Leonard James Spencer, M.A.

Assistant in Department of Mineralogy, British Museum. Formerly Scholar of Sidney Sussex College, Cambridge, and Harkness Scholar. Editor of the Mineralo- gical Magazine.

Lucien Wolf.

Vice-President of the Jewish Historical Society of England. Formerly President of the Society; Joint-editor of the Bibliotheca Anglo- judaica.

Moses Gaster, Ph.D. (Leipzig).

Chief Rabbi of the Sephardic Communities of England! Vice-President, Zionist Congress, 1898, 1899, 1900. Ilchester Lecturer at Oxford on Slavonic and Byzantine – Literature, 1886 and 1891. President, Folk lore Society of England. Vice-President Anglo-Jewish Association. Author of History of Rumanian Popular Literature; &c.

Marcus Hartog, M.A., D.Sc, F.L.S. C

Professor of Zoology, University College, Cork. Author of ” Protozoa ” in Cam- < Heliozoa, bridge Natural History; and papers for various scientific journals.: (_

Montague Hughes Crackanthorpe, K.C., D.C.L.

President of the Eugenics Education Society. Honorary Fellow, St John’s College, Oxford. Bencher of Lincoln’s Inn. Formerly Member of the General Council of – the Bar and of the Council of Legal Education, and Standing Counsel to the Univer- sity of Oxford.

Marcus Niehbur Tod, M.A.

Fellow and Tutor of Oriel College, Oxford. University Lecturer in Epigraphy. – Joint-author of Catalogue of the Sparta Museum. L

Maximilian Otto Bismarck Caspari. f

Reader in Ancient History at London University. Lecturer in Greek at Birmingham ■{ Heraelius, University, 1905-1908. I

Maxwell T. Masters, M.D., F.R.S. (1833-1907). f

Formerly Editor of Gardeners’ Chronicle ; and Lecturer on Botany, St George’s Hos- pital, London. Author of Plant Life; Botany for Beginners; and numerous mono- graphs in botanical works.

American U» part).

Harmotome; Kemimorphite; Heulandite; Hornblende; Humite.

Hirsch, Baron.

Hasdeu.

Herschell, 1st Baron.

Helots.

Horticulture (in part).

Newton Dennison Mereness, A.M., Author of Maryland as a Proprietary

Ph.D.

Province.

f Henry, Patrick; \ Homestead and Exemption [Laws.

Oswald Barron, F.S.A. Editor of The Ancestor,

1 902- 1 905.

Honourable Society of the Baronetage Oscar Briliant.

f Heraldry; Hon. Genealogist to Standing Council of the J Herbert: family;

[Howard: family.

f Hungary: Geography \ and Statistics.

INITIALS AND HEADINGS OF ARTICLES

XI

0. c. w.

P. A. P. C. M.

P.

C.

Y.

H.

H.

P.-S.

La

R.

A.

•

R.

Ad

.

R.

A.

S. M

R

A.

W.

R

H

S.

R

I.

P.

R

J.

M.

R

J.

S.

R

.K

. D.

R. L.*

R. N. B.

R. Po.

R. P. S.

R. S. C.

R. S. T.

{

Rev. Owen Charles Whitehouse, M.A., D.D.

Christ’s College, Cambridge. Professor of Hebrew, Biblical Exegesis and Theology, and Theological Tutor, Cheshunt College. Cambridge.

Paul Daniel Alphandery.

Professor of the History of Dogma, Ecole pratique des hautes etudes, Sorbonne, Paris. Author of Les Idees morales chez les heterodoxes Latines au debut du XIII’ si’ecle.

Peter Chalmers Mitchell, M.A., F.R.S., F.Z.S., D.Sc, LLD.

Secretary to the Zoological Society of London. University Demonstrator in Com- parative Anatomy and Assistant to Linacre Professor at Oxford, 1 888-1 891. Examiner in Zoology to the University of London, 1903. Author of Outlines of Biology; &c.

Philip Chesney Yorke, M.A.

Magdalen College, Oxford. Editor of Letters of Princess Elizabeth of England.

Peter Henderson (1823-1890).

Formerly Horticulturist, Jersey City and New York Profit; Garden and Farm Topics.

Philip Henry Pye-Smith, M.D., F.R.S. I

Consulting Physician to Guy's Hospital, London. Formerly Vice-Chancellor of the -j University of London. Joint-author of A Text Book of Medicine ; &c. '

Philip Lake, M.A., F.G.S. I

Lecturer on Physical and Regional Geography in Cambridge University. Formerly J of the Geological Survey of India. Author of Monograph of British Cambrian] Trilobites. Translator and Editor of Kayser's Comparative Geology.

Robert Anchel.

Archivist to the Department de l'Eure.

Robert Adamson, LL.D.

See the biographical article, Adamson, R.

Robert Alexander Stewart Macalister, M.A., F.S.A.

St John's College, Cambridge. Director of Excavations for the Palestine Explora- ■ tion Fund.

Robert Alexander Wahab, C.B., C.M.G., CLE.

Colonel, Royal Engineers. Formerly H.M. Commissioner, Aden Boundary Delimi- tation, and Superintendent, Survey of India. Served with Tirah* Expeditionary Force, 1 897-1 898; Anglo-Russian Boundary Commission, Pamirs, 1895; &c.

Richard Henry Stoddard.

See the biographical article, Stoddard, Richard Henry.

Hebrew Religion.

Henry of Lausanne; Hugh of St Victor; Humiliati.

Hemiehorda; Heredity.

Holies, Baron.

,’, ,.,.,! Horticulture: American Author of Gardening for y CaUndar {in p art) _

Harvey, William.

Himalaya: Geology.

Herault de Seehelles.

Hume, David {in part).

Hebron; Hor, Mt.

Hasa, El; Hejaz.

I Hawthorne, Nathaniel. J” Harvester; Hibernation.

Reginald Innes Pocock, F.Z.S.

Superintendent of the Zoological Gardens, London.

Ronald John McNeill, M.A. C

Christ Church, Oxford. Barrister-at-Law. Formerly Editor of the St James’s -i Hely-Hutchinson. Gazette, London. I ,

Hon. Robert John Strutt, M.A. , F.R.S. f

Professor of Physics in the Imperial College of Science and Technology, South J Helium. Kensington. Fellow of Trinity College, Cambridge. [_

Sir Robert Kennaway Douglas. f

Formerly Keeper of Oriental Printed Books and MSS. at the British Museum, _ and Professor of Chinese, King’s College, London. Author of The Language and* Literature of China ; &c.

Richard Lydekker, F.R.S., F.G.S., F.Z.S.

Member of the Staff of the Geological Survey of India, 1874-1882. Author of Catalogue of Fossil Mammals, Reptiles and Birds in the British Museum; The Deer of all Lands; The Game Animals of Africa; &c.

Robert Nisbet Bain (d. iqoq).

Assistant Librarian, British Museum, 1883-1909. Author of Scandinavia, the Political History of Denmark, Norway and Sweden, 1$ 13-1900; The First Romanovs – 1613-172$; Slavonic Europe, the Political History of Poland and Russia from 1469 to 1796 ; Slc.

Rene Poupardin, D.-es-L.

Hsttan Tsang {in part).

Hedgehog;

Hippopotamus;

Horse {in part); Howler.

H'opken; Horn, A. B., Count; Hungary: History {in part); Hunyadi, Janos; Hu'nyadi, Laszl6.

Secretary of the Ecole des Chartes. Honorary Librarian at the Bibliotheque J jij nema « Nationale, Paris. Author of Le Royaume de Provence sous les Carolingiens ; Recueil\ n,n cmar. des chartes de Saint-Germain; &c. I

R. Phene Spiers, F.S.A. , F.R.I.B. A.

Formerly Master of the Architectural School, Royal Academy, London. Past President of Architectural Association. Associate and Fellow of King's College, -j HoUSe. London. Corresponding Member of the Institute of France. Editor of Fergusson' s History of Architecture. Author of Architecture: East and West; &c.

Robert Seymour Conway, M.A. , D.Litt. (Cantab.). r _ _

Professor of Latin and Indo-European Philology in the University of Manchester. J Hernici; Formerly Professor of Latin in University College, Cardiff; and Fellow of Gonville 1 Hirpini. and Caius College, Cambridge. Author of The Italic Dialects. {

Ralph Stockman Tarr. J Hudson River

Professor of Physical Geography, Cornell University. , I ■■ ■

Xll R.W.

S. P. B. S. A* C.

T. A. I. T. As.

T. Ba.

iMTMLSi aito amftornGS of articles

T.

B.*

T.

F. H.

T.

Gi.

T.

H. H.*

T.

L. H.

T.

Se.

T. Wo, T. W. A. W. A. B. C.

W. A. P.

w.

Ba

w.

Fr.

w.

F.

C.

w.

G.

H.

w.

H.

F.

w.

H.

Ha

Robert Wallace, F.R.S. (Edin.), F.L.S.

':'■' : Pr«>fdstSofcof Agriculture and Rural Economy at Edinburgh University, and Garton Lecturer on Colonial and Indian Agriculture. Professor of Agriculture, R.A.C.,. Cirencester, 1882-1885. Author of Farm Live Stock of Great Britain; The Agricul- ture and Rural Economy of Australia and New Zealand; Farming Industries of Cape Colony; &c.

Spencer Fuller-ton Baird, LL.D.

See the biographical article, Baird, S. F.

Horse (m part).

{

Henry, Joseph.

Hezekiah; Hoshea.

Stanley Arthur Cook, M.A.

Lecturer in Hebrew and Syriac, and formerly Fellow, Gonville and Caius College, Cambridge. Editor for Palestine Exploration Fund. Examiner in Hebrew and Aramaic, London University, 1904-1908. Author of Glossary of Aramaic Inscrip- tions ; The Laws of Moses and ihe Code of Hammurabi ; Critical Notes en Old Testament History; Religion of Ancient Palestine; &c.

Thomas Allan Ingram, M.A., LL.D. Trinity College, Dublin.

Thomas Ashby, M.A., D.Litt. (Oxon.).

Director of British School of Archaeology at Rome. Formerly Scholar of Christ Church, Oxford. Craven Fellow, 1897. Conington Prizeman, 1906. Member of the Imperial German Archaeological Institute.

Sir Thomas Barclay, M.P. (”

Member of the Institute of International Law. Member of the Supreme Council] tij-j, q oa « of the Congo Free State. Officer of the Legion of Honour. Author of Problems | nlsn OBa! > of International Practice and Diplomacy; &c. M.P. for Blackburn, 1910. I

J Holiday.

Heraclea (in part)- Hispellum.

{

Hosiery.

Thomas Brown.

Incorporated Weaving, Dyeing and Printing College, Glasgow.

T. F. Henderson.

Author of The Casket Letters and Mary Queen of Scots; Life of Robert Burns; &c.

Thomas Gilray, M.A.

Formerly Professor of Modern History and English Literature, University College, < Dundee. • |_

Colonel Sir Thomas Hungerford Holdich, K.C.M.G., K.C.I.E., Hon. D.Sc. Superintendent Frontier Surveys, India, 1892-1898. Gold Medallist, R.G.S., London, 1887. Author of The Indian Borderland; The Countries of the King’s Award; India; Tibet; &c.

Sir Thomas Little Heath, K.C.B., D.Sc.

Assistant Secretary to the Treasury. Formerly Fellow of Trinity College, Cam- ” bridge.

Thomas Seccombe, M.A.

Balliol College, Oxford. Lecturer in History, East London and Birkbeck Colleges, University of London. Stanhope Prizeman, Oxford, 1887. Assistant Editor' of Dictionary of National Biography, 1891-1901. Author of The Age of Johnson; joint-author of Bookman History of English Literature; &c.

Thomas Woodhouse.

Head of the Weaving and Textile Designing Department, Technical College, Dundee. "^

Thomas William Allen, M.A.

Fellow and Tutor of Queen's College, Oxford. Joint-editor of The Homeric Hymns. \ '

Rev. William Augustus Brevoort Coolidge, M.A. , F.R.G.S., Ph.D. THautes Alpes*

Fellow of Magdalen College, Oxford. Professor of English History, St David's I xi_„f c», „• .' College, Lampeter, 1880-1881. Author of Guide to Switzerland; The Alps in Nature') H auie-aavoie, and in History; &c. Editor of The Alpine Journal, 1 880-1 889. [Herzog, Hans.

4 Hooker, Richard.

[Henderson, Alexander

(in part).

Helmund; Herat; Himalaya; Hindu Kush.

Hero of Alexandria.

Hayward > Abraham; Hughes, Thomas.

-I Hose-Pipe.

Si -j Homer Q n part).

Walter Alison Phillips, M.A.

rHohenlohe (in part).

Formerly Exhibitioner of Mer'ton College and Senior Scholar of St John's College, J Holy A1,iance > Tne : Oxford. Author oi Modern Europe; &c. Hononus I.;

[Hungary: History (in part).

William Bacher, D.Ph.

Professor of Biblical Studies at the Rabbinical Seminary, Budapest.

Hillel.

William Fream, LL.D. (d. 1907). r„ .

Formerly Lecturer on Agricultural Entomology, University of Edinburgh, and J ™°P' Agricultural Correspondent of The Times. 1 Horse (in part).

William Feilden Craies, M.A. r

Barrister-at-Law, Inner Temple. Lecturer on Criminal Law at King's College, J Homicide. London. Editor of Archbold's Criminal Pleading (23rd ed.). [

Walter George Headlam (1866- 1908). r

Fellow of King's College, Cambridge. Editor of Herodas. Translator of the plays J Herodas. of Aeschylus. 1

Sir William Henry Flower, F.R.S. f _

t See the biographical article, Flower, Sir W. H. ˆ *"TSe \m part).

William Henry Hadow, M.A., Mus.Doc. r

Principal, Armstrong College, Newcastle-on-Tyne. Formerly Fellow and Tutor) tj„ v j_ of Worcester College, Oxford. Member of Council, Royal College of Music. Editor 1 Ma J an * of Oxford History of Music. Author of Studies in Modern Music; &c. |

13

INITIALS AND HEADINGS OF ARTICLES

X1U

w.

M

R.

w.

P.

J.

w.

R.

Ni.

w.

R.

S.

w.

R.

S.-R

Howe, Joseph.

s,|)

j Harris, Thomas Lake. j Hosea

W. L. G. William Lawson Grant, M.A.

Professor at Queen's University, Kingston, Canada. Formerly Beit Lecturer in . Colonial History at Oxford University. Editor of Acts of the Privy Council, Colonial Series ; Canadian Constitutional Development (in collaboration). L

William Michael Rossetti JHaydon, Benjamin Robert.

See the biographical article, Rossetti, Dante Gabriel. L

William Price James.

University College, Oxford. Barrister-at-Law. High Bailiff of County Courts, -j Henley, W. E. Cardiff. Author of Romantic Professions ; &c.

Sir William Robertson Nicoll, LL.D.

See the biographical article, Nicoll, Sir W. R.

William Robertson Smith, LL.D. H ..

See the biographical article, Smith, William Robertson. “^nosea [m part).

William Ralston Shedden-Ralston, M.A. J”

Assistant in the Department of Printed Books, British Museum. Author of Russian ~i Hertzen. Folk Tales ; &c. I

W. R. W. William Robert Worthington Williams, F.L.S. f

Superintendent of London County Council Botany Centre. Assistant Lecturer J tinrtipnHnro t m *■ -A in Botany, Birkbeck College (University of London). Member of the Geologists’ | norucuuure U» part). Association. I

W. T. H. William Tod Helmtjth, M.D., LL.D. (d. iooi).

Formerly Professor of Surgery and Dean of the Homoeopathic and Medical College and Hospital New York. President of the Collins State Homoeopathic Hospital. Sometime President of the American Institute of Homoeopathy and the New York State Homoeopathic Medical Society. Author of Treatise on Diphtheria; System of Surgery ; &c.

W. W. William Wallace, LL.D.

See the biographical article, WALLACE, WlLLIAM (1844-1897).

W. Wr. Williston Walker, Ph.D., D.D.

Professor of Church History, Yale University. Author of History of the Congrega- tional Churches in the United States ; The Reformation ; John Calvin ; &c.

W. Y. S. William Young Sellar, LL.D.

See the biographical article, Sellar, W. Y.

Homoeopathy.

4 Hegel

{in part).

{

Hopkins, Samuel.

Horace (in pari).

PRINCIPAL UNSIGNED ARTICLES

Harrow.

Hartford.

Hartlepool.

Harvard University.

Harz Mountains.

Hat.

Havana.

Hawaii.

Hazel.

Health.

Heath.

Hebrides, The.

Heidelberg Catechism.

Heligoland.

Heliostat.

Hellebore.

Helmet

Hemp.

Herbarium.

Herefordshire.

Hero.

Hertfordshire.

Hesse.

Hesse-Cassel.

Hesse-Darmstadt.

High Place.

Highway.

Hockey.

Holly.

Homily.

Honduras.

Hong-Kong.

Hostage.

Hottentots.

Household, Royal.

Hudson’s Bay Company.

Huntingdonshire.

ENCYCLOPEDIA BRITANNICA

ELEVENTH EDITION

VOLUME XIII

HARMONY (Gr. apuovia, a concord of musical sounds, apfiofav to join; apjMVLK-q (sc. rexvif) meant the science or art of music, novaiK-q being of wider significance), a combination of parts so that the effect should be aesthetically pleasing. In its earliest sense in English it is applied, in music, to a pleasing combination of musical sounds, but technically it is confined to the science of the combination of sounds of different pitch.

I. Concord and Discord. — By means of harmony modern music has attained the dignity of an independent art. In ancient times, as at the present day among nations that have not come under the influence of European music, the harmonic sense was, if not altogether absent, at all events so obscure and undeveloped as to have no organizing power in the art. The formation by the Greeks of a scale substantially the same as that which has received our harmonic system shows a latent harmonic sense, but shows it in a form which positively excludes harmony as an artistic principle. The Greek perception of certain successions of sounds as concordant rests on a principle identifiable with the scientific basis of concord in simultaneous sounds. But the Greeks did not conceive of musical simultaneity as consisting of anything but identical sounds; and when they developed the practice of magadizing — i.e. singing in octaves — they did so because, while the difference between high and low voices was a source of pleasure, a note and its octave were then, as now, perceived to be in a certain sense identical. We will now start from this fundamental identity of the octave, and with it trace the genesis of ether concords and discords; bearing in mind that the history of harmony is the history of artistic instincts and not a series of progressive scientific theories.

The unisonous quality of octaves is easily explained when we examine the ” harmonic series ” of upper partials (see Sound). Every musical sound, if of a timbre at all rich (and hence pre-eminently the human voice), contains some of these upper partials. Hence, if one voice produce a note which is an upper

Ex. i. — The notes marked * are out of tune.

m.^^L

rf»_

pti_

i 2 3 4 s 6 7 8 9 10 ii 12

partial of another note sung at the same time by another voice, the higher voice adds nothing new to the lower but only rein- forces what is already there. Moreover, the upper partials of the

higher voice will also coincide with some of the lower. Thus, if a note and its octave be sung together, the upper octave is itself No. 2 in the harmonic series of the lower, No. 2 of its own series is No. 4 of the lower, and its No. 3 is No. 6, and so on. The impression of identity thus produced is so strong that we often find among people

unacquainted with music a firm conviction that a man is singing in unison with a boy or an instrument when he is really singing in the octave below. And even musical people find a difficulty in realizing more than a certain brightness and richness of single tone when a violinist plays octaves per- fectly in tune and with a strong emphasis on the lower notes. Doubling in octaves therefore never was and never will be a process of harmonization.

Now if we take the case of one sound doubling another in the 1 2th, it will be seen that here, too, no real addition is made by the higher sound to the lower. The 1 2th is No. 3 of the harmonic series, No. 2 of the higher note will be No. 6 of the lower, No. 3 will be No. 9, and so on. But there is an important difference between the 12th and the octave. However much we alter the octave by transposition into other octaves, we never get anything but unison or octaves. Two notes two octaves apart are just as devoid of harmonic difference as a plain octave or unison. But, when we apply our principle of the identity of the octave to the 1 2th, we find that the removal of one of the notes by an octave may produce a combination in which there is a distinct harmonic element. If, for example, the lower note is raised by an octave so that the higher note is a fifth from it, No. 3 of the harmonic series of the higher note will not belong to the lower note at all. The 5th is thus a combination of which the two notes are obviously different; and, moreover, the principle oLthe identity of octaves can now operate in a contrary direction aUd transfer this positive harmonic value of the. 5th to the 12th, so that we regard the 12th as a 5th plus an octave, instead of regarding the 5th as a compressed 12th. 1 At the same time, the relation between the two is quite close enough to give the 5th much of the feeling of harmonic poverty and reduplication that characterizes the octave; and hence when medieval musicians

1 Musical intervals are reckoned numerically upwards along the degrees of the diatonic scales (described below). Intervals greater than an octave are called compound, and are referred to their simple forms, e.g. the 12th is a compound 5th.

doubled a melody in sths and octaves they believed themselves to be doing no more than extending and diversifying the means by which a melody might be sung in unison by different voices. How they came to prefer for this purpose the 4th to the 5th seems puzzling when we consider that the 4th does not appear as a fundamental interval in the harmonic series until that series has passed beyond that part of it that

maintains any relation to our musical ideas. But it was of course certain that they obtained the 4th as the inversion of the 5th; and it is at least possible that the singers of lower voices found a peculiar pleasure in singing below higher voices in a position which they felt harmonically as that of a top part. That is to say, a bass, in singing a fourth below a tenor, would take pleasure in doubling in the octave an alto singing normally a 5th above the tenor. 1 This should also, perhaps, be taken in connexion with the fact that the interval of the downward 4th is in melody the earliest that became settled. And it is worth noticing that, in any singing-class where polyphonic music is sung, there is a marked tendency among the more timid members to find their way into their part by a gentle humming which is generally a 4th below the nearest steady singers.

The limited compass of voices soon caused modifications in the medieval parallelisms of 4ths and 5ths, and the introduction of independent ornaments into one or more of the voices increased to an extent which drew attention to other intervals. It was long, however, before the true criterion of concord and discord was attained; and at first the notion of concord was purely acoustic, that is to say, the ear was sensitive only to the difference in roughness and smoothness between combinations in them- selves. And even the modern researches of Helmholtz fail to represent classical and modern harmony, in so far as the pheno- mena of beats are quite independent of the contrapuntal nature of concord and discord which depends upon the melodic intelligi- bility of the motion of the parts. Beats give rise to a, strong physical sense of discord akin to the painfulness of a flickering light (see Sound). Accordingly, in the earliest experiments in harmony, the ear, in the absence of other criteria, attached much more importance to the purely acoustic roughness of beats than our ears under the experience of modern music. This, and the circumstance that the imperfect concords 2 (the 3rds and 6ths) long remained out of tune owing to the incom- pleteness of the Pythagorean system of harmonic ratios, sufficiently explain the medieval treatment of these combinations as discords differing only in degree from the harshness of 2nds and 7ths. In the earliest attempts at really contrapuntal writing (the astonishing 13th and 14th- century motets, in which voices are made to sing different melodies at once, with what seems to modern ears a total disregard of sound and sense) we find that the method consists in a kind of rough-hewing by which the concords of the octave, 5th and 4th are provided at most of the strong accents, while the rest of the. harmony is left to take care of itself. As the art advanced the imperfect concords began to be felt as different from the discords; but as their true nature appeared it

brought with it such an increased sense of the harmonic poverty of octaves, 5ths and 4ths, as ended in a complete inversion of the earliest rules of harmony.

The harmonic system of the later 15th century, which cul- minated in the “golden age” of the 16th-century polyphony, may be described as follows: Imagine a flux of simultaneous inde- pendent melodies, so ordered as to form an artistic texture based not only on the variety of the melodies themselves, but also upon gradations between points of repose and points in which the roughness of sound is rendered interesting and beautiful by means of the clearness with which the melodic sense in each part indicates the convergence of all towards the next point of repose. The typical point of repose owes its effect not only to the acoustic smoothness of the combination, but to the fact that it actually 1 It is at least probable that this is one of the several rather obscure reasons for the peculiar instability of the 4th in modern harmony, which is not yet satisfactorily explained.

■ The ‘jerfect concords are the octave, unison, 5th and 4th. Other diatonic combinations, whether concords or discords, are called imperfect.

consists of the essential elements present in the first five notes of the harmonic series. The major 3rd has thus in this scheme asserted itself as a concord, and the fundamental principle of the identity of octaves produces the result that any combination of a bass note with a major 3rd and a perfect 5th above it, at any distance, and with any amount of doubling, g

may constitute a concord available even as the Ex QEˆpzE

final point of repose in the whole composition. zˆE—

And by degrees the major triad, with its major ~ &

3rd, became so familiar that a chord consisting of a bare 5th, with or without an octave, was regarded rather as a skeleton triad without the 3rd than as a concord free from elements of imperfection. Again, the identity of the octave secured for the combination of a note with its minor 3rd and minor 6th a place among concords; because, whether so recognized by early theorists or not, it was certainly felt as an inversion of the major triad. The fact that its bass note is not the fundamental note (and therefore has a series of upper partials not compatible with the higher notes) deprives it of the finality and perfection of the major triad, to which, however, its relationhsip is too

near for it to be felt otherwise than as a concord. This sufficiently explains

why the minor 6th ranks as a concord -y ■ — – — .

in music, though it is acoustically nearly Ex. 3. SESEbEgE3 as rough as the discord of the minor 7th, »

and considerably rougher than that of the 7th note of the harmonic series, which has not become accepted in our musical system at all.

But the major triad and its inversion are not the only concords that will be produced by our flux of melodies. From time to time this flux will arrest attention by producing a combination which, while it does not appeal to the ear as being a part of the harmonic chord of nature, yet contains in itself no elements not already present in the major triad. Theorists have in vain tried to find in ” nature ” a combination of a note with its minor 3rd and perfect 5th; and so long as harmony was treated unhistori- cally and unscientifically as an a priori theory in which every chord must needs have a ” root,” the minor triad, together with nearly every other harmonic principle of any complexity, remained a mystery. But the minor triad, as an artistic and not purely acoustic phenomenon, is an inevitable thing. It has the character of a concord because of our intellectual percep- tion that it contains the same elements as the major triad; but its absence of connexion with the natural harmonic series deprives it of complete finality in the simple system of 16th-century harmony, and at the same time gives it a permanent contrast with the major triad; a contrast which is acoustically intensified by the fact that, though its intervals are in themselves as con- cordant as those of the major triad, their relative position produces decidedly rough combinations of “resultant tones.”

By the time cur flux of melodies had come to include the major and minor triads as concords, the notion of the independence of parts had become of such paramount importance as totally to revolutionize the medieval conception of the perfect concords/ Fifths and octaves no longer formed an oasis in a desert of cacophony, but they assumed the character of concord so nearly approaching to unison that a pair of consecutive sths or octaves began to be increasingly felt as violating the independence of the parts. And thus it came about that in pure 16th-century counterpoint (as indeed at the present day whenever harmony and counterpoint are employed in their purest significance) consecutive 5ths and octaves are strictly forbidden. When we compare our laws of counterpoint with those of medieval discant (in which

consecutive 5ths and octaves are the rule, while con- secutive 3rds and 6ths are strictly forbidden) we are sometimes tempted to think that the very nature of the human ear has changed. But it is now generally recognized that the process was throughout natural and inevitable, and the above account aims at showing that consecutive 5ths are forbidden by our harmonic system for the very reason which inculcated them in the system of the 12th century.

II. Tonality. — As soon as the major and minor triad and their first inversions were well-defined entities, it became evident that

the successions of these concords and their alternations with discord involved principles at once larger and more subtle than those of mere difference in smoothness and artificiality. Not only was a major chord (or at least its skeleton) necessary for the final point of repose in a composition, but it could not itself sound final unless the concords as well as the discords before it showed a well-defined tendency towards it. This tendency was best realized when the penultimate concord had its fundamental note at the distance of a 5th or a 4th above or below that of the final chord. When the fundamental note of the penultimate chord is a 5th above or (what is the same thing) a 4th below that of the final chord, we have an ” authentic ” or ” perfect ” cadence, and the relation between the two chords is very clear. While the contrast between them is well marked, they have one note in common — for the root of the penultimate chord is the 5th of the final chord; and the statement of this common note, first as an octave or unison and then as a 5th, expresses the first facts of harmony with a force which the major 3rds of the chords can only strengthen, while it also involves in the bass that melodic interval of the 4th or the 5th which is now known

3 to be the germ of all melodic scales. The

EEjjEgEd relation of the final note of a scale with its ■3- upper 5th or lower 4th thus becomes a

fundamental fact of complex harmonic significance — that is to say, of harmony modified by melody in so far as it concerns the succession of sounds as well as their simultaneous combination. In our modern key-system the final note of the scale is called the tonic, and the 5th above or 4th below it is the dominant. (In the 1 6th century the term ” dominant ” has this meaning only in the ” authentic ” modes other than the Phrygian, but as an aesthetic fact it is present in all music,

though the theory here given would not have been intelligible to any composers before the 18th century). Another penultimate chord asserts itself as the converse of the dominant — namely, the chord of which the root is a 5th below or a 4th above the final. This chord has not that relationship to the final which the dominant chord shows, for its fundamental note is not in the harmonic series of the final. But the fundamental note of the final chord is in its harmonic series, and in fact stands to it as the dominant stands to the final. Thus the progression from subdominant, as it is called, to tonic, or final, forms a full close known as the ” plagal cadence,” second only in importance to the ” perfect ”

_o or ” authentic cadence.” In our modern

i—ˆ--jp=ˆz : \ key-system these three chords, the tonic, * the dominant and the subdominant, form

Ex. 5.

a firm harmonic centre in reference to which all other chords are grouped. The tonic is the final in which everything ultimately resolves: the dominant stands on one side of it as a chord based on the note harmonically most closely related to the tonic, and the subdominant stands on the other side as the converse and opposite of the dominant, weaker than the dominant because not directly derived from the tonic. The other triads obtainable from the notes of the scale are all minor, and of less importance; and their relationship to each other and to the tonic is most definite when they are so grouped that their basses rise and fall in 4th and 5ths, because they then tend to imitate the relation- ship between tonic, dominant and subdominant.

Ex. 6.

Tonic. Supertonic. Mediant. Sub- Dominant. Sub- dominant. mediant.
1

=t

Here are the six common chords of the diatonic scale. The triad on the 7th degree or ” leading-note ” (B) is a discord, and is therefore not given here.

Now, in the 16th century it was neither necessary nor desirable that chords should be grouped exclusively in this way. The relation between tonic, dominant and subdominant must necessarily appear at the final close, and in a lesser degree at

1 The submediant is so-called because if the subdominant is taken a 5th below the tonic, the submediant will come midway between it and the tonic, as the mediant comes midway between tonic and dominant.

subordinate points of repose; but, where no harmonies were dwelt on as stable and independent entities except the major and minor triads and their first inversions, a scheme in which these were confined to the illustration of their most elementary relationship would be intolerably monotonous. It is therefore neither surprising nor a sign of archaism that the tonality of modal music is from the modern point of view often very in- definite. On the contrary, the distinction between masterpieces and inferior works in the 16th century is nowhere more evident than in the expressive power of modal tonality, alike where it resembles and where it differs from modern. Nor is it too much to say that that expressive power is based on the modern sense of key, and that a description of modal tonality in terms of modern key will accurately represent the harmonic art of Palestrina and the other supreme masters, though it will have almost as little in common with 16th-century theory and inferior 16th- century practice as it has with modern custom. We must conceive modal harmony and tonality as a scheme in which voices move independently and melodiously in a scale capable of bearing the three chords of the tonic, dominant and sub- dominant, besides three other minor triads, but not under such restrictions of symmetrical rhythm and melodic design as will necessitate a confinement to schemes in which these three cardinal chords occupy a central position. The only stipulation is that the relationship of at least two cardinal chords shall appear at every full close. At other points the character and drift of the harmony is determined by quite a different principle — namely, that, the scale being conceived as indefinitely extended, the voices are agreed in selecting a particular section of it, the position of which determines not only the melodic character of each part but also the harmonic character of the whole, according to its greater or less remoteness from the scale in which major cardinal chords occupy a central position. Historically these modes were derived, with various errors and changes, from the purely melodic modes of the Greeks. Aesthetically they are systems of modern tonality adapted to conditions in which the range of harmony was the smallest possible, and the necessity for what we may conveniently call a clear and solid key-perspective incomparably slighter than that for variety within so narrow a range. We may thus regard modal harmony as an essentially modern scheme, presented to us in cross-sections of various degrees of obliquity, and modified at every close so as either to take us to a point of view in which we see the harmony sym- metrically (as in those

modes 2 of which the final chord is normally major, namely the Ionian, which is practically our major scale, the Mixolydian and the Lydian, which last is almost invariably turned into Ionian by the systematic flattening of its 4th degree) or else to transform the mode itself so that its own notes are flattened and sharpened into suitable final chords (as is necessary in those modes of which the triad on the final is normally minor, namely, the Dorian, Phrygian and Aeolian). In this way we may describe Mixolydian tonality as a harmonic scheme in which the keys of G major and C major are so combined that sometimes we feel that we are listening to harmony in C major that is disposed to overbalance towards the dominant, and sometimes that we are in G major with a pronounced leaning towards the subdominant. In the Dorian mode our sensations of tonality are more confused. We seem to be wandering through all the key-relationships of a minor tonic without defining anything, until at the final close the harmonies gather strength and bring us, perhaps with poetic surprise, to a close in D with a major chord. In the Phrygian mode the difficulty in forming the final close is such that classical Phrygian compositions actually end in what we feel to be a half-close, an impression which is by the great masters rendered perfectly artistic by the strong feeling that all such parts of the composition as do not owe their ex- pression to the variety and inconstancy of their harmonic drift are on the dominant of A minor.

It cannot be too strongly insisted that the expression of modal music is a permanent artistic fact. Its refinements may be crowded out by the later tonality, in which the much greater 2 See Plain. Song.

Ex. 7. Suspension.

No. 8. Passing Notes.

?HˆEt

m

variety of fixed chords needs a much more rigid harmonic scheme to control it, but they can never be falsified. And when Beethoven in his last ” Bagatelle ” raises the 6th of a minor scale for the pleasure he takes in an unexpectedly bright major chord; or when, in the Incarnatus of his Mass in D, he makes a free use of the Dorian scale, he is actuated by precisely the same harmonic and aesthetic motives as those of the wonderful opening of Palestrina’s eight-part Stabat

Mater; just as in the Lydian figured chorale in his A minor Quartet he carries out the principle of harmonic variety, as produceable by an oblique melodic scale, with a thoroughness from which Palestrina himself would have shrunk. (We have noted that in 16th-century music the Lydian mode is almost invariably Ionicized.)

III. Modern Harmony and Tonality. — In the harmonic system of Palestrina only two kinds of discord are possible, namely, suspensions and passing-notes. The principle of the suspension

is that while parts are moving from one concord to another _ one of the parts remains

I * » behind, so as to create a

-ˆ— *-«-«z«! zzfrrˆ — i discord at the moment when V ~ji : SS5 = fei £ˆ = J the other parts proceed. The ˆ — ‘ suspended part then goes on

to its concordant note, which must lie on an adjacent (and in most cases a lower) degree of the scale. Passing-notes are produced transiently by the motion of a part up or down the scale while other parts remain stationary. The possibilities of these two devices can be worked out logically so as to produce combinations of extreme harshness. And, when combined with the rules which laid on the performers the responsibility for modifying the strict scale of the mode in order to form satis- factory closes and avoid melodic harshness, they some- times gave rise to combinations which the clearest artistic intellects of the 16th century perceived as incompatible with the modal style. For example, in a passage written thus

the singer of the lower

part would be obliged

Ex »•

order to avoid the ugly “tritone” be- tween F and B, while the other singer would be hardly less likely on the spur of the moment to sharpen his G under the impression that he was making a close; and thus one of the most complex and characteristically modern discords, that of the augmented 6th, did frequently occur in 16th-century performances, and was not always regarded as a blunder. But if the technical principles of 16th-century discord left much to the good taste of composers and singers, they nevertheless in conjunction with that good taste severely restricted the resources of harmony; for, whatever the variety and artificiality of the discords admitted by

them, they all had this in common, that every discord was transient and could only arise as a phenomenon of delay in the movement of one or more parts smoothly along the scale (” in conjunct motion “) or of a more rapid motion up and down the scale in which none but the rigorously concordant first and last notes received any emphasis. No doubt there were many licenses (such as the ” changing-note “) which introduced discords by skip, or on the strong beat without preparation, but these were all as natural as they were illogical. They were artistic as intelligible accidents, precisely like those which make language idiomatic, such as ” attraction of the relative ” in Greek. But when Monteverde and his fellow monodists tried experi- ments with unprepared discords, they opened up possibilities far too vast to be organized by them or by the next three genera- tions. We have elsewhere compared the difference between early and modern harmony with that between classical Greek, which is absolutely literal and concrete in expression, and modern English, which is saturated with metaphors and abstractions. We may go further and say that a 16th-century discord, with its preparation and resolution, is, on a very small scale, like a simile, in which both the figure and its interpretation are given, whereas modern discord is like the metaphor, in which the figure

ˆE

m

F%-7B — «

eeˆ

1

is a substitute for and not an addition to the plain statement. It is not surprising that the sudden opening up of the whole possibilities of modern harmony at the end of the 16th century at first produced a chaos of style.

Another feature of the harmonic revolution arose from the new habit of supporting a single voice on chords played by an instrument. ‘This, together with the use of discords in a new sense, drew attention to the chords as things in themselves and not as moments of greater or less repose in a flux of independent melodies. This was as valuable an addition to musical thought and expression as the free use of abstract terms is in literature, but it had precisely the same dangers, and has until recent times vitiated harmonic theory and divorced it from the modest observation of the practice of great masters. When, early in

the 18th century, Rameau devoted much of his best energy to the elaboration of a theory of harmony, his field of observation was a series of experiments begun in chaos and resolved, not as yet in a great art, but in a system of conventions, for the contemporary art of Bach and Handel was beyond the scope of contemporary theory. He showed great analytical genius and sense of tonality in his development of the notion of the ” fundamental bass,” and it is rather to his credit than otherwise that he did not emphasize the distinction between discords on the dominant and those on other degrees of the scale. But his system, with all subsequent improvements, refutations and repairs only led to that bane of 19th-century theory and source of what may be called the journalese of harmonic style, according to which every chord (no matter how obviously artificial and transient) must be regarded, so to speak, as a literal fact for which a root and a scientific connexion with the natural harmonic series must at all cost be found. Some modern theorists have, however, gone too far in denying the existence of harmonic roots altogether, and certainly it is neither scientific nor artistic to regard the coincidence of the major triad with the first five notes of the harmonic series as merely accidental. It is not likely that the dominant 7 th owes all its naturalness to a resemblance to the flat 7th of the harmonic series, which is too far out of tune even to pass for an augmented 6th. But the dominant major 9th certainly gains in sonorousness from its coincidence with the 9th harmonic, and many cases in music could be found where the dominant 7th itself would gain from being so far flattened as to add coincidence with a natural harmonic to its musical significance as an unprepared discord (see, for example the ” native wood-notes wild ” of the distant huntsmen in the second act of Tristan und Isolde, where also the 9th and 1 ith are involved, and, moreover, on horns, of which the natural scale is the harmonic series itself). If the distinction between ” essential ” and ” unessential ” discords is, in the light of history and common sense, a difference only in degree, it is thus none the less of great aesthetic importance. Arithmetic and acoustics show that in proportion as musical harmony emphasizes combinations belonging to the lower region of the harmonic series the effect will be sonorous and natural; but common sense, history and aesthetics also show that the inter- action of melody, harmony and rhythm must produce a host of combinations which acoustics alone cannot possibly explain. These facts are amply competent to explain themselves. To describe them in detail is beyond the scope of the present article, but a few examples from different periods are given at the end in musical type.

IV. The Minor Mode. — When the predecessors of Bach and Handel

had succeeded in establishing a key-system able to bear the weight of free discord, that key-system took two forms, in both of which the three chords of tonic, dominant and sub- dominant occupied cardinal points. In the one form the tonic chord was natural, that is to say, major. In the other form the tonic chord was artificial, that is to say, minor. In the minor mode so firm is the position of the tonic and dominant (the dominant chord always being major) that it is no longer necessary, as in the 16th century, to conclude with a major chord, although it long remained a frequent practice, rather because of the inherent beauty and surprise of the effect than because of any

mere survival of ancient customs, at least where great masters are concerned. (This final major chord is known as the Tierce de Picardie.) The effect of the minor mode is thus normally plaintive because it centres round the artificial concord instead of the natural; and; though the keynote bears this minor artificial triad, the ear nevertheless has an expectation (which may be intensified into a powerful emotional effect) that the final conclusion of the harmonic scheme may brighten out into the more sonorous harmonic system of major chords. Let us once more recall those ecclesiastical modes of which the 3rd degree is normally minor. We have seen how they may be regarded as the more oblique of the various cross-sections of the 16th-century harmonic scheme. Now, the modern minor mode is too firmly rooted in its minor tonic chord for the 16th-century feeling of an oblique harmonic scheme to be of more than secondary importance, though that feeling survives, as the discussion of key-relationships will show us. But it is constantly thrust into the background by the new possibility that the minor tonic chord with its attendant minor harmonies may give place to the major system round the same tonic, and by the certainty that if any change is made at the conclusion of the work it will be upon the same tonic and not have reference to some other harmonic centre. In other words, a major and minor key on the same tonic are felt as identical in everything but expression (a point in which the Tonic Sol Fa system, as hitherto practised, with its identification of the minor key with its ” relative ” instead of its tonic major, shows a most unfortunate confusion of thought). The characteristics of the major and minor modes may of course be modified by many artistic considerations, and it would be as absurd to develop this account into a scheme of pigeon-holed passions as to do the same for the equally obvious and closely parallel fact that in drama a constant source of pathos is the placing of our sympathies in an oblique relation to the natural sequence of events or to the more universal issues of the subject.

V. Key- Relationships. — On the modern sense of the identity of the tonic in major and minor rests the whole distinctive character of modern harmony, and the whole key-system of the classical composers. The masters of the 16th century naturally found it necessary to make full closes much more frequently than would be desirable if the only possible close was that on the final of the mode. They therefore formed closes on other notes, but they formed them on these exactly as on a final. Thus, a close on the second degree of the Ionian mode was identical with a Dorian final close. The notes, other than the final, on which closes could be made were called modulations. And what between the three ” regular modulations ” (known as the dominant, mediant, and participant) and the ” conceded modula- tions,” of which two were generally admitted in each mode simply in the interests of variety, a composer was at liberty to form a full close on any note which did not involve too many extraneous sharps or flats for its correct accomplishment. But there was a great difference between modal and modern con- ceptions of modulation. We have said that the close on the second degree of the Ionian mode was Dorian, but such a modula- tion was not regarded as a visit paid to the Dorian mode, but merely as the formation of a momentary point of repose on the second degree of the Ionian mode. When therefore it is said that the modulations of 16th-century music are ” purposeless and shifting,” the criticism implies a purpose in change of key which is wholly irrelevant. The modal composers’ purpose lay in purely local relationships of harmony, in various degrees of refinement which are often crowded out of the larger and more coarse-grained scheme of modern harmony, but which modern harmony is perfectly capable of employing in precisely the same sense whenever it has leisure.

Modulation, in the modern sense of the term, is a different thing. The modern sense of tonality is so firm, and modern designs so large, that it is desirable that different portions of a composition should be arranged round different harmonic centres or keys, and moreover that the relation between these keys and the primary key should be telt, and the whole design

should at last return to the primary key, to remain there with such emphasis and proportion as shall leave upon the mind the impression that the whole is in the primary key and that the foreign keys have been as artistically grouped around it as its own local harmonies. The true principles on which keys are related proved so elastic in the hands of Beethoven that their results utterly outstripped the earlier theory which adhered desperately to the limitations of the 16th century; and so vast is the range of key which Beethoven is able to

organize in a convincing scheme of relationship, that even modern theory, dazzled by the true harmonic possibilities, is apt to come to the conclusion, more lame and impotent than any ancient pedantry, that all keys are equally related. A vague conception, dubbed ” the unity of the chromatic scale,” is thus made to explain away the whole beauty and power of Wagner’s no less than Beethoven’s harmonic system. We have not space to dispute the matter here, and it must suffice to state dog- matically and statistically the classical facts of key-relationship, including those which Beethoven established as normal possi- bilities on the suggestion of Haydn, in whose works they appear as special effects.

a. Direct Relationships.- — The first principle on which two keys are considered to be related is a strengthening of that which determined the so-called modulations of the 16th-century modes. Two keys .are directly related when the tonic chord of the one is among the common chords of the other. Thus, D minor is related to C major because the tonic chord of D minor is the common chord on the supertonic of C (see Ex. 6). In the same way the four other related keys to C major are E minor the mediant, F major the subdominant, G major the dominant and A minor the submediant.

This last key-relationship is sometimes called the ” relative ” minor, partly because it is usually expressed by the same key- signature as the tonic, but probably more justifiably because it is the point of view from which to reckon the key-relationships of the minor tonic. If we take the minor scale in its ” harmonic ” form {i.e. the form deducible from its chords of minor tonic, minor subdominant and major dominant, without regard to the exigencies of melody in concession to which the ” melodic ” minor scale raises the 6th in ascent and flattens the 7th in descent), we shall find it impossible to build a common chord upon its mediant (Ex. 10). But we have ˆ

seen that A minor is related to C major; Ex. 10. £g£|g=3 therefore it is absurd to suppose that C «T s

major is not related to A minor. Clearly then we must deduce some of the relationships of a minor tonic as the converse of those of a major tonic. Thus we may read Ex. 6 backwards and reason as follows: A minor is the submediant of C major; therefore C major is the mediant or relative major of A minor. D minor is the supertonic of C major; therefore C major is related to D minor and may be called its flat 7 th. Taking A minor as our standard key, G major is then the flat 7th to A minor. The remaining major keys (C major to E minor = F major to A minor) may be traced directly as well as conversely; and the

subdominant, being minor, does not involve an appeal to the major scale at all. But with the dominant we find the curious fact that while the dominant chord of a minor key is major it is impossible to regard the major dominant key as directly related to the minor tonic, since it does not contain the minor tonic chord at all; e.g. the only chord of A in E major is A major. But the dominant minor key contains the tonic chord of the- primary minor key clearly enough as subdominant, and therefore when we modulate from a minor tonic to a minor dominant we feel that we have a direct key- relationship and have not lost touch with our tonic. Thus in the minor mode modulation to the dominant key is, though frequent and necessary, a much more uphill process than in the major mode, because the naturally major dominant chord has first to be contradicted. On the other hand, a contrast between minor tonic and major dominant key is very difficult to work on a large scale (as, for example, in the complementary key for second subjects of sonata movements) because, while the major dominant key behaves as if not directly

related to the minor tonic, it also gives a curious sensation of being merely on the dominant instead of in it; and thus we find that in the few classical examples of a dominant major second subject in a minor sonata-movement the second subject either relapses into the dominant minor, as in Beethoven's Kreulzer Sonata and the finale of Brahms's Third Symphony, or begins in it, as in the first movement of Brahms's Fourth Symphony.

The effect of a modulation to a related key obviously depends upon the change of meaning in the chords common to both keys, and also in the new chords introduced. Thus, in modulating to the dominant we invest the brightest chord of our first key with the finality and importance of a tonic; our original tonic chord becomes comparatively soft in its new position as sub- dominant; and a new dominant chord arises, surpassing in brilliance the old dominant (now tonic) as that surpassed the primary tonic. Again, in modulating to the subdominant the softest chord of the primary key becomes tonic, the old tonic is comparatively bright, and a new and softer subdominant chord appears. We have seen the peculiarities of modulation to the dominant from a minor tonic, and it follows from them that modulation from a minor tonic to the subdominant involves the beautiful effect of a momentary conversion of the primary tonic chord to major, the poetic and often dramatically ironical power of which is manifested at the conclusion of more than half the finest classical slow movements in minor keys, from Bach's Eb minor Prelude in the first book of the

Forty-eight to the slow movement of Brahms's G major Siring Quintet, Op. m.

The effect of the remaining key-relationships involves contrasts between major and minor mode; but it is otherwise far less defined, since the primary tonic chord does not occupy a cardinal position in the second key. These key-relationships are most important from a minor tonic, as the change from minor to major is more vivid than the reverse change. The smoothest changes are those to " relative " minor, " relative " major (C to A minor; C minor to Eb); and mediant minor and sub- mediant major (C to E minor; C minor to Ab). The change from major tonic to supertonic minor is extremely natural on a small scale, i.e. within the compass of a single melody, as may be seen in countless openings of classical sonatas. But on a large scale the identity of primary dominant with secondary sub- dominant confuses the harmonic perspective, and accordingly in classical music the supertonic minor appears neither in the second subjects of first movements nor as the key for middle movements. 1 But since the key-relationships of a minor tonic are at once more obscure harmonically and more vivid in con- trast, we find that the converse key-relationship of the flat 7th, though somewhat bold and archaic in effect on a small scale, has once or twice been given organic function on a large scale in classical movements of exceptionally fantastic character, of which the three great examples are the ghostly slow movement of Beethoven's D major Trio, Op. 70, No. 1, the scherzo of his Ninth Symphony, and the finale of Brahms's D minor Violin Sonata (where, however, the C major theme soon passes per- manently into the more orthodox dominant minor).

Thus far we have the set of key-relationships universally recognized since the major and minor modes were established, a relationship based entirely on the place of the primary tonic chord in the second key. It only remains for us to protest against the orthodox description of the five related keys as being the " relative " minor or major and the dominant and sub- dominant with their " relative " minors or majors; a conception which expresses the fallacious assumption that keys which are related to the same key are related to one another, and which thereby implies that all keys are equally related and that classical composers were fools. It cannot be too strongly insisted that there is no foundation for key-relationship except through a tonic, and that it is through the tonic that the most distant keys

1 Until Beethoven developed the resources for a wider scheme of key-contrasts, the only keys for second subjects of sonata-movements were the dominant (when the tonic was major) and the " relative " major or

dominant minor (when the tonic was minor). A wider range was possible only in the irresponsible style of D. Scarlatti.

have always been connected by every composer with a wide range of modulation, from Haydn to Brahms and (with due allowance for the conditions of his musical drama) Wagner.

b. Indirect Relationships. — So strong is the indentity of the tonic in major and minor mode that Haydn and Mozart had no scruple in annexing, with certain reservations, the key-relation- ships of either as an addition to those of the other. The smooth- ness of Mozart's style makes him prefer to annex the key-relation- ships of the tonic minor (e.g. C major to Ab, the submediant of C minor), because the primary tonic note is in the second key, although its chord is transformed. His range of thought does not allow him to use these keys otherwise than episodically; but he certainly does not treat them as chaotically remote by confining them to rapid modulations in the development-portions of his movements. They occur characteristically as beautiful purple patches before or during his second subjects. Haydn, with his mastery of rational paradox, takes every opportunity, in his later works, of using all possible indirect key-relationships in the choice of key for slow movements and for the trios of minuets. By using them thus sectionally (i.e. so as not to involve the organic connecting links necessary for the complementary keys of second subjects) he gives himself a free hand; and he rather prefers those keys which are obtained by transforming the minor relationships of a major primary key (e.g. C to A major instead of A minor). These relationships are of great brilliance and also of some remoteness of effect, since the primary tonic note, as well as its chord, disappears entirely. Haydn also obtains extreme contrasts by changing both modes (e.g. C minor to A major, as in the G minor Quartet, Op. 72, No 6, where the slow movement is in E major), and indeed there is not one key-contrast known to Beethoven and Brahms which Haydn does not use with complete sense of its meaning, though his art admits it only as a surprise.

Beethoven rationalized every step in the whole possible range of key-relationship by such harmonic means as are described in the article Beethoven. Haydn's favourite key-relationships he used for the complementary key in first movements; and he at once discovered that the use of the major mediant as complementary key to a major tonic implied, at all events just as much suggestion of the submediant major in the recapitula- tion as would not keep the latter half of the movement for too long out of the tonic. The converse is not the case, and where Beethoven uses the submediant major as complementary

key in a major first movement he does not subsequently introduce the still more remote and brilliant mediant in the recapitulation. The function of the complementary key is that of contrast and vividness, so that if the key is to be remote it is as well that it should be brilliant rather than sombre; and accordingly the easier key-relationships obtainable through transforming the tonic into minor do not appear as complementary keys until Beethoven's latest and most subtle works, as the Quartet in B\>, Op. 130 (where we again note that the flat submediant of the exposition is temporarily answered by the flat mediant of the recapitulation).

c. Artificial Key-relationships. — Early in the history of the minor mode it was discovered that the lower tetrachord could be very effectively and naturally altered so as to resemble the upper (thus producing the scale C Db Et(F, G Ab Btf C). This produces a flat supertonic (the chord of which is generally pre- sented in its first inversion, and is known as the Neapolitan 6th, from its characteristic use in the works of the Neapolitan school which did so much to establish modern tonality) and its origi*, as just described, often impels it to resolve on a major tonic chord. Consequently it exists in the minor mode as a pheno- menon not much more artificial than the mode itself; and although the keys it thus connects are extremely remote, and the effect of their connexion very surprising, the connexion is none the less real, whether from a major or a minor tonic, and is a crucial test of a composer's sense of key-perspective. Thus Philipp Emanuel Bach in a spirit of mere caprice puts the charming little slow movement of his D major Symphony into Eb and obliterates all real relationship by chaotic operatic

connecting links. Haydn's greatest pianoforte sonata (which, being probably his last, is of course No. i in mo«:t editions) is in Eb, and its slow movement is in Fˆ major (= Fb). That key had already appeared, with surprising effect, in the wander- ings of the development of the first movement. No attempt is made to indicate its connexion with Eb; and the finale begins in Eb, but its first bar is unharmonized and starts on the one note which most contradicts El| and least prepares the mind for Eb. The immediate repetition of the opening phrase a step higher on the normal supertonic strikes the note which the open- ing had contradicted, and thus shows its function in the main key without in the least degree explaining away the paradoxical effect of the key of the slow movement. Brahms's

Violoncello Sonata Op. 99, is in F; a prominent episode in the development of the first movement is in E# minor (= Gb), thus preparing the mind for the slow movement, which is in F# major (= Gb), with a central episode in F minor. The scherzo is in F minor, and begins on the dominant. Thus if we play its first chord immedi- ately after the last chord of the slow movement we have exactly that extreme position of flat supertonic followed by dominant which is a favourite form of cadence in Wagner, who can even convey its meaning by its mere bass without any harmonies (Walkiire, Act 3, Scene 2:“Was jetzt du bist,das sage dir selbst”).

Converse harmonic relationships are, as we have seen, always weaker than their direct forms. And thus the relation of C major to B major or minor {as shown in the central episode of the slow movement just mentioned) is rare. Still more rare is the obtain- ing of indirect artificial relationships, of which the episode in the first movement just mentioned is an illustration in so far as it enhances the effect of the slow movement, but is incon- clusive in so far as it is episodic. For with remote key-relation- ships everything depends upon whether they are used with what may be called cardinal function (like complementary keys) or not. Even a near key may occur in the course of wandering modula- tions without producing any effect of relationship at all, and this should always be borne in mind whenever we accumulate statistics from classical music.

d. Contrary and Unconnected Keys. — There remain only two pairs of keys that classical music has not brought into connexion, a circumstance which has co-operated with the utter vagueness of orthodox theories on the subject to confirm the conventionally progressive critic in his conviction that all modulations are alike. We have seen how the effect of modulation from major tonic to minor supertonic is, on a large scale, obscured by the identity of the primary dominant with the secondary sub- dominant, though the one chord is major and the other minor. Now when the supertonic becomes major this difference no longer obviates the confusion, and modulation from C major to D major, though extremely easy, is of so bewildering effect that it is used by classical composers only in moments of intensely dramatic surprise, as, for example, in the recapitulation of the first subject of Beethoven’s Eroica Symphony, and the last variation (or coda) of the slow movement of his Trio in B\>, Op. 97. And in both cases the balance is restored by the converse (and equally if not more contradictory) modulation between major tonic and major flat 7th, though in the slow movement of the B\> Trio the latter is represented only by its dominant chord which is ” enharmonically ” resolved into quite another key. The frequent attempts made by easy-going

innovators to treat these key-contrasts on another footing than that of paradox, dramatic surprise or hesitation, only show a deficient sense of tonality, which must also mean an inability to see the intensely powerful effect of the true use of such modulations in classical music, an effect which is entirely inde- pendent of any ability to formulate a theory to explain it. 1

1 Many theorists mistake the usual extreme emphasis on the dominant chord of the dominant key, in preparation for second subjects, for a modulation to the major supertonic, but this can deceive no one with any sense of tonality. A good practical test is to see what becomes of such passages when translated into the minor mode. Illusory modulation to the flat 7th frequently occurs as a bold method of throwing strong emphasis on to the subdominant at the outset of a movement, as in Beethoven's Sonata, Op. 31, No. 1.

There now remains only one pair of keys that have never been related, namely, those that (whether major or minor) are at the distance of a tntone 4th. In the first place they are unrelated because there is no means of putting any form of a tonic chord of F# into any form of the key of C, or vice versa; and in the second place because it is impossible to tell which of two precisely opposite keys the second key may be (e.g. we have no means of knowingthat a direct modulation from C to F# is not from C to Gb, which is exactly the same distance in the opposite direction) . And this brings us to the only remaining subjects of importance in the science and art of harmony, namely, those of the tempered scale, enharmonic ambiguity and just intonation. Before proceeding we subjoin a table of all the key-relationships from major and minor tonics, representing the degrees by capital Roman figures when the second key is major and small figures

TABLES OF KEY-RELATIONSHIPS

A.

From Major Tonic Direct Relationships li

iii IV V vi

Indirect through both \ i and the second key i

.....

Indirect, through i III* yu

\ \

Indirect through the i second key ‘

<---

‘ 1 1 1

Doubly indirect through the former indirect keys iiiˆ vi*

s , \ 1

V »

s l \ 1

Artificial, direct

\

VII & vfi

Artificial, indirect*

ˆ 1

- \ !

\ 1

Unrelated

1 >

IV* & iv» =V k & »k

Contradictory

i

V

VIIf & viit>

B.

i

From Minor Tonic 3 Direct Relationships III

iy v VI V,II

.1

I

1

\

1

1

Indirect through both J I and the second key ,

■ ■■ <

1 1 1 1

1 • » ‘

iV v 1 ;

Indirect, through I iii# vi#

Indirect through the ‘ 1 second key ill

i/

1 i Doubly indirect III* V»*

1

1 1

/ / /

•

Artificial, direct

1

\ I*

f

f

Artificial, Indirect 4

1 ilk vn«“a

vii#

1 r

/

Unrelated

f.

V IV# & iv# = 1 V* & v|>

Contradictory 5

li II vii>

2 Very rare, but the slow movement of Schubert’s C major String Quintet demonstrates it magnificently.

3 All the indirect relationships from a minor tonic are distinctly strained and, except in the violently contrasted doubly indirect keys, obscure as being themselves minor. But the direct artificial modulation is quite smooth, and rich rather than remote. See Beethoven’s C# minor Quartet.

4 No classical example, though the clearer converse from a major tonic occurs effectively.

5 Not (with the exception of II) so violent as when from major tonic. Bach, whose range seldom exceeds direct key-relationships, is not afraid to drift from D minor to C minor, though nothing would induce him to go from D major to C major or minor.

when minor. Thus I represents tonic major, iv represents subdominant

minor, and so on. A flat or a sharp after the figure indicates that the normal degree of the standard scale has been lowered or raised a semitone, even when in any particular pair of keys it would not be expressed by a flat or a sharp. Thus vit> would, from the tonic of Bb major, express the position of the slow movement of Beethoven's Sonata, Op. 106, which is written in F# minor since Gb minor is beyond the practical limits of notation.

VI. Temperament and Enharmonic Changes. — As the facts of artistic harmony increased in complexity and range, the purely acoustic principles which (as Helmholtz has shown) go so far to explain 16th-century aesthetics became more and more inadequate; and grave practical obstacles to euphonious tuning began to assert themselves. The scientific (or natural) ratios of the diatonic scale were not interfered with by art so long as no discords were " fundamental "; but when discords began to assume independence, one and the same note often became assignable on scientific grounds to two slightly different positions in pitch, or at all events to a position incompatible with even tolerable effect in performance. Thus, the chord of the diminished 7th is said to be intolerably harsh in " just intonation," that is to say, intonation based upon the exact ratios of a normal minor scale. In practical performance the diminished 7th contains three minor 3rds and two imperfect 5ths (such as that which is present in the dominant 7th), while the peculiarly dissonant interval from which the chord takes its name is very nearly the same as a major 6th. Now it can only be said that an intonation which makes nonsense of chords of which every classical composer from the time of Corelli has made excellent sense, is a very unjust intonation indeed; and to anybody who realizes the universal relation between art and nature it is obvious that the chord of the diminished 7th must owe its naturalness to its close approximation to the natural ratios of the minor scale, while it owes its artistic possibility to the extremely minute instinctive modification by which its dissonance becomes tolerable. As a matter of fact, although we have shown here and in the article Music how artificial is the origin and nature of all but the very scantiest materials of the musical language, there is no art in which the element of practical compromise is so minute and so hard for any but trained scientific observation to perceive. If a painter could have a scale of light and shade as nearly approaching nature as the practical intonation of music approaches the acoustic facts it really involves, a visit to a picture gallery would be a severe strain on the strongest eyes, as Ruskin constantly points out. Yet music is in this respect exactly on the same footing as other arts. It constitutes no exception to the universal law that artistic ideas must be realized-, not in spite of, but

by means of practical necessities. However independent the treatment of discords, they assert themselves in the long run as transient. They resolve into permanent points of repose of which the basis is natural; but the transient phenomena float through the harmonic world adapting themselves, as best they can, to their environment, showing as much dependence upon the stable scheme of ” just intonation ” as a crowd of metaphors and abstractions in language shows a dependence upon the rules of the syllogism. As much and no more, but that is no doubt a great deal. Vet the attempt to determine the point in modern harmony where just intonation should end and the Tempered scale begin, is as vexatious as the attempt to define in etymology the point at which the literal meaning of a word gives places to a metaphorical meaning. And it is as unsound scientifically as the conviction of the typical circle-squarer that he is unravelling a mystery and measuring a quantity hitherto unknown. Just intonation is a reality in so far as it emphasizes the contrast between concord and discord; but when it forbids artistic interaction between harmony and melody it is a chimera. It is sometimes said that Bach, by the example of his forty-eight preludes and fugues in all the major and minor keys, first fixed the modern scale. This is true practically, but not aesthetically. By writing a scries of movements in every key of which the

keynote was present in the normal organ and harpsichord manuals of his and later times, he enforced the system by which all facts of modern musical harmony are represented on keyed instruments by dividing the octave into twelve equal semitones, instead of tuning a few much-used keys as accurately as possible ■ and sacrificing the euphony of all the rest. This system of equal temperament, with twelve equal semitones in the octave, obviously annihilates important distinctions, and in the most used keys it sours the concords and blunts the discords more than unequal temperament; but it is never harsh; and where it does not express harmonic subtleties the ear instinctively supplies the interpretation; as the observing faculty, indeed, always does wherever the resources of art indicate more than they express.

Now it frequently happens that discords or artificial chords are not merely obscure in their intonation, whether ideally or practically, but as produced in practice they are capable of two sharply distinct interpretations. And it is possible for music to take advantage of this and to approach a chord in one signifi- cance and quit it with another. Where this happens in just intonation (in so far as that represents a real musical conception) such chords will, so to speak, quiver from one meaning into the other. And even in the tempered scale the ear will interpret the change of meaning as involving a minute difference

of intonation. The chord of the diminished 7th has in this way four different meanings —

Ex. 11

and the chord of the augmented 6th, when accompanied by the fifth, may become a dominant 7th or vice versa, as in the passage already cited in the coda of the slow movement of Beethoven's B\> Trio, Op. 97. Such modulations are called enharmonic. We have seen that all the more complex musical phenomena involve distinctions enharmonic in the sense of intervals smaller than a semitone, as, for instance, whenever the progression D E in the scale of C, which is a minor tone, is identified with the progression of D E in the scale of D, which is a major tone (differing from the former as f from ˆ). But the special musical meaning of the word " enharmonic " is restricted to the difference between such pairs of sharps with fiats or naturals as can be represented on a keyboard by the same note, this difference being the most impressive to the ear in " just intonation " and to the imagination in the tempered scale.

Not every progression of chords which is, so to speak, spelt enharmonically is an enharmonic modulation in itself. Thus a modulation from D flat to E major looks violently enharmonic on paper, as in the first movement of Beethoven's Sonata, Op. no. But E major with four sharps is merely the most convenient way of expressing F flat, a key which would need six flats and a double flat. The reality of an enharmonic modula- tion can be easily tested by transporting the passage a semi- tone. Thus, the passage just cited, put a semitone lower, becomes a perfectly diatonic modulation from C to E flat. But no transposition of the sixteen bars before the return of the main theme in the scherzo of Beethoven's Sonata in Eb, Op. 31, No. 3, will get rid of the fact that the diminished 7th (G Bb Db Efl), on the dominant of F minor, must have changed intoGBb Db Fb (although Beethoven does not take the trouble to alter the spelling) before it could resolve, as it does, upon the dominant of Ab. But though there is thus a distinction between real arid apparent enharmonic modulations, it frequently happens that a series of modulations perfectly diatonic in themselves returns to the original key by a process which can only be called an enharmonic circle. Thus the whole series of keys now in practical use can be arranged in what is called the circle of fifths (C G D A E B F# [= Gb] Db Ab Bb F C, from which series we now see the meaning of what was said in the discussion of key-relationships as to the ambiguity of the relationships between keys a tritone fourth apart). Now no human memory is capable of distinguishing the difference of pitch between the

keys of C and B# after a wide series of modulations. The difference would be perceptible enough in immediate juxta- position, but after some interval of time the memory will certainly accept two keys so near in pitch as identical, whether in “just intonation ” or not. And hence the enharmonic circle of fifths is a conception of musical harmony by which infinity is at once rationalized and avoided, just as some modern mathematicians are trying to rationalize the infinity of space by a non-Euclidian space so curved in the fourth dimension as to return upon itself. A similar enharmonic circle progressing in major 3rds is of frequent occurrence and of very rich effect. For example, the keys of the movements of Brahms’s C Minor Symphony are C minor, E major, Ab major (= G#), and C (= B#). And the same circle occurs in the opposite direction in the first movement of his Third Symphony, where the first subject is in F, the transi- tion passes directly to Db and thence by exactly the same step to A (= Bbb). The exposition is repeated, which of course means that in ” just intonation ” the first subject would begin in Gbb and then pass through a transition in Ebbb to the second subject in Cbbb. As the development contains another spurious enharmonic modulation, and the recapitulation repeats in another position the first spurious enharmonic modulation of the exposition, it would follow that Brahms’s movement began in F and ended in C sextuple-flat! So much, then, for the application of bad metaphysics and circle-squaring mathematics to the art of music. Neither in mathematics nor in art is an approximation to be confused with an imperfection. Brahms’s movement begins and ends in F much more exactly than any wooden diagonal fits a wooden square.

The following series of musical illustrations show the genesis of typical harmonic resources of classical and modern music.

Ex. 12. — Three concords (tonic, first inversion of sub- dominant, and dominant of A minor, a possible 16th- century cadence in the Phrygian mode).

Ex. T3- — The pension I*).

same chords v

Ex. 14 —Ditto, with the further addition of a double suspension {*) and two passing notes (tt>.

Ex. 15. — Di’-to, with a chromatic alteration of the second chord (*) and an “essential” discord (dominant 7th) at (t).

Ex.

passin

16. — Ditto, with chromatic notes (**) and appoggiaturas

Ex. 17. — The last two choids of Ex. 16 attacked unexpectedly, the first ap- poggiatura (*) prolonged till It seems to make a strange foreign chord before it resolves on the short note at i, while the second appoggiatura (t) is chromatic.

Ex. 18. — The same en- harmonically transformed so as to become a variation of the “dominant ninth” of C minor. 1 he Gi at * is redly A?, and t is no longer a note of resolution, but a chromatic passing-note.

Definitions.

(Intended to comprise the general conceptions set forth in the above article.)

1. Musical sounds, or notes, are sensations produced by regular periodical vibrations in the air, sufficiently rapid to coalesce in a single continuous sensation, and not too rapid for the mechanism of the human ear to respond.

2. The pitch of a note is the sensation corresponding to the degree of rapidity of its vibrations; being low or grave where these are slow, and high or acute where they are rapid.

3. An interval is the difference in pitch between two notes.

4. Rhythm is the organization, in a musical scheme, of sounds in respect of time.

5. Melody is the organization, in a musical scheme, of rhythmic notes in respect of pitch.

6. Harmony is the organization, in a musical scheme, of simul- taneous combinations of notes on principles whereby their acoustic properties interact with laws of rhythm and melody.

7. The harmonic series is an infinite series of notes produced by the subdivision of a vibrating body or column of air into aliquot parts, such notes being generally inaudible except in the form of the timbre which their presence in various proportions imparts to the fundamental note produced by the whole vibrating body or air-

column.

8. A concord is a combination which, both by its acoustic smoothness and by its logical origin and purpose in a musical scheme, can form a point of repose.

9. A discord is a combination in which both its logical origin in a musical scheme and its acoustic roughness show that it cannot form a point of repose.

10. The perfect concords and perfect intervals are those comprised within the first four members of the harmonic series, namely, the octave, as between numbers 1 and 2 of the series (see Ex. 1 above) ; the 5th, as between Nos. 2 and 3; and the 4th, as between Nos. 3 and 4.

11. All notes exactly one or more octaves apart are regarded as harmonically identical.

12. The root of a chord is that note from which the whole or the most important parts of the chord appear (if distributed in the right octaves) as members of the harmonic series.

13. A chord is inverted when its lowest note is not its root.

14. The major triad is a concord containing three different notes which (octaves being disregarded) are identical with the first, third and fifth members of the harmonic series (the second and fourth members being negligible as octaves).

15. The minor triad is a concord containing the same intervals as the major triad in a different order; in consequence it is artificial, as one of its notes is not derivable from the harmonic series.

16. Unessential discords are those that are treated purely as the phenomena of transition, delay or ornament, in an otherwise concordant harmony.

17. Essential discords are those which are so treated that the mind tends to regard them as definite chords possessing roots.

18. A key is an harmonic system in which there is never any doubt as to which note or triad shall be the final note of music in that system, nor of the relations between that note or chord and the other notes or chords. (In this sense the church modes are either not keys or else they are subtle mixtures of keys.)

19. This final note of a key is called its tonic.

20. The major mode is that of keys in which the tonic triad and the two other cardinal triads are major.

21. The minor mode is that of keys in which the tonic triad and one other cardinal triad are minor.

22. A diatonic scale is a series of the notes essential to one major or minor key, arranged in order of pitch and repeating itself in other octaves on reaching the limit of an octave.

23. Modulation is the passing from one key to another.

24. Chromatic notes and chords are those which do not belong to the diatonic scale of the passage in which they occur, but which are not so used as to cause modulation.

25. Enharmonic intervals are minute intervals which never occur in music as directly measured quantities, though they exist as differences between approximately equal ordinary intervals, diatonic or chromatic. In an enharmonic modulation, two chords differing by an enharmonic quantity are treated as identical.

26. Pedal or organ point is the sustaining of a single note in the jass (or, in the case of an inverted pedal, in an upper part) while the

harmonies move independently. Unless the harmonies are some- times foreign to the sustained note, it does not constitute a pedal. In modern music pedals take place on cither the tonic or the dominant, other pedal-notes being rare and of complex meaning. Double pedals (of tonic and dominant, with tonic below) are not unusual. The device is capable of very free treatment, and has produced many very bold and rich harmonic effects in music since the earlier works of Beethoven. It probably accounts for many so-called ” essential discords.”

In the form of drones the pedal is the only real harmonic device of ancient and primitive music. The ancient Greeks sometimes

used a reiterated instrumental note as an accompaniment above the melody. These primitive devices, though harmonic in the true modern sense of the word, are out of the line of harmonic develop- ment, and

did not help it in any definite way.

27. The fundamental bass of a harmonic passage is an imaginary bass consisting of the roots of the chords.

28. A figured bass, or continue, is the bass of a composition supplied with numerals indicating the chords to be filled in by the accompanist. Thorough-bass (Ger. Ceneralbass) is the art of interpreting such figures. (D. F. T.)

HARMOTOME, a mineral of the zeolite group, consisting of hydrous barium and aluminium silicate, $H_2BaAl_2(SiO_3)_5 + 5H_2O$. Usually a small amount of potassium is present replacing part

of the barium. The system of crystallization is monoclinic; only complex twinned crystals are known. A common and character- istic form of twinned crystal, such as is represented in the figure, con- sists of four intercrossing indi- viduals twinned together according to two twin-laws; the compound group resembles a tetragonal crystal with prism and pyramid, but may be distinguished from this by the grooves along the edges of the pseudo-prism. The faces of the crystals are marked by character- istic striations, as indicated in the figure. Twinned crystals of exactly the same kind are also frequent in phillipsite (q-v.). Crystals are usually white and translucent, with a vitreous lustre. The hardness is 4.5, and the specific gravity 2-5.

The name harmotome (from apfios, ” a joint,” and renvew, ” to cut “) was given by R. J. Haiiy in 1801, and has a crystallo- graphic signification. Earlier names are cross-stone (Ger. Kreuzstein) , ercinite, andreasbergolite and andreolite, the two last being derived from the locality, Andreasberg in the Harz. Morvenite (from Morven in Argyllshire) is the name given to small transparent crystals formerly referred to phillipsite.

Like other zeolites, harmotome occurs with calcite in the amygdaloidal cavities of volcanic rocks, for example, in the dolerites of Dumbartonshire, and as fine crystals in the agate- lined cavities in the melaphyre of Oberstein in Germany. It also occurs in gneiss, and sometimes in metalliferous veins. At Andreasberg in the Harz it is. found in the lead and silver veins; and at Strontian in Argyllshire in lead veins, associated with brewsterite (a strontium and barium zeolite), barytes and calcite. (L. J. S.)

HARMS, CLAUS (1778-1855), German divine, was born at Fahrstedt in Schleswig-Holstein on the 25th of May 1778, and in his youth worked

in his father's mill. At the university of Kiel he repudiated the prevailing rationalism and under the influence of Schleiermacher became a fervent Evangelical preacher, first at Lunden (1806), and then at Kiel (1816). His trenchant style made him very popular, and he did great service for his cause especially in 181 7, when, on the 300th anniversary of the Reformation, he published side by side with Luther's theses, ninety-five of his own, attacking reason as " the pope of our time " who " dismisses Christ from the altar and throws God's word from the pulpit." He also had some fame as a hymn- writer, and besides volumes of sermons published a good book on Pastoraltheologie (1830). He resigned his pastorate on account of blindness in 1849, and died on the 1st of February 1855.

See Autobiography (2nd ed., Kiel, 1852); M. Baumgarten, Ein Denkmal fur C. Harms (Brunswick, 1855).

HARNACK, ADOLF (1851-), German theologian, was born on the 7th of May 1851 at Dorpat, in Russia, where his father, Theodosius Harnack (1817-1880), held a professorship of pastoral theology.

Theodosius Harnack was a staunch Lutheran and a prolific writer on theological subjects; his chief field of work was practical theology, and his important book on that subject, summing up his long experience and teaching, appeared at

Erlangen (1877-1878, 2 vols.). The liturgy of the Lutheran church of Russia has, since 1898, been based on his Liturgische Formulare (1872).

The son pursued his studies at Dorpat (1869-1872) and at Leipzig, where he took his degree; and soon afterwards (1874) began lecturing as a Privatdozent. These lectures, which dealt with such special subjects as Gnosticism and the Apocalypse, attracted considerable attention, and in 1876 he was appointed professor extraordinarius. In the same year he began the publica- tion, in conjunction with 0. L. von Gebhardt and T. Zahn, of an edition of the works of the Apostolic Fathers, Patrum aposloli- corum opera, a smaller edition of which appeared in 1877. Three years later he was called to Giessen as professor ordinarius of church history. There he collaborated with Oscar Leopold von Gebhardt in Texte und Untersuchungen zur Geschithte der altchristlichen Litteratur (1882 sqq.), an irregular periodical, con- taining only essays in New Testament and patristic fields. In 1 88 1 he published a work on monasticism, Das Monchtum, seine Ideale und seine Geschichte (5th ed., 1900; English translation, 1901), and became joint-editor with Emil Schiirer of the Theologische Literaturzeitung. In 1885 he published the first volume of his epoch-making work, Lehrbuch der Dogmengeschichle (3rd ed. in three volumes, 1894-1898; English translation in seven volumes, 1 894-1 899). In this work Harnack traces the rise of dogma, by which he understands the authoritative doctrinal system of the 4th century and its development down to the Reformation. He considers that in its earliest origins Christian faith and the methods of Greek thought were so closely intermingled that much that is not essential to Chris- tianity found its way into the resultant system. Therefore Protestants are not only free, but bound, to criticize it; indeed, for a Protestant Christian, dogma cannot be said to exist. An abridgment of this appeared in 1889 with the title Grundriss der Dogmengeschichle (3rd ed., 1898). In 1886 Harnack was called to Marburg; and in 1888, in spite of violent opposition from the conservative section of the church authorities, to Berlin. In 1890 he became a member of the Academy of

Sciences. At Berlin, somewhat against his will, he was drawn into a controversy on the Apostles' Creed, in which the paity antagon- isms within the Prussian Church had found expression. Harnack's view is that the creed contains both too much and too little to be a satisfactory test for candidates for ordination, and he would prefer a briefer symbol which could be rigorously exacted from all (cf. his Das apostolische Glaubensbekenntnis. Ein geschichtlicher Bericht nebst einem Nachworte, 1892; 27th ed., 1896). At Berlin Harnack continued his literary labours. In 1893 he published a history of early Christian literature down to Eusebius, Geschichte der altchristl. Litteratur bis Eusebius (part 2 of vol. i., 1897); and in 1900 appeared his popular – lectures, Das Wesen des Christentums (5th ed., 1901; English translation, What is Christianity? 1901; 3rd ed., 1904). One of his more recent historical works is Die Mission und Ausbreitung des Christentums in den ersten drei Jahrhunderten (1902; English translation in two volumes, 1904-1905). It has been followed by some very interesting and important New Testament studies (Beitrdge zur Einleitung in das neue Testament, 1906 sqq.; Engl. trans.: Luke the Physician, 1907; The Sayings of Jesus, 1908). Harnack, both as lecturer and writer, was one of the most prolific and most stimulating of modern critical scholars, and trained up in his " Seminar " a whole generation of teachers, who carried his ideas and methods throughout the whole-of Germany and even beyond its borders. His distinctive character- istics are his claim for absolute freedom in the study of church history and the New Testament; his distrust of speculative theology, whether orthodox or liberal; his interest in practical Christianity as a religious life and not a system of theology. Some of his addresses on social matters have been published under the heading " Essays on the Social Gospel " (1907).

HARNESS (from O. Fr. harneis or harnois; the ultimate origin is obscure; the Celtic origin which connects it with the Welsh haiarn, iron, has phonetic and other difficulties; the French is the origin of the Span, arnes, and Ger. Harnisch), probably, in

origin, gear, tackle, equipment in general, but early applied particularly to the body armour of a soldier, including the trappings of the horse; now the general term for the gear of an animal used for draft purposes, traces, collar, bridle, girth, breeching, &c. It is usually not applied to the saddle or bridle of a riding animal. The word, in its original meaning of tackle or working apparatus, is still found in

weaving, for the mechanism which shifts the warp-threads to form the ” shed,” and in bell-hanging, for the apparatus by which a large bell is hung. The New English Dictionary quotes an early use of the word for the lines, rod and hooks of an angler {Fysshing with an Angle, c. 1450).

HARO, CLAM EUR DE, the ancient Norman custom of ” crying for justice,” still surviving in the Channel Islands. The wronged party must on his knees and before witnesses cry: “Haro! Haro! Haro! a l’aide, mon prince, on me fait tort.” This appeal has to be respected, and the alleged trespass or tort must cease till the matter has been thrashed out in the courts. The ” cry ” thus acts as an interim injunction, and no inhabitant of the Channel Islands would think of resisting it. The custom is undoubtedly very ancient, dating from times when there were no courts and no justice except such as was meted out by princes personally. The popular derivation for the name is that which explains “Haro” as an abbreviation of “Ha! Rollo,” a direct appeal to Rollo, first duke of Normandy. It is far more probable that haro is simply an exclamation to call attention (O.H.G. hem, hara, ” here “!). Indeed it is clear that the ” cry for justice ” was in no sense an institution of Rollo, but was a method of appeal recognized in many countries. It is said to be identical with the ” Legatro of the Bavarians and the Thuringians,” and the first mention of it in France is to be found in the ” Grand coutumier de Normandie.” A similar custom, only observed in criminal charges, was recognized by the Saxon laws under the name of ” Clamor Violentiae.” Thus there is reason to think that William the Conqueror on his arrival in England found the ” cry ” fully established as far as criminal matters were concerned. Later the ” cry ” was made applicable to civil wrongs, and, when the administration of justice became systematized, disappeared altogether in criminal cases. It naturally tended to become obsolete as the administra- tion of justice became systematized, but it was long retained in north-western France in cases of disputed possession, and was not actually repealed until the close of the 18th century. A survival of the English form of haro is possibly to be found in the ” Ara,” a cry at fairs when ” settling time ” arrived.

HAROLD I. (d. 1040), surnamed Harefoot, the illegitimate son of Canute, king of England, and ˆElfgifu of Northampton. On the death of his father in 1035, he claimed the crown of England in opposition to Canute’s legitimate son, Hardicanute. His claims were supported by Leofric, earl of Mercia, and the north; those of Hardicanute by his mother, Queen Emma, Godwine, earl of the West-Saxons and the south. Eventually Harold was temporarily elected regent, pending a final settle- ment on Hardicanute’s return from Denmark. Hardicanute,

however, tarried, and meanwhile Harold's party increased rapidly. In 1037 he was definitely elected king, and banished Emma from the kingdom. The only events of his brief reign are ineffectual inroads of the Welsh and Scots. Hardicanute was preparing to invade England in support of his claims when Harold died at Oxford on the 10th of March 1040.

HAROLD II. (c. 1022-1066), king of the English, the second son of Earl Godwine, was born about 1022. While still very young (before 1045) he was appointed to the earldom of the East-Angles. He shared his father's outlawry and banishment in 105 1 ; but while Godwine went to Flanders, Harold with his brother Leofwine took refuge in Ireland. In 1052 Harold and Leofwine returned. Having plundered in the west of England, they joined their father, and were with him at the assembly which decreed the restoration of the whole family. Harold was now restored to his earldom of the East-Angles, and on his father's death in 1053 he succeeded him in the greater earldom

of the West-Saxons. He was now the chief man in the kingdom, and when the older earls Leofric and Siward died his power increased yet more, and the latter part of Edward's reign was virtually the reign of Harold. In 1055 he drove back the Welsh, who had burned Hereford. In 1063 came the great Welsh war, in which Harold, with the help of his brother Tostig, crushed the power of Gruffyd, who was killed by his own people. But in spite of his power and his prowess, Harold was the minister of the king rather than his personal favourite. This latter position rather belonged to Tostig, who on the death of Siward in 1055 received the earldom of Northumberland. Here, however, his harshness soon provoked enmity, and in 1065 the North- umbrians revolted against him, choosing Morkere in his place. Harold acted as mediator between the king and the insurgents, and at length agreed to the choice of Morkere, and the banish- ment of his brother. At the beginning of 1066 Edward died, with his last breath recommending Harold as his successor. He was accordingly elected at once and crowned. The men of Northumberland at first refused to acknowledge him, but Harold won them over. The rest of his brief reign was taken up with preparations against the attacks which threatened him on both sides at once. William challenged the crown, alleging both a bequest of Edward in his favour and a personal engagement which Harold had contracted towards him — probably in 1064; and prepared for the invasion of England. Meanwhile Tostig was trying all means to bring about his own restoration. He first attacked the Isle of Wight, then Lindesey, but was compelled to take shelter in Scotland. From May to September the king kept the coast with a great force by sea and land, but at last provisions failed and the land army was

dispersed. Harold then came to London, ready to meet which- ever enemy came first. By this time Tostig had engaged Harold Hardrada of Norway to invade England. Together they sailed up the Humber, defeated Edwin and Morkere, and received the submission of York. Harold hurried northwards; and on the 25th of September he came on the Northmen at Stamford Bridge and won a complete victory, in which Tostig and Harold Hardrada were slain. But two days later William landed at Pevensey. Harold marched southward as fast as possible. He gathered his army in London from all southern and eastern England, but Edwin and Morkere kept back the forces of the north. The king then marched into Sussex and engaged the Normans on the hill of Senlac near Battle (see Hastings). After a fight which lasted from morning till evening, the Normans had the victory, and Harold and his two brothers lay dead on the field (14th of October 1066).

HARP (Fr. harpe; Ger. Harfe; Ital. arpa), a member of the class of stringed instruments of which the strings are twanged or vibrated by the fingers. The harp is an instrument of beautiful proportions, approximating to a triangular form, the strings diminishing in length as they ascend in pitch. The mechanism is concealed within the different parts of which the instrument is composed, (1) the pedestal or pedal-box, on which rest (2) the vertical pillar, and (3) the inclined convex body in which the soundboard is fixed, (4) the curved neck, with (5) the comb concealing the mechanism for stopping the strings, supported by the pillar and the body.

(1) The pedestal or pedal-box forms the base of the harp and contains seven pedals both in single and double action harps, the difference being that in the single action the pedals are only capable of raising the strings one semitone by means of a drop into a notch, whereas with the double action the pedals, after a first drop, can by a further drop into a second and lower notch shorten the string a second semitone, whereby each string is made to serve in turn for flat, natural and sharp. The harp is normally in the key of C flat major, and each of the seven pedals acts upon one of the notes of this diatonic scale throughout the compass. The choice of this method of tuning was imposed by the construction of the harp with double action. The pedals remain in the notches until released by the foot, when the pedal returns to its normal position through the action of a spiral spring, which may be seen under each of the pedals by turning the harp up.

(2) The vertical pillar is a kind of tunnel in which are placed the seven rods worked by the pedals, which set in motion the mechanism

situated in the neck of the instrument. Although the pillar apparently

rests on the pedestal, it is really supported by a brass shoulder firmly screwed to the beam which forms the lowest part of the body, a connexion which remains undisturbed when the pedal box and its cover are removed.

(3) The body or sound-chest of the harp is in shape like the longitudinal section of a cone. It was formerly composed of staves joined together as in the lute and mandoline. Erard was the first to make it in two pieces of wood, generally sycamore, with the addition of a flat soundboard of Swiss pine. The body is strengthened on the inside, in order to resist the tension of the strings, by means of ribs; there are five soundholes in the back, which in the older models were furnished with swell shutters opened at will by the swell pedal, the fourth from the left worked by the left foot. As the increaseof sound obtained by means of the swell was infinitesimal, the device has now been discarded. The harp is strung by knotting the end of the string and passing it through its hole in the centre of the sound- board, where it is kept in position by means of a grooved peg which grips the string.

(4) The neck consists of a curved piece of wood resting on the body at the treble end of the instrument and joining the pillar at the bass end. In the neck are set the tuning pins round which are wound the strings.

(5) The comb is the name given to two brass plates or covers which fit over both sides of the neck, concealing part of the mechan- ism for shortening the strings and raising their pitch a semitone when actuated by the pedals. On the front plate of the comb, to the left of the player, is a row of brass bridges against which the strings rest below the tuning pins, and which determine the vibrating length of the string reckoned from the peg in the soundboard. Below the bridges are two rows of brass disks, known as forks, connected by steel levers; each disk is equipped with two studs for grasping the string and shortening it. The mechanism is ingenious. When a pedal is depressed to the first notch, the corresponding lower disk turns a little way on a mandrel keeping the studs clear of the string. The upper disk, set in motion by the steel levers connecting the disks, revolves simultaneously till the string is caught by the two studs which thus form a new bridge, shortening the vibrating length of the string by just the length necessary’ to raise the pitch a semitone. If the same

pedal be depressed to the second notch, another move- ment causes the lower disk to revolve again till the string is a second time seized and shortened, the upper disk remaining stationary. The hidden mechanism meanwhile has gone through a series of movements ; the pedal is really a lever set upon a spring, and when depressed it draws down the connecting rod in the pillar which sets in motion chains governing the mandrels of the disks.

The harp usually has forty-six strings, of gut in the middle and upper registers, and of covered steel wire in the bass; the C strings are red and the F strings blue. The compass thus has a range of

6k octaves from

The double stave is

used as for the pianoforte. The single action harp used to be tuned to the key of Eb major.

The modern harp with double action is the only instrument with fixed tones, not determined by the ear or touch of the performer, which has separate notes for naturals, sharps and flats, giving it an enharmonic compass. On the harp the appreciable interval between D# and Eb can be played. The harp in its normal condition is tuned to Cb major; it rests with the performer to transpose it at will in a few seconds into any other key by means of the pedals. Each of the pedals influences one note of the scale throughout the compass, beginning at the left with D, C, and B worked by the left foot. Missing the fourth or forte pedal, and continuing towards the right we get the E, F, G and A pedals worked by the right foot. By lowering the D pedal into the first notch the Db becomes Dt;, and into the second notch D#, and so on for all the pedals, if, for example, a piece be written in the key of E major, the harp is trans- posed into that key by depressing the E, A, and B pedals to the first notch, and those for F, G, C and D to the second or sharp notch and so on through all the keys. Accidentals and modulations are readily played by means of the pedals, provided the transitions be not too rapid. The harp is the instrument upon which transposition presents the least difficulty, for the fingering is the same for ail keys. The strings are twanged with the thumbs and the first three fingers.

The quality of tone does not vary much in the different registers, but it has the greatest brilliancy in keys with many flats, forthe strings are then open and not shortened by the forks. Various effects can be obtained on the harp: (1) by harmonics, (2) by damp- ing, (3) by

guitar tones, (4) by the glissando. (1) Harmonics are produced by resting the ball of the hand on the middle of the string and setting it in vibration by the thumb or the first two fingers of the same hand, whereby a mysterious and beautiful tone is obtained. Two or three harmonics can be played together with the left hand, and by using both hands at once as many as four are possible. (2) Damping is effected by laying the palm against the string in the

bass and the back of the finger in the treble. (3) Guitar or pizzicato notes are obtained by twanging the strings sharply at the lower end near the soundboard with the nails. (4) The glissando effect is produced, as on the pianoforte, by sliding the thumb or finger along the strings in quick succession; this does not necessarily give the diatonic scale, for by means of the pedals the harp can be tuned beforehand to chords. It is possible to play on the harp all kinds of diatonic and arpeggio passages, but no chromatic, except in very slow tempo, on account of the time required by the mechanism of the pedals; and chords of three or four notes in each hand, shakes, turns, successions of double notes can be easily acquired. The same note can also be repeated slowly or quickly, the next string being tuned to a duplicate note, and the two strings plucked alternately in order to give the string time to vibrate.

Pleyel's chromatic harp, patented in 1894 and improved in 1903 by Gustave Lyon, manager of the firm of Pleyel, Wolff & Co., is an instrument practically without mechanism which has already won great favour in France and Belgium, notably in the orchestra. It has been constructed on the familiar lines of the pianoforte. Henry Pape, a piano manufacturer, had in 1845 conceived the idea of a chromatic harp of which the strings crossed in the centre as in the piano, and "a report on the construction was published at the time; the instrument, however, was not considered successful, and was relegated to oblivion until Mr Lyon revised the matter and brought out a successful and practical instrument. The advantages claimed for this harp are the abandonment . of the whole pedal mechanism, a metal framing which insures the strings keeping in tune as long as those of a piano, and an easily acquired technique. The chromatic harp consists of (1) a pedestal on castors, (2) a steel pillar without internal mechanism, (3) a wide neck containing two brass wrest-planks in which are fixed two rows of tuning pins, and (4) a soundchest in which is firmly riveted the steel plate to which the strings are fastened, and the soundboard pierced with eyelet holes through which the strings are drawn to the string plate. There is a string for every chromatic semitone of the scale of C major, the white strings representing the white keys of the piano keyboard, and the black strings corresponding to the black keys. The

tuning pins for the black strings are set in the left side of the neck in alternate groups of twos and threes, and those for the white in the right side in alternate groups of threes and fours. The strings cross half-way between neck and soundboard, this being the point where they are plucked; the left hand finds the black notes above, and the right hand below the crossing. There is besides in the neck a set of twelve tuning buttons, each one of which on being pressed gives out one note of the chromatic scale tuned to the pitch of the diapason normal. It is obvious that the repertoire for this harp is very extensive, including many compositions written for the piano, which however cannot be played with any legato effects, these being still impossible on this chromatic harp.

History. — While the instrument is of great antiquity, it is yet from northern Europe that the modern harp and its name are derived. The Greeks and Romans preferred to it the lyre in its different varieties, and a Latin writer, Venantius Fortunatus, 1 describes it in the 7th century of our era as an instrument of the barbarians — " Romanusque lyra, plaudat tibi barbarus harpa." This is believed to be the earliest mention of the name, which is clearly Teutonic, — ■ O.H.Ger. harapha, A.-S. hearpe, Old Norse harpa. The modern Fr. harpe retains the aspirate; in the Spanish and Italian arpa it is dropped.

The earliest delineations of the harp in Egypt give no indication that it had not existed long before. There are, indeed, representa- tions in Egyptian paintings of stringed instruments of a bow-form having affinities with both primitive harp and nefer (a kind of oval guitar) that support the idea of the invention of the harp from the tense string of the warrior's or hunter's bow. This primitive- looking instrument, called nanga, had a boat- shaped sound-chest with a parchment or skin soundboard, down the centre of which one end of the string was fas- tened to a strip of wood, whilst the other was wound round pegs in the upper part of the bow. The nanga was played horizontally, being borne upon the performer's shoulder. 2 Between it and the grand vertical harps in the frescos of the time of Rameses III., more than 3000 years old, discovered by the traveller Bruce 3 (fig. 1), there are varieties that permit us to bind the whole,

1 Poemata, lib. vii. cap. 8, p. 245, Migne's Patrologiae cursus computus (Paris, 1857-1866, vol. 88).

2 A few nangas (c. 1500 B.C.) are preserved among the Egyptian antiquities at the British Museum, fourth Egyptian room.

3 Bruce's harps are reproduced by Champollion, tome iii. p. 261.

Fig. 1.

from the simplest bow-form to the almost triangular harp, into one

family (see fig. 2).

The Egyptian harp had no front pillar, and as it was strung with

catgut the tension and pitch must necessarily have been low. The

harps above – mentioned depicted in the tomb at Thebes, assumed from the players to be more than 6 ft. high, have not many strings, the one having ten, the other thirteen. What the accordance of these strings was it would be hard to recover. We must be content with the know- ledge that the old Egyptians possessed harps in principle like our own, the largest having pedestals upon which they if to show how much they

Fig.

many Irish harpers as could be at that late date assembled, he

found the compass of their harps to comprise

thirty notes which were tuned diatonically in the key of G, under certain circumstances transposable to C and rarely to D, the scales being the major of these keys. The harp first appeared in the coat of arms of Ireland in the reign of Henry VIII.; and some years after in a map of 1567 preserved in a volume of state papers, we find it truly drawn according to the outlines of the national Irish instrument. 2 References to the Highlands of Scotland are of neces- sity included with Ireland ; and in both we find another name erroneously applied by lexicographers to the harp, viz. " cruit." Bunting particularly mentions the " cinnard cruit " (harp with a high head) and the " crom cruit " (the curved harp). In the Ossianic MSS. of the Dean of Lismore. (15 12) the word " crwt " occurs several times, and in Neill M'Alpine's Gaelic Dictionary (1832), which gives the dialect of Islay, closely related to that of Ulster, the word " cruit " is rendered I " harp." The confusion doubtless arose from/ the fact that from the nth century citharal is glossed hearpan in Anglo-Saxon MSS., a word which, like

citharisare in medieval Latin, referred to plucking or twanging of strings in contradistinction to those instru- ments vibrated by means of the bow. In ~ Irish of the 8th and 9th centuries (Zeuss) Irish (Dalway) Harp, cithara is always glossed by ” crot.” The modern Welsh ” crwth ” is not a harp but a ” rotta ” (see Crowd). An old Welsh harp, not triple strung, exists, which bears a great resemblance to the Irish harp in neck, soundboard and soundholes. But this does not imply derivation of the harp of Wales from that of Ireland or the reverse. There is really no good historical evidence,

Fig. 3.

bestowed a wealth of decoration, prized them.

The ancient Assyrians had harps like those of Egypt in being without a front pillar, but differing from them in having the sound- body uppermost, in which we find the early use of soundholes ;, while the lower portion was a liar to which the strings were tied and by means of which the tuning was apparently effected. 1 What the Hebrew harp was, whether it followed the Egyptian or the Assyrian, we do not know. That King David played upon the harp as com- monly depicted is rather a modern idea. Medieval artists frequently gave King David the psaltery, a horizontal stringed instrument from which has gradually developed the modern piano. The Hebrew ” kinnor ” may have been a kind ol trigonon, a triangular stringed instrument between a small harp and a psaltery, sounded by a plectrum, or more probably, as advocated by Dr Stainer in his essay

on the music of the Bible, a kind of lyre. i ■ 1 11 – i- • • • u- t.

The earliest records that we possess of the Celtic race, whether | and there may have been a common or distinct origin on which Gaelic or Cymric, give the harp a prominent place and harpists ! ethnology only can throw light. 3 The Welsh like the Irish harp

peculiar veneration and distinction. The names for the harp are, however, quite different from the Teutonic. The Irish ” clairseach,” the Highland Scottish ” clarsach,” the Welsh, Cornish, Breton ” telyn,” ” telein,” ” telen,” show no. etymological kinship to the other European names. The first syllable in clairseach or clarsach is derived from the Gaelic ” clar,” a board or table (soundboard), while the first syllable of telyn is distinctly Old Welsh, and has a tensile meaning; thus resonance supplies the one idea, tension the other.

The literature of these Celtic harps may be most directly found in

Bunting's Ancient Music of Ireland (Dublin, 1840,/, Gunn's His- torical Enquiry respecting the Performance onthe Harp in the Highlands of Scotland (Edinburgh, 1807), and E. Jones's Musical and Poetical Memoirs of the Welsh Bards (London, 1784). The treatises of Walker, Dalyell, and others may also be consulted ; but in all these authorities due care must be taken of the bias of patriotism, and the delusive aim to reconstruct much that we must be content to receive as only vaguely indicated in records and old monuments. There is, however, one early Irish monument about which there can be no mistake, the harp upon a cross belonging to the ancient church of Ullard near Kilkenny, the date of which cannot be later than 830; the sculpture is rude, but the instrument is clearly shown by the drawing in Bunting's work to have no front pillar. This remarkable structural likeness to the old harps of Egypt and Assyria may be accidental, but permits the plausible hypothesis of Eastern descent. The oldest specimen of the beautiful form by which the Irish harp is now recognized, with gracefully curved front pillar and sweep of neck (the latter known as the harmonic curve), is the famous harp in Trinity College, Dublin, the possession of which has been attributed to King Brian Boiroimhe. From this mythic ownership Dr Petrie (see essay in Bunting) has delivered it; but he can only deduce the age from the ornamentation and heraldry, which fix its date in the 14th century or a little later. There is a cast of it in the Victoria and Albert Museum. The next oldest is in the Highlands of Scotland, the Clarsach Lumanach, or Lamont's Clarschoe, belonging, with another of later date, to the old Perthshire family of Robertson of Lude. Both are described in detail by Gunn. This Lamont harp was taken by a lady of that family from Argyleshire about 1460, on her marriage into the family of Lude. It had about thirty strings tuned singly, but the scale was sometimes doubled in pairs of unisons like lutes and other contemporary instruments. The Dalway harp in Ireland (fig. 3) inscribed " Ego sum Regina Cithararum," and dated 1621, appears to have had pairs of strings in the centre only. These were of brass wire, and played with the pointed finger-nails. The Italian contemporary " Arpa Doppia " was entirely upon the duplex principle, but with gut strings played by the fleshy ends of the fingers. When E. Bunting met at Belfast in I~'J2 as

1 Representations of these may be seen among the musical scenes in the Nimrod Gallery at the British Museum.

was often an hereditary instrument to be preserved with great care and veneration, and used by the bards of the family, who were alike the poet-musicians and historians. A slave was not allowed to touch a harp, and it was exempted by the Welsh laws from seizure for debt.

The old Welsh harp appears to have been at one time strung with horse-hair, and by the Eisteddfod laws the pupil spent his noviciate of three years in the practice of a harp with that string- ing. The comparatively modern Welsh triple harp (fig. 4) is always strung with gut. It has a rising neck as before stated, and three rows of strings, — the outer rows tuned diatonic, the centre one chromatic for the sharps and flats. Jones gives it 98 strings and a compass of 5 octaves and one note, from violoncello C. As in all Celtic harps, the left is the treble hand, and in the triple harps there are 27 strings on that side, the right or bass hand having 37, and the middle or chromatic row 34.

The first pattern of the modern harp is dis- covered in German and Anglo-Saxon illuminated MSS. as far back as the 9th century. 4 A diatonic instrument, it must have been common through- out Europe, as Orcagna, Fra Angelico, and other famous Italian painters depict it over and over again in their masterpieces. No accidental semitones were possible with this instrument, unless the strings were shortened by the player's fingers. This lasted until the 17th century, when a Tirolese maker adapted hooks 6 (perhaps Fig. 4.

suggested by the fretted or bonded clavichord) WelshTripleHarp. that, screwed into the neck, could be turned downwards to fix the desired semitone at pleasure. At last, some- where about 1720, Hochbrucker, a Bavarian, invented pedals that, acting through the pedestal of the instrument, governed by mechan- ism the stopping, and thus left the player's hands free, an indisput- able advantage ; and it became possible at once to play in no less

2 See also a woodcut in John Derrick's Image of Ireland (1581), pi. iii. (Edinburgh ed. 1883).

3 See the fine volume Musical Instruments on the Irish and. Scottish harps by Robert Bruce Armstrong (1904), vol. i. Vol. ii., which deals with the Welsh harp, has unfortunately, been withdrawn from sale.

4 See for the medieval harp a careful article by Hortense Panum, " Harfe und Lyra im alten Nord-Europa," in Intern. Mus. Ges. vol. vii. pt. 1 (Leipzig, 1905) ; and for references as to illuminated MSS., early woodcuts, paintings, &c. see Hugo Leichtentritt, " Was lehren uns die Bildwerke des 14-17 Jahrhunderts fiber die Instru- mentalmusik ihrer Zeit ?" ibid. vol. vii. p. 3 (Leipzig, 1906).

6 See Nauwerk, " Die Hakenharfe, Die Vervoilkommnung des Meriianismus an der deutschen Harfe." in Allg. musik. Ztg. (Leipzig, 1815), p. 545 seq.

Fig. 5.

Modern Erard

Harp

than eight major scales. By a sequence of improvements, in which two Frenchmen named Cousineau took an important part, the various defects inherent in Hochbrucker's plan became ameliorated. The pedals were doubled, and, the tuning of the instrument being changed from the key of Eb to Cb, it became possible to play in fifteen keys, thus exceeding the power of the keyboard instruments, over which the harp has another important advantage in the sim- plicity of the fingering, which is the same for every key.

It is to Sebastian Erard we owe the perfecting of the pedal harp (fig- 5)> a triumph he gained in Paris by unremitting studies begun when he adopted a " fork " mechanism in 1786 and ended in 18 10 when he had attained com- plete success with the double action pedal mechanism already described above. Erard 's merit was not confined to this improvement only; he modified the structure of the comb that conceals the mechanism, and constructed the sound-body of the instrument upon a modern principle more advantageous to the tone.

Notwithstanding these improvements and the great beauty of tone the harp possesses, the domestic use of it in modern times has almost disappeared. The great cost of a good harp, and the trouble to many amateurs of tuning, may have led to the supplanting of the harp by the more convenient and useful pianoforte. With this comes naturally a diminution in the number of solo-players on the instru- ment. Were it not for the increasing use of the harp in the orchestra, the colour of its tone having attracted the masters of instrumentation, so that the great scores of Meyerbeer and Gounod, of Berlioz, Liszt and Wagner are not complete without it, we should perhaps know little more of the harp than of the dulcimer, in spite of the efforts of distinguished virtuosi whose devotion to their instrument maintains its technique on an equality with that of any other, even the most in public favour. The first record of the use of harps in the orchestra occurs in the account of the Ballet comique de la royne performed at the chateau de Moutiers on the occasion of the marriage of Mary of Lorraine with the due de Joyeuse in 1581, when harps formed part of the concert de

musique.

See in addition to the works already referred to, Engel's Musical Instruments in the South Kensington Museum (1874); ai, d the articles " Harp," in Rees's Cyclopaedia, written by Dr Burney, in Stainer and Barrett's Dictionary of Musical Terms (1876), and in Grove's Dictionary of Music and Musicians. On the origins of the instrument see Proceedings of British Association (1904) (address of president of anthropological section). (K. S. ; A. J. H.)

HARPENDEN, an urban district in the Mid or St Albans parliamentary division of Hertfordshire, England, 25 m. N.W. by N. from London by the Midland railway, served also by a branch of the Great Northern railway. Pop. (1901) 4725. It is a favourite outlying residential district for those whose work lies in London. The church of St Nicholas is a modern recon- struction with the exception of the Perpendicular tower. In the Lawes Testimonial Laboratory there is a vast collection of samples of experimentally grown produce, annual products, ashes and soils. Sir John Bennet Lawes (d. 1900) provided an endowment of £100,000 for the perpetuation of the agricultural experiments which he inaugurated here at his seat of Rothamsted Park. The success of his association of chemistry with botany is shown by the fact that soil has been made to bear wheat without intermission for upwards of half a century without manure. The country neighbouring to Harpenden is very pleasant, includ- ing the gorse-covered Harpenden Common and the narrow well-wooded valley of the upper Lea.

HARPER'S FERRY, a town of Jefferson county, West Virginia, U.S.A., finely situated at the confluence of the Potomac and Shenandoah rivers (which here pass through a beautiful gorge in the Blue Ridge), 55 m. N.W. of Washington. Pop. (1900) 896; (1910) 766. It is served by the Baltimore & Ohio railway, which crosses the Potomac here, by the Winchester & Potomac railway (Baltimore & Ohio) of which it is a terminus, and by boats on the Chesapeake & Ohio Canal, which passes along the Maryland side of the Potomac. Across the Potomac on the north rise the Maryland Heights; across the Shenandoah, on the West Virginia side, the Virginia or Loudoun Heights; and behind the town to the W. the Bolivar Heights. A United States arsenal and armoury were established at Harper's Ferry in 1796, the site being chosen because of the good water-power;

these were seized on the 16th of October 1859 by John Brown (q.v.), the abolitionist, and some 21 of his followers. For four months before the raid Brown and his men lived on the Kennedy Farm, in Washington county, Maryland, about 4 m. N.W. of Harper's Ferry. The

engine-house in which Brown was captured was exhibited at the Columbian Exposition at Chicago and was later rebuilt on Bolivar Heights; a marble pillar, marked ” John Brown’s Fort,” has been erected on its original site. On Camp Hill is Storer College (state-aided), a normal school for negroes, which was established under Free Baptist control in 1867, and has academic, normal, biblical, musical and industrial departments.

The first settlement here was made about 1747 by Robert Harper, who ran a ferry across the Potomac. The position of Harper’s Ferry at the lower end of the Shenandoah Valley rendered it a place of strategic importance during the Civil War. On the 18th of April 1861, the day after Virginia passed her ordinance of secession, when a considerable force of Virginia militia under General Kenton Harper approached the town — an attack having been planned in Richmond two days before — the .Federal garrison of 45 men under Lieutenant Roger Jones set fire to the arsenal and fled. Within the next few days large numbers of Confederate volunteers assembled here; and Harper was succeeded in command (27th April) by ” Stonewall ” Jackson, who was in turn succeeded by Brigadier- General Joseph E. Johnston on the 23rd of May. Johnston thought that the place was unimportant, and withdrew when (15th June) the Federal forces under General Robert Patterson and Colonel Lew Wallace approached, and Harper’s Ferry was again occupied by a Federal garrison. In September 1862, during General Lee’s first invasion of the North, General McClellan advised that the place be abandoned in order that the 10,000 men defending it might be added to his fighting force, but General Halleck would not consent, so that when Lee needed supplies from the Shenandoah Valley he was blocked by the garrison, then under the command of Colonel Dixon S. Miles. On Jackson’s approach they were distributed as follows: about 7000 men on Bolivar Heights, about 2000 on Maryland Heights, and about 1800 on the lower ground. On the 13th of September General Lafayette McLaws carried Maryland Heights and General John G. Walker planted a battery on Loudoun Heights. On the 14th there was some fighting, but early on the 15 th, as Jackson was about to make an assault on Bolivar Heights, the garrison, surrounded by a superior force, surrendered. The total Federal loss (including the garrisons at Winchester and Martinsburg) amounted to 44 killed (the commander was mortally wounded), 12,520 prisoners, and 13,000 small arms. For this terrible loss to the Union army the responsibility seems to have been General Halleck’s, though the blame was officially put on Colonel Miles, who died immediately after the surrender. Jackson rejoined Lee on the following day in time to take part in the battle of Antietam, and after the battle General McClellan placed a strong

garrison (the 12th Corps) at Harper's Ferry. In June 1863 the place was again abandoned to the Confederates on their march to Pennsylvania. After their defeat at Gettysburg, the town again fell into the hands of the Federal troops, and it remained in their possession until the end of the war. On the 4th of July 1864 General Franz Sigel, who was then in command here, withdrew his troops to Maryland Heights, and from there resisted Early's attempt to enter the town and to drive the Federal garrison from Maryland Heights. Harper's Ferry was seriously damaged by a flood in the Shenandoah in October

1878.

HARPIES (Gr. "kfrnviai, older form 'Apeirviai., " swift robbers "), in ancient mythology, the personification of the sweep- ing storm- winds. In Homer, where they appear indifferently under the name of aprvi-ai, and dveWaL, their function is to carry off those whose sudden disappearance is desired by the gods. Only one of them is there mentioned (Iliad, xvi. 1 50) by name, Podarge, the mother of the coursers of Achilles by Zephyrus, the generative wind. According to Hesiod (Theog. 265) they are two in number, Aello and Ocypete, daughters of Thaumas and Electra, winged

goddesses with beautiful locks, swifter than winds and birds in their flight, and their domain is the air. In later times their number was increased (Celaeno being a frequent addition and their leader in Virgil), and they were described as hateful and repulsive creatures, birds with the faces of old women, the ears of bears, crooked talons and hanging breasts ; even in Aeschylus (Eumenides, 50) they appear as ugly and misshapen monsters. Their function of snatching away mortals to the other world brings them into connexion with the Erinyes, with whom they are often confounded. On the so-called Harpy monument from Lycia, now in the British Museum, the Harpies appear carrying off some small figures, supposed to be the daughters of Pandareus, unless they are intended to represent departed souls. The repulsive character of the Harpies is more especially seen in the legend of Phineus, king of Salmydessus in Thrace (Apollodorus i. 9, 21; see also Diod. Sic. iv. 43). Having been deprived of his sight by the gods for his ill-treatment of his sons by his first wife (or for having revealed the future to mortals), he was con- demned to be tormented by two Harpies, who carried off what- ever food was placed before him. On the arrival of the Argonauts, Phineus promised to give them

particulars of the course they should pursue and of the dangers that lay before them, if they would deliver him from his tormentors. Accordingly, when the Harpies appeared as usual to carry off the food from Phineus's table, they were driven off and pursued by Calais and Zetes, the sons of Boreas, as far as the Strophades islands in the Aegean. On promising to cease from molesting Phineus, their lives were spared. Their place of abode is variously placed in the Strophades, the entrance to the under-world, or a cave in Crete. According to Cecil Smith, Journal of Hellenic Studies, xiii. (1892-1893), the Harpies are the hostile spirits of the scorching south wind; E. Rohde (Rheinisches Museum, i., 1895) regards them as spirits of the storm, which at the bidding of the gods carry off human beings alive to the under-world or some spot beyond human ken.

See articles in Roscher's Lexikon der Mythologie and Daremberg and Saglio's Dictionnaire des antiquitis. In the article Greek Art, fig. 14 gives a representation of the winged Harpies.

HARPIGNIES, HENRI (1819-), French landscape painter, born at Valenciennes in 1819, was intended by his parents for a business career, but his determination to become an artist was so strong that it conquered all obstacles, and he was allowed at the age of twenty-seven to enter Achard's atelier in Paris. From this painter he acquired a groundwork of sound constructive draughtsmanship, which is so marked a feature of his landscape painting. After two years under this exacting teacher he went to Italy, whence he returned in 1850. During the next few years he devoted himself to the painting of children in landscape setting, and fell in with Corot and the other Barbizon masters, whose principles and methods are to a certain extent reflected in his own personal art. To Corot he was united by a bond of warm friendship, and the two artists went together to Italy in i860. On his return, he scored his first great success at the Salon, in 1861, with his " Lisiere de bois sur les bords de rAllier." After that year he was a regular exhibitor at the old Salon; in 1886 he received his first medal for " Le Soir dans la campagne de Rome," which was acquired for the Luxembourg Gallery. Many of his best works were painted at Herisson in the Bourbonnais, as well as in the Nivernais and the Auvergne. Among his chief pictures are " Soir sur les bords de la Loire " (1861), "Les Corbeaux" (1865), " Le Soir" (1866), " Le Saut-du-Loup " (1873), "La Loire" (1882), and " Vue de Saint-Prive " (1883). He also did some decorative work for the Paris Opera — the " Vallee d'Egerie " panel, which he ishowed at the Salon of 1870.

HARP-LUTE, or Dital Harp, one of the many attempts to revive the popularity of the guitar and to increase its compass, invented in 1798

by Edward Light. The harp-lute owes the first part of its name to the characteristic mechanism for shortening the effective length of the strings; its second name — dital harp — emphasizes the nature of the stops, which are worked by the thumb in contradistinction to the pedals of the harp worked

by the feet. It consists of a pear-shaped body, to which is added a curved neck supported on a front pillar or arm springing from the body, and therefore reminiscent of the harp. There are 12 catgut strings. The curved fingerboard, almost parallel with the neck, is provided with frets, and has in addition a thumb- key for each string, by means of which the accordance of the string is mechanically raised a semitone at will. The dital or key, on being depressed, acts upon a stop-ring or eye, which draws the string down against the fret, and thus shortens its effective length. The fingers then stop the strings as usual over the remaining frets. A further improvement was patented in 1816 as the British harp-lute. Other attempts possessing less practical merit than the dital harp were the lyra-guitarre, which appeared in Germany at the beginning of the 19th century; the accord-guitarre, towards the middle of the same century; and the keyed guitar. (K. S.)

HARPOCRATES, originally an Egyptian deity, adopted by the Greeks, and worshipped in later times both by Greeks and Romans. In Egypt, Harpa-khruti, Horus the child, was one of the forms of Horus, the sun-god, the child of Osiris. He was supposed to carry on war against the powers of darkness, and hence Herodotus (ii. 144) considers him the same as the Greek Apollo. He was represented in statues with his finger on his mouth, a symbol of childhood. The Greeks and Romans, not understanding the meaning of this attitude, made him the god of silence (Ovid, Metam. ix. 691), and as such he became a favourite deity with the later mystic schools of philosophy.

See articles by G. Lafaye in Daremberg and Saglio's Dictionnaire des antiquitSs, and by E. Meyer (s.v. " Horos ") in Roscher's Lexikon der Mythologie.

HARPOCRATION, VALERIUS, Greek grammarian of Alex- andria. He is possibly the Harpocration mentioned by Julius Capitolinus (Life of Verus, 2) as the Greek tutor of Antoninus Verus (2nd century A.D.); some authorities place him much later, on the ground that he borrowed from Athenaeus. He is the author of a Ae%uibv (or Htpl twv Xe£ecoy) ra>v8eKa pyropuv, which has come down to us in an incomplete form. The work contains, in more or less alphabetical order, notes on well-known events and persons mentioned by the orators, and explanations of legal and commercial expressions. As

nearly all the lexicons to the Greek orators have been lost, Harpocration's work is especially valuable. Amongst his authorities were the writers of Atthides (histories of Attica), the grammarian Didymus, Dionysius of Halicarnassus, and the lexicographer Dionysius, son of Tryphon. The book also contains contributions to the history of Attic oratory and Greek literature generally. Nothing is known of an 'AvBripwv avvaywy-q, a sort of anthology or chrestomathy attributed to him by Suidas. A series of articles in the margin of a Cambridge MS. of the lexicon forms the basis of the Lexicon rhetoricum Cantabrigiense (see Dobree, P. P.).

The best edition is by W. Dindorf (1853); see also J. E. Sandys, History of Classical Scholarship, i. (1906), p. 325; C. Boysen, De Harpocrationis fontibus (Kiel, 1876).

HARPOON (from Fr. harpon, a grappling-iron, O. Fr. harpe, a dog's claw, an iron clamp for fastening stones together; the source of these words is the Lat. harpago, harpa, &c, formed from Gr. aprayri, hook, apiraˆuv, to snatch, tear away, cf. " harpy "), barbed spear, particularly one used for spearing whales or other large fish, and either thrown by hand or fired from a gun (see Whale-Fishery).

HARPSICHORD, Harpsicon, double virginals (Fr. clavecin; . Ger. Clavicymbel, Kiel-Fliigel; Ital. arpicordo, cembalo, clavi- cembalo, gravecembalo; Dutch, clavisinbal) , a large keyboard instrument (see Pianoforte), belonging to the same family as the virginal and spinet, but having 2, 3, or even 4 strings to each note, and a case of the harp or wing shape, afterwards adopted for the grand pianoforte. J. S. Bach's harpsichord, preserved in the museum of the Hochschule fur Musik at Charlottenburg, has two manuals and 4 strings to each note, one 16 ft., two 8 ft. and one 4 ft. By means of stops the performer has within his power a number of combinations for varying the tone and dynamic power. In all instruments of the harpsichord family

the strings, instead of being struck by tangents as in the clavi- chord, or by hammers as in the pianoforte, are plucked by means of a quill firmly embedded in the centred tongue of a jack or upright placed on the back end of the key-lever. When the finger depresses a key, the jack is thrown up, and in passing the crow-quill catches the string and twangs it. It is this twanging of the string which produces the brilliant incisive tone peculiar to the harpsichord family. What these

instruments gain in brilliancy of tone, however, they lose in power of expression and of accent. The impossibility of commanding any emphasis necessarily created for the harpsichord an individual technique which influenced the music composed for it to so great an extent that it cannot be adequately rendered upon the pianoforte.

The harpsichord assumed a position of great importance during the 16th and 17th centuries, more especially in the orchestra, which was und?r the leadership of the harpsichord player. The most famous of all harpsichord makers, whose names form a guarantee for excellence, were the Ruckers, established at Antwerp from the last quarter of the 16th century. (K. S.)

HARPY, a large diurnal bird of prey, so named after the mythological monster of the classical poets (see Harpies), — the Thrasaetus harpyia of modern ornithologists — an inhabitant of the warmer parts of America from Southern Mexico to Brazil. Though known since the middle of the 17th century, its habits have come very little under the notice of naturalists, and what is said of them by the older writers must be received with some

Harpy.

suspicion. A cursory inspection of the bird, which is not un- frequently brought alive to Europe, its size, and its enormous bill and talons, at once suggest the vast powers of destruction imputed to it, and are enough to account for the stories told of its ravages on mammals — sloths, fawns, peccaries and spider- monkeys. It has even been asserted to attack the human race. How much of this is fabulous there seems no means at present of determining, but some of the statements are made by veracious travellers — D'Orbigny and Tschudi. It is not uncommon in the forests of the isthmus of Panama, and Salvin says (Proc. Zool. Society, 1864, p. 368) that its flight is slow and heavy. Indeed its owl-like visage, its short wings and soft plumage, do not in- dicate a bird of very active habits, but the weapons of offence with which it is armed show that it must be able to cope with vigorous prey. Its appearance is sufficiently striking — the head and lower parts, except a pectoral band, white, the former

adorned with an erectile crest, the upper parts dark grey bandec with black, the wings dusky, and the tail barred; but the huge bill and powerful scutellated legs most of all impress the be- holder. The precise affinities of the harpy cannot be said tc have been determined. By some authors it is referred to the eagles, by others to the buzzards, and by others again to the hawks; but possibly the first of these

alliances is the most likely “to be true. (A. N.)

HARRAN, Haran or Charran (Sept. Xappav or Xappa : Strabo, Kappcu: Pliny, Carrae or Carrhae; Arab. Harran), in biblical history the place where Terah halted after leaving Ur, and ap- parently the birthplace of Abraham, a town on the stream Jullab, some nine hours’ journey from Edessa in Syria. At this point the road from Damascus joins the highway between Nineveh and Carchemish, and Haran had thus considerable military and commercial value. As a strategic position it is mentioned in inscriptions as early as the time of Tiglath Pileser I., about 1100 B.C., and subsequently by Sargon II., who restored the privileges lost at the rebellion which led to the con- quest referred to in 2 Kings xix. 12 (= Isa. xxxvii. 12). It was the centre of a considerable commerce (Ezek. xxvii. 23), and one of its specialities was the odoriferous gum derived from the strobus (Pliny, H.N. xii. 40). It was here that Crassus in his eastern expedition was attacked and slain by the Parthians (53 B.C.); and here also the emperor Caracalla was murdered at the instigation of Macrinus (a.d. 217). Haran was the chief home of the moon-god Sin, whose temple was rebuilt by several kings, among them Assur-bani-pal and Nabunidus and Herodian (iv. 13, 7) mentions the town as possessing in his day a temple of the moon. In the middle ages it is mentioned as having been the seat of a particular heathen sect, that of the Haranite Sabeans. It retained its importance down to the period of the Arab ascendancy; but by Abulfeda it is mentioned as having before his time fallen into decay. It is now wholly in ruins. The Yahwistic writer (Gen. xxvii. 43) makes it the home of Laban and connects it with Isaac and Jacob. But we cannot thus put Haran in Ara mnaharaim ; the home of the Labanites is rather to be looked for in the very similar word Hauran.

HARRAR (or Harar), a city of N.E. Africa, in 8° 45′ N., 42 36′ E., capital of a province of Abyssinia and 220 m. S.S.W. of the ports of Zaila (British) and Jibuti (French) on the Gulf of Aden. With Jibuti it is connected by a railway (188 m. long) and carriage-road. Harrar is built on the slopes of a hill at an elevation of over 5000 ft. A lofty stone wall, pierced by five gates and flanked by twenty-four towers, encloses the city, which has a population of about 40,000. The streets are steep, narrow, dirty and unpaved, the. roadways consisting of rough boulders. The houses are in general made of undressed stone and mud and are flat-topped, the general aspect of the city being Oriental and un-Abyssinian. A few houses, including the palace of the governor and the foreign consulates, are of more elaborate and solid construction than the majority of the build- ings. There are several mosques and an Abyssinian church (of the usual circular construction) built of stone. Harrar is a city of considerable commercial importance,

through it passing all the merchandise of southern Abyssinia, Kaffa and Galla land. The chief traders are Abyssinians, Armenians and Greeks. The principal article of export is coffee, which is grown extensively in the neighbouring hills and is of the finest quality. Besides coffee there is a large trade in durra, the kat plant (used by the Mahommedans as a drug), ghee, cattle, mules and camels, skins and hides, ivory and gums. The import trade is largely in cotton goods, but every kind of merchandise is included.

Harrar is believed to owe its foundation to Arab immigrants from the Yemen in the 7th century of the Christian era. In the region of Somaliland, now the western part of the British pro- tectorate of that name, the Arabs established the Moslem state of Adel or Zaila, with their capital at Zaila on the Gulf of Aden. In the 13th century the sultans of Adel enjoyed great power. In 1 52 1 the then sultan Abubekr transferred the seat of govern- ment to Harrar, probably regarding Zaila as too exposed to the attacks of the Turkish and Portuguese navies then contending

for the mastery of the Red Sea and Gulf of Aden. Abubekr's successor was Mahommed III., Ahmed ibn Ibrahim el-Ghazi (1507-1543), surnamed Gran (Granye), the left-handed. He was not an Arab but, probably, of Somali origin. The son of a noted warrior, he quickly rose to supreme power, becoming sultan or amir in 1525. He is famous for his invasion of Abys- sinia, of which country he was virtual master for several years. From the beginning of the 17th century Adel suffered greatly from the ravages of pagan Galla tribes, and Harrar sank to the position of an amirate of little importance. It was first visited by a European in 1854 when (Sir) Richard Burton spent ten days there in the guise of an Arab. In 1875 Harrar was occupied by an Egyptian force under Raouf Pasha, by whose orders the amir was strangled. The town remained in the possession of Egypt until 1885, when the garrison was withdrawn in consequence of the rising of the Mahdi in the Sudan. The Egyptian garrison and many Egyptian civilians, in all 6500 persons, left Harrar between November 18S4 and the 25th of April 1885, when a son of the ruler who had been deposed by Egypt was installed as amir, the arrangement being carried out under the super- intendence of British officers. The new amir held power until January 1887, in which month Harrar was conquered by Menelek II., king of Shoa (afterwards emperor of Abyssinia). The governorship of Harrar was by Menelek entrusted to Ras Makonnen, who held the post

until his death in 1906.

The Harrari proper are of a distinct stock from the neigh- bouring peoples, and speak a special language. Harrarese is ” a Semitic graft inserted into an indigenous stock ” (Sir R. Burton, First Footsteps in East Africa). The Harrari are Mahommedans of the Shafa’i or Persian sect, and they employ the solar year and the Persian calendar. Besides the native population there are in Harrar colonies of Abyssinians, Somalis and Gallas. By the Somalis the place is called Adari, by the Gallas Adaray.

See Abyssinia; Somaliland. Also P. Paulitschke, Harar: Forschungsreise nach den Somal- und oGalla-Lundern Osl-Ajrikas (Leipzig, 1888).

HARRATIN, black Berbers, dwelling in Tidikelt and other Saharan oases. Many of them are blacker than the average negro. In physique, however, they are true to the Berber type, being of handsome appearance with European features and well- proportioned bodies. They are the result of an early crossing with the Sudanese negro races, though to-day they have all the pride of the Berbers (q.v.), and do not live with or intermarry among negroes.

HARRIER, or Hen-Harrier, name given to certain birds of prey which were formerly very abundant in parts of the British Islands, from their habit of harrying poultry. The first of these names has now become used in a generic sense for all the species ranked under the genus Circus of Lacepede, and the second con- fined to the particular species which is the Falco cyaneus of Linnaeus and the Circus cyaneus of modern ornithologists.

One European species, C. aeruginosus, though called in books the marsh-harrier, is far more commonly known in England and Ireland as the moor-buzzard. But harriers are not, like buzzards, arboreal in their habits, and always affect open country, generally, though not invariably, preferring marshy or fenny districts, for snakes and frogs form a great part of their ordinary food. On the ground their carriage is utterly unlike that of a buzzard, and their long wings and legs render it easy to distinguish the two groups when taken in the hand. All the species also have a more or less well-developed ruff or frill of small thickset feathers surrounding the lower part of the head, nearly like that seen in owls, and accordingly many systematists consider that the genus Circus, though undoubtedly belonging to the Falconidae, connects that family with the Striges. No osteological affinity, however, can be established between the harriers and any section of the owls, and the superficial resemblance will have to be

explained in some other way. Harriers are found almost all over the world, 1 and

1 The distribution of the different species is rather curious, while the range of some is exceedingly wide, — one, C. maillardi, seems to be limited to the island of Reunion (Bourbon).

fifteen species are recognized by Bowdler Sharpe {Cat. Birds Brit. Museum, i. pp. 50-73). In most if not all the harriers the sexes differ greatly in colour, so much so that for a long while the males and females of one of the commonest and best known, the C. cyaneus above mentioned, were thought to be distinct species, and were or still are called in various European languages by different names. The error was maintained with the greater persistency since the young males, far more abundant than the adults, wear much the same plumage as their mother, and it was not until after Montagu's observations were published at the

Hen-Harrier (Male and Female).

beginning of the 19th century that the " ringtail," as she was called (the Falco pygargus of Linnaeus), was generally admitted to be the female of the " hen-harrier." But this was not Montagu's only good service as regards this genus. He proved the hitherto unexpected existence of a second species, 2 subject to the same diversity of plumage. This was called by him the ash-coloured falcon, but it now generally bears his name, and is known as Montagu's harrier, C. cineraceus. In habits it is very similar to the hen-harrier, but it has longer wings, and its range is not so northerly, for while the hen-harrier extends to Lapland, Mon- tagu's is but very rare in Scotland, though in the south of England it is the most common species. Harriers indeed in the British Islands are rapidly becoming things of the past. Their nests are easily found, and the birds when nesting are easily destroyed. In the south-east of Europe, reaching also to the Cape of Good Hope and to India, there is a fourth species, the C. swainsoni of some writers, the C. pallidus of others. In North America C. cyaneus is represented by a kindred form, C. hudsonius, usually regarded as a good species, the adult male of which is always to be recognized by its rufous markings beneath, in which character it rather resembles C. cineraceus, but it has not the long wings of that species. South America has in C. cinereus another representative form, while China, India and Australia possess more of this type. Thus there is a section in which the males have a strongly contrasted black and grey plumage, and finally there is a group of larger forms allied to the European C. aeru- ginosus, wherein a grey dress is less often attained,

of which the South African C. ranivorus and the New Zealand C. gouldi are examples. (A. N.) .

HARRIGAN, EDWARD (1845-), American actor, was born in New York of Irish parents on the 26th of October 1845. He made his first appearance in San Francisco in 1867, and soon afterwards formed a stage partnership with Tony' Hart, whose real name was Anthony Cannon. As " Harrigan and Hart," they had a great success in the presentation of types of low life in New York. Beginning as simple sketches, these were gradually worked up into plays, with occasional songs, set to popular music

2 A singular mistake, which has been productive of further error, was made by Albin, who drew his figure (Hist. Birds, ii. pi. 5) from a specimen of one species, and coloured it from a specimen of the other.

by David Braham. The titles of these plays indicate their character, The Mulligan Guards, Squatter Sovereignly, A Leather Patch, The 0′ Regans. The partnership with Hart lasted from 1871-1884. Subsequently Harrigan played in different cities of the United States, one of his favourite parts being George Coggs- well in Old Lavender.

HARRIMAN, EDWARD HENRY (1848-1909), American financier and railroad magnate, son of the Rev. Orlando Harriman, rector of St George's Episcopal church, Hempstead, L.I., was born at Hempstead on the 25th of February 1848. He became a broker's clerk in New York at an early age, and in 1870 was able to buy a seat on the New York Stock Exchange on his own account. For a good many years there was nothing sensational in his success, but he built up a considerable business connexion and prospered in his financial operations. Meanwhile he carefully mastered the situation affecting American railways. In this respect he was assisted by his friendship with Mr Stuy- vesant Fish, who, on becoming vice-president of the Illinois Central in 1883, brought Harriman upon the directorate, and in 1887, being then president, made Harriman vice-president; twenty years later it was Harriman who dominated the finance of the Illinois Central, and Fish, having become his opponent, was dropped from the board. It was not till 1898, however, that his career as a great railway organizer began with his formation, by the aid of the bankers, Kuhn, Loeb & Co., of a syndicate to acquire the Union Pacific line, which was then in the hands of a receiver and was generally regarded as a

hopeless failure. It was soon found that a new power had arisen in the railway world. Having brought the Union Pacific out of bankruptcy into prosperity, and made it an efficient instead of a decaying line, he utilized his position to draw other lines within his control, notably the Southern Pacific in 1901. These extensions of his power were not made without friction, and his abortive contest in 1901 with James J. Hill for the control of the Northern Pacific led to one of the most serious financial crises ever known on Wall Street. But in the result he became the dominant factor in American railway matters. At his death, on the 9th of September 1909, his influence was estimated to extend over 60,000 m. of track, with an annual earning power of $700,000,000 or over. Astute and unscrupulous manipulation of the stock markets, and a capacity for the hardest of bargaining and the most determined warfare against his rivals, had their place in this success, and Harriman's methods excited the bitterest criticism, culminating in a stern denunciation from President Roosevelt himself in 1907. Nevertheless, besides acquiring colossal wealth for himself, he helped to create for the American public a vastly improved railway service, the benefit of which survived all controversy as to the means by which he triumphed over the obstacles in his way.

HARRIMAN, a city of Roane county, Tennessee, U.S.A., on the Emory river, about 35 m.W.by S. of Knoxville. Pop. (1900)3442 (516 being negroes) ; (1910) 306 1 . Harriman is served by the Har- riman & North Eastern, the Tennessee Central, and the Southern railways. It is the seat of the East Tennessee Normal and Industrial Institute, for negroes, and of the American University of Harriman (Christian Church, coeducational; 1893), which comprises primary, preparatory, collegiate, Bible school, civic research, commercial, music and art departments, and in 1907- 1908 had 12 instructors and 317 students. Near the city are large deposits of iron and an abundance of coal and timber. Among manufactures are cotton products, farming tools, leather, tannic acid, furniture and flour. Harriman was founded in 1890 by a land company. A clause in this company's by-laws requires that every conveyance of real estate by the company " shall contain a provision forbidding the use of the property or any building thereon, for the purpose of making, storing or selling intoxicating beverages as such." Harriman was chartered as a city in 1891, and its charter was revised in 1899.

HARRINGTON, EARLS OF. The first earl of Harrington was the diplomatist and politician, William Stanhope (c. 1690- 1756), a younger son of John Stanhope of Elvaston, Derbyshire, and a brother of Charles Stanhope (1673-1760), an active

politician during the reign of George I. His ancestor, Sir Johri Stanhope (d. 1638), was a half-brother of Philip Stanhope, 1st earl of Chesterfield. Educated at Eton, William Stanhope entered the army and served in Spain, but soon he turned his attention to more peaceful pursuits, went on a mission to Madrid and represented his country at Turin. When peace was made between England and Spain in 1720 Stanhope became British ambassador to the latter country, and he retained this position until March 1727, having built up his reputation as a diplomatist during a difficult period. In 1729 he had some part in arranging the treaty of Seville between England, France and Spain, and for his services in this matter he was created Baron Harrington in January 1730. Laterin thesame year he was appointed secretary of state for the northern department under Sir Robert Walpole, but, like George II., he was anxious to assist the emperor Charles VI. in his war with France, while Walpole favoured a policy of peace. Although the latter had his way Harrington remained secretary until the great minister's fall in 1742, when he was transferred to the office of president of the council and was created earl of Harrington and Viscount Petersham. In 1744, owing to the influence of his political allies, the Pelhams, he returned to his former post of secretary of state, but he soon lost the favour of the king, and this was the principal cause why he left office in October 1746. He was lord lieutenant of Ireland from 1747 to 1751, and he died in London on the 8th of December 1756.

The earl's successor was his son, William (1719-1779), who entered the army, was wounded at Fontenoy and became a general in 1770. He was a member of parliament for about ten years and he died on the 1st of April 1779. This earl's wife Caroline (17 2 2-1 784), daughter of Charles Fitzroy, 2nd duke of Grafton, was a noted beauty, but was also famous for her eccentricities. Their elder son, Charles(i753-i829),who became the 3rd earl, was a distinguished soldier. He served with the British army during the American War of Independence and attained the rank of general in 1802. From 1805 to 181 2 he was commander-in-chief in Ireland; he was sent on diplomatic errands to Vienna and to Berlin, and he died at Brighton on the 15th of September 1829.

Charles Stanhope, 4th earl of Harrington (1780-1851), the eldest son of the 3rd earl, was known as Lord Petersham until he succeeded to the earldom in 1829. He was very well known in society owing partly to his eccentric habits; he dressed like the French king Henry IV., "and had other personal peculiarities. He married the actress, Maria Foote, but when he died in March 185 1 he left no sons, and his brother Leicester Fitzgerald Charles (1 784-1862) became the 5th earl. This

nobleman was a soldier and a politician of advanced views, who is best known as a worker with Lord Byron in the cause of Greek independence. He was in Greece in 1823 and 1824, where his relations with Byron were not altogether harmonious. He wrote A Sketch of the History and Influence of the Press in British India (1823); and Greece in 1823 and 1824 (English edition 1824, American edition 1825). His son Sydney Seymour Hyde, 6th earl (1845-1866), dying unmarried, was succeeded by a cousin, Charles Wyndham Stanhope (1809-1881), as 7th earl, and in 1881 the latter's son Charles Augustus Stanhope (b. 1844) became 8th earl of Harrington.

Before the time of the first earl of Harrington the Stanhope family had held the barony of Stanhope of Harrington, which was created in 1605 in favour of Sir John Stanhope (c. 1550-1621) of Harrington, Northamptonshire. Sir John was a younger son of Sir Michael Stanhope (d. 1552) of Shelford, Nottinghamshire, who was a brothef-in-law of the protector Somerset. Sir Michael's support of Somerset cost him his life, as he was beheaded on the 26th of February 1552. Sir John was treasurer of the chamber from 1596 to 1616 and was a member of parliament for several years. He died on the 9th of March 1621, and when his only son Charles, 2nd baron (c. 1595-1675), died without issue in 1675 the barony became extinct.

HARRINGTON, or Harington, JAMES (1611-1677), English political philosopher, was born in January 161 1 of an old Rutland- shire family. He was son of Sir Sapcotes Harrington of Rand, Lincolnshire, and great-nephew of the first Lord Harington of Exton (d. 1615). In 1629 he entered Trinity College, Oxford, as

a gentleman commoner. One of his tutors was the famous Chillingworth. After several years spent in travel, and as a soldier in the Dutch army, he returned to England and lived in retirement till 1646, when he was appointed to the suite of Charles I., at that time being conveyed from Newcastle as prisoner. Though republican in his ideas, Harrington won the king's regard and esteem, and accompanied him to the Isle of Wight. He roused, however, the suspicion of the parliament- arians and was dismissed: it is said that he was for a short time put in confinement because he would not swear to refuse assist-ance to the king should he attempt to escape. After Charles's death Harrington devoted his time to the composition of his Oceana, a work which pleased neither party. By order of Cromwell it was seized when

passing through the press. Harrington, how- ever managed to secure the favour of the Protector's favourite daughter, Mrs Claypole; the work was restored to him, and appeared in 1656, dedicated to Cromwell. The views embodied in Oceana, particularly that bearing on vote by ballot and rota- tion of magistrates and legislators, Harrington and others (who in 1659 formed a club called the " Rota ") endeavoured to push practically, but with no success. In November 1 661, by order of Charles II., Harrington was arrested, apparently without sufficient cause, on a charge of conspiracy, and was thrown into the Tower. Despite his repeated request no public trial could be obtained, and when at length his sisters obtained a writ of habeas corpus he was secretly removed to St Nicholas Island off Plymouth. There his health gave way owing to his drinking guaiacum on medical advice, and his mind appeared to be affected. Careful treatment restored him to bodily vigour, but his mind never wholly recovered. After his release he married,— at what date does not seem to be precisely known. He died on the nth of September 1677, and was buried next to Sir Walter Raleigh in St Margaret's, Westminster.

Harrington's writings consist of the Oceana, and of papers, pamphlets, aphorisms, even treatises, in defence of the Oceana. The Oceana is a hard, prolix, and in many respects heavy exposi- tion of an ideal constitution, " Oceana " being England, and the lawgiver Olphaus Megaletor, Oliver Cromwell. The details are elaborated with infinite care, even the salaries of officials being computed, but the main ideas are two in number, each with a practical corollary. The first is that the determining element of power in a state is property generally, property in land in particular; the second is that the executive power ought not to be vested for any considerable time in the same men or class of men. In accordance with the first of these, Harrington re- commends an agrarian law, limiting the portion of land held to that yielding a revenue of £3000, and consequently insisting on particular modes of distributing landed property. As a practical issue of the second he lays down the rule of rotation by ballot. A third part of the executive or senate are voted out by ballot every year (not being capable of being elected again for three years). Harrington explains very carefully how the state and its govern- ing parts are to be constituted by his scheme. Oceana contains many valuable ideas, but it is irretrievably dull.

His Works were edited with biography by John Toland in 1700; Toland's edition, with additions by Birch, appeared in 1747, and again in 1771. Oceana was reprinted by Henry Morley in 1887. See Dwight in Political Science Quarterly (March, 1887). Harrington has often been confused with his cousin Sir James Harrington, a member of the

commission which tried Charles I., and afterwards excluded from the acts of pardon.

HARRIOT, or Harriott, THOMAS (1 560-16 2 1) , English mathematician and astronomer, was born at Oxford in 1560. After studying at St Mary Hall, Oxford, he became tutor to Sir Walter Raleigh, who appointed him in 1585 to the office of geographer to the second expedition to Virginia. Harriot published an account of this expedition in 1588, which was afterwards reprinted in Hakluyt's Voyages. On his return to England, after an absence of two years, he resumed his mathematical studies, and having made the acquaintance of Henry Percy, earl of Northumberland, distinguished for his patronage of men of science, he received from him a yearly pension of £120. He died at London on the 2nd of July 1621. A manuscript of

Harriot's entitled Ephemeris chrysometria is preserved in Sion College; and his Artis analyticae praxis ad aequaliones alge- braicas resolvendas was published at London in 1631. His con- tributions to algebra are treated in the article Algebra; Wallis's History of Algebra (1685) may also be consulted. From some papers of Harriot's, discovered in 1784, it would appear that he had either procured a telescope from Holland, or divined the construction of that instrument, and that he coincided in point of time with Galileo in discovering the spots on the sun's disk.

See Charles Hutton, Mathematical and Philosophical Dictionary (1815), and J. E. Montucla, Histoire des mathematiques (1758).

HARRIS, GEORGE, ist Baron (1746-1829), British general, was the son of the Rev George Harris, curate of Brasted, Kent, and was born on the 18th of March 1746. Educated at West- minster school and at the Royal Military Academy, Woolwich, he was commissioned to the Royal Artillery in 1760, transferring to an ensigncy in the 5th foot (Northumberland Fusiliers) in 1762. Three years later he became lieutenant, and in 1771 captain. His first active service was in the American War of Independence, in which he served at Lexington, Bunker Hill (severely wounded) and in every engagement of Howe's army except one up to November 1778. By this time he had obtained his majority, and his next service was under Major-General Medows at Santa Lucia in 1778-1779, after which his regiment served as marines in Rodney's fleet. Later in 1779 he was for a time a prisoner of war. Shortly before his promotion to lieu- tenant-colonel in his regiment (1780) he married. After com- manding the 5th in Ireland for some years, he exchanged and went with General Medows to Bombay, and served with that officer in India until 1792, taking part in various

battles and engagements, notably Lord Cornwallis's attack on Seringapatam. In 1794, after a short period of home service, he was again in India. In the same year he became major-general, and in 1796 local lieutenant-general in Madras. Up to 1800 he commanded the troops in the presidency, and for a short time he exercised the civil government as well. In December 1798 he was appointed by Lord Wellesley, the governor-general, to command the field army which was intended to attack Tipu Sahib, and in a few months Harris reduced the Mysore country and stormed the great stronghold of Seringapatam. His success established his reputation as a capable and experienced commander, and its political importance led to his being offered the reward (which he declined) of an Irish peerage. He returned home in 1800, became lieutenant-general in the army the following year, and attained the rank of full general in 1812. In 1815 he was made a peer of the United Kingdom under the title Baron Harris of Seringapatam and Mysore, and of Belmont, Kent. In 1820 he received the G.C.B., and in 1824 the governorship of Dumbarton Castle. Lord Harris died at Belmont in May 1829. He had been colonel of the 73rd Highlanders since 1800.

His descendant, the 4th Baron Harris (b. 1851), best known as a cricketer, was under-secretary for India (1885-1886), under- secretary for war (1886-1889) and governor of Bombay (1890-

1895)-

See Rt. Hon. S. Lushington, Life of Lord Harris (London, 1840), and the regimental histories of the 5th Northumberland Fusiliers and 73rd Highlanders.

HARRIS, JAMES (1709-1780), English grammarian, was born at Salisbury on the 20th of July 1709. He was educated at the grammar school in the Close at Salisbury, and at Wadham College, Oxford. On leaving the university he was entered at Lincoln's Inn as a student of law, though not intended for the bar. The death of his father in 1733 placed him in possession of an independent fortune and of the house in Salisbury Close. He became a county magistrate, and represented Christchurch in parliament from 1761 till his death, and was comptroller to the queen from 1774 to 1780. He held office under Lord Grenville, retiring with him in 1765. The decided bent of his mind had always been towards the Greek and Latin classics; and to the study of these, especially of Aristotle, he applied himself with unremitting assiduity during a period of fourteen or fifteen

years. He published in 1744 three treatises — on art; on music, painting and poetry; and on happiness. In 1751 appeared the work by which he became best known, Hermes, a philosophical inquiry concerning universal grammar. He also published Philosophical Arrangements and Philosophical Inquiries. Harris was a great lover of music, and adapted the words for a selec- tion from Italian and German composers, published by the cathedral organist, James Corfe. He died on the 22nd of December 1780.

His works were collected and published in 1801, by his son, the first earl of Malmesbury, who prefixed a brief biography.

HARRIS, JOEL CHANDLER (1848-1008), American author, was born in Eatonton, Putnam county, Georgia, on the 8th of December 1848. He started as an apprentice to the printer's trade in the office of the Countryman, a weekly paper published on a plantation not far from his home. He then studied law, and practised for a short time in Forsyth, Ga., but soon took to journalism. He joined the staff of the Savannah Daily News in 1871, and in 1876 that of the Atlanta Constitution, of which he was an editor from 1890 to 1901, and in this capacity did much to further the cause of the New South. But his most distinctive contribution to this paper, and to American literature, consisted of his dialect pieces dealing with negro life and folklore. His stories are characterized by quaint humour, poetic feeling and homely philosophy; and " Uncle Remus," the principal character of most of them, is a remarkably vivid and real creation. The first collection of his stories was published in 1880 as Uncle Remus: his Songs and his Sayings. . Among his later works are Nights with Uncle Remus (1883), Mingo and Other Sketches in Black and White (1884), Free Joe and Other Georgian Sketches (1887), Balaam and His Master and Other Sketches and Stories (1891), Uncle Remus and His Friends (1892), On the Plantation (1892), which is partly autobiographic, Sister Jane (1896), The Chronicles of Aunt Minervy Ann (1899), and The Tar-Baby and Other Rhymes of Uncle Remus (1904). More purely juvenile are Daddy Jake the Runaway and Other Stories (1889), Little Mr Thimblefinger and his Queer Country (1894) and its sequel Mr Rabbit at Home (1895), Aaron in the Wildwoods (1897), Plantation Pageants (1899), Told by Uncle Remus (1905), and Uncle Remus and Br'cr Rabbit (1907). He was one of the compilers of the Life of Henry W. Grady, including his Writings and Speeches (1890) and wrote Stories of Georgia (1896), and Georgia from the Invasion of De Soto to Recent Times (1899). He died in Atlanta on the 3rd of July 1908.

HARRIS, JOHN (c. 1666-17 19), English writer. He is best known as the editor of the Lexicon technicum, or Dictionary of the Arts and Sciences (1704), which ranks as the earliest of the long line of English encyclopaedias, and as the compiler of the Collection of Voyages and Travels which passes under his name. He was born about 1666, probably in Shropshire, and was a scholar of Trinity College, Oxford, from 1684 to 1688. He was presented to the vicarage of Icklesham in Sussex, and subse- quently to the rectory of St Thomas, Winchelsea. In 1698 he was entrusted with the delivery of the seventh series of the Boyle lectures — Atheistical Objections against the Being of God and His Attributes fairly considered and fully refuted. Between 1702 and 1704 he delivered at the Marine Coffee House in Birchin Lane the mathematical lectures founded by Sir Charles Cox, and advertised himself as a mathematical tutor at Amen Corner. The friendship of Sir William Cowper, afterwards lord chancellor, secured for him the office of private chaplain, a prebend in Rochester cathedral (1708), and the rectory of the united parishes of St Mildred, Bread Street and St Margaret Moses, in addition to other preferments. He showed himself an ardent supporter of the government, and engaged in a bitter quarrel with the Rev. Charles Humphreys, who afterwards was chaplain to Dr Sacheverel. Harris was one of the early members of the Royal Society, and for a time acted as vice-president. At his death on the 7th of September 17 19, he was busy completing an elaborate History of Kent. He is said to have died in poverty brought on by his own bad management of his affairs.

HARRIS, THOMAS LAKE (1823-1906), American spiritual- istic ” prophet,” was born at Fenny Stratford in Buckinghamshire, England, on the 15th of May 1823. His parents were Calvinistic Baptists, and very poor. They settled at Utica, New York, when Harris was five years old. When he was about twenty Harris became a Universalist preacher, and then a Swedenborgian. He became associated about 1847 with a spiritualist of indifferent character named Davis. After Davis had been publicly exposed, Harris established a congregation in New York. About 1850 he professed to receive inspirations, and published some long poems. He had the gift of improvisation in a very high degree. About 1859 he preached in London, and is described as a man ” with low, black eyebrows, black beard, and sallow countenance.” He was an effective speaker, and his poetry was admired by many; Alfred Austin in his book The Poetry of the Period even devoted a chapter to Harris. He founded in 1861 a community at Wassaic, New York, and opened a bank and a mill, which he superintended. There he was joined by about sixty converts, including five orthodox clergymen, some Japanese people, some American

ladies of position, and especially by Laurence Oliphant (q.v.) v.‘ith his wife and mother. The community — the Brother- hood of the New Life — decided to settle at the village of Brocton on the shore of Lake Erie. Harris established there a wine- making industry. In reply to the objections of teetotallers he said that the wine prepared by himself was filled with the divine breath so that all noxious influences were neutralized. ‘ Harris also built a tavern and strongly advocated the use of tobacco. He exacted complete surrender from his disciples — even the surrender of moral judgment. He taught that God was bi-sexual, and apparently, though not in reality, that the rule of society should be one of married celibacy. He professed to teach his community a change in the mode of respiration which was to be the visible sign of possession by Christ and the seal of immortality. The Oliphants broke away from the restraint about 1 88 1, charging him with robbery and succeeding in getting back from him many thousands of pounds by legal proceedings. But while losing faith in Harris himself, they did not abandon his main teaching. In Laurence Oliphant’s novel Masollam his view of Harris will be found. Briefly, he held that Harris was originally honest, greatly gifted, and possessed of certain, psychical powers. But in the end he came to practise unbridled licence under the loftiest pretensions, made the profession of extreme disinterestedness a cloak to conceal his avarice, and demanded from his followers a blind and supple obedience. Harris in 1876 discontinued for a time public activities, but issued to a secret circle books of verse dwelling mainly on sexual questions. On these his mind ran from the first. In 1891 he announced that his body had been renewed, and that he had discovered the secret of the resuscitation of humanity. He pub- lished a book, Lyra triumphalis, dedicated to A. C. Swinburne. He also made a third marriage, and visited England intending to remain there. He was called back by a fire which destroyed large stocks of his wine, and remained in New York till 1903, when he visited Glasgow. His followers believed that he had attained the secret of immortal life on earth, and after his death on the 23rd of March 1906 declared that he was only sleeping. It was three months before it was acknowledged publicly that he was really dead. . There can be little or no doubt as to the real character of Harris. His teaching was esoteric in form, but is a thinly veiled attempt to alter the ordering of sexual relations.

The authoritative biography from the side of his disciples is the Life by A. A. Cuthbert, published in Glasgow in 1908. It is full of the jargon of Harris’s sect, but contains some biographical facts as well as many quotations. Mrs Oliphant’s Life of Laurence Oliphant (1891) has not been shaken in any important particular, and Oli- phant’s own portrait

of Harris in Masollam is apparently unexag- gerated. But Harris had much personal magnetism, unbounded self-confidence, along with endless fluency, and to the last was believed in by some disciples of character and influence. (W. R. N I .)

HARRIS, SIR WILLIAM SNOW (1 791-1867), English electrician, was descended from an old family of solicitors at Plymouth, where he was born on the 1st of April 1791. He received his early education at the Plymouth grammar-school,

and completed a course of medical studies at the university of Edinburgh, after which he established himself as a general medical practitioner in Plymouth. On his marriage in 1824 he resolved to abandon his profession on account of its duties interfering too much with his favourite study of electricity. As early as 1820 he had invented a new method of arranging the lightning conductors of ships, the peculiarity of which was that the metal was permanently fixed in the masts and extended throughout the hull; but it was only with great difficulty, and not till nearly thirty years afterwards, that his invention was adopted by the government for the royal navy. In 1826 he read a paper before the Royal Society " On the Relative Powers of various Metallic Substances as Conductors of Electricity," which led to his being elected a fellow of the society in 183 1. Subse- quently, in 1834, 1836 and 1839, he read before the society several valuable papers on the elementary laws of electricity, and he also communicated to the Royal Society of Edinburgh various interesting accounts of his experiments and discoveries in the same field of inquiry. In 1835 he received the Copley gold medal from the Royal Society for his papers on the laws of electricity of high tension, and in 1839 he was chosen to deliver the Bakerian lecture. Meanwhile, although a government commission had recommended the general adoption of his conductors in the royal navy, and the government had granted him an annuity of £300 "in consideration of services in the cultivation of science," the naval authorities continued to offer various objections to his invention; to aid in removing these he in 1843 published his work on Thunderstorms, and also about the same time contributed a number of papers to the Nautical Magazine illustrative of damage by lightning. His system waS actually adopted in the Russian navy before he succeeded in removing the prejudices against it in England, and in 1845 the emperor of Russia, in acknowledgment of his services, presented him with a valuable ring and vase. At length, the efficiency

of his system being acknowledged, he received in 1847 the honour of knighthood, and subsequently a grant of /5000. After suc- ceeding in introducing his invention into general use Harris resumed his labours in the field of original research, but as he failed to realize the advances that had been made by the new school of science his application resulted in no discoveries of much value. His manuals of Electricity, Galvanism and Magnetism, published between 1848 and 1856, were, however, written with great clearness, and passed through several editions. He died at Plymouth on the 22nd of January 1867, while having in preparation a Treatise on Frictional Electricity, which was published posthumously in the same year, with a memoir of the author by Charles Tomlinson.

HARRIS, WILLIAM TORREY (1835-1900), American edu- cationist, was born in North Killingly, Connecticut, on the 10th of September 1835. He studied at Phillips Andover Academy, Andover, Massachusetts, and entered Yale, but left in his junior year (1857) to accept a position as a teacher of shorthand in the St Louis, Missouri, public schools. Advancing through the grades of principal and assistant superintendent, he was city superintendent of schools from 1867 until 1880. In 1858, under the stimulus of Henry C. Brockmeyer, Harris became interested in modern German philosophy in general, and in particular in Hegel, whose works a small group, gather- ing about Harris and Brockmeyer, began to study in 1859. From 1867 to 1893 Harris edited The Journal of Speculative Philosophy (22 vols.), which was the quarterly organ of the Philosophical Society founded in 1866. The Philosophical Society died out before 1874, when Harris founded in St Louis a Kant Club, which lived for fifteen years. In 1873, with Miss Susan E. Blow, he established in St Louis the first permanent public-school kindergarten in America. He represented the United States Bureau of Education at the International Con- gress of Educators at Brussels in 1880. In 1889 he represented the United States Bureau of Education at the Paris Exposition, and from 1889 to 1906 was United States commissioner of education. In 1899 the university of Jena gave him the honorary degree of Doctor of Philosophy for his work on Hegel. In 1906

the Carnegie Foundation for the Advancement of Teaching conferred upon him “as the first man to whom such recognition for meritorious service is given, the highest retiring allowance which our rules will allow, an annual income of $3000.” Besides being a contributor to the magazines and encyclopedias on educational and philosophical subjects, he wrote An Intro- duction to the Study of Philosophy (1889); The Spiritual Sense of Dante’s Divina Coin-media (1889); Hegel’s Logic (1890); and Psychologic Foundations of Education

(1898); and edited Appleton's International Education Series and Webster's Inter- national Dictionary. He died on the 5th 'of November 1909.

See Henry R. Evans, "A List of the Writings of William Torrey Harris" in the Report of the Commissioner of Education for 1Q07, vol. i. (Washington, 1908).

HARRISRURG, the capital of Pennsylvania, U.S.A., and the county-seat of Dauphin county, on the E. bank of the Susque- hanna river, about 105 m. W. by N. of Philadelphia. Pop. (1890), 39,385; (1900), 50,167, of whom 2493 were foreign-born and 4107 were negroes; (1910 census) 64,186. It is served by the Pennsylvania, the Philadelphia & Reading, the Northern Central and the Cumberland Valley railways; and the Pennsyl- vania canal gives it water communication with the ocean. The river here is a mile wide, and is ordinarily very shallow and dotted with islets, but rises from 4 to 6 ft. after a moderate rain; it is spanned by several bridges.

The city lies for the most part on the E. slope of a hill extend- ing from the river bank, several feet in height, across the Penn- sylvania canal to Paxton Creek. Front Street, along the river, is part of a parkway connecting the park system with which the city is encircled. Overlooking it are the finest residences, among them the governor's mansion. State Street, 120 ft. in width, runs at right angles with Front Street through the business centre of the city, being interrupted by the Capitol Park (about 16 acres). The Capitol, 1 dedicated in 1906, was erected to re- place one burned in 1897; it is a fine building, with a dome modelled after St Peter's at Rome. At the main entrance are bronze doors, decorated in relief with scenes from the state's history; the floor of the rotunda is of tiles made at Doylestown, in the style of the pottery made by early Moravian settlers, and illustrating the state's resources; the Senate Chamber and the House Chamber have stained-glass windows by W. B. van Ingen and mural paintings by Edwin A. Abbey, who painted a series, " The Development of the Law," for the Supreme Court room in the eastern wing and decorated the rotunda. The mural decorations of the south corridor, by W. B. van Ingen, portray the state's religious sects; those in the north corridor, by John W. Alexander, represent the changes in the physical and material character of the state; and there is a frieze by Miss Violet Oakley, " The Founding of the State of Liberty Spiritual," in the governor's reception room. Two heroic groups of statuary for the building were designed by George Grey Barnard. The state library in the Capitol contains about 150,000 volumes. In the same park is also a monument 105 ft. high erected in

1 For this building the legislature in 1901 appropriated $4,000,000, stipulating that it should be completed before the 1st of January 1907. It was completed by that time, the net expenditure of the building commission being about $3,970,000. Although the legis- lature had made no provision for furniture and decoration, the state Board of Public Grounds and Buildings (governor, auditor-general and treasurer) undertook to complete the furnishing and decoration of the building within the stipulated time, and paid out for that purpose more than $8,600,000. In May 1906 a new treasurer entered office, who discovered that many items for furniture and decoration were charged twice, once at a normal and again at a remarkably high figure. In 1907 the legislature appointed a committee to investigate the charge of fraud. The committee's decision was that the Board of Grounds and Buildings was not authorized to let the decorating and furnishing of the state house; that it had illegally authorized certain expenditures; and that architect and contractors had made fraudulent invoices and certificates. Various indictments were found: in the first trial for conspiracy in the making and delivering of furniture the contractor and the former auditor-general, state treasurer and superintendent of public grounds and buildings were convicted and in December 1908 were sentenced to two years' imprisonment and fined $500 each; in 1910 a suit was brought for the recovery of about $5,000,000 from those responsible.

1868 to the memory of the soldiers who fell in the Mexican War; it has a column of Maryland marble 76 ft. high, which is sur- mounted by an Italian marble statue of Victory, executed in Rome. At the base of the monument are muskets used by United States soldiers in that war and guns captured at Cerro Gordo. In State Street is the Dauphin County Soldiers' monu- ment, a shaft 10 ft. sq. at the base and no ft. high, with a pyra- midal top.

For several years prior to 1902 Harrisburg suffered much from impure water, a bad sewerage system, and poorly paved and dirty streets. In that year, however, a League for Municipal Improvements was formed; in February 1902 a loan of $1,000,000 for municipal improvements was voted, landscape gardeners and sewage engineers were consulted, and a non- partisan mayor was elected, under whom great advances were made in street cleaning and street paving, a new filtration plant was completed, the river front was beautified and protected from flood, sewage was diverted from Paxton Creek, and the

development of an extensive park system was undertaken.

Harrisburg's charitable institutions include a city hospital, a home for the friendless, a children's industrial home, and a state lunatic hospital (1845). The city is the seat of a Roman Catholic bishopric. Both coal and iron ore abound in the vicinity, and the city has numerous manufacturing establish- ments. The value of its factory products in 1905 was $17,146,338 (14-3% more than in 1900), the more important being those of steel works and rolling mills ($4,528,907), blast furnaces, steam railway repair shops, cigar and cigarette factories ($1,258,498), foundries and machine shops ($953,617), boot and shoe factories ($922,568), flouring and grist mills, slaughtering and meat-packing establishments and silk mills.

Harrisburg was named in honour of John Harris, who, upon coming into this region to trade early in the 18th century, was attracted to the site as an easy place at which to ford the Susque- hanna, and about 1726 settled here. He was buried in what is now Harris Park, where he erected the first building, a small hut, within the present limits of Harrisburg. In 1753 his son estab- lished a ferry over the river, and the place was called Harris's Ferry until 1785, when the younger Harris laid out the town and named it Harrisburg. In the same year it was made the county- seat of the newly constituted county of Dauphin, and its name was changed to Louisburg; but when, in 1791, it was incorporated as a borough, the present name was again adopted. In 1812, after an effort begun twenty-five years before, it was made the capital of the state; and in i860 it was chartered as a city. In the summer of 1827, through the persistent efforts of persons most interested in the woollen manufactures of Massachusetts and other New England states to secure legislative aid for that industry, a convention of about 100 delegates — manufacturers, newspaper men and politicians — was held in Harrisburg, and the programme adopted by the convention did much to bring about the passage of the famous high tariff act of 1828.

HARRISMITH, a town in the Orange Free State, 60 m. N.W. by rail of Ladysmith, Natal, and 240 m. N.E. of Bloemfontein via Bethlehem. Pop. (1904) 8300 (including troops 1921). It is built on the banks of the Wilge, 5250 ft. above the sea and some 20 m. W. of the Drakensberg. Three miles N. is the Platberg, a table-shaped mountain rising 2000 ft. above the town, whence an excellent supply of water is derived. The town is well laid out and several of the streets are lined with trees. Most of the houses are built of white stone quarried in the neighbourhood. The Kaffirs, who numbered in 1904 3483, live in a separate location. Harrismith has a dry, bracing climate and enjoys a

high reputation in South Africa as a health resort. It serves one of the best -watered and most fertile agricultural and pastoral districts of the province, of which it is the chief eastern trading centre. Wool and hides are the principal exports.

Harrismith was founded in 1849, the site first chosen being on the Elands river, where the small town of Aberfeldig now is; but the advantages of the present site soon became apparent and the settlement was removed. The founders were Sir Harry Smith (after whom the town is named), then governor of Cape

Colony, suid Major Henry D. Warden, at that time Britisl resident at Bloemfontein, whose name is perpetuated in tha of the principal street. In a cave about 2 m. from the town an well-preserved Bushman paintings.

HARRISON, BENJAMIN -(1833-1901), the twenty-thirc president of the United States, was born at North Bend, neai Cincinnati, Ohio, on the 20th of August 1833. His great- grandfather, Benjamin Harrison of Virginia (c. 1740-1791), was a signer of the Declaration of Independence. His grandfather William Henry Harrison (1773-1841), was ninth president oi the United States. His father, John Scott Harrison (1804-1878) represented his district in the national House of Representatives in 1853-1857. Benjamin's youth was passed upon the ancestral farm, and as opportunity afforded he attended school in the log school-house near his home. He was prepared for college by a private tutor, studied for two years at the Farmers' College, near Cincinnati, and in 1852 graduated from Miami University, at that time the leading educational institution in the State oi Ohio. From his youth he was diligent in his studies and a great reader, and during his college life showed a marked talent for extemporaneous speaking. He pursued the study of law, partly in the office of Bellamy Storer (1798-1875), a leading lawyer and judge of Cincinnati, and in 1853 he was admitted to the bar. At the age of twenty-one he removed to Indianapolis. He had but one acquaintance in the place, the clerk of the federal court, who permitted him to occupy a desk in his office and place at the door his sign as a lawyer. Waiting for professional business, he was content to act as court crier for two dollars and a half a day; but he soon gave indications of his talent, and his studious habits and attention to his cases rapidly brought him clients. Within a few years he took rank among the leading members of the profession at a bar which included some of the ablest lawyers of the country. His legal career was early inter- rupted by the Civil War. His whole heart was enlisted in the anti-slavery cause, and during the second year of the war he accepted a commission from the governor of the state as

second- lieutenant and speedily raised a regiment. He became its colonel, and as such continued in the Union Army until the close of the war, and on the 23rd of January 1865 was breveted a brigadier-general of volunteers for " ability and manifest energy and gallantry in command of brigade." He participated with his regiment in various engagements during General Don Carlos Buell's campaigns in Kentucky and Tennessee in 1862 and 1863; took part in General W. T. Sherman's march on Atlanta in 1864 and in the Nashville campaign of the same year; and was transferred early in 1865 to Sherman's army in its march through the Carolinas. As the commander of a brigade he served with particular distinction in the battles of Kenesaw Mountain (June 29-July 3, 1864), Peach Tree Creek (20th of July 1864) and Nashville (i5th-i6th of December 1864).

Allowing for this interval of military service, he applied himself exclusively for twenty-four years to his legal work. The only office he held was that of reporter of the supreme court of Indiana for two terms (1860-1862 and 1864-1868), and this was strictly in the line of his profession. He was a devoted member of the Republican party, but not a politician in the strict sense. Once he became a candidate for governor, in 1876, but his candidature was a forlorn hope, undertaken from a sense of duty after the regular nominee had withdrawn. He took a deep interest in the campaign which resulted in the election of James A. Garfield as president, and was offered by him a place in his cabinet; but this he declined, having been elected a member of the United States 'Senate, in which he took his seat on the 4th of March 1881. He was chairman of the committee on territories, and took an active part in urging the admission as states of North Dakota, South Dakota, Washington, Idaho and Montana, which finally came into the Union during his presidency. He served also on the committee of military and Indian affairs, the committee on foreign relations and others, was prominent in the discussion of matters brought before the Senate from these committees, advocated the enlargement of the navy and the reform of the civil service, and opposed the

pension veto messages of President Cleveland. Having failed to secure a re-election to the Senate in 1887, Harrison was nominated by the Republican party for the presidency in 1888, and defeated Grover Cleveland, the candidate of the Democratic party, receiving 233 electoral votes to Cleveland's 168. Among the measures and events distinguishing his term as president were the following: The meeting

of the Pan-American Congress at Washington; the. passage of the McKinley Tariff Bill and of the Sherman Silver Bill of 1800; the suppressing of the Louisiana Lottery; the enlargement of the navy; further advance in civil service reform; the convocation by the United States of an international monetary conference; the establishment of commercial reciprocity with many countries of America and Europe; the peaceful settlement of a controversy with Chile; the negotiation of a Hawaiian Annexation Treaty, which, however, before its ratification, his successor withdrew from the Senate; the settlement of difficulties with Germany concerning the Samoan Islands, and the adjustment by arbitration with Great Britain of the Bering Sea fur-seal question. His adminis- tration was marked by a revival of American industries and a reduction of the public debt, and at its conclusion the country was left in a condition of prosperity and on friendly terms with foreign nations. He was nominated by his party in 1892 for re-election, but was defeated by Cleveland, this result being due, at least in part, to the labour strikes which occurred during the presidential campaign and arrayed the labour unions against the tariff party.

After leaving public life he resumed the practice of the law, and in 1898 was retained by the government of Venezuela as its leading counsel in the arbitration of its boundary dispute with Great Britain. In this capacity he appeared before the inter- national tribunal of arbitration at Paris in 1899, worthily main- taining the reputation of the American bar. After the Spanish- American War he strongly disapproved of the colonial policy of his party, which, however, he continued to support. He occupied a portion of his leisure in writing a book, entitled This Country of Ours (1897), treating of the organization and administration of the government of the United States, and a collection of essays by him was published posthumously, in 1901, under the title Views of an Ex- President. He died at Indianapolis on the 13th of March 1901. Harrison's distinguish- ing trait of character, to which his success is to be most largely attributed, was his thoroughness. He was somewhat reserved in manner, and this led to the charge in political circles that he was cold and unsympathetic; but no one gathered around him more devoted and loyal friends, and his dignified bearing in and out of office commanded the hearty respect of his countrymen.

President Harrison was twice married; in 1853 to Miss Caroline Lavinia Scott, by whom he had a son and a daughter, and in 1896 to Mrs Mary Scott Lord Dimmock, by whom he had a daughter.

A " campaign " biography was published by Lew Wallace (Phila- delphia, 1888), and a sketch of his life may be found in Presidents of

the United States (New York, 1894), edited by James Grant Wilson. (J. W. Fo.)

HARRISON, FREDERIC (1831-), English jurist and historian, was born in London on the 18th of October 1831. Members of his family (originally Leicestershire yeomen) had been lessees of Sutton Place, Guildford, of which he wrote an interesting account (Annals of an Old Manor House, 1893). He was educated at King's College school and at Wadham College, Oxford, where, after taking a first-class in Literae Humaniores in 1853, he became fellow and tutor. He was called to the bar in 1858, and, in addition to his practice in equity cases, soon began to distinguish himself as an effective contributor to the higher-class reviews. Two articles in the Westminster Review, one on the Italian question, which procured him the special thanks of Cavour, the other on Essays and Reviews , which had the probably undesigned effect of stimulating the attack on the book, attracted especial notice. A few years later Mr Harrison worked at the codification of the law with Lord Westbury, of whom he con- tributed an interesting notice to Nash's biography of the chan-

cellor. His special interest in legislation for the working classes led him to be placed upon the Trades Union Commission of 1867- 1869; he was secretary to the commission for the digest of the law, 1869-1870; and was from 1877 to 1889 professor of juris- prudence and international law under the council of legal educa- tion. A follower of the positive philosophy, but in conflict with Richard Congreve (q.v.) as to details, he led the Positivists who split off and founded Newton Hall in 1881, and he was president of the English Positivist Committee from 1880 to 1905; he was also editor and part author of the Positivist New Calendar of Great Men (1892), and wrote much on Comte and Positivism. Of his separate publications, the most important are his lives of Cromwell (1888), William the Silent, (1897), Ruskin (1902), and Chatham (1905); his Meaning of History (1862; enlarged 1894) and Byzantine History in the Early Middle Ages (1900); and his essays on Early Victorian Literature (1896) and The Choice of Books (1886) are remarkable alike for generous admiration and good sense. In 1904 he published a " romantic mono- graph " of the 10th century, Theophano, and in 1906 a verse tragedy, Nicephorus. An advanced and vehement Radical in politics and Progressive in municipal affairs, Mr Harrison in 1886 stood unsuccessfully for parliament against Sir John Lubbock for London University. In 1889 he was elected an alderman of the London County Council, but resigned in 1893. In 1870 he married Ethel Berta, daughter of Mr William Harrison, by whom he had four sons. George Gissing, the novelist, was at one time their tutor; and in 1905 Mr

Harrison wrote a preface to Gissing's Veranilda (see also Mr Austin Harrison's article on Gissing in the Nineteenth Century, September 1906). As a relig- ious teacher, literary critic, historian and jurist, Mr Harrison took a prominent part in the life of his time, and his writings, though often violently controversial on political and social subjects, and in their judgment and historical perspective characterized by a modern Radical point of view, are those of an accomplished scholar, and of one whose wide knowledge of literature was combined with independence of thought and admirable vigour of style. In 1907 he published The Creed of a Layman, Apologia pro fide mea, in explanation of his religious position.

HARRISON, JOHN (1693-1776), English horologist, was the son of a carpenter, and was born at Faulby, near Pontefract in Yorkshire, in the year 1693. Thence his father and family removed in 1700 to Barrow in Lincolnshire. Young Harrison at first learned his father's trade, and worked at it for several years, at the same time occasionally making a little money by land-measuring and surveying. The bent of his mind, however, was towards mechanical pursuits. In 171 5 he made a clock with wooden wheels, which is in the patent museum at South Kensington, and in 1726 he devised his ingenious " gridiron pendulum," which maintains its length unaltered in spite of variations of temperature (see Clock). Another invention of his was a recoil clock escapement in which friction was reduced to a minimum, and he was the first to employ the commonly used and effective form of " going ratchet," which is a spring arrangement for keeping the timepiece going at its usual rate during the interval of being wound up.

In Harrison's time the British government had become fully alive to the necessity of determining more accurately the longi- tude atsea. Forthis purpose they passed an act in 1713 offering rewards of £10,000, £15,000 and £20,000 to any who should construct chronometers that would determine the longitude within 60, 40 and 30 m. respectively. Harrison applied himself vigorously to the task, and in 1735 went to the Board of Longi- tude with a watch which he also showed to Edmund Halley, George Graham and others. Through their influence he was allowed to proceed in a king's ship to Lisbon to test it; and the result was so satisfactory that he was paid £500 to carry out further improvements. Harrison worked at the subject with the utmost perseverance, and, after making several watches, went up to London in 1761 with one which he considered almost perfect. His son William was sent on a voyage to Jamaica to test it ; and, on his return to Portsmouth in 1762, it was found to have lost

only i minute 54! seconds. This was surprisingly accurate, as it determined the longitude within 18 m., and Harrison claimed the full reward of £20,000; but though from time to time he received sums on account, it was not till 1773 that he was paid in full. In these watches compensation for changes of temperature was applied for the first time by means of a ” compensation-curb,” designed to alter the effective length of the balance-spring in proportion to the expansion or contraction caused by variations of temperature. Harrison died in London on the 24th of March 1776. His want of early education was felt by him greatly throughout life. He was unfortunately never able to express his ideas clearly in writing, although in conversation he could give a very precise and exact account of his many intricate mechanical contrivances.

Among his writings were a Description concerning such Mechanism as will afford a Nice or True Mensuration of Time (1775), and The Principles of Mr Harrison’s Timekeeper, published by order of the Commissioners of Longitude (1767).

HARRISON, THOMAS (1 606-1 660), English parliamentarian, a native of Newcastle-under-Lyme in Staffordshire, the son of a butcher and mayor of that town, was baptized in 1606. He was placed with an attorney of Clifford’s Inn, but at the beginning of the war in 1642 he enlisted in Essex’s lifeguards, became major in Fleetwood’s regiment of horse under the earl of Manchester, was present at Marston Moor, at Naseby, Langport and at the taking of Winchester and Basing, as well as at the siege of Oxford. At Basing Harrison was accused of having killed a prisoner in cold blood. In 1646 he was returned to parliament for Wendover, and served in Ireland in 1647 under Lord Lisle, returning to England in May, when he took the side of the army in the dispute with the parliament and obtained from Fairfax a regiment of horse. In November he opposed the negotiations with the king, whom he styled ” a man of blood ” to be called to account, and he declaimed against the House of Lords. At the surprise of Lambert’s quarters at Appleby on the 18th of July 1648, in the second civil war, he distinguished himself by his extraordinary daring and was severely wounded. He showed a special zeal in bringing about the trial of the king. Charles was entrusted to his care on being brought up from Hurst Castle to London, and believed that Harrison intended his assassination, but was at once favourably impressed by his bearing and reassured by his disclaiming any such design. Harrison was assiduous in his attendance at the trial, and signed the death-warrant with the fullest conviction that it was his duty. He took part in sup-

pressing the royalist rising in the midlands in May 1649, and in July was appointed to the chief command in South Wales, where he is said to have exercised his powers with exceptional severity. On the 20th of February 1651 he became a member of the council of state, and during Cromwell's absence in Scotland held the supreme military command in England. He failed in stopping the march of the royalists into England at Knutsford on the 16th of August 1651, but after the battle of Worcester he ren- dared great service in pursuing and capturing the fugitives. Later he pressed on Cromwell the necessity of dismissing the Long Parliament, and it was he who at Cromwell's bidding, on ihe 20th of April 1653, laid hands on Speaker Lenthall and com- pelled him to vacate the chair. He was president of the council of thirteen which now exercised authority, and his idea of govern- ment appears to have been an assembly nominated by the congre- gations, on a strictly religious basis, such as Barebone's Parlia- ment which now assembled, of which he was a member and a ruling spirit. Harrison belonged to the faction of Fifth Monarchy men, whose political ideals were entirely destroyed by Cromwell's assumption of the protectorate. He went immediately into violent opposition, was deprived of his commission on the 22nd of December 1653, and on the 3rd of February 1654 was ordered to confine himself to his father's house in Staffordshire. Suspected of complicity in the plots of the anabaptists, he was imprisoned for a short time in September, and on that occasion was sent for by Cromwell, who endeavoured in a friendly manner to per- suade him to desist. He, however, incurred the suspicions of the .idministration afresh, and on the 15th of February 1655 he was

imprisoned in Carisbrooke Castle, being liberated in March 1656 when he took up his residence at Highgate with his family. L April 1657 he was arrested for supposed complicity in Vernier'; conspiracy, and again once more in February 1658, when he wa: imprisoned in the Tower. At the Restoration, Harrison, wh(was excepted from the Act of Indemnity, refused to take an) steps to save his life, to give any undertaking not to conspiri against the government or to flee. " Being so clear in the thing,' he declared, " I durst not turn my back nor step a foot out o: the way by reason I had been engaged in the service of so glorious and great a God." He was arrested in Staffordshire in May 166c and brought to trial on the nth of October. He made a manl) and straightforward defence, pleading the authority of parlia ment and adding, " May be I might be a little mistaken, but J did it all according to the best of my understanding, desiring tc make the revealed will of God in His holy scriptures a guide tc me." At his execution, which took place at Charing Cross on th(13th of October 1660, he behaved

with great fortitude.

Richard Baxter, who was acquainted with him, describe: Harrison as ” a man of excellent natural parts for affectior and oratory, but not well seen in the principles of his religion of a sanguine complexion, naturally of such a vivacity, hilarit) and alacrity as another man hath when he hath drunken a cuf too much, but naturally also so far from humble thoughts ol himself that it was his ruin.” Cromwell also complained of his excessive eagerness. ” Harrison is an honest man and aims al good things, yet from the impatience of his spirit will not wail the Lord’s leisure but hurries me on to that which he and al! honest men will have cause to repent.” Harrison was ar eloquent and fluent expounder of the scriptures, and his ” rap- tures” on the field of victory are recorded by Baxter. He was of the chief of those ” fiery spirits ” whose ardent and emotiona religion inspired their political action, and who did wonders during the period of struggle and combat, but who later, in the more sober and difficult sphere of constructive statesmanship, showed themselves perfectly incapable.

Harrison married about 1648 Katherine, daughter and heiress of Ralph Harrison of Highgate in Middlesex, by whom he had several children, all of whom, however, appear to have died in infancy.

See the article on Harrison by C. H. Firth in the Diet, of Nat. Biog.; Life of Harrison by C. H. Simpkinson (1905); Notes and Queries, 9 series, xi. 21 1.

HARRISON, THOMAS ALEXANDER (1853-), American artist, was born in Philadelphia on the 17th of January 1853. He was a pupil of the Pennsylvania Academy of Fine Arts and of the Ecole des Beaux-Arts, Paris, whither he went in 1878, having previously been with a United States government survey expedition on the Pacific coast. Chafing under the restraints of the schools, he went into Brittany, and at Pont Aven and Con- carneau turned his attention to marine painting and landscape. In 1882 he sent a figure-piece to the Salon, a fisher boy on the beach, which he called ” Chateaux en Espagne.” This attracted attention, and in 1885 he received an honourable mention, the first of many awards conferred upon him, including the Temple gold medal (Pennsylvania Academy of Fine Arts, Philadelphia, 7), first medal, Paris Exhibition (1889), andmedals in Munich,

Brussels, Ghent, Vienna and elsewhere. He became a member of the Legion of Honour and officier of Public Instruction, Paris; a member of the Societe Nationale des Beaux-Arts, Paris; of the Royal Institute of Painters in Oil Colours, London; of the Secession societies of Munich,

Vienna and Berlin; of the National Academy of Design, the Society of American Artists, New York, and other art bodies. In the Salon of 1885 he had a large canvas of several nude women, called ” In Arcady,” a remarkable study of flesh tones in light and shade which had a strong influence on the younger men of the day. But his reputation rests rather on his marine pictures, long waves rolling in on the beach, and great stretches of open sea under poetic con- ditions of light and colour.

His brother, Birge Harrison (1854-), also a painter, particularly successful in snow scenes, was a pupil of the Ecole

des Beaux Arts, Paris, under Cabanel and Carolus Duran; his ” November ” (honourable mention, 1882) was purchased by the French government. Another brother, Butler Harrison (d. 1886), was a figure painter.

HARRISON, WILLIAM (1534-1593), English topographer and antiquary, was born in London on the 18th of April 1534. He was educated, according to his own account, at St Paul’s school and at Westminster under Alexander No well. In 1551 he was at Cambridge, but he took his B.A. degree from Christ Church, Oxford, in 1560. He was inducted early in 1559 to the rectory of Radwinter, Essex, on the presentation of Sir William Brooke, Lord Cobham, to whom he had formerly acted as chaplain; and from 1571 to 1581 he held from another patron, Francis de la Wood, the living of Wimbish in the same county. He became canon of Windsor in 1586, and his death and burial are noted in the chapter book of St George’s chapel on the 24th of April 1593.

His famous and amusing Description of England was under- taken for the queen’s printer, Reginald Wolfe, who designed the publication of ” an universall cosmographie of the whole world . . . with particular histories of every knowne nation.” After Wolfe’s death in 1576 this comprehensive plan was reduced to descriptions and histories of England, Scotland and Ireland. The historical section was to be supplied by Raphael Holinshed, the topographical by Harrison. The work was eventually pub- lished as The Chronicles of England, Scotland and Ireland . . . by Raphael Holinshed and others, and was printed in two black- letter folio volumes in 1577. Harrison’s Description of England, humbly described as his ” foule frizeled

treatise," and dedicated to his patron Cobham, is an invaluable survey of the condition of England under Elizabeth, in all its political, religious and social aspects. Harrison is a minute and careful observer of men and things, and his descriptions are enlivened with many examples of a lively and caustic humour which makes the book excellent reading. In spite of his Puritan prejudices, which lead him to regret that the churches had not been cleared of their " pictures in glass " (" by reason of the extreme cost thereof "), and to exhaust his wit on the effeminate Italian fashions of the younger generation, he had an eye for beauty and is loud in his praise of such architectural gems as Henry VII. 's chapel at Westminster. He is properly contemptuous of the snobbery that was even then characteristic of English society; but his account of " how gentlemen are made in England " must be read in full to be appreciated. He is especially instructive on the condition and services of the Church immediately after the Reformation; notably in the fact that, though an ardent Protestant, he is quite unconscious of any breach of continuity in the life and organiza- tion of the Church of England.

Harrison also contributed the translation from Scots into English of Bellenden's version of Hector Boece's Latin Descrip- tion of Scotland. His other works include a " Chronologic," giving an account of events from the creation to the year 1593, which is of some value for the period covered by the writer's lifetime. This, with an elaborate treatise on weights and measures, remains in MS. in the diocesan library of Londonderry.

For the later editions of the Chronicles of England . . . see Holinshed. The second and third books of Harrison's Description were edited by Dr F. J. Furnivall for the New Shakspere Society, with extracts from his " Chronologic " and from other contemporary writers, as Shakspere's England (2 vols., 1877-1878).

HARRISON, WILLIAM HENRY (1773-1841), ninth president of the United States, was born at Berkeley, Charles City county, Virginia, on the 9th of February 1773, the third son of Benjamin Harrison (c 1740-1701). His father was long prominent in Virginia politics, and became a member of the Virginia House of Burgesses in 1764, opposing Patrick Henry's Stamp Act resolutions in the following year; he was a member of the Continental Congress in 1774-1777, signing the Declaration of Independence and serving for a time as president of the Board of War; speaker of the Virginia House of Delegates in 1777-1782; governor of Virginia in 1781-17S4; and in 1788 as a member of the Virginia Convention he actively opposed the ratification of the Federal Constitution by his state. William

Henry Harrison received a classical education at Hampden- Sidney College, where he was a student in 1 787-1 790, and began a medical course in Philadelphia, but the death of his father caused him to discontinue his studies, and in November 1791 he entered the army as ensign in the Tenth Regiment at Fort Washington, Cincinnati. In the following year he became a lieutenant, and subsequently acted as aide-de-camp to General Anthony Wayne in the campaign which ended in the battle of Fallen Timbers on the 10th of August 1 794. He was promoted to a captaincy in 1797 and for a brief period served as commander of Fort Washington, but resigned from the army in June 1798. Soon afterwards he succeeded Winthrop Sargent as secretary of the North-west Territory. In 1799 he was chosen by the Jeffer- sonian party of this territory as the delegate of the territory in Congress. While serving in this capacity he devised a plan for disposing of the public lands upon favourable terms to actual settlers, and also assisted in the division of the North-west Territory. It was his ambition to become governor of the more populous eastern portion, which retained the original name, but instead, in January 1800, President John Adams appointed him governor of the newly created Indiana Territory, which com- prised until 1809 a much larger area than the present state of the same name. (See Indiana: History.) He was not sworn into office until the 10th of January 1801, and was governor until September 181 2. Among the legislative measures of his administration may be mentioned the attempted modification of the slavery clause of the ordinance of ˆ87 by means of an indenture law — a policy which Harrison favoured; more effective land laws; and legislation for the more equitable treatment of the Indians and for preventing the sale of liquor to them. In 1803 Harrison also became a special commissioner to treat with the Indians ” on the subject of boundary or lands,” and as such negotiated various treaties — at Fort Wayne (1803 and 1809), Vincennes (1804 and 1809) and Grouseland (1805) — • by which the southern part of the present state of Indiana and portions of the present states of Illinois, Wisconsin and Missouri were opened to settlement. For a few months after the division in 1804 of the Louisiana Purchase into the Orleans Territory and the Louisiana Territory he also acted as governor of the Louisiana Territory — all of the Louisiana Purchase N. of the thirty-third parallel, his jurisdiction then being the greatest in extent ever exercised by a territorial official in the United States.

The Indian cessions of 1809, along the Wabash river, aroused the hostility of Tecumseh (q.v.) and his brother, familiarly known as ” The Prophet,” who were attempting to combine the tribes between the Ohio and the Great Lakes in opposition to the encroachment of the

whites. Several fruitless conferences between the governor and the Indian chiefs, who were believed to be encouraged by the British, resulted in Harrison's advance with a force of militia and regulars to the Tippecanoe river, where (near the present Lafayette, Ind.) on the 7th of November 181 1 he won over the Indians a victory which established his military reputation and was largely responsible for his sub- sequent nomination and election to the presidency of the United States. From one point of view the battle of Tippecanoe may be regarded as the opening skirmish of the war of 181 2. When in the summer of 181 2 open hostilities with Great Britain began, Harrison was appointed by Governor Charles Scott, of Kentucky major-general in the militia of that state. A few weeks later (22nd August 1812) he was made brigadier-general in the regular U.S. army, and soon afterwards was put in command of all the troops in the north-west, and on the 2nd of March i8r3 he was promoted to the rank of major-general. General James Win- chester, whom Harrison had ordered to prepare to cross Lake Erie on the ice and surprise Fort Maiden, turned back to rescue the threatened American settlement at Frenchtown (now Monroe), on the Raisin river, and there on the 22nd of January 1813 was forced to surrender to Colonel Henry A. Proctor. Harrison's offensive operations being thus checked, he accom- plished nothing that summer except to hold in check Proctor, who (May 1-5) besieged him at Fort Meigs, the American advanced

post after the disaster of the river Raisin. After Lieutenant O. H. Perry's naval victory on the ioth of September 1813, Harrison no longer had to remain on the defensive; he advanced to Detroit, re-occupied the territory surrendered by General William Hull, and on the 5th of October administered a crushing defeat to Proctor at the battle of the Thames.

In 1814 Harrison received no active assignments to service, and on this account and because the secretary of war (John Armstrong) issued an order to one of Harrison's subordinates without consulting him, he resigned his commission. Armstrong accepted the resignation without consulting President Madison, but the president later utilized Harrison in negotiating with the north-western Indians, the greater part of whom agreed (22nd July 1814) to a second treaty of Greenville, by which they were to become active allies of the United States, should hostilities with Great Britain continue. This treaty publicly marked an American policy of alliance with these Indians and caused the British

peace negotiators at Ghent to abandon them. In the following year Harrison held another conference at Detroit with these tribes in order to settle their future territorial relations with the United States.

From 1816 to 1819 Harrison was a representative in Congress, and as such worked in behalf of more liberal pension laws and a better militia organization, including a system of general military education, of improvements in the navigation of the Ohio, and of relief for purchasers of public lands, and for the strict construc- tion of the power of Congress over the Territories, particularly in regard to slavery. In accordance with this view in 1819 he voted against Tallmadge's amendment (restricting the extension of slavery) to the enabling act for the admission of Missouri. He also delivered forcible speeches upon the death of Kosciusko and upon General Andrew Jackson's course in the Floridas, favouring a partial censure of the latter.

Harrison was a member of the Ohio senate in 1819-1821, and was an unsuccessful candidate for the National House of Repre- sentatives in 1822, when his Missouri vote helped to cause his defeat; he was a presidential elector in 1824, supporting Henry Clay, and from 1825 to 1828 was a member of the United States Senate. In 1828 after unsuccessful efforts to secure for him the command of the army, upon the death of Major-General Jacob Brown, and the nomination for the vice-president, on the ticket with John Quincy Adams, his friends succeeded in getting Harrison appointed as the first minister of the United States to Colombia. He became, however, an early sacrifice to Jackson's spoils system, being recalled within less than a year, but not until he had involved himself in some awkward diplomatic com- plications with Bolivar's autocratic government.

For some years after his return from Colombia he lived in retirement at North Bend, Ohio. He was occasionally " men- tioned " for governor, senator or representative, by the anti- Jackson forces, and delivered a few addresses on agricultural or political topics. Later he became clerk of the court of common pleas of Hamilton county — a lucrative position that was then most acceptable to him. Early in 1835 Harrison began to be mentioned as a suitable presidential candidate, and later in the year he was nominated for the presidency at large public meet- ings in Pennsylvania, New York and Maryland. In the election of the following year he attracted a large part of the Whig and Anti-Masonic vote of the Middle and Western states and led among the candidates opposing Van Buren, but received only 73 electoral votes while Van Buren received 170. His unexpected strength, due largely to his clear, if non-committal, political record,

rendered him the most ” available ” candidate for the Whig party for the campaign of 1840, and he was nominated by the Whig convention at Harrisburg, Pa., in December 1839, his most formidable opponent being Henry Clay, who, though generally regarded as the real leader of his party, was less ” available ‘* because as a mason he would alienate former members of the old Anti-Masonic party, and as an advocate of a protect i ve tariff would repel many Southern voters. The conven- tion adjourned without adopting any ” platform ” of principles, the party shrewdly deciding to make its campaign merely on the

issue of whether the Van Buren administration should be con- tinued in power and thus to take full advantage of the popular discontent with the administration, to which was attributed the responsibility for the panic of 1837 and the subsequent business depression. Largely to attract the votes of Democratic mal- contents the Whig convention nominated for the vice-presidency John Tyler, who had previously been identified with the Demo- cratic party. The campaign was marked by the extraordinary enthusiasm exhibited by the Whigs, and by their skill in attacking Van Buren without binding themselves to any definite policy. Because of his fame as a frontier hero, of the circumstance that a part of his home at North Bend, Ohio, had formerly been a log cabin, and of the story that cider, not wine, was served on his table, Harrison was derisively called by his opponents the ” log cabin and hard cider ” candidate; the term was eagerly accepted by the Whigs, in whose processions miniature log cabins were carried and at whose meetings hard cider was served, and the campaign itself has become known in history as the “log cabin and hard cider campaign.” Harrison’s canvass was con- spicuous for the immense Whig processions and mass meetings, the numerous ” stump ” speeches (Harrison himself addressing meetings at Dayton, Chillicothe, Columbus and other places), and the use of campaign songs, of party insignia, and of campaign cries (such as ” Tippecanoe and Tyler too “); and in the election he won by an overwhelming majority of 234 electoral votes to 60 cast for Van Buren.

President Harrison was inaugurated on the 4th of March 1841. He chose for his cabinet Daniel Webster as secretary of state, Thomas Ewing as secretary of the treasury, John Bell as secretary of war, George E. Badger as secretary of the navy, Francis Granger as postmaster-general, and John J. Crittenden as attorney-general. He survived his inauguration only one month, dying on the 4th of April 1841, and being succeeded by the vice- president, John Tyler. The immediate cause of his death was an attack of pneumonia, but the disease was aggravated by the excitement attending his sudden

change in circumstances and the incessant demands of office seekers. After temporary interment at Washington, his body was removed to the tomb at North Bend, Ohio, where it now lies. A few of Harrison's public addresses survive, the most notable being A Discourse on the Aborigines of the Ohio. It has been said of him: " He was not a great man, but he had lived in a great time, and he had been a leader in great things." He was the first territorial delegate in the Congress of the United States and was the author of the first step in the development of the country's later homestead policy; the first presidential candidate to be selected upon the ground of " expediency " alone; and the first president to die in office. In 1795 he married Anna Symmes (1775-1864), daughter of John Cleves Symmes. Their grandson, Benjamin Harrison, was the twenty-third president of the United States.

Authorities. — In 1824 Moses Dawson published at Cincinnati the Historical Narrative of the Civil and Military Services of Major-General William H. Harrison. This is a combined defence and political pamphlet, but it is the source of all the subsequent " lives " that have appeared. There are several " campaign " biographies, including one by Richard Hildreth (1839) and one by Caleb Cushing (1 840) ; and there is a good sketch in Presidents of the United States (New York, 1894), edited by J. G. Wilson. An excellent study of Harrison's career in Indiana appears in vol. 4 of the Indiana Historical Society Publications. Selections from his scanty correspondence appear in vols. ii. and iii. of the Quarterly Publications of the Historical and Philosophical Society of Ohio.

HARRISON, a town of Hudson county, New Jersey, U.S.Aˆ, on the Passaic river, opposite Newark (with which it is connected by bridges and electric railways), and 7 m. W. of Jersey City. Pop. (1890) 8338; (1900) 10,596, of whom 3633 were foreign- born; (1910 census) 14,498. It is served by the Pennsylvania, the Erie, and the Delaware, Lackawanna & Western railways. Harrison was chosen as the eastern terminal of the Pennsylvania railroad for steam locomotive service, transportation thence to New York being by electric power through the railway's Hudson river tunnels. The town has an extensive river-front, along which are many of its manufactories; among their products are steam-pumps, steel, iron, machinery, roller bearings,

brass tubing, iron and brass castings, marine engines, hoisting engines,

metal novelties, dry batteries, electric lamps, concrete blocks, cotton thread, wire cloth, leather, trunks, beer, barrels, lumber, inks and cutlery. The factory product in 1905 was valued at $8,408,924. The town is governed by a mayor and a common council. Harrison was settled toward the close of the 17th century, and for many years constituted the S. portion of the township of Lodi. In 1840, however, it was set off from Lodi and named in honour of President William Henry Harrison, and in 1873 it was incorporated. Harrison originally included what is now the town of Kearny (q.v.).

HARRODSBURG, a city and the county-seat of Mercer county, Kentucky, U.S.A., 32 m. S. of Frankfort, on the Southern railway. Pop. (1890) 3230; (1900) 2876, of whom 1150 were negroes; (1910 U.S. census) 3147. On account of its sulphur springs Harrodsburg became early in the 19th century a fashion- able resort, and continues to attract a considerable number of visitors. The city is the seat of Harrodsburg Academy, Beau- mont College for women (1894; founded as Daughters' College in 1856); and Wayman College (African M.E.) for negroes. Among its manufactures are flour, whisky, dressed lumber and ice. About 7 m. E. of Harrodsburg is Pleasant Hill, or Union Village, a summer resort and the home, since early in the 19th century, of a Shaker community. Harrodsburg was founded on the 1 6th of June 1774 by James Harrod (1 746-1 793) and a few followers, and is the oldest permanent settlement in the state. It was incorporated in 1875. Harrodsburg was formerly the seat of Bacon College (see Lexington, Kentucky).

HARROGATE, a municipal borough and watering-place in the Ripon parliamentary division of the West Riding of York- shire, England, 203 m. N. by W. from London, on the North- Eastern railway. Pop. (1891) 16,316; (1901) 28,423. It is indebted for its rise and importance to its medicinal springs, and is the principal inland watering-place in the north of England. It consists of two scattered townships, Low Harrogate and High Harrogate, which have gradually been connected by a continuous range of handsome houses and villas. A common called the Stray, of 200 acres, secured by act of parliament from ever being built upon, stretches in front of the main line of houses, and on this account Harrogate, notwithstanding its rapid increase, has retained much of its rural charm. As regards climate a choice is offered between the more bracing atmosphere of High Harro- gate and the sheltered and warm climate of the low town. The waters are chalybeate, sulphureous and saline, and some of the springs possess all these qualities to a greater or less extent. The principal chalybeate springs are the Tewitt well, called by Dr Bright, who wrote the first account of it, the " English Spa," discovered by Captain William

Slingsby of Bilton Hall near the close of the 16th century; the Royal Chalybeate Spa, more commonly known as John's Well, discovered in 1631 by Dr Stanhope of York; Muspratt's chalybeate or chloride of iron spring discovered in 1819, but first properly analysed by Dr Sheridan Muspratt in 1865; and the Starbeck springs midway between High Harrogate and Knaresborough. The principal sulphur springs are the old sulphur well in the centre of Low Harrogate, discovered about the year 1656; the Montpellier springs, the principal well of which was discovered in 1822, situated in the grounds of the Crown Hotel and surmounted by a handsome building in the Chinese style, containing pump-room, baths and reading-room; and the Harlow Car springs, situated in a wooded glen about a mile west from Low Harrogate. Near Harlow Car is Harlow observatory, a square tower 100 ft. in height, standing on elevated ground and commanding a very extensive view. A saline spring situated in Low Harrogate was discovered in 1783. Some eighty springs in all have been dis- covered. The principal bath establishments are the Victoria Baths (1871) and the Royal Baths (1897). There are also a handsome kursaal (1903), a grand opera house, numerous modern churches, and several hospitals and benevolent institutions, including the Royal Bath hospital. The corporation owns the Stray, and also the Spa concert rooms and grounds, Harlow Moor, Crescent Gardens, Royal Bath gardens and other large

open spaces, as well as Royal Baths, Victoria Baths and Starbeck Baths. The mineral springs are vested in the corporation. The high-lying moorland of the surrounding district is diversified by picturesque dales; and Harrogate is not far from nmny towns and sites oT great interest, such as Ripon, Knaresborough and Fountains Abbey. The town was incorporated in 1884, and the corporation consists of a mayor, 8 aldermen and 24 councillors. Area, 3276 acres.

HARROW, 1 an agricultural implement used for (1) levelling ridges left by the plough and preparing a smooth surface for the reception of seeds; (2) covering in seeds after sowing; (3) tearing up and gathering weeds; (4) disintegrating and levelling the soil of meadows and pastures; (5) forming a surface tilth by pulverizing the top soil and so conserving moisture.

The harrow rivals the plough in antiquity. In its simplest form it consists of the boughs of trees interlaced into a wooden frame, and this form survives in the " bush-harrow." Another old type, found in the middle ages and still in use, consists of a wooden framework in which iron pegs or " tines " are set. This is now generally superseded by the " zig-zag " harrow patented by Armstrong in 1839, built of iron

bars in which the tines are so arranged that each follows its own track and has a separate line of action. This harrow is usually made in two or three sections

Fig. 1. — Jointed Zig-zag Harrow. (Ransomes, Sims & Jefferies, Ltd.)

which fold over one another and are thus easily portable, the arrangement at the same time giving a flexibility on uneven ground. Additional flexibility may be imparted to the imple- ment by jointing the stays of the frame which are in the line of draught. The liability that the tines may snap off is the chief weakness of this type, and improvements have consisted chiefly in alterations in their shape and the method of fixing them to the frame.

The other type of harrow most used is the chain harrow, con- sisting of a number of square-link chains connected by cross links and attached to a draught-bar, the whole being kept expanded by stretchers and trailing weights. It is used for levelling and spreading manure over grass-land, from which it at the same time tears up moss and coarse herbage. Mention may also be made of the drag-harrow, a heavy implement with long tines, approximating closely to the cultivator, and of the Norwegian harrow with its revolving rows of spikes.

A few variations and developments of the ordinary harrow require notice. In the adjustable harrow (fig. 2) the teeth are secured to bars pivoted at their ends in the side bars of the frame, and provided with crank arms connected to a common link bar, which may be moved horizontally by means of a lever for the purpose of adjusting

1 In Mid. Eng. harwe; the O. Eng. appears to have been hearge; the word is cognate with the Dutch hark, Swed. harke, Ger. Harke, rake, and with Danish harv, and Swed. harf, harrow, but the ultimate origin is unknown ; the Fr. herse is a different word, cf. HEARSE.

the angle which the teeth make with the ground, and thus convert the machine from a pulverizer to a smoothing harrow. The small figure illustrates a spring connexion between the adjusting lever and its locking bar, which allows the teeth to yield upon striking an obstruction. As the briskness of the operation adds to its effective-

Fig. 2. — Adjustable Harrow.

ness, the harrow is often made with a seat from which the operator can hasten the team without fatiguing himself.

Fig. 3 illustrates a spring-tooth harrow. In this harrow the independent frames are carried upon wheels, and a seat for the operator is mounted upon standards supported by the two frames. The teeth consist of flat steel springs of scroll form, which yield to rigid obstructions and are mounted on rock shafts in the same manner as in the walking harrow before described. The levers enable the operator t o raise the teeth more or less, and thus free them from rubbish and also regulate the depth ot action.

Another variation of the harrow with great pulverizing and loosening capabilities consists of a main frame, having a pole and whipple-trees attached ; to this frame are pivoted two supplemental frames, each of which has mounted on it a shaft carrying a series of concavo-convex disks. The supplemental frames may be swung by

member of parliament for Tiverton in 1784 and under-secretary for foreign affairs in 1789. In 1791 he was appointed paymaster of the forces and vice-president of the board of trade, but he resigned the positions and also that of treasurer of the navy

when he succeeded to his father's barony in June 1803. In 1804 he was secretary of state for foreign affairs and in 1805 chancellor of the duchy of Lancaster under his intimate friend William Pitt; in the latter year he was sent on a special and important mission to the emperors of Austria and Russia and the king of Prussia, and and 1827 he was lord

Showing looth mechanism of harrow.

Fig. 3. — Spring-tooth Harrow.

the adjusting levers to any, angle with relation to the line of draught, and the disks then act like that of the disk plough (see Plough), throwing the soil outward with more or less force, according to the angle at which they are set, and thus thoroughly breaking up and pulverizing the clods. Above the disks is a bar to which are pivoted a series of scrapers, one for each disk, which are held to their work with a yielding action, being thrown out of operation when desired by the levers shown in connexion with the operating bar. Pans on the main frame are used to carry weights to hold the disks down to their work. The cut away disk harrow differs from the ordinary disk harrow in that its disks are notched and so have greater penetrating power. The

curved knife-tooth harrow consists of a frame to which a row of curved blades is attached. Other forms of the implement are illustrated and discussed in Farm Machinery and Farm Motors by J. B. Davidson and L. W. Chase (New York, 1908).

HARROWBY, DUDLEY RYDER, ist Earl of (1762-1847), the eldest son of Nathaniel Ryder, ist Baron Harrowby (1735- 1803), was born in London on the 22nd of December 1762. His grandfather Sir Dudley Ryder (1691-1756) became a member of parliament and solicitor-general owing to the favour of Sir Robert Walpole in 1733; in 1737 he was appointed attorney- general and three years later he was knighted; in 1754 he was made lord chief justice of the king's bench and a privy councillor, the patent creating him a peer having been just signed by the king, but not passed, when he died on the 25th of May 1756. His only son Nathaniel, who was member of parliament for Tiverton for twenty years, was created Baron Harrowby in 1776. Educated at St John's College, Cambridge, Dudley Ryder became

for the long period between 18 12 president of the council. After Canning's death in 1827 he refused to serve George IV. as prime minister and he never held office again, although he continued to take part in politics, being especially prominent during the deadlock which preceded the passing of the Reform Bill in 1832. Harrowby's long association with the Tories did not prevent him from assisting to remove the disabilities of Roman Catholics and Protestant dissenters, or from supporting the movement for electoral reform; he was also in favour of the emancipation of the slaves. The earl died at his Staffordshire residence, Sandon Hall, on the 26th of December 1847, being, as Charles Greville says, " the last of his generation and of the colleagues of Mr Pitt, the sole survivor of those stirring times and mighty contests."

Harrowby's eldest son, Dudley Ryder, 2nd earl (1798-1882), was born in London on the 19th of May 1798, his mother being Susan (d. 1838), daughter of Granville Leveson-Gower, marquess of Stafford, a lady of exceptional attainments. As Viscount Sandon he became member of parliament for Tiverton in i8rg, in 1827 he was appointed a lord of the admiralty, and in 1830 secretary to the India board. From 1831 to 1847 Sandon represented Liverpool in the House of Commons. For a long time he was out of office, but in 1855, eight years after he had become earl of Harrowby, he was appointed chancellor of the duchy of Lancaster by Lord Palmerston; in a few months he was trans- ferred to the office of lord privy seal, a position which he resigned in 1857. He was chairman of the Maynooth commission and a member of other important royal commissions, and

was among the most stalwart and prominent defenders of the established church. He died at Sandon on the 19th of November 1882. His successor was his eldest son, Dudley Francis Stuart Ryder (1831-1900), vice-president of the council from 1874 to 1878, president of the board of trade from 1878 to 1880, and lord privy seal in 1885 and 1886. He died without sons on the 26th of March 1900, and was succeeded by his brother, Henry Dudley Ryder (1836-1900), whose son, John Herbert Dudley Ryder (b. 1864), became 5th earl of Harrowby.

HARROWING OF HELL, an English poem in dialogue, dating from the end of the 13th century. It is written in the East Midland dialect, and is generally cited as the earliest dramatic work of any kind preserved in the language, though it was in reality probably intended for recitation rather than performance; It is closely allied to the kind of poem known as a debat, and the opening words — ” Alle herkneth to me nou A strif wille I tellen ou Of Jesu and of Satan ” — seem to indicate that the piece was delivered by a single performer. The subject — the descent of Christ into Hades to succour the souls of the just, as related in the apocryphal gospel of Nicodemus — is introduced in a kind of prologue; then follows the dispute between ” Dominus ” and “Satan” at the gate of Hell; the gatekeeper runs away, and the just are set free, while Adam, Eve, Habraham, David, Johannes and Moyses do homage to the deliverer. The poem

ends with a short prayer: ” God, for his moder loue Let ous never thider come.” Metrically, the poem is characterized by frequent alliteration imposed upon the rhymed octosyllabic couplet : —

Welcome, louerd, god of londe

Godes sone and godes sonde (ii. 149-150).

The piece is obviously connected with the Easter cycle of litur- gical drama, and the subject is treated in the York and Townley plays.

MSS. are: Brit. Mus., Harl. MS. 2253; Edinburgh, Auchinleck MS., W 41; Oxford, Bodleian, Digby 86. It was privately printed by J. P. Collier and by J. O. Halliwell, but is available in Appendix III. of A. \V. Pollard’s English Miracle Plays . . . (4th ed., 1904) K. Boddeker, Altengl. Dichtungen des MS. Harl. 2253 (Berlin, 1878) ; and E. Mall, The Harrowing of Hell (Breslau, 1871). See also E. K. Chambers, The

Medieval Stage (2 vols., 1903).

HARROW-ON-THE-HILL, an urban district in the Harrow parliamentary division of Middlesex, England, 12 m. W.N.W. of St Paul's cathedral, London, served by the London and North Western, Metropolitan and District railways. Pop. (1901), 10,220. It takes its name from its position on an isolated hill rising to a height of 345 ft. On the summit, and forming a conspicuous landmark, is the church of St Mary, said to have been founded by Lanfranc, archbishop of Canterbury, in the reign of William I., and Norman work appears at the base of the tower. The re- mainder of the church is of various later dates, and there are several ancient monuments and brasses.

Harrow is celebrated for its public school, founded in 1571 by John Lyon, whose brass is in the church, a yeoman of the neighbouring village of Preston who had yearly during his life set aside 20 marks for the education of poor children of Harrow; though a school existed before his time. Though the charter was granted by Queen Elizabeth in 1571, and the statutes drawn up by the founder in 1590, two years before his death, it was not till 161 1 that the first building was opened for scholars. Lyon originally settled about two-thirds of his property on the school, leaving the remainder for the maintenance of the highway between London and Harrow, but in the course of time the values of the respective endowments have changed so far that the benefit accruing to the school is a small proportion of the whole. About 1660 the headmaster, taking advantage of a con- cession in Lyon's statutes, began to receive " foreigners," i.e. boys from other parishes, who were to pay for their education. From this time the prosperity of the school may be dated. In 1809 the parishioners of Harrow appealed to the court of chan- cery against the manner in which the school was conducted, but the decision, while it recognized their privileges, confirmed the right of admission to foreigners. The government of the school was originally vested in six persons of standing in the parish who had the power of filling vacancies in their number by election among themselves; but under the Public Schools Act of 1868 the governing body now consists of the surviving members of the old board, besides six new members who are elected re- spectively by the lord chancellor, the universities of Oxford, Cambridge and London, the Royal Society, and the assistant masters of the school. There are several scholarships in con- nexion with the school to Oxford and Cambridge Universities. Harrow was originally an exclusively classical school, but mathematics became a compulsory study in 1837; modern languages, made compulsory in the upper forms in 1851, were extended to the whole school in 1855; while English history and literature began to be especially studied about

1869. The number of boys is about 600. The principal buildings are modern, including the chapel (1857), the library (1863), named after the eminent headmaster Dr Charles John Vaughan, and the speech-room (1877), the scene of the brilliant ceremony on ” Speech Day ” each summer term. The fourth form room, however, dates from i6n, and on its panels are cut the names of many eminent alumni, such as Byron, Robert Peel, R. B. Sheridan and Temple (Lord Palmerston). Several of the buildings were erected out of the Lyon Tercentenary Fund, sub- scribed after the tercentenary. celebration in 1871.

A considerable extension of Harrow as an outer residential suburb of London has taken place north of the hill, where is the urban district of Wealdstone (pop. 5901), and there are also important printing and photographic works.

HARRY THE MINSTREL, or Blind Harry (fl. 1470-1492), author of the Scots historical poem The Actis and Deidis of the Illustere and Vaiheand Campioun Schir William Wallace, Knicht of Ellerslie, flourished in the latter half of the 1 5th century. The details of his personal history are of the scantiest. He appears to have been a blind Lothian man, in humble circumstances, who had some reputation as a story-teller, and who received, on five occasions, in 1490 and 1491, gifts from James IV. The entries of these, in the Accounts of the Lord High Treasurer, occur among others to harpers and singers. He is alluded to by Dunbar (q.v.) in the fragmentary Interlude of the Droichis Part of the Play, where a ” droich,” or dwarf, personates

” the nakit blynd Harry That lang has bene in the fary Farleis to find;”

and again in Dunbar’s Lament for the Makaris. John Major (q.v.) in his Latin History speaks of ” one Henry, blind from his birth, who, in the time of my childhood, fashioned a whole book about William Wallace, and therein wrote down in our popular verse — and this was a kind of composition in which he had much skill — all that passed current among the people in his day. I, however, can give but partial credence to these writings. This Henry used to recite his tales before nobles, and thus received food and clothing as his reward ” (Bk. iv. ch. xv.).

The poem (preserved in a unique MS., dated 1488, in the Advocates’ library, Edinburgh) is divided into eleven books and runs to 11,853 lines. Its poetic merits are few, and its historical accuracy is easily impugned. It has the formal interest of being one of the earliest, certainly one of the most extensive verse- documents in Scots written in five-accent, or heroic, couplets. It is also the earliest outstanding work which discloses that habit of Scotticism which took such strong

hold of the popular Northern literature during the coming years of conflict with England. In this respect it is in marked contrast with all the patriotic verse of preceding and contemporary literature. This attitude of the Wallace may perhaps be accepted as corroborative evidence of the humble milieu and popular sentiment of its author. The poem owed its subsequent widespread reputation to its appeal to this sentiment rather than to its literary quality. On the other hand, there are elements in the poem which show that it is not entirely the work of a poor crowder; and these (notably references to historical and literary authorities, and occasional reminiscences of the literary tricks of the Scots Chaucerian school) have inclined some to the view that the text, as we have it, is an edited version of the minstrel's rough song- story. It has been argued, though by no means conclusively, that the " editor " was John Ramsay, the scribe of the Edinburgh MS. and of the companion Edinburgh MS. of the Brus by John Barbour (q.v.).

The poem appears, on the authority of Laing, to have been printed at the press of Chepman & Myllar about 1508, but the fragments which Laing saw are not extant. The first complete edition, now available, was printed by Lekprevik for Henry Charteris in 1570 (Brit. Museum). It was reprinted by Charteris in 1594 and 1601, and by Andro Hart in 161 1 and 1620. At least six other editions appeared in the 17th century. There are many later reprints, including some of William Hamilton of Gilbertfield's modern Scots version of 1722. The first critical edition was prepared by Dj- Jamieson and published in 1820. In 1889 the Scottish Text Society completed their edition of the text, with prolegomena and notes by James Moir.

See, in addition to Jamieson's and Moir's volumes (u.s.), J. T. T. Brown's The Wallace and the Bruce Restudied (Bonner, Beitrdge zur Anglistik. vi., 1900), a plea for Ramsay's authorship of the known text; also W. A. Craigie's article in The Scottish Review (July 1903), a comparative estimate of the Brus and Wallace, in favour of the latter.

HARSDORFFER, GEORG PHILIPP (1607-1658), German poet, was born at Nuremberg on the 1st of November 1607. He studied law at Altdorf and Strassburg, and subsequently travelled

through Holland, England, France and Italy. His knowledge of languages gained for him the appellation " the learned," though he was as little a learned man as he was a poet. As a member of the

Fruchtbringende Gesellschaft he was called der Spielende (the player). Jointly with Johann Klaj (q.v.) he founded in 1644 at Nuremberg the order of the Pegnitzschafer, a literary society, and among the members thereof he was known by the name of Strephon. He died at Nuremberg on the 22nd of September 1658. His writings in German and Latin fill fifty volumes, and a selection of his poems, interesting mostly for their form, is to be found in Miiller's Bibliothek deutscher Dichter des iyten Jahrhunderls, vol. ix. (Leipzig, 1826).

His life was written by Widmann (Altdorf, 1 707). See also Tittmann, Die Niirnberger Dichterschule (Gottingen, 1847); Hoder- mann, Fine vornehme Gesellschaft, nach Harsdorffers " Gesprdch- spielen " (Paderborn, 1890); T. Bischoff, " Georg Philipp Hars- dorffer " in the Festschrift zur 2;ojdhrigen Jitbelfeier des Peg- nesischen Blumenordens (Nuremberg, 1894); an d Krapp, Die dsthetischen Tendenzen Harsdorffers (Berlin, 1904).

HARSHA, or Harshavardhana (fl. a.d. 606-648), an Indian king who ruled northern India as paramount monarch for over forty years. The events of his reign are related by Hsiian Tsang, the Chinese pilgrim, and by Bana, a Brahman author. He was the son of a raja of Thanesar, who gained prominence by success- ful wars against the Huns, and came to the throne in a.d. 606, though he was only crowned in 612. He devoted himself to a scheme of conquering the whole of India, and carried on wars for thirty years with success, until (a.d. 620) he came in contact with Pulakesin II., the greatest of the Chalukya dynasty, who made himself lord of the south, as Hˆrsha was lord of the north. The Nerbudda river formed the boundary between the two empires. In the latter years of his reign Harsha's sway over the whole basin of the Ganges from the Himalayas to the Nerbudda was undisputed. After thirty-seven years of war he set himself to emulate Asoka and became a patron of art and literature. He was the last native monarch who held paramount power in the north prior to the Mahommedan conquest; and was suc- ceeded by an era of petty states.

See Bana, Sri-harsha-charita, trans. Cowell and Thomas (1897); Ettinghausen, Harsha Vardhana (Louvain, 1906).

HARSNETT, SAMUEL (1561-1631), English divine, arch- bishop of York, was born at Colchester in June 1561, and was educated at Pembroke Hall, Cambridge, where he was success- ively scholar, fellow and master (1605-1616). He was also vice- chancellor of the university in 1606 and 1614. His ecclesiastical career began somewhat unpromisingly, for he was censured by Archbishop Whitgift for Romanist tendencies in a sermon which he preached against

predestination in 1584. After holding the living of Chigwell (1 597-1605) he became chaplain to Bancroft (then bishop of London), and afterwards archdeacon of Essex (1603-1609), rector of Stisted and bishop of Chichester (1609- 16 19) and archbishop of York (1629). He died on the 25th of May 1 63 1. Harsnett was no favourite with the Puritan com- munity, and Charles I. ordered his Considerations for the better Settling of Church Government (1629) to be circulated among the bishops. His Declaration of Egregious Popish Impostures (1603) furnished Shakespeare with the names of the spirits mentioned by Edgar in King Lear.

HART, ALBERT BUSHNELL (1854-), American his- torian, was born at Clarksville, Mercer county, Pennsylvania, on the 1st of July 1854. He graduated at Harvard College in 1880, studied at Paris, Berlin and Freiburg, and received the degree of Ph.D. at Freiburg in 1883. He was instructor in history at Harvard in 1883-1887, assistant professor in 1887- 1897, and became professor in 1897. Among his writings are: Introduction to the Study of Federal Government (1890), Forma- tion of the Union (1892, in the Epochs of American History series), Practical Essays on American Government (1893), Studies in American Education (1895), Guide to the Study of American History (with Edward Channing, 1897), Salmon Portland Chase (1899, in the American Statesman series), Foundations of American Foreign Policy (1901), Actual Government (1903), Slavery and Abolition (1906, the volume in the American

Nation series dealing with the period 1831-1841), National Ideals Historically Traced (1907), the 26th volume of the American Nation series, and many historical pamphlets and articles. In addition he edited American History told by Con- temporaries (4 vols., 1898-1901), and Source Readers in American History (4 vols., 1901-1903), and two co-operative histories of the United States, the Epochs of American History series (3 small text-books), and, on a much larger scale, the American Nation series (27 vols., 1903-1907); he also edited the American Citizen series.

HART, CHARLES (d. 1683), English actor, grandson of Shakespeare's sister Joan, is first heard of as playing women's parts at the Blackfriars' theatre as an apprentice of Richard Robinson. In the Civil War he was a lieutenant of horse in Prince Rupert's regiment, and after the king's defeat he played surreptitiously at the Cockpit and at Holland House and other noblemen's residences. After the Restoration he is known to have been in 1660 the original Dorante in The Mistaken Beauty, adapted from Corneille's Le Menteur. In 1663 he went to the Theatre Royal in Killigrew's company, with which he

remained until 1682, taking leading parts in Dryden's, Jonson's and Beaumont and Fletcher's plays. He is highly spoken of by contemporaries in such Shakespearian parts as Othello and Brutus. He is often mentioned by Pepys. Betterton praised him, and would not himself play the part of Hotspur until after Hart's retirement. He died in 1683 and was buried on the 20th of August. Hart is said to have been the first lover of Nell Gwyn, and to have trained her for the stage.

HART, ERNEST ABRAHAM (1835-1898), English medical journalist, was born in London on the 26th of June 1835, the son of a Jewish dentist. He was educated at the City of London school, and became a student at St George's hospital. In 1856 he became a member of the Royal College of Surgeons, making a specialty of diseases of the eye. He was appointed ophthalmic surgeon at St Mary's hospital at the age of 28, and occupied various other posts, introducing into ophthalmic practice some modifications since widely adopted. His name, too, is associated with a method of treating popliteal aneurism, which he was the first to use in Great Britain. His real life-work, however, was as a medical journalist, beginning with the Lancet in 1857. He was appointed editor of the British Medical Journal in 1866. He took a leading part in the exposures which led to the inquiry into the state of London workhouse infirmaries, and to the reform of the treatment of sick poor throughout England, and the Infant Life Protection Act of 1872, aimed at the evils of baby- farming, was largely due to his efforts. The record of his public work covers nearly the whole field of sanitary legislation during the last thrity years of his life. He had a hand in the amend- ments of the Public Health and of the Medical Acts; in the measures relating to notification of infectious disease, to vaccina- tion, to the registration of plumbers; in the improvement of factory legislation; in the remedy of legitimate grievances of Army and Navy medical officers; in the removal of abuses and deficiencies in crowded barrack schools; in denouncing the sanitary shortcomings of the Indian government, particularly in regard to the prevention of cholera. His work on behalf of the British Medical Association is shown by the increase from 2000 to 19,000 in the number of members, and the growth of the British Medical Journal from 20 to 64 pages, during his editor ship. From 1872 to 1897 he was chairman of the Association's Parliamentary Bill Committee. He died on the 7th of January 1898. For his second wife he married Alice Marion Rowland, who had herself studied medicine in London and Paris, and was no less interested than her husband in philanthropic reform. She was most active in her encouragement of Irish cottage industries, and was the founder of the Donegal Industrial Fund.

‘ HART, SIR ROBERT, Bart. (1835-), Anglo-Chinese statesman, was born at Milltown, Co. Armagh, on the 20th of February 1835. He was educated at Taunton, Dublin and Belfast, and graduated at Queen’s College, Belfast, in 1853. In the following year he received an appointemnt as student-

interpreter in the China consular service, and after serving for a short time at the Ningpo vice-consulate, he was transferred to Canton, where after acting as secretary to the allied commis- sioners governing the city, he was appointed the local inspector of customs. There he first gained an insight into custom-house work. One effect of the Taiping rebellion was to close the native custom-house at Shanghai; and as the corrupt alternatives proposed by the Chinese were worse than useless, it was arranged by Sir Rutherford Alcock, the British consul, with his French and American colleagues, that they should undertake to collect the duties on goods owned by foreigners entering and leaving the port. Sir T. Wade was appointed to the post of collector in the first instance, and after a short tenure of office was succeeded by Mr H. N. Lay, who held the post until 1863, when he resigned owing to a disagreement with the Chinese government in con- nexion with the Lay-Osborn fleet. During his tenancy of office the system adopted at Shanghai was applied to the other treaty ports, so that when on Mr Lay’s resignation Mr Hart was appointed inspector-general of foreign customs, he found himself at the head of an organization which collected a revenue of up- wards of eight million taels per annum at fourteen treaty ports. From the date when Mr Hart took up his duties at Peking, in 1863, he unceasingly devoted the whole of his energies to the work of the department, with the result that the revenue grew from upwards of eight million taels to nearly twenty-seven million, collected at the thirty-two treaty ports, and the customs staff, which in 1864 numbered 200, reached in 1901 a total of 5704. From the first Mr Hart gained the entire confidence of the members of the Chinese government, who were wise enough to recognize his loyal and able assistance. Of all their numerous sources of revenue, the money furnished by Mr Hart was the only certain asset which could be offered as security for Chinese loans. For many years, moreover, it was customary for the British minister, as well as the ministers of other powers, to consult him in every difficulty; and such complete confidence had Lord Granville in his ability and loyalty, that on the retirement of Sir T. Wade he appointed him minister plenipotentiary at Peking (1885). Sir Robert Hart, however — who

was made a K.C.M.G. in 1882 — recognized the anomalous position in which he would have been placed had he accepted the proposal, and declined the proffered honour. On all disputed points, whether commercial, religious or political, his advice was invariably sought by the foreign ministers and the Chinese alike. Thrice only did he visit Europe between 1863 and 1902, the result of this long comparative isolation, and of his constant intercourse with the Peking officials, being that he learnt to look at events through Chinese spectacles; and his work, These from the Land of Sinim, shows how far this affected his outlook. The faith which he put in the Chinese made him turn a deaf ear to the warnings which he re- ceived of the threatening Boxer movement in 1900. To the last he believed that the attacking force would at least have spared his house, which contained official records of priceless value, but he was doomed to see his faith falsified. The building was burnt to the ground with all that it contained, including his private diary for forty years. When the stress came, and he retreated to the British legation, he took an active part in the defence, and spared neither risk nor toil in his exertions. In addition to the administration of the foreign customs service, the establishment of a postal service in the provinces devolved upon him, and after the signing of the protocol of 1901 he was called upon to organize a native customs service at the treaty ports.

The appointment of Sir Robert Hart as inspector-general of the imperial maritime customs secured the interests of European investors in Chinese securities, and helped to place Chinese finance generally on a solid footing. When, therefore, in May 1906 the Chinese government appointed a Chinese administrator and assistant administrator of the entire customs of China, who would control Sir Robert Hart and his staff, great anxiety was aroused. The Chinese government had bound itself in 1896 and 1898 that the imperial maritime customs services should remain as then constituted during the currency

of the loan. The British government obtained no satisfactory answer to its remonstrances, and Sir Robert Hart, finding himself placed in a subordinate position after his long service, retired in July 1907. He received formal leave of absence in January 1908, when he received the title of president of the board of customs. Both the Chinese and the British govern- ments from time to time conferred honours upon Sir Robert Hart. By giving him a Red Button, or button of the highest rank, a Peacock's Feather, the order of the Double Dragon, a patent of nobility to his ancestors for three generations, and the title of Junior Guardian of the heir apparent, the Chinese showed their appreciation of his manifold and great services; while under the seal of the British government there were bestowed uponhimtheordersofC.M.G. (1880),

K.C.M.G. (1882), G.C.M.G. (1889), and a baronetcy (1893). He has also been the recipient of many foreign orders. Sir Robert Hart married in 1886 Hester, the daughter of Alexander Bredon, Esq., M.D., of Portadown.

See his life by Julia Bredon {Sir Robert Hart, 1909).

HART, WILLIAM (1823-1894), American landscape and cattle painter, was born in Paisley, Scotland, on the 31st of March 1823, and was taken to America in early youth. He was apprenticed to a carriage painter at Albany, New York, and his first efforts in art were in making landscape decorations for the panels of coaches. Subsequently he returned to Scotland, where he studied for three years. He opened a studio in New York in 1853, and was elected an associate of the National Academy of Design in 1857 and an academician in the following year. He was also a member of the American Water Colour Society, and was its president from 1870 to 1873. As one of the group of the Hudson River School he enjoyed considerable popularity, his pictures being in many well-known American collections. He died at Mount Vernon, New York, on the 17th of June 1894.

His brother, James McDougal Hart (1828-1901), born in Kilmarnock, Scotland, was also a landscape and cattle painter. He was a pupil of Schirmer in Dusseldorf, and became an associate of the National Academy of Design in 1857 and a full member in 1859. He was survived by two daughters, both figure painters, Letitia B. Hart (b. 1867) and Mary Theresa Hart (b.1872).

HARTE, FRANCIS BRET (1839-1902), American author, was born at Albany, New York, on the 25th of August 1839. His father, a professor of Greek at the Albany College, died during his boyhood. After a common-school education he went with his mother to California at the age of seventeen, afterwards working in that state as a teacher, miner, printer, express- messenger, secretary of the San Francisco mint, and editor. His first literary venture was a series of Condensed Novels (travesties of well-known works of fiction, somewhat in the style of Thackeray), published weekly in The Calif ornian, of which he was editor, and reissued in book form in 1867. The Overland Monthly, the earliest considerable literary magazine on the Pacific coast, was established in 1868, with Harte as editor. His sketches and poems, which appeared in its pages during the next few years, attracted wide attention in the eastern states and in Europe.

Bret Harte was an early master of the short story, and his Californian talcs were regarded as introducing a new genre into fiction. ” The Luck of Roaring Camp ” (1868), ” The Outcasts of Poker Flat ” (1869), the later sketch ” How Santa Claus came to Simpson’s Bar,” and the verses entitled ” Plain Language from Truthful James,” combined humour, pathos and power of character portrayal in a manner that indicated that the new land of mining-gulches, gamblers, unassimilated Asiatics, and picturesque and varied landscape had found its best delineator; so that Harte became, in his pioneer pictures, a sort of later Fenimore Cooper. Forty-four volumes were published by him between 1867 and 1898. After a year as professor in the university of California, Harte lived in New York, 1871-1878; was United States consul at Crefeld, Germany, 1878-1880; consul at. Glasgow, 1880-1885; and after 1885 resided in London, engaged

in literary work. He died at Camberley, England, on the 5th of May 1902.

A library edition of his Writings (16 vols.) was issued in 1900, and increased to 19 vols, in 1904. See also H. VV. Boynton, Bret Harte (1905) in the Contemporary Men of Letters series; T. E. Peraberton, Lije of Bret Harte (1903), which contains a list of his poems, tales, &c.

HARTEBEEST, the Boer name for a large South African antelope (also known as caama) characterized by its red colour, long face with naked muzzle and sharply angulated lyrate horns, which are present in both sexes. This antelope is the

Cape Hartebeest (Bubalis cama).

Biibalis cama or Alcelaphtis cama of naturalists; but the name hartebeest has been extended to include all the numerous members of the same genus, some of which are to be found in every part of Africa, while one or two extend into Syria. Some of the species of the allied genus Damaliscus, such as Hunter’s antelope (D. hunteri), are also often called hartebeests. (See Antelope.)

HARTFORD, a city and the capital of Connecticut, U.S.A., the county-seat of Hartford county, and a port of entry, coter- minous with the township of Hartford, in the west central part of the state, on the W. bank of the Connecticut river, and about 35 m. from Long Island

Sound. Pop. (1890), 53,23°; (ro 00), 79,850, of whom 23,758 were foreign-born (including 8076 Irish, 2700 Germans, 2260 Russians, 1952 Italians, 1714 Swedes, 1634 English and 1309 English Canadians); (1910 census) 98,915. Of the total population in 1900, 43,872 were of foreign parentage (both parents foreign-born), and of these 18,410 were of Irish parentage. Hartford is served by two divisions of the New York, New Haven & Hartford railway, by the Central New England railway, by the several electric lines of the Connecticut Company which radiate to the surrounding towns, and by the steamboats of the Hartford & New York Transporta- tion Co., all of which are controlled by the N.Y., N.H. & H. The river, which is navigable to this point, is usually closed from the middle of December to the middle of March.

The city covers an area of 17-7 sq. m.; it is well laid out and compactly built, and streets, parks, &c, arc under a city-plan commission authorized in 1907. It is intersected by the sluggish Park river, which is spanned by ten bridges. A stone arch bridge, with nine arches, built of granite at a cost of $1,700,000 and dedicated in 1908, spans the Connecticut (replacing the old Connecticut river bridge built in 1818 and burned in 1895), and connects Hartford with the village of East Hartford in the town- ship of East Hartford (pop. igoo, 6406), which has important, paper-manufacturing and tobacco-growing interests. The park system of Hartford is the largest in any city of the United States in proportion to the city's population. In 1908 there were 21 public parks, aggregating more than 1335 acres. In the extreme

S. of the city is Goodwin Park (about 200 acres) ; in the S.E. is Colt Park (106 acres), the gift of Mrs Elizabeth Colt, the widow of Samuel Colt, inventor of the Colt revolver; in the S.W. is Pope Park (about 90 acres); in the W. is Elizabeth (100 acres); in the E., along the Connecticut river front, is Riverside (about 80 acres); and in the extreme N. is Keney Park (680 acres), the gift of Henry Keney, and, next to the Metropolitan Reservations near Boston, the largest park in the New England states. Near the centre of the city are the Capitol Grounds (27 acres; until 1872 the campus of Trinity College) and Bushnell Park (41 acres), adjoining Capitol Park. Bushnell Park, named in honour of Horace Bushnell, contains the Corning Memorial Fountain, erected in 1899 and designed by J. Massey Rhind, and three bronze statues, one, by J. Q. A. Ward, of General Israel Putnam; one, by Truman H. Bartlett, of Dr Horace Wells (1815-1848), the discoverer of anaesthesia; and one, by E. S. Woods, of Colonel Thomas Knowlton (1749-1776), a patriot soldier of the War of Independence, killed at the battle of Harlem Heights. On the Capitol Grounds is the state

capitol (Richard M. Upjohn, archi- tect) , a magnificent white marble building, which was completed in 1880 at a cost of $2,534,000. Its exterior is adorned with statues and busts of Connecticut statesmen and carvings of scenes in the history of the state. Within the building are regimental flags of the Civil War, a bronze statue by Olin L. Warner of Governor William A. Buckingham, a bronze statue by Karl Gerhardt of Nathan Hale, a bronze tablet (also by Karl Ger- hardt) in memory of John Fitch (1 743-1 798), the inventor; a portrait of Washington, purchased by the state in 1800 from the artist, Gilbert Stuart ; and a series of oil portraits of the colonial and state governors. The elaborately carved chair of the lieutenant-governor in the senate chamber, made of wood from the historic Charter Oak, and the original charter of 1662 (or its duplicate of the same date) are preserved in a special vault in the Connecticut state library. A new state library and supreme court building and a new state armoury and arsenal, both of granite, have been (1910) erected upon lands recently added to the Capitol Grounds, thus forming a group of state buildings with the Capitol as the centre. Near the Capitol, at the approach of the memorial bridge across the Park river, is the Soldiers' and Sailors' memorial arch, designed by George Keller and erected by the city in 1885 in memory of the Hartford soldiers and sailors who served in the American Civil War.

Near the centre of the city is the old town square (now known as the City Hall Square), laid off in 1637. Here, facing Main Street, stands the city hall, a beautiful example of Colonial architecture, which was designed by Charles Bulfinch, completed in 1796, and until 1879 used as a state capitol; it has subse- quently been restored. In Main Street is the present edifice of the First Church of Christ, known as the Centre Congregational Church, which was organized in Cambridge, Massachusetts, in 1632, and removed to Hartford, under the leadership of Thomas Hooker and Samuel Stone, in 1636. In the adjoining cemetery are the graves of Thomas Hooker, Governor William Leete (1603-1683), and Governor John Haynes, and a monument in memory of 100 early residents of Hartford. In the same thoroughfare is the Wadsworth Atheneum (built in 1842; enlarged in 1892-1893 and 1907) and its companion buildings, the Colt memorial (built in 1908 to accommodate the Elizabeth Colt art collection) and the Morgan art gallery (built in 1908 by J. Pierpont Morgan in memory of his father, Junius Morgan, a native of Hartford) . In this group of buildings are the Hart.ford public library (containing 90,000 volumes in 1908), the Watkinson library of reference (70,000 volumes in 1908), the library of the Connecticut historical society (25,000 volumes in 1908) and a public art gallery. Other institutions of

importance in Hartford are the American school for the deaf (formerly the American asylum for the deaf and dumb), founded in 1816 by Thomas H. Gallaudet; the retreat for the insane (opened for patients in 1824); the Hartford hospital; St Francis hospital; St Thomas's seminary (Roman Catholic) ; La Salette Missionary college (R.C.; 1898); Trinity college (founded by members of the Protestant Episcopal church, and now non-sectarian), which was

chartered as Washington College in 1823, opened in 1824, renamed Trinity College in 1845, and in 1907-1908 had 27 in- structors and 208 students; the Hartford Theological seminary, a Congregational institution, which was founded at East Windsor Hill in 1834 as the Theological Institute of Connecticut, was removed to Hartford in 1865, and adopted its present name in 1885; and, affiliated with the last mentioned institution, the Hartford School of Religious Pedagogy. The Hartford grammar school, founded in 1638, long managed by the town and in 1847 merged with the classical department of the Hartford public high school, is the oldest educational institution in the state. In Farmington Avenue is St Joseph's cathedral (Roman Catholic) , the city being the seat of the diocese of Hartford.

During the 18th century Hartford enjoyed a large and lucrative commerce, but the railway development of the 19th century centralized commerce in New York and Boston, and consequently the principal source of the city's wealth has come to be manu- facturing and insurance. In 1905 the total value of the "factory" product was $25,975,651. The principal industries are the manufacture of small arms (by the Colt's Patent Fire-Arms Manufacturing Co., makers of the Colt revolver and the Catling gun) , typewriters (Royal and Underwood) , automobiles, bicycles, cyclometers, carriages and wagons, belting, cigars, harness, machinists' tools and instruments of precision, coil-piping, church organs, horse-shoe nails, electric equipment, machine screws, drop forgings, hydrants and valves, and engines and boilers. In 1788 the first woollen mill in New England was opened in Hartfcrd; and here, too, about 1846, the Rogers process of electro-silver plating was invented. The city is one of the most important insurance centres in the United States. As early as 1794 policies were issued by the Hartford Fire Insurance Company (chartered in 1810). In 1909 Hartford was the home city of six fire insurance and six life insurance companies, the principal ones being the Aetna (fire), Aetna Life, Phoenix Mutual Life, Phoenix Fire,

Travelers (Life and Accident), Hartford Fire, Hartford Life, National Fire, Connecti- cut Fire, Connecticut General Life and Connecticut Mutual Life. In 1906 the six fire insurance companies had an aggregate capital of more than $10,000,000; on the 1st January 1906 they reported assets of about $59,000,000 and an aggregate surplus of $30,000,000. In the San Francisco disaster of that year they paid more than $15,000,000 of losses. Since the fire insurance business began in Hartford, the companies of that city now doing business there have paid about $340,000,000 in losses. Several large and successful foreign companies have made Hartford their American headquarters. The life insurance companies have assets to the value of about $225,000,000. The Aetna (fire), Aetna Life, Connecticut Fire, Connecticut Mutual Life, Connecticut General Life, Hartford Fire, Hartford Life, Hartford Steam Boiler Inspection and Insurance Co., National Fire. Orient Fire, Phoenix Mutual Life and Travelers companies have their own homes, some of these being among the finest buildings in Hartford. The city has also large banking interests.

The first settlement on the site of Hartford was made by the Dutch from New Amsterdam, who in 1633 established on the bank of the Connecticut river, at the mouth of the Park river, a fort which they held until 1654. The township of Hartford was one of the first three original townships of Connecticut. The first English settlement was made in 1635 by sixty immi- grants, mostly from New Town (now Cambridge), Massachusetts; but the main immigration was in 1636, when practically all the New Town congregation led by Thomas Hooker and Samuel Stone joined those who had preceded them. Their settlement was called Newtown until 1637, when the present name was adopted from Hertford, England, the birthplace of Stone. In 1636 Hartford was the meeting-place of the first general court of the Connecticut colony; the Fundamental Orders, the first written constitution, were adopted at Hartford in 1639; and after the union of the colonies of New Haven and Connecticut, accomplished by the charter of 1662, Hartford became the sole capital: but from 1701 until 1873 tnat honour was shared with

New Haven. At Hartford occurred in 1687 the meeting of Edmund Andros and the Connecticut officials (see Connecticut). Hartford was first chartered in 1784, was rechartered in 1856 (the charter of that date has been subsequently revised) , and in 1 88 1 was made coterminous with the township of Hartford. The city was the literary centre of Federalist ideas in the latter part of the 18th century, being the home of Lemuel Hopkins, John Trumbull, Joel Barlow and David Humphreys, the leading members of a group of authors known as the ” Hartford Wits “; and in 1814-1815 the city was the meeting-place of

the famous Hartford Convention, an event of great importance in the history of the Federalist party. The War of 181 2, with the Embargo Acts (1807-1813), which were so destructive of New England's commerce, thoroughly aroused the Federalist leaders in this part of the country against the National government as ad- ministered by the Democrats, and in 1814, when the British were not only threatening a general invasion of their territory but had actually occupied a part of the Maine coast, and the National government promised no protection, the legislature of Massachusetts invited the other New England states to join with her in sending delegates to a convention which should meet at Hartford to consider their grievances, means of preserv- ing their resources, measures of protection against the British, and the advisability of taking measures to bring about a con- vention of delegates from all the United States for the purpose of revising the Federal constitution. The legislatures of Connecti- cut and Rhode Island, and town meetings in Cheshire and Grafton counties (New Hampshire) and in Windham county (Vermont) accepted the invitation, and the convention, composed of 12 delegates from Massachusetts, 7 from Connecticut, 4 from Rhode Island, 2 from New Hampshire and 1 from Vermont, all Federalists, met on the 15th of December 1814, chose George Cabot of Massachusetts president and Theodore Dwight of Connecticut secretary, and remained in secret session until the 5th of January 181 5, when it adjourned sine die. At the con- clusion of its work it recommended greater military control for each of the several states and that the Federal constitution be so amended that representatives and direct taxes should be apportioned among the several states " according to their respective numbers of free persons," that no new state should be admitted to the Union without the concurrence of two-thirds of both Houses of Congress, that Congress should not have the power to lay an embargo for more than sixty days, that the concurrence of two-thirds of the members of both Houses of Congress should be necessary to pass an act " to interdict the commercial intercourse between the United States and any foreign nation or the dependencies thereof " or to declare war against any foreign nation except in case of actual invasion, that " no person who shall hereafter be naturalized shall be eligible as a member of the Senate or House of Representatives of the United States, nor capable of holding any civil office under the authority of the United States," and that " the same person shall not be elected president of the United States a second time; nor shall the president be elected from the same state two terms in succession." After making these recommendations concerning amendments the Convention resolved: " That if the application of these states to the government of the United States, recom- mended in a foregoing resolution, should be

unsuccessful, and peace should not be concluded, and the defence of these states should be neglected, as it has been since the commencement of the war, it will, in the opinion of this convention, be expedient for the legislatures of the several states to appoint delegates to another convention, to meet at Boston in the state of Massachusetts on the third Thursday of June next, with such powers and instructions as the exigency of a crisis so momentous may require." The legislatures of Massachusetts and Connecticut approved of these proposed amendments and sent commissioners to Washington to urge their adoption, but before their arrival the war had closed, and not only did the amendments fail to receive the approval of any other state, but the legislatures of nine states expressed their disapproval of the Hartford Convention itself, some charging it with sowing "seeds of dissension and

disunion." The cessationof the war brought increased popularity to the Democratic administration, and the Hartford Convention was vigorously attacked throughout the country.

Hartford was the birthplace of Noah Webster, who here published his Grammatical Institute of the English Language (1783-1785), and of Henry Barnard, John Fiske and Frederick Law Olmsted, and has been the home of Samuel P. Goodrich (Peter Parley), George D. Prentice, Harriet Beecher Stowe, Charles Dudley Warner, Samuel L. Clemens (Mark Twain) and Horace Bushnell. More than 100 periodicals have been established in Hartford, of which the oldest is the Hartford Courant (1 764) , the oldest newspaper in the United States. This paper was very influential in shaping public opinion in the years preceding the War of Independence; after the war it was successively Federalist, Whig and Republican. The Times (semi-weekly 181 7; daily 1841) was one of the most powerful Democratic organs in the period before the middle of the 19th century, and had Gideon Wells for editor 1826-1836. The Congregationalist (afterwards published in Boston) and the Churchman (afterwards published in New York) were also founded at Hartford.

See Scaeva, Hartford in the Olden Times: Its First Thirty Years (Hartford, 1853), edited by VV. M. B. Hartley; and J. H. Trumbull, Memorial History of Hartford County (Boston, 1886). For the Hartford Convention see History of the Hartford Convention (Boston, 1833), published by its secretary, Theodore Dwight; H. C. Lodge Life and

Letters of George Cabot (Boston, 1877); and Henry Adams, Documents Relating to New England Federalism (Boston, 1877).

HARTFORD CITY, a city and the county-seat of Blackford county, Indiana, U.S.A., 62 m. N.E. of Indianapolis. Pop. (1890) 2287; (1900) 5912 (572 foreign-born); (1910) 6187. The city is served by the Fort Wayne, Cincinnati & Louisville, and the Pittsburg, Cincinnati, Chicago & St Louis railways, and the Indiana Union Traction line (electric) . There are oil and natural gas wells in the vicinity, and the city has pulp and paper mills, glass and tile works, and manufactories of woodenware, and nitro-glycerine and powder. The municipality owns and operates its water-works system. The first settlement in the vicinity was made in 1832. Hartford City became the county-seat of Black- ford county when that county was erected in 1837; it was laid out in 1839 and was first incorporated as a town in 1S67

HARTIG, GEORG LUDWIG (1 764-1837), German agricul- turist and writer on forestry, was born at Gladenbach near Marburg, on the 2nd of September 1764. After obtaining a practical knowledge of forestry at Harzburg, he studied from 1 781 to 1783 at the university of Giessen. In 1786 he became manager of forests to the prince of Solms-Braunfels at Hungen in the Wetterau, where he founded a school for the teaching of forestry. After obtaining in 1797 the appointment of inspector of forests to the prince of Orange-Nassau, he continued his school of forestry at Dillenburg, where the attendance thereat increased considerably. On the dissolution of the principality by Napoleon I. in 1805 he lost his position, but in 1806 he went as chief inspector of forests to Stuttgart, whence in 181 1 he was called to Berlin in a like capacity. There he continued his school of forestry, and succeeded in connecting it with the university of Berlin, where in 1 830 he was appointed an honorary professor. He died at Berlin on the 2nd of February 1S37. His son Theodor 0805-1880) and grandson Robert (1839-1901), were also distinguished for their contributions to the study of forestry.

t ?V L ‘w art r? wa f c the author of a number of valuable works: Lehrbuch fur Jager (Stuttgart, 1810) ; Lehrbuch fur Fbrster (3 vols., ^} S % 7 l8 fV Kubl l tab f™ f*r geschnittene, beschlagene, und rundeHoher (18,5 ,oth cd Berlin, 1871); and Lexikon fur Jager und Jagdfreunde (1836, 2nd ed. Berlin, 1859-1861). Thkxfor Hartig and his son Robert also published numerous works dealing with forestry, one of the latter’s books being translated into English by W. Somerv.Ue and H. Marshall Ward as Diseases of Trees (1894).
HARTLEPOOL, a parliamentary borough of Durham, England embracing the municipal borough of Hartlepool or East Hartle- pool

and the municipal and county borough of West Hartlepool Pop. (1901) of Hartlepool, 22,723; of West Hartlepool, 62,627 I he towns are on the coast of the North Sea separated by Hartle- pool Bay, with a harbour, and both have stations on branches of

the North Eastern railway, 247 m. N. by W. from London The surrounding country is bleak, and the coast is low. Caves occur in the slight cliffs, and protection against the attacks of the waves has been found necessary. The ancient market town of Hartle- pool lies on a peninsula which forms the termination of a south- eastward sweep of the coast and embraces the bay. Its naturally strong position was formerly fortified, and part of the walls serving as a promenade, remain. The parish church of St Hilda' standing on an eminence above the sea, is late Norman and Early English, with a massive tower, heavily buttressed. There is a handsome borough hall in Italian style. West Hartlepool, a wholly modern town, has several handsome modern churches municipal buildings, exchange, market hall, Athenaeum and public library. The municipal area embraces the three town- ships of Seaton Carew, a seaside resort with good bathing, and golf links; Stranton, with its church of All Saints, of the 14th century, on a very early site; and Throston.

The two Hartlepools are officially considered as one port. The harbour, which embraces two tidal basins and six docks aggregat- ing 83I acres, in addition to timber docks of 57 acres, covers altogether 350 acres. There are five graving docks, admitting vessels of 550 ft. length and 10 to 21 ft. draught. The depth of water on the dock sills varies from i 7 | ft. at neap tides to 25 ft. at spring tides. A breakwater three-quarters of a mile long protects the entrance to the harbour. An important trade is carried on in the export of coal, ships, machinery, iron and other metallic ores, woollens and cottons, and in the import of timber, sugar iron and copper ores, and eggs. Timber makes up 59 % of the imports, and coal and ships each about 30 % of the exports. The principal industries are shipbuilding (iron), boiler and engineer- ing works, iron and brass foundries, steam saw and planing mills, flour-mills, paper and paint factories, and soapworks.

The parliamentary borough (falling within the south-east county division) returns one member. The municipal borough of Hartlepool is under a mayor, 6 aldermen and 18 councillors and has an area of 972 acres. The municipal borough of West Hartlepool is under a mayor, 8 aldermen and 24 councillors, and has an area of 2684 acres.

Built on the horns of a sheltered bay, Hartlepool (Hertepull, Hertipol), grew up round the monastery founded there in 640 but was destroyed

by the Danes in 800 and rebuilt by Ecgred' bishop of Lindisfarne. In n 73 Bishop Hugh de Puiset allowed 1-rench and Flemish troops to land at Hartlepool to aid the Scots It is not mentioned in Boldon Book as, being part of the royal manor of Sadberg held at this time by the family of Bruce it did not become the property of the see of Durham until the purchase of that manor in 1189. The bishops did not obtain possession until the reign of John, who during the interval in 1201 gave Hartlepool a charter granting the burgesses the same privileges that the burgesses of Newcastle enjoyed; in 1230 Bishop Richard Poor granted further liberties, including a gild merchant. Jidward II. seized the borough as a possession of Robert Bruce but he could control it very slightly owing to the bishop's powers! In 1328 Edward III. granted the borough 100 marks towards the town-wall and Richard II. granted murage for seven years, the term being extended in 1400. In 1383 Bishop Fordham gave the burgesses licence to receive tolls within the borough for the maintenance of the walls, while Bishop Neville granted a com- mission for the construction of a pier or mole. In the 16th century Hartlepool was less prosperous; in 1523 the haven was said to be ruined, the fortifications decayed. An act of 1535 declared Hartlepool to be in Yorkshire, but in 1554 it was re- instated in the county of Durham. It fell into the hands of the northern earls in 1563, and a garrison was maintained there after the rebellion was crushed. In 1593 Elizabeth incorporated it and gave the burgesses a town hall and court of pie powder. During the civil wars Hartlepool, which a few years before was said to be the only port town in the country, was taken by the Scots, who maintained a garrison there until 1647. As a borough of the Palatinate Hartlepool was not represented in parliament until the 19th century, though strong arguments in its favour were advanced in the Commons in 1614. The markets of

Hartlepool were important throughout the middle ages. In 1216 John confirmed toRobertBruce the marketon Wednesday granted to his father and the fair on the feast of St Lawrence ; this fair was extended to fifteen days by the grant of 1230, while the charter of 1595 also granted a fair and market. During the 14th century trade was carried on with Germany, Spain and Holland, «.nd in 1346 Hartlepool provided five ships for the French war, being considered one of the chief seaports in the kingdom. The markets were still considerable in Camden's day, but declined during the 18th century, when Hartlepool became fashionable as a watering-place.

HARTLEY, SIR CHARLES AUGUSTUS (1825-), English engineer, was born in 1825 at Heworth, Durham. Like most engineers of his generation he was engaged in railway work in the early part of his career, but subsequently he devoted himself to hydraulic engineering and the improvement of estuaries and harbours for the purposes of navigation. He was employed in connexion with some of the largest and most important water- ways of the world. After serving in the Crimea as a captain of engineers in the Anglo-Turkish contingent, he was in 1856 appointed engineer-in-chief for the works carried out by the European Commission of the Danube for improving the navigation at the mouths of that river, and that position he retained till 1872, when he became consulting engineer to the Commission (see Danube). In 1875 he was one of the committee appointed by the authority of the U.S.A. Congress to report on the works necessary to form and maintain a deep channel through the south pass of the Mississippi delta; and in 1884 the British government nominated him a member of the international technical commission for widening the Suez Canal. In addition he was consulted by the British and other governments in connexion with many other river and harbour works, including the improvement of the navigation of the Scheldt, Hugh, Don and Dnieper, and of the ports of Odessa, Trieste, Kustendjie, Burgas, Varna and Durban. He was knighted in 1862, and became K.C.M.G. in 1884.

HARTLEY, DAVID (1705-1757), English philosopher, and founder of the Associationist school of psychologists, was born on the 30th of August 1705. He was educated at Bradford grammar school and Jesus College, Cambridge, of which society he became a fellow in 1727. Originally intended forthe Church, he was deterred from taking orders by certain scruples as to signing the Thirty-nine Articles, and took up the study of medicine. Nevertheless, he remained in the communion of the English Church, living on intimate terms with the most distinguished churchmen of his day. Indeed he asserted it to be a duty to obey ecclesiastical as well as civil authorities. The doctrine to which he most strongly objected was that of eternal punishment. Hartley practised as a physician at Newark, Bury St Edmunds, London, and lastly at Bath, where he died on the 28th of August 1757. His Observations on Man was pub- lished in 1749, three years after Condillac's Essai sur I'origine des connaissances humaines, in which theories essentially similar to his were expounded. It is in two parts — the first dealing with the frame of the human body and mind, and their mutual connexions and influences, the second with the duty and expecta- tions of mankind. His two main theories are the doctrine of vibrations and the doctrine of associations. His physical theory, he

tells us, was drawn from certain speculations as to nervous action which Newton had published in his Principia. His psychological theory was suggested by the Dissertation con- cerning the Fundamental Principles of Virtue or Morality, which was written by a clergyman named John Gay (1699-1745), and prefixed by Bishop Law to his translation ‘ of Archbishop King’s Latin work on the Origin of Evil, its chief object being to show that sympathy and conscience are developments by means of association from the selfish feelings.

The outlines of Hartley’s theory are as follows. With Locke he asserted that, prior to sensation, the human mind is a blank. By a growth from simple sensations those states of consciousness which appear most remote from sensation come into being. And the one

‘Anonymously in the 1 731 ed., with acknowledgment in the 1758 ed.

law of growth of which Hartley took account was the law of con- tiguity, synchronous and successive. By this law he sought to explain, not only the phenomena of memory, which others had similarly explained before him, but also the phenomena of emotion, of reasoning, and of voluntary and involuntary action (see Associa- tion of Ideas).

By his physical theory Hartley gave the first strong impulse to the modern study of the intimate connexion of ‘physiological and psychical facts which has proved so fruitful, though his physical theory in itself is inadequate, and has not been largely adopted. He held that sensation is the result of a vibration of the minute particles of the medullary substance of the nerves, to account for which he postulated, with Newton, a subtle elastic ether, rare in the interstices of solid bodies and in their close neighbourhood, and denser as it recedes from them. Pleasure is the result of moderate vibrations, pain of vibrations so violent as to break the continuity of the nerves. These vibrations leave behind them in the brain a tendency to fainter vibrations or ” vibratiuncles ” of a similar kind, which correspond to ” ideas of sensation.” Thus memory is accounted for. The course of reminiscence and of the thoughts generally, when not immediately dependent upon external sensation, is accounted for on the ground that there are always vibrations in the brain on account of its heat and the pulsation of its arteries. What these vibrations shall be is determined by the nature of each man’s past experience, and by the influence of the circumstances of the moment, which causes now one now another tendency to prevail over the rest. Sensations which are often associated together become each associated with the ideas corresponding to the others; and the ideas corresponding to the

associated sensations become associated together, sometimes so intimately that they form what appears to be a new simple idea, not without careful analysis resolv- able into its component parts.

Starting, like the modern Associationists, from a detailed account of the phenomena of the senses, Hartley tries to show how, by the above laws, all the emotions, which he analyses with considerable skill, may be explained. Locke's phrase " association of ideas " is employed throughout, " idea " being taken as including every mental state but sensation. He emphatically asserts the existence of pure disinterested sentiment, while declaring it to be a growth from the self-regarding feelings. Voluntary action is explained as the result of a firm connexion between a motion and a sensation or " idea," and, on the physical side, between an " ideal " and a motory vibration. Therefore in the Freewill controversy Hartley took his place as a determinist. It is singular that, as he tells us, it was only with reluctance, and when his speculations were nearly complete, that he came to a conclusion on this subject in accordance with his theory.

See life of Hartley by his son in the 1801 edition of the Observations, which also contains notes and additions translated from the German of H. A. Pistorius; Sir Leslie Stephen, History of English Thought in the Eighteenth Century (3rd ed., 1902), and article in the Dictionary of National Biography; G. S. Bower, Hartley and James Mill (1881); B. Schonlank, Hartley und Priestley die Begriinder des Assoziatio- nismus in England (1882). See also the histories of philosophy and bibliography in J. M. Baldwin's Dictionary of Philosophy and Psychology (1905), vol. iii.

HARTLEY, JONATHAN SCOTT (1845-), American sculptor, was born at Albany, New York, on the 23rd of September 1845. He was a pupil of E. D. Palmer, New York, and of the schools of the Royal Academy, London; he later studied for a year in Berlin and for a year in Paris. His first important work (1882) was a statue of Miles Morgan, the Puritan, for Springfield, Mass. Among his other works are the Daguerre monument in Washington; " Thomas K. Beecher," Elmira, New York, and "Alfred the Great," Appellate Court House, New York. He devoted himself particularly to the making of portrait busts, in which he attained high rank. In 1891 he became a member of the National Academy of Design.

HARTLIB, SAMUEL (c. 1599-c. 1670), English writer on education and agriculturist, was born towards the close of the 16th century at Elbing in Prussia, his father being a refugee merchant from Poland. His mother was the daughter of a rich- English merchant at Danzig. About

1628 Hartlib went to England, where he carried on a mercantile agency, and at the same time found leisure to enter with interest into the public questions of the day. An enthusiastic admirer of Comenius, he published in 1637 his Conatuum Comenianorum praeludia, and in 1639 Comenii pansophiae prodromus et didaciica dissertatio. In 1641 appeared his Relation of that which hath been lately attempted to procure Ecclesiastical Peace among Protestants, and A Description of Macaria, containing his ideas of what a model I state should be. During the civil war Hartlib occupied himself

with the peaceful study of agriculture, publishing various works by himself, and printing at his own expense several treatises by others on the subject. In 1652 he issued a second edition of the Discourse of Flanders Husbandry by Sir Richard Weston (1645); and in 1651 Samuel Hartlib, his Legacy, or an Enlarge- ment of the Discourse of Husbandry used in Brabant and Flanders, by Robert Child. For his various labours Hartlib received from Cromwell a pension of /ioo, afterwards increased to £300, as he had spent all his fortune on his experiments. He planned a school for the sons of gentlemen, to be conducted on new principles, and this probably was the occasion of his friend Milton's Tractate on Education, addressed to him in 1644, and of Sir William Petty's Two Letters on the same subject, in 1647 and 1648. At the Restoration Hartlib lost his pension, which had already fallen into arrears; he petitioned parliament for a new grant of it, but what success he met with is unknown, as his latter years and death are wrapped in obscurity. A letter from him is known to have been written in February 1661-1662, and apparently he is referred to by Andrew Marvell as alive in 1670 and fleeing to Holland from his creditors.

A Biographical Memoir of Samuel Hartlib, by H. Dircks, appeared in 1865.

HARTMANN, KARL ROBERT EDUARD VON (1842-1906), German philosopher, was born in Berlin on the 23rd of February 1842. He was educated for the army, and entered the artillery of the Guards as an officer in i860, but a malady of the knee, which' crippled him, forced him to quit the service in 1865. After some hesitation between music and philosophy, he decided to make the latter the serious work of his life, and in 1867 the university of Rostock conferred on him the degree of doctor of philosophy. He subsequently returned to Berlin,

and died at Grosslichterfelde on the 5th of June 1906. His reputation as a philosopher was established by his first book, The Philosophy of the Unconscious (1869; 10th ed. 1890). This success was largely due to the originality of its title, the diversity of its contents (von Hartmann professing to obtain his speculative results by the methods of inductive science, and making plentiful use of concrete illustrations), the fashionableness of its pessimism and the vigour and lucidity of its style. The conception of the Unconscious, by which von Hartmann describes his ultimate metaphysical principle, is not at bottom as paradoxical as it sounds, being merely a new and mysterious designation for the Absolute of German metaphysicians. The Unconscious appears as a combination of the mctaphysic of Hegel with that of Schopen- hauer. The Unconscious is both Will and Reason and the absolute all-embracing ground of all existence. Von Hartmann thus combines ” pantheism ” with ” panlogism ” in a manner adumbrated by Schelling in his ” positive philosophy.” Never- theless Wiil and not Reason is the primary aspect of the Un- conscious, whose melancholy career is determined by the primacy of the Will and the subservience of the Reason. Precosmically the Will is potential and the Reason latent, and the Will is void of reason when it passes from potentiality to actual willing. This latter is absolute misery, and to cure it the Unconscious evokes its Reason and with its aid creates the best of all possible worlds, which contains’ the promise of its redemption from actual existence by the emancipation of the Reason from its subjugation to the Will in the conscious reason of the enlightened pessimist. When the greater part of the Will in existence is so far enlightened by reason as to perceive the inevitable misery of existence, a collective effort to will non-existence will be made, and the world will relapse into nothingness, the Unconscious into quiescence. Although von Hartmann is a pessimist, his pessim- ism is by no means unmitigated. The individual’s happiness is indeed unattainable either here and now or hereafter and in the future, but he does not despair of ultimately releasing the Unconscious from its sufferings. He differs from Schopenhauer in making salvation by the ” negation of the Will-to-live ” depend on a collective social effort and not on individualistic asceticism. The conception of a redemption of the Unconscious also supplies the ultimate basis of von Hartmann’s ethics. We must provisionally affirm life and devote ourselves to social

evolution, instead of striving after a happiness which is impossible; in so doing we shall find that morality renders life less unhappy than it would otherwise be. Suicide, and all other forms of selfishness, are highly reprehensible. Epistemologically von Hartmann is a transcendental realist, who ably defends his views and acutely

criticizes those of his opponents. His realism enables him to maintain the reality of Time, and so of the process of the world's redemption.

Von Hartmann's numerous works extend to more than 12,000 pages. They may be classified into — A. Systematical, including Grundprobleme der Erkenntnistheorie ; Kategorienlehre; Das sittliche Bewusstsein ; Die Philosophic des Schbnen ; Die Religion des Geistes ; Die Philosophic des Unbewusstett (3 vols., which now include his, originally anonymous, self-criticism, Das Unbewusste vom Standpunkte der Physiologie und Descendenztheorie, and its refutation, Eng. trs. by W. C. Coupland, 1884) ; System der Philosophic im Grundriss, i. ; Grundriss der Erke?mtnislehre. B. Historical and critical — Das religiose Bewusstsein der Menschheit; Geschichte der Metaphysik (2 vols.); Kant's Erkenntnistheorie; Kritische Grundlegung des transcendentalen Realismus ; Uber die dialektische Mcthode ; studies of Schelling, Lotze, von Kirchmann; Zur Geschichte des Pessimismus; Neukantianismus, Schopenhauerismus , Hegelianismus ; Geschichte der deutschen Aslhetik seit Kant; Die Krisis des Christentums in der modernen Theologie; Philosophische Fragen der Gegenwart; Ethische Studien; Moderne Psychologic; Das Christentum des neuen Testaments; Die Weltanschauung der modernen Physik, C. Popular — Soziale Kernfragen; Moderne Probleme; Tagesfragen; Zwei jahrzehnte deutscher Politik ; Das Judentum in Gegenwart und Zukunft; Die Selbstzersetzung des Christentums; Gesammette Studien; Der Spiritismus and Die Geisterhypothese des Spiritismus; Zur Zeitgeschichle. His select works have been published in 10 volumes (2nd ed., 1885-1896). On his philosophy see R. Kober, Das philosophische System Eduard von Hartmanns (1884); O. Pllimacher, Der Kampf urns Unbewusste (2nd ed., 1890), with a chronological table of the Hartmann literature from 1868 to 1890; A. Drews, E. von Hartmanns Philosophic und der Materialismus in der modernen Kullur (1890) and E. von Hartmanns philosophisches System im Grundriss (1902), with biographical introduction; and for further authorities, J. M. Baldwin, Dictionary of Philosophy and Psychology (1901-1905).

HARTMANN, MORITZ (1S21-1872), German poet and author, was born of Jewish parentage at Duschnik in Bohemia on the 15th of October 1821. Having studied philosophy at Prague and Vienna, he travelled in south Germany, Switzerland and Italy, and became tutor in a family at Vienna. In 1845 ne proceeded to Leipzig and there published a volume of patriotic poems, Kelch und Schwert (1845). Fearing in consequence prosecution at the hands of the authorities, he abided events in France and Belgium,, and after issuing in Leipzig Nenere Gedichte (1846) returned home, suffered a short term of imprisonment, and in 1848 was elected member for Leitmeritz in the

short-lived German parliament at Frankfort-onˆMain, in which he sided with the extreme Radical party. He took part with Robert Blum (1807-1848) in the revolution of that year in Vienna, but contrived to escape to London and Paris. In 1849 he published Reimchronik des Pfaffen Mauritius, a satirical political poem in the style of Heine. During the Crimean War (1854-56) Hart- mann was correspondent of the Kblnische Zeitung, settled in i860 in Geneva as a teacher of German literature and history, became in 1865 editor of the Freya in Stuttgart and in 1868 a member of the staff of the Ncue Freie Presse in Vienna. He died at Oberdobling near Vienna on the 13th of May 1872.

Among Hartmann's numerous works may be especially mentioned Der Krieg um den Wald (1850), a novel, the scene of which is laid in Bohemia; Tagebuch aus Languedoc und Provence (1852); Erzahlungen eincs Unsteten (1858); and Die lelzten Tage eines Kbnigs (1867). His idyll, Adam und Eva (1851), and his collection of poetical tales, Schatten (1851), show that the author possessed but little talent for epic narrative. Hartmann's poems are often lacking in genuine poetical feeling, but the love of liberty which inspired them, and the fervour, ease and clear- ness of their style compensated for these shortcomings and gained for him a wide circle of admirers.

His Gesammelte Werke were published in 10 vols, in 1873-1874, and a selection of his Gedichte in the latter year. The first two volumes of a new edition of his works contain a biography of Hart- mann bv O. Wittner. See also E. Ziel, " Moritz Hartmann " (in Unsere Zeit, 1872); A. Marchand, Les Poetes lyriques de V Autriche (1892) ; Brandes, Dasjunge Deutschland (Charlottenburg, 1899).

HARTMANN VON AUE (c. nyo-c. 1210), one of the chief Middle High German poets. He belonged to the lower nobility of Swabia, where he was born about n 70. After receiving a monastic education, he became retainer (dienstman) of a noble- man whose domain, Aue, has been identified with Obernau on the Neckar. He also took part in the Crusade of 1196-97. The date of his death is as uncertain as that of his birth; he is mentioned by Gottfried von Strassburg (c. 1210) as still alive, and in the Krone of Heinrich von dem Turlin, written about 1220, he is mourned for as dead. Hartmann was the author of four narrative poems which are of importance for the evolution of the Middle High German court epic. The oldest of these, Erec, which may have been written as early as 1191 or 1192, and the latest and ripest,

Iwein, belong to the Arthurian cycle and are based on epics by Chretien de Troyes (q.v.); between them lie the romance, Grcgorius, also an adaptation of a French epic, and Der arme Heinrich, one of the most charming specimens of medieval German poetry. The theme of the latter — the cure of the leper, Heinrich, by a young girl who is willing to sacrifice her life tor him — Hartmann had evidently found in the annals of the family in whose service he stood. Hartmann's most con- spicuous merit as a poet lies in his style; his language is carefully chosen, his narrative lucid, flowing and characterized by a sense of balance and proportion which is rarely to be found in German medieval poetry. Gregorius, Der arme Heinrich and his lyrics, which are all fervidly religious in tone, imply a tendency towards asceticism, but, on the whole, Hartmann's striving seems rather to have been to reconcile the extremes of life; to establish a middle way of human conduct between the worldly pursuits of knighthood and the ascetic ideals of medieval religion.

Erec has been edited'by M. Haupt (2nd ed., Leipzig, 1871); Gregorius, by H. Paul (2nd ed., Halle, 1900); Der arme Heinrich, by W. Wackernagel and W. Toischer (Basel, 1885) and by H. Paul (2nd ed., Halle, 1893); by J. G. Robertson (London, 1895), with English notes; Iwein, by G. F. Benecke and K. Lach- mann (4th ed., Berlin, 1877) and E. Henrici (Halle, 1891-1893). A convenient edition of all Hartmann's poems by F. Bech, 3 vols. (3rd ed., Leipzig, 1891-1893, vol. 3 in 4th ed., 1902).

The literature on Hartmann is extensive. See especially L. Schmid, Des Minnesingers Hartmann von Aue Stand, Heimat und Geschlecht (Tubingen, 1874); H. Rotteken, Die epische Kunst Heinrichs von Veldeke und Ilartmanns von Aue (Halle, 1887); F. Saran, Hartmann von Aueals Lyriker (Halle, 1889) ; A., E. Schonbach, Uber Hartmann von Aue (Graz, 1894); F. Piquet, Etude sur Hart- mann d'Ave (Paris, 1898). Translations have been made into modern German of all Hartmann's poems, while Der arme Heinrich has repeatedly attracted the attention of modern poets, both English (Longfellow, Rossetti) and German (notably, Gerhart Hauptmann). See H. Tardel, Der arme Heinrich in der neueren Dichtung (Berlin, I905)-

HARTSHORN, SPIRITS OF, a name signifying originally the ammoniacal liquor obtained by the distillation of horn shavings, afterwards applied to the partially purified similar products of the action of heat on nitrogenous animal matter generally, and now popularly used to designate the aqueous solution of ammonia (q.v).

HARTZENBUSCH, JUAN EUGENIO (1806-1880), Spanish dramatist,

was born at Madrid on the 6th of September 1806. The son of a German carpenter, he was educated for the priest- hood, but he had no religious vocation and, on leaving school, followed his father's trade till 1830, when he learned shorthand and joined the staff of the Gaceta. His earliest dramatic essays were translations from Moliere, Voltaire and the elder Dumas; he next recast old Spanish plays, and in 1837 produced his first original play, Los Amantes de Teritel, the subject of which had been used by Rey de Artieda, Tirso de Molina and Perez de Montal'oan. Los Amantes de Teruel at once made the author's reputation, which was scarcely maintained by Dona Mencia (1S30) and Alfonso el Casto (1841); it was not till 1845 that he approached his former success with La Jura en Santa Gadea. Hartzenbusch was chief of the National Library from 1862 to 1875, and was an indefatigable — though not very judicious — editor of many national classics. Inferior in inspiration to other contemporary Spanish dramatists, Hartzenbusch excels his rivals in versatility and in conscientious workmanship.

HARUN AL-RASHID (763 or 766-809), i.e. "Harun the Orthodox," the fifth of the 'Abbasid caliphs of Bagdad, and the second son of the third caliph Mahdi. His full name was Harun ibn Muhammad ibn "Abdallah ibn Muhammad ibn 'Ali ibn 'Abdallah ibn "Abbas. He was born at Rai (Rhagae) on the 20th of March a.d. 763, according to some accounts, and according to others on the 15th of February a.d. 766. Harun al-Rashld was twenty-two years old when he ascended the throne. His father Mahdi just before his death conceived the idea of superseding his elder son Musa (afterwards known as Hadl, the fourth caliph) by Harun. But on Mahdi's death Harun gave way to his brother. For the campaigns in which he took part prior to his accession see Caliphate, section C, The Abbasids, §§3 and 4.

Rashld owed his succession to the throne to the prudence and sagacity of Yahya. b. Khalid the Barmecide, his secretary, whom on his accession he appointed his lieutenant and grand vizier (see Barmecides). Under his guidance the empire flourished on the whole, in spite of several revolts in the provinces by members of the old Alid family. Successful wars were waged with the rulers of Byzantium and the Khazars. In 803, however, Harun became suspicious of the Barmecides, whom with only a single exception he caused to be executed. Henceforward the chief power was exercised by Fadl b. Rabi", who had been chamberlain not only under Harun himself but under his predecessors, Mansur, Madhi and Hadl. In the later years of Hariin's reign troubles arose in the eastern parts of the empire. These troubles assumed proportions so serious that Harun himself decided to go to Khorasan. He died, however, at Tus in March 809.

The reign of Harun (see Caliphate, section C, § 5) was one of the most brilliant in the annals of the caliphate, in spite of losses in north-west Africa and Transoxiana. His fame spread to the West, and Charlemagne and he exchanged gifts and com- pliments as masters respectively of the West and the East. No caliph ever gathered round him so great a number of learned men, poets, jurists, grammarians, cadis and scribes, to say nothing of the wits and musicians who enjoyed his patronage. Harun himself was a scholar and poet, and was well versed in history, tradition and poetry. He possessed taste and discernment, and his dignified demeanour is extolled by the historians. In religion. he was extremely strict; he prostrated himself a hundred times daily, and nine or ten times made the pilgrimage to Mecca. At the same time he cannot be regarded as a great administrator. He seems to have left everything to his viziers Yahya and Fadl, to the former of whom especially was due the prosperous con- dition of the empire. Harun is best known to Western readers as the hero of many of the stories in the Arabian Nights; and in Arabic literature he is the central figure of numberless anecdotes and humorous stories. Of his incognito walks through Bagdad, however, the authentic histories say nothing. His Arabic biographers are unanimous in describing him as noble and generous, but there is little doubt that he was in fact a man of little force of character, suspicious, untrustworthy and on occasions cruel.

See the Arabic histories of Ibn al-Athir and Ibn Khaldun. Among modern works see Sir W. Muir, The Caliphate (London, 1891); R. D. Osborn, Islam under the Khalifs of Bagdad (London, 1878); Gustav Weil, Geschichte der Chalifen (Mannheim and Stuttgart, 1846-1862); G. le Strange, Baghdad during the Abbasid Caliphate (Oxford, 1900) ; A. Mtiller, Der Islam, vol. i. (Berlin, 1885) ; E. H. Palmer, The Caliph Haroun Alraschid (London, 1880); J. B. Bury's edition of Gibbon's Decline and Fall (London, 1898), vol. vi. pp. 34 foil.

HARUSPICES, or Aruspices (perhaps " entrail observers," cf. Skt. hira, Gr. xopSrf), a class of soothsayers in Rome. Their art (disciplina) consisted especially in deducing the will of the gods from the appearance presented by the entrails of the slain victim . They also interpreted all portents or unusual phenomena of nature, especially thunder and lightning, and prescribed the expiatory ceremonies after such events. To please the god, the victim must be without spot or blemish, and the practice of ob- serving whether the entrails presented any abnormal appearance,

and thence deducing the will of heaven, was also very im- portant in Greek religion. This art, however, appears not to have been, as some other modes of ascertaining the will of the gods undoubtedly were, of genuine Aryan growth. It is foreign to the Homeric poems, and must have been introduced into Greece after their composition. In like manner, as the Romans themselves believed, the art was not indigenous in Rome, but derived from Etruria. 1 The Etruscans were said to have learned it from a being named Tages, grandson of Jupiter, who had suddenly sprung from the ground near Tarquinii. Instructions were contained in certain books called libri haruspicini, fulgurates, rituales. The art was practised in Rome chiefly by Etruscans, occasionally by native-born Romans who had studied in the priestly schools of Etruria. From the regal period to the end of the republic, haruspices were summoned from Etruria to deal with prodigies not mentioned in the pontifical and Sibylline books, and the Roman priests carried out their instructions as to the offering necessary to appease the anger of the deity con- cerned. Though the art was of great importance under the early republic, it never became a part of the state religion. In this respect the haruspices ranked lower than the augurs, as is shown by the fact that they received a salary; the augurs were a more ancient and purely Roman institution, and were a most important element in the political organization of the city. In later times the art fell into disrepute, and the saying of Cato the Censoriswell known, that he wondered how one haruspex could look another in the face without laughing (Cic. De div. ii. 24). Under the empire, however, we hear of a regular collegium of sixty haru- spices; and Claudius is said to have tried to restore the art and put it under the control of the pontifices. This collegium con- tinued to exist till the time of Alaric.

See A. Bouch6-Leclercq, Histoire de la divination dans I'antiquite (1879-1881); Marquardt, Romische Staatsverwaltung, iii. (1885), pp. 410-415; G. Schmeisser, Die etruskiscke Disciplin vom Bundes- genossenkriege bis zum Unlergang des Heidentums (1881), and Quaestionum de Etrusca disciplina particula (1872); P. Clairin, De haruspicibus apud Romanos (1880). Also Omen.

HARVARD UNIVERSITY, the oldest of American educational institutions, established at Cambridge, Massachusetts. In 1636 the General Court of the colony voted £400 towards " a schoale or colledge," which in the next year was ordered to be at " New Towne." In memory of the English university where many (probably some seventy) of the leading men of the colony had been educated, the

township was named Cambridge in 1638. In the same year John Harvard (1607-1638), a Puritan minister lately come to America, a bachelor and master of Emmanuel college, Cambridge, dying in Charlestown (Mass.), bequeathed to the wilderness seminary half his estate (£780) and some three hundred books; and the college, until then unorganized, was named Harvard College (1639) in his honour. Its history is unbroken from 1640, and its first commencement was held in 1642. The spirit of the founders is beautifully expressed in the words of a contemporary letter which are carved on the college gates: ” After God had carried us safe to New-England, and wee had builded our houses, provided necessaries for our liveli-hood, rear’d convenient places for Gods worship, and setled the Civill Government; One of the next things we longed for, and looked after was to advance Learning, and perpetuate it to Posterity; dreading to leave an illiterate Ministry to the Churches, when our present Ministers shall lie in the Dust.” The college charter of 1650 dedicated it to ” the advancement of all good literature, arts, and sciences,” and ” the education of the English and Indian youth … in knowledge and godlynes.” The second building (1654) on the college grounds was called ” the Indian College.” In it was set up the College press, which since 1638 had been in the president’s house, and here, it is believed, was printed the trans- lation of the Bible (1661-1663) by John Eliot into the language of the natives, with primer, catechisms, grammars, tracts, &c. A fair number of Indians were students, but only one, Caleb Cheeshahteaumuck, took a bachelor’s degree(i66s). By generous

1 The statement of Dionysius of Halicarnassus (ii. 22) that the haruspices were instituted by Romulus is due to his confusing them with the augurs.

aid received from abroad for this special object, the college was greatly helped in its infancy.

The charter of 1650 has been in the main, and uninterruptedly since 1 707, the fundamental source of authority in the administra- tion of the university. It created a co-optating corporation consisting of the president, treasurer and five fellows, who formally initiate administrative measures, control the college funds, and appoint officers of instruction and government; subject, however, to confirmation by the Board of Overseers (established in 1642), which has a revisory power over all acts of the corporation. Circumstances gradually necessitated ordinary government by the resident teachers; and to-day the various faculties, elaborately organized, exercise immediate government and discipline over all the students, and individually or in the general university council consider questions of

policy. The Board of Overseers was at first jointly representative of state and church. The former, as founder and patron, long regarded Harvard as a state institution, controlling or aiding it through the legislature and the overseers; but the contro- versies and embarrassments incident to legislative action proved prejudicial to the best interests of the college, and its organic connexion with the state was wholly severed in 1866. Financial aid and practical dependence had ceased some time earlier; indeed, from the very beginning, and with steadily increasing preponderance, Harvard has been sustained and fostered by private munificence rather than by public money. The last direct subsidy from the state determined in 1824, although state aid was afterwards given to the Agassiz museum, later united with the university. The church was naturally sponsor for the early college. The changing composition of its Board of Overseers marked its liberation first from clerical and later from political control; since 1865 the board has been chosen by the alumni (non-residents of Massachusetts being eligible since 1880), who therefore really control the university. When the state ceased to repress effectually the rife speculation characteristic of the first half of the seventeenth century, in religion as in politics, and in America as in England, the unity of Puritanism gave way to a variety of intense sectarianisms, and this, as also the incoming of Anglican churchmen, made the old faith of the college insecure. President Henry Dunster (c. 1612-1659), the first president, was censured by the magistrates and removed from office for questioning infant baptism. The conservatives, who clung to pristine and undiluted Calvinism, sought to intrench themselves in Harvard, especially in the Board of Overseers. The history of the college from about 1673 to 1725 was exceedingly troubled. Increase and Cotton Mather, forceful but bigoted, were the bulwarks of reaction and fomenters of discord. One episode in the struggle was the foundation and encouragement of Yale College by the reaction- aries of New England as a truer ” school of the prophets ” (Cotton Mather being particularly zealous in its interests), after they had failed to secure control of the government of Harvard. It represented conservative secession. In 1792 the first layman was chosen to the corporation; in 1805 a Unitarian became professor of theology; in 1843 the board of overseers was opened to clergymen of all denominations; in 1886 attendance on prayers by the students .ceased to be compulsory. Thus Harvard, in response to changing ideas and conditions, grew away from the ideas of its founders.

Harvard, her alumni, and her faculty have been very closely connected with American letters, not only in the colonial period, when the Mathers, Samuel Sewall and Thomas Prince were important

names, or in the revolutionary and early national epoch with the Adamses, Fisher Ames, Joseph Dennie and Robert Treat Paine, but especially in the second third of the 19th century, when the great New England movements of Unitarianism and Transcendentalism were led by Harvard graduates. In 1805 Henry Ware (1764-1845) was elected the first anti-Trinitarian to be Hollis professor of divinity, and this marked Harvard's close connexion with Unitarianism, in the later history of which Ware, his son Henry (1794-1843), and Andrews Norton (1786-1852), all Harvard alumni and professors,

and Joseph Buckminster (1751-1812) and William Ellery Channing were leaders of the conservative Unitarians, and Joseph Stevens Buckminster (1784-1812), James Freeman Clarke, and Theodore Parker were liberal leaders. Of the " Transcendentalists," Emerson, Francis Henry Hedge (1805- 1890), Clarke, Convers Francis (1 795-1863), Parker, Thoreau and Christopher Pearse Cranch (1813-1892) were Harvard graduates. Longfellow's professorship at Harvard identified him with it rather than with Bowdoin; Oliver Wendell Holmes was professor of anatomy and physiology at Harvard in 1847- 1882; and Lowell, a Harvard alumnus, was Longfellow's successor in 1855-1886 as Smith Professor of the French and Spanish languages and literatures. Ticknor and Charles Eliot Norton are other important names in American literary criticism. The historians Sparks, Bancroft, Hildreth, Palfrey, Prescott, Motley and Parkman were graduates of Harvard, as were Edward Everett, Charles Sumner and Wendell Phillips.

In organization and scope of effort Harvard has grown, especially after 1869, under the direction of President Charles W. Eliot, to be in the. highest sense a university; but the " college " proper, whose end is the liberal culture of under- graduates, continues to be in many ways the centre of university life, as it is the embodiment of university traditions. The medical school (in Boston) dates from 1782, the law school from 181 7, the divinity school 1 (though instruction in theology was of course given from the foundation of the college) from 1819, and the dental school (in Boston) from 1867. The Bussey Institution at Jamaica Plain was established in 1871 as an undergraduate school of agriculture, and reorganized in 1908 for advanced instruction and research in subjects relating to agriculture and horticulture. The Graduate School of Arts and Sciences dates from 1872, the Graduate School of Applied Science (growing out of the

Lawrence Scientific School) from 1906, and the Graduate School of Business Administration (which applies to commerce the professional methods used in post-graduate schools of medicine, law, &c.) from 1908. The Lawrence Scientific School, established in 1847, was practically abolished in 1907-1908, when its courses were divided between the College (which thereafter granted a degree of S.B.) and the Graduate School of Applied Science, which was established in 1906 and gives professional degrees in civil, mechanical and electrical engineering, mining, metallurgy, architecture, landscape architecture, forestry, applied physics, applied chemistry, applied zoology and applied geology. A school of veterinary medicine, established in 1882, was discontinued in 1901. The university institutions comprise the botanic garden (1807) and the (Asa) Gray herbarium (1864); the Arnold arboretum (1872), at Jamaica Plain, for the study of arboriculture, forestry and dendrology; the university museum of natural history, founded in 1859 by Louis Agassiz as a museum of comparative zoology, enormously developed by his son, Alexander Agassiz, and transferred to the university in 1876, though under an inde- pendent faculty; the Peabody museum of American archaeology and ethnology, founded in 1866 by George Peabody; the William Hayes Fogg art museum (1895); the Semitic museum (1889); the Germanic Museum (1902), containing rich gifts from Kaiser Wilhelm II., the Swiss government, and individuals and societies of Germanic lands; the social museum (1906); and the astronomical observatory (1843; location 42 22′ 48″ N. lat., 71 8′ W. long.), which since 1891 has maintained a station near Arequipa, Peru. A permanent summer engineering camp is maintained at Squam Lake, New Hampshire. In Petersham, Massachusetts, is the Harvard Forest, about 2000 acres of hilly wooded country with a stand in 1908 of 10,000,000 ft. B.M. of merchantable timber (mostly white pine); this forest was given to the university in 1907, and is an important part of the equip- ment of the division of forestry. The university library is the largest college library in the country, and from its slow and competent selection is of exceptional value. In 1 908 it numbered,

1 Affiliated with the university, but autonomous and independent, is the Andover Theological Seminary, which in 1908 removed from Andover to Cambridge.

including the various special libraries, 803,800 bound volumes, about 496,600 pamphlets, and 27,450 maps. Some of its collec- tions are of great value from associations or special richness, such as Thomas Carlyle's collection on Cromwell and Frederick the Great; the collection on folk-lore and medieval romances, supposed to be the largest in existence and including the material used by Bishop Percy in

preparing his Reliques; and that on the Ottoman empire. The law library has been described by Professor A. V. Dicey of Oxford as ” the most perfect collection of the legal records of the English people to be found in any part of the English-speaking world.” There are department libraries at the Arnold arboretum, the Gray herbarium, the Bussey Institution, the astronomical observatory, the dental school, the medical school, the law school, the divinity school, the Peabody museum, and the museum of comparative zoology. In 1878 the library published the first of a valuable series of Bibliographical Contributions. Other publications of the univer- sity (apart from annual reports of various departments) are: the Harvard Oriental Series (started 1891), Harvard Studies in Classical Philology (1890), Harvard Theological Review (1907), the Harvard Law Review (1889), Harvard Historical Studies (1897), Harvard Economic Studies (1906), Harvard Psychological Studies (1903), the Harvard Engineering Journal (1902), the Bulletin (1874) of the Bussey Institution, the Archaeological and Ethnological Papers (1888) of the Peabody museum, and the Bulletin (1863), Contributions and Memoirs (1865) of the museum of comparative zoology. The students’ publications include the Crimson (1873), a daily newspaper; the Advocate (1831), a literary bi-weekly; the Lampoon (1876), a comic bi-weekly; and the Harvard Monthly (1885), a literary monthly. The Harvard Bulletin, a weekly, and the Harvard Graduates’ Magazine (1892), a quarterly, are published chiefly for the alumni.

In 1 908-1 909 there were 743 officers of instruction and ad- ministration (including those for Radcliffe) and 5250 students (1059 in 1869), the latter including 2238 in the college, 1641 in the graduate and professional schools, and 1332 in the summer school. Radcliffe College, for women, had 449 additional students. The whole number of degrees conferred up to 1905 was 3 1,805 (doctors of science and of philosophy by examination, 408; masters of arts and of science by examination, 1759). The conditions of the time when Harvard was a theological seminary for boys, governed like a higher boarding school, have left traces still discernible in the organization and discipline, though no longer in the aims of the college. The average age of students at entrance, only 14 years so late as 1820, had risen by 1890 to 19 years, making possible the transition to the present regime of almost entire liberty of life and studies without detriment, but with positive improvement, to the morals of the student body. A strong development toward the university ideal marked the opening of the 19th century, especially in the widen- ing of courses, the betterment of instruction, and the suggestions of quickening ideas of university freedom, whose realization, along with

others, has come since 1870. The elimination of the last vestiges of sectarianism and churchly discipline, a lessening of parietal oversight, a lopping off of various outgrown colonial customs, a complete reconstruction of professional standards and methods, the development of a great graduate school in arts and sciences based on and organically connected with the undergraduate college, a great improvement in the college standard of scholarship, the allowance of almost absolute freedom to students in the shaping of their college course fthe " elective " system), and very remarkable material prosperity marked the administration (1869-1909) of President Eliot. In the readjustment in the curricula of American colleges of the elements of professional training and liberal culture Harvard has been bold in experiment and innovation. With Johns Hopkins University she has led the movement that has trans- formed university education, and her influence upon secondary education in America has been incomparably greater than that of any other university. Her entrance requirements to the college and to the schools of medicine, law, dentistry and divinity have been higher than those of any other American university.

4°

HARVEST

A bachelor's degree is requisite for entrance to the professional schools (except that of dentistry), and the master's degree (since 1872) is given to students only for graduate work in residence, and rarely to other persons as an honorary degree. In scholarship and in growth of academic freedom Germany has given the quickening impulse. This influence began with George Ticknor and Edward Everett, who were trained in Germany, and was continued by a number of eminent German scholars, some driven into exile for their liberalism, who became professors in the second half of the 19th century, and above all by the many members of the faculty still later trained in German universities. The ideas of recognizing special students and introducing the elective system were suggested in 1824, attaining establishment even for freshmen by 1885, the movement characterizing particu- larly the years 1865-1885. The basis of the elective system (as in force in 1010) is freedom in choice of studies within liberal limits; and, as regards admission to college 1 (completely established 1891), the idea that the admission is of minds for the quality of their training and not for their knowledge of particular subjects, and that any subject may be acceptable for such training if followed with requisite devotion and under proper methods. Except for one course in English in the Freshman year, and one course in French or German for those who do

not on entrance present both of these languages, no study is prescribed, but the student is compelled to select a certain number of courses in some one department or field of learning, and to distribute the remainder among other departments, the object being to secure a systematic education, based on the principle of knowing a little of everything and something well.

The material equipment of Harvard is very rich. In 1909 it included invested funds of $22,716,760 ($2,257,990 in 1869) and lands and buildings valued at $12,000,000 at least. In 1908- 1909 an income of more than $130,000 was distributed in scholarships, fellowships, prizes and other aids to students. The yearly income available for immediate use from all sources in 1899-1904 averaged $1,074,229, of which $452,760 yearly represented gifts. The total gifts, for funds and for current use, in the same years aggregated $6,152,988. The income in 1907- 1908 was $1,846,976; $241,924 was given for immediate use, and $449,822 was given for capital. The medical school is well endowed and is housed in buildings (1906) on Longwood Avenue, Boston; the gifts for its buildings and endowments made in 1901-1902 aggregate $5,000,000. Among the university buildings are two dining-halls accommodating some 2500 students, a theatre for public ceremonies, a chapel, a home for religious societies, a club-home (the Harvard Union) for graduates and undergraduates, an infirmary, gymnasium, boat houses and large playgrounds, with a concrete stadium capable of seating 27,000 spectators. Massachusetts Hall (1720) is the oldest building. University Hall (1815), the administration building, dignified, of excellent proportions and simple lines, is a good example of the work of Charles Bulfinch. Memorial Hall (1874), an ambitious building of cathedral suggestion, commemorates the Harvard men who fell in the Civil War, and near it is an ideal statue (1884) of John Harvard by Daniel C. French. The medical and dental schools are in Boston, and the Bussey Institution and Arnold Arboretum are at Jamaica Plain.

Radcliffe College, essentially a part of Harvard, dates from the beginning of systematic instruction of women by members of the Harvard faculty in 1879, the Society for the Collegiate Instruction of Women being formally organized in 1882. The present name was adopted in 1894 in honour of Ann

1 The requirements for admission as changed in 1908 are based on the ” unit system “; satisfactory marks must be got in subjects aggregating 26 units, the unit being a measure of preparatory study. Of these 20 units, English (4 units), algebra (2), plane geometry (2), some science or sciences (2), history (2; either Greek and Roman, or American and

English), a modern language (2; French and (.erman) are prescribed ; prospective candidates for the degree of A.B. are required to take examinations for 4 additional units in Greek or Latin, and for the other 8 [joints have large range of choice ; and candidates for the degree of S.B. must take additional examina- tions in French or German (2 units) and have a similar freedom of choice in making up the remaining 10 units.

Radcliffe, Lady Mowlson (ob. c. 1661), widow of Sir Thomas Mowlson, alderman and (1634) lord mayor of London, who in 1643 founded the first scholarship in Harvard College. From 1894 also dates the present official connexion of Radcliffe with Harvard. The requirements for admission and for degrees are the same as in Harvard (whose president countersigns all diplomas), and the president and fellows of Harvard control absolutely the administration of the college, although it has for immediate ad- ministration a separate government. Instruction is given by members of the university teaching force, who repeat in Rad- cliffe many of the Harvard courses. Many advanced courses in Harvard, and to a certain extent laboratory ‘facilities, are directly accessible to Radcliffe students, and they have unrestricted access to the library.

The presidents of Harvard have been: Henry Dunster (1640- 1654); Charles Chauncy (1654-1672); Leonard Hoar (1672- 1675); Urian Oakes (1675-1681); John Rogers (1682-1684); Increase Mather (1685-1701); Charles Morton (vice-president) (1697-1698) ; Samuel Willard (1700-1707) ; John Leverett (1708- 1724); Benjamin Wadsworth (1725-J737); Edward Holyoke (1737-1769); Samuel Locke (1770-1773); Samuel Langdon (1774-1780); Joseph Willard (1781-1804); Samuel Webber (1806-1810); John Thornton Kirkland (1810-1828); Josiah Quincy (1829-1845); Edward Everett (1846-1849); Jared Sparks (1849-1853); James Walker (1853-1860); Cornelius Conway Felton (1860-1862); Thomas Hill (1862-1868); Charles William Eliot (1 869-1 909); Abbott Lawrence Lowell (appointed

1909).

Authorities. — Benjamin Peirce, A History of Harvard University i6j6-i/’/g (Boston, 1883); Josiah Quincy, A History of Harvard University (2 vols., Boston, 1840); Samuel A. Eliot, Harvard College and its Benefactors (Boston, 1848); H. C. Shelley, John Harvard and his Times (Boston, 1907) ; The Harvard Book (2 vols., Cambridge, 1874) ; G. Birkbcck Hill, Harvard College, by an Oxonian (New York, 1894); William R. Thayer, “History and Customs of Harvard University,” in

Universities and their Sons, vol. i. (Boston, 1898); Official Guide to Harvard, and the various other publications of the university; also the Harvard Graduates' Magazine (1892 sqq.).

HARVEST (A.S. kcerfest "autumn," O.H. Ger. herbist, possibly through an old Teutonic root representing Lat. carpere, " to pluck "), the season of the ingathering of crops. Harvest has been a season of rejoicing from the remotest ages. The ancient Jews celebrated the Feast of Pentecost as their harvest festival, the wheat ripening earlier in Palestine. The Romans had their Cerealia or feasts in honour of Ceres. The Druids celebrated their harvest on the 1st of November. In pre-reformation England Lammas Day (Aug. 1st, O.S.) was observed at the be- ginning of the harvest festival, every member of the church presenting a loaf made of new wheat. Throughout the world harvest has always been the occasion for many queer customs which all have their origin in the animistic belief in the Corn- Spirit or Corn-Mother. This personification of the crops has left its impress upon the harvest customs of modern Europe. In west Russia, for example, the figure made out of the last sheaf of corn is called the Bastard, and a boy is wrapped up in it. The woman who binds this sheaf represents the " Cornmother," and an elaborate simulation of childbirth takes place, the boy in the sheaf squalling like a new-born child, and being, on his liberation, wrapped in swaddling bands. Even in England vestiges of sympathetic magic can be detected. In Northumberland, where the harvest rejoicing takes place at the close of the reaping and not at the ingathering, as soon as the last sheaf is set on end the reapers shout that they have " got the kern." An image formed of a wheatsheaf, and dressed in a white frock and coloured ribbons, is hoisted on a pole. This is the " kern-baby " or harvest-queen, and it is carried back in triumph with music and shouting and set up in a prominent place during the harvest supper. In Scotland the last sheaf if cut before Hallowmas is called the " maiden," and the youngest girl in the harvest-field is given the privilege of cutting it. If the reaping finishes after Hallowmas the last corn cut is called the Cailleach (old woman). In some parts of Scotland this last sheaf is kept till Christmas, morning and then divided among the cattle " to make them

thrive all the year round," or is kept till the first mare foals and is then given to her as her first food. Throughout the world, as J. G. Frazer shows, the semi-worship of the last sheaf is or has been the great feature of the harvest-home. Among harvest customs none is more

interesting than harvest cries. The cry of the Egyptian reapers announcing the death of the corn-spirit, the rustic prototype of Osiris, has found its echo on the world's harvest-fields, and to this day, to take an English example, the Devonshire reapers utter cries of the same sort and go through a ceremony which in its main features is an exact counterpart of pagan worship. " After the wheat is cut they ' cry the neck.' ... An old man goes round to the shocks and picks out a bundle of the best ears he can find. . . this bundle is called ' the neck ' ; the harvest hands then stand round in a ring, the old man holding ' the neck ' in the centre. At a signal from him they take off their hats, stooping and holding them with both hands towards the ground. Then all together they utter in a prolonged cry ' the neck! ' three times, raising themselves upright with their hats held above their heads. Then they change their cry to ' Wee yen! way yen! ' or, as some report, ' we haven!' " On a fine still autumn evening " crying the neck " has a wonderful effect at a distance. In East Anglia there still survives the custom known as " Hallering Largess." The harvesters beg largess from passers, and when they have received money they shout thrice " Halloo, largess," having first formed a circle, bowed their heads low crying " Hoo-Hoo-Hoo," and then jerked their heads backwards and uttered a shrill shriek of " Ah ! Ah ! "

For a very full discussion of harvest customs sec J. G. Frazer, The Golden Bough, and Brand's Antiquities of Great Britain (Hazlitt's edit., 1905).

HARVEST-BUG, the familiar name for mites of the family Trombidiidae, belonging to the order Acari of the class Arachnida. Although at one time regarded as constituting a distinct species, described as Leptus autumnalis, harvest-bugs are now known to be the six-legged larval forms of several British species of mites of the genus Trombidium. They are minute, rusty-brown organisms, barely visible to the naked eye, which swarm in grass and low herbage in the summer and early autumn, and cause considerable, sometimes intense, irritation by piercing and adhering to the skin of the leg, usually lodging themselves in some part where the clothing is tight, such as the knee when covered with gartered stockings. They may be readily destroyed, and the irritation allayed, by rubbing the affected area with some insecticide like turpentine or benzine. They are not permanently parasitic, and if left alone will leave their temporary host to resume the active life characteristic of the adult mite, which is predatory in habits, preying upon minute living animal organisms.

HARVESTER, Harvest-Spider, or Harvest-Man, names given to Arachnids of the order Opiliones, referable to various species of the

family Phalangiidae. Harvest-spiders or harvest- men, so-called on account of their abundance in the late summer and early autumn, may be at once distinguished from all true spiders by the extreme length and thinness of their legs, and by the small size and spherical or oval shape of the body, which is not divided by a waist or constriction into an anterior and a posterior region. They may be met with in houses, back yards, fields, woods and heaths; either climbing on walls, running over the grass, or lurking under stones and fallen tree trunks. They are predaceous, feeding upon small insects, mites and spiders. The males are smaller than the females, and often differ from them in certain well-marked secondary sexual characters, such as the mandibular protuberance from which one of the common English spiders, Phalangium cornutum, takes its scientific name. The male is also furnished with a long and protrusible penis, and the female with an equally long and protrusible ovipositor. The sexes pair in the autumn, and the female, by means of her ovipositor, lays her eggs in some cleft or hoie in the soil and leaves them to their fate. After breeding, the parents die with the autumn cold; but the eggs retain their vitality through the winter and hatch with the warmth of spring and early summer, the young gradually attaining maturity as the latter season

progresses. Hence the prevalence of adult individuals in the late summer and autumn, and at no other time of the year. They are provided with a pair of glands, situated one on each side of the carapace, which secrete an evil-smelling fluid believed to be protective in nature. Harvest-men are very widely distributed and are especially abundant in temperate countries of the

Fig. I. — Harvest-man (Phalangium cornutum, Linn.); profile of male, with legs and palpi truncated.

a, Ocular tubercle. d, Sheath of penis protruded.

b, Mandible e, Penis.

c, Labrum (upper lip). /, The glans.

northern hemisphere. They are also, however, common in India, where they are well known for their habit of adhering together in great masses, comparable to a swarm of bees, and of swaying gently backwards and forwards. The long legs of harvest-men serve them not only as organs of rapid locomotion, but also as props to raise the body well off the ground, thus enabling the animals to stalk unmolested from the midst of an army of raiding ants. (R. I. P.)

HARVEY, GABRIEL (c. 1545-1630), English writer, eldest son of a ropemaker of Saffron-Walden, Essex, was born about 1545. He matriculated at Christ's College, Cambridge, in 1 566, and in 1570 was elected fellow of Pembroke Hall. Here he formed a lasting friendship with Edmund Spenser, and it has been sug- gested (A then. Cantab, ii. 258) that he may have been the poet's tutor. Harvey was a scholar of considerable weight, who has perhaps been judged too exclusively from the brilliant invectives directed against him by Thomas Nashe. Henry Morley, writing in the Fortnightly Review (March 1869), brought evidence from Harvey's Latin writings which shows that he was distinguished by quite other qualities than the pedantry and conceit usually associated with his name. He desired to be " epitaphed as the Inventour of the English Hexameter," and was the prime mover in the literary clique that desired to impose on English verse the Latin rules of quantity. In a " gallant, familiar letter " to M. Immerito (Edmund Spenser) he says that Sir Edward Dyer and Sir Philip Sidney were helping forward " our new famous enter- prise for the exchanging of Barbarous and Balductum Rymes with Artificial Verses." The document includes a tepid apprecia- tion of the Faerie Queene which had been sent to him for his opinion, and he gives examples of English hexameters illustrative of the principles enunciated in the correspondence. The opening lines — " What might I call this Tree ? A Laurell ? O bonny Laurell

Needes to thy bowes will I bow this knee, and vayle my bonetto " —

afford a fair sample of the success of Harvey's metrical experf- ments, which presented a fair mark for the wit of Thomas Nashe. " He (Harvey) goes twitching and hopping in our language like a man running upon quagmires, up the hill in one syllable, and down the dale in another," says Nashe in Strange Newes, and he mimics him in the mocking couplet:

" But eh ! what news do you hear of that good Gabriel Huffe-Snuffe,
Known to the world for a foole, and clapt in the Fleete for a Runner ?
"

Harvey exercised great influence over Spenser for a short time, and the friendship lasted even though Spenser's genius refused

to be bound by the laws of the new prosody. Harvey is the Hobbinoll

of his friend's Shepheards Calender, and into his mouth is put the beautiful song in the fourth eclogue in praise of Eliza. If he was really the author of the verses " To the Learned Shepheard " signed " Hobynoll " and prefixed to the Faerie Queene, he was a good poet spoiled. But Harvey's genuine friendship for Spenser shows the best side of a disposition un- compromising and quarrelsome towards the world in general. In 1573 ill-will against him in his college was so strong that there was a delay of three months before the fellows would agree to grant him the necessary grace for his M.A. degree. He became reader in rhetoric aboat 1576, and in 1578, on the occasion of Queen Elizabeth's visit to Sir Thomas Smith at Audley End, he was appointed to dispute publicly before her. In the next year he wrote to Spenser complaining of the unauthorized publi- cation of satirical verses of his which were supposed to reflect on high personages, and threatened seriously to injure Harvey's career. In 1583 he became junior proctor of the university, and in 1585 he was elected master of Trinity Hall, of which he had been a fellow from 1578, but the appointment appears to have been quashed at court. He was a protege of the Earl of Leicester, to whom he introduced Spenser, and this connexion may account for his friendship with Sir Philip Sidney. But in spite of patron- age, a second application for the mastership of Trinity Hall failed in 1598. In 1585 he received the degree of D.C.L. from the university of Oxford, and is found practising at the bar in London. Gabriel's brother, Richard, had taken part in the Marprelate controversy, and had given offence to Robert Greene by contemptuous references to him and his fellow wits. Greene retorted in his Quip for an Upstart Courtier with some scathing remarks on the Harveys, the worst of which were expunged in later editions, drawing attention among other things to Harvey's modest parentage. In 1 599 Archbishop Whitgift made a raid on contemporary satire in general, and among other books the tracts of Harvey and Nashe were destroyed, and it was forbidden to reprint them. Harvey spent the last years of his life in retire- ment at his native place, dying in 1630.

His extant Latin works are: Ciceronianus (1577); G. Harveii rhetor, sive 2 dierum oratio de natura, arte et exercitatione rhetorica ('577); Smithus, vel Musarum lachrymae (157S), in honour of Sir Thomas Smith ; and G. Harveii gratulationum Valdensium lib'ri quatuour (sic), written on the occasion of the queen's visit to Audley End (1578). The Letter-Book of Gabriel Harvey, A.D. 1573-80 (1884, ed. E. J. L. Scott, Camden Society), contains rough drafts of the correspondence between Spenser and Harvey, letters relative to the disputes at Pembroke Hall, and an extraordinary correspondence dealing with the pursuit of his sister Mercy by a young nobleman. A copy of Quintilian

(1542), in the British Museum, is extensively annotated by Gabriel Harvey. After Greene's death Harvey pub- lished Foure Letters and certaine Sonnets (1592), in which in a spirit of righteous superiority he laid bare with spiteful fulness the miser- able details of Greene's later years. Thomas Nashe, who in power of invective and merciless wit was far superior to Harvey, took upon himself to avenge Greene's memory, and at the same time settle his personal account with the Harveys, in Strange Newes (1593). Harvey refuted the personal charges made by Nashe in Pierce's Superero- gation, or a New Prayse of the Old Asse . . . (1593). In Christes Teares over Jerusalem (1593) Nashe made a full apology to Harvey, who refused to be appeased, and resumed what had become a very scur- rilous controversy in a New Letter of Notable Contents (1593). Nashe thereupon withdrew his apology in a new edition (1594) of Christes Teares, and hearing that Harvey had boasted of victory he produced the most biting satire of the series in Have with you to Saffron Walden (1596). Harvey retorted in The Trimming of Thomas Nashe Gentle- man, by the high-tituled patron Don RicharUo de Medico campo

■ ■ ■ (1597)-

His complete works were edited by Dr A. B. Grosart with a " Memorial Introduction " for the Huth Library (1884-1885). See also Isaac Disraeli, on " Literary Ridicule," in Calamities of Authors (ed. 1840) ; T. Warton's History of English Poetry (ed. W. C. Hazlitt, 1871); J. P. Collier's Bibliographical and Critical. Account of the Rarest Books in the English Language (1865), and the Works of Thomas Nashe.

HARVEY, SIR GEORGE (1806-1876), Scottish painter, the son of a watchmaker, was born at St Ninians, near Stirling, in February 1806. Soon after his birth his parents removed to Stirling, where George was apprenticed to a bookseller. His love for art having, however, become very decided, in his

eighteenth year he entered the Trustees' Academy at Edinburgh. Here he so distinguished himself that in 1826 he was invited by the Scottish artists, who had resolved to found a Scottish academy, to join it as an associate. Harvey's first picture, " A Village School," was exhibited in 1826 at the Edinburgh Institution; and from the time of the opening of the Academy in the following year he continued annually to exhibit. His best-known pictures are those depicting historical episodes in religious history from a puritan or evangelical point of view, such as " Covenanters Preaching," " Covenanters' Communion," " John Bunyan and his Blind Daughter," " Sabbath Evening," and the " Quitting of the Manse." He was, however, equally popular in Scotland for subjects not

directly religious; and ” The Bowlers,” ” A Highland Funeral,” ” The Curlers,” “A Schule Skailin’,” and ” Children Blowing Bubbles in the Church- yard of Greyfriars’, Edinburgh,” manifest the same close observa- tion of character, artistic conception and conscientious elabora- tion of details. In ” The Night Mail” and ” Dawn Revealing the New World to Columbus ” the aspects of nature are made use of in different ways, but with equal happiness, to lend impressiveness and solemnity to human concerns. He also painted landscapes and portraits. In 1829 he was elected a fellow of the Royal Scottish Academy; in 1864 he succeeded Sir J. W. Gordon as president; and he was knighted in 1867. He died at Edinburgh on the 22nd of January 1876.

Sir George Harvey was the author of a paper on the ” Colour of the Atmosphere,” read before the Edinburgh Royal Society, and afterwards published with illustrations in Good Words; and in 1870 he published a small volume entitled Notes of the Early History of the Royal Scottish Academy. Selections from the Works of Sir George Harvey, P.R.S.A., described by the Rev. A. L. Simpson, F.S.A. Scot., and photographed by Thomas Annan, appeared at Edinburgh in 1869.

HARVEY, WILLIAM (1578-1657), English physician, the discoverer of the circulation of the blood, was the eldest son of Thomas Harvey, a prosperous Kentish yeoman, and was born at Folkestone on the 1st of April 1578. After passing through the grammar school of Canterbury, on the 31st of May 1593, having just entered his sixteenth year, he became a pensioner of Caius College, Cambridge, at nineteen he took his B.A. degree, and soon after, having chosen the profession of medicine, he went to study at Padua under H. Fabricius and Julius Casserius. At the age of twenty-four Harvey became doctor of medicine, in April 1602. Returning to England in the first year of James I., he settled in London; and two years later he married the daughter of Dr Lancelot Browne, who had been physician to Queen Elizabeth. In the same year he became a candidate of the Royal College of Physicians, and was duly admitted a fellow (June 1607). In 1609 he obtained the reversion of the post of physician to St Bartholomew’s hospital. His application was supported by the king himself and by Dr Henry Atkins (1558-1635), the president of the college, and on the death of Dr Wilkinson in the course of the same year he succeeded to the post. He was thrice censor of the college, and in 161 5 was appointed Lumleian lecturer.

In 16 1 6 he began his course of lectures, and first brought forward his views upon the movements of the heart and blood. Meantime his practice increased, and he had the lord chancellor, Francis Bacon, and

the earl of Arundel among his patients. In 1618 he was appointed physician extraordinary to James I., and on the next vacancy physician in ordinary to his successor. In 1628, the year of the publication of the Exercitatio anatomica de motu cordis et sanguinis, he was elected treasurer of the College of Physicians, but at the end of the following year he resigned the office, in order, by command of Charles I., to accom- pany the young duke of Lennox (James Stuart, afterwards duke of Richmond) on his travels. He appears to have visited Italy, and returned in 1632. Four years later he accompanied the earl of Arundel on his embassy to the emperor Ferdinand II. He was eager in collecting objects of natural history, sometimes causing the earl anxiety for his safety by his excursions in a country infested by robbers in consequence of the Thirty Years' War. In a letter written on this journey, he says: " By the

way we could scarce see a dogg, crow, kite, raven, or any bird, or anything to anatomise; only sum few miserable people, the reliques of the war and the plague, whom famine had made anatomies before I came." Having returned to his practice in London at the close of the year 1636, he accompanied Charles I. in one of his journeys to Scotland (1639 or 1641). While at Edinburgh he visited the Bass Rock; he minutely describes its abundant population of sea-fowl in his treatise De generatione, and incidentally speaks of the account then credited of the solan goose growing on trees as a fable. He was in attendance on the king at the battle of Edgehill (October 1642), where he withdrew under a hedge with the prince of Wales and the duke of York (then boys of twelve and ten years old), " and took out of his pocket a book and read. But he had not read very long before a bullet of a great gun grazed on the ground near him, which made him remove his station," as he afterwards told John Aubrey. After the indecisive battle, Harvey followed Charles"!, to Oxford, " where," writes the same gossiping narrator, " I first saw him, but was then too young to be acquainted with so great a doctor. I remember he came several times to our college (Trinity) to George Bathurst, B.D. who had a hen to hatch eggs in his chamber, which they opened daily to see the progress and way of generation. " In Oxford he remained three years, and there was some chance of his being superseded in his office at St Bartholomew's hospital, " because he hath withdrawn himself from his charge, and is retired to the party in arms against the Parliament." It was no doubt at this time that his lodgings at Whitehall were searched, and not only the furniture seized but also

invaluable manuscripts and anatomical preparations. 1

While with the king at Oxford he was made warden of Merton College, but a year later, in 1646, that city surrendered to Fairfax, and Harvey returned to London. He was now sixty-eight years old, and, having resigned his appointments and relinquished the cares of practice, lived in learned retirement with one or other of his brothers. It was in his brother Daniel's house at Combe that Dr (afterwards Sir George) Ent, a faithful friend and disciple (1604-1689), visited him in 1650. "I found him," he says. " with a cheeerful and sprightly countenance investigating, like Democritus, the nature of things. Asking if all were well with him — 'How can that be,' he replied, 'when the state is so agitated with storms and I myself am yet in the open sea? And indeed, were not my mind solaced by my studies and the recollec- tion of the observations I have formerly made, there is nothing which should make me desirous of a longer continuance. But thus employed, this obscure life and vacation from public cares which would disgust other minds is the medicine of mine.' " The work on which he had been chiefly engaged at Oxford, and indeed since the publication of his treatise on the circulation in 1628, was an investigation into the recondite but deeply interesting subject of generation. Charles I. had been an enlightened patron of Harvey's studies, had put the royal deer parks at Windsor and Hampton Court at his disposal, and had watched his demonstration of the growth of the chick with no less interest than the movements of the living heart. Harvey had now collected a large number of observations, though he would probably have delayed their publication. But Ent succeeded in obtaining the manuscripts, with authority to print them or not as he should find them. " I went from him," he says, " like another Jason in possession of the golden fleece, and when

1 " Ignoscant mihi niveae animae, si, summarum injuriarum memor, levem gemitum effudero. Doloris mihi haec causa est : cum, inter nuperos nostros tumultus et bella plusquam civilia, serenissimum regem (idque non solum senatus permissione sed et jussu) sequor, rapaces quaedam manus non modo aedium mearum supellectilem omnem expilarunt, sed etiam, quae mihi causa gravior querimoniae, adversaria mea, multorum annorum laboribus parta, e museo meo summoverunt. Quo factum est ut observationes plurimae, prae- sertim de generatione insectorum, cum republicae literariae (ausim dicere) detrimento, perierint." — De gen., Ex. lxviii. To this loss Co\v!ey refers —

" O cursed war! who can forgive thee this? Houses and towns may rise again, And ten times easier 'tis To rebuild Paul's than any work of

his.”

I came home and perused the pieces singly, I was amazed that so vast a treasure should have been so long hidden.” The result was the publication of the Exercitationes de generatione (1651).

This was the last of Harvey’s labours. He had now reached his seventy-third year. His theory of the circulation had been opposed and defended, and was now generally accepted by the most eminent anatomists both in his own country and abroad. He was known and honoured throughout Europe, and his own college (Caius) voted a statue in his honour (1652) viro monu- mentis suis immortali. In 1654 he was elected to the highest post in his profession, that of president of the college; but the follow- ing day he met the assembled fellows, and, declining the honour for himself on account of the infirmities of age, recommended the re-election of the late president Dr Francis Prujean (1593- 1666). He accepted, however, the office of consiliarius, which he again held in the two following years. He had already enriched the college with other gifts besides the honour of his name. He had raised for them ” a noble building of Roman architecture (rustic work with Corinthian pilasters) , comprising a great parlour or conversation room below and a library above”; he had furnished the library with books, and filled the museum with ” simples and rarities,” as well as with specimens of instru- ments used in the surgical and obstetric branches of medicine. At last he determined to give to his beloved college his paternal estate at Burmarsh in Kent. His wife had died some years before, his brothers were wealthy men, and he was childless, so that he was defrauding no heir when, in July 1656, he made the transfer of this property, then valued at £56 per annum, with provision for a salary to the college librarian and for the endowment of an annual oration, which is still given on the anniversary of the day. The orator, so Harvey orders in his deed of gift, is to exhort the fellows of the college ” to search out and study the secrets of nature by way of experiment, and also for the honour of the profession to continue mutual love and affection among themselves.”

Harvey, like his contemporary and great successor Thomas Sydenham, was long afflicted with gout, but he preserved his activity of mind to an advanced age. In his eightieth year, on the 3rd of June 1657, he was attacked by paralysis, and though deprived of speech was able to send for his nephews and distribute his watch, ring, and other personal trinkets among them. He died the same evening, ” the palsy giving him an easy passport,” and was buried with great honour in his brother Eliab’s vault at Hempstead in Essex, annorum etfamae satur.

In 1883 the lead coffin containing his remains was enclosed in a marble sarcophagus and moved to the Harvey chapel within the church.

John Aubrey, to whom we owe most of the minor particulars about Harvey which have been preserved, says: ” In person he was not tall, but of the lowest stature; round faced, olivaster complexion, little eyes, round, very black, full of spirits; his hair black as a raven, but quite white twenty years before he died.” The best portrait of him extant is by Cornelius Jansen in the library of the College of Physicians, one of those rescued from the great fire, which destroyed their original hall in 1666. It has been often engraved, and is prefixed to the fine edition of his works published in 1766.

Harvey’s Work on the Circulation. — In estimating the character and value of the discovery announced in the Exereitatio de molu cordis et sanguinis, it is necessary to bear in mind the previous state of knowledge on the subject. Aristotle taught that in man and the higher animals the blood was elaborated from the food in the liver, thence carried to the heart, and sent by it through- the veins over the body. His successors of the Alexandrian school of medicine, Erasistratus and Herophilus, further elabor- ated his system, and taught that, while the veins carried blood from the heart to the members, the arteries carried a subtle kind of air or spirit. For the practical physician only two changes had been made in this theory of the circulation between the Christian era and the 16th century. Galen had discovered that the arteries were not, as their name implies, merely air-pipes, but that they contained blood as well as vital air or spirit. And it had been gradually ascertained that the nerves (vtvpa) which

arose from the brain and conveyed ” animal spirits ” to the body were different from the tendons or sinews (vevpa) which attach muscles to bones. First, then, the physicians of the time of Thomas Linacre knew that the blood is not stagnant in the body. So did Shakespeare and Homer, and every augur who inspected the entrails of a victim, and every village barber who breathed a vein. Plato even uses the expression to alfia Kara wavTa ra /AXr/ otyodpCx ■Kipu&tptoQa.i. But no one had a con- ception of a continuous stream returning to its source (a circula- tion in the true sense of the word) either in the system or in the lungs. If they used the word circulatio, as did Caesalpinus, 1 it was as vaguely as the French policeman cries ”

Circulez.” The movements of the blood were in fact thought to be slow and irregular in direction as well as in speed, like the ” circulation ” of air in a house, or the circulation of a crowd in the streets of a city. Secondly, they supposed that one kind of blood flowed from the liver to the right ventricle of the heart, and thence to the lungs and the general system by the veins, and that another kind flowed from the left ventricle to the lungs and general system by the arteries. Thirdly, they supposed that the septum of the heart was pervious and allowed blood to pass directly from the right to the left side. Fourthly, they had no conception of the functions of the heart as the motor power of the movement of the blood. They doubted whether its substance was muscular; they supposed its pulsation to be due to expansion of the spirits it contained; they believed the only dynamic effect which it had on the blood to be sucking it in during its active diastole, and they supposed the chief use of its constant movements to be the due mixture of blood and spirits.

Of the great anatomists of the 16th century, Sylvius {In Hipp. et Gal. phys. partem analom. isagoge) described the valves of the veins; Vesalius (De humani corporis fabrica, 1542) ascer- tained that the septum between the right and left ventricles is complete, though he could not bring himself to deny the invisible pores which Galen’s system demanded. Servetus, in his Chris- tianismi restitutio (1553), goes somewhat farther than his fellow- student Vesalius, and says: ” Paries ille medius non est aptus ad communicationem et elaborationem illam; licet aliquid resudare possit “; and, from this anatomical fact and the large size of the pulmonary arteries he concludes that there is a communication in the lungs by which blood passes from the pulmonary artery to the pulmonary vein: ” Eodem artificio quo in hepate fit trans- fusio a vena porta ad venam cavam propter sanguinem, fit etiam in pulmone transfusio a vena arteriosa ad arteriam venosam propter spiritum.” The natural spirit of the left side and the vital spirit of the right side of the heart were therefore, he concluded, practically the same, and hence two instead of three distinct spiritus should be admitted. It seems doubtful whether even Servetus rightly conceived of the entire mass of the blood passing through the pulmonary artery and the lungs. The transference of the spiritus naturalis to the lungs, and its return to the left ventricle as spiritus vitalis, was the function which he regarded as important. Indeed a true conception of the lesser circulation as a transference of the whole blood of the right side to the left was impossible until the corresponding transference in the greater or systematic circulation was discovered. Servetus, however, was the true predecessor of Harvey in physiology, and his claims to that honour are perfectly

authentic and universally admitted. 2

1 Indeed the same word, irepioSos ai/uaros, occurs in the Hippo cratic writings, and was held by Van der Linden to prove that to the father of medicine himself, and not to Columbus or Caesalpinus, belonged the laurels of Harvey.

2 Realdo Columbus (De re anatomica, 1559) formally denies the muscularity of the heart, yet correctly teaches that blood and spirits pass from the right to the left ventricle, not through the septum but through the lungs, ” quod nemo hactenus aut animadvertit aut scriptum reliquit.” The fact that Harvey quotes Columbus and not Servetus is explained by the almost entire destruction of the writings of the latter, which are now among the rarest curiosities. The great anatomist Fabricius, Harvey’s teacher at Padua, described the valves of the veins more perfectly than had Sylvius. Carlo Ruini, in his treatise on the Anatomy and Diseases of the Horse (1590), taught that the left ventricle sends blood and vital spirits to all parts of the body except the lungs — the ordinary Galenical doctrine. Yet on the

The way then to Harvey’s great work had been paved by th< discovery of the valves in the veins, and by that of the lessei circulation — the former due to Sylvius and Fabricius, the latte: to Servetus — but the significance of the valves was unsuspected and the fact of even the pulmonary circulation was not generally admitted in its full meaning.

In his treatise Harveyproves (1) that it is the contraction, not the dilatation, of the heart which coincides with the pulse, and that the ventricles as true muscular sacs squeeze the blood which they contain into the aorta and pulmonary artery; (2) that the pulse is not produced by the arteries enlarging and so filling, but by the arteries being filled with blood and so enlarging; (3) that there are no pores in the septum of the heart, so that the whole blood in the right ventricle is sent to the lungs and round by the pulmonary veins to the left ventricle, and also that the whole blood in the left ventricle is again sent into the arteries, round by the smaller veins into the venae cavae, and by them to the right ventricle again — thus making a complete “circulation” ; (4) that the blood in the arteries and that in the veins is the same blood; (5) that the action of the right and left sides of the heart, auricles, ventricles and valves, is the same, the mechanism in both being for reception and propulsion of liquid and not of air, since the blood on the right side, though mixed with air, is still blood; (6) that the blood sent through tlie arteries to the tissues is not all used, but that most of it runs through into the veins; (7) that there is no to and

fro undulation in the veins, but a con- stant stream from the distant parts towards the heart; (8) that the dynamical starting-point of the blood is the heart and not the liver.

The method by which Harvey arrived at his complete and almost faultless solution of the most fundamental and difficult problem in physiology has been often discussed, and is well worthy of attention. He begins his treatise by pointing out the many inconsistencies and defects in the Galenical theory, quoting the writings of Galen himself, of Fabricius, Columbus and others, with great respect, but with unflinching criticism. For, in his own noble language, wise men must learn anatomy, not from the decrees of philosophers, but from the fabric of nature herself, ” nee ita in verba jurare antiquitatis magistrae, ut veritatem amicam in apertis relinquant, et in conspectu omnium deserant.” He had, as we know, not only furnished himself with all the knowledge that books and the instructions of the best anatomists of Italy could give, but, by a long series of dissections, had gained a far more complete knowledge of the comparative anatomy of the heart and vessels than any contemporary — we may almost say than any successor — until the times of John Hunter and J. F. Meckel. Thus equipped, he tells us that he began his investigations into the movements of the heart and blood by looking at them — i.e. by seeing their action in living animals. After a modest preface, he heads his first chapter

strength of this phrase Professor J. B. Ercolani actually put up a tablet in the veterinary school at Bologna to Ruini as the discoverer of the circulation of the blood! The claims of Caesalpinus, a more plausible claimant to Harvey’s laurels, are scarcely better founded. In his Quaestiones peripateticae (1571) he followed Servetus and Columbus in describing what we now know as the pulmonary ” circulation ” under that name, and this is the only foundation for the assertion (first made in Bayle’s dictionary) that Caesalpinus knew ” the circulation of the blood.” He is even behind Servetus, for he only allows part of the blood of the right ventricle to go round by this “circuit “; some, he conceives, passes through the hypo- thetical pores in the septum, and the rest by the superior cava to the head and arms, by the inferior to the rest of the body: ” Hanc esse venarum utilitatem ut omnes partes corporis sanguinem pro nutrimento deferant. Ex dextro ventr° cordis vena cava sanguinem crassiorem, in quo calor intensus est magis, ex altera autem ventr°, sanguinem temperatissimum ac sincerissimum habente, egreditur aorta.” Caesalpinus seems to have had no original views on the subject; all that he writes is copied from Galen or from Servetus except some erroneous observations df his own. His greatest merit was as a botanist ; and no claim to the ” discovery of the

circulation ” was made by him or by his contemporaries. When it was made, Haller decided conclusively against it. The fact that an inscription has been placed on the bust of Caesalpinus at Rome, which states that he preceded others in recognizing and demonstrating ” the general circulation of the blood,” is only a proof of the blindness of misplaced national vanity.

HARVEY, WILLIAM

” Ex vivorum dissectione, qualis sit cordis motus.” He minutely describes what he saw and handled in dogs, pigs, serpents, frogs and fishes, and even in slugs, oysters, lobsters and insects, in the transparent minima squilla, ” quae Anglice dicitur a shrimp,” and lastly in the chick while still in the shell. In these investiga- tions he used a perspicillum or simple lens. He particularly describes his observations and experiments on the ventricles, the auricles, the arteries and the veins. He shows how the arrangement of the vessels in the foetus supports his theory. He adduces facts observed in disease as well as in health to prove the rapidity of the circulation. He explains how the mechanism of the valves in the veins is adapted, not, as Fabricius believed, to moderate the flow of blood from the heart, but to favour its flow to the heart. He estimates the capacity of each ventricle, and reckons the rate at which the whole mass of blood passes through it. He elaborately and clearly demonstrates the effect of obstruction of the blood-stream in arteries or in veins, by the forceps in the case of a snake, by a ligature on the arm of a man, and illustrates his argument by figures. He then sums up his conclusion thus: ” Circulari quodam motu, in circuitu, agitari in animalibus sanguinem, et esse in perpetuo motu; et hanc esse actionem sive functionem cordis quam pulsu peragit; et omnino motus et pulsus cordis causam unam esse.” Lastly, in the 15th, 16th and 17th chapters, he adds certain confirmatory evidence, as the effect of position on the circulation, the absorption of animal poisons and of medicines applied externally, the muscular structure of the heart and the necessary working of its valves. The whole treatise, which occupies only 67 pages of large print in the quarto edition of 1766, is a model of accurate observation, patient accumulation of facts, ingenious experimentation, bold yet cautious hypothesis and logical deduction.

In one point only was the demonstration of the circulation incomplete. Harvey could not discover the capillary channels by which the blood passes from the arteries to the veins. This gap in the circulation was supplied several years later by the great anatomist Marcello Malpighi, who in 1661 saw in the lungs of a frog, by the newly invented microscope, how the blood passes from the one set of vessels to the

other. Harvey saw all that could be seen by the unaided eye in his observations on living animals; Malpighi, four years after Harvey's death, by another observation on a living animal, completed the splendid chain of evidence. If this detracts from Harvey's merit it leaves Servetus no merit at all. But in fact the existence of the channels first seen by Malpighi was as clearly pointed to by Harvey's reasoning as the existence of Neptune by the calculations of Leverrier and of Adams.

Harvey himself and all his contemporaries were well aware of the novelty and importance of his theory. He says in the admirable letter to Dr Argent, president of the College of Physicians, which follows the dedication of his treatise to Charles I., that he should not have ventured to publish " a book which alone asserts that the blood pursues its course and flows back again by a new path, contrary to the received doctrine taught so many ages by innumerable learned and illustrious men," if he had not set forth his theory for more than nine years in his college lectures, gradually brought it to perfection, and convinced his colleagues by actual demonstrations of the truth of what he advanced. He anticipates opposition, and even obloquy or loss, from the novelty of his views. These antici- pations, however, the event proved to have been groundless. If we are to credit Aubrey indeed, he found that after the publication of the Dz motu " he fell mightily in his practice; 'twas believed by the vulgar that he was crackbrained, and all the physicians were against him." But the last assertion is demonstrably untrue; and if apothecaries and patients ever forsook him, they must soon have returned, for Harvey left a handsome fortune. By his own profession the book was received as it deserved. So novel a doctrine was not to be accepted without due inquiry, but his colleagues had heard his lectures and seen his demonstrations for years; they were already convinced of the truth of his theory, urged its publication, continued him in his lectureship, and paid him every honour in their power. In other countries the book was widely read and much canvassed. Few accepted the new theory; but no one dreamt of claiming the honour of it for himself, nor for several years did any one pretend that it could be found in the works of previous authors. The first attack on it was a feeble tract by one James Primerose, a pupil of Jean Riolan (Exerc, et animadv. in libr. Hariri de motu cord, et sang., 1630). Five years later Parisanus, an Italian physician, published his Lapis Lydius de motu cord.

et sang. (Venice, 1635), a still more bulky and futile performance. Primerose's attacks were " imbellia pleraque " and "sine ictu"; that of

Parisanus ” in quamplurimis turpius,” according to the con- temporary judgment of Johann Vessling. Their dulness has pro- tected them from further censure. Caspar Hoffmann, professor at Nuremberg, while admitting the truth of the lesser circulation in the full Harveian sense, denied the rest of the new doctrine. To him the English anatomist replied in a short letter, still extant, with great consideration yet with modest dignity, beseeching him to convince himself by actual inspection of the truth of the facts in question. He concludes: ” I accept your censure in the candid and friendly spirit in which you say you wrote it; do you also the same to me, now that I have answered you in the same spirit.” This letter is dated May 1636, and in that year Harvey passed through Nuremberg with the earl of Arundel, and visited Hoffmann. But he failed to convince him; ” nee tamen valuit Harveius vel ˆ.oram,” writes P. M. Schlegel, who, however, afterwards succeeded in persuading the obstinate old Galenist to soften his opposition to the new doctrine, and thinks that his complete conversion might have been effected if he had but lived a little longer — ” nee dubito quin concessisset tandem in nostra castra.” While in Italy the following year Harvey visited his old university of Padua, and demonstrated his views to Professor Vessling. A few months later this excellent anatomist wrote him a courteous and sensible letter, with certain objections to the new theory. The answer to this has not been preserved, but it convinced his candid opponent, who admitted the truth of the circulation in a second letter (both were published in 1640), and afterwards told a friend, ” Harveium nostrum si audis, agnosces coelestem sanguinis et spiritus ingressum ex arteriis per venas in dextrum cordis sinum.” Meanwhile a greater convert, R. Descartes, in his Discours sur la mcthode (1637) had announced his adhesion to the new doctrine, and refers to ” the English physician to whom belongs, the honour of having first shown that the course of the blood in the body is nothing less than a kind of perpetual movement in a circle.” J. Walaeus of Leyden, H. Regius of Utrecht and Schlegel of Hamburg successively adopted the new physiology. Of these professors, Regius was mauled by the pertinacious Prime- rose and mauled him in return {Spongia qua eluuntur sordes quae Jac. Primirosius, &c, and Anlidotum adv. Spongiam venenatam Henr. Regit). Descartes afterwards repeated Harvey’s vivisections, and, more convinced than ever, demolished Professor V. F. Plempius of Louvain, who had written on the other side. George Ent also published an Apologia pro circulatione sanguinis in answer to Parisanus.

At last Jean Riolan ventured to publish his Enchiridium ana- tomicum (1648), in which he attacks Harvey’s theory, and proposes one of his own. Riolan had accompanied the queen dowager of France (Maria de’

Medici) on a visit to her daughter at Whitehall, and had there met Harvey and discussed his theory. He was, in the opinion of the judicious Haller, ” vir asper et in nuperos suosque coaevos immitis ac nemini parcens, nimis avidus suarum laudum praeco, et se ipso fatente anatomicorum princeps.” Harvey replied to the Enchiridium with perfectly courteous language and perfectly conclusive arguments, in two letters De circulatione sanguinis, which were published at Cambridge in 1649, and are still well worth reading. He speaks here of the ” circuitus sanguinis a me in- ventus.” Riolan was unconvinced, but lived to see another pro- fessor of anatomy appointed in his own university who taught Harvey’s doctrines. Even in Italy, Trullius, professor of anatomy at Rome, expounded the new doctrine in 1651. But the most illustrious converts were Jean Pecquet of Dieppe, the discoverer of the thoracic duct, and of the true course of the lacteal vessels, and Thomas Bartholinus of Copenhagen, in his Anatome ex omnium veterum recentiorumque observationibus, imprimis institutionibus beati mei parentis Caspari Bartholini, ad circulationem Harveianam et vasa lymphatica renovata (Leiden, 1651). At last Plempius also retracted all his objections; for, as he candidly stated, ” having opened the bodies of a few living dogs, I find that all Harvey’s state- ments are perfectly true.” Hobbes of Malmesbury could thus say in the preface to his Elementa philosophise that his friend Harvey, ” solus quod sciam, doctrinam novam superata invidia vivens stabilivit.”

It has been made a reproach to Harvey that he failed to appreciate the importance of the discoveries of the lacteal and lymphatic vessels by G. Aselli, J. Pecquet and C. Bartholinus. In three letters on the subject, one to Dr R. Morison of Paris (1652)’ and two to Dr Horst of Darmstadt (1655), a correspondent of Bartholin’s, he discusses these observations, and shows himself unconvinced of their accuracy. He writes, however, with great moderation and reasonableness, and excuses himself from investigating the subject further on the score of the infirmities of age; he was then above seventy-four. The following quotation shows the spirit of these letters: ” Laudo equidem summopere Pecqueti aliorumque in indaganda veritate industriam singularem, nee dubito quin multa adhuc in Democriti puteo abscondita sint, a venturi saeculi indefatigabili diligentia expromenda.” Bartholin, though reasonably disappointed in not having Harvey’s concurrence, speaks of him with the utmost respect, and generously says that the glory of discovering the movements of the heart and of the blood was enough for one man.

Harvey's Work on Generation. — We have seen how Dr. Ent persuaded his friend to publish this book in 165 1. It is between five and six times as long as the Exerc. de motu cord, el sang., and is followed by excursus De partu, De uteri membranis, De conceptione; but, though the fruit of as patient and extensive observations, its value is far inferior. The subject was far more abstruse, and in fact inaccessible to proper investigation without the aid of the microscope. And the field was almost untrodden since the days of Aristotle. Fabricius, Harvey's master, in his work De formatione ovi et pulli (1621), had alone preceded him in modern times. Moreover, the seventy-two chapters which form the book lack the co-ordination so conspicuous in the earlier treatise, and some of them seem almost like detached chapters of a system which was never completed or finally revised.

Aristotle had believed that the male parent furnished the body of the future embryo, while the female only nourished and formed the seed; this is in fact the theory on which, in the Eumenides of Aeschylus, Apollo obtains the acquittal of Orestes. Galen taught almost as erroneously that each parent contributes seeds, the union of which produced the young animal. Harvey, after speaking with due honour of Aristotle and Fabricius, begins rightly " ab ovo "; for, as he remarks, " eggs cost little and are always and everywhere to be had," and moreover " almost all animals, even those which bring forth their young alive, and man himself, are produced from eggs " (" omnia omnino animalia, ctiam vivipara, atque hominem adeo ipsum, ex ovo progigni "). This dictum, usually quoted as " omne vivum ex ovo," would alone stamp this work as worthy of the discoverer of the circulation of the blood, but it was a prevision of genius, and was not proved to be a fact until K. E. von Baer discovered the mammalian ovum in 1827. Harvey proceeds with a careful anatomical description of the ovary and oviduct of the hen, describes the new-laid egg, and then gives an account of the appear- ance seen on the successive days of incubation, from the 1st to the 6th, the 10th and the 14th, and lastly describes the process of hatching. He then comments upon and corrects the opinions of Aristotle and Fabricius, declares against spontaneous generation (though in one passage he seems to admit the current doctrine of production of worms by putrefaction as an exception), proves that there is no semen foemineum, that the chalazae of the hen's eggs are not the semen galli, and that both parents contribute to the forma tion of the egg. He describes accurately the first appearance of the ovarian ova as mere specks, their assumption of yelk and after- wards of albumen. In chapter xlv. he describes two methods of production of the embryo from the ovum : one is metamorphosis, or the direct transformation of pre-existing

material, as a worm from an egg, or a butterfly from an aurelia (chrysalis) ; the other is epigenesis, or development with addition of parts, the true genera- tion observed in all higher animals. Chapters xlvi.l. are devoted to the abstruse question of the efficient cause of generation, which, after much discussion of the opinions of Aristotle and of Sennertius, Harvey refers to the action of both parents as the efficient instru ments of the first great cause. 1 He then goes on to describe the order in which the several parts appear in the chick. He states that the punctum saliens or foetal heart is the first organ to be seen, and explains that the nutrition of the chick is not only effected by yelk conveyed directly into the midgut, as Aristotle taught, but also by absorption from yelk and white by the umbilical (omphalomeseraic) veins ; on the fourth day of incubation appear two masses (which he oddly names vermiculus), one of which develops into three vesicles, to form the cerebrum, cerebellum and eyes, the other into the breastbone and thorax; on the sixth or seventh day come the viscera, and lastly, the feathers and other external parts. Harvey points out how nearly this order of development in the chick agrees with what he had observed in mammalian and particularly in human embryos. He notes the bifid apex of the foetal heart in man and the equal thickness of the ventricles, the soft cartilages which represent the future bones, the large amount of liquor amnii and absence of placenta which characterize the foetus in the third month ; in the fourth the position of the testes in the abdomen, and the uterus with its Fallopian tubes resembling the uterus bicornis of the sheep; the large thymus; the caecum, small as in the adult, not forming a

1 So in Exerc. liv. : “Superior itaque et divinior opifex, quam est homo, videtur hominem fabricare et conservare, et nobilior artifex, quam gallus, pullum ex ovo producere. Nempe agnoscimus Deum, creatorem summum atque omnipotentem, in cunctorum animalium fabrica ubique praesentem esse, et in operibus suis quasi digito monstrari : cujus in procreatione pulli instruments sint gallus et gallina. . . . Nee cuiquam sane haec attributa conveniunt nisi omnipotenti rerum Principio, quocunque demum nomine idipsum appellare Hbuerit: sive Mentem divinam cum Aristotele, sive cum Platone Animam Mundi, aut’eum aliis Naturam naturantem, vel cum ethnicis Saturnum aut Iovem; vel potius (ut nos decet) Crea- torem ac Patrem omnium quae in coelis et terris, a quo animalia eorumque origines dependent, cujusque nutu sive effatu fiunt et generantur omnia.

second stomach as in the pig, the horse and the hare; the lobulated kidneys, like those of the seal (” vitulo,” sc. marino) and porpoise, and the large suprarenal veins, not much smaller than those of the kidneys

(li.lvi). He failed, however, to trace the connexion of the urachus with the bladder. In the following chapters (lxiii. lxxii.) he describes the process of generation in the fallow deer or the roe. After again insisting that all animals arise from ova, that a ” conception ” is an internal egg and an egg an extruded conception, he goes on to describe the uterus of the doe, the process of impregnation, and the subsequent development of the foetus and its membranes, the punctum saliens, the cotyledons of the placenta, and the ” uterine milk,” to which Sir William Turner recalled attention in later years. The treatise concludes with detached notes on the placenta, parturition and allied subjects.

Harvey’s other Writings and Medical Practice. — The remaining writings of Harvey which are extant are unimportant. A com- plete list of them will be found below, together with the titles of those which we know to be lost. Of these the most important were probably that on respiration, and the records of post- mortem examinations. From the following passage {De partu, p. 550) it seems that he had a notion of respiration being con- nected rather with the production of animal heat than, as then generally supposed, with the cooling of the blood. ” Haec qui diligenter perpenderit, naturamque aeris diligenter introspexerit, facile opinor fatebitur eundem nee refrigerationis gratia nee in pabulum animalibus concedi. Haec autem obiter duntaxat de respiratione diximus, proprio loco de eadeni forsitan copiosius disceptaturi.”

Of Harvey as a practising physician we know very little. Aubrey tells us that ” he paid his visits on horseback with a foot- cloth, his man following on foot, as the fashion then was.” He adds — ” Though all of his profession would allow him to be an excellent anatomist, I never heard any that admired his thera- peutic way. I knew several practitioners that would not have given threepence for one of his bills ” (the apothecaries used to collect physicians’ prescriptions and sell or publish them to their own profit), ” and that a man could hardly tell by his bill what he did aim at.” However this may have been, — and rational therapeutics was impossible when the foundation stone of physio- logy had only just been laid, — we know that Harvey was an active practitioner, performing such important surgical operations as the removal of a breast, and he turned his obstetric experience to account in his book on generation. Some good practical precepts as to the conduct of labour are quoted by Percivall Willughby (1596-1685). He also took notes of the anatomy of disease ; these unfortunately perished with his other manuscripts. Otherwise we might regard him as a forerunner of G. B. Mor- gagni; for Harvey saw that pathology is but a branch of physio- logy, and like it must depend first on accurate

anatomy. He speaks strongly to this purpose in his first epistle to Riolan: “Sicut enim sanorum et boni habitus corporum dissectio plurimum ad philosophiam et rectam physiologiam facit, ita corporum morbosorum et cachecticorum inspectio potissimum ad patho- logiam philosophicam.” The only specimen we have of his observations in morbid anatomy is his account of the post- mortem examination made by order of the king on the body of the famous Thomas Parr, who died in 1635, at the reputed age of 152. Harvey insists on the value of physiological truths for their own sake, independently of their immediate utility; but he himself gives us an interesting example of the practical application of his theory of the circulation in the cure of a large tumour by tying the arteries which supplied it with blood {De generat. Exerc. xix.).

The following is believed to be a complete list of all the known writings of Harvey, published and unpublished : —

Exercitatio anatomica de motu cordis et sanguinis, 4to (Frankfort- on-the-Main, 1628); Exercitationes duae anatomicae de circulatione sanguinis, ad Johannem Riolanum, filium, Parisiensem (Cambridge, 1649); Exercitationes de generatione animalium, quibus accedunt quaedam de partu, de membranis ac humoribus uteri, et de concep- ‘ tione, 4to (London, 1651); Anatomia Thomae Parr, first published in the treatise of Dr John Betts, De ortu et natura sanguinis, 8vo (London, 1669). Letters: (l) to Caspar Hoffmann of Nuremberg, May 1636; (2) to Schlegel of Hamburg, April 1651; (3) three to Giovanni Nardi of Florence, July 1651, Dec. 1653 a °d Nov. 1655; (4) two to Dr Morison of Paris, May 1652; (5) two to Dr Horst of

Darmstadt, Feb. 1654-1655 and July 1655; (6) to Dr Vlackveld of Haarlem, May 1657. His letters to Hoffmann and Schlegel are on the circulation; those to Morison, Horst and Vlackveld refer to the discovery of the lacteals ; the two to Nardi are short letters of friendship. All these letters were published by Sir George Ent in his collected works (Leiden, 1687). Of two MS. letters, one on official business to the secretary Dorchester was printed by Dr Aveling, with a facsimile of the crabbed handwriting (Memorials of Harvey, 1875), and the other, about a patient, appears in Dr Robert Willis’s Life of Harvey (1878). Praelectiones anatomiae universalis per me Gul. Harveium medicum Londinensem, anat. et chir. professorem, an. dom. (1616), aetat. 37, — MS. notes of his Lumleian lectures in Latin, —

are in the British Museum library ; an autotype reproduction was issued by the College of Physicians in 1886. An account of a second MS. in the British Museum, entitled Gulielmus Harveius de musculis, motu locali, &c, was published by Sir G. E. Paget (Notice of an unpublished MS. of Harvey, London, 1850). The following treatises, or notes towards them, were lost either in the pillaging of Harvey's house, or perhaps in the fire of London, which destroyed the old College of Physicians : A Treatise on Respiration, promised and probably at least in part completed (pp. 82, 550, ed. 1766); Observationes de usu Lienis; Observationes de motu locali, perhaps identical with the above-mentioned manuscript ; Tractatum physiologicum; Anatomia medicalis (apparently notes of morbid anatomy) ; De generatione insectorum. The fine 4to edition of Harvey's Works, published by the Royal College of Physicians in 1766, was superintended by Dr Mark Akenside; it contains the two treatises, the account of the post-mortem examination of old Parr, and the six letters enumerated above. A translation of this volume by Dr Willis, with Harvey's will, was published by the Sydenham Society, 8vo (London, 1849).

The following are the principal biographies of Harvey : in Aubrey's Letters of Eminent Persons, &c, vol. ii. (London, 1813), first published in 1685, the only contemporary account", in Bayle's Dictionnaire historique et critique (1698 and 1720; Eng. ed., 1738); in the Biographia Britannica, and in Aitken's Biographical Memoirs; the Latin Life by Dr Thomas Lawrence, prefixed to the college edition of Harvey's Works in 1766; memoir in Lives of British Physicians (London, 1830); a Life by Dr Robert Willis, founded on that by Lawrence, and prefixed to his English edition of Harvey in 1847; the much enlarged Life by the same author, published in 1878; the biography by Dr William Munk in the Roll of the College of Physicians, vol. i. (2nd ed., 1879).

The literature which has arisen on the great discovery of Harvey, on his methods and his merits, would fill a library. The most im- portant contemporary writings have been mentioned above. The following list gives some of the most remarkable in modern times: the article in Bayle's dictionary quoted above; Anatomical Lectures, by Wm. Hunter, M.D. (1784) ; Sprengell, Geschichte der Arzneikunde (Halle, 1800), vol. iv.; Flourens, Histoire de la circulation (1854); Lewes, Physiology of Common Life (1859), vol. i. pp. 291-345; Ceradini, La Scoperta delta circolazione del sangue (Milan, 1876); Tollin, Die Entdeckung des Blutkreislaufs durch Michael Servet (Jena, 1876); Kirchner, Die Entdeckung des Blutkreislaufs (Berlin, 1878); Willis, in his Life of Harvey; Wharton Jones, " Lecture on the Circulation of the Blood,"

Lancet for Oct. 25 and Nov. I, 1879; and the various Harveian Orations, especially those by Sir E. Sieve- king, Dr Guy and Professor George Rolleston. (P. H. P.-S.)

HARVEY, a city of Cook county, Illinois, U.S.A., about 18 m. S. of the Chicago Court House. Pop. (1900) 5395 (982 foreign- born); (1910) 7227. It is served by the Chicago Terminal Transfer, the Grand Trunk and the Illinois Central railways. Harvey is a manufacturing and residence suburb of Chicago. Among its manufactures are railway, foundry and machine-shop supplies, mining and ditching machinery, stone crushers, street-making and street-cleaning machinery, stoves and motor-vehicles. It was named in honour of Turlington W. Harvey, a Chicago capitalist, founded in 1890, incorporated as a village in 1891 and chartered as a city in 1895.

HARWICH, a municipal borough and seaport in the Harwich parliamentary division of Essex, England, on the extremity of a small peninsula projecting into the estuary of the Stour and Orwell, 70 m. N.E. by E. of London by the Great Eastern railway. Pop. (1901), 10,070. It occupies an elevated situation, and a wide view is obtained from Beacon Hill at the southern end of the esplanade. The church of St Nicholas was built of brick in 1821; and there are a town hall and a custom-house. The harbour is one of the best on the east coast of England, and in stormy weather is largely used for shelter. A breakwater and sea-wall prevent the blocking of the harbour entrance and encroachments of the sea; and there is another breakwater at Landguard Point on the opposite (Suffolk) shore of the estuary. The principal imports are grain and agricultural produce, timber

and coal, and the exports cement and fish. Harwich is one of the principal English ports for continental passenger traffic, steamers regularly serving the Hook of Holland, Amsterdam, Rotterdam, Antwerp, Esbjerg, Copenhagen and Hamburg. The continental trains of the Great Eastern railway run to Parkeston Quay, 1 m. from Harwich up the Stour, where the passenger steamers start. The fisheries are important, principally those for shrimps and lobsters. There are cement and shipbuilding works The port is the headquarters of the Royal Harwich Yacht Club. There are batteries at and opposite Harwich, and modern works on Shotley Point, at the fork of the two estuaries, There are also several of the Martello towers of the Napoleonic era. At Landguard Fort there are important defence works with heavy modern guns commanding the main channel. This has been a point of coast defence since the time of James I. Between the Parkeston Quay and Town railway stations is that of Dover- court, an adjoining parish and popular watering-place. Harwich is under a

mayor, 4 aldermen and 12 councillors. Area, 1541 acres.

Harwich (Herewica, Herewyck) cannot be shown to have been inhabited very early, although in the 18th century remains of a camp, possibly Roman, existed there. Harwich formed part of the manor of Dovercourt. It became a borough in 1319 by a charter of Edward II., which was confirmed in 1342 and 1378, and by each of the Lancastrian kings. The exact nature and degree of its self-government is not clear. Harwich' received charters in 1547, 1553 and 1560. In 1604 James I. gave it a charter which amounted to a new constitution, and from this charter begins the regular parliamentary representation. Two burgesses had attended parliament in 1343, but none had been summoned since. Until 1867 Harwich returned two members; it then lost one, and in 1885 it was merged in the county. Included in the manor of Dovercourt, Harwich from 1086 was for long held by the de Vere family. In 1252 Henry III. granted to Roger Bigod a market here every Tuesday, and a fair on Ascension day, and eight days after. In 1320 a grant occurs of a Tuesday market, but no fair is mentioned. James I. granted a Friday market, and two fairs, at the feast of St Philip and St James, and on St Luke's day. The fair has died out, but markets are still held on Tuesday and Friday. Harwich has always had a considerable trade; in the 14th century merchants came even from Spain, and there was much trade in wheat and wool with Flanders. But the passenger traffic appears to have been as important at Harwich in the 14th century as it is now. Shipbuilding was a considerable industry at Harwich in the 17th century.

HARZBURG, a town of Germany, in the duchy of Brunswick, beautifully situated in a deep and well-wooded vale at the north foot of the Harz Mountains, at the terminus of the Brunswick- Harzburg railway, 5 m. E.S.E. from Goslar and 18 m. S. from Wolfenbuttel. Pop. (1905), 4396. The Radau, a mountain stream, descending from the Brocken, waters the valley and adds much to its picturesque charm. The town is much frequented as a summer residence. It possesses brine and carbonated springs, the Juliushall saline baths being about a mile to the south of the town, and a hydropathic establishment. A mile and a half south from ;he town lies the Burgbcrg, 1500 ft. above sea-level, on whose summit, according to tradition, was once an altar to the heathen idol Krodo, still to be seen in the Ulrich chapel at Goslar. There are on the summit of the hill the remains of an old castle, and a monument erected in 1875 to Prince Bismarck, with an inscription taken from one of his speeches against the Ultramontane claims of Rome — " Nach Canossa gehen wir nicht."

The castle on the Burgberg called the Harzburg is famous in German

history. It was built between 1065 and 1069, but was laid in ruins by the Saxons in 1074; again it was built and again destroyed during the struggle between the emperor Henry IV. and the Saxons. By Frederick I. it was granted to Henry the Lion, who caused it to be rebuilt about 11 80. It was a frequent residence of Otto IV., who died therein, and after being frequently besieged and taken, it passed to the house of

Brunswick. It ceased to be of importance as a fortress after the Thirty Years' War, and gradually fell into ruins.

See Delius, Vntersuchungen iiber die Geschichte der Harzburg (Halberstadt, 1826); Dommes, Harzburg und seine Umgebung (Goslar, 1862); Jacobs, Die Harzburg und ihre Geschichte (1885); and Stolle, Fiihrer von Bad Harzburg (1899).

HARZ MOUNTAINS (also spelt Hartz, Ger. Harzgebirge, anc. Silva Hercynia), the most northerly mountain-system of Germany, situated between the rivers Weser and Elbe, occupy an area of 784 sq. m., of which 455 belong to Prussia, 286 to Brunswick and 43 to Anhalt. Their greatest length extends in a S.E. and N.W. direction for 57 m., and their maximum breadth is about 20 m. The group is made up of an irregular series of terraced plateaus, rising here and there into rounded summits, and intersected in various directions by narrow, deep valleys. The north-western and higher part of the mass is called the Ober or Upper Harz; the south-eastern and more extensive part, the Unter or Lower Harz; while the N.W. and S.W. slopes of the Upper Harz form the Vorharz. The Brocken group, which divides the Upper and Lower Harz, is generally regarded as belonging to the first. The highest summits of the Upper Harz are the Brocken (3747 ft.), the Heinrichshohe (3425 ft.), the Konigsberg (3376 ft.) and the Wurmberg (3176 ft.); of the Lower Harz, the Josephshohe in the Auerberg group and the Viktorhohe in the Ramberg, each 1887 ft. Of these the Brocken (q.v.) is celebrated for the legends connected with it, immortal- ized in Goethe's Faust. Streams are numerous, but all small. While rendered extensively useful, by various skilful artifices, in working the numerous mines of the district, at other parts of their course they present the most picturesque scenery in the Harz. Perhaps the finest valley is the rocky Bodethal, with the Rosstrappe, the Hexentanzplatz, the Baumannshohle and the Bielshohle.

The Harz is a mass of Palaeozoic rock rising through the Mesozoic

strata of north Germany, and bounded on all sides by faults. Slates, schists, quartzites and limestones form the greater part of the hills, but the Brocken and Victorshohe are masses of intrusive granite, and diabases and diabase tuffs are interstratified with the sedi- mentary deposits. The Silurian, Devonian and Carboniferous systems are represented — the Silurian and Devonian forming the greater part of the hilis S.E. of a line drawn from Lauterberg to Wernigerode, while N.W. of this line the Lower Carboniferous pre- dominates. A few patches of Upper Carboniferous are found on the borders of the hills near Ilfeld, Baflenstedt, &c, lying unconformably upon the Devonian. The structure of the Harz is very complicated, but the general strike of the folds, especially in the Oberharz plateau, is N.E. or N.N.E. The whole mass evidently belongs to the ancient Hercynian chain of North Europe (which, indeed, derives its name from the Harz), and is the north-easterly continuation of the rocks of the Ardennes and the Eifel. The folding of the old rocks took place towards the close of the Palaeozoic era; but the faulting to which they owe their present position was probably Tertiary. Metalliferous veins are common, amongst the best-known being the silver-bearing lead veins of Klausthal, which occur in the Culm or Lower Carboniferous.

Owing to its position as the first range which the northerly winds strike after crossing the north German plain, the climate on the summit of the Harz is generally raw and damp, even in summer. In 1895 an observatory was opened on the top of the Brocken, and the results of the first five years (1896-1900) showed a July mean of 50 Fahr., a February mean of 24-7°, and a yearly mean of 36-6°. During the same five years the rainfall averaged 64$ ins. annually. But while the summer is thus relatively un- genial on the top of the Harz, the usual summer heat of the lower-lying valleys is greatly tempered and cooled; so that, adding this to the natural attractions of the scenery, the deep forests, and the legendary and romantic associations attaching to every fantastic rock and ruined castle, the Harz is a favourite summer resort of the German people. Among the more popular places of resort are Harzburg, Thale and the Bodethal; Blanken- burg, with the Teufelsmauer and the Hermannshohle; Werni- gerode, Ilsenburg, Grund, Lauterberg, Hubertusbad, Alexisbad and Suderode. Somecf these, and other places not named, add to their natural attractions the advantage of mineral springs and baths, pine- needle baths, whey cures, &c. The Harz is pene- trated by several railways, among them a rack-railway up the

Brocken, opened in 1898. The district is traversed by excellent roads in all directions.

The northern summits are destitute of trees, but the lower slopes of the Upper Harz are heavily wooded with pines and firs. Between the forests of these stretch numerous peat-mosses, which contain in their spongy reservoirs the sources of many small streams. On the Brocken are found one or two arctic and several alpine, plants. In the Lower Harz the forests contain a great variety of timber. The oak, elm and birch are common, while the beech especially attains an unusual size and beauty. The walnut-tree grows in the eastern districts.

The last bear was killed in the Harz in 1705, and the last lynx in 181 7, and since that time the wolf too has become extinct; but deer, foxes, wild cats and badgers are still found in the forests.

The Harz is one of the richest mineral storehouses in Germany, and the chief industry is mining, which has been carried on since the middle of the 10th century. The most important mineral is a peculiarly rich argentiferous lead, but gold in small quantities, copper, iron, sulphur, alum and arsenic are also found. Mining is carried on principally at Klausthal and St Andreasberg in the Upper Harz. Near the latter is one of the deepest mining shafts in Europe, namely the Samson, which goes down 2790 ft. or 720 ft. below sea-level. For the purpose of getting rid of the water, and obviating the flooding of such deep workings, it has been found necessary to construct drainage works of some magnitude. As far back as 1777-1799 the Georgsstollen was cut through the mountains from the east of Klausthal westward to Grund, a distance of 4 m.; but this proving insufficient, another sewer, the Ernst-Auguststollen, no less than 14 m. in length, was made from the same neighbourhood to Gittelde, at the west side of the Harz, in 1851-1864. Marble, granite and gypsum are worked; and large quantities of vitriol are manufactured. The vast forests that cover the mountain slopes supply the materials for a considerable trade in timber. Much wood is exported for building and other purposes, and in the Harz itself is used as fuel. The sawdust of the numerous mills is collected for use in the manufacture of paper. Turf-cutting, coarse lace-making and the breeding of canaries and native song-birds also occupy many of the people. Agriculture is carried on chiefly on the plateaus of the Lower Harz; but there is excellent pasturage both in the north and in the south. In the Lower Harz, as in Switzerland, the cows, which carry bells harmoniously tuned, are driven up into the heights in early summer, returning to the sheltered regions in late autumn.

The inhabitants are descended from various stocks. The Upper and Lower Saxon, the Thuringian and the Frankish races have all contributed to form the present people, and their respective influences

are still to be traced in the varieties of dialect. The boundary line between High and Low German passes through the Harz. The Harz was the last stronghold of paganism in Germany, and to that fact are due the legends, in which no district is richer, and the fanciful names given by the people to peculiar objects and appearances of nature.

See Zeitschrift des Harzvereins (Wernigerode, annually since 1868) ; Gunther, Der Harz in Geschichts- Kultur- und Landschaftsbildern (Hanover, 1885), and ” Der Harz ” in Scobel’s Monographien zur Erdkunde (Bielefeld, 1901); H. Hoffmann and others, Der Harz (Leipzig, 1899), Harzwanderungen (Leipzig, 1902) ; Hampe, Flora Hercynica (Halle, 1873); von Groddeck, Abriss der Geognosie des Harzes (2nd ed., Klausthal, 1883); Prohle, Harzsagen (2nd ed., Leipzig, 1886); Hautzinger, Der Kupfer- und Silbersegen des Harzes (Berlin, 1877) ; Hoppe, Die Bergwerke im Ober- und Vnterharz (Klausthal, 1883); Schulze, Lithia Hercynica (Leipzig, 1895); Ludecke, Die Minerale des Harzes (Berlin, 1896).

HASA, EL {Ahsa, Al Hasa), a district in the east of Arabia stretching along the shore of the Persian Gulf from Kuw6t in 29° 20′ N. to the south point of the Gulf of Bahrein in 25 10′ N., a length of about 360 m. On the W. it is bounded by Nejd, and on the S.E. by the peninsula of El Katr which forms part of Oman. The coast is low and flat and has no deep-water port along its whole length with the exception of Kuwet; from that place to El Katif the country is barren and without villages

Or permanent settlements, and is only occupied by nomad tribes, of which the principal are the Bani Hajar, Ajman and Khalid. The interior consists of low stony ridges rising gradually to the inner plateau. The oases of Hofuf and Katif, however, form a strong contrast to the barren wastes that cover the greater part of the district. Here an inexhaustible supply of underground water (to which the province owes its nameHasa) issues in strong springs, marking, according to Arab geographers, the course of a great subterranean river draining the Nejd highlands. Hofuf the capital, a town of 15.000 to 20,000 inhabitants, with its neighbour Mubariz scarcely less populous, forms the centre of a thriving district 50 m. long by 15 m. in breadth, containing numerous villages each with richly cultivated fields and gardens. The town walls enclose a space of r§ by 1 m., at the north-west angle of which is a remarkable citadel attributed to the

Carmathian princes. Mubariz is celebrated for its hot spring, known as Urn Saba or ” mother of seven,” from the seven channels by which its water is distributed. Beyond the present limits of the oasis much of the country is well supplied with water, and ruined sites and half-obliterated canals show that it has only relapse.d into waste in recent times. Cultivation reappears at Katif, a town situated on a small bay some 35 m. north-west of Bahrein. Date groves extend for several miles along the coast, which is low and muddy. The district is fertile but the climate is hot and unhealthy; still, owing to its convenient position, the town has a considerable trade with Bahrein and the gulf ports on one side and the interior of Nejd on the other. The fort is a strongly built enclosure attributed, like that at Hofuf, to the Carmathian prince Abu Tahir.

‘Uker or ‘Ujer is the nearest port to Hofuf, from which it is distant about 40 m.; large quantities of rice and piece goods transhipped at Bahrein are landed here and sent on by caravan to Hofuf, the great entrepot for the trade between southern Nejd and the coast. It also shares in the valuable pearl fishery of Bahrein and the adjacent coast.

Politically El Hasa is a dependency of Turkey, and its capital Hofuf is the headquarters of the sanjak’or district of Nejd. Hofuf, Katif and El Katr were occupied by Turkish garrisons in 187 1, and the occupation has been continued in spite of British protest as to El Katr, which according to the agreement made in 1867, when Bahrein was taken under British protection, was tributary to the latter. Turkish claims to Kuwet have not been admitted by Great Britain.

Authorities. — W. G. Palgrave, Central and Eastern Arabia (London, 1865); L. Pelly, Journal R.G.S. (1866); S. M. Zwemer, Geog. Journal (1902) : G. F. Sadlier, Diary of a Journey across Arabia (Bombav, 1866); V. Chirol, The Middle East (London, 1904).

(R. A. W.)

HASAN and HOSAIN (or Husein), sons of the fourth Mahommedan caliph Ali by his wife Fatima, daughter of Mahomet. On Ali’s death Hasan was proclaimed caliph, but the strength of Moawiya who had rebelled against Ali was such that he resigned his claim on condition that he should have the disposal of the treasure stored at Kufa, with the revenues of Darabjird. This secret negotiation came to the ears of Hasan’s supporters, a mutiny broke out and Hasan was wounded. He retired to Medina where he died about 669. The story that he was poisoned at Moawiya’s instigation is generally discredited (see Caliphate, sect. B, § 1). Subsequently his brother Hosain was invited

by partisans in Kufa to revolt against Moawiya's successor Yazid. He was, however, defeated and killed at Kerbela on the 10th of October (Muharram) 680 (see Caliphate, sect. B, § 2 ad init.). Hosain is the hero of the Passion Play which is performed annually {e.g. at Kerbela) on the anniversary of his death by the Shi'itcs of Persia and India, to whom from the earliest times the family of Ali are the only true descendants of Mahomet. The play lasts for several days and concludes with the carrying out of the coffins (tabiif) of the martyrs to an open place in the neighbourhood.

See Sir Wm. Muir, The Caliphate (1883); Sir Lewis Pelly, The Miracle Play of Hasan and Hosein (1879).

HASAN UL-BASRI [Aba Sa'ud ul-Hasan ibn Abi-1-Hasan Vassar ul-Basri], (642-728 or 737), Arabian theologian, was

born at Medina. His father was a freedman of Zaid ibn Thabit, one of the Ansar (Helpers of the Prophet), his mother a client of Umm Salama, a wife of Mahomet. Tradition says that Umm Salama often nursed Hasan in his infancy. He was thus one of the Tdbi'un (i.e. of the generation that succeeded the Helpers). He became a teacher of Basra and founded a school there. Among his pupils was Wasil ibn 'Ata, the founder of the Mo'tazilites. He himself was a great supporter of orthodoxy and the most important representative of asceticism in the time of its first development. With him fear is the basis of morality, and sadness the characteristic of his religion. Life is only a pilgrimage, and comfort must be denied to subdue the passions. Many writers testify to the purity of his life and to his excelling in the virtues of Mahomet's own companions. He was " as if he were in the other world." In politics, too, he adhered to the earliest principles of Islam, being strictly opposed to the in- herited caliphate of the Omayyads and a believer in the election of the caliph.

His life is given in Nawjiwi's Biographical Dictionary (ed. F. Wustenfeld, Gottingen, 1842-1847). Cf. R. Dozy, Essai sur I'his- toire de Vislamisme, pp. 201 sqq. (Leiden and Paris, 1879); A. von Kremer, Ctuturgeschichtliche Streifziige, p. 5 seq. ; R. A. Nicholson, A Literary History of the Arabs, pp. 225-227 (London, 1907). (G. W. T.)
HASBEYA, or Hasbeiya, a town of the Druses, about 36 m. W. of Damascus, situated at the foot of Mt. Hermon in Syria, overlooking a deep amphitheatre from which a brook flows to the Hasbani. The population is about 5000 (4000 Christians). Both sides of the valley are planted in terraces with olives, vines and other fruit trees. The grapes are either dried or made into a kind of syrup. In 1846 an American Protestant mission was established in the town. This little

community suffered much persecution at first from the Greek Church, and afterwards from the Druses, by whom in i860 nearly 1000 Christians were massacred, while others escaped to Tyre or Sidon. The castle in Hasbeya was held by the crusaders under Count Oran; but in 1 1 71 the Druse emirs of the great Shehab family (see Druses) recaptured it. In 1205 this family was confirmed in the lordship of the town and district, which they held till the Turkish authorities took possession of the castle in the 19th century. Near Hasbeya are bitumen pits let by the government; and to the north, at the source of the Hasbani, the ground is volcanic. Some travellers have attempted to identify Hasbeya with the biblical Baal-Gad or Baal-Hermon.

HASDAI IBN SHAPRUT, the founder of the new culture of the Jews in Moorish Spain in the 10th century. He was both physician and minister to Caliph Abd ar-Rahman III. in Cordova. A man of wide learning and culture, he encouraged the settlement of Jewish scholars in Andalusia, and his patronage of literature, science and art promoted the Jewish renaissance in Europe. Poetry, philology, philosophy all flourished under his encourage- ment, and his name was handed down to posterity as the first of the many Spanish Jews who combined diplomatic skill with artistic culture. This type was the creation of the Moors in Andalusia, and the Jews ably seconded the Mahommedans in the effort to make life at once broad and deep. (I. A.)

HASDEU, or Hajdeu, BOGDAN PETRICEICU (1836-1907), Rumanian philologist, was born at Khotin in Bessarabia in 1836, and studied at the university of Kharkov. In 1858 he first settled in Jassy as professor of the high school and librarian. He may be considered as the pioneer in many branches of Rumanian philology and history. At Jassy he started his Archiva historica a Romaniei (1865-1867), in which a large number of old documents in Slavonic and Rumanian were published for the first time. In 1870 he inaugurated Columna lui Traian, the best philological review of the time in Rumania. In his Cuvente den Batrdni (2 vols., 1878-1881) he was the first to contribute to the history of apocryphal literature in Rumania. His Historia crilica a Romanilor (1875), though incomplete, marks the beginning of critical investigation into the history of Rumania. Hasdeu edited the ancient Psalter of Coresi of 1577 (Psaltirea lui Coresi, 1881). His Etymologicum magnum Romaniae (1886, &c.) is the beginning of an encyclopaedic I dictionary of the Rumanian language, though never finished

beyond the fetter B. In 1876 he was appointed director of the state

archives in Bucharest and in 1878 professor of philology at the university of Bucharest. His works, which include one iirama, Rasvan si Vidra, bear the impress of great originality of thought, and the author is often carried away by his profound erudition and vast imagination. Hasdeu was a keen politician. After the death of his only child Julia in 1888 he became a mystic and a strong believer in spiritism. He died at Campina on the 7th of September 1907. (M. G.)

HASDRUBAL, the name of several Carthaginian generals, among whom the following are the most important: —

1. The son-in-law of Hamilcar Barca (q.v.), who followed the latter in his campaign against the governing aristocracy at Carthage at the close of the First Punic War, and in his subsequent career of conquest in Spain. After Hamilcar's death (228) Hasdrubal, who succeeded him in the command, extended the newly acquired empire by skilful diplomacy, and consolidated it by the foundation of New Carthage (Cartagena) as the capital of the new province, and by a treaty with Rome which fixed the Ebro as the boundary between the two powers. In 221 he was killed by an assassin.

Polybius ii. 1 ; Livy xxi. 1 ; Appian, Hispanica, 4-8.

2. The second son of Hamilcar Barca, and younger brother of Hannibal. Left in command of Spain when Hannibal departed to Italy (218), he fought for six years against the brothers Gnaeus and Publius Scipio. He had on the whole the worst of the conflict, and a defeat in 216 prevented him from joining Hannibal in Italy at a critical moment; but in 212 he com- pletely routed his opponents, both the Scipios being killed. He was subsequently outgeneralled by Publius Scipio the Younger, who in 209 captured New Carthage and gained other advantages. In the same year he was summoned to join his brother in Italy. He eluded Scipio by crossing the Pyrenees at their western extremity, and, making his way thence through Gaul and the Alps in safety, penetrated far into Central Italy (207). He was ultimately checked by two Roman armies, and being forced to give battle was decisively defeated on the banks of the Metaurus. Hasdrubal himself fell in the fight; his head was cut off and thrown into Hannibal's camp as a sign of his utter defeat.

Polybius x. 34-xi. 3; Livy xxvii. 1-51 ; Appian, Bellum Hanni- balicum, ch. Hi. sqq. ; R. Oehler, Der letzte Feldzug des Barkiden Hasdrubals (Berlin, 1897); C. Lehmann, Die Angriffe der drei Barkiden auf Italien (Leipzig, 1905). See also Punic Wars.

HASE, CARL BENEDICT (1780-1864), French Hellenist, of German extraction, was born at Suiza near Naumburg on the nth of May 1780. Having studied at Jena and Helmstedt, in 1801 he made his way on foot to Paris, where he was commis- sioned by the comte de Choiseul-GoufBer, late ambassador to Constantinople, to edit the works of Johannes Lydus from a MS. given to Choiseul by Prince Mourousi. Hase thereupon decided to devote himself to Byzantine history and literature, on which he became the acknowledged authority. In 1805 he obtained an appointment in the MSS. department of the royal library; in 18 16 became professor of palaeography and modern Greek at the Ecole Royale, and in 1852 professor of compara- tive grammar in the university. In 181 2 he was selected to superintend the studies of Louis Napoleon (afterwards Napoleon III.) and his brother. He died on the 21st of March 1864. His most important works are the editions of Leo Diaconus and other Byzantine writers (1819), and of Johannes Lydus, De ostenlis (1823), a masterpiece of textual restoration, the diffi- culties of which were aggravated by the fact that the MS. had for a long time been stowed away in a wine-barrel in a monastery. He also edited part of the Greek authors in the collection of the Historians of the Crusades and contributed many additions (from the fathers, medical and technical writers, scholiasts and other sources) to the new edition of Stephanus's Thesaurus. _ See J. D. Guigniaut, Notice historique sur la vie et les travaux de Cart Benedict Hase (Paris, 1867); articles in Nouvelle Biographie generate and Allgemeine deutsche Biographie; and a collection of autobiographical letters, Briefe von der Wanderung und aus Paris, edited by O. Heine (1894), containing a vivid account of Hase's journey, his enthusiastic impressions of Paris and the hardships of his early life.

HASE, KARL AUGUST VON (1800-1890), German Protestant theologian and Church historian , was born at Steinbach in Saxony on the 25th of August 1800. He studied at Leipzig and Erlangen, and in 1829 was called to Jena as professor of theology. He retired in 1883 and was made a baron. He died at Jena on the 3rd of January 1890. Hase's aim was to reconcile modern culture with historical Christianity in a scientific way. But though a liberal theologian, he was no dry rationalist. Indeed, he vigor- ously attacked rationalism, as distinguished from the rational principle, charging it with being unscientific inasmuch as it ignored the historical significance of Christianity, shut its eyes to individuality and failed to give religious feeling its due. His views are presented scientifically in his Evangelisch-protestan- tische Dogmatik (1826; 6th ed., 1870), the value of which " lies partly in the full and judiciously chosen historical materials prefixed to each dogma, and partly in the skill, caution and

tact with which the permanent religious significance of various dogmas is discussed ” (Otto Pfleiderer) . More popular in style is his Gnosis oder prot.-evang. Glaubenslehre (3 vols., 1827-1829; 2nd ed. in 2 vols., 1869-1870). But his reputation rests chiefly on his treatment of Church history in his Kirchengeschichte, Lehrbuch zunachst fur akademische Vorlesungen (1834, 12th ed., 1900).

His biographical studies, Franz von Assist (1856; 2nd ed., 1892), Katerina von Siena (1864; 2nd ed., 1892), Neue Propheten (Die Jungfrau von Orleans, Savonarola, Thomas Miinzer) are judicious and sympathetic. Other works are: Hutterus redivivus oder Dog- matik der evang.-luth. Kirche (1827; 12th ed., 1883), in which he sought to present the teaching of the Protestant church in such a way as H utter would have reconstructed it, had he still been alive; Leben Jesu (1829; 5th ed., 1865; Eng. trans., i860); in an enlarged form, Geschichte Jesu (2nd ed., 1891); and Handbuch der prot. Polemik gegen die rom.-kath. Kirche (1862; 7th ed., 1900; Eng. trans., 1906).

For his life see his Ideate und Irrtiimer (1872; 5th ed., 1894) and Annalen meines Lebens (1891); and cf. generally Otto Pfleiderer, Development of Theology (1890); F. Lichtenberger, Hist, of German Theology (1889).

HASHISH, or Hasheesh, the Arabic name, meaning literally ” dried herb,” for the various preparations of the Indian hemp plant {Cannabis indica), used as a narcotic or intoxicant in the East, and either smoked, chewed or drunk (see Hemp and Bhang). From the Arabic hashlskin, i.e. “hemp-eaters,” comes the English ” assassin ” (see Assassin).

HASLEMERE, a market-town in the Guildford parliamentary division of Surrey, England, 43 m. S.W. from London by the London & South-Western railway. It is situated in an elevated valley between the bold ridges of Hindhead (895 ft.) and Black- down (918 ft.). Their summits are open and covered with heath, but their flanks and the lower ground are magnificently wooded. The hills are deeply scored by steep and picturesque valleys, of which the most remarkable is the Devil’s Punch Bowl, a hollow of regular form om the west flank of Hindhead . The invigorating air has combined with scenic attraction to make the district a favourite place of residence. Professor Tyndall built a house on the top of Hindhead, setting an example followed by many others. On Blackdown, closely screened by plantations, is Aldworth, built for Alfred, Lord Tennyson, who died here in 1892. George Eliot stayed for a considerable period at Shotter- mill, a neighbouring village. Pop. of Haslemere (1901), 2614; of Hindhead, 666.

HASLINGDEN, a market-town and municipal borough in the Rossendale and Heywood parliamentary divisions of Lancashire, England, 19 m. N. by W. from Manchester by the Lancashire & Yorkshire railway. Pop. (1901), 18,543. It lies in a hilly district on the borders of the forest of Rossendale, and is supposed by some to derive its name from the hazel trees which formerly abounded in its neighbourhood. The old town stood on the slope of a hill, but the modern part has extended about its base. The parish church of St James was rebuilt in 1780, with the exception of the tower, which dates from the time of Henry VIII. The woollen manufacture was formerly the staple. The town, however, steadily increasing in importance, has cotton, woollen and engineering works — coal-mining, quarrying and (brickmaking are carried on in the neighbourhood. The borough,

as incorporated in 1 891 , comprised several townships and parts of townships, but under the Local Government Act of 1894 these were united into one civil parish. The corporation consists of a mayor, 6 aldermen and 18 councillors. Area, 8196 acres.

HASPE, a town of Germany, in the Prussian province of Westphalia, in the valley of the Ennepe, at the confluence of the Hasper, and on the railway from Diisseldorf to Dortmund, 10 m. N.E. of Barmen by rail. Pop. (1905), 19,813. Its industries include iron foundries, rolling mills, puddling furnaces, and manufactures of iron, steel and brass wares and of machines. Haspe was raised to the rank of a town in 1873.

HASSAM, CHILDE (1859-), American figure and land- scape painter, born in Boston, Massachusetts, was a pupil of Boulanger and Lef ebvre in Paris. He soon fell under the influence of the Impressionists, and took to painting in a style of his own, in brilliant colour, with effective touches of pure pigment. He won a bronze medal at the Paris Exhibition of 1889; medals at the World's Fair, Chicago, 1893; Boston Art Club, 1896; Philadelphia Art Club, 1892; Carnegie Institute, Pittsburg, 1898; Buffalo Pan-American, 1901; Temple gold medal, Pennsylvania Academy of Fine Arts, Philadelphia, 1899; and silver medal, Paris Exhibition, 1900. ' He became a member of the National Academy of Design, the Society of American Artists, the Ten Americans, the American Water Colour Society, the Societe Nationale des Beaux Arts, Paris, and the Secession Society, Munich.

HASSAN, a town and district of Mysore, India. The town dates from the nth century and had in 190 1 a population of 8241. The district naturally divides into two portions, the Malnad, or hill country, which includes some of the highest ranges of the Western Ghats, and the Maidan or plain country, sloping towards the south. The Hemavati, which flows into the Cauvery in the extreme south, is the most important river of the district. The upper slopes of the Western Ghats are abundantly clothed with magnificent forests, and wild animals abound. Among the mineral products are kaolin, felspar and quartz. The soil of the valleys is a rich red alluvial loam. The area is 2547 sq. m. Population (1901), 568,919, showing an increase of 11% in the decade. The district contains some of the most remarkable archaeological monuments in India, such as the colossal Jain image at Sravana Belgola (a monolith 57 ft. high on the summit of a hill) and the great temple at Halebid. Coffee cultivation has been on the increase of late years. The first plantation was opened in 1843, and now there are many coffee estates owned by Europeans and also native holdings. The exports are large, consisting chiefly of food-grains and coffee. The imports are European piece-goods, hardware of all sorts and spices. The largest weekly fair is held at Alur. A great annual religious gathering and fair, attended by about 10,000 persons, takes place every year at Melukot. The Southern Mahratta railway traverses the north-east of the district.

The real history of Hassan does not begin until the epoch of the Hoysala dynasty, which lasted from the nth till the 14th century. Their capital was at D warasamundra (Dwaravati-pura) , the ruins of which are still to be seen scattered round the village of Halebid. The earlier kings professed the Jain faith, but the finest temples were erected to Siva by the later monarchs of the line. While they were at the zenith of their power the whole of southern India acknowledged their sway.

HASSANIA, an African tribe of Semitic stock. They inhabit the desert between Merawi and the Nile at the 6th Cataract, and the left bank of the Blue Nile immediately south of Khartum. HASSAN IBN THABIT (died 674), Arabian poet, was born in Yathrib (Medina), a member of the tribe Khazraj. In his youth he travelled to Hira and Damascus, then settled in Medina, where, after the advent of Mahomet, he accepted Islam and wrote poems in defence of the prophet. His poetry is regarded as commonplace and lacking in distinction.

His diwan has been published at Bombay (1864), Tunis (1864) and Lahore (1878). See H. Hirschfeld's " Prolegomena to an edition of the Diwan of Hassan " in Transactions of Oriental Congress (London, 1892). (G. W. T.)

HASSE, JOHANN ADOLPH (1699-1783), German musical composer, was born at Bergedorf near Hamburg, on the 25th of March 1699, an d received his first musical education from his father. Being possessed of a fine tenor voice, he chose the theatrical career, and joined the operatic troupe conducted by Reinhard Keiser, in whose orchestra Handel had played the second violin some years before. Hasse's success led to an engagement at the court theatre of Brunswick, and it was there that, in 1723, he made his debut as a composer with the opera Anligonus. The success of this first work induced the duke to send Hasse to Italy for the completion of his studies, and in 1724 he went to Naples and placed himself under Porpora, with whom, however, he seems to have disagreed both as a man and as an artist. On the other hand he gained the friendship of Alessandro Scarlatti, to whom he owed his first commission for a serenade for two voices, sung at a family celebration of a wealthy merchant by two of the greatest singers of Italy, Farinelli and Signora Tesi. This event established Hasse's fame; he soon became very popular, and his opera Sesostrato, written for the Royal Opera at Naples in 1726, made his name known all over Italy. At Venice, where he went in 1727, he became acquainted with the celebrated singer Faustina Bordogni (born at Venice in 1700), who became the composer's wife in 1730. The two artists soon afterwards went to Dresden, in compliance with a brilliant offer made to them by the splendour-loving elector of Saxony, Augustus II. There Hasse remained for two years, after which he again journeyed to Italy, and also in 1733 to London, in which latter city he was tempted by the aristocratic clique inimical to Handel to become the rival and antagonist of that great master. But this he modestly and wisely declined, remaining in London only long enough to superintend the rehearsals for his opera Artaserse (first produced at Venice, 1730). All this while Faustina had remained at Dresden, the declared favourite of the public and unfortunately also of the elector, nor was her husband, who remained attached to her, allowed to see her except at long intervals. In 1739, after the death of Augustus II., Hasse settled permanently at Dresden till 1763, when he and his wife retired from court service with considerable pensions. But Hasse was still too young to rest on his laurels. He went with his family to Vienna, and added several operas to the great number of his works already in existence. His last work for the stage was the opera Ruggiero (17 71), written for the wedding of Archduke Ferdinand at Milan. On the same occasion a work by Mozart, then fourteen years old, was performed, and Hasse observed " this youngster will surpass us all." By desire of his wife Hasse settled at her birthplace Venice, and there he died on the 23rd of December 1783. His compositions include as many as 120 operas, besides oratorios, cantatas, masses, and almost every variety

of instru- mental music. During the siege of Dresden by the Prussians in 1760, most of his manuscripts, collected for a complete edition to be brought out at the expense of the elector, were burnt. Some of his works, amongst them an opera Alcide al Bivio (1760), have been published, and the libraries of Vienna and Dresden possess the autographs of others. Hasse's instrumentation is certainly not above the low level attained by the average musicians of his time, and his ensembles do not present any features of interest. In dramatic fire also he was wanting, but he had a fund of gentle and genuine melody, and by this fact his enormous popularity during his life must be accounted for. The two airs which Farinelli had to repeat every day for ten years to the melancholy king of Spain, Philip V., were both from Hasse's works. Of Faustina Hasse it will be sufficient to add that she was, according to the unanimous verdict of the critics (including Dr Burney), one of the greatest singers of a time rich in vocal artists. The year of her death is not exactly known. Most probably it shortly preceded that of her husband.

HASSELQUIST, FREDERIK (1722-1752), Swedish traveller and naturalist, was born at Tornevalla, East Gothland, on the 3rd of January 1722. On account of the frequently expressed regrets of Linnaeus, under whom he studied at Upsala, at the lack of information regarding the natural history of Palestine,

Hasselquist resolved to undertake a journey to that country, and a sufficient subscription having been obtained to defray expenses, he reached Smyrna towards the end of 1749. He visited parts of Asia Minor, Egypt, Cyprus and Palestine, making large natural history collections, but his constitution, naturally weak, gave way under the fatigues of travel, and he died near Smyrna on the 9th of February 1752 on his way hohie. His collections reached home in safety, and five years after his death his notes were published by Linnaeus under the title Resa till Heliga Landet fordttad frdn dr 174Q till 1752, which was translated into French and German in 1762 and into English in 1766.

HASSELT, ANDRE HENRI CONSTANT VAN (1806-1874), Belgian poet, was born at Maastricht, in Limburg, on the 5th of January 1806. He was educated in his native town, and at the university of Liege. In 1833 he left Maastricht, then blockaded by the Belgian forces, and made his way to Brussels, where he became a naturalized Belgian, and

was attached to the Biblio- theque de Bourgogne. In 1843 he entered the education depart- ment, and eventually became an inspector of normal schools. His native language was Dutch, and as a French poet Andre van Hasselt had to overcome the difficulties of writing in a foreign language. He had published a Chant hellenique in honour of Canaris in the columns of La Sentinelle des Pays-Bas as early as 1826, and other poems followed. His first volume of verse, Primevercs (1834), shows markedly the influence of Victor Hugo, which had been strengthened by a visit to Paris in 1830. His relations with Hugo became intimate in 1851-1852, when the poet was an exile in Brussels. In 1839 he became editor of the Renaissance, a paper founded to encourage the fine arts. His chief work, the epic of the Qualre Incarnations du Christ, was published in 1867. In the same volume were printed his Etudes rythmiques, a series of. metrical experiments designed to show that the French language could be adapted to every kind of musical rhythm. With the same end in view he executed trans- lations of many German songs, and wrote new French libretti for the best-known operas of Mozart, Weber and others. Hasselt died at Saint Josse ten Noode, a suburb of Brussels, on the 1st of December 1874.

A selection from his works (10 vols., Brussels, 1876-1877) was edited by MM. Charles Hen and Louis Alvin. He wrote many books for children, chiefly under the pseudonym of Alfred Avelines; and studies on historical and literary subjects. The books written in collaboration with Charles Hen are signed Charles Andre. A bibliography of his writings is appended to the notice by Louis Alvin in the Biographic nat. de Belgique, vol. vii. Van Hasselt's fame has continued to increase since his death. A series of tributes to his memory are printed in the Poesies choisies (1901), edited by M. Georges Barral for the Collection des poetes francais de Vetranger. This book contains a biographical and critical study by Jules Guil- laume, and some valuable notes on the poet's theories of rhythm.

HASSELT, the capital of the Belgian province of Limburg. Pop. (1904), 16,179. It derives its name from Ilazel-bosch (hazel wood). It stands at the junction of several important roads and railways from Maaseyck, Maastricht and Liege. It has many breweries and distilleries, and the spirit known by its name, which is a coarse gin, has a certain reputation throughout Belgium. On the 6th of August 1831 the Dutch troops obtained here their chief success over the Belgian nationalists during the War of Independence. Hasselt is best known for its great septen- nial fete held on the day of Assumption, August rˆth. The curious part of this fete, which is held in honour of the Virgin under the name of Yirga Jesse, is the conversion of the town for the day into

the semblance of a forest. Fir trees and branches from the neighbouring forest arc collected and planted in front of the houses, so that for a few hours Hasselt has the appearance of being restored to its primitive condition as a wood. The figure of the giant who is supposed to have once held the Plazel- bosch under his terror is paraded on this occasion as the ” lounge man.” Originally this celebration was held annually, but in the 18th century it was restricted to once in sevgn years. There was a celebration in 1905.

HASSENPFLUQ, HANS DANIEL LUDWIG FRIEDRICH (1794-1862), German statesman, was born at Hanau in Hesse

on the 26th of February 1794. He studied law at Gottingen, graduated in 1816, and took his seat as Assessor in the judicial- chamber of the board of government (Regierungskollegium) at Cassel, of which his father Johann Hassenpiiug was also a member. In 182 1 he was nominated by the new elector, William II., Justisrat (councillor of justice) ; in 1832 he became Ministerialrat and reporter {Referent) to the ministry of Hesse-Cassel, and in May of the same year was appointed successively minister of justice and of the interior. It was from this moment that he became conspicuous in the constitutional struggles of Germany.

The reactionary system introduced by the elector William I. had broken down before the revolutionary movements of 1830, and in 1S31 Flesse had received a constitution. This develop- ment was welcome neither to the elector nor to the other German governments, and Hassenpflug deliberately set to work to reverse it. In doing so he gave the lie to his own early promise; for he had been a conspicuous member of the revolutionary Burschcn- schaft at Gottingen, and had taken part as a volunteer in the War of Liberation. Into the causes of the change it is unnecessary to inquire; Hassenpflug by training and tradition was a strait-laced official; he was also a first-rate lawyer; and his naturally arbitrary temper had from the first displayed itself in an attitude of overbearing independence towards his colleagues and even towards the elector. To such a man constitutional restrictions were intolerable, and from the moment he came into power he set to work to override them, by means of press censorship, legal quibbles, unjustifiable use of the electoral prerogatives, or frank supersession of the legislative rights of the Estates by electoral ordinances. The story of the constitutional deadlock that resulted belongs to the history of Hesse-Cassel and Germany; so far as Hassenpflug himself was concerned, it made him, more even than Metternich, the Mephistopheles of the Reaction to the German people. In Hesse itself he was known as ” Hessen’s HassundFluch” (Hesse’s hate and curse).

In the end, however, his masterful temper became unendurable to the regent (Frederick William) ; in the summer of 1837 he was suddenly removed from his post as minister of the interior and he thereupon left the elector's service.

In 1838 he was appointed head of the administration of the little principality of Hohenzollern-Sigmaringen, an office which he exchanged in the following year for that of civil governor of the grand-duchy of Luxemburg. Here, too, his independent character suffered him to remain only a year: he resented having to transact all business with the grand-duke (king of the Nether- lands) through a Dutch official at the Hague; he protested against the absorption of the Luxemburg surplus in the Dutch treasury; and, failing to obtain redress, he resigned (1840). From 1841 to 1850 he was in Prussian service, first as a member of the supreme court of justice (Oberlribunal) and then (1846) as president of the high court of appeal (Oberappellalionsgerichl) at Grcifswald. In 1850 he was tried for peculation and convicted; and, though this judgment was reversed on appeal, he left the service of Prussia.

With somewhat indecent haste (the appeal had not been heard) he was now summoned by the elector of Hesse once more to the head of the government, and he immediately threw himself again with zeal into the struggle against the constitution. He soon found, however, that the opinion of all classes, including the army, was solidly against him, and he decided to risk all on an alliance with the reviving fortunes of Austria, which was steadily working for the restoration of the status quo overthrown by the revolution of 1848. On his advice the elector seceded, from the Northern Union established by Prussia and, on the 13th of September, committed the folly of flying secretly from Hesse with his minister. They went to Frankfort, wdiere the federal diet had been re-established, and on the 21st persuaded the diet to decree an armed intervention in Hesse. This decree, carried out by Austrian troops, all but led to war with Prussia, but the unreadiness of the Berlin government led to the triumph of Austria and of Hassenpflug, who at the end of the year was once more installed in power at Cassel as minister of finance. His position was, however, not enviable; he was loathed a;-?

despised by all, and disliked even by his master. The climax- came in November 1853, when he was publicly horse-whipped by the count of

Isenburg-Wachtersbach, the elector's son-in-law. The count was pronounced insane; but Hassenpflug was con- scious of the method in his madness, and tendered his resignation. This was, however, not accepted; and it was not till the 16th of October 1855 that he was finally relieved of his offices. He retired to Marburg, where he died on the 15th of October 1862. He lived just long enough to hear of the restoration of the Hesse constitution of 1831 (June 21, 1862), which it had been his life's mission to destroy. Of his publications the most important is Actenstiicke, die landsldndischen Anklagen wider den Kurjiirst- lichen hessischen Staatsminister Hassenpflug. Ein Beitrag zur Zeitgesckichte and sum neueren deutschen Staatsrcchte, anonym. (Stuttgart and Tubingen, 1836). He was twice married, his first wife being the sister of the brothers Grimm. His son Karl Hassenpflug (1824-1890) was a distinguished sculptor.

See the biography by Wippermann in Allgemeine deutsche Bio- graphic, with authorities.

HASTINAPUR, an ancient city of British India, in the Meerut district of the United Provinces, lying on the bank of a former bed of the Ganges, 22 m. N.E. of Meerut. It formed the capital of the great Pandava kingdom, celebrated in the Mahabhdrata, and probably one of the earliest Aryan settlements outside the Punjab. Tradition points to a group of shapeless mounds as the residence of the Lunar princes of the house of Bharata whose deeds are commemorated in the great national epic. After the conclusion of the famous war which forms the central episode of that poem, Hastinapur remained for some time the metropolis of the descendants of Parikshit, but the town was finally swept away by a flood of the Ganges, and the capital was transferred to Kausambi.

HASTINGS, a famous English family. John, Baron Hastings (c. 1262-c. 1313), was a son of Sir Henry de Hastings (d. 1268), who was summoned to parliament as a baron by Simon de Montfort in 1264. Having joined Montfort's party Sir Henry led the Londoners at the battle of Lewes and was taken prisoner it Evesham. After his release he continued his opposition to Henry HI.; he was among those who resisted the king at Kenilworth, and after the issue of the Dictum de Kenilworth he commanded the remnants of the baronial party when they made their last stand in the isle of Ely, submitting to Henry in July 1267. His younger son, Edmund, was specially noted for his military services in Scotland during the reign of Edward I. John Hastings married Isabella (d. 1305), daughter of William de Valence, earl of Pembroke, a half-brother of Henry III., and fought in Scotland and in Wales. Through his mother, Joanna de Cantilupe, he inherited

the extensive lordship of Abergavenny, hence he is sometimes referred to as lord of Bergavenny, and in 1295 he was summoned to parliament as a baron. Before this date, however, he had come somewhat prominently to the front. His paternal grandmother, Ada, was a younger daughter of David, earl of Huntingdon, and a niece of the Scottish king, William the Lion; and in 1290 when Margaret, the maid of Norway, died, Hastings came forward as a claimant for the vacant throne. Although unsuccessful in the matter he did not swerve from his loyalty to Edward I. He fought constantly either in France or in Scotland; he led the bishop of Durham's men at the celebrated siege of Carlaverock castle in 1300; and with his brother Edmund he signed the letter which in 1301 the English barons sent to Pope Boniface VIII. repudiating papal interference in the affairs of Scotland; on two occasions he represented the king in Aquitaine. Hastings died in 1312 or 1313. His second wife was Isabella, daughter af the elder Hugh le Despenser. Hastings, who was one of the most wealthy and powerful nobles of his time, stood high in the regard of the king and is lauded by the chroniclers.

f I is eldest son John (d. 1325), who succeeded to the barony, was the father of Laurence Hastings, who was created earl of Pembroke in 1339, the earls of Pembroke retaining the barony of Hastings until 1389. A younger son by a second marriage, .Sir Hugh Hastings (c. 1307-1347), saw a good deal of military

service in France; his portrait and also that of his wife may still be seen on the east window of Elsing church, which contains a beautiful brass to his memory.

On the death of John, the third and last earl of Pembroke of the Hastings family, in 1389, Sir Hugh's son John had, according to a decision of the House of Lords in 1840, a title to the barony of Hastings, but he did not prosecute his claim and he died without sons in 1393. However his grand-nephew and heir, Hugh (d. 1396), claimed the barony, which was also claimed by Reginald, Lord Grey of Ruthyn. Like the earls of Pembroke, Grey was descended through his grandmother, Elizabeth Hastings, from John, Lord Hastings, by his first wife; Hugh, on the other hand, was descended from John's second wife. After Hugh's death his brother, Sir Edward Hastings (c. 1382-1438), claimed the barony, and the case as to who should bear the arms of the Hastings family came before the court of chivalry. In 1410 it was decided in favour of Grey, who thereupon assumed the arms. Both disputants still claimed the barony, but the view seems to have prevailed that it had fallen into abeyance in 1389. Sir Edward was imprisoned for refusing to pay his rival's costs, and he was probably

still in prison when he died in January 1438. After his death the Hastings family, which became extinct during the 16th century, tacitly abandoned the claim to the barony. Then in 1840 the title was revived in favour of Sir Jacob Astley, Bart. (1 797-1859), who derived his claim from a daughter of Sir Hugh Hastings who died in 1540. Sir Jacob's descendant, Albert Edward (b. 1882), became 21st Baron Hastings in 1904.

A distant relative of the same family was William, Baron Hastings (c. 1430-1483), a son of Sir Leonard Hastings (d. 1455). He became attached to Edward IV., whom he served before his accession to the throne, and after this event he became master of the mint, chamberlain of the royal household and one of the king's most trusted advisers. Having been made a baron in 146 1, he married Catherine, daughter of Richard Neville, earl of Salisbury, and was frequently sent on diplomatic errands to Burgundy and elsewhere. He was faithful to Edward IV. during the king's exile in the winter of 1470-1471, and after his return he fought for him at Barnet and at Tewkesbury ; he has been accused of taking part in the murder of Henry VI. 's son, prince Edw r ard, after the latter battle. Hastings succeeded his sovereign in the favour of Jane Shore. He was made captain of Calais in 147 1 , and was with Edward IV. when he met Louis XL of France at Picquigny in 147 5, on which occasion he received gifts from Louis and from Charles the Bold of Burgundy. After Edward IV. 's death Hastings be- haved in a somewhat undecided manner. He disliked the queen, Elizabeth Woodville, but he refused to ally himself with Richard, duke of Gloucester, afterwards King Richard III. Suddenly Richard decided to get rid of him, and during a meeting of the council on the 13th of June 1483 he was seized and at once put to death. This dramatic incident is related by Sir Thomas More in his History oj Richard 1 1 1., and has been worked by Shakespeare into his play Richard III. Hastings is highly praised by his friend Philippe de Commines, and also by More. He left a son, Edward (d. 1508), the father of George, Baron Hastings (c. 1488- 1545), who was created earl of Huntingdon (q.v.) in 1529.

When Francis, 10th earl of Huntingdon, died in October 1789, the barony of Hastings passed to his sister Elizabeth (173 1-1808) , wife of John Rawdon, earl of Moira, and from her it came to her son Francis Rawdon-Hastings (see below), who was created marquess of Hastings in 181 7.

HASTINGS, FRANCIS RAWDON-HASTINGS, 1st Marquess or (1754-1826), British soldier and governor-general of India, born on the 9th of December 1754, was the son of Sir John Rawdon of Moira

in the county of Down, 4th baronet, who was created Baron Rawdon of Moira, and afterwards earl of Moira, in the Irish peerage. His mother was the Lady Elizabeth Hastings, daughter of Theophilus, 9th earl of Huntingdon. Lord Rawdon, as he was then called, was educated at Harrow and Oxford, and joined the army in 1771 as ensign in the 15th foot. His life henceforth was entirely spent in the service of his country, and may be divided into four periods: from 1775 to

1782 he was engaged with much distinction in the American war; from 1783 to 1813 he held various high appointments at home, and took an active part in the business of the House of Lords; from 1813 to 1823 was the period of his labours in India; after retiring from which, in the last years of his life (1824-1826), he was governor of Malta.

In America Rawdon served at the battles of Bunker Hill, Brooklyn, White Plains, Monmouth and Camden, at the attacks on Forts Washington and Clinton, and at the siege of Charleston. In fact he was engaged in many important operations of the war. Perhaps his most noted achievements were the raising of a corps at Philadelphia, called the Irish Volunteers, who under him became famous for their fighting qualities, and the victory of Hobkirk's Hill, which, in command of only a small force, he gained by superior military skill and determination against a much larger body of Americans. In 1781 he was invalided. The vessel in which he returned to England was captured and carried into Brest. He was speedily released, and on his arrival in England was much honoured by George III., who created him an English peer (Baron Rawdon) in March 1783. In 1789 his mother succeeded to the barony of Hastings, and Rawdon added the surname of Hastings to his own.

In 1793 Rawdon succeeded his father as earl of Moira. In 1794 he was sent with 7000 men to Ostend to reinforce the duke of York and the allies in Flanders. The march by which he effected a junction was considered extraordinary. In 1803 he was appointed commander-in-chief in Scotland, and in 1804 he married Flora Mure Campbell, countess of Loudoun in her own right. When Fox and Grenville came into power in 1806, Lord Moira, who had always voted with them, received the place of master-general of the ordnance. He was now enabled to carry a philanthropic measure, of which from his first entry into the House of Lords he had been a great promoter, namely, the

Debtor and Creditor Bill for relief of poor debtors. Ireland was another subject to which he had given particular attention: in 1797 there was published a Speech by Lord Moira on the Dreadful and Alarm- ing State of Ireland. Lord Moira's sound judgment on public affairs, combined with his military reputation and the upright- ness of his character, won for him a high position among the statesmen of the day, and he gained an additional prestige from his intimate relations with the prince of Wales. As a mark of the regent's regard Lord Moira received the order of the Garter in 181 2, and in the same year was appointed governor-general of Bengal and commander-in-chief of the forces in India. He landed at Calcutta, and assumed office in succession to Lord Minto in October 1813. One of the chief questions which awaited him was that of relations with the Gurkha state of Nepal. The Gurkhas, a brave and warlike little nation, failing to extend their conquests in the direction of China, had begun to encroach on territories held or protected by the East India Company; especially they had seized the districts of Batwal and Seoraj, in the northern part of Oudh, and when called upon to relinquish these, they deliberately elected (April 1814) to go to war rather than do so. Lord Moira, having travelled through the northern provinces and fully studied the question, declared war against Nepal (November 1814). The enemy's frontier was 600 m. long, and Lord Moira, who directed the plan of the campaign, resolved to act offensively along the whole line. It was an anxious under- taking, because the native states of India were all watching the issue and waiting for any serious reverse to the English to join against them. At first all seemed to go badly, as the British officers despised the enemy, and the sepoys were unaccustomed to mountain warfare, and thus alternate extremes of rashness and despondency were exhibited. But this rectified itself in time, especially through the achievements of General (afterwards Sir David) Ochterlony, who before the end of 181 5 had taken all the Gurkha posts to the west, and early in 1816 was advancing victoriously within 50 m. of Khatmandu, the capital. The Gurkhas now made peace; they abandoned the disputed districts, ceded some territory to the British, and agreed to receive a British resident. For his masterly conduct of these affairs Lord Moira was created marquess of Hastings in February 1817.

He had now to deal with internal dangers. A combination of Mahratta powers was constantly threatening the continuance of British rule, under the guise of plausible assurances severally given by the peshwa, Sindhia, Holkar and other princes. At the same time the existence of the Pindari state was not only dangerous to the British, as being a warlike power always ready to turn against them, but it was a scourge

to India itself. In 1-816, however, the Pindaris entered British territory in the Northern Circars, where they destroyed 339 villages. On this, permission was obtained to act for their suppression. Before the end of 181 7 the preparations of Lord Hastings were com- pleted, when the peshwa suddenly broke into war, and the British were opposed at once to the Mahratta and Pindari powers, estimated at 200,000 men and 500 guns. Both were utterly shattered in a brief campaign of four months (1817-18). The peshwa's dominions were annexed, and those of Sindhia, Holkar, and the raja of Berar lay at the mercy of the governor-general, and were saved only by his moderation. Thus, after sixty years from the battle of Plassey, the supremacy of British power in India was effectively established. The Pindaris had ceased to exist, and peace and security had been substituted for misery and terror.

" It is a proud phrase to use," said Lord Hastings, " but it is a true one, that we have bestowed blessings upon millions. Nothing can be more delightful than the reports I receive of the sensibility manifested by the inhabitants to this change in their circumstances. The smallest detachment of our troops cannot pass through that district without meeting everywhere eager and exulting gratula- tions, the tone of which proves them to come from glowing hearts. Multitudes of people have, even in this short interval, come from the hills and fastnesses in which they had sought refuge for years, and have reoccupied their ancient deserted villages. The plough- share is again in every quarter turning up a soil which had for many seasons never been stirred, except by the hoofs of predatory cavalry." A

While the natives of India appreciated the results of Lord Hastings's achievements, the court of directors grumbled at his having extended British territory. They also disliked and opposed his measures for introducing education among the natives and his encouraging the freedom of the press. In 1819 he obtained the cession by purchase of the island of Singapore. In finance his administration was very successful, as notwith- standing the expenses of his wars he showed an annual surplus of two millions sterling. Brilliant and beneficent as his career had been, Lord Hastings did not escape unjust detraction. His last years of office were embittered by the discussions on a matter notorious at the time, namely, the affairs of the banking-house of W. Palmer and Company. The whole affair was mixed up with insinuations against Lord Hastings, especially charging him with having been actuated by favouritism towards one of the partners in the firm. From imputations which were incon- sistent with his whole character he has subsequently been exonerated. But while smarting under them he tendered his resignation in 1821, though he did not leave India till the first day of 1823. He was much exhausted by the

arduous labours which for more than nine years he had sustained. Among his characteristics it is mentioned that ” his ample fortune absolutely sank under the benevolence of his nature “; and, far from having enriched himself in the appointment of governor- general, he returned to England in circumstances which obliged him still to seek public employment. In 1824 he received the comparatively small post of governor of Malta, in which island he introduced many reforms and endeared himself to the in- habitants. He died on the 28th of November 1826, leaving- a request that his right hand should be cut off and preserved till the death of the marchioness of Hastings, and then be interred in her coffin.

Hastings was succeeded by his son, Francis George Augustus (1808-1844), who in 1840 succeeded through his mother. to the earldom of Loudoun. When his second son, Henry Weysford, the 4th marquess, died childless on the 10th of November 1868 the marquessate became extinct; the earldom of Loudoun devolved upon his sister, Edith Mary (d. 1874)* wife of Charles. Frederick Abney-Hastings, afterwards Baron Donington; the

barony of Hastings, which fell into abeyance, was also revived in 187 1 in her favour.

See Ross-of-Bladensburg, The Marquess of Hastings (” Rulers of India” series) (1893); and Private Journal cf the Marquess of Hastings, edited by his daughter, the marchioness of Bute (1858).

HASTINGS, FRANK ABNEY (1794-1828), British naval officer and Philhellene, was the son of Lieut. general Sir Charles Hastings, a natural son of Francis Hastings, tenth earl of Huntingdon. He entered the navy in 1805, and was in the ” Neptune ” (100) at the battle of Trafalgar; but in i82oaquarrel with his flag captain led to his leaving the service. The revolu tionary troubles of the time offered chances of foreign employ- ment. Hastings spent a year on the continent to learn French, and sailed for Greece on the 12th of March 1822 from Marseilles. On the 3rd of April he reached Hydra. For two years he took part in the naval operations of the Greeks in the Gulf of Smyrna and elsewhere. He saw that the light squadrons of the Greeks must in the end be overpowered by the heavier Turkish navy, clumsy as it was; and in 1823 he drew up and presented to Lord Byron a very able memorandum which he laid before the Greek government in 1824.

This paper is of peculiar interest apart from its importance in the Greek insurrection, for it contains the germs of the great revolution which has since been effected in naval gunnery and tactics. In substance the memorandum advocated the use of steamers in preference to sailing ships, and of direct fire with shells and hot shot, as a more trustworthy means of destroying the Turkish fleet than fire-ships. It will be found in Finlay's History of the Greek Revolution, vol. ii. appendix i. The application of Hastings's ideas led necessarily to the disuse of sailing ships, and the introduction of armour. The incompetence of the Greek government and the corrupt waste of its resources prevented the full application of Hastings's bold and far-seeing plans. But largely by the use of his own money, of which he is said to have spent £7000, he was able to some extent to carry them out. In 1824 he came to England to obtain a steamer, and in 1825 he had fitted out a small steamer named the " Karteria " (Perseverance), manned by Englishmen, Swedes and Greeks, and provided with apparatus for the discharge of shell and hot shot. He did enough to show that if his advice had been vigorously followed the Turks would have been driven off the sea long before the date of the battle of Navarino. The great effect produced by his shells in an attack on the sea-line of communication of the Turkish army, then besieging Athens at Oropus and Volo in March and April 1827, was a clear proof that much more could have been done. Military mismanagement caused the defeat of the Greeks round Athens. But Hastings, in co-operation with General Sir R. Church (q.v.), shifted the scene of the attack to western Greece. Here his destruction of a small Turkish squadron at Salona Bay in the Gulf of Corinth (29th of September 1827) provoked Ibrahim Pasha into the aggressive movements which led to the destruction of his fleet by the allies at Navarino (q.v.) on the 20th of October 1827. On the 25th of May 1828 he was wounded in an attack on Anatolikon, and he died in the harbour of Zante on the 1st of June. General Gordon, who served in the war and wrote its history, says of him: "If ever there was a disinterested and really .useful Philhellene it was Hastings. He received no pay, and had expended most of his slender fortune in keeping the ' Karteria ' afloat for the last six months. His ship, too, was the only one in the Greek navy where regular discipline was maintained."

See Thomas Gordon, History of the Greek Revolution (London, 1832); George Finlay, History of the Creek Revolution (Edinburgh,

1861).

HASTINGS, WARREN (1732-1818), the first governor-general of British India, was born on the 6lh of December 1732 in the little

hamlet of Churchill in Oxfordshire. He came of a family which had been settled for many generations in the adjoining village of Daylesford; but his great-grandfather had sold the ancestral manor-house, and his grandfather had been unable to maintain himself in possession of the family living. His mother died a few days after giving him birth; his father,

Pynaston Hastings, drifted away to perish obscurely in the West Indies. Thus unfortunate in his birth, young Hastings received the elements of education at a charity school in his native village. At the age of eight he was taken in charge by an elder brother of his father, Howard Hastings, who held a post in the customs. After spending two years at a private school at Newington Butts, he was moved to Westminster, where among his contemporaries occur the names of Lord Thurlow and Lord Shelburne, Sir Elijah Impey, and the poets Cowper and Churchill. In 1749, v/hen his headmaster Dr Nichols was already anticipating for him a successful career at the university, his uncle died, leaving him to the care of a distant kinsman, Mr Creswicke, who was afterwards in the direction of the East India Company; and he determined to send his ward to seek his fortune as a ” writer ” in Bengal.

When Hastings landed at Calcutta in October 1750 the affairs of the East India Company were at a low ebb. Throughout the entire south of the peninsula French influence was predominant. The settlement of Fort St George or Madras, captured by force of arms, had only recently been restored in accordance with a clause of the peace of Aix-la-Chapelle. The organizing genius of Dupleix everywhere overshadowed the native imagination, and the star of Clive had scarcely yet risen above the horizon. The rivalry between the English and the French, which had already convulsed the south, did not penetrate to Bengal. That province was under the able government of Ali Vardi Khan, who peremptorily forbade the foreign settlers at Calcutta and Chander-nagore to introduce feuds from Europe. The duties of a young ” writer ” were then such as are implied in the name. At an early date Hastings was placed in charge of an aurang or factory in the interior, where his duties would be to superintend the weaving of silk and cotton goods under a system of money advances. In 1753 he was transferred to Cossimbazar, the river-port of the native capital of Murshidabad. In 1756 the old nawab died, and was succeeded by his grandson Suraj-ud-Dowlah, a young madman of 19, whose name is indelibly associated with the tragedy of the Black Hole. When that passionate young prince, in revenge for a fancied wrong, resolved to drive the English out of Bengal, his first step was to occupy the fortified factory at Cossimbazar, and make prisoners of Hastings and his companions.

Hastings was soon released at the intercession of the Dutch resident, and made use of his position at Murshidabad to open negotiations with the English fugitives at Falta, the site of a Dutch factory near the mouth of the Hugh. In later days he used to refer with pride to his services on this occasion, when he was first initiated into the wiles of Oriental diplomacy. After a while he found it necessary to fly from the Mahommedan court and join the main body of the English at Falta. When the relieving force arrived from Madras under Colonel Clive and Admiral Watson, Hastings enrolled himself as a volunteer, and took part in the action which led to the recovery of Calcutta. Clive showed his appreciation of Hastings's merits by appointing him in 1758 to the important post of resident at the court of Murshidabad. It was there that he first came into collision with the Bengali Brahman, Nuncomar, whose sub- sequent fate has supplied more material for controversy than any other episode in his career. During his three years of office as resident he was able to render not a few valuable services to the Company; but it is more important to observe that his name nowhere occurs in the official lists of those who derived pecuniary profit from the necessities and weakness of the native court. In 1 761 he was promoted to be member of council, under the presi- dency of Mr Vansittart, who had been introduced by Clive from Madras. The period of Vansittart's government has been truly described as " the most revolting page of our Indian history." The entire duties of administration were suffered to remain in the hands of the nawab, while a few irresponsible English traders had drawn to themselves all real power. The members of council, the commanders of the troops, and the commercial residents plundered on a grand scale. The youngest servant of the Company claimed the right of trading on his own account, free from taxation and from local jurisdiction, not only for him- self but also for every native subordinate whom he might permit

to use his name. It was this exemption, threatening the very foundations of the Mussulman government, that finally led to a rupture with the nawab. Macaulay, in his celebrated essay, has said that " of the conduct of Hastings at this time little is known." As a matter of fact, the book which Macaulay was professing to review describes at length the honourable part consistently taken by Hastings in opposition to the great majority of the council. Sometimes in conjunction only with Vansittart, some- times absolutely alone, he protested unceasingly against the policy and practices of his

colleagues. On one occasion he was stigmatized in a minute by Mr Batson with ” having espoused the nawab’s cause, and as a hired solicitor defended all his actions, however dishonourable and detrimental to the Company.” An altercation ensued. Batson gave him the lie and struck him in the council chamber. When war was actually begun, Hastings officially recorded his previous resolution to have resigned, in order to repudiate responsibility for measures which he had always opposed. Waiting only for the decisive victory of Buxar over the allied forces of Bengal and Oudh, he resigned his seat and sailed for England in November 1764.

After fourteen years’ residence in Bengal Hastings did not return home a rich man, estimated by the opportunities of his position. According to the custom of the time he had augmented his slender salary by private trade. At a later date he was charged by Burke with having taken up profitable contracts for supplying bullocks for the use of the Company’s troops. It is admitted that he conducted by means of agents a large business in timber in the Gangetic Sundarbans. When at Falta he had married Mrs Buchanan, the widow of an officer. She bore him two children, of whom one died in infancy at Murshidabad, and was shortly followed to the grave by her mother. Their common gravestone is in existence at the present day, bearing date July n, 1759. The other child, a son, was sent to England, and also died shortly tefore his father’s return. While at home Hastings is said to have attached himself to literary society; and it may be inferred from his own letters that he now made the personal acquaintance of Samuel Johnson and Lord Mansfield. In 1766 he was called upon to give evidence before a committee of the House of Commons upon the affairs of Bengal. The good sense and clearness of the views which he expressed caused attention to be paid to his desire to be again employed in India. His pecuniary affairs were embarrassed, partly from the liberality with which he had endowed his few surviving relatives. The great influence of Lord Clive was also exercised on his behalf. At last, in the winter of 1768, he received the appointment of second in council at Madras. Among his companions on his voyage round the Cape were the Baron Imhoff, a speculative portrait-painter, and his wife, a lady of some personal attractions and great social charm, who was destined henceforth to be Hastings’s lifelong companion. Of his two years’ work at Madras it is needless to speak in detail. He won the good-will of his employers by devoting himself to the improvement of their manufacturing business, and he kept his hands clean from the prevalent taint of pecuniary transactions with the nawab of the Carnatic. One fact of some interest is not generally known. He drew up a scheme for the construction of a pier at Madras,

to avoid the dangers of landing through the surf, and instructed his brother-in-law in England to obtain estimates from the engineers Brindley and Smeaton.

In the beginning of 1772 his ambition was stimulated by the nomination to the second place in council in Bengal with a promise of the reversion of the governorship when Mr Cartier should retire. Since his departure from Bengal in 1764 the situation of affairs in that settlement had scarcely improved. The second governorship of Clive was marked by the transfer of the d'vwani or financial administration from the Mogul emperor to the Company, and by the enforcement of stringent regulations against the besetting sin of peculation. But Clive was followed by two inefficient successors; and in 1770 occurred the most terrible Indian famine on record, which is credibly estimated to have swept away one-third of the population. In April 1772 Warren Hastings took his seat as president of the council at Fort

William. His first care was to carry out the instructions received from home, and effect a radical reform in the system of govern- ment. Clive's plan of governing through the agency of the native court had proved a failure. The directors were determined " to stand forth as dlwan, and take upon themselves by their own servants the entire management of the revenues." All the officers of administration were transferred from Murshidabad to Calcutta, which Hastings boasted at this early date that he would make the first city in Asia. This reform involved the ruin of many native reputations, and for a second time brought Hastings into collision with the wily Brahman, Nuncomar. At the same time a settlement of the land revenue on leases for five years was begun, and the police and military systems of the country were placed upon a new footing. Hastings was a man of immense industry, with an insatiable appetite for detail. The whole of this large series of reforms was conducted under his own personal supervision, and upon no part of his multifarious labours did he dwell in his letters home with greater pride. As an independent measure of economy, the stipend paid to the titular nawab of Bengal, who was then a minor, was reduced by one-half — to sixteen lakhs a year (say £160,000). Macaulay imputes this reduction to Hastings as a characteristic act of financial immorality; but in truth it had been expressly enjoined by the court of directors, in a despatch dated six months before he took up office. Hispecuniary bargains with Shuja-ud-Dowlah, the nawab wazlr of Oudh, stand on a different basis. Hastings himself always regarded them as incidents in his general scheme of foreign policy. The Mahrattas at this time had got possession of the person of the Mogul emperor, Shah Alam, from whom Clive obtained the grant of Bengal in 1765, and to whom he assigned in return the districts of

Allahabad and Kora and a tribute of £300,000. With the emperor in their camp, the Mahrattas were threatening the province of Oudh, and causing a large British force to be cantoned along the frontier for its defence. Warren Hastings, as a deliberate measure of policy, withheld the tribute due to the emperor, and resold Allahabad and Kora to the wazir of Oudh. The Mahrattas retreated, and all danger for the time was dissipated by the death of their principal leader. The wazlr now bethought him that he had a good opportunity for satisfying an old quarrel against the adjoining tribe of Rohillas, who had played fast and loose with him while the Mahratta army was at hand. The Rohillas were a race of Afghan origin, who had established themselves for some generations in a fertile tract west of Oudh, between the Himalayas and the Ganges, which still bears the name of Rohilkhand. They were not so much the occupiers of the soil as a dominant caste of warriors and freebooters. But in those troubled days their title was as good as any to be found in India. After not a little hesitation, Hastings consented to allow the Company's troops to be used to further the ambitious designs of his Oudh ally, in consideration of a sum of money which relieved the ever-pressing wants of the Bengal treasury. The Rohillas were defeated in fair fight. Some of them fled the country, and so far as possible Hastings obtained terms for those who remained. The fighting, no doubt, on the part of the wazlr was conducted with all the savagery of Oriental warfare; but there is no evidence that it was a war of extermination.

Meanwhile, the affairs of the East India Company had come under the consideration of parliament. The Regulating Act, passed by Lord North's ministry in 1773, effected considerable changes in the constitution of the Bengal government. Tie council was reduced to four members with a governor-generalˆ who were to exercise certain indefinite powers of control over the presidencies of Madras and Bombay. Hastings was named in the act as governor-general for a term of five years. The council consisted of General Clavering and the Hon. Colonel Monson, two third-rate politicians of considerable parliamentary influence; Philip Francis (q.v.), then only known as an able permanent official; and Barwell, of the Bengal Civil Service. At the same time a supreme court of judicature was appointed, composed of a chief and three puisne judges, to exercise an indeterminate jurisdiction at Calcutta. The chief-justice was Sir Elijah Impey,

already mentioned as a schoolfellow of Hastings at Westminster. The

whole tendency of the Regulating Act was to establish for the first time the influence of the crown, or rather of parliament, in Indian affairs. The new members of council disembarked at Calcutta on the ioth of October 1774; and on the following day commenced the long feud which scarcely terminated twenty- one years later with the acquittal of Warren Hastings by the House of Lords. Macaulay states that the members of council were put in ill-humour because their salute of guns was not proportionate to their dignity. In a contemporary letter Francis thus expresses the same petty feeling: ” Surely Mr H. might have put on a ruffled shirt.” Taking advantage of an ambiguous clause in their commission, the majority of the council (for Barwell uniformly sided with Hastings) forthwith proceeded to pass in review the recent measures of the governor- general. All that he had done they condemned; all that they could they reversed. Hastings was reduced to the position of a cipher at their meetings. After a time they lent a ready ear to detailed allegations of corruption brought against him by his old enemy Nuncomar. To charges from such a source, and brought in such a manner, Hastings disdained to reply, and referred his accuser to the supreme court. The majority of the council, in their executive capacity, resolved that the governor-general had been guilty of peculation, and ordered him to refund. A few days later Nuncomar was thrown into prison on a charge of forgery preferred by a private prosecutor, tried before the supreme court sitting in bar, found guilty by a jury of Englishmen and sentenced to be hanged. Hastings always maintained that he did not cause the charge to be instituted, and the legality of Nuncomar’s trial is thoroughly proved by Sir James Stephen. The majority of the council abandoned their supporter, who was executed in due course. He had forwarded a petition for reprieve to the council, which Clavering took care should not be presented in time, and which was subse- quently burnt by the common hangman on the motion of Francis. While the strife was at its hottest, Hastings had sent an agent to England with a general authority to place his resignation in the hands of the Company under certain conditions. The agent thought fit to exercise that authority. The resignation was promptly accepted, and one of the directors was appointed to the vacancy. But in the meantime Colonel Monson had died, and Hastings was thus restored, by virtue of his casting vote, to the supreme management of affairs. He refused to ratify his resignation; and when Clavering attempted to seize on the governor-generalship, he judiciously obtained an opinion from the judges of the supreme court in his favour. From that time forth, though he could not always command an absolute majority in council, Hastings was never again subjected to gross insult, and his general policy was able to prevail.

A crisis was now approaching in foreign affairs which de- manded all the experience and all the genius of Hastings for its solution. Bengal was prosperous, and free from external enemies on every quarter. But the government of Bombay had hurried on a rupture with the Mahratta confederacy at a time when France was on the point of declaring war against England, and when the mother-country found herself unable to subdue her rebellious colonists in America. Hastings did not hesitate to take upon his own shoulders the whole responsibility of military affairs. All the French settlements in India were promptly occupied. On the part of Bombay, the Mahratta war was conducted with procrastination and disgrace. But Hastings amply avenged the capitulation of Wargaon by the complete success of his own plan of operations. Colonel Goddard with a Bengal army marched across the breadth of the peninsula from the valley of the Ganges to the western sea, and achieved almost without a blow the conquest of Gujarat. Captain Popham, with a small detachment, stormed the rock fortress of Gwalior, then deemed impregnable and the key of central India; and by this feat held in check Sindhia, the most formidable of the Mahratta chiefs. The Bhonsla Mahratta raja of Nagpur, whose dominions bordered on Bengal, was won over by the diplomacy of an emissary of Hastings. But while these events were taking place,

a new source of embarrassment had arisen at Calcutta. The supreme court, whether rightly or wrongly, assumed a jurisdic- tion of first instance over the entire province of Bengal. The English common law, with all the absurdities and rigours of that day, was arbitrarily extended to an alien system of society. Zamindars, or government renters, were arrested on mesne process; the sanctity of the zen&na, or women's chamber, as dear to Hindus as to Mahommedans, was violated by the sheriff's officer; the deepest feelings of the people and the entire fabric of revenue administration were alike disregarded. On this point the entire council acted in harmony. Hastings and Francis went joint-bail for imprisoned natives of distinction. At last, after the dispute between the judges and the executive threatened to become a trial of armed force, Hastings set it at rest by a charac- teristic stroke of policy. A new judicial office was created in the name of the Company, to which Sir Elijah Impey was appointed, though he never consented to draw the additional salary offered to him. The understanding between Hastings and Francis, originating in this state of affairs, was for a short period extended to general policy. An agreement was come to by which Francis received patronage for his circle of friends, while Hastings was to be unimpeded in the control of foreign affairs. But a difference of interpretation arose. Hastings recorded in an official minute that he had found Francis's private and public conduct to be " void of truth and honour." They met as duellists. Francis fell wounded, and soon afterwards returned to England.

The Mahratta war was not yet terminated, but a far more formidable danger now threatened the English in India. The imprudent conduct of the Madras authorities had irritated beyond endurance the two greatest Mussulman powers in the peninsula, the nizam of the Deccan and Hyder Ali, the usurper of Mysore, who began to negotiate an alliance with the Mahrattas. A second time the genius of Hastings saved the British empire in the east. On the arrival of the news that Hyder had descended from the highlands of Mysore, cut to pieces the only British army in the field, and swept the Carnatic up to the gates of Madras, he at once adopted a policy of extraordinary boldness. He signed a blank treaty of peace with the Mahrattas, who were still in arms, reversed the action of the Madras government towards the nizam, and concentrated all the resources of Bengal against Hyder Ali. Sir Eyre Coote, a general of renown in former Carnatic wars, was sent by sea to Madras with all the troops and treasure that could be got together; and a strong body of rein- forcements subsequently marched southwards under Colonel Pearse along the coast line of Orissa. The landing of Coote preserved Madras from destruction, though the war

lasted through many campaigns and only terminated with the death of Hyder. Pearse's detachment was decimated by an epidemic of cholera (perhaps the first mention of this disease by name in Indian history) ; but the survivors penetrated to Madras, and not only held in check Bhonsla and the nizam, but also corro- borated the lesson taught by Goddard — that the Company's sepoys could march anywhere, when boldly led. Hastings's personal task was to provide the ways and means for this exhaust- ing war. A considerable economy was effected by a reform in the establishment for collecting the land tax. The government monopolies of opium and salt were then for the first time placed upon a remunerative basis. But these reforms were of necessity slow in their beneficial operation. The pressing demands of the military chest had to be satisfied by loans, and in at least one case from the private purse of the governor-general. Ready cash could alone fill up the void; and it was to the hoards of native princes that Hastings's fertile mind at once turned. Chait Sing, raja of Benares, the greatest of the vassal chiefs who had grown rich under the protection of the British rule, lay under the suspicion of disloyalty. The wazir of Oudh had fallen into arrears in the payment due for the maintenance of the Company's garrison posted in his dominions, and his administra- tion was in great disorder. In his case the ancestral hoards were under the control of his mother, the begum of Oudh, into whese hands they had been allowed to pass at the time when Hastings

was powerless in council. Hastings resolved to make a progress up country in order to arrange the affairs of both provinces, and bring back all the treasure that could be squeezed out of its holders by his personal intervention. When he reached Benares and presented his demands, the raja rose in insurrection, and the governor-general barely escaped with his life. But the faithful Popham rapidly rallied a force for his defence. The insurgents were defeated again and again; Chait Sing took to flight, and an augmented permanent tribute was imposed upon his suc- cessor. The Oudh business was managed with less risk. The wazir consented to everything demanded of him. The begum was charged with having abetted Chait Sing in his rebellion; and after the severest pressure applied to herself and her attendant eunuchs, a fine of more than a million sterling was exacted from her. Hastings appears to have been not altogether satisfied with the incidents of this expedition, and to have antici- pated the censure which it received in England. As a measure of precaution, he procured documentary evidence of the rebellious intentions of the raja and the

begum, to the validity of which Impey obligingly lent his extra-judicial sanction.

The remainder of Hastings's term of office in India was passed in comparative tranquillity, both from internal opposition and foreign war. The centre of interest now shifts to the India House and to the British parliament. The long struggle between the Company and the ministers of the crown for the supreme control of Indian affairs and the attendant patronage had reached its climax. The decisive success of Hastings's adminis- tration alone postponed the inevitable solution. His original term of five years would have expired in 1778; but it was annually prolonged by special act of parliament until his voluntary resignation. Though Hastings was thus irremovable, his policy did not escape censure. Ministers were naturally anxious to obtain the reversion to his vacant post, and Indian affairs formed at this time the hinge on which party politics turned. On one occasion Dundas carried a motion in the House of Commons, censuring Hastings and demanding his recall. The directors of the Company were disposed to act upon this resolution; but in the court of proprietors, with whom the decision ultimately lay. Hastings always possessed a sufficient majority. Fox's India Bill led to the downfall of the Coalition ministry in 1783. The act which Pitt successfully carried in the following year introduced a new constitution, in which Hastings felt that he had no place. In February 1785 he finally sailed from Calcutta, after a dignified ceremony of resignation, and amid enthusiastic farewells from all classes.

On his arrival in England, after a second absence of sixteen years, he was not displeased with the reception he met with at court and in the country. A peerage was openly talked of as his due, while his own ambition pointed to some responsible office at home. Pitt had never taken a side against him, while Lord Chancellor Thurlow was his pronounced friend. But he was now destined to learn that his enemy Francis, whom he had discomfited in the council chamber at Calcutta, was more than his match in the parliamentary arena. Edmund Burke had taken the subject races of India under the protection of his eloquence. Francis, who had been the early friend of Burke, supplied him with the personal animus against Hastings, and with the know-ledge of detail, which he might otherwise have lacked. The Whig party on this occasion unanimously followed Burke's lead. Dundas, Pitt's favourite subordinate, had already committed himself by his earlier resolution of censure; and Pitt was induced by motives which are still obscure to incline the ministerial majority to the same side. To meet the oratory of Burke and Sheridan and Fox, Hastings wrote an elaborate minute with which he wearied the ears of the House for two

successive nights, and he subsidized a swarm of pamphleteers. The impeachment was decided upon in 1786, but the actual trial did not commence until 1788. For seven long years Hastings was upon his defence on the charge of " high crimes and misdemeanours." During this anxious period he appears to have borne himself with characteristic dignity, such as is consistent with no other hypothesis than the consciousness of innocence. At last, in 1795, the House

of Lords gave a verdict of not guilty on all charges laid against him; and he left the bar at which he had so frequently appeared, with his reputation clear, but ruined in fortune. However large the wealth he brought back from India, all was swallowed up in defraying the expenses of his trial. Continuing the line of conduct which in most other men would be called hypocrisy, he forwarded a petition to Pitt praying that he might be reimbursed his costs from the public funds. This petition, of course, was rejected. At last, when he was reduced to actual destitution, it was arranged that the East India Company should grant him an annuity of £4000 for a term of years, with £90,000 paid down in advance. This annuity expired before his death; and he was compelled to make more than one fresh appeal to the bounty of the Company, which was never withheld. Shortly before his acquittal he had been able to satisfy the dream of his childhood, by buying back the ancestral manor of Daylesford, where the remainder of his life was passed in honourable retirement. In 1 813 he was called on to give evidence upon Indian affairs before the two houses of parliament, which received him with excep- tional marks of respect. The university of Oxford conferred on him the honorary degree of D.C.L.; and in the following year he was sworn of the privy council, and took a prominent part in the reception given to the duke of Wellington and the allied sovereigns. He died on the 22nd of August 1818, in his 86th year, and lies buried behind the chancel of the parish church, which he had recently restored at his own charges.

In physical appearance, Hastings " looked like a great man, and not like a bad man." The body was wholly subjugated to the mind. A frame naturally slight had been further attenuated by rigorous habits of temperance, and thus rendered proof against the diseases of the tropics. Against his private character not even calumny has breathed a reproach. As brother, as husband and as friend, his affections were as steadfast as they were warm. By the public he was always regarded as reserved, but within his own inner circle he gave and received perfect confidence. In his dealings with money, he was characterized rather by liberality of expenditure than by carefulness of acquisi- tion. A classical education and the instincts of family pride saved him from both the greed and the vulgar display which marked the typical "

nabob," the self-made man of those days. He could support the position of a governor-general and of a country gentleman with equal credit. Concerning his second marriage, it suffices to say that the Baroness Imhoff was nearly forty years of age, with a family of grown-up children, when the complaisant law of her native land allowed her to become Mrs Hastings. She survived her husband, who cherished towards her to the last the sentiments of a lover. Her children he adopted as his own; and it was chiefly for her sake that he desired the peerage which was twice held out to him.

Hastings's public career will probably never cease to be a subject of controversy. It was his misfortune to be the scape- goat upon whose head parliament laid the accumulated sins, real and imaginary, of the East India Company. If the acquisi- tion of the Indian empire can be supported on ethical grounds, Hastings needs no defence. No one who reads his private correspondence will admit that even his least defensible acts were dictated by dishonourable motives. It is more pleasing to point out certain of his public measures upon which no difference of opinion can arise. He was the first to attempt to open a trade route with Tibet, and to organize a survey of Bengal and of the eastern seas. It was he who persuaded the pundits of Bengal to disclose the treasures of Sanskrit to European scholars. He founded the Madrasa or college for Mahommedan education at Calcutta, primarily out of his own funds; and he projected the foundation of an Indian institute in England. The Bengal Asiatic Society was established under his auspices, though he yielded the post of president to Sir W. Jones. No Englishman ever understood the native character so well as Hastings; none ever devoted himself more heartily to the promotion of every scheme, great and small, that could advance the prosperity of India. Natives and Anglo-Indians alike venerate his name, the former as their first beneficent administrator, the latter as the

most able and the most enlightened of their own class. If Clive's sword conquered the Indian empire, it was the brain of Hastings that planned the system of civil administration, and his genius that saved the empire in its darkest hour.

See G. B. Malleson, Life of Warren Hastings (1894); G. W.

Forrest, The Administration of Warren Hastings (Calcutta, 1892);

Sir Charles Lawson, The Private Life of Warren Hastings (1895);

L. J. Trotter, Warren Hastings (" Rulers of India " series) (1890);

Sir Alfred Lyall, Warren Hastings (" English Men of Action " series) (1889) ; F. M. Holmes, Four Heroes of India (1892) ; G. W. Hastings, A Vindication of Warren Hastings (1909). Macaulay's famous essay, though a classic, is very partial and inaccurate; and Burke's speech, on the impeachment of Warren Hastings, is magnificent rhetoric. The true historical view has been restored by Sir James Stephen's Story of Nuncomar (1885) and by Sir John Strachey's Hastings and the Rohilla War (1892), and it is enforced in some detail in Sydney C. Grier's Letters of Warren Hastings to his Wife (1905), material for which existed in a mass of documents relating to Hastings, acquired by the British Museum. (J. S. Co.)

HASTINGS, a municipal, county and parliamentary borough and watering-place of Sussex, England, one of the Cinque Ports, 62 m. S.E. by S. from London, on the South Eastern & Chatham and the London, Brighton & South Coast railways. Pop. (1901), 65,528. It is picturesquely situated at the mouth of two narrow valleys, and, being sheltered by considerable hills on the north and east, has an especially mild climate. Eastward along the coast towards Fairlight, and inland, the country is beautiful. A parade fronts the English Channel, and connects the town on the west with St Leonard's, which is included within the borough. This is mainly a residential quarter, and has four railway stations on the lines serving Hastings. Both Hastings and St Leonard's have fine piers; there is a covered parade known as the Marina, and the Alexandra Park of 75 acres was opened in 1891. There are also numerous publi : gardens. The sandy beach is extensive, and affords excellent bathing. On the brink of the West Cliff stand a square and a circular tower and other fragments of the castle, probably erected soon after the time of William the Conqueror; together with the ruins, opened up by excavation in 1824, of the castle chapel, a transitional Norman structure no ft. long, with a nave, chancel and aisles. Besides the chapel there was formerly a college, both being under the control of a dean and secular canons. The deanery was held by Thomas Becket, and one of the canOnries by William of Wykeham. The principal public buildings are the old parish churches of All Saints and St Clements, the first containing in its register for 1619 the baptism of Titus Oates, whose father was rector of the parish; numerous modern churches, the town hall (1880); theatre, music hall and assembly rooms. The Brassey Institute contains a public library, museum and art school. The Albert Memorial clock-tower was erected in 1864. Educational institu- tions include the

grammar school (1883), school of science and art (1878) and technical schools. At the west end of the town are several hospitals and convalescent homes. The prosperity of the town depends almost wholly on its reputation as a watering- place, but there is a small fishing and boat-building industry. In 1890 an act of parliament authorized the construction of a harbour, but the work, begun in 1896, was not completed. The fish-market beneath the castle cliff is picturesque. The parlia- mentary borough, returning one member, falls within the Rye division of the county. The county borough was created in 1888. The municipal borough is under a mayor, 10 aldermen and 30 councillors. Area, 4857 acres.

Rock shelters on Castle Hill and numerous flint instruments which have been discovered at Hastings point to an extensive neolithic population, and there are ancient earthworks and a promontory camp of unknown date. There is no evidence that Hastings was a Roman settlement, but it was a place of some note in the Anglo-Saxon period. In 795 land at Hastings (Haestingaceaster, Haestingas, Haestingaport) is included in a grant, which may possibly be a forgery, of a South Saxon chieftain to the abbey of St Denis in France; and a royal mint was established at the town by ˆEthelstan. The battle of Hastings in 1066 described below was the first and decisive act of the Norman Conquest. It was fought near the present Battle Abbey,

about 6 m. inland. After the Conquest William I. erected the earthworks of the existing castle. By 1086 Hastings was a borough and had given its name to the rape of Sussex in which it lay. The town at that time had a harbour and a market. Whether Hastings was one of the towns afterwards known as the Cinque Ports at the time when they received their first charter from Edward the Confessor is uncertain, but in the reign of William I. it was undoubtedly among them. These combined towns, of which Hastings was the head, had special liberties and a separate jurisdiction under a warden. The only charter peculiar to Hastings was granted in 1589 by Elizabeth, and incorporated the borough under the name of ” mayor, jurats and commonalty,” instead of the former title of ” bailiff, jurats and commonalty.” Hastings returned two members to parlia- ment probably from 1322, and certainly from 1366, until 1885, when the number was reduced to one.

Battle of Hastings. — On the 28th of September 1066, William of Normandy, bent on asserting by arms his right to the English crown, landed at Pevensey. King Harold, who had destroyed the invaders of northern England at the battle of Stamford Bridge in Yorkshire, on hearing the news hurried southward, gathering what forces he could

on the way. He took up his position, athwart the road from Hastings to London, on a hill 1 some 6 m. inland from Hastings, with his back to the great forest of Anderida (the Weald) and in front of him a long glacis- like slope, at the bottom of which began the opposing slope of Telham Hill. The English army was composed almost entirely of infantry. The shire levies, for the most part destitute of body armour and with miscellaneous and even improvised weapons, were arranged on either flank of Harold's guards (huscarles), picked men armed principally with the Danish axe and shield.

Before this position Duke William appeared on the morning of the 14th of October. His host, composed not only of his Norman vassals but of barons, knights and adventurers from all quarters, was arranged in a centre and two wings, each corps having its archers and arblasters in the front line, the rest of the infantry in the second and the heavy armoured cavalry in the third. Neither the arrows nor the charge of the second line of foot-men, who, unlike the English, wore defensive mail, made any impression on the English standing in a serried mass behind their interlocked shields. 2

Then the heavy cavalry came on, led by the duke and his brother Odo, and encouraged by the example of the minstrel Taillefer, who rode forward, tossing and catching his sword, into the midst of the English line before he was pulled down and killed. All along the front the cavalry came to close quarters with the defenders, but the long powerful Danish axes were

1 Freeman called this hill Senlac and introduced the fashion of describing the battle as " the battle of Senlac." Mr J. H. Round, however, proved conclusively that this name, being French (Sen-lecque), could not have been in use at the time of the Conquest, that the battlefield had in fact no name, pointing out that in William of Malmesbury and in Domesday Book the battle is called " of . Hastings " (Bellum Hastingense), while only one writer, Ordericus Vitalis, describes it two hundred years after the event as Bellum Senlacium. See Round, Feudal England (London, 1895), p. 333 et sen.

2 There is still a difference of opinion as to whether the English were, or were not, defended by any other rampart than that of the customary " shield-wall." Freeman, apparently as a result of a misunderstanding of a passage in Henry of Huntingdon and the slightly ambiguous verse of Wace in the Roman du Rou (11. 6991-6994 and 11. 7815-7826), affirms that Harold turned " the battle as far as possible into the likeness of a siege," by building round hig troops a " palisade " of solid timber {Norman Conquest, iii. 444). This

was proved to be a fable by J. H. Round, in the course of a general attack on Freeman's historical method, which provoked the professor's defenders to take up the cudgels on his behalf in a very long and lively controversy. "The result of this was that Freeman's account was wholly discredited, though Round'sview-~that there was no wall of any kind save the shield-wall— is not generally accepted. Professor Oman {Academy, June 9, 1894), for instance, holds that there was " an abattis of some sort " set to hamper the advance of cavalry (see also English History, vol. ix., p. 474). Mr Round sums up the controversy, from his point of view, in his Feudal England, p. 340 et seq., where references to other monographs on the subiect will be found.

as formidable as the halbert and the bill proved to be in battles of later centuries, and they lopped off the arms of the assailants and cut down their horses. The fire of the attack died out and the left wing (Bretons) fled in rout. But as thefyrd levies broke out of the line and pursued the Bretons down the hill in a wild, formless mob, William's cavalry swung round and destroyed them, and this suggested to the duke to repeat deliberately what the Bretons had done from fear. Another advance , followed by a feigned retreat, drew down a second large body of the English from the crest, and these in turn, once in the open, were ridden over and slaughtered by the men-at-arms. Lastly, these two disasters having weakened the defenders both materially and morally, William subjected the huscarles, who had stood fast when the fyrd broke its ranks, to a constant rain of arrows, varied from time to time by cavalry charges. These magnificent soldiers endured the trial for many hours, from noon till close on nightfall; but at last, when the Norman archers raised their bows so as to pitch the arrows at a steep angle of descent in the midst of the huscarles, the strain became too great. While some rushed forward alone or in twos and threes to die in the midst of the enemy, the remainder stood fast, too closely crowded almost for the wounded to drop. At last Harold received a mortal wound, the English began to waver, and the knights forced their way in. Only a remnant of the defenders made its way back to the forest; and William, after resting for a night on the hardly-won ground, began the work of the Norman Conquest.

HASTINGS, a city and the county-seat of Adams county, Nebraska, U.S.A., about 95 m. W. by S. of Lincoln. Pop. (1890) 13,584; (1900) 7188 (1253 foreign-born); (1910) 9338. Hastings is served by the

Chicago, Burlington & Quincy, the Chicago & North-western, the Missouri Pacific and the St Joseph & Grand Island railways. It is the seat of Hastings College (Presbyterian, coeducational), opened in 1882, and having 286 students in 1908, and of the state asylum for the chronic insane. The city carries on a considerable jobbing business for the farm- ing region of which it is the centre and produce market. There are a large foundry and several large brickyards here. Hastings was settled in 1872, was incorporated in 1874 and was chartered as a city in the same year.

HAT, a covering for the head worn by both sexes, and dis- tinguished from the cap or bonnet by the possession of a brim. The word in O.E. is hast, which is cognate with O. Frisian halt, O.N. hotte, &c, meaning head-covering, hood ; it is distantly related to the O.E. hod, hood, which is cognate with the German for ” hat,” Hut. The history of the hat as part of the apparel of both sexes, with the various changes in shape which it has undergone, is treated in the article Costume.

Hats were originally made by the process of felting, and as tradition ascribed the discovery of that very ancient operation to St Clement, he was assumed as the patron saint of the craft. At the present day the trade is divided into two distinct classes. The first and most ancient is concerned with the manufacture of felt hats, and the second has to do with the recent but now most extensive and important manufacture of silk or dress hats. In addition to these there is the important manufacture of straw or plaited hats (see Straw and Straw Manufactures); and hats are occasionally manufactured of materials and by processes not included under any of these heads, but such manufactures do not take a large or permanent position in the industry.

Felt Hats. — There is a great range in the quality of felt hats: the finer and more expensive qualities are made entirely of fur; for commoner qualities a mixture of fur and wool is used ; and for the cheapest kinds wool alone is employed. The processes and apparatus necessary for making hats of fur differ also from those required in the case of woollen bodies; and in large manufactories machinery is now generally employed for operations which at no distant date were entirely manual. An outline of the operations by which the old beaver hat was made will give an idea of the manual processes in making a fur napped hat, and the apparatus and mechanical processes employed in making ordinary hard and soft felts will afterwards be noticed.

Hatters’ fur consists principally of the hair of rabbits (technically - ailed coneys) and hares, with some proportion of nutria, musquash

ai.J beavers hair; and generally any parings and cuttings from

furriers are also used. Furs intended for felting are deprived of their long coarse hairs, after which they are treated with a solution of nitrate of mercury, an operation called carroting or secretage, whereby the felting properties of the fur are greatly increased. The fur is then cut by hand or machine from the skin, and in this state it is delivered to the hat maker.

The old process of making a beaver hat was as follows. The materials of a proper beaver consisted, for the body or foundation, of rabbits' fur, and for the nap, of beaver fur, although the beaver was often mixed with or supplanted by a more common fur. In pre- paring the fur plate, the hatter weighed out a sufficient quantity of rabbit fur for a single hat, and spread it out and combined it by the operation of bowing. The bow or stang ABC (fig. 1) was about

Fig. 1.

7 ft. long, and it stretched a single cord of catgut D, which the workman vibrated by means of a wooden pin E, furnished with at half knob at each end. Holding the bow in his left hand, and the pint in his right, he caused the vibrating string to come in contact with the heap of tangled fur, which did not cover a space greater than that of the hand. At each vibration some of the filaments started up to the height of a few inches, and fell away from the mass, a little to the right of the bow, their excursions being restrained by a concave frame of wicker work called the basket. One half of the material was first operated on, and by bowing and gathering, or a patting use of the basket, the stuff was loosely matted into a triangular figure, about 50 by 36 in., called a bat. In this formation care was taken to work about two-thirds of the fur down towards what was intended for the brim, and this having been effected, greater density was in- duced by gentle pressure with the basket. It was then covered with a wettish linen cloth, upon which was laid the hardening skin, a piece of dry half-tanned horse hide. On this the workman pressed until the stuff adhered closely to the damp cloth, in which it was then doubled up, freely pressed with the hand, and laid aside. By this process, called basoning, the bat became compactly felted and thinned toward the-sides and point. The other half of the fur was next subjected to precisely the same processes, after which a cone-shaped slip of stiff paper was laid on its surface, and the sides of the bat were folded over ics edges to its form and size. It was then laid paper-side downward upon the first bat, which was now replaced on the hurdle, and its edges were transversely doubled over the introverted side-lays of the second bat, thus giving equal

thickness to the whole body. In this condition it was reintroduced between folds of damp linen cloth, and again hardened, so as to unite the two halves, the knitting together of which was quickly effected. The paper was then with- drawn, and the body in the form of a large cone removed to the plank or battery room.

The battery consisted of an open iron boiler or kettle A (fig. 2), filled with scalding hot water, with shelves, B, C, partly of mahogany and partly of lead, slop- ing down to it. Here the body was first dipped in the water, and then withdrawn to the plank to cool and drain, when it was unfolded, rolled gently with a pin tapering towards the ends, turned, and worked in every direction, to toughen and shrink it, and at the same time prevent adhesion of its sides. Stopping or thickening any thin spots seen on looking through the body, was carefully performed by dabbing on additional stuff in succes-

Fig. 2.

sive supplies from the hot liquor with a brush frequently dipped into the kettle, until the body was shrunk sufficiently (about one-half) and thoroughly equalized. When quite dried, stiffening was effected with a brush dipped into a thin varnish of shellac, and rubbed into the body, the surface intended for the inside having much more laid on it than the outer, while the brim was made to absorb many times the quantity applied to any other part.

On being again dried, the body was ready to be covered with a nap of beaver hair. For this, in inferior qualities, the hair of the otter, nutria or other fine fur was sometimes substituted. The requisite quantity of one or other of these was taken and mixed with a pro- portion of cotton, and the whole was bowed up into a thin uniform lap. The cotton merelv served to give sufficient body to the material to enable the workman :o handle the lap. The body of the hat

being damped, the workman spread over it a covering of this lap, and by moistening and gentle patting with a brush the cut ends of the hair penetrated and fixed themselves in the felt body. The hat was then put into a coarse hair cloth, dipped and rolled in the hot liquor until the fur was quite worked in, the cotton being left on the surface loose and ready for removal. The blocking, dyeing and finishing processes in the case of beaver hats were similar to those employed for ordinary felts,

except that greater care and dexterity were required on the part of the workmen, and further that the coarse hairs or kemps which might be in the fur were cut off by shaving the surface with a razor. The nap also had to be laid in one direction, smoothed and rendered glossy by repeated wettings, ironings and brushings. A hat so finished was very durable and much more light, cool and easy-fitting to the head than the silk hat which has now so largely superseded it.

The first efficient machinery for making felt hats was devised in America, and from the United States the machine-making processes were introduced into England about the year 1858; and now in all large establishments machinery such as that alluded to below is employed. For the forming of hat bodies two kinds of machine are used, according as the material employed is fur or wool. In the case of fur, the essential portion of the apparatus is a ” former,” con- sisting of a metal cone of the size and form of the body or bat to be made, perforated all over with small holes. The cone is made to revolve on its axis slowly over an orifice under which there is a powerful fan, which maintains a strong inward draught of air through the holes in the cone. At the side of the cone, and with an opening towards it, is a trunk or box from which the fur to be made into a hat is thrown out by the rapid revolution of a brush- like cylinder, and as the cloud of separate hairs is expelled from the trunk, the current of air being sucked through the cone carries the fibres to it and causes them to cling closely to its surface. Thus a coating of loose fibres is accumulated on the copper cone, and these are kept in position only by the exhaust at work under it. When sufficient for a hat body has been deposited, it is damped and a cloth is wrapped round it; then an outer cone is slipped over it and the whole is removed for felting, while another copper cone is placed in position for continuing the work. The fur is next felted by being rolled and pressed, these operations being performed partly by hand and partly by machine.

In the case of wool hats the hat or body is prepared by first carding in a modified form of ca.rd.ing machine. The wool is divided into two separate slivers as delivered from the cards, and these are wound simultaneously on a double conical block of wood mounted and geared to revolve slowly with a reciprocating horizontal motion, so that there is a continual crossing and recrossing of the wool as the sliver is wound around the cone. This diagonal arrangement of the sliver is an essential feature in the apparatus, as thereby the strength of the finished felt is made equal in every direction; and when strained in the blocking the texture yields in a uniform manner without rupture. The wool wound on the double block forms the material of two hats, which are separated by cutting around the

median or base line, and slipping each half off at its own end. Into each cone of wool or bat an ” inlayer ” is now placed to prevent the inside from matting, alter which they are folded in cloths, and placed over a perforated iron plate through which steam is blown. When well moistened and heated, they are placed between boards, and subjected to a rubbing action sufficient to harden them for bearing the subsequent strong planking or felting operations. The planking of wool hats is generally done by machine, in some cases a form of fulling mill being used; but in all forms the agencies are heat, moisture, pressure, rubbing and turning.

When by thorough felting the hat bodies of any kind have been reduced to dense leathery cones about one-half the size of the original bat, they are dried, and, if hard felts are to be made, the bodies are at this stage hardened or stiffened with a varnish of shellac. Next follows the operations of blocking, in which the felt for the first time assumes approximately the form it is ultimately to possess. For this purpose the conical body is softened in boiling water, and forcibly drawn over and over a hat-shaped wooden block. The operation of dyeing next follows, and the finishing processes include shaping on a block, over which crown and brim receive ultimately their accurate form, and pouncing or pumicing, which consists of smoothing the surface with fine emery paper, the hat being for this purpose mounted on a rapidly revolving block. The trimmer finally binds the outer brim and inserts the lining, after which the brim may be given more or less of a curl or turn over according to pre- vailing fashion.

Silk Huts. — The silk hat, which has now become co-extensive with civilization, is an article of comparatively recent introduction. It was invented in Florence about 1760, but it was more than half a century before it was worn to any great extent.

A silk hat consists of a light stilt body covered with a plush of silk, the manufacture of which in a brilliant glossy condition is the most important element in the industry. Originally the bodies were made of felt and various other materials, but now calico is chiefly used. The calico is first stiffened with a varnish of shellac, and then cut into pieces sufficient for crown, side and brim. The side-piece is wound round a wooden hat block, and its edges are

joined by hot ironing, and the crown-piece is put on and similarly attached to the side. The brim, consisting of three thicknesses of calico cemented together, is now slipped over and brought to its position, and thereafter a second side-piece and another crown are cemented on. The whole of the body, thus prepared, now receives a coat of size,

and subsequently it is varnished over, and thus it is ready for the operation of covering. In covering this body, the under brim, generally of merino, is first attached, then the upper brim, and lastly the crown and side sewn together are drawn over. All these by hot ironing and stretching are drawn smooth and tight, and as the varnish of the body softens with the heat, body and cover adhere all over to each other without wrinkle or pucker. Dressing and polishing by means of damping, brushing and ironing, come next, after which the hat is " velured " in a revolving machine by the application of haircloth and velvet velures, which cleans the nap and gives it a smooth and glossy surface. The brim has only then to be bound, the linings inserted, and the brim finally curled, when the hat is ready for use.

HATCH, EDWIN (1835-1889), English theologian, was born at Derby on the 14th of September 1835, and was educated at King Edward's school, Birmingham, under James Prince Lee, afterwards bishop of Manchester. He had many struggles to pass through in early life, which tended to discipline his character and to form the habits of severe study and the mental independ- ence for which he came to be distinguished. Hatch became scholar of Pembroke College, Oxford, took a second-class in classics in 1857, and won the Ellerton prize in 1858. He was professor of classics in Trinity College, Toronto, from 1859 to 1862, when he became rector of the high school at Quebec. In 1867 he returned to Oxford, and was made vice-principal of St Mary Hall, a post which he held until 1885. In 1883 he was presented to the living of Purleigh in Essex, and in 1884 was appointed university reader in ecclesiastical history. In 1880 he was Bampton lecturer, and from 1880 to 1884 Grinfield lecturer on the Septuagint. In 1883 the university of Edinburgh conferred on him the D.D. degree. He was the first editor of the university official Gazette (1870), and of the Student's Hand- book to the University. A reputation acquired through certain contributions to the Dictionary of Christian Antiquities was confirmed by his treatises On the Organization of the Early Christian Churches (1881, his Bampton lectures), and on The Influence of Greek Ideas and Usages on the Christian Churth (the Hibbert lectures for 1888). These works provoked no little criticism on account of the challenge they threw down to the high-church party, but the research and fairness displayed were admitted on all hands. The Bampton lectures were translated into German by Harnack. Among his other works are The Growth of Church Institutions (1887); Essays in Biblical Greek (1889); A Concordance to the Septuagint (in collaboration with H. A. Redpath); Towards Fields of Light (verse, 1889); The God of Hope (sermons with memoir, 1890). Hatch died on the 10th of November 1889.

An appreciation by W. Sanday appeared in The Expositor for February 1890.

HATCH. 1. (In Mid. Eng. hacche; the word is of obscure origin, but cognate forms appear in Swed. hacka, and Dan. hackke; it has been connected with ” hatch,” grating, with possible reference to a coop, and with ” hack ” in the sense ” to peck,” of chickens coming out of the shell), to bring out young from the egg, by incubation or other process, natural or artificial. The word is also used as a substantive of a brood of chickens brought out from the eggs. ” Hatchery ” is particularly applied to a place for the hatching of fish spawn, where the natural process is aided by artificial means. In a figurative sense ” to hatch ” is often used of the development or contrivance of a plot or conspiracy.

2. (From the Fr. hacker, to cut, hache, hatchet), to engrave or draw by means of cutting lines on wood, metal, &c, or to ornament by inlaying with strips of some other substance as gold or silver. Engraved lines, especially those used in shading, are called ” hatches ” or ” hachures ” (see Hachure).

3. (O.E. hac, a gate, rack in a stable; found in various Teutonic languages; cf. Dutch hek, Dan. hekke; the ultimate origin is obscure; Skeat suggests a connexion with the root seen in ” hook “), the name given to the lower half of a divided

door, as in ” buttery-hatch,” the half-door leading from the buttery or kitchen, through which the dishes could be passed into the dining-hall. It was used formerly as another name for a ship’s deck, and thus the phrase ” under hatches ” meant properly below deck; the word is now applied to the doors of grated framework covering the openings (the ” hatchways “) which lead from one deck to another into the hold through which the cargo is lowered. In Cornwall the word is used to denote certain dams or mounds used to prevent the tin-washes and the water coming from the stream-works from flowing into the fresh rivers.

HATCHET (adapted from the Fr. hachette, diminutive of hache, axe, hacher, to cut, hack), a small, light form of axe with a short handle (see Tool); for the war-hatchet of the North American Indians and the symbolical ceremonies connected with it see Tomahawk.

HATCHETTITE, sometimes termed Mountain Tallow, Mineral Adipocire, or Adipocerite, a mineral hydrocarbon occurring in the Coal-measures of Belgium and elsewhere, occupying in some cases the interior of hollow concretions of iron-ore, but more generally the cavities of fossil shells or crevices in the rocks. It is of yellow colour, and translucent, but darkens and becomes opaque on exposure. It has no odour, is greasy to the touch, and has a slightly glistening lustre. Its hardness is that of soft wax. The melting point is 46° to 47 C, and the composition is C. 85-55, H. 14-45.

HATCHMENT, properly, in heraldry, an escutcheon or armorial shield granted for some act of distinction or ” achievement,” of which word it is a corruption through such forms as atcheament, achement, hachement, &c. ” Achievement ” is an adaptation of the Fr. achevcment, from achever, a chef venir, Lat. ad caput venire, to come to a head, or conclusion, hence accomplish, achieve. The term ” hatchment ” is now usually applied to funeral escutcheons or armorial shields enclosed in a black lozenge-shaped frame suspended against the wall of a deceased person’s house. It is usually placed over the entrance at the level of the second floor, and remains for from six to twelve months, when it is removed to the parish church. ‘ This custom is falling into disuse, though still not uncommon. It is usual to hang the hatchment of a deceased head of a house at the univer- sities of Oxford and Cambridge over the entrance to his lodge or residence.

If for a bachelor the hatchment bears upon a shield his arms, crest, and other appendages, the whole on a black ground. If for a single woman, her arms are represented upon a lozenge,

bordered with knotted ribbons, also on a black ground. If the hatchment be for a married man (as in the illustration), his arms upon a shield impale those of his surviving wife; or if she be an heiress they are placed upon a scutcheon of pretence, and crest and other appendages are added. The dexter half of the ground is black, the sinister white. For a wife whose hus- band is alive the same arrange- ment is used, but the sinister ground only is black. For a – ˆugˆjˆf ˆ ‘ ■” M ” 1 ” sdhr) widower the same is used as f* |— WW IKqifpWJiH J for a married man, but the

whole ground is black; for a widow the husband’s arms are given with her own, but upon a lozenge, with ribbons, without crest or appendages, and the whole ground is black. When there have been two wives or two husbands the ground is divided into three parts per pale, and the division behind the arms of the survivor is white. Colours and military or naval emblems are sometimes placed behind

the arms of military or naval officers. It is thus easy to discern from the hatchment the sex, condition and quality, and possibly the name of the deceased.

In Scottish hatchments it is not unusual to place the arms of the father and mother of the deceased in the two lateral angles of the lozenge, and sometimes the 4, 8 or 16 genealogical escutcheons are ranged along the margin.

HATFIELD, a town in the Mid or St Albans parliamentary division of Hertfordshire, England, 17I m. N. of London by the Great Northern railway. Pop. (1901), 4754. It lies picturesquely on the flank of a wooded hill, and about its foot, past which runs the Great North Road. The church of St Etheldreda, well situated towards the top of the hill, contains an Early English round arch with the dog-tooth moulding, but for the rest is Decorated and Perpendicular, and largely restored. The chapel north of the chancel is known as the Salisbury chapel, and was erected by Robert Cecil, first earl of Salisbury (d. 1612), who was buried here. It is in a mixture of classic and Gothic styles. In a private portion of the churchyard is buried, among others of the family, the third marquess of Salisbury (d. 1903). In the vicinity is Hatfield House, close to the site of a palace of the bishops of Ely, which was erected about the beginning of the 1 2 th century. From this palace comes the proper form of the name of the town, Bishop's Hatfield. In 1538 the manor was resigned to Henry VIII. by Bishop Thomas Goodrich of Ely, in exchange for certain lands in Cambridge, Essex and Norfolk; and after that monarch the palace was successively the residence of Edward VI. immediately before his accession, of Queen Elizabeth during the reign of her sister Mary, and of James I. The last-named exchanged it in 1607 for Theobalds, near Cheshunt, in the same county, an estate of Robert Cecil, earl of Salisbury, in whose family Hatfield House has since remained. The west wing of the present mansion, built for Cecil in 1608- 161 1, was destroyed by fire in November 1835, the dowager marchioness of Salisbury, widow of the 1st marquess, perishing in the flames. Hatfield House was built, and has been restored and maintained, in the richest style of its period, both without and within. The buildings of mellowed red brick now used as stables and offices are, however, of a period far anterior to Cecil's time, and are probably part of the erection of John Morton, bishop of Ely in 1478-1486. The park measures some 10 m. in circumference. From the eminence on which the mansion stands the ground falls towards the river Lea, which here expands into a small lake. Beyond this is a rare example of a monks' walled vineyard. In the park is also an ancient oak under which Elizabeth is said to have been seated when the news of her sister's death was brought to her. Brocket

Park is another fine demesne, at the neighbouring village of Lemsford, and the Brocket chapel in Hatfield church contains memorials of the families who have held this seat.

HATHERLEY, WILLIAM PAGE WOOD, 1ST Baron (1801- 1881), lord chancellor of Great Britain, son of Sir Matthew Wood, a London alderman and lord mayor who became famous for befriending Queen Caroline and braving George IV., was born in London on the 29th of November i8or. He was educated at Winchester, Geneva University, and Trinity College, Cam- bridge, where he became a fellow after being 24th wrangler in 1824. He entered Lincoln's Inn, and was called to the bar in 1824, studying conveyancing in Mr John Tyrrell's chambers. He soon obtained a good practice as an equity draughtsman and before parliamentary committees, and in 1830 married Miss Charlotte Moor. In 1845 he became Q.C., and in 1847 was elected to parliament for the city of Oxford as a Liberal. In 1849 he was appointed vice-chancellor of the county palatine of Lancaster, and in 185 1 was made solicitor-general and knighted, vacating that position in 1852. When his party returned to power in 1853, he was raised to the bench as a vice-chancellor. In 1868 he was made a lord justice of appeal, but before the end of the year was selected by Mr Gladstone to be lord chancellor, and was raised to the peerage as Lord Hatherley of Down Hatherley. He retired in 1872 owing to failing eyesight, but sat occasionally as a law lord. His wife's death in 1878 was a great blow, from which he never recovered, and he died in London on the 10th of July 1881. Dean Hook said that Lord Hatherley — who was a sound and benevolent supporter of the Church of

England — was the best man he had ever known. He was a particularly clear-headed lawyer, and his judgments — always delivered extempore — commanded the greatest confidence both with the public and the legal profession. He left no issue and the title became extinct on his death.

HATHERTON, EDWARD JOHN LITTLETON, ist Baron (1791-1863), was born 011 the 18th of March 1791 and was educated at Rugby school and at Brasenose College, Oxford. He was the only son of Moreton Walhouse of Hatherton, Stafford- shire; but in 181 2, in accordance with the will of his great-uncle Sir Edward Littleton, Bart. (d. 1812), he took the name of Littleton. From 181 2 to 1832 he was member of parliament for Staffordshire and from 1832 to 1835 for the

southern division of that county, being specially prominent in the House of Commons as an advocate of Roman Catholic emancipation. In January 1833, against his own wish, he was put forward by the Radicals as a candidate for the office of speaker, but he was not elected and in May 1833 he became chief secretary to the lord-lieutenant of Ireland in the ministry of Earl Grey. His duties in this capacity brought him frequently into conflict with O'Connell, but he was obviously unequal to the great Irishman, although he told his colleagues to " leave me to manage Dan." He had to deal with the vexed and difficult question of the Irish tithes on which the government was divided, and with his colleagues had to face the problem of a new coercion act. Rather hastily he made a compact with O'Connell on the assumption that the new act could not contain certain clauses which were part of the old act. The clauses, however, were inserted; O'Connell charged Littleton with deception; and in July 1834 Grey, Althorp (afterwards Earl Spencer) and the Irish secretary resigned. The two latter were induced to serve under the new premier, Lord Melbourne, and they remained in office until Melbourne was dismissed in November 1 834. In 1835 Littleton was created Baron Hatherton, and he died at his Staffordshire residence, Teddesley Hall, on the 4th of May 1863. In 1888 his grandson, Edward George Littleton (b. 1842), became 3rd Baron Hatherton.

See Hatherton's Memoirs and Correspondence relating to Political Occurrences, June-July 1834, edited by H. Reeve (1872) ; and Sir S. Walpole, History of England, vol. iii. (1890).

HATHRAS, a town of British India, in the Aligarh district of the United Provinces, 29 m. N. of Agra. Pop. (1001), 42,578. At the end of the 18th century it was held by a Jat chieftain, whose ruined fort still stands at the east end of the town, and was annexed by the British in 1803, but insubordination on the part of the chief necessitated the siege of the fort in 181 7. Since it came under British rule, Hathras has rapidly risen to commercial importance, and now ranks second to Cawnpore among the trading centres of the Doab. The chief articles of commerce are sugar and grain, there are also factories for ginning and pressing cotton, and a cotton spinning-miil. Hathras is connected by a light railway with Muttra, and by a branch with Hathras junction, on the East Indain main line.

HATTIESBURG, a city and the county-seat of Forrest county, Mississippi, U.S.A., on the Hastahatchce (or Leaf) river, about 90 m. S.E. of Jackson. Pop. (1890) 1172; (1900) 4175 (1687 negroes) ; (1910) 11,733. Hattiesburg is served by the Gulf &Ship Island, the .Mississippi Central, the New Orleans, Mobile & Chicago and the New

Orleans & North Eastern railways. The officers and employees of the Gulf & Ship Island railway own and maintain a hospital here. The city is in a rich farming, truck- gardening and lumbering country. Among its manufactures are lumber (especially yellow-pine), wood-alcohol, turpentine, paper and pulp, fertilizers, wagons, mattresses and machine-shop products. Hattiesburg was founded about 1882 and was named in honour of the wife of \V. H. Hardy, a railway official, who planned a town at the intersection of the New Orleans & North-Eastern (which built a round house and repair shops here in 1885) and the Gulf & Ship Island railways. The latter railway was opened from Gulfport to Hattiesburg in January 1897, and from Hattiesburg to Jackson in September 1900. Hattiesburg was incorporated as a town in 1884 and was chartered as a cily in 1899. Formerly the ” court house ” of the second judicial

district of Perry county, Hattiesburg became on the ist of January 1908 the county-seat of Forrest county, erected from the W. part of Perry county.

HATTINGEN, a town of Germany, in the Prussian province of Westphalia, on the river Ruhr, 21 m. N.E. of Dusseldorf. Pop. (1900), 8975. It has two Evangelical and a Roman Catholic church. The manufactures include tobacco, and iron and steel goods. In the neighbourhood are the ruins of the Isenburg, demolished in 1 2 26. Hattingen, which received communal rights in 1396, was one of the Hanse towns.

HATTO I. (c. 850-913), archbishop of Mainz, belonged to a Swabian family, and was probably educated at the monastery of Reichenau, of which be became abbot in 888. He soon became known to the German king, Arnulf, who appointed him arch- bishop of Mainz in 891; and he became such a trustworthy and confidential counsellor that he was popularly called ” the heart of the king.” He presided over the important synod at Tribur in 895, and accompanied the king to Italy in 894 and 895, where he was received with great favour by Pope Formosus. In 899, when Arnulf died, Hatto became regent of Germany, and guardian of the young king, Louis the Child, whose authority he compelled Zwentibold, king of Lorraine, an illegitimate son of Arnulf, to recognize. During these years he did not neglect his own interests, for in 896 he secured for himself the abbey of Ellwangen and in 898 thatof Lorsch. He assisted the Franconian family of the Conradines in its feud with the Babenbergs, and was accused of betraying Adalbert, count of Babenbcrg, to death. He retained his influence during the whole of the reign of Louis; and on the king’s death in 911 was prominent in securing the election of Conrad, duke

of Franconia, to the vacant throne. When trouble arose between Conrad and Henry, duke of Saxony, afterwards King Henry the Fowler, the attitude of Conrad was ascribed by the Saxons to the influence of Hatto, who wished to prevent Henry from securing authority in Thuringia, where the see of Mainz had extensive possessions. He was accused of complicity in a plot to murder Duke Henry, who in return ravaged the archiepiscopal lands in Saxony and Thuringia. He died on the 15th of May 913, one tradition saying he was struck by lightning, and another that he was thrown alive by the devil into the crater of Mount Etna. His memory was long regarded in Saxony with great abhorrence, and stories of cruelty and treachery gathered round his name. The legend of the Mouse Tower at Bingen is connected with Hatto II., who was archbishop of Mainz from 968 to 970. This Hatto built . the church of St George on the island of Reichenau, was generous to the see of Mainz and to the abbeys of Fulda and Reichenau, and was a patron of the chronicler Regino, abbot of Prum.

See E. Dummler, Geschichte des ostfrdnkischen Reichs (Leipzig, 1887-1888); G. Phillips, Die grosse Synode von Tribur (Vienna, 1865); J. Heidemann, Hatto I., Erzbischof von Mainz (Berlin, 1865); G. Waitz, Jahrbiicher der deutschen Geschichte unter Heinrich I. (Berlin and Leipzig, 1863); and J. F. Bohmer, Regesta archiepisco- porum Maguntinensium, edited by C. Will (Innsbruck, 1877-1886).

HATTON, SIR CHRISTOPHER (1 540-1 591), lord chancellor of England and favourite of Queen Elizabeth, was a son of William Hatton (d. 1546) of Holdenby, Northamptonshire, and was educated at St Mary Hall, Oxford. A handsome and accom- plished man, being especially distinguished for his elegant dancing, he soon attracted the notice of Queen Elizabeth, became one of her gentlemen pensioners in 1564, and captain of her bodyguard in 1572. He received numerous estates and many positions of trust and profit from the queen, and suspicion was not slow to assert that he was Elizabeth's lover, a charge which was definitely made by Mary queen of Scots in 1584. Hatton, who was probably innocent in this matter, had been made vice- chamberlain of the royal household and a member of the privy council in 1578, and had been a member of parliament since 1571, first representing the borough of Higham Ferrers and afterwards the county of Northampton. In 1578 he was knighted, and was now regarded as the queen's spokesman in the House of Commons, being an active agent in the prosecutions of John Stubbs and William Parry. He was one of those who were appointed to arrange a marriage between Elizabeth and Francis, duke of

Alencon, in 15S1; was a member of the court which tried Anthony Babington in 1586; and was one of the commissioners who found Mary queen of Scots guilty. He besought Elizabeth not to marry the French prince; and according to one account repeatedly assured Mary that he would fetch her to London if the English queen died. Whether or no this story be true, Hatton's loyalty was not questioned; and he was the foremost figure in that striking scene in the House of Commons in December 1584, when four hundred kneeling members repeated after him a prayer for Elizabeth's safety. Having been the constant recipient of substantial marks of the queen's favour, he vigorously denounced Alary Stuart in parliament, and advised William Davison to forward the warrant for her execution to Fother- ingay. In the same year (1587) Hatton was made lord chan- cellor, and although he had no great knowledge of the law, he appears to have acted with sound sense and good judgment in his new position. He is said to have been a Roman Catholic in all but name, yet he treated religious questions in a moderate and tolerant way. He died in London on the 20th of November 1591, and was buried in St Paul's cathedral. Although mention has been made of a secret marriage, Hatton appears to have remained single, and his large and valuable estates descended to his nephew, Sir William Newport, who took the name of Hatton. Sir Christopher was a knight of the Garter and chan- cellor of the university of Oxford. Elizabeth frequently showed her affection for her favourite in an extravagant and ostentatious manner. She called him her mouton, and forced the bishop of Ely to give him the freehold of Ely Place, Holborn, which became his residence, his name being perpetuated in the neighbouring Hatton Garden. Hatton is reported to have been a very mean man, but he patronized men of letters, and among his friends was Edmund Spenser. He wrote the fourth act of a tragedy, Tancrcd and Gismund, and his death occasioned several pane- gyrics in both prose and verse.

When Hatton's nephew, Sir William Hatton, died without sons in 1597, his estates passed to a kinsman, another Sir Christ- opher Hatton (d. 1619), whose son and successor, Christopher (c. 1605-1670), was elected a member of the Long Parliament in 1640, and during the Civil War was a partisan of Charles I. In 1643 he was created Baron Hatton of Kirby; and, acting as comptroller of the royal household, he represented thekingduring the negotiations at Uxbridge in 1645. Later he lived for some years in France, and after the Restoration was made a privy councillor and governor of Guernsey. He died at Kirby on the 4th of July 1670, and was buried in Westminster Abbey. By his wife Elizabeth (d. 1672), daughter of Sir

Charles Montagu of Boughton, he had two sons and three daughters. His eldest son Christopher (1632-1706), succeeded his father as Baron Hatton and also as governor of Guernsey in 1670. In 1683 he was created Viscount Hatton of Grendon. He was married three times, and left two sons: William (1690-1760), who succeeded to his father's titles and estates, and Henry Charles (c. 1700- 1762), who enjoyed the same dignities for a short time after his brother's death. When Henry Charles died, the titles became extinct, and the family is now represented by the Finch-Hattons, earls of Winchilsea and Nottingham, whose ancestor, Daniel Finch. 2nd earl of Nottingham, married Anne (d. 1743), daughter of the 1st Viscount Hatton.

See Sir N. H. Nicolas, Life and Tunes of Sir Christopher Hatton (London, 1847); and Correspondence of the Family of Hatton, being chiefly Letters addressed to Christopher, first Viscount Hatton, 1601-1704, edited with introduction by E. M. Thompson (London, 1878).

HATTON, JOHN LIPTROT (1809-1886), English musical composer, was born at Liverpool on the 12th of October 1809. He was virtually a self-taught musician, and besides holding several appointments as organist in Liverpool, appeared as an actor on the Liverpool stage, subsequently finding his way to London as a member of Macready's company at Drury Lane in 1832. Ten years after this he was appointed conductor at the s une theatre for a series of Knglish operas, and in 1843 his own first operetta, ()wc;i of tin: Thames, wasgiven with success. Staudigl. the eminent German bass, was a member of the com-

pany, and at his suggestion Hatton wrote a more ambitious work, Pascal Bruno, which, in a German translation, was presented at Vienna, with Staudig! in the principal part; the opera con- tained a song, " Revenge," which the basso made very popular in England, though the piece as a whole was not successful enough to be produced here. Hatton's excellent pianoforte playing attracted much attention in Vienna; he took the opportunity of studying counterpoint under Sechter, and wrote a number of songs, obviously modelled on the style of German classics. In 1846 he appeared at the Hereford festival as a singer, and also played a pianoforte concerto of Mozart. He undertook concert tours about this time with Sivori, Vieuxtemps and others. From 1848 to 1850 he was in America; on his return he became conductor of the Glee and Madrigal Union, and from about 1853 was engaged at the Princess's theatre to provide and con- duct the music for Charles Kean's Shakespearean revivals. He seems to have kept this apppointment for about five years. In 1856 a cantata, Robin Hood, was given at the Bradford festival, and a third opera, Rose, or Love's

Ransom, at Covent Garden in 1864, without much success. In 1866 he went again to America, and from this year Hatton held the post of accompanist at the Ballad Concerts, St James's Hail, for nine seasons. In 1875 he went to Stuttgart, and wrote an oratorio, Hezekiah, given at the Cyrstal Palace in 1877; like all his larger works it met with very moderate success. Hatton excelled in the lyricai forms of music, and, in spite of his distinct skill in the severer styles of the madrigal, &c, he won popularity by such songs as " To Anthea," " Good-bye, Sweetheart," and " Simon the Cellarer," the first of which may be called a classic in its own way. His glees and part-songs, such as " When Evening's Twilight," arc still reckoned among the best of their class; and he might have gained a place of higher distinction among English composers had it not been for his irresistible animal spirits and a want of artistic reverence, which made it uncertain in his younger days whether, when he appeared at a concert, he would play a fugue of Bach or sing a comic song. He died at Margate on the 20th of September 1886.

HAUCH, JOHANNES CARSTEN (1790-1872), Danish poet, was born of Danish parents residing at Frederikshald in Norway, on the 12th of May 1790. In 1802 he lost his mother, and in 1803 returned with his father to Denmark. In 1807 he fought as a volunteer against the English invasion. He entered the university of Copenhagen in 1808, and in 1821 took his doctor's degree. He became the friend and associate of Steffens and Oehlenschlager, warmly adopting the romantic views about poetry and philosophy. His first two dramatic poems, The Journey to Ginistan and The Power of Fancy, appeared in 1816, and were followed by a lyrical drama, Rosaura (181 7); but these works attracted little or no attention. Hauch therefore gave up all hope of fame as a poet, and resigned himself entirely to the study of science. He took his doctor's degree in zoology in 1821, and went abroad to pursue his studies. At Nice he had an accident which obliged him to submit to the amputation of one foot. He returned to literature, publishing a dramatized fairy tale, the Hamadryad, and the tragedies of Bajazet, Tiberius, Gregory VII., in 1828- 1829, The Death of Charles V. (1831), and The Siege of Maastricht (1832). These plays were violently attacked and enjoyed no success. Hauch then turned to novel- writing, and published in succession five romances — Vilhelm Zabern (1834); The Alchemist (1836); A Polish Family (1839); The iLastle on the Rhine (1845); and Robert Fulton (1853). In 1842 he collected his shorter Poems. In 1846 he was appointed professor of the Scandinavian languages in Kiel, but returned to Copenhagen when the war broke out in 1848. About this time his dramatic talent was at its height, and he produced one admirable tragedy after "another; among

these may be mentioned Svend Grathe (1841); The Sisters at Kinne-kullc (1849); Marshal Stig (1850); Honour Lost and Won (1851); and Tycho Brake's Youth (1852). From 1858 to i860 Hauch was director of the Danish National Theatre; he produced three more tragedies — The King's Favourite (1859); Henry of Navarre (1863); and Julian the Apostate (1866). In 1861 he

published another collection of Lyrical Poems and Romances; and in 1862 the historical epic of Valdemar Seir, volumes which contain his best work. From 1851, when he succeeded Oehlen- schl'ager, to his death, he held the honorary post of professor of aesthetics at the university of Copenhagen. He died in Rome in 1872. Hauch was one of the most prolific of the Danish poets, though his writings are unequal in value. His lyrics and romances in verse are always line in form and often strongly imaginative. In all his writings, but especially in his tragedies, he displays a strong bias in favour of what is mystical and supernatural. Of his dramas Marshal Stig is perhaps the best, and of his novels the patriotic tale of Vilkelm Zabem is admired the most.

Seed. Brandes, " Carsten Hauch " (1873) in Danske Digtere (1877) ; F. Running, /. C. Hauch (1890), and in Dansk Biografisk-Lexicon, (vol. vii. Copenhagen, 1893). Hauch's novels were collected (1873- 1874) and his dramatic works (3 vols., 2nd ed., 1852-1859).

HAUER, FRANZ, Ritter von (1 82 2-1 899) , Austrian geologist, born in Vienna on the 30th of January 1822, was son of Joseph von Hauer (1778-1863), who was equally distinguished as a high Austrian official and authority on finance and as a palaeontologist. He was educated in Vienna, afterwards studied geology at the mining academy of Schemnitz (1839-1843), and for a time was engaged in official mining work in Styria. In 1846 he became assistant to W. von Haidinger at the mineralogical museum in Vienna; three years later he joined the imperial geological institute, and in 1866 he was appointed director. In 1886 he became superintendent of the imperial natural history museum in Vienna. Among his special geological works are those on the Cephalopoda of the Triassic and Jurassic formations of Alpine regions (1S55-1856). His most important general work was that of the Geological Map of Austro-Hungary, in twelve sheets (1867-1871; 4th ed., 1884, including Bosnia and Montenegro). This map was accompanied by a series of explanatory pamphlets. In 1S82 he was awarded the Wollaston medal by the Geological Society of London. In 1892 von Hauer became a life-member of the upper house of the Austrian parlia- ment. He died on the 20th of March 1899.

Publication's. — Beitrage zur Palaontolographle von Osterreich (1858-1859); Die Ceologie und ihre Anwendung auf die Kenntnis der Bodenbeschaffenheit der iisterr .-ungar . Monarchic (1875; ed. 2,

1878).

Memoir by Dr E. Tietze; Jahrbuch der K. K. geolog. Reichsanstalt (1899, reprinted 1900, with portrait).

HAUFF, WILHELM (1802-1827),. German poet and novelist, was born at Stuttgart on the 29th of November 1802, the son of a secretary in the ministry of foreign affairs. Young Hauff lost his father when he was but seven years of age, and his early education was practically self-gained in the library of his maternal grandfather at Tubingen, to which place his mother had removed. In 1818 he was sent to the Klosterschule at Biaubeuren, whence he passed in 1820 to the university of Tubingen. In four years he completed his philosophical and theological studies, and on leaving the university became tutor to the children of the famous Wiirttemberg minister of war, General Baron Ernst Eugen von Hiigei (1774-1849), and for them wrote his Mdrchen, which he published in his Miirchcnalmanach auf das Jahr 1826. He also wrote there the first part of the M itteilungen aus den Memoir en des Satan (1826) and Der Mann im Monde (1825). The latter, a parody of the sentimental and sensual novels of II. Clauren (pseudonym of Karl Gottlieb Samuel Heun[i77i-i854]), became, in course of composition, a close imitation of that author's style and was actually published under his name. Clauren, in con- sequence, brought an action for damages against Hauff and gained his case. Whereupon Hauff followed up the •attack in his witty and sarcastic Konlroverspredigt tiber H. Clauren und den Mann im Monde (1826) and attained his original object — the moral annihilation of the mawkish and unhealthy literature with which Clauren was flooding the country. Meanwhile, animated by Sir Walter Scott's novels, Hauff wrote the historical romance Lichtenstein (1826), which acquired great popularity in Germany and especially in Swabia, treating as it did the most interesting period in the history of that country, the reign

of Duke Ulrich (1487-1550). While on a journey to France, the Netherlands and north Germany he wrote the second part of the Memoir en des Satan and some short novels, among them the charming Bettlerin vom Pont des Arts and his masterpiece, the Phantasien im Bremer Ratskeller (1827). He also published some short poems "which have passed into Volkslieder, among them M or gen rot,

Morgenrot, leuchtest mir zum fr till en Tod; and Stch' ich in finstrer Mitternacht. In January 1827, Hauff undertook the editorship of the Stuttgart Morgcnblatt and in the following month married, but his happiness was prematurely cut short by his death from fever on the 18th of November 1827.

Considering his brief life, Hauff was an extraordinarily prolific writer. The freshness and originality of his talent, his inventive- ness, and his genial humour have won him a high place among the south German prose writers of the early nineteenth century.

His Sdmtliche Werke were published, with a biography, by G. Schwab (3 vols., 1830-1834; 5 vols., 18th ed., 1882), and by F. Bobertag (1891-1897), and a selection by M. Mendheim (3 vols., 1891). For his life cf. J. Klaiber, Wilhelm Hauff, ein Lcbensbild (1881); M. Mendheim, Hauff s Leben und Werke (1894); and H. Hofmann, W. Hauff (1902).

HAUG, MARTIN (1827-1876), German Orientalist, was born at Ostdorf near Balingen, Wurttemberg, on the 30th of January 1827. He became a pupil in the gymnasium at Stuttgart at a comparatively late age, and in 1848 he entered the university of Tubingen, where he studied Oriental languages, especially Sanskrit. He afterwards attended lectures in Gottingen, and in 1854 settled as Privatdozent at Bonn. In 1856 he removed to Heidelberg, where he assisted Bunsen in his literary under- takings; and in 1859 he accepted an invitation to India, where he became superintendent of Sanskrit studies and professor of Sanskrit in Poona. Here his acquaintance with the Zend language and literature afforded him excellent opportunities for extending his knowledge of this branch of literature. The result of his researches was a volume of Essays on the sacred language, writings and religion of the Parsees (Bombay, 1862). Having returned to Stuttgart in 1866, he was called to Munich as professor of Sanskrit and comparative philology in 1868. He died on the 3rd of June 1876.

Besides the Essays on the Parsees, of which a new edition, by E. W. West, greatly enriched from the posthumous papers of the author, appeared in 1878, Haug published a number of works of considerable importance to the student of the literatures of ancient India and Persia. They include Die Pehlevjisprache und der Bunde- hesch (1854); Die Schrift und Sprache der zweiten Keilschriftgattung (1855); Die fiinf Galhas, edited, translated and expounded (1858- 1860); an edition, with translation and explanation, of the Aitareya Brahmana of the Rigveda (Bombay, 1863), which is accounted his best work in the province of ancient Indian literature; A Lecture on an original Speech

of Zoroaster (1865); An old Zend-Pahlavi Glossary (1867); Uber den Character der Pehlewisprache (1869); Das 18. Kapitel des Wendidad (1869); Uber das Ardai-Viraf- nameh (1870) ; An old Pahlavi-Pazand Glossary (1870) ; and Vedische Rdtselfragen und Ratselspriiche (1875).

For particulars of Haug's life and work, see A. Bezzenberger, Beitrage zur Kunde der indogermanischen Sprachen, vol. i. pp. 70 seq. HAUGE, HANS NIELSEN (1771-1824), Norwegian Lutheran divine, was born in the parish of Thuno, Norway, on the 3rd of April 1 771, the son of a peasant. With the aid of various religious works which he found in his father's house, he laboured to supplement his scanty education. In his twenty-sixth year, believing himself to be a divinely-commissioned prophet, he began to preach in his native parish and afterwards throughout Norway, calling people to repentance and attacking rationalism. In 1800 he passed to Denmark, where, as at home, he gained many followers and assistants, chiefly among the lower orders. Proceeding to Christiansand in 1804, Hauge set up a printing- press to disseminate his views more widely, but was almost immediately arrested for holding illegal religious meetings, and for insulting the regular clergy in his books, all of which were confiscated; he was also heavily fined. After being in confinement for some years, he was released in 1814 on payment of a fine, and retiring to an estate at Breddwill, near Christiania, he died there on the 29th of March 1824. His adherents, who did not formally break with the church, were called Haugianer or Leser (i.e. Readers). He unquestionably did much to revive

the spiritual life of the northern Lutheran Church. His views were of a pietistic nature. Though he cannot be said to have rejected any article of the Lutheran creed, the peculiar emphasis which he laid upon the evangelical doctrines of faith and grace involved considerable antagonism to the rationalistic or sacerdotal views commonly held by the established clergy.

Hauge's principal writings are Forsog til Afhandeling om Guds Visdom (1796); Anvisning til nogle mbrkelige Sprog i Bibelen (1798) ; Forklaring over Loven og Evangelium (1803). For an account of his life and doctrines see C. Bang's Hans Nielsen Hauge og hans Samtid (Christiania; 2nd ed., 1875); O. Rost, Nogle Bemaerkninger om Hans Nielsen Hauge og hans Reining (1883), and the article in Herzog-

Hauck, Realencyklopddie.

HAUGESUND, a seaport of Norway in Stavanger ami (county), on the west coast, 34 m. N. by W. of Stavanger. Pop. (1900), 7935. It is an important fishing centre. Herrings are exported to the annual value of £100,000 to £200,000, also mackerel and lobsters. The principal imports are coal and salt. There are factories for woollen goods and a margarine factory. Haugesund is the reputed death-place of Harald Haarfager, to whom an obelisk of red granite was erected in 1872 on the thousandth anniversary of his victory at the Hafsfjord (near Stavanger) whereby he won the sovereignty of Norway. The memorial stands ij m. north of the town, on the Haraldshaug, where the hero's supposed tombstone is shown.

HAUGHTON, SAMUEL (1821-1897), Irish scientific writer, the son of James Haughton (1795-1873), was born at Carlow on the 21st of December 1821. His father, the son of a Quaker, but himself a Unitarian, was an active philanthropist, a strong supporter of Father Theobald Mathew, a vegetarian, and an anti-slavery worker and writer. After a distinguished career in Trinity College, Dublin, Samuel was elected a fellow in 1844. He was ordained priest in 1847, but seldom preached. In 1851 he was appointed professor of geology in Trinity College, and this post he held for thirty years. He began the study of medicine in 1859, and in 1862 took the degree of M.D. in the university of Dublin. He was then made registrar of the Medical School, the status of which he did much to improve, and he represented the university on the General Medical Council from 1878 to 1896. He was elected F.R.S. in 1858, and in course of time Oxford conferred upon him the hon. degree of D.C.L., and Cambridge and Edinburgh that of LL.D. He was a man of remarkable knowledge and ability, and he communicated papers on widely different subjects to various learned societies and scientific journals in London and Dublin. He wrote on the laws of equilibrium and motion of solid and fluid bodies (1846), on sun-heat, terrestrial radiation, geological climates and on tides. He wrote also on the granites of Leinster and Donegal, and on the cleavage and joint-planes in the Old Red Sandstone of Waterford (1857-1858). He was president of the Royal Irish Academy from 1886 to 1891, and for twenty years he was secretary of the Royal Zoological Society of Ireland. He died in Dublin on the 31st of October 1897.

Publications. — Manual of Geology (1865); Principles of Animal Mechanics (1873); Six Lectures on Physical Geography (1880). In conjunction with his friend, Professor J. Galbraith, he issued a scries of .Manuals of Mathematical and Physical Science.

HAUGHTON, WILLIAM (fl. 1598), English playwright. He collaborated in many plays with Henry Chettle, Thomas Dekker, John Day and Richard Hathway. The only certain biographical information about him is derived from Philip Henslowe, who on the 10th of March 1600 lent him ten shillings ” to release him out of the Clink.” Mr Fleay credits him with a considerable share in The Patient Grissill (1599), and a merry comedy entitled English-Men for my Money, or A Woman will have, her Will (1598) is ascribed to his sole authorship. The Devil and his Dame, mentioned as a forthcoming play by Henslowe in March 1600, is identified by Mr Fleay as Grim, the Collier of Croydon, which was printed in 1662. In this play an emissary is sent from the infernal regions to report on the conditions of married life on earth.

Grim is reprinted in vol. viii., and English-Men for my Money in vol. x., of W. C. Hazlitt’s edition of Dodsley’s Old Plays.

HAUGWITZ, CHRISTIAN AUGUST HEINRICH KURT,

Count von, Freiherr von Krappitz (1752-1831), Prussian statesman, was born on the nth of June 1752, at Peucke near Ols. He belonged to the Silesian (Protestant) branch of the ancient family of Haugwitz, of which the Catholic branch is established in Moravia. He studied law, spent some time in Italy, returned to settle on his estates in Silesia, and in 1791 was elected by the Silesian estates general director of the province. At the urgent instance of King Frederick William II. he entered the Prussian service, became ambassador at Vienna in 1792 and at the end of the same year a member of the cabinet at Berlin.

Haugwitz, who had attended the young emperor Francis II. at his coronation and been present at the conferences held at Mainz to consider the attitude of the German powers towards the Revolution, was opposed to the exaggerated attitude of the French SmigrSs and to any interference in the internal affairs of France. After the war broke out, however, the defiant temper of the Committee of Public Safety made an honourable peace impossible, while the strained relations between Austria and Prussia on the question of territorial ” compensations ” crippled the power of the Allies to carry the war to a successful conclusion. It was in these circumstances that Haugwitz entered on the negotiations that resulted in the subsidy treaty between Great Britain and Prussia, and Great Britain and Holland, signed at the Hague on the 19th of April 1794. Haugwitz, however, was not the man to direct a strong and aggressive policy; the failure of Prussia to make any effective use of the money supplied broke the patience of Pitt, and in October the denunciation by Great Britain of the Hague treaty broke the last tie that bound Prussia to the Coalition. The

separate treaty with France, signed at Basel on the 5th of April 1795, was mainly due to the influence of Haugwitz.

His object was now to save the provinces on the left bank of the Rhine from being lost to the Empire. No guarantee of their maintenance had been inserted in the Basel treaty; but Haug- witz and the king hoped to preserve them by establishing the armed neutrality of North Germany and securing its recognition by the French Republic. This policy was rendered futile by the victories of Napoleon Bonaparte and the virtual conquest of South Germany by the French. Haugwitz, who had con- tinued to enjoy the confidence of the new king, Frederick William III., recognized this fact, and urged his master to join the new Coalition'in 1798. But the king clung blindly to the illusion of neutrality, and Haugwitz allowed himself to be made the instrument of a policy of which he increasingly disapproved. It was not till 1803, when the king refused his urgent advice to demand the evacuation of Hanover by the French, that he tendered his resignation. In August 1804 he was definitely replaced by Hardenberg, and retired to his estates.

In his retirement Haugwitz was still consulted, and he used all his influence against Hardenberg's policy of a rapprochement with France. His representations had little weight, however, until Napoleon's high-handed action in violating Prussian territory by marching troops through Ansbach, roused the anger of the king. Haugwitz was now once more appointed foreign minister, as Hardenberg's colleague, and it was he who was charged to carry to Napoleon the Prussian ultimatum which was the outcome of the visit of the tsar Alexander I. to Berlin in November. But in this crisis his courage failed him; his nature was one that ever let " I dare not wait upon I will "; he delayed his journey pending some turn in events and to give time for- the mobilization of the duke of Brunswick's army; he was frightened by reports of separate negotiations between Austria and Napoleon, not realizing that a bold declaration by Prussia would nip them in the bud. Napoleon, when at last they met, read him like a book and humoured his diplomatic weakness until the whole issue was decided at Austerlitz. On the 1 5th of December, instead of delivering an ultimatum, Haugwitz signed at Schonbrunn the treaty which gave Hanover to Prussia in return for Ansbach, Cleves and Neuchatel.

The humiliation of Prussia and her minister was, however,

not yet complete. In February 1806 Haugwitz went to Paris to ratify the treaty of Schonbrunn and to attempt to secure some modifications in favour of Prussia. He was received with a storm of abuse by Xapoleon, who insisted on tearing up the treaty and drawing up a fresh one, which doubled the amount of territory to be ceded by Prussia and forced her to a breach with Great Britain by binding her to close the Hanoverian ports to British commerce. The treaty, signed on the 15th of February, left Prussia wholly isolated in Europe. What followed belongs to the history of Europe rather than to the biography of Haugwitz. He remained, indeed, at the head of the Prussian ministry of foreign affairs, but the course of Prussian policy it was beyond his power to control. The Prussian ultimatum to Napoleon was forced upon him by overwhelming circumstances, and with the battle of Jena, on the 14th of October, his political career came to an end. He accompanied the flight of the king into East Prussia, there took leave of him and retired to his Silesian estates. In 181 1 he was appointed Curator of the university of Breslau; in 1820, owing to failing health, he went to live in Italy, where he remained till his death at Venice in 1831.

Haugwitz was a man of great intellectual gifts, of dignified presence and a charming address which endeared him to his sovereigns and his colleagues; but as a statesman he failed, not through want of perspicacity, but through lack of will power and a fatal habit of procrastination. During his retirement in Italy he wrote memoirs in justification of his policy, a fragment of which dealing with the episode of the treaty of Schonbrunn was published at Jena in 1837.

See J. von Minutoli, Der Graf von Haugwitz und Job von Witzleben (Berlin, 1844); L. von Ranke, Hardenberg u. d. Gesch. des preuss. Staales (Leipzig, 1879-1881”), note on Haugwitz’s memoirs in vol. ii. ; Denkwiirdigkeiten des Staatskanzlers Fiirsten von Hardenberg, ed. Ranke (5 vols., Leipzig, 1877); A. Sorel, L’Europe et la Revol. Franc., passim.

HAUNTINGS (from ” to haunt,” Fr. hanter, of uncertain origin, but possibly from Lat. ambitare, ambire, to go about, frequent), the supposed manifestations of existence by spirits of the dead in houses or places familiar to them in life. The savage practice of tying up the corpse before burying it is clearly intended to prevent the dead from ” walking “; and cremation, whether in savage lands or in classical times, may have originally had the same motive. The ” spirit ” manifests himself, as a rule, cither in his bodily form, as when he

lived, or in the shape of some animal, or by disturbing noises, as in the case of the poltergeist (q.v.). Classical examples occur in Plautus {M o stel- lar ia), Lucian (P/iilopseudes), Pliny, Suetonius, St Augustine, St Gregory, Plutarch and elsewhere, while Lucretius has his theory of apparitions of the dead. He does not deny the fact; he explains it by ” films ” diffused from the living body and persisting in the atmosphere.

A somewhat similar hypothesis, to account for certain alleged phenomena, was invented by Mr Edmund Gurney. Some visionary appearances in haunted houses do not suggest the idea of an ambulatory spirit, but rather of the photograph of a past event, impressed we know not how on we know not what. In this theory there is no room for the agency of spirits of the dead. The belief in hauntings was naturally persistent through the middle ages, and example and theory abound in the Loca infesta (Cologne, 150S) of Petrus Thyraeus, S.J.; Wierius (c. 1560), in I)c pracsligiis dacmonum, is in the same tale. According to Thyraeus, hauntings appeal to the senses of sight, hearing and touch. The auditory phenomena are mainly thumping noises, sounds of footsteps, laughing and moaning. Rackets in general are caused by lares domeslici (” brownies “) or the Poltergeist. In the tactile way ghosts push the living; ” I have been thrice pushed by an invisible power,” writes the Rev. Samuel Wesley, in 1717, in his narrative of the disturbances at his rectory at Epworth. Once he was pushed against the corner of his desk in the study; once up against the door of the matted chamber; and, thirdly, ” against the right-hand side of the frame of my study door, as I was going in.” We have thus Protestant corroboration of the statement of the learned Tesuit.

Thyraeus raises the question, Are the experiences hallucina- tory? Did Mr Wesley (to take his case) receive a mere halluci- natory set of pushes? Was the hair of a friend of the writer’s, who occupied a haunted house, only pulled in a subjective way ? Thyraeus remarks that, in cases of noisy phenomena, not all persons present hear them ; and, rather curiously, Mr Wesley records the same experience; he sometimes did not hear sounds that seemed violently loud to his wife and family, who were with him at prayers. Thyraeus says that, as collective hallucinations of sight are rare — all present not usually seeing the apparition — so audible phenomena are not always ex- perienced by all persons present. In such cases, he thinks that the sights and sounds have no external cause, he regards the sights and sounds as delusions — caused by spirits. This is a difficult question. He mentions that we hear all the furniture being tossed about (as Sir Walter and Lady Scott heard it at Abbotsford; see Lockhart’s Life, v.

311-315). Yet, on inspec- tion, we find all the -furniture in its proper place. There is abundant evidence to experience of this phenomenon, which remains as inexplicable as it was in the days of Thyraeus. When the sounds are heard, has the atmosphere vibrated, or has the impression only been made on ” the inner ear ” ? In reply, Mr. Procter, who for sixteen years (1831-1847) endured the unexplained disturbances at Willington Mill, avers that the material objects on which the knocks appeared to be struck did certainly vibrate (see Poltergeist). Is then the felt vibration part of the hallucination?

As for visual phenomena, ” ghosts,” Thyraeus does not regard them as space-filling entities, but as hallucinations imposed by spirits on the human senses; the spirit, in each case, not being necessarily the soul of the dead man or woman whom the phantasm represents.

In the matter of alleged hauntings, the symptoms, the pheno- mena, to-day, are exactly the same as those recorded by Thyraeus. The belief in them is so far a living thing that it greatly lowers the letting value of a house when it is reported to be haunted. (An action for libelling a house as haunted was reported in the London newspapers of the 7th of March 1907). It is true that ancient family legends of haunts are gloried in by the inheritors of stately homes in England, or castles in Scotland, and to discredit the traditional ghost — in the days of Sir Walter Scott — was to come within measurable distance of a duel. But the time-honoured phantasms of old houses usually survive only in the memory of ” the oldest aunt telling the saddest tale.”' Their historical basis can no more endure criticism than does the family portrait of Queen Mary, — signed by Medina about 1750-ˆ1770, and described by the family as ” given to our ancestor by the Queen herself.” After many years’ experience of a baronia) dwelling credited with seven distinct and separate phantasms, not one of which was ever seen by hosts, guests or domestics, scepticism as regards traditional ghosts is excusable. Legend reports that they punctually appear on the anniversaries of their misfortunes, but no evidence of such punctuality has been produced.

The Society for Psychical Research has investigated hundreds of cases of the alleged haunting of houses, and the reports are in the archives of the society. But, as the mere rumour of a haunt greatly lowers the value of a house, it is seldom possible to publish the names of the witnesses, and hardly ever permitted to publish the name of the house. From the point of view of science this is unfortunate (see Proceedings S.P.R. vol. vidi. pp. 311-332 and Proceedings of 1882-1883, 1883-1884). As far as inquiry had any results, they were to the following effect. The spectres were of the most shy and fugitive

kind, seen now by one person, now by another, crossing a room, walking along 1 , corridor, and entering chambers in which, on inspection, they were not found. There was almost never any story to account for the appearances, as in magazine ghost-stories, and, if story there were, it lacked evidence. Recognitions of known dead persons were infrequent ; occasionally there was recognition of a portrait in the house. The apparitions spoke in only one or two recorded cases, and, as a rule, seemed to have no motive for appearing.

The ” ghost ” resembles nothing so much as a somnambulist, or the dream-walk of one living person made visible, telepathic- ally, to another living person. Almost the only sign of conscious- ness given by the appearances is their shyness; on being spoken to or approached they generally vanish. Not infrequently they are taken, at first sight, for living human beings. In darkness they are often luminous, otherwise they would be invisible ! Unexplained noises often, but not always, occur in houses where these phenomena are perceived. E vi dence is only good , approxi- mately, when a series of persons, in the same house, behold the same appearance, without being aware that it has previously been seen by others. Naturally it it almost impossible to prove this ignorance.

When inquirers believe that the appearances are due to the agency of spirits of the dead, they usually suppose the method to be a telepathic impact on the mind of the living by some ” mere automatic projection from a consciousness which has its centre elsewhere ” (Myers, Proceedings S.P.R. vol. xv. p. 64). Myers, in Human Personality, fell back on ” palaeolithic psycho- logy,” and a theory of a phantasmogenetic agency producing a phantasm which had some actual relation to space. But space forbids us to give examples of modern experiences in haunted houses, endured by persons sane, healthy and well educated. The cases, abundantly offered in Proceedings S. P.R., suggest that certain localities, more than others, are ” centres of permanent possibilities of being hallucinated in a manner more or less uniform.” The causes of this lact (if causes there be, beyond a casual hallucination or illusion of A, which, when reported, begets by suggestion, or, when not reported, by telepathy, hallucinations in B, C, D and E), remain unknown {Proceedings S.P.R. vol. viii. p. 133 et seq.). Mr Podmore proposed this hypothesis of causation, which was not accepted by Myers; he thought that the theory laid too heavy a burden on telepathy and suggestion. Neither

cause, nor any other cause of similar results, ever affects members of the S.P.R. who may be sent to dwell in haunted houses. They have no weird experiences, except when they are visionaries who see phantoms wherever. they go. (A. L.)

HAUPT, MORITZ (1808-1874), German philologist, was born at Zittau, in Lusatia, on the 27th of July 1808. His early education was mainly conducted by his father, Ernst Friedrich Haupt, burgomaster of Zittau, a man of good scholarly attain- ment, who used to take pleasure in turning German hymns or Goethe's poems into Latin, and whose memoranda were employed by G. Freytag in the 4th volume of his Bilder aus der deutschen Vergangenheit. From the Zittau gymnasium, where he spent the five years 1821-1826, Haupt removed to the university of Leipzig with the intention of studying theology; but the natural bent of his mind and the influence of Professor G. Hermann soon turned all his energies in the direction of philosophy. On the close of his university course (1830) he returned to his father's house, and the next seven years were devoted to quiet work, not only at Greek, Latin and German, but at Old French, Provencal and Bohemian. He formed with Lachmann at Berlin a friendship which had great effect on his intellectual development. In September 1837 he " habilitated " at Leipzig as Privatdozent, and his first iectures, dealing with such diverse subjects as Catullus and the Nibelungenlied, indicated the twofold direction of his labours. A new chair of German language and literature being founded for his benefit, he became professor extraordinarius (1841) and then professor ordinarius (1843); and in 1842 he married Louise Hermann, the daughter of his master and col- league. But the peaceful and prosperous course opening out before him at the university of Leipzig was brought to a sudden close. Having taken part in 1849 with Otto Jahn and Theodor Mommsen in a political agitation for the maintenance of the imperial constitution, Haupt was deprived of his professorship by a decree of the 22nd of April 185T. Two years later, however, he was called to succeed Lachmann at the university of Berlin; and at the same time the Berlin academy, which had made him a corresponding member in 1841, elected him an ordinary member. For twenty-one years he continued to hold a prominent

place among the scholars of the Prussian capital, making his presence felt, not only by the prestige of his erudition and the clearness of his intellect, but by the tirelessness of his energy and the ardent fearlessness of his temperament. He died, of heart disease, on the 5th of February 1874.

Haupt's critical work is distinguished by a happy union of the most

painstaking investigation with intrepidity of conjecture, and while in his lectures and addresses he was frequently carried away by the excitement of the moment, and made sharp and questionable attacks on his opponents, in his writings he exhibits great self- control. The results of mariy of his researches are altogether lost, because he could not be prevailed upon to publish what fell much short of his own high ideal of excellence. To the progress of classical scholarship he contributed by Quaestiones Catullianae (1837), Observationes criticae (1841), and editions of Ovid's Halieutica and the Cynegctica of Gratius and Ncmesianus (1838), of Catullus, Tibullus and Propertius (3rd ed., 1868), of Horace (3rd ed., 1871) and of Virgil (2nd ed., 1873). As early as 1836, with Hoffmann von Fallersleben, he started the Altdeutsche Blatter, which in 1841 gave place to the Zeitschrift fur deutsches A Iter turn, of which he continued editor till his death. Hartmann von Aue's Erec (1839) and his Lieder, Biichlein and Der arme Heinrich (1842), Rudolf von Ems's Guter Gerhard (1840) and Conrad von Wiirzburg's Engelhard (1844) are the principal German works which he edited. To form a collection of the French songs of the 16th century was one of his favourite schemes, but a little volume published after his death, Franzosische Volkslieder (1877), is the only monument of his labours in that direction. Three volumes of his Opuscula were published at Leipzig (1875-1877).

See Kirchhoff, " Gedachtnisrede," in Abhandl. der Konigl. Akad. der Wissenschaften zu Berlin (1875); Otto Belger, Moritz Iiaupt als Lchrer (1879); Sandys, Hist. Class. Schol. iii. (1908).

HAUPTMANN, GERHART (1862-), German dramatist, was born on the 15th of November 1862 at Obersalzbrunn in Silesia, the son of an hotel-keeper. From the village school of his native place he passed, to the Realschule in Breslau, and was then sent to learn agriculture on his uncle's farm at Jauer. Having, however, no taste for country life, he soon returned to Breslau and entered the art school, intending to become a sculptor. He then studied at Jena, and spent the greater part of the years 1883 and 1884 in Italy. In May 1885 Hauptmann married and settled in Berlin, and, devoting himself henceforth entirely to literary work, soon attained a great reputation as one of the chief representatives of the modern drama. In 1891 he retired to Schreiberhau in Silesia. Hauptmann's first drama, Vor Sonnenaufgang (1889) inaugurated the realistic movement in modern German literature; it was followed by Das Friedens- fesl (1890), Einsame Menschen (1891) and Die Weber (r8g2), a powerful drama depicting the rising of the Silesian weavers in 1844. Of Hauptmann's subsequent work mention may be made of the comedies Kollege Crampton (1892), Der Biberpeh (1893) and Der rote Hahn (1901), a " dream

poem," Hannele (1893), and an historical drama Florian Geyer (1895). He also wrote two tragedies of Silesian peasant life, Fuhrmann Henschel (1898) and Rose Berndt (1903), and the " dramatic fairy-tales " Die vcrsunkene Glocke (1897) and Und Pippa tanzt (1905). Several of his works have been translated into English.

Biographies of Hauptmann and critical studies of his dramas have been published by A. Bartels (1897); P. Schlenther (1898); and U. C. Woerner (2nd ed., 1900). See also L. Benoist-Hanappier, Le Drame naturaliste en Allemagne (1905).

HAUPTMANN, MORITZ (1792-1868), German musical com- poser and writer, was born at Dresden, on the 13th of October 1792, and studied music under Scholz, Lanska, .Grosse and Morlacchi, the rival of Weber. Afterwards he completed his education as a violinist and composer under Spohr, and till 1820 held various appointments in private families, varying his musical occupations with mathematical and other studies bearing chiefly on acoustics and kindred subjects. For a time also Hauptmann was employed as an architect, but all other – pursuits gave place to music, and a grand tragic opera, Mathilde, belongs to the period just referred to. In 1822 he entered the orchestra of Cassel, again under Spohr's direction, and it was then that he first taught composition and musical theoryto such men as Ferdinand David, Burgm tiller, Kiel and others. His com- positions at this time chiefly consisted of motets, masses, can- tatas and songs. His opera Mathilde was performed at Cassel

with great success. In 1842 Hauptmann obtained the position of cantor at the Thomas-school of Leipzig (long previously occupied by the great Johann Sebastian Bach) together with that of professor at the conservatoire, and it was in this capacity that his unique gift as a teacher developed itself and was acknow- ledged by a crowd of enthusiastic and more or less distinguished pupils. He died on the 3rd of January 1868, and the universal regret felt at his death at Leipzig is said to have been all but equal to that caused by the loss of his friend Medelssohn many years before. Hauptmann's compositions are marked by symmetry and perfection of workmanship rather than by spontaneous invention.

Amongst his vocal compositions — by far the most important portion of his work — may be mentioned two masses, choral songs for mixed

voices (Op. 32, 47), and numerous part songs. The re- sults of his scientific research were embodied in his book Die Nalur der Harmonik und Metrik (1853), a standard work of its kind, in which a philosophic explanation of the forms of music is attempted.

HAUREAU, (JEAN) BARTHˆLEMY (1812-1896), French historian and miscellaneous writer, was born in Paris. At the age of twenty he published a series of apologetic studies on the Montagnards. In later years he regretted the youthful enthu- siasm of these papers, and endeavoured to destroy the copies. He joined the staff of the National, and was praised by Theophile Gautier as the ” tribune ” of romanticism. At that time he seemed to be destined to a political career, and, indeed, after the revolution of the 24th of February 1848 was elected member of the National Assembly; but close contact with revolutionary men and ideas gradually cooled his old ardour. Throughout his life he was an enemy to innovators, not only in politics and religion, but also in literature. This attitude sometimes led him to form unjust estimates, but only on very rare occasions, for his character was as just as his erudition was scrupulous. After the coup d’etat he resigned his position as director of the MS. department of the Bibliotheque Nationale, to which he had been appointed in 1848, and he refused to accept any adminis- trative post until after the fall of the empire. After having acted as director of the national printing press from 1870 to 1881, he retired, but in 1893 accepted the post of director of the Fondation Thiers. _ He was also a member of the council of improvement of the Ecole des Chartes. He died on the 29th of April 1896. For over half a century he was engaged in writing on the religious, philosophical, and more particularly the literary history of the middle ages. Appointed librarian of the town of Lc Mans in 183S, he was first attracted by the history of Maine, and in 1843 published the first volume of his Histoire litteraire dn Maine (4 vols., 1843-1852), which he subsequently recast on a new plan (10 vols.. 1870-1S77). In 1845 he brought out an edition of vol. ii. of G. Menage’s Histoire dc Sable. He then undertook the continuation of the Gallia Christiana, and produced vol. xiv. (1856) for the province of Tours, vol. xv. (1862) for the province of Besancon, and vol. xvi. (1865-1870) for the province of Vienne. This important work gained him admission to the Academie des Inscriptions et Belles-Let tres (1862). In the Notices et cxtraits des manuscrits he inserted several papers which were afterwards published separately, with additions and corrections, under the title Notices et cxtraits de quelques manuscrits dc la Bibliotheque Nationale (6 vols., 1890-1893). To the Histoire litteraire de la France he contributed a number of studies, among which must be mentioned that relating to the sermon-writers

(vol. xxvi., 1873), whose works, being often anonymous, raise many problems of attribution, and, though deficient in orginalitvˆ of thought and style, reflect the very spirit of the middle ages. Among his other works mention must be made of his remarkable Histoire de la philosophic scolastique (1872-1880), extending from the time of Charlemagne to the 13th century, which was expanded from a paper crowned by the Academic des Sciences Morales et Politiques in 1S50; Lcs Melanges poetiques d'Hildcbcrl de Lavardin (1882); an edition of the Works of Hugh of St Victor (1886); a critical study of the Latin poems attributed to St Bernard (iSqo); and Bernard Delicieux el I'inquisition albigeoise (1877). To these must be added his contributions to the Dictionnairc des sciences philosophiqiics, Didot's Biographic generate, the Biblio-

theque de V Ecole des Chartes, and the Journal des savants. From the time of his appointment to the Bibliotheque, Nationale up to the last days of his life he was engaged in 'making abstracts of all the medieval Latin writings (many anonymous or of doubtful attribution) relating to philosophy, theology, grammar, canon law, and poetry, carefully noting on cards the first words of each passage. After his death this index of incipits, arranged alphabetically, was presented to the Academie des Inscriptions, and a copy was placed in the MS. department of the Bibliotheque Nationale.

Secˆ obituary notice read by Henri Wallon at a meeting of the Academie des Inscriptions on the 12th of November 1897; and the notice by Paul Meyer prefixed to vol. xxxiii. of the Histoire litteraire de la France.

HAUSA, sometimes incorrectly written Haussa, Houssa or Haoussa, a people inhabiting about half a million square miles in the western and central Sudan from the river Niger in the west to Bornu in the east. Heinrich Barth identifies them with the Atarantians of Herodotus. According to their own traditions the earliest home of the race was the divide between the Sokoto and Chad basins, and more particularly the eastern watershed, whence they spread gradually westward. In the middle ages, to which period the first authentic records refer, the Hausa, though never a conquering race, attained great political power. They were then divided into seven states known as " Hausa bokoy " (" the seven Hausa ") and named Biram, Daura, Gober, Kano, Rano, Katsena and Zegzeg, after the sons of their legendary ancestor. This confederation extended its authority over many of the neighbouring countries, and remained paramount till the Fula under Sheikh Dan Fodio in 1810 conquered the Hausa states and founded the Fula empire of Sokoto (see Fula).

The Hausa, who number upwards of 5,000,000, form the most important nation of the central Sudan. They are undoubtedly nigritic, though in places with a strong crossing of Fula and Arab blood. Morally and intellectually they are, however, far superior to the typical Negro. They are a powerful, heavily built race, with skin as black as most Negroes, but with lips not so thick nor hair so woolly. They excel in physical strength. The average Hausa will carry on his head a load of ninety or a hundred pounds without showing the slightest signs of fatigue during a long day's march. When carrying their own goods it is by no means uncommon for them to take double this weight. They are a peaceful and industrious people, living partly in farmsteads amid their crops, partly in large trading centres such as Kano, Katsena and Yakoba (Bauchi). They are extremely intelligent and even cultured, and have exercised a civilizing effect upon their Fula conquerors to whose oppressive rule they submitted. They are excellent agriculturists, and, almost unaided by foreign influence, they have developed a variety of industries, such as the making of cloth, mats, leather and glass. In Sierra Leone and the Gold Coast territory they form the backbone of the military police, and under English leadership have again and again shown themselves to be admir- able fighters and capable of a high degree of discipline and good conduct. Their food consists chiefly of guinea corn (sorghum vulgare), which is ground up and eaten as a sort of porridge mixed with large quantities of red pepper. The Hausa attribute their superiority in strength to the fact that they live on guinea corn instead of yams and bananas, which form the staple food of the tribes on the river Niger. The Hausa carried on agriculture chiefly by slave labour; they are themselves born traders, and as such are to be met with in almost every part of Africa north of the equator. Small colonies of them are to be foundin towns as far distant from one another as Lagos, Tunis, Tripoli, Alexandria and Suakin.

Language. — The Hausa language has a wider range over Africa north of the equator, south of Burbary and west of the valley of the Nile, than any other tongue. It is a rich sonorous language, with a vocabulary containing perhaps 10,000 words. As an example of the richness of the vocabulary Bishop Crowther mentions that there are eight names for different parts of the day from cockcrow till after sunset. About a third of the words are connected with Arabic roots, nor arc these such as the Hausa could well have borrowed in anything like recent times from the Arabs. Many words representing

/

o

ideas or things with which the Hausa must have been familiar from the very earliest time are obviously connected with Arabic or Semitic roots. There is a certain amount of resemblance between the Hausa language and that spoken by the Berbers to the south of Tripoli and Tunis. This language, again, has several striking points of resemblance with Coptic. If, as seems likely, the connexion between these three languages should be demonstrated, such con- nexion would serve to corroborate the Hausa tradition that their ancestors came from the very far east away beyond Mecca. The Hausa language has been reduced to writing for at least a century, possibly very much longer. It is the only language in tropical Africa which has been reduced to writing by the natives themselves, unless the Vai alphabet, introduced by a native inventor in the interior of Liberia in the first half of the 19th century be excepted; the character used is a modified form of Arabic. Some fragments of literature exist, consisting of political and religious poems, together with a limited amount of native history. A volume, consisting of history and poems reproduced in facsimile, with translations, has been published by the Cambridge University Press.

Religion. — About one-third of the people are professed Mahom- medans, one-third are heathen, and the remainder have apparently no definite form of religion. Their Mahommedanism dates from the 14th century, but became more general when the Fula sheikh Dan Fodio initiated the religious war which ended in the founding of the Fula empire. Ever since then the ruler of Sokoto has been acknow- ledged as the religious head of the whole country, and tribute has been paid to him as such. The Hausa who profess Mahommedanism are extremely ignorant of their own faith, and what little religious fanaticism exists is chiefly confined to the Fula. Large numbers of the Hausa start every year on the pilgrimage to Mecca, travelling sometimes across the Sahara desert and by way of Tripoli and Alex- andria, sometimes by way of Wadai, Darfur, Khartum and Suakin. The journey often occupies five or six years, and is undertaken quite as much from trading as from religious motives. Mahommedanism is making very slow, if any, progress amongst the Hausa. The greatest obstacle to its general acceptance is the institution of the Ramadan fast. In a climate so hot as that of Hausaland, the obligation to abstain from food and drink from sunrise to sunset during one month in the year is a serious difficulty. Until the last decade of the 19th century no important attempt had been made to introduce Christianity, but the fact that the Hausa are fond of read- ing, and that native schools exist in all parts of the country, should greatly facilitate the work of Christian missionaries.

Bibliography. — El Hage Abd Salam Shabeeny, Account of Timbuctoo and Haussa Territories (1820) ; Norris, Dialogues and part of the New Testament in the English, Arabic, Haussa and Bornu Languages (1853); Koelle, Polyglotta Africana (1854); Schon, Grammar of the Hausa Language (London, 1862), Hausa Reading Book (1877), and also A Dictionary of the Hausa Language (1877). Schon has also produced Hausa translations of Gen. (1858), Matt. (1857) and Luke (1858). Heinrich Barth, Travels in North and Central Africa (2 vols., London, 1857); Central-afrikanische Vokabu- larien (Gotha, 1867) ; C. H. Robinson, Hausaland, or Fifteen Hundred Miles through the Central Soudan (1896); Specimens of Hausa Literature (1896); Hausa Grammar (1897); Hausa Dictionary (1 899) ; P. L. Monteil, De St-Lonis & Tripoli par le lac Tchad (Paris, 1895) ; Lt. Seymour Vandeleur, Campaigning on the Upper Nile and Niger (1898J.

HAUSER, KASPAR, a German youth whose life was re- markable from the circumstances of apparently inexplicable mystery in which it was involved. He appeared on the 26th of May 1828. in the streets of Nuremberg, dressed in the garb of a peasant, and with such a helpless and bewildered air that he attracted the attention of the passers-by. In his possession was found a letter purporting to be written by a poor labourer, stating that the boy was given into his custody on the 7th of October 1812, and that according to agreement he had instructed him in reading, writing, and the Christian religion, but that up to the time fixed for relinquishing his custody he had kept him in close confinement. Along with this letter was enclosed another purporting to be written by the boy's mother, stating that he was born on the 30th of April 1812, that his name was Kaspar, and that his father, formerly a cavalry officer in the 6th regiment at Nuremberg, was dead. The appearance, bearing, and pro- fessions of the youth corresponded closely with these credentials. He showed a repugnance to all nourishment except bread and water, was seemingly ignorant of outward objects, wrote his name as Kaspar Hauser, and said that he wished to be a cavalry officer like his father. For some time he was detained in prison at Nuremberg as a vagrant, but on the 18th of July 1828 he was delivered over by the town authorities to the care of a school- master, Professor Daumcr, who undertook to be his guardian and to take the charge of his education. Further mysteries

accumulated about Kaspar's personality and conduct, not altogether unconnected with the vogue in Germany, at that time, of " animal magnetism," " somnambulism," and similar theories of the occult and strange. People associated him with all sorts of possibilities. On the 17th of October 1829 he was found to have received a wound in the forehead, which, according to his own statement, had been inflicted

on him by a man with a blackened face. Having on this account been removed to the house of a magistrate and placed under close surveillance, he was visited by Earl Stanhope, who became so interested in his history that he sent him in 1832 to Ansbach to be educated under a certain Dr Meyer. After this he became clerk in the office of Paul John Anselm von Feuerbach, president of the court of appeal, who had begun to pay attention to his case in 1828; and his strange history was almost forgotten by the public when the interest in it was suddenly revived by his receiving a deep wound on his left breast, on the 14th of December 1833, and dying from it three or four days afterwards. He affirmed that the wound was inflicted by a stranger, but many believed it to be the work of his own hand, and that he did not intend it to be fatal, but only so severe as to give a sufficient colouring of truth to his story. The affair created a great sensa- tion, and produced a long literary agitation. But the whole story remains somewhat mysterious. Lord Stanhope eventually became decidedly sceptical as to Kaspar's stories, and ended by being accused of contriving his death !

In 1830 a pamphlet was published at Berlin, entitled Kaspar Hauser nicht unwahrscheinlich ein Betruger; but the truthfulness of his statements was defended by Daumer, who published Mittei- lungen iiber Kaspar Hauser (Nuremberg, 1832), and Enthullungen iiber Kaspar Hauser (Frankfort, 1859); as well as Kaspar Hauser, sein Wesen, seine Unschuld, &c. (Regensburg, 1873), in answer to Meyer's (a son of Kaspar's tutor) Authentische Miileilungen iiber Kaspar Hauser (Ansbach, 1872). Feuerbach awakened considerable psychological interest in the case by his pamphlet Kaspar Hauser, Beispiel eines Verbrechens am Seelenleben (Ansbach, 1832), and Earl Stanhope also took part in the discussion by publishing Materialen zur Geschichte K. Hausers (Heidelberg, 1836). The theory of Daumer and Feuerbach and other pamphleteers (finally presented in 1892 by- Miss Elizabeth E. Evans in her Story of Kaspar Hauser from Authentic Records) was that the youth was the crown prince of Baden, the legitimate son of the grand-duke Charles of Baden, and that he had been kidnapped at Karlsruhe in October 1812 by minions of the countess of Hochberg (morganatic wife of the grand-duke) in order to secure the succession to her offspring; but this theory was answered in 1875 by the publication in the Augsburg Allgemeine Zeitung of the official record of the baptism, post-mortem examina- tion and burial of the heir supposed to have been kidnapped. See Kaspar Hauser und sein badisches Prinzentum (Heidelberg, 1876). ■ In 1883 the story was again revived in a Regensburg pamphlet attack- ing, among other people, Dr Meyer; and the sons of the Jatter, who was dead, brought

an action for libel, under the German law, to which no defence was made ; all the copies of the pamphlet were ordered to be destroyed. The evidence has been subtly analyzed by Andrew Lang in his Historical Mysteries (1904), with results un- favourable to the ” romantic ” version of the story. Lang’s view is that possibly Kaspar was a sort of” ambulatory automatist,” an instance of a phenomenon, known by other cases to students of psychical abnormalities, of which the characteristics are a mania for straying away and the persistence of delusions as to identity; but he inclines to regard Kaspar as simply a ” humbug ” The ” authentic records ” purporting to confirm the kidnapping story Lang stigmatizes as ” worthless and impudent rubbish.” The evidence is in iny case in complete confusion.

HAUSMANN, JOHANN FRIEDRICH LUDWIG (1782-1859), German mineralogist, was born at Hanover on the 22nd of Feb- ruary 1782. He was educated at Gottingen, where he obtained the degree of Ph.D. After making a geological tour in Denmark, Norway and” Sweden in 1807, he was two years later placed a.t the head of a government mining establishment in Westphalia, and he established a school of mines at Clausthal in the Harz mountains. In 181 1 he was appointed professor of technology and mining, and afterwards of geology and mineralogy in the university of Gottingen, and this chair he occupied until a short time before his death. He was also for many years secretary of the Royal Academy of Sciences of Gottingen. He published observations on geology and mineralogy in Spain and Italy as well as in central and northern Europe: he wrote on gypsum, pyrites, felspar, tachylite, cordierite and on some eruptive

rocks, and he devoted much attention to the crystals developed during metallurgical processes. He died at Hanover on the 26th of December 1859.

Publication’s. — Grundlinien einer Encyklopadie der Bergwerks- wissenschaften (181 1); Reise durch Skandinavien (5 vols., 1811-1818); Handbuch der Mineralogie (3 vols., 1813; 2nd ed., 1828-1847).

HAUSRATH, ADOLPH (1837- 1909), German theologian, was born at Karlsruhe on the 13th of January 1837 and was educated at Jena, Gottingen, Berlin and Heidelberg, where he became Privatdozent in 1861, professor extraordinary in 1867 and ordinary professor in 1872.

He was a disciple of the Tubingen school and a strong Protestant. Among other works he wrote Der Apostcl Paulus (1865), Neutestamentliche Zeitgeschichte (1868-1873, 4 vols.; Eng. trans.), D. F. Strauss und die Theologie seiner Zeit (1876-1878, 2 vols.), and lives of Richard Rothe (2 vols. 1902), and Lutlier (1904). His scholarship was sound and his style vigorous. Under the pseudonym George Taylor he wrote several historical romances, especially Antinous (1880), which quickly ran through five editions, and is the story of a soul " which courted death because the objective restraints of faith had been lost." Klytia (1883) was a 16th-century story, Jetta (1884) a tale of the great immigrations, and Eljriede " a romance of the Rhine." He died on the 2nd of August 1909.

HAUSSER, LUDWIG (1S18-1867), German historian, was born at Kleeburg, in Alsace. Studying philology at Heidelberg in 1835, ne was ' e d by F. C. Schlosser to give it up for history, and after continuing his historical work at Jena and teaching in the gymnasium at Wertheim he made his mark by his Die teutschen Geschichtssc.hr eiber vom Anfang des Frankenreichs bis auf die Hohcnstaufen (1839). Next year appeared his Sage von Tell. After a short period of study in Paris on the French Revolution, he spent some time working in the archives of Baden and Bavaria, and published in 1845 Die Ceschichte der rheinischen Pfdlz, which won for him a professorship extra-ordinarily at Heidelberg. In 1850 he became professor ordinarius. Hausser also interested himself in politics while at Heidelberg, publishing in 1846 Schlcswig-H olstein, Ddncmark und Deutschland, and editing with Gervinus the Deutsche Zcitung. In 1848 he was elected to the lower legislative chamber of Baden, and in 1850 advocated the project of union with Prussia at the parlia- ment held at Erfurt. Another timely work was his edition of Friedrich List's Gesammelle Schriften (1850), accompanied with a life of the author. His greatest achievement, and the one on which his fame as an historian rests, is his Deutsche Ceschichte vom Tode Friedrichs des Grossen bis zur Griindung des deutsclien Bundcs (Leipzig, 1854-1857, 4 vols.). This was the first work covering that period based On a scientific study of the archival sources. In 1859 he again took part in politics, resuming his place in the lower chamber, opposing in 1863 the project of Austria for the reform of the Confederation brought forward in the assembly of princes at Frankfort, in his book Die Reform des deutschen Bundestages, and becoming one of the leaders of the " little German " (kleindeutsche) party, which advocated the exclusion of Austria from Germany. In addition to various essays (in his Gcsammelte Schriften, Berlin, 1869- 1870, 2 vols.), Hausser's lectures have been edited by W. Oncken in the Ceschichte des

Zeitalters der Reformation (1869, 2nd ed. 1880). and Ceschichte der franzbsischen Revolution (1869, 2nd ed. 1870). These lectures reveal all the charm of style and directness of presentation which made Hausser's work as a professor so vital.

See \Y. Wattenbach, Lud. Hausser- ein Vortrag (Heidelberg, 1867).

HAUSSMANN, GEORGES EUGENE, Baron (1809-1891), whose name is associated with the rebuilding of Paris, was born in that city on the 27th of March 1809 of a Protestant family, German in origin. He was educated at the College Henri IV, and subsequently studied law, attending simultaneously the classes at the Paris conservatoire of music, for he was a good musician. He became sous-prefet of Nerac in 1830, and advanced rapidly in the civil service until in 1853 he was chosen by Persigny prefect of the Seine in succession to Jean Jacques Berger, who hesitated to incur the vast expenses of the imperial schemes

for the embellishment of Paris. Haussmann laid out the Bois de Boulogne, and made extensive improvements in the smaller parks. The gardens of the Luxembourg Palace were cut down to allow of the formation of new streets, and the Boulevard de Sebastopol, the southern half of which is now the Boulevard St Michel, was driven through a populous district. A new water supply, a gigantic system of sewers, new bridges, the opera, and other public buildings, the inclusion of outlying districts — these were among the new prefect's achievements, accomplished by the aid of a bold handling of the public funds which called forth Jules Ferry's indictment, Lcs Comptes fan- tasticrues de Haussmann, in 1867. A loan of 250 million francs was sanctioned for the city of Paris in 1865, and another of 260 million in 1869. These sums represented only part of his financial schemes, which led to his dismissal by the government of Emile Ollivier. After the fall of the Empire he spent about a year abroad, but he re-entered public life in 1877, when he became Bonapartist deputy for Ajaccio. He died in Paris on the nth of January 1891. Haussmann had been made senator in 1857, member of the Academy of Fine Arts in 1867, and grand cross of the Legion of Honour in 1862. His name is preserved in the Boulevard Haussmann. His later years were occupied with the preparation of his Memoires (3 vols.,

1890-1893).

HAUSSONVILLE, JOSEPH OTHENIN BERNARD DE CLlSRON, Comte d' (1800-1884), French politician and historian, was born in Paris on the 27th of May 1809. His grandfather had been " grand louvetier " of

France; his father Charles Louis Bernard de Cleron, comte d'Haussonville (1770-1846), was chamberlain at the court of Napoleon, a count of the' French empire, and under the Restoration a peer of France and an opponent of the Villele ministry. Comte Joseph had filled a series of diplomatic appointments at Brussels, Turin and Naples before he entered the chamber of deputies in 1842 for Provins. Under the Second Empire he published a liberal anti-imperial paper at Brussels, Le Bulletin franqais, and in 1863 he actively supported the candidature of Prevost Paradol. He was elected to the French Academy in 1869, in recognition of his historical writings, Histoire de la politique exterieure du gouvernement franqais de 1830 a 1848 (2 vols., 1850), Histoire de la reunion de la Lorraine a la France (4 vols., 1854-1859), L'Eglise rotnaine et le premier empire 1800-1814 (5 vols., 1864-1879). In 1870 he published a pamphlet directed against the Prussian treatment of France, La France et la Prusse devant I' Europe, the sale of which was prohibited in Belgium at the request of King William of Prussia. He was the president of an association formed to provide new homes in Algeria for the inhabitants of Alsace-Lorraine who elected to retain their French nationality. In 1878 he was made a life-senator, in which capacity he allied himself with the Right Centre in defence of the religious associa- tions against the anti-clericals. He died in Paris on the 28th of May 1884.

His wife Louise (1818-1882), a daughter of Due Victor de Broglie, published in 1858 a novel Robert Emmet, followed by Marguerite de Valois reine de Navarre (1870), La Jeunesse de Lord Byron (1872), and Les Demieres Annies de Lord Byron (1874).

His son, Gabriel Paul Othenin de Cleron, comte d'Haussonville, was born at Gurcy de Chatel (Seine-et-Marne) on the 21st of September 1843, and married in 1865 Mile Pauline d'Harcourt. He represented Seine-et-Marne in the National Assembly (187 1) and voted with the Right Centre. Though he- was not elected to the chamber of deputies he became the right- hand man of his maternal uncle, the due de Broglie, in the attempted coup of the 16th of May. His Etablissements peni- tentiaires en France et aux colonies (1875) was crowned by the Academy, of which he was admitted a member in 1888. In 1891 the resignation of Henri Edouard Bocher from the adminis- tration of the Orleans estates led to the appointment of M d'Haussonville as accredited representative of the comte de Paris in France. He at once set to work to strengthen the Orleanist party by recruiting from the smaller nobility the officials of the local monarchical committees. He established

new Orleanist organs, and sent out lecturers with instructions to emphasize the modern and democratic principles of the comte de Paris; but the prospects of the party were dashed in 1894 by the death of the comte de Paris. In 1904 he was admitted to the Academy of Moral and Political Science. The comte d'Haussonvillc published:— C. A. Sainlc-Bcuve, jp, vie et scs ceuvres (1875), Etudes biograpliiques et liltcraires, 2 series (1879 and 188S), Le Salon de Mine Necker (1882, 2 vols.), Madame de La Fayette (1891), Madame Ackermami (1892), Le Comte de Paris, souvenirs personnels (1895), La Duehesse de Bourgogne et V alliance savoyarde (1898-1903), Salaire et miseres de femme (1900), and, with G. Hanotaux, Souvenirs sur Madame de Maintcnon (3 vols., 1002-1904).

ˆ HAUTE-GARONNE, a frontier department of south-western I' ranee, formed in 1790 from portions of the provinces of Languedoc(Toulousain and Lauraguais)and Gascony(Comminges and Xebouzan). Pop. (1906), 442,065. Area, 2458 sq. m. It is bounded X. by the department of Tarn-et-Garonne, E. by larn, Aude and Ariege, S. by Spain and W. by Gers and Hautes- Pyrenees. Long and narrow in shape, the department consists m the north of an undulating stretch of country with continual interchange of hill and valley nowhere thrown into striking rebel; while towards the south the land rises gradually to the Pyrenees, winch on the Spanish border attain heights of upwards of 10,000 ft. Two passes, the Port d'Oo, near the beautiful lake and waterfall of Oo, and the Port de Venasque, exceed 9800 and 7900 ft. in altitude respectively. Entering the deoartment in the south-east, the Garonne flows in a northerly direction and traverses almost its entire length, receiving in its course the Pique, the Salat, the Louge, the Ariege, the Touch and the Save. Except 111 the mountainous region the climate is mild, the mean annual temperature being rather higher than that of Paris. The rainfall, which averages 24 in. at Toulouse, exceeds 40 in. m some parts of the mountains; and sudden and destructive inundations of the Garonne— of which that of 1875 is a celebrated example— are always to be feared. The valley of the Garonne is also frequently visited by severe hail-storms. Thick forests of oak, fir and pine exist in the mountains and furnish timber for shipbuilding. The arable land of the plains and valleys is well adapted for the cultivation of wheat, maize and other grain crops; and the produce of cereals is generally much more than is required for the local consumption. Market-gardening flourishes around Toulouse. A large area is occupied by vineyards, though the wine is only of medium quality; and chestnuts, apples and peaches are grown. As pasture land is abundant a good deal oi attention is given to the

rearing of cattle and sheep, and co-operative dairies are numerous in the mountains; but de- forestation has tended to reduce the area of pasture-land, because the soil, unretained by the roots of trees, has been gradually washed away. Haute-Garonne has deposits of zinc and lead and salt-workings; there is an ancient and active marble- workmg industry at St Beat. Mineral springs are common, those ol Bagneres-de-Luchon Encausse, Barbazan and Salies-du- Salat being well known. The manufactures are various though not individually extensive, and include iron and copper goods woollen, cotton and linen goods, leather, paper, boots and shoes' tobacco and table delicacies. Flour-mills, iron-works and brick-works are numerous. Railway communication is furnished by the Southern and the Orleans railways, the main line of the former from Bordeaux to Cette passing through Toulouse. The Canal du Midi traverses the department for 32 m. and the lateral canal of the Garonne for 15 m. The Garonne is navigable below its confluence with the Salat. There are four arrondissements—loulouse, \ illefranche, Muret and St Gaudens, subdivided into 39 cantons and 588 communes. The chief town is Toulouse which is the seat of a court of appeal and of an archbishop the headquarters of the XVIIth army corps and the centre of an academy; and St Gaudens, Bagneres-de-Luchon and, from an architectural and historical standpoint, St Bertrand-de- Comminges are of importance and receive separate treatment Other places of interest are St Aventin,Montsaunes and Venerque which possess ancient churches in the Romanesque style. The

church of St Just at Valcabrere is of still greater age, the choir dating from the 8th or 9 th century and part of the nave from the nth century. There are ruins of a celebrated Cistercian abbey at Bonnefont near St Martory. Gallo-Roman remains and works of art have been discovered at Martres. Near Revel is the fine reservoir of St Ferrdol, constructed for the canal du Midi in the 17th century.

_ HAUTE-LOIRE, a department of central France, formed in 1790 of Velay and portions of Vivarais and Gevaudan three districts formerly belonging to the old province of Lang'uedoc of a portion of Forez formerly belonging to Lyonnais, and a portion of lower Auvergne. Pop. (1906), 314,770. Area, 1931 sq. m. It is bounded N. by Puy-de-D6me and Loire, E by Loire and Ardeche, S. by Ardeche and Lozere and W. by Lozere and Cantal. Haute-Loire, which is situated on the central plateau of France, is traversed from north to south by four mountain ranges. Its highest point, the Mont Mezenc (5755 ft.), in the south-east of the department, belongs to the mountains of \1vara1s, which are continued along the eastern border by the Boutieres chain. The Lignon divides the Boutieres from the Massif du Megal, which is

separated by the Loire itself from the mountains of Velay, a granitic range overlaid with the eruptions of more than one hundred and fifty craters. The Margeride mountains run along the western border of the department The Loire enters the department at a point 16 m. distant from its source in Ardeche, and first flowing northwards and then north-east, waters its eastern half. The Allier, which joins the Loire at Nevers, traverses the western portion of Haute-Loire in a northerly direction. The chief affluents of the Loire within the limits of the department are the Borne on the left, joining it near Le Puy, and the Lignon, which descends from the Mezenc between the Boutieres and Megal ranges, on the right The climate, owing to the altitude, the northward direction of the valleys, and the winds from the Cevennes, is cold, the winters being long and rigorous. Storms and violent rains are frequent on the higher grounds, and would give rise to serious inundations were not the rivers for the most part confined within deep rocky channels. Cereals, chiefly rye, oats, barley and wheat, are cultivated in the lowlands and on the plateaus, on which aromatic and medicinal plants are abundant. Lentils, peas, mangel- wurzels and other forage and potatoes are also grown. Horned cattle belong principally to the Mezenc breed; goats are numerous. The woods yield pine, fir, oak and beech. Lace- making, which employs about 90,000 women, and coal-mining are mam industries; the coal basins are those of Brassac and [ˆ, ngea) (;- There are aIso mines of antimony and stone-quarries. Silk-millmg, caoutchouc-making, various kinds of smith's work paper-making, glass-blowing, brewing, wood-sawing and flour- milling are also carried on. The principal imports are flour brandy,wine, live-stock, lace-thread and agricultural implements' Exports include fat stock, wool, aromatic plants, coal, lace. I he department is served chiefly by the Paris-Lyon-Mediterranee company. There are three arrondissements— Le Puy, Brioude and Yssingeaux, with 28 cantons and 265 communes.

Haute-Loire forms the diocese of Le Puy and part of the ecclesiastical province of Bourges, and belongs to the academie (educational division) of Clermont-Ferrand. Its court of appeal is at Riom. Le Puy the capital, Brioude and La Chaise-Dieu the principal towns of the department, receive separate treat- ment. It has some notable churches, of which those of Chama- heres, St Paulien and Sainte-Marie-des-Chazes are Romanesque in style; Le Monastier preserves the church, in part Romanesque" and the buildings of the abbey to which it owes its origin' Arlempdes and Bouzols (near Coubon) have the ruins of large feudal chateaus. The rocky plateau overlooking Polignac is occupied by the ruins of the imposing stronghold of the ancient family of Polignac, including a square donjon of the 14th century.

Interesting Gallo-Roman remains have been found on the site.

HAUTE-MARNE, a department of north-eastern France made up for the most part of districts belonging to the former province of Champagne (Bassigny, Perthois, Vallage), with smaller portions of Lorraine and Burgundy, and some fragments of

Franche-Comte. Area, 2415 sq. m. Pop. (1906), 221,724. It is bounded N.E. by Meuse, E. by Vosges, S.E. by Haute-Saone, S. and S.W. by Cote d'Or, W. by Aube, and N.W. by Marne. Its greatest elevation (1693 ft.) is in the plateau of Langres in the south between the sources of the Marne and those of the Aube; the watershed between the basin of the Rhone on the

' south and those of the Seine and Meuse on the north, which is formed by the plateau of Langres continued north-east by the Monts Faucilles, has an average height of 1500 or 1600 ft. The country descends rapidly towards the south, but in very gentle slopes northwards. To the north is Bassigny (the paybas or low country, as distinguished from the highlands), a district characterized by monotonous flats of little fertility and extensive wooded tracts. The lowest level of the department is 361 ft. Hydrographically Haute-Marne belongs for the most part to the basin of the Seine, the remainder to those of the Rhone and the Meuse. The principal river is the Marne, which rises here, and has a course of 75 m. within the department. Among its

» more important affluents arc, on the right the Rognon, and on the left the Blaise. The Saulx, another tributary of the Marne on the right, also rises in Haute-Marne. Westward the depart- ment is watered by the Aube and its tributary the Aujon, both of which have their sources on the plateau of Langres. The Meuse also rises in the Monts Faucilles, and has a course of 31 m. within the department. On the Mediterranean side the department sends to the Saone the Apance, the Amance, the Salon and the Vingeanne. The climate is partly that of the Seine region, partly that of the Vosges, and partly that of the Rhone; the mean temperature is 51 F., nearly that of Paris; the rainfall is slightly below the average for France.

The agriculture of the department is carried on chiefly by small proprietors. The chief crops are wheat and oats, which are more than

sufficient for the needs of the inhabitants; potatoes, lucerne and mangel wurzels are next in importance. Natural pasture is abundant, especially in Bassigny, where horse and cattle-raising flourish. The vineyards produce some fair wines, notably the white wine of Soyers. More than a quarter of the territory is under wood. The department is rich in iron and building and other varieties of stone are quarried. The warm springs of Bourbonne-les-Bains are among the earliest known and most frequented in France. The leading industry is the metallurgical; its establishments include blast furnaces, foundries, forges, plate-rolling works, and shops for nailmaking and smith's work of various descriptions. St Dizier is the chief centre of manufacture and distribution. The cutlery trade occupies thousands of hands at Nogent-en-Bassigny and in the neighbour- hood of Langres. Yal d'Osne is well known for its production of fountains, statues, &c. in metal-work. Flour-milling, glove- making (at Chaumont), basket-making, brewing, tanning and other industries are also carried on. The principal import is coal, while manufactured goods, iron, stone, wood and cereals are exported. The department is served by the Eastern railway, of which the line from Paris to Belfort passes through Chaumont and Langres. The canal from the Marne to the Saone and the canal of the Haute-Marne, which accompany the Marne, together cover 99 m.; there is a canal 14 m. long from St Dizier to Wassy. There are three a rrondissements (Chaumont, Langres and Wassy), with 28 cantons and 550 communes. Chaumont is the capital. Th . department forms the diocese of Langres; it belongs to the VII. military region and to the educational circumscription (academic) of Dijon, where also is its court of appeal. The principal towns —Chaumont, Langres, St Dizier and Bourbonne- les-Bains — receive separate notice. At Monlier-en-Dcr the remains of an abbey founded in the 7th century include a fine church with nave and aisles of the roth, and choir of the 13th century. Wassy. the scene in [562 of the celebrated massacre of Protestants by the troops of Francis, duke of Guise, has among its old building* a church much of which dates from the Koman- esque period. Yignory has a church of the nth century. Join- ville. a metallurgical centre, preserves a chateau of the dukes of Guise in the Renaissance style. Pailly, near Langres, has a fine chateau of the last half of the 16th century.

HAUTERIVE, ALEXANDRE MAURICE BLANC DE LANAUTTE, Comte d' (1754-1830), French statesman and diplomatist, was born at Aspres (Hautes-Alpes) on the 14th of April 1754, and was educated at Grenoble, where he became a professor. Later he held a similar position at Tours, and there he attracted the attention of the due de Choiseul, who invited him to visit him at Chanteloup. Hauterive thus

came in contact with the great men who visited the duke, and one of these, the comte de Choiseul-Goiflier, on his appointment as ambassador to Constantinople in 1784 took him with him. Hauterive was enriched for a time by his marriage with a widow, Madame de Marchais, but was ruined by the Revolution. In 1790 he applied for and received the post of consul at New York. Under the Consulate, however, he was accused of embezzlement and re- called; and, though the charge was proved to be false, was not reinstated. In 1798, after trying his hand at farming in America, Hauterive was appointed to a post in the French foreign office. In this capacity he made a sensation by his L'Etat de la France A la fin de Van VIII (1800), which he had been commissioned by Bonaparte to draw up, as a manifesto to foreign nations, after the coup d'etat of the 18th Brumaire. This won him the con- fidence of Bonaparte, and he was henceforth employed in drawing up many of the more important documents. In 1805 he was made a councillor of state and member of the Legion of Honour, and between 1805 and 1813 he was more than once temporarily minister of foreign affairs. He attempted, though vainly, to use his influence to moderate Napoleon's policy, especially in the matter of Spain and the treatment of the pope. In 1805 a difference of opinion with Talleyrand on the question of the Austrian alliance, which Hauterive favoured, led to his with- drawal from the political side of the ministry of foreign affairs, and he was appointed keeper of the archives of the same depart- ment. In this capacity he did very useful work, and after the Restoration continued in this post at the request of the due de Richelieu, his work being recognized by his election as a member of the Academie des Inscriptions et Belles-Lettres in 1820. He died at Paris on the 28th of July 1830.

There is a detailed account of Hauterive, with considerable extracts from his correspondence with Talleyrand, in the Biographie universelle by A. F. Artand de Montor, who published a separate life in 1831. Criticisms of his Etat de la France appeared in Germany and England by F. von Gentz (Von dem politischen Zustande, 1801). and by T. B. Clarke {A Hist, and Pol. View . . . . 1803).

HAUTES ALPES, a department in S.E. France, formed in 1790 out of the south-eastern portion of the old province of Dauphine, together with a small part of N. Provence. It is bounded N. by the department of Savoic, E. by Italy and the department of the Basses Alpes, S. by the last-named depart- ment and that of the Drome, and W. by the departments of the Drome and of the Iscre. Its area is 2178 sq. m., its greatest length is 85 m. and its greatest breadth 62 m. It is very moun- tainous, and includes the Pointe des Ecrins (13,462 ft.), the loftiest summit in France before the annexation of Savoy in i860, as well as

the Meije (13,081 ft.), the Ailefroide (12,989 ft.) and the Mont Pelvoux (12,973 ft.), though Monte Viso (12,609 ft.) is wholly in Italy, rising just over the border. The department is to a large extent made up of the basins of the upper Durance (with its tributaries, the Guisane, the Gyronde and the Guil), of the upper Drac and of the Buech — all being to a very large extent wild mountain torrents in their upper course. The depart- ment is divided into three arrondissements (Gap, Briancon and Embrun), 24 cantons and 186 communes. In 1906 its population was 107,498. It is a very poor department owing to its great elevation above the sea-level. There are no industries of any extent, and its commerce is almost wholly of local importance. The prolonged winter greatly hinders agricultural development, while the pastoral region has been greatly damaged and the forests destroyed by the ravages of the Provencal sheep, vast flocks of which are driven up here in the summer, as the pastures are leased out to a large extent, and but little utilized by the inhabitants. It now forms the diocese of Gap (this see is first certainly mentioned in the 6th century), which is in the ecclesi- astical province of Aix en Provence; in 1791 there was annexed

to it the archiepiscopal see of Embrun, which was. then sup- pressed. There are 114 m. of railway in the department. This includes the main line from Briancon past Gap towards Grenoble. About i6| m. W. of Gap is the important railway junction of Veynes, whence branch off the lines to Grenoble, to Valence by Die and Livron, and to Sisteron for Marseilles. The chief town is Gap, while Briancon and Embrun are the only other important places.

See J. Roman, Dictionnaire topographique du dep. des Htes-Alpes (Paris, 1884), Tableau historique du dep. des Htes-Alpes (Paris, 1887-1890, 2 vols.), and Repertoire archeologique du dep. des Htes-Alpes (Paris, 1888); J. C. F. Ladoucette, Histoire, topographie, fife, des Hautes-Alpes (3rd ed., Paris, 1848). (W. A. B. C.)

HAUTE-SA6NE, a department of eastern France, formed in 1 -go from the northern portion of Franche Comte. It is traversed by the river Saone, bounded N. by the department of the Vosges, E. by the territory of Belfort, S. by Doubs and Jura, and W. by Cote-d'Or and Haute-Marne. Pop. (1906), 263,890; area, 2075 sq. m. On the north-east, where they are formed by the Vosges, and to the south along the course of the Ognon the limits are natural. The highest point of the

department is the Ballon de Servance (3970 ft.), and the lowest the confluence of the Saone and Ognon (610 ft.). The general slope is from north-east to south-west, the direction followed by those two streams. In the north-east the department belongs to the Vosgian formation, consisting of forest-clad mountains of sandstone and granite, and is of a marshy nature; but throughout the greater part of its extent it is composed of limestone plateaus 800 to 1000 ft. high pierced with crevasses and subterranean caves, into which the rain water disappears to issue again as springs in the valleys 200 ft. lower down. In its passage through the department the Saone receives from the right the Amance and the Salon from the Langres plateau, and from the left the Coney, the Lanterne (augmented by the Breuchin which passes by Luxeuil), the Durgeon (passing Vesoul), and the Ognon. The north-eastern districts are cold and have an annual rainfall ranging from 36 to 48 in. Towards the south-west the climate becomes more temperate. At Vesoul and Gray the rainfall only reaches 24 in. per annum.

Haute-Saone is primarily agricultural. Of its total area nearly half is arable land; wheat, oats, meslin and rye are the chief cereals and potatoes are largely grown. The vine flourishes mainly in the arrondissement of Gray. Apples, plums and cherries (from which the kirsch, for which the department is famous, is distilled) are the chief fruits. The woods which cover a quarter of the department are composed mainly of firs in the Vosges and of oak, beech, hornbeam and aspen in the other districts. The river-valleys furnish good pasture for the rearing of horses and of horned cattle. The department possesses mines of coal (at Ronchamp) and rock-salt (at Gouhenans) and stone quarries are worked. Of the many mineral waters of Haute-Saone the best known are the hot springs of Luxeuil (q.v.). Besides iron-working establishments (smelting furnaces, foundries and wire-drawing mills), Haute-Saone possesses copper-foundries, engineering works, steel-foundries and factories at Planchcr-les- Mines and elsewhere for producing ironmongery, nails, pins, fdes, saws, screws, shot, chains, agricultural implements, locks, spin- ning machinery, edge tools. Window-glass and glass wares, pottery and earthenware arc manufactured; there are also brick and tile-works. The spinning and weaving of cotton, of which Hcricourt (pop. in 1906, 5104) is the chief centre, stand next in importance to metal working, and there are numerous paper- mills. Print-works, fulling mills, hosiery factories and straw-hat factories are also of some account; as well as sugar works, distilleries, dye-works, saw-mills, starch-works, the chemical works at Gouhenans, oil-mills, tanyards and flour- miiis. The department exports wheat, cattle, cheese, butter, iron, wood, pottery,

kirschwasser, plaster, leather, glass, &c. The Saone provides a navigable channel of about 70 m., which is connected with the Moselle and the Meuse at Corre by the Canal de l'Est along the valley of the Coney. Gray is the chief emporium of the water-borne trade of the Saone. Haute-Saone

is served chiefly by the Eastern railway. There are three arrondissements — Vesoul, Gray, Lure — comprising 28 cantons, 583 communes. Haute-Saone is in the district of the VII. army corps, and in its legal, ecclesiastical and educational relations depends on Besancon.

Vesoul, the capital of the department, Gray and Luxeuil are the principal towns. There is an important school of agri- culture at St Remy in the arrondissement of Vesoul. The Roman ruins and mosaics at Membrey in the arrondissement of Gray and the church (13th and 15th centuries) and abbey buildings at Faverney, in the arrondissement of Vesoul, are of antiquarian interest.

HAUTE-SAVOIE, a frontier department of France, formed in i860 of the old provinces of the Genevois, the Chablais and the Faucigny, which constituted the northern portion of the duchy of Savoy. It is bounded N. by the canton and Lake of Geneva, E. by the Swiss canton of the Valais, S. by Italy and the department of Savoie, and W. by the department of the Ain. It is mainly made up of the river-basins of the Arve (flowing along the northern foot of the Mont Blanc range, and receiving the Giffre, on the right, and the Borne and Foron, on the left — the Arve joins the Rhone, close to Geneva), of the Dranse (with several branches, all flowing into the Lake of Geneva), of the Usses and of the Fier (both flowing direct into the Rhone, the latter after forming the Lake of Annecy) . The upper course of the Arly is also in the department, but the river then leaves it to fall into the Isere. The whple of the department is mountainous. But the hills attain no very great height, save at its south-east end, where rises the sncwclad chain of Mont Blanc, with many high peaks (culminating in Mont Blanc, 15,782 ft.) and many glaciers. That portion of the department is alone frequented by travellers, whose centre is Chamonix in the upper Arve valley. The lowest point (945 ft.) in the department is at the junction of the Fier with the Rhone. The whole of the department is included in that portion of the duchy of Savoy which was neutral- ized in 1815. In 1906 the population of the department was 260,617. Its area is 1775 sq. m., and it is divided into four arrondissements (Annecy, the chief town, Bonneville, St Julien and Thonon), 28 cantons and 314 communes. It forms the diocese of Annecy. There are in the department 176 m. of broad-gauge railways, and 70 m. of narrow-

gauge lines. There are also a number of mineral springs, only three of which are known to foreigners — the chalybeate waters of Evian and Amphion, close to each other on the south shore of the Lake of Geneva, and the chalybeate and sulphurous waters of St Gervais, at the north-west end of the chain of Mont Blanc. Anthracite and asphalte mines are numerous, as well as stone quarries. Cotton is' manufactured at Annecy, while Cluses is the centre of the clock-making industry. There is a well-known bell foundry at Annecy le Vieux. Thonon (the old capital of the Chablais) is the most important town on the southern shore of the Lake of Geneva and, after Annecy, the most populous place in the department. (W. A. B. C.)

HAUTES-PYR§N6ES, a department of south-western France, on the Spanish frontier, formed in 1790, half of it being taken from Bigorre and the remainder from Armagnac, Nebouzan, Astarac and Quatre Vallees, districts which all belonged to the province of Gascony. Pop. (1906), 209,397. Area, 1750 sq. m. Hautes-Pyrenees is bounded S. by Spain, W. by the department of Basses-Pyrenees (which encloses on its eastern border five communes belonging to Hautes-Pyrenees), N. by Gers and E. by Haute-Garonne. Except on the south its boundaries are conventional. The south of the department, comprising two- thirds of its area, is occupied by the central Pyrenees. Some of the peaks reach or exceed the height of 10,000 ft., the Vigne- male (10,820 ft.) being the highest in the French Pyrenees. The imposing cirques (Cirques de Troumouse, Gavarnie and Estaube), with their glaciers and waterfalls, and the pleasant valleys attract a large number of tourists, the most noted point being the Cirque de Gavarnie. The northern portion of the depart- ment is a region of plains and undulating hills clothed with corn- fields, vineyards and meadows. To the north-east, however, the

cold and wind-swept plateau of Lannemezan (about 2000 ft.), the watershed of the streams that come down on the French side of the Pyrenees, presents in its bleakness and barrenness a striking contrast to the plain that lies below. The department is drained by three principal streams, the Gave de Pau, the Adour and the Neste, an affluent of the Garonne. The sources of the first and third lie close together in the Cirque of Gavarnie and on the slopes of Troumouse, whence they flow respectively to the north-west and north-east. An important section of the Pyrenees, which carries the Massif Neouvielle and the Pic du Midi de Bigorre (with its meteorological observatory), runs northward between these two valleys. From the Pic du Midi

descends the Adour, which, after watering the pleasant valley of Campan, leaves the mountains at Bagneres and then divides into a multitude of channels, to irrigate the rich plain of Tarbes. The chief of these is the Canal dAlaric with a length of 36 m. Beyond Hautes-Pyrenees it receives on the right the Arros, which flows through the department from south to north-north- west; on the left it receives the Gave de Pau. This latter stream, rising in Gavarnie, is joined at Luz by the Gave de Bastan from Neouvielle, and at Pierrefitte by the Gave de Cauterets, fed by streams from the Vignemale. The Gave de Pau, after passing Argeles, a well-known centre for excursions, and Lourdes, leaves the mountains and turns sharply from north to west; it has a greater volume of water than the Adour, but, being more of a mountain torrent, is regarded as a tributary of the Adour, which is navigable in the latter part of its course. The Neste d'Aure, descending from the peaks of Neouvielle and Troumouse, receives at Arreau the Neste de Louron from the pass of Clarabide and flows northwards through a beautiful valley as far as La Barthe, where it turns east; it is important as furnishing the plateau of Lannemezan with a canal, the Canal de la Neste, the waters of which are partly used ior irrigation and partly for supplying the streams that rise there and are dried up in summer — the Gers and the Ba'ise, affluents of the Garonne. This latter only touches the department. The climate of Hautes- Pyrenees, though very cold on the highlands, is warm and moist in the plains, where there are hot summers, fine autumns, mild winters and rainy springs. On the plateau of Lannemezan, while the summers are dry and scorching, the winters are very severe. The average annual rainfall at Tarbes, in the north of the department, is about 34 in.; at the higher altitudes it is much greater. The mean annual temperature at Tarbes is 59 Fahr.

Hautes-Pyrenees is agricultural in the plains, pastoral in the highlands. The more important cereals are wheat and maize, which is much used for the feeding of pigs and poultry, especially geese; rye, oats and barley are grown in the mountain districts. The wines of Madiran and Peyriguere are well known and tobacco is also cultivated; chestnut trees and fruit trees are grown on the lower slopes. In the neighbourhood of Tarbes and Bagneres-de-Bigorre horse-breeding is the principal occupation and there is a famous stud at Tarbes. The horse of the region is the result of a fusion of Arab, English and Navarrese blood and is well fitted for saddle and harness; it is largely used by light cavalry regiments. Cattle raising is important; the milch-cows of Lourdes and the oxen of Tarbes and the valley of the Aure are highly esteemed. Sheep and goats are also reared. The forests, which occur chiefly in the highlands, contain bears, boars, wolves and other

wild animals. There are at Campan and Sarrancolin quarries of fine marble, which is sawn and worked at Bagneres. There is a group of slate quarries at Labassere. Deposits of lignite, lead, manganese and zinc are found. The mineral springs of Hautes-Pyrenees are numerous and much visited. The principal in the valley of the Gave de Pau are Cauterets (hot springs containing sulphur and sodium), St Sauveur (springs with sulphur and sodium), and Bareges (hot springs with sulphur and sodium), and in the valley of the Adour Bagneres (hot or cold springs containing calcium sulphates, iron, sulphur and sodium) and Capvern near Lannemezan (springs containing calcium sulphates).

The department has flour-mills and saw-mills, a large military

arsenal at Tarbes, paper-mills, tanneries and manufactories of agricultural implements and looms. The spinning and weaving of wool and the manufacture of knitted goods are carried on; Bagneres-de-Bigorre is the chief centre of the textile industry.

Of the passes (ports) into Spain, even the chief, Gavarnie (7398 ft.), is not accessible to carriages. The department is served by the Southern railway and is traversed from west to east by the main line from Bayonne to Toulouse. There are three arrondissements, those of Tarbes, Argeles and Bagneres- de-Bigorre, 26 cantons and 480 communes. Tarbes is the capital of Hautes-Pyrenees, which constitutes the diocese of Tarbes, and is attached to the appeal court of Pau ; it forms part of the region of the XVIII. army corps. In educational matters it falls within the circumscription of the academie of Toulouse. Tarbes, Lourdes, Bagneres-de-Bigorre and Luz-St Sauveur are the prin- cipal towns. St Savin, in the valley of the Gave de Pau, and Sarrancolin have interesting Romanesque churches. The church of Maubourguet built by the TeniDlars in the 1 2th century is also remarkable.

HAUTE-VIENNE, a department of central France, formed in 1790 of Haut-Limousin and of portions of Marche, Poitou and Berry. Pop. (1906), 385,732. Area, 2144 sq. m. It is bounded N. by Indre, E. by Creuse, S.E. by Correze, S.W. by Dordogne, W. by Charente and N.W. by Vienne. Haute- Vienne belongs to the central plateau of France, and drains partly to the Loire and partly to the Garonne. The highest altitude (2549 ft.) is in the extreme south-east, and belongs to the treeless but well- watered plateau of Millevaches, formed of granite, gneiss and mica. From that point the department slopes towards the west, south-west and north. To the north-west of the Millevaches are the Ambazac and Blond Hills, both separating the valley of the Vienne from that of the Gartempe, a tributary of the Creuse. The Vienne

traverses the department from east to west, passing Eymoutiers, St Leonard, Limoges and St Junien, and receiving on the right the Maude and the Taurion. The Isle, which flows into the Dordogne, with its tributaries the Auvezere and the Dronne, and the Tardoire and the Bandiat, tributaries of the Charente, all rise in the south of the department. The altitude and inland position of Haute-Vienne, its geological character, and the northern exposure of its valleys make the winters long and severe; but the climate is milder in the west and north-west. The annual rainfall often reaches 36 or 37 in. and even more in the mountains. Haute-Vienne is on the whole unproductive. Rye, wheat, buckwheat and oats are the cereals most grown, but the chestnut, which is a characteristic product of the department, still forms the staple food of large numbers of the population. Potatoes, mangolds, hemp and colza are cultivated. After the chestnut, walnuts and cider-apples are the principal fruits. Good breeds of horned cattle and sheep are reared and find a ready market in Paris. Horses for remount purposes are also raised. The quarries furnish granite and large quantities of kaolin, which is both exported and used in the porcelain works of the department. Amianthus, emeralds and garnets are found. Limoges is the centre of the porcelain industry and has important liqueur distilleries. Woollen goods, starch, paper and pasteboard, wooden and leather shoes, gloves, agri- cultural implements and hats are other industrial products, and there are flour-mills, breweries, dye-works, tanneries, iron foundries and printing works. Wine and alcohol for the liqueur- manufacture, coal, raw materials for textile industries-, hops, skins and various manufactured articles are among the imports.

The department is served almost entirely by the Orleans Railway. It is divided into the arrondissements of Limoges, Bellac, Rochechouart and St Yrieix (29 cantons and 205 com- munes), and belongs to the academie (educational division) of Poitiers and the ecclesiastical province of Bourges. Limoges, the capital, is the seat of a bishopric and of a court of appeal, and is the headquarters of the XII. army corps. The other prin- cipal towns are St Yrieix and St Junien. Solignac, St Leonard and Le Dorat have fine Romanesque churches. The remains

of the chateau of Chalusset (S.S.E. of Limoges), the most remark- able feudal ruins in Limousin, and the chateau of Rochechouart, which dates from the 13th, 15th and 16th centuries, are also of interest.

HAUT-RHIN, before 1S71 a department of eastern France, formed in 1700 from the southern portion of Alsace. The name ” Haut-Rhin ” is sometimes used of the territory of Belfort (q.v.).

HAUY, RENi JUST (1743-1822), French mineralogist, commonly styled the Abbe Haiiy, from being an honorary canon of Notre Dame, was born at St Just, in the department of Oise, on the 28th of February 1743. His parents were in a humble rank of life, and were only enabled by the kindness of friends to s<;nd their son to the college of Navarre and afterwards to that of Lemoine. Becoming one of the teachers at the latter, he began to devote his leisure hours to the study of botany; but an accident directed his attention to another field in natural history. Happening to let fall a specimen of calcareous spar belonging to a friend, he was led by examination of the fragments to make experiments which resulted in the statement of the geometrical law of crystallization associated with his name (see Crystallography). The value of this discovery, the mathematical theory of which is given by Haiiy in his Traite de mineralogie, was immediately recognized, and when communi- cated to the Academy, it secured for its author a place in that society. Hatty's name is also known for the observations he made in pyro-electricity. When the Revolution broke out, he was thrown into prison, and his life was even in danger, when he was saved by the intercession of E. Geoffroy Saint-Hilaire. In 1802, under Napoleon, he became professor of mineralogy at the museum of natural history, but after 1814 he was deprived of his appointments by the government of the Restoration. His latter days were consequently clouded by poverty, but the courage and high moral qualities which had helped him forward in his youth did not desert him in his old age; and he lived cheerful and respected till his death at Paris on the 3rd of June

1822.

The following are his principal works: Essai d’une theorie sur la structure des cristaux (1784); Exposition raisonnee de la theorie de Velectricite et du magnetisme, d’apres les principes d’Aepinus (1787); De la structure consideree comme caract’ere distinctif des mineraux (1793); Exposition abregee’ de la theorie de la structure des cristaux (1793); Extrait d’un traite elementaire de mineralogie (1797); Traite de mineralogie (4 vols., 1801); Traite elementaire de physique (2 vols., 1803, 1806); Tableau comparatif des resultats de la cristallographie, et de V analyse chimique relativement d la classification des miner aux (1809); Traite des pierres precieuses (1817); Traite de cristallographie (2 vols., 1822). He also contri- buted papers, of which 100 are enumerated in the Royal Society’s catalogue,

to various scientific journals, especially the Journal de physique and the Annals du Museum d'Histoire Naturelle.

HAVANA (the name is of aboriginal origin; Span. Habana or, more fully, San Cristobal de la Habana), the capital of Cuba, the largest city of the West Indies, and one of the principal seats of commerce in the New World, situated on the northern coast of the island in 23 9′ N. lat. and 82 22′ W. long. Pop. (1899), 235,981; (1907), 297,159. The city occupies a peninsula to the W. of the harbour, between its waters and those of the sea. Several small streams, of which the Almendares river is the largest, empty into the harbour. The pouch-shaped, land- locked bay is spacious and easy of access. Large merchantmen and men-of-war can come up and unload along at least a consider- able part of the water-front. The entrance, which is encumbered by neither bar nor rock, averages about 260 yds. in width and is about 1400 yds. long. Within, the bay breaks up into three distinct arms, Marimalena or Regla Bay, Guanabacoa Bay and the Bay of Atares. On the left hand of the entrance stands the lofty lighthouse tower of the Morro. The sewage of the city and other impurities were for centuries allowed to pollute the bay, but the extent to which the harbour was thereby filled up has been exaggerated. Though certainly very much smaller than it once was, there is a difference of opinion as to whether the harbour has grown smaller since the end of the 18th century. From the sea the city presents a picturesque appearance.

The Havana side of the bay has a sea-wall and an excellent drive. The city walls, begun in 1671 and completed about 1740, were almost entirely demolished between 1863 and 1880, only a few insignificant remnants having survived the American military occupation of 1899-1902; but it is still usual to speak of the " intramural " and the " extramural " city. The former, the old city, lying close to the harbour front, has streets as narrow as is consistent with wheel traffic. Obispo (Pi y Margall in the new republican nomenclature), O'Reilly and San Rafael are the finest retail business streets, and the Prado and the Cerro the handsomest residential streets in the city proper. The new city, including the suburbs to the W. overlooking the sea, has been laid out on a somewhat more spacious plan, with isolated dwellings and wide thoroughfares, some planted with trees. Most of the houses, and especially those of the planter aristocracy, are massively built of stone, with large grated windows, flat roofs with heavy parapets and inner courts. As the erection of wooden buildings was illegal long after 1772, it is only in the suburban districts that they are to be seen. The limestone which underlies almost all the island affords excellent building stone. The poorer houses are built of brick with plaster fronts. Three-fourths of all the buildings of the city are of one very

high storey; there are but a few dozen buildings as high as four storeys. Under Spanish rule, Havana was reputed to be a city of noises and smells. There was no satisfactory cleaning of the streets or draining of the sub-soil, and the harbour was rendered visibly foul by the impurities of the town. A revolution was worked in this respect during the United States military occupation of the city, and the republic continued the work.

Climate. — The general characteristics of the climate of Havana are described in the article Cuba. A temperature as low as 40 F. is extraordinary; and freezing point is only reached on extremely rare occasions, such as during hurricanes or electric storms. The mean annual temperature is about 25-7° C. (78 F.) ; that of the hottest month is about 28-8° C. (84 F.), and that of the coldest, 21° C. (70 F.). The means of the four seasons are approximately — for December, January, February and successive quarters — 23 , 27 , 28 and26* C. (73-4°, 8o-6°, 82-4° and 78-8° F.). The mean relative humidity is between 75 and 80 for all seasons save spring, when it is least and may be from 65 upward. A difference of 30 C. (54 F.) at mid-day in the temperature of two spots close together, one in sun and one in shade, is not unusual. The daily variation of temperature is also considerable. The depressing effect of the heat and humidity is greatly relieved by afternoon breezes from the sea, and the nights are invariably comfortable and generally cool.

Defences. — The principal defences of Havana under Spanish rule, when the city was maintained as a military stronghold of the first rank, were (to use the original and unabbreviated form of the names) the Castillo de San Salvador de la Punta, to the W. of the harbour entrance; the Castillo de Los Tres Reyes del Morro and San Carlos de la Cabana, to the E. ; the Santo Domingo de Atares, at the head of the western arm of the bay, commanding the city and its vicinity; and the Castillo del Principe (1 767-1 780), situated inland on an eminence to the W. El Morro, as it is popularly called, was first erected in 1590-1640, and La Punta, a much smaller fort, is of the same period; both were reconstructed after the evacuation of the city by the English in 1763, from which time also date the castles of Principe, Atares and the Cabana. The Cabana, which alone can accommodate some 6000 men, fronts the bay for a distance of more than 800 yds., and was long supposed, at least by Spaniards, to be the strongest fortress of America. Here is the ” laurei ditch ” or ” dead-line ” — commemorated by a handsome bronze relief set in the wall of the fortress — where scores of Cuban patriots were shot. To the E. and W. inland are several small forts. The military establishment of the republic is very small.

Churches. — Of the many old churches in the city, the most note 1 worthy is the cathedral. The original building was abandoned in 1762. The present one, originally the church of the Jesuits, was erected in 1 656-1 724. The interior decoration dates largely from the last decade of the 18th century and the first two decades of the 19th. In the wall of the chancel, a medallion and inscription long distinguished the tomb of Columbus, whose remains were removed hither from Santo Domingo in 1796. In 1898 they were taken to Spain. Mention may also be made of the churches of Santo Domingo (begun in 1578), Santa Catalina (1700), San Agustin (t6o8), Santa Clara (1644), La Merced (1744, with a collection of oil paintings) and San Felipe (1693). Monasteries and nunneries were very numerous until the suppression of the religious orders in 1842, when many became simple churches. Some of the convents were successful in conserving their wealth. The former monastery of the Jesuits, now the Jesuit church of Bcl<5n (1704), at the corner of Luz

and Compostela Streets, is one of the most elegant and richly ornamented in Cuba.

Public Buildings. — The Palace, which served as a residence for the captains-general during the Spanish rule, is the home of the city government and the residence of the president of the republic. It is a large and handsome stone structure (tinted in white and yellow), and stands on the site of the original parish church, facing” the Plaza de Armas from the east. It was erected in 1 773-1 792 and radically altered in 1835 and 1851. A large municipal gaol (1834-1837), capable of receiving 500 inmates, with barracks for a regiment, is a striking object on the Prado. The Castillo del Principe now serves as the state penitentiary. Among other public buildings are the exchange (El Muelle), the custom-house (formerly the church of San Francisco; begun about 1575, rebuilt in 1731-1737), and the Maestranza (c. 1723), once the navy yard and the headquarters of the artillery and now the home of the national library. All these are in the old city. Some of the older structures — notably the church of Santo Domingo and the Maestranza — are built of grey limestone. In the old city also are the Plaza Vieja, dating from the middle of the 16th century (with the modern Mercado de Cristina, of 1837 — destroyed 1908), the old stronghold La Fuerza, erected by Hernando de Soto in 1538, once the treasury of the flotas and galleons, and residence of the governors, with its old watch-tower (La Vigia) ; and the Plaza de Armas, with the

palace, the Senate building, a statue of Fernando VII. (1833), and a commemorative chapel (El Templete, 1828) to mark the supposed spot where mass was first said at the establishment of the city. Mention must be made of the large and interesting markets, especially those of Colon and Tacon. Of the theatres, which until the end of the Spanish period had to compete with the bull-ring and the cock- pit, the most important is the Tacon (now ” Nacional “) erected in 1838.

Havana is famous for its promenades, drives and public gardens. On the city’s E. harbour front runs the Paseo (Alameda) de Paula (1772-1775, improved 1844-1845), an embanked drive, continued by the Paseo de Rocali and the Cortina de Valdes, with fine views of the forts and the harbour. On the N., along the sea, beginning at the Punta fortress and running W. for several miles along the sea- wall, is a speedway and pleasure-drive, known — from the wall — as the Malecon. Beginning at the Punta fortress — where a park was laid out in 1899 in the place of an ugly quarter, with a memorial to the students judicially murdered by the Spanish volunteers in 1 87 1 — and running along the line of the former city walls, past the Parque Central, through the Parque de Isabel II. and the Parque de la India (these two names are now practically abandoned) to the Parque de Colon or Campo de Marte, is the Prado, 1 a wide and hand- some promenade and drive, shaded with laurels and lined with fine houses and clubs. In 1907 a hurricane destroyed the greater part of the laurels of the Prado and the royal palms of the Parque de Colon. Central Park is surrounded by hotels, theatres, cafes and clubs, the last including the Centro Asturiano and Casino Espafiol. In the centre is a monument to Jose Marti (1853-1895), ” the apostle of independence,” and in an adjoining square is the city’s fine monu- ment to the Cuban engineer Francisco de Albcar, to whom she owes her water system. From the Parque de Colon the Calle (or Calzada) de la Reina — an ordinary business street, once a promenade and known as the Alameda de Isabel II. — with its continuations, the Paseo de Carlos III. and Paseo de Tacon, runs westward through the city past the botanical gardens and the Quinta de los Molinos to the citadel of El Principe (1774-1794). A statue of Charles III. by Canova (1803), fountains, pavilions and four rows of trees adorn the Pasco de Carlos III. The gardens of Los Molinos, where the captains- general formerly maintained their summer residence, and the ad- joining botanical gardens of the university, contain beautiful avenues of palm trees. Near El Principe is the Columbus cemetery, with a fine gateway, a handsome monument (1888) to the students shot in 1 87 1, and another (1897; 75 ft. high) to the firemen lost in a great fire in 1890, besides many smaller memorials. The Calzada de la Infanta is a fine

street at the W. end of the new city; the Cerro, in the S.W., is lined with massive residences, once the homes of Cuban aristocracy.

Suburbs. — In the coral rock of the coast sea-baths are excavated, so that bathers may run no risk from sharks. On the S. and W. the city is backed by an amphitheatre of hills, which are crowned in the W. by the conspicuous fortifications of Castillo del Principe. On the lower heights near the city lie Vcdado, Jesus del Monte, Lnyano and other healthy suburbs. Chorrera, Puentes Grandes, Marianao (founded 1830; pop. 1907, 9332) and Ouanabacoa (with mineral springs), are attractive places of resort. Regla, just across the bay (now part of the municipio), has large business interests.

Charities and Education. — Among the numerous charitable institutions the most important hospital is the Casa de Bencficencia y Maternidad (Charity and Maternity Asylum), opened in 1794, and containing an orphan asylum, a maternity ward, a home for vagrants, a lunatic asylum and an infirmary. There is also in the city an immense lazaretto for lepers. The Centro Asturiano, a club with a membership of some ten or fifteen thousand (not limited to Asturians),

1 Renamed Paseo de Marti by the republic, but the name is never used.

maintains for the benefit of its members a large and well-managed sanatorium in spacious grounds in the midst of the city.

Of the schools of the city the most noteworthy is the university (581 regular students, 1907), founded in 1728. Its quarters were in the old convent of Santo Domingo until 1900, when the American military government prepared better quarters for it in the former Pirotecnica Militar, near El Principe. There arc various laboratories in the city. Other schools are the provincial Institute of Secondary Education (490 regular students in 1907; library of 12,863 vols.), a provincial school of arts and trades (opened 1882), a theological seminary, a boys' technical school, a school of painting and sculpture, a conservatory of music, normal school, mercantile school and a military academy. The Jesuit church (Belen) has a large college for boys, laboratories, an observatory, a museum of natural history, and an historical library. Great progress has been made in educa- tion, which was extremely backward until after the end of Spanish rule. The Sociedad Economica de Amigos del Pais, established in 1792, has always had considerable influence. It has a library of some 42,000 volumes, rich in material for Cuban history. Among other similar organizations are an Academy of Medical, Physical and Natural Sciences (1863); a national library,

established in 1901, and having in 1908 about 40,000 volumes, including the finest collection in the world of materials for Cuban history ; an anthropo- logical society; various medical societies; and a Bar association. An association of sugar planters is a very important factor in the economic development of the island.

Of the newspapers of Havana the most notable is the El Diario de la Marina (established in 1838; under its present name, 1844; morning and evening), which was almost from its foundation an official organ of the Spanish government, and generally the mouth- piece of the most intransigent peninsular opinion in all that con- cerned the politics of the island. El Ansador Comercial (1868; evening) is devoted almost exclusively to commercial and financial news. Of the other newspapers the leading ones in 1909 were La Discusion (1888; evening), La Lucha (1884; evening) and El Mundo (1902; morning).

Trade. — Havana commands the wholesale trade of all the western half of the island, and is the centre of commercial and banking interests. Its foreign trade in the five calendar years 1902-1906 (average imports 157,201,276; exports, $40,563,637) amounted to 68-9% of the imports and 44-6% of the exports of the island. The average number of vessels entering the port annually in the ten years from 1864 to 1873 was 1981 (771,196 tons), and the average entries in the five years 1902-1906 were 3698 of 3,904,906 gross tons (coast trade alone, 2162 of 333,795 tons).

In spite of high tariffs and civil wars, and the competition of Matanzas, Cardenas, Cienfuegos and other Cuban ports opened to foreign trade in modern times, the commerce of Havana has steadily increased. The chief foreign customers are Great Britain and the United States. The two staple articles of export are sugar and tobacco- wares. Other exports of importance are rum, wax and honey; and of less primary importance, fruits, fine cabinet woods, oils and starch. The leading imports are grains, flour, lard and ■various other foodstuffs, coal, lumber, petroleum and machinery, all mainly from the United States; wines and olive oil from Spain; jerked beef from South America; fabrics and other staples from varied sources. Rice is a principal food of the people; it was formerly taken from the East Indies, but is now mostly raised in the island.

The chief manufacturing industry of Havana is that of tobacco. Of the cigar factories, some of which are in former public and private palaces, more than a hundred may be reckoned as of the first class. Besides the making of boxes and barrels and other articles necessarily involved in its sugar and tobacco trade, Havana also, to some extent,

builds carriages and small ships, and manufactures iron and machinery; but the weight of taxation during the Spanish period was always a heavy deterrent on the development of any business requiring great capital. There are minor manufacturing interests in tanneries, and in the manufacture of sweetmeats, malt and distilled liquors, especially rum, besides soaps, candles, starch, perfume, &c. There is one large and complete petroleum refinery (1905).

Havana has frequent steam-boat communication with New York, Baltimore, Philadelphia, Tampa, Mobile, New Orleans and other ports of the United States; and about as frequent with several ports in England, Spain and France. It is the starting-point of a railway system which reaches the six provincial capitals between Pinar del Rio and Santiago, Cardenas, Cienfuegos and other ports. Telegraphs radiate to all parts of the island; a submarine cable" to Key West forms part of the line of communication between Colon and New York, and by other cables the island has connexion with various parts of the West Indies and with South America.

Population and Health. — The population of Havana was reported as 51,307 in 1791; 96,304 in 1811; 94,023 in 1817; 184,508 m 1841. In 1899 the American census showed 235,981, of whom about 25% were foreign (20 % Spanish) ; and the census of 1907 showed 2 97. x 59 (n °t including the attached country districts) and 302,526 (including these country districts), the last being forthe" municipio " of Havana. The industrial population is very densely crowded. Owing to this, as well as to the entire lack of proper sanitary customs I among the people, the horrible condition of sewerage and the

favour as a seaside resort, having a wide sandy beach and good golf links. The island was in the possession of successive religious bodies from the Conquest (when it was given to the Benedictines of Jumieges, near -Rouen), until the Dissolution. The church of South Hayling is a fine Early English building.

HAVEL, a river of Prussia, Germany, having its origin in Lake Dambeck (223 ft.) on the Mecklenburg plateau, a few miles north-west of Neu-Strelitz, and after threading several lakes flowing south as far as Spandau. Thence it curves south- west, past Potsdam and Brandenburg, traversing another chain of lakes, and finally continues north-west until it joins the Elbe from the right some miles above

Wittenberge after a total course of 221 m. and a total fall of only 158 ft. Its banks are mostly marshy or sandy, and the stream is navigable from the Mecklenburg lakes downwards. Several canals connect it with these lakes, as well as with other rivers — e.g. the Finow canal with the Oder, the Ruppin canal with the Rhin, the Berlin- Spandau navigable canal (5 J m.) with the Spree, and the Plaue- Ihlc canal with the Elbe. The Sakrow-Paretz canal, 11 m. long, cuts off the deep bend at Potsdam. The most notable of the tributaries is the Spree (227'm. long), which bisects Berlin and joins the Havel at Spandau. Area of river basin, 10,159 sq. m.

HAVELBERG, a town of Germany, in the Prussian province of Brandenburg, on the Havel and the railway Glowen-Havel- berg. Pop. (1905), 5988. The town is built partly on an island in the Havel, and partly on hills on the right bank of the river, on one of which stands the fine Romanesque cathedral dating from the 12th century. The two parts, which are connected by a bridge, were incorporated as one town in 1875. The inhabitants are chiefly engaged in tobacco manufacturing, sugar-refining and boat-building, and in the timber trade.

Otto I. founded a bishopric at Havelberg in 946; the bishop, however, who was a prince of the Empire, generally resided at Plattenburg, or Wittstock, a few miles to the north. In 1548 the bishopric was seized by the elector of Brandenburg, who finally took possession of it fifty years later, and the cathedral passed to the Protestant Church, retaining its endowments till the edict of 1810, by which all former ecclesiastical oossessions were assumed by the crown. The final secularization was delayed till 1819. Havelberg was formerly a strong fortress, but in the Thirty Years" War it was taken from the Danish by the imperial troops in 1627. Recaptured by the Swedes in 1631, and again in 1635 and 1636, it was in 1637 retaken by the Saxons. It suffered severely from a conflagration in 1870.

HAVELOCK, SIR HENRY (1795-1857), British soldier, one of the heroes of the Indian Mutiny, the second of four brothers (all of whom entered the army), was born at Ford Hall, Bishop- Wearmouth, Sunderland, on the 5th of April 1795. Flis parents were William Havelock, a wealthy shipbuilder in Sunderland, and Jane, daughter of John Carter, solicitor at Stockton-on-Tees. When about five years old Henry accompanied his elder brother William to Mr Bradley's school at Swanscombe, whence at the age of ten he removed for seven years to Charterhouse school. In accordance with the desire of his mother, who had died in 1S11. he entered the Middle Temple in 1813, studying under Chitty the eminent special pleader. His legal studies

having been abridged by a misunderstanding with his father, he in 1815 accepted a second lieutenancy in the Rifle Brigade (95th), procured for him by the interest of his brother William. During the following eight years of service in Britain he read extensively and acquired a good acquaintance with the theory of war. In 1823, having exchanged into the 21st and thence into the 13th Light Infantry, he followed his brothers William and Charles to India, first qualifying himself in Hindustani under Dr Gilchrfst, a celebrated Orientalist.

At the close of twenty-three years' service he was still a lieutenant, and it was not until 1838 that, after three years' adjutancy of his regiment, he became captain. Before this, however, he had held several staff appointments, notably that of deputy assistant-adjutant-general of the forces in Burma till the peace of Yandabu, of which he, with Lumsden and Knox, procured the ratifications at Ava from the '.' Golden Foot,"

who bestowed on him the " gold leaf " insignia of Burmese nobility. His first command had been at a stockade capture in the war, and he was present also at the battles of Napadee, Patanago and Pagan. He had also held during his lieutenancy various interpreterships and the adjutancy of the king's troops at Chinsura. In 1828 he published at Serampore Campaigns in Ava, and in 1829 he married Hannah Shepherd, daughter of Dr Marshman, the eminent missionary. About the same time he became a Baptist, being baptized by Mr John Mack at Serampore. During the first Afghan war he was present as aide-de-camp to Sir Willoughby Cotton at the capture of Ghazni, on the 23rd of July 1839, and at the occupation of Kabul. Aft era short absence in Bengal to secure the publication of his Memoirs of the Afghan Campaign, he returned to Kabul in charge of recruits, and became interpreter to General Elphinstone. In 1840, being attached to Sir Robert Sale's force, he took part in the Khurd- Kabul fight, in the celebrated passage of the defiles of the Ghilzais (1841) and in the fighting from Tezeen to Jalalabad. Here, after many months' siege, his column in a sortie en masse defeated Akbar Khan on the 7 th of April 1842. He was now made deputy adjutant-general of the infantry division in Kabul, and in September he assisted at Jagdalak, at Tezeen, and at the release of the British prisoners at Kabul, besides taking a prominent part at Istaliff . Having obtained a regimental majority he next went through the Mahratta campaign as Persian interpreter to Sir Hugh (Viscount) Gough, and distinguished himself at Maharajpore in 1843, and also in the Sikh campaign at Moodkee, Ferozeshah and Sobraon in 1845. For these services he was made deputy adjutant-general at Bombay. He exchanged from the 13th to the 39th, then as second major into the 53rd at the beginning of 1849, and soon

afterwards left for England, where he spent two years. In 1854 he became quartermaster-general, then full colonel, and lastly ajdutant-general of the troops in India.

In 1857 he was selected by Sir James Outram for the command of a division in the Persian campaign, during which he was present at the actions of Muhamra and Ahwaz. Peace with Persia set him free just as the Mutiny broke out; and he was chosen to command a column ” to quell disturbances in Allahabad, to support Lawrence at Lucknow and Wheeler at Cawnpore’, to disperse and utterly destroy all mutineers and insurgents.” At this time Lady Canning wrote of him in her diary: ” General Havelock is not in fashion, but all the same we believe that he will do well. No doubt he is fussy and tiresome, but his little old stiff figure looks as active and fit for use as if he were made of steel.” But in spite of this lukewarm commendation Havelock proved himself the man for the occasion, and won the reputation of a great military leader. At Fatehpur, on the 12th of July, at Aohg and Pandoob ridge on the 15th, at Cawnpore on the 16th, at Unao on the 29th, at Busherutgunge on the 29th and again on the 5th of August, at Boorhya on the 12th of August, and at Bithur on the 16th, he defeated overwhelming forces. Twice he advanced for the relief of Lucknow, but twice prudence forbade a reckless exposure of troops wasted by battle and disease in the almost impracticable task. Reinforcements arriv- ing at last under Outram, he was enabled by the generosity of his superior officer to crown his successes on the 25th of September 1857 by the capture of Lucknow. There he died on the 24th of November 1857, of dysentery, brought on by the anxieties and fatigues connected with his victorious march and with the subsequent blockade of the British troops. He lived long enough to receive the intelligence that he had been created K.C.B. for the first three battles of the campaign; but of the major-general- ship which was shortly afterwards conferred he never knew. On the 26th of November, before tidings of his death had reached England, letters-patent were directed to create him a baronet and a pension of £1000 a year was voted at the assembling of parliament. The baronetcy was afterwards bestowed upon his eldest son; while to his widow, by royal order, was given the rank to which she would have been entitled had her husband survived and been created a baronet. To both widow and son pensions of £1000 were awarded by parliament.

HAVANT

prevalence of yellow fever (first brought to Havana, it is thought, in

1761 , from Vera Cruz), the reputation of the city as regards health was long very bad. The practical extermination of yellow fever during the U.S. military occupation following 1899 was a remarkable achievement. In 1895-1899, owing to the war, there were few non-immune persons in the city, and there was no trouble with the fever, but from the autumn of 1899 a heavy immigration from Spain began, and a fever epidemic was raging in 1900. The American military authorities found that the most extraordinary measures for cleansing the city — involving repeated house-to-house inspection, enlorced cleanliness, improved drainage and sewerage, the destruc- tion ol various public buildings, and thorough cleansing of the streets — although decidedly effective in reducing the general death-rate of the city (average, 1890-1899, 45-83; 1900, 24-40; 1901, 22-11; 1902, 2063; general death-rate of U.S. soldiers in 1898, 67-94; in 1901-1902, 7-00), apparently did not affect yellow fever at all. In 1900-1901 Major Walter Reed (1851-1902), a surgeon in the United States army, proved by experiments on voluntary human subjects that the infection was spread by the Stegomyia mosquito, 1 and the prevention of the disease was then undertaken by Major William C. Gorgas — all patients being screened and mosquitoes practically exterminated. 2 The number of subsequent deaths from yellow fever has depended solely on the degree to which the necessary precautionary measures were taken.

The entire administrative system of the island, when a Spanish jolony, was centred at Havana. Under the republic this remains the capital and the residence of the president, the supreme court, Congress when in session and the chief administrative officers. None of the public services was good in the Spanish period, except the water-supply, which was excellent. The water is derived from the Vento springs, 9 m. from Havana, and is conducted through aqueducts constructed between 1 859 and 1894 at a cos t of some §5,000,000. About 40,000,000 gallons are supplied daily. The system is owned by the municipality. The older Fernando VII. aqueduct (1831-1835) is still usable in case of need; its supply was the Almendares river (until long after the construction of this, a still older aqueduct, opened at the end of the 16th century, was in use). The sewerage system and conditions of house sanitation were found extremely inadequate when the American army occupied the city in 1899. Several public buildings were so foul that they were demolished and burned. The improvement since the end of Spanish rule has been steady.

History. — Havana, originally founded by Diego Velasquez in 1 5 14 on an unhealthy site near the present Batabano (pop. in 1007, 15,435, including attached country districts), on the south coast, was soon

removed to its present position, was granted an ayuntamiento (town council), and shortly came to be considered one of the most important places in the New World. Its commanding position gained it in 1634, by royal decree, the title of Llave del Nuevo Mundo y Antemural de las Indias Occidentales" (Key of the New World and Bulwark of the West Indies), in reference to which it bears on its coat of arms a symbolic key and representations of the Morro, Punta and Fuerza. In the history of the place in the 16th century few things stand out except the investments by buccaneers: in 1537 it was sacked and burned, and in 1555 plundered by French buccaneers, and in 1586 it was threatened by Drake. In 15S9 Philip II. of Spain ordered the erection of the Punta and the Morro. In the same year the residence of the governor of the island was moved from Santiago de Cuba to Havana. Philip II. granted Havana the title of " ciudad " in 1592. Sugar plantations in the environs appeared before the end of the 16th century. The population of the city, probably about 3000 at tie beginning of the 17th century, was doubled in the years following 1655 by the coming of Spaniards from Jamaica. In the course of the 17th century the port became the great

1 Dr Carlos Finlay of Havana, arguing from the coincidence between the climatic limitation of yellow fever and the geographical limitation of the mosquito, urged (1881 sqq.) that there was some relation between the disease and the insect. Reed worked from the observation of Dr H. R. Carter (U.S. Marine Hospital Service) chat although the incubation of the disease was 5 days, 15 to 20 days had to elapse before the " infection " of the house, and from Ross's demonstration of the part played in malaria by the Anopheles. See H. A. Kelly, Walter Reed and Yellow Fever (New York, 1907).

1 The average number of deaths from yellow fever annually from 1885 (when reliable registration began) to 1898 was 455; maximum 1282 in 1896 (supposed average for 4 years, 1856-1859, being 1489-8 and for 7 years, 1873-1879, 1395-1), minimum 136, in 1898; average deaths of military, 1885-1898, 278-4 (in 1896-1897 constituting 1966 out of a total of 2140); deaths of American soldiers, 1809-1900, 18 out of 431.

rendezvous for the royal merchant and treasure fleets that monopolized trade with America, and the commercial centre of the Spanish-American possessions. It was blockaded four times by the Dutch (who were continually molesting the treasure fleets) in the first half of the 17th century. In 167 1 the city walls were begun; they were completed in 1702. The European wars of the 17th and 18th centuries were marked by various incidents in local history. After the end of the

Spanish War of Succession (1713) came a period of comparative prosperity in slave-trading and general commerce. The creation in 1740 of a monopolistic trading-company was an event of importance in the history of the island. English squadrons threatened the city several times in the first half of the 18th century, but it was not until 1762 than an investment, made by Admiral Sir George Pocock and the earl of Albemarle, was successful. The siege lasted from June to August and was attended by heavy loss to both besiegers and besieged. The British commanders wrung great sums from the church and the city as prize of war and price of good order. By the treaty of the 10th of February 1763, at the close of the Seven Years' War, Havana was restored to Spain in exchange for the Floridas. The English turned over the control of the city on the 6th of July. Their occupation greatly stimulated commerce, and from it dates the modern history of the city and of the island (see Cuba). The gradual removal of obstacles from the commerce of the island from 1766 to 1818 particularly benefited Havana. At the end of the 1 8th century the city was one of the seven or eight great com- mercial centreb of the world, and in the first quarter of the 19th century was a rival in population and in trade of Rio Janeiro, Buenos Aires and New York. In 1789 a bishopric was created at Havana suffragan to the archbishopric at Santiago. From the end of the 18th century Havana, as the centre of government, was the centre of movement and interest. During the administration of Miguel Tacon Havana was improved by many important public works; his name is frequent in the nomenclature of the city. The railway from Havana to Guines was built between 1835 and 1838. Fifty Americans under Lieut. Crittenden, members of the Bahia Honda filibustering expedition of Narciso Lopez, were shot at Fort Atares in 1851. Like the rest of Cuba, Havana has frequently suffered severely from hurricanes, the most violent being those of 1768 (St Theresa's), 1810 and 1846. The destruction of the U.S. battle-ship "Maine" in the harbour of Havana on the 15th of February 1898 was an influential factor in causing the outbreak of the Spanish-American War, and during the war the city was blockaded by a United States fleet.

See J. de la Pezuela, Diccionario de la Isla de Cuba, vol. iii. (Madrid, 1863), for minute details of history, administration and economic conditions down to 1862; J. M. de la Torre, Lo que fuimos y lo que somos, 6 la Habana antigua y moderna (Habana, 1857); P. J. Guit6ras, Historia de la conquista de la Habana 1762 (Philadelphia, 1856); J. de la Pezuela, Sitio y rendition de la Habana en 1762 (Madrid, 1859); A. Bachiller y Morales, Monograjia liisiorica (Habana, 1883), minutely covering the English occupation (the best account) of 1762-1763;

Maria de los Mercedes, comtesse de Merlin, La Havana (3 vols., Paris, 1844) ; and the works cited under Cuba.

HAVANT, a market-town in the Fareham parliamentary division of Hampshire, England, 67 m. S.W. from London by the London & South Western and the London, Brighton & South Coast railways. Pop. of urban district (igoi), 3837. The urban district of Warblington, 1 m. S.E. (pop. 3639), has a fine church, Norman and later, with traces of pre-Norman work, and some remains of a Tudor castle. Havant lies in a flat coastal district, near the head of Langstone Harbour, a wide shallow inlet of the English Channel. The church of St Faith was largely rebuilt in 1875, but retains some good Early English work. There are breweries and tanneries, and the manufacture of parchment is carried on. Off the mainland near Havant lies Hayling, a flat island of irregular form lying between the harbours of Langstone and Chichester. It measures 4 m. in length from N. to S., and is nearly the same in breadth at the south, but the breadth generally is about i\ m. It is well wooded and fertile. A railway serves the village of South Hayling, which is in some

See Marshman, Life of Havelock (i860) ; L. J. Trotter, The Bayard of India (1903) ; F. M. Holmes, Four Heroes of India; G. B. Smith, heroes of the Nineteenth Century (1901); find A. Forbes, Havelock (” English Men of Action ” series, 1890).

HAVELOK THE DANE, an Anglo-Danish romance. The hero, under the name of Cuheran or Cuaran, was a scullion-jongleur at the court of Edelsi (Alsi) or Godric, king of Lincoln and Lindsey. At the same court was brought up Argentille or Goldborough, the orphan daughter of Adelbrict, the Danish king of Norfolk, and his wife Orwain, Edelsi’s sister; and Edelsi, to humiliate his ward, mairied her to the scullion Cuaran. But, inspired by a vision, Cuaran and Goldborough set out for Grimsby, where Cuaran learned that Grim, his supposed father, was dead. His foster-sister, moreover, told him that his real name was Havelok, that he was the son of Gunter (or Birkabeyn), king of Denmark, and had been rescued by Grim, who though a poor fisherman was a noble in his own country, when Gunter perished by treason. The hero then wins back his own and Goldborough’s kingdoms, punishing traitors and rewarding the faithful. The story exists in two French versions: as an inter- polation between Geffrei Gaimar’s Brut and his Estorie dcs Engles (c. 11 50) and in the Anglo-

Norman Lai a" Havelok (12th century). The English Havelok (c. 1300) is written in a Lincoln- shire dialect and embodies abundant local tradition. A short version of the tale is interpolated in the Lambeth MS. of Robert Mannyng's Handlyng Symie. The story reappears more than once in English literature, notably in the ballad of " Argentille and Curan " in William Warner's Albion's England. The name of Havelok (Habloc, Abloec, Abloyc) is said to correspond in Welsh to Anlaf or Olaf . Now the historical Anlaf Curan was the son of a Viking chief Sihtric, who was king of Northumbria in 025 and died in 927. Anlaf Sihtricson was driven into exile by his stepmother's brother .Lkhelstan, and took refuge in Scotland at the court of Constantine II., whose daughter he married. He was defeated with Constantine 1 at Brunanburh (937), but was nevertheless for two short periods joint ruler in Northumbria with his cousin Anlaf Godfreyson. He reigned in Dublin till 980, when he was defeated. He died the next year as a monk at Iona. Round the name of Anlaf Curan a number of legends rapidly gathered, and the legend of the Danish hero probably filtered through Celtic channels, as the Welsh names of Argentille and Orwain indicate. The close similarity between the Havelok saga and the story of Flamlet (Amlethus) as told by Saxo Gram- maticus was pointed out long ago by Scandinavian scholars. The individual points they have in common are found in other legends, but the series of coincidences between the adventurous history of Anlaf Curan and the life of Amlethus can hardly be fortuitous. Interesting light is thrown on the whole question by Professor I. Gollancz {Hamlet in Iceland, 1898) by the identifica- tion of Amhlaide — who is said by Queen Gormflaith 2 in the Annals of Ireland by the Four Masters to have slain Niall Glundubh — with Anlaf's father Sihtric. The exploits of father and son were likely to be confused.

The mythical elements in the Havelok story are numerous. Argentille, as II. L. Ward points out, is a disguised Valkyrie. Like Svava she inspired a dull and nameless youth, and as Hild raised the dead to fight by magic, so Argentille in Havelok and Hermuthruda in Amleth prop up dead or wounded men with stakes to bluff the enemy. Havelok's royal lineage is betrayed by his flame breath when he is asleep, a phenomenon which has parallels in the history of Servius Tullius and of Dietrich of Bern. Part of the Havelok legend lingers in local tradition. Havelok destroyed his enemies in Denmark by casting down great stones upon them from the top of a lower, and Grim is said to have 1 H. L. Ward (Cat. of Romances, i. 426) suggests that it was the mention of Constantine in the Havelock legend which led (jaimar to place the tale in the 6th century in the days of the Constantine who succeeded King Arthur. Gaimar voices more than

once an Anglo- Danish legend of a Danish dynasty in Britain anterior to the Saxon invasion.

i A different person from the second wife of Anlaf Curan, also Gormflaith, who forms another link with Amlethus, as she was a woman of the Hermuthruda type and married her husband's conqueror.

kicked three of the turrets from the church tower in his efforts to destroy the enemy's ships. John Weever (Antient Funerall Monuments, 1631, p. 749) says that the privilege of the town in Elsinore, where its merchants were free from toll, was due to the interest of Havelok, the Danish prince, and the common seal of the town of Grimsby represents Grim, with " Habloc " on his right hand and Goldeburgh on his left.

The English MS. of Havelok (MSS. Laud Misc. 108) in the Bodleian library is unique. It was edited for the Roxburghe Club by Sir F. Madden in 1828. This edition contains, besides the English text, the two French versions. There are subsequent editions by W. W. Skeat (1868) for the E.E. Text Society, by F. Holthausen (London, New York and Heidelberg, 1901), and by W. W. Skeat (Clarendon Press, Oxford, 1902, where further bibliographical references will be found) ; and a modern English version by Miss E. Hickey (London, 1902). Gaimar's text and the French lai are edited by Sir T. D. Hardy and C. F. Ma,rtin in Rerum Brit. wed. aev. scriptores, vol. i. (1888). Sec also the account of the saga by H. L. Ward [Cat. of Romances, i. 423-446) ; for the identification of Havelok with Anlaf Curan see G. Storm, Euglische Sludien (1880), iii. 533, a reprint of an earlier article; E. K. Putnam, The Lambeth Version of Havelok (Baltimore, 1900).

HAVERFORDWEST (Welsh Hwlfordd, the English name ,being perhaps a corruption of the Scandinavian Hafna-Fjord), the chief town of Pembrokeshire, S. Wales, a contributory parliamentary and municipal borough, and a county of itself with its own lord-lieutenant. Pop. (1901), 6007. It is pictur- esquely situated on the slopes overlooking the West Cleddau river, which is here crossed by two stone bridges. It has a station on the Great Western Railway on the east side of the river, and when viewed from this point the town presents an imposing appearance with its castle-keep and its many ancient buildings. The river is tidal and navigable for vessels of not more than 150 tons. Coal, cattle, butter and grain are exported, but the commercial importance of the place has greatly declined, as the many ruined warehouses near the river plainly testify. The old walls and fortifications have almost disappeared, but Haver- fordwest is still rich

in memorials of its past greatness. The huge castle-keep, which dominates the town, was probably built by Gilbert de Clare, early in the 12th century; formerly used as the county gaol, it now serves as the police-station. The large church of St Mary, at the top cf the steep High Street, has fine clerestory windows, clustered columns and an elaborate carved- oak ceiling of the 15th century; it contains several interesting monuments of the 17th and 18th centuries, some of which commemorate members of the family of Philipps of Picton Castle. At the N. corner of the adjacent churchyard stands an ancient building with a vaulted roof, once the record office, but now used as a fish-market. St Martin's, with a low tower and spire, close to the castle, is probably the oldest church in the town, but has been much modernized. Near St Thomas's church on the Green stands an old Moravian chapel which is closely associated with the great scholar and divine, Bishop John Gambold (1711-1771). In a meadow on the W. bank of the river are the considerable remains of the Augustinian Priory of St Mary and St Thomas, built by Robert de Hwlfordd, lord of Haverford, about the year 1200. On the E. bank are the suburbs of Cartlet and Prender- gast, the latter of which contains the ancient parish church of St David and the ruins of a large mansion originally built by Maurice de Prendergast (12th century) and subsequently the seat of the Stepney family. A little to the S. of the town are the remains of Haroldstone, once the residence of the powerful Perrot family. The charities belonging to the town, which include John Perrot's bequest (1579), yielding about £356 annually for the improvement of the town, and Tasker's charity school (1684), are very considerable.

Haverfordwest owes its origin to the advent of the Flemings, who were permitted by Henry I. to settle in the hundred of Roose, or Rhos, in the years ito6-no8, in 1111, and again in 1 1 56. English is exclusively spoken in the town and district, and its inhabitants exhibit their foreign extraction by their language, customs and appearance. Haverfordwest is, in fact, the capital of that English-speaking portion of Pembrokeshire, which has been, nicknamed " Little England beyond Wales."

This new settlement of intruding foreigners had naturally to be protected against the infuriated natives, and the castle was accordingly built c. 1113 by Gilbert de Clare, first earl of Pem- broke, who subsequently conferred the seignory of Haverford on his

castellan, Richard Fitz-Tancred. On the death of Robert de Hwlfordd, the benefactor and perhaps founder of the priory of St Mary and St Thomas, in 1213, the lordship of the castle reverted to the Crown, and was purchased for 1000 marks from King John by William Marshal, earl of Pembroke, who gave various privileges to the town. Of the numerous charters the earliest known (through an allusion found in a document of Bishop Houghton of St Davids, c. 1370) is one from Henry II., who therein confirms all former rights granted by his grand-father, Henry I. John in 1207 gave certain rights to the town concerning the Port of Milford, while William Marshal II., earl of Pembroke, presented it with three charters, the earliest of which is dated 1210. An important charter of Edward V., as prince of Wales and lord of Haverford, enacted that the town should be incorporated under a mayor, two sheriffs and two bailiffs, duly chosen by the burgesses. In 1536, under Henry VIII., Haverfordwest was declared a town and county of itself and was further empowered to send a representative burgess to parliament.

The town long played a prominent part in South Welsh history. In 1220 Llewelyn ap Iorwerth, prince of North Wales, during the absence of William Marshal II., earl of Pembroke, attacked and burnt the suburbs, but failed to reduce the castle by assault. Several of the Plantagenet kings visited the town, including Richard II., who stopped here some time on his return from Ireland in 1299, and is said to have performed here his last regal act — the confirmation of the grant of a burgage to the Friars Preachers. Oliver Cromwell spent some days here on his way to Ireland, and his original warrant to the mayor and council for the demolition of the castle is still preserved in the council chamber. The prosperity and local im- portance of Haverfordwest continued unimpaired throughout the 17th and 18th centuries, and Richard Fenton, the historian of Pembrokeshire, describes it in 1810, as ” the largest town in the county, if not in all Wales.” With the rise of Milford, however, the shipping trade greatly declined, and Haverfordwest has now the appearance of a quiet country town.

HAVERGAL, FRANCES RIDLEY (1836-1S79), English hymn- writer, daughter of the Rev. William Henry Havergal, was born at Astley, Worcestershire, on the 14th of December 1836. At the age of seven she began to write verse, most of it of a religious character. As a hymn-writer she was particularly successful, and the modern English Church collections include several of her compositions. Her collected Poetical Works were published in 1884. She died at Caswell Bay, Swansea, on the 3rd of June

1870.

See Memorials of Frances Ridley Havergal (1880), by her sister.

HAVERHILL, a market town of England, in the Sudbury parliamentary division of Suffolk, and the Saffron Walden division of Essex. Pop. of urban district (1901), 4862. It is 55 m. X.X.E. from London by the Great Eastern railway, on the Long Melford-Cambridge branch, and is the terminus of the Colne Valley railway from Chappel in Essex. The church of St Mary is Perpendicular, but extensively restored. There are large manufactures of cloth, silk, matting, bricks, and boots and shoes, and a considerable agricultural trade.

HAVERHILL, a city of Essex county, Massachusetts, U.S.A., situated on the Merrimac river, at the head of tide and navigation, and on the Boston & Maine railway, 33 m. N. of Boston. Pop. (1880) 18,472; (i8qo) 27,412; (iooo) 37.175, of whom 8530 were foreign-born (including 2403 French Canadians, 165 1 English Canadians and 2144 Irish), and 15,077 were of foreign parentage (both parents foreign - born); (1910 census) 44,115. The city, 3 rn. wide and 10 m. long, lies for its entire length along the Merrimac river, from which it rises picturesquely, its surface being undulating, with several detached round hills (maximum 330 ft.). Pike all old New England cities, it is imgnlarly laid out. A number of lakes within its limits are the

source of an abundant and excellent water supply. There arc fifteen public parks, the largest of which, Winnikenni Park. (214 acres), contiguous to Lake Kenoza, is of great natural beauty. The city has three well-equipped hospitals, the beautiful Pentucket club house, a children's home, an old ladies' hom< and numerous charitable organizations. The schools of tin- city, both public and private, are of high standing; they include Bradford Academy (1803) for girls and the St James School (Roman Catholic). The public library is generously endowed, and in 1908 had about 90,000 volumes. Almost from the beginning of its history Haverhill was active industrially. Thomas Dustin, the husband of Hannah Dustin, manufactured bricks, and this industry has been carried on in the same locality for more than two hundred years. The large Stevens woollen mills are the outgrowth of mills established in 1835. The manufacture of woollen hats, established in the middle of the 1 8th century, is one of the prominent industries. There are large morocco factories. By far the leading industry of the city is the manufacture of boots, shoes and slippers, chiefly of the finer kinds, of which it is one of the largest producers in the world. In 1905 Haverhill ranked fourth among the cities of the United States in the product value of this manufacture, which was 4-8% of the total value of boots and shoes made in the United States. This industry began about 1795. In 1905 Haverhill's manufacturing establishments produced goods valued at $24,446,594, 83-9% of this output being represented by boots and shoes or their accessories. One of the largest sole- leather manufactories in the world is here.

Haverhill was settled in June 1640 by a small colony from Newbury and Ipswich, and its Indian name, Pentucket, was replaced by that of Haverhill in compliment to the first minister, Rev. John Ward, who was born at Haverhill, England. In its earlier years this frontier town suffered severely from the forays of the Indians, and in 1690 the abandonment of the settlement was contemplated. Two Indian attacks are particularly noteworthy — one in 1698, in which Hannah Dustin, her new- born babe, and her nurse were carried away to the vicinity of Penacook, now Concord, New Hampshire. Here in the night Mrs Dustin, assisted by her nurse and by a captive English boy, tomahawked and scalped ten Indians (two men, the others children and women) and escaped down the river to Haverhill; a monument to her stands in City Hall Park. In 1708 250 French and Indians attacked the village, killing 40 of its inhabitants. In 1873 a destructive fire caused the loss of 35 places of business, and on the 17th of February 1882 almost the entire shoe district (consisting of ro acres) was burned, with a loss of more than $2,000,000; but a greater business district was built on the ruins of the old. Haverhill was the birthplace

of Whittier, who lived here in 1 807-1 836, and who in his poem Haverhill, written for the 250th anniversary of the town in 1890, and in many of his other poems, gave the poet's touch to. the history, the legends and the scenery of his native city. His birthplace, the scene of Snow-Bound in the eastern part of the city, is owned by the Whittier Association and is open to visitors. A petition from Haverhill to the national House of Representatives in 1842, praying for a peaceable dissolution of the Union, raised about J. Q. Adams, its presenter, perhaps the most violent storm in the long course of his defence of the right of petition. Haverhill was incorporated as a town in 1645 and became a city in 1869. Bradford, a town (largely residential) lying on the opposite bank of the river, became a part of the city in 1897. In October T908, by popular vote, the city adopted a new charter providing for government by commission.

HAVERSACK, or Havresack (through the French from Ger. Habersack, an oat-sack, a nose-bag, Hafer or Haver, oats), the bag in which horsemen carried the oats for their horses. In Scotland and the north of England haver, meaning oats, is still used, as haver-meal or haver-bread. Haversack is now used for the strong bag made of linen or canvas, in which soldiers, sportsmen or travellers, carry their personal belongings, or more usually the provisions for the day.

HAVERSTRAW, a village of Rockland county, New York, U.S.A., in a township of the same name, 32 m. N. of New York City, and finely situated on the W. shore of Haverstraw Bay, an enlargement of the Hudson river. Pop. of the village (1890), 5070; (1900) 5935, of whom 1231 were foreign-born and 568 were negroes; (1905, state census) 6182; (1910) 5669; of the town- ship (1910) 9335. Haverstraw is served by the West Shore, the New Jersey & New York (Erie), and the New York, Ontario & Western railways, and is connected by steamboat lines with Peekskill and Newburgh. The village lies at the N. base of High Tor (83 2 f t .) . It has a public library, founded by the King's Daughters' Society in 1895 and housed in the Fowler library building. Excellent clay is found in the township, and Haver- straw is one of the largest brick manufacturing centres in the world; brick-machines also are manufactured here. The Minesceongo creek furnishes water power for silk mills, dye works and print works. Haverstraw was settled by the Dutch probably as early as 1648. Near the village of Haverstraw (in the township of Stony Point), in the Joshua Hett Smith House, or " Old Treason House," as it is generally called, Benedict Arnold and

Major Andre met before daylight on the 22nd of September 1780 to arrange plans for the betrayal of West Point. In 1826 a short-lived Owenite Community (of about 80 members) was established near West Haverstraw and Garnerville (in the township of Haverstraw). The members of the community established a Church of Reason, in which lectures were delivered on ethics, philosophy and science. Dissensions soon arose in the community, the experiment was abandoned within five months, and most of the members joined in turn the Coxsackie Community, also in New York, and the Kendal Community, near Canton, Ohio, both of which were also short-lived. The village of Haverstraw was originally known as Warren and was incorporated under that name in 1854; in 1873 it became officially the village of Haverstraw — both names had previously been used locally. The village of West Haverstraw (pop. in 1890, 180; in 1900, 2079; an d ‘ n i 9 io j 2369), also in Haverstraw township, was founded in 1830, was long known as Samsondaie, and was incorporated under its present name in 1883.

See F. B. Green, History of Rockland County (New York, 1886).
HAVET, EUGENE AUGUSTE ERNEST (1813-1889), French scholar, was born in Paris on the nth of April 1813. Educated at the Lycee Saint-Louis and the Ecole Normale, he was for many years before his death on the 21st of December 1889 professor of Latin eloquence at the College de France. His two capital works were a commentary on the works of Pascal, Pensies de Pascal publiees dans leitr texte authenlique avec un commentaire suivi (1852; 2nd ed. 2 vols., 1881), and Le Christianisme el ses origincs (4 vols., 1871-1884), the chief thesis of which was that Christianity owed more to Greek philosophy than to the writings of the Hebrew prophets. His elder son, Pierre Antoine Louis Havet (b. 1849), was professor of Latin philology at the College de France and a member of the Institute. The younger, Julien, is separately noticed.

HAVET, ‘ JULIEN (Pierre Eugene) (1853-1893), French historian, was born at Vitry-sur-Seine on the 4th of April 1853, the second son of Ernest Havet. He early showed a remarkable aptitude for learning, but had a pronounced aversion for pure rhetoric. His studies at the Ecole des Charles (where he took first place both on entering and leaving) and at the Ecole des Hautes Etudes did much to develop his critical faculty, and the historical method taught and practised at these establishments brought home to him the dignity of history, which thenceforth became his ruling passion. His valedictory thesis at the Ecole des Chart es, Serie chronologique des gardiens el seigneurs des lies Normandes (1876), was a definitive work and but slightly affected by later research. In 1878 he followed his thesis by a study called Lcs

Cours royalcs dans les lies Normandes. Both these works were composed entirely from the original documents at the Public Record Office, London, and the archives of Jersey and Guernsey. On the history of Merovingian institutions, Havet's conclusions were widely accepted (see La For mule N. rex F rancor., v. inl..

1885). His first work in this province was Du sens du mot " romain " dans les lots franques (1876), acritical study on atheory of Fustel de Coulanges. In this he showed that the status of the homo Romanus of the barbarian laws was inferior to that of the German freeman; that the Gallo-Romans had been subjected by the Germans to a state of servitude; and, consequently, that the Germans had conquered the Gallo-Romans. He aimed a further blow at Fustel's system by showing that the Frankish kings had never borne the Roman title of vir inhister, and that they could not therefore be considered as being in the first place Roman magistrates; and that in the royal diplomas the king issued his commands as rex Francorum and addressed his functionaries as viri inlustres. His attention having been drawn to questions of authenticity by the forgeries of Vrain Lucas, he devoted himself to tracing the spurious documents that en- cumbered and perverted Merovingian and Carolingian history. In his A propos des decouvertes de Jerome Vignier (1880), he exposed the forgeries committed in the 17th century by this priest. He then turned his attention to a group of documents relating to ecclesiastical history in the Carolingian period and bearing on the question of false decretals, and produced Les Charles de St-Calais (1887) and Les Actes de I'cveche du Mans (1894). On the problems afforded by the chronology of Gerbert's (Pope Silvester II.) letters and by the notes in cipher in the MS. of his letters, he wrote L'Ecriture secrete de Gerbert (1877), which may be compared with his Notes tironiennes dans les diplomes mfrovingiens (1885). In 1889 he brought out an edition of Gerbert's letters, which was a model of critical sagacity. Each new work increased his reputation, in Germany as well as France. At the Bibliotheque Nationale, where he obtained a post, he rendered great service by his wide knowledge of foreign languages, and read voraciously everything that related, however remotely, to his favourite studies. He was finally appointed assistant curator in the department of printed books. He died pre- maturely at St Cloud on the 19th of August 1893.

After his death his published and unpublished writings were collected and published (with the exception of Les Cours royales des lies Normandes and Lettres de Gerbert) in two volumes called Questions merovingiennes and Opuscules inedits (1896), containing, besides important papers on diplomatic and on Carolingian and Merovingian

history, a large number of short monographs ranging over a great variety of subjects. A collection of his articles was published by his friends under the title of Melanges Havet (1895), pre- fixed by a bibliography of his works compiled by his friend Henri Omont. (C. B.*)

HAVRE, LE, a seaport of north-western France, in the depart- ment of Seine-Inferieure, on the north bank of the estuary of the Seine, 143 m. W.N.W. of Paris and 55 m. W. of Rouen by the Western railway. Pop. (1906), 129,403. The greater part of the town stands on the level strip of ground bordering the estuary, but on the N. rises an eminence, la Cote, covered by the gardens and villas of the richer quarter. The central point of the town is the Place de l'hotel de ville in which are the public gardens. It is crossed by the Boulevard de Strasbourg, running from the sea on the west to the railway station and the barracks on the east. The rue de Paris, the busiest street, starts at the Grand Quai, overlooking the outer harbour, and, intersecting the Place Gambetta, runs north and enters the Place de I'hotel de ville on its southern side. The docks start immediately to the east of this street and extend over a large area to the south and south-east of the town. Apart from the church of Notre-Dame, dating from the 16th and 17th centuries, the chief buildings of Havre, including the hotel de ville, the law courts, and the exchange, are of modern erection. The museum contains a collection of antiquities and paintings. Havre is the seat of a sub-prefect, and forms part of the maritime arrondissement of Cherbourg. Among the public institutions are a tribunal of first instance, a tribunal of commerce, a board of trade arbitrators, a tribunal of maritime commerce, a chamber of commerce and a branch of the Bank of France. There are lycees for boys and girls, schools of commerce and other educational establishments. Havre, which is a fortified place of the second class, ranks second to Marseilles among French seaports. There are nine basins (the oldest of which

dates back to 1669) with an area of about 200 acres and more than 8 m. of quays. They extend to the east of the outer harbour which on the west opens into the new outer harbour, formed by two breakwaters converging from the land and leaving an entrance facing west. The chief docks (see Dock for plan) are the Bassin Bellot and the Bassin de l'Eure. In the latter the mail-steamers of the Compagnie Generale Transatlantique are berthed; and the Tancarvillc canal, by which river-boats unable to attempt the estuary of the Seine can make

the port direct, enters the harbour by this basin. There are, besides, several repairing docks and a petroleum dock for the use of vessels carry- ing that dangerous commodity. The port, which is an important point of emigration, has regular steam-communication with New York (by the vessels of the Compagnie Generale Trans- atlantique) and with man}- of the other chief ports of Europe, North, South and Central America, the West Indies and Africa. Imports in 1907 reached a value of £57,686,000. The chief were cotton, for which Havre is the great French market, coffee, copper and other metals, cacao, cotton goods, rubber, skins and hides, silk goods, dye-woods, tobacco, oil-seeds, coal, cereals and wool. In the same year exports were valued at £47,130,000, the most important being cotton, silk and woollen goods, coffee, hides, leather, wine and spirits, rubber, tools and metal ware, earthen- ware and glass, clothes and millinery, cacao and fancy goods. In 1907 the total tonnage of shipping (with cargoes) reached its highest point, viz. 5,671,975 tons (4018 vessels) compared with 3,816,340 tons (3832 vessels) in 1898. Forty-two per cent of this shipping sailed under the British flag. France and Germany were Great Britain's most serious rivals. Havre possesses oil works, soap works, saw mills, flour mills, works for extracting dyes and tannin from dye-woods, an important tobacco manu- factory, chemical works and rope works. It also has metal- lurgical and engineering works which construct commercial and war-vessels of every kind as well as engines and machinery, cables, boilers, &c.

Until 1 516 Havre was only a fishing village possessing a chapel dedicated to Notre-Dame de Grace, to which it owes the name. Havre (harbour) de Grace, given to it by Francis I. when he began the construction of its harbour. The town in 1562 was delivered over to the keeping of Queen Elizabeth by Louis 1.. prince de Conde, leader of the Huguenots, and the command of it was entrusted to Ambrose Dudley, earl of Warwick; but the English were expelled in 1563, after a most obstinate siege, which was pressed forward by Charles IX. and his mother, Catherine de' Medici, in person. The defences of the town and the harbour-works were continued by Richelieu and com- pleted by Vauban. In 1694 it was vainly besieged by the English, who also bombarded it in 1759, 1794 and 1795. It was a port of considerable importance as early as 1572, and despatched vessels to the whale and cod-fishing at Spitsbergen and Newfoundland. In 1672 it became the entrepot of the French East India Company, and afterwards of the Senegal and Guinea companies. Napoleon I. raised it to a war harbour of the first rank, and under Napoleon III. works begun by Louis XVI. were completed.

See A. E. Borelv, Ilistoire de la ville du Havre (Le Havre, 1880-

1881).

HAWAII (Hawaiian or Sandwich Islands), a Territory of the United States of America, consisting of a chain of islands in the North Pacific Ocean, eight inhabited and several unin- habited. The inhabited islands lie between latitudes 18° 54′ and 22 15′ N., and between longitudes 154° 50′ and 160 30′ W., and extend about 380 m. from E.S.E. to W.N.W.; the unin- habited ones, mere rocks and reefs, valuable only for their guano deposits and shark-fishing grounds, continue the chain several hundred miles farther W.N.W. From Honolulu, the capital, which is about 100 m. N.W. of the middle of the inhabited group, the distance to San Francisco is about 2100 m.; to Auckland, New Zealand, about 3810 m.; to Sydney, New South Wales, about 4410 m.; to Yokohama, about 3400 m.; to Hong-Kong, about 4920 m.; to Manila, about 4890 m. The total area of the inhabited islands is 6651 sq. m., distributed as

follows: Hawaii, 4210; Maui, 728; Oahu, about 600; Kauai, 547; Molokai, 261; Lanai, 139; Niihau, 97; Kahoolawe, 69.

All the islands are of volcanic origin, and have been built up by the eruptive process from a base about 15,000 ft. below the sea to a maximum height (Mauna Kea) on the largest island (Hawaii) of 13,823 ft. above the sea; altogether there are forty volcanic peaks. Evidence of slight upheaval is occasionally afforded by an elevated coral-reef along the shore, and evidence of the subsidence of the S. portion of Oahu for several hundred feet has been discovered by artesian borings through coral-rock. In some instances, notably the high and nearly vertical wall along the N. shore of the E. half of Molokai, there is evidence of a fracture followed by the sub- mergence of a portion of a volcano. With the exception of the coral and a small amount of calcareous sandstone, the rocks are entirely volcanic and range from basalt to trachyte, but are mainly basalt. Cinder cones and tufa cones abound, but one of the most distinguish- ing features of the Hawaiian volcanoes is the great number of craters of the engulfment type, i.e. pit-craters which enlarge slowly by the breaking off and falling in of their walls, and discharge vast lava-flows with comparatively little violence. The age of the several inhabited islands, or at least the time since the last eruptions on them, decreases from W. to E., and on the most easterly (Hawaii) volcanic forces are still in operation. That those to the westward have long been inactive is shown by the destruction of craters by denudation, by deep ravines, valleys and tall cliffs eroded on the mountain sides, especially on the windward side, by the depth of soil formed from the disintegrated rocks, and by the amount as well as variety of vegetable life.

Hawaii Island, from which the group and later the Territory was named, has the shape of a rude triangle with sides of 90 m., 75 m. and 65 m. Its coast, unlike that of the other islands of the archipelago, has few coral reefs. Its surface consists mainly of the gentle slopes of five volcanic mountains which have encroached much upon one another by their eruptions.

Mauna Loa (" Great Mountain "), on the S., is by far the largest volcano in the world; from a base measuring at sea-level about 75 in. from N. to S. and 50 m. from E. to W., it rises gradually to a height of 13,675 ft. On its E.S.E. side, at an elevation of 4000 ft. above the sea (300 ft. above the adjoining plain on the W.) is Kilauea, from whose lava-flows the island has been extended to form its S.E. angle. To the N.N.E. ot Mauna Loa, and blending with it in an intervening plateau, is Mauna Kea ("White Mountain," so named from the snow on its summit), with a much smaller base. but with steeper slopes and a crowning cinder cone 13,823 ft. above the sea, the maximum height in the Pacific Ocean; blending with Mauna Loa on the N.N.W. is Mauna Hualalai, 8269 ft. in height; and rising abruptly from the extreme N.W. shore are the remains of the oldest mountains of the island, the Kohala, with a summit 5505 ft. in height. On the land side the Kohala Mountains have been covered with lava from Mauna Kea, and form the broad plains of Kohala, having a maximum elevation of about 3000 ft.; on the ocean side, wherever this lava has not extended, erosion has gone on until bluffs 1000 ft. in height face the sea and the enormous gorges of Waipio and Waimanu, with nearly perpendicular walls as much as 3000 ft. high and extending inland 5-6 m., have been formed. Mauna Kea is not nearly so old as the Kohala Mountains, but there is no record of its eruption, nor have its lavas a modern aspect. The last eruption of Mauna Hualalai was in 1801. Mauna Loa and Kilauea are still active. Cinder cones are the predominant type of craters on both Mauna Kea and the Kohala Mountains, and they are also numerous on the upper slopes of Mauna Hualalai ; but the more typically Hawaiian pit or engulfment craters also abound on Mauna Hualalai and Mokuaweoweo, crowning the summit of Mauna Loa, as well as Kilauea, to the S.E. of it, are prominent representatives of this type. Kilauea is the largest active crater in the world (8 m. in circum- ference) and is easily accessible. Enclosed by a circular wall from 200 to 700 ft. in height is a black and slightly undulating plain having an area of 4-14 sq. m., and within this plain is a pit, Hale- maumau, of varying area (about 2000 ft. in diameter in 1905), now full of boiling lava, now empty to a depth of perhaps 1000 ft. When most active, Halemaumau affords a grand spectacle, especially at night : across the crust run glowing cracks, the

crust is then broken into cakes, the cakes plunge beneath, lakes of liquid lava are formed, over whose surface play fire-fountains 10 to 50 ft. in height, the surface again solidifies and the process is repeated. 1 According to an account of the natives, a violent eruption of Kilauea occurred in 1789, or about that time, and deposits of volcanic sand, large stones, sponge-like scoria (pumice) and ashes for miles around are evidence of such an eruption. Since the Rev. William Ellis and a party of American missionaries first made the volcano known to the civilized

1 Among the minor phenomena of Hawaiian volcanoes are the delicate glassy fibres called Pele's hair by the Hawaiians, which are spun by the wind from the rising and falling drops of liquid lava, and blown over the edge or into the crevices of the crater. Pele in idolatrous times was the dreaded goddess of Kilauea.

world in 1823, the eruptions have consisted mainly in the quiet discharge of lava through a subterranean passage into the sea. In the eruptions of 1823, 1832, 1840 and 1868 the floor of the crater rose on the eve of an eruption and then sank, sometimes hundreds of feet, with the discharge of lava; but since 1868 (in 1879, 1886, 1891, 1894 and 1907; and once, before 1868, in 1855) this action has been confined to Halemaumau and such other pits as at the time existed.

Mokuaweoweo, on the flat top of Mauna Loa, is a pit crater with a floor 3-7 sq. m. in area and sunk 500-600 ft. within walls that are almost vertical and that measure 9-47 m. in circumference. Formerly, on the eve of a great eruption of Mauna Loa, this crater often spouted forth great columns of flame and emitted clouds of vapour, but in modern times this action has usually been followed by a fracture of the mountain side from the summit down to a point 1000 ft. or more below where the lava was discharged in great streams, the action at the summit diminishing or wholly ceasing when this discharge began. The first recorded eruption of_ Mauna Loa was in 1832; since then there have been eruptions in 1851, 1852, 1855, 1859, 1868, 1880-1881, 1887, 1896, 1899 and 1907. The eruptions of 1868, 1887 and 1907 were attended by earthquakes; in 1868 huge sea waves, 40 ft. in height, were raised, and, as they broke on the S. shore, they destroyed the villages of Punaluu, Ninole, Kawaa and Honuapo. But the eruptions of Mauna Loa have consisted mainly in the quiet discharge of enormous flows of lava: in 1859 the lava-stream, which

began to run on the 23rd of January, flowed N.W., reached the sea, 33 m. distant, eight days later, and continued to flow into it until the 25th of November; and the average length of the flows from seven other eruptions is nearly 14 m. The surface of the upper slopes of Mauna Loa is almost wholly of two widely different kinds of barren lava-flows, called by the Hawaiians the pahoehoe and the aa. The pahoehoe has a smooth but billowy or hummocky surface, and is marked by lines which show that it cooled as it flowed. The aa is lava broken into fragments having sharp and jagged edges. As the same stream sometimes changes abruptly from one kind to the other, the two kinds must be due to different conditions affecting the flow, and among the conditions which may cause a stream to break up into the aa have been mentioned the greater depth of the stream, a sluggish current, impediments in its course just as it is granulating, and, what is more probable, subterranean moisture which causes it to cool from below upward instead of from above downward as in the pahoehoe. The natives are in the habit of making holes in the aa, and planting in them banana shoots or sweet-potato cuttings, and though the holes are simply filled with stones or fern leaves, the

plants grow and in due time are productive. Another curious feature of Mauna Loa, and to some extent of other Hawaiian volcanoes, is the great number of caves, some of them as much as 60 to 80 ft. in height and several miles in length ; they were produced by the escape of lava over which a crust had formed. In the midst of barren wastes to the S.E. and S.W. of Kilauea are small channels with steam cracks, along which appears the only vegetation of the region.

Maui, lying 26 m. N.W. of Hawaii, is composed of two mountains connected by an isthmus, Wailuku, 7 or 8 m. long, about 6 m. across, and about 160 ft. above the sea in its highest part.

Mauna Haleakala, on the E. peninsula, has a height of 10,032 ft., and forms a great dome-like mass, with a circumference at the base of 90 m. and regular slopes of only 8° or 9 . It has numerous cinder cones on its S.W. slope, is well wooded on the N. and E. slopes, and has on its summit an extinct pit-crater which is one of the largest in the world. This crater is 7-48 m. long, 2-37 m. wide, and covers 19 sq. m. ; the circuit of its walls, which are composed of a hard grey clinkstone much fissured, is 20 m. ; its greatest depth is 2720 ft. At opposite ends arc breaks in the walls a mile or more in width — one about 1000 ft., the other at least 3000 ft. in depth — through which poured the lava of probably the last great eruption. From the floor of the crater rise sixteen well-preserved cinder-cones, which range from more than 400 ft. to 900 ft. in height. Along the N. base of the mountain are

numerous ravines (several hundred feet deep), to the bottom of which small streams of water fall in long cascades, but elsewhere on the eastern mountain there is little erosion or other mark of age. That the mountainous mass of western Maui is much older is shown by the destruction of its crater, by its sharp ridges and by deeply eroded gorges or valleys. Its highest peak, Puu Kukui, rises 5788 ft. above the sea, and directly under this is the head of Iao Valley, 5 m. long and 2 m. wide, which has been cut in the mountain to a depth of 4000 ft. This and the smaller valleys are noted for the beauty of their tropical scenery.

Kahoolawe is a small island 6 m. S.W. of Maui. It is 14 m. long by 6 m. wide. Its mountains, which rise to a height of 1472 ft., are rugged and nearly destitute of verdure, but the intervening valleys afford pasturage for sheep.

Lanai is another small island, 7 m. W. of Maui, about 18 m. long and 12 m. wide. It has a mountain range which rises to a

maximum height, S.E. of its centre, of about 3480 ft. The N.E. slope is cut by deep gorges, and at the bottom of one of these, which is 2000 ft. deep, is the only water-supply on the island. On the S. side is a rolling table-land affording considerable pasturage for sheep, but over the whole N.W. portion of the island the trade winds, driving through the channel between Maui and Molokai, sweep the rocks bare. Kahoolawe and Lanai are both privately owned.

Molokai, 8 m. X.W. of Maui, extends 40 m. from E. to W. and has an average width of nearly 7 m. From the S.W. ex- tremity of the island rises the backbone of a ridge which extends E.X.E. about 10 m., where it culminates in the round-topped hill of Mauna Loa, 1382 ft. above the sea. Both the northern and southern slopes of this ridge are cut by ravines and gulches, and along the X. shore is a steep sea-cliff. At the E. extremity of the ridge there is a sudden drop to a low and gently rolling plain, but farther on the surface rises gradually towards a range of mountains which comprises more than one-half the island and attains a maximum height of 4958 ft. in the peak of Kama- kou. The S. slope of this range is gradual but is cut by many straight and narrow ravines, in some instances to a great depth. The X. slope is abrupt, with precipices from 1000 to 4000 ft. in height. Ex: ending N. from the foot of the precipice, a little E. of the centre of the island, is a

comparatively low peninsula (separated from the mainland by a rock wall 2000 ft. high), on which is a famous leper settlement. The peninsula forms a separate county, Kalawao.

Oahit, 23 m. N.W. of Molokai, has an irregular quadrangular form. It is traversed from S.E. to N.W. by two roughly parallel ranges of hill separated by a plain that is 20 m. long and in some parts 9 to 10 m. wide. The highest point in the island is Mauna Kaala. 4030 ft., in the Waianae or W. range; but the Koolau or E. range is much longer than the other, and its ridge is very much broken; on the land side there are many ravines formed by lateral spurs, but to the sea for 30 m. it presents a nearly vertical wall without a break. The valleys are remarkable for beautiful scenery, — peaks, cliffs, lateral ravines, cascades and tropical vegetation. There are few craters on the loftier heights, but on the coasts there are several groups of small cones with craters, some of lava, others of tufa. The greater part of the coast is surrounded by a coral reef, often half a mile wide; in several localities an old reef upheaved, sometimes 100 ft. high, forms part of the land.

Kauai. 63 m. W.X.W. of Oahu, has an irregularly circular form with a maximum diameter of about 25 m. On the N.W. is a precipice 2000 ft. or more in height and above this is a mountain plain, but elsewhere around the island is a shore- plain, from which rises Mount Waialeale to a height of 5250 ft. The peaks of the mountain are irregular, abrupt and broken; its sides are deeply furrowed by gorges and ravines; the shore plain is broken by ridges and by broad and deep valleys; no other island of the group is so well watered on all sides by large mountain streams; and it is called ” garden isle.”

Niihau, the most westerly of the inhabited islands, is 18 m. W.by S.of Kauai. It is 16 m.longand 6 m. wide. The western two-thirds consists of a low plain, composed of an uplifted coral reef and matter washed down from the mountains; but on the E. side the island rises precipitously from the sea and attains a maximum height of 1304 ft. at Paniau. There are large salt lagoons on the southern coast.

Climate. — The climate is cooler than that of other regions in the same latitude, and is very healthy. The sky is usually cloudless or only partly cloudy. The N.E. trades blow with periodic varia- tions from March to December; and the leeward coast, being pro- tected by high mountains, is refreshed by regular land and sea breezes. During January, February and a part of March the wind blows strongly from the S. or S.W. ; and at this season an unpleasant hot, damp wind is sometimes felt. More rain falls from January to May than during the other months; very much more falls on’ the windward side of the

principal islands than on the leeward; and the amount increases with the elevation also up to about 4000 ft. The greatest recorded extremes of local rainfall for a year within the larger islands range from 12 to 300 in. For Honolulu the mean annual rainfall (,1884-1899) was 28-18 in.; the maximum 49-82 ; and the

minimum 13-46. At sea level the daily average temperature for July is 76-4° F., for December 70-7° F. : the mean annual tempera- ture is about 73° F. — 68° during the night, 8o° during the day — and for each 200 ft. of elevation the temperature falls about 1° F., and snow lies for most of the time on the highest mountains.

Flora. — The Hawaiian Islands have a peculiar flora. As a result of their isolation, the proportion of endemic plants is greater here than in any other region, and the great elevation of the mountains, with the consequent variation in temperature, moisture and baro- metric pressure, has multiplied the number of species. Towards the close of the 19th century William Ilillebrand found 365 genera and 999 species, and of this number of species 653 were peculiar to this part of the Pacific. The number of species is greatest on the older islands, particularly Kauai and Oahj, and the total number for the group has been constantly increasing, some being introduced, others possibly being produced by the varying climatic conditions from those already existing. Among the peculiar dicotyledonous plants there is not a single annual, and by far the greater number are per- ennial and woody. Hawaiian forests are distinctly tropical, and are composed for the most part of trees below the medium height. They are most common between elevations of 2000 and 8000 ft. ; there are only a few species below 2000 ft., and above 8000 ft. the growth is stunted. The destruction of considerable portions of the forests by cattle, goats, insects, fire and cutting has been followed by re- foresting, the planting of hitherto barren tracts, the passage of severe forest fire laws, and the establishment of forest reserves, of which the area in 1909 was 545,746 acres, of which 357,180 were govern- ment land. In regions of heavy rainfall the ohia-lchua (Metrosideros pblymorpha), a tree growing from 30 to 100 ft. in height, is predomi- nant, and on account of the dense undergrowth chiefly of ferns and climbing vines, forms the most impenetrable of the forests; its hard wood is used chiefly for fuel. The koa (Acacia koa), from the wood of which the natives used to make the bodies of their canoes, and the only tree of the islands that furnishes much valuable lumber (a hard cabinet wood marketed as ” Hawaiian mahogany “), forms extensive forests on Hawaii and Maui between elevations of 2000 and 4000 ft. The mamane (Sophora chrysophylla) , which furnishes the best posts, grows principally on the high slopes of Mauna Kea and Hualalai. Posts

and railway ties are also made from ohia-ha (Eugenia sandwicensis). In many districts between elevations of 2000 and 6000 ft., where there is only a moderate amount of moisture, occur mixed forests of koa, koaia (Acacia koaia), kopiko (Straussia oncocarpa and 5. hawaiiensis) , kolea (Myrsine kauaiensis and M. lanaiensis), naio or bastard sandalwood (Myoporum sandwicense) and pua (Olea sandwicensis) ; of these the koaia furnishes a hard wood suitable for the manufacture of furniture, and out of it the natives formerly made spears and fancy paddles. The wood of the naio when dry has a fragrance resembling that of sandalwood, and is used for torches in fishing. The kukui (Aleuriles triloba) and the algaroba (Prosopis juliflora) are the principal species of forest trees that occur below elevations of 2000 ft. The kukui grows along streams and gulches ; from its nuts, which are very oily, the natives used to make candles, and it is still frequently called the candlenut tree. On the leeward side, from near the sea level to elevations of 1500 ft., and on ground that was formerly barren, the algaroba tree has formed dense forests since its introduction in 1837. Forests of iron-wood and blue gum have also been planted. Sandalwood (Santalum album or freycinetianum) was once abundant on rugged and rather inaccessible heights, but so great a demand arose for it in China, 1 where it was used for incense and for the manufacture of fancy articles, that the supply was nearly exhausted between 1802 and 1836; since then some young trees have sprung up, but the number is relatively small. Other peculiar trees prized for their wood are: the kauila (Alphitonia potiderosa), used for making spears, mallets and other tools; the kela (Mezoneuron kauaiense), the hard wood of which resembles ebony; the halapepe (Dracaena aurea), out of the soft wood of which the natives carved many oi their idols; and the wiliwili (Erythrina monosperma), the wood of which is as light as cork and is used for outriggers. In 1909, on six large rubber plantations, mostly on the windward side of the island of Maui, there were planted 444,450 ceara trees, 66,700 hevea trees, and 600 castilloa trees. About the only indigenous fruit-bearing plants are the Chilean strawberry (Fragaria chiiensis) and the ohelo berry (V actinium reticulatum), both of which grow at high elevations on Hawaii and Maui. The ohelo berry is famous in song and story, and formerly served as a propitiatory offering to Pele. The number of fruit-bearing trees, shrubs and plants that have been introduced and are successfully cultivated or grow wild is much greater; among them are the mango, orange, banana, pineapple, coconut, palm, grape, fig, strawberry, litchi (Nephelium litchi) — the favourite fruit of the Chinese — avocado or alligator pear (Persea gratissima), Sapodilla pear (Achras sapota), loquat or mcspilus plum (Eriobotrya japonica) , Cape gooseberry (Physalis peruviana), tamarind (Tamarindus indica),

papaw (Carica papaya), resembling in appearance the cantaloupe, granadilla (Passiflora quadrangularis) and guava (Psidium guajava). Most of the nativ-e grasses are too coarse for grazing, and some of

1 The Chinese name for the Hawaiian Islands means ” Sandalwood Islands.”

them, particularly the hilo grass {Paspalum conjugatum), which forms a dense mat over the ground, prevent the spread of forests. The pili grass (Heteropogon contortus) is also noxious, for its awns get badly entangled in the wool of sheep. The native manienie {Stenotaphrum americanum) and kukai (Panicum pruriens), however, are relished by stock and are found on all the inhabited islands; the Bermuda grass (Cynodon dactylon), a June grass (Poa annua), and Guinea grass (Panicum jumentorum) have also been successfully introduced. The Paspalum orbiculare is the large swamp grass with which the natives covered their houses. On the island of Niihau is a fine grass {Cyperus laevigatus) , out of which the beautiful Niihau mats were formerly made; it is used in making Panama hats. Mats were also made of the leaves of the hala tree (Pandanus odoratissi- mus). The wauke plant (Broussonetia papyrifera), and to a less extent the mamake (Pipturus albidus) and Boehmeria stipularis, furnished the bark out of which the famous kapa cloth was made, while the olopa {Cheirodendron gaudichaudii) and the koolea (Myrsine lessertiana) furnished the dyes with which it was coloured. From several species of Cibotium is obtained a glossy yellowish wool, used for making pillows and mattresses. Ferns, of which there are about 130 species varying from a few inches to 30 ft. in height, form a luxuriant undergrowth in the ohia-lehua and the koa forests, and the islands are noted for the profusion and beautiful colours of their flowering plants. Kalo (Colocasia antiquorum, var., escu- lenta), which furnishes the principal food of the natives, and sugar cane {Saccharum officinarum) , the cultivation of which has become the chief industry of the islands, were introduced before the discovery of the group by Captain Cook in 1778. Sisal hemp has been intro- duced, and there is a large plantation of it W. of Honolulu.

Over seventy varieties of seaweeds, growing in the fresh-water pools and in the waters near the coast, are used by the natives as food. These limus, as they are called by the Kanakas, are washed, salted, broken and eaten as a relish or as a flavouring for fish or other meat.

The culture of such algae may prove of eco- nomic importance; gelatine, glue and agar-agar would be valuable by-products.

Fauna. — A day-flying bat, whales and dolphins are about the only indigenous mammals ; hogs, dogs and rats had been introduced before Cook's discovery. Fish in an interesting variety of colours and shapes abound in the sea and in artificial ponds along the coasts. 1 There are some fine species of birds, and the native avifauna is so distinctive that Wallace argued from it that the Hawaiian Archi- pelago had long been separated from any other land. There were native names for 89 varieties. The most typical family is the Drepanidae, so named for the stout sickle-shaped beak with which the birds extract insects from heavy-barked trees; Gadow con- siders the family American in its origin, and thinks that the Moho 2 a family of honey-suckers, were later comers and from Australia. The mamo (Drepanis pacifica) has large golden feathers on its back ; it is now very rare, and is seldom found except on Mauna Loa, Hawaii, about 4000 ft. above the sea. The smaller yellow feathers, once used for the war cloaks of the native chiefs, were furnished by the 00 (Moho nobilis) and the aa (Moho braccatus) , now found only occasionally in the valleys of Kauai near Hanalei, on the N. side of the island ; scarlet feathers for similar mantles were taken from the iiwi (Vestiaria coccinea), a black-bodied, scarlet-winged song-bird, which feeds on nectar and on insects found in the bark of the koa and ohia trees, and from the Fringilla coccinea. In the old times birds were protected by the native belief that divine messages were conveyed by bird cries, and by royal edict forbidding the killing of species furnishing the material for feather cloaks, contributions towards which were long almost the only taxes paid. Thus the downfall of the monarchy and of the ancient cults have been nearly fatal to some of the more beautiful birds; feather ornaments, formerly worn only by nobles, came to be a common decoration ; and many species (for example the Hawaiian gallinule, Gallinula sandwicensis, which, because of its crimson frontal plate and bill, was said by the natives to have played the part of Prometheus, burning its head with fire stolen from the gods and bestowed on mortals) have been nearly destroyed by the mongoose, or have been driven from their lowland homes to the mountains, such being the fate of the mamo, mentioned above, and of the Sandwich Island goose (Bernicla sandwicensis), which is here a remarkable example of adaptation, as its present habitat is quite arid. This goose has been introduced successfully into Europe. A bird called moho, but actually of a different family, was the Pennula ecaudata or millsi, which had hardly any tail, and had wings so degenerate that it was commonly thought wingless. The turnstone (Strepsilas inlerpres) arrives in the islands in

August after breeding in Alaska. There are no parrots. The only reptiles are three species of skinks and four of the gecko ; the islands are famed for their freedom from

1 Partly described by T. S. Streets, Contributions to the Natural History of the Hawaiian and Fanning Islands, Bulletin 7 of U.S. National Museum (Washington, 1877). Several new species are described in U.S. Bureau of Fisheries Document, No. 623 (Washington, 1907).

2 So Lesson called the family from the native name in 1831; Cabanis (1847) suggested Acrulocercus.

snakes. Land-snails, mostly A chatinellidae, are remarkably frequent and diverse; over 300 varieties exist. Insects are numerous, and of about 500 species of beetle some 80 % are not known to exist elsewhere; cockroaches and green locusts are pests, as are, also, mosquitoes, 3 wasps, scorpions, centipedes and white ants, which have all been introduced from elsewhere.

Soil. — The soil of the Territory is almost wholly a decomposition of lava, and in general differs much from the soils of the United States, particularly in the large amount of nitrogen (often more than 1-25% in cane and coffee soil, and occasionally 2-2%) and iron, and in the high degree of acidity. High up on the windward side of a mountain it is thin, light red or yellow, and of inferior quality. Low down on the leeward side it is dark red and fertile, but still too pervious to retain moisture well. In the older valleys on the islands of Kauai, Oahu and Maui, as well as on the lowland plain of Molokai, the soil is deeper and usually, too, the moisture is retained by a heavy clay. In some places along the coast there is a narrow strip of decomposed coral limestone; often, too, a coral reef has served to catch the sediment washed down the mountain side until a deep sedimentary soil has been deposited. On the still lower levels the soil is deepest and most productive.

Agriculture. — The tenure by which lands were held before 1838 was strictly feudal, resembling that of Germany in the I ith century, and lands were sometimes enfeoffed to the seventh degree. But in the ” Great Division ” which took place in 1848 and forms the foundation of present land titles, about 984,000 acres, nearly one- fourth of the inhabited area, were set apart for the crown, about 1,495,000 acres for the government, and about 1,619,000 acres for the several chiefs; and the common people received fee-simple titles 4 for their house lots and the pieces of land which they culti- vated for themselves,

about 28,600 acres, almost entirely in isolated patches of irregular shape hemmed in by the holdings of the crown, the government or the great chiefs. Generally the chiefs ran into debt; many died without heirs; and their lands passed largely into the hands of foreigners. At the abolition of the monarchy in 1893, the crown domains were declared to be public lands, and, with the other government lands, were by the terms of annexation turned over to the United States in 1898. They had been offered for sale or lease in accordance with land acts (of 1884 and 1895 — the latter corresponding generally to the land laws of New Zealand) designed to promote division into small farms and their immediate improvement. In 1909 the area of the public land was about 1,700,000 acres. In 1900 there were in the Territory 2273 farms, of which 1209 contained less than 10 acres, 785 contained between 10 and 100 acres, and 116 contained 1000 acres or more. The natives seldom cultivate more than half an acre apiece, and the Portuguese settlers usually only 25 or 30 acres at most. Of the total area of the Territory only 86,854 acres, or 2-77%, were under cultivation in 1900, and of this 65,687 acres, or 75-6%, were divided into 170 farms and planted to sugar-cane. In 1909 it was estimated that 2 13,000 acres (about half of which was irrigated) were planted to sugar, one half being cropped each year. The average yield per acre of cane-sugar is the greatest in the world, 30 to 40 tons of cane being an average per acre, and as much as 10J tons of sugar having been produced from a single acre under irrigation. The cultivation of the cane was greatly encouraged by the Reciprocity Treaty of 1875, which established practically free trade between the islands and the United States, and since 1879 it has been widely extended by means of irrigation, the water being obtained both by pumping from numerous artesian wells and by conducting surface water through canals and ditches. The sugar farms are mostly on the islands of Hawaii, Oahu, Maui and Kauai, at the bases of mountains; those on the leeward side have the better soil, but require much more irrigating. The product increased from 26,072,429 lb in 1876 to 259,789,462 lb in 1890, 542,098,500 lb in 1899 and about 1,060,000,000 lb (valued at more than $40,000,000) in 1909. Nearly all of it is exported to the United States. Rice was the second product in importance until competition with Japan, Louisiana and Texas made the crop a poor investment ; improved culture and machinery may restore rice culture to its former importance. It is grown almost wholly by Japanese and Chinese on small low farms along the coasts, mostly on the islands of Kauai and Oahu. In 1899 the product amounted to 33,442,400 lb; in 1907 about 12,000 acres were planted, and the crop was estimated to be worth $2, 500,000. Coffee of good quality is grown at elevations ranging between 1000 to 3000 ft. above the sea; the Hawaiian product is

called Kona coffee — from Kona, a district of the S. side of Hawaii island, where much of it is grown. In 1909 about 4500 acres were in coffee, the value of the crop was §350,000; and 1,763,119 lb of coffee, valued at $211,535, were exported from Hawaii to the mainland of the United States. A few bananas and (especially from Oahu) pineapples of fine quality are exported; since 1901 the canning of

3 The entomological department of the Hawaii Experiment Station undertakes ” mosquito control,” and in 1905-1906 imported top-minnows (Poeciliidae) to destroy mosquito larvae.

4 These and other title-holders received corresponding rights to the use of irrigation ditches, and to fish in certain sea areas adjacent to their holdings.

pineapples has been successfully carried on, and in the year ending May 31, 1907, 186,700 cases were exported, being packed in nine canneries. Oranges, lemons, limes, figs, mangoes, grapes and peaches, besides a considerable variety of vegetables, are raised in small quantities lor local consumption. In 1909 the exports of fruits and nuts to the continental United States were valued at 81,457,644. An excellent quality of sisal is grown. Rubber trees have been planted with some success, particularly on the eastern part of the island of Maui; they were not tapped for commercial use until 1909. In 1907 there were vanilla plantations in the islands of Oahu and Hawaii. Tobacco of a high grade, especially for wrappers, has been grown at the Agricultural Experiment Station’s farm at Hamakua, on the island of Hawaii, where the tobacco is practically ” shade grown ” under the afternoon fogs from Mauna Kea. Cotton and silk culture have been experimented with on the islands; and the work of the Hawaiian Agricultural Experiment Station is of great value, in introducing new crops, in improving old, in studying soils and fertilizers and in entomological research. Honey is a crop of some importance; in 1908 the yield was about 950 tons of honey and 15 tons of wax. The small islands of Lanai, Niihau and Kahoolawe are devoted chiefly to the raising of sheep and cattle — Niihau is one large privately owned sheep-ranch. There are large cattle-ranches on the islands supplying nearly all the meat for domestic consumption, and cattle-raising is second in importance to the sugar industry. It was estimated in 1908 that there were about 130,500 cattle and about 99,500 sheep on the islands. The ” native ” cattle, descended from those left on the islands

by early navigators, are being improved by breeding with imported Hereford, Shorthorn, Angus and Holstein bulls, the Here- fords being the best for the purpose. In the fiscal year 1908, 359,413 lb of wool (valued at $58,133) and 928,599 lb of raw hides (valued at 887,599) were shipped from the Territory to the United States.

Minerals. — The islands have large (unworked) supplies of pumice, sandstone, sulphur, gypsum, alum and mineral-paint ochres, and some salt, kaolin and sal-ammoniac, but otherwise they are without mineral wealth other than lava rocks for building purposes.

Manufactures. — The manufactures are chiefly sugar, fertilizers, and such products of the foundry and machine shop as are required for the machinery of the sugar factories. Most of the manufacturing industries, indeed, are maintained for supplying the local market, there being only three important exceptions — the manufacture of sugar, the cleaning of coffee and the cleaning and polishing of rice. The manufacture of sugar, which began between 1830 and 1840, has long been much the most important of the manufacturing in- dustries: thus in 1900 the value of the sugar production was $19,254,773, and the total value of all manufactures, including custom work and repairing, was only $24,992,068. Next to sugar, fertilizers were the most important manufactured product, their value being §1,150,625; the products of the establishments for the polishing and cleaning cf rice were valued at 8664,300. Of the total product in 1900, only 18-5 % (by value) is to be credited to the city of Honolulu. The growth of manufacturing is much hampered by the lack of labour. Excellent water power is utilized on the island of Kauai in an electric plant.

Communications. — There are good wagon roads on the islands, some of them macadamized, built of the hard blue lava rock. Hawaii had in 1909 about 200 m. of railway, of which the principal line is that of the Oahu Railway & Land Company (about 89 m.), extending from Honolulu W. and N. along the coast to Kahuku abcut one-half the distance around Oahu; another line from Kahuku Mill, the most northerly point of the island, S.E. to Hono- lulu, was projected in 1905; on the island of Hawaii is the Hilo Railroad (about 46 m.), carrying sugar, pineapples, rubber and lumber; other railways arc for the most part short lines on sugar estates and in coffee-producing sections of the islands of Hawaii and Maui. Each of the larger islands has one or more ports which a local steamboat serves regularly, and Honolulu has the regular service of seven trans-Pacific lines (the American-Hawaiian Steamship Co., the Canadian-Australian Steamship Co., the Matson Navigation Co., the Oceanic Steamship Co., the Pacific Mail Steamship Co., the Mexican Oriental and the Toyo

Kiscn Kaisha) ; it is a midway station for vessels between the United States (mainland) and Australia and Southern Asia. In 1908 five steamship companies were engaged in traffic between island ports and the mainland (including Mexico). Honolulu has cable connexion with San Francisco and the East, and the several islands of the group are served by wireless telegraph.

Commerce. — The position of the archipelago, at the ” cross-roads ” of the \orth Pacific, has made it commercially important since the days of the whale fishery, and it has a practical monopoly of coaling, watering and victualling. Its main disadvantage is the lack of harbours — Honolulu and Pearl Harbor are the only ones in the archi- pelago; but under the River and Harbour Act of 1905 examinations and surveys were made to improve Hilo Bay on the island of Hawaii. Pearl Harbor is the U.S. naval station, and a great naval dock, nearly 1200 ft. long, was projected for the station in 1908. Within recent years commerce has grown greatly in volume; it has always been almost entirely with the United States. In 1880 the value of imports from the United States was $2,086,000, that of exports to the United States was S4,6o6,ooo; in 1907 the value of shipments

of domestic merchandise from the United States to Hawaii was S?. 00 ?,. and the value of shipments of domestic merchandise from Hawaii to the United States was §31,984,433, of which $30.l T l,5 2 4 was the value of brown sugar, $133,133 the value of rice, $601,748 the value of canned fruits, $124,146 the value of green, ripe or dried fruits, $117,403 the value of hides and skins, and $105,515 the value of green or raw coffee. The shipments of foreign merchandise each way are relatively insignificant. In the fiscal year 1908 the exports from Hawaii to foreign countries were valued at $597,640, ten times as much as in 1905 ($59,541); the imports into Hawaii from foreign countries were valued at $4,682,399 in the fiscal year 1908, as against $3,014,964 in 1905.

Population. — The total population of the islands in 1890 was 89,990; in 1900 it was 154,001, an increase within the decade of 71-13%; in 1910 it was 191,909. In 1908 there were about 72,000 Japanese, 18,000 Chinese, 5000 Koreans, 23,000 Portu- guese, 2000 Spanish, 2000 Porto Ricans, 35,000 Hawaiians and part Hawaiians and 12,000 Teutons. Of the total for 1900 there were 61,111 Japanese, 25,767 Chinese and 233 negroes; of the same total there were 90,780 foreign-born, of whom 56,234 were natives of Japan, and 6512 were natives of Portugal. There were in all in 1900, 106,369 males (69-1%; a preponder- ance due to the large number of Mongolian labourers, whose wives are left in Asia) and only 47,632 females. About three-

fifths of the Hawaiians and nearly all of American, British or North European descent are Protestants. Most of the Portuguese and about one-third of the native Hawaiians are Roman Catholics. The Mormons claim more than 4000 adherents, whose principal settlement is at Laie, on the north-east shore of Oahu; the first Mormon missionaries came to the islands in 1850. The popula- tion of 1910 was distributed among the several islands as follows: Oahu, 82,028; Hawaii, 55,382; Kauai and Niihau, 23,952; Kalawao, 785; and Maui, Lanai, Kahoolawe and Molokai, 29,762. The population of Honolulu district, the entire urban population of the Territory, was 22,907 in 1890, 39,306 in 1900, and 52,183 in 1910. The aboriginal Hawaiians (sometimes called Kanakas, from a Hawaiian word kanaka, meaning ” man “) belong to the Malayo-Polynesian race; they probably settled in Hawaii in the 10th century, having formerly lived in nooufa- Samoa, and possibly before that in Tahiti and the tion. Marquesas. Their reddish-brown skin has been com- pared in hue to tarnished copper. Their hair is dark brown or black, straight, wavy or curly; the beard is thin, the face broad, the profile not prominent, the eyes large and expressive, the nose somewhat flattened, the lips thick, the teeth excellent in shape and of a pearly whiteness. The skull is sub-brachycephalic in type, with an index of 82-6 from living ” specimens ” and 79 from a large collection of skulls; it is never prognathous. Most of the people are of moderate stature, but the chiefs and the women of their families have been remarkable for their height, and 400 pounds was formerly not an unusual weight for one of this class. This corpulence was due not alone to over-feeding but to an almost purely vegetable diet; stoutness was a part of the ideal of feminine beauty. The superiority in physique of the nobles to the common people may have been due in part to a system of massage, the lotni-lomi; it is certainly contrary to the belief in the bad effects of inbreeding — among the upper classes marriage was almost entirely between near relatives.

The Rev. William Ellis, an early English missionary, described the natives as follows: ” The inhabitants of these islands are, considered physically, amongst the finest races in the Pacific, bearing the strongest resemblance to the New Zealanders in stature, and in their well-developed muscular limbs. The tattoo- ing of their bodies is less artistic than that of the New Zealanders, and much more limited than among some of the other islanders. They are also more hardy and industrious than those living nearer the equator. This in all probability arises from their salubrious climate, and the comparative sterility of their soil rendering them dependent upon the cultivation of the ground for the yam, the arum, and the sweet potato, their chief articles of food. Though, like all undisciplined races, the Sandwich

Islanders [Hawaiians] have proved deficient in firm and steady perseverance, they manifest considerable intellectual capability. Their moral character, when first visited by Europeans, was n

superior to that of other islanders; and excepting when improved and preserved by the influence of Christianity, it has suffered much from the vices of intemperance and licentiousness introduced by foreigners. Polygamy prevailed among the chiefs and rulers, and women were subject to all the humiliations of the tabu system, which subjected them to many privations, and kept them socially in a condition of inferiority to the other sex. Infanticide was practised to some extent, the children destroyed being chiefly females. Though less superstitious than the Tahitians, the idolatry of the .Sandwich Islanders was equally barbarous and sanguinary, as, in addition to the chief objects of worship included in the mythology of the other islands, the supernatural beings supposed to reside in the volcanoes and direct the action of subterranean fires rendered the gods objects of peculiar terror. Human sacrifices were slain on several occasions, and vast offerings presented to the spirits supposed to preside over the volcanoes, especially during the periods of actual eruptions. The requisitions of their idolatry were severe and its rites cruel and bloody. Grotesque and repulsive wooden figures, animals and the bones of chiefs were the objects of worship. Human sacrifices were offered whenever a temple was to be dedicated, or a chief was sick, or a war was to be under- taken; and these occasions were frequent. The apprehensions of the people with regard to a future state were undefined, but fearful. The lower orders expected to be slowly devoured by evil spirits, or to dwell with the gods in burning mountains. The several trades, such as that of fisherman, the tiller of the ground, and the builder of canoes and houses, had each their pre-siding deities. Household gods were also kept, which the natives worshipped in their habitations. One merciful provision, however, had existed from time immemorial, and that was [the puuhonuas] sacred inclosures, places of refuge, into which those who fled in time of war, or from any violent pursuer, might enter and be safe. To violate their sanctity was one of the greatest crimes of which a man could be guilty.” The native religion was an admixture of idolatry and hero-worship, of some ethical but little moral force. The king was war chief, priest and god in one, and the shocking licence at the death of a king was probably due to the feeling that all law or restraint was

annulled by the death of the king — incarnate law. The mythic and religious legends of the people were preserved in chants, handed down from generation to generation; and in like poetic form was kept the knowledge of the people of botany, medicine and other sciences. Name-songs, written at the birth of a chief, gave his genealogy and the deeds of his ancestors; dirges and love-songs were common. These were without rhyme or rhythm, but had alliteration and a parallelism resembling Hebrew poetry. Drums, gourd and bamboo flutes,and a kind of guitar, were known before Cook's day.

When the islands first became known to Europeans, the Hawaiian family was in a stage including both polyandry and polygyny, and, according to Morgan, older than either: two or more b ethers, with their wives, or two or more sisters with their husbands, cohabited with seeming promiscuity. This system called pimalua (a word which in the modern verna- cular means merely " dear friend ") was first brought to the attention of ethnologists in 1871 by Lewis H. Morgan (who was incorrect in many of his premises) and was. made the basis of his second stage, the punaluan, in the evolution of the family. These conditions did not last long after the coming of the mission- aries. Descent was more commonly traced through the female line. As regard cannibalism, it appears that the heart and liver of the human victims offered in the temples were eaten as a religious rite, and that the same parts of any prominent warrior slain in battle were devoured by the victor chiefs, who believed that they would thereby inherit the valour of the dead man. Under taboo as late as 1819 women were to be put to death if they ate bananas, cocoa-nuts, pork, turtles or certain fish. In the days of idolatry the only dress worn by the men was a narrow strip of cloth wound around the loins and passed between the legs. Women wore a short petticoat made of kapa cloth (already referred to), which reached from the waist to the knee. But now

the common class of men wear a shirt and trousers; the better class are attired in the European fashion. The women are clad in the holoka, a loose white or coloured garment with sleeves, reaching from the neck to the feet. A coloured handkerchief is twisted around the head or a straw hat is worn. Both sexes delight in adorning themselves with garlands (lets) of flowers and necklaces of coloured seeds. The Hawaiians are a good-tempered, light-hearted and pleasure-loving race. They have many games and sports, including boxing, wrestling (both in and out of water), hill-sliding, spear-throwing, and a game cf bowls played with stone discs. Both sexes are passionately fond of riding. They delight to be in the water and swim with remarkable skill and ease. In the exciting sport of surf-riding, which always astonishes strangers, they balance themselves lying, kneeling or standing on a

small board which is carried landwards on the curling crest of a great roller. All games were accompanied by gambling. Dances, especially the indecent hula, ” danse du ventre,” were favourite entertainments.

Even at the time when they were first known to Europeans, they had stone and lava hatchets, shark’s-tooth knives, hard- wood spades, kapa cloth or paper, mats, fans, fish-hooks and nets, woven baskets, &c, and they had introduced a rough sort 01 irrigation of the inland country with long canals from highlands to plains. They derived their sustenance chiefly from pork and fish (both fresh and dried), from seaweed (limn), and from the kalo (Colocasia antiquorum, var. esculenta), the banana, sweet potato, yam, bread-fruit and cocoa-nut. From the root of the kalo is made the national dish called poi; after having been baked and well beaten on a board with a stone pestle it is made into a paste with water and then allowed to ferment for a few days, when it is ready to be eaten. One of the table delicacies of former days was a particular breed of dog which was fed exclusively on poi before it was killed, cooked and served. Like other South Sea Islanders they made an intoxicating drink, awa or kava, from the roots of the Macropipcr laiifolium or Piper methysticum; in early times this could be drunk only by nobles and priests. The native dwellings are constructed of wood, or occasionally are huts thatched with grass at the sides and top. What little cooking is undertaken among the poorer natives is usually done outside. The oven consists of a hole in the ground in which a fire is lighted and stones made hot; and the fire having been removed, the food is wrapped up in leaves and placed in the hole beside the hot stones and covered up until ready; or else, as is now more common, the cooking is done in an old kerosene-oil can over a fire.

The Hawaiian language is a member of the widely-diffused Malayo-Polynesian group and closely resembles the dialect of the Marquesas; Hawaiians and New Zealanders, although occupying the most remote regions north and south at which the race has been found, can understand each other without much difficulty. Various unsuccessful attempts have been made to prove the language Aryan in its origin. It is soft and har- monious, being highly vocalic in structure. Every syllable is open, ending in a vowel sound, and short sentences may be constructed wholly of vocalic sounds. The only consonants are k, I, m, 11 and p, which with the gently aspirated h, the five vowels, and the vocalic w, make up all the letters in use. The letters r and t have been discarded in favour of I and k, as expressing more accurately the native pronunciation, so that, for example, tcro, the former name of the Colocasia plant, is now kalo. The language was not reduced to a written form until after the arrival of the missionaries. A Hawaiian

spelling book was” printed in 1822; in 1834 two newspapers were founded; and in 1839 the first translation of the Bible was published.

In spite of moral and material progress — indeed largely because of changes in their food, clothing, dwellings and of other ” advan- tages ” of civilization — the race is probably dying out. Captain Cook estimated the number of natives at 400,000, probably an over-estimate; in 1823 the American missionaries estimated their number at 142,000; the census of 1832 showed the popula- tion to be 130,313; the census of 1878 proved that the number of natives was no more than 44,088. In 1890 they numbered

34,436; in 1900, 29,834, a decrease of 4602 or 13-3% within the decade. To account for this it is said that the blood of the race has become poisoned by the introduction of foreign dis- eases. The women are much less numerous than the men; and the married ones have few children at the most; two out of three have none. Moreover, the mothers appear to have little maternal instinct and neglect their offspring. It is, however, thought by some that these causes are now diminishing in force, and that the ” fittest ” of the race may survive. The part- Hawaiians, the offspring of intermarriage between Hawaiian women and men of other races, increased from 3420 in 1878 to 6186 in 1890 and 7835 in 1900.

The pressing demand for labour created by the Reciprocity Treaty of 1875 with the United States led to great changes in the population of the Hawaiian Islands. It became the policy of the Immigra- government to assist immigrants from different countries. “”” In 1877 arrangements were made for the importation of

Portuguese families from the Azores and Madeira, and during the next ten years about 7000 of these people were brought to the islands; in 1906-1907 there was a second immigration from the Azores and Madeira of 1325 people. In 1900 the total number of Portuguese in the islands, including those born there, was not far from 1 6,000, about 2400 of whom were employed in sugar plantations. They have shown themselves to be industrious, thrifty and law- abiding. In 1907 2201 Spanish immigrants from the sugar district about Malaga arrived in Hawaii, and about the same number of Portuguese immigrated in the same year. The Board of Immigration, using funds contributed by planters, was very active in its efforts to encourage the immigration of

suitable labourers, but the general im- migration law of 1907 prohibited the securing of such immigration through contributions from corporations. Persistent efforts have also been made to introduce Polynesian islanders, as being of a cognate race with the Hawaiians, but the results have been wholly unsatisfactory. About 2000, mainly from the Gilbert Islands, were brought in at the expense of the government between 1878 and 1884; but they did not give satisfaction either as labourers or as citizens, and most of them have been returned to their homes. There never existed any treaty or labour convention between Hawaii and China. In early days a limited number of Chinese settled in the islands, intermarried with the natives and by their industry and economy generally prospered. About 750 of them were natural- ized under the monarchy. The first importation of Chinese labourers was in 1852. In 1878 the number of Chinese had risen to 5916. During the next few years there was such a steady influx of Chinese free immigrants that in the spring of 1881 the Hawaiian government sent a despatch to the governor of Hong Kong to stop this invasion. Again, in April 1883, it was suddenly renewed, and within twenty days five steamers arrived from Hong Kong bringing 2253 Chinese passengers, followed the next month by 1 100 more, with the news that several thousand more were ready to embark. Accordingly, the Hawaiian government sent another despatch to the governor of Hong Kong, refusing to permit any further immigration of male Chinese from that port. Various regulations restricting Chinese immigration were enacted from time to time, until in 1886 the landing of any Chinese passenger without a passport was prohibited. The number of Chinese in the islands had then risen to 21,000. The consent of the Japanese government to the immigration of its subjects to Hawaii was obtained with difficulty in 1884, and in 1886 a labour convention was ratified. Subsequently the increase of the Japanese element in the population was rapid. It rose from 116 in 1884 to 12,360 in 1890 and 24,400 in 1896. Most of these were recruited from the lowest classes in Japan. Unlike the Chinese, they show no inclination to intermarry with the Hawaiians. The effect of making Hawaii a Territory of the United States was to put an end to all assisted immigration, of whatever race, and to exclude all Chinese labourers. No Chinese labourer is allowed to enter any other Territory of the Union from Hawaii; and the act of Congress of the 26th of February 1885, ” to prohibit the importation and migration of foreigners and aliens under contract or agreement to perform labour in the United States, its Territories and the District of Columbia,” and the amending and supplementary acts, are extended to it. But in the treaty of 1894 between the United States and Japan there is nothing to limit the free immigration of Japanese; and several companies have

been formed to promote it. The system of contract labour, which was abolished by the act of Congress in 1900, and under which labourers had been restrained from leaving their work before the end of the contract term, concerned few labourers except the Japanese. Various methods of co-operation or profit-sharing are in successful operation on some plantations.

An interesting sociological problem is raised by the presence of the large Asiatic element in the population. The Japanese and Koreans, and in less measure the Chinese, act as domestic servants, work under white contractors on irrigating ditches and reservoirs, do most of the plantation labour and compete successfully with whites and native islanders in all save skilled urban occupations, -ueh as printing and the manufacture of machinery. The ” Yellow

Peril ” is considered less dangerous in Hawaii than formerly, although it was used as a political cry in the campaign for American annexation. No success met the apparently well-meaning efforts of the Central .Japanese League which was organized in November and December 1903 to promote the observance of law and order by the Japanese in the islands, who assumed a too independent attitude and felt themselves free from governmental control whether Japanese or American; indeed, after the League had been in operation for a year or more, it almost seemed that it contributed to industrial disorders among the Japanese. At about the same time Japanese immigration to Hawaii fell off upon the opening of new fields for colonization by the Russo-Japanese War, and Korean immigration was promoted by employers on the islands. From the first of January 1903 to the 30th of June 1905 Japanese immigrants num- bered 18,027; Koreans 7388 (four Koreans to every ten Japanese); but in the last twelve months of this same period there were 4733 Koreans to 5941 Japanese (eight Koreans to every ten Japanese). Another fact which is possibly contributing to the solution of the problem is that the Japanese are leaving the islands in large numbers as compared with the Koreans. The Japanese leaving Hawaii between the 14th of June 1900 and the 31st of December 1905 numbered 42,313, o 4284 more than the number of Japanese immigrants airiving during the same period. The corresponding figures for Koreans during the same period are as follows: number leaving between the 14th of June 1900 and the 31st of December 1905, 721, or 6673 less than the Korean immigrants for the same period. The acceleration of the departure of the Japanese is shown by the fact that in the eighteen months (July 1904 to January 1906) occurred 19,114 of the 42,313 departures in the sixty-six months from July 1900 to January 1906. 1 After 1906, owing to restrictions by the Japanese government, immigration to Hawaii

greatly de- creased. At the same time the number of departures was decreasing rapidly. The change in the character of the immigration of Japanese is shown by the fact that in the fiscal year 1906-1907 the ratio of female immigrants to males was as I to 8, in the fiscal year 1907- 1908 it was as I to 2, and in the latter year, of 4593 births in the Territory, 2445 were Japanese.

Administration. — The Hawaiian Islands are governed under an Act of Congress, signed by the president on the 30th of April 1900, which first organized them as a Territory of the United States. The legislature, which meets biennially at Honolulu, consists of a Senate of 15 members holding office for four years, and a House of Representatives of 30 members holding office for two years. In order to vote for Representatives or Senators, the elector must be a male citizen of the United States who has attained the age of twenty-one years, has lived in the Territory not less than one year preceding, and is able to speak, read and write the English or Hawaiian language. No person is allowed to vote by reason of being in or attached to the army or navy. The executive power is vested in a governor, appointed by the president and holding office for four years. He must not be less than thirty-five years of age and must be a citizen of the Territory. The secretary of the Territory is appointed in like manner for a term of the same length. The governor appoints, by and with the consent of the Senate of the Territory, an attorney-general, treasurer, commissioner of public lands, commissioner of agriculture and forestry, superintendent of public works, superintendent of public instruction, commissioners of public instruction, auditor and deputy-auditor, surveyor, high sheriff, members of the board of health, board of prison inspectors, board of registration, inspectors of election, &c. All such officers are appointed for four years except the com- missioners of public instruction and the members of the said

1 Large numbers of Japanese immigrants have used the Hawaiian Islands merely as a means of gaining admission at the mainland ports of the United States. For, as the Japanese government would issue only a limited number of passports to the mainland but would quite readily grant passports to Honolulu, the latter were accepted, and after a short stay on some one of the islands the im- migrants would depart on a ” coastwise ” voyage to some mainland port. The increasing numbers arriving by this means, however, provoked serious hostility in the Pacific coast states, especially in San Francisco, and to remedy the difficulty Congress inserted a clause in the general immigration act of the 20th of Februarv 1007 which provides that whenever the president is satisfied that passports issued by any foreign government to any other country than the United States, or to

any of its insular possessions, or to the Canal Zone, ” are being used for the purpose of enabling the holders to come to che continental territory of the United States to the detri- ment of labour conditions therein,” he may refuse to admit them. This provision has been successful in reducing the number of Japanese coming to the mainland from Hawaii.

boards, whose terms are as provided by the laws of the Territory ; all must be citizens of the Territory. The judicial power is vested in a supreme court, 5 circuit courts, and 29 district courts, each having a jurisdiction corresponding to similar courts in each state in the Union; and, entirely distinct from these territorial courts, Hawaii has a United States district court. A Supplementary Act of the 3rd of March 1905 provides that writs of error and appeals may be taken from the Supreme Court of Hawaii to the Supreme Court of the United States ” in all cases where the amount involved exclusive of costs or value exceeds the sum of five thousand dollars.” The Territory was without the forms of local government common to the United States until 1905, when the Territorial legislature divided it into five counties 1 without, however, giving to them the usual powers of taxation. Each county has the following officers: a board of supervisors, a clerk, a treasurer, an auditor, an assessor and tax-collector, a sheriff and coroner, and an attorney. The members (from five to nine) of the board of supervisors are elected by districts into which the county is divided, usually only one from each. All county officers are elected for a term of two years. The act of 1900 provides for the election of a delegate to Congress, and prescribes that the delegate shall have the qualifications necessary for membership in the Hawaiian Senate, and shall be elected by voters qualified to vote for members of the House of Representatives of Hawaii. As usual, the delegate has a right to take part in the debates in the national House of Representatives, but may not vote.

Charities. — The principal public charity of the Territory is the leper asylum on a peninsula almost 10 sq. m. in area on the N. side of the island of Molokai. A steep precipice forms a natural wall between it and the rest of the island. The place became an asylum for lepers and the caring for them began to be a charity under government charge in 1866; but conditions here were at first unspeakably unhygienic, their improvement being largely due to Father Damien, who devoted himself to this work in 1873. The patients are almost exclusively

native Hawaiians, and their number is slowly but steadily decreasing; in 1908 they numbered 791, and there were at Molokai 46 non-leprous helpers and 27 officers and assistants, including the Roman Catholic brothers and sisters in charge of the homes. In 1905 the United States government appropriated $100,000 for a hospital station and laboratory " for the study of the methods of transmission, cause and treatment of leprosy," and $50,000 a year for their maintenance; the station and laboratory to be established when the territorial government should have ceded to the United States a tract of 1 sq. m. on the leper reservation. The cession was made soon afterward by the territorial government. In 1907-1908 a home for non-leprous boys of leprous parents was established at Honolulu. Another public charity of Hawaii is the general free dispensary maintained by the territorial government at Honolulu.

Education. — Education is universal, compulsory and free. Every child between the ages of six and fifteen must attend either a public school or a duly authorized private school. Consequently the per- centage of illiteracy is extremely low. The school system is essenti- ally American in its text-books and in its methods, thanks to the foundations laid by American missionaries. Between 1820 and 1824 the missionaries taught about 2000 natives to read. Several im- portant schools were founded before 1840, when the first written laws were published. Among these was a law providing for com-

Culsory education, and decreeing that no illiterate born after the eginning of Liholiho's reign should hold office, and that no illiterate man or woman, born after the same date, could marry. The first Hawaiian minister of public instruction was the Rev. William Richards (1792-1847), who held office from 1843 to 1847, and was followed by Richard Armstrong (1805-1860), an American Presby- terian missionary, the father of General S. C. Armstrong. He laid stress on the importance of manual and industrial training during his term of office (1847-1855), and was succeeded by a board of education (1855-1865), of which he was first president; then an inspector-general of schools was appointed, Judge Abraham For- nander being the first inspector; in 1896 an executive department was created under a minister of public instruction and six com-

1 These are : the county of Hawaii, consisting of the island of the same name; the county of Maui, including the islands of Maui, Lanai and Kahoolawe, and the greater part of Molokai ; the county of Kalawao, being the leper settlement on Molokai; the city and county of Honolulu (created from the former county of Oahu by an act of 1907, which came into effect in 1909), consisting of the island of Oahu and

various small islands, of which the only ones of any importance are the Midway Islands, 1232 m. from Honolulu, a Pacific cable relay station and a post of the U.S. navy marines; and the county of Kauai, including Kauai and Niihau islands.

missioners; in 1900 a superintendent of public instruction was first appointed. English is by law the medium of instruction in all schools, both public and private, although other languages may be taught in addition. Formal instruction in Hawaiian ceased in 1898. The schools are in session forty weeks during the year. In 1908 there were 154 public schools with 18,564 pupils (27-06% of whom were Japanese, 20-89% Hawaiian, 13-54% part Hawaiian, 18-72% Portuguese and 10-63% Chinese) and 51 private schools with 4881 pupils. A normal school has been established at Honolulu, with a practice school attached to it. The territorial legislature of 1907 established the College of Agriculture and Mechanic Arts of the Territory of Hawaii, and also founded a public library. The Hono- lulu high school does excellent work and has beautiful buildings and grounds. The Lahainaluna Seminary on west Maui, founded in 1 83 1 as a training school for teachers, furnishes instruction to Hawaiian boys in agriculture, carpentry, printing and mechanical drawing. The boys in the industrial school (1902) at Waialee, on the island of Oahu, are taught useful trades. The teaching of sewing in the public schools has met with great success, and a simple form of the Swedish sloid was introduced into many of the schools in 1894. Lace work was introduced into the public schools in 1903. But the best industrial instruction is furnished by the independent schools, among which the Kamehameha schools take the first place. They were founded by Mrs Bernice Pauahi Bishop (1831-1884), the last lineal descendant of Kamehameha I., who left her extensive landed estates in the hands of trustees for their support. They furnish a good manual and technical training to Hawaiian boys and girls, in addition to a primary and grammar school course of study, and exert a strong religious influence. There are six boarding schools for Hawaiian girls, supported by private resources. The most advanced courses of study are offered by Oahu College, which occupies a beautiful site near the beach just E. of Honolulu; it was founded in 1841 as the Punahou School for missionaries' children, and was chartered as Oahu College in 1852. It is well equipped with build- ings and apparatus, and iias an endowment of about $300,000.

Finance. — -The revenue of the Territory for the fiscal year ending the 30th of June 1908 amounted to $2,669,748-32, of which $640,051-42 was the proceeds of the tax on real estate, $635,265-81 was the proceeds of the tax on personal property; and among the larger of the

remaining items were the income tax ($266,241-74), waterworks ($141,898-04), public lands (sales, $37,585-75; revenue, $122,541-71) and licences ($206,374-28). On the 30th of June 1908 the bonded debt of the Territory was $3,979,000 ; there was on hand net cash, without floating debt, $677,648-48.

History. — The history of the islands before their discovery by Captain James Cook, in 1778, is obscure. 2 This famous navigator, who named the islands in honour of the earl of Sand— wich, was received by the natives with many demonstrations of astonishment and delight; and offerings and prayers were presented to him by their priest in one of the temples; and though in the following year he was killed by a native when he landed in Kealakekua Bay in Hawaii, his bones were preserved by the priests and continued to receive offerings and homage from the people until the abolition of idolatry. At the time of Cook's visit the archipelago seems to have been divided into three distinct kingdoms: Hawaii; Oahu and Maui; and Lanai and Molokai. On the death of the chief who ruled Hawaii at that time there succeeded one named Kamehameha (1736-1819), who appears to have been a man of quick perception and great force of character. When Vancouver visited the islands in 1792, he left sheep and neat cattle, 3 protected by a ten years' taboo, and laid down the keel of a European ship for Kamehameha. Ten or twelve years later Kamehameha had 20 vessels (of 25 to 50 tons), which traded among the islands. He afterwards purchased others from foreigners. Having encouraged a warlike spirit in his people and having introduced firearms, Kamehameha attacked and overcame the chiefs of the other kingdoms one after another, until (in 1795) he became undisputed master of the whole group. He made John Young (c. 1775-1835) and Isaac Dayis, Americans from one of the ships of Captain Metcalf which visited the island in 1789, his advisers, encouraged trade with foreigners,

2 Their discovery in the 16th century (in 1542 or 1555 by Juan Gaetan, or in 1528 when two of the vessels of Alvaro de Saavedra were shipwrecked here and the captain of one, with his sister, survived and intermarried with the natives) seems probable, because there are traces of Spanish customs in the islands; and they are marked in their correct latitude on an English chart of 1687, which is apparently based on Spanish maps; a later Spanish chart (1743) gives a group of islands io° E. of the true position of the Hawaiian Islands.

8 The first horses were left by Captain R. J. Cleveland in 1803.

and derived from its profits a large increase of revenue as well as the means of consolidating his power. He died in 1819, and was succeeded by his son, Lilohilo, or Kamehameha II., a mild and well-disposed prince, but destitute of his father's energy. One of the first acts of Kamehameha II. was, for vicious and selfish reasons, to abolish taboo and idolatry throughout the islands. Some disturbances were caused thereby, but the insurgents were defeated.

On the 31st of March 1820 missionaries of the American Board of Commissioners for Foreign Missions — two clergymen, two teachers, a physician, a farmer, and a printer, each with his wife — and three Hawaiians educated in the Cornwall (Con- necticut) Foreign Missionary School, arrived from America and began their labours at Honolulu. A short time afterwards the British government presented a small schooner to the king, and this afforded an opportunity for the Rev. William Ellis, the well-known missionary, to visit Honolulu with a number of Christian natives from the Society Islands. Finding the language of the two groups nearly the same, Mr Ellis, who had spent several years in the southern islands, was able to assist the American missionaries in reducing the Hawaiian language to a written form. In 1825 the ten commandments were recog- nized by the king as the basis of a code of laws. In the years 1 830-1 84 5 the educational work of the American missionaries was so successful that hardly a native was unable to read and write. A law prohibiting drunkenness (1835) was followed in 1838 by a licence law and in 1839 by a law prohibiting the importation of spirits and taxing wines fifty cents a gallon; in 1840 another prohibitory law was enacted; but licence laws soon made the sale of liquor common. Missionary effort was particularly fruitful in Hilo, where Titus Coan (1801-1882), sent out in 1835 by the American Board of Commissioners for Foreign Missions, worked in repeated revivals, induced most of his church members to give up tobacco even, and received prior to 18S0 more than 12,000 members into a church which became self-supporting and sent missions to the Gilbert Islands and the Marquesas. In 1823 Keopuolani, the king's mother, was baptized; and on a single Sunday in 1838 Coan baptized 1705 converts at Hilo. In 1S64 the American Board withdrew its control of evangelical work.

In 1824 the king and queen of the Hawaiian Islands paid a visit to England, and both died there of measles. His successor, Kamehameha III. ruled from 1823 to 1854. In 1830 Kame- hameha III. signed a Bill of Rights and in 1840 he promulgated the first constitution of the realm; in 1842 a code of laws was proclaimed; by 1848 the feudal

system of land tenure was completely abolished; the first legislature met in 1845 and full suffrage was granted in 1852, but in 1864 suffrage was restricted. Progress was at times interrupted by the conduct of the officers of foreign powers. On one occasion (July 1839) French officers abrogated the laws (particularly against the importation of liquor), dictated treaties, extorted $20,000 and by force of arms procured privileges for Roman Catholic J priests in the country; and at another time (February r843) a British officer, Captain Paulet of the " Carysfort," went so far as to take possession of Oahu and establish a commission for its government. The act of the British officer was disavowed by his superiors as soon as known.

These incidents led to a representation on the part of the native sovereign to the governments of Great Britain, France and the United States, and the independence of the islands (recognized by the United States in 1842) was recognized in 1844 by France and Great Britain. In 1844 John Ricord, an American lawyer, became the first minister of foreign affairs. A new constitution came into effect in 1852. It was the aim of Kamehameha III. and his advisers to combine the native and the foreign elements under one government; to make the king the sovereign not of one race or class, but of all; and to extend equal and impartial laws over all inhabitants of the

1 The first Roman Catholic priests came in 1827 and were banished in 1831, but returned in 1837. An edict of toleration in 1839 shortly preceded the visit of the " Artemise."

country. Kamehameha IV. and his queen, Emma, ruled from 1855 to 1863 and were succeeded by his brother, Kamehameha V., who died in 1872, and in whose reign a third (and a re- actionary) constitution went into effect in 1864, by mere royal proclamation. Lunalilo, a grandson of Kamehameha I., was king for two years, and in 1874, backed by American influence, Kalakaua was elected his successor, in preference to Queen Emma, a member of the Anglican Church and the candidate of the pro-British party. Kalakaua considered residents of European or American descent as alien invaders, and he aimed to restore largely the ancient system of personal government, under which he should have control of the public treasury. On the 2nd of July 1878, and again on the 14th of August 1880, he dismissed a ministry without assigning any reason, after it had been triumphantly sustained by a test vote of the legis- lature. On the latter occasion he appointed C. C. Moreno, who had come to Honolulu in the interest of a Chinese steam- ship company, as Premier and minister of foreign affairs. This called forth the protest of the representatives of Great Britain, France and the United States, and aroused such opposition on

the part of both the foreigners and the better class of natives that the king was obliged, after four days of popular excitement, to remove the obnoxious minister. During the king's absence on a tour round the world in 1881, his sister, Mrs Lydia Dominis (b. 1838), also styled Liliuokalani, acted as regent. After his return the contest was renewed between the so-called National party, which favoured absolution, and the Reform party, which sought to establish parliamentary government. The king took an active part in the elections, and used his patronage to the utmost to influence legislation. For three successive sessions a majority of the legislature was composed of office-holders, dependent on the favour of the executive. Among the measures urged by the king and opposed by the Reform party were the project of a ten-million dollar loan, chiefly for military purposes; the removal of the prohibition of the sale of alcoholic liquor to Hawaiians, which was carried in 1882; the licensing of the sale of opium; the chartering of a lottery company; the licensing of kahunas, or medicine men, &c. Systematic efforts were made to turn the constitutional question into a race issue, and the party cry was raised of " Hawaii for Hawaiians." Adroit politicians flattered the king's vanity, defended his follies and taught him how to violate the spirit of the constitution while keeping the letter of the law. From 1882 till 1887 his prime minister was Walter Murray Gibson (T823-1888), a singular and romantic genius, a visionary adventurer and a shrewd politician, who had been imprisoned by the Dutch government in Batavia in 1852 on a charge of inciting insurrection in Sumatra, and had arrived at Honolulu in 1861 with the intention of leading a Mormon colony to the East Indies. To exalt his royal dignity, which was lowered, he thought, by his being only an elected king, Kalakaua caused himself to be crowned with imposing ceremonies on the ninth anniversary of his election (Feb. 12,

1883).

Kalakaua was now no longer satisfied with being merely king of Hawaii, but aspired to what was termed the " Primacy of the Pacific." Accordingly Mr Gibson addressed a protest to the great powers, deprecating any further annexation of the islands of the Pacific Ocean, and claiming for Hawaii the ex- clusive right " to assist them in improving their political and social condition." In pursuance of this policy, two commissioners were sent to the Gilbert Islands in 1883 to prepare the way for a Hawaiian protectorate. On the 23rd of December 1886 Mr J. E. Bush was commissioned as minister plenipotentiary to the king of Samoa, the king of Tonga and the other independent chiefs of Polynesia. He arrived in Samoa on the 3rd of January 1887, and remained there six months, during which time he

concluded a treaty of alliance with Malietoa, which was ratified by his government. The ” Explorer,” a steamer of 170 tons, which had been employed in the copra trade, was purchased for $20,000, and refitted as a man-of-war, to form the ” nest-egg ” of the future Hawaiian navy. She was renamed the ” Kaim- iloa,” and was despatched to Samoa on the 17th of May 1887

to strengthen the hands of the embassy. As R. L. Stevenson wrote: ” The history of the ‘ Kaimiloa ‘ is a story of debauchery, mutiny and waste of government property.” At length the intrigues of the Hawaiian embassy gave umbrage to the German government, and it was deemed prudent to recall it to Honolulu in July 1887. Meanwhile a reform league had been formed to stop the prevailing misrule and extravagance; it was supported by a volunteer military force, the ” Honolulu Rifles.” The king carried through the legislature of 1886 a bill for an opium licence, as well as a Loan Act, under which a million dollars were borrowed in London. Under his influence the Hale Naua Society was organized in 1886 for the spread of idolatry and king-worship; and in the same year a “Board of Health” was formed which revived the vicious practices of the kahunas or medicine-men.

The king’s acceptance of two bribes — one of $75,000 and another of $80,000 for the assignment of an opium licence — precipitated the revolution of 1887. An immense mass meeting was held on the 30th of June, which sent a committee to the king with specific demands for radical reforms. Finding himself without support, he yielded without a struggle, dismissed his ministry and signed a constitution on the 7th of July 1887, revising that of 1864, and intended to put an end to personal government and to make the cabinet responsible only to the legislature; this was called the ” bayonet constitution,” because it was so largely the result of the show of force made by the Honolulu Rifles. By its terms office-holders were made ineligible for seats in the legislature, and no member of the legislature could be appointed to any civil office under the government during the term for which he had been elected. The members of the Upper House, instead of being appointed by the king tor life, were henceforth to be elected for terms of six years by electors possessing a moderate property qualification. The remainder of Kalakaua’s reign teemed with intrigues and conspiracies to restore autocratic rule. One of these came to a head on the 30th of July 1889, but this ” Wilcox rebellion,” led by R. W. Wilcox, a half-breed, educated in Italy, and a friend of the king and of

his sister, was promptly suppressed. Seven of the insurgents were killed and a large number wounded. For his health the king visited California in the United States cruiser ” Charleston ” in November 1890, and died on the 20th of January 1891 in San Francisco. On the 29th of January at noon his sister, the regent, took the oath to maintain the constitution of 1887, and was proclaimed queen, under the title of Liliuokalani.

The history of her reign shows that it was her constant purpose to restore autocratic government. The legislative session of 1892, during which four changes of ministry took place, was protracted to eight months chiefly by her determination to carry through the opium and lottery bills and to have a pliable cabinet. She had a new constitution drawn up, practically providing for an absolute monarchy, and disfranchising a large class of citizens who had voted since 1887; this constitution (drawn up, so the royal party declared, in reply to a petition signed by thousands of natives) she undertook to force on the country after proroguing the legislature on the 14th of January 1803, but her ministers shrank from the responsibility of so revolutionary an act, and with difficulty prevailed upon her to postpone the execution of her design. An uprising similar to that of 1887 declared the monarchy forfeited by its own act. A third party proposed a regency during the minority of the heir-apparent, Princess Kaiulani, but in her absence this scheme found few supporters. A Committee of Safety was appointed at a public meeting, which formed a provisional government and reorganized the volunteer military companies, which had been disbanded in 1890. Its leading spirits were the “Sons of Missionaries ” (as E. L. Godkin styled them), who were accused of using their knowledge of local affairs and their inherited prestige among the natives for private ends — of founding a ” Gospel Republic ” which was actually a business enterprise. The provisional government called a mass meeting of citizens, which met on the afternoon of the 6th and ratified its action.

The United States steamer ” Boston,” which had unexpectedly arrived from Hilo on the 14th, landed a small force on the evening of the 16th, at the request of the United States minister, Mr J. L. Stevens, and a committee of residents, to protect the lives and property of American citizens in case of riot or in- cendiarism. On the 17th the Committee of Safety took possession of the government building, and issued a proclamation declaring a monarchy to be abrogated, and establishing a provisional government, to exist ” until terms of union with the United States of America shall have been negotiated and agreed upon.” Meanwhile two companies of volunteer troops arrived and occupied the grounds. By the advice of her ministers, and to avoid

bloodshed, the queen surrendered under protest, in view of the landing of United States troops, appealing to the govern- ment of the United States to reinstate her in authority. A treaty of annexation was negotiated with the United States during the next month, just before the close of President Benjamin Harrison's administration, but it was withdrawn on the 9th of March 1893 by President Harrison's successor, President Cleveland, who then despatched James H. Blount 1837-1903) of Macon, Georgia, as commissioner paramount, to investigate the situation in the Hawaiian Islands. On receiving Blount's report to the effect that the revolution had been accomplished by the aid of the United States minister and by the landing of troops from the " Boston," President Cleveland sent Albert Sydney Willis (1843-1897) of Kentucky to Honolulu with secret instructions as United States minister. Willis with much difficulty and delay obtained the queen's promise to grant an amnesty, and made a formal demand on the provisional government for her reinstatement on the 19th of December 1893. On the 23rd President Sanford B. Dole sent a reply to Willis, declining to surrender the authority of the provisional government to the deposed queen. The United States Congress declared against any further intervention by adopting on the 3 1st of May 1894 the Turpie Resolution. On the 30th of May 1894 a convention was held to frame a constitution for the republic of Hawaii, which was proclaimed on the 4th of July following, with S. B. Dole as its first president. Toward the end of the same year a plot was formed to overthrow the republic and to restore the monarchy. A cargo of arms and ammunition from San Francisco was secretly landed at a point near Honolulu, where a company of native royalists were collected on the 6th of January 1895, intending to capture the government buildings by surprise that night, with the aid of their allies in the city. A premature encounter with a squad of police alarmed the town and broke up their plans. There were several other skirmishes during the following week, resulting in the capture of the leading conspirators, with most of their followers. The ex-queen, on whose premises arms and am- munition and a number of incriminating documents were found, was arrested and was imprisoned for nine months in the former palace. On the 24th of January 1895 she formally renounced all claim to the throne and took the oath of allegiance to the republic. The ex-queen and forty-eight others were granted conditional pardon on the 7th of September, and on the following New Year's Day the remaining prisoners were set at liberty.

On the inauguration of President McKinlcy, in March 1897, negotiations with the United States were resumed, and on the 16th of

June a new treaty of annexation was signed at Washington. As its ratification by the Senate had appeared to be uncertain, extreme measures were taken: the Newlands joint resolution, by which the cession was “accepted, ratified and confirmed,” was passed by the Senate by a vote of 42 to 21 and by the House of Representatives by a vote of 209 to 91, and was signed by the president on the 7th of July 1898. The formal transfer of sovereignty took place on the 12th of August 1898, when the flag of the United States (the same flag hauled down by order of Commissioner Blount) was raised over the Executive Building with impressive ceremonies.

The sovereigns of the monarchy, the president of the republic and the governors of the Territory up to 19 10 were as follows:

Sovereigns: Kamehameha I., 1795-1819; Kamehameha II., 1819-1824; Kaahumanu (regent), 1824-1832; Kamehameha III., 1832-1854; Kamehameha IV., 1855-1863; Kamehameha V., 1863-187 2; Lunalilo, 1873-1874; Kalakaua, 1874-1891; Liliuokalani, 1891-1893. President: Sanford B. Dole, 1893- 1898. Governors: S. B. Dole, 1898-1904; George R. Carter, 1904-1907; W. F. Frear, 1907.

Authorities. — Consult the bibliography in Adolf Marcuse, Die hawaiischen Inseln (Berlin, 1894); A. P. C. Griffen, List of Books relating to Hawaii (Washington, 1898); C. E. Dutton, Hawaiian Volcanoes, in the fourth annual report of the United States Geological Survev (Washington, 1884); J. D. Dana, Characteristics of Volcanoes ■aith Contribution of Facts and Principles from the. Hawaiian Islands (New York, 1890); W. H. Pickering, Lunar and Hawaiian Physical Features compared (1906) ; C. H. Hitchcock, Hawaii and its Volcanoes (Honolulu, 1909) ; Augustin Kramer, Hawaii, Ostmikronesien und Samoa (Stuttgart, 1906); Sharp, Fauna (London, 1899); Walter Maxwell, Lavas and Soils of the Hawaiian Islands (Honolulu, 1898); W. Hillcbrand, Flora of the Hawaiian Islands (London, 1888); G. P. Wilder, Fruits of the Hawaiian Islands (3 vols., Honolulu, 1907); H. W. Henshaw, Birds of the Hawaiian Islands (Washington, 1902) ; A. Fornandcr, Account of the Poly- nesian Race and the Ancient History of the Hawaiian People to the Times of Kamehameha I. (3 vols., London, 1878-1885); W. D. Alexander, A Brief History of the Hawaiian People (New York, 1899); C. H. Forbes-Lindsay, American Insular Possessions (Phila- delphia, 1906); Jose de Olivares, Our Islands and their People (New York, 1899); J. A. Owen, Story of

Hawaii (London, 1898); E. J. Carpenter, America in Hawaii (Boston, 1899); W. F. Blackman, The Making of Hawaii, a Study in Social Evolution (New York, 1899), with bibliography; T. G. Thrum, Hawaiian Almanac and Annual (Honolulu); Lucien Young, The Real Hawaii (New York, 1899), written by a lieutenant of the " Boston," an ardent defender of Stevens; Liliuokalani, Hawaii's Story (Boston, 1898); C. T. Rodgers, Education in the Hawaiian Islands (Honolulu, 1897); Henry E. Chambers, Constitutional History of Hawaii (Baltimore, 1896), in Johns Hopkins University Studies; W. Ellis, Tour Around Hawaii (London, 1829); J. J. Jarves, History of the Sandwich Islands (Honolulu, 1847); H. Bingham, A Residence of Twenty-one Years in the Sandwich Islands (Hartford, 1848); Isabella Bird, Six Months in the Sandwich Islands (New York, 1881); Adolf Bastian, Zur Kenntnis Hawaiis (Berlin, 1883) ; the annual Reports of the governor of Hawaii, of the Hawaii Agricultural Experiment Station, of the Hawaiian Sugar Planters' Experiment Station, of the Board of Commissioners on Agriculture and Forestry, and of the Hawaii Promotion Committee; and the Papers of the Hawaiian Historical Society.

HAWARDEN (pronounced Harden, Welsh Penarldg), a market-town of Flintshire, North Wales, 6 m. W. of Chester, on a height commanding an extensive prospect, connected by a branch with the London & North-Western railway. Pop. (1901), 5372. It lies in a coal district, with clay beds near. Coarse earthenware, draining tiles and fire-clay bricks are the chief manufactures. The Maudes take the title of viscount from the town. Hawarden castle — built in 1752, added to and altered in the Gothic style in 181 4 — stands in a fine wooded park near the old castle of the same name, which William the Conqueror gave to his nephew, Hugh Lupus. It was taken in 1282 by Dafyckl, brother of Llewelyn, prince of Wales, destroyed by the Parliamentarians in the Civil War, and came into the possession of Sergeant Glynne, lord chief justice of England under Cromwell. The last baronet, Sir Stephen R. Glynne, dying in 1S74, Castell Penarlag passed to his brother-in-law, William Ewart Gladstone. St Deiniol church, early English, was restored in 1857 and 1878. There are also a grammar school (1606). a Gladstone golden-wedding fountain (1889), and St Deiniol's Hostel (with accommodation for students and an Anglican clerical warden) ; west of the church, on Truman's hill, is an old British camp.

HAWAWIR (Hauhauin), an African tribe of Semitic origin, dwelling in the Bayuda desert, Anglo-Egyptian Sudan. They are found along the road from Debba to Khartum as far as Bir Gamr, and from Ambigol to Wadi Bishara. They have adopted none of the negro customs, such as

gashing the cheeks or elaborate hairdressing. They own large herds of oxen, sheep and camels.

HAWEIS, HUGH REGINALD (1838-1901), English preacher and writer, was born at Egham, Surrey, on the 3rd of April 183S. On leaving Trinity College, Cambridge, he travelled in

Italy and served under Garibaldi in i860. On his return to England he was ordained and held various curacies in London, becoming in 1866 incumbent of St James's, Marylebone. His unconventional methods of conducting the service, combined with his dwarfish figure and lively manner, soon attracted crowded congregations. He married Miss M. E. Joy in 1866, and both he and Mrs Haweis (d. 1898) contributed largely to periodical literature and travelled a good deal abroad. Haweis was Lowell lecturer at Boston, U.S.A., in 1885, and represented the Anglican Church at the Chicago Parliament of Religions in 1893. He was much interested in music, and wrote books on violins and church bells, besides contributing an article to the 9th edition of the Encyclopaedia Briiannica on bell-ringing. His best-known book was Music and Morals (3rd ed., 1873); and for a time he was editor of Cassell's Magazine. He also wrote five volumes on Christ and Christianity (a popular church history, 1886-1887). Other writings include Travel and Talk (1896), and similar chatty and entertaining books. He died on the 29th of January 1901.

HAWES, STEPHEN (fl. 1502-1521), English poet, was probably a native of Suffolk, and, if his own statement of his age may be trusted, was born about 1474. He was educated at . Oxford, and travelled in England, Scotland and France. On his return his various accomplishments, especially his " most excellent vein " in poetry, procured him a place at court, He was groom of the chamber to Henry VII. as early as 1502. He could repeat by heart the works of most of the English poets, especially the poems of John Lydgate, whom he called his master. He was still living in 1521, when it is stated in Henry VIII. 's household accounts that £6, 13s. 4d. was paid " to Mr Hawes for his play," and he died before 1530, when Thomas Field, in his " Conversation between a Lover and a Jay," wrote " Yong Steven Hawse, whose soule God pardon, Treated of love so clerkly and well." His capital work is The Passetyme of Pleasure, or the History of Graunde Amour and la Bel Pucel, conteining the knowledge of the Seven Sciences and the Course of Man's Life in this Worlde, printed by Wynkyn de W'orde, 1509, but finished three years earlier. It was also printed with slightly varying titles by the same printer in 1517, by J. Way land in 1554, by Richard Tottel and by John Waley in 1555. Tottel's edition was edited by T. Wright and reprinted by the Percy

Society in 1845. The poem is a long allegory in seven-lined stanzas of man's life in this world. It is divided into sections after the manner of the Morte Arthur and borrows the machinery of romance. Its main motive is the education of the knight, Graunde Amour, based, according to Mr W. J. Courthope {Hist, of Eng. Poetry, vol. i. 382), on the Marriage of Mercury and Philology, by Martianus Capella, and the details of the description prove Hawes to have been well acquainted with medieval systems of philosophy. At the suggestion of Fame, and accompanied by her two greyhounds, Grace and Governance, Graunde Amour starts out in quest of La Bel Pucel. He first visits the Tower of Doctrine or Science where he acquaints himself with the arts of grammar, logic, rhetoric and arithmetic. After a long dis- putation with the lady in the Tower of Music he returns to his studies, and after sojourns at the Tower of Geometry, the Tower of Doctrine, the Castle of Chivalry, &c, he arrives at the Castle of La Bel Pucel, where he is met by Peace, Mercy, Justice, Reason and Memory. His happy marriage does not end the story, which goes on to tell of the oncoming of Age, with the concomitant evils of Avarice and Cunning. The admonition of Death brings Contrition and Conscience, and it is only when Remembraunce has delivered an epitaph chiefly dealing with the Seven Deadly Sins, and Fame has enrolled Graunde Amour's name with the knights of antiquity, that we are allowed to part with the hero. This long imaginative poem was widely read and esteemed, and certainly exercised an influence on the genius of Spenser.

The remaining works of Hawes are all ol them bibliographical rarities. The Conversyon of Swerers (1509) and A Joy full Medy- tncyon to all Englonde, a coronation poem (1509), was edited by David Laing for the Abbotsford Club (Edinburgh, 1865). A

Compendyous Story . . . called the Example of Vertu (pr. 1512) and the Comfort of Lovers (not dated) complete the list of his extant work.

See also G. Saintsbury, The Flourishing of Romance and the Rise of Allegory (Edin. and Lond., 1897) ; the same writer's Hist, of English Prosody (vol. i. 1906); and an article by W. Murison in the Cambridge History of English Literature (vol. ii. 1908).

HAWES, WILLIAM (1785-1846), English musician, was born in London in 1785, and was for eight years (1793-1801) a chorister of the Chapel Royal, where he studied music chiefly under Dr Ayrtoa. He

subsequently held various musical posts, being in 18 1 7 appointed master of the children of the Chapel Royal. He also carried on the business of a music publisher, and was for many years musical director of the Lyceum theatre, then devoted to English opera. In the last-named capacity (July 23rd, 1824), he introduced Weber's Der Freischiitz for the first time in England, at first slightly curtailed, but soon afterwards in its entirety. Winter's Interrupted Sacrifice, Mozart's Cosi fan tutte, Marschner's Vampyre and other important works were also brought out urider his auspices. Hawes also wrote or compiled the music for numerous pieces. Better were his glees and madrigals, of which he published several collections. He also superintended a new edition of the celebrated Triumph of Oriana. He died on the 18th of February 1846.

HAWFINCH, a bird so called from the belief that the fruit of the hawthorn {Crataegus Oxyacantha) forms its chief food, the Loxia coccothraustes of Linnaeus, and the Coccothraustes vulgaris of modern ornithologists, one of the largest of the finch family (Fringillidae), and found over nearly the whole of Europe, in Africa north of the Atlas and in Asia from Palestine to Japan. It was formerly thought to be only an autumnal or winter- visitor to Britain, but later experience has proved that, though there may very likely be an immigration in the fall of the year, it breeds in nearly all the English counties to Yorkshire, and abundantly in those nearest to London. In coloration it bears some resemblance to a chaffinch, but its much larger size and enormous beak make it easily recognizable, while on closer inspection the singular bull-hook form of some of its wing-feathers will be found to be very remarkable. Though not uncommonly frequenting gardens and orchards, in which as well as in woods it builds its nest, it is exceedingly shy in its habits, so as seldom to afford opportunities for observation. (A. N.)

HAWICK, a municipal and police burgh of Roxburghshire, Scotland. Pop. (1891), 19,204; (1901), 1.7,303. It is situated at the confluence of the Slitrig (which flows through the town) with the Teviot, 10 m. S.W. of Jedburgh by road and 52! m. S.E. of Edinburgh by the North British railway. The name has been derived from the O. Eng. heaih-wic, " the village on the flat meadow," or haga-wic, " the fenced-in dwelling," the Gadeni being supposed to have had a settlement at this spot. Hawick is a substantial and flourishing town, the prosperity of which dates from the beginning of the 19th century, its enterprise having won for it the designation of " The Glasgow of the Borders." The municipal buildings, which contain the free library and reading-room, stand on the site of the old town hall. The Buccleuch memorial hall, commemorating the 5th duke of Buccleuch, contains the Science

and Art Institute and a museum rich in exhibits illustrating Border history. The Academy furnishes both secondary and technical education. The only church of historical interest is that of St Mary's, the third of the name, built in 1763. The first church, believed to have been founded by St Cuthbert (d. 687), was succeeded by one dedicated in 1 214, which was the scene of the seizure of Sir Alexander Ramsay of Dalhousie in 1342 by Sir William Douglas. The modern Episcopal church of St Cuthbert was designed by Sir Gilbert Scott. The Moat or Moot hill at the south end of the town — an earthen mound ˆo ft. high and 300 ft. in circumference — is conjectured to have been the place where formerly the court of the manor met; though some authorities think it was a primitive form of fortification. The Baron's Tower, founded in 1 155 by the Lovels, lords of Branxholm and Hawick, and after- wards the residence of the Douglases of Drumlanrig, is said to have been the only building that was not burned down during

the raid of Thomas Radcliffe, 3rd earl of Sussex, in April 1570. At a later date it was the abode of Anne, duchess of Buccleuch and Monmouth, after the execution of her husband, James, duke of Monmouth in 1585, and finally became the Tower Hotel. Bridges across the Teviot connect Hawick with the suburb of Wilton, in which a public park has been laid out, and St Leonard's Park and race-course are situated on the Common, 2 m. S.W. The town is governed by a provost, bailies and council, and unites with Selkirk and Galashiels (together known as the Border burghs) to send a member to parliament. The leading industries are the manufacture of hosiery, established in 1771, and woollens, dating from 1830, including blankets, shepherd's plaiding and tweeds. There are, besides, tanneries, dye works, oil-works, saw-mills, iron-founding and engineering works, quarries and nursery gardens. The markets for live stock and grain are also important.

In 1537 Hawick received from Sir James Douglas of Drum- lanrig a charter which was confirmed by the infant Queen Mary in 1545, and remained in force until 1S61, when the corporation was reconstituted by act of parliament. Owing to its situation Hawick was often imperilled by Border warfare and maraud- ing freebooters. Sir Robert Umfraville (d. 1436), governor of Berwick, burned it about 141 7, and in 1562 the regent Moray had to suppress the lawless with a strong hand. Neither of the Jacobite risings aroused enthusiasm. In 171 5 the dis- contented Highlanders mutinied on the Common, 500 of them abandoning their cause, and in 1745 Prince Charles Edward's cavalry passed southward through the town. In 1514, the year after the battle of Hodden, in which the burghers had suffered severely, a number of

young men surprised an English force at Hornshole, a spot on the Teviot 2 m. below the town, routed them and bore away their flag. This event is celebrated every June in the ceremony of ” Riding the Common ” — in which a facsimile of the captured pennon is carried in procession to the accompaniment of a chorus ” Teribus, ye Teri Odin,” supposed to be an invocation to Thor and Odin — a survival of Northum- brian paganism. Two of the most eminent natives of the burgh were Dr Thomas Somerville (i74i-i83o),the historian, and James Wilson (1805-1860), founder of the Economist newspaper and the first financial member of the council for India.

Minto House, 5 m. N.E., is the seat of the earl of Minto. Denholm, about midway between Hawick and Jedburgh, was the birthplace of John Leyden the poet. The cottage in which Leyden was born is now the property of the Edinburgh Border Counties Association, and a monument to his memory has been erected in the centre of Denholm green. Cavers, nearer Hawick, was once the home of a branch of the Douglases, and it is said that in Cavers House are still preserved the pennon that was borne before the Douglas at the battle of Otterburn (Chevy Chase), and the gauntlets that were then taken from the Percy (1388). Two m. S.W. of Hawick is the massive peel of Goldielands — the ” watch-tower of Branxholm,” a well-preserved typical Border stronghold. One mile beyond it, occupying a commanding site on the left bank of the Teviot, stands Branxholm Castle, the Branksome Hall of The Lay of the Last Minstrel, once owned by the Lovels, but since the middle of the 15th century the property of the Scotts of Buccleuch, and up to 1756 the chief seat of the duke. It suffered repeatedly in English in- vasions and was destroyed in 1570. It was rebuilt next year, the peel, finished five years later, forming part of the modern mansion. About 3 m. W. of Hawick, finely situated on high ground above Harden Burn, a left-hand affluent of Borthwick Water, is Harden, the home of Walter Scott (1550-1629), an ancestor of the novelist.

HAWK (O. Eng. hafec or heafoc, a common Teutonic word, cf. Dutch havik, Ger. Habicht; the root is hob-, haf-, to hold, cf. Lat. accipiter, from capere), a word of somewhat indefinite meaning, being often used to signify all diurnal birds-of-prey which are neither vultures nor eagles, and again more exclusively for those of the remainder which are not buzzards, falcons, harriers or kites. Even with this restriction it is comprehensive enough, and will include more than a hundred species, which have been arrayed in genera varying in number from a dozen to above a score, according to the fancy of the systematizer. Speaking generally, hawks may be characterized by possessing compara- tively short wings and long legs, a bill which begins to

decurve directly from the cere (or soft bare skin that covers its base), I and has the cutting edges of its maxilla (or upper mandible)

sinuated 1 but never notched. To these may be added as characters, structurally perhaps of less value, but in other respects quite as important, that the sexes differ very greatly in size, that in most species the irides are yellow, deepening with age into orange or even red, and that the immature plumage is almost invariably more or less striped or mottled with heart

with which they are often classed. The differences between all the forms above named and the much larger number here unnamed are such as can be only appreciated by the specialist. The so-called ” sparrow-hawk ” of New Zealand (Hieracidca) does not belong to this group of birds at all, and by many authors has been deemed akin to the falcons. For hawking

shaped spots beneath, while that of the adults is generally much see Falconry.

(A. N.)

barred, though the old males have in many instances the breast and belly quite free from markings. Nearly all are of small or moderate size — the largest among them being the gos-hawk (q.v.) and its immediate allies, and the male of the smallest, Accipiter tinus, is not bigger than a song-thrush. They are all birds of great boldness in attacking a quarry, but if foiled in the first attempts they are apt to leave the pursuit. Thoroughly arboreal in their habits, they seek their prey, chiefly consisting of birds (though reptiles and small mammals are also taken), among trees or bushes, patiently waiting for a victim to shew

European Sparrow-Hawk (Male and Female).

itself, and gliding upon it when it appears to be unwary with a rapid swoop, clutching it in their talons, and bearing it away to eat it in some convenient spot.

Systematic ornithologists differ as to the groups into which the numerous forms known as hawks should be divided. There is at the outset a difference of opinion as to the scientific name which the

largest and best known of these groups should bear — some authors terming it Nisus, and others, who seem to have the most justice on their side, Accipiter. In Europe there are two species — first,.-!, nisus, the common sparrow-hawk, which has a wide distribution from Ireland to Japan, extending also to northern India, Egypt and Algeria, and secondly, A. brevipes (by some placed in the group Micronisus and by others called an Astur), which only appears in the south-east and the adjoining parts of Asia Minor and Persia. In North America the place of the former is taken by two very distinct species, a small one, A.fuscus, usually known in Canada and the United States as the sharp-shinned hawk, and Stanley's or Cooper's hawk, A. cooperi (by some placed in another genus, Cooperastur), which is larger and has not so northerly a range. In South America there are four or five more, including A. tinus, before mentioned as the smallest of all, while a species not much larger, A. minullus, together with several others of greater size, inhabits South Africa. Madagascar and its neighbouring islands have three or four species sufficiently distinct, and India has A. badlus. A good many more forms are found in south-eastern Asia, in the Indo-Malay Archipelago, and in Australia three or four species, of which A . cirrhoccplialus most nearly represents the sparrow-hawk of Europe and northern Asia, while A. radiatus and A. approximans show some affinity to the gos-hawks {Astur)

1 In one form, Nisoides, which on that account has been generically separated, they are said to be perfectly straight.

HAWKE, EDWARD HAWKE, Baron (1705-1781), British admiral, was the only son of Edward Hawke, a barrister. On his mother's side he was the nephew of Colonel Martin Bladen (1 680-1 746), a politician of some note, and was connected with the family of Fairfax. Edward Hawke entered the navy on the 20th of February 1720 and served the time required to qualify him to hold a lieutenant's commission on the North American and West Indian stations. Though he passed his examination on the 2nd of June 1725, he was not appointed to a ship to act in that rank till 1729, when he was named third lieutenant of the " Portland " in the Channel. The continuance of peace allowed him no opportunities of distinction, but he was fortunate in obtaining promotion as commander of the " Wolf " sloop in 1733, and as post captain of the " Flamborough " (20) in 1734. When war began with Spain in 1739, he served as captain of the " Portland " (50) in the West Indies. His ship was old and rotten. She nearly drowned her captain and crew, and was broken up after she was paid off in 1742. In the following year Hawke was appointed to the " Berwick " (70), a fine new vessel, and was attached to the Mediterranean fleet then under the command of Thomas Mathews. The " Berwick " was

manned badly, and suffered severely from sickness, but in the ill-managed battle of Toulon on the nth of January 1744 Hawke gained great dis- tinction by the spirit with which he fought his ship. The only prize taken by the British fleet, the Spanish ” Poder ” (74), surrendered to him, and though she was not kept by the admiral, Hawke was not in any degree to blame for the loss of the only trophy of the fight. His gallantry attracted the attention of the king. There is a story that he was dismissed the service for having left the line to engage the ” Poder,” and was restored by the king’s order. The legend grew not unnaturally out of the confusing series of courts martial which arose out of the battle, but it has no foundation. There is better reason to believe that when at a later period the Admiralty intended to pass over Hawke’s name in a promotion of admirals, the king, George II., did insist that he should not be put on the retired list.

He had no further chance of making his energy and ability known out of the ranks of his own profession, where they were fully realized, till 1747. In July of that year he attained flag rank, and was named second in command of the Channel fleet. Owing to the ill health of his superior he was sent in command of the fourteen ships detached to intercept a French convoy on its way to the West Indies. On the 14th of October 1747 he fell in with it in the Bay of Biscay. The French force, under M. Desher- biers de l’fitenduere, consisted of nine ships, which were, how- ever, on the average larger than Hawke’s. He attacked at once. The French admiral sent one of his liners to escort the merchant ships on their way to the West Indies, and with the other eight fought a very gallant action with the British squadron. Six of the eight French ships were taken. The French admiral did for a time succeed in saving the trading vessels under his charge, but most of them fell into the hands of the British cruisers in the West Indies. Hawke was made a knight of the Bath for this timely piece of service, a reward which cannot be said to have been lavish. ” .

In 1747 Hawke had been elected M.P. for Portsmouth, which he continued to represent for thirty years, though he can seldom have been in his place, and it does not appear that he often spoke. A seat in parliament was always valuable to a naval officer at that time, since it enabled him to be useful to ministers, and increased his chances of obtaining employment. Hawke had married a lady of fortune in Yorkshire, Catherine Brook, in 1737, and was able to meet the expenses entailed by a seat in parlia- ment, which were considerable at a time when votes were openly paid for by money down. In the interval between the war of

the Austrian Succession and the Seven Years' War, Hawke was almost always on active service. From 1748 till 1752 he was in command at home, and he rehoisted his flag in 1755 as admiral in command of the Western Squadron. Although war was not declared for some time, England and France were on very hostile terms, and conflicts between the officers of the two powers in America had already taken place. Neither government was scrupulous in abstaining from the use of force while peace was still nominally unbroken. Hawke was sent to sea to intercept a French squadron which bad been cruising near Gibraltar, but a restriction was put on the limits within which he might cruise, and he failed to meet the French. The fleet was much weakened by ill-health. In June 1756 the news of John Byng's retreat from Minorca reached England and aroused the utmost indigna- tion. Hawke was at once sent out to relieve him in the Mediter- ranean command, and to send him home for trial. He sailed in the "Antelope," carrying, as the wits of the day put it, "a cargo of courage " to supply deficiencies in that respect among the officers then in the Mediterranean. Minorca had fallen, from want of resources rather than the attacks of the French, before he could do anything for the assistance of the garrison of Fort St Philip. In winter he was recalled to England, and he reached home on the 14th of January 1757. On the 24th of February following he was promoted full admiral.

It is said, but on no very good authority, that he was not on good terms with Pitt (afterwards earl of Chatham), and it is certain that when Pitt's great ministry was formed in June 1757, he was not included in the Board of Admiralty. Yet as he was continued in command of important forces in the Channel, it is obvious that his great capacity was fully recognized. In the late summer of 1757 he was entrusted with the naval side of an expedition to the coast of France. These operations, which were scoffingly described at the time as breaking windows with guineas, were a favourite device of Pitt's for weakening the French and raising the confidence of the country. The expedition of 1757 was directed against Rochefort, and it effected nothing. Hawke, who probably expected very little geod from it, did his own work as admiral punctually, but he cannot be said to have shown zeal, or any wish to inspirit the military officers into making greater efforts than they were disposed naturally to make. The expedition returned to Spit- head by the 6th of October. No part of the disappointment of the public, which was acute, was visited on Hawke. During the end of 1757 and the beginning of 1758 he continued cruising in the Channel in search of the French naval forces, without any striking success. In May of that year he was ordered to detach a

squadron under the command of Howe to carry out further combined operations. Hawke considered himself as treated with a want of due respect, and was at the time in bad humour with the Admiralty. He somewhat pettishly threw up his command, but was induced to resume it by the board, which knew his value, and was not wanting in flattery. He re- tired in June for a time on the ground of health, but happily for his own glory and the service of the country he was able to hoist his flag in May 1759, the ” wonderful year ” of Garrick’s song.

France was then elaborating a scheme of invasion which bears much resemblance to the plan afterwards formed by Napoleon. An army of invasion was collected at the Morbihan in Brittany, and the intention was to transport it under the protection of a powerful fleet which was to be made up by uniting the squadron at Brest with the ships at Toulon. The plan, like Napoleon’s, had slight chance of success, since the naval part of the invading force must necessarily be brought together from distant points at the risk of interruption by the British squadrons. The naval forces of England were amply sufficient to provide what- ever was needed to upset the plans of the French government. But the country was not so confident in the capacity of the navy to serve as a defence as it was taught to be in later genera- tions. It had been seized by a most shameful panic at the beginning of the war in face of a mere threat of invasion. There- fore the anxiety of Pitt to baffle the schemes of the French

decisively was great, and the country looked on at the develop ment of the naval campaign with nervous attention. The proposed combination of the French fleet was defeated by the annihilation of the Toulon squadron on the coast of Portugal by Boscawen in May, but the Brest fleet was still untouched and the troops were still at Morbihan. It was the duty of Hawke to prevent attack from this quarter. The manner in which he discharged his task marks an epoch in the history of the navy. Until his time, or very nearly so, it was still believed that there was rashness in keeping the great ships out after September. Hawke maintained his blockade of Brest till far into November. Long cruises had always entailed much bad health on the crews, but by the care he took to obtain fresh food, and the energy he showed in pressing the Admiralty for stores, he was able to keep his men healthy. Early in November a series of severe gales forced him off the French coast, and he was compelled to anchor in Torbay. His absence was brief, but it allowed the French admiral, M. de Conflans (i6oo?-i777), time to put to sea, and to steer for the Morbihan. Hawke, who had left Torbay on the 13th of November, learnt of the departure of the French at sea on the 17th from a look-out ship, and as the French admiral could have done nothing but steer for the Morbihan,

he followed him thither. The news that M. de Conflans had got to sea spread a panic through the country, and for some days Hawke was the object of abuse of the most irrational kind. There was in fact no danger, for behind Hawke's fleet there were ample reserves in the straits of Dover, and in the North Sea. Following his enemy as fast as the bad weather, a mixture of calms and head winds would allow, the admiral sighted the French about 40 m. to the west of Belleisle on the morning of the 20th of November. The British fleet was of twenty-one sail, the French of twenty. There was also a small squadron of British ships engaged in watching the Morbihan as an inshore squadron, which was in danger of being cut off. M. de Conflans had a sufficient force to fight in the open sea without rashness, but after making a motion to give battle, he changed his mind and gave the signal to his fleet to steer for the anchorage at Quiberon. He did not believe that the British admiral would dare to follow him, for the coast is one of the most dangerous in the world, and the wind was blowing hard from the west and rising to a storm. Hawke, however, pursued without hesitation, though it was well on in the afternoon before he caught up the rear of the French fleet, and dark by the time the two fleets were in the bay. The action, which was more a test of seamanship than of gunnery, or capacity to manoeuvre in order, ended in the destruc- tion of the French. Five ships only were taken or destroyed, but others ran ashore, and the French navy as a whole lost all confidence. Two British vessels were lost, but the price was little to pay for such a victory. No more fighting remained to be done. The fleet in Quiberon Bay suffered from want of food, and its distress is recorded in the lines: —

" Ere Hawke did bang Mounseer Conflang

You sent us beef and beer; Now Mounseer's beat We've nought to eat,

Since you have nought to fear."

Hawke returned to England in January 1760 and had no further service at sea. He was not made a peer till the 20th of May 1776, and then only as Baron Hawke of Towton. From 1776 to i77r he was first lord of the Admiralty. His administra- tion was much criticized, perhaps more from party spirit than because of its real defects. Whatever his relations with Lord Chatham may have been he was no favourite with Chatham's partizans. It is very credible that, having spent all his life at sea, his faculty did not show in the uncongenial life of the shore. As an admiral at sea and on his own element Hawke has had no superior. It is true that he was not put to the test of having to meet opponents of equal strength and efficiency, but then neither has

any other British admiral since the Dutch wars of the 17th century. On his death on the 17th of October 1781 his title passed to his son, Martin Bladen (1744-1805), and it is

still held by his descendants, the 7th Baron (b. i860) being best known as a great Yorkshire cricketer.

There is a portrait of Hawke in the Painted Hall at Greenwich. His Life by Montagu Burrows (1883) has superseded all other authorities; it is supplemented in a few early particulars by Sir J. K. Laughton's article in the Diet. Nat. Biog. (1891).

HAWKER, ROBERT STEPHEN (1803-1874), English anti- quary and poet, was born at Stoke Damerel, Devonshire, on the 3rd of December 1803. His father, Jacob Stephen Hawker, was at that time a doctor, but afterwards curate and vicar of Stratton, Cornwall. Robert was sent to Liskeard grammar school, and when he was about sixteen was apprenticed to a solicitor. He was soon removed to Cheltenham grammar school, and in April 1823 matriculated at Pembroke College, Oxford. In the same year he married Charlotte I'Ans, a lady much older than himself. On returning to Oxford he migrated to Magdalen Hall, where he graduated in 1828, having already won the Newdigate prize for poetry in 1827. He became vicar of Morwenstow, a village on the north Cornish coast, in 1S34. Hawker described the bulk of his parishioners as a " mixed multitude of smugglers, wreckers and dissenters of various hues." He was himself a high churchman, and carried things with a high hand in his parish, but was much beloved by his people. He was a man of great originality, and numerous stories were told of his striking sayings and eccentric conduct. He was the original of Mortimer Collins's Canon Tremaine in Surd and Twenty. His first wife died in 1863, and in 1864 he married Pauline Kuczynski, daughter of a Polish exile. He died in Plymouth on the 15th of August 1875. Before his death he was formally received into the Roman Catholic Church, a proceeding which aroused a bitter newspaper controversy. The best of his poems is The Quest of the Sangraal: Chant the First ("Exeter, 1864). Among his Cornish Ballads (1869) the most famous is on " Trelawny," the refrain of which, " And shall Trelawny die," &c, he declared to be an old Cornish saying.

See The Vicar of Morwenstow (1875; later and corrected editions, I1S76 and 1886), by the Rev. S. Baring-Gould, which was severely

criticized by Hawker's friend, \V. Maskell, in the Athenaeum (March 26, 1876); Memorials of the late Robert Stephen Hawker (1876), by the late Dr F. G. Lee. These were superseded in 1905 by The Life and Letters of R. S. Hawker, by his son-in-law, C. fi. Byles, which contains a bibliography of his works, now very valuable to collectors. See also Boase and Courtney, Bibliolheca Cornubiensis. His Poetical Works (1879) and his Prose Works (1893) were edited by J. ('‚. Godwin. Another edition of his Poetical Works (1899) has a preface and bibliography by Alfred Wallis, and a complete edition of his poems by C. E. Byles, with the title Cornish Ballads and other Poems, appeared in 1904.

HAWKERS and PEDLARS, the designation of itinerant dealers who convey their goods from place to place to sell. The word " hawker " seems to have come into English from the tier. Hiikcr or Dutch heuker in the early 16th century. In an act of 1533 (25 Henry VIII. c. 9, § 6) we find " Sundry evill disposed persons which commonly beene called haukers . . . buying and selling of Brasse and Pewter." The earlier word for -urn an itinerant dealer is " huckster," which is found in t.'oo. " For that they have turned God's house infill hucksterсss bothe " (Ormulum. 15,817). The base of the two words is the same, and is probably to be referred to German hocken, to squat, crouch; cf. " hucklebone." the hip-bone; and the hawkers or hucksters were so called either because they stooped under I heir packs, or squatted at booths in markets, &c. Another derivation finds the origin in the Dutch hock, a hole, corner. It may be noticed that the termination of " huckster " is feminine; though there are examples of its application to women it was always applied indiscriminately to either sex.

" Pedlar " occurs much earlier than the verbal form " to peddle." which is therefore a derivative from the substantive. The origin is to be found in the still older word "pedder," one who carries about goods for sale in a " ped," a basket or hamper. This is now only used dialectically and in Scotland. In the Ancren Rhde (c. 1225), peoddare is found with the meaning of " pedlar," though the Promptorium parvulorum (c. 1440) defines it a> culathdsiits, i.e. a maker of panniers or baskets.

The French term for a hawker or pedlar of books, colporteur (col, neck, porter, to carry), has been adopted by the Bible Society and other English religious bodies as a name for itinerant vendors and distributors of Bibles and other religious literature.

The occupation of hawkers and pedlars has been regulated in the United Kingdom, and the two classes have also been technically

distinguished. The Pedlars Act 1871 defines a pedlar as ” any hawker, pedlar, petty chapman, tinker, caster of metals, mender of chairs, or other person who, without any horse or other beast bearing or drawing burden, travels and trades on foot and goes from town to town or to other men’s houses, carrying to sell or exposing for sale any goods, wares or merchandise … or selling or offering for sale his skill in handicraft.” Any person who acts as a pedlar must have a certificate, which is to be obtained from the chief officer of police of the police district. in which the person applying for the certificate has resided during one month previous to his application. Hl- must satisfy the officer that he is above seventeen years of age, is of good character, and in good faith intends to carry on the trade of a pedlar. The fee for a pedlar’s certificate is five shillings, and the certificate remains in force for a year from the date of issue. The act requires a register of certificates to be kept in each district, and imposes a penalty for the assigning, borrowing or forging of any certificate. It does not exempt any one from vagrant law, and requires the pedlar to show his certificate on demand to certain persons. It empowers the police to inspect a pedlar’s pack, and provides for the arrest of an uncertificated pedlar or one refusing to show his certificate. A pedlar’s certificate is not required by commercial travellers, sellers of vegetables, fish, fruit or victuals, or sellers in fairs. The Hawkers Act 1888 defines a hawker as ” any one who travels with a horse or other beast of burden, selling goods,” &c. An excise licence (expiring on the 31st of March in each year) must be taken out by every hawker in the United Kingdom. The duty imposed upon such licence is £2. A hawker’s licence is not granted, otherwise than by way of licence, except on production of a certificate signed by a clergyman and two householders of the parish or place wherein the applicant resides, or by a justice of the county or place, or a superintendent or inspector of police for the district, attesting that the person is of good character and a proper person to be licenced as a hawker. There are certain exemptions from taking out a licence — commercial travellers, sellers of fish, coal, &c, sellers in fairs, and the real worker or maker of any goods. The act also laj’s down certain provisions to be observed by hawkers and others, and imposes penalties for infringe- ments. In the United States hawkers and pedlars must take out licences under State laws and Federal laws.

HAWKESWORTH, JOHN (c. 1715-1773), English miscellaneous writer, was born in London about 171 5. He is said to have been clerk to an attorney, and was certainly self-educated. In 1744 he succeeded Samuel Johnson as compiler of the parliamentary debates for the Gentleman’s Magazine, and from 1746 to 1749 he contributed poems

signed Greville, or H. Greville, to that journal. In company with Johnson and others he started a periodical called Tlie Adventurer , which ran to 140 numbers, of which 70 were from the pen of Hawkesworth himself. On account of what was regarded as its powerful defence of morality and religion, Hawkesworth was rewarded by the archbishop of Canterbury with the degree of LL.D. In 1754-1755 he pub- lished an edition (r2 vols.) of Swift's works, with a life prefixed which Johnson praised in his Lives of the Poets. A larger edition (27 vols.) appeared in 1766-1779. He adapted Dryden's Amphitryon for the Drury Lane stage in 1756, and Southerne's Oronooko in 1759. He wrote the libretto of an oratorio Zimri in 1760, and the next year Edgar and Emmeline: a Fairy Tale, was produced at Drury Lane. His Almoran and Hamet (2 vols., 1 761! was first of all drafted as a play, and a tragedy founded on it by S. J. Pratt, The Fair Circassian (1781), met with some success. He was commissioned by the admiralty to edit Captain Cook's papers relative to his first voyage. For this work, An Account of the Voyages undertaken . . . for making discoveries in the Southern Hemisphere and performed by Commodore Byrone, Captain Wallis, Captain Carteret and Captain Cook (from 1764 to 1771) drawn up from the Journals … (3 vols., 1773), Hawkesworth is said to have received from the publishers the sum of £6000. His descriptions of the manners and customs of the South Seas were, however, regarded by many critics as inexact and hurtful to the interests of morality, and the severity of their strictures is said to have hastened his death, which took place on the i6lh of November 1773. He was buried

at Bromley. Kent, where he and his wife had kept a school. Hawkesworth was a close imitator of Johnson both in style and thought, and was at one time on very friendly terms with him. It is said that he presumed on his success, and lost Johnson's friendship as early as 1756.

HAWKHURST, a town in the southern parliamentary divi- sion of Kent, England, 47 m. S.E. of London, on a branch of the South-Eastern & Chatham railway. Pop. (1001), 3136. It lies mainly on a ridge above the valley of the Kent Ditch, a tributary of the Rother. The neighbouring country is hilly, rich and well wooded, and the pleasant and healthy situation has led to the considerable extension of the old village as a residential locality. The Kent Sanatorium and one of the Barnardo homes are established here. The church of St Lawrence,

founded from Battle Abbey in Sussex, is Decorated and Per- pendicular and its east window, of the earlier period, is specially beautiful.

HAWKINS, CAESAR HENRY (1798-1884), British surgeon, son of the Rev. E. Hawkins and grandson of the Sir Caesar Hawkins (1711-1786), who was serjeant-surgeon to Kings George II. and George III., was born at Bisley, Gloucestershire, on the 1 9th of September 1798, was educated at Christ's Hospital, and entered St George's Hospital, London, in 1818. He was surgeon to the hospital from 1829 to 1861, and in 1862 was made serjeant-surgeon to Queen Victoria. He was president of the College of Surgeons in 1852, and again in 1861; and he delivered the Hunterian oration in 1849. His success in complex surgical cases gave him a great reputation. For long he was noted as the only surgeon who had succeeded in the operation of ovariotomy in a London hospital. This occurred in 1846, when anaesthetics were unknown. He did much to popularize colotomy. A successful operator, he nevertheless was attached to conservative surgery, and was always more anxious to teach his pupils how to save a limb than how to remove it. He re- printed his contributions to the medical journals in two volumes, 1874, the more valuable papers being on Tumours, Excision of the Ovarium. Hydrophobia and Snake-biles, Stricture of the Colon, and Tlie Relative Claims of Sir Charles Bell and Magendie to the Discovery of the Functions of the Spinal Nerves. He died on the 20th of July 1884. His brother, Edward Hawkins (1789-1882), was the well-known provost of Oriel, Oxford, who played so great a part in the Tractarian movement.

HAWKINS, or Hawkyns, SIR JOHN (1532-1595), British admiral, was born at Plymouth in 1532, and belonged to a family of Devonshire shipowners and skippers — occupations then more closely connected than is now usual. His father, William Hawkins (d. 1553), was a prosperous freeman of Ply- mouth, who thrice represented that town in parliament, and is described by Hakluyt as one of the principal sea-captains in the west parts of England; his elder brother, also called William (d. 1589), was closely associated with him in his Spanish expedi- tions, and took an active part in fitting out ships to meet the Armada; and his nephew, the eldest son of the last named and of the same name, sailed with Sir Francis Drake to the South Sea in 1577, and served as lieutenant under Edward Fenton (q.v.) in the expedition which started for the East Indies and China in 1582. His son, Sir Richard Hawkins, is separately noticed.

Sir John Hawkins was bred to the sea in the ships of his family. When the great epoch of Elizabethan maritime adventure began, he took an active part by sailing to the Guinea coast, where he robbed the

Portuguese slavers, and then smuggled the negroes he had captured into the Spanish possessions in the New World. After a first successful voyage in 1562-1563, two vessels which he had rashly sent to Seville were confiscated by the Spanish government. With the help of friends, and the open approval of the queen, who hired one of her vessels to him, he sailed again in 1564, and repeated his voyage with success, trading with the Creoles by force when the officials of the king endeavoured to prevent him. These two voyages brought him reputation, and he was granted a coat of arms with a dcmi-Moor, or negro, chained, as his crest. The rivalry with Spain was now

becoming very acute, and when Hawkins sailed for the third time in 1567, he went in fact, though not technically, on a national venture. Again he kidnapped negroes, and forced his goods on the Spanish colonies. Encouraged by his discovery that these settlements were small and unfortified, he on this occasion ventured to enter Vera Cruz, the port of Mexico, after capturing some Spaniards at sea to be held as hostages. He alleged that he had been driven in by bad weather. The falsity of the story was glaring, but the Spanish officers on the spot were too weak to offer resistance. Hawkins was allowed to enter the harbour, and to refit at the small rocky island of San Juan de Ulloa by which it is formed. Unfortunately for him, and for a French corsair whom he had in his company, a strong Spanish force arrived, bringing the new viceroy. The Spaniards, who were no more scrupulous of the truth than himself, pretended to accept the arrangement made before their arrival, and then when they thought he was off his guard attacked him on the 24th of September. Only two vessels escaped, his own, the ” Minion,” and the ” Judith,” a small vessel belonging to his cousin Francis Drake. The voyage home was miserable, and the sufferings of all were great.

For some years Hawkins did not return to the sea, though he continued to be interested in privateering voyages as a capitalist. In the course of 1572 he recovered part of his loss by pretending to betray the queen for a bribe to Spain. He acted with the knowledge of Lord Burleigh. In 1573 he became treasurer of the navy in succession to his father-in-law Benjamin Gonson. The office of comptroller was conferred on him soon after, and for the rest of his life he remained the principal administrative officer of the navy. Burleigh noted that he was suspected of fraud in his office, but the queen’s ships were kept by him in good condition. In 1588 he served as rear-admiral against the Spanish Armada and was knighted. In 1590 he was sent to the coast of Portugal to intercept the Spanish treasure fleet, but did not meet it. In giving an account of his failure to the queen he quoted the text ” Paul doth plant, Apollo doth water, but God giveth the

increase," which exhibition of piety is said to have provoked the queen into exclaiming, " God's death ! This fool went out a soldier, and has come home a divine," In 1595 he accompanied Drake on another treasure-hunting' voyage to the West Indies, which was even less successful, and he died at sea off Porto Rico on the 12th of November 1595.

Hawkins was twice married, first to Katharine Gonson and then to Margaret Vaughan. He was counted a puritan when Puritanism meant little beyond hatred of Spain and popery, and when these principles were an ever-ready excuse for voyages in search of slaves and plunder. In the course of one of his voyages, when he was becalmed and his negroes were dying, he consoled himself by the reflection that God would not suffer His elect to perish. Contemporary evidence can be produced to show that he was greedy, unscrupulous and rude. But if he had been a more delicate man he would not have risked the gallows by making piratical attacks on the Portuguese and by appearing in the West Indies as an armed smuggler; and in that case he would not have played an important part in history by setting the example of breaking down the pretension of the Spaniards to exclude all comers from the New World. His morality was that of the average stirring man of his time, whether in England or elsewhere.

See R. A. J. Walling, A Sea-dog of Devon (1907); and Southey in his British Admirals, vol. iii. The original accounts of his voyages compiled by Hakluyt have been reprinted by the Hakluyt Society, with a preface by Sir C. R. Markham.

HAWKINS, SIR JOHN (1719-1789), English writer on music, was born on the 30th of March 1719, in London, the son of an architect who destined him for his own profession. Ultimately, however, Hawkins took to the law, devoting his leisure hours to his favourite study of music. A wealthy marriage in 1753 enabled him to indulge his passion for acquiring rare works of music, and he bought, for example, the collection formed by Dr Pepusch, and subsequently presented by Hawkins to the British Museum. It was on such materials that Hawkins

founded his celebrated work on the General History of the Science and Practice of Music, in 5 vols, (republished in 2 vols., 1876). It was brought out in 1776, the same year which witnessed the appearance

of the first volume of Burney's work on the same subject. The relative merits of the two works were eagerly discussed by contemporary critics. Burney no doubt is in- finitely superior as a literary man, and his work accordingly comes much nearer the idea of a systematic treatise on the subject than Hawkins's, which is essentially a collection of rare and valuable pieces of music with a more or less continuous commentary. But by rescuing these from oblivion Hawkins has given a permanent value to his work. Of Hawkins's literary efforts apart from music it will be sufficient to mention his occasional contributions to the Gentleman's Magazine, his edition (1760) of the Complete Angler (1787) and his biography of Dr Johnson, with whom he was intimately acquainted. He was one of the original members of the Ivy Lane Club, and ultimately became one of Dr Johnson's executors. If there were any doubt as to his intimacy with Johnson, it would be settled by the slighting way in which Boswell refers to him. Speaking of the Ivy Lane Club, he mentions amongst the members " Mr John Hawkins, an attorney," and adds the following footnote, which at the same time may serve as a summary of the remaining facts of Hawkins's life: " He was for several years chairman of the Middlesex justices, and upon presenting an address to the king accepted the usual offer of knighthood (1772). He is the author of a History of Music in five volumes in quarto. By assiduous attendance upon Johnson in his last illness he obtained the office of one of his executors — in consequence of which the booksellers of London employed him to publish an edition of Dr Johnson's works and to write his life." Sir John Hawkins died on the 21st of May 1789, and was buried in the cloisters of Westminster Abbey.

HAWKINS, or Hawkyns, SIR RICHARD (c. 1562-1622), British seaman, was the only son of Admiral Sir John Hawkins (q.v.) by his first marriage. He was from his earliest days familiar with ships and the sea, and in 1582 he accompanied his uncle, William Hawkins, to the West Indies. In 1585 he was captain of a galliot in Drake's expedition to the Spanish main, in 1588 he commanded a queen's ship against the Armada, and in 1 590 served with his father's expedition to the coast of Portugal. In 1593 he purchased the " Dainty," a ship originally built for his father and used by him in his expeditions, and sailed for the West Indies, the Spanish main and the South Seas. It seems clear that his project was to prey on the oversea possessions of the king of Spain. Hawkins, however, in an account of the voyage written thirty years afterwards, maintained, and by that time perhaps had really persuaded himself, that his expedition was undertaken purely for the purpose of geographical discovery. After visiting the coast of Brazil, the " Dainty " passed through the Straits of Magellan,

and in due course reached Valparaiso. Having plundered the town, Hawkins pushed north, and in June 1594, a year after leaving Plymouth, arrived in the bay of San Mateo. Here the “Dainty” was attacked by two Spanish ships. Hawkins was hopelessly outmatched, but defended himself with great courage. At last, when he himself had been severely wounded, many of his men killed, and the ” Dainty ” was nearly sinking, he surrendered on the promise of a safe-conduct out of the country for himself and his crew. Through no fault of the Spanish commander this promise was not kept. In 1597 Hawkins was sent to Spain, and imprisoned first at Seville and subse- quently at Madrid. He was released in 1602, and, returning to England, was knighted in 1603. In 1604 he became member of parliament for Plymouth and vice-admiral of Devon, a post which, as the coast was swarming with pirates, was no sinecure. In 1620-162 1 he was vice-admiral, under Sir Robert Mansell, of the fleet sent into the Mediterranean to reduce the Algerian corsairs. He died in London on the 17th of April 1622.

See his Observations in his Voiage into the South Sea (1622), re-published by the Halduyt Society.

HAWKS, FRANCIS LISTER (1798-1866), American clergyman, was born at Newbern, North Carolina, on the 10th of June 1798,

and graduated at the university of his native state in 1815. After practising law with some distinction he entered the Episcopalian ministry in 1827 and proved a brilliant and im- pressive preacher, holding livings in New Haven, Philadelphia, New York and New Orleans, and declining several bishoprics. On his appointment as historiographer of his church in 1835, he went to England, and collected the abundant materials afterwards utilized in his Contributions to the Ecclesiastical History of U.S.A. (New York, 1836-1839). These two volumes dealt with Maryland and Virginia, while two later ones (1863- 1864) were devoted to Connecticut. He was the first president of the university of Louisiana (now merged in Tulane). He died in New York on the 26th of September 1866.

HAWKSHAW, SIR JOHN (1811-1891), English engineer, was born in Yorkshire in 181 1, and was educated at Leeds grammar school. Before he was twenty-one he had been engaged for six or seven years in railway engineering and the construction of roads in his native county, and in the year of his majority he obtained an appointment as engineer to the Bolivar Mining Association in Venezuela. But the climate there was more than his health could stand, and in 1834 he was obliged to return to England. He soon obtained employment

under Jesse Hartley at the Liverpool docks, and subsequently was made engineer in charge of the railway and navigation works of the Manchester, Bury and Bolton Canal Company. In 1845 he became chief engineer to the Manchester & Leeds railway, and in 1847 to its successor, the Lancashire & Yorkshire railway, for which he constructed a large number of branch lines. In 1850 he removed to London and began to practise as a consulting engineer, at first alone, but subsequently in partnership with Harrison Hayter. In that capacity his work was of an extremely varied nature, embracing almost every branch of engineering. He retained his connexion with the Lancashire & Yorkshire Company until his retirement from professional work in 1888, and was consulted on all the important engineering points that affected it in that long period. In London he was responsible for the Charing Cross and Cannon Street railways, together with the two bridges which carried them over the Thames; he was engineer of the East London railway, which passes under the Thames through Sir M. I. Brunei's well-known tunnel; and jointly with Sir J. Wolfe Barry he constructed the section of the Underground railway which completed the " inner circle " between the Aldgate and Mansion House stations. In addition, many railway works claimed his attention in all parts of the world — Germany, Russia, India, Mauritius, &c. One noteworthy point in his railway practice was his advocacy, in opposition to Robert Stephenson, of steeper gradients than had previously been thought desirable or possible, and so far back as 1838 he expressed decided disapproval of the maintenance of the broad gauge on the Great Western, because of the troubles he foresaw it would lead to in connexion with future railway extension, and because he objected in general to breaks of gauge in the lines of a country. The construction of canals was another branch of engineering in which he was actively engaged. In 1862 he became engineer of the Amsterdam ship-canal, and in the succeeding year he may fairly be said to have been the saviour of the Suez Canal. About that time the scheme was in very bad odour, and the khedive determined to get the opinion of an English engineer as to its practicability, having made up his mind to stop the works if that opinion was unfavourable. Hawkshaw was chosen to make the inquiry, and it was because his report was entirely favourable that M. de Lesseps was able to say at the opening ceremony thatvto him he owed the canal. As a member of the International Congress which considered the construction of an interoceanic canal across central America, he thought best of the Nicaraguan route, and privately he regarded the Panama scheme as im- practicable at a reasonable cost, although publicly he expressed no opinion on the matter and left the Congress without voting. Sir John Hawkshaw also had a wide experience in constructing harbours (e.g.

Holyhead) and docks (e.g. Penarth, the Albert Dock at Hull, and the south dock of the East and West India Docks in London), in river-engineering, in drainage and sewerage,

in water-supply, &c. He was engineer, with Sir James Brunlees, of the original Channel Tunnel Company from 1872, but many years previously he had investigated for himsself the question of a tunnel under the Strait of Dover from an engineering point of view, and had come to a belief in its feasibility, so far as that could be determined from borings and surveys. Subsequently, however, he became convinced that the tunnel would not be to the advantage of Great Britain, and thereafter would have nothing to do with the project. He was also engineer of the Severn Tunnel, which, from its magnitude and the difficulties encountered in its construction, must rank as one of the most notable engineering undertakings of the 19th century. He died in London on the 2nd of June 1891.

HAWKSLEY, THOMAS (1807-1893), English engineer, was born on the 12th of July 1807, at Arnold, near Nottingham. He was at Nottingham grammar school till the age of fifteen, but was indebted to his private studies for his knowledge of mathe- matics, chemistry and geology. In 1822 he was articled to an architect in Nottingham, subsequently becoming a partner in the firm, which also undertook engineering work; and in 1852 he removed to London, where he continued in active practice till he was well past eighty. His work was chiefly concerned with water and gas supply and with main-drainage. Of water- works he used to say that he had constructed 150, and a long list rnight be drawn up of important towns that owe their water to his skill, including Liverpool, Sheffield, Leicester, Leeds, Derby, Darlington, Oxford, Cambridge and Northampton in Engla'nd, and Stockholm, Altona and Bridgetown (Barbados) in other countries. To his native town of Nottingham he was water engineer for fifty years, and the system he designed for it was noteworthy from the fact that the principle of constant supply was adopted for the first time. The gas-works at Notting- ham, a;id at many other towns for which he provided water supolies were also constructed by him. He designed main- drainage systems for Birmingham, Worcester and Windsor among other places, and in 1857 he was called in, together with G. P. Bidder and Sir J. Bazalgette, to report on the best solution of the vexed question of a main-drainage scheme for London. In 1872 he was president of the Institution of Civil Engineers — an office in which his

son Charles followed him in 1001. He died in London on the 23rd of September 1893.

HAWKSMOOR, NICHOLAS (1661-1736), English architect, of Nottinghamshire birth, became a pupil of Sir Christopher Wren at the age of eighteen, and his name is intimately associated with those of Wren and Sir J. Vanbrugh in the English archi- tecture of his time. Through Wren's influence he obtained various official posts, as deputy-surveyor at Chelsea hospital, clerk of the works and deputy-surveyor at Greenwich hospital, clerk of the works at Whitehall, St James's and Westminster, and he succeeded Wren as surveyor-general of Westminster Abbey. He took part in much of the work done by Wren and Vanbrugh, and it is difficult often to assign among them the credit for the designs of various features. Hawksmoor appears, however, to have been responsible for the early Gothic designs of the two towers of All Souls' (Oxford) north quadrangle, and the library and other features at Queen's College (Oxford). At the close of Queen Anne's reign he had a principal part in the scheme for building fifty new churches in London, and himself designed five or six of them, including St Mary Woolnoth (1716-1719) and St George's, Bloomsbury (1720-1730). A number of his drawings have been preserved. He died in London on the 25th of March 1736.

HAWKWOOD, SIR JOHN (d. 1394), an English adventurer who attained great wealth and renown as a condottiere in the Italian wars of the 14th century. His name is variously spelt as Haccoude, Aucud, Aguto, &c, by contemporaries. It is said that he was the son of a tanner of Hedingham Sibil in Essex, and was apprenticed in London, whence he went, in the English army, to France under Edward III. and the Black Prince. It is said also that he obtained the favour of the Black Prince, and received knighthood from King Edward III., but though it is certain that he was of knightly rank, there is no evidence as to

the time or place at which he won it. On the peace of Bretigny in 1360, he collected a band of men-at-arms, and moved south- ward to Italy, where we find the White Company, as his men were called, assisting the marquis of Monferrato against Milan in 1362-63, and the Pisans against Florence in 1364. After several campaigns in various parts of central Italy, Hawkwood in 1368 entered the service of Bernabo Visconti. In 1369 he fought for Perugia against the pope, and in 1370 for the Visconti against Pisa, Florence and other enemies. In 1372 he defeated the marquis of Monferrato, but soon afterwards, resenting the interference of a council of war with his plans, Hawkwood resigned his command, and the White Company passed

into the papal service, in which he fought against the Visconti in 1373- 1375. In 1375 the Florentines entered into an agreement with him, by which they were to pay him and his companion 130,000 gold florins in three months on condition that he undertook no engagement against them; and in the same year the priors of the arts and the gonfalonier decided to give him a pension of 1200 florins per annum for as long as he should remain in Italy. In 1377, under the orders of the cardinal Robert of Geneva, legate of Bologna, he massacred the inhabitants of Cesena, but in May of the same year, disliking the executioner's work put upon him by the legate, he joined the anti-papal league, and married, at Milan, Donnina, an illegitimate daughter of Bernabo Visconti. In 1378 and 1379 Hawkwood was constantly in the field; he quarrelled with Bernabo in 1378, and entered the service of Florence, receiving, as in 1375, 130,000 gold florins. He rendered good service to the republic up to 1382, when for a time he was one of the English ambassadors at the papal court. He engaged in a brief campaign in Naples in 1383, fought for the marquis of Padua against Verona in 1386, and in 1388 made an unsuccessful effort against Gian Galeazzo Visconti, who had murdered Bernabo. In 1390 the Florentines took up the war against Gian Galeazzo in earnest, and appointed Hawkwood commander-in-chief. His campaign against the Milanese army in the Veronese and the Bergamask was reckoned a triumph of generalship, and in 1392 Florence exacted a satisfactory peace from Gian Galeazzo. His latter years were spent in a villa in the neighbourhood of Florence. On his death in 1394 the republic gave him a public funeral of great magnificence, and decreed the erection of a marble monument in the cathedral. This, however, was never executed; but Paolo Uccelli painted his portrait in terre-verte on the inner facade of the building, where it still remains, though damaged by removal from the plaster to canvas. Richard II. of England, probably at the instigation of Hawkwood's sons, who returned to their native country, requested the Florentines to let him remove the good knight's bones, and the Florentine government signified its consent.

Of his children by Donnina Visconti, who appears to have been his second wife, the eldest daughter married Count Brezaglia of Porciglia, podesta of Ferrara, who succeeded him as Florentine commander-in-chief, and another a German condottiere named Conrad Prospergh. His son, John, returned to England and settled at Hedingham Sibil, where, it is supposed, Sir John Hawkwood was buried. The children of the first marriage were two sons and three daughters, and of the latter the youngest married John Shelley, an ancestor of the poet.

Aut horities. — M uratori, Rerum Italicarum scriptores, and supplement by Tartinius and Manni; Archivio slonco italiano; Temple-

Leader and Marcotti, Giovanni Acuta (Florence, 1889; Eng. transl., Leader Scott, London, 1889); Nichol, Bibliotheca topographka Britannica, vol. vi.; J. G. Alger in Register and Magazine of Biography, v. 1.; and article in Diet. Nat. Biog.

HAWLEY, HENRY (c. 1670-1750), British lieut.-general, entered the army, it is said, in 1694. He saw service in the War of Spanish Succession as a captain of Erie's (the 19th) foot. After Almanza he returned to England, and a few years later had become lieut. colonel of the 19th. With this regiment he served at Sheriffmuir in 1715, where he was wounded. After this for some years he served in the United Kingdom, obtaining pro motion in the usual course, and in 1739 he arrived at the grade of major general. P'our years later he accompanied George 11.

and Stair to Germany, and, as a general officer of cavalry under Sir John Cope, was present at Dettingen. Becoming lieut. -general somewhat later, he was second-in-command of the cavalry at Fontenoy, and on the 20th of December 1745 became commander-in-chief in Scotland. Less than a month later Hawley suffered a severe defeat at Falkirk at the hands of the Highland insurgents. This, however, did not cost him his command, for the duke of Cumberland, who was soon afterwards sent north, was captain-general. Under Cumberland's orders Hawley led the cavalry in the campaign of Culloden, and at that battle his dragoons distinguished themselves by their ruthless butchery of the fugitive rebels. After the end of the " Forty- Five " he accompanied Cumberland to the Low Countries and led the allied cavalry at Lauffeld (Val). He ended his career as governor of Portsmouth and died at that place in 1759. James Wolfe, his brigade-major, wrote of General Hawley in no flattering terms. " The troops dread his severity, hate the man and hold his military knowledge in contempt," he wrote. But, whether it be true or false that he was the natural son of George II., Hawley was always treated with the greatest favour by that king and by his son the duke of Cumberland.

HAWLEY, JOSEPH ROSWELL (1826-1905), American political leader, was born on the 31st of October at Stewartsville,. Richmond county, North Carolina, where his father, a native of Connecticut, was pastor of a Baptist church. The father returned to Connecticut in 1S37 and the son graduated at Hamilton College (Clinton, N.Y.)in 1847. He was

admitted to the bar in 1850, and practised at Hartford, Conn., for six years. An ardent opponent of slavery, he became a Free Soiler, was a delegate to the National Convention which nominated John P. Hale for the presidency in 1852, and subsequently served as chairman of the State Committee, having at the same time editorial control of the Charter Oak, the party organ. In 1856 he took a leading part in organizing the Republican party in Connecticut, and in 1857 became editor of the Hartford Evening Press, a newly established Republican-newspaper. He served in the Federal army throughout the Civil War, rising from the rank of captain CApril 22, 1861) to that of brigadier-general of volunteers (Sept. 1864); took part in the Port Royal Expedition, in the capture of Fort Pulaski (April 1862), in the siege of Charleston and the capture of Fort Wagner (Sept. 1863), in the battle of Olustee (Feb. 20, 1864), in the siege operations about Petersburg, and in General W. T. Sherman's campaign in the Carolinas; and in September 1865 received the brevet of major-general of volunteers. From April 1866 to April 1867 he was governor of Connecticut, and in 1867 he bought the Hartford Courant, with which he combined the Press, and which became under his editorship the most influential newspaper in Connecticut and one of the leading Republican papers in the country. He was the permanent chairman of the Republican National Convention in 1868, was a delegate to the conventions of 1872, 1876 and 1880, was a member of Congress from December 1872 until March 1875 and again in 1879-1881, and was a United States senator from i8Sr until the 3rd of March 1905, being one of the Republican leaders both in the House and the Senate. From 1873 to 1876 he was president of the United States Centennial Commission, the great success of the Centennial Exhibition being largely due to him. He died at Washington, D.C., on the 17th of March 1905.

HAWORTH, an urban district in the Keighley parliamentary division of the West Riding of Yorkshire, England, 10 m. N.W. of Bradford, on a branch of the Midland railway. Pop. (1901), 7492. It is picturesquely situated on a steep slope, lying high, and surrounded by moorland. The Rev. Patrick Bronte (d.1861) was incumbent here for forty-one years, and a memorial near the west window of St Michael's church bears his name and the names of his gifted daughters upon it. The grave of Charlotte and Emily Bronte is also marked by a brass. In 1895 a museum was opened by the Bronte society. There is a large worsted industry.

HAWSER (in sense and form as if from " hawse," which, from the 16th-century form halse, is derived from Teutonic

hals, neck, of which there is a Scandinavian use in the sense of the

forepart of a ship; the two words are not etymologically connected; ” hawser ” is from an O. Fr. haucier, hausser, to raise, tow, hoist, from the Late Lat. altiare, to lift, alius, high), a small cable or thick rope used at sea for the purposes of mooring or warping, in the case of large vessels made of steel. When a cable or tow line is made of three or more small ropes it is said to be ” hawser-laid.” The ” hawse ” of a ship is that part of the bows where the ” hawse-holes ” are made. These are two holes cut in the bows of a vessel for the cables to pass through, having small cast-iron pipes, called ” hawse-pipes,” fitted into them to prevent abrasion. In bad weather at sea these holes are plugged up with ” hawse-plugs ” to prevent the water entering. The phrase to enter the service by the ” hawse-holes ” is used of those who have risen from before the mast to commissioned rank in the navy. When the ship is at anchor the space between her head and the anchor is called ” hawse,” as in the phrase ” athwart the hawse.” The term also applies to the position of the ship’s anchors when moored; when they are laid out in a line at right angles to the wind it is said to be moored with an ” open hawse “; when both cables are laid out straight to their anchors without crossing, it is a ” clear hawse.”

HAWTHORN, a city of Bourke county, Victoria, Australia, 4i m. by rail E. of and suburban to Melbourne. Pop. (1901), 2I >339- It is the seat of the important Methodist Ladies’ College. The majority of the inhabitants are professional and business men engaged in Melbourne- and their residences are numerous at Hawthorn.

HAWTHORN (O. Eng. haga-, h

a yellowish tinge. Fresh cut it weighs 68 lb 12 oz. per cubic foot, and dry 57 lb 3 oz. It can seldom be obtained in large portions, and has the disadvantage of being apt to warp; its great hard- ness, however, renders it valuable for the manufacture of various articles, such as the cogs of mill-wheels, flails and mallets, and handles of hammers. Both green and dry it forms excellent fuel. The bark possesses tanning properties, and in Scotland in past times yielded with ferrous sulphate a black dye for wool. The leaves are eaten by cattle, and have been employed as a substitute for tea. Birds and deer feed upon the haws, which are used in the preparation of a fermented and highly intoxicating liquor. The hawthorn serves as a stock for grafting other trees. As an ornamental feature in landscapes, it is worthy of notice; and the pleasing shelter, it affords and the beauty of its blossoms have

frequently been alluded to by poets. The custom of employing the flowering branches for decorative purposes on the i st of May is of very early origin; but since the alteration in the calendar the tree has rarely been in full bloom in England before the second week of that month. In the Scottish Highlands the flowers may be seen as late as the middle of June. The hawthorn has been regarded as the emblem of hope, and its branches are stated to have been carried by the ancient Greeks in wedding processions, and to have been used by them to deck the altar of Hymen. The supposition that the tree was the source of Christ's crown of thorns gave rise doubtless to the tradition current among the French peasantry that it utters groans and cries on Good Friday, and probably also to the old popular superstition in Great Britain and Ireland that ill-luck attended the uprooting of hawthorns. Branches of the Glaston- bury thorn, C. Oxyacantha, var. praecox, which flowers both in December and in spring, were formerly highly valued in England, on account of the legend that the tree was originally the staff of Joseph of Arimathea.

The number of species in the genus is from fifty to seventy, according to the view taken as to whether or not some of the forms, especially of those occurring in the United States, repre- sent distinct species. C. coccinea, a native of Canada and the eastern United States, with bright scarlet fruits, was introduced into English gardens towards the end of the 17th century. C. Crus-Galli, with a somewhat similar distribution and intro- duced about the same time, is a very decorative species with showy, bright red fruit, often remaining on the branches till spring, and leaves assuming a brilliant scarlet and orange in the autumn; numerous varieties are in cultivation. C. Pyracantha, known in gardens as pyracantha, is evergreen and has white flowers, appearing in May, and fine scarlet fruits of the size of a pea which remain on the tree nearly all the winter. It is a native of south Europe and was introduced into Britain early in the 17th century.

HAWTHORNE, NATHANIEL (1804-1864), American writer, son of Nathaniel Hathorne (1 776-1808), was born at Salem, Massachusetts, on the 4th of July 1804. The head of the American branch of the family, William Hathorne of Wilton, Wiltshire, England, emigrated with Winthrop and his company, and arrived at Salem Bay, Mass., on the 12th of June 1630. He had grants of land at Dorchester, where he resided for upwards of six years, when he was persuaded to remove to Salem by the tender of further grants of land there, it being considered a public benefit that he should become an inhabitant of that town. He represented his fellow-townsmen in the legislature, and served them in a military capacity as a captain in the first regular troop organized in Salem, which he led to victory through an Indian campaign in

Maine. Originally a determined ” Separatist,” and opposed to compulsion for conscience, he signalized himself when a magistrate by the active part which he took in the Quaker persecutions of the time (1657-1662), going so far on one occasion as to order the whipping of Anne Coleman and four other Friends through Salem, Boston and Dedham. He died, an old man, in the odour of sanctity, and left a good property to his son John, who inherited his father’s capacity and intolerance, and was in turn a legislator, a magistrate, a soldier and a bitter persecutor of witches. Before the death of Justice Hathorne in 171 7, the

destiny of the family suffered a sea-change, and they began to be noted as mariners. One of these seafaring Hathornes figured in the Revolution as a privateer, who had the good fortune to escape from a British prison-ship; and another, Captain Daniel Hathorne, has left his mark on early American ballad-lore. He too was a privateer, commander of the brig ” Fair American,” which, cruising off the coast of Portugal, fell in with a British scow laden with troops for General Howe, which scow the bold Hathorne and his valiant crew at once engaged and fought for over an hour, until the vanquished enemy was glad to cut the Yankee grapplings and quickly bear away. The last of the Hathornes with whom we are concerned was a son of this sturdy old privateer, Nathaniel Hathorne. He was born in 1776, and about the beginning of the 19th century married Miss Elizabeth Clarke Manning, a daughter of Richard Manning of Salem, whose ancestors emigrated to America about fifty years after the arrival of William Hathorne. Young Nathaniel took his hereditary place before the mast, passed from the forecastle to the cabin, made voyages to the East and West Indies, Brazil and Africa, and finally died of fever at Surinam, in the spring of 1808. He was the father of three children, the second of whom was the subject of this article. The form of the family name was changed by the latter to ” Hawthorne ” in his early manhood.

After the death of her husband Mrs Hawthorne removed to the house of her father with her little family of children. Of the boyhood of Nathaniel no particulars have reached us, except that he was fond of taking long walks alone, and that he used to declare to his mother that he would go to sea some time and would never return. Among the books that he is known to have read as a child were Shakespeare, Milton, Pope and Thomson, The Castle of Indolence being an especial favourite. In the autumn of 1818 his mother removed to Raymond, a town in Cumberland county, Maine, where his uncle, Richard Manning, had built a large and ambitious dwelling. Here the lad resumed his solitary walks, exchanging the narrow streets of Salem for the boundless, primeval wilderness, and its sluggish harbour for the

fresh bright waters of Sebago lake. He roamed the woods by day, with his gun and rod, and in the moonlight nights of winter skated upon the lake alone till midnight. When he found himself away from home, and wearied with his exercise, he took refuge in a log cabin where half a tree would be burning upon the hearth. He had by this time acquired a taste for writing, that showed itself in a little blank-book, in which he jotted down his woodland adventures and feelings, and which was remarkable for minute observation and nice perception of nature.

After a year's residence at Raymond, Nathaniel returned to Salem in order to prepare for college. He amused himself by publishing a manuscript periodical, which he called the Spectator, and which displayed considerable vivacity and talent. He speculated upon the profession that he would follow, with a sort of prophetic insight into his future. " I do not want to be a doctor and live by men's diseases," he wrote to his mother, " nor a minister to live by their sins, nor a lawyer and live by their quarrels. So I don't see that there is anything left for me but to be an author. How would you like some day to see a whole shelf full of books, written by your son, with ' Hawthorne's Works' printed on their backs?"

Nathaniel entered Bowdoin College, Brunswick, Maine, in the autumn of 1821, where he became acquainted with two students who were destined to distinction — Henry W. Longfellow and Franklin Pierce. He was an excellent classical scholar, his Latin compositions, even in his freshman year, being remark- able for their elegance, while his Greek (which was less) was good. He made graceful translations from the Roman poets, and wrote several English poems which were creditable to him. After graduation three years later (1825) he returned to Salem, and to a life of isolation. He devoted his mornings to study, his afternoons to writing, and his evenings to long walks along the rocky coast. He was scarcely known by sight to his towns-men, and he held so little communication with the members of his own family that his meals were frequently left, at his

locked door. He wrote largely, but destroyed many of his manuscripts, his taste was so difficult to please. He thought well enough, however, of one of his compositions to print it anonymously in 1828. A crude melodramatic story, entitled Fanshawe, it was unworthy even of his immature powers, and should never have been rescued from the

oblivion which speedily overtook it. The name of Nathaniel Hawthorne finally became known to his countrymen as a writer in The Token, a holiday annual which was commenced in 1828 by Mr S. G. Goodrich (better known as “Peter Parley “), by whom it was conducted for fourteen years. This forgotten publication numbered among its contributors most of the prominent American writers of the time, none of whom appear to have added to their reputation in its pages, except the least popular of all — Hawthorne, who was for years the obscurest man of letters in America, though he gradually made admirers in a quiet way. His first public recognition came from England, where his genius was discovered in 1835 by Henry F. Chorley, one of theeditors of the Athenaeum, in which he copied three of Hawthorne’s most characteristic papers from The Token. He had but little encouragement to continue in literature, for Mr Goodrich was so much more a publisher than an author that he paid him wretchedly for his contributions, and still more wretchedly for his work upon an American Magazine of Useful and Entertaining Knowledge, which he persuaded him to edit. This author-publisher consented, however, at a later period (18,37) to bring out a collection of Hawthorne’s writings under the title of Twice-told Tales. A moderate edition was got rid of, but the great body of the reading public ignored the book altogether. It was generously reviewed in the North American Review by his college friend Longfellow, who said it came from the hand of a man of genius, and praised it for the exceeding beauty of its style, which was as clear as running waters.

The want of pecuniary success which had so far attended his authorship led Hawthorne to accept a situation which was tendered him by George Bancroft, the historian, collector of the port of Boston under the Democratic rule of President Van Buren. He was appointed a weigher in the custom-house at a salary of about $1 200 a year, and entered upon the duties of his office, which consisted for the most part in measuring coal, salt and other bulky commodities on foreign vessels. It was irksome employment, but faithfully performed for two years, when he was superseded through a change in the national administration. Master of himself once more, he returned to Salem, where he remained until the spring of 1841, when he wrote a collection of children’s stories entitled Grandfather’s Chair, and joined an industrial association at West Roxbury, Mass. Brook Farm, as it was called, was a social Utopia, composed of a number of advanced thinkers, whose object was so to distribute manual labour as to give its members time for intellectual culture. The scheme worked admirably — on paper; but it was suited neither to the temperament nor the taste of Hawthorne, and after trying it patiently for nearly a

year he returned to the everyday life of mankind.

One of Hawthorne's earliest admirers was Miss Sophia Peabody , a lady of Salem, whom he married in the summer of 1842. He made himself a new home in an old manse, at Concord, Mass., situated on historic ground, in sight of an old revolutionary battlefield, and devoted himself diligently to literature. He was known to the few by his Twice-told Tales, and to the many by his papers in the Democratic Review. He published in 1842 a further portion of Grandfather's Chair, and also a second volume of Twice-told Tales. He also edited, during 1845, the African Journals of Horatio Bridge, an officer of the navy, who had been at college with him; and in the following year he published in two volumes a collection of his later writings, under the title of Mosses from an Old Manse.

After a residence of nearly four years at Concord, Hawthorne returned to Salem, having been appointed surveyor of the custom-house of that port by a new Democratic administration. He filled the duties of this position until the incoming of the Whig administration again led to his retirement. lie seems to

have written little during his official term, but, as he had leisure enough and to spare, he read much, and pondered over subjects for future stories. His next work, The Scarlet Letter, which was begun after his removal from the custom-house, was published in 1850. If there had been any doubt of his genius before, it was settled for ever by this powerful romance.

Shortly after the publication of The Scarlet Letter Hawthorne removed from Salem to Lenox, Berkshire, Mass., where he wrote The House of the Seven Gables (1851) and The Wonder-Book (1851). From Lenox he removed to West Newton, near Boston, Mass., where he wrote The Blithedale Romance (1852) and The Snow Image and other Twice-told Tales (1852). In the spring of 1852 he removed back to Concord, where he purchased an old house which he called The Wayside, and where he wrote a Life of Franklin Pierce (1852) and Tanglewood Tales (1853). Mr Pierce was the Democratic candidate for the presidency, and it was only at his urgent solicitation that Hawthorne consented to become his biographer. He declared that he would accept no office in case he were elected, lest it might compromise him; but his friends gave him such weighty reasons for reconsidering his decision that he accepted the consulate at Liverpool, which was understood to be one of the best gifts at the disposal of the president.

Hawthorne departed for Europe in the summer of 1853, and returned

to the United States in the summer of i860. Of the seven years which he passed in Europe five were spent in attending to the duties of his consulate at Liverpool, and in little journeys to Scotland, the Lakes and elsewhere, and the remaining two in France and Italy. They were quiet and uneventful, coloured by observation and reflection, as his note-books show, but productive of only one elaborate work, Transformation, or The Marble Faun, which he sketched out during his residence in Italy, and prepared for the press at Leamington, England, whence it was despatched to America and published in i860.

Hawthorne took up his abode at The Wayside, not much richer than when he left it, and sat down at his desk once more with a heavy heart. He was surrounded by the throes of a great civil war, and the political party with which he had always acted was under a cloud. His friend ex-President Pierce was stig- matized as a traitor, and when Hawthorne dedicated his next book to him — a volume of English impressions entitled Our Old Home (1863)— it was at the risk of his own popularity. His pen was soon to be laid aside for ever; for, with the exception of the unfinished story of Septimius Felton, which was published after his death by his daughter Una (1872), and the fragments of The Dolliver Romance, the beginning of which was published in the Atlantic Monthly in July 1864, he wrote no more. His health gradually declined, his hair grew white as snow, and the once stalwart figure that in early manhood flashed along the airy cliffs and glittering sands sauntered idly on the little hill behind his house. In the beginning of April 1864 he made a short southern tour with his publisher Mr William D.Ticknor, and was benefited by the change of scene until he reached Philadelphia, where he was shocked by the sudden death of Mr Ticknor. He returned to The Wayside, and after a short season of rest joined his friend ex-President Pierce. He died at Plymouth, New Hampshire, on the 19th of May 1864, and five days later was buried at Sleepy Hollow, a beautiful cemetery at Concord, where he used to walk under the pines when he was living at the Old Manse, and where his ashes moulder under a simple stone, inscribed with the single word ” Hawthorne.”

The writings of Hawthorne are marked by subtle imagination, curious power of analysis and exquisite purity of diction. He studied exceptional developments of character, and was fond of exploring secret crypts of emotion. His shorter stories are re- markable for originality and suggestiveness, and his larger ones are as absolute creations as Hamlet or Undine. Lacking the accomplishment of verse, he was in the highest sense a poet. His work is pervaded by a manly personality, and by an almost feminine delicacy and gentleness. He inherited the gravity of his Puritan ancestors without their

superstition, and learned in his solitary meditations a knowledge of the night-side of life

which would have filled them with suspicion. A profound anatomist of the heart, he was singularly free from morbidness, and in his darkest speculations concerning evil was robustly right-minded. He worshipped conscience with his intellectual as well as his moral nature; it is supreme in all he wrote. Besides these mental traits, he possessed the literary quality of style — a grace, a charm, a perfection of language which no other American writer ever possessed in the same degree, and which places him among the great masters of English prose.

His Complete Writings (22 vols., Boston, 1901) were edited, with introduction, including a bibliography, by H. S. Scudder. The standard authority for Hawthorne's biography is Nathaniel Haw- thorne and his Wife (2 vols., Boston, 1884), by his son Julian Haw- thorne (b. 1846), himself a novelist and critic of distinction. See also Henry James, Hawthorne (London, 1879), in the " English Men ','(, Letters" series; Julian Hawthorne, Hawthorne and 'his Circle (.New \ork, 1903); a paper in R. H. Hutton's Essays Theological and Literary (London, 1871); George B. Smith, Poets and Novelists London, 1875); Moncure D. Conway, Life of Nathaniel Hawthorne (London, 1890, in the "Great Writers" series); Horatio Bridge, Personal Recollections of Nathaniel Hawthorne (New York, 189-5); Rose Hawthorne Lathrop, Memories of Hawthorne (Boston, 1897)' \. C. Lawton, The New England Poets (New York, 1898)- Sir L Stephen, Hours in a Library (1874); Annie Fields, Nathaniel Hawthorne (Boston, 1899); G. E. Woodberry, Life of Hawthorne (1902) ; and oibhography by N. E. Browne (1905). (R. H. S.)

HAWTREY, CHARLES HENRY (1858-), English actor, was born at Eton, where his father was master of the lower school, and educated at Rugby and Oxford. He took to the stage in 1 88 1, and in 1883 adapted von Moser's Bibliothekar as The Private Secretary, which had an enormous success. He then appeared in London in a number of modern plays, in which he was conspicuous as a comedian. He was unapproachable for parts in which cool imperturbable lying constituted (he leading characteristic. Among his later successes A Message from Mars was particularly popular in London and in America.

HAWTREY, EDWARD CRAVEN (1789-1862), English educa- tionalist, was born at Burnham on the 7th of May 1789, the son of the vicar of the parish. He was educated at Eton and King's College, Cambridge, and in 1814 was appointed assistant, master at Eton under Dr Keate. In 1834 he became headmaster of the college, and his administration was a vigorous one. New buildings were erected, including the school library and the sanatorium, the college chapel was restored, the Old Christopher Inn was closed, and the custom of " Montem," the collection by street begging of funds for the university expenses of the captain of the school, was suppressed. He is supposed to have suggested the prince consort's modern language prizes, while the prize for English essay he founded himself. In 1852 he became provost of Eton, and in 1854 vicar of Mapledurham. He died on the 27th of January 1862, and was buried in the Eton College chapel. On account of his command of languages ancient and modern, he was known in London as " the English Mezzofanti," and he was a book collector of the finest taste. Among his own books arc some excellent translations from the English into Italian, German and Greek. He had a considerable reputation as a writer of English hexameters and as a judge of Homeric translation.

HAXO, FRANCOIS NICOLAS BENOIT, Baron (1774-1838), French general and military engineer, was born at Luneville on the 24th of June 1774, and entered the Engineers in 1793. He remained unknown, doing duty as a regimental officer for many years, until, as major, he had his first chance of distinction in the second siege of Saragossa in 1800, after which Napoleon made him a colonel. Haxo took part in the campaign of Wagram, and then returned to the Peninsula to direct the siege operations of Suchet's army in Catalonia and Valencia. In 1810 he was made general of brigade, in 181 1 a baron, and in the same year he was employed in preparing the occupied fortresses of Germany against a possible Russian invasion. In 181 2 he was chief engineer of Davout's I. corps, and after the retreat from Moscow he was made general of division. In 1813 he constructed the works around Hamburg which made possible the famous defence of t hat fortress by Davout, and commanded the Guard Engineers nut il he fe!i into the enemy's hands at Kulm. After the Restora-

tion Louis XVIII. wished to give Haxo a command in the Royal Guards, but the general remained faithful to Napoleon, and in the Hundred Days laid out the provisional fortifications of Paris and fought at Waterloo. It was, however, after the second Restoration that the best work of his career as a military engineer was done. As inspector-general he managed, though not without meeting considerable opposition, to reconstruct in accordance with the requirements of the

time, and the designs which he had evolved to meet them, the old Vauban and Ccrmontaigne fortresses which had failed to check the invasions of 1814 and 1815. For his services he was made a peer of France by Louis Philippe (1832). Soon after this came the French intervention in Belgium and the famous scientific siege of Antwerp citadel. Under Marshal Gerard Haxo directed the besiegers and completely outmatched the opposing engineers, the fortress being reduced to surrender afterasiegeof alittlemorethan three weeks (December 23, 1832). He was after this regarded as the first engineer in Europe, and his latter years were spent in urging upon the government and the French people the fortification of Paris and Lyons, a project which was partly realized in his time and after his death fully carried out. General Haxo died at Paris on the 25th of June 1838. He wrote Memoir e sur le figure du terrain dans les cartes topographiques (Paris, N.D.), and a memoir of General Dejean (1824).

HAXTHAUSEN, AUGUST FRANZ LUDWIG MARIA, Freiherr von (1792-1866), German political economist, was born near Paderborn in Westphalia on the 3rd of February 1 792- Having studied at the school of mining at Klausthal, and having served in the Hanoverian army, he entered the university of Gottingen in 1815. Finishing his course there in i8r8 he was engaged in managing his estates and in studying the land laws. The result of his studies appeared in 1829 when he published Uber die Agrarverfassung in den Fiirstentumern Paderborn und Corvey, a work which attracted much attention and which procured for its author a commission to investigate and report upon the land laws of the Prussian provinces with a view to a new code. After nine years of labour he published in 1839 an exhaustive treatise, Die landliche Verfassung in der Provinz Preussen, and in 1843, at the request of the emperor Nicholas, he undertook a similar work for Russia, the fruits of his in- vestigations in that country being contained in his Studien iibcr die mnern Zustande des Volkslebens, und insbesondere die land- lichen Einrichtungen Russlands (Hanover, 1847-1852). He received various honours, was a member of the combined diet in Berlin in 1847 and 1848, and afterwards of the Prussian upper house. Haxthausen died at Hanover on the 31st of December

1866.

In addition to the works already mentioned he wrote Die land- liche Verfassung Russlands (Leipzig, 1866). His Studien has been SS r ° h and , ln to English by R. Farie as The Russian Empire (1856). Other works of his which have appeared in English are: Transcaucasia Sketches of the Nations and Races between the Black Sea and the Caspian (1854), and The Tribes of the

Caucasus U°55)- Haxthausen edited Das konstitutionelle Prinzip (Leipzig 1 864), a collection of political writings by various authors, which has been translated into French (1865).

HAY, GEORGE (1729-1811), Scottish Roman Catholic divine was born at Edinburgh on the 24th of August 1729. He was accused of sympathizing with the rebellion of 1745 and served a term of imprisonment 1 746-1 747. He then entered the Roman Catholic Church, studied in the Scots College at Rome, and in 1759 accompanied John Geddes (173S-1799). afterwards bishop of Morocco, on a Scottish mission. Ten years later- he was appointed bishop of Daulis in partibus and coadiutor to Bishop James Grant (1706-1778). In 1778 he became vicar apostolic of the lowland district. During the Protestant riots in Edinburgh in 1779 his furniture and library were destroyed by fire. From 1788 to 1793 he was in charge of the Scalan seminary; in 1802 he retired to that of Aquhorties near Inverury which he had founded in 1799. He died there on the 15th of October 181 1.

His theological works, including The Sincere Christian, The Devout Christian, The Pious Christian and The Scripture Doctrine of Miracles, were edited by Bishop Strain in 1 87 1 -1873.

HAY, GILBERT, or “Sir Gilbert the Have” (fl. 1450), Scottish poet and translator, was perhaps a kinsman of the house of Errol. If he be the student named in the registers of the university of St Andrews in 1418-1419, his birth may be fixed about 1403. He was in France in 1432, perhaps some years earlier, for a ” Gilbert de la Haye ” is mentioned as present at Reims, in July 1430, at the coronation of Charles VII. He has left it on record, in the Prologue to his Buke of the Law of Armys, that he was “” chaumerlayn Umquhyle to the maist worthy King Charles of France.” In 1456 he was back in Scotland, in the service of the chancellor, William, earl of Orkney and Caithness, ” in his castell of Rosselyn,” south of Edinburgh. The date of his death is unknown.

Hay is named by Dunbar (q.v.) in his Lament for the Makaris, and by Sir David Lyndsay (q.v.) in his Testament and Complaynt of the Papyngo. His only political work is The Bulk of Alexander the Conquerour ,of which a portion, in copy, remains atTaymouth Castle. He has left three translations, extant in one volume (in old binding) in

the collection of Abbotsford: (a) The Buke of the Law of Armys or The Buke of Bataillis, a translation of Honore Bonet's Arbre des batailles; (b) The Buke of the Order of Knichlhood from the Livre de I'ordre de chevalerie; and © The Buke of the Governaunce of Princes, from a French version of the pseudo-Aristotelian Secreta secretorum. The second of these precedes Caxton's independent translation by at least ten years.

For the Bulk of Alexander see Albert Herrmann's The Taymouth Castle MS. of Sir Gilbert Hay's Bulk, &c. (Berlin, 1898). The com- plete Abbotsford MS. has been reprinted by the Scottish Text Society (ed. J. H. Stevenson). The first volume, containing The Buke of the Laiv of Armys, appeared in 1901. The Order of Knichlhood was printed by David Laing for the Abbotsford Club (1847). See also S.T.S. edition (u.s.) " Introduction/' and Gregory Smith's Specimens of Middle Scots, in which annotared extracts are given from the Abbotsford MS., the oldest known exc.mplc of literary Scots prose.

HAY, JOHN (1838-1905), American statesman and author, was born at Salem, Indiana, on the 8th of October 1838. He graduated from Brown University in 1858, studied law in the office of Abraham Lincoln, was admitted to the bar in Spring- field, Illinois, in 1861, and soon afterwards was selected by President Lincoln as assistant private secretary, in which capacity he served till the president's death, being associated with John George Xicolay (1832-1901). Hay was secretary of the U.S. legation at Paris 111 1865-1867, at Vienna in 1867-1869 and at Madrid in 1869-1870. After his return he was for five years an editorial writer on the New York Tribune; in 1879- 1S81 he was first assistant secretary of state to W. M. Evarts; and in 1881 was a delegate to the International Sanitary Con- ference, which met in Washington, D.C., and of which he was chosen president. Upon the inauguration of President McKinley in 1897 Hay was appointed ambassador to Great Britain, from which post he was transferred in 1898 to that of secretary of state, succeeding VV. R. Day, who was sent to Paris as a member of the Peace Conference. He remained in this office until his death at Xewburg, New Hampshire, on the 1st of July 1905. lie directed the peace negotiations with Spain after the war of 1S9S, and not only secured American interests in the imbroglio caused by the Boxers in China, but grasped the opportunity to insist on " the administrative entity" of China; influenced the powers to declare publicly for the " open door " in China; challenged Russia as to her intentions in Manchuria, securing a promise to evacuate the country on the 8th of October 1903; and in 1004 again urged " the administrative entity " of China and took the initiative in inducing Russia and Japan to " localize and limit. " the area of hostilities. It

was largely due to his tact and good management, in concert with Lord Pauncefote, the British ambassador, that negotiations for abrogating theClayton- Bulwer Treaty and for making a new treaty with Great Britain regarding the Isthmian Canal were successfully concluded at the end of i<)oi; subsequently he negotiated treaties with Colombia and with Panama, looking towards the construction by the United States of a trans-isthmian canal. He also arranged the settlement of difficulties with Germany over Samoa in December

1899, and the settlement, by joint commission, of the question concerning the disputed Alaskan boundary in 1903. .John Hay was a man of quiet and unassuming disposition, whose training in diplomacy gave a cool and judicious character to his states- manship. As secretary of state under Presidents McKinley and Roosevelt his guidance was invaluable during a rather critical period in foreign affairs, and no man of his time did more to create confidence in the increased interest taken by the United States in international matters. He also represented, in another capacity, the best American traditions — namely in literature. He published Pike County Ballads (1871) — the most famous being ” Little Breeches ” — a volume worthy to rank with Bret Harte, if not with the Lowell of the Biglmv Papers; Castilian Days (1871), recording his observations in Spain; and a volume of Poems (189c) ; with John G. Nicolay he wrote Abraham Lincoln: A History (10 vols., 1890), a monumental work indispensable to the student of the Civil War period in America, and published an edition of Lincoln’s Complete Works (2 vols., 1894). The authorship of the brilliant novel The Breadwinners (1883) is now certainly attributed to him. Hay was an excellent public speaker ■, some of his best addresses are In Praise of Omar; On the Unveiling of the Bust of Sir Walter Scott in Westminster Abbey, May 21, 1897; and a memorial address in honour of President McKinley.

The best of his previously unpublished speeches appeared in Addresses of John Hay (1906).

HAY, a town of Waradgery county, New South Wales, Australia, on the Murrumbidgee river, 454 m. by rail W.S.W. of Sydney. Pop. (1901), 3012. It is the cathedral town of the Anglican diocese of Riverina, the terminus of the South Western railway, and the principal depot for the wool produced at the numerous stations on the banks of the Murrumbidgee and Lachlan rivers.

HAY, a market town and urban district of Breconshire, south Wales, on the Hereford and Brecon section of the Midland railway, 164I m. from London, 20 m. W. of Hereford and 17 m. N.E. of Brecon by rail.

Pop. (1901), 1680. The Golden Valley railway to Pontrilas (i8f m.), now a branch of the Great Western, also starts from Hay. The town occupies rising ground on the south (right) bank of the Wye, which here separates the counties of Brecknock and Radnor but immediately below enters Herefordshire, from which the town is separated on the E. by the river Dulas.

Leland and Camden ascribe a Roman origin to the town, and the former states that quantities of Roman coin (called by the country people ” Jews’ money “) and some pottery had been found near by, but of this no other record is known. The Wye valley in this district served as the gate between the present counties of Brecknock and Hereford, and, though Welsh con- tinued for two or three centuries after the Norman Conquest to be the spoken language of the adjoining part of Herefordshire south of the Wye (known as Archenfield), there must have been a ” burh ” serving as a Mercian outpost at Glasbury, 4 m. W. of Hay, which was itself several miles west of Offa’s Dyke. But the earliest settlement at Hay probably dates from the Norman conquest of the district by Bernard Newmarch about 1088 (in which year he granted Glasbury, probably as the first fruits of his invasion, to St Peter’s, Gloucester). The manor of Hay, which probably corresponded to some existing Welsh division, he gave to Sir Philip Walwyn, but it soon reverted to the donor, and its subsequent devolution down to its forfeiture to the crown as part of the duke of Buckingham’s estate in 1521, was identical with that of the lordship of Brecknock (see Brecon shire). The castle, which was probably built in Newmarch’s time and rebuilt by his great-grandson William de Breos, passed on the latter’s attainder to the crown, but was again seized by de Breos’s second son, Giles, bishop of Hereford, in 1215, and re-taken by King John in the following year. In 1231 it was burnt by Llewelyn ab Iorwerth, and in the Barons’ War it was taken in 1263 by Prince Edward, but in the following year was burnt by Simon Montfort and the last Llewelyn. From the 1 6th century the castle has been used as a private residence.

io6

HAY

The Welsh name of the town is Y Gelli (” the wood “), or formerly in full (Y) Gelli ganddryll (literally ” the wood all to pieces “), which roughly corresponds to Sepes Inscissa, by which name Walter Map (a native of the district) designates it. Its Norman name, La Haia (from the Fr. kaie, cf. English ” hedge “), was probably intended as a translation of Gelli. The same word is found in Urishay and Oldhay,

both between Hay and the Golden Valley. The town is still locally called the Hay, as it also is by Leland.

Even down to Leland's time Hay was surrounded by a " right strong wall," which had three gates and a postern, but the town within the wall has " wonderfully decayed," its ruin being ascribed to Owen Glendower, while to the west of it was a flourishing suburb with the church of St Mary on a precipitous eminence overlooking the river. This was rebuilt in 1834. The old parish church of St John within the walls, used as a school- house in the 17th century, has entirely disappeared. The Baptists, Calvinistic Methodists, Congregationalists and Primitive Methodists have a chapel each. The other public buildings are the market house (1833); a masonic hall, formerly the town hall, its basement still serving as a cheese market; a clock tower (1884); parish hall (1890); and a drill hall. The Wye is here crossed by an iron bridge built in 1864. There are also eighteen almshouses for poor women, built and endowed by Miss Frances Harley in 1832-1836, and Gwyn's almshouses for six aged persons, founded in 1702 and rebuilt in 1878

Scarcely anything but provisions are sold in the weekly market, the farmers of the district now resorting to the markets of Brecon and Hereford. There are good monthly stock fairs and a hiring fair in May. There is rich agricultural land in the district.

Hay was reputed to be a borough by prescription, but it never had any municipal institutions. Its manor, like that of Talgarth, consisted of an Englishry and a Welshery, the latter, known as Haya Wallensis, comprising the parish of Llanigon with the hamlet of Glynfach, and in this Welsh tenures and customs prevailed. The manor is specially mentioned in the act of Henry VIII. (1335) as one of those which were then taken to constitute the new county of Brecknock. (D. Ll. T.)

HAY (a word common in various forms to Teutonic languages ; cf. Ger. Heu, Dutch hooi; the root from which it is derived, meaning " to cut," is also seen in " to hew "; cf. " hoe "), grass mown and dried in the sun and used as fodder for cattle. It is properly applied only to the grass when cut, but is often also used of the standing crop. (See Haymaking below). Another word " hay," meaning a fence, must be distinguished; the root from which it is derived is seen in its doublet " hedge," cf . " haw-thorn," i.e. " hedge thorn." In this sense it survives in legal history in " hay bote," i.e. hedge-bote, the right of a tenant, copyholder, &c. to take wood to repair fences, hedges, &c. (see Estovers), and also in " hayward," an official of a manor whose duty was to protect the enclosed lands from cattle breaking out of the

common land.

Haymaking. — The term ” haymaking ” signifies the process of drying and curing grass or other herbage so as to fit it for storage in stacks or sheds for future use. As a regular part of farm work it was unknown in ancient times. Before its introduc- tion into Great Britain the animals intended for beef and mutton were slaughtered in autumn and salted down; the others were turned out to fend for themselves, and often lost all the fat in winter they had gained the previous summer. The introduction of haymaking gave unlimited scope for the production of winter food, and improved treatment of live stock became possible.

Though every country has its own methods of haymaking, the principal stages in the process everywhere are: (1) mowing, (2) drying or ” making,” (3) ” carrying ” and storage in stacks or sheds.

In a wet district such as the west of Ireland the ” making ” is a difficult affair and large quantities of hay are often spoiled, while much labour has to be spent in cocking up, turning over, ricking, &c, before it is fit to be stacked up. On the other hand, in the dry districts of south-eastern England it is often possible to cut and carry the hay without any special ” making,” as the

sun and wind will dry it quickly enough to fit it for stacking up without the expenditure of much labour. This rule also applies to dry countries like the United States and several of the British colonies, and it is for this reason that most of the modern imple- ments used for quickly handling a bulk of hay have been invented or improved in those countries. Forage of all kinds intended for hay should be cut at or before the flowering stage if possible. The full growth and food value of the plant are reached then, and further change consists in the formation and ripening of the seed at the expense of the leaves and stems, leaving these hard and woody and of less feeding value.

Grass or other forage, when growing, contains a large pro- portion of water, and after cutting must be left to dry in the sun and wind, a process which may at times be assisted by turning over or shaking up. In fine weather in the south of England grass is sufficiently dried in from two to four days to be stacked straight away. In Scotland or other districts where the rainfall is heavy and the air moist, it is first put into small field- ricks or ” pykes ” of from 10 to 20 cwt. each. In the drying process the 75% of water usually present in grass should be reduced to approximately 15% in the hay, and in wet or broken weather it is exceedingly difficult to secure this reduction. With a heavy crop or in damp weather grass may need turning in the swathe,

raking up into ” windrows,” and then making up into cocks or ” quiles,” i.e. round beehive-like heaps, before it can be ” carried.” A properly made cock will stand bad weather for a week, as only the outside straws are weathered, and there- fore the hay is kept fresh and green. Indeed, it is a good rule always to cock hay, for even in sunny weather undue exposure ends in bleaching, which is almost as detrimental to its quality as wet-weathering.

In the last quarter of the 19th century the methods of hay- making were completely changed, and even some of the principles underlying its practice were revised. Generally speaking, before that time the only implements used were the scythe, the rake and the pitchfork; nowadays — with the exception of the pitchfork — these implements are seldom used, except where the work is carried on in a small way. Instead of the scythe, for instance, the mowing machine is employed for cutting the crop, and with a modern improved machine taking a swathe as wide as 5 or 6 ft. some 10 acres per day can easily be mown by one man and a pair of horses (figs. 1 and 2).

It will be seen from the figures that a mower consists of three principal parts: (1) a truck or carriage on two high wheels carrying the driving gear; (2) the cutting mechanism, comprising a reciprocat- ing knife or sickle operating through slots in the guards or ” fingers ”

Fig. i. — Mower (viewed from above) with enlarged detail of Blade. (Harrison, M’Gregor & Co.)

fastened to the cutting bar which projects to either the right or left of the truck; and (3) the pole with whippletrees, by which the horses are attached to give the motive power. The reciprocating knife has a separate blade to correspond to each finger, and is driven by a connecting rod and crank on the fore part of the truck. In work the pointed ” fingers ” pass in between the stalks of grass and the knives shear them off, acting against the fingers as the crank drives them backwards and forwards. In the swathe of grass left

behind by the machine, the stalks are, in a manner, thatched over one another, so that it is in the best position for drying in the sun, or, per contra, for shedding off the rain if the weather is wet. This is a great point in favour of the use of the machine, because the swathe left by the scythe required to be ” tedded ” out, i.e. the grass had to be

shaken out or spread to allow it to be more easily dried.

After the grass has lain in the swathe a day or two till it is partly dried, it is necessary to turn it over to dry the other side. This used to be done with the hand rake, and a band of men or women would advance in echelon across a field, each turning the

Fig. 2. — Mower (side view).

swathe of hay by regular strokes of the rake at each step: ” driving the dusky wave along the mead ” as described in Thomson’s Seasons. This part of the work was the act of ” haymaking ” proper, and the subject of much sentiment in both prose and poetry. The swathes as laid by the mowing machine lent themselves to this treatment in the old days when the swathe was only some 3 to 4 ft. wide, but with the wide cut of the present day it becomes impracticable. If the hay is turned and ” made ” at all, the operation is now generally performed by a machine made for the purpose. There is a wide selection of ” tedders ” or ” kickers,” and ” swathe-turners ” on the market. The one illustrated in fig. 3 is the first prize winner at the Royal Agricultural Society’s trials (1907). It

Fig. 3. — Swathe-turner. (Blackstone & Co., Ltd.).

takes two swathes at a time, and it will be seen that the working part consists of a wheel or circle of prongs or tines, which revolves across the line of the swathe. Each prong in turn catches the edge of the swathe of grass and kicks it up and over, thus turning it and leaving it loose for the wind to blow through.

The ” kicker ” is mounted on two wheels, and cairies in bearings at the rear of the frame a multiple-cranked shaft, provided with a series of forks sleeved on the cranks and having their upper ends connected by links to the frame. As the crank- shaft is driven from the wheels by proper gearing the forks move

upward and forward, then downward and rearward, in an elliptical path, and kick the hay sharply to the rear, thus scatter- ing and turning it.

It is a moot point, however, whether grass should be turned at all, or left to ” make ” as it falls from the mowing machine. In a dry sunny season and with a moderate crop it is only a waste of time and labour to turn it, for it will be cured quite well as it lies, especially if raked up into loose ” windrows ” a little before carrying to the stack. On the other hand, where the crop is heavy (say over 2 tons per acre) or the climate is wet, turning will be necessary.

With heavy crops of clover, lucerne and similar forage crops, turning may be an absolute necessity, because a thick swathe of a succulent crop will be difficult to dry or ” make ” excepting in hot sunny weather, but with ordinary meadow grass or with a mixture of ” artificial ” grasses it may often be dispensed with. It must be remembered, however, that the process of turning breaks the stalks (thus letting out the albuminoid and saccharine juices), and should be avoided as far as possible in order to save both labour and the quality of the hay.

One of the earlier mechanical inventions in connexion with hay-making was that of the horse rake (fig. 4). Before its introduction the hay, after making, had to be gathered up by the hand rake — a tedious and laborious process — but the introduction of this imple- ment, whereby one horse and one man can do work before requiring six or eight men, marked a great advance. The horse rake is a framework on two wheels carrying hinged steel teeth placed 3 in. apart, so that their points slide along the ground below the hay. In work it gathers up the loose hay, and when full a tipping mechan- ism permits the emptying of the load.

The tipping is effected by pulling down a handle which sets a leverage device in motion, whereby the teeth are lifted up and the load of hay dropped below and left behind. On some rakes a

Fig. 4. — Self-acting Horse Rake. (Ransomes, Sims & Jefferies, Ltd.).

clutch is worked by the driver’s foot, and this put in action causes the ordinary forward revolving motion of the driving wheels to do the tipping.

The loads are tipped end to end as the rake passes and repasses at the work, and thus the hay is left loose in long parallel rows on the field.

Each row is termed a ” windrow,” the passage of the wind through the hay greatly aiding the drying and ” making ” thereof. When hay is in this form it may either be carried direct to the stack if sufficiently ” made,” or else put into cocks to season a little longer. The original width of horse rakes was about 8 ft., but nowadays they range up to 16 and 18 ft. The width should be suited to that of the swathes as left by the mower, and as the latter is now made to cut 5 and 6 ft. wide, it is necessary to have a rake to cover two widths. The very wide rakes are only suitable for even, level land ; those of less width must be used where the land has been laid down in ridge and furrow. As the swathes lie in long parallel rows, it is a great convenience in working for two to be taken in width at a time, so that the horse can walk in the space between.

The side-delivery rake, a development of the ordinary horse rake, is a useful implement, adapted for gathering and laying a quantity of hay in one continuous windrow. It is customary with this to go up the field throwing two swathes to one side, and then back down on the adjacent swathes, so that thus four are thrown into one central windrow. The implement consists of a frame carried on two wheels with shafts for a horse ; across the frame are fixed travelling or revolving prongs of different varieties which pick up the hay off the ground and pass it along sideways across the line of travel, leaving it in one continuous line. Some makes of swathe-turners are designed to do this work as well as the turning of the hay.

Perhaps the greatest improvement of modern times is the method

of carrying the hay from the field to the stack. An American invention known as the sweep rake was introduced by the writer into England in 1894, and now in many modified forms is in very general use in the Midlands and south of England, where the hay is carried from the cock, windrow or swathe straight to the stack. This implement consists of a wheeled framework fitted with long wooden iron-pointed teeth which slide along the ground; two horses are yoked to it — one at each side — the driver directing from a central seat behind the framework. When in use it is taken to the farther end of a row of cocks, a windrow, or even to a row of untouched swathes on the ground, and walked forward. As it advances it scoops up a load,

and when full is drawn to where the stack is being erected (fig. 5). In ordinary circumstances the sweep rake will

Fig. 5. — Sweep Rake.

pick up at a load two-thirds of an ordinary cart-load, but, where the hay is in good order and it is swept down hill, a whole one-horse cart-load can be carried each time. The drier the hay the better will the sweep rake work, and if it is not working sweetly but has a tendency to clog or make rolls of hay, it may be inferred that the latter is not in a condition fit for stacking. Where the loads must be taken through a gateway or a long distance to the stack, it is necessary to use carts or wagons, and the loading of these in the field out of the windrow is largely expedited by the use of the ” loader,” also an American invention of which many varieties are in the market. Generally speaking, it consists of a frame carrying a revolving web with tines or prongs. The implement is hitched on behind a cart or wagon, and as it moves forward the web picks the loose hay off the ground and delivers it on the top, where a man levels it with a pitchfork and builds it into a load ready to move to the stack. At the stack the most convenient method of transferring the hay from a cart, wagon or sweep rake is the elevator, a tall structure with a revolving web carrying teeth or spikes (fig. 6). The hay is thrown in forkfuls on at the bottom, a pony-gear causes the web to revolve, and the hay is carried in an almost continuous stream up the elevator and dropped over the top on to the stack. The whole imple- ment is made to fold down, and is provided with wheels so that it can be moved from stack to stack. In the older forms there is a ” hopper ” or box at the bottom into which the hay is thrown to enable the teeth of the web to catch it, but in the modern forms there is no hopper, the web reaching down to the ground so that hay can be picked up from the ground level. Where the hay is brought to the stack on carts or wagons it can be unloaded by means of the horse fork. This is an adaptation of the principle of the ordinary crane; a central pole and jib are supported by guy ropes, and from the end of the jib a rope runs over a pulley. At the end of this rope is a ” fork ” formed of two sets of prongs which open and shut. This is lowered on to the load of hay, the prongs are forced into it, a horse pulls at the other end of the rope, and the prongs close and ” grab ” several cwt. of hay which are swung up and dropped on the stack. In this way a large cart or wagon load is hoisted on to the stack in three or four ” forkfuls.” The horse fork is not suited for use with the sweep rake, however, because the hay is brought up to the stack in a loose flat heap without sufficient body for the fork to get hold of.

In northern and wet districts of England it is customary to ” make ” the hay as in the south, but it is then built up into little stacks in the field where it grew (ricks, pykes or tramp- cocks are names used for these in different districts), each con- taining about 10 to 15 cwt. These are made in the same way as the ordinary stack— one person on top building, another on the grouud pitching up the hay— and are carefully roped and raked down. In these the hay gets a preliminary sweating or tempering while at the same time it is rendered safe from the weather, and, thus stored, it may remain for weeks before being

carried to the big stacks at the homestead. The practice of putting up the hay into little ricks in the field has brought about the introduction of another set of implements for carrying these to the stackyard.

Various forms of rick-lifters are in use, the characteristic feature of which is a tipping platform on wheels to which a horse is attached between shafts. The vehicle is backed against a rick, and a chain passed round the bottom of the latter, which is then pulled up the slant of the tipped platform by means of a small windlass. When the centre of the balance is passed, the platform carrying the rick tips back to the level, and the whole is thus loaded ready to move Another variety of loader is formed of three shear-legs with block and tackle. These are placed over a rick, under which the grab- irons are passed, and the whole hauled up by a horse. When high enough a cart is backed in below, the rick lowered, and the load is ready to carry away.

When put into a stack the next stage in curing the hay begins— the heating or sweating. In the growing plants the tissues are composed of living cells containing protoplasm. This continues its life action as long as it gets sufficient moisture and air. As life action involves the development of heat, the temperature in a confined space like a stack where the heat is not dissipated may rise to such a point that spontaneous combustion occurs. The chemical or physical reasons for this are not very well under- stood. The starch and sugar contents of the tissues are changed in part into alcohol. In the analogous process of making silage (i.e. stacking wet green grass in a closed building) the alcohol develops into acetic acid, thus making ” sour ” silage. In a hay- stack the intermediate body, acetaldehyde, which is both inflam- mable and suffocating, is produced— men having been suffocated when sleeping on the top of a heating stack. The production of this gas leads to slow combustion and ignition. One explanation of the process is that the protoplasm of the cells acts as a ferment- ing agent (like yeast) until a temperature sufficient to kill germ life, say 150° F., is reached, beyond which the action which leads up to the temperature

of ignition must be purely chemical. If the stack contains no air at all it does not heat, or if it has excess

Fig. 6.— Hay Elevator. (Maldon Iron Works Co.).

of air it is safe. The danger-point in a stack is the centre at about 6 ft. from the ground; below this the weight of the hay itself squeezes out the air, ana at the sides and top the heat is dissipated outwaids. If a stack shows signs of overheating (a process that may take weeks or even months to develop) it can be saved by cutting a gap in the side of it with the hay knife, thus letting out the heat and fumes, and admitting fresh air to the centre. The essential point in haymaking is that the hay should be dried sufficiently to ensure the sweating process in the stack reaching no further than the stage of the formation of

sugar. Good hay should come out green and with the odour of coumarin — to which is due the scent of new-mown hay. Only part of a stack can ever attain to a perfect state: the tops, bottom and outsides are generally wasted by the weather after stacking, while there may be three or four intermediate qualities present. In some markets hay that has been sweated till it is brown in colour is desired, but for general purposes green hay is the best.

Hay often becomes musty when the weather during ” making ” has been too wet to allow of its getting sufficiently dry for stack- ing. Mustiness is caused by the growth of various moulds (Penicillium, Aspergillus, &c.) on the damp stems, with the result that the hay when cut out for use is dusty and shows white streaks and spots. Such hay is inferior to that which has been overheated, and in practice it is found that a strong heating will prevent mouldiness by killing the fungi.

Heavy lush crops — especially those containing a large propor- tion of clover or other leguminous plants — are proportionately more difficult to ” make ” than light grassy ones. Thus, if one ton is taken as a fair yield off one acre, a two-ton crop will probably require four times as much work in curing as the smaller crop. In the treacherous climate of Great Britain hay is frequently spoiled because the weather does not hold good long enough to permit of its being properly ” made.” Consequently many experienced haymakers regard a moderate crop as the more profitable because it can be stacked in first-class

condition, whereas a heavy crop forced by ” high farming ” is grown at a loss, owing to the weather waste and the heavier expenses involved in securing it.

In handling or marketing out of the stack hay may be transported loose on a cart or wagon, but it is more usual to truss or bale it. A truss is a rectangular block cut out of the solid stack, usually about 3 ft. long and 2 ft. wide, and of a thickness sufficient to give a weight of 56 lb : thirty-six of these constitute a ” load ” of 18 cwt. — the unit of sale in many markets. A truss is generally bound with two bands of twisted straw, but if it has to undergo much handling it is compressed in a hay-press and tied with two string bands. In some districts a baler is used : a square box with a compressible lid. The hay is tumbled in loose, the lid forced down by a leverage arrangement and the bale tied by three .strings. It is usually made to weigh from 1 to 1 \ cwt. The customs of different markets vary very much in their methods of handling hay, and in the overseas hay trade the size and style of the trusses or bales are adapted for packing on ship-board.

HAYASHI, TADASU, Count (1850-), Japanese states- man, was born in Tokyo (then Yedo), and was one of the first batch of students sent by the Tokugawa government to study in England. He returned on the eve of the abolition of the Shogunale, and followed Enomoto (q.v.) when the latter, sailing with the Tokugawa fleet to Yezo, attempted to establish a republic there in defiance of the newly organized government of the emperor. Thrown into prison on account of this affair, Hayashi did not obtain office until 187 1. Thereafter he rose rapidly, until, after a long period of service as vice-minister of foreign affairs, he was appointed to represent his country first in Peking, then in St Petersburg and finally in London, where he acted an important part in negotiating the first Anglo- Japanese Alliance, for which service he received the title of viscount. He remained in London throughout the Russo- Japanese War, and was the first Japanese ambassador at the court of St James after the war. Returning to Tokyo in 1906 to take the portfolio of foreign affairs, he remained in office until the resignation of the Saionji cabinet in 1908. He was raised to the rank of count for eminent services performed during the war between his country and Russia, and in connexion with the second Anglo-Japanese Alliance of 1905.

HAYDEN, FERDINAND VANDEVEER (1829-1S87), American geologist, was born at Westfield, Massachusetts, on the 7th of September 1829. He graduated from Oberlin College in 1850 and from the Albany Medical College in 1853, where he attracted the notice of Professor James Hall, state geologist of New York, through whose

influence he was induced to join in an exploration of Nebraska. In 1856 he was engaged under the United States government, and commenced a series of investigations of the

Western Territories, one result of which was his Geological Report of the Exploration of the Yellowstone and Missouri Rivers in 1859-1860 (1869). During the Civil War he was actively employed as an army surgeon. In 1867 he was appointed geologist-in-charge of the United States Geological and Geo- graphical Survey of the Territories, and from his twelve years of labour there resulted a most valuable series of volumes in all branches of natural history and economic science; and he issued in 1877 his Geological and Geographical Atlas of Colorado. Upon the reorganization and establishment of the United States Geological Survey in 1879 he acted for seven years as one of the geologists. He died at Philadelphia on the 22nd of December

1887.

His other publications were: Sun Pictures of Rocky Mountain Scenery (1870); _ The Yellowstone National Park, illustrated by chromolithographic reproductions of water-colour sketches by Thomas Moran (1876) ; The Great West : its Attractions and Resources (1880). With F. B. Meek, he wrote {Smithsonian Institution Contributions, v. 14. Art. 4) ” Palaeontology of the Upper Missouri, Pt. I, Inverte- brate.” His valuable notes on Indian dialects are in The Transactions of the American Philosophical Society (1862). in The American Journal of Science (1862) and in The Proceedings of the American Philosophical Society (1869). With A. R. C. Selwyn he wrote North America (1883) for Stanford’s Compendium.

HAYDN, FRANZ JOSEPH (1732-1809), Austrian composer, was born on the 3 1st of March 1 73 2 at Rohrau (Trstnik) , a village on the borders of Lower Austria and Hungary. There is sufficient evidence that his family was of Croatian stock: a fact which throws light upon the distinctively Slavonic character of much of his music. He received the first rudiments of education from his father, a wheelwright with twelve children, and at an early age evinced a decided musical talent. This attracted the atten- tion of a distant relative named Johann Mathias Frankh, who was schoolmaster in the neighbouring town of Hainburg, and who, in 1738, took the child and for the next two years trained him as a chorister. In 1740, on the recommendation of the Dean of Hainburg, Haydn obtained a place in the cathedral choir of St Stephen’s, Vienna, where he took the solo-part in the services and received, at the choir school, some further instruction on the violin and the harpsichord. In 1749 his voice broke, and the director, Georg

von Reutter, took the occasion of a boyish escapade to turn him into the streets. A few friends lent him money and found him pupils, and in this way he was enabled to enter upon a rigorous course of study (he is said to have worked for sixteen hours a day), partly devoted to Fux's treatise on counterpoint, partly to the " Friedrich " and " Wurttemberg " sonatas of C. P. E. Bach, from which he gained his earliest acquaintance with the principles of musical structure. The first fruits of his work were a comic opera, Der neue krumme Teufel, and a Mass in F major (both written in 1751), the former of which was produced with success. About the same time he made the acquaintance of Metastasio, who was lodging in the same house, and who introduced him to one or two patrons; among others Sefior Martinez, to whose daughter he gave lessons, and Porpora, who, in 1753, took him for the summer to Manners- dorf, and there gave him instruction in singing and in the Italian language.

The turning-point of his career came in 175s, when he accepted an invitation to the country-house of Freiherr von Fiirnberg, an accomplished amateur who was in the habit of collecting parties of musicians for the performance of chamber-works. Here Haydn wrote, in rapid succession, eighteen divertimenti which include his first symphony and his first quartet; the two earliest examples of the forms with which his name is most closely associated. Thenceforward his prospects improved. On his return to Vienna in 1756 he became famous as teacher and composer, in 1759 he was appointed conductor to the private band of Count Morzin, for whom he wrote several orchestral works (including a symphony in D major erroneously called his first), and in 1760 he was promoted to the sub-directorship of Prince Paul Esterhazy's Kapelle, at that time the best in Austria. During the tenure of his appointment with Count Morzin he married the daughter of a Viennese hairdresser named Keller, who had befriended him in his days of poverty, but the

marriage turned out ill and he was shortly afterwards separated from his wife, though he continued to support her until her death in 1800. From 1760 to 1790 he remained with the Esterhazys, principally at their country-seats of Esterhaz and Eisenstadt, with occasional visits to Vienna in the winter. In 1762 Prince Paul Esterhazy died and was succeeded by his brother Nicholas, surnamed the Magnificent, who increased Haydn's salary, showed him every mark of favour, and, on the death of Werner in 1766, appointed him Oberkapellmeister. With

the encourage- ment of a discriminating patron, a small but excellent orchestra and a free hand, Haydn made the most of his opportunity and produced a continuous stream of compositions in every known musical form. To this period belong five Masses, a dozen operas, over thirty clavier-sonatas, over forty quartets, over a hundred orchestral symphonies and overtures, a Stabat Mater, a set of interludes for the service of the Seven Words, an Oratorio Tobias written for the Tonkiinstler-Societat of Vienna, and a vast number of concertos, divertimenti and smaller pieces, among which were no less than 175 for Prince Nicholas' favourite instrument, the baryton.

Meanwhile his reputation was spreading throughout Europe. A Viennese notice of his appointment as Oberkapellmeister spoke of him as " the darling of our nation," his works were reprinted or performed in every capital from Madrid to St Petersburg. He received commissions from the cathedral of Cadiz, from the grand duke Paul, from the king of Prussia, from the directors of the Concert Spiriluel at Paris; beside his transactions with Breitkopf and Hartel, and with La Chevardiere, he sold to one English firm the Copyright of no less than 129 compositions. But the most important fact of biography during these thirty years was his friendship with Mozart, whose acquaintance he made at Vienna in the winter of 1 781-1 782. There can have been little personal intercourse between them, for Haydn was rarely in the capital, and Mozart seems never to have visited Eisenstadt; but the cordiality of their relations and the mutual influence which they exercised upon one another are of the highest moment in the history of 18th-century music. " It was from Haydn that I first learned to write a quartet," said Mozart; it was from Mozart that Haydn learned the richer style and the fuller mastery of orchestral effect by which his later symphonies are distinguished.

In 1790 Prince Nicholas Esterhazy died and the Kapelle was disbanded. Haydn, thus released from his official duties, forth- with accepted a commission from Salomon, the London concert- director, to write and conduct six symphonies for the concerts in the Hanover Square Rooms. He arrived in England at the beginning of 1791 and was welcomed with the greatest enthusiasm, receiving among other honours the degree of D Mus. from the university of Oxford. In June 1792 he returned home, and, breaking his journey at Bonn, was presented with a Cantata by Beethoven, then aged two-and-twenty, whom he invited to come to Vienna as his pupil. The lessons, which were not very success- ful, lasted for about a year, and were then interrupted by Haydn's second visit to England (January 1794 to July 1795), where he produced the last six of his " Salomon " symphonies. From 1795 onward he resided in the Mariahilf suburb of Vienna, and

there wrote his last eight Masses, the last and finest of his chamber works, the Austrian national anthem (1797), the Creation (1799) and the Seasons (1801). His last choral composition which can be dated with any certainty was the Mass in C minor, written in 1802 for the name-day of Princess Esterhazy. Thence- forward his health declined, and his closing years, surrounded by the love of friends and the esteem of all musicians, were spent almost wholly in retirement. On the 27th of March 1808 he was able to attend a performance of the Creation, given in his honour, but it was his last effort, and on the 31st of May 1809 he died, aged seventy-seven. Among the mourners who followed him to the grave were many French officers from Napoleon's army, which was then occupying Vienna.

Haydn's place in musical history is best determined by his instrumental compositions. His operas, for all their daintiness and melody, no longer hold the stage; the Masses in which he

" praised God with a cheerful heart " have been condemned by the severer decorum of our own day; of his oratorios the Creation alone survives. In all these his work belongs mainly to the style and idiom of a bygone generation: they are monu- ments, not landmarks, and their beauty and invention seem rather to close an epoch than to inaugurate its successor. Even the na'if pictorial suggestion, of which free use is made in the Creation and in the Seasons, is closer to the manner of Handel than to that of the 19th century: it is less the precursor of romance than the descendant of an earlier realism. But as the first great master of the quartet and the symphony his claim is incontestable. He began, half-consciously, by applying through the fuller medium the lessons of design which he had learned from C. P. E. Bach's sonatas; then the medium itself began to suggest wider horizons and new possibilities of treat- ment; his position at Eisenstadt enabled him to experiment without reserve; his genius, essentially symphonic in character, found its true outlet in the opportunities of pure musical structure. The quartets in particular exhibit a wider range and variety of structural invention than those of any other composer except Beethoven. Again it is here that we can most readily trace the important changes- which he wrought in melodic idiom. Before his time instrumental music was chiefly written for the Paradiesensaal, and its melody often sacrificed vitality of idea to a ceremonial courtliness of phrase. Haydn broke through this convention by frankly introducing his native folk-music, and by writing many of his own tunes in the same direct, vigorous and simple style. The innovation was at first received with some disfavour; critics accustomed to polite formalism censured it as extravagant and undignified; but the freshness and beauty of its melody soon silenced

all opposition, and did more than anything else throughout the 18th century to establish the principle of nationalism in musical art. The actual employment of Croatian folk-tunes may be illustrated from the string quartets Op. 17, No. 1; Op. 33. No. 3; Op. 50, No. 1; Op. 77, No. 1, and the Salomon Symphonies in D and Eb, while there is hardly an instrumental composition of Haydn's in which his own melodies do not show some traces of the same influence. His natural idiom in short was that of a heightened and ennobled folk-song, and one of the most remarkable evidences of his genius was the power with which he adapted all his perfection and symmetry of style to the requirements of popular speech. His music is in this way singularly expressive ; its humour and pathos are not only absolutely sincere, but so outspoken that we cannot fail to catch their significance.

In the development of instrumental polyphony Haydn's work was almost as important as that of Mozart. Having at his disposal a band of picked virtuosi he could produce effects as different from the tentative experiments of C. P. E. Bach as these were from the orchestral platitudes of Reutter or Hasse. His symphony Le Midi (written in 1761) already shows a remark- able freedom and independence in the handling of orchestral forces, and further stages of advance were reached in the oratorio of Tobias, in the Paris and Salomon symphonies, and above all in the Creation, which turns to good account some of the debt which he owed to his younger contemporary. The importance of this lies not only in a greater richness of musical colour, but in the effect which it produced on the actual substance and texture of composition. The polyphony of Beethoven was unquestionably influenced by it and, even in his latest sonatas and quartets, may be regarded as its logical outcome.

The compositions of Haydn include 104 symphonies, 16 overtures, 76 quartets, 68 trios, 54 sonatas, 31 concertos and a large number <5f divertimentos, cassations and other instrumental pieces ; 24 operas and dramatic pieces, 16 Masses, a Stabat Mater, interludes for the " Seven Words," 3 oratorios, 2 Te Deums and many smaller pieces for the church, over 40 songs, over 50 canons and arrangements of Scottish and Welsh national melodies.

His younger brother, Johann Michael Haydn (173 7-1 806), was also a chorister at St Stephen's, and shortly after leaving the choir-school was appointed Kapellmeister at Grosswardein (i7SS) and at Salzburg (1762). The latter office he held for forty- three years, during which time he wrote over 360 compositions

HAYDON, B. R.

in

for the church and much instrumental music, which, though unequal, deserves more consideration than it has received. He was the intimate friend of Mozart, who had a high opinion of his genius, and the teacher of C. M. von Weber. His most important works were the Missa kispanica, which he exchanged for his diploma at Stockholm, a Mass in D minor, a Lauda Sion, a set of graduals, forty-two of which are reprinted in Diabelli's Ecclesiasticon, three symphonies (1785), and a string quintet in C major which has been erroneously attri- buted to Joseph Haydn. Another brother, Johann Evangelist Haydn (1743-1805), gained some reputation as a tenor vocalist, and was for many years a member of Prince Esterhazy's Kapelle.

Bibliography. — S. Mayr, Brevi notizie storiche della vita e delle opere di Giuseppe Haydn (1809); Griesinger, Biographische Notizen iiber Joseph Haydn (1810); Carpani, Le Haydeni (1812 and 1823); Bombet (M. de Stendhal), Vies de Haydn, de Mozart et de Metastase (Paris, 1854) ; Karajan, Joseph Haydn in London (1861) ; C. F. Pohl, Mozart und Haydn in London (1867); Joseph Haydn (vol. i. 1875, vol. ii. 1882 : this, the standard biography, was left unfinished at Dr Pohl's death and needs a third volume to complete it) ; article on Haydn in Grove's Dictionary of Music and Musicians; Fr. S. Kuhac, Josip Haydn i Hravatske Narodne Popievke (Joseph Haydn and the Croatian Folk-songs) (Agram, 1880); A. Niggli, Joseph Haydn, sein Leben und Werken (Basel, 1882); L. Nohl, Biographic Haydns (Leipzig, Reclam) ; P. D. Townsend; Joseph Haydn .(London, 1884), Biography in H. Reimann's Beruhmte Musiker (Berlin, 1898) ; J. C. Hadden, Joseph Haydn (Great Musicians series) (London, 1902). To these should be added the list of Haydn's sym- phonies printed in Alfred Wotquenne's Catalogue de la Bibliotheque du Conservatoire Royal de Bruxelles, vol. ii. (1902). (W. H. Ha.)

HAYDON, BENJAMIN ROBERT (1786-1846), English historical painter and writer, was born at Plymouth on the 26th of January 1786. His mother was the daughter of the Rev. Benjamin Cobley, rector of Dodbrook, Devon, whose son, General Sir Thomas Cobley, signalized himself in the Russian service at the siege of Ismail. His father, a prosperous printer, stationer and publisher, was a man of literary taste, and was well known and esteemed amongst all classes in Plymouth. Haydon, an only son, at an early date gave evidence of his taste for study, which was carefully fostered and promoted by his mother. At the age of six he was placed in Plymouth grammar school, and at twelve in Plympton St Mary school. He completed his education in this institution, where Sir Joshua Reynolds also had

acquired all the scholastic training he ever received. On the ceiling of the school-room was a sketch by Reynolds in burnt cork, which it used to be Haydon's delight to sit and contemplate. Whilst at school he had some thought of adopting the medical profession, but he was so shocked at the sight of an operation that he gave up the idea. A perusal of Albinus, however, inspired him with a love for anatomy; and Reynolds's discourses revived within him a smouldering taste for painting, which from childhood had been the absorbing idea of his mind.

Sanguine of success, full of energy and vigour, he started from the parental roof, on the 14th of May 1804, for London, and entered his name as a student of the Royal Academy. He began and prosecuted his studies with such unwearied ardour that Fuseli wondered when he ever found time to eat. At the age of twenty-one (1807) Haydon exhibited, for the first time, at the Royal Academy, " The Repose in Egypt," which was bought by Mr Thomas Hope the year after. This was a good start for the young artist, who shortly received a commission from Lord Mulgrave and an introduction to Sir George Beaumont. In 1809 he finished his well-known picture of " Dentatus," which, though it brought him a great increase of fame, involved him in a lifelong quarrel with the Royal Academy, whose committee had hung the picture in a small side-room instead of the great hall. In 1810 his difficulties began through the stoppage of an allowance of £200 a year he had received from his father. His disappointment was embittered by the controversies in which he now became involved with Sir George Beaumont, for whom he had painted his picture of " Macbeth," and Payne Knight, who had denied the beauties as well as the money value of the Elgin Marbles. " The Judgment of Solomon," his next pro-

duction, gained him £700, besides £100 voted to him by the directors of the British Institution, and the freedom of the borough of Plymouth. To recruit his health and escape for a time from the cares of London life, Haydon joined his intimate friend Wilkie in a trip to Paris; he studied at the Louvre; and on his return to England produced his " Christ's Entry into Jerusalem," which afterwards formed the nucleus of the American Gallery of Painting, erected by his cousin, John Haviland of Philadelphia. Whilst painting another large work, the " Resurrection of Lazarus," his pecuniary difficulties increased, and for the first time he was arrested but not im- prisoned, the sheriff-officer taking his word for his appearance. Amidst all these harassing cares he married in October 1821 a beautiful young widow who had some children, Mrs Hyman, to whom he was devotedly attached.

In 1823 Haydon was lodged in the King's Bench, where he received consoling letters from the first men of the day. Whilst a prisoner he drew up a petition to parliament in favour of the appointment of " a committee to inquire into the state of en- couragement of historical painting," which was presented by Brougham. He also, during a second imprisonment in 1827, produced the picture of the " Mock Election," the idea of which had been suggested by an incident that happened in the prison. The king (George IV.) gave him £500 for this work. Among Haydon's other pictures were — 1829, " Eucles " and " Punch "; 1 83 1, "Napoleon at St Helena," for Sir Robert Peel; "Xeno- phon, on his Retreat with the ' Ten Thousand,' first seeing the Sea"; and "Waiting for the Times," purchased by the marquis of Stafford; 1832, " Falstaff " and " Achilles playing the Lyre." In 1834 he completed the " Reform Banquet," for Lord Grey — this painting contained 197 portraits; in 1843, " Curtius Leaping into the Gulf," and " Uriel and Satan." There was also the " Meeting of the Anti-Slavery Society," energetically treated, now in the National Portrait Gallery. When the competition took place at Westminster Hall, Haydon sent two cartoons, " The Curse of Adam " and " Edward the Black Prince," but, with some unfairness, he was not allowed a prize for either. He then painted " The Banishment of Aris- tides," which was exhibited with other productions under the same roof where the American dwarf Tom Thumb was then making his debut in London. The exhibition was unsuccessful; and the artist's difficulties increased to such an extent that, whilst employed on his last grand effort, " Alfred and the Trial by Jury," overcome by debt, disappointment and ingratitude, he wrote " Stretch me no longer on this rough world," and put an end to his existence with a pistol-shot, on the 22nd of June 1846, in the sixty-first year of his age. He left a widow and three children (various others had died), who, by the generosity of their father's friends, were rescued from their pecuniary diffi- culties and comfortably provided for; amongst the foremost of these friends were Sir Robert Peel, Count D'Orsay, Mr Justice Talfourd and Lord Carlisle.

Haydon began his first lecture on painting and design in 1835, and afterwards visited all the principal towns in England and Scotland. His delivery was energetic and imposing, his language powerful, flowing and apt, and replete with wit and humour; and to look at the lecturer, excited by his subject, one could scarcely fancy him a man overwhelmed with difficulties and anxieties. The height of Haydon's ambition was to behold the chief buildings of his country adorned with historical repre- sentations of her glory. He lived to see the acknowledgment of his principles by government in the establishment of schools of design, and the embellishment of the new houses of

parliament; but in the competition of artists for the carrying out of this object, the commissioners (amongst whom was one of his former pupils) considered, or affected to consider, that he had failed. Haydon was well versed in all points of his profession; and his Lectures, which were published shortly after their delivery, showed that he was as bold a writer as painter. It may be mentioned in this connexion that he was the author of the long and elaborate article, ” Painting,” in the 7th edition of the Encyclopaedia Britannica.

112

HAYES, R.

B.

To form a correct estimate of Haydon it is necessary to read his autobiography. This is one of the most natural books ever written, full of various and abundant power, and fascinating to the reader. The author seems to have daguerreotyped his feelings and sentiments without restraint as they rose in his mind, and his portrait stands in these volumes limned to the life by his own hand. His love for his art was both a passion and a principle. He found patrons difficult to manage; and, not having the tact to lead them gently, he tried to drive them fiercely. He failed, abused patrons and patronage, and intermingled talk of the noblest independence with acts not always dignified. He was self-willed to perversity, but his perseverance was such as is seldom associated with so much vehemence and passion. With a large fund of genuine self-reliance he combined a considerable measure of vanity. To the last he believed in his own powers and in the ultimate triumph of art. In taste he was deficient, at least as concerned himself. Hence the tone of self- assertion which he assumed in his advertisements, catalogues and other appeals to the public. He proclaimed himself the apostle and martyr of high art, and, not without some justice, he believed himself to have on that account a claim on the sympathy and support of the nation. It must be confessed that he often tested severely those whom he called his friends. Every reader of his autobiography will be struck at the frequency and fervour of the short prayers interspersed throughout the work. Haydon had an overwhelming sense of a personal, overruling and merciful providence, which influenced his relations with his family, and to some extent with the world. His conduct as a husband and father entitles him to the utmost sympathy. In art his powers and attainments were undoubtedly very great, although his actual performances mostly fall short of the faculty which was manifestly within him; his general range and force of mind were also most

remarkable, and would have qualified him to shine in almost any path of intellectual exertion or of practical work. His eager and combative character was partly his enemy; but he had other enemies actuated by motives as unworthy as his own were always high-pitched and on abstract grounds laudable. Of his three great works — the ” Solomon,” the ” Entry into Jerusalem ” and the ” Lazarus ” — the second has generally been regarded as the finest. The ” Solomon ” is also a very admirable production, showing his executive power at its loftiest, and of itself enough to place Haydon at the head of British historical painting in his own time. The ” Lazarus ” (which belongs to the National Gallery, but is not now on view there) is a more unequal performance, and in various respects open to criticism and censure; yet the head of Lazarus is so majestic and impressive that, if its author had done nothing else, we must still pronounce him a potent pictorial genius.

The chief authorities for the life of Haydon are Life of B. R. Haydon, from his Autobiography and Journals, edited and compiled by Tom Taylor (3 vols., 1853); and B. R. Haydon’ ‘s Correspondence and Table Talk, with a memoir by his son, F. W. Haydon (2 vols., 1876). (W. M. R.)

HAYES, RUTHERFORD BIRCHARD (1822-1803), nine- teenth president of the United States, was born in Delaware, Ohio, on the 4th of October 1822. He received his first education in the common schools, graduated in 1842 at Kenyon College, Gambier, Ohio, and was a student at the law school of Harvard University from 1843 until his graduation in 1845. He was admitted to the bar in 1845, and practised law, first at Lower Sandusky (now Fremont), and then at Cincinnati, where he won a very respectable standing, and in 1858-1861 served as city solicitor. In politics he was at first an anti-slavery Whig and then from the time of its organization in 1854 until his death was a member of the Republican party. In December 1852 he married Lucy Ware Webb of Chillicothe, Ohio, who survived him. After the breaking out of the Civil War the governor of Ohio, on the 7th of June 1861, appointed hirn a major of a volunteer regiment, and in July he was sent to western Virginia tor active service. He served throughout the war, distinguished himself particularly at South Mountain, Winchester, Fisher’s Hill and Cedar Creek, and by successive promotions’ became a brigadier-general of volunteers and, by brevet, a major-general

of volunteers. While still in the field he was elected a member of the National House of Representatives, and took his seat in December 1865. He was re-elected in 1866, and supported the reconstruction

measures advocated by his party. Prom 1868 to 1872 he was governor of Ohio. In 1873 he removed from Cincinnati to Fremont, his intention being to withdraw from public life; but in 1875 the Republican party in Ohio once more selected him as its candidate for the governorship. He accepted the nomination with great reluctance. The Democrats adopted a platform declaring in favour of indefinitely enlarging the volume of the irredeemable paper currency which the Civil War had left behind it. Hayes stoutly advocated the speediest practicable resumption of specie payments, and carried the election. The " sound-money campaign " in Ohio having attracted the attention of the whole country, Hayes was marked out as a candidate for the presidency, and he obtained the nomination of the Republican National Convention of 1876, his chief competitor being James G. Blaine. The candidate of the Democratic party, Samuel J. Tilden, by his reputation as a states-man and a reformer of uncommon ability, drew many Republican votes. An excited controversy having arisen about the result of the balloting in the states of South Carolina, Florida, Oregon and Louisiana, the two parties in Congress in order to allay a crisis dangerous to public peace agreed to pass an act referring all contested election returns to an extraordinary commission, called the " Electoral Commission " (q.v.), which decided each contest by eight against seven votes in favour of the Republican candidates. Hayes was accordingly on the 2nd of March 1877 declared duly elected.

During his administration President Hayes devoted his efforts mainly to civil service reform, resumption of specie pay- ments and the pacification of the Southern States, recently in rebellion. In order to win the co-operation of the white people in the South in maintaining peace and order, he put himself in communication with their leaders. He then withdrew the Federal troops which since the Civil War had been stationed at the southern State capitals. An end was thus made of the " carpet-bag governments " conducted by Republican politicians from the North, some of which were very corrupt, and had been upheld mainly by the Federal forces. This policy found much favour with the people generally, but displeased many of the Republican politicians, because it loosened the hold of the Republican party upon the Southern States. Though it did not secure to the negroes sufficient protection in the exercise of their political rights, it did much to extinguish the animosities still existing between the two sections of the Union and to promote the material prosperity of the South. President Hayes en- deavoured in vain to induce Congress to appropriate money for a Civil Service Commission; and whenever he made an effort to restrict the operation of the traditional " spoils system," he met the strenuous opposition of a majority of the most

powerful politicians of his party. Nevertheless the system of competitive examinations for appointments was introduced in some of the great executive departments in Washington, and in the custom-house and the post-office in New York. Moreover, he ordered that ” no officer should be required or permitted to take part in the management of political organizations, caucuses, conventions or election campaigns,” and that ” no assessment for political purposes on officers or subordinates should be allowed “; and he removed from their offices the heads of the post-office in St Louis and of the custom-house in New York — influential party managers — on the ground that they had misused their official positions for partisan ends. In New York the three men removed were Chester A. Arthur, the collector; Alonzo B. Cornell, the naval officer of the Port; and George H. Sharpe, the surveyor of the customs. While these measures were of limited scope and effect, they served greatly to facilitate the more extensive reform of the civil service which subsequently took place, though at the same time they alienated a powerful faction of the Republican party in New York under the leadership of Roscoe Conkling. Although the resumption of specie payments had been provided for, to begin at a given

time by the Resumption Act of January 1875, opposition to it did not cease. A bill went through both Houses of Congress providing that a silver dollar should be coined of the weight of 412I grains, to be full legal tender for all debts and dues, public and private, except where otherwise expressly stipulated in the contract. President Hayes returned this bill with his veto, but the veto was overruled in both Houses of Congress. Meanwhile, however, the preparations for the return to specie payments were continued by the Administration with unflinching constancy and on the 1st of January 1879 specie payments were resumed without difficulty. None of the evils predicted appeared. A marked revival of business and a period of general prosperity ensued. In his annual message of the 1st of December 1879 President Hayes urged the suspension of the silver coinage and also the withdrawal of the United States legal tender notes, but Congress failed to act upon the recommendation. His ad- ministration also did much to ameliorate the condition of the Indian tribes and to arrest the spoliation of the public forest lands.

Although President Hayes was not popular with the pro- fessional politicians of his own party, and was exposed to bitter attacks on the

part of the Democratic opposition on account of the cloud which hung over his election, his conduct of public affairs gave much satisfaction to the peopk generally. In the presidential election of 1880 the Republican party carried the day after an unusually quiet canvass, a result largely due to popular contentment with the then existing state of public affairs. On the 4th of March 1881 President Hayes retired to his home at Fremont, Ohio. Various universities and colleges conferred honorary degrees upon him. His remaining years he devoted to active participation in philanthropic enterprises; thus he served as president of the National Prison Association and of the Board of Trustees chosen to administer the John F. Slater fund for the promotion of industrial education among the negroes of the South, and was a member, also, of the Board of Trustees of the Peabody Education fund for the promotion of education in the South. He died at Fremont, after a short ill- ness, on the 17 th of January 1893.

There is no adequate biography, but three ” campaign lives ” may be mentioned: Life, Public Services and Select Speeches of Rutherford B. Haves, by James Quay Howard (Cincinnati, 1876); Life of R. B. Hayes, by William D. Howells (New York, 1876); and a Life by Russell H. C’onwell (Boston, 1876). See also Paul L. Haworth, The Hayes-Tilden Disputed Presidential Election of 1876 (Cleveland, O., 1906). (C. S.)

HAY FEVER, Hay Asthma, or Summer Catarrh, a catarrhal affection of the mucous membrane of the upper respiratory tract, due to the action of the pollen of certain grasses. It is often associated with asthmatic attacks. The disease affects certain families, and is hereditary in about one-third of the cases. It is more common among women than men, city than country dwellers, and the educated and highly nervous than the lower classes. It has no connexion with the coryzas that are produced in nervous people by the odour of cats, &c. The complaint has been investigated by Professor W. P. Dunbar of Hamburg, who has shown that it is due to the pollens of certain grasses (notably rye) and plants, and that the severity of the attack is directly proportional to the amount of pollen in the air. He has isolated an albuminoid poison which, when applied to the nose of a susceptible individual, causes an attack, while there is no result in the case of a normal person. By injecting the poison into animals, he has obtained an anti-toxin, which is capable of aborting an attack of hay fever. The symptoms are those commonly experienced in the case of a severe cold, consisting of headache, violent sneezing and watery discharge from the nostrils and eyes, together with a hard dry cough, and occasionally severe asthmatic paroxysms. The period of liability to infection naturally coincides with the pollen season.

The radical treatment is to avoid vegetation. Local treat- ment consisting of thorough destruction of the sensitive area of the mucous membrane of the nose often produces good results. There are various drugs, the best of which are cocaine and the extract of the suprarenal body, which, when applied to the nose,

are sometimes effectual; in practice, however, it is found that larger and larger doses are required, and that sooner or later they afford no relief. The same remarks apply to a number of patent specifics, of which the principal constituent is one of the above drugs. An additional and stronger objection to the use of cocaine is that a ” habit ” is often contracted, with the most disastrous results. Finally Dunbar’s serum may be applied to the nose and eyes on rising, and on the slightest suggestion of irritation during the day; it will, in the large majority of cases, be found to be quite effectual.

HAYLEY, WILLIAM (1745-1820), English writer, the friend and biographer of William Cowper, was born at Chichester on the 9th of November 1745. He was sent to Eton in 1757, and to Trinity Hall, Cambridge, in 1763; his connexion with the Middle Temple, London, where he was admitted in 1766, was merely nominal. In 1767 he left Cambridge and went to live in London. Two years later he married Eliza, daughter of Thomas Ball, dean of Chichester. His private means enabled Hay ley to live on his patrimonial estate at Eartham, Sussex, and he retired there in 1774. He had already written many occasional poetical pieces, when in 1771 his tragedy, The Afflicted Father, was rejected by David Garrick. In the same year his translation of Pierre Corneille’s Rodogune as The Syrian Queen was also declined by George Colman. Hayley won the fame he enjoyed amongst his contemporaries by his poetical Essays and Epistles; a Poetical Epistle to an Eminent Painter (1780), addressed to his friend George Romney, an Essay on History (1780), in three epistles, addressed to Edward Gibbon: Essay on Epic Poetry (1782) addressed to William Mason; A Philosophical Essay on Old Maids (1785); and the Triumphs of Temper (1781). Thelast- mentioned work was so popular as to run to twelve or fourteen editions; together with the Triumphs of Music (Chichester, 1804) it was ridiculed by Byron in English Bards and Scotch Reviewers. So great was Hayley’s fame that on Thomas Warton’s death in 1790 he was offered the laureateship, which he refused. In 1792, while writing the Life of Milton (1794), Hayley made Cowper’s acquaintance. A warm friendship sprang up between the two which lasted till Cowper’s death in 1800. Hayley indeed was mainly instrumental in getting Cowper his pension. In 1800 Hayley also lost his natural son, Thomas Alphonso Hayley, to whom he was devotedly attached. He had been a pupil of John Flaxman’s, to whom.

Hayley's Essay on Sculpture (1800) is addressed. Flaxman introduced William Blake to Hayley, and after the latter had moved in 1800 to his " marine hermitage " at Felpham, Sussex, Blake settled near him for three years to engrave the illustrations for the Life of Cowper. This, Hayley's best known work, was published in 1803-1804 (Chichester) in 3 vols. In 1805 he published Ballads founded on Anecdotes of Animals (Chichester), with illustrations by Blake, and in 1809 The Life of Romney. For the last twelve years of his life Hayley received an allowance for writing his Memoirs. He died at Felpham on the 12th of November 1820. Hayley's first wife died in 1797; her mind had been seriously affected, and since 1789 they had been separated. He married in 1809 Mary Welford, but they also separated after three years. He left no children.

Hayley's Poetical Works were published in 3 vols. (1785); his Poems and Plays in 6 vols. (1788).

See Memoirs . . . of William Hayley . . . and Memoirs of his son T. A. Hayley, ed. John Johnson (2 vols., 1823) (containing many of Hayley's letters) ; an article on these memoirs by Robert Southey in the Quarterly Review, vol. xxxi., 1825; William Blake, by A. C. Swinburne (2nd ed., 1868, pp. 28 et seq.); Life of William Blake, by Alexander Gilchrist (vol. i., 1880), with some of Blake's letters to Hayley; The Correspondence of William Cowper, arranged by Thomas Wright (vol. iv., 1904), containing many letters to Hayley.

HAYM, RUDOLF (1821-1901), German publicist and philo- sopher, was born at Griinberg, in Silesia, on the 5th of October 1821, and died at St Anton (Arlberg) on the 27th of August 1901. He studied philosophy and theology at Halle and Berlin, and lived at Halle during 1846 and 1847. He was a member of the National Assembly at Frankfort in 1848, and wrote an account of the proceedings from the standpoint of the Right Centre.

From 1851 he lectured in literature and philosophy at the uni- versity of Halle, and became professor in i860. His writings are biographical and critical, devoted mainly to modern German philosophy and literature. In 1870 he published a masterly history of the Romantic school. He also wrote biographies of W. von Humboldt (1856), Hegel (1857), Schopenhauer (1864), Herder (1877-1885), Max Duncker (1890). In 1001 he published Erinnerungen aus meinetn Leben.

HAYNAU, JULIUS JACOB (1786-1853), Austrian general, was the natural son of the landgrave — afterwards elector — of Hesse-Cassel, William IX. He entered the Austrian army as an infantry officer in 1801, and saw much service in the Napoleonic wars. He was wounded at Wagram, and distinguished during the operations in Italy in 1813 and 1814. Between 181 5 and 1847 he rose to the rank of field marshal lieutenant. A violent temper, which he made no attempt to control or conceal, led him into trouble with kis superiors. His hatred of revolu- tionary principles was fanatical. When the insurrectionary move- ments of 1848 broke out in Italy, his known zeal for the cause of legitimacy, as much as his reputation as an officer, marked him out for command. He fought with success in Italy, but was chiefly noted for the severity he showed in suppressing and punishing a rising in Brescia. It ought to be remembered that the mob of Brescia had massacred invalid Austrian soldiers in the hospital, a provocation which always leads to reprisals. In June 1849 Haynau was called to Vienna to command first an army of reserve, and then in the field against the Hungarians. His successes against the declining revolutionary cause were numerous and rapid. In Hungary, as in Italy, he was accused of brutality. It was, for instance, asserted that he caused women who showed any sympathy with the insurgents to be whipped. His ostentatious hatred of the revolutionary parties marked him out as the natural object for these accusations. On the restora- tion of peace he was appointed to high command in Hungary. His temper quickly led him into quarrels with the minister of war, and he resigned his command in 1850. He then travelled abroad. The refugees had spread his evil reputation . In London he was attacked and beaten by Messrs Barclay & Perkins' dray- men when visiting the brewery, and he was saved from mob violence in Brussels with some difficulty. He died on the 14th of March 1853. On the nth of October 1808 Haynau had married Therese von Weber, the daughter of Field Marshal Lieutenant Weber, who was slain at Aspern. She died, leaving one daughter, in 1850.

See R. v. Schonhals, Biographie des K. K. Feldzeugmeisters Julius Freiherrn von Haynau (Vienna, 1875).

HAYNE, ROBERT YOUNG (1791-1839), American political leader, born in St Paul's parish, Colleton district, South Carolina, on the 10th of November 1791. He studied law in the office of Langdon Cheves(1 7 76-1857)ˆ Charleston, S.C., and in November 181 2 was admitted to the bar there, soon obtaining a large practice. For a short time during the War of 181 2 against Great Britain, he was captain in the Third South Carolina Regiment. He was a member of the lower house of the state legislature from 1814 to 1818, serving as speaker in the latter

year; was attorney-general of the state from 1818 to 1822, and in 1823 was elected, as a Democrat, to the United States Senate. Here he was conspicuous as an ardent free-trader and an uncompromising advocate of " States Rights," opposed the protectionist tariff bills of 1824 and 1828, and consistently upheld the doctrine that slavery was a domestic institution and should be dealt with only by the individual states. In one of his speeches opposing the sending by the United States of repre- sentatives to the Panama Congress, he said, " The moment the federal government shall make the unhallowed attempt to inter- fere with the domestic concerns of the states, those states will consider themselves driven from the Union." Hayne is best remembered, however, for his great debate with Daniel Webster (q.v.) in January 1830. The debate arose over the so-called " Foote's Resolution," introduced by Senator Samuel A. Foote d 780-1846) of Connecticut, calling for the restriction of the sale of public lands to those already in the market, but was con-

cerned primarily with the relation to one another and th: respect ive powers of the federal government and the individual states, Hayne contending that the constitution was essentially a com- pact between the states, and the national government and the states, and that any state might, at will, nullify any federal law which it considered to be in contravention of that compact. He vigorously opposed the tariff of 1832, was a member of the South Carolina Nullification Convention of November 1832, and reported the ordinance of nullification passed by that body on the 24th of November. Resigning from the Senate, he was governor of the state from December 1832 to December 1834, and as such took a strong stand against President Jackson, though he was more conservative than many of the nullifica- tionists in the state. He was intendant (mayor) of Charleston, S.C., from 1835 to 1837, and was president of the Louisville, Cincinnati & Charleston railway from 1837 to 1839. He died at Asheville> N.C., on the 24th of September 1839. His son, Paul Hamilton Hayne (1 830-1 886), was a poet of some distinction, and in 1878 published a life of his father.

See Theodore D. Jervey, Robert Y. Hayne and his Times (New York, 1909).

HAYTER, SIR GEORGE (1792-1871), English painter, was the son of a popular drawing-master and teacher of perspective who published a well-known introduction to perspective and other works. He was born in London, and in his early youth went to sea. He afterwards studied in the Royal Academy, became a miniature-painter, and was appointed in 1816 miniature-painter to the princess Charlotte. He passed some . years in Italy, more especially in Rome, between 181 6

and 1831, returned to London in the last-named year, resumed portrait- painting, now chiefly in oil-colour, executed many likenesses of the royal family, and attained such a reputation for finish and refinement in his work that he received the appointment of principal painter to Queen Victoria and teacher of drawing to the princesses. In 1842 he was knighted. He painted various works on a large scale of a public and semi-historical character, but essentially works of portraiture; such as ” The Trial of Queen Caroline ” (189 likenesses), ” The Meeting of the First Reformed Parliament,” now in the National Portrait Gallery, ” Queen Victoria taking the Coronation Oath ” (accounted his finest production), ” The Marriage of the Queen,” and the ” Trial of Lord William Russell.” The artistic merits of Hayter’s works are not, however, such as to preserve to him with posterity an amount of prestige corresponding to that which court patronage procured him.

He is not to be confounded with a contemporary artist, John Hayter, who produced illustrations for the Book of Beauty, &c.

HAYTON (Haithon, Hethum), king of Little Armenia or Cilicia from 1224 to 1269,. traveller in western and central Asia, Mongolia, &c, was the son. of Constantine Rupen, and became heir to the throne of Lesser Armenia by his marriage with Isabella, daughter and only child of Leo II. After a reign of forty-five years he abdicated (1269) in favour of his son Leo III., became a monk and died in 1271. Before his accession he had been ” constable,” or head of the Armenian army, and ” bailiff ” of the realm. Throughout his reign he followed the policy of friendship and alliance with the overwhelming power of the Mongols. In about 1 248 he sent his brother Sempad, who was now constable in his place, on a mission to Kuyuk Khan, the supreme Mongol emperor. Sempad was well received and returned home in 1250, bringing letters from Kuyuk. After Mangu’s accession in 1251, Batu (the most powerful of the” Mongol princes and generals, and the conqueror — in name at least — of eastern Europe, now commanding on the line of the Volga) sunmoned Hay ton to the court of the new grand khan. Carefully disguised, so as to pass safely through the Turkish states in the interior of eastern Asia Minor (where he was hated as an ally of the Mongols against Islam), Hayton made his way to Kars, the central Mongol camp in Great Armenia, where the famous general Bachu, or Baiju, commanded. Here he reported himself, and was permitted to remain some time in the Ararat region, at the foot of Mt Alagoz, near the metropolitan church of

HAY WARD, ABRAHAM

Echmiadzin. Being joined by his suite, especially the clerical diplomatists Basil the Priest, and James the Abbot, Hayton next passed through eastern Caucasia, threading the pass of the Iron Gates of Derbent, and so reached the camp of Batu on the Volga, where he was cordially welcomed. Thence he set out (May 13th, 1254) on the ” very long road beyond the Caspian I Sea ” to the residence of Mangu at or near Karakorum, south of Lake Baikal. After passing the Ural river, we only hear of his arrival at Or, probably the present Hi province, east of Balkhash, and of his reaching the Irtish, entering the Naiman country, and passing through ” Karakhitai ” (apparently the capital of the ruined Karakhitai empire is intended, a place perhaps situated on the Chu, mentioned out of itsproper place inHayton’s record). On the 13th of September the travellers entered Mongolia, and on the 14th (?) of September were received by Mangu. Here the king remained till the 1st of November, when he left with diplomas, seals and letters of enfranchisement which promised great things for the Armenian state, church and people. His return journey was by very unusual and interesting routes — through the Urumtsi region, the basin of ” the sea of milk,” Lake Sairam, the valley of the Hi, the neigh- bourhood of Kulja, and so over mountains, which probably answer to certain outliers of the Alexander range, to Talas near the present Aulie Ata, midway between the Syr Daria and the Chu. Here he met and conferred with Hulagu Khan, Mangu’s brother, the future conqueror of Bagdad: probably Hayton was expected to aid in the coming forward movement of the Mongol armies against the Moslem world. From Talas Hayton made a detour to the north-west to meet another Mongol prince, Sartach the son of Batu; after which he ascended the valley of the Syr Daria, crossed into Trans-Oxiana, visited Samarkand and Bokhara, and passed the Oxus apparently near Charjui. By way of Merv and Sarakhs he then entered Khorasan and traversed north Persia, passing through Rai near Tehran, Kazvin and Tabriz, and so returning to the camp of Bachu in Armenia, now at Sisian near Lake Gokcha (July 1255). Thanks to his powerful friends, Hayton ‘s journey was unusually rapid. Eight months after quitting Mangu’s horde, he was back in Great Armenia. The narrative of this journey, which was written by a member of the king’s suite, one Kirakos of Gandsak (the modern Eliza vetpol) , concludes with some interest- ing references to Buddhist tenets, to Chinese habits, to various monstrous races and to certain ” women endowed with reason ” dwelling ” beyond Cathay.” It also gives some notes, com- pounded of truth and legend, on the wild tribes and animals of the Gobi and adjoining regions.

The record drawn up by Kirakos Gandsaketsi was in Armenian. A MS.

of his, dated 1616, was found in the Sanahin monastery in Georgia, and translated into Russian by Prince Argutinsky in the Sibirsky Vyestnik for 1822, pp. 69, &-c. This Russian version was again translated into French by Klaproth in the Nouveau Journal asiatique for 1833 (vol. xii. pp. 273, &c). Another French trans- lation was made direct from the Armenian by M. Brosset in the Memoires de I' Academic des Sciences de St Petersbourg for 1870; a fresh Russian version of the original, by Professor Patkanov, appeared in 1874. See also E. Bretschneider, Medieval Researches from Eastern Asiatic Sources, i. 164-172 (London, 1888, " Triibner's Oriental " Series); C. R. Beazley, Dawn of Modern Geography, ii. 381-391 (1901). (C. R. B.)

HAYWARD, ABRAHAM (1801-1884), English man of letters, son of Joseph Hay ward, of an old Wiltshire family, was born at Wilton, near Salisbury, on the 22nd of November 1801. After education at Blundell's school, Tiverton, he entered the Inner Temple in 1824, and was called to the bar in June 1832. He took part as a conservative in the discussions of the London Debating Society, where his opponents were J. A. Roebuck and John Stuart Mill. The editorship of the Law Magazine; or, Quarterly Review of Jurisprudence, which he held from 1829 to 1844, brought him into connexion with John Austin, G. Cornewall Lewis, and such foreign jurists as Savigny, whose tractate on contemporary legislation and jurisprudence he rendered into English. In 1833 he travelled abroad, and on his return printed privately a translation of Goethe's Faust into English prose (pronounced by Carlyle to be the best version

extant in his time). A second and revised edition was published after another visit to Germany in January 1834, in the course of which Hayward met Tieck, Chamisso, De La Motte Fouqui, Varnhagen von Ense and Madame Goethe. In 1878 he con- tributed the rather colourless volume on Goethe to Blackwood's Foreign Classics. A successful translation was in those days a first-rate credential for "a reviewer, and Hayward began con- tributing to the New Monthly, the Foreign Quarterly, the Quarterly Review and the Edinburgh Review. His first successes in this new field were won in 1835-1836 by articles on Walker's " Original " and on " Gastronomy." The essays were reprinted to form one of his best volumes, The Art of Dining, in 1852. In February 1835 he was elected to the Athenaeum Club under Rule II., and he remained for nearly fifty years one of its most conspicuous and most influential members. He was also a subscriber to the Carlton, but ceased to frequent it when he be- came a Peelite. At the Temple, Hayward, whose reputation was rapidly growing as a connoisseur not only of a bill of fare but also (as Swift would have said) of a bill of company, gave recherche dinners, at which ladies of rank and fashion

appreciated the wit of Sydney Smith and Theodore Hook, the dignity of Lockhart and Lyndhurst and the oratory of Macaulay. At the Athenaeum and in political society he to some extent succeeded to the position of Croker. He and Macaulay were commonly said to be the two best-read men in town. Hayward got up every important subject of discussion immediately it came into pro- minence, and concentrated his information in such a way that he habitually had the last word to say on a topic. When Rogers died, when Vanity Fair was published, when the Greville Memoirs was issued or a revolution occurred on the continent, Hayward, whose memory was as retentive as his power of accumulating documentary evidence was exhaustive, wrote an elaborate essay on the subject for the Quarterly or the Edinburgh. He followed up his paper by giving his acquaintances no rest until they either assimilated or undertook to combat his views. Political ladies first, and statesmen afterwards, came to recognize the advantage of obtaining Hayward's good opinion. In this way the " old reviewing hand " became an acknowledged link between society, letters and politics. As a professional man he was less successful; his promotion to be Q.C. in 1845 excited a storm of opposition, and, disgusted at not being elected a Bencher of his Inn in the usual course, Hayward virtually withdrew from legal practice. In February 1848 he became one of the chief leader-writers for the Peelite organ, the Morning Chronicle. The morbid activity of his memory, however, continued to make him many enemies. He alienated Disraeli by tracing a purple patch in his official eulogy of Wellington to a newspaper translation from Thiers's funeral panegyric on General St Cyr. His sharp tongue made an enemy of Roebuck, and he disgusted the friends of Mill by the stories he raked up for an obituary notice of the great economist {The Times, 10th May 1873). He broke with Henry Reeve in 1874 by a venomous review of the Greville Memoirs, in which Reeve was compared to the beggarly Scot deputed to let off the blunderbuss which Bolingbroke (Greville) had charged. His enemies prevented him from enjoying a well-selected quasi- sinecure, which both Palmerston and Aberdeen admitted to be his due. Samuel Warren attacked him (very unjustly, for Hayward was anything but a parasite) as Venom Tuft in Ten Thousand a Year; and Disraeli aimed at him partially in Ste Barbe (in Endymion), though the satire here was directed primarily against Thackeray. After his break with Reeve, Hayward devoted himself more exclusively to the Quarterly. His essays on Chesterfield and Selwyn were. reprinted in 1854. Collective editionsof his articles appeared in volume form in 1858, 1873 and 1874, and Selected Essays in two volumes, 1878. In his useful but far from flawless edition of the Autobiography, Letters and Literary Remains of Mrs (Thrale) Piozzi (186 1), he again appears as a

supplementer and continuator of J. W. Croker. His Eminent Statesmen and Writers (1880) commemo- rates to a large extent personal friendships with such men as Dumas, Cavour and Thiers, whom he knew intimately. As a counsellor of great ladies and of politicians, to whom he

held forth with a sense of all-round responsibility surpassing that of a cabinet minister, Hayward retained his influence to the last years of his life. But he had little sympathy with modern ideas. He used to say that he had outlived every one that he could really look up to. He died, a bachelor, in his rooms at 8 St James's Street (a small museum of autograph portraits and reviewing trophies) on the 2nd of February 1884.

Two volumes of Hayward's Correspondence (edited by H. E. Carlisle) were published in 1886. It > Vanity Fair (27th November 1875) he may be seen as he appeared in later life. (T. Se.)

HAYWARD, SIR JOHN (c. 1560-1627), English historian, was born at or near Felixstowe, Suffolk, where he was educated, and afterwards proceeded to Pembroke College, Cambridge, where he took the degrees of B.A., M.A. and LL.D. In 1599 he published The First Part of the Life and Raigne of King Henrie I V. dedicat ed to Robert Devereux, earl of Essex. This was reprinted in 1642. – Queen Elizabeth and her advisers disliked the tone of the book and its dedication, and the queen ordered Francis Bacon to search it for " places in it that might be drawn within case of treason." Bacon reported " for treason surely I find none, but for felony very many," explaining that many of the sentences were stolen from Tacitus; but nevertheless Hayward was put in prison, where he remained until about 1601. On the accession of James I. in 1603 he courted the new king's favour by publishing two pamphlets — " An Answer to the first part of a certaine conference concerning succession," and " A Treatise of Union of England and Scotland." The former pamphlet, an argument in favour of the divine right of kings, was reprinted in 1683 as " The Right of Succession " by the friends of the duke of York during the struggle over the Exclusion Bill. In 1610 Hayward was appointed one of the historiographers of the college which James founded at Chelsea; in 1613 he published his Lives of the Three Norman Kings of England, written at the re- quest of James's son, Prince Henry; in 1616 he becameamember of the College of Advocates; and in 1619 he was knighted. He died in

London on the 27th of June 1627. Among his manu- scripts was found The Life and Raigne of King Edward VI., first published in 1630, and Certain Yeres of Queen Elizabeth's Raigne, the beginning of which was printed in an edition of his Edward VI., published in 1636, but which was first published in a complete form in 1840 for the Camden Society under the editor- ship of John Bruce, who prefixed an introduction on the life and writings of the author. Hayward was conscientious and diligent in obtaining information, and although his reasoning on questions of morality is often childish, his descriptions are generally graphic and vigorous. Notwithstanding his imprisonment under Elizabeth, his portrait of the qualities of the queen's mind and person is flattering rather than detractive. He also wrote several works of a devotional character.

HAYWOOD, ELIZA (c. 1693-1756), English writer, daughter of a London tradesman named Fowler, was born about 1693. She made an early and unhappy marriage with a man named Haywood, and her literary enemies circulated scandalous stories about her, possibly founded on her works rather than her real history. She appeared on the stage as early as 1715, and in 1 721 she revised for Lincoln's Inn Fields The Fair Captive, by a Captain Hurst. Two other pieces followed, but Eliza Haywood made her mark as a follower of Mrs Manley in writing scandalous and voluminous novels. To Memoirs of a certain Island adjacent to Utopia, written by a celebrated author of that country. Now translated into English (1725), she appended a key in which the characters were explained by initials denoting living persons. The names are supplied to these initials in the copy in the British Museum. The Secret History of the Present Intrigues of the Court of Caramania (1727) was explained in a similar manner. The style of these productions is as extravagant as their matter. Pope attacked her in a coarse passage in The Dunciad (bk. ii. 11. 157 et seq.), which is aggravated by a note alluding to the " profligate licentiousness of those shameless scribblers (for the most part of that sex which ought least to be capable of such malice or impudence) who in libellous Memoirs and Novels reveal the faults or misfortunes of both sexes, to

the ruin of public fame, or disturbance of private happiness." Swift, writing to Lady Suffolk, says, "Mrs Haywood I have heard of as a stupid, infamous, scribbling woman, but have not seen any of her productions." She continued to be a prolific writer of novels until her death on the 25th of February 1756, but her later works are characterized by extreme propriety, though -an anonymous story of The Fortunate Foundlings (1744), purporting to be an account of the children of Lord Charles Manners, is generally ascribed to her.

A collected edition of her novels, plays and poems appeared in 1724, and her Secret Histories, Novels and Poems in 1725. See also an article by S. L. Lee in the Dictionary of National Biography.

HAZARA, a race of Afghanistan. The Hazaras are of Mongolian origin, speak a dialect of Persian, and belong to the Shiah sect of Mahommedans. They are of middle size but stoutly made, with small grey eyes, high cheek bones and smooth faces. They are descendants of military colonists introduced by Jenghiz Khan, who occupy all the highlands 01 the upper Helmund valley, spreading through the country between Kabul and Herat, as well as into a strip of territory on the frontier slopes of the Hindu Kush north of Kabul. In the western provinces they are known as the Chahar Aimak (Hazaras, jamshidis, Taimanis and Ferozkhois), and in other districts they are distinguished by the name of the territory they occupy. They are pure Mongols, intermixing with no other races (chiefly for the reason that no other races will intermix with them), preserving their language and their Mongol characteristics uninfluenced by their surroundings, having absolutely displaced the former occupants of the Hazarajat and Ghor. They make good soldiers and excellent pioneers. The amir's companies of engineers are recruited from the Hazaras, and they form perhaps the most effective corps in his heterogeneous army. They are now recruited into the British service in India.

HAZARA, a district of British India, in the Peshawar division of the North-West Frontier Province, with an area of 3391 sq. m. It is bounded on the N. by the Black Moun- tain, the Swat country, Kohistan and Chilas; on the E. by the native state of Kashmir; on the S. by Rawalpindi district; and on the W. by the river Indus. On the creation of the North-West Frontier Province in 1901 the district was reconstituted,theTahsilof Attock being transferred toRawalpindi. The district forms a wedge of territory extending far into the heart of the outer Himalayas, and consisting of a long narrow valley, shut in on both sides by lofty mountains, whose peaks rise to a height of 17,000 ft. above sea level. Towards the centre of the district the vale of Kagan is bounded by mountain chains, which sweep southward still maintaining a general parallel direction, and send off spurs on every side which divide the country into numerous minor dales. The district is well watered by the tributaries of the Indus, the Kunhar, which flows through the Kagan Valley into the Jhelum, and many rivulets. Throughout the scenery is picturesque. To the north rise the distant peaks of the snow-clad ranges; midway, the central mountains stand clothed to their rounded summits with pines and other forest trees, while grass and brushwood spread a green cloak over the nearer hills, and cultivation covers every available slope. The chief frontier tribes

on the border are the cis-Indus Swatis, Hassanzais, Akazais, Chagarzais, Pariari Syads, Madda Khels, Amazais and Umarzais. Within the district Pathans are not numerous.

The name Hazara possibly belonged originally to a Turki family which entered India with Timur in the 14th century? and subsequently settled in this remote region. During the prosperous period of the Mogul dynasty the population included a number of mixed tribes, which each began to assert its inde- pendence, so that the utmost anarchy prevailed until Hazara attracted the attention of the rising Sikh monarchy. Ranjit Singh first obtained a footing here in 1818, and, after eight years of constant aggression, became master of the whole country. During the minority of the young maharaja Dhuleep Singh, the Sikh kingdom fell into a state of complete disorganization; the people seized the opportunity for recovering their independence,

and rose in 1845 i n rebellion. They stormed the Sikh forts, laid siege to Haripur, and drove the governor across the borders. After the first Sikh War it was proposed to transfer Hazara with Kashmir to Gulab Singh, but it remained under the Lahore government in charge of James Abbott, who pacified it in less than a year and held it single-handed throughout the troubles of the second Sikh War. It was also undisturbed during the Mutiny. The population in 1901 was 560, 288, showing an increase of 8-52% in the decade. The headquarters are at Abbotabad; pop. (1001) 7764. Through the Kagan valley and over the Babusar pass at its head lies the most direct route from the Punjab to Chilas and Gilgit.

HAZARD (O. Fr. hazard, from Span, azar, unlucky throw at dice, misfortune, from Arab, al, and zar, dice), a game of dice (called Craps in America), once very popular in England and played for large stakes at the famous rooms of Crockford (St James's Street, London) and Almack (Pall Mall, London), The player or " caster " calls a " main " (that is, any number from five to nine inclusive). He then throws with two dice. If he

” throws in,” or ” nicks,” he wins the sum played for from the banker or ” setter.” Five is a nick to five, six and twelve are nicks to six, seven and eleven to seven, eight and twelve to eight and nine to nine. If the caster ” throws out ” by throwing aces, or deuce-ace (called crabs or craps), he loses. When the main is five or nine the caster throws out with n or 12; when the main is six or eight he throws out with n; when the main is seven he throws out with 12. If the caster neither nicks nor throws out, the number thrown is his “chance,” and he keeps on throwing till either the chance comes up, when he wins, or till the main comes up, when he loses. When a chance is thrown the ” odds ” for or against the chance are laid by the setter to the amount of the original stake. Seven is the best main for the caster to call, as it can be thrown in six different ways out of the thirty-six casts which are possible with dice. Supposing seven to be the main; then the caster wins if he throws 7 or 11; he loses if he throws crabs or 12. If he throws any other number, 4 for example, that is his chance. The odds against him are two to one, as 7 can be thrown in six ways, but 4 only in three; hence six to three, or two to one, are the correct odds, and if the original stake was £1, the setter now lays £2 to £1 in addition. It is useful to remember that 2 and 12 can be thrown in one way; 3 and 11 in two ways; 4 and 10 in three ways; 5 and 9 in four ways; 6 and 8 in five ways. The odds against

the caster are thus given by Hoyle: If 7 is the main and 4

the chance, two to one; 6 and 4, five to three; 5 and 4, four

to three; 7 and 9, three to two; 7 and 6, six and five; 7 and 5,

three to two; 6 and 5, five to four; 8 and 5, five to four, &c.

HAZARIBAGH, a town and district of British India, in the Chota Nagpur division of Bengal. The town is well situated at an elevation of 2000 ft. Pop. (1901) 15,799. Hazaribagh has ceased to be a military cantonment since the European peni- tentiary was abolished. There are a central jail and a reform- atory school. The Dublin University Mission maintains a First Arts college.

The District comprises an area of 7021 sq. m. In 1901 the population was 1,177,961, showing an increase of 1% in the decade. The physical formation of Hazaribagh exhibits three distinct features: (1) a high central plateau occupying the western section, the surface of which is undulating and cultivated; (2) a lower and more extensive plateau stretching along the north and eastern portions; to the north, the land is well cultivated, while to the east the country is of a more varied character, the elevation is lower, and the character of a plateau is gradually lost; (3) the central valley of the Damodar river occupying the entire southern section. Indeed, although the characteristics of the district are rock, hill and wide-spreading jungle, fine patches of cultivation are met with in all parts, and the scenery is generally pleasing and often striking. The district forms a part of the chain of high land which extends across the continent of India, south of the Nerbudda on the west, and south of the Sone river on the east. The most important river is the Damodar, with its many tributaries, which drains an area of 2480 sq. m.

The history of the district is involved in obscurity until 1755, about which time a certain Mukund Singh was chief of the country. In a few years he was superseded by Tej Singh, who had gained the assistance of the British. In 1780 Hazaribagh, along with the surrounding territory, passed under direct British rule.

The district contains an important coal-field at Giridih which supplies the East Indian railway. There are altogether six mines. There are also mica mines which are gaining in import- ance. Rice and oilseeds are the principal crops. Tea cultivation has been tried but does not flourish, and is almost extinct. The only railways are the branch of the East Indian to the coal- field at Giridih, where there is a technical

school maintained by the railway company, and the newly-opened Gaya-Katrasgarh chord line; but the district is traversed by the Grand Trunk road. Parasnath hill is annually visited by large numbers of Jain worshippers.

HAZEBROUCK, a town of northern France, capital of an arrondissement in the department of Nord, on the canalized Bourre, 29 m. W.N.W. of Lille, on the Northern railway, between that town and St Omer. Pop. (1906), town, 8798; commune, 12,819. With the exception of the church of St Eloi, a building of the 16th century with a spire of fine open work 260 ft. high, and the hospice, occupying a convent built in the 16th and 17th centuries, there is little of architectural interest in the town. Hazebrouck is the seat of a sub prefect, and has a tribunal of first instance and a board of trade arbitration. It is the market for a fertile agricultural district, and has trade in live-stock, grain and hops. Cloth-weaving is the chief industry. Hazebrouck is an important junction, and railway employes form a large part of its population.

HAZEL (O. Eng. hasel 1 ; cf. Ger. Hasel, Swed. and Dan. hassel, &c.,; Fr. noisetier, coudrier), botanically corylus, a genus of shrubs or low trees of the natural order Corylaceae. The common hazel, Corylus Avellana (fig. 1), occurs throughout Europe, in North Africa and in central and Russian Asia, except the northernmost parts. It is commonly found in hedges and coppices, and as an undergrowth in woods, and reaches a height of some 12 ft.; occasionally, as at Eastwell Park, Kent, it may attain to 30 ft. According to Evelyn (Sylva, p. 35, 1664),

hazels ” above all affect cold, barren, dry, and sandy soils; also mountains, and even rockie ground produce them; but more plentifully if somewhat moist, dankish, and mossie.” In Kent they flourish best in a calcareous soil. The bark of the older stems is of a bright brown, mottled with grey, that of the young twigs is ash-coloured, and glandular and hairy. The leaves are alternate, from 2 to 4 in. in length, downy below, roundish heart-shaped, pointed and shortly stalked. In the variety C. purpurea, the leaves, as also the pellicle of the kernel and the husk of the nut, are purple, and in C. heterophylla they are thickly clothed with hairs. In autumn the rich yellow tint acquired by the leaves of the hazel adds greatly to the beauty of landscapes. TKe flowers are monoecious, and appear in Great Britain in February and March, before the leaves. The cylindrical drooping yellow male catkins (fig. 2) are 1 to 25 in. long, and occur 2 to 4 in a raceme; when in unusual numbers they may be terminal in position. The female flowers are small, sub-globose and

sessile,

1 It has been supposed that the origin is to be found in O. Eng. has, a behest, connected with hatan = Ger. heissen, to give orders: the hazel-wand was the sceptre of authority of the shepherd chieftain (iroi/iˆj' \a£ > v) of olden times, see Grimm, Gesch. d. deutsch. Sprache, p. 1016, 1848. The root is kas-, cf. Lat. corulas, corylus; and the original meaning is unknown.

Fig. 1. — Hazel {Corylus Avellana). — 1, Female catkin (enlarged) ; 2, Pair of fruits (nuts) each enclosed in its involucre (reduced).

u8

HAZLETON

Fig. 2. — Catkin of Hazel (Corylus Avel-

resembling leaf -buds, and have protruding crimson stigmas; the minute inner bracts, by their enlargement, form the palmately lobed and cut involucre or husk of the nut. The ovary is not visible till nearly midsummer, and is not fully developed before autumn. The nuts have a length of from § to J in., and grow in clusters. Double nuts are the result of the equal development of the two carpels of the original flower, of which ordinarily one becomes abortive; fusion of two or more nuts is not uncommon. From the light-brown or brown colour of the nuts the terms hazel and hazelly, i.e. " in hue as hazel nuts " (Shakespeare, Taming of the Shrew, ii. i), derive their significance. 1 The wood of the hazel is whitish-red, close in texture and pliant, and has when dry a weight of 49 lb per cub. ft.; it has been used in cabinet-making, and for toys and turned articles. Curiously veined veneers are obtained from the roots; and the root-shoots are largely employed in the making of crates, coal- corves or baskets, hurdles, withs and tana), consisting of an bands, whip-handles and other objects, axis covered with bracts The rods are reputed to be most durable in the form of scales, when from the dr ; est ground, and to be each of which covers … , . ,. . ..

a male flower, the especially good where the bottom is stamens of which are chalky. The light charcoal afforded by seen projecting beyond the hazel serves well for crayons, and the scale. The catkin j s va j ue(j by gunpowder manufacturers. a a tin\ from n Vhe'b S ra P n a ch An objection to the construction of by an articulation. hedges of hazel is the injury not in-

frequently done to them by the nut- gatherer, who " with active

vigour crushes down the tree ” (Thomson’s Seasons, ” Autumn “), and otherwise damages it.

The filbert, 2 among the numerous varieties of Corylus Avellana, is extensively cultivated, especially in Kent, for the sake of its nuts, which are readily distinguished from cob-nuts by their ample involucre and greater length. It may be propagated by suckers and layers, by grafting and by sowing. Suckers afford the strongest and earliest-bearing plants. Grafted filberts are less liable than others to be encumbered by suckers at the root. By the Maidstone growers the best plants are considered to be obtained from layers. These become well rooted in about a twelvemonth, and then, after pruning, are bedded out in the nursery for two or three years. The filbert is economically grown on the borders of plantations or orchards, or in open spots in woods. It thrives most in a light loam with a dry subsoil; rich and, in particular, wet soils are unsuitable, conducing to the formation of too much wood. Plantations of filberts are made in autumn, in well-drained ground, and a space of about 10 ft. by 8 has to be allowed for each tree. In the third year after planting the trees may require root-pruning; in the fifth or sixth they should bear well. The nuts grow in greatest abundance on the extremities of second year’s branches, where light and air have ready access. To obtain a good tree, the practice in Kent is to select a stout upright shoot 3 ft. in length; this is cut down to about 18 in. of which the lower 12 are kept free from out-growth. The head is pruned to form six or eight strong offsets; and by judicious use of the knife, and by training, preferably on a hoop placed within them, these are caused to grow outwards and upwards to a height of about 6 ft. so as to form a bowl-like shape. Excessive luxuriance of the laterals may be combated by root- pruning, or by checking them early in the season, and again later, and by cutting back to a female blossom bud, or else spurring nearly down to the main branch in the following spring.

Filbert nuts required for keeping must be gathered only when quite ripe; they may then be preserved in dry sand, or, after drying, by packing with a. sprinkling of salt in sound casks or new

1 On the expression ” hazel eyes,” see Notes and Queries, 2nd ser. xii. 337, and 3rd ser. iii. 18, 39.

2 For derivations of the word see Latham’s Johnson’s Dictionary.

flower-pots. Their different forms include the Cosford, which are thin-shelled and oblong; the Downton, or large square nut, having a lancinated husk; the white or Wrotham Park filbert; and the red hazel

or filbert, the kernel of which has a red pellicle. The last two, on account of their elongated husk, have been distinguished as a species, under the name Corylus tubulosa. Like these, appar- ently, were the nuts of Abella, or Avella, in the Campania (cf. Fr. aveline, filbert), said by Pliny to have been originally designated ” Pontic,” from their introduction into Asia and Greece from Pontus (see Nat Hist. xv. 24, xxiii. 78). Hazel-nuts, under the name of Barcelona or Spanish nuts, are largely exported from France and Portugal, and especially Tarragona and other places in Spain. They afford 60% of a colourless or pale-yellow, sweet- tasting, non-drying oil, which has a specific gravity of 0-92 nearly, becomes solid at — 19 C. (Cloez), and consists approximately of carbon 77, and hydrogen and oxygen each 11-5%. Hazel nuts formed part of the food of the ancient lake-dwellers of Switzerland and other countries of Europe (see Keller, Lake Dwellings, trans. Lee, 2nd ed., 1878). By the Romans they were sometimes eaten roasted. Kaltenbach (Pflanzenfeinde, pp. 633-638, 1874) enumerates ninety-eight insects which attack the hazel. Among these the beetle Balaninus nucum, the nut-weevil, seen on hazel and oak stems from the end of May till July, is highly destructive to the nuts. The female lays an egg in the unripe nut, on the kernel of which the larva subsists till September, when it bores its way through the shell, and enters the earth, to undergo transformation into a chrysalis in the ensuing spring. The leaves of the hazel are frequently found mined on the upper and under side respectively by the larvae of the .moths Lithocotletis coryli and L. Nicelii. Squirrels and dormice are very destructive to the nut crop, as they not only take for present consumption but for a store for future supply. Parasitic on the roots of the hazel is found the curious leafless Lathraea Squamaria or toothwort.

The Hebrew word luz, translated ” hazel ” in the authorized version of the English Bible (Gen. xxx. 37), is believed to signify ” almond ” (see Kitto, Cycl. of Bill. Lit. ii. 869, and iii. 811, 1864). A belief in the efficacy of divining-rods of hazel for the discovery of concealed objects is probably of remote origin (cf. Hosea iv. 12). G. Agricola, in his treatise Vom Bergwerck (pp. xxix.xxxi., Basel, 1557), gives an account, accompanied by a woodcut, of their em ployment in searching for mineral veins. By certain persons, who for different metals used rods of various materials, rods of hazel, he says, were held serviceable simply for silver lodes, and by the skilled miner, who trusted to natural signs of mineral veins, they were regarded as of no avail at all. The virtue of the hazel wand was supposed to be dependent on its having two forks; these were to be grasped in the fists, with the fingers uppermost, but with moderate firmness only,

lest the free motion of the opposite end downwards towards the looked-for object should be interfered with. According to Cornish tradition, the divining or dowsing rod is guided to lodes by the pixies, the guardians of the treasures of the earth. By Vallemont, who wrote towards the end of the 17th century, the divining-rod of hazel, or ” baguette divinatoire,” is described as instrumental in the pursuit of criminals. The Jesuit Vaniere, who flourished in the early part of the 18th century, in the Praedium rusticum (pp. 12, 13, new ed., Toulouse, 1742) amus- ingly relates the manner in which he exposed the chicanery of one who pretended by the aid of a hazel divining-rod to point out hidden water-courses and gold. The burning of hazel nuts for the magical investigation of the future is alluded to by John Gay in Thursday, or the Spell, and by Burns in Halloween. The hazel is very frequently mentioned by the old French romance writers. Corylus rostrata and C. americana of North America have edible fruits like those of C. Avellana.

The witch hazel is quite a distinct plant, Hamamelis virginica, of the natural order Hamamalideae, the astringent bark of which is used in medicine. It is a hardy deciduous shrub, native of North America, which bears a profusion of rich yellow flowers in autumn and winter when the plant is leafless.

HAZLETON, a city of Luzerne county, Pennsylvania, U.S.A., about 25 m. S. of Wilkes-Barre. Pop. (1890) 11,872; (1900) 14,230, of whom 2732 were foreign-born; (1910 census) 25,452. It is served by the Lehigh Valley, the Pennsylvania (for freight) , and the Wilkes-Barre & Hazleton (electric) railways. The city is built on a broad tableland on Nescopeck or Bifck Mountain, a spur of the Blue Mountains, about 1620 ft. above sea-level. It has a park and a number of handsome residences; and its agreeable climate and picturesque situation make it attractive as a summer resort. The city has a public library. Hazleton is near the centre of one of the richest coal regions (the Lehigh or ” Eastern Middle Coal Field “) of the state, and its principal industry is the mining and shipping of anthracite coal. It has silk mills, knitting mills, shirt factories, breweries, maca- roni factories, lumber and planing mills, important iron works, a casket factory and a large electric power plant. The value of

the city’s factory products increased from $998,823 in 1900 to $2,185,876 in 1905, or 118-8%, only three other cities in the state

having a population of 8000 or more in 1900 showing a greater rate of increase. There is a state hospital here for the treatment of persons injured in mines. Hazleton was settled in 1820, was laid out in 1836, was incorporated as a borough in 1856 and received a city charter in 1891. The local coal industry dates from 1837.

HAZLITT, WILLIAM (1778-1830), British literary critic and essayist, was born on the 10th of April 1778 at Maidstone, where his father, William Hazlitt, was minister of a Unitarian con- gregation. The father took the side of the Americans in their struggle with the mother-country, and during a residence at Bandon, Co. Cork, interested himself in the welfare of some American prisoners at Kinsale. In 1783 he migrated with his family to America, but in the winter of 1786-1787 returned to England, and settled at Wem in Shropshire, where he ministered to a small congregation. There his son William went to school, till in 1793 he was sent to the Hackney theological college in the hope that he would become a dissenting minister. For this career, however, he had no inclination, and returned, probably in 1794, to Wem, where he led a desultory life until 1802, and then decided to become a portrait painter. His elder brother John was already established as a miniature painter in London. The monotony of life at Wem was broken in January 1798 by the visit of Samuel Taylor Coleridge to Shrewsbury, where young Hazlitt went to hear him preach. Coleridge encouraged William Hazlitt ‘s interest in metaphysics, and in the spring of the next year Hazlitt visited Coleridge at Nether Stowey and made the acquaintance of William Wordsworth. The circumstances of this early intercourse with Coleridge are related with in- imitable skill in a paper in Hazlitt’s Literary Remains (1839). On visits to his brother in London he made many acquaint- ances, the most important being a friendship with Charles Lamb, said to have been founded on a remark of Lamb’s interpolated in a discussion between Coleridge, Godwin and Holcroft, ” Give me man as he is not to be.” He also formed an acquaintance with John Stoddart, whose sister Sarah he married in 1808. In October 1802 he went to Paris to copy portraits in the Louvre, and spent four happy months in Paris. When he returned to London he undertook commissions for portraits, but soon found he was not likely to excel in his art; his last portrait, one of Charles Lamb as a Venetian senator (now in the National Portrait Gallery), was executed in 1805. In that year he published his first book, An Essay on the Principles of Human Action: being an argument in favour of i he Natural Disinterestedness of the Human Mind, which had occupied him at intervals for six or seven years. It attracted little attention, but remained a favourite with its author. Other works belonging to this period are: Free Thoughts on

Public Affairs (1806); An Abridgment of the Light of Nature Revealed, by Abraham Tucker. . . (1807); The Eloquence of the British 'Senate … (2 vols., 1807); A Reply to Mallhus, on his Essay on Population (1807); A New and Improved Grammar of the English Tongue . . . (1810).

Hazlitt married in 1808. His domestic life was unhappy. His wife was an unromantic, business-like woman, while he him- self was fitful and moody, and impatient of restraint. -The dissolution of the ill-assorted union was nevertheless deferred for fourteen years, during which much of Hazlitt's best literary work had been produced. Mrs Hazlitt had inherited a small estate at Winterslow near Salisbury, and here the Hazlitts lived until 181 2, when they removed to 19 York Street, Westminster, a house that was once Milton's. Hazlitt delivered in 181 2 a course of lectures at the Russell Institution on the Rise and Progress of Modern Philosophy. He soon abandoned philosophy, however, to give his whole attention to journalism. He was parliamentary reporter and subsequently dramatic critic for the Morning Chronicle; he also contributed to the Champion and The Times; but his closest connexion was with the Examiner, owned by John and Leigh Hunt. In conjunction with Leigh Hunt he undertook the series of articles called The Round Table,

a collection of essays on literature, men and manners which were originally contributed to the Examiner. To this time belong his View of the English Stage (1818), and Lectures on the English Poets (1818), on the English Comic Writers (1819) , andon the Dramatic Literature of the Age of Elizabeth (1821). By these works, together with his Characters of Shakespeare's Plays (1 8 1 7) , and his Ta ble Talk; or Original Essays on Men and Manners (1 8 2 1-1822) , his reputation as a critic and essayist was established. Next to Coleridge, Hazlitt was perhaps the most powerful ex- ponent of the dawning perception that Shakespeare's art was no less marvellous than his genius; and Hazlitt's criticism did riot, like Coleridge's, remain in the condition of a series of brilliant but fitful glimpses of insight, but was elaborated with steady care. His lectures on the Elizabethan dramatists performed a similar service for the earlier, sweeter and simpler among them, such as Dekker, till then unduly eclipsed by later writers like Massinger, better playwrights but worse poets. Treating of the contemporary drama, he successfully vindicated for Edmund Kean, whose genius he recognized from the first, the high place which he has retained as an actor, and his enthusiasm for Mrs Siddons knew no bounds. His criticisms on the English comic writers and men of letters in general are masterpieces of inge- nious and felicitous exposition, though rarely, like Coleridge's, penetrating to the inmost core of the subject.

Moreover, at the time when the lectures were written, Hazlitt's views, orthodox as they may seem now, were novel enough.

As an essayist Hazlitt is even more effective than as a critic. Being enabled to select his own subjects, he escapes dependence upon others either for his matter or his illustrations, and presents himself by turns as a metaphysician, a moralist, a humorist, a painter of manners and characteristics, but always, whatever his ostensible theme, deriving the essence of his commentary from himself. This combination of intense subjectivity with strict adherence to his subject is one of Hazlitt's most distinctive and creditable traits. Intellectual truthfulness is a passion with him. He steeps his topic in the hues of his own individuality, but never uses it as a means of self-display. The first reception of his admirable essays was by no means in accordance with their deserts. Hazlitt's political sympathies and antipathies were vehement, and he had taken the unfashionable side. The Quarterly Review attacked him with deliberate malignity, stopped the sale of his writings for a time and blighted his credit with publishers. Hazlitt retaliated by his Letter to William Gifford (1819), accusing the editor of deliberate misrepresentation. In downright abuse and hard-hitting, Hazlitt proved himself more than a match even for Gifford. By the writers in Black- wood's Magazine Hazlitt was also scurrilously treated.' He had become estranged from his early friends, the Lake poets, by what he uncharitably but not unnaturally regarded as their political apostasy; and he had no scruples about recording his often very unfavourable opinions of his contemporaries. He displayed, moreover, an exasperating facility in grounding his criticisms on facts that his victims were unable to deny. His inequalities of temper separated him for a time even from Leigh Hunt and Charles Lamb, and on the whole the period of his most brilliant literary success was that when he was most soured and broken. Domestic troubles supervened; he had gone to live in South- ampton Buildings in September 18 19, and his marriage, long little more than nominal, was dissolved in consequence of the infatuated passion he had conceived for his landlord's daughter, Sarah Walker, a most ordinary person in the eyes of every, one else. It is impossible to regard Hazlitt as a responsible agent while he continued subject to this influence.. His own record of the transaction, published by himself under the title of Liber Amoris, or the New Pygmalion (1823), is an unpleasant but remarkable psychological document. It consists of conversations between Hazlitt and Sarah Walker, drawn up in the spring of 1822, of a correspondence between Hazlitt and his friend P. G. Patmbre between March and July, and an account of the rupture of his relations with Sarah. The business-like dissolution of his marriage under the law of

Scotland is related with amazing 1 For some quotations see Alexander Ireland's bibliography.

naivete by the family biographer. Rid of his wife and cured of his mistress, he shortly afterwards astonished his friends by marrying a widow. " All I know," says his grandson, " is that Mrs Bridgewater became Mrs Hazlitt." They travelled on the continent for a year and then parted finally. Hazlitt's study of the Italian masters during this tour, described in a series of letters contributed to the Morning Chronicle, had a deep effect upon him, and perhaps conduced to that intimacy with the cynical old painter Northcote which, shortly after his return, engendered a curious but eminently readable volume of The Conversations of James Northcote, R.A. (1830). The respective shares of author and artist are not always easy to determine. During the recent agitations of his life he had been writing essays, collected in 1826 under the title of The Plain Speaker: opinions on Books, Men- and Things (1826). The Spirit of the Age; or Contemporary Portraits (1825), a series of criticisms on the leading intellectual characters of the day, is in point of style perhaps the most splendid and copious of his compositions. It is eager and ani- mated to impetuosity, though without any trace of careless- ness or disorder. He now undertook a work which was to have crowned his literary reputation, but which can hardly be said to have even enhanced it — The Life of Napoleon Buonaparte (4 vols., 1828-1830). The undertaking was at best premature, and was inevitably disfigured by partiality to Napoleon as the representative of the popular cause, excusable in a Liberal politician. writing in the days of the Holy Alliance. Owing to the failure of his publishers Hazlitt received no recompense for this laborious work. Pecuniary anxieties and disappointments may have contributed to hasten his death, which took place on the 18th of September 1830. Charles Lamb was with him to the last.

Hazlitt had many serious defects of temper. His consistency was gained at the expense of refusing to revise his early impres- sions and prejudices. His estimate of a man's work was too apt to be decided by sympathy or the reverse with his politics. For Scott, however, he had a great admiration, although they were far enough apart in politics. He was a compound of in- tellect and passion, and the refinement of his critical analysis is associated with vehement eloquence and glowing imagery. He was essentially a critic, a dissector and, as Bulwer justly remarks, a much better judge of men of thought than of men of action.

The paradoxes with which his works abound never spring from affectation ; they are in general the sallies of a mind so agile and ardent as to overrun its own goal. His style is perfectly natural, and yet admirably calculated for effect. His diction, always rich and masculine, seems to kindle as he pro- ceeds; and when thoroughly animated by his subject, he advances with a succession of energetic, hard-hitting sentences, each carrying his argument a step further, like a champion dealing out blows as he presses upon the enemy. Although, however, his grasp upon his subject is strenuous, his insight into it is rarely profound. He can amply satisfy men of taste and culture; he cannot, like Coleridge or Burke, dissatisfy them with them- selves by showing them how much they would have missed without him. He is a critic who exhibits, rather than reveals, the beauties of an author. But all shortcomings are forgotten in the genuineness and fervour of the writer's self-portraiture. The intensity of his personal convictions causes all he wrote to appear in a manner autobiographic. Other men have been said to speak like books, Hazlitt's books speak like men. To read his works in connexion with Leigh Hunt's and Charles Lamb's is to be introduced into one of the most attractive of English literary circles, and this alone will long preserve them from oblivion.

His son, William Hazlitt (1811-1893), was born on the 26th of September 1811. The separation between his parents did not prevent him from being on affectionate terms with both of them. He early began to writs for the Morning Chronicle, and in 1833 married Caroline Reynell. He was the author of many translations, chiefly from the French, and of some works on the law of bankruptcy. He was called -to the bar at the Middle Temple in 1844, and became registrar in the court of

bankruptcy. He held this position for more than thirty years, retiring two years before his death, which took place at Addle- stone, Surrey, on the 23rd of February 1893. ■ Hazlitt's grandson, William Carew Hazlitt, the biblio- grapher, was born on the 22nd of August 1834. He was educated at the Merchant Taylors' school and was called to the bar of the Inner Temple in 1861. Among his many publications may be noted his invaluable Handbook to the Popular, Poetical and Dramatic Literature of Great Britain, from the Invention of Printing to the Restoration (1867), supplemented in 1876, 1882, 1887 and 1889, a General Index by J. G. Gray appearing in 1893. He published further contributions to the subject in Biblio- graphical Collections and Notes on Early English Literature made during the years 1893-1903 (1903), and a Manual for the Collector and Amateur of Old English Plays . . . (1892). He was the chief editor of the useful 1871 edition of Warton's

History of English Poetry, and compiled the Catalogue of the Hutk Library

(1880).

The list of the first William Hazlitt's works also includes: Political Essays, with Sketches of Public Characters (1819); Sketches of the Principal Picture Galleries in England . . . (1824); Characteristics; in the Manner of Rochefoucauld's Maxims (1823); Select Poets of Great Britain: to which are prefixed Critical Notices of each Author (1825); Notes of a Journey through France and Italy . . . (1826); The Life of Titian; with Anecdotes of the Distinguished Persons of his Time (1830), nominally by James Northcote; an article on the " Fine Arts " contributed to the seventh edition of the Encyclopaedia Britannica ; and posthumous collections made by his son.

A comprehensive edition of The Collected Works of William Hazlitt (12 vols., 1902-1904) does not include the life of Napoleon. It contains an introduction by W. E. Henley, and was issued under the superintendence of A. R. Waller and Arnold Glover, and there are many modern reprints of isolated works. The most copious source of information respecting Hazlitt is the Memoirs of William Hazlitt, with Portions of his Correspondence (2 vols., 1867), by his grandson, W. C Hazlitt, a medley rather than a memoir, yet full of interest. A slight but appropriate sketch had previously been prefixed by his son to his Literary Remains … (2 vols., 1836), accompanied by estimates of his intellectual character by Bulwer and by Talfourd, who had been his fast friend. There is an excellent monograph on William Hazlitt (1902) by Mr Augustine Birrell, in the " English Men of Letters " series, and one in French by J. Donady (Paris, 1907), who also published a bibliography of his works. Valuable bio- graphical particulars have been preserved in Barry Cornwall's memoirs of Lamb; in the My Friends and Acquaintances (1854) of Mr P. G. Patmore, Hazlitt's most intimate associate in his later years; in Crabb Robinson's Diary; and in Lamb's correspondence. A full bibliographical list of his writings, with a collection of the most remarkable critical judgments upon them from all quarters, was prepared by Alexander Ireland (1868). Further information on the Hazlitt family is to be found in Mr W. C Hazlitt's Four Generations of a Literary Family (2 vols., 1897). The chief interest of this desultory book is the considerable extracts from the diary of Margaret [Peggy] Hazlitt, which describes the Hazlitt experiences in America. See also " William Hazlitt " in Sir L. Stephen's Hours in a Library (ed. 1892, vol. ii.), and Lamb and Hazlitt, further Letters and Records hitherto unpublished (1900), by W. C Hazlitt.

HEAD, SIR EDMUND WALKER, Bart. (1805-1868), English colonial governor and writer on art, was the son of the Rev. Sir John Head, Bart., rector of Rayleigh, Essex. He was educated at Winchester school and Oriel College, Oxford, and taking his degree with first-class honours in classics, he became fellow of Merton College. On his father's death in 1838, he succeeded to the baronetcy as 8th baronet. His services as poor-law commissioner, to which post he was appointed in 1841 after five years as assistant-commissioner, procured for him in 1847 the office of lieutenant-governor of New Brunswick, whence he passed in 1854 to the governor-generalship of Canada, which he retained till 1861. The following year, having returnedtQ England, Head was nominated a civil service commissioner. In 1857 he was sworn of the Privy Council, and in i860 was decorated as K.CB-, while in the course of his career he received the degrees of D.C.L. at Oxford and LL.D. at Cambridge. He died in London on the 28th of January 1868, the baronetcy becoming extinct, as his only son had died in 1859.

Sir Edmund Head wrote the article " Painting " in the Penny Cyclopaedia; A Handbook of the Spanish and French Schools of Painting (1845) ; Shall and Will, or two Chapters on Future Auxiliary Verbs (1856); and Ballads and other Poems, Original and Translated (1868). He also edited F. T. Kugler's Handbook of Painting of the

German, Flemish, Dutch, Spanish, and French Schools (1854) ar) d the Essays on the Administrations of Great Britain (1864), written by his lifelong friend, Sir George Cornewall Lewis. His translation from the Icelandic of Viga Ghcm's Saga appeared in 1866.

HEAD, SIR FRANCIS BOND, Bart. (1793-1875), English soldier, traveller and author, son of James Roper Head of the Hermitage, Higham, Kent, was born there on the 1st of January 1793. He was educated at Rochester grammar school and the Royal Military Academy, whence in 181 1 he was commissioned to the Royal Engineers. He was for some years stationed in the Mediterranean, and he served in the campaign of 1815, being present at the battle of Waterloo. He went on half-pay in 1825, when he accepted the charge of an association formed to work the gold and silver mines of Rio de La Plata. In connexion with this enterprise he made several rapid journeys across the Pampas and among the Andes, his Rough Notes of which, published in 1826, and written in a clear and spirited style,

obtained for him the name of ” Galloping Head.” On his return in 1827, he became involved in a controversy with the directors of his company, and in defence of his conduct he published Reports of the La Plata Mining Association (London, 1827). He was soon afterwards restored to the active list of the army as a major unattached, mainly owing to his efforts to introduce the South American lasso into the British service for auxiliary draught. In 1830 he published a life of Bruce, the i\frican traveller, and in 1834 Bubbles front the Brunncns of Nassau, by an Old Man. In 1835 he was knighted, and in the following year created a baronet. In 1835 he was appointed lieutenant-governor of Upper Canada, and in this capacity he had to deal with a political situation of great difficulty, being called upon in 1837 to suppress a serious insurrection. Shortly afterwards, in consequence of a dispute with the home govern- ment, he resigned his post and returned to England, via New York (see Quarterly Review, vols. 63-64). Thereafter he devoted himself to writing, chiefly for the Quarterly Review, and to hunting. He rode to hounds until he was seventy-five. In 1869 Sir Francis Head was made a privy councillor. He died on the 20th of July 1875, at Duppas Hall, Croydon.

Head was the author of a considerable number of works, chiefly of travel, written in a clever, amusing and graphic fashion, and displaying both acute observation and genial humour. His principal works, beside those mentioned above, and a narrative of his Canadian administration (1839), were The Emigrant (1846); Highways and Dryways, the Britannia and Conway Tubular Bridges (1849); Stokers and Pokers, a sketch of the working of a railway line (1849); The Defenceless Stale of Great Britain (1850); A Faggot of French Sticks (1852); A Fortnight in Ireland (1852); Descriptive Essays (1856); comments on Kinglake’s Crimean War (1853); The Horse and his Rider (i860); The Royal Engineer (1870); and a sketch of the life of Sir John Burgoyne (1872).

His brother, Sir George Head (1782-1855), was educated at the Charterhouse. In 1808 he received an appointment in the commissariat of the British army in the Peninsula, where he was a witness of many exciting scenes and important battles, of which he gave an interesting account in ” Memoirs of an Assistant Commissary-General ” attached to the second volume of his Home Tour, published in 1837. In 1814 he was sent to America to take charge of the commissariat in a naval establish- ment on the Canadian lakes, and he subsequently held appoint- ments at Halifax and Nova Scotia. Some of his Canadian experiences were narrated by him in Forest Scenery and Incidents in the Wilds of North America (1829). In 1831 he was knighted.

He published in 183.5 A Home Tour through the Manufacturing Districts of England, and in 1837 a sequel to it, entitled A Home Tour through various parts of the United Kingdom. Both works are amusing and instructive, but his Rome, a Tour of many Days, pub- lished in 1849. is somewhat dull and tedious. He also translated Historical Memoirs of Cardinal Pacca (1850), and the Metamorphoses of Apuleius (1851).

HEAD (in 0. Eng. hiafod; the word is common to Teutonic languages; cf. Dutch hoofd, Ger. Haupt, generally taken to be in origin connected with Lat. caput, Gr. KeipaMfly the upper portion of the body in man, consisting of the skull with its integuments and contents, &c, connected with the trunk by the neck ("see Anatomy, Skull and Brain); also the anterior

or fore part of other animals. The word is used in a large number of transferred and figurative senses, generally with reference to the position of the head as the uppermost part, hence the leading, chief portion of anything.

HEAD-HUNTING, or Head-Snapping, as the Dutch call it, a custom once prevalent among all Malay races and surviving even to-day among the Dyaks (q.v.) of Borneo and elsewhere. Martin de Rada, provincial of the Augustinians, reported its existence in Luzon (Philippine Islands) as early as 1577. The practice is believed to have had its origin in religious motives, the worship of skulls being universal among the Malays. Severe repressive measures have led to its decrease. Among the Igorrotes all that remains is the dance, accompanied by singing, around the bare pole on which the head was formerly fixed. With the Ilongotes a bridegroom must bring his bride a number of heads, those of Christians being preferred. The chief examples of head-hunters are the Was, a hill-tribe on the north-eastern frontier of India, and the Nagas and Kukis of Assam.

See Bock, Headhunters of Borneo (1881) ; W. H. Furness, Home Life of Borneo Head-hunters (Philadelphia, 1902) ; T. C. Hodson, " Head-hunting in Assam," in Folk-Lore, xx. 2. 132.

HEALTH, a condition of physical soundness or well-being, in which an organism discharges its functions efficiently; also in a transferred sense a state of moral or intellectual well-being (see Hygiene, Therapeutics and Public Health). " Health " represents the O. Eng. hcdth, the condition or state of being hdl, safe or sound. This word took in northern dialects the form " hale," in southern or midland English hole, hence " whole," with the addition of an initial w, as in "

whoop," and in the pronunciation of " one." " Hail," properly an exclamation of greeting, good health to you, hence, to greet, to call out to, is directly Scandinavian in origin, from Old Norwegian heill, cognate with the O. Eng. hdl, used also in this sense. " To heal " (O. Eng. hcdan), to make in sound health, to cure, is also cognate.

Drinking of Healths. — The custom of drinking " health " to the living is most probably derived from the ancient religious rite of drinking to the gods and the dead. The Greeks and Romans at meals poured out libations to their gods, and at ceremonial banquets drank to them and to the dead. The Norsemen drank the " minni " of Thor, Odin and Freya, and of their kings at their funeral feasts. With the advent of Christianity the pagan custom survived among the Scandinavian and Teutonic peoples. Such festal formulae as " God's minne!" "A bowl to God in Heaven !" occur, and Christ, the Virgin and the Saints were invoked, instead of heathen gods and heroes. The Norse " minne " was at once love, memory and thought of the absent one, and it survived in medieval and later England in the " minnying " or " mynde " days, on which the memory of the dead was celebrated by services and feasting. Intimately associated with these quasi-sacrificial drinking customs must have ever been the drinking to the health of living men. The Greeks drank to one another and the Romans adopted the custom. The Goths pledged each other with the cry "Hails!" a greeting which had its counterpart in the Anglo-Saxon " waes hael " (see Wassail). Most modern drinking-usages have had their equivalents in classic times. Thus the Greek practice of drinking to the Nine Muses as three times three survives to-day in England and elsewhere. The Roman gallants drank as many glasses to their mistresses as there were letters in each one's name. Thus Martial:

" Six cups to Naevia's health go quickly round, And be with seven the fair Justina's crown'd."

The English drinking phrase — a "toast," to "toast" anyone — not older than the 17th century, had reference at first to this custom of drinking to the ladies. A toast was at first invariably a woman, and the origin of the phrase is curious. In Stuart days there appears to have been a time-honoured custom of putting a piece of toast in the wine-cup before drinking, from a fanciful notion that it gave the liquor a better flavour. In the Taller No. 24 the connexion between this sippet of toast and the fair one pledged is explained as follows: " It happened that on a publick day " (speaking of Bath in Charles II. 's reign)

In the auditory canal waves of sound are reflected from side to side until they reach the membrana tympani. From the obliquity in position and peculiar curvature of this membrane, most of the waves strike it nearly perpendicularly, and in the most advantageous direction.

2. Transmission in Middle Ear. — The middle ear is a small cavity, the walls of which are rigid with the exception of the portions consisting of the membrana tympani, and the membrane of the round window and of the apparatus filling the oval window. This cavity communicates with the pharynx by the Eustachian tube, which forms an air-tube between the pharynx and the tympanum for the purpose of regulating pressure on the mem- brana tympani. During rest the tube is open, but it is closed during the act of deglutition. As this action is frequently taking place, not only when food or drink is introduced, but when saliva is swallowed, it is evident that the pressure of the air in the tympanum will be kept in a state of equilibrium with that of the external air on the outer surface of the membrana tym- pani, and that thus the membrana tympani will be rendered independent of variations of atmospheric pressure such as occur when we descend in a diving bell or ascend in a balloon. By a forcible expiration, the oral and nasal cavities being closed, air may be driven into the tympanum, while a forcible inspiration (Valsalva's experiment) will draw air from that cavity. In the first case, the membrana tympani will bulge outwards, in the second case inwards, and in both, from excessive stretching of the membrane, there will be partial deafness, especially for sounds of high pitch. Permanent occlusion of the tube is one of the most common causes of deafness.

The membrana tympani is capable of being set into vibration by a sound of any pitch included in the range of perceptible sounds. It responds exactly as to number of vibrations (pitch), intensity of vibrations (intensity), and complexity of vibration (quality or timbre). Consequently we can hear a sound of any given pitch, of a certain intensity, and in its own specific timbre or quality. Generally speaking, very high tones are heard more easily than low tones of the same intensity. As the membrana tympani is not only fixed by its margin to a ring or tube of bone, but is also adherent to the handle of the malleus, which follows its movements, its vibrations meet with considerable resistance. This diminishes the intensity of its vibrations, and prevents also the • continued vibration of the membrane after an external pressure has ceased, so that a sound is not heard much longer than its physical cause lasts. The tension of the membrane may be affected (i) by differences of pressure on the two surfaces of the membrana tympani, as may occur during forcible expira- tion or

inspiration, and (2) by muscular action, due to con- traction of the tensor tympani muscle. This small muscle arises from the apex of the petrous temporal and the cartilage of the Eustachian tube, enters the tympanum at its anterior wall, and is inserted into the malleus near its root. The handle of the malleus is inserted between the layers of the membrana tympani, and, as the malleus and incus move round an axis passing through the neck of the malleus from before backwards, the action' of the muscle is to pull the membrana tympani inwards towards the tympanic cavity in the form of a cone, the meridians of which are not straight but curved, with convexity outwards. When the muscle contracts, the handle of the malleus is drawn still farther inwards, and thus a greater tension of the tympanic membrane is produced. On relaxation of the muscle, the mem- brane returns to its position of equilibrium by its elasticity and by the elasticity of the chain of bones. This power of varying the tension of the membrane is an accommodating mechanism for receiving and transmitting sounds of different pitch. With different degrees of tension it will respond more readily to sounds of different pitch. Thus, when the membrane is tense, it will readily respond to high sounds, while relaxation will be the condition most adapted for low tones. In addition, increased tension of the membrane, by increasing the resistance, will diminish the intensity of vibrations. This is especially the case for sounds of low pitch.

The vibrations of the membrana tympani are transmitted to

the internal ear partly by the air which the middle ear or tym- panum contains, and partly by the chain of bones, consisting of the malleus, incus and stapes. Of these, transmission by the chain of bones is by far the most important. In birds and in the amphibia, this chain is represented by a single rod-like ossicle, the columella, but in man the two membranes— the membrana tympani and the membrane filling the fenestra ovalis — are con- nected by a compound lever consisting of three bones, namely, the malleus, or hammer, inserted into the membrana tympani' the incus, or anvil, and the stapes, or stirrup, the base of which is attached to a membrane covering the oval window. It must also be noted that in the transmission of vibrations of the mem- brana tympani to the fluid in the labyrinth or internal ear, through the oval window, the chain of ossicles vibrates as a whole and acts efficiently, although its length may be only a fraction of the wave- length of the sound transmitted. The chain is a lever in which the handle of the malleus forms the long arm, the fulcrum is where the short process of the incus abuts against the wall of the tympanum,

while the long process of the incus, carrying the stapes, forms the short arm. The mechanism is a lever of the second order. Measurements show that the ratio of the lengths of the two arms is as 1-5:1; the ratio of the resulting force at the stapes is therefore as 1:1-5; while the amplitudes of the movements at the tip of the handle of the malleus and the stapes is as 1-5:1. Hence, while there is a diminution in amplitude there is a gain in power, and thus the pressures are conveyed with great efficiency from the membrana tympani to the labyrinth, while the amplitude of the oscillation is diminished so as to be adapted to the small capacity of the labyrinth. As the drum-head is nearly twenty times greater in area than the membrane covering the oval window, with which the base of the stapes is connected, the energy of the movements of the membrana tympani is concentrated on an area twenty times smaller; hence the pressure is increased thirtyfold (1-5X20) when it acts at the base of the stapes. Experiments on the human ear have shown that the movement of greatest amplitude was at the tip of the handle of the malleus, 0-76 mm.; the movement of the tip of the long arm process of the incus was o-2i mm.; while the greatest amplitude at the base of the stapes was only -0714 mm. Other observations have shown the movements at the stapes to have a still smaller amplitude, varying from o-ooi to 0-032 mm. With tones of feeble intensity the movements must be almost infinitesimal. There may also be very minute transverse movements at the base of the stapes. 3. Transmission in the Internal Ear. — The internal ear is composed of the labyrinth, formed of the vestibule or central part, the semicircular canals, and the cochlea, each of which consists of an osseous and a membranous portion. The osseous labyrinth may be regarded as an osseous mould in the petrous portion of the temporal bone, lined by tesselated endothelium, and containing a small quantity of fluid called the perilymph. In this mould, partially surrounded by, and to some extent floating in, this fluid, there is the membranous labyrinth, in certain parts of which we find the terminal apparatus in connexion with the auditory nerve, immersed in another fluid called the endolymph. The membranous labyrinth consists of a vestibular portion formed by two small sac-like dilatations, called the saccule and the utricle, the latter of which communicates with the semicircular canals by five openings. Each canal consists of a tube, bulging out at each extremity so as to form the so-called ampulla, in which, on a projecting ridge, called the crista acustica, there are cells bearing long auditory hairs, which are the peripheral end-organs of the vestibular branches of the auditory nerve. The cochlear division of the membranous labyrinth consists of the ductus cochlearis, a tube of triangular form fitting in between the two cavities in the cochlea, called the scala vesiibuli, because it commences in the vestibule, and

the scala tympani, because it ends in the tympanum, at the round window. These two scalae communicate at the apex of the cochlea. The roof of the ductus cochlearis is formed by a thin membrane called the membrane of Reissner, while its floor consists of the basilar membrane, on which we find the remarkable organ of Corti, which constitutes

” a celebrated beauty of those times was in the cross bath, and one of the crowd of her admirers took a glass of the water in which the fair one stood, and drank her health to the company.’ There was in the place a gay fellow, half fuddled, who offered to jump in, and swore, though he liked not the liquor, he would have the coast. He was opposed in his resolution; yet this whim gave foundation to the present honour which is done to the lady we mention in our liquor, who has ever since been called a toast.” Skeat adds (Elym. Diet., 1908), “whether the story be true or not, it may be seen that a ‘ toast,’ i.e. a health, easily took its name from being the usual accompaniment to liquor, especially in loving cups,” &c.

Health drinking had by the beginning of the 17th century become a very ceremonious business in England. At Christmas 1623 the members of the Middle Temple, according to one of the Harleian MSS. quoted in The Life of Sir Simonds D’Ewes, drank to the health of the princess Elizabeth, who, with her husband- the king of Bohemia, was then suffering great misfortunes, and stood up, one after the other, cup in one hand, sword in the other, and pledged her, swearing to die in her service. Toasts were often drunk solemnly on bended knees; according to one authority, Samuel Ward of Ipswich, in his Woe to Drunkards (1622), on bare knees. In 1668 at Sir George Carteret’s at Cranbourne the health of the duke of York was drunk by all in turn, each on his knees, the king, who was a guest, doing the like. A Scotch custom, still surviving, was to drink a toast with one foot on the table and one on the chair. Healths, too, were drunk in a definite order. Braithwaite says: ” These cups proceed either in order or out of order. In order when no person trans- gresseth or drinkes out of course, but the cup goes round according to their manner of sitting: and this we call a health-cup, because in our wishing or confirming of any one’s health, bare headed and standing, it is performed by all the company ” (Laws of Drinking, 161 7). Francis Douce’s MSS. notes say: ” It was the custom in Beaumont and Fletcher’s time for the young gallants to stab themselves in the arms or elsewhere, in order to drink the health of

their mistresses." Pepys, in his Diary for the 19th of June 1663, writes: " To the Rhenish wine house, where Mr Moore showed us the French manner when a health is drunk, to bow to him that drunk to you, and then apply yourself to him, whose lady's health is drunk, and then to the person that you drink to, which I never knew before; but it seems it is now the fashion." A Frenchman visiting England in Charles II. 's time speaks of the custom of drinking but half your cup, which is then filled up again and presented to him or her to whose health you drank. England's divided loyalty in the 18th century bequeathed to modern times a custom which possibly yet survives. At dinners to royalties, until the accession of Edward VII., finger-glasses were not placed on the table, because in early Georgian days those who were secretly Jacobites passed their wine-glasses over the finger-bowls before drinking the loyal toasts, in allusion to the royal exiles " over the water," thus salving their consciences. Lord Cockbum (1770-1854),., in his Memorials of his Time (1856), states that in his day the drinking of toasts had become a perfect social' tyranny; "every glass during dinner had to be dedicated to some one. It was thought sottish and rude to take wine without this, as if forsooth there was nobody present worth drinking with. I was present about 1803 when the late duke of Buccleuch took a glass of sherry by himself at the table of Charles Hope, then lord advocate, and this was noticed afterwards as a piece of direct contempt." In Germany to-day it is an insult to refuse to drink with any one; and at one time in the west of America a man took his life in his hands by declining to pledge another. All this is a survival of that very early and universal belief that drinking to one another was a proof of fair play, whether it be in a simple bargain or in matters of life and death. The ceremony surrounding the Loving Cup to-day is reminiscent of the perils of those times when every man's hand was raised against his fellow. This cup, known at the universities as the Grace Cup, was originated, says Miss Strickland in her Lives of the Queens of Scotland, by Margaret Atheling, wife of Malcolm Canmore, who, in order to induce the Scots to remain at table for

grace had a cup of the choicest wine handed round immediately after it had been said. The modern "loving cup" sometimes has a cover, and in this case each guest rises and bows to his immediate neighbour on the right, who, also rising, removes and holds the cover with his right hand while the other drinks; the little comedy is a survival of the days when he who drank was glad to have the assurance that the right or dagger hand of his neighbour was occupied in holding the lid of the chalice. When there is no cover it is a common custom for both the left- and the right-hand neighbour to rise while the loving cup is

drunk, with the similar object of protecting the drinker from attack. The Stirrup Cup is probably the Roman poculum boni genii, the last glass drunk at the banquet to a general ” good night.”

See Chambers, Book of Days; Valpy, History of Toasting (1881); F. W. Hackwood, Inns, Ales, and Drinking Customs (London, 1909).

HEALY, GEORGE PETER ALEXANDER (1808-1894), American painter, was born in Boston, Massachusetts, on the 15th of July 1808. Going to Europe in 1835 Healy studied under Baron Gros in Paris and in Rome. He received a third- class medal in Paris in 1840, and one of the second class in 1855, when he exhibited his ” Franklin urging the claims of the American Colonies before Louis XVI.” Among his portraits of eminent men are those of Webster, Clay, Calhoun, Guyot, Seward, Louis Philippe, and the presidents of the United States from John Quincy Adams to Grant — this series being painted for the Corcoran Gallery, Washington. His large group, ” Webster replying to Hayne,” containing 150 portraits, is in Faneuil Hall, Boston, Mass. He was one of the most prolific and popular painters of his day. He died in Chicago, Illinois, on the 24th of June 1894.

HEANOR, an urban district in the Ilkeston parliamentary division of Derbyshire, England, 10 m. N.W. of Nottingham, on the Great Northern and Midland railways. Pop. (1901) 16,249. Large hosiery works employ many of the inhabitants, and collieries are worked in the parish. The urban district includes Codnor-cum-Loscoe. Shipley Hall, to the south of Heanor, is a mansion built on a hill, amidst fine gardens. The ruin of the ancient moated castle of Codnor stands, overlooking the vale of the Erewash, on land which was once Codnor Park, and is now the site of large ironworks.

HEARING (formed from the verb ” to hear,” O. Eng. hyran, heran, &c, a common Teutonic verb; cf. Ger. hbren, Dutch hooren, &c; the O. Teut. form is seen in Goth, hausjan; the initial h makes any connexion with ” ear,” Lat. audire, or Gr. aicoveiv very doubtful), in physiology, the function of the ear [q.v.), and the general term for the sense or special sensation, the cause of which is an excitation of the auditory nerves by the vibrations of sonorous bodies. The anatomy of the ear is described in the separate article on that organ. A description of sonorous vibrations is given in the article Sound; here we shall consider the transmission of such vibrations from the external ear to the auditory nerve, and the physiological characters of auditory sensation.

1. Transmission in External Ear. — The external ear consists of the

pinna, or auricle, and the external auditory meatus, or canal, at the bottom of which we find the membrana tym- pani, or drum head. In many animals the auricle is trumpet- shaped, and, being freely movable by muscles, serves to collect sonorous waves coming from various directions. The auricle of the human ear presents many irregularities of surface. If these irregularities are abolished by filling them up with a soft" material such as wax or oil, leaving the entrance to the canal free, experiment shows that the intensity of sounds is weakened, and that there is more difficulty in judging of their direction. When waves of sound strike the auricle, they are partly reflected outwards, while the remainder, impinging at various angles, undergo a number of reflections so as to be directed into the auditory canal. Vibrations are transmitted along the auditory canal, partly by the air it contains and partly by its walls, to the membrana tympani. The absence of the auricle, as the result of accident or injury, does not cause diminution of hearing.

the terminal organ of the cochlear division of the auditory nerve. It is sufficient to state here that this organ consists essentially of an arrangement of epithelial cells bearing hairs which are in communication with the terminal filaments of this portion of the auditory nerve, and that groups of these hairs pass through holes in a closely investing membrane, membrana reticularis, which may act as a damping apparatus, so as quickly to stop their movements. The ductus cochlearis and the two scalae are filled with fluid. Sonorous vibrations may reach the- fluid in the labyrinth by three different ways— (i) by the osseous walls of the labyrinth, (2) by the air in the tympanum and the round window, and (3) by the base of the stapes inserted into the oval window.

When the head is plunged into water, or brought into direct contact with any vibrating body, vibrations must be transmitted directly. Vibrations of the air in the mouth and in the nasal passages are also communicated directly to the walls of the cranium, and thus pass to the labyrinth. In like manner, we may experience auditive sensations, such as blowing, rubbing and hissing sounds, due to muscular contraction or to the passage of blood in vessels close to the auditory organ. It is doubtful whether any vibrations are communicated to the fluid in the labyrinth by the round window. Vibrations which cause hearing are communicated by the chain of bones. When the base of the stirrup is pushed into the oval window, the pressure in the laby-

rinth increases, and, as the only mobile part of the wall of the labyrinth is the membrane covering the round window, this membrane is forced outwards; when the base of the stirrup moves outwards a reverse action takes place. Thus the fluid of the labyrinth receives a series of pulses isochronous with the movements of the base of the stirrup, and these pulses affect the terminal apparatus in connexion with the auditory nerve.

The sacs of the internal ear, known as the utricle and saccule, receive the impulses of the base of the stapes. They are organs connected with the perception of sounds as sounds, without reference to pitch or quality. For the analysis of tone a cochlea is necessary. Even in mammals all the parts of the ear may be destroyed or affected by disease, except these sacs, without causing complete deafness.

It has been suggested by Lee (Amer. Jour, of Physiol, vol. i. No. 1, p. 128) that in fishes the sac has nothing to do with hearing, but serves for the perception of movements, such as those of rotation and translation through space, movements much coarser than those that form the physical basis of sound. He considers, also, that as fishes, with few exceptions, are dumb, they are also deaf. In the fish there are peculiar organs along the lateral line which are known to be connected with the perception of movements of the body as a whole, and Beard (Zool. Anz. Leipzig, 1884, Bd. vii. S. 140) has attempted to trace a phylo- genetic connexion between the sacs of the internal ear and the organs in the lateral line. According to this view, when animals became air-breathers, a part of the ear (the papilla- acuslica basilaris) was gradually evolved for the perception of delicate vibrations of sound. (See Equilibrium.)

It is by means of the cochlea that we discriminate pitch, hear beats, and are affected by quality of tone.

Since the size of the membranous labyrinth is so small, measur- ing, in man, not more than 3 in. in length by J in. in diameter at its widest part, and since it is a chamber consisting partly of conduits of very irregular form, it is impossible to state accurately the course of vibrations transmitted to it by impulses com- municated from the base of the stirrup. In the cochlea vibrations must pass from the saccule along the scala vestibuli to the apex, thus affecting the membrane of Reissner, which forms its roof; then, passing through the opening at the apex (the helicotrema) , they must descend by the scala tympani to the round window, and affect in their passage the membrana basilaris, on which the organ of Corti is situated. From the round window impulses must be reflected backwards, but how they affect

the advancing impulses is not known. But the problem is even more complex when we take into account the fact that impulses are trans- mitted simultaneously to the utricle and to the semicircular

canals communicating with it by five openings. The mode of action of these vibrations or impulses upon the nervous termina- tions is still unknown; but to appreciate critically the hypothesis which has been advanced to explain it, it is necessary, in the first place, to refer to some of the general characters of auditory sensation.

4. General Characters of Auditory Sensations. — Certain con- ditions are necessary for excitation of the auditory nerve sufficient to produce a sensation. In the first place, the vibrations must have a certain amplitude and energy; if too feeble, no impression will be produced.

Various physicists have attempted to measure the sensitiveness of the ear by estimating the amplitude of the molecular move- ments necessary to call forth the feeblest audible sound. Thus A. Topler and L. Boltzmann, on data founded on experiments with organ pipes, state that the ear is affected by vibrations of molecules of the air not more in amplitude than -0004 mm. at the ear, or o-i of the wave-length of green light, and that the energy of such a vibration on the drum-head is not more than •3^$ billionth kilog., or •jVth °f that produced upon an equal surface of the retina by a single candle at the same distance (Ann. d. Phys. u. Chem., Leipzig. 1870, Bd. cxli. S. 321). Lord Rayleigh, by two other methods, arrived at the conclusion ” that the streams of energy required to influence the eye and ear are of the same order of magnitude.” He estimated the ampli- tude of the movement of the aerial particles, with a sound just audible, as less than the ten-millionth of a centimetre, and the energy emitted when the sound was first becoming audible, at 42-1 ergs per second. He also states that in considering the amplitude or condensation in progressive aerial waves, at a distance of 27-4 metres from a tuning-fork, the maximum con- densation was = 6-oXio~ 9 cm., a result showing “that the ear is able to recognize the addition or subtraction of densities far less than those to be found in our highest vacua ” (Proc. Roy. Soc, 1877, vol. xxvi. p. 248; Lond. Edin. and Dub. Phil. Mag., 1894, vol. xxxviii. p. 366).

In the next place, vibrations must have a certain duration to be perceived; and lastly, to excite a sensation of a continuous musical sound, & certain number oi impulses must occur in a given interval of time. The lower limit is about 30, and the upper about 30,000 vibrations per second. Below 30, the individual impulses may be observed, and above 30,000 few ears can detect any sound at all. The

extreme upper limit is not more than 35,000 vibrations per second. Auditory sensations are of two kinds — noises and musical sounds. Noises are caused by impulses which are not regular in intensity or duration, or are not periodic, or they may be caused by a series of musical sounds occurring instantaneously so as to produce discords, as when we place our hand at random on the key-board of a piano. Musical tones are produced by periodic and regular vibrations. In musical sounds three characters are prominent — intensity, pitch and quality. Intensity depends on the amplitude of the vibration, and a greater or lesser amplitude of the vibration will cause a corresponding movement of the transmitting apparatus, and a corresponding intensity of excitation of the terminal apparatus. Pilch, as a sensation, depends on the length of time in which a single vibration is executed, or, in other words, the number of vibrations in a given interval of time. The ear is capable of appreciating the relative pitch or height of a sound as compared with another, although it may not ascertain precisely the absolute pitch of a sound. What we call an acute or high tone is produced by a large number of vibrations, while a grave or low tone is v caused by few. The musical tones which can be used with advantage range between 40 and 4000 vibrations per second, extending thus from 6 to 7 octaves. According to E. H. Weber, practised musicians can perceive a difference of pitch amounting to only the ˆth of a semitone, but this is far beyond average attainment. In a few individuals, and especially in early life, there may be an appreciation of absolute pitch. Quality or timbre (or Klang) is that peculiar characteristic of a musical sound by which we may identify it as proceeding from a particular instru- ment or from a particular human voice. It depends on the fact

that many waves of sound that reach the ear are compound wave systems, built up of constituent waves, each of which is capable of exciting a sensation of a simple tone if it be singled out and reinforced by a resonator (see Sound), and which may sometimes be heard without a resonator, after special practice and tuition. Thus it appears that the ear must have some arrangement by which it resolves every wave system, however complex, into simple pendular vibrations. When we listen to a sound of any quality we recognize that it is of a certain pitch. This depends on the number of vibrations of one tone, predominant in intensity over the others, called the fundamental or ground tone, or first partial tone. The quality, or timbre, depends on the number and intensity of other tones added to it. These are termed

harmonic or partial tones, and they are related to the first partial or funda- mental tone in a very simple manner, being multiples of the fundamental tone: thus —

Funda- mental Tone. Notes . . . do 1 Partial tones I

Number of \

vibrations) 33

Upper Partials or Harmonics.

do 2 sol 2 do 3 mi 3 sol 3 sib 3 do 4 re 4 mi 4

234567 89 10

66 99 132 165 198 231 264 297 330

When a simple tone, or one free from partials, is heard, it gives rise to a simple, soft, somewhat insipid sensation, as may be obtained by blowing across the mouth of an open bottle or by a tuning-fork. The lower partials added to the fundamental tone give softness combined with richness; while the higher, especially if they be very high, produce a brilliant and thrilling effect, as is caused by the brass instruments of an orchestra. Such being the facts, how may they be explained physiologically ?

Little is yet known regarding the mode of action of the vibra- tions of the fluid in the labyrinth upon the terminal apparatus connected with the auditory nerve. There can be no doubt that it is a mechanical action, a communication of impulses to delicate hair-like processes, by the movements of which the nervous filaments are irritated. In the human ear it has been estimated that there are about 3000 small arches formed by the rods of Corti. Each arch rests on the basilar membrane, and supports rows of cells having minute hair-like processes. It would appear also that the filaments of the auditory nerve terminate in the basilar membrane, and possibly they may be connected with the hair-cells. At one time it was supposed by Helmholtz that these fibres of Corti were elastic and that they were tuned for particular sounds, so as to form a regular series corresponding to all the tones audible to the human ear. Thus 2800 fibres distributed over the tones of seven octaves would give 400 fibres for each octave, or nearly 33 for a semitone. Helmholtz put forward the hypothesis that, when a pendular vibration reaches the ear, it excites by sympathetic vibration the fibre of Corti which is tuned for its proper number of vibrations. If, then, different fibres are

tuned to tones of different pitch, it is evident that we have here a mechanism which, by exciting different nerve fibres, will give rise to sensations of pitch. When the vibration is not simple but compound, in consequence of the blending of vibrations corresponding to various harmonics or partial tones, the ear has the power of resolving this compound vibration into its elements. It can only do so by different fibres responding to the constituent vibrations of the sound — one for the fundamental tone being stronger, and giving the sensation of a particular pitch to the sound, and the others, corresponding to the upper partial tones, being weaker, and causing undefined sensations, which are so blended together in consciousness as to terminate in a complex sensation of a tone of a certain quality or timbre. It would appear at first sight that 33 fibres of Corti for a semitone are not sufficient to enable us to detect all the gradations of pitch in that interval, sincˆ as has been stated above, trained musicians may distinguish a difference of iˆ-th of a semitone. To meet this difficulty, Helmholtz stated that if a sound is produced, the pitch of which may be supposed to come between two adjacent fibres of Corti, both of these will be set into sympathetic vibration, but the one which comes nearest to the pitch of the sound will vibrate with greater intensity than

the other, and that consequently the pitch of that sound would be thus appreciated. These theoretical views of Helmholtz have derived much support from experiments of V. Hensen, who observed that certain hairs on the antennae of My sis, a Crustacean, when seen with a low microscopic power, vibrated with certain tones produced by a keyed horn. It was seen that certain tones of the horn set some hairs into strong vibration, and other tones other hairs. Each hair responded also to several tones of the horn. Thus one hair responded strongly to rf# and d'#, more weakly to g, and very weakly to G. It was probably tuned to some pitch between d" and d"§. (Studien iiber das Gehororgan der Decapoden, Leipzig, 1863.)

Histological researches have led to a modification of this hypothesis. It has been found that the rods or arches of Corti are stiff structures, not adapted for vibrating, but apparently constituting a support for the hair-cells. It is also known that there are no rods of Corti in the cochlea of birds, which are capable nevertheless of appreciating pitch. Hensen and Helm- holtz suggested the view that not only may the segments of the membrana basilaris be stretched more in the radial than in the longitudinal direction, but different segments may be stretched radially with different degrees of tension so as to resemble a series of tense strings of gradually increasing length. Each string would then respond to a vibration of a particular pitch communicated

to it by the hair-cells. The exact mechanism of the hair-cells and of the membrana reticularis, which looks like a damping apparatus, is unknown.

5. Physiological Characters of Auditory Sensation. — Under ordinary circumstances auditory sensations are referred to the outer world. When we hear a sound, we associate it with some external cause, and it appears to originate in a particular place or to come in a particular direction. This feeling of exteriority of sound seems to require transmissior through the membrana tympani. Sounds which are sent through the walls of the cranium, as when the head is immersed in, and the external auditory canals are filled with, water, appear to originate in the body itself.

An auditory sensation lasts a short time after the cessation of the exciting cause, so that a number of separate vibrations, each capable of exciting a distinct sensation if heard alone, may succeed each other so rapidly that they are fused into a single sensation. If we listen to the puffs of a syren, or to vibrating tongues of low pitch, the single sensation is usually produced by about 30 or 35 vibrations per second; but when we listen to beats of considerable intensity, produced by two adjacent tones of sufficiently high pitch, the ear may follow as many as 132 intermissions per second.

The sensibility of the ear for sounds of different pitch is not the same. It is more sensitive for acute than for grave sounds, and it is probable that the maximum degree of acuteness is for sounds produced by about 3000 vibrations per second, that is near fa^. Sensibility as to pitch varies much with the individual. Thus some musicians may detect a difference of nrnrth of the total number of vibrations, while other persons may have difficulty in appreciating a semitone.

6. Analytical Power of the Ear. — When we listen to a compound tone, we have the power of picking out these partials from the general mass of sound. It is known that the frequencies of the partials as compared with that of the fundamental tone are simple multiples of the frequency of the fundamental, and also that physic- ally the waves of the partials so blend with each other as to produce waves of very complicated forms. Yet the ear, or the ear aridvihe brain together, can resolve this complicated wave-form into its constituents, and this is done more easily if we. listen to the sound with resonators, the pitch of which corresponds, or nearly corre- sponds, to the frequencies of the partials. Much discussion has taken place as to how the ear accomplishes this analysis. All are agreed that there is a complicated apparatus in the cochlea which may serve this purpose ; but while

some are of opinion that this structure is sufficient, others hold that the analysis takes place in the brain. When a complicated wave falls on the drum-head, it must move out and in in a way corresponding to the variations of pressure, and these variations will, in a single vibration, depend on the greater or less degree of complexity of the wave. Thus a single tone will cause a movement like that of a pendulum, a simple pendular vibration,

while a complex tone, although occurring in the same duration of time, will cause the drum-head to move out and in in a much more complicated manner. The complex movement will be conveyed to the base of the stapes, thence to the vestibule, and thence to the cochlea, in which we find the ductus cochlearis containing the organ of Corti. It is to be noted also that the parts in the cochlea are so small as to constitute only a fraction of the wave-length of most tones audible to the human ear. Now it is evident that the cochlea must act either as a whole, all the nerve fibres being affected by any variations of pressure, or the nerve fibres may have a selective action, each fibre being excited by a wave of a definite period, or there may exist small vibratile bodies between the nerve filaments and the pressures sent into the organ. The last hypothesis gives the most rational explanation of the phenomena, and on it is founded a theory generally accepted and associated with the names of Thomas Young and Hermann Helmholtz. It may be shortly stated as follows: —

” (i) In the cochlea there are vibrators, tuned to frequencies within the limits of hearing, say from 30 to 40,000 or 50,000 vibs. per second. (2) Each vibrator is capable of exciting its appropriate nerve filament or filaments, so that a nervous impulse, correspond- ing to the frequency of the vibrator, is transmitted to the brain — not corresponding necessarily, as regards the number of nervous impulses, but in such a way that when the impulses along a particular nerve filament reach the brain, a state of consciousness is aroused which does correspond with the number of the physical stimuli and with the period of the auditory vibrator. (3) The mass of each vibrator is such that it will be easily set in motion, and after the stimulus has ceased it will readily come to rest. (4) Damping arrangements exist in the ear, so as quickly to extinguish movements of the vibrators. (5) If a simple tone falls on the ear, there is a pendular movement of the base of the stapes, which will affect all the parts, causing them to move; but any part whose natural period is nearly the same as that of the sound will

respond on the principle of sympathetic resonance, a particular nerve filament or nerve filaments will be affected, and a sensation of a tone of definite pitch will be experienced, thus accounting for discrimination in pitch. (6) Intensity or loudness will depend on the amplitude of movement of the vibrating body, and consequently on the intensity of nerve stimulation. (7) If a compound wave of pressure be com- municated by the base of the stapes, it will be resolved into its constituents by the vibrators corresponding to tones existing in it, each picking out its appropriate portion of the wave, and thus irritating corresponding nerve filaments, so that nervous impulses are transmitted to the brain, where they are fused in such a way as to give rise to a sensation of a particular quality or character, but still so imperfectly fused that each constituent, by a strong effort of attention, may be specially recognized ” (article ” Ear,” by M’Kendrick, Schafer’s Text-Book, loc. cit.).

The structure of the ductus cochlearis meets the demands of this theory, it is highly differentiated, and it can be shown that in it there are a sufficient number of elements to account for the delicate appreciation of pitch possessed by the human ear, and on the basis that the highly trained ear of a violinist can detect a difference of ˆth of a semitone (M’Kendrick, Trans. Roy, Soc. Ed., 1896, vol. xxxviii. p. 780; also Schafer’s Text-Book, loc. cit.). Measurements of the cochlea have also shown such differentiation as to make it difficult to imagine that it can act as a whole. A much less complex organ might have served this purpose (M’Kendrick, op. cit.). The following table, given by Retzius (Das Gehororgan tier Wirbelthiere, Bd. ii. S. 356), shows differentiations in the cochlea of man, the cat and the rabbit, all of which no doubt hear tones, although in all probability they have very different powers of discrimination : —

Ear-teeth …. Holes in habenula for nerves Inner rods of Corti’s organ Outer rods of Corti’s organ Inner hair-cells (one row) Outer hair-cells (several rows) Fibres in basilar membrane

Man.

Cat.

Rabbit

2,490

2,430

1.550

3.985

2,780

1,650

5.590

4,700

2,800

•3.848

3.300

1,900

3,487

2,600

1,600

n,750

9,900

6,100

23.750

15.700

10,500

7. Dissonance. — The theory can also be used to explain dissonance. When two tones sufficiently near in pitch are simultaneously sounded, beats are produced. If the beats are few in number they can be counted, because they give rise to separate and distinct sensations; but if they are numerous they blend so as to give roughness or dissonance to the interval. The roughness or dissonance is most disagreeable with about 33 beats falling on the ear per second. When two compound tones are sounded, say a minor third on a harmonium in the lower part of the keyboard, then we have beats not only between the primaries, but also between the upper partials of each of the primaries. The beating distance may, for tones of medium pitch, be

fixed at about a nrnor third, but this interval will expand for intervals on low tones and contract for intervals on high ones. This explains why the same interval in the lower part of the scale may give slow beats that are not disagreeable, while in the higher part it may cause harsh and unpleasant dissonance. The partials up to the seventh are beyond beating distance, but above this they

come close together. Consequently instruments (such as tongues, or reeds) that abound in upper partials cause an intolerable dissonance if one of the primaries is slightly out of tune. Some intervals are pleasant and satisfying when produced on instruments having few partials in their tones. These are concords. Others are less so, and they may give rise to an uncomfortable sensation. These are discords. In this way unison, {, minor third f, major third i, fourth f , fifth I, minor sixth |, major sixth f and octave -f, are all concords; while a second f , minor seventh f and major seventh V , are discords. Helmholtz compares the sensation of dissonance to that of a flickering light on the eye. ” Something similar 1 have found to be produced by simultaneously stimulating the skin, or margin of the lips, by bristles attached to tuning-forks giving forth beats. If the frequency of the forks is great, the sensation is that of a most disagreeable tickling. It may be that the instinctive effort at analysis of tones close in pitch causes the disagreeable sensation ” (Schafer’s Text-Book, op. cit. p. 1187).

8. Other Theories. — In 1865 Rennie objected to the analysis theory, and urged that the cochlea acted as a whole (Ztschr. f. rat. Med., Dritte Reihe, Bd. xxiv. Heft 1, S. 12-64). This view was revived by Voltolini (Virchow’s Archiv, Bd. c. S. 27) some years later, and in 1886 it was urged by E. Rutherford (Rep. Brit. Assoc. Ad. Sc, 1 886), who compared the action of the cochlea to that of a telephone plate. According to this theory, all the hairs of the auditory cells vibrate to every note, and the hair-cells transform sound vibrations into nerve vibrations or impulses, similar in fre- quency, amplitude and character to the sound vibrations. There is no analysis in the peripheral organ. A. D. Waller, in 189 1 (Proc. Physiol. Soc, Jan. 20, 1891) suggested that the basilar membrane as a whole vibrates to every note, thus repeating the vibrations of the membrana tympani ; and since the hair-cells move with the basilar membrane, they produce what may be called pressure patterns against the tectorial membranes, and filaments of the auditory nerve are stimulated by these pressures. Waller admits a certain’ degree of peripheral analysis, but he relegates ultimate analysis to the brain. These theories, dispensing with peripheral analysis, leave out of account the highly complex structure of the cochlea, or, in other words, they assign to that structure a comparatively simple function which could be performed by a simple

membrane capable of vibrating. We find that the cochlea becomes more elaborate as we ascend the scale of animals, until in man, who possesses greater powers of analysis than any other being, the number of hair-cells, fibres of the basilar membrane and arches of Corti are all much increased in number (see Retzius's table, supra). The principle of sympathetic resonance appears, therefore, to offer the most likely solution of the problem. Hurst's view is that with each movement of the stapes a wave is generated which travels up the scala vestibuli, through the helicotrema into the scala tympani and down the latter to the fenestra rotunda. The wave, however, is not merely a movement of the basilar membrane, but an actual movement of fluid or a transmission of pressure. As the one wave ascends while the other descends, a pressure of the basilar membrane occurs at the point where they meet; this causes the basilar membrane to move to- wards the tectorial membrane, forcing this membrane suddenly against the apices of the hair-cells, thus irritating the nerves. The point at which the waves meet will depend on the time interval between the waves (Hurst, " A New Theory of Hearing," Trans. Biol. Soc. Liverpool, 1895, vol. ix. p. 321). More recently Max Mayer has advanced a theory somewhat similar. He supposes that with each movement of the stapes corresponding to a vibration, a wave travels up the scala vestibuli, pressing the basilar membrane down- wards. As it meets with resistance in passing upwards, its amplitude therefore diminishes, and in this way the distance up the scala through which the wave progresses will be determined by its ampli- tude. The wave in its progress irritates a certain number of nerve terminations, consequently feeble tones will irritate only those nerve fibres that are near the fenestra ovalis, while stronger tones will pass farther up and irritate a larger number of nerve fibres the same number of times per unit of time. Pitch, according to this view, depends on the number of stimuli per second, while loudness depends on the number of nerve fibres irritated. Mayer also applies the theory to the explanation ofcthe powers of the cochlea as an analyser, by supposing that with a compound tone these are at maxima and minima of stimulation. As the compound wave travels up the scala, portions of the wave corresponding to maxima and minima die away in consecutive series, until only a maximum and minimum are left ; and, finally, as the wave travels farther, these also disappear. Wif.lv each maximum and minimum different parts of the basilar membrane are affected, and affected a different number of times per second, according to the frequencies of the partials existing in the compound tone. Thus with a fifth, 2 : 3, there are three maxima and three minima ; but the compound tone is resolved into three tones having vibration frequencies -in the ratio of 3 : 2 : 1. According to Mayer, we actually

hear when a fifth is sounded tones of the relationship of 3 : 2 : I, the last (1) being the differential tone. He holds, also, that combinational tones are entirely subjective (Max Mayer, Ztschr. /. Psych, und Phys. d. Sinnesorgane, Leipzig, Bd. xvi. and xvii. ; also Verhandl. d. physiolog. Gesellsch. zu Berlin, Feb. 18, 1898, S. 49). Two fatal objections can be urged to these theories, namely, first, it is impossible to conceive of minute waves following each other in

rapid succession in the minute tubes forming the scalaeˆHhe length of the scala being only a very small part of the wave-length of the sounid; and, secondly, neither theory takes into account the differentiation of structure found in the epithelium of the organ of Corti. Each push in and out of the base of the stapes must cause a movement of the fluid, or a pressure, in the scalae as a whole.

There are difficulties in the way of applying the resonance theory to the perception of noises. Noises have pitch, and also each noise has a special character; if so, if the noise is analysed into its con- stituents, why is it that it seems impossible to analyse a noise, or to perceive any musical element in it ? Helmholtz assumed that a sound is noisy when the wave is irregular in rhythm, and he suggested that the crista and macula acustica, structures that exist not in the cochlea but in the vestibule, have to do with the per- ception of noise. These structures, however, are concerned rather in the sense of the perception of equilibrium than of sound (see Equilibrium).

9. Hitherto we have considered only the audition of a single sound, but it is possible also to have simultaneous auditive sensa- tions, as in musical harmony. It is difficult to ascertain what is the limit beyond which distinct auditory sensations may be perceived. We have in listening to an orchestra a multiplicity of sensations which produces a total effect, while, at the same time, we can with ease single out and notice attentively the tones of one or two special instruments. Thus the pleasure of music may arise partly from listening to simultaneous, and partly from the effect of contrast or suggestion in passing through successive, auditory sensations.

The principles of harmony belong to the subject of music (see Harmony), but it is necessary here briefly to refer to these from the physiological point of view. If two musical sounds reach the ear at the same moment, an agreeable or disagreeable sensation is experienced, which may be termed a concord or a discord, and it can be shown by experiment with the syren that this depends upon the vibrational numbers of the two tones. The octave (1 : 2), the twelfth (1 :3) and double octave (1 : 4) are absolutely consonant sounds; the fifth (2 13) is said to be perfectly consonant; then follow, in the direction of dissonance, the fourth (3 : 4), major sixth (3 ■: 5). major third (4 : 5), minor sixth (5 : 8) and the minor third (5:6). Helmholtz has attempted to account for this by the appli- cation of his theory of beats.

Beats are observed when two sounds of nearly the same pitch are produced together, and the number of beats per second is equal to the difference of the number of vibrations of the two sounds. Beats give rise to a peculiarly disagreeable intermittent sensation. The maximum roughness of beats is attained by 33 per second; beyond 132 per second, the individual impulses are blended into one uniform auditory sensation. When two notes are sounded, say on a piano, not only may the first, fundamental or prime tones beat, but partial tones of each of the primaries may beat also, and as the difference of pitch of two simultaneous sounds augments, the number of beats, both of prime tones and of harmonics, augments also. The physio- logical effect of beats, though these may not be individually dis- tinguishable, is to give roughness to the ear. If harmonics or partial tones of prime tones coincide, there are no beats; if they do not coincide, the beats produced will give a character of roughness to the interval. Thus in the octave and twelfth, all the partial tones of the acute sound coincide with the partial tones of the grave sound; in the fourth, major sixth and major third, only two pairs of the partial tones coincide, while in the minor sixth, minor third and minor seventh only one pair of the harmonics coincide

It is possible by means of beats to measure the sensitiveness of the ear by determining the smallest difference in pitch that may give rise to a beat. In no part of the scale can a difference smaller than 0-2 vibration per second be distinguished. The sensitiveness varies with pitch. Thus at 120 vibs. per second 0-4 vib. per second, at 500 about 0-3 vib. per second, and at 1000, 0-5 vib. per second can be distinguished. This is a remarkable illustration of the sensitiveness of the ear. When tones of low pitch are produced that do not rapidly die away, as by sounding heavy tuning-forks, not only may the beats be perceived corresponding to the difference between the frequencies of the forks, but also other sets of beats. Thus, if the two tones have frequencies of 40 and 74, a two-order beat may be heard, one having a frequency of 34 and the other of 6, as 74-5-40 = 1 +a positive remainder of 34, and 74 + 40 = 2-6, or 80-74, a negative remainder of 6. The lower beat is heard most distinctly when the number is less than half the frequency of the lower primary, and the upper when the number is greater. The beats we have been considering are produced when two notes are sounded slightly differing in frequency, or at all events their frequencies are not so great as those of two notes separated by a musical interval, such as an octave or a fifth. But Lord Kelvin has shown that beats may also be produced on slightly inharmonious musical intervals (Proc. Roy. Soc. Ed. 1878, vol. ix. p. 602). Thus, take two tuning- forks, 1(ˆ = 256 and ˆ3 = 512; slightly flatten uh so as to

make its frequency ‘510, and we hear, not a roughness corresponding to 254 beats, but a slow beat of 2 per second. The sensation also passes through a cycle, the beats now sounding loudly and fading away in intensity, again sounding loudly, and so on. One might suppose that the beat occurred between 510 (the frequency of utz flattened) and

5.12, the first partial of uh, namely uh, but this is not so, as the beat is most audible when uh is sounded feebly. In a similar way, beats may be produced on the approximate harmonies 2:3, 3:4, 4:5, 5 : 6, 6 : 7, 7 : 8, I : 3, 3 : 5, and beats may even be produced on the major chord 4 :5 : 6 by sounding ut 3 , mi 3 , soh, with sol 3 or mi 3 slightly flattened, ” when a peculiar beat will be heard as if a wheel were being turned against a surface, one small part of which was rougher than the rest.” These beats on imperfect harmonies appear to indicate that the ear does distinguish between an increase of pressure on the drum-head and a diminution, or between a push and a pull, or, in other words, that it is affected by phase. This was denied by Helmholtz.

10. Beat Tones. — Considerable difference of opinion exists as to whether beats can blend so as to give a sensation’ of tone; but R. Konig, by using pure tones of high pitch, has settled the question. These tones were produced by large tuning-forks. Thus «<6 = 2048 and ˆ6=2304. Then the beat tone is 1ˆ3 = 256 (2304-2048). If we strike the two forks, uh sounds as a grave or lower beat tone. Again, ut e — 20ˆ8 and ˆ6 = 3840. Then (2048)2-3840 = 256, a negative remainder, uh, as before, and when both forks are sounded uh will be heard. Again, ut$ = 2048 and soh — 3072, and 3072-2048 = 1024, or uh, which will be distinctly heard when uh and sok, are sounded (Konig, Quelgues experiences d' acoustique, Paris, 1882, p. 87).

11. Combination Tones. — Frequently, when two tones are sounded, not only do we hear the compound sound, from which we can pick out the constituent tones, but we may hear other tones, one of which is lower in pitch than the lowest primary, and the other is higher in pitch than the higher primary. These, known as combination tones, are of two classes: differential tones, in which the frequency is the difference of the frequencies of the generating tones, and summational tones, having a frequency which is the sum of the frequencies of the tones producing them. Differential tones, first noticed by Sorge about 1740, are easily heard. Thus an interval of a fifth, 2 : 3, gives a differential tone 1, that is, an octave below 2; a fourth, 3:4, gives I, a twelfth below 3; a major third, 4 : 5> gives 1, two octaves below 4; a minor third, 5:6, gives 1, two octaves and a major third below 5; a

major sixth, 3:5, gives 2, that is, a fifth below 3; and a minor sixth, 5 : 8, gives 3, that is, a major sixth below 5. Summational tones, first noticed by Helm- holtz, are so difficult to hear that much controversy has taken place as to their very existence. Some have contended that they are produced by beats. It appears to be proved physically that they may exist in the air outside of the ear. Further differential tones may be generated in the middle ear. Helmholtz also demon- strated their independent existence, and he states that ” whenever the vibrations of the air or of other elastic bodies, which are set in motion at the same time by two generating simple tones, are so powerful that they can no longer be considered infinitely small, mathematical theory shows that vibrations of the air must arise which have the same vibrational numbers as the combination tones ” (Helmholtz, Sensations of Tone, p. 235). The importance of these combinational tones in the theory of hearing is obvious. If the ear can only analyse compound waves into simple pendular vibrations of a certain order (simple multiples of the prime tone), how can it detect combinational tones, which do not belong to that order ? Again, if such tones are purely subjective and only exist in the mind of the listener, the fact would be fatal to the resonance theory. There can be no doubt, however, that the ear, in dealing with them, vibrates in some part of its mechanism with each generator, while it also is affected by the combinational tone itself, according to its frequency.

12. Hearing with two ears does not appear materially to influence auditive sensation, but probably the two organs are enabled, not only to correct each other’s errors, but also to aid us in determin- ing the locality in which a sound originates. It is asserted by G. T. Fechner that one ear may perceive the same tone at a slightly higher pitch than the other, but this may probably be due to some slight pathological condition in one ear. If two tones, produced by two tuning-forks, of equal pitch, are produced one near each ear, there is a uniform single sensation ; if one of the tuning-forks be made to revolve round its axis in such a way that its tone increases and diminishes in intensity, neither fork is heard continuously, but both sound alternately, the fixed one being only audible when the revolving one is not. It is difficult to decide whether excitations of corresponding elements in the two ears can be distinguished from each other. It is probable that the resulting sensations may be distinguished, provided one of the generating tones differs from the other in intensity or quality, although it may be the same in pitch. Our judgment as to the direction of sounds is formed mainly from the different degrees of intensity with which they are heard by two ears. Lord Rayleigli states that diffraction of the sound-waves will occur as

they pass round the head to the ear farthest from the source of sound; thus partial tones will reach the two ears with different intensities, and thus quality of tone may be affected (Trans. Music. Soc, London, 1876). Silvanus P. Thompson advo- cates a similar view, and he shows that the direction of a complex tone can be more accurately determined than the direction of a simple tone, especially if it be of low pitch (Phil. Mag., 1882). (j. G. M)

HEARN, LAFCADIO (1850-1904), author of books about Japan, was born on the 27th of June 1850 in Leucadia (pro- nounced Lefcadia, whence his name, which was one adopted by himself), one of the Greek Ionian Islands. He was the son of Surgeon-major Charles Hearn, of King's County, Ireland, who, during the English occupation of the Ionian Islands, was stationed there, and who married a Greek wife. Artistic and rather bohemian tastes were in Lafcadio Hearn's blood. His father's brother Richard was at one time a well-known member of the Barbizon set of artists, though he made no mark as a painter through his lack of energy. Young Hearn had rather a casual education, but was for a time (1865) at Ushaw Roman Catholic College, Durham. The religious faith in which he was brought up was, however, soon lost; and at nineteen, being thrown on his own resources, he went to America and at first picked up a living in the lower grades of newspaper work. The details axe obscure, but he continued to occupy himself with journalism and with out-of-the-way observation and reading, and meanwhile his erratic, romantic and rather morbid idio- syncrasies developed. He was for some time in New Orleans, writing for the Times Democrat, and was sent by that paper for two years as correspondent to the West Indies, where he gath- ered material for his Two Years in the French West Indies (1890). At last, in 1891, he went to Japan with a commission as a news- paper correspondent, which was quickly broken off. But here he found his true sphere. The list of his books on Japanese subjects tells its own tale: Glimpses of Unfamiliar Japan (1894); Out of the East (1895); Kokoro (1896); Gleanings in Buddha Fields (1897); Exotics and Retrospections (1898); In Ghostly Japan (1899); Shadowings (1900); A Japanese Miscellany (1901); Kotto (1902); Japanese Fairy Tales and Kwaidan (1903), and (published just after his death) Japan, an Attempt at Interpretation (1904), a study full of knowledge and insight. He became a teacher of English at the Uni- versity of Tokyo, and soon fell completely under the spell of Japanese ideas. He married a Japanese wife, became a naturalized Japanese under the name of

Yakumo Koizumi, and adopted the Buddhist religion. For the last two years of his life (he died on the 26th of September 1904) his health was failing, and he was deprived of his lecturership at the University. But he had gradually become known to the world at large by the originality, power and literary charm of his writings. This wayward bohemian genius, who had seen life in so many climes, and turned from Roman Catholic to atheist and then to Buddhist, was curiously qualified, among all those who were ” interpreting ” the new and the old Japan to the Western world, to see it with unfettered understanding, and to express its life and thought with most intimate and most artistic sincerity. Lafcadio Hearn’s books were indeed unique for their day in the literature about Japan, in their combination of real knowledge with a literary art which is often exquisite.

See Elizabeth Bisland, The Life and Letters of Lafcadio Hearn (2 vols., 1906); G. M. Gould, Concerning Lafcadio Hearn (1908).

HEARNE, SAMUEL (1745-1792), English explorer, was born in London. In 1756 he entered the navy, and was some time with Lord Hood; at the end of the Seven Years’ War (1763) he took service with the Hudson’s Bay Company. In 1768 he examined portions of the Hudson’s Bay coasts with a view to improving the cod fishery, and in 1760-1772 he was employed in north-western discovery, searching especially for certain copper mines described by Indians. His first attempt (from the 6th of November 1769) failed through the desertion of his Indians; his second (from the 23rd of February 1770) through the breaking of his quadrant; but in his third (December 1770 to June 1772) he was successful, not only discovering the copper of the Coppermine river basin, but tracing this river to the -. Arctic Ocean. He reappeared at Fort Prince of Wales on the 30th of June 1772. Becoming governor of this fort in 1775, he was taken prisoner by the French under La Perouse in 1782. He returned to England in 1787 and died there in 1792.

See his posthumous Journey from Prince of Wales Fort in Hudson’s Bay to the Northern Ocean (London, 1795).

HEARNE, THOMAS (1678-1735), English antiquary, was born in July 1678 at Littlefield Green in the parish of White Waltham, Berkshire. Having received his early education from his father, George Hearne, the parish clerk, he showed such taste for study that a wealthy neighbour, Francis Cherry of Shottes- brooke (c. 1665-1713), a celebrated nonjuror, interested himself in the boy, and sent him to the school at Bray ” on purpose to learn the Latin tongue.” Soon Cherry took him into his own house, and his education was continued at Bray

until Easter 1696, when he matriculated at St Edmund Hall, Oxford. At the university he attracted the attention of Dr John Mill (1645-1707), the principal of St Edmund Hall, who employed him to compare manuscripts and in other ways. Having taken the degree of B.A. in 1699 he was made assistant keeper of the Bodleian Library, where he worked on the catalogue of books, and in 171 2 he was appointed second keeper. In 17 15 Hearne was elected architypographus and esquire bedell in civil law in the University, but objection having been made to his holding this office together with that of second librarian, he resigned it in the same year. As a nonjuror he refused to take the oaths of allegiance to King George I., and early in 1 716 he was deprived of his librarianship. However he continued to reside in Oxford, and occupied himself in editing the English chroniclers. Having refused several important academical positions, including the librarianship of the Bodleian and the Camden professorship of ancient history, rather than take the oaths, he died on the 10th of June 1735.

Hearne's most important work was done as editor of many of the English chroniclers, and until the appearance of the" Rolls "series his editions were in many cases the only ones extant. Very carefully prepared, they were, and indeed are still, of the greatest value to historical students. Perhaps the most important of a long list are : Benedict of Peterborough's (Benedictus Abbas) De vita et gestis Henrici II. et Ricardi I. (1735); John of Fordun's Scotichronicon (1722); the monk of Evesham's Historia vitae et regni Ricardi II. (1729) ; Robert Mannyng's translation of Peter Langtoft's Chronicle (1725); the work of Thomas Otterbourne and John Whethamstede as Duo rerum Anglicarum scriptores veteres (1732); Robert of Gloucester's Chronicle (1724); J. Sprott's Chronica (1719); the Vita et gesta Henrici V., wrongly attributed to Thomas Elmham (1727); Titus Livy's Vita Henrici V. (1716); Walter of Heming- burgh's Chronicon (1731); and William of Newburgh's Historia rerum Anglicarum (1719). He also edited John Leland's Itinerary (1710-1712) and the same author's Collectanea (1715); W. Camden's A nnales rerum A nglicarum et Hibemicarum regnante Elizabetha (1 7 1 7) ; Sir John Spelman's Life of Alfred (1709) ; and W. Roper's Life of Sir Thomas More (17 16). He brought out an edition of Livy (1708) ; one of Pliny's Epistolae et panegyricus (1703); and one of the Acts of the Apostles (1715). Among his other compilations may be mentioned: Ductor historicus, a Short System of Universal History (1704, 1705, 1714, 1724); A Collection of Curious Discourses by Eminent Antiquaries (1720); and Reliquiae Bodleianae (1703).

Hearne left his manuscripts to William Bedford, who sold them to Dr

Richard Rawlinson, who in his turn bequeathed them to the Bodleian. Two volumes of extracts from his voluminous diary were published by Philip Bliss (Oxford, 1857), and afterwards an enlarged edition in three volumes appeared (London, 1869). A large

Cart of his diary entitled Remarks and Collections, 1705-1714, edited y C. E. Doble and D. W. Rannie, has been published by the Oxford Historical Society (1885-1898). Bibliotheca Hearniana, excerpts from the catalogue of Hearne's library, has been edited by B. Botfield (1848).

See Impartial Memorials of the Life and Writings of Thomas Hearne by several hands (1736) ; and W. D. Macray, Annals of the Bodleian Library (1890). Hearne's autobiography is published in W. Huddesford's Lives of Leland, Hearne and Wood (Oxford, 1772). T. Ouvry's Letters addressed to Thomas Hearne has been privately printed (London, 1874).

HEARSE (an adaptation of Fr. horse, a harrow, from Lat. hirpex, hirpicem, rake or harrow, Greek ixpiral;), a vehicle for the conveyance of a dead body at a funeral. The most usual shape is a four-wheeled car, with a roofed and enclosed body, sometimes with glass panels, which contains the coffin. This is the only current use of the word. In its earlier forms it is usually found as " herse," and meant, as the French word did, a harrow (q.v.). It was then applied to other objects resembling a harrow, following the French. It was then used of a portcullis, and thus becomes a heraldic term, the " herse " being frequently borne as a " charge, " as in the arms of the City of Westminster. The

chief application of the word is, however, to various objects used in funeral ceremonies. A " herse " or " hearse " seems first to have been a barrow-shaped framework of wood, to hold lighted tapers and decorations placed on a bier or coffin; this later developed into an elaborate pagoda-shaped erection of woodwork or metal for the funerals of royal or other distinguished persons. This held banners, candles, armorial bearings and other heraldic devices. Complimentary verses or epitaphs were often attached to the " hearse." An elaborate " hearse " was designed by Inigo Jones for the funeral of James I. The "

hearse ” is also found as a permanent erection over tombs. It is generally made of iron or other metal, and was used, not only to carry lighted candles, but also for the support of a pall during the funeral ceremony. There is a brass ” hearse ” in the Beauchamp Chapel at Warwick Castle, and one over the tomb of Robert Marmion and nis wife at Tanfield Church near Ripon.

HEART, in anatomy. — The heart 1 is a four-chambered muscular bag, which lies in the cavity of the thorax between the two lungs. It is surrounded by another bag, the pericardium, for protective and lubricating purposes (see Coelom and Serous Membranes). Externally the heart is somewhat conical, its base being directed upward, backward and to the right, its apex downward, forward and to the left. In transverse section the cone is flattened, so that there is an anterior and a posterior surface and a superior and inferior border. The superior border, running obliquely downward and to the left, is very thick, and so gains the name of margo obtusus, while the inferior border is horizontal and sharp and is called margo acutus (see fig. 1). The divisions between the four chambers of the heart (namely, the two auricles and two ventricles) are indicated on the surface by grooves, and when these are followed it will be seen that the

Fig. 2. Cavities of the Right Side of the Heart. — o, superior, and b, inferior vena cava; c, arch of aorta; d, pulmonary artery ; e, right, and/, left auricular append- age; g, fossa ovalis; h, Eustachian valve; k, mouth of coronary vein; /, m, n, cusps of the tricuspid valve; 0, 0, papillary muscles; p, semilunar valve; g, corpus Arantii; r, lunula.

Fig. 1. The Thoracic Viscera. — In this diagram the lungs are turned to the side, and the pericardium removed to display the heart, a, upper, a’, lower lobe of left lung; b, upper, b’, middle, b”, lower lobe of right lung; c, trachea; d, arch of aorta; e, superior vena cava ; /, pulmonary artery ; g, left, and h, right auricle; k, right, and /, left ventricle; m, inferior vena cava; n, descending aorta; I, innominate artery; 2, right, and 4, left common carotid artery; 3, right, and 5, left subclavian artery; 6, 6, right and left innominate vein; 7 and 9, left and right internal jugular veins; 8 and 10, left and right subclavian veins; 11, 12, 13, left pulmonary artery, bronchus and vein; 14, 15, 16, right pulmonary bronchus, artery and vein ; 17 and 18, left and right coronary arteries.

right auricle and ventricle lie on the front and right side, while the left auricle and ventricle are behind and on the left.

The right auricle is situated at the base of the heart, and its outline is

seen on looking at the organ from in front. Into the

1 In O. Eng. heorte; this is a common Teut. word, cf. Dut. hart, Ger. Herz, Goth, hairto ; related by root are Lat. cor and Gr. xapSia : the ultimate root is kard-, to quiver, shake.

posterior part of it open the two venae cavae (see fig. 2), the superior (a) above and the inferior (b) below. In front and to the left of the superior vena cava is the right auricular appendage (e) which overlaps the front of the root of the aorta, while running obliquely from the front of one vena cava to the other is a shal- low groove called the sulcus lerminalis, which indicates the original separation between the true auricle in front and the sinus venosus behind. When the auricle is opened by turning the front wall to the right as a flap the following structures are exposed:

1. A muscular ridge, called the crista termin- alis, corresponding to the sulcus terminalis on the exterior.

2. A series of ridges on the anterior wall and in the appendage, running downward from the last and at right angles to it, like the teeth of a comb; these are known as musculi pectinati.

3. The orifice of the superior vena cava (fig. 2, a) at the upper and back part of the chamber.

4. The orifice of the inferior vena cava (fig. 2, b) at the lower and back part.

5. Attached to the right and lower margins of this opening are the remains of the Eustachian valve (fig. 2, h), which in the foetus directs the blood from the inferior vena cava, through the foramen ovale, into the left auricle.

6. Below and to the left of this is the opening of the coronary sinus (fig. 2, k), which collects most of the veins returning blood from the substance of the heart.

7. Guarding this opening is the coronary valve or valve of Thebesius.

8. On the posterior or septal wall, between the two auricles, is an oval depression, called the fossa ovalis (fig. 2, g), the remains of the original communication between the two auricles. In about a quarter of all normal hearts there is a small valvular communication between

the two auricles in the left margin of this depression (see " 7th Report of the Committee of Collective Investigation," /. Anat. and Phys. vol. xxxii. p. 164).

9. The annulus ovalis is the raised margin surrounding this depression.

10. On the left side, opening into the right ventricle, is the right auriculo-ventricular opening.

11. On the right wall, between the two caval openings, may occasionally be seen a slight eminence, the tubercle of Lower, which is supposed to separate the two streams of blood i*h>,the embryo.

12. Scattered all over the auricular wall are minute depres- sions, the foramina Thebesii, some of which receive small veins from the substance of the heart.

The right ventricle is a triangular cavity (see fig. 2) the base of which is largely formed by the auriculo-ventricular orifice. To the left cf this it is continued up into. the root of the pulmonary artery, and this part is known as the infundibulum. Its anterior wall forms part of the anterior surface of the heart, while its posterior wall is chiefly formed by the septum ventriculorum,

between it and the left ventricle. Its lower border is the margo acutus already mentioned. In transverse section it is crescentic, since the septal wall bulges into its cavity. In its interior the following structures are seen:

i. The tricuspid valve (fig. 2, /, m, n) guarding against reflux of blood into the right auricle. This consists of a short cylindrical curtain of fibrous tissue, which projects into the ventricle from the margin of the auriculo-ventricular aperture, while from its free edge three triangular flaps hang down, the bases of which touch one another. These cusps are spoken of as septal, marginal and infundibular, from their position.

2. The chordae lendineae are fine fibrous cords which fasten the cusps

to the musculi papillares and ventricular wall, and prevent the valve being turned inside out when the ventricle contracts.

3. The columnae carneae are fleshy columns, and are of three kinds. The first are attached to the wall of the ventricle in their whole length and are merely sculptured in relief, as it were; the second are attached by both ends and are free in the middle; while the third are known as the musculi papillares and are attached by one end to the ventricular wall, the other end giving attachment to the chordae tendineae. These musculi papillares are grouped into three bundles (fig. 2, 0).

4. The moderator band is really one of the second kind of columnae carneae which stretches from the septal to the anterior wall of the ventricle.

5. The pulmonary valve (fig. 2, p) at the opening of the pulmonary artery has three crescentic, pocket-like cusps, which, when the ventricle is filling, completely close the aperture, but during the contraction of the ventricle fit into three small niches known as the sinuses of Valsalva, and so are quite out of the way of the escaping blood. In the middle of the free margin of each is a small knob called the corpus Aranlii (fig. 2, 17), and on each side of this a thin crescent-shaped flap, the lunula (fig. 2,r), which is only made of two layers of endocardium, whereas in the rest of the cusp there is a fibrous backing between these two layers.

The left auricle is situated at the back of the base of the heart, behind and to the left of the right auricle. Running down behind it are the oesophagus and the thoracic aorta. When it is opened it is seen to have a much lighter colour than the other cavities, owing to the greater thickness of its endocardium obscuring the red muscle beneath. There are no musculi pectinati except in the auricular appendage. The openings of the four pulmonary veins are placed two on each side of the posterior wall, but sometimes there may be three on the right side, and only one on the left. On the septal wall is a small depression like the mark of a finger-nail, which corresponds to the anterior part of the fossa ovalis and often forms a valvular communication with the right auricle. The auriculo-ventricular orifice is large and oval, and is directed downward and to the left. Foramina Thebesii and venae minimae cordis are found in this auricle, as in the right, although the chamber is one for arterial or oxidized blood.

At the lower part of the posterior surface of the unopened auricle, lying in the left auriculo-ventricular furrow, is the coronary sinus, which receives most of the veins returning the blood from the heart

substance; these are the right and left coronary veins at each extremity and the posterior and left cardiac veins from below. One small vein, called the oblique vein of Marshall, runs down into it across the posterior surface of the auricle, from below the left lower pulmonary vein, and is of morphological interest.

The left ventricle is conical, the base being above, behind and to the right, while the apex corresponds to the apex of the heart and lies opposite the fifth intercostal space, 3ˆ in. from the mid line. The following structures are seen inside it: —

1. The mitral valve guarding the auriculo-ventricular opening has the same arrangement as the tricuspid, already described, save that there are only two cusps, named marginal and aortic, the latter of which is the larger.

2. The chordae tendineae and columnae carneae resemble those of the right ventricle, though there are only two bundles

of musculi papillares instead of three. These are very large. A moderator band has been found as an abnormality (see J. Anat. and Phys. vol. xxx. p. 568).

3. The aortic valve has the same structure as the pulmonary, though the cusps are more massive. From the anterior and left posterior sinuses of Valsalva the coronary arteries arise. That part of the ventricle just below the aortic valve, corresponding to the infundibulum on the right, is known as the aortic vestibule.

The walls of the left ventricle are three times as thick as those of the right, except at the apex, where they are thinner. The septum ventriculorum is concave towards the left ventricle, so that a transverse section of that cavity is nearly circular. The greater part of it has nearly the same thickness as the rest of the left ventricular wall and is muscular, but a small portion of the upper part is membranous and thin, and is called the pars membranacea septi; it lies between the aortic and pulmonary orifices.

Structure of the Heart.— The arrangement of the muscular fibres of the heart is very complicated and only imperfectly known. For details one of the larger manuals, such as Cunning- ham's Anatomy (London, 1910), or Gray's Anatomy (London, 1909), should be consulted. The general scheme is that there are superficial fibres common to the two auricles and two ventricles and deeper fibres for each cavity. Until recently no fibres had been traced from the auricles to the ventricles,

though Gaskell predicted that these would be found, and the credit for first demonstrating them is due to Stanley Kent, their details having subsequently been worked out by W. His, Junr., and S. Tawara. The fibres of this auriculo-ventricular bundle begin, in the right auricle, below the opening of the coronary sinus, and run forward on the right side of the auricular septum, below the fossa ovalis, and close to the auriculo-ventricular septum. Above the septal flap of the tricuspid valve they thicken and divide into two main branches, one on either side of the ventricular septum, which run down to the bases of the anterior and posterior papillary muscles, and so reach the walls of the ventricle, where their secondary branches form the fibres of Purkinje. The bundle is best seen in the hearts of young Ruminants, and it is presumably through it that the wave of contraction passes from the auricles to the ventricles (see article by A. Keith and M. Flack, Lancet, nth of August 1906, p. 359).

The central fibrous body is a triangular mass of fibro-cartilage, situated between the two auriculo-ventricular and the aortic orifices. The upper part of the septum ventriculorum blends with it. The endocardium is a delicate layer of endothelial cells backed by a very thin layer of fibro-elastic tissue ; it is continuous with the endothelium of the great vessels and lines the whole of the cavities of the heart.

The heart is roughly about the size of the closed fist and weighs from 8 to 12 oz.; it continues to increase in size up to about fifty years of age, but the increase is more marked in the male than in the female. Each ventricle holds about 4 f. oz. of blood, and each auricle rather less. The nerves of the heart are derived from the vagus, spinal accessory and sympathetic, through the superficial and deep cardiac plexuses.

Embryology.

In the article on the arteries (q.v.) the formation and coal- escence of the two primitive ventral aoriae to form the heart are noticed, so that we may here start with a straight median tube lying ventral to the pharynx and being prolonged cephalad into the ventral aortae and caudad into the vitelline veins. This soon shows four dilatations, which, from the tail towards the head end, are called the sinus venosus, the auricle, the ventricle and the truncus 1 arteriosus. As the tubular heart grows more rapidly than the pericardium which contains it, it becomes bent into the form of an S laid on its side (CO), the ventral convexity being the ventricle and the dorsal the auricle. The passage from the auricle to the ventricle is known as the auricular canal, and in the dorsal and ventral parts of this appear two

thickenings

1 This is often called bulbus arteriosus, but it will be seen that the term is used rather differently in comparative anatomv.

Fig. 3. — Formation of Septa. Diagram

of the formation of some of th; septa of

the heart (viewed from the right side).

S.V. Sinus venosus.

Au. Auricle.

B.C. Endocardial cushions forming septum intermedium.

Y. Septum ventriculorum.

T. Ar. Septum aorticum intruncus ar- teriosus.

V.A. Ventral aorta.

known as endocardial cushions, which approach one another and leave a transverse slit between them (fig. 3, E.C.). Eventually these two cushions fuse in the middle line, obliterating the central part of the slit, while the lateral parts remain as the two auriculo-ventricular orifices ; this fusion is known as the septum intermedium. From the bottom (ventral convexity) of the ventricle an antero-posterior median septum grows up, which is

the septum inferius or septum ventriculorum (fig. 3, V). Posteriorly (caudally) this septum fuses with the septum intermedium, but anteriorly it is free at the lower part of the truncus arteriosus. On referring to the development of the arteries (see Arteries) it will be seen that another septum starts between the last two pairs of aortic arches and grows downward (caudad) until it reaches and joins with the septum inferius just mentioned. This septum aorticum (formed by two ingrowths from the wall of the vessel which fuse later) becomes twisted in such a way that the right ventricle is continuous with the last pair of aortic arches (pulmonary artery), while the left ventricle

communicates with the other arches (the permanent ventral aorta and its branches); it joins the septum ventriculorum in the upper part of the ventricular cavity and so forms the pars membranacea sepli (fig. 3, T. Ar).

The fate of the sinus venosus and auricle must now be followed. Into the former, at first, only the two vitelline veins open, but later, as they develop, the ducts of Cuvier and the umbilical veins join in (see Veins). As the ducts of Cuvier come from each side the sinus spreads out to meet them and becomes transversely elongated. The slight constriction, which at first is the only separation between the sinus and the auricle, becomes more marked, and later the opening is into the right part of the auricle, and is guarded by two valvular folds of endocardium (the venous valves) which project into that cavity, and are continuous above with a temporary downgrowth from the roof, known as the septum spurium. Later the right side of the sinus enlarges, and so does the right part of the aperture, until the back part of the right side of the auricle and the right part of the sinus venosus are thrown into one, and the only remnants of the partition are the crista terminalis and the Eustachian and Thebesian valves. The left part of the sinus venosus, which does not enlarge at the same rate as the right part, remains as the coronary sinus. It will now be seen why, in the adult heart, all the veins which open into the right auricle open into its posterior part, behind the crista terminalis. The septum spurium has been referred to as a temporary structure; the real division between the two auricles occurs at a later date than that between the ventricles and to the left of the septum spurium. It is formed by two partitions, the first of which, called the septum primum, grows down from the auricular roof. At first it does not quite reach the endocardial cushions in the auricular canal, already mentioned, but leaves a gap, called the ostium primum, between. This has nothing to do with the foramen ovale, which occurs as an independent perforation higher up, and at first is known as the ostium secundum. When it is established the septum primum grows down and meets the endocardial cushions, and so the ostium primum is obliterated. The septum secundum grows down on the right of the septum primum and is never complete; it grows round and largely overlaps the foramen ovale and its edges form the annulus

ovalis, so that, in the later months of foetal life, the foramen ovale is a valvular opening, the floor of which is formed by the septum primum and the margins by the septum secundum. The closure of the foramen is brought about by adhesion of the two septa.

The pulmonary veins of the two sides at first join one another, dorsal

to the left auricle, and open into that cavity by a single median trunk, but, as the auricle grows, this trunk and part of the right and left veins are absorbed into its cavity.

The mitral and tricuspid valves are formed by the shortening of the auricular canal which becomes telescoped into the ventricle, and the cusps are the remnants of this telescoping process.

The columnae carneae and chordae tendineae are the remains of a spongy network which originally filled the cavity of the primary ventricle.

The aortic and pulmonary valves are laid down in the ventral aorta, before it is divided into aorta and pulmonary artery, as four endocardial cushions; anterior, posterior and two lateral. The septum aorticum cuts the latter two into two, so that each artery has the rudiments of three cusps.

Abnormalities of the heart are very numerous, and can usually be explained by a knowledge of its development. They often cause grave clinical symptoms. A clear and well-illustrated review of the most important of them will be found in the chapter on congenital disease of the heart in Clinical Applied Anatomy, by C. R. Box and W. McAdam Eccles, London, 1906.

For further details of the embryology of the heart see Oscar Hertwig's Entwickelungslehre der Wirbeltiere (Jena, 1902) ; G. Born, " Entwicklung des Saugetierherzens," Archiv f. mik. Anat. Bd. 33 (1889); W. His, Anatomie menschlicher Embryonen (Leipzig, 1881-'885); Quain's Anatomy, vol. i. (1908); C. S. Minot, Human Embryology (New York, 1892); and A. Keith, Human Embryology and Morphology (London, 1905).

. Comparative Anatomy.

In the Acrania (e.g. lancelet) there is no heart, though the vessels are specially contractile in the ventral part of the pharynx. In the Cyclostomata (lamprey and hag), and Fishes, the heart has the same arrangement which has been noticed in the human embryo. There is a smooth, thin-walled sinus venosus, a thin reticulate-walled auricle, produced laterally into two appendages, a thick-walled ventricle, and a conus arteriosus containing valves. In addition to these the beginning of the ventral aorta is often thickened and expanded to forrr* a bulbus arteriosus, which is non-contractile, and, strictly speaking, should rather be described with the arteries than with the

heart. In relation to human embryology the smooth sinus venosus and reticulated auricle are interesting. Between the auricle and ventricle is the auriculo-ventricular valve, which primarily consists of two cusps, comparable to the two endocardial cushions of the human embryo, though in some forms they may be sub- divided. In the interior of the ventricle is a network of muscular trabeculae. The conus arteriosus in the Elasmobranchs (sharks and rays) and Ganoids (sturgeon) is large and provided with several rows of semilunar valves, but in the Cyclostomes (lamprey) and Teleosts (bony fishes) the conus is reduced and only the anterior (cephalic) row of valves retained. With the reduction of the conus the bulbus arteriosus is enlarged. So far the heart is a single tubular organ expanded into various cavities and having the characteristic W-shaped form seen in the human embryo; it contains only venous blood which is forced through the gills to be oxidized on its way to the tissues. In the Dipnoi (mud fish) , in which rudimentary lungs, as well as gills, are developed, the auricle is divided into two, and the sinus venosus opens into the right auricle. The conus arteriosus too begins to be divided into two chambers, and in Protopterus this division is complete. This division of the heart is one instance in which mammalian ontogeny does not repeat the processes of phylogeny, because, in the human embryo, it has been shown that the ventricular septum appears before the auricular. This want of harmony is sometimes spoken of as the ” falsification of the embryological record.”

In the Amphibia there are also two auricles and one ventricle,

though in the Urodela (tailed amphibians) the auricular septum is often fenestrated. The sinus venosus is still a separate chamber, and the conus arteriosus, which may contain many or few valves, is usually divided into two by a spiral fold. Structurally the amphibian heart closely resembles the dipnoan, though the increased size of the left auricle is an advance. In the Anura (frogs and toads) the whole ventricle is filled with a spongy network which prevents the arterial and venous blood from the two auricles mixing to any great extent. (For the anatomy and physiology of the frog’s heart, see The Frog, by Milnes Marshall.)

In the Reptiles the ventricular septum begins to appear;’ this in the

lizards is quite incomplete, but in the crocodiles, which are usually regarded as the highest order of living reptiles, the partition has nearly reached the top of the ventricle, and the condition resembles that of the human embryo before the pars membranacea septi is formed. The conus arteriosus becomes included in the ventricular cavity, but the sinus venosus still remains distinct, and its opening into the right ventricle is guarded by two valves which closely resemble the two venous valves in the auricle of the human embryo already referred to.

In the Birds the auricular and ventricular septa are complete; the right ventricle is thin-walled and crescentic in section, as in Man, and the musculi papillares are developed. The left auriculo- ventricular valve has three membranous cusps with chordae tendineae attached to them, but the right auriculo-ventricular valve has a large fleshy cusp without chordae tendineae. The sinus venosus is largely included in the right auricle, but remains of the two venous valves are seen on each side of the orifice of the inferior vena cava.

In the Mammals the structure of the heart corresponds closely with the description of that of Man already given. In the Ornithorynchus, among the Monotremes, the right auriculo- ventricular valve has two fleshy and two membranous cusps, thus showing a resemblance to that of the bird. In the Echidna, the other member of the order, however, both auriculo-ventricular valves are membranous. In the Edentates the remains of the venous valves at the opening of the inferior vena cava are better marked than in other orders. In the Ungulates the moderator band in the right ventricle is especially well developed, and the central fibrous body at the base of the heart is often ossified, forming the os cordis so well known in the heart of the ox.

The pdsition of the heart in the lower mammals is not so oblique as it is in Man.

For further details, see C. Rose, Beitr. z. vergl. Anal, des Herzens der Wirbelthiere Morph. Jahrb., Bd. xvi. (1890); R. Wiedersheim, Ver %1eichen.de Analomie der Wirbelthiere (Jena, 1902) (for literature) ; also Parker and Haswell's Zoology (London, 1897). (F. G. P.)

Heart Disease. — In the early ages of medicine, the absence of correct anatomical, physiological and pathological knowledge prevented diseases of the heart from being recognized with any certainty during life, and almost entirely precluded them from becoming the object of medical treatment. But no sooner did Harvey (1628) publish his

discovery of the circulation of the blood, and its dependence on the heart as its central organ, than derangements of the circulation began to be recognized as signs of disease of that central organ. (See also under Vascular System.)

Among the earliest to profit by this discovery and to make important contributions to the literature of diseases of the heart and circulation were, R. Lower (1631-1691), R. Vieussens (1641-1716), H. Boerhave (1668-1738) and the great patho- logists at the beginning of the 18th century, G. M. Lancisi (1654-1720), G. B. Morgagni (1682-1771) and J. B. Senac (1693-1770). The works of these writers form very interesting reading, and it is remarkable how careful were the observations made, and how sound the conclusions drawn, by these pioneers of scientific medicine. J. N. Corvisart (1755-1821) was one of the earliest to make practical use of R. T. Auenbrugger's (1722- 1809) invention of percussion to determine the size of the heart. R. T. H. Laennec (1781-1826) was the first to make a scientific application of mediate auscultation to the diagnosis of disease of

the chest, by the invention of the stethoscope. J. Bouillaud (1796-1881) extended its use to the diagnosis of disease of the heart. To James Hope (1801-1841) we owe much of the precision we have now attained in diagnosis of valvular disease from abnormalities in the sounds produced during cardiac movements. This short list by no means exhausts the earlier literature on the subject, but each of these names marks an era in the progress of the diagnosis of cardiac disease. In later years the literature on this subject has become very copious.

The heart and great vessels occupy a position immediately to the left of the centre of the thoracic cavity. The anterior surface of the heart is projected against the chest wall and is surrounded on either side by the lungs, which are resonant organs, so that any increase in the size of the heart, " dilatation," can be de- tected by percussion. By placing the hand on the chest, palpa- tion, the impulse of the left ventricle, or apex beat, can normally be felt just below and internal to the nipple. Deviations from the normal in the position or force of the apex beat will afford important information as to the nature of the pathological changes in the heart. Thus, displacement downwards and out- wards of the apex beat, with a forcible thrusting impulse, will indicate hypertrophy, or increase of the muscular wall and increased driving power of the left ventricle, whereas a similar displacement with a feeble diffuse impulse will indicate dilatation, or over-distension of its cavity from stretching of the walls.

By auscultation, or listening with a suitable instrument named a

stethoscope over appropriate areas, we can detect any abnor- mality in the sounds of the heart, and the presence of murmurs indicative of disease of one or other of the valves of the heart. The pericardium is a fibro-serous sac which loosely envelops the heart and the origin of the great vessels. Inflammation of this sac, or pericarditis, is apt to occur as a result of rheumatism, more especially in children. It may also occur as a complication of pneumonia. It is a serious affection associated with pain over the heart, fever, shortness of breath, rapid pulse and dilatation of the heart. As a result of the inflammation, fluid may accu- mulate in the pericardial sac, or the walls of the sac may become adherent to the heart and tend to embarrass its action. In favourable cases, however, recovery may take place without any untoward sequelae.

Diseases of the heart may be classified in two main groups, (1) Disease of the valves, and (2) Disease of the walls of the heart.

1. Valvular Disease. — Inflammation of the valves of the heart, or endocarditis, is one of the most common complications of rheumatism in children and young adults. More severe types, which are apt to prove fatal from a form of blood poisoning, may result when the valves of the heart are attacked by certain micro-organisms, such as the pneumococcus, which is responsible for pneumonia, the streptococcus and the staphylococcus pyogenes, the gonococcus and the influenza bacillus.

As a result of endocarditis, one or more of the valves may be seriously damaged, so that it leaks or becomes incompetent. The valves of the left side of the heart, the aortic and mitral valves, are affected far more commonly than those of the right side. It is indeed comparatively rarely that the latter are attacked. In the process of healing of a damaged valve, scar tissue is formed which has a tendency to contract, so that in some cases the orifice of the valve becomes narrowed, and the resulting stenosis or narrowing gives rise to obstruction of the blood stream. We may thus have incompetence or stenosis of a valve” or both combined.

Valvular lesions are detected on auscultation over appropriate areas by the blowing sounds or murmurs to which they give rise, which modify or replace the normal heart sounds. Thus, lesions of the mitral valve give rise to murmurs which are heard at the apex beat of the heart, and lesions of the aortic valves to murmurs which are heard over the aortic area, in the second right inter- costal space. Accurate timing of the murmurs in relation to the heart sounds enables us to judge whether the murmur is due to stenosis or incompetence of the

valve affected.

If the valvular lesion is severe, it is essential for the proper maintenance of the circulation that certain changes should take place in the heart to compensate for or neutralize the effects of the regurgitation or obstruction, as the case may be. In affec- tions of the aortic valve, the extra work falls on the left ventricle, which enlarges proportionately and undergoes hypertrophy. In affections of the mitral valve the effect is felt primarily by the left auricle, which is a thin walled structure incapable of under- going the requisite increase in power to resist the backward flow through the mitral orifice in case of leakage, or to overcome the effects of obstruction in case of stenosis. The back pressure is therefore transmitted to the pulmonary circulation, and as the right ventricle is responsible for maintaining the flow of blood through the lungs, the strain and extra work fall on the right ventricle, which in turn enlarges and undergoes hypertrophy. The degree of hypertrophy of the left or right ventricle is thus, up to a certain point, a measure of the extent of the lesion of the aortic or mitral valve respectively. When the effects of the valvular lesion are so neutralized by these structural changes in the heart that the circulation is equably maintained, ” com- pensation ” is said to be efficient.

When the heart gives way under the strain, compensation is said to break down, and dropsy, shortness of breath, cough and cyanosis, are among the distressing symptoms which may set in. The mere existence of a valvular lesion does not call for any special treatment so long as compensation is efficient, and a large number of people with slight valvular lesions are living lives indistinguishable from those of their neighbours. It will, however, -be readily understood that in the case of the more serious lesions certain precautions should be observed in regard to over-exertion, excitement, over-indulgence in tobacco or alcohol, &c, as the balance is more readily upset and any undue strain on the heart may cause a breakdown of compensation. When this occurs treatment is required. A period of rest in bed is often sufficient to enable the heart to recover, and this may be supplemented as required by the administration of mercurial a«d saline purgatives to relieve the embarrassed circulation, and of suitable cardiac tonics, such as digitalis and strychnin, to reinforce and strengthen the heart’s

action.

2. Affections of the Muscular Wall of the Heart. — Dilatation of the heart, or stretching of the walls of the heart, is an incident, as has already been stated, in pericarditis and in the earlier stages of valvular disease antecedent to hypertrophy. Temporary over-distension or dilatation of the cavities of the heart occurs in violent and protracted exertion, but rapidly subsides and is in no wise harmful to the sound and vigorous heart of the young. It is otherwise if the heart is weak and flabby from a too sedentary life or degenerative changes in its walls or during convalescence from a severe illness, when the same circumstances which will not injure a healthy heart, may give rise to serious dilatation from which recovery may be very protracted.

Influenza is a common cause of cardiac dilatation, and is liable to be a source of trouble after the acute illness has subsided, if the patient goes about and resumes his ordinary avocations too soon.

Fatty or fibroid degeneration of the heart wall may occur in later life from impaired nutrition of the muscle, due to partial obstruction of the blood-vessels supplying it, when they are the seat of the degenerative changes known as arteriosclerosis or atheroma. The affection known as angina pectoris (q.v.) may be a further consequence of this defective blood-supply.

The treatment will vary according to the nature of the case. In serious cases of dilatation, rest in bed, purgatives and cardiac tonics may be required.

In commencing degenerative change the Oertel treatment, consisting of graduated exercise up a gentle slope, limitation of fluids and a special diet, may be indicated.

In cases of slight dilatation after influenza or recent illness, the Schott treatment by baths and exercises as carried out at Xauheim mav be sometimes beneficial. The change of air and scene, the enforced rest, the placid life, together with freedom

from excitement and worry, are among the most important factors which contribute to success in this class of case.

Disorders of Rhythm of the Heart’s Action. — Under this heading may be grouped a number of conditions to which the name ” functional affections of the heart ” has sometimes been applied, inasmuch as the disturbances in question cannot usually be attributed to definite organic disease of the heart. We must, of course, exclude from this

category the irregularity in the force and frequency of the pulse, which is commonly associated with incompetence of the mitral valve.

The heart is a muscular organ possessing certain properties, rhythmicity, excitability, contractility, conductivity and ton- icity, as pointed out by Gaskell, in virtue of which it is able to maintain a regular automatic beat independently of nerve stimulation. It is, however, intimately connected with the brain, blood-vessels and the abdominal and thoracic viscera, by innumerable nerves, through which impulses or messages are being constantly sent to and received from these various portions of trie body. Such messages may give rise to disturbances of rhythm with which we are all familiar. For instance, sudden fright or emotion may cause a momentary arrest of the heart's action, and excitement or apprehension may set up a rapid action of the heart or palpitation. Palpitation, again, is often the result of digestive disorders, the message in this case being received from the stomach, instead of the brain as in emotional disturbances. It may also result from over-indulgence in tobacco and alcohol.

Tachycardia is the name applied to a more or less permanent increase in the rate of the heart-beat. It is usually a prominent feature in the affection known as Graves' disease or exophthalmic goitre. It may also result from chronic alcoholism. In the condition known as paroxysmal tachycardia there appears to be no adequate explanation for its onset.

Bradycardia or abnormal slowness of the heart-beat, is the converse of tachycardia. An abnormally slow pulse is met with in melancholia, cerebral tumour, jaundice and certain toxic conditions, or may follow an attack of influenza. There is, however, a peculiar affection characterized by abnormal slowness of pulse (often ranging as low as 30), and the onset, from time to time, of epileptiform or syncopal attacks. To this the name " Stokes-Adams disease " has been applied, as it was first called attention to by Adams in 1827, and subsequently fully described by Stokes in 1836. It is usually associated with senile degenerative change of the heart and vascular system, and is held to be due to impairment of conductivity in the muscular fibres (bundle of His) which transmit the wave of contraction from the auricle to the ventricle. It is of serious, significance in view of the symptoms associated with it.

I ntermitlency of the Pulse. — By this is understood a pulse in which a beat is dropped from time to time. The dropping of a beat may occur at regular intervals every two, four or six beats, &c, or occasionally at irregular intervals after a series of normal beats. On examining the heart, it is found, as a rule, that the cause of the intermission at the

wrist is not actual omission of a heart-beat, but the occurrence of a hurried imperfect cardiac contraction which does not transmit a pulse-wave to the wrist. It is not characteristic of any special form of heart affection, and is rarely of serious import. It may be due to reflex digestive disturbances, or be associated with conditions of nervous breakdown and irritability, or with an atonic and relaxed condition of the heart muscle. The treatment of these disorders of rhythm of the heart will vary greatly according to the cause and is often a matter of considerable difficulty. (J. F. H. B.)

Surgery of Heart and Pericardium. — As the result of acute or chronic inflammation of the lining membrane of the fibrous sac which surrounds the heart and the neighbouring parts of the large blood-vessels, a dropsical or a purulent collection may form in it, or the sac may be quietly distended by a thin watery fluid. In. either case, but especially in the latter, the heart may be so embarrassed in its work that death seems imminent. The condition is generally due to the cultivation

in the pericardium of the germs of rheumatism, influenza or gonorrhoea, or of those of ordinary suppuration. Respiration as well as circulation is embarrassed, and there is a marked fulness and dulness of the front wall of the chest to the left of the breast-bone. In that region also pain and tenderness are complained of. By using the slender, hollow needle of an aspirator great relief may be afforded, but the tapping may have to be repeated from time to time. If the fluid drawn off is found to be purulent, it may be necessary to make a trap-door opening into the chest by cutting across the 4th and 5th ribs, incising and evacuating the pericardium and providing for drainage. In short, an abscess in the pericardium must be treated like an abscess in the pleura.

Wounds of the heart are apt to be quickly fatal. If the probability is that the enfeebled action of the heart is due to pressure from blood which is leaking into, and is locked up in the pericardium, the proper treatment will be to open the pericardium, as described above, and, if possible, to close the opening in the auricle, ventricle or large vessel, by sutures. (E. O.*).

HEART-BURIAL, the burial of the heart apart from the body. This is a very ancient practice, the special reverence shown towards the heart

being doubtless due to its early association with the soul of man, his affections, courage and conscience. In medieval Europe heart-burial was fairly common. Some of the more notable cases are those of Richard I., whose heart, preserved in a casket, was placed in Rouen cathedral; Henry III., buried in Normandy; Eleanor, queen of Edward I., at Lincoln; Edward I., at Jerusalem; Louis IX., Philip III., Louis XIII. and Louis XIV., in Paris. Since the 17th century the hearts of deceased members of the house of Habsburg have been buried apart from the body in the Loretto chapel in the Augustiner Kirche, Vienna. The most romantic story of heart-burial is that of Robert Bruce. He wished his heart to rest at Jerusalem in the church of the Holy Sepulchre, and on his deathbed entrusted the fulfilment of his wish to Douglas. The latter broke his journey to join the Spaniards in their war with the Moorish king of Granada, and was killed in battle, the heart of Bruce enclosed in a silver casket hanging round his neck. Subsequently the heart was buried at Melrose Abbey. The heart of James, marquess of Montrose, executed by the Scottish Covenanters in 1650, was recovered from his body, which had been buried by the roadside outside Edinburgh, and, enclosed in a steel box, was sent to the duke of Montrose, then in exile. It was lost on its journey, and years afterwards was discovered in a curiosity shop in Flanders. Taken by a member of the Montrose family to India, it was stolen as an amulet by a native chief, was once more regained, and finally lost in France during the Revolution. Of notable 17th-century cases there is that of James II., whose heart was buried in the church of the convent of the Visitation at Chaillot near Paris, and that of Sir William Temple, at Moor Park, Farnham. The last ceremonial burial of a heart in England was that of Paul Whitehead, secretary to the Monks of Med- menham club, in 1775, the interment taking place in the Le Despenser mausoleum at High Wycombe, Bucks. Of later cases the most notable are those of Daniel O'Connell, whose heart is at Rome. Shelley at Bournemouth, Louis XVII. at Venice, Kosciusko at the Polish museum at Rapperschwyll, Lake Zurich, and the marquess of Bute, taken by his widow to Jerusalem for burial in 1900. Sometimes other parts of the body, removed in the process of embalming, are given separate and solemn burial. Thus the viscera of the popes from Sixtus V. (1590) onward have been preserved in the parish church of the Quirinal. The custom of heart-burial was forbidden by Pope Boniface VIII. (1294- 1303), but Benedict XI. withdrew the prohibition.

See Pettigrew, Chronicles of the Tombs (1857).

HEARTH (a word which appears in various forms in several Teutonic languages, cf. Dutch haard, German Herd, in the sense of " floor "), the part of a room where a fire is made, usually constructed of stone,

bricks, tiles or earth, beaten hard and having a chimney above; the fire being lighted either on the hearth itself, or in a receptacle placed there for the purpose.

Like the Latin focus, especially in the phrase for ” hearth and home ” answering to pro arts etfocis, the word is used as equiva- lent to the home or household. The word is also applied to the fire and cooking apparatus on board ship; the floor of a smith’s forge; the floor of a reverberatory furnace on which the ore is exposed to the flame; the lower part of a blast furnace through which the metal goes down into the crucible; in soldering, a portable brazier or chafing dish, and an iron box sunk in the middle of a flat iron plate or table. An ” open-hearth furnace ” is a regenerative furnace of the reverberatory type used in making steel, hence “open-hearth steel” (see Iron and Steel).

Hearth-money, hearth tax or chimney-money, was a tax im- posed in England on all houses except cottages at a rate of two shillings for every hearth. It was first levied in 1662, but owing to its unpopularity, chiefly caused by the domiciliary visits of the collectors, it was repealed in 1689, although it was pro- ducing £170,000 a year. The principle of the tax was not new in the history of taxation, for in Anglo-Saxon times the king derived a part of his revenue from a futnage or tax of smoke farthings levied on all hearths except those of the poor. It appears also in the hearth-penny or tax of a penny on every hearth, which as early as the 10th century was paid annually to the pope (see Peter’s Pence).

HEARTS, a game of cards of recent origin, though founded upon the same principle as many old games, such as Slobber- hannes, Four Jacks and Enfle, namely, that of losing instead of winning as many tricks as possible. Hearts is played with a full pack, ace counting highest and deuce lowest. In the fourhanded game, which is usually played, the entire pack is dealt out as at whist (but without turning up the last card, since there are no trumps), and the player at the dealer’s left begins by leading any card he chooses, the trick being taken by the highest card of the suit led. Each player must follow suit if he can; if he has no cards of the suit led he is privileged to throw away any card he likes, thus having an opportunity of getting rid of his hearts, which is the object of the game. When all thirteen tricks have been played each player counts the hearts he has taken in and pays into the pool a certain number of counters for them, according to an arrangement made before beginning play. In the four- handed, or sweepstake, game the method of settling called ” Howell’s,” from the name of the inventor, has been generally adopted, according to which each player begins with an equal number of chips, say 100, and, after

trie hand has been played, pays into the pool as many chips for each heart he had taken as there are players besides himself. Then each player takes out of the pool one chip for every heart he did not win. The pool is thus exhausted with every deal. Hearts may be played by two, three, four or even more players, each playing for himself.

Spot Hearts. — In this variation the hearts count according to the number of spots on the cards, excepting that the ace counts 14, the king 13, queen 12 and knave 11, the combined score of the thirteen hearts being thus 104.

Auction Hearts. — In this the eldest hand examines his hand and bids a certain number of counters for the privilege of naming the suit to be got rid of, but without naming the suit. The other players in succession have the privilege of outbidding him, and whoever bids most declares the suit and pays the amount of his bid into the pool, the winner taking it.

Joker Hearts. — Here the deuce of hearts is discarded, and an extra card, called the joker, takes its place, ranking in value between ten and knave. It cannot be thrown away, excepting when hearts are led and an ace or court card is played, though if an opponent discards the ace or a court card of hearts, then the holder of the joker may discard it. The joker is usually considered worth five chip$; which are either paid into the pool or to the player who succeeds in discarding the joker.

Heartsette. — In this variation the deuce of spades is deleted and the three cards left after dealing twelve cards to each player are called the widow (or kitty), and are left face downward on the table. The winner of the first trick must take the widow without showing it to his opponents.

Slobberhannes. — The object of this older form of Hearts is to avoid taking either the first or last trick or a trick containing the queen of clubs. A euchre pack (thirty two-cards, lacking all below the 7) is used, and each player is given 10 counters, one being forfeited to the pool if a player takes the first or last trick, or that containing the club queen. If he takes all three he forfeits four points.

HEAT

Four Jacks {Polignac or Quatre-Valets) is usually played with a piquet pack, the cards ranking in France as at ecarte, but in Great Britain and

America as at piquet. There is no trump suit. Counters are used, and the object of the game is to avoid taking any trick containing a knave, especially the knave of spades, called Polignac. The player taking such a trick forfeits one counter to the pool.

Enfle (or Schwellen) is usually played by four persons with a piquet pack and for a pool. The cards rank as at Hearts, and there is no trump suit. A player must follow suit if he can, but if he cannot he may not discard, but must take up all tricks already won and add them to his hand. Play is continued until one player gets rid of all his cards and thus wins.

HEAT (O. E. haetu, which like ” hot,” Old Eng. hdt, is from the Teutonic type haita, hit, to be hot; cf. Ger. hitze, heiss; Dutch, hitte, heet, &c), a general term applied to that branch of physical science which deals with the effects produced by heat on material bodies, with the laws of transference of heat, and with the transformations of heat into other kinds of energy. The object of the present article is to give a brief sketch of the historical development of the science of heat, and to indicate the relation of the different branches of the subject, which are discussed in greater detail with reference to the latest progress in separate articles.

1 . Meanings of the Term Heat. — The term heat is employed in ordinary language in a number of different senses. This makes it a convenient term to employ for the general title of the science, but the different meanings must be carefully distinguished in scientific reasoning. For the present purpose, omitting meta- phorical significations, we may distinguish four principal uses of the term: (a) Sensation of heat; (6) Temperature, or degree of hotness; (c) Quantity of thermal energy; (d) Radiant heat, or energy of radiation.

(a) From the sense of heat, aided in the case of very hot bodies by the sense of sight, we obtain our first rough notions of heat as a physical entity, which alters the state of a body and its condition in respect of warmth, and is capable of passing from one body to another. By touching a body we can tell whether it is warmer or colder than the hand, and, by touching two similar bodies in suc- cession, we can form a rough estimate, by the acuteness of the sensation experienced, of their difference in hotness or coldness over a limited range. If a hot iron is placed on a cold iron plate, we may observe that the plate is heated and the iron cooled until both attain appreciably the same degree of warmth; and we infer from similar cases that something which we call ” heat ” tends to pass from hot to cold bodies, and to attain finally a state of equable diffusion when all the bodies

concerned are equally warm or cold. Ideas such as these derived entirely from the sense of heat, are, so to speak, embedded in the language of every nation from the earliest times.

(b) From the sense of heat, again, we naturally derive the idea of a continuous scale or order, expressed by such terms as summer heat, blood heat, fever heat, red heat, white heat, in which all bodies may be placed with regard to their degrees of hotness, and we speak of the temperature of a body as denoting its place in the scale, in contradistinction to the quantity of heat it may contain.

(c) The quantity of heat contained in a body obviously depends on the size of the body considered. Thus a large kettleful of boiling water will evidently contain more heat than a teacupful, though both may be at the same temperature. The temperature does not depend on the size of the body, but on the degree of concentration of the heat in it, i.e. on the quantity of heat per unit mass, other things being equal. We may regard it as axiomatic that a given body (say a pound of water) in a given state (say boiling under a given pressure) must always contain the same quantity of heat, and conversely that, if it contains a given quantity of heat, and if it is under conditions in other respects, it must be at a definite tempera- ture, which will always be the same for the same given conditions.

(d) It is a matter of common observation that rays of the sun or of a fire falling on a body warm it, and it was in the first instance natural to suppose that heat itself somehow travelled across the intervening space from the sun or fire to the body warmed, in much the same way as heat may be carried by a current of hot air or water. But we now know that energy of radiation is not the same thing as heat, though it is converted into heat when the rays strike an absorbing substance. The term ” radiant heat,” however, is generally retained, because radiation is commonly measured in terms of the heat it produces, and because the transference of energy by radiation and absorption is the most important agency in the diffusion of heat.

2. Evolution of the Thermometer.— The first step in the develop ment of the science of heat was necessarily the invention of a thermometer, an instrument for indicating temperature and measuring its changes. The first requisite in the case of such an

instrument is that it should always give, at least approximatel. ‘ the same indication at the same temperature. The air-thermo scope of Galileo, illustrated in fig. 1, which consisted of a glass bulb containing air, connected to a glass tube of small bore dipping into a coloured

liquid, though very .sensi tive to variations of temperature, was not satisfactory as a measuring instrument, because it was also affected by varia- tions of atmospheric pressure. The invention of the type of thermometer familiar at the present day, containing a liquid hermetically sealed in a glass bulb with a fine tube attached,

is also generally attributed to Galileo at

a slightly later date, about 161 2. Alcohol was the liquid first employed, and the degrees, intended to represent thousandths of the volume of the bulb, were marked with small beads of enamel fused on the stem, as shown in fig. 2. In order to render the readings of such instruments comparable with each other, it was necessary to select a fixed point or standard temperature as the zero or starting-point of the graduations. In- stead of making each degree a given fraction of the volume of the bulb, which would be difficult in practice, and would give different values for the degree with different liquids, it was soon found to be preferable to take two fixed points, and to divide the interval between them into the same number of degrees

(h

|| 1

1

1

1

-i

III $

t

1

I.

tf3

ml W

Fig. 1.

Fig.

It was natural in the first instance to take the temperature of the human body as one of the fixed points. In 1701 Sir Isaac Newton proposed a scale in which the freezing-point of water was taken as zero, and the temperature of the human body as 12°. About the same date (17 14) Gabriel Daniel Fahrenheit proposed to take as zero the lowest temperature obtainable with a freezing mixture of ice and salt, and to divide the interval between this temperature and that of the human body into 12 . To obtain finer graduations the number was subsequently increased to 96°. The freezing- point of water was at that time supposed to be somewhat variable, because as a matter of fact it is possible to cool water several degrees below its freezing-point in the absence of ice. Fahrenheit showed, however, that as soon as ice began to form the tempera- ture always rose to the same point, and that a mixture of ice or snow with pure water always gave the same temperature. At a later period he also showed that the temperature of boiling water varied with the barometric pressure, but that it was always the same at the same pressure, and might therefore be used as the second fixed point (as Edmund Halley and others had suggested) provided that a definite pressure, such as the average atmospheric pressure, were specified. The freezing and boiling- points on one of his thermometers, graduated as already ex- plained, with the temperature of the body as 96°, came out in the neighbourhood of 32 and 212 respectively, giving an interval of 180° between these points. Shortly after Fahrenheit's death (1736) the freezing and boiling-points of water were generally recognized as the most convenient fixed points to adopt, but different systems of subdivision were employed. Fahrenheit's scale, with its small degrees and its zero below the freezing-point, possesses undoubted advantages for meteorological work, and is still retained in most English-speaking countries. But for general scientific purposes, the centigrade system, in which'the freezing-point is marked o° and the boiling-point ioo°, is now almost universally employed, on account of its greater simplicity from an arithmetical point of view. For work of precision the fixed points have been more exactly defined (see Thermometry), but no change has been made in the fundamental principle of graduation.

3. Comparison of Scales based on Expansion.- — Thermometers constructed in the manner already described will give strictly comparable readings, provided that the tubes be of uniform bore, and that the same liquid and glass be employed in their

construction. But they possess one obvious defect from a theo- retical point of view, namely, that the subdivision of the tem- perature scale depends on the expansion of the particular liquid selected as the standard. A liquid such as water, which, when con- tinuously heated at a uniform rate from its freezing-pcint, first contracts and then expands, at a rapidly increasing rate, would obviously be unsuitable. But there is no a priori reason why other liquids should not behave to some extent in a similar way. As a matter of fact, it was soon observed that thermometers care- fully constructed with different liquids, such as alcohol, oil and mercury, did not agree precisely in their indications at points of the scale intermediate between the fixed points, and diverged even more widely outside these limits. Another possible method, proposed in 1694 by Carlo Renaldeni (1615-1698), professor of mathematics and philosophy at Pisa, would be to determine the intermediate points of the scale by observing the temperatures of mixtures of ice-cold and boiling water in varying proportions. On this method, the temperature of 50 C. would be defined as that obtained by mixing equal weights of water at o° C. and ioo° C; 20 C, that obtained by mixing 80 parts of water at o° C. with 20 parts of water at ioo° C. and so on. Each degree rise of temperature in a mass of water would then represent the addition of the same quantity of heat. The scale thus obtained would, as a matter of fact, agree very closely with that of a mercury thermometer, but the method would be very difficult to put in practice, and would still have the disadvantage of depending on the properties of a particular liquid, namely, water, which is known to behave in an anomalous manner in other respects. At a later date, the researches of Gay-Lussac (1802) andRegnault (1847) showed that the laws of the expansion of gases are much simpler than those of liquids. Whereas the expansion of alcohol between 0° C. and ioo° C. is nearly seven times as great as that of mercury, all gases (excluding easily condensible vapours) expand equally, or so nearly equally that the differences between them cannot be detected without the most refined observations. This equality of expansion affords a strong a priori argument for selecting the scale given by the expansion of a gas as the standard scale of temperature, but there are still stronger theoretical grounds for this choice, which will be indicated in discussing the absolute scale (§ 21). Among liquids mercury is found to agree most nearly with the gas scale, and is generally employed in thermometers for scientific purposes on account of its high boiling-point and for other reasons. The differences of the mercurial scale from the gas scale having been carefully determined, .the mercury thermometer can be used as a secondary

standard to replace the gas thermometer within certain limits, as the gas thermometer would be very troublesome to employ directly in ordinary investigations. For certain purposes, and especially at temperatures beyond the range of mercury thermometers, electrical thermometers, also standardized by reference to the gas thermometer, have been very generally employed in recent years, while for still higher temperatures beyond the range of the gas thermometer, thermometers based on the recently established laws oftradiation are the only instruments available. For a further discussion of the theory and practice of the measurement of temperature, the reader is referred to the article Thermometry.

4. Change of State. — Among the most important effects of heat is that of changing the state of a substance from solid to liquid, or from liquid to vapour. With very few exceptions, all substances, whether simple or compound, are known to be capable of existing in each of the three states under suitable conditions of temperature and pressure. The transition of any substance, from the state of liquid to that of solid or vapour under the ordinary atmospheric pressure, takes place at fixed temperatures, the freezing and boiling-points, which are very sharply defined for pure crystalline substances, and serve in fact as fixed points of the thermometric scale. A change of state cannot, however, be effected in any case without the addition or subtraction of a certain definite quantity of heat. If a piece of ice below the freezing-point is gradually heated at a uniform rate, its tem- perature may be observed to rise regularly till the freezing-point

is reached. At this point it begins to melt, and its temperature ceases to rise. The melting takes a considerable time, during the whole of which heat is being continuously supplied without producing any rise of temperature, although if the same quantity of heat were supplied to an equal mass of water, the temperature of the water would be raised nearly 8o° C. Heat thus absorbed in producing a change of state without rise of temperature is called ” Latent Heat,” a term introduced by Joseph Black, who was one of the first to study the subject of change of state from the point of view of heat absorbed, and who in many cases actually adopted the comparatively rough method described above of estimating quantities of heat by observing the time required to produce a given change when the substance was receiving heat at a steady rate from its surroundings. For every change of state a definite quantity of heat is required, without which the change cannot take place. Heat must be added to melt a solid, or to vaporize a solid or a liquid, and conversely, heat must be subtracted to reverse the change, i.e. to condense a vapour or freeze a liquid. The quantity required for any given change depends on the nature of the substance

and the change considered, and varies to some extent with the conditions (as to pressure, &c.) under which the change is made, but is always the same for the same change under the same conditions. A rough measurement of the latent heat of steam was made as early as 1764 by James Watt, who found that steam at 212 F., when passed from a kettle into a jar of cold water, was capable of raising nearly six times its weight of water to the boiling point. He gives the volume of the steam as about 1800 times that of an equal weight of water.

The phenomena which accompany change of state, and the physical laws by which such changes are governed, are discussed in a series of special articles dealing with particular cases. The articles on Fusion and Alloys deal with the change from the solid to the liquid state, and the analogous case of solution is dis- cussed in the article on Solution. The articles on Condensation op Gases, Liquid Gases and Vaporization deal with the theory of the change of state from liquid to vapour, and with the important applications of liquid gases to other researches. The methods of measuring the latent heat of fusion or vaporization are described in the article Calorimetry, and need not be further discussed here except as an introduction to the history of the evolution of knowledge with regard to the nature of heat.

5. Calorimetry by Latent Heat. — In principle, the simplest and most direct method of measuring quantities of heat consists in observing the effects produced in melting a solid or vaporizing a liquid. It was, in fact, by the fusion of ice that quantities of heat were first measured. If a hot body is placed in a cavity in a block of ice at o° C, and is covered by a closely fitting slab of ice, the quantity of ice melted will be directly proportional to the quantity of heat lost by the body in cooling to 0° C. None of the heat can possibly escape through the ice, and conversely no heat can possibly get in from outside. The body must cool exactly to o° C, and every fraction of the heat it loses must melt an equivalent quantity of ice. Apart from heat lost in trans- ferring the heated body to the ice block, the method is theoretic- ally perfect. The only difficulty consists in the practical measurement of the quantity of ice melted. Black estimated this quantity by mopping out the cavity with a sponge before and after the operation. But there is a variable film of water adhering to the walls of the cavity, which gives trouble in accurate work. In 1780 Laplace and Lavoisier used a double-walled metallic vessel containing broken ice, which was in many respects more convenient than the block, but aggravated the difficulty of the- film of water adhering to the ice. In spite of this practical difficulty, the quantity of heat required to melt unit weight of ice was for a long time taken as the unit of heat. This unit possesses the great advantage that it is independent of the scale of temperature

adopted. At a much later date R. Bunsen {Phil. Mag., 1871), adopting a suggestion of Sir John Herschel's, devised an ice-calorimeter suitable for measuring small quan- tities of heat, in which the difficulty of the water film was over- come by measuring the change in volume due to the melting of the ice. The volume of unit mass of ice is approximately 1-0920 times that of unit mass of water, so that the diminution of volume

is 0-092 of a cubic centimetre for each gramme of ice melted. The method requires careful attention to details of manipulation, which are more fully discussed in the article on Calorimetry.

For measuring large quantities of heat, such as those produced by the combustion of fuel in a boiler, the most convenient method is the evaporation of water, which is commonly employed by engineers for the purpose. The natural unit in this case is the quantity of heat required to evaporate unit mass of water at the boiling point under atmospheric pressure. In boilers working at a higher pressure, or supplied with water at a lower temperature, appropriate corrections are applied to deduce the quantity evaporated in terms of this unit.

For laboratory work on a small scale the converse method of condensation has been successfully applied by John Joly, in whose steam-calorimeter the quantity of heat required to raise the temperature of a body from the atmospheric temperature to that of steam condensing at atmospheric pressure is observed by weighing the mass of steam condensed on it. (See Calori-

METRY.)

6. Thermometric Calorimetry. — For the majority of purposes the most convenient and the most readily applicable method of measuring quantities of heat, is to observe the rise of tem- perature produced in a known mass of water contained in a suitable vessel or calorimeter. This method was employed from a very early date by Count Rumford and other investigators, and was brought to a high pitch of perfection by Regnault in his extensive calorimetric researches (Memoires de VInstitut de Paris, 1847); but it is only within comparatively recent years that it has really been placed on a satisfactory basis by the accurate definition of the units involved. The theoretical objections to

the method, as compared with latent heat calorimetry, are that some heat is necessarily lost by the calorimeter when its tem- perature is raised above that of the surroundings, and that some heat is used in heating the vessel containing the water. These are small corrections, which can be estimated with considerable accuracy in practice. A more serious difficulty, which has impaired the value of much careful work by this method, is that the quantity of heat required to raise the temperature of a given mass of water i° C. depends on the temperature at which the water is taken, and also on the scale of the thermometer employed. It is for this reason, in many cases, impossible to say, at the present time, what was the precise value, within \ or even 1 % of the heat unit, in terms of which many of the older results, such as those of Regnault, were expressed. For many purposes this would not be a serious matter, but for work of scientific precision such a limitation of accuracy would constitute a very serious bar to progress. The unit generally adopted for scientific purposes is the quantity of heat required to raise 1 gram (or kilogram) of water 1° C, and is called the calorie (or kilo-calorie). English engineers usually state results in terms of the British Thermal Unit (B.Th.U.), which is the quantity of "heat required to raise 1 lb of water 1° F.

7. Watt's Indicator Diagram; Work of Expansion. — The rapid development of the steam-engine (q.v.) in England during the latter part of the 18th century had a marked effect on the progress of the science of heat. In the first steam-engines the working cylinder served both as boiler and condenser, a very wasteful method, as most of the heat was transferred directly from the fire to the condensing water without useful effect. The first improvement (about 1700) was to use a separate boiler, but the greater part of the steam supplied was still wasted in reheating the cylinder, which had been cooled by the injection of cold water to condense the steam after the previous stroke. In 1769 James Watt showed how to avoid this waste by using a separate condenser and keeping the cylinder as hot as possible. In his earlier engines the steam at full boiler pressure was allowed to raise the piston through nearly the whole of its stroke. Connexion with the boiler was then cut off, and the steam at full pressure was discharged into the condenser. Here again there was unnecessary waste, as the steam was still capable of doing useful work. He subsequently introduced " expansive working," which effected still further economy. The connexion

with the boiler was cut off when a fraction only, say J, of the stroke had been completed, the remainder of the stroke being effected by the expansion of the steam already in the cylinder with continually diminishing pressure. By the end of the stroke, when connexion was

made to the condenser, the pressure was so reduced that there was comparatively little waste from this cause. Watt also devised an instrument called an indicator (see Steam Engine), in which a pencil, moved up and down vertically by the steam pressure, recorded the pressure in the cylinder at every point of the stroke on a sheet of paper moving horizontally in time with the stroke of the piston. The diagram thus obtained made it possible to study what was happening inside the cylinder, and to deduce the work done by the steam in each stroke. The method of the indicator diagram has since proved of great utility in physics in studying the properties of gases and vapours. The work done, or the useful effect obtained from an engine or any kind of machine, is measured by the product of the resistance overcome and the distance through which it is overcome. The result is generally expressed in terms of the equivalent weight raised through a certain height against the force of gravity. 1 If, for instance, the pressure on a piston

1 Units oj ‘Work, Energy and Power. — In English-speaking countries work is generally measured in foot-pounds. Elsewhere it is generally measured in kilogrammetres, or in terms of the work done in raising 1 kilogramme weight through the height of I metre. In the middle of the 19th century the terms ” force ” and ” motive power ” were commonly employed in the sense of ” power of doing work.” The term ” energy ” is now employed in this sense. A quantity of energy is measured by the work it is capable of performing. A body may possess energy in virtue of its state (gas or steam, under pressure), or in virtue of its position (a raised weight), or in various other ways, when at rest. In these cases it is said to possess potential energy. It may also possess energy in virtue of its motion or rotation (as a fly-wheel or a cannon-ball). In this case it is said to possess kinetic energy, or energy of motion. In many cases the energy(as in the case of a vibrating body, like a pendulum) is partly kinetic and partly potential, and changes continually from one to the other throughout the motion. For instance, the energy of a pendulum is wholly potential when it is momentarily at rest at the top of its swing, but is wholly kinetic when the pendulum is moving with its maximum velocity at the lowest point of its swing. The whole energy at any moment is the sum of the potential and kinetic energy, and this sum remains constant so long as the amplitude of the vibration remains the same. The potential energy of a weight W lb raised to a height h ft. above the earth, is \Vh foot-pounds. If allowed to fall freely, without doing work, its kinetic energy on reaching the earth would be Wh foot-pounds, and its velocity of motion would be such that if projected upwards with the same velocity it would rise to the height h from which it fell. We have

here a simple and familiar case of the conversion of one kind of energy into a different kind. But the two kinds of energy are mechanically equivalent, and they can both be measured in terms of the same units. The units already considered, namely foot-pounds or kilo- grammetres, are gravitational units, depending on the force of gravity. This is the most obvious and natural method of measuring the potential energy of a raised weight, but it has the disadvantage of varying with the force of gravity at different places. The natural measure of the kinetic energy of a moving body is the product of its mass by half the square of its velocity, which gives a measure in kinetic or absolute units independent of the force of gravity. Kinetic and gravitational units are merely different ways of measur- ing the same thing. Just as foot-pounds may be reduced to kilo- grammetres by dividing by the number of foot-pounds in one kilo- grammetre, so kinetic may be reduced to gravitational units by dividing by the kinetic measure of the intensity of gravity, namely, the work in kinetic units done by the weight of unit mass acting through unit distance. For scientific purposes, it is necessary to take account of the variation of gravity. The scientific unit of energy is called the erg. The erg is the kinetic energy of a mass of 2 gm. moving with a velocity of I cm. per sec. The work in ergs done by a force acting through a distance of 1 cm. is the absolute measure of the force. A force equal to the weight of 1 gm. (in England) acting through a distance of 1 cm. does 981 ergs of work. A force equal to the weight of 1000 gm. (1 kilogramme) acting through a distance of r metre (100 cm.) does 98-1 million ergs of work. As the erg is a very small unit, for many purposes, a unit equal to 10 million ergs, called a joule, is employed. In England, where the weight of I gm. is 981 ergs per cm., a foot-pound is equal to 1-356 joules, and a kilogrammetre is equal to 9-81 joules.

The term power is now generally restricted to mean ” rate of work- ing.” Watt estimated that an average horse was capable of raising 550 lb I ft. in each second, or doing work at the rate of 550 foot- pounds per second, or 33,000 foot-pounds per minute. This con- ventional horse-power is the unit commonly employed fcrestimating

is 50 lb per sq. in., and the area of the piston is 100 sq. in., the force on the piston is 5000 lb weight. If the stroke of the piston is 1 ft., the work done per stroke is capable of raising a weight of 5000 lb through

a height of 1 ft., or 50 lb through a height of 100 ft. and so on.

Fig. 3 represents an imaginary indicator diagram for a steam- engine, taken from one of Watt's patents. Steam is admitted to the cylinder when the piston is at the beginning of its stroke, at S. ST represents the length of the stroke or the limit of horizontal movement of the paper on which the diagram is drawn. The indicat- ing pencil rises to the point A, representing the absolute pressure of 60 ft per sq. in. As the piston moves outwards the pencil traces

2 F 3

Fig. 3. — Watt's Indicator Diagram. Patent of 1782.

8T

the horizontal line AB, the pressure remaining constant till the point B is reached, at which connexion to the boiler is cut off. The work done so far is represented by the area of the rectangle ABSF, namely AS X SF, multiplied by the area of the piston in sq. in. The result is in foot-pounds if the fraction of the stroke SF is taken in feet. After cut-off at B the steam expands under diminishing pressure, and the pencil falls gradually from B to C, following the steam pressure until the exhaust valve opens at the end of the stroke. The pressure then falls rapidly to that of the condenser, which for an ideal case may be taken as zero, following Watt. The work done during expansion is found by dividing the remainder of the stroke FT into a number of equal parts (say 8, Watt takes 20) and measuring the pressure at the points 1, 2, 3, 4, &c, corresponding to the middle of each. We thus obtain a number of small rectangles, the sum of which is evidently very nearly equal to the whole area BCTF under the expansion curve, or to the remainder of the stroke FT multiplied by the average or mean value of the pressure. The whole work done in the forward stroke is represented by the area ABCTSA, or by the average value of the pressure P over the whole stroke multiplied by the stroke L. This area must be multiplied by the area of the piston A in sq. in. as before, to get the work done per stroke in foot-pounds, which is PLA. If the engine repeats this cycle N times per minute, the work done per minute is PLAN foot-pounds, which is reduced to horse-power by dividing by 33,000. If the steam is ejected by the piston at atmospheric pressure (15ft per sq. in.) instead of being condensed at zero pressure, the area CDST under the atmospheric line CD, representing work done against back-pressure on the return stroke must be subtracted. If the engine repeats the same cycle or series of operations continu- ously, the indicator diagram will be a closed curve, and the nett work done per cycle will

be represented by the included area, what- ever the form of the curve.

8. Thermal Efficiency. — The thermal efficiency of an engine is the ratio of the work done by the engine to the heat supplied to it. According to Watt's observations, confirmed later by Clement and Desormes, the total heat required to produce 1 lb of saturated steam at any temperature from water at 0° C. was approximately 650 times the quantity of heat required to raise 1 lb of water i° C. Since 1 lb of steam represented on this assumption a certain quantity of heat, the efficiency could be measured naturally in foot-pounds of work obtainable per lb of steam, or conversely in pounds of steam consumed per horsc-power-hour.

In his patent of 1782 Watt gives the following example of the improvement in thermal efficiency obtained by expansive work-

the power of engines. The horse-power-hour, or the work done by one horse-power in one hour, is nearly 2 million foot-pounds. For electrical and scientific purposes the unit of power employed is called the watt. The watt is the work per second done by an electromotive force of 1 volt in driving a current of 1 ampere, and is equal to 10 million ergs or 1 joule per second. One horse-power is 746 watts or nearly J of a kilowatt. The kilowatt-hour, which is the unit by which electrical energy is sold, is 3-6 million joules or 2-65 million foot-pounds, or 366,000 kilogrammetres, and is capable of raising nearly 19 lb of water from the freezing to the boiling point.

ing. Taking the diagram already given, if the quantity of steam represented by AB, or 300 cub. in. at 60 lb pressure, were em- ployed without expansion, the work realized, represented by the area ABSF, would be 6000/4 = 1 500 foot-pounds. With expansion to 4 times its original volume, as shown in the diagram by the whole area ABCTSA, the mean pressure (as calculated by Watt, assuming Boyle's law) would be 0-58 of the original pressure, and the work done would be 6000X0-58 = 3480 foot-pounds for the same quantity of steam, or the thermal efficiency would be 2-32 times greater. The advantage actually obtained would not be so great as this, on account of losses by condensation, back- pressure, &c, which are neglected in Watt's calculation, but the margin would still be very considerable. Three hundred cub. in. of steam at 60 lb pressure would represent about -0245 of 1 lb of steam, or 28-7 B.Th.U., so that, neglecting all losses, the possible thermal efficiency attainable with steam at this pressure and four expansions (j cut-off) would be 3480/28-7, or 121 foot-pounds per B.Th.U. At a later date, about 1820, it was usual to include the efficiency of the boiler with that of the engine, and to reckon the

efficiency or ” duty ” in foot-pounds per bushel or cwt. of coal. The best Cornish pumping-engines of that date achieved about 70 million foot-pounds per cwt., or consumed about 3-2 lb per horse-power-hour, which is roughly equivalent to 43 foot-pounds per B.Th.U. The efficiency gradually increased as higher pressures were used, with more complete expansion, but the conditions upon which the efficiency depended were not fully worked out till a much later date. Much additional knowledge with regard to the nature of heat, and the properties of gases and vapours, was required before the problem could be attacked theoretically.

9. Of the Nature of Heat. — In the early days of the science it was natural to ascribe the manifestations of heat to the action of a subtle imponderable fluid called ” caloric,” with the power of penetrating, expanding and dissolving bodies, or dissipating them in vapour. The fluid was imponderable, because the most careful experiments failed to show that heat produced any in- crease in weight. The opposite property of levitation was often ascribed to heat, but it was shown by more cautious investigators that the apparent loss of weight due to heating was to be attri- buted to evaporation or to upward air currents. The funda- mental idea of an imaginary fluid to represent heat was useful as helping the mind to a conception of something remaining invariable in quantity through many transformations, but in some respects the analogy was misleading, and tended greatly to retard the progress of science. The caloric theory was very simple in its application to the majority of calorimetric ex- periments, and gave a fair account of the elementary phenomena of change of state, but it encountered serious difficulties in explaining the production of heat by friction, or the changes of temperature accompanying the compression or expansion of a gas. The explanation which the calorists offered of the production of heat by friction or compression was that some of the latent caloric was squeezed or ground out of the bodies concerned and became ” sensible.” In the case of heat developed by friction, they supposed that the abraded portions of the material were capable of holding a smaller quantity of heat, or had less “capacity for heat,” than the original material. From a logical point of view, this was a perfectly tenable hypothesis, and one difficult to refute. It was easy to account in this way for the heat produced in boring cannon and similar operations, where the amount of abraded material was large. To refute this explanation, Rumford {Phil. Trans., 1798) made his celebrated experiments with a blunt borer, in one of which he succeeded in boiling by friction 26-5 lb of cold water in 2$ hours, with the production of only 4145 grains of metallic powder. He then showed by experiment that the metallic

powder required the same amount of heat to raise its temperature i°, as an equal weight of the original metal, or that its ” capacity for heat ” (in this sense) was unaltered by reducing it to powder; and he argued that ” in any case so small a quantity of powder could not possibly account for all the heat generated, that the supply of heat appeared to be inexhaustible,

and that heat could not be a material substance, but must be I more exact generalization. The way was paved in the first something of the nature of motion.” Unfortunately Rumfotd’s I instance by a more complete study of the laws of gases, to which argument was not quite conclusive. The supporters of the I Laplace, Dalton, Gay-Lussac, Dulong and many others contri- caloric theory appear, whether consciously or unconsciously, 1 buted both on the experimental and theoretical side. Although

to have used the phrase ” capacity for heat” in two entirely distinct senses without any clear definition of the difference. The phrase ” capacity for heat ” might very naturally denote the total quantity of heat contained in a body, which we have no means of measuring, but it was generally used to signify the quantity of heat required to raise the temperature of a body one degree, which is quite a different thing, and has no necessary relation to the total heat. In proving that the powder and the solid metal required the same quantity of heat to raise the temperature of equal masses of either one degree, Rumford did not prove that they contained equal quantities of heat, which was the real point at issue in this instance. The metal tin actually changes into powder below a certain temperature, and in so doing evolves a measurable quantity of heat. A mixture of the gases oxygen and hydrogen, in the proportions in which they combine to form water, evolves when burnt sufficient heat to raise more than thirty times its weight of water from the freezing to the boiling point; and the mixture of gases may, in this sense, be said to contain so much more heat than the water, although its capacity for heat in the ordinary sense is only about half that of the water produced. To complete the refutation of the calorists’ explanation of the heat produced by friction, it would have been necessary for Rumford to show that the powder when reconverted into tha same state as the solid metal did not absorb a quantity of heat equivalent to that evolved in the

grinding; in other words that the heat produced by friction was not simply that due to the change of state of the metal from solid to powder.

Shortly afterwards, in 1799, Davy 1 described an experiment in which he melted ice by rubbing two blocks together. This experiment afforded a very direct refutation of the calorists' view, because it was a well-known fact that ice required to have a quantity of heat added to it to convert it into water, so that the water produced by the friction contained more heat than the ice. In stating as the conclusion to be drawn from this experi- ment that " friction consequently does not diminish the capacity of bodies for heat," Davy apparently uses the phrase capacity for heat in the sense of total heat contained in a body, because in a later section of the same essay he definitely gives the phrase this meaning, and uses the term " capability of temperature " to denote what we now term capacity for heat.

The delay in the overthrow of the caloric theory, and in the acceptance of the view that heat is a mode of motion, was no doubt partly due to some fundamental confusion of ideas in the use of the term " capacity for heat " and similar phrases. A still greater obstacle lay in the comparative vagueness of the motion or vibration theory. Davy speaks of heat as being " repulsive motion," and distinguishes it from light, which is " projective motion "; though heat is certainly not a substance — according to Davy in the essay under discussion — and may not even be treated as an imponderable fluid, light as certainly is a material substance, and is capable of forming chemical com- pounds with ordinary matter, such as oxygen gas, which is not a simple substance, but a compound, termed phosoxygen, of light and oxygen. Accepting the conclusions of Davy and Rumford that heat is not a material substance but a mode of motion, there still remains the question, what definite conception is to be attached to a quantity of heat? What do we mean by a quantity of vibratory motion, how is the quantity of motion to be esti- mated, and why should it remain invariable in many trans- formations? The idea that heat was a " mode of motion " was applicable as a qualitative explanation of many of the effects of heat, but it lacked the quantitative precision of a scientific statement, anc|could not be applied to the calculation and prediction of definite results. The state of science at the time of Rumford's and Davy's experiments did not admit of a

1 In an essay on " Heat, Light, and Combinations of Light," republished in Sir H. Davy's Collected Works, ii. (London, 1836).

the develoˆnent proceeded simultaneously along many parallel lines, it

is interesting and instructive to take the investigation of the properties of gases, and to endeavour to trace the steps by which the true theory was finally attained.

10. Thermal Properties of Gases. — The most characteristic property of a gaseous or elastic fluid, namely, the elasticity, or resistance to compression, was first investigated scientifically by Robert Boyle (1662), who showed that the pressure p of a given mass of gas varied inversely as the volume i\ provided that the temperature remained constant. This is generally expressed by the formula pv = C, where C is a constant for any given temperature, and v is taken to represent the specific volume, or the volume of unit mass, of the gas at the given pressure and temperature. Boyle was well aware of the effect of heat in expanding a gas, but he was unable to investigate this properly as no thermometric scale had been defined at that date. Accord- ing to Boyle's law, when a mass of gas is compressed by a small amount at constant temperature, the percentage increase of pressure is equal to the percentage diminution of volume (if the compression is v/100, the increase of pressure is very nearly p/100) . Adopting this law, Newton showed, by a most ingenious piece of reasoning (Principia, ii., sect. 8), that the velocity of sound in air should be equal to the velocity acquired by a body falling under gravity through a distance equal to half the height of the atmosphere, considered as being of uniform density equal to that at the surface of the earth. This gave the result 918 ft. per sec. (280 metres per sec.) for the velocity at the freezing point. Newton was aware that the actual velocity of sound was somewhat greater than this, but supposed that the difference might be due in some way to the size of the air particles, of which no account could be taken in the calculation. The first accurate measurement of the velocity of sound by the French Academie des Sciences in 1738 gave the value 332 metres per sec. as the velocity at 0° C. The true explanation of the discrepancy was not discovered till nearly 100 years later.

The law of expansion of gases with change of temperature was investigated by Dalton and Gay-Lussac (1802), who found that the volume of a gas under constant pressure increased by i/267th part of its volume at o° C. for each 1° C. rise in temperature. This value was generally assumed in all calculations for nearly 50 years. More exact researches, especially those of Regnault, at a later date, showed that the law was very nearly correct for all permanent gases, but that the value of the coefficient should be T^grd. According to this law the volume of a gas at any temperature f C. should be proportional to 273+/, i.e. to the temperature reckoned from a zero 273 below that of the Centigrade scale, which was called the absolute zero of the gas

thermometer. If T = 273-H, denotes the temperature measured from this zero, the law of expansion of a gas may be combined with Boyle's law in the simple formula

£z> = RT

(1)

which is generally taken as the expression of the gaseous laws. If equal volumes of different gases are taken at the same tempera- ture and pressure, it follows that the constant R is the same for all gases. If equal masses are taken, the value of the constant R for different gases varies inversely as the molecular weight or as the density relative to hydrogen. " ■■<»

Dalton also investigated the laws of vapours, and of mixtures of gases and vapours. He found that cohdensible vapours approximately followed Boyle's law when compressed, until the condensation pressure was reached, at which the vapour lique- fied without further increase of pressure. He found that when a liquid was introduced into a closed space, and allowed to evaporate until the space was saturated with the vapour and evaporation ceased, the increase of pressure in the space was equal to the condensation pressure of the vapour, and did not depend on the volume of the space or the presence of any other gas or vapour

provided that there was no solution or chemical action. He showed that the condensation or saturation-pressure of a vapour depended only on the temperature, and increased by nearly the same fraction of itself per degree rise of temperature, and that the pressures of different vapours were nearly the saAe at equal distances from their boiling points. The increase of pressure per degree C. at the boiling point was about -jˆth of 760 mm. or 27-2 mm., but increased in geometrical progression with rise of temperature. These results of Dalton's were confirmed, and in part corrected, as regards increase of vapour-pressure, by Gay- Lussac, Dulong, Regnault and other investigators, but were found to be as close an approximation to the truth as could be obtained with such simple expressions. More accurate empirical ex- pressions for the increase of vapour-pressure of a liquid with temperature were soon obtained by Thomas Young, J. P.

L. A. Roche and others, but the explanation of the relation was not arrived at until a much later date (see Vaporization).

11. Specific Heats of Gases. — In order to estimate the quantities of heat concerned in experiments with gases, it was necessary in the first instance to measure their specific heats, which pre- sented formidable difficulties. The earlier attempts by Lavoisier and others, employing the ordinary methods of calorimetry, gave very uncertain and discordant results, which were not regarded with any confidence even by the experimentalists themselves. Gay-Lussac (Mimoires d'Arcueil, 1807) devised an ingenious experiment, which, though misinterpreted at the time, is very interesting and instructive. With the object of comparing the specific heats of different gases, he took two equal globes A and B connected by a tube with a stop-cock. The globe B was exhausted, the other A being filled with gas. On opening the tap between the vessels; the gas flowed from A to B and the pressure was rapidly equalized. He observed that the fall of temperature in A was nearly equal to the rise of temperature in B, and that for the same initial pressure the change of tempera- ture was very nearly the same for all the. gases he tried, except hydrogen, which showed greater changes of temperature than other gases. He concluded from this experiment that equal volumes of gases had the same capacity for heat, except hydrogen, which he supposed to have a larger capacity, because it showed a greater effect. The method does not in reality afford any direct information with regard to the specific heats, and the conclusion with regard to hydrogen is evidently wrong. At a later date {Ann. de Chim., 181 2, 81, p. 98) Gay-Lussac adapted A. Crawford's method of mixture, allowing two equal streams of different gases, one heated and the other cooled about 20 C, to mix in a tube containing a thermometer. The resulting temperature was in all cases nearly the mean of the two, from which he concluded that equal volumes of all the gases tried, namely, hydrogen, carbon dioxide, air, oxygen and nitrogen, had the same thermal capacity. This was correct, except as regards carbon dioxide, but did not give any information as to the actual specific heats referred to water or any known substance. About the same time, F. Delaroche and J. E. Berard {Ann. de chim., 1813, 85, p. 72) made direct determinations of the specific heats of air, oxygen, hydrogen, carbon monoxide, carbon dioxide, nitrous oxide and ethylene, by passing a stream of gas heated to nearly ioo° C. through a spiral tube in a calorimeter containing water. Their work was a great advance on previous attempts, and gave the first trustworthy results. With the exception of hydrogen, which presents peculiar difficulties, they found that equal volumes of the permanent gases, air, oxygen and carbon monoxide, had nearly the same thermal

capacity, but that the compound condensible gases, carbon dioxide, nitrous oxide and ethylene, had larger thermal capacities in the order given. They were unable to state whether the specific heats of the gases increased or diminished with temperature, but from experiments on air at pressures of 740 mm. and 1000 mm., they found the specific heats to be -269 and 245 respectively, and concluded that the specific heat diminished with increase of pressure. The difference they observed was really due to errors of experi ment, but they regarded it as proving beyond doubt the truth of the calorists' contention that the heat disengaged- on the

compression of a gas was due to the diminution of its thermal capacity.

Dalton and others had endeavoured to measure directly the rise of temperature produced by the compression of a gas. Dalton had observed a rise of 50° F. in a gas when suddenly com- pressed to half its volume, but no thermometers at that time were sufficiently sensitive to indicate more than a fraction of the change of temperature. Laplace was the first to see in this phenomenon the probable explanation of the discrepancy between Newton's calculation of the velocity of sound and the observed value. The increase of pressure due to a sudden compression, in which no heat was allowed to escape, or as we now call it an " adiabatic " compression, would necessarily be greater than the increase of pressure in a slow isothermal compression, on account of the rise of temperature. As the rapid compressions and rarefactions occurring in the propagation of a sound wave were perfectly adiabatic, it was necessary to take account of the rise of temperature due to compression in calculating the velocity. To reconcile the observed and calculated values of the velocity, the increase of pressure in adiabatic compression must be 1-410 times greater than in isothermal compression. This is the ratio of the adiabatic elasticity of air to the isothermal elasticity. It. was a long time, however, before Laplace saw his way to any direct experimental verification of the value of this ratio. At a later date {Ann. de chim., 1816, 3, p. 238) he stated that he had succeeded in proving that the ratio in question must be the same as the ratio of the specific heat of air at constant pressure to the specific heat at constant volume.

In the method of measuring the specific heat adopted by Delaroche and B6rard, the gas under experiment, while passing through a tube at practically constant pressure, contracts in cooling, as it gives up its heat to the calorimeter. Part of the heat surrendered to the calorimeter is due to the contraction of volume. If a gramme of gas at pressure p,

volume v and temperature T abs. is heated I ° C. at constant pressure p, it absorbs a quantity of heat S = 238 calorie (according to Regnault) the specific heat at constant pressure. At the same time the gas expands by a fraction i/T of v, which is the same as 1/273 of its volume at 0° C. If now the air is suddenly compressed by an amount v/T, it will be restored to its original volume, and its temperature will be raised by the liberation of a quantity of heat R', the latent heat of expansion for an increase of volume v/T. If no heat has been allowed to escape, the air will now be in the same state as if a quantity of heat S had been communicated to it at its original volume v without expansion. The rise of tempera ture above the original temperature T will be S/s degrees, where s is the specific heat at constant volume, which is obviously equal to S – R'. Since p/T is theincrease of pressure for I ° C. rise of tempera- ture at constant volume, the increase of pressure for a rise of S/s degrees will be yp/T, where 7 is the ratio S/s. But this is the rise of pressure produced by a sudden compression v/T, and is seen to be 7 times the rise of pressure p/T produced by the same compression at constant temperature. The ratio of the adiabatic to the iso- thermal elasticity, required for calculating the velocity of sound, is therefore the same as the ratio of the specific heat at constant pressure to that at constant volume.

12. Experimental Verification of the Ratio of Specific Heats. — This was a most interesting and important theoretical relation to dis- cover, but unfortunately it did not help much in the determination of the ratio required, because it was not practically possible at that time to measure the specific heat of air at constant volume in a closed vessel. Attempts had been made to do this, but they had signally failed, on account of the small heat capacity of the gas as compared with the containing vessel. Laplace endeavoured to extract some confirmation of his views from the values given by Delaroche and Berard for the specific heat of air at 1000 and 740 mm. pressure. On the assumption that the quantities of heat con- tained in a given mass of air increased in direct proportion to its volume when heated at constant pressure, he deduced, by some rather obscure reasoning, that the ratio of the specific heats S and s should be about 1-5 to 1, which he regarded as a fairly satisfactory agree- ment with the value 7 = 1-41 deduced from the velocity of sound.

The ratio of the specific heats could not be directly measured, but a few years later, Cle'ment and Desormes (Journ. de Phys., Nov. 1819) succeeded in making a direct measurement of the ratio of the elasticities in a very simple manner. They took a large globe containing air at atmospheric pressure and temperature, and re- moved a small quantity of air. They then observed the defect of

pressure po when the air had regained its original temperature. By suddenly opening the globe, and immediately closing it, the pressure was restored almost instantaneously to the atmospheric, the rise of pressure po corresponding to the sudden compression produced. The air. having been heated by the compression, was

allowed to regain its original temperature, the tap remaining closed, and the final defect of pressure p l was noted. The change of pressure for the same compression performed isothermally is then p —p l . The ratio p„l(p,—p l) is the ratio of the adiabatic and isothermal elasticities, provided that p„ is small compared with the whole atmospheric pressure. In this way they found the ratio I '354, which is not much smaller than the value 1-410 required to reconcile the observed and calculated values of the velocity of sound. Gay- Lussac and J. J. Welter (Ann. de chim., 1822) repeated the experi- ment with slight improvements, using expansion instead of com- pression, and found the ratio 1-375. The experiment has often been repeated since that time, and there is no doubt that the value of the ratio deduced from the velocity of sound is correct, the defect of the value obtained by direct experiment being due to the fact that the compression or expansion is not perfectly adiabatic. Gay-Lussac and Welter found the ratio practically constant for a range of pressure 144 to 1460 mm., and for a range of temperature from —20° to 4-40° C. The velocity of sound at Quito, at a pressure of 544 mm. was found to be the same as at Paris at 760 mm. at the same tempera- ture. Assuming on this evidence the constancy of the ratio of the specific heats of air, Laplace (MScanique celeste, v. 143) showed that, if the specific heat at constant pressure was independent of the temperature, the specific heat per unit volume at a pressure p

must vary as p y , according to the caloric theory. The specific

1

heat per unit mass must then vary as pi ' which he found agreed precisely with the experiment of Delaroche and Berard already cited. This was undoubtedly a strong confirmation of the caloric theory. Poisson by the same assumptions (Ann. de chim., 1823, 23, p. 337) obtained the same results, and also showed that the relation between

the pressure and the volume of a gas in adiabatic compression or expansion must be of the form pv y = constant.

P. L. Dulong (Ann. de chim., 1829, 41, p. 156), adopting a method due to E. F. F. Chladni, compared the velocities of sound in different gases by observing the pitch of the note given by the same tube when filled with the gases in question. He thus obtained the values of the ratios of the elasticities or of the specific heats for the gases employed. For oxygen, hydrogen and carbonic oxide, these ratios were the same as for air. But for carbonic acid, nitrous oxide and olefiant gas, the values were much smaller, showing that these gases experienced a smaller change of temperature in compression. On comparing his results with the values of the specific heats for the same gases found by Delaroche and Berard, Dulong observed that the changes of temperature for the same compression were in the inverse ratio of the specific heats at constant volume, and deduced the important conclusion that " Equal volumes of all gases under the same conditions evolve on compassion the same quantity of heat." This is equivalent to the statement that the difference of the specific heats, or the latent heat of expansion R' per 1 °, is the same for all gases if equal volumes are taken. Assuming the ratio 7 = 1-410, and taking Delaroche and B6rard's value for the specific heat of air at constant pressure S = -267, we have £ = 8/1-41 =-189, and the difference of the specific heats per unit mass of air S— s = R' = -078. Adopting Regnauit's value of the specific heat of air, namely, S = -238, we should have S— 5 = -069. This quantity represents the heat absorbed by unit mass of air in expanding at constant temperature T by a fraction l/T of its volume f, or by ˆi 3 rd of its volume 0° C.

If, instead of taking unit mass, we take a volume 1)0 = 22-30 litres at 0° C. and 760 mm. being the volume of the molecular weight of the gas in grammes, the quantity of heat evolved by a compression equal to i>/T will be approximately 2 calories, and is the same for all gases. The work done in this compression is pv/T = R, and is also the same for all gases, namely, 8-3 joules. Dulong's experimental result, therefore, shows that the heat evolved in the compression of a gas is proportional to the work done. This result had previously been deduced theoretically by Carnot (1824). At a later date it was assumed by Mayer, Clausius and others, on the evidence of these experiments, that the heat evolved was not merely proportional to the work done, but was equivalent to it. The further experimental evidence required to justify this assumption was first supplied by Joule.

Latent heat of expansion R' = -069 calorie per gramme of air,

per i° C. = 2-0 calories per gramme-molecule of any gas. Work done in expansion R = 287 joule per gramme of air per

i° C. = 8-3 joules per gramme-molecule of any gas.

13. Carnot: On the Motive Power of Heat. — A practical and theoretical question of the greatest importance was first answered by Sadi Carnot about this time in his Reflections on the Motive Power of Heat (1824). How much motive power (defined by Carnot as weight lifted through a certain height) can be obtained from heat alone by means of an engine repeating a regular succes-

sion or " cycle " of operations continuously? Is the efficiency limited, and, if so, how is it limited ? Are other agents preferable to steam for developing motive power from heat ? In discussing this problem, we cannot do better than follow Carnot's reasoning which, in its main features, , could hardly be improved at the present day.

Carnot points out that in order to obtain an answer to this question, it is necessary to consider the essential conditions of the process, apart from the mechanism of the engine and the working substance or agent employed. Work cannot be said to be produced from heat alone unless nothing but heat is supplied, and the working substance and all parts of the engine are at the end of the process in precisely the same state as at the beginning. 1

Carnot's Axiom. — Carnot here, and throughout his reasoning, makes a fundamental assumption, which he states as follows: " When a body has undergone any changes and after a certain number of transformations is brought back identically to its original state, considered relatively to density, temperature and mode of aggregation, it must contain the same quantity of heat as it contained originally." 2

Heat, according to Carnot, in the type of engine we are con- sidering, can evidently be a cause of motive power only by virtue of changes of volume or form produced by alternate heating and cooling. This involves the existence of cold and hot bodies to act as boiler and condenser, or source and sink of heat, respec- tively. Wherever there exists a difference of temperature, it is possible to have the production of motive power from heat; and conversely, production of motive power, from heat alone, is impossible without difference of temperature. In other words the production of motive power from heat is not merely a question of the consumption of heat, but always requires transference of heat from hot to cold. What then are the

conditions which enable the difference of temperature to be most advantageously employed in the production of motive power, and how much motive power can be obtained with a given difference of tempera- ture from a given quantity of heat?

Carnot's Rule for Maximum Effect. — In order to realize the maximum effect, it is necessary that, in the process employed, there should not be any direct interchange of heat between bodies at different temperatures. Direct transference of heat by conduction or radiation between bodies at different tempera- tures is equivalent to wasting a difference of temperature which might have been utilized to produce motive power. The working substance must throughout every stage of the process be in equilibrium with itself (i.e. at uniform temperature and pressure) and also with external bodies, such as the boiler and condenser, at such times as it is put in communication with them. In the actual engine there is always some interchange of heat between the steam and the cylinder, and some loss of heat to external bodies. There may also be some difference of temperature between the boiler steam and the cylinder on admission, or between the waste steam and the condenser at release. These differences represent losses of efficiency which may be reduced indefinitely, at least in imagination, by suitable means, and designers had even at that date been very successful in reducing

1 For instance a mass of compressed air, if allowed to expand in a cylinder at the ordinary temperature, will do work, and will at the same time absorb a quantity of heat which, as we now know, is the thermal equivalent of the work done. But this work cannot be said to have been produced solely from the heat absorbed in the process, because the air at the end of the process is in a changed condition, and could not be restored to its original state at the same temp%»ture without having work done upon it precisely equal to that obtained by its expansion. The process could not be repeated indefinitely without a continual supply of compressed air. The source of the work in this case is work previously done in compressing the air, and no part of the work is- really generated at the expense of heat alone, unless the compression is effected at a lower temperature than the expansion.

2 Clausius (Pogg. Ann. 79, p. 369) and others have misinterpreted this assumption, and have taken it to mean that the quantity of heat required to produce any given change of state is independent of the manner in which the change is effected, which Carnot does not here

them. All such losses are supposed to be absent in deducing the ideal limit of efficiency, beyond which it would be impossible to go.

14. Camel's Description of his Ideal Cycle. — Carnot first gives a rough illustration of an incomplete cycle, using steam much in the same way as it is employed in an ordinary steam-engine. After expansion down to condenser pressure the steam is completely condensed to water, and is then returned as cold water to the hot boiler. He points out that the last step does not conform exactly to the condition he laid down, because although the water is restored to its initial state, there is direct passage of heat from a hot body to a cold body in the last process. He points out that this difficulty might be overcome by supposing the difference of temperature small, and by employing a series of engines, each working through a small range, to cover a finite interval of temperature. Having established the general notions of a perfect cycle, he proceeds to give a more exact illustration, employing a gas as the working substance. He takes as the basis of his demonstration the well-established experimental fact that a gas is heated by rapid compression and cooled by rapid expansion, and that if compressed or expanded slowly in contact with conducting bodies, the gas will give out heat in compression or absorb heat in expansion while its temperature remains constant. He then goes on to say: —

" This preliminary notion being settled, let us imagine an elastic fluid, atmospheric air for example, enclosed in a cylinder abed, fig. 4, fitted with a movable diaphragm or piston cd. Let there also be two bodies A, B, each maintained at a constant temperature, that of A being more elevated than that of B. Let us now suppose the following series of operations to be performed :

" 1. Contact of the body A with the air contained in the space abed, or with the bottom of the cylinder, which we will suppose to transmit heat easily. The air is now at the temperature of the body A, and cd is the actual position of the piston.

" 2. The piston is gradually raised, and takes the position ef. The air remains in contact with the body A, and is thereby maintained at a

constant temperature during the expansion. The body A furnishes the heat necessary to maintain the constancy of temperature.

” 3. The body A is removed, and the air no longer being in contact with any body capable of giving it heat, the piston con- tinues nevertheless to rise, and passes from the position ef to gh. The air expands without receiving heat and its temperature falls. Let us imagine that it falls until it is just equal to that of the body B. At this moment the piston is stopped and occupies the position gh.

4. The air is placed in contact with the body B; it is compressed by the return of the piston, which is brought from the position gh to the position cd. The air remains meanwhile at a constant temperature, because of its contact with the body B to which it gives up its heat.

” 5. The body B is removed, and the compression of the air is continued. The air being now isolated, rises in temperature. The compression is continued until the air has acquired the temperature of the body A. The piston passes meanwhile from the position cd to the position ik.

” 6. The air is replaced in contact with the body A, and the piston returns from the position ik to the position ef, the temperature remaining invariable.

” 7. The period described under (3) is repeated, then successively the periods (4), (5), (6) ; (3), (4), (5), (6) ; (3), (4). (5). (6) ; and so on. ” During these operations the air enclosed in the cylinder exerts an effort more or less great on the piston. The pressure of the air varies both on account of changes of volume and on account of changes of temperature; but it should be observed that for equal volumes, that is to say, for like positions of the piston, the temperature is higher during the dilatation than during the compression. Since the pressure is greater during the expansion, the quantity of motive power produced by the dilatation is greater than that consumed by the compression. We shall thus obtain a balance of motive power, which may be employed for any purpose. The air has served as working substance in a heat-engine; it has also been employed in the most advantageous manner possible, since no useless re-establish- ment of the equilibrium of heat has been allowed to occur.

C WMttffWWSI d

B

Fig. 4. Carnot’s Cylinder.

” All the operations above described may be executed in the reverse order and direction. Let us imagine that after the sixth period, that is to say, when the piston has reached the position ef, we make it return to the position ik, and that at the same time we keep the air in contact with the hot body A; the heat furnished by this body during the sixth period will return to its source, that is, to the body A, and everything will be as it was at the end of the fifth period. If now we remove the body A, and if we make the piston move from ik to cd, the temperature of the air will decrease by just as many degrees as it increased during the fifth period, and will become that of the body B. We can evidently continue in this way a series of operations the exact reverse of those which were previously described; it suffices to place oneself in the same circumstances and to execute for each period a movement of expansion in place of a movement of compression, and vice versa.

” The result of the first series of operations was the production of a certain quantity of motive power, and the transport of heat from the body A to the body B ; the result of the reverse operations is the consumption of the motive power produced in the first case, and the return of heat from the body B to the body A, in such sort that these two series of operations annul and neutralize each other.

” The impossibility of producing by the agency of heat alone a quantity of motive power greater than that which we have obtained in our first series of operations is now easy to prove. It is demon- strated by reasoning exactly similar to that which we have already given. The reasoning will have in this case a greater degree of exactitude; the air of which we made use to develop the motive power is brought back at the end of each cycle of operations precisely to its initial state, whereas this was not quite exactly the case for the vapour of water, as we have already remarked.”

15. Proof of Carnot’s Principle. — Carnot considered the proof too obvious to be worth repeating, but, unfortunately, his previous demonstration, referring to an incomplete cycle, is not so exactly worded that exception cannot be taken to it. We will therefore repeat his proof in a slightly more definite and exact form. Suppose that a reversible engine R, working in the cycle above described, takes a quantity of heat H from the source in each cycle, and performs a quantity of useful work W r . If it were possible for any other engine S, working with the same two bodies A and B as source and refrigerator, to perform a greater amount of useful work W s per cycle for the same quantity of heat H taken from the source, it would suffice to take a portion W, of this motive power (since W s is by hypothesis greater than W r) to drive the engine R backwards, and return a quantity of heat H to the source in each cycle. The process might be re- peated indefinitely, and we should obtain at each repetition a balance of usefiil work W»-W r , without taking any heat from the source, which is contrary to experience. Whether the quantity of heat taken from the condenser by R is equal to that given to the condenser by S is immaterial. The hot body A might be a comparatively small boiler, since no heat is taken from it. The cold body B might be the ocean, or the whole earth. We might thus obtain without any consumption of fuel a practically unlimited supply of motive power. Which is absurd.

Carnot’s Statement of his Principle. 1 — If the above reasoning be admitted, we must conclude with Carnot that the motive power obtainable from heat is independent of the agents employed \ to realize it. The efficiency is fixed solely by the temperatures of the

bodies between which, in the last resort, the transfer of heat is effected. ” We must understand here that each of the methods of developing motive power attains the perfection of which it is susceptible. This condition is fulfilled if, according to our rule, there is produced in the body no change of temperature that is not due to change of volume, or in other words, if there is no direct interchange of heat between bodies of sensibly different temperatures.”

It is characteristic of a state of frictionless mechanical equili- brium that an indefinitely small difference of pressure suffices to upset the equilibrium and reverse the motion. Similarly in thermal equilibrium between bodies at the same temperature, an indefinitely small difference of temperature suffices to reverse the transfer of heat. Carnot’s rule is therefore the criterion of the reversibility of a cycle of operations as regards transfer of heat. It is assumed that the ideal engine is mechanically

1 Carnot’s description of his cycle and statement of his principle have been given as nearly as possible in his own words, because some injustice has been done him by erroneous descriptions and statements.

reversible, that there is not, for instance, any communication between reservoirs of gas or vapour at sensibly different pressures, and that there is no waste of power in friction. If there is equilibrium both mechanical and thermal at every stage of the cycle, the ideal engine will be perfectly reversible. That is to say, all its operations will be exactly reversed as regards transfer of heat and work, when the operations are performed in the reverse order -and direction. On this understanding Carnot’s principle may be put in a different way, which is often adopted, but is really only the same thing put in different words: The efficiency of a perfectly reversible engine is the maximum possible, and is a function solely of the limits of temperature between which it works. This result depends essentially on the existence of a state of thermal equilibrium denned by equality of temperature, and independent, in the majority of cases, of the state of a body in other respects. In order to apply the principle to the calculation and prediction of results, it is sufficient to determine the manner in which the efficiency depends on the temperature for one particular case, since the efficiency must be the same for all reversible engines.

16. Experimental Verification of Carnot's Principle.— Carnot en deavoured to test his result by the following simple calculations. Suppose that we have a cylinder fitted with a frictionless piston, containing I gram of water at ioo c C, and that the pressure of the steam, namely 760 mm., is in equilibrium with the external pressure on the piston at this temperature. Place the cylinder in connexion with a boiler or hot body at 101 C. The water will then acquire the temperature of 101° C., and will absorb I gram-calorie of heat. Some waste of motive power occurs here because heat is allowed to pass from one body to another at a different temperature, but the waste in this case is so small as to be immaterial. Keep the cylinder in contact with the hot body at 101 C. and allow the piston to rise. It may be made to perform useful work as the pressure is now 27-7 mm. (or 377 grams per sq. cm.) in excess of the external pressure. Continue the process till all the water is converted into steam. The heat absorbed from the hot body will be nearly 540 gram- calories, the latent heat of steam at this temperature. The increase of volume will be approximately 1620 c.c, the volume of I gram of steam at this pressure and temperature. The work done by the excess pressure will be 37-7X1620 = 61,000 gram-centimetres or 0-6 1 of a kilogrammetre. Remove the hot body, and allow the steam to expand further till its pressure is 760 mm. and its tempera- ture has fallen to 100 ° C. The work which might be done in this expansion is less than vo\ioth part of a kilogrammetre, and may be neglected for the present purpose. Place the cylinder in contact with the cold body at 100 C, and allow the steam to condense at this temperature. No work is done on the piston, because there is equilibrium of pressure, but a quantity of heat equal to the latent heat of steam at 100 C. is given to the cold body. The water is now in its initial condition, and the result of the process has been to gain o-6i of a kilogrammetre of work by allowing 540 gram-calories of heat to pass from a body at 101 ° C. to a body at 100° C. by means of an ideally simple steam-engine. The work obtainable in this way from 1000 gram-calories of heat, or 1 kilo-calorie, would evidently be 1-13 kilogrammetre (=o-6iXVW).

Taking the same range of temperature, namely 101 to 100° C, we may perform a similar series of operations with air in the cylinder, instead of water and steam. Suppose the cylinder to contain I gramme of air at 100 C. and 760 mm. pressure instead of water. Compress it without loss of heat (adiabatically) , so as to raise its temperature to ici" C. Place it in contact with the hot body at 101 C, and allow it to expand at this temperature, absorbing heat from the hot body, until its volume is increased by s' 7 jth part (the expansion per degree at constant pressure). The quantity of heat absorbed in this expansion, as

explained in § 14, will be the difference of the specific heats or the latent heat of expansion R’ = -069 calorie. Remove the hot body, and allow the gas to expand further without gain of heat till its temperature falls to 100 C. Compress it at ioo° (‘. to its original volume, abstracting the heat of compression by contact i\ith the cold body at 100° C. The air is now in its original state, and the process has been carried out in strict accordance with Carnot’s rule. The quantity of external work done in the cycle is easily obtained by the aid of the indicator diagram ABCD (fig. 5), which is approximately a parallelogram in this instance. The area of the diagram is equal to that of the rectangle BEHG, being the product ol the vertical height BE, namely, the increase of pressure per 1° at constant volume, by the increase of volume BG, which is ^^srdof the volume at 0° C. and 760 mm., or 2-83 c.c. The increase of pressure BE is 3-E §, or 2-03 mm., which is equivalent to 2-76 gm. per sq. cm. The work done in the evele is 2-76X2-83 = 7-82 gm. cm., or -0782 gram-metre. The heat absorbed at 101° C. was •069 gram-calorie, so that the work obtained is -0782/-069 or 1-13 gram-metre per gram-calorie, or 1-13 kilogrammetre per kilogram- calorie. This result is precisely the same as that obtained by using

UJ

G

a.

D

01

3

to

Ul

E

vV— H

ft

0.

F

u.

O

(0

<

i

e

AXIS OF VOLUME

F ig. 5. — Elementary Carnot Cycle for Gas.

steam with the same range of temperature, but a very different kind of cycle. Carnot in making the same calculation did not obtain quite so good an agreement, because the experimental data at that time available were not so accurate. He used the value uˆyfor the coefficient of expansion, and 267 for the specific heat of air. More over, he did not feel justified in assuming, as above, that the difference of the specific heats was the same at 100° C. as at the ordinary temperature of i5°to 20° C.,at which ithad been experimentally deter- mined. He made similar calculations for the vapour of alcohol, which differed slightly from the vapour of water. But the agreement he found was close enough to satisfy him that his theor- etical deductions were cor- rect, and that the resulting ratio of work to heat should be the same for all substances at the same temperature.

17. Carnot's Function. Variation of Efficiency with Temperature. — By means of calculations, similar to those given above, Carnot endeavoured to find the amount of motive power obtainable from one unit of heat per degree fall at various temperatures with various sub- stances. The value found above, namely 1-13 kilogrammetre per kilo- calorie per i° fall, is the value of the efficiency per 1 fall at 100 C. He was able to show that the efficiency per degree fall probably diminished with rise of temperature, but the experimental data at that time were too inconsistent to suggest the true relation. He took as the analytical expression of his principle that the efficiency W/H of a perfect engine taking in heat H at a temperature t° C, and rejecting heat at the temperature o° C, must be some function Ft of the temperature t, which would be the same for all substances. The efficiency per degree fall at a temperature t he represented by F't, the derived function of Ft. The function F't would be the same for all

substances at the same temperature, but would have different values at different temperatures. In terms of this function, which is generally known as Carnot's function, the results obtained in the previous section might be expressed as follows :— -«

" The increase of volume of a mixture of liquid and vapour per unit-mass vaporized at any temperature, multiplied by the increase of vapour-pressure per degree, is equal to the product of the function F't by the latent heat of vaporization.

" The difference of the specific heats, or the latent heat of ex- pansion for any substance multiplied by the function F't, is equal to the product of the expansion per degree at constant pressure by the increase of pressure per degree at constant volume."

Since the last two coefficients are the same for all gases if equal volumes are taken, Carnot concluded that: " The difference of the specific heats at constant pressure and volume is the same for equal volumes of all gases at the same temperature and pressure."

Taking the expression W = RT log e r for the whole work done by a gas obeying the gaseous laws pv = RT in expanding at a temperature T from a volume 1 (unity) to a volume r, or for a ratio of expansion r, and putting W = R log e r for the work done in a cycle of range I °, Carnot obtained the expression for the heat absorbed by a gas in isothermal expansion

H = Rlog.f/F'/ . . . . (2)

He gives several important deductions which follow from this formula, which is the analytical expression of the experimental result already quoted as having been discovered subsequently by Dulong. Employing the above expression for the latent heat of expansion, Carnot deduced a general expression for the specific heat of a gas at constant volume on the basis of the caloric theory. He showed that if the specific heat was independent of the temperature (the hypothesis already adopted by Laplace and Poisson) the function F't must be of the form

F't~R/C(t+k) . . . .. (3)

where C and k are unknown constants. A similar result follows from his expression for the difference of the specific heats.ˆ If this is assumed to be constant and equal to C, the expression for F't becomes R/CT, which is the same as the above if ˆ = 273. Assuming* the specific heat to be also independent of the volume, he shows that the

function F’t should be constant. But this assumption is inconsistent with the caloric theory of latent heat of expansion, which requires the specific heat to be a function of the volume. It appears in fact impossible to reconcile Carnot’s principle with the caloric theory on any simple assumptions. As Carnot remarks: ” The main prin- ciples on which the theory of heat rests require most careful examina- tion. Many experimental facts appear almost inexplicable in the present state of this theory.”

Carnot’s work was subsequently put in a more complete analytical form by B, P E, Clapeyron (Journ, &ef*c, polytechn.,

Paris, 1832, 14, p. 153), who also made use of Watt’s indicator diagram for the first time in discussing physical problems. Clapeyron gave the general expressions for the latent heat of a vapour, and for the latent heat of isothermal expansion of any substance, in terms of Carnot’s function, employing the notation of the calculus. The expressions he gave are the same in form as those in use at the present day. He also gave the general expression for Carnot’s function, and endeavoured to find its variation with temperature; but having no better data, he succeeded no better than Carnot. Unfortunately, in describing Carnot’s cycle, he assumed the caloric theory of heat, and made some unnecessary mistakes, which Carnot (who, we now know, was a believer in the mechanical theory) had been very careful to avoid. Clapeyron directs one to compress the gas at the lower temperature in contact with the body B until the heat disengaged is equal to that which has been absorbed at the higher temperature. 1 He assumes that the gas at this point contains the same quantity of heat as it contained in its original state at the higher tempera- ture, and that, when the body B is removed, the gas will be restored to its original temperature, when compressed to its initial volume. This mistake is ‘still attributed to Carnot, and regarded as a fatal objection to his reasoning by nearly all writers at the present day.

18. Mechanical Theory of Heat. — Accordingto the caloric theory, the heat absorbed in the expansion of a gas became latent, like the latent heat of vaporization of a liquid, but remained in the gas and was again evolved on compressing the gas. This theory gave no explanation of the source of the motive power produced by expansion.

The mechanical theory had explained the production of heat by friction as being due to transformation of visible motion into a brisk agitation of the ultimate molecules, but it had not so far given any definite explanation of the con- verse production of motive power at the expense of heat. The theory could not be regarded as complete until it had been shown that in the production of work from heat, a certain quantity of heat disappeared, and ceased to exist as heat; and that this quantity was the same as that which could be generated by the expenditure of the work produced. The earliest complete statement of the mechanical theory from this point of view is contained in some notes written by Carnot, about 1830, but published by his brother (Life of Sadi Carnot, Paris, 1878). Taking the difference of the specific heats to be 078, he estimated the mechanical equivalent at 370 kilogrammetres. But he fully recognized that there were no experimental data at that time available for a quantitative test of the theory, although it appeared to afford a good qualitative explanation of the phenomena. He therefore planned a number of crucial experi ments such as the ” porous plug ” experiment, to test the equivalence of heat and motive power. His early death in 1836 put a stop to these experiments, but many of them have since been independently carried out by other observers.

The most obvious case of the production of work from heat is in the expansion of a gas or vapour, which served in the first instance as a means of calculating the ratio of equivalence, on the assumption that all the heat which disappeared had been transformed into work and had not merely become latent. Marc Seguin, in his De I’influence des chemins de fer (Paris, 1839), made a rough estimate in this manner of the mechanical equivalent of heat, assuming that the loss of heat represented by the fall of temperature of steam on expanding was equivalent to the mechanical effect produced by the expansion. He also remarks (loc. cit. p. 382) that.it was absurd to suppose that ‘ : a finite quantity of heat could produce an indefinite quantity of mechanical action, and that it was more natural to assume that a certain quantity of heat disappeared in the very act of producing motive power.” J. R. Mayer (Liebig’s Annalen, 1842, 42, p. 233) stated the equivalence of heat and work more

1 It was for this reason that Professor W. Thomson (Lord Kelvin) stated {Phil. Mag., 1852, 4) that ” Carnot’s original demonstration utterly fails,” and that he introduced the ” corrections ” attributed to James Thomson and Clerk Maxwell respectively. In reality Carnot’s original demonstration requires no correction.

definitely, deducing it from the old principle, causa aequat ejfectuni.

Assuming that the sinking of a mercury column by which a gas was compressed was equivalent to the heat set free by the compression, he deduced that the warming of a kilo- gramme of water i° C. would correspond to the fall of a weight of one kilogramme from a height of about 365 metres. But Mayer did not adduce any fresh experimental evidence, and made no attempt to apply his theory to the fundamental equations of thermodynamics. It has since been urged that the experiment of Gay-Lussac (1807), on the expansion of gas from one globe to another (see above, § n), was sufficient justification for the assumption tacitly involved in Mayer's calculation. But Joule was the first to supply the correct interpretation of this experiment, and to repeat it on an adequate scale with suit- able precautions. Joule was also the first to measure directly the amount of heat liberated by the compression of a gas, and to prove that heat was not merely rendered latent, but disappeared altogether as heat, when a gas did work in expansion.

19. Joule's Determinations of the Mechanical Equivalent. — The honour of placing the mechanical theory of heat on a sound experimental basis belongs almost exclusively to J. P. Joule, who showed by direct experiment that in all the most important cases in which heat was generated by the expenditure of mechanical work, or mechanical work was produced at the expense of heat, there was a constant ratio of equivalence between the heat generated and the work expended and vice versa. His first experiments were on the relation of the chemical and electric energy expended to the heat produced in metallic conductors and voltaic and electrolytic cells; these experiments were described in a series of papers published in the Phil. Mag., 1840-1843. He first proved the relation, known as Joule's law, that the heat produced in a conductor of resistance R by a current C is proportional to C 2 R per second. He went on to show that the total heat produced in any voltaic circuit was proportional to the electromotive force E of the battery and to the number of equivalents electrolysed in it. Faraday had shown that electromotive force depends on chemical affinity. Joule measured the corresponding heats of combustion, and showed that the electromotive force corresponding to a chemical reaction is proportional to the heat of combustion of the electro- chemical equivalent. He also measured the E.M.F. required to decompose water, and showed that when part of the electric energy EC is thus expended in a voltameter, the heat generated is less than the heat of combustion corresponding to EC by a quantity representing the heat of combustion of the decomposed gases. His papers so far had been concerned with the relations between electrical energy, chemical energy and heat which he showed to be mutually

equivalent. The first paper in which he discussed the relation of heat to mechanical power was entitled ” On the Calorific Effects of Magneto-Electricity, and on the Mechanical Value of Heat” (Brit. Assoc, 1843; Phil. Mag., 23, p. 263). In this paper he showed that the heat produced by currents generated by magneto-electric induction followed the same law as voltaic currents. By a simple and ingenious arrangement he succeeded in measuring the mechanical power expended in producing the currents, and deduced the mechanical equivalent of heat and of electrical energy. The amount of mechanical work required to raise 1 lb of water i° F. (1 B.Th.U.), as found by this method, was 838 foot-pounds. In a note added to the paper he states that he found the value 770 foot-pounds by the more direct method of forcing water, through fine tubes. In a paper ” On the Changes of Tempera- ture produced by the Rarefaction and Condensation.of Air ” (Phil. Mag., May 1845), he made the first direct measurements of the quantity of heat disengaged by compressing air, and also of the heat absorbed when the air was allowed to expand against atmospheric pressure; as the result he deduced the value 798 foot-pounds for the mechanical equivalent of 1 B.Th.U. He also showed that there was no appreciable absorption of heat when air was allowed to expand in such a manner as not to develop mechanical power, and he pointed out that the mechanical equivalent of heat could not be satisfactorily deduced from

the relations of the specific heats, because the knowledge of the specific heats of gases at that time was of so uncertain a character. He attributed most weight to his later determina- tions of the mechanical equivalent made by the direct method of friction of liquids. He showed that the results obtained with different liquids, water, mercury and sperm oil, were the same, namely, 782 foot-pounds; and finally repeating the method with water, using all the precautions and improvements which his ex- perience had suggested, he obtained the value 772 foot-pounds, which was accepted universally for many years, and has only recently required alteration on account of the more exact defini- tion of the heat unit, and the standard scale of temperature (see Calorimetry). The great value of Joule’s work for the general establishment of the principle of the conservation of energy lay in the variety and completeness of the experimental evidence he adduced. It was not sufficient to find the relation between heat and

mechanical work or other forms of energy in one particular case. It was necessary to show that the same relation held in all cases which could be examined experimentally, and that the ratio of equivalence of the different forms of energy, measured in different ways, was independent of the manner in which the conversion was effected and of the material or working substance employed.

As the result of Joule's experiments, we are justified in con- cluding that heat is a form of energy, and that all its transforma- tions are subject to the general principle of the conservation of energy. As applied to heat, the principle is called the first law of thermo-dynamics, and may be stated as follows: When heat is transformed into any other kind of energy, or vice versa, the total quantity of energy remains invariable; that is to say, the quantity of heat which disappears is equivalent to the quantity of the other kind of energy produced and vice versa.

The number of units of mechanical work equivalent to one unit of heat is generally called the mechanical equivalent of heat, or Joule's equivalent, and is denoted by the letter J. Its numerical value depends on the units employed for heat and mechanical energy respectively. The values of the equivalent in terms of the units most commonly employed at the present time are as follows: —

777 foot-pounds (Lat. 45 °)are equivalent to I B. Th. U.(lb deg.Fahr.)
1399 foot-pounds ,, ,, ,, I lb deg. C.

426-3 kilogrammetres ,, „ 1 kilogram-deg. Cor kilo-

calorie. 426-3 grammetres „ ,, 1 gram-deg. C. or calorie.

4-180 joules „ ,, 1 gram-deg. C. or calorie.

The water for the heat units is supposed to be taken at 20° C. or 68° F., and the degree of temperature is supposed to be measured by the hydrogen thermometer. The acceleration of gravity in latitude 45° is taken as 980-7 C.G.S. For details of more recent and accurate methods of determination, the reader should refer to the article Calorimetry, where tables of the variation of the specific heat of water with temperature are also given.

The second law of thermodynamics is a title often used to denote Carnot's principle or some equivalent mathematical expression. In some cases this title is not conferred on Carnot's principle itself, but on some axiom from which the principle may be indirectly deduced. These axioms, however, cannot as a rule be directly applied, so that it

would appear preferable to take Carnot's principle itself as the second law. It may be observed that, as a matter of history, Carnot's principle was established and generally admitted before the principle of the conservation of energy as applied to heat, and that from this point of view the titles, first and second laws, are not particularly appropriate.

20. Combination of Carnot's Principle with the Mechanical Theory.— A very instructive paper, as showing the state of the science of heat about this time, is that of C. H. A. Holtzmann, " On the Heat and Elasticity of Gases and Vapours " (Mannheim, 1845; Taylor's Scientific Memoirs, iv. 189). He- points out that the theory of Laplace and Poisson does not agree with facts when applied to vapours, and that Clapeyron's formulae,

though probably correct, contain an undetermined function (Carnot's F't, Clapeyron's i/C) of the temperature. He deter- mines the value of this function to be J/T by assuming, with Seguin and Mayer, that the work done in the isothermal expan- sion of a gas is a measure of the heat absorbed. From the then accepted value -078 of the difference of the specific heats of air, he finds the numerical value of J to be 374 kilogram metres per kilo-calorie. Assuming the heat equivalent of the work to remain in the gas, he obtains expressions similar to Clapeyron's for the total heat and the specific heats. In consequence of this assump- tion, the formulae he obtained for adiabatic expansion were necessarily wrong, but no data existed at that time for testing them. In applying his formulae to vapours, he obtained an expression for the saturation-pressure of steam, which agreed with the empirical formula of Roche, and satisfied other experimental data on the supposition that the co-efficient of expansion of steam was -00423, and its specific heat 1-69 — values which are now known to be impossible, but which appeared at the time to give a very satisfactory explanation of the phenomena.

The essay of Hermann Helmholtz, On the Conservation of Force (Berlin, 1847), discusses all the known cases of the trans- formation of energy, and is justly regarded as one of the chief landmarks in the establishment of the energy-principle. Helm- holtz gives an admirable statement of the fundamental principle as applied to heat, but makes no attempt to formulate the correct equations of thermodynamics on the mechanical theory. He points out the fallacy of Holtzmann's (and Mayer's) calculation of the equivalent, but admits that it is supported by Joule's experiments, though he does not seem to appreciate the true value of Joule's work. He considers that Holtzmann's formulae are well supported by experiment, and are much preferable to Clapeyron's, because the value of the undetermined function F't is

found. But he fails to notice that Holtzmann's equations are fundamentally inconsistent with the conservation of energy, because the heat equivalent of the external work done is supposed to remain in the gas.

That a quantity of heat equivalent to the work performed actually disappears when a gas does work in expansion, was first shown by Joule in the paper on condensation and rarefaction of air (1845) already referred to. At the conclusion of this paper he felt justified by direct experimental evidence in reasserting definitely the hypothesis of Seguin (loc. cit. p. 383) that " the steam while expanding in the cylinder loses heat in quantity exactly proportional to the mechanical force developed, and that on the condensation of the steam the heat thus converted into power is not given back." He did not see his way to reconcile this conclusion with Clapeyron's description of Carnot's cycle. At a later date, in a letter to Professor W. Thomson (Lord Kelvin) (1848), he pointed out that, since, according to his own experi- ments, the work done in the expansion of a gas at constant temperature is equivalent to the heat absorbed, by equating Carnot's expressions (given in § 17) for the work done and the heat absorbed, the value of Carnot's function F't must be equal to J/T, in order to reconcile his principle with the mechanical theory.

Professor W. Thomson gave an account of Carnot's theory (Trans. Roy. Soc. Edin., Jan. 1849), in which he recognized the discrepancy between Clapeyron's statement and Joule's experi- ments, but did not see his way out of the difficulty. He there- fore adopted Carnot's principle provisionally, and proceeded to calculate a table of values of Carnot's function F't, from the values of the total-heat and vapour-pressure of steam-then recently determined by Regnault (Memoires de I'Institut de Paris, 1847). In making the calculation, he assumed that the specific volume v of saturated steam at any temperature T and pressure p is that given by the gaseous laws, />d = RT. The results are otherwise correct so far as Regnault's data are accurate, because the values of the efficiency per degree F't are not affected by any assumption with regard to the nature of heat. He obtained the values of the efficiency F't over a finite range from t to 0° C, by adding up the values of F't for the separate degrees. This latter proceeding is inconsistent with the mechanical theory, but is the

correct method on the assumption that the heat given up to the condenser is equal to that taken from the source. The values he obtained for F't agreed very well with those previously given by Carnot and Clapeyron, and showed that this function diminishes with rise of temperature roughly in the inverse ratio of T, as suggested by Joule.

R. J-. E. Clausius (Pogg. Ann., 1850, 79, p. 369) and W. J. M. Rankine (Trans. Roy. Soc. Edin., 1850) were the first to develop the correct equations of thermodynamics on the mechanical theory. When heat was supplied to a body to change its tempera- ture or state, part remained in the body as intrinsic heat energy E, but part was converted into external work of expansion W and ceased to exist as heat. The part remaining in the body was always the same for the same change of state, however performed, as required by Carnot's fundamental axiom, but the part corre- sponding to the external work was necessarily different for different values of the work done. Thus in any cycle in which the body was exactly restored to its initial state, the heat remaining in the body would always be the same, or as Carnot puts it, the quantities of heat absorbed and given out in its diverse transformations are exactly " compensated," so far as the body is concerned. But the quantities of heat absorbed and given out are not necessarily equal. On the contrary, they differ by the equivalent of the external work done in the cycle. Apply- ingˆ this principle to the case of steam, Clausius deduced a fact previously unknown, that the specific heat of steam maintained in a state of saturation is negative, which was also deduced by Rankine (loc. cit.) about the same time. In applying the principle to gases Clausius assumes (with Mayer and Holtzmann) that the heat absorbed by a gas in isothermal expansion is equivalent to the work done, but he does not appear to be acquainted with Joule's experiment, and the reasons he adduces in support of this assumption are not conclusive. This being admitted, he deduces from the energy principle alone the propositions already given by Carnot with reference to gases, and shows in addition that the specific heat of a perfect gas must be independent of the density. In the second part of his paper he introduces Carnot's principle, which he quotes as follows: " The perform- ance of work is equivalent to a transference of heat from a hot to a cold body without the quantity of heat being thereby diminished." This is not Carnot's way of stating his principle (see § 15), but has the effect of exaggerating the importance of Clapeyron's unnecessary assumption. By equating the expres- sions given by Carnot for the work done and the heat absorbed in the expansion of a gas, he deduces (following Holtzmann) the value J/T for Carnot's function F't (which Clapeyron denotes by i/C). He shows that this

assumption gives values of Carnot's function which agree fairly well with those calculated by Clapeyron and Thomson, and that it leads to values of the mechanical equivalent not differing greatly from those of Joule. Substituting the value J/T for C in the analytical expressions given by Clapeyron for the latent heat of expansion and vaporization, these relations are immediately reduced to their modern form (see Thermodynamics, § 4). Being unacquainted with Carnot's original work, but recognizing the invalidity of Clapeyron's description of Carnot's cycle, Clausius substituted a proof consistent with the mechanical theory, which he based on the axiom that " heat cannot of itself pass from cold to hot." The proof on this basis involves the application of the energy principle, which does not appear to be necessary, and the axiom to which final appeal is made does not appear more convincing than Carnot's. Strange to say, Clausius did not in this paper give the expression for the efficiency in a Carnot cycle of finite range (Carnot's Fl) which follows immediately from the value J/T assumed for the efficiency F't of a cycle of infinitesimal range at the temperature t C or T Abs.

Rankine did not make the same assumption as Clausius explicitly, but applied the mechanical theory of heat to the development of his hypothesis of molecular vortices, and deduced from it a number of results similar to those obtained by Clausius. Unfortunately the paper (loc. cit.) was not published till some time latex, but in a summary given in the Phil. Mag. (July 1851)

the principal results were detailed. Assuming the value of Joule's equivalent, Rankine deduced the value 0-2404 for the specific heat of air at constant pressure, in place of 0-267 as found by Delaroche and Berard. The subsequent verification of this value by Regnault (Comptes rendus, 1853) afforded strong confirmation of the accuracy of Joule's work. In a note appended to the abstract in the Phil. Mag. Rankine states that he has succeeded in proving that the maximum efficiency of an engine working in a Carnot cycle of finite range h to to is of the form (ti-to)/(h-k), where k is a constant, the same for all substances. This is correct if t represents temperature Centigrade, and £ = — 273.

Professor W. Thomson (Lord Kelvin) in a paper " On the Dynamical Theory of Heat " (Trans. Roy. Soc. Edin., 1851, first published in the Phil. Mag., 1852) gave a very clear state- ment of the position of the theory at that time. He showed that the value F'i = J/T, assumed for Carnot's function by Clausius without a-ny experimental justification, rested solely on the evidence of Joule's experiment, and might possibly not be true at all temperatures. Assuming the value J/T with

this reservation, he gave as the expression for the efficiency over a finite range h to t C, or Ti to T Abs., the result,

W/H = (/ 1 -M/ai + 273) = (T 1 -T„)/T 1 .

(4)

which, he observed, agrees in form with that found by Rankine. 21. The Absolute Scale of Temperature. — Since Carnot's function is the same for all substances at the same temperature, and is a function of the temperature only, it supplies a means of measuring temperature independently of the properties of any particular substance. This proposal was first made by Lord Kelvin (Phil. Mag., 1848), who suggested that the degree of temperature should be chosen so that the efficiency of a perfect engine at any point of the scale should be the same, or that Carnot's function F't should be constant. This would give the simplest expression for the efficiency on the caloric theory, but the scale so obtained, when the values of Carnot's function were calculated from Regnault's observations on steam, was found to differ considerably from the scale of the mercury or air-thermo- meter. At a later date, when it became clear that the value of Carnot's function was very nearly proportional to the re ciprocal of the temperature T measured from the absolute zero of the gas thermometer, he proposed a simpler method (Phil. Trans., 1854), namely, to define absolute temperature 6 as proportional to the reciprocal of Carnot's function. On this definition of absolute temperature, the expression (0i-0o)/#i for the efficiency of a Cannot cycle with limits di and do would be exact, and it became a most important problem to determine how far the temperature T by gas thermometer differed from the absolute temperature 0. With this object he devised a very delicate method, known as the " porous plug experiment " (see Thermodynamics) of testing the deviation of the gas thermometer from the absolute scale. The experiments were carried out in conjunction with Joule, and finally resulted in showing (Phil. Trans., 1862, " On the Thermal Effects of Fluids in Motion ") that the deviations of the air thermometer from the absolute scale as above defined are almost negligible, and that in the case of the gas hydrogen the deviations are so small that a thermometer containing this gas may be taken for all practical purposes as agreeing exactly with the absolute scale at all ordinary temperatures. For this reason the hydrogen thermometer has since been generally adcpted as the standard.

22. Availability of Heat of Combustion. — Taking the value 1-13 kilogrammetres per kilo-calorie for i° C. fall of temperature at 100° C, Carnot attempted to estimate the possible perform- ance of a steam-

engine receiving heat at 160 C. and rejecting it at 40 C. Assuming the performance to be simply proportional to the temperature fall, the work done for 120° fall would be 134 kilogrammetres per kilo-calorie. To make an accurate calculation required a knowledge of the variation of the function F't with temperature. Taking the accurate formula of § 20, the work obtainable is 118 kilogrammetres per kilo-calorie, which is

28% of 426, the mechanical equivalent of the kilo-calorie in kilogrammetres. Carnot pointed out that the fall of 120 C. utilized in the steam-engine was only a small fraction of the whole temperature fall obtainable by combustion, and made an estimate of the total power available if the whole fall could be utilized, allowing for the probable diminution of the function F't with rise of temperature. His estimate was 3-9 million kilogrammetres per kilogramme of coal. This was certainly an over-estimate, but was surprisingly close, considering the scanty data at his disposal.

In reality the fraction of the heat of combustion available, even in an ideal engine and apart from practical limitations, is much less than might be inferred from the efficiency formula of the Carnot cycle. In applying this formula to estimate the availability of the heat it is usual to take the temperature obtainable by the combustion of the fuel as the upper limit of temperature in the formula. For carbon burnt in air at constant pressure without any loss of heat, the products of combustion might be raised 2300 C. in temperature, assuming that the specific heats of the products were constant and that there was no dissociation. If all the heat could be supplied to the working fluid at this temperature, that of the condenser being 40 C, the possible efficiency by the formula of § 20 would be 89%. But the combustion obviously cannot maintain so high a tem- perature if heat is being continuously abstracted by a boiler. Suppose that 8′ is the maximum temperature of combustion as above estimated, 8″ the temperature of the boiler, and 8° that of the condenser. Of the whole heat supplied by combustion represented by the rise of temperature 8'— 8°, the fraction (8′ -6") /(d' -6") is the maximum that could be supplied to the boiler, the fraction (8″ -6°) / \8′ -6°) being carried away with the waste gases. Of the heat supplied to the boiler, the fraction (8"-8°)j8″ might theoretically be converted into work. The problem in the case of an

engine using a separate working fluid, like a steam-engine, is to find what must be the temperature 8″ of the boiler in order to obtain the largest possible fraction of the heat of combustion in the form of work. It is easy to sh ow that 8″ must be the geometric mean of 0′ and 8°, or 8”=ˆ8‘8 a . Taking 0’-0°=23oo c C, and 0° = 3i3° Abs. as before, we find 8″ = 903 Abs. or 630 C. The heat supplied to the boiler is then 74-4% of the heat of combustion, and of this 65-3% is converted into work, giving a maximum possible efficiency of 49% in place of 89 . With the boiler at 160 C, the possible efficiency, calculated in a similar manner, would be 26-3, which shows that the possible increase of efficiency by increasing the tem- perature range is not so great as is usually supposed. If the temperature of the boiler were raised to 300 C, corresponding to a pressure of 1 260 lb per sq. in., which is occasionally surpassed in modern flash-boilers, the possible efficiency would be 40%. The waste heat from the boiler, supposed perfectly efficient, would be in this case 11%, of which less than a quarter could be utilized in the form of work. Carnot foresaw that in order to utilize a larger percentage of the heat of combustion it would be necessary to employ a series of working fluids, the waste heat from one boiler and condenser serving to supply the next in the series. This has actually been effected in a few cases, e.g. steam and SO2, when special circumstances exist to compensate for the extra complication. Improvements in the steam-engine since Carnot’s time have been mainly in the direction of reducing waste due to condensation and leakage by multiple expansion, superheating. &c. The gain by increased temperature range has been comparatively small owing to limitations of pressure, and the best modern steam-engines do not utilize more than 20% of the heat of combustion. This is in reality a very respectable fraction of the ideal limit of 40% above calculated on the assumption of 1260 lb initial pressure, with a perfectly efficient boiler and complete expansion, and with an ideal engine which does not waste available motive power by complete condensation of the steam before it is returned to the boiler.

23. Advantages of Internal Combustion.— As Carnot pointed out, the chief advantage of using atmospheric air as a working fluid in a heat-engine lies in the possibility of imparting heat to

it directly by internal combustion. This avoids the limitation imposed by the use of a separate boiler, which as we have seen reduces the possible efficiency at least 50%. Even with internal combustion, however, the full range of temperature is not available, because the heat cannot conveniently in practice be communicated to the working fluid at constant temperature, owing to the large range of expansion at constant temperature required for the absorption of a sufficient

quantity of heat. Air-engines of this type, such as Stirling's or Ericsson's, taking in heat at constant temperature, though theoretically the most perfect, are bulky and mechanically inefficient. In practical engines the heat is generated by the combustion of an explosive mixture at constant volume or at constant pressure. The heat is not all communicated at the highest temperature, but over a range of temperature from that of the mixture at the beginning of combustion to the maximum temperature. The earliest instance of this type of engine is the lycopodium engine of M.M. Niepce, discussed by Carnot, in which a combustible mixture of air and lycopodium powder at atmospheric pressure was ignited in a cylinder, and did work on a piston. The early gas-engines of E. Lenoir (i860) and N. Otto and E. Langen (1866), operated in a similar manner with illuminating gas in place of lycopodium. Combustion in this case is effected practically at constant volume, and the maximum efficiency theoretically obtainable is i-\og e rj(r-i), where r is the ratio of the maximum temperature 8′ to the initial temperature 8°. In order to obtain this efficiency it would be necessary to follow Carnot's rule, and expand the gas after ignition without loss or gain of heat from 8′ down to 8°, and then to compress it at 8° to its initial volume. If the rise of temperature in com- bustion were 2300° C, and the initial temperature were o° C. or 273 Abs., the theoretical efficiency would be 73-3%, which is much greater than that obtainable with a boiler. But in order to reach this value, it would be necessary to expand the mixture to about 270 times its initial volume, which is obviously impracticable. Owing to incomplete expansion and rapid cooling of the heated gases by the large surface exposed, the actual efficiency of the Lenoir engine was less than 5%, and of the Otto and Langen, with more rapid expansion, about 10%. Carnot foresaw that in order to render an engine of this type practically efficient, it would be necessary to compress the mixture before ignition. Compression is beneficial in three ways: (1) it permits a greater range of expansion after ignition; (2) it raises the mean effective pressure, and thus improves the mechanical efficiency and the power in proportion to size and weight; (3) it reduces the loss of heat during ignition by reducing the surface exposed to the hot gases. In the modern gas or petrol motor, compression is employed as in Carnot's cycle, but the efficiency attainable is limited not so much by considera- tions of temperature as by limitations of volume. It is impractic- able before combustion at constant volume to compress a rich mixture to much less than ˆth of its initial volume, and, for mechanical simplicity, the range of expansion is made equal to that of compression. The cycle employed was patented in 1862 by Beau de Rochas (d. 1892), but was first successfully carried out by Otto (1876). It differs from the Carnot cycle in employing reception and

rejection of heat at constant volume instead of at constant temperature. This cycle is not so efficient as the Carnot cycle for given limits of temperature, but, for the given limits of volume imposed, it gives a much higher efficiency than the Carnot cycle. The efficiency depends only on the range of temperature in expansion and compression, and- is given by the formula (9'~8")/8', where 8′ is the maximum temperature, and 8″ the temperature at the end of expansion. The formula is. the same as that for the Carnot cycle with the same range of temperature in expansion. The ratio 6′ 18″ is r y ~ l , where r is the given ratio of expansion or compression, and 7 is the ratio of the specific heats of the working fluid. Assuming the working fluid to be a perfect gas with the same properties as air, we should have 7 = 1-41. Taking r=$, the formula gives 48% for the maximum possible efficiency. The actual products of combustion vary with the nature of the fuel

employed, and have different properties from air, but the efficiency is found to vary with compression in the same manner as for air. For this reason a committee of the Institution of Civil Engineers in 1905 recommended the adoption of the air-standard for estimating the effects of varying the compression ratio, and defined the relative efficiency of an internal combustion engine as the ratio of its observed efficiency to that of a perfect air-engine with the same compression.

24. Effect of Dissociation, and Increase of Specific Heat. — One of the most important effects of heat is the decomposition or dissociation of compound molecules. Just as the molecules of a vapour combine with evolution of heat to form the more complicated molecules of the liquid, and as the liquid molecules require the addition of heat to effect their separation into molecules of vapour; so in the case of molecules of different kinds which combine with evolution of heat, the reversal of the process can be effected either by the agency of heat, or indirectly by supplying the requisite amount of energy by electrical or other methods. Just a s the latent heat of vaporization diminishes with rise of temperature, and the pressure of the dissociated vapour molecules increases, so in the case of compound molecules in general the heat of combination diminishes with rise of tempera- ture, and the pressure of the products of dissociation increases. There is evidence that the compound carbon dioxide, COj, is

partly dissociated into carbon monoxide and oxygen at high temperatures, and that the proportion dissociated increases with rise of temperature. There is a very close analogy between these phenomena and the vaporization of a liquid. The laws which govern dissociation are the same fundamental laws of thermodynamics, but the relations involved are necessarily more complex on account of the presence of different kinds of molecules, and present special difficulties for accurate investiga- tion in the case where dissociation does not begin to be appreciable until a high temperature is reached. It is easy, however, to see that the general effect of dissociation must be to diminish the available temperature of combustion, and all experiments go to show that in ordinary combustible mixtures the rise of temperature actually attained is much less than that calculated as in § 22, on the assumption that the whole heat of combustion is developed and communicated to products of constant specific heat. The defect of temperature observed can be represented by supposing that the specific heat of the products of combustion increases with rise of temperature. This is the case for CO2 even at ordinary temperatures, according to Regnault, and probably also for air and steam at higher temperatures. Increase of specific heat is a necessary accompaniment of dissociation, and from some points of view may be regarded as merely another way of stating the facts. It is the most convenient method to adopt in the case of products of combustion consisting of a mixture of C0 2 and steam with a large excess of inert gases, because the relations of equilibrium of dissociated molecules of so many different kinds would be too complex to permit of any other method of expression. It appears from the researches of Dugald Clerk, H. le Chatelier and others that the apparent specific heat of the products of combustion in a gas-engine may be taken as approximately -34 to -33 in place of -24 at working temperatures between 1000° C. and 1700 C, and that the ratio of the specific heats is about 1-20 in place of 1-41. This limits the availability of the heat of combustion by reducing the rise of temperature actually obtainable in combustion at constant volume by 30 or 40%, and also by reducing the range of temperature 9′ 16″ for a given ratio of expansions from r’ 41 to r- 29 . The formula given in § 21 is no longer quite exact, because the ratio of the specific heats of the mixture during compression is not the same as that of the products of combustion during expansion. But since the work done depends principally on the expansion curve, the ratio of the range of temperature in ex- pansion (d’-d”) to the maximum temperature 6′ will still give a very good approximation to the possible efficiency. Taking r = 5, as before, for the compression ratio, the possible efficiency is reduced from 48% to 38%, if 7 = 1-29 instead of 1-41. A large gas-engine of the present

day with r = $ may actually

realize as much as 34% indicated efficiency, which is 90% of the maximum possible, showing how perfectly all avoidable heat losses have been minimized.

It is often urged that the gas-engine is relatively less efficient than the steam-engine, because, although it has a much higher absolute efficiency, it does not utilize so large a fraction of its temperature range, reckoning that of the steam-engine from the temperature of the boiler to that of the condenser, and that of the gas-engine from the maximum temperature of combustion to that of the air. This is not quite fair, and has given rise to the mistaken notion that ” there is an immense margin for improve- ment in the gas-engine,” which is not the case if the practical limitations of volume are rightly considered. If expansion could be carried out in accordance with Carnot’s principle of maximum efficiency, down to the lower limit of temperature O , with rejection of heat at O during compression to the original volume Va, it would no doubt be possible to obtain an ideal efficiency of nearly 80%. But this would be quite impracticable, as it would require expansion to about 100 times 1% or 500 times the com- pression volume. Some advantage no doubt might be obtained by carrying the expansion beyond the original volume. This has been done, but is not found to be worth the extra complica- tion. A more practical method, which has been applied by Diesel for liquid fuel, is to introduce the fuel at the end of compression, and adjust the supply in such a manner as to give combustion at nearly constant pressure. This makes it possible to employ higher compression, with a corresponding increase in the ratio of expansion and the theoretical efficiency. With a compression ratio of 14, an indicated efficiency of 40% has been obtained in this way, but owing to additional complications the brake efficiency was only 31%, which is hardly any improve- ment on the brake efficiency of 30% obtained with the ordinary type of gas-engine. Although Carnot’s principle makes it possible to calculate in every case what the limiting possible efficiency would be for any kind of cycle if all heat losses were abolished, it is very necessary, in applying the principle to practical cases, to take account of the possibility of avoiding the heat losses which are supposed to be absent, and of other practical limita- tions in the working of the actual engine. An immense amount of time and ingenuity has been wasted in striving to realize impossible margins of ideal efficiency, which a close study of the practical conditions would have shown to be illusory. As Carnot remarks at the conclusion of his essay: ” Economy of fuel is only one of the conditions a heat-engine must satisfy; in many cases it is only secondary, and must often give way to considerations of safety,

strength and wearing qualities of the machine, of smallness of space occupied, or of expense in erecting. To know how to appreciate justly in each case the considerations of convenience and economy, to be able to distinguish the essential from the accessory, to balance all fairly, and finally to arrive at the best result by the simplest means, such must be the principal talent of the man called on to direct and co-ordinate the work of his fellows for the attainment of a useful object of any kind."

Transference of Heat

25. Modes of Transference.— There are three principal modes of transference of heat, namely (1) convection, (2) conduction, and (3) radiation.

(1) In convection, heat is carried or conveyed by the motion of heated masses of matter. The most familiar illustrations of this method of transference are the heating of buildings by Ihe circulation of steam or hot water, or the equalization of tem- perature of a mass of unequally heated liquid or gas by convection currents, produced by natural changes of density Or by artificial stirring. (2) In conduction, heat is transferred by contact between contiguous particles of matter and is passed on from one particle to the next without visible relative motion of the parts of the body. A familiar illustration of conduction is the passage of heat through the metal plates of a boiler from the fire to the water inside, or the transference of heat from a soldering bolt to the solder and the metal with which it is placed in contact.

(3) In radiation, the heated body gives rise to a motion of vibration in the aether, which is propagated equally in all directions, and is reconverted into heat when it encounters any obstacle capable of absorbing it. Thus radiation differs from conduction and convection in taking place most perfectly in the absence of matter, whereas conduction and convection require material communication between the bodies concerned.

In the majority of cases of transference of heat all three modes of transference are simultaneously operative in a greater or less degree, and the combined effect is generally of great complexity. The different modes of transference are subject to widely different laws, and the

difficulty of disentangling their effects and subjecting them to calculation is often one of the most serious obstacles in the experimental investigation of heat. In space void of matter, we should have pure radiation, but it is difficult to obtain so perfect a vacuum that the effects of the residual gas in transferring heat by conduction or convection are inappreciable. In the interior of an opaque solid we should have pure conduction, but if the solid is sensibly transparent in thin layers there must also be an internal radiation, while in a liquid or a gas it is very difficult to eliminate the effects of convection. These difficulties are well illustrated in the historical development of the subject by the experimental investigations which have been made to determine the laws of heat-transference, such as the laws of cooling, of radiation and of conduction.

26. Newton's Law of Cooling. — There is one essential condition common to all three modes of heat-transference, namely, that they depend on difference of temperature, that the direction of the transfer of heat is always from hot to cold, and that the rate of transference is, for small differences, directly proportional to the difference of temperature. Without difference of tem- perature there is no transfer of heat. When two bodies have been brought to the same temperature by conduction, they are also in equilibrium as regards radiation, and vice versa. If this were not the case, there could be no equilibrium of heat defined by equality of temperature. A hot body placed in an enclosure of lower temperature, e.g. a calorimeter in its containing vessel, generally loses heat by all three modes simultaneously in different degrees. The loss by each mode will depend in different ways on the form, extent and nature of its surface and on that of the inciosure, on the manner in which it is supported, on its relative position and distance from the enclosure, and on the nature of the intervening medium. But provided that the difference of temperature is small, the rate of loss of heat by all modes will be approximately proportional to the difference of temperature, the other conditions remaining constant. The rate of cooling or the rate of fall of temperature will also be nearly proportional to the rate of loss of heat, if the specific heat of the cooling body is constant, or the rate of cooling at any moment will be pro- portional to the difference of temperature. This simple relation is commonly known as Newton's law of cooling, but is limited in its application to comparatively simple cases such as the foregoing. Newton himself applied it to estimate the temperature of a red-hot iron ball, by observing the time which it took to cool from a red heat to a known temperature, and comparing this with the time taken to cool through a known range at ordinary temperatures. According to this law if the excess of

temperature of the body above its surroundings is observed at equal intervals of time, the observed values will form a geometrical progression with a common ratio. Supposing, for instance, that the surrounding temperature were C, that the red-hot ball took 25 minutes to cool from its original temperature to 20° C, and 5 minutes to cool from 20 C. to io° C, the original temperature is easily calculated on the assumption that the excess of temperature above o° C. falls to half its value in each interval of 5 minutes. Doubling the value 20 at 25 minutes five limes, we arrive at 640 C. as the original temperature. No other method of estimation of such temperatures was available in the time of Newton, but, as we now know, the simple law of proportionality to the temperature difference is inapplicable over such large ranges of temperature. The rate of loss of heat by radiation,

and also by convection and conduction to the surrounding air, increases much more rapidly than in simple proportion to the temperature difference, and the rate of increase of each follows a different law. At a later date Sir John Herschel measured the intensity of the solar radiation at the surface of the earth, and endeavoured to form an estimate of the temperature of the sun by comparison with terrestrial sources on the assumption that the intensity of radiation was simply proportional to the tem- perature difference. He thus arrived at an estimate of several million degrees, which we now know would be about a thousand times too great. The application of Newton's law necessarily leads to absurd results when the difference of temperature is very large, but the error will not in general exceed 2 to 3% if the temperature difference does not exceed io° C, and the percentage error is proportionately much smaller for smaller differences.

27. Dulong and Petit' s Empirical Laws of Cooling. — One of the most elaborate experimental investigations of the law of cooling was that of Dulong and Petit {Ann. Chim. Phys., 1817, 7, pp. 225 and 337), who observed the rate of cooling of a mercury thermometer from 300 C. in a water-jacketed enclosure at various temperatures from 0° C. to 8o° C. In order to obtain the rate of cooling by radiation alone, they exhausted the enclosure as perfectly as possible after the introduction of the thermometer, but with the imperfect appliances available at that time they were not able to obtain a vacuum better than about 3 or 4 mm. of mercury. They found that the velocity of cooling V in a vacuum could be represented by a formula of the type

V = A(o«-o'o)

(5)

in which t is the temperature of the thermometer, and t that of the enclosure, a is a constant having the value 1-0075, an d the coefficient A depends on the form of the bulb and the nature of its surface. For the ranges of temperature they employed, this formula gives much better results than Newton's, but it must be remembered that the temperatures were expressed on the arbitrary scale of the mercury thermometer, and were not corrected for the large and uncertain errors of stem-exposure (see Thermometry). Moreover, although the effects of cooling by convection currents are practically eliminated by exhausting to 3 or 4 mm. (since the density of the gas is reduced to i/2ooth while its viscosity is not appreciably affected), the rate of cooling by conduction is not materially diminished, since the conductivity, like the viscosity, is nearly independent of pressure. It has since been shown by Sir William Crookes (Proc. Roy. Soc, 1881, 21, p. 239) that the rate of cooling of a mercury thermometer in a vacuum suffers a very great diminution when the pressure is reduced from 1 mm. to -ooi mm., at which pressure the effect of conduction by the residual gas has practically disappeared.

Dulong and Petit also observed the rate of cooling under the same conditions with the enclosure filled with various gases. They found that the cooling effect of the gas could be represented by adding to the term already given as representing radiation, an expression of the form

V' = Bˆ(<-'o) ,-!35 .... (6)

They found that the cooling effect of convection, unlike that of radiation, was independent of the nature of the surface of the thermometer, whether silvered or blackened, that it varied as some power c of the pressure p, and that it was independent of the absolute temperature of the enclosure, but varied as the excess temperature (t-to) raised to the power 1-233ˆ.. This highly artificial result undoubtedly contains some elements of truth, but could only be applied to experiments similar to those from which it was derived. F. Herve de la Provostaye and P. Q. Desains (Ann. Chim. Phys., 1846, 16, p. 337), in repeating these experiments under various conditions, found that the coefficients A and B were to some extent dependent on the temperature, and that the manner in which the cooling effect varied with the pressure depended on the form and size of the enclosure. It is evident that this should be the case, since the cooling effect of the gas depends partly on convective currents.

which are necessarily greatly modified by the form of the enclosure in a manner which it would appear hopeless to attempt to represent by any general formula.

28. Surface Emissivity. — The same remark applies to many attempts which have since been made to determine the general value of the constant termed by Fourier and early writers the ” exterior conductibility,” but now called the surface emissivity. This coefficient represents the rate of loss of heat from a body per unit area of surface per degree excess of temperature, and includes the effects of radiation, convection and conduction. As already pointed out, the combined effect will be nearly proportional to the excess of temperature in any given case provided that the excess is small, but it is not necessarily pro- portional to the extent of surface exposed except in the case of pure radiation. The rate of loss by convection and conduction varies greatly with the form of the surface, and, unless the enclosure is very large compared with the cooling body, the effect depends also on the size and form of the enclosure. Heat is necessarily communicated from the cooling body to the layer of gas in contact with it by conduction. If the linear dimensions of the body are small, as in the case of a fine wire, or if it is separated from the enclosure by a thin layer of gas, the rate of loss depends chiefly on conduction. For very fine metallic wires heated by an electric current, W. E. Ayrton and H. Kilgour {Phil. Trans., 1892) showed that the rate of loss is nearly independent of the surface, instead of being directly proportional to it. This should be the case, as Porter has shown {Phil. Mag., March 1895), since the effect depends mainly on conduction. The effects of conduction and radiation may be approximately estimated if the conductivity of the gas and the nature and forms of the surfaces of the body and enclosure are known, but the effect of convection in any case can be determined only by experiment. It has been found that the rate of cooling by a current of air is approximately proportional to the velocity of the current, other things being equal. It is obvious that this should be the case, but the result cannot generally be applied to convection currents. Values which are commonly given for the surface emissivity must therefore be accepted with great reserve. They can be regarded only as approximate, and as applicable only to cases precisely similar to those for which they were experimentally obtained. There cannot be said to be any general law of convection. The loss of heat is not necessarily proportional. to the area of the surface, and no general value of the coefficient can be given to suit all cases. The laws of con- duction and

radiation admit of being more precisely formulated, and their effects predicted, except in so far as they are complicated by convection.

29. Conduction of Heat. — The laws of transference of heat in the interior of a solid body formed one of the earliest subjects of mathematical and experimental treatment in the theory of heat. The law assumed by Fourier was of the simplest possible type, but the mathematical application, except in the simplest cases, was so difficult as to require the development of a new mathematical method. Fourier succeeded in showing how, by his method of analysis, the solution of any given problem with regard to the flow of heat by conduction in any material could be obtained in terms of a physical constant, the thermal conductivity of the material, and that the results obtained by experiment agreed in a qualitative manner with those predicted by his theory. But the experimental determination of the actual values of these constants presented formidable difficulties which were not surmounted till a later date The experimental methods and difficulties are discussed in a special article on Conduction of Heat. It will suffice here to give a brief historical sketch, including a few of the more important results by way of illustration.

30. Comparison of Conducting Powers. — That the power of transmitting heat by conduction varied widely in different materials was probably known in a general way from prehistoric times. Empirical knowledge of this kind is shown in the con- struction of many articles for heating, cooking, &c, such as the copper soldering bolt, or the Norwegian cooking-stove. One

of the earliest experiments for making an actual comparison of conducting powers was that suggested by Franklin, but carried out by Jan Ingenhousz {Journ. de phys., 1789, 34, pp. 68 and 380). Exactly similar bars of different materials, glass, wood, metal, &c, thinly coated with wax, were fixed in the side of a trough of boiling water so as to project for equal distances through the side of the trough into the external air. The wax coating was observed to melt as the heat travelled along the bars, the distance from the trough to which the wax was melted along each affording an approximate indication of the distribution of temperature. When the temperature of each bar had become stationary the heat which it gained by conduction from the trough must be equal to the heat lost to the surrounding air, and must therefore be approximately proportional to the distance to which the wax had melted along the bar. But the temperature fall per unit length, or the temperature-gradient, in each bar at the point where it emerged from the trough would be inversely proportional to the same distance. For equal temperature-gradients the quantities of heat

conducted (or the relative conducting powers of the bars) would therefore be proportional to the squares of the distances to which the wax finally melted on each bar. This was shown by Fourier and Despretz {Ann. chim. phys., 1822, 19, p. 97).

31. Diffusion of Temperature. — It was shown in connexion, with this experiment by Sir H. Davy, and the experiment was later popularized by John Tyndall, that the rate at which wax melted along the bar, or the rate of propagation of a given temperature, during the first moments of heating, as distinguished from the melting-distance finally attained, depended on the specific heat as well as the conductivity. Short prisms of iron and bismuth coated with wax were placed on a hot metal plate. The wax was observed to melt first on the bismuth, although its conductivity is less than that of iron. The reason is that its specific heat is less than that of iron in the proportion of 3 to n. The densities of iron and bismuth being 7-8 and 9-8, the thermal capacities of equal prisms will be in the ratio -86 for iron to 29 for bismuth. If the prisms receive heat at equal rates, the bis muth will reach the temperature of melting wax nearly three times as quickly as the iron. It is often stated on the strength of this experiment that the rate of propagation of a temperature wave, which depends on the ratio of the conductivity to the specific heat per unit volume, is greater in bismuth than in iron {e.g. Preston, Heat, p. 628). This is quite incorrect, because the conductivity of iron is about six times that of bismuth, and the rate of propagation of a temperature wave is therefore twice as great in iron as in bismuth. The experiment in reality is misleading because the rates of reception of heat by the prisms are limited by the very imperfect contact with the hot metal plate, and are not proportional to the respective conductivities. If the iron and bismuth bars are properly faced and soldered to the top of a copper box (in order to ensure good metallic contact, and exclude a non-conducting film of air), and the box is then heated by steam, the rates of reception of heat will be nearly proportional to the conductivities, and the wax will melt nearly twice as fast along the iron as along the bismuth. A bar of lead similarly treated will show a faster rate of propagation than iron, because, although its conductivity is only half that of iron, its specific heat per unit volume is 2 ■ 5 times smaller.

32. Bad Conductors. Liquids and Gases. — Count Rumford (1792) compared the conducting powers of substances used in clothing, such as wool and cotton, fur and down, by observing the time which a thermometer took to cool when embedded in a” globe filled successively with the different materials. The times of cooling observed for a given range varied from 1300 to 900 seconds for different materials. The low conducting power of such materials is

principally due to the presence of air in the interstices, which is prevented from forming convection currents by the presence of the fibrous material. Finely powdered silica is a very bad conductor, but in the compact form of rock crystal it is as good a conductor as some of the metals. According to the kinetic theory of gases, the conductivity of a gas depends on molecular diffusion. Maxwell estimated the conductivity of

air at ordinary temperatures at about 20,000 times less than that oi copper. This has been verified experimentally by Kundt and Warburg, Stefan and Winkelmann, by taking special precautions to eliminate the effects of convection currents and radiation. It was for some time doubted whether a gas possessed any true conductivity for heat. The experiment of T. Andrews, repeated by Grove, and Magnus, showing that a wire heated by an electric current was raised to a higher temperature in air than in hydrogen, was explained by Tyndall as being due to the greater mobility of hydrogen which gave rise to stronger convection currents. In reality the effect is due chiefly to the greater velocity of motion of the ultimate molecules of hydrogen, and is most marked if molar (as opposed to molecular) convection is eliminated. Molecular convection or diffusion, which cannot be distinguished experimentally from conduction, as it follows the same law, is also the main cause of conduction of heat in liquids. Both in liquids and gases the effects of convection currents are so much greater than those of diffusion or conduction that the latter are very difficult to measure, and, except in special cases, comparatively unimportant as affecting the transference of heat. Owing to the difficulty of eliminating the effects of radiation and convection, the results obtained for the conductivities of liquids are somewhat discordant, and there is in most cases-great uncertainty whether the conductivity increases or diminishes with rise of temperature. It would appear, however, that liquids, such as water and glycerin, differ remarkably little in conduc- tivity in spite of enormous differences of viscosity. The viscosity of a liquid diminishes very rapidly with rise of temperature, without any marked change in the conductivity, whereas the viscosity of a gas increases with rise of temperature, and is always nearly proportional to the conductivity.

33. Difficulty of Quantitative Estimation of Heat Transmitted. — The

conducting powers of different metals were compared by C. M. Despretz, and later by G. H. Wiedemann and R. Franz, employing an extension of the method of Jan Ingenhousz, in which the temperatures at different points along a bar heated at one end were measured by thermometers or thermocouples let into small holes in the bars, instead of being measured at one point only by means of melting wax. These experiments un- doubtedly gave fairly accurate relative values, but did not permit the calculation of the absolute amounts of heat transmitted. This was first obtained by J. D. Forbes (Brit. Assoc. Rep., 1852; Trans. Roy. Soc. Ed., 1862, 23, p. 133) by deducing the amount of heat lost to the surrounding air from a separate experiment in which the rate of cooling of the bar was observed (see Conduc- tion of Heat). Clement (Ann. chim. phys., 1841) had pre- viously attempted to determine the conductivities of metals by observing the amount of heat transmitted by a plate with one side exposed to steam at 100° C, and the other side cooled by water at 28° C. Employing a copper plate 3 mm. thick, and assuming that the two surfaces of the plate were at the same temperatures as the water and the steam to which they were exposed, or that the temperature-gradient in the metal was 72° in 3 mm., he had thus obtained a value which we now know to be nearly 200 times too small. The actual temperature difference in the metal itself was really about 0-36° C. The remainder of the 72° drop was in the badly conducting films of water and steam close to the metal surface. Similarly in a boiler plate in contact with flame at 1500 C. on one side and water at. say, 150 C. on the other, the actual difference of temperature in the metal, even if it is an inch thick, is only a few degrees. The metal, unless badly furred with incrustation, is but little hotter than the water. It is immaterial so far as the transmission of heat is concerned, whether the plates are iron or copper. The greater part of the resistance to the passage of heat resides in a comparatively quiescent film of gas close to the surface, through which film the heat has to pass mainly by conduction. If a Bunsen flame, preferably coloured with sodium, is observed impinging on a cold metal plate, it will be seen to be separated from the plate by a dark space of a millimetre or less, throughout which the temperature of the gas is lowered by its own conductivity below the temperature of incandescence.

There is no abrupt change of temperature in passing from the gas to the metal, but a continuous temperature-gradient from the temperature of the metal to that of the flame. It is true that this gradient may be upwards of 1000 C. per mm., but there is no discontinuity.

34. Resistance of a Gas Film to the Passage of Heat. — It is possible to

make a rough estimate of the resistance of such a film to the passage of heat through it. Taking the average conductivity of the gas in the film as 10,000 times less than that of copper (about double the conductivity of air at ordinary temperatures) a millimetre film would be equivalent to a thickness of 10 metres of copper, or about 1-2 metres of iron. Taking the temperature- gradient as 1000 C. per mm. such a film would transmit 1 gramme-calorie per sq. cm. per sec, or 36,000 kilo-calories per sq. metre per hour. With an area of 100 sq. cms. the heat transmitted at this rate would raise a litre of water from 20 C. to 100° C. in 800 sees. By experiment with a strong Bunsen flame it takes from 8 to 10 minutes to do this, which would indicate that on the above assumptions the equivalent thickness of quiescent film should be rather less than 1 mm. in this case. The thickness of the film diminishes with the velocity of the burning gases impinging on the surface. This accounts for the rapidity of heating by a blowpipe flame, which is not due to any great increase in temperature of the flame as compared with a Bunsen. Similarly the efficiency of a boiler is but slightly reduced if half the tubes are stopped up, because the increase of draught through the remainder compensates partly for the diminished heating surface. Some resistance to the passage of heat into a boiler is also due to the water film on the inside. But this is of less account, because the conductivity of water is much greater than that of air, and because the film is continu- ally broken up by the formation of steam, which abstracts heat very rapidly.

35. Heating by Condensation of Steam. — It is often stated that the rate at which steam will condense on a metal surface at a temperature below that corresponding to the saturation pressure of the steam is practically infinite (e.g. Osborne Reynolds, Proc. Roy. Soc. Ed., 1873, p. 275), and conversely that the rate at which water will abstract heat from a metal surface by the formation of steam (if the metal is above the temperature of saturation of the steam) is limited only by the rate at which the metal can supply heat by conduction to its surface layer. The rate at which heat can be supplied by condensation of steam appears to be much greater than that at which heat can be supplied by a flame under ordinary conditions, but there is no reason to suppose that it is infinite, or that any discontinuity exists. Experiments by H. L. Callendar and J. T. Nicolson by three independent methods (Proc. Inst. Civ. Eng., 1898, 131, p. 147; Brit. Assoc. Rep. p. 418) appear to show that the rate of abstraction of heat by evaporation, or that of communica- tion of heat by condensation, depends chiefly on the difference of temperature between the metal surface and the saturated steam, and is nearly proportional to the temperature difference (not to the pressure difference, as suggested by Reynolds) for such ranges of

pressure as are common in practice. The rate of heat transmission they observed was equivalent to about 8 calories per sq. cm. per sec, for a difference of 20 ° C. between the temperature of the metal surface and the saturation tempera- ture of the steam. This would correspond to a condensation of 530 kilogrammes of steam at ioo° C. per sq. metre per hour, or 109 lb per sq. ft. per hour for the same difference of temperature, values which are many times greater than those actually obtained in ordinary surface condensers. The reason for this is that there is generally some air mixed with the steam in a surface condenser, which greatly retards the condensation. It is also difficult to keep the temperature of the metal as much as 20 C. below the temperature of the steam unless a very free and copious circula- tion of cold water is available. For the same difference of temperature, steam can supply heat by condensation about a thousand times faster than hot air. This rate is not often approached in practice, but the facility of generation and transmission of steam, combined with its high latent heat

and the accuracy of control and regulation of temperature afforded, render it one of the most convenient agents for the distribution of large quantities of heat in all kinds of manu- facturing processes.

36. Spheroidal Stale. — An interesting contrast to the extreme rapidity with which heat is abstracted by the evaporation of a liquid in contact with a metal plate, is the so-called spheroidal state. A small drop of liquid thrown on a red-hot metal plate assumes a spheroidal form, and continues swimming about for some time, while it slowly evaporates at a temperature somewhat below its boiling-point. The explanation is simply that the liquid itself cannot come in actual contact with the metal plate (especially if the latter is above the critical temperature), but is separated from it by a badly conducting film of vapour, through which, as we have seen, the heat is comparatively slowly transmitted even if the difference of temperature is several hundred degrees. If the metal plate is allowed to cool gradually, the drop remains suspended on its cushion of vapour, until, in the case of water, a temperature of about 200° C. is reached, at which the liquid comes in contact with the plate and boils explosively, reducing the temperature of the plate, if thin, almost instantaneously to ioo c C. The temperature of the metal is readily observed by a thermo-electric method, employing a

platinum dish with a platinum-rhodium wire soldered with gold to its under side. The absence of contact between the liquid and the dish in the spheroidal state may also be shown by connecting one terminal of a galvanometer to the drop and the other through a battery to the dish, and observing that no current passes until the drop boils.

37. Early Theories of Radiation. — It was at one time supposed that there were three distinct kinds of radiation — thermal, luminous and actinic, combined in the radiation from a luminous source such as the sun or a flame. The first gave rise to heat, the second to light and the third to chemical action. The three kinds were partially separated by a prism, the actinic rays being generally more refracted, and the thermal rays less re- fracted than the luminous. This conception arose very naturally from the observation that the feebly luminous blue and violet rays produced the greatest photographic effects, which also showed the existence of dark rays beyond the violet, whereas the brilliant yellow and red were practically without action on the photographic plate. A thermometer placed in the blue or violet showed no appreciable rise of temperature, and even in the yellow the effect was hardly discernible. The effect increased rapidly as the light faded towards the extreme red, and reached a maximum beyond the extreme limits of the spectrum (Herschel), showing that the greater part of the thermal radiation was al- together non-luminous. It is now a commonplace that chemical action, colour sensation and heat are merely different effects of one and the same kind of radiation, the particular effect produced in each case depending on the frequency and intensity of the vibration, and on the nature of the substance on which it falls. When radiation is completely absorbed by a black substance, it is converted into heat, the quantity of heat produced being equivalent to the total energy of the radiation absorbed, irrespective of the colour or frequency of the different rays. The actinic or chemical effects, on the other hand, depend essenti- ally on some relation between the period of the vibration and the properties of the substance acted on. The rays producing such effects are generally those which are most strongly absorbed. The spectrum of chlorophyll, the green colouring matter of plants, shows two very strong absorption bands in the red. The red rays of corresponding period are found to be the most active in promoting the growth of the plant. The chemically active rays are not necessarily the shortest. Even photographic plates may be made to respond to the red rays by staining them with pinachrome or some other suitable dye.

The action of light rays on the retina is closely analogous to the action on a photographic plate. The retina, like the plate, is sensitive only to rays within certain restricted limits of frequency. The limits of

sensitiveness of each colour sensation are not exactly defined, but vary slightly from one individual

to another, especially in cases of partial colour-blindness, and are modified by conditions of fatigue. We are not here concerned with these important physiological and chemical effects of radiation, but rather with the question of the conversion of energy of radiation into heat, and with the laws of emission and absorp- tion of radiation in relation to temperature. We may here also assume the identity of visible and invisible radiations from a heated body in all their physical properties. It has been abund- antly proved that the invisible rays, like the visible, (1) are propagated in straight lines in homogeneous media; (2) are reflected and diffused from the surface of bodies according to the same law; (3) travel with the same velocity in free space, but with slightly different velocities in denser media, being subject to the same law of refraction; (4) exhibit all the phenomena of diffraction and interference which are characteristic of wave- motion in general; (5) are capable of polarization and double refraction; (6) exhibit similar effects of selective absorption. These properties are more easily demonstrated in the case of visible rays on account of the great sensitiveness of the eye. But with the aid of the thermopile or other sensitive radiometer, they may be shown to belong equally to all the radiations from a heated body, even such as are thirty to fifty times slower in frequency than the longest visible rays. The same physical properties have also been shown to belong to electromagnetic waves excited by an electric discharge, whatever the frequency, thus including all kinds of aetherial radiation in the same category as light.

38. Theory of Exchanges. — The apparent concentration of cold by a concave mirror, observed by G. B. Porta and redis- covered by M. A. Pictet, led to the enunciation of the theory of exchanges by Pierre Prevost in 1791. Prevost's leading idea was that all bodies, whether cold or hot, are constantly radiating heat. Heat equilibrium, he says, consists in an equality of ex- change. When equilibrium is interfered with, it is re-established by inequalities of exchange. If into a locality at uniform temperature a refracting or reflecting body is introduced, it has no effect in the way of changing the temperature at any point of that locality. A reflecting body, heated or cooled in the interior of such an enclosure, will acquire the surrounding temperature more slowly than would a non-reflector, and will less affect another body placed at a little distance, but will not affect the final equality of temperature. Apparent radiation of cold, as from a block of ice to a thermometer placed near it, is due to the fact that the thermometer being at a higher tempera- ture sends more heat to the ice than it received back from it. Although Prevost does not make the statement

in so many words, it is clear that he regards the radiation from a body as depending only on its own nature and temperature, and as independent of the nature and presence of any adjacent body. Heat equilibrium in an enclosure of constant temperature such as is here postulated by Prevost, has often been regarded as a consequence of Carnot's principle. Since difference of temperature is required for transforming heat into work, no work could be obtained from heat in such a system, and no spontaneous changes of tempera- ture can take place, as any such changes might be utilized for the production of work. This line of reasoning does not appear quite satisfactory, because it is tactitly assumed, in the reasoning by which Carnot's principle was established, as a result of universal experience, that a number of bodies within the same impervious enclosure, which contains no source of heat, will ultimately acquire the same temperature, and that difference of temperature is required to produce flow of heat. Thus although we may regard the equilibrium in such an enclosure as being due to equal exchanges of heat in all directions, the equal and opposite streams of radiation annul and neutralize each other in such a way that no actual transfer of energy in any direction takes place. The state of the medium is everywhere the same in such an enclosure, but its energy of -agitation per unit volume is a function of the temperature, and is such that it would not be in equilibrium with any body at a different temperature.

30. " Full " and Selective Radiation. Correspondence of Emission and Absorption. — The most obvious difficulties in the

way of this theory arise from the fact that nearly all radiation is more or less selective in character, as regards the quality and frequency of the rays emitted and absorbed. It was shown by J. Leslie, M. Melloni and other experimentalists that many substances such as glass and water, which are very transparent to visible rays, are extremely opaque to much of the invisible radiation of lower frequency; and that polished metals, which are perfect reflectors, are very feeble radiators as compared with dull or black bodies at the same temperature. If two bodies emit rays of different periods in different proportions, it is not at first sight easy to see how their radiations can balance each other at the same temperature. The key to all such difficulties lies in the fundamental conception, so strongly insisted on by Balfour Stewart, of

the absolute uniformity (qualitative as well as quantitative) of the full or complete radiation stream inside an impervious enclosure of uniform temperature. It follows from this conception that the proportion of the full radiation stream absorbed by any body in such an enclosure must be exactly compensated in quality as well as quantity by the proportion emitted, or that the emissive and absorptive powers of any body at a given temperature must be precisely equal. A good reflector, like a polished metal, must also be a feeble radiator and absorber. Of the incident radiation it absorbs a small fraction and reflects the remainder, which together with the radiation emitted (being precisely equal to that absorbed) makes up the full radiation stream. A partly transparent material, like glass, absorbs part of the full radiation and transmits part. But it emits rays precisely equal in quality and intensity to those which it absorbs, which together with the transmitted portion make up the full stream. The ideal black body or perfect radiator is a body which absorbs all the radiation incident on it. The rays emitted from such a body at any temperature must be equal to the full radiation stream in an isothermal enclosure at the same temperature. Lampblack, which may absorb between 98 to 99% of the incident radiation, is generally taken as the type of a black body. But a closer approximation to full radiation may be obtained by employing a hollow vessel the internal walls of which are blackened and maintained at a uniform temperature by a steam jacket or other suitable means. If a relatively small hole is made in the side of such a vessel, the radiation proceeding through the aperture will be the full radia- tion corresponding to the temperature. Such a vessel is also a perfect absorber. Of radiation entering through the aperture an infinitesimal fraction only could possibly emerge by successive reflection even if the sides were of polished metal internally. A thin platinum tube heated by an electric current appears feebly luminous as compared with a blackened tube at the same temperature. But if a small hole is made in the side of the polished tube, the light proceeding through the hole appears brighter than the blackened tube, as though the inside of the tube were much hotter than the outside, which is not the case to any appreciable extent if the tube is thin. The radiation proceeding through the hole is nearly that of a perfectly black body if the hole is small. If there were no hole the internal stream of radiation would be exactly that of a black- body at the same temperature however perfect the reflecting power, or however low the emissive power of the walls, because the defect in emissive power would be exactly compensated by the internal reflection.

Balfour Stewart gave a number of striking illustrations of the

qualitative identity of emission and absorption of a substance. Pieces of coloured glass placed in a fire appear to lose their colour tvhen at the same temperature as the coals behind them, because they compensate exactly for their selective absorption by radiating chiefly those colours which they absorb. Rocksalt is remarkably transparent to thermal radiation of nearly all kinds, but it is extremely opaque to radiation from a heated plate of rocksalt, because it emits when heated precisely those rays which it absorbs. A plate of tourmaline cut parallel to the axis absorbs almost completely light polarized in a plane parallel to the axis, but transmits freely light polarized in a perpendicular plane. When heated its radiation is polarized in the same plane as the radiation which it absorbs. In the case

of incandescent vapours, the exact correspondence of emission and absorption as regards wave-length of frequency of the light emitted and absorbed forms the foundation of the science of spectrum analysis. Fraunhofer had noticed the coincidence of a pair of bright yellow lines seen in the spectrum of a candle flame with the dark D lines in the solar spectrum, a coincidence which was afterwards more exactly verified by W. A. Miller. Foucault found that the flame of the electric arc showed the same lines bright in its spectrum, and proved that they appeared as dark lines in the otherwise continuous spectrum when the light from the carbon poles was transmitted through the arc. Stokes gave a dynamical explanation of the phenomenon and illustrated it by the analogous case of resonance in sound. Kirchhoff completed the explanation {Phil. Mag., i860) of the dark lines in the solar spectrum by showing that the reversal of the spectral lines depended on the fact that the body of the sun giving the continuous spectrum was at a higher temperature than the absorbing layer of gases surrounding it. Whatever be the nature of the selective radiation from a body, the radiation of light of any particular wave-length cannot be greater than a certain fraction E of the radiation R of the same wave-length from a black body at the same temperature. The fraction E measures the emissive power of the body for that particular wave-length, and cannot be greater than unity. The same fraction, by the principle of equality of emissive and absorptive powers, will measure the proportion absorbed of incident radiation R'. If the black body emitting the radiation R' is at the same tempera- ture as the absorbing layer, R = R', the emission balances the absorption, and the line will appear neither bright nor dark. If the source and the absorbing layer are at different temperatures, the radiation absorbed will be ER', and that transmitted will be R'-ER'. To this must be added the radiation emitted by the absorbing layer, namely ER, giving R'-E(R'-R). The lines will appear darker than the background R' if R' is

greater than R, but bright if the reverse is the case. The D lines are dark in the sun because the photosphere is much hotter than the reversing layer. They appear bright in the candle-flame because the outside mantle of the flame, in which the sodium burns and combustion is complete, is hotter than the inner reducing flame containing the incandescent particles of carbon which give rise to the con- tinuous spectrum. This qualitative identity of emission and absorption as regards wave-length can be most exactly and easily verified for luminous rays, and we are justified in assuming that the relation holds with the same exactitude for non-luminous rays, although in many cases the experimental proof is less complete and exact.

40. Diathermancy. — A great array of data with regard to the transmissive power or diathermancy of transparent substances for the heat radiated from various sources at different tempera- tures were collected by Melloni, Tyndall, Magnus and other experimentalists. The measurements were chiefly of a qualitative character, and were made by interposing between the source and a thermopile a layer or plate of the substance to be examined. This method lacked quantitative precision, but led to a number of striking and interesting results, which are admirably set forth in Tyndall's Heat. It also gave rise to many curious discrepancies, some of which were recognized as being due to selective absorption, while others are probably to be explained by im- perfections in the methods of experiment adopted. The general result of such researches was to show that substances, like water, alum and glass, which are practically opaque to radiation from a source at low temperature, such as a vessel filled with boilmg water, transmit an increasing percentage of the radiation when the temperature of the source is increased. This is what would be expected, as these substances are very transparent to visible rays. That the proportion transmitted is not merely a question of the temperature of the source, but also of the quality of the radiation, was shown by a number of experiments. For instance, K. H. Knoblauch (Pogg. Ann., 1847) found that a plate of glass interposed between a spirit lamp and a thermopile intercepts a larger proportion of the radiation from the flame itself than of the radiation from a platinum, spiral heated in the flame,

although the spiral is undoubtedly at a lower temperature than the

flame. The explanation is that the spiral is a fairly good radiator of the visible rays to which the glass is transparent, but a bad radiator of the invisible rays absorbed by the glass which constitute the greater portion of the heat-radiation from the feebly luminous flame.

Assuming that the radiation from the source under investiga- tion is qualitatively determinate, like that of a black body at a given temperature, the proportion transmitted by plates of various substances may easily be measured and tabulated for given plates and sources. But owing to the highly selective char- acter of the radiation and absorption, it is impossible to give any general relation between the thickness of the absorbing plate or layer and the proportion of the total energy absorbed. For these reasons the relative diathermancies of different materials do not admit of any simple numerical statement as physical constants, though many of the qualitative results obtained are very striking. Among the most interesting experiments were those of Tyndall, on the absorptive powers of gases and vapours, which led to a good deal of controversy at the time, owing to the difficulty of the experiments, and the contradictory results obtained by other observers. The arrangement employed by Tyndall for these measurements is shown in Fig. 6. A brass

Fig. 6. — Tyndall's Apparatus for observing absorption of heat by gas and vapours.

tube AB, polished inside, and closed with plates of highly diathermanous rocksalt at either end, was fitted with stopcocks C and D for exhausting and admitting air or other gases or vapours. The source ol heat S was usually a plate of copper heated by a Bunsen burner, or a Leslie cube containing boiling water as shown at E. To obtain greater sensitiveness for differential measurements, the radiation through the tube AB incident on one face of the pile P was balanced against the radiation from a Leslie cube on the other face of the pile by means of an adjust- able screen H. The radiation on the two faces of the pile being thus balanced with the tube exhausted, Tyndall found that the admission of dry air into the tube produced practically no absorp- tion of the radiation, whereas compound gases such as carbonic acid, ethylene or ammonia absorbed 20 to 90%, and a trace of aqueous vapour in the air increased its absorption 50 to 100 times. H. G. Magnus, on the other hand, employing a thermopile and a source of heat, both of which were enclosed in the same exhausted receiver, in order to avoid interposing any rocksalt or other plates between the source and the pile, found an absorp- tion of 11% on admitting dry air, but could not detect any difference whether the air were dry or moist. Tyndall suggested that the apparent absorption

observed by Magnus may have been due to the cooling of his radiating surface by convection, which is a very probable source of error in this method of experi- ment. Magnus considered that the remarkable effect of aqueous vapour observed by Tyndall might have been caused by con- densation on the polished internal walls of his experimental tube, or on the rocksalt plates at either end. 1 The question of

1 In reference to this objection, Tyndall remarks (Phil. Mag., 1862, p. 422; Heat, p. 385); ” In the first place the plate of salt nearest the source of heat is never moistened, unless the experiments are of the roughest character. Its proximity to the source enables the heat to chase away every trace of humidity from its surface.” He therefore took precautions to dry only the circumferential por- tions of the plate nearest the pile, assuming that the flux of heat through the central portions would suffice to keep them dry. This reasoning is not at all satisfactory, because rocksalt is very hygro- scopic and becomes wet, even in unsaturated air, if the vapour pressure is greater than that of a saturated solution of salt at the

the relative diathermancy of air and aqueous vapour for radiation from the sun to the earth and from the earth into space is one of great interest and importance in meteorology. Assuming with Magnus that at least 10% of the heat from a source at ioo° C. is absorbed in passing through a single foot of air, a very moderate thickness of atmosphere should suffice to absorb practically all the heat radiated from the earth into space. This could not be reconciled with well-known facts in regard to terrestrial radiation, and it was generally recognized that the result found by Magnus must be erroneous. Tyndall’s experi- ment on the great diathermancy of dry air agreed much better with meteorological phenomena, but he appears to have exaggerated the effect of aqueous vapour. He concluded from his experiments that the water vapour present in the air absorbs at least. 10% of the heat radiated from the earth within 10 ft. of its surface, and that the absorptive power of the vapour is about 17,000 times that of air at the same pressure. If the absorption of aqueous vapour were really of this order of magni- tude, it would exert a far greater effect in modifying climate than is actually observed to be the case. Radiation is observed to take place freely through the atmosphere at times when the proportion of aqueous vapour is such as would practically stop all radiation if Tyndall’s results were correct. The very careful experiments of E. Lecher and J. Pernter (Phil. Mag., Jan. 1881) confirmed Tyndall’s observations on the absorptive powers of gases and vapours satisfactorily in nearly all cases with the single exception of aqueous vapour. They found that there was no appreciable absorption of heat from a source at ioo° C. in passing through 1 ft. of

air (whether dry or moist), but that CO and C0 2 at atmospheric pressure absorbed about 8%, and ethylene (defiant gas) about 50% in the same distance; the vapours of alcohol and ether showed absorptive powers of the same order as that of ethylene. They confirmed Tyndall's important result that the absorption does not diminish in pro- portion to the pressure, being much greater in proportion for smaller pressures in consequence of the selective character of the effect. They also supported his conclusion that absorptive power increases with the complexity of the molecule. But they could not detect any absorption by water vapour at a pressure of 7 mm., though alcohol at the same pressure absorbed 3% and acetic acid 10%. Later researches, especially those of S. P. Langley with the spectro-bolometer on the infra-red spectrum of sunlight, demonstrated the existence of marked absorption bands, some of which are due to water vapour. From the character of these bands and the manner in which they vary with the state of the air and the thickness traversed, it may be inferred that absorption by water vapour plays an important part in meteorology, but that it is too small to be

temperature of the plate. Assuming that the vapour pressure of the saturated salt solution is only half that of pure water, it would require an elevation of temperature of 10° C. to dry the rocksalt plates in saturated air at 15° C. It is only fair to say that the laws of the vapour pressures of solutions were unknown in Tyndall's time, and that it was usual to assume that the plates would not become wetted until the dew-point was reached. The writer has repeated Tyndall's experiments with a facsimile of one of Tyndall's tubes in the possession of the Royal College of Science, fitted with plates of rocksalt cut from the same block as Tyndall's, and therefore of the same hygroscopic quality. Employing a reflecting galvano- meter in conjunction with a differential bolometer, which is quicker in its action than Tyndall's pile, there appears to be hardly any difference between dry and moist air, provided that the latter is not more than half saturated. Using saturated air with a Leslie cube as source of heat, both rocksalt plates invariably become wet in a minute or two and the absorption rises to 10 or 20 % according to the thickness of the film of deposited moisture. Employing the open tube method as described by Tyndall, without the rocksalt plates, the absorption is certainly less than 1 % in 3 ft. of air saturated at 20° C, unless condensation is induced on the walls of the tube. It is possible that the walls of Tyndall's tube may have become covered with a very hygroscopic film from the powder of the calcium chloride which he was in the habit of introducing near one end. Such a film would be exceedingly difficult to remove, and would account for the excessive precautions which he found necessary

in drying the air in order to obtain the same transmitting power as a vacuum. It is probable that Tyndall's experiments on aqueous vapour were effected by experimental errors of this character.

readily detected by laboratory experiments in a 4 ft. tube, with- out the aid of spectrum analysis.

41. Relation between Radiation and Temperature. — Assuming, in accordance with the reasoning of Balfour Stewart and Kirchhoff , that the radiation stream inside an impervious enclosure at a uniform temperature is independent of the nature of the walls of the enclosure, and is the same for all substances at the same temperature, it follows that the full stream of radiation in such an enclosure, or the radiation emitted by an ideal black body or full radiator, is a function of the temperature only. The form of this function may be determined experimentally by observing the radiation between two black bodies at different temperatures, which will be proportional to the difference of the full radiation streams corresponding to their several temperatures. The law now generally accepted was first proposed by Stefan as an empirical relation. Tyndall had found that the radiation from a white hot platinum wire at 1200° C. was 11-7 times its radiation when dull red at 525 C. Stefan {Wien. Akad. Ber., 1879, 79, p. 421) noticed that the ratio 11-7 is nearly that of the fourth power of the absolute temperatures as estimated by Tyndall. On making the somewhat different assumption that the radiation between two bodies varied as the difference of the fourth powers of their absolute temperatures, he found that it satisfied approxi- mately the experiments of Dulong and Petit and other observers. According to this law the radiation between a black body at a temperature 6 and a black enclosure or a black radiometer at a temperature O should be proportional to (0 4 0 o 4). The law was very simple and convenient in form, but it rested so far on very insecure foundations. The temperatures given by Tyndall were merely estimated from the colour of the light emitted, and might have been some hundred degrees in error. We now know that the radiation from polished platinum is of a highly selective character, and varies more nearly as the fifth power of the absolute temperature. The agreement of the fourth power law with Tyndall's experiment appears therefore to be due to a purely accidental error in estimating the tempera tures of the wire. Stefan

also found a very fair agreement with Draper's observations of the intensity of radiation from a platinum wire, in which the temperature of the wire was deduced from the expansion. Here again the apparent agreement was largely clue to errors in estimating the temperature, arising from the fact that the coefficient of expansion of platinum increases considerably with rise of temperature. So far as the experimental results available at that time were concerned, Stefan's law could be regarded only as an empirical expression of doubtful significance. But it received a much greater import- ance from theoretical investigations which were even then in progress. James Clerk Maxwell (Electricity and Magnetism, 1873) had shown that a directed beam of electromagnetic radiation or light incident normally on an absorbing surface should produce a mechanical pressure equal to the energy of the radiation per unit volume. A. G. Bartoli (1875) took up this idea and made it the basis of a thermodynamic treatment of radiation. P. N. Lebedew in 1900, and E. F. Nichols and G. F. Hull in 1901, proved the existence of this pressure by direct experiments. L. Boltzmann (1884) employing radiation as the working sub- stance in a Carnot cycle, showed that the energy of full radiation at any temperature per unit volume should be pro- portional to the fourth power of the absolute temperature. This law was first verified in a satisfactory manner by Heinrich Schneebeli (Wied. Ann., 1884, 22, p. 30). He observed the radiation from the bulb of an air thermometer heated to known temperatures through a small aperture in the walls of the furnace. With this arrangement the radiation was very nearly that of a black body. Measurements by J.T. Bottomley, August Schleier- macher, L. C. H. F. Paschen and others of the radiation from electrically heated platinum, failed to give concordant results on account of differences in the quality of the radiation, the importance of which was not fully realized at first. Later

researches by Paschen with improved methods verified the law, and greatly extended our knowledge of radiation in other directions. One of the most complete series of experiments on

the relation between full radiation and temperature is that of O. R. Lummer and Ernst Pringsheim (Ann. Phys., 1897, 63, p. 395). They employed an aperture in the side of an enclosure at uniform temperature as the source of radiation, and compared the intensities at different temperatures by means of a bolometer. The fourth power law was well satisfied throughout the whole range of their experiments from -190 C. to 2300 C. According to this law, the rate of loss of heat by radiation R from a body of emissive power E and surface S at a temperature 6 in an enclosure at 9 is given by the formula

R =

where a is the radiation constant. The absolute value of cr was determined by F. Kurlbaum using an electric compensation method (Wied. Ann., 1898, 65, p. 746), in which the radiation re- ceived by a bolometer from a black body at a known temperature was measured by finding the electric current required to produce the same rise of temperature in the bolometer. K. Angstrom employed a similar method for solar radiation. Kurlbaum gives the valuer = 5-32 X io -5 ergs per sq. cm. per sec. C.Christiansen (Wied. Ann., 1883, 19, p. 267) had previously found a value about 5 % smaller, by observing the rate of cooling of a copper plate of known thermal capacity, which is probably a less accurate method.

42. Theoretical Proof of the Fourth Power Law. — The proof given by Boltzmann may be somewhat simplified if we observe that full radiation in an enclosure at constant temperature behaves exactly like a saturated vapour, and must therefore obey Carnot's or Clapey- ron's equation given in section 17. The energy of radiation per unit volume, and the radiation-pressure at any temperature, are functions of the temperature only, like the pressure of a saturated vapour. If the volume of the enclosure is increased by any finite amount, the temperature remaining the same, radiation is given off from the walls so as to fill the space to the same pressure as before. The heat absorbed when the volume is increased corresponds with the latent heat of vaporization. In the case of radiation, as in the case of a vapour, the latent heat consists partly of internal energy of formation and partly of external work of expansion at constant pressure. Since in the case of full or undirected radiation the pres- sure is one-third of the energy per unit volume, the external work for any expansion is one-third of the internal energy added. The latent heat absorbed is, therefore, four times the external work of expansion. Since the external work is the product of the pressure P and the increase of volume V, the latent heat per unit increase of volume is four times the pressure. But by Carnot's equation the latent heat of a saturated vapour per unit increase of volume is equal to the rate of increase of saturation-pressure per degree divided by Carnot's function or multiplied by the absolute temperature. Expressed in symbols we have,

0(

where (dP/dO) represents the rate of increase of pressure. This equation shows that the percentage rate of increase of pressure is four times the percentage rate of increase of temperature, or that if the

temperature is increased by I , the pressure is increased by 4. This is equivalent to the statement that the pressure varies as the fourth power of the temperature, a result which is mathematic- ally deduced by integrating the equation.

43. Wien's Displacement Law. — Assuming that the fourth power law gives the quantity of full radiation at any tempera- ture, it remains to determine how the quality of the radiation varies with the temperature, since as we have seen both quantity and quality are determinate. This question may be regarded as consisting of two parts. (1) How is the wave-length or frequency of any given kind of radiation changed when its temperature is altered? (2) What is the form of the curve expressing the distribution of energy between the various wave- lengths in the spectrum of full radiation, or what is the distribu- ■» tion of heat in the spectrum? The researches of Tyndall, Draper, Langley and other investigators had shown that while the energy of radiation of each frequency increased with rise of temperature, the maximum of intensity was shifted or dis- placed along the spectrum in the direction of shorter wave- lengths or higher frequencies. W. Wien (Ann. Phys., 1898, 58, p. 662), applying Doppler's principle to the adiabatic com- pression of radiation in a perfectly reflecting enclosure, deduced that the wave-length of each constituent of the radiation should be shortened in proportion to the rise of temperature produced

by the compression, in such a manner that the product A0 of wave-length and the absolute temperature should remain constant. According to this relation, which is known as Wien's Displacement Law, the frequency corresponding to the maximum ordinate of the energy curve of the normal spectrum of full radiation should vary directly (or the wave-length inversely) as the absolute temperature, a result previously obtained by H. F. Weber (1888). Paschen, and Lummer and Pringsheim verified this relation by observing with a bolometer the intensity at different points in the spectrum produced by a fluorite prism. The intensities were corrected and reduced to a wave-length scale with the aid of Paschen's results on the dispersion formula of fluorite (Wied Ann., 1894, 53, p. 301). The curves in fig. 7 illustrate results obtained by Lummer and Pringsheim (Ber. dent. phys. Ges., 1899, 1, p. 34) at three different temperatures, namely 1377 ,

1087 and 836 absolute, plotted on a wave- length base with a scale of microns (/*) or millionths of a metre. The wave-lengths Oa, Ob, Oc, corresponding to the maximum ordinates of each curve, vary inversely as the absolute tempera- tures given. The constant value of the product \d at the maximum point is found to be 2920 Thus for a temperature of 1000 Abs. the maximum is at wave-length 2-92ˆ; at 2000° the maximum is at 1-46 y..

44. Form of the Curve representing the Distribution of Energy in the Spectrum. — Assuming Wien's displacement law, it follows that the form of the curve representing the distribution of energy in the spectrum of full radiation should be the same for different temperatures with the maximum displaced in proportion to the absolute temperature, and with the total area increased in proportion to the fourth power of the absolute temperature. Observations taken with a bolometer along the length of a normal or wave-length spectrum, would give the form of the curve plotted on a wave-length base. The height of the ordinate at each point would represent the energy included between given limits of wave-length, depending on the width of the bolometer strip and the slit. Supposing that the bolometer strip had a width ˆcorresponding to -oifi, and were placed at i-o/z in the spectrum of radiation at 2000 Abs., it would receive the energy corresponding to wave-lengths between i-oo and i-oi n. At a temperature of 1000 Abs. the corresponding part of the energy, by Wien's displacement law, would lie between the limits 2-00 and 2-02 n, and the total energy between these limits would be 16 times smaller. But the bolometer strip placed at 2-o/i would now receive only half of the energy, or the energy in a band oi n wide, and the deflection would be 32 times less. Corresponding ordinates of the curves at different tempera tures will therefore vary as the fifth power of the temperature, when the curves are plotted on a wave-length base. The maximum ordinates in the curves already given are found to vary as the fifth powers of the corresponding temperatures. The equation representing the distribution of energy on a wave- length base must be of the form

E = CX- 5 F(X0) = C0 6 (X0)- 5 F(X0)

where F(\0) represents some function of the product of the wave-length and temperature, which remains constant for corresponding wave-lengths when 8 is changed. If the curves were plotted on a frequency base, owing to the change of scale, the maximum ordinates would vary as the cube of the temperature instead of the fifth power, but the form of the function F would remain unaltered. Reasoning on the analogy of the distribution of velocities among the particles of a

gas on the kinetic theory, which is a very similar problem, Wien was led to assume that the function F should be of the form er°M, where e is the base of Napierian logarithms, and c is a constant having the value 14,600 if the wave-length is measured in microns 11. This expression was found by Paschen to give a vtry good approxima- tion to the form of the curve obtained experimentally for those Dortions of the visible and infra-red spectrum where observations couid be most accurately made. The formula was tested in two ways: (1) by plotting the curves of distribution of energy in the spectrum for constant temperatures as illustrated in

fig. 7; (2) by plotting the energy corresponding to a given wave-length as a function of the temperature. Both methods gave very good agreement with Wien's formula for values of the product \6 not much exceeding 3000 A method of isolating rays of great wave-length by successive reflection was devised by H. Rubens and E. F. Nichols (Wied. Ann., 1897, 60, p. 418). They found that quartz and fluorite possessed the property of selective reflection for rays of wave-length 8-8/i and 24 /i to 32ˆ1 respec- tively, so that after four to six reflections these rays could be isolated from a source at any temperature in a state of considerable purity. The residual impurity at any stage could be estimated by interposing a thin

a ~ – \ Z" 13 =4 6 6m.

Fig. 7. — Distribution of energy in the spectrum of a black body.

plate of quartz or fluorite which completely reflected or absorbed the residual rays, but allowed the impurity to pass. H. Beckmann, under the direction of Rubens, investigated the variation with tempera- ture of the residual rays reflected from fluorite employing sources from 8o c to 600° C, and found the results could not be represented by Wien's formula unless the constant c were taken as 26,000 in place of 14,600. In their first series of observa tions extending to 6 n O.R. Lummer and E. Pringsheim (Deut. phys. Ges., 1899, i,p. 34) found systematic deviations indicating an increase in the value of the constant c for long waves and high temperatures. In a theoretical discussion of the subject, Lord Rayleigh (Phil. Mag., 1900, 49, p. 539) pointed out that Wien's law would lead to a limiting value CX"" 6 , of the radiation corresponding to any particular wave-length when the tempera- ture increased to infinity, whereas according to his view the radiation of great wave-length should ultimately increase in direct proportion to the temperature. Lummer and Pringsheim (Deut. phys. Ges., 1900, 2, p. 163) extended the range of their observations to i&/j. by employing a prism of sylvine in place of fluorite. They found deviations from

Wien’s formula increasing to nearly 50% at 18 M> where, however, the observations were very difficult on account of the smallness of the energy to be measured. Rubens and F. Kurlbaum (Ann. Phys., 1901, 4, p. 649) extended the residual reflection method to a temperature range from — 190 to 1500 C, and employed the rays reflected from quartz 8-8 ju, and rocksalt 51 M> i n addition to those from fluorite. It ap- peared from these researches that the rays of great wave- length from a source at a high temperature tended to vary in the limit directly as the absolute temperature of the source, as suggested by Lord

Rayleigh, and could accordi t0 formluae of Planck & wien . not be represented

by Wien’s formula with any vaLue of the constant c. The simplest type of formula satisfying the required conditions is that proposed by Max Planck (Ann. Phys., 1901, 4, p. 553) namely,

E = C- 5 e / w -ih l .

which agrees with Wien’s formula when 6 is small, where Wien’s formula is known to be satisfactory, but approaches the limiting

\

^

V

^

\

/

^

^

w

/,

W0>

IF DA I «**« &OM&4 OS vyWiLEtiOTH »i MICRONS ft,

^^^ Fig. 8. — Distribution of energy in the

*a r- \A spectrum of full radiation at 2000 Abs. ana coma _j:„„ *.„
■„„-,,,, ,i„ — f v>\„ — i, s, \7:~

HEATH, B.— HEATH, N.

>

\>

1.

ymrm

/

>

V*

«OV UMIT 1

~~ —

J

•* ‘ m

tutim Tummruna

FlG. 9. — Variation of energy of radiation cor- responding to wave-length 30 p., with tem- perature of source.

form E = C-

Bibliography. — It would not be possible, within the limits of an article like the present, to give tables of the specific thermal properties of different substances so far as they have been ascertained by experiment. To be of any use, such tables require to be extremely detailed, with very full references and explanations with regard to the value of the experimental evidence, and the limits within which the results may be relied on. The quantity of material available is so enormous and its value so varied, that the most elaborate tables still require reference to the original authorities. Much information will be found collected in Landolt and Bornstein’s Physical and Chemical Tables (Berlin, 1905). Shorter tables, such as Everett’s Units and

Physical Constants, are useful as illustrations of a system, but are not sufficiently complete for use in scientific investigations. Some of the larger works of reference, such as A. A. Winkelmann's Handbuch der Physik, contain fairly complete tables of specific properties, but these tables occupy so much space, and arc so mis- leading if incomplete, that they are generally omitted in theoretical textbooks.

Among older textbooks on heat, Tyndall's Heat may be recom- mended for its vivid popular interest, and Balfour Stewart's Heat for early theories of radiation. Maxwell's Theory of Heat and Tait's Heat give a broad and philosophical survey of the subject. Among modern textbooks, Preston's Theory of Heat and Poynting and Thomson's Heat are the best known, and have been brought well up to date. Sections on heat are included in all the general text- books of Physics, such as those of Deschanel (translated by Everett), Ganot (translated by Atkinson), Daniell, Watson, &c. Of the original investigations on the subject, the most important have already been cited. Others will be found in the collected papers of Joule, Kelvin and Maxwell. Treatises on special branches of the subject, such as Fourier's Conduction of Heat, are referred to in the separate articles in this encyclopaedia dealing with recent progress, of which the following is a list: Calorimetry, Condensation of Gases, Con- duction of Heat, Diffusion, Energetics, Fusion, Liquid Gases, Radiation, Radiometer, Solution, Thermodynamics, Thermo- electricity, Thermometry, Vaporization. For the practical aspects of heating see Heating. (H. L. C.)

HEATH, BENJAMIN (1 704-1 766), English classical scholar and bibliophile, was born at Exeter on the 20th of April 1704. He was the son of a wealthy merchant, and was thus able to devote himself mainly to travel and book-collecting. He became town cleik of his native city in 1752, and held the office till his death on the 13th of September 1766. In 1763 he had published a pamphlet advocating the repeal of the cider tax in Devonshire, and his endeavours led to success three years later. As a classical scholar he made his reputation by his critical and metrical notes on the Greek tragedians, which procured him an honorary

D.C.L. from Oxford (31st of March 1752). He also left MS. notes on Burmann's and Martyn's editions of Virgil, on Euripides, Catullus, Tibullus, and the greater part of Hesiod. In some of these he adopts the whimsical name Dexiades Ericius. His Revisal of Shakespear's Text (1765) was an answer to the " in- solent dogmatism " of Bishop Warburton. The Essay towards a Demonstrative Proof of the Divine

Existence, Unity and Attributes (1 740) was intended to combat the opinions of Voltaire, Rousseau and Hume. Two of his sons (among a family of thirteen) were Benjamin, headmaster of Harrow (1771-1785), and George, headmaster of Eton (1796). His collection of rare classical works formed the nucleus of his son Benjamin's famous library (Biblio- theca Heathiana).

An account of the Heath family will be found in Sir W. R. Drake's Heathiana (1882).

HEATH, NICHOLAS (c. 1501-1578), archbishop of York and lord chancellor, was born in London about 1501 and graduated B.A. at Oxford in 1519. He then migrated to Christ's College, Cambridge, where he graduated B.A. in 1520, M.A. in 1522, and was elected fellow in 1524. After holding minor preferments he was appointed archdeacon of Stafford in 1 534 and graduated D.D. in 1535. He then accompanied Edward Fox (q.v.), bishop of Hereford, on his mission to promote a theological and political understanding with the Lutheran princes of Germany. His selection for this duty implies a readiness on Heath's part to proceed some distance along the path of reform; but his dealings with the Lutherans did not confirm this tendency, and Heath's subsequent career was closely associated with the cause of re-action. In 1539, the year of the Six Articles, he was made bishop of Rochester, and in 1543 he succeeded Latimer at Worcester. His Catholicism, however, was of a less rigid type than Gardiner's and Bonner's; he felt something of the force of the national antipathy to foreign influence, whether ecclesiastical or secular, and was always impressed by the necessity of national unity, so far as was possible, in matters of faith. Apparently he made no difficulty about carrying out the earlier reforms of Edward VI., and he accepted the first book of common prayer after it had been modified by the House of Lords in a Catholic direction.

His definite breach with the Reformation occurred on the grounds, on which four centuries later Leo XIII. denied the Catholicity of the reformed English Church, namely, on the question of the Ordinal drawn up in February 1550. Heath refused to accept it, was imprisoned, and in 1551 deprived of his bishopric. On Mary's accession he was released and restored, and made president of the council of the Marches and Wales. In 1555 he was promoted to the archbishopric of York, which he did much to enrich after the Protestant spoliation; he built York House in the Strand. After Gardiner's death he was appointed lord chancellor, probably on Pole's recommendation; for Heath, like Pole himself, disliked the Spanish party in England. Unlike Pole, however, he seems to have been averse

from the excessive persecution of Mary's reign, and no Protestants were burnt in his diocese. He exercised, however, little influence on Mary's secular or ecclesiastical policy.

On Mary's death Heath as chancellor at once proclaimed Elizabeth. Like Sir Thomas More he held that it was entirely within the competence of the national state, represented by parliament, to determine questions of the succession to the throne; and although Elizabeth did not renew his commission as lord chancellor, he continued to sit in the privy council for two months until the government had determined to complete the breach with the Roman Catholic Church; and as late aS April 1559 he assisted the government by helping to arrange the Westminster Conference, and reproving his more truculent co-religionists. He refused to crown Elizabeth because she would not have the coronation service accompanied with the elevation of the Host; and ecclesiastical ceremonies and doctrine could not, in Heath's view, be altered or abrogated by any mere national authority. Hence he steadily resisted Elizabeth's acts of supremacy and uniformity, although he had acquiesced in the acts of 1534 and 1549. Like others of Henry's bishops, he had been convinced by the events of Edward VI. 's reign that Sir

Thomas More was right and Henry VIII. was wrong in their attitude towards the claims of the papacy and the Catholic Church. He was therefore necessarily deprived of his arch- bishopric in 1550, but he remained loyal to Elizabeth; and after a temporary confinement he was suffered to pass the remaining nineteen years of his life in peace and quiet, never attending public worship and sometimes hearing mass in private. The queen visited him more than once at his house at Chobham, Surrey; he died and was buried there at the end of 1578.

Authorities. — Letters and Papers of Henry VIII.; Acts of the Privy Council; Cal. State Papers, Domestic, Addenda, Spanish and Venetian; Kemp's Loseley MSS. ; Froude's History; Burnet, Collier, Dixon and Frere's Church Histories- Strype's Works (General Index); Parker Soc. Publications (Gough's Index); Birt's Eliza- bethan Settlement. (A. F. P.)

HEATH, WILLIAM (1737-1814), American soldier, was born in Roxbury, Massachusetts, on the 2nd of March 1737 (old style). He was brought up as a farmer and had a passion for military exercises. In 1

765 he entered the Ancient and Honour- able Artillery Company of Boston, of which he became commander in 1770. In the same year he wrote to the Boston Gazette letters signed ” A Military Countryman, ” urging the necessity of military training. He was a member of the Massachusetts General Court from 1770 to 1774, of the provincial committee of safety, and in 1 774-1775 of the provincial congress. He was commissioned a provincial brig. -general in December 1774, directed the pursuit of the British from Concord (April 19, 1775), was promoted to be provincial major-general on the 20th of June 1775, and two days later was commissioned fourth brig.-general in the Continental Army. He became major-general on the 9th of August 1776, and was in active service around New York until early the next year. In January 1777 he attempted to take Fort Independence, near Spuyten Duyvil, then garrisoned by about 2000 Hessians, but at the first sally of the garrison his troops became panic-stricken and a few days later he withdrew. Washington reprimanded him and never again entrusted to him any important operation in the field. Throughout the war, however, Heath was very efficient in muster service and in the barracks. From March 1777 to October 1778 he was in command of the Eastern Department with headquarters at Boston, and had charge (Nov. 1777-Oct. 1778) of the prisoners of war from Burgoyne’s army held at Cambridge, Massachusetts. In May 1779 he was appointed a commissioner of the Board of War. He was placed in command of the troops on the E. side of the Hudson in June 1779, and of other troops and posts on the Hudson in November of the same year. In July 1780 he met the French allies under Rochambeau on their arrival in Rhode Island; in October of the same year he succeeded Arnold in command of West Point and its dependencies; and in August 1781, when Washington went south to meet Cornwallis, Heath was left in command of the Army of the Hudson to watch Clinton. After the war he retired to his farm at Roxbury, was a member of the state House of Representatives in 1788, of the Massachusetts convention which ratified the Federal Constitution in the same year, and of the governor’s council in 1 789-1 790, was a state senator (1 791-1793), and in 1806 was elected lieutenant-governor of Massachusetts but declined to serve. He died at Roxbury on the 24th of January 1814, the last of the major-generals of the War of American Independence.

See Memoirs of Major-General Heath, containing Anecdotes, Details of Skirmishes, Battles and other Military Events during the American War. written by Himself (Boston, 1798; frequently reprinted, perhaps the best edition being that published in New York in 1901 by William Abbatt), particularly valuable for the descriptions of Lexington and Bunker Hill, of the fighting around New York, of the contro- versies

with Burgoyne and his officers during their stay in Boston, and of relations with Rochambeau; and his correspondence, The Heath Papers, vols, iv.-v., seventh series, Massachusetts Historical Society Collections (Boston, 1904-1905).

HEATH, the English form of a name given in most Teutonic dialects to the common ling or heather (Calluna vulgaris), but now applied to all species of Erica, an extensive genus of mono- petalous plants, belonging to the order Ericaceae. The heaths are evergreen shrubs, with small narrow leaves, in whorls usually

Fig. 1. Calluna vulgaris.

set rather thickly on the shoots; the persistent flowers have 4

sepals, and a 4-cleft campanulate or tubular corolla, in many

species more or less ventricose or inflated; the dry capsule is

4-ceiled, and opens, in the true Ericae, in 4 segments, to the

middle of which the partitions adhere, though in the ling the

valves separate at the dissepiments. The plants are mostly of

low growth, but several African kinds reach the size of large

bushes, and a common South European species, E. arborea,

occasionally attains almost the aspect and dimensions of a tree. One of the best known and most interesting of the family is

the common heath, heather or ling, Calluna vulgaris (fig. 1),

placed by most botanists in a separate

genus on account of the peculiar dehiscence

of the fruit, and from the coloured calyx,

which extends beyond the corolla, having

a whorl of sepal-like bracts beneath. This

shrub derives some economic importance

from its forming the chief vegetation on

many of those extensive wastes that occupy

so large a portion of the more sterile lands

of northern and western Europe, the usually

desolate appearance of which is enlivened

in the latter part of summer by its abundant

pink blossoms. When growing erect to the

height of 3 ft. or more, as it often does in

sheltered places, its purple stems, close- leaved green shoots and feathery spikes

of bell-shaped flowers render it one of the

handsomest of the heaths; but on the

bleaker elevations and more arid slopes it

frequently rises only a few inches above the

ground. In all moorland countries the ling

is applied to many rural purposes; the

larger stems are made into brooms, the shorter tied up into bundles that serve as brushes, while the long trailing shoots are woven into baskets. Pared up with the peat about its roots it forms a good fuel, often the only one obtainable on the drier moors. The shielings of the Scottish Highlanders were formerly constructed of heath stems, cemented together with peat-mud, worked into a kind of mortar with dry grass or straw; hovels and sheds for temporary purposes are still sometimes built in a similar way, and roofed in with ling. Laid on the ground, with the flowers above, it forms a soft springy bed, the luxurious couch of the ancient Gael, still gladly resorted to at times by the hill shepherd or hardy deer-stalker. The young shoots were in former days employed as a substitute for hops in brewing, while their astringency rendered them valuable as a tanning material in Ire'and and the Western Isles. They are said also to have been ust-d by the Highlanders for dyeing woollen yarn yelhow, and other colours are asserted to have been obtained from them, but soine writers appear to con- fuse the dyer's-weed, Genista tincloria, with the heather. The young juicy shoots and the seeds, wh ; ch remain long in the capsules,

furnish the red grouse of Scotland with the larger portion of its sustenance; the ripe seeds are eaten by many birds. The tops of the ling afford a considerable part of the winter fodder of the hill flocks, and are popularly suppose' 1 to communicate the fine flavour to Welsh and Highland mutton, but sheep seldom crop heather while the mountain grasses and rishes are sweet and accessible. Ling has been suggested as a material for paper, but the stems are hardly sufficiently fibrou* for that purposed The purple or fine-leaved heath, E. cinerea (fig. 2), one of the most beautiful of the genus, abounds on the lower rr oors and commons of Great Britain and western Europe, in suet situations being sometimes more prevalent than the ling. Th° flowers of both these species yield much honey, furnishing a plentiful supply to the bees in moorland districts; from this heath honey the Picts probably brewed the mead said by Boetijs to have been made from the flowers themselves.

The genus contains about 420 known species, b} far the greater part being indigenous to the western districts o! South Africa,

Fig. 2. Erica cinerea.

but it is also a characteristic genus of the Mediterranean region, while several species extend into northern Europe. No species is native in America, but ling occurs as an introduced plant on the Atlantic side from Newfoundland to New Jersey. Five species occur in Britain: E. cinerea, E. letralix (cross-leaved heath), both abundant on heaths and commons, E. vagans, Cornish heath, found only in West Cornwall, E. ciliaris in the west of England and Ireland and E. mediterranea in Ireland. The three last are south-west European species which reach the northern limit of their distribution in the west of England and Ireland. E. scoparia is a common heath in the centre of France and elsewhere in the Mediterranean region, forming a spreading bush several feet high. It is known as bruyere, and its stout underground rootstocks yield the briar-wood used for pipes.

The Cape heaths have long been favourite objects of horticulture. In the warmer parts of Britain several will bear exposure to the cold of ordinary winters. in a sheltered border, but most need the protection of the conservatory. They are sometimes raised from seed, but are chiefly multiplied by cuttings " struck " in sand, and afterwards transferred to pots filled with a mixture of black peat and sand; the

peat should be dry and free from sourness. Much attention is requisite in watering heaths, as they seldom recover if once allowed to droop, while they will not bear much water about their roots: the heath-house should be light and well ventilated, the plants requiring sun, and soon perishing in a close or permanently damp atmo- sphere ; in England little or no heat is needed in ordinary seasons. The European heaths succeed well in English gardens, only requiring a peaty soil and sunny situation to thrive as well as in their native localities: E. carnea, mediterranea, ciliaris, vagans, and the pretty cross-leaved heath of boggy moors, E. Tetralix, are among those most worthy of cultivation. The beautiful large- flowered St Dabeoc's heath, belonging to the closely allied genus Dabeccia, is likewise often seen in gardens. It is found in boggy heaths in Connemara and Mayo, and is also native in West France, Spain and the Azores.

A beautiful work on heaths is that by H. C. Andrews, containing coloured engravings of nearly 300 species and varieties, with descriptions in English and Latin (4 vols., 1802-1805).

HEATHCOAT, JOHN (1783-1861), English inventor, was born at Duffield near Derby on the 7th of August 1783. During his apprenticeship to a framesmith near Loughborough, he made an improvement in the construction of the warp-loom, so as to produce mitts of a lace-like appearance by means of it. He began business on his own account at Nottingham, but finding himself subjected to the intrusion of competing inventors he removed to Hathern. There in 1808 he constructed a machine capable of producing an exact imitation of real pillow-lace. This was by far the most expensive and complex textile apparatus till then existing; and in describing the process of his invention Heathcoat said in 1836, " The single difficulty of getting the diagonal threads to twist in the allotted space was so great that, if now to be done, I should probably not attempt its accomplish- ment." Some time before perfecting his invention, which he patented in 1809, he removed to Loughborough, where he entered into partnership with Charles Lacy, a Nottingham manufacturer; but in 1816 their factory was attacked by the Luddites and their 55 lace frames destroyed. The damages were assessed in the King's Bench at £10,000; but as Heathcoat declined to expend the money in the county of Leicester he never received any part of it. Undaunted by his loss, he began at once to construct new and greatly improved machines in an unoccupied factory at Tiverton, Devon, propelling them by water-power and afterwards by steam. His claim to the inven-

tion of the twisting and traversing lace machine was disputed, and a patent was taken out by a clever workman for a similar machine,

which was decided at a trial in 18 16 to be an infringe- ment of Heathcoat's patent. He followed his great invention by others of much ability, as, for instance, contrivances for orna- menting net while in couise of manufacture and for making ribbons and platted and twisted net upon his machines, improved yarn spinning-frames, and methods for winding raw silk from cocoons. He also patented an improved process for extracting and purifying salt. An offer of £10,000 was made to him in 1833 for the use of his processes in dressing and finishing silk nets, but he allowed the highly profitable secret to remain undivulged. In 1832 he patented a steam plough. Heathcoat was elected member of parliament for Tiverton in 1832. Though he seldom spoke in the House he was constantly engaged on committees, where his thorough knowledge of business and sound judgment were highly valued. He retained his seat until 1859, and after two years of declining health he died on the 18th of January 1861 at Bolham House, near Tiverton.

HEATHCOTE, SIR GILBERT (c. 1651-1733), lord mayor of London, belonged to an old Derbyshire family and was educated at Christ's College, Cambridge, afterwards becoming a merchant in London. His trading ventures were very successful; he was one of the promoters of the new East India company and he emerged victorious from a contest between himself and the old East India company in 1693; he was also one of the founders and first directors of the bank of England. In 1702 he became an alderman of the city of London and was knighted; he served as lord mayor in 1 71 1, being the last lord mayor to ride on horse- back in his procession. In 1700 Heathcote was sent to parlia- ment as member for the city of London, but he was soon expelled for his share in the circulation of some exchequer bills; however, he was again elected for the city later in the same year, and he retained his seat until 1710. In 1714 he was member for Helston, in 1722 for New Lymington, and in 1727 for St Germans. He was a consistent Whig, and was made a baronet eight days before his death. Although extremely rich, Heath- cote's meanness is referred to by Pope; and it was this trait that accounts largely for his unpopularity with the lower classes. He died in London on the 25th of January 1733 and was buried at Normanton, Rutland, a residence which he had purchased from the Mackworths.

A descendant, Sir Gilbert John Heathcote, Bart. (1795-1867), was created Baron Aveland in 1856; and his son Gilbert Henry, who in 1888 inherited from his mother the barony of Willoughby de Eresby, became 1st earl of Ancaster in 1892.

HEATHEN, a term originally applied to all persons or races who did

not hold the Jewish or Christian belief, thus including Mahommedans. It is now more usually given to polytheistic races, thus excluding Mahommedans. The derivation of the word has been much debated. It is common to all Germanic languages; cf. German Heide, Dutch heiden. It is usually ascribed to a Gothic haipi, heath. In Ulfilas' Gothic version of the Bible, the earliest extant literary monument of the Germanic languages, the Syrophoenician woman (Mark vii. 26) is called hai\>no, where the Vulgate has gentilis. " Heathen," i.e. the people of the heath or open country, would thus be a translation of the Latin paganus, pagan, i.e. the people of the pagus or village, applied to the dwellers in the country where the worship of the old gods still lingered, when the people of the towns were Christians (but see Pagan for a more tenable explanation of that term). On the other hand it has been suggested (ProT.v,,S. Bugge, Indo-German. Forschungen, v. 178, quoted in the New English Dictionary) that Ulfilas may have adopted the word from the Armenian hetanos, i.e. Greek Wvq, tribes, races, the word used for the " Gentiles " in the New Testament. Gentilis in Latin, properly meaning " tribesman," came to be used of foreigners and non-Roman peoples, and was adopted in eccle- siastical usage for the non-Christian nations and in the Old Testament for non- Jewish races.

HEATHFIELD, GEORGE AUGUSTUS ELIOTT, Baron (1717- 1790), British general, a younger son of Sir Gilbert Eliott, Bart.,

of Stobs, Roxburghshire, was born on the 25th of December 1 717, and educated abroad for the military profession. As a volunteer he fought with the Prussian army in 1735 and 1736, and then entered the Grenadier Guards. He went through the war of the Austrian Succession, and was wounded at Dettingen, rising to be lieutenant-colonel in 1 7 54. In 1 7 59 he became colonel of a new regiment of light horse (afterwards the 15th Hussars) and became well known for the efficiency which it displayed in the subsequent campaigns. He became lieutenant-general in 1765. In 1775 ne was selected to be governor of Gibraltar (q.v.), and it is in connexion with his magnificent defence in the great siege of 1779 that his name is famous. His portrait by Sir Joshua Reynolds is in the National Gallery. In 1787 he was created Baron Heathfield of Gibraltar, but died on the 6th of July 1790. He had married in 1748 the heiress of the Drake family, to which Sir Francis Drake belonged. His son, the 2nd baron, died in 1813 and the peerage became extinct, but the estates went to the family of Eliott-Drake (baronetcy of 182 1) through his sister.

HEATING. In temperate latitudes the climate is generally such as to necessitate in dwellings during a great portion of the year a temperature warmer than that out of doors. The object of the art of heating is to secure this required warmth with the greatest economy and efficiency. For reasons of health it may be assumed that no system of heating is advisable which does not provide for a constant renewal of the air in the locality warmed, and on this account there is a difficulty in treating as separate matters the subjects of heating and ventilation, which in practical schemes should be considered conjointly. (See Y'entilation).

The object of all heating apparatus is the transference of heat from the fire to the various parts of the building it is intended to warm, and this transfer may be effected by radiation, by con- duction or by convection. An open fire acts by radiation; it warms the air in a room by first warming the walls, floor, ceiling and articles in the room, and these in turn warm the air. There- fore in a room with an open fire the air is, as a rule, less heated than the walls. In many forms of fireplaces fresh air is brought in and passed around the back and sides of the

stove before being admitted into the room. A closed stove acts mainly by con- vection; though when heated to a high temperature it gives out radiant heat. Windows have a chilling effect on a room, and in calculations extra allowance should be made for window areas.

There are a number of methods available for adoption in the heating of buildings, but it is a matter of considerable difficulty to suit the method of warming to the class of building to be warmed. Heating may be effected by one of the following systems, or installations may be so arranged as to combine the advantages of more than one method: open fires, closed stoves, hot-air apparatus, hot water circulating in pipes at low or at high pressure, or steam at high or low pressure.

The open grate still holds favour in England, though in America and on the continent of Europe it has been superseded by the closed stove. The old form of open fire is certainly wasteful of fuel, and the loss of heat up the chimney and by conduction into the brickwork backing of the stove is considerable. Great improvements, however, have been effected in the design of open fireplaces, and many ingenious contrivances of this nature are now in the market which combine efficiency of heating with economy of fuel. Unless suitable fresh air inlets are provided, this form of stove will cause the room to be draughty, the strong current of warm air up the flue drawing cold air in through the crevices in the doors and windows. The best form of open fireplace is the ventilating stove, in which fresh air is passed around the back and sides of the stove before being admitted through convenient openings into the room. This has immense advantages over the ordinary type of fireplace. The illustrations show two forms of ventilating fireplace, one (fig. 1) similar in appearance to the ordinary domestic grate, the other (fig. 2) with descending smoke flue suitable for hospitals and public rooms, where it

Open fires.

might be fixed in the middle of the apartment. The fixing). stoves of this kind entails the laying of pipes or ducts from th* open to convey fresh air to the back of the stove.

With closed stoves much less heat is wasted, and consequently less fuel is burned, than with open grates, but they often cause an unpleasant sensation of dryness in the air, and the products of combustion also escape, to some extent, stoves. rendering this method of heating not only unpleasant but sometimes even dangerous. The method in Great Britain is almost entirely confined to places of public

assembly, but in

Warm t

‘— Warm

air

Fig. 1.

Fig. 2.

America and on the continent of Europe it is much used for domestic heating. If the flue pipe be carried up a considerable distance inside the apartment to be warmed before being turned into the external air, practically the whole of the heat generated will be utilized. Charcoal, coke or anthracite coal are the fuels generally used in slow combustion heating stoves.

Gas fires, as a substitute for the open coal fire, have many points in their favour, for they are conducive to cleanliness, they need but little attention, and the heat is easily controlled. On the other hand, they may give off unhealthy flres-

fumes and produce unpleasant odours. They usually take the form of cast iron open stoves fitted with a number of Bunsen burners which heat perforated lumps of asbestos. The best form of stove is that with which perfect combustion is most nearly attained, and to which a pan of water is affixed to supply a desirable humidity to the air, the gas having the effect of drying the atmosphere. With another form of gas stove coke is used in place of the perforated asbestos; the fire is started with the gas, which, when the coke is well alight, may be dispensed with, and the fire kept up with coke in the usual way.

Electrical heating appliances have only recently passed the experimental stage; there is, however, undoubtedly a great future for electric heating, and the perfecting of the B ,„_iL stove, together with the cheapening of the electric „eailag! current, may be expected to result in many of the other stoves and convectors being superseded. Hitherto the large bill for electric energy has debarred the general use of electrical heating, in spite of its numerous advantages.

Oils are powerful fuels, but the high price of refined petroleum, the oil generally preferred, precludes its widespread use for many purposes for which it is suitable. In small stoves for warming and for cooking, petroleum presents stoves. some advantages over other fuels, in that

there is no chimney to sweep, and if well managed no unpleasant fumes, and the stoves are easily portable. On the other hand, these stoves need a considerable amount of attention in filling, trimming and cleaning, and there is some risk of explosion and damage-by accidental leaking and smoking. Crude or unrefined petroleum needs a special air-spray pressure burner for its use, and this suffers from the disadvantage of being noisy. Gas and oil radiators would be more properly termed ” convectors,” since they warm mainly by converted-currents. They are similar in appearance to a hot-water or steam radiator, and, indeed, some are designed to be filled with water and used as such. They should always be fitted with a pan of water to supply the necessary humidity to the warmed air, and a flue to carry o0 any disagreeable fumeS.

Warm air.

Heating by warmed air, one of the oldest methods in use, has been much improved by attention to the construction of the apparatus, and if properly installed will give as good effects as it is possible to obtain. The system is especially suitable for churches, assembly halls and large rooms. A stove of special design is placed in a chamber in the basement or cellar, and cold fresh air is passed through it, and led by means of flues to the various apartments for dis- tribution by means of easily regulated inlet valves. To prevent the atmosphere from becoming unduly dry a pan of water is fitted to the stove; this serves to moisten the air before it passes into the distributing flues. If each distributing flue is connected by means of a mixing valve with a cold-air flue, the warmth of the incoming air can be regulated to a nicety (see Ventilation).

There are many different systems of heating by hot water circulating in pipes. The oldest and best known is the ” two Low P’P e ” svstern i others being the ” one pipe ” or ” simple

pressure circuit,” and the ” drop ” or ” overhead.” The high *»’ pressure system is of later invention, having been

water. g rs(; p U(. tQ p ract ; ca i use by ^]yj Perkins in 1845.

All these methods warm chiefly by means of convected heat, the amount of true radiation from the pipes being small. The manner in which the circulation of hot v/ater takes place in the tubes is as

follows. Fire heats the water in a boiler from the top of which a ” flow ” pipe communicates with the rooms to be warmed (fig. 3). As the water is heated it becomes lighter,

rises to the top of the boiler, and passes along the flow pipe. It is followed by

generally merge in a single return pipe which is connected to

the lower part of the boiler.

The rate of circulation in the ordinary low pressure hot-water system may be considerably accelerated by means of steam injections. The water after being heated passes into a circulating

Ojerflo.t Combined feed &

is*.

/~yBrancli return’s

Cold utcttf

‘*”””””” more and more hot water and so travels along the flow pipe, which is rising all the time, to the farthest point of the circuit, by which time it has in all proba- bility cooled considerably. From this point the ” re- turn ” pipe drops, usually at the same rate as the flow pipe rises; and in due course the water reaches its start- ing point, the boiler, and is again heated and again cir- culated through the system. The connexion of the return pipe is made with the lower part of the boiler. Branches may be made from the main pipes by means of smaller pipes arranged in the same manner as the mains, the branch flow pipe being con- nected with the main flow pipe and returning into the main return. To obtain a larger heating surface than a pipe affords, radiators are connected with the pipes where desired, and the water passing through them warms the sur- rounding air.

The ” one pipe ” system (tig. 4) acts on precisely the same principle, but in place of two pipes being placed in adjacent positions one large main makes a complete circuit of the area to be warmed, starting from and return- ing to the boiler, and from this main flow and return branches are taken and connected with radiators and other heating appliances.

In the ” drop ” or ” overhead ” system (fig. 5) a rising main is taken directly from the boiler to the topmost floor of the building, and from

this branches are dropped to the lower floors, and connected by means of smaller branches to radiators or coils. The vertical branches descend to the basement and

A. denotes radiator V. ,, rtgulatir.

Fig. 3.

R. denotes radiator

V. „ regulating valve.

Tap to empty system

Fig. 4.

tank into which steam is introduced; this, mixing with the hot water, gives it additional motive power, resulting in a faster circulation. This steam condensing adds to the water in the pipe and naturally causes an overflow, which is led back to the boiler and re-used. In districts where the water is hard, this arrangement considerably lengthens the life of the boiler, as

the same water is used over and over again, and no fresh deposit of fur occurs. Owing to the very rapid movement and the consequent increased rate of transmission of heat, the pipes and radiators may be reduced in size, in many circumstances a very desirable thing to achieve. With this system the temperature

hot water.

\E xoansion Ichamber

t Tank of wtn section •.Jieated by 90H

can be quickly raised and easily controlled. If the weather is mild, a moderate heat may be obtained by using the apparatus as an ordinary hot water system, and shutting off the steam injectors.

The cold-water supply and expansion tank (fig. 3) are often combined in one tank placed at a point above the level of circula- tion. The tank should be of a size to hold not less than a twentieth part of the total amount of water held in the system. The automatic inlet of cold water

to the hot water system from the main house tank or other source is controlled by a ball valve, which is so fixed as to allow the water to rise no more than an inch above the bottom of the tank, thus leavin™ the remainder of the space clear for expansion. An overflow is provided, discharging into the open air to allow the water to escape should the ball valve become defective.

The ” Perkins ” or ” small bore high pressure ” system (fig. 6) has many advantages, for it is safe, the boiler is small High and is easily managed, the temperature is well under

pressure control and may be regulated to suit the changing weather, and the small pipes present a neat appearance in a room. The whole system is constructed of wrought iron pipe of small diameter, strong enough to resist a testing pressure of 2000 to 2500 lb per sq. in. The boiler consists of

similar pipe coiled up to form a fire-box, inside which the furnace is lighted. The coil is encased with firebricks and brickwork, and the smoke from the fire is carried off by a flue in the ordinary way. The flow pipe of similar (usually having an internal diameter of about 1 in. , the metal being nearly \ in. thick) continues from the top of the coil, and after travel- ling round the various apart- ments returns to, and is connected with, the lowest part of the boiler coil. The joints take a special form to enable them to withstand the great strain to which they are subjected (fig. 7). One end of a pipe is finished flat, the end of the other pipe being brought to a conical edge. On one end also a right-handed, and on the other a left-handed, screw- thread is turned. A coupling collar, tapped in the same manner, is screwed on, and causes the conical edge to impress itself tightly on the flat end, giving a sound and lasting joint. The system is hermetically sealed after being pumped full of water, an expansion chamber in the shape of a pipe of larger dimensions being provided at the top of the system above the highest point of circulation. Upon the application of heat

to the fire-box coil the water naturally expands and forces its way up into the expansion chamber; but there it encounters the pressure of the confined air, and ebullition is consequently prevented. Thus at no time can steam form in the system. This system is trustworthy and safe in working. The smallness of the pipes renders it liable to damage by frost, but this accident may be prevented by always keeping in frosty weather a small fire in the furnace. If this course is inconvenient, some liquid of low freezing-point, such as glycerine, may be mixed with the water.

Fig. 6.

Fig. 7.

For large public buildings, factories, &c, heating by steam is generally adopted on account of the rapidity with Which heat is available, and the great distance from the boiler at which warming is effected. In the case of factories heating, the exhaust steam from the engines used for driving the working machinery is made use of and forms the most economical method of heating possible. There are several different systems of heating by steam — low pressure, high pressure and minus pressure.

In the low pressure two pipe system the flow pipe is carried to a sufficient height directly above the boiler to allow of its gradual fall to a little beyond the most distant point at which connexion is to be made with the return pipe, which thence slopes towards the boiler. Branches are taken off the flow pipe, and after circulating through coils or radiators are connected with the return pipe. In a well-proportioned system the pres- sure need not exceed 2 or 3 lb per sq. in. for excellent results to be obtained. The one-pipe system is similar in prin- ciple, the pipe rising to its greatest height above the boiler and being then carried around as a single pipe falling all the while. It resembles in many points the one-pipe low pressure hot-water system. Radiators are fed directly from the main. Where, as in factories or workshops, there are already installed engines working at a high steam pressure, say 120 to 180 lb per sq. in., a portion of the steam generated in the boilers may be utilized for heating by the aid of a reducing valve. The steam is passed through the valve and emerges at the pressure required generally from 3 lb upwards. It is then used for one of the systems described above.

High-pressure steam-heating, compared with the heating by low pressure, is little used. The principles are the same as those applied to low-pressure work, but all fittings and appliances must, of course, be made to stand the higher strain to which they are subjected.

The ” minus pressure ” steam system, sometimes termed ” atmospheric ” or ” vacuum,” is of more recent introduction than those just described. It is certainly the most scientific method of steam-heating, and heat can be made to travel a greater distance by its aid than by any other means. The heat of the pipes is great, but can be easily regulated. The system is economical in fuel, but needs skilled attendance to keep the appliances and fittings in order. The steam is introduced into the pipes at about the pressure of the atmosphere, and

is sucked through the system by means of a vacuum pump, which at the same operation frees the pipes from air and from condensation water. This pumping action results in an extremely rapid circulation of the heating agent, enabling long distances to be traversed without much loss of heat.

Compared with heating by hot water, steam-heating requires less piping, which, further, may be of much smaller diameter to attain a similar result, because of the higher temperature of the heat yielding surface. A drawback to the use of steam is the fact that the high temperature of the pipes and radiators attracts and spreads a great deal of dust. There is also a risk that woodwork near the pipes may warp and split. The apparatus needs constant attention, since neglect in stoking would result in stopping the generation of steam, and the whole system would almost immediately cool. To regulate the heat it is necessary either to instal a number of small radiators or to divide the radiators into sections, each section controlled by distinct valves; steam may then be admitted to all the sections^ of the radiator or to any less number of sections as desired. In a hot-water system the heat is given off at a lower temperature and is consequently more agreeable than that yielded by a steam-heating apparatus. The joint most commonly used for hot-water pipes is termed the ” rust ” joint, which is cheap to make, but unfortunately is inefficient. The materials required are iron borings, sal-ammoniac and sulphur; these are mixed together, moistened with water, and rammed into the socket, which is previously half filled with yarn, well caulked. The materials mixed with the iron borings cause them to rust into a solid mass, and in doing so a slight expansion takes place. On

this account it is necessary to exercise some skill in forming the joint, or the socket of the pipe will be split; numbers of pipes are undoubtedly spoilt in this way. Suitable proportions of materials to form a rust joint are 90 parts by weight of iron borings well mixed with 2 parts of flowers of sulphur, and 1 part of powdered sal-ammoniac. Another joint, less rigid but sound and durable, is made with yarn arid white and red lead. The white and red lead are mixed together to form a putty, and are filled into the socket alternately with layers of well-caulked yarn, starting with yarn and finishing off with the lead mixture. Iron expands when heated to the temperature of

boiling water (212 F.) about 1 part in 900, that is to say, a pipe

, , _ too ft. long would expand or increase in length when

Joints i,ii., 1 1 •

for pipes. neate(J to this temperature about 15 in., an amount which seems small but which would be quite sufficient to destroy one or more of the joints if provision were not made to prevent damage. The amount of expansion increases as the temperature is raised; at 340 F. it is 25 in. in 100 ft. With wrought iron pipes bends may be arranged, as shown in fig. 8, to take up this expansion. With cast iron pipe this cannot be done, and no length of piping over 40 ft. should be without a proper expansion joint. The pipes are best supported on rollers which allow of movement without straining the joints.

There are several joints in general use for the best class of work which are formed with the aid of india-rubber rings or collars, any expansion being divided amongst the whole number of joints. In the rubber ring joint an india-rubber ring is used ; slightly less in diameter than the pipe. The rubber is circular in section, and about 5 in. thick, and is stretched on the extreme end of a pipe which is then forced into the next socket. This joint is durable, secure and easily made; it allows for expansion and by its use the risk of pipe sockets being cracked is avoided. It is much used for greenhouse heating works. Richardson's

IHllllllllllll i

Rubber ring

Fig. 9.

Fig. 10.

of pipe; they are made in various types and designs and are usually of cast iron. Ventilating radiators are similar, but have an inlet arrangement at the base to allow external air to pass over the heating surface before passing out through the perfora- tions. Radiators should not be fixed directly on to the main heating pipe, but always on branches of smaller diameter leading from the flow pipe to one end of the radiator and back to the main return pipe from the other end; they may then be easily controlled by a valve placed on the branch from the flow pipe. To each radiator should be fitted an air tap, which when opened will permit the escape of any air that has accumulated in the coil; otherwise free circulation is impossible, and the full benefit of the heat is not obtained.

A plentiful supply of hot water is a necessity in every house for domestic and hygienic purposes. In small houses all require- ments may be satisfied with a boiler heated by the kitchen fire. For large buildings where large quantities of hot water are used an independent boiler of suitable size should be installed. Every installation is made up of a boiler or other water heater, a tank or cylinder to contain the water when heated, and a cistern of cold water, the supply from which to the system is regulated automatically by a ball valve. These containers, proportioned to the required supply of hot water, are connected with each other by means of pipes, a ” flow ” and a ” return ” connecting the boiler with the cylinder or tank (fig. 12). The flow pipe starts from the top of the boiler and is connected near the top of the cylinder, the return pipe joining the

Hot-

water

supply.

patent joint (fig. 9) is a good form of this class of joint. The pipes have specially shaped ends between which a rubber collar is placed, the joint being held together by clips. The result is very satisfactory and will stand heavy water pressure. Messenger’s joint (fig. 10) is designed to allow more freedom of expansion and at the same time to withstand considerable pressure; one loose cast iron collar is used, and another is formed as a socket on the end of the pipe itself. One end of each pipe is plain, so that it may be cut to any desired length; pipes with shaped ends obviously must be obtained in the exact lengths required. Jones’s expansion joint (fig. 11) is somewhat similar to Messenger’s but it is not capable of withstanding so great a pressure. In this case both collars of cast iron are loose. Radiators (really convectors) were in their primitive design coils of pipe, used to give a larger heating area than the single pipe would afford. They are now usually of special design, and may be divided into three classes — indirect radiators, direct radiators and direct ventilating radiators. Indirect radiators are placed beneath the floor of the apartment to be heated and give off heat through a grating. This method is frequently adopted in combined schemes of heating and ventilating; the fresh air is warmed by being passed over their surfaces previously to being admitted through the gratings into the room. Direct radiators are a development of the early coil

lower portions of the cylinder and boiler. The supply from the cold water cistern enters the bottom of the cylinder, and thence travels by

way of the re- turn pipe to the boiler, where it is heated, and back through the flow pipe to the cylinder, which is thus soon filled with hot water. A flow pipe which serves also for expansion is taken from the top of the cylinder to a point above the cold – water supply and turned down to prevent the ingress of dirt. From this pipe at

various points are taken ra»

the supply pipes to baths, lavatories, sinks and other appliances. It will be observed that is placed in proximity to the boiler;

Stop cockˆ

Boiler

Fig. 12.

Fig. 11.

Radiators.

in fig. 12 the cylinder this is the usual and most effective method, but it may be placed some distance away if desired. The tank system is of much earlier date than this cylinder system, and although the two resemble each other in many respects, the tank system is in practice the less effective. The tank is placed above the level of the topmost draw off, and often in a cupboard which it will warm sufficiently to permit of its being used as a linen airing closet. An expansion pipe is taken from the top of the tank to a point above the roof. All draw off services are taken off from the flow pipe which connect? . the boiler with the tank. This method differs from that adopted in the cylinder system, where all services are led from the top of the cylinder. A suitable proportion between the size of the tank or cylinder and that of the boiler is 8 or 10 to 1. Water may also be heated by placing a coil of steam or high-pressure hot-water pipes in a water tank (fig. 6), the water heated in this way circulating in the manner already described. An alternative plan is to pass the water through pipes placed in a steam chest. Cylinders, tanks and independent boilers should be encased in a non-conducting material such as silicate cotton, thick felt or asbestos composition. The two first mentioned are affixed

Flow pipe

Fig. 13.

by means of bands or straps or stitched on; the asbestos is laid on in the form of a plaster from 2 to 6 in. thick.

Taps to baths and lavatories should be connected to the main services by a flow and return pipe so that hot water is constantly flowing past the tap, thus enabling hot water to be obtained immediately. Frequently a single pipe is led to the tap, but the water in this branch cools and must therefore be drawn off before hot water can be obtained.

Two classes of boilers are chiefly used in hot-water heating installations, viz. those heated by the fire of the kitchen range, and those heated separately or independently. Of the first class there are two varieties in common use — a form of ” saddle ” boiler (fig. 13) and the ” boot ” boiler (fig. 14). Independent boilers are made in every conceivable size and form of construction, and many of them are capable of doing excellent work. In the choice of a boiler of this description it should be remembered that rapid heating, economical combustion of fuel, and facilities for cleaning, are requisites, the absence of any of which considerably lowers the efficiency of the apparatus. Boilers set in brickwork are sometimes used in domestic work, although they are more favoured for horticultural heating. The shape mostly used is the ” saddle ” boiler, or some variation upon this very old pattern. The coiled pipe fire- box of the high-pressure hot-water system previously described may be also classed with boilers.

A notable feature of modern boiler construction is the mode of building the apparatus of cast iron in either horizontal or vertical sections. Both the types intended to be set in brickwork and those working independently are formed on the sectional principle, which has many good points. The parts are easy of transport and can be handled without difficulty through narrow doorways and in confined situations. The size of the boiler may be increased or diminished by the addition or subtraction of one or more sections; these, being simple in design, are easily fitted together, and should a section become defective it is a simple matter to insert a new one in its place. Should a defect occur with a wrought iron boiler it is usually necessary for the purpose of repair to disconnect and remove the whole apparatus, the heating system of which it forms a part being in the meantime useless. In a type built with vertical sections each division is complete in itself, and is not directly connected with the

next section, but communicates I with flow and return drums. A defective section may thus be left in position and | stopped off by means of plugs from the drums until it is convenient to fit a new one in its place. A boiler with horizontal sections is shown in fig. 15; it will be seen that each of the upper sections has a number of cross waterways which form a series of gratings over the fire-box and intercept most of the heat generated, effecting great economy of fuel.

In the ordinary working of a hot-water apparatus the expansion pipe already referred to will prevent any overdue pressure occurring in the boiler; should, however, the pipes become blocked in any way while the apparatus is in use, or the water in them become frozen, the lighting of the fire would cause the water to expand, and having no outlet it would in all probability burst the boiler. To prevent this a safety valve should be fitted on the top of the boiler, or be con- nected thereto with a large pipe so as to be visible. The valve may be of the dead weight (fig. 16), lever weight, spring (fig. 17) or diaphragm variety. The three first named are largely used. In the diaphragm valve a thin piece of metal is fixed to an outlet from the boiler, and when a moderate pressure is exceeded this gives way, allowing the water and steam to escape.

Fusible plugs are little used; they consist of pieces of softer

metal inserted on the side of the boiler, which melt should the. heat of the water rise above a certain temperature.

A ” Geyser ” is a very convenient form of apparatus for heat- ing a quantity of water in a short time. A water pipe of copper or wrought iron is passed through a cylinder in which Qeysers. gas or oil heating burners are placed. The piping takes a winding or zigzag course, and by the time the outlet is reached, the water it contains has reached a high temperature.

Safety vaJres.

float pipe.

Flow plat

Fig. 15. By this means a continuous stream of hot water is obtained, greater or smaller in proportion to the size and power of the apparatus. The improved types of gas geysers are provided with a single control to both gas and water supplies, with a small ” pilot ” burner to ignite the gas. A flue should in all cases be provided to carry off the fumes of the fuel.

In districts where the water is of a ” hard nature,” that is, contains bicarbonate of lime in solution, the interior of the boiler, cylinders, tanks and pipes of a hot water system will become incrusted with a deposit of lime

Fig. 17. The use of soft water entails

upon these metals. In districts supplied with soft water, copper should be employed to as large an extent as possible.

The table given below will be useful in calculating the size of the radiating surface necessary to raise the temperature to the extent required when the external air is at freezing point (32 Fahr.) : —

Description of Building to be heated.

Temperature required.

Cubic Feet of Air heated by

I sq. ft. of Radiator or

Pipe Surface.

Low Pressure Water.

Low Pressure Steam.

Dwelling rooms

Churches and chapels ….

Offices and shops

Public halls, workshops, waiting-rooms Warehouses, stores ….

55°-6o°

6o° 55°-6o° 55°-6o°

50*-55°

85-90 90-100 100-120 120-125 130-150 140-160

1 15-125 120-130 135-160 160-170 175-200 190-220

In closing this account of heating and the practical methods

of application of heat, an example may be mentioned to show

the great capabilities of a carefully planned system.

Steam ˆ t jj e c j t y f L 0C j C p 0rt m]y ew y rk state, America,

Lockport. ai i interesting example of the direct application of steam-heating on a large scale has been carried out under the direction of Mr Birdsill Holly of that city. Houses within a radius of 3 m. from the boiler house are supplied with superheated steam at a pressure of 35 lb to the in. The mains, the largest of which are 4 in. in diameter, and the smallest 2 in., are wrapped in asbestos, felt and other non-conducting materials, and are placed in wooden tubes laid under ground like water and gas pipes. The house branches pipes are i\ in. in diameter, and $-in. pipes are used inside the houses. The steam is employed for warming apartments by means of pipe radiators, for heating water by steam injections, and for all cooking purposes. The steam mains to the houses are laid by the supply company; the internal pipes and fittings are paid for or rented by the occupier, costing for an installation from £30 for an ordinary eight-roomed house to £100 or more for larger buildings. With the success of this undertaking in view it is a matter of wonder that the example set in this instance has not been adopted to a much greater extent elsewhere.

The principal publications on heating are: Hood, Practical Treatise on Warming Buildings by Hot Water; Baldwin, Hot Water Heating and Fittings; Baldwin, Steam Heating for Buildings; Billings, Ventilation and Heating; Carpenter, Heating and Ventilating Buildings; Jones, Heating by Hot Water, Ventilation and Hot Water Supply; Dye, Hot Water Supply. (J. Bt.)

HEAVEN (O. Eng. hefen, henfon, heofone; this word appears in O.S. hevan; the High. Ger. word appears in Ger. Himmel, Dutch kernel; there does not seem to be any connexion between the two words, and the ultimate derivation of the word is unknown; the suggestion that it is connected with ” to heave, ” in the sense of something ” lifted up,” is erroneous), properly the expanse, taking the appearance of a domed vault above the earth, in which the sun, moon, planets and stars seem to be placed, the firmament; hence also used, generally in the plural, of the space immediately above the earth, the atmospheric region of

winds, rain, clouds, and of the birds of the air. The heaven and the earth together, therefore, to the ancient cosmographers, and still in poetical language, make up the universe. . In the cosmogonies of many ancient peoples there was a plurality of heavens, probably among the earlier Hebrews, the idea being elaborated in rabbinical literature, among the Babylonians and in Zoroastrianism. The number of these heavens, the higher transcending the lower in glory, varied from three to seven. Heaven, as in the Hebrew shamayint, the Greek ovpavos, the Latin caelum, is the abode of God, and as such in Christian eschatology is the place of the blessed in the next world (see Eschatology and Paradise).

HEBBEL, CHRISTIAN FRIEDRICH (1813-1863), German poet and dramatist, was born at Wesselburen in Ditmarschen, Holstein, on the 18th of March 1813. Though only the son of a poor bricklayer; he early showed a talent for poetry, which was

first displayed to the world by the publication, in the Hamburg Modezeitung, of verses which he had sent to Amalie Schoppe (1 791-1858), a then popular journalist and author of nursery tales. Through the kindness of this lady, who interested several of her friends on his behalf, he was enabled to go to Hamburg and there prepare himself for the university. A year later he went to Heidelberg to study law, but finding this uncongenial he passed on to the university of Munich, where he devoted himself to philosophy, history and literature. In 1839 Hebbel left Munich and wandered back to Hamburg on foot, where he resumed his relations with Elsie Lensing, whose self-sacrificing assistance had helped him over the darkest days in Munich. In the same year he wrote his first tragedy Judith (published 1841), which in the following year was performed in Hamburg and Berlin and made his name known throughout Germany. In 1840 he wrote the tragedy Genoveva, and the following year finished a comedy, Der Diamant, which he had begun at Munich, In 1842 he visited Copenhagen, where he obtained from the king of Denmark a small travelling studentship, which enabled him to spend some time in Paris and two years (1844-1846) in Italy. In Paris he wrote his fine ” tragedy of common life,” Maria Magdalene (1844). On his return from Italy Hebbel met at Vienna two Polish noblemen, the brothers Zerboni di Sposetti, who in their enthusiasm for his genius urged him to remain, and supplied him with the means to mingle in the best intellectual society of the Austrian capital. The unwonted life of ease had its effect. The old precarious existence became a horror to him, he made a deliberate breach with it by marrying (in 1846) the beautiful and wealthy actress Christine Enghaus, ruthlessly sacrificing the girl who had given up all for him and who remained faithful till

her death, on the ground that ” a mail’s first duty is to the most powerful force within him, that which alone can give him happiness and be of service to the world ” : in his case the poetical faculty, which would have perished “in the miserable struggle for existence.” This ” deadly sin,” which, ” if peace of conscience be the test of action,” was, he considered, the best act of his life, established his fortunes. Elise, however, still provided useful inspiration for his art. As late as 1855, shortly after her death, he wrote the little epic Mutter und Kind, intended to show that the relation of parent and child is the essential factor which makes the quality of happiness among all classes and under all conditions equal. Long before this Hebbel had become famous. German sovereigns bestowed decorations upon him; and in foreign capitals he was feted as the greatest of living German dramatists. From the grand-duke of Saxe- Weimar he received a flattering invitation to take up his residence at Weimar, where several of his plays were first performed. He remained, however, at Vienna until his death on the 13th qf December 1863.

Besides the works already mentioned, Hebbel’s principal tragedies are Herodes und Mariamne (1850); Julia (1851); Michel Angelo (1851); Agnes Bernauer (1855); Gyges und sein Ring (1856), and the magnificently conceived trilogy Die Nibelungen (1862), his last work (consisting of a prologue, Der gehornte Siegfried, and the tragedies, Siegfrieds Tod and Kriem- hilds Racke), which won for the author the Schiller prize. Of his comedies Der Diamant (1847), Der Rubin (1850), and the tragi-comedy Bin Trauerspiel in Sizilien (1845), are the more important, but they are heavy and hardly rise above mediocrity. All his dramatic productions, however, exhibit skill in character- ization, great glow of passion, and a true feeling for dramatic situation; but their poetic effect is frequently marred by extravagances which border on the grotesque, and by the intro- duction of incidents the unpleasant character of which is not sufficiently relieved. In many of his lyric poems, and especially in Mutter und Kind, published in 1859, Hebbel showed that his poetic gifts were not restricted to the drama.

His collected works were first published by E. Kuh (12 vols.,

Hamburg, 1866-1868); revised by H. Krumm (12 vols., Hamburg, 1892). The best critical edition is that by R. M. Werner (12 vols., 1901-1903), to which have been added Hebbel’s Diaries (4 vols.) and Correspondence (6 vols.). Hebbel’s Briefwechsel mit Freunden und

beriihmten Zeitgenossen was issued by F. Bamberg (1890-1892). The chief biographies of Hebbel are those by E. Kuh (1877) and R. M. Werner (1905). See also L..A. Frankl, Zur Biographie F. Hebbels (1884); T. Poppe, F. Hebbel und sein Drama (1900); A. Scheunert, Der Pantragismus als System der Weltanschauung und Asthetik Hebbels (1903); E. A. Georgy, Die Tragodie F. Hebbels nach ihrem Ideengehalt (1904).

HEBBURN, an urban district in the Jarrow parliamentary division of Durham, England, on the right bank of the Tyne, 4ˆ m. below Newcastle, and on a branch of the North-Eastern railway. Pop. (1881), 11,802; (1901), 20,901. It has extensive shipbuilding and engineering works, rope and sail factories, chemical, colour and cement works, and collieries.

HEBDEN BRIDGE,. an urban district in the Sowerby parlia- mentary division of the West Riding of Yorkshire, England, on the Calder and Hebden rivers, 7 m. W. by N. of Halifax by the Lancashire and Yorkshire railway. Pop. (1901), 7536. The town has cotton factories, dye-works, foundries and manu- factories of shuttles. The upper Calder valley, between Halifax and Todmorden, is walled with bold hills, the summits of which consist of wild moorland. The vale itself is densely populated, but its beauty is not destroyed, and the contrast with its desolate surroundings is remarkable.

HEBE, in Greek mythology, daughter of Zeus and Hera, the goddess of youth. In the Homeric poems she is the female counterpart of Ganymede, and acts as cupbearer to the gods (Iliad, iv. 2). She was the special attendant of her mother, whose horses she harnessed (Iliad, v. 722). When Heracles was received amongst the gods, Hebe was bestowed upon him in marriage (Odyssey, xi. 603). When the custom of the heroic age, which permitted female cupbearers, fell into disuse, Hebe was replaced by Ganymede in the popular mythology. To account for her retirement from her office, it was said that she fell down in the presence of the gods while handing the wine, and was so ashamed that she refused to appear before them again. Hebe exhibits many striking points of resemblance with the pure Greek goddess Aphrodite. She is the daughter of Zeus and Hera, Aphrodite of Zeus and Dione; but Dione and Hera are often identified. Hebe is called Dia, a regular epithet of Aphrodite; at Phlius, a festival called ~K.utoot6hoi (the days of ivy-cutting) was annually celebrated in her honour (Pausanias, ii. 13); and ivy was sacred also to Aphrodite. The apotheosis of Heracles and his marriage with Hebe became a favourite subject with poets and painters, and many instances occur on vases. In later art she is often represented, like Ganymede, caressing the eagle.

See R. Kekule\ Hebe (1867), mainly dealing with the represen- tations of Hebe in art ; and P. Decharme in Daremberg and Saglio's Dictionnaire des antiquites.

The meaning of the word Hebe tended to transform the goddess into a mere personification of the eternal youth that belongs to the gods, and this conception is frequently met with. Then she becomes identical with the Roman Juventas, who is simply an abstraction of an attribute of Jupiter Juventus, the god of increase and blessing and youth. To Juventas, as personifying the eternal youth of the Roman state, a chapel was dedicated in very early times in the cella of Minerva in the temple of Jupiter Capitolinus. With this temple is connected the legend of Juventas and Terminus, who alone of all the gods refused to give way when it was being built — an indication of the eternal solidity and youth of Rome. The cult of Juventas did not, however, become firmly established until the time of the second Punic war. In 218 the Sibylline books ordered a lecti- sternium in honour of Juventas and a supplicatio in honour of Hercules, and in 191 a temple was dedicated in her honour in the Circus Maximus. In later times Juventas became the personification, not of the Roman youth, but of the emperor, who assumed the attributes of a god (Livy v. 54, xxi. 62, xxxvi. 36; Dion. Halic. iii. 69; G. W'issowa in Roscher's Lexikon der Mythologie) .

HEBEL, JOHANN PETER (1760-1826), German poet and popular writer, was born at Basel on the 10th of May 1760. The father dying when the child was little over a year old, he was brought up amidst poverty-stricken conditions in the village of Hausen in the Wiesental, where he received his earliest education. Being of brilliant promise, he found friends who enabled him to complete his school education and to study theology (1778-1780) at Erlangen. At the end of his university course he was for a time a private tutor, then became teacher at the Gymnasium in Karlsruhe, and in 1808 was appointed director of the school. He was subsequently appointed member of the Consistory and " evangelical prelate." He died at Schwetzingen, near Heidelberg, on the 22nd of September 1826. Hebel is one of the most widely read of all German popular poets and writers. His poetical narratives and lyric poems, written in the " Alemanic" dialect, are " popular " in the best sense. His Allemannische Gedichte (1803) " bucolicize," in the words of Goethe, " the whole world in the most attractive manner " (verbauert das ganze Universum auf die anmutigste Weise). Indeed, few modern German poets surpass him in fidelity, naivete, humour, and in the freshness and vigour of his descriptions. His poem, Die Wiese, has been described by Johannes Scherr as the " pearl of German idyllic poetry"; while his prose

writings, especially the narra- tives and essays contained in the Schatzkdstlein des rheinischen Hausfreundes (Tubingen, 181 1; new edition, Stuttg. 1869, 1888), belong to the best class of German stories, and according . to August Friedrich Christian Vilmar (1800-1868) in his Geschichte der deutschen Literatur are ” worth more than a cartload of novels ” (wiegen ein gauzes Fuder Romane auf). Memorials have been erected to him at Karlsruhe, Basel and Schwetzingen.

A complete edition of Hebel’s works — Sdmtliche Werke — was first published at Stuttgart in 8 vols. (1832-1834); subsequent editions appeared in 1847 (3 vols.), 1868 (2 vols.), 1873 (edited by G. Wendt, 2 vols.), 1883-1885 (edited by O. Behaghel, 2 vols.) and 1905 (edited by E. Keller, 5 vols.), as well as innumerable reprints. Hebel’s correspondence has been edited by O. Behaghel (1883). See G. Langin, /. P. Hebel, ein Lebensbild (1894), and the introduction to Behaghel’s edition.

HEBER, REGINALD (r 783-1826), English bishop and hymn- writer, was born at Malpas in Cheshire on the 21st of April 1783. His father, who belonged to an old Yorkshire family, held a moiety of the living of Malpas. Reginald Heber early showed remarkable promise, and was entered in November 1800 at Brasenose College, Oxford, where he proved a distinguished student, carrying off prizes for a Latin poem entitled Carmen seculare, an English poem on Palestine, and a prose essay on The Sense of Honour. In November 1804 he was elected a fellow of All Souls College; and, after finishing his distinguished university career, he made a long tour in Europe. He was admitted to holy orders in 1807, and was then presented to the family living of Hodnet in Shropshire. In 1809 Heber married Amelia, daughter of Dr Shipley, dean of St Asaph. He was made prebendary of St Asaph in 181 2, appointed Bampton lecturer for 181 5, preacher at Lincoln’s Inn in 1822, and bishop of Calcutta in January 1823. Before sailing for India he received the degree of D.D. from the university of Oxford. In India Bishop Heber laboured indefatigably, not only for the good of his own diocese, but for the spread of Christianity throughout the East. He undertook numerous tours in India, consecrating churches, founding schools and discharging other Christian duties. His devotion to his work in a trying climate told severely on his health. At Trichinopoly he was seized with an apoplectic fit when in his bath, and died on the 3rd of April 1826. A statue of him, by Chantrey, was erected at Calcutta.

Heber was a pious man of profound learning, literary taste and great practical energy. His fame rests mainly on his hymns, which rank

among the best in the English language. The following may be instanced: ” Lord of mercy and of might “; “Brightest and best of the sons of the morning “; “By cool Siloam’s shady rill”; “God, that madest earth and heaven”; “The Lord of might from Sinai’s brow”; ” Holy, holy, holy, Lord God Almighty “; ” From Greenland’s icy mountains “; ” The Lord will come, the earth shall quake “;

HEBER, RICHARD— HEBREW LANGUAGE

” The Son of God goes forth to war.” Heber’s hymns and other poems are distinguished by finish of style, pathos and soaring aspiration; but they lack originality, and are rather rhetorical than poetical in the strict sense.

Among Heber’s works are: Palestine: a Poem, to which is added the Passage of the Red Sea (1809); Europe: Lines on the Present War ■)} 8c *}} ‘ , a volume of poems in 18 12; The Personality and Office of the Christian Comforter asserted and explained (being the Bampton Lectures for 1815); The Whole Works of Bishop Jeremy Taylor, with a Life of the A uthor, and a Critical Examination of his Writings (1822) • Hymns written and adapted Jo the Weekly Church Service of the Year’ principally by Bishop Heber (1827) ; A Journey through India (1828) • Sermons preached in England, and Sermons preached in India (1829) : Sermons on the Lessons, the Gospel, or the Epistle for every Sunday in the iear (1837). The Poetical Works of Reginald Heber were collected m 1841.

See the Life of Reginald Heber, D.D by his widow, Amelia

Heber (1830), which also contains a number of Heber’s miscellaneous writings; The Last Days of Bishop Heber, by Thomas Robinson, A. M ..archdeacon of Madras (1830); T. S. Smyth, The Character and Religious Doctrine of Bishop Heber (1831), and Memorials of a Quiet Life, by Augustus J. C. Hare (1874).

HEBER, RICHARD (1773-1833), English book-collector, the half-brother of Reginald Heber, was born in London on the 5th of January 1773. As an undergraduate at Brasenose College, Oxford, he began to collect a purely classical library, but his taste broadening, he became interested in early English drama and literature, and began his wonderful collection of rare books in these departments. He attended continental book- sales, purchasing sometimes single volumes, sometimes whole libraries. Sir Walter Scott, whose intimate friend he was, and who dedicated to him the sixth canto of Marmion, classed Heber’s library as “superior to all others in the world”; Campbell

described him as ” the fiercest and strongest of all the bibliomaniacs.” He did not confine himself to the purchase of a single copy of a work whichjtookhis fancy. ” No gentleman,” he remarked, ” can be without three copies of a book, one for show, one for use, and one for borrowers.” To such a size did his library grow that it over-ran eight houses, some in England, someon the Continent. Itisestimatedtohavecostover£ioo,ooo, and after his death the sale of that part of his collection stored in England realized more than £56,000. He is known to have owned 1 50,000 volumes, and probably many more. He possessed extensive landed property in Shropshire and Yorkshire, and was sheriff of the former county in 182 1, was member of Parliament for Oxford University from 1821-1826, and in 1822 was made a D.C.L. of that University. He was one of the founders of the Athenaeum Club, London. He died in London on the 4th of October 1833.

HEBERDEN, WILLIAM (1710-1801), English physician, was born in London in 1710. In the end of 1724 he was sent to St John’s College, Cambridge, where he obtained a fellowship about 1730, became master of arts in 1732, and took the degree of M.D. in 1739. He remained at Cambridge nearly ten years longer practising medicine, and gave an annual course of lectures on materia medica. In 1746 he became a fellow of the Royal College of Physicians in London; and two years later he settled in London, where he was elected a fellow of the Royal Society in 1749, and enjoyed an extensive medical practice for more than thirty years. At the age of seventy-two he partially retired, spending his summers at a house which he had taken at Windsor, but he continued to practise in London during the winter for some years longer. In 1 7 78 he was made an honorary member of the Paris Royal Society of Medicine. He died in London on the 17th of May 1801. Heberden, who was a good classical scholar, published several papers in the Phil. Trans. ot the Royal Society, and among his noteworthy contributions lo the Medical Transactions (issued, largely at his suggestion, by the College of Physicians) were papers on chicken-pox (1767) and angina pectoris (1768). His Commentarii de morborum historia et curatione, the result of careful notes made in his pocket-book at the bedside of bis patients, were published in 1802; in the following year an English translation appeared, believed to be from the pen of his son, William Heberden (1767-

1845), also a distinguished scholar and physician, who attended King George III. in his last illness.

HEBERT EDMOND (18×2-1890), French geologist, was born at Vdlefargau, Yonne, on the 12th of June 181 2. He was educated at the College de Meaux, Auxerre, and at the Ecole Normale in Paris. In 1836 he became professor at Meaux in 1838 demonstrator in chemistry and physics at the Ecole Normale, and in 1841 sub-director of studies at that school and lecturer on geology. In 1857 thedegreeofD.es Sc. was conferred upon him, and he was appointed professor of geology at the Sorbonne. There he was eminently successful as a teacher and worked with great zeal in the field, adding much to the knowledge of the Jurassic and older strata. He devoted, how- ever, special attention to the subdivisions of the Cretaceous and Tertiary formations in France, and to their correlation with the strata in England and in southern Europe. To him we owe the first definite arrangement of the Chalk into palaeontological zones (see Table in Geol. Mag., 1869, p. 200). During his later years he was regarded as the leading geologist in France. He was elected a member of the Institute in 1877, Commander of the Legion of Honour in 1885, and he was three times president of the Geological Society of France. He died in Paris on the 4th of April 1890.

HUBERT, JACQUES RENE (1757-1794), French Revolutionist, called Pere Duchesne," from the newspaper he edited was born at Alencon, on the 15th of November 1757, where his father, who kept a goldsmith's shop, had held some municipal office. His family was ruined, however, by a lawsuit while he was still young, and Hebert came to Paris, where in his struggle against poverty he endured great hardships- the accusations of theft directed against him later by Camille Desmoulins were, however, without foundation. In 1790 he attracted attention by some pamphlets, and became a prominent member of the club of the Cordeliers in 1791. On the 10th of August 1792 he was a member of the revolutionary Commune of Paris, and became second substitute of the procureur of the Commune on the 2nd of December 1792. His violent attacks on the Girondists led to his arrest on the 24th of May 1793, but he was released owing to the threatening attitude of the mob. Henceforth very popular, Hebert organized with P. G. Chaumette (?.».) the "worship of Reason," in opposition to the theistic cult inaugurated by Robespierre, against whom he tried to excite a popular movement. The failure of this brought about the arrest of the Hebertists, or enrages, as his partisans were called Hebert was guillotined on the 24th of March 1794. His wife, who had been a nun, was executed twenty days later. Hebert's influence was mainly due to his articles in his journal Le Pere Duchesne, 1 which appeared from 1790 to 1794. These articles, while not lacking in a certain cleverness, were violent and abusive, and

purposely couched in foul language in order to appeal to the mob.

See Louis Duval, ” Hebert chez lui,” in La Revolution Francaise, revue dhistoire moderns et contemporaine, t. xii. and t. xiii. ; D. Mater J. R. Hebert, I auleur du Pere Duchesne avant la journee du 10 aou’t 1792 (Bourges, Cornm. Hist, du Cher, 1888); F. A. Aulard, Le Culle ae la raison et de letre supreme (Paris, 1892).

HEBREW LANGUAGE. The name ” Hebrew ” is derived, through the Greek ‘Ep>cuos, from ‘ibkray, the Aramaic equivalent of the Old Testament word ‘ibhri, denoting the people who commonly spoke of themselves as Israel or Children of Israel from the name of their common ancestor (see Jews). The later derivative Visra’eli, Israelite, from Yisra’el, is not found- in the Old Testament. 2 Other names used for the language of Israel are speech of Canaan (Isa. xix. 18) and Yehudhith, Jewish, (2 Kings xviii. 26). In later times it was called the holy tongue. The real meaning of the word ‘ibhri must ultimately be sought in the root ‘abhor, to pass across, to go beyond, from which is derived the noun ‘ebker, meaning the ” farther bank ” of a river. The usual explanation of the term is that of Jewish tradition

- There were several journals of this name, the best known of the Others being that edited by Lemaire.

2 In 2 Sam. xvii. 25 Israelite should be Ishmaelite, as in the parallel passage 1 Chron. ii. 17.

that ‘ibhri means the man ” from the other side,” i.e. either of the Euphrates or the Jordan. Hence the Septuagint in Gen’, xiv. 13 render Abram ha-ibhri by b repimji, the ” croseer,” and Aquila, following the same tradition, has 6 vtpcXrifi, the man ” from beyond.” This view of course implies that the term was originally applied to Abram or his descendants by a people living on the west of the Euphrates or of the Jordan. It has been suggested that the root ‘abkar is to be taken in the sense of ” travelling,” and that Abram the wandering Aramaean (Deut. xxvi. 5) was called ha-‘ibhrt because he travelled about for trading purposes, his language, ‘ibhri, being the lingua franca of Eastern trade. The use of the term «j3pai’crri for biblical Hebrew is first found in the Greek prologue to Ecclesi- asticus (c. 130 B.C.). In the New Testament it denotes the native language of Palestine (Aramaic and Hebrew

being popularly confused) as opposed to Greek. In modern usage the name Hebrew is applied to that branch of the northern part of the Semitic family of languages which was used by the Israelites during most of the time of their national existence in Palestine, and in which nearly all their sacred writings are composed. As to its characteristics and relation to other languages of the same stock, see Semitic Languages. It also includes the later forms of the same language as used by Jewish writers after the close of the Canon throughout the middle ages (Rabbinical Hebrew) and to the present day (New Hebrew).

Before the rise of comparative philology it was a popular opinion that Hebrew was the original speech of mankind, from which all others were descended. This belief, derived from the Jews (cf. Pal. Targ. Gen. xi. 1), was supported by the etymologies and other data supplied by the early chapters of Genesis. But though Hebrew possesses a very old literature, it is not, as we know it, structurally as early as, e.g. Arabic, or, in other words, it does not come so near to that primitive Semitic speech which may be pre-supposed as the common parent of all the Semitic languages. Owing to the imperfection of the Hebrew alphabet, which, like that of most Semitic languages, has no means of expressing vowel-sounds, it is only partly possible to trace the development of the language. In its earliest form it was no doubt most closely allied to the Canaanite or Phoenician stock, to the language of Moab, as revealed by the stele of Mesha (c. 850 B.C.), and to Edomite. The vocalization of Canaanite, as far as it is known to us, e.g. from glosses in the Tell-el-Amarna tablets (15th century. B.C.) 1 and much later from the Punic passages in the Pocnulus of Plautus, differs in many respects from that of the Hebrew of the Old Testament, as also does the Septuagint transcription of proper names. The uniformity, however, of the Old Testament text is due to the labours of successive schools of grammarians who elaborated the Massorah (see Hebrew Literature), thereby obliterating local or dialectic differences, which undoubtedly existed, and establishing the pronunciation current in the synagogues about the 7th century a.d. The only mention of such differences in the Old Testament is in Judges xii. 6, where it is stated that the Ephraimites pro- nounced e> (sh) as or o (s). In Neh. xiii. 24, the “speech of Ashdod ” is more probably a distinct (Philistine) language. Certain peculiarities in the language of the Pentateuch (mn for s’n, -ij’j for .Tisu)) which used to be regarded as archaisms, are to be explained as purely orthographical. 2 In a series of writings, however, extending over so long a period as those of the Old Testament, some variation or development in language is to be expected apart from the natural differences between the poetic (or prophetic) and prose styles. The

consonantal text sometimes betrays these in spite of the Massorah. In general, the later books of the Old Testament show, roughly speaking, a greater simplicity and uniformity of style, as well as a tendency to Aramaisms. For some centuries after the Exile, the people of Palestine must have been bilingual, speaking Aramaic for ordinary purposes, but still at least understanding Hebrew. Not that they forgot their own tongue in the Captivity and learnt Aramaic in Babylon, as used to be supposed. In the western

1 See Zimmern, in Ztsch. fur Assyriol. (1891), p. 154. – See Gesenius-Kautzsch, Llcbr. Gram. § 17 c.

provinces of the Persian empire Aramaic was the official lan- guage, spoken not only in Palestine but in all the surrounding countries, even in Egypt and among Arab tribes such as the Nabateans. It is natural, therefore, that it should influence and finally supplant Hebrew in popular use, so that translations even of the Old Testament eventually appear in it (Targums). Mean- while Hebrew did not become a dead language — indeed it can hardly be said ever to have died, since it has continued in use till the present day for the purposes of ordinary life among educated Jews in all parts of the world. It gradually became a literary rather than a popular tongue, as appears from the style of the later books of the Old Testament (Chron., Dan., Eccles.), and from the Hebrew text of Ecclesiasticus {c. 170 B.C.). During the 1st century B.C. and the 1st century a.d. we have no direct evidence of its characteristics. After that period there is a great development in the language of the Mishna. It was still living Hebrew, although mainly confined to the schools, with very clear differences from the biblical language. In the Old Testa ment the range of subjects was limited. In the Mishna it was very much extended. Matters relating to daily life had to be discussed, and words and phrases were adopted from what was no doubt the popular language of an earlier period. A great many foreign words were also introduced. The language being no longer familiar in the same sense as formerly, greater definite- ness of expression became necessary in the written style. In order to avoid the uncertainty arising from the lack of vowels to distinguish forms consisting of the same consonants (for the vowel-points were not yet invented), the aramaising use of the reflexive conjugations (Hithpa'el, Nithpa'el) for the internal passives (Pu'al, Hoph'al) became common; particfes were used to express the genitive and other relations, and in general there was an endeavour to avoid the obscurities of a purely consonantal writing. What is practically Mishnic Hebrew continued to be used in Midrash for some centuries. The language of both Talmuds, which, roughly speaking, were growing contem- poraneously with Midrash, is a mixture of Hebrew and Aramaic (Eastern Aram, in the

Babylonian, Western in the Jerusalem Talmud), as was also that of the earlier commentators. As the popular use of Aramaic, was gradually restricted by the spread of Arabic as the vernacular (from the 7th century onwards), while the dispersion of the Jews became wider, biblical Hebrew again came to be the natural standard both of East and West. The cultivation of it is shown and was no doubt promoted by the many philological works (grammars, lexicons and masorah) which are extant from the 10th century onward. In Spain, under Moorish dominion, most of the important works of that period were composed in Arabic, and the influence of Arabic writers both on language and method may be seen in con- temporaneous' Hebrew compositions. No other vernacular (except, of course, Aramaic) ever had the same influence upon Hebrew, largely because no other bears so close a relation to it. At the present day in the East, and among learned Jews else- where, Hebrew is still cultivated conversationally, and it is widely used for literary purposes. Numerous works on all kinds of subjects are produced in various countries, periodicals flourish, and Hebrew is the vehicle of correspondence between Jews in all parts of the world. Naturally its quality varies with the ability and education of the writer. In the modern pronunciation the principal differences are between the Ashkenazim (German and Polish Jews) and the Sephardim (Spanish and Portuguese Jews), and concern not only the vowels but also certain con- sonants, and in some cases probably go back to early times. A? regards writing, it is most likely that the oldest Hebrew records were preserved in some form of cuneiform script. The alphabet (see Writing) subsequently adopted is seen in its earliest form on the stele of Mesha, and has been retained, with modifications, by the Samaritans. According to Jewish tradition Ezra in- troduced the Assyrian character (*wk 3ro), a much-debated statement which no doubt means that the Aramaic hand in use in Babylonia was adopted by the Jews about the 5th century B.C. Another form of the same hand, allowing for differences of material, is found in Egyptian Aramaic papyri of the .5th and 4th

centuries B.C. From this were developed (a) the square character used in MSS. of the Bible or important texts, and in most printed books, (b) the Rabbinic(or Rashi) character, used in commentaries and treatises of all kinds, both in MS. and in printed books, (e)the Cursive character, used in letters and for informal purposes, not as a rule printed. In the present state of Hebrew palaeo- graphy it is not possible to determine accurately the date of a MS., but it is easy to

recognize the country in which it was written. The most clearly marked distinctions are between Spanish, French, German, Italian, Maghrebi, Greek, Syrian (including Egyptian), Yemenite, Persian and Qaraite hands. It is in the Rabbinic and Cursive characters that the differences are most noticeable. The Hebrew alphabet is also used, generally with the addition of some diacritical marks, by Jews to write other languages, chiefly Arabic, Spanish, Persian, Greek, Tatar (by Qaraites) and in later times German.

The philological study of Hebrew among the Jews is described below, under Hebrew Literature, of which it formed an integral part. Among Christian scholars there was no independent school of Hebraists before the revival of learning. In the Greek and Latin Church the few fathers who, like Origen and Jerome, knew something of the language, were wholly dependent on their Jewish teachers, and their chief value for us is as depositaries of Jewish tradition. Similarly in the East, the Syriac version of the Old Testament is largely under the influence of the syna- gogue, and the homilies of Aphraates are a mine of Rabbinic lore. In the middle ages some knowledge of Hebrew was pre- served in the Church by converted Jews and even by non-Jewish scholars, of whom the most notable were the Dominican con- troversialist Raymundus Martini (in his Pugio fidei) and the Franciscan Nicolaus of Lyra, on whom Luther drew largely in his interpretation of Scripture. But there was no tradition of Hebrew study apart from the Jews, and in the 15th century when an interest in the subject was awakened, only the most ardent zeal could conquer the obstacles that lay in the way. Orthodox Jews refused to teach those who were not of their faith, and on the other hand many churchmen conscientiously believed in the duty of entirely suppressing Jewish learning. Even books were to be had only with the greatest difficulty, at least north of the Alps. In Italy things were somewhat better. Jews expelled from Spain received favour from the popes. Study was facilitated by the use of the printing-press, and some of the earliest books printed were in Hebrew. The father of Hebrew study among Christians was the humanist Johann Reuchltn (1455-1522), the author of the Rudimenta Hebraica (Pforzheim, 1506), whose contest with the converted Jew Pfefferkorn and the Cologne obscurantists, established the claim of the new study to recognition by the Church. Interest in the subject spread rapidly. Among Reuchlin's own pupils were Melanchthon, Oecolampadius and Cellarius, while Sebastian Miinster in Heidelberg (afterwards professor at Basel), and Biichlein (Fagius) at Isny, Strasburg and Cambridge, were pupils of the liberal Jewish scholar Elias Levita. France drew teachers from Italy. Santes Pagninus of Lucca was at Lyons; and the trilingual college of Francis I. at Paris,

with Vatablus and le Mercier, attracted, among other foreigners, Giustiniani, bishop of Nebbio, the editor of the Genoa psalter of 1516. In Rome the converted Jew Felix Pratensis taught under the patronage of Leo X., and did useful work in connexion with the great Bomberg Bibles. In Spain Hebrew learning was promoted by Cardinal Ximenes, the patron of the Com- plutensian Polyglot, The printers, as J. Froben at Basel and Etienne at Paris, also produced Hebrew books. For a time Christian scholars still leaned mainly on the Rabbis. But a more independent spirit soon arose, of which le Mercier in the 16th, and Drusius early in the 17 th century, may be taken as repre- sentatives. In the 17th century too the cognate languages were studied by J. Selden, E. Castell (Heptaglott lexicon) and E. Pococke (Arabic) in England, Ludovicus de Dieu in Holland, S. Bochart in France, J. Ludolf (Ethiopic) and J. H. Hottinger (Syriac) in Germany, with advantage to the Hebrew grammar and lexicon. Rabbinic learning moreover was cultivated at

Basel by the elder Buxtorf who was the author of grammatical works and a lexicon. With the rise of criticism Hebrew philology soon became a necessary department of theology. Cappellus (d. 1658) followed Levita in maintaining, against Buxtorf, the late introduction of the vowel-points, a controversy in which the authority of the massoretic text was concerned. He was supported by J. Morin and R. Simon in France. In the 18th century in Holland A. Schultens and N. W. Schroeder used the comparative method, with great success, relying mainly on Arabic. In Germany there was the meritorious J. D. Michaelis and in France the brilliant S. de Sacy. In the 19th century the greatest name among Hebraists is that of Gesenius, at Halle, whose shorter grammar (of Biblical Hebrew) first, published in 1813, is still the standard work, thanks to the ability with which his pupil E. Rodiger and recently E. Kautzsch have revised and enlarged it. Important work was also done by G. H. A. Ewald, J. Olshausen and P. A. de Lagarde, not to mention later scholars who have utilized the valuable results of Assyrio- logical research.

Bibliography.— Among the numerous works dealing with the study of Hebrew, the following are some of the most practically useful.

Grammars, Introductory. — Davidson,IntroductoryHebrewGrammar (9th ed., Edinburgh, 1888); and Syntax (Edinburgh, 1894). Ad- vanced: Gesenius's Hebrdische Grammatik, ed. Kautzsch (28th ed., Leipzig, 1909; Eng. trans., Oxford, 1910); also Driver, Treatise on the Use of the Tenses in Hebrew (3rd ed., Oxford, 1892). For post- biblical Hebrew, Strack and Siegfried, Lehrbuch d. neuhebraischen Sprache (Leipzig, 1884).

Comparative Grammar. — Wright, Lectures on the Comp. Grammar of the Sem. Lang. (Cambridge, 1890); Brockelmann, Grundriss der vergleichenden Grammatik (Berlin, 1907, &c).

Lexicons. — Gesenius's Thesaurus philologicus(Le\iz\g, 1829-1858), and his Hebrdisches Handworterbuch (15th ed. by Zimmern and Buhl, Leipzig, 1910); Brown, Briggs and Driver, Hebrew and Eng. Lexicon (Oxford, 1892-1906). For later Hebrew: Levy, Neuhebrdisches Wbrlerbuch (Leipzig, 1876-1889); Jastrow, Dictionary of the Targumi, &c. (NewYork, 1886, &c.) ; Dalman, Aramaisches neuhebrdisches Wbrterbuch (Frankfort a. M., 1897); Kohut, Aruch completum (Vienna, 1878-1890) (in Hebrew) is valuable for the language of the Talmud. (A. Cy.)

HEBREW LITERATURE. Properly speaking, "Hebrew Literature " denotes all works written in the Hebrew language. In catalogues and bibliographies, however, the expression is now generally used, conveniently if incorrectly, as synonymous with Jewish literature, including all works written by Jews in Hebrew characters, whether the language be Aramaic, Arabic or even some vernacular not related to Hebrew.

The literature begins with, as it is almost entirely based upon, the Old Testament. There were no doubt in the earliest times popular songs orally transmitted and perhaps books ow festa- of annals and laws, but except in so far as remnants ment- al them are embedded in the biblical books, they have Scrip- entirely disappeared. Thus the Book of the Wars of ures ' the Lord is mentioned in Num. xxi. 14; the Book of Jashar in Josh. x. 13, 2. Sam. i. 18; the Song of the Well is quoted in Num. xxi. 17, 18, and the song of Sihon and Moab, ib. 27-30; of Lamech, Gen. iv. 23, 24; of Moses, Exod. xv. As in other literatures, these popular elements form the foundation on which greater works are gradually built, and it is one function of literary criticism to show the way in which the component parts were welded into a uniform whole. The traditional view that Moses was the author of the Pentateuch in its present form, would make this the earliest monument of Hebrew literature. Modern inquiry, however, has arrived at other conclusions (see Bible, Old Testament) , which may be briefly summarized as follows* the Pentateuch is compiled from various documents, the earliest of which is denoted by J (beginning at Gen. ii. 4) from the fact that its author regularly uses the divine name Jehovah (Yahweh). Its date is now usually given as about 800 B.C. 1 In the next century the document E was composed, so called from its using

1 The dating of these documents is extremely difficult, since it is based entirely on internal evidence. Various scholars, while agreeing on the actual divisions of the text, differ on the question of priority. The dates here given are those which seem to be most generally accepted at the present time. They are not put forward &s the result of an independent review of the evidence.

Elohlm (God) instead of Yahweh. Both these documents are considered to have originated in the Northeiji kingdom, Israel, where also in the 8th century appeared the prophets Amos and Hosea. To the same period belong the book of Micah, the earlier parts of the books of Samuel, of Isaiah and of Proverbs, and perhaps some Psalms. In 722 B.C. Samaria was taken and the Northern kingdom ceased to exist. Judah suffered also, and it is not until a century later that any important literary activity is again manifested. The main part of the book of Deuteronomy was ” found ” shortly before 621 B.C. and about the same time appeared the prophets Jeremiah and Zephaniah, and perhaps the book of Ruth. A few years later (about 600) the two Penta- teuchal documents J and E were woven together, the books of Kings were compiled,’ the book of Habakkuk and parts of the Proverbs were written. Early in the next century Jerusalem was taken by Nebuchadrezzar, and the prophet Ezekiel was among the exiles with Jehoiachin. Somewhat later (c. 550) the combined document JE was edited by a writer under the influence of Deuteronomy, the later parts of the books of Samuel were written, parts of Isaiah, the books of Obadiah, Haggai, Zechariah and perhaps the later Proverbs. In the exile, but probably after 500 B.C., an important section of the Hexateuch, usually called the Priest’s Code (P), was drawn up. At various times in the same century are to be placed the book of Job, the post-exilic parts of Isaiah, the books of Joel, Jonah, Malachi and the Song of Songs. The Pentateuch (or Hexateuch) was finally completed in its present form at some time before 400 B.C. The latest parts of the Old Testament are the books of Chronicles, Ezra and Nehemiah (c. 330 B.C.), Ecclesiastes and Esther (3rd century) and Daniel, composed either in the 3rd century or according to some views as late as the time of Antiochus Epiphanes (c. 168 B.C.). With regard to the date of the Psalms, internal evidence, from the nature of the case, leads to few results which are con- vincing. The most reasonable view seems to be that the collection was formed gradually and that the process was going on during most of the period sketched above.

It is not to be svpposed that all the contents of the Old Testa- ment were immediately accepted as sacred, or that they were ever all regarded as being on the same level. The Apocry- Torah, the Law delivered to Moses, held among the literature. J ews of the 4th century B.C. as it holds now, a pre- eminent position. The inclusion of other books in the Canon was gradual, and was effected only after centuries of debate. The Jews have always been, however, an intensely literary people, and the books ultimately accepted as canonical were only a selection from the literature in existence at the beginning of the Christian era. The rejected books receiving little attention have mostly either been altogether lost or have survived only in translations, as in the case of the Apocrypha. Hence from the composition of the latest canonical books to the redaction of the Mishna (see below) in the 2nd century a.d., the remains of Hebrew literature are very scanty. Of books of this period which are known to have existed in Hebrew or Aramaic up to the time of Jerome (and even later) we now possess most of the original Hebrew text of Ben Sira (Ecclesiasticus) in a somewhat corrupt form, and fragments of an Aramaic text of a re- cension of theTestaments of theTwelve Patriarchs,both discovered within recent years. Besides definite works of this kind, there was also being formed during this period a large body of ex- egetical and legal material, for the most part orally transmitted, which only received its literary form much later. As Hebrew became less familiar to the people, a system of translating the text of the Law into the Aramaic vernacular verse by verse, was adopted in the synagogue. The beginnings of it are supposed to be indicated in Neh. viii. 8. The translation was no doubt originally extemporary, and varied with the individual trans- lators, but its form gradually became fixed and was ultimately written down. It was called Targum, from the "^ ' Aramaic targem, to translate. The earliest to be thus edited was the Targum of Onkelos (Onqelos), the proselyte, on the Law. It received its final form in Babylonia probably in the 3rd century a.d. The Samaritan Targum, of about the same

date, clearly rests on the same tradition. Parallel to Onkeios was another Targum on the Law, generally called pseudo- Jonathan, which was edited in the 7th century in Palestine, and is based on the same system of interpretation but is fuller ana closer to the original tradition. There is also a fragmentary Targum (Palestinian) the relation of which to the others is obscure. It may be only a series of disconnected glosses on Onkelos. For the other books, the recognized Targum on the Prophets is that ascribed to Jonathan ben Uzziel (4th century ?), which originated in Palestine, but was edited in Babylonia, so that it has the same history and linguistic character as Onkelos.

Just as there is a Palestinian Targum on the Law parallel to the Babylonian Onkelos, so there is a Palestinian Targum (called Yerushaltni) on the Prophets parallel to that of Ben Uzziel, but of later date and incomplete. The Law and the Prophets being alone used in the services of the synagogue, there was no author- ized version of the rest of the Canon. There are, however, Targumim on the Psalms and Job, composed in the 5th century, on Proverbs, resembling the Peshitta version, on the five Meghilloth, paraphrastic and agadic (see below) in character, and on Chronicles — all Palestinian. There is also a second Targum on Esther. There is none on Daniel, Ezra and Nehemiah. We must now return to the 2nd century. During the period which followed the later canonical books, not only was translation, and therefore exegesis, cultivated, but even more the amplification of the Law. According to Jewish teach- ing (e.g. Abhoth i. 1) Moses received on Mount Sinai not only the written Law as set down in the Pentateuch, but also the Oral Law, which he communicated personally to the 70 elders and through them by a "chain of tradition" to succeeding ages. The application of this oral law is called Halakhah, the rules by which a man's daily " walk " is regulated. The halakhah was by no means inferior in prestige to the written Law. Indeed some teachers even went so far as to ascribe a higher value to it, since it comes into closer relation with the details of everyday life. It was not independent of the written Law, still less could it be in opposition to it. Rather it was implicitly contained in the Torah, and the duty of the teacher was to show this. It was therefore of the first importance that the chain of tradition should be continuous and trustworthy. The line is traced through biblical teachers to Ezra, the first of the Sopherim or scribes, who handed on the charge to the " men of the Great Synagogue," a much-discussed term for a body or succession of teachers inaugurated by Ezra. The last member of it, Simon the Just (either Simon I., who died about 300 B.C., or Simon II., who diedabout 200B.C), was the first of the next series, called Elders, represented in the tradition by pairs of teachers, ending with Hillel and Shammai about the beginning of the Christian era. Their pupils form the starting-point of the next series, the Tannalm (from Aram, tend to teach), who occupy the first two centuries a.d.

By this time the collection of halakhic material had become very large and various, and after several attempts had been made to reduce it to uniformity, a code of oral tradition was Mishap finally drawn up in the 2nd century by Judah ha-Nasi, called Rabbi par excellence. This was the Mishnah. Its name is derived from the Hebrew shanah, corresponding to the Aramaic tend, and therefore a suitable name for a tannaitic work, meaning the repetition or teaching of the oral law. It

is written in the Hebrew of the schools (leshon hakhamim) which differs in many respects from that of the Old Testament (see Hebrew Language). It is divided into six “orders,” according t» subject, and each order is subdivided into chapters. In making his selection of halakhoth, Rabbi used the earlier compilations, which are quoted as ” words of Rabbi ‘Aqlba” or of R. Me’ir, but rejected much which was afterwards collected under the title of Tosefta (addition) and Baraita (outside the Mishnah).

Traditional teaching was, however, not confined to halakhah. As observed above, it was the duty of the teachers to show the connexion of practical rules with the written Law, the more so since the Sadducees rejected the authority of the oral law as such. Hence arises Midrash, exposition, from

Midrash.

darash to ” investigate ” a scriptural passage. Of this halakhic Midrash we possess that on Exodus, called Mekhilta. that on Leviticus, called Sifra, and that on Numbers and Deuteronomy, called Sifre. All of these were drawn up in the period of the Amoralm, the order of teachers who succeeded the Tannalm, from the close of the Mishnah to about a.d. 500. The term Midrash, however, more commonly implies agada, i.e. the homiletical exposition of the text, with illustrations designed to make it more attractive to the readers or hearer. Picturesque teaching of this kind was always popular, and specimens of it are familiar in the Gospel discourses. It began, as a method, with the Sopherim (though there are traces in the Old Testament itself), and was most developed among the Tannalm and Amor- alm, rivalling even the study of halakhah. As the existing halakhoth were collected and edited in the Mishnah, so the much larger agadic material was gathered together and arranged in the Midrashlm. Apart from the agadic parts of the earlier Mekhilta, Sifra and Sifre, the most important of these collections (which are anonymous) form a sort of continuous commentary on various books of the Bible. They were called Rabboth {great Midrashlm) to distinguish them from preceding smaller collec- tions. Bereshilh Rabba, on Genesis, and Ekhah Rabbati, on Lamen- tations, were probably edited in the 7th century. Of the same character and of about the same date are the Pesiqta, on the lessons for Sabbaths and feast-days, and Wayyiqra R. on Leviti- cus. A century perhaps later is the Tanhuma, on the sections of the

Pentateuch, and later still the Pesiqta Rabbati, Shemoth R. (on Exodus), Bemidhbar R. (on Numbers), Debharim R. (on Deuteronomy). There are also Midrashlm on the Canticle, Ruth, Ecclesiastes, Esther and the Psalms, belonging to this later period, the Pirqe R. Eliezer, of the 8th or 9th century, a sort of history of creation and of the patriarchs, and the Tanna debe Eliyahil (an ethical work of the 10th century but containing much that is old), besides a large number of minor compositions. 1 In general, these performed very much the same function as the lives of saints in the early and medieval church. Very important for the study of Midrashic literature are the Yalqut {gleaning) Shimoni, on the whole Bible, the Yalqut Mekhiri, on the Prophets, Psalms, Proverbs and Job, and the Midrash ha-gadhol, 2 all of which are of uncertain but late date and preserve earlier material. The last, which is preserved in MSS. from Yemen , is especially valuable as representing an independent tradition.

Meanwhile, if agadic exegesis was popular in the centuries following the redaction of the Mishna, the study of halakhah was by no means neglected. As the discussion of the Law led up to the compilation of the Mishnah, so the Mishnah itself became in turn the subject of further discussion. The material thus accumulated, both halakhic and agadic, forming a commentary on and amplification of the Mishnah, was eventually written down under the name of Gemara (from gemar, to learn completely), the two together forming the Talmud (properly ” instruction “). The tradition, as in the case of the Targums, was again twofold; that which had grown up in the Palestinian Schools and that of Babylonia. The founda- tion, however, the Mishnah, was the same in both. Both works were due to the Amoraim and were completed by about a.d. 500, though the date at which they were actually committed to writing is very uncertain. It is probable that notes or selections were from time to time written down to help in teaching and learning the immense mass of material, in spite of the fact that even in Sherira’s time (nth century) such aids to memory were not officially recognized. Both Talmuds are arranged according to the six orders of the Mishnah, but the discussion of the Mishnic text often wanders off into widely different topics. Neither is altogether complete. In the Palestinian Talmud {Y erushalmi) the gemara of the 5th order {Qodashim) and of nearly all the 6th (Tohoroth) is missing, besides smaller parts.

1 See especially A. Jellinek’s Bet-ha-Midrasch (Leipzig, 1853), for these lesser midrashlm.

- That on Genesis was edited for the first time by Schechter (Cambridge, 1902).

Talmud.

In the Babylonian Talmud {Babhll) there is no gemara to the smaller tractates of Order 1, and to parts of ii., iv., v., vi. The language of both gemaras is in the main the Aramaic vernacular (western Aramaic in Yerushalml, eastern in Babhll), but early halakhic traditions {e.g. of Tannaitic origin) are given in their original form, and the discussion of them is usually also in Hebrew. Babhll is not only greater in bulk than Yerushalml, but has also received far greater attention, so that the name Talmud alone is often used for it. As being a constant object of study numerous commentaries have been written on the Talmud from the earliest times till the present. The most important of them for the understanding of the gemara (Babhll) is that of Rashi 3 (Solomon ben Isaac, d. 1104) with the Tosafoth {additions, not to be confused with the Tosefta) chiefly by the French school of rabbis following Rashi. These are always printed in the editions on the same page as the Mishnah and Gemara, the whole, with various other matter, filling generally about 1 2 folio volumes. Since the introduction of printing, the Talmud is always cited by the number of the leaf in the first edition (Venice, 1520, &c), to which all subsequent editions conform. In order to facilitate the practical study of the Talmud, it was natural that abridge- ments of it should be made. Two of these may be mentioned which are usually found in the larger editions: that by Isaac AlfasI {i.e. of Fez) in the nth century, often cited in the Jewish manner as Rif; and that by Asher ben Yehlel (d. 1328) of Toledo, usually cited as Rabbenu Asher. The object of both was to collect all halakhoth having a practical importance, omitting all those which owing to circumstances no longer possess more than an academic interest, and excluding the discussions on them and all agada. Both add notes and explanations of their own, and both have in turn formed the text of commentaries.

With the Talmud, the anonymous period of Hebrew literature may be considered to end. Henceforward important works are produced not by schools but by particular teachers, Masorah who, however, no doubt often represent the opinions of a school. There are two branches of work which partake of both characters, the Masorah and the Liturgy. The name Masorah (Massorah) is usually derived from masar, to hand on, and explained as ” tradition.” According to others 4 it is the word found in Ezek. xx. 37, meaning a ” fetter.” Its object was to fix the biblical text unalterably. It is generally divided into the Great and the Small Masorah, forming together an apparatus criticus which grew up gradually in the course of centuries and now accompanies the text in most MSS. and printed editions to a greater or less extent. There are also separate masoretic treat- ises. Some system of the kind

was necessary to guard against corruptions of copyists, while the care bestowed upon it no doubt reacted so as to enhance the sanctity ascribed to the text. Many apparent puerilities, such as the counting "Of letters and the marking of the middle point of books, had a practical use in enabling copyists of MSS. to determine the amount of work done. The registration of anomalies, such as the suspended letters, inverted nuns and larger letters, enabled any one to test the accuracy of a copy. But the work of the Masoretes was much greater than this. Their long lists of the occurrences of words and forms fixed with accuracy the present (Masoretic) text, which they had produced, and were invaluable to subsequent lexicographers, while their system of vowel-points and accents not only gives us the pronunciation and manner of reading traditional about the 7th century a.d., but frequently serves also the purpose of an explanatory commentary. (See further under Bible.) Most of the Masorah is anonymous, incladmgj the Massekheth Soferlm (of various dates from perhaps the 6th to the 9th century) and the Okhlah we-Okhlah, but when the period of anonymous literature ceases, there appear (in the 10th century) Ben Asher of Tiberias, the greatest authority on the subject, and his opponent Ben Naphthali. Later on, Jacob

3 In Hebrew 'en, from the initial letters of Rabbi Shelomoh Yi?baql, a convenient method used by Jewish writers in referring to well-known authors. The name Jarchi, formerly used for Rasjhi, rests on a misunderstanding.

- So Bacher in J.Q.R. iii. 785 sqq.

The Oeoalm.

ben Hayyim arranged the Masorah for the great Bomberg Bible of 1524. Elias Levita's Massoreth ha-Massoreth (1538) and Buxtorf's Tiberias (1620) are also important.

We must now turn back to a most difficult subject — the growth of the Liturgy. We are not concerned here with indica- tions of the ritual used in the Temple. Of the prayer- book as it is at present, the earliest parts are the Shema' (Deut. vi. 4, &c.) and the anonymous blessings commonly called Shemoneh 'Esreh (the Eighteen), together with certain Psalms. (Readings from the Law and the Prophets [Haphtarah] also formed part of the service.) To this framework were fitted, from

time to time, various prayers, and, for festivals especially, numerous hymns. The earliest existing codification of the prayer- book is the Siddiir {order) drawn up by Amram Gaon of Sura about 850. Half a century later the famous Gaon Seadiah, also of Sura, issued his Siddiir, in which the rubrical matter is in Arabic. Besides the Siddiir, or order for Sabbaths and general use, there is the Mahzor {cycle) for festivals and fasts. In both there are ritual differences according to the Sephardic (Spanish), Ashkenazic (German-Polish), Roman (Greek and South Italian) and some minor uses, in the later additions to the Liturgy. The Mahzor of each rite is also distinguished by hymns {piyyutim) composed by authors {payyetanim) of the district. The most important writers are Yoseh ben Yoseh, probably in the 6th century, chiefly known for his compositions for the day of Atonement, Eleazar Qallr, the founder of the payyetanic style, perhaps in the 7th century, Seadiah, and the Spanish school consisting of Joseph ibn Abitur (died in 970), Ibn Gabirol, Isaac Gayyath, Moses ben Ezra, Abraham ben Ezra and Judah ha-levi, who will be mentioned below; later, Moses ben Nahman and Isaac Luria the Kabbalist. 1

The order of the Amoraim, which ended with the close of the Talmud (a.d. 500), was succeeded by that of the Saboralm, who merely continued and explained the work of their predecessors, and these again were followed by the Geonlm, the heads of the schools of Sura and Pum- beditha in Babylonia. The office of Gaon lasted for something over 400 years, beginning about a.d. 600, and varied in import- ance according to the ability of the holders of it. Individual Geonlm produced valuable works (of which later), but what is perhaps most important from the point of view of the develop- ment of Judaism is the literature of their Responsa or answers to questions, chiefly on halakhic matters, addressed to them from various countries. Some of these were actual decisions of particular Geonlm; others were an official summary of the discussion of the subject by the members of the School. They begin with Mar Rab Sheshna (7th century) and continue to Hai Gaon, who died in 1038, and are full of historical and literary interest. 2 The She’iltoth {questions) of Rab Ahai (8th century) also belong probably to the school of Pumbeditha, though their author was not Gaon. Besides the Responsa, but closely related to them, we have the lesser Halakhoth of Yehudai Gaon of Sura (8th century) and the great Halakhoth of Simeon Qayyara of Sura (not Gaon) in the 9th century. In a different department there is the first Talmud lexicon {‘Aritkh) now lost, by ?emah ben Paltoi, Gaon of Pumbeditha in the 9th century. The Siddiir of Amram ben Sheshna has been already mentioned. All these writers, however, are entirely eclipsed by the commanding personality of the most famous of the

Geonlm, Seadiah ben Joseph {q.v.) of Sura, often called al-Fayyumi (of the Fayum in Egypt), one of the greatest representatives of Jewish learning of all times, who died in 942. The last three holders of the office were also distinguished. Sherira of Pumbeditha (d. 998) was the author of the famous “Letter” (in the form of a Responsum to a question addressed to him by residents in Kairawan), an historical document of the highest value and the foundation of our knowledge of the history of tradition. His son Hai, last Gaon of Pumbeditha (d. 1038), a man of wide learning, wrote

1 For the history of the very extensive literature of this class, Zunz, Literalurgeschichte der synagogalen Poesie (Berlin, 1865), is indispensable.

- See the edition of them in Harkavy, Studien, iv. (Berlin, 1885).

(partly in Arabic) not only numerous Responsa, but also treatises on law, commentaries on the Mishnah and the Bible, a lexicon called in Arabic al-ffawi, and poems such as the Musar Haskel, but most of them are now lost or known only from translations or quotations. Though his teaching was largely directed against superstition, he seems to have been inclined to mysticism, and perhaps for this reason various kabbalistic works were ascribed to him in later times. His father-in-law Samuel ben Ilophni, last Gaon of Sura (d. 1034), was a voluminous writer on law, translated the Pentateuch into Arabic, commented on much of the Bible, and composed an Arabic introduction to the Talmud, of which the existing Hebrew introduction (by Samuel the Nagid) is perhaps a translation. Most of his works are now lost.

In the Geonic period there came into prominence the sect of the Karaites {Bene miqrd, ” followers of the Scripture “, the pro- testants of Judaism, who rejected rabbinical authority, basing their doctrine and practice exclusively on icaraites. the Bible. The sect was founded by ‘Anan in the 8th century, and, after many vicissitudes, still exists. Their litera- ture, with which alone we are here concerned, is largely polemical and to a great extent deals with grammar and exegesis. Of their first important authors, Benjamin al-Nehawendi and Daniel al-QiimisI (both in the 9th century), little is preserved. In the 10th century Jacob al-Qirqisanl wrote his Kitdb al-anwar, on law, Solomon ben Yeruham (against Seadiah) and Yefet ben ‘All wrote exegetical works; in the nth century Abu’l-faraj Furqan, exegesis, and Yusuf al-BasIr against Samuel ben Hophni. Most of these wrote in Arabic. In the 12th century and in S. Europe, Judah Hadassi composed his Eshkol ha-Kopher, a great theological compendium in the form of a

commentary on the Decalogue. Other writers are Aaron (the elder) ben Joseph, 13th century, who wrote the commentary Sepher ha-mibhhar ; Aaron (the younger) of Nicomedia (14th century), author of ‘£? ffayyim, on philosophy, Gan ‘Eden, on law, and the com- mentary Kether Torah; in the 15th century Elijah Bashyazi, on law {Addereth Eliyahu), and Caleb Efendipoulo, poet and theologian; in the 16th century Moses BashyazI, theologian. From the 12th century onward the sect gradually declined, being ultimately restricted mainly to the Crimea and Lithuania, learning disappeared and their literature became merely popular and of little interest: Much of it in later times was written in a curious Tatar dialect. Mention need only be made further of Isaac of Troki, whose anti-Christian polemic Jlizzilq Emunah (1593) was translated into English by Moses Mocatta under the title of. Faith Strengthened (1851); Solomon of Troki, whose Appiryon, an account of Karaism, was written at the request of Pufendorf (about 1700); and Abraham Firkovich, who, in spite of his impostures, did much for the literature of his people about the middle of the 19th century. (See also Qaraites.)

To return to the period of the Geonlm. While the schools of Babylonia were flourishing as the religious head of Judaism, the West, and especially Spain under Moorish rule, was becoming the home of Jewish scholarship. On the Medieval breaking up of the schools many of the fugitives fled sbt – to the West and helped to promote rabbinical learning there. The communities of Fez, Kairawan and N. Africa were in close relation with those of Spain, and as early as the beginning of the 9th century Judah ben Quraish of Tahort had composed his Risdlah {letter) to the Jews of Fez on grammatical subjects from a comparative point of view, and a dictionary now lost. His work was used in the 10th century by Menahem ben Saruq, of Cordova, in his Mahbereth (dictionary). Menahem’s system-, of bi-literal and uni-literal roots was violently attacked by Dunash ibn Labrat, and as violently defended by the author’s pupils. Among these was Judah Hayyuj of Cordova, the father of modern Hebrew grammar, who first established the principle of tri-literal roots. His treatises on the verbs, written in Arabic, were translated into Hebrew by Moses Giqatilla (nth century), himself a considerable grammarian and com- mentator, and by Ibn Ezra. His system was adopted by Abu’l-walld ibn Jannah, of Saragossa (died early in the nth century), in his lexicon {Kitdb al-usill, in Arabic) and other works.

HEBREW LITERATURE

Exegesis.

In Italy appeared the invaluable Talmud-lexicon (‘Ariikh) by Nathan b. Yehiel, of Rome (d. 1106), who was indirectly indebted to Babylonian teaching. He does not strictly follow the system of Hayyuj. Other works of a different kind also originated in Italy about this time: the very popular history of the Jews, called Josippon (probably of the 10th or even 9th century), ascribed to Joseph ben Gorion (Gorionides) 1 ; the medical treatises of Shabbethai Donnolo (10th century) and his commentary on the Sepher Yegirah, the anonymous and earliest Hebrew kabbalistic work ascribed to the patriarch Abraham. In North Africa, probably in the 9th century, appeared the book known under the name of Eldad ha-Dani, giving an account of the ten tribes, from which much medieval legend was derived; 2 and in Kairawan the medical and philosophical treatises of Isaac Israeli, who died in 932.

The aim of the grammatical studies of the Spanish school was ultimately exegesis. This had already been cultivated in the East. In the 9th century Hivi of Balkh wrote a rationalistic treatise 3 on difficulties in the Bible, which was refuted by Seadiah. The commentaries of the Geonim have been mentioned above. The impulse to similar work in the West came also from Babylonia. In the 10th century Hushlel, one of four prisoners, perhaps from Babylonia, though that is doubtful, was ransomed and settled at Kairawan, where he acquired great reputation as a Talmudist. His son Hananeel (d. 1050) wrote a commentary on (probably all) the Talmud, and one now lost on the Pentateuch. Hananeel’s contemporary Nisslm ben Jacob, of Kairawan, who corresponded with Hai Gaon of Pumbeditha as well as with Samuel the Nagid in Spain, likewise wrote on the Talmud, and is probably the author of a collection of Maasiyyoth or edifying stories, besides works now lost. The activity in North Africa reacted on Spain. There the most prominent figure was that of Samuel ibn Nagdela (or Nagrela), generally known as Samuel the Nagid or head of the Jewish settlement, who died in 1055. As vizier to the Moorish king at Granada, he was not only a patron of learning, but himself a man of wide knowledge and a considerable author. Some of his poems are extant, and an Introduction to the Talmud mentioned above. In grammar he followed Hayyuj, whose pupil he was. Among others he was the patron of Solomon ibn Gabirol (

The French school of the nth century was hardly less im- portant. Gershom ben Judah, the ” Light of the Exile ” (d. in 1040 at Mainz), a famous Talmudist and com- mentator, his pupil Jacob ben Yaqar, and Moses of Narbonne, called ha-Darshan, the ” Exegete,” were the fore- runners of the greatest of all Jewish commentators, Solomon ben Isaac

(Rashi) , who died at Troyes in 1 105. Rashi was a pupil of Jacob ben Yaqar, and studied at Worms and Mainz. Unlike his contemporaries in Spain, he seems to have confined himself wholly to Jewish learning, and to have known nothing of Arabic or other languages except his native French. Yet no commentator is more valuable or indeed more voluminous, and for the study

n Two different texts of it exist: (1) in the ed. pr. (Mantua, 1476); (2) ed. by Seb. Milnster (Basel, 1541). There is also an early Arabic recension, but its relation to the Hebrew and to the Arabic 2 Maccabees is still obscure. See /. Q. R., xi. 355 sqq. The Hebrew text was edited with a Latin translation by Breithaupt (Gotha, 1 707).

2 On the various recensions of the text see D. H. Miiller in the Denkschriften of the Vienna Academy (Phil.-hisi. CI., xli. 1, p. 41) and Epstein's ed. (Pressburg, 1891).

3 A fragment of such a work, probably emanating from the school of hlivi. was found by Schechter and published in J.Q.R., xiii. 345 sqq.

Rashi.

of the Talmud he is even now indispensable. He commented on all the Bible and on nearly all the Talmud, has been himself the text of several super-commentaries, and has exercised great influence on Christian exegesis. The biblical commentary was translated into Latin by Breithaupt (Gotha, 1710-1714), that on the Pentateuch rather freely into German by L. Dukes (Prag, 1838, in Hebrew-German characters, with the text,), and parts by others. Closely connected with Rashi, or of his school, are Joseph Qara, of Troyes (d. about 1130), the commentator, and his teacher Menahem ben Helbo, Jacob ben Me'Ir, called Rabbenu Tarn (d. 1171), the most important of the Tosaphists (v. sup.), and later in the 1 2th century the liberal and rationalizing Joseph Bekhor Shor, and Samuel ben Me'Ir (d. about n 74) of Ramerupt, commentator and Talmudist.

In the 12th and 13th centuries literature maintained a high level in Spain. Abraham bar Hiyya, known to Christian scholars as Abraham Judaeus (d. about 1136), was a mathematician, astronomer and philosopher much studied in the middle ages. Moses ben Ezra, of Granada (d. about 11 40), wrote in Arabic a philosophical work based on Greek and Arabic as well as Jewish authorities, known by the name of the Hebrew translation as 'Arilgath ha-bosem, and the Kitab al-Mahadarah, of great value for literary history. He is even better known as a poet, for his Diwan and the 'Anaq, and as a hymn- writer.

His relative Abraham ben Ezra, generally called simply Ibn Ezra, 4 was still more distinguished. He was born at Toledo, spent most of his life in travel, wandering even to England and to the East, and died in 1167. Yet he contrived to write his great commentary on the Pentateuch and other books of the Bible, treatises on philosophy (as the Yesodh mora), astronomy, mathematics, grammar (translation of Hayyuj), besides a Diwan. The man, however, who shares with Ibn Gabirol the first place in Jewish poetry is Judah Ha-levi, of Toledo, who died in Jerusalem about n 40. His poems, both secular and religious, contained in his Diwan and scattered in the liturgy, are all in Hebrew, though he employed Arabic metres. In Arabic he wrote his philosophical work, called in the Hebrew translation Sepher ha-Kuzarl, a defence of revelation as against non- Jewish philosophy and Qaraite doctrine. It shows considerable knowledge of Greek and Arabic thought (Avicenna). Joseph ibn Mlgash (d. 1141 at Lucena), a friend of Judah Ha-levi and of Moses ben Ezra, wrote Responsa and Hiddushin {annota- tions) on parts of the Talmud. In another sphere mention must be made of the travellers Benjamin of Tudela (d. after 1173), whose Massa'oth are of great value for the history and geography of his time, and (though not belonging to Spain) Pethahiah»of Regensburg (d. about 1190), who wrote short notes of his journeys. Abraham ben David, of Toledo (d. about 11 80), in philosophy an Aristotelian (through Avicenna) and the precursor of Maimonides, is chiefly known for his Sepher ha- qabbalah, written as a polemic against Karaism, but valuable for the history of tradition.

The greatest of all medieval Jewish scholars was Moses ben Maimon (Rambam), called Maimonides by Christians. He was born at Cordova in 1135, fled with his parents from persecution in 1148, settled at Fez in 11 60, passing n ides. ' there for a Moslem, fled again to Jerusalem in 1165, and finally went to Cairo where he died in 1204. He was distinguished in his profession as a physician, and wrote a number of medical works in Arabic (including a commentary on the aphorisms of Hippocrates), all of which were translated into Hebrew, and most of them into Latin, becoming the text-books, of Europe in the succeeding centuries. But his fame rests mainly on his theological works. Passing over the less important, these are the Moreh Nebhukhim (so the Hebrew translation of the Arabic original), an endeavour to show philosophically the reasonableness of the faith, parts of which, translated into Latin, were studied by the Christian schoolmen, and the Mishneh Torah, also called Yad hahazaqah (T =i4, the number of the parts), a classified compendium of the Law, written in Hebrew

4 See M. Friedliinder in Publications of the Society of Hebrew Lit., 1st ser. vol. i., and 2nd ser. vol. iv.

Maimo nlsts.

and early translated into Arabic. The latter of these, though generally accepted in the East, was much opposed in the West, especially at the time by the Talmudist Abraham ben David of Posquieres (d. 1198). Maimonides also wrote an Arabic commentary on the Mishnah, soon afterwards translated into Maimo- Hebrew, commentaries on parts of the Talmud (now nlsts and lost), and a treatise on Logic. His breadth of view ami- and his Aristotelianism were a stumbling-block to the

orthodox, and subsequent teachers may be mostly classified as Maimonists or anti-Maimonists. Even his friend Joseph ibn ‘Aqnln (d. 1226), author of a philosophical treatise in Arabic and of a commentary on the Song of Solomon, found so much difficulty in the new views that the Moreh Nebhukhim was written in order to convince him. Maimonides’ son Abraham (d. 1234), also a great Talmudist, wrote in Arabic Ma’aseh Yeriishalmi, on oaths, and Kitab al-Kifdyah, theology. His grandson David was also an author. A very different person was Moses ben Nahman (Ramban) or Nahmanides, who was born at Gerona in 1104 and died in Palestine about 1270. His whole tendency was as conservative as that of Maimonides was liberal, and like all conservatives he may be said to represent a lost though not necessarily a less desirable cause. Much of his life was spent in controversy, not only with Christians (in 1293 before the king of Aragon), but also with his own people and on the views of the time. His greatest work is the commentary on the Pentateuch in opposition to Maimonides and Ibn Ezra. He had a strong inclination to mysticism, but whether certain kabbalistic works are rightly attributed to him is doubtful. It is, however, not a mere coincidence that the two great kabbal- istic text books, the Bahir and the Zohar (both meaning ” bright ness “) , appear first in the 13th century. If not due to his teaching they are at least in sympathy with it. The Bahir, asort of outline of the Zohar, and traditionally ascribed to Nehunya (1st century), is believed by some to be the work of Isaac the Blind ben Abraham of Posquieres (d. early in the 13th century), the founder of the modern Kabbalah and the author of the names for the 10 Sephiroth. The Zohar, supposed to be by Simeon ben Yohai (2nd century), is now generally attributed to Moses of Leon (d. 1305), who, however, drew his material in part from earlier written or traditional sources, such as the Sepher Yezlrah. At any rate the work was immediately accepted by thekabbalists, and has formed the basis of all

subsequent study of the subject. Though put into the form of a commentary on the Pentateuch, it is really an exposition of the kabbalistic view of the universe, and incidentally shows considerable acquaintance with the natural science of the time. A pupil, though not a follower of Nahmanides, was Solomon Adreth (not Addereth), of Barcelona (d. 1310), a prolific writer of Talmudic and polemical works (against the Kabbalists and Mahommedans) as well as of responsa. He was opposed by Abraham Abulafia (d. about 1201) and his pupil Joseph Giqatilla (d. about 1305), the author of numerous kabbalistic works. Solomon's pupil Bahya ben Asher, of Saragossa (d. 1340) was the author of a very popular com- mentary on the Pentateuch and of religious discourses entitled Kad ha-qemah, in both of which, unlike his teacher, he made large use of the Kabbalah. Other studies, however, were not neglected. In the first half of the 13th century, Abraham ibn Hasdai, a vigorous supporter of Maimonides, translated (or adapted) a large number of philosophical works from Arabic, among them being the Sepher ha-tappuah, based on Aristotle's de Anima, and the Mozene Zedeq of Ghazzali on moral philosophy, of both of which the originals are lost. Another Maimonist was Shem Tobh ben Joseph Falaquera (d. after 1290), philosopher (following Averroes), poet and author of a commentary on the Moreh. A curious mixture of mysticism and Aristotelianism is seen in Isaac Aboab (about 1300), whose Menorath ha-Ma'dr, a collection of agadoth, attained great popularity and has been frequently printed and translated. Somewhat earlier in the 13th century lived Judah al-HarizI, who belongs in spirit to the time of Ibn Gabirol and Judah ha-levi. He wrote numerous transla- tions, of Galen, Aristotle, Hariri, Hunain ben Isaac and Maimonides, as well as several original works, a Sepher ' Anaq

in imitation of Moses ben Ezra, and treatises on grammar and medicine (Rephiiath geviyyah), but he is best known for his Tahkemoni, a diwan in the style of Hariri's Maqdmdt.

Meanwhile the literary activity of the Jews in Spain had its effect on those of France. The fact that many of the most important works were written in Arabic, the vernacular of the Spanish Jews under the Moors, which was not understood in France, gave rise to a number of translations into Hebrew, chiefly by the family of Ibn Tibbon (or Tabbon). The first of them, Judah ibn Tibbon, translated works of Bahya ibn Paqudah, Judah ha-levi, Seadiah, Abu'lwalid and Ibn Gabirol, besides writing works of his own. He was a native of Granada, but migrated to Lunel, where he probably died about 1190. His son Samuel, who died at Marseilles about 1230, was equally prolific. He translated the Moreh Nebhukhim during the life of the

author, and with some help from him, so that this may be regarded as the authorized version; Maimonides' commentary on the Mishnah tractate Pirqe Abhoth, and some minor works; treatises of Averroes and other Arabic authors. His original works are mostly biblical commentaries and some additional matter on the Moreh. His son Moses, who died about the end of the 13th century, translated the rest of Maimonides, much of Averroes, the lesser Canon of Avicenna, Euclid's Elements (from the Arabic version), Ibn al-Jazzar's Viaticum, medical works of Hunain ben Isaac (Johannitius) and Razi (Rhazes), besides works of less-known Arabic authors. His original works are commentaries and perhaps a treatise on immortality. His nephew Jacob ben Makhlr, of Montpellier (d. about 1304), translated Arabic scientific works, such as parts of Averroes and Ghazzali, Arabic versions from the Greek, as Euclid's Data, Autolycus, Menelaus (dvIvd) and Theodosius on the Sphere, and Ptolemy's Almagest. He also compiled astronomical tables and a treatise on the quadrant. The great importance of these translations is that many of them were afterwards rendered •into Latin, 1 thus making Arabic and, through it, Greek learning accessible to medieval Europe. Another important family about this time is that of Qimhi (or Qarohi). It also originated in Spain, where Joseph ben Isaac Qimhi was born, who migrated to S. France, probably for the same reason which caused the flight of Maimonides, and died there about 11.70. He wrote on grammar {Sepher ha-galui and Sepher Zikkaron), commentaries on Proverbs and the Song of Solomon, an apologetic work, Sepher ha-berith, and a translation of Bahya's ffobkolh ha-lebhabhoth. His son Moses (d. about n 90) also wrote on grammar and some commentaries, wrongly attributed to Ibn Ezra. A younger son, David (Radaq) of Narbonne (d. 1235) is the most famous of the name. His great work, the Mikhlol, consists of a grammar and lexicon; his commentaries on various parts of the Bible are admirably luminous, and, in spite of his 1 anti-Christian remarks, have been widely used by Christian theologians and largely influenced the English authorized version of the Bible. A friend of Joseph Qimhi, Jacob ben Me'ir, known as Rabbenu Tarn of Ramerupt (d. n 71), the grandson of: Rashi, wrote the Sepher ha-yashar (hiddiishln and responsa) and was one of the chief Tosaphists. Of the same school were Menahem ben Simeon of Posquieres, a commentator, who died about the end of the 1 2th century, and Moses ben Jacob of Coucy (13th century), author of the Semag (book of precepts, positive and negative) a very popular and valuable halakhic work. A younger contemporary of David Qimhi was Abraham ben Isaac Bedersi (i.e. of Beziers), the poet, and some time in the 13th century lived Joseph Ezobhi of Perpignan, whose ethical poem, Qe'arath Yoseph, was translated by Reuchlin and later by others.

Berachiah, 2 the compiler of the ” Fox Fables ” (which have much in common with the ” Ysopet ” of Marie de France), is generally thought to have lived in Provence in the 13th century, but according to others in England in the 12th century. In Germany, Eleazar ben Judah of Worms (d. 1238), besides being

1 The fullest account of them is to be found in Steinschneider’s Hebrdische Ubersetzungen des Mittelalters (Berlin, 1893).

2 See H. Gollancz, The Ethical Treatises of Berachya (London,

1902).

a Talmudist, was an earnest promoter of kabbalistic studies. Isaac ben Moses (d. about 1270), who had studied in France, wrote the famous Or Zarua’ (from which he is often called), an halakhic work somewhat resembling Maimonides’ Mishneh Torah, but more diffuse. In the course of his wanderings he settled for a time at Wiirzburg, where he had as a pupil Me’ir of Rothenburg (d. 1293). The latter was a prolific writer of great influence, chiefly known for his Responsa, but also for his halakhic treatises, hiddushin and tosaphoth. He also composed a number of piyyutim. Me’lr’s pupil, Mordecai ben Hillel of Nurnberg (d. 1298), had an even greater influence through his halakhic work, usually known as the Mordekhai. This is a codi- fication cf halakhSth, based on all the authorities then known, some of them now lost. Owing to the fact that the material collected by Mordecai was left to his pupils to arrange, the work was current in two recensions, an Eastern (in Austria) and a Western (in Germany, France, &c). In the East, Tanhum ben Joseph of Jerusalem was the author of commentaries (not to be confounded with the Midrash Tanhuma) on many books of the Bible, and of an extensive lexicon (Kitab al-Murshid) to the Mishnah, all in Arabic.

With the 13th century Hebrew literature may be said to have reached the limit of its development. Later writers to a large extent used over again the materials of their predecessors, while secular works tend to be influenced by the surrounding civiliza- tion, or even are composed in the vernacular >»,nguages. From the 14th century onward only the most notable names can be men- tioned. In Italy Immanuel ben Solomon, of Rome (d. about 1330), perhaps the friend and certainly the imitator of Dante, wrote his diwan, of which the last part, ”

Topheth ve-‘Eden,” is suggested by the Divina Commedia. In Spain Israel Israeli, of Toledo (d. 1326), was a translator and the author of an Arabic work on ritual and a commentary on Pirqe Abhoth. About the same time Isaac Israeli wrote his Yesodh ‘Olam and other astronomical works which were much studied. Asher ben Jehiel, a pupil of Me’ir of Rothenburg, was the author of the popular Talmudic compendium, generally quoted as Rabbenu Asher, on the lines of Alfasi, besides other halakhic works. He migrated from Germany and settled at Toledo, where he died in 1328. His son Jacob, of Toledo (d. 1340), was the author of the Tilr (or the four Turlm), a most important manual of Jewish law, serving as an abridgement of the Mishneh Torah brought up to date. His pupil David Abudrahim, of Seville (d. after 1340), wrote a commentary on the liturgy. Both the 14th and 15th centuries in Spain were largely’ taken up with controversy, as by Isaac ibn Pulgar (about 1350), and Shem Tobh ibn Shaprut (about 1380), who translated St Matthew’s gospel into Hebrew. In France Jcdaiah Bedersi, i.e. of Beziers (d. about 1340), wrote poems (Behinath ha- olam), commentaries on agada and a defence of Maimonides against Solomon Adreth. Levi ben Gershom (d. 1344), called Ralbag, the great commentator on the Bible and Talmud, in philosophy a follower of Aristotle and Averroes, known to Christians as Leo Hebraeus, wrote also many works on halakhah, mathematics and astronomy. Joseph Kaspi, i.e. of Largentiere (d. 1340), wrote a large number of treatises on grammar and philosophy (mystical), besides commentaries and piyyutim. In the first half of the 14th century lived the two translators Qalonymos ben David and Qalonymos ben Qalonymos, the latter of whom translated many works of Galen and Averroes, and various scientific treatises, besides writing original works, e.g. one against Kaspl, and an ethical work entitled Eben Bohan. At the end of the century Isaac ben Moses, called Profiat Duran (Efodi), is chiefly known as an anti- Christian controversialist (letter to Me’ir Alguadez), but also wrote on grammar (Ma’aseh Efod) and a commentary on the Moreh. In philosophy he was an Aristotelian. About the same time in Spain controversy was very active. Hasdai Crescas (d. 1410) wrote against Christianity and in his Or Adonai against the Aristotelianism of the Maimonists. His pupil Joseph Albo in his ‘Iqqarim had the same two objects. On the side of the Maimonists was Simeon Duran (d. at Algiers 1444) in his Magen Abhoth and in his numerous commentaries. Shem T6bh

ibn Shem Tobh, the kabbalist, was a strong anti-Maimonist, as was his son Joseph of Castile (d. 1480), a commentator with kabbalistic tendencies but versed in Aristotle, Averroes and Christian doctrine. Joseph’s son Shem Tobh was, on the contrary, a follower of

Maimonides and the Aristotelians. In other subjects, Saadyah ibn Danan, of Granada (d. at Oran after 1473), is chiefly important for his grammar and lexicon, in Arabic; Judah ibn Verga, of Seville (d. after 1480), was a mathematician and astronomer; Solomon ibn Verga, somewhat later, wrote Shebet Yehudah, of doubtful value historically; Abraham Zakkuth or Zakkuto, of Salamanca (d. after 15 10), astronomer, wrote the Sephe? Yuhasin an historical work of importance. In Italy, Obadiah Bertinoro (d. about 1500) compiled his very useful commentary on the Mishnah, based on those of Rashi and Maimonides. His account of his travels and his letters are also of great interest. Isaac Abravanel (d. 1508) wrote com- mentaries (not of the first rank) on the Pentateuch and Prophets and on the Moreh, philosophical treatises and apologetics, such as the Yeshu'oth Meshiho, all of which had considerable influence. Elijah Delmedigo, of Crete (d. 1497), a strong opponent of Kabbalah, was the author of the philosophical treatise Behinath ha-dath, but most of his work (on Averroes) was in Latin.

The introduction of printing (first dated Hebrew printed book, Rashi, Reggio, 1475) gave occasion for a number of scholarly compositors and proof-readers, some of whom were also authors, such as Jacob ben Hayyim f Tunis writers (d. about 1530), proof-reader to Bomberg, chiefly known for his masoretic work in connexion with the Rabbinic Bible and his introduction to it; Elias Levita, of Venice (d. 1549), also proof-reader to Bomberg, author of the Massoreth ha- Massoreth and other works on grammar and lexicography; and Cornelius Adelkind, who however was not an author. In the East, Joseph Karo (Qaro) wrote his Beth Yoseph (Venice, 1550), a commentary on the Tilr, and his Shulhan 'Arukh (Venice, 1564) an halakhic work like the Tur, which is still a standard authority. The influence of non- Jewish methods is seen in the more modern tendency of Azariah dei Rossi, who was opposed by Joseph Karo. In his Me'or 'Enayim (Mantua, 1573) Dei Rossi endeavoured to investigate Jewish history in a scientific spirit, with the aid of non- Jewish authorities, and even criticizes Talmudic and traditional statements. Another historian living also in Italy was Joseph ben Joshua, whose Dibhre ha-yamlm (Venice, 1534) is a sort of history of the world, and his 'Emeq ha-bakhah an account of Jewish troubles to the year 1575. In Germany David Gans wrote on astronomy, and also the historical work Zemah David (Prag, 1592). The study of Kabbalah was promoted and the practical Kabbalah founded by Isaac Luria in Palestine (d. 1572). Numerous works, representing the extreme of mysticism, were published by his pupils as the result of his teaching. Foremost among these was Hayyim Vital, author of the 'Ez hayyim, and his son Samuel,

who wrote an introduction to the Kabbalah, called Shemoneh She'arim. To the same school- belonged Moses Zakkuto, of Mantua (d. 1697), poet and kabbalist. Contemporary with Luria and also living at Safed, was Moses Cordovero (d. 1570), the kabbalist, whose chief work was the Pardes Rimmonim (Cracow, 1591). In the 17th century Leon of Modena (d. 1648) wrote his Beth Yehudah, and probably Qol Sakhal, against traditionalism, besides many controversial works and commentaries. Joseph Delmedigo, of Prag (d. 1655), wrote almost entirely on scientific subjects. Also connected with Prag was Yom Tobh Lipmann Heller, a voluminous author, best known for the Tosaphoth Yom Tdbk on the Mishna (Prag, 1614; Cracow, 1643). Another important Talmudist, Shabbethai ben Me'ir, of Wilna (d. 1662), commented on the Shulhan ' Arukh. In the East, David Conforte (d. about 1685) wrote the historical work Qore ha-doroth (Venice, 1746), using Jewish and other sources; Jacob ben Hayyim Zemah, kabbalist and student of Luria, wrote Qol be-ramah, a com- mentary on the Zokar and on the liturgy; Abraham HayekM, kabbalist, chiefly remembered as a supporter of the would-be Messiah, Shabbethai Zebhi, wrote Hod Malkuth (Constantinople, 1655) and sermons. In the 18th century the study of the

tend- encies.

kabbalah was cultivated by Moses Hayylm Luzzatto (d. 1747) and by Elijah ben Solomon, called Gaon, of Wilna (d. 1797), who commented on the whole Bible and on many Talmudic and kabbalistic works. In spite of his own leaning towards mysticism he was a strong opponent of the IJasidlm, a mystical sect founded by Israel Ba'al Shem J obh (Besht) and promoted by Baer of Meseritz. Elijah's son Abraham (d. 1808), the com- mentator, is valuable for his work on Midrash. An historical work which makes an attempt to be scientific, is the Seder ha-doroth of Yehiel Heilprin (d. 1746). These, however, belong in spirit to the previous century.

The characteristic of the 18th and 19th centuries is the en- deavour, connected with the name of Moses Mendelssohn, to Modem- bring Judaism more into relation with external izing learning, and in using the Hebrew language to purify

and develop it in accordance with the biblical standard. The result, while linguistically more uniform and pleasing, often lacks the

spontaneity of medieval literature. It was Moses Mendelssohn's German translation of the Pentateuch (1 780-1 793) which marked the new spirit, while the views of his opponents belong to a bygone age. In fact the controversy of which he was the centre may fitly be compared with the earlier battles between the Maimonists and anti-Maimonists. One of the most remarkable writers of the new Hebrew was Mendelssohn's friend N. H. Wessely, of Hamburg (d. 1805), author of Shire Tiphe'relh, a long poem on the Exodus, Dibhre Shalom, a plea for liberalism, Sepher ha-middolh, on ethics, besides philological works and commentaries. A curious com- bination of new and old was Hayylm Azulai (d. 1807), a kabbalist, but also the author of Shem ha-gedholim, a valuable contribution to literary history.

In the 19th century the modernizing tendency continued to grow, though always side by side with a strong conservative opposition, and the most prominent names on both sides are those of scholars rather than literary men. Among them may be mentioned, Akiba ('Aqibha) Eger (d. 1837), Talmudist of the orthodox, conservative school; W. Heidenheim (d. 1832), a liberal, and editor of the Pentateuch and Mahzor; N. Krochmal, of Galicia (d. 1840), author of Moreh Nebhukhe ha-zeman, on Jewish history and literature; his son Abraham (d. 1895), conservative commentator and philosopher. One consequence of the Mendelssohn movement was that many writers used their vernacular language besides or instead of Hebrew, or translated from one to the other. Thus Isaac Samuel Reggio (d. 1855), a strong liberal, wrote both in Hebrew and Italian; Joseph Almanzi, of Padua (d. i860), a poet, translated Italian poems into Hebrew; S. D. Luzzatto, of Padua (d. 1865), a distinguished scholar and opponent of the philosophy of Maimonides, wrote much in Italian; M. H. Letteris, of Vienna (d. 187 1), translated German poems into Hebrew; S. Bacher, of Hungary (d. 1891), was a poet and moderate liberal; L. Gordon (d. 1892), poet and prose-writer in Hebrew and Russian, of liberal views; A. Jellinek, of Vienna (d. 1893), preacher and scholar; Jacob Reifmann (d. 1895), scholar, wrote only in Hebrew. The endeavour to bring Judaism into relation with the modern world and to change the current impressions about Jews by making their teaching accessible to the rest of the world, is connected chiefly with the names of Z. Frankel (d. 1875), the first Jewish scholar to study the Septuagint; Abraham Geiger (d. 1874), critic of the first rank; L. Zunz (d. 1884) and L. Dukes (d. 1891), both scholarly investigators of Jewish literary history. Their most important works are in German. The question of the use of the vernacular or of Hebrew is bound up with the differences between the orthodox and the liberal or reform parties, complicated by the many problems involved. Patriotic efforts are made to encourage the use of

Hebrew both for writing and speaking, but the continued existence of it as a literary language depends on the direction in which the future history of the Jews will develop.

Bibliography. — Only the more comprehensive works are men- tioned here, omitting those relating to particular authors, and those already cited.

Introductory: Abrahams, Short History of Jewish Literature (London, 1906); Steinschneider, Jewish Literature (London, 1857); Winter and Wiinsche, Die judische Literatur (Leipzig, 1893-1895) (containing selections translated into German).

For further study: Graetz, Geschichte der Juden (Leipzig, 1853, &c.) (the volumes are in various editions), with special reference to the notes; English translation by B. Lowy (London, 1891-1892) (without the notes) ; Zunz, Gottesdienslliche Vortrage der Juden (new ed., Frankfort-on-Main, 1892); Zur Geschichte und Literatur (Berlin, 1845). The Synagogale Poesie has been mentioned above. Steinschneider, Arabische Literatur der Juden (Frankfort-on-Main, 1902) ; Hebrdische Ubersetzungen des Mittelalters (Berlin, 1893).

On particular authors and subjects there are many excellent monogra.phsin.the Jewish Encyclopaedia (New York, 1 901-6), to which the present article is much indebted.

Bibliographies of printed books: Steinschneider, Catalogus libr. Hebr. in Bibl. Bodleiana (Berlin, 1852-1860) (more than'a catalogue) ; Zedner, Catalogue of the Hebr. Books in the British Museum (London, 1867; continued by van Straalen, London, 1894). Of manuscripts: Neubauer, Catal. of the Hebrew MSS. in the Bodleian Library (Oxford, 1886), vol. ii. by Neubauer and Cowley (Oxford, 1906); G. Margo-Wouth, Catal. of the Hebr. . . . MSS. in the British Museum (London, 1899, &c). Of both: Benjacob, Ozar ha-sepharim (Wilna, 1880) (in Hebrew; arranged by titles).

Periodicals: Jewish Quarterly Review, Revue des etudes juives; Hebrdische Bibliographie. (A. Cy.)

HEBREW RELIGION (1) Introductory.— To trace the history of the religion of the Hebrews is a complex task, because the literary sources from which our knowledge of that history is derived are themselves complex and replete with problems as to age and authorship, some of which have been solved according to the consensus of nearly all the best scholars, but some of which still await solution or are matters of

dispute. Even if the analysis of the literature into component documents were complete, we should still possess a most imperfect record, since the documents themselves have passed through many re-dactions, and these redactions have proceeded from varying standpoints of religious tradition, successively eliminating or modifying certain elements deemed inconsistent with the canons of religious usage or propriety which prevailed in the age when the redaction took place. Lastly it should be recollected that the entire body of the fragments of tradition and literature belonging to northern Israel has come down to us through the channel of Judaean recensions.

The influence of the Deuteronomic tradition in redaction is seen in such passages as Genesis xxxiii. 20 (cf. xxxi. 45 fol.); Josh. iv. 9-20, xxiv. 26 fol.; 1 Sam. vii. 12, where the massebhah or stone symbol of deity (forbidden in Deut. xii. 3, xvi. 22) is in some way got rid of (in Gen. xxxiii. 20 the word ” altar ” in Hebrew is substituted). Similarly in Gen. xiii. 18, xiv. 13, xviii. 1, the Septuagint shows that the singular form ” tere- binth ” stood in the original text. But the Massoretes altered this to the plural as this form was less suggestive of tree-worship (see Smend, A.Tliche Religionsgesch. i. p. 134, footnote 1; Nowack, Heb. Archdol. p. 12, footnote 1). Many other examples might be cited, as the ” suspended nun ” which transforms the pronunciation of the original Mosheh (Moses) into Menashsheh (Manasseh) owing to the irregular practices of his descendant, Jonathan ben Gershom (Jud. xviii. 30). It is not improbable that in 2 Kings iii. 27 the words ” from Kemosh ” stood after ” great wrath ” in the original document, as the phraseology seems bald without them, and the motives for their suppression are obvious.

So far as concerns the critical problems which stand at the threshold of our task, it must suffice to say that the main con- clusions reached by the school of Kuenen and Wellhausen as to the literary problems of the Old Testament are assumed throughout this sketch of the evolution of Hebrew religion. The documents underlying the Pentateuch and book of Joshua, represented by the ciphers J, E, D and P, are assumed to have been drawn up in the chronological order in which those ciphers are here set down, and the period of their composition extends from the 9th century B.C., in which the earlier portions of J were written, to the 5th century B.C., in which P finally took shape. The view of Professor Dillmann, who placed P before D in the regal period (though he admitted exilic and post- exilic additions in Exod., Levit. and Numb.), a view which he

maintained in his commentary on Genesis (edition of 1892), has now been abandoned by nearly all scholars of repute. In the following pages we shall not attempt to do more than to sketch in very succinct outline the general results of investigation into the origins and growth of Hebrew religion.

2. Pre-Mosaic Religion. — Can any clear indications be found to guide us as to the religion of the Hebrew clans before the time of Moses ? That Moses united the scattered tribes, probably consisting at first mainly of the Josephite, under the common worship of Yahweh, and that upon the religion of Yahweh a distinctly ethical character was impressed, is generally recognized. The tradition of the earliest document J ascribes the worship of Yahweh to rr-uch earlier times, in fact to the dawn of human life. A close survey of the facts, however, would lead us to regard it as probable that some at least of the Hebrew clans had patron- deities of their own.

(a) Both Moab and Ammon as well as Edom had their separate tribal deities, viz. Chemosh (Moab) and Milk (Milcom), the god of Ammon, and in the case of Edom a deity known from the inscriptions as K6s (in Assyrian Kaus). 1 From the patriarchal narratives and genealogies in Genesis we infer that these races were closely allied to Israel. That in early pre-Mosaic times parallel cults existed among the various Hebrew tribes is by no means improbable. It would be reasonable to assume that Moab, Ammon, Edom and kindred tribes of Israel in the 15th and preceding centuries were included in the generic term Habirl (or Hebrews) mentioned in the Tell e!-Amarna inscriptions a,s forming predatory bands that disturbed the security of the Canaanite dwellers west of the Jordan. Lastly pre-Mosaic poly- theism seems to be implied in the Mosaic prohibition Ex. xx. 3, xxii. 20.

(b) The tribal names Gad and Asher are suggestive of the worship of a deity of fortune (Gad) and of the male counterpart of the goddess, Asherah. Under the name Shaddai (which Noldeke suggests 2 was originally Shedi ” my demon “) it is possible to discern the name of a deity who in later times came to be identified with Yahweh. On the other hand, the. connexion of the name Samson with sun-worship throws light on the period of the Hebrew settlement in Canaan and not on pre-Mosaic times. Nor is it possible to agree with Baudissin (Studien sur semit. Religionsgcsch. i. 55) that Elohlm as a plural form for the name of the Hebrew deity ” can hardly be understood otherwise than as a comprehensive expression for the multitude of gods embraced in the One God of Old Testament religion,” in other

words that it presupposes an original polytheism. For (1) Elohlm is also applied in Judges xi. 24 to the Moabite Chemosh (Kemosh); in 1 Sam. v. 7 to Dagon; in 1 Kings xi. 5 to Ash- toreth; in 2 Kings i. 2, iii. 6, 16 to Ba'al Zebul of Ekron. (2) It is merely a plural of dignity (pluralis majestalis) parallel to adonlm (applied to a king in 1 Kings xviii. 8, whereas in the previous verse the singular form adoni is applied to the prophet Elijah). (3) The Tell el-Amarna inscriptions indicate that the term Elohlm might even be applied in abject homage to an Egyptian monarch as the use of the term Hani in this connexion obviously implies. 3

The religion of the Arabian tribes in the days of Mahomet, of which a picture is presented to us by Wellhausen in his Remains of Arabic Heathendom, furnishes some suggestive indica- tions of the religion that prevailed in nomadic Israel before as well as during the lifetime of Moses. It is true that Arabian polytheism in the time of Mahomet was in a state of decay. Nevertheless the life of tha desert changes but slowly. We may therefore infer that ancient Israel during the period when they

'See Bathgen, Beitrage zur semit. Religionsgesch. p. II (Edom); and rf. Schrader, C.O.T. i. 137; K.A'.T. (3rd ed.), p. 472 foil. See also Beitrage, pp. 13-15; K.A.T. (3rd ed.), pp. 469-472.

- Z.D.M.G. (1886). It is impossible to discuss the other theories of the origin of this name. See Driver, Commentary on Genesis, excursus i. pp. 404-406.

3 The Tell el-Amarna despatches are crowded with evidences of Canaanite forms and idioms impressed on the Babylonian language of these cuneiform documents. Hani here simply corresponds to the Canaanite Elohlm. See opening of the letters of Abimelech of Tyre, Bezold's Oriental Diplomacy, Nos. 28, 29, 30.

inhabited the negebh (S. of Canaan) stood in awe of the demons (Jinn) of the desert, just as the Arabs at the present day described in Doughty's Arabia deserta. We know that diseases were attri- buted by the Israelites to malignant demons which they, like the Arabs, identified with serpents. The counterspell took the form of a bronze image of the serpent-demon; see Frazer, Golden Bough, ii. 426 ; and 1 Sam. v. 6, vi. 4, 5 (LXX. and Heb.) as well as Buchanan Gray's instructive note in Numbers, p. 276. The slaughter of a lamb at the Passover or Easter season, whose blood was smeared on the door-post, as described in Ex. xii. 21-23, probably points back to an immemorial custom. In this case the counterspsll assumed a different form.

Westermarck has shown from his observations in Morocco that the blood of the victim was considered to visit a curse upon the object to whom the sacrifice is offered and thereby the latter is made amenable to the sacrificer. 4 It is hardly possible to doubt that in the original form of the rite described in Exodus the blood offering was made to the plague demon (" the destroyer ") and possessed over him a magic power of arrest.

It is therefore certain that belief in demons and magic spells prevailed in pre-Mosaic times 6 among the Israelite clans. And it is also probable that certain persons combined in their own individuality the functions of magician and sacrificer as well as soothsayer. For we know that in Arabic the Kahin, or soothsayer, is the same participial form that we meet with in the Hebrew Kohen, or priest, and in the early period of Hebrew history {e.g. in the days of Saul and David) it was the priest with the ephod or image of Yahweh who gave answers to those who consulted him. How far totemism, or belief in deified animal ancestors, existed in prehistoric Israel, as evidenced by the tribal names Simeon (hyena, wolf), Caleb (dog), Hamor (ass), Rahel (ewe) and Leah (wild cow), &c., 6 as well as by the laws respecting clean and unclean animals, is too intricate and speculative a problem to be discussed here. That the food-taboo against eating the flesh of a particular animal would prevail in the clan of which that animal was the deified totem-ancestor is obvious, and it would be a plausible theory to hold that the laws in question arose when the Israelite tribes were to be con- solidated into a national unity (i.e. in the time of David and Solomon), but the application of this theory to the list of unclean foods in Deut. xiv. (Lev. xi.) seems to present insuperable difficulties. In fact, while Robertson Smith (in Kinship and Marriage in Early Arabia, as well as his Religion of the Semites, followed by Stade and Benzinger) strongly advocated the view that clear traces of totemism can be found in early Israel, later writers, such as Marti, Gesch. der israelii. Religion, 4th ed., p. 24, Kautzsch in his Religion of Israel already cited, p. 613, and recently Addis in his Hebrew Religion, p. ˆ3 foil., have abandoned the theory as applied to Israel. 7 On the other hand, the evidence for the existence of ancestor-worship in primitive Israel cannot be so easily disposed of as Kautzsch (ibid. p. 615) appears to think. We have examples (1 Sam. xxviii. 13) in which Elohlm is the term which is applied to departed spirits. Oracles were received from them (Isa. viii. 19, xxviii. 15, 18; Deut. xviii. 10 foil.). At the graves of national heroes or ancestors worship was paid. In Gen. xxxv. 20 we read that a massebah or sacred pillar was erected at Rahel's tomb. That the Teraphim, which we know to have resembled the human form (1 Sam. xix. 13, 16), were ancestral images is a

reasonable theory. That they were employed- in divination is consonant with the facts already noted. Lastly, the rite of circumcision (

4 ” Magic and Social Relations ” in Sociological Papers, ii.

160.

6 See Kautzsch, ” Religion of Israel,” in Hastings’s Diet, of the Bible, extra vol., p. 614.

6 See Benzinger, Hebrdische Archdologie, pp. 152, 297 foil. (1st ed.;.

7 The theory was opposed by Noldeke, 1886 (Z.D.M.G. p. 157 foil.), as well as Wellhausen, and since then by Jacobs and Zapletal. (Der Totemismus u. die Religion Israels). See Stanley A. Cook, " Israel and Totemism," in J.Q.R. (April, 1902).

Herod, ii. 104, and Barton, Semitic Origins, pp. 98-100. Probably the custom was of African origin, and came from eastern Africa along with the Semitic race. Respecting Arabia, see Doughty, Arabia deserta, i. 340 foil.

It is necessary here to advert to a subject much debated during recent years, viz. the effects of Babylonian culture in western Asia on Israel and Israel's religion in early times even preceding the advent of Moses. The great influence exercised by Babylonian culture over Palestine between 2000 and 1400 B.C. (circa), which has been clearly revealed to us since 1887 by the discovery of the Tell el Amarna tablets, is now universally acknowledged. The subsequent discovery of a document written in Babylonian cuneiform at Lachish (Tell el Hesy), and more recently still of another in the excavations at Ta'annek, have established the fact beyond all dispute. The last discovery had tended to confirm the views of Fried. Delitzsch, Jeremias (Monotheistische Stromungen) and Baentsch, that monotheistic tendencies are to be found in the midst of Babylonian polytheism. Page Renouf, in his Hibbert lectures, Origin and Growth of Religion as illustrated by that of Ancient Egypt (1879), p. 89 foil., pointed out this monotheistic tendency in Egyptian religion, as did de Rouge before him. Baentsch draws attention to this feature in his monograph Altorientalischer u. israelitischer Monotheismus (1906). This tendency, however, he, unlike the earlier conserva- tive writers, rightly considers to have emerged out of polytheism. He ventures into a more disputable region when he penetrates into the obscure realm of the Abrahamic migration and finds in the Abrahamic traditions of Genesis the higher Canaanite mono- theistic tendencies evolved out of Babylonian astral religion, and reflected in the name El'Elyon (Gen. xiv. 18, 22). Further discoveries like Sellin's find at Ta'annek may elucidate the problem. See Baudissin in Theolog. lit. Zeitung (27th October

1906).

3. The Era of Moses.— We are now on safer ground though still

obscure. Moses was the first historic individuality who can be said to have welded the Israelite clans into a whole. This could never have been accomplished without unity of worship. The object of this worship was Yahweh. As we have already indicated, the document J assumes that Yahweh was worshipped by the Hebrew race from the first. On the other hand, according to P (Ex. vi. 2), God spake to Moses and said to him: ” I am Yahweh. But I appeared to Abraham, Isaac and Jacob as El Shaddai and by my name Yahweh I did not make myself known to them.” According to this later tradition Yahweh was unknown till the days of Moses, and under the aegis of His power the Hebrew tribes were delivered from Egyptian thraldom. The truth probably lies somewhere between these two sharply con- trasted traditions. So much is clear. Yahweh now becomes the supreme deity of the Hebrew people, and an ark analogous to the Egyptian and Babylonian arks portrayed on the monuments 1 was constructed as embodiment of the numen of Yahweh and was borne in front of the Hebrew army when it marched to war. It was the signal victory won by Moses at the exodus against the Egyptians and in the subsequent battle at Rephldim against ‘Amalek (Ex. xvii.) that consolidated the prestige of Yahweh, Israel’s war-god. Indications in the Old Testament itself clearly point to the celestial or atmospheric character of the Yahweh of the Hebrews. The supposition that the name originally con- tained the notion of permanent or eternal being, and was derived from the verbal root signifying ” to be,” involves too abstract a conception to be probable, though it is based on Ex. iii. 15 (E) representing a tradition which may have prevailed in the 8th century B.C. Kautzsch, however, supports it (Hastings’s D.B., extra vol. ” Rel. of Isr.” p. 625 foil.) against the other derivations proposed by recent scholars (see Jehovah). That the name also prevailed as that of a god among other Semitic races (or even

1 These sacred arks were carried in procession accompanied by symbolic figures. We note in this connexion the form of a sacred bark represented in Meyer’s Hist, of Egypt (Oncken series), p. 257, viz. the procession carrying the sacred ark and the bark of the god Am5n belonging to the reign of Rameses II. (Lepsius, Denkmaler, iii. 189b). See also Birch, Egypt (S.P.C.K.), p. 151 (ark of Khonsu) ; cf. Jeremias, Das A.T. im Lichte des alien Orients (2nd ed.), pp. 436—441.

non-Semitic) is rendered certain by the proper names Jau-bi’-di (= Ilu-bi’di) of Hamath in Sargon’s inscriptions, Ahi-jawi (mi) in Sellin’s discovered tablet at Ta’annek, to say nothing of those which have been found in the documents of Khammurabi’s reign. It has generally been held that Stade’s supposition has much to recommend it, that it was derived by Moses from the Kenites, and should be connected with

the Sinai-Horeb region. The name Sinai suggests moon-worship and the moon-god Sin; and it also suggests Babylonian influence (cf . also Mount Nebo, which was a place-name both in Moab and in Judah, and naturally connects itself with the name of the Babylonian deity). Several indica- tions favour the view of the connexion in the age of Moses between the Yahweh-cult at Sinai and the moon- worship of Babylonian origin to which the name Sinai points (Sin being the Babylonian moon-god). We note (a) that in the worship of Yahweh the sacred seasons of new moon and Sabbath are obviously lunar. Recent investigations have even been held to disclose the fact that the Sabbath coincided originally, i.e. in early pre-exilian days, with the full moon. 2 (b) It also accords with the name bestowed on Yahweh as ” Lord of Hosts ” (sebdoth) or stars, which were regarded as personified beings (Job xxxviii. 7) and attendants on the celestial Yahweh, constituting His retinue (1 Kings xxii. 19) which fought on high while the earthly armies of Israel, His people, contended below (Judges v. 20).

The atmospheric and celestial character which belonged from the first to the Hebrew conception of Yahweh explains to us the ease with which the idea of His universal sovereignty arose, which the Yahwistic creation account (belonging to the earlier stratum of J, Gen. ii. 46 foil.) presupposes. How this came to be overlaid by narrow local limitations of His power and province will be shown later. It is probable that Moses held the larger rather than the narrower conception of Yahweh’s sphere of influence. While the ark carried with Israel’s host symbolized His presence in their midst, He was also known to be present in the cloud which hovered before the host and in the lightning (‘esh Yahweh or ” fire of Yahweh “) and the thunder (kol Yahweh or ” voice, of Yahweh “) which played around Mount Sinai. Moreover, it is hardly probable that a great leader like Moses remained unaffected by the higher conceptions tending towards monotheism which prevailed in the great empires on the Nile and on the Euphrates. In Egypt we know that Amenophis IV. came under this monotheistic movement, and attempted to suppress all other cults except that of the sun-deity, of which he

2 Cf. Zimmern in Z.D.M.G. (1904), pp. 199 foil., 458 foil. This view is based on Dr Pinches’s discovered list in which Sapatti is called the 15th day (Proc. of the Soc. of Biblical Arch., p. 51 foil.). See A. Jeremias, Das A. T. im Lichte des alien Orients (2nd ed.), pp. 182-187. Marti, in his stimulating work Religion des A.T., pp. 5, 72, advocates the exclusive reference of the word Sabbath to the full moon until the time of Ezekiel on the basis of Meinhold’s arguments in Sabbat u. Woche im A.T. The latter regards Ezekiel as the organizer of

the Jewish community and the originator of the sanctity of the Sabbath as a seventh day (Ezek. xlvi. 1 ; cf. Ezek. xx. 12, 13, 16, 20, 24, xxii. 8, 26, xxiii. 38, in which the reproaches for the profanation or neglect of the' Sabbath in no way sustain Meinhold's view). In opposition to Meinhold, see Lotz in P.R.E. (3rd ed., art. " Sabbath," vol. xvii. pp. 286-289). To this Meinhold replies in Z.A.T.W. (1909), p. 81 f. Cf. also Hehn, Siebenzahl und Sabbat. While admitting that a special significance may have been attached in pre-exilian times to the full-moon Sabbath, and that the latter may have been specially intended in the combination " new moon and Sabbath" in the 8th-century prophets (Hos. ii. 13; Amos viii. 5 ; Isa. i. 13), we are not prepared to deny that the institution of a seventh-day Sabbath was an ancient pre-exilian tradition. The sacredness of the number seven is based on the seven planetary deities to whom each day of the week was respectively dedicated, i.e. was astral in origin. Cf. C.O.T. i. 18 foil., and Winckler, Religionsgeschichtlicher u. geschichtlicher Orient, p. 39. See also K.A . T. (3rd ed.), pp. 620-626. In the Old Testament the sanctity of the number seven is clearly fundamental (e.g. in the Nif'al form niiba', " to swear," in the derivative subst. for " oath," in Beer-sheba", &c). The seventh day of rest was parallel to the seventh year of release and of the fallow field. It is, therefore, impossible to detach Ex. xxiii. 12 from Ex. xxi. 2. xxiii. 10 foil.; cf. Ex. xxxiv. 21. We therefore hold that the law of the seventh-day Sabbath goes back to the Mosaic age. The general coincidence of the Sabbath or seventh day with the easily recognized first quarter and full moon established its sacred character as lunar as well as planetary.

was a devoted worshipper. We also know that between 2000 and 1400 B.C. the Babylonian language as well as Babylonian civilization and ideas spread over Palestine (as the Tell el Amarna tables clearly testify). The ancient Babylonian psalms clearly reveal that the highest minds were moving out of polytheism to a monotheistic identification of various deities as diverse phases of one underlying essence. A remarkable Babylonian tablet dis- covered by Dr Pinches represents Marduk, the god of light, as identified in his person with all the chief deities of Babylonia, who are evidently regarded as his varying manifestations. 1

Through the influence of Mosaic teaching and law a definitely ethical character was ascribed to Yahweh. It was His " finger " that wrote the brief code which has come down to us in the decalogue. At first, as

Erdmanns suggests, it may have con- sisted of only seven commands. So also Kautzsch, ibid. p. 634. The most strongly distinguishing feature of the code is the rigid exclusion of the worship of other gods than Yahweh. Moreover, the definitely ethical character of the religion of Yahweh estab- lished by Moses is exhibited in the strict exclusion of all sexual impurity in His worship. Unlike the Canaanite Baal, Yahweh hasnofemale consort, and this remained throughouta distinguish- ing trait of the original and unadulterated Hebrew religion (see Bathgen, Beitrdge, p. 265). Indeed, Hebrew, unlike Assyrian or Phoenician, has no distinctive form for ” goddess.” From first to last the true religion of Yahweh was pure of sexual taint. The kedeshlm and kedeshoth, the male and female priest attend- ants in the Baal and ‘Ashtoreth shrines (cf. the kadishtu of the temples of the Babylonian Ishtar) were foreign Canaanite elements which became imported into Hebrew worship during the period of the Hebrew settlement in Canaan.

Lastly, the earliest codes of Hebrew legislation (Ex. xxi.- xxiii.) bear the distinct impress of the high ethical character of Yahweh’s requirements originally set forth by Moses. Of this tradition the Naboth incident in the time of Ahab furnishes a clear example which brings to light the contrast between the Tyrian Baal-cult, which was scarcely ethical, and of which Jezebel and Ahab were devotees, and the moral requirements of the religion of Yahweh of which Elijah was the prophet and im- passioned exponent. It was this definite basis of ethical Mosaic religion to which the prophets of the 8th century appealed, and apart from which their denunciations become meaningless. To this early standard of life and practice Ephraim was faithless in the days of the prophet Hosea (see his oracles passim — especially chaps, i.-iv. and xiv.), and Judah in the time of Isaiah turned a deaf ear (Isa. i. 2-4, 21).

4. Influence of Canaan. — The entrance of Israel into Canaan marks the beginning of a new epoch in the development of Israel’s religious life. For it involved a transition from the simple nomadic relations to those of the agricultural and more highly civilized Canaanite life. This subject has been recently treated with admirable clearness by Marti in his useful treatise Die Religion des A.T. (1006), pp. 25-41.

It is in the festivals of the annual calendar that this agricultural impress is most fully manifested. To the original nomadic Pesah (Passover) — sacrifice of a lamb — there was attached a distinct and agricultural festival of unleavened cakes (massoth) which marks the beginning of the corn harvest in the middle of the month Abib (the name of which points to its Canaanite and

1 The tablet is neo-Babylonian and published by Dr Pinches in the Transactions of the Victoria Institute, and is cited by Professor Fried. Delitzsch in the notes appended to his first lecture Babel u. Bibel (5th German ed., p. 81 ad fin. and p. 82). On this subject of Baby- lonian influence over Israel sc-e Jeremias, Monotheislische Slromungen innerhalb der babylonischen Religion, and E. Baentsch, Altorienta- lischer u. israelitischer Monotheismus. The text and rendering of the passage are doubtful in the cuneiform letter discovered by Sellin in Ta'annek (biblical Ta'anach, near Megiddo) addressed by Ahi-jawi (? Ahijah) to Ishtar-wasur, in which the following remark- able phrases are read: " May the Lord of the gods protect thy life. . . . Above thy head is one who is above the towns. See now whether he will show thee good. When he reveals his face, then will they be put to shame and the victory will be complete." The letter appears to belong to about 1400 B.C. See A. Jeremias, Das A.T. im Lichte des alten Orients (2nd ed.), pp. 315, 316, 323. Sellin, Ertrag der A usgrabungen im Orient.

agricultural origin). The close of the corn-harvest was marked by the festival Shabhuolh (weeks) or jfcdsir (harvest) held seven weeks after massoth. The last and most characteristic festival of Canaanite life was that of Asiph or " ingathering " which after the Deuteronomic reformation (621 B.C.) had made a single sanctuary and therefore a considerable journey with a longer stay necessary, came to be called Succoth or booths. This was the autumn festival held at the close of September or beginning of October. It marked the close of the year's agricul- tural operations when the olives and grapes had been gathered [Ex. xxiii. 14-17 (E), xxxiv. 18, 22, 23 (J)];' see Feasts, Passover, Pentecost and Tabernacles. Another special characteristic of Israel's religion in Canaan was the considerable increase of sacrificial offerings. Animal sacrifices became much more frequent, and included not only the bloody sacrifice (Zebah) but also burnt offerings (kdlil, 'olah) whereby the whole animal was consumed (see Sacrifice). But we have in addition to the animal sacrifices, vegetable offerings of meal, oil and cakes (massoth, ashishah and kawwan, which last is specially connected with the 'Ashtoreth cult: Jer. vii. 18, xliv. 19), as well as the " bread of the Presence " (lehem happdnim), 1 Sam. xxi. 6. Whether the primitive rite of water-offerings (1 Sam. vii. 6; 2 Sam. xxiii. 16) belonged to early nomadic Israel (as seems probable) it is not possible to determine with any certainty.

Again, the conception of Yahweh suffered modification. In the desert he was worshipped as an atmospheric deity, who manifested himself in thunder and lightning, whose abode was in the sky, whose sanctuary was on the mountain summit of Horeb-Sinai, and whose

movable palladium was the ark of the covenant. But when the nomadic clans of Israel came to occupy the settled abodes of the agricultural Canaanites who had a stake in the soil which they cultivated, these conditions evidently reacted on their religion. Now the locai Baal was the divine owner of the fertile spot where his sanctuary (qodesh) was marked by the upright stone pillar, the symbol of his presence, on which the blood of the slaughtered victim was smeared. To this Baal the productiveness of the soil was due. Consequently it was needful to secure his favour, and in order to gain this, gifts were made to him by the local resident population who depended on the produce of the land (see Baal, especially ad init.). Now when the Hebrews succeeded to these agricultural conditions and acquired possession of the Canaanite abodes, they naturally fell into the same cycle of religious ideas and tradition. Yahweh ceased to be exclusively regarded as god of the atmosphere, worshipped in a distant mountain, Horeb-Sinai, situated in the south country (negebh),&nd moving in the clouds of heaven before the Israelites in the desert, but he came to be associated with Israel's life in Canaan. He manifested His presence either by a signal victory over Israel's foes (Josh.x. 10, n; 1 Sam. vii. 10-12) or by a thunderstorm (1 Sam. xii. 18) or through a dream (Gen. xxviii. 16 foil. ; cf . 1 Kings iii. 5 foil.) at a sacred spot like Bethel. Accordingly, whenever His presence and power were displayed in places where the Canaanite Baal had been worshipped, they came to be attached to these spots. He had " put his name," i.e. power and presence (numen) there, and the same festivals and sacrifices which had previously been devoted to the cult of the Canaanite Baal were now annexed to the service of Yahweh, the war-god of the conquering race. The process of transference was facilitated by two potent causes: (a) Both Canaanite and Hebrew spoke a common language; (b) the name Baal is not in reality an individual proper name like Kemosh (Chemosh), Ramman or Hadad, but is, like El (Ilu)" god," an appellative meaning " lord," " owner " or " husband." The. name Baal might therefore be used for any deity such as Milk (Milcom) or Shemesh (" sun ") who was the divine owner of the spot. It was simply a covering epithet, and like the word " god " could be transferred from one deity to another. In this way Yahweh came to be called the Baal or " lord " of any sacred place where the armies of Israel by their victories attested " his mighty hand and outstretched arm." (See Kautzsch in Hastings's D.B., extra vol., p. 645 foil.)

Such was the path of syncretism, and it was fraught with

peril to the older and purer faith. For when Yahweh gradually became Israel's local Baal he became worshipped like the old Canaanite deity, and all the sensuous accompaniments of Kedeshoth, 1 as well as the presence of the asherah or sacred pole, became attached to his cult. But the symbol carried with it the minien of the goddess symbolized, and there can be little doubt that Asherah came to be regarded as Yahweh's consort. In the days of Manasseh syncretism went on unchecked even in the Jerusalem temple and its precincts, and it was not till the year of Jcsiah's reformation (621 B.C.) that the Kedeshlm and Kedeshoth as well as the Asherah were banished for ever from Yahweh's sanctuary (2 Kings xxi. 7, xxiii. 7), which their presence had profaned.

Now local worship means the differentiation of the personality worshipped in the varied local shrines, in other words Baalim or Baals. Just as we have in Assyria an Ishtar of Arbela and an Ishtar of Nineveh (treated in Assur-bani-pal's (Rassam) cylinder 2 like two distinct deities), as we have local Madonnas in Roman Catholic countries, so must it have been with the cults of Yahweh in the regal period carried on in the numerous high places, Bethel, Shechem, Shiloh (till its destruction in the days of Eli) and Jerusalem. Each in turn claimed that Yahweh had placed his name {i.e. personal presence and power or numen) there. Each had a Yahweh of its own.

On the other hand, old deities still lurked in old spots which had been for centuries their abode. It was no easy task to establish Yahweh in permanent possession of the new lands conquered by the Hebrew settlers. The old gods were not to be at once discrowned of might. Of this we have a vivid example in the episode 2 Kings xviii. 24-28. The inhabitants of Babylonia and other regions whom the Assyrian kings had settled in Ephraim after 721 B.C. (cf. Ezra iv. 10) are described as suffering from the depredations of lions, and a priest from the deported Ephraimites is sent to them to teach them the worship of Yahweh, the god of the land. Similarly in the earlier pre-exilian period of Israel's occupation of Canaanite territory the Hebrews were always subject to this tendency to worship the old Baal or 'Ashtoreth (the goddess who made the cattle and flocks prolific). 3 A few years of drought or of bad seasons would make a Hebrew settler betake himself to the old Canaanite gods. Even in the days of Hosea the rivalry between Yahweh and the old Canaanite Baal still continued. The prophet reproaches his Ephraimite countrymen for going after their " lovers," the old local Baals who were supposed to have bestowed on them the bread, water, wool, flax and oil, and for not

knowing that ” it is I (Yahweh) who have bestowed on her {i.e. Israel) the corn, the new wine and the oil, and have bestowed on her silver and gold in abund- ance which they have wrought into a Baal image ” (Hos. ii. 10).

External danger from a foreign foe, such as Midian or the Philistines, at once brought into prominence the claim and power of Yahweh, Israel’s national war-god since the great days of the exodus. The religion of Yahweh (as Wellhausen said) meant patriotism, and in war-time tended to weld the participat- ing tribes into a national unity. The book of Judges with its ” monotonous tempo — religious declension, oppression, repent- ance, peace,” to which Wellhausen 4 refers as its ever-recurring cycle, makes us familiar with these alternating phases of action and reaction. Times of peace meant national disintegration and the lapse of Israel into the Canaanite local cults, which is interpreted by the redactor as the prophets of the 8th century would have interpreted it, viz. as defection from Yahweh. On the other hand, times of war against a foreign foe meant on the religious side the unification, partial or complete, of the

1 The allusion in Amos ii. 7; Hos. iv. 13, 14 is sufficiently explicit; cf. Jer. ii. 20-23, iii. 6-1 1, v. 7, 8. The practice is prohibited in Deut. xxiii. 17.

2 Column i. 15, 16, 42, 43, ii. 128, iii. 30, 31, iv. 47, 48, &c. Probably wc should regard them as differentiated hypostases.

s Hence the ‘Ashtaroth or offspring of flocks in Deut. vii. 13, xxviii. 18. A like function belonged to the Babylonian Ishtar. See ” Descent of Ishtar to Hades,” Rev. lines 6-10, where universal non-intercourse of sexes follows Ishtar’s departure from earth to Hades.

4 Proleg. Gesch. Israels (2nd ed.), p. 240 foil., cf . p. 258.

Israelite tribes by the rallying cry ” the sword of Yahweh ” (Judges vii. 20). In this way ‘Ophrah became the centre of the coalition under Gideon in the tribe of Manasseh. Its im- portance is attested by Judges viii. 22-28, and we may disregard the ” snare ” which the Deuteronomic writer condemns in accordance with the later canons of orthodoxy. What ‘Ophrah became on a small scale in the days of Gideon, Jerusalem became on a larger scale in the days of David and his successors. It was the religious expression of the unity of Israel which the life and death struggle with the Philistines had gradually wrought out.

Despite the capture of the ark after the disastrous battle of Shiloh, Yahweh had in the end shown himself through a destructive plague superior in might to the Philistine Dagoc. There are indeed abundant indications that prove that in the prevalent popular religion of the regal period monotheistic conceptions had no place. Yahweh was god only of Israel and of Israel's land. An invasion of foreign territory would bring Israel under the power of its patron-deity. The wrath with which the Israelite armies believed themselves to be visited (probably an outbreak of pestilence) when the king of Moab was reduced to his last extremity, was obviously the wrath of Chemosh the god of Moab, which the king's sacrifice of his only son had awakened against the invading army (2 Kings iii. 27). In other words, the ordinary Israelite worshipper of Yahweh was at this time far removed from monotheism, and still remained in the preliminary stage of henotheism, which regarded Yahweh as sole god of Israel and Israel's land, but at the same time recognized the existence and power of the deities of other lands and peoples. Of this we have recurring examples in pre-exilian Hebrew history. See 1 Sam. xxvi. 19; Judges xi. 23, 24; Ruth i. 16.

5. Characteristics and Constituent Elements. — It is only possible here to refer in briefest enumeration to the material and external objects and forms of popular Hebrew religion. These were of the simplest character. The upright stone Q bif/ts (or massebah) was the material symbol of deity on which the blood of sacrifice was smeared, and in which the numen of the god resided. It is probable that in some primitive sanctuaries no real distinction was made between this stone pillar and the altar or place where the animal was slaughtered. In ordinary pre-exilian high places the custom described in the primitive compend of laws (Ex. xx. 24) would be observed. A mound of earth was raised which would serve as a platform on which the victim would be slaughtered in the presence of the concourse of spectators. In the more important shrines, as at Jerusalem or Samaria, there would be an altar of stone or of bronze. Another accompaniment of the sanctuary would be the sacred tree — most frequently a terebinth (cf. Judges ix. 37 " terebinth of soothsayers "), or it might be a palm tree (cf. "palm tree of Deborah " in Judges iv. 5), or a tamarisk {'eshel), or pomegranate {rimmon), as at the high place in Gibeah where Saul abode. Moreover, we have frequent references to sacred springs, as that of Beer-sheba, ' Enharod {'eyn-harod) (Judges vii. 1; cf. also Judges 19, ' En-hafckore ['eyn-haqqore']). (On this subject of holy trees, holy waters and holy stones, consult article Tree-Worship, and Robertson Smith's Religion of the Semites, 2nd ed., pp. 165-197.)

The wide prevalence of magic and soothsaying may be illustrated from the historical books of the Old Testament as well as from the pre-

exilian prophets. The latter indeed tolerated the qosem (soothsayer) as they did the seer (ro'eh). The rhabdomancy denounced by Hosea (iv. 12) was associated with idolatry at the high places. But the arts of the necromancer were always and without exception treated as foreign to the religion of Yahweh. The necromancer of ba'al 'obh' was held to be possessed of the spirit who spoke through him with a hollow voice. Indeed both necromancer and the spirit that possessed him were sometimes identified, and the former was simply called obh. It is probable that necromancy, like the worship of Asherah and 'Ashtoreth, as well as the cult of graven images, was a Canaanite importation into Israel's religious practices. (See Marti, Religion des A.T., p. 32.)

Priest- hood.

The history of the rise of the priesthood in Israel is exceedingly obscure. In the nomadic period and during the earlier years of the settlement of Israel in Canaan the head of every family could offer sacrifices. In the primitive codes, Ex. xx. 22-xxiii. 19 (E), xxxiv. 10-28 (J), we have no allusion to any separate order of men who were qualified to offer sacrifices. In Ex. xxiv. 5 (E) we read that Moses simply commissioned young men to offer sacrifices. On the other hand the addendum to the book of Judges, chaps, xvii., xviii. (which Budde, Moore and other critics consider to belong to the two sources of the narratives in Judges, viz. J 1 as well as E), makes reference to a Levite of Bethlehem-Judah, expressly stated in xvii. 7 as belonging to a clan of Judah. This man Micah took into his household as priest. This narrative has all the marks of primitive simplicity. There can be no reasonable doubt that the Levite here was member of a priestly tribe or order, and this view is confirmed by the discovery of what is really the same word in south Arabian inscriptions. 2 The narrative is of some value as it shows that while it was possible to appoint any one as a priest, since Micah, like David, appointed one of his own sons (xvii. 5), yet a special priest-tribe or order also existed, and Micah considered that the acquisition of one of its members was for his household a very exceptional advantage: " Now

1 know that Yahweh will befriend me because I have the Levite as priest." 3 In other words a priest who was a Levite possessed a superior professional qualification. He is paid ten shekels per annum, together with his food and clothing, and is dignified by the

appellation ” father ” (cf. the like epithet of ” mother ” applied to the prophetess Deborah, Judges v. 7; see also

2 Kings ii. 12, vi. 21, xiii. 14). This same narrative dwells upon the graven images, ephod and teraphlm, as forming the apparatus of religious ceremonial in Micah’s household. Now the ephod and teraphim are constantly mentioned together (cf. Hos. iii. 4) and were used in divination. The former was the plated image of Yahweh (cf. Judges viii. 26, 27) and the latter were ancestral images (see Marti, op. cit. pp. 27, 29; Harper, Int. Comm. ” Amos and Hosea,” p. 222). In other words the function of the priest was not merely sacrificial (a duty which Kautzsch unnecessarily detaches from the services which he originally rendered), nor did he merely bear the ark of the covenant and take charge of God’s house; but he was also and mainly (as the Arabic name kahin shows) the soothsayer who consulted the ephod and gave the answers required on the field of battle (see 1 Sam. and 2 Sam. passim) and on other occasions. This is clearly shown in the ” blessing of Moses ” (Deut. xxxiii. 8), where the Levite is specially associated with another apparatus of inquiry, viz. the sacred lots, Urim and Thummim. The true character of Urim (as expressing ” aye “) and Thummim (as expressing ” nay ”) is shown by the reconstructed text of 1 Sam. xiv. 41 on the basis of the Septuagint. See Driver ad loc.

The chief and most salient characteristic of the worship of the high places was geniality. The sacrifice was a feast of social

communion between the deity and his worshippers, otwoi > an < ˆ knit b ot h deity and clan-members together in ship. the bonds of a close fellowship. This genial aspect

of Hebrew worship is nowhere depicted more graphic- ally than in the old narrative (a J section = Budde’s G) 1 Sam. ix. 19-24, where a day of sacrifice in the high place is described. Saul and his attendant are invited by the seer-priest Samuel into the banqueting chamber (lishkah) where thirty persons partake of the sacrificial meal. It was the ‘dsiph or festival of ingathering, when the agricultural operations were brought to a close, which exhibited these genial features of Canaanite- Hebrew life most vividly. References to them abound in pre- exilian literature: Judges xxi. 21 (cf. ix. 27); Amos viii. 1 foil.; Hos. ix. 1 foil., Jer. xxxi. 4; Isa. xvi. 10 (Jer. xlviii. 33). These festivals formed the veins and arteries of ancient Hebrew

1 Interna/-. Crit Commentary, Judges, Introd. p. xxx., also p. 367 foil.

2 hˆ> “priest,” r\K-S “priestess”; see Hommel, Siid-arabische Chrestomathie, p. 127; Ancient Hebrew Tradition, p. 278 foil.

‘ Moore regards this verse as belonging to the J or older document, op. cit. p. 367.

clan and tribal life. 4 Wellhausen’s characterization of the Arabian hajj b applies with equal force to the Hebrew hagg (festival): ” They formed the rendezvous of ancient life. Here came under the protection of the peace of God the tribes and clans which otherwise lived apart from one another and only knew peace and security within their own frontiers.” 1 Sam. xx. 28 foil, indicates the strong claims on personal attendance exercised on each individual member by the local clan festival at Bethlehem-Judah.

It is easy to discern from varied allusions in the Old Testament that the Canaanite impress of sensuous life clung to the autumnal vintage festivals. They became orgiastic in character and scenes of drunkenness, cf. Judges ix. 27; 1 Sam. 14-16; Isa. xxviii. 7, 8. Against this tendency the Nazirite order and tradition was a protest. Cf. Amos ii. 11 foil.; Judges xiii. 7, 14. As certain sanctuaries, Shiloh, Shechem, Bethel, &c, grew in importance, the priesthoods that officiated at them would acquire special prestige. Eli, the head priest at Shiloh in the early youth of Samuel, held an important position in what was then the chief religious and political centre of Ephraim; and the office passed by inheritance to the sons in ordinary cases. In the regal period the royal residence gave the priesthood of that place an exceptional position. Thus Zadok, who obtained the priestly office at Jerusalem in the reign of- Solomon and was succeeded by his sons, was regarded in later days as the founder of the true and legitimate succession of the priesthood descended from Levi (Ezek. xl. 46, xliii. 19, xliv. 15; cf. 1 Kings ii. 27, 35). His descent, however, from Eleazar, the elder brother of Aaron, can only be regarded as the later artificial construction of the post-exilian chronicler (1 Chron. vi. 4-15, 50-53, xxiv. 1 foil.), who was controlled by the traditions which prevailed in the 4th century B.C. and after.

6. The Prophets. — The rise of the order of prophets, who gradually emerged out of and became distinct from the old Hebrew ” seer ” or augur (1 Sam. ix. 9), 8 marks a new epoch in the religious development of the Hebrews. Over the successive stages of this growth we pass lightly (see Prophet). The life- and-death struggle between Israel and the Philistines in the reign of Saul called forth under Samuel’s leadership a new order of ” men of God,” who were called ” prophets ” or divinely inspired speakers. 7 These men were distributed

in various settlements, and their exercises were usually of an ecstatic character. The closest modern analogy would be the orders of dervishes in Islam. Probably there was little externally to distinguish the prophet of Yahweh in the days of Samuel from the Canaanite-Phoenician prophets of Baal and Asherah (1 Kings xviii. 19, 26, 28), for the practices of both were ecstatic and orgiastic (cf. 1 Sam. x. 5 foil., xviii. 10, xix. 23 foil.). The special quality which distinguished these prophetic gilds or companies was an intense patriotism combined with enthusiastic devotion to the cause of Yahweh. This necessarily involved in that primitive age an extreme jealousy of foreign importations or innovations in ritual. It is obvious from numerous passages that these pro- phetic gilds recognized the superior position and leadership of Samuel, or of any other distinguished prophet such as Elijah or Elisha. Thus 1 Sam. xix. 20, 23 et seq. show that Samuel was regarded as head of the prophetic settlement at Naioth. With reference to Elijah and Elisha, see 2 Kings ii. 3, 5, 15, iv. 1, 38 et seq., vi. 1 et seq. There cannot be any doubt that

4 Similarly in ancient Greece. See the instructive passage _ in Aristotle, Nic. Eth. viii. Q (4, 5), on the relation of Greek sacrifices and festivals to Koiviiiviai and politics: at yhp apxˆc-i- Qvffiai ical abvoboi a.ivovTai yiyveaOai juera r As t&v Kapiruiv avytcofudas olov &.irapxai ; cf. Grote on Pan-Hellenic festivals, History of Greece, vol. iii. < ch.

28.

5 Wellhausen, Reste arabischen Heidentums (2nd ed.), p. 89.

6 Though this be an interpolated gloss (Thenius, Budde), it states a significant truth as Kautzsch clearly shows, op. cit. p. 672. In Micah iii. 7 the hozeh is mentioned in a sense analogous tothero'eh or " seer," and coupled with the qosem or " soothsayer," viz. as spurious; cf. Deut. xviii. 10.

7 No better derivation is forthcoming of the word nabhi', " prophet," than that it is a Katil form of the root «aid = Assyr. nabu, " speak."

such enthusiastic devotees of Yahweh, in days when religion meant patriotism, did much to keep alive the flame of Israel's hope and courage in the dark period of national disaster. It is significant that Saul in his last unavailing struggle against the overwhelming forces of

the Philistines sought through the medium of a sorceress for an interview with the deceased prophet Samuel. It was the advice of Elisha that rescued the armies of Jehoram and Jehoshaphat in their war against Moab when they were involved in the waterless wastes that surrounded them (2 Kings iii. 14 foil.). We again find Elisha intervening with effect on behalf of Israel in the wars against Syria, so that his fame spread to Syria itself (2 Kings v.-viii. 7 foil.). Lastly it was the fiery counsels of the dying prophet, accompanied by the acted magic of the arrow shot through the open window, and also of the thrice smitten floor, that gave nerve and courage to Joash, king of Israel, when the armies of Syria pressed heavily on the northern kingdom (2 Kings xiii ._ 14-19).

We see that the prophet had now definitely emerged from the old position of " seer." Prophetic personality now moved in a larger sphere than that of divination, important though that function be in the social life of the ancient state 1 as instrumental in declaring the will of the deity when any enterprise was on loot. For the prophet's function became in an increasing degree a function of mind, and not merely of traditional routine or mechanical technique, like that of the diviner with his arrows or his lots which he cast in the presence of the ephod or plated Yahweh image. The new name nabhi' became necessary to express this function of more exalted significance, in which human personality played its larger role. Even as early as the time of David it would seem that Nathan assumed this more developed function as interpreter of Yahweh's righteous will to David. But both in 2 Sam. xii. 1-15 as well as in 2 Sam. vii. we have sections which are evidently coloured by the conceptions of a later time. We stand on safer ground when we come to Elijah's bold intervention on behalf of righteousness when he declared in, the name of Yahweh the divine judgment on Ahab and his house for the judicial murder of Naboth. We here observe a great advance in the vocation of the prophet. He becomes the interpreter and vindicator of divine justice, the vocal exponent of a nation's conscience. For Elijah was in this case obviously no originator or innovator. He represents the old ethical Mosaism, which had not disappeared from the national consciousness, but still remained as the moral pre-supposition on which the prophets of the following century based their appeals and denunciations. It is highly significant that Elijah, when driven from the northern kingdom by the threats of the Tyrian Jezebel, retreats to the old sanctuary at Horeb, whence Moses derived his inspiration and his Torah.

We have hitherto dealt with isolated examples of prophetism and its rare and distinguished personalities. The ordinary Hebrew nabhi' still

remained not the reflective visionary, stirred at times by music into strange raptures (2 Kings iii. 15), but the ecstatic and orgiastic dervish who was meshuggah or " frenzied," a term which was constantly applied to him from the days of Elisha to those of Jeremiah (2 Kings ix. 11; in Hos. ix. 7 and Jer. xxix. 26 it is regarded as a term of reproach). It is only in rare instances that some exalted personality is raised to a higher level. Of this we have an interesting example in the vivid episode that preceded the battle of Ramoth-Gilead described in 1 Kings xxii., when Micaiah appears as the true prophet of Yahweh, who in his rare independence stands in sharp contrast with the conventional court prophets, who prophesied then, as their descendants prophesied more than two centuries later, smooth things.

It is not, however, till the 8th century that prophecy attained its highest level as the interpreter of God's ways to men. This is due to the fact that it for the first time unfolded the true character of Yahweh, implicit in the old Mosaic religion and submerged in the subsequent centuries of Israel's life in Canaan, but now at length made clear and explicit to the mind of the

1 In Isa. iii. 2 the soothsayer is placed on a level with the judge, prophet and elder.

nation. It became now detached from the limitations of nation- alism and local association with which it had been hitherto circumscribed.

Even Elisha, the greatest prophet of the 9th century, had remained within these national limitations which characterized the popular conceptions of Yahweh. Yahweh was Israel's war- god. His power was asserted in and from Canaanite soil. If Naaman was to be healed, it could only be in a Palestinian river, and two mules' load of earth would be the only permanent guarantee of Yahweh's effective blessing on the Syrian general in his Syrian home.

That larger conceptions prevailed in some of the loftier minds of Israel, and may be held to have existed even as far back as the age of Moses, is a fact which the Yahwistic cosmogony in Gen. ii. 46-9 (which may have been composed in the 9th century B.C.) clearly suggests, and it is strongly sustained by the over- whelming evidence of the powerful influence of Babylonian culture in the Palestinian region during the centuries 2000- 1400 B.C. 2 Probably in our modern construction of ancient Hebrew history sufficient consideration has not been given to the inevitable coexistence of different types and planes of thought, each evolved from earlier and more primordial forms. In other words we have to deal not with one evolution but with

evolutions.

The existence of the purer and larger conception of Yahweh's character and power before the advent of Amos indicates that the transition from the past was not so sudden as Wellhausen's graphic portrayal in the 9th edition of this Encyclopaedia (art. Israel) would have led us to suppose. There were pre-existent ideas upon which that prophet's epoch-making message was based. Yet this consideration should in no way obscure the fact that the prophet lived and worked in the all-pervading atmosphere of the popular syncretic Yahweh religion, intensely national and local in its character. In Wellhausen's words, each petty state " revolved on its own axis " of social-religious life till the armies of Tiglath-Pileser III. broke up the security within the Canaanite borders. According to the dominating popular conception, the destruction of the national power by a foreign army meant the overthrow of the prestige of the national deity by the foreign nation's god. If Assyria finally overthrew Israel and carried off Yahweh's shrine, Assur (Asur), the tutelary deity of Assyria, was mightier than Yahweh. This was precisely what was happening among the northern states, and Amos foresaw that this might eventually be Israel's doom. Rabshakeh's appeal to the besieged inhabitants of Jerusalem was based on these same considerations. He argued from past history that

2 Kautzsch, in his profoundly learned article on the " Religion of Israel," to which frequent reference has been made, exhibits (pp. 669-671) an excess of scepticism, in our opinion, towards the views propounded by Gunkel in 1895 (Schopfung und Chaos) respecting the intimate connexion between the early Hebrew cosmogonic ideas and those of Babylonia. Stade indeed (Z.A.T.W., 1903, pp. 176- 178) maintained that the conception of Yahweh as creator of the world could not have arisen till after the middle of the 8th century as the result of prophetic teaching, and that it was not till the time of Ezekiel that Babylonian conceptions entered the world of Hebrew thought in any fulness. Such a theory appears to ignore the remark- able results of archaeology since 1887. At that time Stade's position might have appeared reasonable. It was the conclusion to which Wellhausen's brilliant literary analysis, when not supplemented by the discoveries at Tell el-Amarna and Tell el-Hesi, appeared to many scholars (by no means all) inevitably to conduct us. But the years 1887 to 1891 opened many eyes to the fact that the Hebrews lived their life on the great highways of intercourse between Egyjit on the one hand, and Babylonia, Assyria and the N. Palestiniaa states on the other, and that they could scarcely have escaped the all-pervading Babylonian influences of 2000-1400 B.C. It is now becoming clearer every day,

especially since the discovery of the laws of Khammurabi, that, if we are to think sanely about Hebrew history before as well as after the exile, we can only think of Israel as part of the great complex of Semitic and especially Canaanite humanity that lived its life in western Asia between 2000 and 600 B.C. ; and that while the Hebrew race maintained by the aid of prophetism its own individual and exalted place, it was not less susceptible then, than it has been since, to the moulding influences of great adjacent civilizations and ideas. Cf. C. H. W. Johns in Inter- preter, pp. 300-304 (in April 1906), on prophetism in Babylonia.

Yahweh would be powerless in the presence of Ashur (2 Kings xviii. 33-35)-

This problem of religion was solved by Amos and by the prophets who succeeded him through a more exalted conception of Yahweh and His sphere of working, which tended to detach Him from His limited realm as a national deity. Amos exhibited Him to his countrymen as lord of the universe, who made the seven stars and Orion and turns the deep midnight darkness into morning. He calls to the waters of the sea and pours them on the earth's surface (chap. v. 8). Such a universal God of the world would hardly make Israel His exclusive concern. Thus He not only brought the Israelites out of Egypt, but also the Philistines from Caphtor and the Syrians from Kir (ix. 7). But Amos went beyond this. Yahweh was not only the lord of the universe and possessed of sovereign power. The prophet also emphasized with passionate earnestness that Yahweh was a God whose character was righteous, and God's demand upon His people Israel was not for sacrifices but for righteous conduct. Sacrifice, as this prophet, like his successor Jeremiah, insisted (Amos v. 25; cf. Jer. vii. 22) played no part in Mosaic religion. In words which evidently impressed his younger contemporary Isaiah (cf. esp. Is. chap. i. n-17), Amos denounced the non- ethical ceremonial formalism of his countrymen which then prevailed (chap. v. 21 foil.): —

" I hate, I contemn your festivals and in your feasts I delight not; for when you offer me your burnt-offerings and gifts, I do not regard them with favour and your fatted peace-offerings I will not look at. Take away from me the clamour of your songs; and the music of your viols I will not hear. But let judgment roll down like waters and justice like a perennial brook."

In the younger contemporary prophet of Ephraim, Hosea, the stress is laid on the relation of love (hesed) between Yahweh, the divine husband, and Israel, the faithless spouse. Israel's faithlessness is shown in idolatry and the prevailing corruption of the high places in which the old Canaanite Baal was worshipped instead of Yahweh. It is shown, moreover, in foreign alliances. Compacts with a powerful foreign state, under whose aegis Israel was glad to shelter, involved covenants sealed by sacrificial rites in which the deity or deities of the foreign state were involved as well as Yahweh, the god of the weaker vassal-state. And so Yahweh 's honour was compromised. While these aspects of Israel's relation to Yahweh are emphasized by the Ephraimite prophet, the larger conceptions of Yahweh's character as universal Lord and the God of righteousness, whose government of the world is ethical, emphasized by the prophet of Tekoah, are scarcely presented.

In Isaiah both aspects — divine universal sovereignty and justice, taught by Amos, and divine loving- kindness to Israel and God's claims on His people's allegiance, taught by Hosea — are fully expressed. Yahweh's relation of love to Israel is exhibited under the purer symbol of fatherhood (Isa. i. 2-4), a conception which was as ancient and familiar as that of husband, though perhaps the latter recurs more frequently in prophecy (Isa, i. 21; Ezek. xvi. &c.l. Even more insistently does Isaiah present the great truth of God's universal sovereignty. As with his elder contemporary, the foreign peoples — (but in Isaiah's oracles Assyria and Egypt as well as the Palestinian races) — come within his survey. The "fullness of the earth "is Yahweh's glory (vi. 3) and the nations of the earth are the instruments of His irresistible and righteous will. Assyria is the "bee" and Egypt the " fly " for which Yahweh hisses. Assyria is the "hired razor " (Isa. vii. 18, 19), or the " rod of His wrath," for the chastise- ment of Israel (x. 5). But the instrument unduly exalts itself, and Assyria itself shall suffer humiliation at the hands of the world's divine sovereign (x. 7-15).

And so th° old limitations of Israel's popular religion, — the same limitations that encumbered also the religions of all the neighbouring races that succumbed in turn to Assyria's in- vincible progress, — now began to disappear. Therefore, while every other religion which was purely national was extinguished in the nation's overthrow, the religion of Israel survived even amid exile and dispersion. For Amos and Isaiah were able to

single out those loftier spiritual and ethical elements which lay implicit in Mosaism and to lift them into their due place of

prominence. National sacra and the ceremonial requirements were made to assume a secondary r61e or were even ignored. 1 The centre of gravity in Hebrew religion was shifted from ceremonial observance and local sacra to righteous conduct. Religion and righteousness were henceforth welded into an indissoluble whole. The religion of Yahweh was no longer to rest upon the narrow perishable basis of locality and national sacra, but on the broad adamantine foundations of a universal divine sovereignty over all mankind and of righteousness as the essential element in the character of Yahweh and in his claims on man. This was the ” corner-stone of precious solid foundation “: “I will make judgment the measuring-line and righteousness the plummet ” (Isa. xxviii. 16, 17). The religion of the Hebrew race — properly the Jews — now enters on a new stage, for it should be observed that it was Amos, Isaiah and Micah — prophets of Judah — who laid the actual foundations. The latter half of the 8th century, which witnessed a rapid succession of reigns in the northern kingdom accompanied by dismemberment of its territory and final overthrow, witnessed also the humiliating vassalage and religious decline of the kingdom of Judah. Unlike Amos and Micah, Isaiah was not only the prophet of denunciation but also the prophet of hope. Though Yahweh’s chastisements on Ephraim and Judah would continue to fall till scarcely a remnant was left (Isa. vi. 13, LXX.), yet all was not to be lost. A remnant of the people was to return, i.e. be converted to Yahweh. The name given to an infant child — Immanuel — was to become the mystic symbol of a growing hope. God’s presence was to abide in Jerusalem, and, as the century drew near its close, ” Immanuel ” became the watchword and talisman of a strong faith that God would never permit Jerusalem to be captured by the Assyrians. In fact it is not improbable that the words of consolation uttered by the prophet (Isa. viii. 9-10) in the dark days of Ahaz (735-734 B.C.) were among the oracles which God commanded Isaiah ” to seal up among his disciples ” (verse 16), and that they were quoted once more with effect as the armies of Sennacherib closed around Jerusalem. The talismanic name Immanuel became the nucleus out of which the later Messianic prophecies of Isaiah grew. To this age alone can we probably assign Isa. ix. 1-7, xi. 1-9, xxxii. 1-3. The hopes expressed in the word Immanuel, ” God with us,” were to become embodied in a personality of the royal seed of David, an ideal righteous ruler who was to bring peace to the war-distraught realm. Thus Isaiah became in that troubled age the true founder of Messianic prophecy. The strange contrast between the succes- sion of dynasties and kings cut off by assassination in the northern kingdom, ending in the tragic overthrow of 721 B.C., and the persistent succession through three centuries of the seed of David on the throne of Jerusalem, as well as the

marvellous escape of Jerusalem in 701 B.C. from the fate of Samaria, must have invested the seed of David in the eyes of all thoughtful observers with a mysterious and divine significance. The Messianic prophecies of Isaiah, the prophet of faith and deliverance, were destined to reverberate through all subsequent centuries. We hear the echoes in Jeremiah and Ezekiel and lastly in Haggai in ever feebler tones, and they were destined to reawaken in the Psalter (Pss. ii. and lxxii.), in the psalms of Solomon and in the days of Christ. See Messiah (and also the article " Messiah " in Hastings's Diet, of Christ and the Gospels) .

The next notable contribution to the permanent growth of Hebrew prophetic religion was made about a century after the lifetime of Isaiah by Jeremiah and Ezekiel. The reaction into idolatry and Babylonian star worship in the long reign of Manasseh synchronized and was connected with vassalage

1 There is some danger in too strictly construing the language of the prophets and also the psalmists. It is not to be supposed that either Amos or Isaiah would have countenanced the total suppression of all sacrificial observance. It was the existing cere- monial observance divorced from the ethical piety that they denounced. The speech of prophecy is poetical and rhetorical, not strictly defined and logical like that of a modern essayist. See Moore in Encyt. Bibl., " Sacrifice," col. 4222.

to Assyria, while the reformation in the reign of Josiah (621 B.C.) is conversely associated with the decay of Assyrian power after the death of Assur-bani-pal. That reformation failed to effect its purifying mission. The hurt of the daughter of God's people was but lightly healed (Jer. vi. 14, 15; cf. viii. n, 12). No possibility of recovery now remained to the diseased Hebrew state. The outlook appeared indeed far darker to Jeremiah than it seemed more than a century before to Isaiah in the evil days of Jotham and Ahaz, " when the whole head was sick and the whole heart faint " (Isa. i. 5). Jeremiah foresaw that there was now no possibility of recovery. The Hebrew state was doomed and even its temple was to be destroyed. This involved' an entire reconstruction of theological ideas which went beyond even the reconstructions of Amos and Isaiah. In the old religion the race or clan was the unit of religion as well as of social life. Properly speaking, the individual was related to God only through the externalities of the

clan or tribal life, its common temple and its common sacra. But now that these external bases of the old religion were to be swept away, a reconstruction of religious ideas became necessary. For the external supports which had vanished Jeremiah substituted a basis which was internal, personal and spiritual {i.e. ethical). In place of the old covenant based on external observance, which had been violated, there was to be a new covenant which* was to consist not in outward prescription, but in the law which God would place in the heart (Jer. xxxi. 30-33). This was to take place by an act of divine grace (Jer. xxiv. 5 foil.): “I will give them an heart to know me that I am the Lord ” (verse 7). Ezekiel, who borrowed both Jeremiah’s language and ideas, expresses the same thought in the well-known words that Yahweh would give the people instead of a heart of stone a heart of flesh (Ezek. xi. 19, 20, xx. 40 foil., xxxvi. 25-27), and would shame them by his loving-kindness into repentance, and there ” shall ye remember your ways and all your doings wherein ye have been defiled and ye shall loathe yourselves in your own sight ” (xx. 43).

Personal religion now became an important element in Hebrew piety and upon this there logically followed the idea of personal responsibility. The solidarity of race or family was expressed in the old tradition reflected in Deut. v. 9, 10, that God would visit the sins of the fathers upon the children, and it lived on in later Judaism under exaggerated forms. The hopes of the individual Jew were based on the piety of holy ancestors. ” We have Abraham as our father.” But Ezekiel expressed the strong reaction which had set in against this belief in its older forms. He denies that the individual ever dies for the sins of the father. ” The soul that sinneth, it (the pronoun emphasized in the original) shall die ” (Ezek. xviii. 4). Neither Noah, Daniel nor Job could have rescued by his righteousness any but his own soul (xiv. 14). And as a further consequence individual freedom is strongly asserted. It is possible for every sinner to turn to God and escape punishment, and conversely for a righteous man to backslide and fall. In the presence of these a’wful truths which Ezekiel preached of individual freedom and of impending judgment, the prophet is weighted with a heavy responsibility. It is his duty to warn every individual, for no sinner is to be punished without warning (Ezek. iii. 16 foil, xxxiii.).

The closing years of the Judaean kingdom and the final destruction of the temple (586 B.C.) shattered the Messianic ideals cherished in the evening of Isaiah’s lifetime and again in the opening years of the reign of Josiah. The untimely death of that monarch upon the battlefield of Megiddo (608 B.C.), followed by the inglorious reigns of the kings who succeeded him, who became puppets in turn of Egypt or of

Babylonia, silenced for a while the Messianic hopes for a future king or line of kings of Davidic lineage who would rule a renovated kingdom in righteousness and peace. Even in the darkness of the exile period hopes did not die. Yet they no longer remained the same. In the Deutero-Isaiah (chaps, xl.-lv.) we have no longer a Jewish but a foreign messiah. The onward progress of the Persian Cyrus and his anticipated conquest of Babylonia marked

him out as Yahweh's anointed instrument for effecting the deliverance of exiled Israel and their restoration to their old home and city (Isa. xli. 2, xliv. 24, xlv.). This was, however, but a subsidiary issue and possesses no permanent spiritual significance. Of far more vital importance is the conception of Israel as God's suffering servant. This is not the place to enter into the pro- longed controversy as to the real significance of this term, whether it signifies the nation Israel or the righteous community only, or finally an idealized prophetic individual who, like the prophet Jeremiah, was destined to suffer for the well-being of his people. Duhm, in his epoch-making commentary, distinguishes on the grounds of metre and contents the four servant-passages, in the last of which (lii. 13-liii. 12) the ideal suffering servant of Yahweh is portrayed most definitely as an individual. In the " servant-passages " he is innocent, while in the rest of the Deutero-Isaiah he appears as by no means faultless, and the personal traits are not prominent. These views of Duhm, in which a severe distinction is thus drawn between the repre- sentation of Yahweh's servant in the servant-passages, and that which meets us in the rest of the Deutero-Isaiah, have been challenged by a succession of critics. 1 It is only necessary for us to take note of the ideal in its general features. It probably arose from the fact that the calamities from which Israel had suffered both before and during the exile had drawn the reflective minds of the race to the contemplation of the problem of suffering. The " servant of Yahweh " presents one aspect of the problem and its attempted solution, the book of Job another, while in the Psalms, e.g. Pss. xxii., xlii.-xliii., lxxiii., lxxvii., other phases of the problem are presented. In the Deutero-Isaiah the meaning of Israel's sufferings is exhibited as vicarious. Israel is suffering for a great end. He suffers, is despised, rejected, chastened and afflicted that others may be blessed and be at peace through his chastisement. This noble conception of Israel's great destiny is conveyed in Isa. xlix. 6, in words which may be regarded as perhaps the noblest utterance in Hebrew prophecy: " To establish the tribes of Jacob and bring back the preserved of Israel is less important than being my servant. Yea, I will make you a light to the Gentiles that my salvation may be unto the end of the earth." 2 This passage, which belongs to the second of the brief " servant-

songs," sets the mission of Israel in its true relation to the world. It is the necessary corollary to the teaching of Amos, that God is the righteous lord of all the world. If Jerusalem has been chosen as His sanctuary and Israel as His own people, it is only that Israel may diffuse God's blessings in the world even at the cost of Israel's own humiliation, exile and dispersion.

The Deutero-Isaiah closes a great prophetic succession, which begins with Amos, continues in Isaiah in even greater splendour with the added elements of hope and Messianic expectation, and receives further accession in Jeremiah with his special teaching on inward spiritual and personal religion which constituted the new covenant of divine grace. Finally the Deutero-Isaiah conveyed to captive Israel the message of Yahweh's unceasing love and care, and the certainty of their return to Judaea and the restoration of the national prosperity which Ezekiel had already announced in the earlier period of the exile. To this is united the noble ideal of the suffering servant, which serves both as a contribution to the great problem of suffering as purifying and vicarious and as the interpretation to the mind of the nation itself of that nation's true function in the future, a lesson which the actual future showed that Israel was slow to receive. Nowhere in the Old Testament does the doctrine taught by Amos of Yahweh's universal power and sovereignty

1 Viz. Budde in Die so-genannten Ebed-Jahweh Lieder u. die Bedeutung des Knechtes Jahwehs in Jes. xl.-lv. (Giessen, 1900) ; Karl Marti in his well-known commentary on Isaiah, and F. Giesebrecht, Der Knecht Jahwes des Deuterojesaja. The special servant-songs which Duhm asserts can be readily detached from the texture of the Deutero-Isaiah without disturbance to its integrity are Isa. xlii. 1-4, xlix. 1-6, i. 4-9, lii. 13-liii. 12.

2 We have here followed Dillmann's construction of a difficult passage which Duhm attempts to simplify by omission of the com- plicating clause without altering the general sense.

receive ampler and more splendid exposition than in the great lyrical passages of chap. xl. It marks the highest point to which the Hebrew race attained in its progress from henotheism to monotheism. Here again we see the wholesome influences of the exile. The Jew had passed from the narrow confines of his homeland into a wider world,

and this larger vision of human life reacted on the prophet's theology. This closes the evolution of Hebrew prophetism. What immediately follows is on a descending slope with some striking exceptions, e.g. the book of Job and the book of Jonah.

7. Deuteronomic Legalism. — The book of Deuteronomy was the product of prophetic teaching operating on traditional custom, which was represented in its essential features by the two codes of legislation contained in Ex. xx. 24-xxiii. 19 (E) and Ex. xxxiv. 10-26 (J), but had also become tainted and corrupted by centuries of Canaanite influence and practice which especially infected the cult of the high places. The existence of " high places " is presupposed in those two ancient codes and is also presumed in the narratives of the documents E and J which contain them. But the prevalence of the worship of " other gods " and of graven images in these " high places," and the moral debasement of life which accompanied these cults, made it clear that the " high places " were sources of grave injury to Israel's social life. In all probability the reformation instituted in the reign of Hezekiah, to which 2 Kings xviii. 4 (cf. verse 22) refers, was only partial. It is hardly possible that all the high places were suppressed. The idolatrous reaction in the reign of Manasseh appears to have restored all the evils of the past and added to them. Another and more drastic reform than that which had been previously initiated (probably at the instigation of Isaiah and Micah) now became necessary to save the state. It is universally held by critics that our present book of Deuteronomy (certainly chaps, xii.-xxvi.) is closely connected with the reformation in the reign of Josiah. It is quite clear that many provisions in the old codes of J and E expanded lie at the basis of the book of Deuteronomy. But new features were added. We note for the first time definite regulations respecting Passover and the close union of that celebration with Massoth or " unleavened bread." We note the laws respecting the clean and unclean animals (certainly based on ancient custom). Moreover, the prohibitions are strengthened and multiplied. In addition to the bare interdict of the sorceress (Ex. xxii. 18), of stone pillars to the Canaanite Baal, of the Asherah-pole, molten images and the worship of other gods than Yahweh (Ex. xxxiv. 13-17), we now have the strict prohibition of any employment whatever of the stone- symbol {Masscbhah), and of all forms of sorcery, soothsaying and necromancy (Deut. xviii. 10, n. Respecting the stone-pillar see xvi. 22). But of much more far-reaching importance was the law of the central sanctuary which constantly meets us in Deuteronomy in the reference to " the place {i.e. Jerusalem) which Yahweh your God shall choose out of all your tribes to put His name there " (xii. 5, xvi. 5, n, 16, xxvi. 2). There alone all offerings of any

kind were to be presented (xii. 6, 7, xvi. 7). By this positive enactment all the high places outside the one sanctuary in Jerusalem became illegitimate. A further consequence directly followed from the limitation as to sanctuary, viz. limitation as to the officiating ministers of the sanctuary. In the ” book of the covenant ” (Ex. xx. 22-xxii. 19), as we have already seen, and in the general practice of the regal period, there was no limitation as to the priesthood, but a definite order of priesthood, viz. Levites, existed, to whom a higher professional prestige belonged. As it was impossible to find a place for the officiating priests of the high places, non-levitical as well as levitical, in the single sanctuary, it became necessary to restrict the functions of sacrifice to the Levites only as well as to the existing official priesthood of the Jerusalem temple (see Priest). Doubtless such a reform met with strong resistance from the disestablished and vested interests, but it was firmly supported by royal influence and by the Jerusalem priesthood as well as by the true prophets of Yahweh who had protested against the idolatrous usages and corruptions of the high places.

The strong impress of Hebrew prophecy is to be found in the deeply marked ethical spirit of the Deuteronomic legislation. Love to God and love to man is stamped on a large number of its provisions. Love to God is emphasized in Deut. vi. 5, while love to man meets us in the constant reference to the fatherless and the widow (cf. especially Deut. xvi.). This note of philanthropy is frequently found as a mitigating element {e.g. in the laws respecting slavery and war) 1 that subdues or even removes the harshness of earlier laws or usages. It should be noted, however, that the spirit of brotherly love was confined within national barriers. It did not operate as a rule beyond the limits of race.

The book of Deuteronomy, in conjunction with the reformation of Josiah’s reign (which synchronizes with the rapid decline of Assyria and the reviving prestige of Yahweh), appeared to mark the triumph of the great prophetic movement. It became at once a codified standard of purer religious life and ultimately served as a beacon of light for the future. But there was shadow as well as light. We note {a) that though the book of Deuteronomy bears the prophetic impress, the priestly impress is perhaps more marked. The writer ” evinces a warm regard for the priestly tribe; he guards its privileges (xviii. T -8), demands obedience for its decisions (xxiv. 8; cf. xvii. 10-12) u ‘d earnestly commends its members to the Israelites’ benevolence v -ii. 18-19, xiv. 27-29, &c.).” 2 {b) In many passages Jewish particularism is painfully manifest. Yahweh’s care for other peoples dc”s not appear. The flesh of a dead (unslaughtered) beast is not to be eaten, but it may be given to the ” stranger within the gates “! (Deut. xiv. 21). 3 ©

Prophetic religion was a religion of the spirit which came to the messenger (Isa., lxi. 1) and exprassed itself as a word of instruction of Yahweh _{torah) ; see Isa. i. 10. Now when the Hebrew religion was reduced to written form it began to be a book-religion, and since the book consisted of fixed rules and enactments, religion began to acquire a stereotyped character. It will be seen in the sequel that this was destined to be the grow- ing tendency of Jewish religious life — to conform itself to prescribed rules, in other words, it became legalism, {d) Lastly, the old genial life of the high places, in which the " new moon " Or Sabbath or the annual festival was a sacrificial feast of com- munion, in which the members of the local community or clan enjoyed fellowship with one another — all this picturesque life ceased to be. And though there was positive gain in the removal of idolatrous and corrupt modes of worship, there was also positive loss in the disappearance of this old genial phase of Hebrew social life and worship. It involved a vast difference to many a Judaean village when the festival pilgrimage was no longer made to the familiar local sanctuary with its hoary associations of ancient heroic or patriarchal story, but to a distant and comparatively unfamiliar city with its stately shrine and priesthood.

8. Ezekiel's System. — Ezekiel was the successor of Jeremiah and inherited his conceptions. But though the younger prophet adopted the ideas respecting personal religion and individual responsibility from the elder, the characters of the two men were very different. Jeremiah, when he foretold the destruction of the external state and temple ritual, found no resource save in a reconstruction that was internal and spiritual. In this he was true to his prophetic impulse and genius. But Ezekiel was, as Wellhausen well describes him, " a priest in prophet's mantle." While Jeremiah's tendency was spiritual and ideal, Ezekiel's was constructive and practical. He was the first to foretell with clearness the return of his people from captivity foreshadowed by Jeremiah, and he set himself the task even in

1 Thus in comparison with the " book of the covenant," Deuter- onomy adds the stipulation in reference to the release of the slave; that his master was to provide him liberally from his flocks, his corn and his wine (Deut. xv. 13, 14). See Hastings's D.B., arts. ". Ser- vant," " Slave," p. 464, where other examples may be found. In war fruit-trees are to be spared (Deut. xx. 19 foil.), whereas the old universal practice is the barbarous custom Elisha commended (2 Kings hi. 19) of ruthlessly destroying thera.

2 Driver,' ; Internat. Commentary on Deuteronomy, Introd. p. xxx.

8 It should be noted that in P (Code of Holiness) Lev. xvii. 15 foil, the resident alien (ger) is placed on an equality with the Jew.

the midnight darkness of Israel's exile to prepare for the nation's renewed life. The external bases of Israel's religion had been swept away, and in exchange for these Jeremiah had led his countrymen to the more permanent internal grounds of a spiritual renewal. But a religion could not permanently subsist in this world of space and time without some external concrete embodiment. It was the task of Ezekiel to take up once more the broken threads of Israel's religious traditions, and weave them anew into statelier forms of ritual and national polity. The priest-prophet's keen eye for detail, manifested in the elaborate vision of the wheels and living creatures (Ezek. i.) and in his lamentation on Tyre (chap, xxvii.), is also exhibited in the visions contained in chaps, xl.-xlviii., which describe the ideal reconstructed temple and theocracy of the restored Israel. The foreground is filled by the temple and its precincts. The officiating priests are now the descendants of the line of Zadok belonging to the tribe of Levi. Thus the priesthood is still further restricted as compared with the restriction already noted in the Deuteronomic legislation. It is the sons of Zadok only that have any right to offer sacrifice at the altar of burnt offering (xliii. 19, xliv. 15 foil.). The Levites, who formerly ministered in the hir . places, now discharge the subordinate offices of gate-ker ,ers and slaughterers of the sacrificial victims.

Another eler.ent in this ideal scheme which comes into prominence it the sharp distinction between holy and profane. The word holiness (qodesh) in primitive Hebrew usage partook of the nature of taboo, and came to be applied to whatever, whether thing or person, stood in close relation to deity and belonged to him, and could not, therefore, be used or treated like other objects not so related, and so was separated or stood apart. The idea underlying the word, which to us is invested with deep ethical meaning, had only this non-ethical, ritual significance in Ezekiel. Unlike the old temple and city, the ideal temple of Ezekiel is entirely separate from the city of Jerusalem. In the immediate surroundings of the temple there is an open space. Then come two concentric forecourts of the temple. The temple stands in the midst of what is called the gizrah or space severed off. The outer court lies higher than the open space, the inner court higher still, and the temple-building in the centre highest of all. No heathen may tread the outer court, no layman the inner court, while the holiest of all

may not be trodden even by the priest Ezekiel but only by the arigel who accompanies him. ” The temple-house has a graduated series of compartments increasing in sanctity inwards ” (Davidson). In the innermost the presence of Yahweh abides.

We are here moving in a realm of ideas prevailing in ancient Israel respecting holiness, uncleanness and sin, which are ceremonial and not ethical; see especially Robertson Smith’s Religion of the Semites, 2nd ed., p. 446 foil, (additional note B.) on holiness, uncleanness and taboo. It is, of course, true that the ethical conception of sin as violation of righteousness and an act of rebellion against the divine righteous will had been developed since the days of Amos and Isaiah; but, as we have already observed, cultus and prophetic teaching were separated by an immense gulf, and in spite of the reformation of 621 B.C. still remain separated. In the sacrificial system of sin-offerings [hattath a.nd’dsham) we have to do with sin as ceremonial violation and neglect (frequently involuntary), or violation of holiness in the old sense of the term or as personal uncleanness (touching a corpse, eating unclean food, sexual impurity, &c). In the historical evolution of Hebrew sacrifice it is remarkable how long this non-ethical and primitive survival of old custom still survived, even far into post-exilian times. (See Sacrifice; also Moore’s art. ” Sacrifice ” in Ency. Bibl.)

One conspicuous feature of Ezekiel’s system is the predomin- ance of piacular sacrifice. It undoubtedly existed in pre-exilian Israel, especially in times of crisis or calamity, for the appease- ment of an offended deity (2 Sam. xxiv. 18 foil.), and in Deut. xxi. 1-0, we have details of the purificatory rite which was necessary when human blood was shed; but now and in the future propitiatory sacrifice and ideas of propitiation began to

overshadow all the other forms of sacrifice and their ideas. Ezekiel prescribes a half-yearly ritual of sin-offering whereby atonement was to be made (xlv. 18-20). We shall . ee subsequently to what great institution this led the way.

Ezekiel’s system constituted an ecclesiastical in place of a political organization, a church-state in place of a nation. We clearly discern how this reacted on his Messianic conceptions. In his earlier oracles (xxxiv. 23 foil.) we find one shepherd ruling over united Israel, viz. Yahweh’s servant David, whereas in the ideal scheme detailed in chap. xl. et seq. the role of the prince as a ruler is a very shadowy one. The prince, it is true, has a central domain, but his functions are ecclesiastical and sub- ordinate and his powers strictly limited (xlvi.

3-8, 12, 16-18).

Thus the exile period marks the parting of the ways in the development of Hebrew religion. In the Deutero-Isaiah we reach the highest point in the evolution of prophetism. It is true that we have some noble resounding echoes in the lyrical passages lx.-lxii. in the Trito-Isaiah during the post-exilian period, and in such psalm literature as Pss. xxii., xxxvii., 1., lxii., cvii., cxlv. 9-12 and others; and also in Isa. xxxv., which is obviously a lyrical reproduction of earlier literature. But it cannot be said that we possess in later literature any fresh contribution to the conception of God or any presentation of a higher ideal of human life 1 or national destiny than that which meets us in chap. xl. or in the servant-passages of the Deutero- Isaiah. It may with truth be said that after Jeremiah we discern the parting of the ways. The first is represented by the Deutero-Isaiah, who constitutes the climax and close of Hebrew prophetism, which is henceforth (with the possible exception of the Trito-Isaiah, Malachi and Jonah, who reproduce some features of the earlier prophecy) a virtually arrested development. The second path is that which is traced out by the priest-prophet Ezekiel, and is that of legalism, which was destined to secure a permanent place in the life and literature of the Jewish people. It is essentially the path which may be summed up in the word Judaism, though, as will be shown in the sequel, Judaism came to include many other factors. The statement, however, remains virtually true, since Judaism is mainly constituted by the body of legal precepts called the Torah, and, moreover, by the post- exilian Torah.

9. Post-exilian Law — The Priestercodex.- — The oracles of Malachi clearly reveal the continued influence of the book of Deuteronomy in his day. But the new conditions created by the return of the exiles and the germinating influence of Ezekiel's ideas developed a process of new legislative construction. The code of holiness (Lev. xvii.-xxvi.) is the most obvious product of that influence. The ideas of expiation and atonement so prevalent in Ezekiel's scheme, which there find expression in the half-yearly sacrificial celebrations, are expressed in Lev. xvi. in the single annual great fast of atonement. It is impossible to enter here into the numerous details of that impressive ceremonial. Two special features, however, which characterize the celebration should here be noted: (

1 We shall have to note the emergence of the doctrine of the resurrection of the righteous in later Judaism, which is obviously a fresh contribution of permanent value to Hebrew doctrine. On the other hand, the doctrine of pre-existence is speculative rather than religious, and applies to institutions rather than persons.

2 The legislative portions are mainly comprised in Ex. xxxv.- end, Leviticus entire and Num. i.-x. .

3 But this term (literally the chief priest) was already in use during the regal period to designate the head priest of an important sanctuary such as Jerusalem (2 Kings xii. 11).

doubt that Azazel was an evil demon (like an Arabic Jinn) of the desert. The goat set apart for Azazel was in the concluding part of the ceremonial brought before the high priest, who laid both his hands upon it and confessed over it the sins of the people. It was then carried off by an appointed person to a lonely spot and there set free.

In later post-exilian times this great day of atonement became to an increasing degree a day of humiliation for sin and penitent sorrow, accompanied by confession; and the sins confessed were not only of a purely ceremonial character, whether voluntary or inadvertent, but also sins against righteousness and the duties which we owe to God and man. This element of public confession for sin became more prominent in the days when synagogal worship developed, and prayer took the place of the sacrificial offerings which could only be offered in the Jerusalem temple. The development of the priestly code of legislation (Priestercodex) was a gradual process, and probably occupied a considerable part of the 5th century b.c. The Hebrew race now definitely entered upon the new path of organized Jewish legalism which had been originally marked out for it by Ezekiel in the preceding century. It became a holy people on holy ground. Circumcision and Sabbath, separation from marriage with a foreigner, which rendered a Jew unclean, as well as strict conformity to the precepts of the Torah, constituted hence- forth an adamantine bond which was to preserve the Jewish communities from disintegration.

10. The later Post-exilian Developments in Jewish Religion. — These may be briefly referred to under the following aspects:

(a) Codified law and the written record of the patriarchal history, as well as the life and work of the lawgiver Moses (to whom the entire body of law came to be ascribed), assumed an ever greater importance. The reverence felt for the canonized Torah or law (the Pentateuch or so-called five books of Moses) grew even into worship. Of this spirit we find clear expression in some of the later psalms, e.g.

the elaborate alphabetic Ps. cxix. and the latter portion of Ps. xix. There were various causes which combined to enhance the importance of the written Torah (the ” instruction ” par excellence communicated by God through Moses). Chief among these were (1) The conception of God as transcendent. We have taken due note of Amos, who unfolded the character of Yahweh as universal righteous sovereign; and also the sublime portrayal of His exalted nature in Isa. xl. (verse 15; cf. 22-26, and Job xxxvi. 22-xlii. 6). The intellectual influence of Greece, manifested in Alexandrian philosophy, tended to remove God still further from the human world of phenomena into that of an inaccessible transcendental abstrac- tion. Little, therefore, was possible for the Jew save strict per- formance of the requirements of the Torah, once for all given to Moses on Sinai, and, in his approach to the awful and unknown mystery, to rely on ceremonial and ascetic performances (see Wendt’s Teaching of Jesus, i. 55 foil.). The same tendency led the pious worshippers to avoid His awful name and to sub- stitute Adonai in their scriptures or to use in the Mishna the term ” name ” (shem) or ” heaven.” (2) The Maccabean conflict (165 b.c.) tended to accentuate the national sentiment of anta- gonism to Hellenic influence. The Hasldim or pious devotees, who arose at that time, were the originators of the Pharisaic movement which was conservative as well as national, and laid stress on the strict performance of the law.

(b) Eschatology in the Judaism of the Greek period began to assume a new form. The pre-exilian prophets (especially Isaiah) spoke of the forthcoming crisis in the world’s history as a ” day of the Lord.” These were usually regarded as visitations of chastisement for national sins and vindications of divine righteousness or judgments, i.e. assertions of God’s power as judge (shophel). Hy the older prophets this judgment of God or ” day of Yahweb ” was never held to be far removed from the horizon of the present or the world in which they lived. But now as we enter the Greek period (320 B.C. and onwards) there is a gradual change from prophecy to apocalyptic. ” It may be asserted in general terms that whereas prophecy foretells a definite future which has its foundation in the present, apoca-

lyptic directs its anticipations solely and simply to the future, to a new world-period which stands sharply contrasted with the present. The classical model for all apocalyptic is to be found in Dan. vii. It is only after a great war of destruction, a day of Yahweh’s great judgment, that the dominion of God will begin ” (Bousset). Ezek. xxxviii. and xxxix. clearly bear the apocalyptic character; so also Isa. xxxiv. and notably Isa. xxiv.-xxvii. Apocalyptic, as Baldensperger has shown, formed a counterpoise to the normal current of conformity to law. It afose from a spiritual movement in answer to the yearning of the

heart: ” O that Thou mightest rend the heavens and come down and the mountains quake at Thy presence!” (Isa. lxiv. 1 [Heb. Ixiii. 19]) ; and it was intended to meet the craving of souls sick with waiting and disappointment. The present outlook was hopeless, but in the enlarged horizon of time as well as space the thoughts of some of the most spiritual minds in Judaism were directed to the transcendent and ultimate. The present world was corrupt and subject to Satan and the powers of darkness. This they called ” the present aeon ” (age). Their hopes were therefore directed to ” the coming aeon.” Between the two aeons there would take place the advent of the Messiah, who would lead the struggle with evil powers which was called ” the agonies of the Messiah.” This terrible intermezzo was no longer terrestrial, but was a cosmic and universal crisis in which the Messiah would emerge victorious from the final conflict with the heathen and demonic powers. This victory inaugurates the entrance of the ” aeon to come,” in which the faithful Jews would enter their inheritance. In this way we perceive the transformation of the old Messianic doctrine through apocalyptic. Of apocalyptic literature we have numerous examples extending from the 2nd century b.c. to the 2nd century a.d. (See especially Charles’s Book of Enoch.)

The doctrine of the resurrection of the righteous to life in the heavenly world became engrafted on to the old doctrine of Sheol, or the dark shadowy underworld (Hades), where life was joyless and feeble, and from which the soul might be for a brief space summoned forth by the arts of the necromancer. The most vivid portraiture of Sheol is to be found in the exilian passage Isa. xiv. 9-20 (cf. Job x. 21-22). With this also compare the Babylonian Descent of Ishlar to Hades. The added conception of the resurrection of the righteous does not appear in the world of Jewish thought till the early Greek period in Isa. xxvi. 19. R. H. Charles thinks that in this passage the idea of resurrection is of purely Jewish and not of Mazdaan (or Zoroastrian) origin, but it is otherwise with Dan. xii. 2; see his Eschatology, Hebrew, Jewish and Christian. Corresponding to heaven, the abode of the righteous, we have Ge-henna (originally Ge-Hinnom, the scene of the Moloch rites of human sacrifice), the place of punish- ment after death for apostate Jews.

(c) Doctrine of Angels and of Hypostases. — In the writings of the pre-exilian period we have frequent references to super- natural personalities good and bad. It is only necessary to refer to them by name. Sebdolh, or ” hosts,” attached to the name of Yahweh, denoted the heavenly retinue of stars. The seraphim were burning serpentine forms who hovered above the enthroned Yahweh and chanted the Trisagion in Isaiah’s consecration vision (Isa. vi.). We have also

constant references to ” angels ” (maldchim) of God, divine messengers who represent Him and may be regarded as the manifestation of His power and presence. This especially applies to the ” angel of Yahweh ” or angel of His Presence [Ex. xxiii. 20, 23 (E). Note in Ex. xxxiii. 14 (J) he is called “my face” or “presence” 1 (cf. Isa. Ixiii. 9)]. We also know that from earliest times Israel believed in the evil as well as good spirits. Like the Arabs they held that demons became incorporate in serpents, as in Gen. iii. The nephilim were a monstrous brood begotten of the inter- course of the supernatural beings called ” sons of God ” with the women of earth. We also read of the ” evil spirit ” that came upon Saul. Contact with Babylonia tended to stimulate the

1 Cf. the Phoenician parallel of ” Face of Baal,” worshipped as Tanit, “queen of Heaven” (Bathgen, Beitrage zur Semit. Religions-geschichte, p. 55 foil.); also the place Penuel (face of God).

angelology and demonology of Israel. The Hebrew word shed or ” demon ” is no more than a Babylonian loan word, and came to designate the deities of foreign peoples degraded into the position of demons. 1 LUith, the blood-sucking night-hag of the post-exilian Isa. xxxiv. 14, is the Babylonian Lildtu. Whether the se’irim or shaggy satyrs (Isa. xiii. 31; Lev. xvii. 7) and Azdzel were of Babylonian origin it is difficult to determine. The emergence of Satan as a definite supernatural personality, the head of prince of the world of evil spirits, is entirely a pheno- menon of post-exilian Judaism. He is portrayed as the arch- adversary and accuser of man. It is impossible to deny Persian influence in the development of this conception, and that the Persian Ahriman (Angromainyu) , the evil personality opposed to the good, Ahura Mazda, moulded the Jewish counterpart, Satan. But in Judaism monotheistic conceptions reigned supreme, and the Satan of Jewish belief as opposed to God stops short of the dualism of Persian religion. Of this we see evidence in the multiplication of Satans in the Book of Enoch. In the Book of Jubilees -he is called mastemd. In later Judaism Sammael is the equivalent of Satan. Persian influence is also responsible for the vast multiplication of good spirits or angels, Gabriel, Raphael, Michael, &c, who play their part in apocalyptic works, such as the Book of Daniel and the Book of Enoch.

Probably the transcendent nature of the deity in the Judaism of this

later period made the interposition of mediating spirits an intellectual necessity (cf. Ps. civ. 4). It also stimulated the creation of divine hypostases. First among these may be men- tioned Wisdom. The roots of this conception belong to pre-exilian times, in which the ” word ” of divine denunciation was regarded as a quasi-material thing. (It is hurled against offending Israel, Isa. ix. 8.) In the post exilian cosmogony it is the divine word or fiat that creates the world (Gen. i.; cf. Ps. xxxiii. 6, 9). Out of these earlier conceptions the idea of the divine wisdom (Heb. hokhmah) gradually arose during the Persian period. The expression ” wisdom,” as it is employed in the locus classicus, Prov. viii., connotes the contents of the Divine reason — His conscious life, out of which created things emerge. This wisdom is personified. It dwelt with God (Prov. viii. 22 foil.) before the world was made. It is the companion of His throne, and by it He made the world (Prov. iii. 19, viii. 27; cf. Ps. civ. 24). It, moreover, enters into the life of the world and especially man (Prov. viii. 31). This conception of wisdom became still further hypostatized. It becomes redemptive of man. In the Wisdom of Solomon it is the sharer of God’s throne (vapedpos), the effulgence of the eternal light and the outflow of His glory (Wisd. vii. 25, viii. 3 foil., ix. 4, 9); “Them that love her the Lord doth love” (Ecclesiasticus iv. 14). This group of ideas culminated in the Logos of Philo, expressing the world of divine ideas which God first of all creates and which becomes the mediating and formative power between the absolute and trans cendent deity and passive formless matter, transmuted thereby into a rational, ordered universe.

In later Jewish literature we meet with further examples of similar hypostases in the form of Memrd, Melatron, Shechinah, Holy Spirit and Bath kol.

{d) The doctrine of pre-existence is another product of the speculative tendency of the Jewish mind. The Messiah’s pre- existent state before the creation of the world is asserted in the Book of Enoch (xlviii. 6, 7). Pre-existence is also asserted of Moses and of sacred institutions such as the New Jerusalem, the Temple, Paradise, the Torah, &c. (Apocal. of Baruch iv. 3-lix. 4; Assumptio Mosis i. 14, 17) Edersheim’s Life and Times of the Messiah, i. 175 and footnote 1.

n. Christ resumes the Broken Tradition of Prophetism. — The Psalms of Solomon and the synoptic Gospels (70 b.c.a.d. 100) elearly reveal the powerful revival of Messianic hopes of a national deliverer of the seed of David. This Messianic expecta tion had been a fermenting leaven since the great days of Judas Maccabaeus. The conceptions of Jesus <"f Nazareth, however, were not the Messianic conceptions of

his fellow-countrymen, but

1 Deut. xxxii. 17; Ps. cvi. 37. Baal Zebflb of the Philistine Ekron became the Beelzebub who was equivalent to Satan.

of the spiritual ” son of man ” destined to found a kingdom of God which was righteousness and peace. The Torah of Jesus was essentially prophetic and in no sense priestly or legal. The arrested prophetic movement of Jeremiah and Deutero-Isaiah reappears in John the Baptist and Jesus after an interval of more than five centuries. The new covenant of redeeming grace — the righteousness which is in the heart and not in externalities of legal observance or ceremonial — are once more proclaimed, and the exalted ideals of the suffering servant of Isa. xlix. 6 and Isa. liii. (nearly suppressed in the Targum of Jonathan) are reasserted and vindicated by the words and life of Jesus. Like Jeremiah He foretold the destruction of the temple and suffered the extreme penalties of anti-patriotism. And thus Israel’s eld prophetic Torah was at length to achieve its victory, for after Jesus came St Paul. ” Many shall come from the east and the west and sit down with Abraham, Isaac and Jacob in the kingdom of heaven ” (Matt. viii. n, 12). The fetters of nationalism were to be broken, and the Hebrew religion in its essential spiritual elements was to become the heritage of all humanity.

Authorities. — 1. On Semitic religion generally: Wellhausen’s Reste des arabischen Heidentums (2nd ed.) and Robertson Smith’s Religion of the Semites (2nd ed.) are chiefly to be recommended. Barton’s Semitic Origins is extremely able, but his doctrine of the derivation of male from original female deities is pushed to an extreme. Biithgen’s Beitrdge zur semitischen Religionsgeschichte (1888) is most useful, and contains valuable epigraphic material. Baudissin’s Sludien zur semitiscken Religionsgeschichte (1876) is still valuable. See also Kuenen’s National Religions and Universal Religions (Hibbert lectures) and Lagrange’s Etudes sur les religions semitiques (2nd ed.).

2. On Hebrew religion in particular: specially full and helpful is Kautzsch’s article ” Religion of Israel ” in Hastings’s D.B., extra vol.; Marti’s recent Religion des A.T. (1906) and his Geschichte der israelitischen Religion, are clear, compact and most serviceable, and the former work presents the subject in fresh and suggestive aspects. Wellhausen’s Prolegomena and Jiidische Geschichte should be read both for criticism and Hebrew history generally. Duhm’s Theologie der Propheten and Robertson Smith’s Prophets of Israel should also be consulted. Strongly to be recommended areSmend, Lehrbuch der alttestatnentlichen Religionsgeschichte; Bennett, Theo- logy of the Old

Testament and Religion of the Post-Exilic Prophets; A. B. Davidson, The Theology of the Old Testament, as well as the sections devoted to ” Sacralaltertiimer ” in the Hebrdische Archdo- logie both of Benzinger and also of Nowack. Budde’s Die Religion des Volkes Israel bis zur Verbannung, as well as Addis’s recent Hebrew Religion (1906), is a most careful and scholarly compendium. Harper’s Introd. to his Commentary on Amos and Hosea (I. and T. Clark) contains a useful survey of the history of Hebrew religion before the 8th century. Buchanan Gray’s Divine Discipline of Israel, and A. S. Peake’s Problem of Suffering in the O.T., are sugges- tive. See also S. A. Cook, Religion of Ancient Palestine.

3. On the history of Judaism till the time of Christ, Schurer’s Geschichte des jiidischen Volkes im Zeitalter Chrisli (3rd ed.), vol. ii. and in part vol. iii., are indispensable. Bousset’s Religion des Judentums (2nd ed.), and Volz, Die jiidische Escha*ologie von Daniel bis Akiba, are highly to be commended. Weber’s Jiidische Theologie is a usef ul compendium of the theology of later Judaism.

4. On the special department

5. On the religion of Babylonia, Jastrow’s work is the standard one. Zimmern’s Heft ii. in K.A.T. (3rd ed.) is specially important to the Old Testament student. See also W. Schrank, Babylonische Siihnriten. _ (O. C. W.)

HEBREWS, EPISTLE TO THE, one of the books of the New Testament. In the oldest MSS. it bears no other title than ” To Hebrews.” This brief heading embraces all that on which Christian tradition from the end of the 2nd century was un- animous; and it says no more than that the readers addressed were Christians of Jewish extraction. This would be no sufficient address for an epistolary writing (xiii. 22) directed to a definite circle of readers, to whose history repeated reference is made, and with whom the author had personal relations (xiii. 19, 23). Probably, then, the original and limited address, or rather saluta- tion, was never copied when this treatise in letter form, like the epistle to the Romans, passed into the wider circulation which

its contents merited. In any case the Roman Church, where the first traces of the epistle occur, about a.d. 96 (1 Clement), had nothing to contribute to the question of authorship except the negative opinion

that it was not by Paul (Euseb. Eccl. Hist. iii. 3): yet this central church was in constant connexion with provincial churches.

The earliest. positive traditions belong to Alexandria and N. Africa. The Alexandrine tradition can be traced back as far as a teacher of Clement, presumably Pantaenus (Euseb. Eccl. Hist. vi. 14), who sought to explain why Paul did not name himself as usual at the head of the epistle. Clement himself, taking it for granted that an epistle to Hebrews must have beeen written in Hebrew, supposes that Luke translated it for the Greeks. Origen implies that ” the men of old ” regarded it as Paul’s, and that some churches at least in his own day shared this opinion. But he feels that the language is un-Pauline, though the ” admirable ” thoughts are not second to those of Paul’s unquestioned writings. Thus he is led to the view that the ideas were orally set forth by Paul, but that the language and composition were due to some one giving from memory a sort of free interpretation of his teacher’s mind. According to some this disciple was Clement of Rome; others name Luke; but the truth, says Origen, is known to God alone (Euseb. vi. 25, cf. iii. 38). Still from the time of Origen the opinion that Paul wrote the epistle became prevalent in the East. The earliest African tradition, on the other hand, preserved by Tertullian 1 (De pudicitia, c. 20), but certainly not invented by him, ascribed the epistle to Barnabas. Yet it was perhaps, like those named by Origen, only an inference from the epistle itself, as if a ” word of exhortation ” (xiii. 22) by the Son of Exhortation (Acts iv. 36; see Barnabas). On the whole, then, the earliest traditions in East and West alike agree in effect, viz. that our epistle was not by Paul, but by one of his associates.

This is also the twofold result reached by modern scholarship with growing clearness. The vacillation of tradition and the dissimilarity of the epistle from those of Paul were brought out with great force by Erasmus. Luther (who suggests Apollos) and Calvin (who thinks of Luke or Clement) followed with the decisive argument that Paul, who lays such stress on the fact that his gospel was not taught him by man (Gal. i.), could not have written Heb. ii. 3. Yet the wave of reaction which soon over- whelmed the freer tendencies of the first reformers, brought back the old view until the revival of biblical criticism more than a century ago. Since then the current of opinion has set irrevocably against any form of Pauline authorship. Its type of thought is quite unique. The Jewish Law is viewed not as a code of ethics or ” works of righteousness,” as by Paul, but as a system of religious rites (vii. n) shadowing forth the way of access to God in worship, of which the Gospel reveals the archetypal realities (ix. 1, 11, 15, 23 f., x. 1 ff., 19 ff.). The Old and the New Covenants are related to one another as

imperfect (earthly) and perfect (heavenly) forms of the same method of salvation, each with its own type of sacrifice and priesthood. Thus the conception of Christ as High Priest emerges, for the first time, as a central point in the author's conception of Christianity. The Old Testament is cited after the Alexandrian version more exclusively than by Paul, even where the Hebrew is divergent. Nor is this accidental. There is every appearance that the author was a Hellenist who lacked knowledge of the Hebrew text, and derived his metaphysic and his allegorical method from the Alexandrian rather than the Palestinian schools. Yet the epistle has manifest Pauline affinities, and can hardly have originated beyond the Pauline circle, to which it is referred not only by the author's friendship with Timothy (xiii. 23), but by many echoes of the Pauline theology and even, it seems, of passages in Paul's epistles (see Holtzmann, Einleitung in das N. T.. 1892, p. 298). These features early suggested Paul as the author of a book which stood in MSS. immediately after the epistles of that apostle, and contained nothing in its title to

1 Also in Codex Claromontanus, the Tractatus de libris (x.), Philastrius of Brescia (c. a.d. 380), and a prologue to the Catholic Epistles {Revue benedictinc, xxiii. 82 ff.). It is defended in a mono- graph by H. H. B. Ayles (Cambridge, 1899).

distinguish it from the preceding books with like headings, " To the Romans," " To the Corinthians," and the like. A similar history attaches to the so-called Second Epistle of Clement (see Clementine Literature).

Everything turns, then, on internal criticism of the epistle,

working on the distinctive features already noticed, together

with such personal allusions as it affords. As to its first readers,

with whom the author stood in close relations (xiii. 19, 23, cf. vi.

10, x. 32-34), it used generally to be agreed that they were

" Hebrews " or Christians of Jewish birth. But, for a generation

or so, it has been denied that this can be inferred simply from

the fact that the epistle approaches all Christian truth through

Old Testament forms. This, it is said, was the common method

of proof, since the Jewish scriptures were the Word of God to all Christians alike. Still it remains true that the exclusive use of the argument from Mosaism, as itself implying the Gospel of Jesus the Christ as final cause (tcXos), does favour the view that the readers were of Jewish origin. Further there is no allusion to the incorporation of ” strangers and foreigners ” (Eph. ii. 19) with the people of God. Yet the readers are not to be sought in Jerusalem (see e.g. ii. 3), nor anywhere in Judaea proper. The whole Hellenistic culture of the epistle (let alone its language), and the personal references in it, notably that to Timothy in xiii. 23, are against any such view: while the doubly emphatic ” all ” in xiii. 24 suggests that those addressed were but part of a community composed of both Jews and Gentiles. Caesarea, indeed, as a city of mixed population and lying just outside Judaea proper — a place, moreover, where Timothy might have become known during Paul’s two years’ detention there — would satisfy many conditions of the problem. Yet these very conditions are no more than might exist among intensely Jewish members of the Dispersion, like ” the Jews of Asia ” (cf. Sir W.M. Ramsay, The Letters to the Seven Churches, 155 f.), whose zeal for the Temple and the Mosaic ritual customs led to Paul’s arrest in Jerusalem (Acts xix. 27 f., cf. 20 f.), in keeping both with his former experiences at their hands and with his forebodings resulting therefrom (xx. 19, 22-24). Our”Hebrews” hadobviously

high regard for the ordinances of Temple worship. But this was the case with the dispersed Jews generally, who kept in touch with the Temple, and its intercessory worship for all Israel, in every possible way; in token of this they sent with great care their annual contribution to its services, the Temple tribute. This bond was doubtless preserved by Christian Hellenists, and must have tended to continue their reliance on the Temple services for the forgiveness of their recurring " sins of ignorance " — subsequent to the great initial Messianic forgiveness coming with faith in Jesus. Accordingly many of them, while placing their hope for the future upon Messiah and His eagerly expected return in power, might seek assurance of present forgiveness of daily offences and cleansing of conscience in the old mediatorial system. In particular the annual Day of Atonement would be relied on, and that in proportion as the expected Parousia tarried, and the first enthusiasm of a faith that was largely eschatological died away, while ever-present temptation pressed the harder as disappointment and perplexity increased.

Such was the general situation of the readers of this epistle, men who rested partly on the Gospel and partly on Judaism. For lack of a true theory as to the relation between the two, they were now drifting away (ii. 1) from effective faith in the Gospel, as being mainly future in its application, while Judaism was a very present, concrete, and impressive system of religious aids — to which also their sacred scriptures gave constant witness." The points at which it chiefly touched them may be inferred from the author's counter-argument, with its emphasis in the spiritual ineffectiveness of the whole Temple-system, its high- priesthood and its supreme sacrifice on the Day of Atonement. With passionate earnestness he sets over against these his

constructive theory as to the efficacy, the heavenly yet unseen reality, of the definitive ” purification of sins ” (i. 3) and per- fected access to God’s inmost presence, secured for Christians as such by Jesus the Son of God (x. 9-22), and traces their” moral feebleness and slackened zeal to want of progressive insight

into the essential nature of the Gospel as a ” new covenant,” moving on a totally different plane of religious reality from the now antiquated covenant given by Moses (viii. 13).

The following plan of the epistle may help to make apparent the writer’s theory of Christianity as distinct from Judaism, which is related to it as ” shadow ” to reality:

Thesis: The finality of the form of religion mediated in God’s Son, i. 1-4.

i. The supreme excellence of the Son’s Person (i. 5-iii. 6), as compared with (a) angels, (b) Moses. Practical exhortation, iii. 7-iv. 13, leading” up to: ii. The corresponding efficacy of the Son’s High-priesthood (iv. 14-ix.).

(1) The Son has the qualifications of all priesthood, especially

sympathy.

Exhortation, raising the reader’s thought to the height of the topic reached (v. 1 i-vi. 20).

(2) The Son as absolute high priest, in an order transcending

the Aaronic (vii.) and relative to a Tabernacle of ministry and a Covenant higher than the Mosaic in point of reality and finality (viii., ix.).

(3) His Sacrifice, then, is definitive in its effects (rereXekwe),

and supersedes all others (x. 1-18). iii. Appropriation of the benefits of the Son’s high-priesthood, by steadfast faith, the paramount duty (x. 19-xii.). More personal epilogue (xiii.).

As lack of insight lay at the root of their troubles, it was not

enough simply to enjoin the moral fidelity to conviction which is three parts of faith to the writer, who has but little sense of the mystical side of faith, so marked in Paul. There was need of a positive theory based on real insight, in order to inspire faith for more strenuous conflict with the influences tending to produce the apostasy from Christ, and so from ” the living God,” which already threatened some of them (iii. 12). Such ” apostasy ” was not a formal abjuring of Jesus as Messiah, but the subtler lapse involved in ceasing to rely on relation to Him for daily moral and religious needs, summed up in purity of conscience and peace before God (x. 19-23, xiii. 20 f.). This ” falling aside ” (vi. 5, cf. xii. 12 f.), rather than conscious ” turning back,” is what is implied in the repeated exhortations which show the intensely practical spirit of the whole argument. These exhortations are directed chiefly against the dullness of spirit which hinders progressive moral insight into the genius of the New Covenant (v. n-vi. 8), and which, in its blindness to the full work of Jesus, amounts to counting His blood as devoid of divine efficacy to consecrate the life (x. 26, 29), and so to a personal ” crucifying anew ” of the Son of God (vi. 6). The antidote to such ” profane ” negligence (ii. 1, 3, xii. 12 f., 15-17) is an earnestness animated by a fully-assured hope, and sustained by a ” faith ” marked by patient waiting ((ia.Kpodvy.ia) for the inheritance guaranteed by divine promise (x. 11 f.). The

outward expression of such a spirit is ” bold confession,” a glorying in that Hope, and mutual encouragement therein (iii. 6, 12 f.); while the sign of its decay is neglect to assemble together for mutual stimulus, as if it were not worth the odium and opposition from fellow Jews called forth by a marked Christian confession (x. 23-25, xii. 3) — a very different estimate of the new bond from that shown by readiness in days gone by to suffer for it (x. 32 ff.). Their special danger, then, the sin which deceived(iii. i3)themore easily that it represented the line of least resistance (perhaps the best paraphrase of emepLcrTaTos afiaprlo. in xii. 1). was the exact opposite of ” faith ” as the author uses it. especially in the chapter devoted to its illustration by Old Testament examples. His readers needed most the moral heroism of fidelity to the Unseen, which made men ” despise shame ” due to aught that sinners in their unbelief might do to them (xii. 2-11, xiii. 5 f.) — and of which Jesus Himself was at once the example and the inspiration. To quicken this by awakening deeper insight into the real objects of ” faith,” as these bore on their actual life, he develops his high argument on the lines already indicated.

Their situation was so dangerous just because it combined inward debility and outward pressure, both tending to the same result, viz. practical disuse of the distinctively Christian means of grace, as compared with those recognized by Judaism, and

such conformity to the latter as would make the reproach of the Cross to cease (xiii. 13, cf. xi. 26). This might, indeed, relieve the external strain of the contest {hy&v xii. 1), which had become well-nigh

intolerable to them. But the practical surrender of what was distinctive in their new faith meant a theoretic surrender of the value once placed on that element, when it was matter of a living religious experience far in advance of what Judaism had given them (vi. 4 ff., x. 26-29). This twofold infidelity, in thought and deed, God, the ” living ” God of prq- gress from the ” shadow ” to the substance, would require at their hands (x. 30 f., xii. 22-29). For it meant turning away from an appeal that had been known as ” heavenly,” for some- thing inferior and earthly (xii. 25); from a call sanctioned by the incomparable authority of Him in whom it had reached men, a greater than Moses and all media of the Old Covenant, even the Son of God. Thus the key of the whole exhortation is struck in the opening words, which contrast the piecemeal revelation ” to the fathers ” in the past, with the complete and final revelation to themselves in the last stage of the existing order of the world’s history, in a Son of transcendent dignity (i. 1 ff., cf. ii. 1 ff., x. 28 f., xii. 18 ff.). This goes to the root of their difficulty, ambiguity as to the relation of the old and the new elements in Judaeo-Christian piety, so that there was constant danger of the old overshadowing the new, since national Judaism remained hostile. At a stroke the author separates the new from the old, as belonging to a new ” covenant ” or order of God’s revealed will. It is a confusion, resulting in loss, not in gain, as regards spiritual power, to try to combine the two types of piety, as his readers were more and more apt to do. There is no use, religiously, in falling back upon the old forms, in order to avoid the social penalties of a sectarian position within Judaism, when the secret of religious ” perfection ” or maturity (vi. 1, cf. the frequent use of the kindred verb) lies elsewhere. Hence the moral of his whole argument as to the two covenants, though it is formulated only incidentally amid final detailed counsels (xiii. 13 f.) is to leave Judaism, and adopt a frankly Christian standing, on the same footing with theii non-Jewish brethren in the local church. For this the time was now ripe; and in it lay the true path of safety — eternal safety as before God, whatever man might say or do (xiii. 5 f.).

The obscure section, xiii. 9 f ., is to be taken as “only a symptom of the general retrogression of religious energy ” (Jiilicher), and not as bearing directly on the main danger of these ” Hebrews.” The ” foods ” in question probably refer neither to temple sacrifices nor to the Levitical laws of clean and unclean foods, nor yet to ascetic scruples (as in Rom. xiv., Col. ii. 20 ff.), but rather to some form of the idea, found also among the Essenes, that food might so be partaken of as to have the value of a sacrifice (see verse 15 foil.) and thus ensure divine favour. Over against this view, which might well grow up among the Jews of the Dispersion as a sort of substitute for the possibility of

offering sacrifices in the Temple — but which would be a lame addition to the Christianity of their own former leaders (xiii. 7 f.) — the author first points his readers to its refutation from experience, and then to the fact that the Christian's " altar " or sacrifice {i.e. the supreme sin-offering) is of the kind which the Law itself forbids to be associated with " eating." If Christians wish to offer any special sacrifice to God, let it be that of grateful praise or deeds of beneficence (15 f.).

In trying further to define the readers addressed in the epistle, one must note the stress laid on suffering as part of the divinely appointed discipline of sonship (ii. 10, v. 8, xii. 7 f.), and the way in which the analogy in this respect between Jesus, as Messianic Son, and those united to Him by faith, is set in relief. He is not only the inspiring example for heroic faith in the face of opposition due to unbelievers (xii. 3 ff.), but also the mediator qualified by his very experience of suffering to sympathize . with His tried followers, and so to afford them moral aid (ii. 17 f.. v. 8 f., cf. iv. 15). This means that suffering for Christianity, at least in respect of possessions (xiii. 5 f., cf. x. 34) and social standing, was imminent for those addressed: and it seems as if they were mostly men of wealth and position (xiii. i-6 4

vi. 10 f., x. 34), who would feel this sort of trial acutely (cf. Jas. i. ro). Such men would also possess a superior mental culiure (cf. v. n f.), capable of appreciating the form of an epistle " far too learned for the average Christian " (Jiilicher), yet for which its author apologizes to them as inadequate (xiii. 22). It was now long since they themselves had suffered seriously for their faith (x. 32 f.); but others had recently been harassed even to the point of imprisonment (xiii. 3); and the writer's very impatience to hurry to their side implies that the crisis was both sudden and urgent. The finished form of the epistle's argument is sometimes urged to prove that it was not originally an epistle at all, written more or less on the spur of the moment, but a literary composition, half treatise and half homily, to which its author — as an . afterthought — gave the suggestion of being a Pauline epistle by adding the personal matter in ch. xiii. (so W. Wrede, Das lilerarische Ratsel des Hebriierbriefs, 1906, pp. 70-73). The latter part of this theory fails to explain why the Pauline origin was not made more obvious, e.g. in an opening address. But even the first part of it overlooks the probability that our author was here only fusing into a fresh form materials often used before in his oral ministry of Christian

instruction.

Many attempts have been made to identify the home of the Hellenistic Christians addressed in this epistle. For Alexandria little can be urged save a certain strain of ” Alexandrine ” idealism and allegorism, mingling with the more Palestinian realism which marks the references to Christ’s sufferings, as well as the eschatology, and recalling many a passage in Philo. But Alexandrinism was a mode of thought diffused throughout the Eastern Mediterranean, and the divergences from Philo’s spirit are as notable as the affinities (cf. Milligan, ut infra, 203 ff.). For Rome there is more to be said, in view of the references to Timothy and to ” them of Italy ” (xiii. 23 f.); and the theory has found many supporters. It usually contemplates a special Jewish-Christian house-church (so Zahn), like those which Paul salutes at the end of Romans, e.g. that meeting in the house of I’risca and Aquila (xvi. 5) ; and Harnack has gone so far as to suggest that they, and especially Prisca, actually wrote our epistle. There is, however, really little that points to Rome in particular, and a good deal that points away from it. The words in xii. 4, ”” Not yet unto blood have ye resisted,” would ill suit Rome after the Neronian “bath of blood” in a.d. 64 (as is usually held), save at a date too late to suit the reference to Timothy. Nor does early currency in Rome prove that the epistle was written to Rome, any more than do the words ” they of Italy salute you.” This clause must in fact be read in the light of the reference to Timothy, which suggests that he had been in prison in Rome and was about to return, possibly in the writer’s company, to the region which was apparently the headquarters of both. Now this in Timothy’s case, as far as we can trace his steps, was Ephesus; and it is natural to ask whether it will not suit all the conditions of the problem. It suits those of the readers, 1 as analysed above; and it has the merit of suggesting to us as author the very person of all those described in the New Testament who seems most capable of the task, Apollos. the learned Alexandrian (Acts xviii. 24 ff.), connected with Ephesus and with Paul and his circle (cf. 1 Cor. xvi. 12), yet having his own distinctive manner of presenting the Gospel (1 Cor. iv. 6). That Apollos visited Italy at any rate once during Paul’s imprisonment in Rome is a reasonable inference from Titus iii. 13 (see Paul); and if so, it is quite natural that he should be there again about the time of Paul’s martyrdom. With that event it is again natural to connect Timothy’s imprisonment, his release from which our author records in closing: while the news of Jewish success in Paul’s case would enhance any tendency among Asian Jewish Christians’ to shirk ” boldness ” of confession (x. 23, 35, 38 f.), in fear of

1 i.e. a house-church of upper-class Jewish Christians, not fully in

touch with the attitude even of their own past and present ” leaders ” (xiii. 7, 17), as distinct from the local church generally (xiii. 24). The Gospel had reached them, as also the writer himself (cf. Acts xviii. 25), through certain hearers of the Lord (ii. 3), not necessarily apostles.

further aggression from their compatriots. On the chronology adopted in the article Paul, this would yield as probable date for the epistle a.d. 61-62. The place of writing would be some spot in Italy (” they of Italy salute you “) outside Rome, probably a port of embarkation for Asia, such as Brundisium.

Be this as it may, the epistle is of great historical importance, as reflecting a crisis inevitable in the development of the Jewish-Christian consciousness, when a definite choice between the old and the new form of Israel’s religion had to be made, both for internal and external reasons. It seems to follow directly on the situation implied by the appeal of James to Israel in dispersion, in view of Messiah’s winnowing-fan in their midst (i. 1-4, ii. 1-7, v. 1-6, and especially v. 7-1 1). It may well be the immediate antecedent of that revealed in 1 Peter, an epistle which perhaps shows traces of its influence {e.g. in i. 2, ” sprinkling of the blood of Jesus Christ,” cf. Heb. ix. 13 f., x. 22, xii. 24). It is also of high interest theologically, as exhibiting, along with affinities to several types of New Testament teaching (see Stephen), a type all its own, and one which has had much influence on later Christian thought (cf. Milligan, ut infra, ch. is..). Indeed, it shares with Romans the right to be styled ” the first treatise of Christian theology.”

Literature. — The older literature may be seen in the great work of F. Blcek, Der Brief an die Hebrder (1828-1840), still a valuable storehouse of material, while Bleek’s later views are to be found in a posthumous work (Elberfeld, 1868); also in Franz Delitzsch’s Commentary (Edinburgh, 1868). The more recent literature is given in G. Milligan, The Theology of the Epistle of the Hebrews (1899), a useful summary of all bearing on the epistle, and in the large New Testament Introductions and Biblical Theologies. See also Hast- ings’s Diet, of the Bible, the Encycl. Biblica and T. Zahn’s article in Hauck’s Realencyklopadie. (J. V. B.)

HEBRIDES, THE, or Western Isles, a group of islarids off the west coast of Scotland. They are situated between 55 35′ and 58° 30′ N. and 5 26′ and 8° 40′ W. Formerly the term was held to embrace not only all the islands off the Scottish western coast, including the islands in the Firth of Clyde, but also the peninsula of Kintyre, the Isle of Man and the Isle

of Rathlin, off the coast of Antrim. They have been broadly classified into the Outer Hebrides and the Inner Hebrides, the Minch and Little Minch dividing the one group from the other. Geologically, they have also been differentiated as the Gneiss Islands and the Trap Islands. The Outer Hebrides being almost entirely composed of gneiss the epithet suitably serves them, but, strictly speaking, only the more northerly of the Inner Hebrides may be distinguished as Trap Islands. The chief islands of the Outer Hebrides are Lewis- with-Harris (or Long Island), North Uist, Benbecula, South Uist, Barra, the Shiants, St Kilda and the Flannan Isles, or Seven Hunters, an unin- habited group, about 20 m. N.W. of Gallon Head in Lewis. Of these the Lewis portion of Long Island, the Shiants and the Flannan belong to the county of Ross and Cromarty, and the remainder to Inverness-shire. The total length of this group, from Barra Head to the Butt of Lewis, is 130 m., the breadth varying from less than 1 m. to 30 m. The Inner Hebrides are much more scattered and principally include Skye, Small Isles (Canna, Sanday, Rum, Eigg and Muck), Coll, Tyree, Lismore, Mull, Ulva, Staffa, Iona, Kerrera, the Slate Islands (Seil, Easdale, Luing, Shuna, Torsay), Colonsay, Oronsay, Scarba, Jura, Islay and Gigha. Of these Skye and Small Isles belong to Inverness-shire, and the rest to Argyllshire. The Hebridean islands exceed 500 in number, of which one-fifth are inhabited. Of the inhabited islands n belong to Ross and Cromarty, 47 to Inverness-shire, and 44 to Argyllshire, but of this total of 102 islands, one-third have a population of only 10 souls, or fewer, each. The population of the Hebrides in 1901 numbered 78,947 (or 28 to the sq. m.), of whom 41,031 were females, who thus exceeded the males by 10%, and 22,733 spoke Gaelic only and 47,666 Gaelic and English. The most populous island is Lewis- with-Harris (32,160), and next to it are Skye (13,883), Islay (6857) and Mull (4334).

Of the total area of 1,800,000 acres, or 2812 sq. m., only one-ninth is cultivated, most of the surface being moorland and mountain. The annual rainfall, particularly in the Inner

Hebrides, is heavy (42-6 in. at Stornoway) but the temperature is high, averaging for the year 47 F. Potatoes and turnips are the only root crops that succeed, and barley and oats are grown in some of the islands. Sheep-farming and cattle-raising are carried on very generally, and, with the fisheries, provide the main occupation of the inhabitants, though they profit not a little from the tourists who flock to many of the islands through- out the summer. The principal

industries include distilling, slate-quarrying and the manufacture of tweeds, tartans and other woollens. There are extensive deer forests in Lewis-with- Harris, Skye, Mull and Jura. On many of the islands there are prehistoric remains and antiquities within the Christian period. The more populous islands are in regular communication with certain points of the mainland by means of steamers f romGlasgow, Oban and Mallaig. The United Free Church has a strong hold on the poeple, but in a few of the islands the Roman Catholics have a great following. In the larger inhabited islands board schools have been established. The islands unite with the counties to which they belong in returning members to parliament (one for each shire).

History. — The Hebrides are mentioned by Ptolemy under the name of “EPovdai and by Pliny under that of Hebudes, the modern spelling having, it is said, originated in a misprint. By the Norwegians they were called Sudreyjar or Southern Islands. The Latinized form was Sodorenses, preserved to modern times in the title of the bishop of Sodor and Man. The original inhabitants seem to have been of the same Celtic race as those settled on the mainland. In the 6th century Scandinavian hordes poured in with their northern idolatry and lust of plunder, but in time they adopted the language and faith of the islanders. Mention is made of incursions of the vikings as early as 793, but the principal immigration took place towards the end of the 9th century in the early part of the reign of Harald Fairhair, king of Norway, and consisted of persons driven to the Hebrides, as well as to Orkney and Shetland, to escape from his tyrannous rule. Soon afterwards they began to make incursions against their mother-country, and on this account Harald fitted out an expedition against them, and placed Orkney, Shetland, the Hebrides and the Isle of Man under Norwegian government. The chief seat of the Norwegian sovereignty was Colonsay. About the year 1095 Godred Crovan, king of Dublin, Man and the Hebrides, died in Islay. His third son, Olaf, succeeded to the government about 1103, and the daughter of Olaf was married to Somerled, who became the founder of the dynasty known as Lords of the Isles. Many efforts were made by the Scottish monarchs to displace the Norwegians. Alexander II. led a fleet and army to the shores of Argyllshire in 1249, but he died on the island of Kerrera. On the other hand, Haakon IV., king of Norway, at once to restrain the independence of his jarls and to keep in check the ambition of the Scottish kings, set sail in 1263 on a great expedition, which, however, ended disastrously at Largs. Magnus, son of Haakon, concluded in 1266 a peace with the Scots, renouncing all claim to the Hebrides and other islands except Orkney and Shetland, and Alexander III. agreed to give him a sum of 4000 merks in four yearly

payments. It was also stipulated that Margaret, daughter of Alexander, should be betrothed to Eric, the son of Magnus, whom she married in 1281. She died two years later, leaving an only daughter afterwards known as the Maid of Norway.

The race of Somerled continued to rule the islands, and from a younger son of the same potentate sprang the lords of Lome, who took the patronymic of Macdougall. John Macdonaldof Islay, who died about 1386, was the first to adopt the title of Lord of the Isles. He was one of the most potent of the island princes, and was married to a daughter of the earl of Strathearn, afterwards Robert II. His son, Donald of the Isles, was memor- able for his rebellion in support of his claim to the earldom of Ross, in which, however, he was unsuccessful. Alexander, son of Donald, resumed the hereditary warfare against the Scottish crown; and in 1462 a treaty was concluded between Alexander's son and successor John and Edward IV. of England, by which John, his son John, and his cousin Donald Balloch, became

bound to assist King Edward and James, earl of Douglas, in subduing the kingdom of Scotland. The alliance seems to have led to no active operations. In the reign of James V. another John of Islay resumed the title of Lord of the Isles, but was compelled to surrender the dignity. The glory of the lordship of the isles — the insular sovereignty — had departed. From the time of Bruce the Campbells had been gaining the ascendancy in Argyll. The Macleans, Macnaughtons, Maclachlans, Laments, and other ancient races had sunk before this favoured family. The lordship of Lome was wrested from the Macdougalls by Robert Bruce, and their extensive possessions, with Dunstaffnage Castle, bestowed on the king's relative, Stewart, and his de- scendants, afterwards lords of Lome. The Macdonalds of Sleat, the direct representatives of Somerled, though driven from Islay and deprived of supreme power by James V., still kept a sort of insular state in Skye. There were also the Macdonalds of Clanranald and Glengarry (descendants of Somerled), with the powerful houses of Macleod of Dunvegan and Macleod of Harris, M'Neill of Barra and Maclean of Mull. Sanguinary feuds continued throughout the 16th and 17th centuries among these rival clans and their dependent tribes, and the turbulent spirit was not subdued till a comparatively recent period. James VI. made an abortive endeavour to colonize Lewis. William III. and Queen Anne attempted to subsidize the chiefs in order to preserve tranquillity, but the wars of Montrose and Dundee, and the Jacobite insurrections of 1715 and 1745, showed how futile were all such efforts. It was not till 1748, when a decisive blow was struck at the power of the chiefs by the abolition of heritable jurisdictions, and the appointment of sheriffs in the different districts, that the arts of peace

and social improvement made way in these remote regions. The change was great, and at first not unmixed with evil. A new system of management and high rents were imposed, in consequence of which numbers of the tacksmen, or large tenants, emigrated to North America. The exodus continued for many years. Sheep-farming on a large scale was next introduced, and the crofters were thrust into villages or barren corners of the land. The result was that, despite the numbers who entered the army or emigrated to Canada, the standard of civilization sank lower, and the popula- tion multiplied in the islands. The people came to subsist almost entirely on potatoes and herrings; and in 1846, when the potato blight began its ravages, nearly universal destitution ensued — embracing, over the islands generally, 70% of the inhabitants. Temporary relief was administered in the shape of employment on roads and other works; and an emigration fund being raised, from 4000 to 5000 of the people in the most crowded districts were removed to Australia. Matters, however, were not really mended, and in 1884 a royal commission reported upon the condition of the crofters of the islands and mainland. As a result of their inquiry the Crofters' Holdings Act was passed in 1886, and in the course of a few years some improvement was evident and has since been sustained.

Authorities. — Martin Martin's Description of the Western Islands of Scotland (1703) ; T. Pennant's Tour in Scotland and Voyage to the Hebrides (1774); James Boswell's Tour to the Hebrides with Samuel Johnson, LL.D. (1898); John Macculloch's Geological Account of the Hebrides (1819); Hugh Miller's Cruise of the " Betsy " (1858); W. A. Smith's Lewisiana, or Life in the Outer Hebrides (1874); Alexander Smith, A Summer in Skye (1865); Robert Buchanan, The Hebrid Isles (1883) ; C. F. Gordon-Cumming, In the Hebrides (1883) ; Report of the Crofters' Commission (1884); A. Goodrich-Freer, Outer Isles (1902); and W. C. Mackenzie, History of the Outer Hebrides (1903). Their history under Norwegian rule is given in the Chronica regum Manniae et insularum, edited, with learned notes, from the MS. in the British Museum by Professor P. A. Munch of Christiania (i860).

HEBRON (mod. Khulil er-Rahmdn, i.e. " the friend of the Merciful One " — an allusion to Abraham), a city of Palestine some 20 m. S. by S. W. of Jerusalem. The city, which lies 3040 ft. above the sea, is of extreme antiquity (see Num. xiii. 22, and Josephus, War, iv. 9, 7) and until taken by the Calebites (Josh. xv. 13) bore the name Kirjath-Arba. Biblical traditions connect it closely with the patriarch Abraham and make it a " city of refuge." The town figures prominently under David as the headquarters of his early rule, the scene of Abner's murder

and the centre of Absalom's rebellion. In later days the Edom- ites held it for a time, but Judas Maccabaeus recovered it. It was destroyed in the great war under Vespasian. In a.d. 1167 Hebron became the see of a Latin bishop, and it was taken in 1 187 by Saladin. In 1834 it joined the rebellion against Ibrahim Pasha, who took the town and pillaged it. Modern Hebron rises on the east slope of a shallow valley — a long narrow town of stone houses, the flat roofs having small stone domes. The main quarter is about 700 yds. long, and two smaller groups of houses exist north and south of this. The hill behind is terraced, and luxuriant vineyards and fruit plantations surround the place, which is well watered on the north by three principal springs, including the Well Sirah, now 'Ain Sara (2 Sam. iii. 26). Three conspicuous minarets rise, two from the Haram, the other in the north quarter. The population (10,000) includes Moslems and about 500 Jews. The Bedouins bring wool and camel's hair to the market ; and glass bracelets, lamps and leather water- skins are manufactured in the town. The most conspicuous building is the Haram built over the supposed site of the cave of Machpelah. It is an enclosure measuring 112 ft. east and west by 198 north and south, surrounded with high rampart walls of masonry similiar in size and dressing to that of the Jerusalem Haram walls. These ramparts are ascribed by architectural authorities to the Herodian period. The interior area is partly occupied by a 12th-century Gothic church, and contains six modern cenotaphs of Abraham, Isaac, Jacob, Sarah, Rebecca and Leah. The cave bene.ath the platform has probably not been entered for at least 600 years. The numerous traditional sites now shown round Hebron are traceable generally to medieval legendary topography; they include the Oak of Mamre (Gen. xiii. 18 R.V.) which has at various times been shown in different positions from J to 2 m. from the town.

There are a British medical mission, a German Protestant mission with church and schools, and, near Abraham's Oak, a Russian mission. Since 1880 several notices of the Haram, within which are the tombs of the Patriarchs, have appeared.

See C. R. Conder, Pal. Exp. Fund, Memoirs, iii. 333, &c. ; Riant, Archives de I' orient latin, ii. 411, &c. ; Dalton and Chaplin, P.E.F. Quarterly Statement (1897); Goldziher, "Das Patriarchengrab in Hebron," in Zeilschrift d. Dn. Pal. Vereins, xvii. (R. A. S. M.)

HECATAEUS OF ABDERA (or of Teos), Greek historian and Sceptic philosopher, flourished in the 4th century B.C. He accompanied Ptolemy I. Soter in an expedition to Syria, and sailed up the Nile with him as far as Thebes (Diogenes Laertius ix. 61). The result of his travels was set down by him in two works — klyvKTMKa. and Tlepi 'TTtpfioptuiv, which were used by Diodorus Siculus. According to Suidas, he also wrote a treatise on the poetry of Hesiod and Homer. Regarding his authorship of a work on the Jews (utilized by Josephus in Contra Apionem), it is conjectured that portions of the AiyvirriaKa were revised by a Hellenistic Jew from his point of view and published as a special work.

Fragments in C. W. Miiller's Fragmenta historicorum Graecorum.

HECATAEUS OF MILETUS (6th- 5th century B.C.), Greek historian, son of Hegesander, flourished during the time of the Persian invasion. After having travelled extensively, he settled in his native city, where he occupied a high position, and devoted his time to the composition of geographical and historical works. When Aristagoras held a council of the leading Ionians at Miletus, to organize a revolt against the Persian rule, Hecataeus in vain tried to dissuade his countrymen from the undertaking (Herodotus v. 36, 125). In 494, when the defeated Ionians were obliged to sue for terms, he was one of the ambassadors to the Persian satrap Artaphernes, whom he persuaded to restore the constitution of the Ionic cities (Diod. Sic. x. 23). He is by some credited with a work entitled Ttjs wepiodos ("Travels round the Earth "), in two books, one on Europe, the other on Asia, in which were described the countries and inhabitants of the known world, the account of Egypt being especially com prehensive; the descriptive matter was accompanied by a map, based upon Anaximander's map of the earth, which he corrected a nd pnlarged. The authenticity of the work is, however,

strongly attacked by J. Wells in the Journal of Hellenic Studies, xxix. pt. i. 1909. The only certainly genuine work of Hecataeus was the Ttverj\oyiaL or Toropicu, a systematic account of the traditions and mythology of the Greeks. He was probably the first to attempt a serious prose history and to employ critical method to distinguish myth from historical fact, though he accepts Homer and the other poets as trustworthy authority. Herodotus, though he once at least controverts his statements, is indebted to Hecataeus not only for facts, but also in regard of method and general scheme, but the extent of the debt depends on the genuineness of the Tt)s ireplodos.

See fragments in C. W. Miiller, Fragmenta historicorum Graecorum,. ;

H. Berger, Geschichte der wissenschaftlichen Erdkunde der Griechen (i9 3); E. H. Bunbury, History of Ancient Geography, i.; W. Mure, History of Greek Literature, iv. ; especially J. V. Prasek, Hekataios als Herodots Quelle zur Geschichte Vorderasiens. Beitrdge zur alten Geschichte {Klio), iv. 193 seq. (1904), and J. Wells in Journ. Hell. Stud., as above.

HECATE (Gr. ‘Ewm?, ” she who works from afar ” 1), a goddess in Greek mythology. According to the generally accepted view, she is of Hellenic origin, but Farnell regards her as a foreign importation from Thrace, the home of Bendis, with whom Hecate has many points in common. She is not mentioned in the Iliad or the Odyssey, but in Hesiod {Theogony, 409) she is the daughter of the Titan Perses and Asterie, in a passage which may be a later interpolation by the Orphists (for other genealogies see Steuding in Roscher’s Lexikon). She is there represented as a mighty goddess, having power over heaven, earth and sea; hence she is the bestower of wealth and all the blessings of daily life. The range of her influence is most varied, extending to war, athletic games, the tending of cattle, hunting, the assembly of the people and the law-courts. Hecate is frequently identified with Artemis, an identification usually justified by the assump- tion that both were moon-goddesses. Farnell, who regards Artemis as originally an earth-goddess, while recognizing a ” genuine lunar element ” in Hecate from the 5th century, considers her a chthonian rather than a lunar divinity (see also Warr in Classical Review, ix. 390). He is of opinion that neither borrowed much from, nor exercised much influence on, the cult and character of the other.

Hecate is the chief goddess who presides over magic arts and spells, and in this connexion she is the mother of the sorceresses Circe and Medea. She is constantly invoked, in the well-known idyll (ii.) of Theocritus, in the incantation to bring back a woman’s faithless lover. As a chthonian power, she is worshipped at the Samothracian mysteries, and is closely connected with Demeter. Alone of the gods besides Helios, she witnessed the abduction of Persephone, and, torch in hand (a natural symbol for the moon’s light, but see Farnell), assisted Demeter in her search for her daughter. On moonlight nights she is seen at the cross-roads (hence her name rptoStrts, Lat. Trivia) accompanied by the dogs of the Styx and crowds of the dead. Here, on the last day of the month, eggs and fish were offered to her. Black puppies and she-lambs (black victims being offered to chthonian deities) were also sacrificed (Schol. on Theocritus ii. 12). Pillars like the Hermae, called Hecataea, stood, especially in Athens at cross-roads and doorways, perhaps to keep away the spirits of evil. Like Artemis,. Hecate is also a goddess of fertility, presiding especially over the birth

and the youth of wild animals, and over human birth and marriage. She also attends when the soul leaves the body at death, and is found near graves, and on the hearth, where the master of the house was formerly buried. It is to be noted that Hecate plays little or no part in mythological legend. Her worship seems to have flourished especially in the wilder parts of Greece, such as Samothrace and Thessaly, in Caria and on the coasts of Asia Minor. In Greece proper it prevailed on the east coast and especially in Aegina, where her aid was invoked against madness.

In older times Hecate is represented as single-formed, clad in

1 J. B. Bury, in Classical Review, iii. p. 416, suggests that the name

means " dog," against which see J. H. Vince, ib. iv. p. 47. G. C.

Warr, ib. ix. 390, takes the Hesiodic Hecate to be a moon-goddess,

daughter of the sun-god Perseus.

a long robe, holding burning torches; later she becomes triformis, " triple-formed," with three bodies standing back to back — corresponding, according to those who regard her as a moon- goddess, to the new, the full and the waning moon. In her six hands are torches, sometimes a snake, a key (as wardress of the lower world), a whip or a dagger; her favourite animal was the dog, which was sacrificed to her — an indication of her non- Hellenic origin, since this animal very rarely fills this part in genuine Greek ritual.

See H. Steuding in Roscher's Lexikon, where the functions of Hecate are systematically derived from the conception of her as a moon-goddess; L. R. Farnell, Cults of the Greek States, ii., where this view is examined ; P. Paris in Daremberg and Saglio's Dictionnaire des antiquitis; O. Gruppe, Griechische Mythologie, ii. (1906) p. 1288.

HECATOMB (Gr. luarbtifiri from tKarov, a hundred, and 0oCs, an ox), originally the sacrifice of a hundred oxen in the religious ceremonies of the Greeks and Romans; later a large number of any kind of animals devoted for sacrifice. Figura- tively, "hecatomb" is used to describe the sacrifice or destruc- tion by fire, tempest, disease or the sword of any large number of persons or animals; and also of the wholesale destruction of inanimate objects, and even of mental and moral

attributes.

HECATO OF RHODES, Greek Stoic philosopher and disciple of Panaetius (Cicero, De officiis, iii. 15). Nothing else is known of his life, but it is clear that he was eminent amongst the Stoics of the period. He was a voluminous writer, but nothing remains. A list is preserved by Diogenes, who mentions works on Duly, Good, Virtues, Ends. The first, dedicated to Tubero, is eulogized by Cicero in the De officiis, and Seneca refers to him frequently in the De beneficiis. According to Diogenes Laertius, he divided the virtues into two kinds, those founded on scientific intellectual principles {i.e. wisdom and justice), and those which have no such basis (e.g. temperance and the resultant health and vigour). Cicero shows that he was much interested in casuistical questions, as, for example, whether a good man who had received a* coin which he knew to be bad was justified in passing it on to another. On the whole, his moral attitude' is cynical, and he is inclined to regard self-interest as the best criterion. This he modifies by explaining that self-interest is based on the relationships of life; a man needs money for the sake of his children, his friends and the state whose general prosperity depends on the wealth of its citizens. Like the earlier Stoics, Cleanthes and Chrysippus, he held that virtue may be taught. (See Stoics and Panaetius.)

HECKER, FRIEDRICH FRANZ KARL (1811-1881), German revolutionist, was born at Eichtersheim in the Palatinate on the 28th of September 1811, his father being a revenue official. He studied law with the intention of becoming an advocate, but soon became absorbed in politics. On entering the Second Chamber of Baden in 1842, he at once began to take part in the opposition against the government, which assumed a more and more openly Radical character, and in the course of which his talents as an agitator and his personal charm won him wide popularity and influence. A speech, denouncing the projected incorporation of Schleswig and Holstein with Denmark, delivered in the Chamber of Baden on the 6th of February 1845, spread his fame beyond the limits of his own state, and his popularity was increased by his expulsion from Prussia on the occasion of a journey to Stettin. After the death of his more moderate-minded friend Adolf Sander (March 9th, 1845), Hecker's tone towards the government became more and more bitter. In spite cf the shallowness and his culture and his extremely weak character, he enjoyed an ever-increasing popularity. Even before the outbreak of the revolution he included Socialistic claims in his programme. In 1847 he was temporarily occupied with ideas of emigration, and with this object made a journey to Algiers, but returned to Baden and resumed his former position as the Radical champion of popular rights, later

becoming president of the Volksverein, where he was destined to fall still further under the influence of the agitator Gustav von Struve. In conjunction with Struve he drew up the Radical programme carried at the great Liberal meeting held at Offenburg on the

1 2th of September 1847 (entitled ” Thirteen Claims put forward

by the People of Baden”). In addition to the Offenburg pro- gramme, the Sturmpetition of the 1st of March 1848 attempted to extort from the government the most far-reaching concessions. But it was in vain that on becoming a deputy Hecker en- deavoured to carry out its impracticable provisions. He had to yield to the more moderate majority, but on this account was driven still further towards the Left. The proof lies in the new Offenburg demands of the 19th of March, and in the resolution moved by Hecker in the preliminary parliament of Frankfort that Germany should be declared a republic. But neither in Baden nor Frankfort did he at any time gain his point.

This double failure, combined with various energetic measures of the government, which were indirectly aimed at him (e.g. the arrest of the editor of the Conslanzer Seeblatt, a friend of Hecker’s, in Karlsruhe station on the 8th of April), inspired Hecker with the idea of an armed rising under pretext of the foundation of the German republic. The 9th to the nth of April was secretly spent in preliminaries. On the 12th of April Hecker and Struve sent a proclamation to the inhabitants of the Seekreis and of the Black Forest ” to summon the people who can bear arms to Donaueschingen at mid-day on the 14th, with arms, ammunition and provisions for six days.” They expected 70,000 men, but only a few thousand appeared. The grand-ducal government of the Seekreis was dissolved, and Hecker gradually gained reinforcements. But friendly advisers also joined him, pointing out the risks of his undertaking. Hecker, however, was not at all ready to listen to them; on the contrary, he added to violence an absurd defiance, and offered an amnesty to the German princes on condition of their retiring within fourteen days into private life. The troops of Baden and Hesse marched against him, under the command of General Friedrich von Gagern, and on the 20th of April they met near Kandern, where Gagern was killed, it is true, but Hecker was completely defeated.

Like many of the revolutionaries of that period, Hecker retired to Switzerland. He was, it is true, again elected to the Chamber of Baden by the circle of Thiengen, but the government, no longer willing to respect his immunity as a deputy, refused its ratification. On this account Hecker resolved in September 1848 to emigrate to North America, and obtained possession of a farm near Belleville in the state

of Illinois.

During the second rising in Baden in the spring of 1849 he again made efforts to obtain a footing in his own state, but with- out success. He only came as far as Strassburg, but had to retreat before the victories of the Prussian troops over the Baden insurgents.

On his return to America he won some distinction during the Civil War as colonel of a regiment which he had himself got together on the Federal side in 1861 and 1864. It was with great joy that he heard of the union of Germany brought about by the victory over France in 1870-71. It was then that he made his famous festival speech at St Louis, in which he gave an animated expression to the enthusiasm of the German Americans for their newly-united fatherland. He received a less favourable impression during a journey he made in Germany in 1873. He died at St Louis on the 24th of March 1881.

Hecker was always very much beloved of all the German democrats. The song and the hat named after him (the latter a broad slouch hat with a feather) became famous as the symbols of the middle-classes in revolt. In America, too, he had won great esteem, not only on political grounds but also for his personal qualities.

See F. Hecker, Die Erhebung des Volkes in Baden fur die deutscRe Republik (Baden, 1848); F. Hecker, Reden und Vorlesungen (Neer-stadt a. d. H., 1872); F. v. Weech, Badische Biographien, iv. (1891); L. Mathy, Aus dem Nachlasse von K. Matty, Briefe aus den Jahren 1846-1848 (Leipzig, 1898). (J. Hn.)

HECKER, ISAAC THOMAS (18 19-1888), American Roman Catholic priest, the founder of the “Paulist Fathers,” was born in New York City, of German immigrant parents, on the 18th of December 1819. When barely twelve years of age, he had to go to work, and pushed a baker’s cart for his elder brothers, who had a bakery in Rutgers Street. But he studied

at every possible opportunity, becoming immersed in Kant’s I Critique of Pure Reason, and while still a lad took part in certain politico-social movements which aimed at the elevation oi the working man. It was at this juncture that he met Orestes Brownson, who exercised a marked influence over him. Isaac ■was deeply religious, a characteristic for which he gave much credit to his prayerful mother,

and remained so amid all the reading and agitating in which he engaged. Having grown into young manhood, he joined the Brook Farm movement, and in that colony he tarried some six months. Shortly after leaving it (in 1844) he was baptized into the Roman Catholic Church by Bishop McC'loskey of New York. One year later he was entered in the novitiate of the Redemptorists in Belgium, and there he cultivated to a high degree the spirit of lofty mystical piety which marked him through life.

Ordained a priest in London by Wiseman in 1849, he returned to America, and worked until 1857 as a Redemptorist missionary. With all his mysticism, Isaac Hecker had the wide-awake mind of the typical American, and he perceived that the missionary activity of the Catholic Church in the United States must remain to a large extent ineffective unless it adopted methods suited to the country and the age. In this he had the sympathy of four fellow Redemptorists, who like himself were of American birth and converts from Protestantism. Acting as their agent, and with the consent of his local superiors, Hecker went to Rome to beg of the Rector Major of his Order that a Redemptorist novitiate might be opened in the United States, in order thus to attract American youths to the missionary life. In furtherance of this request, he took with him the strong approval of some members of the American hierarchy. The Rector Major, instead of listening to Father Hecker, expelled him from the Order for having made the journey to Rome without sufficient authoriza- tion. Theoutcome of the trouble was that Hecker and the other four American Redemptorists were permitted by Pius IX. in 1858 to form the separate religious community of the Paulists. Hecker trained and governed this community in spiritual exercises and mission-preaching until his death in New York City, after seventeen years of suffering, on the 22nd of December 1888. He founded and was the director of the Catholic Publication Society, was the founder, and from 1865 until his death the editor, of the Catholic World, and wrote Questions of the Soul (1855), Aspirations of Nature (1857), Catholicity in the United States (1879) and The Church and the Age (1888).

project of Catholic enterprise. From the American priesthood, Father Hecker stood out conspicuous for sturdy courage, deep interior piety, an assertive self-initiative and immense love of modern times and modern liberty. So they took Father Hecker for a kind of patron saint. His biography (New York, 1891), written in English by the PauVist Father Elliott, was translated into French (1897), and speedily became the book of the hour. Under the inspiration of Father Hecker's life and character, the more spirited section of the French clergy undertook the task of persuading their fellow- priests loyally to accept the actual

political establishment, and then, breaking out of their isolation, to put themselves in touch with the intellectual life of the country, and take an active part in the work of social amelioration.

In 1897 the movement received an impetus — and a warning — when Mgr O'Connell, former Rector of the American College in Rome, spoke on behalf of Father Hecker's ideas at the Catholic Congress in Friburg. The conservatives took alarm at what they considered to be symptoms of pernicious modernism or " Liberalism." Did not the watchword " Allans au peuple " savour of heresy ? Did it not tend toward breaking down the divinely established distinction between the priest and the layman, and conceding something to the laity in the management of the Church ? The insistence upon individual initiative was judged to be incompatible with the fundamental principle of Catholicism, obedience to authority. Moreover, the conservatives were, almost to a man, anti-republicans who distrusted and disliked the democratic abbes. Complaints were sent to Rome. A violent polemic against the new movement was launched in Abbe Maignan's Le pere Hecker, est-il un saint ? (1898). Repugnance to American tendencies and influences had a strong representation in the Curia and in powerful circles in Rome. Leo XIII. was extremely reluctant to pronounce any strictures upon American Catholics, of whose loyalty to the Roman See, and to their faith, he had often spoken in terms of high approbation. But he yielded, in a measure, to the pressure brought to bear upon him, and, early in February 1899, addressed to Cardinal Gibbons the Brief Teslem Benevolentiae. This document contained a condem- nation of the following doctrines or tendencies : (a) undue insistence on interior initiative in the spiritual life, as leading to disobedience ; (b) attacks on religious vows, and disparagement of the value in the present age, of religious orders; (c) minimizing Catholic doctrine; (d) minimizing the importance of spiritual direction. The brief did not assert that any unsound doctrine on the above points had been held by Hecker or existed among Americans. Its tenour was, that if such opinions did exist, the Pope called upon the hierarchy to eradicate the evil. Cardinal Gibbons and many other prelates replied to Rome. With all but unanimity, they declared that the incriminated opinions had no existence among American Catholics. It was well known that Hecker never had countenanced the slightest departure from Catholic principles in their fullest and most strict application. The disturbance caused by the condemnation was slight ; almost the entire laity, and a considerable part of the clergy, never understood what the noise was about. The affair was soon forgotten, but the result was to strengthen the hands of the con- servatives in France. (J. J. F.)

The name of Hecker is closely associated with that of " American-

ism.” To understand this movement it is necessary to comprehend the tendency of events in Catholic Europe rather than in America itself. The steady decline in the power and influence of French Catholicism since shortly after 1870 is the most remarkable feature of the history of the Third Republic. Not only did the French State pass laws bearing more and more stringently on the Church, under each succeeding ministry, but the bulk of the people acquiesced in the policy of its legislators. The clergy, if not Catholicism, was rapidly losing its hold over the once Catholic nation. Observing this fact, and encouraged by the action of Leo XIII., who, in 1892 called on French Catholics loyally to accept the Republic, a body of vigorous young French priests set themselves to check the disaster. They studied the causes which produced it. These causes, they considered to be, first, the clergy’s predominant sympathy with the monarchists, and in its undisguised hostility to the Republic; secondly, the Church’s aloofness from modern men, methods and thought. The progressive party believed that there was too little cultivation of individual, independent character, while too much stress was laid upon what might be called the mechanical or routine side of religion. The party perceived, too, that Catholicism was making scarcely any use of modern aggressive modes of propaganda; that, for example, the Church took but an insignificant part in social move- ments, in the organization of clubs for social study, in the establishing of settlements and similar philanthropic endeavour. Lack of adaptability to modern needs expresses in short the deficiencies in Catholicism which these men endeavoured to correct. They began a domestic apostolate which had for one of its rallying cries, “Allons au peuple,’ — ” Let us go to the people.” They agitated for the inauguration of social works, for a more intimate mingling of priests with the people, and for general cultivation of personal initiative, both in clergy and in laity.

Not unnaturally, they looked for inspiration to America. There they saw a vigorous Church among a free people, with priests publicly respected, and with a note of aggressive zeal in every

HECKMONDWIKE, an urban district in the Spen Valley parliamentary division of the West Riding of Yorkshire, England, 8 m. S.S.E. of Bradford, on the Lancashire & Yorkshire, Great Northern, and London & North- Western railways. Pop. (1901), 9459. Like the town of Dewsbury, on the south-east, it is an important centre of the blanket and carpet manufactures, and there are also machine works, dye works and iron foundries. Coal is extensively wrought in the vicinity.

HECTOR, in Greek mythology, son of Priam and Hecuba, the husband of Andromache. Like Paris and other Trojans, he had an Oriental

name, Darius. In Homer he is represented as an ideal warrior, the champion of the Trojans and the mainstay of the city. His character, is drawn in most favourable colours as a good son, a loving husband and father, and a trusty friend. His leave-taking of Andromache in the sixth book of the Iliad, and his departure to meet Achilles for the last time, are most touchingly described. He is an especial favourite of Apollo; and later poets even describe him as son of that god. His chief exploits during the war were his defence of the wounded Sarpedon, his fight with Ajax, son of Telamon (his particular enemy), and the storming of the Greek ramparts. When Achilles, enraged with Agamemnon, deserted the Greeks, Hector drove them back to their ships, which he almost succeeded in burning. Patroclus, the friend of Achilles, who came to the help of the Greeks, was slain by Hector with the help of Apollo. Then Achilles, to revenge his friend's death, returned to the war, slew Hector, dragged his body behind his chariot to the camp, and afterwards round the tomb of Patroclus. Aphrodite and Apollo preserved

it from corruption and mutilation. Priam, guarded by Hermes, went to Achilles and prevailed on him to give back the body, which was buried with great honour. Hector was afterwards worshipped in the Troad by the Boeotian tribe Gephyraei, who offered sacrifices at his grave.

HECUBA (Gr. 'Ek

HEDA, WILLEH CLAASZ (c. 1504-e. 1670), Dutch painter, born at Haarlem, was one of the earliest Dutchmen who devoted himself exclusively to the painting of still life. He was the contemporary and comrade of Dirk Hals, with whom he had in common pictorial touch and technical execution. But Heda was more careful and finished than Hals, and showed consider- able skill and not a little taste in arranging and colouring chased cups and beakers and tankards of precious and inferior metals. Nothing is so appetizing as his " luncheon," with rare comestibles set out upon rich plate, oysters — seldom without the cut lemon — bread, champagne, olives and pastry. Even the commoner " refection " is also not, without charm, as it comprises a cut ham, bread, walnuts and beer. One of Heda's early masterpieces, dated 1623, in the Munich Pinakothek is as homely as a later one of 165 1 in the Liechtenstein Gallery at Vienna. A more luxurious repast is a" Luncheonin theAugsburg Gallery," dated 1644. Most of Heda's

pictures are on the European continent, notably in the galleries of Paris, Parma, Ghent, Darmstadt, Gotha, Munich and Vienna. He was a man of repute in his native city, and filled all the offices of dignity and trust in the gild of Haarlem. He seems to have had con- siderable influence in forming the younger Franz Hals.

HEDDLE, MATTHEW FORSTER (1828-1897), Scottish mineralogist, was born at Hoy in Orkney on the 28th of April 1828. After receiving his early education at the Edinburgh academy, he entered as a medical student at the university in that city, and subsequently studied chemistry and mineralogy at Klausthal and Freiburg. In 1851 he took his degree of M.D. at Edinburgh, and for about five years practised there. Medical work, however, possessed for him little attraction; he became assistant to Prof. Connell, who held the chair of chemistry at St Andrews, and in 1862 succeeded him as professor. This post he held until in 1880 he was invited to report on some gold mines in South Africa. On his return he devoted himself with great assiduity to mineralogy, and formed one of the finest collections by means of personal exploration in almost every part of Scotland. His specimens are now in the Royal Scottish Museum at Edinburgh. It had been his intention to publish a comprehensive work on the mineralogy of Scotland. This he did not live to complete, but the MSS. fell into able hands, and The Mineralogy of Scotland, in 2 vols., edited by J. G. Goodchild, was issued in 1 901. Heddle was one of the founders of the Mineralogical Society, and he contributed many articles on Scottish minerals, and on the geology of the northern parts of Scotland, to the

Mineralogical Magazine, as well as to the Transactions of ihe Royal Society of Edinburgh. He died on the 19th of November

1897.

See Dr Heddle and his Geological Work (with portrait), by J. G. Goodchild, Trans. Edin. Geol. Soc. (1898) vii. 317.

HEDGEHOG, or Urchin, a member of the mammalian order Insectivora, remarkable for its dentition, its armature of spines and its short tail. The upper jaw is longer than the lower, the snout is long and flexible, with the nostrils narrow, and the claws are long but weak. The animal is about 10 in. long, its eyes are small, and the lower surface covered with hairs of the ordinary character. The brain is remarkable for its low development, the cerebral hemispheres being small, and marked with but one groove, and that a shallow one, on each side. The hedgehog has the power of rolling itself up into a ball, from which the spines stand out in every direction. The spines are

sharp, hard and elastic, and form so efficient a defence that there are few animals able to effect a successful attack on this creature. The moment it is touched, or even hears the report of a gun, it rolls itself up by the action of the muscles beneath the skin, while this contraction effects the erection of the spines. The most important muscle is the orbicularis panniculi, which extends over the anterior region of the skull, as far down the body

The Hedgehog (Erinaceus europaeus).

as the ventral hairy region, and on to the tail, but three other muscles aid in the contraction.

Though insectivorous, the hedgehog is reported to have a liking for mice, while frogs and toads, as well as plants and fruits, all seem to be acceptable. It will also eat snakes, and its fond- ness for eggs has caused it to meet with the enmity of game- preservers; and there is no doubt it occasionally attacks leverets and game-chicks. In a state of nature it does not emerge from its retreat during daylight, unless urged by hunger or by the necessities of its young. During winter it passes into a state of hibernation, when its temperature falls considerably; having provided itself with a nest of dry leaves, it is well protected from the influences of the rain, and rolling itself up, remains undisturbed till warmer weather returns. In July or August the female brings forth four to eight young, or, according to others, two to four at a somewhat earlier period; at birth the spines, which in the adult are black in the middle, are white and soft, but soon harden, though they do not attain their full size until the succeeding spring.

The hedgehog, which is known scientifically as Erinaceus europaeus, and is the type of the family Erinaceidae, is found in woods and gardens, and extends over nearly the whole of Europe; and has been found at 6000 to 8000 ft. above the level of the sea. The adult is provided with thirty-six teeth; in the upper jaw are 6 incisors, 2 canines and 12 cheek-teeth, and in the lower jaw 4 incisors, 2 canines and 10 cheek-teeth. The genus is represented by about a score of species, ranging over Europe, Asia, except the Malay countries, and Africa. (R. L.*)

HEDGES AND FENCES. The object of the hedge » or fence (abbreviation of ” defence “) is to mark a boundary or to enclose

1 Hedge is a Teutonic word, cf. Dutch heg, Ger. Hecke; the root appears in other English words, e.g. ” haw,” as in ” hawthorn.”

an area of land on which stock is kept. The hedge, i.e. a row of bushes or small trees, forms a characteristic feature of the scenery of England, especially in the midlands and south; it is more rarely found in other countries. Its disadvantages as a fence are that it is not portable, that it requires cutting and training while young, that it harbours weeds and vermin and that it occupies together with the ditch which usually borders it a considerable space of ground, the margins of which cannot be cultivated. For these reasons it is to some extent superseded by the fence proper, especially where shelter for cattle is not required. In Great Britain the hawthorn (q.v.) is by far the most important of hedge plants. Holly resembles the hawthorn in its amenability to pruning and in its prickly nature and closeness of growth , which make it an effective barrier to, and shelter for, stock, but it is less hardy and more slow-growing than the hawthorn. Hornbeam, beech, myrobalan or cherry plum and blackthorn also have their advantages, hornbeam being proof against great exposure, blackthorn thriving on poor land and possessing great impenetrability and so on. Box, yew, privet and many other plants are used for ornamental hedging; in the United States the osage orange and honey locust are favourite hedge plants. As fences, wooden posts and rails and stone walls may be conveniently used in districts where the requisite materials are plentiful. But the most modern form of fence is formed of wire strands either smooth or barbed (see Barbed Wire), strained between iron standards or wooden or concrete posts. The wire may be interwoven with vertical strands or, if necessary, may be kept apart by iron droppers between the standards. Fences of a lighter description are machine-made with pickets of split chestnut or other wood closely set, woven with a few strands of wire; they are braced by posts at intervals. From the fact that tramps and vagabonds frequently sleep under hedges the word has come to be used as a term of contempt, as in ” hedge-priest,” an inferior and illiterate kind of parson at one time existing in England and Ireland, and in ” hedge- school,” a low class school held in the open air, formerly very common in Ireland. From the sense of ” hedge ” as an enclosure or barrier the- verb “to hedge” means to enclose, to form a barrier or defence, to bound or limit. As a sporting term the word is used in betting to mean protection from loss, by betting on both sides, by “laying off ” on one side, after laying odds on another or vice versa. The word was early used figuratively in the sense of to avoid committing oneself.

See articles in the Cyclopaedia of American Agriculture, vol. i., ed. by

L. H. Bailey (New York, 1907ˆ; in the Standard Cyclopaedia of Modern Agriculture, ed. by R. P. Wright (London, 1908-1909); and in the Encyclopaedia of Agriculture, vol. ii., ed. by C. E. Green and D. Young (Edinburgh, 1908).

HEDON, a municipal borough in the Holderness parliamentary division of the East Riding of Yorkshire, England, 8 m. E. of Hull by a branch of the North -Eastern railway. Pop. (1901), 1010. It stands in a low-lying, flat district bordering the Humber. It is 2 m. from the river, but was formerly reached by a navigable inlet, now dry, and was a considerable port. There is a small harbour, but the prosperity of the port has passed to Hull. The church of St Augustine is a splendid cruciform building with central tower. It is Early English, Decorated and Perpendicular, the tower being of the last period. The west front is particularly fine, and the church, with its noble pro- portions and lofty clerestories, resembles a cathedral in miniature. There are a manufacture of bricks and an agricultural trade. The corporation consists of a mayor, 3 aldermen and 9 councillors; and possesses a remarkable ancient mace, of 15th- century workmanship. Area, 321 acres.

According to tradition the men of Hedon received a charter of liberties from King ˆEthelstan, but there is no evidence to prove this or indeed to prove any settlement in the town until after the Conquest. The manor is not mentioned in the Domesday Survey, but formed part of the lordship of Holderness which William the Conqueror granted to Odo, count of Albemarle. A charter of Henry II., which is undated, contains the first certain evidence of settlement. By it the king granted to William,

count of Albemarle, free borough rights in Hedon so that his burgesses there might hold of him as freely and quietly as the burgesses of York or Lincoln held of the king. An earlier charter granted to the inhabitants of York shows that these rights included a trade gild and freedom from many dues not only in England but also in France. King John in 1200 granted a confirmation of these liberties to Baldwin, count of Albemarle, and Hawisia his wife and for this second charter the burgesses themselves paid 70 marks. In 1272 Henry III. granted to Edmund, earl of Lancaster, and Avelina his wife, then lord and lady of the manor, the right of holding a fair at Hedon on the eve, day, and morrow of the feast of St Augustine and for five following days. After the countess's death the manor came to the hands of Edward I. In 1280 it was found by an inquisition that the men of Hedon "were few and poor " and that if the town were demised at a fee-farm rent the town might improve. The grant, however, does not appear to have

been made until 1346. Besides this charter Edward III. also granted the burgesses the privilege of electing a mayor and bailiffs every year. At that time Hedon was one of the chief ports in the Humber, but its place was gradually taken by Hull after that town came into the hands of the king. Hedon was incorporated by Charles II. in 1661, and James II. in 1680 gave the burgesses another charter granting among other privileges that of holding two extra fairs, but of this they never appear to have taken advantage. The burgesses returned two members to parliament in 1295, and from 1547 to 1832 when the borough was disfranchised.

See Victoria County History, Yorkshire; J. R. Boyle, The Early History of the Town and Port of Hedon (Hull and York, 1895); G. H. Park, History of the Ancient Borough of Hedon (Hull, 1895).

HEDONISM (Gr. fjdovri, pleasure, from riSvs, sweet, pleasant), in ethics, a general term for all theories of conduct in which the criterion is pleasure of one kind or another. Hedonistic theories of conduct have been held from the earliest times, though they have been by no means of the same character. Moreover, hedonism has, especially by its critics, been very much mis- represented owing mainly to two simple misconceptions. In the first place hedonism may confine itself to the view that, as a matter of observed fact, all men do in practice make pleasure the criterion of action, or it may go further and assert that men ought to seek pleasure as the sole human good. The former statement takes no view as to whether or not there is any absolute good: it merely denies that men aim at anything more than pleasure. The latter statement admits an ideal, summum bonum — namely, pleasure. The second confusion is the tacit assumption that the pleasure of the hedonist is necessarily or characteristically of a purely physical kind; this assumption is in the case of some hedonistic theories a pure perversion of the facts. Practically all hedonists have argued that what are known as the ” lower ” pleasures are not only ephemeral in themselves but also pro- ductive of so great an amount of consequent pain that the wise man cannot regard them as truly pleasurable; the sane hedonist will, therefore, seek those so-called ” higher ” pleasures which are at once more lasting and less likely to be discounted by consequent pain. It should be observed, however, that this choice of pleasures by a hedonist is conditioned not by ” moral ” (absolute) but by prudential (relative) considerations.

The earliest and the most extreme type of hedonism is that of the Cyrenaic School as stated by Aristippus, who argued that the only good for man is the sentient pleasure of the moment. Since (following Protagoras) knowledge is solely of momentary sensations, it is useless

to try, as Socrates recommended, to make calculations as to future pleasures, and to balance present enjoy- ment with disagreeable consequences. The true art of life is to crowd as much enjoyment as possible into every moment. This extreme or ” pure ” hedonism regarded as a definite philosophic theory practically died with the Cyrenaics, though the same spirit has frequently found expression in ancient and modern, especially poetical, literature.

The confusion already alluded to between ” pure ” and ” rational ” hedonism is nowhere more clearly exemplified than in the misconceptions which have arisen as to the doctrine of

the Epicureans. To identify Epicureanism with Cyrenaicism is a complete misunderstanding. It is true that pleasure is the summum bonum of Epicurus, but his conception of that pleasure is profoundly modified by the Socratic doctrine of prudence and the eudaemonism of Aristotle. The true hedonist will aim at a life of enduring rational happiness; pleasure is the end of life, but true pleasure can be obtained only under the guidance of reason. Self-control in the choice of pleasures with a view to reducing pain to a minimum is indispensable. ” Of all this, the beginning, and the greatest good, is prudence.” The negative side of Epicurean hedonism was developed to such an extent by some members of the school (see Hegesias) that the ideal life is held to be rather indifference to pain than positive enjoyment. This pessimistic attitude is far removed from the positive hedonism of Aristippus.

hetween the hedonism of the ancients and that of modern philosophers there lies a great gulf. Practically speaking ancient hedonism advocated the happiness of the individual: the modern hedonism of Hume, Bentham and Mill is based on a wider conception of life. The only real happiness is the happiness of the community, or at least of the majority: the criterion is society, not the individual. Thus we pass from Egoistic to Universalistic hedonism, Utilitarianism, Social Ethics, more especially in relation to the still broader theories of evolution. These theories are confronted by the problem of reconciling and adjusting the claims of the individual with those of society. One of the most important contributions to the discussion is that of Sir Leslie Stephen (Science of Ethics), who elaborated a theory of the ” social organism ” in relation to the individual. The end of the evolution process is the production of a ” social tissue ” which will be

” vitally efficient.” Instead, therefore, of the criterion of ” the greatest happiness of the greatest number,” Stephen has that of the ” health of the organism.” Life is not ” a series of detached acts, in each of which a man can calculate the sum of happiness or misery attainable by different courses.” Each action must be regarded as directly bearing upon the structure of society.

A criticism of the various hedonistic theories will be found in the article Ethics (ad fin.). See also, beside works quoted under Cyrenaics, Epicurus, &c, and the general histories of philosophy, J. S. Mackenzie, Manual of Ethics (3rd ed., 1897); J. H. Muirhead, Elements of Ethics (1892); J. Watson, Hedonistic Theories (1895), J. Martineau, Types of Ethical Theory (2nd ed., 1886) ; F. H. Bradley, Ethical Studies (1876); H. Sidgwick, Methods of Ethics (6th ed., 1901); Jas. Seth, Ethical Principles (3rd ed., 1898); other works quoted under Ethics.

HEEL. (1) (0. Eng. hela, cf. Dutch hiel; a derivative of 0. Eng. hoh, hough, hock), that part of the foot in man which is situated below and behind the ankle; by analogy, the calcaneal part of the tarsus in other vertebrates. The heel proper in digitigrades and ungulates is raised off the ground and is commonly known as the “knee” or “hock,” while the term “heel” is applied to the hind hoofs. (2) (A variant of the earlier hield; cf. Dutch hellen, for helden), to turn over to one side, especially of a ship. It is this word probably, in the sense of ” tip-up,” used particularly of the tilting or tipping of a cask or barrel of liquor, that explains the origin of the expression ” no heel-taps,” a direction to the drinkers of a toast to drain their glasses and leave no dregs remaining. ” Tap” is a common word for liquor, and a cask is said to be ” heeled ” when it is tipped and only dregs or muddy liquor are left. This suits the actual sense of the phrase better than the explanations which connect it with tapping the ” heel ” or bottom of the glass (see Notes and Queries, 4th series, vols, xi.-xii., and 5th series, vol. i.).

HEEM, JAN DAVIDSZ VAN (or Johannes de),’(c. 1600-C.1683), Dutch painter. He was, if not the first, certainly the greatest painter of still life in Holland; no artist of his class combined more successfully perfect reality of form and colour with brilliancy and harmony of tints. No object of stone or silver, no flower humble or gorgeous, no fruit of Europe or the tropics, no twig or leaf, with which he was not familiar. Sometimes he merely represented a festoon or a nosegay. More frequently he worked with a purpose to point a moral or illustrate a motto. Here

the snake lies coiled under the grass, there a skull rests on blooming plants. Gold and silver tankards or cups suggest the vanity of earthly

possessions; salvation is allegorized in a chalice amidst blossoms, death as a crucifix inside a wreath. Sometimes de Heem painted alone, sometimes in company with men of his school, Madonnas or portraits surrounded by festoons of fruit or flowers. At one time he signed with initials, at others with Johannes, at others again with the name of his father joined to his own. At rare intervals he condescended to a date, and when he did the work was certainly of the best. De Heem entered the gild of Antwerp in 1635-1636, and became a burgher of that city in 1637. He steadily maintained his residence till 1667, when he moved to Utrecht, where traces of his presence are preserved in records of 1668, 1669 and 1670. It is not known when he finally returned to Antwerp, but his death is recorded in the gild books of that place. A very early picture, dated 1628, in the gallery of Gotha, bearing the signature of Johannes in full, shows that de Heem at that time was familiar with the technical habits of execution peculiar to the youth of Albert Cuyp. In later years he completely shook off dependence, and appears in all the vigour of his own originality.

Out of 100 pictures or more to be met with in European galleries scarcely eighteen are dated. The earliest after that of Gotha is a chased tankard, with a bottle, a silver cup, and a lemon on a marble table, dated 1640, in the museum of Amsterdam. A similar work of 1645, with the addition of fruit and flowers and a distant landscape, is in Lord Radnor's collection at Longford. A chalice in a wreath, with the radiant host amidst wheatsheaves, grapes and flowers, is a masterpiece of 1648 in the Belvedere of Vienna. A wreath round a Madonna of life size, dated 1650, in the museum of Berlin, shows that de Heem could paint brightly and harmoniously on a large scale. In the Pinakothek at Munich is the celebrated composition of 1653, in which creepers, beautifully commingled with gourds and blackberries, twigs of orange, myrtle and peach, are enlivened by butterflies, moths and beetles. A landscape with a blooming rose tree, a jug of strawberries, a selection of fruit, and a marble bust of Pan, dated 1655, is in the Hermitage at St Petersburg; an allegory of abundance in a medallion wreathed with fruit and flowers, in the gallery of Brussels, is inscribed with de Heem's monogram, the date of 1668, and the name of an obscure artist called Lambrechts. All these pieces exhibit the master in full possession of his artistic faculties.

Cornelius de Heem, the son of Johannes, was in practice as a flower painter at Utrecht in 1658, and was still active in his profession in 1671 at the Hague. His pictures are not equal to those of his father, but they are all well authenticated, and most of them in the galleries of the Hague, Dresden, Cassel, Vienna and Berlin. In the Staedel at Frankfort is a fruit piece, with pot-herbs and a porcelain jug, dated

1658; another, dated 1671, is in the museum of Brussels. David de Heem, another member of the family, entered the gild of Utrecht in 1668 and that of Antwerp in 1693. The best piece assigned to him is a table with a lobster, fruit and glasses, in the gallery of Amsterdam; others bear his signature in the museums of Florence, St Petersburg and Brunswick. It is well to guard against the fallacy that David de Heem above mentioned is the father of Jan de Heem. We should also be careful not to make two persons of the first artist, who sometimes signs Johannes, sometimes Jan Davidsz or J. D. Heem.

HEEMSKERK, JOHAN VAN (1597-1656), Dutch poet, was born at Amsterdam in 1597. He was educated as a child at Bayonne, and entered the university of Leiden in 161 7. In 1 62 1 he went abroad on the grand tour, leaving behind him his first volume of poems, Minnekunst (The Art of Love), which appeared in 1622. He was absent from Holland four years. He was made master of arts at Bourges in 1623, and in 1624 visited Hugo Grotius in Paris. On his return in 1625 he published Minnepligt (The Duty of Love), and began to practise as an advocate in the Hague. In 1628 he was sent to England in his legal capacity by the Dutch East India Company, to settle the dispute respecting Amboyna. In the same year he published

the poem entitled Minnekunde, or the Science of Love.- He proceeded to Amsterdam in 1640, where he married Alida, sister of the statesman Van Beuningen. In 1641 he published a Dutch version of Corneille's The Cid t a tragi-comedy, and in 1647 his most famous work, the pastoral romance of Batavische Arcadia, which he had written ten years before. During the last twelve years of his life Heemskerk sat in the upper chamber of the states-general. He died at Amsterdam on the 27th of February 1656.

The poetry of Heemskerk, which fell into oblivion during the 18th century, is once more read and valued. His famous pastoral, the Batavische Arcadia, which was founded on the Aslrie of Hononi d'Urf6, enjoyed a great popularity for more than a century, and passed through twelve editions. It provoked a host of more or less able imitations, of which the most distinguished were the Dor- drechlsche Arcadia (1663) of Lambert van den Bos (1610-1698), the Saanlandsche Arcadia (1658) of Hendrik Sooteboom (1616-1678) and the Rotlerdamsche Arcadia (1703) of Willem den Elger (d. 1703). But the original work of Heemskerk, in which a party of nymphs and

shepherds go out from the Hague to Katwijk, and there indulge in polite and pastoral discourse, surpasses all these in brightness and versatility.

HEEMSKERK, MARTIN JACOBSZ (1498-1574), Dutch painter, sometimes called Van Veen, was born at Heemskerk in Holland in 1498, and apprenticed by his father, a small farmer, to Cornelisz Willemsz, a painter at Haarlem. Recalled after a time to the paternal homestead and put to the plough or the milking of cows, young Heemskerk took the first opportunity that offered to run away, and demonstrated his wish to leave home for ever by walking in a single day the 50 miles which separate his native hamlet from the town of Delft. There he studied under a local master whom he soon deserted for John Schoreel of Haarlem. At Haarlem he formed what is known as his first manner, which is but a quaint and gauche imitation of the florid style brought from Italy by Mabuse and others. He then started on a wandering tour, during which he visited the whole of northern and central Italy, stopping at Rome, where he had letters for a cardinal. It is evidence of the facility with which he acquired the rapid execution of a scene-painter that he was selected to co-operate with Antonio da San Gallo, Battista Franco and Francesco Salviati to decorate the triumphal arches erected at Rome in April 1536 in honour of Charles V. Vasari, who saw the battle-pieces which Heemskerk then produced, says they were well composed and boldly executed. On his return to the Netherlands he settled at Haarlem, where he soon (1540) became president of his gild, married twice, and secured a large and lucrative practice. In 1572 he left Haarlem for Amsterdam, to avoid the siege which the Spaniards laid to the place, and there he made a will which has been preserved, and shows that he had lived long enough and prosperously enough to make a fortune. At his death, which took place on the 1st of October 1574, he left money and land in trust to the orphanage of Haarlem, with interest to be paid yearly to any couple who should be willing to perform the marriage ceremony on the slab of his tomb in the cathedral of Haarlem. It was a superstition which still exists in Catholic Holland that a marriage so celebrated would secure the peace of the dead within the tomb.

The works of Heemskerk are still very numerous. ” Adam and Eve,” and ” St Luke painting the Likeness of the Virgin and Child ” in presence of a poet crowned with ivy leaves, and a parrot in a cage — an altar-piece in the gallery of Haarlem, and the ” Ecce Homo ” in the museum of Ghent, are characteristic works of the period preceding Heemskerk’s visit to Italy. An altar-piece executed for St Laurence of Alkmaar in 1538-1 541, and composed of at least a dozen large panels, would, if preserved, have given us a clue to his style after his

return from the south. In its absence we have a ” Crucifixion ” executed for the Riches Claires at Ghent (nowin the Ghent Museum) in 1543, and the altar-piece of the Drapers Company at Haarlem, now in the gallery of the Hague, and finished in 1546. In these we observe that Heems- kerk studied and repeated the forms which he had seen at Rome in the works of Michelangelo and Raphael, and in Lombardy in the frescoes of Mantegna and Giulio Romano. But he never forgot the while his Dutch origin or the models first presented to him by

Schoreel and Mabuse. As late as 1551 his memory still served him to produce a copy from Raphael’s ” Madonna di Loretto ” (gallery of Haarlem). A ” Judgment of Momus,” dated 1561, in the Berlin Museum, proves him to have been well acquainted with anatomy, but incapable of selection and insensible of grace, bold of hand and prone to daring though tawdry contrasts of colour, and fond of florid architecture. Two altar- pieces which he finished for churches at Delft in 1551 and 1559, one complete, the other a fragment, in the museum of Haarlem, a third of 1551 in the Brussels Museum, representing “Golgotha,” the “Crucifixion,” the “Flight into Egypt,” ” Christ on the Mount,” and scenes from the lives of St Bernard and St Benedict, are all fairly representa- tive of his style. Besides these we have the ” Crucifixion ” in the Hermitage of St Petersburg, and two ” Triumphs of Silenus ” in the gallery of Vienna, in which the same relation to Giulio Romano may be noted as we mark in the canvases of Rinaldo of Mantua. Other pieces of varying importance are in the galleries of Rotterdam, Munich, Cassel, Brunswick, Karlsruhe, Mainz and Copenhagen. In England the master is best known by his drawings. A comparatively feeble picture by him is the ” Last Judgment ” in the palace of Hampton Court.

HEER, OSWALD (1809-1883), Swiss geologist and naturalist, was born at Nieder-Utzwyl in Canton St Gallen on the 31st of August 1809. He was educated as a clergyman and took holy orders, and he also graduated as doctor of philosophy and medicine. Early in life his interest was aroused in entomology, on which subject he acquired special knowledge, and later he took up the study of plants and became one of the pioneers in paleo- botany, distinguished for his researches on the Miocene flora. In 1851 he became professor of botany in the university of Zurich, and he directed his attention to the Tertiary plants and insects of Switzerland. For some time he was director of the botanic garden at Zurich. In 1863 (with W. Pengelly, Phil. Trans., 1862) he investigated the plant-remains from the lignite-deposits of Bovey Tracey in Devonshire, regarding them as of Miocene age; but they are now classed as Eocene. Heer also reported on the Miocene flora of Arctic regions, on the plants of the Pleistocene

lignites of Dtirnten on lake Zurich, and on the cereals of some of the lake-dwellings {Die Pflanzen der Pfahlbauten, 1866). During a great part of his career he was hampered by slender means and ill-health, but his services to science were acknowledged in 1873 when the Geological Society of London awarded to him the Wollaston medal. Dr Heer died at Lausanne on the 27th of September 1883. He published Flora Tertiaria Helvetiae (3 vols., 1855-1859); Die Urwelt der Schweiz (1865), and Flora fossilis Arctica (1868-1883).

HEEREN, ARNOLD HERMANN LUDWIG (1760-1842), German historian, was born on the 25th of October 1760 at Arbergen, near Bremen. He studied philosophy, theology and history at Gottingen, and thereafter travelled in France, Italy and the Netherlands. In 1787 he was appointed one of the professors of philosophy, and then of history at Gottingen, and he afterwards was chosen aulic councillor, privy councillor, &c, the usual rewards of successful German scholars. He died at Gottingen on the 6th of March 1842. Heeren's great merit as an historian was that he regarded the states of antiquity from an altogether fresh point of view. Instead of limiting himself to a narration of their political events, he examined their economic relations, their constitutions, their financial systems, and thus was enabled to throw a new light on the development of the old world. He possessed vast and varied learning, perfect calmness and impartiality, and great power of historical insight, and is now looked back to as the pioneer in the movement for the economic interpretation of history.

Heeren's chief works are: Ideen iiber Politik, den Verkehr, und den Handel der vornehmsten Volker der alten Welt (2 vols., Gottingen, I 793~I796; 4th ed., 6 vols., 1824-1826; Eng. trans., Oxford, !833); Geschichte des Studiums der klassischen Litter atur seil dem Wiederaufleben der Wissenschaften (2 vols., Gottingen, 1797-1802; new ed., 1822); Geschichte der Staaten des Altertums (Gottingen, 1799; Eng. trans., Oxford, 1840); Geschichte des enropaischen Slaalensy stems (Gottingen, 1800; 5th ed., 1830; Eng. trans., 1834) ; Versuch einer Entwickelung der Folgen der Kreuzzuge (Got- tingen, 1808; French trans., Paris, 1R08), a prize essay of the

Institute of France. Besides these, Heeren wrote brief biographical sketches of Johann von Muller (Leipzig, 1809); Ludwig Spittler (Berlin, 1812); and Christian Heyne (Gottingen, 1813). With Friedrich August Ukert (1780-1851) he founded the famous historical

collection, Geschichie der europdischen Staaten (Gotha, 1819 seq.), and contributed many papers to learned periodicals.

A collection of his historical works, with autobiographical notice, was published in 15 volumes (Gottingen, 1821-1830).

HEFELE, KARL JOSEF VON (1800-1893), German theologian, was born at Unterkochen in Wurttemberg on the 15th of March 1809, and was educated at Tubingen, where in 1839 he became professor-ordinary of Church history and patristics in the Roman Catholic faculty of theology. From 1842 to 1845 he sat in the National Assembly of Wurttemberg. In December 1869 he was enthroned bishop of Rottenburg. His literary activity, which had been considerable, was in ho way diminished by his elevation to the episcopate. Among his numerous theological works may be mentioned his well-known edition of the Apostolic Fathers, issued in 1839; his Life of Cardinal Ximenes, published in 1844 (Eng. trans., i860); and his still more celebrated History of the Councils of the Church, in seven volumes, which appeared between 1855 and 1874 (Eng. trans., 1871, 1882). Hefele's theological opinions inclined towards the more liberal school in the Roman Catholic Church, but he nevertheless received considerable signs of favour from its authorities, and was a member of the com- mission that made preparations for the Vatican Council of 1870. On the eve of that council he published at Naples his Causa Honorii Papae, which aimed at demonstrating the moral and historical impossibility of papal infallibility. About the same time he brought out a work in German oh the same subject. He took rather a prominent part in the discussions at the council, associating himself with Felix Dupanloup and with Georges Darboy, archbishop of Paris, in his opposition to the doctrine of Infallibility, and supporting their arguments from his vast knowledge of ecclesiastical history. In the preliminary discussions he voted against the promulgation of the dogma. He was absent from the important sitting of the 18th of June 1870, and did not send in his submission to the decrees until i87i,when he explained in a pastoral letter that the dogma " referred only to doctrine given forth ex cathedra, and therein to the definitions proper only, but not to its proofs or explanations." In 1872 he took part in the congress summoned by the Ultramontanes at Fulda, and by his judicious use of minimizing tactics he kept his diocese free from any participation in the Old Catholic schism. The last four volumes of the second edition of his History of the Councils have been described as skilfully adapted to the new situation created by the Vatican decrees. During the later years of his life he undertook no further literary efforts on behalf of his church, but retired into comparative privacy. He died on the 6th of June

1893.

See Herzog-Hauck's Realencyklopddie, vii. 525.

HEGEL, GEORG WILHELM FRIEDRICH (1770-1831), German philosopher, was born at Stuttgart on the 27th of August 1 770. His father, an official in the fiscal service of Wurttemberg, is not otherwise known to fame; and of his mother we hear only that she had scholarship enough to teach him the elements of Latin. He had one sister, Christiana, who died unmarried, and a brother Ludwig, who served in the campaigns of Napoleon. At the grammar school of Stuttgart, where Hegel was educated between the ages of seven and eighteen, he was not remarkable. His main productions were a diary kept at intervals during eighteen months (1785-1787), and translations of the Antigone, the Manual of Epictetus, &c. But the characteristic feature of his studies was the copious extracts which from this time onward he unremittingly made and preserved. This collection, alphabetically arranged, comprised annotations on classical authors, passages from newspapers, treatises on morals and mathematics from the standard works of the period. In this way he absorbed in their integrity the raw materials for elaboration. Yet as evidence that he was not merely receptive we have essays already breathing that admiration of the classical world which he never lost. His chief amusement was cards, and he began the habit of taking snuff.

In-the autumn of 1788 he entered at Tubingen as a student of theology; but he showed no interest in theology: his sermons were a failure, and he found more congenial reading in the classics, on the advantages of studying which his first essay was written. After two years he took the degree of Ph.D., and in the autumn of 1793 received his theological certificate, stating him to be of good abilities, but of middling industry and knowledge, and especially deficient in philosophy.

As a student, his elderly appearance gained him the title " Old man," but he took part in the walks, beer-drinking and love-making of his fellows. He gained most from intellectual intercourse with his contemporaries, the two best known of whom were J. C. F. Holderlin and Schelling. With Holderlin Hegel learned to feel for the old Greeks a love which grew stronger as the semi-Kantianized theology of his teachers more and more failed to interest him. With Schelling like sympathies bound him. They both protested against the political and ecclesiastical inertia of their native state, and adopted the doctrines of freedom and reason. The story which tells how the two went out one

morning to dance round a tree of liberty in a meadow is an anachronism, though in keeping with their opinions.

On leaving college, he became a private tutor at Bern and lived in intellectual isolation. He was, however, far from inactive. He compiled a systematic account of the fiscal system of the canton Bern, but the main factor in his mental growth came from his study of Christianity. Under the impulse given by Lessing and Kant he turned to the original records of Chris- tianity, and attempted to construe for himself the real significance of Christ. He wrote a life of Jesus, in which Jesus was simply the son of Joseph and Mary. He did not stop to criticize as a philologist, and ignored the miraculous. He asked for the secret contained in the conduct and sayings of this man which made him the hope of the human race. Jesus appeared as revealing the unity with God in which the Greeks in their best days unwittingly rejoiced, and as lifting the eyes of the Jews from a lawgiver who metes out punishment on the transgressor, to the destiny which in the Greek conception falls on the just no less than on the unjust. The interest of these ideas is twofold. In Jesus Hegel finds the expression for something higher than mere morality: he finds a noble spirit which rises above the contrasts of virtue and vice into the concrete life, seeing the infinite always embracing our finitude, and proclaiming the divine which is in man and cannot be overcome by error and evil, unless the man close his eyes and ears to the godlike presence within him. In religious life, in short, he finds the principle which reconciles the opposition of the temporal mind. But, secondly, the general source of the doctrine that life is higher than all its incidents is of interest. He does not free himself from the current theology either by rational moralizing like Kant, or by bold speculative synthesis like Fichte and Schelling. He finds his panacea in the concrete life of humanity. But although he goes to the Scriptures, and tastes the mystical spirit of the medieval saints, the Christ of his conception has traits tLat seem borrowed from Socrates and from the heroes of Attic tragedy, who suffer much and yet smile gently on a destiny to which they were reconciled. Instead of the Hebraic doctrine of a Jesus punished for our sins, we have the Hellenic idea of a man who is calmly tranquil in the. consciousness of his unity with God.

During these years Hegel kept up a slack correspondence with Schelling and Holderlin. Schelling, already on the way to fame, kept Hegel abreast with German speculation. Both of them were intent on forcing the theologians into the daylight, and grudged them any aid they might expect from Kant's postulation of God and immortality to crown the edifice of ethics. Meanwhile, Holderlin in Jena had been following Fichte's career with an enthusiasm with which he infected

Hegel.

It is pleasing to turn from these vehement struggles of thought to a tour which Hegel in company with three other tutors made through the Bernese Oberland in July and August 1796. Of this tour he left a minute diary. He was delighted with the varied play of the waterfalls, but no glamour blinded him to the squalor of Swiss peasant life. The glaciers and the rocks called forth no

raptures. ” The spectacle of these eternally dead masses gave me nothing but the monotonous and at last tedious idea, ‘ Es ist so.’ ”

Towards the close of his engagement at Bern, Hegel had received hopes from Schelling of a post at Jena. Fortunately his friend Holderlin, now tutor in Frankfort, secured a similar situation there for Hegel in the family of Herr Gogol, a merchant (January 1797). The new post gave him more leisure and the society he needed.

About this time he turned to questions of economics and government. He had studied Gibbon, Hume and Montesquieu in Switzerland. We now find him making extracts from the English newspapers on the Poor-Law Bill of 1796; criticising the Prussian land laws, promulgated about the same time; and writing a commentary onˆSir James Steuart’s Inquiry into the Principles of Political Economy. Here, as in contemporaneous criticisms of Kant’s ethical writings, Hegel aims at correcting the abstract discussion of a topic by treating it in its systematic interconnexions. Church and state, law and morality, commerce and art are reduced to factors in the totality of human life, from which the specialists had isolated them.

But the best evidence of Hegel’s attention to contemporary politics is two unpublished essays — one of them written in 1798, ” On the Internal Condition of Wurttemberg in Recent Times, particularly on the Defects in the Magistracy,” the other a criticism on the constitution of Germany, written, probably, not long after the peace of Luneville (1801). Both essays are critical rather than constructive. In the first Hegel showed how the supineness of the committee of estates in Wurttemberg had favoured the usurpations of the superior officials in whom the court had found compliant servants. And though he perceived the advantages of change in the constitution of the estates, he still doubted if an improved system could work in the actual

conditions of his native province. The main feature in the pamphlet is the recognition that a spirit of reform is abroad. If Wurttemberg suffered from a bureaucracy tempered by despotism, the Fatherland in general suffered no less. ” Ger- many,” so begins the second of these unpublished papers, ” is no longer a state.” Referring the collapse of the empire to the retention of feudal forms and to the action of religious animosities, Hegel looked forward to reorganization by a central power (Austria) wielding the imperial army, and by a representa- tive body elected by the geographical districts of the empire. But such an issue, he saw well, could only be the outcome of violence — of ” blood and iron. ” The philosopher did not pose as a practical statesman. He described the German empire in its nullity as a conception without existence in fact. In such a state of things it was the business of the philosopher to set forth the outlines of the coming epoch, as they were already moulding themselves into shape, amidst what the ordinary eye saw only as the disintegration of the old forms of social life.

His old interest in the religious question reappears, but in a more philosophical form. Starting with the contrast between a natural and a positive religion, he regards a positive religion as one imposed upon the mind from without, not a natural growth crowning the round of human life. A natural religion, on the other hand, was not, he thought, the one universal religion of every clime and age, but rather the spontaneous development of the national conscience varying in varying circumstances. A people’s religion completes and consecrates their whole activity: in it the people rises above its finite life in limited spheres to an infinite life where it feels itself all at one. Even philosophy with Hegel at this epoch was subordinate to religion; for philosophy must never abandon the finite in the search for the infinite. Soon, however, Hegel adopted a view according to which philosophy is a higher mode of apprehending the infinite than even religion.

At Frankfort, meanwhile, the philosophic ideas of Hegel first assumed the proper philosophic form. In a MS. of 102 quarto sheets, of which the first three and the seventh are -vanting, there is preserved the original sketch of the Hegelian »ystem, so far as the logic and metaphysics and part of the

philosophy of nature are concerned. The third part of the system — the ethical theory — seems to have been composed afterwards; it is contained in its first draft in another MS. of 30 sheets. Even these had been preceded by earlier Pytha- gorean constructions envisaging the divine life in divine triangles. Circumstances soon put Hegel in the

way to complete these outlines. His father died in January 1799; and the slender sum which Hegel received as his inheritance, 3154 gulden (about £260), enabled him to think once more of a studious life. At the close of 1800 we find him asking Schelling for letters of introduction to Bamberg, where with cheap living and good beer he hoped to prepare himself for the intellectual excitement of Jena. The upshot was that Hegel arrived at Jena in January 1801. An end had already come to the brilliant epoch at Jena, when the romantic poets, Tieck, Novalis and the Schlegels made it the headquarters of their fantastic mysticism, and Fichte turned the results of Kant into the banner of revolutionary ideas. Schelling was the main philosophical lion of the time; and in some quarters Hegel was spoken of as a new champion summoned to help him in his struggle with the more prosaic continuators of Kant. Hegel's first performance seemed to justify the rumour. It was an essay on the difference between the philosophic systems of Fichte and Schelling, tending in the main to support the latter. Still more striking was the agreement shown in the Critical Journal of Philosophy, which Schelling and Hegel wrote conjointly during the years 1802-1803. So latent was the difference between them at this epoch that in one or two cases it is not possible to determine by whom the essay was written. Even at a later period foreign critics like Cousin saw much that was alike in the two doctrines, and did not hesitate to regard Hegel as a disciple of Schelling. The disserta- tion by which Hegel qualified for the position of Privatdozent (De orbitis planetarum) was probably chosen under the influence of Schelling's philosophy of nature. It was an unfortunate subject. For while Hegel, depending on a numerical proportion suggested by Plato, hinted in a single sentence that it might be a mistake to look for a planet between Mars and Jupiter, Giuseppe Piazzi (q.v.) had already discovered the first of the asteroids (Ceres) on the ist of January 1801. Apparently in August, when Hegel qualified, the news of the discovery had not yet reached him, but critics have made this luckless suggestion the ground of attack on a priori philosophy.

Hegel's lectures, in the winter of 1801-1802, on logic and metaphysics were attended by about eleven students. Later, in 1804, we find him with a class of about thirty, lecturing on his whole system; but his average attendance was rather less. Besides philosophy, he once at least lectured on mathematics. As he taught, he was led to modify his original system, and notice after notice of his lectures promised a text-book of philosophy — which, however, failed to appear. Meanwhile, after the departure of Schelling from Jena in the middle of 1803, Hegel was left to work out his own views. Besides philosophical

studies, where he now added Aristotle to Plato, he read Homer and the Greek tragedians, made extracts from books, attended lectures on physiology, and dabbled in other sciences. On his own representation at Weimar, he was in February 1805 made a professor extraordinarius, and in July 1806 drew his first and only stipend — 100 thalers. At Jena, though some of his hearers became attached to him, Hegel was not a popular lecturer any more than K. C. F. Krause (q.v.). The ordinary student found J. F. Fries (q.v.) more intelligible.

Of the lectures of that period there still remain considerable notes. The language often had a theological tinge (never entirely absent), as when the ” idea ” was spoken of, or ” the night of the divine mystery,” or the dialectic of the absolute called the ” course of the divine life. ” Still his view was growing clearer, and his difference from Schelling more palpable. Both Schelling and Hegel stand in a relation to art, but while the aesthetic model of Schelling was found in the contemporary world, where art was a special sphere and the artist a separate profession in no intimate connexion with the age and nation, the model of Hegel was found rather in those works of national

art in which art is not a part but an aspect of the common life, and the artist is not a mere individual but a concentration of the passion and power of beauty in the whole community. ” Such art,” says Hegel, ” is the common good and the work of all. Each generation hands it on beautified to the next; each has done something to give utterance to the universal thought. Those who are said to have genius have acquired some special aptitude by which they render the general shapes of the nation their own work, one in one point, another in another. What they produce is not their invention, but the invention of the whole nation; or rather, what they find is that the whole nation has found its true nature. Each, as it were, piles up his stone. So too does the artist. Somehow he has the good fortune to come last, and when he places his stone the arch stands self- supported.” Hegel, as we have already seen, was fully aware of the change that was coming over the world. ” A new epoch,” he says, ” has arisen. It seems as if the world-spirit had now succeeded in freeing itself from all foreign objective existence, and finally apprehending itself as absolute mind.” These words come from lectures on the history of philosophy, which laid the foundation for his P.hanomenologie des Geistes (Bamberg,

1807).

On the 14th of October 1806 Napoleon was at Jena. Hegel, like Goethe, felt no patriotic shudder at the national disaster, and in Prussia he saw only a corrupt and conceited bureaucracy. Writing to his friend F. J. Niethammer (1 766-1848) on the day before the battle, he speaks with admiration of the " world-soul," the emperor, and with satisfaction of the probable overthrow of the Prussians. The scholar's wish was to see the clouds of war pass away, and leave thinkers to their peaceful work. His manuscripts were his main care; and doubtful of the safety of his last despatch to Bamberg, and disturbed by the French soldiers in his lodgings, he hurried off, with the last pages of the Phanomenologie, to take refuge in the pro-rector's house. Hegel's fortunes were now at the lowest ebb. Without means, and obliged to borrow from Niethammer, he had no further hopes from the impoverished university. He had already tried to get away from Jena. In 1805, when several lecturers left in con- sequence of diminished classes, he had written to Johann Heinrich Voss (q.v.), suggesting that his philosophy might find more congenial soil in Heidelberg; but the application bore no fruit. He was, therefore, glad to become editor of the Bamberger Zcitung (1807-180S). Of his editorial work there is little to tell; no leading articles appeared in his columns. It was not a suitable vocation, and he gladly accepted the rectorship of the Aegidien-gymnasium in Nuremberg, a post which he held from December 1808 to August 1816. Bavaria at this time was modernizing her institutions. The school system was reorganized by new regulations, in accordance -with which Hegel wrote a series of lessons in the outlines of philosophy — ethical, logical and psychological. They were published in 1840 by Rosenkranz from Hegel's papers.

As a teacher and master Hegel inspired confidence in his pupils, and maintained discipline without pedantic interference in their associations and sports. On prize-days his addresses summing up the history of the school year discussed some topic of general interest. Five of these addresses are preserved. The first is an exposition of the advantages of a classical training, when it is not confined to mere grammar. " The perfection and grandeur of the master-works of Greek and Roman literature must be the intellectual bath, the secular baptism, which gives the first and unfading tone and tincture of taste and science." In another address, speaking of the introduction of military exercises at school, he says: " These exercises, while not in- tended to withdraw the students from their more immediate duty, so far as they have any calling to it, still remind them of the possibility that every one, whatever rank in society he may belong to, may one day have to defend his country and his king, or help to that end. This duty, which is natural to all, was formerly recognized by every citizen,

though whole ranks in the state have become strangers to the very idea of it."

On the 16th of September 181 1 Hegel married Marie von

Tucher (twenty-two years his junior) of Nuremberg. She brought her husband no fortune, but the marriage was entirely happy. The husband kept a careful record of income and expenditure. His income amounted at Nuremberg to 1500 gulden (£130) and a house; at Heidelberg, as professor, he received about the same sum; at Berlin about 3000 thalers (£300). Two sons were born to them; the elder, Karl, became eminent as a historian. The younger, Immanuel, was born on the 24th of September 181 6. Hegel's letters to his wife, written during his solitary holiday tours to Vienna, the Netherlands and Paris, breathe of kindly and happy affection. Hegel the tourist — recalling happy days spent together; confessing that, were it not because of his sense of duty as a traveller, he would rather be at home, dividing his time between his books and his wife; commenting on the shop windows at Vienna; describing the straw hats of the Parisian ladies — is a contrast to the professor of a profound philosophical system. But it shows that the enthusiasm which in his days of courtship moved him to verse had blossomed into a later age of domestic bliss.

In 181 2 appeared the first two volumes of his Wissenschaft der Logik, and the work was completed by a third in 1816. This work, in which his system was for the first time presented in what, with a few minor alterations, was its ultimate shape, found some audience in the world. Towards the close of his eighth session three professorships were almost simultaneously put within his reach — at Erlangen, Berlin and Heidelberg. The Prussian offer expressed a doubt that his long absence from university teaching might have made him rusty, so he accepted the post at Heidelberg, whence Fries had just gone to Jena (October 1816). Only four hearers turned up for one of his courses. Others, however, on the encyclopaedia of philosophy and the history of philosophy drew classes of twenty to thirty. While he was there Cousin first made his acquaintance, but a more intimate relation dates from Berlin. Among his pupils was Hermann F. W. Hinrichs (q.v.), to whose Religion in its Inward Relation to Science (1822) Hegel contributed an important preface. The strangest of his hearers was an Esthonian baron, Boris d'Yrkull, who after serving in the Russian army came to Heidelberg to hear the wisdom of Hegel. But his books and his lectures were alike obscure to the baron, who betook himself by Hegel's advice to simpler studies before he returned to the Hegelian system.

At Heidelberg Hegel was active in a literary way also. In 181 7 he brought out the Encyklopadie d. philos. Wissenschaften im Grundrisse (4th ed., Berlin, 181 7; new ed., 1870) for use at his lectures. It is the only exposition of the Hegelian system as a whole which we have direct from Hegel's own hand. Besides this work he wrote two reviews for the Heidelberg Jahrbucher — the first on F. H. Jacobi, the other a political pamphlet which called forth violent criticism. It was entitled a Criticism on the Transactions of the Estates of Wiirttemberg in 1815-1816. On the 15th of March 181 5 King Frederick of Wiirttemberg, at a meeting of the estates of his kingdom, laid before them the draft of a new constitution, in accordance with the resolutions of the congress of Vienna. Though an improve- ment on the old constitution, it was unacceptable to the estates, jealous of their old privileges and suspicious of the king's intentions. A decided majority demanded the restitution of their old laws, though the kingdom now included a large popula- tion to which the old rights were strange. Hegel in his essay, which was republished at Stuttgart, supported the royal pror posals, and animadverted on the backwardness of the bureaucracy and the landed interests. In the main he was right; but he forgot too much the provocation they had received, the usurpa- tions and selfishness of the governing family, and the unpatriotic character of the king.

In 1 8 18 Hegel accepted the renewed offer of the chair of philosophy at Berlin, vacant since the death of Fichte. The hopes which this offer raised of a position less precarious than that of a university teacher of philosophy were in one sense disappointed; for more than a professor Hegel never became. But his influence upon his pupils, and his solidarity with the

Prussian government, gave him a position such as few professors have held.

In 182 1 Hegel published the Grundlinien der Philosophic des Rechts (2nd ed., 1840; ed. G. J. B. Bolland, iqoi; Eng. trans., Philosophy of Right, by S. W. Dyde, 1896). It is a combined system of moral and political philosophy, or a sociology dominated by the idea of the state. It turns away contemptuously and fiercely from the sentimental aspirations of reformers possessed by the democratic doctrine of the rights of the omnipotent nation. Fries is stigmatized as one of the " ringleaders of shallowness " who were bent on substituting a fancied

tie of enthusiasm and friendship for the established order of the state. The disciplined philosopher, who had devoted himself to the task of comprehending the organism of the state, had no patience with feebler or more mercurial minds who recklessly laid hands on established ordinances, and set them aside where they con- travened humanitarian sentiments. With the principle that whatever is real is rational, and whatever is rational is real, Hegel fancied that he had stopped the mouths of political critics and constitution-mongers. His theory was not a mere formulation of the Prussian state. Much that he construed as necessary to a state was wanting in Prussia; and some of the reforms already introduced did not find their place in his system. Yet, on the whole, he had taken his side with the government. Altenstein even expressed his satisfaction with the book. In his disgust at the crude conceptions of the enthusiasts, who had hoped that the war of liberation might end in a realm of internal liberty, Hegel had forgotten his own youthful vows recorded in verse to Holderlin, ” never, never to live in peace with the ordinance which regulates feeling and opinion.” And yet if we look deeper we see that this is no worship of existing powers. It is rather due to an overpowering sense of the value of organiza- tion — a sense that liberty can never be dissevered from order, that a vital interconnexion between all the parts of the body politic is the source of all good, so that while he can find nothing but brute weight in an organized public, he can compare the royal person in his ideal form of constitutional monarchy to the dot upon the letter i. A keen sense of how much is at stake in any alteration breeds suspicion of every reform.

During his thirteen years at Berlin Hegel’s whole soul seems to have been in his lectures. Between 1823 and 1827 his activity reached its maximum. His notes were subjected to perpetual revisions and additions. We can form an idea of them from the shape in which they appear in his published writings. Those on Aesthetics, on the Philosophy of Religion, on the Philosophy of History and on the History of Philosophy, have been published by his editors, mainly from the notes of his students, under their separate heads; while those on logic, psychology and the philosophy of nature are appended in the form of illustrative and explanatory notes to the sections of his Encyklopadie. During these years hundreds of hearers from all partsof Germany, and beyond, came under his influence. His fame was carried abroad by eager or intelligent disciples. At Berlin Henning served to prepare the intending disciple for fuller initiation by the master himself. Edward Gans (q.v.) and Heinrich Gustav Hotho (q.v.) carried the method into special spheres of inquiry. At Halle Hinrichs maintained the standard of Hegelianism amid the opposition or

indifference of his colleagues.

Three courses of lectures are especially the product of his Berlin period: those on aesthetics, the philosophy of religion and the philosophy of history. In the years preceding the revolution of 1830, public interest, excluded from political life, turned to theatres, concert-rooms and picture-galleries. At these Hegel became a frequent and appreciative visitor and made extracts from the art-notes in the newspapers. In his holiday excursions, the interest in the fine arts more than once took him out of his way to see some old painting. At Vienna in 1824 he spent every moment at the Italian opera, the ballet and the picture-galleries. In Paris, in 1827, he saw Charles Kemble and an English company play Shakespeare. This familiarity with the facts of art, though neither deep nor histori- cal, gave a freshness to his lectures on aesthetics, which, as

put together from the notes of 1820, 1823, 1826, are in many ways the most successful of his efforts.

The lectures on the philosophy of religion are another applica- tion of his method. Shortly before his death he had prepared for the press a course of lectures on the proofs for the existence of God. In his lectures on religion he dealt with Christianity, as in his philosophy of morals he had regarded the state. On the one hand he turned his weapons against the rationalistic school, who reduced religion to the modicum compatible with an ordinary worldly mind. On the other hand he criticized the school of Schleiermacher, who elevated feeling to a place in religion above systematic theology. His middle way attempts to show that the dogmatic creed is the rational development of what was implicit in religious feeling. To do so, of course, philosophy becomes the interpreter and the superior. To the new school of E. W. Hengstenberg, which regarded Revelation itself as supreme, such interpretation was an abomination.

A Hegelian school began to gather. The flock included intelligent pupils, empty-headed imitators, and romantic natures who turned philosophy into lyric measures. Opposition and criticism only served to define more precisely the adherents of the new doctrine. Hegel himself grew more and more into a belief in his own doctrine as the one truth for the world. He was in harmony with the government, and his followers were on the winning side. Though he had soon resigned all direct official connexion with the schools of Brandenburg, his real influence in Prussia was considerable, and as usual was largely exaggerated in popular estimate. In the narrower circle of his friends his birthdays were the signal for congratulatory verses. In 1826 a

formal festival was got up by some of his admirers, one of whom, Herder, spoke of his categories as new gods; and he was pre- sented with much poetry and a silver mug. In 1830 the students struck a medal in his honour, and in 1831 he was decorated by an order from Frederick William III. In 1830 he was rector of the university; and in his speech at the tricentenary of the Augsburg Confession in that year he charged the Catholic Church with regarding the virtues of the pagan world as brilliant vices, and giving the crown of perfection to poverty, continence and obedience.

One of the last literary undertakings in which he took part was the establishment of the Berlin Jahrbiicher fiir wissenschaft- liche Kritik, in which he assisted Edward Gans and Varnhagen von Ense. The aim of this review was to give a critical account, certified by the names of the contributors, of the literary and philosophical productions of the time, in relation to the general progress of knowledge. The journal was not solely in the Hegelian interest; and more than once, when Hegel attempted to domineer over the other editors, he was met by vehement and vigorous opposition.

The revolution of 1830 was a great blow to him, and the prospect of democratic advances almost made him ill. His last literary work, the first part of which appeared in the Preussische Staatszeitung, was an essay on the English Reform Bill of 1831. It contains primarily a consideration of its probable effects on the character of the new members of parliament, and the measures which they may introduce. In the latter connexion he enlarged on several points in which England had done less than many continental states for the abolition of monopolies and abuses. Surveying the questions connected with landed property, with the game laws, the poor, the Established Church, especially in Ireland, he expressed grave doubt on the legislative capacity of the English parliament as compared with the power of re- novation manifested in other states of western Europe.

In 1 83 1 cholera first entered Europe. Hegel and his family retired for the summer to the suburbs, and there he finished the revision of the first part of his Science of Logic. On the beginning of the winter session, however, he returned to his house in the Kupfergraben. On this occasion an altercation occurred between him and his friend Gans, who in his notice of lectures on juris- prudence had recommended Hegel's Philosophy cf Right. Hegel, indignant at what he deemed patronage, demanded that the note should be withdrawn. On the 14th of November, after one

day's illness, he died of cholera and was buried, as he had wished, between Fichte and Solger.

Hegel in his class-room was neither imposing nor fascinating. You saw a plain, old-fashioned face, without life or lustre — a figure which had never looked young, and was now prematurely aged; the furrowed face bore witness to concentrated thought. Sitting with his snuff-box before him, and his head bent down, he looked ill at ease, and kept turning the folios of his notes. His utterance was interrupted by frequent coughing; every sentence came out with a struggle. The style was no less ir- regular. Sometimes in plain narrative the lecturer would be specially awkward, while in abstruse passages he seemed specially at home, rose into a natural eloquence, and carried away the hearer by the grandeur of his diction.

Philosophy. — Hegelianism is confessedly one of the most difficult of all philosophies. Every one has heard the legend which makes Hegel say, " One man has understood me, and even he has not." He abruptly hurls us into a world where old habits of thought fail us. In three places, indeed, he has attempted to exhibit the transition to his own system from other levels of thought; but in none with much success. In the introductory lectures on the philosophy of religion he gives a rationale of the difference between the modes of consciousness in religion and philosophy (between Vorstellung and Begriff). In the beginning of the Encyklopadie he discusses the defects of dogmatism, empiricism, the philosophies of Kant and Jacobi. In the first case he treats the formal or psychological aspect of the difference; in the latter he presents his doctrine less in its essential character than in special relations to the prominent systems of his time. The Phenomenology of Spirit, regarded as an introduction, suffers from a different fault. It is not an introduction — for the philosophy which it was to introduce was not then fully elaborated. Even to the last Hegel had not so externalized his system as to treat it as something to be led up to by gradual steps. His philosophy was not one aspect of his intellectual life, to be con- templated from others; it was the ripe fruit of concentrated re- flection, and had become the one all-embracing form and principle of his thinking. More than most thinkers he had quietly laid himself open to the influences of his time and the lessons of history.

The Phenomenology is the picture of the Hegelian philosophy in the making — at the stage before the scaffolding has been removed from the building. For this reason the book is at once the most brilliant and

the most difficult of Hegel's works — the most brilliant because it is to some degree an autobiography meaology. Q { H e g e r s m ind — not the abstract record of a logical evolution, but the real history of an intellectual growth; the most difficult because, instead of treating the rise of intelligence (from its first appearance in contrast with the real world to its final recognition of its presence in, and rule over, all things) as a purely subjective process, it exhibits this rise as wrought out in historical epochs, national characteristics, forms of culture and faith, and philosophical systems. The theme is identical with the introduction to the Encyklopadie; but it is treated in a very different style. From all periods of the world — from medieval piety and stoical pride, Kant and Sophocles, science and art, religion and philosophy — with disdain of mere chronology, Hegel gathers in the vineyards of the human spirit the grapes from which he crushes the wine of thought. The mind coming through a thousand phases of mistake and disappointment to a sense and realization of its true position in the universe — such is the drama which is consciously Hegel's own history, but is represented objectively as the process of spiritual history which the philosopher reproduces in himself. The Phenomenology stands to the Encyklo- padie somewhat as the dialogues of Plato stand to the Aristotelian treatises. It contains almost all his philosophy — but irregularly and without due proportion. The personal element gives an undue prominence to recent phenomena of the philosophic atmosphere. It is the account given by an inventor of his own discovery, not the explanation of an outsider. It therefore to some extent assumes from the first the position which it proposes ultimately to reach, and gives not a proof of that position, but an account of the ex- perience (Erfahrung) by which consciousness is forced from one position to another till it finds rest in Absolutes Wissen.

The Phenomenology is neither mere psychology, nor logic, nor moral philosophy, nor history, but is all of these and a great deal more. It needs not distillation, but expansion and illustration from contemporary and antecedent thought and literature. It treats of the attitudes of consciousness towards reality under the six heads of consciousness, self-consciousness, reason (Vernunft), spirit (Geist), religion and absolute knowledge. The native attitude of consciousness towards existence is reliance on the evidence of the senses; but a little reflection is sufficient to show that the reality attributed to the external world is as much due to intellectual conceptions as to the senses, and that these conceptions elude us when we try to fix them. If consciousness cannot detect a permanent object outside it, so self-consciousness cannot find a permanent subject in itself. It may, like

the Stoic, assert freedom by holding

The Pheno-

aloof from the entanglements of real life, or like the sceptic regard the world as a delusion, or finally, as the ” unhappy consciousness ” (Ungluckliches Bewusstseyn), may be a recurrent falling short of a perfection which it has placed above it in the heavens. But in this isolation from the world, self-consciousness has closed its gates against the stream of life. The perception of this is reason. Reason convinced that the world and the soul are alike rational observes the external world, mental phenomena, and specially the nervous organism, as the meeting ground of body and mind. But reason finds much in the world recognizing no kindred with her, and so turning to practical activity seeks in the world the realization of her own aims. Either in a crude way she pursues her own pleasure, and finds that necessity counteracts her cravings ; or she endeavours to find the world in harmony with the heart, and yet is unwilling to see fine aspirations crystallized by the act of realizing them Finally, unable to impose upon the world either selfish or humani- tarian ends, she folds her arms in pharisaic virtue, with the hope that some hidden power will give the victory to righteousness. But the world goes on in its life, heedless of the demands of virtue. The principle of nature is to live and let live. Reason abandons’ her efforts to mould the world, and is content to let the aims of individuals work out their results independently, only stepping in to lay down precepts for the cases where individual actions conflict, and to test these precepts by the rules of formal logic.

So far we have seen consciousness on one hand and the real world on the other. The stage of Geist reveals the consciousness no longer as critical and antagonistic but as the indwelling spirit of a community, as no longer isolated from its surroundings but the union of the single and real consciousness with the vital feeling that animates the community. This is the lowest stage of concrete consciousness — life, and not knowledge ; the spirit inspires, but does not reflect. It is the age of unconscious morality, when the in- dividual’s life is lost in the society of which he is an organic member. But increasing culture presents new ideals, and the mind, absorbing the ethical spirit of its environment, gradually emancipates itself from conventions and superstitions. This Aufkldrung prepares the way for the rule of conscience, for the moral view of the world as subject of a moral law. From the moral world the next step is religion; the moral law gives place to God; but the idea of God- head, too, as it first appears, is imperfect, and has to pass through the forms of nature-worship and of

art before it reaches a full utterance in Christianity. Religion in this shape is the nearest step to the stage of absolute knowledge ; and this absolute knowledge — ” the spirit knowing itself as spirit ” — is not something which leaves these other forms behind but the full comprehension of them as the organic constituents of its empire; ” they are the memory and the sepulchre of its history, and at the same time the actuality, truth and certainty of its throne.” Here, according to Hegel, is the field of philosophy.

The preface to the Phenomenology signalled the separation from Schelling — the adieu to romantic. It declared that a genuine philosophy has no kindred with the mere aspirations of artistic minds, but must earn its bread by the sweat of its brow. It sets its face against the idealism which either thundered against the world for its deficiencies, or sought something finer than reality. Philosophy is to be the science of the actual world — -it is the spirit comprehending itself in its own externalizations and manifestations. The philosophy of Hegel is idealism, but it is an idealism in which every idealistic unification has its other face in the multiplicity of existence. It is realism as well as idealism, and never quits its hold on facts. Compared with Fichte and Schelling, Hegel has a sober, hard, realistic character. At a later date, with the call of Schelling to Berlin in 1841, it became fashionable to speak of Hegelianism as a negative philosophy requiring to be complemented by a ” positive ” philosophy which would give reality and not mere ideas. The cry was the same as that of Krug (q.v.), asking the philosophers who expounded the absolute to construe his pen. It was the cry of the Evangelical school for a personal Christ and not a dialectical Logos. The claims of the individual, the real, material and historical fact, it was said, had been sacrificed by Hegel to the universal, the ideal, the spiritual and the logical.

There was a truth in these criticisms. It was the very aim of Hegelianism to render fluid the fixed phases of reality — to show existence not to be an immovable rock limiting the efforts of thought, but to have thought implicit in it, waiting for release from its petrifaction. Nature was no longer, as with Fichte, to be a mere spring-board to evoke the latent powers of the spirit. Nor was it, as in Schelling’s earlier system, to be a collateral progeny with mind from the same womb of indifference and identity. Nature and mind in the Hegelian system — the external and the spiritual world — have the same origin, but are not co-equal branches. The natural world proceeds from the ” idea,” the spiritual from the idea and nature. It is impossible, beginning with the natural world, to explain the mind by any process of distillation or development, unless consciousness or its

potentiality has been there from the first. Reality, independent of the individual consciousness, there must be; reality, independent of all mind, is an impossibility. At the basis of all reality, whether material or mental, there is thought. But the thought thus regarded as the basis of all existence is not

consciousness with its distinction of ego and non-ego. It is rather the stuff of which both mind and nature are made, neither extended as in the natural world, nor self-centred as in mind. Thought in its primary form is, as it were, thoroughly transparent and absolutely fluid, free and mutually interpenetrable in every part — the spirit in its seraphic scientific life, before creation had produced a natural world, and thought had risen to independent existence in the social organism. Thought in this primary form, when in all its parts completed, is what Hegel calls the " idea." But the idea, though fundamental, is in another sense final, in the process of the world. It only appears in consciousness as the crowning development of the mind. Only with philosophy does thought become fully con- scious of itself in its origin and development. Accordingly the history of philosophy is the presupposition of logic, or the three branches of philosophy form a circle.

The exposition or constitution of the " idea " is the work of the

Logic. As the total system falls into three parts, so every part of

. the system follows the triadic law. Every truth, every

■ˆ reality, has three aspects or stages; it is the unification of

two contradictory elements, of two partial aspects of truth which are not merely contrary, like black and white, but contradictory, like same and different. The first step is a preliminary affirmation and unification, the second a negation and differentiation, the third a final synthesis. For example, the seed of the plant is an initial unity of life, which when placed in its proper soil suffers disintegration into its constitutents, and yet in virtue of its vital unity keeps these divergent elements together, and reappears as the plant with its members in organic union. Or again, the process of scientific induction is a threefold chain ; the original hypothesis (the first unification of the fact) seems to melt away when confronted with opposite facts, and yet no scientific progress is possible unless the stimulus of the original

unification is strong enough to clasp the discordant facts and establish a reunification. Thesis, antithesis and synthesis, a Fichtean formula, is generalized by Hegel into the perpetual law of thought.

In what we may call their psychological aspect these three stages are known as the abstract stage, or that of understanding (Verstand) , the dialectical stage, or that of negative reason, and the speculative stage, or that of positive reason (Vernunft). The first of these attitudes taken alone is dogmatism; the second, when similarly isolated, is scepticism; the third, when unexplained by its elements, is mysticism. Thus Hegelianism reduces dogmatism, scepticism and mysticism to factors in philosophy. The abstract or dogmatic thinker believes his object to be one, simple and stationary, and intelligible apart from its surrounding. He speaks, e.g., as if species and genera were fixed and unchangeable; and fixing his eye on the ideal forms in their purity and self-sameness, he scorns the phenomenal world, whence this identity and persistence are absent. The dialectic of negative reason rudely dispels these theories. Appealing to reality it shows that the identity and permanence of forms are contradicted by history; instead of unity it exhibits multiplicity, instead of identity difference, instead of a whole, only parts. Dialectic is, therefore, a dislocating power; it shakes the solid structures of material thought, and exhibits the instability latent in such conceptions of the world. It is the spirit of progress and change, the enemy of convention and conservatism; it is absolute and universal unrest. In the realm of abstract thought these transitions take place lightly. In the worlds of nature and mind they are more palpable and violent. So far as this Hegel seems on the side of revolution. But reason is not negative only; while it disintegrates the mass or unconscious unity, it builds up a new unity with higher organization. But this third stage is the place of effort, requiring neither the surrender of the original unity nor the ignoring of the diversity afterwards suggested. The stimulus of contradiction is no doubt a strong one ; but the easiest way of escap- ing it is to shut our eyes to one side of the antithesis. What is required, therefore, is to readjust our original thesis in such a way as to include and give expression to both the elements in the process.

The universe, then, is a process or development, to the eye of philosophy. It is the process of the absolute — in religious language, the manifestation of God. In the background of all the absolute is eternally present; the rhythmic movement of thought is the self-unfolding of the absolute. God reveals Himself in the logical idea, in nature and in mind; but mind is not alike conscious of its absoluteness in every stage of development. Philosophy alone sees God revealing Himself in the ideal organism of thought as it were a possible deity

prior to the world and to any relation between God and actuality; in the natural world, as a series of materialized forces and forms of life; and in the spiritual world as the human soul, the legal and moral order of society, and the creations of art, religion and philosophy.

This introduction of the absolute became a stumbling-block to Feuerbach and other members of the ” Left.” They rejected as an illegitimate interpolation the eternal subject of development, and, instead of one continuing God as the subject of all the predicates by which in the logic the absolute is defined, assumed only a series of ideas, products of philosophic activity. They denied the theo- logical value of the logical forms — the development of these forms being in their opinion due to the human thinker, not to a self- revealing absolute. Thus they made man the creator of the absolute.

But with this modification on the system another necessarily followed; a mere logical series could not create nature. And thus the material universe became the real starting-point. Thought became only the result of organic conditions — subjective and human; and the system of Hegel was no longer an idealization of religion, but a naturalistic theory with a prominent and peculiar logic.

The logic of Hegel is the only rival to the logic of Aristotle. What Aristotle did for the theory of demonstrative reasoning, Hegel attempted to do for the whole of human knowledge. His logic is an enumeration of the forms or categories by which our experience exists. It carried out Kant’s doctrine of the categories as a priori synthetic principles, but removed the limitation by which Kant denied them any constitutive value except in alliance with ex- perience. According to Hegel the terms in which thought exhibits itself are a system of their own, with laws and relations which reappear in a less obvious shape in the theories of nature and mind. Nor are they restricted to the small number which Kant obtained by manipulating the current subdivision of judgments. But all forms by which thought holds sensations in unity (the formative or synthetic elements of language) had their place assigned in a system where one leads up to and passes over into another.

The fact which ordinary thought ignores, and of which ordinary logic therefore provides no account, is the presence of gradation and continuity in the world. The general terms of language simplify the universe by reducing its variety of individuals to a few forms, none of which exists simply and perfectly. The method of the understanding is to divide and then to give a separate reality to what it has thus distinguished. It is part of Hegel’s plan to remedy this one-sided

character of thought, by laying bare the gradations of ideas. He lays special stress on the point that abstract ideas when held in their abstraction are almost interchangeable with their opposites — that extremes meet, and that in every true and concrete idea there is a coincidence of opposites.

The beginning of the logic is an illustration of this. The logical idea is treated under the three heads of being {Seyn), essence (Wesen) and notion (Begriff). The simplest term of thought is being; we cannot think less about anything than when we merely say that it is. Being — the abstract ” is ” — is nothing definite, and nothing at least is. Being and not being are thus declared identical — a proposition which in this unqualified shape was to most people a stumbling-block at the very door of the system. Instead of the mere ” is ” which is as yet nothing, we should rather say ” becomes,” and as ” becomes ” always implies ” something,” we have determinate being — ” a being ” which in the next stage of definiteness becomes ” one.” And in this way we pass on to the quantitative aspects of being.

The terms treated under the first head, in addition to those already mentioned, are the abstract principles of quantity and number , and their application in measure to determine the limits of being. Under the title of essence are discussed those pairs of correlative terms which are habitually employed in the explanation of the world — such as law and phenomenon, cause and effect, reason and consequence, substance and attribute. Under the head of notion are considered, firstly, the subjective forms of conception, judgment and syllogism; secondly, their realization in objects as mechanically, chemically or teleologically constituted; and thirdly, the idea first of life, and next of science, as the complete interpenetration of thought and objectivity. The third part of logic evidently is what contains the topics usually treated in logic-books, though even here the province of logic in the ordinary sense is exceeded. The first two divisions — the ” objective logic ” — are what is usually called metaphysics.

The characteristic of the system is the gradual way in which idea is linked to idea so as to make the division into chapters only an arrange- ment of convenience. The judgment is completed in the syllogism; the syllogistic form as the perfection of subjective thought passes into objectivity, where it first appears embodied in a mechanical system ; and the teleological object, in which the members are as means and end, leads up to the idea of life, where the end is means and means end indissolubly till death. In some cases these transitions may be unsatisfactory and forced ; it is apparent that the linear develop- ment from ” being ” to the ” idea ” is got by

transforming into a logical order the sequence that has roughly prevailed in philosophy from the Eleatics; cases might be quoted where the reasoning seems a play upon words; and it may often be doubted whether certain ideas do not involve extra-logical considerations. The order of the categories is in the main outlines fixed ; but in the minor details much depends upon the philosopher, who has to fill in the gaps between ideas, with little guidance from the data of experience,, and to assign to the stages of development names which occasionally deal hardly with language. The merit of Hegel is to have indicated and to a large extent displayed the filiation and mutual limitation of our forms of thought; to have arranged them in the order of their comparative capacity to give a satisfactory expression to truth in the totality of its relations ; and to have broken down the partition which in Kant separated the formal logic from the transcendental analytic, as well as the general disruption between logic and meta-physic. It must at the same time be admitted that much of the work of weaving the terms of thought, the categories, into a system has a hypothetical and tentative character, and that Hegel has rather pointed out the path which logic must follow, viz. a criticism of the terms of scientific and ordinary thought in their filiation

and interdependence, than himself in every case kept to the right way. The day for a fuller investigation of this problem will partly depend upon the progress of the study of language in the direction marked out by W. von Humboldt.

The Philosophy of Nature starts with the result of the logical development, with the full scientific ” idea.” But the relations of „. „ pure thought, losing their inwardness, appear as relations

saohyof °^ s P ace an d time; the abstract development of thought nature. appears as matter and movement. Instead of thought, we have perception ; instead of dialectic, gravitation ; instead of causation, sequence in time. The whole falls under the three heads of mechanics, physics and ” organic ” — the content under each varying somewhat in the three editions of the Encyklopddie. The first treats of space, time, matter, movement ; and in the solar system we have the representation of the idea in its general and abstract material form. Under the head of physics we have the theory cf the elements, of sound, heat and cohesion, and finally of chemical affinity — presenting the phenomena of material change and inter- change in a

series of special forces which generate the variety of the life of nature. Lastly, under the head of ” organic,” come geology, botany and animal physiology — presenting the concrete results of these processes in the three kingdoms of nature.

The charges of superficial analogies, so freely urged against the ” Natur-philosophie ” by critics who forget the impulse it gave to physical research by the identification of forces then believed to be radically distinct, do not particularly affect Hegel. But in general it may be said that he looked down upon the mere natural world. The meanest of the fancies of the mind and the most casual of its whims he regarded as a better warrant for the being of God than any single object of nature. Those who supposed astronomy to inspire religious awe were horrified to hear the stars compared to eruptive spots on the face of the sky. Even in the animal world, the highest stage of nature, he saw a failure to reach an independent and rational system of organization ; and its feelings under the continuous violence and menaces of the environment he described as insecure, anxious and unhappy.

His point of view was essentially opposed to the current views of science. To metamorphosis he only allowed a logical value, as explaining the natural classification; the only real, existent metamorphosis he saw in the development of the individual from its embryonic stage. Still more distinctly did he contravene the general tendency of scientific explanation. ” It is held the triumph of science to recognize in the general process of the earth the same categories as are exhibited in the processes of isolated bodies. This is, however, an application of categories from a field where the conditions are finite to a sphere in which the circumstances are infinite.” In astronomy he depreciates the merits of Newton and elevates Kepler, accusing Newton particularly, a propos of the distinction of centrifugal and centripetal forces, of leading to a confusion between what is mathematically to be distinguished and what is physically separate. The principles which explain the fall of an apple will not do for the planets. As to colour, he follows Goethe, and uses strong language against Newton’s theory, for the barbarisn’ of the conception that light is a compound, the incorrectness of his observations, &c. In chemistry, again, he objects to the way in which all the chemical elements are treated as on the same level.

The third part of the system is the Philosophy of Mind. Its three divisions are the ” subjective mind ” (psychology), the ” ob- jective mind ” (philosophic jurisprudence, moral and political philosophy) and the ” absolute mind ” (the

topic of the Rechts-Philosophie, and of the lectures on the Philosophy of History; while on the ” absolute mind ” we have the lectures on Aesthetic, on the Philosophy of Religion and on the History of Philosophy — in short, more than one-third of his works.

The purely psychological branch of the subject takes up half of the space allotted to Geist in the Encyklopddie. It falls under the three heads of anthropology, phenomenology and psychology proper. Anthropology treats of the mind in union with the body — of the natural soul — and discusses the relations of the soul with the planets, the races of mankind, the differences of age, dreams, animal magnetism, insanity and phrenology. In this obscure region it is rich in suggestions and rapprochements; but the ingenuity of these speculations attracts curiosity more than it satisfies scientific inquiry. In the Phenomenology consciousness, self-consciousness and reason are dealt with. The title of the section and the contents recall, though with some important variations, the earlier half of his first work; only that here the historical background on which the stages in the development of the ego were represented has dis- appeared. Psychology, in the stricter sense, deals with the various forms of theoretical and practical intellect, such as attention, memory, desire and will. In this account of the development of an inde- pendent, active and intelligent being from the stage where man like the Dryad is a portion of the natural life around him, Hegel has combined what may be termed a physiology and pathology of the mind — a subject far wider than that of ordinary psychologies, and one of vast intainsic importance. It is, of course, easy to set aside these questions as unanswerable, and to find artificiality in the

Philo- sophy of mln J.

arrangement. Still it remains a great point to have even attempted some system in the dark anomalies which lie under the normal consciousness, and to have traced the genesis of the intellectual faculties from animal sensitivity.

The theory of the mind as objectified in the institutions of law, the family and the state is discussed in the ” Philosophy of Right.” Beginning with the antithesis of a legal system and 2 . taw morality, Hegel, carrying out the work of Kant, presents and the synthesis of these elements in the ethical life (Sittlich- history- keit) of the family and the state. Treating the family as an instinctive realization of the moral life, and not as the result of contract, he shows how by the means of wider associations due to private interests the state issues as the full home of the moral spirit, where intimacy of interdependence

is combined with freedom of independent growth. The state is the consummation of man as finite; it is the necessary starting-point whence the spirit rises to an absolute existence in the spheres of art, religion and philosophy. In the finite world or temporal state, religion, as the finite organization of a church, is, like other societies, subordinate to the state. But on another side, as absolute spirit, religion, like art and philosophy, is not subject to the state, but belongs to a higher region.

The political state is always an individual, and the relations of these states with each other and the ” world-spirit ” of which they are the manifestations constitute the material of history. The Lectures on the Philosophy of History, edited by Gans and subse- quently by Karl Hegel, is the most popular of Hegel’s works. The history of the world is a scene of judgment where one people and one alone holds for awhile the sceptre, as the unconscious instrument of the universal spirit, till another rises in its place, with a fuller measure of liberty — a larger superiority to the bonds of natural and artificial circumstance. Three main periods — the Oriental, the Classical and the Germanic — in which respectively the single despot, the dominant order, and the man as man possess freedom — constitute the history of the world. Inaccuracy in detail and artifice in the arrangement of isolated peoples are inevitable in such a scheme. A graver mistake, according to some critics, is that Hegel, far from giving a law of progress, seems to suggest that the history of the world is nearing an end, and has merely reduced the past to a logical formula. The answer to this charge is partly that such a law seems unattainable, and partly that the idealistic content of the present which philosophy extracts is always an advance upon actual fact, and so does throw a light into the future. And at any rate the method is greater than Hegel’s employment of it. But as with Aristotle so with Hegel — beyond the ethical and political sphere rises the world of absolute spirit in art, religion and philosophy. The psychological distinction between the , . . three forms is that sensuous perception (Anschauung) rellxloa is the organon of the first, presentative conception aag * (Vorstellung) of the second and free thought of the third. phllo- The work of art, the first embodiment of absolute mind, sophy. shows a sensuous conformity between the idea and the reality in which it is expressed. The so-called beauty of nature is for Hegel an adventitious beauty. The beauty of art is a beauty born in the spirit of the artist and born again in the spectator; it is not like the beauty of natural things, an incident of their existence, but is ” essentially a question, an address to a responding breast, a call to the heart and spirit.” The perfection of art depends on the degree of intimacy in which idea and form appear

worked into each other. From the different proportion between the idea and the shape in which it is realized arise three different forms of art. When the idea, itself indefinite, gets no further than a struggle and endeavour for its appropriate expression, we have the symbolic, which is the Oriental, form of art, which seeks to compensate its imperfect ex- pression by colossal and enigmatic structures. In the second or classical form of art the idea of humanity finds an adequate sensuous representation. But this form disappears with the decease of Greek national life, and on its collapse follows the romantic, the third form of art; where the harmony of form and content again grows de- fective, because the object of Christian art — the infinite spirit — is a theme too high for art. Corresponding to this division is the classi- fication of the single arts. First comes architecture — in the main, symbolic art; then sculpture; the classical art par excellence; they are found, however, in all three forms. Painting and music are the specially romantic arts. Lastly, as a union of painting and music comes poetry, where the sensuous element is more than ever sub- ordinate to the spirit.

The lectures on the Philosophy of Art stray largely into the next-sphere and dwell with zest on the close connexion of art and religion ; and the discussion of the decadence and rise of religions, of the aesthetic qualities of Christian legend, of the age of chivalry, &c, make the Asthetik a book of varied interest.

The lectures on the Philosophy of Religion, though unequal in their composition and belonging to different dates, serve to exhibit the vital connexion of the system with Christianity. Religion, like art, is inferior to philosophy as an exponent of the harmony between man and the absolute. In it the absolute exists as the poetry and music of the heart, in the inwardness of feeling. Hegel after ex- pounding the nature of religion passes on to discuss its historical phases, but in the immature state of religious science falls into several mistakes. At the bottom of the scale of nature-worships he

places the religion of sorcery. The gradations which follow are apportioned with, some uncertainty amongst the religions of the East. With the Persian religion of light and the Egyptian of enigmas we pass to those faiths where Godhead takes the form of a spiritual

individuality, i.e. to the Hebrew religion (of sublimity), the Greek (of beauty) and the Roman (of adaptation). Last comes absolute religion, in which the mystery of the reconciliation between God and man is an open doctrine. This is Christianity, in which God is a Trinity, because He is a spirit. The revelation of this truth is the subject of the Christian Scriptures. For the Son of God, in the immediate aspect, is the finite world of nature and man, which far from being at one with its Father is originally in an attitude of estrangement. The history of Christ is the visible reconciliation between man and the eternal. With the death of Christ this union, ceasing to be a mere fact, becomes a vital idea — the Spirit of God which dwells in the Christian community.

The lectures on the History of Philosophy deal disproportionately with the various epochs, and in some parts date from the beginning of Hegel's career. In trying to subject history to the order of logic they sometimes misconceive the filiation of ideas. But they created the history of philosophy as a scientific study. They showed that a philosophical theory is not an accident or whim, but an exponent of its age determined by its antecedents and environments, and handing on its results to the future. (W. W. ; X.)

Hegelianism in England. — On the continent of Europe the direct influence of Hegelianism was comparatively short-lived. This was due among other causes to the direction of attention to the rising science of psychology, partly to the reaction against the speculative method. In England and Scotland it had another fate. Both in theory and practice it here seemed to supply precisely the counter- active to prevailing tendencies towards empiricism and individualism that was required. In this respect it stood to philosophy in some- what the same relation that the influence of Goethe stood to litera- ture. This explains the hold which it had obtained upon both English and Scottish thought soon after the middle of the 19th cen- tury. The first impulse came from J. F. Ferrier and J. H. Stirling in Edinburgh, and B. jowett in Oxford. Already in the seventies there was a powerful school of English thinkers under the lead of Edward Caird and T. H. Green devoted to the study and exposition of the Hegelian system. With the general acceptance of its main principle that the real is the rational, there came in the eighties a more critical examination of the precise meaning to be attached to it and its bearing on the problems of religion. The earlier Hegelians had interpreted it in the sense that the world in its ultimate essence was not only spiritual but self-conscious intelligence whose nature was reflected inadequately but truly in the finite mind. They thus seemed to come forward in the character of exponents rather than critics of the Western belief in God, freedom and immortality. As time went on it became obvious that without

departure from the spirit of idealism Hegel's principle was susceptible of a different interpretation. Granted that rationality taken in the sense of inner coherence and self-consistency is the ultimate standard of truth and reality, does self-consciousness itself answer to the demands of this criterion? If not. are we not forced to deny ultimate reality to personality whether human or divine? The question was definitely raised in F. H. Bradley's Appearance and Reality (1893; 2nd cd., 1897) an< J answered in the negative. The completeness and self-consistency which our ideal requires can be realized only in a form of being in which subject and object, will and desire, no longer stand as exclusive opposites, from which it seemed at once to follow that the finite self could not be a reality nor the infinite reality a self. On this basis Bradley developed a theory of the Absolute which, while not denving that it must be conceived of spiritually, insisted that its spirituality is of a kind that finds no analogy in our self-conscious experience. More recently J. M. E. McTaggart's Studies in Hegelian Dialectic (1896). Studies in Hegelian Cosmology (1901) and Some Dogmas of Religion (1906) have opened a new chapter in the inter-pretation of Hegelianism. Truly perceiving that the ultimate metaphysical problem is, here as ever, the relation of the One and the Many, McTaggart starts with a definition of the ideal in which our thought upon it can come to rest. He finds it where (u) the unity is for each individual, (b) the whole nature of the individual is to be for the unity. It follows from such a conception of the relation that the whole cannot itself be an individual apart from the individuals in whom it is realized, in other words, the Absolute cannot be a Person. But for the same reason — viz. that in it first and in it alone this condition is realized — the individual soul must be held to be an ultimate reality reflecting in its inmost nature, like the monad of Leibniz, the complete fulness and harmony of the whole. In reply to Bradley's argument for the unreality of the self, Hegel is inter- preted as meaning that the opposition between self and not-self on which it is founded is one that is self-made and in being made is transcended. The fuller our knowledge of reality the more does the object stand out as an invulnerable system of ordered parts, but the process by which it is thus set in opposition to the subject is also the process by which we understand and transform it into the substance of our own thought. From this position further conse- quences followed. Seeing that the individual soul must thus be taken to stand in respect to its inmost essence in complete har- mony with the whole, it must eternally be at one with itself: all

change must be appearance. Seeing, moreover, that it is, and is maintained in being, by a fixed relation to the Absolute, it cannot fail

of immortality. No pantheistic theory of an eternal substance continuously expressing itself in different individuals who fall back into its being like drops into the ocean will here be sufficient. The ocean is the drops. ” The Absolute requires each self not to make up a sum or to maintain an average but in respect of the self’s special and unique nature.” Finally as it cannot cease, neither can the individual soul have had a beginning. Pre-existence is as necessary and certain as a future life. If memory is lacking as a link between the different lives, this only shows that memory is not of the sub- stance of the soul.

In view of these differences (amounting almost to an antinomy of paradoxes) in interpretation, it is not surprising to find that recent years have witnessed a violent reaction in some quarters against Hegelian influence. This has taken the direction on trft: one hand of a revival of realism (see Metaphysics), on the other of a new form of subjective idealism (see Pragmatism). As yet neither of these movements has shown sufficient coherence or stability to establish itself as a rival to the main current of philosophy in England. But they have both been urged with sufficient ability to arrest its progress and to call for a reconsideration and restatement of the fundamental principle of idealist philosophy and its relation to the fundamental problems of religion. This will probably be the main work of the next generation of thinkers in England (see Idealism).

Among Italian Hegelians are A. Vera, Raffaele Mariano and

B. Spaventa (1817-1883) ; see V. de Lucia, L’Hegel in Italia (1891). In Sweden, J. J. Borelius of Lund ; in Norway, G. V. Lyng (d. 1884), M. J. Monrad (1816-1897) and G. Kent (d. 1892) have adopted Hegelianism; in France, P. Leroux and P. Prevost.

Bibliography. — Shortly after Hegel’s death his collected works were published by a number of his friends, who combined for the purpose. They appeared in eighteen volumes in 1832, and a second edition came out about twelve years later. Volumes i.-viii. contain the works published by himself; the remainder is made up of his lectures on the Philosophy of History, Aesthetic, the Philosophy of Religion and the History of Philosophy, besides some essays and reviews, with a few of his letters, and the Philosophical Propaedeutic.

For his life see K. Rosenkranz, Leben Hegels (Berlin, 1844); R. R. Haym, Hegel und seine Zeit (Berlin, 1857); K- Kostlin, Hege! in philosophischer , politischer und nationaler Beziehung (Tubingen, 1870); Rosenkranz, Hegel als deutscher National-Philosoph (Berlin, 1870), and his Neue Sludien, vol. iv. (Berlin, 1878); Kuno Fischer,

Hegels Leben und Werke.

For the philosophy see A. Ruge's Aus fruiterer Zeit, vol. iv. (Berlin, 1867); Haym (as above); F. A. Trendelenburg (in Logische Untersuchungen) ; A. L. Kym (Metaphysische Untersuchungen) and

C. Hermann {Hegel und die logische Frage and other works) are noticeable as modern critics. Georges Noel, La Logique de Hegel (Paris, 1897) ! Aloys Schmid, Die Entwickelungsgeschichte der Hegelschen Logik (Regensburg, 1858). Vera has translated the Encyklopddie into French, with notes; C. Benard, the Asthetik. In English J. Hutcheson Stirling's Secret of Hegel (2 vols., London, 1865) contains a translation of the beginning of the Wissenschaft der Logik; the "Logic" from the Encyklopddie has been translated, with Prolegomena, by W. Wallace (Oxford, 1874). W. Wallace also translated the third part of the Encyklopddie in Hegel's Philosophy of Mind (1894); R. B. Haldane the History of Philosophy (1896); E. B. Speirs, lectures on the Philosophy of Religion (1895) ; J. Sibree, lectures on The Philosophy of History (1852); B. Bosanquet, Philosophy of Fine Art, Introduction (1886); W. Hastie, The Philosophy of Art (1886); S. W. Dyde, The Philosophy of Right (1896). Other recent expositions and criticisms in addition to those mentioned above are W. T. Harris, Hegel's Logic (1890); J. B. Baillie, Origin and Significance of Hegel's Logic (1901), and Outline of the Idealistic Construction of Experience (1906) ; P. Barth, Die Geschichtsphilosophie Hegels (1890); J. A. Marrast, La Philosophic du droit de Hegel (1869); L. Miraglia, I Principii fondamentali e la dottrina elico- giuridica di Hegel (1873) ; Hegel's Philosophy of the State and History (Germ. Phil. Classics, 1887); G. Bolland, Philosophic des Rechts (1902), and Hegels Philosophic der Religion (1901); E. Ott, Die Religionsphilosophie Hegels (1904); J. M. Sterrett, Studies in Hegel's Philosophy of Religion (1891); M. Ehrenhauss, Hegels Gottesbegriff (1880); E. Caird, Hegel (1880); A. Seth Pringle-Pattison, Hegelian- ism and Personality (1893) ; Millicent Mackenzie, Hegel's Educational Theory and Practice (1909), with biographical sketch; J. My. E. McTaggart, Commentary on Hegel's Logic (1910). (J. H. Mo.)

HEGEMON OF THASOS, Greek writer of the old comedy, nicknamed $a/oj from his fondness for lentils. Hardly anything is known of him, except that he flourished during the Pelopon- nesian War. According to Aristotle (Poetics, ii. 5) he was the inventor of a kind of parody; by slightly altering the wording in well-known poems he transformed the" sublime into the ridiculous. When the news of the disaster in Sicily reached Athens, his parody of the Giganlomachia was being performed; it is said that the audience were so amused by it that,

instead of leaving to show their grief, they remained in their seats. He

was also the author of a comedy called Philinne (Philine), written in the manner of Eupolis and Cratinus, in which he attacked a well-known courtesan. Athenaeus (p. 698), who preserves some parodic hexameters of his, relates other anecdotes concerning him (pp. 5, 108, 407).

Fragments in T. Kock, Comicorum Atticorum fragmenta, i. (1880); B. J. Peltzer, De parodied Graecorum poesi (1855).

HEGEMONY (Gr. fiyenovia, leadership, from fiyelcrdcu, to lead, the leadership especially of one particular state in a group of federated or loosely united states. The term was first applied in Greek history to the position claimed by different individual city-states, e.g. by Athens and Sparta, at different times to a position of predominance (primus inter pares) among other equal states, coupled with individual autonomy. The reversion of this position was claimed by Macedon (see Greece: Ancient History, and Delian League).

HEGESIAS OF MAGNESIA (in Lydia), Greek rhetorician and historian, flourished about 300 B.C. Strabo (xiv. 648), speaks of him as the founder of the florid style of composition known as “Asiatic” (cf. Timaeus). Agatharchides, Dionysius of Hali- carnassus and Cicero all speak of him in disparaging terms, although Varro seems to have approved of his work. He pro- fessed to imitate the simple style of Lysias, avoiding long periods, and expressing himself in short, jerky sentences, without modula- tion or finish. His vulgar affectation and bombast made his writings a mere caricature of the old Attic. Dionysius describes his composition as tinselled, ignoble and effeminate. It is generally supposed, from the fragment quoted as a specimen by Dionysius, that Hegesias is to be classed among the writers of lives of Alexander the Great. This fragment describes the treatment of Gaza and its inhabitants by Alexander after its conquest, but it is possible that it is only part of an epideictic or show-speech, not of an historical work. This view is supported by a remark of Agatharchides in Photius (cod. 250) that the only aim of Hegesias was to exhibit his skill in describing sensational events.

See Cicero, Brutus 83, Orator 67, 69, with J. E. Sandys’s note, ad Ait. xii. 6; Dion. Halic. De verborum comp. iv. ; Aulus GclUus ix. 4;

Plutarch, Alexander, 3; C. W. M tiller, Scriptores rerum Alexandri Magni, p. 138 (appendix to Didot ed. of Arrian, 1846); Norden, Die antike Kunstprosa (1898); J. B. Bury, Ancient Greek Historians (‘9°9)i PP- 169-172, on origin and development of ” Asiatic ” style, with example from Hegesias.

HEGESIPPUS, Athenian orator and statesman, nicknamed Kpa(3uXo$ (” knot “), probably from the way in which he wore his hair. He lived in the time of Demosthenes, of whose anti- Macedonian policy he was an enthusiastic supporter. In 343 B.C. he was one of the ambassadors sent to Macedonia to dis- cuss, amongst other matters, the restoration of the island of Halonnesus, which had been seized by Philip. The mission was unsuccessful, but soon afterwards Philip wrote to Athens, offering to resign possession of the island or to submit to arbitration the question of ownership. In reply to this letter the oration De Halonneso was delivered, which, although included among the speeches of Demosthenes, is generally considered to be by Hegesippus. Dionysius of Halicarnassus and Plutarch, however, favour the authorship of Demosthenes.

See Demosthenes, De falsa legatione 364, 447, De corona 250, Philippica iii. 129; Plutarch, Demosthenes 17, Apophthegmata, r87D; Dionysius Halic. ad Ammaeum, i.; Grote, History of Greece, ch. 90.

HEGESIPPUS (fl. a.d. 150-180), early Christian writer, was of Palestinian origin, and lived under the Emperors Antoninus Pius, Marcus Aurelius and Commodus. Like Aristoof Pella he belonged to that group of Judaistic Christians which, while keeping the law themselves, did not attempt to impose on others the requirements of circumcision and Sabbath observance. He was the author of a treatise (vToiivrjuara) in five books dealing with such subjects as Christian literature, the unity of church doctrine, paganism, heresy and Jewish Christianity, fragments of which are found in Eusebius, who obtained much of his information concerning early Palestinian church history and chronology from this source. Hegesippus was also a great traveller, and like many other leaders

of his time came to Rome (having visited Corinth on the way) about the middle of the 2nd century. His journeyings impressed him with the idea that the continuity of the church in the cities he visited was a guarantee of its fidelity to apostolic orthodoxy: ” in each succession and in every city, the doctrine is in accordance with that which the Law and the Prophets and the Lord [i.e the Old Testament and the evangelical tradition] proclaim.” To illustrate this opinion he drew up a list of the Roman bishops. Hegesippus is thus a significant figure

both for the type of Christianity taught in the circle to which he belonged, and as accentuating the point of view which the church began to assume in the presence of a developing gnosticism.

HEGESIPPUS, the supposed author of a free Latin adaptation of the Jewish War of Josephus under the title De hello Judaico et excidio urbis Ilierosolymitanae. The seven books of Josephus are compressed into five, but much has been added from the Antiquities and from the works of Roman historians, while several entirely new speeches are introduced to suit the occasion. Internal evidence shows that the work could not have been written before the 4th century a.d. The author, who is undoubtedly a Christian, describes it in his preface as a kind of revised edition of Josephus. Some authorities attribute it to Ambrose, bishop of Milan (340- 397), but there is nothing to settle the authorship definitely. The name Hegesippus itself appears to be a corruption of Josephus, through the stages 'Ioxtt/ttos, Iosippus, Egesippus, Hegesippus, unless it was purposely adopted as reminiscent of Hegesippus, the father of ecclesiastical history (2nd century).

Best edition by C. F. Weber and J. Caesar (1864); authorities in E. Schiirer, History of the Jewish People (Eng. trans.), i. 99 seq. ; F. Vogel, De Hegesippo, qui dicitur, Josephi interprets (Erlangen,

1881).

HEGIUS [VON HEEK], ALEXANDER (c. 1433-1498), German humanist, so called from his birthplace Heek in Westphalia. In his youth he was a pupil of Thomas a Kempis, at that time canon of the convent of St Agnes at Zwolle. In 1474 he settled down at Deventer in Holland, where he either founded or succeeded to the headship of a school, which became famous for the number of its distinguished alumni. First and foremost of these was Erasmus; others were Hermann von dem Busche, the missionary of humanism, Conrad Goclenius (Gockelen), Conrad Mutianus (Muth von Mudt) and pope Adrian VI. Hegius died at Deventer on the 7th of December 1498. His writings, consisting of short poems, philosophical essays, grammatical notes and letters, were published after his death by his pupil Jacob Faber. They display considerable knowledge of Latin, but less of Greek, on the value of which he strongly insisted. Hegius's chief claim to be remembered rests not upon his published works, but upon his services in the cause of humanism. He succeeded in abolishing the old-fashioned medieval textbooks and methods of instruction, and led his pupils to the study of the classical authors themselves. His generosity in assisting poor students exhausted a considerable fortune, and at his death he left nothing but his books and clothes. .

See D. Reichling, ” Beitriige zur Charakteristik des Alex. Hegius,” in the Monatsschrift fiir Westdeutschland (1877); H. Hamelmann, Opera genealogico-histerica (171 1); H. A. Erhard, Geschichte des Wiederaufbluhens wissenschaftlicher Bildung (1826); C. Krafft and W. Crecelius, ” Alexander Hegius und seine Schiller,” from the works of Johannes Butzbach, one of Hegius’s pupils, in Zeitschrift des bergischen Geschichtsvereins , vii. (Bonn, 1871).

HEIBERG, JOHAN LUDVIG (1791-1860), Danish poet and critic, son of the political writer Peter Andreas Heiberg (1758- 1841), and of the famous novelist, afterwards the Baroness Gyllembourg-Ehrensvard, was born at Copenhagen on the 14th of December 1791. In 1800 his father was exiled and settled in Paris, where he was employed in the French foreign office, retir- ing in 181 7 with a pension. His political and satirical writings continued to exercise great influence over his fellow-countrymen. Johan Ludvig Heiberg was taken by K. L. Rahbek and his wife into their house at Bakkehuset. He was educated at the uni- versity of Copenhagen, and his first publication, entitled The Theatre for Marionettes (1814), included two romantic dramas. This was followed by Christmas Jokes and New Year’s Tricks

(1816), The Initiation of Psyche (1817), and The Prophecy of Tycho Brahi, a satire on the eccentricities of the Romantic writers, especially on the sentimentality of Ingemann. These works attracted attention at a time when Baggesen, Ohlen- schlager and Ingemann possessed the popular ear, and were understood at once to be the opening of a great career. In 18 17 Heiberg took his degree, and in 1810 went abroad with a grant from government. He proceeded to Paris, and spent the next three years there with his father. In 1822 he published his drama of Nina, and was made professor of the Danish language at the university of Kiel, where he delivered a course of lectures, com- paring the Scandinavian mythology as found in the Edda with the poems of Ohlenschlager. These lectures were published in German in 1827.

In 1825 Heiberg came back to Copenhagen for the purpose of introducing the vaudeville on the Danish stage. He composed a great number of these vaudevilles, of which the best known are King Solomon and George the Hatmaker (1825); April Fools (1826); A Story in Rosenborg Garden (1827); Kjoge Huskors (1831); The Danes in Paris (1833); No (1836); and Yes (1839). He took his models from the French theatre, but showed extraordinary skill in blending the

words and the music; but the subjects and the humour were essentially Danish and even topical. Meanwhile he was producing dramatic work of a more serious kind; in 1828 he brought out the national drama of Elverhoi; in 1830 The Inseparables; in 1835 the fairy comedy of The Elves, a dramatic version of Tieck's Elfin; and in 1838 Fata Morgana. In 1 841 Heiberg published a volume of New Poems containing " A Soul after Death," a comedy which is perhaps his master- piece, " The Newly Wedded Pair," and other pieces. He edited from 1827 to 1830 the famous weekly, the Flyvende Post (The Flying Post), and subsequently the Inlerimsblade (1834-1837) and the Intelligensblade (1842-1843). In his journalism he carried on his warfare against the excessive pretensions of the Romanticists, and produced much valuable and penetrating criticism of art and literature. In 183 1 he married the actress Johanne Louise Paetges (181 2-1890), herself the author of some popular vaudevilles. Heiberg's scathing satires, however, made him very unpopular; and this antagonism reached its height when, in 1845, he published his malicious little drama of The Nut Crackers. Nevertheless he became in 1847 director of the iiational theatre. He filled the post for seven years, working with great zeal and conscientiousness, but was forced by intrigues from without to resign it in 1854. Heiberg died at Bonderup, near Ringsted, on the 25th of August i860. His influence upon taste and critical opinion was greater than that of any writer of his time, and can only be compared with that of Holberg in the 18th century. Most of the poets of the Romantic movement in Denmark were very grave and serious; Heiberg added the element of humour, elegance and irony. He had the genius of good taste, and his witty and delicate productions stand almost unique in the literature of his country.

The poetical works of Heiberg were collected, in II vols., in 1861-1862, and his prose writings (11 vols.) in the same year. The last volume of his prose works contains some fragments of autobiography. See also G. Brandes, Essays (1889). For the elder Heiberg see monographs by Thaarup (1883) and by Schwanenfliigel (1891).

HEIDE, a town of Germany, in the Prussian province of Schleswig-Holstein, on a small plateau which stands between the marshes and moors bordering the North Sea, 35 m. N.N.W. of Gliickstadt, at the junction of the railways Elmshorn- Hvidding and Neumunster-Tbnning. Pop. (1905), 8758. Ithasan Evangelical and a Roman Catholic church, a high-grade school, and tobacco and cigar manufactories and breweries. Heide in 1447 became the capital of the Ditmarsh peasant republic, but on the 13th of June 1559 it was the scene of the complete defeat of the peasant forces by the Danes.

HEIDEGGER, JOHANN HEINRICH (1633-1698), Swiss theologian, was born at Barentschweil, in the canton of Zurich, Switzerland, on the 1st of July 1633. He studied at Marburg and at Heidelberg, where he became the friend of J. L. Fabricius '1652-1696), and was appointed professor extraordinarius of

Hebrew and later of philosophy. In 1659 he was called to Steinfurt to fill the chair of dogmatics and ecclesiastical history, and in the same year he became doctor of theology of Heidelberg. In 1660 he revisited Switzerland; and, after marrying, he travelled in the following year to Holland, where he made the acquaintance of Johannes Cocceius. He returned in 1665 to Zurich, where he was elected professor of moral philosophy. Two years later he succeeded J. H. Hottinger (1620-1667) in the chair of theology, which he occupied till his death on the 18th of January 1698, having declined an invitation in 1669 to succeed J. Cocceius at Leiden, as well as a call to Groningen. Heidegger was the principal author of the Formula Consensus Helvetica in 1675, which was designed to unite the Swiss Reformed churches, but had an opposite effect. W. Gass describes him as the most notable of the Swiss theologians of the time.

His writings are largely controversial, though without being bitter, and are in great part levelled against the Roman Catholic Church. The chief are De historia sacra patriarcharum exercita- tiones selectae (1667-1671); Dissertatio de Peregrinationibus religiosis (1670); De ratione studiorum, opuscula aurea, &c. (1670); Historia papatus (1684; under the name Nicander von Hohenegg); Manuductio in viam concordiae Prolestantium ecclesiasticae (1686); Tumulus concilii Tridentini (1690); Exercitationes biblicae (1700), with a life of the author prefixed; Corpus theologiae Chrisiianae (1700, edited by J. H. Schweizer); Ethicae Christianae elementa (1711); and lives of J. H. Hottinger (1667) and J. L. Fabricius (1698). His autobiography appeared in 1698, under the title Historia vitae J. H. Heideggeri.

See the articles in Herzog-Hauck's Realencyklopddie and the Allgemeine deutsche Biographie; and cf. W. Gass, Geschichte der protestantischen Dogmatik, ii. 353 ff.

HEIDELBERG, a town of Germany, on the south bank of the Neckar, 12 m. above its confluence with the Rhine, 13 m. S.E. from Mannheim and 54 m. from Frankfort-on-Main by rail. The situation of the town, lying between lofty hills covered with vineyards and forests, at the spot where the rapid Neckar leaves the gorge and enters the plain of the Rhine, is one of great natural beauty. The town itself consists practically of one long, narrow street — the Hauptstrasse — running

parallel to the river, from the railway station on the west to the Karlstor on the east (where there is also a local station) for a distance of 2 m. To the south of this is the Anlage, a pleasant promenade flanked by handsome villas and gardens, leading directly to the centre of the place. A number of smaller streets intersect the Haupt- strasse at right angles and run down to the river, which is crossed by two fine bridges. Of these, the old bridge on the east, built in 1788, has a fine gateway and is adorned with statues of Minerva and the elector Charles Theodore of the Palatinate; the other, the lower bridge, on the west, built in 1877, connects Heidelberg with the important suburbs of Neuenheim and Handschuchsheim. Of recent years the town has grown largely towards the west on both sides of the river; but the additions have been almost entirely of the better class of residences. Heidelberg is an important railway centre, and is connected by trunk lines with Frankfort, Mannheim, Karlsruhe, Spires and Wiirzburg. Electric trams provide for local traffic, and there are also several light railways joining it with the neighbouring villages. Of the churches the chief are the Protestant Peters- kirche dating from the 15th century and restored in 1873, to the door of which Jerome of Prague in 1460 nailed his theses; the Heilige Geist Kirche (Church of the Holy Ghost), an imposing Gothic edifice of the 15th century; the Jesuitenkirche (Roman Catholic), with a sumptuously decorated interior, and the new Evangelical Christuskirche. The town hall and the university buildings, dating from 17 12 and restored in 1886, are common- place erections; but to the south of the Ludwigsplatz, upon which most of the academical buildings lie, stands the new university library, a handsome structure of pink sandstone in German Renaissance style. In addition to the Ludwigsplatz with its equestrian statue of the emperor William I. there are other squares in the town, among them being the Bismarckplatz with a statue of Bismarck, and the Jubilaumsplatz.

The chief attraction of Heidelberg is the castle, which over- hangs the east part of the town. It stands on the Jettenbiihl, a spur of the Konigsstuhl (1800 ft.), at a height of 330 ft. above the Neckar. Though now a ruin, yet its extent, its magnificence, its beautiful situation and its interesting history render it by far the most noteworthy, as it certainly is the grandest and largest, of the old castles of Germany. The building was begun early in the 13th century. The elector palatine and German king Rupert III. (d. 1410) greatly improved it, and built the wing, Ruprechtsbau or Rupert's building, that bears his name. Succeeding electors further extended and embellished it (see

Architecture, Plate VII., figs. 78-80); notably Otto Henry “the Magnanimous” (d. 1559), who built the beautiful early Renaissance wing known as the Otto-Heinrichsbau (1556-1559); Frederick IV., for whom the fine late Renaissance wing called the Friedrichsbau was built (1601-1607); and Frederick V., the unfortunate ” winter king ” of Bohemia, who on the west side added the Elisabethenbau or Englischebau (1618), named after his wife, the daughter of James I. of Great Britain and ancestress

b»m Heyert Keflvcrttiiani Lofton.

Bncry Walker fa

of the present English reigning family. In 1648, at the peace of Westphalia, Heidelberg was given back to Frederick V.‘s son, Charles Louis, who restored the castle to its former splendour. In 1688, during Louis XIV. ‘s invasion of the Palatinate, the castle was taken, after a long siege, by the French, who blew part of it up when they found they could not hope to hold it (March 2, 1689). In 1693 it was again captured by them and still further wrecked. Finally, in 1764, it was struck by lightning and reduced to its present ruinous condition.

Apart from the outworks, the castle forms an irregular square with round towers at the angles, the principal buildings being grouped round a central courtyard, the entrance to which is from the south through a series of gateways. In this courtyard, besides the buildings already mentioned, are the oldest parts of the castle, the so-called Alte Bau (old building) and the Bandhaus. The Friedrichsbau, which is decorated with statues of the rulers of the Palatinate, was elaborately restored and rendered habitable between 1897 and 1903. Other noteworthy objects in the castle are the fountain in the courtyard, decorated with four granite columns from Charlemagne’s palace at Ingel- heim; the Elisabethentor, a beautiful gateway named after the English princess; the beautiful octagonal bell-tower at the N.E. angle; the ruins of the Krautturm, now known as the Gesprengte Turm, or blown-up tower, and the castle chapel and the museum of antiquities in the Friedrichsbau. In a cellar entered from the courtyard is the famous Great Tun of Heidelberg. This

vast vat was built in 1751, but has only been used on one or two occasions. Its capacity is 49,000 gallons, and it is 20 ft. high and 31 ft. long. Behind the Friedrichsbau is the Altan (1610), or castle balcony, from which is obtained a view of great beauty, extending from the town beneath to the heights across the Neckar and over the broad luxuriant plain of the Rhine to Mannheim and the dim contours of the

Hardt Mountains behind. On the terrace of the beautiful grounds is a statue of Victor von Scheffel, the poet of Heidelberg.

The university of Heidelberg was founded by the elector Rupert I., in 1385, the bull of foundation being issued by Pope Urban VI. in that year. It was constructed after the type of Paris, had four faculties, and possessed numerous privileges. Marselius von Inghen was its first rector. The electors Frederick I., the Victorious, Philip the Upright and Louis V. respectively cherished it. Otto Henry gave it a new organization, further endowed it and founded the library. At the Reformation it became a stronghold of Protestant learning, the Heidelberg catechism being drawn up by its theologians. Then the tide turned. Damaged by the Thirty Years' War, it led a struggling existence for a century and a half. A large portion of its remain- ing endowments was cut off by the peace of Luneville (1801). In 1803, however, Charles Frederick, grand-duke of Baden, raised it anew and reconstituted it under the name of " Ruperto- Carola." The number of professors and teachers is at present about 150 and of students 1700. The library was first kept in the choir of the Heilige Geist Kirche, and then consisted of 3500 MSS. In 1623 it was sent to Rome by Maximilian I., duke of Bavaria, and stored as the Bibliotheca Palatina in the Vatican. It was afterwards taken to Paris, and in 181 5 was restored to Heidelberg. It has more than 500,000 volumes, besides 4000 MSS. Among the other university institutions are the academic hospital, the maternity hospital, the physio- logical institution, the chemical laboratory, the zoological museum, the botanical garden and the observatory on the Konigsstuhl.

The other educational foundations are a gymnasium, a modern and a technical school. There is a small theatre, an art and several other scientific societies. The manufactures of Heidelberg include cigars, leather, cement, surgical instruments and beer, but the inhabitants chiefly support themselves by supplying the wants of a large and increasing body of foreign permanent residents, of the considerable number of tourists who during the summer pass through the town, and of the university students. A funicular railway runs from the Korn-Markt up to the level of the castle and thence to the Molkenkur (700 ft. above the town). The town is well lighted and is supplied with excellent water from the Wolfsbrunnen. Pop. (1885), 29,304;

(1905), 49,527-

At an early period Heidelberg was a fief of the bishop of Worms, who entrusted it about 1225 to the count palatine of the Rhine, Louis I. It soon became a town and the chief residence of the counts palatine.

Heidelberg was one of the great centres of the reformed teaching and was the headquarters of the Calvinists. On this account it suffered much during the Thirty Years' War, being captured and plundered by Count Tilly in 1622, by the Swedes in 1633 and again by the imperialists in 1635. By the peace of Westphalia it was restored to the elector Charles Louis. In 1688 and again in 1693 Heidelberg was sacked by the French. On the latter occasion the work of destruction was carried out so thoroughly that only one house escaped; this being a quaintly decorated erection in the Markt— platz, which is now the H6tel zum Ritter. In 1720 the elector Charles II. removed his court to Mannheim, and in 1803 the town became part of the grand-duchy of Baden. On the 5th of March 1848 the Heidelberg assembly was held here, and at this meeting the steps were taken which led to the revolution in Germany in that year.

See Oncken, Stadt, Schloss und Hochschule Heidelberg; Bilder aus ihrer Vergangenheit (Heidelberg, 1885); Ochelhauser, Das Heidelberger Schloss, bau- und kunstgeschichtlicher Fiihrer (Heidelberg, 1902) ; Pfaff, Heidelberg und Umgebung (Heidelberg, 1902) ;

Lorentzen, Heidelberg und Vmgebung (Stuttgart, 1902) ; Durm, Das Heidelberger Schloss, eine Studie (Berlin, 1884) ; Koch and Seitz, Das Heidelberger Schloss (Darmstadt, 1887-1891); J. F. Hautz, Geschichte der Universitat Heidelberg (1863-1864); A. Thorbecke, Geschichte der Universitat Heidelberg (Stuttgart, 1886); the Urkunden- buch der Universitat Heidelberg, edited by Winkelmann (Heidelberg, 1886); Bahr, Die Entfuhrung der Heidelberger Bibliothek nach Rom (Leipzig, 1845) ; and G. Weber, Heidelberger Erinnerungen (Stuttgart,

1886).

HEIDELBERG, a town and district of the Transvaal. The district is bounded S. by the Vaal river and includes the south- eastern part of the Witwatersrand gold-fields. The town of Heidelberg is 42 m. S.E. of Johannesburg and 441 m. N.W. of Durban by rail. Pop. (1904), 3220, of whom 1837 were white. It was founded in 1865, is built on the slopes of the Rand at an elevation of 5029 ft., and is reputed the best sanatorium in the colony. It is the centre of the eastern Rand gold-mines.

HEIDELBERG CATECHISM, THE, the most attractive of all the

catechisms of the Reformation, was drawn up at the bidding of Frederick III., elector of the Palatinate, and published on Tuesday the 19th of January 1563. The new religion in the Palatinate had been largely under the guidance of Philip Melanchthon, who had revived the old university of Heidelberg and staffed it with sympathetic teachers. Oneof these, Tillemann, Heshusius, who became general superintendent in 1558, held extreme Lutheran views on the Real Presence, and in his desire to force the community into his own position excommunicated his colleague Klebitz, who held Zwinglian views. When the breach was widening Frederick, ” der fromme Kurfiirst,” came to the succession, dismissed the two chief combatants and referred the trouble to Melanchthon, whose guarded verdict was distinctly Swiss rather than Lutheran. In a decree of August 1560 the elector declared for Calvin and Zwingli, and soon after he resolved to issue a new and unambiguous catechism of the evangelical faith. He entrusted the task to two young men who have won deserved remembrance by their learning and their character alike. Zacharias Ursinus was born at Breslau in July 1534 and attained high honour in the university of Wittenberg. In 1558 he was made rector of the gymnasium in his native town, but the incessant strife with the extreme Lutherans drove him to Zurich, whence Frederick, on the advice of Peter Martyr, summoned him to be professor of theology at Heidelberg and superintendent of the Sapientiae Collegium. He was a man of modest and gentle spirit, not endowed with great preaching gifts, but unwearied in study and consummately able to impart his learning to others. Deposed from his chair by the elector Louis in 1576, he lived with John Casimir at Neustadt and found a congenial sphere in the new seminary there, dying in his 49th year, in March 1583.

Caspar Olevianus was born at Treves in 1536. He gave up law for theology, studied under Calvin in Geneva, Peter Martyr in Zurich, and Beza in Lausanne. Urged by William Farel he preached the new faith in his native city, and when banished therefrom found a home with Frederick of Heidelberg, where he gained high renown as preacher and administrator. His ardour and enthusiasm made him the happy complement of Ursinus. When the reaction came under Louis he was befriended by Ludwig von Sain, prince of Wittgenstein, and John, count of Nassau, in whose city of Herborn he did notable work at the high school until his death on the 15th of March 1587. The elector could have chosen no better men, young as they were, for the task in hand. As a first step each drew up a catechism of his own composition, that of Ursinus being naturally of a more grave and academic turn than the freer production of Olevianus, while each

made full use of the earlier catechisms already in use. But when the union was effected it was found that the spirits of the two authors were most happily and harmoniously wedded, the exactness and erudition of the one being blended with the fervency and grace of the other. Thus the Heidelberg Catechism, which was completed within a year of its inception, has an individuality that marks it out from all its predecessors and successors. The Heidelberg synod unanimously approved of it,

it was published in January 1563, and in the same year officially turned into Latin by Jos. Lagus and Lambert Pithopoeus.

The ultra-Lutherans attacked the catechism with great bitterness, the assault being led by Heshusius and Flacius Illyricus. Maximilian II. remonstrated against it as an infringe- ment of the peace of Augsburg. A conference was held at Maulbronn in April 1564, and a personal attack was made on the elector at the diet of Augsburg in 1566, but the defence was well sustained, and the Heidelberg book rapidly passed beyond the bounds of the Palatinate (where indeed it suffered eclipse from 1576 to 1583, during the electorate of Louis), and gained an abundant Success not only in Germany (Hesse, Anhalt, Brandenburg and Bremen) but also in the Netherlands (1588), and in the Reformed churches of Hungary, Transylvania and Poland. It was officially recognized by the synod of Dort in 1619, passed into France, Britain and America, and probably shares with the De imitatione Christi and The Pilgrim's Progress the honour of coming next to the Bible in the number of tongues into which it has been translated.

This wide acceptance and high esteem are due largely to an avoidance of polemical and controversial subjects, and even more to an absence of the controversial spirit. There is no mistake about its Protestantism, even when we omit the unhappy addition made to answer 80 by Frederick himself (in indignant reply to the ban pronounced by the Council of Trent), in which the Mass is described as " nothing else than a denial of the one sacrifice and passion of Jesus Christ, and an accursed idolatry "— an addition which is the one blot on the ernei/ ceia of the catechism. The work is the product of the best qualities of head and heart, and its prose is frequently marked by all the beauty of a lyric. It follows the plan of the epistle to the Romans (excepting chapters ix.-xi.) and falls into three parts: Sin, Redemption and the New Life. This arrangement alone would mark it out from the normal reformation catechism, which runs along the stereotyped lines of Decalogue, Creed, Lord's Prayer Church and Sacraments. These themes are included, but are shown as organically related. The Commandments, e.g. " belong to the first part so far as they are a

mirror of our sin and misery, but also to the third part, as being the rule of our new obedience and Christian life." The Creed — a panorama of the sublime facts of redemption — and the sacraments find their place in the second part; the Lord's Prayer (with the Decalogue) in the third.

See The Heidelberg Catechism, the German Text, with a Revised Translation and Introduction, edited by A. Smellie (London, 1900).

HEIDELOFF, KARL ALEXANDER VON (1788-1865), German architect, the son of Victor Peter Heideloff, a painter, was born at Stuttgart. He studied at the art academy of his native town, and after following the profession of an architect for some time at Coburg was in 1818 appointed city architect at Nurem- berg. In 1822 he became professor at the polytechnic school, holding his post until 1854, and some years later he was chosen conservator of the monuments of art. Heideloff devoted his chief attention to the Gothic style of architecture, and the buildings restored and erected by him at Nuremberg and in its neighbourhood attest both his original skill and his purity of taste. He also achieved some success as a painter in water- colour. He died at Hassfurt on the 28th of September 1865. Among his architectural works should be mentioned the castle of Reinhardsbrunn, the Hall of the Knights in the fortress at Coburg, the castle of Landsberg,the mortuary chapel in Meiningen , the little castle of Rosenburg near Bonn, the chapel of the castle of Rheinstein near Bingen, and the Catholic church in Leipzig. His powers in restoration are shown in the castle of Lichtenstein, the cathedral of Bamberg, and the Knights' Chapel {Ritter Kapelle) at Hassfurt.

Among his writings on architecture are Die Lehre von den Saulen-ordnungen (1827); Der Kleine Vignola (1832); Niirnbergs Baudenk-maler der Vorzeit (1838-1843, complete edition 1854); and Die Ornamentik des Mittelalters (1838-1842).

HEIDENHEIM, a town of Germany, in the kingdom of Wiirttemberg, 31 m. by rail north by east of Ulm. Pop. (1905), 12,173. ˆ has an Evangelical and a Roman Catholic church,

and several schools. Its industrial establishments include cotton, woollen, tobacco, machinery and chemical factories, bleach-works, dye-works and breweries, and corn and cattle markets. The town,

which received municipal privileges in 1356, is overlooked by the ruins of the castle of Hellenstein, standing on a hill 1985 ft. high. Heidenheim is also the name of a small place in Bavaria famous on account of the Benedictine abbey which formerly stood therein. Founded in 748 by Wilibald, bishop of Eichstatt, this Was plundered by the peasantry in 1525 and was closed in 1537.

HEIFER, a young cow that has not calved. The O. Eng. heah- fore or heafru, from which the word is derived, is of obscure origin. It is found in Bede's History (a.d. 900) as heahjore, and has passed through many forms. It is possibly derived from heah, high, and faren (fare), to go, meaning " high-stepper." It has also been suggested that the derivation is from hea, a stall, and fore, a cow.

HEIGEL, KARL AUGUST VON (1835-1905), German novelist, was born, the son of a regisseur or stage-manager of the court theatre, on the 25th of March 1835 at Munich. In this city he received his early schooling and studied (1854-1858) philosophy at the university. He was then appointed librarian to Prince Heinrich zu Carolath-Beuthen in Lower Silesia, and accompanied the nephew of the prince on travels. In 1863 he settled in Berlin, where from 1865 to 1875 he was engaged in journalism. He next resided at Munich, employed in literary work for the king, Ludwig II., who in 1881 conferred upon him a title of nobility. On the death of the king in 1886 he removed to Riva on the Lago di Garda, where he died on the 6th of September 1905. Karl von Heigel attained some popularity with his novels: Wohin? (1873), Die Dame ohne Herz (1873), Das Geheimnis des Kbnigs (1891), Der Roman einer Stadt (1898), Der Maha- radschah (1900), Die nervose Frau (1900), Die neuen Heiligen (1901), and Bromels Gliick und Ende (1902). He also wrote some plays, notably Josephine Bonaparte (1892) and Die Zarin (1883); and several collections of short stories, Neue Erzahlungen (1876), Neueste Novellen (1878), and Heitere Erzdhlungen

(1893).

HEIJERMANS, HERMANN (1864-), Dutch writer, of Jewish origin, was born on the 3rd of December 1864 at Rotter- dam. In the Amsterdam Handelsblad he published a series of sketches of Jewish family life under the pseudonym of " Samuel Falkland," which were collected in volume form. His novels .tnd tales include Trinetle (1892), Fles (1893), Kamerljeszonde (2 vols., 1896), InUrieurs (1897), Diamantstadt (2 vols., 1903). He created great interest by his play Op Hoop van Zegen (1900), represented at the Theatre Antoine in Paris, and in English by the Stage Society as The Good Hope. His other plays

are: Dora Kremer (1893), Ghetto (1898), Het zevende Gebot (1899), Het Pantser (1901), Ora ei labora (1901), and numerous one-act pieces. A Case of Arson, an English version of the one-act play Brand in de Jonge Jan, was notable for the impersonation (1904 and 1905) by Henri de Vries of all the seven witnesses who appear as characters.

HEILBRONN, a town of Germany, in the kingdom of Wiirttem- berg, situated in a pleasant and fruitful valley on the Neckar, 33 m. by rail N. of Stuttgart, and at the junction of lines to Jagdsfeld, Crailsheim and Eppingen. Pop. (1905), 40,026. In the older part of the town the streets are narrow, and contain a number of high turreted houses with quaintly adorned gables. The old fortifications have now been demolished, and their site is occupied by promenades, outside of which are the more modern parts of the town with wide streets and many handsome buildings. The principal public buildings are the church of St Kilian (restored 1886-1895) in the Gothic and Renaissance styles, begun about 1019 and completed in 1529, with an elegant tower 210 ft. high, a beautiful choir, and a finely carved altar; the town hall (Rathaus), founded in 1540, and possessing a curious clock made in 1580, and a collection of interesting letters and other docu- ments; the house of the Teutonic knights (Deutsches Haus), now used as a court of law; the Roman Catholic church of St Joseph, formerly the church of the Teutonic Order; the tower

(Diebsturm or GGtzens Turm) on the Neckar, in which Gotz von Berlichingen was confined in 15 19; a fine synagogue; an historical museum and several monuments, among them those to the emperors William I. and Frederick I., to Bismarck, to Schiller and to Robert von Mayer (1814-1878), a native of the town, famous for his discoveries concerning heat. The educa- tional establishments include a gymnasium, a commercial school and an agricultural academy. The town in a commercial point of view is the most important in Wiirttemberg, and possesses an immense variety of manufactures, of which the principal are gold, silver, steel and iron wares, machines, sugar of lead, white lead, vinegar, beer, sugar, tobacco, soap, oil, cement, chemicals, artificial manure, glue, soda, tapestry, paper and cloth. Grapes, fruit, vegetables and flowering shrubs are largely grown in the neighbourhood, and there are large quarries for sandstone and gypsum and extensive salt-works. By means of the Neckar a considerable trade is carried on in wood, bark, leather, agricultural produce, fruit and cattle.

Heilbronn occupies the site of an old Roman settlement; it is first mentioned in 741, and the Carolingian princes had a palace here. It owes its name — originally Heiligbronn, or holy spring — to a spring

of water which until 1857 was to be seen issuing from under the high altar of the church of St Kilian. Heilbronn obtained privileges from Henry IV. and from Rudolph I. and became a free imperial city in 1360. It was frequently besieged during the middle ages, and it suffered greatly during the Peasants' War, the Thirty Years' War, and the various wars with France. In April 1633 a convention was entered into here between Oxenstierna, the Swabian and Frankish estates and the French, English and Dutch ambassadors, as a result of which the Heilbronn treaty, for the prosecution of the Thirty Years' War, was concluded. In 1802 Heilbronn was annexed by Wiirttem- berg.

See Jager, Geschichte von Heilbronn (Heilbronn, 1828); Kuttler, Heilbronn, seine Umgebungen und seine Geschichte (Heilbronn, 1859); Diirr, Heilbronner Chronik (Halle, 1896); Schliz, Die Entstehung der Stadtgemeinde Heilbronn (Leipzig, 1903); and A. Kiisel, Der Heilbronner Konvent (Halle, 1878).

HEILIGENSTADT, a town of Germany, in Prussian Saxony, on the Leine, 32 m. E.N.E. of Cassel, on the railway to Halle. Pop. (1905), 7955. It possesses an old castle, formerly belonging to the electors of Mainz, one Evangelical and two Roman Catholic churches, several educational establishments, and an infirmary. The principal manufactures are cotton goods, cigars, paper, cement and needles. Heiligenstadt is said to have been built by the Frankish king Dagobert and was formerly the capital of the principality of Eichsfeld. In 1022 it was acquired by the archbishop of Mainz, and in 1103 it came into the possession of Henry the Proud, duke of Saxony, but when his son Henry the Lion was placed under the ban of the Empire, it again came to Mainz. It was destroyed by fire in 1333, and was captured in 1525 by Duke Henry of Brunswick. In 1803 it came into possession of Prussia. The Jesuits had a celebrated college here from 1581 to 1773.

HEILSBERG, a town of Germany, in the province of East Prussia, at the junction of the Simser and Alle, 38 m. S. of Konigsberg. Pop. (1905), 6042. It has an Evangelical and a Roman Catholic church, and an old castle formerly the seat of the prince-bishops of Ermeland, but now used as an infirmary. The principal industries are tanning, dyeing and brewing, and there is considerable trade in grain. The castle founded, at Heilsberg by the Teutonic order in 1240 became in 1306 the seat of the bishops of Ermeland, an honour which it retained for 500 years. On the 10th of June 1807 a battle took place at Heilsberg between the French under Soult and Murat, and the Russians and Prussians under Bennigsen.

HEILSBRONN (or Kloster-Heilsbronn), a village of Germany, in the

Bavarian province of Middle Franconia, with a station on the railway between Nuremberg and Ansbach, has 1 200 inhabitants. In the middle ages it was the seat of one of the great monasteries of Germany. This foundation, which belonged to the Cistercian order, owed its origin to Bishop Otto

of Bamberg in 1132, and continued to exist till 1555. Its sepulchral monuments, many of which are figured by Hocker, Heilsbronnischer Antiquitdtenschatz (Ansbach, 1 731-1740), are of exceptionally high artistic interest. It was the hereditary burial-place of the Hohenzollern family and ten burgraves of Nuremberg, five margraves and three electors of Brandenburg, and many other persons of note are buried within its walls. The buildings of the monastery have mostly disappeared, with the exception of the fine church, a Romanesque basilica, restored between 1851 and 1866, and possessing paintings by Albert Diirer. The ” Monk of Heilsbronn ” is the ordinary appellation of a didactic poet of the 14th century, whose Sicben Graden, Tochter Syon and Leben ties heiligen Alexius were published by J. F. L. T. Merzdorf at Berlin in 1870.

See Rehrn, Ein Gang durch und um die Miinster-Kirche zu Kloster-Heilsbronn (Ansbach, 1875); Stillfried, Kloster -Heilsbronn, ein Beitrag zu den HohenzolUrnsclien Forschungen (Berlin, 1877); Muck, Geschichte von Kloster-Heilsbronn (Nordlingen, 1879-1880); J. Meyer, Die Hohenzollerndenkmale in Heilsbronn (Ansbach, 1891); and A. Wagner, Uber den Monch von Heilsbronn (Strassburg, 1876).

HEIM, ALBERT VON ST GALLEN (1849-), Swiss geologist, was born at Zurich on the 12th of April 1849. He was educated at Zurich and Berlin universities. Very early in life he became interested in the physical features of the Alps, and at the age of sixteen he made a model of the Todi group. This came under the notice of Arnold Escher von der Linth, to whom Heim was indebted for much encouragement and geological instruction in the field. In 1873 he became professor of geology in the polytechnic school at Zurich, and in 1875 professor of geology in the university. In 1882 he was appointed director of the Geological Survey of Switzerland, and in 1884 thehon. degree of Ph.D. was conferred upon him at Berne. He is especially distinguished for his researches on the structure of the Alps and for the light thereby thrown on the structure of mountain masses in general. He traced the plications from minor to major stages, and illustrated the remarkable

foldings and overthrust faultings in numerous sections and with the aid of pictorial drawings. His magnificent work, Mechanismus der Gebirgs- bildung (1878), is now regarded asa classic, and it served to inspire Professor C. Lapworth in his brilliant researches on the Scottish Highlands (see Geol. Mag. 1883). Heim also devoted consider- able attention to the glacial phenomena of the Alpine regions. The Wollaston medal was awarded to him in 1904 by the Geological Society of London.

HEIM, FRANCOIS JOSEPH (1787-1865), French painter, was born at Belfort on the 16th of December 1787. He early distinguished himself at the Ecole Centrale of Strassburg, and in 1803 entered the studio of Vincent at Paris. In 1807 he obtained the first prize, and in 181 2 his picture of “The Return of Jacob ” (Musee de Bordeaux) won for him a gold medal of the first class, which he again obtained in 181 7, when he exhibited, together with other works, a St John — bought by Vivant Denon. In 1819 the ” Resurrection of Lazarus ” (Cathedral Autun), the ” Martyrdom of St Cyr ” (St Gervais), and two scenes from the life of Vespasian (ordered by the king) attracted attention. In 1823 the ” Re-erection of the Royal Tombs at St Denis,” the ” Martyrdom of St Laurence ” (Notre Dame) and several full-length portraits increased the painter’s popularity; and in 1824, when he exhibited his great canvas, the ” Massacre of the Jews ” (Louvre), Heim was rewarded with the legion of honour. In 1827 appeared the ” King giving away Prizes at the Salon of 1824 ” (Louvre — engraved by Jazet) — the picture by which Heim is best known — and ” Saint Hyacinthe.” Heim was now commissioned to decorate the Gallery Charles X. (Louvre). Though ridiculed by the romantists, Heim succeeded Regnault at the Institute in 1834, shortly after which he commenced a series of drawings of the celebrities of his day, which are of much interest. His decorations of the Conference room of the Chamber of Deputies were completed in 1844; and in 1847 his works at the Salon — “Champ de Mai ” and ” Reading a Play at the Theatre Francais ” — were the signal for violent criticisms. Yet something like a turn of opinion in his favour took place at the exhibition of 1851; his powers as a

draughtsman and the occasional merits of his composition were recognized, and toleration extended even to his colour. Heim was awarded the great gold medal, and in 1855 — having sent to the Salon no less than sixteen portraits, amongst which may be cited those of ” Cuvier,” ” Geoffroy de St Hilaire,” and ” Madame Hersent ” — he was made officer of the legion of honour. In 1859 he again exhibited a curious collection of portraits, sixty-four members of the Institute arranged in groups of four. He died on the 29th of September 1865. Besides the paintings already mentioned, there is to be seen in Notre

Dame de Lorette (Paris) a work executed on the spot; and the museum of Strassburg contains an excellent example of his easel pictures, the subject of which is a ” Shepherd Drinking from a Spring.”

HEIMDAL, or Heimdaix, in Scandinavian mythology, the keeper of the gates of Heaven and the guardian of the rainbow bridge Bifrost. He is the son of Odin by nine virgins, all sisters. He is called ” the god with the golden teeth.” He lives in the stronghold of Himinsbiorg at the end of Bifrost. His chief attribute is a vigilance which nothing can escape. He sleeps less than a bird; sees at night and even in his sleep; can hear the grass, and even the wool on a lamb’s back grow. He is armed with Gjallar, the magic horn, with which he will summon the gods on the day of judgment.

HEINE, HEINRICH, (1 797-1856), German poet and journalist, was born at Diisseldorf, of Jewish parents, on the 13th of December 1797. His father, after various vicissitudes in business, had finally settled in Diisseldorf, and his mother, who possessed much energy of character, was the daughter of a physician of the same place. Heinrich (or, more exactly, Harry) was the eldest of four children, and received his education, first in private schools, then in the Lyceum of his native town; although not an especially apt or diligent pupil, he acquired a knowledge of French and English, as well as some tincture of the classics and Hebrew. His early years coincided with the most brilliant period of Napoleon’s career, and the boundless veneration which he is never tired of expressing for the emperor throughout his writings shows that his true schoolmasters were rather the drummers and troopers of a victorious army than the masters of the Lyceum. By freeing the Jews from many of the political disabilities under which they had hitherto suffered, Napoleon became, it may be noted, the object of particular enthusiasm in the circles amidst which Heine grew up. When he left school in 181 5, an attempt was made to engage him in business in Frankfort, but without success. In the following year his uncle, Solomon Heine, a wealthy banker in Hamburg, took him into his office. A passion for his cousin Amalie Heine seems to have made the young man more contented with his lot in Hamburg, and his success was such that his uncle decided to set him up in business for himself. This, however, proved too bold a step; in a very few months the firm of ” Harry Heine & Co.” was insolvent. His uncle now generously provided him with money to enable him to study at a university, with the view to entering the legal profession, and in the spring of 1819 Heine became a student of the university of Bonn. During his stay there he devoted himself rather to the study of literature and history than to that of law; amongst his teachers A. W. von Schlegel, who took a kindly interest in Heine’s poetic essays,

exerted the most lasting influence on him. In the autumn of 1820 Heine left Bonn for Gottingen, where he proposed to devote himself more assiduously to professional studies, but in February of the following year he challenged to a pistol duel a fellow-student who had insulted him, and was, in consequence, rusticated for six months. The pedanfie* atmosphere of the university of Gottingen was, however, little to his taste; the news of his cousin's marriage unsettled him still more; and he was glad of the opportunity to seek distraction in Berlin.

In the Prussian capital a new world opened up to him; a very different life from that of Gottingen was stirring in the new university there, and Heine, like all his contemporaries, sat at the feet of Hegel and imbibed from him, doubtless, those views which in later years made the poet the apostle of an outlook upon life more modern than that of his romantic predecessors.

Heine was also fortunate in having access to the chief literary circles of the capital; he was on terms of intimacy with Varnhagen von Ense and his wife, the celebrated Rahel, at whose house he frequently met such men as the Humboldts, Hegel himself and Schleiermacher; he made the acquaintance of leading men of letters like Fouque and Chamisso, and was on a still more familiar footing with the most distinguished of his co-religionists in Berlin. Under such favourable circum- stances his own gifts were soon displayed. He contributed poems to the Berliner Gesellschafter, many of which were subse- quently incorporated in the Buck der Lieder, and in December 1821 a little volume came from the press entitled Gedichle, his first avowed act of authorship. He was also employed at this time as correspondent of a Rhenish newspaper, as well as in completing his tragedies Almansor and William Ratclijf, which were published in 1823 with small success. In that same year Heine, not in the most hopeful spirits, returned to his family, who had meanwhile moved to Liineburg. He had plans of settling in Paris, but as he was still dependent on his uncle, the latter's consent had to be obtained. As was to be expected, Solomon Heine did not favour the new plan, but promised to continue his support on the condition that Harry completed his course of legal study. He sent the young student for a six weeks' holiday at Cuxhaven, which opened the poet's eyes to the wonders of the sea; and three weeks spent subsequently at his uncle's county seat near Hamburg were sufficient to awaken a new passion in Heine's breast — this time for Amalie's sister, Therese. In January 1824 Heine returned to Gottingen, where, with the exception of a visit to Berlin and the excursion to the Hartz mountains in the autumn of 1824, which is immortal- ized in the first volume of the Reisebilder, he remained until his graduation in the summer of the following year. It was on the latter of these journeys that he had the interview with Goethe which was so amusingly described by him in later years. A few weeks before obtaining his degree, he took a step which he had long meditated; he formally embraced Christianity. This " act of apostasy," which has

been dwelt upon at unnecessary length both by Heine's enemies and admirers, was actuated wholly by practical considerations, and did not arise from any wish on the poet's part to deny his race. The summer months which followed his examination Heine spent by his beloved sea in the island of Norderney, his uncle having again generously supplied the means for this purpose. The question of his future now became pressing, and for a time he seriously considered the plan of settling as a solicitor in Hamburg, a plan which was associated in his mind with the hope of marrying his cousin Therese. Meanwhile he had made arrangements for the publica- tion of the Reisebilder, the first volume of which, Die Harzreise, appeared in May 1826. The success of the book was instan- taneous. Its lyric outbursts and flashes of wit; its rapid changes from grave to gay; its flexibility of thought and style, came as a revelation to a generation which had grown weary of the lumbering literary methods of the later Romanticists.

In the spring of the following year Heine paid a long planned visit to England, where he was deeply impressed by the free and vigorous public life, by the size and bustle of London ; above all, he was filled with admiration for Canning, whose policy had realized many a dream of the young German idealists of that age. But the picture had also its reverse; the sordidly commercial spirit of English life, and brutal egotism of the ordinary Englishman, grated on Heine's sensitive nature; he missed the finer literary and artistic tastes of the continent and was repelled by the austerity of English religious sentiment and observance. Unfortunately the latter aspects of English life left a deeper mark on his memory than the bright side. In October Baron Cotta, the well-known publisher, offered Heine — the second volume of whose Reisebilder and the Buck der Lieder had meanwhile appeared and won him fresh laurels — the joint-editorship of the Neue allgemeine politische Annalen. He gladly accepted the offer and betook himself to Munich. Heine did his best to adapt himself and his political opinions to the new surroundings, in the hope of coming in for a share of

the good things which Ludwig I. of Bavaria was so generously distributing among artists and men of letters. But the stings of the Reisebilder were not so easily forgotten; the clerical party in particular did not leave him long in peace. In July 1828, the professorship on which he had set his hopes being still not forthcoming, he left Munich for Italy, where he remained until the following November, a holiday which provided material for the third and part of the fourth volumes of the Reisebilder. A blow more serious than the Bavarian king's refusal to establish him in Munich awaited him on his return to Germany — the death of his father. In the beginning of 1829 Heine

took up his abode in Berlin, where he resumed old acquaintanceships; in summer he was again at the sea, and in autumn he returned to the city he now loathed above all others, Hamburg, where he virtually remained until May 1831. These years were not a happy period of the poet's life; his efforts to obtain a position, apart from that which he owed to his literary work, met with rebuffs on every side; his relations with his uncle were un- satisfactory and disturbed by constant friction, and for a time he was even seriously ill. His only consolation in these months of discontent was the completion and publication of the Reise-bilder. When in 1830 the news of the July Revolution in the streets of Paris reached him, Heine hailed it as the beginning of a new era of freedom, and his thoughts reverted once more to his early plan of settling in Paris. All through the following winter the plan ripened, and in May 1831 he finally said farewell to his native land.

Heine's first impressions of the "New Jerusalem of Liberalism " were jubilantly favourable; Paris, he proclaimed, was the capital of the civilized world, to be a citizen of Paris the highest of honours. He was soon on friendly terms with many of the notabilities of the capital, and there was every prospect of a congenial and lucrative journalistic activity as correspondent for German newspapers. Two series of his articles were subse- quently collected and published under the titles Franzosische Zustdnde (1832) and Lulezia (written 1840-1843, published in the Vermischte Schriften, 1854). In December 1835, however, the German Bund, incited by W. Menzel's attacks on " Young Germany," issued its notorious decree, forbidding the publication of any writings by the members of that coterie; the name of Heine, who had been stigmatized as the leader of the movement headed the list. This was the beginning of a series of literary feuds in which Heine was, from now on, involved; but a more serious and immediate effect of the decree was to curtail consider- ably his sources of income. His uncle, it is true, had allowed him 4000 francs a year when he settled in Paris, but at this moment he was not on the best of terms with his Hamburg relatives. Under these circumstances he was induced to take a step which his fellow-countrymen have found it hard to forgive; he applied to the French government for support from a secret fund formed for the benefit of " political refugees " who were willing to place themselves at the service of France. From 1836 or 1837 until the Revolution of 1848 Heine was in receipt of 4800 francs annually from this source.

In October 1834 Heine made the acquaintance of a young Frenchwoman, Eugenie Mirat, a saleswoman in a boot-shop in Paris, and before long had fallen passionately in love with her. Although ill-educated, vain and extravagant, she inspired the poet with a deep and

lasting affection, and in 1841, on the eve of a duel in which he had become involved, he made her his wife. ” Mathilde,” as Heine called her, was not the comrade to help the poet in days of adversity, or to raise him to better things, but, in spite of passing storms, he seems to have been happy with her, and she nursed him faithfully in his last illness. Her death occurred in 1883. His relations with Mathilde undoubtedly helped to weaken his ties with Germany; and notwithstanding the affection he professed to cherish for his native land, he only revisited it twice, in the autumn of 1843 and the summer of 1847. In 1845 appeared the first unmistakable signs of the terrible spinal disease, which, for eight years, from the spring of 1848 till his death, condemned him to a ” mattress grave,” These years of suffering — suffering which left his

intellect as clear and vivacious as ever — seem to have effected I vvhat might be called a spiritual purification in Heine’s nature, and to have brought out all the good sides of his character, whereas adversity in earlier years only intensified his cynicism. The lyrics of the Romanzero (1851) and the collection of Neueste Gedichte (1853-1854) surpass in imaginative depth and sincerity of purpose the poetry of the Buck der Lieder. Most wonderful of all are the poems inspired by Heine’s strange mystic passion for the lady he called Die Alouche, a countrywoman of his own — her real name was Elise von Krienitz, but she had written in French under the nom de plume of Camille Selden — who helped to brighten the last months of the poet’s life. He died on the 17th of February 1856, and lies buried in the cemetery of Montmartre.

Besides the purely journalistic work of Heine’s Paris years, to which reference has already been made, he published a collec- tion of more serious prose writings under the title Der Salon (1833-1S39). In this collection will be found, besides papers on French art and the French stage, the essays ” Zur Geschichte der Religion und Philosophic in Deutschland,” which he had written for the Revue des deux mondes. Here, too, are the more character- istic productions of Heine’s genius, A us den Memoir en des Herrn von Schnabelewopski, Der Rabbi von Bacherach and Florentinische Ndchle. Die romantische Schule (1836), with its unpardonable personal attack on the elder Schlegel, is a less creditable essay in literary criticism. In 1839 appeared Shakespeares Mddchen und Frauen, which, however, was merely the text to a series of illustrations; and in 1840, the witty and trenchant satire on a

writer, who, in spite of many personal disagreements, had been Heine's fellow-fighter in the liberal cause, Ludwig Borne. Of Heine's poetical work in these years, his most important publications were, besides the Romanzero, the two admirable satires, Deutschland, ein Wintcrmarchen (1844), the result of his visit to Germany, and Atta Troll, ein Sommernachtstraum (1876), an attack on the political Tendenz- literatur of the 'forties.

In the case of no other of the greater German poets is it so hard to arrive at a final judgment as in that of Heinrich Heine. In his Buck der Lieder he unquestionably struck a new lyric note, not merely for Germany but for Europe. No singer before him had been so daring in the use of nature-symbolism :is he, none had given such concrete and plastic expression to rhe spiritual forces of heart and soul; in this respect Heine was clearly the descendant of the Hebrew poets of the Old Testament. At times, it is true, his imagery is exaggerated to the degree of absurdity, but it exercised, none the less, a fascination over his generation. Heine combined with a spiritual delicacy, a fineness of perception, that firm hold on reality which is so essential to the satirist. His lyric appealed with particular force to foreign peoples, who had little understanding for the intangible, undefinable spirituality which the German people regard as an indispensable element in their national lyric poetry. Thus his fame has always stood higher in England and France than in Germany itself, where his lyric method, his self-consciousness, his cynicism in season and out of season, were little in harmony with the literary traditions. As far, indeed, as the development of the German lyric is concerned, Heine's influence has been of questionable value. But he introduced at least one new and refreshing element into German poetry with his lyrics of the North Sea; no other German poet has felt and expressed so well as Heine the charm of sea and coast.

As a prose writer, Heine's merits were very great. His work was, in the main, journalism, but it was journalism of a high order, and, after all, the best literature of the " Young German" school to which he belonged was of this character. Heine's light fancy, his agile intellect, his straightforward, clear style stood him here in excellent stead. The prose writings of his French period mark, together with Borne's Briefe aus Paris, the beginning of a new era in German journalism and a healthy revolt against the unwieldly prose of the Romantic period. Above all things, Heine was great as a wit and a satirist. His

lyric may not be able to assert itself beside that of the very greatest German singers, but as a satirist he had powers of the highest order. He combined the holy zeal and passionate earnestness of the " soldier

of humanity ” with the withering scorn and ineradicable sense of justice common to the leaders of the Jewish race. It was Heine’s real mission to be a reformer, to restore with instruments of war rather than of peace ” the interrupted order of the world.” The more’s the pity that his magnificent Aristophanic genius should have had so little room for its exercise, and have been frittered away in the petty squabbles of an exiled journalist.

The first collected edition of Heine’s works was edited by A. Strodtmann in 21 vols. (1861-1866), the best critical edition is the Sdmtliche Werke, edited by E. Elster (7 vols., 1 887-1 890). Heine has been more translated into other tongues than any other German writer of his time. Mention may here be made of the French translation of his CEuvres completes (14 vols., 1852-1868), and the English translation (by C. G. Leland and others) recently completed, The Works of Heinrich Heine (13 vols., 1892-1905). For biography and criticism see the following works : A. Strodtmann, Heines Leben und Werke (3rd ed., 1884); H. Hueffer, Aus dem Leben H. Heines (1878); and by the same author, H. Heine: Gesammelte Aufsatze (1906); G. Karpeles, H. Heine und seine Zeitgenossen (1888), and by the same author, II. Heine: aus seinem Leben und aus seiner Zeit (1900); W. Bolsche, II. Heine: Versuch einer asthetisch- kritischen Analyse seiner Werke und seiner Weltanschauung (1888); G. Brandes, Det unge Tyskland (1890; Eng. trans., 1905). An English biography by W. Stigand, Life, Works and Opinions of Heinrich Heine, appeared in 1875, but it has little value; there is also a short life by W. Sharp (1888). The essays on Heine by George Eliot and Matthew Arnold are well known. The best French contributions to Heine criticism are J. Legras, H. Heine, poete (1897), and H. Lichtenberger, H. Heine, penseur (1905). See also L.P. Betz, Heine in Frankreich (1895). (J. W. F.; J. G. R.)

HEINECCIUS, JOHANN GOTTLIEB (1681-1741), German jurist, was born on the nth of September 1681 at Eisenberg, Altenburg. He studied theology at Leipzig, and law at Halle; and at the latter university he was appointed in 17 13 professor of philosophy, and in 1718 professor of jurisprudence. He subsequently filled legal chairs at Franeker in Holland and at Frankfort, but finally returned to Halle in 1733 as professor of philosophy and jurisprudence. He died there on the 31st of August 1 741 . Heineccius belonged to the school of philosophical jurists. He endeavoured to treat law as a rational science, and not merely as an empirical art whose rules had no deeper source than expediency. Thus he continually refers to first principles, and he develops his legal doctrines as a system of philosophy.

His chief works were Antiquitatum Romanarum jurisprudentiam

illustrantium syntagma (17 18), Historia juris civilis Romani ac Germanici (1733), Elementa juris Germanici (1735), Elementa juris naturae et gentium (1737; Eng. trans, by Turnbull, 2 vols., London, 1763). Besides these works he wrote on purely philosophical subjects, and edited the works of several of the classical jurists. His Opera omnia (9 vols., Geneva, 1771, &c.) were edited by his son Johann Christian Gottlieb Heineccius (1718-1791).

Heineccius's brother, Johann Michael Heineccius (1674- 1722), was a well-known preacher and theologian, but is re- membered more from the fact that he was the first to make a systematic study of seals, concerning which he left a book, De veteribus Germanorum aliarumque nationum sigillis (Leipzig, 1710; 2nd ed., 1719).

HEINECKEN, CHRISTIAN HEINRICH (1721-1725), a child remarkable for precocity of intellect, was born on the 6th of February 1721 at Liibeck, where his father was a painter. Able to speak at the age of ten months, by the time he was one year old he knew by heart the principal incidents in the Pentateuch. At two years of age he had mastered sacred history; at three he was intimately acquainted with history and geography, ancient and modern, sacred and profane, besides being able to speak French and Latin; and in his fourth year he devoted himself to the study of religion and church history. This wonderful precocity was no mere feat of memory, for the youthful savant could reason on and discuss the knowledge he had acquired. Crowds of people flocked to Liibeck to see the wonderful child; and in 1724 he was taken to Copenhagen at the desire of the king of Denmark. On his return to Liibeck

he began to learn writing, but his sickly constitution gave way, and he died on the 22nd of June 1725.

The Life, Deeds, Travels and Death of the Child of Liibeck were published in the following year by his tutor Schoneich. See also Teutsche Bibliothek, xvii., and Memoires de Trivoux (Jan. I73i).

HEINICKE, SAMUEL (1727-1790), the originator in Germany of systematic education for the deaf and dumb, was born on the 10th of April 1727, at Nautschiitz, Germany. Entering the electoral bodyguard at Dresden, he subsequently supported himself by teaching. About 1754 his first deaf and dumb pupil was brought him. His success in

teaching this pupil was so great that he determined to devote himself entirely to this work. The outbreak of the Seven Years' War upset his plans for a time. Taken prisoner at Pima, he was brought to Dresden, but soon made his escape. In 1768, when living in Hamburg, he success- fully taught a deaf and dumb boy to talk, following the methods prescribed by Amman in his book Surdus loquens, but improving on them. Recalled to his own country by the elector of Saxony, he opened in Leipzig, in 1778, the first deaf and dumb institution in Germany. This school he directed till his death, which took place on the 30th of April 1790. He was the author of a variety of books on the instruction of the deaf and dumb.

HEINSE, JOHANN JAKOB WILHELM (1 749-1803), German author, was born at Langewiesen near Ilmenau in Thuringia on the 16th of February 1749. After attending the gymnasium at Schleusingen he studied law at Jena and Erfurt. In Erfurt he became acquainted with Wieland and through him with " Father " Gleim who in 1772 procured him the post of tutor in a family at Quedlinburg. In 1774 he went to Dusseldorf, where he assisted the poet J. G. Jacobi to edit the periodical Iris. Here the famous picture gallery inspired him with a passion for art, to the study of which he devoted himself with so much zeal and insight that Jacobi furnished him with funds for a stay in Italy, where he remained for three years (1780-1783). He returned to Diissel- dorf in 1784, and in 1786 was appointed reader to the elector Frederick Charles Joseph, archbishop of Mainz, who subse- quently made him his librarian at Aschaffenburg, where he died on the 22nd of June 1803.

The work upon which Heinse's fame mainly rests is Ardinghello und die glilckseligen Inseln (1787), a novel which forms the frame- work for the exposition of his views on art and life, the plot being laid in the Italy of the 16th century. This and his other novels Laidion, oder die eleusinischen Geheimnisse (1774) and Hildegard von Hohenthal (1796) combine the frank voluptuousness of Wieland with the enthusiasm of the " Sturm und Drang." Both as novelist and art critic, Heinse had considerable influence on the romantic school.

Heinse's complete works {Sdmtliche Schriften) were published by H. Laube in 10 vols. (Leipzig, 1838). A new edition by C. Schiidde- kopf is in course of publication (Leipzig, 1901 sqq.). See H. Prohle, Lessing, Wieland, Heinse (Berlin, 1877), and J. Schober, Johann Jacob Wilhelm Heinse, sein Leben und seine Werke (Leipzig, 1882) ; also K. D. Jessen, Heinses Stellung zur bildenden Kunst (Berlin, I903)-

HEINSIUS (or Heins) DANIEL (1580-1655), one of the most famous

scholars of the Dutch Renaissance, was born at Ghent on the 9th of June 1580. The troubles of the Spanish war drove his parents to settle first at Veere in Zeeland, then in England, next at Ryswick and lastly at Flushing. In 1594, being already remarkable for his attainments, he was sent to the university of Franeker to perfect himself in Greek under Henricus Schotanus. He stayed at Franeker half a year, and then settled at Leiden for the remaining sixty years of his life. There he studied under Joseph Scaliger, and there he found Marnix de St Aldegonde, Janus Douza, Paulus Merula and others, and was soon taken into the society of these celebrated men as their equal. His proficiency in the classic languages won the praise of all the best scholars of Europe, and offers were made to him, but in vain, to accept honourable positions outside Holland. He soon rose in dignity at the university of Leiden. In 1602 he was made professor of Latin, in 1605 professor of Greek, and at the death of Merula in 1607 he succeeded that illustrious scholar as librarian

to the university. The remainder of his life is recorded in a list of his productions. He died at the Hague on the 25th of February 1655. The Dutch poetry of Heinsius is of the school of Roemer Visscher, but attains no very high excellence. It was, however, greatly admired by Martin Opitz, who was the pupil of Heinsius, and who, in translating the poetry of the latter, introduced the German public to the use of the rhyming alexandrine.

He published his original Latin poems in three volumes — Iambi (1602), Elegiac (1603) and Poemata (1605); his Emblemata amatoria, poems in Dutch and Latin, were first printed in 1604. In the same year he edited Theocritus, Bion and Moschus, having edited Hesiod in 1603. In 1609 he printed his Latin Orations. In 1610 he edited Horace, and in 161 1 Aristotle and Seneca. In 1613 appeared in Dutch his tragedy of The Massacre of the Innocents; and in 1614 his treatise De politica sapientia. In 1616 he collected his original Dutch poems into a volume. He edited Terence in 1618, Livy in 1620, published his oration De contemptu mortis in 1621, and brought out the Epistles of Joseph Scaliger in 1627.

HEINSIUS, NIKOLAES (1620-1681), Dutch scholar, son of Daniel Heinsius, was born at Leiden on the 20th of July 1620. His boyish Latin poem of Breda expugnata was printed in 1637, and attracted much attention. In 1642 he began his wanderings with a visit to England in search of MSS. of the classics; but he met with little courtesy from the English scholars. In 1644 he was sent to Spa to drink the waters; his health restored, he set out once more in search of codices, passing through Louvain, Brussels, Mechlin, Antwerp and so

back to Leiden, everywhere collating MSS. and taking philological and textual notes. Almost immediately he set out again, and arriving in Paris was welcomed with open arms by the French savants. After investigating all the classical texts he could lay hands on, he proceeded southwards, and visited on the same quest Lyons, Marseilles, Pisa, Florence (where he paused to issue a new edition of Ovid) and Rome. Next year, 1647, found him in Naples, from which he fled during the reign of Masaniello; he pursued his labours in Leghorn, Bologna, Venice and Padua, at which latter city he published in 1648 his volume of original Latin verse entitled Italica. He proceeded to Milan, and worked for a con- siderable time in the Ambrosian library; he was preparing to explore Switzerland in the same patient manner, when the news of his father's illness recalled him hurriedly to Leiden. He was soon called away to Stockholm at the invitation of Queen Christina, at whose court he waged war with Salmasius, who accused him of having supplied Milton with facts from the life of that great but irritable scholar. Heinsius paid a flying visit to Leiden in 1650, but immediately returned to Stockholm. In 1651 he once more visited Italy; the remainder of his life was divided between Upsala and Holland. He collected his Latin poems into a volume in 1653. His latest labours were the editing of Velleius Paterculus in 1678, and of Valerius Flaccus in 1680. Hedied at the Hague on the 7th of Octoberi68i. Nikolaes Heinsius was one of the purest and most elegant of Latinists, and if his scholarship was not quite so perfect as that of his father, he displayed higher gifts as an original writer.

His illegitimate son, Nikolaes Heinsius (b. 1655), was the author of The Delightful Adventures and Wonderful Life of Mirandor (1675), the single Dutch romance of the 17th century. He had to flee the country in 1677 for committing a murder in the streets of the Hague, and died in obscurity.

HEIR (Lat. heres, from a root meaning to grasp, seen in herus or erus, master of a house, Gr. xˆP, hand, Sans, hat ana, hand), in law, technically one who succeeds, by descent, to an, estate of inheritance, in contradistinction to one who succeeds to personal property, i.e. next of kin. The word is now used generally to denote the person who is entitled by law to inherit property, titles, &c.,of another. The rules regulating the descent of property to an heir will be found in the articles Inheritance, Succession, &c.

An heir apparent (Lat. apparens, manifest) is he whose right of inheritance is indefeasible, provided he outlives the ancestor, e.g. an eldest or only son.

Heir by custom, or customary heir, he who inherits by a particular and local custom, as in borough-English, whereby

the youngest son inherits, or in gavelkind, whereby all the sons inherit as parceners, and made but one heir.

Heir general, or heir at law, he who after the death of his ancestor has, by law, the right to the inheritance.

Heir presumptive, one who is next in succession, but whose right is defeasible by the birth of a nearer heir, e.g. a brother or nephew, whose presumptive right may be destroyed by the birth of a child, or a daughter, whose right may be defeated by the birth of a son.

Special heir, one not heir at law {i.e. at common law), but by special custom.

Ultimate heir, he to whom lands come by escheat on failure of proper heirs. In Scots law the technical use of the word ” heir ” is not confined to the succession to real property, but includes succession to personal property as well.

HEIRLOOM, strictly so called in English law, a chattel (” loom ” meaning originally a tool) which by immemorial usage is regarded as annexed by inheritance to a family estate. Any owner of such heirloom may dispose of it during his life- time, but he cannot bequeath it by will away from the estate. If he dies intestate it goes to his heir-at-law, and if he devises the estate it goes to the devisee. At the present time such heirlooms are almost unknown, and the word has acquired a secondary and popular meaning and is applied to furniture, pictures, &c, vested in trustees to hold on trust for the person foi the time being entitled to the possession of a settled house. Such things are more properly called settled chattels. An heirloom in the strict sense is made by family custom, not by settlement. A settled chattel may, under the Settled Land Act 1882, be sold under the direction of the court, and the money arising under such sale is capital money. The court will only sanction such a sale if it be shown that it is to the benefit of all parties concerned; and if the article proposed to be sold is of unique or historical character, it will have regard to the intention of the settlor and the wishes of the remainder men (Re Hope, De Cctlo v. Hope, 1899, 2 ch. 679).

HEJAZ (Hijaz), a Turkish vilayet and a province of Western Arabia, extending along the Red Sea coast from the head of the Gulf of Akaba in 29 30′ N. to the south of Taif in 20° N. It is bounded N. by Syria, E. by the Nafud desert and by Nejd and S. by Asir. Its length is about 750 m. and its greatest breadth from the Harra east of Khaibar to the coast is 200 m. The name Hejaz, which signifies ” separating,” is sometimes limited to the region extending from Medina in the north to Taif in the south, which separates the island province of Nejd from the Tehama (Tihama) or coastal district, but most authorities, both Arab and European, define it in the wider sense. Though physically the most desolate and uninviting province in Arabia, it has a special interest and importance as containing the two sacred cities of Islam, Mecca and Medina (q.v.), respectively the birthplace and burial-place of Mahomet, which are visited yearly by large numbers of Moslem pilgrims from all parts of the world.

Hejaz is divided longitudinally by the Tehama range of mountains into two zones, a narrow littoral and a broader upland. This range attains its greatest height in Jebel Shar, the Mount Seir of scripture, overlooking the Midian coast, which probably reaches 7000 ft., and Jebel Radhwa a little N.E. of Yambu rising to 6000 ft. It is broken through by several valleys which carry off the drainage of the inland zone; the principal of these is the Wadi Hamd, the main source of which is on the Harra east of Khaibar. Its northern tributary the Wadi Jizil drains the Harrat el Awerid and a southern branch comes from the neighbourhood of Medina. Farther south the Wadi es Safra cuts through the mountains and affords the principal access to the valley of Medina from Yambu or Jidda. None of the Hejaz Wadis has a perennial stream, but they are liable to heavy floods after the winter rains, and thick groves of date- palms and occasional settlements are met with along their courses wherever permanent springs are found. The northern part of Hejaz contains but few inhabited sites. Muwela, Damgha and El Wijh are small ports used by coasting craft. The last

named was formerly an important station on the Egyptian pilgrim route, and in ancient days was a Roman settlement, and the port of the Nabataean towns of el Hajr 150 m. to the east. Inland the sandstone desert of El Hisma reaches from the Syrian border at Ma’an to Jebel Awerid, where the volcanic tracts known as harra begin, and extend southwards along the western borders of the Nejd plateau as far as the latitude of Mecca. East of Jebel Awerid lies the oasis of Tema, identified with the Biblical Teman, which belongs to the Shammar tribe; its fertility depends on the famous well, known as Bir el Hudaj. Farther south and on the main pilgrim route is El ‘Ala, the principal settlement of El Hajr, the Egra of Ptolemy, to whom it was

known as an oasis town on the gold and frankincense road. Higher up the same valley are the rock-cut tombs of Medina Salih, similar to those at Petra and shown by the Nabataean coins and inscriptions discovered there by Doughty and Huber to date from the beginning of the Christian era. To the south- east again is the oasis of Khaibar, with some 2500 inhabitants, chiefly negroes, the remnants of an earlier slave population. The citadel, known as the Kasr el Yahudi, preserves the tradition of its former Jewish ownership. With these exceptions there are no settled villages between Ma'an and Medina, the stations on the pilgrim road being merely small fortified posts with reservoirs, at intervals of 30 or 40 m., which are kept up by the Turkish government for the protection of the yearly caravan.

The southern part of the province is more favoured by nature. Medina is a city of 25,000 to 30,000 inhabitants, situated in a broad plain between the coast range and the low hills across which lies the road to Nejd. Its altitude above the sea is about 2500 ft. It is well supplied with water and is surrounded by gardens and plantations; barley and wheat are grown, but the staple produce, as in all the cultivated districts of Hejaz, is dates, of which 100 different sorts are said to grow. Yambu' has a certain importance as the port for Medina. The route follows for part of the way along the Wadi es Safra, which contains several small settlements with abundant date groves; from Badr Hunen, the last of these, the route usually taken from Medina to Mecca runs near the coast, passing villages with some cultivation at each stage. The eastern route though more direct is less used; it passes through a barren country described by Burton as a succession of low plains and basins surrounded by rolling hills and intersected by torrent beds; the predominant formation is basalt. Suwerikiya and Es Safina are the only villages of importance on this route.

' Mecca and the holy places in its vicinity are described in a separate article; it is about 48 m. from the port of Jidda, the most important trade centre of the Hejaz province. The great majority of pilgrims for Mecca arrive by sea at Jidda. Their transport and the supply of their wants is therefore the chief business of the place; in 1904 the number was 66,500, and the imports amounted in value to £1,400,000.

From the hot lowland in which Mecca is situated the country rises steeply up to the Taif plateau, some 6000 ft. above sea- level, a district resembling in climate and physical character the highlands of Asir and Yemen. Jebel el Kura at the northern edge of the plateau is a fertile well-watered district, producing wheat and barley and fruit. Taif, a day's journey farther south, lies in a sandy plain, surrounded by low mountains. The houses, though small, are well built of stone; the

gardens for which it is celebrated lie at a distance of a mile or more to the S.W. at the foot of the mountains.

Hejaz, together with the other provinces of Arabia which on” the overthrow of the Bagdad Caliphate in 1258 had fallen under Egyptian domination, became by the conquest of Egypt in 1517 a dependency of the Ottoman empire. Beyond assuming the title of Caliph, neither Salim I. nor his successors interfered much in the government, which remained in the hands of the sharifs of Mecca until the religious upheaval which culminated at the beginning of the 19th century in the pillage of the holy cities by the Wahhabi fanatics. Mehemet AH, viceroy of Egypt, was entrusted by the sultan with the task of establishing order, and after several arduous campaigns the Wahhabis were routed

and their capital Deraiya in Nejd taken by Ibrahim Pasha in 1817. Hejaz remained in Egyptian occupation until 1845, when its administration was taken over directly by Constan- tinople, and it was constituted a vilayet under a vali or governor- general. The population is estimated at 300,000, about half of which are inhabitants of the towns and the remainder Bedouin, leading a nomad or pastoral life. The principal tribes are the Sherarat, Beni Atiya and Huwetat in the north; the Juhena between Yambu’ and Medina, and the various sections of the Harb throughout the centre and south; the Ateba also touch the Mecca border on the south-east. All these tribes receive surra or money payments of large amount from the Turkish government to ensure the safe conduct of the annual pilgrimage, otherwise they are practically independent of the Turkish administration, which is limited to the large towns and garrisons. The troops occupying these latter belong to the 16th (Hejaz) division of the Turkish army.

The difficulties of communication with his Arabian provinces, and of relieving or reinforcing the garrisons there, induced the sultan Abdul Hamid in 1900 to undertake the con- i. b ‘ struction of a railway directly connecting the Hejaz

railway. cities with Damascus without the necessity of leaving Turkish territory at any point, as hitherto required by the Suez Canal. Actual construction was begun in May 1901 and on the 1st of September 1904 the section Damascus-Ma’an (285 m.) was officially opened. The

line has a narrow gauge of 1-05 metre = 41 in., the same gauge as that of the Damascus- Beirut line; it has a ruling gradient of 1 in 50 and follows gener- ally the pilgrim track, through a desert country presenting no serious engineering difficulties. The graver difficulties due to the scarcity of water, and the lack of fuel, supplies and labour were successfully overcome; in 1906 the line was completed to El Akhdar, 470 m. from Damascus and 350 from Medina, in time to be used by the pilgrim caravan of that year; and the section to Medina was opened in 1908. Its military value was shown in the previous year, when it conveyed 28 battalions from Damascus to Ma'an, from which station the troops marched to Akaba for embarkation en route to Hodeda . The length of the line from Damascus to Medina is approximately 820 m., and from Medina to Mecca 280 m.; the highest level attained is about 4000 ft. at Dar el Hamra in the section Ma'an-Medina.

Authorities. — J. L. Burckhardt, Travels in Arabia (London, 1829); 'Ali Bey, Travels (London, 1816); R. F. Burton, Pilgrimage to Medinah and Mecca (1893); Land of Midian (London, 1879); J. S. Hurgronje, Mekka (Hague, 1888); C. M. Doughty, Arabia Deserla (Cambridge, 1888) ; Auler Pasha, Die Hedschasbahn (Gotha, 1906). (R. A. W.)

HEJIRA, 1 or Hegira (Arab, hijra, flight, departure from one's country, from hajara, to go away), the name of the Mahom- medan era. It dates from 622, the year in which Mahomet " fled " from Mecca to Medina to escape the persecution of his kinsmen of the Koreish tribe. The years of this era are dis- tinguished by the initials " a.h." (anno hegirae). The Mahom- medan year is a lunar one, about 11 days shorter than the Christian; allowance must be made for this in translating Hegira dates into Christian dates; thus a.h. 1321 corresponds roughly to a.d. 1903. The actual date of the " flight " is fixed as 8 Rabia I., i.e. 20th of September 622, by the tradition that Mahomet arrived at Kufa on the Hebrew Day of Atonement. Although Mahomet himself appears to have dated events by his flight, it was not till seventeen years later that the actual era was systematized by Omar, the second caliph(see Caliphate), as beginning from the 1st day of Muharram (the first lunar month of the year) which in that year (639) corresponded to July 16. The term hejira is also applied in its more general sense to other " emigrations " of the faithful, e.g. to that to Abyssinia (see Mahomet), and to that of Mahomet's followers to Medina before the capture of Mecca. These latter are known as Muhajirun.

For the problems of Moslem chronology and comparative tables of dates see (beside the articles Calendar, Chronology and

1 The 1 in the second syllable is short.

Mahomet), Wtistenfeld, Vergleichungstabellen der muhammedanischen und chrisllichen Zeitrechnung (2nd ed., Leipzig, 1903); Mas Latrie, Tresor de chronologie (Paris, 1889); Durbaneh, Universal Calendar (Cairo, 1896); Winckler, Altorientalischc Forschungen, ii. 326-350; D. Nielson, Die altarabische Mondreligion (Strassburg, 1904) ; Hughes, Dictionary of Islam, s.v. ” Hijrah.”

HEL, or Hela, in Scandinavian mythology, the goddess of the dead. She was a child of Loki and the giantess Angurboda, and dwelt beneath the roots of the sacred ash, Yggdrasil. She was given dominion over the nine worlds of Helheim. In early myth all the dead went to her: in later legend only those who died of old age or sickness, and she then became synonymous with suffering and horror. Her dwelling was Elvidnir (dark clouds), her dish Hungr (hunger), her knife Sullt (starvation), her servants Ganglate (tardy feet), her bed Kor (sickness), and her bed-curtains Blikiandabol (splendid misery).

HELDENBUCH, DAS, the title under which a large body of German epic poetry of the 13th century has come down to us. The subjects of the individual poems are taken from national German sagas which originated in the epoch of the Migrations (V olkerwanderung) , although doubtless here, as in all purely popular sagas, motives borrowed from the forces and phenomena of nature were, in course of time, woven into events originally historical. While the saga of the Nibelungs crystallized in the 13th century into the N ibelungenlied (q.v.) , and the Low German Hilde-saga into the epic of Gudrun (q.v.) the poems of the Heldenbuch, in the more restricted use of that term, belong almost exclusively to two cycles, (1) the Ostrogothic saga of Ermanrich, Dietrich von Bern (i.e. Dietrich of Verona, Theodorich the Great) and Etzel (Attila), and (2) the cycle of Hugdietrich, Wolfdietrich and Ortnit, which like the Nibelungen saga, was probably of Franconian origin. The romances of the Heldenbuch are of varying poetic value; only occasionally do they rise to the height of the two chief epics, the N ibelungenlied and Gudrun. Dietrich von Bern, the central figure of the first and more im- portant group, was the ideal type of German medieval hero, and, under more favourable literary conditions, he might have become the centre of an epic more nationally German than even the N ibelungenlied itself. Of the romances of this group, the chief are Biterolf und Dietlieb, evidently the work of an Austrian poet, who introduced many elements from the court epic of chivalry into a milieu and amongst characters familiar to us from the N ibelungenlied. Der Rosengarten tells of the conflicts which took place round Kriemhild’s ” rose garden ” in Worms-

conflicts from which Dietrich always emerges victor, even when he is confronted by Siegfried himself. In Laurin und der kleine Rosengarten, the Heldensage is mingled with elements of popular fairy-lore; it deals with the adventures of Dietrich and his henchman Witege with the wily dwarf Laurin, who watches over another rose garden, that of the Tyrol. Similar in character are the adventures of Dietrich with the giants Ecke (Eckenlied) and Sigenot, with the dwarf Goldemar, and the deeds of chivalry he performs for queen Virginal (Dietrichs erste Ausfahrt) — all of these romances being written in the fresh and popular tone characteristic of the wandering singers or Spielleute. Other elements of the Dietrich saga are represented by the poems Alpharts Tod, Dietrichs Flucht and Die Rabenschlacht (" Battle of Ravenna "). Of these, the first is much the finest poem of the entire cycle and worthy of a place beside the best popular poetry of the Middle High German epoch. Alphart, a young hero in Dietrich's army, goes out to fight single-handed with Witege and Heime, who had deserted to Ermanrich, and he falls* not in fair battle, but by the treachery of Witege whose life he had spared. The other two Dietrich epics belong to a later period, the end of the 13th century — the author being an Austrian, Heinrich der Vogler — and show only too plainly the decay that had by this time set in in Middle High German poetry.

The second cycle of sagas is represented by several long romances, all of them unmistakably " popular " in tone — conflicts with dragons, supernatural adventures, the wonderland of the East providing the chief features of interest. The epics of this group are Ortnit, Hugdietrich, Wolfdietrich, the latter with its

pathetic episode of the unswerving loyalty of Wolfdietrich's vassal Duke Berchtung and his ten sons. Although many of the incidents and motives of this cycle are drawn from the best traditions of the Heldensage, its literary value is not very high.

This collection of popular romances was one of the first German books to be printed. The date of the first edition is unknown, but the second edition appeared in the year 1491 and was followed by tl er K e!?nnt f S I? I5 ° 9, I5 1?' \S6o and 1590. The last of these forms the basis of the text edited by A. von Keller for the Stuttgart LUeransche \erem in 1867 In 1472 the Heldenbuch was adapted to the popular tastes of the time by being remodelled in rough Kmltelvers or doggerel; the author, or at least copvist, of the MS was a certain kaspar von der Roen, of Miinnerstadt in Franconia'

thrir w r w°Y V ‘\ S P r o” ted o b> \ F – % ; on der Ha § en and S – PHmisser in their Heldenbuch (1820-1825). Das Heldenbuch, which F. von der Hagen published in 2 vols, in 1855, was the first attempt to reproduce the original text by collating the MSS. A critical edition, based not merely on the oldest printed text— the only one which has any value

mU P ur P° s ,e. as t. he oth , ers are a11 c °P ies °f >t— but also on the MSS was published in 5 vols, by O. Janicke, E. Martin, A. Amelung and J./upitza at Berlin (1866-1873). A selection, edited by E v,S ” C V,bT!1 be D found “?. Kurschner’s Deutsche Nationalliteralur, \o\ , (1887) Kecent editions have appeared of Der Rosengarten

?™ wT : 7 °- 5° ,Z (A 893 and l8 97)- All the poems have been translated into modern German by K. Simrock and others. See -rl r ach ‘r 1 ! te Hemc -^ a i a -Cycle of Dietrich of Bern (1906)

Hie literature ; of the Heldensage is very extensive. &e especially H. Grimm, Die deulsche Heldensage (3rd ed., 1889); L. Uhland (^f\ ^^hichte der deutschen Poesie im Mittelalter,” Schriften, vol. i. (1866); OL. Jinczek, Deutsche Heldensage, vol. i. (1898)- and especially B. Symons, ” Germanische Heldensage,” in Paul’s Grund- nss der germanischen Philologie (2nd ed., 1898).

HELDER, a seaport town at the northern extremity of the province of North Holland, in the kingdom of Holland 51 m by rail N.N.W. of Amsterdam. Pop. (1900) 25.842. It is situated on the Marsdiep, the channel separating the island of Texel from the mainland, and the main entrance to the Zuider Zee, and besides being the terminus of the North Holland canal from Amsterdam, it is an important naval and military station On the east side of the town, called the Nieuwe Diep, is situated the fine harbour, which formerly served, as Ymuiden now does as the outer port of Amsterdam. In this neighbourhood are the naval wharves and magazines, wet and dry docks, and the naval cadet school of Holland, the name Willemsoord being given to the whole naval establishment. From Nieuwe Diep to Fort Erfpnns on the west side of the town, a distance of about 5 m stretches the great sea-dike which here takes the place of the dunes. This dike descends at an angle of 40° for a distance of 200 ft. into the sea, and is composed of Norwegian granite and Belgian limestone, strengthened at intervals by projecting jetties of piles and fascines. A circle of forts and batteries defends the town and coast, and there is a permanent garrison of 7000 to 9000 men, while 30,000 men can be accommodated within the lines, and the province flooded from this point Besides several churches and a synagogue, there are a town hall (1836), a hospital, an

orphan asylum, the “palace” of the board of marine, a meteorological observatory, a zoological station and a lighthouse. The industries of the town are sustained by the garrison and marine establishments.

HELEN, or Helena (Gr. ‘E\^),in Greek mythology, daughter of Zeus by Leda (wife of Tyndareus, king of Sparta), sister of Castor, Pollux and Clytaemnestra, and wife of Menelaus Other accounts make her the daughter of Zeus and Nemesis or of Oceanus and Tethys. She was the most beautiful woman in Greece, and indirectly the cause of the Trojan war. When a child she was carried off from Sparta by Theseus to Attica but was recovered and taken back by her brothers. When she grew up, the most famous of the princes of Greece sought her hand m marriage, and her father’s choice fell upon Menelaus. During her husbands absence she was induced by Paris, son of Priam, with the connivance of Aphrodite, to flee with ‘him to Troy. After the death of Paris she married his brother Deiphobus whom she is said to have betrayed into the hands of Menelaus at the capture of the city (Aeneid, vi. 517 ff.). Menelaus there- upon took her back, and they returned together to Sparta, where they lived happily till their death, and were buried at Therapnae in Laconia. According to another story, Helen survived her

husband, and was driven out by her stepsons. She fled to Rhodes where she was hanged on a tree by her former friend Polyxo’ to avenge the loss of her husband Tlepolemus in the Trojan War (Pausamas lii. 19). After death, Helen was said to have married Achilles in his home in the island of Leuke. In another version, Paris, on his voyage to Troy with Helen, was driven ashore on the coast of Egypt, where King Proteus, upon learning the facts of the case, detained the real Helen in Egypt while a phantom Helen was carried off to Troy. Menelaus on his way home was also driven by stress of winds to Egypt, where he found his wife and took her home (Herodotus ii. 112-120; Euripides, Helena). Helen was worshipped as the goddess of beauty at Therapnae in Laconia, where a festival was held in her honour. At Rhodes she was worshipped under the name of Dendntis (the tree goddess), where the inhabitants built a temple m her honour to expiate the crime of Polyxo. The Rhodian story probably contains a reference to the worship connected with her name (cf. Theocritus xviii. 48 akfav m’ EXei/as vr6v ei/xl). She was the subject of a tragedy by Euripides and ah epic by Colluthus. Originally, Helen was perhaps a goddess of light, a moon-goddess, who was gradually transformed into the beautiful heroine round whom the action of the Iliad revolves. Like her brothers, the Dioscuri, she was a

patron deity of sailors.

See E. Oswald, The Legend of Fair Helen (1905) ; J. A. Symonds Studies of the Greek Poets, i. (1893); F. Decker Pi, g/iShe Helena in Mythosund Epos (1894); Andrew Lang, Helen of Troy)l„ V ” .u Pan l m P arem berg and Saglio’s Dictionnaire des an- tiquites- the exhaustive article by R. Engelmann in Roscher’s Lexikon der Mythologie- and O. Gruppe, Griechische MytMogie, 1. 63, according to whom Helen originally represented, in the

nntT 1 ˆ ™ (a j n r” Jt, , c fe ? tival of Artemis, Iphigeneia or Tauro! polos) the sacred basket (*Xˆ) in which the holy objects were carried ; and hence, as the personification of the initiation ceremony, she was connected with or identified with the moon, the first appear- ance of which probably marked the beginning of the festivity. •

t ˆuf ,ENA ‘ ST (c ” 247_C ‘ 32?) the wife Gf the emperor Constantius I. Chlorus, and mother of Constantine the Great. She was a woman of humble origin, born probably at Drepanum, a town on the Gulf of Nicomedia, which Constantine named Helenopolis in her honour. Very little is known of her history. It is certain that, at an advanced age, she undertook a pilgrimage to Palestine visited the holy places, and founded several churches She was still living at the time of the murder of Crispus (3 26) . Con- stantine had coins struck with the effigy of his mother. The name of Helena is intimately connected with the commonly received story of the discovery of the Cross. But the accounts which connect her with the discovery are much later than the date of the event. The Pilgrim of Bordeaux (333), Eusebius and Cyril of Jerusalem were unaware of this important episode in the life of the empress. It was only at the end of the 4 th century and in the West that the legend appeared. The principal centre of the cult of St Helena in the West seems to be the abbey of Hautvilhers, near Reims, where since the 9th century they have claimed to be in possession of her body. In England legends arose representing her as the daughter of a prince of Britain. Following these Geoffrey of Monmouth makes her the daughter of Coel, the king who is supposed to have given his name to the town of Colchester. These legends have doubt- less not been without influence on the cult of the saint in England where a great number of churches are dedicated either to St Helena alone, or to St Cross and St Helena. Her festival is celebrated in the Latin Church on the 18th of August. The Greeks make no distinction between her festival and that of Constantine, the 21st of May. See Acta sanctorum ˆAugust! iii. 548-580; Tixeront, Les Origines

ChlA nJ g ? eSSe {P l US ; l8 J 8) J, F – Arnold-Forster, Studied

Church Dedications or England's Patron Saints, i. 181-189 iii 16 365-366 (1899). (H. De.)

HELENA, a city and the county-seat of Phillips county, Arkansas, U.S.A., situated on and at the foot of Crowly's Ridge, about 150 ft. above sea-level, in the alluvial bottoms of the Mississippi river, about 65 m. by rail S.W. of Memphis Tennessee. Pop. (1890) 5189, (1900) 5550, of whom 340ˆ

were negroes; (1910) 8772. Itisservedby the Yazoo & Mississippi Valley (Illinois Central), the St Louis, Iron Mountain & Southern (Missouri Pacific), the Arkansas Midland, and the Missouri & North Arkansas railways. Built in part upon " made land," well protected by levees, and lying within the richest cotton- producing region of the south, the rich timber country oi the St Francis river, and the Mississippi " bottom lands," Helena concentrates its economic interests in cotton-compressing and shipping, the manufacture of cotton-seed products, lumbering and wood-working. The city was founded about 1821, but so late as i860 the population was only 800. During the Civil War the place was of considerable strategic importance. It was occupied in July 1862 by the Union forces, who strongly fortified it to guard their communications with the lower Mississippi; on the 4th of July 1863, when occupied by General Benjamin M. Prentiss (1819-1901) with 4500 men, it was attacked by a force of 9000 Confederates under General Theophilus H.Holmes (1 804-1 880), who hoped to raise the siege of Vicksburg or close the river to the Union forces. The attack was repulsed, with a loss to the Confederates of one-fifth their numbers, the Union loss being slight.

HELENA, a city and the county-seat of Lewis and Clark

county, Montana, U.S.A., and the capital of the state, at the

E. base of the main range of the Rocky Mountains, 80 m. N.E.

of Butte, at an altitude of about 4000 ft. Pop. (1880) 3624;

(1890) 13,834; (1900) 10,770, of whom 2793 were foreign-born;

(1910 census) 12,515. It is served by the Great Northern

and the Northern Pacific railways. Helena is delightfully

situated with Mt Helena as a background in the hollow of the Prickly Pear valley, a rich agricultural region surrounded by rolling hills and lofty mountains, and contains many fine buildings, including the state capitol, county court house, the Montana club house, high school, the cathedral of St Helena, a federal building, and the United States assay office. It is the seat of the Montana Wesleyan University (Methodist Episcopal), founded in 1890; St Aloysius College and St Vincent's Academy (Roman Catholic); and has a public library with about 35,000 volumes, the Montana state library with about 40,000 volumes, and the state law library with about 24,000 volumes. The city is the commercial and financial centre of the state (Butte being the mining centre), and is one of the richest cities in the United States in proportion to its population. It has large railway car-shops, extensive smelters and quartz crushers (at East Helena), and various manufacturing establishments; the value of the factory product in 1905 was $1,309,746, an increase of 68-7% over that of 1900. The surrounding country abounds in gold- and silver-bearing quartz deposits, and it is estimated that from the famous Last Chance Gulch alone, which runs across the city, more than $40,000,000 in gold has been taken. The street railway and the lighting system of the city are run by power generated at a plant and 40 ft. dam at Canyon Ferry, on the Missouri river, 18 m. E. of Helena.

There is another great power plant at Hauser Plant, 20 m.

N. of Helena. Three miles W. of the city is the Broadwater

Natatorium with swimming pool, 300 ft. long and 100 ft. wide,

the water for which is furnished by hot springs with a temperature

at the source of 160°. Fort Harrison, a United States army post,

is situated 3 m. W. of the city. Helena was established as a

placer mining camp in 1864 upon the discovery of gold in Last

Chance Gulch. The town was laid out in the same year, and

after the organization of Montana Territory it was designated

as the capital. Helena was burned down in 1869 an d in 1874.

It was chartered as a city in 1881.

HELENSBURGH, a municipal and police burgh and watering- place of Dumbartonshire, Scotland, on the N. shore of the Firth of Clyde, opposite Greenock, 24 m. N.W. of Glasgow by the North British railway. Pop. (1901) 8554. There is a station at Upper Helensburgh on the West Highland railway, and from the railway pier at Craigendoran there is steamer communication with Garelochhead, Dunoon and other pleasure resorts on the western coast. In 1776 the site began to be built upon, and in 1802 the town, named after Lady Helen, wife of Sir James

Colquhoun of Luss, the ground landlord, was erected into a burgh of barony, under a provost and council. The public buildings include the burgh hall, municipal buildings, Hermitage schools and two hospitals. On the esplanade stands an obelisk to Henry Bell, the pioneer of steam navigation, who died at Helensburgh in 1830.

HELENUS, in Greek legend, son of Priam and Hecuba, and twin-brother of Cassandra. He is said to have been originally called Scamandrius, and to have received the name of Helenus from a Thracian soothsayer who instructed him in the prophetic art. In the Iliad he is described as the prince of augurs and a brave warrior; in the Odyssey he is not mentioned at all. Various details concerning him are added by later writers. It is related that he and his sister fell asleep in the temple of Apollo Thymbraeus and that snakes came and

cleansed their ears, whereby they obtained the gift of prophecy and were able to understand the language of birds. After the death of Paris, Helenus and his brother Deiphobus became rivals for the hand of Helen. Deiphobus was preferred, and Helenus withdrew in indignation to Mount Ida, where he was captured by the Greeks, whom he advised to build the wooden horse and carry off the Palladium. According to other accounts, having been made prisoner by a stratagem of Odysseus, he declared that Philoctetes must be fetched from Lemnos before Troy could be taken; or he surrendered to Diomedes and Odysseus in the temple of Apollo, whither he had fled in disgust at the sacrilegious murder of Achilles by Paris in the sanctuary. After the capture of Troy, he and his sister-in-law Andromache accompanied Neoptolemus (Pyrrhus) as captives to Epirus, where Helenus persuaded him to settle. After the death of Neoptolemus, Helenus married Andromache and became ruler of the country. He was the reputed founder of Buthrotum and Chaonia, named after a brother or companion whom he had accidentally slain while hunting. He was said to have been buried at Argos, where his tomb was shown. When Aeneas, in the course of his wanderings, reached Epirus, he was hospitably received by Helenus, who predicted his future destiny.

Homer, Iliad, vi. 76, vii. 44, xii. 94, xiii. 576; Sophocles, Philoc- tetes, 604, who probably follows the Little Iliad, of Lesches ; Pausanias i. 11, ii. 23; Conon, Narrationes, 34; Dictys Cretensis iv. 18; Virgil, Aeneid, iii. 294-490; Servius on Aeneid, ii. 166, iii. 334.

HELGAUD, or Helgaldtjs (d. c. 1048), French chronicler, was a monk of the Benedictine abbey of Fleury. Little else is known about him save that he was chaplain to the French king, Robert II. the Pious, whose life he wrote. This Epitoma vilae Roberti regis, which is probably part of a history of the abbey of Fleury, deals rather with the private than with the public life of the king, and its value is not great either from the literary or from the historical point of view. The only existing manuscript is in the Vatican, and the Epitoma has been printed by J. P. Migne in the Patrologia Latina, tome cxli. (Paris, 1844); and by M. Bouquet in the Recueil des historiens des Gaules, tome x. (Paris, 1760).

See Histoire litteratre de la France, tome vii. (Paris, 1 865-1 869); and A- Molinier, Les Sources de I' histoire de France, tome, ii. (Paris,

1902)

HELGESEN, POVL, 1 Danish humanist, was born at Varberg in Halland

about 1480, of a Danish father and a Swedish mother. Helgesen was educated first at the Carmelite monastery of his native place and afterwards at another monastery at Elsinore, where he devoted himself to humanistic studies and adopted Erasmus as his model. None had a keener eye for the abuses- of the Church; long before the appearance of Luther, he denounced the ignorance and immorality of the clergy, and, as lector at the university of Copenhagen, gathered round him a band of young enthusiasts, the future leaders of the Danish Reformation. But Helgesen desired an orderly, methodical, rational reformation, and denounced Luther, whose ablest opponent in Denmark he subsequently became, as a hot-headed revolutionist. Christian II. was also an object of Helgesen's detestation, and so boldly did he oppose that monarch's measures 1 He wrote his name Heliae or Eliar.

that, to save his life, he had to flee to Jutland. Under Frederick I. (1523-1533) he returned to Copenhagen and resumed his chair at the university, becoming soon afterwards provincial of the Carmelite Order for Scandinavia. But like all moderate men in a time of crisis, Helgesen could gain the confidence of neither party, and was frequently attacked as bitterly by the Catholics as by the Protestants. From 1530 to 1533 he and the Protestant champion Hans Tausen exhausted the whole vocabulary of vituperation in their fruitless polemics. In October 1534, however, Helgesen issued an eirenicon in which he attempted to reconcile the two contending confessions. After that every trace of him is lost. For a long time he was unjustly regarded as a turn-coat, but he was too superior to the prejudices of his age to be understood by his contemporaries. His ideal was a moral internal reformation of the Church on a rational basis, conducted not by ill-informed fanatics, but by an enlightened and well-educated clergy; and" from this standpoint he never diverged. Helgesen was indisputably the greatest master of style of his age in Denmark, and as a historian he also occupies a prominent position. He always endeavours to probe down to the very soul of things, though his passionate nature made it very difficult for him to be impartial. His chief works are Denmark's Kongers Historie and Skibby Kroniken.

See Ludwig Schmitt, Der Karmeliter Paulus Helta (Freiburg, 1893); Danmarks Riges Historie (Copenhagen, 1897-1905), vol. iii.

HELIACAL, relating to the sun (»)\ws), a term applied in the ancient

astronomy to the first rising of a star which could be seen after it emerged from the rays of the sun, or the last setting that could be seen before it was lost from sight by proximity to the sun.

HELIAND. The 9th-century poem on the Gospel history, to which its first editor, J. A. Schmeller, gave the appropriate name of Heliand (the word used in the text for ” Saviour,” answering to the O. Eng. hcelend and the Ger. Heiland), is, with the fragments of a version of the story of Genesis believed to be by the same author, all that remains of the poetical literature of the old Saxons, i.e. the Saxons who continued in their original home. It contained when entire about 6000 lines, and portions of it are preserved in four MSS. The Cotton MS. in the British Museum, written probably late in the 10th century, is nearly complete, ending in the middle of the story of the journey to Emmaus. The Munich MS., formerly at Bamberg, begins at line 85, and has many lacunae, but continues the history down to the last verse of St Luke’s Gospel, ending, however, in the middle of a sentence. A MS. discovered at Prague in 1881 contains lines 958-1106, and another, in the Vatican library, discovered by K. Zangemeister in 1894, contains lines 1279-1358. The poem is based, not directly on the New Testament, but on the nseudo-Tatian’s harmony of the Gospels, and it shows acquaintance with the commentaries of Alcuin, Baeda and Hrabanus Maurus.

The questions relating to the Heliand cannot be adequately discussed without considering also the poem on the history of Genesis, which, on the grounds of similarity in style and vocabu- lary, and for other reasons afterwards to be mentioned, may with some confidence be referred to the same author. A part of this poem, as is mentioned in the article Cˆedmon, is extant only in an Old English translation. The portions that have been preserved in the original language are contained in the same Vatican MS. that includes the fragment of the Heliand referred to above. In the one language or the other, there are in existence the following three fragments: (1) The passage which appears as lines 235-851 in the so-called ” Caedmon’s Genesis ,” on the revolt of the angels and the temptation and fall of Adam and Eve. Of this the part corresponding to lines 790- 820 exists also in the original Old Saxon. (2) The story of Cain and Abel, in 124 lines. (3) The account of the destruction of Sodom, in 187 lines. The main source of the Genesis is the Bible, but Professor E. Sievers has shown that considerable use was made of the two Latin poems by Alcimus Avitus, De initio mundi and De peccato originali. The two poems give evidence of genius and trained skill,

though the poet was no doubt hampered by the necessity of not

deviating too widely from the sacred originals. Within the limits imposed by the nature of his task, his treatment of his sources is remarkably free, the details unsuited for poetic handling being passed over, or, in some instances, boldly altered. In many passages his work gives the impression of being not so much an imitation of the ancient Germanic epic, as a genuine example of it, though concerned with the deeds of other heroes than those of Germanic tradition. In the Heliand the Saviour and His Apostles are conceived as a king and his faithful warriors, and the use of the traditional epic phrases appears to be not, as with Cynewulf or the author of Andreas, a mere following of accepted models, but the spontaneous mode of expression of one accustomed to sing of heroic themes. The Genesis fragments have less of the heroic tone, except in the splendid passage describing the rebellion of Satan and his host. It is noteworthy that the poet, like Milton, sees in Satan no mere personification of evil, but the fallen archangel, whose awful guilt could not obliterate all traces of his native majesty. Somewhat curiously, but very naturally, Enoch the son of Cain is confused with the Enoch who was translated to heaven — an error which the author of the Old English Genesis avoids, though (according to the existing text) he confounds the names of Enoch and Enos.

Such external evidence as exists bearing on the origin of the Heliand and the companion poem is contained in a Latin docu- ment printed by Flacius Illyricus in 1562. This is in two parts; the one in prose, entitled (perhaps only by Flacius himself) ” Praefatio ad librum antiquum in lingua Saxonica conscriptum “; the other in verse, headed ” Versus de poeta et Interpreta hujus codicis.” The Praefatio begins by stating that the emperor Ludwig the Pious, desirous that his subjects should possess the word of God in their own tongue, commanded a certain Saxon, who was esteemed among his countrymen as an eminent poet, to translate poetically into the German language the Old and New Testaments. The poet willingly obeyed, all the more because he had previously received a divine command to under- take the task. He rendered into verse all the most important parts of the Bible with admirable skill, dividing his work into vitteas, a term which, the writer says, may be rendered by ” lectiones ” or ” sententias.” The Praefatio goes on to say that it was reported that the poet, till then knowing nothing of the art of poetry, had been admonished in a dream to turn into verse the precepts of the divine law, which he did with so much skill that his work surpasses in beauty all other German poetry (ut cuncta Theudisca poemata suo vincat decor e). The Versus practically reproduce in outline Baeda’s account of Caedmon’s dream, without mentioning the dream, but describing

the poet as a herdsman, and adding that his poems, beginning with the creation, relate the history of the five ages of the world down to the coming of Christ.

The suspicion of some earlier scholars that the Praefatio and the Versus might be a modern forgery is refuted by the occur- rence of the word vitteas, which is the Old Saxon fittea,. cor- responding to the Old English fill, which means a ” canto ” of a poem. It is impossible that a scholar of the 16th century could have been acquainted with this word, and internal evidence shows clearly that both the prose and the verse are of early origin. The Versus, considered in themselves, might very well be supposed to relate to Casdmon; but the mention of the five ages of the world in the concluding lines is obviously due to recollection of the opening of the Heliand (lines 46-47). It is therefore certain that the Versus, as well as the Praefatio, atfric bute to the author of the Heliand a poetic rendering of the Old Testament. Their testimony, if accepted, confirms the ascription to him of the Genesis fragments, which is further supported by the fact that they occur in the same MS. with a portion of the Heliand. As the Praefatio speaks of the emperor Ludwig in the present tense, the former part of it at least was probably written in his reign, i.e. not later than a.d. 840. The general opinion of scholars is that the latter part, which represents the poet as having received his vocation in a dream, is by a later hand, and that the sentences in the earlier part which refer to the dream are

interpolations by this second author. The date of these additions, and of the Versus, is of no importance, as their statements are incredible. That the author of the, Heliand was, so to speak, another Casdmon — an unlearned man who turned into poetry what was read to him from the sacred writings — is impossible, because in many passages the text of the sources is so closely followed that it is clear that the poet wrote with the Latin books before him. On the other hand, there is no reason for rejecting the almost contemporary testimony of the first part of the Pracfatio that the author of the Heliand had won renown as a poet before he undertook his great task at the emperor’s command. It is certainly not impossible that a Christian Saxon, sufficiently educated to read Latin easily, may have chosen to follow the calling of a scop or minstrel l instead of entering the priesthood or the cloister; and if such a person existed, it would be natural that he should be selected by the emperor to execute his design. As has been said above, the tone of many portions of the Heliand is that of a man who was no mere

imitator of the ancient epic, but who had himself been accustomed to sing of heroic themes.

The commentary on the gospel of Matthew by Hrabanus Maurus was finished about 821, which is therefore the superior limit of date for the composition of the Heliand. It is usually maintained that this work was written before the Old Testament poems. The arguments for this view are that the Heliand con- tains no allusion to any foregoing poetical treatment of the ante- cedent history, and that the Genesis fragments exhibit a higher degree of poetic skill. This reasoning does not appear con- clusive, and if it be set aside, the limit of date for the beginning of the work is carried back to a.d. 814, the year of the accession of Ludwig.

Bibliography. — The first complete edition of the Heliand was published by J. A. Schmeller in 1830; the second volume, containing the glossary and grammar, appeared in 1 840. The standard edition is that of E. Sievers (1877), in which the texts of the Cotton and Munich MSS. are printed side by side. It is not provided with a glossary, but contains an elaborate and most valuable analysis of the diction, synonymy and syntactical features of the poem. Other useful editions are those of M. Heyne (3rd ed., 1903), O. Behaghel (1882) and P. Piper (1897, containing also the Genesis fragments). The fragments of the Heliand and the Genesis contained in the Vatican MS. were edited in 1894 by K. Zangemeister and W. Braune under the title Bruchstiicke der altsdchsischen Bibeldichtung. Among the works treating of the authorship, sources and place of origin of the poems, the most important are the following: E. Windisch, Der Heliand itnd seine Quellen (1868); E. Sievers, Der Heliand und die angelsdchsische Genesis (1875); R. Kogel, Deutsche Literatur- geschichte, Bd. i. (1894) and Die altsdchsische Genesis (1895); R. Kijgel and \V. Bruckner, ” Althoch- und altniederdeutsche Li- ter;. tur,” in Paul’s Grundriss der germanischen Philologie, Bd. ii. (2nd ed., 1901), which contains references to many other works; Hermann Collitz, Zum Dialekte des Heliand (1901). (H. Br.)

HELICON, a mountain range, of Boeotia in ancient Greece, celebrated in classical literature as the favourite haunt of the Muses, is situated between Lake Copals and the Gulf of Corinth. On the fertile eastern slopes stood a temple and grove sacred to the Muses, and adorned with beautiful statues, which, taken by Constantine the Great to beautify his new city, were consumed there by a fire in a.d. 404. Hard by were the famous fountains, Aganippe and Hippocrene, the latter fabled to have gushed from the earth at the tread of the winged horse Pegasus, whose favourite browsing place was there. At the

neighbouring Ascra dwelt the poet Hesiod, a fact which probably enhanced the poetic fame of the region. Pausanias, who describes Helicon in his ninth book, asserts that it was the most fertile mountain in Greece, and that neither poisonous plant nor serpent was to be found on it, while many of its herbs possessed a miraculous healing virtue. The highest summit, the present Palaeovouni (old hill), rises to the height of about 5000 ft. Modern travellers, aided by ancient remains and inscriptions, and guided by the local descriptions of Pausanias, have succeeded in identifying many of the ancient classical spots, and the French excavators have discovered the temple of the Muses and a theatre.

1 The term Volkssdnger, commonly used in German discussions of this question, is misleading; the audience for heroic poetry was not ” the people ” in the modern sense, but the nobles.

See also Clarke, Travels in Various Countries (vol. vii., 1818); Dodwell, Classical and Topographical Tour through Greece (1818); W. M. Leake, Travels in Northern Greece (vol. ii., 1835); J. G. Frazer’s edition of Pausanias, v. 150.

HELICON (Fr. helicon, bombardon circuiaire; Ger. Helikon), the circular form of the Bb contrabass tuba used in military bands, worn round the body, with the enormous bell resting on the left shoulder and towering above the head of the performer. The pitch of the helicon is an octave below that of the euphonium. The idea of winding the long tube of the contrabass tuba and of wearing it round the shoulders was suggested by the ancient Roman buccina and cornu, represented in mosaics and on the sculptured reliefs surrounding Trajan’s Column. The buccina and cornu 2 differed in the diameter of their respective bores, the former having the narrow, almost cylindrical bore and harmonic series of the trumpet and trombone, whereas the cornu, having a bore in the form of a wide cone, was the prototype of the bugle and tubas.

HELIGOLAND (Ger. Helgoland), an island of Germany, in the North Sea, lying off the mouths of the Elbe and the Weser, 28 m. from the nearest point in the mainland. Pop. (1900) 2307. From 1807 to 1890 a British possession, it was ceded in 1890 to Germany, and since 1892 has formed part of the Prussian province of Schleswig-Holstein. It consists of two islets, the smaller, the Diinen-Insel, a quarter of a mile E. of the main, or Rock Island, connected until 1720, when it was severed by a violent irruption of the sea, with the other by a neck of land, and the main, or Rock Island. The latter is nearly triangular in shape and is surrounded by steep red cliffs, the only beach being the

sandy spit near the south-east point, where the landing-stage is situated. The rocks composing the cliffs are worn into caves, and around the island are many fantastic arches and columns. The impression made by the red cliffs, fringed by a white beach and supporting the green Oberland, is commonly believed to have suggested the national colours, red, white and green, or, as the old Frisian rhyme goes: —

” Gron is dat Land, Rood is de Kant, Witt is de Sand, Dat is de Flagg vun’t hillige Land.”

The lower town of Unterland, on the spit, and the upper town, or Oberland, situated on the cliff above, are connected by a wooden stair and a lift. There is a powerful lighthouse, and since its cession by Great Britain to Germany, the main island has been strongly fortified, the old English batteries being replaced by armoured turrets mounting guns of heavy calibre. Inside the Diinen-Insel the largest ships can ride safely at anchor, and take in coal and other supplies. The greatest length of the main island, which slopes somewhat from west to east, is just a mile, and the greatest breadth less than a third of a mile, its average height 198 ft., and the highest point, crowned by the church, with a conspicuous spire, 216 ft. The Diinen-Insel is a sand-bank protected by groines. It is only about 200 ft. above the sea at its highest point, but the drifting sands make the height rather variable. The sea-bathing establishment is situated here; a shelving beach of white sand presenting excellent facilities for bathing. Most of the houses are built of brick, but some are of wood. There are a theatre, a Kurhaus, and a number of hotels and restaurants. In 1892 a biological institute, with a marine museum and aquarium (1900) attached, was opened.

During the summer some 20,000 people visit the island for sea-bathing. German is the official language, though among, themselves the natives speak a dialect of Frisian, barely in- telligible to the other islands of the group. There is regular communication with Bremen and Hamburg.

The winters are stormy. May and the early part of June are wet and foggy, so that few visitors arrive before the middle of the latter month.

2 For illustrations of the ccrnu see the altar of Julius Victor ex Collegio, reproduced in Bartoli, Pict. Ant. p. 76; Bellori, Pict. antiq. crypt, rom. p. 76, pi. viii. ; in Daremberg and Saglio, Diet, des antiq. grecques et romaines, under ” Cornu,” the buccina and cornu have not been distinguished.

The generally accepted derivation of Heligoland (or Helgoland) from Heiligeland, i.e. ” Holy Land,” seems doubtful. According to northern mythology, Forseti, a son of Balder and Nanna, the god of justice, had a temple on the island, which was sub- sequently destroyed by St Ludger. This legend may have given rise to the derivation ” Holy Land.” The more probable etymology, however, is that of Hallaglun, or Halligland, i.e. ” land of banks, which cover and uncover.” Here Hertha, according to tradition, had her great temple, and hither came from the mainland the Angles to worship at her shrine. Here also lived King Radbod, a pagan, and on this isle St Willibrord in the 7th century first preached Christianity, and for its owner- ship, before and after that date, many sea-rovers have fought. Finally it became a fief of the dukes of Schleswig-Holstein, though often hypothecated for loans advanced to these princes by the free city of Hamburg. The island Was a Danish possession in 1807, when the English seized and held it until it was formally ceded to them in 18 14. In the picturesque old church there are still traces of a painted Dannebrog.

In 1890 the island was ceded to Germany, and in 1892 it was incorporated with Prussia, when it was provided that natives born before the year 1880 should be allowed to elect either for British or German nationality, and until 1901 no additional import duties were imposed.

Bibliography. — Von der Decken, Philosophisch-hislorisch-geo- graphische Untersuchungen iiber die Insel Helgoland, oder Heilige- land, und ihre Bewohner (Hanover, 1826); Wiebel, Die Insel Helgo- land, Untersuchungen iiber deren Crosse in Vorzeit und Gegenwart vom Standpunkte der Ceschichte und Ceologie (Hamburg, 1 848); J. M. Lappenberg, Uber den ehemaligen Umfang und die alte Ceschichte Helgolands (Hamburg, 1831); F. Otker, Helgoland. Schilderungen und Erorterungen (Berlin, 1855); E. Hallier, Helgoland, Nordsee- studien (Hamburg, 1893); A. W. F. Moller, Rechtsgeschichte der Insel Helgoland (Weimar, 1904) ; W. G. Black, Heligoland and the Islands of the North Sea (Glasgow, 1888); E. Lindermann, Die Nordseeinsel Helgoland in topographischer , geschichtlicher, sanitarer Beziehung (Berlin, 1889) ; and Tittel, Die natiirlichen Verdnderungen Helgolands (Leipzig, 1894).

HELIOCENTRIC, i.e. referred to the centre of the sun (t|\ios) as an origin, a term designating especially co-ordinates or heavenly bodies

referred to that origin.

HELIODORUS, of Emesa in Syria, Greek writer of romance. According to his own statement his father's name was Theodosius, and he belonged to a family of priests of the sun. He was the author of the Aethiopica, the oldest and best of the Greek romances that have come down to us. It was first brought to light in modern times in a MS. from the library of Matthias Corvinus, found at the sack of Buda (Ofen) in 1526, and printed at Basel in 1534. Other codices have since been discovered. The title is taken from the fact that the action of the beginning and end of the story takes place in Aethiopia. The daughter of Persine, wife of Hydaspes, king of Aethiopia, was born white through the effect of the sight of a marble statue upon the queen during pregnancy. Fearing an accusation of adultery, the mother gives the babe to the care of Sisimithras, a gymnosophist, who carries her to Egypt and places her in charge of Charicles, a Pythian priest. The child is taken to Delphi, and made a priestess of Apollo under the name of Chariclea. Theagenes, a noble Thessalian, comes to Delphi and the two fall in love with each other. He carries off the priestess with the help of Calasiris, an Egyptian, employed by Persine to seek for her daughter. Then follow many perils from sea-rovers and others, but the chief personages ultimately meet at Meroe at the very moment when Chariclea is about to be sacrificed to the gods by her own father. Her birth is made known, and the lovers are happily married. The rapid succession of events, the variety of the characters, the graphic descriptions of manners and of natural scenery, the simplicity and elegance of the style, give the Aethiopica great charm. As a whole it offends less against good taste and morality than others of the same class. Homer and Euripides were the favourite authors of Heliodorus, who in his turn was imitated by French, Italian and Spanish writers. The early life of Clorinda in Tasso's Jerusalem Delivered (canto xii. 2 1 sqq.)is almost identical with that of Chariclea; Racine meditated a drama on the same

subject; and it formed the model of the Persiles y Sigismunda of Cervantes. According to the ecclesiastical historian Socrates (Hist, eccles. v. 22), the author of the Aethiopica was a certain Heliodorus, bishop of Tricca in Thessaly. It is supposed that the work was written in his early years before he became a Christian, and that, when confronted with the alternative of disowning it or resigning his bishopric, he preferred resignation. But it is now generally agreed that the real author was a sophist of the 3rd century a.d.

The best editions are: A. Coraes (1804), G. A. Hirschig (1856); see also M. Oeftering, H. und seine Bedeutung fur die Liter atur, with full

bibliographies (1901); J. C. Dunlop, History of Prose Fiction (1888); and especially E. Rohde, Der griechische Roman (1900). There are translations in almost all European languages: in English, in Bohn's Classical Library and the " Tudor " series (v., 1895, containing the old translation by T. Underdowne, 1587, with introduction by C. Whibley) ; in French by Amyot and Zevort.

HELIOGABALUS (ELAGABALUS), Roman emperor (a.d. 218-222), was born at Emesa about 205. His real name was Varius Avitus. On the murder of Caracalla (217), Julia Maesa, Varius's grandmother and Caracalla's aunt, left Rome and retired to Emesa, accompanied by her grandsons (Varius and Alexander Severus). Varius, though still only a boy, was ap- pointed high priest of the Syrian sun-god Elagabalus, one of the chief seats of whose worship was Emesa (Horns) . His beauty, and the splendid ceremonials at which he presided, made him a great favourite with the troops stationed in that part of Syria, and Maesa increased his popularity by spreading reports that he was in reality the illegitimate son of Caracalla. Macrinus, the successor and instigator of the murder of Caracalla, was very unpopular with the army; an insurrection was easily set on foot, and on the 16th of May 218 Varius was proclaimed emperor as Marcus Aurelius Antoninus. The troops sent to quell the revolt went over to him, and Macrinus was defeated near Antioch on the 8th of June. Heliogabalus was at once recognized by the senate as emperor. After spending the winter in Nicomedia, he proceeded in 219 to Rome, where he made it his business to exalt the deity whose priest he was and whose name he assumed. The Syrian god was proclaimed the chief deity in Rome, and all other gods his servants; splendid ceremonies in his honour were celebrated, at which Heliogabalus danced in public, and it was believed that secret rites accompanied by human sacrifice were performed in his honour. In addition to these affronts upon the state religion, he insulted the intelli- gence of the community by horseplay of the wildest description and by childish practical joking. The shameless profligacy of the emperor's life was such as to shock even a Roman public. His popularity with the army declined, and Maesa, perceiving that the soldiers were in favour of Alexander Severus, persuaded Heliogabalus to raise his cousin to the dignity of Caesar (221), a step of which he soon repented. An attempt to murder Alexander was frustrated by the watchful Maesa. Another attempt in 2 2 2 produced a mutiny among the praetorians, in which Heliogabalus and his mother Soemias (Soaemias) were slain (probably in the first half of March).

Authorities. — Life by Aelius Lampridius in Scriptores historiae Augustae; Herodian v. 3-8; Dio Cassius lxxviii. 30 sqq., lxxix. 1-21 ; monograph by G. Duviquet, Heliogabale (1903), containing a trans-

lation of the various accounts of Heliogabalus in Greek and Latin authors, notes, bibliography and illustrations; O. F. Butler, Studies in the Life of Heliogabalus (New York, 1908); Gibbon, Decline and Fall, ch. 6; H. Schiller, Geschichte der rbmischen Kaiserzeit, i. pt. ii. (1883), p. 759 ff. On the Syrian god see F. Cumont in Pauly- Wissowa's Realencyclopddie, v. pt. ii. (1905).

HELIOGRAPH (from Gr. t/Xios, sun, and ypafciv to write), an instrument for reflecting the rays of the sun (or the light obtained from any other source) over a considerable distance. Its main application is in military signalling (see Signal). A similar instrument is the heliotrope, used principally for defining distant points in geodetic surveys, such as in the triangulation of India, and in the verification of the African arc of the meridian. It is necessary to distinguish the method of signalling termed heliography from the photographic process of the same name (see Photography).

22a.

HELIOMETER

Fig. 3.

HELIOMETER (from Gr. jjAios, sun, and ixtrpov, a measure), an instrument originally designed for measuring the variation of the sun's diameter at different seasons of the year, but applied now to the modern form of the instrument which is capable of much wider use. The present article also deals with other forms of double-image micrometer.

The discovery of the method of making measures by double images is stated to have been first suggested by O. Roemer about 1768. But no such suggestion occurs in the Basis Astronomiae of Peter Horrebow (Copenhagen, 1735), which contains the only works

, , of Roemer that re-

main to us. It would appear that to Ser- vington Savary is due the first invention of a micrometer for measurement by double image. His heliometer (described in a paper communi- cated to the Royal Society in 1743, and printed, along with a letter from James Short, in Phil. Trans., 1753, p. 156) was constructed by cutting from a complete lens abed the equal portions aghc and acfe (fig. 1). The segments gbh and efd so formed were then attached to the end of a tube having an internal diameter represented by the dotted circle (fig. 2). The width of each of the portions aghc and acfe cut away from the lens was

made slightly greater than the focal length of lens X tangent of sun's greatest diameter. Thus at the focus two images of the sun were formed nearly in contact as in fig. 3. The small interval between the adjacent limbs was then measured with a wire micrometer.

Savary also describes another form of helio- meter, on the same principle, in which the seg- ments aghc and acfe are utilized by cementing their edges gh and ef together (fig. 4), and covering all except the portion indicated by the unshaded circle. Savary expresses preference for this second plan, and makes the pertinent remark that in both these models " the rays of red light in the two solar images will be next to each other, which will render the sun's disk more easy to be observed than the violet ones." This he mentions " because the glasses in these two sorts are somewhat prismatical, but mostly those of the first model, which could there- fore bear no great charge (magnifying power)."

A third model proposed by Savary consists of two complete lenses of equal focal length, mounted in cylinders side by side, and attached to a strong brass plate (fig. 5). Here, in order to fulfil the purposes of the previous models, the distance of the centres of the lenses from each other should only slightly exceed the tangent of sun's diameter X focal length of lenses. Savary dwells on the difficulty both of procuring lenses sufficiently equal in focus and of accurately adjusting and centring them.

In the Mem. Acad, de Paris (1748), Pierre Bouguer describes an instrument which he calls a heliometer. his Astronomie (vol. ii. p. 639) mentions such a helio- meter which had been in his possession fromthe year 1753, and of which he gives a representation on Plate XXVIII., fig. 186, of the same volume. Bouguer's heliometer was in fact similar to that of Savary's third model, with the important difference that, instead of both object-glasses being fixed, one of them is movable by a screw provided with a divided head. No auxiliary filar micrometer was required, as in Savary's heliometer, to measure the interval between the limbs of two adjacent images of the sun, it being only necessary to turn the screw with the divided head to change the distance between the object-glasses till the two images of the sun are in contact as in fig. 6. The differences of the readings of the screw, when converted into arc, afford the means of measuring the variations of the sun's apparent diameter.

On the 4th of April 1754 John Dollond com- municated a paper to the Royal Society of f X / """"N. London {Phil. Trans., vol. xlviii. p. 551) in (V \ which he shows that a micrometer can be

• much more easily constructed by dividing a :ingle object-glass through its axis than by he employment of two object-glasses. He p IG g points out — (1) that a telescope with an object-

glass so divided still produces a single image of any object to which it may be directed, provided that the optical centres of the segments are in coincidence {i.e. provided the segments retain the same relative positions to each other as before the glass

Fig. 5.

was cut) ; (2) that if the segments are separated in any direction two images of the object viewed will be produced; (3) that the most convenient direction of separation for micrometric purposes is to slide these straight edges one along the other as the figure on the margin (fig. 7) represents them: ” for thus they may be moved without suffering any false light to come in between them ; and by this way of removing them the distance between their centres may be very conveniently measured, viz. by having a vernier’s division fixed to the brass work that holds one segment, so as to slide along a scale on the plate to which the other part of the glass is fitted.”

Dollond then points out three different types in which a glass so divided and mounted may p

be used as a micrometer:— ‘ ‘ ‘

” 1. It may be fixed at the end of a tube, of a suitable length to its focal distance, as an object-glass, — the other end of the tube having an eye-glass fitted as usual in astronomical telescopes.

“2. It may be applied to the end of a tube much shorter than its focal distance, by having another convex glass within the tube, to shorten the focal distance of that which is cut in two.

“3. It may be applied to the open end of a reflecting telescope, either of the Newtonian or the Cassegrain construction.”

Dollond adds his opinion that the third type is ” much the best and most convenient of the three”; yet it is the first type that has survived the test of time and experience, and which is in fact the modern heliometer. It must be remembered, however, that when Dollond expressed preference for this third type he had not then in- vented the achromatic object-glass.

Some excellent instruments of the second type were subsequently

made by Dollond's eldest son Peter, in which for the " convex glass within the tube " was substituted an achromatic object-glass, and outside that a divided negative achromatic combination of long focus. In the fine example of this instrument at the Cape Observatory the movable negative lenses consist of segments of the shape gach and acfe (fig. 1) cut from a complete negative achromatic combination of 8 J in. aperture and about 41 ft. focal length, composed of a double concave flint lens and a double convex crown. This was applied to an excellent achromatic telescope of 3i in. aperture and 42 in. focal length. In this instrument a considerable linear relative movement of the divided lens corresponds with a comparatively small separation of the double image, so that simple verniers reading to Ttfta in. are sufficient for measurement.

With one of these instruments of somewhat smaller dimensions (telescope 25 in. aperture and 32 ft. focus), Franz von Paula Tries-necker made a series of measurements at the observatory of Vienna which has been reduced by Dr Wilhelm Schur of Strasburg {Nova Acta der Ksl. Leop.-Carol. Deutschen Akademie der Natursforscher, 1882, xlv. No. 3). The angle between the stars f and g Ursae maj. (7o8"-55) was measured on four nights; the probable error of a measure on one night was = t o"-44. Jupiter was measured on eleven nights in the months of June and July 1794; from these measures Schur derives the values 35 "-39 and 37 "94 for the polar and equa torial diameter respectively, at mean distance, corresponding with a compression 1/14-44. These agree satisfactorily with the correspond- ing values 35"'2i, 37"'6o, l/i5'59 afterwards obtained by F. W. Bessel {Konigsberger Beobachtungen, xix. 102). From a series of measures of the angle between Jupiter's satellites and the planet, made in June and July 1794 and in August and September 1795, Schur finds the mass of Jupiter = 1/1048-55^ 1-45, a result which accords well within the limits of its probable error with the received value of the mass derived from modern researches. The probable errors for the measures of one night are = fc o"-577, =fco"-889, ±o"-542, ±i"-096, for Satellites I., II., III. and IV. respectively.

Considering the accuracy of these measures (an accuracy far sur-passing that of any other contemporary observations), it is somewhat surprising that this form of micrometer was never systematically used in any sustained or important astronomical researches, although a number of instruments of the kind were made by Dollond. Prob- ably the last example of its employment is an observation of the transit of Mercury (November 4, 1868) by Mann, at the Royal Observatory, Cape of Good Hope {Monthly Notices R.A.S. vol. xxix. p. 197-209). The most important part, however, which this type of instrument

seems to have played in the history of astronomy arises from the fact that one of them was in the possession of Bessel at Konigsberg during the time when his new observatory there was being built. In 1812 Bessel measured with it the angle b< iweep the components of the double star 61 Cygni and observed the great comet of 181 1. He also observed the eclipse of the sun on May 4, 1818. In the discussion of these observations {Kdnigsberger Beo- bacht, Abt. 5, p. iv.) he found that the index error of the scale changed systematically in different position angles by quantities which were independent of the direction of gravity relative to the position angle under measurement, but which depended solely on the direction of the measured position angle relative to a fixed radius of the object-glass. Bessel attributed this to non-homogeneity in the object-glass, and determined with great care the necessary corrections. But he was so delighted with the general performance of the instrument, with the sharpness of the images and the possi- ' bilities which a kindred construction offered for the measurement of

considerable angles with micrometric accuracy, that he resolved, when he should have the choice of a new telescope for the observatory, to secure some form of heliometer.

Nor is it difficult to imagine the probable course of reasoning which led Bessel to select the model of his new heliometer. Why, he might ask, should he not select the simple form of Dollond's first type ? Given the achromatic object-glass, why should not it be divided ? This construction would give all the advantage of the younger Dollond's object-glass micrometer, and more than its sharp- ness of definition, without liability to the systematic errors which may be due to want of homogeneity of the object-glass; for the lenses will not be turned with respect to each other, but, in measurement, will always have the same relation in position angle to the line joining the objects under observation. It is true that the scale will require to be capable of being read with much greater accuracy than YdVsth f an mc h — f or that, even in a telescope of 10 ft. focus, would correspond with 2″ of arc. But, after all, this is no practical diffi- culty, for screws can be used to separate the lenses, and, by these screws, as in a Gascoigne micrometer, the separation of the lenses tan be measured; or we can have scales for this purpose, read by microscopes, like the Troughton 1 circles of Piazzi or Pond, or those of the Carey circle, with almost any required accuracy.

Whether Bessel communicated such a course of reasoning to Fraunhofer, or whether that great artist arrived independently at like conclusions, we have been unable to ascertain with certainty. The fact remains that before 1820 2 Fraunhofer had completed one or more of the five heliometers (3 in. aperture and 39 in. focus) which have since become historical instruments. In 1824 the great Konigsberg heliometer was commenced, and it was completed in 1829.

To sum up briefly the history of the development of the heliometer. The first application of the divided object-glass and the employment of double images in astronomical measures'is due to Savary in 1743. To Bouguer in 1748 is due the true conception of measurement by double" image without the auxiliary aid of a filar micrometer, viz. by changing the distance between two object-glasses of equal focus. To Dollond in 1754 we owe the combination of Savary 's idea of the divided object-glass with Bouguer's method of measurement, and the construction of the first really practical heliometers. To Fraunhofer, some time not long previous to 1820, is due, so far as we can ascertain, the construction of the first heliometer with an achromatic divided object-glass, i.e. the first heliometer of the modern type.

The Modern Heliometer.

The Konigsberg heliometer is represented in fig. 8. No part of

the equatorial mounting is shown in the figure, as it resembles in

every respect the usual Fraunhofer mounting. An adapter h is fixed

on a telescope-tube, made of wood, in Fraunhofer's usual fashion.

To this adapter is attached a flat circular flange h. The slides carrying the segments of the divided object-glass are mounted on a plate, which is fitted and ground to rotate smoothly on the flange h. Rotation is communi- cated by a pinion, turned by the handle c (concealed in the figure), which works in teeth cut on the edge of the flange h. The counterpoise w balances the head about its axis of rotation. The slides are moved by the screws a and b, the divided heads of which serve to measure the separation of the segments. These screws are turned from the eye-end by bevelled wheels and pinions, the latter connected with the handles a', b'. The reading micrometers e, / also serve to measure, independently, the separation of the segments, by scales attached to the slides; such measurements can be employed as a check on those made by the screws. The measurement of position angles is provided for by a graduated circle attached to the

head. There is also a position circle, attached at m to the eye-end, provided with a slide to move the eye-piece radially from the axis of the telescope, and with a micrometer to measure the distance of an object from that axis. The ring c, wh ; ch carries the supports of the handles a', &', is capable of a certain amount of rotation on the tube. The weight of the handles and their supports is balanced by the counterpoise z. This ring is necessary in order to allow the rods to follow the micrometer heads when the position angle is changed. Complete rotation of the head is obviously impossible because of the interference of the declination axis with the rods, and therefore, in some angles, objects cannot be measured in two positions of the circle. The object-glass has an aperture of 6$ in. and 102 in. focal length.

There are three methods in which this heliometer can be used. First Method. — One of the segments is fixed in the axis of the telescope, and the eye-piece is also placed in the axis. Measures

1 The circles by Reichenbach, then almost exclusively used in Germany, were read bv verniers only.

2 The diameter of Venus was measured with one of these helio- meters at the observatory of Breslau by Brandes in 1820 {Berlin Jahrbuch. 1824, p. 164).

Fig

are made with the moving segment displaced alternately on opposite sides of the fixed segment.

Second Method. — One segment is fixed, and the measures are made as in the first method, excepting that the eye-piece is placed symmetrically with respect to the images under measurement. For this purpose the position angle of the eye-piece micrometer is set to that of the head, and the eye-piece is displaced from the axis of the tube (in the direction of the movable segment) by an amount equal to half the angle under measurement.

Third Method. — The eye-piece is fixed in the axis, and the segments are symmetrically displaced from the axis each by an amount equal to half the angle measured.

Of these methods Bessel generally employed the first because of its simplicity, notwithstanding that it involved a resetting of the right ascension and declination of the axis of the tube with each reversal of the segments. The chief objections to the method are that, as one star is in the axis of the telescope and the other dis- placed from it, the

images are not both in focus of the eye-piece, 3 and the rays from the two stars do not make the same angle with the optical axis of each segment. Thus the two images under measurement are not defined with equal sharpness and symmetry. The second method is free from the objection of non-coincidence in focus of the images, but is more troublesome in practice from the necessity for frequent readjustment of the position of the eye-piece. The third method is the most symmetrical of all, both in obser- vation and reduction; but it was not employed by Bessel, on the ground that it involved the determination, of the errors of two screws instead of one. On the other hand it is not necessary to reset the telescope after each reversal of the segments. 4

When Bessel ordered the Konigsberg heliometer, he was anxious to have the segments made to move in cylindrical slides, of which the radius should be equal to the focal length of the object-glass. Fraunhofer, however, did not execute this wish, on the ground that the mechanical difficulties were too great.

M. L. G. Wichmann states (Konigsb. Beobach. xxx. 4) that Bessel had indicated, by notes in his handbooks, the following points which should be kept in mind in the construction of future heliometers: (1) The segments should move in cylindrical slides; 6 (2) the screw should be protected from dust; 6 (3) the zero of the position circle should not be so liable to change ; 7 (4) the distance of the optical centres of the segments should not change in different position angles or otherwise ; 8 (5) the points of the micrometer screws should rest on ivory plates; 9 (6) there should be an apparatus for changing the screen. 10

Wilhelm Struve, in describing the Pulkowa heliometer, 11 made

3 The distances of the optical centres of the segments from the eye-piece are in this method as I ; secant of the angle under measure- ment. In Bessel' s heliometer this would amount to a difference of ijˆth of an inch when an angle of i c is measured. For 2 the difference would amount to nearly T \>th of an inch. Bessel confined his measures to distances considerably less than 1 °.

4 In criticizing Bessel's choice of methods, and considering the loss of time involved in each, it must be remembered that Fraunhofer provided no means of reading the screws or even the heads from the eye-end. Bessel's practice was to unclamp in declination, lower and read off the head, and then restore the telescope to its former declina- tion reading, the clockwork meanwhile following the stars in right ascension. The setting of both lenses symmetrically would, under such circumstances, be very tedious.

5 This most important improvement would permit any two stars under measurement each to be viewed in the optical axis of each segment. The optical centres of the segments would also remain at the same distance from the eye-piece at all angles of separation. Thus, in measuring the largest as well as the smallest angles, the images of both stars would be equally symmetrical and equally well in focus. Modern heliometers made with cylindrical slides measure angles over 2°, the images remaining as sharp and perfect as when the smallest angles are measured.

6 Bessel found, in course of time, that the original corrections for the errors of his screw were no longer applicable. He considered that the changes were due to wear, which would be much lessened if the screws were protected from dust.

7 The tube, being of wood, was probably liable to warp and twist in a very uncertain way.

8 We have been unable to find any published drawing showing how the segments are fitted in their cells.

9 We have been unable to ascertain the reasons which led Bessel to choose ivory planes for the end-bearings of his screws. He actually introduced them in the Konigsberg heliometer in 1840, and they were renewed in 1848 and 1850.

10 A screen of wire gauze, placed in front of the segment through which the fainter star is viewed, was employed by Bessel to equalize the brilliancy of the images under observation. An arrangement, afterwards described, has been fitted in modern heliometers for placing the screen in front of either segment by a handle at the eve-end.

11 This heliometer resembles Bessel's, except that its foot is a solid block of granite instead of the ill-conceived wooden structure that supported his instrument. The object-glass is of 7-4 in. aperture and 123 in. focus.

by Merz in 1839 on the model of Bessel's heliometer, submits the following suggestions for its improvement: ' (1) to give automatic- ally to the two segments simultaneous equal and opposite move- ment ; 2 and (2) to make the tube of metal instead of wood ; to attach the heliometer head firmly to this tube; to place the eye-piece

permanently in the axis of the telescope ; and to fix a strong cradle on the end of the declination axis, in which the tube, with the attached head and eye-piece, could rotate on its axis.

Both suggestions are important. The first is originally the idea of Dollond ; its advantages were overlooked by his son, and it seems to have been quite forgotten till resuggested by Struve. But the method is not available if the separation is to be measured by screws ; it is found, in that case, that the direction of the final motion of turn- ing of the screw must always be such as to produce motion of the segment against gravity, otherwise the ” loss of time ” is apt to be variable. Thus the simple connexion of the two screws by cog- wheels to give them automatic opposite motion is not an available method unless the separation of the segments is independently measured by scales.

Struve’s second suggestion has been adopted in nearly all succeed- ing heliometers. It permits complete rotation of the tube and measurement of all angles in reversed positions of the circle; the handles that move the slides’ can be brought down to the eye-end, inside the tube, and consequently made to rotate with it ; and the position circle may be placed at the end of the cradle next the eye-end where it is convenient of access. Struve also points out that by attaching a fine scale to the focusing slide of the eye-piece, and knowing the coefficient of expansion of the metal tube, the means would be provided for determining the absolute change of the focal length of the object-glass at any time by the simple process of focusing on a double star. This, with a knowledge of the tempera- ture of the screw or scale and its coefficient of expansion, would enable the change of screw-value to be determined at any instant.

It is probable that the Bonn heliometer was in course of con- struction before these suggestions of Struve were published or discussed, since its construction resembles that of the Konigsberg and Pulkowa instruments. Its dimensions are similar to those of the former instrument. Bessel, having been consulted by the celebrated statesman, Sir Robert Peel, on behalf of the Radcliffe trustees, as to what instrument, added to the Radcliffe Observatory, would probably most promote the advancement of astronomy, strongly advised the selection of a heliometer. The order for the instrument was given to the Repsolds in 1840, but ” various circum- stances, for which the makers are not responsible, contributed to delay the completion of the instrument, which was not delivered before the winter of 1848.” 3 The building to receive it was com- menced in March 1849 and completed in the end of the same year. This instrument has a superb object- glass of 7! in. aperture and 126 in. focal length. The makers availed

themselves of Bessel's suggestion to make the segments move in cylindrical slides, and of Struve's to have the head attached to a brass tube; the eye-piece is set permanently in the axis, and the whole rotates in a cradle attached to the declination axis. They provided a splendid, rigidly mounted, equatorial stand, fitted with every luxury in the way of slow motion, and scales for measuring the displacement of the segments were read by powerful micro- meters from the eye-end.* It is somewhat curious that, though Struve's second suggestion was adopted, his first was overlooked by the makers. But it is still more curious that it was not afterwards carried out, for the communication of automatic symmetrical motion to both segments only involves a simple alteration previously described. But, as it came from the hands of the makers in 1849, the Oxford heliometer was incomparably the most powerful and perfect instrument in the world for the highest order of micrometric research. It so remained, unrivalled in every respect, till 1873.

As the transit of Venus of 1874 approached, prepara- tions were set on foot by the German Government in good time; a commission of the most celebrated astronomers was appointed, and it was resolved that the heliometer should be the instrument chiefly relied on. The four long-neglected small heliometers made by Fraun- hofer were brought into requisition. Fundamental alterations were made upon them: their wooden tubes were replaced by tubes of metal;

1 Description de V observatoire central de Pulkowa, p. 208.

2 Steinheil applied such motion to a double-image micrometer made for Struve. This instrument suggested to Struve the above- mentioned idea of employing a similar motion for the heliometer.

3 Manuel Johnson, M.A., Radcliffe observer, Astronomical Obser- vations made at the Radcliffe Observatory, Oxford, in the Year 1850, Introduction, p. iii.

4 The illumination of these scales is interesting as being the first application of electricity to the illumination of astronomical instru- ments. Thin platinum wire was rendered incandescent by a voltaic current; a small incandescent electric lamp would now be found more satisfactorv.

means of measuring the focal point were provided ; symmetrical motion was given to the slides; scales on each slide were provided instead of screws for measuring the separation of the segments, and both scales were read by the same micrometer microscope ; a metallic

thermometer was added to determine the temperature of the scales. These small instruments have since done admirable work in the hands of Schur, Hartwig, Kiistner, Elkin, Auwers and others.

The Russian Government ordered three new heliometers (each of 4 in. aperture and 5 ft. focal length) from the Repsolds, and the design for their construction was superintended by Struve, Auwers

o'S

Fig. 9.

and Winnecke, the last-named making the necessary experiments at Carlsruhe. Fig. 9 represents the resulting type of instrument which was finally designed and constructed by Repsolds. The brass tube, strengthened at the bearing points by strong truly turned collars, rotates in the cast iron cradle q attached to the declination axis. a is the eye-piece fixed in the optical axis, b the micrometer for reading both scales, c and d are telescopes for reading the position circle p, e the handle for quick motion in position angle, / the slow motion in position angle, g the handle for changing the separation of the segments by acting on the bevel-wheel g' (fig. 10). h is a milled head connected by a rod with h' (fig. 10), for the purpose of inter- posing at pleasure the prism 7r in the axis of the reading micrometer; this enables the observer to view the graduations on the face of the metallic thermometer tt (composed of a rod of brass and a rod of zinc), i is a milled head connected with the wheel i'i' (fig. 10), and affords the means of placing the screen s (fig. 9), counterpoised by w over either half of the object-glass, k clamps the telescope in declination, n clamps it in right ascension, and the handles m and / provide slow motion in declination and right ascension respectively.

The details of the interior mechanism of the " head " will be almost

Fig. 10.

evident from fig. 10 without description. The screw, turned by the wheels at g', acts in a toothed arc, whence, as shown in the figure, equal and opposite motion is communicated to the slides by the jointed rods v, v. The slides are kept firmly down to their bear- ings by the rollers r, r, r, r, attached to axes which are, in the middle, very strong springs. Side-shake is prevented by the screws and* pieces k, k, k, k. The scales are at », re; they are fastened only at the middle, and are kept down by the brass pieces /, /.

A similar heliometer was made by the Repsolds to the order of Lord

Lindsay for his Mauritius expedition in 1874. It differed only from the three Russian instruments in having a mounting by the Cookes in which the declination circle reads from the eye-end. 6 This instrument was afterwards most generously lent by Lord Lindsay to Gill for his expedition to Ascension in 1877. 6

These four Repsold heliometers proved to be excellent instruments,

6 For a detailed description of this instrument see Dunecht Publications, vol. ii.

6 Mem. Royal Astronomical Society, xlvi I -172.

easy and convenient in use, and yielding results of very high accuracy in measuring distances. Their slow motion in position angle, however, was not all that could be desired. When small movements

Fig. 11.

were communicated to the handle e (fig. 9) by the tangent screw /, acting on a small toothed wheel clamped to the rod connected with the driving pinion, there was apt to be a torsion of the rod rather than an immediate action. Thus the slow motion would take place

the observer. This alteration and the new equatorial mounting have been admirably made by Grubb; the result is completely successful. The instrument so altered was in use at the Cape Observatory from March 1881 till 1887 in deter- mining the parallax of some of the more interesting southern stars. The instrument then passed, by purchase from Gill, to Lord McLaren, by whom it was presented to the Royal Observatory, Edinburgh.

Still more recently the Repsolds have completed a new heliometer for Yale College, New Haven, United States. The object-glass is of 6 in. aper- ture and 98 in. focal length. The mounting, the tube, objective-cell, slides, &c, are all of steel. 1 The instrument is shown in fig. 11. The circles for position angle and declination are read by micrometer-microscopes illuminated by the lamp L; the scales are illuminated by the lamp /. T is part of the tube proper, and turns with the head. The tube V, on the contrary, is attached to the cradle, and merely forms a support for the finder Q, the handles at / and p, and the moving ring P. The latter giver, quick motion in position angle; the handles at p

clamp and give slow motion in position angle, those at / clamp and give slow motion in right ascension and declination, a is the eye-piece, b the handle for moving the seg- ments, c the micrometer microscope for reading the scales and scale micrometer, d the micrometer readers of the position and declination circles, e the handle for rotating the large wheel E which carries the screens. The hour circle is also read by microscopes, and the instrument can be used in both positions (tube preceding and following) for elimination of the effect of flexure on the position angles. Elkin found that the chief drawbacks to speed and convenience in working this heliometer were: (1) The loss of time involved in entering the correspond- ing readings of the micrometer pointings on two scales. (2) That an additional motion inter- mediate between the quick and slow motion in position angle was necessary, because, whilst the slow motion provided by Repsolds was admirably-adapted for adjusting the pointings in position angle, it was too slow for causing the images to “cross through ” each other in the process of measur- ing distances. To remedy drawback (1) Repsolds devised the form of printing micrometer which is shown in figs. 12 and 13. This micrometer is provided with two pairs of parallel webs. One fixed pair of webs is attached to the micrometer-box, the other pair is moved by the screw S. The whole micrometer-box is moved by

Fig. 12.

by jerks instead of with the necessary smoothness and certainty. VVhen the heliometer-part of Lord Lindsay’s heliometer was acquired by Gill in 1879, he changed the manner of imparting the motion in question. A square toothed racked wheel was applied to the tube at r (fig. 9). This wheel is acted on by a tangent screw whose bear- ings ‘re attached to the cradle; the screw is turned by means of a handle supported by bearings attached to the cradle, and coming within convenient reach of the observer’s hand. The tube turns smoothly in the racked wheel, or can be clamped to it at the will of

Fig. 13.

the screw attached to the heads. Accordingly, in reading the scales A and B (attached to the slides which carry the two halves of the object-glass), it is only necessary to turn the screws until the fixed

1 The primary object was to have the object-glass mounted in steel cells, which more nearly correspond in expansion with glass. It became then desirable to make the head of steel for sake of uniformity of material, and the advantages of steel in lightness and rigidity for the tube then became evident.

«.-♦■ >

double web is pointed symmetrically on one of the divisions of scale A, then to move the other double web by the screw S until it is symmetrically pointed on the adjoining division of scale B. By turning the quick acting screw P (fig. 13) to the right, the cushion C (which is faced with india-rubber) presses the paper ribbon (shown in fig. 13) against the index-edge and type-wheels, and thus the beautifully cut divisions of the micrometer-head, the numbers marking the jJ B parts of the head, the index and the total number of revolutions are all sharply embossed together upon the paper ribbon. Fig. 14 shows the record of several successive paintings on the same scale as that given by the micrometer. The reverse motion of P auto- matically moves the paper ribbon forward, ready to receive the next impression. It must be mentioned that the pressure of the cushion C on the type-wheels has no influence whatever upon the micrometer-screw, because the type-wheels are mounted on a hollow cylindrical axis, concentric with the axis of the screw, but entirely disconnected from the screw itself. The only connexion between the type-wheel and the screw- head S is by the pin p (which is screwed into S), the cylindrical end of which acts in a slot cut in the type- wheel. To remedy drawback (2) Repsolds provided for the Yale heliometer an additional handle for motion in position angle, intermediate in velocity between the original quick and slow motions.

In the 7-in. heliometer, completed in 1887 for the Royal Ob- servatory at the Cape of Good Hope, Repsolds, on Gill's suggestion, introduced the following improvements: (a) Four different speeds of motion in position angle were provided. The quickest movement is given by the hand-ring, 73 (fig. 15). This_ ring runs between friction wheels and is provided with teeth on its inner periphery, and these teeth transmit motion to a pinion on a spindle having at its other end another pinion which, through an intermediate wheel, rotates the heliometer tube. The transmission spindle, just men- tioned, carries at its end a head, 74, which, if turned directly, gives the second speed. The slowest speed is given by means of a tangent screw which is carried by a ball-bearing on the flange of the telescope-

Fig. 14.

From Engineering, vol. xUx.

Fig. 15.

sleeve, whilst its nut is double-jointed to a ring that encircles the flange of the heliometer-tube. This ring is provided with a clamping screw, which, through the intervention of bevel-gear and rods, is operated by means of the hand-wheel 78. With similar bevel-gear and rods the tangent screw is connected to the hand-wheel, 79, by which the observer communicates the fourth or slowest motion in position angle. Finally the hand-wheel 80 is connected by gearing to the rod carrying the hand-wheel 79, and it can thus be used to give the latter a more rapid motion than if used direct ; this constitutes the third speed of movement.

(b) In lieu of oil-lamps, small, conveniently placed incandescent electric 6- volt lamps are employed; and these are fitted with suitable switches and variable resistances. Thus the scales, the position- and declination-circles, the field of view, the heads of all the micrometer-microscopes, the focusing scale, &c, are read without the aid of a hand-lamp and with an amount of illumination that can be regulated at the observer's pleasure,

(c) A button in the centre of the position-angle handle (74) con- nects with a chronograph which enables the observer to record the instant of observation. Little card-holders (81) (also illuminated) enable the astronomer to enter beforehand the R.A. and Dec. of the object to be observed, the scale divisions to be pointed upon, and thus, in measures of distance, with the aid of the chronograph and printing micrometer, enable the observer to adjust the instrument for observation and obtain a record of his observations without the aid of a hand-lamp or the necessity to make any records in his notebook. In observations of position angle one of the two tablets 81 can be used to record the readings.

(d) The scales are made of iridio-platinum instead of silver, and the magnifying power of the reading microscope is increased fourfold (viz. to 100 diameters). A special microscope is introduced for determining the division errors of the scales. It enables the observer to compare any division-interval on one half of either scale with any corresponding interval on the other scale. With this apparatus Gill was enabled (Annals Cape Obs. vii. 29-42, and Monthly Notices,ˆ R.A.S., xlix. 105-115) to determine the division error of every line on both scales with a probable error corresponding to

=to"-oo92 arc.

(e) A position-micrometer is attached to the finder to enable the observer to select comparison stars for observation with some unexpected object. Thus a comet may be encountered in the morn- ing dawn or evening twilight, and without such an adjunct the astronomer may lose the whole available opportunity for observation in the vain endeavour to find a suitable comparison-star. But with such a position-micrometer of large field he has no difficulty. Directing the finder to the comet, he has at once in the field of view all available comparison stars. Having selected the most suitable one he directs the axis of the finder to the estimated middle point between the comet and the star, turns the finder-micrometer in

position angle until the images of comet and star lie symmetrically between the parallel position wires, and then turns the micrometer screw (which moves the distance-wires sym- metrically from the centre in opposite direc- tions) till one wire bisects the comet and the other the star. The reading of the position- circle of the finder is then the reading to which the position-circle of the heliometer should be set, and from the readings of the micrometer- screw he finds, by a convenient table, the proper settings of the heliometer scales in distance. When the scales and position-circle of the heliometer have been set to these readings, the comet and the selected comparison-star appear together in the field of view.

Fig. 15 shows the very convenient arrange- ment of the eye-end of the instrument. The disk, 30 with its small projecting handle enables the 2 segments of the divided object to be moved rapidly or with any required delicacy relative to each other. The disk 32 operates the wire gauze screens for equalizing the brightness of the two stars under observa- tion. The dial between 30 and 32 indicates the screen in use. 18 clamps and 19 gives slow motion in declination; 20 clamps and 21 gives slow motion in right ascension. The two handles 82 serve for manipulating the instrument. The microscopes adjoining 82 read the position and declination circles; for, by an ingenious arrangement of prisms and screens, the images of both circles can be read by each single microscope as shown in fig. 16, thus avoiding the necessity for the employ- ment of two additional micrometers.

Experience has shown that there is little that can be advantageously changed to im- prove this instrument either in convenience or precision of working. A series of observa- tions can be easily and more accurately ac- complished with the Cape heliometer in half an hour; with the Oxford heliometer it would occupy 2 hours, and with the 4-in. Repsold heliometer (fig. 9) I hour. Heliometers of 6 to 8 in. aperture have subsequently been constructed by Repsolds on these plans for Gottingen, Bamberg, Leipzig and the Kuffner Ob- servatory (near Vienna), and all of them have made important contributions to astronomy of precision.

Heliometer observations of distance in their most refined sense cannot be considered absolute measures of angles. Essentially the scale-value of the instrument depends on the relation of the focal

Qrclt of position Circk ofdtdinatm

II

S3

II

5:8.

Oil.

e

From Engineering, vol. xlix.

Fig. 16.

length of the object-glass to the length of the unit of the scale. But the eye is tolerant of small changes in the focal adjustment which sensibly affect the scale-value. These changes may and do arise from the following causes: (i.) The focal length of the object-glass and the length of the tube are affected by temperature, (ii.) The focal length is sensibly different for objects of different colour, (iii.) The length of the scale is affected by temperature, (iv.) The state of adaptation

of the observer's eye is dependent on his state of health, on a con- dition of greater or less fatigue, or on the inclina- . tion of the head

ithreldi inconsequenceof the altitude of the object ob- served, (v.) The temperature of the object-glass, of the scale and of the tube, can- not be assumed to be identical. Thus, for re- fined purposes, it cannot be as- sumed with any certainty that the instantane- ous scale- value of theheliometer

is known, or that it is a function of the temperature. Of course, for many purposes, mean conditions may be adopted and mean scale-values be found which are applicable with considerable pre- cision to small angles or to comparatively crude observations of large distances; but the highest refinement is lost unless means are provided for determining the scale-value for each observer at each epoch of observation.

In determinations of stellar or solar parallax, comparison stars, symmetrically situated with respect to the object whose parallax is sought, should be employed, in which case the instantaneous scale-value may be regarded as an unknown quantity which can be derived in the process of the computation of the results. Examples of this mode of procedure will be found, in the case of stellar parallax in the Mem. R.A.S. vol. xlviii. pp. 1-194, and in the Annals of the Cape Observatory, vol. viii. parts 1 and 2 ; and in the case of planetary parallax in the Mem. R.A.S. vol. xlvi. pp. 1-171, and in the Annals of the Cape Observatory, vol. vi. In other operations, such as the triangulation of lane croups of stars, it is necessary to select a pair of standard stars, if possible near the middle of the group, and to determine the scale-value by measures of this standard distance at frequent intervals during the night (see Annals of the Cape Ob-

servatory, vol. vi. pp. 3-224). In other cases, such as the measurement of the mutual distances and position angles of the satellites of Jupiter, for derivation of the elements of the orbits of the satellites and the mass of Jupiter, reference must also be made to measures of standard stars whose relative distance and position angle is accurately determined by independent methods (see Annals of the Cape Observatory, vol. xii. part 2).

Gill introduced a powerful auxiliary to the accuracy of helio- meter measures in the shape of a reversing prism placed in front of the eye-piece, between the latter and the observer's eye. If measures are made by placing the image of a star in the centre of the disk of a planet, the observer may have a tendency to do so systematically in error from some acquired habit or from natural astigmatism of the eye. But by rotating the prism 90 the image is presented entirely reversed to the eye, so that in the mean of measures made in two such positions personal error is eliminated. Simi- li , larly the prism may be used for the study and elim- sj"' ination of personal errors depending on the angle made •-...;» by a double star with the vertical. The best plan of Fig 17 moun ting such a prism has been found to be the " following. P-, P (fig. 17) are the eye lens and field lens respectively of a Merz positive eye-piece. In this construction the lenses are much closer together and the diaphragm for the eye is much farther from the lenses than in Ramsden's eye-piece. The prism p is fitted accurately into brass slides (care has to be taken in the construction to place the prism so that an object in the centre of the field will so remain when the eye-piece is rotated in its adapter). There is a collar, clamped by the screw at S, which is so adjusted that the eye-piece is in focus when pushed home, in its adapter, to this collar. The prism and eye-piece are then rotated together in the adapter.

The Double Image Micrometer. — Thomas Clausen in 1841 (Ast. Naeh. No. 414) proposed a form of micrometer consisting of a divided plate of parallel glass placed within the cone of rays from the object-glass at right angles to the telescoue axis. One-half of

this plane remains fixed, the other half is movable. When the inclination of the movable half with respect to the axis of the telescope is changed by rotation about an axis at right angles to the plane of division, two images are produced. The amount of separation is very small, and depends on the thickness of the glass, the index of refraction and the focal length of the telescope. Angelo Secchi (Comptes rendus, xli., 1855, p. 906) gives an account of some experiments with a similar micrometer; and Ignarjio Porro (Comptes rendus, xli. p. 1058) claims the original invention and construction of

such a micrometer in 1842. Clausen, however, has undoubted priority. Helmholtz in his ” Ophthalmometer ” has employed Clausen’s principle, but arranges the plates so that both move sym- metrically in opposite directions with respect to the telescope axis. Should Clausen’s micrometer be employed as an astronomical instrument, it would be well to adopt the improvement of Helmholtz.

Double-Image Micrometers with Divided Lenses. — Various micrometers have been invented besides the heliometer for measuring by double image. Ramsden’s dioptric micrometer consists of a divided lens placed in the conjugate focus of the innermost lens of the erecting eye-tube of a terrestrial telescope. The inventor claimed that it would supersede the heliometer, but it has never done anything for astronomy. Dollond claims the independent invention and first construction of a similar instrument (Pearson’s Practical Astronomy, ii. 182). Of these and kindred instruments only two types have proved of practical value. G. B. Amici of Modena (Mem. Soc. Ital. xvii., 1815, pp. 344-359) describes a micrometer in which a negative lens is introduced between the eye-piece and the object- glass. This lens is divided and mounted like a heliometer object- glass; the separation of the lenses produces the required double image, and is measured by a screw. W. R. Dawes very successfully used this micrometer in conjunction with a filar micrometer, and found that the precision of the measures was in this way greatly increased (Monthly Notices, vol. xviii. p. 58, and Mem. R.A.S. vol. xxxv. p. 147).

In the improved form 1 of Airy’s divided eye-glass micrometer (Mem. R.A.S. vol. xv. pp. 199-209) the rays from the object-glass pass successively through lenses as follows :

Lens.

Distance from next Lens.

Focal Length.

a. An equiconvex lens

b. „ „ . . .

c. Plano-convex,convex towards b

d. Plano-convex,convex towards c

P

2

arbitrary = p

5 1 1

The lens & is divided, and one of the segments is moved by a micrometer screw. The magnifying power is varied by changing the lens a for another in which p has a different value. The magnifying power of the eye-piece is that of a single lens of focus = %p.

In 1850 J. B. Valz pointed out that the other optical conditions could be equally satisfied if the divided lens were made concave instead of convex, with the advantage of giving a larger field of view (Monthly Notices, vol. x. p. 160).

The last improvement on this instrument is mentioned in the Report of the R.A.S. council, February 1865. It consists in the introduction by Simms of a fifth lens, but no satisfactory descrip- tion has ever appeared. There is only one practical published investigation of Airy's micrometer that is worthy of mention, viz. that of F. Kaiser (Annalen der Sternwarte in Leiden, iii. 1 1 1-274). The reader is referred to that paper for an exhaustive history and discussion of the intrument. 2 It is somewhat surprising that, after Kaiser's investigations, observers should continue, as many have done, to discuss their observations with this instrument as if the screw-value were constant for all angles.

1 For description of the earliest form see Cambridge Phil. Trans. vol. ii., and Greenwich Observations (1840).

2 Dawes (Monthly Notices, January 1858, and Mem. R.A.S. vol. xxxv. p. 150) suggested and used a valuable improvement for pro- ducing round images, instead of the elongated images which are otherwise inevitable when the rays pass through a divided lens of which the optical centres are not in coincidence, viz. " the intro- duction of a diaphragm having two circular apertures touching each other in a point coinciding with the line of collimation of the telescope, and the diameter of each aperture exactly equal to the semidiameter of the cone of rays at the distance of the diaphragm from the .focal point of the object-glass." Practically the difficulty of making these diaphragms for the different powers of the exact required equality is insuperable; but, if the observer is content to lose a certain amount of light, we see no reason why they may not readily be made slightly less. Dawes found the best method for the purpose in question was to limit the aperture of the object-glass by a dia- phragm having a double circular

aperture, placing the line joining the centres of the circles approximately in the position angle under measurement. Dawes successfully employed the double circular aperture also with Amici's micrometer. The present writer has successfully used a similar plan in measuring position angles of a Centauri with the heliometer, viz. by placing circular diaphragms on the two segments of the object-glass.

Steinheil (Journal savant de Munich, Feb. 28, 1843) describes a " heliometre-oculaire " which he made for the great Pulkowa refractor, the result of consultations between himself and the elder Struve. It is essentially the same in principle as Amici's micro- meter, except that the divided lens is an achromatic positive instead of a negative lens. Struve (Description de I'Observatoire Central de Pulkowa, pp. 196, 197) adds a few remarks to Steinheil's description, in which he states that the images have not all desirable precision — a fault perhaps inevitable in all micrometers with divided lenses, and which is probably in this case aggravated by the fact that the rays falling upon the divided lens have considerable convergence. He, however, successfully employed the instrument in measuring double stars, so close as 1 " or 2", and using a power of 300 diameters, with results that agreed satisfactorily amongst themselves and with those obtained with the filar micrometer. If Struve had employed a properly proportioned double circular diaphragm, fixed symmetric- ally with the axis of the telescope in front of the divided lens and turning with the micrometer, it is probable that his report on the instrument would have been still more favourable. This particular instrument has historical interest, having led Struve to some of those criticisms of the Pulkowa heliometer which ultimately bore such valuable fruit (see ante).

Ramsden (Phil. Trans, vol. xix. p. 419) suggested the division of the small speculum of a Cassegrain telescope and the production of double image by micrometric rotation of the semispecula in the plane passing through their axis. Brewster (Ency. Brit. 8th ed. vol. xiv. p. 749) proposed a plan on a like principle, by dividing the plane mirror of a Newtonian telescope. Again, in an ocular helio- meter by Steinheil double image is similarly produced by a divided prism of total reflection placed in parallel rays. But practically these last three methods are failures. In the last the field is full of false light, and it is not possible to give sufficiently minute and steady separation to the images; and there are of necessity a collimator, two prisms of total

reflection, and a small telescope through which the rays must pass; consequently there is great loss of light.

Micrometers Depending on Doable Refraction. — To the Abbe Rochon (Jour, de phys. liii., 1801, pp. 169-198) is due the happy idea of applying the two images formed by double refraction to the construction of a micrometer. He fell upon a most ingenious plan of doubling the amount of double refraction of a prism by using two prisms of rock-crystal, so cut out of the solid as to give each the same quantity of double refraction, and yet to double the quantity in the effect produced. The combination so formed is known as Rochon's prism. Such a prism he placed between the object-glass and eye-piece of a telescope. The separation of the images increases as the prism is approached to the object-glass, and diminishes as it is approached towards the eye-piece.

D. F. J. Arago (Comples rendus, xxiv., 1847, pp. 400-402) found that in Rochon's micrometer, when the prism was approached close to the eye-piece for the measurement of very small angles, the smallest imperfections in the crystal or its surfaces were inconveniently magnified. He therefore selected for any particular measurement such a Rochon prism as when fixed between the eye and the eye- piece (i.e. where a sunshade is usually placed) would, combined with the normal eye-piece employed, bring the images about to be measured nearly in contact. He then altered the magnifying power by sliding the field lens of the eye-piece (which was fitted with a slipping tube for the purpose) along the eye-tube, till the images were brought into contact. By a scale attached to the sliding tube the magnifying power of the eye-piece was deduced, and this com- bined with the angle of the prism employed gave the angle measured.

Fig. it

If p" is the refracting angle of the prism, and n the magnifying power of the eye-piece, then p"/n will be the distance observed. Arago made many measures of the diameters of the planets with such a micrometer.

Dollond (Phil. Trans., 1821, pp. 101-103) describes a double- image micrometer of his own invention, in which a sphere of rock- crystal is substituted for the eye-lens of an ordinary eye-piece. In this instrument (figs. 18, 19) a is the sphere, placed in half-holes on the axis bb, so that when its principal axis is parallel to the axis of the telescope it gives only one image of the object. In a direction perpendicular to that axis it must be so placed that when it is moved

by rotation of the axis bb the separation of the images shall be parallel to that motion. The angle of rotation is measured on

the graduated circle C. The angle between the objects measured is = r sin 20, where r is a constant to be determined for each magni- fying power employed, 1 and 6 the angle through which the sphere has been turned from zero (i.e. from coincidence of its principal axis with that of the telescope). The maximum separation is conse- quently at 45 from zero. The measures can be made on both sides of zero for eliminating index error. There are considerable difficulties of construction, but these have been successfully overcome by Dollond; and in the hands of Dawes (Mem. R.A.S. xxxv. p. 144 seq.) such instruments have done valuable service. They are liable to the objection that their employment is limited to the measurement of very small angles, viz. 13″ or 14″ when the magnifying power is 100, and varying inversely as the power. Yet the beautiful images which these micrometers give permit the measurement of very difficult objects as a check on measures with the parallel-wire micrometer.

On the theory of the heliometer and its use consult Bessel, Astronomische Untersuchungen, vol. i. ; Hansen, Ausfilhrliche Meihode mit dem Fraunhoferschen Heliometer anzustellen (Gotha, 1827); Chauvenet, Spherical and Practical Astronomy, vol. ii. (Philadelphia and London, 1876); Seeliger, Theorie des Heliometers (Leipzig, 1877); Lindsay and Gill, Dunecht Publications, vol. ii. (Dunecht, for private circulation, 1877); Gill, Mem. R.A.S. vol. xlvi. pp. 1-172, and references mentioned in the text. (D. Gi.)

HELIOPOLIS, one of the most ancient cities of Egypt, met with in the Bible under its native name On. It stood 5 m. E. of the Nile at the apex of the Delta. It was the principal seat of sun-worship, and in historic times its importance was entirely religious. There appear to have been two forms of the sun-god at Heliopolis in the New Kingdom — namely, Ra-Harakht, or Re'-Harmakhis, falcon-headed, and Etdm, human-headed; the foimer was the sun in his mid-day strength, the latter the evening sun. A sacred bull was worshipped here under the name Mnevis (Eg. Mreu), and was especially connected with Etom. The sun-god Re' (see Egypt: Religion) was especially the royal god, the ancestor of all the Pharaohs, who therefore held the temple of Heliopolis in great honour. Each dynasty might give the first place to the god of its residence — Ptah of Memphis, Ammon of Thebes, Neith of Sais, Bubastis of Bubastis, but all alike honoured Re*. His temple became in a special degree a depository for royal records, and Herodotus states that the priests of Heliopolis were the best informed in matters of history of all the Egyptians. The schools of philosophy

and astronomy are said to have been frequented by Plato and other Greek philosophers; Strabo, however, found them deserted, and the town itself almost uninhabited, although priests were still there, and cicerones for the curious traveller. The Ptolemies probably took little interest in their ” father ” Re”, and Alexandria had eclipsed the learning of Heliopolis; thus with the withdrawal of royal favour Heliopolis quickly dwindled, and the students of native lore deserted it for other temples supported by a wealthy population of pious citizens. In Roman times obelisks were taken from its temples to adorn the northern cities of the Delta, and even across the Mediterranean to Rome. Finally the growth of Fostat and Cairo, only 6 m. to the S.W., caused the ruins to be ransacked for building materials. The site was known to the Arabs as ‘Ayin esh shews, ” the fountain of the sun,” more recently as Tel Hisn. It has now been brought for the most part under cultivation, but the ancient city walls of crude brick are to be seen in the fields on all sides, and the position of the great temple is marked by an obelisk still standing (the earliest known, being one of a pair set up by Senwosri I., the second king of the Twelfth Dynasty) and a few granite blocks bearing the name of Rameses II.

See Strabo xvii. cap. 1. 27-28; Baedeker’s Egypt. (F. Ll. G.)

HELIOSTAT (from Gr. rJXtos, the sun, ctotos, fixed, set up), an instrument which will reflect the rays of the sun in a fix < *d direction notwithstanding the motion of the sun. The optical apparatus generally consists of a mirror mounted on an axis parallel to the axis of the earth, and rotated with the same angular velocity as the sun. This construction assumes that the sun describes daily a small circle about the pole of the celestial sphere, and ignores any diurnal variation in the declination. This variation is, however, so small that it can be neglected for most purposes.

1 Dollond provides for changing the power by sliding the lens d nearer to or farther from a.

Many forms of heliostats have been devised, the earliest having | to the framework pafe, the members of which are parallel to the

Fig. 1. by reference *to* fig.

been described by Wilhelm Jacob s’Gravesande in the 3rd edition of his Physices elementa (1742). One of the simplest consists of a

plane mirror rigidly connected with a revolving axis so that the angle be- tween the normal to the mirror and the axis of the instrument equals half the sun's polar distance, the mirror being adjusted so that the normal has the same right ascension as the sun. ft is easily seen that if the mirror be rotated at the same angular velocity as the sun the right ascensions will re- main equal throughout the day, and therefore this device reflects the rays in the direction of the earth's axis; a second fixed mirror reflects them in any other fixed direction. Foucault's heliostat reflects the rays horizontally in any required direction. The principle of the apparatus may be explained The axis of rotation AB bears a rigidly attached rod DBC inclined to it at an angle equal to the sun's polar distance. By adjusting the right ascension of the plane ABC and rotating the axis with the angular velocity of the sun, it follows that BC will be the direction of the solar rays throughout the day. X is the mirror rotating about the point E, and placed so that (if EB is the horizontal direction in which the rays are to be reflected) (1) the normal CE to the mirror is jointed to BC at C and is equal in length to BE, (2) the rod DBC passes through a slot in a rod ED fixed to, and in the plane of, the mirror. Since CE equals BE these directions are equally inclined to, and coplanar with, the normal to the mirror. Hence light incident along the direction BC will be reflected along CE. Silbermann's heliostat reflects the rays in any direction. The principle may be explained by means of fig. 2. AB is the axis of rotation, BC an adjustable rod as in Foucault's constiuction, and which can be set to the direction in which -..*. rays are to be reflected. The rods BC and DB carry two small rods EF, GF jointed at F; at this joint there is a pin which slides in a slot on the rod BH, which is normal to the mirror X. The

BD

th(

Fig. 2. is another rod

Vrom Jamin and Bouty, Ccura de physique, Gauthier-Villars.

Fig. 3. — Silbermann's Heliostat.

rods EF, GF are such that BEFG is a rhombus. It is easy to show that rays falling op the mirror in the direction BC will be reflected along BD. One construction of the instrument, described in Jamin's Cours de physique, is shown in fig. 3. The mirror mm is attached

ncident and reflected rays SO, OR, and the diagonal pf is per-

pendicular to the mirror. The framework is attached to two independent circular arcs Cs and rr' having their centres at O and provided with clamps D and A on the axis F of the instrument. The arc Cs is graduated, and is set so that the angle COD equals the complement of the sun's declination. This can be effected (after setting the axis) by rotating Cs until a needle indicates true time on the hour dial B. The arc rr is set so as to reflect the rays in the required direction. The axis F of the instrument is set at an angle equal to the latitude of the place of observation and in the meridian by means of the screw K, and rotated by clockwork contained in the barrel H. The setting in the meridian is effected by turning the instrument after setting for latitude until a pin-hole aperture s and a small screen P, placed so that Ps is parallel to CO, are in a line with the sun.

Many other forms of heliostats have been designed, the chief difference consisting in the mechanical devices for maintaining the constant direction of the reflecting ray. One of the most important applications of the heliostat is as an adjunct to the newer forms of horizontal telescopes (q.v.) and in conjunction with spectroscopic telescopes in observations of eclipses.

HELIOTROPE, or Turnsole, Heliotropium (Gr. riXwTpoiriov, i.e. a plant which follows the sun with its flowers or leaves, or, according to Theophrastus (Hist, plant, vii. 15), which flowers at the summer solstice), a genus of usually more or less hairy

herbs or undershrubs of the tribe Heliolropieae of the natural

order Boraginaceae, having alternate, rarely almost opposite

leaves; small white, lilac or blue flowers, in terminal or lateral

one-sided simple or once or twice

forked spikes, with a calyx of five

deeply divided segments, a salver- shaped, hypogynous, 5-lobed corolla,

and entire 4-celled ovary; fruit 2-

to 4-sulcate or lobed, at length

separable into four 1 -seeded nutlets

or into two hard 2-celled carpels.

The genus contains 220 species

indigenous in the temperate and

warmer parts of both hemispheres.

A few species are natives of Europe,

as H. europaeum, which is also a

naturalized species in the southern

parts of North America.

The common heliotrope of English

hothouses, H . peruvianum, popularly

known as ” cherry-pie,” is on

account of the delicious odour of

its flowers a great favourite with

florists. It was introduced into

Europe by the younger Jussieu,

who sent seed of it from Peru

to the royal garden at Paris. About the year 1757 it

was grown in England by Philip Miller from seed obtained

from St Germains. H. corymbosum (also a native of Peru),

which was grown in Hammersmith nurseries as early as 181 2,

has larger but less fragant flowers than H. peruvianum. The

species commonly grown in Russian gardens is H. suaveolens, which has white, highly fragrant flowers.

Heliotropes may be propagated either from seed, or, as commonly, by means of cuttings of young growths taken an inch or two in length. Cuttings when sufficiently ripened, are struck in spring or during the summer months; when rooted they should be potted singly into small pots, using as a compost fibry loam, sandy peat and well-decomposed

stable manure from an old hotbed. The plants soon require to be shifted into a pot a size larger. To secure early-flowering plants, cuttings should be struck in August, potted off before winter sets in, and kept in a warm greenhouse. In the spring larger pots should be given, and the plants shortened back to make them bushy. They require frequent shiftings during the summer, to induce them to bloom freely.

The heliotrope makes an elegant standard. The plants must in this case be allowed to send up a central shoot, and all the side growths must be pinched off until the necessary height is reached, when the shoot must be stopped and lateral growths will be produced to form the head. During winter they should

Heliotropium suaveolens.

be kept somewhat dry, and in spring the ball of soil should be reduced and the plants repotted, the shoots being slightly pruned, so as to maintain a symmetrical head. When they are planted out against the walls and pillars of the greenhouse or conservatory an abundance of highly perfumed blossoms will be supplied all the year round. From the end of May till October heliotropes are excellent for massing in beds in the open air by themselves or with other plants. Many florists' varieties of the common heliotrope are known in cultivation.

Pliny (Nat. hist. xxii. 29) distinguishes two kinds of " helio- tropium," the tricoccum, and a somewhat taller plant, the helioscopium; the former, it has been supposed, is Crolon linctorium, and the latter the rihiorpbinov ixinpov of Dioscorides or Heliotropium europaetim. The helioscopium, according to Pliny, was variously employed in medicine; thus the juice of the leaves with salt served for the removal of warts, whence the term herba verrucaria applied to the plant. What, from the perfume of its flowers, is sometimes called winter heliotrope, is the fragrant butterbur, or sweet-scented coltsfoot, Petasiies (Tussilago) fragrans, a perennial Composite plant.

Heliotrope, in mineralogy, is the mineral commonly called " bloodstone " (q.v.), and sometimes termed girasol— a name applied also to fire-opal. The name, like those of many ancient names of minerals, seems to have had a fanciful origin. According to Pliny the stone was so called because when thrown into the water it turned the

sun's light falling upon it into a reflection like that of blood.

HELIOZOA, in zoology, a group of the Sarcodina (q.v.) so named by E. Haeckel, 1866. They are characterized by the radiate pseudopods, finely tapering at the apex, springing abruptly from the superficial protoplasm, containing a denser, rather permanent axial rod (figs. 1 (1), 2 (2); protoplasm without a clear ectoplasm or pellicle, often frothy with large vacuoles, like the alveoli of Radiolaria; nucleus 1 or numerous; skeleton absent, gelatinous or of separate siliceous fibres, plates or spicules, rarely complete and latticed; reproduction by simple fission or by brood-formation, often syngamous; form usually nearly spherical, rarely changing slowly. This group was formerly included with the Rhizopoda; but was separated from it by Haeckel on account of the character of its pseudopods, and its general adaptation to a semipelagic existence correlated with the frothy cytoplasm (fig. 1 (1)). Actinophrys sol and Actinosphaerium eichhomii (fig. 2), known as sun animalcules to the older microscopists, float freely in stagnant or slow- flowing waters, and Myriophrys is able by an investment of long flagelliform cilia to swim freely. The majority, however, lurk among confervae or the light debris of the bottom ooze; and come under the head of " sapropelic " rather than pelagic organisms. The body is usually of constant spherical form in relation to the floating habit. Nuclear ia, however, shows amoe- boid changes of general outline. The pseudopods are retractile, the axial filament being absorbed as the filament grows shorter and thicker and disappearing when the pseudopod merges into the ectoplasm, to be reformed at the same time with the pseudopod. There is often a distinction, clear, but never sharp, between the richly vacuolate, almost frothy ectoplasm and the denser endoplasm. One or more contractile vacuoles may protrude from the ectoplasm. The endoplasm contains the nucleus or nuclei. The nucleus when single may be central or excentric: in the latter case, the endoplasm contains a clear central sphere (" centrosome ")on which abut the axial filaments of the pseudo- pods. The ectoplasm contains, in some species, constantly (Raphidiophrys viridis) or occasionally (Actinosphaerium) , green cells belonging to the genera Zoochlorella and Sphaerocystis, both probably — the latter certainly — vegetative stages of a Chlamy- domonad (Flagellata, q.v.) and of symbiotic significance.

The Heliozoa can move by rolling over on their extended pseudo- pods; Acanthocystis ludibunda traversing a path of as much as twenty times its diameter in a minute, according to Penard. several species (e.g. Raphidiophrys elegans) remain associated by the union of their pseudopods, whether into social aggregates (due to approximation) or " colonies " due to lack of separation

Fig. 1. — Heliozoa. 1. Actinophrys sol, Ehrb. a, food-particle lying in a large food-vacuole; b, deep-lying finely granular pro- toplasm; c, axial filament of a pseudopodium extended inwards to the nucleus; d, the central nucleus; e, contractile vacuole; /, superficial much vacuolated protoplasm. 2. Clathrulina elegans, Cienk. 3. Ileterophrys marina, H. and L. a, nucleus; b, clearer protoplasm surrounding the nucleus; c, the peculiar felted envelope. 4. Raphidiophrys pallida, F. E. Schultze. a, food-particle; b, con- tractile vacuole; c, the nucleus; d, central granule in which all the axis-filaments of the pseudopodia meet. The tangentially disposed spicules are seen arranged in masses on the surface. 5. Acantho- cystis turfacea, Carter, a, probably the central nucleus; b, cleaˆ protoplasm around the nucleus; c, more superficial protoplasm with vacuoles and chlorophyll corpuscles; d, coarser siliceous spicules; e, finer forked siliceous spicules; /, finely granular layer of pro- toplasm. The long pseudopodia reaching beyond the spicules are not lettered. 6. Bi-flagellate "flagellula" of Acanthocystis aculeata. a, nucleus. 7. Id. of Clathrulina elegans. a, nucleus; b, granules. 8. Astrodisculus ruber, Greeff. a, red-coloured central sphere (? nu- cleus); b, peripheral homogeneous envelope.

after fission, is not accurately known. The multinuclear species Actinosphaerium eichhomii (fig. 2), normally apocytial (i.e. the nuclei divide repeatedly without division of the cytoplasm),

Fig. 2. — Heliozoa. 1. Actinosphaerium eichhornii, Ehr. ; a, nuclei; b, deeper protoplasm with smaller vacuoles and numerous nuclei; c, contractile vacuoles; d, peripheral protoplasm with larger vacuoles. 2. A portion of the same specimen more highly magnified and seen in optical section, a, Nuclei; b, deeper proto- plasm (so-called endosarc); d, peripheral protoplasm (so-called ectosarc) ; e, pseudopodia showing the granular protoplasm stream- ing over the stiff axial filament; /, food-particle in a good-vacuole. 3, 4. N'uclei of Actinosphaerium in the resting condition. 5-13. Successive stages in the division of a nucleus of Actinosphaerium, showing fibrillation, and in 7 and 8 formation of an equatorial plate of chromatin substance (after Hertwig). 14. Cyst-phase of Actinosphaerium eichhornii, showing the protoplasm divided into twelve chlamydospores, each of which has a siliceous coat; a, nucleus of the spore ; g, gelatinous wall of the cyst ; h, siliceous coat of the spore.

may increase in size by the fusion (" plastogamic ") of small

individuals. If a large specimen be cut up or fragment itself under irritation, the small ones so produced soon approach one another and fuse completely.

Reproduction. — Binary fission has been repeatedly observed; in sotne cases one or both of the daughter cells may swim for a time

as a biflagellate zoospore (fig. 1 (6, 7)). The process may take place when the cell is naked or after preliminary encystment. Budding has been well studied in Acanthocystis; the cell nucleus divides repeatedly and most of the daughter nuclei pass to the periphery, aggregate part of the cytoplasm, and with it are constricted off as independent cells; one nucleus remains central and the process may be repeated. The detached bud may assume the typical character after a short amoeboid (lobose) stage, sometimes preceded by rest, or it may develop 2 flagella and swim off (fig. 1 (6)).

Brood formation is only known here in relation to a syngamic process; this is a sharp contrast to Proteomyxa (q.v.) where brood- formation is the commonest mode of reproduction, and plasmodium- formation, rare indeed, is the nearest approach to syngamy observed. Indeed, if we knew the life-history of all the species this difference in the life cycle would be a convenient critical character.

Equal conjugation was demonstrated fully by F. Schaudinn in Actinophrys; two individuals approach and enter into close contact, and are surrounded by a common cyst wall. The nucleus of either male divides; and one nucleus passes to the surface at either side, and is budded off with a small portion of the cytoplasm as an abortive cell; the two remaining nuclei which are ” first cousins ” in cellular relationship now fuse, as is the case with the cytoplasts. The resulting coupled cell or zygote divides into two, which again encyst.

Actinosphaerium (fig. 2) shows a still more remarkable process, fully studied by R. Hertwig. The large multinucleate animal withdraws its pseudopods, its vacuoles disappear, it encysts and its nuclei diminish in number to about ˆth partly by fusion, 2 and 2, probably by digestion of the majority. Within the primary cyst the body is now resolved into nuclear cells, which again surround themselves with secondary cysts. The cell in each secondary cyst divides (by karyokinesis), and these sister cells, or rather their offspring, pair in much the same way as the individual cells of Actinophrys— the chief difference is that after the first division and budding off of, a rudimentary cell, a second division of the same character takes place, with the formation of a second rudimentary cell, which is the niece of

the first, absolutely in the same way as the 1st and 2nd polar bodies are formed in the maturation of the ovum in Metazoa. The actual pairing cells are thus second cousins, great- granddaughters of the original cell of the secondary cysts. Complete fusion now takes place to form the coupled cell, which is now con- tracted and forms a gelatinous wall within the siliceous secondary cyst wall (fig. 2 (14)). During a resting stage nuclear divisions occur and finally a brood of young i-nuclear Actinosphaerium leave the cyst.

Classification. Aphrothoraca. Body naked. Actinophrys Ehrb. (fig. 1 (1)) (nucleate), Actinosphaerium Stein plurinucleate (fig. 2 (1)), Camptonema (plurinucleate) Schaud., Dimorpha Gruber (some- times 2 flagellate).

I. Chlamydophora. Investment gelatinous. Astrodiscus. II. Chalarothoraca. Body protected by an investment of

spicules or fibre scattered or approximated, never fused

into a continuous skeleton.

§ 1. Spicules netted or free in the protoplasm. Hetero-

phrys Arch. (fig. 1 (3)), Raphidiophrys Arch. (fig. 1 (4)),

Pinacodocystis, Hertw. and Less.

§2. Spicules approximated radially. Pinaciophora Greeff,

Pompholyxophrys Arch., Lithocolla F. E. Schultze,

Elaeorhanis Greeff (in the two foregoing genera the spicules

represented by sand granules), Acanthocystis Carter (fig. 1

(5)), Pinacocystis (?) Hertw. and Less, Myriophrys Penard.

(Astrodisculus). III. Desmothoraca. § 1 attached by a stalk. Clathrulina Cienk.

(fig. 1 (2, 7)), Hedriocystis, Hertw. and Less. § 2. Free Elaster, Grimin, Choanocystis. Literature. — The most important English original papers on this group are those by W. Archer, ” On some Freshwater Rhizopoda, new, or little known,” Quarterly Journal of Microscopic Science, N.S. ix.-xi. (1869-1871), and ” R6sume of Recent Contributions to the Knowledge of Freshwater Rhizopods,” ibid, xvi., xvii. (1876- 1877). See also R. Hertwig and Lesser, ” tjber Rhizopoda

und denselben nahestehenden Organismen," in Archiv fiir mikroscopische Anatomie, x. (1874), p. 35; R. Schaudinn, " Heliozoa " in Tierreich (1896); E. Penard, Les Heliozoaires d'eau douce (1904); the two last named contain full bibliographies. (M. Ha.)

HELIUM (from Gr. rjXios, the sun), a gaseous chemieaj element, the modern discovery of which followed closely on that of argon (q.v.). The investigations of Lord Rayleigh and Sir William Ramsay had shown that indifference to chemical reagents did not sufficiently characterize an unknown gas as nitrogen, and it became necessary to reinvestigate other cases of the occurrence of "nitrogen" in nature. H. Miers drew Ramsay's attention to the work of W F. Hillebrand, who had noticed, in examining the mineral uraninite, that an inert gas was evolved when the mineral was decomposed with acid. Ramsay, repeating these experiments, found that the inert gas emitted refused

to oxidize when sparked with oxygen, and on examining it spectroscopically he saw that the spectrum was not that of argon, but was characterized by a bright yellow line near to, but not identical with, the D line of sodium. This was after- wards identified with the D 3 line of the solar chromosphere, observed in 1868 by Sir J. Norman Lockyer, and ascribed by him to a hypothetical element helium. This name was adopted for the new gas.

Helium is relatively abundant in many minerals, all of which are radioactive, and contain uranium or thorium as important constituents. (For the significance of this fact see Radio- activity.) The richest known source is thorianite, which consists mainly of thorium oxide, and contains 9-5 cc. of helium per gram. Monazite, a phosphate of thorium and other rare earths, contains on the average about 1 cc. per gram. Cleveite, samarskite and fergusonite contain a little more than monazite. The gas also occurs in minute quantities in the common minerals of the earth's crust. In this case too it is associated with radio- active matter, which is almost ubiquitous. In two cases, how- ever, it has been found in the absence of appreciable quantities of uranium and thorium compounds, namely in beryl, and in sylvine (potassium chloride). Helium is contained almost universally in the gases which bubble up with the water of thermal springs. The proportion varies greatly. In the hot springs of Bath it amounts to about one-thousandth part of the gas evolved. Much larger percentages have been recorded in some French springs (Compt. rend.,

1906, 143, p. 795, and 146, p. 435), and considerable quantities occur in some natural gas (Journ. Amer. Chem. Soc. 29, p. 1524). R. J. Strutt has suggested that helium in hot springs may be derived from the disintegration of common rocks at great depths.

Helium is present in the atmosphere, of which it constitutes four parts in a million. It is conspicuous by its absorption spectrum in many of the white stars. Certain stars and nebulae show a bright line helium spectrum.

Much the best practical source of helium is thorianite, a mineral imported from Ceylon for the manufacture of thoria. It dissolves readily in strong nitric acid, and the helium contained is thus liberated. The gas contains a certain amount of hydrogen and oxides of carbon, also traces of nitrogen. In order to get rid of hydrogen, some oxygen is added to the helium, and the mixture exploded by an electric spark. All remaining impurities, including the excess of oxygen, can then be taken out of the gas by Sir James Dewar's ingenious method of absorption with charcoal cooled in liquid air. Helium alone refuses to be absorbed, and it can be pumped off from the charcoal in a state of absolute purity. In the absence of liquid air the helium must be purified by the methods employed for argon (q.v.). If thorianite cannot be obtained, monazite, which is more abundant, may be utilized. A part of the helium contained in minerals can be extracted by heat or by grinding (J. A. Gray, Proc. Roy. Soc, 1909, 8 2 a, p. 301).

Properties. — All attempts to make helium enter into stable chemical union have hitherto proved unsuccessful. The gas is in all probability only mechanically retained in the minerals in which it is found. Jacquerod and Perrot have found that quartz-glass is freely permeable to helium below a red-heat (Compt. rend., 1904, 139, p. 789). The effect is even perceptible at a temperature as low as 220 C. Hydrogen, and, in a much less degree, oxygen and nitrogen, will also permeate silica, but only at higher temperatures. They have made this observation the basis of a practical method of separating helium from the other inert gases. M. Travers has suggested that it may explain the liberation of helium from minerals by heat, the gas being enabled to permeate the siliceous materials in which it is enclosed. Thorianite, however, contains no silica, and until it is shown that metallic oxides behave in the same way this explanation must be accepted with reserve.

The density of helium has been determined by Ramsay and Travers as 1-98. Its ratio of specific heats has very nearly the ideal value 1666,

appropriate to a monatomic molecule. The accepted atomic weight is accordingly double the density, i.e.

approximately four times that of hydrogen. The refractivity of helium is 0-1238 (air = i). The solubility in water is the lowest known, being, at 18-2°, only -0073 vols, per unit volume of water. The viscosity is -96 (air = 1).

The spectrum of helium as observed in a discharge tube is distinguished by a moderate number of brilliant lines, dis- tributed over the whole visual spectrum. The following are the approximate wave-lengths of the most brilliant lines:

Red 7066

Red 6678

Yellow 5876

Green 4922

Blue 4472

Violet 4026

When the discharge passes through helium at a pressure of several millimetres, the yellow line 5876 is prominent. At lower pressures the green line 4922 becomes more conspicuous. At atmospheric pressure the discharge is able to pass through a far greater distance in helium than in the common gases.

M. Travers, G. Senter and A. Jacquerod (Phil. Trans, a. 1903, 200, p. 105) carefully examined the behavour of a constant volume gas thermometer filled with helium. For the pressure coefficient per degree, between o° and ioo° C, they give the value -00366255, when the initial pressure is 700 mm. This value is indistinguishable from that which they find for hydrogen. Thus at high temperatures a helium thermometer is of no special advantage. At low temperatures, on the other hand, they find, using an initial pressure of 1000 mm., that the temperatures on the helium scale are measurably higher than on the hydrogen scale, owing to the more perfectly gaseous condition of helium. This difference amounts to about xV at the temperature of liquid oxygen, and about £° at that of liquid hydrogen.

The liquefaction of helium was achieved by H. Kamerlingh Onnes at Leiden in 1908. According to him its boiling point is 4-3° abs. (-268-7°

C.), the density of the liquid 0-154, the critical temperature 5 abs., and the critical pressure 2-3 atmo- spheres (Communications from the Physical Laboratory at Leiden, No. 108; see also Liquid Gases).

References. — A bibliography and summary of the earlier work on helium will be found in a paper by Ramsay, Ann. chim. pkys. (1898) [7], 13, p. 433. See also M. Travers, The Study of Gases (1901). (R. J. S.)

HELIX (Gr. ‘ih.%, a spiral or twist), an architectural term for the spiral tendril which is carried up to support the angles of the abacus of the Corinthian capital; from the same stalk springs a second helix rising to the centre of the capital, its junction with one on the opposite side being sometimes marked by a flower. Sometimes the term ” volute ” is given to the angle helix, which is incorrect, as it is of a different design and rises from the same stalk as the central helices. Its origin is probably metallic, that is to say, it was copied from the conventional treatment in Corinthian bronze of the tendrils of a plant.

HELL (O. Eng. hel, a Teutonic word from a root meaning ” to cover,” cf. Ger. Holle, Dutch hel), the word used in English both of the place of departed spirits and of the place of torment of the wicked after death. It is used in the Old Testament to translate the Hebrew Sheol, and in the New Testament the Greek $5?;s, Hades, and yekvva, Hebrew Gehenna (see Eschatology).

HELLANICUS of Lesbos, Greek logographer, flourished during the latter half of the 5th century b.c. According to Suidas, he lived for some time at the court of one of the kings of Macedon, and died at Perperene, a town on the gulf of Adra> myttium opposite Lesbos. Some thirty works are attributed to him — chronological, historical and episodical. Mention may be made of: The Priestesses of Hera at Argos, a chronological compilation, arranged according to the order of succession of these functionaries; the Carneonikae, a list of the victors in the Carnean games (the chief Spartan musical festival), including notices of literary events; an Atlhis, giving the history of Attica from 683 to the end of the Peloponnesian War (404), which is referred to by Thucydides (i. 97), who says that he treated the ‘ events of the years 480-431 briefly and superficially, and with

little regard to chronological sequence: Phoronis, chiefly genealogical,

with short notices of events from the times of Phorcneus the Argive ” first man ” to. the return of the Heraclidae; Troica and Persica, histories of Troy and Persia.

Hellanicus marks a real step in the development of historio- graphy. He transcended the narrow local limits of the older logographers, and was not content to repeat the traditions that had gained general acceptation through the poets. He tried to give the traditions as they were locally current, and availed himself of the few national or priestly registers that presented something like contemporary registration. He endeavoured to lay the foundations of a scientific chronology, based primarily on the list of the Argive priestesses of Hera, and secondarily on genealogies, lists of magistrates (e.g. the archons at Athens), and Oriental dates, in place of the old reckoning by generations. But his materials were insufficient and he often had recourse to the older methods. On account of his deviations from common tradition, Hellanicus is often called an untrustworthy writer by the ancients themselves, and it is a curious fact that he appears to have made no systematic use of the many inscriptions which were ready to hand. Dionysius of Halicarnassus censures him for arranging his history, not according to the natural connexion of events, but according to the locality or the nation he was describing; and undoubtedly he never, like his contem- porary Herodotus, rose to the conception of a single current of events wider than the local distinction of race. His style, like that of the older logographers, was dry and bald:

Fragments in M tiller, Fragmenta historicorum Graecorum, i. and iv. ; see among older works L. Preller, De Hellanico Lesbio historico (1840); Mure, History of Greek Literature, iv. ; late criticism in H. Kullmer, ” Hellanikos ” in Jahrbucher fur klass. Philologie (Supplementband, xxvii. 455 sqq.) (1902), which contains new edition and arrangement of fragments; C. F. Lehmann-Haupt, “Hellanikos, Herodot, Thukydides,” in Klio vi. 127 sqq. (1906); J. B. Bury, Ancient Greek Historians (1909), pp. 27 sqq.

HELLEBORE (Gr. tWifiopos: mod. Gr. also crKaˆw?: Ger. Nieswurz, Christwurz; Fr. hellebore, and in the district of Avranche, herbe enragie), a genus (Helleborus) of plants of the natural order Ranunculaceae, natives of Europe and western Asia. They are coarse perennial herbs with palmately or pedately lobed leaves. The flowers have five persistent petaloid sepals, within the circle of which are placed the minute honey-containing tubular petals of the form of a horn with an irregular opening. The stamens are very numerous, and are spirally arranged; and the carpels are variable in number, sessile

or stipitate and slightly united at the base and dehisce by ventral suture.

Helleborus niger, black hellebore, or, as from blooming in mid- winter it is termed the Christmas rose (Ger. Schwarze Nieswurz; Fr., rose de Noel or rose i'hiver), is found in southern and central Europe" and with other species was cultivated in the time of Gerard (see Herball, p. 977, ed. Johnson, 1633) in English gardens. Its knotty root-stock is blackish-brown externally, and, as with other species, gives origin to numerous straight roots. The leaves spring from the top of the root-stock, and are smooth, distinctly pedate, dark-green above, and lighter below, with 7 to 9 segments and long petioles. The scapes, which end the branches of the rhizome, have a loose entire bract at the base, and terminate in a single flower, with two bracts, from the axis of one of which a second flower may be developed. The flowers have 5 white or pale-rose, eventually greenish sepals, 15 to 18 lines in breadth; 8 to 13 tubular green petals containing honey; and 5 to 10 free carpels. There are several forms, the best being maximus. The Christmas rose is extensively grown in many market gardens to provide white flowers forced in gentle heat about Christmas time for decorations, emblems, &c.

H. orientalis, the Lenten rose, has given rise to several fine hybrids with H. niger, some of the best forms being clear in colour and distinctly spotted. H. foetidus, stinking hellebore, is a native of England, where like H. viridis, it is confined chiefly to limestone districts; it is common in France and the south of Europe. Its leaves have 7- to n-toothed divisions, and the flowers are in panicles, numerous, cup-shaped and drooping,

with many bracts, and green sepals tinged with purple, alternating with the five petals.

H. viridis, or green hellebore proper, is probably indigenous in some of the southern and eastern counties of England, and occurs also in central and southern Europe, It has bright yellowish-green flowers, 2 to 4 on a stem, with large leaf-like bracts. O. Brunfels and H. Bock (16th century) regarded the plant as the black hellebore of the Greeks.

H. lividus, holly-leaved hellebore, found in the Balearic Islands, and in Corsica and Sardinia, is remarkable for the hand- someness of its foliage. White hellebore is Veratrum album (see Veratrum), a liliaceous plant.

Hellebores may be grown in any ordinary light garden mould, but

thrive best in a soil of about equal parts of turfy loam and

Helleborus niger. 1, Vertical section of flower; 2, Nectary, side and front view.

well-rotted manure, with half a part each of fibrous peat and coarse sand, and in moist but thoroughly-drained situations, more especially where, as at the margins of shrubberies, the plants can receive partial shade in summer. For propagation cuttings of the rhizome may be taken in August, and placed in pans of light soil, with a bottom heat of 60° to 70 Fahr.; helle- bores can also be grown from seed, which must be sown as soon as ripe, since it quickly loses its vitality. The seedlings usually blossom in their third year. The exclusion of frost favours the production of flowers; but the plants, if forced, must be gradually inured to a warm atmosphere, and a free supply of air must be afforded, without which they are apt to become much affected by greenfly. For potting, H. niger and its varieties, and H. orientalis, atrorubens and olympicus have been found well suited. After lifting, preferably in September, the plants should receive plenty of light, with abundance of water, and once a week liquid manure, not over-strong. The flowers are improved in delicacy of hue, and are brought well up among the leaves, by preventing access of light except to the upper part of the plants. Of the numerous species of hellebore now grown, the deep-purple-flowered H. colchicus is one of the handsomest; by crossing with H. guttatus and other species several valuable garden forms have been produced, having variously coloured spreading or bell-shaped flowers, spotted with crimson, red or purple.

The rhizome of H. niger occurs in commerce in irregular and nodular pieces, from about 1 to 3 in. in length, white and of a horny texture within. Cut transversely it presents internally a circle of 8 to 12 cuneiform ligneous bundles, surrounded by a thick bark. It emits a faint odour when cut or broken, and has a bitter and slightly acrid taste. The drug is sometimes, adulterated with the rhizome of baneberry, Actaea spicala, which, however, may be recognized by the distinctly cruciate appearance of the central portion of the attached roots when

cut across, and by its decoction giving the chemical reactions for tannin. 1 The rhizome is darker in colour in proportion to its degree of dryness, age and richness in oil. A specimen dried by Schroff lost in

eleven days 65% of water.

H. niger, orientalis, viridis, foetidus, and several other species of hellebore contain the glucosides helleborin, C 36 H 42 6 , and helleborein, C 23 H440i 5 , the former yielding glucose and helleboresin, CsoHˆOj, and the latter glucose and a violet-coloured substance helleboretin, ChH 2 o0 3 . Helleborin is most abundant in H. viridis. A third and volatile principle is probably present in H. foetidus. Both helleborin and helleborein act poisonously on animals, but their decomposition- products helleboresin and helleboretin seem to be devoid of any inj urious qualities. Helleborin produces excitement and restlessness, followed by paralysis of the lower extremities or whole body, quickened respiration, swelling and injection of the mucous membranes, dilatation of the pupi., and, as with helleborein, salivation, vomiting and diarrhoea. H >Heborein exercises on the heart an action similar to that of digitalis, but more powerful, accompanied by at first quickened and then slow and laboured respiration; it irritates the conjunctiva, and acts as a sternutatory, but less violently than veratrine. Pliny states that horses, oxen and swine are killed by eating “black hellebore”; and Christison (On Poisons, p. 876, nth ed., 1845) writes: “I have known severe griping produced by merely tasting the fresh root in January.” Poisonous doses of hellebore occasion in man singing in the ears, vertigo, stupor, thirst, with a feeling of suffocation, swelling of the tongue and fauces, emesis and catharsis, slowing of the pulse, and finally collapse and death from cardiac paralysis. Inspection after death reveals much inflammation of the stomach and intestines, more especially the rectum. The drug has been observed to exercise a cumulative action. Its extract was an ingredient in Bacher’s pills, an empirical remedy once in great repute in France. In British medicine the rhizome was formerly official. H. foetidus was in past times much extolled as an anthelmintic, and is recommended by Bisset (Med. Ess., pp. 169 and 195, 1766) as the best vermifuge for children; J. Cook, however, remarks of it (Oxford Mag., March 1769, p. 99): ” Where it killed not the patient, it would certainly kill the worms; but the worst of it is, it will sometimes kill both.” This plant, of old termed by farriers ox-heel, setter- wort and setter-grass, as well as H. viridis (Fr. Herbe a seton), is employed in veterinary surgery, to which also the use of H. niger is now chiefly confined in Britain.

In the early days of medicine two kinds of hellebore were recognized, the white or Veratrum album (see Veratrum), and the black, including the various species of Helleborus. The former, according

to Codronchius (Comtn de elleb., 1610), Castellus (De helleb.

epist., 1622), and others, is the drug usually signified in the writings of Hippocrates. Among the hellebores indigenous to Greece and Asia Minor, //. orientalis, the rhizome of which differs from that of H. niger and of H. viridis in the bark being readily separable from the woody axis, is the species found by Schroff to answer best to the descriptions given by the ancients of black hellebore, the kWkftopoi piXas of Dioscorides. The rhizome of this plant, if identical, as would appear, with that obtained by Tournefort at Prusa in Asia Minor (Rel. d'un voy. du Levant, ii. 189, 1718), must be a remedy of no small toxic properties. According to an early tradition, black hellebore administered by the soothsayer and physician Melampus (whence its name Melampodium) , was the means of curing the mad- ness of the daughters of Proetus, king of Argos. The drug was used by the ancients in paralysis, gout and other diseases, more particu- larly in insanity, a fact frequently alluded to by classical writers, e.g. Horace (Sat. ii. 3. 80-83, &P- ad Pis. 300). Various supersti- tions were in olden times connected with the cutting of black hellebore. The best is said by Pliny (Nat. hist. xxv. 21) to grow on Mt Helicon. Of the three Anticyras that in Phocis was the most famed for its hellebore, which, being there used combined with " sesamoides," was, according to Pliny, taken with more safety than elsewhere.

The British Pharmaceutical Conference has recommended the preparation which it terms the tinctura veratri viridis, as the best form in which to administer this drug. It may be given in doses of 5-15 minims. The tincture is prepared from the dried rhizome and rootlets of green hellebore, containing the alkaloids jervine, veratrine and veratroidine. It is recommended as a cardiac and nervous sedative in cerebral haemorrhage and puerperal eclampsia. Black hellebore is a purgative and uterine stimulant.

HELLENISM (from Gr. iWrˆvifav, to imitate the Greeks, who were known as "EXXˆes, after "EXXijj/, the son of Deucalion). The term " Hellenism " is ambiguous. It may be used to denote ancient Greek culture in all its phases, and even those elements in modern civilization which are Greek in origin or in spirit; but, while Matthew Arnold made the term popular in the latter connexion as the antithesis of " Hebraism," the German historian

1 For the microscopical characters and for figures of transverse sections of the rhizome, see Lanessan, Hist, des drogues, i. 6 (1878).

J. G. Droysen introduced the fashion (1836) of using it to describe particularly the latter phases of Greek culture from the conquests of Alexander to the end of the ancient world, when those over whom this

culture extended were largely not Greek in blood, i.e. Hellenes, but peoples who had adopted the Greek speech and way of life, Hellenistai. Gieek culture had, however, both in ” Hellenic ” and ” Hellenistic ” times, a common essence, just as light is light whether in the original luminous body or in a reflection, and to describe this by the term Hellenism seems most natural But whilst using the term in the larger sense, this article, in deference to the associations which have come to be specially connected with it, will devote its principal attention to Hellenism as it appeared in the world after the Macedonian conquests. But it will be first necessary to indicate briefly what Hellenism in itself implied.

No verbal formula can really enclose the life of a people or an age, but we can best understand the significance of the old Greek cities and the life they developed, when, looking at the history of mankind as a whole, we see the part played by reason, active and critical, in breaking down the barriers by which custom hinders movement, in guiding movement to definite ends, in dissipating groundless beliefs and leading onwards to fresh scientific conquests — when we see this and then take note that among the ancient Greeks such an activity of reason began in an entirely novel degree and that its activity in Europe ever since is due to their impulsion. When Hellenism came to stand in the world for something concrete and organic, it was, of course, no mere abstract principle, but embodied in a language, a literature, an artistic tradition. In the earliest existing monument of the Hellenic genius, the Homeric poems, one may already observe that regulative sense of form and proportion, which shaped the later achievements of the race in the intellectual and artistic spheres. It was not till the great colonizing epoch of the 8th and 7th centuries B.C., when the name ” Hellene ” came into use as the antithesis of ” barbarian,” that the Greek race came to be conscious of itself as a peculiar people; it was yet some three centuries more before Hellenism stood fully declared in art and literature, in politics and in thought. There was now a new thing in the world, and to see how the world was affected by it is our immediate concern.

I. The Expansion of Hellenism before Alexander.— In the 5th century b.c. Greek cities dotted the coasts of the Mediter- ranean and the Black Sea from Spain to Egypt and the Caucasus, and already Greek culture was beginning to pass beyond the limits of the Greek race. Already in the 7th century B.C., when Hellenism was still in a rudimentary stage, the citizens of the Greek city-states had been known to the courts of Babylon and Egypt as admirable soldiers, combining hardihood with discipline, and Greek mercenaries came to be in request through- out the Nearer East. But as Hellenism developed, its social and intellectual

life began to exercise a power of attraction. The proud old civilizations of the Euphrates and the Nile might ignore it, but the ruder barbarian peoples in East and West, on whose coasts the Greek colonies had been planted, came in various degrees under its spell. In some cases an outlying colony would coalesce with a native population, and a fusion of Hellenism with barbarian customs take place, as at Emporium in Spain (Strabo iii. p. 160) and at Locri in S. Italy (Polyb. xii. 5. 10). Perinthus included a Thracian phyle. The stories of Anacharsis and Scylas (Herod, iv. 76-80) show how the leading men of the tribes in contact with the Greek colonies in the Black Sea might be fascinated by the appeal which the exotic culture made to- mind and to eye.

The great developments of the century and a half before Alexander set the Greek people in a very different light before the world. In the sphere of material power the repulse of Xerxes and the extension of Athenian or Spartan supremacy in the eastern Mediterranean were large facts patent to the most obtuse. The kings of the East leant more than ever upon Greek mercen- aries, whose superiority to barbarian levies was sensibly brought home to them by the expedition of Cyrus. But the developments within the Hellenic sphere itself were also of great consequence

for its expansion outwards. The political disunion of the Greeks was to some extent neutralized by the rise of Athens to a leading position in art, in literature and in philosophy. In Athens the Hellenic genius was focussed, its tendencies drawn together and combined; nor was it a circumstance of small moment that the Attic dialect attained, for prose, a classical authority; for if Hellenism was to be propagated in the world at large, it was obviously convenient that it should have some one definite form of speech to be its medium.

1. The Persians. — The ruling race of the East, the Persian, was but little open to the influences of the new culture. The military qualities of the Greeks were appreciated, and so, too, was Greek science, where it touched the immediately useful; a Greek captain was entrusted by Darius with the exploration of the Indus; a Greek architect bridged the Bosporus for him; Greek physicians {e.g. Democedes, Ctesias) were retained for enormous fees at the Persian court. The brisk diplomatic intercourse between the Great King and the Greek states in the 4th century may have produced effects that were not merely political. We

certainly find among those members of the Persian aristocracy, who came by residence in Asia Minor into closer contact with the Greeks, some traces of interest in the more ideal side of Hellenism. A man like the younger Cyrus invited Greek captains to his friendship for something more than their utility in war, and procured Greek hetaerae for something more than sensual pleasure. There, is the Mithradates who presented the Academy with a statue of Plato by Silanion, not improbably identical (though the supposition implies a correction in the text of Diogenes Laertius) with that Mithradates who, together with his father Ariobarzanes, received the citizenship of Athens (Dem. xxiii. 141, 202). Exactly how far Greek influence can be traced in the remains of Persian art, such as the royal palaces of Persepolis and Susa may be doubtful (see Gayet, L 'Art person; R. Phene Spiers, Architecture East and West, p. 245 f.), but it is certain that the engraved gems for which there was a demand in the Persian empire were largely the work of Greek artists (Furtwangler, Antike Gemmen, hi. p. 1 16 f.). 2. The Phoenicians. — As early as the first half of the 4th century we find communities of Phoenician traders established in the Peiraeus {C.I. A. ii. 86). In Cyprus, on the frontier between the Greek and Semitic worlds, a struggle for ascendancy went on. The Phoenician element seems to have been dominant in the island when Evagoras made himself king of Salamis in 412, and restored Hellenism with a strong hand. The words of Isocrates (even allowing for their rhetorical colour) give us a vivid insight into what such a process meant. " Before Evagoras established his rule, they were so hostile and exclusive, that those of their rulers were actually held to be the best who were the fiercest adversaries of the Greeks; but now such a change has taken place, that it is a matter of emulation who shall show himself the most ardent phil-hellen, that for the mothers of their children most of them choose wives from amongst us, and that they take pride in having Greek things about rather than native, in following the Greek fashion of life, whilst our masters of the fine arts and other branches of culture now resort to them in greater numbers than were once to be found in those quarters they specially frequented " (Isoc. 199 = Evag. §§ 49, 50). Even into the original seats of the Phoenicians Hellenism began to intrude. Evagoras at one time (about 386) made himself master of Tyre (Isoc. Evag. §62; Diod. xv. 2,4). His grandson Evagoras II. is found as governor of Sidon for the Persian king 349-346. (Babelon, Perses Achemenides, p. cxxii.; cf. Diod. xvi. 46, 3).

Abdashtart, king of Sidon (374-362 B.C.), called Straton by the Greeks, had already entered into close relations with the Greek states, and imitated the Hellenic princes of Cyprus {A then. xii. 531; C.I. A.

ii. 86; Corp. inscr. Semit. i. 114). The Phoenician colonists in Sardinia purchased or imitated the work of Greek artists (Furtwangler, Antike Gemmen, iii. 109).

3. The Carians and Lycians. — The seats of the Greeks in the East touched peoples more or less nearly related to the Hellenic stock, with native traditions not so far remote from those of the Greeks in a more primitive age, the Carians and the

Lycians. It came about in the last century preceding Alexander that the first of these peoples was organized as a strong state under native princes, the line founded by Hecatomnus of Mylasa. Hecatomnus made himself master of Caria in the first decade of the 4th century, but it was under his son Mausolus, who succeeded him in 377-376 that the house rose to its zenith. These Carian princes ruled as satraps for the Great King, but they modelled themselves upon the pattern of the Greek tyrant. The capital of Mausolus was a Greek city, Halicarnassus, and all that we can still trace of his great works of construction and adornment shows conformity to the pure Hellenic type. His famous sepulchre, the Mausoleum (the remains of it are now in the British Museum), was a monument upon which the most eminent Greek sculptors of the time worked in rivalry (Plin. N.H. xxxvi. Si § 3°; Vitruv. vii. 13). His court gave a welcome to the vagrant Greek philosopher (Diog. Laert. viii. 8, § 87). Even the Carian town of Mylasa now shows the forms of a Greek city and records its public decrees in Greek {C.I.G. 2691 c,d,e — Michel 471). In Lycia, which in spite of ” the son of Harpagus ” and King Pericles, had never been brought under one man’s rule, the Greek influence is more limited. Here, for the most part in the in- scriptions, the native language maintains itself against Greek. The proper names are (if not native) mainly Persian. But the Greek language makes an occasional appearance; Greek names are borne by others beside Pericles. The coins are Greek in type. And above all the monumental remains of Lycia show strong Greek influence, especially the well-known ” Nereid Monument ” in the British Museum, whose date is held to go back to the 5th century (Gardner, Handbook of Gk. Sculp, p. 344).

4. South Russia. — Hellenic influences continued to penetrate the Scythian peoples from the Greek colonies of the Black Sea, at any rate in the matter of artistic fabrication. Our evidence is the actual objects recovered from the soil. (See Scythia.)

5. Egypt. — From the time of Psammetichus (d. 610 B.C.) Greek mercenaries had been used to prop Pharaoh’s throne. At the same time Greek merchants had begun to find their way up the Nile and even to

the Oases. A Greek city Naucratis {q.v.) was allowed to arise at the Bolbitinic mouth of the Nile. But the racial repugnance to the Greek, which forbade an Egyptian even to eat an animal which had been carved with a Greek's knife (Hdt. ii. 41) , probably kept the soul of the people more shut against Hellenic influences than was that of the other races of the East.

6. Macedonia. — In Macedonia the native chiefs had been attracted by the rich Hellenic life at any rate from the beginning of the 5th century, when Alexander I., surnamed " Phil-hellen," persuaded the judges at Olympia that the Temenid house was of good Argive descent (Hdt. v. 22). And, although their enemies might stigmatize them as barbarians, the Macedonian kings maintained that they were not Macedonians, but Greeks (cf. avfip "EXKriv MaKedovcov wnxpxos, Hdt. v. 20). It was not probably till the reorganization of the kingdom by Archelaus (413-399) that Greek culture found any abundant entrance into Macedonia. Now all that "was most brilliant in Greek literature and Greek art was concentrated in the court of Aegae; the palace was decorated by Zeuxis; Euripides spent there the end of his days. From that time, no doubt, a certain degree of literary culture was general among the Macedonian nobility; their names in the days of Philip are largely Greek; the Macedonian service was full of men from the Greek cities within Philip's dominions. The values recognized at the court would naturally be recognized in noble families generally, and Philip chose Aristotle to be the educator of his son. How far the country generally may be regarded as Hellenized is a problem which involves the vexed question what right the Macedonian people itself has to be classed among the Hellenes, and Macedonian to be considered a dialect of Greek. 1 As the literary and official language, Greek alone would seem to have had any status.

1 See, among recent writers, on one side Kaerst, Gesch. des Hellenist. Zeitalters, pp. 97 f., and on the other Beloch, Griech. Gesch., iii. [i.] 1-9; Kretschmer, Einleitung in die Gesch. d. griech. Sprache, p. 283 f. ; O. Hoffmann, Die Makedonen, ihre Sprache u. ihr Volkstum dqo6).

7. In the West: the Native Races of Sicily. — Italy and \he south of Gaul had not remained unaffected by the neighbourhood of the Greek colonies. Under the rule of the elder and younger Dionysius in the 4th century, the hellenization of the Sicels in the interior of Sicily seems to have become complete (Freeman, History of Sicily, ii. 387, 388,

422-424; Beloch, Griech. Gesch. iii. [i.] 261).

The alphabets used by the various Italian races from the 5th century were directly or indirectly learnt from the Greeks. The peoples of the south (Lucanians, Bruttians, Mamertines) show a Greek principle of nomenclature (Mommsen, Unterital. Dialekl, p. 240 f.). The Pythagorean philosophy, whose seat was in southern Italy, w r on adherents among the native chiefs (Cic. Desenec. 12, cf. Dio Chrys. Orat. Cor. 37, § 24). From the Greeks of southern Gaul Hellenic influences penetrated the Celtic races so far that imitations of Greek coins were struck even on the coasts of the Atlantic.

II. After Alexander the Great. — When we review generally the extent to which Hellenism had penetrated the outer world in the middle of the 4th century B.C., it must be admitted that it had not seriously affected any but the more primitive races which dwelt upon the borders of the Hellenic lands, and here it would seem, with the doubtful exception of the Macedonians, to have been an affair rather of the courts than of the life of the people. On the other hand it must be taken into account that Hellenism had as yet only been a very short while in the world. What would have happened had it continued to depend upon its spiritual force only for propagation we cannot say. Everything was changed when by the conquests of Alexander (334-323) it suddenly rose to material supremacy in all the East as far as India, and when cities of Greek speech and constitution were planted by the might of kings at all the cardinal points of intercourse within those lands. The values honoured by the rulers of the world must naturally impress themselves upon the subject multitudes. The Macedonian chiefs found their pride in being champions of Hellenism. Of Alexander there is no need to speak. The courts of his successors in Asia Minor, Syria and Egypt were Greek in language and atmosphere. All kings liked to win the good word of the Greeks by munificence bestowed upon Greek cities and Greek institutions. All of them in some degree patronized Greek art and letters, and some sought fame for themselves as authors. Even the barbarian courts, their neighbours or vassals, were swayed by the dominant fashion to imitation. But by the courts alone Hellenism could never have been propagated far. Greek culture had been the product of the city-state, and Hellenism could not be dissevered from the city. It was upon the system of Greek and Macedonian cities, planted by Alexander and his successors, that their work rested, and though their dynasties crumbled, their work remained. Rome, when it stepped into their place, did no more than safeguard its continuance; in the East Rome acted as a Hellenistic power, and if, when the legions had thundered past, the brooding East ” plunged in thought again,” that thought was largely directed by the

Greek schoolmaster who followed in the legions' train. From our present point of view we may therefore regard this work of Hellenism as one continuous process, initiated by the Macedonians and carried on under Roman protection, and ask in the first place what the institution of a Greek city implied.

The Character of the New Greek Cities. — The citizen bodies at the outset were really of Greek or Macedonian blood— soldiers who had served in the royal armies, or men attracted from the older Greek cities to the new lands thrown open to commerce. To fix their European soldiery upon the new soil was an obvious necessity for the Macedonian chiefs who had set up kingdoms among the barbarians, and the lots of the veterans (except in Egypt) were naturally attached to various urban centres. The cities, of course, drew in numbers beside of the people of the land; Alexander is specially said to have incorporated large bodies of natives in some of the new cities of the Eastern provinces (Arr. iv. 4, 1; Diod. xvii. 83, 2; Curtius ix. 10, 7). It may generally be taken for granted that the lower strata of the city-

populations " was mainly native; to be included in the city population was not, however, to be included in the citizen body, and it remains a question how far the latter admitted members of other than European origin (Beloch iii. [i.] 414). The statements, for instance, of Josephus that the Jews were given full citizen rights in the new foundations are probably false (Willrich, Juden und Griechen vor der makkabaischen Erhebung, 1895, p. 19 f.). The social organization of the citizen-body conformed to the regular Hellenic type with a division into phylae and, in Egypt, at any rate, into demi (Liban. Or. xix. 62; Satyrus, frag. 2i = F.H.G. iii. 164; Sir W. M. Ramsay, Cities and Bishoprics, i. 60; Kenyon, Archiv f. Papyr. ii. 74; Jonguet, Bull. coir. hell, xxi., 1897, 184 f.; Liebenam, Stddlc- verwaltung, 220 f.). The cities appear equally Hellenic in their political organs and functions with boule and demos and popularly elected magistrates. Life was filled with the universal Hellenic interests, which centred in the gymnasium and the religious festivals, these kst including, of course, not only athletic contests but performances of the classical dramas or later imitations of them. The wandering sophist and rhetorician would find a hearing no less than the musical artist. The language of the upper classes was Greek; and the material background of building and decoration, of dress and furniture, was of Greek design. A greater regularity in the street-plans seems to have distinguished the new cities from the older slowly grown cities of the Greek lands, just as it distinguishes the cities of the New World to-day from those of Europe. Alexandria and Antioch were both traversed from end to end by one long straight street, crossed by shorter ones at right angles; Nicaea was a square

from the centre of which all the four gates could be seen at the ends of the intersecting thoroughfares (Strabo xii. 565) ; similar characteristics are noted in the rebuilt Smyrna iib. xiv. 646).

Sometimes the Greek city was not an absolutely new founda- tion, but an old Oriental city, re-colonized and transformed. And in such cases the old name was often replaced by a Greek one. Thus Celaenae in Phrygia became Apamea; Haleb (Aleppo) in Syria became Beroea; Nisibis in Mesopotamia, Antioch; Rhagae (Rai) in Media, Europus. In some cases the old name was left unchallenged, e.g. Thyatira, Damascus and Samaria. Even where there was no new foundation the older cities of Phoenicia and Syria became transformed from the overwhelming prestige of Hellenic culture. In Tyre and Sidon, no less than in Antioch or Alexandria, Greek literature and philosophy were seriously cultivated, as we may see by the great names which they contributed. The process by which Hellenism thus leavened an older city we may trace with peculiar vividness in the case of Jerusalem; we see there the younger generation captivated by its ideals, the appearance of gymnasium and theatre, the eager adoption of Greek political forms (1 Mace. 1. 13 f.; 2 Mace. 4., 10 f.).

A. Characteristics of Hellenism after Alexander. — To the number of Greek city-states existing before Alexander were now therefore added those which extended Hellas as far as India. With the enormous extension of Greek territory a great shifting took place in the old centres of gravity. What changes in the character of Greek culture did the new conditions of the world bring about ?

Hellenism had been the product of the free life of the Greek city-state, and after Chaeronea the great days of the city-state were past. Not that all liberty was everywhere extinguished. Under Alexander himself the Greek mea i. ” states were restive, and Aetolia unsubdued; and, with the break-up of the empire at Alexander’s death, there was once more scope for the action of the individual cities among the rival great powers. In the history of the next two or three centuries the cities are by no means ciphers. Rhodes takes a great part in Weltpolitik, as a sovereign ally of one or other of the royal courts. In Greece itself the overlordship to which the Macedonian king aspires is imperfect in extent and only maintained to that extent by continual wars. The Greek states on their side show that they are capable even of progressive

political development, the needs of the time being met by the federal system, by larger unions of equal members than the leading cities of the past would have tolerated, with their extreme unwillingness to forego the least shred of sovereign independence. The Achaean and Aetolian Leagues are inde- pendent powers, which the Macedonian can indeed check by garrisons in Corinth, Chalcis and elsewhere, but which keep a field clear for Hellenic freedom within their borders. Sparta also is a power which can cross swords with the Macedonian king, and Cleomenes III. aspires to unite the Peloponnesus under his headship. As to the cities outside Greece, within or around the royal realms, Seleucid, Ptolemaic or Attalid, their degree of freedom probably differed widely according to circum- stances. At one end of the scale, cities of old renown, e.g. Lampsacus or Smyrna, could still make good their independence against Antiochus III. at the beginning of the 2nd century B.C. At the other end of the scale the cities which were royal capitals, e.g. Alexandria, Antioch and Pergamum, were normally controlled altogether by royal nominees. At Pergamum indeed and (at any rate after Antiochus IV.) at Antioch, forms of self-govern- ment subsisted upon which, of course, the court had its hand, whilst at Alexandria even such forms were wanting. Between the two extremes there was variation not only between city and city, but, no doubt, in one and the same city at different times. In Syria the independent action of the cities greatly increased during the last weakness of the Seleucid monarchy. With the extension of the single strong rule of Rome over this Hellenistic world, the conditions were changed. Just as the Macedonian conquest, whilst increasing the domain of Greek culture, had straitened Greek liberty, so Rome, whilst bringing Hellenism finally into secure possession of the nearer East, extinguished Greek freedom altogether. Even now the old forms were long religiously respected. Formally, the most illustrious Greek states, Athens, for instance, or Marseilles, or Rhodes, were not subjects of Rome, but free allies. Even in the case of civitates stipendiariae (tribute-paying states), municipal autonomy, subject indeed to interference on the part of the Roman governor, was allowed to go on. Boule and demos long continued to function. The old catchword, ” autonomy of the Hellens,” was still heard and indeed was solemnly proclaimed by Nero at the Isthmian games of a.d. 67. But during the first centuries of the Christian era, this municipal autonomy, by a process which can only be imperfectly traced in detail, decayed. The demos first sank into political annihilation and the council, no longer popularly elected but an aristocratic order, concen- trated the whole administration in its hands. By the end of the 2nd century a.d., claims made by the imperial government upon the municipal senate are more and more changing member- ship of the order from an honour into an

intolerable burden, and financial disorganization is calling on imperial officials in one place after another to undertake the business of government. After Diocletian and under the Eastern Empire the Greek world is organized on the principles of a vast bureaucracy.

With this long process of political decline from Alexander to Diocletian correspond the inner changes in the temper of the Hellenic and Hellenistic peoples. There were, of course, changes. marked differences between one region and another. But certain general characteristics distinguished at once Greek society after the Macedonian conquests from the society of the earlier age. When the vast field of the East was opened to Hellenic enterprise and the bullion of its treasuries flung abroad, fortunes were made on a scale before unparalleled. A new standard of sumptuousness and splendour was set up in the richest stratum of society. This material elaboration of life was furthered by the existence of Hellenistic courts, where the great ministers amassed fabulous riches (e.g. Dionysius, the state secretary of Antiochus IV., Polyb. xxxi. 3, 16; Hermias, the chief minister of Seleucus III., and Antiochus III., Polyb. v. 50. 2; cf. Plutarch, Agis 9), and of huge cities like Alexandria, Antioch and the enlarged Ephesus. It is significant that whereas the earlier Greeks had used precious stones only as a medium for the engraver's art, unengraven gems, valuable for their

mere material, now came to be used in profusion for adornment. Already before Alexander pan-hellenic feeling had in various ways overridden the internal divisions of the Greek race, but now, with the vast mingling of Greeks of all sorts in the newly- conquered lands, a generalized Greek culture in which the old local characteristics were merged, came to overspread the world. The gradual supersession of the old dialects by the Koine the common speech of the Greeks, a modification of the Attic idiom coloured by Ionic, was one obvious sign of the new order of things (see Greek Language).

In its artistic, its literary, its spiritual products the age after Alexander gave evidence of the change. In no department did activity immediately stop; but the old freshness and creative exuberance was gone. Artistic pleasure, A tˆ an f grown less delicate, required the stimulus of a more tore . sensational effect or a more striking realism, as we may see by the Pergamene and Rhodian schools of sculpture, by the bas-reliefs with the genre subjects drawn from the life of the countryside, or, in literature by the sort of historical writing which became popular with Cleitarchus and Duris, by the studied emotional or rhetorical point of Callimachus, and by the portrayal of country life in Theocritus. At the same time, artists and men of letters were now

addressing themselves in most cases, not to their fellow-citizens in a free city, but to kings and courtiers, or the educated class generally of the Greek world. In those departments of intellectual activity which demand no high ideal faculty, in the study of the world of fact, the centuries immediately following Alexander witnessed notable advance. Scientific research might prosper, just as poetry withered, under the patronage of kings, and such research had now a vast amount of new material at its disposal and could profit by the old Babylonian and Egyptian traditions. The medical schools, especially that of Alexandria, really enlarged knowledge of the animal frame. Knowledge of the earth gained immensely by the Macedonian conquests. The literary schools of Alexandria and Pergamum built up grammatical science, and brought literary and artistic criticism to a fine point. If indeed the earlier ages had been those of creative and spontaneous life, the Hellenistic age was that of conscious criticism and book-learning. The classical products were registered, studied, assorted and commented upon. Men travelled and read more. Books were in demand and were multiplied. Libraries became a feature of the age, the kings leading the way as collectors, of books, especially the rival dynasties of Egypt and Pergamum. The library attached to the Museum at Alexandria is said to have contained at the time of its destruction in 47 B.C. as many as 700,000 rolls (Aul. Gell. vi. 17. 3). Even smaller cities, like Aphrodisias in Caria, had public libraries for the instruction of their youth (Le Bas, III. No. 1618).

With the general decay of ancient civilization under the Roman empire, even scientific research ceased, and though there were literary revivals, like that connected with the new Atticism under the Antonine emperors, these were mainly imitative and artificial, and even learning became at last under the Byzantine emperors a jejune and formal tradition (see Greek Literature). The diffusion of the Greek race far from the former centres of its life, the mingling of citizens of many cities, the close contact between Greek and barbarian in the conquered lands — all this had made the old sanctions of civic religion tiel, P°J” n and civic morality of less account than ever. New SO ph y . guides of life were needed. The Stoic philosophy, with its cosmopolitan note, its fixed dogmas and plain ethical precepts, came into the world at the time of the Macedonian conquests to meet the needs of the new age. Its ideas became popular among ordinary men as the older philosophies had never been. The Stoic or Cynic preacher, attacking theways of society, in pungent, often coarse, phrase, became a familiar figure of the Greek market-place (P. Wendland, Beitrage zur Gesch. d. griech. Philo- sophie, 1895).

Although the cults of the old Greek deities in the new cities, with their

splendid apparatus of festivals and sacrifice might still hold the multitude, men turned ever in large numbers to alien

religions, felt as more potent because strange, and the various gods of Egypt and the East began to find larger entrance in the Greek world. Even in the old Greek religion before Alexander there had been large elements of foreign origin, and that the Greeks should now do honour to the gods of the lands into which they came, as we find the Cilician and Syrian Greeks doing to Baal-tars and Baal- marcod and the Egyptian Greeks to the gods of Egypt, was only in accordance with the primitive way of thinking. But it was a sign of the times when Serapis and Isis, Osiris and Anubis began to take place among the popular deities in the old Greek lands. The origin of the cult of Serapis, which Ptolemy I. found, or established, in Egypt is disputed; the familiar type of the god is the invention of a Greek artist, but the name and religion came from somewhere in the East (see discussion under Serapis). Before the end of the 2nd century B.C. there were temples of Serapis in Athens, Rhodes, Delos and Orchomenos in Boeotia. Under the Roman empire the cult of Isis, now furnished with an official priesthood and elaborate ritual, became really popular in the Hellenistic world. King Asoka in the 3rd century B.C. sent Buddhist missionaries from India to the Mediterranean lands; their preaching has, it is true, left little or no trace in our Western records. But other religions of Oriental origin penetrated far, the worship of the Phrygian Great Mother, and in the 2nd century a.d. the religion of the Mithras (Lafaye, Culte des divinitSs alexandrines, 1884; Roscher, articles ” Anubis,” ” Isis,” &c; F. Cumont, Mysleres de Mithra, Eng. trans., 1903; Les Religions orientates dans le paganisme romain, 1906).

The Jews, too, by the time of Christ were finding in many quarters an open door. Besides those who were ready to go the whole length and accept circumcision, numbers adopted particular Jewish practices, observing the Sabbath, for instance, or turned from polytheism to the doctrine of the One God. The synagogues in the Gentile cities had generally attached to them, in more or less close connexion a multitude of those ” who feared God ” and frequented the services (Schurer, Gesch. d. jild. Volks, iii. 102-

135)-

Among the religions which penetrated the Hellenistic world from an

Eastern source, one ultimately overpowered all the rest and made that world its own. The inter-action of Christianity and Hellenism opens large fields of inquiry. The teaching of Christ Himself contained, as it is given to us, no Hellenic element ; so far as He built with older material, that material was exclusively the sacred tradition of Israel. So soon, however, as the Gospel was carried in Greek to Greeks, Hellenic elements began to enter into it, in the writings, for instance, of St Paul, the appeal to what ” nature ” teaches would be generally admitted to be the adoption of a Greek mode of thought. It was, of course, impossible that speaking in Greek and living among Greeks, Christians should not to some extent use current conceptions for the expression of their faith. There was, at the same time, in the early Church a powerful current of feeling hostile to Greek culture, to the wisdom of the world. What the attitude of the New People should be to it, whether it was all bad, or whether there were good things in it which Christians should appropriate, was a vital question that always confronted them. The great Christian School of Alexandria re-presented by Clement and Origen effected a durable alliance between Greek education and Christian doctrine. In proportion as the Christian Church had to go deeper into metaphysics in the formulation of its belief as to God, as to Christ, as to the soul, the Greek philosophical terminology, which was the only vehicle then available for precise thought, had to become more and more an essential part of Christianity. At the same time Christian ethics incorporated much of the current popular philosophy, especially large Stoical elements. In this way the Church itself, as we shall see, became a propagator of Hellenism (see Hatch, Hibbert Lectures, 1888; Wendland, ” Christentum u. Hellenismus ” in Neue Jahrb. J. kl. All. ix. 1902, p. 1 f.; and Die hellenistisch- romische Kultur in ihren Beziehungen zu Judentum u. Christentum,

1907).

B. Effect upon non-Hellenic Peoples. — Hellenism secured by the Macedonian conquest points d’appui from the Mediterranean to

Greek cities.

Christi- anity.

India, and brought the system of commerce and intercourse into Greek hands. What effect did it produce in these various countries? What effect again in the lands of the West which fell under the sway of Rome?

(i.) India. — In India (including the valleys of the Kabul and its northern tributaries, then inhabited by an Indian, not, as now, by an Iranian, population) Alexander planted a number of Greek towns. Alexandria ” under the Caucasus ” commanded the road from Bactria over the Hindu-Kush; it lay somewhere among the hills to the north of Kabul, perhaps at Opian near Charikar (MacCrindle, Ancient India, p. 87, note 4); that it is the city meant by ” Alasadda the capital of the Yona (Greek) country ” in the Buddhist Mahavanso, as is generally affirmed, seems doubtful (Tarn, loc. cit. below, p. 269, note 7). We hear of a Nicaea in the Kabul valley itself (near Jalalabad?), another Nicaea on the Hydaspes (Jhelum) where Alexander crossed it, with Bucephala (see Bucephalus) opposite, a city (unnamed) on the Acesines (Chenab) (Arr. vi. 29, 3), and a series of foundations strung along the Indus to the sea. Soon after 321, Macedonian supremacy beyond the Indus collapsed before the advance of the native Maurya dynasty, and about 303 even large districts west of the Indus were ceded by Seleucus. But the chapter of Greek rule in India was not yet closed. The Maurya dynasty broke up about 180 B.C., and at the same time the Greek rulers of Bactria began to lead expeditions across the Hindu-Kush. Menander in the middle of the 2nd century B.C. extended his rule from the Hindu- Kush to the Ganges. Then ” Scythian ” peoples from central Asia, Sakas and Yue-chi, having conquered Bactria, gradually squeezed within ever-narrowing limits the Greek power in India. The last Greek prince, Hermaeus, seems to have succumbed about 30 B.C. It was just at this time that the Graeco-Roman world of the West was consolidated as the Roman Empire, and, though Greek rule in India had disappeared, active commercial intercourse went on between India and the Hellenistic lands. How far, through these changes, did the Greek population settled by Alexander or his successors in India maintain their distinctive character? What influence did Hellenism during the centuries in which it was in contact with India exert upon the native mind? Only extremely qualified answers can be given to these questions. Capital data are possibly waiting there under ground — the Kabul valley for instance is almost virgin soil for the archaeologist — and any conclusion we can arrive at is merely provisional. If certain statements of classical authors were true, Hellenism in India flourished exceedingly. But the phil- hellenic Brahmins in Philostratus’ life of Apollonius had no exist- ence outside the world of romance, and the statement of Dio Chrysostom that the Indians were familiar with Homer in their own tongue {Or. liii. 6) is a traveller’s tale. India, the sceptical observe, has yielded no Greek inscription, except, of course, on the coins of the Greek kings and their Scythian rivals and suc- cessors. To what extent can it be inferred from legends on coins that Greek was a living

speech in India ? Perhaps to no large extent outside the Greek courts. The fact, however, that the Greek character was still used on coins for two centuries after the last Greek dynasty had come to an end shows that the language had a prestige in India which any theory, to be plausible, must account for. If we argue by probability from what we know of the conditions, we have to consider that the Greek rule in India was all through fighting for existence, and can have had ” little time or energy left for such things as art, science and literature ” (Tarn, loc. cit. p. 292), and it is pointed out that a casual reference to the Greeks in an Indian work contemporary with Menander characterizes them as ” viciously valiant Yonas.” How long is it probable that Greek colonies planted in the midst of alien races would have remained distinct? Mr Tarn builds much upon the fact that the descendants of the Greek Branchidae settled by Xerxes in central Asia had become bilingual in six generations (Curt. vii. 5, 29). But the Greek race before Alexander had not its later prestige, and we must consider such a sentiment as leads the Eurasian to-day to cling to his Western parentage, so that the instance of the Branchidae cannot be

Greek art.

used straight away for the time after Alexander. Certainly, had the Greek colonies in India been active political bodies, we could hardly have failed to find some trace of them, in civic architecture or in inscriptions, by this time. Perhaps we should rather think of them as resembling the Greeks found to-day dispersed over the nearer East with interests mainly commercial, easily assimilating themselves to their environment. A notice derived from Agatharchides (about 140 B.C.) possibly refers to the activity of these Indian Greeks in the sea-borne trade of the Indian Ocean (Miiller, Gcog. Graeci min. i. p. 191; cf. Diod. iii. 47. 9). As to what India derived from Greece there has been a good deal of erudite debate. That the Indian drama took its origin from the Greek is still maintained by some scholars, though hardly proved. There is no doubt that Indian astronomy shows marked Hellenic features, including actual Greek words borrowed. But by far the most signal borrowing is in the sphere of art. The stream of Buddhist art which went out eastwards across Asia had its rise in North-West India, and the remains of architecture and sculpture un-earthed in this region enable us to trace its development back to pure Greek types. It remains, of course, a question whether the tradition was transmitted by the Greek dynasties from Bactria or by intercourse

with the Roman empire; the latter seems now almost certain; but the fact of the influence is equally striking on either theory. How far to the east the distinctive influence of Greece went is shown by the seal-impressions with Athena and Eros types found by Dr Stein in the buried cities of Khotan {Sand-buried Ruins of Khotan, p. 396), and according to Mr E. B. Havell, there exist ” paintings treasured as the most precious relics and rarely shown to Europeans, which closely resemble the Graeco-Buddhist art of India ” in some of the oldest temples of Japan (Studio, vol. xxvii. 1903, p. 26).

See A. A. Macdonell, History of Sanskrit Literature (1900) p. 411 f ., and the references on p. 452; V. A. Smith, Early History of India (1904); Griinwedel, Buddhist Art in India (Eng. trans., edited by Dr Burgess, 1901); W. W. Tarn, ” Notes on Hellenism in Bactria and India” in Journ. of Hell. Studies, xxii. (1902); Foucher, L’Art grico-bouddhique du Gandhdra (1905).

(ii.) Iran and Babylonia. — The colonizing activity of Alexander and his successors found a large field in Iran where, up till his time, hardly any walled towns seem to have existed. Cities now arose in all its provinces, superseding in many cases native market places and villages, and holding the vantage-points of commerce. Media, Polybius says, was defended by a chain of Greek cities from barbarian incursion (x. 27. 3); in the neighbourhood of Teheran seem to have stood Heraclea and Europus. In Eastern Iran the cities which are its chief places to-day then bore Greek names, and looked upon Alexander or some other Hellenic prince as their founder. Khojend, Herat, Kandahar were Alexandrias, Merv was an Alexandria till it changed that name for Antioch. When the farther provinces broke away under independent Greek kings, a Eucratidea and a Demetrias attested their glory. Even in a town definitely barbarian like Syrinca in 209 B.C. there was a resident mercantile community of Greeks (Polyb. x. 31). The bulk of Greek historical literature having perished, and in the absence of both archaeological data from Iran, we can only speculate on the inner life of these Greek cities under a strange sky. One precious document is the decree of Antioch in Persis (about 206 B.C.) cited in a recently discovered inscription (Kern, Inschr. v. Magnesia, No. 61; Dittenberger, Orient, gr. Inscr. i. No. 2ˆ). This shows us the normal organs of a Greek city, boulc, ecclesia, prytaneis, &c, in full working, with the annual election of magistrates, and ordinary forms of public action. But more than this, it throws a remarkable light upon the solidarity of the Hellenic Dispersion. The citizen body had been increased some generations before by colonists from Magnesia-on-Meander sent at the invitation of Antiochus I. The Magnesians are instigated by pan-hellenic enthusiasm. And we see a brisk diplomatic

intercourse between the scattered Greek cities going on. It is especially the local religious festivals which bind them together. Antioch in Persis, of course, sends athletes to the great games of Greece, but in this decree it determines to take part in

Greek cities.

the new festival being started in honour of Artemis at Magnesia. The loyalty, too, expressed towards the Seleucid king implies a predominant interest in pan-hellenic unity, natural in colonies isolated among barbarians. A list is given (fragmentary) of other Greek cities in Babylonia and beyond from which similar decrees had come.

In the middle of the 3rd century B.C. Bactria and Sogdiana broke away from the Seleucid empire; independent Greek kings reigned there till the country was conquered by nomads from Central Asia (Sacae and Yue-chi) a /Jˆtdoms. century later. Alexander had settled large masses of Greeks in these regions (Greeks, it would seem, not Mace- donians), whose attempts to return home in 325 and 323 had been frustrated, and it may well be that a racial antagonism quickened the revolt against Macedonian rule in 250. The history of these Greek dynasties is for us almost a blank, and for estimating the amount and quality of Hellenism in Bactria during the 180 years or so of Macedonian and Greek rule, we are reduced to building hypotheses upon the scantiest data. Probably nothing important bearing on the subject has been left out of view in W. W. Tarn's learned discussion (Journ. of Hell. Stud, xxii., 1902, p. 268 f.), and his result is mainly negative, that palpable evidences of an active Hellenism have not been found; he inclines to think that the Greek kingdoms mainly took on the native Iranian colour. The coins, of course, are adduced on the other side, being not only Greek in type and legend, but (in many cases) of a peculiarly fine and vigorous execution; and excellence in one branch of art is thought to imply that other branches flourished in the same milieu. Tarn suggests that they may be a " sport," a spasmodic outbreak of genius (see Bactria and works there quoted). In these out- lying provinces the national Iranian sentiment seems to have been most intense, and it is interesting to see that under Alexander Hellenism appeared as " belligerent civilization," in the attempt to suppress practices like the exposure of the dying to the dogs (an exaggeration of Zoroastrianism) and, possibly also, abhorrent forms of marriage (Strabo xi. 517; Porphyr. De abslin. 4. 21; Plut. Defort. Al. 5).

The west of Iran slipped from the Seleucids in the course of the' 2nd century B.C. to be joined to the Parthian kingdom, or fall under petty

native dynasties. Soon after 130 Babylonia too was conquered by the Parthian, and Mesopotamia before 88. Then the reconquest of the nearer East by Oriental dynasties was checked by the advance of Rome. Asia Minor and Syria remained substantial parts of the Roman Empire till the Mahom- medan conquests of the 7th century a.d. began a new process of recoil on the part of the Hellenistic power. In Babylonia, also, in Susiana and Mesopotamia, Hellenism had been established in a system of cities for 200 years before the coming of the Parthian. The greatest of all of them stood here — almost on the site of Bagdad — Seleucia on the Tigris. It superseded Babylon as the industrial focus of Babylonia and counted some 600,000 inhabitants (plebs urbana) according to Pliny, N.H. vi. §122 (cf. Joseph. Arch, xviii. § 372, 374; for coins, probably of Seleucia, with the type of Tyche issued in the years a.d. 43-44 see Wroth, Coins of Parthia, p. xlvi.). The list of other Greek cities known to us in these regions is too long to give here (see Droysen, loc. cil., and E. Schwartz in Kern's Inschr. v. Magnesia, p. 171 f.). In Mesopotamia, Pliny especially notes how the character of the country was changed when the old village life was broken in upon by new centres of population in the cities of Macedonian foundation (Pliny, N.H. vi. § 117; cf. K. Regling, " Histor. geog. d. mesopot. Parallelograms," in Lehmann's Beilrage, i. p. 442 f.).

We do not look in vain for notable names in Hellenistic literature and philosophy produced on an Asiatic soil. Diogenes, the Stoic philosopher (head of the school in 156 B.C.), was a " Babylonian," i.e. a citizen of Seleucia on the Hellenic- Tigris; so too was Seleucus, the mathematician and culture. astronomer, being possibly a native Babylonian; Berossus, who wrote a Babylonian history in Greek (before 261 b.c.) was a Hellenized native. Apollodorus, Strabo 's authority

for Parthian history (c. 80 B.C. ?), was from the Greek city of Artemita in Assyria. When the Parthians rent away provinces from the Seleucid empire, the Greek cities did not cease to exist by passing under barbarian rule. Gradually no doubt the Greek colonies were absorbed, but the process was a long one. In 140 and 130 B.C. those of Iran were ready to rise in support of the Seleucid invader (Joseph. Arch. xiii. § 184; Justin xxxviii. 10.6-8). Just so, Crassus in 53 B.C. found a welcome in the Greek cities of Mesopotamia. Seleucia on the Tigris is spoken of by Tacitus as being in a.d. 36 " proof against barbarian influences and mindful of its founder Seleucus " {Ann. vi. 42). How

im- portant an element the Greek population of their realm seemed to the Parthian kings we can see by the fact that they claimed to be themselves champions of Hellenism. From the reign of Artabanus I. (1 28/7-1 23 B.C.) they bear the epithet of ” Phil- hellen ” as a regular part of their title upon the coins. Under the later reigns the Tyche figure (the personification of a Greek city) becomes common as a coin type (Wroth, Coins of Parthia, pp. liii., lxxiv.). The coinage may, of course, give a somewhat one-sided representation of the Parthian kingdom, being specially designed for the commercial class, in which the population of the Greek cities was, we may guess, predominant. The state of things which prevails in modern Afghanistan, where trade is in the hands of a class distinct in race and speech (Persian in this case) from the ruling race of fighters is very probably analogous to that which we should have found in Iran under the Parthians. 1 That the Parthian court itself was to some extent Hellenized is shown by the story, often adduced, that a Greek company of actors was performing the Bacchae before the king when the head of Crassus was brought in. This single instance need not, it is true, show a Hellenism of any profundity; still it does show that certain parts of Hellenism had become so essential to the lustre of a court that even an Arsacid could not be without them. Artavasdes, king of Armenia (54?~34 B.C.) composed Greek tragedies and histories (Plut. Crass. 33). Then the prestige of the Roman Empire, with its prevailingly Hellenistic culture, must have told powerfully. The Parthian princes were in many cases the children of Greek mothers who had been taken into the royal harems (Plut. Crass. 32). Musa, the queen-mother, whose head appears on the coins of Phraataces (3/2 b.c-a.d. 4) had been an Italian slave-girl. Many of the Parthian princes resided temporarily, as hostages or refugees, in the Roman Empire; but one notes that the nation at large looked with anything but favour upon too liberal an introduction of foreign manners at the court (Tac. Ann. ii. 2).

Such slight notices in Western literature do not give us any penetrating view into the operation of Hellenism among the Iranians. As an expression of the Iranian mind we have the Avesta and the Pehlevi theological literature. Unfortunately in a question of this kind the dating of our documents is the first matter of importance, and it seems that we can only assign dates to the different parts of the Avesta by processes of fine- drawn conjecture. And even if we could date the Avesta securely, we could only prove borrowing by more or less close coincidences of idea, a tempting but uncertain method of inquiry. Taking an opinion based on such data for what it is worth, we may note that Darmesteter believed in the influence of the later Greek philosophy (Philonian and Neo-platonic) as one of those which shaped

the Avesta as we have it {Sacred Books of the East, iv. 54 f.), but we must also note that such an influence is emphatically denied by Dr L. Mills {Zarathushtra and the Greeks, Leipzig, 1906). Outside literature, we have to look to the artistic remains offered by the region to determine Hellenic influence. But here, too, the preliminary classification of the documents is beset with doubt. In the case of small objects like gems the place of manufacture may be far from the place of discovery. The architectural remains are solidly in situ, but 1 ” Ce sont les Tadjik de l’Afghanistan qui constituent les trente- deux corps de metier, qui tiennent boutique, expedient les marchan- dises, representent, en un mot, la vie industrielle et commerciale de la nation. Ce sont aussi les Tadjik des villes qui forment la classe lettree, et qui ont empSche’ les Afghans de retomber dans la barbarie.” (Rectus, Nouvelle GSograph. univ. ix. p. 71.)

we may have such vast disagreement as to date as that between Dieulafoy and M. de Morgan with respect to domed buildings of Susa, a disagreement of at least five centuries. It is enough then here to observe that Iran and Babylonia do, as a matter of fact, continually yield the explorer objects of workmanship either Greek or influenced by Greek models, belonging to the age after Alexander, and that we may hence infer at any rate such an influence of Hellenism upon the tastes of the richer classes as would create a demand for these things.

For gems see ” Gobineau ” in the Rev. archeol., vols, xxvii., xxviii. (1874); Menant, Recherches sur la glyptique orientate, ii. 189 f . ; E. Babelon, Catalogue des camees de la Bibl. Nat. (1897), p. 56; A. Furtwangler, Die antiken Gemmen, pp. 165, 369 ff . ; Figurines: Heuzey, Fig. ant. du Louvre (1883) p. 3; J. P. Peters, Nippur, ii. 128; Military standard: Heuzey, Comptes rendus de I’ Acad, d. Inscr. (1895) p. 16; Rev. d’Assyr. v. (1903), p. 103 f. Alabaster vase: Sykes, Ten Thousand Miles in Persia, p. 445. In the case of the architectural remains, the Greek tradition is obvious at Hatra (Jacquerel, Rev. archeol., 1897 [ii.], 343 f.), and in the relics of the temple at Kingavar (Dieulafoy, L Art antique de la Perse, v. p. 10 f.).

If any vestige of Hellenism still survived under the Sassanian kings, our records do not show it. The spirit of the Sassanian monarchy was more jealously national than that of the Arsacid, and alien grafts could hardly have flourished emp i re , under it. Of course, if Darmesteter was right in seeing a Greek element in Zoroastrianism, Greek influence must still have operated under the new dynasty, which recognized the national religion. But, as we saw, the Greek influence has been authoritatively denied. At the court a limited recognition might be given, as fashion veered, to the values prevalent in the

Hellenistic world. The story of Hormisdas in Zosimus is sugges- tive in this connexion (Zosim. Hist. nov. ii. 27). Chosroes I. interested himself in Greek philosophy and received its professors from the West with open arms (Agath. ii. 28 f.) ; according to one account, he had his palace at Ctesiphon built by Greeks (Theophylact. Simocat. v. 6).

But the account of Chosroes' mode of action makes it plain that the Hellenism once planted in Iran had withered away; representatives of Greek learning and skill have all to be imported from across the frontier.

For Hellenism in Babylonia and Iran, see the useful article of M. Victor C'hapot in the Bull, el memoires de la Soc. Nat. des Anti- quaires de France for 1902 (published 1904), p. 206 f., which gives a conspectus of the relevant literature.

(iii.) Asia Minor. — Very different were the fortunes of Hellen- ism in those lands which became annexed to the Roman Empire.

In Asia Minor, we have seen how, even before Alexander, Hellenism had begun to affect the native races and Persian nobility. During Alexander's own reign, we cannot areek trace any progress in the Hellenization of the interior, cities nor can we prove here his activity as a builder of of the cities. But under the dynasties of his successors a oc '

great work of city-building and colonization went on. Antigonu s fixed his capital at the old Phrygian town of Celaenae, and the famous cities of Nicaea and Alexandria Troas owed to him their first foundation, each as an Antigonia; they were refounded and renamed by Lysimachus (301-281 B.C.). Then we have the great system of Seleucid foundations. Sardis, the Seleucid capital in Asia Minor, had become a Greek city before the end of the 3rd century B.C. The main high road between the Aegean coast and the East was held by a series of new cities. Going west from the Cilician Gates we have Laodicea Catacecaumene, Apamea, the Phrygian capital which absorbed Celaenae, Laodicea on the Lycus, Antioch-on-Meander, Antioch-Nysa, Antioch- TralleS. To the south of this high road we have among the Seleucid foundations Antioch in Pisidia (colonized with Mag- nesians from the Meander) and Stratonicea in Caria; in the region to the north of it the most famous Seleucid colony was Thy atira. Along the southern coast , where the houses of Seleucus and Ptolemy strove for predominance, we find the names of Berenice, Arsinoe and Ptolemais confronting those of Antioch and Seleucia. With the rise of the Attalid dynasty of Pergamum, a system of Pergamene foundation begins to

oppose the Seleucid in the interior, bearing such names as Attalia, Philetaeria,

Eumenia, Apollonis. Of these, one may note for their later celebrity Philadelphia in Lydia and Attalia on the Pamphylian coast. The native Bithynian dynasty became Hellenized in the course of the 3rd century, and in the matter of city building Prusias (the old Cius), Apamea (the old Myrlea), probably Prusa, and above all Nicomedia attested its activity. While new- Greek cities were rising in the interior, the older Hellenism of the western coast grew in material splendour under the muni- ficence of Hellenistic kings. Its centres of gravity to some extent shifted. There was a tendency towards concentration in large cities of the new type, which caused many of the lesser towns, like Lebedus, Myus or Colophon, to sink to insignificance, while Ephesus grew in greatness and wealth, and Smyrna rose again after an extinction of four centuries. The great importance of Rhodes belongs to the days after Alexander, when it received the riches of the East from the trade-routes which debouched into the Mediterranean at Alexandria and Antioch. In Aeolis, of course, the centre of gravity moved to the Attalid capital, Pergamum. It was the irruption of the Celts, beginning in 278-277 B.C., which checked the Hellenization of the interior. Not only did the Galatian tribes take large tracts towards the north of the plateau in possession, but they were an element of perpetual unrest, which hampered and distracted the Hellenistic monarchies. The wars, therefore, in which the Pergamene kings in the latter part of the 3rd century stemmed their aggres- sions, had the glory of a Hellenic crusade.

The minor dynasties of non-Greek origin, the native Bithynian and the two Persian dynasties in Pontus and Cappadocia, were Hellenized before the Romans drove the Seleucid out dynasties. °^ tne coun t rv – In Bithynia the upper classes seem to have followed the fashion of the court (Beloch iii. [i.], 278); the dynasty of Pontus was phil-hellenic by ancestral tradition; the dynasty of Cappadocia, the most conservative, dated its conversion to Hellenism from the time when a Seleucid princess came to reign there early in the 2nd century b.c. as the wife of Ariarathes V. (Diod. xxxi. 19. 8). But Hellenism in Cappadocia was for centuries to come still confined to the castles of the king and the barons, and the few towns.

When Rome began to interfere in Asia Minor, its first action was to

break the power of the Gauls (189 B.C.). In 133 Rome Hellenism entered formally upon the heritage of the Attalid under kingdom and became the dominant power in the Roman Anatolian peninsula for 1 200 years. Under Rome the sway. process of Hellenization, which the divisions and weakness of the Macedonian kingdoms had checked, went forward. The coast regions of the west and south the Romans found already Hellenized. In Lydia ” not a trace ” of the old language was left in Strabo’s time (Strabo xiv. 631); in Lycia, the old language became obsolete in the early days of Macedonian rule (see Kalinka, Titnli Asioe minoris, i. 8). But inland, in Phrygia, Hellenism had as yet made little headway outside the Greek cities. Even the Attalids had not effected much here (Korte, Atken. Mitth. xxiii., 1898, p. 152), and under the Romans, the penetration of the interior by Hellenism was slow. It was not till the reign of Hadrian that city life on the Phrygian plateau became rich and vigorous, with its material circumstances of temples, theatres and baths. Among the villages of the north and east of Phrygia, Hellenism ” was only beginning to make itself felt in the middle of the 3rd century a.d.” (Ramsay in Kuhn’s Zcitsch. f. verglcich. Sprachforschung, xxviii., 1885, p. 382). Gravestones in this region as late as the 4th century curse violators in the old Phrygian speech. The lower classes at Lystra in St Paul’s time spoke Lycaonian (Acts xiv. n). In that part of Phrygia, which by the settlement of the Celtic invaders became Galatia, the larger towns seem to have become Hellenized by the time of the Christian era, whilst the Celtic speech maintained itself in the country villages till the 4th century a.d. (Jerome, Preface to Comment, in Epist. ad Gal. book ii.; see J. G. C. Anderson, Journ. of Hell, Stud, xix., 1899, p. 312 f.). Cappadocia at the beginning of the Christian era was still comparatively townless (Strabo xii. 537), a countryˆ of large estates with a servile peasantry. Even in the 4th century

its Hellenization was still far from complete; but Christianity had assimilated so much of the older Hellenic culture that the Church was now a main propagator of Hellenism in the backward regions. The native languages of Asia Minor all ultimately gave way to Greek (unless Phrygian lingered on in parts till the Turkish invasions; see Mordtmann, Silzungsb. d. bayer. Ak. 1862, i. p. 30; K. Holl in Hermes, xliii., 1908, p. 240 f.). The effective Hellenization of Armenia did not take place till the 5th century, when the school of Mesrop and Sahak gave Armenia a literature translated from, or imitating, Greek books (Gelzer in I. v. Miiller’s Handbuch, vol. ix. Abt. i. p. 916.)

(iv.) Syria. — In Syria, which with Cilicia and Mesopotamia, formed the central part of the Seleucid empire, the new colonies were especially numerous. Alexander himself had perhaps made a

beginning with Alexandria-by-Issus e „, p /re. (mod. Alexandretta), Samaria, Pella (the later Apamea), Carrhae, &c. Antigonus founded Antigonia, which was absorbed a few years later by Antioch, and after the fall of Antigonus in 301, the work of planting Syria with Greek cities was pursued effectively north of the Lebanon by the house of Seleucus, and, less energetically, south of the Lebanon by the house of Ptolemy. In the north of Syria four cities stood pre-eminent above the rest, (1) Antioch on the Orontes, the Seleucid capital; (2) Seleucia-in-Pieria near the mouth of the Orontes, which guarded the approach to Antioch from the sea; (3) Apamea (mod. Famia), on the middle Orontes, the military headquarters of the kingdom; and (4) Laodicea ” on sea ” {ad mare), which had a commercial importance in connexion with the export of Syrian wine. Of the Ptolemaic foundations in Coele-Syria only one attained an importance comparable with that of the larger Seleucid foundations, Ptolemais on the coast, which was the old Semitic Acco transformed (mod. Acre). The group of Greek cities east of the Jordan also fell within the Ptolemaic realm during the 3rd century B.C., though their greatness belonged to a somewhat later day. The whole of Syria was brought under the Seleucid sceptre, together with Cilicia, by Antiochus III. the Great (223-187 B.C.). Under his son, Antiochus IV. Epiphanes (175-164), a fresh impulse was given to Syrian Hellenism. In 1 Maccabees he is represented as writing an order to all his subjects to forsake the ways of their fathers and conform to a single prescribed pattern, and though in this form the account can hardly be exact, it does no doubt represent the spirit of his action. Other facts there are which point the same way. We now find a sudden issue of bronze money by a large number of the cities of the kingdom in their own name— an indication of liberties extended or confirmed. Many of them exchange their existing name for that of Antioch (Adana, Tarsus, Gadara, Ptolemais), Seleucia (Mopsuestia, Gadara) or Epiphanea (Oeniandus, Hamath). At Antioch itself great public works were carried out, such as were involved in the addition of a new quarter to the city, including, we may suppose, the civic council chamber which is afterwards spoken of as being here. With the ever-growing weakness of the Seleucid dynasty, the independence and activity of the cities increased, although, if, on the one hand, they were less suppressed by a strong central government, they were less protected against military adventurers and barbarian chieftains. Accordingly, when Pompey annexed Syria in 64 B.C. as a Roman province, he found it a chaos of city-states and petty princi- palities. The Nabataeans and the Jews above all had riod. encroached upon the Hellenistic domain; in the south the Jewish raids had spread desolation and left many cities practically in ruins. Under Roman protection, the cities were soon rebuilt and Hellenism secured from the barbarian peril. Greek city life, with its political forms, its complement of festivities, amusements and intellectual exercise, went on more largely than before. The great

majority of the Hellenistic remains in Syria belong to the Roman period. Such local dynasties as were suffered by the Romans to exist had, of course, a Hellenistic complexion. Especially was this the case with that of the Herods. Not only were such marks of Hellenism as a theatre introduced

by Herod the Great (37-34 B.C.) at Jerusalem, but in the work of city-building this dynasty showed itself active. Sebaste (the old Samaria), Caesarea, Antipatris were built by Herod the Great, Tiberias by Herod Antipas (4 b.c.-a.d. 39). The reclaiming of the wild district of Hauran for civilization and Hellenistic life was due in the first instance to the house of Herod (Schurer, Gesch. d. jiid. V oik. 3rd ed., ii. p. 12 f.). In Syria, too, Hellenism under the Romans advanced upon new ground. Palmyra, of which we hear nothing before Roman times, is a notable instance.

As to the effect of this network of Greek cities upon the aboriginal population of Syria, we do not find here the same disappearance of native languages and racial charac-

ar f, el L teristics as in Asia Minor. Still less was this the case

culture . . . .

in Syria. m Mesopotamia, where a strong native element in such

a city as Edessa is indicated by its epithet /sti£oj3ap/3apos. The old cults naturally went on, and at Carrhae (Harran) even survived the establishment of Christianity. The lower classes at Antioch, and no doubt in the cities generally, were in speech Aramaic or bilingual; we find Aramaic popular nicknames of the later Seleucids (K. O. Miiller, Antiq. Ant. p. 29). The villages, of course, spoke Aramaic. The richer natives, on the other hand, those who made their way into the educated classes of the towns, and attained official position, would become Hellenized in language and manners, and the ” Syrian Code ” shows how far the social structure was modified by the Hellenic tradition (Mitteis, Reichsrecht und Volksrechl in den ost. Pro- vinzen des rom. Kaiserreichs , 1891; Arnold Meyer, Jesu Mutter- sprache, 1896). Of the Syrians who made their mark in Greek literature, some were of native blood, e.g. Lucian of Samosata.

One may notice the great part taken by natives of the Phoenician cities in the history of later Greek philosophy, and in the poetic movement of the last century B.C., which led to fresh cultivation of the epigram. Greek, in fact, held the field as the language of literature and polite society. Possibly at places like Edessa, which for some 350 years (till a.d. 216) was under a dynasty of native princes, Aramaic was cultivated as a literary language. There was a Syriac-speaking church here as early as the 2nd century, and with the spread of Christianity Syriac asserted itself against Greek. The Syriac literature which we possess is all Christian.

But where Greek gave place to Syriac, Hellenism was not thereby effaced. It was to some extent the passing over of the Hellenic tradition into a new medium. We must remember the marked Hellenic elements in Christian theology. The earliest Syriac work which we possess, the book ” On Fate,” produced in the circle of the heretic Bardaisan or Bardesanes (end of the 2nd century), largely follows Greek models. There was an extensive translation of Greek works into Syriac during the next centuries, handbooks of philosophy and science for the most part. The version of Homer into Syriac verses made in the 8th century has perished, all but a few lines (R. Duval, La Lilt, syriaque, 1900, p. 325).

(v.) The relation of the Jews to Hellenism in the first century and a half of Macedonian rule is very obscure, since the state- ments made

by later writers like Josephus, as to the visit of Alexander to Jerusalem or the privileges con- ferred upon the Jews in the new Macedonian realms are justly suspected of being fiction. It has been maintained that Greek influence is to be traced in parts of the Old Testament assigned to this period, as, for instance, the Book of Proverbs; but even in the case of Ecclesiastes, the canonical writing whose affinity with Greek thought is closest, the coincidence of idea need not necessarily prove a Greek source. The one solid fact in this con- nexion is the translation of the Jewish Law into Greek in the 3rd century B.C., implying a Jewish Diaspora at Alexandria, so far Hellenized as to have forgotten the speech of Palestine. Early in the 2nd century B.C. we see that the priestly aristocracy of Jerusalem had, like the well-to-do classes everywhere in Syria, been carried away by the Hellenistic current, its strength being evidenced no less by the intensity of the conservative

opposition embodied in the party of the ” Pious ” (Assideans, ffasidim).

Under Antiochus IV. Epiphanes (176-165) the Hellenistic aristocracy contrived to get Jerusalem converted into a Greek city; the gymnasium appeared, and Greek dress became fashion- able with • the young men. But when Antiochus, owing to political developments, interfered violently at Jerusalem, the conservative opposition carried the nation with them. The revolt under the Hasmonaean family (Judas Maccabaeus and his brethren) followed, ending in 143-142 in the establishment of an independent Jewish state under a Hasmonaean prince. But whilst the old Hellenistic party had been crushed the Hasmonaean state was of the nature of a compromise. The Mosaic Law was respected, but Hellenism still found an entrance in various forms. The first Hasmonaean ” king,” Aristobulus I. (104-103), was known to the Greeks as Phil-hellen. He and all later kings of the dynasty bear Greek names as well as Hebrew ones, and after Jannaeus Alexander (103-76) the Greek legends are common on the coins beside the Hebrew. Herod, who sup- planted the Hasmonaean dynasty (37-34 b.c,) made, outside Judaea, a display of Phil-hellenism, building new Greek cities and temples, or bestowing gifts upon the older ones of fame. His court, at the same time, welcomed Greek men of letters like Nicolaus of Damascus. Even in the neighbourhood of Jerusalem, he erected a theatre and an amphitheatre. We have already noticed the work done by the Herodian dynasty in furthering Hellenism in Syria (see Schurer, Gesch. des jildisch. Volkes, vols. i. and ii.). Meanwhile a great part of the Jewish people was living dispersed among the cities

of the Greek world, speaking Greek as their mother-tongue, and absorbing Greek influences in much larger measure than their brethren of Palestine. These are the Jews whom we find contrasted as ” Hellenists ” with the ” Hebrews ” in Acts. They still kept in touch with the mother-city, and indeed we hear of special synagogues in Jerusalem in which the Hellenists temporarily resident there gathered (Acts vi. 9). A large Jewish literature in Greek had grown up since the translation of the Law in the 3rd century. Beside the other canonical books of the Old Testament, translated in many cases with modifications or additions, it included transla- tions of other Hebrew books (Ecclesiasticus, Judith, &c), works composed originally in Greek but imitating to some extent the Hebraic style (like Wisdom), works modelled more closely on the Greek literary tradition, either historical, like 2 Maccabees, or philosophical, like the productions of the Alexandrian school, represented for us by Aristobulus and Philo, in which style and thought are almost wholly Greek and the reference to the Old Testament a mere pretext ; or Greek poems ■ on Jewish subjects, like the epic of the elder Philo and Ezechiel’s tragedy, Exagoge. It included also a number of forgeries, circulated under the names of famous Greek authors, verses fathered upon Aeschylus .or Sophocles, or books like the false Hecataeus, or above all the pretended prophecies of ancient Sibyls in epic verse. These frauds were all contrived for the heathen public, as a means of propaganda, calculated to inspire them with respect for Jewish antiquity or turn them from idols to God.

For Jewish Hellenism see Schurer, op. cit. iii. ; Susemihl, Gesch der griech- Lit. in der Alexandrinerzeit, ii. 601 f. ; Willrich, Juden und Griechen (1895), Judaica (1900); Hastings’ Diet, of the Bible, art. “Greece”; Encyclop. Biblica, art. “Hellenism”; Pauly- Wissowa, art. ” Aristobulus (15) “; also the work of P. Wendland cited above.

Through the Hellenistic Jews, Greek influences reached Jerusalem itself, though their effect upon the Aramaic-speakifrg Rabbinical schools was naturally not so pronounced. The large number of Greek words, however, in the language of the Mishnah and the Talmud is a significant phenomenon. The attitude of the Rabbinic doctors to a Greek education does not seem to have been hostile till the time of Hadrian. The sect of the Essenes probably shows an intermingling of the Greek with Other lines of tradition among the Jews of Palestine.

See Schurer ii. 42-67, 583; S. Krauss, Griech. u. latein. JLehnworter im Talmud (1898); Jewish Encyclopedia, art. ” GreeK Language.”

HELLENISM

(vi.) In Egyplthe Ptolemies were hindered byspecial considera- tions from building Greek cities after the manner of the other Macedonian houses. One Greek city they found kinedom. ex i stm g> Naucratis; Alexander had called Alexandria into being; the first Ptolemy added Ptolemais as a Greek centre for Upper Egypt. They seem to have suffered no other community in the Nile Valley with the inde- pendent life of a Greek city, for the Greek and Macedonian soldier-colonies settled in the Fayum or elsewhere had no political self-existence. And even at Alexandria Hellenism was not allowed full development. Ptolemais, indeed, enjoyed all the ordinary forms of self-government, but Alexandria was governed despotically by royal officials. In its population, too, Alexandria was only semi-Hellenic; for besides the proportion of Egyptian natives in its lower strata, its commercial greatness drew in elements from every quarter; the Jews, for instance, formed a majority of the population in two out of the five divisions of the city. At the same time the prevalent tone of the populace was, no doubt, Hellenistic, as is shown by the fact that the Jews who settled there acquired Greek in place of Aramaic as their mother-tongue, and in its upper circles Alexandrian society under the Ptolemies was not only Hellenistic, but notable among the Hellenes for its literary and artistic brilliance. The state university, the ” Museum,” was in close connexion with the court, and gave to Alexandria the same pre-eminence in natural science and literary scholar- ship which Athens had in moral philosophy.

Probably in no other country, except Judaea, did Hellenism encounter as stubborn a national antagonism as in Egypt. The common description of ” the Oriental ” as indurated in his antagonism to the alien conqueror here perhaps has some truth in it. The assault made upon the Macedonian devotee in the temple of Serapis at Memphis ” because he was a Greek ” is significant (Papyr. Brit. Mus. i. No. 44; cf. Grenfell, Amherst Papyr. p. 48) . And yet even here one must observe qualifications. The papyri show us habitual marriage of Greeks and native women and a frequent adoption by natives of Greek names. It has even been thought that some developments of the Egyptain religion are due to Hellenistic influence, such as the deification of Imhotp (Bissing, Deutsche Literaturzeitung, 1902, col. 2330) or the practice of forming voluntary religious associations (Otto, Priester mid Tempel, i. 125). The worship of Serapis was patronized by the court with the very object of affording a mixed cultus in which Greek and native might unite. In Egypt, too, the triumph of Christianity brought into being a native Christian literature, and if this was in one way the assertion of the native against Hellenistic predominance, one must

remember that Coptic literature, like Syriac, necessarily incorporated those Greek elements which had become an essential part of Christian theology.

From the Ptolemaic kingdom Hellenism early travelled up the Nile into Ethiopia. Ergamenes, the king of the Ethiopians

Ethi oia ‘ n l ˆ e t; ‘ rne °ˆ t ˆ le secon d Ptolemy, ” who had received a Greek education and cultivated philosophy,” broke with the native priesthood (Diod. iii. 6), and from that time traces of Greek influence continue to be found in the monuments of the Upper Nile. When Ethiopia became a Christian country in the 4th century, its connexion with the Hellenistic world became closer.

(vii.) Hellenism in the West. — Whilst in the East Hellenism had been sustained by the political supremacy of the Greeks, in G . Italy Graecia capta had only the inherent power and

culture charm of her culture wherewith to win her way. At lathe Carthage in the 3rd century the educated classes

R0 Hd” seem generally to have been familiar with Greek culture (Bernhardy, Grundriss d. griech. Lit. § 77). The philosopher Clitomachus, who presided over the Academy at Athens in the 2nd century, was a Carthaginian. Even before Alexander, as we saw, Hellenism had affected the peoples of Italy, but it was not till the Greeks of south Italy and Sicily were brought under the supremacy of Rome in the 3rd century B.C. that the stream of Greek influence entered Rome in any

volume. It was now that the Greek freedman, L. Livius Andronicus, laid the foundation of a new Latin literature by his translation of the Odyssey, and that the Greek dramas were recast in a Latin mould. The first Romans who set about writing history wrote in Greek. At the end of the 3rd century there was a circle of enthusiastic phil-hellenes among the Ron an aristocracy, led by Titus Quinctius Flamininus, who in Rome’s name proclaimed the autonomy of the Greeks at the Isthmian games of ro6. In the middle of the 2nd century Roman Hellen- ism centred in the circle of Scipio Aemilianus, which included men like Polybius and the philosopher Panaetius. The visit of the three great philosophers, Diogenes the ” Babylonian,” Critolaus and Carneades in 155, was an epoch-making event in the history of Hellenism at Rome. Opposition there could not fail to be, and in 161 a senatus consultum ordered all Greek philosophers and rhetoricians to leave the city. The effect of such measures was, of course, transient.

Even though the opposition found so doughty a champion as the elder Cato (censor in 184), it was ultimately of no avail. The Italians did not indeed surrender themselves passively to the Greek tradition. In different departments of culture the degree of their inde- pendence was different. The system of government framed by Rome was an original creation. Even in the spheres of art and literature, the Italians, while so largely guided by Greek canons, had something of their own to contribute. The mere fact that they produced a literature in Latin argues a power of creation as well as receptivity. The great Latin poets were imitators indeed, but mere imitators they were no more than Petrarch or Milton. On the other hand, even where the creative originality of Rome was most pronounced, as in the sphere of Law, there were elements of Hellenic origin. It has been often pointed out how the Stoic philosophy especially helped to shape Roman jurisprudence (Schmekel, Philos. d. mittl. Stoa, p. 454 L).

Whilst the upper classes in Italy absorbed Greek influences by their education, by the literary and artistic tradition, the lower strata of the population of Rome became largely hellenized by the actual influx on a vast scale of Greeks and hellenized Asiatics, brought in for the most part as slaves, and coalescing as freedmen with the citizen body. Of the Jewish inscriptions found at Rome some two-thirds are in Greek. So too the early Christian church in Rome, to which St Paul addressed his epistle, was Greek-speaking, and continued to be till far into the 3rd century.

III. Later History. — It remains only to glance at the ultimate destinies of Hellenism in West and East. In the Latin West knowledge of Greek, first-hand acquaintance with the Greek classics, became rarer and rarer as general culture declined, till in the dark ages (after I the 5th century) it existed practically nowhere but in Ireland (Sandys, History of Classical Scholarship, i. 438). In Latin literature, however, a great mass of Hellenistic tradition in a derived form was maintained in currency, wherever, that is, culture of any kind continued to exist. It was a small number of monkish communities whose care of those narrow channels prevented their ever drying up altogether. Then the stream began to rise again, first with the influx of the learning of the Spanish Moors, then with the new knowledge of Greek brought from Constantinople in the 14th century. With the Renaissance and the new learning, Hellenism came in again in flood, to form a chief part of that great river on which the modern world is being carried forward into a future, of which one can only say that it must be utterly unlike anything that has gone before. In the East it is popularly thought that Hellenism, as an exotic, withered altogether away. This view is superficial. During the dark ages, in the Byzantine East, as well as in

the West, Hellenism had become little more than a dried and shrivelled tradition, although the closer study of Byzantine culture in latter years has seemed to discover more vitality than was once supposed. Ultimately the Greek East was absorbed by Islam; the popular mistake lies in supposing that the Hel- hiam lenistic tradition thereby came to an end. The Mahommedan conquerors found a considerable part of it taken

The

middle

ages.

over, as we saw, by the Syrian Christians, and Greek philosophical and scientific classics were now translated from Syriac into Arabic. These were the starting-points for the Mahommedan schools in these subjects. Accordingly we find that Arabian philosophy (q.v.), mathematics, geography, medicine and philology are all based professedly upon Greek works (Brockel- mann, Gesch. d. arabischen Literalur, 1898, vol. i.; R. A. Nicholson, A Literary History of the Arabs, 1907, pp. 358-361). Aristotle in the East no less than in the West was the ” master of them that know ”; and Moslem physicians to this day invoke the names of Hippocrates and Galen. The Hellenistic strain in Mahommedan civilization has, it is true, flagged and failed, but only as that civilization as a whole has declined. It was not that the Hellenistic element failed, whilst the native elements in the civilization prospered; the culture of Islam has, as a whole (from whatever causes) , sunk ever lower during the centuries that have witnessed the marvellous expansion of Europe.

Authorities. — For the inner history of Hellenism after Alexander, the general historical literature dealing with later Greece and Rome supplies material in various degrees. See works quoted in articles Greece, History; Rome, History; Ptolemies; Seledcid Dynasty ; Bactria, &c.

Different elements (literature, philosophy, art, &c.) are dealt with in works dealing specially with these subjects, among which those of Susemihl, Wilamowitz-Moellendorff, Erwin Rohde and E. Schwartz are of especial importance for the literature; those of Schreiber and Strzygowski for the later Greek art.

Sketches of Hellenistic civilization generally are found in J. P. Mahaffy's Greek Life and Thought (1887), The Greek World under Roman Sway (1890), The Silver Age of the Greek World (1906); Julius Kaerst, Gesch. d. Hellenist. Zeitalters (Band ii., publ. 1909) ; and in Beloch's Griechische Geschichte, vol. iii. (for the century immediately succeeding Alexander). R. von Scala's " The Greeks after Alexander," in Helmolt's History of the World (vol. v.), covers the whole period from Alexander to the end of the Byzantine Empire. P. Wendland's Hellenistisch-rbmische Kullur in ihren Beziehungen 2« Judentum u. Christentum (1907) is an illuminating monograph, giving a conspectus of the material. For Hellenistic Egypt, Bouch6- Leclercq, Histoire des Lagides, vol. iii. (1906). (E. R. B.)

HELLER, STEPHEN (181 5-1888), Austrian pianist and composer, was born at Pest on the 15th of May 1815. (Fetis's dictionary says 1814, but this is almost certainly wrong.) He was at first intended for a lawyer, but at nine years of age performed so successfully at a concert that he was sent to Vienna to study under Czerny. Halm was his principal master, and from the age of twelve he gave concerts in Vienna, and made a tour through Hungary, Poland and Germany. At Augsburg he had the good fortune to be befriended when ill by a wealthy family, who practically adopted him and gave him the opportunity to complete his musical education. In 1838 he went to Paris, and soon became intimate with Liszt, Chopin, Berlioz and their set, among whom was Halle, throughout his life an indefatigable performer of Heller's music. In 1849 he came to England and played a few times, and in 1862 he appeared with Halle at the Crystal Palace. He outlived the great reputation he had enjoyed among cultivated amateurs for so many years, and was almost forgotten when he died at Paris on the 14th of January 1888. His pianoforte pieces, almost all of them pub- lished in sets and provided with fancy names, do not show very startling originality, but their grace and refinement could not but make them popular with players and listeners of all classes.

HELLESPONT (i.e. " Sea of Helle "; variously named in classical literature 'EXXifcnroi'Tos, 6 "EXX77S tovtos, Helle- sp&ntum Pelagus, and Frctum Hellesponticum), the ancient name of the Dardanelles (q.v.). It was so-called from Helle, the daughter of Athamas (q.v.), who was drowned here. See Argonauts.

HELLEVOETSLUIS, or Helvoetsluis, a fortified seaport in the province of South Holland, the kingdom of Holland, on the south side of the island of Voorne-and-Ptitten, on the sea-arm known as the Haringvliet, 55 m. S. of Brielle. It has daily steam- boat connexion with Rotterdam by the Voornsche canal. Pop. (1900), 4152. Hellevoetsluis is an

important naval station, and possesses a naval arsenal, dry and wet docks, wharves and a naval college for engineers. Among the public buildings arc the

communal chambers, a Reformed church (1661), a Roman Catholic church and a synagogue.

HELLJN, a town of south-eastern Spain, in the province of Albacete, on the Albacete-Murcia railway. Pop. (1900), 12,558. Hellin is built on the outskirts of the low hills which line the left bank of the river Mundo. It possesses the remains of an old Roman castle and a beautiful parish church, the masonry and marble pavement at the entrance of which are worthy of special notice. The surrounding country yields wine, oil and saffron in abundance; within the town there are manufactures of coarse cloth, leather and pottery. Sulphur is obtained from the cele- brated mining district of Minas del Mundo, 12 m. S., at the junc- tion between the Mundo and the Segura; and there are warm sulphurous springs in the neighbouring village of Azaraque. Hellin was known to the Romans who first exploited its sulphur as Illunum.

HELLO, ERNEST (1828-1885), French critic, was born at Treguier. He was the son of a lawyer who held posts of great importance at Rennes and in Paris, and was well educated at both places, but took to no profession and resided much, for a time, in his father's country-house in Brittany. A very strong Roman Catholic, he appears to have been specially excited by his countryman Renan's attitude to religious matters, and coming under the influence of J. A. Barbey d' Aurevilly and Louis Veuillot, the two most brilliant crusaders of the Church in the press> he started a newspaper of his own, Le Croise, in 1859; but it only lasted two years. He wrote, however, much in other papers. He had very bad health, suffering apparently from spinal or bone disease. But he was fortunate enough to meet with a wife, Zoe Berthier, who, ten years older than himself, and a friend for some years before their marriage, became his devoted nurse, and even brought upon herself abuse from gutter journalists of the time for the care with which she guarded him. He died in 1885. Hello's work is somewhat varied in form but uniform in spirit. His best- known book, Physionomie de saints (1875), which has been trans- lated into English {1903) as Studies in Saintship, does not display his qualities best. Conies extraordinaires, published not long before his death, is better and more original. But the real Hello is to be found in a series of philosophical and critical essays, from Renan, I'Allemagne et I'atheisme (1861), through L'Homme (18 71) and Les Plateaux de la balance (1880), perhaps his chief book, to the posthumously

published Le Si'ecle. The peculiarity of his standpoint and the originality and vigour of his handling make his studies, of Shakespeare, Hugo and others, of abiding importance as literary " triangulations," results of object, sub- ject and point of view.

HELMERS, JAN FREDERIK (1 767-1813), Dutch poet, was born at Amsterdam on the 7th of March 1767. His early poems, Night (178&) and Socrates (1790), were tame and sentimental, but after 1805 he determined, in company with his brother-in-law, Cornelis Loots (1765-1834), to rouse national feeling by a burst of patriotic poetry. His Poems (2 vols., 1 809-1810), but especially his great work The Dutch Nation, a poem in six cantos (1812), created great enthusiasm and enjoyed immense success. Helmers died at Amsterdam on the 26th of February 1813. He owed his success mainly to the integrity of his patriotism and the opportune moment at which he sounded his counterblast to the French oppression. His posthumous poems were collected in 181 5.

HELMERSEN, GREGOR VON (1803-1885), Russian geologist, was born at Laugut-Duckershof, near Dorpat, on the 29th of September (O.S.) 1803. He received an engineering training and became major-general in the corps of Mining Engineers. In 1837 he was appointed professor of geology in the mining institute at St Petersburg. He was author of numerous memoirs on the geology of Russia, especially on the coal and other mineral deposits of the country; and he wrote also some explanations to accompany separate sheets of the geological map of Russia. His geological work was continued to an advanced age, one of the later publica- tions being Studien Uber die Wanderblocke und die Diluvialgebilde Russlands (1869 arid 1882). Most of his memoirs were published by the Imperial Academy of Sciences at St Petersburg. He died at St Petersburg on the 3rd of February (O.S.) 1885.

Fig

I. — Casque with Neck-guard.

HELMET (from an obsolete diminutive of O. Fr. helme, mod. heaume; the English word is " helm," as in O. Eng., Dutch and Ger. ; all are from the Teutonic base Hal-, pre-Teut. kal-, to cover; cf. Lat. celare, to hide, Eng. " hell," &c), a defensive covering for the head. The present

article deals with the helmet during the middle ages down to the close of the period when body armour was worn. For the helmet worn by the Greeks and Romans see Arms and Armour.

The head-dress of the warriors of the dark ages and of the earlier feudal' period was far from being the elaborate helmet which is associated in the imagination with the knight in armour and the tourney. It was a mere casque, a cap with or without additional safeguards for the ears, the nape of the neck and the nose (fig. i). By those warriors who possessed the means to equip themselves fully, the casque was worn over a hood of mail, as shown in fig. 2. In manuscripts, &c, armoured men are some- times portrayed fighting in their hoods, without casques, basinets or other form of helmet. The casque was, of course, normally of plate, but in some instances it was a strong leather cap covered with mail or imbricated plates. The most advanced form of this early helmet is the conical steel or iron cap with nasal (fig. 2), worn in conjunction with the hood of mail.- This is the typical helmet of the 1 ith-century warrior, and is made familiar by the Bayeux Tapestry. From this point however (c. 1 100) the evolution of war head-gear follows two different paths for many years. On the one hand the simple casque easily transformed itself into the basinet, originally a pointed iron skull-cap without nasal, ear-guards, &c. On the other hand the knight in armour, especially after the fashion of the tournament set in, found the mere cap with nasal insufficient, and the htaume (or " helmet ") gradually This was in principle a large heavy iron pot Often a light basinet was worn

Fig. 2. — Casque with Nasal and Mail Hood.

came into vogue.

covering the head and neck.

underneath it -or rather the knight usually wore his basinet and only put the heaume on over it at the last moment before engaging. The earlier (12th century) war heaumes are intended to be worn with the mail hood and have nasals (fig. 3). Towards the end of the 13th century, however, the basinet grew in size and strength, just as the casque had grown, and

Fig. 3.— Heaume, early be S an to challenge comparison with the 13th century. heavy and clumsy heaume. There-

upon the heaume became, by degrees^

the special head-dress of the tournament, and grew heavier,

larger and more elaborate, while the basinet, reinforced with

10th-century cap to the towering helmet of 1350, with its long snouted vizor and ample drooping ” camail,” is shown in fig. 6, a, b, c and d, the two latter showing the same helmet with vizor down and up. But the tendency set in during, the earlier years of the 15th century to make all parts of the armour thicker. Chain ” mail ” gradually gave way to plate on the body and the limbs, remaining only in those parts, such as neck and elbows, where flexibility was essential, and even there it was in the end replaced by jointed steel bands or small plates. The final step was the discarding of the ” camail ” and the introduction of the

Fig. 4. — Heaume, 15th century. Fig. 5. — Heaume, 15th century.

camail and vizor, was worn in battle. Types of the later, purely tilting, heaume are shown in figs. 4 and 5.

The basinet, then, is the battle head-dress of nobles, knights and sergeants in the 14th century. Its development from the

Fig. 6. — Basinets.

” armet.” The latter will be described later. Soon after the beginning of the 15th century the high-crowned basinet gave place to the salade or sallet, a helmet with a low rounded crown and a long brim or neck-guard at the back. This was the typical head- piece of the last half of the Hundred Years’ War as the vizore4 basinet had been of the first. Like the basinet it was worn in a simple form by archers and pikemen and in a more elaborate form by the knights and men-at arms. The larger and heavier salades were also often used instead of the heaume in tournaments. Here again, however, there is a great difference between those worn by light armed men, foot-soldiers and archers and those of the heavy cavalry. The former, while possessing as a rule the bowl shape and the lip or brim of the type, and always destitute of the conical point which is the distinguishing mark of the basinet, are cut away in front of the face (fig. 7 a). In some cases this was remedied in part by the addition of a small pivoted vizor, which, however, could not protect the throat. In the larger salades of the heavy cavalry the wide brim served to protect the whole‸ head, a slit being made in that part of the brim which came in front of the eyes (in some examples the whole of the front part of the brim was made movable). But the chin and

neck, directly opposed to the enemy’s blows, were scarcely protected

at all, and with these helmets a large volant-piece or beaver (mentonniere) — usually a continuation of the body armour up to the chin or even beyond— was worn for this purpose, as shown in fig. 7 b. This arrangement combined, in a rough way, the advantages of freedom of movement for the head with adequate protection for the neck and lower part of the face. The armet, which came into use about 1475-1500 and com- pletely superseded the salade, realized these requirements far better, and later at the zenith of the armourer's art (about 1520) and throughout the period of the' decline of armour it remained the standard pattern of helmet, whether for war or for tourna- ment, It figures indeed in nearly all portraits of kings, nobles and

Fig. 7. — Salades or Sallets.

soldiers up to the time of Frederick the Great, either with the suit of armour or half armour worn by the subject of the portrait or in allegorical trophies, &c. The armet was a fairly close fitting rounded shell of iron or steel, with a movable vizor in front and complete plating over chin, ears and neck, the latter replacing the mentonniere or beaver. The armet was connected to the rest of the suit by the gorget, which was usually of thin laminated steel plates. With a good armet and gorget there was no weak point for the enemy's sword to attack, a roped lower edge of the armet generally fitting into a sort of flange round the top of the gorget. Thus, and in other and slightly different ways,

Fig. 8.— Armets.

was solved the problem which in the early days of plate armour had been attempted by the clumsy heaume and the flexible, if tough, camail of the vizored basinet, and still more clumsily in the succeeding period by the salade and its grotesque mentonniere. As far as existing examples show, the wide-brimmed salade itself first gave way to the more rounded armet, the mentonniere being.carried up to the level of the eyes. Then the use (growing throughout the 15th century) of laminated armour for the joints of the harness probably suggested the gorget, and once this was applied to the lower edge of the armet by a satisfactory joint, it was an easy step to the elaborate pivoted vizor which completed the new head-dress. Types of armets are shown in fig. 8.

The burgonet, often confused with the armet, is the typical helmet of the late 16th and early 17 th centuries. In its simple form it was worn by the foot and light cavalry — though the latter must not be held to include the pistol-armed chevaux-Ugers of the wars of religion, these being clad in half-armour and

Fig. 9. — Burgonets.

vizored burgonet — and consisted of a (generally rounded) cap with a projecting brim shielding the eyes, a neck-guard and ear- pieces. It had almost invariably a crest or comb, as shown in the illustrations (fig. 0). Other forms of infantry head-gear much in vogue during the 16th century are shown in figs. 10 and 11, which represent the morion and cabasset respectively. Both these were lighter and smaller than the burgonet; indeed much of their popularity was due to the ease with which they were worn or put on and off, for in the matter of protection they could not compare with the burgonet, which in one form or another was used by cavalry (and often by pikemen) up to the final

Fig. 10. — Morion.

Fig. 11. — Cabasset.

disappearance of armour from the field of battle about 1670. Fig. 9 b gives the general outline of richly decorated 16th-century Italian burgonet which is preserved in Vienna. The archetype of the burgonet is perhaps the casque worn by the Swiss infantry (fig. 9 a) at the epoch of Marignan (15 15). This was probably copied by them from their former Burgundian antagonists, whose connexion with this helmet is sufficiently indicated by its name. The lower part of the more elaborate burgonets worn by nobles and cavalrymen is often formed into a complete covering for the ears, cheek and chin, and connected closely with the gorget. They therefore resemble the armets and have often been confused with them, but the distinguishing feature of the bur- gonet is invariably the front peak. Various forms of vizor were fitted to such helmets; these as a rule were either fixed bars (fig. 9 c) or mere upward continuations of the chin piece. Often a nasal was the only face protection (fig. 9 d, a Hungarian type). The latest form of the burgonet used in active service is the familiar Cromwellian cavalry helmet with its straight brim, from which depends the slight vizor of three bars or stout wires joined together at the bottom.

The above are of course only the main types. Some writers class all

remaining examples either as casques or as ” war-hats,” the latter term conveniently covering all those helmets which resemble in any way the head-gear of civil life. For illustrations of many curiosities of this sort, including the famous iron hat of King Charles I. of England, and also for examples of Russian, Mongolian, Indian and Chinese helmets, the reader is referred to pp. 262-269 and 285-286 of Demmin’s Arms and Armour (English edition 1894). The helmets in brass, steel or cloth, worn by troops since the general introduction of uniforms and the disuse of armour, depend for their shape and material solely on con- siderations of comfort and good appearance. From time to time, however, the readoption of serviceable helmets is advocated by cavalrymen, and there is much to be said in favour of this. The burgonet, which was the final type of war helmet evolved by the old armourers, would certainly appear to be by far the best head-gear to adopt should these views prevail, and indeed it is still worn, in a modified yet perfectly recognizable form, by the German and other cuirassiers.

HELMHOLTZ, HERMANN LUDWIG FERDINAND VON (1821-1894), German philosopher and man of. science, was born on the 31st of August 1821 at Potsdam, near Berlin. His father, Ferdinand, was a teacher of philology and philosophy in the gymnasium, while his mother was a Hanoverian lady, a lineal descendant of the great Quaker William Penn. Delicate in early life, Helmholtz became by habit a student, and his father at the same time directed his thoughts to natural phenomena. He soon showed mathematical powers, but these were not fostered by the careful training mathematicians usually receive, and it may be said that in after years his attention was directed to the higher mathematics mainly by force of circumstances. As his parents were poor, and could not afford to allow him to follow a purely scientific career, he became a surgeon of the Prussian army. In 1842 he wrote a thesis in which he announced the discovery of nerve-cells in ganglia. This was his first work, and from 1842 to 1894, the year of his death, scarcely a year passed without several important, and in some cases epoch- making, papers on scientific subjects coming from his pen. He lived in Berlin from 1842 to 1849, when he became professor of physiology in Kbnigsberg. There he remained from 1849 to 1855, when he removed to the chair of physiology in Bonn. In 1858 he became professor of physiology in Heidelberg, and in 1 87 1 he was called to occupy the chair of physics in Berlin. To this professorship was added in 1887 the post of director of the physico-technical institute at Charlottenburg, near Berlin,

and he held the two positions together until his death on the 8th of September 1854.

His investigations occupied almost the whole field of science, including physiology, physiological optics, physiological acoustics, chemistry, mathematics, electricity and magnetism, meteorology and theoretical mechanics. At an early age he contributed to our knowledge of the causes of putrefaction and fermentation. In physiological science he investigated quantitatively the phenomena of animal heat, and he was one of the earliest in the field of animal electricity. He studied the nature of muscular contraction, causing a muscle to record its movements on a smoked glass plate, and he worked out the problem of the velocity of the nervous impulse both in the motor nerves of the frog and in the sensory nerves of man. In 1847 Helmholtz read to the Physical Society of Berlin a famous paper, tlber die Erhaltung der Kraft (on the conservation of force), which became one of the epoch-making papers of the century; indeed, along with J. R. Mayer, J. P. Joule and W. Thomson (Lord Kelvin), he may be regarded as one of the founders of the now universally received law of the conservation of energy. The year 1851, while he was lecturing on physiology at Konigsberg, saw the brilliant invention of the ophthalmoscope, an instrument which has been of in- estimable value to medicine. It arose from an attempt to demonstrate to his class the nature of the glow of reflected light sometimes seen in the eyes of animals such as the cat. When the great ophthalmologist, A. von Grafe, first saw the fundus of the living human eye, with its optic disc and blood-vessels, his face flushed with excitement, and he cried, ” Helmholtz has unfolded to us a new world!” Helmholtz’s contributions to physiological optics are of great importance. He investigated the optical constants of the eye, measured by his invention, the ophthalmometer, the radii of curvature of the crystalline lens for near and far vision, explained the mechanism of accom- modation by which the eye can focus within certain limits, discussed the phenomena of colour vision, and gave a luminous account of the movements of the eyeballs so as to secure single vision with two eyes. In particular he revived and gave new force to the theory of colour-vision associated with the name of Thomas Young, showing the three primary colours to be red, green and violet, and he applied the theory to the explanation of colour-blindness. His great work on Physiological Optics (1S56-1S66) is by far the most important book that has appeared on the physiology and physics of vision. Equally distinguished were his labours in physiological acoustics. He explained accurately the mechanism of the bones of the ear, and he discussed

the physiological action of the cochlea on the principles of sympathetic vibration. Perhaps his greatest contribution, however, was his attempt to account for our perception of quality of tone. He showed, both by analysis and by synthesis, that quality depends on the order, number and intensity of the over- tones or harmonics that may, and usually do, enter into the structure of a musical tone. He also developed the theory of differential and of summational tones. His work on Sensa- tions of Tone (1862) may well be termed the principia of physio- logical acoustics. He may also be said to be the founder of the fixed-pitch theory of vowel tones, according to which it is asserted that the pitch of a vowel depends on the resonance of the mouth, according to the form of the cavity while singing it, and this independently of the pitch of the note on which the vowel is sung. For the later years of his life his labours may be summed up under the following heads: (1) On the conserva- tion of energy; (2) on hydro-dynamics; (3) on electro-dynamics and theories of electricity; (4) on meteorological physics; (5) on optics; and (6) on the abstract principles of dynamics. In all these fields of labour he made important contributions to science, and showed himself to be equally great as a mathe- matician and a physicist. He studied the phenomena of electrical oscillations from i860 to 187 iˆand in the latter year he announced that the velocity of the propagation of electromagnetic induction was about 314,000 metres per second. Faraday had shown that the passage of electrical action involved time, and he also asserted that electrical phenomena are brought about by changes

in intervening non-conductors or dielectric substances. This led Clerk Maxwell to frame his theory of electro-dynamics, in which electrical impulses were assumed to be transmitted through the ether by waves. G. F. Fitzgerald was the first to attempt to measure the length of electric waves; Helmholtz put the problem into the hands of his favourite pupil, Heinrich Hertz, and the latter finally gave an experimental demonstration of electromagnetic waves, the ” Hertzian waves,” on which wireless telegraphy depends, and the velocity of which is the same as that of light. The last investigations of Helmholtz related to problems in theoretical mechanics, more especially as to the relations of matter to the ether, and as to the distribu- tion of energy in mechanical systems. In particular he explained the principle of least action, first advanced by P. L. M. de Maupertuis, and developed by Sir W. R. Hamilton, of quaternion fame. Helmholtz also wrote on philosophical and aesthetic problems. His position was that of an empiricist, denying the doctrine of innate ideas and holding that all knowledge is founded on experience, hereditarily transmitted or acquired.

The life of Helmholtz was uneventful in the usual sense. He was twice married, first, in 1849, to Olga von Velten (by whom he had two children, a son and daughter), and secondly, in i86r, to Anna von Mohl, of a Wiirtemberg family of high social position. Two children were born of this marriage, a son, Robert, who died in 1889, after showing in experimental physics indications of his father's genius, and a daughter, who married a son of Werner von Siemens. Helmholtz was a man of simple but refined tastes, of noble carriage and somewhat austere manner. His life from first to last was one of devotion to science, and he must be accounted, on intellectual grounds, one of the foremost men of the 19th century.

See L. Konigsberger, Hermann von Helmholtz (1902; English translation by F. A. Welby, Oxford, 1906); J. G. M°Kendrick, H. L. F. von Helmholtz (1899). (J. G. M.)

HELMOLD, an historian of the 12 th century, was a priest at Bosau near Plon. He was a friend of the two bishops of Oldenburg, Vicelin (d. 1154) and Gerold (d, 1163), who did much to Christianize the Slavs. At Bishop Gerold's instigation Helmold wrote his Chronica Slavorum, a history of the conquest and conversion of the Slavonic countries from the time of Charlemagne. For the life and times of Henry the Lion, duke of Saxony, Helmold's chronicle, as that of a contemporary who had exceptional means for gaining information, is of first-rate importance. The history was continued down to 1209 by Abbot Arnold of Liibeck.

The Chronica were first edited by Siegmund Schorkel (Frankfort a. M., 1556). The best edition is by J. M. Lappenberg in Mon. Germ. hist, scriptores, xxi. (1869). For critical works on the Chronica see A. Potthast, Bibliotheca hist. med. aevi, s. " Helmoldus. "

HELMOND, a town in the province of North Brabant, Holland, on the small river Aa, and on the canal (Zuid-Willems Vaart) between 'sHertogenbosch and Maastricht, 24! m. by rail W.N.W. of Venlo. It is connected by steam tramway with 'sHertogen- bosch (21 m. N.W.), a branch line northwards to Osch being given off at Veghel. Pop. (1900) 11,465. The castle of Helmond, built in 1402, is a beautiful specimen of architecture, and among the other buildings of note in the town are the spacious church of St Lambert, the Reformed church and the town hall. Helmond is one of the industrial centres of the province, and possesses over a score of factories for cotton and silk weaving, cotton printing, dyeing, iron founding, brewing, soap boiling and tobacco dressing, as well as engine works and a margarine"* factory. There is an art school in the town.

HELMONT, JEAN BAPTISTE VAN (1577-1644), Belgian chemist, physiologist and physician, a member of a noble family, was born at Brussels in 1577. 1 He was educated at Louvain, and after ranging restlessly from one science to another and finding satisfaction in none, turned to medicine, in which he took his doctor's degree in 1 599. The next few years he spent in travelling through Switzerland, Italy, France and England. Returning to his own country he was at Antwerp at the time of 1 An alternative date for his birth is 1579 and for his death 1635 I (see Bull. Roy. Acad. Belg., 1907, 7, p. 732).

the great plague in 1605, and having contracted a rich marriage settled in 1609 at Vilvorde, near Brussels, where he occupied himself with chemical experiments and medical practice until his death on the 30th of December 1644. Van Helmont presents curious contradictions. On the one hand he was a disciple of Paracelsus (though he scornfully repudiates his errors was well as those of most other contemporary authorities), a mystic with strong leanings to the supernatural, an alchemist who believed that with a small piece of the philosopher's stone he had trans- muted 2000 times as much mercury into gold; on the other hand he was touched with the new learning that was producing men like Harvey, Galileo and Bacon, a careful observer of nature, and an exact experimenter who in some cases realized that matter can neither be created nor destroyed. As a chemist he deserves to be regarded as the founder of pneumatic chemistry, even though it made no substantial progress for a century after his time, and he was the first to understand that there are gases distinct in kind from atmospheric air. The very word " gas " he claims as his own invention, and he perceived that his " gas sylvestre " (our carbon dioxide) given off by burning charcoal is the same as that produced by fermenting must and that which sometimes renders the air of caves irrespirable. For him air and water are the two primitive elements of things. Fire he explicitly denies to be an element, and earth is not one because it can be reduced to water. That plants, for instance, are composed of water he sought to show by the ingenious quantitative experiment of planting a willow weighing 5 lb in 200 lb of dry soil and allowing it to grow for five years; at the end of that time it had become a tree weighing 169 lb, and since it had received nothing but water and the soil weighed practically the same as at the beginning, he argued that the increased weight of wood, bark and roots had been formed from water alone. It was an old idea that the processes of the living body are fermentative in character, but he applied it more elaborately than

any of his predecessors. For him digestion, nutrition and even movement are due to ferments, which convert dead food into living flesh in six stages. But having got so far with the application of chemical principles to physiological problems, he introduces a complicated system of supernatural agencies like the archei of Paracelsus, which preside over and direct the affairs of the body. A central archeus controls a number of subsidiary archei which move through the ferments, and just as diseases are primarily caused by some affection (exorbitatio) of the archeus, so remedies act by bringing it back to the normal. At the same time chemical principles guided him in the choice of medicines — undue acidity of the digestive juices, for example, was to be corrected by alkalies and vice versa; he was thus a forerunner of the iatrochemical school, and did good service to the art of medicine by applying chemical methods to the prepara- tion of drugs. Over and above the archeus he taught that there is the sensitive soul which is the husk or shell of the immortal mind. Before the Fall the archeus obeyed the immortal mind and was directly controlled by it, but at the Fall men received also the sensitive soul and with it lost immortality, for when it perishes the immortal mind can no longer remain in the body. In addition to the archeus, which he described as ” aura vitalis seminum, vitae directrix,” Van Helmont had other governing agencies resembling the archeus and not always clearly distin- guished from it. From these he invented the term bias, defined as the ” vis motus tam alterivi quam localis.” Of bias there were several kinds, e.g. bias humanutn and bias meteoron; the heavens he said ” constare gas materia et bias efficiente.” He was a faithful Catholic, but incurred the suspicion of the Church by his tract De magnetica vulnerum curatione (1621), which was thought to derogate from some of the miracles. His works were collected and published at Amsterdam as Orius medicinae, vel opera et opuscula omnia in 1668 by his son Franz Mercurius (b. 1618 at Vilvorde, d. 1699 at Berlin), in whose own writings, e.g. Cabbalah Denudata (1677) and Opuscula philosophica (1690) , mystical theosophy and alchemy appear in still wilder confusion.

See M. Foster, Lectures on the History of Physiology (1901); also Chevrcul in Journ. des savants (Feb. and March 1850), and Cap

in Journ. pharm. chim. (1852). Other authorities are Poultier d’Elmoth, Memoir e sur J. B. van Helmont (1817) ; Rixner and Sieber, Beitrage zur Geschichte der Physiologie (1819-1826), vol. ii.; Spiers, Helmont’ s System der Medicin (1840); Melsens, Lecons sur van Helmont (1848) ; Rommelaere, Etudes sur J. B. van Helmont (i860).

HELMSTEDT, or more rarely Helmstadt, a town of Germany, in the

duchy of Brunswick, 30 m. N.W. of Magdeburg on the main line of railway to Brunswick. Pop. (1905) 15,415. The principal buildings are the Juleum, the former university, built in the Renaissance style towards the close of the 16th century, and containing a library of 40,000 volumes; the fine Stephans- kirche dating from the 12th century; the Walpurgiskirche restored in 1893-1894; the Marienberger Kirche, a beautiful church in the Roman style, and the Roman Catholic church. The Augustinian nunnery of Marienberg founded in n 76 is now a Lutheran school. The town contains the ruins of the Benedictine abbey of St Ludger, which was secularized in 1803. The educational institutions include several schools. The principal manufactures are furniture, yarn, soap, tobacco, sugar, vitriol and earthenware. Near the town is Bad Helmstedt, which has an iron mineral spring, and the Lubbensteine, two blocks of granite on which sacrifices to Woden are said to have been offered. Near Bad Helmstedt a monument has been erected to those who fell in the Franco-German War; in the town there is one to those killed at Waterloo. Helmstedt originated, according to legend, in connexion with the monastery founded by Ludger or Liudger (d. 809) , the first bishop of Munster. There appears, however, little doubt that this tradition is mythical and that Helmstedt was not founded until about 000. It obtained civic rights in 1099 and, although destroyed by the archbishop of Magdeburg in n 99, it was soon rebuilt. In 1457 k joined the Hanseatic League, and in 1490 it came into the possession of Brunswick. In 1576 Julius, duke of Brunswick, founded a university here, and throughout the r7th century this was one of the chief seats of Protestant learning. It was closed by Jerome, king of Westphalia, in 1809.

See Ludewig, Geschichte und Beschreibung der Stadt Helmstedt (Helmstedt, 182 1).

HELMUND, a river of Afghanistan, in length about 600 m. The Helmund, which is identical with the ancient Etymander, is the most important river in Afghanistan, next to the Kabul river, which it exceeds both in volume and length. It rises in the recesses of the Koh-i-Baba to the west of Kabul, its infant stream parting the Unai pass from the Irak, the two chief passes on the well-known road from Kabul to Bamian. For 50 m. from its source its course is ascertained, but beyond that point for the next 50 no European has followed it. About the parallel of 33 N. it enters the Zamindawar province which lies to the N.W. of Kandahar, and thenceforward it is a well- mapped river to its termination in the lake of Seistan. Till about 40 m. above Girishk the character of the Helmund is that of a mountain river, flowing through valleys which in summer are the resort of pastoral tribes. On leaving the hills it enters on a flat country, and extends over a gravelly

bed. Here also it begins to be used in irrigation. At Girishk it is crossed by the principal route from Herat to Kandahar. Forty-five miles below Girishk the Helmund receives its greatest tributary, the Arghandab, from the high Ghilzai country beyond Kandahar, and becomes a very considerable river, with a width of 300 or 400 yds. and an occasional depth of 9 to 12 ft. Even in the dry season it is never without a plentiful supply of water. The course of the river is more or less south-west from its source till in Seistan it crosses meridian 62 , when it turns nearly north, and so flows for 70 or 80 m. till it falls into the Seistan hamuns, or swamps, by various mouths. In this latter part of its course it forms the boundary between Afghan and Persian Seistan, and owing to constant changes in its bed and the swampy nature of its borders it has been a fertile source of frontier squabbles. Persian Seistan was once highly cultivated by means of a great system of canal irrigation; but for centuries, since the country was devastated by Timur, it has been a barren, treeless waste of flat alluvial plain. In years of exceptional flood the Seistan lakes spread southwards into an overflow channel called the

Shelag which, running parallel to the northern course of the Helmund in the opposite direction, finally loses its waters in the Gaod-i-Zirreh swamp, which thus becomes the final bourne of the river. Throughout its course from its confluence with the Arghandab to the ford of Chahar Burjak, where it bends north- ward, the Helmund valley is a narrow green belt of fertility sunk in the midst of a wide alluvial desert, with many thriving villages interspersed amongst the remains of ancient cities, relics of Kaiani rule. The recent political mission to Seistan under Sir Henry M c Mahon (1904-1905) added much information respecting the ancient and modern channels of the lower Helmund, proving that river to have been constantly shifting its bed over a vast area, changing the level of the country by silt deposits, and in conjunction with the terrific action of Seistan winds actually altering its configuration. (T. H. H.*)

HELM WIND, a wind that under certain conditions blows over the escarpment of the Pennines, near Cross Fell from the eastward, when a helm (helmet) cloud covers the summit; The helm bar is a roll of cloud that forms in front of it, to leeward.

See ” Report on the Helm Wind Inquiry,” by W. Marriott, Quart. Journ. Roy. Met. Soc. xv. 103.

HELOTS (Gr. (Owes or eiXurai), the serfs of the ancient Spartans. The word was derived in antiquity from the town of Helos in Laconia, but is more probably connected with «Xo$, a fen, or with the root of i \tlt>, to capture. Some scholars suppose them to have been of Achaean race, but they were more probably the aborigines of Laconia who had been enslaved by the Achaeans before the Dorian conquest. After the second Messenian war (see Sparta) the conquered Messenians were reduced to the status of helots, from which Epaminondas liberated them three centuries later after the battle of Leuctra (371 B.C.). The helots were state slaves bound to the soil — adscripti glebae — and assigned to individual Spartiates to till their holdings (ickrjpot.) ; their masters could neither emancipate them nor sell them off the land, and they were under an oath not to raise the rent payable yearly in kind by the helots. In time of war they served as light-armed troops or as rowers in the fleet; from the Peloponnesian War onwards they were occasionally employed as heavy infantry (6x \Trat), distinguished bravery being rewarded by emancipation. That the general attitude of the Spartans towards them was one of distrust and cruelty cannot be doubted. Aristotle says that the ephors of each year on entering office declared war on the helots so that they might be put to death at any time without violating religious scruple (Plutarch, Lycurgus 28), and we have a well-attested record of 2000 helots being freed for service in war and then secretly assassinated (Thuc. iv. 80). But when we remember the value of the helots from a military and agricultural point of view we shall not readily believe that the crypteia was really, as some authors represent it, an organized system of massacre; we shall see in it ” a good police training, inculcating hardihood and vigour in the young,” while at the same time getting rid of any helots who were found to be plotting against the state (see further Crypteia).

Intermediate between Helots and Spartiates were the two classes of Neodamodes and Mot/tones. The former were emanci- pated helots, or possibly their descendants, and were much used in war from the end of the 5th century; they served especi- ally on foreign campaigns, as those of Thibron (400-399 B.C.) and Agesilaus (396-394 B.C.) in Asia Minor. The mothones ox mothakes were usually the sons of Spartiates and helot mothers; they were free men sharing the Spartan training, but were not full citizens, though they might become such in recognition of special merit.

See C. O. Milller, History and Antiquities of the Doric Race (Eng. trans.), bk. iii. ch. 3.; G. Gilbert, Greek Constitutional Antiquities (Eng. trans.), pp. 30-35; A. H. J. Greenidge, Handbook of Greek Constitutional History, pp. 83-85; G. Busolt, Die griech. Staats- u.

Rechtsaltertumer, § 84; Griechische Geschichte, i. 2 525-528; G. F. Schomann, Antiquities of Greece: The State (Eng. trans.) pp. 194 ff.

(M. N. T.)

HELPS, SIR ARTHUR (1813-1875), English writer and clerk of the Privy Council, youngest son of Thomas Helps, a London

merchant, was born near London on the 10th of July 1813. He was educated at Eton and at Trinity College, Cambridge, coming out 31st wrangler in the mathematical tripos in 1835. He was recognized by the ablest of his contemporaries there as a man of superior gifts, and likely to make his mark in after life. As a member of the Conversazione Society, better known as the ” Apostles,” a society established in 1820 for the purposes of discussion on social and literary questions by a few young men attracted to each other by a common taste for literature and speculation, he was associated with Charles Buller, Frederick Maurice, Richard Chenevix Trench, Monckton Milnes, Arthur Hallam and Alfred Tennyson. His first literary effort, Thoughts in the Cloister and the Crowd (1835), was a series of aphorisms upon life, character, politics and manners. Soon after leaving the university Arthur Helps became private secretary to Spring Rice (afterwards Lord Monteagle), then chancellor of the exchequer. This appointment he filled till 1839, when he went to Ireland as private secretary to Lord Morpeth (afterwards earl of Carlisle), chief secretary for Ireland. In the meanwhile (28th October 1836) Helps had married Bessy, daughter of Captain Edward Fuller. He was one of the commissioners for the settlement of certain Danish claims which dated so far back as the siege of Copenhagen; but with the fall of the Melbourne administration (1841) his official experience closed for a period of nearly twenty years. He was not, however, forgotten by his political friends. He possessed admirable tact and sagacity; his fitness for official life was unmistakable, and in i860 he was appointed clerk of the Privy Council, on the recommendation of Lord Granville.

His Essays written in the Intervals of Business had appeared in 1 84 1, and his Claims of Labour, an Essay on the Duties of the Employers to the Employed, in 1844. Two plays, King Henry the Second, an Historical Drama, and Catherine Douglas, a Tragedy, published in 1843, have no particular merit. Neither in these, nor in his only other dramatic effort, Oulita the Serf (1858) did he show any real qualifications as a playwright.

Helps possessed, however, enough dramatic power to give life and individuality to the dialogues with which he enlivened many of his

other books. In his Friends in Council, a Series of Readings and Discourse thereon (1847-1859), Helps varied his presentment of social and moral problems by dialogues between imaginary personages, who, under the names of Milver- ton, Ellesmere and Dunsford, grew to be almost as real to Helps's readers as they certainly became to himself. The book was very popular, and the same expedient was resorted to in Conversations on War and General Culture, published in 1871. The familiar speakers, with others added, also appeared in his Realmah (1868) and in the best of its author's later works, Talk about Animals and their Masters (1873).

A long essay on slavery in the first series of Friends in Council was subsequently elaborated into a work in two volumes pub- lished in 1848 and 1852, called The Conquerors of the New World and their Bondsmen. Helps went to Spain in 1847 to examine the numerous MSS. bearing upon his subject at Madrid. The fruits of these researches were embodied in an historical work based upon his Conquerors of the New World, and called The Spanish Conquest in America, and its Relation to the History of Slavery and the Government of Colonies (4 vols., 1855-1857-1861). But in spite of his scrupulous efforts after accuracy, the success of the book was marred by its obtrusively moral purpose and its discursive character. ~. v .

The Life of Las Casas, the Apostle of the Indians (1868), The Life of Columbus (1869), The Life of Pizarro (1869), and The Life of Hernando Cortes (1871), when extracted from the work and published separately, proved successful. Besides the books which have been already mentioned he wrote: Organisation in Daily Life, an Essay (1862), Casimir Maremma (1870), Brevia, Short Essays and Aphorisms (1871), Thoughts upon Government (1872), Life and Labours of Mr Thomas Brassey (1872), Ivan de Biron (1874), Social Pressure (1875).

His appointment as clerk of the Council brought him into personal communication with Queen Victoria and the Prince

Consort, both of whom came to regard him with confidence and respect. After the Prince's death, the Queen early turned to Helps to prepare an appreciation of her husband's life and character. In his introduction to the collection (1862) of the Prince Consort's speeches and addresses Helps adequately fulfilled his task. Some years afterwards he edited and wrote a preface to the Queen's Leaves from a

Journal of our Life in the Highlands (1868). In 1864 he received the honorary degree of D.C.L. from the university of Oxford. He was made a C.B. in 1871 and K.C.B. in the following year. His later years were troubled by financial embarrassments, and he died on the 7th of March 1875.

HELSINGBORG, a seaport of Sweden in the district {Ian) of Malmohus, 35 m. N. by E. of Copenhagen by rail and water. Pop. (1000), 24,670. It is beautifully situated at the narrowest part of Oresund, or the Sound, here only 3 m. wide, opposite Helsingor (Elsinore) in Denmark. Above the town the brick tower of a former castle crowns a hill, commanding a fine view over the Sound. On the outskirts are the Oresund Park, gardens containing iodide and bromide springs, and frequented sea-baths. On the coast to the north is the royal chateau of Sofiero; to the south, the small spa of Ramlosa. A system of electric trams is maintained. North and east of Helsingborg lies the only coal-field in Sweden, extending into the lofty Kullen peninsula, which forms the northern part of the east shore of the Sound. Potter's clay is also found. Helsingborg ranks among the first manufacturing towns of Sweden, having copper works, using ore from Sulitelma in Norway, india-rubber works and breweries. The artificial harbour has a depth of 24 ft., and there are extensive docks. The chief exports are timber, butter and iron. The town is the headquarters of the first army division.

The original site of the town is marked by the tower of the old fortress, which is first mentioned in 1135. in the 14th century it was several times besieged. From 1370 along with other towns in the province of Skane, it was united for fifteen years with the Hanseatic League. The fortress was destroyed by fire in 1418, and about 1425 Eric XIII. built another near the sea, and caused the town to be transported thither, bestowing upon it important privileges. Until 1658 it belonged to Denmark, and it was again occupied by the Danes in 1676 and 1677. In 1684 its fortifications were dismantled. It was taken by Frederick IV. of Denmark in November 1709, but on the 28th of February 1 7 10 the Danes were defeated in the neighbourhood, and the town came finally into the possession of Sweden, though in 1711 it was again bombarded by the Danes. A tablet on the quay commemorates the landing of Bernadotte after his election as successor to the throne in 1810.

HELSINGFORS (Finnish Helsinki), a seaport and the capital of Finland and of the province of Nyland, centre of the admini- strative, scientific, educational and industrial life of Finland. The fine harbour is divided into two parts by a promontory, and is protected at its

entrance by a group of small islands, on one of which stands the fortress of Sveaborg. A third harbour is situated on the west side of the promontory, and all three have granite quays. The city, which in 1810 had only 4065 inhabitants, Abo the then capital having 10,224, has increased with great rapidity, having 22,228 inhabitants in i860, 61,530 in 1890 and 111,654 in 1904. It is the centre of an active shipping trade with the Baltic ports and with England, and of a railway system connecting it with all parts of the grand duchy and with St Petersburg. Helsingfors is handsome and well laid out with wide streets, parks, gardens and monuments. The principal square contains the cathedral of St Nicholas, the Senate House and the university, all striking buildings of considerable archi- tectural distinction. In the centre is the statue of the Tsar Alexander II., who is looked upon as the protector of the liberties of Finland, the monument being annually decorated with wreaths and garlands. The university has a teaching staff of 141 with (1906) 1921 students, of whom 328 were women. The university is well provided with museums and laboratories and has a library of over 250,000 volumes. Other public institutions are the Athenaeum, with picture gallery, a Swedish theatre

and opera house, a Finnish theatre, the Archives, the Senate House, the Nobles' House (Riddarhuset) and the House of the Estates, the German (Lutheran) church and the Russian church. Some of the scientific societies of Helsingfors have a wide repute, such as the academy of sciences, the geographical, historical, Finno-Ugrian, biblical, medical, law, arts and forestry societies, as also societies for the spread of popular education and of arts and crafts. There are a polytechnic, ten high schools, navigation and trade schools, institutes for the blind and the mentally deficient, and numerous elementary schools. The general standard of education is high, the publication of books, reviews and newspapers being very active. The language of culture is Swedish, but owing to recent manufacturing develop- ments the majority of the population is Fjnnish-speaking. Helsingfors displays great manufacturing and commercial activity, the imports being coal, machinery, sugar, grain and clothing. The manufactures of the city consist largely of tobacco, beer and spirits, carpets, machinery and sugar.

HELST, BARTHOLOMAEUS VAN DER, Dutch painter, was born in Holland at the opening of the 17th century, and died at Amsterdam in 1670. The date and place of his birth are uncertain; and it is equally difficult to confirm or to deny the time-honoured statement that he was born in 1613 at Amsterdam. It has been urged indeed by competent authority that Van der Heist was not a native of

Amsterdam, because a family of that name lived as early as 1607 at Haarlem, and pictures are shown as works of Van der Heist in the Haarlem Museum which might tend to prove that he was in practice there before he acquired repute at Amsterdam. Unhappily Bartholomew has not been traced amongst the children of Severijn van der Heist, who married at Haarlem in 1607, and there is no proof that the pictures at Haarlem are really his; though if they were so they would show that he learnt his art from Frans Hals and became a skilled master as early as 1631. Scheltema, a very competent judge in matters of Dutch art chronology, supposes that Van der Heist was a resident at Amsterdam in 1636. His first great picture, representing a gathering of civic guards at a brewery, is variously assigned to 1639 and 1643, and still adorns the town-hall of Amsterdam. His noble portraits of the burgo- master Bicker and Andreas Bicker the younger, in the gallery of Amsterdam, of the same date no doubt as Bicker's wife lately in the Ruhl collection at Cologne, were completed in 1642. From that time till his death there is no difficulty in tracing Van der Heist's career at Amsterdam. He acquired and kept the position of a distinguished portrait-painter, producing indeed little or nothing besides portraits at any time, but founding, in conjunction with Nicolaes de Helt Stokade, the painters' guild at Amsterdam in 1654. At some unknown date he married Constance Reynst, of a good patrician family in the Netherlands, bought himself a house in the Doelenstrasse and ended by earning a competence. His likeness of Paul Potter at the Hague, executed in 1654, and his partnership with Backhuysen, who laid in the backgrounds of some of his pictures in 1668, indicate a constant companionship with the best artists of the time. Wagen has said that his portrait of Admiral Kortenaar', in the gallery of Amsterdam, betrays the teaching of Frans Hals, and the statement need not be gainsaid; yet on the whole Van der Heist's career as a painter was mainly a protest against the systems of Hals and Rembrandt. It is needless to dwell on the pictures which preceded that of 1648, called the Peace of Minister, in the gallery of Amsterdam. The Peace challenges comparison at once with the so-called Night Watch by Rembrandt and the less important but not less characteristic portraits of Hals and his wife in a neighbouring room. Sir Joshua Reynolds was disappointed by Rembrandt, whilst Van der Heist surpassed his expectation. But Burger asked whether Reynolds had not already been struck with blindness when he ventured on this criticism. The question is still an open one. But certainly Van der Heist attracts by qualities entirely differing from those of Rembrandt and Frans Hals. Nothing can be more striking than the contrast between the strong concentrated light and the deep gloom of Rembrandt and the contempt of chiaroscuro

peculiar to his rival, except the contrast between the rapid sketchy touch of Hals and the careful finish and rounding of van der Heist. ” The Peace ” is a meeting of guards to’ celebrate the signature of the treaty of Mtinster. The members of the Doele of St George meet to feast and congratulate each other not at a formal banquet but in a spot laid out for good cheer, where de Wit, the captain of his. company, can shake hands with his lieutenant Waveren, yet hold in solemn state the great drinking- horn of St George. The rest of the company sit, stand or busy themselves around — some eating, others • drinking, others carving or serving — an animated scene on a long canvas, with figures large as life. Well has Burger said, the heads are full of life and the hands admirable. The dresses and subordinate parts are finished to a nicety without sacrifice of detail or loss of breadth in touch or impast. But the eye glides from shape to shape, arrested here by expressive features, there by a bright stretch of colours, nowhere at perfect rest because of the lack of a central thought in light and shade, harmonies or composition. Great as the qualities of van der Heist undoubtedly are, he remains below the line of demarcation which separates the second from the first-rate masters of art.

His pictures are very numerous, and almost uniformly good ; but in his later creations he wants power, and though still amazingly careful, he becomes grey and woolly in touch. At Amsterdam the four regents in the Werkhuys (1650), four syndics in the gallery (1656), and four syndics in the town-hall (1657) are masterpieces, to which may be added a number of fine single portraits. Rotterdam, notwithstanding the fire of 1864, still boasts of three of van der Heist’s works. The Hague owns but one. St Petersburg, on the other hand, possesses ten or eleven, of various shades of excellence. The Louvre has three, Munich four. Other pieces are in the galleries of Berlin, Brunswick, Brussels, Carlsruhe, Cassel, Darmstadt, Dresden, Frankfort, Gotha, Stuttgart and Vienna.

HELSTON, a market town and municipal borough in the Truro parliamentary division of Cornwall, England, n m. by road W.S.W. of Falmouth, on a branch of the Great Western railway. Pop. (iqoi) 3088. It is pleasantly situated on rising ground above the small river Cober, which, a little below the town, expands into a picturesque estuary called Looe Pool, the water being banked up by the formation of Looe Bar at the mouth. Formerly, when floods resulted from this obstruction, the townsfolk of Helston acquired the right of clearing a

passage through it by presenting leathern purses containing three halfpence to the lord of the manor. The mining industry on which the town formerly depended is extinct, but the district is agricultural and dairy farming is carried on, while the town has flour mills, tanneries and iron foundries. As Helston has the nearest railway station to the Lizard, with its magnificent coast-scenery, there is a considerable tourist traffic in summer. Some trade passes through the small port of Porthleven, 3 m. S.W., where the harbour admits vessels of 500 tons. On the 8th of May a holiday is still observed in Helston and known as Flora or Furry day. It has been regarded as a survival of the Roman Floralia, but its origin is believed by some to be Celtic. Flowers and branches were gathered, and dancing took place in the streets and through the houses, all being thrown open, while a pageant was also given and a special ancient folk-song chanted. This ceremony, after being almost forgotten, has been revived in modern times. The borough is under a mayor, 4 aldermen and 1 2 councillors. Area, 309 acres.

Helston (Henliston, Haliston, Helleston), the capital of the Meneage district of Cornwall, was held by Earl Harold in the time of the Confessor and by King William at the Dornesday Survey. At the latter date besides seventy-three villeins, bordars and serfs there were forty cervisarii, a species of unfree tenants who rendered their custom in the form of beer. King John (1201) constituted Helleston a free borough, established a gild merchant, and granted the burgesses freedom from toll and other similar dues throughout the realm, and the cognizance of all pleas within the borough except crown pleas. Richard, king of the Romans (1260), extended the boundaries of the borough and granted permission for the erection of an additional mill. Edward I. (ˆ304) granted the pesage of tin, and Edward III. a

Saturday market and four fairs. Of these the Saturday market and a fair on the feast of SS. Simon and Jude are still held, also five other fairs of uncertain origin. In 1585 Elizabeth granted a charter of incorporation under the name of the mayor and commonalty of Helston. This was confirmed in 1641, when it was also provided that the mayor and recorder should be ipso facto justices of the peace. From 1294 to 1832 Helston returned two members to parliament. In 1774 the number of electors (which by usage had been restricted to the mayor, aldermen and freemen elected by them) had dwindled to six, and in 1790 to one person only, whose return of two members, however, was rejected and that of the general body of the freemen accepted. In 1832 Helston lost one of its members, and in 1885 it lost the other and became merged in the county.

HELVETIC CONFESSIONS, the name of two documents expressing the common belief of the reformed churches of Switzerland. The first, known also as the Second Confession of Basel, was drawn up at that city in 1536 by Bullinger and Leo Jud of Zurich, Megander of Bem,Oswald Myconius and Grynaeus of Basel, Bucer and Capito of Strassburg, with other representa- tives from Schaffhausen, St Gall, Miihlhausen and Biel. The first draft was in Latin and the Zurich delegates objected to its Lutheran phraseology. 1 Leo Jud's German translation was, however, accepted by all, and after Myconius and Grynaeus had modified the Latin form, both versions were agreed to and adopted on the 26th of February 1536.

The Second Helvetic Confession was written by Bullinger in 1562 and revised in 1564 as a private exercise. It came to the notice of the elector palatine Friedrich III., who had it translated into German and published. It gained a favourable hold on the Swiss churches, who had found the First Confession too short and too Lutheran. It was adopted by the Reformed Church not only throughout Switzerland but in Scotland (1566), Hungary (ˆ567), France (1571), Poland (1578), and next to the Heidelberg Catechism is the most generally recognized Confession of the Reformed Church.

See L. Thomas, La Confession ■ hehetique (Geneva, 1853); P. Schaff, Creeds of Christendom, i. 390-420, Hi. 234-306; Miiller, Die Bekenntnisschriften der reformierten Kirche (Leipzig, 1903).

HELVETII ('EXoiˆriot, 'E\f}r)TTioi), a Celtic people, whose original home was the country between the Hercynian forest (probably the Rauhe Alp), the Rhine and the Main (Tacitus, Germania, 28). In Caesar's time they appear to have been driven farther west, since, according to him {Bell. Gall. i. 2. 3) their boundaries were on the W. the Jura, on the S. the Rhone and the Lake of Geneva, on the N. and E. the Rhine as far as Lake Constance. They thus inhabited the western part of modern Switzerland. They were divided into four cantons (pagi) 7 common affairs being managed by the cantonal assemblies. They possessed the elements of a higher civilization (gold coinage, the Greek alphabet), and, according to Caesar, were the bravest people of Gaul. The reports of gold and plunder spread by the Cimbri and Teutones on their way to southern Gaul induced the Helvetii to follow their example. In 107, under Divico, two of their tribes, the Tougeni and Tigurini, crossed the Jura and made their way as far as Aginnum (Agen on the Garonne), where they utterly defeated the Romans under L. Cassius Longinus, and forced them to pass under the yoke (Livy, Epit. 65; according to a different reading, the battle took place near the Lake of Geneva). In 102 the Helvetii joined the Cimbri in the

invasion of Italy, but after the defeat of the latter by Marius they returned home. In 58, hard pressed by the Germans arid incited by one of their princes, Orgetorix, they resolved to found a hew home west of the Jura. Orgetorix was thrown into prison, being suspected of a design to make himself king, but the Helvetii themselves persisted in their plan. Joined by the Rauraci, Tulingi, Latobrigi and some of the Boii — according to their own reckoning 368,000 in all — they agreed to meet on the 28th of

1 Some of the delegates, especially Bucer, were anxious to effect a union of the Reformed and Lutheran Churches. There was also a desire to lay the Confession before the council summoned at Mantua by Pope Paul III.

March at Geneva and to advance through the territory of the Allobroges. They were overtaken, however, by Caesar ‘at Bibracte, defeated and forced to submit. Those who survived were sent back home to defend the frontier of the Rhine against German invaders. During the civil wars and for some time after the death of Caesar little is heard of the Helvetii.

Under Augustus Helvetia (not so called till later times, earlier ager Helvetiorum) proper was included under Gallia Belgica. Two Roman colonies had previously been founded at Noviodunum (Colonia Julia Equestris, mod. Nyon) and at Colonia Rauracorum (afterwards Augusta Rauracorum, Angst near Basel) to keep watch over the inhabitants, who were treated with generosity by their conquerors. Under the name of foederati they retained their original constitution and division into four cantons. They were under an obligation to furnish a contingent to the Roman army for foreign service, but were allowed to maintain garrisons of their own, and their magistrates had the right to call out a militia. Their religion was not interfered with; they managed their own local affairs and kept their own language, although Latin was used officially. Their chief towns were Aventicum (Avenches) and Vindonissa (Windisch). Under Tiberius the Helvetii were separated from Gallia Belgica and made part of Germania Superior. After the death of Galba (a.d. 69), having refused submission to Vitellius, their land was devastated by Alienus Caecina, and only the eloquent appeal of one of their leaders named Claudius Cossus saved them from annihilation. Under Vespasian they attained the height of their prosperity. He greatly increased the importance of

Aventicum, where his father had carried on business. Its inhabitants, with those of other towns, probably obtained the ius Latinum, had a senate, a council of decurienes, a prefect of public works and flamens of Augustus. After the extension of the eastern frontier, the troops were withdrawn from the garrisons and fortresses, and Helvetia, free from warlike disturbances, gradually became completely romanized. Aventicum had_ an amphitheatre, a public gymnasium and an academy with Roman professors. Roads were made wherever possible, and commerce rapidly developed. The old Celtic religion was also supplanted by the Roman. The west of the country, however, was more susceptible to Roman influence, and hence preserved its independence against barbarian invaders longer than its eastern portion. During the reign of Gallienus (260-268) the Alamanni overran the country; and although Probus, Constantius Chlorus, Julian, Valentinian I. and Gratian to some extent checked the inroads of the barbarians, it never regained its former prosperity. In the subdivision of Gaul in the 4th century, Helvetia, with the territory of the Sequani and Rauraci, formed the Provincia Maxima Sequanorum, the chief town of which was Vesontio (Besancon). Under Honorius (395-423) it was probably definitely occupied by the Alamanni, except in the west, where the small portion remaining to the Romans was ceded in 436 by Aetius to the Burgundians.

See L. von Haller, Hehetien unter den Romern (Bern, 1811); T. Mommsen, Die Schweiz in rbmischer Zeit (Zurich, 1854); J. Brosi, Die Kelten und Althelvetier (Solothurn, 1851); L. Hug and R. Stead, “Switzerland” in Story of the Nations, xxvi.; C. Dandliker, Ge- schichte der Schweiz (1892-1895), and English translation (of a shorter history by the same) by E. Salisbury (1899); Die Schweiz unlet den Romern (anonymous) published by the Historischer Verein of St Gall (Scheitlin and Zollikofer, St Gall, 1862); and G. Wyss, ” Uber das romische Helvetien ” in Archiv fur schweizerische Geschichte, vii. (1851). For Caesar’s campaign against the Helvetii, see T. R. Holmes, Caesar’s Conquest of Caul (1899) and Mommsen, Hist, of Rome (Eng. trans.), bk. v. ch. 7; ancient authorities in A. Holder, AUkeltischer Sprachscliatz (1896), s.v. Elvetii.

HELVETIUS, CLAUDE ADRIEN (1715-1771), French philo- sopher and litterateur, was born in Paris in January 171 5. He was descended from a family of physicians, whose original name was Schweitzer (latinized as Helvetius). His grandfather introduced the use of ipecacuanha; his father was first physician to Queen Marie Leczinska of France. Claude Adrien was trained for a financial career, but he occupied his spare time with writing verses. At the age of twenty-three, at the queen’s request, he was appointed farmer-general, a post

of great re- sponsibility and dignity worth a 1 00,000 drowns a year. Thus

provided for, he proceeded to enjoy life to the utmost, with the help of his wealth and liberality, his literary and artistic tastes. As he grew older, however, his social successes ceased, and he began to dream of more lasting distinctions, stimulated by the success of Maupertuis as a mathematician, of Voltaire as a poet, of Montesquieu as a philosopher. The mathematical dream seems to have produced nothing; his poetical ambitions resulted in the poem called Le Bonheur (published posthumously, with an account of Helvetius's life and works, by C. F. de Saint- Lambert, 1773), in which he develops the idea that true happiness is only to be found in making the interest of one that of all; his philosophical studies ended in the production of his famous book De I 'esprit. It was characteristic of the man that, as soon as hethought his fortune sufficient, he gave up his post of farmer- general, and retired to an estate in the country, where he employed his large means in the relief of the poor, the encourage- ment of agriculture and the development of industries. De V esprit (Eng. trans, by W. Mudford, 1807), intended to be the rival of Montesquieu's L' Esprit des lots, appeared in 1758. It attracted immediate attention and aroused the most formidable opposition, especially from the dauphin, son of Louis XV. The Sorbonne condemned the book, the priests persuaded the court that it was full of the most dangerous doctrines, and the author, terrified at the storm he had raised, wrote three separate re- tractations; yet, in spite of his protestations of orthodoxy, he had to give up his office at the court, and the book was publicly burned by the hangman. The virulence of the attacks upon the work, as much as its intrinsic merit, caused it to be widely read; it was translated into almost all the languages of Europe. Voltaire said that it was full of commonplaces, and that what was original was false or problematical; Rousseau declared that the very benevolence of the author gave the lie to his principles; Grimm thought that all the ideas in the book were borrowed from Diderot; according to Madame du Deffand, Helvetius had raised such a storm by saying openly what every one thought in secret; Madame de Graffigny averred that all the good things in the book had been picked up in her own salon. In 1764 Helvetius visited England, and the next year, on the invitation of Frederick II., he went to Berlin, where the king paid him marked attention. He then returned to his country estate and passed the remainder of his life in perfect tranquillity. He died on the 26th of December 1771.

His philosophy belongs to the utilitarian school. The four discussions of which his book consists have been thus summed up: (1) All man's faculties may be reduced to physical sensa- tion, even memory,

comparison, judgment; our only difference from the lower animals lies in our external organization. (2) Self-interest, founded on the love of pleasure and the fear of pain, is the sole spring of judgment, action, affection; self-sacrifice is prompted by the fact that the sensation of pleasure outweighs the accontpanying pain; it is thus the result of deliberate calculation; we have no liberty of choice between good and evil; there is no such thing as absolute right— ideas of justice and injustice change according to customs. (3) All intellects are equal; their apparent inequalities do not depend on a more or less perfect organization, but have their cause in the unequal desire for instruction, and this desire springs from passions, of which all men commonly well organized are susceptible to the same degree; and we can, therefore, all love glory with the same enthusiasm and we owe all to education. (4) In this discourse the author treats of the ideas which are attached to such words as genius, imagination, talent, taste, good sense, &c. The only original ideas in his system are those of the natural equality of intelligences and the omnipotence of education, neither of which, however, is generally accepted, though both were prominent in the system of J. S. Mill. There is no doubt that his thinking was unsystematic; but many of his critics have entirely mis-represented him (e.g. Cairns in his Unbelief in the Eighteenth Century). As J. M. Robertson (Short History of Free Thought) points out, he had great influence upon Bentham, and C. Beccaria states that he himself was largely inspired by Helv6tius in his attempt to modify penal laws. The keynote of his thought was

that public ethics has a utilitarian basis, and he insisted strongly on the importance of culture in national development.

A sort of supplement to the De V esprit, called De I'homme, de ses jacultes intellectuelles et de son education (Eng. trans, by W. Hooper, I777)i found among his manuscripts, was published after his death, but created little interest. There is a complete edition of the works of Helvetius, published at Paris, 1818. For an estimate of his work and his place among the philosophers of the 1 8th century see Victor Cousin's Philosophie sensualisle (1863); P. L. Lezaud, Resumes philosophiques (1853); F. D. Maurice, in his Modern Philosophy (1862), pp. 537 seq.; J. Morley, Diderot and the Encyclopaedists (London, 1878); D. G. Mostratos, Die Padagogik des Helvttius (Berlin, 1 891); A. Guillois, Le Salon de Madame Helvetius (1894); A. Piazzi, Le Idee filosofiche specialmente pedagogiche de C. A. Helvitius

(Milan, 1889); G. Plekhanov, Beitrage zur Geschichte des Maleria-Iismus (Stuttgart, 1896); L. Limentani, Le Teorie psicologiche di C. A. Helvetius (Verona, 1902); A. Keim, HelvStius, sa vie et son auvre (1907).

HELVIDIUS PRISCUS, Stoic philosopher and statesman, lived during the reigns of Nero, Galba, Otho, Vitellius and Vespasian. Like his father-in-law, Thrasea Paetus, he was distinguished for his ardent and courageous republicanism. Although he repeatedly offended his rulers, he held several high offices. During Nero's reign he was quaestor of Achaea and tribune of the plebs (a.d. 56); he restored peace and order in Armenia, and gained the respect and confidence of the provincials. His declared sympathy with Brutus and Cassius occasioned his banishment in 66. Having been recalled to Rome by Galba in 68, he at once impeached Eprius Marcellus, the accuser of Thrasea Paetus, but dropped the charge, as the condemnation of Marcellus would have involved a number of senators. As praetor elect he ventured to oppose Vitellius in the senate (Tacitus, Hist. ii. 91), and as praetor (70) he maintained, ■ in opposition to Vespasian, that the management of the finances ought to be left to the discretion of the senate; he proposed that the capitol, which had been destroyed in the Neronian conflagration, should be restored at the public expense; he saluted Vespasian by his private name, and did not recognize him as emperor in his praetorian edicts. At length he was banished a second time, and shortly afterwards was executed by Vespasian's order. His life, in the form of a warm panegyric, written at his widow's request by Herennius Senecio, caused its author's'death in the reign of Domitian.

Tacitus, Hist. iv. 5, Dialogus, 5; Dio Cassius lxvi. 12, lxvii. 13; Suetonius, Vespasian, 15; Pliny, Epp. vii. 19.

HELY-HUTCHINSON, JOHN (1724-1794), Irish lawyer, states- man, and provost of Trinity College, Dublin, son of Francis Hely, a gentleman of County Cork, was educated at Trinity College, Dublin, and was called to the Irish bar in 1748. He took the additional name of Hutchinson on his marriage in 1751 with Christiana Nixon, heiress of her uncle, Richard Hutchinson. He was elected member of the Irish House of Commons for the borough of Lanesborough in 1759, but after 1761 he represented the city of Cork. He at first attached himself to the " patriotic " party in opposition to the government, and although he after- wards joined t he administration he never abandoned his advocacy of popular measures. He was a man of brilliant and versatile ability, whom Lord Townshend, the lord lieutenant, described as " by far the most powerful man in parliament." William Gerard Hamilton said of him that " Ireland never

bred a more able, nor any country a more honest man." Hely-Hutchinson was, however, an inveterate place-hunter, and there was point in Lord North's witticism that "if you were to give him the whole of Great Britain and Ireland for an estate, he would ask the Isle of Man for a potato garden." After a session or two in parliament he was made a privy councillor and prime serjeant-at-law; and from this time he gave a general, though by no means invariable, support to the government. In 1767 the ministry contemplated an increase of the army establishment in Ireland from 12,000 to 15,000 men, but the Augmentation Bill met with strenuous opposition, not only from Flood, Ponsonby and the habitual opponents of the government, but from the Undertakers, or pro- prietors of boroughs, on whom the government had hitherto relied to secure them a majority in the House of Commons. It

therefore became necessary for Lord Townshend to turn to other methods for procuring support. Early in 1768 an English act was passed for the increase of the army, and a message from the king setting forth the necessity for the measure was laid before the House of Commons in Dublin. An address favourable to the government policy was, however, rejected; and Hely-Hutchinson, together with the speaker and the attorney-general, did their utmost both in public and private to obstruct the bill. Parlia- ment was dissolved in May 1768, and the lord lieutenant set about the task of purchasing or otherwise securing a majority in the new parliament. Peerages, pensions and places were bestowed lavishly on those whose support could be thus secured; Hely- Hutchinson was won over by the concession that the Irish army should be established by the authority of an Irish act of parlia- ment instead of an English one. The Augmentation Bill was carried in the session of 1769 by a large majority. Hely- Hutchinson's support had been so valuable that he received as reward an addition of £1000 a year to the salary of his sinecure of Alnagar, a major's commission in a cavalry regiment, and a promise of the secretaryship of state. He was at this time one of the most brilliant debaters in the Irish parliament, and he was enjoying an exceedingly lucrative practice at the bar. This in- come, however, together with his well-salaried sinecure, and his place as prime Serjeant , he surrendered in 1 7 74 , to become provost of Trinity College, although the statute requiring the provost to be in holy orders had to be dispensed with in his favour.

For this great academic position Hely-Hutchinson was in no way qualified, and his appointment to it for purely political service to the government was justly criticized with much asperity. His conduct in using his position as provost to secure the parliamentary

representation of the university for his eldest son brought him into conflict with Duigenan, who attacked him in Lacrymae academicae, and involved him in a duel with a Mr Doyle; while a similar attempt on behalf of his second son in 1790 led to his being accused before a select committee of the House of Commons of impropriety as returning officer. But although without scholarship Hely-Hutchinson was an efficient provost, during whose rule material benefits were conferred on Trinity College. He continued to occupy a prominent place in parliament, where he advocated free trade, the relief of the Catholics from penal legislation, and the reform of parliament. He was one of the very earliest politicians to recognize the soundness of Adam Smith's views on trade; and he quoted from the Wealth of Nations, adopting some of its principles, in his Commercial Restraints of Ireland, published in 1779, which Lecky pronounces " one of the best specimens of political literature produced in Ireland in the latter half of the 1 8th century." In the same year, the economic condition of Ireland being the cause of great anxiety, the government solicited from several leading politicians their opinion on the state of the country with sugges- tions for a remedy. Hely-Hutchinson's response was a remark- ably able state paper(MS. in the Record Office) , which also showed clear traces of the influence of Adam Smith. The Commercial Restraints, condemned by the authorities as seditious, went far to restore Hely-Hutchinson's popularity which had been damaged by his greed of office. Not less enlightened were his views on the Catholic question. In a speech in parliament on Catholic educa- tion in 1782 the provost declared that Catholic students were in fact to be found at Trinity College, but that he desired their presence there to be legalized on the largest scale. " My opinion," he said, " is strongly against sending Roman Catholics abroad for education, nor would I establish Popish colleges at home, the advantage of being admitted into the university of Dublin will be very great to Catholics; they need not be obliged to attend the divinity professor, they may have one of their own; and I would have a part of the public money applied to their use, to the support of a number of poor lads as sizars, and to provide premiums for persons of merit, for I would have them go into examinations and make no distinction between them and the Protestants but such as merit might claim." And after sketching a scheme for increasing the number of diocesan schools where Roman Catholics might receive free education, lie went on to

urge that " it is certainly a matter of importance that the educa- tion

of their priests should be as perfect as possible, and that if they have any prejudices they should be prejudices in favour of their own country. The Roman Catholics should receive the best educa- tion in the established university at the public expense; but by no means should Popish colleges be allowed, for by them we should again have the press groaning with themes of controversy, and subjects of religious disputation that have long slept in oblivion would again awake, and awaken with them all the worst passions of the human mind." 1

In 1777 Hely-Hutchinson became secretary of state. When Grattan in 1782 moved an address to the king containing a declaration of Irish legislative independence, Hely-Hutchinson supported the attorney-general's motion postponing the question; but on the 16th of April, after the Easter recess, he read a message from the lord lieutenant, the duke of Portland, giving the king's permission for the House to take the matter into con- sideration, and he expressed his personal sympathy with the popular cause which Grattan on the same day brought to a triumphant issue (see Grattan, Henry). Hely-Hutchinson supported the opposition on the regency question in 1788, and one of his last votes in the House was in favour of parliamentary reform. In 1790 he exchanged the constituency of Cork for that of Taghmon in County Wexford, for which borough he remained member till his death at Buxton on the 4th of September

1794-

In 1785 his wife had been created Baroness Donoughmore and on her death in 1788, his eldest son Richard (1756-1825) succeeded to the title. Lord Donoughmore was an ardent advocate of Catholic emancipation. In 1797 he was created Viscount Donoughmore, 2 and in 1800 (having voted for the Union, hoping to secure Catholic emancipation from the united parliament) he was further created earl of Donoughmore of Knocklofty, being succeeded first by his brother John Hely- Hutchinson (1757-1832) and then by his nephew John, 3rd earl (1787-1851), from whom the title descended.

See W. E. H. Lecky, Hist, of Ireland in the Eighteenth Century (5 vols., London, 1892) ; J. A. Froude, The English in Ireland in the Eighteenth Century (3 vols., London, 1872-1874); H. .Grattan, Memoirs of the Life and Times of Henry Grattan (8 vols., London, 1839-1846); Baratariana, by various writers (Dublin, 1773).

(R. J. M.)

HELYOT, PIERRE (1660-1716), Franciscan friar and his- torian, was born at Paris in January 1660, of supposed English ancestry. After spending his youth in study, he entered in his twenty-fourth year the convent of the third, order of St Francis, founded at Picpus, near Paris, by his uncle Jerome Helyot, canon of St Sepulchre. There he took the name of Pere Hip- polyte. Two journeys to Rome on monastic business afforded him the opportunity of travelling over most of Italy; and after his final return he saw much of France, while acting as secretary to various provincials of his order there. Both in Italy and France he was engaged in collecting materials for his great work, which occupied him about twenty-five years, L'Histoire des ordre.ˆ monastiques, religieux, et mililaircs, et des congregations seculieres, de 1'iui et de I'autre sexc, qui ont ete etablies jusqu'a present, published in 8 volumes in 1714-1721. Helyot died on the 5th of January 17 16, before the fifth volume appeared, but his friend Maximilien Bullot completed the edition. Helyot's only other noteworthy work is Le Chretien mouranl (1695)

The Histoire is a work of first importance, being the great repertory of information for the general history of the religious orders up to the end of the 17th century. It is profusely illustrated by large plates

1 Irish Pari. Debates, i. 309, 310.

2 It is generally supposed that the title conferred by this patent was that of V iscount Suirdale, and such is the courtesy title by which the heir apparent of the earls of Donoughmore is usually styled This, however, appears to be an error. In all the three creations Jbarony 1783, viscountcy 1797, earldom 1800) the title is

Donoughmore of Knocklofty." In 182 1 the 1st earl was further created \ iscount Hutchinson of Knocklofty in the peerage of the L nited Kingdom. The courtesy title of the earl's eldest son should theretore, apparently be either " Viscount Hutchinson " or " Vis- count Knocklofty." See G. E. C. Complete Peerage (London, 1890)

exhibiting, the dress of the various orders, and in the edition of 1792 the plates are coloured. It was translated into Italian (1737) and into German (1753). The material has been arranged in dictionary form in Migne's Encyclopedic theologique, under the title "Dictionnaire des orders religieux " (4 vols., 1858).

HEMANS, FELICIA DOROTHEA (1793-1835), English poet, was born in Duke Street, Liverpool, on the 25th of September 1793. Her father, George Browne, of .Irish extraction, was a merchant in Liverpool, and

her mother, whose maiden name was Wagner, was the daughter of the Austrian and Tuscan consul at Liverpool. Felicia, the fifth of seven children, was scarcely seven years old when her father failed in business, and retired with his family to Gwrych, near Abergele, Denbighshire; and there the young poet and her brothers and sisters grew up in a romantic old house by the sea-shore, and in the very midst of the mountains and myths of Wales. Felicia's education was desultory. Books of chronicle and romance, and every kind of poetry, she read with avidity; and she also studied Italian, Spanish, Portuguese and German. She played both harp and piano, and cared especially for the simple national melodies of Wales and Spain. In 1808, when she was only fourteen, a quarto volume of her Juvenile Poems, was published by subscription, and was harshly criticized in the Monthly Review. Two of her brothers were fighting in Spain under Sir John Moore; and Felicia, fired with military enthusiasm, wrote England and Spain, or Valour and Patriotism, a poem afterwards translated into Spanish. Her second volume, The Domestic Affections and other Poems, appeared in 181 2, on the eve of her marriage to Captain Alfred Hemans. She lived for some time at Daventry, where her husband was adjutant of the Northamptonshire militia. About this time her father went to Quebec on business and died there; and, after the birth of her first son, she and her husband went to live with her mother at Bronwylfa, a house near St Asaph. Here during the next six years four more children— all boys — were born; but in spite of domestic cafes arid failing health she still read and wrote indcfatigably. Her poem entitled The Restoration of Works of Art to Italy was published in 1816, her Modern Greece in 1817, and in 1818 Translations from Camoens and other Poets.

In 1818 Captain Hemans went to Rome, leaving his wife, shortly before the birth of their fifth child, with her mother at Bronwylfa. There seems to have been a tacit agreement, perhaps on account of their limited means, that they should separate. Letters were interchanged, and Captain Hemans was often consulted about his children; but the husband and wife never met again. Many friends— among them the bishop of St Asaph and Bishop Heber— gathered round Mrs Hemans and her children. In 1819 she published Tales and Historic Scenesin Verse, and gained a prize of £50 offered for the best poem on The Meeting of Wallace and Bruce on the Banks of the Carron. In 1820 appeared The Sceptic and Stanzas to the Memory of the late King. In June 1821 she won the prize awarded by the Royal Society of Literature for the best poem on the subject of Dart- moor, and began her play, The Vespers of Palermo. She now applied herself to a course of German reading. Korner was her favourite German poet,

and her lines on the grave of Korner were one of the first English tributes to the genius of the young soldier-poet. In the summer of 1823 a volume of her poems was published by Murray, containing ” The Siege of Valencia,” ” The Last Constantine ” and ” Belshazzar’s Feast.” The Vespers of Palermo was acted at Covent Garden, December 12’, 1823, an/1 Mrs Hemans received £200 for the copy-right; but. though the leading parts were taken by Young and Charles Kemble, the play was a failure, and was withdrawn after the first performance. It was acted again in Edinburgh in the following April with greater success, when an epilogue, written for it by Sir Walter Scott at Joanna Baillie’s request, was spoken by Harriet Siddons. This was the beginning of a cordial friendship between Mrs Hemans and Scott. In the same year she wrote De Chatillon, or the Crusaders; but the manu- script was lost, and the poem was published after her death, from a rough copy. In 1824 she began ” The Forest Sanctuary,”

which appeared a year later with the “Lays of Many Lands” and miscellaneous pieces collected from the New Monthly Magazine and other periodicals.

In the spring of 1825 Mrs Hemans removed from Bronwylfa, which had been purchased by her brother, to Rhyllon, a house on an opposite height across the river Clwyd. The contrast between the two houses suggested her Dramatic Scene between Bronwylfa and Rhyllon. The house itself was bare and un- picturesque, but the beauty of its surroundings has been cele- brated in ” The Hour of Romance,” ” To the River Clwyd in North Wales,” ” Our Lady’s Well ” and ” To a Distant Scene.” This time seems to have been the most tranquil in Mrs Hemans’s life. But the death of her mother in January 1827 was a second great breaking-point in her life. Her heart was affected, and she was from this time an acknowledged invalid. In the summer of 1828 the Records of Woman was published by Blackwood, and in the same year the home in Wales was finally broken up by the marriage of Mrs Hemans’s sister and the departure of her two elder boys to their father in Rome. Mrs Hemans removed to Wavertree, near Liverpool. But, although she had a few intimate friends there — among them her two subsequent biographers, Henry F. Chorley and Mrs Lawrence of Wavertree Hall — she was disappointed in her new home, She thought the people of Liverpool stupid and provincial; and they, on the other hand, found her uncommunicative and eccentric. In the following summer she travelled by sea to Scotland with two of her boys,- to visit

the Hamiltons of Chiefswood.

Here she enjoyed ” constant, almost daily, intercourse ” with Sir Walter Scott, with whom she and her boys afterwards stayed some time at Abbotsford. ” There are some whom we meet, and should like ever after to claim as kith and kin; and you are one of those,” was Scott’s compliment to her at parting. One of the results of her Edinburgh visit was an article, full of praise, judiciously tempered with criticism, by Jeffrey himself for the Edinburgh Review. Mrs Hemans returned to Wavertree to write her Songs of the Affections, which were published early in 1830. In the following June, however, she again left home, this time to visit Wordsworth and the Lake country; and in August she paid a second visit to Scotland. In 183 1 she removed to Dublin. Her poetry of this date is chiefly religious. Early in 1834 her Hymns for Childhood, which had appeared some years before in America, were published in Dublin. At the same time appeared her collection of National Lyrics, and shortly afterwards Scenes and Hymns of Life. She was planning also a series of German studies, one of which, on Goethe’s Tasso, was completed and published in the New Monthly Magazine for January 1834. In intervals of acute suffering she wrote the lyric Despondency and Aspiration, and dictated a series of sonnets called Thoughts during Sickness, the last of which, ” Recovery,” was written when she fancied she was getting well. After three months spent at Redesdale, Archbishop Whately’s country seat, she was again brought into Dublin, where she lingered till spring. Her last poem, the Sabbath Sonnet, was dedicated to her brother on Sunday April 2&th, and she died in Dublin on the 16th of May 1835 at the age of forty-one.

Mrs Hemans’s poetry is the production of a fine imaginative and enthusiastic temperament, but not of a commanding intellect or very complex or subtle nature. It is the outcome of a beautiful but singularly circumscribed life, a life spent in romantic seclusion, without much worldly experience, and warped and saddened by domestic unhappiness and physical suffering. An undue preponderance of the emotional is its prevailing characteristic. Scott complained that it was ” too poetical,” that it contained ” too many flowers ” and ” too little fruit.” Many of her short poems, such as ” The Treasures of the Deep,” ” The Better Land,” ” The Homes of England,” ” Casabianca,” ” The Palm Tree,” “The Graves of a Household,” ” The Wreck,” ” The Dying Improvisatore,” and ” The Lost Pleiad,” have become standard English lyrics. It is on the strength of these that her reputation must rest.

Mrs Hemans’s Poetical Works were collected in 1832 ; her Memorials

8k., by H. F. Chorley (1836).

xin. 9

HEMEL HEMPSTEAD, a market-town and municipal borough in the Watford parliamentary division of Hertfordshire, England, 25 m. N.W. from London, with a station on a branch of the Midland railway from Harpenden, and near Boxmoor station on the London and North Western main line. Pop. (1891) 9678; (iqoi) 11,264. It is pleasantly situated in the steep- sided valley of the river Gade, immediately above its junction with the Bulbourne, near the Grand Junction canal. The church of St Mary is a very fine Norman building with Decorated additions. Industries include the manufacture of paper, iron founding, brewing and tanning. Boxmoor, within the parish, is a considerable township of modern growth. Hemel Hempstead is governed by a mayor, 6 aldermen and 18 councillors. Area, 7184 acres.

Settlements in the neighbourhood of Hemel Hempstead (Hamalamstede, Hemel Hampsted) date from pre-Roman times, and a Roman villa has been discovered at Boxmoor. The manor, royal demesne in 1086, was granted by Edmund Plantagenet in 1285 to the house of Ashridge, and the town developed under monastic protection. In 1539 a charter incorporated the bailiff and inhabitants. A mayor, aldermen and councillors received governing power by a charter of 1898. The town has never had parliamentary representation. A market on Thursday and a fair on the feast of Corpus Christi were conferred in 1539- A statute fair, for long a hiring fair, originated in 1803.

HEMEROBAPTISTS, an ancient Jewish sect, so named from their observing a practice of daily ablution as an essential part of religion. Epiphanius (Panarion, i. 17), who mentions their doctrine as the fourth heresy among the Jews, classes the Hemerobaptists doctrinally with the Pharisees (q.v.) from whom they differed only in, like the Sadducees, denying the resurrection of the dead. The name has been sometimes given to the Mandaeans on account of their frequent ablutions; and in the Clementine Homilies (ii. 23) St John the Baptist is spoken of as a Hemero- baptist. Mention of the sect is made by Hegesippus (see Euseb. Hist. Eccl. iv. 22) and by Justin Martyr in the Dialogue with Trypho, § 80. They were probably a division of the Essenes.

HEMICHORDA, or Hemichordata, a zoological term intro- duced by W. Bateson in 1884, without special definition, as equivalent to Enteropneusta, which then included the single genus Balanoglossus,

and now generally employed to cover a group of marine worm-like animals believed by many zoologists to be related to the lower vertebrates and so to represent the invertebrate stock from which Vertebrates have been derived. Vertebrates, or as they are sometimes termed Chordates, are distinguished from other animals by several important features. The chief of these is the presence of an elastic rod, the notochord, which forms the longitudinal axis of the body, and which persists throughout life in some of the lowest forms, but which appears only in the embryo of the higher forms, being replaced by the jointed backbone or vertebral column. A second feature is the development of outgrowths of the pharynx which unite with the skin of the neck and form a series of perforations leading to the exterior. These structures are the gill-slits, which in fishes are lined with vascular tufts, but which in terrestrial breathing animals appear only in the embryo. The third feature of importance is the position of structure of the central nervous system, which in all the Chordates lies dorsally to the alimentary canal and is formed by the sinking in of a longitudinal media dorsal groove. Of these structures the Vertebrata or Craniata possess all three in a typical form; the Cephalochordata (see Amphioxus) also possess them, but the notochord extends throughout the whole length of the body to the extreme tip of the snout; the Urochordata (see Ttjnicata) possess them in a larval condition, but the notochord is present only in the tail, whilst in the adult the notochord disappears and the nervous system becomes profoundly modified; in the Hemichorda, the respiratory organs very closely resemble gill-slits, and structures comparable with the notochord and the tubular dorsal nervous system are present.

The Hemichorda include three orders, the Phoronidea (q.v.), the Pterobranchia (q.v.) and the Eateropneusta (see Balano-

glossus), but the relationship to the Chordata expressed in the designation Hemichordata cannot be regarded as more than an attractive theory with certain arguments in its favour. (P. C. M.)

HEMICYCLE (Gr. 17/K-, half, and kvkKos, circle), a semi- circular recess of considerable size which formed one of the most conspicuous features in the Roman Thermae, where it was always covered with a

hemispherical vault. A small example exists in Pompeii, in the street of tombs, with a seat round inside, where those who came to pay their respects to the departed could rest. An immense hemicycle was designed by Bramante for the Vatican, where it constitutes a fine architectural effect at the end of the great court.

HEMIMERUS, an Orthopterous or Dermapterous insect, the sole representative of the family Hemimeridae, which has affinities with both the Forficulidae • (earwigs) and the Blattidae (cock- roaches). Only two species have been discovered, both from West Africa. The better known of these (H . hanseni) lives upon a large rat-like rodent (Cricetomys gambianus) feeding perhaps upon its external parasites, perhaps upon scurf and other dermal products. Like many epizoic or parasitic insects, Hemimerus is wingless, eyeless and has relatively short and strong legs. Correlated also with its mode of life is the curious fact that it is viviparous, the young being born in an advanced stage of growth, HEMIMORPHITE, a mineral consisting of hydrous zinc silicate, H 2 Zn2Si05, of importance as an ore of the metal, of which it contains 54-4%. It is interesting crystallographically by reason of the hemimorphic development of its orthorhombic crystals; these are prismatic in habit and are differently terminated at the two ends. In the figure, the faces at the upper end of the crystal are the basal plane k and the domes 0, p, I, m, whilst at the lower end there are only the four faces of the pyramid P. Con- nected with this polarity of the crystals is their pyroelectric character— when a crystal is subjected to changes of temperature it becomes positively electrified at one end and negatively at the opposite end. There are per- fect cleavages parallel to the prism faces (din the figure). Crystals are usually colourless, some- times yellowish or greenish, and transparent; they have vitreous lustre. The hardness is 5, and the specific gravity 3.45. The mineral also occurs as stalactitic or botryoidal masses with a fibrous structure, or in a massive, cellular or granular condition intermixed with calamine and clay. It is decomposed by hydrochloric acid with gelatinization; this property affords a ready means of distinguishing hemimorphite from calamine (zinc carbonate) , these two minerals being, when not crystallized, very like each other in appearance. The water contained in hemimorphite is expelled only at a red heat, and the mineral must therefore be considered as a basic metasilicate, (ZnOH),Si0 3 .

The name hemimorphite was given by G. A. Kenngott in 1853 because of the typical hemimorphic development of the crystals. The mineral had long been confused with calamine (q.v.) and even now this name is often applied to it. On account of its pyroelectric properties, it was called electric calamine by J. Smithson in 1803.

Hemimorphite occurs with other ores of zinc (calamine and blende), forming veins and beds in sedimentry limestones. British localities are Matlock, Alston, Mendip Hills and Lead- hills; at Roughten Gill, Caldbeck Fells, Cumberland, it occurs as mammillated incrustations of a sky-blue colour. Well-crystallized specimens have been found in the zinc mines at Altenberg near Aachen in Rhenish Prussia, Nerchinsk mining district in Siberia, and Elkhorn in Montana. (L. J. S.)

HEMINGBURGH, WALTER OF, also commonly, but errone- ously, called Walter Hemingford, a Latin chronicler of the 14th century, was a canon regular of the Austin priory of Gisburn in Yorkshire. Hence he is sometimes known as Walter of Gisburn (Walterus Gisburnensis) . Bale seems to have been the first to give him the name by which he became more commonly known.

His chronicle embraces the period of English history from the Conquest (1066) to the nineteenth year of Edward III., with the exception of the years 13 16-1326. It ends with the title of a chapter in which it was proposed to describe the battle of Crefy (1346); but the chronicler seems to have died before the required information reached him. There is, however, some controversy as to whether the later portions which are lacking in some of the MSS. are by him. In compiling the first part, Hemingburgh apparently used the histories of Eadmer, Hoveden, Henry of Huntingdon, and William of Newburgh; but the reigns of the three Edwards are original, composed from personal observation and information. There are several manuscripts of the history extant — the best perhaps being that presented to the College of Arms by the earl of Arundel. The work is correct and judicious, and written in a pleasing style. One of its special features is the preservation in its pages of copies of the great charters, and Hemingburgh's versions have more than once supplied deficiencies and cleared up obscurities in copies from other sources.

The first three books were published by Thomas Gale in 1687, in his Historiae Anglicanae scriptores quinque, and the remainder by Thomas Hearne in 1731. The first portion was again published in 1848 by the English Historical Society, under the title Chronicon Walteri de Hemingburgh, vulgo Hemingford nuncupati, de gestis regum Angliae, edited by H. C. Hamilton.

HEMIPTERA (Gr. 17JU-, half and impbv, a wing), the name applied in zoological classification to that order of the class Hexapoda (q.v.) which includes bugs, cicads, aphids and scale- insects. The name was first used by Linnaeus (1735), who derived it from the half-coriaceous and half-membranous con- dition of the forewing in many members of

the order. But the wings vary considerably in different families, and the most dis- tinctive feature is the structure of the jaws, which form a beak- like organ with stylets adapted for piercing and sucking. Hence the name Rhyngota (or Rhynchota) , proposed by J. C. Fabricius (1775), is used by many writers in preference to Hemiptera.

Structure.— The head varies greatly in shape, and the feelers have usually but few segments — often only four or five. The arrangement of the jaws is remarkably constant throughout the order, if we exclude from it the lice (Anoplura). Taking as our type the head of a cicad, we find a jointed rostrum or beak (figs. 1 and 2, IV. b, c) with a deep groove on its anterior face; this organ is formed by the second pair of maxillae and corresponds therefore to the labium or ” lower lip ” of biting insects. Within the groove of the rostrum two pairs of slender piercers — often barbed at the tip — work to and fro. One of these pairs (fig. 2, II. a, b, c) represents the mandibles, the other (fig. 2, III. a, b, c) the first maxillae. The piercing portions of the latter— representing their inner lobes or laciniae — lie median to the man dibular piercers in the natural position of the organs. These homologies of the hemipterous jaws were determined by J. C. Savigny in 1816, and though disputed by various subsequent writers, they have been lately confirmed by the embryological researches of R. Heymons (1899). Vestigial palps have been described in various species of Hemiptera, but the true nature of these structures is doubtful. In front of the rostrum and the piercers lies the pointed flexible labrum and within its base a small hypopharynx (fig. 2, IV. d) consisting of paired conical processes which lie dorsal to the ” syringe ” of the salivary glands. This latter organ injects a secretion into the plant or

After Marlatt, Bull. 14 (N.S.) Div. Ent. V.S.

Dept. Agr.

Fig. 1

I.»

II.,

III.,

IV.,

v.,

Head and Prothorax of Cicad from side. Frons.

Base of mandible. Base of first maxillae. Second maxillae f ormingrostrufhi Pronotum.

animal tissue from which the insect is sucking. The point of the j in many Hemiptera. In the adult there is a pair of such glands

rostrum is pressed against the surface to be pierced; then the stylets come into play and the fluid food is believed to pass into the mouth by capillary attraction.

The prothorax (figs, i and 2, V.) in Hemiptera is large and free, and the mesothoracic scutellum is usually extensive. The number of tarsal segments is reduced; often three, two or only one may be present instead of the typical insectan number five. The wings will be described in connexion with the various

After Marlatt, Bull. 14 (X. S.) Div. Enl. VS. Depl. Agr. Fig. 2. — Head and Prothorax of Cicad

I.,

parts separated. c, labrum ; d, epipharynx.

c’, muscle.

c, ligula, forming

a, frons; b, clypeus 1’., Same from behind. II., Mandible. III., 1st maxilla; o, base; b, sheath; c, stylet; IV., 2nd maxillae, o, sub-mentum; b, mentum;

beak; d, hypopharynx (shown also from front d’, and behind d”). V., Prothorax, b, haunch; a, trochanter.

sub-orders, but an interesting peculiarity of the Hemiptera is the occasional presence of winged and wingless races of the same species. Eleven abdominal segments can be recognized, at least in the early stages; as the adult condition is reached, the hinder segments become reduced or modified in connexion with the external reproductive organs, and show, in some male Hemiptera, a marked asymmetry. The typical insectan ovi- positor with its three pairs of processes, one pair

belonging to the eighth and two pairs to the ninth abdominal segment, can be distinguished in the female.

In the nervous system the concentration of the trunk ganglia

TERZI.—

After Marlatt, Bull. 4 (X.S.) Div. Enl. U.S. Depl. Axr.

Fig, 3. — a, Cast-off nymphal skin of Bed-bug (Cimex leclularius) ; b. Second instar after emergence from a; c, The same after a meal.

into a single nerve-centre situated in the thorax is remarkable. The digestive system has a slender gullet, a large crop and no gizzard; in some Hemiptera the hinder region of the mid-gut forms a twisted loop with the gullet. Usually there are four excretory (Malpighian) tubes; but there are only two in the Coccidae and none in the Aphidae. ” Stink glands,” which secrete a nauseous fluid with a defensive function, are present

opening ventrally on the hiridmost thoracic segment, or at the base of the abdomen; but in the young insect the glands are situated dorsally and open to the exterior on a variable number of the abdominal terga.

Development. — In most Hemiptera the young insect (fig. 3) resembles its parents except for the absence of wings, and is active through all stages of its growth. In all Hemiptera the wing-rudiments develop externally on the nymphal cuticle, but in some families — the cicads for example — the young insect (fig. 10) is a larva differing markedly in form from its parent, and adapted for a different mode of life, while the nymph before the final moult is sluggish and inactive. In the male Coccidae (Scale-insects) the nymph (fig. 4) remains passive and takes no food. The order of the Hemiptera affords, therefore, some interesting transition stages towards the complete metamorphosis of the higher insects.

Distribution and Habits. — Hemiptera are widely distributed, and are plentiful in most quarters of the globe, though they probably have not penetrated as far into remote and inhospitable regions as have the Coleoptera, Diptera and Aptera. They feed entirely by suction, and the majority of the species pierce plant tissues and suck sap. The leaves of plants are for the most part the objects of attack, but many aphids and scale-insects pierce stems, and some go underground and feed on roots. The enormous rate at which aphids multiply under favourable conditions makes them of the greatest economic importance, since the growth of immense numbers of the same kind of plant in close

proximity — as in ordinary farm-crops — is especially advantageous to the insects that feed on them. Several families of bugs are pre-daceous in habit, attacking other insects /ˆ ter Rji ey and Howard — often members of their own order — insect Life, vol. i. (U.S. and sucking their juices. Others are ep ‘ g ‘ ‘ scavengers feeding on decaying organic ˆ IG y ˆ” ~7. p asslV ” matter; the pond skaters, for example, ;7Xk scale iXct live mostly on the juices of dead float- (icerya). ing insects. And some, like the bed-bugs, are parasites of vertebrate animals, on

whose bodies they live temporarily or permanently, and whose blood they suck.

The Hemiptera are especially interesting as an order from the variety of aquatic insects included therein. Some of these — the Hydrotnetridae or pond-skaters, for example — move over the surface-film, on which they are supported by their elongated, slender legs, the body of the insect being raised clear of the water. ; They are covered with short hairs which form a velvet-like pile, so dense that water cannot penetrate. Consequently when the insect dives, an air-bubble forms around it, a supply of oxygen is thus secured for breathing and the water is kept away from the spiracles. In many of these insects, while most individuals of the species are wingless, winged specimens are now and then met with. The occasional development of wings is probably of service to the species in enabling the insects to reach new fresh-water breeding-grounds. This family of Hemiptera (the Hydrotnetridae) and the Saldidae contain several insects that are marine, haunting the tidal margin. One genus of Hydrome- tridae (Halobales) is even oceanic in its habit, the species being met with skimming over the surface of the sea hundreds of miles from land. Probably they dive when the surface become* ruffled. In these marine genera the abdomen often undergoes excessive reduction (fig. 5).

Other families of Hemiptera — such as the ” Boatmen ” (Notonectidae) and the ” Water-scorpions ” (fig. 6) and their allies {Nepidae) dive and swim through the water. They obtain their supply of air from the surface. The Nepidae breathe by means of a pair of long, grooved tail processes (really out-growths

of the abdominal pleura) which when pressed together form a tube whose point can pierce the surface film and convey air to the

hindmost spiracles which are alone functional in the adult. The Notonectidae breathe mostly through the thoracic spiracles; the air is conveyed to these from the tail-end, which is brought to the surface, along a kind of tunnel formed by overlapping hairs.

Sound-producing Organs. — The Hemiptera are remarkable for the variety of their stridulating organs. In many genera of

After Carpenter, Proc. R. Dublin Sae., vol. viii.

Fig. 5. — A reef-haunting hemipteron {Hermatobate s haddonii) with excessively re- duced abdomen. Magnified.

Fig. 6. — Water-scorpion (Nepa cinerea) with raptorial fore-legs, heteropterous wings, and long siphon for conveying air to spiracles. Somewhat magnified, sc, scutellum; co, cl, m, corium, clavus and membrane of forewing.

the Pentatomidae, bristle-bearing tubercles on the legs are scraped across a set of fine striations on the abdominal sterna. In Halobates a comb-like series of sharp spines on the fore-shin can be drawn across a set of blunt. processes on the shin of the opposite leg. Males of the little wt'ter-bugs of the genus Corixa make a shrill chirping note by drawing a row of teeth on the flattened fore-foot across a group of spines on the haunch of the opposite leg. But the loudest and most remarkable vocal organs of all insects are those of the male cicads, which " sing "

d e

From Marlatt, Bull. 14 (N.S.) Div. Enl. U.S. Dept. Agr.

Fig. 7.

Fossil History. — The Heteroptera can be traced back farther than any other winged insects if the fossil Protocimex silurica Moberg, from the Ordovician slates of Sweden is rightly regarded as the wing of a bug. But according to the recent researches of A. Handlirsch it is not insectan at all. Both Heteropterous and Homopterous genera have been described from the Carbon- iferous, but the true nature of some of these is doubtful. Eugereon is a remarkable Permian fossil, with jaws that are typically hemipterous except that the second maxillae are not fused and with cockroach-like wings. In the Jurassic period many of the existing families, such as the Cicadidae, Fulgoridae, Aphidae, Nepidae, Reduviidae, Hydrometridae, Lygaeidae and Coreidae, had already become differentiated.

Classification.— The number of described species of Hemiptera must now be nearly 20,000. The order is divided into two sub- orders, the Heteroptera and the Homoptera. The Anoplura or lice should not be included among the Hemiptera, but it has been thought convenient to refer briefly to them at the close of this article.

Heteroptera

In this sub-order are included the various families of bugs and their aquatic relations. The front of the head is not in contact with the haunches of the fore-legs. There is usually a marked difference between the wings of the two pairs. The fore-wing is generally divided into a firm coriaceous basal region, occupying most of the area, and a mem- branous terminal portion, while the hind-wing is delicate and entirely membranous (see fig. 6). In the firm portion of the fore- wing two

a, Body of male Cicad from c,

below, showing cover-plates of musical organs; d,

b, From above showing drums, e,

natural size;

Section showing muscles which vibrate drum (magnified) ;

A drum at rest ;

Thrown into vibration, more highly magnified.

by the rapid vibration of a pair of ” drums ” or membranes within the metathorax. These drums are worked by special muscles, and the cavities in which they lie are protected by conspicuous plates visible beneath the base of the abdomen (see fig. 7).

After Marlatt, Bull. 4 (N.S.) Div. Enl. U.S. Dept. Agr.

Fig. 8. — Bed-bug (Cimex lectularius, Linn.).

a, Female from above ; d. Jaws, very highly magnified

b, From beneath; (tips of mandibles and 1st

c, Vestigial wing; maxillae still more highly

magnified).

distinct regions can usually be distinguished; most of the area is formed by the corium (fig. 6, co), which is separated by a longitudinal suture from the clavus (fig. 6, cl) on its hinder edge, and in some families there is also a cuneus (fig. 9 cu) external to and an embolium in front of the corium.

Most Heteroptera are flattened in form, and the wings lie flat, or nearly so, when closed. The young Heteropteron is hatched from the egg in a form not markedly different from that of its parent ; it is active and takes food through all the stages of its growth. It is usual to divide the Heteroptera into two tribes — the Gymnocerata and the Cryptocerata.

Gymnocerata. — This tribe includes some eighteen families of terrestrial, arboreal and marsh-haunting bugs, as well as those aquatic Heteroptera that live on the surface-film of water. The feelers are elongate and conspicuous. The Pentatomidae (shield- bugs), some of which are metallic or otherwise brightly coloured, are easily recognized by the great development of the scutellum, which reaches at least half-way back towards the tip of the abdomen, and in some genera covers the whole of the hind body, and also the wings when these are closed. The Coreidae have a smaller scutellum, and the feelers are inserted high on the head, while in the Lygaeidae they are inserted lower down. These three families have the foot with three segments. In the curious little Tingidae, whose integuments exhibit a pattern of network-like ridges, the feet are two-segmented and the scutellum is hidden by the pronotum. The Aradidae have two segmented feet, and a large visible scutellum. The Hydro- metridae are a large family including the pond-skaters and other dwellers on the surface-film of fresh water, as well as the remarkable oceanic genus Halobates already referred to. The Reduviidae are

a family of predaceous bugs that attack other insects and suck their juices; the beak is short, and carried under the head in a hook- like curve, not — as in the preceding families — lying close against the breast. The Cimicidae have the feet three-segmented and the fore-wings greatly reduced; most of the species are parasites on birds and bats, but one — Cimex lectularius (figs. 3, 8) — is the well-known ” bed-bug ” which abounds in unclean dwellings and sucks human blood (see Bug). The Anthecoridae are nearly related to the Cimi-cidae, but the wings are usually well developed and the forewing

possesses cuneus and embolium as well as corium and clavus. The Capsidae are a large family of rather soft-skinned bugs mostly

elongate in form with the two basal segments of the feelers stouter than the two terminal. The forewing in this family has a cuneus (fig. 9 cm), but not an embolium. These insects are often found in large numbers on plants whose juices they suck.

Cryptocerala. — In this tribe are included five or six families of aquatic Heteroptera which spend the greater part of their lives submerged, diving and swimming through the water. The feelers are very small and are often hidden in cavities beneath the head. The Naucoridae and Belostomalidae are flattened in- sects, with four-segmented feelers and fore-legs inserted at the front of the prosternum. Two species of the former family inhabit our islands, but the Belostomatidae are found only in the warmer regions of the globe ; some of them, attaining a length of 4 to 5 in., are giants among insects. The Fig. 9. — Capsid Leaf-bug (Poe- Nepidae (fig. 6) or water-scorpions cilocapsus lineatus) N. America, (q.v.) — two British species — Magnified — , cu cuneus. are distinguished by their three-

segmented feelers, their raptorial fore-legs (in which the shin and foot, fused together, work like a sharp knife-blade on the grooved thigh), and their elongate tail-processes formed of the abdominal pleura and used for respiration. The Nolonectidae, or ” water-boatmen ” (q.v.) have convex ovoid bodies admirably adapted for aquatic life. By msans of the oar-like hind- legs they swim actively through the water with the ventral surface upwards; the fore-legs are inserted at the hinder edge of the pro- sternum. The Corixidae are small flattened water-bugs, with very short unjointed beak, the labrum being enclosed within the second

After M. V. Slingerland, Cornell Univ Ent. Bull. 58.

HOMOPTERA This sub-order includes the cicads, lantern-flies, frog-hoppers, aphids and scale-insects. The face has such a marked backward slope (see fig. I) as to bring the beak into close contact with the haunches of the fore-legs. The feelers have one or more thickened basal segments, while the remaining segments are slender and thread-like. The fore-wings are sometimes membranous like the hind-wings, usually they are firmer in texture, but they never show the distinct areas that characterize the wings of Heteroptera. When at rest the wings of Homoptera slope roofwise across the back of the insect. In their life-history the Homoptera are more specialized than the Heteroptera; the young insect often differs markedly from its

After Weed, Riley and Howard, Insect Life, vol. iii.

Fig. 11. — Cabbage Aphid (Aphisbrassicae). a, Male; c, female (wingless). Magnified, b and d, Head and feelers of male and female, more highly magnified.

parent and does not live in the same situations; while in some families there is a passive stage before the last moult.

The Cicadidae are for the most part large insects with ample wings; they are distinguished from other Homoptera by the front thighs being thickened and toothed beneath. The broad head carries, in addition to the prominent compound eyes, three simple eyes (ocelli) on the crown, while the feeler consists of a stout basal segment, followed by five slender segments. The female, by means of her serrated ovipositor, lays her eggs in slits cut in the twigs of plants. The young have simple feelers and stout fore-legs (fig. 10) adapted for digging; they live underground and feed on the roots of plants-

From Marlatt, Bull 14 (N. S.), Div. Ent. V. S. Dept. Agr.

Fig. 10. — a. Nymph (4th stage) of Cicad, magnified; c, d, inner and outer faces of front leg, magnified — ; b, teeth on thigh, more highly magnified.

maxillae, and the foot in the fore and intermediate leg having but a single segment. The hinder abdominal segments in the male show a curious asymmetrical arrangement, the sixth segment bearing on its upper side a small stalked plate (strigil) of unknown function, furnished with rows of teeth. On account of the reduction and modification of the jaws in the Corixidae, C. Borner has lately suggested that they should form a special sub-order of Hcmiptera — the Sandaliorrhyncha.

After Howard, Year Book V. S. Dept. Agr., 1804-

Fig. 12. — Apple Scale Insect {Mytilaspis pomorum). a, Male; e, female; c, larva magnified — ; b, foot of male; d, feeler of larva, more highly magnified.

In the case of a North American species it is known that this larval life lasts for seventeen years. The ” song ” of the male cicads is notorious and the structures by which it is produced have already been described (see also Cicada). There are about 900 known species, but the family is mostly confined to warm countries ; only a single cicad is found in England, and that is restricted to the south. The Fulgoridae

and Membracidae are two allied families most of whose members are also natives of hot regions. The Fulgoridae

have the head with two ocelli and three-segmented feelers ; frequently as in the tropical ” lantern-flies ” (g.v.) the head is prolonged into a conspicuous bladder, or trunk-like process. The Membracidae arc remarkable on account of the backward prolongation of the pronotum

TERZI. —

Alter Howard, Year Book U.S. Dept. Agr., 1894.

Fig. 13. — Apple Scale Insect (Mytilaspis pomorum). a, Scale from beneath showing female and eggs; b, from above, magnified — ; c and e, female and male scales on twigs, natural size ; d, male scale magnified.

into a process or hood-like structure which may extend far behind the tail-end of the abdomen. Two other allied families, the Ccrcopidae and Jassidae, are more numerously represented in our islands. The young of many of these insects are green and soft-skinned, protecting themselves by the well-known frothy secretion that is called ” cuckoo-spit.”

In all the above- mentioned families of Homoptera there are three segments in each foot. The remaining four families have feet with only two seg- ments. They arc of very great zoological interest on account of the peculiarities of their life-history — par- thenogenesis being of normal occurrence

The families Psyllidae »r ” jumpers “) with eight or ten segments in the feeler and the Aleyrodidae (or ” snowy- flies “) distinguished by their white mealy wings, are of comparatively slight importance. The two families to which special attention has been paid are the Aphidae or plant-lice (” green fly “) and the Coccidae or sca’.e-insccts. The aphids (fig. 11) have feelers with seven or fewer distinct segments, and the fifth abdominal ,, ,. , segment usually carries a pair of tubular pro- Schiodie), Bull. 5 (N.S.), cesses through which a waxy secretion is dis- viv. Ent. U.S. Dcpi. charged. Th? sweet “honey-dew,” often Agr. sought as a food by ants, is secreted from the Fig. 15. — Pro- intestines of aphids. The peculiar life-cycle in boscis of Pediculus. which successive generations are produced Highly magnified, through the summer months by virgin females — the egg developing within the body of the mother — is de- scribed at length in the articles Aphides and Phylloxera. The Coccidae have only a single claw to the foot; the males (fig. 12 a) have the fore- wings developed and the hind-wings greatly reduced, while in the female wings are totally absent and the body undergoes marked degradation (figs. 12, e, 13, a, b). In the Coccids the forma-

Trom Osborn (after Dennv), Hull. 5 {N.S.), Div. Ent. U.S. Depl. Agr.

Fig. 14. — Louse (Pediculus veslimenti). .Magnified.

among

most of them.

tion of a protective waxy secretion — present in many genera of Homoptera — reaches its most extreme development. In some coccids — the ” mealy-bugs ” (Dactylopius, &c.) for example — the secretion forms a white thread-like or plate-like covering which the insect carries about. But in most members of the family, the secretion, united with cast cuticles and excrement, forms a firm ” scale,” closely attached by its edges to the surface of the plant on which the insect lives, and serving as a shield beneath which the female coccid, with her eggs (fig. 13 a) and brood, finds shelter. The male coccid passes through a passive stage (fig. 4) before attaining the perfect condition. Many scale-insects are among the most serious of pests, but various species have been utilized by man for the production of wax (lac) and red dye (cochineal). See Economic Entomology, Scale-Insect.

Anoplura

The Anoplura or lice (see Louse) arc wingless parasitic insects (fig. 14) forming an order distinct from the Hemiptcra, their sucking and piercing mouth-organs being apparently formed on quite a different plan from those of the Heteroptcra and Homoptera. In front of the head is a short tube armed with strong recurved hooks which can be fixed into the skin of the host, and from the tube an elongate more slender sucking-trufik can be protruded (fig. 15). Each foot is provided with a single strong claw which, opposed to a process on the shin, serves to grasp a hair of the host, all the lice being parasites on different mammals. Although G. Enderlein has recently shown that the jaws of the Hemiptera can be recognized in a reduced condition in connexion with the louse’s proboscis, the modification is so excessive that the group certainly deserves ordinal separation.

Bibliography.— A recent standard work on the morphology of the Hemiptera by R. Heymons (Nova Acta Acad. Leop. Carol. lxxiv. 3, 1899) contains numerous references to older literature. An excellent survey of the order is given by D. Sharp (Cambridge Nat. Hist. vol. vi., 1898). For internal structure of Heteroptera sec R. Dufour, Mem. savans etrangers (Paris, iv., 1833); OI Homoptera, E. Witlaczil (Arb. Zool. Inst. Wien, iv., 1882, Zeits. f. wiss. Zool. xliii., 1885). The development of Aphids has been dealt with by T. H. Huxley (Trans. Linn. Soc. xxii., 1858) and E. Witlaczil (Zeits. f. wiss. Zool. xl., 1884). Fossil Hemiptera are described by S. H. Scudder in K. Zittel’s Paleontologie (French translation, vol. ii. Paris, 1887, and English

edition, vol. i., London, 1900), and by A. Handlirsch (Verh. zool. hot. Gesell. Wien, lii., 1902). Among general systematic works on Heteroptera may be mentioned J. C. Sehiodte (Ann. Mag. Nat. Hist. (4) vi., 1870); C. Stal's Enumeratio Hemip- terorum. (K. Svensk. Vet. Akad. Handl. ix.-xiv., 1870-1876); L. Lethierry and G. Severin's Catalogue generate des hemipteres (Brussels 1893, &c); G. C. Champion's volumes in the Biologia Centrali- Americana; W. L. Distant's Oriental Cicadidae (London, 1889-1892), and many other papers; M. E. Fernald's Catalogue of the Coccidae (Amherst, U.S.A., 1903). European Hemiptera have been dealt with in numerous papers by A. Puton. For British species we have E. Saunders's Ilemiptera-Heteroptera of the British Isles (London, 1892); J. Edwards's Hemiptera-Homoptera of the British Isles (London, 1896); J. B. Buckton's British Aphidae (London, Ray Society, 1875-1882); and R. Newstead's British Coccidae (London, Ray Society, 1901-1903). Aquatic Hemiptera are described by L. C. Miall (Nat. History Aquatic Insects; London, 1895), and by G. W. Kirkajdy in numerous recent papers (Entomologist, &c). For marine Hemiptera (Halobates) see F. 6. White (Challenger Reports, vii., 1883); J. J. Walker (Ent. Mo. Mag., 1893); N. Nassonov (Warsaw, 1893), ar >d ˆ- H. Carpenter (Knowledge, 1901, and Report, Pearl Oyster Fisheries, Royal Society, 1906). Sound-producing organs of Heteroptera are described by A. Handlirsch (Ann. Hofmus. Wien, xv. 1900), and G. W. Kirkaldy (Journ. Quekelt Club (2) viii. 1901); of Cicads by G. Carlet (Ann. Sci. Nat. Zool. (6) v. 1877). For the Anoplura see E. Piaget's Pediculines (Leiden, 1880-1905), and G. Enderlein (Zool. Anz. xxviii., 1904). (G. H. C.)

HEMLOCK (in 0. Eng. hemlic or hymlice; no cognate is found in any other language, and the origin is unknown), the Coniuin maculatum of botanists, a biennial umbelliferous plant, found wild in many parts of Great Britain and Ireland, where it occurs in waste places on hedge-banks, and by the borders of fields, and also widely spread over Europe and temperate Asia, and naturalized in the cultivated districts of North and South America. It is an erect branching plant, growing from 3 to 6 ft. high, and emitting a disagreeable smell, like that of mice. The stems are hollow, smooth, somewhat glaucous green, spotted with dull dark purple, as alluded to in the specific name, maculatum. The root-leaves have long furrowed footstalks, sheathing the stem at the base, and are large, triangular in outline, and repeatedly divided or compound, the ultimate and very numerous segments being small, ovate, and deeply incised at the edge. These leaves generally perish after the growth of the flowering stem, which takes place in the second year, while the leaves

produced on the stem became gradually smaller upwards. The branches are all terminated by compound many-rayed umbels of small white flowers, the general involucres consisting of several, the partial ones of about three short lanceolate bracts, the latter being usually turned towards the outside of the umbel. The flowers are succeeded by broadly ovate fruits, the mericarps (half-fruits) having five ribs which, when mature, are waved or crenated; and when cut across the albumen is seen to be deeply furrowed on the inner face, so as to exhibit in section a reniform outline. The fruits when triturated with a solution of caustic potash evolve a most unpleasant odour.

Hemlock is a virulent poison, but it varies much in potency according to the conditions under which it has grown, and the season cr stage of growth at which it is gathered. In the first year the leaves have little power, nor in the second are their properties developed until the flowering period, at which time, or later on when the fruits are fully grown, the plant should be gathered. The wild plant growing in exposed situations i3 to be preferred to garden-grown samples, and is more potent in dry warm summers than in those which are dull and moist.

The poisonous property of hemlock resides chiefly in the alkaloid canine or conia which is found in both the fruits and the leaves, though in exceedingly small proportions in the latter. Conine resembles nicotine in its deleterious action, but is much less powerful. No chemical antidote for it is known. The plant also yields a second less poisonous crystallizable base called conhydrine, which may be converted into conine by the abstraction of the elements of water. When collected for medicinal purposes, for which both leaves and fruits are used, the former should be gathered at the time the plant is in full blossom, while the latter are said to possess the greatest degree of energy just before they ripen. The fruits are the chief source whence conine is prepared. The principal forms in which hemlock is employed are the extract and juice of hemlock, hemlock poultice, and the tincture of hemlock fruits. Large doses produce vertigo, nausea and paralysis; but in smaller quantities, administered by skilful hands, it has a sedative action on the nerves. It has also some reputation as an alterative and resolvent, and as an anodyne.

The acrid narcotic properties of the plant render it of some importance that one should be able to identify it, the more so as some of the

compound-leaved umbellifers, which have a general similarity of appearance to it, form wholesome food for man and animals. Not only is this knowledge desirable to prevent the poisonous plant being detrimentally used in place of the wholesome one; it is equally important in the opposite case, namely, to prevent the inert being substituted for the remedial agent. The plant with which hemlock is most likely to be confounded is AiUhriscus sylvestris, or cow-parsley, the leaves of which are freely eaten by cattle and rabbits; this plant, like the hemlock, has spotted stems but they are hairy, not hairless; it has much-divided leaves of the same general form, but the) are downy and aromatic, not smooth and nauseous when bruised; and the fruit of Anthriscus is linear-oblong and not ovate.

HEMP (in O. Eng. henep, cf . Dutch hennep, Ger. Hanf, cognate with Gr. Kavvapts, Lat. cannabis) , an annual herb (Cannabis sativa) having angular rough stems and alternate deeply lobed leaves. The bast fibres of Cannabis are the hemp of commerce, but, unfortunately, the products from many totally different plants are often included under the general name of hemp. In some cases the fibre is obtained from the stem, while in others it comes from the leaf. Sunn hemp, Manila hemp, Sisal hemp, and Phormium (New Zealand flax, which is neither flax nor hemp) are treated separately. All these, however, are often classed under the above general name, and so are the following: — Deccan or Ambari hemp, Hibiscus cannabinus, an Indian and East Indian malvaceous plant, the fibre from which is often known as brown hemp or Bombay hemp; Pite hemp, which is obtained from the American aloe, Agave americana; and Mctotva * > r bowstring-hemp, Sansevieria zeylanica, which, is obtained from an aloe-like plant, and is a native of India and

Ceylon. Then there are Canada hemp, Apocynum tannabinum, Kentucky hemp, Urtica cannabiua, and others.

The hemp plant, like the hop, which is of the same natural order, Cannabinaceae, is dioecious, i.e. the male and female flowers are borne on separate plants. The female plant grows to a greater height than the male, and its foliage is darker and more luxuriant, but the plant takes from five to six weeks longer to ripen. When the male plants are ripe they are pulled, put up into bundles, and steeped in a similar manner to flax, but the female plants are allowed to remain until the seed is perfectly ripe. They are then pulled, and after the seed has been removed are retted in the ordinary way. The seed is also a valuable product; the finest is kept for sowing, a large quantity is sold for the food of cage birds, while the remainder is sent to the oil mills to be crushed. The extracted oil is used in the manufacture of

soap, while the solid remains, known as oil-cake, are valuable as a food for cattle. The leaves of hemp have five to seven leaflets, the form of which is lanceolate-acuminate, with a serrate margin. The loose panicles of male flowers, and the short spikes of female flowers, arise from the axils of the upper leaves. The height of the plant varies greatly with season, soil and manuring; in some districts it varies from 3 to 8 ft., but in the Piedmont province it is not unusual to see them from 8 to 16 ft. in height, whilst a variety (Cannabis sctiva, variety gigantea) has produced specimens over 17 ft. in height.

All cultivated hemp belongs to the same species, Cannabis sativa; the special varieties such as Cannabis indica, Cannabis chinensis, &c, owe their differences to climate and soil, and they lose many of their peculiarities when cultivated in temperate regions. Rumphius (in the 17th century) had noticed these differences between Indian and European hemp.

Wild hemp still grows on the banks of the lower Ural, and the Volga, near the Caspian Sea. It extends to Persia, the Altai range and northern and western China. The authors of the Pharmacographia say: —" It is found in Kashmir and in the Himalaya, growing 10 to 12 ft. high, and thriving vigorously at an elevation of 6000 to 10,000 ft." Wild hemp is, however of very little use as a fibre producer, although a drug is obtained from it.

It would appear that the native country of the hemp plant is in some part of temperate Asia, probably near the Caspian Sea. It spread westward throughout Europe, and southward through the Indian peninsula.

The names given to the plant and to its products in different countries are of interest in connexion with the utilization of the fibre and resin. In Sans, it is called goni, sana, shanapu, banga and ganjika; in Bengali, ganga; Pers. bang and canna; Arab. kinnub or cannub; Gr. kannabis; Lat. cannabis; Ital. canappa; Fr. chanvre; Span, cdnamo; Portuguese, cdnamo; Russ. kondpel; Lettish and Lithuanian, kannapes; Slav, konopi; Erse, canaib and canab; A. Sax. hoenep; Dutch, hennep; Ger. Hanf; Eng. hemp; Danish and Norwegian, hamp; Icelandic, hampr; and in Swed. hampa. The English word canvas sufficiently reveals its derivation from cannabis.

Very little hemp is now grown in the British Isles, although this variety was considered to be of very good quality, and to possess great strength. The chief continental hemp-producing countries are Italy, Russia and France; it is also grown in several parts of Canada and the

United States and India. The Central Provinces, Bengal and Bombay are the chief centres of hemp cultivation in India, where the plant is of most use for narcotics. The satisfactory growth of hemp demands a light, rich and fertile soil, but, unlike most substances, it may be reared for a few years in succession. The time of sowing, the quantity of seed per acre (about three bushels) and the method of gathering and retting are very similar to those of flax; but, as a rule, it is a hardier plant than flax, does not possess the same pliability, is much coarser and more brittle, and does not require the same amount of attention during the first few weeks of its growth.

The very finest hemp, that grown in the province of Piedmont,

Italy, is, however, very similar to flax, and in many cases the two fibres are mixed in the same material. The hemp fibre has always been valuable for the rope industry, and it was at one time very extensively used in the production of yarns for the manufacture of sail cloth, sheeting, covers, bagging, sacking, &c. Much of the finer quality is still made into cloth, but almost all the coarser quality finds its way into ropes and similar material.

A large quantity of hemp cloth is still made for the British navy. The cloth, when finished, is cut up into lengths, made into bags and tarred. They are then used as coal sacks. There is also a quantity made into sacks which are intended to hold very heavy material. Hemp yarns are also used in certain classes of carpets, for special bags for use in cop dyeing and for similar special purposes, but for the ordinary bagging and sacking the employment of hemp yarns has been almost entirely supplanted by yarns made from the jute fibre.

Hemp is grown for three products — (1) the fibre of its stem; (2) the resinous secretion which is developed in hot countries upon its leaves and flowering heads ; (3) its oily seeds.

Hemp has been employed for its fibre from ancient times. Herodotus (iv. 74) mentions the wild and cultivated hemp of Scythia, and describes the hempen garments made by the Thracians as equal to linen in fineness. Hesychius says the Thracian women made sheets of hemp. Moschion (about 200 B.C.) records the use of hempen ropes for rigging the ship ” Syracusia ” built for Hiero II. The hemp plant has been cultivated in northern India from a considerable antiquity, not

only as a drug but for its fibre. The Anglo-Saxons were well acquainted with the mode of preparing hemp. Hempen cloth became common in central and southern Europe in the 13th century.

Hemp-resin. — Hemp as a drug or intoxicant for smoking and chewing occurs in the three forms of bhang, ganja and charas.

1. Bhang, the Hindustani siddhi or sabzi, consists of the dried leaves and small stalks of the hemp; a few fruits occur in it. It is of a dark brownish-green colour, and has a faint peculiar odour and but a slight taste. It is smoked with or without tobacco; or it is made into a sweetmeat with honey, sugar and aromatic spices; or it is powdered and infused in cold water, yielding a turbid drink, subdschi. Hashish is one of the Arabic names given to the Syrian and Turkish preparations of the resinous hemp leaves. One of the commonest of these preparations is made by heating the bhang with water and butter, the butter becoming thus charged with the resinous and active substances of the plant.

2. Ganja, the guaza of the London brokers, consists of the flowering and fruiting heads of the female plant. It is brownish- green, and otherwise resembles bhang, as in odour and taste. Some of the more esteemed kinds of hashish are prepared from this ganja. Ganja is met with in the Indian bazaars in dense bundles of 24 plants or heads apiece. The hashish in such extensive use in Central Asia is often seen in the bazaars of large cities in the form of cakes, 1 to 3 in. thick, 5 to 10 in. broad and 10 to 15 in. long.

3. Charas, or churrus, is the resin itself collected, as it exudes naturally from the plant, in different ways. The best sort is gathered by the hand like opium; sometimes the resinous exudation of the plant is made to stick first of all to cloths, or to the leather garments of men, or even to their skin, and is then removed by scraping, and afterwards consolidated by kneading, pressing and rolling. It contains about one-third or one-fourth its weight of the resin. But the churrus prepared by different methods and in different countries differs greatly in appearance and purity. Sometimes it takes the form of egg-like masses of greyish-brown colour, having when of high quality a shining resinous fracture. Often it occurs in the form of irregular friable lumps, like pieces of impure linseed oil-cake.

The medicinal and intoxicating properties of hemp have probably been known in Oriental countries from a very early period. An ancient Chinese herbal, part of which was written about the 5th century B.C., while the remainder is of still earlier

date, notices the seed and flower-bearing kinds of hemp. Other early writers refer to hemp as a remedy. The medicinal and dietetic use of hemp spread through India, Persia and Arabia in the early middle ages. The use of hemp (bhang) in India was noticed by Garcia d'Orta in 1563. Berlu in his Treasury of Drugs (1690) describes it as of " an infatuating quality and pernicious use." Attention was recalled to this drug, in consequence of Napoleon's Egyptian expedition, by de Sacy (1809) and Rouger (1810). Its modern medicinal use is chiefly due to trials by Dr O'Shaughnessy in Calcutta (1838-1842). The plant is grown partly and of ten mainly for the sake of its resin in Persia, northern India and Arabia, in many parts of Africa and in Brazil.

Pharmacology and Therapeutics. — The composition of this drug is still extremely obscure; partly, perhaps, because it varies so much in individual specimens. It appears to contain at least two alkaloids — cannabinine and tetano-cannabine — of which the former is volatile. The chief active principle may possibly be neither of these, but the substance cannabinon. There are also resins, a volatile oil and several other constituents. Cannabis indica — as the drug is termed in the pharmacopoeias — may be given as an extract (dose 3-1 gr.) or tincture (dose 5-15 minims) .

The drug has no external action. The effects of its absorption, whether it be swallowed or smoked, vary within wide limits in different individuals and races. So great is this variation as to be inexplicable except on the view that the nature and propor- tions of the active principles vary greatly in different specimens. But typically the ' drug in an intoxicant, resembling alcohol in many features of its action, but differing in others. The early symptoms are highly pleasurable, and it is for these, as in the case of other stimulants, that the drug is so largely consumed in the East. There is a subjective sensation of mental brilliance, but, as in other cases, this is not borne out by the objective results. It has been suggested that the incoordination of nervous action under the influence of Indian hemp may be due to independent and non-concerted action on the part of the two halves of the cerebrum. Following on a decided lowering of the pain and touch senses, which may even lead to complete loss of cutaneous sensation, there comes a sleep which is often accompanied by pleasant dreams. There appears to be no evidence in the case of either the lower animals or the human subject that the drug is an aphrodisiac. Excessive indulgence in cannabis indica is very rare, but may lead to general ill-health and occasionally to insanity. The apparent impossibility of obtaining pure and trustworthy samples of the drug has led to its entire abandon- ment in therapeutics. When a good sample is obtained it is a safe and efficient hypnotic, at any rate in the case of a European. The tincture

should not be prescribed unless precautions are taken to avoid the precipitation of the resin which follows its dilution with water.

See Watt, Dictionary of the Economic Products of India.
HEMSTERHUIS, FRANCOIS (1721-1790), Dutch writer on aesthetics and 'moral philosophy, son of Tiberius Hemsterhuis, was born at Franeker in Holland, on the 27th of December 17 21. He was educated at the university of Leiden, where he studied Plato. Failing to obtain a professorship, he entered the service of the state, and for many years acted as secretary to the state council of the United Provinces. He died at the Hague on the 7th of July 1790. Through his philosophical writings he became acquainted with many distinguished persons — Goethe, Herder, Princess Amalia of Gallitzin, and especially Jacobi, with whom he had much in common. Both were idealists, and their work* suffer from a similar lack of arrangement, although distinguished by elegance of form and refined sentiment. His most valuable contributions are in the department of aesthetics or the general analysis of feeling. His philosophy has been characterized as Socratic in content and Platonic in form. Its foundation was the desire for self-knowledge and truth, untrammelled by the rigid bonds of any particular system.

His most important works, all of which were written in French, are: Lettre sur la sculpture (1769), in which occurs the well-known definition of the Beautiful as " that which gives us the greatest number of

ideas in the shortest space of time"; its continuation, Lettre sur les desirs (1770) ; Lettre sur Vhomme et ses rapports (1772), in which the " moral organ " and the theory of knowledge are discussed; Sopyle (1778), a dialogue on the relation between the soul and the body, and also an attack on materialism; Aristee (1779), the " theodicy " of Hemsterhuis, discussing the existence of God and his relation to man; Simon (1787), on the four faculties of the soul, which are the will, the imagination, the moral principle (which is both passive and active); Alexis (1787), an attempt to prove that ;here are three golden ages, the last being the life beyond the grave ; Lettre surVathiisme (1787).

The best collected edition of his works is by P. S. Meijboom (1846-1850); see also S. A. Gronemann, F.' 'Hemsterhuis, de Nederlandische Wijsgeer (Utrecht, 1867) ; E. Grucker, Franqois Hemsterhuis , sa vie et ses osuvres (Paris, 1866); E. Meyer, Der Philosoph Franz

Hemsterhuis (Breslau, 1893), with bibliographical notice.

HEMSTERHUIS, TIBERIUS (1685-1766), Dutch philologist and critic, was born on the 9th of January 1685 at Groningen in Holland. His father, a learned physician, gave him so good an early education that, when he entered the university of his native town in his fifteenth year, he speedily proved himself to be the best student of mathematics. After a year or two at Groningen, he was attracted to the university of Leiden by the fame of Perizonius; and while there he was entrusted with the duty of arranging the manuscripts in the library. Though he accepted an appointment as professor of mathematics and philosophy at Amsterdam in his twentieth year, he had already directed his attention to the study of the ancient languages. In 1 706 he completed the edition of Pollux's Onomasticon begun by Lederlin; but the praise he received from his countrymen was more than counterbalanced by two letters of criticism from Bentley, which mortified him so keenly that for two months he refused to open a Greek book. In 1717 Hemsterhuis was appointed professor of Greek at Franeker, but he did not enter on his duties there till 1720. In 1738 he became professor of national history also. Two years afterwards he was called to teach the same subjects at Leiden, where he died on the 7th of April 1766. Hemsterhuis was the founder of a laborious and useful Dutch school of criticism, which had famous disciples in Yalckenaer, Lennep and Ruhnken.

His chief writings are the following: Luciani colloquia et Timon (1708); Aristophanis Plutus (1744); Notae, fife, ad Xenophonlem Ephesium in the Miscellanea critica of Amsterdam, vols. iii. and iv. ; Observationes ad Chrysostomi homilias; Orationes (1784); a Latin translation of the Birds of Aristophanes, in Kiister's edition; notes to Bernard's Thomas Magister, to Alberti's Hesychius, to Ernesti's Callimachus and to Burmann's Propertius. See Elogium T. Hemsterhusii (with Bentley's letters) by Ruhnken (1789), and Supplemcnta annotationis ad elogium T. Hemsterhusii, &c. (Leiden, 1874) ; also J. E. Sandys' Hist. Class. Scholarship, ii. (1908).

HEMY, CHARLES NAPIER (1841-), British painter, born at Newcastle-on-Tyne, was trained in the Newcastle school of art, in the Antwerp academy and in the studio of Baron Leys. He has produced some figure subjects and landscapes, but is best known by his admirable marine paintings. He was elected an associate of the Royal Academy in 1898, associate of the Royal Society of Painters in Water Colours in 1890 and member in 1897. Two of his paintings, " Pilchards " (1897) and " London River " (1904), are in the National Gallery of British Art.

HEN, a female bird, especially the female of the common fowl (q.v.) . The O. Eng. hem is thefeminine form of hdna, the male bird, a correlation of words which is represented in other Teutonic languages, cf. Ger. Hahn, Hemic, Dutch Itaan, hen, Swed. hane, hdnnc, &c. The O. Eng. name for the male bird has disappeared, its place being taken by ” cock,” a word probably of onomato- poeic origin, being from a base kuk- or kik-, seen also in ” chicken.” This word also appears in Fr. coq, and medieval Lat. coccus.

HENAULT, CHARLES JEAN FRANCOIS (1685-1770), French historian, was born in Paris on the 8th of P”ebruary 1685. His father, a farmer-general of taxes, was a man of literary tastes, and young Henault obtained a good education at the Jesuit college. Captivated by the eloquence of Massillon, in his fifteenth year he entered the Oratory with the view of becoming a preacher, but after two years’ residence he changed his intention, and, inheriting a position which secured him access to the most select society of Paris, he achieved distinction at an early period by his

gay, witty and graceful manners. His literary talent, mani- fested in the composition of various light poetical pieces, an opera, a tragedy {Cornelie vestale, 1710), &c, obtained his entrance to the Academy (1723). Petit-maUre as he was, he had also serious capacity, for he became councillor of the parlement of Paris (1705), and in 17 10 he was chosen president of the court of enquetes. After the death of the count de Rieux (son of the famous financier, Samuel Bernard) he became (1753) super- intendent of the household of Queen Marie Leszczynska, whose intimate friendship he had previously enjoyed. On his recovery in his eightieth year from a dangerous malady (1765) he pro- fessed to have undergone religious conversion and retired into private life, devoting the remainder of his days to study and devotion. His religion was, however, according to the marquis d’Argenson, ” exempt from fanaticism, persecution, bitterness and intrigue ”"; and it did not prevent him from continuing his friendship with Voltaire, to whom it is said he had formerly rendered the service of saving the manuscript of La Henriade, when its author was about to commit it to the flames. The literary work on which Henault bestowed his chief attention was the AbregS chronologique de Vhistoire de France, first published in 1744 without the author’s name. In the compass of two volumes he comprised the whole history of France from the earliest times to the death of Louis XIV. The work has no originality. Henault had kept his note-books of the history lectures at the Jesuit college, of which the substance was taken from Mezeray and P. Daniel. He revised them first in 1723, and later put them in the form of question and answer on the model of P. le Ragois, and by following Dubos and

Boulain- villiers and with the aid of the abbe Boudot he compiled his^4 brige. The research is all on the surface and is only borrowed. But the work had a prodigious success, and was translated into several languages, even into Chinese. This was due partly to Henault's popularity and position, partly to the agreeable style which made the history readable. He inserted, according to the fashion of the period, moral and political reflections, which are always brief and generally as fresh and pleasing as they are just. A few masterly strokes reproduced the leading features of each age and the characters of its illustrious men; accurate chronological tables set forth the most interesting events in the history of each sovereign and the names of the great men who flourished during his reign; and interspersed throughout the work are occasional chapters on the social and civil state of the country at the close of each era in its history. Continuations of the work have been made at separate periods by Fantin des Odoards, by Anguis with notes by Walckenaer, and by Michaud. He died at Paris on the 24th of November 1770.

Bibliography. — H6nault's Memoires have come down to us in two different versions, both claiming to be authentic. One was published in 1855 by M. du Vigan; the other was owned by the Comte de Coutades, who permitted Lucien Perey to give long extracts in his work on President H6nault (Paris, 1893). The memoirs are fragmentary and disconnected, but contain interesting anecdotes and details concerning persons of note. See the Correspondance of Grimm, of Madame du Deffand and of Voltaire; the notice by Walckenaer in the edition of the Abrege; Sainte-Beuve, Causeries du lundi, vol. xi.; and the Origines de V abrege, (Ann. Bulletin de la Societe de Vhistoire de France, 1901). Also H. Lion, Le President Henault (Paris, 1903).

HENBANE (Fr. jusquiaume, from the Gr. vocrKva/xos, or hog's-bean; Ital. giusquiamo; Ger. Schwarzes Bilsenkraut, Huhnertod, Saubohne and Zigcuner-Korn or " gipsies' corn "), the common name of the plant Hyoscyamus niger, a member of the natural order Solanaceae, indigenous to Britain, found' wild in waste places, on rubbish about villages and old castles, and cultivated for medicinal use in various counties in the south and east of England. It occurs also in central and southern Europe and in western Asia extending to India and Siberia, and has long been naturalized in the United States. There are two forms of the plant, an annual and a biennial, which spring indifferently from the same crop of seed — the one growing on during summer to a height of from 1 to 2 ft., and flowering and perfecting seed; the other producing the first season only a tuft of radical leaves, which disappear in winter, leaving under-

ground a thick fleshy root, from the crown of which arises in spring a branched flowering stem, usually much taller and more Vigorous than the flowering stems of the annual plants. The Diennial form is that which is considered officinal. The radical ieaves of this biennial plant spread out flat on all sides from the crown of the root; they are ovate-oblong, acute, stalked, and more or less incisely-toothed, of a greyish-green colour, and covered with viscid hairs; these leaves perish at the approach of winter. The flowering stem pushes up from the root-crown in spring, ultimately reaching from 3 to 4 ft. in height, and as it grows becoming branched, and furnished with alternate sessile leaves, which are stem-clasping, oblong, unequally-lobed, clothed with glandular clammy hairs, and of a dull grey-green, the whole plant having a powerful nauseous odour. The flowers are shortly- stalked, the lower ones growing in the fork of the branches, the upper ones sessile in one-sided leafy spikes which are rolled back at the top before flowering, the leaves becoming smaller upwards and taking the place of bracts. The flowers have an urn-shaped calyx which persists around the fruit and is strongly veined, with five stiff, broad, almost prickly lobes; these, when the soft matter is removed by maceration, form very elegant specimens when associated with leaves prepared in a similar way. The corollas are obliquely funnel-shaped, of a dirty yellow or buff, marked with a close reticulation of purple veins. The capsule opens transversely by a convex lid and contains numerous seeds. Both the leaves and the seeds are employed in pharmacy. The Mahommedan doctors of India are accustomed to prescribe the seeds. Henbane yields a poisonous alkaloid, hyoscyamine, which is stated to have properties almost identical with those of atropine, from which it differs in being more soluble in water. It is usually obtained in an amorphous, scarcely ever in a crystalline state. Its properties have been investigated in Germany by T. Husemann, Schroff, Hohn, &c. Hohn finds its chemical composition expressed by CisHsNiOs. (Compare Hellmann, BeitrUge zur Kenntnis der physiolog. IVirkitng des Hyoscyamins, &c, Jena, 1874.) In small and repeated doses henbane has been found to have a tranquillizing effect upon persons affected by severe nervous irritability. In poisonous doses it causes loss of speech, distortion and paralysis. In the form of extract or tincture it is a valuable remedy in the hands of a medical man, either as an anodyne, a hypnotic or a sedative. The extract of henbane is rich in nitrate of potassium and other inorganic salts. The smoking of the seeds and capsules of henbane is noted in books as a somewhat dangerous remedy adopted by country people for toothache.

Accidental poisoning from henbane occasionally occurs, owing sometimes to the apparent edibility and whole- someness of the root.

See Bentley and Trumen, Medicinal Plants, 194 (1880).

HENCHMAN, originally, probably, one who attended on a horse, a groom, and hence, like groom (q.v.), a title of a sub- ordinate official in royal or noble households. The first part of the word is the O. Eng. hengest, a horse, a word which occurs in many Teutonic languages, cf. Ger. and Dutch hengst. The word appears in the name, Hengest, of the Saxon chieftain (see Hengest and Horsa) and still survives in English in place and other names beginning with Hingst- or Hinx-. Hefichmen, pages of honour or squires, rode or walked at the side of their master in processions and the like, and appear in the English royal household from the 14th century till Elizabeth abolished the royal henchmen, known also as the ” children of honour.” The word was obsolete in English from the middle of the 17th century, and seems to have been revived through Sir Walter Scott, who took the word and its derivation, according to the New English Dictionary, from Edward Burt’s Letters from a Gentleman in the North of Scotland, together with its erroneous derivation from ” haunch.” The word is, in this sense, used as synonymous with ” gillie,” the faithful personal follower of a Highland chieftain, the man who stands at his master’s “haunch,” ready for any emergency. It is this sense that usually survives in modern usage of the word, where it is often used of an out-and- out adherent or partisan, ready to do anything.

HENDERSON, ALEXANDER (1583-1646), Scottish ecclesi- astic, was born in 1583 at Criech, Fifeshire. He graduated at the university of St Andrews in 1603, and in 1610 was appointed professor of rhetoric and philosophy and questor of the faculty of arts. Shortly after this he was presented to the living of Leuchars. As Henderson was lorcid upon his parish by Arch- bishop George Gladstanes, and was known to sympathize with episcopacy, his settlement was at first extremely unpopular; but he subsequently changed his views and became a Presby- terian in doctrine and church government, and one of the most esteemed ministers in Scotland. He early made his mark as a church leader, and took an active part in petitioning against the ” five acts ” and later against the introduction of a service-book and canons drawn up on the model of the English prayer-book. On the 1st of March 1638 the public signing of the ” National Covenant ” began m Greyfriars Church, Edinburgh. Henderson was mainly responsible for the final form of this document, which consisted of (1) the ” king’s confession ” drawn up in 1581 by John Craig, (2) a recital of the acts of parliament against ■” superstitious and papistical rites,” and (3) an

elaborate oath to maintain the true reformed religion. Owing to the skill shown on this occasion he seems to have been applied to when any manifesto of unusual ability was required. In July of the same year he proceeded to the north to debate on the ” Covenant ” with the famous Aberdeen doctors ; but he was not well received by them. ” The voyd church was made fast, and the keys keeped by the magistrate,” says Baillie. Henderson’s next public opportunity was in the famous Assembly which met in Glasgow on the 21st of November 1638. He was chosen moderator by acclamation, being, as Baillie says, ” incomparablie the ablest man of us all for all things.” James Hamilton, 3rd marquess of Hamilton, was the king’s commissioner; and when the Assembly insisted on proceeding with the. trial of the bishops, he formally dissolved the meeting under pain of treason. Acting on the constitutional principle that the king’s right to convene did not interfere with the church’s independent right to hold assemblies, they sat till the 20th of December, deposed all the Scottish bishops, excommunicated a number of them, repealed all acts favouring episcopacy, and reconstituted the Scottish Kirk on thorough Presbyterian principles. During the sitting of f his Assembly it was carried by a majority of seventy-five vote’s that Henderson should be transferred to Edinburgh. He had been at Leuchars for about twenty-three years, and was extremely reluctant to leave it.

While Scotland and England were preparing for the ” First Bishops’ War,” Henderson drew up two papers, entitled respec- tively The Remonstrance of the Nobility and Instructions for Defensvde Arms. The first of these documents he published himself; the second was published against his wish by John Corbet (1603-1641), a deposed minister. The ” First Bishops’ War ” did not last long. At the Pacification of Birks the king virtually granted’ all the demands of the Scots. In the negotia- tions for peace Henderson was one of the Scottish commissioners, and made a very favourable impression on the king. In 1640 Henderson was elected by the town council rector of Edinburgh University— an office to which he was annually re-elected till his death. The Pacification of Birks had been wrung from the king; and the Scots, seeing that he was preparing for the ” Second Bishops’ War,” took the initiative, and pressed into England so vigorously that Charles had again to yield everything. The maturing of the treaty of peace took a considerable time, . and Henderson was again active in the negotiations, first at Ripon (October 1st) and afterwards in London. While he was in London he had a personal interview with the king, with the view of obtaining assistance for the Scottish universities from the’ money formerly applied to the support of the bishops. On Henderson’s return to Edinburgh in July 1641 the Assembly was

sitting at St Andrews. To suit the convenience of the parliament, however, it removed to Edinburgh; Henderson was elected moderator of the Edinburgh meeting. In this Assembly he proposed that ” a confession of faith, a catechism, a directory for all the parts of the public worship, and a platform

of government, wherein possibly England and we might agree,” I should be drawn up. This was unanimously approved of, and the laborious undertaking was left in Henderson’s hands; but the ” notable motion ” did not lead to any immediate results. During Charles’s second state-visit to Scotland, in the autumn of 1641, Henderson acted as his chaplain, and managed to get the funds, formerly belonging to the bishopric of Edinburgh, applied to the metropolitan university. In 1642 Henderson, whose policy was to keep Scotland neutral in the war which had now broken out between the king and the parliament, was engaged in corresponding with England on ecclesiastical topics; and, shortly afterwards, he was sent to Oxford to mediate between the king and his parliament; but his mission proved a failure.

A memorable meeting of the General Assembly was held in August 1643. Henderson was elected moderator for the third time. He presented a draft of the famous ” Solemn League and Covenant,” which was received with great enthusiasm. Unlike the ” National Covenant ” of 1638, which applied to Scotland only, this document was common to the two kingdoms. Henderson, Baillie, Rutherford and others were sent up to London to represent Scotland in the Assembly at Westminster. The ” Solemn League and Covenant,” which pledged both countries to the extirpation of prelacy, leaving further decision as to church government to be decided by the ” example of the best reformed churches,” after undergoing some slight alterations, passed the two Houses of Parliament and the Westminster Assembly, and thus became law for the two kingdoms. By means of it Henderson has had considerable influence on the history of Great Britain. As Scottish commissioner to the Westminster Assembly, he was in England from August 1643 till August 1646; his principal work was the drafting of the directory for public worship. Early in 1645 Henderson was sent to Uxbridge to aid the commissioners of the two parliaments in negotiating with the king; but nothing came of the conference. In 1646 the king joined the Scottish army; and, after retiring with them to Newcastle, he sent for Henderson, and discussed with him the two systems of church government in a number of papers. Meanwhile

Henderson was failing in health. He sailed to Scotland, and eight days after his arrival died, on the 19th of August 1646. He was buried in Greyfriars churchyard, Edinburgh; and his death was the occasion of national mourning in Scotland. On the 7th of August Baillie had written that he had heard that Henderson was dying ” most of heartbreak.” A document was published in London purporting to be a “Declara- tion of Mr Alexander Henderson made upon his Death-bed “; and, although this paper was disowned, denounced and shown to be false in the General Assembly of August 1648, the document was used by Clarendon as giving the impression that Henderson had recanted. Its foundation was probably certain expressions lamenting Scottish interference in English affairs.

Henderson is one of the greatest men in the history of Scotland and, next to Knox, is certainly the most famous of Scottish ecclesiastics. He had great political genius; and his statesman- ship was so influential that ” he was,” as Masson well observes, ”’ a cabinet minister without office.” He has made a deep mark on the history, not only of Scotland, but of England; and the existing Presbyterian churches in Scotland are largely indebted to him for the forms of their dogmas and their ecclesiastical organization. He is thus justly considered the second founder of the Reformed Church in Scotland.

See M’Crie’s Life of Alexander Henderson (1846) ; Alton’s Life and Times of Alexander Henderson (1836); The Letters and Journals of Robert Baillie (1841-1842) (an exceedingly valuable work, from an historical point of view); J. H. Burton’s History of Scotland; D, Masson’s Life of Drummond of Hatvthornden; and, above all, Masson’s Life of Milton; Andrew Lang, Hist, of Scotland (1907), vol. iii. Henderson’s own works are chiefly contributions to current controversies, speeches and sermons. (T. Gl. ; D. Mn.)

HENDERSON, EBENEZER (1784-1858), a Scottish divine, was born at the Linn near Dunfermline on the 17th of November 1784, and died at Mortlake on the 17th of May 1858. He was the youngest son of an agricultural labourer, and aftef three years’

schooling spent some time at watchmaking and as a shoemaker’s apprentice. In 1803 he joined Robert Haldane’s theological seminary, and in 1805 was selected to accompany the Rev. John Paterson to India; but as the East India Company would not allow British vessels to convey missionaries to India, Henderson and his colleague went to Denmark to await the chance of a passage to Serampur, then a Danish port. Being unexpectedly delayed, and having begun to preach in Copenhagen, they ultimately decided to settle in Denmark, and in

1806 Henderson became pastor at Elsinore. From this time till about 1817 he was engaged in encouraging the distribution of Bibles in the Scandinavian countries, and in the course of his labours he visited Sweden and Lapland (1807-1808), Iceland (1814-1815) andthe mainland of Denmark and part of Germany (1816). During most of this time he was an agent of the British and Foreign Bible Society. On the 6th of October 181 1 he formed the first Congregational church in Sweden. In 1818, after a visit to England, he travelled in company with Paterson through Russia as far south as Tiflis, but, instead Of settling as was proposed at Astrakhan, he retraced his steps, having resigned his connexion with the Bible Society owing to his disapproval of a translation of the Scriptures, which had been made in Turkish. In 1822 he was invited by Prince Alexander (Galitzin) to assist the Russian Bible Society in translating the Scriptures into various languages spoken in the Russian empire. After twenty years of foreign labour Henderson returned to England, and in 182 5 was appointed tutor of the Mission College, Gosport. In 1830 he succeeded Dr William Harrison as theological lecturer and professor of Oriental languages in Highbury Congregational College. In 1850, on the amalgamation of the colleges of Homerton, Coward and Highbury, he retired on a pension. In 1852-1853 he was pastor of Sheen Vale chapel at Mortlake. His last work was a translation of the book of Ezekiel. Henderson was a man of great linguistic attain- ment. He made himself more or less acquainted, not only with the ordinary languages of scholarly accomplishment and the various members of the Scandinavian group, but also with Hebrew, Syriac, Ethiopic, Russian, Arabic, Tatar, Persian, Turkish, Armenian, Manchu, Mongolian and Coptic. He organized the first Bible Society in Denmark (1814), and paved the way for several others. In 1817 he was nominated by the Scandinavian Literary Society a corresponding member; and in 1840 he was made D.D. by the university of Copenhagen. He was honorary secretary for life of the Religious Tract Society, and one of the first promoters of the British Society for the Propagation of the Gospel among the Jews. The records of his travels in Iceland (1818) were valuable contributions to our knowledge of that island, His other principal works are: Iceland, or the Journal of a Residence in that Island (2 vols., 1818); Biblical Researches and Travels in Russia (1&26) ; Elements of Biblical Criticism and Interpretation (1830); The Vaudois, a Tour of the Valleys of Piedmont (1845).

See Memoirs of Ebenezer Henderson, by Thulia S. Henderson (his daughter) (London, 1859); Congregational Year Book (1859).

HENDERSON, GEORGE FRANCIS ROBERT (1854-1903), British soldier and military writer, was born in Jersey in 1854. Educated at

Leeds Grammar School, of which his father, after- wards Dean of Carlisle, was headmaster, he was early attracted to the study of history, and obtained a scholarship at St John's College, Oxford. But he soon left the University for Sandhurst, whence he obtained his first commission in 1878. One year later, after a few months' service in India, he was promoted lieutenant ' and returned to England, and in 1882 he went On : active service with his regiment, the York and Lancaster (65th/ 84th) to Egypt. He was present at Tell-el-Mahuta and Kassassin, and at Tell-el-Kebir was the first man of his regiment to enter the enemy's wOrks. His conduct attracted the notice of Sir Garnet (afterwards Lord) Wolseley, and he received the 5th class of the Medjidieh order. His name was, further, noted for a brevet-majority, which he did not receive till he became captain in 1886. During these years he had been quietly studying military art and history at Gibraltar, in Bermuda and in Nova Scotia, in spite of the difficulties of research, and in 1889 appeared

(anonymously) his first work, The Campaign of Fredericksburg. In the same year he became Instructor in Tactics, Military Law and Administration at Sandhurst. From this post he proceeded as Professor of Military Art and History to the Staff College (1892-1899), and there exercised a profound influence on the younger generation of officers. His study on Spicheren had been begun some years before, and in 1898 appeared, as the result of eight years' work, his masterpiece, Stonewall Jackson and the American Civil War. In the South African War Lieutenant- Colonel Henderson served with distinction on the staff of Lord Roberts as Director of Intelligence. But overwork and malaria broke his health, and he had to return home, being eventually selected to write the official history of the war. But failing health obliged him to go to Egypt, where he died at Assuan on the 5th of March 1903. He had completed the portion of the history of the South African War dealing with the events up to the commencement of hostilities, amounting to about a volume, but the War Office decided to suppress this, and the work was begun de novo and carried out by Sir F. Maurice.

Various lectures and papers by Henderson were collected and published in 1905 by Captain Malcolm, D.S.O., under the title The Science of War ; to this collection a memoir was contributed by Lord Roberts. See also Journal of the Royal United Service Institution, vol. xlvii. No. 302.

HENDERSON, JOHN (1 747-1 785), English actor, of Scottish descent, was born in London. He made his first appearance on the stage at Bath on the 6th of October 1772 as Hamlet. His success in this and other Shakespearian parts led to his being called the ” Bath Roscius.” He had great difficulty in getting a London engagement, but finally appeared at the Haymarket in 1777 as Shylock, and his success was a source of considerable profit to Colman, the manager. Sheridan then engaged him to play at Drury Lane, where he remained for two years. When the companies joined forces he went to Covent Garden, appearing as Richard III, in 1778, and creating original parts in many of the plays of Cumberland, Shirley, Jephson and others. His last appearance was in 1785 as Horatius in The Roman Father, and he died on the 25th of November of that year and was buried in Westminster Abbey. Garrick was very jealous of Henderson, and the latter’s power of mimicry separated him also from Colman, but he was always gratefully remembered by Mrs. Siddons and others of his profession whom he had encouraged. He was a close friend of Gainsborough, who painted his portrait, as did also Stewart and Romney. He was co-author of Sheridan and Henderson’s Practical Method of Reading and Writing English Poetry.

HENDERSON, a city and the county-seat of Henderson county, Kentucky, U.S.A., on the S. bank of the Ohio river, about 142 m. W.S.W. of Louisville. Pop. (1890), 8835; (1900), 10,272, of whom 4029 were negroes; (1910 census) 11,452. It is served by the Illinois Central, the Louisville & Nashville, and the Louisville, Henderson & St. Louis railways, and has direct communication by steamboat with Louisville, Evansville, Cairo, Memphis and New Orleans. Henderson is built on the high bank of the river, above the flood level; the river is spanned here by a fine steel bridge, designed by George W. G. Ferris (1859-1896), the designer of the Ferris Wheel. The city has a public park of 80 acres and a Carnegie library. It is situated in the midst of a region whose soil is said to be the best in the world for the raising of dark, heavy-fibred tobacco, and is well adapted also for the growing of fruit, wheat and Indian corn. Bituminous coal is obtained from the surrounding country. Immense quantities of stemmed tobacco are shipped from here, and the city is an important market for Indian corn. The manufactures of the city include cotton and woollen goods, hominy, meal, flour, tobacco and cigars, carriages, baskets, chairs and other furniture, bricks, ice, whisky and beer; the value of the city’s factory products in 1905 was $1,365,120. The municipality owns and operates its water works, gas plant and electric-lighting plant. Henderson, named in honour of Richard Henderson (1734-1785), was settled as early as 1784, was first known as Red Banks, was laid out as

a town by Hender- son's company in 1797, was incorporated as a town in 1810, and

was first chartered as a city in 1854. The city boundary lines were extended in 1905 by the annexation of Audubon and Edgewood. Henderson was for some time the home of John James Audubon, the ornithologist.

HENDIADYS, the name adopted from the Gr. tv bia Svolv (" one by means of two ") for a rhetorical figure, in which two words connected by a copulative conjunction are used of a single idea; usually the figure takes the form of two substantives instead of a substantive and adjective, as in the classical example paleris libamus et auro (Virgil, Georgics, ii. 192), " we pour libations in cups and gold " for " cups of gold."

HENDON, an urban district in the Harrow parliamentary division of Middlesex, England, on the river Brent, 8 m. N.W. of St Paul's Cathedral, London, served by the Midland railway. Pop. (1891), 15,843; (1901), 22,450. The nucleus of the township lies on high ground to the east of the Edgware road, which crosses the Welsh Harp reservoir of Regent's Canal, a favourite fishing and skating resort. The church of St Mary is mainly Per- pendicular, and contains a Norman font and monuments of the 1 8th century. To the north of the village, which has extended greatly as a residential suburb of the metropolis, is Mill Hill, with a Roman Catholic Missionary College, opened in 1871, with branches at Rosendaal, Holland and Brixen, Austria, and a preparatory school at Freshfield near Liverpool; and a large grammar school founded by Nonconformists in 1807. The manor belonged at an early date to the abbot of Westminster.

HENDRICKS, THOMAS ANDREWS (1810-1885), American political leader, vice-president of the United States in 1885, was born near Zanesville, Ohio, on the 7th of September 1819. He graduated at Hanover College, Hanover, Indiana, in 1841, and began in 1843 a successful career at the bar. Identifying himself with the Democratic party, he served in the state House of Representatives in 1848, and was a prominent member of the convention for the revision of the state constitution in 1850-1851, a representative in Congress (1851-1855), commissioner of the United States General Land Office (1855-1859), a United States senator (1863-1869), and governor of Indiana (1873-1877). From 1868 until his death he was put forward for nomination for the presidency at every national Democratic Convention save in 1872. Both in 1876 and 1884, after his failure to receive the nomination for the presidency, he was nominated by the

Demo- cratic National Convention for vice-president, his nomination in each of these conventions being made partly, it seems, with the hope of gaining “greenback” votes — Hendricks had opposed the immediate resumption of specie payments. In 1876, with S. J.- Tilden, he lost the disputed election by the decision of the electoral commission, but he was elected with Grover Cleveland in 1884. He died at Indianapolis on the 25th of November 1885.

HENGELO, or Hengeloo, a town in the province of Overyssel, Holland, and a junction station 5 m. by rail N.W. of Enschede. Pop. (1900), 14,968. The castle belonging to the ancient terri- torial lords of Hengelo has long since disappeared, and the only interest the town now possesses is as the centre of the flourishing industries of the Twente district. The manufacture of cotton in all its branches is very actively carried on, and there are dye-works and breweries, besides the engineering works of the state railway company.

HENGEST and HORSA, the brother chieftains who led the first Saxon bands which settled in England. They were apparently called in by the British king Vortigern (q.v.)to defend him against the Picts. The place of their landing is said to have been Ebbsfleet in Kent. Its date is not certainly known, 450-455 being given by the English authorities, 428 by the Welsh (see Kent). The settlers of Kent are described by Bede as Jutes (q.v.), and there are traces in Kentish custom of differences from the other Anglo-Saxon kingdoms. Hengest and Horsa were at first given the island of Thanet as a home, but soon’ quarrelled with their British allies, and gradually possessed themselves of what became the kingdom of Kent. In 455 the Saxon. Chronicle records a battle between Hengest and Horsa I and Vortigern at a place called Aegaels threp, in which Horsa

was slain. Thenceforward Hengest reigned in Kent, together with his son Aesc (Oisc). Both the Saxon Chronicle and the Historia Briltonum record three subsequent battles, though the two authorities disagree as to their issue. There is no doubt, however, that the net result was the expulsion of the Britons from Kent. According to the Chronicle, which probably derived its information from a lost list of Kentish kings, Hengest died in 488, while his son Aesc continued to reign until 512.

Bede, Hist. Eccl. (Plummer, 1896), i. 15, ii. 5; Saxon Chronicle (Earle and Plummer, 1899), s.a. 449, 455, 457, 465, 473; Nennius, Historia

Brittonum (San Marte, 1844), §§ 31, 37, 38, 43-46, 58.

HENGSTENBERG, ERNST WILHELM (1802-1869), German Lutheran divine and theologian, was born at Frondenberg, a Westphalian village, on the 20th of October 1802. He was educated by his father, who was a minister of the Reformed Church, and head of the Frondenberg convent of canonesses (Frauleinstift). Entering the university of Bonn in 1819, he attended the lectures of G. G. Freytag for Oriental languages and of F. K. L. Gieseler for church history, but his energies were principally devoted to philosophy and philology, and his earliest publication was an edition of the Arabic Moallakat of Amru'l- Qais, which gained for him the prize at his graduation in the philosophical faculty. This was followed in 1824 by a German translation of Aristotle's Metaphysics. Finding himself without the means to complete his theological studies under Neander and Tholuck in Berlin, he accepted a post at Basel as tutor in Oriental languages to J. J. Stahelin, who afterwards became professor at the university. Then it was that he began to direct his attention to a study of the Bible, which led him to a conviction, never afterwards shaken, not only of the divine character of evangelical religion, but also of the unapproachable adequacy of its expression in the Augsburg Confession. In 1824 he joined the philosophical faculty of Berlin as a Privatdozent, and in 1825 he became a licentiate in theology, his theses being remark- able for their evangelical fervour and for their emphatic protest against every form of " rationalism," especially in questions of Old Testament criticism. In 1826 he became professor extra- ordinarius in theology; and in July 1827 appeared, under his editorship, the Evangelische Kirchenzeitung, a strictly orthodox journal, which in his hands acquired an almost unique reputation as a controversial organ. It did not, however, attain to great notoriety until in 1830 an anonymous article (by E. L. von Gerlach) appeared, which openly charged Wilhelm Gesenius and J. A. L. Wegscheider with infidelity and profanity, and on the ground of these accusations advocated the interposition of the civil power, thus giving rise to the prolonged Hallische Streit. In 1828 the first volume of Hengstenberg's Christologie des Allen Testaments passed through the press; in the autumn of that year he became professor ordinarius in theology, and in 1829 doctor of theology. He died on the 28th of May 1869.

The following is a list of his principal works: Christologie des Alten Testaments (1829-1835; 2nd ed., 1854-1857; Eng. trans, by

R. Keith, 1835-1839, also in Clark's " Foreign Theological Library by T. Meyer and J. Martin, 1854ˆ-1858), a work of much learning, the estimate of which varies according to the hermeneutical principles of

the individual critic ; Beitrdge zur Einleitung in das Alte Testament (1831-1839) ; Eng. trans., Dissertations on the Genuineness of Daniel and the Integrity of Zechariah (Edin., 1848), and Dissertations on the Genuineness of the Pentateuch (Edin., 1847), in which the traditional view on each question is strongly upheld, and much capital is made of the absence of, harmony among the negative critics; Die Biicher Moses und Agypten (1841); Die Geschichte Bileams u. seiner Weissagungen (1842; translated along with the Dissertations on Daniel and Zechariah) ; Commentar uber die Psalmen (1842-1847; 2nd ed., 1849-1852; Eng. trans, by P. Fairbairn and J. Thomson, Edin., 1844-1848), which shares the merits and defects of the Christologie; Die Ojfenbarung Johannis erldutert (1849-1851; 2nd ed., 1861-1862; Eng. trans, by P. Fairbairn, also in Clark's "Foreign Theological Library," 1851-1852); Das Hohe Lied ausgelegt (1853); Der Prediger Salomo ausgelegt (1859); Das Evangelium Johannis erldutert (1861-1863; 2nd ed., 1867-1871 ; Eng. trans., 1865) and Die Weissagungen des Propheten Ezechiel erldutert (1867-1868). Of minor importance are De rebus Tyriorum commentatio academica (1832) ; Uber den Tag des Herrn (1852) ; Das Passa, ein Vortrag (1853) ; and Die Opfer der heiligen Schrift (1859). Several series of papers also, as, for example, on " The Retention of the Apocrypha," " Freemasonry " (1854), " Duelling " (1856) and

" The Relation between the Jews and the Christian Church " (1857 ; 2nd ed., 1859), which originally appeared in the Kirchenzeitung, were afterwards printed in a separate form. Geschichte des Reiches Gottes unter dem Alten Bunde (1869-1871), Das Buch Hiob erldutert (1870-1875) and Vorlesungen iiber die LeAdtnsgeschichte (1875) were published posthumously.

See J. Bachmann's Ernst Wilhelm Hengstenberg (1876-1879); also his article in Herzog-Hauck, Rea.lencyklopM.ie (1899), and the article in the Allgemeine deutsche Biographie. Also F. Lichtenberger, History of German Theology in the Nineteenth Century (1889), pp. 212-217; Philip Schaff, Germany; its Universities, Theology and Religion (1857), pp. 300-319.

HENKE, HEINRICH PHILIPP KONRAD (1752-1809), German theologian, best known as a writer on church history, was born at Hehlen, Brunswick, on the 3rd of July 1752. He was educated at the gymnasium of Brunswick and the university of Helmstadt, and from 1778 to 1809 he was professor, first of philosophy, then of theology, in that university. In 1803 he was appointed principal of the Carolinum in Brunswick as well. He died on the 2nd of May 1809. Henke belonged to the rationalistic school. His principal work

{Allgemeine Geschichte der christl. Kirche, 6 vols., 1 788-1804; 2nd ed., 1795-1806) is commended by F. C. Baur for fullness, accuracy and artistic composition. His other works are Lineamenta institutionum fidei Christianae historico-criticarum (1783), Opuscula academica (1802) and two volumes of Predigten. He was also editor of the Magazin jilr die Religionsphilosophie, Exegese und Kirchen-geschichte (1 793-1802) and the Archiv Jilr die neueste Kirchen-geschichte (1794-1799).

His son, Ernst Ludwig Theodor Henke (1804-1872), after Studying at the university of Jena, became professor extra- ordinarius there in 1833, and professor ordinarius of Marburg in 1839. He is known as the author of monographs upon Georg Calixt u. seine Zeit (1853-1860), Papst Pius VII. (i860), Konrad von Marburg (186 1), Kaspar Peucer u. Nik. Krell (1865), Jak. Friedr. Fries (1867), Zur neuern Kirchengeschichte

(1867).

HENLE, FRIEDRICH GUSTAV JAKOB (1809 – 1885), German pathologist and anatomist, was born on the 9th of July 1809 at Fiirth, in Franconia. After studying medicine at Heidelberg and at Bonn, where he took his doctor's degree in 1832, he became prosector in anatomy to Johannes Miiller at Berlin. During the six years he spent in that position he pub- lished a large amount of work, including three anatomical monographs on new species of animals, and papers on the structure of the lacteal system, the distribution of epithelium in the human body, the structure and development of the hair, the formation of mucus and pus, &c. In 1840 he accepted the chair of anatomy at Zurich, and in 1844 he was called to Heidel- berg, where he taught not only anatomy, but physiology and pathology. About this period he was engaged on his complete system of general anatomy, which formed the sixth volume of the new edition of S. T. von Sommerring's treatise, published at Leipzig between 1841 and '844. While ac Heidelberg he published a zoological monograph on the sharks and rays, in conjunction with his master M tiller, and in 1846 his famous Manual of Rational Pathology began to appear; this marked the beginning of a new era in pathological study, since in it physiology and pathology were treated, in Henle's own words, as " branches of one science," and the facts of disease were systematically considered with reference to their physiological relations. In 1852 he moved to Gottingen, whence he issued three years later the first instalment of his great Handbook of Systematic Human Anatomy, the last volume of which was. not published till 1873. This work was perhaps the most complete and comprehensive of its kind that had so far appeared, and

it was remarkable not only for the fullness and minuteness oi the anatomical descriptions, but also for the number and ex- cellence of the illustrations with which they were elucidated. During the latter half of his life Henle's researches were mainly histological in character, his investigations embracing the minute anatomy of the blood vessels, serous membranes, kidney, eye, nails, central nervous system, &c. He died at G6ttingen on the 13th of May 1885.

HENLEY, JOHN (1692-1759), English clergyman, commonly known as ',' Orator Henley," was born on the 3rd of August 1692 at Melton-Mowbray, where his father was vicar. After attending the grammar schools of Melton and Oakham, he entered St John's College, Cambridge, and while still an under- graduate he addressed in February 1712, under the pseudonym of Peter de Quir, a letter to the Spectator displaying no small wit and humour. After graduating B.A., he became assistant and then headmaster of the grammar school of his native town, uniting to these duties those of assistant curate. His abundant energy found still further expression in a poem entitled Esther, Queen of Persia (1714), and in the compilation of a grammar of ten languages entitled The Complete Linguist (2 vols., London, 1719-1721). He then decided to go to London, where he obtained the appointment of assistant preacher in the chapels of Ormond Street and Bloomsbury. In 1723 he was presented to the rectory of Chelmondiston in Suffolk; but residence being insisted on, he resigned both his appointments, and on the 3rd of July 1726 opened what he called an " oratory " in Newport Market, which he licensed under the Toleration Act. In 1729 he transferred the scene of his operations to Lincoln's Inn Fields. Into his services he introduced many peculiar alterations: he drew up a " Primitive Liturgy," in which he substituted for the Nicene and Athanasian creeds two creeds taken from the Apostolical Constitutions; for his " Primitive Eucharist " he made use of unleavened bread and mixed wine; he distributed at the price of one shilling medals of admission to his oratory, with the device of a sun rising to the meridian, with the motto Ad summa, and the words Inveniam viam autfaciam below. But the most original element in the services was Henley himself, who is described by- Pope in the Dunciad as

" Preacher at once and zany of his age." He possessed some oratorical ability and adopted a very theatrical style of elocution, " tuning his voice and balancing his hands "; and his addresses were a strange

medley of solemnity and buffoonery, of clever wit and the wildest absurdity, of able and original disquisition and the worst artifices of the oratorical charlatan. His services were much frequented by the ” free- thinkers,” and he himself expressed his determination ” to die a rational.” Besides his Sunday sermons, he delivered Wednes- day lectures on social and political subjects; and he also pro- jected a scheme for connecting with the ” oratory ” a university on quite a Utopian plan. For some time he edited the Hyp Doctor, a weekly paper established in opposition to the Crafts- man, and for this service he enjoyed a pension of £100 a year from Sir Robert Walpole. At first the orations of Henley drew great crowds, but, although he never discontinued his services, his audience latterly dwindled almost entirely away. He died on the 13th of October 1759.

Henley is the subject of several of Hogarth’s prints. His life, professedly written by A. Welstede, but in all probability by himself, was inserted by him in his Oratory Transactions. See J. B. Nichols, History of Leicestershire; I. Disraeli, Calamities of Authors.

HENLEY, WILLIAM ERNEST (1849-1903), British poet, critic and editor, was born on the 23rd of August 1849 at Glou- cester, and was educated at the Crypt Grammar School in that city. The school was a sort of Cinderella sister to the Cathedral School, and Henley indicated its shortcomings in his article {Pall Mall Magazine, Nov. 1900) on T. E. Brown the poet, who was headmaster there for a brief period. Brown’s appointment, uncongenial to himself, was a stroke of luck for Henley, for whom, as he said, it represented a first acquaintance with a man of genius. ” He was singularly kind to me at a moment when I needed kindness even more than I needed encouragement.” Among other kindnesses Brown did him the essential service of lending him books. To the end Henley was no classical scholar, but his knowledge and love of literature were vital. Afflicted with a physical infirmity, he found himself in 1874, at the age of twenty-five, an inmate of the hospital at Edinburgh. From there he sent to the Cornhill Magazine poems in irregular rhythms, describing with poignant force his experiences in hospital. Leslie Stephen, then editor, being in Edinburgh,

visited his contributor in hospital and took Robert Louis Steven- son, another recruit of the Cornhill, with him. The meeting between Stevenson and Henley, and the friendship of which it was the beginning, form one of the best-known episodes in recent literature (see especially Stevenson’s letter to Mrs Sitwell, Jan. 1875, and Henley’s poems ” An Apparition ” and ” Envoy to Charles Baxter “). In 1877 Henley went to London and began his editorial career by editing

London, a journal of a type more usual in Paris than London, written for the sake of its contributors rather than of the public. Among other dis- tinctions it first gave to the world The New Arabian Nights of Stevenson. Henley himself contributed to his journal a series of verses chiefly in old French forms. He had been writing poetry since 1872, but (so he told the world in his ” advertise- ment ” to his collected Poems, 1898) he ” found himself about 1877 so utterly unmarketable that he had to own himself beaten in art and to addict himself to journalism for the next ten years.” After the decease of London, he edited the Magazine of Art from 1882 to 1886. At the end of that period he came before the public as a poet. In 1887 Mr Gleeson White made for the popular series of Canterbury Poets (edited by Mr William Sharp) a selection of poems in old French forms. In his selection Mr Gleeson White included a considerable number of pieces from London, and only after he had completed the selection did he discover that the verses were all by one hand, that of Henley. In the following year, Mr H. B. Donkin in his volume Voluntaries, done for an East End hospital, included Henley’s unrhymed rhythms quintessentializing the poet’s memories of the old Edinburgh Infirmary. Mr Alfred Nutt read these, and asked for more; and in 1888 his firm published A Book of Verse. Henley was by this time well known in a restricted literary circle, and thi publication of this volume determined for them his fame as a poet, which rapidly outgrew these limits, two new editions of this volume being called for within three years. In this same year (1888) Mr Fitzroy Bell started the f Scots Observer in Edin- burgh, with Henley as literary editor, and early in 1889 Mr Bell left the conduct of the paper to him. It was a weekly review somewhat on the lines of the old Saturday Review, but inspired in every paragraph by the vigorous and combative personality of the editor. It was transferred soon after to London as the National Observer, and remained under Henley’s editorship until 1893. Though, as Henley confessed, the paper had almost as many writers as readers, and its fame was mainly confined to the literary class, it was a lively and not uninfluential feature of the literary life of its time. Henley had the editor’s great gift of discerning promise, and the ” Men of the Scots Observer,” as Henley affectionately and characteristically called his band of contributors, in most instances justified his insight. The paper found utterance for the growing imperialism of its day, and among other services to literature gave to the world Mr Kipling’s Barrack-Room Ballads. In 1890 Henley published Views and Reviews, a volume of notable criticisms, described by himself as ” less a book than a mosiac of scraps and shreds recovered from the shot rubbish of some fourteen years of journalism.” The criticisms, covering a wide range of authors (except Heine and Tolstoy, all English and French), though wilful and often

one-sided were terse, trenchant and picturesque, and remarkable for insight and gusto. In 1892 he published a second volume of poetry, named after the first poem, The Song of the Sword, but on the issue of the second edition (1893) re-christened London Voluntaries after another section. Stevenson wrote that he had not received the same thrill of poetry since Mr Meredith's" " J°y of Earth " and " Love in the Valley," and he did not know that that was so intimate and so deep. " I did hot guess you were so great a magician. These are new tunes; this is an undertone of the true Apollo. These are not verse; they are poetry." In 1892 Henley published also three plays written with Stevenson — Beau Austin, Deacon Brodie and Admiral Guinea. In 1895 followed Macaire, afterwards published in a volume with the other plays. Deacon Brodie was produced in Edinburgh in 1884 and later in London. Beerbohm Tree produced Beau Austin at the Haymarket oft the 3rd of November 1890

and Macaire at His Majesty's on the 2nd of May 1901. Admiral Guinea also achieved stage performance. In the meantime Henley was active in the magazines and did notable editorial work for the publishers: the Lyra Heroica, 1891; A Book of English Prose (with Mr Charles Whibley), 1894; the centenary Burns (with Mr T.F. Henderson) in 1896-1897, in which Henley's Essay (published separately 1898) roused considerable con- troversy. In 1892 he undertook for Mr Nutt the general editor- ship of the Tudor Translations; and in 1897 began for Mr Heinemann an edition of Byron, which did not proceed beyond one volume of letters. In 1898 he "published a collection of his Poems in one volume, with the autobiographical " advertise- ment " above quoted; in 1899 London Types, Quatorzains to accompany Mr William Nicolson's designs; and in 1900 during the Boer War, a patriotic poetical brochure, For England's Sake. In 1901 he published a second volume of collected poetry with the title Hawthorn and Lavender, uniform with the volume of 1898. In 1902 he collected his various articles on painters and artists and published them as a companion volume of Views and Reviews: Art. These with " A Song of Speed " printed in May 1903 within two months of his death make up his tale of work. At the close of his life he was engaged upon his edition of the Authorized Version of the Bible for his series of Tudor Translations. There remained uncollected some of his scattered articles in periodicals and reviews, especially the series of literary articles contributed to the Pall Mall Magazine from 1899 until his death. These contain the most outspoken utterances of a critic never mealy-

mouthed, and include the splenetic attack on the memory of his dead friend R. L. Stevenson, which aroused deep regret and resentment. In 1894 Henley lost his little six- year-old daughter Margaret; he had borne the ” bludgeonings of chance” with “the unconquerable soul” of which he boasted, not unjustifiably, in a well-known poem; but this blow broke his heart. With the knowledge of this fact, some of these out- bursts may be better understood; yet we have the evidence of a clear-eyed critic who knew Henley well, that he found him more generous, more sympathetic at the close of his life than he had been before. He died on the nth of July 1903. In spite of his too boisterous mannerism and prejudices, he exercised by his originality, independence and fearlessness an inspiring and inspiriting influence on the higher class of journalism. This influence he exercised by word of mouth as well as by his pen, for he was a famous talker, and figures as ” Burly ” in Stevenson’s essay on Talk and Talkers. As critic he Was a good hater and a good fighter. His virtue lay in his vital and vitalizing love of good literature, and the vivid and pictorial phrases he found to give it expression. But his fame must rest on his poetry. He excelled alike in his delicate experiments in complicated metres, and the strong impressionism of Hospital Sketches and London Volun- taries. The influence of Heine may be discerned in these ” un- rhymed rhythms “; but he was perhaps a truer and more successful disciple of Heine in his snatches of passionate song, the best of which should retain their place in English literature.

See also references in Stevenson’ s Letters; Cornhill Magazine (1903) (Sidney Low) ; Fortnightly Review (August 1892) (Arthur Symons) ; and for bibliography, English Illustrated Magazine, vol. xxix. p. 548.

(W. P. J.)

HENLEY-ON-THAMES, a market town and municipal borough in the Henley parliamentary division of Oxfordshire, England, on the left bank of the Thames, the terminus of a branch of the Great Western railway, by which it is 35I m. W. of London, while it is 57I m. by river. Pop. (1901) 5984. It occupies one of the most beautiful situations on the Thames, at the foot of the finely wooded Chiltern Hills. The river is crossed by an elegant stone bridge of five arches, constructed in 1786. The parish church (Decorated and Perpendicular) possesses a lofty tower of intermingled flint and stone, attributed to Cardinal Wolsey, but more probably erected by Bishop Longland. The grammar school, founded in 1605, is incorporated with a Blue Coat school. Henley is a favourite summer resort, and is celebrated for the annual Henley Royal Regatta, the principal gathering of amateur oarsmen in England, first held

in 1839 and usually taking place in July. Henley is governed by a mayor, 4 aldermen and 12 councillors. .Area, 549 acres.

Henley-on-Thames (Hanlegang, Henle, Handley), not mentioned in Domesday, was a manor or ancient demesne of the crown and was granted (1337) to John de Molyns, whose family held it for about 250 years. It is said that members for Henley sat in parliaments of Edward I. and Edward III., but no writs have been found. Henry VIII. having granted the use of the titles ” mayor ” and ” burgess,” the town was incorporated in 1570-1571 by the name of the warden, portreeves, burgesses and commonalty. Henley suffered from both parties in the Civil War. William III. on his march to London (1688) rested here and received a deputation from the Lords. The period of prosperity in the 17th and 18th centuries was due to manu- factures of glass and malt, and to trade in corn and wool. The existing Thursday market was granted by a charter of John and the existing Corpus Christi fair by a charter of Henry VI.

See J. S. Burn, History of Henley-on-Thames (London, 1861).

HENNA, the Persian name for a small shrub found in India, Persia, the Levant and along the African coasts of the Mediter- ranean, where it is frequently cultivated. It is the Lawsonia alba of botanists, and from the fact that young trees are spineless, while older ones have the branchlets hardened into spines, it has also received the names of Lawsonia inermis and L. spinosa. It forms a slender shrubby plant of from 8 to 10 ft. high, with opposite lance-shaped smooth leaves, which are entire at the margins, and bears small white four-petalled sweet-scented flowers disposed in panicles. Its Egyptian name is Khenna, its Arabic name Al Khanna, its Indian name Mendee, while in England it is called Egyptian privet, and in the West Indies, where it is naturalized, Jamaica mignonette.

Henna or Henne is of ancient repute as a cosmetic. This consists of the leaves of the Lawsonia powdered and made up into a paste; this is employed by the Egyptian women, and also by the Mahommedan women in India, to dye their finger- nails and other parts of their hands and feet of an orange-red colour, which is considered to add to their beauty. The colour lasts for three or four weeks, when it requires to be renewed. It is moreover used for dyeing t\t hair and beard, and even the manes of horses; and the same material is employed for dyeing skins and morocco-leather a reddish-yellow, but it contains no tannin. The practice of dyeing the nails was common amongst the Egyptians, and not to conform to it would have been con- sidered indecent. It has .descended from very remote ages, as is proved by the

evidence afforded by Egyptian mummies, the nails of which are most commonly stained of a reddish hue. Henna is also said to have been held in repute amongst the Hebrews, being considered to be the plant referred to as camphire in the Bible (Song of Solomon i. 14, iv. 13). ” The custom of dyeing the nails and palms of the hands and soles of the feet of an iron-rust colour with henna,” observes Dr J. Forbes Royle, ” exists throughout the East from the Mediterranean to the Ganges, as well as in northern Africa. In some parts the practice is not confined to women and children, but is also followed by men, especially in Persia. In dyeing the beard the hair is turned to red by this application, which is then changed to black by a preparation of indigo. In dyeing the hair of children, and the tails and manes of horses and asses, the process is allowed to stop at the red colour which the henna produces.” Mahomet, it is said, used henna as a dye for his beard, and the fashion was adopted by the caliphs. ” The use of henna,” remarks Lady Callcott in her Scripture Herbal, ” is scarcely to be called a caprice in the East. There is a quality in the drug which gently restrains perspiration in the hands and feet, and produces an agreeable coolness equally conducive to health and comfort.” She further suggests that if the Jewish women were not in the habit of using this dye before the time of Solomon, it might probably have been introduced amongst them by his wife, the. daughter of Pharaoh, and traces to this probability the allusion to “camphire” in the passages in Canticles above referred to.

The preparation of henna consists in reducing the leaves and young twigs to a fine powder, catechu or lucerne leaves

in a pulverized state being sometimes mixed with them. When required for use, the powder is made into a pasty mass with hot water, and is then spread upon the part to be dyed, where it is generally allowed to remain for one night. According to Lady Callcott, the flowers are often used by the Eastern women to adorn their hair. The distilled water from the flowers is used as a perfume.

HENNEBONT, a town of western France, in the department of Morbihan, 6m. N.E. of Lorient by road. Pop. (1906) 7250. It is situated about 10 m. from the mouth of the Blavet, which divides it into two parts — the Ville Close, the medieval military town, and the Ville Neuve on the left bank and the Vieille Ville on the right bank. The Ville Close, surrounded by ramparts and entered by a massive

gateway flanked by machicolated towers, consists of narrow quiet streets bordered by houses of the 16th and 17th centuries. The Ville Neuve, which lies nearer the river, developed during the 17th century and later than the Ville Close, while the Vieille Ville is older than either. The only building of architectural importance is the church of Notre-Dame de Paradis (16th century) preceded by a tower with an orna- mented stone spire. There are scanty remains of the old fortress. Hennebont has a small but busy river-port accessible to vessels of 200 to 300 tons. An important foundry in the environs of the town employs 1400 work-people in the manufacture of tin- plate for sardine boxes and other purposes. Boat-building, tanning, distilling and the manufacture of earthenware, white lead and chemical manures are also carried on. Granite is worked in the neighbourhood. Hennebont is famed for the resistance which it made, under the widow of Jean de Montfort, when besieged in 1342 by the armies of Philip of Valois and Charles of Blois during the War of the Succession in Brittany (see Brittany) .

HENNEQUIN, PHILIPPE AUGUSTE (1763-1833), French painter, was a pupil of David. He was born at Lyons in 1763, distinguished himself early by winning the ” Grand Prix,” and left France for Italy. The disturbances at Rome, during the course of the Revolution, obliged him to return to Paris, where he executed the Federation of the 14th of July, and he was at work on a large design commissioned for the town-hall of Lyons, when in July 1794 he was accused before the revolutionary tribunal and thrown into prison. Hennequin escaped, only to be anew accused and imprisoned in Paris, and after running great danger of death, seems to have devoted himself thenceforth wholiy to his profession. At Paris he finished the picture ordered for the municipality of Lyons, and in 1801 produced his chief work, ” Orestes pursued by the Furies ” (Louvre, engraved by Landon, Annales du Musee, vol. i. p. 105). He was one of the four painters who competed when in 1802 Gros carried off the official prize for a picture of the Battle of Nazareth, and in 1808 Napoleon himself ordered Hennequin to illustrate a series of scenes from his German campaigns, and commanded that his picture of the ” Death of General Salomon ” should be engraved. After 18 1 5 Hennequin retired to Liege, and there, aided by subventions from the Government, carried out a large historical picture of the ” Death of the Three Hundred in defence of Liege “— a sketch of which he himself engraved. In 1824 Hennequin settled at Tournay, and became director of the academy; he exhibited various works at Lille in the following year, and continued to produce actively up to the day of his death in May 1833.

HENNER, JEAN JACQUES (1829-1905), French painter, was born on

the 5th of March 1829 at Dornach (Alsace). At first a pupil of Drolling and of Picot, he entered the Ecole des Beaux- Arts in 1848, and took the Prix de Rome with a painting of ” Adam and Eve finding the Body of Abel ” (1858). At Rome he was guided by Flandrin, and, among other works, painted four pictures for the gallery at Colmar. He first exhibited at the Salon in 1863 a ” Bather Asleep,” and subsequently contri- buted ” Chaste Susanna ” (1865) ; ” Byblis turned into a Spring ” (1867); ” The Magdalene ” (1878); ” Portrait of M. Hayem ” (1878); “Christ Entombed” (1879); “Saint Jerome” (1881); “Herodias” (1887); “A Study” (1891); ” Christ in His Shroud,” and a ” Portrait of Carolus-Duran ” (1896) ; a ” Portrait

of Mile Fouquier ” (1897) ; ” The Levite of the Tribe of Ephraim ” (1898), for which a first-class medal was awarded to him; and “The Dream” (1900). Among other professional distinctions Henner also took a Grand Prix for painting at the Paris Inter- national Exhibition of 1900. He was made Knight of the Legion of Honour in 1873, Officer in 1878 and Commander in 1889. In 1889 he succeeded Cabanel in the Institut de France.

See E. Bricon, Psychologie d’art (Paris, 1900); C. Phillips, Art Journal (1888); F. Wedmore, Magazine of Art (1888).

HENRIETTA MARIA (1609-1666), queen of Charles I. of England, born on the 25th of November 1609, was the daughter of Henry IV. of France. When the first serious overtures for her hand were made on behalf of Charles, prince of Wales, in the spring of 1624, she was little more than fourteen years of age. Her brother, Louis XIII., only consented to the marriage on the condition that the English Roman Catholics were relieved from the operation of the penal laws. When therefore she set out for her new home in June 1625, she had already pledged the husband to whom she had been married by proxy on the 1 st of May to a course of action which was certain to bring unpopularity on him as well as upon herself.

That husband was now king of England. The early years of the married life of Charles I. were most unhappy. He soon found an excuse for breaking his promise to relieve the English Catholics. His young wife was deeply offended by treatment which she naturally regarded as unhandsome. The favourite Buckingham stirred the flames of his master’s discontent. Charles in vain strove to reduce her to tame submission. After the assassination of Buckingham in 1628 the barrier between the married pair was broken down, and the bond of affection which from that moment united th em was never loosened. The children of the marriage were Charles II. (b. 1630), Mary, princess of

Orange (b. 1631), James II. (b. 1633), Elizabeth (b. 1636) Henry, duke of Gloucester (b. 1640), and Henrietta, duchess at Orleans (b. 1644).

For some years Henrietta Maria's chief interests lay in her young family, and in the amusements of a gay and brilliant court. She loved to be present at dramatic entertainments, and her participation in the private rehearsals of the Shepherd's Pastoral, written by her favourite Walter Montague, probably drew down upon her the savage attack of Prynne. With political matters she hardly meddled as yet. Even her co-religionists found little aid from her till the summer of 1637. She had then recently opened a diplomatic communication with the see of Rome. She appointed an agent to reside at Rome, and a papal agent, a Scotsman named George Conn, accredited to her, was soon engaged in effecting conversions amongst the English gentry and nobility. Henrietta Maria was well pleased to become a patroness of so holy a work, especially as she was not asked to take any personal trouble in the matter. Protestant England took alarm at the proceedings of a queen who associated herself so closely with the doings of "the grim wolf with privy paw."

When the Scottish troubles broke out, she raised money from her fellow-Catholics to support the king's army on the borders in 1639. During the session of the Short Parliament in the spring of 1640, the queen urged the king to oppose himself to the House of Commons in defence of the Catholics. When the Long Parlia- ment met, the Catholics were believed to be the authors and agents of every arbitrary scheme which was supposed to have entered into the plans of Strafford or Laud. Before the Long Parliament had sat for two months, the queen was urging upon the pope the duty of lending money to enable her to restore her husband's authority. She threw herself heart and soul into the schemes for rescuing Strafford and coercing the parliament. The army plot, the scheme for using Scotland against England, and the attempt upon the five members were the fruits of her political activity.

In the next year the queen effected her passage to the Continent. In February 1643 she landed at Burlington Quay, placed herself at the head of a force of loyalists, and marched through England to join the king near Oxford. After little more than a year's residence there, on the 3rd oi April 1644, she left her husband,

to see his face no more. Henrietta Maria found a refuge in France. Richelieu was dead, and Anne of Austria was com- passionate. As long as her husband was alive the queen never ceased to encourage him to resistance.

During her exile in France she had much to suffer. Her husband's execution in 1649 wa s a terrible blow. She brought up her youngest child Henrietta in her own faith, but her efforts to induce her youngest son, the duke of Gloucester, to take the same course only produced discomfort in the exiled family. The story of her marriage with her attached servant Lord Jermyn needs more confirmation than it has yet received to be accepted, but all the information which has reached us of her relations with her children points to the estrangement which had grown up between them. When after the Restoration she returned to England, she found that she had no place in the new world. She received from parliament a grant of £30,000 a year in com- pensation for the loss of her dower-lands, and the king added a similar sum as a pension from himself. In January 1661 she returned to France to be present at the marriage of her daughter Henrietta to the duke of Orleans! In July 1662 she set out again for England, and took up her residence once more at Somerset House. Her health failed her, and on the 24th of June 1665, she departed in search of the clearer air of her native country. She died on the 31st of August 1666, at Colombes, not far from Paris.

See I. A. Taylor, The Life of Queen Henrietta Maria (1905).

HENRY (Fr. Henri; Span. Enrique; Ger. Heinrich; Mid. H. Ger. Heinrich and Heimrich; O.H.G. Haimi- or Heimirih, i.e. " prince, or chief of the house," from O.H.G. heim, the Eng. home, and rih, Goth, reiks; compare Lat. rex " king " — " rich," therefore " mighty," and so " a ruler." Compare Sans, radsh " to shine~ forth, rule, &c. " and mod. raj " rule " and raja, " king "), the name of many European sovereigns, the more important of whom are noticed below in the following order: (1) emperors and German kings; (2) kings of England; (3) other kings in the alphabetical order of their states; (4) other reigning princes in the same order; (5) non-reigning princes; (6) bishops, nobles, chroniclers, &c.

HENRY I. (c. 876-936), surnamed the " Fowler," German king, son of Otto the Illustrious, duke of Saxony, grew to manhood amid the disorders which witnessed to the decay of the Carolingian empire, and in early life shared in various campaigns for the defence of Saxony. He married Hatburg, a daughter of Irwin, count of Merseburg, but as she had taken the veil on the death of a former husband this union was

declared illegal by the church, and in 909 he married Matilda, daughter of a Saxon count named Thiederich, and a reputed descendant of the hero Widukind. On his father's death in 912 he became duke of Saxony, which he ruled with considerable success, defending it from the attacks of the Slavs and resisting the claims of the German king Conrad I. (see Saxony). He afterwards won the esteem of Conrad to such an extent that in 918 the king advised the nobles to make the Saxon duke his successor. After Conrad's death the Franks and the Saxons met at Fritzlar in May 919 and chose Henry as German king, after which the new king refused to allow his election to be sanctioned by the church. His authority, save in Saxony, was merely nominal; but by negotiation rather than by warfare he secured a recognition of his sovereignty from the Bavarians and the Swabians. A struggle soon took place between Henry and Charles III., the Simple, king of France, for the possession of Lorraine. In 921 Charles recognized Henry as king of the East Franks, and when in 923 the French king was taken prisoner by Herbert, count of Vermandois, Lorraine came under Henry's authority, and Giselbert, who married his daughter Gerberga, was recognized as duke. Turning his attention to the east, Henry reduced various Slavonic tribes to subjection, took Brennibor, the modern Brandenburg, from the Hevelli, and secured both banks of the Elbe for Saxony. In 923 he had bought a truce for ten years with the Hungarians, by a promise of tribute, but on its expiration he gained a great victory over these formidable foes in March 933. The Danes were defeated, and territory as far as the Eider secured for Germany; and the king sought further to extend his influence by entering into relations with the kings

of England, France and Burgundy. He is said to have been contemplating a journey to Rome, when he died at Memleben on the 2nd of July 936, and was buried at Quedlinburg. By his first wife, Hatburg, he left a son, Thankmar, who was excluded from the succession as illegitimate; and by Matilda he left three sons, the eldest of whom, Otto (afterwards the emperor Otto the Great), succeeded him, and two daughters. Henry was a successful ruler, probably because he was careful to undertake only such enterprises as he was able to carry through. Laying more stress on his position as duke of Saxony than king of Germany, he conferred great benefits on his duchy. The founder of her town life and the creator of her army, he ruled in harmony with her nobles and secured her frontiers from attack. The story that he received the surname of " Fowler " because the nobles, sent to inform him of his election to the throne, found him engaged in laying snares for the birds, appears to be mythical.

See Widukind of Corvei, Res gestae Saxonicae, edited by G. Waitz in

the Monumenta Germaniae hislorica. Scriptores, Band iii. (Hanover and Berlin, 1826 seq.) ; ” Die Urkunde des deutschen Konigs Heinrichs I.,” edited by T. von Sickel in the Monumenta Germaniae historica. Diplomata (Hanover, 1879); W. von Giese- brecht, Geschichte der deutschen Kaiserzeit, Bande i., ii. (Leipzig, 1881); G. Waitz, Jahrbticher des deutschen Reichs unter Konig Heinrich I. (Leipzig, 1885); and F. Loher, Die deutsche Politik Konig Heinrich I. (Munich, 1857).

HENRY II. (973-1024), surnamed the ” Saint, ” Roman emperor, son of Henry II., the Quarrelsome, duke of Bavaria, and Gisela, daughter of Conrad, king of Burgundy, or Aries (d. 993), and great-grandson of the German king Henry I., the Fowler, was born on the 6th of May 973. When his father was driven from his duchy in 976 it was intended that Henry should take holy orders, and he received the earlier part of a good education at Hildesheim. This idea, however, was abandoned when his father was restored to Bavaria in 985; but young Henry, whose education was completed at Regensburg, retained a lively interest in ecclesiastical affairs. He became duke of Bavaria on his father’s death in 995, and appears to have governed his duchy quietly and successfully for seven years. He showed a special regard for monastic reform and church government, accompanied his kinsman, the emperor Otto III., on two occasions to Italy, and about 1001 married Kunigunde (d. 1037), daughter of Siegfried, count of Luxemburg. When Otto III. died childless in 1002, Henry sought to secure the German throne, and seizing the imperial insignia made an arrangement with Otto I., duke of Carinthia. There was con- siderable opposition to his claim; but one rival, Ekkard I., margrave of Meissen, was murdered, and, hurrying to Mainz, Henry was chosen German king by the Franks and Bavarians on the 7th of June 1002, and subsequently crowned by Willigis, archbishop of Mainz, who had been largely instrumental in securing his election. Having ravaged the lands of another rival, Hermann II., duke of Swabia, Henry purchased the allegiance of the Thuringians and the Saxons; and when shortly afterwards the nobles of Lorraine did homage and Hermann of Swabia submitted, he was generally recognized as king. Danger soon arose from Boleslaus I., the Great, king of Poland, who had extended his authority over Meissen and Lusatia, seized Bohemia, and allied himself with some discontented German nobles, including the king’s brother, Bruno, bishop of Augsburg. Henry easily crushed his domestic foes; but the incipient war with Boleslaus was abandoned in favour of an expedition into Italy, where Arduin, margrave of Ivrea, had been elected king. Cross- ing the Alps Henry met with no resistance from Arduin, and ih May 1004 he was chosen and crowned king of the

Lombards at Pavia; but a tumult caused by the presence of the Germans soon arose in the city, and having received the homage of several cities of Lombardy the king returned to Germany. He then freed Bohemia from the rule of the Poles, led an expedition into Friesland, and was successful in compelling Boleslaus to sue for peace in 1005. A struggle with Baldwin IV., count of Flanders, in 1006 and 1007 was followed by trouble with the king's brothers-in-law, Dietrich and Adalbero of Luxemburg, who had seized respectively the bishopric of Metz and the

archbishopric of Trier (Treves) . Henry sought to dislodge them, but aided by their elder brother Henry, who had been made duke of Bavaria in 1004, they held their own in a desultory warfare in Lorraine. In 1009, however, the eldest of the three brothers was deprived of Bavaria, while Adalbero had in the previous year given up his claim to Trier, but Dietrich retained the bishopric of Metz. The Polish war had been renewed in 1007, but it was not until 1010 that the king was able to take a personal part in these campaigns. Meeting with indifferent success, he made peace with Boleslaus early in 1013, when the duke retained Lusatia, but did homage to Henry at Merseburg. In 1013 the king made a second journey to Italy where two popes were contending for the papal chair, and meeting with no opposition was received with great honour at Rome. Having recognized Benedict VIII. as the rightful pope, he was crowned emperor on the 14th of February 1014, and soon returned to Germany laden with treasures from Italian cities. But the struggle with the Poles now broke out afresh, and in 1015 and 1017 the king, having obtained assistance from the heathen I iutici, led formidable armies against Boleslaus. During the Campaign of 1017 he had as an ally the grand duke of Russia, but his troops suffered considerable loss, and on the 30th of January 1018 he made peace at Bautzen with Boleslaus, who again retained Lusatia. As early as 1006 Henry had concluded a succession treaty with his uncle Rudolph III., the childless king of Burgundy, or Aries; but when Rudolph desired to abdicate in 1016 Henry's efforts to secure possession of the territory were foiled by the resistance of the nobles. In 1020 the emperor was visited at Bamberg by Pope Benedict, in response to whose entreaty for assistance against the Greeks of southern Italy he crossed the Alps in 102 1 for the third and last time. With the aid of the Normans he captured many fortresses and seriously crippled the power of the Greeks, but was compelled by the ravages of pestilence among his troops to return to

Germany in 1022. It was probably about this time that Henry gave Benedict the diploma which ratified the gifts made by his predecessors to the papacy. Spending his concluding years in disputes over church reform he died on the 13th of July 1024 at Grana near Gottingen, and was buried at Bamberg, where he had founded and richly endowed a bishopric.

Henry was an enthusiast for church reform, and under the influence of his friend Odilo, abbot of Cluny, sought to further the principles of the Cluniacs, and seconded the efforts of Benedict VIII. to prevent the marriage of the clergy and the sale of spiritual dignities. He was energetic and capable, but except in his relations with the church was not a strong ruler. But though devoted to the church and a strict observer of religious rites, he was by no means the slave of the clergy. He appointed bishops without the formality of an election, and attacked clerical privileges although he made clerics the representatives of the imperial power. He held numerous diets and issued frequent ordinances for peace, but feuds among the nobles were common, and the frontiers of the empire were insecure. Henry, who was the last emperor of the Saxon house, was the first to use the title ” King of the Romans. ” He died childless, and a tradition of the 12th century says he and his wife took vows of chastity. He was canonized in 1146 by Pope Eugenius III.

See Adalbold of Utiecht, Vita Heinrici II., Thietmar of Merse- burg, Chronicon, both in the Monumenta Germaniae historica. Scriptores, Bande iii. and iv. (Hanover and Berlin, 1826 seq.) ; W. von Giesebrecht, Geschichte der deutschen Kaiscrzeit (Leipzig, 1 881-1890) ; S. Hirsch, continued by R. Usinger, H. Pabst and H. Bresslau, Jahrbiicher des deutschen Reichs unttr Kaiser Heinrich II. (Leipzig, 1874); A. Cohn, Kaiser Heinrich II. (Halle, 1867); H. Zeissberg, Die Kriege Kaiser Heinrichs II. mit Boleslaw I. von Polen (Vienna, 1868); and G. Matthaei, Die Klosterpolitik Kaiser Heinrichs II. (Gottingen, 1877).

HENRY III. (1017-1056), surnamed the “Black,” Roman emperor, only son of the emperor Conrad II., and Gisela, widow of Ernest I., duke of Swabia, was born on the 28th of October 1017, designated as his father’s successor in 1026, and crowned German king at Aix-la-Chapelle by Pilgrim, archbishop of Cologne, on the 14th of April 1028. In 1027 he was appointed

duke of Bavaria, and his early years were mainly spent in this country, where he received an excellent education under the care of Bruno, bishop of Augsburg and, afterwards, of Egilbert, bishop of Freising. He

soon began to take part in the business of the empire. In 1032 he took part in a campaign in Burgundy; in 1033 led an expedition against Ulalrich, prince of the Bohemians; and in June 1036 was married at Nijmwegen to Gunhilda, afterwards called Kunigunde, daughter of Canute, king of Denmark and England. In 1038 he followed his father to Italy, and in the same year the emperor formally handed over to him the kingdom of Burgundy, or Aries, and appointed him duke of Swabia. In spite of the honours which Conrad heaped upon Henry the relations between father and son were not uniformly friendly, as Henry disapproved of the emperor's harsh treatment of some of his allies and adherents. When Conrad died in June 1039. Henry became sole ruler of the empire, and his authority was at once recognized in all parts of his dominions. Three of the duchies were under his direct rule, no rival appeared to contest his claim, and the outlying parts of the empire, as well as Germany, were practically free from disorder. This peaceful state of affairs was, however, soon broken by the ambition of Bretislaus, prince of the Bohemians, who revived the idea of an independent Slavonic state, and conquered various Polish towns. Henry took up arms, and having suffered two defeats in 1040 renewed the struggle with a stronger force in the following year, when he compelled Bretislaus to sue for peace and to do homage for Bohemia at Regensburg. In 1042 he received the homage of the Bui gundians and his attention was then turned to the Hungarians, who had driven out their king Peter, and set up in his stead one Aba Samuel, or Ovo, who attacked the eastern border of Bavaria.

In 1043 and the two following years Henry crushed the Hungarians, restored Peter, and brought Hungary completely under the power of the German king. In 1038 Queen Kuni- gunde had died in Italy, and in 1043 the king was married at Ingelheim to Agnes, daughter of William V., duke of Guienne, a union which drew him much nearer to the reforming party in the church. In 1044 Gothelon (Gozelo), duke of Lorraine, died, and some disturbance arose over Henry's refusal to grant the whole of the duchy to his son Godfrey, called the Bearded. Godfrey took up arms, but after a short imprisonment was released and confirmed in the possession of Upper Lorraine in 1046 which, however, he failed to secure. About this time Henry was invited to Italy where three popes were contending for power, and crossing the Alps with a large army he marched to Rome. Councils held at Sutri and at Rome having declared the popes deposed, the king secured the election of Suidger, bishop of Bamberg, who took the name of Clement II., and by this pontiff Henry was crowned as emperor on the 25th of December 1046. He was immediately recognized by the Romans as Patricius, an office which carried with it at this time the

right to appoint the pope. Supreme in church and state alike, ruler of Germany, Italy and Burgundy, overlord of Hungary and Bohemia, Henry occupied a commanding position, and this time may be regarded as marking the apogee of the power of the Roman empire of the Germans. The emperor assisted Pope Clement in his efforts to banish simony. He made a victorious progress in southern Italy, where he restored Pandulph IV. to the principality of Capua, and asserted his authority over the Normans in Apulia and Aversa. Returning to Germany in 1047 he appointed two popes, Damasus II. and Leo IX., in quick succession, and turned to face a threatening combination* in the west of the empire, where Godfrey of Lorraine was again in revolt, and with the help of Baldwin V., count of Flanders and Dirk IV., count of Holland, who had previously caused trouble to Henry, was ravaging the lands of the emperor's representatives in Lorraine. Assisted by the kings of England arid Denmark, Henry succeeded with some difficulty in bringing the rebels to submission in 1050. Godfrey was deposed; but Baldwin soon found an opportunity for a further revolt, which an expedition undertaken by the emperor in 1054 was unable to crush.

Meanwhile a reaction against German influence had taken place in Hungary. King Peter had been driven out in 1046 and his place taken by Andreas I. Inroads into Bavaria followed, and in 1051 and 1052 Henry led his forces against the Hungarians, and after the pope had vainly attempted to mediate, peace was made in 1053. It was quickly broken, however, and the emperor, occupied elsewhere, soon lost most of his authority in the east; although in 1054 he made peace between Brestislav of Bohemia and Casimir I., duke of the Poles. Henry had not lost sight of affairs in Italy during these years, and had received several visits from the pope, whose aim was to bring southern Italy under his own dominion. Henry had sent military assistance to Leo, and had handed over to him the government of the principality of Benevento in return for the bishopric of Bamberg. But the pope's defeat by the Normans was followed by his death. Henry then nominated Gebhard, bishop of Eichstadt, who took the name of Victor II., to the vacant chair, and promised his assistance to the reluctant candidate. Jn 1055 the emperor went a second time to Italy, where his authority was threatened by Godfrey of Lorraine, who had married Beatrice, widow of Boniface III., margrave of Tuscany, and was ruling her vast estates. Godfrey fled, however, on the appearance of Henry, who only remained a short time in Italy, during which he granted the duchy of Spoleto to Pope Victor, and negotiated for an

attack upon the Normans. Before the journey to Italy, Henry had found it necessary to depose Conrad III., duke of Bavaria, and to suppress a rising in southern Germany. During his absence Conrad formed an alliance with Welf, duke of Carinthia, and Gebhard III. , bishop of Regensburg. A conspiracy to depose the emperor, support for which was found in Lorraine, was quickly discovered, and Henry, leaving Victor as his repre- sentative in Italy, returned in 1055 to Germany to receive the submission of his foes. In 1056, the emperor was visited by the pope; and on the 5th of October in the same year he died at Bodfeld and was buried at Spires. Henry was a pious and peace-loving prince, who favoured church reform, sought earnestly to suppress private warfare, and alone among the early emperors is said to have been innocent of simony. Although under his rule Germany enjoyed considerable tranquillity, and a period of wealth and progress set in for the towns, yet his secular and ecclesiastical policy showed signs of weakness. Unable, or unwilling, seriously to curb the increasing power of the church, he alienated the sympathies of the nobles as a class, and by allowing the southern duchies to pass into other hands restored ». power which true to its traditions was not always friendly 10 the royal house. Henry was a patron of learning, a founder of schools, and built or completed cathedrals at Spires, Worms snd Mainz.

The chief original authorities for the life and reign of Henry 111. are the Chronicon of Herimann of Reichenau, the Annates Sangattenses majores, the Annates HUdesheimenses , all in the Monumenta Germaniae historica. Scriplores (Hanover and Berlin, 1826 fol.). The best modern authorities are W. von Giesebrecht, Gesckichte der deutschen Kaiserzeit, Band ii. (Leipzig, 1888); M. ferlbach, ” Die Kriege Heinrichs III. gegen BShmen,” in the Forschungen zur deutschen Geschichte, Band x. (Gottingen, 1862— 1886) ; E. Steindorff, Jakrbiicher des deutschen Reichs unter Heinrich III. (Leipzig, 1874-1881); and F. Steinhoff, Das Konigthum und Kuiserthum Heinrichs III. (Gottingen, 1865).

HENRY IV. (1050-1106), Roman emperor, son of the emperor Henry III. and Agnes, daughter of William V., duke of Guienne, was born on the nth of November 1050, chosen German king at Tribur in 1053, and crowned at Aix-la-Chapelle on the 17th of July 1054. In 1055 he was appointed duke of Bavaria, and on his father’s death in October 1056 inherited the kingdoms of Germany, Italy and Burgundy. These territories were governed in his name by his mother, who was unable to repress the internal disorder or to take adequate measures for their defence. Some opposition was soon aroused, and in 1062 Anno, archbishop of Cologne, and others planned to seize the person of the

young king and to deprive Agnes of power. This plot met with complete success. Henry, who was at Kaiserwerth, was persuaded to board a boat lying in the Rhine; it was

immediately unmoored and the king sprang into the stream, but was rescued by one of the conspirators and carried to Cologne. Agnes made no serious effort to regain her control, and the chief authority was exercised for a time by Anno; but his rule proved unpopular, and he was soon compelled to share his power with Adalbert, archbishop of Bremen. The education and training of Henry were supervised by Anno, who was called his magister, while Adalbert was styled patronus; but Anno was disliked by Henry, and during his absence in Italy the chief power passed into the hands of Adalbert. Henry's education seems to have been neglected, and his wilful and headstrong nature was developed by the conditions under which his early years were passed. In March 1065 he was declared of age, and in the following year a powerful coalition of ecclesiastical and lay nobles brought about the banishment of Adalbert from court and the return of Anno to power. In 1066 Henry was persuaded to marry Bertha, daughter of Otto, count of Savoy, to whom he had been betrothed since 1055. For some time he regarded his wife with strong dislike and sought in vain for a divorce, but after she had borne him a son in 107 1 she gained his affections, and became his most trusted friend and companion.

In 1060 the king took the reins of government into his own hands. He recalled Adalbert to court; led expeditions against the Liutici, and against Dedo or Dedi II., margrave of a district east of Saxony; and soon afterwards quarrelled with Rudolph, duke of Swabia, and Berthold, duke of Carinthia. Much more serious was Henry's struggle with Otto of Nordheim, duke of Bavaria. This prince, who occupied an influential position in Germany, was accused in 1070 by a certain Egino of being privy to a plot to murder the king. It was decided that a trial by battle should take place at Goslar, but when the demand of Otto for a safe conduct for himself and his followers, to and from the place of meeting, was refused, he declined to iappear. He was thereupon declared deposed in Bavaria, and his Saxon estates were plundered. • He obtained sufficient support, however, to carry on a struggle with the king in Saxony and Thuringia until 107 1, when he submitted at Halberstadt. Henry aroused the hostility of the Thuringians by supporting Siegfried, arch- bishop of Mainz, in his efforts to exact tithes from them; but still more formidable was the enmity of the Saxons, who had several causes of complaint against the king. He was the son of one enemy, Henry III., and the friend of another, Adalbert of Bremen. He had ordered a restoration of all

crown lands in Saxony and had built forts among this people, while the country was ravaged to supply the needs of his courtiers, and its duke Magnus was a prisoner in his hands. All classes were united against him, and when the struggle broke out in 1073 the Thuringians joined the Saxons; and the war, which lasted with slight intermissions until 1088, exercised a most potent influence upon Henry's fortunes elsewhere (see Saxony).

Henry soon found himself confronted by an abler and more stubborn antagonist than either Thuringian or Saxon. In 1073 Hildebrand became pope as Gregory VII. Two years later this great ecclesiastic issued his memorable prohibition of lay investiture, and the blow then struck at the secular power by the papacy threatened seriously to undermine the imperial authority. Spurred on by his advisers, Henry did not refuse the challenge. Threatened with the papal ban, he summoned a synod of German bishops which met at Worms in January 1076 and declared Gregory deposed; and he wrote his famous letter to the pope, in which he referred to him as " not pope, but false monk." The king was at once excommunicated. His adherents" gradually fell away, the Saxons were again in arms, and Otto of Nordheim succeeded in uniting the malcontents of north and south Germany. In October 1076 an important diet: met at Tribur, and after discussing the deposition of the king, decided that he should be judged by an assembly to be held at Augsburg in the following February under the presidency of the pope. This union of the temporal and spiritual forces was too strong for the king, and he decided to submit.

Crossing the Alps, Henry appeared in January 1077 && a penitent before the castle of Canossa, where Gregory had taken

refuge. The story of this famous occurrence, which represents the king as standing in the courtyard of the castle for three days in the snow, clad as a penitent, and entreating to be admitted to the pope's presence, is now regarded as mythical in its details; but there is no doubt that the king visited the castle at intervals, and prayed for admission for three days until the 28th of January, when he was received by Gregory and absolved, after promising to submit to the pope's authority and to secure for him a safe journey to Germany. No historical incident has more profoundly impressed the imagination of the Western world. It marked the highest point reached by papal

authority, and presents a vivid picture of the awe inspired during the middle ages by the super- natural powers supposed to be wielded by the church.

Scorned by his Lombard allies, Henry left Italy to find that in his absence Rudolph, duke of Swabia, had been chosen German king; and although Gregory had taken no part in this election, Henry sought to prevent the pope's journey to Germany, and regaining courage, tried to recover his former position. Supported by most of the German bishops and by the Lombards, now reconciled to him, and recognized in Burgundy, Bavaria and Franconia, Henry (who at this time is referred to by Bruno, the author of De bello Saxonico, as exrex) appeared stronger than his rival Rudolph; but the ensuing war was waged with varying success. He was beaten at Mellrichstadt in 1078, and at Flarchheim in 1080, but these defeats were due rather to the fierce hostility of the Saxons, and the military skill of Otto of Nordheim, than to any general sympathy with Rudolph. Gregory's attitude remained neutral, in spite of appeals from both sides, until March 1080, when he again excommunicated Henry, but without any serious effect on the fortunes of the king. At Henry's initiative, Gregory was declared deposed on three occasions, and an anti-pope was elected in the person of Wibert, archbishop of Ravenna, who took the name of Clement III.

The death of Rudolph in October 1080, and a consequent lull in the war, enabled the king to go to Italy early in 108 1. He found considerable support in Lombardy; placed Matilda, marchioness of Tuscany, the faithful friend of Gregory, under the imperial ban; took the Lombard crown at Pavia; and secured the recognition of Clement by a council. Marching to Rome, he undertook the siege of the city, but was soon compelled to retire to Tuscany, where he granted privileges to various cities, and obtained monetary assistance from a new ally, the eastern emperor, Alexius I. A second and equally unsuccessful attack on Rome was followed by a war of devastation in northern Italy with the adherents of Matilda; and towards the end of 1082 the king made a third attack on Rome. After a siege of seven months the Leonine city fell into his hands. A treaty was concluded with the Romans, who agreed that the quarrel between king and pope should be decided by a synod, and secretly bound them- selves to induce Gregory to crown Henry as emperor, or to choose another pope. Gregory, however, shut up in the castle of St Angelo, would hear of no compromise; the synod was a failure, as Henry prevented the attendance of many of the pope's supporters; and the king, in pursuance of his treaty with Alexius, marched against the Normans. The Romans soon fell away from their allegiance to the pope; and,

recalled to the city, Henry entered Rome in March 1084, after which Gregory was declared deposed and Clement was recognized by the Romans. On the 31st of March 1084 Henry was crowned emperor by Clement, and received the patrician authority. His next step was to attack the fortresses still in the hands of Gregory. The pope was saved by the advance of Robert Guiscard, duke of Apulia, with a large force, which compelled Henry to return to Germany.

Meanwhile the German rebels had chosen a fresh anti-king, Hermann, count of Luxemburg, whom Henry's supporters had already driven to his last line of defence in Saxony. During the campaign of 1086 Henry was defeated near Wiirzburg, but in 1088 Hermann abandoned the struggle and the emperor was generally recognized in Saxony, to which country he showed considerable clemency. Although Henry's power was in the ascendent, a few powerful nobles adhered to the cause of Gregory's

successor, Urban II. Among them was Welf, son of Welf I., the deposed duke of Bavaria, whose marriage with Matilda of Tuscany rendered him too formidable to be neglected. The emperor accordingly returned to Italy in 1090, where Mantua and Milan were taken, and Pope Clement was restored to Rome. Henry's communications with Germany were, however,threatened by a league of the Lombard cities, and his anxieties were soon augmented by domestic troubles.

Henry's first wife had died in 1087, and in 1089 he had married a Russian princess, Praxedis, afterwards called Adelaide. Her conduct soon aroused his suspicions, and his own eldest son, Conrad, who had been crowned German king in 1087, was thought to be a partner in her guilt. Escaping from prison, Adelaide fled to Henry's enemies and brought grave charges against her husband; while the papal party induced Conrad to desert his father and to be crowned king of Italy at Monza in 1093. Crushed by this blow, Henry remained almost helpless and inactive in northern Italy for five years, until 1097, when having lost every shred of authority in that country, he returned to Germany, where his position was stronger than ever. Welf had submitted, had forsaken the cause of Matilda and had been restored to Bavaria, and in 1098 the diet assembled at Mainz declared Conrad deposed, and chose the emperor's second son, Henry, afterwards the emperor Henry V., as German king. The crusade of 1096 had freed Germany from many turbulent spirits, and the emperor, meeting with some success in his efforts to restore order, could afford to ignore his repeated excommunication. A success- ful campaign in Flanders was followed in 1 103 by a diet at Mainz, where serious efforts were made to restore peace, and Henry himself promised to go on crusade. But this

plan was shattered by the revolt of the younger Henry in 1104, who, encouraged by the adherents of the pope, declared he owed no allegiance to an excommunicated father. Saxony and Thuringia were soon in arms, the bishops held mainly to the younger Henry, while the emperor was supported by the towns. A desultory warfare was unfavourable, however, to the emperor, who, deceived by false promises, became a prisoner in the hands of his son in 1 105. The diet met at Mainz inDecember, when he was compelled to abdicate ; but contrary to the conditions, he was detained at Ingelheim and denied his freedom. Escaping to Cologne, he found considerable support in the lower Rhineland; he entered into negotiations with England, France and Denmark, and was engaged in collecting an army when he died at Liege on the 7th of August 1 106. His body was buried by the bishop of Liege with suitable ceremony, but by command of the papal legate it was unearthed, taken to Spires, and placed in an unconsecrated chapel. After being released from the sentence of excommunication the remains were buried in the cathedral of Spires in August mi.

Henry IV. was very licentious and in his early years was careless and self-willed, but better qualities were developed in his later life. He displayed much diplomatic ability, and his abasement at Canossa may fairly be regarded as a move of policy to weaken the pope's position at the cost of a personal humiliation to himself. He was always regarded as a friend of the lower orders, was capable of generosity and gratitude, and showed considerable military skill. Unfortunate in the time in which he lived, and in the troubles with which he had to contend, he holds an honourable position in history as a monarch who resisted the excessive pretensions both of the papacy and of the ambitious feudal lords of Germany.

The authorities for the life and reign of Henry are Lambert of Hersfeld, Annates; Bernold of Reichenau, Chronicon; Ekkehard of Aura, Chronicon; and Bruno, De bello Saxonico, which gives several of the more important letters that passed between Henry and Gregory VII. These are all found in the Monumenta Germaniae historica. Scriptores, Bande v. and vi. (Hanover and Berlin, 1826- 1892). There is an anonymous Vita Heinrici IV., edited by W. Wattenbach (Hanover, 1876). The best modern authorities are: G. Meyer von Knonau, Jahrbiicher des •deutscken Reiches unter Heinrich IV. (Leipzig, 1890); H.- Floto, Kaiser Heinrich IV. und sein Zeitalter (Stuttgart, 1855); E. Kilian, Itinerar Kaiser Heinrichs IV. (Karlsruhe, 1886); K. W. Nitzsch, " Das deutsche Reich und Heinrich IV.," in the Historische Zeitschrift, Band xlv. (Munich, 1859); H. Ulmann, Zum Verstan'lniss der sdchsischen Erhebung gegen Heinrich IV. (Hanover, 1886), W. von

der deutschen Kaiserzeit (Leipzig, 1881-1890); B. Gebhardt, Hand- bv-ch der deutschen Geschichte (Berlin, 1901). For a list of other works, especially those on the relations between Henry and Gregory, see Dahlmann-Waitz, Quellenkunde der deutschen Geschichte (G6t-tingen, 1894). (A. W. H.*)

HENRY V. (1081-1125), Roman emperor, son of the emperor Henry IV., was born on the 8th of January 1081, and after the revolt and deposition of his elder brother, the German king Conrad (d. 1101), was chosen as his successor in 1098. He promised to take no part in the business of the Empire during his fathei's lifetime, and was crowned at Aix-la-Chapelle on the 6th of January 1099. In spite of his oath Henry was induced by his father's enemies to revolt in 1104, and some of the princes did homage to him at Mainz in January 1 106. In August of the same year the elder Henry died, when his son became sole ruler of the Empire. Order was soon restored in Germany, the citizens of Cologne were punished by a fine, and an expedition against Robert II., count of Flanders, brought this rebel to his knees. In 1 107 a campaign, which was only partially successful, was undertaken to restore Bofiwoj II. to the dukedom of Bohemia, and in the year following the king led his forces into Hungary, where he failed to take Pressburg. In 1109 he was unable to compel the Poles to renew their accustomed tribute, but in 1 1 10 he succeeded in securing the dukedom of Bohemia for Ladislaus I.

The main interest of Henry's reign centres in the controversy over lay investiture, which had caused a serious dispute during Lhe previous reign. The papal party who had supported Henry in his resistance to his father hoped he would assent to the decrees of the pope, which had been renewed by Paschal II. at the synod of Guastalla in 1106. The king, however, continued to invest the bishops, but wished the pope to hold a council in Germany to settle the question. Paschal after some hesitation preferred France to Germany, and, after holding a council at Troyes, renewed his prohibition of lay investiture. The matter slumbered until 11 10, when, negotiations between king and pope having failed, Paschal renewed his decrees and Henry went to Italy with a large army. The strength of his forces helped him to secure general recognition in Lombardy, and at Sutri he concluded an arrangement with Paschal by which he renounced the right of

investiture in return for a promise of coronation, and the restoration to the Empire of all lands given by kings, or emperors, to the German church since the time of Charlemagne. It was a treaty impossible to execute, and Henry, whose consent to it is said to have been conditional on its acceptance by the princes and bishops of Germany, probably foresaw that it would occasion a breach between the German clergy and the pope. Having entered Rome and sworn the usual oaths, the king presented himself at St Peter's on the 12th of February mi for his coronation and the ratification of the treaty. The words commanding the clergy to restore the fiefs of the crown to Henry were read amid a tumult of indignation, whereupon the pope refused to crown the king, who in return declined to hand over his renunciation of the right of investiture. Paschal was seized by Henry's soldiers and, in the general disorder into which the city was thrown, an attempt to liberate the pontiff was thwarted in a struggle during which the king himself was wounded. Henry then left the city carryingthepopewithhim;andPaschal'sfailure to obtain assistance drew from him a confirmation of the king's right of investiture and a promise to crown him emperor. The coronation ceremony accordingly took place on the 13th of April mi, after which the emperor returned to Germany, where he sought to strengthen his power by granting privileges to the inhabitants of the region of the upper Rhine.

In 1 1 12 Lothair, duke of Saxony, rose in arms against Henry, but was easily quelled. In n 13, however, a quarrel over the succession to the counties of Weimar and Orlamunde gave occasion for a fresh outbreak on the part of Lothair, whose troops were defeated at Warnstadt, after which the duke was pardoned. Having been married at Mainz on the 7th of January n 14 to Matilda, or Maud, daughter of Henry I., king of England, the emperor was confronted with a further rising, initiated by the

citizens of Cologne, who were soon joined by the Saxons and others. Henry failed to take Cologne, his forces were defeated at Welfesholz on the nth of February n 15, and complications in Italy compelled him to leave Germany to the care of Frederick II. of Hohenstaufen, duke of Swabia, and his brother Conrad, afterwards the German king Conrad III. After the departure of Henry from Rome in 1 1 1 1 a council had declared the privilege of lay investiture, which had been extorted from Paschal, to be invalid, and Guido, archbishop of Vienne, excommunicated the emperor and called upon the pope to ratify this sentence. Paschal, however, refused to take so extreme a step; and the quarrel entered upon a new stage in 1 1 1 5 when Matilda, daughter and heiress of Boniface, margrave of Tuscany, died leaving her vast estates to the papacy. Crossing the Alps in n 16 Henry won the

support of town and noble by privileges to the one and presents to the other, took possession of Matilda's lands, and was gladly received in Rome. By this time Paschal had withdrawn his consent to lay investiture and the excommunication had been published in Rome; but the pope was compelled to fly from the city. Some of the cardinals withstood the emperor, but by means of bribes he broke down the opposition, and was crowned a second time by Burdinas, archbishop of Braga. Meanwhile the defeat at Welfesholz had given heart to Henry's enemies; many of his supporters, especially among the bishops, fell away; the excommunication was published at Cologne, and the pope, with the assistance of the Normans, began to make war. In January n 18 Paschal died and was succeeded by Gelasius II. The emperor immediately returned from northern Italy to Rome. But as the new pope escaped from the city, Henry, despairing of making a treaty, secured the election of an antipope who took the name of Gregory VIII., and who was left in possession of Rome when the emperor returned across the Alps in n 18. The opposition in Germany was gradually crushed and a general peace declared at Tribur, while the desire for a settlement of the investiture dispute was growing. Negotiations, begun at Wiirzburg, were continued at Worms, where the new pope, Calixtus II., was represented by Caidinal Lambert, bishop of Ostia, In the concordat of Worms, signed in September 1122,- Henry renounced the right of investiture with ring and crozier, recognized the freedom of election of the clergy and promised to restore all church property. The pope agreed to allow elections to take place in presence of the imperial envoys, and the investi- ture with the sceptre to be granted by the emperor as a symbol that the estates of the church were held under the crown. Henry, who had been solemnly excommunicated at Reims by Calixtus in October n 19, was received again into the communion of the church, after he had abandoned his nominee, Gregory, to defeat and banishment. The emperor's concluding years were occupied with a campaign in Holland, and with a quarrel over the succes- sion to the margraviate of Meissen, two disputes in which his enemies were aided by Lothair of Saxony. In n 24 he led an expedition against King Louis VI. of France, turned his arms against the citizens of Worms, and on the 23rd of May 1125 died at Utrecht and was buried at Spires. Having no children, he left his possessions to his nephew, Frederick II. of Hohen- staufen, duke of Swabia, and on his death the line of Franconian, or Salian, emperors became extinct.

The character of Henry is unattractive. His love of power was inordinate; he was wanting in generosity, and he did not shrink from treachery in pursuing his ends.

The chief authority for the life and reign of Henry V. is Ekkehard of Aura, Chronicon, edited by G. Waitz in the Monuments Germaniae hisiorica. Scriptores, Band vi. (Hanover and Berlin, 1826-1892). See also W. von Giesebrecht, Geschichte der deutschen Kaiserzeit, Band iii. (Leipzig, 1881-1890); L. von Ranke, Welt- geschichte, pt. vii. (Leipzig, 1886); M. Manitius, Deutsche Geschichte (Stuttgart, 1889) ; G. Meyer von Knonau, Jahrbucher des deutschen Reiches unter Heinrich IV. und Heinrich V. (Leipzig, 1890); E. Gervais, Politische Geschichte Deutschlands unter der Regierung der Kaiser Heinrich V. und Lothar IIJ. (Leipzig, 1841-1842) ; G. Peiser, Der deutsche Investiturstreit unter Kaiser Heinrich V. (Berlin, 1883); C. Stutzer, ” Zur Kritik der Investiturverhandlungen im Jahre 1 1 19,” in the Forschungen zur deutschen Geschichte, Band xviii. (Gottingen, 1862-1886) ; T. von Sickel and H. Bresslau, ” Die

kaiserliche Ausfertigung des Wormser Konkordats,” in the Mittheilungen des Insliituts fiir osterreichische Geschichtsforschung (Innsbruck, 1880); B. Gebhardt, Handbuch der deutschen Geschichte, Band i. (Berlin, 1901), and E. Bernheim, Ztir Geschichte des Wormser Konkordats (Gottingen, 1878).

HENRY VI. (1165-1197), Roman emperor, son of the emperor Frederick I. and Beatrix, daughter of Renaud III., count of upper Burgundy, was born at Nijmwegen, and educated under the care of Conrad of Querfurt, afterwards bishop of Hildesheim and Wiirzburg. Chosen German king, or king of the Romans, at Bamberg in June 1160, he was crowned at Aix-la-Chape!le on the 15th of August 1169, invested with lands in Germany in 1 1 79, and at Whitsuntide 11 84 his knighthood was celebrated in the most magnificent manner at Mainz. Frederick was anxious to associate his son with himself in the government of the empire, and when he left Germany in n 84 Henry remained behind as regent, while his father sought to procure his coronation from Pope Lucius III. The pope was hesitating when he heard that the emperor had arranged a marriage between Henry and Constance, daughter of the late king of Sicily, Roger I., and aunt and heiress of the reigning king, William II.; and this step, which threatenedto unite Sicily with Germany, decided him to refuse the proposal. This marriage took place at Milan on the 27th of January 1186, and soon afterwards Henry was crowned king of Italy. The claim of Henry and his wife on Sicily was recognized by the barons of that kingdom; and having been recognized by the pope as Roman

emperor elect, Henry returned to Germany, and was again appointed regent when Frederick set out on crusade in May 1189. His attempts to bring peace to Germany were interrupted by the return of Henry the Lion, duke of Saxony, in October 1180, and a campaign against him was followed by a peace made at Fulda in July 1190.

Henry's desire to make this peace was due to the death of William of Sicily, which was soon followed by that of the emperor Frederick. Germany and Italy alike seemed to need the king's presence, but for him, like all the Hohenstaufen, Italy had the greater charm, and having obtained a promise of his coronation from Pope Clement III. he crossed the Alps in the winter of 1 190. He purchased the support of the cities of northern Italy; but on reaching Rome he found Clement was dead and his successor, Celestine III., disinclined to carry out the engagement of his predecessor. The strength of the German army and a treaty made between the king and the Romans induced him, however, to crown Henry as emperor on the 14th of April 1191. The aid of the Romans had been purchased by the king's promise to place in their possession the city of Tusculum, which they had attacked in vain for three years. After the ceremony the emperor fulfilled this contract, when the city was destroyed and many of the inhabitants massacred. Meanwhile a party in Sicily had chosen Tancred, an illegitimate son of Roger, son of King Roger II., as their king, and he had already won considerable authority and was favoured by the pope. Leaving Rome Henry met with no resistance until he reached Naples, which he was

unable to take, as the ravages of fever and threatening news from Germany, where his death was reported, compelled him to raise the siege. In December 1191 he returned to Germany. Disorder was general and a variety of reasons induced both the Welfs and their earlier opponents to join in a general league against the emperor. Vacancies in various bishoprics added to the confusion, and Henry's enemies gained in numbers and strength when it was suspected that he was implicated in the murder of Albert, bishop of Liege. Henry acted energetically in fighting this formidable combination, but his salvation came from the captivity of Richard I., king of England, and the skill with which he used this event to make peace with his foes; and, when Henry the Lion came to terms in March 1194, order was restored to Germany.

In the following May, Henry made his second expedition to Italy, where Pope Celestine had definitely espoused the cause of Tancred. The ransom received from Richard enabled him to equip a large army, and aided by a fleet fitted out by Genoa and Pisa he soon secured a complete mastery over the Italian main-

land. When he reached Sicily he found Tancred dead, and, meeting with very little resistance, he entered Palermo, where he was crowned king on Christmas day n 94. A stay of a few months' duration enabled Henry to settle the affairs of the kingdom; and leaving his wife, Constance, as regent, and appointing many Germans to positions of influence, he returned to Germany in June 1195.

Having established his position in Germany and Italy, Henry began to cherish ideas of universal empire. Richard of England had already owned his supremacy, and declaring he would compel the king of France to do the same Henry sought to stir up strife between France and England. Nor did the Spanish kingdoms escape his notice. Tunis and Tripoli were claimed, and when the eastern emperor, Isaac

Angelus, asked his help, he demanded in return the cession of the Balkan peninsula. The kings of Cyprus and Armenia asked for investiture at his hands; and in general Henry, in the words of a Byzantine chronicler, put forward his demands as ” the lord of all lords, the king of all kings.” To complete this scheme two steps were necessary, a reconciliation with the pope and the recognition of his young son, Frederick, as his successor in the Empire. The first was easily accomplished; the second was more difficult. After attempting to suppress the renewed disorder in Germany, Henry met the princes at Worms in December 1195 and put his proposal before them. In spite of promises they disliked the suggestion as tending to draw them into Sicilian troubles, and avoided the emperor’s displeasure by postponing their answer. By threats or negotiations, however, Henry won the consent of about fifty princes; but though the diet which met at Wiirzburg in April 1196 agreed to the scheme, the vigorous opposition of Adolph, archbishop of Cologne, and others rendered it inopera- tive. In June 1196 Henry went again to Italy, sought vainly to restore order in the north, and tried to persuade the pope to crown his son who : had been chosen king of the Romans at Frankfort. Celestine, who had many causes of complaint against the emperor and his vassals, refused. The emperor then went to the south, where the oppression of his German officials had caused an insurrection, which was put down with terrible cruelty. At Messina on the 28th of September 1197 Henry died from a cold caught whilst hunting, and was buried at Palermo. He was a man of small frame and delicate constitution, but possessed considerable mental gifts and was skilled in knightly exercises. His ambition was immense, and to attain his ends he often resorted deliberately to cruelty and treachery. His chief recreation was hunting, and he also found pleasure in the society of the Minnesingers and in writing poems, which appear in F. H. von der Hagen’s Minnesinger (Leipzig, 1838). He left an only son Frederick, afterwards the emperor Frederick II.

The chief authorities for the life and reign of Henry VI. are Otto of Freising, Chronicon, continued by Otto of St Blasius; Godfrey of Viterbo, Gesta Friderici I. and Gesta Heinrici VI.; Giselbert of Mons, Chronicon Hanoniense, all of which appear in the Monu- m-enta G.ermaniae historica. Scriptores, Bande xx., xxi., xxii. (Hanover and Berlin, 1 826-1892), and the various annals of the time.

The best modern authorities are: W. von Giesebrecht, Geschichte der deutschen Kaiserzeit, Band iv. (Brunswick, 1877); T. Toeche, Kaiser Heinrich VI. (Leipzig, 1867); H. Bloch, Forschungen zur Politik Kaiser Heinrichs VI. (Berlin, 1892), and K. A. Kneller, Des Richard Lowenherz deutsche Gefangenschaft (Freiburg, 1893).

HENRY VII. (c. 1269-13×3), Roman emperor, son of Henry III., count of Luxemburg, was knighted by Philip IV., king of France, and passed his early days under French influences," while the French language was his mother-tongue. His father was killed in battle in 1288, and Henry ruled his tiny inheritance with justice and prudence, but came into collision with the citizens of Trier over a question of tolls. In 1292 he married Margaret (d. 1311), daughter of John I., duke of Brabant, and after the death of the German king, Albert I., he was elected to the vacant throne on the 27th of November 1308. Recognized at ottCe by the German princes and by Pope Clement V., the aspira 1 tions of the new king turned to Italy, where he hoped by restoring the imperial authority to prepare the way for the conquest of

the Holy Land. Meanwhile he strove to secure his position in Germany. The Rhenish archbishops were pacified by the restoration of the Rhine tolls, negptiations were begun with Philip IV., king of France, and with Robert, king of Naples, and the Habsburgs were confirmed in their possessions. At this time Bohemia was ruled by Henry V., duke of Carinthia, but the terrible disorder which prevailed induced some of the Bohemians to offer the crown, together with the hand of Elizabeth, daughter of the late king Wenceslas II., to John, the son of the German king. Henry accepted the offer, and in August 1310 John was invested with Bohemia and his marriage was cele- brated. Before John's coronation at Prague, however, in February 131 1, Henry had crossed the Alps. His hopes of re- uniting Germany and Italy and of restoring the empire of the Hohenstaufen were flattered by an appeal from the Ghibellines to come to their assistance, and by the fact that many Italians, sharing the sentiments expressed by Dante in his De Monorchia, looked eagerly for a restoration of the imperial authority. In October 1310 he reached Turin where, on receiving the homage of the Lombard cities, he declared that he favoured neither Guelphs nor Ghibellines, but only sought to impose peace. Having entered Milan he placed the Lombard crown upon his head on the 6th of January 13 11. But trouble soon showed itself. His poverty compelled him to exact money from the citizens; the peaceful professions of the Guelphs were insincere, and Robert, king of Naples, watched his progress with suspicion. Florence was fortified against him, and the mutual hatred of Guclph and Ghibelline was easily renewed. Risings took place in various places and, after the capture of Brescia, Henry marched to Rome only to find the city in the hands of the Guelphs and the troops of King Robert. Some street fighting

ensued, and the king, unable to obtain possession of St Peter's, was crowned emperor on the 29th of June 13 12 in the church of St John Lateran by some cardinals who declared they Only acted under compulsion. Failing to subdue Florence, the emperor from his headquarters at Pisa prepared to attack Robert of Naples, for which purpose he had allied himself with Frederick III., king of Sicily. But Clement, anxious to protect Robert, threatened Henry with excommunication. Undeterred by the threat the emperor collected fresh forces, made an alliance with the Venetians, and set out for Naples. On the march he was, however, taken ill, and died at Buonconvento near Siena on the 24th of August 1313. and was buried at Pisa. His death was attributed, probably without reason, to poison given him by a Dominican friar in the sacramental wine. Henry is described by his contemporary Albertino Mussato, in the Historia Augusta, as a handsome man, of well-proportioned figure, with reddish hair and arched eyebrows, but disfigured by a squint. He adds, among other details, that he was slow and laconic in his speech, magnanimous and devout, but impatient of any compacts with his subjects, loathing the mention of the Guelph and Ghibelline factions, and insisting on the absolute authority of the Empire over all {cuncta absoluto complectens Imperio), He was, however, a lover of justice, and as a knight both bold and skilful. He was hailed by Dante as the deliverer of Italy, and in the Paradiso the poet reserved for him a place marked by a crown.

The contemporary- documents for the life and reign of Henry VII. p.rc very numerous. Many of them are found in the Rerum Itali- enrum scrip/ores, edited by L. A. Muratori (Milan, 1723-1751), others in Pontes rerum Germanicarum, edited by J. F. Bohmer (Stuttgart, 1843-1868), and in Die Gcschichtsschreiber der deutschen Vorzcit. Riindc 79 and 80 (Leipzig, 1884). The following modern works may also be consulted: Acta Ilenrici VII. imperatoris Romanorum, edited by G. Donniges (Berlin, 1839); F. Bonaini, Acta Henrici VII. Romanorum imperatoris (Florence, 1877); T. Lindner, Deutsche Geschichte unter den Habsburgern und Luxem- biirgern (Stuttgart, 1888-1893); J. Heideniann, "Die Konigswahl Heinrichs von Luxemburg," in the Forscfntngen zur deutschen Geschichte, Band xi. (Gottingen, 1862-1886); B. Thomas, Zur Konigswahl des Grafen Heinrich von Luxemburg (Strassburg, 1875) ; I). Konig, Kritische Eriirterungen zu einigen italienischen Quelten fiir die Geschichte des Roniercuges Konigs Heinrich VII. (Gottingen, 1874): K. YYenck, Clemens V. mid Heinrich VII. (Halle, 1882); F. VV. Barthold, Der Rbmerzug Konig Heinrichs von Lutzclburg

(Konigsberg, 1830-1831); R. Pohlmann, Der Romerzug Konig

Heinrichs VII. und die Politik der Curie (Nuremberg, 1875); W. Donniges, Kritik der Quellen fiir die Geschichte Heinrichs VII. des Luxemburgers (Berlin, 1841), and G. Sommerfeldt, Die Romfahrt Kaiser Heinrichs VII. (Konigsberg, 1888).

HENRY VII. (1211-1242), German king, son of the emperor Frederick II. and his first wife Constance, daughter of Alphonso II., king of Aragon, was crowned king of Sicily in 121 2 and made duke of Swabia in 12 16. Pope Innocent III. had favoured his coronation as king of Sicily in the hope that the union of this island with the Empire would be dissolved, and had obtained a promise from Frederick to this effect. In spite of this, however, Henry was chosen king of the Romans, or German king, at Frankfort in April 1220, and crowned at Aix-la-Chapelle on the 8 th of M ay 1 2 2 2 by his guardian Engelbert , archbishop of Cologne. He appears to have spent most of his youth in Germany, and on the 1 8th of November 1225 was married at Nuremberg to Margaret (d. 1267), daughter of Leopold VI., duke of Austria. Henry's marriage was the occasion of some difference of opinion, as Engelbert wished him to marry an English princess, and the name of a Bohemian princess was also mentioned in this connexion, but Frederick insisted upon the union with Margaret. The murder of Engelbert in 1225 was followed by an increase of disorder in Germany in which Henry soon began to participate, and in 1227 he took part in a quarrel which had arisen on the death of Henry V., the childless count palatine of the Rhine. About this time the relations between Frederick and his son began to be somewhat strained. The emperor had favoured the Austrian marriage because Margaret's brother, Duke Frederick II., was childless; but Henry took up a hostile attitude towards his brother-in-law and wished to put away his wife and marry Agnes, daughter of Wenceslaus I., king of Bohemia. Other causes of trouble probably existed, for in 1231 Henry: not only refused to appear at the diet at Ravenna, but opposed the privileges granted by Frederick to the princes at Worms. In 1232, however, he submitted to his father, promising to adopt the emperor's policy and to obey his commands. He did not long keep his word and was soon engaged in thwarting Frederick's wishes in several directions, until in 1233 he took the decisive step of issuing a manifesto to the princes, and the following year raised the standard of revolt at Boppard. He obtained very little support in Germany, however, while the suspicion that he favoured heresy deprived him of encouragement from the pope. On the other hand, he succeeded in forming an alliance with the Lombards in December 1234, but his few supporters fell away when the emperor reached Germany in 1235, and, after a vain attack on Worms, Henry submitted and was kept for some time as a prisoner in

Germany, though his formal deposition as Gernian king was not considered necessary, as he had broken the oath taken in 1232. He was soon removed to San Felice in Apulia, and afterwards to Martirano in Calabria, where he died, prob- ably by his own hand, on the 12th of February 1242, and was buried at Cosenza. He left two sons, Frederick and Henry, both of whom died in Italy about 1251.

See J. Rohden, Der Sturz Heinrichs VII. (Gottingen, 1883) ; F. . W, Schirrmacher, Die letzten Hohenstaufen (Gottingen, 1871), and E.

Winkelmann, Kaiser Friedrich II. (Leipzig, 1889). l

HENRY RASPE (c. 1202-1247), German king and landgrave of Thuringia, was the second surviving son of Hermann 1 , landgrave of Thuringia, and Sophia, daughter of Otto I., duke of Bavaria. When his brother the landgrave Louis IV. died in Italy in September 1227, Henry seized the government OL. Thuringia and expelled his brother's widow, St Elizabeth of Hungary, and her son Hermann. With some trouble Henry made good his position, although his nephew Hermann II. was nominally the landgrave, and was declared of age in 1237. Henry, who governed with a zealous regard for his own interests, remained loyal to the emperor Frederick II. during his quarrel with the Lombards and the revolt of his son Henry. In 1236 he accompanied the emperor on a campaign against Frederick II., duke of Austria, and took part in the election of his son Conrad as German king at Vienna in 1 237. He appears, however, to have become somewhat estranged from Frederick after this

expedition, for he did not appear at the diet of Verona in 1238; and it is not improbable that he disliked the betrothal of his nephew Hermann to the emperor's daughter Margaret. At all events, when the projected marriage had been broken off the landgrave publicly showed his loyalty to the emperor in 1239 in opposition to a plan formed by various princes to elect an anti-king. Henry, whose attitude at this time was very important to Frederick, was probably kept loyal by the in- fluence which his brother Conrad, grand-master of the Teutonic Order, exercised over him, for after the death of this brother in 1 241 Henry's loyalty again wavered, and he was himself mentioned as a possible anti-king. Frederick's visit to Germany in 1242 was successful in preventing this step for a time, .and in May of that year the landgrave was appointed administrator of Germany for

King Conrad; and by the death of his nephew in this year he became the nominal, as well as the actual, ruler of Thuringia. Again he coptemplated deserting the cause of Frederick, and in April 1246 Pope Innocent IV. wrote to the German princes advising them to choose Henry as their king in place of Frederick who had just been declared deposed. Acting on these instructions, Henry was elected at Veitshochheim on the 22nd of May 1246, and owing to the part played by the spiritual princes in this election was called the PJajfenkonig, or parsons' king. Collecting an army, he defeated King Conrad near Frankfort on the 5th of August 1246, and then, after holding a diet at Nuremberg, undertook the siege of Ulm. But he was soon compelled to give up this enterprise, and returning to Thuringia died at the Wartburg on the 17th of February 1247. Henry married Gertrude, sister of Frederick II., duke of Austria, but left no children, and on his death the male line of his family became extinct.

See F. Reuss, Die Wahl Heinrich Raspes (Lildenscheid, 1878); A. Riibesamen, Landgraf Heinrich Raspe von Thilringen (Halle, 1885); F. W. Schirrmacher, Die letzten Hohenstaufen (Gottingen, 1871); E. Winkelmann, Kaiser Friedrich . 1 1 . (Leipzig, 1889), and T. Knochenhauer, Geschichte Thiiringens zur Zeit des ersten Land- grafenhauses (Gotha, 1871).

HENRY (c. 1174-1216), emperor of Romania, or Constan- tinople, was a younger son of Baldwin, count of Flanders and Hainaut (d. 1195). Having joined the Fourth Crusade about 1 201, he distinguished himself at the siege of Constantinople in 1204 and elsewhere, and soon became prominent among the princes of the new Latin empire of Constantinople. When his brother, the emperor Baldwin I., was captured at the battle of Adrianople in April 1 205, Henry was chosen regent of the empire, succeeding to the throne when the news of Baldwin's death arrived. He was crowned on the 20th of August 1205. Henry was a wise ruler, whose reign was largely passed in successful struggles with the Bulgarians and with his rival, Theodore Lascaris I., emperor of Nicaea. Henry appears to have been brave but not cruel, and tolerant but not weak; possessing " the superior courage to oppose, in a superstitious age, the pride and avarice of the clergy." The emperor died, poisoned, it is said, by his Greek wife, on the nth of June 12 16.

See Gibbon's Decline and Fail of the Roman Empire, vol. vi. (ed. J. B. Bury, 1898).

HENRY I. (1068-1135), king of England, nicknamed Beau- clerk, the fourth and youngest son of William I. by his queen Matilda of

Flanders, was born in 1068 on English soil. Of his life before 1086, when he was ‘solemnly knighted by his father at Westminster, we know little. He was his mother’s favourite, and she bequeathed to him her English estates, which, however, he was not permitted to hold in his father’s lifetime. Henry received a good education, of which in later life he was proud; he is credited with the saying that an unlettered king is only a crowned ass. His attainments included Latin, which he could both read and write; he knew something of the English laws and language, and it may have been from an interest in natural history that he collected, during his reign, the Woodstock menagerie which was the admiration of his subjects. But from 1087 his life was one of action and vicissitudes which left him little leisure. Receiving, under the Conqueror’s last dis- positions, a legacy of five thousand pounds of silver, but no land,

he traded upon the pecuniary needs of Duke Robert of Normandy, from whom he purchased, for the small sum of £3000, the district of the Cotentin. He negotiated with Rufus to obtain the possession of their mother’s inheritance, but only incurred thereby the suspicions of the duke, who threw him into prison. In 1090 the prince vindicated his loyalty by suppressing, on Robert’s behalf, a revolt of the citizens of Rouen which Rufus had fomented. But when his elder brothers were reconciled in the next year they combined to evict Henry from the Cotentin. He dissembled his resentment for a time, and lived for nearly two years in the French Vexin in great poverty. He then accepted from the citizens of Domfront an invitation to defend them against Robert of Belleme; and subsequently, coming to an agreement with Rufus, assisted the king in making war on their elder brother Robert. When Robert’s departure for the First Crusade left Normandy in the hands of Rufus (1096) Henry took service under the latter, and he was in the royal hunting train on the day of Rufus’s death (August 2nd, 1 100). Had Robert been in Normandy the claim of Henry to the English crown might have been effectually opposed. But Robert only returned to the duchy a month after Henry’s coronation. In the meantime the new king, by issuing his famous charter, by recalling Anselm, and by choosing the Anglo-Scottish princess Edith-Matilda, daughter of Malcolm III., king of the Scots, as his future queen, had cemented that alliance with the church and with the native English which was the foundation of his greatness. Anselm preached in his favour, English levies marched under the royal banner both to repel Robert’s invasion (1101) and to crush the revolt of the Mont- gomeries headed by Robert of Belleme (1102). The alliance of crown and church was subsequently imperilled by the question of Investitures (1103-1106). Henry was sharply criticized for his ingratitude to

Anselm (q.v.), in spite of the marked respect which he showed to the archbishop. At this juncture a sentence of excommunication would have been a dangerous blow to Henry's power in England. But the king's diplomatic skill enabled him to satisfy the church without surrendering any rights of conse- quence (1106); and he skilfully threw the blame of his previous conduct upon his counsellor, Robert of Meulan. Although the Peterborough Chronicle accuses Henry of oppression in his early years, the nation soon learned to regard him with respect. William of Malmesbury, about 1125, already treats Tinchebrai (rio6) as an English victory and the revenge for Hastings. Henry was disliked but feared by the baronage, towards whom he showed gross bad faith in his disregard of his coronation promises. In 11 10 he banished the more conspicuous mal- contents, and from that date was safe against the plots of his English feudatories.

With Normandy he had more trouble, and the military skill which he had displayed at Tinchebrai was more than once put to the test against Norman rebels. His Norman, like his English administration, was popular with the non-feudal classes, but doubtless oppressive towards the barons. The latter had abandoned the cause of Duke Robert, who remained a prisoner in England till his death (1134); but they embraced that of Robert's son William the Clito, whom Henry in a fit of generosity had allowed to go free after Tinchebrai. The Norman con- spiracies of 1112, 1118, and 1123-24 were all formed in the Clito's interest. Both France and Anjou supported this pre- tender's cause from time to time; he was always a thorn in Henry's side till his untimely death at Alost (112S), but more especially after the catastrophe of the White Ship (112c) deprived the king of his only lawful son. But Henry emerged from these complications with enhanced prestige. His campaigns had been uneventful, his chief victory (Bremule, 1119) was little more than a skirmish. But he had held his own as a general, and as a diplomatist he had shown surpassing skill. The chief triumphs of his foreign policy were the marriage of his daughter Matilda to the emperor Henry V. (1114) which saved Normandy in 1124; the detachment of the pope, Calixtus II., from the side of France and the Clito (1119), and the Angevin marriages which he arranged for his son William Aetheling (n 19) and for

the widowed empress Matilda (1129) after her brother's death. This latter match, though unpopular in England and Normandy, was a fatal

blow to the designs of Louis VI., and prepared the way for the expansion of English power beyond the Loire. After 1 1 24 the disaffection of Normandy was crushed. The severity with which Henry treated the last rebels was regarded as a blot upon his fame; but the only case of merely vindictive punishment was that of the poet Luke de la Barre, who was sentenced to lose his eyes for a lampoon upon the king, and only escaped the sentence by. committing suicide.

Henry's English government was severe and grasping; but he "kept good peace" and honourably distinguished himself among contemporary statesmen in an age when administrative reform was in the air. He spent more time in Normandy than in England. But he showed admirable judgment in his choice of subordinates; Robert of Meulan, who died in 1118, and Roger of Salisbury, who survived his master, were statesmen of no common order; and Henry was free from the mania of attending in person to every detail, which was the besetting sin of medieval sovereigns. As a legislator Henry was conservative. He issued few ordinances; the unofficial compilation known as the Leges Henrici shows that, like the Conqueror, he made it his ideal to maintain the " law of Edward." His itinerant justices were not altogether a novelty in England or Normandy. It is characteristic of the man that the exchequer should be the chief institution created in his reign. The eulogies of the last Peterborough Chronicle on his government were written after the anarchy of Stephen's reign had invested his predecessor's " good peace " with the glamour of a golden age. Henry was respected and not tyrannous. He showed a lofty indifference to criticism such as that of Eadmer in the Historia novorum, which was published early in the reign. He showed, on some occasions, great deference to the opinions of the magnates. But dark stories, some certainly unfounded, were told of his prison-houses. Men thought him more cruel and more despotic than he actually was.

Henry was twice married. After the death of his first wife, Matilda (1080-1118), he took to wife Adelaide, daughter of Godfrey, count of Louvain (1121), in the hope of male issue: But the marriage proved childless, and the empress Matilda was designated as her father's successor, the English baronage being compelled to do her homage both in n 26, and again, after the Angevin marriage, in 1131. He had many illegitimate sons and daughters by various mistresses. Of these bastards the most important is Robert, earl of Gloucester, upon whom fell the main burden of defending Matilda's title against Stephen.

Henry died near Gisors on the 1st of December, 1135, in the thirty-sixth year of his reign, and was buried in the abbey of Reading which he himself had founded.

Original Authorities. — ThePeterboroughChronicle(ed.P\ummer, Oxford, 1882-1889); Florence of Worcester and his first continuator (ed. B. Thorpe, 1848-1849); Eadmer, Historia novorum (ed. Rule, Rolls Series, 1884); William of Malmesbury, Gesta regum and Historia novella (ed. Stubbs, Rolls Series, 1887-1889); Henry of Huntingdon, Historia Anglorum (ed. Arnold, Rolls Series, 1879); Simeon of Durham (ed. Arnold, Rolls Series, 1882-1885); Orderic Yitalis, Historia eccles'astica (ed. le Prevost, Paris, 1838-1855); Robert of Torigni, Chronica (ed. Howlett, Rolls Series, 1889), and Continuatio Willelmi Gemmeticensis (ed. Duchesne, Hist. Norman- norum scriptores, pp. 215-317, Paris, 1619). See also the Pipe Roll of 31 H. I. (ed. Hunter, Record Commission, 1833) ; the documents in \V. Stubbs's Select Chapters (Oxford, 1895); the Leges Henrici in Liebermann's Gesetze der Angel-Sachsen (Halle, 1898, &c.) ; and the same author's monograph, Leges Henrici (Halle, 1901); the treaties, &c, in the Record Commission edition of Thomas Rymer's Foedera, vol. i. (1816).

Modern Authorities. — E. A. Freeman, History of the Norman Conquest, vol. v.; J. M. Lappenberg, History of England under the Norman Kings (tr. Thorpe, Oxford, 1857); Kate Norgate, England under the Angevin Kings, vol. i. (1887); Sir James Ramsay, Foundations of England, vol. ii. ; W. Stubbs, Constitutional History, vol. i. ; H. \V. C. Davis, England under the Normans and Angevins; Hunt and Poole, Political History of England, vol. ii. (H. W. C. D.)

HENRY II. (1133-1180), king of England, son of Geoffrey Plantagenet, count of Anjou, by Matilda, daughter of Henry I., was born at Le Mans on the 25th of March 1133. He was

brought to England during his mother's conflict with Stephen (1142), and was placed under the charge of a tutor at Bristol. He returned to Normandy in 1 146. He next appeared on English soil in 1149 1 when he came to court the help of Scotland and the English baronage against King Stephen. The second visit was of short duration. In n 50 he was invested with Normandy by his father, whose death in the next year made him also count of Anjou. In 1152 by a marriage with Eleanor of Aquitaine, the divorced wife of the French king Louis VII., he acquired Poitou, Guienne and Gascony; but in doing so incurred the ill-will of his suzerain from which he suffered not a little in the future. Lastly in n 53 he was able, through the aid of the Church and his mother's partisans, to extort from Stephen the recognition of his claim to the English succession; and this claim Was asserted without opposition immediately after Stephen's death (25th of October n 54). Matilda retired into seclusion, although she possessed, until her death

(1167), great influence with her son.

The first years of the reign were largely spent in restoring the public peace and recovering for the crown the lands and pre- rogatives which Stephen had bartered away. Amongst the older partisans of the Angevin house the most influential were Archbishop Theobald, whose good will guaranteed to Henry the support of the Church, and Nigel, bishop of Ely, who presided at the exchequer. But Thomas Becket, archdeacon of Canter- bury, a younger statesman whom Theobald had discovered and promoted, soon became all-powerful. Becket lent himself entirely to his master's ambitions, which at this time centred round schemes of territorial aggrandizement. In 1155 Henry asked and obtained from Adrian IV. a licence to invade Ireland, which the king contemplated bestowing upon his brother, William of Anjou. This plan was dropped; but Malcolm of Scotland was forced to restore the northern counties which had been ceded to David; North Wales was invaded in 1157; and in 1 1 59 Henry made an attempt, which was foiled by the inter- vention of Louis VII., to assert his wife's claims upon Toulouse. After vainly invoking the aid of the emperor Frederick I., the young king came to terms with Louis (1160), whose daughter was betrothed to Henry's namesake and heir. The peace proved unstable, and there was desultory skirmishing in 1161. The following year was chiefly spent in reforming the government of the continental provinces. In 1163 Henry returned to England, and almost immediately embarked on that quarrel with the Church which is the keynote to the middle period of the reign.

Henry had good cause to complain of the ecclesiastical courts, and had only awaited a convenient season to correct abuses which were admitted by all reasonable men. But he allowed the question to be complicated by personal issues. He was bitterly disappointed that Becket, on whom he bestowed the primacy, left vacant by the death of Theobald (1162), at once became the champion of clerical privilege; he and the archbishop were no longer on speaking terms when the Constitutions of Clarendon came up for debate. The king's demands were not intrinsically irreconcilable with the canon law, and the papacy would probably have allowed them to take effect sub silentio, if Becket (q.v.) had not been goaded to extremity by persecution in the forms of law. After Becket's flight (1164), the king put himself still further in the wrong by impounding the revenues of Canterbury and banishing at one stroke a number of the archbishop's friends and connexions. He showed, however, considerable dexterity in playing off the emperor against Alexander III. and Louis VII., and contrived for five yeaj"s, partly by these means, partly by insincere negotiations with Becket, to stave off a papal interdict upon his dominions. When,

in July 1 1 70, he was forced by Alexander's threats to make terms with Becket, the king contrived that not a word should be said of the Constitutions. He undoubtedly hoped that in this matter he would have his way when Becket should be more in England and within his grasp. For the murder of Becket (Dec. 29, 1 1 70) the king cannot be held responsible, though the

1 For a supposed visit in 1 147, see J. H. Round in English Historical Review, v. 747.

deed was suggested by his impatient words. It was a misfortune to the royal cause; and Henry was compelled to purchase the papal absolution by a complete surrender on the question of criminous clerks (1172). When he heard of the murder he was panic-stricken; and his expedition to Ireland (n 71), although so momentous for the future, was originally a mere pretext for placing himself beyond the reach of Alexander's censures.

Becket's fate, though it supplied an excuse, was certainlynot the real cause of the troubles with his sons which disturbed the king's later years (1173-1189). But Henry's misfortunes were largely of his own making. Queen Eleanor, whom he alienated by his faithlessness, stirred up her sons to rebellion; and they had grievances enough to be easily persuaded. Henry was an affectionate but a suspicious and close-handed father. The titles which he bestowed on them carried little power, and served chiefly to denote the shares of the paternal inheritance which were to be theirs after his death. The excessive favour which he showed to John, his youngest-born, was another cause of heart-burning; and Louis, the old enemy, did his utmost to foment all discords. It must, however, be remembered in Henry's favour, that the supporters of the princes, both in England and in the foreign provinces, were animated by resent- ment against the soundest features of the king's administration; and that, in the rebellion of 1173, he received from the English commons such hearty support that any further attempt to raise a rebellion in England was considered hopeless. Henry, like his grandfather, gained in popularity with every year of his reign. In 1183 the death of Prince Henry, the heir-apparent, while engaged in a war against his brother Richard and their father, secured a short interval of peace. But in 1184 Geoffrey of Brittany and John combined with their father's leave to make war upon Richard, now the heir-apparent. After Geoffrey's death (1186)

the feud between John and Richard drove the latter into an alliance with Philip Augustus of France. The ill-success of the old king in this war aggravated the disease from which he was suffering; and his heart was broken by the dis- covery that John, for whose sake he had alienated Richard, was in secret league with the victorious allies. Henry died at Chinon on the 6th of July 1180, and was buried at Fontevraud. By Eleanor of Aquitaine the king had five sons and three daughters. His eldest son, William, died young; his other sons, Henry, Richard, Geoffrey and John, are all mentioned above. His daughters were: Matilda (1156-1180), who became the wife of Henry the Lion, duke of Saxony; Eleanor (1162-1214), who married Alphonso III., king of Castile;, and Joanna, who, after the death of William of Sicily in 1189, became the wife of Ray- mund VI., count of Toulouse, having previously accompanied her brother, Richard, to Palestine. He had also three illegiti- mate sons: Geoffrey, archbishop of York; Morgan; and William Longsword, earl of Salisbury.

Henry's power impressed the imagination of his contem- poraries, who credited him with aiming at the conquest of France and the acquisition of the imperial title. But his ambitions of conquest were comparatively moderate in ;his later years. He attempted to secure Maurienne and Savoy for John by a marriage-alliance, for which a treaty was signed in n 73. But the project failed through the death of the intended bride; nor did the marriage of his third daughter, the princess Joanna (1 165-1 199), with William II., king of Sicily {1 177) lead to English intervention in Italian politics. Henry once declined an offer of the Empire, made by the opponents of Frederick Barbarossa; and he steadily supported the young Philip Augustus against the intrigues of French feudatories. The conquest of Ireland was carried out independently of his assistance, and perhaps against his wishes. He asserted his suzerainty over Scotland by the treaty of Falaise (1175), but not so stringently as to pro- voke Scottish hostility. This moderation was partly due to the embarrassments produced by the ecclesiastical question atnd the rebellions of the princes. But Henry, despite a violent and capricious temper, had a strong taste for the work of a legislator and administrator. He devoted infinite pains and thought to \he reform of government both in England and Normandy.

The legislation of his reign was probably in great part of his own contriving. His supervision of the law courts was close and jealous; he transacted a great amount of judicial business in his own person, even after he had formed a high court of justice which might sit without his personal presence. To these activities he devoted his scanty intervals of leisure. His govern- ment was stern; he over-rode the privileges of

the baronage without regard to precedent; he persisted in keeping large districts under the arbitrary and vexatious jurisdiction of the forest-courts. But it is the general opinion of historians that he had a high sense of his responsibilities and a strong love of justice; despite the looseness of his personal morals, he com- manded the affection and respect of Gilbert Foliot and Hugh of Lincoln, the most upright of the English bishops.

Original Authorities.— Henry's laws are printed in W. Stubb's Select Charters (Oxford, 1895). The chief chroniclers of his reign are William of Newburgh, Ralph de Diceto, the so-called Benedict of Peterborough, Roger of Hoveden, Robert de Torigni (or de Monte), Jordan Fantosme, Giraldus Cambrensis, Gervase of Canterbury; all printed in the Rolls Series. The biographies and letters contained in the 7 vols, of Materials for the History of Thomas Becket (ed. J. C. Robertson, Rolls Series, 1875-1885) are valuable for the early and middle part of the reign. For Irish affairs the Song of Dermot (ed. Orpen, Oxford, 1892), for the rebellions of the princes the metrical Hisioire de Guillaume le Marechal (ed. Paul Meyer, 3 vols., Paris, 1891, &c.) are of importance. Henry's legal and administrative reforms are illustrated by the Traclatus de legibus attributed to Ranulph Glanville, his chief justiciar (ed. G. Phillips, Berlin, 1828); by the Dialogus de scaccario of Richard fitz Nigel (Oxford, 1902) ; the Pipe Rolls, printed by J. Hunter for the Record Commission (1844) and by the Pipe-Roll Society (London, 1884, &c.) supply valuable details. The works of John of Salisbury (ed. Giles, 1848), Peter of Blois (ed. Migne), Walter Map (Camden Society, 1841, 1850) and the letters of Gilbert Foliot (ed. J. A. Giles, Oxford, 1845) are useful for the social and Church history of the reign.

Modern Authorities. — R. W. Eyton, Itinerary of Henry II. (London, 1878); W. Stubbs, Constitutional History, vol. i. (Oxford, 1893), Lectures on Medieval and Modern History (Oxford, 1886) and Etirly Plantagenets (London, 1876); the same author's introduction to the Rolls editions of "Benedict," Gervase, Diceto, Hoveden; Mrs J. R. Green, Henry II. (London, 1888); Miss K. Norgate, England under (he Angevin Kings (2 vols., London, 1887) ; Sir J. H. Ramsay's The Angevin Empire (London, 1893); H. W. C. Davis's England under the Normans and Angevins (London, 1905) ; Sir F. Pollock and F. W. Maitland, History of English Law (2 vols., Cam- bridge, 1898) ; and F. Hardegen, Imperialpolitih Konig Heinrichs II. von England (Heidelberg, 1905). (H. W. C. D.)

HENRY III. (1207-1272), king of England, was the eldest son of King John by Isabella of Angouleme. Born on the 1st of October 1207, the prince was but nine years old at the time of his father's death. The

greater part of eastern England being in the hands of the French pretender, Prince Louis, afterwards King Louis VIII., and the rebel barons, Henry was crowned by his supporters at Gloucester, the western capital. John had committed his son tc the protection of the Holy See; and a share in the government was accordingly allowed to the papal legates, Gualo and Pandulf, both during the civil war and for some time afterwards. But the title of regent was given by the loyal barons to William Marshal, the aged earl of Pembroke; and Peter des Roches, the Poitevin bishop of Winchester, received the charge of the king's person. The cause of the young Henry was fully vindicated by the close of the year 121 7. Defeated both by land and sea, the French prince renounced his pretensions and evacuated England, leaving the regency to deal with the more difficult questions raised by the lawless insolence of the royal partisans. Henry remained a passive spectator of the measures by which William Marshal (d. 1219), and his successor, the justiciar Hubert de Burgh, asserted the royal prerogative against native barons and foreign mercenaries. In 1223 Honorius III. declared the king of age, but this was a mere formality, intended to justify the resumption of the royal castles and demesnes which had passed into private hands during the commotions of the civil war.

The personal rule of Henry III. began in 1227, when he was again proclaimed of age. Even then he remained for some time under the influence of Hubert de Burgh, whose chief rival, Peter des Roches, found it expedient to quit the kingdom for four years. But Henry was ambitions to recover the continental

possessions which his father had lost. Against the wishes of the justiciar he planned and carried out an expedition to the west of France (1230); when it failed he laid the blame upon his minister. Other differences arose soon afterwards. Hubert was accused, with some reason, of enriching himself at the ex- pense of the crown, and of encouraging popular riots against the alien clerks for whom the papacy was providing at the expense of the English Church. He was disgraced in 1232; and power passed for a time into the hands of Peter des Roches, who filled the administration with Poitevins. So began the period of misrule by which Henry III. is chiefly remembered ih history. The Poitevins fell in 1234; they were removed at the demand of the barons and the primate Edmund Rich, who held them responsible for the tragic fate of the rebellious Richard Marshal. But the king replaced them with a new clique of servile and rapacious

favourites. Disregarding the wishes of the Great Council, and excluding all the more important of the barons and bishops from office, he acted as his own chief minister and never condescended to justify his policy except when he stood in need of subsidies. When these were refused, he extorted aids from the towns, the Jews or the clergy, the three most defenceless interests in the kingdom. Always in pecuniary straits through his extravagance, he pursued a foreign policy which would have been expensive under the most careful management. He hoped not only to regain the French possessions but to establish members of his own family as sovereigns in Italy and the Empire. These plans were artfully fostered by the Savoyard kinsmen of Eleanor, daughter of Raymond Berenger, count of Provence, whom he married at Canterbury in January 1236, and by his half-brothers, the sons of Queen Isabella and Hugo, count of la Marche. These favourites, not content with pushing their fortunes in the English court, encouraged the king in the wildest designs. In 1242 he led an expedition to Gascony which ter- minated disastrously with the defeat of Taillebourg; and hostilities with France were intermittently continued for seven- teen years. The Savoyards encouraged his natural tendency to support the Papacy against the Empire; at an early date in the period of misrule he entered into a close alliance with Rome, which resulted in heavy taxation of the clergy and gave great umbrage to the barons. A cardinal-legate was sent to England at Henry's request, and during four years (1237-1241) admini- stered the English Church in a manner equally profitable to the king and to the pope. After the recall of the legate Otho the alliance was less open and less cordial. Still the pope continued to share the spoils of the English clergy with the king, and the king to enforce the demands of Roman tax-collectors.

Circumstances favoured Henry's schemes. Archbishop Edmund Rich was timid and inexperienced; his successor, Boniface of Savoy, was a kinsman of the queen; Grosseteste, the most eminent of the bishops, died in 1253, when he was on the point of becoming a popular hero. Among the lay barons, the first place naturally belonged to Richard of Cornwall who, as the king's brother, was unwilling to take any steps which might impair the royal prerogative; while Simon de Montfort, earl of Leicester, the ablest man of his order, was regarded with suspicion as a foreigner, and linked to Henry's cause by his marriage with the princess Eleanor. Although the Great Council repeatedly protested against the king's misrule and extravagance, their remonstrances came to nothing for want of leaders and a clear-cut policy. But between 1248 and 1252 Henry alienated Montfort from his cause by taking the side of the Gascons, whom the earl had provoked

to rebellion through his rigorous administration of their duchy. A little later, when Montfort was committed to opposition, Henry foolishly accepted from Innocent IV. the crown of Sicily for his second son Edmund Crouchback (1255). Sicily was to be conquered from the Hohenstaufen at the expense of England; and Henry pledged his credit to the papacy for enormous subsidies, although years of comparative inactivity had already overwhelmed him with debts. On the publication of the ill-considered bargain the baronage at length took vigorous action. They forced upon the king the Provisions of Oxford (1258), which placed the govern-

ment in the hands of a feudal oligarchy; they reduced expendi- ture, expelled the alien favourites from the kingdom, and insisted upon a final renunciation of the French claims. The king submitted for the moment, but at the first opportunity endeavoured to cancel his concessions. He obtained a papal absolution from his promises; and he tricked the opposition into accepting the arbitration of the French king, Louis IX., whose verdict was a foregone conclusion. But Henry was incapable of protecting with the strong hand the rights which he had recovered by his double-dealing. Ignominiously defeated by Montfort at Lewes (1264) he fell into the position of a cipher, equally despised by his opponents and supporters. He acquiesced in the earl's dictatorship; left to his eldest son, Edward, the difficult task of reorganizing the royal party; marched with the Montfortians to Evesham; and narrowly escaped sharing the fate of his gaoler. After Evesham he is hardly mentioned by the chroniclers. The compromise with the surviving rebels was arranged by his son in concert with Richard of Cornwall and the legate Ottobuono; the statute of Marlborough (1267), which purchased a lasting peace by judicious concessions, was similarly arranged between Edward and the earl of Gloucester. Edward was king in all but name for some years before the death of his father, by whom he was alternately suspected and adored.

Henry had in him some of the elements of a fine character. His mind was cultivated; he was a discriminating patron of literature, and Westminster Abbey is an abiding memorial of his artistic taste. His personal morality was irreproachable, except that he inherited the Plantagenet taste for crooked courses and dissimulation in political affairs; even in this respect the king's reputation has suffered unduly at the hands of Matthew Paris, whose literary skill is only equalled by his malice. The ambitions which Henry cherished, if extravagant, were never sordid; his patriotism, though seldom attested by practical measures, was thoroughly sincere. Some of his worst actions as a politician were due to a sincere, though exaggerated, gratitude for the support which the Papacy had given him during his minority. But he

had neither the training nor the temper of a statesman. His dreams of autocracy at home and far- reaching dominion abroad were anachronisms in a century of constitutional ideas and national differentiation. Above all he earned the contempt of Englishmen and foreigners alike by the instability of his purpose. Matthew Paris said that he had a heart of wax; Dante relegated him to the limbo of ineffectual souls; and later generations have endorsed these scathing judgments.

Henry died at Westminster on the 16th of November 1272; his widow, Eleanor, took the veil in 1276 and died at Amesbury on the 25th of June 1291. Their children were: the future king Edward I.; Edmund, earl of Lancaster; Margaret (1240-1275), the wife of Alexander III., king of Scotland; Beatrice; and Katherine.

Original Authorities. — Roger of Wendover, Flores hisloriarum (ed. H. O. Coxe, 4 vols., 1 841-1844) ; and Matthew of Paris, Chronica majora (ed. H. R. Luard, Rolls Series, 7 vols., 1872-1883) are the chief narrative sources. See also the Annates monastici (ed. H.'R. Luard, Rolls Series, 5 vols., 1 864-1 869) ; the collection of Royal and other Historical Letters edited by W. Shirley (Rolls Series, 2 vols., 1 862-1 866) ; the Close and Patent Rolls edited for the Record Com- mission and the Master of the Rolls; the Epistolae Roberti Grosse- teste (ed. H. R. Luard, Rolls Series, 1861); the Monumenta Francis- cana, vol. i. (ed. J. S. Brewer, Rolls Series, 1858) ; the documents in the new Foedera, vol. i. (Record Commission, 1816).

Modern Works. — G. J. Turner's article on the king's minority in Transactions of the Royal Historical Society, New Series, vol. xvrii. ; Dom Gasquet s Henry III. and the Church (1905) ; the lives of Simon de Montfort by G. W. Prothero (1871), R. Pauli (Eng. ed., 1876) and C. B6mont (Paris, 1884); W. Stubbs's Constitutional History of England, vol. ii. (1887) ; R. Pauli's Geschichte von England, vol. iii. (Hamburg, 1853); T. F. Tout in the Political History of England, vol. iii. (1905), and H. W. C. Davis in England under the Normans and Angevins (1905). (H. W. C. D.)

HENRY IV. (1367-1413), king of England, son of John of Gaunt, by Blanche, daughter of Henry, duke of Lancaster, was born on the 3rd of April 1367, at Bolingbroke in Lincolnshire. As early as 1377 he is styled earl of Derby, and in 1380 he married

Mary de Bohun (d. 1394) one of the co-heiresses of the last earl of Hereford. In 1387 he supported his uncle Thomas, duke of Gloucester, in his armed opposition to Richard II. and his favourites. Afterwards, probably through his father's influence, he changed sides. He was already distinguished for his knightly prowess, and for some years devoted himself to adventure. He thought of going on the crusade to Barbary; but instead, in July 1390, went to serve with the Teutonic knights in Lithuania. He came home in the following spring, but next year went again to Prussia, whence he journeyed by way of Venice to Cyprus and Jerusalem. After his return to England he sided with his father and the king against Gloucester, and in 1397 was made duke of Hereford. In January 1398 he quarrelled with the duke of Norfolk, who charged him with treason. The dispute was to have been decided in the lists at Coventry in September; but at the last moment Richard intervened and banished them both.

When John of Gaunt died in February 1399 Richard, contrary to his promise, confiscated the estates of Lancaster. Henry then felt himself free, and made friends with the exiled Arundels. Early in July, whilst Richard was absent in Ireland, he landed at Ravenspur in Yorkshire. He was at once joined by the Percies; and Richard, abandoned by his friends, surrendered at Flint on the 19th of August. In the parliament, which assembled on the 30th of September, Richard was forced to abdicate. Henry then made his claim as coming by right line of blood from King Henry III., and through his right to recover the realm which was in point to be undone for default of govern- ance and good law. Parliament formally accepted him, and thus Henry became king, " not so much by title of blood as by popular election " (Capgrave). The new dynasty had consequently a constitutional basis. With this Henry's own political sympathies well accorded. But though the revolution of 1399 was popular in form, its success was due to an oligarchical faction. From the start Henry was embarrassed by the power and pretensions of the Percies. Nor was his hereditary title so good as that of the Mortimers. To domestic troubles was added the complication of disputes with Scotland and France. The first danger came from the friends of Richard, who plotted prematurely, and were crushed in January 1400. During the summer of 1400 Henry made a not over-successful expedition to Scotland. The French court would not accept his overtures, and it was only in the summer of 1401 that a truce was patched up by the restoration of Richard's child-queen, Isabella of Valois. Meantime a more serious trouble had arisen through the outbreak of the Welsh revolt under Owen Glendower (q.v.). In 1400 and again in each of the two following autumns Henry invaded Wales in vain. The success of the Percies over the Scots at

Homildon Hill (Sept. 1402) was no advantage. Henry Percy (Hotspur) and his father, the earl of Northumberland, thought their services ill-requited, and finally made common cause with the partisans of Mortimer and the Welsh. The plot was frustrated by Hotspur's defeat at Shrewsbury (21st of July 1403); and Northumberland for the time submitted. Henry had, however, no one on whom he could rely outside his own family, except Archbishop Arundel. The Welsh were unsubdued; the French were plundering the southern coast; Northumberland was fomenting trouble in the north. The crisis came in 1405. A plot to carry off the young Mortimers was defeated; but Mowbray, the earl marshal, who had been privy to it, raised a rebellion in the north supported by Archbishop Scrope of York. Mowbray and Scrope were taken and beheaded; Northumberland escaped into Scotland. For the execution of the archbishop Henry was personally responsible, and he could never free himself from its odium. Popular belief regarded his subsequent illness as a judgment for his impiety. Apart from ill-health and unpopularity Henry had succeeded — relations with Scotland were secured by the capture of James, the heir to the crown; Northumberland was at last crushed at Bramham Moor (Feb. 1408) ; and a little later the Welsh revolt was mastered.

Henry, stricken with sore disease, was unable to reap the advantage. His necessities had all along enabled the Commons

to extort concessions in parliament, until in 1406 he was forced to nominate a council and govern by its advice. However, with Archbishop Arundel as his chancellor, Henry still controlled the government. But in January 1410 Arundel had to give way to the king's half-brother, Thomas Beaufort. Beaufort and his brother Henry, bishop of Winchester, were opposed to Arundel and supported by the prince of Wales. For two years the real government rested with the prince and the council. Under the prince's influence the English intervened in France in 141 1 on the side of Burgundy. In this, and in some matters of home politics, the king disagreed with his ministers. There is good reason to suppose that the Beauforts had gone so far as to con- template a forced abdication on the score of the king's ill-health. However, in November 141 1 Henry showed that he was still capable of vigorous action by discharging the prince and his sup-porters. Arundel again became chancellor, and the king's second son, Thomas, took his brother's place. The change was further marked by the sending of an expedition to France in support of Orleans. But Henry's health was failing steadily. On the 20th of March 1413, whilst praying in Westminster Abbey he was seized with a fainting fit, and died that same evening in the Jerusalem Chamber. At the time he was

believed to have, been a leper, but as it would appear without sufficient reason.

As a young man Henry had been chivalrous and adventurous, and in politics anxious for good government and justice. As king the loss and failure of friends made him cautious, suspicious and cruel. The persecution of the Lollards, which began with the burning statute of 1401, may be accounted for by Henry's own orthodoxy, or by the influence of Archbishop Arundel, his one faithful friend. But that political Lollardry was strong is shown by the proposal in the parliament of 1410 for a wholesale confiscation of ecclesiastical property. Henry's faults may be excused by his difficulties. Throughout he was practical and steadfast, and he deserved credit for maintaining his principles as a constitutional ruler. So after all his troubles he founded his dynasty firmly, and passed on the crown to his son with a better title. He is buried under a fine tomb at Canterbury.

By Mary Bohun Henry had four sons: his successor Henry V., Thomas, duke of Clarence, John, duke of Bedford, and Humphrey, duke of Gloucester; and two daughters, Blanche, who married Louis III., elector palatine of the Rhine, and Philippa, who married Eric XIII., king of Sweden. Henry's second wife was Joan, or Joanna, (c. 1370-1437), daughter of Charles the Bad, king of Navarre, and widow of John IV. or V., duke of Brittany, who survived until July 1437. By her he had no children.

The chief contemporary authorities are the Annates Henrici Quarli and T. Walsingham's Historia Anglicana (Rolls Series), Adam of Usk's Chronicle and the various Chronicles of London. The life by John Capgrave {De illustrious Henricis) is of little value. Some personal matter is contained in Wardrobe Accounts of Henry, Earl of Derby (Camden Soc). For documents consult T. Rymer's Foedera; Sir N. H. Nicolas, Proceedings and Ordinances of the Privy Council; Sir H. Ellis, Original Letters illustrative of English History (London, 1825-1846); Rolls of Parliament; Royal and Historical Letters, Henry IV. (Rolls Scries) and the Calendars of Patent Rolls. Of modern authorities the foremost is J. H. Wylie's minute and learned Hist, of England under Henry IV. (4 vols., London, 1884-1898). See also W. Stubbs, Constitutional History; Sir J. Ramsay, Lancaster and York (2 vols., Oxford, 1892), and C. W. C. Oman, The Political History of England, vol. iv. (C. L. K.)

HENRY V. (1387-1422), king of England, son of Henry IV. by Mary de Bohun, was born at Monmouth, in August 1387. On his father's exile

in 1398 Richard II. took the boy into his” own charge, and treated him kindly. Next year the Lancastrian revolution forced Henry into precocious prominence as heir to the throne. From October 1400 the administration of Wales was conducted in his name; less than three years later he was in actual command of the English forces and fought against the Percies at Shrewsbury. The Welsh revolt absorbed his energies till 1408. Then through the king’s ill-health he began to take a wider share in politics. From January 1410, helped by his uncles Henry and Thomas Beaufort, he had practical control of the government. Both in foreign and domestic policy he

differed from the king, who in November 141 1 discharged the prince from the council. The quarrel of father and son was political only, though it is probable that the Beauforts had discussed the abdication of Henry IV., and their opponents certainly endeavoured to defame the prince. It may be that to political enmity the tradition of Henry’s riotous youth, immortal- ized by Shakespeare, is partly due. To that tradition Henry’s strenuous life in war and politics is a sufficient general contradic- tion. The most famous incident, his quarrel with the chief- justice, has no contemporary authority and was first related by SirThomas Elyot in 15.31. The story of Falstaff originated partly in Henry’s early friendship for Oldcastle (q.v.). That friendship, and the prince’s political opposition to Archbishop Arundel, perhaps encouraged Lollard hopes. If so, their disappointment may account for the statements of ecclesiastical writers, like Walsingham, that Henry on becoming king was changed suddenly into a new man.

Henry succeeded his father on the 20th of March 1413. With no past to embarrass him, and with no dangerous rivals, his practical experience had full scope. He had to deal with three main problems — the restoration of domestic peace, the healing of schism in the Church and the recovery of English prestige in Europe. Henry grasped them all together, and gradually built upon them a yet wider policy. From the first he made it clear that he would rule England as the head of a united nation, and that past differences were to be forgotten. Richard II. was honourably reinterred; the young Mortimer was taken into favour; the heirs of those who had suffered in the last reign were restored gradually to their titles and estates. With Old- castle Henry used his personal influence in vain, and the gravest domestic danger was Lollard discontent. But the king’s firmness nipped the movement in the bud (Jan. 1414), and made his own position as ruler secure.

Save for the abortive Scrope and Cambridge plot in favour of Mortimer in July 1415, the rest of his reign was free from serious trouble at home. Henry could now turn his attention to foreign affairs. A writer of the next generation was the first to allege that Henry was encouraged by ecclesiastical statesmen to enter on the French war as a means of diverting attention from home troubles. For this story there is no foundation. The restoration of domestic peace was the king's first care, and until it was assured he could not embark on any wider enterprise abroad. Nor was that enterprise one of idle conquest. Old commercial disputes and the support which the French had lent to Glendower gave a sufficient excuse for war, whilst the disordered state of France afforded no security for peace. Henry may have regarded the assertion of his own claims as part of his kingly duty, but in any case a permanent settlement of the national quarrel was essential to the success of his world policy. The campaign of 1415, with its brilliant conclusion at Agincourt (October 25), was Qnly the first step. Two years of patient preparation followed. The command of the sea was secured by driving the Genoese allies of the French out of the Channel. A successful diplomacy detached the emperor Sigismund from France, and by the Treaty of Canterbury paved the way to end the schism in the Church. So in 1417 the war was renewed on a larger scale. Lower Normandy was quickly conquered, Rouen cut off from Paris and besieged. The French were paralysed by the disputes of Burgundians and Armagnacs. Henry skilfully played them off one against the other, without relaxing his warlike energy. In January 1410 Rouen fell. By August the English were outside the wallsof Paris. Theintrigues of the French parties culminated in the assassination of John of Burgundy by the dauphin's partisans at Montereau (September 10, 1419). Philip, the new duke, and the French court threw themselves into Henry's arms. After six months' negotia- tion Henry was by the Treaty of Troyes recognized as heir and regent of France, and on the 2nd of June 1420 married Catherine, the "king's daughter. He was now at the height of his power. His eventual success in France seemed certain. He shared with Sigismund the credit of having ended the Great Schism by obtain- ing the election of Pope Martin V. All the states of western Europe were being brought within the web of his diplomacy.

The headship of Christendom was in his grasp, and schemes for a new crusade began to take shape. He actually sent an envoy to collect information in the East; but his plans were cut short by death. A visit to England in 142 1 was interrupted by the defeat of Clarence at Baug6. The hardships of the longer winter siege of Meaux broke down his health, and he died at Bois de Vincennes on the 31st of August

1422.

Henry's last words were a wish that he might live to rebuild the walls of Jerusalem. They are significant. His ideal was founded consciously on the models of Arthur and Godfrey as national king and leader of Christendom. So he is the typical medieval hero. For that very reason his schemes were doomed to end in disaster, since the time was come for a new departure. Yet he was not reactionary. His policy was constructive: a firm central government supported by parliament; church reform on conservative lines; commercial development; and the mainten- ance of national prestige. His aims in some respects anticipated those of his Tudor successors, but he would have accomplished them on medieval lines as a constitutional ruler. His success was due to the power of his personality. He could train able lieu- tenants, but at his death there was no one who could take his place as leader. War, diplomacy and civil administration were all dependent on his guidance. His dazzling achievements as a general have obscured his more sober qualities as a ruler, and even the sound strategy, with which he aimed to be master of the narrow seas. If he was not the founder of theEnglish navy he was one of the first to realize its true importance. Henry had so high a sense of his own rights that he was merciless to disloyalty. But he was scrupulous of the rights of others, and it was his eager desire to further the cause of justice that impressed his French contemporaries. He has been charged with cruelty as a religious persecutor; but in fact he had as prince opposed the harsh policy of Archbishop Arundel, and as king sanctioned a more moderate course. Lollard executions during his reign had more often a political than a religious reason. To be just with sternness was in his eyes a duty. So in his warfare, though he kept strict discipline and allowed no wanton violence, he treated severely all who had in his opinion transgressed. In his personal conduct he was chaste, temperate and sincerely pious. He delighted in sport and all manly exercises. At the same time he was cultured, with a taste for literature, art and music. Henry lies buried in Westminster Abbey. His tomb was stripped of its splendid adornment during the Reformation. The shield, helmet and saddle, which formed part of the original funeral equipment, still hang above it.

Of original authorities the best on the English side is the Gesta Henrici Quinti (down to 1416), printed anonymously for the English Historical Society, but probably written by Thomas Elmham, one of Henry's chaplains. Two lives edited by Thomas Hearne under the names of Elmham and Titus Livius Forojuliensis come from a common source; the longer, which Hearne ascribed incorrectly to Elmham, is perhaps the original work of Livius, who was an Italian in the service of

Humphrey of Gloucester, and wrote about 1440. Other authorities are the Chronicles of Walsingham and Otterbourne, the English Chronicle or Brut, and the various London Chronicles. On the French side the most valuable are Chronicles of Monstrelet and St R6my (both Burgundian) and the Chronique du religieux de S. Denys (the official view of the French court) . For documents and modern authorities see under Henry IV. See also Sir N. H. Nicolas, Hist, of the Battle of Agincourt and the Expedition of 1415 (London, 1833); C. L. Kingsford, Henry V., the Typical Medieval Hero (New York, 1901), where a fuller bibliography will be found. (C. L. K.)

HENRY VI. (1421-1471), king of England, son of Henry V. and Catherine of Valois, was born at Windsor on the 6th of December 1421. He became king of England on the 1st of September 1422, and a few weeks later, on the death of his grandfather Charles VI., was proclaimed king of France also. Henry V. had directed that Richard Beauchamp, earl of Warwick (q.v.); should be his son's preceptor; Warwick took up his charge in 1428; he trained his pupil to be a good man and refined gentleman, but he could not teach him kingship. As early as 1423 the baby king was made to appear at public functions and take his place in parliament. He was knighted by his uncle Bedford at Leicester in May 1426, and on the 6th of November 1429 was crowned at Westminster.

Early in the next year he was taken over to France, and after long delay crowned in Paris on the 16th of December 1431. His return to London on the 14th of February 1432 was celebrated with a great pageant devised by Lydgate.

During these early years Bedford ruled France wisely and at first with success, but he could not prevent the mischief which Humphrey of Gloucester (q.v.) caused both at home and abroad. Even in France the English lost ground steadily after the victory of Joan of Arc before Orleans in 1429. The climax came with the death of Bedford, and defection of Philip of Burgundy in 1435. This closed the first phase of Henry's reign. There followed fifteen years of vain struggle in France, and growing disorder at home. The determining factor in politics was the conduct of the war. Cardinal Beaufort, and after him Suffolk, sought by work- ing for peace to secure at least Guienne and Normandy. Gloucester courted popularity by opposing them throughout; with him was Richard of York, who stood next in

succession to the crown. Beaufort controlled the council, and it was under his guidance that the king began to take part in the government. Thus it was natural that as Henry grew to manhood he seconded heartily the peace policy. That policy was wise, but national pride made it unpopular and difficult. Henry himself had not the strength or knowledge to direct it, and was unfortunate in his advisers. The cardinal was old, his nephews John and Edmund Beaufort were incompetent, Suffolk, though a man of noble character, was tactless. Suffolk, however, achieved a great success by negotiating the marriage of Henry to Margaret of Anjou (q.v.) in 1445. Humphrey of Gloucester and Cardinal Beaufort both died early in 1447. Suffolk was now all-powerful in the favour of the king and queen. But his home administration was unpopular, whilst the incapacity of Edmund Beaufort ended in the loss of all Normandy and Guienne. Suffolk's fall in 1450 left Richard of York the foremost man in England. Henry's reign then entered on its last phase of dynastic struggle. Cade's rebellion suggested first that popular discontent might result in a change of rulers. But York, as heir to the throne, could abide his time. The situa- tion was altered by the mental derangement of the king, and the birth of his son in 1453- York after a struggle secured the protectorship, and for the next year ruled England. Then Henry was restored to sanity, and the queen and Edmund Beaufort, now Duke of Somerset, to power. Open war followed, with the defeat and death of Somerset at St Albans on the 22nd of May 1455. Nevertheless a hollow peace was patched up, which con- tinued during four years with lack of all governance. In 1450 war broke out again. On the 10th of July 1460 Henry was taken prisoner at Northampton, and forced to acknowledge York as heir, to the exclusion of his own son. Richard of York's death at Wakefield (Dec. 29, 1460), and the queen's victory at St Albans (Feb. 17, 14ˆ1), brought Henry his freedom and no more. Edward of York had himself proclaimed king, and by his decisive victory at Towton on the 29th of March, put an end to Henry's reign. For over three years Henry was a fugitive in Scotland. He returned to take part in an abortive rising in 1464. A year later he was captured in the north, and brought a prisoner to the Tower. For six months in 1470-147 1 he emerged to hold a shadowy kingship as Warwick's puppet. Edward's final victory at Tewkesbury was followed by Henry's death on the 21st of May 147 1, certainly by violence, perhaps at the hands of Richard of Gloucester.

Henry was the most hapless of monarchs. He was so honest and well-meaning that he might have made a good ruler in quiet times. But he was crushed by the burden of his inheritance. He had not the genius

to find a way out of the French entangle- ment or the skill to steer a constitutional monarchy between rival factions. So the system and policy which were the creations of Henry IV. and Henry V. led under Henry VI. to the ruin of their dynasty. Henry's very virtues added to his difficulties. He was so trusting that any one could influence him, so faithful that he would not give up a minister who had become impossible. Thus even in the middle period he had no real control of the government. In his latter years he was mentally too weak for independent action. At his best he was a " good and gentle

creature," but too kindly and generous to rule others. Religious observances and study were his chief occupations. His piety was genuine; simple and pure, he was shocked at any suggestion of impropriety, but his rebuke was only " Fie, for shame ! forsooth ye are to blame." For education he was really zealous. Even as a boy he was concerned for the upbringing of his half-brothers, his mother's children by Owen Tudor. Later, the planning of his great foundations at Eton and King's College, Cambridge, was the one thing which absorbed his interest. To both he was more than a royal founder, and the credit of the whole scheme belongs to him . The charter for Eton was granted on the 1 1 th of October 1440, and that for King's College in the following February. Henry himself laid the foundation-stones of both buildings. He frequently visited Cambridge to superintend the progress of the work. When at Windsor he loved to send for the boys from his school and give them good advice.

Henry's only son was Edward, prince of Wales (1453-1471), who, having shared the many journeys and varying fortunes of his mother, Margaret, was killed after the battle of Tewkesbury (May 4, 147 1) by some noblemen in attendance 011 Edward IV.

There is a life of Henry by his chaplain John Blakman (printed at the end of Hearne's edition of Otterbourne) ; but it is concerned only with his piety and patience in adversity. English chronicles for the reign are scanty; the best are the Chronicles of London (ed. C. L. Kingsford), with the analogous Gregory's Chronicle (ed. J. Gairdner for Camden Soc.) and Chronicle of London (ed. Sir H. N. Nicolas). The Paston Letters, with James Gairdner's valuable Introductions, are indispensable. Other useful authorities are Joseph Stevenson's Letters and Papers illustrative of the Wars of the English in France during the Reign of Henry VI. ; and Correspondence of T. Bekynton (both in " Rolls " series) . For the French war the chief sources are the Chronicles of Monstrelet, D'Escouchy and T. Basin. For other documents and modern authorities see under Henry IV. For Henry's foundations see Sir H. C. Maxwell-Lyte, History of Eton College (London, 1899), and J.

B. Mullinger, History of the University of Cambridge (London, 1888). (C. L. K.)

HENRY VII. (1457-1509), king of England, was the first of the Tudor dynasty. His claim to the throne was through his mother from John of Gaunt and Catherine Swynford, whose issue born before their marriage had been legitimated by parliament. This, of course, was only a Lancastrian claim, never valid, even as such, till the direct male line of John of Gaunt had become extinct. By his father the genealogists traced his pedigree to Cadwallader, but this only endeared him to the Welsh when he had actually become king. His grand- father, Owen Tudor, however, had married Catherine, the widow of Henry V. and daughter to Charles VI. of France. Their son Edmund, being half brother of Henry VI., was created by that king earl of Richmond, and having married Margaret Beaufort, only daughter of John, duke of Somerset, died more than two months before their only child, Henry, was born in Pembroke Castle in January 1457. The fatherless child had sore trials. Edward IV. won the crown when he was four years old, and while Wales partly held out against the conqueror, he was carried for safety from one castle to another. Then for a time he was made a prisoner; but ultimately he was taken abroad by his uncle Jasper, who found refuge in Brittany. At one time the duke of Brittany was nearly induced to surrender him to Edward IV.; but he remained safe in the duchy till the cruelties of Richard III. drove more and more Englishmen abroad to join him. An invasion of England was planned in 1483 in concert with the duke of Buckingham's rising; but stormy weather at sea and an inundation in the Severn defeated the two movements. A second expedition, two years later, aided this time by France, was more successful. Henry landed at Milford Haven among his Welsh allies and defeated Richard at the battle of Bosworth (August 22, 1485). He was crowned at Westminster on the 30th of October following. Then, in fulfilment of pledges by which he had procured the adhesion of many Yorkist supporters, he was married at Westminster to Elizabeth (146 5-1 503), eldest daughter and heiress of Edward IV. (Jan. 18, i486), whose two brothers had both been murdered by Richard III. Thus the Red and White Roses were united and the pretexts for civil war done away with.

Nevertheless, Henry's reign was much disturbed by a succession

of Yorkist conspiracies and pretenders. Of the two most not- able impostors, the first, Lambert Simnel, personated the earl of Warwick, son of the duke of Clarence, a youth of seventeen whom Henry had at his accession taken care to imprison in the Tower. Simnel, who was but a boy, was taken over to Ireland to perform his part, and the farce was wonderfully successful. He was crowned as Edward VI. in Christchurch Cathedral, Dublin, and received the allegiance of every one — bishops, nobles and judges, alike with others. From Ireland, accom- panied by some bands of German mercenaries procured for him in the Low Countries, he invaded England; but the rising was put down at Stoke near Newark in Nottinghamshire, and, Simnel being captured, the king made him a menial of his kitchen.

This movement had been greatly assisted by Margaret, duchess dowager of Burgundy, sister of Edward IV., who could not endure to see the House of York supplanted by that of Tudor. The second pretender, Perkin Warbeck, was also much indebted to her support; but he seems to have entered on his career at first without it. And his story, which was more prolonged, had to do with the attitude of many countries towards England. Anxious as Henry was to avoid being involved in foreign wars, it was not many years before he was committed to a war with France, partly by his desire of an alliance with Spain, and partly by the indignation of his own subjects at the way in which the French were undermining the independence of Brittany. Henry gave Brittany defensive aid; but after the duchess Anne had married Charles VIII. of France, he felt bound to fulfil his obligations to Ferdinand and Isabella of Spain, and also to the German king Maximilian, by an invasion of France in 1492. His allies, however, were not equally scrupulous or equally able to fulfil their obligations to him; and after besieging Boulogne for some little time, he received very advantageous offers from the French king and made peace with him.

Now Perkin Warbeck had first appeared in Ireland in 149 1, and had somehow been persuaded there to personate Richard, duke of York, the younger of the two princes murdered in the Tower, pretending that he had escaped, though his brother had been killed. Charles VIII., then expecting war with England, called him to France, recognized his pretensions and gave him a retinue; but after the peace he dismissed him. Then Margaret of Burgundy received him as her nephew, and Maxi- milian, now estranged from Henry, recognized him as king of England. With a fleet given him by Maximilian he attempted to land at Deal, but sailed away to Ireland and, not succeeding very well there either, sailed farther to Scotland, where James IV. received him with open arms, married him to an earl's daughter and made a brief and

futile invasion of England along with him. But in 1497 he thought best to dismiss him, and Perkin, after attempting something again in Ireland, landed in Cornwall with a small body of men.

Already Cornwall had risen in insurrection that year, not liking the taxation imposed for the purpose of repelling the Scotch invasion. A host of the country people, led first by a blacksmith, but afterwards by a nobleman, marched up towards London and were only defeated at Blackheath. But the Cornish- men were quite ready for another revolt, and indeed had invited Perkin to their shores. He had little fight in him, however, and after a futile siege of Exeter and an advance to Taunton he stole away and took sanctuary at Beaulieu in Hampshire. But, being assured of his life, he surrendered, was brought to London, and was only executed two years later, when, being imprisoned near the earl of Warwick in the Tower, he inveigled that simple-minded youth into a project of escape. For this Warwick, too, was tried, condemned and executed — no doubt to deliver Henry from repeated conspiracies in his favour.

Henry had by this time several children, of whom the eldest, Arthur, had been proposed in infancy for a bridegroom to Catherine, daughter of Ferdinand of Aragon. The match had always been kept in view, but its completion depended greatly on the assurance Ferdinand and Isabella could feel of Henry's Secure position upon the throne. At last Catherine was brought

to England and was married to Prince Arthur at St. Paul's on the 14th of November 1501. The lad was just over fifteen and the co-habitation of the couple was wisely delayed; but he died on the 2nd of April following. Another match was presently proposed for Catherine with the king's second son, Henry, which only took effect when the latter had become king himself. Mean- while Henry's eldest daughter Margaret was married to James IV. of Scotland — a match distinctly intended to promote inter- national peace, and make possible that ultimate union which actually resulted from it. The espousals had taken place at Richmond in 1502, and the marriage was celebrated in Scotland the year after. In the interval between these two events Henry lost his queen, who died on the nth of February 1503, and during the remainder of his reign he made proposals in various quarters for a second marriage — proposals in which political objects were always the chief consideration; but none of them led to any result. In his latter years he became unpopular from the extortions practised by his two instruments, Empson and Dudley, under the authority of antiquated statutes. From the beginning of his reign he had been accumulating money, mainly for his own security against

intrigues and conspiracies, and avarice had grown upon him with success. He died in April 1509, undoubtedly the richest prince in Christendom. He was not a niggard, however, in his expenditure. Before his death he had finished the hospital of the Savoy and made provision for the magnificent chapel at Westminster which bears his name. His money-getting was but part of his statesmanship, and for his statesmanship his country owes him not a little gratitude. He not only terminated a disastrous civil war and brought under control the spirit of ancient feudalism, but with a clear survey of the conditions of foreign powers he secured England in almost uninterrupted peace while he developed her commerce, strengthened her slender navy and built, apparently for the first time, a naval dock at Portsmouth.

In addition to his sons Arthur and Henry, Henry VII. had several daughters, one of whom, Margaret, married James IV., king of Scotland, and another/Mary, became the wife of Louis XII. of France, and afterwards of Charles Brandon, duke of Suffolk.

The popular view of Henry VII. ‘s reign has always been derived from Bacon’s History of that king. This has been edited by J, R. Lumby (Cambridge, 1881). But during the last half century large accessions to our knowledge have been made from foreign and domestic archives, and the sources of Bacon’s work have been more critically examined. For a complete account of those sources the reader may be referred to W. Busch’s England under the . Tudors, published in German in 1892 and in an English translation in 1895. Some further information of a special kind will be found in M. Oppenheim’s Naval Accounts and Inventories, published by the Navy Records Society in 1896. See also J. Gairdner’s Henry VII. (1889). (J- Ga.)

HENRY VIII. (1491-1547), king of England and Ireland, the third child and second son of Henry VII. and Elizabeth of York, was born on the 28th of June 149 1 and, like all the Tudor sovereigns except Henry VIL, at Greenwich. His two brothers, Prince Arthur and Edmund, duke of Somerset, and two of his sisters predeceased their father; Henry was the only son, and Margaret, afterwards queen of Scotland, and Mary, after- wards queen of France and duchess of Suffolk, were the only daughters who survived. Henry is said, on authority which has not been traced farther back than Paolo Sarpi, to have been destined for the church; but the story is probably a mere surmise from his theological accomplishments, and from his earliest years high secular posts such as the viceroyalty of Ireland were conferred upon the child. He was the first English monurjch to be educated under the influence of the Renaissance, and his tutors included the poet Skelton; he became an accomplished scholar, linguist, musician and athlete, and

when by the death of his brother Arthur in 1502 and of his father on the 22nd of April 1509 Henry VIII. succeeded to the throne, his accession was hailed with universal acclamation.

He had been betrothed to his brother's widow ' Catherine of Aragon, and in spite of the protest which he had been made to register against the marriage, and of the doubts expressed by Julius II. and Archbishop Warham as to its validity, it was

completed in the first few months of his reign. This step was largely due to the pressure brought to bear by Catherine's father Ferdinand upon Henry's council; he regarded England as a tool in his hands and Catherine as his resident ambassador. The young king himself at first took little interest in politics, and for two years affairs were managed by the pacific Richard Fox (q.v.) and Warham. Then Wolsey became supreme, while Henry was immersed in the pursuit of sport and other amusements. He took, however, the keenest interest from the first in learning and in the navy, and his inborn pride easily led him to support Wolsey's and Ferdinand's war-like designs on France. He followed an English army across the Channel in 1513, and personally took part in the successful sieges of Therouanne and Tournay and the battle of Guinegate which led to the peace of 1514. Ferdinand, however, deserted the English alliance, and amid the consequent irritation against everything Spanish, there was talk of a divorce between Henry and Catherine (15 14), whose issue had hitherto been attended with fatal misfortune. But the renewed antagonism between England and France which followed the accession of Francis I. (1515) led to a rapprochement with Ferdinand; the birth of the lady Mary (1516) held out hopes of the male issue which Henry so much desired ; and the question of a divorce was postponed. Ferdinand died in that year (1516) and the emperor Maximilian in 1519. Their grandson Charles V. succeeded them both in all their realms and dignities in spite of Henry's hardly serious candidature for the empire; and a lifelong rivalry broke out between him and Francis I. Wolsey used this antagonism to make England arbiter between them; and both monarchs sought England's favour in 1520, Francis at the Field of Cloth of Gold and Charles V. more quietly in Kent. At the conference of Calais in 1521 English influence reached its zenith; but the alliance with Charles destroyed the balance on which that influence depended. Francis was overweighted, and his defeat at Pa via in 1525 made the emperor supreme. Feeble efforts to challenge his power in Italy

provoked the sack of Rome in 1527; and the peace of Cambrai in 1529 was made without any reference to Wolsey or England's interests.

Meanwhile Henry had been developing a serious interest in politics, and he could brook no superior in whatever sphere he wished to shine. He began to adopt a more critical attitude towards Wolsey's policy, foreign and domestic; and to give ear to the murmurs against the cardinal and his ecclesiastical rule. Parliament had been kept at arm's length since 1515 lest it should attack the church; but Wolsey's expensive foreign policy rendered recourse to parliamentary subsidies indispensable. When it met in 1523 it refused Wolsey's demands, and forced loans were the result which increased the cardinal's unpopularity. Nor did success abroad now blunt the edge of domestic discontent. His fate, however, was sealed by his failure to obtain a divorce for Henry from the papal court. The king's hopes of male issue had been disappointed, and by 1526 it was fairly certain that Henry could have no male heir to the throne while Catherine remained his wife. There was Mary, but no queen regnant had yet ruled in England; Margaret Beaufort had been passed over in favour of her son in 1485, and there was a popular impression that women were excluded from the throne. No candidate living could have secured the succession without a recurrence of civil war. Moreover the unexampled fatality which had attended Henry's issue revived the theological scruples which had always existed about the marriage; and the breach with Charles V. in 1527 provoked a renewal of the design of 1514. All these considerations were magnified by Henry's passion for Anne Boleyn, though she certainly was not the sole or the main cause of the divorce. That the succession was the main point is proved by the fact that Henry's efforts were all directed to securing a wife and not a mistress. Wolsey persuaded him that the necessary divorce could be obtained from Rome, as it had been in the case of Louis XII. of France and Margaret of Scotland. For a time Clement VII. was inclined to concede the demand, and Campeggio in 1528 was given ample powers. But the prospect of French success in Italy which had encouraged the

pope proved delusive, and in 1529 he had to submit to the yoke of Charles V. This involved a rejection of Henry's suit, not because Charles cared anything for his aunt, but because a divorce would mean disinheriting Charles's cousin Mary, and perhaps the eventual succession of the son of a French princess to the English throne.

Wolsey fell when Campeggio was recalled, and his fall involved the triumph of the anti-ecclesiastical party in England. Lay- men who had resented their exclusion from power were now promoted to offices such as those of lord chancellor and lord privy seal which they had

rarely held before; and parliament was encouraged to propound lay grievances against the church. On the support of the laity Henry relied to abolish papal jurisdic- tion and reduce clerical privilege and property in England; and by a close alliance with Francis I. he insured himself against the enmity of Charles V. But it was only gradually that the breach was completed with Rome. Henry had defended the papacy against Luther in 1521 and had received in return the title ” defender of the faith.” He never liked Protestantism, and he was prepared for peace with Rome on his own terms. Those terms were impossible of acceptance by a pope in Clement VII. ‘s position; but before Clement had made up his mind to reject them, Henry had discovered that the papacy was hardly worth conciliating. His eyes were opened to the extent of his own power as the exponent of national antipathy to papal jurisdiction and ecclesiastical privilege; and his appetite for power grew. With Cromwell’s help he secured parliamentary support, and its usefulness led him to extend parliamentary re- presentation to Wales and Calais, to defend the privileges of Parliament, and to yield rather than forfeit its con- fidence. He had little difficulty in securing the Acts of Annates, Appeals and Supremacy which completed the separation from Rome, or the dissolution of the monasteries which, by transferring enormous wealth from the church to the crown, really, in Cecil’s opinion, ensured the reformation.

The abolition of the papal jurisdiction removed all obstacles to the divorce from Catherine and to the legalization of Henry’s marriage with Anne Boleyn (1533). But the recognition of the royal supremacy could only be enforced at the cost of the heads of Sir Thomas More, Bishop Fisher and a number of monks and others among whom the Carthusians signalized themselves by their devotion (1535-1536). Anne Boleyn fared no better than the Catholic martyrs; she failed to produce a male heir to the throne, and her conduct afforded a jury of peers, over which her uncle, the duke of Norfolk, presided, sufficient excuse for condemning her to death on a charge of adultery (1536). Henry then married Jane Seymour, who was obnoxious to no one, gave birth to Edward VI., and then died (1537). The dissolution of the monasteries had meanwhile evoked a popular protest in the north, and it was only by skilful and unscrupulous diplomacy that Henry was enabled to suppress so easily the Pilgrimage of Grace. Foreign intervention was avoided through the renewal of war between Francis and Charles; and the insurgents were hampered by having no rival candidate for the throne and no means of securing the execution of their programme.

Nevertheless their rising warned Henry against further doctrinal change. He had authorized the English Bible and some approach

towards Protestant doctrine in the Ten Articles. He also considered the possibility of a political and theological alliance with the Lutheran princes of Germany. But in 1538 he definitely rejected their theological terms, while in 1 539-1 54.0 they rejected his political proposals. By the statute of Six Articles (1539) he took his stand on Catholic doctrine; and when the Lutherans had rejected his alliance, and Cromwell's nominee, Anne of Cleves, had proved both distasteful on personal grounds and unnecessary because Charles and Francis were not really projecting a Catholic crusade against England, Anne was divorced and Cromwell beheaded. The new queen Catherine Howard represented the triumph of the reactionary party under Gardiner and Norfolk; but there was no idea of returning to the papal obedience, and even Catholic orthodoxy as represented

by the Six Articles was only enforced by spasmodic outbursts of persecution and vain attempts to get rid of Cranmer.

The secular importance of Henry's activity has been somewhat obscured by his achievements in the sphere of ecclesiastical politics; but no small part of h/s energies was devoted to the task of expanding the royal authority at the expense of temporal competitors. Feudalism was not yet dead, and in the north and west there were medieval franchises in which the royal writ and common law hardly ran at all. Wales and its marches were brought into legal union with the rest of England by the statutes of Wales (1534-1536); and after the Pilgrimage of Grace the Council of the North was set up to bring into subjection the extensive jurisdictions of the northern earls. Neither they nor the lesser chiefs who flourished on the lack of common law and order could be reduced by ordinary methods, and the Councils of Wales and of the North were given summary powers derived from the Roman civil law similiar to those exercised by the Star Chamber at Westminster and the court of Castle Chamber at Dublin. Ireland had been left by Wolsey to wallow in its own disorder; but disorder was anathema to Henry's mind, and in 1535 Sir William Skeffington was sent to apply English methods and artillery to the government of Ireland. Sir Anthony St Leger continued his policy from 1540; Henry, instead of being merely lord of Ireland dependent on the pope, was made by an Irish act of parliament king, and supreme head of the Irish church. Conciliation was also tried with some success; planta- tion schemes were rejected in favour of an attempt to Anglicize the Irish; their chieftains were created earls and endowed with monastic lands;

and so peaceful was Ireland in 1542 that the lord-deputy could send Irish kernes and gallowglasses to fight against the Scots.

Henry, however, seems to have believed as much in the coercion of Scotland as in the conciliation of Ireland. Margaret Tudor's marriage had not reconciled the realms; and as soon as James V. became a possible pawn in the hands of Charles V., Henry bethought himself of his old claims to suzerainty over Scotland. At first he was willing to subordinate them to an attempt to win over Scotland to his anti-papal policy, and he made various efforts to bring about an interview with his nephew. But James V. was held aloof by Beaton and two French marriages; and France was alarmed by Henry's growing friendliness with Charles V., who was mollified by his cousin Mary's restoration to her place in the succession to the throne. In 1542 James madly sent a Scottish army to ruin at Solway Moss; his death a few weeks later left the Scottish throne to his infant daughter Mary Stuart, and Henry set to work to secure her hand for his son Edward and the recognition of his own suzerainty. A treaty was signed with the Scottish estates; but it was torn up a few months later under the influence of Beaton and the queen-dowager Mary of Guise, and Hertford was sent in 1 544 to punish this breach of promise by sacking Edin- burgh.

Perhaps to prevent French intervention in Scotland Henry joined Charles V. in invading France, and captured Boulogne (Sept . 1 544) . But Charles left his ally in the lurch and concluded the peace of Cr6py that same month; and in 1545 Henry had to face alone a French invasion of the Isle of Wight. This attack proved abortive, and peace between England and France was made in 1546. Charles V.'s desertion inclined Henry to listen to the proposals of the threatened Lutheran princes, and the last two years of his reign were marked by a renewed tendency to advance in a Protestant direction. Catherine Howard had been brought to the block (1542) on charges in which there was probably a good deal of truth, and her successor, Catherine Parr, was a patroness of the new learning. An act of 1545 dissolved chantries, colleges and other religious foundations; and in the autumn of 1546 the Spanish ambassador was anticipating further anti-ecclesiastical measures. Gardiner had almost been sent to the Tower, and Norfolk and Surrey were condemned to death, while Cranmer asserted that it was Henry's intention to convert the mass into a communion service. An opportunist to the last, he would readily have sacrificed any theological convictions he

may have had in the interests of national uniformity. He died on the 28th of January 1547, and was buried in St George's Chapel, Windsor.

The atrocity of many of Henry's acts, the novelty and success of his religious policy, the apparent despotism of his methods* or all combined, have made it difficult to estimate calmly the importance of Henry's work or the conditions which made it possible. Henry's egotism was profound, and personal motives underlay his public action. While political and ecclesiastical conditions made the breach with Rome possible — and in the view of most Englishmen desirable — Henry VIII. was led to adopt the policy by private considerations. He worked for the good of the state because he thought his interests were bound up with those of the nation; and it was the real coincidence of this private and public point of view that made it possible for so selfish a man to achieve so much for his country. The royal supremacy over the church and the means by which it was enforced were harsh and violent expedients; but it was of the highest importance that England should be saved from religious civil war, and it could only be saved by a despotic government. It was necessary for the future development of England that its governmental system should be centralized and unified, that the authority of the monarchy should be more firmly extended over Wales and the western and northern borders, and that the still existing feudal franchises should be crushed; and these objects were worth the price paid in the methods of the Star Chamber and of the Councils of the North and of Wales. Henry's work on the navy requires no apology; without it Elizabeth's victory over the Spanish Armada, the liberation of the Netherlands and the development of English colonies would have been impossible; and " of all others the year 1545 best marks the birth of the English naval power " (Corbett, Drake, i. 59). His judgment was more at fault when he conquered Boulogne and sought by violence to bring Scotland into union with England. But at least Henry appreciated the necessity of union within the British Isles; and his work in Ireland relaid the foundations of English rule. No less important was his development of the parliamentary system. Representation was extended to Wales, Cheshire, Berwick and Calais; and parliamentary authority was enhanced, largely that it might deal with the church, until men began to complain of this new parliamentary infallibility. The privileges of the two Houses were encouraged and expanded, and parliament was led to exercise ever wider powers. This policy was not due to any belief on Henry's part in parliamentary government, but to opportunism, to the circumstance that parliament was willing to do most of the things which Henry desired, while competing authorities, the church and the old nobility, were not. Nevertheless, to the encouragement given by Henry VIII. parliament owed not a little of its future growth, and to the aid rendered by parliament Henry owed his success.

He has been described as a ” despot under the forms of law “; and it is apparently true that he committed no illegal act. His despotism consists not in any attempt to rule unconstitutionally, but in the extraordinary degree to which he was able to use constitutional means in the furtherance of his own personal ends. His industry, his remarkable political insight, his lack of scruple, and his combined strength of will and subtlety of intellect enabled him to utilize all the forces which tended at that time towards strong government throughout western Europe. In Michelet’s words, ” le nouveau Messie est le roi”; and the monarchy alone seemed capable of guiding the state througrr the social and political anarchy which threatened all nations in their transition from medieval to modern organization. The king was the emblem, the focus and the bond of national unity; and to preserve it men were ready to put up with vagaries which to other ages seem intolerable. Henry could thus behead ministers and divorce wives with comparative impunity, because the individual appeared to be of little importance compared with the state. This impunity provoked a licence which is responsible for the unlovely features of Henry’s reign and character. The elevation and the isolation of his position fostered a detachment from ordinary virtues and compassion,

and he was a remorseless incarnation of Machiavelli’s Prince. He had an elastic conscience which was always at the beck and call of his desire, and he cared little for principle. But he had a passion for efficiency, and for the greatness of England and himself. His mind, in spite of its clinging to the outward forms of the old faith, was intensely secular; and he was as devoid of a moral sense as he was of a genuine religious temperament. His greatness consists in his practical aptitude, in his political perception, and in the self-restraint which enabled him to confine within limits tolerable to his people an insatiable appetite for power.

The original materials for Henry VIII. ‘s biography are practically all incorporated in the monumental Letters and Papers of the Reign of Henry VIII. (21 vols.), edited by Brewer and Gairdner and com- pleted after fifty years’ labour in 1910. A few further details may be gleaned from such contemporary sources as Hall’s Chronicle, Cavendish’s Life of Wolsey, W. Thomas’s The Pilgrim and others; and some additions have been made to the documentary sources contained in the Letters

and Papers by recent works, such as Ehses' Romische Dokumente, and Merriman's Life and Letters of Thomas Cromwell. Lord Herbert of Cherbury's Life and Reign of Henry VIII. (1649), while good for its time, is based upon a very partial knowledge of the sources and somewhat antiquated principles of historical scholarship. Froude's famous portraiture of Henry is coloured by the ideas of hero-worship and history which the author imbibed from Carlyle, and the rival portraits in Lingard, R. W. Dixon's Church History and Gasquet's Henry VIII. and the Monas- teries by strong religious feeling. A more discriminating estimate is attempted by H. A. L. Fisher in Messrs Longmans' Political History of England, vol. v. (1906). Of the numerous paintings of Henry none is by Holbein, who, however, executed the striking chalk-drawing of Henry's head, now at Munich, and the famous but decaying cartoon at Devonshire House. The well-known three- quarter length at Windsor, usually attributed to Holbein, is by an inferior artist. The best collection of Henry's portraits was exhibited at the Burlington Fine Arts Club in 1909, and the catalogue of that exhibition contains the best description of them; several are re-produced in Pollard's Henry VIII. (Goupil) (1902), the letterpress of which was published by Longmans in a cheaper edition (1905). Henry composed numerous state papers still extant; his only book was his Assertio seftem sacramentorum contra M. Lutheru-m (1521), a copy of which, signed by Henry himself, is at Windsor. Several anthems composed by him are extant; and one at least, O Lord, the Maker of all Things, is still occasionally rendered in English cathedrals. (A. F. P.)

HENRY I. (1214-1217), king of Castile, son of Alphonso VIII. of Castile, and his wife Eleanor of Aquitaine, daughter of Henry II. of England, after whom he was named, was born about 1207. He was killed, while still a boy, by the fall of a tile from a roof.

Henry II. of Trastamara (1360-1379), king of Castile, founder of the dynasty known as " the new kings," was the eldest son of Alphonso XI. and of his mistress Leonora de Guzman. He was born in 1333. His father endowed him with great lordships in northern Spain, and made him count of Trastamara. After the death of Alphonso XI. in 1350, Leonora was murdered to satisfy the revenge of the king's neglected wife. Several of the numerous children she had borne to Alphonso were slain at

different times by Peter the Cruel, the king's legitimate son and successor. Henry preserved his life by submissions and by keeping out of the king's way. At last, after taking part in several internal commotions, he fled to France in 1356. In 1366 he persuaded the mercenary soldiers paid off by the kings of England and France to accompany him on an expedition to upset Peter, who was driven out. The Black Prince having intervened on behalf of Peter, Henry was defeated at Najera (3rd of April 1367) and had again to flee to Aragon. When the Black Prince was told that " the Bastard " had neither been slain nor taken, he said that nothing had been done. And so it turned out; for, when the Black Prince had left Spain, Henry came back with a body of French soldiers of fortune under du Guesclin, and drove his brother into the castle of Montiel in La Mancha. Peter was tempted out by du Guesclin, and the half brothers met in the Frenchman's tent. . They rushed at one another, and Peter, the stronger man, threw Henry down, arid fell on him. One of Henry's pages seized the king by the leg and threw him on his back. Henry then pulled up Peter's hauberk and stabbed him mortally in the stomach, on the 23rd of March 1369. He reigned for ten years, with some success both in pacifying the kingdom and in war with Portugal. But as his title was disputed he was compelled to purchase support by vast grants to the nobles and concessions to the cities, by which he gained the title of El de las Mercedes — he of the largesse. Henry was a strong ally of the French king in his wars with the English, who supported the claims of Peter's natural daughters. He died on the 30th of May 1379.

Henry III, (1390-1406) king of Castile, called El Doliente, the Sufferer, was the son of John I. of Castile and Leon, and of his wife Beatrice, daughter of Ferdinand of Portugal. He was born in 1379. The period of minority was exceptionally anarchi- cal, even for Castile, but as the cities, always the best supporters of the royal authority, were growing in strength, Henry was able to reduce his kingdom to obedience, and, when he took the government into his own hands after 1393, to compel his nobles with comparative ease to surrender the crown lands they had seized. The meeting of the Cortes summoned by him at Madrid in 1394 marked a great epoch in the establishment of a practically despotic royal authority, based on the consent of the commons, who looked to the crown to protect them against the excesses of the nobles. Henry strengthened his position still further by his marriage with Catherine, daughter of John of Gaunt and of Constance, elder daughter of Peter the Cruel and Maria de Padilla. This union combined the rival claims of the descendants of Peter and of Henry of Trastamara. The king's bodily weak- ness limited his real capacity, and his early death on the 25th of December 1406 cut short the promise of his reign.

HenryIV. (1453-1474), king of Castile, surnamed the Impotent, or the Spendthrift, was the son of John II. of Castile and Leon, and of his wife, Mary, daughter of Ferdinand I. of Aragon and Sicily. He was born at Valladolid on the 6th of January 1425. The surnames given to this king by his subjects are of much more than usual accuracy. His personal character was one of mere weakness, bodily and mental. Henry was an undutiful son, and his reign was one long period of confusion, marked by incidents of the most ignominious kind. He divorced his first wife Blanche of Navarre in 1453 on the ground of " mutual impotence." Yet in 1468 he married Joan of Portugal, and when she bore a daughter, first repudiated her as adulterine, and then claimed her for his own. In 1468 he was solemnly deposed in favour of his brother Alphonso, on whose death in the same year his authority was again recognized. The last years of his life were spent in vain endeavours, first to force his half-sister Isabella, afterwards queen, to marry his favourite, the Master of Santiago, and then to exclude her from the throne. Henry died at Madrid on the 1 2th of December 1474.

HENRY I. (1008-1060), king of France, son of King Robert and his queen, Constance of Aquitaine, and grandson of Hugh Capet, came to the throne upon the death of his father in 103 1, although in 1027 he had been anointed king at Reims and associated in the government with his father. His mother, who favoured her younger son Robert, and had retired from court upon Henry's coronation, formed a

powerful league against him, and he was forced to take refuge with Robert II., duke of Normandy. In the civil war which resulted, Henry was able to break up the league of his opponents in 1032. Constance died in 1034, and the rebel brother Robert was given the duchy of Burgundy, . thus founding that great collateral line which was to rival the kings of France for three centuries. Henry atoned for this by a reign marked by unceasing struggle against the great barpns. From 1033 to 1043 he was involved in a life and death content with those nobles whose territory adjoined the royal domains, especially with the great house of Blois, whose count, Odo II., had been the centre of the league of Constance, and with the counts of Champagne. Henry's success in these wars was largely due to the help given him by Robert of Normandy, but upon the accession of Robert's son William (the "Conqueror), Normandy itself became the chief danger. From 1047 to the year of his death, Henry was almost constantly at war with William, who held his own against the king's formidable leagues and beat back two royal invasions, in 1055 and 1058. Henry's reign

marks the height of feudalism. The Normans were independent of him, with their frontier barely 25 rri. west of Paris; to the south his authority was really bounded by the Loire; in the east the count of Champagne was little more than nominally his subject, and the duchy of Burgundy was almost entirely cut off from the king. Yet Henry maintained the independence of the clergy against the pope Leo IX., and claimed Lorraine from the emperor Henry III. In an interview at Ivois, he reproached the emperor with the violation of promises, and Henry III. challenged him to a single combat. According to the German chronicle — which French historians doubt— the king of France declined the combat and fled from Ivois during the night. In 1059 he had his eldest son Philip crowned as joint king, and died the following year. Henry's first wife was Maud, niece of the emperor Henry III., whom he married in 1043. She diedchild- less in 1044. Historians have sometimes confused her with Maud (or Matilda), the emperor Conrad II. 's daughter, to whom Henry was affianced in 1033, but who died before the marriage. In 1051 Henry married the Russian princess Anne, daughter. of Yaroslav I., grand duke of Kiev. She bore him two sons, Philip, his successor, and Hugh the great, count of Vermandois.

See the Historiae of Rudolph Glaber, edited by M. Prou (Paris, 1886); F. Sochnee, Catalogue des actes d' Henri I" (1907); de Caiz de Saint

Aymour, Anne de Russie, reine de France (1896) ; F. Lavisse, Hisloire de France, tome ii. (1901), and the article on Henry I. in La Grande Encyclopedic by M. Prou.

HENRY II. (1519-1559), king of France, the second son of Francis I. and Claude, succeeded to the throne in 1547. When only seven years old he was sent by his father, with his brother the dauphin Francis, as a hostage to Spain in 1526, whence they returned after the conclusion of the peace of Cambrai in 1530. Henry was too young to have carried away any abiding impres- sions, yet throughout his life his character, dress and bearing were far more Spanish than French. In 1533 his father married him to Catherine de' Medici, from which match, as he said, Francis hoped to gain great advantage, even though it might be somewhat of a misalliance. In 1536 Henry, hitherto duke of Orleans, became dauphin by the death of his elder brother Francis. From that time he was under the influence of two personages, who dominated him completely for the remainder of his life — Diane de Poitiers, his mistress, and Anne de Mont- morency, his mentor. Moreover, his younger brother, Charles of Orleans, who was of a more sprightly temperament, was his father's favourite; and the rivalry of Diane and the duchesse d'Etampes helped to make still wider the breach between the king and the dauphin. Henry supported the constable Mont- morency when he was disgraced in 1541; protested against the treaty of Crepy in 1544; and at the end of the reign held himself completely aloof. His accession in 1547 gave rise to a veritable revolution at the court. Diane, Montmorency and the Guises were all-powerful, and dismissed Cardinal de Tournon, de Longueval, the duchesse d'Etampes and all the late king's friends and officials. At that time Henry was twenty-eight years old. He was a robust man, and inherited his father's love of violent exercise; but his character was weak and his intelligence mediocre, and he had none of the superficial and brilliant gifts of Francis I. He was cold, haughty, melancholy and dull. He was a bigoted Catholic, and showed to the Protestants even less mercy than his father. During his reign the royal authority became more severe and more absolute than ever. Resistance to the financial extortions of the government was cruelly chastised, and the " Chambre Ardente " was instituted against the Re- formers. Abroad, the struggle was continued against Charles V. and Philip II., which ended in the much-discussed treaty of Cateau-Cambr£sis. Some weeks afterwards high feast was held on the occasion of the double marriage of the king's daughter Elizabeth with the king of Spain, and of his sister Margaret with the duke of Savoy. On the 30th of June 1559, when tilting with the count of Montgomery, Henry was'wounded in the temple by a lance. In spite of the attentions of Ambroise Pare he

died on the 10th of July. By his wife Catherine de' Medici he had seven children living: Elizabeth, queen of Spain;

Claude, duchess of Lorraine; Francis (II.), Charles (IX.) and Henry (III.), all of whom came to the throne; Marguerite, who became queen of Navarre in 1572; and Francis, duke of Alencon and afterwards of Anjou, who died in 1584.

The bulk of the documents for the roign of Henry II. are un- published, and are in the Bibliotheque Nationale, Paris. Of the published documents, see especially the correspondence of Catherine de' Medici (ed. by de la Ferriere, Paris, 1880), of Diane de Poitiers (ed. by Guiffrey, Paris, 1866), of Antoine de Bourbon and Jeanne d'Albret (ed. by Rochambeau, Paris, 1877), of Odet de Selve, ambassador to England (ed. by LefSvre-Pontalis, Paris, 1888) and of Dominique du Gabre, ambassador to Venice (ed. by Vitalis, Paris, 1903); Ribier, Lettres et memoires d'estat (Paris, 1666); Relations des ambassadeurs venitiens, &c. Of the contemporary memoirs and histories, see BrantSme (ed. by Lalanne, Paris, 1864-1882), Francois de Lorraine (ed. by Michaud and Poujoulat, Paris, 1839), Montluc (ed. by de Ruble, Paris, 1864), F. de Boyvin du Villars (Michaud and Poujoulat), F. de Rabutin {Pantheon litteraire, Paris, 1836). See al»o de Thou, Historia sui temporis . . . (London, 1733); Decrue, Anne de Montmorency (Paris, 1889); H. Forneron, Les Dues de Guise et leur epoque, vol. i. (Paris, 1877) ; and H. Lemonnier, " La France sous Henri II " (Paris, 1904), in the Histoire de France, by E. Lavisse, which contains a fuller bibliography of the subject.

HENRY III. (1551-1589), king of France, third son of Henry II. and Catherine de' Medici, was born at Fontainebleau on the 19th of September 1551, and succeeded to the throne of France on the death of his brother Charles IX. in 1574. In his youth, as duke of Anjou, he was warmly attached to the Huguenot opinions, as we learn from his sister Marguerite de Valois; but his unstable character soon gave way before his mother's will, and both Henry arid Marguerite remained choice ornaments of the Catholic Church. Henry won, under the direction of Marshal de Tavannes, two brilliant victories at Jarnac and Moncontour (1569). He was the favourite son of his motherland took part with her in organizing the massacre of St Bartholomew. In 1573 Catherine procured his election to the throne of Poland. Passionately enamoured of the princess of Conde, he set out reluctantly to Warsaw, but, on the death of his brother Charles IX. in 1 574, he escaped from his Polish subjects, who endeavoured to retain him by force, came back to France and assumed the crown. He returned to a wretched kingdom, torn with civil war. In spite of his good intentions, he was

incapable of govern- ing, and abandoned the power to his mother and his favourites. Yet he was no dullard. He was a man of keen intelligence and cultivated mind, and deserves as much as Francis I. the title of patron of letters and art. But his incurable indolence and love of pleasure prevented him from taking any active part in affairs! Surrounded by his mignons, he scandalized the people by his effeminate manners. He dressed himself in women's clothes, made a collection of little dogs and hid in the cellars when it thundered. The disgust aroused by the vices and effeminacy of the king increased the popularity of Henry of Guise. After the " day of the barricades" (the 12th of May 1588), the king, perceiving that his influence was lost, resolved to rid himself of Guise by assassination; and on the 23rd of December 1588 his faithful bodyguard, the " forty-five," carried out his design at the chateau of Blois. But the fanatical preachers of the League clamoured furiously for vengeance, and on the 1st of August 1 589, while Henry III. was investing Paris with Henry of Navarre, Jacques Clement, a Dominican friar, was introduced into his presence on false letters of recommendation, and plunged a knife into the lower part of his body. He died a few hours afterwards with great fortitude. By his wife Louise of Lorraine, daughter of the count of Vaudemont, he had no children, and en his deathbed he recognized Henry of Navarre as his successor.

See the memoirs and chronicles of l'Estoile, Villeroy, Ph. Hurault de Cheverny, Brant6me,. Marguerite de Valois, la Huguerye, du Plessis-Mornay, &c; Archives curieuses of Cimber and Danjou, vols. x. and xi. ; Memoires de la Ligue (new ed., Amsterdam, 1758); the histories of T. A. d'Aubign*; and J. A. de Thou ; Correspondence of Catherine de' Medici and of Henry IV. (in the Collection de docu- ments inedits),, and of the Venetian ambassadors, &c. ; P. Matthieu, Histoire de France, vol. i. (1631); Scipion Dupleix, Histoire de Henri III (1633); Robiquet, Paris et la Ligue (1886); and J. H. Mari6jol, " La Reforme et la Ligue," in the Histoire de France, by E. Lavisse (Paris, 1904), which contains a more complete bibliography.

HENRY IV.

HENRY IV. (1553-1610), king of France, the son of Antoine de Bourbon, duke of Vendome, head of the younger branch of the Bourbons, descendant of Robert of Clermont, sixth son of St Louis and of Jeanne d'Albret, queen of Navarre, was born at Pau (Basses Pyrenees) on the 14th of December 1553. He was educated as a Protestant, and in 1557 was sent to the court at Amiens. In 156 1 ha

entered the College de Navarre at Paris, returning in 1565 to Beam. During the third war of religion in France (1 568-1 570) he was taken by his mother to Gaspard de Coligny, leader of the Protestant forces since the death of Louis I., prince of Conde, at Jarnac, and distinguished himself at the battle of Arnay-le-Duc in Burgundy in 1569. On the 9th of June 1572, Jeanne d'Albret died and Henry became king of Navarre, marrying Margaret of Valois, sister of Charles IX. of France, on the 18th of August of that year. He escaped the massacre of St Bartholomew on the 24th of August by a feigned abjuration. On the 2nd of February 1576, after several vain attempts, he escaped from the court, joined the combined forces of Protestants and of opponents of the king, and obtained by the treaty of Beaulieu (1576) the government of Guienne. In 1577 he secured the treaty of Bergerac, which foreshadowed the edict of Nantes. As a result of quarrels with his unworthy wife, and the unwelcome intervention of Henry III., he undertook the seventh war of religion, known as the " war of the lovers " (des amoureux), seized Cahorson the 5th of May 1580, and signed the treaty of Fleix on the 26th of November 1580. On the 10th of June 1584 the death of Monsieur, the duke of Anjou, brother of King Henry III., made Henry of Navarre heir presumptive to the throne of France. Excluded from it by the treaty of Nemours (1585) he began the " war of the three Henrys " by a campaign in Guienne (1586) and defeated Anne, due de Joyeuse, at Coutras on the 20th of October 1587. Then Henry III., driven from Paris by the League on account of his murder of the duke of Guise at Blois (1588), sought the aid of the king of Navarre to win back his capital, recognizing him as his heir. The assassi- nation of Henry III. on the 1st of August 1589 left Henry king of France; but he had to struggle for ten more years against the League and against Spain before he won his kingdom. The main events in that long struggle were the victory of Arques over Charles, duke of Mayenne, on the 28th of September 1589; of Ivry, on the 14th of March 1590; the siege of Paris (1590); of Rouen (1 592) ; the meeting of the Estates of the League (1593), which the Satire Minippee turned to ridicule; and finally the conversion of Henry IV. to Catholicism in July 1593 — an act of political wisdom, since it brought about the collapse of all opposition. Paris gave in to him on the 22nd of March 1594 and province by province yielded to arms or negotiations; while the victory of Fontaine- Francaise (1595) and the capture of Amiens forced Philip II. of Spain to sign the peace of Vervins on the 2nd of May 1598. On the 13th of April of that year Henry IV. had promulgated the Edict of Nantes.

Then Henry set to work to pacify and restore prosperity to his

kingdom. Convinced by the experience of the wars that France needed an energetic central power, he pushed at times his royal prerogatives to excess, raising taxes in spite of the Estates, interfering in the administration of the towns, reforming their constitutions, and holding himself free to reject the advice of the notables if he consulted them. Aided by his faithful friend Maximilien de Bethune, baron de Rosny and due de Sully (q.v.) , he reformed the finances, repressed abuses, suppressed useless offices, extinguished the formidable debt and realized a reserve of eighteen millions. To alleviate the distress of the people, he undertook to develop both agriculture and industry: planting colonies of Dutch and Flemish settlers to drain the marshes of Saintonge, issuing prohibitive measures against the importation of foreign goods (1597), introducing the silk industry, encouraging the manufacture of cloth, of glass-ware, of tapestries (Gobelins), and under the direction of Sully — named grand-voyer de France — improving and increasing the routes for commerce. A complete system of canals was planned, that of Briare partly dug. New capitulations were concluded with the sultan Ahmed I. (1604) and treaties of commerce with England (1606), with

Spain and Holland. Attempts were made in 1604 and 1608 to colonize Canada (see Champlain, Samuel de). The army was reorganized, its pay raised and assured, a school of cadets formed to supply it with officers, artillery constituted and strongholds on the frontier fortified. While lacking the artistic tastes of the Valois, Henry beautified Paris, building the great gallery of the Louvre, finishing the Tuileries, building the Pont Neuf, the H6tel-de-Ville and the Place Royale.

The foreign policy of Henry IV. was directed against the Habsburgs. Without declaring war, he did all possible harm to them by alliances and diplomacy. In Italy he gained the grand duke of Tuscany — marrying his niece Marie de' Medici in 1600 — the duke of Mantua, the republic of Venice and Pope Paul V. The duke of Savoy, who had held back from the treaty of Vervins in 1598, signed the treaty of Lyons in 1601; in ex- change for the marquisate of Saluzzo, France acquired Bresse, Bugey, Valromey and the bailliage of Gex. In the Low Countries, Henry sent subsidies to the Dutch in their struggle against Spain. He concluded alliances with the Protestant princes in Germany, with the duke of Lorraine, the Swiss cantons (treaty of Soleure, 1602) and with Sweden.

The opening on the 25th of March 1609 of the question of the succession of John William the Good, duke of Cleves, of Julich and of Berg, led Henry, in spite of his own hesitations and those of his German allies, to declare war on the emperor Rudolph II. But he was

assassinated by Ravaillac (q.v.) on the 14th of May 1610, upon the eve of his great enterprise, leaving his policy to be followed up later by Richelieu. Sully in his Economies royales attributes to his master the ” great design ” of constitut- ing, after having defeated Austria, a vast European confedera- tion of fifteen states — a ” Christian Republic ” — directed by a general council of sixty deputies reappointed every three years. But this ” design ” has been attributed rather to the imagination of Sully himself than to the more practical policy of the king.

No figure in France has been more popular than that of ” Henry the Great.” He was affable to the point of familiarity, quick-witted like a true Gascon, good-hearted, indulgent, yet skilled in reading the character of those around him, and he could at times show himself severe and unyielding. His courage amounted almost to recklessness. He was a better soldier than strategist. Although at bottom authoritative he surrounded himself with admirable advisers (Sully, Sillery, Villeroy, Jeannin) and profited from their co-operation. His love affairs, un- doubtedly too numerous (notably with Gabriclle d’Estrees and Henriette d’Entragues), if they injure his personal reputation, had no bad effect on his policy as king, in which he was guided only by an exalted ideal of his royal office, and by a sympathy for the common people, his reputation for which has perhaps been exaggerated somewhat in popular tradition by the circum- stances of his reign.

Henry IV. had no children by his first wife, Margaret of Valois. By Marie de’ Medici he had Louis, later Louis XIII. ; Gaston, duke of Orleans; Elizabeth, who married Philip IV. of Spain; Christine, duchess of Savoy; and Henrietta, wife of Charles I. of England. Among his bastards the most famous were the children of Gabrielle d’Estrees— Caesar, duke of Vendome, Alexander of Vend6me, and Catherine Henriette, duchess of Elbeuf.

Several portraits of Henry are preserved at Paris, in the Bibliotheque Nationale (cf . Bouchot, Portraits an crayon, p. 189), at the Louvre (by Probus, bust by Barthelemy Prieur) at Versailles, Geneva (Henry at the age of fifteen), at HamptoTv, Court, at Munich and at Florence.

The works dealing with Henry IV. and his reign are too numerous to be enumerated here. For sources, see the Recueil des lettres missives de Henri IV, published from 1839 to 1853 by B. de Xivrey, in the Collection de documents inedits relatifs a I’histoire de France, and the various researches of Galitzin, Bautiot, Halphen, Dussieux and others. Besides their historic interest, the letters written personally by Henry,

whether love notes or letters of state, reveal a charming writer. Mention should be made of Auguste Poirson's Histoire du revne de Henri IV (2nd ed., 4 vols., Paris, 1862-1867) and of J. H. Mariejol's volume (vi.) in the Histoire de France, edited by Ernest Lavisse (Paris, 1905), where main sources and literature

are given with each chapter. A Revue Henri IV has been founded at Paris (1905). Finally, a complete survey of the sources for the

Feriod 1494-1610 is given by Henri Hauser in vol. vii. of Sources de histoire de France (Paris, 1906) .in continuation of A. Molinier's collection of the sources for French history during the middle ages.

HENRY I. (c. 1210-1274), surnamed le Gros, king of Navarre and count of Champagne, was the youngest son of Theobald I. king of Navarre by Margaret of Foix, and succeeded his eldest brother Theobald III. as king of Navarre and count of Champagne in December 1270. His proclamation at Pamplona, however, did not take place till March of the following year, and his coronation was delayed until May 1273. After a brief reign, characterized, it is said, by dignity and talent, he died in July 1274, suffocated, according to the generally received accounts, by his own fat. In him the male line of the counts of Champagne and kings of Navarre, became extinct. He married in 1269 Blanche, daughter of Robert, count of Artois, and niece of King Louis IX. and was succeeded by his only legitimate child, Jeanne or Joanna, by whose marriage to Philip IV. afterwards king of France in 1 284, the crown of Navarre became united to that of France.

HENRY II. (1503-1555), titular king of Navarre, was the eldest son of Jean d'Albret (d. 1516) by his wife Catherine de Foix, sister and heiress of Francis Phoebus, king of Navarre, and was born at Sanquesa in April 1503. When Catherine died in exile in 151 7 Henry succeeded her in her claim on Navarre, which was disputed by Ferdinand I. king of Spain; and under the protection of Francis I. of France he assumed the title of king. After ineffectual conferences at Noyon in 15 16 and at Montpellier in 1 5 18, an active effort was made in 1 52 1 to establish him in the de facto sovereignty; but the French troops which had seized the country were ultimately expelled by the Spaniards. In 1525 Henry was taken prisoner at the battle of Pa via, but he contrived to escape, and in 1526 married Margaret, the sister of Francis I. and widow of Charles, duke of Alencon. By her he was the

father of Jeanne d'Albret (d. 1572), and was conse- quently the grandfather of Henry IV. of France. Henry, who had some sympathy with the Huguenots, died at Pau on the 25th of May 1555.

HENRY I. (151 2-1 580), king of Portugal, third son of Emanuel the Fortunate, was born in Lisbon, on the 31st of January 1512. He was destined for the church, and in 1532 was raised to the archiepiscopal see of Braga. In 1542 he received the cardinal's hat, and in 1578 when he was called to succeed his grandnephew Sebastian on the throne, he held the archbishoprics of Lisbon and Coimbra as well as that of Braga, in addition to the wealthy abbacy of Alcobazar. As an ecclesiastic he was pious, pure, simple in his mode of life, charitable, and a learned and liberal patron of letters; but as a sovereign he proved weak, timid and incapable. On his death in 1580, after a brief reign of seventeen months, the male line of the royal family which traced its descent from Henry, first count of Portugal (c. 1100), came to an end'; and all attempts to fix the succession during his lifetime having ignominiously failed, Portugal became an easy prey to Philip II. of Spain.

HENRY II. (1489-1568), duke of Brunswick-Wolfenbiittel, was a son of Duke Henry I., and was born on the 10th of November 1489. He began to reign in 1514, but his brother William objected to the indivisibility of the duchy which had been decreed by the elder Henry, and it was only in 1535, after an im- prisonment of eleven years, that William recognized his brother's title. Sharing in an attack on John, bishop of Hildesheim, Henry was defeated at the battle of Soltau in June 15 19, but afterwards he was more successful, and when peace was made received some lands from the bishop. In 1525 he assisted Philip, landgrave of Hesse, to crush the rising of the peasants in north Germany, and in 1528 took help to Charles V. in Italy, where he narrowly escaped capture. As a pronounced opponent of the reformed doctrines, he joined the Catholic princes in concerting measures for defence at Dessau and elsewhere, but on the other hand promised Philip of Hesse to aid him in restoring his own brother-in-law Ulrich, duke of Wurttemberg, to his

duchy. However he gave no assistance when this enterprise was undertaken in 1 534, and subsequently the hostility between Philip and himself was very marked. Henry was attacked by Luther with unmeasured violence in a writing Wider Hans Worst ; but more serious was his isolation in north Germany. The duke soon came into collision with the Protestant towns of Goslar and Brunswick, against the former of which a sentence of restitution had been pronounced by the imperial court of justice (Reichskammergerichl). To conciliate the

Protestants Charles V. had suspended the execution of this sentence, a proceeding which Henry declared was ultra vires. The league of Schmalkalden, led by Philip of Hesse and John Frederick, elector of Saxony, then took up arms to defend the towns; and in 1 542 Brunswick was overrun and the duke forced to flee. In September 1545 he made an attempt to regain his duchy, but was taken prisoner by Philip, and only released after the victory of Charles V. at Muhlberg in April 1 547. Returning to Brunswick, where he was very unpopular, he soon quarrelled with his subjects both on political and religious questions, while his duchy was ravaged by Albert Alcibiades, prince of Bayreuth. Henry was among the princes who banded themselves together to crush Albert, and after the death of Maurice, elector of Saxony, at Sievershausen in July 1553, he took command of the allied troops and defeated Albert in two engagements. In his later years he became more tolerant, and was reconciled with his Protestant subjects. He died at Wolfenbiittel on the nth of June 1568. The duke was twice married, firstly in 1515 to Maria (d. 1541), sister of Ulrich of Wurttemberg, and secondly in 1556 to Sophia (d. 1575) daughter of Sigismund I., king of Poland. He attained some notoriety through his romantic attachment to Eva von Trott, whom he represented as dead and afterwards kept con- cealed at Staufenburg. Henry was succeeded by his only surviving son, Julius (1 528-1 589).

See F. Koldewey* Heinz von Wolfenbiittel (Halle, 1883); and F. Bruns, Die Vertreibung Herzog Heinrichs von Braunschweig durch den Schmalkaldischen Bund (Marburg, 1889).

HENRY (c. 1108-1139), surnamed the “Proud,” duke of Saxony and Bavaria, second son of Henry the Black, duke of Bavaria, and Wulfhild, daughter of Magnus Billung, duke of Saxony, was a member of the Welf family. His father and mother both died in 11 26, and as his elder brother Conrad had entered the church, Henry became duke of Bavaria and shared the family possessions in Saxony, Bavaria and Swabia with his younger brother, Welf. At Whitsuntide n 27 he was married to Gertrude, the only child of the German king, Lothair the Saxon, and at once took part in the warfare between the king and the Hohenstaufen brothers, Frederick II., duke of Swabia, and Conrad, afterwards the German king Conrad III. While engaged in this struggle Henry was also occupied in suppressing a rising in Bavaria, led by Frederick, count of Bogen, during which both duke and count sought to establish their own candi- dates in the bishopric of Regensburg. After a war of devastation, Frederick submitted in 1133, and two years later the Hohen- staufen brothers made their peace with Lothair. In 1 136 Henry accompanied his father-in-law to Italy, and taking command of one division of the German army marched into southern

Italy, devastating the land as he went. It was probably about this time that he was invested with the margraviate of Tuscany and the lands of Matilda, the late margravine. Having distinguished himself by his military genius during this campaign Henry left Italy with the German troops, and was appointed by the emperor as his successor in the dukedom of Saxony.' – When Lothair died in December 1 13 7 Henry's wealth and position made him a formidable candidate for the German throne; but the same qualities which earned for him the surname of " Proud," aroused the jealousy of the princes, and so prevented his election. The new king, Conrad III., demanded the imperial insignia which were in Henry's possession, and the duke in return asked for his investiture with the Saxon duchy. But Conrad, who feared his power, refused to assent to this on the pretext that it was unlawful for two duchies to be in one hand. Attempts at a settlement failed, and in July n 38 the duke was placed

under the ban, and Saxony was given to Albert the Bear, after- wards margrave of Brandenburg. War broke out in Saxony and Bavaria, but was cut short by Henry's sudden death at Quedlinburg on the 20th of October 1139. He was buried at Kbnigslutter. Henry was a man of great ability, and his early death alone prevented him from playing an important part in German history. Conrad the Priest, the author of the Rolands- lied, was in Henry's service, and probably wrote this poem at the request of the duchess, Gertrude.

See S. Riezler, Geschichte Bayerns, Band i. (Gotha, 1878); W. Bernhardi, Lothar von Supplinburg (Leipzig, 1879); W. von Giese-brecht, Geschichte der drutschen Kaistrzeit, Band iv. (Brunswick,

1877).

HENRY (1120-1195), surnamed the " Lion," duke of Saxony and Bavaria, only son of Henry the Proud, duke of Saxony and Bavaria, and Gertrude, daughter of the emperor Lothair the Saxon, was born at Ravensburg, and was a member of the family of Welf. In 1 138 the German king Conrad III. had sought to deprive Henry the Proud of his duchies, and when the duke died in the following year the interests of his young son were maintained in Saxony by his mother, and his grandmother Richenza, widow of Lothair, and in Bavaria by his uncle, Count Welf VI. This struggle ended in May 1142 when Henry was invested as duke of Saxony at Frankfort, and Bavaria was given to

Henry II., Jasomirgott, margrave of Austria, who married his mother Gertrude. In 1 147 he married Clementia, daughter of Conrad, duke of Zahringen (d. 1152), and began to take an active part in administering his dukedom and extending its area. He engaged in a successful expedition against the Abo- trites, or Obotrites, in 1147, and won a considerable tract of land beyond the Elbe, in which were re-established the bishoprics of Mecklenburg, 1 Oldenburg 2 and Ratzeburg. Hartwig, arch- bishop of Bremen, wished these sees to be under his authority, but Henry contested this claim, and won the right to invest these bishops himself, a privilege afterwards confirmed by the emperor Frederick I. Henry, meanwhile, had not forgotten Bavaria. In 1147 ne made a formal claim on this duchy, and in 1151 sought to take possession, but failing to obtain the aid of his uncle Welf, did not effect his purpose. The situation was changed in his favour when Frederick I., who was anxious to count the duke among his supporters, succeeded Conrad as German king in February n 52. Frederick was unable at first to persuade Henry Jasomirgott to abandon Bavaria, but in June 1 1 54 he recognized the claim of Henry the Lion, who accom- panied him on his first Italian campaign and distinguished himself in suppressing a rising at Rome, Henry's formal in- vestiture as duke of Bavaria taking place in September 1156 on the emperor's return to Germany. Henry soon returned to Saxony, where he found full scope for his untiring energy. Adolph II., count of Holstein, was compelled to cede Ltibeck to him in 1158; campaigns in 1163 and 1164 beat down further resistance of the Abotrites; and Saxon garrisons were estab- lished in the conquered lands. The duke was aided in this work by the alliance of Valdemar I., king of Denmark, and, it is said, by engines of war brought from Italy. During these years he had also helped Frederick I. in his expedition of 1157 against the Poles, and in July 1159 had gone to his assistance in Italy, where he remained for about two years.

The vigorous measures taken by Henry to increase his power aroused considerable opposition. In 1 166 a coalition was formed against him ai. Merseburg under the leadership of Albert the Bear, margrave of Brandenburg, and Archbishop Hartwig. Neither side met with much success in the desultory warfare that ensued, and Frederick made peace between the combatants at Wurzburg in June 1168. Having obtained a divorce from his first wife in 1 162, Henry was married at Minden in February 1168 to Matilda (1156-1189), daughter of Henry II., king of England, and was soon afterwards sent by the emperor Frederick I. on an embassy to the kings of England and France. A war with Valdemar of Denmark, caused by a quarrel over the booty obtained from

■The see was transferred to Schwerin by Henry in 1167. 2 Transferred to Lubeck in H63.

the conquest of Rtigen, engaged Henry's activity until June 1 171, when, in pursuance of a treaty which restored peace, Henry's daughter, Gertrude, married the Danish prince, Canute. Henry, whose position was now very strong, made a pilgrimage to Jerusalem in 1172, was received with great respect by the eastern emperor Manuel Comnenus at Constantinople, and returned to Saxony in n 73.

A variety of reasons were leading to a rupture in the har- monious relations between Frederick and Henry, whose increasing power could not escape the emperor's notice, and who showed little inclination to sacrifice his interests in Germany in order to help the imperial cause in Italy. He was not pleased when he heard that his uncle, Welf, had bequeathed his Italian and Swabian lands to the emperor, and the crisis came after Frederick's check before Alessandria in n 75. The emperor appealed personally to Henry for help in February, or March 1 1 76, but Henry made no move in response, and his defection contributed in some measure to the emperor's defeat at Legnano. The peace of Venice provided for the restoration of Ulalrich to his see of Halberstadt. Henry, however, refused to give up the lands which he had seized belonging to the bishopric, and this conduct provoked a war in which Ulalrich was soon joined by Philip, archbishop of Cologne. No attack on Henry appears to have been contemplated by Frederick to whom both parties carried their complaints, and a day was fixed for the settlement of the dispute at Worms. But neither then, nor on two further occasions, did Henry appear to answer the charges preferred against him; accordingly in January 1180 he was placed under the imperial ban at Wurzburg, and was declared deprived of all his lands.

Meanwhile the war with Ulalrich continued, but after his victory at Weissensee Henry's allies began to fall away, and his cause to decline. When Frederick took the field in June 1181 the struggle was soon over. Henry sought for peace, and the conditions were settled at Erfurt in November 1181, when he was granted the counties of Liineburg and Brunswick, but was banished under oath not to return without the emperor's per- mission. In July 1 182 he went to his father-in-law's court in Normandy, and afterwards to England, returning to Germany with Frederick's permission in 1 185. He was soon regarded once more as a menace to the peace of Germany, and of the three alternatives presented to him by the emperor in 1188 he rejected the idea of making a formal renunciation of his claim, or of participating in the crusade, and chose exile, going again to England in 1189. In

October of the same year, however, he returned to Saxony, excusing himself by asserting that his lands had not been defended according to the emperor's promise. He found many allies, took Lubeck, and soon almost the whole of Saxony was in his power. King Henry VI. was obliged to take the field against him, after which the duke's cause declined, and in July 1190 a peace was arranged at Fulda, by which he retained Brunswick and Liineburg, received half the revenues of Lubeck, and gave two of his sons as hostages. Still hoping to regain his former position, he took advantage of a league against Henry VI. in n 93 to engage in a further revolt; but the cap- tivity of his brother-in-law Richard I., king of England, led to a reconciliation. Henry passed his later years mainly at his castle of Brunswick, where he died on the 6th of August 1195, and was buried in the church of St Blasius which he had founded in the town. He had by his first wife a son and a daughter, and by his second wife five sons and a daughter. One of his sons was Otto, afterwards the emperor Otto IV., and another was Henry (d. 1227) count palatine of the Rhine.

Henry was a man of great ambition, and won his surname of " Lion " by his personal bravery. His influence on the fortunes of Saxony and northern Germany was very considerable. He planted Flemish and Dutch settlers in the land between the Elbe and the Oder, fostered the growth and trade of Lubeck, and in other ways encouraged trade and agriculture. He sought to spread Christianity by introducing the Cistercians, founding bishoprics, and building churches and monasteries. In 1874 a colossal statue was erected to his memory at Brunswick.

The authorities for the life of Henry the Lion are those dealing with the reign of the emperor Frederick I., and the early years of his son King Henry VI. The chief modern works are H. Prutz, Heinrich der Lowe (Leipzig, 1865); M. Philippson, Geschichte Heinrichs des Lowen (Leipzig, 1867) ; and L. Weiland, Das sdchsische Herzogthum unter Lothar und Heinrich dem Lovien (Greifswald, 1866).

HENRY, Prince of Battenberg (1858-1896), was the third son of Prince Alexander of Hesse and his morganatic wife, the beautiful Countess Julia von Hauke, to whom was granted in 1858 the title of princess of Battenberg, which her children inherited. He was born at Milan on the 5th of October 1858, was educated with a special view to military service, and in due time became a lieutenant in the first regiment of

Rhenish hussars. By their relationship to the grand dukes of Hesse the princes of Battenberg were brought into close contact with the English court, and Prince Henry paid several visits to England, where he soon became popular both in public and in private circles. It therefore created but little surprise when, towards the close of 1884, it was announced that Queen Victoria had sanctioned his engagement to the Princess Beatrice. The wedding took place at Whippingham on the 23rd of July 1885, and after the honeymoon the prince and princess settled down to a quiet home life with the queen, being seldom absent from the court, and accompanying her majesty in her annual visits' to the continent. Three sons and a daughter were the issue of the marriage. On the 31st of July 1885 a bill to naturalize Prince Henry was passed by the House of Lords, and he received the title of royal highness. He was made a Knight of the Garter and a member of the Privy Council, and also appointed a colonel in the army, and afterwards captain-general and governor of the Isle of Wight and governor of Carisbrooke Castle. He adapted himself very readily to English country life, for he was an excellent shot and an enthusiastic yachtsman. Coming of a martial race, the prince would gladly have embraced an active military career, and when the Ashanti expedition was organized in November 1805 he volunteered to join it. But when the expedition reached Prahsu, about 30 m. from Kumasi, he was struck down by fever, and being promptly conveyed back to the coast, was placed on board H.M.S. " Blonde." On the 17th of January he seemed to recover slightly, but a relapse occurred on the 19th, and he died on the evening of the 20th off the coast of Sierra Leone.

HENRY FITZ HENRY (1155-1183), second son of Henry II., king of England, by Eleanor of Aquitaine, became heir to the throne on the death of his brother William (1156), and at the age of five was married to Marguerite, the infant daughter of Louis VII. In 1170 he was crowned at Westminster by Roger of York. The protests of Becket against this usurpation of the rights of Canterbury were the ultimate cause of the primate's murder. The young king soon quarrelled with his father, who allowed him no power and a wholly inadequate revenue, and headed the great baronial revolt of n 73. He was assisted by his father-in-law, to whose court he had repaired; but, failing to shake the old king's power either in Normandy or England, made peace in n 74. Despite the generous terms which he received, he continued to intrigue with Louis VII., and was in consequence jealously watched by his father. In 1182 he and his younger brother Geoffrey took up arms, on the side of the Poitevin rebels, against Richard Coeur de Lion; apparently from resentment at the favour which Henry II. had shown to Richard in giving him the government

of Poitou while they were virtually landless. Henry II. took the field in aid of Richard; but the young king and Geoffrey had no scruples about withstanding their father, and continued to aid the Aquitanian rising until the young king fell ill of a fever which proved fatal to him (June n, 1183). His death was bitterly regretted by his father and by all who had known him. Though of a fickle and treacherous nature, he had all the personal fascina- tion of his family, and is extolled by his contemporaries as a mirror of chivalry. His train was full of knights who served him without pay for the honour of being associated with his exploits in the tilting-lists and in war.

The original authorities for Henry's life are Robert de Torigni, Chronica ; Giraldus Cambrcnsis, Dc instruction: principutn, Guil-

laume le Marechal (ed. P. Meyer, Paris, 1891, &c); Benedict, Gesta Henrici, William of Newburgh. See also Kate Norgate, England under the Angevin Kings (1887) ; Sir James Ramsay, Angevin Empire (1903); and C. E. Hodgson, Jung Heinrich, Konig von England (Jena, 1906).

HENRY, or in full, Henry Benedict Maria Clement Stuart (1725-1807), usually known as Cardinal York, the last prince of the royal house of Stuart, was the younger son of James Stuart, and was born in the Palazzo Muti at Rome on the 6th of March 1725. He was created duke of Yonk by his father soon after his birth, and by this title he was always alluded to by Jacobite adherents of his house. British visitors to Rome speak of him as a merry high-spirited boy with martial instincts; nevertheless, he grew up studious, peace-loving and serious. In order to be of assistance to his brother Charles, who was then campaigning in Scotland, Henry was despatched in the summer of 1745 to France, where he was placed in nominal command of French troops at Dunkirk, with which the marquis d'Argenson had some vague idea of invading England. Seven months after Charles's return from Scotland Henry secretly departed to Rome and, with the full approval of his father, but to the intense disgust of his brother, was created a cardinal deacon under the title of the cardinal of York by Pope Benedict XIV. on the 3rd of July 1747. In the following year he was ordained priest, and nominated arch-priest of the Vatican Basilica. In 1759 he was consecrated archbishop of Corinth inpartibus, and in 1761 bishop of Frascati (the ancient Tus- culum) in the Alban Hills near Rome. Six years later he was appointed vice-chancellor of the Holy See. Henry Stuart likewise held sinecure benefices in France, Spain and Spanish America, so that he became one of the wealthiest churchmen of the period, his annual revenue being said to amount to £30,000 sterling. On the death of his father, James Stuart (whose

affairs he had managed during the last five years of his life), Henry made persistent attempts to induce Pope Clement XIII. to acknowledge his brother Charles as legitimate king of Great Britain, but his efforts were defeated, chiefly through the adverse influence of Cardinal Alessandro Albani, who was bitterly opposed to the Stuart cause. On Charles's death in 1788 Henry issued a manifesto asserting his hereditary right t6 the British crown, and likewise struck a medal, commemorative of the event, with the legend "Hen. IX. Mag. Brit. Fr. et Hib. Rex. Fid. Def . Card. Ep. Tusc: " (Henry the Ninth of Great Britain, France and Ireland, King, Defender of the Faith, Cardinal, Bishop of Frascati). In February 1798, at the approach of the invading French forces, Henry was forced to fly from Frascati to Naples, whence at the close of the same year he sailed to Messina. From Messina he proceeded by sea in order to be present at the ex- pected conclave at Venice, where he arrived in the spring of 1799, aged, ill and almost penniless. His sad plight was now made known by Cardinal Stefano Borgia to Sir John Coxe Hippisley (d. 1825), who had formerly acted semi-officially on behalf of the British government at the court of Pius VI. Sir John Hippisley appealed to George III., who on the warm recommendation of Prince Augustus Frederick, duke of Sussex, gave orders for the annual payment of a pension of £4000 to the last of the Royal Stuarts. Henry received the proffered assist- ance gratefully, and in return for the king's kindness subsequently left by his will certain British crown jewels in his possession to the prince regent. In 1800 Henry was able to return to Rome, and in 1803, being now senior cardinal bishop, he became ipso facto dean of the Sacred College and bishop of Ostia and Velretri. He died at Frascati on the 13th of July 1807, and was buried in the Grotte Vaticane of St Peter's in an urn bearing the title of " Henry IX."; he is also commemorated in Canova's well- known monument to the Royal Stuarts (see James). The Stuart archives, once the property of Cardinal York, were subsequently presented by Pope Pius VII. to the prince regent, who placed them in the royal library at Windsor Castle.

' See B. W. Kelly. Life of Cardinal York; H. M. Vaughan, Last of the Royal Stuarts; and A. Shield, Henry Stuart, Cardinal of York, and his Times (1908). (11. M. V.)

HENRY OF PORTUGAL

HENRY OF PORTUGAL, surnamed the " Navigator " (1394- 1460), duke of Viseu, governor of the Algarve, was born at Oporto on the 4th of March 1394. He was the third (or, counting children who died in

infancy, the fifth) son of John (Joao) I., the founder of the Aviz dynasty, under whom Portugal, victorious against Castile and against the Moors of Morocco, began to take a prominent place among European nations; his mother was Philippa, daughter of John of Gaunt. When Ceuta, the " African Gibraltar," was taken in 1415, Prince Henry performed the most distinguished service of any Portuguese leader, and received knighthood; he was now created duke of Viseu and lord of Covilham, and about the same time began his explorations, which, however, limited in their original conception, certainly developed into a search for a better knowledge of the western ocean and for a sea-way along the unknown coast of Africa to the supposed western Nile (our Senegal), to the rich negro lands beyond the Sahara desert, to the half-true, half-fabled realm of Prester John, and so ultimately to the Indies.

Disregarding the traditions which assign 1412 or even 1410 as the commencement of these explorations, it appears that in 141 5, the year of Ceuta, the prince sent out one John de Trasto on a voyage which brought the Portuguese to Grand Canary. There was no discovery here, for the whole Canarian archipelago was now pretty well known to French and Spanish mariners, especially since the conquest of 1402-06 by French adventurers under Castilian overlordship ; but in 1418 Henry's captain, Joao Goncalvez Zarco rediscovered Porto Santo, and in 1420 Madeira, the chief members of an island group which had originally been discovered (probably by Genoese pioneers) before 1351 or perhaps even before 1339, but had rather faded from Christian knowledge since. The story of the rediscovery of Madeira by the Englishman Robert Machim or Machin, elooing from Bristol with his lady-love, Anne d'Arfet, in the reign of Edward III. (about 1370), has been the subject of much con- troversy; in any case it does not affect the original Italian discovery, nor the first sighting of Porto Santo by Zarco, who, while exploring the west African mainland coast, was driven by storms to this island. In 1424-1425 Prince Henry attempted to purchase the Canaries, and began the colonization of the Madeira group, both in Madeira itself and in Porto Santo; to aid this latter movement he procured the famous charters of 1430 and 1433 from the Portuguese crown. In 1427, again, with the co-operation of his father King John, he seems to have sent out the royal pilot Diogo de Sevill, followed in 1431 by Goncalo Velho Cabral, to explore the Azores, first mentioned and depicted in a Spanish treatise of 1345 (the Conoscimiento de todos los Reynos) and in an Italian map of 1351 (the Laureniian Portolano, also the first cartographical work to give us the Madeiras with modern names), but probably almost unvisited from that time to the advent of

Sevill. This rediscovery of the far western archipelago, and the expeditions which, even within Prince Henry's life (as in 1452) pushed still deeper into the Atlantic, seem to show that the infante was not entirely forgetful of the possibility of such a western route to Asia as Columbus attempted in 1492, only to find America across his path. Mean- time, in 1418, Henry had gone in person to relieve Ceuta from an attack of Morocco and Granada Mussulmans; had accomplished his task, and had planned, though he did not carry out, a seizure of Gibraltar. About this time, moreover, it is probable that he had begun to gather information from the Moors with regard to the coast of " Guinea" and the interior of Africa. In 1419, after his return to Portugal, he was created governor of the " kingdom " of Algarve, the southernmost province of Portugal; and his connexion now appears to have begun with what after- wards became known as the " Infante's Town " (Villa do Iff ante) at Sagres, close to Cape St Vincent; where, before 1438, a Tercena Nabal or naval arsenal grew up; where, from 1438, after the Tangier expedition, the prince certainly resided for a great part of his later life; and where he died in 1460.

In 1433 died King John, exhorting his son not to abandon those schemes which were now, in the long-continued failure to round Cape Bojador. ridiculed by many as costly absurdities;

and in 1434 one of the prince's ships, commanded by Gil Eannes, at length doubled the cape. In 1435 Affonso Goncalvez Baldaya, the prince's cup-bearer, passed fifty leagues beyond; and before the close of 1436 the Portuguese had almost reached Cape Blanco. Plans of further conquest in Morocco, resulting in 1437 in the disastrous attack upon Tangier, and followed in 1438 by the death of King Edward (Duarte) and the domestic troubles of the earlier minority of Affonso V., now interrupted Atlantic and African exploration down to 1441, except only in the Azores. Here rediscovery and colonization both progressed, as is shown by the royal licence of the 2nd of July 1439, to people " the seven islands " of the group then known. In 1441 exploration began again in earnest with the venture of Antam Goncalvez, who brought to Portugal the first slaves and gold-dust from the Guinea coasts beyond Bojador; while Nuno Tristam in the same year pushed on to Cape Blanco. These successes produced a great effect; the cause of discovery, now connected with boundless hopes of profit, became popular; and many volunteers, especially merchants and seamen from Lisbon and Lagos, came forward. In 1442 Nuno Tristam reached the Bay or Bight of Arguim, where the infante erected a fort in 1448, and where for years the Portuguese carried on vigorous slave-raiding. Meantime the prince, who had now, in 1443, been created by Henry VI. a knight of the Garter of England,

proceeded with his Sagres buildings, especially the palace, church and observatory (the first in Portugal) which formed the nucleus of the ” Infante’s Town,” and which were certainly commenced soon after the Tangier fiasco (1437), if not earlier. In 1444-1446 there was an immense burst of maritime and exploring activity; more than 30 ships sailed with Henry’s licence to Guinea; and several of their commanders achieved notable success. Thus Diniz Diaz, Nuno Tristam, and others reached the Senegal in 1445; Diaz rounded Cape Verde in the same year; and in 1446 Alvaro Fernandez pushed on almost to our Sierra Leone, to a point no leagues beyond Cape Verde. This was perhaps the most distant point reached before 1461. In 1444, moreover, the island of St Michael in the Azores was sighted (May 8), and in 1445 its colonization was begun. During this latter year also John Fernandez (q.v.) spent seven months among the natives of the Arguim coast, and brought back the first trustworthy first-hand European account of the Sahara hinterland. Slave- raiding continued ceaselessly; by 1446 the Portuguese had carried off nearly a thousand captives from the newly surveyed coasts; but between this time and the voyages of Cadamosto (q.v.) in 1455-1456, the prince altered his policy, forbade the kidnapping of the natives (which had brought about fierce reprisals, causing the death of Nuno Tristam in 1446, and of other pioneers in 1445, 1448, &c), and endeavoured to promote their peaceful inter- course with his men. In 144 5-1446, again, Dom Henry renewed his earlier attempts (which had failed in 1424-1425) to purchase or seize the Canaries for Portugal; by these he brought his country to the verge of war with Castile; but the home govern- ment refused to support him, and the project was again abandoned. After 1446 our most voluminous authority, Azurara, records but little; his narrative ceases altogether in 1448; one of the latest expeditions noticed by him is that of a foreigner in the prince’s service, ” Vallarte the Dane,” which ended in utter destruction near the Gambia, after passing Cape Verde in 1448. after this the chief matters worth notice in Dom Henry’s life are, first, the progress of discovery and colonization in the Azores — where Terceira was discovered before 1450, perhaps in 144S, and apparently by a Fleming, called ” Jacques de Bruges ” in the prince’s charter of the 2nd of March 1450 (by this charter Jacques receives the captaincy of this isle as its intending colonizer) ; secondly, the rapid progress of civilization in Madeira, evidenced by its timber trade to Portugal, by its sugar, corn and honey, and above all by its wine, produced from the Malvoisie or Malmsey grape, introduced from Crete; and thirdly, the explorations of Cadamosto and Diogo Gomez (q.v.). Of these the former, in his two voyages of 1455 and 1456, explored part of the courses of the Senegal and the Gambia, discovered the Cape Verde Islands (1456), named

and mapped more carefully than

before a considerable section of the African littoral beyond Cape Verde, and gave much new information on the trade-routes of north-west Africa and on the native races; while Gomez, in his first important venture (after 1448 and before 1458), though not accomplishing the full Indian purpose of his voyage (he took a native interpreter with him for use ” in the event of reaching India “), explored and observed in the Gambia valley and along the adjacent coasts with fully as much care and profit. As a result of these expeditions the infante seems to have sent out in 1458 a mission to convert the Gambia negroes. Gomez’ second voyage, resulting in another ” discovery ” of the Cape Verde Islands, was probably in 1462, after the death of Prince Henry; it is likely that among the infante’s last occupations were the necessary measures for the equipment and despatch of this venture, as well as of Pedro de Sintra’s important expedi- tion of 1461.

The infante’s share in home politics was considerable, especially in the years of Affonso V.‘s minority (1438, &c.) when he helped to make his elder brother Pedro regent, reconciled him with the queen-mother, and worked together with them both in a council of regency. But when Dom Pedro rose in revolt (1447), Henry stood by the king and allowed his brother to be crushed. In the Morocco campaigns of his last years, especially at the capture of Alcazar the Little (1458), he restored the military fame which he had founded at Ceuta and compromised at Tangier, and which brought him invitations from the pope, the emperor and the kings of Castile and England, to take command of their armies. The prince was also grand master of the Order of Christ, the successor of the Templars in Portugal; and most of his Atlantic and African expeditions sailed under the flag of his order, whose revenues were at the service of his explorations, in whose name he asked and obtained the official recognition of Pope Eugenius IV. for his work, and on which he bestowed many privileges in the new-won lands— the tithes of St Michael in the Azores and one- half of its sugar revenues, the tithe of all merchandise from Guinea, the ecclesiastical dues of Madeira, &c. As ” protector of Portuguese studies,” Dom Henry is credited with having founded a professorship of theology, and perhaps also chairs of mathematics and medicine, in Lisbon — -where also, in 143 1, he is said to have provided house-room for the university teachers and students. To instruct his captains, pilots and

other pioneers more fully in the art of navigation and the making of maps and instruments he procured, says Barros, the aid of one Master Jacome from Majorca, together with that of certain Arab and Jewish mathematicians. We hear also of one Master Peter, who inscribed and illuminated maps for the infante; the mathematician Pedro Nunes declares that the prince's mariners were well taught and provided with instruments and rules of astronomy and geometry " which all map-makers should know "; Cadamosto tells us that the Portuguese caravels in his day were the best sailing ships afloat; while, from several matters recorded by Henry's biographers, it is clear that he devoted great attention to the study of earlier charts and of any available information he could gain upon the trade-routes of north-west Africa. Thus we find an Oran merchant corresponding with him about events happening in the negro-world of the Gambia basin in 1458. Even if there were never a formal " geographical school " at Sagres, or elsewhere in Portugal, founded by Prince Henry, it appears certain that his court was the centre of active and useful geographical study, as well as the source of the best practical exploration of the time.

The prince died on the 13th of November 1460, in his town near Cape St Vincent, and was buried in the church of St Mary in Lagos, but a year later his body was removed to the superb monastery of Batalha. His great-nephew, King Dom Manuel, had a statue of him placed over the centre column of the side gate of the church of Belem. On the 24th of July 1840, a monu- ment was erected to him at Sagres at the instance of the marquis de Sa da Bandeira.

The glory attaching to the name of Prince Henry does not rest merely on the achievements effected during his own lifetime, but on the subsequent results to which his genius and perseverance had lent the primary inspiration. To him the human race is

indebted, in large measure, for the maritime exploration, within one century (1420-1522), of more than half the globe, and especially of the great waterways from Europe to Asia both by east and by west. His own life only sufficed for the accomplish- ment of a small portion of his task. The complete opening out of the African or south-east route to the Indies needed nearly forty years of somewhat intermittent labour after his death (1460- 1498), and the prince's share has often been forgotten in that of pioneers who were really his executors — Diogo Cam, Bartholomew Diaz or Vasco da Gama. Less directly, other sides of his activity may be considered as fulfilled by the Portuguese penetration of inland Africa, especially of Abyssinia, the land of the " Prester John " for whom Dom Henry sought, and even by the finding

of a western route to Asia through the discoveries of Columbus, Balboa and Magellan.

See Alguns documentos do archivo nacional da Torre do Tontbo acerca das navegacoes . . . portuguezas (Lisbon, 1892); Alves, Dom Henrique Infante (Oporto, 1894) ; Archivo dos Azores (Ponta Delgada, 1878-1894); Gomes Eannes de Azurara, Chronica do descobrimento e conquista de Guine, ed. Carreira and Santarem (Paris, 1841 ; Eng. trans, by Raymond Beazley and Edgar Prestage, Hakluyt Society, London, 1 896-1 899); Joao de Barros, Decadas da Asia (Lisbon, 1652); Raymond Beazley, Prince Henry the Navigator (London, 1895), and introduction to Azurara, vol. ii., in Hakluyt Soc. trans, (see above) ; Antonio Cordeiro, Historia Insultana (Lisbon, 1717); Freire (Candido Lusitano), Vida do Infante D. Henrique (Lisbon, 1858); ” Diogo Gomez,” in Dr Schmeller’s Uber Valentim Fernandez Alemdo, vol. iv. pt. iii., in the publications of the 1st class of the Royal Bavarian Academy of Sciences (Munich, 1845) ! R. H. Major, The Life of Henry of Portugal, surnamed the Navigator (London, 1868); Jules Mees, Henri le Navigateur et I’academie . . . de Sagres (Brussels, 1901), and Histoire de la decouverle des ties Azores (Ghent, 1901); Duarte Pacheco Pereira, Esmeraldo de situ orbis (Lisbon, 1892); Sophus Ruge, ” Prinz Heinrich der See- fahrer,” in vol. 65 of Globus, p. 153 (Brunswick, 1894); Gustav de Veer, Prinz Heinrich der Seefahrer (Danzig, 1863); H. E. Wauwer- man, Henri le Navigateur et I’academie bortugaise de Sagres (Antwerp and Brussels, 1890). ‘ (C. R. B.)

HENRY OF ALMAIN (1235-1271), so called from his father’s German connexions, was the son of Richard, earl of Cornwall and king of the Romans. As a nephew of both Henry III. and Simon de Montfort he wavered between the two at the beginning of the Barons’ War, but finally took the royalist side and was among the prisoners taken by Montfort at Lewes (1264). In 1268 he took the cross with his cousin Edward, who, however, sent him back from Sicily to pacify the unruly province of Gascony. Henry took the land route with the kings of France and Sicily. While attending mass at Viterbo (13 March 1271) he was attacked by Guy and Simon de Montfort, sons of Earl Simon, and foully murdered. This revenge was the more outrageous since Henry had personally exerted himself on behalf of the Montforts after Evesham. The deed is mentioned by Dante, who put Guy de Montfort in the seventh circle of hell.

See W. H. Blaauw’s The Barons’ War (ed. 1871); Ch. B6mont’s Simon de Montfort (1884).

HENRY OF BLOIS, bishop of Winchester (1101-1171), was the son of

Stephen, count of Blois, by Adela, daughter of William I., and brother of King Stephen. He was educated at Cluny, and consistently exerted himself for the principles of Cluniac reform. If these involved high claims of independence and power for the Church, they also asserted a high standard of devotion and discipline. Henry was brought to England by Henry I. and made abbot of Glastonbury. In 11 29 he was given the bishopric of Winchester and allowed to hold his abbey in conjunction with it. His hopes of the see of Canterbury were disappointed, but he obtained in 1139 a legatine commission which gave him a higher rank than the primate. In fact as well as in theory he became the master of the Church in England. He even contemplated the erection of a new province, with Winchester as its centre, which was to be independent of Canterbury. Owing both to local and to general causes the power of the Church in England has never been higher than in the reign of Stephen (1135-1154). Henry as its leader and a legate of the pope was the real " lord of England," as the chronicles call him. Indeed, one of the ecclesi- astical councils over which he presided formally declared that the election of the king in England was the special privilege of the

clergy. Stephen owed his crown to Henry (1135), but they quarrelled when Stephen • refused to give Henry the primacy; and the bishop took up the cause of Roger of Salisbury (1139). After the battle of Lincoln (1141) Henry declared for Matilda; but finding his advice treated with contempt, rejoined his brother's side, and his successful defence of Winchester against the empress (Aug.-Sept. 1141) was the turning-point of the civil war. The expiration of his legatine commission of 1 144 deprived him of much of his power. He spent the rest of Stephen's reign in trying to procure its renewal. But his efforts were unsuccessful, though he made a personal visit to Rome. At the accession of Henry II. (1154) he retired from the world and spent the rest of his life in works of charity and penitence. He died in 1171. Henry seems to have been a man of high character, great courage, resolution and ability. Like most/great bishops of his age he had a passion for architecture. He built, among other castles, that of Farnham ; and he began the hospital of St Cross at Winchester. Authorities. — Original: William of Malmesbury, De gestis regum; the Gesta Stephani. Modern: Sir James Ramsay, Founda- tions of England, vol. ii.; Kate Norgate's Angevin Kings; Kitchin's Winchester.

HENRY OF GHENT [Henricus a Gandavo] (c. 1 217-1293), scholastic

philosopher, known as ” Doctor Solennis,” was born in the district of Mude, near Ghent, and died at Tournai (or Paris) . He is said to have belonged to an Italian family named Bonicolli, in Flemish Goethals, but the question of his name has been much discussed (see authorities below). He studied at Ghent and then at Cologne under Albertus Magnus. After obtaining the degree of doctor he returned to Ghent, and is said to have been the first to lecture there publicly on philosophy and theology. Attracted to Paris by the fame of the university, he took part in the many disputes between the orders and the secular priests, and warmly defended the latter. A contemporary of Aquinas, he opposed several of the dominant theories of the time, and united with the current Aristotelian doctrines a strong infusion of Platonism. He distinguished between knowledge of actual objects and the divine inspiration by which we cognize the being and existence of God. The first throws no light upon the second. Individuals are constituted not by the material element but by their independent existence, i.e. ultimately by the fact that they are created as separate entities. Universals must be distinguished according as they have reference to our minds or to the divine mind. In the divine intelligence exist exemplars or types of the genera and species of natural objects. On this subject Henry is far from clear; but he defends Plato against the current Aristotelian criticism, and endeavours to show that the two views are in harmony. In psychology, his view of the intimate union of soul and body is remarkable. The body he regards as forming part of the substance of the soul, which through this union is more perfect and complete.

Works. — Quodlibeta theologica (Paris, 1518; Venice, 1608 and 1613); Summa theologiae (Paris, 1520; Ferrara, 1646); De scriptoribus ecclesiasticis (Cologne, 1580).

Authorities. — F. Huet’s Recherches hist, etcrit. . . . de H. de G. (Paris, 1838) has been superseded by F. Ehrle’s monograph in Archiv fur Lit. u. Kirchengeschichte des Mittelalters, 1.(1885); see also A. Wauters and N. de Pauw in the Bull, de la Com. royale d’histoire de Belgique (4th series, xiv., xv., xvi., 1887-1889); H. Delehaye, Nouvelles Recherches sur Henri de Gand (1886) ; C.Werner, Heinrich von Gent als Reprdsentant des christlichen Platonismus im ijten Jahrh. (Vienna, 1878); A. Stockl, Phil. d. Mittelalters, ii. 738-758; C. Brfchillet Jourdain, La Philosophie de St Thomas d’Aquin (1858), ii. 29-46; Alphonse le Roy in Biographie nationals de Belgique, vii. (Brussels, 1880); and article Scholasticism.

HENRY OP HUNTINGDON, English chronicler of the 12th century, was born, apparently, between the years 1080 and 1090. His father,

by name Nicholas, was a clerk, who became archdeacon of Cambridge, Hertford and Huntingdon, in the time of Remigius, bishop of Lincoln (d. 1092). The celibacy of the clergy was not strictly enforced in England before 1102. Hence the chronicler makes no secret of his antecedents, nor did they interfere with his career. At an early age Henry entered the household of Bishop Robert Bloet, who appointed him, immediately after the death of Nicholas (11 10), archdeacon of Hertford and Huntingdon. Henry was on familiar terms with his patron;

and also, it would seem, with Bloet ‘s successor, by whom he was encouraged to undertake the writing of an English history from the time of Julius Caesar. This work, undertaken before 1 130, was first published in that year; the author subsequently published in succession four more editions, of which the last ends in 1 1 54 with the accession of Henry II. The only recorded fact of the chronicler’s later life is that he went with Archbishop Theobald to Rome in 1139. On the way Henry halted at Bee, and there made the acquaintance of Robert de Torigni, who mentions their encounter in the preface to his Chronicle.

The Historia Anglorum was first printed in Savile, Rerum Angli- carum scriptores post Bedam (London, 1596). The first six books excepting the third, which is almost entirely taken from Bede, are given in Monumenta historica Britannica, vol. i. (ed. H. Petrie and J. Sharpe, London, 1848). The standard edition is that of T. Arnold in the Rolls Series (London, 1879). There is a translation by T. Forester in Bohn’s Antiquarian Library (London, 1853). The Historia is of little independent value before 1126. Up to that point the author compiles from Eutropius, Aurelius Victor, Nennius, Bede and the English chronicles, particularly that of Peterborough ; in some cases he professes to supplement these sources from oral tradition; but most of his amplifications are pure rhetoric (see F. Liebermann in Forschungen zur deutschen Geschichte for 1878, pp. 265 seq.). Arnold prints, in an appendix, a minor work from Henry’s pen, the Epistola ad Walterum de contemptu mundi, which was written in 11 35. It is a moralizing tract, but contains some interesting anecdotes about contemporaries. Henry also wrote epistles to Henry I. (on the succession of kings and emperors in the great monarchies of the world) and to ” Warinus, a Briton ” (on the early British kings, after Geoffrey of Monmouth). A book, De miraculis, composed of extracts from Bede, was appended along with these three epistles to the later recensions of the Historia. Henry composed eight books of Latin epigrams; two books survive in the Lambeth MS., No. 118. His value as a historian, formerly much overrated, is discussed at length by Liebermann and in T. Arnold’s

introduction to the Rolls edition of the Historia:

(H. W. C. D.)

HENRY OF LAUSANNE (variously known as of Bruys, of Cluny, of Toulouse, and as the Deacon), French heresiarch of the first half of the 1 2th century. Practically nothing is known of his origin or early life. He may have been one of those hermits who at that time swarmed in the forests of western Europe, and particularly in France, always surrounded by popular veneration, and sometimes the founders of monasteries or religious orders, such as those of Premontre or Fontevrault. If St Bernard's reproach (Ep. 241) be well founded, Henry was an apostate monk — a " black monk " (Benedictine) according to the chronicler Alberic de Trois Fontaines. The information we possess as to his degree of instruction is scarcely more precise or less conflicting. When he arrived at Le Mans in 1101, his terminus a quo was probably Lausanne. At that moment Hildebert, the bishop of Le Mans, was absent from his episcopal town, and this is one of the reasons why Henry was granted permission to preach (March to July 1101), a function jealously guarded by the regular clergy. Whether by his prestige as a hermit and ascetic or by his personal charm, he soon acquired enormous influence over the people. His doctrine at that date appears to have been very vague; he seemingly rejected the invocation of saints and also second marriages, and preached penitence. Women, inflamed by his words, gave up their jewels and luxurious apparel, and young men married courtesans in the hope of reclaiming them. Henry was peculiarly fitted for a popular preacher. In person he was tall and had a long beard; his voice was sonorous, and his eyes flashed fire. He went bare-footed, preceded by a man carrying a staff surmounted with an iron cross; he slept on the bare ground, and lived by alms. At his instigation the inhabitants of Le Mans soon began, to slight the clergy of their town and to reject all ecclesiastical authority. On his return from Rome, Hildebert had a public disputation with Henry, in which, according to the bishop's Acta episcoporum Cenomannensium, Henry was shown to be less guilty of heresy than of ignorance. He, however, was forced to leave Le Mans, and went probably to Poitiers and afterwards to Bordeaux. Later we find him in the diocese of Aries, where the archbishop arrested him and had his case referred to the tribunal of the pope. In 1134 Henry appeared before Pope Innocent III. ax the council of Pisa, where he was compelled

to abjure his errors and was sentenced to imprisonment. It appears that St Bernard offered him an asylum at Clairvaux; but it is not known if he reached Clairvaux, nor do we know when or in what circumstances he resumed his activities. Towards 1139, however, Peter the Venerable, abbot of Cluny, wrote a treatise called Epistola seu tractatus adversus Petrobru- sianos (Migne, Patr. Lat. clxxxix.) against the disciples of Peter of Bruys and Henry of Lausanne, whom he calls Henry of Bruys, and whom, at the moment of writing, he accuses of preaching, in all the dioceses in the south of France, errors which he had inherited from Peter of Bruys. According to Peter the Venerable, Henry's teaching is summed up as follows: rejection of the doctrinal and disciplinary authority of the church; recognition of the Gospel freely interpreted as the sole rule of faith; condemnation of the baptism of infants, of the eucharist, of the sacrifice of the mass, of the communion of saints, and of prayers for the dead; and refusal to recognize any form of worship or liturgy. The success of this teaching spread very rapidly in the south of France. Speaking of this region, St Bernard (Ep. 241) says: " The churches are without flocks, the flocks without priests, the priests without honour; in a word, nothing remains save Christians without Christ." On several occasions St Bernard was begged to fight the innovator on the scene of his exploits, and in 1145, at the instance of the legate Alberic, cardinal bishop of Ostia, he set out , passing through the diocese of Angouleme and Limoges, sojourning for some time at Bordeaux, and finally reaching the heretical towns of Bergerac, Perigueux, Sarlat, Cahors and Toulouse. At Bernard's approach Henry quitted Toulouse, leaving there many adherents, both of noble and humble birth, and especially among the weavers. But Bernard's eloquence and miracles made many converts, and Toulouse and Albi were quickly restored to orthodoxy. After inviting Henry to a disputation, which he refused to attend, St Bernard returned to Clairvaux. Soon afterwards the heresi- arch was arrested, brought before the bishop of Toulouse, and probably imprisoned for life. In a letter to the people of Toulouse, undoubtedly written at the end of 1146, St Bernard calls upon them to extirpate the last remnants of the heresy. In 1 1 51, however, some Henricians still remained in Languedoc, for Matthew Paris relates (Chron. maj., at date 1151) that a young girl, who gave herself out to be miraculously inspired by the Virgin Mary, was reputed to have converted a great number of the disciples of Henry of Lausanne. It is impossible to designate definitely as Henricians one of the two sects discovered at Cologne and described by Everwin, provost of Steinfeld, in his letter to St Bernard (Migne, Patr. Lat., clxxxii. 676-680), or the heretics of Perigord mentioned by a certain monk Heribert (Martin Bouquet, Recueil des historiens des Gaules et de la France,

xii- 55°-55i)-

See ” Les Origines de l’heresie albigeoise,” by Vacandard in the Revue des questions historiques (Paris, 1894, pp. 67-83). (P. A.)

HENRY, EDWARD LAMSON (1841-), American genre painter, was born in Charleston, South Carolina, on the 12th of January 1841. He was a pupil of the schools of the Pennsylvania Academy of Fine Arts in Philadelphia, and of Gleyre and Courbet in Paris, and in 1870 was elected to the National Academy of Design, New York. As a painter of colonial and early American themes and incidents of rural life, he displays a quaint humour and a profound knowledge of human nature. Among his best- known compositions are some of early railroad travel, incidents of stage coach and canal boat journeys, rendered with much detail on a minute scale.

HENRY, JAMES (1 798-1876), Irish classical scholar, was born in Dublin on the 13th of December 1798. He was educated at Trinity College, and until 1845 practised as a physician in the city. In spite of his unconventionality and unorthodox views on religion and his own profession, he was very successful. His accession to a large fortune enabled him to devote himself entirely to the absorbing occupation of his life — the study of Virgil. Accompanied by his wife and daughter, he visited all those parts of Europe where he “was likely to find rare editions or MSS. of the poet. He died near Dublin on the 14th of July

1876. As a commentator on Virgil Henry will always deserve to be remembered, notwithstanding the occasional eccentricity of his notes and remarks. The first fruits of his researches were published at Dresden in 1853 under the quaint title Notes of a Twelve Fears’ Voyage of Discovery in the first six Books of the Eneis. These were embodied, with alterations and additions, in the Aeneidea, or Critical, Exegetical and Aesthetical Remarks on the Aeneis (1873-1892), of which only the notes on the first book were published during the author’s lifetime. As a textual critic Henry was exceedingly conservative. His notes, written in a racy and interesting style, are especially valuable for their wealth of illustration and references to the less-known classical authors. Henry was also the author of several poems, some of them descriptive accounts of his travels, and of various pamphlets of a satirical nature.

See obituary notice by I. P. Mahaffy in the Academy of the 12th of August 1876, where a list of his works, nearly all of which were privately printed, is given.

HENRY, JOSEPH (1797-1878), American physicist, was born in Albany, N.Y., on the 17th of December 1797. He received his education at an ordinary school, and afterwards at the Albany Academy, which enjoyed considerable reputation for the thoroughness of its classical and mathematical courses. On finishing his academic studies he contemplated adopting the medical profession, and prosecuted his studies in chemistry, anatomy and physiology with that view. He occasionally contributed papers to the Albany Institute, in the years 1824 and 1825, on chemical and mechanical subjects; and in the latter year, having been unexpectedly appointed assistant engineer on the survey of a route for a state road from the Hudson river to Lake Erie, a distance somewhat over 300 m., he at once embarked with zeal and success in the new enterprise. This diversion from his original bent gave him an inclination to the career of civil and mechanical engineering; and in the spring of 1826 he was elected by the trustees of the Albany Academy to the chair of mathematics and natural philosophy in that institution. In the latter part of 1827 he read before the Albany Institute his first important contribution," On Some Modifications of the Electro-Magnetic Apparatus." Struck with the great improvements then recently introduced into such apparatus by William Sturgeon of Woolwich, he had still further extended their efficiency, with considerable reduction of battery- power, by adopting in all the experimental circuits (where applicable) the principle of J. S. C. Schweigger's " multiplier," that is, by substituting for single wire circuits, voluminous coils (Trans. Albany Institute, 1827, 1, p. 22). In June 1828 and in March 1829 he exhibited before the institute small electro- magnets closely and repeatedly wound with silk-covered wire, which had a far greater lifting power than any then known. Henry appears to have been the first to adopt insulated or silk- covered wire for the magnetic coil; and also the first to employ what may be called the " spool " winding for the limbs of the magnet. He was also the first to demonstrate experimentally the difference of action between what he called a " quantity " magnet excited by a " quantity " battery of a single pair, and an " intensity " magnet with long fine wire coil excited by an " intensity " battery of many elements, having their resistances suitably proportioned. He pointed out that the latter form alone was applicable to telegraphic purposes. A detailed account of these experiments and exhibitions was not, however, published till 1831 (Sill. Journ., 19, p. 400). Henry's " quantity " magnets acquired considerable celebrity at the time, from their uri* precedented attractive power — one (August 1830) lifting 750 lb, another (March 1831) 2300, and a third (1834) 3500.

Early in 1831 he arranged a small office- bell to be tapped by the

polarized armature of an ” intensity ” magnet, whose coil was in continuation of a mile of insulated copper wire, suspended about one of the rooms of his academy. This was the first instance of magnetizing iron at a distance, or of a suitable combination of magnet and battery being so arranged as to be capable of such action. It was, therefore, the earliest example of a true ” magnetic ” telegraph, ail preceding experiments to

this end having been on the galvanometer or needle principle. About the same time he devised and constructed the first electromagnetic engine with automatic polechanger (Sill. Journ., 1831, 20, p. 340; and Sturgeon’s Annals Elecir., 1839, 3, p. 554). Early in 1832 he discovered the induction of a current on itself, in a long helical wire, giving greatly increased intensity of discharge (Sill. Journ., 1832, 22, p. 408). In 1832 he was elected to the chair of natural philosophy in the New Jersey college at Princeton. In 1834 he continued and extended his researches ” On the Influence of a Spiral Conductor in increasing the Intensity of Electricity from a Galvanic Arrangement of a Single Pair,” a memoir of which was read before the American Philo- sophical Society on the 5th of February 1835. In 1835 he combined the short circuit of his monster magnet (of 1834) with the small ” intensity ” magnet of an experimental telegraph wire, thereby establishing the fact that very powerful mechanical effects could be produced at a great distance by the agency of a very feeble magnet used as a circuit maker and breaker, or as a ” trigger ” — the precursor of later forms of relay and receiving magnets. In 1837 he paid his first visit to England and Europe. In 1838 he made important investigations in regard to the conditions and range of induction from electrical currents — showing that induced currents, although merely momentary, produce still other or tertiary currents, and thus on through successive orders of induction, with alternating signs, and with reversed initial and terminal signs. He also discovered similar successive orders of induction in the case of the passage of frictional electricity (Trans. Am. Phil. Soc, 6, pp. 303-337). Among many minor observations, he discovered in 1842 the oscillatory nature of the electrical discharge, magnetizing about a thousand needles in the course of his experiments (Proc Am. Phil. Soc, 1, p. 301). He traced the influence of induction to sur- prising distances, magnetizing needles in the lower story of a house through several intervening floors by means of electrical discharges in the upper story, and also by the secondary current in a wire 220 ft. distant from the wire of the

primary circuit. The five numbers of his Contributions to Electricity and Magnetism (1833-1842) were separately republished from the Transactions. In 1843 he made some interesting original observations on “Phosphorescence” (Proc. Am. Phil. Soc. ,3, pp.38-44). In 1844, by experiments on the tenacity of soap-bubbles, he showed that the molecular cohesion of water is equal (if not superior) to that of ice, and hence, generally, that solids and their liquids have practically the same amount of cohesion (Proc. Am. Phil. Soc., 4, pp. s6and84). Ini845heshowed,bymeansof a thermo-galvano- meter, that the solar spots radiate less heat than the general solar surface (Proc. Am. Phil. Soc, 4, pp. 173-176).

In December 1846 Henry was elected secretary and director of the Smithsonian Institution, then just established. While closely occupied with the exacting duties of that office, he still found time to prosecute many original inquiries— as into the application of acoustics to public buildings, and the best construction and arrangement of lecture-rooms, into the strength of various building materials, &c. Having early devoted much attention to meteorology, both in observing and in reducing and discussing observations, he (among his first administrative acts) organized a large and widespread corps of observers, and made arrange- ments for simultaneous reports by means of the electric telegraph, which was yet in its infancy (Smithsott. Report for 1847, PP- x 46, 147). He was the first to apply the telegraph to meteorological research, to have the atmospheric conditions daily indicated on a large map, to utilize the generalizations made in weather forecasts, and to embrace a continent under a single system — • British America and Mexico being included in the field of observa- tion. In 1852, on the reorganization of the American lighthouse system, he was appointed a member* of the new board; and in 1871 he became the presiding officer of the establishment — a position he continued to hold during the rest of his life. His diligent investigations into the efficiency of various illuminants in differing circumstances, and into the best conditions for developing their several maximum powers of brilliancy, while greatly improving the usefulness of the line of beacons along the

extensive coast of the United States, effected at the same time a great economy of administration. His equally careful experi- ments on various acoustic instruments also resulted in giving to his country the most serviceable system of fog-signals known to maritime powers. In the course of these varied and prolonged researches from 1865 to 1877, he also made important contribu- tions to the science of acoustics; and he established by several series of laborious observations, extending over many years and along a wide coast

range, the correctness of G. G. Stokes's hypothesis (Report Brit. Assoc, 1857, part ii. 27) that the wind exerts a very marked influence in refracting sound-beams. From 1868 Henry continued to be annually chosen as president of the National Academy of Sciences; and he was also president of the Philosophical Society of Washington from the date of its organization in 1871.

Henry was by general concession the foremost of American physicists. He was a man of varied culture, of large breadth and liberality of views, of generous impulses, of great gentleness and courtesy of manner, combined with equal firmness of purpose and energy of action. He died at Washington on the 13th of May 1878. (S. F. B.)

HENRY, MATTHEW (1662-1714), English nonconformist divine, was born at Broad Oak, a farm-house on the confines of Flintshire and Shropshire, on the 18th of October 1662. He was the Son of Philip Henry, who had, two months earlier, been ejected by the Act of Uniformity. Unlike most of his fellow- sufferers, Philip Henry possessed some private means, and was thus enabled to give a good education to his son, who went first to a school at Islington, and then to Gray's Inn. He soon relinquished his legal studies for theology, and in 1687 became minister of a Presbyterian congregation at Chester, removing in 1712 to Mare Street, Hackney. Two years later (22nd of June 1 7 14), he died suddenly of apoplexy at Nantwich while on a journey from Chester to London. Henry's well-known Exposi- tion of the Old and New Testaments (1708-17 10) is a commentary of a practical and devotional rather than of a critical kind, covering the whole of the Old Testament, and the Gospels and Acts in the New. Here it was broken off by the author's death, but the work was finished by a number of ministers, and edited by G. Burder and John Hughes in 181 1. Of no value as criticism, its unfailing good sense, its discriminating thought, its high moral tone, its simple piety and its singular felicity of practical application, combine with the well-sustained flow of its racy English style to secure for it the foremost place among works of its class.

His Miscellaneous Writings, including a Life of Mr Philip Henry, The Communicant's Companion, Directions for Daily Communion with God, A Method for Prayer, A Scriptural Cate- chism, and numerous sermons, were edited in 1809 and in 1830. See biographies by W. Tong (1816), C. Chapman (1859), J. B. Williams (1828, new ed. 1865); and M. H. Lee's Diaries and Letters of Philip Henry (1883).

HENRY, PATRICK (1 736-1 799), American statesman and orator, was born at Studley, Hanover county, Virginia, on the 29th of May 1736.

He was the son of John Henry, a well- educated Scotsman, among whose relatives was the historian William Robertson, and who served in Virginia as county surveyor, colonel and judge of a county court. His mother was one of a family named Winston, of Welsh descent, noted for conversational and musical talent. At the age of ten Patrick was making slow progress in the study of reading, writing and arithmetic at a small country school, when his father became his tutor and taught him Latin, Greek and mathematics for five years, but with limited success. His school days being then terminated, he was employed as a store-clerk for one year. Within the seven years next following he failed twice as a store- keeper and once as a farmer; but in the meantime acquired a taste for reading, of history especially, and read and re-read the history of Greece and Rome, of England, and of her American colonies. Then, poor but not discouraged, he resolved to be a lawyer, and after reading Coke upon Littleton and the Virginia laws for a few weeks only, he strongly impressed one of his

examiners, and was admitted to the bar at the age of twenty- four, on condition that he spend more time in study before beginning to practise. He rapidly acquired a considerable practice, his fee books shewing that for the first three years he charged fees in 1185 cases. Then in 1763 was delivered his speech in ” The Parson’s Cause ” — a suit brought by a clergy- man, Rev. James Maury, in the Hanover County Court, to secure restitution for money considered by him to be due on account of his salary (16,000 pounds of tobacco by law) having been paid in money calculated at a rate less than the current market price of tobacco. This speech, which, according to reports, was extremely radical and denied the right of the king to disallow acts of the colonial legislature, made Henry the idol of the common people of Virginia and procured for him an enormous practice. In 1765 he was elected a member of the Virginia legislature, where he became in the same year the author of the ” Virginia Resolutions,” which were no less than a declara- tion of resistance to the Stamp Act and an assertion of the right of the colonies to legislate for themselves independently of the control of the British parliament, and gave a most powerful impetus to the movement resulting in the War of Independence. In a speech urging their adoption appear the often-quoted words: ” Tarquin and Caesar had each his Brutus, Charles the First his Cromwell, and George the Third [here he was interrupted by cries of ” Treason “] and George the Third may profit by their example! If this be treason, make the most of it.” Until 1775 he

continued to sit in the House of Burgesses, as a leader during all that eventful period. He was prominent as a radical in all measures in opposition to the British government, and was a member of the first Virginia committee of correspondence. In 1774 and 1775 he was a delegate to the Continental Congress and served on three of its most important committees: that on colonial trade and manufactures, that for drawing up an address to the king, and that for stating the rights of the colonies. In 1775, in the second revolutionary convention of Virginia, Henry, regarding war as inevitable, presented resolutions for arming the Virginia militia. The more conservative members strongly opposed them as premature, whereupon Henry supported them in a speech familiar to the American school-boy for several generations following, closing with the words, ” Is life so dear or peace so sweet as to be purchased at the price of chains and slavery? Forbid it, Almighty God! I know not what course others may take, but as for me, give me liberty or give me death ! ” The resolutions were passed and their author was made chairman of the committee for which they provided. The chief command of the newly organized army was also given to him, but previously, at the head of a body of militia, he had demanded satisfaction for powder removed from the public store by order of Lord Dunmore, the royal governor, with the result that £330 was paid in compensation. But his military appointment required obedience to the Committee of Public Safety, and this body, largely dominated by Edmund Pendleton, so restrained him from active service that he resigned on the 28th of February 1776. In the Virginia convention of 1776 he favoured the postponement of a declaration of independence, until a firm union of the colonies and the friendship of France and Spain had been secured. In the same convention he served on the com- mittee which drafted the first constitution for Virginia, and was elected governor of the State — to which office he was re-elected in 1777 and 1778, thus serving as long as the new constitution allowed any man to serve continuously. As governor he gave Washington able support and sent out the expedition under George Rogers Clark (q.v.) into the Illinois country. In 1778 he was chosen a delegate to Congress, but declined to serve. From 1780 to 1784 and from 1787 to 1790 he was again a member of his State legislature; and from 1784 to 1786 was again governor. Until 1786 he was a leading advocate of a stronger central government but when chosen a delegate to the Philadelphia constitutional convention of 1787, he had become cold in the cause and declined to serve. Moreover, in the state convention called to decide whether Virginia should ratify the Federal Constitution he led the opposition, contending that the proposed

Constitution, because of its centralizing character, was dangerous to

the liberties of the country. This change of attitude is thought to have been due chiefly to his suspicion of the North aroused by John Jay's proposal to surrender to Spain for twenty- five or thirty years the navigation of the Mississippi. From 1794 until his death he declined in succession the following offices: United States senator (1794), secretary of state in Washington's cabinet (1795), chief justice of the United States Supreme Court (179s), governor of Virginia (1796), to which office he had been elected by the Assembly, and envoy to France (1799). In 1799, however, he consented to serve again in his State legislature, where he wished to combat the Virginia Resolutions; he never took his seat, since he died, on his Red Hill estate in Charlotte county, Virginia, on the 6th of June of that year. Henry was twice married, first to Sarah Skelton, and second to Dorothea Spotswood Dandridge, a grand-daughter of Governor Alexander Spotswocd.

See Moses Coit Tyler, Patrick Henry (Boston, 1887; new ed., 1899), and William Wirt Henry (Patrick Henry's grandson), Patrick Henry: Life, .Correspondence and Speeches (New York, 1890-1891); these supersede the very unsatisfactory biography by William Wirt, Sketches of the Life and Character of Patrick Henry (Philadelphia, 1817). See also George Morgan, The True Patrick Henry (Phila- delphia, 1907). (N. D. M.)

HENRY, ROBERT (1718-1790), British historian, was the son of James Henry, a farmer of Muirton, near Stirling. Born on the 1 8th of February 1718 he was educated at the parish school of St Ninians, and at the grammar school of Stirling, and, after completing his course at Edinburgh University, became master of the grammar school at Annan. In 1746 he was licensed to preach, and in 1 748 was chosen minister of a Presby- terian congregation at Carlisle, where he remained until 1760, when he removed to a similar charge at Berwick-on-Tweed. In 1768 he became minister of the New Greyfriars' Church, Edinburgh, and having received the degree of D.D. from Edin- burgh University in 1771, and served as moderator of the general assembly of the church of Scotland in r774, he was appointed one of the ministers of the Old Greyfriars' Church, Edinburgh, in 1776, remaining in this charge until his death on the 24th of November 1 790. During his residence in Berwick, Henry commenced his History of Great Britain, written on a new plan; but, owing to the difficulty of consulting the original authorities, he did not make much progress with the work until his removal to Edinburgh in 1768. The first five volumes appeared between 1771 and 1785, and the sixth, edited and completed by Malcolm Laing, was published three years after the author's death. A life of Henry was prefixed to this volume. The

History covers the years between the Roman invasion and the death of Henry VIII., and the ” new plan ” is the combina- tion of an account of the domestic life and commercial and social progress of the people with the narrative of the political events of each period. The work was virulently assailed by Dr Gilbert Stuart (1742-1786), who appeared anxious to damage the sale of the book; but the injury thus effected was only slight, as Henry received £3300 for the volumes published during his lifetime. In 1781, through the influence of the earl of Mans- field, he obtained a pension of £100 a year from the British government.

The History of Great Britain has been translated into French, and has passed into several English editions. An account of Stuart’s attack on Henry is given in Isaac D’Israeli’s Calamities of Authors. ,

HENRY, VICTOR (1850-), French philologist, was born at Colmar in Alsace. Having held appointments at Douai and Lille, he was appointed profeˆor of Sanskrit and comparative grammar in the university of Paris. A prolific and versatile writer, he is probably best known by the English translations of his Precis de Grammaire comparSe de I’ anglais et de I’allemand and Precis . . . du Grec et du Latin. Important works by him on India and Indian languages are: Manuel pour itudier le Sanscrit vedique (with A. Bergaigne, 1890); Elements de Sanscrit classique (1902); Pr&cis de grammaire Pdlie (1904); Les Litera- tures de I’Inde: Sanscrit, Pdli, Pricrit (1904); La Magic dans I’Inde antique (1904); Le Parsisme (1905); L’Agnistoma (190&).

Obscure languages (such as Innok, Quichua, Greenland) and local dialects (Lexique ttymologique du Breton moderne; Le Diaiecle Alaman de Colmar) also claimed his attention. Le Langagc Martien is a curious book. It contains a discussion of some 40 phrases (amounting to about 300 words), which a certain Mademoiselle H61ene Smith (a well-known spiritualist medium of Geneva), while on a hypnotic visit to the planet Mars, learnt and repeated and even wrote down during her trance as specimens of a language spoken there, explained to her by a disembodied interpreter.

HENRY, WILLIAM (1775-1836), English chemist, son of Thomas Henry (1734-1816), an apothecary and writer on chemistry, was born at Manchester on the 12th of December 1775. He began to study

medicine at Edinburgh in 1705, taking his doctor's degree in 1807, but ill-health interrupted his practice as a physician, and he devoted his time mainly to chemical research, especially in regard to gases. ■. One. of his best-known papers (Phil. Trans., 1803) describes experiments on the quantity of gases absorbed by water at different tempera- tures and under different pressures, the conclusion he reached (" Henry's law ") being that " water takes up of gas condensed by one, two or more additional atmospheres, a quantity which, ordinarily compressed, would be equal to twice, thrice, &c. the volume absorbed under the common pressure of the atmosphere." Others of his papers deal with gas-analysis, fire-damp, illuminating gas, the composition of hydrochloric acid and of ammonia, urinary and other morbid concretions, and the disinfecting powers of heat. His Elements of Experimental Chemistry (1790) enjoyed considerable vogue in its day, going through 1 1 editions in 30 years. He died at Pendlebury, near Manchester, on the 2nd of September 1836.

HENRYSON, ROBERT (c. 142 S"C 1500), Scottish poet, was born about 1425. It has been surmised that he was connected with the family of Henderson of Fordell, but of this there is no evidence. He is described, on the title-page of the 1570 edition of his Fables, as " scholemaister of Dunfermeling," probably of the grammar-school of the Benedictine Abbey there. There is no record of his having studied at St Andrews, the only Scottish university at this time; but in 1462 a " Master Robert Henryson " is named among those incorporated in the recently founded university of Glasgow. It is therefore likely that his first studies were completed abroad, at Paris or Louvain. He would appear to have been in lower orders, if, in addition to being master of the grammar-school, he is the notary Robert Henryson who subscribes certain deeds in 1478. As Dunbar (q.v.) refers to him as deceased in his Lament for the Makaris, his death may be dated about 1500.

Efforts have been made to draw up a chronology of his poems; but every scheme of this kind, is, in a stronger sense than in the case of Dunbar, mere guess-work. There are no biographical or bibliographical facts to guide us, and the " internal evidence " is inconclusive.

Henryson's longest, and in many respects his most original and effective work, is his Morall Fabillis of EsOpe, a collection of thirteen fables, chiefly based on the versions of Anonymus, Lydgate and Caxton. The outstanding merit of the work is its freshness of treatment. The old themes are retold with such vivacity, such fresh lights on human character, and with so much local " atmosphere," that they deserve the credit of original productions. They are certainly

unrivalled in English fabulistic literature. The earliest available texts are the Char- teris text printed by Lekpreuik in Edinburgh in 1570 and the Harleian MS. No. 3865 in the Irtish Museum.

In the Testament of Cresseid Henryson supplements Chaucer's tale of Troilus with the story of the tragedy of Cresseid. Here again his literary craftsmanship saves him from the disaster which must have overcome another poet in undertaking to con- tinue the part of the story which Chaucer had intentionally left untold. The description of Cresseid's leprosy, of ner meeting with Troilus, of his sorrow and charity, and of her death, give the poem a high place in writings of this genre.

The poem entitled Orpheus and Eurydicc, which is drawn from

Boethius, contains some good passages, especially the lyrical lament of Orpheus, with the refrains " Quhar art thow gane, my luf Erudices?" and." My lady quene and luf, Erudices." It is followed by a long moralitas, in the manner of the Fables.

Thirteen shorter poems have been ascribed to Henryson. Of these the pastoral dialogue " Robene and Makyne," perhaps the best known of his work, is the most successful. Its model may perhaps be found in the pastourclles, but it stands safely on its own merits. Unlike most of the minor poems it is inde- pendent of Chaucerian tradition. The other pieces deal with the conventional 15th-century topics, Age: Death, Hasty Credence, Want of Wise Men and the like. The verses entitled " Sum Practysis of Medecyne," in which some have failed to see Henry- son's hand, is an example of that boisterous alliterative burlesque which is represented by a single specimen in the work of the greatest makers, Dunbar, Douglas and Lyndsay. For this reason, if not for others, the difference of its manner is no argu- ment against its authenticity.

The MS. authorities for the text are the Asloan, Bannatync, Maitland Folio, Makculloch, Gray and Riddell. Chepman and Myllar's Prints (1508) have preserved two of the minor poems and a fragment of Orpheus and Eurydice. The first complete edition was prepared by David Laing (1 vol., Edinburgh, 1865). A more ex- haustive edition in three volumes, containing all the texts, was undertaken by the Scottish Text Society (ed. G. Gregory Smith), the first volume of the text (vol. ii. of the work) appearing in 1907. For a critical account of Henryson, see Irving's History of Scottish Poetry, Henderson's Vernacular Scottish Literature, Gregory Smith's Transition Period, J. H. Millar's Literary History of Scotland, and the second volume of the Cambridge

History of English Literature ■(!9o8). (G. G. S.)

HENSCHEL, GEORGE [Isidoe Georg] (1850-), English musician (naturalized 1890), of German family, was born at Breslau, and educated as a pianist, making his first public appearance in Berlin in 1862. He subsequently, however, took up singing, having developed a fine baritone voice; and in 1868 he sang the part of Hans Sachs in Meister singer at Munich. In 1877 he began a successful career in England, singing at the principal concerts; and in 1881 he married the American soprano, Lilian Bailey (d. 1901), who was associated with him in a number of vocal recitals. He was also prominent as a conductor, starting the London symphony concerts in 1886, and both in England and America (where he was the first conductor of the Boston symphony concerts, 1881) he took a leading part in advancing his art. He composed a number of instrumental works, a fine Stabat Mater (Birmingham festival, 1894), &c, and an opera, Nubia (Dresden, 1899).

HENSELT, ADOLF VON (1814-1889), German composer, was born at Schwabach, in Bavaria, on the 12th of May 1814. At three years old he began to learn the violin, and at five the pianoforte under Frau v. Fladt. On obtaining financial help from King Louis I. he went to study under Hummel in Weimar, and thence in 1832 to Vienna, where, besides studying composition under Simon Sechter, he made a great success as a concert pianist. In order to recruit his health he made a prolonged tour in 1836 through the chief German towns. In 1837 he settled at Breslau, where he had married, but in the following year he migrated to St Petersburg, where previous visits had made him persona grata at Court. He then became court pianist and inspector of musical studies in the Imperial Institute of Female Education, and was ennobled. In 1852 and again in 1867 he visited England, though in the latter year he made no public appearance. St Petersburg was his home practically until his death, which took place at Warmbrunn on the 10th of October 1889. The characteristic of Henselt's playing was a combination of Liszt's sonority with HummeFs smoothness. It was full of poetry, remarkable for the great use he made of extended chords, and for his perfect technique. He excelled in his own works and in those of Weber and Chopin. His concerto in F minor is frequently played on the continent ; and of his many valuable studies, Si oiseau j'etais is very familiar. His A minor trio deserves to be better knewn. At one time Henselt was second to Rubinstein in the direction of the St Petersburg Conscrvalorium.

HENSLOW, JOHN STEVENS (1796-1861), English botanist and geologist, was born at Rochester on the 6th of February 1796. From his iather, who was a solicitor in that city, he imbibed a love of natural history which largely influenced his career. He was educated at St John's College, Cambridge, where he graduated as sixteenth wrangler in 1818, the year in which Sedgwick became Woodwardian professor of geology. He accompanied Sedgwick in 18 19 during a tour in the Isle of Wight, and there he learned his first lessons in geology. He also studied chemistry under Professor James Cumming and mineralogy under E. D. Clarke. In the autumn of 1819 he made some valuable observations on the geology of the Isle of Man (Trans. Geol. Soc, 1821), and in 1821 he investigated the geology of parts of Anglesey, the results being printed in the first volume of the Transactions of the Cambridge Philosophical Society (1821), the foundation of which society was originated by Sedgwick and Henslow. Meanwhile, Henslow had studied mineralogy with considerable zeal, so that on the death of Clarke he was in 1822 appointed professor of mineralogy in the university at Cambridge. Two years later he took holy orders. Botany, how ever, had claimed much of his attention, and to this science he became more and more attached, so that he gladly resigned the chair of mineralogy in 1825, to succeed to that of botany. As a teacher both in the class-room and in the field he was eminently successful. To him Darwin largely owed his attachment to natural history, and also his introduction to Captain Fitzroy of H.M.S. " Beagle." In 1832 Henslow was appointed vicar of Cholsey- cum-Moulsford in Berkshire, and in 1837 rector of Hitcham in Suffolk, and at this latter parish he lived and laboured, endeared to all who knew him, until the close of his life. His energies were devoted to the improvement of his parishioners, but his influence was felt far and wide. In 1843 he discovered nodules of coprolitic origin in the Red Crag at Felixstowe in Suffolk, and two years later he called attention to those also in the Cambridge Greensand and remarked that they might be of use in agriculture. Although Henslow derived no benefit, these discoveries led to the establish- ment of the phosphate industry in Suffolk and Cambridgeshire; and the works proved lucrative until the introduction of foreign phosphates. The museum at Ipswich, which was established in 1847, owed much to Henslow, who was elected president in 1850, and then superintended the arrangement of the collections. He died at Hitcham on the 16th of May 1861. His publications included A Catalogue of British Plants (1829; ed. 2, 1835); Principles of Descriptive and Physiological Botany (1835); Flora of Suffolk (with E. Skepper) (i860). Memoir, by the Rev. Leonard

Jenyns (1862).

HENSLOWE, PHILIP (d. 1616), English theatrical manager, was the son of Edmund Henslowe of Lindfield, Sussex, master of the game in Ashdown Forest and Broil Park. He was originally a servant in the employment of the bailiff to Viscount Montague, whose property included Montague House in Southwark, and his duties led him to settle there before 1577. He subsequently married the bailiff's widow, and, with the fortune he got with her, he developed into a clever business man and became a consider- able owner of Southwark property. He started his connexion with the stage when, on the 24th of March 1 584, he bought land near what is now the southern end of Southwark Bridge, on which stood the Little Rose playhouse, afterwards rebuilt as the Rose. Successive companies played in it under Henslowe's financial management between 1592 and 1603. The theatre at Newington Butts was also under him in 1594. A share of the control in the Swan theatre, which like the Rose was on the Bankside, fell to Henslowe before the close of the 16th century. With the actor Edward Alleyn, who married his step-daughter Joan Woodward, he built in Golden Lane, Cripplegate Without, the Fortune Playhouse, opened in November 1600. In December of 1594, they had secured the Paris Garden, a place for bear- baiting, on the Bankside, and in 1604 they bought the office of master of the royal game of bears, bulls and mastiffs from the holder, and obtained a patent. Alleyn sold his share to Henslowe in February 1610, and three years later Henslowe formed a new partnership with Jacob Meade and built the Hope playhouse,

designed for stage performances as well as bull and bear-baiting, and managed by Meade.

In Henslowe's theatres were first produced many plays by the famous Elizabethan dramatists. What'is known as " Henslowe's Diary " contains some accounts referring to Ashdown Forest between 1576 and 1581, entered by John Henslowe, while the later entries by Philip Henslowe from 1592 to 1609 are those which throw light on the theatrical matters of the time, and which have been subjected to much controversial criticism as a result of injuries done to the manuscript. " Henslowe's Diary " passed into the hands of Edward Alleyn, and thence into the Library of Dulwich College, where the manuscript remained intact for more than a hundred and fifty years. In 1780 Malone tried to borrow it, but it had been mislaid; in 1790 it was discovered and given into his charge. He was then at work on his Variorum Shake- speare. Malone had a transcript made of certain portions, and collated it with the original; and this transcript, with

various notes and corrections by Malone, is now in the Dulwich Library. An abstract of this transcript he also published with his Variorum Shakespeare. The MS. of the diary was eventually returned to the library in 1812 by Malone's executor. In 1840 it was lent to J. P. Collier, who in 1845 printed for the Shakespeare Society what purported to be a full edition, but it was afterwards shown by.G. F. Warner (Catalogue of the Dulwich Library, 1881) that a number of forged interpolations have been made, the responsibility for which rests on Collier.

The complicated history of the forgeries and their detection has been exhaustively treated in Walter W. Greg's edition of Henslowe's Diary (London, 1904; enlarged 1908).

HENTY, GEORGE ALFRED (1832-1002), English war- correspondent and author, was born at Trumpington, near Cambridge, in December 1832, and educated at Westminster School and Caius College, Cambridge. He served in the Crimea in the Purveyor's department, and after the peace filled various posts in the department in England and Ireland, but he found the routine little to his taste, and drifted into journalism for the London Standard. He volunteered as Special Correspondent for the Austro-Italian War of 1866, accompanied Garibaldi in his Tirolese Campaign, followed Lord Napier through the mountain gorges to Magdala, and Lord Wolseley across bush and swamp to Kumassi. Next he reported the Franco-German War, starved in Paris through the siege of the Commune, and then turned south to rough it in the Pyrenees during the Carlist insurrection. He was in Asiatic Russia at the time of the Khiva expedition, and later saw the desperate hand-to-hand fighting of the Turks in the Servian War. He found his real vocation in middle life. Invited to edit a magazine for boys called the Union Jack, he became the mainstay of the new periodical, to which he contributed several serials in succession. The stories pleased their public, and had ever increasing circulation in book form, until Henty became a name to conjure with in juvenile circles. Altogether he wrote about eighty of these books. Henty was an enthusiastic yachts- man, having spent at least six months afloat each year, and he died on board his yacht in Weymouth Harbour on the 16th of November 1902.

HENWOOD, WILLIAM JORY (1805-1875), English mining geologist, was born at Perron Wharf, Cornwall, on the 16th of January 1805. Ini822he commenced work as a clerk in a mining office, and soon took an active interest in the working of mines and in the metalliferous deposits. In 183 2 he was appointed to the office of assay-master and supervisor of tin in the duchy of Cornwall, a post

from which he retired in 1838. Meanwhile he- had commenced in 1826 to communicate papers on mining sub- jects to the Royal Geological Society of Cornwall, and the Geological Society of London, and in 1840 he was elected F.R.S. In 1843 he went to take charge of the Gongo-Soco mines in Brazil ; afterwards he proceeded to India to report on certain metalliferous deposits for the Indian government; and in 1858, impaired in health, he retired and settled at Penzance. His most important memoirs on the metalliferous deposits of Cornwall and Devon were published in 1843 by the Royal Geological Society of Cornwall. At a much later date he communicated with enlarged

experience a second series of Observations on Metalliferous Deposits, and on Subterranean Temperature (reprinted from Trans. R. Geol. Soc. Cornwall, 2 vols., 1871). In 1874 he con- tributed a paper on the ‘Detrilal Tin-ore of Cornwall (Journ. R. Inst. Cornwall). The Murchison medal of the Geological Society was awarded to him in 1875, and the mineral Henwoodite was named after him. He died at Penzance on the 5th of August

1875-

HENZADA, a district of Lower Burma, formerly in the Pegu, but now in the Irrawaddy division. Area, 2870 sq. m. Pop. (1901) 484,558. It stretches from north to south in one vast plain, forming the valley of the Irrawaddy, and is divided by that river into two nearly equal portions. This country is protected from inundation by immense embankments, so that almost the whole area is suitable for rice cultivation. The chief mountains are the Arakan and Pegu Yoma ranges. The greatest elevation of the Arakan Yomas in Henzada, attained in the latitude of Myan-aung, is 4003 ft. above sea-level. Numerous torrents pour down from the two boundary ranges, and unite in the plains to form large streams, which fall into the chief streams of the district, which are the Irrawaddy, Hlaing and Bassein, all of them branches of the Irrawaddy. The forests comprise almost every variety of timber found in Burma. The bulk of the cultivation is rice, but a number of acres are under tobacco. The chief town of the district is Henzada, which had in 1901 a population of 24,756. It is a municipal town, with ten elective and three ex-officio members. Other municipal towns in the district are Zalun, with a population of 6642; Myan-aung, with a population of 6351; and Kyangin, with a population of 7183, according to the iooi census. The town of

Lemyethna had a population of 5831. The steamers of the Irrawaddy Flotilla Company call at Henzada and Myan-aung.

The district was once a portion of the Taking kingdom of Pegu, afterwards annexed to the Burmese empire in 1753, and has no history of its own. During the second Burmese war, after Prome had been seized, the Burmese on the right bank of the Irrawaddy crossed the river and offered resistance to the British, but were completely routed. Meanwhile, in Tharawaddy, or the country east of the Irrawaddy, and in the south of Henzada, much disorder was caused by a revolt, the leaders of which were, however, defeated by the British and their gangs dispersed.

HEPBURN, SIR JOHN (e. 1598-1636), Scottish soldier in the Thirty Years' War, was a son of George Hepburn of Athel- staneford near Haddington. In 1620 and in the following years he served in Bohemia, on the lower Rhine and in the Netherlands, and in 1623 he entered the service of Gustavus Adolphus, who, two years later, appointed him colonel of a Scottish regiment of his army. He took part with his regiment in Gustavus's Polish wars, and in 1631, a few months before the battle of Breitenfeld he was placed in command of the " Scots " or " Green " brigade of the Swedish army. At Breitenfeld it was Hepburn's brigade which delivered the decisive stroke, and after this he remained with the king, who placed the fullest reliance on his skill and courage, until the battle of the Alte V'este near Nuremberg. He then entered the French service, and raised two thousand men in Scotland for the French army, to which force was added in France the historic Scottish archer bodyguard of the French kings. The existing Royal Scots (Lothian) regiment (late 1st Foot) represents in the British army of to-day Hepburn's French regiment, and indirectly, through the amalgamation referred to, the Scottish contingent of the Hundred Years' War. Hepburn's claim to the right of the line of battle was bitterly resented by the senior French regiments. Shortly after this, in 1633, Hepburn was under a marichal de camp, and he took part in the campaigns in Alsace and Lorraine (1634-36). In 1635 Bernhard of Saxe-Weimar, on entering the French service, brought with him Hepburn's former Swedish regiment, which was at once amalgamated with the French " regiment d'Hebron," the latter thus attaining the unusual strength of 8300 men. Sir John Hepburn was killed shortly afterwards during the siege of Saverne (Zabern) on the 8th of July 1636. He was buried in Toul cathedral. With his friend

Sir Robert Monro, Hepburn was the foremost of the Scottish soldiers of fortune who bore so conspicuous a part in the Thirty Years' War. He was a sincere Roman Catholic. It is stated that he left Gustavuc owing

to a jest about his religion, and at any rate he found in the French service, in which he ended his days, the opportunity of reconciling his beliefs with the desire of military glory which had led him into the Swedish army, and with the patriotic feeling which had first brought him out to the wars to fight for the Stuart princess, Queen Elizabeth of Bohemia. See James Grant, Memoirs of Sir John Hepburn.
HEPHAESTION, a Macedonian general, celebrated as the friend of Alexander the Great, who, comparing himself with Achilles, called Hephaestion his Patroclus. In the later cam- paigns in Bactria and India, he was entrusted with the task of founding cities and colonies, and built the fleet intended to sail down the Indus. He was rewarded with a golden crown and the hand of Drypetis, the sister of Alexander's wife Stateira (324). In the same year he died suddenly at Ecbatana. A general mourning was ordered throughout Asia; at Babylon a funeral pile was erected at enormous cost, and temples were built in his honour (see Alexander the Great).

HEPHAESTION, a grammarian of Alexandria, who flourished in the age of the Antonines. He was the author of a manual (abridged from a larger work in 48 books) of Greek metres ('E7xeipt5ioi' jrepi fj.irpo)v), which is most valuable as the only complete treatise on the subject that has been preserved. The concluding chapter (Hepl iroLrnxaros) discusses the various kinds of poetical composition. It is written in a clear and simple style, and was much used as a school-book.

Editions by T. Gaisford (1855, with the valuable scholia), R. Westphal (1886, in Scripiores metrici Graeci) and M. Consbruch (1906); translation by T. F. Barham (184.3); see also W. Christ, Gesch. der griech. Litt. (1898); M. Consbruch, De veterum llepl TTOiˆuaTos doctrina (1890) ; J. E. Sandys, Hist. Class. Schol. i. (1906).

HEPHAESTUS, in Greek mythology, the god of fire, analogous to, and by the ancients often confused with, the Roman god Vulcan (q.v.); the derivation of the name is uncertain, but it may well be of Greek origin. The elemental character of Hephaestus is far more apparent than is the case with the majority of the Olympian gods; the word Hephaestus was used as a synonym for fire not only in poetry (Homer, //. ii. 426 and later), but also in common speech (Diod. v. 74). It is doubtful whether the origin of the god can be traced to any specific form of fire. As all earthly fire was thought to have come from heaven, Hephaestus has been identified with the lightning. This is supported by the myth of his fall from heaven, and by the fact that, according to the Homeric tradition, his father was Zeus, the heaven-god. On the other hand, the lightning is not associated with him in literature or cult, and his connexion with volcanic fires is so close as to suggest

that he was originally a volcano-god. The connexion, however, though it may be early, is probably not primitive, and it seems reasonable to conclude that Hephaestus was a general fire-god, though some of his characteristics were due to particular manifestations of the element.

In Homer the fire-god was the son of Zeus and Hera, and found a place in the Olympian system as the divine smith. The Iliad contains two versions of his fall from heaven. In one account (i. 590) he was cast out by Zeus and fell on Lemnos; in the other, Hera threw him down immediately after his birth in disgust at his lameness, and he was received by the sea-god- desses Eurynome and Thetis. The Lemnian version is due to the prominence of his cult at Lemnos in very early times; and his fall into the sea may have been suggested by volcanic activity in Mediterranean islands, as at Lipara and Thera. The subsequent return of Hephaestus to Olympus is a favourite theme in early art. His wife was'Charis, one of the Graces (in the Iliad) or Aphrodite (in the Odyssey) . The connexion of the rough Hephaestus with these goddesses is curious; it may be due to the beautiful works of the smith-god (xapio'Ta epya), but it is possibly derived from the supposed fertilizing and productive power of fire, in which case Hephaestus is a natural mate of Charis, a goddess of spring, and Aphrodite the goddess

of love. In Homer, the skill of Hephaestus in metallurgy is often mentioned; his forge was on Olympus, where he was served by images of golden handmaids which he had animated. Similar myths are found in relation to the Finnish smith-god Ilmarinen, who made a golden woman, and the Teutonic Wieland; a belief in the magical power of metal-workers is a common survival from an age in which their art was new and mysterious. In epic poetry Hephaestus is rather a comic figure, and his limping gait provokes " Homeric laughter " among the gods. In Vedic poetry Agni, the fire-god, is footless; and the ancients themselves attributed this lameness to the crooked appearance of flame (Servius on Aen. viii. 814), and possibly no better explanation can be found, though it has been suggested that in an early stage of society the trade of a smith would be suitable for the lame; Hephaestus and the lame Wieland would thus conform to the type of their human counterparts.

Except in Lemnos and Attica, there are few indications of any cult of Hephaestus. His association with Lemnos can be traced from Homer to

the Roman age. A town in the island was called Hephaestia, and the functions of the god must have been wide, as we are told that his Lemnian priests could cure snake- bites. Once a year every fire was extinguished on the island for nine days, during which period sacrifice was offered to the gods of the underworld and the dead. After the nine days were passed, new fire was brought from the sacred hearth at Delos. The significance of this and similar customs is examined by J. G. Frazer, Golden Bough, iii. ch. 4. The close connexion of Hephaestus with Lemnos and especially with its mountain Mosychlus has been explained by the supposed existence of a volcano; but no crater or other sign of volcanic agency is now apparent, and the ” Lemnian fire ” — a phenomenon attributed to Hephaestus — may have been due to natural gas (see LeMNOS). In Sicily, however, the volcanic nature of the god is prominent in his cult at Etna, as well as in the neighbouring Liparaean isles. The Olympian forge had been transferred to Etna or some other volcano, and Hephaestus had become a subterranean rather than a celestial power.

The divine smith naturally became a ” culture-god “; in Crete the invention of forging in iron was attributed to him, and he was honoured by all metal-workers. But we have little record of his cult in this aspect, except at Athens, where his worship was of real importance, belonging to the oldest stratum of Attic religion. A tribe was called after his name, and Erich- thonius, the mythical father of the Attic people, was the son of Hephaestus. Terra-cotta statuettes of the god seem to have been placed before the hearths of Athenian houses. This temple has been identified, not improbably, with the so-called ” Theseum “; it contained a statue of Athena, and the two deities are often associated, in literature and cult, as the joint givers of civilization to the Athenians. The class of artisans was under their special protection; and the joint festival of the two divinities — the Chalceia — commemorated the invention of bronze-working by Hephaestus. In the Hephaesteia (the particular festival of the god) there was a torch race, a ceremonial not indeed confined to fire-gods like Hephaestus and Prometheus, but probably in its origin connected with them, whether its object was to purify and quicken the land, or (according to another theory) to transmit a new fire with all possible speed to places where the fire was polluted. If the latter view is correct, the torch race would be closely akin to the Lemnian fire-ritual which has been mentioned. The relation between Hephaestus and Prometheus is in some respects close, though the distinction between these gods is clearly marked. The fire, as an element, belongs to the Olympian Hephaestus; the Titan Prometheus, a more human character, steals it for the use of man. Prometheus resembles the

Polynesian Maui, who went down to fetch fire from the volcano of Mahuika, the fire-god. Hephaestus is a culture-god mainly in his secondary aspect as the craftsman, whereas Prometheus originates all civilization with the gift of fire. But the importance of Prometheus is mainly mythological; the Titan belonged to a fallen dynasty, and in actual cult was largely superseded by Hephaestus.

In archaic art Hephaestus is generally represented as bearded, though occasionally a younger beardless type is found, as on a vase (in the British Museum), on which he appears as a young man assisting Athena in the creation of Pandora. At a later time the bearded type prevails. The god is usually clothed in a short sleeveless tunic, and wears a round close-fitting cap. His face is that of a middle-aged man, with unkempt hair. He is in fact represented as an idealized Greek craftsman, with the hammer, and sometimes the pincers. Some mythologists have compared the hammer of Hephaestus with that of Thor, and have explained it as the emblem of a thunder-god; but it is Zeus, not Hephaestus, who causes the thunder, and the emblems of the latter god are merely the signs of his occupation as a smith. In art no attempt was made, as a rule, to indicate the lameness of Hephaestus; but one sculptor (Alcamenes) is said to have suggested the deformity without spoiling the statue.

Authorities. — L. Preller (ed. C. Robert), Griech. Mythologie, i. 174 f. (Berlin, 1894); W. H. Roscher, Lex. der griech. u. rom. Mythologie, s.v. ” Hephaistos ” (Leipzig, 1884-1886); Harrison, Myth. and. Mon. of Ancient Athens, p. 119 f. (London, 1890); O. Gruppe, Griech. Mythologie u. Religionsgesch. p. 1304 f. (Munich, 1906) ; O. Schrader and F. B. Jevons, Prehistoric Antiquities of the Aryan People, p. 161, &c. (London, 1890); L. R. Farnell, Cults of the Greek States, v. (1909).
(E. E. S.)

HEPPENHEIM, a town of Germany, in the grand-duchy of Hesse-Darmstadt, on the Bergstrasse, between Darmstadt and Heidelberg, 21 m. N. of the latter by rail. Pop. (1905), 6364. It possesses a parish church, occupying the site of one reputed to have been built by Charlemagne about 805, an interesting town hall and several schools. On an isolated hill close by stand the extensive ruins of the castle of Starkenburg, built by the abbot, Ulrich von Lorsch, about 1064 and destroyed during the Seven Years’ War, and another hill, the Landberg, was a place of assembly in the middle ages. Heppenheim, at first the property of the abbey of Lorsch, became a town in 13 18. After belonging to the Rhenish Palatinate, it came into the possession of Hesse- Darmstadt in 1803. Hops, wine and tobacco are grown, and there are large stone quarries, and several small industries in the

town.

HEPPLEWHITE, GEORGE (d. 1786), one of the most famous English cabinet-makers of the 18th century. There is practically no biographical material relating to Hepplewhite. The only facts that are known with certainty are that he was apprenticed to Gillow at Lancaster, that he carried on business in the parish of Saint Giles, Cripplegate, and that administration of his estate was granted to his widow Alice on the 27th of June 1786. The administrator's accounts, which were filed in the Prerogative Court of Canterbury a year later, indicate that his property was of considerable value. After his death the business was continued by his widow under the style of A. Hepplewhite & Co. Our only approximate means of identifying his work are The Cabinet- Maker and Upholsterer's Guide, which was first published in 1788, two years after his death, and ten designs in The Cabinet- maker's London Book of Prices (1788), issued by the London Society of Cabinet-Makers. It is, however, exceedingly difficult to earmark any given piece of furniture as being the actual work or design of Hepplewhite, since it is generally recognized that to a very large extent the name represents rather a fashion than a man. Lightness, delicacy and grace are the distinguishing characteristics of Hepplewhite work. The massiveness of Chippendale had given place to conceptions that, especially in regard to chairs — which had become smaller as hoops went out of fashion — depended for their effect more upon inlay than upon carving. In one respect at least the Hepplewhite style was akin to that of Chippendale — in both cases the utmost ingenuity was lavished upon the chair, and if Hepplewhite was not the originator he appears to have been the most constant and success- ful user of the shield back. This elegant form was employed by the school in a great variety of designs, and nearly always in a way artistically satisfying. Where Chippendale, his contem- poraries and his immediate successors had used the cabriole and the square leg with a good deal of carving, the Hepplewhite manner preferred a slighter leg, plain, fluted or reeded, tapering to

a spade foot which often became the " spider leg " that character- ized much of the late 18th-century furniture; this form of leg was indeed not confined to chairs but was used also for tables and sideboards. Of the dainty drawing-room grace of the style there can be no question. The great majority of modern chairs are of Hepplewhite inspiration, while he, or those who worked with him, appears to have a clear

claim to have originated, or at all events popularized, the winged easy-chair, in which the sides are continued to the same height as the back. This is probably the most comfortable type of chair that has ever been made. The backs of Hepplewhite chairs were often adorned with galleries and festoons of wheat-ears or pointed fern leaves, and not infrequently with the prince of Wales's feathers in some more or less decorative form. The frequency with which this badge was used has led to the suggestion either that A. Hepple- white & Co. were employed by George IV. when prince of Wales, or that the feathers were used as a political emblem. The former suggestion is obviously the more feasible, but there is little doubt that the feathers were used by other makers working in the same style. It has been objected as an artistic flaw in Hepplewhite 's chairs that they have the appearance of fragility. They are, however, constructionally sound as a rule. The painted and japanned work has been criticized on safer grounds. This delicate type of furniture, often made of satinwood, and painted with wreaths and festoons, with amorini and musical instruments or floral motives, is the most elegant and pleasing that can be imagined. It has, however, no elements of decorative perman- ence. With comparatively little use the paintings wear off and have to be renewed. A piece of untouched painted satin- wood is almost unknown, and one of the essential charms of old furniture as of all other antiques is that it should retain the patina of time. A large proportion of Hepplewhite furniture is inlaid with the exotic woods which had come into high favour by the third quarter of the 18th century. While the decorative use upon furniture of so evanescent a medium as paint is always open to criticism, any form of marquetry is obviously legitimate, and, if inlaid furniture be less ravishing to the eye, its beauty is but enhanced by time. It was not in chairs alone that the Hepplewhite manner excelled. It acquired, for instance, a speciality of seats for the tall, narrow Georgian sash windows, which in the Hepplewhite period had almost entirely superseded the more picturesque forms of an earlier time. These window- seats had ends rolling over outwards, and no backs, and despite their skimpiness their elegant simplicity is decidedly pleasing. Elegance, in fact, was the note of a style which on the whole was more distinctly English than that which preceded or immediately followed it. The smaller Hepplewhite pieces are much prized by collectors. Among these may be included urn-shaped knife-boxes in mahogany and satinwood, charming in form and decorative in the extreme; inlaid tea-caddies, varying greatly in shape and material, but always appropriate and coquet; delicate little fire-screens with shaped poles; painted work- tables, and inlaid stands. Hepplewhite's bedsteads with carved and fluted pillars were very handsome and attractive. The evolution of the dining-room sideboard

made rapid progress towards the end of the 18th century, but neither Hepplewhite nor those who worked in his style did much to advanceit. Indeed they somewhat retarded its development by causing it to revert to little more than that side-table which had been its original form. It was, however, a very delightful table with its undulat- ing front, its many elegant spade-footed legs and its delicate carving. If we were dealing with a less elusive personality it would be just to say that Hepplewhite's work varies from the extreme of elegance and the most delicious simplicity to an unimaginative commonplace, and sometimes to actual ugliness. As it is, this summary may well be applied to the style as a whole — a style which was assuredly not the creation of any one man, but owed much alike of excellence and of defect to a school of cabinet-makers who were under the influence of conflicting tastes and changing ideals. At its best the taste was so fine and so full of distinction, so simple, modest and sufficient, that it amounted tc genius. On its lower planes it was clearly influenced

by commercialism and the desire to make what tasteless people preferred. Yet this is no more than to say that the Hepplewhite style succumbed sometimes, perhaps very often, to the eternal enemy of all art — the uninspired banality of the average man. (J. P.-B.)

HEPTARCHY (Gr. brTa seven, and a.pxh, rule), a word which is frequently used to designate the period of English history between the coming of the Anglo-Saxons in 449 and the union of the kingdoms under Ecgbert in 828. It was first used during the 16th century because of the belief held by Camden and other older historians, that during this period there were exactly seven kingdoms in England, these being Northumbria, Mercia, East Anglia, Essex, Kent, Sussex and Wessex. This belief is erroneous, as the number of kingdoms varied consider- ably from time to time; nevertheless the word still serves a useful purpose to denote the period.

HERA, in Greek mythology, the sister and wife of Zeus and queen of the Olympian gods; she was identified by the Romans with Juno. The derivation of the name is obscure, but there is no reason to doubt that she was a genuine Greek deity. There are no signs of Oriental influence in her cults, except at Corinth, where she seems to have been identified with Astarte. It is probable that she was originally a personification of some depart- ment of nature; but the traces of her primitive significance are vague, and have been interpreted to suit various theories. Some of the ancients connected her with the earth; Plato, followed by the Stoics, derived her name from ai)p, the air. Both theories have been revived in modern times, the former notably by F. G. Welcker, the latter by L. Preller. A third view, that Hera is the

moon, is held by W. H. Roscher and others. Of these explanations, that advanced by Preller has little to commend it, even if, with O. Gruppe, we understand the air-goddess as a storm deity; some of the arguments in support of the two other theories will be examined in this article.

Whatever may have been the origin of Hera, to the historic Greeks (except a few poets or philosophers) she was a purely anthropomorphic goddess, and had no close relation to any province of nature. In literature, from the times of Homer and Hesiod, she played an important part, appearing most frequently as the jealous and resentful wife of Zeus. In this character she pursues with vindictive hatred the heroines, such as Alcmene, Leto and Semele, who were beloved by Zeus. She visits his sins upon the children born of his intrigues, and is thus the constant enemy of Heracles and Dionysus. This char- acter of the offended wife was borrowed by later poets from the Greek epic; but it belongs to literature rather than to cult, in which the dignity and power of the goddess is naturally more emphasized.

The worship of Hera is found, in different degrees of promi- nence, throughout the Greek world. It was especially important in the ancient Achaean centres, Argos, Mycenae and Sparta, which she claims in the Iliad (iv. 51) as her three dearest cities. Whether Hera was also worshipped by the early Dorians is un- certain; after the Dorian invasion she remained the chief deity of Argos, but her cult at Sparta was not so conspicuous. She received honour, however, in other parts of the Peloponnese, particularly in Olympia, where her temple was the oldest, and in Arcadia. In several Boeotian cities she seems to have been one of the principal objects of worship, while the neighbouring island of Euboea probably derived its name from a title of Hera, who was ” rich in cows ” (ES|Soto). Among the islands of the Aegean,, Samos was celebrated for the cult of Hera; according to’the local tradition, she was born in the island. As Hera Lacinia (from her Lacinian temple near Croton) she was extensively worshipped in Magna Graecia.

The connexion of Zeus and Hera was probably not primitive, since Dione seems to have preceded Hera as the wife of Zeus at Dodona. The origin of the connexion may possibly be due to the fusion of two ” Pelasgic ” tribes, worshipping Zeus and Hera respectively; but speculation on the earliest cult of the goddess, before she became the wife of Zeus, must be largely conjectural. The close relation of the two deities appears in a

frequent community of altars and sacrifices, and also in the Upos ya/jios, a dramatic representation of their sacred marriage. The festival, which was certainly ancient, was held not only in Argos, Samos, Euboea and other centres of Hera-worship, but also in Athens, where the goddess was obscured by the predominance of Athena. The details of the Upos fa/tos may have varied locally, but the main idea of the ritual was the same. In the Daedala, as the festival was called at Plataea, an effigy was made from an oak-tree, dressed in bridal attire, and carried in a cart with a woman who acted as bridesmaid. The image was called Daedale, and the ritual was explained by a myth: Hera had left Zeus in her anger; in order to win her back, Zeus announced that he was about to marry, and dressed up a puppet to imitate a bride; Hera met the procession, tore the veil from the false bride, and, on discovering the ruse, became reconciled to her husband. The image was put away after each occasion; every sixty years a large number of such images, which had served in previous celebrations, were carried in procession to the top of Mount Cithaeron, and were burned on an altar together with animals and the altar itself. As Frazer notes {Golden Bough? i. 227), this festival appears to belong to the large class of mimetic charms designed to quicken the growth of vegetation; the marriage of Zeus and Hera would in this case represent the union of the king and queen of May. But it by no means follows that Hera was therefore originally a goddess of the earth or of vegetation. When the real nature of the ritual had become lost or obscured, it was natural to explain it by the help of an aetiological myth; in European folklore, images, corresponding to those burnt at the Daedala, were sometimes called Judas Iscariot or Luther {Golden Bough? iii. 315). At Samos the Upds yanos was celebrated annually; the image of Hera was concealed on the sea-shore and solemnly discovered. This rite seems to reflect an actual custom of abduction; or it may rather refer to the practice of intercourse between the betrothed before marriage. Such intercourse was sanctioned by the Samians, who excused it by the example of Zeus and Hera (schol. on //. xiv. 296). There is nothing in the Samian Upos yafws to suggest a marriage of heaven and earth, or of two vegetation-spirits; as Dr Farnell points out, the ritual appears to explain the custom of human nuptials. The sacred marriage, therefore, though connected with vegetation at the Daedala, was not necessarily a vegetation-charm in its origin; consequently, it does not prove that Hera was an earth-goddess or tree-spirit. It is at least remarkable that, except at Argos, Hera had little to do with agriculture, and was not closely associated

with such deities as Cybele, Demeter, Perse- phone and Dionysus, whose connexion with the earth, or with its fruits, is beyond doubt.

In her general cult Hera was worshipped in two main capa- cities: (1) as the consort of Zeus and queen of heaven; (2) as the goddess who presided over marriage, and, in a wider sense, over the various phases of a woman's life. Dionysius of Hali- carnassus {Ars rhet. ii. 2) calls Zeus and Hera the first wedded pair, and a sacrifice to Zeus rAetos and Hera reXeia was a regular feature of the Greek wedding. Girls offered their hair or veils to Hera' before marriage. In Aristophanes {Thesm.gii) she " keeps the keys of wedlock." The marriage-goddess naturally became the protector of women in childbed, and bore the title of the birth-goddess (Eileithyia), at Argos and Athens. In Homer (77. xi. 270) and Hesiod {Theog. 922) she is the mother of the Eileithyiae, or the single Eileithyia. Her cult-titles irapdkvos (or 7tcus), reKeia and x

relation with women has been held a proof that Hera was originally a moon-goddess, as the moon is often thought to influence childbirth and other aspects of feminine life. But Hera's patronage of women, though undoubtedly ancient, is not necessarily primitive. Further, the Greeks themselves, who were" always ready to identify Artemis with the moon, do not seem to have recognized any lunar connexion in Hera.

Among her particular worshippers, at Argos and Samos, Hera was much more than the queen of heaven and the marriage- goddess. As the patron of these cities {iro\iovxos) she held a place corresponding to that of Athena in Athens. The Argives are called " the people of Hera " by Pindar; the Heraeum, situated under a mountain significantly called Mt. Euboea, was the most important temple in Argolis. Here the agricultural character of her ritual is well marked; the first oxen used in ploughing were, according to an Argive myth, dedicated to her as £evl;i8la; and the sprouting ears of corn were called "the flowers of Hera." She was worshipped as the goddess of flowers {avBtia); girls served in her temple under the name of "flower-bearers," and a flower festival {'YLpoaavdua, 'Hpoavdia) was celebrated by Peloponnesian women in spring. These rites recall our May day observance, and give colour to the earth- goddess theory. On the other hand it must be remembered that the patron deity of a Greek state had very wide functions; and it is not surprising to find that Hera (whatever her origin may have been) assumed an agricultural character among her own people whose occupations were largely agricultural. So, although the warlike character of Hera was not elsewhere prominent, she assumed a militant aspect in her two

chief cities; a festival called the Shield {hairls, in Pindar ayuv xaX/ ceos) was part of the Argive cult, and there was an armed procession in her honour at Samos. The city-goddess, whether Hera or Athena, must be chief alike in peace and war.

The cow was the animal specially sacred to Hera both in ritual and in mythology. The story of Io, metamorphosed into a cow, is familiar; she was priestess of Hera, and was originally, no doubt, a form of the goddess herself. The Homeric epithet (3o£nris may have meant " cow-faced " to the earliest worshippers of Hera, though by Homer and the later Greeks it was understood as " large-eyed," like the cow. A car drawn by oxen seems to have been widely used in the processions of Hera, and the cow was her most frequent sacrifice. The origin of Hera's association with the cow is uncertain, but there is no need to see in it, with Roscher, a symbol of the moon. The cuckoo was also sacred to Hera, who, according to the Argive legend, was wooed by Zeus in the form of the bird. In later times the peacock, which was still unfamiliar to the Greeks in the 5th century, was her favourite, especially at Samos.

The earliest recorded images of Hera preceded the rise of Greek sculpture; a log at Thespiae, a plank at Samos, a pillar at Argos served to represent the goddess. In the archaic period of sculpture the %bavov or wooden statue of the Samian Hera by Smilis was famous. In the first half of the 5th century the sacred marriage was represented on an extant metope from a temple at Selinus. The most celebrated statue of Hera was the chryselephantine work of Polyclitus, made for the Heraeum at Argos soon after 423 B.C. It is fully described by Pausanias, who says that Hera was seated on a throne, wearing a crown {(TTeavos) , and carrying a sceptre in one hand and a pomegranate in the other. Various ancient writers testify to the beauty and dignity of the statue, which was considered equal to the Zeus of Pheidias. Polyclitus seems to have fixed the type of Hera as a youthful matron, but unfortunately the exact character of her head cannot be determined. A majestic and rather severe beauty marks the conception of Hera in later art, of which the Farnese bust at Naples and the Ludovisi Hera are the most conspicuous examples.

Authorities. — F. G. Welcker, Griech. Gotterl. i. 362 f. (Gottingen, 1857-1863); L. Prellcr (ed. C. Robert), Griech. Mytho- logie, i. 160 f. (Berlin, 1894); W. H. Roscher, Lex. der griech. u. rom. Mythologie, s.v. (Leipzig, 1884); C. Daremberg and E. Saglio,

Diet, des ant. grecques el rom. s.v. “Juno” (Paris, 1877); L. R. Farnell, Cults of the Greek States, i. 179 f. (Oxford, 1896); A. B. Cook in Class. Rev. xx. 365 f. 416 f. ; O. Gruppe, Griech. Mytho- logie u. Religionsgesch. p. 1121 f. (Munich, 1903). In the article Greek Art, fig. 24, will be found a roughly executed head of Hera, from the pediment of the treasury of the Megarians. (E. E. S.)

HERACLEA, the name of a large number of ancient cities founded by the Greeks.

1. Heraclea (Gr. ‘Hpa/cXeta), an ancient city of Lucania, situated near the modern Policoro, 3 m. from the coast of the gulf of Tarentum, between the rivers Aciris (Agri) and Siris (Sinni) about 13 m. S.S.W. of Metapontum. It was a Greek colony founded by the Tarentines and Thurians in 432 B.C., the former being predominant. It was chosen as the meeting-place of the general assembly of the Italiot Greeks, which Alexander of Epirus, after his alienation from Tarentum, tried to transfer to Thurii. Here Pyrrhus, king of Epirus, defeated the consul Laevinus in 280 B.C., after he had crossed the river Siris. In 278 B.C., or possibly in 282 B.C., probably in order to detach it from Tarentum, the Romans made a special treaty with Heraclea, on such favourable terms that in 89 B.C. the Roman citizenship given to the inhabitants by the Lex Plautia Papiria was only accepted after considerable hesitation. We hear that Heraclea surrendered under compulsion to Hannibal in 212 B.C. and that in the Social war the public records were destroyed by fire. Cicero in his defence of the poet Archias, an adopted citizen of Heraclea, speaks of it as a flourishing town. As a consequence of its having accepted Roman citizenship, it became a municipium; part of a copy of the Lex Iulia Municipals of 46 B.C. (engraved on the back of two bronze tablets, on the front of which is a Greek inscription of the 3rd century B.C. defining the boundaries of lands belonging to various temples), which was found between Heraclea and Metapontum, is of the highest importance for our knowledge of that law. It was still a place of some importance under the empire ; a branch road from Venusia joined the coast road here. The circumstances of its destruction and abandon- ment was unknown; the site is now marked by a few heaps of ruins. Its medieval representative was Anglona, once a bishopric, but now itself a heap of ruins, among which are those of an 11th-century church.

2. Heraclea Minoa, an ancient town on the south coast of Sicily, at the mouth of the river Halycus, near the modern Montallegro, some 20 m. N.W. of Girgenti. It was at first an outpost of Selinus (Herod, v. 46),

then overthrown by Carthage, later a border town of Agrigentum. It passed into Carthaginian hands by the treaty of 405 B.C., was won back by Dionysius in his first Punic war, but recovered by Carthage in 383. From this date onwards coins bearing its Semitic name, Ras Melkart, become common, and it was obviously an important border fortress. It was here that Dion landed in 357 B.C., when he attacked Syracuse. The Agrigentines won it back in 309, but it soon fell under the power of Agathocles. It was temporarily recovered for Greece by Pyrrhus. (T. As.)

3. Heraclea Pontica (mod. Bender Eregli), an ancient city on the coast of Bithynia in Asia Minor, at the mouth of the Kilijsu. It was founded by a Megarian colony, which soon subjugated the native Mariandynians and extended its power over a considerable territory. The prosperity of the city, rudely shaken by the Galatians and the Bithynians, was utterly destroyed in the Mithradatic war. It was the birthplace of Heraclides Ponticus. The modern town is best known for its lignite coal-mines, from which Constantinople receives a good part of its supply.

4. Heraclea Sintica, a town in Thracian Macedonia, to the south of the Strymon, the site of which is marked by the village of Zervokhori, and identified by the discovery of local coins.

5. Heraclea, a town on the borders of Caria and Ionia, near the foot of Mount Latmus. In its neighbourhood was the burial cave of Endymion.

6. Heraclea-Cybistra (mod. Eregli in the vilayet of Konia), under the name Cybistra, had some importance in Hellenistic times owing to its position near the point where the road to the Cilician Gates enters the hills. It lay in the way of armies and was

more than once sacked by the Arab invaders of Asia Minor (a.d. 805 and 832). It became Turkish (Seljuk) in the nth century. Modern Eregli had grown from a large village to a town since the railway reached it from Konia and Karaman in 1904; and it has now an hotel and good shops. Three hours' ride S. is the famous "Hittite" rock-relief of Ivriz, representing a king (probably of neighbouring Tyana) adoring a god (see Hittites). This was the first " Hittite " monument discovered in modern times (early 18th century, by the Swede Otter, an emissary of Louis XIV.).

For Heraclea Trachinia see Trachis, and for Heraclea Perinthus see Perinthus.

Heraclea was also the name of one of the Sporades, between Naxos and Ios, which is still called Raklia, and bears traces of a Greek township with temples to Tyche and Zeus Lophites.

(D. G. H.) HERACLEON, a Gnostic who flourished about a.d. 125, probably in the south of Italy or in Sicily, and is generally classed by the early heresiologists with the Valentinian school of heresy. In his system he appears to have regarded the divine nature as a vast abyss in whose pleroma were aeons of different orders and degrees, — emanations from the source of being. Midway between the supreme God and the material world was the Demiurgus, who created the latter, and under whose jurisdiction the lower, animal soul of man proceeded after death, while his higher, celestial soul returned to the pleroma whence at first it issued. Though conspicuously uniting faith in Christ with spiritual maturity, there are evidences that, like other Valentinians, Heracleon did not sufficiently emphasize abstinence from the moral laxity and worldliness into which his followers fell. He seems to have received the ordinary Christian scriptures; and Origen, who treats him as a notable exegete, has preserved fragments of a commentary by him on the fourth gospel (brought together by Grabe in the second volume of his Spicilegium), while Clement of Alexandria quotes from him what appears to be a passage from a commentary on Luke. These writings are remarkable for their intensely mystical and allegorical interpretations of the text.

HERACLEONAS, east-Roman emperor (Feb.-Sept. 641), was the son of Heraclius (q.v.) and Martina. At the end of Heraclius' reign he obtained through his mother's influence the title of Augustus (638), and after his father's death was proclaimed joint emperor with his half-brother Constantine III. The premature death of Constantine, in May 641, left Heracleonas sole ruler. But a suspicion that he and Martina had murdered Constantine led soon after to a revolt, and to the mutilation and banishment of the supposed offenders. Nothing further is known about Heracleonas subsequent to 641.

HERACLIDAE, the general name for the numerous descend- ants of Heracles (Hercules) , and specially applied in a narrower sense to the descendants of Hyllus, the eldest of his four sons by Deianeirathe, conquerors of Peloponnesus. Heracles, whom Zeus had originally intended to be ruler of Argos, Lacedaemon and Messenian Pylos, had been supplanted by the cunning of Hera, and his intended possessions had fallen into the hands of Eurystheus, king of Mycenae. After the death of Heracles, his children, after many wanderings, found refuge from Eurys- theus at Athens. Eurystheus, on his demand for their surrender being refused, attacked Athens, but was defeated and slain. Hyllus and his brothers then invaded Peloponnesus, but after a year's stay were forced by a pestilence to quit. They with- drew to Thessaly, where Aegimius, the mythical ancestor of the Dorians, whom Heracles

had assisted in war against the Lapithae, adopted Hyllus and made over to him a third part of his territory. After the death of Aegimius, his two sons, Pamphilus and Dymas, voluntarily submitted to Hyllus (who was, according to the Dorian tradition in Herodotus v. 72, really an Achaean), who thus became ruler of the Dorians, the three branches of that race being named after these three heroes. Being desirous of reconquering his paternal inheritance, Hyllus consulted the Delphic oracle, which told him to wait for " the third fruit," and then enter Peloponnesus by " a narrow passage by sea."

Accordingly, after three years, Hyllus marched across the isthmus of Corinth to attack Atreus, the successor of Eurystheus, but was slain in single combat by Echemus, king of Tegea. This second attempt was followed by a third under Cleodaeus and a fourth under Aristomachus, both of which were equally un- successful. At last, Temenus, Cresphontes and Aristodemus, the sons of Aristomachus, complained to the oracle that its instructions had proved fatal to those who had followed them. They received the answer that by the " third fruit " the " third generation " was meant, and that the " narrow passage " was not the isthmus of Corinth, but the straits of Rhium. They accordingly built a fleet at Naupactus, but before they set sail, Aristodemus was struck by lightning (or shot by Apollo) and the fleet destroyed, because one of the Heraclidae had slain an Acarnanian soothsayer. The oracle, being again consulted by Temenus, bade him offer an expiatory sacrifice and banish the murderer for ten years, and look out for a man with three eyes to act as guide. On his way back to Naupactus, Temenus fell in with Oxylus, an Aetolian, who had lost one eye, riding on a horse (thus making up the three eyes) and immediately pressed him into his service. According to another account, a mule on which Oxylus rode had lost an eye. The Heraclidae repaired their ships, sailed from Naupactus to Antirrhium, and thence to Rhium in Peloponnesus. A decisive battle was fought with Tisamenus, son of Orestes, the chief ruler in the peninsula, who was defeated and slain. The Heraclidae, who thus became practically masters of Peloponnesus, proceeded to distribute its territory among themselves by lot. Argos fell to Temenus, Lacedaemonto Procles and Eurysthenes, the twin sons of Aristodemus ; and Messene to Cresphontes. The fertile district of Elis had been reserved by agreement for Oxylus. The Hera- clidae ruled in Lacedaemon till 221 B.C., but disappeared much earlier in the other countries. This conquest of Peloponnesus by the Dorians, commonly called the "

Return of the Heraclidae," is represented as the recovery by the descendants of Heracles of the rightful inheritance of their hero ancestor and his sons. The Dorians followed the custom of other Greek tribes in claiming as ancestor for their ruling families one of the legendary heroes, but the traditions must not on that account be regarded as entirely mythical. They represent a joint invasion of Pelopon- nesus by Aetolians and Dorians, the latter having been driven southward from their original northern home under pressure from the Thessalians. It is noticeable that there is no mention of these Heraclidae or their invasion in Homer or Hesiod. Herodotus (vi. 52) speaks of poets who had celebrated their deeds, but these were limited to events immediately succeeding the death of Heracles. The story was first amplified by the Greek tragedians, who probably drew their inspiration from local legends, which glorified the services rendered by Athens to the rulers of Peloponnesus.

Apollodorus ii. 8; Diod. Sic. iv. 57, 58; Pausanias i. 32, 41, ii. 13, 18, iii. 1, iv. 3, v. 3; Euripides, Heraclidae ; . Pindar, Pythia, ix. 137; Herodotus ix. 27. See Muller's Dorians, i. ch. 3; Thirlwall, History of Greece, ch. vii. ; Grote, Hist, of Greece, pt. i. ch. xviii. ; Busolt, Griechische Geschichte, i. ch. ii. sec. 7, where a list of modern authorities is given.

HERACLIDES PONTICUS, Greek philosopher and miscel- laneous writer, born at Heraclea in Pontus, flourished in the 4th century B.C. He studied philosophy at Athens under Speusippus, Plato and Aristotle. According to Suidas, Plato, on his departure for Sicily, left his pupils in charge of Heraclides. The latter part of his life was spent at Heraclea. He is said to have been vain and fat, and to have been so fond of display that he was nicknamed Pompicus, or the Showy (unless the epithet refers to his literary style). Various idle stories are related about him. On one occasion, for instance, Heraclea was afflicted with famine, and the Pythian priestess at Delphi, bribed by Heraclides, assured his inquiring townsmen that the dearth would be stayed if they granted a golden crown to that philosopher. This was done; but just as Heraclides was receiving his honour in a crowded assembly, he was seized with apoplexy, while the dishonest priestess perished at the same moment from the bite of a serpent. On his death-bed he is said to have requested a

friend to hide his body as soon as life was extinct, and, by putting a serpent in its place, induce his townsmen to suppose that he had been carried up to heaven. The trick was discovered, and Heraclides received only ridicule instead of divine honours (Diogenes Laertius y. 6). Whatever may be the truth about these stories, Heraclides seems to

have been a versatile and prolific writer on philosophy, mathematics, music, grammar, physics, history and rhetoric. Many of the works attributed to him, however, are probably by one or more persons of the same name.

The extant fragment of a treatise On Constitutions (C.W. Muller, F.H.G. ii. 197-207) is probably a compilation from the Politics of Aristotle by Heraclides Lembos, who lived in the time of Ptolemy Vl.Philometor (1 81-146). See Otto Voss, De Heraclidis Pontici vita etScriptis (1896).

HERACLITUS (‘Hpd/cXetros; c. 540-475 B.C.), Greek philo- sopher, was born at Ephesus of distinguished parentage. Of his early life and education we know nothing; from the contempt with which he spoke of all his fellow-philosophers and of his fellow-citizens as a whole we may gather that he regarded himself as self-taught and a pioneer of wisdom. So intensely aristocratic (hence his nickname 6xXoXoi5opos, ” he who rails at the people “) was his temperament that he declined to exercise the regal-hieratic office of /iWiXei’s which was hereditary in his family, and presented it to his brother. It is probable, however, that he did occasionally intervene in the affairs of the city at the period when the rule of Persia had given place to autonomy; it is said that he compelled the usurper Melancomas to abdicate. From the lonely life he led, and still more from the extreme profundity of his philosophy and his contempt for mankind in general, he was called the ” Dark Philosopher ” (6 cKoreivos), or the ” Weeping Philosopher,” in contrast to Democritus, the ” Laughing Philosopher.”

Heraclitus is in a real sense the founder of metaphysics. Starting from the physical standpoint of the Ionian physicists, he accepted their general idea of the unity of nature, but entirely denied their theory of being. The fundamental uniform fact in nature is constant change (iravra xˆP 6 ‘ K(” ov8tv ixkvti); everything both is and is not at the same time. He thus arrives at the principle of Relativity; harmony and unity consist in diversity and multiplicity. The senses are ” bad witnesses ” (ko.koI fiaprvpes) ; only the wise man can obtain knowledge.

To appreciate the significance of the doctrines of Heraclitus, it must be borne in mind that to Greek philosophy the sharp distinction between subject and object which pervades modern thought was foreign, a consideration which suggests the conclusion that, while it is a great mistake to reckon Heraclitus with the materialistic cosmologists of the Ionic schools, it is, on the other hand, going too far to treat his theory, with Hegel and Lassalle, as one of pure Panlogism. Accordingly, when

he denies the reality of Being, and declares Becoming, or eternal flux and change, to be the sole actuality, Heraclitus must be understood to enunciate not only the unreality of the abstract notion of being, except as the correlative of that of not-being, but also the physical doctrine that all phenomena are in a state of continuous transition from non-existence to existence, and vice versa, without either distinguishing these propositions or qualifying them by any reference to the relation of thought to experience. ” Every thing is and is not ”'; all things are, and nothing remains. So far he is in general agreement with Anaximander ig.v.), but he differs from him in the solution of the problem, disliking, as a poet and a mystic, the primary matter which satisfied the patient researcher, and demanding a more vivid and picturesque element. Naturally he selects fire, according to him the most complete embodiment of the process of Becoming, as the principle of empirical existence, out of which all things, including even the soul, grow by way of a quasi condensation, and into which all things must in course of time be again resolved. But this primordial fire is in itself that divine rational process, the harmony of which constitutes the law of the universe (see Logos). Real knowledge consists in comprehending this all-pervading harmony as embodied in the manifold of perception, and the senses are ” bad-witnesses,” because they apprehend phenomena,

not as its manifestation, but as ” stiff and dead.” In like manner real virtue consists in the subordination of the individual to the laws of this harmony as the universal reason wherein alone true freedom is to be found. ” The law of things is a law of Reason Universal (X670S), but most men live as though they had a wisdom of their own.” Ethics here stands to sociology in a close relation, similar, in many respects, to that which we find in Hegel and in Comte. For Heraclitus the soul approaches most nearly to perfection when it is most akin to the fiery vapour out of which it was originally created, and as this is most so in death, ” while we live our souls are dead in us, but when we die our souls are restored to life.” The doctrine of immortality comes prominently forward in his ethics, but whether this must not be reckoned with the figurative accommodation to the popular theology of Greece which pervades his ethical teaching, is very doubtful.

The school of disciples founded by Heraclitus flourished for long after his death, the chief exponent of his teaching being Cratylus. A good deal of the information in regard to his doctrines has been gathered

from the later Greek philosophy, which was deeply influenced by it.

Bibliography. — The only authentic extant work of Heraclitus is the irepi v

HERACLIUS (‘Hpa/cXeios) (c. 575-642), East Roman emperor, was born in Cappadocia. His father held high military command under the emperor Maurice, and as governor of Africa maintained his independence against the usurper Phocas (q.v.). When invited to head a rebellion against the latter, he sent his son with a fleet which reached Constantinople unopposed, and precipitated the dethronement of Phocas. Proclaimed emperor, Heraclius set himself to reorganize the utterly disordered administration. At first he found himself helpless before the Persian armies (see Persia: Ancient History; and Chosroes II.) of Chosroes II., which conquered Syria and Egypt and since 616 had encamped opposite Constantinople; in 618 he even proposed in despair to abandon his capital and seek a refuge in Carthage, but at the entreaty of the patriarch he took courage. By securing a loan from the Church and suspending the corn-distribution at Constantinople, he raised sufficient funds for war, and after making a treaty with the Avars, who had nearly surprised the capital during an incursion in 619, he was at last able to take the field against Persia. During his first expedition (622) he failed to secure a footing in Armenia, whence he had hoped to take the Persians in flank, but by his unwearied energy he restored the discipline and efficiency of the army. In his second campaign (624-26) he penetrated into Armenia and Albania, and beat the enemy in the open field. After a short stay at Constantinople,

which his son Constantine had successfully defended against renewed incursions by the Avars, Heraclius resumed his attacks upon the Persians (627). Though deserted by the Khazars, with whom he had made an alliance upon entering into Pontus,, he gained a decisive advantage by a brilliant march across the Armenian highlands into the Tigris plain, and a hard-fought victory over Chosroes’ general, Shahrbaraz, in which Heraclius distinguished himself by his personal bravery. A subsequent revolution at the Persian court led to the dethronement of Chosroes in favour of his son Kavadh II. (q.v.); the new king promptly made peace with the emperor, whose troops were already advancing upon the Persian capital Ctesiphon (628). Having thus secured his eastern frontier, Heraclius returned to Constantinople with ample spoils, including the true cross, which in 629 he brought back in person to Jerusalem. On the northern frontier of the empire he kept the Avars in check by inducing the Serbs to migrate from the Carpathians to the Balkan lands so as to divert the attention of the

Avars.

The triumphs which Heraclius had won through his own energy and skill did not bring him lasting popularity. In his civil administration he followed out his own ideas without deferring to the nobles or the Church, and the opposition which he encountered from these quarters went far to paralyse his attempts at reform. Worn out by continuous fighting and weakened by dropsy, Heraclius failed to show sufficient energy against the new peril that menaced his eastern provinces towards the end of his reign. In 629 the Saracens made their first incursion into Syria (see Caliphate, section A, § 1); in 636 they won a notable victory on the Yermuk (Hieromax), and in the following years conquered all Syria, Palestine and Egypt. Heraclius made no attempt to retrieve the misfortunes of his generals, but evacuated his possessions in sullen despair. The remaining years of his life he devoted to theological speculation and ecclesiastical reforms. His religious enthusiasm led him to oppress his Jewish subjects; on the other hand he sought to reconcile the Christian sects, and to this effect propounded in his Ecthesis a conciliatory doctrine of monothelism. Heraclius died of his disease in 642. He had been twice married; his second union, with his niece Martina, was frequently made a matter of reproach to him. In spite of his partial failures, Heraclius must be regarded as one of the greatest of Byzantine emperors, and his early campaigns were the means of saving the realm from almost certain destruction.

Authorities. — G. Finlay, History of Greece (Oxford, 1877) i. 311-358; J. B. Bury, The Later Roman Empire (London, 1889), ii. 207-273; T. E. Evangelides, ‘Hpa/cXeios 6 auro/cparajp toO Bufacrlou (Odessa, 1903) ; A. Pernice, V Imperatore Eraclio (Florence, 1905). On the Persian campaigns: the epic of George Pisides (ed. 1836, Bonn); F. Macler, Histoire d’Heraclius par I’evique Sebeos (Paris, 1904) ; E. Gerland in Byzantinische Zeit- schrift, iii. (1894) 330-337; N. H. Baynes in the English Historical Review (1904), pp. 694-702. (M. O. B. C.)

HERALD (O. Fr. heraut, herault; the origin is uncertain, but O.H.G. heren, to call, or hariwald, leader of an army, have been proposed; the Gr. equivalent is Krjpvˆ: Lat. praeco, caduceator, fetialis), in Greek and Roman antiquities, the term for the officials described below; in modern usage, while the word ” herald ” is often used generally in a sense analogous to that of the ancients, it is more specially restricted to that dealt with in the article Heraldry.

The Greek heralds, who claimed descent from Hermes, the messenger

of the gods, through his son Keryx, were public functionaries of high importance in early times. Like Hermesˆ they carried a staff of olive or laurel wood surrounded by two snakes (or with wool as messengers of peace) ; their persons were inviolable; and they formed a kind of priesthood or corpora- tion. In the Homeric age, they summoned the assemblies of the people, at which they preserved order and silence; pro- claimed war; arranged the cessation of hostilities and the conclusion of peace; and assisted at public sacrifices and banquets. They also performed certain menial offices for the kings (mixing and pouring out the wine for the guests) , by whom they were treated as confidential servants. In later times,

their position was a less honourable one; they were recruited from the poorer classes, and were mostly paid servants of the various officials. Pollux in his Onomaslicon distinguishes four classes of heralds: (i) the sacred heralds at the' Eleusinian mysteries; 1 (2) the heralds at the public games, who announced the names of the competitors and victors; (3) those who super- intended the arrangements of festal processions; (4) those who proclaimed goods for sale in the market (for which purpose they mounted a stone), and gave notice of lost children and run- away slaves. To these should be added (5) the heralds of the boule and demos, who summoned the members of the council and ecclesia, recited the solemn formula of prayer before the opening of the meeting, called upon the orators to speak, counted the votes and announced the results; (6) the heralds of the law courts, who gave notice of the time of trials and summoned the parties. The heralds received payment from the state and free meals together with the officials to whom they were attached. Their appointment was subject to some kind of examination, probably of the quality of their voice. Like the earlier heralds, they were also employed in negotiations connected with war and peace.

Among the Romans the praecones or " criers " exercised their profession both in private and official business. As private criers they were especially concerned with auctions; they adver- tized the time, place and conditions of sale, called out the various bids, and like the modern auctioneer varied the proceedings with jokes. They gave notice in the streets of things that had been lost, and took over various commissions, such as funeral arrange- ments. Although the calling was held in little estimation, some of these criers amassed great wealth. The state criers, who were mostly freedmen and well paid, formed the

lowest class of apparitores (attendants on various magistrates). On the whole, their functions resembled those of the Greek heralds. They called the popular assemblies together, proclaimed silence and made known the result of the voting; in judicial cases, they summoned the plaintiff, defendant, advocates and witnesses; in criminal executions they gave out the reasons for the punishment and called on the executioner to perform his duty; they invited the people to the games and announced the names of the victors. Public criers were also employed at state auctions in themunicipia and colonies, but, according to the lex Julia municipalis of Caesar, they were prohibited from holding office.

Amongst the Romans the settlement of matters relating to war and peace was entrusted to a special class of heralds called Fetiales (not Feciales), a word of uncertain etymology, possibly connected with fateor, fari, and meaning " the speakers." They formed a priestly college of 20 (or 15) members, the institution of which was ascribed to one of the kings. They were chosen from the most distinguished families, held office for life, and filled up vacancies in their number by co-optation. Their duties were to demand redress for insult or injury to the state, to declare war unless satisfaction was obtained within a certain number of days and to conclude treaties of peace. A deputation of four (or two), one of whom was called pater palratus, wearing priestly garments, with sacred herbs plucked from the Capitoline hill borne in front, proceeded to the frontier of the enemy's territory and demanded the surrender of the guilty party. This demand was called clarigaiio (perhaps from its being made in a loud, clear voice). If no satisfactory answer was given within 30 days, the deputa- tion returned to Rome and made a report. If war was decided upon, the deputation again repaired to the frontier, pronounced a solemn formula, and hurled a charred and blood-stained javelin across the frontier, in the presence of three witnesses, which was tantamount to a declaration of war (Livy i. 24, 32). With

1 These heralds are regarded by some as a branch of the Eumol- pidae, by others as of Athenian origin. They enjoyed great prestige and formed a hieratic caste like the Eumolpidae, with whom they shared the most important liturgical functions. From them were selected the SpJoOxos or torch-bearer, the Upcnrjpv£, whose chief duty was to proclaim silence, and 6 irl fany, an official connected with the service at the altar (see L. R. Farnell, Cults of the Greek States, iii. 161; J. Topffer, Attische Genealogie (1889) ;. Ditten- berger in Hermes, xx. ; P. Foucart, " Les Grands Myst&res d'Eleusis " in Mem. dc I'lnstitul National de France, xxxvii. (1904).

the extension of the Roman empire, it became impossible to carry out this ceremonial, for which was substituted the hurling of a javelin over a column near the temple of Bellona in the direction of the enemy's territory. When the termination of a war was decided upon, the fetiales either made an arrangement for the suspension of hostilities for a definite term of years, after which the war recommenced automatically or they con- cluded a solemn treaty with the enemy. Conditions of peace or alliance proposed by the general on his own responsibility (sponsio) were not binding upon the people, and in case of rejection the general, with hands bound, was delivered by the fetiales to the enemy (Livy ix. 10). But if the terms were agreed to, a deputation carrying the sacred herbs and the flint stones, kept in the temple of Jupiter Feretrius for sacrificial purposes, met a deputation of fetiales from the other side. After the conditions of the treaty had been read, the sacrificial formula was pronounced and the victims slain by a blow from a stone (hence the expression foedus ferire). The treaty was then signed and handed over to the keeping of the fetial college. These ceremonies usually took place in Rome, but in 201 a deputation of fetiales went to Africa to ratify the conclusion of peace with Carthage. From that time little is heard of the fetiales, although they appear to have existed till the end of the 4th century a.d. The caduceator (from caduceus, the latinized form of icqpvKftov) was the name of a person who was sent to treat for peace. His person was considered sacred; and like the fetiales he carried the sacred herbs, instead of the caduceus, which was not in use amongst the Romans.

For the Greek heralds, see Ch. Ostermann, De praeconibus Grae- corum (1845); for the Roman Praecones, Mommsen, Romisches Staatsrecht, i. 363 (3rd ed., 1887); also article Praecones in Pauly's Realencyclopadie (1852 edition); for the Fetiales, mono- graphs by F. C. Conradi (1734, containing all the necessary material), and G. Fusinato (1884, from Atti delta R. Accad. dei Lincei, series iii. vol. 13) ; also Marquardt, Rbmische Staatsverwaltung, iii. 415 (3rd ed., 1885), and A. Weiss in Daremberg and Saglio's Dictionnaire des antiquites. (J. H. F.)

HERALDRY. Although the word Heraldry properly belongs to all the business of the herald (q.v.), it has long attached itself to that which in earlier times was known as armory, the science of armorial bearings.

History of Armorial Bearings, — In all ages and in all quarters of the world distinguishing symbols have been adopted by tribes or nations, by families or by chieftains. Greek and Roman poets describe the

devices borne on the shields of heroes, and many such painted shields are pictured on antique vases. Rabbinical writers have supported the fancy that the standards of the tribes set up in their camps bore figures devised from the prophecy ,of Jacob, the ravening wolf for Benjamin, the lion's whelp for Judah and the ship of Zebulon. In the East we have such ancient symbols as the five-clawed dragon of the Chinese empire and the chrysanthemum of the emperor of Japan. In Japan, indeed, the systematized badges borne by the noble clans may be regarded as akin to the heraldry of the West, and the circle with the three asarum leaves of the Tokugawa shoguns has been made as familiar to us by Japanese lacquer and porcelain as the red pellets of the Medici by old Italian fabrics. Before the landing of the Spaniards in Mexico the Aztec chiefs carried shields and banners, some of whose devices showed after the fashion of a phonetic writing the names of their bearers; and the eagle on the new banner of Mexico may be traced to the eagle that was once carved over the palace of Montezuma. That mysterious business of totemism, which students of folk-lore have discovered among most primitive peoples, must be regarded as another of the fore- runners of true heraldry, the totem of a tribe supplying a badge which was sometimes displayed on the body of the tribesman in paint, scars or tattooing. Totemism so far touches our heraldry that some would trace to its symbols the white horse of West- phalia, the bull's head of the Mecklenburgers and many other ancient armories.

When true heraldry begins in Western Europe nothing is more remarkable than the suddenness of its development, once the idea of hereditary armorial symbols was taken by the nobles and

knights. Its earliest examples are probably still to be discovered by research, but certain notes may be made which narrow the dates between which we must seek its origin. The older writers on heraldry, lacking exact archaeology, were wont to carry back the beginnings to the dark ages, even if they lacked the assurance of those who distributed blazons among the angelic host before the Creation. Even in our own times old misconceptions give ground slowly. Georg Ruexner's Thurnier Buck of 1522 is still cited for its evidence of the tournament laws of Henry the Fowler, by which those who would contend in tournaments were forced to show four generations of arms-bearing ancestors. Yet modern criticism has shattered the elaborated fiction of Ruexner. In England many legends survive of arms borne by

the Conqueror and his companions. But nothing is more certain than that neither armorial banners nor shields of arms were borne on either side at Hastings. The famous record of the Bayeux tapestry shows shields which in some cases suggest rudely devised armorial bearings, but in no case can a shield be identified as one which is recognized in the generations after the Conquest. So far is the idea of personal arms from the artist, that the same warrior, seen in different parts of the tapestry's history, has his shield with differing devices. A generation later, Anna Comnena, the daughter of the Byzantine emperor, describing the shields of the French knights who came to Constantinople, tells us that their polished faces were plain.

Of all men, kings and princes might be the first to be found bearing arms. Yet the first English sovereign who appears on his great seal with arms on his shield is Richard I. His seal of 1 1 89 shows his shield charged with a lion ramping towards the sinister side. Since one half only is seen of the rounded face of the shield, English antiquaries have perhaps too hastily suggested that the whole bearing was two lions face to face. But the mounted figure of Philip of Alsace, count of Flanders, on his seal of 1 164 bears a like shield charged with a like lion, and in this case another shield on the counterseal makes it clear that this is the single lion of Flanders. Therefore we may take it that, in 1189, King Richard bore arms of a lion rampant, while, nine years later, another seal shows him with a shield of the familiar bearings which have been borne as the arms of England by each one of his successors.

That seal of Philip of Alsace is the earliest known example of the arms of the great counts of Flanders. The ancient arms of the kings of France, the blue shield powdered with golden fleurs- de-lys, appear even later. Louis le Jeune, on the crowning of his son Philip Augustus, ordered that the young prince should be clad in a blue dalmatic and blue shoes, sewn with golden fleurs- de-lys, a flower whose name, as " Fleur de Loys," played upon that of his own, and possibly upon his epithet name of Florus. A seal of the same king has the device of a single lily. But the first French royal seal with the shield of the lilies is that of Louis VIII. (1223-1226). The eagle of the emperors may well be as ancient a bearing as any in Europe, seeing that Charlemagne is said, as the successor of the Caesars, to have used the eagle as his badge. The emperor Henry III. (1039-1056) has the Sceptre on his seal surmounted by an eagle; in the 12th century the eagle was embroidered upon the imperial gloves. At Molsen in 1080 the emperor's banner is said by William of Tyre to have borne the eagle, and with the beginning of regular heraldry this imperial badge would soon be displayed on a shield. The double-headed eagle is not seen on

an imperial seal until after 1414, when the bird with one neck becomes the recognized arms of the king of the Romans.

There are, however, earlier examples of shields of arms than any of these. A document of the first importance is the descrip- tion by John of Marmoustier of the marriage of Geoffrey of Anjou with Maude the empress, daughter of Henry I., when the king is said to have hung round the neck of his son-in-law a shield with golden ” lioncels.” Afterwards the monk speaks of Geoffrey in fight, ” pictos leones preferens in clypeo.” Two notes may be added to this account. The first is that the enamelled plate now in the museum at Le Mans, which is said to have been placed over the tomb of Geoffrey after his death in 1151, shows him bearing a

long shield of azure with six golden lioncels, thus confirming the monk’s story. The second is the well-known fact that Geoffrey’s bastard grandson, William with the Long Sword, undoubtedly bore these same arms of the six lions of gold in a blue field, even as they are still to be seen upon his tomb at Salisbury. Some ten years before Richard I. seals with the three leopards, his brother John, count of Mortain, is found using a seal upon which he bears two leopards, arms which later tradition assigns to the ancient dukes of Normandy and to their descendants the kings of England before Henry II., who is said to have added the third leopard in right of his wife, a legend of no value. Mr Round has pointed out that Gilbert of Clare, earl of Hertford, who died in n 52, bears on his seal to a document sealed after 1138 and not later than 1146, the three cheverons afterwards so well known in England as the bearings of his successors. An old drawing of the seal of his uncle Gilbert, earl of Pembroke {Lansdowne MS. 203), shows a chever- onny shield used between 1 138 and 1 148. At some date between 1 144 and 1 1 50, Waleran, count of Meulan, shows on his seal a pennon and saddle-cloth with a checkered pattern: the house of Warenne, sprung from his mother’s son, bore shields cheeky of gold and azure. If we may trust the inventory of Norman seals made by M. Demay, a careful antiquary, there is among the archives of the Manche a grant by Eudes, seigneur du Pont, sealed with a seal and counterseal of arms, to which M. Demay gives a date as early as n 28. The writer has not examined this seal, the earliest armorial evidence of which he has any knowledge, but it may be remarked that the arms are described as varying on the seal and counterseal, a significant touch of primitive armory. Another type of seal common in this 12th century shows the personal device which had not yet developed into an armorial charge. A good example is that of Enguerrand de Candavene, count of St Pol, where, although the shield of the horseman is uncharged, sheaves of oats, playing on his name, are

strewn at the foot of the seal. Five of these sheaves were the arms of Candavene when the house came to display arms. In the same fashion three different members of the family of Armenteres in England show one, two or three swords upon their seals, but here the writer has no evidence of a coat of arms derived from these devices.

From the beginning of the 13th century arms upon shields increase in number. Soon the most of the great houses of the west display them with pride. Leaders in the field, whether of a royal army or of a dozen spears, saw the military advantage of a custom which made shield and banner things that might be recognized in the press. Although it is probable that armorial bearings have their first place upon the shield, the charges of the shield are found displayed on the knight's long surcoat, his " coat of arms," on his banner or pennon, on the trappers of his horse and even upon the peaks of his saddle. An attempt has been made to connect the rise of armory with the adoption of the barrel-shaped close helm; but even when wearing the earlier Norman helmet with its long nasal the knight's face was not to be recognized. The Conqueror, as we know, had to bare his head before he could persuade his men at Hastings that he still lived. Armory satisfied a need which had long been felt. When fully armed, one galloping knight was like another; but friend and foe soon learned that the gold and blue checkers meant that Warenne was in the field and that the gold and red vair was for Ferrers. Earl Simon at Evesham sent up his barber to a spying place and, as the barber named in turn the banners which had come up against him, he knew that his last fight was at hand. In spite of these things the growth of the custom of sealing deeds and charters had at least as much in- fluence in the development of armory as any military need. By this way, women and clerks, citizens and men of peace, corporations and colleges, came to share with the fighting man in the use of armorial bearings. Arms in stone, wood and brass decorated the tombs of the dead and the houses of the living; they were broidered in bed-curtains, coverlets and copes, painted on the sails of ships and enamelled upon all manner of gold-smiths' and silversmiths' work. And, even by warriors, the full splendour of armory was at all times displayed more fully

HERALDRY

Tlatf. I.

: 'YNW

-

Ion 9e \tt|>fcjtS h«mft 9c befow fe frt3 -ma hg-ti ‘

1

–’

7,

Qc(fonc>QPcy6ft- <£?.-fiˆ

r ;

ˆr«&;

/«

(■in

— -■-■■——■ • ■— —

nil i n

♦ +

M I I I I

inn

i in >

u.

\»*»tyfoˆ*tofc*ttb*9*$*fr& aˆ MWC *?«fc <&#'

“&VM*

Sfcaft*”

3ˆ

► “ >

“? <

(L «*»>!

-«>*• – ■■ w’ «» l w. – lfl ” „ , & *_ *~ * S ,ˆfn

T.YiJU

:> g

8r

iiii

1 1

<$ ©

W

■jar? ^ v .. ^im*.

-^ r

Til

ir

PART OF A ROM- OE ARMS I’AINTED IS ENGLAND AT THE BEGINNING OP THE Hill CENTURY. THE NAMES HAVE BEEN ADDED BY A SOMEWHAT LATER HAND. AND ARE IX MANY CASES MISTAKEN AND MIS-SPELLED. Draw iiy William dti> /or Ikt tNCYCLOPAEDIA BRITANNIC*.

HERALDRY

Platk I.

■■•*•»■.

louˆevˆi’fetS Ke«# $c be$m JejVti -mahetv • ‘

i

>e f u*&w

kf$tyˆ***fc*ti£b*.tofcyktft &*£ M»C fcˆlW

S&tt9«

PH

ˆ)

• ,-» r – r

V§» ■ #

PART OF A KQLI. Ol’ Alt MS PAINTED IN ENGLAND AT THE BEGINNING OF THE Uni CENTURY. TflE NAMES HAVE BEEN ADDED 11 Y A SOMEWHAT LATER HAND. AND ARE IN MANY CASES MISTAKEN AND MIS-SPELLED. Dra-j-n by H’tfJiiSM GiU > for (hi ENCVCL0PA6DIA BRITANNIC*.

HERALBRY

3*3

in the fantastic magnificence of the tournament than in the rougher business of war.

There can be little doubt that ancient armorial bearings were chosen at will by the man who bore them, many reasons guiding his choice. Crosses in plenty were taken. Old writers have asserted that these crosses commemorate the badge of the crusaders, yet the fact that the cross was the symbol of the faith was reason enough. No symbolism can be found in such charges as bends and f esses; they are on the shield because a broad band, aslant or athwart, is a charge easily recognized. Medieval wisdom gave every noble and magnanimous quality to the lion, and therefore this beast is chosen by hundreds of knights as their bearing. We have already seen how the arms of a Candavene play upon his name. Such an example was imitated on all sides. Salle of Bedfordshire has two so/amanders sa/tirewise; Belet has his namesake the weasel. In ancient shields almost all beasts and birds other than the lion and the eagle play upon the bearer’s name. No object is so humble that it is unwelcome to the knight seeking a pun for his shield. Trivet has a three-legged trivet; Trumpington two trumps; and Montbocher three pots. The legends which assert that certain arms were ” won in the Holy Land ” or granted by ancient kings for heroic deeds in the field are for the most part worthless fancies.

Tenants or neighbours of the great feudal lords were wont to make their arms by differencing the lord’s shield or by bringing some charge of it into their own bearings. Thus a group of Kentish shields borrow lions from that of Leyborne, which is azure with six lions of silver. Shirland of Minster bore the same arms differenced with an ermine quarter. Detling had the silver lions in a sable field. Rokesle’s lions are azure in a golden field with a fesse of gules between them; while

Wateringbury has six sable lions in a field of silver, and Tilmanstone six ermine lions in a field of azure. The Vipont ring or annelet is in several shields of Westmorland knights, and the cheverons of Clare, the cinquefoil badge of Beaumont and the sheaves of Chester can be traced in the coats of many of the followers of those houses. Sometimes the lord himself set forth such arms in a formal grant, as when the baron of Greystock grants to Adam of Blencowe a shield in which his own three chaplets are charges. The Whitgreave family of Staffordshire still show a shield granted to their ancestor in 1442 by the earl of Stafford, in which the Stafford red cheveron on a golden field is four times repeated.

Differences. — By the custom of the middle ages the ” whole coat,” which is the undifferenced arms, belonged to one man only and was inherited whole only by his heirs. Younger branches differenced in many ways, following no rule. In modern armory the label is reckoned a difference proper only to an eldest son. But in older times, although the label was very commonly used by the son and heir apparent, he often chose another distinc- tion during his father’s lifetime, while the label is sometimes found upon the shields of younger sons. Changing the colours or varying the number of charges, drawing a bend or baston over the shield or adding a border are common differences of cadet lines. Beauchamp, earl of Warwick, bore ” Gules with a fesse and six crosslets gold.” His cousins are seen changing the crosslets for martlets or for billets. Bastards difference their father’s arms, as a rule, in no more striking manner than the legitimate cadets. Towards the end of the 14th century we have the beginning of the custom whereby certain bastards of princely houses differenced the paternal arms by charging them upon a bend, a fesse or a chief, a cheveron or a quarter. Before his legitimation the eldest son of John of Gaunt by Katharine Swinford is said to have borne a shield party silver and azure with the arms of Lancaster on a bend. After his legitimation in 1397 he changed his bearings to the royal arms of France and England within a border gobony of silver and azure. Warren of Poynton, descended from the last earl Warenne and his concubine, Maude of Neirford, bore the checkered shield of Warenne with a quarter charged with the ermine lion of Neirford. By the end of the middle ages the baston under continental influence tended to become a bastard’s

difference in England and the jingle of the two words may have helped to support the custom. About the same time the border gobony began to acquire a like character. The ” bar sinister ” of the novelists is probably the baston sinister, with the ends couped, which has since the time of Charles II. been familiar on the arms of certain descendants of the royal house. But it has rarely been seen in England

over other shields; and, although the border gobony surrounds the arms granted to a peer of Victorian creation, the modern heralds have fallen into the habit of assigning, in nineteen cases out of twenty, a wavy border as the standard difference for illegitimacy.

Although no general register of arms was maintained it is remarkable that there was little conflict between persons who had chanced to assume the same arms. The famous suit in which Scrope, Grosvenor and Carininow all claimed the blue shield with the golden bend is well known, and there are a few cases in the 14th century of like disputes, which were never carried to the courts. But the men of the middle ages would seem to have had marvellous memories foi blazonry; and we know that rolls of arms for reference, some of them the records of tournaments, existed in great numbers. A few examples of these remain to us, with painted shields or descriptions in French blazon, some of them containing many hundreds of names and arms.

To women were assigned, as a rule, the undifferenced arms of their fathers. In the early days of armory married women — well-born spinsters of full age were all but unknown outside the walls of re- ligious houses — have seals on which appear the shield of the husband or the father or both shields side by side. But we have some instances of the shield in which two coats of arms are parted or, to use the modern phrase, ” impaled.” Early in the reign of King John, Robert de Pinkeny seals with a parted shield. On the right or dexter side — the right hand of a shield parted arms, is at the right hand of the person covered

by it — are two fusils of an indented fesse: on the left or sinister side are three waves. The arms of Pinkeny being an indented fesse, we may see in this shield the parted arms of husband and wife—the latter being probibly a Basset. In many of the earliest examples, as in this, the dexter half of the husband’s shield was united with the sinister half of that of the wife, both coats being, as modern antiquaries have it, dimidiated. This ” dimidiation,” however, had its incon- venience. With some coats it was impossible. If the. wife bore arms with a quarter for the only charge, her half of the shield would be blank. Therefore the practice was early abandoned by the majority of bearers of parted shields although there is a survival of it in the fact that borders and tressures con- tinue to be ” dimidiated ” in order that the charges within them shall not be cramped. Parted shields came into com- mon use from the reign of Edward II., and the rule is established that the husband’s arms should take the dexter side. There are, however, several instances of the con- trary practice. ... .

(1310) of Maude, wife of John fr ° r ™ ed h f ri ^ a! (l4 ° 3) ‘ showin S Boutetort of Halstead, the p

engrailed saltire of the Boutetorts takes the sinister place. A twice-married woman would sometimes show a shield charged with her paternal arms between those of both of her husbands, as did Beatrice Stafford in 1404, while in 1412 Elizabeth, Lady of Clinton, seals with a shield paled with five coats — her arms

Shield from seal of Robert de Pinkeny, an early exa m pie of

Shield of Joan atte Pole, On the seal widow of Robert of Hemenhale,

of la Plaunche between those of four husbands. In most cases the parted shield is found on the wife’s seal alone. Even in our own time it is recognized that the wife’s arms should not appear upon the husband’s official seal, upon his banner or surcoat or upon his shield when it is surrounded by the collar of an order. Parted arms, it may be noted, do not always repre- sent a husband and wife. Richard II. parted with his quartered

arms of France and England those ascribed to Edward the Confessor, and parting is often used on the continent where quartering would serve in England. In 1497 the seal of Giles Daubeney and Reynold Bray, fellow justices in eyre, shows their arms parted in one shield. English bishops, by a custom begun late in the 14th century, part the see’s arms with their own. By modern English custom a husband and wife, where the wife is not Shield of Beatrice Stafford an heir, use the parted coat from her seal (1404), showing her on a shield, a widow bearing

arms of Stafford between those f u„ „„_,_ „„„„„ +i,„ i„„

of her husbands-Thomas, Lord the S * m f u P° n the lozen g e Roos, and Sir Richard Burley. on which, when a spinster,

she displayed her father’s coat alone. When the wife is an heir, her arms are now borne in a little scocheon above those of her husband. If the husband’s arms be in an unquartered shield the central charge is often hidden away by this scocheon.

The practice of marshalling arms by quartering spread in England by

reason of the example given by Eleanor, wife of Edward I., who displayed the castle of Castile quartered with the lion of Leon. Isabel of France, wife of Edward II., seals with a shield in whose four quarters are the arms of England, France, Navarre and Champagne. Early in the 14th century Simon de Montagu, an ancestor of the earls of Salisbury, quartered with his own arms a coat of azure with a golden griffon. In 1340 we have Laurence Hastings, earl of Pembroke, quartering with the Hastings arms the arms of Valence, as heir of his great-uncle Aymer, earl of Pembroke. In the preceding year the king had already asserted his claim to another kingdom by quartering France with England, and after this quartered shields became common in the great houses whose sons were carefully matched with heirs female. When the wife was an heir the husband would quarter her arms with his own, displaying, as a rule,

the more important coat in the first quarter. Marshalling be- comes more elaborate with shields showing both quarterings and partings, as in the seal (1368) of Sibil Arundel, where Arundel (Fitzalan) is quartered with Warenne and parted with the arms of Montagu. In all, save one, of these examples the quart- ering is in its simplest form, with one coat repeated in the first and fourth quarters of the shield and another in the second and third. But to a charter of 1434 Sir Henry Bromflete sets a seal upon which Bromflete quarters Vesci in the second quarter, Aton in the third and St John in the fourth, after the fashion of the much earlier seal of Edward II. ‘s queen. Another development is that of what armorists style the ” grand quarter,” a quarter which is itself quartered, as in the shield of Reynold Grey of Ruthyn, which bears Grey in the first and fourth quarters and Hastings quartered with Valence in the third and fourth. Humphrey Bourchier, Lord Cromwell, in 1469, bears one grand

Shield of John Talbot, first earl of Shrewsbury (d. 1453), showing four coats quartered.

quarter quartered with another, the first having Bourchier and Lovaine, the second Tatershall and Cromwell.

The last detail to be noted in medieval marshalling is the introduction into the shield of another surmounting shield called by old armorists the ” innerscocheon ” and by modern blazoners the ” inescutcheon.” John the Fearless, count of Flanders, marshalled his arms in 1409 as a quartered shield of the new and old coats of Burgundy. Above these coats a little scocheon, borne over the crossing of the quartering lines, had the black lion of Flanders, the arms of his mother. Richard Beauchamp, the adventurous earl of Warwick, who had seen most

European courts during his wanderings, may have had this shield in mind when, over his arms of Beauchamp quartering Newburgh, he set a scocheon of Clare quartering Despenser, the arms of his wife Isabel Despenser, co-heir of the earls of Gloucester. The seal of his son-in-law, the King-Maker, shows four quarters — Beauchamp quartering Clare, Montagu quartering Monthermer, Nevill alone, and Newburgh quartering Despenser. An interesting use of the scocheon en surtout is that made by Richard Wydvile, Lord Rivers, whose garter stall-plate has a grand quarter of Wydvile and Prouz quartering Beauchamp of Hache, the whole surmounted by a scocheon with the arms of Reviers or Rivers, the house from which he took the title of his barony. On the continent the common use of the scocheon is to bear the paternal arms of a sovereign or noble, surmounting the quarterings of his kingdoms, principalities, fiefs or seigniories. Our own prince of Wales bears the arms of Saxony above those of the United Kingdom differ- enced with his silver label. Mar- . _. shalling takes its most elaborate arms are Beauchamp quartering , °, ,. , , .Newburgh, with a scocheon of form, the most removed from Clare quartering Despenser. the graceful simplicity of the

middle ages, in such shields as the ” Great Arms ” of the Austrian empire, wherein are nine grand quarters each marshal- ling in various fashions from three to eleven coats, six of the grand-quarters bearing scocheons en surtout, each scocheon ensigned with a different crown.

Crests. — The most important accessory of the arms is the crested helm. Like the arms it has its pre-heraldic history in the crests of the Greek helmets, the wings, the wild boar’s and bull’s heads of Viking headpieces. A little roundel of the arms of a Japanese house was often borne as a crest in the Japanese helmet, stepped in a socket above the middle of the brim. The 12th-century seal of Philip of Alsace, count of Flanders, shows a demi-lion painted or beaten on the side of the upper part of his helm, and on his seal of 1198 our own Richard Coeur de Lion’s barrel-helm has a leopard upon the semicircular comb- ridge, the edge of which is set off with feathers arranged as two wings. Crests, however, came slowly into use in England, although before 1250 Roger de Quincy, earl of Winchester, is seen on his seal with a wyver upon his helm. Of the long roll of earls and barons sealing the famous letter to the pope in 1301 only five show true crests on their seals. Two of them are the earl of Lancaster and his brother, each with a wyver crest like that of Quincy. One, and the most remarkable, is John St John of Halnaker, whose crest is a leopard standing between two upright palm branches. Ralph de Monthermer has an eagle crest, while Walter de Money’s helm is surmounted by a fox-like beast. In three of these instances the crest is borne, as was often the case, by

the horse as well as the rider. Others of these seals to the barons' letter have the fan-shaped crest without any decoration upon it. But as the furniture of tournaments grew more magnificent the crest gave a new field for display, and many strange shapes appear in painted and gilded wood,

Shield of Richard Beauchamp, earl of Warwick, from his garter stall-plate (after 1423). The

metal, leather or parchment above the helms of the jousters. The Berkeleys, great patrons of abbeys, bore a mitre as their crest painted with their arms, like crests being sometimes seen on the continent where the wearer was advocatus of a bishopric or abbey. The whole or half figures or the heads and necks of beasts and birds were employed by other families. Saracens' heads topped many helms, that of the great Chandos among them. Astley bore for his crest a silver harpy standing in marsh-sedge, a golden chain fastened to a crown about her neck. Dymoke played pleasantly on his name with a long-eared moke's scalp. Stanley took the eagle's nest in which the eagle is lighting down with a swaddled babe in his claws. Burnell had a burdock bush, la Vache a cow's leg, and Lisle's strange fancy was to perch a huge millstone on edge above his head. Many early helms,' as that of Sir John Loterel, painted in the Loterel psalter, repeat the arms on the sides of a fan-crest. Howard bore for a crest his arms painted on a pair of wings, while simple " bushes " or feathers are seen in great plenty. The crest of a cadet is often differenced like the arms, and thus a wyver or a leopard will have a label about its neck. The Montagu griffon on the helm of John, marquess of Montagu, holds in its beak the gimel ring with which he differenced his father's shield. His brother,

Ralph de Monthermer (1301), showing shield of arms, helm with crest and mantle, horse-crest and armorial trappers.

the King-Maker, following a custom commoner abroad than at home, shows two crested helms on his seal, one for Montagu and one for Beauchamp — none for his father's house of Nevill. It is often stated that a man, unless by some special grace or allowance, can have but one crest. This, however, is contrary to the spirit of medieval armory in which a man, inheriting the coat of arms of another house than his own, took with it all its belongings, crest, badge and the like. The

heraldry books, with more reason, deny crests to women and to the clergy, but examples are not wanting of medieval seals in which even this rule is broken. It is perhaps unfair to cite the case of the bishops of Durham who ride in full harness on their palatinate seals; but Henry Despenser, bishop of Norwich, has a helm on which the winged griffon's head of his house springs from a mitre, while Alexander Nevill, archbishop of York, seals with shield, supporters and crowned and crested helm like those of any lay magnate. Richard Holt, a Northamptonshire clerk in holy orders, bears on his seal in the reign of Henry V. a shield of arms and a mantled helm with the crest of a collared greyhound's head. About the middle of the same century a seal cut for the wife of Thomas Chetwode, a Cheshire squire, has a shield of her husband's arms parted with her own and surmounted by a crowned helm with the crest of a demi-lion; and this is not the only example of such bearings by a woman.

Before passing from the crest let us note that in England the

Shield and crested helm with hat and

juncture of crest and helm was commonly covered, especially after the beginning of the 15th century, by a torse or " wreath " of silk, twisted with one, two or three colours. Coronets or crowns and " hats of estate " often take the place of the wreath as a base for the crest, and there are other curious variants. With the wreath may be considered the mantle, a hanging cloth which, in its earliest form, is seen as two strips of silk or sendal attached to the top of the helm below the crest and streaming like pennants as the rider bent his head and charged. Such strips are often displayed from the conical top of an uncrested helm, and some ancient ex- amples have the air of the two ends of a stole or of the infulae of a bishop's mitre. The general opinion of anti-quaries has been that the mantle originated among the crusaders as a protection for the steel helm from the rays of an Eastern sun ; but the fact that mantles take in England their fuller form after our crusading days were over seems against this theory. When the fashion for slittering the edges of

clothing came in, the edges of the "mantle of Thomas" of mantle were slittered like the edge Hengrave (1401). of the sleeve or skirt, and, flourished

out on either side of the helm, it became the delight of the painter of armories and the seal engraver. A worthless tale, repeated by popular manuals, makes the slittered edge represent the shearing work of the enemy's sword, a fancy which takes no account of the like

developments in civil dress. Modern heraldry in England paints the mantle with the principal colour of the shield, lining it with the principal metal. This in cases where no old grant of arms is cited as evidence of another usage. The mantles of the king and of the prince of Wales are, however, of gold lined with ermine and those of other members of the royal house of gold lined with silver. In ancient examples there is great variety and freedom. Where the crest is the head of a griffon or bird the feathering of the neck will be carried on – to cover the mantle. Other mantles will be powdered with badges or with charges from the shield, others checkered, barred or paled. More than thirty of the mantles enamelled on the stall-plates of the medieval Garter-knights are of red with an ermine lining, tinctures which in most cases have no reference to the shields below them.

Supporters. — Shields of arms, especially upon seals, are sometimes figured as hung round the necks of eagles, lions, swans and griffons, as strapped between the horns of a hart or to the boughs of a tree. Badges may fill in the blank spaces at the sides between the shield and the inscription on the rim, but in the later 13th and early 14th centuries the commonest objects so serving are sprigs of plants, lions, leopards, or, still more frequently, lithe-necked wyvers. John of Segrave in 1301* flanks his shields with two of the sheaves of the older coat of Segrave: William Marshal of Hingham does the like with his two marshal's staves. Henry of Lancaster at the same time shows on his seal a shield and a helm crested with a wyver, with two like wyvers ranged on either side of the shield as " supporters." It is uncertain at what time in the 14th century these various fashions crystallize into the recognized use of beasts, birds, reptiles, men " or inanimate objects, definitely chosen as " supporters " of the shield, and not to be taken as the ornaments suggested by the fancy of the seal engraver. That supporters originate in the decoration of the seal there can be little doubt. Some writers, the learned Mendtrier among them, will have it that they were first the fantastically clad fellows who supported and displayed the knight's shield at the opening of the tournament. If the earliest supporters were wild men, angels or Saracens, this theory might be defended; but lions, boars and talbots, dogs and trees are guises into which a man would put himself with difficulty.

By the middle of the 14th century we find what are clearly recognizable as supporters. These, as in a lesser degree the crest, are

often personal rather than hereditary, being changed generation by generation. The same person is found using more

Arms of William, Lord Hastings, from his seal (1477), showing shield, crowned and crested helm with mantle and supporters.

than one pair of them. The kings of France have had angels as supporters of the shield of the fleurs de lys since the 1 5th century, but the angels have only taken their place as the sole royal supporters since the time of Louis XIV. Sovereigns of England from Henry IV. to Elizabeth changed about between supporters of harts, leopards, antelopes, bulls, greyhounds, boars and dragons. James I. at his accession to the English throne brought the Scottish unicorn to face the English leopard rampant across his shield, and, ever since, the ” lion and unicorn ” have been the royal supporters.

An old herald wrote as his opinion that ” there is little or nothing in precedent to direct the use of supporters.” Modern custom gives them, as a rule, only to peers, to knights of the Garter, the Thistle and St Patrick, and to knights who are ” Grand

Badge of John of Whethamstede, abbot of St Albans (d. 1465), from his tomb in the abbey church.

Rudder badge of Willoughby.

Badge of Dacre of Gilsland and Dacre of the

North.

Crosses ” or Grand Commanders of other orders. Royal warrants are sometimes issued for the granting of supporters to baronets, and, in rare cases, they have been assigned to un- titled persons. But in spite of the jealousy wit’h which official heraldry hedges about the display of these supporters once assumed so freely, a few old English families still assert their

right by hereditary prescription to use these ornaments as their forefathers were wont to use them.

Badges. — The badge may claim a greater antiquity and a wider use than armorial bearings. The ” Plantagenet ” broom is an early example in England, sprigs of it being figured on the seal of Richard I. In the r4th and 15th cen- turies every magnate had his badge, which he displayed on his horse- furniture, on the hangings of his bed, his wall and his chair of state, besides giving it as a ” livery ” to his servants

and followers. Such were the knots of Stafford, Bourchier and Wake, the scabbard – crampet of La Warr, the sickle of Hungerford, the swan of Toesni, Bohun and Lancaster, the dun- bull of Nevill, the blue boar of Vere and the bear and ragged staff of Beauchamp, Nevill' of Warwick and Dudley of Northumberland. So well known of all were these symbols that a political ballad of 1449 sings of the misfortunes of the great lords without naming one of them, all men understanding what signified the Falcon, the Water Bowge and the Cresset and the other badges of the doggerel. More famous still were the White Hart, the Red Rose, the White Rose, the Sun, the Falcon and Fetterlock, the Port- cullis and the many other badges of the royal house. We still call those wars that blotted out the old baronage the Wars of the Roses, and the Prince of Wales's feathers are as well known to-day as the royal arms. The Flint and Steel of Burgundy make a collar for the order of the Golden Fleece.

Mottoes. — The motto now accompanies every coat of arms in these islands. Few of these Latin aphorisms, these bald assertions of virtue, high courage, patriotism, piety and loyalty have any antiquity. Some few, how- ever, like the "Esperance" of Percy, were the war-cries of remote ancestors. " " I mak' sicker " of Kirkpatrick recalls pridefully a bloody deed done on a wounded man, and the "Dieu Ayde," "Agincourt " and " D'Accomplir Agincourt " of the Irish " Montmorencys " and the English Wode- Ostrich feather houses and Dalisons, glorious traditions badgeof Beaufort, based upon untrustworthy genealogy. The JXof HˆThe often-quoted punning mottoes may be illus- silver feather has trated by that of Cust, who says "Qui a quill gobony Cust-odit caveat," a modern example and a silver and azure, fair one. Ancient mottoes as distinct from the war or gathering cry of a house are often cryptic sentences whose meaning might be known to the user and perchance to his mistress. Such are the " Plus est en vous " of Louis de Bruges, the Flemish earl of Winchester, and the " So have I cause " and " Till then thus "of two Englishmen. The word motto is of modern use, our forefathers speaking rather of their " word " or of their " reason."

Coronets of Rank. — Among accessories of the shield may now be counted the coronets of peers, whose present form is post- medieval. When Edward III. made dukes of his sons, goI8 circlets were set upon their heads in token of their new dignity. In 1385 John de Vere, marquess of Dublin, was created in the same fashion. Edward VI. extended the honour of the gold circle to earls. Caps of honour were worn with these circles or coronets, and viscounts wore the cap by appointment of James I., Vincent the herald stating that " a verge of pearls on top of the circulet of gold " was added at the creation of

Robert Cecil as Viscount Cranborne. At the coronation of Charles I. the viscounts walked in procession with their caps and coronets. A few days before the coronation of Charles II. the privilege

HERALDRY

Plate II.

SIXTEEN SHIELDS FROM A ROLL OP ARMS OF ENGLISH KNIGHTS AND BARONS MAUI- BY AN ENGLISH

PAINTER EARLY)N" THE REIGN OF EDWARD III.

H ERALDRY

Plate

SIXTEEN SHIELDS FROM A ROLL OP ARMS OF ENGLISH KNIGHTS AN I J BARONS MALE BY AN ENGLISH

PAINTER EARLY IN THE REIGN OF EDWARD III.

HERALDRY

317

of the cap of honour was given to the lowest rank of the peerage, and letters patent of January 1661 assign to them both cap and coronet. The caps of velvet turned up with miniver, which are now always worn with the peer's coronet, are therefore the ancient caps of honour, akin to that " cap of maintenance " worn by English sovereigns on their coronation days when walking to the Abbey Church, and borne before them on occasions of royal state. The ancient circles were enriched according to the taste of the bearer, and, although used at creations as symbols of the rank conferred, were worn in the 14th and 15th centuries by men and women of rank without the use signifying a rank in the peerage. Edmund, earl of March, in his will of 1380, named his sercle ove roses, emeraudes et rubies d'alisaundre en les roses, and bequeathed it to his daughter. Modern coronets are of silver-gilt, without jewels, set upon caps of crimson velvet turned up with ermine, with a gold tassel at the top. A duke's coronet has the circle decorated with eight gold " strawberry leaves "; that of a marquess has four gold strawberry leaves and four silver balls. The coronet of an earl has eight silver balls, raised upon points, with gold strawberry leaves between the points. A viscount's coronet has on the circle sixteen silver balls, and a baron's coronet six silver balls. On the

continent the modern use of coronets is not ordered in the precise English fashion, men of gentle birth displaying coronets which afford but slight indication of the bearer's rank.

Lines. — Eleven varieties of lines, other than straight lines, which divide the shield, or edge our cheverons, pales, bars and the like, are pictured in the heraldry books and named as en- grailed, embattled, indented, inverted, wavy or undy, nebuly, dancetty, raguly, potente, dovetailed and urdy.

As in the case of many other such lists of the later armorists these eleven varieties need some pruning and a new explanation. The most commonly found is the line engrailed, which for the student of medieval armory must be associated with the line indented. In its earliest form the line which a roll of arms will describe indifferently as indented or engrailed takes almost invariably the form to which the name indented is restricted by modern armorists.

The cross may serve as our first example. A cross, engrailed or indented, the words being used indifferently, is a cross so deeply notched at the edges that it seems made up of so many lozenge-shaped wedges or fusils. About the middle of the 14th century begins a tendency, resisted in practice by many conserva- tive families, to draw the engrailing lines in the fashion to which modern armorists restrict the word " engrailed," making shallower indentures in the form of lines of half circles. Thus

the engrailed cross of the Mohuns takes either of the I two forms which we illustrate. Bends follow the same fashion, early bends engrailed or in- dented being some four or more fusils joined bendwise by their blunt sides, bends of less Mohun. than four fusils being very rare.

Thus also the engrailed or in- dented saltires, pales or cheverons, the exact number of the fusils which go to the making of these being unconsidered. For the fesse there is another law. The fesse indented or engrailed is made up of fusils as is the engrailed bend. But although early rolls of arms sometimes neglect this detail in their blazon, the fusils making a fesse must always be of an ascertained number. Montagu, earl of Salisbury, bore a fesse engrailed or indented of three fusils only, very few shields imitating this. Medieval armorists will describe his arms as a fesse indented of three indentures, as a fesse fusilly of three pieces, or as a fesse engrailed of three points or pieces, all of these blazons having the same value. The indented fesse on the red shield of the Dynhams has four such fusils of ermine. Four,

however, is almost as rare a number as three, the normal form of a fesse indented being that of five fusils as borne by Percy?, Pinkenys, Newmarches and many other ancient houses. Indeed, accuracy of blazon is served

if the number of fusils in a fesse be named in the cases of threes and fours. Fesses of six fusils are not to be found. Note that bars indented or engrailed are, for a reason which will be evi- dent, never subject to this counting of fusils. Fauconberg, for example, bore ” Silver with two bars engrailed, or indented, sable.” Displayed on a shield of the flat-iron outline, the lower bar would show fewer fusils than the upper, while on a square banner each bar would have an equal number — usually five or six.

While bends, cheverons, crosses, saltires and pales often follow, especially in the 15th century, the tendency towards the

Montagu. Dynham.

Percy. Fauconberg.

rounded ” engrailing,” fesses keep, as a rule, their bold indentures — neither Percy nor Montagu being ever found with his bearings in aught but their ancient form. Borders take the newer fashion as leaving more room for the charges of the field. But indented chiefs do not change their fashion, although many saw-teeth sometimes take the place of the three or four strong points of early arms, and parti-coloured shields whose party line is indented never lose the bold zig-zag.

While bearing in mind that the two words have no distinctive force in ancient armory, the student and the herald of modern times may conveniently allow himself to blazon the sharp and saw-toothed line as “indented ” and the scolloped line as ” engrailed,” especially when dealing with the debased armory in which the distinction is held to be a true one and one of the first importance. One error at least he must avoid, and that is the following of the heraldry-book compilers in their use of the word ” dancetty.” A ” dancetty ” line, we are told, is a line having fewer and deeper indentures than the line indented. But no dancetty line could make a bolder dash across the shield than do the lines which the old armorists recognized as ” indented.” In old armory we have fesses dancy — commonly called ” dances ” — bends dancy, or cheverons dancy; there are no chiefs dancy nor borders dancy, nor are there shields blazoned as parted with a dancy line. Waved lines, battled lines and ragged lines need little explanation that a picture

cannot give. The word invecked or invected is sometimes applied by old-fashioned heraldic pedants to engrailed lines; later pedants have given it to a line found in

West,

modern grants of arms, an engrailed line reversed. Dove- tailed and urdy lines are mere modernisms. Of the very rare nebuly or clouded line we can only say that the ancient form, which imitated the conventional cloud-bank of the old painters, is now almost forgotten, while the bold ” wavy ” lines of early armory have the word ” nebuly ” misapplied to them.

The Ordinary Charges. — The writers upon armory have given the name of Ordinaries to certain conventional figures commonly charged upon shields. Also they affect to divide these into Honourable Ordinaries and Sub-Ordinaries without explaining the reason for the superior honour of the Saltire or for the subordination of the Quarter. Disregarding such distinctions, we may begin with the description of the ” Ordinaries ” most commonly to be found.

From the first the Cross was a common bearing on English shields, ” Silver a cross gules ” being given early to St George, patron of knights and of England, for his arms; and under St George’s red cross the English were wont to fight. Our armorial crosses took many shapes, but the ” crosses innumerabill ” of the Book of St Albans and its successors may be left to the heraldic dictionary makers who have devised them. It is more

important to define those forms in use during. the middle ages, and to name them accurately after the custom of those who bore them in war, a task which the heraldry books have never as yet attempted with success.

The cross in its simple form needs no definition, but it will be noted that it is sometimes borne ” voided ” and that in a very few cases it appears as a lesser charge with its ends cut off square, in which case it must be clearly blazoned as ” a plain Cross.”

Andrew Harcla, the march-warden, whom Edward II. made an earl and executed as a traitor, bore the arms of St George with a martlet sable in the quarter.

Crevequer of Kent bore ” Gold a voided cross gules.” Newsom (14th century) bore ” Azure a fesse silver with three plain crosses gules.”

Next to the plain Cross may be taken the Cross paty, the croiz patee or pate of old rolls of arms. It has several forms, according to the taste of the artist and the age. So, in the 13th and early 14th centuries, its limbs curve out broadly, while at a later date the limbs become more slender and of even breadth, the ends somewhat resembling fleurs-de-lys. Each of these forms has been seized by the heraldic writers as the type of a distinct cross for which a name must be found, none of them, as a rule, being recognized as a cross paty, a word which has its misapplica-

ˆFˆwl?

St George.

Harcla.

Crevequer.

Latimer.

tion elsewhere. Thus the books have ” cross patonce ” for the earlier form, while ” cross clechee ” and ” cross fleurie ” serve for the others. But the true identification of the various crosses is of the first importance to the antiquary, since without it descriptions of the arms on early seals or monuments must needs be valueless. Many instances of this need might be cited from the British Museum catalogue of seals, where, for example, the cross paty of Latimer is described twice as a ” cross flory,” six times as a ” cross patonce,” but not once by its own name, although there is no better known example of this bearing in England.

Latimer bore ” Gules a cross paty gold.”

The cross formy follows the lines of the cross paty save that its broadening ends are cut off squarely.

Chetwode bore ” Quarterly silver and gules with four crosses formy countercoloured ” — that is to say, the two crosses in the gules are of silver and the two in the silver of gules.

The cross flory or flowered cross, the ” cross with the ends flowered ” — od les boutes floreles as some of the old rolls have it — is, like the cross paty, a mark for the misapprehension of writers on armory, who

describe some shapes of the cross paty by its name. Playing upon discovered or fancied variants of the word, they bid us mark the distinctions between crosses ” fleur- de-lisee,” ” fleury ” and ” fleurettee,” although each author has his own version of the value which must be given these precious words. But the facts of the medieval practice are clear to those who take their armory from ancient examples and not from phrases plagiarized from the hundredth plagiarist. The flowered cross is one whose limbs end in fleur-de-lys, which spring sometimes from a knop or bud but more frequently issue from the square ends of a cross of the ” formy ” type. Swynnerton bore ” Silver a flowered cross sable.”

The mill-rind, which takes its name from the iron of a mill-stone — fer de moline — must be set with the crosses. Some of the old rolls call it croiz recercele, from which armorial writers have leaped to imagine a distinct type. Also they call the mill-rind itself a ” cross moline ” keeping the word

Mill-rinds.

mill-rind for a charge having the same origin but of somewhat differing form. Since this charge became common in Tudor armory it is perhaps better that the original mill-rind should be called for distinction a mill-rind cross.

Willoughby bore ” Gules a mill-rind cross silver.”

The crosslet, cross botonny or cross crosletted, is a cross whose

limbs, of even breadth, end as trefoils or treble buds. It is

rarely found in medieval examples in the shape — that of a cross

with limbs ending in squarely cut plain crosses — which it took

Chetwode. Swynnerton. Willoughby. Brerelegh.

during the 16th-century decadence. As the sole charge of a shield it is very rare; otherwise it is one of the commonest of charges.

Brerelegh bore ” Silver a crosslet gules.”

Within these modest limits we have brought the greater part of that monstrous host of crosses which cumber the dictionaries. A few rare varieties may be noticed.

Dukinfield bore ” Silver a voided cross with sharpened ends.”

Skirlaw, bishop of Durham (d. 1406), the son of a basket- weaver, bore ” Silver a cross of three upright wattles sable, crossed and interwoven by three more.”

Drury bore ” Silver a chief vert with a St Anthony’s cross gold between two golden molets, pierced gules.”

Brytton bore ” Gold a patriarch’s cross set upon three degrees or steps of gules.”

Hurlestone of Cheshire bore ” Silver a cross of four ermine tails sable.”

Melton bore ” Silver a Toulouse cross gules.” By giving this cross

Skirlaw.

Drury.

St Anthony’s Cross. Brytton.

a name from the counts of Toulouse, its best-known bearers, some elaborate blazonry is spared.

The crosses paty and formy, and more especially the crosslets, are often borne fitchy, that is to say, with the lower limb some- what lengthened and ending in a point, for which reason the 15th-century writers call these ” crosses fixabill.” In the 14th- century rolls the word ” potent ” is sometimes used for these crosses fitchy, the long foot suggesting a potent or staff. From this source modern English armorists derive many of their ” crosses potent,” whose four arms have the T heads of old- fashioned walking staves.

Howard bore ” Silver a bend between six crosslets fitchy gules.” Scott of Congerhurst in Kent bore ” Silver a crosslet fitchy sable.”

The Saltire is the cross in the form of that on which St Andrew

Hurlestone.

Melton.

Howard.

Scott.

suffered, whence it is borne on the banner of Scotland, and by the Andrew family of Northamptonshire.

Nevile of Raby bore ” Gules a saltire silver.”

Nicholas Upton, the 15th-century writer on armory, bore ” Silver I a saltire sable with the ends couped and five golden rings thereon.”

Aynho bore ” Sable a saltire silver having the ends flowered between four leopards gold.”

” Mayster Elwett of Yorke chyre ” in a 15th-century roll bears ” Silver a saltire of chains sable with a crescent in the chief.’ 1

Nevile.

Upton.

Aynho.

Elwett.

Fenwick.

Restwolde bore ” Party saltirewise of gules and ermine.”

The chief is the upper part of the shield and, marked out by a line of division, it is taken as one of the Ordinaries. Shields with a plain chief and no more are rare in England, but Tichborne of Tichborne has borne since the 13th century ” Vair a chief gold.” According to the heraldry books the chief should be marked off as a third part of the shield, but its depth varies, being broader when charged with devices and narrower when, itself uncharged, it surmounts a charged field. Fenwick bore ” Silver a chief gules with six martlets countercoloured,” and in this case the chief would be the half of the shield. Clinging to the belief that the chief must not fill more than a third of the shield, the heraldry books abandon the word in such cases, blazoning them as ” party per fesse.”

Hastang bore ” Azure a chief gules and a lion with a forked tail over all.”

Walter Kingston seals in the 13th century with a shield of ” Two rings

or annelets in the chief.”

Hilton of Westmoreland bore ” Sable three rings gold and two saltires silver in the chief.”

With the chief may be named the Foot, the nether part of the shield marked off as an Ordinary. So rare is this charge that we can cite but one example of it, that of the shield of John of Skipton, who in the 14th century bore ” Silver with the foot indented purple and a lion purple.” The foot, however, is a recognized bearing in France, whose heralds gave it the name of champagne.

The Pale is a broad stripe running the length of the shield. Of a single pale and of three pales there are several old examples. Four red pales in a golden shield were borne by Eleanor of Provence, queen of Henry III.; but the number did not com-

Restwolde.

Hastang.

Hilton.

Provence.

either side of the parting line. Thus Chaucer the poet bore ” Party silver and gules with a bend countercoloured.”

The Fesse is a band athwart the shield, filling, according to the rules of the heraldic writers, a third part of it. By ancient use, however, as in the case of the chief and pale, its width varies with the taste of the painter, narrowing when set in a field full of charges and broadening when charges are displayed on itself.

mend itself to English armorists. When the field is divided evenly into six pales it is said to be paly; if into four or eight pales, it is blazoned as paly of that number of pieces. But paly of more or less than six pieces is rarely found.

The Yorkshire house of Gascoigne bore ” Silver a pale sable with a golden conger’s head thereon, cut off at the shoulder.” Ferlington bore ” Gules three pales vair and a chief gold.” Strelley bore ” Paly silver and azure.” Rothinge bore ” Paly silver and gules of eight pieces.”

When the shield or charge is divided palewise down the middle into two tinctures it is said to be ” party.” ” Party silver and gules ” are the

arms of the Waldegraves. Bermingham bore ” Party silver and sable indented.” Caldecote bore ” Party silver and azure with a chief gules.” Such partings of the field often cut through charges whose colours change about on

Gascoigne.

Ferlington.

Strelley.

Rothinge.

When two or three fesses are borne they are commonly called Bars. ” Ermine jour bars gules ” is given as the shield of Sir John Sully, a 14th-century Garter knight, on his stall-plate at Windsor: but the plate belongs to a later generation, and should probably have three bars only. Little bars borne in couples are styled Gemels (twins). The field divided into an even number of bars of alternate colours is said to be barry,

Bermingham.

Caldecote.

Colevile.

Fauconberg.

barry of six pieces being the normal number. If four or eight divisions be found the number of pieces must be named; but with ten or more divisions the number is unreckoned and ” burely ” is the word.

Colevile of Bitham bore ” Gold a fesse gules.” West bore ” Silver a dance (or fesse dancy) sable.” Fauconberg bore ” Gold a fesse azure with three pales gules in the chief.”

Cayvile bore ” Silver a fesse gules, flowered on both sides.”

Cayvile.

Devereux. Chamberlayne. Harcourt.

Devereux bore ” Gules a fesse silver with three roundels silver in the chief.”

Chamberlayne of Northamptonshire bore ” Gules a fesse and three

scallops gold. ‘

Harcourt bore ” Gules two bars gold.”

Manners bore ” Gold two bars azure and a chief gules.”

Wake bore ” Gold two bars gules with three roundels gules in the chief.”

Bussy bore ” Silver three bars sable.”

Badlesmere of Kent bore ” Silver a fesse between two gemels gules.”

Melsanby bore ” Sable two gemels and a chief silver.”

Manners.

Wake.

Melsanby.

Grey.

Grey bore ” Barry of silver and azure.”

Fitzalan of Bedale bore ” Barry of eight pieces gold and gules.

Stutevile bore ” Burely of silver and gules.”

The Bend is a band traversing the shield aslant, arms with one, two or three bends being common during the middle ages in England. Bendy shields follow the rule of shields paly and barry, but as many as ten pieces have been counted in them. The bend is often accompanied by a narrow bend on either side, these companions being called Cotices. A single narrow bend, struck over all other charges, is the Baston, which during the 13th and 14th centuries was a common difference for the shields of the younger branches of a family, coming in later times to suggest itself as a difference for bastards.

The Bend Sinister, the bend drawn from right to left beginning at the ” sinister ” corner of the shield, is reckoned in the heraldry books as a separate Ordinary, and has a peculiar significance

Fitzalan of Bedale. Mauley. Harley. Wallop.

accorded to it by novelists. Medieval English seals afford a group of examples of Bends Sinister and Bastons Sinister, but there seems no reason for taking them as anything more than cases in which the artist has neglected the common rule.;

Mauley bore ” Gold a bend sable.”

Harley bore ” Gold a bend with two cotices sable.”

Wallop bore ” Silver a bend wavy sable.”

Ralegh bore ” Gules a bend indented, or engrailed, silver.”

Ralegh.

Tracy.

Bodrugan. St Philibert.

Tracy bore ” Gold two bends gules with a scallop sable in the chief between the bends.”

Bodrugan bore ” Gules three bends sable.”

St Philibert bore ” Bendy of six pieces, silver and azure.”

Bishopsdon bore ” Bendy of six pieces, gold’ and azure, with a quarter ermine.”

Montfort of Whitchurch bore ” Bendy of ten pieces gold and azure.”

Henry of Lancaster, second son of Edmund Crouchback, bore the Montfort.

Lancaster.

Fraunceys.

Bishopsdon.

arms of his cousin, the king of England, with the difference of ” a baston azure.”

Adam Fraunceys (14th century) bore ” Party gold and sable bendwise with a lion countercoloured.” The parting line is here commonly shown as ” sinister.”

The Cheveron, a word found in medieval building accounts for the barge-boards of a gable, is an Ordinary whose form is explained by its name. Perhaps the very earliest of English armorial charges, and familiarized by the shield of the great house of Clare, it became exceedingly popular in England. Like the bend and the chief, its width varies in different examples. Likewise its angle varies, being sometimes so acute as to touch the top of the shield, while in post-medieval armory the point is often blunted beyond the right angle. One, two or three cheverons occur in. numberless shields, and five cheverons have been found. Also there are some examples of the bearing of cheveronny.

The earls of Gloucester of the house of Glare bore ” Gold three cheverons gules ” and the Staffords derived from them their shield ol ”

Gold a cheveron gules.”

Chaworth bore ” Azure two cheverons gold.”

Peytevyn bore ” Cheveronny of ermine and gules.”

St Quintin of Yorkshire bore ” Gold two cheverons gules and a chief vair.”

Sheffield bore ” Ermine a cheveron gules between three sheaves gold.”

Cobham of Kent bore ” Gules a cheveron gold with three fleurs- de-lys azure thereon.”

Fitzwalter bore ” Gold a fesse between two cheverons gules.”

Chaworth.

Peytevyn.

Sheffield.

Cobham.

Shields parted cheveronwise are common in the 1 5th century, when they are often blazoned as having chiefs ” enty ” or grafted. Aston of Cheshire bore ” Party sable and silver chever- onwise ” or ” Silver a chief enty sable.”

The Pile or stake (estache) is a wedge-shaped figure jutting from the chief to the foot of the shield, its name allied to the pile of the bridge-builder. A single pile is found in the notable arms of Chandos, and the black piles in the ermine shield of Hollis are seen as an example of the bearing of two piles. Three piles are more easily found, and when more than one is represented the points are brought together at the foot. In ancient armory piles in a shield are sometimes reckoned as a variety of pales, and a Basset with three piles on his shield is seen with three pales on his square banner.

Chandos bore ” Gold a pile gules.” Bryene bore ” Gold three piles azure.”

The Quarter is the space of the first quarter of the shield divided crosswise into four parts. As an Ordinary it is an ancient charge and a common one in medieval England, although it has all but disappeared from modern heraldry books, the ” Canton,” an alleged ” diminutive,” unknown to early armory, taking its place. Like the other Ordinaries,

its size is found to vary with the scheme of the shield's charges, and this has persuaded those armorists who must needs call a narrow bend a " bendlet," to the invention of the " Canton," a word which in the sense of a quarter or small quarter appears for the first time in the latter part of the 15th century. Writers of the 14th century sometimes give it the name of the Cantel, but this word is also applied to the void space on the opposite side of the chief, seen above a bend.

Aston.

Hollis.

Bryene.

Blencowe.

Blencowe bore " Gules a quarter silver."

Basset of Dravton bore " Gold three piles (or pales) gules with a quarter ermine.'

Wydvile bore " Silver a fesse and a quarter gules."

Odingseles bore " Silver a fesse gules with a molet gules in the quarter."

Robert Dene of Sussex (14th century) bore " Gules a quarter azure ' embelif,' or aslant, and thereon a sleeved arm and hand of silver."

Shields or charges divided crosswise with a downward line and a line athwart are said to be quarterly. An ancient coat of this fashion is that of Say who bore (13th century) " Quarterly gold and gules "—the first and fourth quarters being gold and the second and third red. Ever or Eure bore the same with the

HERALDRY

Plate III.

& rt. > i > W*»& .

fc fcoˆ&J&TflV. fcftoft "be garter. Cttie2»J»ˆoufc

cnn«'.

Jf/«ˆ«ntfc6abifoine-. IcfcoplK'tfninoV. j • k-fogfoedauonnit . ; , Jk& < $ bc3rnn

I

j P«-...« by It’fl/i JHtSiH . \ % . /’ I. SflHIKiuil— 1

SHIELDS OF ARMS OF “LE ROY DAHRABE,” “LE ROY »E TARSSE,” AND OTHER SOVEREIGNS. MOSTLY MYTHICAL. TAKEN FROM A ROLL ARMS MADE BY AN’ RKOX4SM PAINTER IN TitE TIME OF HENRY VI.

ferity ˆTV&W: •

HERALDRY

Plate lit

li/eaˆentfe Uawfe

0Ut«”«

ie&gfr£niniiyˆ|j[j • lˆftdˆ

tcfrlk$uh

shields op arms of -le roy darrabe,” “lis roy dk tarsse,” and other sovereigns, mostly mythical, taken from a uoll of arms made dy an english painter in the time of henry vi.

HERALDRY

321

addition of ” a bend sable with three silver scallops thereon.” Phelip, Lord Bardolf, bore ” Quarterly gules and silver with an eagle gold in the quarter.”

With the 1 sth century came a fashion of dividing the shield into more than four squares, six and nine divisions being often found in arms of that age. The heraldry books, eager to work

Basset.

Wydvile.

Odingseles.

Ever.

out problems of blazonry, decide that a shield divided into six squares should be described as ” Party per fesse with a pale counterchanged,” and one divided into nine squares as bearing ” a cross quarter-pierced.” It seems a simpler business to follow a 15th-century fashion and to blazon such shields as being of six or nine ” pieces.” Thus John Garther (15th century) bore ” Nine pieces erminees and ermine ” and Whitgreave of Staffordshire ” Nine pieces of azure and of Stafford’s arms, which are gold with a cheveron gules.” The Tallow Chandlers of London had a grant in 1456 of ” Six pieces azure and silver with three doves in the azure, each with an olive sprig in her beak.”

Squared into more than nine squares the shield becomes cheeky or checkered and the number is not reckoned. Warenne’s checker of gold and azure is one of the most ancient coats in England and checkered fields and charges follow in great numbers. Even lions have been borne checkered. Warenne bore ” Cheeky gold and azure.” Clifford bore the like with ” a fesse gules.” Cobham bore ” Silver a lion cheeky gold and sable.” Arderne bore ” Ermine a fesse cheeky gold and gules.”

Such charges as this fesse of Arderne’s and other checkered fesses, bars, bends, borders and the like, will commonly bear but

Phelip Lord Bardolf.

Whitgreave.

Tallow Chandlers.

Warenne.

were powerful. The voided scocheon is wrongly named in all the heraldry books as an orle, a term which belongs to a number of small charges set round a central charge. Thus the martlets in the shield of Erpingham, already described, may be called an orle of martlets or a border of martlets. This misnaming of the voided scocheon has caused a curious misapprehension of its form, even Dr Woodward, in his Heraldry, British and Foreign, describing the ” orle ” as ” a narrow border detached from the edge of the shield.” Following this definition modern armorial artists will, in the case of quartered arms, draw the ” orle ” in a first or second quarter of a quartered shield as a rectangular figure and in a third or fourth quarter as a scalene triangle with one arched side. Thereby the original voided scocheon changes into forms without meaning.

Balliol bore ” Gules a voided scocheon silver.”

Surtees bore ” Ermine with a quarter of the arms of Balliol.”

The Tressure or flowered tressure is a figure which is correctly described by Woodward’s incorrect description of the orle as cited above, being a narrow inner border of the shield. It is distinguished, however, by the fleurs-de-lys which decorate it,

two rows of squares, or three at the most. The heraldry writers are ready to note that when two rows are used ” counter- compony ” is the word in place of cheeky, and ” compony- counter-compony ” in the case of three rows. It is needless to say that these words have neither practical value nor antiquity to commend them. But bends and bastons, labels, borders and the rest are often coloured with a single row of alternating tinctures. In this case the pieces are said to be ” gobony.” Thus John Cromwell (14th century) bore ” Silver a chief gules with a baston gobony of gold and azure.”

The scocheon or shield used as a charge is found among the earliest arms. Itself charged with arms, it served to indicate alliance by blood or by tenure with another house, as in the bearings of St Owen whose shield of ” Gules with a cross silver ” has a scocheon of Clare in the quarter. In the latter half of the 1 Sth century it plays an important part in the curious marshalling of the arms of great houses and lordships.

Erpingham bore ” Vert a scocheon silver with an orle (or border) of silver martlets.”

Davillers bore at the battle of Boroughbridge ” Silver three scocheons gules.”

The scocheon was often borne voided or pierced, its field cut away to a narrow border. Especially was this the case in the far North, where the Balliols, who bore such a voided scocheon,

♦ + ♦+♦

Clifford.

;i-i-t

Arderne.

Cromwell.

Erpingham.

setting off its edges. The double tressure which surrounds the lion in the royal shield of Scotland, and which is borne by many Scottish houses who have served their kings well or mated with their daughters, is carefully described by Scottish heralds as ” flowered and counter-flowered,” a blazon which is held to mean that the fleurs-de-lys show head and tail in turn from the outer rim of the outer tressure and from the inner rim of the innermost. But this seems to have been no essential matter with medieval armorists and a curious 15th-century enamelled roundel of the arms of Vampage shows that in this English case the flowering takes the more convenient form of allowing all the lily heads to sprout from the outer rim.

Vampage bore “Azure an eagle silver within a flowered tressure silver.”

The king of Scots bore ” Gold a lion within a double tressure flowered and counterflowered gules.”

Felton bore ” Gules two lions passant within a double tressure flory silver.”

The Border of the shield when marked out in its own tincture is counted as an Ordinary. Plain or charged, it was commonly used as a difference. As the principal charge of a shield it is very rare, so rare that in most cases where it apparently occurs

Davillers.

Balliol.

Surtees.

Vampage.

we may, perhaps, be following medieval custom in blazoning- the shield as one charged with a scocheon and not with a border. Thus Hondescote bore ” Ermine a border gules ” or ” Gules a scocheon ermine.”

Somerville bore ” Burely silver and gules and a border azure with golden martlets.”

Paynel bore ” Silver two bars sable with a border, or orle, of martlets gules.”

The Flaunches are the flanks of the shield which, cut off by rounded

lines, are borne in pairs as Ordinaries. These charges are found in many coats devised by 15th-century armorists.

” Ermine two flaunches azure with six golden wheat-ears ” was borne by John Greyby of Oxfordshire (15th century).

The Label is a narrow fillet across the upper part of the chief, from which hang three, four, five or more pendants, the pendants being, in most old examples, broader than the fillet. Reckoned with ihe Ordinaries, it was commonly used as a means of differenc- ing a cadet’s shield, and in the heraldry books it has become the accepted difference for an eldest son, although the cadets often bore it in the middle ages. John of Hastings bore in 1300 before Carlaverock ” Gold a sleeve (or maunche) gules,” while Edmund his brother bore the same arms with a sable label. In modern armory the pendants are all but invariably reduced to three, which, in debased examples, are given a dovetailed form- while the ends of the fillet are cut off.

The Fret, drawn as a voided lozenge interlaced by a slender saltire, is counted an Ordinary. A charge in such a shape is extremely rare in medieval armory, its ancient form when the field is covered by it being a number of bastons — three being the customary number — interlaced by as many more from the sinister side. Although the whole is described as a fret in certain English blazons of the 15th century, the adjective ” fretty ”

Scotland.

Hondescote.

Greyby.

Hastings.

is more commonly used. Trussel’s fret is remarkable for its bezants at the joints, which stand, doubtless, for the golden nail-heads of the ” trellis ” suggested by his name. Curwen, Wyvile and other northern houses bearing a fret and a chief have, owing to their fashion of drawing their frets, often seen them changed by the heraldry books into ” three cheverons braced or interlaced.”

Huddlestone bore ” Gules fretty silver.” Trussel bore ” Silver fretty

gules, the joints bezanty.” Hugh Giffard (14th century) bore ” Gules with an engrailed fret of ermine.”

Wyvile bore ” Gules fretty vair with a chief gold.” Boxhull bore ” Gold a lion azure fretty silver.”

Another Ordinary is the Giron or Gyron — a word now com- monly mispronounced with a hard ” g.” It may be defined as the

Trussel.

Giffard.

Wyvile.

Mortimer.

With the Ordinaries we may take the Roundels or Pellets, disks or balls of various colours. Ancient custom gives the name of a bezant to the golden roundel, and the folly of the heraldic writers has found names for all the others, names which may be disregarded together with the belief that, while bezants and silver roundels, as representing coins, must be pictured with a flat surface, roundels of other hues must needs be shaded by the painter to represent rounded balls. Rings or Annelets were common charges in the North, where Lowthers, Musgraves

lower half of a quarter which has been divided bendwise. No old example of a single giron can be found to match the figure in the heraldry books. Gironny, or gyronny, is a manner of dividing the field into sections, by lines radiating from a centre point, of which many instances may be given. Most of the earlier examples have some twelve divisions although later armory gives eight as the normal number, as Campbell bears them.

Bassmgbourne bore ” Gironny of gold and azure of twelve pieces.”

William Stoker, who died Lord Mayor of London in 1484, bore ” Gironny of six pieces azure and silver with three popinjays in the silver pieces.”

A pair of girons on either side of a chief were borne in the strange shield of Mortimer, commonly blazoned as ” Barry azure and gold of six pieces, the chief azure with two pales and two girons gold, a scocheon silver over all.” An early examnle shows that this shield began as a plain field with a gobony border.

Campbell. Bassingbourne.

Stoker.

Burlay.

and many more, differenced the six rings of Vipont by bearing them in various colours.

Burlay of Wharfdale bore ” Gules a bezant.”

Courtenay, carl of Devon, bore ” Gold three roundels gules with a label azure.”

Caraunt bore ” Silver three roundels azure, each with three cheverons gules.”

Vipont bore ” Gold six annelets gules.”

Avenel bore ” Silver a fesse and six annelets (aunels) gules.”

Hawberk of Stapleford bore ” Silver a bend sable charged with three pieces of a mail hawberk, each of three linked rings of gold.”

Stourton bore ” Sable a bend gold between six fountains.” The fountain is a roundel charged with waves of white and blue.

The Lozenge is linked in the heraldry book with the Fusil. This Fusil is described as a lengthened and sharper lozenge. But

Courtenay.

Caraunt.

Vipont.

Avenel.

it will be understood that the Fusil, other than as part of an engrailed or indented bend, pale or fesse, is not known to true armory. Also it is one of the notable achievements of the English writers on heraldry that they should have allotted to the lozenge, when borne voided, the name of Mascle. This ” mascle ” is the word of the oldest armorists for the unvoided charge, the voided being sometimes described by them as a lozenge, without further qualifications. Fortunately the difficulty can be solved by following the late 14th-century custom in distinguishing between ” lozenges ” and ” voided lozenges ” and by

abandoning altogether this misleading word Mascle.

Thomas of Merstone, a clerk, bore on his seal in 1359 “Ermine a lozenge with a pierced molet thereon.”

Hawberk.

Braybroke bore bore ”

Stourton.

Charles.

Fitzwilliam.

” Silver seven voided lozenges gules.”

Ermine a chief gules with five golden lozenges

Charles thereon.”

Fitzwilliam bore ” Lozengy silver and gules.”

Billets are oblong figures set upright. Black billets in the arms of Delves of Cheshire stand for ” delves ” of earth and the gads of steel in the arms of the London Ironmongers’ Company took a somewhat similar form.

Sir Ralph Mounchensy bore in the 14th century “Silver a cheveron , between three billets sable.”

Haggerston bore ” Azure a bend with cotices silver and three billets sable on the bend.”

With the Billet, the Ordinaries, uncertain as they are in number, may be said to end. But we may here add certain armorial charges which might well have been counted with them.

First of these is the Molet, a word corrupted in modern heraldry to Mullet, a fish-like change with nothing to commend it. This figure is as a star of five or six points, six points being perhaps the commonest form in old examples, although the sixth point is, as a rule, lost during the later period. Medieval armorists are not, it seems, inclined to

make any distinction between molets of five and six points, but some families, such as the Harpedens and Asshetons, remained constant to the five-pointed form. It was generally borne pierced with a round hole, and then represents, as its name implies, the rowel of a spur. In ancient rolls of arms the word Rowel is often used, and probably indicated the pierced molet. That the piercing was reckoned an essential difference is shown by a roll of the time of Edward II., in which Sir John of Pabenham bears ” Barry azure and silver, with a bend gules and three molets gold thereon,” arms which Sir John his son differences by piercing the molets. Beside these names is that of Sir Walter Baa with ” Gules a cheveron and three rowels silver,” rowels which are shown on seals of this family as pierced molets. Probably an older bearing than the molet, which would be popularized when the rowelled spur began to take the place of the prick-spur, is the Star or Estoile, differing from the molet in that its five or six points are wavy. It is possible that several star bearings of the 13th century were changed in the 14th for molets. The star is not pierced in the fashion of the molet; but, like the molet, it tends to lose its sixth point in armory of the decadence. Suns, sometimes blazoned in old rolls as Sun- rays — rays de soleil — are pictured as unpierced molets of many points, which in rare cases are waved.

Harpeden bore ” Silver a pierced molet gules.”

Gentil bore ” Gold a chief sable with two molets goles pierced gules.”

Grimston bore ” Silver a fesse sable and thereon three molets silver pierced gules.”

Ingleby of Yorkshire bore ” Sable a star silver.”

Sir John de la Haye of Lincolnshire bore ” Silver a sun gules.”

The Crescent is a charge which has to answer for many idle tales concerning the crusading ancestors of families who bear

Mounchensy. Haggerston. Harpeden.

Gentil.

adjectives, and an early 15th-century romance discards the simple words deliberately, telling us of its hero that

” His shield was black and blue, sanz fable, Barred of azure and of sable.”

But gold and silver served as the armorists' words for yellows and whites until late in the 16th century, when, gold and silver made way for " or " and " argent," words which those for whom the interest of armory lies in its liveliest days will not be eager to accept. Likewise the colours of " sanguine " and " tenne " brought in by the pedants to bring the tinctures to the mystical number of nine may be disregarded.

A certain armorial chart of the duchy of Brabant, published in 1600, is the earliest example of the practice whereby later engravers have indicated colours in uncoloured plates by the use of lines and dots. Gold is indicated by a powdering of dots ;

it. It is commonly borne with both points uppermost, but when representing the waning or the waxing moon — decrescent or increscent — its horns are turned to the sinister or dexter side of the shield.

Peter de Marines (13th century) bore on his seal a shield charged with a crescent in the chief.

William Gobioun (14th century) bore " A bend between two waxing moons."

Longchamp bore " Ermine three crescents gules, pierced silver."

Tinctures. — The tinctures or hues of the shield and its charges are seven in number — gold or yellow, silver or white, red, blue, black, green and purple. Medieval custom gave, according to a rule often broken, " gules," " azure " and " sable " as more high-sounding names for the red, blue and black. Green was often named as " vert," and sometimes as " synobill," a word which as " sinople " is used to this day by French armorists. The song of the siege of Carlaverock and other early documents have red, gules or " vermeil," sable or black, azure or blue, but gules, azure, sable and vert came to be recognized as armorists'

Grimston.

Ingilby.

Gobioun.

Longchamp.

silver is left plain. Azure is shown by horizontal shading lines; gules by upright lines; sable by cross-hatching of upright and horizontal

lines. Diagonal lines from sinister to dexter indicate, purple; vert is marked with diagonal lines from dexter to sinister. The practice, in spite of a certain convenience, has been disastrous in its cramping effects on armorial art, especially when applied to seals and coins.

Besides the two ” metals ” and five ” colours,” fields and charges are varied by the use of the furs ermine and vair. Ermine is shown by a white field flecked with black ermine tails, and vair by a conventional representation of a fur of small skins sewn in rows, white and blue skins alternately. In the 15th century there was a popular variant of ermine, white tails upon a black field. To this fur the books now give the name of ” ermines ” — a most unfortunate choice, since ermines is a name used in old documents for the original ermine. ” Erminees,” which has at least a 15th-century authority, will serve for those who are not content to speak of ” sable ermined with silver.” Vair, although silver and blue be its normal form, may be made up of gold, silver or ermine, with sable or gules or vert, but in these latter cases the colours must be named in the blazon. To the vairs and ermines of old use the heraldry books have added ” erminois,” which is a gold field with black ermine fails, ” pean,” which is ” erminois ” reversed, and ” erminites,” which is ermine with a single red hair on either side of each black tail. The vairs, mainly by misunderstanding of the various patterns found in old paintings, have been amplified with ” countervail ” ” potent,” ” counter-potent ” and ” vair-en-point,” no one of which merits description.

No shield of a plain metal or colour has ever been borne by an Englishman, although the knights at Carlaverock and Falkirk saw Amaneu d’Albret with his banner all of red having no charge thereon. Plain ermine was the shield of the duke of Brittany and no Englishman challenged the bearing. But Beauchamp of Hatch bore simple vair, Ferrers of Derby ” Vairy gold and gules,” and Ward ” Vairy silver and sable.” Gresley had ” Vairy ermine and gules,” and Beche ” Vairy silver and gules.”

Only one English example has hitherto been discovered of a field covered not with a fur but with overlapping feathers. A 15th-century book of arms gives ” Piumetty of gold and purple ” for ” Mydlam in Coverdale.”

Drops of various colours which variegate certain fields and charges are often mistaken for ermine tails when ancient seals are deciphered. A simple example of such spattering is in the shield of Grayndore, who bore ” Party ermine and vert, the vert

dropped with gold.” Sir Richard le Brun (14th century) bore ” Azure a silver lion dropped with gules.”

A very common variant of charges and fields is the sowing or ” powdering ” them with a small charge repeated many times. Mortimer of Norfolk bore ” gold powdered with fleurs-de-lys sable ” and Edward III. quartered for the old arms of France ” Azure powdered with fleurs-de-lys gold,” such fields being often

Brittany. Beauchamp. Mydlam. Grayndorge.

described as flowered or flory. Golden billets were scattered in Cowdray’s red shield, which is blazoned as ” Gules billety gold,” and bezants in that of Zouche, which is ” Gules bezanty with a quarter ermine.” The disposition of such charges varied with the users. Zouche as a rule shows ten bezants placed four, three, two and one on his shield, while the old arms of France in the royal coat allows the pattern of flowers to run over the edge, the shield border thus showing halves and tops and stalk ends of the fleurs-de-lys. But the commonest of these powderings is that with crosslets, as in the arms of John la Warr ” Gules crusily silver with a silver lion.”

Trees, Leaves and Flowers. — Sir Stephen Cheyndut, a 13th- century knight, bore an oak tree, the cheyne of his first syljable, while for like reasons a Piriton had a pear tree on his shield. Three pears were borne (temp. Edward III.) by Nicholas Stivecle of Huntingdonshire, and about the same date is Applegarth’s

armory, might well be taken amongst the “ordinaries.” In England as in France it is found in great plenty.

Aguylon bore ” Gules a fleur-de-lys silver.”

Peyferer bore ” Silver three fleur-de-lys sable.”

Trefoils are very rarely seen until the 15th century, although Hervey has them, and Gausill, and a Bosville coat seems to have borne them. They have always their stalk left hanging to them. Vincent, Hattecliffe and Massingberd all bore the quatrefoil, while the Bardolfs, and the Quincys, earls of Win- chester, had cinqfoils. The old rolls of arms made much confusion between cinqfoils and sixfoils (quintefoilles e sisfoilles) and the rose. It is still uncertain how far that confusion

extended amongst the families which bore Eton College, these charges. The cinqfoil and sixfoil, how- ever, are all but invariably pierced in the the spur rowel, and the rose's blunt-edged definite shape soon after the decorative

Mortimer.

Cowdray.

Zouche.

La Warr.

shield of three red apples in a silver field. Leaves of burdock are in the arms (14th century) of Sir John de Lisle and mulberry leaves in those of Sir Hugh de Morieus. Three roots of trees are given to one Richard Rotour in a 14th-century roll. Mal- herbe (13th century) bore the " evil herb " — a teazle bush. Pineapples are borne here and there, and it will be noted that armorists have not surrendered this, our ancient word for the " fir-cone," to the foreign ananas. Out of the cornfield English armory took the sheaf, three sheaves being on the shield of an earl of Chester early in the 13 th century and Sheffield bearing sheaves for a play on his name. For a like reason Peverel's sheaves were sheaves of pepper. Rye bore three ears of rye on a bend, and Graindorge had barley-ears. Flowers are few in this

Cheyndut.

Applegarth.

Chester.

Rye.

middle like petals give it movement of the Edwardian age began to carve natural buds and flowers in stone and wood.

Gules a bend silver with three trefoils vert thereon." ' Azure three quatrefoils silver."

field of armory, although lilies with their stalks and leaves are in the grant of arms to Eton College. Ousethorpe has water flowers, and now and again we find some such strange charges as those in the 15th-century shield of Thomas Porthelyne who bore " Sable a cheveron gules between three ' popyebolles,' or poppy-heads vert." The fleur-de-lys, a conventional form from the beginnings of

Hervey bore ” Vincent bore

Aguylon. Peyferer. Hervey. Vincent.

Quincy bore ” Gules a cinqfoil silver.”

Bardolf of Wormegay bore ” Gules three cinqfoils silver.”

Cosington bore ” Azure three roses gold.”

Hilton bore ” Silver three chaplets or garlands of red roses.”

Beasts and Birds. — The book of natural history as studied in the middle ages lay open at the chapter of the lion, to which royal beast all the noble virtues were set down. What is the oldest armorial seal of a sovereign prince as yet discovered bears the rampant lion of Flanders. In England we know of no royal shield earlier than that first seal of Richard I. which has a like device. A long roll of our old earls, barons and knights wore the

Bardolf.

Cosington.

Hilton.

Quincy.

lion on their coats — Lacy, Marshal, Fitzalan and Montfort, Percy, Mowbray and Talbot. By custom the royal beast is shown as rampant, touching the ground with but one foot and clawing at the air in noble rage. So far is this the normal attitude of a lion that the adjective ” rampant ” was often dropped, and we have leave and good authority for blazoning the rampant beast simply as ” a lion,” leave which a writer on armory may take gladly to the saving of much repetition. In France and Germany this licence has always been the rule, and the modern English herald’s blazon of ” Gules a lion rampant or ” for the arms of Fitzalan, becomes in French de gueules au lion d’or and in German in Rot ein goldener Loewe. Other positions must be named with care and the prowling ” lion passant ” distinguished from the rampant beast, as well as from such rarer shapes as the couchant lion, the lion sleeping, sitting or leaping. Of these the lion passant is the only one commonly encountered. The lion standing with his forepaws together is not a figure for the shield, but for the crest, where he takes this position for greater stableness upon the helm, and the sitting lion is also found rather upon helms than in shields. For a

10

ftlfcflpri

fVWtjpV.^^^cfto*, Qkˆy CWK^^^tnˆneˆ

H > x * »»

THE BEGINNING OP A ROLL OF THE ARMS OK THOSE JOUSTING IN A TOURNAMENT HELD ON THE FIELD OK

THE CLOTH OF GOLD. BESIDES THE ARMS OF THE KINGS OP PRANCE AND ENGLAND ARE TWO COLUMNS

OF “CHEQUES,” MARKED WITH THE NAMES AND SCORING POINTS OF THE JOUSTERS.

HERALDRY

‘ Drawn ijr William Gl’il

THE BEGINNING OP A ROLL OP THE ARMS OP THOSE JOUSTING IN A TOURNAMENT HELD ON THE FIELD OP

THECLOTH OF GOLD. BESIDES THE ARMS OF THE KINGS OF PRANCE AND ENGLAND ARE TWO COLUMNS

OF “CHEQUES,” MARKED WITH THE NAMES AND SCORING POINTS OF THE JOUSTERS.

couchant lion or a dormant lion one must search far afield, although there are some medieval instances. The leaping lion is in so few shields that no maker of a heraldry book has, it would appear 1 , discovered an example. In the books this ” lion salient ” is described as with the hind paws together on the ground and the fore paws together in the air, somewhat after the fashion of a diver’s first movement. But examples from seals and monuments of the Felbrigges and the Merks show that the leaping lion differed only from the rampant in that he leans somewhat forward in his eager spring. The compiler of the British Museum catalogue of medieval armorial seals, and others equally unfamiliar with medieval armory, invariably describe this

position as ” rampant,” seeing no distinction from other rampings. As rare as the leaping lion is the lion who looks backward over his shoulder. This position is called ” regardant ” by modern armorists. The old French blazon calls it rere regardant or turnaunle le visage arere, ” regardant ” alone meaning simply ” looking,” and therefore we shall describe it more reasonably in plain English as ” looking backward.” The two- headed lion occurs in a 15th-century coat of Mason, and at the same period a monstrous lion of three bodies and one head is borne, apparently, by a Sharingbury.

The lion’s companion is the leopard. What might be the true form of this beast was a dark thing to the old armorist, yet knowing from the report of grave travellers that the leopard was begotten in spouse-breach between the lion and the pard, it was felt that his shape would favour his sire’s. But nice distinctions of outline, even were they ascertainable, are not to be marked on the tiny seal, or easily expressed by the broad strokes of the shield painter. The leopard was indeed lesser than the lion, but in armory, as in the Noah’s arks launched by the old yards, the bear is no bigger than the badger. Then a happy device came to the armorist. He would paint the leopard like the lion at all points. But as the lion looks forward the leopard should look sidelong, showing his whole face. The matter was | arranged, and until the end of the middle ages the distinction held and served. The disregarded writers on armory, Nicholas Upton, and his fellows, protested that a lion did not become a leopard by turning his face sidelong, but none who fought in the field under lion and leopard banners heeded this pedantry from cathedral closes. The English king’s beasts were leopards in blazon, in ballad and chronicle, and in the mouths of liegeman and enemy. Henry V.‘s herald, named from his master’s coat, was Leopard Herald; and Napoleon’s gazettes never fail to speak of the English leopards. In our own days, those who deal with armory as antiquaries and students of the past will observe the old custom for convenience’ sake. Those for whom the interest of heraldry lies in the nonsense-language brewed during post-medieval years may correct the medieval ignorance at their pleasure. The knight who saw the king’s banner fly at Falkirk or Crecy tells us that it bore ” Gules with three leopards of gold.” The modern armorist will shame the uninstructed warrior with ” Gules three lions passant gardant in pale or.”

As the lion rampant is the normal lion, so the normal leopard is the leopard passant, the adjective being needless. In a few cases only the leopard rises up to ramp in the lion’s fashion, and here he must be blazoned without fail as a leopard rampant. Parts of the lion and the leopard are common charges. Chief of these are the demi-lion and the

demi-leopard, beasts com- plete above their slender middles, even to the upper parts of their lashing tails. Rampant or passant, they follow the customs of the unmaimed brute. Also the heads of lion and leopard are in many shields, and here the armorist of the modern hand- books stumbles by reason of his refusal to regard clearly marked medieval distinctions. The instructed will know a lion's head because it shows but half the face and a leopard's head because it is seen full-fa :e. But the handbooks of heraldry, knowing naught of leopards, must judge by absence or presence of a mane, speaking uncertainly of leopards' faces and lions' heads

England.

and faces. Here again the old path is the straighter. The head of a lion, or indeed of any beast, bird or monster, is generally painted as "razed," or torn away with a ragged edge which is pleasantly conventionalized. Lessoften it is found " couped " orcut off with a sheer line. But the leopard's head is neither razed nor couped, for no neck is shown below it. Likewise the lion's fore leg or paw — " gamb " is the book word — may be borne, razed or coupled. Its normal position is raided iupright, although Newdegate seems to have borne " Gules three lions' legs razed silver, the. paws downward." With the strange bearing of the lion's whip-like tail cut off at the rump, we may end the list of these oddments.

Fitzalan, earl of Arundel, bore " Gules a lion gold." Simon de Montfort bore " Gules a silver lion with a forked tail." Segrave bore " Sable a Hon silver crowned gold." Havering bore " Silver a lion rampant gules with a forked tail, having a collar azure."

Felbrigge of Felbrigge bore " Gold a leaping lion gules." Esturmy bore " Silver a lion sable (or purple) looking backward." Marmion bore " Gules a lion vair." Mason bore " Silver a two-headed lion gules." Lovetot bore " Silver a lion parted athwart of sable and gules." Richard le Jen bore " Vert a lion gold " — the arms of Wakelin of Arderne — " with a fesse gules on the lion." Fiennes bore " Azure three lions gold." Leyburne of Kent bore "Azure six lions silver."

Fitzalan.

Felbrigge.

Fiennes.

Leyburne.

Carew bore ” Gold three lions passant sable.”

Fotheringhay bore ” Silver two lions passant sable, looking backward.”

Richard Norton of Waddeworth (1357) sealed with arms of ” A lion dormant.”

Lisle bore “Gules a leopard silver crowned gold.”

Ludlowe bore ” Azure three leopards silver.”

Brocas bore ” Sable a leopard rampant gold.”

Carew. Fotheringhay. Brocas. Lisle.

John Hardrys of Kent seals in 1372 with arms of “a sitting leopard.”

John Northampton, Lord Mayor of London in 1381, bore ‘ Azure a crowned leopard gold with two bodies rampant against each other.”

Newenham bore ” Azure three demi-lions silver.”

A deed delivered at Lapworth in Warwickshire in 1466 is sealed with arms of ” a molet between three demi-leopards.”

Kenton bore ” Gules three lions’ heads razed sable.”

Kenton. Pole. Cantelou. Pynchebek.

Pole, earl and duke of Suffolk, bore ” Azure a fesse between three leopards’ heads gold.”

Cantelou bore ” Azure three leopards’ heads silver with silver fleurs-de-lys issuing from them.”

Wederton bore ” Gules a cheveron between three lions’ legs razed silver.”

Pynchebek bore ” silver three forked tails of lions sable.”

The tiger is rarely named in collections of medieval arms. Deep mystery wrapped the shape of him, which was never during

the middle ages standardized by artists. A crest upon a 15th- century brass shows him as a lean wolf-like figure, with a dash of the boar, gazing after his vain wont into a looking-glass; and the 16th-century heralds gave him the body of a lion with the head of a wolf, head and body being tufted here and there with thick tufts of hair. But it is noteworthy that the arms of Sir John Norwich, a well-known knight of the 14th century, are blazoned in a roll of that age as " party azure and gules with a tiger rampant ermine." Now this beast in the arms of Norwich has been commonly taken for a lion, and the Norwich family seem in later times to have accepted the lion as their bearing. But a portion of a painted roll of Sir John's day shows on careful examination that his lion has been given two moustache-like tufts to the nose. A copy made about 1600 of another roll gives the same decoration to the Norwich lion, and it is at least possible we have here evidence that the economy of the medieval armor- ist allowed him to make at small cost his lion, his leopard and his tiger out of a single beast form.

Take away the lions and the leopards, and the other beasts upon medieval shields are a little herd. In most cases they are here to play upon the names of their bearers. Thus Swin- burne of Northumberland has the heads of swine in his coat and Bacon has bacon pigs. Three white bears were borne by Barlingham, and a bear ramping on his hind legs is for Barnard. Lovett of Astwell has three running wolves, Videlou three wolves' heads, Colfox three foxes' heads.

Three hedgehogs were in the arms of Heriz. Barnewall reminds us of extinct natives of England by bearing two beavers, and Otter of Yorkshire had otters. Harewell had hares' heads,

Lovett.

Talbot.

Saunders.

Cunliffe conies, Mitford moles or moldi warps. A Talbot of Lancashire had three purple squirrels in a silver shield. An elephant was brought to England as early as the days of Henry III., but he had no immediate armorial progeny, although Saunders of Northants may have borne before the end of the middle ages the elephants' heads which speak of Alysaunder the Great, patron of all Saunderses. Bevil of the west had a red bull, and Bulkeley bore three silver bulls' heads. The heads in Neteham's 14th-century shield are neat's heads, ox heads are for Oxwyk. Calves are for Veel, and the same mild beasts are in the arms

of that fierce knight Hugh Calveley. Stansfeld bore three rams with bells at their necks, and a 14th-century Lecheford thought no shame to bear the head of the ram who is the symbol of lechery. Lambton had lambs. Goats were borne by Chevercourt to play on his name, a leaping goat by Bardwell, and goats' heads by Gateshead. Of the race of dogs the greyhound and the talbot, or mastiff, are found most often. Thus Talbot of Cumberland had talbots, and Mauleverer, running greyhounds or " leverers " for his name's sake. The alaund, a big, crop-eared dog, is in the 15th-century shield of John Woode of Kent, and " kenets," or little tracking dogs, in a 13th-century coatofKenet. Thehorse is not easily found as an English charge, but Moyle's white mule seems an old coat; horses' heads are in Horsiey's shield, and ass heads make crests for more than one noble house. Askew has three asses in his arms. Three bats or flittermice are in the shield of Burninghill and in that of Heyworth of Whethamstede.

As might be looked for in a land where forest and greenwood once linked from sea to sea, the wild deer is a common charge in the shield. Downes of Cheshire bore a hart " lodged " or lying down. Hertford had harts' heads, Malebis, fawns' heads {testes de bis), Bukingham, heads of bucks. The harts in Rother- ham's arm- are the roes of his name's first syllable. Reindeer

Griffin.

Drake.

heads were borne by Bowet in the 14th century. Antelopes,

fierce beasts with horns that have something of the ibex, show

by their great claws, their Hon tails, and their boar muzzles

and tusks that they are midway between the hart and the

monster.

Of the outlandish monsters the griffon is the oldest and the

chief. With the hinder parts of a lion, the rest of him is eagle,

head and shoulders, wings and fore legs. The

long tuft under the beak and his pointed ears

mark him out from the eagle when his head

alone is borne. At an early date a griffon

rampant, his normal position, was borne by

the great house of Montagu as a quartering,

and another griffon played upon Griffin's name. The wyver, who becomes wyvern in the 16th

century, and takes a new form under the

care of inventive heralds, was in the middle

ages a lizard -like dragon, generally with small wings. Sir

Edmund Mauley in the 14th century is found differencing the

black bend of his elder brother by charging it with three wyvers

of silver. During the middle ages there seems small distinction

between the wyver and the still rarer dragon, which, with the

coming of the Tudors, who bore it as their

badge, is seen as a four-legged monster with

wings and a tail that ends like a broad

arrow. The monster in the arms of Drake, blazoned by Tudor heralds as a wyvern, is clearly a fire-drake or dragon in his origin.

The unicorn rampant was borne by Harlyn of Norfolk, unicorn's heads by the Cambridge- shire family of Paris. The mermaid with her comb and looking-glass makes a 14th-century crest for Byron, while " Silver a bend gules with three silver harpies thereon " is found in the 15th century for Entyrdene.

Concerning beasts and monsters the heraldry books have many adjectives of blazonry which may be disregarded. Even as it was once the pride of the cook pedant to carve each bird on the board with a new word for the act, so it became the delight of the pedant herald to order that the rampant horse should be " forcene," the rampant griffon " segreant," the passant hart " trippant "; while the same hart must needs be " attired " as to its horns and " unguled " as to its hoofs. There is ancient authority for the nice blazonry which sometimes gives a separate colour to the tongue and claws of the lion,

but even this may be set aside. Though a black lion in a silver field may be armed with red claws, and a golden leopard in a red field given blue claws and tongues, these trifles are but fancies which follow the taste of the painter, and are never of obligation. The tusks and hoofs of the boar, and often the horns of the hart, are thus given in some paintings a colour of their own which elsewhere is neglected.

As the lion is among armorial beasts, so is the eagle among the birds. A bold convention of the earliest shield painters displayed him with spread wing and claw, the feat of a few strokes of the brush, and after this fashion he appears on many scores of shields. Like the claws and tongue of the lion, the beak and claws of the eagle are commonly painted of a second colour in all but very small representations. Thus the golden eagle of Lymesey in a red field may have blue beak and claws, and golden beak and claws will be given to Jorce's silver eagle upon red. A lure, or two wings joined and spread like those of an eagle, is a rare charge sometimes found. When fitted with the cord by which a falconer's lure is swung, the cord must be named. Monthermer bore " Gold an eagle vert." Siggeston bore " Silver a two-headed eagle sable." Gavaston, earl of Cornwall, bore " Vert six eagles gold." Bayforde of Fordingbridge sealed (in 1388) with arms of " An eagle bendwise, with a border engrailed and a baston."

Graunson bore " Paly silver and azure with a bend gules and three golden eagles thereon."

Seymour bore " Gules a lure of two golden wings."

Commoner than the eagle as a charge is the martlet, a humbler bird which is never found as the sole charge of a shield. In all

but a few early representations the feathers of the legs are seen without the legs or claws. The martlet indicates both swallow and martin, and in the arms of the Cornish Arundels the martlets must stand for " hirundels " or swallows.

The falcon or hawk is borne as a rule with close wings, so that tie may not be taken for the eagle. In most cases he is there

Monthermer.

Siggeston.

Gavaston.

Graunson.

Arundel.

to play on the bearer's name, and this may be said of most of the flight of lesser birds.

Naunton bore " Sable three martlets silver." Heron bore " Azure three herons silver." Fauconer bore " Silver three falcons gules." Hauvile bore " Azure a dance between three hawks gold."

Twenge bore " Silver a fesse gules between three popinjays (or parrots) vert."

Cranesley bore " Silver a cheveron gules be- tween three cranes azure." Gules a swan silver." Silver a cheveron engrailed between three daws'

Asdale bore "

Dalston bore

heads razed sable

Corbet bore " Gold two corbies sable.

Seymour.

Naunton.

Fauconer.

Twenge.

Cockfield bore " Silver three cocks gules." Burton bore " Sable a cheveron sable between three silver owls. Rokeby bore " Silver a cheveron sable between three rooks." Duffelde bore " Sable a cheveron silver between three doves." Pelham bore " Azure three pelicans silver."

Asdale.

Corbet.

Cockfield.

Burton.

Sumeri (13th century) sealed with arms of ” A peacock with his tail spread.”

John Pyeshale of Suffolk (14th century) sealed with arms of ” Three magpies.”

Fishes, Reptiles and Insects. — Like the birds, the fishes are borne for the most part to call to mind their bearers’ names. Unless their position be otherwise named, they are painted as upright in the shield, as though rising towards the water surface. The dolphin is known by his bowed back, old artists making him a grotesquely decorative figure.

Lucy bore ” Gules three luces (or pike) silver.”

Henngaud bore ” Azure, crusilly gold, with six golden herrings.”

Fishacre bore ” Gules a dolphin silver.”

La Roche bore ” Three roach swimming.”

John Samon (14th century) sealed with arms of ” Three salmon swimming.”

Sturgeon bore ” Azure three sturgeon swimming gold, with a fret gules over all.”

Whalley bore ” Silver three whales’ heads razed sable.”

Shell-fish would hardly have place in English armory were it not for the abundance of scallops which have followed their appearance in the banners of Dacre and Scales. The crest

of the Yorkshire Scropes., playing upon their name, was a pair of crabs’ claws.

Dacre bore ” Gules three scallops silver.”

Shelley bore ” Sable a fesse engrailed between three whelk-shells gold.”

Reptiles and insects are barely represented. The lizards in the crest and supporters of the Ironmongers of London belong to the 15th century. Gawdy of Norfolk may have borne the tortoise in his shield in the same age. ” Silver three toads sable ” was quartered as a second

coat for Botreaux of Cornwall

Rokeby.

Pelham.

Lucy.

Fishacre.

Roche.

in the 16th century — Botereau or Boterel

signifying a little toad in the old French

tongue — but the arms do not appear on the

old Botreaux seals beside their ancient bearing

of the griffon. Beston bore ” Silver a bend

between six bees sable ” and a 1 5-century

Harbottle seems to have sealed with arms of

three bluebottle flies. Three butterflies are in

the shield of Presfen of Lancashire in 141 5, while

the winged insect shown en the seal of John Mayre, a King’s

Lynn burgess of the age of Edward I., is probably a mayfly.

Human Charges. — Man and the parts of him play but a small part in English shields, and we have nothing to put beside such a coat as that of the German Manessen, on which two armed knights attack each other’s hauberks with their teeth. But certain arms of religious houses and the like have the whole figure, the see of Salisbury bearing the Virgin and Child in a

Dacre.

Shelley. See of Salisbury. Isle of Man.

blue field. And old crests have demi-Saracens and falchion men, coal-miners, monks and blackamoors. Sowdan bore in his shield a turbaned soldan’s head; Eady, three old men’s “‘eads “1 Heads of maidens, the ”

winsome marrows ” of the ballad, are in the arms of Marow. The Stanleys, as kings of Man, quartered the famous three-armed legs whirling mill-sail fashion, and Tremayne of the west bore three men’s arms in like wise. ” Gules three hands silver ” was for Malmeyns as early as the 13th century, and Tynte of Colchester displayed hearts.

Miscellaneous Charges. — Other charges of the shield are less frequent but are found in great variety, the reason for most of them being the desire to play upon the bearer’s name.

Weapons and the like are rare, having regard to the military associations of armory. Daubeney bore three helms; Philip Marmion took with his wife, the coheir of Kilpek, the Kilpek shield of a sword (espek). Tuck had a stabbing sword or ” tuck.” Bent bows were borne by Bowes, an arblast by Arblaster, arrows by Archer, birding-bolts or bosouns by Bosun, the mangonel by Mangnall. The three lances of Amherst is probably a medieval coat; Leweston had battle-axes.

A scythe was in the shield of Praers; Picot had picks; Bilsby a hammer or ” beal “; Malet showed mallets. The chamberlain’s key is in the shield of a Chamberlain, and the spenser’s key in that of a Spenser. Porter bore the porter’s bell, Boteler the butler’s cup. Three-legged pots were borne by Monbocher,

Crowns are for Coroun. Yarde had. yard-wands; Bordoun a burdon or pilgrim’s staff.

Of horse-furniture we have the stirrups of Scudamore and Giffard, the horse-barnacles of Bernake, and the horse-shoes borne by many branches and tenants of the house of Ferrers.

Of musical instruments there are pipes, trumps and harps for Pipe, Trumpington and Harpesfeld. Hunting horns are common among families bearing such names as Forester or Home. Remarkable charges are the three organs of Grenville, who held of the house of Clare, the lords of Glamorgan.

Combs play on the name of Tunstall, and gloves (wauns or gauns) on that of Wauncy. Hose were borne by Hoese; buckles by a long list of families. But the most notable of the charges derived from clothing is the hanging sleeve familiar in the arms of Hastings, Conyers and Mansel.

Chess-rooks, hardly to be distinguished from the roc or roquet at the head of a jousting-lance, were borne by Rokewode and by many more. Topcliffe had pegtops in his shield, while Ambesas had a cast of three dice which should each show the point of one, for ” to throw ambesace ” is an ancient phrase used of those who throw three aces.

Although we are a sea-going people, there are few ships in our armory, most of these in the arms of sea-ports. Anchors are commoner.

Castles and towers, bridges, portcullises and gates have all examples, and a minster-church was the curious charge borne by the ancient house of Musters of Kirklington.

Letters of the alphabet are very rarely found in ancient armory ; but three capital T’s, in old English script, were borne by Toft of Cheshire in the 14th century. In the period of decadence whole words or sentences, commonly the names of military or naval victories, are often seen.

Blazonry. — An ill-service has been done to the students of armory by those who have pretended that the phrases in which the shields and their charges are described or blazoned must follow arbitrary laws devised by writers of the period of armorial decadence. One of these laws, and a mischievous one, asserts that no tincture should be named a second time in the blazon of one coat. Thus if gules be the hue of the field any charge of that colour must thereafter be styled ” of the first.” Obeying this law the blazoner of a shield of arms elaborately charged jnay find himself sadly involved among ” of the first,” ” of the second,” and ” of the third.” It is needless to say that no such law obtained among armorists of the middle ages. The only rule that demands obedience is that the brief description should convey to the reader a true knowledge of the arms described.

The examples of blazonry given in that part of this article which deals with armorial charges will be more instructive to the student than any elaborated code of directions. It will be observed that the description of the field is first set down, the blazoner giving its plain tincture or describing it as burely, party, paly or barry, as powdered or sown with roses, crosslets or fleurs-de-lys. Then should follow the main or central charges, the lion or griffon dominating the field, the cheveron or the pale, the fesse, bend or bars, and next the subsidiary charges in the field beside the ” ordinary ” and those set upon it. Chiefs and quarters are blazoned after the field and its contents, and the border, commonly an added difference, is taken last of all. Where there are

charges both upon and beside a bend, fesse or the like, a curious inversion is used by pedantic blazoners. The arms of Mr Samuel Pepys of the Admiralty Office would have been described in earlier times as ” Sable a bend gold between two horses’ heads razed silver, with three fleurs-de-lys sable on the bend.” Modern heraldic writers would give the sentence as ” Sable, on a bend or between two horses’ heads erased argent, three fleurs-de-lys of the first.” Nothing is gained by this ■ inversion but the precious advantage of naming the bend but once. On the other side it may be said that, while the newer blazon couches itself in a form that seems to prepare for the naming of the fleurs-de-lys as the important element of the shield, the older form gives the fleurs-de-lys as a mere postscript, and rightly, seeing that charges in such a position are very commonly

the last additions to a shield by way of difference. In like manner when a crest is described it is better to say ” a lion’s head out of a crown ” than ” out of a crown a lien’s head.” The first and last necessity in blazonry is lucidity, which is cheaply gained at the price of a few syllables repeated.

Modern Heraldry. — With the accession of the Tudors armory began a rapid decadence. Heraldry ceased to play its part in military affairs, the badges and banners under which t he medieval ‘noble’s retinue came into the field were banished, and even the tournament in its later days became a renascence pageant which did not need the painted shield and armorial trappers. Treatises on armory had been rare in the days before the printing press, but even so early a writer as Nicholas Upton ha.d shown himself as it were unconcerned with the heraldry that any man might see in the camp and the street. From the Book of St Albans onward the treatises on armory are informed with a peda.ntry which touches the point of crazy mysticism in such volumes as that of Sylvanus Morgan. Thus came into the books those long lists of ” diminutions of ordinaries,” the closets and escarpes, the endorses and ribands, the many scores of strange crosses and such wild fancies as the rule, based on an early German pedantry, that the tinctures in peers shields should be given the names of precious stones and those in the shields of sovereigns the names of planets, Blazon became cumbered with -that vocabulary whose French of Stratford atte Bowe has driven serious students from a business which, to use a phrase as true as it is hackneyed, was at last ” abandoned to the coachpainter and the undertaker.”

With the false genealogy came in the assumption or assigning of shields to which the new bearers had often no better claim than lay in a surname resembling that of the original owner. The ancient system

of differencing arms disappeared. Now and again we see a second son obeying the book-rules and putting a crescent in his shield or a third son displaying a molet, but long before our own times the practice was disregarded, and the most remote kinsman of a gentle house displayed the ” whole coat ” of the head of his family.

The art of armory had no better fate. An absurd rule current for some three hundred years has ordered that the helms of princes and knights should be painted full-faced and those of peers and gentlemen sidelong. Obeying this, the herald painters have displayed the crests of knights and princes as sideways upon a full-faced helm ; the torse or wreath, instead of being twisted about the brow of the helm, has become a sausage-shaped bar see-sawing above the helm; and upon this will be balanced a crest which might puzzle the ancient craftsman to mould in his leather or parchment. A ship on a lee-shore with a thunder- storm lowering above its masts may .stand as an example of such devices. ” Tastes, of course, differ,” wrote Dr Woodward, ” but the writer can hardly think that the epergne given to Lieut. – General Smith by his friends at Bombay was a fitting ornament for a helmet.” As with the crest, so with the shield. It became crowded with ill-balanced figures devised by those who despised and ignored the ancient examples whose painters had followed instinctively a simple and pleasant convention. Landscapes and seascapes, musical lines, military medals and corrugated boiler-flues have all made their appearance in the shield. Even as on the signs of public houses, written words have taken the place of figures, and the often-cited arms exemplified to the first Earl Nelson marked, it may be hoped, the high watermark of these distressing modernisms. Of late years, indeed, official armory in England has shown a disposition to follow the lessons of the archaeologist, although the recovery of medieval use has not yet been as successful as in Germany, where for a long generation a school of vigorous armorial art has flourished.

Officers of Arms. — Officers of arms, styled kings of arms, heralds and pursuivants, appear at an early period of the history of armory as the messengers in peace and war of princes and magnates. It is probable that from the first they bore in some wise their lord’s arms as the badge of their office. In the 14th century we have heralds with the arms on a short mantle, witness the figure of the duke of Gelderland’s herald painted ra the

Armorial de Gelre, The title of Blue Mantle pursuivant, as old as the reign of Edward III., suggests a like usage in England. When the tight-laced coat of arms went out of fashion among the knighthood the loose tabard of arms with its wide sleeves was at once taken in England as the armorial dress of both herald and cavalier, and the fashion of it has changed but little since those days. Clad in such a coat the herald was the image of his master and, although he himself was rarely chosen from any rank above that of the lesser gentry, his person, as a messenger, acquired an almost priestly sacredness. To injure or to insult him was to affront the coat that he wore.

We hear of kings of arms in the royal household of the 13th century, and we may compare their title with those of such officers as the King of the Ribalds and the King of the Minstrels; but it is noteworthy that, even in modern warrants for heralds' patents, the custom of the reign of Edward III. is still cited as giving the necessary precedents for the officers' liveries. Officers of arms took their titles from their provinces or from the titles and badges of their masters. Thus we have Garter, Norroy and Clarenceux, March, Lancaster, Windsor, Leicester, Leopard, Falcon and Blanc Sanglier as officers attached to the royal house; Chandos, the herald of the great Sir John Chandos; Vert Eagle of the Nevill earls of Salisbury, Esperance and Crescent of the Percys of Northumberland. The spirit of Henry VII. 's legislation was against such usages in baronial houses, and in the age of the Tudors the last of the private heralds disappears.

In England the royal officers of arms were made a corporation by Richard III. Nowadays the members of this corporation, known as the College of Arms or Heralds' College, are Garter Principal King of Arms, Clarenceux King of Arms South of Trent, Norroy King of Arms North of Trent, the heralds Windsor, Chester, Richmond, Somerset, York and Lancaster, and the pursuivants Rouge Croix, Bluemantle, Rouge Dragon and Portcullis. Another king of arms, not a member of this corpora- tion, has been attached to the order of the Bath since the reign of George I., and an officer of arms, without a title, attends the order of St Michael and St George.

There is no college or corporation of heralds in Scotland or Ireland. In Scotland " Lyon-king-of-arms," " Lyon rex arm- orum," or " Leo fecialis," so called from the lion on the royal shield, is the head of the office of arms. When first the dignity was constituted is not known, but Lyon was a prominent figure in the coronation of Robert II. in 1371. The office was at first, as in England, attached to the earl marshal, but it has long been conferred by patent under the great seal, and is held direct from the crown. Lyon is also king-of-arms for the

national order of the Thistle. He is styled ” Lord Lyon,” and the office has always been held by men of family, and frequently by a peer who would appoint a ” Lyon depute.” He is supreme in all matters of heraldry in Scotland. Besides the ” Lyon depute,” there are the Scottish heralds, Albany, Ross and Rothesay, with precedence according to date of appointment; and the pursuivants, Carrick, March and Unicorn. Heralds and pursuivants are appointed by Lyon.

In Ireland also there is but one king-of-arms, Ulster. The office was instituted by Edward VI. in 1553. The patent is given by Rymer, and refers to certain emoluments as ” praedicto officio . . . ab antiquo spectantibus.” The allusion is to an Ireland king-of-arms mentioned in the reign of Richard II. and superseded by Ulster. Ulster holds office by patent, during pleasure; under him the Irish office of arms consists of two heralds, Cork and Dublin; and a pursuivant, Athlone. Ulster is king-of-arms to the order of St Patrick. He held visitations in parts of Ireland from 1 568 to 1620, and these and other records, including all grants of arms from the institution of the office, are kept in the Birmingham Tower, Dublin.

The armorial duties of the ancient heralds are not clearly defined. The patent of Edward IV., creating John Wrythe king of arms of England with the style of Garter, speaks vaguely of the care of the office of arms and those things which belong to that office. We know that the heralds had their part in the ordering of tournaments, wherein armory played its greatest

part, and that their expert knowledge of arms gave them such duties as reckoning the noble slain on a battlefield. But it is not until the 15th century that we find the heralds following a recognized practice of granting or assigning arms, a practice on which John of Guildford comments, saying that such arms given by a herald are not of greater authority than those which a man has taken for himself. The Book of St Albans, put forth in i486, speaking of arms granted by princes and lords, is careful to add that ” armys bi a mannys proper auctorite take, if an other man have not borne theym afore, be of strength enogh,” repeating, as it seems, Nicholas Upton’s opinion which, in this matter, does not conflict with the practice of his day. It is probable that the earlier grants of arms by heralds were made by reason of persons uncunning in armorial lore applying for a suitable device to experts in such matters — and that such setting forth of arms may have been practised even in the 14th century.

The earliest known grants of arms in England by sovereigns or private persons are, as a rule, the conveyance of a right in a coat of arms

already existing or of a differenced version of it. Thus in 1391 Thomas Grendale, a squire who had inherited through his grandmother the right in the shield of Beaumeys, granted his right in it to Sir William Moigne, a knight who seems to have acquired the whole or part of the Beaumeys manor in Sawtry. Under Henry VI. we have certain rare and curious letters of the crown granting nobility with arms ” in signum hujusmodi nobilitatis ” to certain individuals, some, and perhaps all of whom, were foreigners who may have asked for letters which followed a continental usage. After this time we have a regular series of grants by heralds who in later times began to assert that new arms, to be valid, must necessarily be derived from their assignments, although ancient use continued to be recog- nized.

An account of the genealogical function of the heralds, so closely connected with their armorial duties will be found in the article Genealogy. In spite of the work of such distinguished men as Camden and Dugdale they gradually fell in public estimation until Blackstone could write of them that the marshal- ling of coat-armour had fallen into the hands of certain officers called heralds, who had allowed for lucre such falsity and con- fusion to creep into their records that even their common seal could no longer be received as evidence in any court of justice. From this low estate they rose again when the new archaeology included heraldry in its interests, and several antiquaries of repute have of late years worn the herald’s tabard.

In spite of the vast amount of material which the libraries catalogue under the head of ” Heraldry,” the subject has as yet received little attention from antiquaries working in the modern spirit. The old books are as remarkable for their detachment from the facts as for their folly. The work of Nicholas Upton, . De studio militari, although written in the first half of the 15th century, shows, as has been already remarked, no attempt to reconcile the conceits of the author with the armorial practice which he must have seen about him on every side. Gerard Leigh, Bossewell, Feme and Morgan carry on this bad tradition, each adding his own extravagances. The Display of Heraldry, first published in 1610 under the name of John Guillim, is more reasonable if not more learned, and in its various editions gives a valuable view of the decadent heraldry of the 17th century. In the 19th century many important essays on the subject are to be found in such magazines as the Genealogist, the Herald and Genealogist and the Ancestor, while Planche’s Pursuivant of Arms contains some slight but suggestive work which attempts original enquiry. But Dr Woodward’s Treatise on Heraldry, British and Foreign (1896), in spite of many errors arising from the author’s reliance upon unchecked material, must be counted the only scholarly book in English upon a

matter which has engaged so many pens. Among foreign volumes may be cited those of Menestrier and Spener, and the vast compilation of the German Siebmacher. Notable ordinaries of arms are those of Papworth and Renesse, companions to the armorials of Burke and Rietstap. The student may be advised to turn his attention to

all works dealing with the effigies, brasses and other monuments of the middle ages, to the ancient heraldic seals and to the heraldry of medieval architecture and ornament. (O. Ba.)

HERAT, a city and province of Afghanistan. The city of Herat lies in 34 20′ 30″ N., and 62° 11′ o” E., at an altitude of 2500 ft. above sea-level. Estimated pop. about 10,000. It is a city of great interest historically, geographically, politically and strategically, but in modern days it has quite lost its ancient commercial importance. From this central point great lines of communication radiate in all directions to Russian, British, Persian and Afghan territory. Sixty-six miles to the north lies the terminus of th« Russian railway system; to the south-east is Kandahar (360 m.) and about 70 m. beyond that, New Chaman, the terminus of the British railway system. Southward lies Seistan (200 m.), and eastward Kabul (550 m.); while on the west four routes lead into Persia by Turbet to Meshed (215 m.), and by Birjend to Kerman (400 m.), to Yezd (500 m.), or to Isfahan (600 m.). The city forms a quadrangle of nearly 1 m. square (more accurately about 1600 yds. by 1500 yds.); on the western, southern and eastern faces the line of defence is almost straight, the only projecting points being the gateways, but on the northern face the contour is broken by a double outwork, consisting of the Ark or citadel, which is built of sun- dried brick on a high artificial mound within the enceinte, and a lower work at its foot, called the Ark-i-nao, or ” new citadel,” which extends 100 yds. beyond the line of the city wall. That which distinguishes Herat from all other Oriental cities, and at the same time constitutes its main defence, is the stupendous character of the earthwork upon which the city wall is built. This earthwork averages 250 ft. in width at the base and about 50 ft. in height, and as it is crowned by a wall 25 ft. high and 14 ft. thick at the base, supported by about 150 semi- circular towers, and is further protected by a ditch 45 ft. in width and 16 in depth, it presents an appearance of imposing strength. When the royal engineers of the Russo-Afghan Boundary Commission entered Herat in 1885 they found its defences in various stages of disrepair. The gigantic rampart was unflanked, and the covered ways in the face of it

subject to enfilade from end to end. The ditch was choked, the gates were unprotected; the tumbled mass of irregular mud buildings which constituted the city clung tightly to the walls; there were no gun emplacements. Outside, matters were almost worse than inside. To the north of the walls the site of old Herat was indicated by a vast mass of debris — mounds of bricks and pottery intersected by a network of shallow trenches, where the only semblance of a protective wall was the irregular line of the Tal-i-Bangi. South of the city was a vast area filled in with the graveyards of centuries. Here the trenches dug by the Persians during the last siege were still in a fair state of preservation; they were within a stone's-throw of the walls. Round about the city on all sides were similar opportunities for close approach; even the villages stretched out long irregular streets towards the city gates. To the north-west, beyond the Tal-i-Bangi, the magnificent outlines of the Mosalla filled a wide space with the glorious curves of dome and gateway and the stately grace of tapering minars, but the impressive beauty of this, by far the finest architectural structure in all Afghanistan, could not be permitted to weigh against the fact that the position occupied by this pile of solid buildings was fatal to the interests of effective defence. By the end of August 1885, when a political crisis had supervened between Great Britain and Russia, under the orders of the Amir the Mosalla was destroyed; but four minars standing at the corners of the wide plinth still remain to attest to the glorious proportions of the ancient structure, and to exhibit samples of that decorative tilework, which for intricate beauty of design and exquisite taste in the blending of colour still appeals to the memory as unique. At the same time the ancient graveyards round the city were swept smooth and levelled; obstructions were demolished, outworks constructed, and the defences generally renovated. Whether or no the strength of this bulwark of North-Western Afghanistan should ever be practically tested, the general result of the most recent in-

vestigations into the value of Herat as a strategic centre has been largely to modify the once widely-accepted view that the key to India lies within it. Abdur Rahman and his successor Habibullah steadfastly refused the offer of British engineers to strengthen its defences; and though the Afghans themselves have occasionally undertaken repairs, it is doubtful whether the old walls of Herat are maintained in a state of efficiency. The exact position of Herat, with reference to the Russian station of Kushk (now the terminus of a branch railway from Merv), is as follows: From Herat, a gentle ascent northwards for 3 m. reaches to the foot of the Koh-i-Mulla Khwaja, crossing the Jui Nao or " new " canal, which here divides the gravel- covered foot hills from

the alluvial flats of the Hari Rud plain. The crest of the outer ridges of this subsidiary range is about 700 ft. above the city, at a distance of 4 m. from it. For 28 m. farther the road winds first amongst the broken ridges of the Koh-i-Mulla Khwaja, then over the intervening dasht into the southern spurs of the Paropamisus to the Ardewan pass. This is the highest point it attains, and it has risen about 2150 ft. from Herat. From the pass it drops over the gradually decreas- ing grades of a wide sweep of Choi (which here happens to be locally free from the intersecting network of narrow ravines which is generally a distinguishing feature of Turkestan loess formations) for a distance of 35 m. into the Russian railway station, falling some 2700 ft. from the crest of the Paropamisus. To the south the road from Herat to India through Kandahar lies across an open plain, which presents no great engineering difficulties, but is of a somewhat waterless and barren character. The city possesses five gates, two on the northern face, the Kutab-chak near the north-east angle of the wall, and the Malik at the re-entering angle of the Ark-i-nao; and three others in the centres of the remaining faces, the Irak gate on the west, the Kandahar gate on the south and the Kushk gate on the east face. Four streets called the Chahar-suk, running from the centre of each face, meet in the centre of the town in a small domed quadrangle. The principal street runs from the south or Kandahar gate to the market in front of the citadel, and is covered in with a vaulted roof through its entire length, the shops and buildings of this bazaar being much superior to those of the other streets, and the merchants' caravanserais, several of which are spacious and well built, all opening out on this great thoroughfare. Near the central quadrangle of the city is a vast reservoir of water, the dome of which is of bold and excellent proportions. The only other public building of any consequence in Herat is the great mosque or Mesjid-i-Juma, which comprises an area of 800 yds. square, and must have been a most magnificent structure. It was erected towards the close of the 15th century, during the reign of Shah Sultan Hussein of the family of Timur, and is said when perfect to have been 465 ft. long by 275 ft. wide, to have had 408 cupolas,i30 windows, 444 pillars and 6 entrances, and to have been adorned in the most magnificent manner with gilding, carving, precious mosaics and other elaborate and costly embellishments. Now, however, it is falling rapidly into ruin, the ever-changing provincial governors who administer Herat having neither the means nor the inclination to undertake the necessary repairs. Neither the palace of the Charbagh within the city wall, which was the re- sidence of the British mission in 1840-1841, nor the royal quarters in the citadel deserve any special notice. At the present day, with the exception of the Chahar-suk, where there is always a certain amount of traffic, and where the great diversity of

race and costume imparts much liveliness to the scene, Herat presents a very melancholy and desolate appearance. The mud houses in rear of the bazaars are for the most part uninhabited and in ruins, and even the burnt brick buildings are becoming every- where dilapidated. The city is also one of the filthiest in the East, as there are no means of drainage or sewerage, and garbage of every description lies in heaps in the open streets.

Along the slopes of the northern hills there is a space of some 4 m. in length by 3 m. in breadth, the surface of the plain, strewn over its whole extent with pieces of pottery and crumbling bricks, and also broken here and there by earthen mounds and

ruined walls, the debris of palatial structures which at one time were the glory and wonder of the East. Of these structures indeed some have survived to the present day in a sufficiently perfect state to bear witness to the grandeur and beauty of the old architecture of Herat. Such was the mosque of the Mosalla before its destruction. Scarcely inferior in beauty of design and execution, though of more moderate dimensions, is the tomb of the saint Abdullah Ansari, in the same neighbourhood. This building, which was erected by Shah Rukh Mirza, the grandson of Timur, over 500 years ago, contains some exquisite specimens of sculpture in the best style of Oriental art. Adjoining the tomb also are numerous marble mausoleums, the sepulchres of princes of the house of Timur; and especially deserving of notice is a royal building tastefully decorated by an Italian artist named Geraldi, who was in the service of Shah Abbas the Great. The locality, which is further enlivened by gardens and running streams, is named Gazir-gdh, and is a favourite resort of the Heratis. It is held indeed in high veneration by all classes, and the famous Dost Mahommed Khan is himself buried at the foot of the tomb of the saint. Two other royal palaces named respectively Bagh-i-Shah and Takht-i-Sefer, are situated on the same rising ground somewhat farther to the west. The buildings are now in ruins, but the view from the pavilions, shaded by splendid plane trees on the terraced gardens formed on the slope of the mountain, is said to be very beautiful.

The population of Herat and the neighbourhood is of a very mixed character. The original inhabitants of Ariana were no doubt of the Aryan family, and immediately cognate with the Persian race, but they were probably intermixed at a very early period with the Sacae

and Massagetae, who seem to have held the mountains from Kabul to Herat from the first dawn of history, and to whom must be ascribed — rather than to an infusion of Turco-Tartaric blood introduced by the armies of Jenghiz and Timur — the peculiar broad features and flattish countenance which distinguish the inhabitants of Herat, Seistan and the eastern provinces of Persia from their countrymen farther to the west. Under the government of Herat, however, there are a. very large number cf tribes, ruled over by separate and semi-independent chiefs, and belonging probably to different nationalities. The principal group of tribes is called the Chahar- Aimdk, or ” four races,” the constituent parts of which, however, are variously stated by different authorities both as to strength and nomenclature. The Heratis are an agricultural race, and are not nearly so warlike as the Pathans from the neighbourhood of Kabul or Kandahar.

The long narrow valley of the Hari Rud, starting from the western slopes of the Koh-i-Baba, extends almost due west for 300 m. before it takes its great northern bend at of Herat Kuhsan, and passes northwards through the broken ridges of the Siah Bubuk (the western extremity of the range which we now call Paropamisus) towards Sarakhs. For the greater part of its length it drains the southern slopes only of the Paropamisus and the northern slopes of a parallel range called Koh-i-Safed. The Paropamisus forms the southern face of the Turkestan plateau, which contains the sources of the Murghab river; the northern face of the same plateau is defined by the Band-i-Turkestan. On the south of the plateau we find a similar succession of narrow valleys dividing parallel flexures, or anticlinals, formed under similar geological conditions to those which appear to be universally applicable to the Himalaya, the Hindu Kush, and the Indus frontier mountain systems. From one of these long lateral valleys the Hari Rud receives its principal tributary, which joins the main river below Obeh, 180 m. from its source; and it is this tributary (separated from the Hari Rud by the narrow ridges of the Koh-i-Safed and Band-i-Baian) that offers the high road from Herat to Kabul, and not the Hari Rud itself. From its source to Obeh the Hari Rud is a valley of sandy desolation. There are no glaciers nearits sources, although they must have existed there in geologically recent times, but masses of melting snow annually give rise to floods, which rush through the midst of the valley in a turbid red stream, frequently rendering the river impassable and cutting off the

crazy brick bridges at Herat and Tirpul. It is impossible, whilst watching the rolling, seething volume of flood-water which swirls westwards in April, to imagine the waste stretches of dry river-bed which in a few months’ time (when every available drop of water is

carried off for irrigation) will represent the Hari Rud. The soft shales or clays of the hills bounding the valley render these hills especially subject to the action of denudation, and the result, in rounded slopes and easily accessible crests, determines the nature of the easy tracks and passes which intersect them. At the same time, any excessive local rainfall is productive of difficulty and danger from the floods of liquid mud and loose boulders which sweep like an avalanche down the hill sides. The intense cold which usually accompanies these sudden northern blizzards of Herat and Turkestan is a further source of danger.

From Obeh, 50 m. east of Herat, the cultivated portion of the valley commences, and it extends, with a width which varies from 8 to 16 m., to Kuhsan, 60 m. west of the city. But the great stretch of highly irrigated and valuable fruit-growing land, which appears to spread from the walls of Herat east and west as far as the eye can reach, and to sweep to the foot of the hills north and south with an endless array of vineyards and melon-beds, orchards and villages, varied with a brilliant patch- work of poppy growth brightening the width of green wheat-fields with splashes of scarlet and purple — all this is really comprised within a narrow area which does not extend beyond a ten-miles' radius from the city. The system of irrigation by which these agricultural results are attained is most elaborate. The despised Herati Tajik, in blue shirt and skull-cap, and with no instrument better than a three-cornered spade, is as skilled an agriculturist as is the Ghilzai engineer, but he cannot effect more than the limits of his water-supply will permit. He adopts the karez (or, Persian, kandt) system of underground irrigation, as does the Ghilzai, and brings every drop of water that he can find to the surface; but it cannot be said that he is more successful than the Ghilzai. It is the startling contrast of the Herati oasis with the vast expanse of comparative sterility that encloses it which has given such a fictitious value to the estimates of the material wealth of the valley of the Hari Rud.

The valley about Herat includes a flat alluvial plain which might, for some miles on any side except the north, be speedily reduced to an impassable swamp by means of flood-water from the surrounding canals. Three miles to the south of the city the river flows from east to west, spanned by the Pal-i-Malun, a bridge possessing grand proportions, but which was in 1885 in a state of grievous disrepair and practically useless. East and west stretches the long vista of the Hari Rud. Due north the hills called the Koh-i-Mulla Khwaja appear to be close and dominating, but the foot of these hills is really about 3 m. distant from the city. This northern line of barren, broken sandstone hills is geographically no part of the Paropamisus range, from which it

is separated by a stretch of sandy upland about 20 m. in width, called the Dasht-i-Hamdamao, or Dasht-i-Ardewan, formed by the talus or drift of the higher mountains, which, washed down through centuries of denudation, now forms long sweeping spurs of gravel and sand, scantily clothed with worm- wood scrub and almost destitute of water. Through this stretch of dasht the drainage from the main water-divide breaks down- wards to the plains of Herat, where it is arrested and utilized for irrigation purposes. To the north-east of the city a very considerable valley has been formed between the Paropamisus and the subsidiary Koh-i-Mulla Khwaja range, called KoroMi. Here there are one or two important villages and a well-known shrine marked by a group of pine trees which is unique in this part of Afghanistan. The valley leads to a group of passes across the Paropamisus into Turkestan, of which the Zirmast is perhaps the best known. The main water-divide between Herat and the Turkestan Choi (the loess district) has been called Paropamisus for want of any well-recognized general name. To the north of the Korokh valley it exhibits something of the formation of the Hindu Kush (of which it is apparently a geo- logical extension), but as it passes westwards it becomes broken

into fragments by processes of denudation, until it is hardly I recognizable as a distinct range at all. The direct passes across it from Herat (the Baba and the Ardewan) wind amongst masses of disintegrating sandstone for some miles on each side of the dividing watershed, but farther west the rounded knolls of the rain-washed downs may be crossed almost at any point without difficulty. The names applied to this debris of a once formidable ■nountain system are essentially local and hardly distinctive. Beyond this range the sand and clay loess formation spreads downwards like a tumbled sea, hiding within the folds of its many-crested hills the twisting course of the Kushk and its tributaries.

History. — The origin of Herat is lost in antiquity. The name first appears in the list of primitive Zoroastrian settlements contained in the Vendidad Sade, where, however, like most of the names in the same list, — such as Sughudu (Sogdiana), Mouru (Merv or Margus) , Haraquiti (Arachotusor Arghand-ab), Haetu- mant (Etymander or Helmund), and Ragha (or Argha-stan), — it seems to apply to the river or river-basin, which was the special centre of population. This name of Haroyu, as it is written in the Vendidad, or Hariwa,a.s it appears in the inscriptions of Darius, is a cognate form with the Sanskrit Sarayu,

which signifies ” a river,” and its resemblance to the ethnic title of Aryan (Sans. Arya) is purely fortuitous; though from the circumstance of the city being named ” Aria Metropolis ” by the Greeks, and being also recognized as the capital of Ariana, ” the country of the Arians,” the two forms have been frequently confounded. Of the foundation of Herat (or Heri, as it is still often called) nothing is known. We can only infer from the colossal character of the earth-works which surround the modern town, that, like the similar remains at Bost on the Helmund and at Ulan Robat of Arachosia, they belong to that period of Central-Asian history which preceded the rise of Achaemenian power, and which in Grecian romance is illustrated by the names of Bacchus, of Hercules and of Semiramis. To trace in any detail the fortunes of Herat would be to write the modern history of the East, for there has hardly been a dynastic revolution, or a foreign invasion, or a great civil war in Central Asia since the time of the prophet, in which Herat has not played a conspicuous part and suffered accordingly. Under the Tahirids of Khorasan, the Saffarids of Seistan and the Samanids of Bokhara, it flourished for some centuries in peace and progressive prosperity; but during the succeeding rule of the Ghaznevid kings its metropolitan character was for a time obscured by the celebrity of the neigh- bouring capital of Ghazni, until finally in the reign of Sultan San jar of Merv about 1157 the city was entirely destroyed by an irruption of the Ghuzz, the predecessors, in race as well as in habitat, of the modern Turkomans. Herat gradually recovered under the enlightened Ghorid kings, who were indeed natives of the province, though they preferred to hold their court amid their ancestral fortresses in the mountains of Ghor, so that at the time of Jenghiz Khan’s invasion it equalled or even exceeded in populousness and wealth its sister capitals Of Balkh, Merv and Nishapur, the united strength of the four cities being estimated at three millions of inhabitants. But this Mogul visitation was most calamitous; forty persons, indeed, are stated to have alone survived the general massacre of 1232, and as a similar catastrophe overtook the city at the hands of Timur in 1398, when the local dynasty of Kurt, which had succeeded the Ghorides in eastern Khorasan, was put an end to, it is astonishing to find that early in the 1 5th century Herat was again flourishing and populous, and the favoured seat of the art and literature of the East. It was indeed under the princes of the house of Timur that most of the noble buildings were erected, of which the remains still excite our admiration at Herat, while all the great historical works relative to Asia, such as the Rozet- es-Sefa, the Habib-es-seir, Hafiz Abru’s Tarikh, the Matld’ a-es- Sa’adin, &c, date from the same place and the same age. Four times was Herat sacked by Turkomans and Usbegs during the centuries which intervened

between the Timuride princes and the rise of the Afghan power, and it has never in modern times attained to anything like its old importance. Afghan

tribes, who had originally dwelt far to the east, were first settled at Herat by Nadir Shah, and from that time they have mono- polized the government and formed the dominant element in the population. It will be needless to trace the revolutions and counter-revolutions which have followed each other in quick succession at Herat since Ahmad Shah Durani founded the Afghan monarchy about the middle of the 18th century. Let it suffice to say that Herat has been throughout the seat of an Afghan government, sometimes in subordination to Kabul and sometimes independent. Persia indeed for many years showed a strong disposition to reassert the supremacy over Herat which was exercised by the Safawid kings, but great Britain, dis- approving of the advance of Persia towards the Indian frontier, steadily resisted the encroachment; and, indeed, after helping the Heratis to beat off the attack of the Persian army in 1838, the British at length compelled the shah in 1857 at the close of his war with them to sign a treaty recognizing the further in- dependence of the place, and pledging Persia against any further interference with the Afghans. In 1863 Herat, which for fifty years previously had been independent of Kabul, was incor- porated by Dost Mahomed Khan in the Afghan monarchy, and the Amir, Habibullah of Afghanistan, like his father Abdur Rahman before him, remained Amir of Herat and Kandahar, as well as Kabul.

See Holdich, Indian Borderland (1901); C. E. Yate, Northern Afghanistan (1888). (T. H. H.*)

HERAULT, a department in the south of France, formed from Lower Languedoc. Pop. (1906) 482,779. Area, 2403 sq. m. It is bounded N.E. by Gard, N.W. by Aveyron and Tarn, and S. by Aude and the Golfe du Lion. The southern prolongation of the Cevennes mountains occupies the north-western zone of the department, the highest point being about 4250 ft. above the sea-level. South-east of this range comes a region of hills and plateaus decreasing in height as they approach the sea, from which they are separated by the rich plains at the mouth of the Orb and the Herault and, farther to the north-east, by the line of intercommunicating salt lagoons (Etang de Thau, &c.) which fringes the coast. The region to the north-west of Mont- pellier comprises an extensive tract of country known as the Garrigues, a district of dry limestone plateaus and hills, which stretches into the neighbouring department of Gard. The mountains of the north-west form the watershed between the Atlantic and Mediterranean basins. From them

flow the Herault, its tributary the Lergue, and more to the south-west the Livron and the Orb, which are the main rivers of the depart- ment. Dry summers, varied by occasional violent storms, are characteristic of H6rault. The climate is naturally colder and more rainy in the mountains.

A third of the surface of Herault is planted with vines, which are the chief source of agricultural wealth, the department ranking first in France with respect to the area of its vineyards; the red wines of St Georges, Cazouls-les-Beziers, Picpoul and Maranssan, and the white wines of Frontignan and Lunel (pop. in 1906, 6769) are held in high estimation. The area given over to arable land and pasture is small in extent. Fruit trees of various kinds, but especially mulberries, olives and chestnuts flourish. The rearing of silk- worms is largely carried on. Con- siderable numbers of sheep are raised, their milk being utilized for the preparation of Roquefort cheeses. The mineral wealth of the department is considerable. There are mines of lignite, coal in the vicinity of Graissessac, iron, calamine and copper, and quarries of building -stone, limestone, gypsum, &c; the marshes supply salt. Mineral springs are numerous, the most important being those of Lamalon-les-Bains and Balaruc- les-Bains. The chief manufactures are woollen and cotton cloth, especially for military use, silk (Ganges), casks, soap and fertilizing stuffs. There are also oil-works, distilleries (B6ziers) and tanneries (Bedarieux). Fishing is an important industry. Cette and Meze (pop. in 1906, 5574) are the chief ports. Herault exports salt fish, wine, liqueurs, timber, salt, building-material, &c. It imports cattle, skins, wool, cereals, vegetables, coal and other commodities. The railway lines belong chiefly to the

Southern and Paris-Lyon-Mediterranee companies. The Cana] du Midi traverses the south of the department for 44 m. and terminates at Cette. The Canal des Etangs traverses the department for about 20 m., forming part of a line of com- munication between Cette and Aigues-Mortes. Montpellier, the capital, is the seat of a bishopric of the province of Avignon, and of a court of appeal and centre of an academie (educational division). The department belongs to the 16th military region, which has its headquarters at Montpellier. It is divided into the arrondissements of Montpellier, Beziers, Lodeve and St Pons, with 36 cantons and 340 communes.

Montpellier, Beziers, Lodeve, Bedarieux, Cette, Agde, Pezenas,

Lamalou-les-Bains and Clermont-l'Herault are the more note- worthy towns and receive separate treatment. Among the other interesting places in the department are St Pons, with a church of the 12th century, once a cathedral, Villemagne, which has several old houses and two ruined churches, one of the 13th, the other of the 14th century; Pignan, a medieval town, near which is the interesting abbey-church of Vignogoul in the early Gothic style; and St Guilhem-le-Desert, which has a church of the nth and 1 2th centuries. Maguelonne, which in the 6th century became the seat of a bishopric transferred to Montpellier in 1536, has a cathedral of the 12th century.

HERAULT DE SECHELLES, MARIE JEAN (1759-1794), French politician, was born at Paris on the 20th of September 1759, of a noble family connected with those of Contades and Polignac. He made his debut as a lawyer at the Chatelet, and delivered some very successful speeches; later he was avocat general to the parlement of Paris. His legal occupations did not prevent him from devoting himself also to literature, and after 1 789 he published an account of a visit he had made to the comte de Buffon at Montbard. Herault's account is marked by a delicate irony, and it has with some justice been called a master- piece of interviewing, before the day of journalists. Herault, who was an ardent champion of the Revolution, took part in the taking of the Bastille, and on the 8th of December 1789 was appointed judge of the court of the first arrondissement in the department of Paris. From the end of January to April 1 791 Herault was absent on a mission in Alsace, where he had been sent to restore order. On his return he was appointed commissaire du roi in the court of cassation. He was elected as a deputy for Paris to the Legislative Assembly, where he gravitated more and more towards the extreme left; he was a member of several committees, and, when a member of the diplomatic committee, presented a famous report demanding that the nation should be declared to be in danger (nth June 1793). After the revolution of the 10th of August 1792 (see French Revolution), he co-operated with Danton, one of the organizers of this rising, and on the 2nd of September was appointed president of the Legislative Assembly. He was a deputy to the National Convention for the department of Seine-et-Oise, and was sent on a mission to organize the new department of Mont Blanc. He was thus absent during the trial of Louis XVI., but he made it known that he approved of the condemnation of the king, and would probably have voted for the death penalty. On his return to Paris, Herault was several times president of the Convention, notably on the 2nd of June 1793, the occasion of the attack on the Girondins, and on the 10th of August

1793, on which the passing of the new constitution was celebrated. On this occasion Herault, as president of the Convention, had to make several speeches. It was he, moreover, who, on the rejection of the projected constitu- tion drawn up by Condorcet, was entrusted with the task of preparing a fresh one; this work he performed within a few days, and his plan, which, however, differed very little from that of Condorcet, became the Constitution of 1793, which was passed, but never applied. As a member of the Committee of Public Safety, it was with diplomacy that Herault was chiefly concerned, and from October to December 1793 he was employed on a diplomatic and military mission in Alsace. But this mission helped to make him an object of suspicion to the other members of the Committee of Public Safety, and especially to Robespierre,

who as a deist and a fanatical follower of the ideas of Rousseau, hated Herault, the follower of the naturalism of Diderot. He was accused of treason, and after being tried before the revolu- tionary tribunal, was condemned at the same time as Danton, and executed on the 16th Germinal in the year II. (5th April 1794). ■ He was handsome, elegant and a lover of pleasure, and was one of the most individual figures of the Revolution.

See the Voyage a Montbard, published by A. Aulard (Paris, 1890); A. Aulard, Les Orateurs de la Legislative el de la Convention, 2nd ed. (Paris, 1906); J. Claretie, Camille Desmoulins . . . etude sur les Danlonistes (Paris, 1875); Dr Robinet, he Proces des Dantonistes (Paris, 1879); “Herault de Sechelles, sa premiere mission en Alsace ” in the review La Revolution Frangaise, tome 22 ; E. Daudet, Le Roman d’un conventionnel. Herault de Sechelles et les dames de Bellegarde (1904). His CEuvres litteraires were edited (Paris, 1907) by E. Dard. (R. A.*)

HERB (Lat. herba, grass, food for cattle, generally taken to represent the Old Lat. Jorbea, Gr. op&T], pasture, 4 > tpf5eiv, to feed, Sans, bharb, to eat), in botany, the name given to those plants whose stem or stalk dies entirely or down to the root each year, and does not become, as in shrubs or trees, woody or permanent, such plants are also called ” herbaceous.” The term ” herb ” is also used of those herbaceous plants, which possess certain properties, and are used for medicinal purposes, for flavouring or garnishing in cooking, and also for perfumes (see Horti- culture and Pharmacology).

HERBARIUM, or Hortus Siccus, a collection of plants so dried and preserved as to illustrate as far as possible their characters. Since the same plant, owing to peculiarities of climate, soil and situation, degree

of exposure to light and other influences may vary greatly according to the locality in which it occurs, it is only by gathering together for comparison and study a large series of examples of each species that the flora of different regions can be satisfactorily represented. Even in the best equipped botanical garden it is impossible to have, at oAe and the same time, more than a very small percentage of the representatives of the flora of any given region or of any large group of plants. Hence a good herbarium forms an indispensable part of a botanical museum or institution. There are large herbaria at the British Museum and at the Royal Gardens, Kew, and smaller collections at the botanical institutions at the principal British universities. The original herbarium of Linnaeus is in the possession of the Linnaean Society of London. It was purchased from the widow of Linnaeus by Dr (afterwards Sir) J. E. Smith, one of the founders of the Linnaean Society, and after his death was purchased by the society. Herbaria are also associated with the more important botanic gardens and museums in other countries. The value of a herbarium is much enhanced by the possession of " types," that is, the original specimens on the study of which a species was founded. Thus the herbarium at the British Museum, which is especially rich in the earlier collections made in the 18th and early 19th centuries, contains the types of many species founded by the earlier workers in botany. It is also rich in the types of Australian plants in the collections of Sir Joseph Banks and Robert Brown, and contains in addition many valuable modern collections. The Kew herbarium, founded by Sir William Hooker and greatly increased by his son Sir Joseph Hooker, is also very rich in types, especially those of plants described in the Flora of British India and various colonial floras. The collection of Dillenius is deposited at Oxford, and that of Professor W. H. Harvey at Trinity College, Dublin. The collections of Antoine Laurent de Jussieu, his son Adrien, and of Auguste de St Hilaire, are included in ihe large herbarium of the Jardin des Plantes at Paris, and in the same city is the extensive private collection of Dr Ernest Cosson. At Geneva are three large collections — Augustin Pyrame de Candolle's, containing the typical specimens of the Prodromus, a large series of monographs of the families of flowering plants, Benjamin Delessert's fine series at the Botanic Garden, and the Boissier Herbarium, which is rich in Mediterranean and Oriental plants. The university of Gottingen has had bequeathed to it the largest collection (exceeding 40,000 specimens) ever made by a single individual — that of Professor Grisebach, At the

herbarium in Brussels are the specimens obtained by the traveller Karl Friedrich Philipp von Martius, the majority of which formed the groundwork of his Flora Brasiliensis. The Berlin herbarium is especially rich in more recent collections, and other national herbaria sufficiently extensive to subserve the require- ments of the systematic botanist exist at St Petersburg, Vienna, Leiden, Stockholm, Upsala, Copenhagen and Florence. Of those in the United States of America, the chief, formed by Asa Gray, is the property of Harvard university; there is also a large one at the New York Botanical Garden. The herbarium at Melbourne, Australia, under Baron Miiller, attained large proportions; and that of the Botanical Garden of Calcutta is noteworthy as the repository of numerous specimens described by writers on Indian botany.

Specimens of flowering plants and vascular cryptograms are generally mounted on sheets of stout smooth paper, of uniform quality; the size adopted at Kew is 17 in. long by n in. broad, that at the British Museum is slightly larger; the palms and their allies, however, and some ferns, require a larger size. The tough but flexible coarse grey paper (German Fliesspapier) , upon which on the Continent specimens are commonly fixed by gummed strips of the same, is less hygroscopic than ordinary cartridge paper, but has the disadvantage of affording harbourage in the inequalities of its surface to a minute insect, Alropos pulsatoria, which commits great havoc in damp specimens, and which, even if noticed, cannot be dislodged without difficulty. The majority of plant specimens are most suitably fastened on paper by a mixture of equal parts of gum tragacanth and gum arabic made into a thick paste with water. Rigid leathery leaves are fixed by means of glue, or, if they present too smooth a surface, by stitching at their edges. Where, as in private herbaria, the specimens are not liable to be handled with great frequency, a stitch here and there round the stem, tied at the back of the sheet, or slips of paper passed over the stem through two slits in the sheet and attached with gum to its back, or simply strips of gummed paper laid across the stem, may be resorted to.

To preserve from insects, the plants, after mounting, are often brushed over with a liquid formed by the solution of j lb. each of corrosive sublimate and carbolic acid in 1 gallon of methylated spirits. They are then laid out to dry on shelves made of a network of stout galvanized iron wire. The use of corrosive sublimate is not, however, recommended, as it forms on drying a fine powder which when the plants are handled will rub off and, being carried into the air, may prove injurious to workers. If the plants are subjected to some process, before mounting, by which injurious organisms are destroyed, such as

exposure in a closed chamber to vapour of carbon bisulphide for some hours, the presence of pieces of camphor or naphthalene in the cabinet will be found a sufficient preservative. After mounting are written — usually in the right-hand corner of the sheet, or on a label there affixed — the designation of each species, the date and place of gathering, and the name of the collector. Other particulars as to habit, local abundance, soil and claim to be indigenous may be written on the back of the sheet or on a slip of writing paper attached to its edge. It is convenient to place in a small envelope gummed to an upper corner of the sheet any flowers, seeds or leaves needed for dissection or microscopical examination, especially where from the fixation of the specimen it is impossible to examine the leaves for oil- receptacles and where seed is apt to escape from ripe capsules and be lost. The addition of a careful dissection of a flower greatly increases the value of the specimen. To ensure that all shall lie evenly in the herbarium the plants should be made to occupy as far as possible alternately the right and left sides of their respective sheets. The species of each genus are then arranged either systematically or alphabetically in separate covers of stout, usually light brown paper, or, if the genus be large, in several covers with the name of the genus clearly in- dicated in the lower left-hand corner of each, and opposite it the names or reference numbers of the species. Undetermined species are relegated to the end of the genus. Thus prepared,

the specimens are placed on shelves or movable trays, at intervals of about 6 in., in an air-tight cupboard, on the inner side of the door of which, as a special protection against insects, is suspended a muslin bag containing a piece of camphor.

The systematic arrangement varies in different herbaria. In the great British herbaria the orders and genera of flowering plants are usually arranged according to Bentham and Hooker's Genera plantarum; the species generally follow the arrangement of the most recent complete monograph of the family. In non- flowering plants the works usually followed are for ferns, Hooker and Baker's Synopsis filicum; for mosses, Mliller's Synopsis muscorum frondosorum, Jaeger & Sauerbeck's Genera et species muscorum, and Engler & Prantl's Pflanzenfamilien; for algae, de Toni's Sylloge algarum; for hepaticae, Gottsche, Lindenberg and Nees ab Esenbeck's Synopsis hepaticarum, supplemented by Stephani's Species hepaticarum; for fungi, Saccardo's Sylloge jungorum, and for mycetozoa Lister's monograph of the group. For the members of large genera, e.g. Piper and Ficus, since the number of cosmopolitan or very widely dis- tributed species is comparatively few, a geographical grouping is found specially convenient by those who are constantly receiving parcels of plants

from known foreign sources. The ordinary systematic arrangement possesses the great advantage, in the case of large genera, of readily indicating the affinities of any particular specimen with the forms most nearly allied to it. Instead of keeping a catalogue of the species contained in the herbarium, which, owing to the constant additions, would be almost impossible, such species are usually ticked off with a pencil in the systematic work which is followed in arranging them, so that by reference to this work it is possible to see at a glance whether the specimen sought is in the herbarium and what species are still wanted.

Specimens intended for the herbarium should be collected when possible in dry weather, care being taken to select plants or portions of plants in sufficient number and of a size adequate to illustrate all the characteristic features of the species. When the root-leaves and roots present any peculiarities, they should invariably be collected, but the roots should be dried separately in an oven at a moderate heat. Roots and fruits too bulky to be placed on the sheet of the herbarium may be conveniently arranged in glass-covered boxes contained in drawers. The best and most effective mode of drying specimens is learned only by experience, different species requiring special treatment according to their several peculiarities. The chief points to be attended to are to have a plentiful supply of botanical drying paper, so as to be able to use about six sheets for each specimen; to change the paper at intervals of six to twelve hours; to avoid contact of one leaf or flower with another; and to increase the pressure applied only in proportion to the dryness of the specimen. To preserve the colour of flowers pledgets of cotton wool, which prevent bruising, should be introduced between them, as also, if the stamens are thick and succulent, as in Digitalis, between these and the corolla. A flower dissected and gummed on the sheets will often retain the colour which it is impossible to preserve in a crowded inflorescence. A flat sheet of lead or some other suitable weight should be laid upon the top of the pile of specimens, so as to keep Up a continuous pressure. Succulent specimens, as many of the Orchi- daceae and sedums and various other Crassulaceous plants, require to be killed by immersion in boiling water before being placed in drying paper, or, instead of becoming dry, they will grow between the sheets. When, as with some plants like Verbascum, the thick hard stems are liable to cause the leaves to wrinkle in drying by removing the pressure from them, small pieces of bibulous paper or cotton wool may be placed upon the leaves near their point of attachment to the stem. When a number of specimens have to be submitted to pressure, ventilation is secured by means of frames corresponding in size to the drying paper,

and composed of strips of wood or wires laid across each other so as to form a kind of network. Another mode of drying is to keep the specimens in a box of dry sand in a warm- place for ten or twelve hours, and then press them in drying paper. A third method consists in placing the specimen within bibulous paper, and enclosing the whole between two plates of coarsely perforated zinc supported in a wooden frame. The zinc plates are then drawn close together by means of straps, and suspended before a fire until the drying is effected. By the last two methods the colour of the flowers may be well preserved. When the leaves are finely divided, as in Conium, much trouble will be experienced in lifting a half-dried specimen from one paper to another; but the plant may be placed in a sheet of thin blotting paper, and the sheet containing the plant, instead of the plant itself, can then be moved. Thin straw-coloured paper, such as is used for biscuit bags, may be conveniently employed by travellers unable to carry a quantity of

bibulous paper. It offers the advantage of fitting closely to thick-stemmed specimens and of rapidly drying. A light but strong portfolio, to which pressure by means of straps can be applied, and a few quires of this paper, if the paper be changed night and morning, will be usually sufficient to dry all except very succulent plants. When a specimen is too large for one sheet, and it is necessary, in order to show its habit, &c, to dry the whole of it, it may be divided into two or three portions, and each placed on a separate sheet for drying. Specimens may be judged to be dry when they no longer cause a cold sensation when applied to the cheek, or assume a rigidity not evident in the earlier stages of preparation.

Each class of flowerless or cryptogamic plants requires special treatment for the herbarium.

Marine algae are usually mounted on tough smooth white cartridge paper in the following manner. Growing specimens of good colour and in fruit are if possible selected, and cleansed as much as practic- able from adhering foreign particles, either in the sea or a rocky pool. Some species rapidly change colour, and cause the decay of any others with which they come in contact. This is especially the case with the Ectocarpi, Desmarestiae, and a few others, which should therefore be brought home in a separate vessel. In mounting, the specimen is floated out in a flat white dish containing sea-water, so that foreign

matter may be detected, and a piece of paper of suitable size is placed under it, supported either by the fingers of the left hand or by a palette. It is then pruned, in order clearly to show the mode of branching, and is spread out as naturally as possible with the right hand. For this purpose a bone knitting-needle answers well for the coarse species, and a camei's-hair pencil for the more delicate ones. The paper with the specimen is then carefully removed from the water by sliding it over the edge of the dish so as to drain it as much as possible. If during this process part of the fronds run together, the beauty of the specimen may be restored by dipping the edge into water, so as to float out the part and allow it to subside naturally on the paper. The paper, with the specimen upwards, is then laid on bibulous paper for a few minutes to absorb as much as possible of the superfluous moisture. When freed from excess of water it is laid on a sheet of thick white blotting-paper, and a piece of smooth washed calico is placed upon it (unwashed calico, -on account of its " facing," adheres to the sea-weed). Another sheet of blotting- paper is then laid over it; and, a number of similar specimens being formed into a pile, the whole is submitted to pressure, the paper being changed every hour or two at first. The pressure is increased, and the papers are changed less frequently as the specimens become dry, which usually takes place in thirty-six hours. Some species, especially those of a thick or leathery texture, contract so much in drying that without strong pressure the edges of the paper become puckered. Other species of a gelatinous nature, like Nemalion and Dudresnaya, may be allowed to dry on the paper, and need not be submitted to pressure until they no longer present a gelatinous appearance. Large coarse algae, such, for instance, as the Fucaceae and Laminariae, do not readily adhere to paper, and require soaking for some time in fresh water before being pressed. The less robust species, such as Sphacelaria scoparia, which do not adhere well to paper, may be made to do so by brushing them over either with milk carefully skimmed, or with a liquid formed by placing isinglass (J oz.) and water (ij oz.) in a wide-mouthed bottle, and the bottle in a small glue-pot or saucepan containing cold water, heating until solution is effected, and then adding I oz. of rectified spirits of wine; the whole is next stirred together, and when cold is kept in a stoppered bottle. For use, the mixture is warmed to render it fluid, and applied by meansof a camel's hair brush to the under side of the specimen, which is then laid neatly on paper. For the more delicate species, such as the Callithamnia and Ectocarpi, it is an excellent plan to place a small fruiting fragment, carefully floated out in water, on a slip of mica of the size of an ordinary microscopical slide, and allow it to dry. The plant can then be at any time examined under the micro- scope

without injuring the mounted specimen. Many of the fresh- water algae which form a mere crust, such as Palmella cruenta, may be placed in a vessel of water, where after a time they float like a scum, the earthy matter settling down to the bottom, and may then be mounted by slipping a piece of mica under them and allowing it to dry. Oscillatoriae may be mounted by laying a portion on a silver coin placed on a piece of paper in a plate, and pouring in water until the edge of the coin is just covered. The alga by its own peculiar movement will soon form a radiating circle, perfectly free from dirt, around the coin, which may then be removed. There is considerable difficulty in removing mounted specimens of algae from paper, and therefore a small portion preserved on mica should accompany each specimen, enclosed for safety in a small envelope fastened at one corner of the sheet of paper. Filamentous diatoms may be mounted like ordinary seaweeds, and, as well as all parasitic algae, should whenever possible be allowed to remain attached to a portion of the alga on which they grow, some species being almost always found found parasitical on particular plants. Ordinary diatoms and desmids may be mounted on mica, as above described, by putting a portion in a vessel of water and exposing it to sunlight, when they rise to the surface, and may be thus removed comparatively free from dirt or impurity. Owing to their want of adhesiveness, they are, however, usually mounted on glass as microscopic slides, either in glycerin jelly, Canada balsam or some other suitable medium.

Lichens are generally mounted on sheets of paper of the ordinary size, several specimens from different localities being laid upon one sheet, each specimen having been first placed on a small square of paper which is gummed on the sheet, and which has the locality, date, name of collector, &c, written upon it. This mode has some disadvantages attending it; such sheets are difficult to handle; the crustaceous species are liable to have their surfaces rubbed; the foliaceous species become so compressed as to lose their character- istic appearance; and the spaces between the sheets caused by the thickness of the specimen permit the entrance of dust. A plan which has been found to answer well is to arrange them in cardboard boxes, either with glass tops or in sliding covers, in drawers — the name being placed outside each box and the specimens gummed into the boxes. Lichens for the herbarium should, whenever possible, be sought for on a slaty or laminated rock, so as to procure them on flat thin pieces of the same, suitable for mounting. Specimens on the bark of trees require pressure until the bark is dry, lest they become curled; and those growing on sand or friable soil, such as Coniocybefurfuracea, should be laid carefully on a layer of gum in the box in which they are intended to be kept. Many

lichens, such as the Verrucariae and Collemaceae, are found in the best condition during the winter months. In mounting collemas it is advisable to let the specimen become dry and hard, and then to separate a portion from adherent mosses, earth, &c, and mount it separately so as to show the branch- ing of the thallus. Pertusariae should be represented by both fruiting and sorediate specimens.

The larger species of fungi, such as the Agaricini and Polyporei, &c, are prepared for the herbarium by cutting a slice out of the centre of the plant so as to show the outline of the cap or pileus, the attachment of the gills, and the character of the interior of the stem. The remaining portions of the pileus are then lightly pressed, as well as the central slices, between bibulous paper until dry, and the whole is then ” poisoned,” and gummed on a sheet of paper in such a manner as to show the under surface of the one and the upper surface of the other half of the pileus on the same sheet. A ” map ” of the spores should be taken by separating a pileus and placing it flat on a piece of thin paper for a few hours when the spores will fall and leave a nature print of the arrangement of the gills which may be fixed by gumming the other side of the paper. As it is impossible to preserve the natural colours of fungi, the specimens should, whenever possible, be accompanied by a coloured drawing of the plant. Microscopic fungi are usually preserved in envelopes, or simply attached to sheets of paper or mounted as microscopic slides. Those fungi which are of a dusty nature, and the Myxomycetes or Mycetozoa may, like the lichens, be preserved in small boxes and arranged in drawers. Fungi under any circumstances form the least satisfactory portion of an herbarium.

Mosses when growing in tufts should be gathered just before the capsules have become brown, divided into small flat portions, and pressed lightly in drying paper. During this process the capsules ripen, and are thus obtained in a perfect state. They are then pre- served in envelopes attached to a sheet of paper of the ordinary size, a single perfect specimen being washed, and spread out under the envelope so as to show the habit of the plant. For attaching it to the paper a strong mucilage of gum tragacanth, containing an eighth of its weight of spirit of wine, answers best. If not preserved in an envelope the calyptra and operculum are very apt to fall off and become lost. Scale-mosses are mounted in the same way, or may be floated out in water like sea-weeds, and dried in white blotting paper under strong pressure before gumming on paper, but are best mounted as microscopic slides, care being taken to show the stipules. The specimens should be collected when the capsules are just appear- ing above or in the colesule or calyx; if kept in a damp saucer they soon

arrive at maturity, and can then be mounted in better condition, the fruit-stalks being too fragile to bear carriage in a botanical tin case without injury.

Of the Characeae many are so exceedingly brittle that it is best to float them out like sea-weeds, except the prickly species, which may be carefully laid out on bibulous paper, and when dry fastened on sheets of white paper by means of gummed strips. Care should be taken in collecting charae to secure, in the case of dioecious species, specimens of both forms, and also to get when possible the roots of those species on which the small granular starchy bodies or gemmae are found, as in C. fragifera. Portions of the fructification may be preserved in small envelopes attached to the sheets.

HERBART, JOHANN FRIEDRICH (1776-1841), German philosopher and educationist, was born at Oldenburg on tR*e 4th of May 1776. After studying under Fichte at Jena he gave his first philosophical lectures at Gottingen in 1805, whence he removed in 1809 to occupy the chair formerly held by Kant at Kbnigsberg. Here he also established and conducted a seminary of pedagogy till 1833, when he returned once more to Gottingen, and remained there as professor of philosophy till his death on the 14th of August 1841.

Philosophy, according to Herbart, begins with reflection upon our empirical conceptions, and consists in the reformation and elaboration of these — its three primary divisions being determined by as

would actually have happened, nothing would appear. As it is we shall find a continuous molecule manifesting attractive and repulsive forces; attraction corresponding to the tendency of the self-preservations to become perfect, repulsion to the frustration of this. Motion, even more evidently than space, implicates the con- tradictory conception of continuity, and cannot, therefore, be a real predicate, though valid as an intelligible form and necessary to the comprehension of the objective semblance. For we have to think of the reals as absolutely independent and yet as entering into con- nexions. This we can only do by conceiving them as originally moving through intelligible space in rectilinear paths and with uniform velocities. For such motion no cause need be supposed; motion, in fact, is no more a state of the moving real than rest is, both alike being but relations, with which, therefore, the real has no concern. The changes in this motion,

however, for which we should require a cause, would be the objective semblance of the self-preserva- tions that actually occur when reals meet. Further, by means of such motion these actual occurrences, which are in themselves timeless, fall for an observer in a definite time — a time which becomes con- tinuous through the partial coincidence, of events.

But in all this it has been assumed that we are spectators of the objective semblance; it remains to make good this assumption, or, in other words, to show the possibility of knowledge ; this is_ the problem of what Herbart terms Eidolology, and forms the transition from metaphysic to psychology. Here, again, a contradictory con- ception blocks the way, that, viz. of the Ego as the identity of knowing and being, and as such the stronghold of idealism. The contradiction becomes more evident when the ego is defined to be a subject (and so a real) that is its own object. As real and not merely formal, this conception of the ego is amenable to the method of relations. The solution this method furnishes is summarily that there are several objects which mutually modify each other, and so constitute that ego we take for the presented real. But to explain this modification is the business of psychology ; it is enough now to see that the subject like all reals is necessarily unknown, and that, therefore, the idealist's theory of knowledge is unsound. But though the simple quality of the subject or soul is beyond knowledge, we know what actually happens when it is in connexion with other's reals, for its self-preservations then are what we call sensations. And these sensations are the sole material of our knowledge; but they are not given to us as a chaos but in definite groups and series, whence we come to know the relations of those reals, which, though themselves unknown, our sensations compel us to posit absolutely.

In his Psychology Herbart rejects altogether the doctrine of mental faculties as one refuted by his metaphysics, and tries to show that all psychical phenomena whatever result from the action and inter- action of elementary ideas or presentations (Vorstellungen). The soul being one and simple, its separate acts of self-preservation or primary presentations must be simple too, and its several presenta- tions must become united together. And this they can do at once and completely when, as is the case, for example, with the several attributes of an object, they are not of opposite quality. But other- wise there ensues a conflict in which the opposed presentations comport themselves like forces and mutually suppress or obscure each other. The act of presentation (Vorstellen) then becomes partly transformed into an effort, and its product, the idea, becomes in the same proportion less and less intense till a position of equili- brium is reached; and then at

length the remainders coalesce. We have thus a statics and a mechanics of mind which investigate respectively the conditions of equilibrium and of movement among presentations. In the statics two magnitudes have to be determined : (i) the amount of the suppression or inhibition (Hemmungssumme) , and (2) the ratio in which this is shared among the opposing presenta- tions. The first must obviously be as small as possible; thus for two totally-opposed presentations a and b, of which a is the greater, the inhibendum = b. For a given degree of opposition this burden will be shared between the conflicting presentations in the inverse ratio of their strength. When its remainder after inhibition = 0, a presentation is said to be on the threshold of consciousness, for on a small diminution of the inhibition the ” effort ” will become actual presentation in the same proportion. Such total exclusion from consciousness is, however, manifestly impossible with only two presentations, 1 though with three or a greater number the residual value of one may even be negative. The first and simplest law in psychological mechanics relates to the ” sinking ” of inhibited presentations. As the presentations yield to the pressure, the pressure itself diminishes, so that the velocity of sinking decreases, i.e. we have the equation (S — cr) dt — da, where S is the total inhibendum, and a the intensity actually inhibited after the time t. Hence S

Z = log

S-

-, and

that equilibrium is never quite obtained for those presentations which continue above the threshold of consciousness, while the rest

1 Thus, taking the case above supposed, the share of the inhibendum falling to the smaller presentation b is the fourth term of the pro- portion a + b:a: :i:ri; and so b’s remainder is b — j = ^rj) which only = 0 when a = x .

which cannot so continue are very speedily driven beyond the threshold. More important is the law according to which a presenta- tion freed from inhibition and rising anew into consciousness tends to raise the other presentations with which it is combined. Suppose two presentations p and tt united by the residua r and p; then the amount of p’s ” help ” to -w is r, the portion of which appropriated by

ir is given by the ratio p: *■; and thus the initial help is — .

But after a time /, when a portion of p represented by u has been actually brought into consciousness, the help afforded in the next instant will be found by the equation

T P

from which by integration we have the value of w.

> = p(l—t t) .

So that if there are several xs connected with p by smaller and smaller parts, there will be a definite ” serial ” order in which they will be revived by p ; and on this fact Herbart rests all the phenomena of the so-called faculty of memory, the development of spatial and temporal forms and much besides. Emotions and volitions, he holds, are not directly self-preservations of the soul, as our presenta- tions are, but variable states of such presentations resulting from their interaction when above the threshold of consciousness. Thus when some presentations tend to force a presentation into con- sciousness, and others at the same time tend to drive it out, that presentation is the seat of painful feeling ; when, on the other hand, its entrance is favoured by all, pleasure results. Desires are presenta- tions struggling into consciousness against hindrances, and when accompanied by the supposition of success become volitions. Tran- scendental freedom of will in Kant’s sense is an impossibility. Self-consciousness is the result of an interaction essentially the same in kind as that which takes place when a comparatively simple presentation finds the field of consciousness occupied by a long- formed and well-consolidated ” mass ” of presentations — as, e.g. one’s business or garden, the theatre, &c, which promptly inhibit the isolated presentation if incongruent, and unite it to themselves if not. What we call Self is, above all, such a central mass, and Herbart seeks to show with great ingenuity and detail how this position is occupied at first chiefly by the body, then by the seat of ideas and desires, and finally by that first-personal Self which re- collects the past and resolves concerning the future. But at any stage the actual constituents of this “complexion” are variable; the concrete presentation of Self is never twice the same. And, therefore, finding on reflection any particular concrete factor contingent, we abstract the position from that which occupies it, and so reach the speculative notion of the pure Ego.

Aesthetics elaborates the ” ideas ” involved in the expression of taste called forth by those relations of object which acquire for them the attribution of beauty or the reverse. The beautiful (kciXop) is to be carefully distinguished from the allied conceptions of the useful and

the pleasant, which vary with time, place and person; whereas beauty is predicated absolutely and involuntarily by all who have attained the right standpoint. Ethics, which is but one branch of aesthetics, although the chief, deals with such relations among volitions (Willensverhdltnisse) as thus unconditionally please or dis- please. These relations Herbart finds to be reducible to five, which do not admit of further simplification; and corresponding to them are as many moral ideas (Musterbegriffe) , viz.: (1) Internal Freedom, the underlying relation being that of the individual's will to his judgment of it; (2) Perfection, the relation being that of his several volitions to each other in respect of intensity, variety and concentration ; (3) Benevolence, the relation being that between his own will and the thought of another's; (4) Right, in case of actual conflict with another; and (5) Retribution or Equity, for intended good or evil done. The ideas of a final society, a system of rewards and punish- ments, a system of administration, a system of culture and a " unanimated society," corresponding to the ideas of law, equity, benevolence, perfection and internal freedom respectively, result when we take account of a number of individuals.. Virtue is the perfect conformity of the will with the moral ideas ; of this the single virtues are but special expressions. The conception of duty arises from the existence of hindrances to the attainment of virtue. A general scheme of principles of conduct is possible, but the sub- sumption of special cases under these must remain matter of tact. Thwapplication of ethics to things as they are with a view to the realization of the moral ideas is moral technology (Tugendlehre) , of which the chief divisions are Paedagogy and Politics.

In Theology Herbart held the argument from design to be as valid for divine activity as for human, and to justify the belief in a super- sensible real, concerning which, however, exact knowledge is neither attainable nor on practical grounds desirable.

Among the post-Kantian philosophers Herbart doubtless ranks next to Hegel in importance, and this without taking into account his very great contributions to the science of education. His disciples speak of theirs as the " exact philosophy," and the term well expresses their master's chief excellence and the character of

many distinct forms of elaboration. Logic, which stands first, has to render our conceptions and the judgments and reasonings arising from

them clear and distinct. But some conceptions are such that the more distinct they are made the more contradictory their elements become; so to change and supplement these as to make them at length thinkable is the problem of the second part of philosophy, or metaphysics. There is still a class of conceptions requiring more than a logical treatment, but differing from the last in not involving latent contradictions, and in being independent of the reality of their objects, the conceptions, viz. that embody our judgments of approval and disapproval; the philosophic treatment of these conceptions falls to Aesthetic.

In Herbart's writings logic receives comparatively meagre notice; he insisted strongly on its purely formal character, and expressed himself in the main at one with Kantians such as Fries and Krug.

As a metaphysician he starts from what he terms " the higher scepticism " of the Hume-Kantian sphere of thought, the beginnings of which he discerns in Locke's perplexity about the idea of substance. By this scepticism the real validity of even the forms of experience is called in question on account of the contradictions they are found to involve. And yet that these forms are " given " to us, as truly as sensations are, follows beyond doubt when we consider that we are as little able to control the one as the other. To attempt at this stage a psychological inquiry into the origin of these conceptions would be doubly a mistake; for we should have to use these unlegitimated conceptions in the course of it, and the task of clearing up their contradictions would still remain, whether we succeeded in our enquiry or not. But how are we to set about this task? We have given to us a conception A uniting among its constituent marks two that prove to be contradictory, say M and N ; and we can neither deny the unity nor reject one of the contradictory members. For to do either is forbidden by experience; and yet to do nothing is forbidden by logic. We are thus driven to the assumption that the conception is contradictory because incomplete; but how are we to supplement it? What we have must point the way to what we want, or our procedure will be arbitrary. Experience asserts that M is the same {i.e. a mark of the same concept) as N, while logic denies it; and so — it being impossible for one and the same M to sustain these contradictory positions — there is but one way open to us; we must posit several Ms. But even now we cannot say one of these Ms is the same as N, another is not; for every M must be both thinkable and valid. We may, however, take the Ms not singly but together; and again, no other course being open to us, this is what we must do; we must assume that N results from a combination of Ms. This is Herbart's method of relations, the counterpart in his system of the Hegelian dialectic.

In the Ontology this method is employed to determine what in reality corresponds to the empirical conceptions of substance and cause, or rather of inherence and change. But first we must analyse this notion of reality itself, to which our scepticism had already led us, for, though we could doubt whether ” the given ” is what it appears, we cannot doubt that it is something; the conception of the real thus consists of the two conceptions of being and quality. That which we are compelled to ” posit,” which cannot be sublated, is that which is, and in the recognition of this lies the simple conception of being. But when is a thing thus posited? When it is posited as we are wont to posit the things we see and taste and handle. If we were without sensations, i.e. were never bound against our will to endure the persistence of a presentation, we should never know what being is. Keeping fast hold of this idea of absolute position, Herbart leads us next to the quality of the real, (i) This must exclude everything negative; for non-A sublates instead of positing, and is not absolute, but relative to A. (2) The real must be absolutely simple; for if it contain two determinations, A and B, then either these are reducible to one, which is the true quality, or they are not, when each is conditioned by the other and their position is no longer absolute. (3) All quantitative conceptions are excluded, for quantity implies parts, and these are incompatible with simplicity. (4) But there may be a plurality of ” reals,” albeit the mere conception of being can tell us nothing as to this. The doctrine here developed is the first cardinal point of Herbart’s system, and has obtained for it the name of ” pluralistic realism.”

The contradictions he finds in the common-sense conception of inherence, or of “a thing with several attributes,” will now become obvious. Let us take some thing, say A, having n attributes, a, b, c …. we are forced to posit each of these because each is presented in intuition. But in conceiving A we make, not n positions, still less n + i positions, but one position simply; for common sense removes the absolute position from its original source, sensation. So when we ask, What is the one posited? we are told — the possessor of a, b, c . . . , or in other words, their seat or substance. But if so, then A, as a real, being simple, must = a; similarly it must = 6; and so on. Now this would be possible if a, 6, c . . . were but ” contingent aspects ” of A, as e.g. 2 3 ,V64, 4 + 3 + 1 are contingent aspects of 8. Such, of course, is not the case, and so we have as many contradic- tions as there are attributes; for we must say A is a, is not a, is b, is not b, &c. There must then, according to the method of relations, be several As. For a let us assume A1 + A1 + A1 . . . ; for b, Aj + A 2 + A 2 . . .; and so on for the rest. But now what relation can there be among these several

As, which will restore to us

the unity of our original A or substance? There is but one; we must assume that the first A of every series is identical, just as the centre is the same point in every radius. By way of concrete illustration Herbart instances ” the common observation that the properties of things exist only under external conditions. Bodies, we say, are coloured, but colour is nothing without light, and nothing without eyes. They sound, but only in a vibrating medium, and for healthy ears. Colour and tone present the appearance of in- herence, but on looking closer we find they are not really immanent in things but rather presuppose a communion among several.” The result then is briefly thus: In place of the one absolute position, which in some unthinkable way the common understanding sub- stitutes for the absolute positions of the « attributes, we have really a series of two or more positions for each attribute, every series, however, beginning with the same (as it were, central) real (hence the unity of substance in a group of attributes), but each being continued by different reals (hence the plurality and difference of attributes in unity of substance). Where there is the appearance of inherence, therefore, there is always a plurality of reals; no such correlative to substance as attribute or accident can be admitted at all. Substantiality is impossible without causality, and to this as its true correlative we now turn.

The common-sense conception of change involves at bottom the same contradiction of opposing qualities in one real. The same A that was a, b, c . . . becomes a, b, d . . . ; and this, which experi- ence thrusts upon us, proves on reflection unthinkable. The meta- physical supplementing is also fundamentally as before. Since c depended on a series of reals A3 + A3 + A3 … in connexion with A, and d may be said similarly to depend on a series A4 + A4 + A4 . . ., then the change from c to d means, not that the central real A or any real has changed, but that A is now in connexion with At, &c, and no longer in connexion with A3, &c.

But to think a number of reals ” in connexion ” (Zusammensein) will not suffice as an explanation of phenomena ; something or other must happen when they are in connexion; what is it? The answer to this question is the second hinge-point of Herbart’s theoretical philosophy. What ” actually happens ” as distinct from all that seems to happen, when two reals A and B are together is that, assuming them to differ in quality, they tend to disturb each other to the extent of that difference, at the same time that each preserves itself intact by resisting, as it were, the other’s disturbance. And so by coming into connexion with different reals the ” self-preserva- tions ” of A will

vary accordingly, A remaining the same through all ; just as, by way of illustration, hydrogen remains the same in water and in ammonia, or as the same line may be now a normal and now a tangent. But to indicate this opposition in the qualities of the reals A + B, we must substitute for these symbols others, which, though only ” contingent aspects ” of A and B, i.e. repre- senting their relations, not themselves, yet like similar devices in mathematics enable thought to advance. Thus we may put A = a + /3— y, B=ot+«+7; 7 then represents the character of the self- preservations in this case, and a+/3+m+w represents all that could be observed by a spectator who did not know the simple qualities, but was himself involved in the relations of A to B ; and such is exactly our position.

Having thus determined what really is and what actually happens, our philosopher proceeds next to explain synthetically the objective semblance (der objective Schein) that results from these. But if this construction is to be truly objective, i.e. valid for all intelligences, ontology must furnish us with a clue. This we have in the forms of Space, Time and Motion which are involved whenever we think the reals as being in, or coming into, connexion and the opposite. These forms then cannot be merely the products of our psychological mechanism, though they may turn out to coincide with these. Meanwhile let us call them ” intelligible,” as being valid for all who comprehend the real and actual by thought, although no such forms are predicable of the real and actual themselves. The elementary spatial relation Herbart conceives to be ” the contiguity (Aneinander) of two points,” so that every ” pure and independent line ” is discrete. But an investigation of dependent lines which are often incommensur- able forces us to adopt the contradictory fiction of partially over- lapping, i.e. divisible points, or in other words, the conception of Continuity. 1 But the contradiction here is one we cannot eliminate by the method of relations, because it does not involve anything real; and in fact as a necessary outcome of an ” intelligible ” form, the fiction of continuity is valid for the “objective semblance,” and no more to be discarded than say V — 1. By its help we are enabled to comprehend what actually happens among reals to produce the appearance of matter. When three or more reals are together, each disturbance and self-preservation will (in general) be imperfect, i.e. of less intensity than when only two reals are together. But “objective semblance” corresponds with reality; the spatial or external relations of the reals in this cage must, there- fore , tally with their inner or actual states. Had the self-preservations been perfect, the coincidence in space would have been complete, and the group of reals would have been inextended ; or had the several reals been simply contiguous, i.e.

without connexion, then, as nothing

1 Hence Herbart gave the name Synechology to this branch of metaphysics, instead of the usual one, Cosmology.

the chief influence he has exerted upon succeeding thinkers of his own and other schools. His criticisms are worth more than his constructions; indeed for exactness and penetration of thought he is quite on a level with Hume and Kant. His merits in this respect, however, can only be appraised by the study of his works at first hand. But we are most of all indebted to Herbart for the enormous advance psychology has been enabled to make, thanks to his fruitful treatment of it, albeit as yet but few among the many who have appropriated and improved his materials have ventured to adopt his metaphysical and mathematical foundations. (J. W.*)

Bibliography. — Herbart's works were collected and published by his disciple G. Hartenstein (Leipzig, 1 850-1 852; reprinted at Hamburg, with supplementary volume, 1883-1893) ; another edition by K. Kehrbach (Leipzig, 1882, and Langensalza, 1887). The following are the most important: Allgemeine Pddagogik (1806; new ed., 1894) ; Hauptpunkte der Metaphysik (1808) ; Allgemeine praktische Philosophic (1808) ; Lehrbuch zur Einleitung in die Philosophie (1813; new ed. by Hartenstein, 1883); Lehrbuch der Psychologie (1816; new ed. by Hartenstein, 1887); Psychologie als Wissenschaft (1824-1825); Allgemeine Metaphysik (1828-1829); Encyhlopddie der Philosophie (2nd ed., 1841); Umriss padagogischer Vorlesungen (2nd ed., 1841); Psychologische Untersuchungen (1839-1840).

Some of his works have been translated into English under the following titles: Textbook in Psychology, by M. K. Smith (1891); The Science of Education and the Aesthetic Revelation of the World (1892), and Letters and Lectures on Education (1898), by H. M. and E. Felkin ; A B C of Sense Perception and minor pedagogical works (New York, 1896), by W. J. Eckhoff and others; Application of Psychology to the Science of Education (1898), by B. C. Mulliner; Outlines of Educational Doctrine, by A. F. Lange (1901).

There is a life of Herbart in flartenstein's introduction to his Kleinere philosophische Schriften. und Abhandlungen (1842-1843) and by F. H. T. Allihn in Zeitschrift filr exacte Philosophie (Leipzig, 1861), the

organ of Herbart and his school, which ceased to appear in 1873. In America the National Society for the Scientific Study of Education was originally founded as the National Herbart Society.

Of the large number of writings dealing with Herbart's works and theories, the following may be mentioned: H. A. Fechner, Zur Kritik der Grundlagen von Herbart's Metaphysik (Leipzig, 1 853); J. Kaftan, Sollen und Sein in ihrem Verhdltniss zu einander: eine Studie zur Kritik Herbarls (Leipzig, 1872); M. W. Drobisch, Uber die Fortbildung der Philosophie durch Herbart (Leipzig, 1876) ; K. S. Just, Die Fortbildung der Kant'schen Ethik durch Herbart (Eisenach, 1876); C. Ufer, Vorschule der Pddagogik Herbarls (1883; Eng. tr. by J. C. Zinser, 1895); G. Kozle, Die pddagogische Schule Herbarts und ihre Lehre (Gutersloh, 1889); L. Strumpell,_ Das System der Pddagogik Herbarts (Leipzig, 1S94); J. Christinger, Herbarts Erziehungslehre und ihre Fortbildner (Zurich, 1895) ; O. H. Lang, Outline of Herbart's Pedagogics (1894); H. M. and E. Felkin, Introduction to Herbart's Science and Practice of Education (1895); C. de Garmo, Herbart and the Herbartians (New York, 1895) ; £. Wagner, Die Praxis der Herbartianer (Langensalza, 1897) and Vollstdndige Darstellung der Lehre Herbarts {ib., 1899); J. Adams, The Herbartian Psychology applied to Education (1897); F. H. Hay ward, The Student's Herbart (1902), The Critics of Herbarl- ianism (1903), Three Historical Educators: Pestalozzi, Frbbel, Herbart (1905), The Secret of Herbart (1907), The Meaning of Educa- tion as interpreted by Herbart (1907) ; W. Kinkel, /. F. Herbart: sein Leben und seine Philosophie (1903); A. Darroch, Herbart and the Herbartian Theory of Education (1903); C. J. Dodd, Introduction to the Herbartian Principles of Teaching (1904); J. Davidson, A new Interpretation of Herbart's Psychology and Educational Theory through the Philosophy of Leibnitz (1906) ; see also J. M. Baldwin, Dictionary of Psychology and Philosophy (1901-1905).

HERBELOT DE MOLAINVILLE, BARTHEXEMY D' (1625- 1695), French orientalist, was born on the 14th of December 1625 at Paris. He was educated at the university of Paris, and devoted himself to the study of oriental languages, going to Italy to perfect himself in them by converse with the orientals who frequented its sea-ports. There he also made the acquaint- ance of Holstenius, the Dutch humanist (1596-1661), and Leo Allatius, the Greek scholar (1586-1669). On his return to France after a year and a half, he was received into the house of Fouquet, superintendent of finance, who gave him a pension of 1500 livres. Losing this on the disgrace of Fouquet in 1661, he was appointed secretary and interpreter of Eastern languages to the king. A few years later he again visited Italy, when the grand-duke

Ferdinand II. of Tuscany presented him with a large number of valuable Oriental MSS., and tried to attach him to his court. Herbelot, however, was recalled to France by Colbert, and received from the king a pension equal to the one he had lost. In 1692 he succeeded D'Auvergne in the chair of Syriac, in the College de France. He died in Paris on the 8th of December 1695. His great work is the Bibliotheque orientale,

ou dictionnaire universel contenant tout ce qui regarde la connoissance des peuples de I'Orienl, which occupied him nearly all his life, and was completed in 1697 by A. Galland. It is based on the immense Arabic dictionary of Hadji Khalfa, of which indeed it is largely an abridged translation, but it also contains the substance of a vast number of other Arabic and Turkish compilations and manuscripts.

The Bibliotheque was reprinted at Maestricht (fol. 1776), and at the Hague (4 vols. 4to, 1777-1799). The latter edition is enriched with the contributions of the Dutch orientalist Schultens, Johann Jakob Reiske (1716-1774), and by a supplement provided by Visdelow and Galland. Herbelot's other works, none of which have been published, comprise an Oriental Anthology, and an Arabic, Persian, Turkish and Latin Dictionary.

HERBERAY DES ESSARTS, NICOLAS DE (d. about 1557), French translator, was born in Picardy. He served in the artillery, and at the expressed desire of Francis I. he translated into French the first eight books of Amadis de Gaul (1540-1548). The remaining books were translated by other authors. His other translations from the Spanish include L'Amant maltraite de sa mye (1539); Le Premier Livre de la chronique de dom Flores de Grece (1552); and L'Horloge des princes (1555) from Guevara. He also translated the works of Josephus (1557). He died about 1557. The Amadis de Gaul was translated into English by Anthony Munday in 161 9.

HERBERT (Family). The sudden rising of this English family to great wealth and high place is the more remarkable in that its elevation belongs to the 15th century and not to that age of the Tudors when many new men made their way upwards into the ranks of the nobility. Earlier generations of a pedigree which carries the origin of the Herberts to Herbert the Chamberlain, a Domesday tenant, being disregarded, their patriarch may be taken to be one Jenkin ap Adam (temp. Edward III.), who had a small Monmouthshire estate at Llanvapley and the office of master sergeant of the lordship of Abergavenny, a place which gave him precedence after the steward of that lordship. Jenkin's son, Gwilim ap Jenkin, who followed his father

as master sergeant, is given six sons by the border genealogists, no less than six score pedigrees finding their origin in these six brothers. Their order is uncertain, although the Progers of Werndee, the last of whom sold his ancestral estate in 1780, are reckoned as the senior line of Gwilim's descendants. But Thomas ap Gwilim Jenkin, called the fourth son, is ancestor of all those who bore the surname of Herbert.

Thomas's fifth son, William or Gwilim ap Thomas, who died in 1446, was the first man of the family to make any figure in history. This Gwilim ap Thomas was steward of the lordships of Usk and Caerleon under Richard, duke of York. Legend makes him a knight on the field of Agincourt, but his knighthood belongs to the year 1426. He appears to have married twice, his first wife being Elizabeth Bluet of Raglan, widow of Sir James Berkeley, and his second a daughter of David Gam, a valiant Welsh squire slain at Agincourt. Royal favour enriched Sir William, and he was able to buy Raglan Castle from the Lord Berkeley, his first wife's son, the deed, which remains among the Beaufort muniments, refuting the pedigree-maker's state- ment that he inherited the castle as heir of his mother " Maude, daughter of Sir John Morley." His sons William and Richard, both partisans of the White Rose, took the surname of Herbert in or before 1461. Playing a part in English affairs remote from the Welsh Marches, their lack of a surname may well have inconvenienced them, and their choice of the name Herbert can only be explained by the suggestion that their long pedigree from Herbert the Chamberlainˆ absurdly represented as a bastard son of Henry I., must already have been discovered for them. Copies exist of an alleged commission issued by Edward IV. to a committee of Welsh bards for the ascertaining of the true ancestry of William Herbert, earl of Pembroke, whom " the chief est men of skill " in the province of South W'ales declare to be the descendant of "Herbert, a noble lord, natural son to King Henry the first," and it is recited that King Edward, after the creation of the earldom, commanded the earl and Sir Richard his brother to " take their surnames after their first progenitor

Herbert fitz Roy and to forego the British order and manner." But this commission, whose date anticipates by some years the true date of the creation of the earldom, is the work of one of the many genealogical forgers who flourished under the Tudors.

Sir William Herbert, called by the Welsh Gwilim Ddu or Black

William, was a baron in 1461 and a Knight of the Garter in the following year. With many manors and castles on the Marches he had the castle, town and lordship of Pembroke, and after the attainder of Jasper Tudor in 1468 was created earl of Pembroke. When in July 1469 he was taken by Sir John Conyers and the northern Lancastrians on Hedgecote, he was beheaded with his brother Sir Richard Herbert of Coldbrook. The second earl while still a minor exchanged at the king's desire in 1479 his earldom of Pembroke for that of Huntingdon. In 1484 this son of one whom Hall not unjustly describes as born" a mean gentleman " contracted to marry Katharine the daughter of King Richard III., but her death annulled the contract and the earl married Mary, daughter of the Earl Rivers, by whom he had a daughter Elizabeth, whose descendants, the Somersets, lived in the Herbert's castle of Raglan until the cannon of the parlia- ment broke it in ruins. With the second earl's death in 1491 the first Herbert earldom became extinct. No claim being set up among the other descendants of the first earl, it may be taken that their lines were illegitimate. One of the chief difficulties which beset the genealogist of the Herberts lies in their Cambrian disregard of the marriage tie, bastards and legitimate issue growing up, it would seem, side by side in their patriarchal households. Thus the ancestor of the present earls of Pembroke and Carnarvon and of the Herbert who was created marquess of Powis was a natural son of the first earl, one Richard Herbert, whom the restored inscription on his tomb at Abergavenny incorrectly describes as a knight. He was constable and porter of Abergavenny Castle, and his son William, " a mad fighting fellow " in his youth, married a sister of Catherine Parr and thus in 1543 became nearly allied to the king, who made him one of the executors of his will. The earldom of Pembroke was revived for him in 155 1. It is worthy of note that all traces of illegiti- macy have long since been removed from the arms of the noble descendants of Richard Herbert.

The honours and titles of this clan of marchmen make a long list. They include the marquessate of Powis, two earldoms with the title of Pembroke, two with that of Powis, and the earldoms of Huntingdon and Montgomery, Torrington and Carnarvon, the viscountcies of Montgomery and Ludlow, fourteen baronies and seven baronetcies. Seven Herberts have worn the Garter. The knights and rich squires of the stock can hardly be reckoned, more especially as they must be sought among Raglans, Morgans, Parrys, Vaughans, Progers, Hugheses, Thomases, Philips, Powels, Gwyns, Evanses and Joneses, as well as among those who have borne the surname of Herbert, a surname which in the 19th century was adopted by the Joneses of Llanarth and Clytha, although they claim no descent from those sons

of Sir William ap Thomas for whom it was devised. (O. Ba.)

HERBERT, GEORGE (1593-1633), English poet, was born at Montgomery Castle on the 3rd of April 1593. He was the fifth son of Sir Richard Herbert and a brother of Lord Herbert of Cherbury. His mother, Lady Magdalen Herbert, a woman of great good sense and sweetness of character, and a friend of John Donne, exercised great influence over her son. Educated privately until 1605, he was then sent to Westminster School, and in 1609 he became a scholar of Trinity College, Cambridge, where he was made B.A. in 1613, M.A. and major fellow of the college in 1616. In 16 18 he became Reader in Rhetoric, and in 16 19 orator for the university. In this capacity he was several times brought into contact with King James. From Cambridge he wrote some Latin satiric verses ‘ in defence of the universities and the English Church against Andrew Melville, a Scottish Presbyterian minister. He numbered among his friends Dr

1 Printed in 1662? as an appendix to J. Vivian’s Ecclesiastes Solomenis.

Donne, Sir Henry Wotton, Izaak Walton, Bishop Andrewes and Francis Bacon, who dedicated to him his translation of the Psalms. Walton tells us that ” the love of a court conversation, mixed with a laudable ambition to be something more than he was, drew him often from Cambridge to attend the king whereso- ever the court was,” and James I. gave him in 1623 the sinecure lay rectory of Whitford, Flintshire, worth £120 a year. The death of his patrons, the duke of Richmond and the marquess of Hamilton, and of King James put an end to his hopes of poh’tical preferment; moreover he probably distrusted the conduct of affairs under the new reign. Largely influenced by his mother, he decided to take holy orders, and in July 1626 he was appointed prebendary of Layton Ecclesia (Leighton Bromswold), Huntingdon. Here he was within two miles of Little Gidding, and came under the influence of Nicholas Ferrar. It was at Ferrar’s suggestion that he undertook to rebuild the church at Layton, an undertaking carried through by his own gifts and the generosity of his friends. There is little doubt that the close friendship with Ferrar had a large share in Herbert’s adoption of the religious life. In 1630 Charles I., at the instance of the earl of Pembroke, whose kinsman Herbert was, presented him to the living of Fugglestone with Bemerton, near Salisbury, and he was ordained priest in September. A year before, after three days’ acquaintance, he had married Jane Danvers, whose father had been set on the marriage for a long time. He had often spoken of his daughter Jane to Herbert, and ” so much commended Mr Herbert to her, that Jane became so much a Platonic

as to fall in love with Mr Herbert unseen." The story of the poet's life at Bemerton, as told by Walton, is one of the most exquisite pictures in literary biography. He devoted much time to explaining the meaning of the various parts of the Prayer-Book, and held services twice every day, at which many of the parishioners attended, and some " let their plough rest when Mr Herbert's saints-bell rung to prayers, that they might also offer their devotions to God with him. " Next to Christianity itself he loved the English Church. He was passionately fond of music, and his own hymns were written to the accompaniment of his lute or viol. He usually walked twice a week to attend the cathedral at Salisbury, and before returning home, would " sing and play his part " at a meeting of music lovers. Walton illustrates Herbert's kindness to the poor by many touching anecdotes, but he had not been three years in Bemerton when he succumbed to consumption. He was buried beneath the altar of his church on the 3rd of March 1633.

None of Herbert's English poems was published during his lifetime. On his death-bed he gave to Nicholas Ferrar a manu- script with the title The Temple: Sacred Poems and Private Ejaculations. This was published at Cambridge, apparently for private circulation, almost immediately after Herbert's death, and a second imprint followed in the same year. On the title-page of both is the quotation " In his Temple doth every man speak of his honour." The Temple is a collection of religious poems connected by unity of sentiment and inspiration. Herbert tried to interpret his own devout meditations by applying images of all kinds to the ritual and beliefs of the Church. Nothing in his own church at Bemerton was too commonplace to serve as a starting-point for the epigrammatic expression of his piety. The church key reminds him that " it is my sin that locks his handes," and the stones of the floor are patience and humility, while the cement that binds them together is love and charity. The chief faults of the book are obscurity, verbal conceits and a forced ingenuity which shows itself in grotesqtte puns, odd metres and occasional want of taste. But the quaint beauty of Herbert's style and its musical quality give The Temple a high place. " The Church Porch," " The Agony," " Sin," " Sunday," " Virtue," " Man," " The British Church," "The Quip," "The Collar," "The Pulley," "The Flower," " Aaron " and " The Elixir " are among the best known of these poems. Herbert and Keble are the poets of Anglican theology. No book is fuller of devotion to the Church of England than The Temple, and no poems in our language exhibit more of the spirit of true Christianity. Every page is marked by

transparent sincerity, and reflects the beautiful character of ” holy George Herbert.”

Nicholas Ferrar’s translation (Oxford, 1638) of the Hundred and Ten Considerations … of Juan de Valdes contained a letter and notes by Herbert. In 1652 appeared Herbert’s Remains; or, Sundry Pieces of that Sweet Singer of the Temple, Mr George Herbert. This included A Priest to the Temple; or, The Country Parson, his Character, and Rule of Holy Life, in prose; J acuta prudentum, a collection of proverbs with a separate title-page dated 1651, which had appeared in a shorter form as Outlandish Proverbs in 1640; and some miscellaneous matter. The completest edition of his works is that by Dr A. B. Grosart in 1874, this edition of the Poetical works being reproduced in the ” Aldine edition ” in 1876. The English Works of George Herbert … (3 vols., 1905) were edited in much detail by G. H. Palmer. A contemporary account of Herbert’s life by Barnabas Oley was prefixed to the Remains of 1652, but the classic authority is Izaak Walton’s Life of Mr George Herbert, pub- lished in 1670, with some letters from Herbert to his mother. See also A. G. Hyde, George Herbert and his Times (1907), and the ” Oxford ” edition of his poems by A. WaUgh (1908).

HERBERT, HENRY WILLIAM [” Frank Forester “] (1807- 1858), English novelist and writer on sport, son of the Hon. and Rev. William Herbert, dean of Manchester, a son of the first earl of Carnarvon, was born in London on the 3rd of April 1807. He was educated at Eton and at Caius College, Cambridge, where he graduated B.A. in 1830. Having become involved in debt, he emigrated to America, and from 1831 to 1839 was teacher of Greek in a private school in New York. In 1833 he started the American Monthly Magazine, which he edited, in conjunption with A. D. Patterson, till 1835. In 1834 he published his first novel, The Brothers: a Tale of the Fronde, which was followed by a number of others which obtained a certain degree of popu- larity. He also wrote a series of historical studies, including The Cavaliers of England (1852), The Knights of England, France and Scotland (1852), The Chevaliers of France (1853), and The Captains of the Old World (1851); but he is best known for his works on sport, published under the pseudonym of ” Frank Forester.” These include The Field Sports of the United States and British Provinces (1849), Frank Forester and his Friends (1849), The Fish and Fishing of the United States (1850), The Young Sportsman’s Complete Manual (1852), and The Horse and Horsemanship in the United States and British Provinces of North America (1858). He also translated many of the novels of Eugene Sue

and Alexandre Dumas. Herbert was a man of varied accomplishments, but of somewhat dissipated habits. He died by his own hand in New York on the 17th of May 1858.

HERBERT, SIR THOMAS (1606-1682), English traveller and author, was born at York in 1606. Several of his ancestors were aldermen and merchants in that city — e.g. his grandfather and benefactor, Alderman Herbert (d. 1614)— and they traced a connexion with the earls of Pembroke. Thomas became a commoner of Jesus College, Oxford, in 1621, but afterwards removed to Cambridge, through the influence of his uncle Dr Ambrose Akroyd. In 1627 the earl of Pembroke procured his appointment in the suite of Sir Dodmore Cotton, then starting as ambassador for Persia with Sir Robert Shirley. Sailing in March they visited the Cape, Madagascar, Goa and Surat; landing at Gambrun (10th of January 1627-1628), they travelled inland to Ashraf and thence to Kazvin, where both Cotton and Shirley died, and whence Herbert made exten- sive travels in the Persian Hinterland, visiting Kashan, Bagdad, &c. On his return voyage he touched at Ceylon, the Coromandel coast, Mauritius and St Helena. He reached England in 1629, travelled in Europe in 1630-1631, married in 1632 and retired from court in 1634 (his prospects perhaps blighted by Pembroke's death in 1630); after this he resided on his Tintern estate and elsewhere till the Civil War, siding with the parliament till his appointment to attend on the king in 1646. Becoming a devoted royalist, he was rewarded with a baronetcy at the Restoration (1660). He resided mainly in York Street, Westminster, till the Great Plague (1666), when he retired to York, where he died (at Petergate House) on the 1st of March 1682.

Herbert's chief work is the Description of the Persian Monarchy now beinge: the Orientall Indyes, lies and other parts of the Greater Asia and Africk (1634), reissued with additions, &c, in 1638 as

Some Yeares Travels into Africa and Asia the Great (al.. into divers parts of Asia and Afrique) ; a third edition followed in 1664, and a fourth in 1677. This is one of the best records of 17th-century travel. Among its illustrations are remarkable sketches of the dodo, cuneiform inscriptions and Persepolis. Herbert's Threnodia Carolina; or, Memoirs of the two last years of the reign of that unparallell' d prince of ever blessed memory King Charles I., was in great part printed at the author's request in Wood's Athenae Oxonienses; in full by Dr C. Goodall in his Collection of Tracts (1702, repr. G. & W. Nicol, 1813). Sir William Dugdale is understood to have received assistance from Herbert in the Monaslicon Anglicanum, vol. iv. ; see two of Herbert's papers on St John's, Beverley and Ripon collegiate church,

now cathedral, in Drake's Eboracum (appendix). Cf. also Robert Davies' account of Herbert in The Yorkshire Archaeological and Topographical Journal, part iii., pp. 182-214 (1870), containing a facsimile of the inscription on Herbert's tomb; Wood's Athenae, iv. 15-41 ; and Fasti, ii. 26, 131, 138, 143-144, 150.

HERBERT OF CHERBURY, EDWARD HERBERT, Baron (1 583-1648), English soldier, diplomatist, historian and religious philosopher, eldest son of Richard Herbert of Montgomery Castle (a member of a collateral branch of the family of the earls of Pembroke) and of Magdalen, daughter of Sir Richard Newport, was born at Eyton-on-Severn near Wroxeter on the 3rd of March 1583. After careful private tuition he matriculated at University College, Oxford, as a gentleman commoner, in May 1596. On the 28th of February 1599 he married his cousin Mary, daughter and heiress of Sir William Herbert (d. 1593). He returned to Oxford with his wife and mother, continued his studies, and obtained proficiency in modern languages as well as in music, riding and fencing. On the accession of James I. . he presented himself at court and was created a knight of the Bath on the 24th of July 1603. In 1608 he went to Paris, en- joying the friendship and hospitality of the old constable de Montmorency, and being entertained by Henry IV. On his return, as he says himself with naive vanity, he was " in great esteem both in court and city, many of the greatest desiring my company." In 16 10 he served as a volunteer in the Low Countries under the prince of Orange, whose intimate friend he became, and distinguished himself at the capture of Juliers from the emperor. He offered to decide the war by engaging in, single combat with a champion chosen from among the enemy, but his challenge was declined. During an interval in the fighting he paid a visit to Spinola, in the Spanish camp near Wezel, and afterwards to the elector palatine at Heidelberg, subsequently travelling in Italy. At the instance of the duke of Savoy he led an expedition of 4000 Huguenots from Languedoc Into Piedmont to help the Savoyards against Spain, but after nearly losing his life in the journey to Lyons he was imprisoned on his arrival there, and the enterprise came to nothing. Thence he returned to the Netherlands and the prince of Orange, arriving in England in 1617. In 1619 he was made by Buckingham am- bassador at Paris, but a quarrel with de Luynes and a challenge sent /by him to the latter occasioned his recall in 1621. After the death of de Luynes Herbert resumed his post in February 1622. He was very popular at the French court and showed considerable diplomatic ability, his chief objects being to accomplish the union between Charles and Henrietta Maria and secure the assistance of Louis XIII. for the unfortunate elector palatine. This latter

advantage he could not obtain, and he was dismissed in April 1624. He returned home greatly in debt and received little reward for his services beyond the Irish peerage of Castle island in 1624 and the English barony of Cherbury, or Chirbury, on the 7th of May 1629. In 1632 he was appointed a member of the council of war. He attended the king at York in 1639, and in May 1642 was imprisoned feˆ the parliament for urging the addition of the words ” without cause ” to the resolution that the king violated his oath by making war on parliament. He determined after this to take no further part in the struggle, retired to Montgomery Castle, and declined the king’s summons. On the 5th of September 1644 he surrendered the castle to the parliamentary forces, returned to London, submitted, and was granted a pension of £20 a week. In 1647 ne P a id a visit to Gassendi at Paris, and died in London on the 20th of August J648, bejng buried in the church of St Giles’s in the Fields.

HERBERT OF LEA

34- 1

Lord Herbert left two sons, Richard (c. 1600-1655), wio succeeded him as 2nd Lord Herbert of Cherbury, and Edward, the title becoming extinct in the person of Henry Herbert, the 4th baron, grandson of the 1st Lord Herbert in 1691. In 1694, however, it was revived in favour of Henry Herbert (1654-1709), son of Sir Henry Herbert (1595-1673), brother of the 1st Lord Herbert of Cherbury. Sir Henry was master of the revels to Charles I. and Charles II., being busily employed in reading and licensing plays and in supervising all kinds of public enter- tainments. He died in April 1673; his son Henry died in January 1709, when the latter’s son Henry became 2nd Lord Herbert of Cherbury of the second creation. He died without issue in April 1738, and again the barony became extinct. In 1743 it was revived for Henry Arthur Herbert (c. 1703-1772), who five years later was created earl of Powis. This nobleman was a great-grandson of the 2nd Lord Herbert of Cherbury of the first creation, and since his time the barony has been held by the earls of Powis.

Lord Herbert’s cousin, Sir Edward Herbert (c. 1591-1657), was a member of parliament under James I. and Charles I. Having become attorney-general he was instructed by Charles to take proceedings against some members of parliament who had been concerned in the passing of the Grand Remonstrance; the only result, however, was Herbert’s own impeachment by the House of Commons and his imprisonment. Later in life he was with the exiled royal family in Holland and in France, becoming lord keeper of the great seal to

Charles II., an office which he had refused in 1645. He died in Paris in December 1657. One of Herbert's son was Arthur Herbert, earl of Torring- ton, and another was Sir Edward Herbert (c. 1648-1698), titular earl of Portland, who was made chief justice of the king's bench in 1685 in succession to Lord Jeffreys. , It was Sir Edward who declared for the royal prerogative in the case of Godden v. Hales, asserting that the kings of England, being sovereign princes, could dispense with particular laws in particular cases. After the escape of James II. to France this king made Herbert his lord chancellor and created him earl of Portland, although he was a Protestant and had exhibited a certain amount of independence during 1687.

The first Lord Herbert's real claim to fame and remembrance is derived from his writings. Herbert's first and most important work is the De verilate prout distinguitur a revelalione, a verisimili, a possibili, el a {also (Paris, 1624; London, 1633; translated into French 1639, but never into English; a MS. in add. MSS. 7081. Another, Sloane MSS. 3957, has the author's dedication to his brother George in his own hand, dated 1622). It combines a theory of knowledge with a partial psychology, a methodology for the investiga- tion of truth, and a scheme of natural religion. The author's method is prolix and often far from clear; the book is no compact system, but it contains the skeleton and much of the soul of a com- plete philosophy. Giving up all past theories as useless, Herbert professedly endeavours to constitute a new and true system. Truth, which he defines as a just conformation of the faculties with one another and with their objects, he distributed into four classes or stages: (1) truth in the thing or the truth of the object; (2) truth of the appearance; (3) truth of the apprehension (conceptus) ; (4) truth of the intellect. The faculties of the mind are as numerous as the differences of their objects, and are accordingly innumerable; but they may be arranged in four groups. The first and fundamental and most certain group is the Natural Instinct, to which belong the Koivai Ivvoiai, the notitiae communes, which are innate, of divine origin and indisputable. The second group, the next in certainty, is the sensus internus (under which head Herbert discusses amongst others love, hate, fear, conscience with its communis notitia, and free will); the third is the sensus externus; and the fourth is discursus, reasoning, to which, as being the least certain, we have recourse when the other faculties fail. The ratiocinative faculties proceed by division and analysis, by questioning, and are slow and gradual in their movement ; they take aid from the other faculties, those of the instinctus naturalis being always the final test. Herbert's categories or questions to be used in investigation are ten in number whether (a thing is), what, of what sort, how much, in what

relation, how, when, where, whence, wherefore. No faculty, rightly used, can err “even in dreams”; badly exercised, reasoning becomes the source of almost all our errors. The discussion of the notitiae communes is the most characteristic part of the book. The exposition of them, though highly dogmatic, is at times strikingly Kantian in substance. ” So far are these elements or sacred principles from being derived from experience or observation that without some of them, or at least some one of them, we can neither experience

nor even observe.” Unless we felt driven by them to explore the nature of things, ” it would never occur to us to distinguish one thing from another.” It cannot be said that Herbert proves the existence of the common notions ; he does not deduce them or even give any list of them. But each faculty has its common notion; and they may be distinguished by six marks, their priority, inde- pendence, universality, certainty, necessity (for the well-being of man), and immediacy. Law is based on certain common notions; so is religion. Though Herbert expressly defines the scope of his book as dealing with the intellect, not faith, it is the common notions of religion he has illustrated most fully; and it is plain that it is in this part of his system that he is chiefly interested.. The common notions of religion are the famous five articles, which became the charter of the English deists (see Deism). There is little polemic against the received form of Christianity, but Herbert’s attitude towards the Church’s doctrine is distinctly negative, and he denies revelation except to the individual soul. In the De religione gentilium (completed 1645, published Amsterdam, 1663, translated into English by W. Lewis, London, 1705) he gives what may be called, in Hume’s words, “a natural history of religion.” By examining the heathen religions Herbert finds, to his great delight, the uni- versality of his five great articles, and that these are clearly recogniz- able under their absurdities as they are under the rites, ceremonies and polytheism invented by sacerdotal superstition. The same vein is maintained in the tracts De caiisis errorum, an unfinished work on logical fallacies, Religio laid, and Ad sacerdotes de religione laid (1645). In the De verilate Herbert produced the first purely metaphysical treatise written by an Englishman, and in the De religione gentilium one of the earliest studies extant in comparative theology; while both his metaphysical speculations and his religious views are throughout distinguished by the highest originality and provoked considerable controversy. His achievements in histori- cal writing are vastly inferior, and vitiated by personal aims and his preoccupation to gain the royal favour. Herbert’s first historical work is the Expeditio Buckinghami duds (published in a Latin translation in 1656 and in the original English by the earl of Powis for the

Philobiblon Society in i860), a defence of Buckingham's conduct of the ill-fated expedition of 1627. The Life and Raigne of King Henry VIII. (1649) derives its chief value from its com- position from original documents, but is ill-proportioned, and the author judges the character and statesmanship of Henry with too obvious a partiality.

His poems, published in 1665 (reprinted and edited by J. Churton Collins in 1881), show him in general a faithful disciple of Donne, obscure and uncouth. His satires are miserable compositions, but a few of his lyrical verses show power of reflection and true inspira- tion, while his use of the metre afterwards employed by Tennyson in his " In Memoriam " is particularly happy and effective. His Latin poems are evidence of his scholarship. Three of these had appeared together with the De causis errorum in 1645. To these works must be added A Dialogue between a Tutor and a Pupil (1768; a treatise on education, MS. in the Bodleian Library); a treatise on the king's supremacy in the Church (MS. in the Record Office and at Queen's College, Oxford), and his well-known auto- biography, first published by Horace Walpole in 1764, a naive and amusing narrative, too much occupied, however, with his duels and amorous adventures, to the exclusion of more creditable incidents in his career, such as his contributions to philosophy and history, his intimacy with Donne, Ben Jonson, Selden and Carew, Casaubori, Gassendi and Grotius, or his embassy in France, in relation to which he only described the splendour of his retinue and his social triumphs.

Bibliography. — The autobiography edited by Sidney Lee with correspondence from add. MSS. 7082 (1886) ; article in the Did. of Nat. Biog. by the same writer and the list of authorities there collated; Hist. MSS. Comm. Rep. x. app. iv., 378; Lord Herbert de Cherbury, by Charles de Remusat (1874); Eduard, Lord Herbert von Cherbury, by C. Guttler (a criticism of his philosophy; 1897); Collections Historical and Archaeological relating to Montgomery- shire, vols, vii., xi., xx,; R. Warner's Epistolary Curiosities, i. ser. ; Reid's works, edited by Sir William Hamilton; National Review, xxxv. 661 (Leslie Stephen) ; Locke's Essay on Human Understand- ing; Wood, Alh. Oxon. (Bliss), hi. 239; Gentleman's Magazine (1816), i. 201 (print of remains of his birthplace); Lord Herbert's Poems, ed. by J. Churton Collins (1881) ; Aubrey's Lives of Eminent Men; also works quoted under Deism.

HERBERT OF LEA, SIDNEY HERBERT, ist Bason (181b- 186 1), English statesman, was the younger son of the nth earl of Pembroke. Educated at Harrow and Oriel, Oxford, he made a reputation at the Oxford Union as a speaker, and entered the House of Commons as Conservative member for a division of Wiltshire in 1832. Under Peel

he held minor offices, and in 1845 was included in the cabinet as secretary at war, and again held this office in 1852-1855, being responsible for the War Office during the Crimean difficulties, and in 1859. It was Sidney Herbert who sent Florence Nightingale out to the Crimea, and he led the movement for War Office reform after the war,

the hard work entailed causing his breakdown in health, so that in July 1861, having been created a baron, he had to resign office, and died on the 2nd of August 1861. His statue was placed in front of the War Office in Pall Mall. He was succeeded in the title by his eldest son, who later became 13th earl of Pembroke, and the barony is now merged in that earldom; his second son became 14th earl. Another son, the Hon. Michael Herbert (1857-1904), was British Ambassador at Washington in succes- sion to Lord Pauncefote.

A life of Lord Herbert by Lord Stanmore was published in 1906.
HERBERTON, a mining town of Cardwell county, Queensland, Australia, 55 m. S.W. of Cairns. Pop. (1901) 2806. Tin was discovered in the locality in 1879, and to this mineral the town chiefly owes its prosperity, though copper, bismuth and some silver and gold are also found. Atherton, 12 m. from the town, is served by rail from Cairns, which is the port for the Herberton district.

HERCULANEUM, an ancient city of Italy, situated about two-thirds of a mile from the Portici station of the railway from Naples to Pompeii. The ruins are less frequently visited than those of Pompeii, not only because they are smaller in extent and of less obvious interest, but also because they are more difficult of access. The history of their discovery and explora- tion, and the artistic and literary relics which they have yielded, are worthy, however, of particular notice. The small part of the city, which was investigated at the spot called Gli scavi nuovi (the new excavations) was discovered in the 19th century. But the more important works were executed in the 18th century; and of the buildings then explored at a great depth, by means of tunnels, none is visible except the theatre, the orchestra of which lies 85 ft. below the surface.

The brief notices of the classical writers inform us that Hercu- laneum 1 was a small city of Campania between Neapolis and Pompeii, that it was situated between two streams at the foot of Vesuvius on a hill overlooking the sea, and that its harbour was at all seasons safe. With

regard to its earlier history nothing is known. The account given by Dionysius repeats a tradition which was most natural for a city bearing the name of Hercules. Strabo follows up the topographical data with a few brief historical statements — “Ocr/cot elxov Kal raxm \v Kal rr)v e < £e£?js Yloixm]iav . . . elra Tvpprjvol Kal neXet

1 A fragment of L. Sisenna calls it ” Oppidum tumulo in excelso loco propter mare, parvis moenibus, inter duas fluvias, infra Vesuvium collocatum ” (lib. iv., fragm. 53, Peters). Of one of these rivers this historian again makes mention in the passage where probably he related the capture of Herculaneum by Minatius Magius and T. Didius (Velleius Paterculus ii. 16). Further topographical details are supplied by Strabo, who, after speaking about Naples, continues — ixt > n*vov hi tppovpidv ktTTiv ‘HpebcXeioj’ kKKeinkvrjv els ry\v dakarrav &Kpav txov, KaTawvˆSfxivou At/St Bavˆaurcis &06′ vyitivrjV iroielv rr/v Karoudav. Dionysius of Halicarnassus relates that Heracles, in the place where he stopped with his fleet on the return voyage from Iberia, founded a little city (toX/xˆ) > to which he gave his own name; and he adds that this city was in his time inhabited by the Romans, and that, situated between Neapolis and Pompeii, it had \inkvas iv vavrl tcaipip f3e{3alcvs (i. 44)*

2 See also Niebuhr, Hist, of Rome, i. 76, and Mommsen, Die unteritalischen Dialekte (1850), p. 314; for later discussions see Osca Lingua, Pelasgians.

family of Calpurnius Piso. By means of the Via Campana it had easy communication north-westward with Neapolis, Puteoli and Capua,- and thence by the Via Appia with Rome; and southwards with Pompeii and Nuceria, and thence with Lucania and the Bruttii. In the year a.d. 63 it suffered terribly from the earthquake which, according to Seneca, ” Campaniam nunquam securam huius mali, indemnem tamen, et toties defunctam metu magna strage vastavit. Nam et Herculanensis oppidi pars ruit dubieque stant etiam quae relicta sunt ” (Nat. quaest.vi. 1). Hardly had Herculaneum completed the restoration of some of its principal buildings (cf. Mommsen, I.N. n. 2384; Catalogo del Museo Nazionale di Napoli, n. 11 51) when it fell beneath the great eruption of the year 79, described by Pliny the younger (Ep. vi. 16, 20), in which Pompeii also was destroyed, with other flourishing cities of Campania. According to the commonest account, on the 23rd of August of that year Pliny the elder, who had command of the Roman fleet at Misenum, set out to render assistance to a young lady of noble family named Rectina and others dwelling on that coast, but, as there was no escape by sea, the little harbour having been on a sudden filled up so as to be inaccessible, he was

obliged to abandon to their fate those people of Herculaneum who had managed to flee from their houses, overwhelmed in a moment by the material poured forth by Vesuvius. But the text of Pliny the younger, where this account is given, has been subjected to various interpreta- tions; and from the comparison of other classical testimonies and the study of the excavations it has been concluded that it is impossible to determine the date of the catastrophe, though there are satisfactory arguments to justify the statement that the event took place in the autumn. The opinion that immedi- ately after the first outbreak of Vesuvius a torrent of lava was ejected over Herculaneum was refuted by the scholars of the 18th century, and their refutation is confirmed by Beule (Le Drame du VSsuve, p. 240 seq.). And the last recensions of the passage quoted from Pliny, aided by an inscription, 3 prove that Rectina cannot have been the name of the harbour described by Beule (ib. pp. 122, 247), but the name of a lady who had implored succour, the wife of Caesius Bassus, or rather Tascius (cf. Pliny, ed. Keil, Leipzig, 1870; Aulus Persius, ed. Jahn, Sat. vi.) . The shore, moreover, according to the accurate studies of the engineer Michele Ruggiero, director of the excavations, was not altered by the causes adduced by Beule (p. 125), but by a simpler event. ” It is certain,” he says (Pompei e la regione sotterrata dal Vesuvio Vanno yg, Naples, 1879, p. 21 seq.), ” that the districts between the south and west, and those between the south and east, were overwhelmed in two quite different ways. From Torre Annunziata (which is believed to be the site of the ancient Oplontii) to San Giovanni a Teduccio, for a distance of about 9 m., there flowed a muddy eruption which in Herculaneum and the neighbouring places, where it was most abundant, raised the level of the country more than 65 ft. The matter transported consisted of soil of various kinds — sand, ashes, fragments of lava, pozzolana and whitish pumice, enclosing grains of uncalcined lime, similar in every respect to those of Pompeii. In the part of Herculaneum already excavated the corridors in the upper portions of the theatre are compactly filled, up to the head of the arches, with pozzolana and pumice transformed into tufa (which proves that the formation of this stone may take place in a comparatively short time). Tufa is also found in the lowest part of the city towards the sea in front of the few houses that have been discovered; and in the very high banks that surround them, as also in the lowest part of the theatre, there are plainly, to be seen earth, sand, ashes, fragments

8 C.I.L. ii. No. 3866. This Spanish inscription refers to a Rectina who died at the age of 18 and was the wife of Voconius Romanus. It is quite possible that she was the Rectina whom Pliny the elder wished

to assist during the disaster of Vesuvius, for her husband; Voconius Romanus, was an intimate friend of Pliny the younger. The latter addressed four letters to Voconius (i. 5, ii. 1, iii. 13, ix. 28), in another letter commended him to the emperor Trajan (x. 3), and in another (ii. 13) says of him: ” Hunc ego cum simul studere- mus arte familiariterque dilexi; ille meus in urbe, ille in secessu contubernalis ; cum hoc seria et jocos miscui.”

of lava and pumice, with little distinction of strata, almost always confused and mingled together, and varying from spot to spot in degree of compactness. It is clear that this immense congeries of earth and stones could not flow in a dry state over those 5 m. of country (in the beginning very steep, and at intervals almost level), where certainly it would have been arrested and all accumulated in a mound; but it must have been borne along by a great quantity of water, the effects of which may be distinctly recognized, not only in the filling and choking up even of the most narrow, intricate and remote parts of the buildings, but also in the formation of the tufa, in which water has so great a share; for it cannot be supposed that enough of it has filtered through so great a depth of earth. The torrent ran in a few hours to the sea, and formed that shallow or lagoon called by Pliny Subitum Vadum, which prevented the ships approaching the shores.” Hence it is that, while many made their escape from Pompeii (which was overwhelmed by the fall of the small stones and afterwards by the rain of ashes), comparatively few can have managed to escape from Hercu- laneum, and these, according to the interpretation given to the inscription preserved in the National Museum (Mommsen, I.N. n. 2455), found shelter in the neighbouring city of Neapolis, where they inhabited a quarter called that of the buried city (Suetonius, Titus, 8; C.I.L. x. No. 1492, in Naples: ” Regio primaria splendidissima Herculanensium “). The name of Herculaneum, which for some time remained attached to the site of the disaster, is mentioned in the later itineraries; but in the course of the middle ages all recollection of it perished.

In 1719, while Prince Elbeuf of the house of Lorraine, in command of the armies of Charles VI., was seeking crushed marble to make plaster for his new villa near Portici, he learned from the peasants that there were in the vicinity some pits from which they not only quarried excellent marble, but had extracted many statues in the course of years (see Jorio, Notizia degli scavi d’ Ercolano, Naples, 1827). In

1738, while Colonel D. Rocco de Alcubierre was directing the works for the construction of the ” Reali Delizie ” at Portici, he received orders from Charles IV. (later, Charles III. of Spain) to begin excavations on the spot where it had been reported to the king that the Elbeuf statues had been found. At first it was believed that a temple was being explored, but afterwards the inscriptions proved that the building was a theatre. This discovery excited the greatest commotion among the scholars of all nations; and many of them hastened to Naples to see the marvellous statues of the Balbi and the paintings on the walls. But everything was kept private, as the government wished to reserve to itself the right of illustrating the monuments. First of all Monsignor Bayardi was brought from Rome and commissioned to write about the antiquities which were being collected in the museum at Portici under the care of Camillo Paderni, and when it was recognized that the prelate had not suffi- cient learning, and by the progress of the excavations other most abundant material was accumulated, about which at once scholars and courtiers were anxious to be informed, Bernardo Tanucci, having become secretary of state in 1755, founded the Accademia Ercolanese, which published the principal works on Herculaneum (he Pitture ed i bronzi d’ Ercolano, 8 vols., 1757, 1792; Disserta- tionis isagogicae ad Herculanensium voluminum explanationem pars prima, 1797). The criterion which guided the studies of the academicians was far from being worthy of unqualified praise, and consequently their work did not always meet the approval of the best scholars who had the opportunity of seeing the monuments. Among these was Winckelmann, who in his letters gave ample notices of the excavations and the antiquities which he was able to visit on several occasions. Other notices were furnished by Gori, Symbolae litterariae Florentinae (1748, 1751), by Marcello Venuti, Descrizione delle prime scoperte d’ Ercolano (Rome, l748),andScipione Maffei, Tre lettere intorno alle scoperte a” Ercolano (Verona, 1748). The excavations, which continued for more than forty years (1738— 1780), were executed at first under the immediate direction of Alcubierre (1738-1741), and then with the assistance of the engineers Rorro and Bardet (1741-1745), Carl Weber (1750-1764), and Francesco La Vega. After the death of Alcubierre (1780) the last-named was appointed director-in-chief of the excavations; but from that time the investigations at Herculaneum were intermitted, and the researches at Pompeii were vigorously carried on. Resumed in 1827, the excavations at Herculaneum were shortly after sus-

C ended, nor were the new attempts made in 1866 with the money estowed by King Victor Emmanuel attended with success, being

impeded by the many dangers arising from the houses built overhead. The meagreness of the results obtained by the occasional works executed in the last century, and the fact that the investigators were unfortunate enough to strike upon places already explored, gave rise to the opinion that the whole area of the city had been crossed by tunnels in the time of Charles III. and in the beginning of the

reign of Ferdinand IV. And although it is recognized that the works had not been prosecuted with the caution that they required, yet in view of the serious difficulties that would attend the collection of the little that had been left by the first excavators, every proposal for new investigations has been abandoned. But in a memoir which Professor Barnabei read in the Reale Accademia dei Lincei (Atti delta R. Ac. series iii. vol. ii. p. 751) he undertook to prove that the researches made by the government in the 1 8th century did not cover any great area. The antiquities excavated at Herculaneum in that century (i.e. the 18th) form a collection of the highest scientific and artistic value. They come partly from the buildings of the ancient city (theatre, basilica, houses and forum), and partly from the private villa of a great Roman family (cf. Comparetti and de Petra, La Villa Ercolanese dei Pisoni, Turin, 1883). From the city come, among many other marble statues, the two equestrian statues of the Balbi (Museo Borbonico, vol. ii. pi. xxxviii.xxxix.), and the great imperial and municipal bronze statues. Mural paintings of extra ordinary beauty were also discovered here, such as those that repre- sent Theseus after the slaughter of the Minotaur (Helbig, Wandge- malde, Leipzig, 1878, No. 1214), Chiron teaching Achilles the art of playing on the lyre (ibid. No. 1291), and Hercules finding Telephus who is being suckled by the hind (ibid. No. 1 143).

Notwithstanding subsequent discoveries of stupendous paintings in the gardens of the Villa Farnesina on the banks of the Tiber, the monochromes of Herculaneum remain among the finest specimens of the exquisite taste and consummate skill displayed by the ancient artists. Among the best preserved is Leto and Niobe, which has been the subject of so many studies and so many publications (ibid. No. 1706). There is also a considerable number of lapidary inscrip- tions edited in vol. ii. of the epigraphic collection of the Cat. del Mus. Naz. di Napoli. The Villa Suburbana has given us a good number of marble busts, and the so-called statue of Aristides, but above all that splendid collection of bronze statues and busts mostly reproductions of famous'Greek works now to be found in the Naples Museum. It is thence that we have obtained the reposing Hermes, the drunken Silenus, the sleeping Faunus, the dancing girls, the bust called Plato's, that believed to be Seneca's, the two quoit- throwers or discoboli, and so many masterpieces more, figured by the academicians in their volume on the bronzes. But a still further discovery made in the Villa Suburbana contributed to magnify the greatness of Herculaneum; within its walls was found the famous library, of which, counting both entire and fragmentary volumes, 1803 papyri are preserved. Among the nations which took the greatest interest in the discovery of the Herculaneum library, the most honourable rank belongs to England, which sent Hayter and other scholars to Naples to solicit the publication of the volumes. Of the 341 papyri which have been unrolled, 195 have been published (Herculanensium voluminum quae supersunt (Naples, 1793-1809); Colleclio altera, 1862-1876). They contain works by Epicurus, Demetrius, Polystratus, Colotes, Chrysippus, Carniscus and Philo- demus. The names of the authors are in themselves sufficient to show that the library belonged to a person whose principal study was the Epicurean philosophy. But of the great master of this school only a few works have been found. Of his treatise IIcpJ vatas, divided into 37 books, it is known that there were three copies in the library (Coll. alt. vi.). Professor Comparetti, studying the first fasciculus of volume xi. of the same new collection, recognized most important fragments of the Ethics of Epicurus, and these he published in 1879 in Nos. ix. and xi. of the Rivista di filologia e d' istruzione classica (Turin). Even the other authors above mentioned are but poorly represented, with the exception of Philodemus, of whom 26 different treatises have been recognized. But all these philosophic discussions, belonging for the most part to an author less than secondary among the Epicureans, fall short of the high expectations excited by the first discovery of the library. Among the many volumes unrolled only a few are of historical importance — that

edited by Biicheler, which treats of the philosophers of the academy (Acad. phil. index Hercul., Greifswald, 1859), and that edited by Comparetti, which deals with the Stoics (“Papiro ercolanese inedito,” in Rivista difil. e d’ ist. class, anno iii. fasc. x.xii.). To appreciate the value of the volumes unrolled but not yet published (for 146 vols, were only copied and not printed) the student must read Com paretti’s paper, ” Relazione sui papiri ercolanesi.” Contributions of some value have been made to the study of Herculaneum frag- ments by Spengel (” Die hercul. Rollen,” in Philologus, 1863, suppl. vol.), and Gomperz (Hercul. Studien, Leipzig, 1865-1866, cf. Zeitschr. f. osterr. Gymn., 1867-1872). There are in the library some volum«s written in Latin, which, according to Boot (Notice sur les manuscrits trouves d, Herculaneum, Amsterdam, 1845), were found tied up in a bundle apart. Of these we know 18, but they are all so damaged that hardly any of them can be deciphered. One with verses relating to the battle of Actium is believed to belong to a poem of Kabirius. The numerical preponderance of the works of Philodemus led some people to believe that this had been the library of that philosopher. Professor Comparetti has thrown out a conjecture (cf. Comparetti and de Petra, op. cit.) that the library was collected by Lucius Piso Caesoninus (see Regione sotterrata dal Vesuvio, Naples, 1879, p. 159 sq.), but this conjecture has not found many supporters. Professor de Petra (in the same work) has also published the official notices upon the antiquities unearthed in the sumrrtuous

; .. j H Tpr

nl ii *

‘»-

rnˆ

V

i: ■ r”

.

VI

x-r

La

:

«>

Plan of ‘\ Villa Ercolanfese, Herculaneum

I Main Entrance

II Impluvium

III flai/i

‘] IV Principal Hall

I ,, V Garden

p-jf VI Pond

; I ! VII Belvedere

villa, giving the plan executed by Weber and recovered by chance by the director of excavations, Michele Ruggiero. This plan, which is here reproduced from de Petra l is the only satisfactory document for the topography of Herculaneum; for the plan of the theatre- published in the Bullettino archeologico italiano (Naples, 1861, i. p. 53, tab. iii.) was executed in 1747, when the excavations were not completed. And even for the history of the ” finds ” made in the Villa Suburbana the necessity for further studies makes itself felt, since there is a lack of agreement between the accounts given by Alcubierre and Weber and those communicated to the Philosophical Transactions (London, vol. x.) by Camillo Paderni, conservator of the Portici Museum.

Among the older works relating to Herculaneum, in addition to those already quoted, may be mentioned de Brosses, Lettre sur I’etat actuel de la ville souterraine d’Heraclea (Paris, 1750) ; Seigneux de CorrevOn, Lettre sur la dScouverte de I’ancienne mile d’Herculane (Yverdon, 1770) ; David, Les Anliquites d’ Herculaneum (Paris, 1780) ; D’ Ancora Gaetano, Prospetto storico-fisico degli scavi d’ Ercolano e di Pompei (Naples, 1803) ; Venuti, Prime Scoverte di Ercolano (Rome, 1748); and Romanelli, Viaggio ad Ercolano (Naples, 181 1). A full list will be found in vol. i. of Museo Borbonico (Naples, 1824), pp. 1-1 1, The most important reference work is C. Waldstein and L. Shoo-bridge, Herculaneum, Past, Present and Future (London, 1908) ; it contains full references to the history and the explorations, and to the

buildings and objects found (with illustrations). Miss E. R. Barker's Buried Herculaneum (1908) is exceedingly useful.

In 1904 Professor Waldstein expounded both in Europe and in America an international scheme for thorough investigation of the site. Negotiations of a highly complex character ensued with the Italian government, which ultimately in 1908 decided that the work should be undertaken by Italian scholars with Italian funds. The work was begun in the autumn of 1908, but financial difficulties with property owners in Resina immediately arose with the result that progress was practically stopped. (F. B.)

HERCULANO DE CARVALHO E ARAUJO, ALEXANDRE (1810-1877), Portuguese historian, was born in Lisbon of humble stock, his grandfather having been a foreman stonemason in the royal employ. He received his early education, comprising Latin, logic and rhetoric, at the Necessidades Monastery, and spent a year at the Royal Marine Academy studying mathematics with the intention of entering on a commercial career. In 1828 Portugal fell under the absolute rule of D. Miguel, and Herculano, becoming involved in the unsuccessful military pronunciamento of August 1 83 1, had to leave Portugal clandestinely and take refuge in England and France. In 1832 he accompanied the Liberal expedition to Terceira as a volunteer, and was one of D. Pedro's famous army of 7500 men who landed at the Mindello and occupied Oporto. He took part in all the actions of the great siege, and at the same time served as a librarian in the city archives. He published his first volume of verses, A Voz de Propheta, in 1832, and two years later another entitled A Harpa do Crente. Privation had made a man of him, and in these little books he proves himself a poet of deep feeling and consider- able power of expression. The stirring incidents in the political emancipation of Portugal inspired his muse, and he describes the bitterness of exile, the adventurous expedition to Terceira, the heroic defence of Oporto, and the final combats of liberty. In 1837 he founded the Panorama in imitation of the English Penny Magazine, and there and in Illustracao he published the historical tales which were afterwards collected into Lendas e Narratives; in the same year he became royal librarian at the Ajuda Palace, which enabled him to continue his studies of the past. The Panorama had a large circulation and in- fluence, and Herculano's biographical sketches of great men and his articles of literary and historical criticism did much to educate the middle class by acquainting them with the story of their nation, and with the progress of knowledge and the state of letters in foreign countries. On entering parliament in 1840 he resigned the editorship to devote himself to history," but he still remained its most important contributor.

Up to the age of twenty-five Herculano had been a poet, but he then abandoned poetry to Garrett, and after several essays in that direction he definitely introduced the historical novel into Portugal in 1844 by a book written in imitation of Walter Scott. Eurico treats of the fall of the Visigothic monarchy and the beginnings of resistance in the Asturias which gave 1 The diagram shows the arrangement and proportions of the Villa Ercolanese. The dotted lines show the course taken by the excava- tions, which began at the lower part of the plan.

birth to the Christian kingdoms of the Peninsula, while the Monge de Cister, published in 1848, describes the time of King John I., when the middle class and the municipalities first asserted their power and elected a king in opposition to the nobility. From an artistic standpoint, these stories are rather laboured productions, besides being ultra-romantic in tone; but it must be remembered that they were written mainly with an educational object, and, moreover, they deserve high praise for their style. Herculano had greater book learning than Scott, but lacked descriptive talent and skill in dialogue. His touch is heavy, and these novels show no dramatic power, which accounts for his failure as a playwright, but their influence was as great as their followers were many, and they still find readers. These and editions of two old chronicles, the Chronica de D. Sebastiao (1839) and the Annaes del rei D. Joao III (1844), prepared Herculano for his life's work, and the year 1846 saw the first volume of his History of Portugal from the Beginning of the Monarchy to the end of the Reign of Ajfonso III., a book written on critical lines and based on documents. The difficulties he encountered in producing it were very great, for the founda- tions had been ill-prepared by his predecessors, and he was obliged to be artisan and architect at the same time. He had to collect MSS. from all parts of Portugal, decipher, classify and weigh them before he could begin work, and then he found it necessary to break with precedents and destroy traditions. Serious students in Portugal and abroad welcomed the book as an historical work of the first rank, for its evidence of careful research, its able marshalling of facts, its learning and its painful accuracy, while the sculptural simplicity of the style and the correctness of the diction have made it a Portuguese classic. The first volume, however, gave rise to a celebrated controversy, because Herculano had reduced the famous battle of Ourique, which was supposed to have seen the birth of the Portuguese monarchy, to the dimensions of a mere skirmish, and denied the apparition of Christ to King Affonso, a fable first

circulated in the 15th century. Herculano was denounced from the pulpit and the press for his lack of patriotism and piety, and after bearing the attack for some time his pride drove him to reply. In a letter to the cardinal patriarch of Lisbon entitled Eu e Clero (1850), he denounced the fanaticism and ignorance of the clergy in plain terms, and this provoked a fierce pamphlet war marked by much personal abuse. The professor of Arabic in Lisbon intervened to sustain the accepted view of the battle, and charged Herculano and his supporter Gayangos with ignorance of the Arab historians and of their language. The conduct of the controversy, which lasted some years, did credit to none of the contending parties, but Herculano's statement of the facts is now universally accepted as correct. The second volume of his history appeared in 1847, the third in 1849 ar »d the fourth in 1853. In his youth, the excesses of absolutism had made Herculano a Liberal, and the attacks on his history turned this man, full of sentiment and deep religious conviction, into an anti-clerical who began to distinguish between political Catho- licism and Christianity. His History of the Origin and Establish- ment of the Inquisition (1854-1855), relating the thirty years' struggle between King John III. and the Jews— he to establish the tribunal and they to prevent him — was compiled, as the preface showed, to stem the Ultramontane reaction, but none the less carried weight because it was a recital of events with little or no comment or evidence of passion in its author. Next to these two books his study, Do Estado das classes servas na Peninsula desde VII. ate XII. seculo, is Herculano's most valuable contribution to history. In 1856 he began editing a series of Portugalliae monumenta historica, but personal differ- ences between him and the keeper of the Archive office, which he was forced to frequent, caused him to interrupt his historical studies, and on the death of his friend King Pedro V. he left the Ajuda and retired to a country house near Santarem.

Disillusioned with men and despairing of the future of his country, he spent the rest of his life devoted to agricultural pursuits, and rarely emerged from his retirement; when he did so, it was to fight political and religious reaction. Once he

had defended the monastic orders, advocating their reform and not their suppression, supported the rural clergy and idealized the village priest in his Parocho da Aldeia, after the manner of Goldsmith in the Vicar of Wakefield. Unfortunately, however, the brilliant epoch of the alliance of Liberalism and Catholicism, represented on its literary side by Chateaubriand and byLamar- tine, to whose poetic school Herculano had belonged, was past, and fanatical attacks and the progress of events drove this former champion of the Church into

conflict with.the ecclesiastical authorities. His protest against the Concordat of the 21st of February 1857 between Portugal and the Holy See, regulating the Portuguese Padroado in the East, his successful opposition to the entry of foreign religious orders, and his advocacy of civil marriage, were the chief landmarks in his battle with Ultra- montanism, and his Estudos sobre Casamento Civil were put on the Index. Finally in 1871 he attacked the dogmas of the Immaculate Conception and papal infallibility, and fell into line with the Old Catholics. In the domain of letters he remained until his death a veritable pontiff, and an article or book of his was an event celebrated from one end of Portugal to the other. The nation continued to look up to him for mental leadership, but, in his later years, lacking hope himself, he could not stimulate others or use to advantage the powers conferred upon him. In politics he remained a constitutional Liberal of the old type, and for him the people were the middle classes in opposition to the lower, which he saw to have been the supporters of tyranny in all ages, while he considered Radicalism to mean a return via anarchy to absolutism. However, though he conducted a political propaganda in the newspaper press in his early days, Herculano never exercised much influence in politics. Grave as most oi his writings are, they include a short description of a crossing from Jersey to Granville, in which he satirizes English character and customs, and reveals an unexpected sense' of humour. A rare capacity for tedious work, a dour Catonian rectitude, a passion for truth, pride, irritability at criticism and independence of character, are the marks of Herculano as a man. He could be broken but never bent, and his rude frankness accorded with his hard, ' sombre face, and alienated men's sympathies though it did not lose him their respect. His lyrism is vigorous, feeling, austere and almost entirely subjective and personal, while his pamphlets are distinguished by energy of conviction, strength of affirmation, and contempt for weaker and more ignorant opponents. His History of Portugal is a great but incomplete monument. A lack of imagination and of. the philosophic spirit prevented him from penetrating or drawing characters, but his analytical gift, joined to persevering toil and honesty of purpose enabled him to present a faithful account of ascertained facts and a satisfactory and lucid explanation of political and economic events. His remains lie in a majestic tomb in the Jeronymos at Belem, near Lisbon, which was raised by public subscription to the greatest modern historian of Portugal and of the Peninsula. His more important works have gone through many editions and his name is still one to conjure with.

Authorities. — Antonio de Serpa Pimentel, Alexandre Herculano e seu tempo (Lisbon, 1881); A. Romero Ortiz, La Litteratura Portuguesa en

el siglo XIX. (Madrid, 1869) ; Moniz Barreto, Revista de Portugal (July 1889). (E. Pr.)

HERCULES (O. Lat. Hercoles, Hercles), the latinized form of the mythical Heracles, the chief national hero of Hellas. The name ‘HpaKXijsO’Hpa, and k\(os = glory) is explained as” re- nowned through Hera ” (i.e. in consequence of her persecution) or ” the glory of Hera ” i.e. of Argos. The thoroughly national character of Heracles is shown by his being the mythical ancestor of the Dorian dynastic tribe, while revered by Ionian Athens, Lelegian Opus and Aeolo-Phoenician Thebes, and closely associated with the Achaean heroes Peleus and Telamon. The Perseid Alcmena, wife of Amphitryon of Tiryns, was Hercules’ mother, Zeus his father. After his father he is often called Amphitryoniades, and also Alcides, after the Perseid Alcaeus, father of Amphitryon. His mother and her husband lived at Thebes in exile as guests of King Creon. By the craft of Hera,

his foe through life, his birth was delayed, and that of Eurystheus, son of Sthenelus of Argos, hastened, Zeus having in effect sworn that the elder of the two should rule the realm of Perseus. Hera sent two serpents to destory the new-born Hercules, but he strangled them. He was trained in all manly accomplishments by heroes of the highest renown in each, until in a transport of anger at a reprimand he slew Linus, his instructor in music, with the lyre. Thereupon he was sent to tend Amphitryon’s oxen, and at this period slew the lion of Mount Cithaeron. By freeing Thebes from paying tribute to the Minyans of Orchomenus he won Creon’s daughter, Megara, to wife. Her children by him he killed in a frenzy induced by Hera. After purification he was sent by the Pythia to serve Eurystheus. Thus began the cycle of the twelve labours.

1. Wrestling with the Nemean lion.

2. Destruction of the Lernean hydra.

3. Capture of the Arcadian hind (a stag in art).

4. Capture of the boar of Erymanthus, while chasing which he fought the Centaurs and killed his friends Chiron and Pholus, this homicide leading to Demeter’s institution of mysteries.

5. Cleansing of the stables of Augeas.

6. Shooting the Stymphalian birds.

7. Capture of the Cretan bull subsequently slain by Theseus at Marathon.

8. Capture of the man-eating mares of the Thracian Diomedes.

9. Seizure of the girdle of Hippolyte, queen of the Amazons.

10. Bringing the oxen of Geryones from Erythia in the far west, which errand involved many adventures in the coast lands of the Mediterranean, and the setting up of the ” Pillars of Hercules ” at the Straits of Gibraltar.

1 1 . Bringing the golden apples from the garden of the Hesperides.

12. Carrying Cerberus from Hades to the upper world.

Most of the labours lead to various adventures called irapepya. On Hercules’ return to Thebes he gave his wife Megara to his friend and charioteer Iolaus, son of Iphicles, and by beating Eurytus of Oechalia and his sons in a shooting match won a claim to the hand of his daughter Iole, whose family, however, except her brother Iphitus, withheld their consent to the union. Iphitus persuaded Hercules to search for Eurytus’ lost oxen, but was killed by him at Tiryns in a frenzy. He consulted the Pythia about a cure for the consequent madness, but she declined to answer him. Whereupon he seized the oracular tripod, and so entered upon a contest with Apollo, which Zeus stopped by sending a flash of lightning between the combatants. The Pythia then sent him to serve the Lydian queen Omphale. He then, with Telamon, Peleus and Theseus, took Troy. He next helped the gods in the great battle against the giants. He destroyed sundry sea-monsters, set free the bound Prometheus, took part in the Argonautic voyage and the Calydonian boar hunt, made war against Augeas, and against Nestor and the Pylians, and restored Tyndareus to the sovereignty of Lacedae- mon. He sustained many single combats, one very famous struggle being the wrestling with the Libyan Antaeus, son of Poseidon and Ge (Earth), who had to be held in the air, as he grew stronger every time he touched his mother, Earth. Hercules withstood Ares, Poseidon and Hera, as well as Apollo. The close of his career is assigned to Aetolia and Trachis. He wrestles with Achelous for Deianeira ‘(” destructive to husband “), daughter of Oeneus, king of Calydon, vanquishes the river god, and breaks off one of his horns, which as a horn of plenty is found as an attribute of Hercules in art. Driven from Calydon for homicide, he goes with Deianeira to Trachis.

On the way he slays the centaur Nessus, who persuades Deianeira that his blood is a love-charm. From Trachis he wages successful war against the Dryopes and Lapithae as ally of Aegimius, king of the Dorians, who promised him a third of his realm, and after his death adopted Hyllus, his son by Deianeira. Finally Hercules attacks Eurytus, takes Oechalia and carries off Lola. Thereupon Deianeira, prompted by love and jealousy, sends him a tunic dipped in the blood of Nessus, and the unsuspecting hero puts it on just before sacrificing at the headland of Cenaeum in Euboea. (So far the dithyramb of Bacchylides xv. [xvi.], agrees with Sophocles' Trachiniae as to the hero's end.) Mad with pain, he seizes Lichas, the messenger who had brought the fatal garment, and hurls him on the rocks; and then he

wanders in agony to Mount Oeta, where he mounts a pyre, which, however, no one will kindle. At last Poeas, father of Philoctetes, takes pity on him, and is rewarded with the gift of his bow and arrows. The immortal part of Hercules passes to Olympus, where he is reconciled to Hera and weds her daughter Hebe. This account of the hero's principal labours, exploits and crimes is derived from the mythologists Apollodorus and Diodorus, who probably followed the Heracleia by Peisander of Rhodes as to the twelve labours or that of Panyasis of Halicarnassus, but sundry variations of order and incident are found in classical literature.

In one aspect Hercules is clearly a sun-god, being identified, especially in Cyprus and in Thasos (as Makar), with the Tyrian Melkarth. The third and twelfth labours may be solar, the horned hind representing the moon, and the carrying of Cerberus to the upper world an eclipse, while the last episode of the hero's tragedy is possibly a complete solar myth developed at Trachis. The winter sun is seen rising over the Cenaean promontory to toil across to Mount Oeta and disappear over it in a bank of fiery cloud. B ut more important and less speculative is the hero's aspect as a national type or an amalgamation of tribal types of physical force, of dauntless effort and endurance, of militant civilization, and of Hellenic enterprise, " stronger than everything except his own passions," and " at once above and below the noblest type of man " (Jebb). The fifth labour seems to symbolize some great improvement in the drainage of Elis. Strenuous devotion to the deliverance of mankind from dangers and pests is the " virtue " which, in Prodicus' famous apologue on the Choice of Hercules, the hero preferred to an easy and happy life. Ethically, Hercules symbolizes the attainment of glory and immortality by toil and suffering.

The Old-Dorian Hercules is represented in three cycles of myth, the Argive, the Boeotian and the Thessalian; the legends of Arcadia,

Aetolia, Lydia, &c, and Italy are either local or symbolical and comparatively late. The fatality by which Hercules kills so many friends as well as foes recalls the destroying Apollo; while his career frequently illustrates the Delphic views on blood-guiltiness and expiation. As Apollo's champion Hercules is Daphnephoros, and fights Cycnus and Amyntor to keep open the sacred way from Tempe to Delphi. As the Dorian tutelar he aids Tyndareus and Aegimius. As patron of maritime adventure (rjyffidvLos) he struggles with Nereus and Triton, slays Eryx and Busiris, and perhaps captures the wild horses and oxen, which may stand for pirates. As a god of athletes he is often a wrestler (7raX

Quite distinct was the Idaean Hercules, a Cretan Dactyl con- nected with the cult of Rhea or Cybele. The Greeks recognized

Hercules in an Egyptian deity Chons and an Indian Dorsanes, not to mention personages of other mythologies.

Hercules is supposed to have visited Italy on his return from Erythia, when he slew Cacus, son of Vulcan, the giant of the Aventine mount of Rome, who had stolen his oxen. To this victory was assigned the founding of the Ara maxima by Evander His worship, introduced from the Greek colonies in Etruria and in the south of Italy, seems to have been established in Rome from the earliest times, as two old Patrician gentes were associated with his cult and the Fabii claimed him as their ancestor The tithes vowed to him by Romans and men of Sora and Reate for safety on journeys and voyages, furnished sacrifices and (in Rome) public entertainment (polluctum). Tibur was a special seat of his cult. In Rome he was patron of gladiators, as of athletes in Greece. With respect to the Roman relations of the hero, it is manifest that the native myths of Recaranus or Sancus, or Dius Fidius, were transferred to the Hellenic Hercules – (C. A. M. F.)

w h d' P if eller V G s rl f ch f s ˆ Mythologie (4 th ed., Berlin, 1900); MMnlnZˆi A " s fu h ' hc tes Lexikon der griechischen und rbmischen MyMogie ; (1884); Sir R. C Jebb, Trachiniae of Sophocles (Introd.), (1892), Cn. Daremberg and E. Saglio, Dictionnaire des antiquMs g ™ C ?? eS s e A rom , alnes ' Br eal, Hercule et Cacus, 1863: J. G. Winter Myth of Hercules at Rome (New York, 1910)

J&£? • artiC ' e i ; A RE u E T Art c . fig- 16 represents Heracles wrestling with the river-god Achelous; fig. 20 from a small pediment, possibly of a shrine of the hero) the slaying of the Hydra; fig. 35

Heracles holding up the sky on a cushion.

Hercules was a favourite figure in French medieval literature. In the romance of Alexander the tent of the hero is decorated with T,)nXl f i S adve ” ture , s – I” the prose romance Les Prouesses

tnrlJZ A t rCU – X H u Cule (Paris ‘ ‘S 00). the hero ‘ s lab ours are represented as having been performed in honour of a Boeotian princess; Pluto is a king dwelling in a dismal castle; the Fates are tlVˆA u*li hm ? Pr ” ser P ine : the entrance to Pluto’s castle is Meridafrˆ ct *”””” ˆberus. Hercules conquers Spain and takes J;™ 9T y0 £- The b °°V s translated into English as Hercules £L (a { – .u), D F, ra P men ts of a French poem on the subject will be lound in the Bulletin de la soc. des anciens textes francais (1877). rˆ1ˆ nn 3 Ue r7 de V , lllei £ t0ok from Les Guesses his prose Los Doze S .1 r f ■ (Zam 7 a ‘ H83 and 1499), and Fernandez de Heredia wrote Trabajos y afanes de Hercules (Madrid, 1682), which belies its title, being a collection of adages and allegories. Le Fatiche

nn/friTrntJr if-VT”/* ln P° etic P rose b y Pietro Bassi, and the Dodeci Travagh dt Ercole (1544) a poem by J. Perillos.

HERCULES, in astronomy, a constellation of the northern hemisphere, mentioned by Eudoxus (4 th century bc) and Aratus (3rd century B.C.) and catalogued by Ptolemy (29 stars) and Tycho Brahe (28 stars). Represented by a man kneeling this constellation was first known as ” the man on his knees ” and was afterwards called Cetheus, Theseus and Hercules by the ancient Greeks. Interesting objects in this constellation are: a Her cults, a fine coloured double star, composed of an orange star of magnitude 2 \, and a blue star of magnitude 6; f Herculis, a binary star, discovered by Sir William Herschel in 1782; one component is a yellow star of the third magnitude, the other a bluish, which appears to vary from red to blue of magnitude 6; g and u Herculis, irregularly variable stars: and the cluster M. i 3 Herculis, the finest globular cluster in the northern hemisphere, containing at least 5000 stars and of the 1000 determined only 2 are variable.

HERD (a word common to Teutonic languages; the O Eng form was heard; cf. Ger. Herde, Swed. and Dan. hjord- the Sans, cardhas, which shows the pre-Teutonic form, means a troop), a number of animals of one kind driven or fed together usually applied to cattle as “flock ” is to sheep, but used also of whales, porpoises, &c, and of birds, as swans, cranes and curlews A ” herd-book ” is a book containing the pedigree and other information of any breed of cattle or pigs, like the

flock-book ” for sheep or ” stud-book ” for horses. Formerly the word ” herdwick ” was applied to the pasture ground under the care of a shepherd, and it is now used of a special hardy breed of sheep in Cumberland and Westmorland. The word

herd ” is also applied in a disparaging sense to a company of people, a mob or rabble, as ” the vulgar herd.” As the name for a keeper of a herd or flock of domestic animals, the herdsman it is usually qualified to denote the kind of animal under his

protection, as swine-herd, shepherd, &c, but in Ireland, Scotland and the north of England, ” herd ” alone is commonly used

HERDER, JOHANN GOTTFRIED VON (1744-1803), one of the most prolific and influential writers that Germany has pro- duced, was born in Mohrungen, a small town in East Prussia on the 25th of August 1744. Like his contemporary Lessing’ Herder had throughout his life to struggle against adverse circumstances. His father was poor, having to put together a subsistence by uniting the humble offices of sexton, choir-singer and petty schoolmaster. After receiving some rudimentary instruction from his father, the boy was sent to the grammar school of his native town. The mode of discipline practised by the pedantic and irritable old man who stood at the head of this institution was not at all to the young student’s liking, and the impression made upon him stimulated him later on to work out his projects of school reform. The hardships of his early years drove him to introspection and to solitary communion with nature, and thus favoured a more than proportionate development of the sentimental and poetic side of his mind. When quite young he expressed a wish to become a minister of the gospel, but his aspirations were discouraged by the local clergyman. In 1762, at the age of eighteen, he went up to Konigsberg with the intention of studying medicine but finding himself unequal to the operations of the dissecting-room he abandoned this object, and, by the help of one or two friends and his own self-supporting labours, followed out his earlier idea of the clerical profession by joining the university. There he came under the influence of Kant, who was just then passing from physical to metaphysical problems. Without becoming a disciple of Kant, young Herder was deeply stimulated to fresh critical inquiry by that thinker’s revolutionary ideas in philo- sophy. To Kant’s lectures and conversations he further owed something of his large interest in cosmological and anthropolo- gical problems. Among the writers whom he most carefully read were Plato, Hume, Shaftesbury, Leibnitz, Diderot and Rousseau. Another personal influence under which he fell

at Konigsberg and which was destined to be far more permanent, was that of J. G. Hamann, ” the northern Mage.” This writer had already won a name, and in young Herder he found a mind well fitted to be the receptacle and vehicle of his new ideas on literature From this vague, incoherent, yet gifted writer our author acquired some of his strong feeling for the naive element in poetry, and for the earliest developments of national literature. Even before he went to Konigsberg he had begun to compose verses, and at the age of twenty he took up the pen as a chief occupation. His first published writings were occasional poems and reviews contributed to the Konigsbergische Zeitung. Soon after this he got an appointment at Riga, as assistant master at the cathedral school, and a few years later, became assistant pastor. In this busy commercial town, in somewhat improved pecuniary and social circumstances, he developed the main ideas of his writings. In ,the year 1767 he published his first considerable work Fragmente Uber die neuere deutsche Literatur which at once made him widely known and secured for him the favourable interest of Lessing. From this time he continued to pour forth a number of critical writings on literature, art, &c. His bold ideas on these subjects, which were a great advance even on Lessmg’s doctrines, naturally excited hostile criticism and in consequence of this opposition, which took the form of aspersions on his religious orthodoxy, he resolved to leave Riga. He was much carried away at this time by the idea of a radical reform of social life in Livonia, which (after the exa’mple of Rousseau) he thought to effect by means of a better method of school-training. With this plan in view he began (1769) a tour through France, England, Holland, &c, for the purpose of collecting information respecting their systems of education. It was during the solitude of his voyage to France, when on deck at night, that he first shaped his idea of the genesis of primitive poetry, and of the gradual evolution of humanity. Having received an offer of an appointment as travelling tutor and chap- lain to the young prince of Eutin-Holstein, he abandoned his somewhat visionary scheme of a social reconstruction of a

Russian province. He has, however, left a curious sketch of his projected school reforms. His new duties led him to Strass- burg, where he met the young Goethe, on whose poetical develop- ment he exercised so potent an influence. At Darmstadt he made the acquaintance of Caroline Flachsland, to whom he soon became betrothed, and who for the rest of his life supplied him with that

abundance of consolatory sympathy which his sensitive and rather querulous nature appeared to require. The engage- ment as tutor did not prove an agreeable one, and he soon threw it up (1771) in favour of an appointment as court preacher and member of the consistory at Buckeburg. Here he had to encounter bitter opposition from the orthodox clergy and their followers, among whom he was regarded as a freethinker. His health continued poor, and a fistula in the eye, from which he had suffered from early childhood, and to cure which he had undergone a number of painful operations, continued to troubft him. Further, pecuniary difficulties, from which he never long managed to keep himself free, by delaying his marriage; added to his depression. Notwithstanding these trying circum- stances he resumed literary work, which his travels had inter- rupted. For some time he had been greatly interested by the poetry of the north, more particularly Percy's Reliques, the poems of " Ossian" (in the genuineness of which he like many others believed) and the works of Shakespeare. Under the influence of this reading he now finally broke with classicism and became one of the leaders of the new Sturm und Drang movement. He co-operated with a band of young writers at Darmstadt and Frankfort, including Goethe, who in a journal of their own sought to diffuse the new ideas. His marriage took place in 1773. In 1776 he obtained through Goethe's influence the post of general superintendent and Court preacher at Weimar, where he passed the rest of his life. There he enjoyed the society of Goethe, Wieland, Jean Paul (who came to Weimar in order to be near Herder), and others, the patronage of the court, with whom as a preacher he was very popular, and an opportunity of carrying out some of his ideas of school reform. Yet the social atmosphere of the place did not suit him. His personal relations with Goethe again and again became embittered. This, added to ill-health, served to intensify a natural irritability of tempera- ment, and the history of his later Weimar days is a rather dreary page in the chronicles of literary life. He had valued more than anything else a teacher's influence over other minds, and as he began to feel that he was losing it he grew jealous of the success of those who had outgrown this influence. Yet while presenting these unlovely traits, Herder's character was on the whole a worthy and attractive one. This seems to be sufficiently attested by the fact that he was greatly liked and esteemed, not only in the pulpit but in private intercourse, by cultivated women like the countess of Buckeburg, the duchess of Weimar and Frau von Stein, and, what perhaps is more, was exceedingly popular among the gymnasium pupils, in whose education he took so lively an interest. While much that Herder produced after settling in Weimar has little value, he wrote also some of his best works, among others his collection of popular poetry on

which he had been engaged for many years, Stimmen der Volker in Liedern (1778-1770) ; his translation of the Spanish romances of the Cid (1805); his celebrated Work on Hebrew poetry, Vom Geist der hebraischen Poesie (1 782-1 783); and his opus magnum, the Ideen zur Philosophie der Geschichte der Menschheit (1784-1791). Towards the close of his life he occupied himself, like Lessing, with speculative questions in philosophy and theology. The boldness of some of his ideas cost him some valuable friendships, as that of Jacobi, Lavater and even of his early teacher Hamann. He died on the 1 8th of December 1803, full of new literary plans up to the very last.

Herder's writings were for a long time regarded as of temporary value only, and fell into neglect. Recent criticism, however, has tended very much to raise their value by tracing out their wide and far-reaching influence. His works are very voluminous, and to a large extent fragmentary and devoid of artistic finish; nevertheless they are nearly always worth investigating for the •brilliant suggestions in which they abound. His place in German

literature has already been indicated in tracing his mental development. Like Lessing, whose work he immediately continued, he was a pioneer of the golden age of this literature. Lessing had given the first impetus to the formation of a national literature by exposing the folly of the current imitation of French writers. But in doing this he did not so much call his fellow-countrymen to develop freely their own national senti- ments and ideas as send them back to classical example and principle. Lessing was the exponent of German classicism; Herder, on the contrary, was a pioneer of the romantic movement. He fought against all imitation as such, and bade German writers be true to themselves and their national antecedents. As a sort of theoretic basis for this adhesion to national type in literature, he conceived the idea that literature and art, together with language and national culture as a whole, are evolved by a natural process, and that the intellectual and emotional life of each people is correlated with peculiarities of physical temperament and of material environment. In this way he became the originator Of that genetic or historical method which has since been applied to all human ideas and institutions. Herder was thus an evolutionist, but an evolutionist still under the influence of Rousseau. That is to say, in tracing back the later acquisitions of civilization to impulses which are as old as the dawn of primitive culture, he did not, as the modern evolutionist does, lay stress on the superiority of the later to the earlier stages of human development, but rather became enamoured of the simplicity and spontaneity of those early impulses which, since they are the oldest, easily come to look like the most real and precious. Yet even in this

way he helped to found the historical school in literature and science, for it was only after an excessive and sentimental interest in primitive human culture had been awakened that this subject would receive the amount of attention which was requisite for the genetic explanation of later developments. This historical idea was carried by Herder into the regions of poetry, art, religion, language, and finally into human culture as a whole. It colours all his writings, and is intimately connected with some of the most characteristic attributes of his mind, a quick sympathetic imagination, a fine feeling for local differences, and a scientific instinct for seizing the sequences of cause and effect.

Herder's works may be arranged in an ascending series, corre' sponding to the way in which the genetic or historical idea was developed and extended. First come the works on poetic literature, art, language and religion as special regions of development. Secondly, we have in the Ideen a general account of the process of human evolution. Thirdly, there are a number of writings which, though inferior in interest to the others, may be said to supply the philosophic basis of his leading ideas.

1. In the region of poetry Herder sought to persuade his country- men, both by example and precept, to return to a natural and spontaneous form of utterance. His own poetry has but little value ; Herder was a skilful verse-maker but hardly a creative poet. He was most successful in his translation of popular song, in which he shows a rare sympathetic insight into the various feelings and ideas of peoples as unlike as Greenlanders and Spaniards, Indians and Scots. In the Fragmente he aims at nationalizing German poetry and freeing it from all extraneous influence. He ridicules the ambi- tion of German writers to be classic, as Lessing had ridiculed their eagerness to be French. He looked at poetry as a kind of " proteus among the people, which changes its form according to language, manners, habits, according to temperament and climate, nay, even according to the accent of different nations." This fact of the idiosyncrasy of national poetry he illustrated with great fulness and richness in the case of Homer, the nature of whose works he was one of the first to elucidate, the Hebrew poets, and the poetry of the north as typified in " Ossian." This same idea of necessary relation to national character and circumstance is also applied to dramatic poetry, and more especially to Shakespeare. Lessing had done much to make Shakespeare known to Germany, but he had regarded him in contrast to the French dramatists with whom he also contrasted the Greek dramatic poets, and accordingly did not bring out his essentially modern and Teutonic character. Herder does this, and in doing so shows a far deeper understanding of Shakespeare's genius than his predecessor had shown.

2. The views on art contained in Herder's Kritische Wdlder (1769), Plastik (1778), &c, are chiefly valuable as a correction of the excesses into which reverence for Greek art had betrayed Winckelmann and Lessing, by help of his fundamental idea of national idiosyncrasy. He argues against the setting up of classic art as an unchanging type,

valid for all peoples and all times. He was one of the first to bring to light the characteristic excellences of Gothic art. Beyond this, he eloquently pleaded the cause of painting as a distinct art, which Lessing in his desire to mark off the formative arts from poetry and music had confounded with sculpture. He regarded this as the art of the eye, while sculpture was rather the art of the organ of touch. Painting being less real than sculpture, because lacking the third dimension of space, and a kind of dream, admitted of much greater freedom of treatment than this last. Herder had a genuine appreciation for early German painters, and helped to awaken the modern interest in Albrecht Dilrer.

3. By his work on language Vber den Ursprung der Sprache (1772), Herder may be said to have laid the first rude foundations of the science of comparative philology and that deeper science of the ultimate nat ure and origin of language. It was specially directed against the supposition of a divine communication of language to man. Its main argument is that speech is a necessary outcome of that special arrangement of mental forces which distinguishes man, and morl particularly from his habits of reflection. " If," Herder says, "it is incomprehensible to others how a human mind could invent language, it is as incomprehensible to me how a human mind could be what it is without discovering language for itself." The writer does not make that use of the fact of man's superior organic endow- ments which one might expect from his general conception of the relation of the physical and the mental in human development.

4. Herder's services in laying the foundations of a comparative science of religion and mythology are even of greater value than his somewhat crude philological speculations. In opposition to the general spirit of the 1 8th century he saw, by means of his historic sense, the naturalness of religion, its relation to man's wants and impulses. Thus with respect to early religious beliefs he rejected Hume's notion that religion sprang out of the fears of primitive men, in favour of the theory that it represents the first attempts of our species to explain

phenomena. He thus intimately associated religion with mythology and primitive poetry. As to later forms of religion, he appears to have held that they owe their vitality to their embodiment of the deep-seated moral feelings of our common humanity. His high appreciation of Christianity, which contrasts with the contemptuous estimate of the contemporary rationalists, rested on a firm belief in its essential humanity, to which fact, and not to conscious deception, he attributes its success. His exposition of this religion in his sermons and writings was simply an unfolding of its moral side. In his later life, as we shall presently see, he found his way to a speculative basis for his religious beliefs.

5. Herder's masterpiece, the Ideen zur Philosophic der Geschichte, has the ambitious aim of explaining the whole of human development in close connexion with the nature of man's physical environment. Man is viewed as a part of nature, and all his widely differing forms of development as strictly natural processes. It thus stands in sharp contrast to the anthropology of Kant, which opposes human development conceived as the gradual manifestation of a growing faculty of rational free will to the operations of physical nature. Herder defines human history as " a pure natural history of human powers, actions and propensities, modified by time and place." The Ideen shows us that Herder is an evolutionist after the manner of Leibnitz, and not after that of more modern evolutionists. The lower forms of life prefigure man in unequal degrees of imperfection; they exist for his sake, but they are not regarded as representing necessary antecedent conditions of human existence. The genetic method is applied to varieties of man, not to man as a whole. It is worth noting, however, that Herder in his provokingly tentative way of thinking comes now and again very near ideas made familiar to us by Spencer and Darwin. Thus in a passage in book xv. chap, ii., which unmistakably foreshadows Darwin's idea of a struggle for existence, we read: " Among millions of creatures whatever could preserve itself abides, and still after the lapse of thousands of years remains in the great harmonious order. Wild animals and tame, carnivorous and graminivorous, insects, birds, fishes and man are adapted to each other." With this may be compared a passage in the Ursprung der Sprache, where there is a curious adumbration of Spencer's idea that intelligence, as distinguished from instinct, arises from a growing complexity of action, or, to use Herder's words, from the substitution of a more for a less contracted sphere. Herder is more successful in tracing the early developments of particular peoples than in constructing a scientific theory of evolution. Here he may be said to have laid the foundations of the science of primitive culture as a whole. His

account of the first dawnings of culture, and of the ruder Oriental civilizations, is marked by genuine insight. On the other hand the development of classic culture is traced with a less skilful hand. Altogether this work is rich in suggestion to the philosophic historian and the anthropologist, though marked by much vagueness of conception and hastiness of generalization.

6. Of Herder's properly metaphysical speculations little needs to be said. He was too much under the sway of feeling and concrete imagination to be capable of great things in abstract thought. It is generally admitted that he had no accurate knowledge either of Spinoza, whose monism he advocated, or of Kant, whose critical philosophy he so fiercely attacked. Herder's Spinozism, which is set forth in his little work, Vom Erkennen iind Empfinden der menschlichen Seele (1778), is much less logically conceived than"

Lessing's. It is the religious aspect of it which attracts him, the presentation in God of an object which at once satisfies the feelings and the intellect. With respect to his attacks on the critical philosophy in the Metakritik (1799), it is easy to understand how his concrete mind, ever alive to the unity of things, instinctively rebelled against that analytic separation of the mental processes which Kant attempted. However crude and hasty this critical investigation, it helped to direct philosophic reflection to the unity of mind, and so to develop the post- Kantian line of speculation. Herder was much attracted by Schelling's early writings, but appears to have disliked Hegelianism because of the atheism it seemed to him to involve. In the Kalligone (1800), work directed against Kant's Kritik der Urteilskraft, Herder argues for the close connexion of the beautiful and the good. To his mind the content of art, which he conceived as human feeling and human life in its completeness, was much more valuable than the form, and so he was naturally led to emphasize the moral element in art. Thus his theoretic opposition to the Kantian aesthetics is but the reflection of his practical opposition to the form-idolatry of the Weimar poets. (J. S.)

Bibliography. — An edition of Herder's Samtliche Werke in 45 vols, was published after his death by his widow (1805-1820); a second in 60 vols, followed in 1827-1830; a third in 40 vols, in 1852- 1854. There is also an edition by H. Diintzer (24 vols., 1869-1879). But these have all been superseded by the monumental critical edition by B. Suphan (32 vols., 1877 sqq.). Of the many " selected works," mention may be made of those by B. Suphan (4 vols., 1884-1887); by H. Lambel, H. Meyer and E. Kuhnemann in Kiirschner's Deutsche Nationalliteratur (10 vols., 1885-1894). For Herder's correspondence,

see Aus Herders Nachlass (3 vols., 1856-1857), Herders Reise nach Ilalien (1859), Von und an Herder: Ungedruckte Briefe (3 vols., 1861-1862) — all three works edited by H. Diintzer and F. G. von Herder. Herder's Briefwechsel mit Nicolai and his Briefe an Hamann have been edited by O. Hoffmann (1887 and 1889). For biography and criticism, see Erinnerungen aus dem Leben Herders, by his wife, edited by J. G. M tiller (2 vols., 1820) ; /. G. von Herders Lebensbild (with his correspondence), by his son, E. G. von Herder (6 vols., 1846); C. Joret, Herder et la renaissance litteraire en Allemagne au XVIII' siecle (1875); F. von Barenbach, Herder als Vorgdnger Darwins (1877); R. Haym, Herder nach seinem Leben und seinen Werken (2 vols., 1880-1885); H. Nevinson, A Sketch of Herder and his Times (1884); M. Kronenberg, Herders Philosophic nach ihrem Entwicklungsgang (1889) ; E.Kuhnemann,i7er- ders Leben (1895) ; R. Burkner, Herder, sein Lebenund Wirken (1904).

HEREDIA, JOSt MARIA DE (1842-1905), French poet, the modern master of the French sonnet, was born at Fortuna Cafeyere, near Santiago de Cuba, on the 22nd of November 1842, being in blood part Spanish Creole and part French. At the age of eight he came from the West Indies to France, returning thence to Havana at seventeen, and finally making France his home not long afterwards. He received his classical education with the priests of Saint Vincent at Senlis, and after a visit to Havana he studied at the Ecole des Chartes at Paris. In the later 'sixties, with Francois Coppee, Sully-Prudhomme, Paul Verlaine and others less distinguished, he made one of the band of poets who gathered round Leconte de Lisle, and received the name of Parnassiens. To this new school, form — the technical side of their art — was of supreme importance, and, in reaction against the influence of Musset, they rigorously repressed in their work the expression of personal feeling and emotion. " True poetry," said M. de Heredia in his discourse on entering the Academy — " true poetry dwells in nature and in humanity, which are eternal, and not in the heart of the creature of a day, however great." M. de Heredia's place in the movement was soon assured. He wrote very little, and published even less, but his sonnets circulated in MS., and gave him a reputation before they appeared in 1893, together with a few longer poems, as a volume, under the title of Les Trophees. He was elected to the Academy on the 22nd of February 1894, in the place of Louis de Mazade-Percin the publicist. Few purely literary men can have entered the Academy with credentials so small in., quantity. A small volume of verse — a translation, with intro- duction, of Diaz del Castillo's History of the Conquest of New Spain (1878-1881) — a translation of the life of the nun Alferez (1894), de Quincey's " Spanish Military

Nun” — and one or two short pieces of occasional verse, and an introduction or so— this is but small literary baggage, to use the French expression. But the sonnets are of their kind among the most superb in modern literature. ” A Ugende des siecles in sonnets ” M. Francois Coppee called them. Each presents a picture, striking, brilliant, drawn with unfaltering hand — the picture of some

characteristic scene in man’s long history. The verse is flawless, polished like a gem; and its sound has distinction and fine harmony. If one may suggest a fault, it is that each picture is sometimes too much of a picture only, and that the poetical b’ne, like that of M. de Heredia’s master, Leconte de Lisle himself, is occasionally overcrowded. M. de Heredia was none the less one of the most skilful craftsmen who ever practised the art of verse. In iqoi he became librarian of the Bibliotheque de l’Arsenal at Paris. He died at the Chateau de Bourdonne (Seine-et-Oise) on the 3rd of October 1905, having completed his critical edition of Andre Chenier’s works.

HEREDIA Y CAMPUZANO, JOSE MARIA (1803-1830), Cuban poet, was born at Santiago de Cuba on the 31st of December 1803, studied at the university of Havana, and was called to the bar in 1823. In the autumn of 1823 he was arrested on a charge of conspiracy against the Spanish government, and was sentenced to banishment for life. He took refuge in the United States, published a volume of verses at New York in 18257 and then went to Mexico, where, becoming naturalized, he obtained a post as magistrate. In 1832 a collection of his poems was issued at Toluca, and in 1836 he obtained permission to visit Cuba for two months. Disappointed in his political ambitions, and broken in health, Heredia returned to Mexico in January 1837, and died at Toluca on the 21st of May 1839. Many of his earlier pieces are merely clever translations from French, English and Italian; but his originality is placed beyond doubt by such poems as the Himno del desterrado, the epistle to Emilia, Desen- garios, and the celebrated ode to Niagara. Bello may be thought to excel Heredia in execution, and a few lines of Olmedo’s Canto d Junin vibrate with a virile passion to which the Cuban poet rarely attained; but the sincerity of his patriotism and the sublimity of his imagination have secured for Heredia a real supremacy among Spanish-American poets.

The best edition of his works is that published at Paris in 1893 with a preface by Elias Zerolo.

HEREDITAMENT (from Lat. heredilare, to inherit, heres, heir), in law, every kind of property that can be inherited. Hereditaments are divided into corporeal and incorporeal; corporeal hereditaments are ” such as affect the senses, and may be seen and handled by the body; incorporeal are not the subject of sensation, can neither be seen nor handled, are creatures of the mind, and exist only in contemplation ” (Blackstone, Commentaries) . An example of a corporeal hereditament is land held in freehold, of incorporeal herditaments, tithes, advowsons, pensions, annuities, rents, franchises, &c. It is still used in the phrase ” lands, tenements and hereditaments ” to describe property in land, as distinguished from goods and chattels or movable property.

HEREDITY, in biological science, the name given to the generalization, drawn from the observed facts, that animals and plants closely resemble their progenitors. (That the resemblance is not complete involves in the first place the subject of variation (see Variation and Selection) ; but it must be clearly stated that there is no adequate ground for the current loose statements as to the existence of opposing ” laws ” or ” forces ” of heredity and variation.) In the simplest cases there seems to be no separate problem of heredity. When a creeping plant propagates itself by runners, when a Nais or Myrianida breaks up into a series of similar segments, each of which becomes a worm like the parent, we have to do with the general fact that growing organisms tend to display a symmetrical repetition of equivalent parts, and that reproduction by fission is simply a special case of metamerism. When we try to answer the question why the segments of an organism resemble one another, whether they remain in association to form a segmented animal, or break into different animals, we come to the conclusion, which at least is on the way to an answer, that it is because they are formed from pieces of the same protoplasm, growing under similar conditions. It is apparently a fundamental property of protoplasm to be able to multiply by division into parts, the properties of which are similar to each other and to those of the parent.

This leads us directly to the cases of reproduction where there is an obvious problem of heredity. In the majority of cases among animals and plants the new organisms arise from portions of living matter, separated from the parents, but different from the parents in size and structure. These germs of the new organisms may be spores, reproductive cells, fused reproductive cells or multicellular masses (see Reproduction). For the present purpose it is enough to state that they consist of portions of the parental protoplasm. These pass through an embryo- logical history, in which by growth,

multiplication and specializa- tion they form structures closely resembling the parents. Now, if it could be shown that these reproductive masses arose directly from the reproductive masses which formed the parent body, the problems of heredity would be extremely simplified. If the first division of a reproductive cell set apart- one mass to lie dormant for a time and ultimately to form the reproductive cells of the new generation, while the other mass, exactly of the same kind, developed directly into the new organism, then heredity would simply be a delayed case of what is called organic symmetry, the tendency of similar living material to develop in similar ways under the stimulus of similar external conditions. The cases in which this happens are very rare. In the Diptera the first division of the egg-cell separates the nuclear material of the subsequent reproductive cells from the material that is elaborated into the new organism to contain these cells. In the Daphnidae and in Sagitta a similar separation occurs at slightly later stages; in vertebrates it occurs much later; while in some hydroids the germ-cells do not arise in the individual which is developed from the egg-cell at all, but in a much later generation, which is produced from the first by budding. However, it is not necessary to dismiss the fertile idea of what Moritz Nussbaum and August Weismann, who drew attention to it, called "con- tinuity of the germ-plasm." Weismann has shown that an actual series of organic forms might be drawn up in which the formation of germ-cells begins at stages successively more remote from the first division of the egg-cell. He has also shown evidence, singularly complete in the case of the hydroids, for the existence of an actual migration of the place of formation of the germ-cells, the migration reaching farther and farther from the egg-cell. He has elaborated the conception of the germ-track, a chain of cell generations in the development of any creature along which the reproductive material saved over from the development of one generation for the germ-cells of the next generation is handed on in a latent condition to its ultimate position. And thus he supposes a real continuity of the germ-plasm, extending from generation to generation in spite of the apparent discontinuity in the observed cases. The conception certainly ranks among the most luminous and most fertile contributions of the 19th century to biological thought, and it is necessary to examine at greater length the superstructure which Weismann has raised upon it.

Weismann 's Theory of the Germ-plasm. — A living being takes its individual origin only where there is separated from the stock of the parent a little piece of the peculiar reproductive plasm, the so-called germ-plasm. In sexless reproduction one parent is enough; in sexual reproduction equivalent masses of germ- plasm from each parent

combine to form the new individual. The germ-plasm resides in the nucleus of cells, and Weismann identifies it with the nuclear material named chromatin. Like ordinary protoplasm, of which the bulk of cell bodies is composed, germ-plasm is a living material, capable of growing in bulk without alteration of structure when it is supplied with appro- priate food. But it is a living material much more complex than protoplasm. In the first place, the mass of germ-plasm which is the starting-point of a new individual consists of several, sometimes of many, pieces named ” idants,” which are either the chromosomes into a definite number of which the nuclear material of a dividing cell breaks up, or possibly smaller units named chromomeres. These idants are a collection of ” ids,” which Weismann tentatively identifies with the microsomata contained in the chromosomes, which are visible after treatment I with certain reagents. Each id contains all the possibilities —

generic, specific, individual — of a new organism, or rather the directing substance which in appropriate surroundings of food, &c, forms a new organism. Each id is a veritable micro- cosm, possessed of an historic architecture that has been elaborated slowly through the multitudinous series of generations that stretch backwards in time from every living individual. This microcosm, again, consists of a number of minor vital units called ” determinants,” which cohere according to the architec- ture of the whole id. The determinants are hypothetical units corresponding to the number of parts of the organism inde- pendently variable. Lastly, each determinant consists of a number of small hypothetical units, the ” biophores.” These are adaptations of a conception of H. deVries, and are supposed to become active by leaving the nucleus of the cell in which they lie, passing out into the general protoplasm of the cell and ruling its activities. Each new individual begins life as a nucleated cell, the nucleus of which contains germ-plasm of this complex structure derived from the parent. The reproductive cell gives rise to the new individual by continued absorption of food, by growth, cell-divisions and cell-specializations. The theory supposes that the first divisions of the nucleus are ” doubling,” or homogeneous divisions. The germ-plasm has grown in bulk without altering its character in any respect, and, when it divides, each resulting mass is precisely alike. From these first divisions a chain of similar doubling divisions stretches along the ” germ-tracks,” so marshalling unaltered germ-plasm to the generative organs of the new individual, to be ready to form the germ-cells of the

next generation. In this mode the continuity of the germ-plasm from individual to individual is maintained. This also is the immortality of the germ-cells, or rather of the germ-plasm, the part of the theory which has laid so large a hold on the popular imagination, although it is really no more than a reassertion in new terms of biogenesis. With this also is connected the celebrated denial of the inheritance of acquired characters. It seemed a clear inference that, if the hereditary mass for the daughters were separated off from the hereditary mass that was to form the mother, at the very first, before the body of the mother was formed, the daughters were in all essentials the sisters of their mother, and could take from her nothing of any characters that might be impressed on her body in subsequent development. In the later elaboration of his theory Weismann has admitted the possibility of some direct modification of the germ-plasm within the body of the individual acting as its host.

The mass of germ-plasm which is not retained in unaltered form to provide for the generative cells is supposed to be employed for the elaboration of the individual body. It grows, dividing and multiplying, and forms the nuclear matter of the tissues of the individual, but the theory supposes this process to occur in a peculiar fashion. The nuclear divisions are what Weismann calls ” differentiating ” or heterogeneous divisions. In them the microcosms of the germ-plasm are not doubled, but slowly disintegrated in accordance with the historical architecture of the plasm, each division differentiating among the determinants and marshalling one set into one portion, another into another portion. There are differences in the observed facts of nuclear division which tend to support the theoretical possibility of two sorts of division, but as yet these have not been correlated definitely with the divisions along the germ-tracks and the ordinary divisions of embryological organogeny. The theoretical conception is, that when the whole body is formed, the cells contain only their own kind of determinants, and it would follow from this that the cells of the tissues cannot give rise to structures containing germ-plasm less disintegrated than their own nuclear material, and least of all to reproductive cells which must contain the undisintegrated microcosms of the germ-plasm. Cases of bud-formation and of reconstructions of lost parts (see Re- generation of Lost Parts) are regarded as special adaptations made possible by the provision of latent groups of accessory determinants, to become active only on emergency.

It is to be noticed that Weismann’s conception of the processes of ontogeny is strictly evolutionary, and in so far is a reversion

to the general opinion of biologists of the 17th and 18th centuries. These supposed that the germ-cell contained an image-in-little of the adult, and that the process of development was a mere unfolding or evolution of this, under the influence of favouring and nutrient forces. Hartsoeker, indeed, went so far as to figure the human spermatozoon with a mannikin seated within the " head," and similar extremes of imagination were indulged in by other writers for the spermatozoon or ovum, according to the view they took of the relative importance of these two bodies. C. F. Wolff, in his Theoria generationis (1759), was the first distinguished anatomist to make assault on these evolutionary views, but his direct observations on the process of development were not sufficient in bulk nor in clarity of interpretation to convince his contemporaries. Naturally the improved methods and vastly greater knowledge of modern day's have made evolution in the old sense an impossible con- ception; we know that the egg is morphologically unlike the adult, that various external conditions are necessary for its subsequent progress through a slow series of stages, each of which is unlike the adult, but gradually approaching it until the final condition is reached. None the less, Weismann's theory supposes that the important determining factor in these gradual changes lies in the historical architecture of the germ- plasm, and from the theoretical point of view his theory remains strictly an unfolding, a becoming manifest of hidden complexity. Hertwig's View. — The chief modern holder of the rival view, and the writer who has put together in most cogent form the objections to Weismann's theory, is Oscar Hertwig. He points out that there is no direct evidence for the existence of differ- entiating as opposed to doubling divisions of the nuclear matter, and, moreover, he thinks that there is very generally diffused evidence as to the universality of doubling division. In the first place, there is the fundamental fact that single-celled organisms exhibit only doubling division, as by that the persistence of species which actually occurs alone is possible. In the case of higher plants, the widespread occurrence of tissues with power of reproduction, the occurrence of budding in almost any part of the body in lower animals and in plants, and the widespread powers of regeneration of lost parts, are easily intelligible if every cell like the egg-cell has been formed by doubling division, and so contains the germinal material for every part of the organism, and thus, on the call of special conditions, can become a germ-cell again. He lays special stress on those experiments in which the process of development has been interfered with in various ways at various stages, as showing that the cells which arise from the division of the egg-cell were not predestined unalterably for a particular role, according to a predetermined plan. He dismisses Weismann's suggestion of the presence of accessory determinants

which remain latent unless they happen to be required, as being too complicated a supposition to be supported without exact evidence, a view in which he has received strong support from those who have worked most at the experimental side of the question. From consideration of a large number of physiological facts, such as the results of grafting, transplantations of tissues and transfusions of blood, he con- cludes that the cells of an organism possess, in addition to their patent microscopical characters, latent characters peculiar to the species, and pointing towards a fundamental identity of the germinal substance in every cell.

The Nuclear Matter. — Apart from these two characteristic protagonists of extreme and opposing views, the general consensus of biological opinion does not take us very far beyond the plainest facts of observation. The resemblances of heredity are due to the fact that the new organism takes its origin from a definite piece of the substance of its parent or parents. This piece always contains protoplasm, and as the protoplasm of every animal and plant appears to have its own specific reactions, we cannot exclude this factor; indeed many, following the views of M. Verworn, and seeing in the specific metabolisms of proto- plasm a large part of the meaning of life, attach an increasing importance to the protoplasm in the hereditary mass. Next, it always contains nuclear matter, and, in view of the extreme

specialization of the nuclear changes in the process of matura- tion and fertilization of the generative cells, there is more than sufficient reason for believing that the nuclear substance, if not actually the specific germ-plasm, is of vast importance in heredity. The theory of its absolute dominance depends on a number of experiments, the interpretation of which is doubtful. Sloritz Nussbaum showed that in Infusoria non-nucleated fragments of a cell always died, while nucleated fragments were able to complete themselves; but it may be said with almost equal confidence that nuclei separated from protoplasm also invariably die — at least, all attempts to preserve them have failed. Hertwig and others, in their brilliant work on the nature of fertilization, shdwed that the process always involved the entrance into the female cell of the nucleus of the male cell, but we now know that part of the protoplasm of the spermatozoon also enters. T. Boveri made experiments on the cross-fertilization of non-nucleated fragments of the eggs of Sphaerechinus granulans with

spermatozoa of Echinus microtubercidatus, and obtained dwarf larvae with only the paternal characters; but the nature of his experiments was not such as absolutely to exclude doubt. Finally, in addition to the nucleus and the protoplasm, another organism of the cell, the centrosome, is part of the hereditary mass. In sum, while most of the evidence points to a pre- ponderating importance of the nuclear matter, it cannot be said to be an established proposition that the nuclear matter is the germ-plasm. Nor are we yet definitely in a position to say that the germinal mass (nuclear matter, protoplasm, &c, of the repro- ductive cells) differs essentially from the general substance of the organism — whether, in fact, there is continuity of germ-plasm as opposed to continuity of living material from individual to individual. The origin of sexual cells from only definite places, in the vast majority of cases, and such phenomena as the phylo- genetic migration of their place of origin amcng the Hydro-medusae, tell strongly in favour of Weismann's conception. Early experiments on dividing eggs, in which, by separation or transposition, cells were made to give rise to tissues and parts of the organism which in the natural order they would not have produced, tell strongly against any profound separation between germ-plasm and body-plasm. It is also to be noticed that the failure of germ-cells to arise except in specific places may be only part of the specialized ordering of the whole body, and does not necessarily involve the interpretation that reproductive material is absolutely different in kind.

Amphimixis. — Hitherto we have considered the material bearer of heredity apart from the question of sexual union, and we find that the new organism takes origin from a portion of living matter, forming a material which may be called germ- plasm, in which resides the capacity to correspond to the same kind of surrounding forces as stimulated the parent germ-plasm by growth of the same fashion. In many cases {e.g. asexual spores) the piece of germ-plasm comes from one parent, and from an organ or tissue not associated with sexual reproduction; in other cases (parthenogenetic eggs) it comes from the ovary of a female, and may have the apparent characters of a sexual egg, except that it develops without fertilization; here also are to be included the cases where normal female ova have been induced to develop, not by the entrance of a spermatozoon, but by artificial chemical stimulation. In such cases the problem of heredity does not differ fundamentally from the symmetrical repetition of parts. In most of the higher plants and animals, however, sexual reproduction is the normal process, and from our present point of view the essential feature of this is that the germ-plasm which starts the new individual

(the fertilized egg) is derived from the male (the spermatozoon) and from the female parent (the ovum). Although it cannot yet be set down sharply as a general proposition, there is considerable evidence to show that in the preparation of the ovum and spermatozoon for fertilization the nuclear matter of each is reduced by half (reduc- ing division of the chromosomes), and that fertilization means the restoration of the normal bulk in the fertilized cell by equal contributions from male and female. So far as the known facts of this process of union of germ-plasms go, they take us no

farther than to establish such a relation between the offspring and two parents as exists between the offspring and one parent in the other cases. Amphimixis has a vast importance in the theory of evolution (Weismann, for instance, regards it as the chief factor in the production of variations); for its relation to heredity we are as yet dependent on empirical observations.

Heredity and Development. — The actual process by which the germinal mass slowly assumes the characters of the adult— that is, becomes like the parent — depends on the interaction of two sets of factors: the properties of the germinal material itself, and the influences of substances and conditions external to the germinal material. Naturally, as K. W. von Nageli and Hertwig in particular have pointed out, there is no perpetual sharp contrast between the two sets of factors, for, as growth proceeds, the external is constantly becoming the internal; the results of influences, which were in one stage part of the environment, are in the next and subsequent stages part of the embryo. The differences between the exponents of evolution and epigenesis offer practical problems to be decided by experiment. Every phenomenon in development that is proved the direct result of epigenetic factors can be discounted from the complexity of the germinal mass. If, for instance, as H. Driesch and Hertwig have argued, much of the differentiation of cells and tissues is a function of locality and is due to the action of different external forces on similar material, then just so much burden is removed from' what evolutionists have to explain. That much remains cannot be doubted. Two eggs similar in appearance develop side by side in the same sea-water, one becoming a mollusc, the other an Amphioxus. Hertwig would say that the slight differ- ences in the original eggs would determine slight differences in metabolism and so forth, with the result that the segmentation of the two is slightly different; in the next stage the differences in metabolisms and other relations will be increased, and so on indefinitely. But in such cases c'est le premier pas qui coAte, and the absolute cost in theoretical complexity of the germinal material can be estimated only after a prolonged course of

experimental work in a field which is as yet hardly touched.

Empirical Study of Heredity. — The fundamental basis of heredity is the separation of a mass from the parent (germ-plasm) which under certain conditions grows into an individual resem- bling the parent. The goal of the study of heredity will be reached only when all the phenomena can be referred to the nature of the germ-plasm and of its relations to the conditions under which it grows, but we have seen how far our knowledge is from any attempt at such references. In the meantime, the empirical facts, the actual relations of the characters in the offspring to the characters of the parents and ancestors, are being collected and grouped. In this inquiry it at once becomes obvious that every character found in a parent may or may not be present in the offspring. When any character occurs in both, it is generally spoken of as transmissible and of having been transmitted. In this broad sense there is no character that is not transmissible. In all kinds of reproduction, the characters of the class, family, genus, species, variety or race, and of the actual individual, are transmissible, the certainty with which any character appears being almost in direct proportion to its rank in the descending scale from order to individual. The transmitted characters are anatomical, down to the most minute detail; physiological, including such phenomena as diatheses, timbre of voice and even compound phenomena, such as gau- cherie and peculiarity of handwriting; psychological; patho- logical; teratological, such as syndactylism and all kinds of individual variations. Either sex may transmit characters which in themselves are necessarily latent, as, for instance, a bull may transmit a good milking strain. In forms of asexual reproduction, such as division, budding, propagation by slips and so forth, every character of the parent may appear in the descendant, and apparently even in the descendants produced from that descendant by the ordinary sexual processes. In reproduction by spore formation, in parthenogenesis and in ordinary sexual modes, where there is an embryological history between the separated mass and the new adult, it is necessary

to attempt a difficult discrimination between acquired and innate characters.

Acquired Characters. — Every character is the result of two sets of factors, those resident in the germinal material and those imposed from without. Our knowledge has taken us far beyond any such idea

as the formation of a germinal material by the collection of particles from the adult organs and tissues (gem- mules of C. Darwin). The inheritance of any character means the transmission in the germinal material of matter which, brought under the necessary external conditions, develops into the character of the parent. There is necessarily an acquired or epigenetic side to every character; but there is nothing in our knowledge of the actual processes to make necessary or even probable the supposition that the result of that factor in one generation appears in the germ-plasm of the subsequent generations, in those cases where an embryological development separates parent and offspring. The development of any normal, so-called ” innate,” character, such as, say, the assumption of the normal human shape and relations of the frontal bone, requires the co-operation of many factors external to the develop- ing embryo, and the absence of abnormal distorting factors. When we say that such an innate character is transmitted, we mean only that the germ-plasm has such a constitution that, in the presence of the epigenetic factors and the absence of abnormal epigenetic factors, the bone will appear in due course and in due form. If an abnormal epigenetic factor be applied during development, whether to the embryo in utero, to the developing child, or in after life, abnormality of some kind will appear in the bone, and such an abnormality is a good type of what is spoken of as an ” acquired ” character. Naturally such a character varies with the external stimulus and the nature of the material to which the stimulus is applied, and probability and observation lead us to suppose that as the germ-plasm of the offspring is similar to that of the parent, being a mass separated from the parent, abnormal epigenetic influences would produce results on the offspring similar to those which they produced on the parent. Scrutiny of very many cases of the supposed inheritance of acquired characters shows that they may be explained in this fashion — that is to say, that they do not necessarily involve any feature different in kind from what we understand to occur in normal development. The effects of increased use or of disuse on organs or tissues, the reactions of living tissues to various external influences, to bacteria, to bacterial or other toxins, or to different conditions of respiration, nutrition and so forth, we know empirically to be different in the case of different individuals, and we may expect that when the living matter of a parent responds in a certain way to a certain external stimulus, the living matter of the descendant will respond to similar circumstances in a similar fashion. The operation of similar influences on similar material accounts for a large proportion of the facts. In the important case of the transmission of disease from parent to offspring it is plain that three sets of normal factors may operate, and other cases of transmission must be subjected

to similar scrutiny: (i) a child may inherit the anatomical and physiological con- stitution of either parent, arid with that a special liability of failure to resist the attacks of a wide-spread disease; (2) the actual bacteria may be contained in the ovum or possibly in the spermatozoon; (3) the toxins of the disease may have affected the ovum, or the spermatozoon, or through the placenta the growing embryo. Obviously in the first two cases the offspring cannot be said in any strict sense to have inherited the disease; in the last case, the theoretical nomenclature is more doubtful, but it is at least plain that no inexplicable factor is involved.

It is to be noticed, however, that ” Lamarckians ” and ” Neo-Lamarckians ” in their advocacy of an inheritance of ” acquired characters ” make a theoretical assumption of a different kind, which applies equally to ” acquired ” and to ” innate ” char- acters. They suppose that the result of the epigenetk factors is reflected on the germ-plasm in such a mode that in develop- ment the products would display the same or a similar character without the co-operation of the epigenetic factors on the new

individual, or would display the result in an accentuated form if with the renewed co-operation of the external factors. Such an assumption presents its greatest theoretical difficulty if, with Weismann, we suppose the germ-plasm to be different in kind from the general soma-plasm, and its least theoretical difficulty if, with Hertwig, we suppose the essential matter of the repro- ductive cells to be similar in kind to the essential substance of the general body cells. But, apart from the differences between such theories, it supposes, in all cases where an embryological development lies between parent and descendant, the existence of a factor towards which our present knowledge of the actual processes gives us no assistance. The separated hereditary mass does not contain the organs of the adult; the Lamarckian factor would involve the translation of the characters of the adult back into the characters of the germ-cell in such a fashion that when the germ-cell developed these characters would be re- translated again into those which originally had been produced by co-operation between germ-plasm characters and epigenetic factors. In the present state of our knowledge the theoretical difficulty is not fatal to the Lamarckian supposition; it does no more than demand a much more careful scrutiny of the supposed cases. Such a scrutiny has been going on since Weismann first raised the difficulty, and the present result is that no known case has appeared which cannot be explained without the Lamarckian factor, and the vast majority of cases have been resolved without any difficulty into the ordinary events of which we have full experience. Taking the empirical data in detail, it would appear first

that the effects of single mutilations are not inherited. The effects of long-continued mutilations are not inherited, but Darwin cites as a possible case the Mahom- medans of Celebes, in whom the prepuce is very small. C. E. Brown-Sequard thought that he had shown in the case of guinea- pigs the inheritance of the results of nervous lesions, but analyses of his results leave the question extremely doubtful. The inheritance of the effects of use and disuse is not proved. The inheritance of the effects of changed conditions of life is quite uncertain. Nageli grew Alpine plants at Munich, but found that the change was produced at once and was not increased in a period of thirteen years. Alphonse de Candolle starved plants, with the result of producing better blooms,,- and found that seedlings from these were also above the average in luxuri- ance of blossom, but in these experiments the effects of selection during the starvation, and of direct effect on the nutrition of the seeds, were not eliminated. Such results are typical of the vast number of experiments and observations) recorded. The empirical issue is doubtful, with a considerable balance against the supposed inheritance of acquired characters.

Empirical Study of Effects of Amphimixis. — Inheritance is theoretically possible from each parent and from the ancestry of each. In considering the total effect it is becoming customary to distinguish between ” blended ” inheritance, where the off- spring appears in respect of any character to be intermediate between the conditions in the parents; ” prepotent ” inheritance, where one parent is supposed to be more effective than the other in stamping the offspring (thus, for instance, Negroes, Jews and Chinese are stated to be prepotent in crosses) ; ” exclusive” inheritance, where the character of the offspring is definitely that of one of the parents. Such a classification depends on the interpretation of the word character, and rests on no certain grounds. An apparently blended character or a prepotent character may on analysis turn out to be due to the inheritance of a certain proportion of minuter characters derived exclusively from either parent. H. de Vries and later on a number of other biologists have advanced the knowledge of heredity in crosses by carrying out further the experimental and theoretical work of Gregor Mendel (see Mendelism and Hybridism), and results of great practical importance to breeders have already been obtained. These experiments and results, however, appear to relate exclusively to sexual reproduction and almost entirely to the crossing of artificial varieties of animals and plants. So far as they go, they point strongly to the occurrence of alternate I inheritance instead of blended inheritance in the case of artificial

varieties. On the other hand, in the case of natural varieties it appears that blended inheritance predominates. The diffi- culty of the interpretation of the word ” character ” still remains and the Mendelian interpretation cannot be dismissed with regard to the behaviour of any ” character ” in inheritance until it is certain that it is a unit and not a composite. There is another fundamental difficulty in making empirical comparisons between the characters of parents and offspring. At first sight it seems as if this mode of work were sufficiently direct and simple, and involved no more than a mere collection of sufficient data. The cranial index, or the height of a human being and of so many of his ancestors being given, it would seem easy to draw an inference as to whether or no in these cases brachycephaly or stature were inherited. But our modern conceptions of the individual and the race make it plain that the problems are not so simple. With regard to any character, the race type is not a particular measurement, but a curve of variations derived from statistics, and any individual with regard to the particular character may be referable to any point of the curve. A tall race like the modern Scots may contain individuals of any height within the human limits; a dolichocephalic race like the modern Spaniards may contain extremely round-headed individuals. What is meant by saying that one race is tall or the other dolicho- cephalic, is merely that if a sufficiently large number be chosen at random, the average height of the one race will be great, the cranial index of the other low. It follows that the study of variation must be associated with, or rather must precede, the empirical study of heredity, and we are beginning to know enough now to be certain that in both cases the results to be obtained are practically useless for the individual case, and of value only when large masses of statistics are collected. No doubt, when general conclusions have been established, they must be acted on for individual cases, but the results can be predicted not for the individual case, but only for the average of a mass of individual cases. It is impossible within the limits of this article to discuss the mathematical conceptions involved in the formation and applications of the method, but it is necessary to insist on the fact that these form an indispensable part of any valuable study of empirical data. One interesting conclusion, which may be called the ” ancestral law ” of heredity, with regard to any character, such as height, which appears to be a blend of the male and female characters, whether or no the apparent blend is really due to an exclusive inheritance of separate com- ponents, may be given from the work of F. Galton and K. Pearson. Each parent, on the average, contributes J or (o-s) 2 , each grand-

parent jV or (°-s) 4 , and each ancestor of n th place (o-5) 2n . But this, like all other deductions, is applicable only to the mass of cases and not to any individual case.

Regression. — An important result of quantitative work brings into prominence the steady tendency to maintain the type which appears to be one of the most important results of am- phimixis. In the tenth generation a man has 1024 tenth grand- parents, and is thus the product of an enormous population, the mean of which can hardly differ from that of the general population. Hence this heavy weight of mediocrity produces regression or progression to type. Thus in the case of height, a large number of cases being examined, it was found that fathers of a stature of 72 in. had sons with a mean stature of 70‘8 in., a regression towards the normal stature of the race. Fathers with a stature of 66 in. had sons with a mean of 68-3 in., a progression towards the normal. It follows from this that where there is much in-and-in breeding the weight of mediocrity will be less, and the peculiarities of the breed will be accentuated.

Atavism. — Under this name a large number of ordinary cases of variation are included. A tall man with very short parents would probably be set down as a case of atavism if the existence of a very tall ancestor were known. He would, however, simply be a case of normal variation, the probability of which may be calculated from a table of stature variations in his race. Less marked cases set down to atavism may be instances merely of normal regression. Many cases of more abnormal structure, which are really due to abnormal embryonic or post-embryonic

development, are set down to atavism, as, for instance, the cervical fistulae, which have been regarded as atavistic per- sistences of the gill clefts. It is also used to imply the reversion that takes place when domestic varieties are set free and when species or varieties are crossed (see Hybridism). Atavism is, in fact, a misleading name covering a number of very different phenomena.

Telegony is the name given to the supposed fact that offspring of a mother to one sire may inherit characters from a sire with which the mother had previously bred. Although breeders of stock have a strong belief in the existence of this, there are no certain facts to support it, the supposed cases being more readily explained as individual variations of the kind generally referred to as ” atavism.” None the less, two theoretical explanations have been suggested: (1) that spermatozoa, or portions of spermatozoa, from the first sire may occasionally survive within the mother for an abnormally long period;

(2) that the body, or the reproductive cells of the mother, may be influenced by the growth of the embryo within her, so that she acquires something of the character of the sire. The first supposition has no direct evidence to support it, and is made highly improbable from the fact that a second impregnation is always necessary. Against the second supposition Pearson brings the cogent empirical evidence that the younger children of the same sire show no increased tendency to resemble him. (See Telegony.)

Authorities. — The following books contain a fair proportion of the new and old knowledge on this subject : — W.Bateson, Materials for the Study of Variation (1894); Y. Delage, La Structure du proto-plasma et les theories sur I ‘ heredite (a very full discussion and list of literature) ; G. H. T. Eimer, Organic Evolution, Eng. trans, by Cunningham (1890) ; J. C. Ewart, The Penycuik Experiments (1899) ; F. Galton, Natural Inheritance (1887); O. Hertwig, Evolution or Epigenesis? Eng. trans, by P. C. Mitchell (1896); K. Pearson, The Grammar of Science (1900) ; Verworn, General Physiology, Eng. trans. (1899); A. Weismann, The Germ Plasm, Eng. trans, by Parker (1893). Lists of separate papers are given in the annual volumes of the Zoological Record under heading ” General Subject.” (P.C.M.)

HEREFORD, a city and municipal and parliamentary borough, and the county town of Herefordshire, England, on the river Wye, 144 m. W.N.W. of London, on the Worcester-Cardiff line of the Great Western railway and on the west-and-north joint line of that company and the North- Western. It is connected with Ross and Gloucester by a branch of the Great Western, and is the terminus of a line from the west worked by the Mid- land and Neath & Brecon companies. Pop. (1901) 21,382. It is mainly on the left bank of the river, which here traverses a broad valley, well wooded and pleasant. The cathedral of St Ethelbert exemplifies all styles from Norman to Perpendicular. The see was detached from Lichfield in 676, Putta being its first bishop; and the modern diocese covers most of Herefordshire, a considerable part of Shropshire, and small portions of Worcester- shire, Staffordshire and Monmouthshire; extending also a short distance across the Welsh border. The removal of murdered Aethelbert’s body from Marden to Hereford led to the foundation of a superior church, reconstructed by Bishop Athelstane, and burnt by the Welsh in 1055. Begun again in 1079 by Bishop Robert Losinga, it was carried on by Bishop Reynelm and completed in 1148 by Bishop R. de Betun. In 1786 the great western tower fell and carried with it the west front and the first bay of the nave, when the church suffered much from unhappy restoration by James Wyatt, but his errors were partly corrected by the further work of Lewis Cottingham and Sir Gilbert Scott in 1841 and 1863

respectively, while the present west front* is a reconstruction completed in 1905. The total length of the cathedral outside is 342 ft., inside 327 ft. 5 in., the nave being 158 ft. 6 in., the choir from screen to reredos 75 ft. 6 in. and the lady chapel 93 ft. 5 in. Without, the principal features are the central tower, of Decorated work with ball-flower ornament, formerly surmounted by a timber spire; and the north porch, rich Perpendicular with parvise. The lady chapel has a bold east end with five narrow lancet windows. The bishop's cloisters, of which only two walks remain, are Perpendicular of curious design, with heavy tracery in the bays. A picturesque tower

at the south-east corner, in the same style, is called the " Lady Arbour," but the origin of the name is unknown. Of the former fine decagonal Decorated chapter-house, only the doorway and slight traces remain. Within, the nave has Norman arcades, showing the wealth of ornament common to the work of this period in the church. Wyatt shortened it by one bay, and the clerestory is his work. There is a fine late Norman font, springing from a base with the rare design of four lions at the corners. The south transept is also Norman, but largely altered by the introduction of Perpendicular work. The north transept was wholly rebuilt in 1287 to contain the shrine of St Thomas de Cantilupe, bishop of Hereford, of which there remains the magnificent marble pedestal surmounted by an ornate arcade. The fine lantern, with its many shafts and vaulting, was thrown open to the floor of the bell-chamber by Cottingham. The choir screen is a florid design by Sir Gilbert Scott, in light wrought iron, with a wealth of ornament in copper, brass, mosaic and polished stones. The dark choir is Norman in the arcades and the stage above, with Early English clerestory and vaulting. At the east end is a fine Norman arch, blocked until 1841 by a Grecian screen erected in 171 7. The choir stalls are largely Decorated. The organ contains original work by the famous builder Renatus Harris, and was the gift of Charles II. to the cathedral. The small north-east and south-east transepts are Decorated but retain traces of the Norman apsidal terminations eastward. The eastern lady chapel, dated about 1220, shows elaborate Early English work. On the south side opens the little Perpendicular chantry of Bishop Audley (1492-1502). In the north choir aisle is the beautiful fan-vaulted chantry of Bishop Stanbury (1470). The crypt is remarkable as being, like the lady chapel, Early English, and is thus the only cathedral crypt in England of a later date than the nth century. The ancient monastic library remains in the archive room, with its heavy oak cupboards.

Deeds, documents and several rare manuscripts and relics are preserved, and several of the precious books are still secured by chains. But the most celebrated relic is in the south choir aisle. This is the Map of the World, dating from about 13 14, the work of a Lincolnshire monk, Richard of Haldingham. It represents the world as surrounded by ocean, and embodies many ideas taken from Herodotus, Pliny and other writers, being filled with grotesque figures of men, beasts, birds and fishes, together with representations of famous cities and scenes of scriptural classical story, such as the Labyrinth of Crete, the Egyptian pyramids, Mount Sinai and the journeyings of the Israelites. The map is surmounted by representations of Paradise and the Day of Judgment.

From the south-east transept of the cathedral a cloister leads to the quadrangular college of the Vicars-Choral, a beautiful Perpendicular building. On this side of the cathedral, too, the bishop's palace, originally a Norman hall, overlooks the Wye, and near it lies the castle green, the site of the historic castle, which is utterly effaced. There is here a column (1809) com- memorating the victories of Nelson. The church of All Saints is Early English and Decorated, and has a lofty spire. Both this and St Peter's (originally Norman) have good carved stalls, but the fabric of both churches is greatly restored. One only of the six gates and a few fragments of the old walls are still to be seen, but there are ruins of the Black Friars' Monastery in Widemarsh, and a mile out of Hereford on the Brecon Road, the White Cross, erected in 1347 by Bishop Louis Charlton, and restored by Archdeacon Lord Saye and Sele, commemorates the departure of the Black Plague. Of domestic buildings the " Old House " is a good example of the picturesque half-timbered style, dating from 1621, and the Coningsby Hospital (almshouses) date from 1614. The inmates wear a remarkable uniform of red, designed by the founder, Sir T. Coningsby. St Ethelbert's hospital is an Early English foundation. Old-established schools are the Cathedral school (1384) and the Blue Coat school (1710); there is also the County College (1880). The public buildings are the shire hall in St Peter's Street, in the Grecian Doric style, with a statue in front of it of Sir George Cornewall Lewis, who represented the county in parliament from 1847 to 1852, the

town hall (1904), the corn-exchange (1858), the free library and museum in Broad Street; the guildhall and mansion house. A musical festival of the choirs of Hereford, Gloucester and Worcester cathedrals is held annually in rotation at these cities.

The government is in the hands of a municipal council con- sisting of a mayor, 6 aldermen and 18 councillors. Area, 5031 acres.

Hereford (Herefortuna), founded after the crossing of the Severn by the West Saxons early in the 7th century, had a strategic importance due to its proximity to the Welsh March. The foundation of the castle is ascribed to Earl Harold, afterwards Harold II. The castle was successfully besieged by Stephen, and was the prison of Prince Edward during the Barons' Wars. The pacification of Wales deprived Hereford of military signifi- cance until it became a Royalist stronghold during the Civil Wars. It surrendered easily to Waller in 1643; but was reoccupied by the king's troops and received Rupert on his march to Wales after Naseby. It was besieged by the Scots during August 1645 an *III., Edward II., Edward III., Richard II., Henry IV. and Edward IV. Incorporation was granted to the mayor, aldermen and citizens in 1597, and confirmed in 1620 and 1697-1698. Hereford returned two members to parliament from 1295 until 1885, when the Redistribution Act deprived it of one representative. In 1116-1117 a fair beginning on St Ethel- berta's day was conferred on the bishop, the antecedent of the modern fair in the beginning of May. A fair beginning on St Denis' day, granted to the citizens in 1226-1227, is represented by that held in October. The fair of Easter Wednesday was granted in 1682. In 1792 the existing fairs of Candlemas week and the beginning of July were held. Market days were, under Henry VIII. and in 1792, Wednesday, Friday and Saturday; the Friday market was discontinued before 1835. Hereford was the site of a provincial mint in 1086 and later. A grant of an exclusive merchant gild, in 1215-1216, was several times con- firmed. The trade in wool was important in 1 202, and eventually responsible for gilds of tailors, drapers, mercers, dyers, fullers, cloth workers, weavers and haberdashers; it brought into the market Welsh friezes and white cloth; but declined in the 16th century, although it existed in 1835. The leather trade was considerable in the 13th century. In 1835 the glove trade had declined. The city anciently had an extensive trade in bread with Wales. It was the birthplace of David Garrick, the actor, in 1 716, and probably of Nell Gwyn, mistress of Charles II., to whose memory a tablet was erected in 1883, marking the supposed site of her house.*

See R. Johnson, Ancient Customs of Hereford (London, 1882); J. Duncumbe, History of Hereford (Hereford, 1 882); Journal oi Brit. Arch. Assoc, xxvi. •

HEREFORDSHIRE, an inland county of England on the south Welsh border, bounded N. by Shropshire, E. by Worcester- shire, S. by Monmouthshire and Gloucestershire, and W. by Radnorshire and Brecknockshire. The area is 839-6 sq. m. The county is almost wholly drained by the Wye and its tribu- taries, but on the north and east includes a small portion of the Severn basin. The Wye enters Herefordshire from Wales at Hay, and with a sinuous and very beautiful course crosses the south- western part of the county, leaving it close above the town Df

Monmouth. Of its tributaries, the Lugg enters in the north-west near Presteign, and has a course generally easterly to Leominster, where it turns south, receives the Arrow from the west, and joins the Wye 6 m. below Hereford, the Frome flowing in from the east immediately above the junction. The Monnow rising in the mountains of Brecknockshire forms the boundary between Herefordshire and Monmouthshire over one-half of its course (about 20 m.), but it joins the main river at Monmouth. Its principal tributary in Herefordshire is the Dore, which traverses the picturesque Golden Valley. The Wye is celebrated for its

salmon fishing, which is carefully preserved, while the Lugg, Arrow and Frome abound in trout and grayling, as does the Teme. This last is a tributary of the Severn, and only two short reaches lie within this county in the north, while it also forms parts of the northern and eastern boundary. The Leddon, also flowing to the Severn, rises in the east of the county and leaves it in the south-east, passing the town of Ledbury. High ground, of an elevation from 500 to 800 ft., separates the various valleys, while on the eastern boundary rise the Malvern Hills, reaching 1 194 ft. in the Herefordshire Beacon, and 1395 ft. in the Worcestershire Beacon, and on the boundary with Brecknock- shire the Black Mountains exceed 2000 ft. The scenery of the Wye, with its wooded and often precipitous banks, is famous, the most noteworthy point in this county being about Symond's Yat, on the Gloucestershire border below Ross.

Geology. — The Archean or Pre-Cambrian rocks, the most ancient in the county, emerge from beneath the newer deposits in three small isolated areas. On the western border, Stanner Rock, a picturesque craggy hill near Kington, consists of igneous materials (granitoid rock, felstone, dolerite and gabbro), apparently of intrusive origin and possibly of Uriconian age. In Brampton Bryan Park, a few miles to the north-east, some ancient conglomerates emerge and may be of Longmyndian age. On the east of the county the Herefordshire Beacon in the Malvern chain consists of gneisses and schists and Uriconian volcanic rocks; these have been thrust over various members of the Cambrian and Silurian systems, and owing to their hard and durable nature they form the highest ground in the county. The Cambrian rocks (Tremadoc Beds) come next in order of age and consist of quartzites, sandstones and shales, well exposed at the southern end of the Malvern chain and also at Pedwardine near Brampton Bryan. The Silurian rocks are well developed in the north-west part of the county, between Presteign and Ludlow; also along the western flanks of the Malvern Hills and in the eroded dome of Woolhope. Smaller patches come to light at

Westhide east of Hereford and at May Hill near Newent. They consist of highly fossiliferous sandstones, mudstones, shales and limestones, known as the Llandovery, Wenlock and Ludlow Series; the Woolhope, Wenlock and Aymestry Limestones are famed for their rich fossii contents. The remainder and by far the greater part of the county is occupied by the Old Red Sandstone, through which the rocks above described project in detached areas. The Old Red Sandstone consists of a great thickness of red sandstones and marls, with impersistent bands of impure concretionary limestone known as cornstones, which by their superior hardness give rise to scarps and rounded ridges; they have yielded remains of fishes and crustaceans. Some of the upper beds are conglomeratic. On its south-eastern margin the county just reaches the Carboniferous Limestone cliffs of the Wye Valley near Ross. Glacial deposits, chiefly sand and gravel, are found in the lower ground along the river-courses, while caves in the Carboniferous Limestone have yielded remains of the hyena, cave-lion, rhinoceros, mammoth and reindeer.

Agriculture and Industries. — The soil is generally marl and clay, but in various parts contains calcareous earth in mixed proportions. Westward the soil is tenacious and retentive of water; on the east it is a stiff and often reddish clay. In the south is found a light sandy loam. More than four-fifths of the total area of the county is under cultivation and about two-thirds of this is in permanent pasture. Ash and oak coppices and larch plantations clothe its hillsides and crests. The rich red soil of the Old Red Sandstone formation is famous for its pear and apple orchards, the county, notwithstanding its much smaller area, ranking in this respect next to Devonshire. The apple crop, generally large, is enormous one year out of four. Twenty hogsheads of cider have been made from an acre of orchard, twelve being the ordinary yield. Cider is the staple beverage of the county, and the trade in cider and perry is large. Hops are another staple of the county, the vines of which are planted in rows on ploughed land. As early as Camden's day a Herefordshire adage coupled Weobley ale with Leominster bread, indicating the county's capacity to produce fine wheat and barley, as well as hops.

Herefordshire is also famous as a breeding county for its cattle of bright red hue, with mottled or white faces and sleek silky coats. The Herefords are stalwart and healthy, and, though not good milkers, put on more meat and fat at an early age, in proportion to food consumed, than almost any other variety. They produce the finest beef, and are more cheaply fed than Devons or Durhams, with which they are advantageously crossed. As a dairy county Herefordshire does not rank high.

Its small, white-faced, hornless, symmetrical breed of sheep known as " the Ryelands," from the district near Ross, where it was bred in most

perfection, made the county long famous both for the flavour of its meat and the merino-like texture of its wool. Fuller says of this that it was best known as " Lempster ore," and the finest in all England. In its original form the breed is extinct, crossing with the Leicester having improved size and stamina at the cost of the fleece, and the chief breeds of sheep on Herefordshire farms at present are Shropshire Downs, Cotswolds and Radnors, with their crosses. Agricultural horses of good quality are bred in the north, and saddle and coach horses may be met with at the fairs. Breeders' names from the county are famous at the national cattle shows, and the number, size and quality of the stock are seen in their supply of the metropolitan and other markets. Prize Herefords are constantly exported to the colonies.

Manufacturing enterprise is small. There are some iron foundries and factories for agricultural implements, and sofne paper is made. There are considerable limestone quarries, as near Ledbury.

Communications. — Hereford is an important railway centre. The Worcester and Cardiff line of the Great Western railway, entering on the east, runs to Hereford by Ledbury and then southward. The joint line of the Great Western and North- western companies runs north from Hereford by Leominster, proceeding to Shrewsbury and Crewe. At Leominster a Great Western branch crosses, connecting Worcester, Bromyard and New Radnor. From Hereford a Great Western branch follows the Wye south to Ross, and thence to the Forest of Dean and to Gloucester; a branch connects Ledbury with Gloucester, and the Golden Valley is traversed by a branch from Pontrilas on the Worcester-Cardiff line. From Hereford the Midland and Neath and Brecon line follows the Wye valley westward. None of the rivers is commercially navigable and the canals are out of use.

Population and Administration. — The area of the ancient county is 537,363 acres, with a population in 1891 of 115,949 and in 1901 of 114,380. The area of the administrative county is 538,921 acres. The county contains 12 hundreds. It is divided into two parliamentary divisions, Leominster (N.) and Ross (S.), and it also includes the parliamentary borough of Hereford, each returning one member. There are two municipal boroughs' — Hereford (pop. 21,382) and Leominster (5826). The other urban districts are Bromyard (1663), Kington (1944), Ledbury (3259) and Ross (3303). The county is in the Oxford circuit, and assizes are held at Hereford. It has one court of quarter sessions and is divided into n petty sessional divisions. The boroughs of Hereford and Leominster have separate com- missions of the peace, and the borough of Hereford has in addition a separate court of quarter sessions. There are 260 civil parishes. The ancient county, which is almost entirely in the diocese of Hereford, with small parts in those of Gloucester, Worcester and

Llandaff, contains 222 ecclesiastical parishes or districts, wholly or in part.

History. — At some time in the 7th century the West Saxons pushed their way across the Severn and established themselves in the territory between Wales and Mercia, with which kingdom they soon became incorporated. The district which is now Herefordshire was occupied by a tribe the Hecanas, who con- gregated chiefly in the fertile area about Hereford and in the mining districts round Ross. In the 8th century Offa extended the Mercian frontier to the Wye, securing it by the earthwdrk known as Offa's dike, portions of which are visible at Knighton and Moorhampton in this county. In 915 the Danes made their way up the Severn to the district of Archenfield, where they took prisoner Cyfeiliawg bishop of Llandaff, and in 921 they besieged Wigmore, which had been rebuilt in that year by Edward. From the time of its first settlement the district was the scene of constant border warfare with the Welsh, and Harold, whose earldom included this county, ordered that any Welshman caught trespassing over the border should lose his right hand. In the period preceding the Conquest much disturbance was

caused by the outrages of the Norman colony planted in this county by Edward the Confessor. Richard's castle in the north of the county was the first Norman fortress erected on English soil, and Wigmore, Ewyas Harold, Clifford, Weobley, Hereford, Donnington and Caldecot were all the sites of Norman strong- holds. The conqueror entrusted the subjugation of Hereford- shire to William FitzOsbern, but Edric the Wild in conjunction with the Welsh prolonged resistance against him for two years.

In the wars of Stephen's reign Hereford and Weobley castles were held against the king, but were captured in 1138. Edward, afterwards Edward I., was imprisoned in Hereford Castle, and made his famous escape thence in 1265. In 1326 the parliament assembled at Hereford which deposed Edward II. In the 14th and 1 5th centuries the forest of Deerfold gave refuge to some of the most noted followers of Wycliffe. During the Wars of the Roses the influence of the Mortimers led the county to support the Yorkist cause, and Edward, afterwards Edward IV., raised 23,000 men in this neighbourhood. The battle of Mortimer's Cross was fought in 1461 near Wigmore. Before the outbreak of the civil war of the 17th century, complaints of illegal taxation were rife in Herefordshire, but a strong anti-puritan feeling induced the county to favour the royalist cause. Hereford, Goodrich and Ledbury all endured sieges.

The earldom of Hereford was granted by William I. to William FitzOsbern, about 1067, but on the outlawry of his son Roger in 1074 the title lapsed until conferred on Henry de Bohun about 1 199. It remained in the possession of the Bohuns until the death of Humphrey de Bohun in 1373; in 1397 Henry, earl of Derby, afterwards King Henry IV., who had married Mary Bohun, was created duke of Hereford. Edward VI. created Walter Devereux, a descendant of the Bohun family, Viscount Hereford, in 1550, and his grandson, the famous earl of Essex, was born in this county. Since this date the viscounty has been held by the Devereux family, and the holder ranks as the premier viscount of England. The families of Clifford, Giffard and Mortimer figured prominently in the warfare on the Welsh border, and the Talbots, Lacys, Crofts and Scuda- mores abo had important seats in the county, Sir James Scuda- more of Holme Lacy being the original of the Sir Scudamore of Spenser's Faery Queen. Sir John Oldcastle, the leader of the Lollards, was sheriff of Herefordshire in 1406.

Herefordshire probably originated as a shire in the time of iEthelstan, and is mentioned in the Saxon Chroncile in 1051. In the Domesday Survey parts of Monmouthshire and Radnor- shire are assessed under Herefordshire, and the western and southern borders remained debatable ground until with the incorporation of the Welsh marches in 1535 considerable territory was restored to Herefordshire and formed into the hundreds of Wigmore, Ewyas Lacy and Huntingdon, while Ewyas Harold was united to Webtree. At the time of the Domesday Survey the divisions of the county were very unsettled. As many as nineteen hundreds are mentioned, but these were of varying extent, some containing only one manor, some from twenty to thirty. Of the twelve modern hundreds, only Greytree, Radlow, Stretford, Wolphy and Wormelow retain Domesday names. Herefordshire has been included in the diocese of Hereford since its foundation in 676. In 1291 it comprised the deaneries of Hereford, Weston, Leominster, Weobley, Frome, Archenfield and Ross in the archdeaconry of Hereford, and the deaneries of Burford, Stottesdon, Ludlow, Pontesbury, Clun and Wenlock, in the archdeaconry of Shropshire. In 1877 the name of the archdeaconry of Shropshire was changed to Ludlow, and in 1899 the deaneries of Abbey Dore, Bromyard, Kingsland, Kington and Ledbury were created in the archdeaconry of Hereford.

Herefordshire was governed by a sheriff as early as the reign of Edward the Confessor, the shire-court meeting at Hereford where later the assizes and quarter sessions were also held. In 1606 an act was passed declaring Hereford free from the juris- diction of the council of Wales, but the county was not finally relieved from the interference of the Lords Marchers until the reign of William and Mary.

Herefordshire has always been esteemed an exceptionally rich agricultural area, the manufactures being unimportant, with the sole exception of the woollen and the cloth trade which flourished soon after the Conquest. Iron was worked in Wormelow hundred in Roman times, and the Domesday Survey mentions iron workers in Marcle. At the time of Henry VIII. the towns had become much impoverished, and Elizabeth in order to encourage local industries, insisted on her subjects wearing English-made caps from the factory of Hereford. Hops were grown in the county soon after their introduction into England in 1524. In 1580 and again in 1637 the county was severely visited by the plague, but in the 17th century it had a flourishing timber trade and was noted for its orchards and cider.

Herefordshire was first represented in parliament in 1295, when it returned two members, the boroughs of Ledbury, Here- ford, Leominster and Weobley being also represented. Hereford was again represented in 1299, and Bromyard and Ross in 1304, but the boroughs made very irregular returns, and from 1306 until Weobley regained representation in 1627, only Hereford and Leominster were represented. Under the act of 1832 the county returned three members and Weobley was disfranchised. The act of 1868 deprived Leominster of one member, and under the act of 1885 Leominster was disfranchised, and Hereford lost one member.

Antiquities. — There are remains of several of the strongholds which Herefordshire possessed as a march county, some of which were maintained and enlarged, after the settlement of the border, to serve in later wars. To the south of Ross are those of Wilton and Goodrich, commanding the Wye on the right bank, the latter a ruin of peculiar magnificence, and both gaining pictur- esqueness from their beautiful situations. Of the several castles in the valleys of the boundary-river Monnow and its tributaries, those in this county include Pembridge, Kilpeck and Longtown ; of which the last shows extensive remains of the strong keep and thick walls. In the north the finest example is Wigmore, consisting of a keep on an artificial mound within outer walls, the seat of the powerful family of Mortimer.

Beside the cathedral of Hereford, and the fine churches of Ledbury, Leominster and Ross, described under separate headings, the county contains some churches of almost unique interest. In that of Kilpeck remarkable and unusual Norman work is seen. It consists of the three divisions of nave, choir and chancel, divided by ornate arches, the chancel ending in an apse, with a beautiful and elaborate west end and south doorway. The columns of the choir arch are composed of figures. A similar plan is seen in Peterchurch in the Golden Valley, and in Moccas church, on the Wye above Hereford. Among the large number of churches exhibiting Norman details that at Bromyard is noteworthy. At Abbey Dore, the

Cistercian abbey church, still in use, is a large and beautiful specimen of Early English work, and there are slight remains of the monastic buildings. At Madley, south of the Wye 5 m. W. of Hereford, is a fine Decorated church (with earlier portions), with the rare feature of a Decorated apsidal chancel over an octagonal crypt. Of the churches in mixed styles those in the larger towns are the most noteworthy, together with that of Weobley. The half-timbered style of domestic architecture, common in the west and midlands of England in the 16th and 17th centuries, beautifies many of the towns and villages. Among country houses, that of Treago, 9 m. W. of Ross, is a remarkable example of a fortified mansion of the 13th century, in a condition little altered. Rudhall and Sufton Court, between Ross and HerefoTd, are good specimens of 15th-century work, and portions of Hampton Court, 8 m. N. of Hereford, are of the same period, built by Sir Rowland Lenthall, a favourite of Henry IV. Holme Lacy, 5 m. S.E. of Hereford, is a fine mansion of the latter part of the 17th century, with picturesque Dutch gardens, and much wood-carving by Grinling Gibbons within. This was formerly the seat of the Scudamores, from whom it was inherited by the Stanhopes, earls of Chesterfield, the 9th earl of Chester-field taking the name of Scudamore-Stanhope. His son, the ipth earl, has recently (1909) sold Holme Lacy to Sir Robert

Lucas-Tooth, Bart. Downton Castle possesses historical interest in having been designed in 1774, in a strange mixture of Gothic and Greek styles, by Richard Payne Knight (1750-1824), a famous scholar, numismatist and member of parliament for Leo- minster and Ludlow; while Eaton Hall, now a farm, was the seat of the family of the famous geographer Richard Hakluyt.

See Victoria County History, Herefordshire; J. Duncomb, Collec- tions towards the History and Antiquities of the County of Hereford (Hereford, 180A-1812) ; John Allen, Bibliotheca Herefordiensis (Here- ford, 1821); John Webb, Memorials of the Civil War between Charles I. and the Parliament of England as it affected Herefordshire and the adjacent Counties (London, 1879); R. Cooke, Visitation of Hereford- shire, 1569 (Exeter, 1886); F. T. Havergal, Herefordshire Words and Phrases (Walsall, 1887); J. Hutchinson, Herefordshire Bio- graphies (Hereford, 1890).

HERERO, or Ovaherero (" merry people "), a Bantu people of German South- West Africa, living in the region known as Damaraland or Hereroland. They call themselves Ovaherero and their language Otshi-

herero. Sometimes they are described as Cattle Damara or " Damara of the Plains " in distinction from the Hill Damara who are of mixed blood and Hottentots in language. The Herero, whose main occupation is that of cattle-rearing, are a warlike race, possessed of considerable mili- tary skill, as was shown in their campaigns of 1904-5 against the Germans. (See further German South- West Africa.)

HERESY, the English equivalent of the Greek word alpems which is used in the Septuagint for " free choice," in later classical literature for a philosophical school or sect as " chosen " by those who belong to it, in Philo for religion, in Josephus for a religious party (the Sadducees, the Pharisees and the Essenes).

*It is in this last sense that the term is used in the New Testa- ment, usually with an implicit censure of the factious spirit to which such divisions are due. The term is applied Testa- * ;o tne Sadducees (Acts v. 17) and Pharisees (Acts xv. menu 5, xxvi. 5). From the standpoint of opponents,*

Christianity is itself so described (Acts xxiv. 14, xxviii. 22). In the Pauline Epistles it is used with severe condemnation of the divisions within the Christian Church itself. Heresies with " enmities, strife, jealousies, wraths, factions, divisions, envyings " are reckoned among " the works of the flesh " (Gal. v. 20). Such divisions, proofs of a carnal mind, are censured in the church of Corinth (1 Cor. iii. 3, 4); and the church of Rome is warned against those who cause them (Rom. xvi. 17). The term " schism," afterwards distinguished from " heresy," is also used of these divisions (1 Cor. i. 10). The estrangements of the rich and the poor in the church at Corinth, leading to a lack of Christian fellowship even at the Lord's Supper, is described as " heresy " (1 Cor. xi. 19). Breaches of the law of love, not errors about the truth of the Gospel, are referred to in these passages. But the first step towards the ecclesiastical use of the term is found already in 2 Peter ii. 1, " Among you also there shall be false teachers who shall privily bring in destructive heresies (R.V. margin " sects of perdition "), denying even the Master that bought them, bringing upon themselves swift destruction." The meaning here suggested is " falsely chosen or erroneous tenets. Already the emphasis is moving from persons and their temper to mental products — from the sphere of sympathetic love to that of objective truth " (Bartlet, art. " Heresy," Hastings's Bible Dictionary). As the parallel passage in Jude, verse 4, shows, however, that these errors had immoral consequences, the moral reference is not absent even from this passage. The first employment of the term outside the New Testament is also its first use for theological error. Ignatius applies it to Docetism {Ad Trail. 6). As doctrine came to be made more important, heresy was restricted to any de- parture from the recognized creed. Even Constantine the Great describes the Christian Church as " the Catholic heresy," " the most sacred heresy "

(Eusebius, Ecclesiastical History, x. c. 5, the letter to Chrestus, bishop of Syracuse); but this use was very soon abandoned, and the Catholic Church distinguished itself from the dissenting minorities, which it condemned as " heresies." The use of the term heresy in the New Testament cannot be regarded as defining the attitude of the Christian

Church, even in the Apostolic age, towards errors in belief. The Apostolic writings show a vehement antagonism towards all teaching opposed to the Gospel. Paul declares anathema the Judaizer, who required the circumcision of the Gentiles (Gal. i. 8), and even calls them the " dogs of the concision " and " evil workers " (Phil. iii. 2). The elders of Ephesus are warned against the false teachers who would appear in the church after the apostle's death as " grievous wolves not sparing the flock " (Acts xx. 29) ; and the speculations of the Gnostics are denounced as " seducing spirits and doctrines of devils " (1 Tim. iv. 1), as " profane babblings and oppositions of the knowledge which is falsely so called " (vi. 20). John's warnings are as earnest and severe. Those who deny the fact of the Incarnation are described as " antichrist," and as " deceivers " (1 John iv. 3; 2 John 7). The references to heretics in 2 Peter and Jude have already been dealt with. This antagonism is explicable by the character of the heresies that threatened the Christian Church in the Apostolic age. Each of these heresies involved such a blending of the Gospel with either Jewish or pagan elements, as would not only pollute its purity, but destroy its power. In each of these the Gospel was in danger of being made of none effect by the environ- ment, which it must resist in order that it might transform (see Burton's Bampton Lectures on The Heresies of the Apostolic Age). These Gnostic heresies, which threatened to paganize the Christian Church, were condemned in no measured terms by the fathers. These false teachers are denounced as " servants of Satan, beasts in human shape, dealers /sm> in deadly poison, robbers and pirates." Polycarp, Ignatius, Justin Martyr, Irenaeus, Hippolytus, Tertullian and even Clement of Alexandria and Origen are as severe in con- demnation as the later fathers (cf. Matt. xiii. 35-43; Tertullian, Praescr. 31). While the necessity of the heresies is admitted in accordance with 1 Cor. xi. 19, yet woe is pronounced on those who have introduced them, according to Matt, xviii. 7. (This application of these passages, however, is of altogether doubtful validity.) " It was necessary," says Tertullian (ibid. 30), " that the Lord should be betrayed; but woe to the traitor." The very worst motives, " pride, disappointed ambition, sensual lust, and avarice," are recklessly imputed to the heretics; and no possibility of morally innocent doubt, difficulty or difference in thought is admitted. Origen and Augustine do, however, recognize that even false teachers may have good motives. While we must admit that there was a very serious peril to the thought and life of the Christian Church in the teaching thus denounced, yet we must not forget that for the most part

these teachers are known to us only in the ex parte representation that their opponents have given of them; and we must not assume that even their doctrines, still less their characters, were so bad as they are described.

The attitude of the church in the post-Nicene period differs from that in the ante-Nicene in two important respects. (1) As has already been indicated, the earlier heresies threatened to introduce Jewish or pagan elements into the faith of the church, and it was necessary that they should be vigorously resisted if the church was to retain its distinctive character". Many of the later heresies were differences in the interpretation of Christian truth, which did not in the same way threaten the very life of the church. No vital interest of Christian faith justified the extravagant denunciations in which theological partisanship so recklessly and ruthlessly indulged. (2) In the ante-Nicene period only ecclesiastical penalties, such as reproof, deposition or excommunication, could be imposed. In the post-Nicene the union of church and state transformed theological error into legal offence (see below).

We must now consider the definition of heresy which was gradually reached in the Christian Church. It is " a religious error held in wilful and persistent opposition to the truth after it has been defined and declared by the Jj^*" church in an authoritative manner," or " pertinax uoa. defensio dogmatis ecclesiae universalis judicio con- demnati " (Schaff's Ante-Nicene Christianity, ii. 512-516). (i.) It " denotes an opinion antagonistic to a fundamental*

article of the Christian faith," due to the introduction of " foreign elements " and resulting in a perversion of Christianity, and an amalgamation with it of ideas discordant with its nature (Fisher's History of Christian Doctrine, p. 9). It has been generally assumed that the ecclesiastical authority was always competent to determine what are the fundamental articles of the Christian faith, and to detect any departures from them; but it is necessary to admit the possibility that the error was in the church, and the truth was with the heresy, (ii.) There cannot be any heresy where there is no orthodoxy, and, therefore, in the definition it is assumed that the church has declared what is the truth or the error in any matter. Accordingly "heresy is to be distinguished from defective stages of Christian knowledge. For example, the Jewish believers, including the Apostles themselves, at the outset required the Gentile believers to be circumcised. They were not on this account chargeable with heresy. Additional light must first come in, and be rejected, before that earlier opinion could be

thus stigmatized. Moreover, heresies are not to be confounded with tentative and faulty hypotheses broached in a period prior to the scrutiny of a topic of Christian doctrine, and before that scrutiny has led the general mind to an assured conclusion. Such hypotheses — for example, the idea that in the person of Christ the Logos is substituted for a rational human spirit — are to be met with in certain early fathers " {ibid. p. 10). Origen indulged in many speculations which were afterwards condemned, but, as these matters were still open questions in his day, he was not reckoned a heretic. (iii.) In accordance with the New Testament use of the term heresy, it is assumed that moral defect accompanies the intel- lectual error, that the false view is held pertinaciously, in spite of warning, remonstrance and rebuke; aggressively to win over others, and so factiously, to cause division in the church, a breach in its unity.

A distinction is made between " heresy " and " schism " (from Gr. a\lˆuv, rend asunder, divide). " The fathers

commonly use ' heresy ' of false teaching in opposition

to Catholic doctrine, and ' schism ' of a breach of discipline, in opposition to Catholic government " (Schaff). But as the claims of the church to be the guardian through its episcopate of the apostolic tradition, of the Christian faith itself, were magnified, and unity in practice as well as in doctrine came to be regarded as essential, this distinction became a theoretical rather than a practical one. While severely condemn- ing, both Irenaeus and Tertullian distinguished schismatics from heretics. " Though we are by no means entitled to say that they acknowledged orthodox schismatics they did not yet venture to reckon them simply as heretics. If it was desired to get rid of these, an effort was made to impute to them some deviation from the rule of faith; and under this pretext the church freed herself from the Montanists and the Monarchians. Cyprian was the first to proclaim the identity of heretics and schismatics by making a man's Christianity depend on his belonging to the great episcopal church confederation. But in both East and West, this theory of his became established only by very imperceptible degrees, and indeed, strictly speaking, the process was never completed. The distinction between heretics and schismatics was preserved because it prevented a public denial of the old principles, because it was advisable on political grounds to treat certain schismatic communities with indulgence, and because it was always possible in case of need to prove heresy against the schismatics." (Harnack's History of Dogma, ii. 02-93).

There was considerable controversy in the early church as to the validity of heretical baptism. As even " the Christian

virtues of the heretics were described as hypocrisy baptism. ant ˆ l° ve °f ostentation," so no value whatever was

attached by the orthodox party to the sacraments performed by heretics. Tertullian declares that the church can have no communion with the heretics, for there is nothing common; as they have not the same God, and the same Christ, so they have not the same baptism (De bapt. 15). Cyprian agreed with him. The validity of heretical baptism was denied

Schism.

by the church of Asia Minor as well as of Africa; but the practice of the Roman Church was to admit without second baptism heretics who had been baptized with the name of Christ, or of the Holy Trinity. Stephen of Rome attempted to force the Roman practice on the whole church in 253. The controversy his intolerance provoked was closed by Augustine's controversial treatise De Baptismo, in which the validity of baptism administered by heretics is based on the objectivity of the sacra- ment. Whenever the name of the three-one God is used, the sacrament is declared valid by whomsoever it may be performed. This was a triumph of sacramentarianism, not of charity.

Three types of heresy have appeared in the history of the Christian Church. 1 The earliest may be called the syncretic; it is the fusion of Jewish or pagan with Christian elements. Ebionitism asserted " the continual obliga- heresy? tion to observe the whole of the Mosaic law," and " outran the Old Testament monotheism by a barren monarchian- ism that denied the divinity of Christ " (Kurtz, Church History, i. 120). Gnosticism was the result of the attempt to blend with Christianity the religious notions of pagan mythology, mysterology, theosophy and philosophy " (p. 98). The Judaizing and the paganizing tendency were combined in Gnostic Ebionitism which was prepared for in Jewish Essenism. In the later heresy of Manichaeism there were affinities to Gnosticism, but it was a mixture of many elements, Babylonian-Chaldaic theosophy, Persian dualism and even Buddhist ethics (p. 126).

1'he next type of heresy may be called evolutionary otformalory. When the Christian faith is being formulated, undue emphasis may be put on one aspect, and thus so partial a statement of truth may result in error. Thus when in the ante-Nicene age the doctrine of the Trinity was under discussion, dynamic M onarchianism " regarded Christ as a mere man, who, like the prophets, though in a much higher measure, had been endued with divine wisdom and power"; modal M onarchianism saw in the Logos dwelling in Christ " only a mode of the activity of the Father"; Patripassianism identified the Logos with the Father; and Sabellianism

regarded Father, Son. and Spirit as "the roles which the God who manifests Himself in the world assumes in succession" (Kurtz, Church History, i. 175-181). When Arius asserted the subordination of the Son to the Father, and denied the eternal generation, Athanasius and his party asserted the Homoousia, the cosubstantiality of the Father and the Son. This assertion of the divinity of Christ triumphed, but other problems at once emerged. How was the relation of the humanity to the divinity in Christ to be conceived? Apollinaris denied the completeness of the human nature, and substituted the divine Logos for the reasonable soul of man. Nestorius held the two natures so far apart as to appear to sacrifice the unity of the person of Christ. Eutyches on the contrary " taught not only that after His incarnation Christ had only one nature, but also that the body of Christ as the body of God is not of like substance with our own " (Kurtz, Church History, i, 330-334). The Church in the Creed of Chalcedon in a.d. 451 affirmed " that Christ is true God and true man, according to His Godhead begotten from eternity and like the Father in everything, only without sin; and that after His incarnation the unity of the person consists in two natures which are con- joined without confusion, and without change, but also without rending and without separation." The problem was not solved, but the inadequate solutions were excluded, and the data to be considered in any adequate solution were affirmed. After this decision the controversies about the Person of Christ degenerated into mere hair-splitting', and the interference of the imperial authority from time to time in the dispute was not conducive to the settlement of the questions in the interests of truth alone. This problem interested the East for the most part; in the West there was waged a theological warfare around the nature of man and the work of Christ. To Augustine's doctrine of man's total depravity, his incapacity for any good, and the absolute sovereignty of the divine grace in salvation according to the divine election, Pelagius opposed the view that " God's grace 1 For fuller details see separate articles.

is destined for all men, but man must make himself worthy of it by honest striving after virtue " (Kurtz, Church History, i. 348). While Pelagius was condemned, it was only a modified Augustinianism which became the doctrine of the church. It is not necessary in illustration of the second type of heresy — that which arises when the contents of the Christian faith are being defined — to refer to the doctrinal controversies of the middle ages. It may be added that after the Reformation Arianism was revived in Socinianism, and Pelagianism in Arminianism; but the conception of heresy in Protestantism demands sub- sequent notice.

The third type of heresy is the revolutionary or reformatory. This is not directed against doctrine as such, but against the church, jts theory and its practice. Such movements of antagon- ism to the errors or abuses of ecclesiastical authority may be so permeated by defective conceptions and injurious influences as by their own character to deserve condemnation. But on the other hand the church in maintaining its place and power may condemn as heretical genuine efforts at reform by a return, though partial, to the standard set by the Holy Scriptures or the Apostolic Church. On the one hand there were during the middle ages sects, like the Catharists and Albigenses whose "opposition as a rule developed itself from dualistic or panthe- istic premises (surviving effects of old Gnostic or Manichaean views) " and who "stood outside of ordinary Christendom, and while no doubt affecting many individual members within it, had no influence on church doctrine." On the other hand there were movements, such as the Waldensian, the Wycliffite and Hussite, which are of ten described as " reformations anticipat- ing the Reformation " which " set out from the Augustinian conception of the Church, but took exception to the develop- ment of the conception," and were pronounced by the medieval church as heretical for (1) " contesting the hierarchical gradation of the priestly order; or (2) giving to the religious idea of the Church implied in the thought of predestination a place superior to the conception of the empirical Church; or (3) applying to the priests, and thereby to the authorities of the Church, the test of the law of God, before admitting their right to exercise, as holding the keys, the power of binding and loosing " (Harnack's History of Dogma, vi. 136-137). The Reformation itself was from the standpoint of the Roman Catholic Church heresy and schism.*

" In the present divided state of Christendom," says Schaff {Ante-Nic'ene Christianity, ii. 513-514), " there are different kinds of orthodoxy and heresy. Orthodoxy is con- Moae 7th f° rnutv t0 tne recognized creed or standard of public term. doctrine; heresy is a wilful departure from it. The

Greek Church rejects as heretical, because contrary to the teaching of the first seven ecumenical councils, the Roman dogmas of the papacy, of the double procession of the Holy Ghost, the immaculate conception of the Virgin Mary, and the infallibility of the Pope. The Roman Church anathematized, in the council of Trent, all the distinctive doctrines of the Pro- testant Reformation. Among Protestant churches again there are minor doctrinal differences, which are held with various degrees of exclusiveness or liberality according to the degree of departure from the Roman Catholic Church. Luther, for instance, would not tolerate Zwingli's view on the Lord's Supper, while Zwingli was willing to fraternize with him notwithstanding this difference." At the colloquy of Marburg " Zwingli offered his hand to Luther with the entreaty that they be at least Christian brethren, but Luther refused it and declared that the Swiss were of another

spirit. He expressed surprise that a man of such views as Zwingli should wish brotherly relations with the Wittenberg reformers " (Walker, The Reformation, p. 174). A difference of opinion on the question of the presence of Christ in the elements at the Lord's Supper was thus allowed to divide and to weaken the forces of the Reformation. , On the problem of divine election Lutheranism and Calvinism remained divided. The Formula of Concord (1 5 7 7) , which gave to the whole Lutheran Church of Germany a common doctrinal system, declined to accept the Calvinistic position that man's condemnation as well

as his salvation is an object of divine predestination. Within Calvinism itself Pelagianism was revived in Arminianism, which denied the irresistibility, and affirmed the universality of grace. This heresy was condemned by the synod of Dort (1619). The standpoint of the Reformed churches was the substitution of the authority of the Scriptures for the authority of the church. Whatever was conceived as contrary to the teaching of the Bible was regarded as heresy. The position is well expressed in the Scotch Confession (1559). "Protesting, that if any man will note in this our Confession any article or sentence repugning to God's Holy Word, that it would please him, of his gentleness, and for Christian charity's sake, to admonish us of the same in writ, and we of our honour and fidelity do promise unto him satisfaction from the mouth of God; that is, from His Holy Scripture, or else reformation of that which he shall prove to be amiss. In God we take to record in our consciences that from our hearts we abhor all sects of heresy, and all teachers of erroneous doctrines; and that with all humility we embrace purity of Christ's evangel, which is the only food of our souls " (Preface).

Although subsequently to the Reformation period the Pro- testant churches for the most part relapsed into the dogmatism of the Roman Catholic Church, and were ever ready with censure for every departure from orthodoxy — yet to-day a spirit of diffidence in regard to one's own beliefs, and of tolerance towards the beliefs of others, is abroad. The enlargement of the horizon of knowledge by the advance of science, the recogni- tion of the only relative validity of human opinions and beliefs as determined by and adapted to each stage of human development, which is due to the growing historical sense, the alteration of. view regarding the nature of inspiration, and the purpose of the Holy Scriptures, the revolt against all ecclesiastical authority, and the acceptance of reason and conscience as alone authorita- tive, the growth of the spirit of Christian charity, the clamorous demand of the social problem for immediate attention, all combine in making the Christian churches less anxious about the danger, and less zealous in the discovery and condemnation of heresy.

Having traced the history of opinion in the Christian churches on the

subject of heresy, we must now return to resume a sub- ject already mentioned, the persecution of heretics. According to the Canon Law, which " was the ecclesi- Persecu' astical law of medieval Europe, and is still the law of heretics. the Roman Catholic Church," heresy was defined as " error which is voluntarily held in contradiction to a doctrine which has been clearly stated in the creed, and has become part of the defined faith of the church," and which is " persisted in by a member of the church." It was regarded not only as an error, but also as a crime to be detected and punished. As it belongs, nowever, to a man's thoughts and not his deeds, it often can be proved only from suspicions. The canonists define the degrees of suspicion as " light " calling for vigilance, " vehement " demanding denunciation, and " violent " requiring punishment. The grounds of suspicion have been formulated " Pope Innocent III. declared that to lead a solitary life, to refuse to accommodate oneself to the prevailing manners of society, and to frequent unauthorized religious meetings were abundant grounds of suspicion; while later canonists were accustomed to give lists of deeds which made the doers suspect: a priest who did not celebrate mass, a layman who was seen in clerical robes, those who favoured heretics, received them as guests, gave them safe conduct, tolerated them, trusted them, defended them, fought, under them or read their books were all to be suspect " (T.M. Lindsay in article " Heresy," Ency. Brit. 9th edition). That the dangers of heresy might be avoided, laymen were forbidden to argue about matters of faith by Pope Alexander IV., an oath " to abjure every heresy and to maintain in its completeness the Catholic faith " was required by the council of Toledo (n 29), the reading of the Scriptures in the vulgar tongue was not allowed to the laity by Pope Pius IV. The reading of books was restricted and certain books were prohibited. Regarding heresy as a crime, the church was not content with inflicting its spiritual penalties,

such as excommunication and such civil disabilities as its own organization allowed it to impose (e.g. the heretics were forbidden to give evidence in ecclesiastical courts, fathers were forbidden to allow a son or a daughter to marry a heretic, and to hold social intercourse with a heretic was an offence). It regarded itself as justified in invoking the power of the state to suppress heresy by civil pains and penalties, including even torture and death.

The story of the persecution of heretics by the state must be briefly sketched.

As long as the Christian Church was itself persecuted by the pagan empire, it advocated freedom of conscience, and insisted that religion could be promoted only by instruction and per- suasion (Justin Martyr, Tertullian, Lactantius) ; but almost immediately after Christianity was adopted as the religion of the Roman empire the persecution of men for religious opinions began. While Constantine at the beginning of his reign (313) declared complete religious liberty, and kept on the whole to this declaration, yet he confined his favours to the orthodox hierarchical church, and even by an edict of the year 326 formally asserted the exclusion from these of heretics and schismatics. Arianism, when favoured by the reigning emperor, showed itself even more intolerant than Catholic Orthodoxy. Theodosius the Great, in 380, soon after his baptism, issued, with his co- emperors, the following edict: "We, the three emperors, will that all our subjects steadfastly adhere to the religion which was taught by St Peter to the Romans, which has been faithfully preserved by tradition, and which is now professed by the pontiff Damasus of Rome, and Peter, bishop of Alexandria, a man of apostolic holiness. According to the institution of the Apostles, and the doctrine of the Gospel, let us believe in the one Godhead of the Father, the Son, and the Holy Ghost, of equal majesty in the Holy Trinity. We order that the adherents of this faith be called Catholic Christians; we brand all the senseless followers of the other religions with the infamous name of heretics, and forbid their conventicles assuming the name of churches. Besides the condemnation of divine justice, they must expect the heavy penalties which our authority, guided by heavenly wisdom, shall think proper to inflict " (Schaff's Nicene and Post-Nicene Christianity, i. 142). The fifteen penal laws which this emperor issued in as many years deprived them of all right to the exercise of their religion, " excluded them from all civil offices, and threatened them with fines, confiscation, banishment and even in some cases with death." In 385 Maximus, his rival and colleague, caused seven heretics to be put to death at Treves (Trier). Many bishops approved the act, but Ambrose of Milan and Martin of Tours condemned it. While Chrysostom dis- approved of the execution of heretics, he approved " the pro- hibition of their assemblies and the confiscation of their churches." Jerome by an appeal to Deut. xiii. 6-10 appears to defend even the execution of heretics. Augustine found a justification for these penal measures in the " compel them to come in " of Luke xiv. 23, although his personal leanings were towards clemency. Only the persecuted themselves insisted on toleration as a Christian duty. In the middle ages the church showed no hesitation about persecuting unto death all who dared to con- tradict her doctrine, or challenge her practice, or question her authority. The instruction and persuasion which St Bernard favoured found little imitation. Even the Dominicans, who began as a preaching order to convert heretics, soon became persecutors. In the Albigensian Crusade (a.d. 1209-12 29) thousands were slaughtered. As the bishops were not zealous

enough in enforcing penal laws against heretics, the Tribunal of the Inquisition was founded in 1232 by Gregory IX., and was ‘ entrusted to the Dominicans who ” as Domini canes subjected to the most cruel tortures all on whom the suspicion of heresy fell, and all the resolute were handed over to the civil authorities, who readily undertook their execution ” (Kurtz, Church History, ii. 137-138)-

At the Reformation Luther laid down the principle that the civil government is concerned with the province of the external and temporal life, and has nothing to do with faith and conscience.

” How could the emperor gain the right,” he asks, ” to rule my faith?” With that only the Word of God is concerned. ” Heresy is a spiritual thing,” he says, ” which one cannot hew with any iron, burn with any fire, drown with any water. The Word of God alone is there to do it.” Nevertheless Luther assigned to the state, which he assumes to be Christian, the function of maintaining the Gospel and the Word of God in public life. He was not quite consistent in carrying out his principle (see Luthard’s Geschichte der christlichen Ethik, ii. $Z)- In the Religious Peace of Augsburg the principle ” cujus regio ejus religio ” was accepted- by it a ruler’s choice between Catholicism and Lutheranism bound his subjects, but any subject unwilling to accept the decision might emigrate without hindrance.

In Geneva under Calvin, while the Consistoire, or ecclesiastical court, could inflict only spiritual penalties, yet the medieval idea of the duty of the state to co-operate with the church to maintain the religious purity of the community in matters of belief as well as of conduct so far survived that the civil authority was sure to punish those whom the ecclesiastical had censured. Calvin consented to the death of Servetus, whose views on the Trinity he regarded as most dangerous heresy, and whose denial of the full authority of the Scriptures he dreaded as overthrow- ing the foundations of all religious authority. Protestantism generally, it is to be observed, quite approved the execution of the heretic. The Synod of Dort (1619) not only condemned Arminianism, but its defenders were expelled from the Nether- lands; only in 1625 did they venture to return, and not till 1630 were they allowed to erect schools and churches. In modern Protestantism there is a growing disinclination to deal even with errors of belief by ecclesiastical censure; the appeal to the civil authority to inflict any penalty is abandoned. During the course of the 19th century in Scottish Presbyterianism the affirmation of Christ’s atoning death for all men, the denial of eternal punishment, the modification of the doctrine of the inspiration of the Scriptures by acceptance of the results of the Higher Criticism, were all censured as perilous errors.

The subject cannot be left without a brief reference to the persecution of

witches. To the beginning of the 13th century the popular superstitions regarding sorcery, witchcraft and compacts with the devil were condemned by the ecclesiastical authorities as heathenish, sinful and heretical. But after the establishment of the Inquisition " heresy and sorcery were regarded as correlates, like two agencies resting on and service- able to the demoniacal powers, and were therefore treated in the same way as offences to be punished with torture and the stake " (Kurtz, Church History, ii. 195). While the Franciscans rejected the belief in witchcraft, the Dominicans were most zealous in persecuting witches. In the 15th century this delusion, fostered by the ecclesiastical authorities, took possession of the mind of the people, and thousands, mostly old women, but also a number of girls, were tortured and burned as witches. Pro- testantism took over the superstition from Catholicism. It was defended by James I. of England. As late as the 18th century death was inflicted in Germany and Switzerland on men, women and even children accused of this crime. This superstition dominated Scotland. Not till 1736 were the statutes against witchcraft repealed; an act which the Associate Presbytery at Edinburgh in 1743 declared to be " contrary to the express law of God, for which a holy God may be provoked in a way of righteous judgment."

The recognition and condemnation of errors in religious belief is by no means confined to the Christian Church. Only a few instances of heresy in other religions can be given. In regard to the fetishism of the Gold Coast ˆ?"" of Africa, Jevons (Introduction to the History of religions. Religion, pp. 165-166) maintains that " public opinion does not approve of the worship by an individual of a suhman, or private tutelary deity, and that his dealings with it are regarded in the nature of ' black art ' as it is not a god of the community." In China there is a " classical or canonical, primitive and therefore alone orthodox (tsching) and true

religion," Confucianism and Taoism, while the " heterodox (sic)," Buddhism especially, is " partly tolerated, but generally forbidden, and even cruelly persecuted " (Chantepie de la Saussaye, Religionsgeschichte, i. 57). In Islam " according to an unconfirmed tradition Mahomet is said to have foretold that his community would split into seventy-three sects (see Mahommedan Religion, § Sects), of which only one would escape the flames of hell." The first split was due to uncertainty regarding the principle which should rule the succession to the Caliphate. The Arabic and orthodox party {i.e. the Sunnites, who held by the Koran and tradition) maintained that this should be determined by the choice of the community. The Persian and heterodox party (the Shiites) insisted on heredity. But this political

difference was connected with theological differences. The sect of the Mu'tazilites which affirmed that the Koran had been created, and denied predestination, began to be persecuted by the government in the 9th century, and discussion of religious questions was forbidden (see Caliphate, sections B and C). The mystical tendency in Islam, Sufism, is also regarded as heretical (see Kuenen's Hibbert Lecture, pp. 45-50). Buddhism is a wide departure in doctrine and practice from Brahmanism, and hence after a swift unfolding and quick spread it was driven out of India and had to find a home -in other lands. Essenism from the standpoint of Judaism was heterodox in two respects, the abandonment of animal sacrifices and the adoration of the sun.

Although in Greece there was generally wide tolerance, yet in 399 B.C. Socrates " was indicted as an irreligious man, a corrupter of youth, and an innovator in worship."

Besides the works quoted above, see Gottfried Arnold's Unpar- teiische Kitchen- und Ketzer-Historie (1699-1700; ed. Schaffhausen, 1740). A very good list of writers on heresy, ancient and medieval, is given in Burton's Bampton Lectures on Heresies of the Apostolic Age (1829). The various Trinitarian and Christological heresies may be studied in Dorner's History of the Doctrine of the Person of Christ(i8A5- 1856; Eng. trans., 1861-1862) ; the Gnostic and Manichaean heresies in the works of Mansel, Matter and Beausobre ; the medieval heresies in Hahn's Geschichte der Ketzer im Mittelalter (1846-1850), and Preger's Geschichte der deutschen Mystik (1875) ; Quietism in Heppe's Geschichte der quietistischen Mystik (1875); the Pietist sects in Palmer's Gemeinschaften und Secten Wtlrttembergs (1875); the Reformation and 17th-century heresies and sects in the Anabaptis- ticum et enthusiasticum Pantheon und geistliches Riist-Haus (1702). Bohmer's Jus ecclesiasticum Protestantium (1714-1723), and van Espen's Jus ecclesiasticum (1702) detail at great length the relations of heresy to canon and civil law. On the question of the baptism of heretics see Smith and Cheetham's Diet, of Eccl. Antiquities, " Baptism, Iteration of "; and on that of the readmission of heretics into the church, compare Martene, De ritibus, and Morinus, De poenitentia. (A. E. G.)*

Heresy according to the Law of England— The highest point reached by the ecclesiastical power in England was in the Act De Haeretico comburendo (2 Henry IV. c. 15). Some have supposed that a writ of that name is as old as the common law, but its execution might be arrested by a pardon from the crown. The Act of Henry IV. enabled the diocesan alone, without the co-operation of a synod, to pronounce sentence of heresy, and required the sheriff to execute it by burning the offender, without waiting for the consent of the crown. 1 A large number of penal statutes were enacted in the

following reigns, and the statute 1 Eliz. c. I is regarded by lawyers as limiting for the first time the description of heresy to tenets declared heretical either by the canonical Scripture or by the first four general councils, or such as should thereafter be so declared by parliament with the assent of Convocation. The writ was abolished by 29 Car. 1 1, c. 9, which reserved to the ecclesiastical courts their jurisdiction over heresy and similar offences, and their power of awarding punishments not extending to death. Heresy became henceforward a purely ecclesiastical offence, although disabling laws of various kinds continued to be enforced against Jews, Catholics and other dissenters. The temporal courts have no knowledge of any offence known as heresy, although incidentally (e.g. in questions of copyright) they have refused protection to persons promulgating irreligious or blasphemous opinions. As an ecclesiastical offence it would at this moment be almost impossible to say what opinion, in the case of a layman at least, would be deemed heretical. Apparently, if a proper case could be made out, an ecclesiastical court might still sentence a layman to excommunication for heresy, but by no other means could his opinions be brought under censure. The last case on the subject (Jenkins v. Cook, L.R. 1 P.D. 80) leaves the matter in the same uncertainty. In that case a clergyman refused the communion

1 Stephen's Commentaries, bk. iv. ch. 7.

to a parishioner who denied the personality of the devil. The judicial committee held that the rights of the parishioners are expressly defined in the statute of 1 Edw. VI. c. i, and, without admitting that the canons of the church, which are not binding on the laity, could specify a lawful cause for rejection, held that no lawful cause within the meaning of either the canons or the rubric had been shown. It was maintained at the bar that the denial of the most fundamental doctrines of Christianity would not be a lawful cause for such rejection, but the judgment only queries whether a denial of the personality of the devil or eternal punishment is consistent with membership of the church. The right of every layman to the offices ot the church is established by statute without reference to opinions, and it is not possible to say what opinions, if any, would operate to disqualify him.

The case of clergymen is entirely different. The statute 13 Eliz. c. 12, § 2, enacts that " if any person ecclesiastical, or which shall have an ecclesiastical living, shall advisedly maintain or affirm any doctrine directly contrary or repugnant to any of the said articles, and by conventicle before the bishop of the diocese, or the ordinary, or before the queen's highness's commissioners in matters ecclesiasti- cal, shall persist therein or not revoke his error, or after such revoca- tion eftsoons affirm such untrue doctrine," he shall be deprived of his ecclesiastical promotions. The act it will be observed applies only to clergymen, and the punishment is

strictly limited to depriva- tion of benefice. The judicial committee of the privy council, as the last court of appeal, has on several occasions pronounced judg- ments by which the scope of the act has been confined to its narrowest legal effect. The court will construe the Articles of Religion and formularies according to the legal rules for the interpretation of statutes and written instruments. No rule of doctrine is to be ascribed to the church which is not distinctly and expressly stated or plainly involved in the written law of the Church, and where there is no rule, a clergy- man may express his opinion without fear of penal consequences. In the Essays and Reviews cases (Williams v. the Bishop of Salisbury and Wilson v. Fendall, 2 Moo. P.C.C., N.S. 375) it was held to be not penal for a clergyman to speak of merit by transfer as a " fiction," or to express a hope of the ultimate pardon of the wicked, or to affirm that any part of the Old or New Testament, however uncon- nected with religious faith or moral duty, was not written under the inspiration of the Holy Spirit. In the case of Noble v. Voysey (L.R.J, P.C. 357) in 1 87 1 the committee held that it was not bound to affix a meaning to articles of really dubious import, as it would have been in cases affecting property. At the same time any manifest contradiction of the Articles, or any obvious evasion of them, would subject the offender to the penalties of deprivation. In some of the cases the question has been raised how far the doctrine of the church could be ascertained by reference to the opinions generally expressed by divines belonging to its communion. Such opinions, it would seem, might be taken into account as showing the extent of liberty which had been in practice, claimed and exercised on the interpretation of the articles, but would certainly not be allowed to increase their stringency. It is not the business of the court to pronounce upon the absolute truth or falsehood of any given opinion, but simply to say whether it is formally consistent with the legal doctrines of the Church of England. Whether Convocation has any jurisdiction in cases of heresy is a question which has occasioned some difference of opinion among lawyers. Hale, as quoted by Phiilimore (Ecc. Law), says that before the time of Richard II., that is, before any acts of Parliament were made about heretics, it is without question that in a convocation of the clergy or provincial synod " they might and frequently did here in England proceed to the sentencing of heretics." But later writers, while adhering to the statement that Convocation might declare opinions to be heretical, doubted whether it could proceed to punish the offender, even when he was a clerk in orders. Phiilimore states that there is no longer any doubt, even apart from the effect of the Church Discipline Act 1840, that Convocation has no power to condemn clergymen for heresy. The supposed right of Convocation to stamp heretical opinions with its disapproval was exercised on a somewhat memorable occasion. In 1864 the Convocation of the province of Canterbury, having taken the opinion of two of the most eminent lawyers of the day (Sir Hugh Cairns and Sir John Rolt), passed

judgment upon the ˆvolume entitled Essays and Reviews. The judgment purported to " synodically condemn the said volume as containing teaching contrary to the doctrine received by the United Church of England and Ireland, in common with the whole Catholic Church of Christ." These proceedings were challenged in the House of Lords by Lord Houghton, and the lord chancellor (Westbury), speaking on behalf of the government, stated that if there was any "synodical judgment" it would be a violation of the law, subjecting those concerned in it to the penalties of a praemunire, but that the sentence in question, was " simply nothing, literally no sentence at all." It is thus at least doubtful whether Convocation has a right even to express an opinion unless specially authorized to do so by the crown, and it is certain that it cannot do anything more. Heresy or no heresy, in the last resort, like all other ecclesiastical questions, is decided by the judicial committee of the council.

The English lawyers, following the Roman law, distinguish between heresy and apostasy. The latter offence is dealt with by an act which still stands on the statute book, although it has long been

virtually obsolete — the 9 & 10 Will. III. c. 35. If any person who has been educated in or has professed the Christian religion shall, by writing, printing, teaching, or advised speaking, assert or maintain that there are more Gods than one, or shall deny any of the persons of the Holy Trinity to be God, or shall deny the Christian religion to be true or the Holy Scriptures of the Old and New Testament to be of divine authority, he shall for the first offence be declared incapable of holding any ecclesiastical, civil, or military office or employment, and for the second incapable of bringing any action, or of being guardian, executor, legatee, or grantee, and shall suffer three years' imprisonment without bail. Unitarians were saved from these atrocious penalties by a later act (53 Geo. III. c. 160), which permits Christians to deny any of the persons in the Trinity without penal consequences.

HEREWARD, usually but erroneously styled " the Wake " (an addition of later days), an Englishman famous for his re- sistance to William the Conqueror. It is now established that he was a tenant of Peterborough Abbey, from which he held lands at Witham-on-the-Hill and Barholme with Stow in the south-western corner of Lincolnshire, and of Crowland Abbey at Rippingale in the neighbouring fenland. His first authentic act is the storm and sacking of Peterborough in 1070, in company with outlaws and Danish invaders. The next year he took part in the desperate stand against

the Conqueror's rule made in the isle of Ely, and, on its capture by the Normans, escaped with his followers through the fens. That his exploits made an exceptional impression on the popular mind is certain from the mass of legendary history that clustered round his name; he became, says Mr Davis, " in popular eyes the champion of the English national cause." The Hereward legend has been fully dealt with by him and by Professor Freeman, who observed that " with no name has fiction been more busy."

See E. A. Freeman, History of the Norman Conquest, vol. iv. ; J. H. Round, Feudal England; H. W. C. Davis, England under the Normans and Angevins. (J. H. R.)

HERFORD, a town in the Prussian province of Westphalia, situated at the confluence of the Werre and Aa, on the Minden & Cologne railway, 9 m. N.E. of Bielefeld, and at the junction of the railway to Detmold and Altenbeken. Pop. (1885) 15,902; (1905) 24,821. It possesses six Evangelical churches, notably the Munsterkirche, a Romanesque building with a Gothic apse of the 15th century; the Marienkirche, in the Gothic style; and the Johanniskirche, with a steeple 280 ft. high. The other principal buildings are the Roman Catholic church, the synagogue, the gymnasium founded in 1540, the agricultural school and the theatre. There is a statue of Frederick William of Brandenburg. The industries include cotton and flax-spinning, and the manu- facture of linen cloth, carpets, furniture, machinery, sugar, tobacco and leather.

Herford owes its origin to a Benedictine nunnery which is said to have been founded in 832, and was confirmed by the emperor Louis the Pious in 839. From the emperor Frederick I. the abbess obtained princely rank and a seat in the imperial diet. Among the abbesses was the celebrated Elizabeth (1618- 1680), eldest daughter of the elector palatine Frederick V., who was a philosophical princess, and a pupil of Descartes. Under her rule the sect of the Labadists settled for some time in Herford. The foundation was secularized in 1803. Herford was a member of the Hanseatic League, and its suzerainty passed in 1 547 from the abbesses to the dukes of Juliers. In 1631 it became a free imperial town, but in 1647 it was subjugated by the elector of Brandenburg. It came into the possession of Westphalia in 1807, and in 1813 into that of Prussia.

See L. Holscher, Reformationsgeschichte der Stadt Herford (Gttters- loh, 1

HERGENROTHER, JOSEPH VON (1824-1890), German theologian, was born at Wiirzburg in Bavaria on the 15th of September 1824. He studied at Wiirzburg and at Rome. After spending a year as parish priest at Zellingen, near his native city, he went, in 1850, at his bishop's command, to the university of Munich, where he took his degree of doctor of theology

the same year, becoming in 1851 Privatdozent, and in 1855 professor of ecclesiastical law and history. At Munich he gained the reputation of being one of the most learned theologians on the Ultramontane side of the Infallibility question,

which had begun to be discussed; and in 1868 he was sent to Rome to arrange the proceedings of the Vatican Council. He was a stanch supporter of the infallibility dogma; and in 1870 he wrote Anti-Janus, an answer to The Pope and the Council, by " Janus " (Dollinger and J. Friedrich), which made a great sensation at the time. In 1877 he was made prelate of the papal household; he became cardinal deacon in 1879, and was afterwards made curator of the Vatican archives. He died in Rome on the 3rd of October 1890.

HergenrSther's first published work was a dissertation on the doctrine of the Trinity according to Gregory Nazianzen (Regensburg, 1850), and from this time onward his literary activity was immense. After several articles and brochures on Hippolytus and the question of the authorship of the Philosophumena, he turned to the study of Photius, patriarch of Constantinople, and the history of the Greek schism. For twelve years he was engaged upon this work, the result being his monumental Photius, Patriarch von Constantinopel. Sein Leben, seine Schriften und das griechische Schisma (3 vols., Regensburg, 1867-1869); an additional volume (1869) gave, under the title Monumenta Graeca ad Photium . . . pertinentia, a collection of the unpublished documents on which the work was largely based. Of Hergenrdther's other works, the most important are his history of the Papal States since the Revolution (Der Kirchenstaat seit der franzbsischen Revolution, Freiburg i. B., i860; Fr. trans., Leipzig, 1 860), his great work on the relations of church and state (Katholische Kirche und christlicher Stoat in ihrer geschichtlichen Entwickelung und in Beziehung auf Fragen der Gegenwart, 2 parts, Freiburg i. B., 1872; 2nd ed. expanded, 1876; Eng. trans., London, 1876, Balti- more, 1889), and his universal church history (Handbuch der allge- meinen Kirchengeschichte, 3 vols., Freiburg i. B., 1876-1880; 2nd ed., 1879, &c; 3rd ed., 1884-1886; 4th ed., by Peter Kirsch, 1902, &c. ; French trans., Paris, 1880, &c). He also found time for a while to edit the new edition of Wetzer and VJehe's Kirchen- lexikon (1877), to superintend the publication of part of the Regesta of Pope Leo X. (Freiburg i.B., i884~i885),andto add two volumes to Hefele's Conciliengeschichte (ib., 1887 and 1890).

HERINGSDORF, a seaside resort of Germany, in the Prussian province of Pomerania, on the north coast of the island of Usedom, 5 m. by rail N.W. of Swinemunde. It is surrounded by beech woods, and is perhaps the most popular seaside resort on the German shore of the Baltic, being frequented by some 12,000 visitors annually

HERIOT, GEORGE (1563-1623), the founder of Heriot's Hospital, Edinburgh, was descended from an old Haddington family; his father, a goldsmith in Edinburgh, represented the city in the Scottish parliament. George was born in 1563, and after receiving a good education was apprenticed to his father's trade. In 1586 he married the daughter of a deceased Edinburgh merchant, and with the assistance of her patrimony set up in business on his own account. At first he occupied a small " buith " at the north-east corner of St Giles's church, and afterwards a more pretentious shop at the west end of the building. To the business of a goldsmith he joined that of a money-lender, and in 1597 he had acquired such a reputation that he was appointed goldsmith to Queen Anne, consort of James VI. In 1601 he became jeweller to the king, and followed him to London, occupying a shop opposite the Exchange. Heriot was largely indebted for his fortune to the extravagance of the queen, and the imitation of this extravagance by the nobility. Latterly he had such an extensive business as a jeweller that on one occasion a government proclamation was issued calling upon all the magistrates of the kingdom to aid him in securing the workmen he required. He died in London on the 10th of February 1623. In 1608, having some time previously lost his first wife, he married Alison Primrose, daughter of James Primrose, grandfather of the first earl of Rosebery, but she died

in 1612; by neither marriage had he any issue. The surplus of his estate, after deducting legacies to his nearest relations and some of his more intimate friends, was bequeathed to found a hospital for the education of freemen's sons of the town of Edinburgh; and its value afterwards increased so greatly as to supply funds for the erection of several Heriot foundation schools in different parts of the city.

Heriot takes a leading part in Scott's novel, The Fortunes of Nigel (see also the Introduction). A History of Heriot's Hospital, vnth a Memoir of the Founder, by William Steven, D.D., appeared in 1827; 2nd ed. 1859.

HERIOT, by derivation the arms and equipment (geatwa) of a soldier or army (here); the O. Eng. word is thus here-geatwa. The lord of a fee provided his tenant with arms and a horse, either as a gift or loan, which he was to use in the military service paid by him. On the death of the tenant the lord claimed the return of the equipment. When by the 10th century land was being given instead of arms, the heriot was still paid, but more in the nature of a "relief " (q.v.). There seems to have been some connexion between the payment of the heriot and the power of making a will (F. W. Maitland, Domesday Book and Beyond, p. 298). By the 13th century the payment was made either in money or in kind by the handing over of the best beast or of the best other chattel of the tenant (see Pollock and Maitland, History of English Law, i. 270 sq.). For the manorial law relating to heriots, see Copyhold.

HERISAU, the largest town in the entire Swiss canton of Appenzell, built on the Glatt torrent, and by light railway 7 m. south-west of St Gall or 135 m. north of Appenzell. In 1900 it had 13,497 inhabitants, mainly Protestant and German- speaking. The lower portion of the massive tower of the parish church (Protestant) dates from the nth century or even earlier. It is a prosperous little industrial town in the Ausser Rhoden half of the canton, especially busied with the manufacture of embroidery by machinery, and of muslins. Near it is the goats' whey cure establishment of Heinrichsbad, and the two castles of Rosenberg and Rosenburg, ruined in 1403 when the land rose against its lord, the abbot of St Gall. About 5 m. to the south-east is

Hundwil, a village of 1523 inhabitants, where the Lands genieinde of Ausser Rhoden meets in the odd years (in other years at Trogen) on the last Sunday in April.

HERITABLE JURISDICTIONS, in the law of Scotland, grants of jurisdiction made to a man and his heirs. They were a usual accompaniment to feudal tenures, and the power which they conferred on great families, being recognized as a source of danger to the state, led to frequent attempts being made by statute to restrict them, both before and after the Union. They were all abolished in '1746.

HERKIMER, a village and the county-seat of Herkimer county, New York, U.S.A., in the township of the same name, on the Mohawk river, about 15 m. S.E. of Utica. Pop. (1900) 5555 (7 2 4 being foreign-born); (1905, state census) 6596; (1910) 7520. It is served by the New York Central & Hudson River railway, a branch of which (the Mohawk & Malone railway) extends through the Adirondacks to Malone, N.Y.; by inter- urban electric railway to Little Falls, Syracuse, Richfield Springs, Cooperstown and Oneonta, and by the Erie canal. The village has a public library, and is the seat of the Folts Mission Institute (opened 1893), a training school for young women, controlled by the Women's Foreign Missionary Society of the Methodist Episcopal Church. Herkimer is situated in a rich dairying region, and has various manufactures. The municipality owns and operates its water-supply system and electric-lighting plant. Herkimer, named in honour of General Nicholas Herkimer (c. 1728-1777), who was mortally wounded in the Battle cf Oriskany, and in whose memory there is a monument (unveiled on the 6th of August 1907) in the village, was settled about 1725 by Palatine Germans, who bought from the Mohawk Indians a large tract of land including the present site of the village and established thereon several settlements which became known collectively as the " German Flats." In 1756 a stone house, built in 1740 by General Herkimer's father, John Jost Herkimer (d. 1775) — apparently one of the original group of settlers — a stone church, and other buildings, standing within what is now Herkimer village, were enclosed in a stockade and ditch fortifications by Sir William Johnson, and this post, at first known as Fort Kouari (the Indian name), was subsequently called Fort Herkimer. Another fort (Ft. Dayton) was built within the limits of the present village in 1776 by Colonel Elias Dayton (1737-1807), who later became a brigadier-general (1783) and served in the Confederation Congress in 1 787-1 788. During the French and Indian War the settlement was attacked (nth November 1757) and practically destroyed, many of the

settlers being killed or taken prisoners; and it was again attacked on the 30th of April 1758. In the War of Independence General Herkimer assembled here the force which on the 6th of August 1777 was ambushed

near Oriskany on its march from Ft. Dayton to the relief of Ft. Schuyler (see Oriskany); and the settlement was attacked by Indians and " Tories " in September 1778 and in June 1782. The township of Herkimer was organized in 1788, and in 1807 the village was incorporated.

See Nathaniel I. Benton, History of Herkimer County (Albany, 1856); and Phoebe S. Cowen, The Herkimers and Schuylers, 1903).

HERKOMER, SIR HUBERT VON (1849-), British painter, was born at Waal, in Bavaria, and eight years later was brought to England by his father, a wood-carver of great ability. He lived for some time at Southampton and in the school of art there began his art training; but in 1866 he entered upon a more serious course of study at the South Kensington Schools, and in 1869 exhibited for the first time at the Royal Academy. By his picture, " The Last Muster," at the Academy in 1875, he definitely established his position as an artist of high distinction. He was elected an associate of the Academy in 1879, and academi- cian in 1890; an associate of the Royal Society of Painters in Water Colours in 1893, and a full member in 1894; and in 1885 he was appointed Slade professor at Oxford. He exhibited a very large number of memorable portraits, figure subjects and landscapes, in oil and water colour ; he achieved marked success as a worker in enamel, as an etcher, mezzotint engraver and illustrative draughtsman; and he exercised wide influence upon art education by means of the Herkomer School (Incorporated), at Bushey, which he founded in 1883 and directed gratuitously until 1904 ,when he retired. It was then voluntarily wound up, and is now conducted privately. Two of his pictures, " Found " (1885) and " The Chapel of the Charterhouse " (1889) , are in the National Gallery of British Art. In the year 1 907 he received the honorary degree of D.C.L. at Oxford, and a knighthood was conferred upon him by the king in addition to the commandership of the Royal Victorian Order with which he was already decorated.

See Hubert von Herkomer, R.A., a Study and a Biography, by A. L. Baldry (London, 1901); Professor Hubert Herkomer, Royal Academician, His Life and Work, by W. L. Courtney (London, 1892).

HERLEN (or Herlin), FRITZ, of N6rdlingen, German artist of

the early Swabiari school, in the 15th century. The date and

place of his birth are unknown, but his name is on the roll of the

tax-gatherers of Ulm in 1449; and in 1467 he was made citizen

and town painter at Nbrdlingen, " because of his acquaintance

with Flemish methods of painting." One of the first of his acknowledged productions is a shrine on one of the altars of the church of Rothenburg on the Tauber, the wings of which were finished in 1466, with seven scenes from the lives of Christ and the Virgin Mary. In the town-hall of Rothenburg is a Madonna and St Catherine of 1467 ; and in the choir of Nordlingen

cathedral a triptych of 1488, representing the " Nativity " and " Christ amidst the Doctors," at the side of a votive Madonna attended by St Joseph and St Margaret as patrons of a family. In each of these works the painter's name certifies the picture, and the manner is truly that of an artist " acquainted with Flemish methods." We are not told under whom Herlen laboured in the Netherlands, but he probably took the same course as Schongauer and Hans Holbein the elder, who studied in the school of van der Weyden. His altarpiece at Rothenburg contains groups and figures, as well as forms of action and drapery, which seem copied from those of van der Weyden's or Memlinc's disciples, and the votive Madonna of 1488, whilst characterized- by similar features, only displays such further changes as may be accounted for by the master's constant later contact with contemporaries in Swabia. Herlen had none of the genius of Schongauer. He failed to acquire the delicacy even of the second-rate men who handed down to Matsys the traditions of the 15th century; but his example was certainly favourable to the development of art in Swabia. By general consent critics have assigned to him a large altar-piece, with scenes from the gospels and figures of St Florian and St Floriana, and a Crucifixion, the principal figure of which is carved in high relief on the surface of

a large panel in the church of Dinkelsbiihl. A Crucifixion, with eight scenes from the New Testament, is shown as his in the cathedral, a " Christ in Judgment, with Mary and John," and the " Resurrection of Souls " in the town-hall of Nordlingen. A small Epiphany, once in the convent of the Minorites of Ulm, is in the Holzschuher collection at Augsburg, a Madonna and Circum- cision in the National Museum at Munich. Herlen's epitaph, preserved by Rathgeber, states that he died on the 12th of October 149 1, and was buried at Nordlingen.

HERMAE, in Greek antiquities, quadrangular pillars, broader above than at the base, surmounted by a head or bust, so called either because the head of Hermes was most common or from their etymological connexion with the Greek word ipfxara (blocks of stone), which originally had no reference to Hermes at all. In the oldest times Hermes, like other divinities, was worshipped in the form of a heap of stones or of an amorphous block of wood or stone, which afterwards took the shape of a phallus, the symbol of productivity. The next step was the addition 01 a nead to this phallic column which became quadrangular (the number 4 was sacred to Hermes, who was born on the fourth day of the month), with the significant indication of sex still prominent. In this shape the number of herms rapidly increased, especially those of Hermes, for which the distinctive name of Hermhermae has been suggested. In Athens they were found at the corners of streets; before the gates and in the courtyards of houses, where they were worshipped by women as having the power to make them prolific; before the temples; in the gymnasia and palaestrae. On each side of the road leading from the Stoa Poikile to the Stoa Basileios, rows of Hermae were set up in such numbers by the piety of private individuals or public corporations, that the Stoa Basileios was called the Stoa of the Hermae. The function of Hermes as protector of the roads, of merchants and of commerce, explains the number of Hermae that served the purpose of sign-posts on the roads outside the city. It is stated in the pseudo- Platonic Hipparchus that the son. of Peisistratus had set up marble pillars at suitable places on the roads leading from the different country districts to Athens, having the places connected with the roads inscribed on the one side in a hexameter verse, and on the other a pentameter containing a short proverb or moral precept for the edification of travellers. Sometimes they bore inscriptions celebrating the valour of those who had fought for their country. Just as it was customary for the passer-by to show respect to the rudest form of the god (the heap of stones) by contributing a stone to the heap or anointing it with oil, in like manner small offerings, generally of dried figs, were deposited near the Hermae, to appease the hunger of the necessitous way- farer. Garlands of flowers were also suspended on the two arm- like tenons projecting from either side of the column at the top (for the oracle at Pharae see Hermes). These pillars were also used to mark the

frontier boundaries or the limits of different estates. The great respect attaching to them is shown by the excitement caused in Athens by the " Mutilation of the Hermae " just before the departure of the Sicilian expedition (May 41 5 B.C.). They formed the object of a special industry, the makers of them being called Hermoglyphi. The surmounting heads were not, however, confined to those of Hermes; those of other gods and heroes, and even of distinguished mortals, were of frequent occurrence. In this case a compound was formed: Hermathena (a herm of Athena), Hermares, Hermaphroditus, Hermanubis, Hermalcibiades, and so on. In the case of these compounds it is disputed whether they indicated a herm with the head of Athena, or with a Janus-like head of both Hermes and Athena, or a figure compounded of both deities. The Romans not only borrowed the Hermes pillars for their deities which at an early period they assimilated to those of the Greeks (as Heracles — Hercules) but also for the indigenous gods who preserved their individuality. Thus herms of Jupiter Terminalis (the hermae being identified with the Roman termini) and of Silvanus occur. Under the empire, the function of the hermae was rather architectural than religious. They were used to keep up the draperies in the interior of a house, and in the Circus Maximus they were used to support the barriers.

See the article with bibliography by Pierre Paris in Daremberg and Saglio's Dictionnaire des antiquites; for the mutilation of the Hermae, Thucydides vi. 27; Andocides, De mysteriis; Grote, Hist, of Greece, ch. 58; H. Weil, Andes sur Vantiquite grecque (1900); Burolt, Griech. Gesch. (ed. 1904), III. ii. p. 1287.

HERMA60RAS, of Temnos, Greek rhetorician of the Rhodian school and teacher of oratory in Rome, flourished during the first half of the 1st century B.C. He obtained a great reputation among a certain section and founded a special school, the members of which called themselves Hermagorei. His chief opponent was Posidonius of Rhodes, who is said to have contended with him in argument in the presence of Pompey (Plutarch, Pompey, 42). Hermagoras devoted himself particularly to the branch of rhetoric known as oiKovofda (inventio), and is said to have invented the doctrine of the four araatis (status) and to have arranged the parts of an oration differently from his predecessors. Cicero held an unfavourable opinion of his methods, which were approved by Quintilian, although he considers that Hermagoras neglected the practical side of rhetoric for the theoretical. According to Suidas and Strabo, he was the author of rkxvai priTopLKai (rhetorical manuals) and of other works, which should perhaps be attributed to his younger namesake, surnamed Carion, the pupil of Theodorus of Gadara.

See Strabo xiii. p. 621; Cicero, De inventione, i. 6. 8, Brutus, 76, 263. 78,

271; Quintilian, Jnstit. iii. I. 16, 3. 9, II. 22; C. W. Piderit, De Hermagora rhetore (1839); G. Thiele, Hermagoras Ein Beitrag zur Geschichte der Rhetorik (1893).

HERMANDAD (from hermano, Lat. germanus, a brother), a Castilian word meaning, strictly speaking, a brotherhood. In the Romance language spoken on the east coast of Spain in Catalonia it is written germandat or germania. In the form germania it has acquired the significance of " thieves' Latin " or " thieves' cant," and is applied to any jargon supposed to be understood only by the initiated. But the typical "germania" is a mixture of slang and of the gipsy language. The herman- dades have played a conspicuous part in the history of Spain. The first recorded case of the formation of an hermandad occurred in the 12th century when the towns and the peasantry of the north united to police the pilgrim road to Santiago in Galicia, and protect the pilgrims against robber knights. Throughout the middle ages such alliances were frequently formed by combinations of towns to protect the roads connecting them, and were occasionally extended to political purposes. They acted to some extent like the Fehmic courts of Germany. The Catholic sovereigns, Ferdinand and Isabella, adapted an existing hermandad to the purpose of a general police acting under officials appointed by themselves, and endowed with large powers of summary jurisdiction even in capital cases. The hermandad became, in fact, a constabulary, which, however, fell gradually into neglect. In Catalonia and Valencia the " germanias " were combinations of the peasantry to resist the exactions of the feudal lords.

HERMAN DE VALENCIENNES, 12th-century French poet, was born at Valenciennes, of good parentage. His father and mother, Robert and Herembourg, belonged to Hainault, and gave him for god-parents Count Baldwin and Countess Yoland — doubtless Baldwin IV. of Hainault and his mother Yoland. Herman was a priest and the author of a verse Histoire de la Bible, which includes a separate poem on the Assumption of the Virgin. The work is generally known as Le Roman de sapience, the name arising from a copyist's error in the first line of the poem:

" Comens de sapiense, ce est la cremors de Deu " the first word being miswritten in one MS. Romens, and in another Romanz. His work has, indeed, the form of an ordinary romance, and cannot be regarded as a translation. He selects such stories from the Bible as suit his purpose, and adds freely from legendary sources, displaying considerable art in the selection and use of his materials. This scriptural poem, very popular in its day, mentions Henry II. of England as already

dead, and must therefore be assigned to a date posterior to n 89. See Notices et extraits d-es manuscrits (Paris, vol. 34), and" Jean

Bonnard, Les Traductions de la Bible en vers jrancais au mo\en due

(1884).

HERMANN I. (d. 1217), landgrave of Thuringia and count palatine of Saxony, was the second son of Louis II. the Hard, landgrave of Thuringia, and Judith of Hohenstaufen, sister of the emperor Frederick I. Little is known of his early years, but in 1 1 80 he joined a coalition against Henry the Lion, duke of Saxony, and with his brother, the landgrave Louis III., suffered a short imprisonment after his defeat at Weissensee by Henry. About this time he received from his brother Louis the Saxon palatinate, over which he strengthened his authority by marrying Sophia, sister of Adalbert, count of Sommerschenburg, a former count palatine. In n 90 Louis died and Hermann by his energetic measures frustrated the attempt of the emperor Henry VI. to seize Thuringia as a vacant fief of the Empire, and established himself as landgrave. Having joined a league against the emperor he was accused, probably wrongly, of an attempt to murder him. Henry was not only successful in detaching Hermann from the hostile combination, but gained his support for the scheme to unite Sicily with the Empire. In 1 197 Hermann went on crusade. When Henry VI. died in 1198 Hermann's support was purchased by the late emperor's brother Philip, duke of Swabia, but as soon as Philip's cause appeared to be weakening he transferred his allegiance to Otto of Bruns- wick, afterwards the emperor Otto IV. Philip accordingly invaded Thuringia in 1204 and compelled Hermann to come to terms by which he surrendered the lands he had obtained in 1198. After the death of Philip and the recognition of Otto he was among the princes who invited Frederick of Hohenstaufen, afterwards the emperor Frederick II., to come to Germany and assume the crown. In consequence of this step the Saxons attacked Thuringia, but the landgrave was saved by Frederick's arrival in Germany in 121 2. After the death of his first wife in 1 1 95 Hermann married Sophia, daughter of Otto I., duke of Bavaria. By her he had four sons, two of whom, Louis and Henry Raspe, succeeded their father in turn as landgrave. Hermann died at Gotha on the 25th of April 1217, and was buried at Reinhardsbrunn. He was fond of the society of men of letters, and Walther von der Vogelweide and other Minne- singers were welcomed to his castle of the Wartburg. In this connexion he figures in Wagner's Tannhauser.

See E. Winkelmann, PhUipp von Schwaben und Otto IV. von Braunschweig (Leipzig, 1873-1878); T. Knochenhauer, Geschichte Thilringens (Gotha, 1 871); and F. Wachter, Thiiringische und ober- sdchsische Geschichte

(Leipzig, 1826).

HERMANN OF REICHENAU (Herimannus Augiensis), commonly distinguished as Hermannus Contractus, i.e. the Lame (1013-1054), German scholar and chronicler, was the son of Count Wolferad of Alshausen in Swabia. Hermann, who became a monk of the famous abbey of Reichenau, is at once one of the most attractive and one of the most pathetic figures of medieval monasticism. Crippled and distorted by gout from his childhood, he was deprived of the use of his legs; but, in spite of this, he became one of the most learned men of his time, and exercised a great personal and intellectual influence on the numerous band of scholars he gathered round him. He died on the 24th of September 1054, at the family castle of Alshausen near Biberach. Besides the ordinary studies of the monastic scholar, he devoted himself to mathematics, astronomy and music, and constructed watches and instruments of various kinds.

His chief work is a Chronicon ad annum 1054, which furnishes important and original material for the history of the emperor Henry HI. The first edition, from a MS. no longer extant, was printed by]. Sichard at Basel in 1529, and reissued by Heinrich Peter in 1549; another edition appeared at St Blaise in 1790 under the supervision of Ussermann; and a third, as a result of the collation of numerous MSS., forms part of vol. v. of Pertz's Monumenta Germaniae historica. A German translation of the last is contributed by K. F. A. Nobbe to Die Geschichtsschreiber der deutschen Vorzeit (1st ed., Berlin, 1851 ; 2nd ed., Leipzig, 1893). The separate lives of Conrad II. and Henry III., often ascribed to Hermann, appear to have perished. His treatises De mensura astrolabii and De utilitatibus astrolabii (to be found, on the authority of Salzburg MSS., in Pez, Thesaurus tnecdoiorum novissimus, iii.) being the first contributions of moment furnished by a European to this subject, Hermann was for a time considered the inventor of the astrolabe. A didactic poem from his

pen, De octo viiiis principalibus, is printed in Haupt's Zeitschrift

fur ieutsches Alterthum (vol. xiii.) ; and he is sometimes credited

with the composition of the Latin hymns Vent Sancte Spiritus, Salve Regina, and Alma Redemptoris. A martyr ologium by Hermann was discovered by E. Dummler in a MS. at Stuttgart, and was published by him in " Das Martyrologium Notkers und seine Verwandten " in Forschungen zur deutschen Geschichte, xxv. (Gottingen, 1885).

See H. Hansjakob, Herimann der Lahme (Mainz, 1875) ; Potthast, Bibliotheca med. aev. s. " Herimannus Augiensis."

HERMANN OF WIED (1477-1552), elector and archbishop of Cologne, was the fourth son of Frederick, count of Wied (d. 1487), and was born on the 14th of January 1477. Educated for the Church, he became elector and archbishop in 1515, and ruled his electorate with vigour and intelligence, taking up at first an attitude of hostility towards the reformers and their teaching. A quarrel with the papacy turned, or helped to turn, his thoughts in the direction of Church reform, but he hoped this would come from within rather than from without, and with the aid of his friend John Gropper (1503-1559), began, about 1 536, to institute certain reforms in his own diocese. One step led to another, and as all efforts at union failed the elector invited Martin Bucer to Cologne in 1542. Supported by the estates of the electorate, and relying upon the recess of the diet of Regensburg in 1541, he encouraged Bucer to press on with the work of reform, and in 1543′ invited Melanchthon to his assistance. His conversion was hailed with great joy by the Protestants, and the league of Schmalkalden declared they were resolved to defend him; but the Reformation in the electorate received checks from the victory of Charles V. over William, duke of Cleves, and the hostility of the citizens of Cologne. Summoned both before the emperor and the pope, the elector was deposed and excommunicated by Paul III. in 1546. He resigned his office in February 1547, and retired to Wied. Hermann, who was also a bishop of Paderborn from 1532 to 1547, died on the 15th of August 1552. See C. Varrentrapp, Hermann von Wied (Leipzig, 1878).

HERMANN, FRIEDRICH BENEDICT WILHELM VON (1795- 1868), German economist, was born on the 5th of December 1795, at Dinkelsbiihl in Bavaria. After finishing his primary education he was for some time employed in a draughtsman's office. He then resumed his studies, partly at the gymnasium in his native town, partly at the universities of Erlangen and Wiirzburg. In 181 7 he took up a private school at Nuremberg, where he remained for four years. After filling an appointment as teacher of mathematics at the gymnasium of Erlangen, he became in 1823

Privatdozent at the university in that town. His inaugural dissertation was on the notions of political economy among the Romans (Dissertatio exhibens sententias Romanorum ad oeconomiam politicam pertinentes, Erlangen, 1823). He after- wards acted as professor of mathematics at the gymnasium and polytechnic school in Nuremberg, where he continued till 1827. During his stay there he published an elementary treatise on arithmetic and algebra (Lehrbuch der Arith. u. Algeb., 1826), and made a journey to France to inspect the organization and conduct of technical schools in that country. The results of his investigation were published in 1826 and 1828 (Uber technische Unterrichts-Anstalten). Soon after his return from France he was made professor extraordinarius of political science of the university of Munich, and in 1833 he was advanced to the rank of ordinary professor. In 1832 appeared the first edition of his great work on political economy, Staatswirth- schaftliche Untersuchungen. In 1835 he was made member of the Royal Bavarian Academy of Sciences. From the year 1836 he acted as inspector of technical instruction in Bavaria, and made frequent journeys to Berlin and Paris in order to study the methods there pursued. In the state service of Bavaria, to which he devoted himself, he rose rapidly. In 1837 he was placed on the council for superintendence of church and school work; in r839 he was entrusted with the direction of the bureau of statistics; in 1845 he was one of the councillors for the interior; in 1848 he sat as member for Munich in the national assembly at Frankfort. In this assembly Hermann, with Johann Heckscher and others, was mainly instrumental in organizing the so-called " Great German " party, and was selected as one of the represen- I tatives of their views at Vienna. Warmly supporting the customs

union (Zollverein), he acted in 1851 as one of its commissioners at the great industrial exhibition at London, and published an elaborate report on the woollen goods. Three years later he was president of the committee of judges at the similar exhibition at Munich, and the report of its proceedings was drawn up by him. In 1855 he became councillor of state, the highest honour in the service. From 1835 to 1847 h e contributed a long series of reviews, mainly of works on economical subjects, to the Miinchener gelehrte Anzeigen and also wrote for Rau's Archiv der politischen Okonomie and the Augsburger allgemeine Zeitung. As head of the bureau of statistics he published a series of valuable annual reports (Beitrage zur Statistik des Konigreichs Bayern, Hefte 1-17, 1850-1867). He was engaged at the time of his death, on the 23rd of November 1868, upon a second edition of his Staalswirthschaftliche Untersuchungen, which was published in 1870.

Hermann's rare technological knowledge gave him a great advantage in dealing with some economic questions. He reviewed the principal fundamental ideas of the science with great thoroughness and acuteness. " His strength," says Roscher, " lies in his clear, sharp, exhaustive distinction between the several elements of a complex conception, or the several steps comprehended in a complex act." For keen analytical power his German brethren compare him with Ricardo. But he avoids several one-sided views of the English economist. Thus he places public spirit beside egoism as an economic motor, regards price as not measured by labour only but as a product of several factors, and habitually contemplates the consumption of the labourer, not as a part of the cost of production to the capitalist, but as the main practical end of economics.

See Kautz, Gesch. Entwicklung d. National-Okonomik, pp. 633-638 ; Roscher, Gesch. d. Nat.-Okon. in Deutschland, pp. 860-879.

HERMANN, JOHANN GOTTFRIED JAKOB (1 772-1848), German classical scholar and philologist, was born at Leipzig on the 28th of November 1772. Entering the university of his native city at the age of fourteen, Hermann at first studied law, which he soon abandoned for the classics. After a session at Jena in 1 793-1 794, he became a lecturer on classical literature in Leipzig, in 1798 professor extraordinarius of philosophy in the university, and in 1803 professor of eloquence (and poetry, 1809). He died on the 31st of December 1848. Hermann maintained that an accurate knowledge of the Greek and Latin languages was the only road to a clear understanding of the intellectual life of the ancient world, and the chief, if not the only, aim of philology. As the leader of this grammatico-critical school, he came into collision with A. Bockh and Otfried Miiller, the representatives of the historico-antiquarian school, which regarded Hermann's view of philology as inadequate and one-sided.

Hermann devoted his early attention to the classical poetical metres, and published several works on that subject, the most important being Elementa doctrinae metricae (1816), in which he set forth a scientific theory based on the Kantian categories. His writings on Greek grammar are also valuable, especially De emendanda ratione Graecae grammaticae (1801), and notes and excursus on Viger's treatise on Greek idioms. His editions of the classics include several of the plays of Euripides; the Clouds of Aristophanes (1799); Trinummus of Plautus (1800); Poetica of Aristotle (1802); Orphica (1805); the Homeric Hymns (1806); and the Lexicon of Photius (1808). In 1825 Hermann finished the edition of Sophocles begun by Erfurdt. His edition of Aeschylus was published after his death in 1852. TheOpuscula, a collection of his smaller writings in Latin, appeared in seven volumes between 1827 and 1839.

See monographs by O. Jahn (1849) and H. Kochly (1874); C. Bursian, Geschichte der klassischen Philologie in Deutschland (1883); art. in Allgem. deutsche Biog. ; Sandys, Hist. Class. Schol. iii.

HERMANN, KARL FRIEDRICH (1804-1855), German classical scholar and antiquary, was born on the 4th of August 1804, at Frankfort-on-Main. Having studied at the universities of Heidelberg and Leipzig, he went for a tour in Italy, on his return from which he lectured as Privatdozent in Heidelberg. In 1832 he was called to Marburg as professor ordinarius of classical

literature; and in 1842 he was transferred to Gottingen to the chair of philology and archaeology, vacant by the death of Otfried Miiller. He died at Gottingen on the 31st of December 1855. His knowledge of all branches of classical learning was profound, but he was chiefly distinguished for his works on Greek antiquities and ancient philosophy. Among these may be mentioned the Lehrbuch der griechischen Antiquitdten (new ed., 1889) dealing with political, religious and domestic antiquities; the Geschichte und System der Platonischen Philosophic (1839), unfinished; an edition of the Platonic Dialogues (6 vols., 1851- 1853); and Cultur geschichte der Griechen und Romer (1857- 1858), published after his death by C. G. Schmidt. He also edited the text of Juvenal and Persius (1854) and Lucian's De conscribenda historic (1828). A collection of Abhandlungen und Beitrage appeared in 1849.

See M. Lechner, Zur Erinnerung an K. F. Hermann (1864), and article by C. Halm in Allgemeine deutsche Biographie, xii. (1880).

HERMAPHRODITUS, in Greek mythology, a being, partly male, partly female, originally worshipped as a divinity. The conception undoubtedly had its origin in the East, where deities of a similar dual nature frequently occur. The oldest traces of the cult in Greek countries are found in Cyprus. Here, according to Macrobius (Saturnalia, iii. 8) there was a bearded statue of a male aphrodite, called Aphroditos by Aristophanes (probably in his Ntc/3os, a similar variant). Philpchorus in his Atthis (ap. Macrobius loc. cit.) further identifies this divinity, at whose sacrifices men and women exchanged garments, with the moon. This double sex also attributed to Dionysus and Priapus — the union in one being of the two principles of generation and con- ception — denotes extensive fertilizing and productive powers. This Cyprian Aphrodite is the same as the later Hermaphro- ditos, which simply means Aphroditos in the form of a herm (see Hermae), and first occurs in the Characteres (16) of Theophrastus. After its introduction .at Athens (probably in the 5th century B.C.), the importance of this being seems to have declined. It appears no longer as the object of a special cult, but limited to the homage of certain sects, expressed by superstitious rites of

obscure significance. The still later form of the legend, a product of the Hellenistic period, is due to a mistaken etymology of the name. In accordance with this, Hermaphroditus is the son of Hermes and Aphrodite, of whom the nymph of the fountain of Salmacis in Caria became enamoured while he was bathing. When her overtures were rejected, she embraced him and entreated the gods that she might be for ever united with him. The result was the formation of a being, half man, half woman. This story is told by Ovid (Metam. iv. 285) to explain the peculiarly enervating qualities of the water of the fountain. Strabo (xiv. p. 656) attributes its bad reputation to the attempt of the inhabitants of the country to find some excuse for the demoralization caused by their own luxurious and effeminate habits of life. There was a famous statue of Hermaphroditus by Polycles of Athens, probably the younger of the two statuaries of that name. In later Greek art he was a favourite subject.

See articles in Daremberg and Saglio, Dictionnaire des antiquiUs, and Roscher's Lexikon der Mythologie; and for art, A. Baumeister, Denkmaler des klassischen Altertums (1884-1888).

HERMAS, SHEPHERD OF, one of the works representing the Apostolic Fathers (q.v.), a hortatory writing which " holds the mirror up " to the Church in Rome during the 3rd Christian generation. This is the period indicated by the evidence of the Muratorian Canon, which assigns it to the brother of Pius, Roman bishop c. 139-154. Probably it was- not the fruit" of a single effort of its author. Rather its contents came to him piecemeal and at various stages in his ministry as a Christian "prophet," extending over a period of years; and, like certain Old Testament prophets, he shows us how by his own experiences he became the medium of a divine message to his church and to God's " elect " people at large.

In its present form it falls under three heads: Visions, Mandates, Similitudes. But these divisions are misleading. The personal and preliminary revelation embodied in Vision i. brings the prophet a new sense of sin as essentially a matter of the heart,

and an awakened conscience as before the " glory of God," the Creator and Upholder of all things. His responsibility also for the sad state of religion at home is emphasized, and he is given a mission of repentance to his erring chifclren. How far in all this and in the next vision the author is describing facts, and how far transforming his personal history into a type (after the manner of Bunyan's Pilgrim's Progress), the better to impress his

moral upon his readers, is uncertain. But the whole style of the work, with its use of conventional apocalyptic forms, favours the more symbolic view. Vision ii. records his call proper, through revela- tion of his essential message, to be delivered both to his wife and children and to " all the saints who have sinned unto this day " (2. 4). It contains the assurances of forgiveness even for the gravest sins after baptism (save blasphemy of the Name and betrayal of the brethren, Sim. ix. 19)," if they repent with their whole heart and remove doubts from their minds. For the Master hath sworn by His glory (' His Son,' below) touching His elect, that if there be more sinning after this day which He hath limited, they shall not obtain salvation. For the repentance of the righteous hath an end; the days of repentance for all saints are fulfilled. . . . Stand fast, then, ye that work righteousness and be not of doubtful mind. . . . Happy are all ye that endure the great tribulation which is to come. . . . The Lord is nigh unto them that turn to Him, as it is written in the book of Eldad and Modad, who prophesied to the people in the wilderness."

Here, in the gist of the " booklet " received from the hand of a female figure representing the Church, we have in germ the message of The Shepherd. But before Hermas announces it to the Roman Church, and through " Clement " ' to the churches abroad, there are added two Visions (iii. iv.) tending to heighten its impressiveness. He is shown the " holy church " under the similitude of a tower in building, and the great and final tribu- lation (already alluded to as near at hand) under that of a devouring beast, which yet is innocuous to undoubting faith.

Hermas begins to deliver the message of Vis. i.iv., as bidden. But as he does so, it is added to, in the way of detail and illustra tion, by a fresh series of revelations through an angel in the guise of a Shepherd, who in a preliminary interview announces himselt as the Angel of Repentance, sent to administer the special " repentance " which it was Hermas's mission to declare. This interview appears in our MSS. as Vis. v., 2 but is really a prelude to the Mandates and Similitudes which form the bulk of the whole work, hence known as "The Shepherd." The relation of this second part to Vis. i.-iv. is set forth by the Shepherd himself. " I was sent, quoth he, to show thee again all that thou sawest before, to wit the sum of the things profitable for thee. First of all write thou my mandates and similitudes; and the rest, as I will show thee, so shalt thou write." This programme is fulfilled in the xii. Mandates — perhaps suggested by the Teaching of the Twelve Apostles (see Didache), which Hermas knows—and Similitudes i.-viii., while Simil. ix. is " the rest " and constitutes a distinct " book " (Sim. ix. 1. 1, x. 1. 1). In this latter the building of the Tower, already shown in outline in Vis. iii., is shown " more carefully " in an elaborate section dealing with the same themes. One may infer that Sim. ix. represents a distinctly later stage in Hermas's ministry — during the whole of which he

seems to have committed to writing what he received on each occasion, 3 possibly for recital to the church (cf. Vis. ii. fin.). Finally came Sim. x., really an epilogue in which Hermas is " delivered " afresh to the Shepherd, for the rest of his days. He is " to continue in this ministry " of proclaiming the Shepherd's

1 More than one interpretation, typical or otherwise, of this " Clement " is possible; but none justifies us in assigning even to this Vision a date consistent with that usually given to the tradi- tional bishop of this name (see Clement I.). Yet we may have to correct the dubious chronology of the first Roman bishops by this datum, and prolong his life to about a.d. no. This is Harnack's date for the nucleus of Vis. ii., though he places our Vis. i.-iii. later in Trajan's reign, and thinks Vis. iv. later still.

1 That a prior vision in which Hermas was " delivered " to the Shepherd's charge, has dropped out, seems implied by Vis. v. 3 f., Sim. x. I. 1.

' Harnack places " The Shepherd " proper mostly under Hadrian (1 17-138), and the completed work c. 140-145.

teaching, " so that they who have repented or are about to repent may have the same mind with thee," and so receive a good report before God (Sim. x. 2 2-4). Only they must " make haste to do aright," lest while they delay the tower be finished (4. 4), and the new aeon dawn (after the final tribulation: cf. Vis. iv. 3. 5).

The relation here indicated between the Shepherd's instruction and the initial message of one definitive repentance, open to those believers who have already "broken" their "seal" of baptism by deadly sins, as announced in Visions i.-iv. is made yet plainer by Sim. vi. 1.3 f. " These mandates are profitable to such as are about to repent; for except they walk in them their repentance is in vain." Hermas sees that mere repentance is not enough to meet the backsliding condition in which so many Christians then were, owing to the recoil of inveterate habits of worldliness 4 entrenched in society around and within. It is, after all, too negative a thing to stand by itself or to satisfy God." " Cease, Hermas," says the Church, " to pray all about thy sins. Ask for righteousness also " (Vis. iii. 1. 6). The positive Christian ideal which " the saints " should attain, " the Lord enabling," it is the business of the Shepherd to set forth.

Here lies a great merit of Hermas's book, his insight into experimental religion and the secret of failure in Christians about him, to many of whom Christianity had come by birth rather than personal conviction. They shared the worldly spirit in its various forms, particularly the desire for wealth and the luxuries it affords, and for a place in " good society " —

which meant a pagan atmosphere. Thus they were divided in soul between spiritual goods and worldly pleasures, and were apt to doubt whether the rewards promised by God to the life of " simplicity " (all Christ meant by the childlike spirit, including generosity in giving and forgiving) and self-restraint, were real or not. For while the expected " end of the age " delayed, persecutions abounded. Such " doubled-souled " persons, like Mr Facing-both-ways, inclined to say, " The Christian ideal may be glorious, but is it practicable?" It is this most fatal doubt which evokes the Shepherd's sternest rebuke; and he meets it with the ultimate religious appeal, viz. to " the glory of God." He who made man " to rule over all things under heaven," could He have given behests beyond man's ability? If only a man " hath the Lord in his heart," he "shall know that there is nothing easier nor sweeter nor gentler than these mandates " (Mand. xii. 3-4). So in the forefront of the Mandates stands the secret of all: " First of all believe that there is one God. . . . Believe therefore in Him, and fear Him, and fearing Him have self-mastery. For the fear of the Lord dwelleth in the good desire," and to " put on " this master-desire is to possess power to curb " evil desire " in all its shapes (Mand. xii. 1-2). Elsewhere " good desire " is analysed into the "spirits" of the several virtues, which yet are organically related, Faith being mother, and Self-mastery her daughter, and so on (Vis. iii. 8. 3 seq. ; cf. Sim. ix. 15). These are the specific forms of the Holy Spirit power, without whose indwelling the mandates cannot be kept (Sim. x. 3; cf. ix. 13. 2, 24. 2).

Thus the " moralism " sometimes traced in Hermas is apparent rather than real, for he has a deep sense of the enabling grace of God. His defect lies rather in not presenting the historic Christ as the Christian's chief inspiration, a fact which connects itself with the strange absence of the names " Jesus " and " Christ." He uses rather " the Son of God," in a peculiar Adoptianist sense, which, as taken for granted in a work by the bishop's own brother, must be held typical of the Roman Church of his day. But as it is implicit and not part of his distinctive message, it did not hinder his book from enjoying wide quasi-canonical honour during most of the Ante-Nicene period.

The absence of the historic names, " Jesus " and " Christ," may be due to the form of the book as purporting to quote angelic com- munications. This would also explain the absence of explicit scriptural citations generally, though knowledge both of the Old Testament and of several New Testament books — including the congenially symbolic Gospel of John — is clear (cf. The New Testa- ment in the Apostolic Fathers, Oxford, 1905, 105 seq.). The one excep- tion is a prophetic writing, the a pocryphal Bo ok of Eldad and Modad ,

4 A careful study of practical Christian ethics at Rome as implier in the

Shepherd, will be found in E. von Dobschutz, Christian Life in the Primitive Church (1904).

which is cited apparently as being similar in the scope of its message. Among its non-scriptural sources may be named the allegoric picture of human life known as Tabula Cebetis (cf. C. Taylor, as below), the Didache, and perhaps certain " Sibylline Oracles. '

Hermas regarded Christians as " justified by the most reverend Angel " (i.e. the pre-existent Holy Spirit or Son, who dwelt in Christ's " flesh "), in baptism, the " seal " which even Old Testament saints had to receive in Hades (Sim. ix. 16. 3-7) and so attain to " life." Yet the degree of " honour " (e.g. that of martyrs, Vis. iii. 2; Sim. ix. 28), the exact place in the kingdom or consummated church (the Tower), is given as reward for zeal in doing God's will beyond the minimum requisite in all. Here comes in Hermas's doctrine of works of supererogation, in fulfilment of counsels of perfection, on lines already seen in Did. vi. 2, cf. i. 4, and reappearing in the two types of Christian recognized by Clement and Origen and in later Catholicism. Again his doctrine of fasting is a spiritualizing of a current opus operatum conception on Jewish lines as though " keeping a watch " (statio) in that way atcmed for sins (Sim. v.). The Shepherd enjoins instead, first, as " a perfect fast," a fast " from every evil word and every evil desire, . . . from all the vanities of this world-age " (3. 6; cf. Barn. iii. and the Oxyrhynchus Saying, " except ye fast from the world ") ; and next, as a counsel of perfection, a fast to yield somewhat for the relief of the widow and orphan, that this extra " service " may be to God for a " sacrifice."

Generally speaking, Hermas's piety, especially in its language, adheres closely to Old Testament forms. But it is doubtful (pace Spitta and Volter, who assume a Jewish or a proselyte basis) whether this means more than that the Old Testament was still the Scriptures of the Church. In this respect, too, Hermas faithfully reflects the Roman Church of the early 2nd century (cf. the language of I Clem., esp. the liturgical parts, and even the Roman Mass). Indeed the prime value of the Shepherd is the light it casts on Christianity at Rome in the otherwise obscure period c. 1 10-140, when it had as yet hardly felt the influences converging on it from other centres of tradition and thought. Thus Hermas's comparatively mild censures on Gnostic teachers in Sim. ix. suggest that the greater systems, like the Valentinian and Marcionite, had not yet made an impression there, as Harnack argues that they must have done by c. 145. This date, then, is a

likely lower limit for Hermas's revision of his earlier prophetic memoranda, and their publication in a single homogeneous work, such as the Shepherd appears to be. Its wider historic significance — it was felt by its author to be adapted to the needs of the Church at large, and was generally welcomed as such — is great but hard to determine in detail. 1 What is certain is its influence on the development of the Church's policy as to discipline in grave cases, like apostasy and adultery — a burning question for some generations from the end of the 2nd century, particularly in Rome and North Africa. Indirectly, too, Hermas tended to keep alive the idea of the Christian prophet, even after Montanism had helped to discredit it.

Literature. — The chief modern edition is by O. von Gebhardt and A. Harnack, in Fasc. iii. of their Pair, apost. opera (Leipzig, 1877); it is edited less fully by F. X. Funk, Pair, apost. (Tubingen, 1901), and in an English trans., with Introduction and occasional notes, by Dr C. Taylor (S.P.C.K., 2 vols., 1903-1906). For the wide literature of the subject, see the two former editions, also Harnack's Chronologie der altchr. Lit. i. 257 seq., and O. Bardenhewer, Gesch. der altkirchl. Lit. i. 557 seq. For the authorship see Apocalyptic Literature, sect. III. (J. V. B.)

HERMENEUTICS (Gr. ipprive\mKr\, sc. rexˆr;, Lat. ars hermeneutica, from ipnr]vevav, to interpret, from Hermes, the messenger of the gods), the science or art of interpretation or explanation, especially of the Holy Scriptures (see Theology).

HERMES, a Greek god, identified by the Romans with Mercury. The derivation of his name and his primitive character are very uncertain. The earliest centres of his cult were Arcadia, where Mt. Cyllene was reputed to be his birthplace, the islands of Lemnos, Imbros and Samothrace, in which he was associated with 'the Cabeiri and Attica. In Arcadia he was specially worshipped as the god of fertility, and his images were ithyphallic, as also were the " Hermae " at Athens. Herodotus (ii. 51) states that the Athenians borrowed this type from the Pelasgians, thus testifying to the great antiquity of the phallic Hermes. At Cyllene in Elis a mere phallus served as his emblem, and was highly venerated in the time of Pausanias (vi. 26. 3). Both in literature and cult Hermes was constantly associated with the protection of cattle and sheep; at Tanagra and elsewhere his title was Kpiocj)6pos, the ram-bearer. As a pastoral god he was often closely connected with deities of vegetation, especially Pan and the nymphs. His pastoral character is recognized in the

1 Note the prestige of martyrs and confessors, the ways of true and false prophets in Mand. xi., and the different types of evil and good " walk " among Christians, e.g. in Vis. iii. 5-7 ; Mand. viii. ; Sim. viii.

Iliad (xiv. 490) and the later epic hymn to Hermes; and his Homeric titles aKaKr/ra, ipiovvios, &6nwp khoiv, probably refer to him as the giver of fertility. In the Odyssey, however, he appears mainly as the messenger of the gods, and the conductor of the dead to Hades. Hence in later times he is often represented in art and mythology as a herald. The conductor of souls was naturally a chthonian god; at Athens there was a festival in honour of Hermes and the souls of the dead, and Aeschylus (Persae, 628) invokes Hermes, with Earth and Hades, in sum- moning a spirit from the underworld. The function of a messenger- god may have originated the conception of Hermes as a dream- god; he is called the " conductor of dreams " (rjynrup bvdposv) , and the Greeks offered to him the last libation before sleep. As a messenger he may also have become the god of roads and door- ways; he was the protector of travellers and his images were used for boundary-marks (see Hekmae). It was a custom to make a cairn of stones near the wayside statues of Hermes, each passer-by adding a stone; the significance of the practice, which is found in many countries, is discussed by Frazer (Golden Bough, 2nd ed., iii. 10 f.) and Hartland (Legendof Perseus, ii. 228). Treasure found in the road (epixatov) was the gift of Plermes, and any stroke of good luck was attributed to him; but it may be doubted whether his patronage of luck in general was developed from his function as a god of roads. As the giver of luck he became a deity of gain and commerce (/cepScjJos, ayopaios), an aspect which caused his identification with Mercury, the Roman god of trade. From this conception his thievish character may have been evolved. The trickery and cunning of Hermes is a prominent theme in literature from Homer downwards, although it is very rarely recognized in official cult. 2 In the hymn to Hermes the god figures as a precocious child (a type familiar in folk-lore), who when a new-born babe steals the cows of Agpllo. In addition to these characteristics various other functions were assigned to Hermes, who developed, perhaps, into the most complete type of the versatile Greek. In many respects he was a counterpart of Apollo, less dignified and powerful, but more human than his greater brother. Hermes was a patron of music, like Apollo, and invented the cithara; he presided over the games, with Apollo and Heracles, and his statues were common in the stadia and gymnasia. He became, in fact, the ideal Greek youth, equally proficient in the " musical " and " gymnastic " branches of Greek education. On the " musical " side he was the special patron of eloquence (\6yics) ; in gymnastic, he was the giver of grace rather than of strength, which was the province of Heracles. Though athletic, he was one of the least militant of the gods; a title irpojuaxos, the Defender, is found only in con- nexion with a victory of young men (" ephebes ") in a battle at Tanagra. A further point of contact between Hermes and Apollo may here be noted: both had prophetic powers, although Hermes held a place far inferior to that of the Pythian god, and possessed no famous oracle. Certain forms of popular

divination were, however, under his patronage, notably the world-wide process of divination by pebbles (OpiaL). The " Homeric " Hymn to Hermes explains these minor gifts of prophecy as delegated by Apollo, who alone knew the mind of Zeus. Only a single oracle is recorded for Hermes, in the market-place of Pharae in Achaea, and here the procedure was akin to popular divination. An altar, furnished with lamps, was placed before the statue; the inquirer, after lighting the lamps and offering incense, placed a coin in the right hand of the god; he then whispered his question into the ear of the statue, and, stopping his own ears, left the market place. The first sound which he heard outside was an omen. "" From the foregoing account it will be seen that it is difficult to derive the many-sided character of Hermes from a single ele- mental conception. The various theories which identified him with the sun, the moon or the dawn, may be dismissed, as they do not rest on evidence to which value would now be attached. The Arcadian or " Pelasgic " Hermes may have been an earth-deity, as his connexion with fertility suggests; but his symbol at Cyllene

2 We only hear of a Hermes 56Xios at Pellene (Paus. vii. 27. 1) and of the custom of allowing promiscuous thieving during the festival of Hermes at Samos (Plut. Quaest. Graec. 55).

rather points to a mere personification of reproductive powers. According to Plutarch the ancients " set Hermes by the side of Aphrodite," i.e. the male, and female principles of generation; and the two deities were worshipped together in Argos and else- where. But this phallic character does not explain other aspects of Hermes, as the messenger-god, the master-thief or the ideal Greek ephebe. It is impossible to adopt the view that the Homeric poets turned the rude shepherd-god of Arcadia into a messenger, in order to provide him with a place in the Olympian circle. To their Achaean audience Hermes must have been more than a phallic god. It is more probable that the Olympian Hermes represents the fusion of several distinct deities. Some scholars hold that the various functions of Hermes may have originated from the idea of good luck which is so closely bound up with his character. As a pastoral god he would give luck to the flocks and herds; when worshipped by townspeople, he would give luck to the merchant, the orator, the traveller and the athlete. But though the notion of luck plays an important part in early thought, it seems improbable that the primitive Greeks would have personified a mere abstraction. Another theory, which has much to commend it, has been advanced by Roscher, who sees in Hermes a wind-god. His strongest arguments are that the wind would easily develop into the messenger of the gods (Auk ovpos), and that

it was often thought to promote fertility in crops and cattle. Thus the two aspects of Hermes which seem most discordant are referred to a single origin. The Homeric epithet 'A.pyu4>6vTTis, which the Greeks interpreted as " the slayer of Argus," inventing a myth to account for Argus, is explained as originally an epithet of the wind (dp7«rTijs), which clears away the mists (ccpyos,

The oldest form under which Hermes was represented was that of the Hermae mentioned above. Alcamenes, the rival or pupil of Pheidias, was the sculptor of a herm at Athens, a copy of which, dating from Roman times, was discovered at Pergamum in 1903. But side by side with the Hermae there grew up a more anthropo- morphic conception of the god. In archaic art he was portrayed as a full-grown and bearded man, clothed in a long chiton, and often wearing a cap (kvvtj) or a broad-brimmed hat (ireraffos), and winged boots. Sometimes he was represented in his pastoral character, as when he bears a sheep on his shoulders; at other times he appears as the messenger or herald of the gods with the KTipvKtlov, or herald's staff, which is his most frequent attribute. From the latter part of the 5th century his art-type was changed in conformity with the general development of Greek sculpture. He now became a nude and beardless youth, the type of the young athlete. In the 4th century this type was probably fixed by Praxiteles in his statue of Hermes at Olympia.

Authorities.— F. G. Welcker, Griech. Gotterl. i. 342 f. (Gottingen, 1857-1863) ; L. Preller, ed. C. Robert, Griech. Mythologie, ii. 385 seq. (Berlin, 1894) ; W. H. Roscher, Lex. der griech. u. rbm. Mythologie, s.v. (Leipzig, 1884-1886); A. Lang, Myth, Ritual and Religion, ii. 225 seq. (London, 1887) ; C. Daremberg and E. Saglio, Diet, des ant. grecques et rom.; Farnell, Cults v. (1909); O. Gruppe, Griech. Mythologie u. Religionsgesch. p. 1318 seq. (Munich, 1906). In the article Greek Art, figs. 43 and 82 (Plate VI.) represent the Hermes of Praxiteles; fig. 57 (Plate II.), a professed copy of the Hermes of Alcamenes. (E. E. S.)

HERMES, GEORG (1775-1831), German Roman Catholic theologian, was born on the 22nd of April 1775, at Dreyerwalde, in Westphalia, and was educated at the gymnasium and univer- sity of Munster, in both of which institutions he afterwards

taught. In 1820 he was appointed professor of theology at Bonn, where he died on the 26th of May 183 1. Hermes had a devoted band of adherents, of whom the most notable was Peter Josef Elvenich (1796-1886), who became professor at Breslau in 1829, and in 1870 threw in his lot with the Old Catholic movement. His works were Untersuchungen iiber die innere Wahrheit des Christenlhums (Munster, 1805), and Einleitung in die christkatholische Theologie, of which the first part, a philo- sophical

introduction, was published in 1819, the second part, on positive theology, in. 1829. The Einleitung was never com- pleted. His Christkatholische Dogmalik was published, from his lectures, after his death by two of his students, Achterfeld and Braun (3 vols., 1831 — 1834).

The Einleitung is a remarkable work, both in itself and in its effect upon Catholic theology in Germany. Few works of modern times have excited a more keen and bitter controversy. Hermes himself was very largely under the influence of the Kantian and Fichtean ideas, and though in the philosophical portion of his Einleitung he criticizes both these thinkers severely, rejects their doctrine of the moral law as the sole guarantee for the existence of God, and condemns their restricted view of the possibility and nature of revelation, enough remained of purely speculative material to render his system obnoxious to his church. After his death, the contests between his followers and their opponents grew so bitter that the dispute was referred to the papal see. The judgment was adverse, and on the 25th of September 1835 a papal bull condemned both parts of the Einleitung and the first volume of the Dogmatik. Two months later the remaining volumes of the Dogmatik were likewise condemned. The controversy did not cease, and in 1845 a systematic attempt was made anonymously by F. X. Werner to examine and refute the Hermesian doctrines, as contrasted with the orthodox Catholic faith (Der Hermesianismus, 1845). In 1847 the condemnation of 1835 was confirmed by Pius IX.

See K. Werner, Geschichte der katholischen Theologie (1866), pp. 405 sqq.

HERMES TRISMEGISTUS (" the thrice greatest Hermes "), an honorific designation of the Egyptian Hermes, i.e. Thoth (q.v.), the god of wisdom. In late hieroglyphic the name of Thoth often has the epithet " the twice very great," sometimes " the thrice very great "; in the popular language (demotic) the corresponding epithet is " the five times very great," found as early as the 3rd century B.C. Greek translations give 6 jueyas /cai ixeyas and /xeywros : rp'urfiey as occurs in a late magical text. 6 rpvaixkyurros has not yet been found earlier than the 2nd century a.d., but there can now be no doubt of its origin in the above Egyptian epithets.

Thoth was " the scribe of the gods," " Lord of divine words," and to Hermes was attributed the authorship of all the strictly sacred books generally called by Greek authors Hermetic. These, according to Clemens Alexandrinus, our sole ancient authority (Strom, vi. p. 268 et seq.), were forty-two in number, and were subdivided into six divisions, of which the first, con- taining ten books, was in charge of the " prophet " and dealt with laws, deities and the education of priests; the second, consisting of the ten books of the stolistes, the official whose duty it was to dress and

ornament the statues of the gods, treated of sacrifices and offerings, prayers, hymns, festive processions; the third, of the " hierogrammatist," also in ten books, was called " hieroglyphics," and was a repertory of cosmographical, geographical and topographical information; the four books of the " horoscopus " were devoted to astronomy and astrology; the two books of the " chanter " contained respectively a collection of songs in honour of the gods and a description of the royal life and its duties; while the sixth and last division, consisting of the six books of the " pastophorus," was medical. Clemens's statement cannot be contradicted. Works are extant in papyri and on temple walls, treating of geography, astronomy, ritual, myths, medicine, &c. It is probable that the native priests would have been ready to ascribe the authorship or inspiration, as well as the care and protection of all their books of sacred lore to Thoth, although

there were a goddess of writing (Seshit), and the ancient deified scribes Imuthes and Amenophis, and later inspired doctors Petosiris, Nechepso, &c, to be reckoned with; there are indeed some definite traces of such an attribution extant in individual cases. Whether a canon of such books was ever established, even in the latest times, may be seriously doubted. We know, however, that the vizier of Upper Egypt (at Thebes) in the eighteenth dynasty, had 40 (not 42) parchment rolls laid before him as he sat in the hall of audience. Unfortunately we have no hint of their contents. Forty-two was the number of divine assessors at the judgment of the dead before Osiris, and was the standard number of the nomes or counties in Egypt.

The name of Hermes seems during the 3rd and following centuries to have been regarded as a convenient pseudonym to place at the head of the numerous syncretistic writings in which it was sought to combine Neo-Platonic philosophy, Philonic Judaism and cabalistic theosophy, and so provide the world with some acceptable substitute for the Christianity which had even at that time begun to give indications of the ascendancy it was destined afterwards to attain. Of these pseudepigraphic Hermetic writings some have come down to us in the original Greek; others survive in Latin or Arabic translations; but the majority appear to have perished. That which is best known and has been most frequently edited is the Tloin&vSpris sive De potestate et sapientia divina (Iloip.a.v8prp being the Divine Intelligence, voip,riv avSpaiv), which consists of fifteen chapters treating of such subjects as the nature of God, the origin of the world, the creation and fall of man, and the divine illumination which is the sole means of his deliverance. The editio princeps appeared in Paris in 1554; there is also an edition by G. Parthey (1854); the work has also been

trans- lated into German by D. Tiedemann (1781). Other Hermetic writings which have been preserved, and which have been for the most part collected by Patricius in the Nova de uni- versis philosophia (1593), are (in Greek) TaTpo/joftj/iart/ca irpos "AfifMtiva Alyinmov , Hepl KaraiOdaecos voaovvruiv irepiyvwariKOL, 'Ek ri?s iiadrinaTiKrjs tvwriqizqs irpos'Appxtiva: (in Latin) Aphorismi sive Centiloquium, Cyranides ; (in Arabic, but doubtless from a Greek original) an address to the human soul, which has been translated by H. L. Fleischer (An die menschliche Seek, 1870).

The connexion of the name of Hermes with alchemy will explain what is meant by hermetic sealing, and will account for the use of the phrase " hermetic medicine " by Paracelsus, as also for the so-called " hermetic freemasonry " of the middle ages.

Besides Thoth, Anubis (q.v.) was constantly identified with

Hermes; see also Horus.

See Ursinus, De Zoroastre, Hermete, &c. (Nuremberg, 1661); Nicolas Lenglet-Dufresnoy, L'Histoire de la philosophic herntetique (Paris, 1742) ; Baumgarten-Crusius, De librorum hermeticorum origine atque indole (Jena, 1827); B. J. Hilgers, De Hermetis Trisme- gisti Poemandro (1855); R. Menard, Hermbs Trismegiste, traduction complete, precedee d'une etude sur V origine des livres hermetiques (1866) ; R. Pietschmann, Hermes . Trismegistus , nach agyptischen, grie- ckischen, und orienlalischen ffberlieferungen (1875); R. Reitzenstein, Poimandres, Studien zur griechisch-agyptischen und friihchrist- lichen Literatur (Leipzig, 1904); G. R. S. Mead, Thrice Greatest Hermes (1907), introduction and translation. (F. Ll. G.)

HERMESIANAX, of Colophon, elegiac poet of the Alexandrian school, flourished about 330 B.C. His chief work was a poem in three books, dedicated to his mistress Leontion. Of this poem a fragment of about one hundred lines has been preserved by Athenaeus (xiii. 597). Plaintive in tone, it enumerates instances, mythological and historical, of the irresistible power of love. Hermesianax, whose style is characterized by alternate force and tenderness, was exceedingly popular in his own times, and was highly esteemed even in the Augustan period.

Many separate editions have been published of the fragment, the text of which is in a very unsatisfactory condition: by F. W. Schneidewin (1838), J. Bailey (1839, with notes, glossary, and Latin and English versions), and others; R. Schulze s Quaestiones Hermesianacteae (1858), contains an account of the life and writings of the poet and a section on the identity of

Leontion.

HERMIAS. (1) A Greek philosopher of the Alexandrian school. A disciple of Proclus, he was known best for the lucidity of his method rather than for any original ideas. His chief works

were a study of the Isagoge of Porphyry and a commentary on Plato's Phaedrus. Unlike the majority of logicians of the time, he admitted the absolute validity of the second and third figures of the syllogism.

(2) A Christian apologist and philosopher who flourished probably in the 4th and 5th centuries. Nothing is known about his life, but there has been preserved of his writings a small thesis entitled Aiaavppbs TuwZlfa i\oo6

Two minor philosophers of the same name are known. Of these, one was a disciple of Plato and a friend of Aristotle; he became tyrant of Atarneus and invited Aristotle to his court. Aristotle subsequently married Pythias, who was either niece or sister of Hermias. Another Hermias was a Phoenician philosopher of the Alexandrian school; when Justinian closed the school of Athens, he was one of the five representatives of the school who took refuge at the Persian court.

HERMIPPUS, " the one-eyed," Athenian writer of the Old Comedy, flourished during the Peloponnesian War. He is said to have written 40 plays, of which the titles and fragments of nine are preserved. He was a bitter opponent of Pericles, whom he accused (probably in the Moipat) of being a bully and a coward, and of carousing with his boon companions while the Lacedaemonians were invading Attica. He also accused Aspasia of impiety and offences against morality, and her acquittal was only secured by the tears of Pericles (Plutarch, Pericles, 32). In the 'AproToiKLSes (" Bakeresses ") he attacked the demagogue Hyperbolus. The $opp,o

Fragments in T. Kock, Comicorum Atticorum fragmenta, i. (1880), and A. Meineke, Po'etarum Graecorum comicorum fragmenta (1855).

HERMIT, a solitary, one who withdraws from all intercourse with other human beings in order t© live a life of religious con- templation, and so marked off from a " coenobite " (Gr. koivos, common, and ffios, life), one who shares this life of withdrawal with others in a community (see Asceticism and Monasticism). The word " hermit " is an adaptation through the O. Fr. ermite or hermile, from the Lat. form, eremite, of the Gr. epejunjs, a solitary, from iprjpia, a desert. The English form " eremite," which was used, according to the New English Dictionary, quite indiscriminately with "hermit" till the middle of the 17th century, is now

chiefly used in poetry or rhetorically, except with reference to the early hermits of the Libyan desert, or sometimes to such particular orders as the eremites of St Augustine (see Augustinian Hermits). Another synonym is " anchoret " or " anchorite." This comes through the French and Latin forms from the Gr. avaxoipqrris, from dvaxcopeti', to withdraw. A form nearer to the Greek original, " anachoret," is sometimes used of the early Christian recluses in the East.

HERMOGENES, of Tarsus, Greek rhetorician, surnamed Svcrrrip (the polisher), flourished in the reign of Marcus Aurelius (a.d. 161-180). His precocious ability secured him a public appoint- ment as teacher of his art while as yet he was only a boy; but at the age of twenty-five his faculties gave way, and he spent the remainder of his long life in a state of intellectual impotence. During his early years, however, he had composed a series of rhetorical treatises, which became popular text-bocks, and the subject of subsequent commentaries. Of his Tex>"? pyropiKri we still possess the sections nept ruv ffraoeoiv (on legal issues), n«pi evptcreias (on the invention of arguments), n«pi ISeSiv (on the various kinds of style) Jlepi piedoSov Stivdrrjros (on the method of speaking effectively), and Hpoyvp.vkcp.aTa rhetorical exercises).

Editions by C. Walz (1832), and by L. Spengel (1854), in their Rhetores Graeci; bibliographical note on the commentaries in VV. Christ, Geschichte der griechischen Literatur (1898).

HERMON, the highest mountain in Syria (estimated at 9050 to 9200 ft.) , an outlier of the Anti-Lebanon. As the Hebrew name (i 1 ®"! 1 ?, " belonging to a sanctuary," " separate ") shows, it was always a sacred mountain. The Sidonians called it Sirion, and the

Amorites Shenir (Deut. iii. 9). According to one theory it is the I " high mountain " near Caesarea Philippi, which was the scene of ' the Transfiguration (Mark ix. 2). A curious reference in Enoch vi. 6, says that in the days of Jared the wicked angels descended on the summit of the mountain and named it Hermon. The modern name is Jebel es-Sheikh, or " mountain of the chief or elder." It is also called Jebel eth-Thelj, " snowy mountain." The ridge of Hermon, rising into a dome-shaped summit, is 20 m. long, extending north-east and south-west. The formation of the lower part is Nubian sandstone, that of the upper part is a hard dark-grey crystalline limestone belonging to the Neocomian period, and full of fossils. The spurs consist in some cases of white chalk covering the limestone, and

on the south there are several basaltic outbreaks. The view from Hermon is very ex- tensive, embracing all Lebanon and the plains east of Damascus, with Palestine as far as Carmel and Tabor. On a clear day Jaffa also may be seen. The mountain in spring is covered with snow, but in autumn there is occasionally none left, even in the ravines. To the height of 500 ft. it is clothed with oaks, poplars and brush, while luxuriant vineyards abound. Foxes, wolves and Syrian bears are not infrequently met with, and there is a heavy dew or night mist. Above the snow-limit the mountain is bare and covered with fine limestone shingle. The summit is a plateau from which three rocky knolls rise up, that on the west being the lowest, that on the south-east the highest. On the south slope of the latter are remains of a small temple or sacellum described by St Jerome. A semicircular dwarf wall of good masonry runs round this peak, and a trench excavated in the rock may perhaps indicate the site of an altar. On the plateau is a cave about 25 ft. sq. with the entrance on the east. A rock column supports the roof, and a building (possibly a Mithraeum) once stood above. Other small temples are found on the sides of Hermon, of which twelve in all have been explored. They face the east and are dated by architects about a.d. 200. The most remarkable are those of Deir el 'Ashaiyir, Hibbariyeh, Hosn Niha and Tell Thatha. At the ruined town called Rukleh on the northern slopes are remains of a temple, the stones of which have been built into a church. A large medallion, 5 ft. in diameter, with a head supposed to represent the sun-god, is built into the wall. Several Greek inscriptions occur among these ruins. In the 1 2th century Psalm lxxxix. 12 was supposed to indicate the proximity of Hermon to Tabor. The conical hill immediately south of Tabor was thus named Little Hermon, and is still so called by some of the inhabitants of the district.

HERMSDORF, a village of Germany, in the Prussian province of Silesia. Pop. (1900) 10,975. There are coal and iron mines and lime quarries in the vicinity, and in the town there are large iron-works. Hermsdorf is known as Niederhermsdorf to dis- tinguish it from other places of the same name. Perhaps the most noteworthy of these is a village in Silesia at the foot of the Riesengebirge, chiefly famous for the ruins of the castle of Kynast. This castle, formerly the seat of the Schaffgotsch family, was destroyed by lightning in 1675. A third Hermsdorf is a village in Saxe-Altenburg, where porcelain is made.

HERNE, JAMES A. [originally Aherne] (1840-1901), American actor and playwright, was born in Troy, New York, and after theatrical experiences in various companies produced his own first play, Hearts of Oak, in 1878, and his great success Shore Acres in 1882. It was in rural drama that his humour and pathos found their proper setting, and Shore Acres was seen throughout the United States almost continuously for six seasons, being followed by the less successful Sag Harbor, 1900.

HERNE, a town of Germany, in the Prussian province of Westphalia, 15 m. by rail N.W. of Dortmund. Pop. (1905) 33,258. It has coal mines, boiler-works, gunpowder mills, &c. Heme was made a town in 1897.

HERNE BAY, a seaside resort in the St Augustine's parlia- mentary division of Kent, England, 8 m. N. by E. of Canterbury, on the South Eastern and Chatham railway. Pop. of urban district (1901) 6726. It has grown up since 1830, above a sandy and pebbly shore, and has a pier £ m. long. The church of St Martin in the village of Heme, 15 m. inland,

is Early English and later; the living was held by Nicholas Ridley (1538), afterwards Bishop of London. At Reculver, 3 m. E. of Heme Bay on the coast, is the site of the Roman station of Regulbium. The fortress occupied about 8 acres, but only traces of the south and east walls remain. In Saxon times it was converted into a palace by King Ethelbert, and in 669 a monastery was founded here by Egbert. The Early English church was taken down early in the 19th century owing to the encroachment of the sea, and parts of its fabric were preserved in the modern church of St Mary. But its twin towers, known as the Sisters from the tradition that they were built by a Benedictine abbess of Faversham in memory of her sister, were preserved by Trinity House as a conspicuous landmark.

HERNE THE HUNTER, a legendary huntsman who was alleged to haunt Windsor Great Park at night, especially around an aged tree, long known as Heme's oak, said to be nearly 700 years old. This was blown down in 1863, and a young oak was planted by Queen Victoria on the spot. Heme has his French counterpart in the Grand Veneur of Fontainebleau. Mention is made of Heme in The Merry Wives of Windsor and in Harrison Ainsworth's Windsor Castle. Nothing definite is known of the Heme legend. It is suggested that it originated in the life- story of some keeper of the forest; but more probably it is only a variant of the " Wild Huntsman" myth common to folk-lore, which (E. B. Tylor, Primitive Culture, 4th ed. pp. 361-362) is almost certainly the modern form of a prehistoric storm-myth.

HERNIA (Lat. hernia, perhaps from Gr. 'ipvos, a sprout), in surgery, the protrusion of a viscus, or part of a viscus, from its normal cavity; thus, hernia cerebri is a protrusion of brain- substance, hernia pulmonum, a protrusion of a portion of lung, and hernia iridis, a protrusion of some of the iris through an aperture in the cornea. But, used by itself, hernia implies a protrusion from the abdominal cavity, or, in common language, a " rupture." A rupture may occur at any weak point in the abdominal wall. The common situations are the groin {inguinal hernia), the upper part of the thigh {femoral hernia), and the navel {umbilical hernia). The more movable the viscus the greater the liability to protrusion, and therefore one

commonly finds some of the small intestine, or of the fatty apron (omentum), in the hernia. The tumour may contain intestine alone (enterocele), omentum alone (epiplocele), or both intestine and omentum (entero-epiplocele). The predisposing cause of rupture is abnormal length of the suspensory membrane of the bowel (the mesentery), or of the omentum, in conjunction with some weak spot in the abdominal wall, as in an inguinal hernia, which descends along the canal in which the spermatic cord lies in the male and the round ligament of the womb in the female. A femoral hernia comes through a weak spot in the abdomen to the inner side of the great femoral vessels; a ventral hernia takes place by the yielding of the scar tissue left after an operation for appendicitis or ovarian disease. The exciting cause of hernia is generally some over-exertion, as in lifting a heavy weight, jumping off a high wall, straining (as in difficult micturition), constipation or excessive coughing. The pressure of the diaphragm above and the abdominal wall in front acting on the abdominal viscera causes a protrusion at the weakest point.

Rupture is either congenital or acquired. A child may be born with a hernia in the inguinal or umbilical region, the result of an arrest of development in these parts; or the rupture may be acquired, first appearing, perhaps, in adult life as the result of a strain or hurt. Men suffer more frequently than women, because of their physical labours, because they are more liable to accidents, and because of the passage for the spermatic cord out of the abdomen being more spacious than that for the round ligament of the womb.

At first the rupture is small, and it gradually increases in bulk. It varies from the size of a marble to a child's head. The swelling consists of three parts — the coverings, sac and contents. The " coverings " are the structures which form the abdominal wall at the part where the rupture occurs. In femoral hernia the coverings are the structures at the upper part of the thigh which are stretched, thinned and matted together as the result of

pressure; in other cases there is an increase in their thickness, the result of repeated attacks of inflammation. The " sac " is composed of the peritoneum or membrane lining the abdominal cavity; in some rare cases the sac is wanting. The neck of the sac is the narrowed portion where the peritoneum forming the sac becomes continuous with the general peritoneal cavity. The neck of the sac is often thickened, indurated and adherent to surrounding parts, the result of chronic inflammation. The " contents " are

bowel, omental fat, or, in children, an ovary.

The hernia may be reducible, irreducible or strangulated. A " reducible " hernia is one in which the contents can be pushed back into the abdomen. In some cases this reduction is effected with ease, in others it is a matter of great difficulty. At any moment a reducible hernia may become " irreducible," that is to say, it cannot be pushed back into the abdominal Cavity, perhaps because of inflammatory adhesions in and around the fatty contents, or because of extra fullness of the bowel in the sac. A " strangulated " hernia is one in which the circulation of the blood through the hernial contents is interfered with, by the pinching at the narrowest part of the passage. The interference is at first slight, but it quickly becomes more pronounced; the pinched bowel in the hernial sac swells as a finger does when a string is tightly wound round its base. At first there is congestion, and this may go on to inflammation, to infection by micro-organisms and to mortification. The rapidity with which the change from simple congestion to mortification takes place depends on the tightness of the constriction, and on the virulence of the bacterial infection fiom the bowel. As a rule, the more rapidly a hernia forms the greater the rapidity of serious change in the conditions of the bowel or omentum, and the more urgent are the symptoms. The constricting band may be one of the structures which form the boundaries of the openings through which the hernia has travelled, or it may be the neck of the sac, which has become thickened in consequence of inflammation — especially is this the case in an inguinal hernia. Reducible Hernia. — With a reducible hernia there is a soft compressible tumour (elastic when it contains intestine, doughy when it contains omentum), its size increasing in the erect, and diminishing in the horizontal posture. As a rule, it causes no trouble during the night. It gives an impulse on coughing, and when the intestinal contents are pushed back into the abdomen a gurgling sensation is perceptible by the fingers. Such a tumour may be met with in any part of the abdominal wall, but the chief situations are as follows. The inguinal region, in which the neck of the tumour lies immediately above Poupart's ligament (a cord-like ligamentous structure which can be felt stretching from the front of the hip-bone to a ridge of bone immediately above the genital organs); the femoral region, in the upper part of the thigh, in which the neck of the sac lies immediately below the inner end of Poupart's ligament; the umbilical region, in which the tumour appears at or near the navel. As the inguinal hernia increases in size it passes into the scrotum in the male, into the labium in the female; while the femoral hernia gradually pushes upwards to the abdomen.

The palliative treatment of a reducible hernia consists in pushing back the contents of the tumour into the abdomen and applying a truss or elastic bandage to prevent their again escaping. The younger the patient the more chance there is of the truss acting as a curative agent. The truss may

generally be left off at night, but it should be put on in the morning before the patient leaves his bed. If, after the hernia has been once returned, it is not allowed again to come down, there is a probability of an actual cure taking place; but if it is allowed to come down occasionally, as it may do, even during the night, in consequence of a cough, or from the patient turning suddenly in bed, the weak spot is again opened out, and the improvement which might have been going on for weeks is undone. It is sometimes found impossible to keep up a hernia by means of a truss, and an operation becomes necessary. The operation is spoken of as " the radical treatment of hernia," in contra distinction to the so-called "palliative treatment" by means of a truss. It should not be spoken of as the radical cure, for

skilfully as the operation may have been performed it is not always a cure. The principles involved in the operation are the emptying of the sac and its entire removal, and the closure of the opening into the abdomen by strong sutures; and, in this way, great advance has been made by modern surgery. Without tiresome delay, and the tedious and sometimes disappointing application of trusses, the weak spot in the abdominal wall is exposed, the sac of the hernia is tied and removed, and the canal by which the rupture descended is blockaded by buried sutures, and with no material risk to life. Thus the patient's worries become a thing of the past, and he. is rendered a fit and normal member of society. Experience has shown that very few ruptures are unsuited for successful treatment by operation. No boy should now be sent to school compelled to wear a truss, and so hindered in his games and rendered an object of remark.

Irreducible Hernia. — The main symptom is a tumour in one of the situations already referred to, of long standing and perhaps of large size, in which the contents of the tumour, in whole or in part, cannot be pushed back into the abdomen. The irreducibility is due either to its large size or to changes which have taken place by indurations or adhesions. Such a tumour is a constant source of danger: its contents are liable, from their exposed situation, to injury from external violence; it has a constant risk of increase; it may at any time become strangulated, or the contents may inflame, and strangulation may occur secondarily to the inflammation. It gives rise to dragging sensations (referred to the abdomen), colic, dyspepsia and constipation, which may lead to obstruction, that is to say, a stoppage may occur of the passage of the contents of that portion of the intestinal canal which lies in the hernia. When an ir- reducible hernia becomes painful and tender, a local peritonitis has occurred, which resembles in many of its symptoms a case of strangulation, and must be regarded with suspicion and anxiety. Indeed, the only safe treatment is by operation.

The treatment of irreducible hernia may be palliative; a " bag truss " may

be worn in the hope of preventing the hernia getting larger; the bowels must be kept open, and all irregu- larities of diet avoided. A person with such a hernia is in constant danger, and if his general condition does not contra-indicate it he should be submitted to operative treatment. That is to say, the surgeon should cut down on the hernia, open the sac, divide any omental adhesions, tie and cut away indurated omentum, return the bowel, and complete the radical operation by closing the aperture by strong sutures.

*In Strangulated Hernia the bowel or omentum is being nipped at the neck of the sac, and the flow of blood into and from the delicate tissues is stopped. The symptoms are — nausea, vomiting of bilious matter, and after a time of faecal-smelling matter; a twisting, burning pain generally referred to the region of the navel, intestinal obstruction; a quick, wiry pulse and pain on pressure over the tumour; the expression grows anxious, the abdomen becomes tense and drum-like, and there is no impulse in the tumour on coughing, because its contents are practically pinched off from the general abdominal cavity. Sometimes there is complete absence of pain and tenderness in the hernia itself, and in an aged person all the symptoms may be very slight. Sooner or later, from eight hours to eight days, if the strangula- tion is unrelieved, the tumour becomes livid, crackling with gas, mortification of the bowel at the neck of the sac takes place, followed by extravasation of the intestinal contents into the abdominal cavity; the patient has hiccough; he becomes collapsed; and dies comatose from blood-poisoning. **

The treatment of a strangulated hernia admits of no delay; if the hernia does not "go back " on the surgeon trying to reduce it, it must be operated on at once, the constriction being relieved, the bowel returned and the opening closed. There should be no treatment by hot-bath or ice-bag: operation is urgently needed. An anaesthetic should be administered, and perhaps one gentle attempt to return the contents by pressure (termed " taxis") may be made, but no prolonged attempts are justi- fiable, because the condition of the hernial contents may be such that they cannot bear the pressure of the fingers. " Think

well of the hernia," says the aphorism, " which has been little handled."

The taxis to be successful should be made in a direction opposite to the one in which the hernia has come down. The inguinal hernia should be pressed upwards, outwards and backwards, the femoral hernia downwards, backwards and upwards. The larger the hernia the greater is the chance of

success by taxis, and the smaller the hernia the greater the risk of its being injured by manipulation and delay. In every case the handling must be absolutely gentle. If taxis does not succeed the surgeon must at once cut down on the tumour, carefully dividing the different coverings until he reaches the sac. The sac is then opened, the constriction divided, care being taken not to injure the bowel. The bowel must be examined before it is returned into the abdomen, and if its lustreless appearance, its dusky colour, or its smell, suggests that it is mortified, or is on the point of mortifying, it must not be put back or perforation would give rise to septic peritonitis which would probably have a fatal ending. In such a case the damaged piece of bowel must be resected and the healthy ends of the bowel joined together by fine suturing. Matted or diseased omentum must be tied off and removed. Should peritonitis supervene after the operation on account of bacillary infection, the bowels should be quickly made to act by repeated doses of Epsom salts in hot water.

A person who is the subject of a reducible hernia should take great care to obtain an accurately fitting truss, and should remember that whenever symptoms resembling in any degree those of strangulation occur, delay in treatment may prove fatal. A surgeon should at once be communicated with, and he should come prepared to operate. (E. O.)*

HERNICI, an ancient people of Italy, whose territory was in Latium between the Fucine Lake and the Trerus, bounded by the Volscian on the S., and by the Aequian and the Marsian on the N. They long maintained their independence, and in 486 B.C. were still strong enough to conclude an equal treaty with the Latins (Dion. Hal. viii. 64 and 68). They broke away from Rome in 362 (Livy vii. 6 ff.) and in 306 (Livy ix. 42), when their chief town Anagnia (q.v.) was taken and reduced to a praefecture, but Ferentinum, Aletrium and Verulae were rewarded for their fidelity by being allowed to remain free municipia, a position which at that date they preferred to the civitas. The name of the Hernici, like that of the Volsci, is missing from the list of Italian peoples whom Polybius (ii. 24) describes as able to furnish troops in 225 B.C.; by that date, therefore, their territory cannot have been distinguished from Latium generally, and it seems probable (Beloch, Ital. Bund, p. 1 23) that they had then received the full Roman citizenship. The oldest Latin inscriptions of the district (from Ferentinum, C.I.L. x. 5837-3840) are earlier than the Social War, and present no local characteristic.

For further details of their history see C.I.L. x. 572. There is no evidence to show that the Hernici ever spoke a really different dialect from the Latins; but one or two glosses indicate that they had certain peculiarities of vocabulary, such as might be expected among folk who clung to their local customs. Their name, however, with its Co-termination, classes them along

with the Co-tribes, like the Volsci, who would seem to have been earlier inhabitants of the west coast of Italy, rather than with the tribes whose names were formed with the iVo-suffix. On this question see Volsci and Sabi.ni.

See Conway's Italic Dialects (Camb. Univ. Press, 1897), P- 3°6 ff., where the glosses and the local and personal names of the district will be found. (R. S. C.)

HERNOSAND, a seaport of Sweden, chief town of the district (Ian) of Vesternorrland on the Gulf of Bothnia. Pop. (1900) 7890. It stands on the' island of Herno (which is connected with the mainland by bridges) near the mouth of the Angerman river, 423 m. N. of Stockholm by rail. It is the seat of a bishop and possesses a fine cathedral. There are engine-works, timber-yards and saw-mills. The harbour is good, but generally ice- bound from December to May. Timber, iron and wood-pulp are exported. There are a school of navigation and an institute for pisciculture. Hernosand was founded in 1584, and received its

first town-privileges from John III. in 1387. It was the first town in Europe to be lighted by electricity (1885). The poet Franzen (q.v.), Bishop of Hernosand, is buried here.

HERO (Gr. r/pcos), a term specially applied to warriors of extraordinary strength and courage, and generally to all who were distinguished from their fellows by superior moral, physical or intellectual qualities. No satisfactory derivation of the word has been suggested.

Ancient Greek Heroes.

In ancient Greece, the heroes were the object of a special cult, and as such were intimately connected with its religious life. Various theories have been put forward as to the nature of these heroes. According to some authorities, they were idealized historical personages; according to others, symbolical repre- sentations of the forces of nature. The view most commonly held is that they were degraded or " depotentiated " gods, occupying a position intermediate between gods and men. According to E. Rohde (in Psyche) they are souls of the dead, which after separation from the body enter upon a higher, eternal existence. But it is only a select minority who attain to the rank of heroes after death, only the distinguished men of the past. The worship of' these heroes is in reality an ancestor worship, which existed in pre-Homeric times, and was preserved in local cults. Instances no doubt occur of gods being degraded to the ranks of heroes, but these are not the real heroes, the heroes who are the object of a cult. The cult-heroes were all persons who had lived the life of man on earth, and it was necessary for

the degraded gods to pass through this stage. They did not at once become cult-heroes, but only after they had undergone death like other mortals. Only one who has been a man can become a hero. The heroes are spirits of the dead, not demi-gods; their position is not intermediate between gods and men, but by the side of these they exist as a separate class.

In Homer the term is applied especially to warrior princes, to kings and kings' sons, even to distinguished persons of lower rank, and free men generally. In Hesiod it is chiefly con- fined to those who fought before Troy and Thebes; in view of their supposed divine origin, he calls them demi-gods (■fjpideoi) . This name is also given them in an interpolated passage in the Iliad (xii. 23), which is quite at variance with the general Homeric idea of the heroes, who are no more than men, even if of divine origin and of superior strength and prowess. But neither in Homer nor in Hesiod is there any trace of the idea that the heroes after death had any power for good or evil over the lives of those who survived them; and consequently, no cult. Nevertheless, traces of an earlier ancestor worship appear, e.g. in funeral games in honour of Patroclus and other heroes, while the Hesiodic account of the five ages of man is a reminiscence of the belief in the continued existence of souls in a higher life. This pre-historic worship and belief, for a time obscured, were subsequently revived. According to Porphyry (De abstinentia, iv. 22), Draco ordered the inhabitants of Attica to honour the gods and heroes of their country "in accordance with the usage of their fathers " with offerings of first fruits and sacrificial cakes every year, thereby clearly pointing to a custom of high antiquity. Solon also ordered that the tombs of the heroes should be treated with the greatest respect, and Cleis- thenes (q.v.) sought to create a pan-Athenian enthusiasm by calling his new tribes after Attic heroes and setting up their statues in the Agora. Heroic honours were at first bestowed upon the founders of a colony or city, and the ancestors of families ;if their name was not known, one was adopted from legend. In many cases these heroes were purely fictitious; such were the supposed ancestors of the noble and priestly families of Attica and elsewhere (Butadae at Athens, Branchidae at Miletus Ceryces at Eleusis), of the eponymi of the tribes and demes. Again, side by side with gods of superior rank, certain heroes were worshipped as protecting spirits of the country or state; such were the Aeacidae amongst the Aeginetans, Ajax son of Oileus amongst the Epizephyrian Locrians and Hector at Thebes. Neglect of the worship of these heroes was held to be

responsible for pestilence, bad crops and other misfortunes, while, on the other hand, if duly honoured, their influence was equally beneficent. This

belief was supported by the Delphic oracle, which was largely instrumental in promoting hero-worship and keeping alive its due observance. Special importance was attached to the grave of the hero and to his bodily remains, with which the spirit of the departed was inseparably connected. The grave was regarded as his place of abode, from which he could only be absent for a brief period; hence his bones were fetched from abroad (e.g. Cimon brought those of Theseus from Scyros), or if they could not be procured, at least a cenotaph was erected in his honour. Their relics also were carefully preserved: the house of Cadmus at Thebes, the hut of Orestes at Tegea, the stone on which Telamon had sat at Salamis (in Cyprus). Special shrines (vpifia) were also erected in their honour, usually over their graves. In these shrines a complete set of armour was kept, in accordance with the idea that the hero was essentially a warrior, who on occasion came forth from his grave and fought at the head of his countrymen, putting the enemy to flight as during his lifetime. Like the gods, the cult heroes were supposed to exercise an influence on human affairs, though not to the same extent, their sphere of action being confined to their own localities. Amongst the earliest known historical examples of the elevation of the dead to the rank of heroes are Timesius the founder of Abdera, Miltiades, son of Cypselus, Harmodius and Aristogiton and Brasidas, the victor of Amphipolis, who ousted the local Athenian hero Hagnon. In course of time admission to the rank of a hero became far more common, and was even accorded to the living, such as Lysimachus in Samothrace and the tyrant Nicias of Cos. Antiochus of Commagene instituted an order of priests to celebrate the anniversary of his birth and coronation in a special sanctuary, and the kings of Pergamum claimed divine honours for themselves and their wives during their lifetime. The birthday of Eumenes was regularly kept, and every month sacrifice was offered to him and games held in his honour. In addition to persons of high rank, poets, legendary and others (Linus, Orpheus, Homer, Aeschylus and Sophocles), legislators and physicians (Lycurgus, Hippocrates), the patrons of various trades or handicrafts (artists, cooks, bakers, potters), the heads of philosophical schools (Plato, Democritus, Epicurus) received the honours of a cult. At Teos incense was offered before the statue of a flute-player during his lifetime. In some countries the honour became so general that every man after death was described as a hero in his epitaph — in Thessaly even slaves.

The cult of the heroes exhibits points of resemblance with that of the chthonian divinities and of the dead, but differs from that of the ordinary gods, a further indication that they were not " depotentiated " gods. Thus, sacrifice was offered to them at night or in the evening; not on a high, but on a low altar (to-x&pa), surrounded by a trench to receive the blood of the victim, which was supposed to make its way through the ground to the

occupant of the grave; the victims were black male animals, whose heads were turned downwards, not upwards; their blood was allowed to trickle on the ground to appease the departed (aluaKovpia) ; the body was entirely consumed by fire and no mortal was allowed to eat of it; the technical expression for the sacrifice was not dveiv but kvayiˆuv (less commonly evrkfivtiv) . The chthonian aspect of the hero is further shown by his attribute the snake, and in many cases he appears under that form himself. On special occasions a sacrificial meal of cooked food was set out for the heroes, of which they were solemnly invited to partake. The fullest description of such a festival is the account given by Plutarch (Aristides, 21) of the festival celebrated by the Plataeans in honour of their countrymen who had fallen at the battle of Plataea. On the 16th of the month Maimacterion, a long pro- cession, headed by a trumpeter playing a warlike air, set out for the graves; wagons decked with myrtle and garlands of flowers followed, young men (who must be of free birth) carried jars of wine, milk, oil and perfumes; next came the black bull destined for the sacrifice, the rear being brought up by the archon, who wore the purple robe of the general, a naked sword in one hand, in the other an urn. When he came near the tombs, he drew

some water with which he washed the gravestones, afterwards anointing them with perfume ; he then sacrificed the bull on the altar calling upon Zeus Chthonios and Hermes Psychopompos, arid inviting them in company with the heroes to the festival of blood. Finally, he poured a libation of wine with the words: " I drink to those who died for the freedom of the Hellenes."

See especially E. Rohde, Psyche (1905) and in Kheinisches Museum, li. (1895), 28; P. Stengel, Die griechischen Kultusaltertiimer (Munich, 1898), p. 124; G. F. Schomann, Griechische Altertiimer, ii. (1897), 159; J. Wassner, De heroum apud Graecos cultu (Kiel, 1883); article by F. Deneken in Roscher's Lexikon der Mythologie, in which a large amount of material is accumulated; J. A. Hild, Etude sur les demons (1881) and article in Daremberg and SagHo's Dictionnaire des antiquites.

Teutonic Legend.

Many of the chief characteristics of the ancient Greek heroes are reproduced in those of the Teutonic North, the parallel being in some cases very striking; Siegfried, for instance, like Achilles, is vulnerable only in one spot, and Wayland Smith, like Hephaestus, is lame. Superhuman qualities and powers, too, are commonly ascribed to both, an important difference, however, being that whatever worship may have been paid to the Teutonic heroes never crystallized into a cult. This applies equally to those who have a recognized historical origin and to those who are regarded as purely

mythical. Of the latter the number has tended to diminish in the light of modern scholarship. The fashion during the 19th century set strongly in the other direction, and the " degraded gods " theory was applied not only to such conspicuous heroes as Siegfried, Dietrich and Beowulf, but to a host of minor characters, such as the good marquis Riideger of the Nibelungenlied and our own Robin Hood (both identified with Woden Hruodperaht). The reaction from one extreme has, indeed, tended to lead to another, until not only the heroes, but the very gods themselves, are being traced to very human, not to say commonplace, origins. Thus M. Henri de Tourville, in his Histoire de la formation particularism (1903), basing his argument on the Ynglinga Saga, interpreted in the light of " Social Science," reveals Odin, " the traveller," as a great " caravan-leader " and warrior, who, driven from Asgard — a trading city on the borders of the steppes east of the Don — by " the blows that Pompey aimed at Mithridates," brought to the north the arts and industries of the East. The argument is developed with convincing ingenuity, but it may be doubted whether it has permanently " rescued Odin from the misty dreamland of mythology and restored him to history." It is now, however, admitted that, whatever influence the one may have from time to time exercised on the other, Teutonic myth and Teutonic heroic legend were developed on independent lines. The Teutonic heroes are, in the main, historical personages, never gods; though, like the Greek heroes, they are sometimes endowed with semi-divine attributes or interpreted as symbolical representations of natural forces.

The origin of Teutonic heroic saga, which may be regarded as including that of the Germans, Goths, Anglo-Saxons and Scandinavians, is to be looked for in the period of the so-called migration of nations (a.d. 350-650). It consequently rests upon a distinct basis of fact, the saga (in the older and wider sense of any story said or sung) being indeed the oldest form of historical tradition; though this of course does not exclude the probability of the accretion of mythical elements round persons and episodes from the very first. As to the origin of the heroic sagas as we now have them, Tacitus tells us that the deeTls- of Arminius were still celebrated in song a hundred years after his death (Annals, ii. 88) and in the Germania he speaks of " old songs " as the only kind of " annals " which the ancient Germans possessed; but, whatever relics of the old songs may be embedded in the Teutonic sagas, they have left no recognizable mark on the heroic poetry of the German peoples. The attempt to identify Arminius with Siegfried is now generally abandoned. Teutonic heroic saga, properly so-called, consists of the traditions connected with the migration period, the earliest traces of which are found in the works of historical writers such as Ammianus Marcellinus and Cassiodorus. According to Jordanes (the epitomator of

Cassiodorus's History of the Goths) at the funeral of Attila his vassals, as they rode round the corpse, sang of his glorious deeds. The next step in the development of epic narrative was the single lay of an episodic character, sung by a single individual, who was frequently a member of a distinguished family, not merely a professional minstrel. Then, as different stories grew up round the person of a particular hero, they formed a connected cycle of legend, the centre of which was the person of the hero (e.g. Dietrich of Bern). The most important figures of these cycles are the following.

(i) Beowulf, king of the Geatas (Jutland), whose story in its present form was probably brought from the continent by the Angles. It is an amalgamation of the myth of Beowa, the slayer of the water-demon and the dragon, with the historical legend of Beowulf, nephew and successor of Hygelac (Chochil- aicus), king of the Geatas, who was defeated and slain (c. 520) while ravaging the Frisian coast. The water-demon Grendel and the dragon (probably), by whom Beowulf is mortally wounded, have been supposed to represent the powers of autumn and darkness, the floods which at certain seasons overflow the low-lying countries on the coast of the North Sea and sweep away all human habitations; Beowulf is the hero of spring and light who, after overcoming the spirit of the raging waters, finally succumbs to the dragon of approaching winter. Others regard him as a wind-hero, who disperses the pestilential vapours' of the fens. Beowulf is also a culture-hero. His father Sceaf- Scyld (i.e. Scyld Scefing," the protector with the sheaf ") lands on the Anglian or Scandinavian coast when a child, in a rudder- less ship, asleep on a sheaf of grain, symbolical of the means whereby his kingdom shall become great; the son indicates the blessings of a fixed habitation, secured against the attacks of the sea. (2) Hildebrand, the hero of the oldest German epic. A loyal supporter of Theodoric, he follows his master, when threatened by Odoacer, to the court of Attila. After thirty years' absence, he returns to his home in Italy; his son Hadu- brand, believing his father to be dead, suspects treachery and refuses to accept presents offered by the father in token of good-will. A fight takes place, in which the son is slain by the father. In a later version, recognition and reconciliation take place. Well-known parallels are Odysseus and Telegonis, Rustem and Sohrab. (3) Ermanaric, the king of the East Goths, who according to Ammianus Marcellinus slew himself (e. 375) in terror at the invasion of the Huns. With him is connected the old German Dioscuri myth of the Harlungen. (4)Dietrich of Bern (Verona), the legendary name of Theodoric the Great. Contrary to historical tradition, Italy is supposed to have been his ancestral inheritance, of which he has been deprived by

Odoacer, or by Ermanaric, who in his altered character of a typical tyrant appears as his uncle and contemporary. He takes refuge in Hungary with Etzel (Attila), by whose aid he finally recovers his kingdom. In the later middle ages he is represented as fighting with giants, dragons and dwarfs, and finally disappears on a black horse. Some attempts have been made to identify him as a kind of Donar or god of thunder. (5) Siegfried (M.H. Ger. Sivrit), the hero of the Niebelungenlied, the Sigurd of the related northern sagas, is usually regarded as a purely mythical figure, a hero of light who is ultimately overcome by the powers of darkness, the mist-people (Niebelungen). He is, however, closely associated with historical characters and events, e.g. with the Burgundian king Gundahari (Gunther, Gunnar) and the overthrow of his house and nation by the Huns; the scholars have exercised considerable ingenuity in attempting to identify him with various historical figures. Theodor Abeling (Das Nibelungenlied, Leipzig, 1907) traces the Nibelung sagas to three groups of Burgundian legends, each based on fact: the Frankish-Burgundian tradition of the murder of Segeric, son of the Burgundian king Sigimund, who was slain by his father at the instigation of his stepmother; the Frankish-Burgundian story, as told by Gregory of Tours (iii. n), of the defeat of the Burgundian kings Sigimund and Godomar, and the captivity and murder of Sigimund, by the sons of Clovis, at the instigation of their mother Chrothildis, in revenge for the murder of her

father Chilperich and of her mother, by Godomar; the Rhenish- Burgundian story of the ruin of Gundahari's kingdom by Attila's Huns. Herr Abeling identifies Siegfried (Sigurd) with Segeric, while — according to him — the heroine of the Nibelung sagas, Kriemhild (Gudrun), represents a confusion of two historical persons: Chrothildis, the wife of Clovis, and Ildico (Hilde), the wife of Attila. (See also the articles Kriemhild, Nibelun- genlied).

(6)Hugdietrich, Wolfdietrich and Ortnit, whose legend, like that of Siegfried, is of Frankish origin. It is preserved in four versions, the best of which is the oldest, and has an historical foundation. Hugdietrich is the " Frankish Dietrich " (= Hugo Theodoric), king of Austrasia (d. 534), who like his son and successor Theodebert, was illegitimate; both had to fight for their inheritance with relatives. The transference of the scene to Constantinople is a reminiscence of the events of the Crusades and Theodebert's projected campaign against that city. The version in which Hugdietrich gains access to his future wife by disguising himself as a woman has also a foundation in fact. As the myth of the Harlungen is connected with Ermanaric, so another Dioscuri myth (of the Hartungen) is combined with the Ortnit-Wolfdietrich legend. The Hartungen are probably identical with the divine youths (mentioned in Tacitus as worshipped by the Vandal Naharvali or Nahanarvali) , from whom the Vandal royal family, the Asdingi, claimed descent. Asdingi ("AvTi/yyoi) would be represented in

Gothic by Hazdiggos, " men with women's hair " (cf. muliebri ornatu in Tacitus), and in middle high German by Hartungen. (7)Rother, king of Lombardy. Desiring to wed the daughter of Constantine, king of Constantinople, he sends twelve envoys to ask her in marriage. They are arrested and thrown into prison by the king. Rother, who appears under the name of Dietrich, sets out with an army, liberates the envoys and carries off the princess. One version places the scene in the land of the Huns. The character of Constantine in many respects resembles that of Alexius Comnenus; the slaying of a tame lion by one of the gigantic followers of Rother is founded on an incident which actually took place at the court of Alexius during the crusade of 1 101 under duke Welf of Bavaria, when King Rother was composed about 1160 by a Rhenish minstrel. Rother may be the Lombard king Rothari (636-650), transferred to the period of the Crusades. (8)Walther of Aquitaine, chiefly known from the Latin poem Waltharius, written by Ekkehard of St Gall at the beginning of the 10th century, and fragments of an 8th-century Anglo-Saxon Epic Waldere. Walther is not an historical figure, although the legend undoubtedly represents typical occurrences of the migration period, such as the detention and flight of hostages of noble family from the court of the Huns, and the rescue of captive maidens by abduction. (o)Wieland (Volundr), Wayland > the Smith, the only Teutonic hero (his original home was lower Saxony) who firmly established himself in England. There is absolutely no historical background for his legend. He is a fire- spirit, who is pressed into man's service, and typifies the advance from the stone age to a higher stage of civilization (working in metals). As the lame smith he reminds us of Hephaestus, and in his flight with wings of Daedalus escaping from Minos. (10) Hcigni (Hagen) and Hedin(Hetel), whose personalities are overshadowed by the heroines Hilde and Gudrun (Kudrun, Kutrun). In one version occurs the incident of the never-ending battle between the forces of Hagen and Hedin. Every night Hilde revives the fallen, and" so will it continue till the twilight of the gods." The battle represents the eternal conflict between light and darkness, the alternation of day and night. Hilde here figures as a typical Valkyr delighting in battle and bloodshed, who frustrates a reconciliation. Hedin had sent a necklace as a peace-offering to Hagen, but Hilde persuades her father that it is only a ruse. This necklace occurs in the story of the goddess Freya (Frigg), who is said to have caused the battle to conciliate the wrath of Odin at her infidelity, the price paid by her for the possession of the necklace Brisnigamen; again, the light god Heimdal is said to have fought with Loki for the necklace (the sun) stolen by the latter. Hence the battle has been explained as the necklace

myth in epic form. The historical background is the raids of the Teutonic maritime tribes on the coasts of England and Ireland. Famous heroes who are specially connected with England are Alfred the Great, Richard Coeur-de-Lion, King Horn, Havelok the Dane, Guy of Warwick, Sir Bevis of Hampton (or South- ampton), Robin Hood and his companions.

Celtic Heroes.

The Celtic heroic saga in the British islands may be divided into the two principal groups of Gaelic (Irish) andBrython (Welsh), the first, excluding the purely mythological, into the Ultonian (con- nected with Ulster) and the Ossianic. The Ultonianis grouped round the names of King Conchobar and the heroCuchulainn, " the Irish Achilles," the defender of Ulster against all Ireland, regarded by some as a solar hero. The second cycle contains the epics of Finn (Fionn, Fingal) mac Cumhail, and his son Oisin (Ossian), the bard and warrior, chiefly known from the supposed Ossianic poems of Macpherson. (See Celt, sec. Celtic Literature.)

Of Brython origin is the cycle of King Arthur (Artus), the adopted national hero of the mixed nationalities of whom the " English "people was composed. Here he appears as a chiefly mythical personality, who slays monsters, such as the giant of St Michel, the boar Troit, the demon cat, and goes down to the underworld. The original Welsh legend was spread by British refugees in Brittany, and was thus celebrated by both English and French Celts. From a literary point of view, however, it is chiefly French and forms " the matter of Brittany. " Arthur, the leader (comes Britanniae, dux bellorum) of the Siluri or Dumnonii against the Saxons, flourished at the beginning of the 6th century. He is first spoken of in Nennius's History of the Britons (pth century), and at greater length in Geoffrey of Monmouth's History of the Kings of Britain (12th century), at the end of which the French Breton cycle attained its fullest development in the poems of Chretien de Troyes and others.

Speaking generally, the Celtic heroes are differentiated from the Teutonic by the extreme exaggeration of their superhuman, or rather extra-human, qualities. Teutonic legend does not lightly exaggerate, and what to us seems incredible in it may be easily conceived as credible to those by whom and for whom the tales were told; that Sigmund and his son Sinfiotli turned them- selves into wolves would be but a sign of exceptional powers to those who believed in werewolves; Fafnir assuming the form of a serpent would be no more incredible to the barbarous Teuton than the similar transformation of Proteus to the Greek. But in the characterization of their heroes the Celtic imagination runs riot, and the quality of their persons and their acts becomes exaggerated beyond the bounds of any conceivable probability. Take, for instance, the description of some of Arthur's knights

in the Welsh tale of Kilhwch and Olwen (in the Mabinogion). Along with Kai and Bedwyr (Bedivere), Peredur (Perceval), Gwalchmai (Gawain), and many others, we have such figures as Sgilti Yscandroed, whose way through the wood lay along the tops of the trees, and whose tread was so light that no blade of grass bent beneath his weight; Sol, who could stand all day upon one leg; Sugyn the son of Sugnedydd, who was "broad-chested" to such a degree that he could suck up the sea on which were three hundred ships and leave nothing but dry land; Gweyyl, the son of Gwestad, who when he was sad would let one of his lips drop beneath his waist and turn up the other like a cap over his head; and Uchtry Varyf Draws, who spread his red untrimmed beard over the eight-and-forty rafters of Arthur's hall. Such figures as these make no human impression, and criticism has busied itself in tracing them to one or other of the shadowy divinities of the Celtic pantheon. However this may be, remnants of their primitive superhuman qualities cling to the Celtic heroes long after they have been transfigured, under the influence of Christi- anity and chivalry, into the heroes, of the medieval Arthurian romance, types — for the most part — of the knightly virtues as these were conceived by the middle ages; while shadowy memories of early myths live on, strangely disguised, in certain of the episodes repeated uncritically by the medieval poets. So Merlin preserves his diabolic origin ; Arthur his mystic coming and

his mystic passing; while Gawain, and after him Lancelot, journey across the river, as the Irish hero Bran had done before them to the island of fair women — the Celtic vision of the realm of death. The chief heroes of the medieval Arthurian romances are the following. Arthur himself, who tends however to become completely overshadowed by his knights, who make his court the starting-point of their adventures. Merlin (Myrddin), the famous wizard, bard and warrior, perhaps an historical figure, first introduced by Geoffrey of Monmouth, originally called Ambrose from the British leader Ambrosius Aurelianus, under whom he is said to have first served. Perceval (Parzival, Parsifal), the Welsh Peredur, " the seeker of the basin," the most intimately connected with the quest of the Grail (q.v.). Tristan (Tristram), the ideal lover of the middle ages, whose name is inseparably associated with that of Iseult. Lancelot, son of Ban king of Brittany, a creation of chivalrous romance, who only appears in Arthurian literature under French influence, known chiefly from his amour with Guinevere, perhaps in imitation of the story of Tristan and Iseult. Gawain (Welwain, Welsh Gwalchmai), Arthur's nephew, who in medieval romance remains the type of knightly courage and chivalry, until his character is degraded in order to exalt that of Lancelot. Among less important, but still conspicuous, figures may be mentioned Kay (the Kai of the Mabinogion), Arthur's foster-brother and sensechal, the type of the bluff and boastful warrior, and

Bedivere (Bedwyr), the type of brave knight and faithful retainer, who alone is with Arthur at his passing, and afterwards becomes " a hermit and a holy man." (See Arthur, Merlin, Perceval, Tristan, Lancelot, Gawain.)

Heroes of Romance.

Another series of heroes, forming the central figures of stories variously derived but developed in Europe by the Latin-speaking peoples, may be conveniently grouped under the heading of " romance." Of these the most important are Alexander of Macedon and Charlemagne, while alongside of them Priam and other heroes of the Trojan war appear during the middle ages in strangely altered guise. Of all heroes of romance Alexander has been the most widely celebrated. His name, in the form of Iskander, is familiar in legend and story all over the East to this day; to the West he was introduced through a Latin translation of the original Greek romance (by the pseudo-Callisthenes) to which the innumerable Oriental versions are likewise traceable (see Alexander III., King or Macedon; sec. The Romance of Alexander). More important in the West, however, was the cycle of legends gathering round the figure of Charlemagne, forming what was known as " the matter of France." The romances of this cycle, of Germanic (Frankish) origin and developed probably in the north of France by the French (probably in the north of France) contain reminiscences of the heroes of the Merovingian period, and in their later development were influenced by the Arthurian cycle. Just as Arthur was eclipsed by his companions, so Charlemagne's vassal nobles, except in the Chanson de Roland, are exalted at the expense of the emperor, probably the result of the changed relations between the later emperors and their barons. The character of Charlemagne himself undergoes a change; in the Chanson de Roland he is a venerable figure, mild and dignified, while later he appears as a cruel and typical tyrant (as is also the case with Ermanaric). The basis of his legend is mainly histori- cal, although the story of his journey to Constantinople and the East is mythical, and incidents have been transferred from the reign of Charles Martel to his. Charlemagne is chiefly venerated as the champion of Christianity against the heathen and the Saracens. (See Charlemagne, ad fin. " The Charlemagne Legends.")

The most famous heroes who are associated with him are Roland, praefect of the marches of Brittany, the Orlando of Ariosto, slain at Roncevaux (Roncevalles) in the Pyrenees, and his friend and rival Oliver (Olivier); Ogier the Dane, the Holger Danske of Hans Andersen, and Huon of Bordeaux, probably both introduced from the Arthurian cycle; Renaud (Rinaldo) of Montauban, one of the four sons of Aymon, to

whom the wonderful horse B ay ard was presented by Charlemagne ; the traitor Doon of Mayence; Ganelon, responsible for the treachery that led to the death of Roland; Archbishop Turpin, a typical specimen of muscular Christianity; William Fierabras, William au court nez, William of Toulouse, and William of Orange (all probably identical), and Vivien, the nephew of the latter and the hero of Aliscans. The late Charlemagne romances originated the legends, in English form, of Sowdoneof Babylone, Sir Otnel, Sir Firumbras and Huon of Bordeaux (in which Oberon, the king of the fairies, the son of Julius Caesar and Morgan the Fay, was first made known to England).

The chief remains of the Spanish heroic epic are some poems on the Cid, on the seven Infantes of Lara, and on Fernin Gonzalez, count of Castile. The legend of Charlemagne as told in the Crdnica general of Alfonso X. created the desire for a national hero distinguished for his exploits against the Moors, and Roland was thus supplanted by Bernardo del Carpio. Another famous hero and centre of a 14th-century cycle of romance was Amadis of Gaul; its earliest form is Spanish, although the Portuguese have claimed it as a translation from their own language. There is no trace of a French original.

Slavonic Heroes. — The Slavonic heroic saga of Russia centres round Vladimir of Kiev (980-1015), the first Christian ruler of that country, whose personality is eclipsed by that of Ilya (Elias) of Mourom, the son of a peasant, who was said to have saved the empire from the Tatars at the urgent request of his emperor. It is not known whether he was an historical personage ; many of the achievements attributed to him border on the miraculous. A much-discussed work is the Tale of Igor, the oldest of the Russian medieval epics. Igor was the leader of a raid against the heathen Polovtsi in 1185; at first successful, he was afterwards defeated and taken prisoner, but finally managed 10 escape. Although the Finns are not Slavs, on topographical grounds mention may here be made of Wainamoinen, the great magician and hero of the Finnish epic Kalevala (" land of heroes ")• The popular hero of the Servians and Bulgarians is Marko Kralyevich (q.v.), son of Vukashin, characterized by Goethe as a counterpart of the Greek Heracles and the Persian Rustem. For the Persian, Indian, &c, heroes see the articles on the literature and religions of the various countries.

Authorities. — On the subject generally, see J. G. T. Gr&sse, Die grossen Sagenkreise des Mittelalters (Dresden, 1842), forming part of his Lehrbuch einer Liter argpschichte der beriihmlesten Volker des Mittelalters; W. P. Ker, Eptc and Romance (2nd ed., 1908). Teu- tonic. — B. Symons, "

Germanische Heldensage " in H. Paul's Grundris der germanischen Philologie, iii. (Strassburg, 1900), 2nd revised edition, separately printed (ib., 1905) ; W. Grimm, Die deutsche Heldensage (1829, 3rd ed., 1889), still one of the most important works; W. Miiller, Mythologie der deutschen Heldensage (Heilbronn, 1886) and supplement, Zur Mythologie der griechischen und deutschen Heldensage (ib., 1889); O. L. Jiriczek, Deutsche Heldensagen, i. (Strassburg, 1898) and Die deutsche Heldensage (3rd revised edition, Leipzig, 1906) ; Chantepie de la Saussaye, The Religion of the Teutons (Eng. tr., Boston, U.S.A., 1902); J. G. Robertson, History of German Literature (1902). See also Helden- buch.

Celtic. — M. H. d'Arbois de Jubainville, Cours de lilterature celtique (12 vols., 1883-1902), one vol. trans, into English by R. I. Best, The Irish Mythological Cycle and Celtic Mythology (1903); L. Petit de julleville, Hist, de la langue el de la litt. frangaise, i. Moyen dee (1896); C. Squire, The Mythology of the British Isles: an Introduction to Celtic Myth and Romance (1905) ; J. Rhys, Celtic Britain (3rd ed., 1904). Slavonic. — A. N. Rambaud, La Russie epique (1876); W. Wollner, Untersuchungen iiber die Volksepik der Grossrussen (1879); W. R. Morfill, Slavonic Literature (1883).

HERO AND LEANDER, two lovers celebrated in antiquity. Hero, the beautiful priestess of Aphrodite at Sestos, was seen by Leander, a youth of Abydos, at the celebration of the festival of Aphrodite and Adonis. He became deeply enamoured of her; but, as her position as priestess and the opposition of her parents rendered their marriage impossible they agreed to carry on a clandestine intercourse. Every night Hero placed a lamp in the top of the tower where she dwelt by the sea, and Leander, guided by it, swam across the dangerous Hellespont. One stormy night the lamp was blown out and Leander perished. On finding his body next morning on the shore, Hero flung

herself into the waves. The story is referred to by Virgil (Georg. iii. 258), Statius (Theb. vi. 535) and Ovid (Her. xviii. and xix.). The beautiful little epic of Musaeus has been frequently trans- lated, and is expanded in the Hero and Leander of C. Marlowe and G. Chapman. It is also the subject of a ballad by Schiller and a drama by F. Grillparzer.

See M. H. Jellinek, Die Sage von Hero und Leander in der Dichtung (1890), and G. Knaack " Hero und Leander " in Festgabe fur Franz Susemihl (1898). A careful collection of materials will be found in F. Koppner, Die Sage von Hero und Leander in der Literatur und Kunst des Alter turns (1894).

HERO OF ALEXANDRIA, Greek geometer and writer on mechanical and

physical subjects, probably flourished in the second half of the 1st century. This is the more modern view, in contrast to the earlier theory most generally accepted, according to which he flourished about 100 B.C. The earlier theory started from the superscription of one of his works, "Hpoovos KT?j

separate treatises on the subject of the mechanical powers, which are fully discussed in the Mechanics, ii. , iii. The Belopoiica (on engines of war) is extant in Greek, and both this and the Mechanics contain Hero's solution of the problem of the two mean proportionals. Hero also wrote Catoptrica (on reflecting surfaces), and it seems certain that we possess this in a Latin work, probably translated from the Greek by Wilhelm van Moerbeek, which was long thought to be a fragment of Ptolemy's Optics, because it bore the title Ptolemaei de speculis in the MS. But the attribution to Ptolemy was shown to be wrong as soon as it was made clear (especially by Martin) that another translation by an Admiral Eugenius Siculus (12th century) of an optical work from the Arabic was Ptolemy's Optics. Of other treatises by Hero only fragments remain. One was four books on Water Clocks (Hepl vhp'ucv oipoaKortluv) , of which Proclus (Hypolyp. astron., ed. Halma) has preserved a fragment, and to which Pappus also refers. Another work was a commentary on Euclid (referred to by the Arabs as " the book of the resolution of doubts in Euclid ") from which quotations have survived in an-Nairlzi's commentary.

The Pneumatica, Automatopoietica, Belopoiica and Cheiroballistra of Hero were published in Greek and Latin in TheVenot's Veterum mathematicorum opera graece et latine pleraque nunc primum edita (Paris, 1693) ; the first important critical researches on Hero were G. B. Venturi's Commentari sopra la storia e la teoria del- I'ottica (Bologna, 1814) and H. Martin's " Recherches sur la vie et les ouvrages d'Heron d'Alexandrie disciple de Ctesibius et sur tous les ouvrages mathematiques grecs conserves ou perdus,publies ou inddits, qui ont dtd attribuds a un auteur nomm6 Heron " (Mint, presentis a I Academie des Inscriptions et Belles-Lettres, i. sdrie, iv., 1854). The geometrical works (except of course the Metrica) were edited (Greek only) by F. Hultsch (Heronis Alexandrini geometricorum et stereo- metricorum reliquiae, 1864), the Dioptra by Vincent (Extraits des manuscrits relatifs & la geometric pratique des Grecs, Notices et extraits des manuscrits de la Bibliotheque Impiriale, xix. 2, 1858), the treatises on Engines of War by C. Wescher (Poliorcttique des Grecs, Paris, 1867). The Mechanics was first published by Carra de Vaux in the Journal asiatique (ix. sdrie, ii., 1893). In 1899 began the publication in Teubner's series of

Heronis Alexandrini opera quae supersunt omnia. Vol. i. and Supplement (by W. Schmidt) contains the Pneumatica and Automata, the fragment on Water Clocks, the De ingeniis spiritualibus of Philon of Byzantium and extracts on Pneumatics by Vitruvius. Vol. ii.pt. i., by L. Nix and W. Schmidt, contains the Mechanics in Arabic, Greek fragments of the same, the Catoptrica in Latin with appendices of extracts from Olympiodorus, Vitruvius, Pliny, &c. Vol. iii. (by Hermann Schone) contains the Metrica (in three books) and the Dioptra. A German translation is added throughout. The approximation to square roots in Hero has been the subject of papers too numerous to mention. But reference should be made to the exhaustive studies on Hero's arithmetic by Paul Tannery, " L'Arithmetique des Grecs dans Heron d'Alexandrie ' ' (Mem. de la Soc. des sciences phys. et math, de Bordeaux, ii. serie, iv., 1882), " La Stereometric d'Heron d'Alexandrie " and " £tudes Heroniennes (ibid, v., 1883), "Questions Hdroniennes " (Bulletin des sciences math., ii. sdrie, viii., 1884), " Un Fragment des Metriques d'Heron " (Zeitschrifl filr Math, und Physik, xxxix., 1894; Bulletin des sciences math., ii. sdrie, xviii., 1894). A good account of Hero's works will be found in M. Cantor's Geschichte der Mathe- matik, i. 2 (1894), chapters 18 and 19, and in G. Loria's studies, Le Scienze esatte nell' antica Grecia, especially libro iii. (Modena, 1900), pp. 103-128. (T. L. H.)

HERO, the Younger, the name given without any sufficient reason to a Byzantine land-surveyor who wrote (about a.d. 938) a treatise on land-surveying modelled on the works of Hero of Alexandria, especially the Dioptra.

See " Geodesie de Heron de Byzance," published by 'Vincent in Notices et extraits des manuscrits de la Bibliotheque Impiriale, xix. 2 (Paris, 1858), and T. H. Martin in Memoires presentes a I' Academie des Inscriptions, 1st series, iv. (Paris, 1854).

HEROD, the name borne by the princes of a dynasty which reigned in Judaea from 40 B.C.

Herod (surnamed the Great), the son of Antipater, who supported Hyrcanus II. against Aristobulus II. with the aid first of the Nabataean Arabs and then of Rome. The family seems to have been of Idumaean origin, so that its members were liable to the reproach of being half -Jews or even foreigners. Justin Martyr has a tradition that they were originally Philistines of Ascalon (Dial. c. 52), and on the other hand Nicolaus of Damascus (apud Jos. Ant. xiv. 1. 3) asserted that Herod, his royal patron, was descended from the Jews who first returned from the Babylonian

Captivity. The tradition and the assertion are in all probability equally

fictitious and proceed respectively – from the foes and the friends of the Herodian dynasty.

Antipas (or Antipater), the father of Antipater, had been governor of Idumaea under Alexander Jannaeus. His son allied himself by marriage with the Arabian nobility and became the real ruler of Palestine under Hyrcanus II. When Rome inter- vened in Asia in the person of Pompey, the younger Antipater realized her inevitable predominance and secured the friendship of her representative. After the capture of Jerusalem in 63 B.C. Pompey installed Hyrcanus, who was little better than a figurehead, in the high-priesthood; and when in 55 B.C. the son of Aristobulus renewed the civil war in Palestine, the Roman governor of Syria in the exercise of his jurisdiction arranged a settlement " in accordance with the wishes of Antipater " (Jos. Ant. xiv. 6. 4). To this policy of dependence upon Rome Antipater adhered, and he succeeded in commending himself to Mark Antony and Caesar in turn. After the battle of Pharsalia Caesar made him procurator and a Roman citizen.

At this point Herod appears on the scene as ruler of Galilee (Jos. Ant. xiv. 9. 2) appointed by his father at the age of fifteen or, since he died at seventy, twenty-five. In spite of his youth he soon found an opportunity of displaying his mettle; for he arrested Hezekiah the arch-brigand, who had overrun the Syrian border, and put him to death. The Jewish nobility at Jerusalem . seized upon this high-handed action as a pretext for satisfying their jealousy of their Idumaean rulers. Herod was cited in the name of Hyrcanus to appear before the Sanhedrin, whose pre- rogative he had usurped in executing Hezekiah. He appeared with a bodyguard, and the Sanhedrin was overawed. Only Sameas, a Pharisee, dared to insist upon the legal verdict of con- demnation. But the governor of Syria had sent a demand for Herod's acquittal, and so Hyrcanus adjourned the trial and persuaded the accused to abscond. Herod returned with an army, but his father prevailed upon him to depart to Galilee without wreaking his vengeance upon his enemies. About this time (47-46 B.C.) he was created strategus of Coelesyria by the provincial governor. The episode is important for the light which it throws upon Herod's relations with Rome and with the Jews.

In 44 B.C. Cassius arrived in Syria for the purpose of filling his war-chest : Antipater and Herod collected the sum of money at which the Jews of Palestine had been assessed. In 43 B.C. Antipater was poisoned at the instigation of one Malichus, who was perhaps a Jewish patriot animated by hatred Of the Herods and their Roman patrons.

With the connivance of Cassius Herod had Malichus assassin- ated; but the country was in a state of anarchy, thanks to the extortions of Cassius and

the encroachments of neighbouring powers. Antony, who became master of the East after Philippi, was ready to support the sons of his friend Antipater; but he was absent in Egypt when the Parthians invaded Palestine to restore Antigonus to the throne of his father Aristobulus (40 B.C.). Herod escaped to Rome: the Arabians, his mother's people, had repudiated him. Antony had made him tetrarch, and now with the assent of Octavian persuaded the Senate to declare him king of Judaea.

In 39 B.C. Herod returned to Palestine and, when the presence of Antony put the reluctant Roman troops entirely at his disposal, he was able to lay siege to Jerusalem two years later. Secure of the support of Rome he was concerned also to legitimize his position in the eyes of the Jews by taking, for love as well as policy, the Hasmonaean princess Mariamne to be his second wife. Jerusalem was taken by storm; the Roman troops withdrew to behead Antigonus the usurper at Antioch. In 37 B.C. Herod was king of Judaea, being the client of Antony and the husband of Mariamne.

The Pharisees, who dominated the bulk of the Jews, were content to accept Herod's rule as a judgment of God. Hyrcanus returned from his prison : mutilated, he could ho longer hold office as high-priest; but his mutilation probably gave him the prestige of a martyr, and his influence — whatever it was worth —

seems to have been favourable to the new dynasty. On the other hand Herod's marriage with Mariamne brought some of his enemies into his own household. He had scotched the faction of Hasmonaean sympathizers by killing forty-five members of the Sanhedrin and confiscating their possessions. But so long as there were representatives of the family alive, there was always a possible pretender to the throne which he occupied; and the people had not lost their affection for their former deliverers. Mariamne's mother used her position to further her plots for the overthrow of her son-in-law; and she found an ally in Cleopatra of Egypt, who was unwilling to be spurned by him, even if she was not weary of his patron, Antony.

The events of Herod's reign indicate the temporary triumphs of his different adversaries. His high-priest, a Babylonian, was deposed in order that AristobulusIIL, Mariamne's brother, might hold the place to which he had some ancestral right. But the enthusiasm with which the people received him at the Feast of Tabernacles convinced Herod of the danger; and the youth was drowned by order of the king at Jericho. Cleopatra had obtained

from Antony a grant of territory adjacent to Herod's domain and even part of it. She required Herod to collect arrears of tribute. So it fell out that, when Octavian and the Senate declared war against Antony and Cleopatra, Herod was preoccupied in obedience to her commands and was thus prevented from fighting against the future emperor of Rome.

After the battle of Actium (31 B.C.) Herod executed Hyrcanus and proceeded to wait upon the victorious Octavian at Rhodes. His position was confirmed and his territories were restored. On his return he took in hand to heal with the Hasmonaeans, and in 25 B.C. the old intriguers, their victims like Mariamne, and all pretenders were dead. From this time onwards Herod was free to govern Palestine, as a client-prince of the Roman Empire should govern his kingdom. In order to put down the brigands who still infested the country and to check the raids of the Arabs on the frontier, he built or rebuilt fortresses, which were of material assistance to the Jews in the great revolt against Rome. Within and without Judaea he erected magnificent buildings and founded cities. He established games in honour of the emperor after the ancient Greek model in Caesarea and Jerusalem and revived the splendour of the Olympic games. At Athens and elsewhere he was commemorated as a benefactor; and as Jew and king of the Jews he restored the temple at Jerusalem. The emperor recognized his successful government by putting the districts of Ulatha and Panias under him in 20 B.C.

But Herod found new enemies among the members of his household. His brother Pheroras and sister Salome plotted for their own advantage and against the two sons of Mariamne. The people still cherished a loyalty to the Hasmonaean lineage, although the young princes were also the sons of Herod. The enthusiasm with which they were received fed the suspicion, which their uncle instilled into their father's mind, and they were strangled at Sebaste. On his deathbed Herod discovered that his eldest son, Antipater, whom Josephus calls a " monster of iniquity," had been plotting against him. He proceeded to accuse him before the governor of Syria and obtained leave from Augustus to put him to death. The father died five days after his son in 4 B.C. He had done much for the Jews, thanks to the favour he had won and kept in spite of all from the successive heads of the Roman state; he had observed the Law publicly— in fact, as the traditional epigram of Augustus says, " it was better to be Herod's swine than a son of Herod." Josephus, Ant. xv., xvi., xvii. 1-8, B.J. i. 18-33; Schiirer, Gesch. d.jiid. Vblk., 4th ed., i. pp. 360-418.

Herod Antipas, son of Herod the Great by the Samaritan Malthace, and full brother of Archelaus, received as his share of his father's dominions the provinces of Galilee and Peraea, with the title of tetrarch. Like his father, Antipas had a turn for architecture: he rebuilt and fortified the town of

Sepphoris in Galilee; he also fortified Betharamptha in Peraea, and called it Julias after the wife of the emperor. Above all he founded the important town of Tiberias on the west shore of the Sea of Galilee, with institutions of a distinctly Greek character. He reigned

4 b.c.a.d. 39. In the gospels he is mentioned as Herod. He it was who was called a " fox " by Christ (Luke xiii. 32). He is erroneously spoken of as a king in Mark vi. 14. It was to him that Jesus was sent by Pilate to be tried. But it is in connexion with his wife Herodias that he is best known, and it was through her that his misfortunes arose. He was married first of all to a daughter of Aretas, the Arabian king; but, making the acquaint ance of Herodias, the wife of his brother Philip (not the tetrarch), during a visit to Rome, he was fascinated by her and arranged to marry her. Meantime his Arabian wife discovered the plan and escaped to her father, who made war on Herod, and com- pletely defeated his army. John the Baptist condemned his marriage with Herodias, and in consequence was put to death in the way described in the gospels and in Josephus. When Herodias's brother Agrippa was appointed king by Caligula, she was determined to see her husband attain to an equal eminence, and persuaded him, though naturally of a quiet and unambitious temperament, to make the journey to Rome to crave a crown from the emperor. Agrippa, however, managed to influence Caligula against him. Antipas was deprived of his dominions and banished to Lyons, Herodias voluntarily sharing his exile.

Herod Philip, son of Herod the Great by Cleopatra of Jerusalem, received the tetrarchate of Ituraea and other districts to E. and N.E. of the Lake of Galilee, the poorest part of his father's kingdom. His subjects were mainly Greeks or Syrians, and his coins bear the image of Augustus or Tiberius. He is described as an excellent ruler, who loved peace and was careful to maintain justice, and spent his time in his own territories. He was also a builder of cities, one of which was Caesarea Philippi, and another was Bethsaida, which he called Julias. He died after a reign of thirty-seven years (4 b.c.-a.d. 34) ; and his dominions were incorporated in the province of Syria. (J. H. A. H.)

HERODAS (Gr. 'HpcjJSas), or Herondas (the name is spelt differently in the few places where he is mentioned), Greek poet, the author of short humorous dramatic scenes in verse, written under the Alexandrian empire in the 3rd century B.C. Apart from the intrinsic merit of these pieces, they are interesting in the history of Greek literature as being a new species, illustrating Alexandrian methods. They are called Mijua/i|8oi, "Mime-iambics." Mimes were the Dorian product of South Italy and Sicily, and the most famous of them — from which Plato is said to have studied the drawing of character — were the work of Sophron. These were scenes in popular life, written in the language of the people, vigorous with racy

proverbs such as we get in other reflections of that region — in Petronius and the Pentamerone. Two of the best known and the most vital among the Idylls of Theocritus, the 2nd and the 15th, we know to have been derived from mimes of Sophron. What Theocritus is doing there, Herodas, his younger contemporary, is doing in another manner — casting old material into novel form, upon a small scale, under strict conditions of technique. The method is entirely Alexandrian: Sophron had written in a peculiar kind of rhythmical prose; Theocritus uses the hexameter and Doric, Herodas the season or " lame " iambic (with a dragging spondee at the end) and the old Ionic dialect with which that curious metre was associated. That, however, hardly goes beyond the choice and form of words; the structure of the sentences is close-knit Attic. But the grumbling metre and quaint language suit the tone of common life which Herodas aims at realizing; for, as Theocritus may be called idealist, Herodas is a realist unflinching. His persons talk in vehement exclamations and emphatic turns of speech, with proverbs and fixed phrases'"; and occasionally, where it is designed as proper to the part, with the most naked coarseness of expression.

The scene of the second and the fourth is laid at Cos, and the speaking characters in each are never more than three. In Mime I. the old nurse, now the professional go-between or bawd, calls on Metriche, whose husband has been long away in Egypt, and endeavours to excite her interest in a most desirable young man, fallen deeply in love with her at first sight. After hearing all the arguments Metriche declines with dignity, but consoles the I old woman with an ample glass of wine, this kind being always

represented with the taste of Mrs Gamp. II. is a monologue by the TlopvofioaKos (" Whoremonger ") prosecuting a merchant- trader for breaking into his establishment at night and attempt- ing to carry off one of the inmates, who is produced in court. The vulgar blackguard, who is a stranger to any sort of shame, remarking that he has no evidence to call, proceeds to a perora- tion in the regular oratorical style, appealing to the Coan judges not to be unworthy of their traditional glories. In fact, the whole oration is also a burlesque in every detail of an Attic speech at law; and in this case we have the material from which to estimate the excellence of the parody. In III. a desperate mother brings to the schoolmaster a truant urchin, with whom neither she nor his incapable old father can do anything. In a voluble stream of interminable sentences she narrates his mis- deeds and implores the schoolmaster to flog him. The boy accordingly is hoisted on another's back and flogged; but his spirit does not appear to

be subdued, and the mother resorts to the old man after all. IV. is a visit of two poor women with an offering to the temple of Asclepius at Cos. While the humble cock is being sacrificed, they turn, like the women in the Ion of Euripides, to admire the works of art; among them a small boy strangling a vulpanser — doubtless the work of Boethus that we know — and a sacrificial procession by Apelles, " the Ephesian," of whom we have an interesting piece of contemporary eulogy. The oily sacristan is admirably painted in a few slight strokes. V. brings us very close to some unpleasant facts of ancient life. The jealous woman accuses one of her slaves, whom she has made her favourite, of infidelity; has him bound and sent degraded through the town to receive 2000 lashes; no sooner is he out of sight than she recalls him to be branded " at one job." The only pleasing person in the piece is the little maidservant — permitted liberties as a verna brought up in the house — whose ready tact suggests to her mistress an excuse for postponing execution of a threat made in ungovernable fury. VI. is a friendly chat or a private conversation. The subject is an ugly one, but the dialogue is as clever and amusing as the rest, with some delicious touches. Our interest is engaged here in a certain Kerdon, the artistic shoemaker, to whom we are introduced in VII. (the name had already become generic for the shoemaker as the typical representative of retail trade) , a little bald man with a fluent tongue, complaining of hard times, who bluffs and wheedles by turns. VII. opens with a mistress waking up her maids to listen to her dream; but we have only the beginning, and the other fragments are very short.

Within the limits of 100 lines or less Herodas presents us with a highly entertaining scene and with characters definitely drawn. Some of these had been perfected no doubt upon the Attic stage, where the tendency in the 4th century had been gradually to evolve accepted types — not individuals, but generalizations from a class, an art in which Menander's was esteemed the master-hand. The Hopvofioaicbs and the Macrrpoiros we can piece together from succeeding literature, and see how skilfully the established traits are indicated here. This is achieved by true dramatic means, with touches never wasted and the more delightful often because they do not clamour for attention. The execution has the qualities of first-rate Alexandrian work in miniature, such as the epigrams of Asclepiades possess, the finish and firm outlines; and these little pictures bear the test of all artistic work — they do not lose their freshness with familiarity, and gain in interest as one learns to appreciate their subtle points.

The papyrus MS., obtained from the Fayum, is in the possession of the British Museum, and was. first printed by F. G. Kenyon in 1891. Editions by O. Crusius (1905, text only, in Teubner series) and J. A. Nairn (1904), with introduction, notes and bibliography. There is an English verse translation of the mimes by H. Sharpley (1906) under the title A Realist of

the Aegean. (W. G. H.)

HERODIANS {'KpuSiavoi), a sect or party mentioned in Scripture as having on two occasions — once in Galilee, and again in Jerusalem — manifested an unfriendly disposition towards Jesus (Mark iii. 6, xii. 13; Matt. xxii. 6; cf. also Mark viii. 15). In each of these cases their name is coupled with that of the Pharisees. According to many interpreters the courtiers or

soldiers of Herod Antipas (" Milites Herodis," Jerome) are intended; but more probably the Herodians were a public political party, who distinguished themselves from the two great historical parties of post-exilian Judaism by the fact that they Were and had been sincerely friendly to Herod the Great and to his dynasty (cf. such formations as " Caesariani," " Pom- peiani "). It is possible that, to gain adherents, the Herodian party may have been in the habit of representing that the establishment of a Herodian dynasty would be favourable to the realization of the theocracy; and this in turn may account for Tertullian's (De praescr.) allegation that the Herodians regarded Herod himself as the Messiah. The sect was called by the Rabbis Boethusians as being friendly to the family of Boethus, whose daughter Mariamne was one of Herod the Great's wives. (J. H. A. H.)

HERODIANUS, Greek historian, flourished during the third century a.d. He is supposed to have been a Syrian Greek. In 203 he was in Rome, where he held some minor posts. He does not appear to have attained high official rank; the statement that he was imperial procurator and legate of the Sicilian pro- vinces rests upon conjecture only. His historical work ('Hpa>5ta- vov rrjs /jera MapKov /SaciXeias ujtopujsv /3i(3X(o oktoi) narrates the events of the fifty-eight years between the death of Marcus Aurelius and the proclamation of Gordianus III. (180-238). The narrative is of special value as supplementing Dion Cassius, whose history ends with Alexander Severus. His work has the value that attaches to a record written by one chronicling the events of his own times, gifted with ordinary powers of observation, indubitable candour and independence of view. But while he gives a lively account of external events — such as the death of Commodus and the assassination of Pertinax — the barbarian invasions, the spread of Christianity, the extension of the franchise by Caracalla are unnoticed. The dates are often wrong, and little attention is paid to geographical details, which makes the narrative of military expeditions beyond the borders of the empire difficult to understand. Herodian has been accused of prejudice against Alexander Severus. His style, modelled on that of Thucydides and unreservedly praised by Photius, is on the whole pure, though somewhat rhetorical and showing a fondness for Latinisms.

Extensive use has been made of Herodianus by later chroniclers, especially

the " Scriptores historiae Augustae " and John of Antioch. His history was first translated into Latin at the end of the 15th century by Politian. The most complete edition is by G. W. Irmisch (1 789-1 805), with elaborate indices, but the notes are very diffuse; critical editions by I. Bekker (1855), L. Mendelssohn (1883); see also C. Dandliker.

HERODIANUS, AELIUS, called 6 rexviKos, Alexandrian grammarian, flourished in the 2nd century a.d. He early took up his residence at Rome, where he enjoyed the patronage of Marcus Aurelius (161-180), to whom he dedicated his great treatise on prosody. This work in twenty-one books (KofloXt/cij Trpoo~

The best edition is by A. Lentz, Herodiani. Technici reliquiae (1867-1870) ; a supplementary volume is included in Uhling's Corpus grammalicorum Graecorum; for further bibliographical information see W. Christ, Geschichte der griechischen Literatur (1898).

HERODOTUS (c. 484-425 B.C.), Greek historian, called the Father of History, was born at Halicarnassus in Asia Minor, then dependent upon the Persians, in or about the year 484 B.C. Herodotus was thus born a Persian subject, and such he con' tinued until he was thirty or five-and-thirty years of age. At the time of his birth Halicarnassus was under the rule of a queen

Artemisia (}.».). The year of her death is unknown; but she I left her crown to her son Pisindelis (born about 498 B.C.), who was succeeded upon the throne by his son Lygdamis about the time that Herodotus grew to manhood. The family of Herodotus belonged to the upper rank of the citizens. His father was named Lyxes, and his mother Rhaeo, or Dryo. He had a brother Theodore, and an uncle or cousin Panyasis (q.v.), the epic poet, a. personage of so much importance that the tyrant Lygdamis, suspecting him of treasonable projects, put him to death. It is probable that Herodotus shared his relative's political opinions, and either was exiled from Halicarnassus or quitted it voluntarily at the time of his execution.

Of the education of Herodotus no more can be said than that it was thoroughly Greek, and embraced no doubt the three subjects essential to a Greek liberal education — grammar, gymnastic training and music. His studies would be regarded as completed when he attained the age of eighteen, and took rank among the ephebi or eirenes of his native city. In a free Greek state he would at once have begun his duties as a citizen, and found therein sufficient employment for his growing energies. But in a city

ruled by a tyrant this outlet was wanting; no political life worthy of the name existed. Herodotus may thus have had his thoughts turned to literature as furnishing a not unsatisfactory career, and may well have been encouraged in his choice by the example of Panyasis, who had already gained a reputation by his writings when Herodotus was still an infant. At any rate it is clear from the extant work of Herodotus that he must have devoted himself early to the literary life, and commenced that extensive course of reading which renders him one of the most instructive as well as one of the most charming of ancient writers. The poetical literature of Greece was already large; the prose literature was more extensive than is generally supposed; yet Herodotus shows an intimate acquaintance with the whole of it. The Iliad and the Odyssey are as familiar to him as Shakespeare to the educated Englishman. He is acquainted with the poems of the epic cycle, the Cypria, the Epigoni, &c. He quotes or other- wise shows familiarity with the writings of Hesiod, Olen, Musaeus, Bacis, Lysistratus, Archilochus of Paros, Alcaeus, Sappho, Solon, Aesop, Aristeas of Proconnesus, Simonides of Ceos, Phrynichus, Aeschylus and Pindar. He quotes and criticizes Hecataeus, the best of the prose writers who had preceded him, and makes numerous allusions to other authors of the same class.

It must not, however, be supposed that he was at any time a mere student. It is probable that from an early age his inquiring disposition led him to engage in travels, both in Greece and in foreign countries. He traversed Asia Minor and European Greece probably more than once; he visited all the most im- portant islands of the Archipelago — Rhodes, Cyprus, Delos, Paros, Thasos, Samothrace, Crete, Samos, Cythera and Aegina. He undertook the long and perilous journey from Sardis to the Persian capital Susa, visited Babylon, Colchis, and the western shores of the Black Sea as far as the estuary of the Dnieper; he travelled in Scythia and in Thrace, visited Zante and Magna Graecia, explored the antiquities of Tyre, coasted along the shores of Palestine, saw Gaza, and made a long stay in Egypt. At the most moderate estimate, his travels covered a space of thirty-one degrees of longitude, or 1700 miles, and twenty-four of latitude, or nearly the same distance. At all the more interesting sites he took up his abode for a time; he examined, he inquired, he made measurements, he accumulated materials. Having in his mind the scheme of his great work, he gave ample time to the elabora- tion of all its parts,„and took care to obtain by personal observation a full knowledge of the various countries.

The travels of Herodotus seem to have been chiefly accomplished between his twentieth and his thirty-seventh year (464-447 B.C.). 1 It was probably in his early manhood that as a Persian subject he visited Susa and Babylon, taking advantage of the Persian system of posts which he describes in his fifth book. His residence

1 The date of his travels is difficult to determine. E. Meyer inclines to put all the longer journeys, except the Scythian, between 440 and 430 B.C. The journey to Susa and Babylon is put by C. F. Lehmann c. 450 B.C., and by H. Stein before 450.

in Egypt must, on the other hand, have been subsequent to 460 B.C., since he saw the skulls of the Persians slain by Inarus in that year. Skulls are rarely visible on a battlefield for more than two or three seasons after the fight, and we may therefore presume that 'it was during the reign of Inarus (460-454 B.C.), 2 when the Athenians had great authority in Egypt, that he visited the country, making himself known as a learned Greek, and therefore receiving favour and attention on the part of the Egyptians, who were so much beholden to his countrymen (see Athens, Cimon, Pericles). On his return from Egypt, as he proceeded along the Syrian shore, he seems to have landed at Tyre, and from thence to have gone to Thasos. His Scythian travels are thought to have taken place prior to 450 B.C.

It is a question of some interest from what centre or centres these various • expeditions were made. Up to the time of the execution of Panyasis, which is placed by chronologists in or about the year 457 B.C., there is every reason to believe that Herodotus lived at Halicarnassus. His travels in Asia Minor, in European Greece, and among the islands of the Aegean, probably belong to this period, as also his journey to Susa and Babylon. We are told that when he quitted Halicarnassus on account of the tyranny of Lygdamis, in or about the year 457 B.C., he took up his abode in Samos. That island was an important member of the Athenian confederacy, and in making it his home Herodotus would have put himself under the protection of Athens. The fact that Egypt was then largely under Athenian influence (see Cimon, Pericles) may have induced him to proceed, in 457 or 456 B.C., to that country. The stories that he had heard in Egypt of Sesostris may then have stimulated him to make voyages from Samos to Colchis, Scythia and Thrace. He was thus acquainted with almost all the regions which were to be the scene of his projected history.

After Herodotus had resided for some seven or eight years in Samos, events occurred in his native city which induced him to return thither. The tyranny of Lygdamis had gone from bad to worse, and at last he was expelled. According to Suidas, Herodotus was himself an actor, and indeed the chief actor, in the rebellion against him; but no other author confirms this state- ment, which is intrinsically improbable. It is certain, however, that Halicarnassus became henceforward a voluntary member of the Athenian confederacy. Herodotus would now naturally return to his native city, and enter upon the enjoyment of those rights of free citizenship on which every Greek set a high value. He would also, if he had by this time composed his history, or any considerable portion of it, begin to make it

known by recitation among his friends. There is reason to believe that these first attempts were not received with much favour, and that it was in chagrin at his failure that he precipitately withdrew from his native town, and sought a refuge in Greece proper (about 447 B.C.,). 5 We learn that Athens was the place to which he went, and that he appealed from the verdict of his countrymen to Athenian taste and judgment. His work won such approval that in the year 445 B.C., on the proposition of a certain Anytus, he was voted a sum of ten talents (£2400) by decree of the people. At one of the recitations, it was said, the future historian Thucydides was present with his father, Olorus, and was so moved that he burst into tears, whereupon Herodotus remarked to the father — " Olorus, your son has a natural enthusiasm for letters." 4

Athens was at this time the centre of intellectual life, and could boast an almost unique galaxy of talent — Pericles, Thucydides the son of Melesias, Aspasia, Antiphon, the musician Damon, Pheidias, Protagoras, Zeno, Cratinus, Crates, Euripides" and Sophocles. Accepted into this brilliant society, on familiar terms with all probably, as he certainly was with Olorus,

2 Most recent critics (e.g. Stein, Meyer, Busolt) put the visit to Egypt after the suppression of the revolt under Inarus and Amyrtaeus (i.e. after 449 B.C.), on the strength of Herod. 2. 30, which implies the restoration of Persian authority.

3 Stein, Meyer, Busolt, and other recent writers attribute his departure from Halicarnassus to political causes, e.g. the ascendancy of the anti-Athenian party in the state.

4 This story is on chronological grounds rejected by all recent critics.

Thucydides and Sophocles, he must have been tempted, like many another foreigner, to make Athens his permanent home. It is to his credit that he did not yield to this temptation. At Athens he must have been a dilettante, an idler, without political rights or duties. As such he would have soon ceased to be respected in a society where literature was not recognized as a separate profession, where a Socrates served in the infantry, a Sophocles commanded fleets, a Thucydides was general of an army, and an Antiphon was for a time at the head of the state. Men were not men according to Greek notions unless they were citizens; and Herodotus, aware of this, probably sharing in the feeling, was anxious, having lost his political status

at Halicarnassus, to obtain such status elsewhere. At Athens the franchise, jealously guarded at this period, was not to be attained without great expense and difficulty. Accordingly, in the spring of the follow- ing year he sailed from Athens with the colonists who went out to found the colony of Thurii (see Pericles), and became a citizen of the new town.

From this point of his career, when he had reached the age of forty, we lose sight of him almost wholly. He seems to have made but few journeys, one to Crotona, one to Metapontum, and one to Athens (about 430 B.C.) being all that his work indicates. 1 No doubt he was employed mainly, as Pliny testifies, in retouching and elaborating his general history. He may also have composed at Thurii that special work on the history of Assyria to which he twice refers in his first book, and which is quoted by Aristotle. It has been supposed by many that he lived to a great age, and argued that " the never-to-be-mistaken fundamental tone of his performance is the quiet talkativeness of a highly cultivated, tolerant, intelligent, old man " (Dahlmann). But the indications derived from the later touches added to his work, which form the sole evidence on the subject, would rather lead to the conclusion that his life was not very prolonged. There is nothing in the nine books which may not have been written as early as 430 B.C.; there is no touch which, .even probably, points to a later date than 424 B.C. As the author was evidently engaged in polishing his work to the last, and even promises touches which he does not give, we may assume that he did not much outlive the date last mentioned, or in other words, that he died at about the age of sixty. The predominant voice of antiquity tells us that he died at Thurii, where his tomb was shown in later ages.

The History. — -In estimating the great work of Herodotus, and his genius as its author, it is above all things necessary to conceive aright what that work was intended to be. It has been called " a universal history," " a history of the wars between the Greeks and the barbarians," and " a history of the struggle between Greece and Persia." But these titles are all of them too comprehensive. Herodotus, who omits wholly the histories of Phoenicia, Carthage and Etruria, three of the most important among the states existing in his day, cannot have intended to compose a " universal history," the very idea of which belongs to a later age. He speaks in places as, if his object was to record the wars between the Greeks and the barbarians; but as he omits the Trojan war, in which he fully believes, the expedition of the Teucrians and Mysians against Thrace and Thessaly, the wars connected with the Ionian colonization of Asia Minor and others, it is evident that he does not really aim at embracing in his narrative all the wars between Greeks and barbarians with which he was acquainted. Nor does it even seem to have been his object to give an account of the entire struggle between Greece and Persia. That struggle was not terminated by the battle of Mycale and the capture of Sestos in 479 B.C. It continued for

thirty years longer, to the peace of Callias (but see Callias and Cimon) . The fact that Herodotus ends his history where he does shows distinctly that his intention

1 Opinion is divided as to this visit to Athens after his settlement at Thurii. Stein, Meyer and Busok hold that much of his work (especially the later books) was composed at Athens soon after 430 B.C. See further Wachsmuth, Rheinisches Museum, Ivi. (1901) 215-218. Macan, Herodotus VII. -IX. (Introduction, pp. xlv.-lxvi., seeks to prove that the last three books were the first part of the Histories to be composed. He is followed in this view by Bury.

was, not to give an account of the entire long contest between the two countries, but to write the history of a particular war— the great Persian war of invasion. His aim was as definite as that of Thucydides, or Schiller, or Napier or any other writer who has made his subject a particular war; only he determined to treat it in a certain way. Every partial history requires an "introduction"; Herodotus, untrammelled by examples, resolved to give his history a magnificent introduction. Thucy- dides is content with a single introductory book, forming little more than one-eighth of his work; Herodotus has six such books, forming two-thirds of the entire composition.

By this arrangement he is enabled to treat his subject in the grand way, which is so characteristic of him. Making it his main object in his " introduction " to set before his readers the previous history of the two nations who were the actors in the great war, he is able in tracing their history to bring into his narrative some account of almost all the nations of the known world, and has room to expatiate freely upon their geography, antiquities, manners and customs and the like, thus giving his work a " universal " character, and securing for it, without trenching upon unity, that variety, richness and fulness which are a principal charm of the best histories, and of none more than his. In tracing the growth of Persia from a petty subject kingdom to a vast dominant empire, he has occasion to set out the histories of Lydia, Media, Assyria, Babylon, Egypt, "Scythia, Thrace, and to describe the countries and the peoples inhabiting them, their natural productions, climate, geographical position, monuments, &c; while, in noting the contemporaneous changes in Greece, he is led to tell of the various migrations of the Greek race, their colonies, commerce, progress in the arts, revolutions, internal struggles, wars with one another, legislation, religious tenets and the like. The greatest variety of episodical matter is thus introduced; but the propriety of the occasion and the mode of introduction are such that no complaint can be made; the episodes never entangle, encumber or even unpleasantly interrupt the main narrative.

It has been questioned, both in ancient and in modern times, whether the

history of Herodotus possesses the essential requisite of trustworthiness. Several ancient writers accuse him of intentional untruthfulness. Moderns generally acquit him of this charge; but his severer critics still urge that, from the inherent defects of his character, his credulity, his love of effect and his loose and inaccurate habits of thought, he was unfitted for the historian's office, and has produced a work of but small historical value. Perhaps it may be sufficient to remark that the defects in question certainly exist, and detract to some extent from the authority of the work, more especially of those parts of it which deal with remoter periods, and were taken by Herodotus on trust from his informants, but that they only slightly affect the portions which treat of later times and form the special subject of his history. In confirmation of this view, it may be noted that the authority of Herodotus for the circumstances of the great Persian war, and for all local and other details which come under his immediate notice, is accepted by even the most sceptical of modern historians, and forms the basis of their narratives.

Among the merits of Herodotus as an historian, the most prominent are the diligence with which he collected his materials, the candour and impartiality with which he has placed his facts before the reader, the absence of party bias and undue national vanity, and the breadth of his conception of the historian's office. On the other hand, he has no claim to rank as a critie^l historian; he has no conception of the philosophy of history, no insight into the real causes that underlie political changes, no power of penetrating below the surface, or even of grasping the real interconnexion of the events which he describes. He belongs distinctly to the romantic school; his forte is vivid and picturesque description, the lively presentation of scenes and actions, characters and states of society, not the subtle analysis of motives, the power of detecting the undercurrents or the generalizing faculty. I But it is as a writer that the merits of Herodotus are most

conspicuous. " O that I were in a condition," says Lucian, " to resemble Herodotus, if only in some measure! I by no means say in all his gifts, but only in some single point; as, for instance, the beauty of his language, or its harmony, or the natural and peculiar grace of the Ionic dialect, or his fulness of thought, or by whatever name those thousand beauties are called which to the despair of his imitator are united in him." Cicero calls his style " copious and polished," Quintilian, " sweet, pure and flowing"; Longinus says he was "the most Homeric of historians "; Dionysius, his countryman, prefers him to Thucy- dides, and regards him as combining in an

extraordinary degree the excellences of sublimity, beauty and the true historical method of composition. Modern writers are almost equally complimentary. " The style of Herodotus," says one, " is universally allowed to be remarkable for its harmony and sweetness." " The charm of his style," argues another, " has so dazzled men as to make them blind to his defects." Various attempts have been made to analyse the charm which is so universally felt; but it may be doubted whether any of them are very successful. All, however, seem to agree that among the qualities for which the style of Herodotus is to be admired are simplicity, freshness, naturalness and harmony of rhythm. Master of a form of language peculiarly sweet and euphonical, and possessed of a delicate ear which instinctively suggested the most musical arrangement possible, he gives his sentences, without art or effort, the most agreeable flow, is never abrupt, never too diffuse, much less prolix or wearisome, and being himself simple, fresh, naif (if we may use the word), honest and somewhat quaint, he delights us by combining with this melody of sound simple, clear and fresh thoughts, perspicuously expressed, often accompanied by happy turns of phrase, and always manifestly the spontaneous growth of his own fresh and un- sophisticated mind. Reminding us in some respects of the quaint medieval writers, Froissart and Philippe de Comines, he greatly excels them, at once in the beauty of his language and the art with which he has combined his heterogeneous materials into a single perfect harmonious whole. See also Greece, section History, " Authorities."

Bibliography. — The history of Herodotus has been translated by many persons and into many languages. About 1450, at the time of the revival of learning, a Latin version was made and published by Laurentius Valla. This was revised in 1537 by Heusbach, and accompanies the Greek text of Herodotus in many editions. The first complete translation into a modern language was the English one of Littlebury, published in 1737. This was followed in 1786 by the French translation of Larcher, a valuable work, accompanied by copious notes and essays. Beloe, the second English translator, based his work on that of Larcher. His first edition, in 1791, was confessedly very defective; the second, in 1806, still left much to be desired. A good German translation, but without note or com- ment, was brought out by Friedrich Lange at Berlin in 1 8 1 1 . Andrea Mustoxidi, a native of Corfu, published an Italian version in 1820. In 1822 Auguste Miot endeavoured to improve on Larcher; and in 1 828-1 832 Dr Adolf Scholl brought out a German translation with copious notes (new ed., 1855), which has to some extent superseded the work of Lange. About the same time a new English version was made by Isaac Taylor (London, 1829). In 1858-1860, the history of Herodotus was translated by Canon G. Rawlinson, assisted in the copious notes and appendices accompanying the work by Sir Gardner Wilkinson and Sir Henry Rawlinson. More

recently we have translations in English by G. C. Macaulay (2 vols., 1890); in German by Ba.hr (Stuttgart, 1867) and Stein (Oldenburg, 1875); in French by Giguet (1857) and Talbot (1864); in Italian by Ricci (Turin, 1871-1876), Grandi (Asti, 1872) and Bertini (Naples, 1871-1872). A Swedish translation by F. Carlstadt was published at Stockholm in 1871.

The best of the older editions of the Greek text are the following: — Hcrodoti historiae, ed. Schweighauser (5 vols., Strassburg, 1816); Herodoti Halicamassei historiarum libri IX. (ed. Gaisford, Oxford, 1840); Herodotus, with a Commentary, by J. W. Blakesley (2 vols., London, 1854); Herodoti musae (ed. Bahr, 4 vols., Leipzig, 1856- 1861, 2nd ed.) ; and Herodoti historiae (ed. Abicht, Leipzig, 1869).

The most recent editions of the text, or of portions of it, with and without commentaries are the following: — H. Stein, Herodoti Historiae (ed. Major, 2 vols., Berlin, 1869-1871, with apparatus criticus; still the best edition of the text)? H. Kellenberg, Histo- riarum libri IX. (2 vols., Leipzig, 1887); van Herwerden, 'Icrropioi (Leiden, 1885); H. Stein, Herodotus, erklart (Berlin, 1856-1861, and several editions since; the best short commentary and intro- duction) ; A. H. Sayce, The Ancient Empires of the East, Herodotus

I.-III., with introductions and appendices (1883; an attempt to prove the unveracity of Herodotus, especially in regard to the extent, of his travels, which has found little support amongst more recent English or German writers); R. W. Macan, Herodotus IV. -VI. (2 vols., J 895) and Herodotus VII.IX. (2 vols., 1908), with exhaustive intro duction, appendices and notes; the only scientific edition of these books in English ; E. Abbott, Herodotus V. and VI. (Oxford, 1893); A. Wiedemann, Herodots zweites Buch mit sachlichen Bemerkungen (Leipzig, 1890; the best and fullest commentary on book ii.).

Among works of value illustrative of Herodotus may be mentioned Bouhier, Recherches sur Herodote (Dijon, 1746); Rennell, Geography of Herodotus (London, 1800) ; Niebuhr, Geography of Herodotus and Scythia (Eng. trans., Oxford, 1830); Dahlmann, Herodot, aus seinem Buche sein Leben (Altona, 1823); Eltz, Quaestiones Herodoteae (Leipzig, 1841) ; Kenrick, Egypt of Herodotus (London, 1841); Mure, Literature of Greece, vol. iv. (London, 1852); Abicht, tjbersicht iiber den Herodoteischen Dialekt (Leipzig, 1869, 3rd ed., 1874), and De codicum Herodoti fide ac auctoritate (Naumburg, 1869); Melander, De anacoluihis Herodoteis (Lund, 1869); Matzat, " Uber die Glaubenswiirdigkeit der geograph. Angaben Herodots iiber Asien," in Hermes, vi. ; Biidinger, Zur dgyptischen Forschung Herodots (Vienna, 1873, reprinted from the Sitzungsber. of the

Vienna Acad.); Merzdorf, Quaestiones grammatical de dialecto Herodotea (Leipzig, 1875); A. Kirchhoff, Uber die Entstehungszeit des Hero- dolischen Geschichtswerkes (Berlin, 1878); Adolf Bauer, Herodots Biographie (Vienna, 1878) ; H. Delbriick, Perser und Burgunde.r- kriege (Berlin, 1887; of great importance for the criticism of the Persian Wars) ; N. Wecklein, tjber die Tradition der Perserkriege (Munich, 1876) ; A. Hauvette-Besnault, Hirodote historien des guerres mediques (Paris, 1894); J. A. R. Munro, Some Observations on the Persian Wars (in various vols, of the Journal of Hellenic Studies; acute and suggestive); G. B. Grundy, The Great Persian War (London, 1901); J. P. Mahaffy, History of Greek Classical Literature, ii. 16 ff. (London, 1880); E. Meyer, Forschungen zur alten Geschichte, i. 151 ff., and ii. 196 ff. (Halle, 1892-1899); Busolt, Griechische Geschichte, ii. 602 ff. (2nd ed., Gotha, 1895) ; J. B. Bury, Ancient Greek Historians (1908), lecture 2. For notices of current literature see Bursian's Jahresbericht. Students of the original may also consult with advantage the lexicons of Aemilius Portus (Oxford, 1817) and of Schweighauser (London, 1824). On Herodotus' debt to Hecataeus see Wells, in Journ. Hell. Stud., 1909, pt. i.

“(G’.R) .;‘E.M. W.)

HEROET, ANTOINE, surnamed La Maison-neuve (d. 1568), French poet, was born in Paris of a family connected with the famous chancellor, Francois Olivier. His poetry belongs to his early years, for after he had taken orders he ceased to write profane poetry, no doubt because he considered it out of keeping with his calling, in which he attained the dignity of bishop of Digue. His chief work is La Parfaicte Amye (Lyons, 1 542) in which he developed the idea of a purely spiritual love, based chiefly on the reading of the Italian Neo-Platonists. The book aroused great controversy. La Borderie replied in L’Amye de cow with a description of a very much more human woman, and Charles Fontaine contributed a Contr’ amye de cour to the dispute, H6roet, in addition to some translations from the classics, wrote the Complainle d’une dame nouvellement surprise d’amour, an IZpistre a Francois I”, and some pieces included in the now very rare Opuscules d’amour par Hiroet, La Borderie el autres divins poetes (Lyons, 1547). Heroet belongs to the Lyonnese school of which Maurice Sceve may be regarded as the leader. Clement Marot praises him, and Ronsard was careful to exempt him with one or two others from the scorn he poured on his immediate predecessors.

See H. F. Cary, The Early French Poets (1846). HEROIC ROMANCES, the name by which is distinguished a class of imaginative literature which flourished in the 17 th century, principally in France. The beginnings of modern fiction in that country took a pseudo-bucolic form, and the celebrated Astree (1610) of Honore d’Urfe (1568-1625), which is the earliest French novel, is properly styled a pastoral. But this ” ingenious and diffuse production, in which all is artificial, was the source of a vast literature, which took many and diverse forms. Although its action was, in the main, languid and sentimental, there was a side of the Astree which encouraged that extravagant love of glory, that spirit of ” panache,” which was now rising to its height in France. That spirit it was which animated Marin le Roy, sieur de Gomberville (1600-1674), who was the inventor of what have since been known as the Heroical Romances. In these there was experienced a violent recrudescence of the oid medieval elements of romance, the

impossible valour devoted to a pursuit of the impossible beauty, but the whole clothed in the language and feeling and atmosphere of the age in which the books were written. In order to give point to the chivalrous

actions of the heroes, it was always hinted that they were well-known public characters of the day in a romantic disguise.

In the Aslrie of Honore d'Urfe, which was a pure pastoral, in the religious romances of Pierre Camus (1582-1653), in the comic Francion of Charles Sorel, piquancy had been given to the recital by this belief that real personages could be recognized under the disguises. But in the Carithie of Gomberville (1621) we have a pastoral which is already beginning to be a heroic romance, and a book in which, under a travesty of Roman history, an appeal is made to an extravagantly chivalrous enthusiasm. A further development was seen in the Polyxene (1623) of Francois de Moliere, and the Endymion (1624) of Gombauld; in the latter the elderly queen, Marie de' Medici, was celebrated under the disguise of Diana, for whom a beautiful shepherd of Caria (the author himself) nourishes a hopeless passion. The earliest of the Heroic Romances, pure and simple, is, however, the celebrated Polexandre (1629) of Gomberville. The author began by intending his hero to represent Louis XIII., but he changed his mind, and drew a portrait of Cardinal Richelieu. In this novel, for the first time, the romantic char- acter proper to this class of books is seen undiluted; there is no intrusion of a personage who is not celebrated for his birth, his beauty or his exploits. The story deals with the adventures of a hero who visits all the sea-coasts of the world, the most remote as well as the most fabulous, in search of an ineffable princess, Alcidiane. This absurd and pretentious, yet very original piece of invention enjoyed an immense success, and historical romances of a similar class competed for the favour of the public. There was an equal amount of geography and more of ancient history in the Ariane (1632) of Desmarets de Saint-Sorlin (1595-1676), a book which, long neglected, has in late years been rediscovered, and which has been greeted by M. Paul Morillot as the most readable and the least tiresome of all the Heroic Romances. The type of that class of literature, however, has always been found in the highly elaborate writings of Gauthier de Coste de la Calprenede (1609-1663), which enjoyed for a time a prodigious celebrity, and were read and imitated all over Europe. La Calprenede was a Gascon soldier, imbued with all the extrava- gance of his race, and in full sympathy with the audacity and violence of the aristocratic society of France in his day. His Cassandre, which appeared in ten volumes between 1642 and 1645, is perhaps the most characteristic of all the Heroic Romances. It deals with a highly romantic epoch of ancient history, the decline of the empire of Alexander the Great. The wars of the Persians and of the Scythians are introduced, and among the characters are discovered such personages as Artaxerxes, Roxana and Ephestion. It must not be supposed, however, that la Calprenede makes the smallest effort to deal with the subject accurately or realistically. The figures are those of his own day; they are seigneurs and great ladies of the court of

Louis XIII., masquerading in Macedonian raiment. The passion of love is dominant throughout, and it is treated in the most exalted and hyperbolical spirit. The central heroes of the story, Oroondate and Lysimachus, are dignified, eloquent and amorous; they undergo unexampled privations in the quest of incomparable ladies whose beauty and whose nobility is only equalled by their magnificent loyalty. These books were written with an aim that was partly didactic. Their object was to entertain the ladies and to gratify a taste for endlessly wire-drawn sentimen- tality, but it was also to teach fortitude and grandeur of soul and to inculcate lessons of practical chivalry. La Calprenede followed up the success of his Cassandre with a CUopdtre (1647) in twelve volumes, and a Faramond (1661) which he did not live to finish. He became more extravagant, more rhapsodical as he proceeded, and he lost all the little hold on history which he had ever held. Cliopdtre, nevertheless, enjoyed a prodigious popularity, and it became the fashion to emulate as far as possible the prowess of its magnificent hero, the proud Artaban.

It should be said that la Calprenede objected to his books being styled romances, and insisted that they were specimens of " history embellished with certain inventions." He may, in opposition to his wishes, claim the doubtful praise of being, in reality, the creator of the modern historical novel. He was immediately imitated or accompanied by a large number of authors, of whom two have achieved a certain immortality, which, unhappily, must be confessed to be partly of ridicule. The vogue of the historical romance was carried to its height by a brother and a sister, Georges de Scudery (1601-1667) and Madeleine de Scudery (1608-1701), who represented in their own persons all the extravagant, tempestuous and absurd elements of the age, and whose elephantine romances remain as portents in the history of literature. These novels — there are five of them — were signed by Georges de Scudery, but it is believed that all were in the main written by Madeleine. The earliest was Ibrahim, ou I'lllustre Bassa (1641); it was followed by Le Grand Cyrus (1648-1653) and the final, and most pre- posterous member of the series was Clelie (1649-1654). The romances of Mile de Scudery (for to her we may safely attribute them) are much inferior in style to those of la Calprenede. They are pretentious, affected and sickly. The author abuses the element of analysis, and pushes a psychology, which was beyond the age in penetration, to a wearisome and excessive extent. Nothing, it is probable, in the whole evolution of the Historical Romances has attracted so much attention as the " Carte de Tendre " which occurs in the opening book of Clelie. This celebrated map, drawn by the heroine in order to show the route from New Friendship to Tender, and a geographical symbol, therefore, of the progress of love, with its city of Tender-upon- Esteem, its sea of Enmity, its river of Inclination, its rock-built citadel of Pride, its cold

lake of Indifference, is a miracle of elaborate and incongruous ingenuity. But, amusing as it is, it shows into what depths of puerility the amorous casuistry of these romances had fallen. These novels formed the chief topic of conversation and of correspondence in the literary society which gathered at and around the Hotel de Rambouillet, and in the personages of Mile de Scudery's romances could be recognized all the famous leaders of that society. The mawkish love-making and the false heroism of these monstrous novels went rapidly out of fashion in France soon after 1660, when the epoch of the Heroic Romance came to an end. In England the Heroic Romance had a period of flourishing popularity. All the principal French examples were very promptly translated, and " he was not to be admitted into the academy of wit who had not read Astrea and The Grand Cyrus." The great vogue of these books in England lasted from about 1645 to 1660. It led, of course, to the composition of original works in imitation of the French. The most remarkable and successful of these was Parthenissa, published in 1654 by Roger Boyle, Lord Broghill and afterwards Earl of Orrery (1621-1679), which was greatly admired by Dorothy Osborne and her correspondents. Addison speaks in the " Spectator " of the popularity of all these huge books, " the Grand Cyrus, with a pin stuck in one of the middle leaves, Clilie, which opened of itself in the place that describes two lovers in a bower." When the drama, and in particular tragedy, was reinstituted in England, sentimental readers found a field for their emotions on the stage, and the heroic romances immediately began to go out of fashion. They lingered, however, for a quarter of a century more, and M. Jusserand has analysed what may be considered the very latest of the race, Pandion and Amphigenia, published in i66g by the dramatist, John Crowne.

See Gordon de Percel, De V usage des tomans (1734); Andr6 Le Breton, Le Roman au XVII' Steele (1890) ; Paul Morillot, Le Roman en France depuis 1610 (1894); J. J. Jusserand, Le Roman anglais au XVII' si'ecle (1888). (E. G.)

HEROIC VERSE, a term exclusively used in English to indicate the rhymed iambic line or Heroic Couplet. In ancient literature, the heroic verse, ripcoindv fierpov, was synonymous with the dactylic hexameter. It was in this measure that those typically heroic poems, cne Iliad and OHyssey and the Aeneid

were written. In English, however, it was not enough to designate a single iambic b'ne of five beats as heroic verse, because it was necessary to

distinguish blank verse from the distich, which was formed by the heroic couplet. This had escaped the notice of Dryden, when he wrote " The English Verse, which we call Heroic, consists of no more than ten syllables." If that were the case, then Paradise Lost would be written in heroic verse, which is not true. What Dryden should have said is " consists of two rhymed lines, each of ten syllables." In French the alexandrine has always been regarded as the heroic measure of that language. The dactylic movement of the heroic line in ancient Greek, the famous frvdubs ypQosoi Homer, is expressed in modern Europe by the iambic movement. The consequence is that much of the rush and energy of the antique verse, which at vigorous moments was like the charge of a battalion, is lost. It is owing to this, in part, that the heroic couplet is so often required to give, in translation, the full value of a single Homeric hexameter. It is important to insist that it is the couplet, not the single line, which constitutes heroic verse. It is interesting to note that the Latin poet Ennius, as reported by Cicero, called the heroic metre of one line versutn longum, to distinguish it from the brevity of lyrical measures. The current form of English heroic verse appears to be the invention of Chaucer, who used it in his Legend of Good Women and afterwards, with still greater freedom, in the Canterbury Tales. Here is an example of it in its earliest development: —

" And thus the longg day in fight they spend, Till, at the last, as everything hath end, Anton is shent, and put him to the flight, And all his folk to go, as best go might."

This way of writing was misunderstood and neglected by Chaucer's English disciples, but was followed nearly a century later by the Scottish poet, called Blind Harry (c. 1475), whose Wallace holds an important place in the history of versification as having passed on the tradition of the heroic couplet. Another Scottish poet, Gavin Douglas, selected heroic verse for his translation of the Aeneid (1513), and displayed, in such examples. as the follow- ing, a skill which left little room for improvement at the hands of later poets: —

" One sang, ' The ship sails over the salt foam, Will bring the merchants and my leman home' ; Some other sings, ' I will be blithe and light, Mine heart is leant upon so goodly wight.' "

The verse so successfully mastered was, however, not very generally used for heroic purposes in Tudor literature. The early poets of the revival, and Spenser and Shakespeare after them, greatly preferred stanzaic forms. For dramatic purposes blank verse was almost exclusively used, although the French had adopted the rhymed alexandrine for their plays. In the earlier half of the 17th century, heroic verse was often put to somewhat unheroic purposes, mainly in prologues and epilogues, or other short poems of

occasion; but it was nobly redeemed by Marlowe in his Hero and Leander and respectably by Browne in his Britannia's Pastorals. It is to be noted, however, that those Elizabethans who, like Chapman, Warner and Drayton, aimed at producing a warlike and Homeric effect, did so in shambling fourteen-syllable couplets. The one heroic poem of that age written at considerable length in the appropriate national metre is the Bosworth Field of Sir John Beaumont (1582-1628). Since the middle of the 17th century, when heroic verse became the typical and for a while almost the solitary form in which serious English poetry was written, its history has known many vicissitudes. Affer having been the principal instrument of Dryden and Pope, it was almost entirely rejected by Wordsworth and Coleridge, but revised, with various modifications, by Byron, Shelley (in Julian and Maddalo) and Keats (in Lamia). In the second half of the 19th century its prestige was restored by the brilliant work of Swin- burne in Tristram and elsewhere. (E. G.)

HAROLD, LOtJIS JOSEPH FERDINAND (1791-1833), French musician, the son of Francois Joseph Herold, an accomplished pianist, was born in Paris, on the 28th of January 1791. It was not till after his father's death that Herold in 1806 entered the Paris conservatoire, where be studied under Catal and M6hul.

In 181 2 he gained the grand prix de Rome with the cantata La Duchesse de la Valliere, and started for Italy, where he re- mained till 1815 and composed a symphony, a cantata and several pieces of chamber music. During his stay in Italy also Herold for the first time ventured on the stage with the opera La Gioventu di Enrico V ., first performed at Naples in 181 5 with moderate success. During a short stay in Vienna he was much in the society of Salieri. Returning to Paris he was invited by Boieldieu to collaborate with him on an opera called Charles de France, performed in 1816, and soon followed by Herold's first French opera, Les Rosieres (1817), which was received very favourably. Herold produced numerous dramatic works for the next fifteen years in rapid succession. Only the names of some of the more important need here be mentioned: — La Clochette (1817), L'Auteur mort et vivant (1820), Marie (1826), and the ballets La Fille mal gardie (1828) and La Belle au bois dormant (1829). Herold also wrote a vast quantity of pianoforte music, in spite of his time being much occupied by his duties as accompanist at the Italian opera in Paris. In 1831 he produced the romantic opera Zampa, and in the following year Le Pri aux clercs (first perform- ance December 15, 1832), in which French esprit and French chivalry find their most perfect embodiment. These two operas secured immortality for the name of the composer, who died on the 18th of January 1833, of the lung disease from which he had suffered for many years, and the effects of which he had accelerated by incessant work. Herold's incomplete opera Ludovic was

afterwards printed by J. F. F. Halevy.

HERON (Fr. heron; Ital. aghirone, airone; Lat. ardea; Gr. epcoSios: A.-S. hragra; Icelandic, hegre; Swed. hager; Dan. heire; Ger. H eiger, Reiher, Heergans; Dutch, reiger), a long-necked, long-winged and long-legged bird, the typical representative of the group Ardeidae. It is difficult or even impossible to estimate with any accuracy the number of species of Ardeidae which exist. Professor Hermann Schlegel in 1863 enumerated 61, besides 5 of what he terms " conspecies," as

Fig. 1. — Heron.

contained in the collection at Leyden (Mus. des Pays-Bus, Ardeae, 64 pp.), — on the other hand, G. R. Gray in 1871 {Handlist, &c. iii. 26-34) admitted above 90, while Dr Anton Reichenow {Journ. fur Ornithologie, 1877, pp. 232-275) recognizes 67 as known, besides 15 " subspecies " and 3 varieties, arranging them in 3 genera, Nycticorax, Botaurus and Ardea, with 17 sub- genera. But it is difficult to separate the family, with any satisfactory result, into genera, if structural characters have to be found for these groups, for in many cases they run almost insensibly into each other — though in common language it is easy to speak of herons, egrets, bitterns, night-herons and

boatbills. With the exception of the last, Professor Schlegel retains all in the genus Ardea, dividing it into eight sections, the names of which may perhaps be Englished — great herons, small herons, egrets, semi-egrets, rail-like herons, little bitterns, bitterns and night-herons.

The common heron of Europe, Ardea cinerea of Linnaeus, is universally allowed to be the type of the family, and it may also be regarded as that of Professor Schlegel's first section. The species inhabits suitable localities throughout the whole of Europe, Africa and Asia, reaching Japan, many of the islands of the Indian Archipelago and even Australia. Though by no means so numerous as formerly in Britain, it is still sufficiently common, 1 and there must be few persons who have not seen it rising slowly from some river-side or marshy flat, or passing over- head in its lofty and leisurely flight on its way to or from its daily haunts; while they are many who have been enter- tained by watching it as it sought its food, consisting chiefly of fishes (especially eels and flounders) and amphibians — though young birds and small mammals come not amiss — wading midleg in the shallows, swimming occasionally when out of its depth, or standing

motionless to strike its prey with its formidable and sure beak. When sufficiently numerous the heron breeds in societies, known as heronries, which of old time were protected both by law and custom in nearly all European countries, on account of the sport their tenants afforded to the falconer. Of late years, partly owing to the withdrawal of the protection they had enjoyed, and still more, it would seem, from agricultural improvement, which, by draining meres, fens and marshes, has abolished the feeding places of a great population of herons, many of the larger heronries have broken up — the birds composing them dispersing to neighbouring localities and forming smaller settlements, most of which are hardly to be dignified by the name of heronry, though commonly accounted such. Thus the number of so-called heronries in the United Kingdom, and especially in England and Wales, has become far greater than formerly, but no one can doubt that the number of herons has dwindled. The sites chosen by the heron for its nest vary greatly. It is generally built in the top of a lofty tree, but not unfrequently (and this seems to have been much more usual in former days) near or on the ground among rough vegetation, on an island in a lake, or again on a rocky cliff of the coast. It commonly consists of a huge mass of sticks, often the accumulation of years, lined with twigs, and in it are laid from four to six sea-green eggs. The young are clothed in soft flax-coloured down, and remain in the nest for a considerable time, therein differing remarkably from the " pipers " of the crane, which are able to run almost as soon as they are hatched. The first feathers assumed by young herons in a general way resemble those of the adult, but the pure white breast, the black throat-streaks and especially the long pendent plumes, which characterize only the very old birds, and are most beautiful in the cocks, are subsequently acquired. The heron measures about 3 ft. from the bill to the tail, and the expanse of its wings is sometimes not less than 6 ft., yet it weighs only between 3 and 4 lb.

Large as is the common heron of Europe, it is exceeded in size by the great blue heron of America {Ardea herodias), which generally resembles it in appearance and habits, and both are smaller than the A. sumatrana or A. typhon of India and the Malay Archipelago, while the A. golialh, of wide distribution in Africa and Asia, is the largest of all. The purple heron, A. purpurea, as a well-known European species having a great range over the Old World, also deserves mention here. The species included in Professor Schlegel's second section inhabit the tropical parts of Africa, Australasia and America. The egrets, forming his third group, require more notice, distinguished as they are by their pure white plumage, and, when in breeding-dress, by

1 In many parts of England it is generally called a " hernser " — being a corruption of " heronsewe," which, as Professor Skeat states {Etymol. Dictionary, p. 264), is a perfectly distinct word from " heronshaw,"

commonly confounded with it. The further corrup- tion of " hernser " into " handsaw," as in the well-known proverb, was easy in the mouth of men to whom hawking the heronsewe was unfamiliar

the beautiful dorsal tufts of decomposed feathers that ordinarily droop over the tail, and are so highly esteemed as ornaments by Oriental magnates. The largest species is A. occidentalis, only known apparently from Florida and Cuba; but one not much less, the great egret {A. alba), belongs to the Old World, breeding regularly in south-eastern Europe, and occasionally straying to Britain. A third, A. egretta, represents it in America, while much the same may be said of two smaller species, A. garzetta, the little egret of English authors, and A. candidissima; and a sixth, A. intermedia, is common in India, China and Japan, besides occurring in Australia. The group of semi-egrets, containing some nine or ten forms, among which the buff-backed heron (A . bubuicus), is the only species that is known to have occurred in Europe, is hardly to be distinguished from the last section except by their plumage being at certain seasons varied in some species with slaty-blue and in others with rufous. The rail-like herons form Professor Schlegel's next section, but it can scarcely be satisfactorily differentiated, and the epithet is misleading, for its members have no rail-like affinities, though the typical species.

Fig. 2. — Bittern.

which inhabits the south of Europe, and occasionally finds its way to England, has long been known as A. ralloides? Nearly all these birds are tropical or subtropical. Then there is the spmewhat better defined group of little bitterns, containing about a dozen species — the smallest of the whole family. One of them, A. minuta, though very local in its distribution, is a native of the greater part of Europe, and has bred in England. It has a close counterpart in the A. exilis of North America, and is represented by three or four forms in other parts of the world, the A . pusilla of Australia especially differing very slightly from it. Ranged by Professor Schlegel with these birds, which are all remarkable for their skulking habits, but more resembling the true herons in their nature, are the common green bittern of America (ˆ4. virescens) and its very near ally the African A. atricapilla, from which last it is almost impossible to distinguish the A % javanica, of wide range throughout Asia and its islands, while other species, less closely related, occur elsewhere as A. flavicollis —one form of which, A. gouldi, inhabits Australia.

The true bitterns, forming the genus Botaurus of most authors, seem to be fairly separable, but more perhaps on account of their wholly nocturnal habits and correspondingly adapted plumage than on strictly structural grounds, though some differences of proportion are observable. The

common bittern (q.v.) of

2 It is the " Squacco-Heron " of modern British authors — the distinctive name, given " Sguacco " by Willughby and Ray from Aldrovandus, having been misspelt by Latham.

Europe (B. stellaris), is widely distributed over the eastern hemisphere. 1 Australia and New Zealand have a kindred species, B. poeciloptilus, and North America a third, B. mugitans 2 or B. lenliginosus. Nine other species from various parts of the world are admitted by Professor Schlegel, but some of them should perhaps be excluded from the genus Botaurus.

Of the night-herons the same author recognizes six species, all of which may be reasonably placed in the genus Nycticorax, characterized by a shorter beak and a few other peculiarities, among which the large eyes deserve mention. The first is N. griseus, a bird widely spread over the Old World, and not un- frequently visiting England, where it would undoubtedly breed if permitted. Professor Schlegel unites with it the common night- heron of America; but this, though very closely allied, is generally deemed distinct, and is the N. naevius or N. gardeni of most writers. A clearly different American species, with a more southern habitat, is theiV. violaceus or N. cayennensis, while others are found in South America, Australia, some of the Asiatic Islands and in West Africa. The Galapagos have a peculiar species,

N. pauper, and another, so far as is known, peculiar to Rodriguez, N. megacephalus, existed in that island at the time of its being first colonized, b.'ut is now extinct.

The boatbill, of which only one species is known, seems to be merely a night-heron with an ex- aggerated bill, — so much widened as to suggest its English name, ■ — but has al- This curious bird, the is a native of tropical

Fig. 3.— Boatbill.

ways been allowed generic rank.

Cancroma cochlearia of most authors.

America, and what is known of its habits shows that they are

essentially those of a Nycticorax?

Bones of the common heron and bittern are not uncommon in the peat of the East-Anglian fens. Remains from Sansan and Langy in France have been referred by Alphonse Milne-Edwards to herons under the names of Ardea perplexa and A. formosa; a tibia from the Miocene of Steinheim am Albuch by Dr Fraas to an A . similis, while Sir R. Owen recognized a portion of a sternum from the London Clay as most nearly approaching this family.

It remains to say that the herons form part of Huxley's section Pelargomorphae, belonging to his larger group Desmognathae, and to draw attention to the singular development of the patches of " powder-down " which in the family Ardeidae attain a magnitude hardly to be found elsewhere. Their use is utterly unknown. (A. N.)

1 The last-recorded instance of the bittern breeding in England was in 1868, as mentioned by Stevenson {Birds of Norfolk, ii.

164).

2 Richardson, a most accurate observer, asserts {Fauna Boreali-Americana, ii. 374) that its booming (whence the epithet) exactly resembles that of its Old-World congener, but American ornitholo- gists seem only to have heard the croaking note it makes when disturbed.

3 The very wonderful shoe-bird (Balaeniceps) has been regarded by many authorities as allied to Cancroma ; but there can be little doubt that it is more nearly related to the genus Scopus belonging to the 6torks. The sun-bittern (Eurypyga) forms a family of itself, allied to the rails and cranes.

HERPES (from the Gr. 'ipimv, to creep), an inflammation of the true skin resulting from a lesion of the underlying nerve or its ganglion, attended with the formation of isolated or grouped vesicles of various sizes upon a reddened base. They contain a clear fluid, and either rupture or dry up. Two well-marked varieties of herpes are frequently met with, (a) In herpes labialis et nasalis the eruption occurs about the lips and nose. It is seen in cases of certain acute febrile ailments, such as fevers, inflammation of the lungs or even in a severe cold. It soon passes off. (b) In the herpes zoster, zona or " shingles " the eruption occurs in the course of one or more cutaneous nerves, often on one side of the trunk, but it may be on the face, limbs or other parts. It may occur at any age, but is probably more frequently met with in elderly people. The appearance of the eruption is usually preceded by severe stinging neuralgic pains for several days, and, not only during the continuance of the herpetic spots, but long after they have dried up and' disappeared, these pains sometimes continue and give rise to great suffering. The disease seldom recurs. The most that can be

done for its relief is to protect the parts with cotton wool or some dusting powder, while the pain may be allayed by opiates or bromide of potassium. Quinine internally is often of service.

HERRERA, FERNANDO DE {c. 1534-1597), Spanish lyrical poet, was born at Seville. Although in minor orders, he addressed many impassioned poems to the countess of Gelves, wife of Alvaro Colon de Portugal; but it is suggested that these should be regarded as Platonic literary exercises in the manner of Petrarch. As is shown by his Anotaciones d las obras de Garcilaso de la Vega (1580), Herrera had a boundless admiration for the Italian poets, and continued the work of Boscan in naturalizing the Italian metrical system in Spain. His commentary on Garcilaso involved him in a series of literary polemics, and his verbal innovations laid him open to attack. But, even if his amatory sonnets are condemned as insincere in sentiment, their work- manship is admirable, while his odes on the battle of Lepanto, on Don John of Austria, and the elegy on King Sebastian of Portugal entitle him to rank as the greatest of Andalusian poets and as the most important of the followers of Garcilaso de la Vega (see Veca). His poems were published in 1582, and reprinted with additions in 1619; they are reissued in the Biblioteca de autores espanoles, vol. xxxii. Of Herrera's prose works only the Vida y muerla de Tomas Moro (1592) survives; it is a translation of the life in Thomas Stapleton's Tres Thomae (1588).

Bibliography. — E. Bourciez, " Les Sonnets de Fernando de Herrera," Annates de la FacultS des Lettres de Bordeaux (1891); Fernando de Herrera, controversia sobre sus anotaciones a les obras de Garcilaso de la Vega (Seville, 1870); A. Morel-Fatio, L'Hymne sur LSpante (Paris, 1893).

HERRERA, FRANCISCO (1576-1656), surnamed el Viejo (the old), Spanish historical and fresco painter, studied under Luis Fernandez in Seville, his native city, where he spent most of his life. Although so rough and coarse in manners that neither scholar nor child could remain with him, the great talents of Herrera, and the promptitude with which he used them, brought him abundant commissions. He was also a skilful worker in bronze, an accomplishment that led to his being charged with coining base money. From this accusation, whether true or false, he sought sanctuary in the Jesuit college of San Hermene- gildo, which he adorned with a fine picture of its patron saint. Philip IV., on his visit to Seville in 1624, having seen this picture, and learned the position of the artist, pardoned him at once, warn- ing him, however, that such powers as his should not be degraded. In 1 6 50 Herrera removed to Madrid, where he lived in great honout till his death in 1656. Herrera was the first to relinquish the timid Italian manner of the old Spanish school of painting, and to initiate the free, vigorous touch and style which reached such perfection in Velazquez, who had been for a short time his pupil. His pictures are marked by an

energy of design and freedom of execution quite in keeping with his bold, rough character. He is said to have used very long brushes in his painting; and it is also said that, when pupils failed, his servant used to dash the colours on the canvas with a broom under his directions, and that he worked them up into his designs before they dried. The drawing

in his pictures is correct, and the colouring original and skilfully managed, so that the figures stand out in striking relief. What has been considered his best easel-work, the " Last Judgment," in the church of San Bernardo at Seville, is an original and striking composition, showing in its treatment of the nude how ill-founded the common belief was that Spanish painters, through ignorance of anatomy, understood only the draped figure. Perhaps his best fresco is that on the dome of the church of San Buenaventura; but many of his frescoes have perished, some by the effects of the weather and others by the artist's own carelessness in preparing his surfaces. He has, however, preserved several of his own designs in etchings. For his easel-works Herrera often chose such humble subjects as fairs, carnivals, ale-houses and the like.

His son Francisco Herrera (1622-1685), surnamed el Mozo (the young), was also an historical and fresco painter. Unable to endure his father's cruelty, the younger Herrera, seizing what money he could find, fled from Seville to Rome. There, instead of devoting himself to the antiquities and the works Of the old Italian masters, he gave himself up to the study of architecture and perspective, with the view of becoming a fresco-painter. He did not altogether neglect easel-work, but became renowned for his pictures of still-life, flowers and fruit, and from his skill in painting fish was called by the Italians Lo Spagnuolo degli pesci. In later life he painted portraits with great success. He returned to Seville on hearing of his father's death, and in 1660 was appointed subdirector of the new academy there under Murillo. His vanity, however, brooked the superiority of no one; and throwing up his appointment he went to Madrid. There he was employed to paint a San Hermenegildo for the barefooted Carmelites, and to decorate in fresco the roof of the choir of San Felipe el Real. The success of this last work procured for him a commission from Philip IV. to paint in fresco the roof of the Atocha church. He chose as his subject for this the Assumption of the Virgin. Soon afterwards he was rewarded with the title of painter to the king, and was appointed superintendent of the royal buildings. He died at Madrid in 1685. Herrera el Mozo was of a somewhat similar temperament to his father, and offended many people by his inordinate vanity and suspicious jealousy. His pictures are inferior to the older

Herrera's both in design and in execution; but in some of them traces of the vigour of his father, who was his first teacher, are visible. He was by no means an unskilful colourist, and was especially master of the effects of chiaroscuro. As his best picture Sir Edmund Head in his Handbook names his " San Francisco," in Seville Cathedral. An elder brother, known as Herrera el Rubio (the ruddy), who died very young, gave great promise as a painter.

HERRERA Y TORDESILLAS, ANTONIO DE (1549-1625), Spanish historian, was born at Cuellar, in the province of Segovia in Spain. His father, Roderigo de Tordesillas, and his mother, Agnes de Herrera, were both of good family. After studying for some time in his native country, Herrera proceeded to Italy, and there became secretary to Vespasian Gonzago, with whom, on his appointment as viceroy of Navarre, he returned to Spain. Gonzago, sensible of his secretary's abilities, commended him to Philip II. of Spain; and that monarch appointed Herrera first historiographer of the Indies, and one of the historiographers of Castile. Placed thus in the enjoyment of an ample salary, Herrera devoted the rest of his life to the pursuit of literature, retaining his offices until the reign of Philip IV., by whom he was appointed secretary of state very shortly before his death, which took place at Madrid on the 29th of March 1625. Of Herrera's writings, the most valuable is his Historia general de los hechos de los Castellanos en las islas y lierra firme del Mar Occano (Madrid, 1601-1615, 4 vols.), a work which relates the history of the Spanish-American colonies from 1492 to 1554. The author's official position gave him access to the state papers and to other authentic sources not attainable by other writers, while he did not scruple to borrow largely from other MSS., especially from that of Bartolome de Las Casas. He used his facilities carefully and judiciously; and the result is a work on the whole accurate and unprejudiced, and quite indispensable to the student either of the history of the early colonies, or of the

institutions and customs of the aboriginal American peoples. Although it is written in the form of annals, mistakes are not wanting, and several glaring anachronisms have been pointed out by M. J. Quintana. " If," to quote Dr Robertson, " by attempting to relate the various occurrences in the New World in a strict chronological order, the arrangement of events in his work had not been rendered so perplexed, disconnected and obscure that it is an unpleasant task to collect from different parts of his book and piece together the detached shreds of a story, he might justly have been ranked among the most eminent historians of his country." This work was republished in 173c, and has been translated into English by J. Stevens (London, 1740), and into other European languages.

Herrera's other works are the following: Historia de lo sucedido en Escocia

£ Inglaterra en quarenta y quatro anos que vivid la reyna Maria Estuarda (Madrid, 1589); Cinco libros de la historia de Portugalˆ y conquista de las islas de los Azores, 1582-1583 (Madrid, 1591); Historia de lo sucedido en Francia, 1585-1594 (Madrid, 1598) ; Historia general del mundo del tiempo del rey Felipe II, desde 1559 hasta su muerte (Madrid, 1601-1612, 3 vols.) ; Tratado, relacion, y discurso historico de los movimientos de Aragon (Madrid, 1612) ; Comentarios de los hechos de los Espanoles, Franceses, y Venecianos en Italia, fife., 1281-1559 (Madrid, 1624, seq.). See W. H. Prescott, History of the Conquest of Mexico, vol. ii.

HERRICK, ROBERT (1 591-1674), English poet, was born at Cheapside, London, and baptized Qn the 24th of August 1591. He belonged to an old Leicestershire family which had settled in London. He was the seventh child of Nicholas Herrick, gold- smith, of the city of London, who died in 1592, under suspicion of suicide. The children were brought up by their uncle, Sir William Herrick, one of the richest goldsmiths of the day, to whom in 1607 Robert was bound apprentice. He had probably been educated at Westminster school, and in 1614 he proceeded to Cambridge; and it was no doubt during his apprenticeship that the young poet was introduced to that circle of wits which he was afterwards to adorn. He seems to have been present at the first performance of The Alchemist in 1610, and it was probably about this time that Ben Jonson adopted him as his poetical " son." He entered the university as fellow-commoner of St John's College, and he remained there until, in 1616, upon taking his degree, he removed to Trinity Hall. A lively series of fourteen letters to his uncle, mainly begging for money, exists at Beau- manoir, and shows that Herrick suffered much from poverty at the university. He took his B.A. in 1617, and in 1620 he became master of arts. From this date until 1627 we entirely lose sight of him; it has been variously conjectured that he spent these years preparing for the ministry at Cambridge, or in much looser pursuits in London. In 1629 (September 30) he was presented by the king to the vicarage of Dean Prior, not far from Totnes in Devonshire. At Dean Prior he resided quietly until 1648, when he was ejected by the Puritans. The solitude there oppressed him at first; the village was dull and remote, and he felt very bitterly that he was cut off from all literary and social associa- tions; but soon the quiet existence in Devonshire soothed and delighted him. He was pleased with the rural and semi-pagan customs that survived in the village, and in some of his most charming verses he has immortalized the morris-dances, wakes and quintains, the Christmas mummers and the Twelfth Night revellings, that diversified the quiet of Dean Prior. Herrick never married, but lived at the vicarage surrounded by a happy family of pets, and tended by an excellent old servant named Prudence Baldwin. His first appearance in print was in some verses he contributed to A Description of the King and Queen of Fairies, in 1635. In 1650 a volume of Wit's

Recreations contained sixty-two small poems afterwards acknowledged by Herrick in the Hesperides, and one not reprinted until our own day. These partial appearances make it probable that he visited London from time to time. We have few hints of his life as a clergyman. Anthony Wood says that Herricks's sermons were florid and witty, and that he was " beloved by the neighbouring gentry." A very aged woman, one Dorothy King, stated that the poet once threw his sermon at his congregation, cursing them for their inattention. The same old woman recollected his favourite pig, which he taught to drink out of a tankard. He

was a devotedly loyal supporter of the king during the Civil War, and immediately upon his ejection in 1648 he published his celebrated collection of lyrical poems, entitled Hesperides; or the Works both Human and Divine of Robert Herrick. The " divine works " bore the title of Noble Numbers and the date 1647. That he was reduced to great poverty in London has been stated, but there is no evidence of the fact. In August 1662 Herrick returned to Dean Prior, supplanting his own supplanter, Dr John Syms. He died in his eighty-fourth year, and was buried at Dean Prior, October 15, 1674. A monument was erected to his memory in the parish church in 1857, by Mr Perry Herrick, a descendant of a collateral branch of the family. The Hesperides (and Noble Numbers) is the only volume which Herrick published, but he contributed poems to Lachrymae Musarum (1649) and to Wit's Recreations.

As a pastoral lyrist Herrick stands first among English poets. His genius is limited in scope, and comparatively unambitious, but in its own field it is unrivalled. His tiny poems — and of the thirteen hundred that he has left behind him not one is long — are like jewels of various value, heaped together in a casket. Some are of the purest water, radiant with light and colour, some were originally set in fplse metal that has tarnished, some were rude and repulsive from the first. Out of the unarranged, heterogeneous mass the student has to select what is not worth reading, but, after he has cast aside all the rubbish, he is astonished at the amount of excellent and exquisite work that remains. Herrick has himself summed up, very correctly, the themes of his sylvan muse when he says: —

" I sing of brooks, of blossoms, birds and bowers, Of April, May, of June and July flowers, I sing of May-poles, hock-carts, wassails, wakes, Of bridegrooms, brides and of their bridal-cakes."

He saw the picturesqueness of English homely life as no one before him had

seen it, and he described it in his verse with a certain purple glow of Arcadian romance over it, in tones of immortal vigour and freshness. His love poems are still more beautiful; the best of them have an ardour and tender sweetness which give them a place in the forefront of modern lyrical poetry, and remind us of what was best in Horace and in the poets of the Greek anthology.

After suffering complete extinction for more than a century, the fame of Herrick was revived by John Nichols, who introduced his poems to the readers of the Gentleman's Magazine of 1796 and 1797. Dr Drake followed in 1798 with considerable enthusiasm. By 1810 interest had so far revived in the forgotten poet that Dr Nott ventured to print a selection from his poems, which attracted the favourable notice of the Quarterly Review. In 1823 the Hesperides and the Noble Numbers were for the first time edited by Mr T. Maitland, afterwards Lord Dundrennan. Since then the reprints of Herrick's have been too numerous to be mentioned here; there are few English poets of the 17th century whose writings are now more accessible. See F. W. Moorman, Robert Herrick (1910). (E. G.)

HERRIES, JOHN CHARLES (1778-1855), English politician, son of a London merchant, began his career as a junior clerk in the treasury, and became known for his financial abilities as private secretary to successive ministers. He was appointed commissary-in-chief (181 1), and, on the abolition of that office (1816), auditor of the civil list. In 1823 he entered parliament as secretary to the treasury, and in 1827 became chancellor of the exchequer under Lord Goderich; but in consequence of internal differences, arising partly out of a slight put upon Herries, the ministry was broken up, and in 1828 he was appointed master of the mint. In 1830 he became president of the board of trade, and for the earlier months of 1835 he was secretary at war. From 1841 to 1847 he was out of parliament, but during 1852 he was president of the board of control under Lord Derby. He was a consistent and upright Tory of the old school, who carried weight as an authority on financial subjects. His eldest son, Sir Charles John Herries (1815-1882), was chairman of the board of inland revenue.

See the Life by his younger son, Edward Herries (1880). HERRIES, JOHN MAXWELL, 4 th Lord (c. 151 2-1 583), Scottish politician, was the second son of Robert Maxwell, 4th Lord Maxwell (d. 1546). In 1547 he married Agnes (d. 1594),

daughter of William Herries, 3rd Lord Herries (d. 1543), a grandson of Herbert Herries (d. c. 1500) of Terregles, Kirkcud- brightshire, who was created a lord of the Scottish parliament about 1490, and in 1567 he obtained the title of Lord Herries. But before this event Maxwell had become prominent among the men who rallied round Mary queen of Scots,

although during the earlier part of his public life he had been associated with the religious reformers and had been imprisoned by the regent, Mary of Lorraine. He was, moreover — at least until 1563 — very friendly with John Knox, who calls him "a man zealous and stout in God's cause." But the transition from one party to the other was gradually accomplished, and from March 1566, when Maxwell joined Mary at Dunbar after the murder of David Rizzio and her escape from Holyrood, he remained one of her staunchest friends, although he disliked her marriage with Bothwell. He led her cavalry at Langside, and after this battle she committed herself to his care. Herries rode with the queen into England in May 1568, and he and John Lesley, bishop of Ross, were her chief commissioners at the conferences at York. He continued to labour in Mary's cause after returning to Scotland, and was imprisoned by the regent Murray; he also incurred Elizabeth's displeasure by harbouring the rebel Leonard Dacres, but he soon made his peace with the English queen. He showed himself in general hostile to the regent Morton, but he was among the supporters of the regent Lennox until his death on the 20th of January 1583. His son William, 5th Lord Herries (d. 1604), was, like his father, warden of the west marches. William's grandson John, 7th Lord Herries (d. 1677), became 3rd earl of Nithsdale in succession to his cousin Robert Maxwell, the 2nd earl, in 1667. John's grandson was William, 5th earl of Nithsdale, the Jacobite (see Nithsdale). William was deprived of his honours in 1716, but in 1858 the House of Lords decided that his descendant William Constable-Maxwell (1804-1876) was rightly Lord Herries of Terregles. In 1876 William's son Marma- duke Constable-Maxwell (b. 1837) became 12th Lord Herries, and in 1884 ne was created a baron of the United Kingdom.

HERRING (Clupea harengus, Haring in German, le hareng in French, sill in Swedish), a fish belonging to the genus Clupea, of which more than sixty different species are known in various parts of the globe. The sprat, pilchard or sardine and shad are species of the same genus. Of all sea-fishes Clupeae are the most abundant; for although other genera may comprise a greater variety of species, they are far surpassed by Clupea with regard to the number of individuals. The majority of the species of Clupea are of greater or less utility to man; it is only a few tropical species that acquire, probably from their food, highly poisonous properties, so as to be dangerous to persons eating them. But no other species equals the common herring in importance as an article of food or commerce. It inhabits in incredible numbers the North Sea, the northern parts of the Atlantic and the seas north of Asia. The herring inhabiting the corresponding latitudes of the North Pacific is another species, but most closely allied to that of the eastern hemisphere. Formerly it was the general belief that the herring inhabits the open ocean close to the Arctic Circle, and that it migrates at

certain seasons towards the northern coasts of Europe and America. This view has been proved to be erroneous, and we know now that this fish lives throughout the year in the vicinity of our shores, but at a greater depth, and at a greater distance from the coast, than at the time when it approaches land for the purpose of spawning.

Herrings are readily recognized and distinguished from the other species of Clupea by having an ovate patch of very small teeth on the vomer (that is, the centre of the palate). In the dorsal fin they have from 17 to 20 rays, and in the anal fin from 16 to 18; there are from 53 to 59 scales in the lateral line and 54 to 56 vertebrae in the vertebral column. They have a smooth gill-cover, without those radiating ridges of bone which are so conspicuous in the pilchard and other Clupeae. The sprat cannot be confounded with the herring, as it has no teeth on the vomer and only 47 or 48 scales in the lateral line.

The spawn of the herring is adhesive, and is deposited on

rough gravelly ground at varying distances from the coast and always in comparatively shallow water. The season of spawning is different in different places, and even in the same district, e.g. the east coast of Scotland, there are herrings spawning in spring and others in autumn. These are not the same fish but different races. Those which breed in winter or spring deposit their spawn near the coast at the mouths of estuaries, and ascend the estuaries to a considerable distance at certain times, as in the Firths of Forth and Clyde, while those which spawn in summer or autumn belong more to the open sea, e.g. the great shoals that visit the North Sea annually.

Herrings grow very rapidly; according to H. A. Meyer's observations, they attain a length of from 17 to 18 mm. during the first month after hatching, 34 to 36 mm. during the second, 45 to 50 mm. during the third, 55 to 61 mm. during the fourth, and 65 to 72 mm. during the fifth. The size which they finally attain and their general condition depend chiefly on the abundance of food (which consists of crustaceans and other small marine animals) , on the temperature of the water, on the season at which they have been hatched, &c. Their usual size is about 12 in., but in some particularly suitable localities they grow to a length of 15 in., and instances of specimens measuring 17 in. are on record. In the Baltic, where the water is gradually losing its saline constituents, thus becoming less adapted for the development of marine species, the herring continues to exist in large

numbers, but as a dwarfed form, not growing either to the size or to the condition of the North-Sea herring. The herring of the American side of the Atlantic is specifically identical with that of Europe. A second species (Clupea leachii) has been supposed to exist on the British coast; but it comprises only individuals of a smaller size, the produce of an early or late spawn. Also the so-called " white-bait " is not a distinct species, but consists chiefly of the fry or the young of herrings and sprats, and is obtained "in perfection" at localities where these small fishes find an abundance of food, as in the estuary of the Thames.

Several excellent accounts of the herring have been published, as by Valenciennes in the 20th vol. of the Histoire natureUe des poissons, and more especially by Mr J. M. Mitchell, The Herring, its Natural History and National Importance (Edinburgh, 1864). Recent investigations are described in the Reports of the Fishery Board for Scotland, and in the reports of the German Kommission tur Untersuchnng der Deuischen Meere (published at Kiel). (J. T. C.)

HERRING-BONE, a term in architecture applied to alternate courses of bricks or stone, which are laid diagonally with binding courses above and below: this is said to give a better bond to the wall, especially when the stone employed is stratified, such as Stonefield stone, and too thin to be laid in horizontal courses. Although it is only occasionally found in modern buildings, it was a type of construction constantly employed in Roman, Byzantine and Romanesque work, and in the latter is regarded as a test of very early date. It is frequently found in the Byzan- tine walls in Asia Minor, and in Byzantine churches was employed decoratively to give variety to the wall surface. Sometimes the diagonal courses are reversed one above the other. Examples in France exist in the churches at Querqueville in Normandy and St Christophe at Suevres (Loir et Cher), both dating from the 10th century, and in England herring-bone masonry is found in the walls of castles, such as at Guildford, Colchester and Tamworth. The term is also applied to the paving of stable yards with bricks laid flat diagonally and alternating so that the head of one brick butts against the side of another; and the effect is more pleasing than when laid in parallel courses.

HERRINGS, BATTLE OF THE, the name applied to the action of Rouvray, fought in 1429 between the French (and Scots) and the English, who, under Sir John Falstolfe (or Falstaff), were convoying Lenten provisions, chiefly herrings, to the besiegers of Orleans. (See Orleans and Hundred Years' War.)

HERRNHUT, a town of Germany, in the kingdom of Saxony, 18 m. S.E. ot Bautzen, and situated on the Lobau-Zittau rail- way. Pop. 1200. It is

chiefly known as the principal seat of the Moravian or Bohemian brotherhood, the members of which

ire called Herrnhuter. A colony of these people, fleeing from persecution in Moravia, settled at Herrnhut in 1722 on a site presented by Count Zinzendorf. The buildings of the society include a church, a school and houses for the brethren, the sisters and the widowed .of both sexes, while it possesses an ethno- graphical museum and other collections of interest. The town is remarkable for its ordered, regular life and its scrupulous cleanliness. Linen, paper (to varieties of which Herrnhut gives its name), tobacco and various minor articles are manufactured. The Hutberg, at the foot of which the town lies, commands a pleasant view. Berthelsdorf, a village about a mile distant, has been the seat of the directorate of the community since about

1789.

HERSCHEL, CAROLINE LUCRETIA (1750-1848), English astronomer, sister of Sir William Herschel, the eighth child and fourth daughter of her parents, was born at Hanover on the 16th of March 1750. On account of the prejudices of her mother, who did not desire her to know more than was necessary for being useful in the family, she received in youth only the first elements of education. After the death of her father in 1767 she obtained permission to learn millinery and dressmaking with a view to earning her bread, but continued to assist her mother in the management of the household until the autumn of 1772, when she joined her brother William, who had established himself as a teacher of music at Bath. At once she became a valuable co-operator with him both in his professional duties and in the astronomical researches to which he had already begun to devote all his spare time. She was the principal singer at his oratorio concerts, and acquired such a reputation as a vocalist that she was offered an engagement for the Birmingham festival, which, however, she declined. When her brother accepted the office of astronomer to George III., she became his constant assistant in his observations, and also executed the laborious calcula- tions which were connected with them. For these services she received from the king in 1787 a salary of £56 a year. Her chief amusement during her leisure hours was sweeping the heavens with a small Newtonian telescope. By this means she detected in 1783 three remarkable nebulae, and during the eleven years 1 786-1 797 eight comets, five of them with un- questioned priority. In 1797 she presented to the Royal Society an Index to Flamsteed's observations, together with a catalogue of 561 stars accidentally omitted from the " British Catalogue," and a list of the errata in that publication. Though she returned to Hanover in 1822 she did not abandon her astro- nomical studies, and in 1828 she completed the reduction, to January 1800, of 2500 nebulae discovered by her brother. In

1828 the Astronomical Society, tc mark their sense of the benefits conferred on science by such a series of laborious exertions, unanimously resolved to present her with their gold medal, and in 1835 elected her an honorary member of the society. In 1846 she received a gold medal from the king of Prussia. She died on the 9th of January 1848.

See The Memoir and Correspondence of Caroline Herschel, by Mrs John Herschel (1876).

HERSCHEL, SIR FREDERICK WILLIAM (1738-1822), generally known as Sir William Herschel, English astronomer, was born at Hanover on the 15th of November 1738. His father was a musician employed as hautboy player in the Hanoverian guard. The family had quitted Moravia for Saxony in the early part of the 17th century on account of religious troubles, they themselves being Protestants. Herschel's earlier education was necessarily of a very limited character, chiefly owing to the warlike commotions of his country; but being at all times an indomitable student, he, by his own exertions, more than repaired this deficiency. He became a very skilful musician, both theoretical and practical; while his attainments as a self-taught mathematician were fully adequate to the prosecution of those branches of astronomy which he so eminently advanced and adorned. Whatever he did he did methodically and thoroughly; and in this methodical thoroughness lay the secret of what Arago very properly termed his astonishing scientific success.

In 1752, at the age of fourteen, he joined the band of the Hanoverian guard, and with his detachment visited England in 1755, accompanied by his father and eldest brother; in the following year he returned to his native country; but the hardships of campaigning during the Seven Years? War imperil- ling his health, his parents privately removed him from the regiment, and on the 26th of July 1757 despatched him to England. There, as might have been expected, the earlier part of his career was attended with formidable difficulties and much privation. We find him engaged in several towns in the north of England as organist and teacher of music, which were not lucrative occupations. But the tide of his fortunes began to flow when he obtained in 1766 the appointment of organist to the Octagon chapel in Bath, at that time the resort of the wealth and fashion of the city.

During the next five or six years he became the leading musical authority, and the director of all the chief public musical enter- tainments at Bath. His circumstances having thus become easier, he revisited Hanover for the

purpose of bringing back with him his sister Caroline, whose services he much needed in his multifarious undertakings. She arrived in Bath in August 1772, being at that time in her twenty-third year. She thus describes her brother's Ufa soon after her arrival: " He used to retire to bed with a bason of milk or a glass of water, with Smith's Harmonics and Ferguson's Astronomy, &c, and so went to sleep buried under his favourite authors; and his first thoughts on waking were how to obtain instruments for viewing those objects himself of which he had been reading." It is not without significance that we find him thus reading Smith's Harmonics; to that study loyalty to his profession would impel him; as a reward for his thoroughness this led him to Smith's Optics; and this, by a natural sequence, again led him to astronomy, for the purposes of which the chief optical instruments were devised. It was in this way that he was introduced to the writings of Ferguson and Keill, and subsequently to those of Lalande, whereby he educated himself to become an astronomer of undying fame. In those days telescopes were very rare, very expensive and not very efficient, for the Dollonds had not as yet perfected even their beautiful little achromatics of 2 1 in. aperture. So Herschel was obliged to content himself with hiring a small Gregorian reflector of about 2 in. aperture, which he had seen exposed for loan in a tradesman's shop. Not satisfied with this implement, he procured a small lens of about 18 ft. focal length, and set his sister to work on a pasteboard tube to match it, so as to make him a telescope. This unsatisfactory material was soon replaced by tin, and thus a sorry sort of vision was obtained of Jupiter, Saturn and the moon. He then sought in London for a reflector of much larger dimensions; but no such instrument was on sale; and the terms demanded for the construction of a reflecting telescope of 5 or 6 ft. focal length he regarded as too exorbitant even for the gratification of such desires as his own. So he was driven to the only alternative that remained; he must himself build a large telescope. His first step in this direction was to purchase the debris of an amateur's implements for grinding and polishing small mirrors; and thus, by slow degrees, and by indomitable perseverance, he in 1774 had, as he says, the satisfaction of viewing the heavens with a Newtonian telescope of 6 ft. focal length made by his own hands. But he was not contented to be a mere star-gazer; on the contrary, he had from the very first conceived the gigantic project of surveying the entire heavens, and, if possible, of ascertaining the plan of their general structure by a settled mode of procedure, if only he could provide himself with adequate instrumental means. For this purpose he, his brother and his sister toiled for many years at the grinding and polishing of hundreds of specula, always retaining the best and recasting the others, until the most perfect of the earlier products had been surpassed. This was the work of the daylight in those seasons of the year when the fashionable visitors of Bath had quitted the place, and had thus freed the family from professional duties. After 1774 every

available hour of the night was devoted to the long-hoped- for scrutiny of the skies. In those days no machinery had been

invented for the construction of telescopic mirrors; the man who had the hardihood to undertake polishing them doomed himself to walk leisurely and uniformly round an upright post for many hours, without removing his hands from the mirror, until his work was done. On these occasions Herschel received his food from the hands of his faithful sister. But his reward was nigh.

In May 1780 his first two papers containing some results of his observations on the variable star " Mira " and the mountains of the moon were communicated to the Royal Society through the influential introduction of Dr William Watson. Herschel had made his acquaintance in a characteristic manner. In order to obtain a sight of the moon the astronomer had taken his telescope into the street opposite his house; the celebrated physician happening to pass at the time, and seeing his eye removed for a moment from the instrument, requested permission to take his place. The mutual courtesies and intelligent conversa- tion which ensued soon ripened this casual acquaintance into a solid and enduring regard.

The phenomena of variable stars were examined by Herschel as a guide to what might be occurring in our own sun. The sun, he knew, rotated on its axis, and he knew that dark spots often exist on its photosphere; the questions that he put to himself were — Are there dark spots also on variable stars? Do the stars also rotate on their axes? or are they sometimes partially eclipsed by the intervention of opaque bodies? And he went on to enquire, What are these singular spots upon the sun? and have they any practical relation to the inhabitants of this planet? To these questions he applied his telescopes and his thoughts; and he communicated the results to the Royal Society in no less than six memoirs, occupying very many pages in the Philosophical Transactions, and extending in date from 1780 to 1801. It was in the latter year that these remarkable papers culminated in the inquiry whether any relation could be traced in the recurrence of sun-spots, regarded as evidences of solar activity, and the varying seasons of our planet, as exhibited by the varying price of corn. Herschel's reply was inconclusive; nor has a final solution of the related problems yet been obtained.

In 1 781 he communicated to the Royal Society the first of a series of papers on the rotation of the planets and of their several satellites. The object which he had in view was not so much to ascertain the times of their rotation as to discover whether those rotations are strictly uniform. From the result he expected to gather, by analogy, the probability of an alteration in the length of our own day. These inquiries occupy the greater part of

seven memoirs extending from 1781 to 1797. While engaged on them he noticed the curious appearance of a white spot near to each of the poles of the planet Mars. On investigating the inclina- tion of its axis to the plane of its orbit, and finding that it differed little from that of the earth, he concluded that its changes of climate also would resemble our own, and that these white patches were probably polar snow. Modern researches have con- firmed his conclusion. He also discovered that, as far as his observations extended, the times of the rotations of the various satellites round their axes conform to the analogy of our moon by equalling the times of their revolution round their primaries. Here again we perceive that his discoveries arose out of the systematic and comprehensive nature of his investigation. Nothing with such a man is accidental.

In the same year (1781) Herschel made a discovery which completely altered the character of his professional life. In the course of a methodical review of the heavens he lighted on an object which at first he supposed to be a comet, but which, by its subsequent motions and appearance, averred itself to be a new planet, moving outside the orbit of Saturn. The name of Georgium Sidus was by him assigned to it, but has by general consent been laid aside in favour of Uranus. The object was detected with a 7-ft. reflector having an aperture of 6| in.; sub- sequently, when he had provided himself with a much more powerful telescope, of 20 ft. focal length, he discovered, as he believed, no less than six Uranian satellites. Modern observations, while abolishing four of these supposed attendants, have added two others apparently not observed by Herschel. Seven memoirs

on the subject were communicated by him to the Royal Society, extending from the date of the discovery in 1 781 to 1815. A noteworthy peculiarity in Herschel's mode of observation led to the discovery of this planet. He had observed that the spurious diameters of stars are not much affected by increasing the magni- fying powers, but that the case is different with other celestial objects; hence if anything in his telescopic field struck him as unusual in aspect, he immediately varied the magnifying power in order to decide its nature. Thus Uranus was discovered; and had a similar method been applied to Neptune, that planet would have been found^at Cambridge some months before it was recognized at Berlin.

We now come to the beginning of Herschel's most important series of observations, culminating in what ought probably to be regarded as his capital discovery. A material part of the task which he had set himself

embraced the determination of the relative distances of the stars from our sun and from each other. Now, in the course of his scrutiny of the heavens, he had observed many stars in apparently very close contiguity, but often differing greatly in relative brightness. He concluded that, on the average, the brighter star would be the nearer to us, the smaller enormously more distant; and considering that an astronomer on the earth, in consequence of its immense orbital displacement of some 180 millions of miles every six months, would see such a pair of stars under different perspective aspects, he perceived that the measurement of these changes should lead to an approximate determination of the stars' relative distances. He therefore mapped down the places and aspects of all the double stars that he met with, and communicated in 1782 and 1785 very extensive catalogues of the results. Indeed, his very last scientific memoir, sent to the Royal Astronomical Society in the year 1822, when he was its first president and already in the eighty-fourth year of his age, related to these investigations. In the memoir of 1 782 he threw out the hint that these apparently contiguous stars might be genuine pairs in mutual revolution; but he significantly added that the time had not yet arrived for settling the question. Eleven years afterwards (1793), he re- measured the relative positions of many such couples, and we may conceive what his feelings must have been at finding his prediction verified. For he ascertained that some of these stars circulated round each other, after the manner required by the laws of gravitation, and thus demonstrated the action among the distant members of the starry firmament of the same mechanical laws which bind together the harmonious motions of our solar system. This sublime discovery, announced in 1802, would of itself suffice to immortalize his memory. If only he had lived long enough to learn the approximate distances of some of these binary combinations, he would at once have been able to calculate their masses relative to that of our own sun; and the quantities being, as we now know, strictly comparable, he would have found another of his analogical conjectures realized.

In the year 1782 Herschel was invited to Windsor by George III., and accepted the king's offer to become his private astronomer, and henceforth devote himself wholly to a scientific career. His salary was fixed at £200 per annum, to which an addition of £50 per annum was subsequently made for the astronomical assistance of his sister. Dr Watson, to whom alone the amount was mentioned, made the natural remark, " Never before was honour purchased by a monarch at so cheap a rate." In this way the great astronomer removed from Bath, first to Datchet and soon afterwards permanently to Slough, within easy access of his royal patron at Windsor.

The old pursuits at Bath were soon resumed at Slough, but with renewed vigour and without the former professional interruptions. The greater part, in fact, of the papers already referred to are dated from Datchet and

Slough; for the magnifi- cent astronomical speculations in which he was engaged, though for the most part conceived in the earlier portion of his philo- sophical career, required years of patient observation before they could be fully examined and realized.

It was at Slough in 1783 that he wrote his first memorable paper on the " Motion of the Solar System in Space," — a sublime

speculation, yet through his genius realized by considerations of the utmost simplicity. He returned to the same subject with fuller details in 1805. It was also after his removal to Slough that he published his first memoir on the construction of the heavens, which from the first had been the inspiring idea of his varied toils. In a long series of remarkable papers, addressed as usual to the Royal Society, and extending from the year 178410 1818, when he was eighty years of age, he demon- strated the fact that our sun is a star situated not far from the bifurcation of the Milky Way, and that all the stars visible to us lie more or less in clusters scattered throughout a comparatively thin, but immensely extended stratum. At one time he imagined that his powerful instruments had pierced through this stellar stratum, and that he had approximately determined the form of some of its boundaries. In the last of his memoirs, having convinced himself of his error, he admitted that to his telescopes the Milky Way was " fathomless." On either side of this assemblage of stars, presumably in ceaseless motion round their common centre of gravity, Herschel discovered a canopy of discrete nebulous masses, such as those from the condensation of which he supposed the whole stellar universe to have been formed, — a magnificent conception, pursued with a force of genius and put to the practical test of observation with an industry almost incredible.

Hitherto we have said nothing about the great reflecting telescope, of 40 ft. focal length and 4 ft. aperture, the construction of which is often, though mistakenly, regarded as his chief performance. The full description of this celebrated instrument will be found in the 85th volume of the Transactions of the Royal Society. On the day that it was finished (August 28, 1780) Herschel saw at the first view, in a grandeur not witnessed before, the Saturnian system with six satellites, five of which had been discovered long before by C. Huygens and G. D. Cassini, while the sixth, subsequently named Enceladus, he had, two years before, sighted by glimpses in his exquisite little telescope of 65 in. aperture, but now saw in unmistakable brightness with the towering giant he had just completed. On the 17th of September he discovered a seventh, which proved to be the nearest to the globe of Saturn. It has since received the name of Mimas. It is somewhat remarkable that, notwith- standing his long and repeated scrutinies of this planet, the eighth satellite, Hyperion, and the crape ring should have escaped him.

Herschel married, on the 8th of May 1788, the widow of Mr John Pitt, a wealthy London merchant, by whom he had an only son, John Frederick William. The prince regent conferred a Hanoverian knighthood upon him in 1816. But a far more valued and less tardy distinction was the Copley medal assigned to him by his associates in the Royal Society in 1781.

He died at Slough on the 25th of August 1822, in the eighty- fourth year of his age, and was buried under the tower of St Laurence's Church, Upton, within a few hundred yards of the old site of the 40-ft. telescope. A mural tablet on the wall of the church bears a Latin inscription from the pen of the late Dr Goodall, provost of Eton College.

See Mrs John Herschel, Memoir of Caroline Herschel (1876); E. S. Holden, Herschel, his Life and Works (1881); A. M. Clerke, The Herschels and Modern Astronomy (1895); E. S. Holden and C. S. Hastings, Synopsis of the Scientific Writings of Sir William Herschel (Washington, 1881); Baron Laurier, Moge historique, Paris Memoirs (1823), P- ' x '- ! F. Arago, Analyse historique, Annuaire du Bureau des Longitudes (1842), p. 249; Arago, Biographies of Scientific Men, p. 167; Madame d'Arblay's Diary, passim; Public Characters (1798-1799), p. 384 (with portrait); J. Sime, William Herschet^and his Work (1900). Herschel's photometric Star Catalogues were discussed and reduced by E. C. Pickering in Harvard Annals, vols, xiv. p. 345, xxiii. p. 185, and xxiv. (C. P. ; A. M. C.)

HERSCHEL, SIR JOHN FREDERICK WILLIAM, Bart. (1792-1871), English astronomer, the only son of Sir William Herschel, was born at Slough, Bucks, on the 7th of March 1792. His scholastic education commenced at Eton, but maternal fears or prejudices soon removed him to the house of a private tutor. Thence, at the early age of seventeen, he was sent to St John's College, Cambridge, and the form and method of the

mathematical instruction he there received exercised a material influence on the whole complexion of his scientific career. In due time the young student won the highest academical distinc- tion of his year, graduating as senior wrangler in 1813. It was during his undergraduateship that he and two of his fellow- students who subsequently attained to very high eminence, Dean Peacock and Charles Babbage, entered into a compact that they would " do their best to leave the world wiser than they found it," — a compact loyally and successfully carried out by all three to the end. As a commencement of this laudable attempt we find Herschel associated with these two friends in the production of a work on the differential calculus,

and on cognate branches of mathematical science, which changed the style and aspect of mathematical learning in England, and brought it up to the level of the Continental methods. Two or three memoirs communicated to the Royal Society on new applica- tions of mathematical analysis at once placed him in the front rank of the cultivators of this branch of knowledge. Of these his father had the gratification of introducing the first, but the others were presented in his own right as a fellow.

With the intention of being called to the bar, he entered his name at Lincoln's Inn on the 24th of January 1814, and placed himself under the guidance of an eminent special pleader. Probably this temporary choice of a profession was inspired by the extraordinary success in legal pursuits which had attended the efforts of some noted Cambridge mathematicians. Be that as it may, an early acquaintance with Dr Wollaston in London soon changed the direction of his studies. He experimented in physical optics; took up astronomy in 1816; and in 1820, assisted by his father, he completed for a reflecting telescope a mirror of 18 in. diameter and 20 ft. focal length. This, subse- quently improved by his own hands, became the instrument which enabled him to effect the astronomical observations forming the chief basis of his fame. In 1821-1823 we find him associated with Sir James South in the re-examination of his father's double stars, by the aid of two excellent refractors, of 7 and 5 ft. focal length respectively. For this work he was presented in 1826 with the Astronomical Society's gold medal; and with the Lalande medal of the French Institute in 1825; while the Royal Society had in i82r bestowed upon him the Copley medal for his mathematical contributions to their Transactions. From 1824 to 1827 he held the responsible post of secretary to that society; and was in 1827 elected to the chair of the Astronomical Society, which office he also filled on two subsequent occasions. In the discharge of his duties to the last-named society he delivered presidential addresses and wrote ■obituary notices of deceased fellows, memorable for their combination of eloquence and wisdom. In 1831 the honour of knighthood was conferred on him by William IV., and two years later he again received the recognition of the Royal Society by the award of one of their medals for his memoir " On the In- vestigation of the Orbits of Revolving Double Stars." The award significantly commemorated his completion of his father's discovery of gravitational stellar systems by the invention of a graphical method whereby the eye could as it were see the two component stars of the binary system revolving under the prescription of the Newtonian law.

Before the end of the year 1833, being then about forty years of age, Sir John Herschel had re-examined all his father's double stars and nebulae, and had added many similar bodies to his own lists; thus accomplishing, under the conditions then pre- vailing, the full work of a lifetime. For it should be remembered that astronomers _were not as yet provided with

those valuable automatic contrivances which at present materially abridge the labour and increase the accuracy of their determinations. Equatorially mounted instruments actuated by clockwork, electrical chronographs for recording the times of the phenomena observed, were not available to Sir John Herschel; and he had no assistant.

His scientific life now entered upon another and very char- acteristic phase. The bias, of his mind, as he subsequently was wont to declare, was towards chemistry and the phenomena

of light, rather than towards astronomy. Indeed, very shortly after taking his degree at Cambridge, he proposed himself as a candidate for the vacant chair of chemistry in that university; but, as he said with some humour, the result of the election was to leave him in a glorious minority of one. In fact Herschel had become an astronomer from a sense of duty, and it was by filial loyalty to his father's memory that he was now impelled to undertake the completion of the work nobly begun at Slough. William Herschel had searched the northern heavens; John Herschel determined to explore the southern, besides re-explor- ing northern skies. " I resolved," he said, " to attempt the completion of a survey of the whole surface of the heavens; and for this purpose to transport into the other hemisphere the same instrument which had been employed in this, so as to give a unity to the results of both portions of the survey, and to render them comparable with each other." In accordance with this resolution, he and his family embarked for the Cape on the 13th November 1833; they arrived in Table Bay on the 15th January 1834; and proceedings, he says, "were pushed forward with such effect that on the 22nd of February I was enabled to gratify my curiosity by a view of k Crucis, the nebula about ij Argus, and some other remarkable objects in the 20-ft. reflector, and on the night of the 4th of March to commence a regular course of sweeping."

To give an adequate description of the vast mass of labour com- pleted during the next four busy years of his life at Feldhausen would require the transcription of a considerable portion of the Cape Observations, a volume of unsurpassed interest and importance ; although it might perhaps be equalled by a judicious selection from Sir William's " Memoirs," now scattered through some thirty volumes of the Philosophical Transactions. It was published, at the sole expense of the late duke of Northumberland, but not till 1847, nine years after the author's return to England, for the cogent reason, that as he said, " The whole of the observations, as well as the entire work of reducing, arranging and preparing them for the press, have been executed by myself." There are 164 pages of catalogues of southern nebulae and clusters of stars. There are then careful and elaborate drawings of the great nebula in Orion, and of the region surrounding the remarkable star in Argˆo. The labour and the thought bestowed upon some

of these objects are almost incredible; several months were spent upon a minute spot in the heavens containing 1216 stars, but which an ordinary spangle, held at a distance of an arm's length, would eclipse. These catalogues and charts being completed, he proceeded to discuss their significance. He confirmed his father's hypothesis that these wonderful masses of glowing vapours are not irregularly scattered over the visible heavens, but are collected in a sort of canopy, whose vertex is at the pole of that vast stratum of stars in which our solar system finds itself buried, as Herschel supposed, at a depth not greater than that of the average distance from us of an eleventh magnitude star. Then follows his catalogue of the relative positions and magnitudes of the southern double stars, to one of which, y Virginis, he applied the beautiful method of orbital determination invented by himself, and he had the satisfaction of witnessing the fulfilment of his prediction that the components would, in the course of their revolution, appear to close up into a single star, inseparable by any telescopic power. In the next chapter he proceeded to describe his observations on the varying and relative brightness of the stars. It has been already detailed how his father began his scientific career by similar observations on stellar light-fluctuations, and how his remarks culminated years afterwards in the question whether the radiative changes of our sun, due to the presence or absence of sun-spots, affected our harvests and the price of corn. Sir John carried speculation still farther, pointing out that variations to the extent of half a magnitude in the sun's brightness would account for those strange alternations of semi-arctic and semi-tropical climates which geological researches show to have occurred in various regions of our globe.

Herschel returned to his English home in the spring of 1838. As was natural and right, he was welcomed with an enthusiastic, greeting. By the queen at her coronation he was created a baronet; and, what to him was better than all such rewards, other men caught the contagion of his example, and laboured in fields similar to his own, with an adequate portion of his success.

Herschel was a highly accomplished chemist. His discovery in 1 81 9 of the solvent power of hyposulphite of soda on the otherwise insoluble salts of silver was the prelude to its use as a fixing agent in photography; and he invented in 1839, independently of Fox Talbot, the process of photography on sensitized paper. He was the first person to apply the now well-known terms positive and negative to photographic images.

and to imprint them upon glass prepared by the deposit of a sensitive film. He also paved the way for Sir George Stokes's discovery of fluorescence, by his addition of the lavender rays to the spectrum, and by his announcement in 1845 of " epipolic dis- persion," as exhibited by sulphate of quinine. Several other important researches connected with the undulatory theory of light are embodied in his treatise on " Light " published in the Encyclopaedia metropolitana.

Perhaps no man can become a truly great mathematician or philosopher if devoid of imaginative power. Jolm Herschel possessed this endowment to a large extent; and he solaced his declining years with the translation of the Iliad into verse, having earlier executed a similar version of Schiller's Walk. But the main work of his later life was the collection of all his father's catalogues of nebulae and double stars combined with his own observations and those of other astronomers each into a single volume. He lived to complete the former, to present it to the Royal Society, and to see it published in a separate form in the Philosophical Transactions, vol. cliv). The latter work he left unfinished, bequeathing it, in its imperfect form, to the Astro- nomical Society. That society printed a portion of it, which serves as an index to the observations of various astronomers on double stars up to the year 1866;

A complete list of his contributions to learned societies will be found in the Royal Society's great catalogue, and from them may be gathered most of the records of his busy scientific life. Sir John Herschel met with an amount of public recognition which was unusual in the time of his illustrious father. Naturally he was a member of almost every important learned society in both hemispheres. For five years he held the same office of master of the mint, which more than a century before had belonged to Sir Isaac Newton; his friends also offered to propose him as president of the Royal Society and again as member of parliament for the university of Cambridge, but neither position was desired by him.

In private life Sir John Herschel was a firm and most active friend; he had no jealousies; he avoided all scientific feuds; he gladly lent a helping hand to those who consulted him in scientific difficulties; hie never discouraged, and still less dis^ paraged, men younger than or inferior to himself; he was pleased by appreciation of his work without being solicitous for applause; it was said of him by a discriminating critic, and without extravagance, that " his was a life full of serenity of the sage and the docile innocence of a child."

He died at Collingwood, his residence near Hawkhurst in Kent, on the nth of May 1871, in the seventy-ninth year of his age, and his remains are interred in Westminster Abbey close to the grave of Sir Isaac Newton.

Besides the laborious Cape Observations, Sir John Herschel was the author of several books, one of which at least, On the Study of Natural Philosophy (1830), possesses an interest which no future advances of the subjects on which he wrote can obliterate. In 1849 came the Outlines of Astronomy, a volume still replete with charm and instruction. His articles, " Meteorology," Physical Geography," and " Telescope," contributed to the 8th edition of the Encyclopaedia Britannica, were afterwards published separately. When he was at the Cape he was more than once assisted in the attempts there made to diffuse a love of knowledge among meri not engaged in literary pursuits; and with the same purpose he, on his return to England, published, in Good Words and elsewhere, a series of papers on interesting points of natural philosophy, subsequently collected in a volume called Familiar Lectures on Scientific Subjects. Another less widely known volume is his Collected Addresses, in which he is seen in his happiest and most instructive mood.

See also Mrs John Herschel, " Memoir of Caroline Herschel," Month. Notices Roy. Astr. Society, xxxii. 122 (C. Pritchard) ; Pro- ceedings Roy. Society, xx. p. xvii. (T. Romney Robinson) ; Proceedings Roy. Society of Edinburgh vii. 543 (P. G. Tait); Nature iv. 69; E. Dunkin, Obituary Notices, p. 47; Report Brit. Association (1871), p. lxxxv. (Lord Kelvin); The Times. (May 13, 1871); R. Grant, History of Phys. Astronomy; A. M. Clerke, Popular Hist, of Astronomy; A. M. Clerke, The Herschels and Modern Astronomy; J. H. Madler, Geschichte der Himmelskunde, Bd. ii.; Mimoires de la Society Physique de Geneve, xxi. 586 (E. Gautier). Reductions, based on standard magnitudes of 919 southern stars, observed by Herschel in sequences of relative brightness, were published by W. Doberck in the Astrophysical Journal, xi. 192, 270, and in Harvard Annals, vol. xli., No. viii. (C. P.; A. M. C.)

HERSCHELL, FARRER HERSCHELL, isx Baron' (1837- 1899), lord chancellor of England, was born on the 2nd of November 1837. His father was the Rev. Ridley Haim Herschell, a native of Strzelno, in Prussian Poland, who, when a young man, exchanged the Jewish faith for Christianity, took a leading part in founding the British Society for the Propagation of the Gospel among the Jews, and, after many journeyings, settled down to the charge of a Nonconformist chapel near the Edgware Road, in London, where he ministered to a large congregation. His mother was a daughter of William Mowbray, a merchant of Leith. He was educated at a private school and at University College, London. In 1857 he took his B.A. degree at the Uni- versity of London. He was reckoned the best speaker in the school debating society, and he displayed there the same command of language and lucidity of thought which were his characteristics during his official life. The reputation which Herschell enjoyed during his school days was maintained after he became a law-

student at Lincoln's Inn. In 1858 he entered the chambers of Thomas Chitty, the famous common law pleader, father of the late Lord Justice Chitty. His fellow pupils, amongst whom were A. L. Smith, afterwards master of the rolls, and Arthur Charles, afterwards judge of the queen's bench division, gave him the sobriquet of " the chief baron" in recognition of his superiority. He subsequently read with James Hannen, after- wards Lord Hannen. In i860 he was called to the bar and joined the northern circuit, then in its palmy days of undivided- ness. For four or five years he did not obtain much work. Fortunately, he was never a poor man, and so was not forced into journalism, or other paths of literature, in order to earn a living. Two of his contemporaries, each of whom achieved great eminence, found themselves in like case, One of these, Charles Russell, became lord chief justice of England; the other, William Court Gully, speaker of the House of Commons. It is said that these three friends, dining together during a Liverpool assize some years after they had been called, agreed that their prospects were anything but cheerful. Certain it is that about this time Herschell meditated quitting England for Shanghai and practising in the consular courts there. Herschell, however, soon made himself useful to Edward James, the then leader of the northern circuit, and to John Richard Quain, the leading stuff- gownsman. For the latter he was content to note briefs and draft opinions, and when, in 1866, Quain donned " silk," it was on Herschell that a large portion of his mantle descended.

In 1872 Herschell was made a queen's counsel. He had all the necessary qualifications for a leader — a clear, though not resonant voice; a calm, logical mind; a sound knowledge of legal prin- ciples; and (greatest gift of all) an abundance of common sense. He never wearied the judges by arguing at undue length, and he knew how to retire with dignity from a hopeless cause. His only weak point was cross-examination. In handling a hostile witness he had neither the insidious persuasiveness of a Hawkins nor the compelling, dominating power of a Russell. But he made up for all by his speech to the jury, marshalling such facts as told in his client's favour with the most consummate skill. He very seldom made use of notes, but trusted to his memory, which he had carefully trained. By this means he was able to conceal his art, and to appear less as a paid 'advocate than as an outsider interested in the case anxious to assist the jury in arriving at the truth. By 1874 Herschell's business had become so good that he turned his thoughts to parliament. In February of that year there was a general election, With the result that, the Conservative party came into power with a majority of fifty. The usual cropof petitionsfollowed. The two Radicals (Thompson and Henderson) who had been returned for Durham city were unseated, and an attack was then made on the seats of two other Radicals (Bell and Palmer) who had been returned for Durham county. For one of

these last Herschell was briefed. He made so excellent an impression on the local Radical leaders that they asked him to stand for Durham city; and after a fortnight's electioneering, he was elected as junior member. Between 1874 and 1880 Herschell was most assiduous in his attendance in the House of Commons. He was not a frequent speaker, but a few

great efforts sufficed in his case to gain for him a reputation as a debater. The best examples of his style as a private member will be found in Hansard under the dates 18th February 1876, 23rd May 1878, 6th May 1879, On the last occasion he carried a resolution in favour of abolishing actions for breach of promise of marriage except when actual pecuniary loss had ensued, the damages in such cases to be measured by the amount of such loss. The grace of manner and solid reasoning with which he acquitted himself during these displays obtained for him the notice of Gladstone, who in 1880 appointed Herschell solicitor- general.

Herschell's public services from 1880 to 1885 were of great value, particularly in dealing with the " cases for opinion " submitted by the Foreign Office and other departments. He was also very helpful in speeding government measures through the House, notably the Irish Land Act 1881, the Corrupt Practices and Bankruptcy Acts 1883, the County Franchise Act 1884 and the Redistribution of Seats Act 1885. This last was a bitter pill for Herschell, since it halved the representation of Durham city, and so gave him statutory notice to quit. Reckoning on the local support of the Cavendish family, he contested the North Lonsdale division of Lancashire; but in spite of the powerful influence of Lord Hartington, he was badly beaten at the poll, though Mr Gladstone again obtained a majority in the country. Herschell now thought he saw the solicitor-generalship slipping away from him, and along with it all prospect of high promotion. Lord Selborne and Sir Henry James, however, successively declined Gladstone's offer of the Woolsack, and in 1886 Herschell, by a sudden turn of fortune's wheel, found himself in his forty- ninth year lord chancellor.

Herschell's chancellorship lasted barely six months, for in August 1886 Gladstone's Home Rule Bill was rejected in the Commons and his administration fell. In August 1892, when Gladstone returned to power, Herschell again became lord chancellor. In September 1893, when the second Home Rule Bill came on for second reading in the House of Lords, Herschell took advantage of the opportunity to justify the " sudden con-version" to Home Rule of himself and his colleagues in 1885 by comparing it to the duke of Wellington's conversion to Catholic Emancipation in 1829

and to that of Sir Robert Peel to Free Trade in 1846. In 1895, however, his second chancellorship came to an end with the defeat of the Rosebery ministry.

Whether sitting at the royal courts in the Strand, on the judicial committee of the privy council, or in the House of Lords, Lord Herschell's judgments were distinguished for their acute and subtle reasoning, for their grasp of legal principles, and, whenever the occasion arose, for their broad treatment of con- stitutional and social questions. He was not a profound lawyer, but his quickness of apprehension was such that it was an excellent substitute for great learning. In construing a real property will or any other document, his first impulse was to read it by the light of nature, and to decline to be influenced by the construction put by the judges oh similar phrases occurring elsewhere. But when he discovered that certain expressions had acquired a technical meaning which could not be disturbed with- out fluttering the dovecotes of the conveyancers, he would yield to the established rule, even though he did not agree with it. He was perhaps seen at his judicial best in Vagliano v. Bank of England (1 89 1) and A lien v. Flood (1 898) . Latterly he showed a tendency, which seems to grow on some judges, to interrupt counsel overmuch. The case last mentioned furnishes an example of this. The question involved was what constituted a molestation of a man in the pursuit of his lawful calling. At the close of the argument of counsel, whom he had frequently interrupted, one of their lordships, noted for his pretty wit, observed that although there might be a doubt as to what amounted to such molestation in point of law, the House could well understand, after that day's proceedings, what it was in actual practice. In addition to his political and judicial work, Herschell rendered many public services. In 1888 he presided over an inquiry directed by the House of Commons with regard to the Metropolitan Board of Works. He acted as chairman of two

royal commissions, one on Indian currency, the other on vaccina- tion. He took a great interest in the National Society for the Prevention of Cruelty to Children, not only promoting the acts of 1889 and 1894, but also bestowing a good deal of time in sifting the truth of certain allegations which had been brought against the management of that society. In June 1893 he was appointed chancellor of the university of London in succession to the earl of Derby, and he entered on his new duties with the usual thoroughness. " His views of reform," according to Victor Dicjdns, the accomplished registrar of the university, " were always most liberal and most frankly stated, though at first they were not altogether popular with an important section of university opinion. He disarmed opposition by his intellectual power, rather than conciliated it by compromise, and sometimes was perhaps a little masterful, after a fashion of his own, in his treatment of the various burning questions that agitated the university during his

tenure of office. His characteristic power of detachment was well illustrated by his treatment of the proposal to remove the university to the site of the Imperial Institute at South Kensington. Although he was at that time chairman of the Institute, the most irreconcilable opponent of the removal never questioned his absolute impartiality." With the Imperial Institute Herschell had been officially connected from its inception. He was chairman of the provisional committee appointed by the prince of Wales to formulate a scheme for its organization, and he took an active part in the preparation of its charter and constitution in conjunction with Lord Thring, Lord James, Sir Frederick Abel and Mr John Hollams. He was the first chairman of its council, and, except during his tour in India in 1888, when he brought the Institute under the notice of the Indian authorities, he was hardly absent from a single meeting. For his special services in this connexion he was made G.C.B. in 1893, this being the only instance of a lord chancellor being decorated with an order.

In 1897 he was appointed, jointly with Lord Justice Collins, to represent Great Britain on the Venezuela Boundary Commission, which assembled in Paris in the spring of 1899. So complicated a business involved a great deal of preparation and a careful study of maps and historic documents. Not content with this, he accepted in 1898 a seat on the joint high commission appointed to adjust certain boundary and other important questions pending between Great Britain and Canada on the one hand and the United States on the other hand. He started for America in July of that year, and was received most cordially at Washington. His fellow commissioners elected him their president. In February 1899, while the commission was in full swing, he had the misfortune to slip in the street and in falling to fracture a hip bone. His constitution, which at one time was a robust one, had been undermined by constant hard work, and proved unequal to sustaining the shock. On the 1st of March, only a fortnight after the accident, he died at the Shoreham Hotel, Washington, a post-mortem examination revealing disease of the heart. Mr Hay, secretary of state, at once telegraphed to Mr Choate, the United States ambassador in London, the "deep sorrow" felt by President McKinley; and Sir Wilfred Laurier said the next day, in the parliament chamber at Ottawa, that he regarded Herschell's death " as a misfortune to Canada and to the British Empire." A funeral service held in St John's Episcopal Church, Washington, was attended by the president and vice-president of the United States, by the cabinet ministers, the judges of the Supreme Court, the members of the joint high commission, and a large number of senators and other representative men. The body was brought to London in a British man-of-war, and a second funeral service was held in Westminster Abbey before it was conveyed to its final resting-place at Tincleton, Dorset, in the parish church of which he had been married. Herschell left a widow,

granddaughter of Vice-Chancellor Kindersley; a son, Richard Farrer (b. 1878), who succeeded him as second baron ; and two daughters.

A " reminiscence " of Herschell by Mr Speaker Gully (Lord Selby) will be found in The Law Quarterly Review for April 1899. The Journal of the Society of Comparative Legislation (of which he had been

president from its formation in 1893) contains, in its part for July ot the same year, notices of him by Lord James of Hereford, Lord Davey, Mr Victor Williamson (his executor and intimate friend), and also by Mr Justice D. J. Brewer and Senator C. W. Fairbanks (both of the United States). (M. H. C.)

HERSENT, LOUIS (1777-1860), French painter, was born at Paris on the 10th of March 1777, and becoming a pupil of David, obtained the Prix de Rome in 1797; in the Salon of 1802 appeared his " Metamorphosis of Narcissus," and he continued to exhibit with rare interruptions up to 1 83 1 . His most considerable works under the empire were " Achilles parting from Briseis," and " Atala dying in the arms of Chactas " (both engraved in Landon's Annales du Musee) ; an " Incident of the life of Fenelon," painted in 1810, found a place at Malmaison, and "Passage of the Bridge atLandshut," which belongs to the same date, is now at Versailles. Hersent's typical works, however, belong to the period of the Re- storation; " Louis XVI. relieving the Afflicted" (Versailles) and " Daphnis and Chloe " (engraved by Langier and by Gelee) were both in the Salon of 1817; at that of 1819 the " Abdication of Gustavus Vasa " brought to Hersent a medal of honour, but the picture, purchased by the duke of Orleans, was destroyed at the Palais Royal in 1848, and the engraving by Henriquel-Dupont is now its sole record. " Ruth," produced in 1822, became the property of Louis XVIII., who from the moment that Hersent rallied to the Restoration jealously patronized him, made him officer of the legion of honour, and pressed his claims at the Institute, where he replaced van Spaendonck. He continued in favour under Charles X. , for whom was executed " Monks of Mount St Gotthard," exhibited in 1824. In 1831 Hersent made his last appearance at the Salon with portraits of Louis Philippe, Marie- Amelie and the duke of Montpensier; that of the king though good, is not equal to the portrait of Spontini (Berlin), which is probably Hersent's chef-d' ceuvre. After this date Hersent ceased to exhibit at the yearly salons. Although in 1846 he sent an excellent likeness of Delphine Gay and one or two other works to the rooms of the Societe d'Artistes, he could not be tempted from his usual reserve even by the

international contest of 1855. He died on the 2nd of October i860.

HERSFELD, a town of Germany, in the Prussian province of Hesse-Nassau, is pleasantly situated at the confluence of the Geis and Haun with the Fulda, on the railway from Frankfort- on-Main to Bebra, 24 m. N.N.E. of Fulda. Pop. (1905) 8688. Some of the old fortifications of the town remain, but the ramparts and ditches have been laid out as promenades. The principal buildings are the Stadt Kirche, a beautiful Gothic building, erected about 1320 and restored in 1899, with a fine tower and a large bell; the old and interesting town hall (Rathaus) and the ruins of the abbey church. This church was erected on the site of the cathedral in the beginning of the 12th century; it was built in the Byzantine style and was burnt down by the French in 1 761 . Outside the town are the Frauenberg and the Johannesberg, on both of which are monastic ruins. Among the public institutions are a gymnasium and a military school. The town has important manufactures of cloth, leather and machinery; it has also dye-works, worsted mills and soap-boiling works.

Hersfeld owes its existence to the Benedictine abbey (see below). It became a town in the 12th century and in 1370 the burghers, having meanwhile shaken off the authority of the abbots, placed themselves under the protection of the landgraves of Hesse. It was taken and retaken during the Thirty Years' War and later it suffered from the attacks of the French.

The Benedictine abbey of Hersfeld was founded by Lullus, afterwards archbishop of Mainz, about 769. It was richly endowed by Charlemagne and became an ecclesiastical princi- pality in the 12 th century, passing under the protection of the landgraves of Hesse in 1423. It was secularized in 1648, having been previously administered for some years by a member of the ruling family of Hesse. As a secular principality Hersfeld passed to Hesse, and with electoral Hesse was united with Prussia in 1866. In the middle ages the abbey was famous for its library.

See Vigelius, Denkwiirdigkeiten von Hersfeld (Hersfeld, 1 888); Demme, Nachrichten und Urkunden zur Chronik von Hersfeld (Hersfeld, 1891-1901), and P. Hafner, Die Reichsabtei Hersfeld bis zur Mitte des ijten Jahrhunderts (Hersfeld, 1889).

HERSTAL, or Heristal, a town of Belgium, less than 2 m. N. of Liege and practically one of its suburbs. The name is supposed to be derived from Heerstelle, i.e. " Permanent Camp." The second Pippin was born here, and this mayor of the palace acquired the control of the kingdom of the Franks. His grand- son, Pippin the Short, died at Herstal in a.d. 768, and it disputes with Aix la Chapelle the honour of being the birthplace of Charlemagne. It is now a very active centre of iron and steel manufactures.

The Belgian national small arms factory and cannon foundry are fixed here. Pop. (1904) 20,114.

HERTFORD, EARLS AND MARQUESSES OF. The English earldom of Hertford was held by members of the powerful family of Clare from about 1138, when Gilbert de Clare was created earl of Hertford, to 1314 when another earl Gilbert was killed at Bannockburn. In 1537 Edward Seymour, viscount Beau- champ, a brother of Henry VIII. 's queen, Jane Seymour, was created earl of Hertford, being advanced ten years later to the dignity of duke of Somerset and becoming protector of England. His son Edward (c. 1540-1621) was styled earl of Hertford from 1547 until the protector's attainder and death in January 1552, when the title was forfeited; in 1559, however, he was created earl of Hertford. In 1560 he was secretly married to Lady Catherine Grey (c. 1538-1568), daughter of Henry Grey, duke of Suffolk, and a descendant of Henry VII. Queen Elizabeth greatly disliked this union, and both husband and wife were imprisoned, while the validity of their marriage was questioned. Catherine died on the 27th of January 1568 and Hertford on the 6th of April 1621. Their son Edward, Lord Beauchamp (1561- 161 2), who inherited his mother's title to the English throne, predeceased his father; and the latter was succeeded in the earldom by his grandson William Seymour (1588-1660), who was created marquess of Hertford in 1640 and was restored to his ancestor's dukedom of Somerset in 1660. The title of marquess of Hertford became extinct when John, 4th duke of Somerset, died in 1675, and the earldom when Algernon, the 7th duke, died in February 1750.

In August 1750 Francis Seymour Conway, 2nd Baron Conway (1718-1794), who was a direct descendant of the protector Somerset, was created earl of Hertford; this noble- man was the son of Francis Seymour Conway (1679-1732), who had taken the name of Conway in addition to that of Seymour, and was the brother of Field-marshal Henry Seymour Coirway. Hertford was ambassador to France from 1763 to 1765; was lord- lieutenant of Ireland in 1765 and 1766; and lord chamberlain of the household from 1766 to 1782. Horace Walpole speaks of his " decorum and piety " and refers to him as a " perfect courtier," but says that he had " too great propensity to heap emoluments on his children." In 1793 he became earl of Yarmouth and marquess of Hertford, and he died on the 14th of June 1 794. His son, Francis Ingram Seymour Conway (1743-1822), who was known during his father's lifetime as Lord Beauchamp, took a prominent part in the debates of the House of Commons from 1766 until he succeeded to the marquessate in 1794. He was sent as ambassador to Berlin and Vienna in 1793 and from 1812 to 182 1 he was lord chamberlain. His son Francis Charles, the 3rd marquess (1777-1842), was an intimate friend of \he prince regent, afterwards George IV., and is the original of the " Marquis of Steyne " in Thackeray's

Vanity Fair and of " Lord Monmouth " in Disraeli's Coningsby. The 4th marquess was his son, Richard (1800-1870), whose mother was the great heiress, Maria Emily Fagniani, and whose brother was Lord Henry Seymour (1805-1859), the founder of the Jockey Club at Paris. When Richard died unmarried in Paris in August 1870 his title passed to his kinsman, Francis Hugh George Seymour (1812- 1884), a descendant of the 1st marquess, whose son, Hugh de Grey (b. 1843) became 6th marquess in 1884. The 4th mar- quess left his great wealth and his priceless collection of art treasures to Sir Richard Wallace (1818-1890), his reputed half- brother, and Wallace's widow, who died in 1897, bequeathed the collection to the British nation. It is now in Hertford House, formerly the London residence of the marquesses of Hertford.

39»

HERTFORD— HERTFORDSHIRE

HERTFORD, a market-town and municipal borough, and the county town of Hertfordshire, England, in the Hertford parlia- mentary division of the county, 24 m. N. from London, the terminus of branch lines of the Great Eastern and Great Northern railways. Pop. (1901) 9322. It is pleasantly situated in the valley of the river Lea. The chief buildings are the modern churches of St Andrew and of All Saints, on the sites of old ones, a town hall, corn exchange, public library, school of art and the old castle, which retains the wall and part of a tower dating from the Norman period, and is represented by a picturesque Jacobean building of brick, largely modernized. There are several educational establishments, including the preparatory school for Christ's Hospital, a picturesque building (in great part, however, rebuilt) at the east end of the town, Hale's grammar school, the Cowper Testimonial school, and a Green-coat scnool for boys and girls. Two miles S.E. is Haileybury College, one of the principal public schools of England, founded in 1805 by the East India Company for their civil service students, who were then temporarily housed in Hertford Castle. The school lies high above the Lea valley, towards Hoddesdon, in the midst of a stretch of finely-wooded country. Hertford has a considerable agricultural trade, and there are makings, breweries, iron foundries, and oriental printing Works. The town is governed by a mayor, 5 aldermen and 15 councillors. Area, 1134 acres.

Hertford (Herutford, Heorotford, Hurtford) was the scene of a synod in 673. Its communication with London by way of the Lea and the Thames gave it strategic importance during the Danish occupation of East Anglia. In 1066 and later it was a royal garrison and burgh. It made separate payments for aids to the Norman and Angevin kings; and in 133 1 was governed by a bailiff annually elected by the commonalty. A charter in-

corporated the bailiffs and burgesses in 1555, and was confirmed under Elizabeth and in 1606. A charter of 1680 to the mayor, aldermen and commonalty was effective until the Municipal Corporation Act. Hertford returned two burgesses to the parliament of 1298, and to others until, after 1375/6, such right became abeyant, to be restored by order of parliament in 1623/4. One representative was lost by the Representation Act in 1868, and separate representation by the Redistribution Act in 1885. A grant of fairs in 1226 probably originated or confirmed those held in 133 1 on the feasts of the Assumption and of St Simon and St Jude r their vigils and morrows, which fairs were confirmed by Elizabeth and Charles II. Another on the vigil, morrow and feast of the Nativity of the Virgin was granted by Elizabeth: its date was changed to May-day under James I. Modern fairs are on the third Saturday before Easter, the 12th of May, the 5th of July and the 8th of November. Markets were held in 1331 on Wednesday and Saturday; after 1368 on Thursday and Saturday; and they returned to Wednesdays and Saturdays in 1680.

HERTFORDSHIRE [Herts], a county of England, bounded N. by Cambridgeshire, N.W. by Bedfordshire, E. by Essex, S. by Middlesex, and S.W. by Buckinghamshire. The area is 634-6 sq. m., the county being the sixth smallest in England. Its aspect is always pleasant, the surface generally undulating, while in some parts, where these undulations form a quick succession of hills and valleys, the woodland scenery becomes very beautiful, as in the upper Lea valley, in the neighbourhood of Tewin near Hertford, and elsewhere. To the north-west and north considerable elevations are reached, a line of hills, facing north-westward with a sharp descent, crossing this portion of the county, and overlooking the flat lands of Bedfordshire and Cambridgeshire. They continue the line of the Chiltern Hills under the name of the East Anglian Ridge. They exceed 800 ft. near Dunstable, sinking gradually north-eastward. These uplands are generally bare, and in parts remarkably sparsely populated as compared with the home counties at large. In the greater part of the county, however, rich arable lands are inter- mingled with the parks and woodlands of numerous fine country seats, which impart to the county a peculiar luxuriance. Of the principal rivers, the Lea, rising beyond Luton in Bedfordshire,

enters Hertfordshire near East Hyde, flows S.E. to near Hatfield, then E. by N. to Hertford and Ware, whence it bends S. and passing along the eastern boundary of the county falls into the Thames below London. It receives in its course the Maran, or Mimram, the Beane, the Rib and the Stort, all joining on the north side; the Stort for some distance forming the county boundary with Essex. The Colne flows through the south- western part of the county, to fall into the Thames at Staines. It receives the Ver, the Bulborne and the Chess. The Ivel, rising in the N.W. soon passes into Bedfordshire to join the Great Ouse. To the south of Hatfield, near North

Mimms, two streams of moderate size are lost in pot-holes, except in the highest floods: The New River, one of the water supplies of London, has its source near Ware, and runs roughly parallel with the Lea. Most of the rivers are full of fish, including trout in the upper parts (of the Lea and Colne especially), which are carefully preserved.

Geology. — The rocks of Hertfordshire belong to the shallow syncline known as the London basin, the beds dipping in a south- easterly direction. The ; two most important formations are the Chalk, which forms the high ground in the north and west; and the Eocene Reading beds and London Clay which occupy the remaining southern part of the county. On the northern boundary, at the foot of the chalk hills, a small strip of Gault Clay and the Upper Greensand above it falls just within the county. The lowest subdivision of the chalk is the Chalk Marl, which with the Totternhoe Stone above it, lies at the base of the Chalk escarpment, by Ashwell, Pirton and Miswell to Tring. Above these beds, the Lower Chalk, without flints, rises up sharply to form the downs which are the easterly continuation of the Chiltern Hills. Next comes the Chalk Rock, which being a hard bed, lies near the hilltops by Boxmoor, Apsley End and near Baldock. The Upper Chalk slopes southward towards the Eocene boundary previously mentioned. The Reading beds consist of mottled and yellow clays and sands, the latter are frequently hardened into masses made up of pebbles in a siliceous cement, known locally as Hertfordshire puddingstone. The London Clay, a stiff blue clay which weathers brown, rests nearly everywhere upon the Reading beds. Outliers of Eocene rocks rest on the chalk at Mickle- field Green, Sarrat, BedmOnt, &c. The Chalk is often covered by the Clay-with-flints, a detrital deposit, formed of the remnants of Tertiary rocks and Chalk. Glacial gravels, clays and loams cover a great deal of the whole area, and the Upper Chalk itself has been disturbed at Reed and Barley by the same agency.: Chalk was formerly used for building purposes; it is now burned for lime. Reading beds and London clay are dug for brickmaking at Watford, Hertford and Hatfield. Phosphatic nodules have been excavated from the base of thˆ Chalk Marl at several places along the outcrop; the Marl is worked for cement.

Climate and Agriculture. — The climate is mild, dry and generally healthy. On this account London physicians were formerly accustomed to, recommend the county to persons in weak health, and it was so much coveted by the noble and wealthy as a place of residence that it was a common saying that " he who buys a home in Hertfordshire pays two years' purchase for the air." Of the total area about four-fifths is under cultiva- tion, and of this more than one-third is in permanent pasture. The principal grain crop is wheat, occupying about two-fifths of the area under corn, but gradually decreasing. The varieties mostly grown are white, and they are unsurpassed by those of any English county. Wheathampstead on

the upper Lea receives its name from the fine quality of the wheat grown in that district. Barley is largely used in the county for malting purposes. Vetches are grown for the London stables, and the greater part of the permanent grass is used for hay. There are some very rich pastures on the banks of the Stort, and also near Rickmansworth on the Colne. Some two-thirds of the area occupied by green crops is under turnips, swedes and mangolds, many cows being kept for the supply of milk and butter to London. The quantity of stock is generally small, but increasing except in the case of sheep, of which the numbers have greatly decreased. Of cows the most common breed is the Suffolk variety; of sheep, Southdowns, Wiltshires and a cross between Cotteswolds and Leicesters. In the south-west large quantities of cherries, apples and strawberries are grown for the London market; and on the best soils near London vegetables are forced by the aid of manure, and more than one crop is sometimes obtained in a year. A considerable industry lies in the growth of watercresses in the pure water of the upper parts of the rivers and

the smaller streams. There are a number of rose-gardens and nurseries.

Other Industries. — The manufacturing industries are slight; though the great brewing establishments at Watford may be mentioned, and straw-plaiting, paper-making, coach-building, tanning and brick-making are carried on in various towns.

Communications. — Owing to its proximity to the metropolis, Hertfordshire is particularly well served by railways. On the eastern border there is the Great Eastern (Cambridge line) with branches to Hertford and to Buntingford. The main line of the Great Northern passes through the centre by Hatfield, Stevenage and Hitchin, with branches from Hatfield to Hertford, to St Albans and to Luton and Dunstable, and from Hitchin to Baldock, Royston and so to Cambridge. The Midland passes through St Albans and Harpenden, with a branch to Hemel Hempstead. The London & North- Western traverses the south- west by Watford, Berkhampstead and Tring, with branches to Rickmansworth and to St Albans. The Metropolitan & Great Central joint line serves Rickmansworth, and suburban lines of the Great Northern the Barnet district. The existence of these communications has combined with the natural attractions of the county to cause many villages to become large residential centres. Water communications are supplied from Hertford, Ware and Bishop Stortford, southward to the Thames by the Lea and Stort Navigation; and the Grand Junction canal from London to the north-west traverses the south-western corner of the

county by Rickmansworth and Berkhampstead. Three great highways from London to the north traverse the county. The Holyhead Road passes Chipping Barnet, South Mimms and St Albans, quitting the county near Dunstable. The Great North Road branches from the Holyhead Road at Barnet, and passes Potter's Bar, Hatfield, Stevenage and Baldock, with a branch from Wei wyn to Hitchin and beyond. Another road follows the Lea valley to Ware, whence it runs to Royston, being here coincident with the Roman Ermine Street and known as the Old North Road.

Population and Administration. — The area of the ancient county is 406,157 acres with a population in 1891 of 220,162, and in 1901 of 250,152. The area of the administrative county is 404,518 acres. The county comprises eight hundreds. The municipal boroughs are: Hemel Hempstead (11,264), Hertford 9322), St Albans, a city (16,019). The other urban districts are: Baldock (2057), Barnet (7876), Berkhampstead (Great Berk- hampstead, 5140), Bishop Stortford (7143), Bushey (4564), Cheshunt (12,292), East Barnet Valley (10,094), Harpenden (4725), Hitchin (10,072), Hoddesdon (4711), Rickmansworth (5627), Royston (351 7), Sawbridgeworth (2085), Stevenage (3957), Tring (4349), Ware (5573) and Watford (29,327). The county is in the home circuit, and assizes are held at Hertford. It has two courts of quarter-sessions, and is divided into 15 petty- sessional divisions. The boroughs of Hertford and St Albans have separate commissions of the peace. The total number of civil parishes is 158. All the civil parishes within 12 m. of, or in which no portion is more than 15 m. from, Charing Cross, London, are included in the metropolitan police district. The county contains 170 ecclesiastical parishes or districts, wholly or in part; it is nearly all in the diocese of St Albans, but small parts are in the dioceses of Ely, Oxford and London. It is divided into four parliamentary divisions— Northern or Hitchin, Eastern or Hertford, Mid or St Albans, Western or Watford, each returning one member. There is no parliamentary borough within the county.

History. — Relics of Saxon occupation have been found in Hertfordshire for the most part near St Albans and Hitchin. The diocesan limits show that part of the shire was included in the West Saxon kingdom. The East Saxons, as early as the 6th century, were settled about Hertford, which in 673 was sufficiently important to be the meeting-place of a synod con- vened by Theodore, archbishop of Canterbury, while in 675 the Witenagemot assembled at a place which has been identified with Hatfield. In the 9th century the district was frequently visited by the Danes ; and after the peace of Wedmore the country east

of the Lea was included in the Danelaw; in 911 Edward the Elder erected forts on both sides of the river at Hertford.

After the battle of Hastings William advanced on Hertford- shire and ravaged as far as Berkhampstead, where the Conquest received its formal ratification. In the sweeping confiscation of estates which followed, the church was generously endowed, the abbey of St Albans alone holding 172 hides, while Count Eustace of Boulogne, the chief lay tenant, held a vast fief in the north-east of the county. Large estates were held by Geoffrey de Mandeville, and the barony of Peter de Valognes, sheriff of the county in 1086, though extending over six counties in the east of England, was returned in n 66 as a Hertfordshire barony. Berkhampstead was the head of an honour carved from the fief of Robert of Mortain. The Hertfordshire estates, however, for the most part changed hands very frequently and the county is noticeably lacking in historic families. Edmund Langley, fifth son of Edward III., was born at King's Langley in this county.

During the war between John and his barons, William, earl of Salisbury and Falkes de Breaute had the king's orders to ravage Hertfordshire, and in 12 16 Hertford Castle was captured and Berkhampstead Castle besieged by Louis of France, who had come over by invitation of the barons. At the time of the rising of 1381 the abbot's tenants broke into the abbey of St Albans and forced the abbot to grant them a charter. During the Wars of the Roses, Henry VI. was defeated at St Albans in 1455; at the second battle of St Albans the earl of Warwick was defeated by Queen Margaret; and in 147 1 Edward IV. again defeated the earl at Barnet. On the outbreak of the Civil War of the 17th century, Hertfordshire joined with Bedfordshire and Essex in petitioning for peace, and St Albans again played an important part in the struggle, being at different times the headquarters of Essex and Fairfax.

As a shire Hertfordshire is of purely military origin, being the district assigned to the fortress which Edward the Elder erected at Hertford. It is first mentioned in the Saxon Chronicle in ror 1 . At the time of the Domesday Survey the boundaries were ap- proximately those of the present day, but part of Meppershall in Bedfordshire formed a detached portion of the shire and is still assessed for land and income tax in Hertfordshire. Of the nine Domesday hundreds, those of Danais and Tring were consolidated about 1 200 under the name of Dacorum ; the modern hundred of Cashio, from being held by the abbots of St Albans, was known as Albaneston, while the remaining six hundreds correspond approximately both in name and extent with those of the present day.

Hertfordshire was originally divided between the dioceses of London and Lincoln. In r29i that part included in the Lincoln diocese formed part of the archdeaconry of Huntingdom and comprised the deaneries of Berkhampstead, Hitchin, Hertford and Baldock", and the archdeaconry and deanery of St Albans; while that part within the London diocese

formed the deanery of Braughing within the archdeaconry of Middlesex. In 1535 the jurisdiction of St Albans had been transferred to the London diocese, the division being otherwise unchanged. In 1846 the whole county was placed within the diocese of Rochester and archdeaconry of St Albans, and in the next year the deaneries of Welwyn, Bennington, Buntingford, Bishop Stortford and Ware were created, and that of Braughing abolished. In 1864 the archdeaconries of Rochester and St Albans were united under the name of the archdeaconry of Rochester and St Albans. Jn 1878 the county was placed in the newly created diocese of St Albans, and formed the archdeaconry of St Albans, the deaneries being unchanged.

Hertfordshire was closely associated with Essex trom the time of its first Settlement, and the counties paid a joint fee-farm and were united under one sheriff until 1565, the shire-court being held at Hertford. The hundred of ' St Albans was at an early date constituted a separate liberty, with independent courts and coroners under the control of the abbot; it preserved a separate commission of the peace until 1874, when by act of parliament the county was arranged in two divisions, the eastern division

being named Hertford, and the western the liberty of St Albans. These divisions have since been abolished.

Hertfordshire has always been an agricultural county, with few manufactures, and at the time of the Domesday Survey its wealth was derived almost entirely from its rural manors, with their water meadows, woodlands, fisheries paying rent in eels, and water-mills, the shire on its eastern side being noticeably free from waste land. In Norman times the woollen trade was considerable, and the great corn market at Royston has been famous since the reign of Elizabeth. At the time of the Civil War the malting industry was largely carried on, and saltpetre was produced in the county. In the 17th century Hertfordshire was famous for its horses, and the 18th century saw the introduction of several minor industries, such as straw-plaiting, paper-making and silk weaving.

In 1290 Hertfordshire returned two members to parliament, and in 1298 the borough of Hertford was represented. St Albans, Bishop Stortford and Berkhampstead acquired repre- sentation in the 14th century, but from 1375 to 1553 no returns were made for the boroughs. St Albans regained representation in 1553 and Hertford in 1623, Under the Reform Act of 1832 the county returned three members. St Albans was dis- franchised on account of bribery in 1852. Hertford lost one member in 1868, and was

disfranchised by the act of 1885.

Antiquities. — Among the objects of antiquarian interest may be mentioned the cave of Royston, doubtless once used as a hermitage; Waltham Cross, erected to mark the spot where rested the body of Eleanor, queen of Edward I., on its way to Westminster for interment; and the Great Bed of Ware referred to in Shakespeare's Twelfth Night and preserved at Rye House. The principal monastic buildings are the noble pile of St Albans abbey; the remains of Sopwell Benedictine nunnery near St Albans, founded in 1140; the remains of the priory of Ware, dedicated to St Francis, and originally a cell to the monastery of St Ebrulf at Utica in Normandy; and the remains of the priory at Hitchin built by Edward II. for the Carmelites. Among the more interesting churches may be mentioned those of Abbots Langley and Hemel Hempstead, both of Late Norman archi- tecture; Baldock, a handsome mixed Gothic building supposed to have been erected by the Knights Templars in the reign of Stephen; Royston, formerly connected with the priory of canons regular; Hitchin of the 15th century; Hatfield, dating from the 13th century but in the main later; Berkhampstead, chiefly in the Perpendicular style, with a tower of the 16th century. Sandridge church shows good Norman work with the use of Roman bricks; Wheathampstead church, mainly very fine Decorated, has pre-Norman remains. The remains of secular buildings of importance are those of Berkhampstead castle, Hertford castle, Hatfield palace of the bishops of Ely, the slight traces at Bishop Stortford, and the earthworks at Anstey. Among the numerous mansions of interest, Rye House, erected in the reign of Henry VI., was tenanted by Rumbold, one of the principal agents in the plot to assassinate Charles II. Moor Park, Rickmansworth, once the property of St Albans abbey, was granted by Henry VII. to John de Vere, earl of Oxford, and was afterwards the property of the duke of Monmouth, who built the present mansion, which, however, was subsequently cased with Portland stone and received various other additions. Knebworth, the seat of the Lyttons, was originally a Norman fortress, rebuilt in the time of Elizabeth in the Tudor style and restored in- the 19th century. Hatfield House is the seat of the marquis of Salisbury; but its earlier history is of great interest, as is that of Theobalds near Cheshunt. Panshanger House, until recently the principal seat of the Cowpers, is a splendid mansion in Gothic style erected at the beginning of the 19th century. The manor of Cashiobury House, the seat of the earls of Essex, was formerly held by the abbot of St Albans, but the mansion was rebuilt in the beginning of the 19th century from designs by Wyatt. Gorhambury House, near St Albans, the seat of the earl of Verulam, formerly the seat of the Bacons, and the residence of the great chancellor, was rebuilt at the close of the 18th century. At Kings Langley and Hunsdon were also former royal residences.

See Sir H. Chauncy, Historical Antiquities of Hertfordshire (London, 1700, 2nd ed., Bishop Stortford, 1826); N. Salmon, History of Hertfordshire (London, 1728); R. Clutterbuck, History and Antiquities of the County of Hertford (London, 1815-1827); W. Berry, Pedigrees of the Hertfordshire Families (London, 1844); J. E. Cussans, History of Hertfordshire (London, 1870-1881); Victoria County History, Hertfordshire (London, 1902, &c); see also " Visitation of Hertfordshire, 1572-1634," in Harleian Society's Publ. vol. xvii., and various papers in Middlesex and Hertfordshire Notes and Queries (1895-1898), which in January 1899 was incor- porated in the Home Counties Magazine.

HERTHA, or Nerthus, in Teutonic mythology, the goddess of fertility, "Mother Earth." Tacitus states that many- Teutonic tribes worshipped her with orgies and mysterious rites celebrated at night. The chief seat of her cult was an island which has not been identified. A single priest performed the service. Her veiled statue was moved from place to place by sacred cows on which none but the priest might lay hands. At the conclusion of the rites the image, its vestments and its vehicle were bathed in a lake.

HERTZ, HEINRICH RUDOLF (1857-1894), German physicist, was born at Hamburg on the 22nd of February 1857. On leaving school he determined to adopt the profession of engineering, and in the pursuance of this decision went to study in Munich in 1877. But soon coming to the conclusion that engineering was not his vocation he abandoned it in favour of physical science, and in October 1878 began to attend the lectures of G. R. Kirchhoff and H. von Helmholtz at Berlin. In preparation for these he spent the winter of 1877-1878 in reading up original treatises like those of Laplace and Lagrange on mathematics and mechanics, and in attending courses on practical physics under P. G. von Jolly and J. F. W. von Bezold; the consequence was that within a few days of his arrival in Berlin in October 1878 he was able to plunge into original research on a problem of electric inertia. For the best solution a prize was offered by the philosophical faculty of the University, and this he succeeded in winning with the paper which was published in 1 880 on the ' ' Kinetic Energy of Electricity in Motion." His next investigation, on " Induction in Rotating Spheres," he offered in 1880 as his dissertation for his doctor's degree, which he obtained with the rare distinction of summa cum laude. Later in the same year he became assistant to Helmholtz in the physical laboratory of the Berlin Institute. During the three years he held this position he carried out researches on the contact of elastic solids, hardness, evaporation and the electric discharge in gases, the last earning him the special commendation of Helmholtz. In 1883 he went to Kiel, becoming Privatdozent, and there he began the studies in Maxwell's electro-magnetic theory which a few years later resulted in the discoveries that rendered his name famous. These were actually made between 1885 and 1889, when he

was professor of physics in the Carlsruhe Polytechnic. He himself recorded that their origin is to be sought in a prize problem proposed by the Berlin Academy of Sciences in 1879, having reference to the experi- mental establishment of some relation between electromagnetic forces and the dielectric polarization of insulators. Imagining that this would interest Hertz and be successfully attacked by him, Helmholtz specially drew his attention to it, and promised him the assistance of the Institute if he decided to work on the subject; but Hertz did not take it up seriously at that time, because he could not think of any procedure likely to prove effective. It was of course well known, as a necessity of Maxwell's mathematical theory, that the polarization and depolarization of an insulator must give rise to the same electromagnetic effects in the neighbourhood as a voltaic current in a conductor. The ex- perimental proof, however, was still lacking, and though several experimenters had come very near its discovery, Hertz was the first who actually succeeded in supplying it, in 1887. Continuing his inquiries for the next year or two, he was able to discover the pro- gressive propagation of electromagnetic action through space, to measure the length and velocity of electromagnetic waves, and to show that in the transverse nature of their vibration and their sus- ceptibility to reflection, refraction and polarization they are in complete correspondence with the waves of light and heat. The result, was in Helmholtz's words, to establish beyond doubt that

ordinary light consists of electrical vibrations in an all-pervading ether which possesses the properties of an insulator and of a magnetic medium. Hertz himself gave an admirable account of the significance of his discoveries in a lecture on the relations between light and electricity, delivered before the German Society for the Advancement of Natural Science and Medicine at Heidel- berg in September 1889. Since the time of these early experi- ments, various other modes of detecting the existence of electric waves have been found out in addition to the spark-gap which he first employed, and the results of his observations, the earliest interest of which was simply that they afforded a confirmation of an abstruse mathematical theory, have been applied to the practical purposes of signalling over considerable distances (see Telegraphy, Wireless). In 1880 Hertz was appointed to succeed R. J. E. Clausius as ordinary professor of physics in the university of Bonn. There he continued his researches on the discharge of electricity in rarefied gases,- only just missing the discovery of the X-rays described by W. C. Rontgen a few years later, and produced his treatise on the Principles of Mechanics. This was his last work, for after a long illness he died at Bonn on the 1st of January 1894. By his premature

death science lost one of her most promising disciples. Helmholtz thought him the one of all his pupils who had penetrated farthest into his own circle of scientific thought, and looked to him with the greatest confidence for the further extension and development of his work.

Hertz's scientific papers were translated into English by Professor D. E. Jones, and published in three volumes: Electric Waves (1893), . Miscellaneous Papers (1896), and Principles of Mechanics (1899). The preface contributed to the first of these by Lord Kelvin, and the introductions to the second and third by Professors P. E. A. Lenard and Helmholtz, contain many biographical details, together with statements of the scope and significance of his investigations.

HERTZ, HENRIK (1797-1870), Danish poet, was born of Jewish parents in Copenhagen on the 25th of August 1798. In 181 7 he was sent to the university. His father died in his infancy, and the family property was destroyed in the bombard- ment of 1807. The boy was brought up by his relative, M. L. Nathanson, a well-known newspaper editor. Young Hertz passed his examination in law in 1825. But his taste was all for polite literature, and in 1826-1827 two plays of his were produced, Mr Burchardt and his Family and Love and Policy; in 1828 followed the comedy of Flyttedagen. In 1830 he brought out what was a complete novelty in Danish literature, a comedy in rhymed verse, A mor's Strokes of Genius. In the same year Hertz published anonymously Gengangerbrevene, or Letters from a Ghost, which he pretended were written by Baggesen, who had died in 1826. The book was written in defence of J. L. Heiberg, and was full of satirical humour and fine critical insight. Its success was overwhelming; but Hertz preserved his anonymity, and the secret was not known until many years later. In 1832 he published a didactic poem, Nature and Art, and Four Poetical Epistles. A Day on the Island of A Is was his next comedy, followed in 1835 by The Only Fault. Hertz passed through Germany and Switzerland into Italy in 1833; he spent the winter there, and returned the following autumn through France to Denmark. In 1836 his comedy of The Savings Bank enjoyed a great success. But it was not till 1837 that he gave the full measure of his genius in the romantic national drama of Svend Dyrings Hus, a beautiful and original piece. His historical tragedy Valdemar Atterdag was not so well received in 1839; but in 1845 he achieved an immense success with his lyrical drama Kong Rent's Datter (King Ren6's Daughter), which has been translated into almost every European language. To this succeeded the tragedy of Ninon in 1848, the romantic comedy of Tonietta in 1849, A Sacrifice in 1853, The Youngest in 1854. His lyrical poems appeared in successive collections, dated 1832, 1840 and 1844. • From 1858 to 1859 he edited a literary journal entitled Weekly Leaves. His last drama, Three Days in Padua, was produced in 1869, and he died on the 25th of February of the next year.

Hertz is one of the first of Danish lyrical poets. His poems are full of colour and passion, his versification has more witch- craft in it than any other poet's of his age, and his style is grace itself. He has all the sensuous fire of Keats without his proclivity

to the antique. As a romantic dramatist he is scarcely less original. He has bequeathed to the Danish theatre, in Svend Dyrings Hus and King Renews Daughter, two pieces which have become classic. He is a troubadour by instinct; he has little or nothing of Scandinavian local colouring, and succeeds best when he is describing the scenery or the emotions of the glowing south.

His Dramatic Works (18 vols.) were published at Copenhagen in 1854-1873; and his Poems (4 vols.) in 1851-1862.

HERTZBERG, EWALD FRIEDRICH, Count von (1725-1795),

Prussian statesman, who came of a noble family which had been settled in Pomerania since the 13th century, was born at Lottin, in that province, on the 2nd of September 1725. After 1739 he studied, chiefly classics and history at the gymnasium at Stettin, and in 1742 entered the university of Halle as a student of juris- prudence, becoming in due course a doctor of laws in 1745. In addition to this principal study, he was also interested while at the university in historical and philosophical (Christian Wolff) studies. A first thesis for his doctorate, entitled Jus publicum Brandenburgicum, was not printed, because it contained a criticism of the existing condition of the state. Shortly after- wards Hertzberg entered the government service, in which he was first employed in the department of the state archives (of which he became director in 1750), soon after in the foreign office, and finally in 1763 as chief minister (Cabinetsminister). In 1752 he married Baroness Marie von Knyphausen, a marriage which was happy, but childless.

For more than forty years Hertzberg played an active part in the Prussian foreign office. In this capacity he had a decisive influence on Prussian policy, both under Frederick the Great and Frederick William II. At the beginning of the Seven Years' War (1756) he took part as a political writer in the Hohenzollern- Habsburg quarrel, both in his Ursachen, die S.K.M. in Preussen bewogen haben, sich wider die Absichten des Wienerischen Hofes zu setzen und deren Ausfuhrung zuvorzukommen (" Motives which have induced the king of Prussia to oppose the intentions of the court of Vienna, and to prevent them from being carried into effect "), and in his MSmoireraisonnisur la conduite des cours de Vienne et de Saxe, based on the secret papers taken by Frederick the Great from the archives of Dresden. After the defeat at Kolin (1757) he hastened to Pomerania in

order to organize the national defence there and collect the necessary troops for the protection of the fortresses of Stettin and Colberg. In the same year he conducted the peace negotiations with Sweden, and was of great service in bringing about the peace of Huberts- burg (1763), on the conclusion of which the king received him with the words, " I congratulate you. You have made peace as I made war, one against many."

In the later years, too, of Frederick the Great's reign, Hertzberg played a considerable part in foreign policy. In 1772, in a memoir based upon comprehensive historical studies, he defended the Prussian claims to certain provinces of Poland. He also took part successfully as a publicist in the negotiations concerning the question of the Bavarian succession (1778) and those of the peace of Teschen (1779). But in 1780 he failed to uphold Prussian interests at the election of the bishop of Munster. In 1784 appeared Hertzberg's memoir containing a thorough study of the Fiirstenbund. He championed this latest creation of Frederick the Great's mainly with a view to an energetic reform of the empire, though the idea of German unity was naturally still far from his mind. In 1785 followed "An explanation of, the motives which have led the king of Prussia to propose to the othifr high estates of the empire an association for the maintenance of the system of the empire" (Erkldrung der Ursachen, welche S.M. in Preussen bewogen haben, ihren hohen Mitstdnden des Reichs eine Association zur Erhaltung des Reichssystems anzutragen). By upholding the Fiirstenbund Hertzberg made many enemies, prominent among whom was the king's brother, Prince Henry. Though the Fiirstenbund failed to effect a reform of the empire, it at any rate prevented the fulfilment of Joseph II. 's old desire for the incorporation of Bavaria with Austria. The last act of state in which Hertzberg took part under Frederick the Great

was the commercial treaty concluded in 1785 between Prussia and the United States.

With Frederick, especially in his later years, Hertzberg stood in very intimate personal relations and was often the king's guest at Sans-Souci. Under Frederick William II. his influential position at the court of Berlin was at first unshaken. The king at once received him with favour, as is clearly proved by Hertz- berg's elevation to the rank of count in i786;and Mirabeau would never have attacked him with such violence in his Secret History of the Court of Berlin, which appeared in 1788, if he had not seen in him the most powerful man after the king. In this attack Mirabeau seems to have been influenced by Hertzberg's personal enemies at the court.

Hertzberg's political system remained on the whole the same under Frederick William II. as it had been under his predecessor. It was mainly characterized by a sharp opposition to the house of Habsburg and by a desire to win for Prussia the support of England, a policy supported by him in important memoirs of the years 1786 and 1787. His diplomacy was directed also against Austria's old ally, France. Hence it was chiefly owing to Hertzberg that in 1787, in spite of the king's unwillingness at first, Prussia intervened in Holland in support of the stadtholder William V. against the demo- cratic French party (see Holland: History). The success of this intervention, which was the practical realization of apian very characteristic of Hertzberg, marks the culminating point in his career.

But the opposition between him and the new king, which had already appeared at the time of the conclusion of the triple alliance between Holland, England and Prussia, became more marked in the following years, when Hertzberg, relying upon this alliance, and in conscious imitation of Frederick II.'s policy at the time of the first partition of Poland, sought to take advantage of the entanglement of Austria with Russia in the war with Turkey to secure for Prussia an extension of territory by diplomatic intervention. According to his plan, Prussia was to offer her mediation at the proper moment, and in the territorial readjust- ments that the peace would bring, was to receive Danzig and Thorn as her portion. Beyond this he aimed at preventing the restoration of the hegemony of Austria in the Empire, and secretly cherished the hope of restoring Frederick the. Great's Russian alliance.

With a curious obstinacy he continued to pursue these aims even when, owing to military and diplomatic events, they were already partly out of date. His personal position became increasingly difficult, as deep-rooted differences between him and the king were revealed during these diplomatic campaigns. Hertzberg wished to effect everything by peaceful means, while Frederick William II. was for a time determined on war with Austria. As regards Polish policy, too, their ideas came into conflict, Hertzberg having always been openly opposed to the total annihilation of the Polish kingdom. The sameis trueof the attitude of king and minister towards Great Britain. At the con- ferences at Reichenbach in the summer of 1700, this opposition became more and more acute, and Hertzberg was only with difficulty persuaded to come to an agreement merely on the basis of the status quo, as demanded by Pitt. The king's renuncia- tion of any extension of territory was in Hertzberg's eyes impolitic, and this view of his was later endorsed by Bismarck. A letter which came to the eyes of the king, in which Hertzberg severely criticized the king's foreign policy, and especially his plans for attacking Russia, led to his dismissal on the 5th of July 1791. He afterwards made several attempts to exert an influence over foreign affairs, but in vain. The king showed himself more and more personally hostile to

the ex- minister, and in later years pursued Hertzberg, now quite embittered, with every kind of petty persecution, even ordering his letters to be opened.

Even in his literary interests Hertzberg found an adversary in the ungrateful king, for Frederick William, to give one instances made it so difficult for him to use the archives that in the end Hertzberg entirely gave up the attempt. He found, however, some recompense for all his disillusionment and discouragement

in learning, and, Wilhelm von Humboldt excepted, he was the most learned of all the Prussian ministers. As a member of the Berlin Academy especially, and, from 1786 onwards, as its curator, Hertzberg carried on a great and valuable activity in the world of learning. His yearly reports dealt with history, statistics and political science. The most interesting is that of 1784: Sur la forme des gouvernements, et quelle est la meilleure. This is directed exclusively against the absolute system (following Montesquieu), upholds a limited monarchy, and is in favour of extending to the peasants the right to be represented in the diet. He spoke for the last time in 1 793 on Frederick the Great and the advantages of monarchy. After 1783 these discourses caused a great sensa- tion, since Hertzberg introduced into them a review of the financial situation, which in the days of absolutism seemed an unprecedented innovation. Besides this, Hertzberg exerted himself as an academician to change the strongly French character of the Academy and make it into a truly German institution. He showed a keen interest in the old German language and literature. A special " German deputation " was set aside at the Academy and entrusted with the drawing up of a German grammar and dictionary. He also stood in very close relations with many of the German poets of the time, and especially with Daniel Schubart. Among the German historians in whom he took a great interest, he had the greatest esteem for Pufendorf. He was equally concerned in the improvement of the state of education. In 1780 he boldly took up the defence of German literature, which had been disparaged by Frederick the Great in his famous writing De la littirature allemande.

Hertzberg's frank and honourable nature little fitted him to be a successful diplomatist; but the course of history has justified many of his aims and ideals, and in Prussia his memory is honoured. He died at Berlin on the 22nd of May 1795.

Authorities.ˆ-(i) By Hertzberg himself: 'The MimoireS, de I' Academie from 1780 on contain Hertzberg's discourses. The most noteworthy of them were printed in 1787. Here too is to be found: Histoire de la dissertation [du roi] sur la litterature allemande; see also Recueil des deductions, &c, qui ont eti rediges . . . pour la cour de Prusse par le ministre (3 vols., 1789-1795);

and an "Auto- biographical Sketch " published by Hopke in Schmidt's Zeitschrift fur Geschichtswissenschaft, i. (1843). (2) Works dealing specially with Hertzberg: Mirabeau, Histoire secrete de la cour de Berlin (1788); P. F. Weddigen, Hertzbergs Leben (Bremen, 1797); E. L. Posselt, Hertzbergs Leben (Tubingen, 1798); H. Lehmann, in Neustettiner Programm (1862) ; E. Fischer, in Staatsanzeiger (1873) ; M. Duncker, in Historische Zeitschrift (1877); Paul Bailleu, in Historische Zeit- schrift (1879); and. Allgemeine deutsche Biographic (1880); H. Petnch, Pommersche Lebensbilder i. (1880) ; G. Dressier, Friedrich II. und Hertzberg in ihrer Stellung zu den hollandischen Wirren, Breslauer Dissertation (1882); K. Krauel, Hertzberg dls Minister Friedrich Wilhelms II. (Berlin, 1899); F. K. Wittichen, in Historische Vierteljahrschrift, 9 (1906); A. Th. Preuss, Ewald Friedrich, Graf von Hertzberg (Berlin, 1909). (3) General works: F. K. Wittichen, Preussen und England, 1785-1788 (Heidelberg, 1902) ; . F. Luckwaldt, Die englisch-preussische Allianz von 1788 in den Forsckungen zur brandenburgisch-preussischen Geschichte, Bd. 15, and in the Delbrückfestschrift (Berlin, 1908) ; L. Sevin, System der preussischen Geheimpolitik 1790-1701 (Heidelberger Dissertation, T 903); P- Wittichen, Die polnische Politik Preussens 1788-1700 (Berlin, 1899); F. Andreae, Preussische und russische Politik in Polen 1787-1780 (Berliner Dissertation, 1905); also W. Wenck, Deutschland vor 100 Jahren (2 vols., 1887, 1890); A. Harnack,. Geschichte der preussischen Akademie (4 vols., 1899); Consentius, Preussische Jahrbucher (1904); J. Hashagen, " Hertzbergs Verhalt- nis zur deutschen Literatur," in Zeitschrift fiir deutsche Philologie for 1903. (J. Hn.)

HERTZEN, ALEXANDER (1812-1870), Russian author, was born at-Moscow, a very short time before the occupation of that city by the French. His father, Ivan Yakovlef, after a personal interview with Napoleon, was allowed to leave, when the invaders arrived, as the bearer of a letter from the French to the Russian emperor. His family attended him to the Russian lines. Then the mother of the infant Alexander (a young German Protestant of Jewish extraction from Stuttgart, according to A. von Wurzbach), only seventeen years old, and quite unable to speak Russian, was forced to seek shelter for some time in a peasant's hut. A year later the family returned to Moscow, where Hertzen passed his youth — remaining there, after completing his studies at the university, till 1834, when he was arrested and tried on a

charge of having assisted, with some other youths, at a festival during

which verses by Sokolovsky, of a nature uncomplimentary to the emperor, were sung. The special commission appointed to try the youthful culprits found him guilty, and in 1835 he was banished to Viatka. There he remained till the visit to that city of the hereditary grand-duke (afterwards Alexander II.), accompanied by the poet Joukofsky, led to his being allowed to quit Viatka for Vladimir, where he was appointed editor of the official gazette of that city. In 1840 he obtained a post in the ministry of the interior at St Petersburg; but in consequence of having spoken too frankly about a death due to a police officer's violence, he was sent to Novgorod, where he led an official life, with the title of " state councillor," till 1842. In 1846 his father died, leaving him by his will a very large property. Early in 1847 he left Russia, never to return. From Italy, on hearing of the revolution of 1848, he hastened to Paris, whence he afterwards went to Switzerland. In 1852 he quitted Geneva for London, where he settled for some years. In 1864 he returned to Geneva, and after some time went to Paris, where he died on the 21st of January 1870.

His literary career began in 1842 with the publication of an essay, in Russian, on Dilettantism in Science, under the pseudonym of " Iskander," the Turkish form of his Christian name — con- victs, even when pardoned, not being allowed in those days to publish under their own names. His second work, also in Russian , was his Letters on the Study of Nature (1845-1846). In 1847 appeared his novel Kto Vinovat? (Whose Fault?), and about the same time were published in Russian periodicals the stories which were afterwards collected and printed in London in 1854, under the title of Prervannuie Razskazui (Interrupted Tales). In 1850 two works appeared, translated from the Russian manuscript, Vom anderen Ufer (From another Shore) and Letlres de France et d'ltalie. In French appeared also his essay Du Developpement des id&es rSvolutionnaires en Russie, and his Memoirs, which, after being printed in Russian, were translated under the title of Le Monde russe et la Revolution (3 vols., 1860- 1862), and were in part translated into English as My Exile to Siberia (2 vols., 1855). From a literary point of view his most important work is Kto Vinovat? a story describing how the domestic happiness of a young tutor, who marries the unacknow- ledged daughter of a Russian sensualist of the old type, dull, ignorant and genial, is troubled by a Russian sensualist of the new school, intelligent, accomplished and callous, without there being any possibility of saying who is most to be blamed for the tragic termination. But it was as a political writer that Hertzen gained the vast reputation which he at one time enjoyed. Having founded in London his " Free Russian Press," of the fortunes of which, during ten years, he gave an interesting account in a book published (in Russian) in 1863, he issued from it a great number of Russian works, all levelled against the system of government prevailing in Russia. Some of these were essays, such as his Baptized Property, an attack

on serfdom ; others were periodical publications, the Polyarnaya Zvyezda (or Polar Star), the Kolokol (or Bell), and the Golosaiz Rossii (or Voices from Russia). The Kolokol soon obtained an immense circulation, and exercised an extraordinary influence. For three years, it is true, the founders of the " Free Press " went on printing, " not only without selling a single copy, but scarcely being able to get a single copy introduced into Russia "; so that when at last a bookseller bought ten shillings' worth of Baptized Property, the half-sovereign was set aside by the surprised editors in a special place of honour. But the death of the emperor Nicholas in 1855 produced an entire change. Hertzen's writings, and the journals he edited, were smuggled wholesale into Russia, and their words resounded throughout that country, as well as all over Europe. Their influence became overwhelming. Evil deeds long hidden, evil-doers who had long prospered, were suddenly dragged into light and disgrace. His bold and vigorous language aptly expressed the thoughts which had long been secretly stirring Russian minds, and were now beginning to find a timid utterance at home. For some years his influence in Russia was a living force, the circulation of his writings was a vocation zealously

pursued. Stories tell how on one occasion a merchant, who had bought several cases of sardines at Nijni-Novgorod, found that they contained forbidden print instead of fish, and at another time a supposititious copy of the Kolokol was printed for the emperor's special use, in which a telling attack upon a leading statesman, which had appeared in the genuine number, was omitted. At length the sweeping changes introduced by Alexander II. greatly diminished the need for and appreciation of Hertzen's assistance in the work of reform. The freedom he had demanded for the serfs was granted, the law-courts he had so long denounced were remodelled, trial by jury was established, liberty was to a great extent conceded to the press. It became clear that Hertzen's occupation was gone. When the Polish insurrection of 1863 broke out, and he pleaded the insurgents' cause, his reputation in Russia received its death-blow. From that time it was only with the revolutionary party that he was in full accord.

In 1873 a collection of his works in French was commenced in Paris. A volume of posthumous works, in Russian, was published at Geneva in 1870. His Memoirs supply the principal information about his life, a sketch of which appears also in A. von Wurzbach's Zeitgenossen, pt. 7 (Vienna, 1871). See also the Revue des deux monies for July 15 and Sept. 1, 1854. Kto Vinovat? has been trans- lated into German under the title of Wer ist schuld? in Wolffsohn's Russlands Novellendichter, vol. iii. The title of My Exile in Siberia is misleading; he was never in that country. (W. R. S.-R.)

HERULI, a Teutonic tribe which figures prominently in the history of the

migration period. The name does not occur in writings of the first two centuries a.d. Where the original home of the Heruli was situated is never clearly stated. Jordanes says that they had been expelled from their territories by the Danes, from which it may be inferred that they belonged either to what is now the kingdom of Denmark, or the southern portion of the Jutish peninsula. They are mentioned first in the reign of Gallienus (260-268), when we find them together with the Goths ravaging the coasts of the Black Sea and the Aegean. Shortly afterwards, in a.d. 289, they appear in the region about the mouth of the Rhine. During the 4th century they frequently served together with the Batavi in the Roman armies. In the 5th century we again hear of piratical incursions by the Heruli in the western seas. At the same time they had a kingdom in central Europe, apparently in or round the basin of the Elbe. Together with the Thuringi and Warni they were called upon byTheodoric the Ostrogoth about the beginning of the 6th century to form an alliance with him against the Frankish king Clovis, but very shortly afterwards they were completely overthrown in war by the Langobardi. A portion of them migrated to Sweden, where they settled among the Gotar, while others crossed the Danube and entered the Roman service, where they are frequently mentioned later in connexion with the Gothic wars. After the middle of the 6th century, however, their name completely disappears. It is curious that in English, Frankish and Scandin- avian works they are never mentioned, and there can be little doubt that they were known, especially among the western Teutonic peoples, by some other name. Probably they are identical either with the North Suabi or with the Iuti. The name Heruli itself is identified by many with the A.S. eorlas (nobles), O.S. erlos (men), the singular of which (erilaz) frequently occurs in the earliest Northern inscriptions, apparently as a title of honour. The Heruli remained heathen until the overthrow of their kingdom, and retained many striking primitive customs. When threatened with death by disease or old age, they were required to call ifi an executioner, who stabbed them on the pyrt. Suttee was also customary. They were entirely devoted to war. fare and Served not only in the Roman armies, but also in those of all the surrounding nations. They disdained the use of helmets and coats of mail, and protected themselves only with shields.

See Georgius Syncellus; Mamertinus Paneg. Maximi; Ammiahus Marcellinus; Zosimus i. 39; Idatius, Chronica; Jordanes, De origine Getarum; Procopius, esp. Bellum Goticum, ii. 14 f. ; Bellum Persicum, ii. 25; Paulus Diaconus, Hist. Langobardorum, L 20; K. Zeuss, Die Deutschen und die Nachbarstamme, pp. 476 ff. (Munich, 1837). (F. G. M. B.)

HERVAS Y PANDURO, LORENZO (1735-1809), Spanish philologist, was born at Horcajo (Cuenca) on the 10th of May 1735- He joined the Jesuits on the 29th of September 1745 and in course of time became successively professor of philosophy and humanities at the seminaries of Madrid and Murcia. When the Jesuit order was banished from Spain in 1767, Hervas settled at Forli, and devoted himself to the first part of his Idea del- V Universo (22 vols., 1778-1792). Returning to Spain in 1798, he published his famous Catdlogo de las lenguas de las naciones conocidas (6 vols., 1800-1805), in which he collected the philo- logical peculiarities of three hundred languages and drew up grammars of forty languages. In 1802 he was appointed librarian of the Quirinal Palace in Rome, where he died on the 24th of August 1809. Max Miüller credits him with having anticipated Humboldt, and with making " one of the most brilliant dis- coveries in the history of the science of language " by establishing the relation between the Malay and Polynesian family of speech.

HERVEY, JAMES (1714-1758), English divine, was born at Hardingstone, near Northampton, on the 26th of February 1714, and was educated at the grammar school of Northampton, and at Lincoln College, Oxford. Here he came under the influence of John Wesley and the Oxford methodists; ultimately, however, while retaining his regard for the men and his sympathy with their religious aims, he adopted a thoroughly Calvinistic creed, and resolved to remain in the Anglican Church. Having taken orders in 1737, he held several curacies, and in 1752 succeeded his father in the family livings of Weston Favell and Collingtree. He was never robust, but was a good parish priest and a zealous writer. His style is often bombastic, but he displays a rare appreciation of natural beauty, and his simple piety made him many friends. His earliest work, Meditations and Contempla- tions, said to have been modelled on Robert Boyle's Occasional Reflexions on various Subjects, within fourteen years passed through as many editions. Theron and Aspasio, or a series of Letters upon the most important and interesting Subjects, which appeared in 1755, and was equally well received, called forth some adverse criticism even from Calvinists, on account of tendencies which were considered to lead to antinomianism, and was strongly objected to by Wesley in his Preservative against unsettled Notions in Religion. Besides carrying into England the theological disputes to which the Marrow of Modern Divinity had given rise in Scotland, it also led to what is known as the Sandemanian controversy as to the nature of saving faith. Hervey died on the 25th of December 1758.

A " new and complete " edition of his Works, with a memoir, appeared in 1797. See also Collection of the Letters of James Hervey, to which is prefixed an account of his Life and Death, by Dr Birch

(1760).

HERVEY DE SAINT DENYS, MARIE JEAN LEON, Marquis d' (1823-1892), French Orientalist and man of letters, was born in Paris in 1823. He devoted himself to the study of Chinese, and in 185 1 published his Recherches sur I 'agriculture et V horti- culture des Chinois, in which he dealt with the plants and animals that might be acclimatized in the West. At the Paris Exhibition of 1867 he acted as commissioner for the Chinese exhibits; in 1874 he succeeded Stanislas Julien in the chair of Chinese at the College de France; and in 1878 he was elected a member of the Academie des Inscriptions et de Belles-Lettres. His works include Poesies de I'Spoque des T'ang (1862), translated from the Chinese; Ethnographie des peuples Strangers A la Chine, translated from Ma-Touan-Lin (1876-1883); Li-Sao (1870), from the Chinese; Memoires sur les doctrines religieuse; de Confucius et de I'ecole des lettres (1887); and translations of some Chinese stories not of classical interest but valuable for the light they throw on oriental custom. Hervey de Saint Denys also trans- lated some works from the Spanish, and wrote a history of the Spanish drama. He died in Paris on the 2nd of November 1892. HERVEY OF ICKWORTH, JOHN HERVEY, Baron (1696- 1743), English statesman and writer, eldest son of John, 1st earl of Bristol, by his second marriage, 'was born on the 13th of October 1696. He was educated at Westminster school and at Clare Hall, Cambridge, where he took his M.A. degree in 1715.

In 1 7 16 his father sent him to Paris, and thence to Hanover to pay his court to George I. He was a frequent visitor at the court of the prince and princess of Wales at Richmond, and in 1720 he married Mary Lepell, who was one of the princess's ladies-in-waiting, and a great court beauty. In 1723 he received the courtesy title of Lord Hervey on the death of his half-brother Carr, and in 1725 he was elected M.P. for Bury St Edmunds. He had been at one time on very friendly terms with Frederick, prince of Wales, but from 1731 hequarrelled with him, apparently because they were rivals in the favour of Anne Vane. These differences probably account for the scathing picture he draws of the prince's callous conduct. Hervey had been hesitating between William Pulteney (afterwards earl of Bath) and Walpole, but in 1730 he definitely took sides with Walpole, of whom he was thenceforward a faithful adherent. He was assumed by Pulteney to be the author of Sedition and Defamation display'd ■with aDedication tothe patrons of The Craftsman (17 31). Pulteney, who, up to this time, had been a firm friend of Hervey, replied with A Proper Reply to a late Scurrilous Libel, and the quarrel resulted in a duel from which Hervey narrowly escaped with his life. Hervey is said to have denied the authorship of both the pamphlet and its dedication, but a note on the MS. at Ickworth, apparently in his own hand, states that he wrote the latter. He was able to render valuable service to Walpole from his influence over the queen. Through him the minister governed Queen Caroline and indirectly George

II. Hervey was vice-chamberlain in the royal household and a member of the privy council. In 1733 he was called to the House of Lords by writ in virtue of his father's barony. In spite of repeated requests he received no further preferment until after 1740, when he became lord privy seal. After the fall of Sir Robert Walpole he was dismissed (July 1742) from his office. An excellent political pamphlet, Miscellaneous Thoughts on the present Posture of Foreign and Domestic Affairs, shows that he still retained his mental vigour, but he was liable to epilepsy, and his weak appearance and rigid diet were a constant source of ridicule to his enemies. He died on the 5th of August 1743. He predeceased his father, but three of his sons became successively earls of Bristol.

Hervey wrote detailed and brutally frank memoirs of the court of George II. from 1727 to 1737. He gave a most unflattering account of the king, and of Frederick, prince of Wales, and their family squabbles. For the queen and her daughter, Princess Caroline, he had a genuine respect and attachment, and the princess's affection for him was commonly said to be the reason for the close retirement in which she lived after his death. The MS. of Hervey's memoirs was preserved by the family, but his son, Augustus John, 3rd earl of Bristol, left strict injunctions that they should not be published until after the death of George III. In 1848 they were published under the editorship of J. W. Croker, but the MS. had been subjected to a certain amount of mutilation before it came into his hands. Croker also softened in some cases the plainspokenness of the original. Hervey's bitter account of court life and intrigues resembles in many points the memoirs of Horace Walpole, and the two books corroborate one another in many statements that might otherwise have been received with suspicion.

Until the publication of the Memoirs Hervey was chiefly known as the object of savage satire on the part of Pope, in whose works he figured as Lord Fanny, Sporus, Adonis and Narcissus. The quarrel is generally put down to Pope's jealousy of Hervey's friendship with Lady Mary Wortley Montagu. In the first of the Imitations of Horace, addressed to William Fortescue, "Lord Fanny " and " Sappho " were generally identified with Hervey and Lady Mary, although Pope denied the personal intention. Hervey had already been attacked in the Dunciad and the Bathos, and he now retaliated. There is no doubt that he had a share in the Verses to the Imitator of Horace (1732) and it is possible that he was the sole author. In the Letter from a noble- man at Hampton Court to a Doctor oj r Divinity (17 33), he scoffed at Pope's deformity and humble birth. Pope's reply was a Letter to a Noble Lord, dated November 1733, and the portrait of Sporus in the Epistle to Dr Arbuthnot (1735), which forms the prologue to

the satires. Many of the insinuations and insults contained in it are borrowed from Pulteney's libel. The malicious caricature of Sporus does Hervey great injustice, and he is not much better treated by Horace Walpole, who in reporting his death in a letter (14th of August 1743) to Horace Mann, said he had outlived his last inch of character. Nevertheless his writings prove him to have been a man of real ability, condemned by Walpole's tactics and distrust of able men to spend his life in court intrigue, the weapons of which, it must be owned, he used with the utmost adroitness. His wife Lady Hervey [Molly Lepell] (1700-1768), of whom an account is to be found in Lady Louisa Stuart's Anecdotes, was a warm partisan of the Stuarts. She retained her wit and charm throughout her life, and has the distinction of being the recipient of English verses by Voltaire.

See Hervey's Memoirs of the Court of George II., edited by J. W. Croker (1848); and an article by G. F. Russell Barker in the Diet. Nat. Biog. (vol. xxvi., 1891). Besides the Memoirs he wrote numerous political pamphlets, and some occasional verses.

HERVIEU, PAUL (1857-), French dramatist and novelist, was born at Neuilly (Seine) on the 2nd of November 1857. He was called to the bar in 1877, and, after serving some time in the office of the president of the council, he qualified for the diplomatic service, but resigned on his nomination in 1881 to a secretaryship in the French legation in Mexico. He contributed novels, tales and essays to the chief Parisian papers and reviews, and published a series of clever novels, including L'Inconnu (1887), Flirt (1890), L'Exorcisee (1891), Peints par eux-mimes (1893), an ironical study written in the form of letters, and L' Armature (1895), dramatized in 1905 by Eugene Brieux. But his most important work consists of a series of plays: Les Paroles restent (Vaudeville, 17th of November 1892); Les Tenailles (Theatre Francais, 28th of September 1895); La Lot de I'komme (Theatre Francais, 15th of February 1897); La Course du flambeau (Vaudeville, 17th of April 1901); Point de lendemain (Odeon, 18th of October 1901), a dramatic version of a story by Vivaut Denon; L'£nig',ne (Theatre Francais, 5th of November 1901); Thiroigne de M&ricourt (Theatre Sarah Bernhardt, 23rd of September 1902); Le Dtdale (Theatre Francais, 19th of December 1903), andLe Rtveil (Theatre Francais, 18th of December 1905). These plays are built upon a severely logical method, the mechanism of which is sometimes so evident as to destroy the necessary sense of illusion. The closing words of La Course du flambeau— ■" Pour mafllle, j'aituimamere " — are an example of his selection of a plot representing an extreme theory. The riddle in L'Engime (staged at Wyndham's Theatre, London, March 1st 1902, as Caesar'sWife) is, however, worked out with great art, and Le De"dale, dealing with the

obstacles to the remarriage of a divorced woman, is reckoned among the master- pieces of the modern French stage. He was elected to the French Academy in 1900.

See A. Binet, in L'Annee psychologique, vol. x. Hervieu's Theatre was published by Lemerre (3 vols., 1900-1904).

HERWARTH VON BITTENFELD, KARL EBERHARD (1796- 1884), Prussian general field-marshal, came of an aristocratic family which had supplied many distinguished officers to the Prussian army. He entered the Guard »infan try in 1811, and served through the War of Liberation (1813-15), distinguishing himself at Ltitzen and Paris. During the years of peace he rose slowly to high command. In the Berlin revolution of 1848 he was on duty at the royal palace as colonel of the 1st Guards. Major-general in 1852, and lieutenant-general in 1856, he received the grade of general of infantry and the command of the VHth (Westphalian) Army Corps in i860. In the Danish War of 1864 he succeeded to the command of the Prussians when Prince Frederick Charles became commander-in-chief of the Allies, end it was under his leadership that the Prussians forced the passage into Alsen on the 29th of June. In the war of 1866 Herwarth commanded the " Army of the Elbe " which overran Saxony and invaded Bohemia by the valley of the Elbe and Iser. His troops won the actions of Huhnerwasser and Munchengratz, and at Koniggratz formed the right wing of the Prussian army. Herwarth himself directed the battle against the Austrian left flank. In 1870 he was not employed in the field, but was in charge of the scarcely less important business of organizing

and forwarding all the reserves and material required for the armies in France. In 187 1 his great services were recognized by promotion to the rank of field-marshal. The rest of his life was spent in retirement at Bonn, where he died in 1884. Since 1889 the 13th (1st Westphalian) Infantry has borne his name.

See G. F. M. Herwarth von Bittenfeld (Minister, 1896).

HERWEGH, GEORG (1817-1875), German political poet, was born at Stuttgart on the 31st of May 1817, the son of a restaurant keeper. He was educated at the gymnasium of his native city, and in 1835 proceeded to the university of Tubingen as a theo- logical student, where, with a view to entering the ministry, he entered the protestant theological seminary. But the strict discipline was distasteful; he broke the rules and was expelled in 1836. He next studied law, but having gained the interest of August Lewald (1 793-1871) by his literary ability, he returned to Stuttgart, where Lewald obtained for him a journalisitic post. Called out for military service, he had hardly joined his regiment when he committed an act of flagrant

insubordination, and fled to Switzerland to avoid punishment. Here he published his Gedichte eines Lebendigen (1841), a volume of political poems, which gave expression to the fervent aspirations of the German youth of the day. The work immediately rendered him famous, and although confiscated, it soon ran through several editions. The idea of the book was a refutation of the opinions of Prince Puckler-Muskau {q.v.) in his Briefe eines Verstorbenen. He next proceeded to Paris and in 1842 returned to Germany, visiting Jena, Leipzig, Dresden and Berlin — a journey which was described as being a " veritable triumphal progress." His military insubordination appears to have been forgiven and forgotten, for in Berlin King Frederick William IV. had him introduced to him and used the memorable words: " ich Hebe eine gesinnungsvolle Opposition" ("I admire an opposition, when dictated by principle.") Herwegh next returned tc Paris, where he published in 1844 the second volume of his Gedichte eines Lebendigen, which, like the first volume, was confiscated by the German police. At the head of a revolutionary column of German working men, recruited in Paris, Herwegh took an active part in the South German rising in 1848; but his raw troops were defeated on the 27th of April at Schopfheim in Baden and, after a very feeble display of heroism, he just managed to escape to Switzerland, where he lived for many years on the proceeds of his literary productions. He was later (1866) permitted to return to Germany, and died at Lichtenthal near Baden-Baden on the 7th of April 1875. A monument was erected to his memory there in 1904. Besides the above-mentioned works, Herwegh pub- lished Einundzwanzig Bogen aus der Schweiz (1843), and transla- tions into German of A. de Lamartine's works and of seven of Shakespeare's plays. Posthumously appeared Neue Gedichte

(1877).

Herwegh's correspondence was published by his son Marcel in 1898. See also Johannes Scherr, Georg Herwegh; liter arische und politische Blatter (1843) ; and the article by Franz Muncker in the Allgemeine deutsche Biographie.

HERZBERG, a town of Germany, in the Prussian province of Hanover, situated under the south-western declivity of the Harz, on the Sieber, 25 m. N.W. from Nordhausen by the railway to Osterode-Hildesheim. Pop. (1905) 3896. It contains an Evan- gelical and a Roman Catholic church, and a botanical garden, and has manufactures of cloth and cigars, and weaving and dyeing works. The breeding of canaries is extensively carried on here and in the district. On a hill to the south-west of the town lies the castle of Herzberg, which in 1 1 57 came into the possession of Henry the Lion, duke of Saxony, and afterwards was one of the residences of a branch of the house of Brunswick.

HERZBERG, a town of Germany, in the Prussian province of Saxony, on the Schwarze Elster, 25 m. S. from Jflterbog by the railway Berlin-Roderau-Dresden. It has a church (Evangelical) dating from the 13th century and a medieval town hall. Its industries include the founding and turning of metal, agricultural machinery and boot-making. Pop. (1905)

4°43-

HERZL, THEODOR (1860-1004), founder of modern political Zionism {q.v.), was born in Budapest on the 2nd of May i860,

and died at Edlach on the 3rd of July 1004. The greater part of his career was associated with Vienna, where he acquired high repute as a literary journalist. He was also a dramatist, and apart from his prominence as a Jewish Nationalist would have found a niche in the temple of fame. All ‘ his other claims to renown, however, sink into insignificance when compared with his work as the reviver of Jewish hopes for a restoration to political autonomy. Herzl was stirred by sympathy for the misery of Jews under persecution, but he was even more powerfully moved by the difficulties experienced under conditions of assimilation. Modern anti-Semitism, he felt, was both like and unlike the medieval. The old physical attacks on the Jews continued in Russia, but there was added the reluctance of several national groups in Europe to admit the Jews to social equality. Herzl believed that the humanitarian hopes which inspired men at the end of the 18th and during the larger part of the 19th centuries had failed. The walls of the ghettos had been cast down, but the Jews could find no entry into the comity of nations. The new nationalism of 1848 did not deprive the Jews of political rights, but it denied them both the amenities of friendly inter- course and the opportunity of distinction in the university, the army and the professions. Many Jews questioned this diagnosis, and refused to see in the new anti-Semitism (q.v.) which spread over Europe in 1881 any more than a temporary reaction against the cosmopolitanism of the French Revolution. In 1896 Herzl published his famous pamphlet ” Der Judenstaat.” Holding that the only alternatives for the Jews were complete merging by intermarriage or self-preservation by a national re-union, he boldly advocated the second course. He did not at first insist on Palestine as the new Jewish home, nor did he attach himself to religious sentiment. The expectation of a Messianic restora- tion to the Holy Land has always been strong, if often latent, in the Jewish consciousness. But Herzl approached the subject entirely on its secular side, and his solution was economic and political rather than sentimental. He was a strong advocate

for the complete separation of Church and State. The influence of HerzPs pamphlet, the progress of the movement he initiated, the subsequent modifications of his plans, are told at length in the article Zionism.

His proposals undoubtedly roused an extraordinary enthusiasm, and though he almost completely failed to win to his cause the classes, he rallied the masses with sensational success. He un- expectedly gained the accession of many Jews by race who were indifferent to the religious aspect of Judaism, but he quite failed to convince the leaders of Jewish thought, who from first to last remained (with such conspicuous exceptions as Nordau and Zangwill) deaf to his pleading. The orthodox were at first cool because they had always dreamed of a nationalism inspired by messianic ideals, while the liberals had long come to dissociate those universalistic ideals from all national limitations. Herzl, however, succeeded in assembling several congresses at Basel (beginning in 1897), and at these congresses were enacted remark- able scenes of enthusiasm for the cause and devotion to its leader. At all these assemblies the same ideal was formulated: " the establishing for the Jewish people a publicly and legally assured home in Palestine." Herzl's personal charm was irresistible. Among his political opponents he had some close personal friends. His sincerity, his eloquence, his tact, his devotion, his power, were recognized on all hands. He spent his whole strength in the furtherance of his ideas. Diplomatic interviews, exhausting journeys, impressive mass meetings, brilliant literary propa- ganda — all these methods were employed by him to the utmost limit of self-denial. In 1901 he was received by the sultan; the pope and many European statesmen gave him audiences. The British government was ready to grant land for an autonomous settlement in East Africa. This last scheme was fatal to Herzl's peace of mind. Even as a temporary measure, the choice of an extra-Palestinian site for the Jewish state was bitterly opposed by many Zionists; others (with whom Herzl appears to have sympathized) thought that as Palestine was, at all events momentarily, inaccessible, it was expedient to form a settlement elsewhere. Herzl's health had been failing and he did not long

survive the initiation of the somewhat embittered " territorial " controversy. He died in the summer of 1904, amid the con- sternation of supporters and the deep grief of opponents of his Zionistic aims.

Herzl was beyond question the most influential Jewish person- ality of the 19th century. He had no profound insight into the problem of Judaism, and there was no lasting validity in his view that the problem — the thousands of years' old mystery — could be solved by a retrogression to local nationality. But he brought home to Jews the perils that confronted them; he compelled many a " semi-detached " son of Israel to rejoin the camp; he forced the "assimilationists " to realize their position and to define it; his

scheme gave a new impulse to "Jewish culture," including the popularization of Hebrew as a living speech; and he effectively roused Jews all the world over to an earnest and vital interest in their present and their future. Herzl thus left an indelible mark on his time, and his renown is assured whatever be the fate in store for the political Zionism which he founded and for which he gave his life. (I. A.)

HERZOG, HANS (1819-1894), Swiss general, was born at Aarau. He became a Swiss artillery lieutenant in 1840, and then spent six years in travelling (visiting England among other countries) , before- he became a partner in his father's business in 1846. In 1847 he saw his first active service (as artillery captain) in the short Swiss Sonderbund war. In i860 he abandoned mercantile pursuits for a purely military career, becoming colonel and inspector-general of the Swiss artillery. In 1870 he was commander-in-chief of the Swiss army, which guarded the Swiss frontier, in the Jura, during the Franco-German War, and in February 1871, as such, concluded the Convention of Verrieres with General Clinchant for the disarming and the interning of the remains of Bourbaki's army, when it took refuge in Switzerland. In 1875 he became the commander-inTchief of the Swiss artillery, which he did much to reorganize, helping also in the reorganiza- tion of the other branches of the Swiss army. He died in 1894 at his native town of Aarau. (W. A. B. C.)

HERZOG, JOHANN JAKOB (1805-1882), German Protestant theologian, was born at Basel on the 12th of September 1805. He studied at Basel and Berlin, and eventually (1854) settled at Erlangen as professor of church history. He died there on the 30th of September 1882, having retired in 1877. His most note worthy achievement was the publication of the Realencyklopddie fiir prolestantische Theologie und Kirche (1853-1868, 22 vols.), of which he undertook a new edition with G. L. Plitt (1836-1880) in 1877, and after Plitt 's death with Albert Hauck (b. 1845). Hauck began the publication of the third edition in 1896 (completed in 22 vols., 1909).

His other works include Joh. Calvin (1843), Leben Okolampads (1843), Die romanischen Waldenser (1853), Abriss der gesamten Kirchengeschichte (3 vols., 1876-1882, 2nd ed., G. Koffmane, Leipzig,

1890-1892).

HESEKIEL, JOHANN GEORG LUDWIG (1819-1874), German author, was born on the 12th of August 18 19 in Halle, where his father, distinguished as> a writer of sacred poetry, was a Lutheran pastor. Hesekiel studied history and philosophy in Halle, Jena and Berlin, and devoted himself in early life to journalism and literature. In 1848 he settled

in Berlin, where he lived until his death on the 26th of February 1874, achieving a considerable re- putation as a writer and as editor of the Neue Preussische Zeitung. He attempted many different kinds of literary work, the most ambitious being perhaps his patriotic songs Preussenlieder, of which he published a volume during the revolutionary excitement of 1 848-1 849. Another collection— ˆ-Neue Preussenlieder — appeared in 1864 after the Danish War, and a third in 1870 — Gegen die Franzosen, Preussische Kriegs- und Kdnigslieder. Among his novels may be mentioned Unter dent Eisenzokn (1864) and Der Schultheiss vom Zeyst (1875). The best known of his works is his biography of Prince Bismarck (Das Buck vom Filrsten Bismarck) (3rd ed.,1873; English trans, by R. H. Mackenzie).

HESILRIGE (or Heselrig), SIR ARTHUR, 2nd Bart. (d. 1661), English parliamentarian, was the eldest son of Sir Thomas Hesilrige, 1st baronet (c. 1622), of Noseley, Leicestershire, a

member of a very ancient family settled in Northumberland and Leicestershire, and of Frances, daughter of Sir William Gorges, of Alderton, Northamptonshire. He early imbibed strong puritanical principles, and showed a special antagonism to Laud. He sat for Leicestershire in the Short and Long Parliaments in 1640, and took a principal part in Strafford's attainder, the Root and Branch Bill and the Militia Bill of the 7th of Decejnber 1641, and was one of the five members im- peached on the 3rd of January 1642. He showed much activity in the Great Rebellion, raised a troop of horse for Essex, fought at Edgehill, commanded in the West under Waller, being nick- named his fidus Achates, and distinguished himself at the head of his cuirassiers, " The Lobsters," at Lansdown on the 5th of July 1643, at Roundway Down on the 13th of July, at both of which battles he was wounded, and at Cheriton, March 29th 1644. On the occasion of the breach between the army and ■the parliament, Hesilrige supported the former, took Cromwell's part in his dispute with Manchester and Essex, and on the passing of the Self-denying Ordinance gave up his commission and became one of the leaders of the Independent party in parlia- ment. On the 30th of December 1647 he was appointed governor of Newcastle, which he successfully defended, besides defeating the Royalists on the 2nd of July 1648 and regaining Tynemouth. In October he accompanied Cromwell to Scotland, and gave him valuable support in the Scottish expedition in 1650. Hesilrige, though he approved of the king's execution, had declined to act as judge on his trial. He was one of the leading men in the Commonwealth, but Cromwell's expulsion of the Long Parliament threw him into antagonism, and he opposed the Protectorate and refused to pay

taxes. He was returned for Leicester to the parliaments of 1654, 1656 and 1659, but was excluded from the two former. He refused a seat in the Lords, whither Cromwell sought to relegate him, and succeeded in again obtaining admission to the Commons in January 1658. On Cromwell's death Hesilrige refused support to Richard, and was instrumental in effecting his downfall. He was now one of the most influential men in the council and in parliament. He attempted to maintain a republican parliamentary administration, " to keep the sword subservient to the civil magistrate," and opposed Lambert's schemes. On the latter succeeding in expelling the parliament, Hesilrige turned to Monk for support, and assisted his movements by securing Portsmouth on the 3rd of December 1659. He marched to London, and was appointed one of the council of state on the 2nd of January 1660, and on the 1 ith of February a commissioner for the army. He was completely deceived by Monk, and trust- ing to his assurance of fidelity to " the good old cause " consented to the retirement of his regiment from London. At the Restora- tion his life was saved by Monk's intervention, but he was imprisoned in the Tower, where he died on the 7th of January 1661. Clarendon describes Hesilrige as " an absurd, bold man." He was rash, " hare-brained," devoid of tact and had little claim to the title of a statesman, but his energy in the field and in parliament wa6 often of great value to the parliamentary cause. He exposed himself to considerable obloquy by his exactions and appropriations of confiscated landed property, though the accusation brought against him by John Lilburne was examined by a parliamentary committee and adjudged to be false. Hesilrige married U) Frances, daughter of Thomas Elmes of Lilford, Northamptonshire, by whom he had two sons and two daughters, and (2) Dorothy, sister of Robert Greville, 2nd Lord Brooke, by whom he had three sons and five daughters. The family was represented in 1907 by his descendant Sir Arthur Grey Hazlerigg of Noseley, 13th Baronet.

Authorities. — Article on Hesilrige by C. H. Firth in the Diet, of Nat. Biography, and authorities there quoted; Early History of the Family of Hesilrige, by W. G. D. Fletcher; Cal. of State Papers, Domestic, 1631-1664, where there are a large number of important references, as also in Hist. MSS., Comm. Series, MSS. of Earl Ctmper, Duke of Leeds and Duke of Portland; Egerton MSS. 2618, Harleian 7001 f. 198, and in the Sloane, Stotve and Additional collec- tions in the British Museum; also S. R. Gardiner, Hist, of England, Hist, of the Great Civil War and Commonwealth ; Clarendon's History, State Papers and Cal. of State Papers, J. L. Sanford's Studies of the

Great Rebellion. His life is written by Noble in the House of Cromwell, i. 403. For his public letters and speeches in parliament see the catalogue of the British Museum.

HESIOD, the father of Greek didactic poetry, probably flourished during the 8th century B.C. His father had migrated from the Aeolic Cyme in Asia Minor to Boeotia; and Hesiod and his brother Perses were born at Ascra, near mount Helicon (Works and Days, 635). Here, as he fed his father's flocks, he received his commission from the Muses to be their prophet and poet — a commission which he recognized by dedicating to them a tripod won by him in a contest of song (see below) at some funeral games at Chalcis in Euboea, still in existence at Helicon in the age of Pausanias (Theogony, 20-34, W. and D., 656; Pausanias ix. 38. 3). After the death of his father Hesiod is said to have left his native land in disgust at the result of a law-suit with his brother and to have migrated to Naupactus. There was a tradition that he was murdered by the sons of his host in the sacred enclosure of the Nemean Zeus at Oeneon In Locris (Thucydides iii. 96; Pausanias ix. 31); his remains were removed for burial by command of the Delphic oracle to Orchomenus in Boeotia, where the Ascraeans settled after the destruction of their town by the Thespians, and where, according to Pausanias, his grave was to be seen.

Hesiod's earliest poem, the famous Works and Days, and accord- ing to Boeotian testimony the only genuine one, embodies the experiences of his daily life and work, and, interwoven with episodes of fable, allegory, and personal history, forms a sort of Boeotian shepherd's calendar. The first portion is an ethical enforcement of honest labour and dissuasive of strife and idle- ness (1-383); the second consists of hints and rules as to hus- bandry (384-764); and the third is a religious calendar of the months, with remarks on the days most lucky or the contrary for rural or nautical employments. The connecting link of the whole poem is the author's advice to his brother, who appears to have bribed the corrupt judges to deprive Hesiod of his already scantier inheritance, and to whom," as he wasted his substance lounging in the agora, the poet more than once returned good for evil, though he tells him there will be a limit to this un- merited kindness. In the Works and Days the episodes which rise above an even didactic level are the " Creation and Equip- ment of Pandora," the " Five Ages of the World " and the much- admired " Description of Winter " (by some critics judged post- Hesiodic). The poem also contains the earliest known fable in Greek literature, that of " The Hawk and the Nightingale." It is in the Works and Days especially that we glean indications of Hesiod's rank and condition in life, that of a stay-at-home farmer of the lower class; whose sole experience of the sea was a single voyage of 40 yds. across the Euripus, and an old-fashioned bachelor whose misogynic views and prejudice against matrimony have been conjecturally traced to his brother Perses having a wife as extravagant as himself.

The other poem attributed to Hesiod or his school which has come down in great part to modern times is The Theogony, a work of grander scope,

inspired alike by older traditions and abundant local associations. It is an attempt to work into system, as none had essayed to do before, the floating legends of the gods and goddesses and their offspring. This task Herodotus (ii. 53) attributes to Hesiod, and he is quoted by Plato in the Symposium (178 b) as the author of the Theogony. The first to question his claim to this distinction was Pausanias, the geographer (a.d. 200). The Alexandrian grammarians had no doubt on the subject; and ■„ indications of the hand fhat wrote the Works and Days may be found in the severe strictures on women, in the high esteem for the wealth-giver Plutus and in coincidences of verbal expression. Although, no doubt, of Hesiodic origin, in its present form it is composed of different recensions and numerous later additions and interpolations'. The Theogony consists of three divisions — (1) a cosmogony, or creation; (2) a theogony proper, recounting the history of the dynasties of Zeus and Cronus; and (3) a brief and abruptly terminated heroogony, the starting-point not improbably of the supplementary poem, the KaraXoyOs, or " Lists of Women "

who wedded immortals, of which all but a few fragments are lost. 1 The proem (1-116) addressed to the Heliconian and Pierian muses, is considered to have been variously enlarged, altered and arranged by successive rhapsodists. The poet has inter- woven several episodes of rare merit, such as the contest of Zeus and the Olympian gods with the Titans, and the description of the prison-house in which the vanquished Titans are confined, with the Giants for keepers and Day and Night for janitors (735 seq.).

The only other poem which has come down to us under Hesiod's name is the Shield of Heracles, the opening verses of which are attributed by a nameless grammarian to the fourth book of Eoiai. The theme of the piece is the expedition of Heracles and Iolaus against the robber Cycnus; but its main object apparently is to describe the shield of Heracles {141-317)- It is clearly an imitation of the Homeric account of the shield of Achilles (Iliad, xviii. 470) and is now generally considered spurious. Titles and fragments of other lost poems of Hesiod have come down to us: didactic, as the Maxims of Cheiron; genealogical, as the Aegimius, describing the contest of that mythical ancestor of the Dorians with the Lapithae; and mythical, as the Marriage of Ceyx and the Descent of Theseus to Hades.

Recent editions of Hesiod include the 'ky&v 'O/Jifaoy Kal 'HoioSov, the contest of song between Homer and Hesiod at the funeral games held in honour of King Amphidamas at Chalcis. This little tract belongs to the time

of Hadrian, who is actually mentioned as having been present during its recitation, but is founded on an earlier account by the sophist Alcidamas (q.r.). Quotations (old and new) are made from the works of both poets, and, in spite of the sympathies of the audience, the judge decides in favour of Hesiod. Certain biographical details of Homer and Hesiod are also given.

A strong characteristic of Hesiod's style is his sententious and proverbial philosophy (as in Works and Days, 24-25, 40, 218, 345, 371). There is naturally less of this in the Theogony, yet there too not a few sentiments take the form of the saw or adage. He has undying fame as the first of didactic poets (see Didactic Poetry), the accredited systematizer of Greek mythology and the rough but not unpoetical sketcher of the lines on which Virgil wrought out his exquisitely finished Georgics.

*Bibliography. — Complete works : Editio princeps (Milan, 1493); Gottling-Flach (1878), with full bibliography up to date of publica- tion; C. Sittl (1889), with introduction and critical and explanatory notes in Greek; P. A. Paley (1883); A. Rzach (1902), including the fragments. Separate works: Works and Days: Van Lennep (1847); A. Kirchhoff (1889); A. Steitz, Die Werke und Tage des Hesiodos (1869), dealing chiefly with the composition and arrange- ment of the poem; G. Wlastoff, Promethee, Pandore, et la ISgende des siecles (1883). Theogony: Van Lennep (1843); F. G. Welcker (1865), valuable edition; G. F. Schomann (1868), with text, critical notes and exhaustive commentary; H. Flach, Die Hesiodiscke Theogonie (1873), with prolegomena dealing chiefly with the digamma in Hesiod, System der Hesiodischen Kosmogonie (1874), an d Glossen und Scholien zur Theogonie (1876); Meyer, De compositione Theogoniae (1887). Shield of Heracles: Wolf-Ranke (1840); Van Lennep-Hullemann (1854) ; F. Stegemann, De scuti Herculis Hesiodei po'eta Homeri carminum imitatore (1904); the fragments were published by W. Marckscheffel in 1840; for the Aywi' 'Ojujjpou (ed. A. Rzach, 1908) see F. Nietzsche in Rheinisches Museum (new series), xxv. p. 528. For papyrus fragments of the " Catalogue," some 50 lines on the wooing of Helen, and a shorter fragment in praise of Peleus, see Wilamowitz-Mollendorff in Sitzungsber. der konigl. preuss. Akad. der Wissenschaflen, for 26th of July 1900; for fragments relating to Meleager and the suitors of Helen, Berliner Klassikertexte, v. (1907); of the Theogony, Oxyrh. Pap. vi. (1908).

On the subject generally, consult G. F. Schomann, Opuscula, ii. (1857); H. Flach, Die Hesiodischen Gedichte (1874); 'A. Rzach, Der Dialekt des Hesiodos (1876); P. O. Gruppe, Die griechischen Kulte und Mythen, i. (1887); O. Friedel, Die Sage vom Tode Hesiods (1879), from Jahrbucher fur classische Philologie (10th suppl. Band, 1879); J- Adam, Religious Teachers of Greece (1908). There is a full bibliography of the publications relating to Hesiod (1884-1898) by A. Rzach in Bursian's Jahresbericht*

uber die Fortschrilte der klassischen Altertumswissenschaft, xxvii. (1900).

1 Part of the poem was called Eoiai, because the description of each heroine began with ij oitj, " or like as." (See Bibliography.)

There are translations of the Hesiodic poems in English by Cooke (1728), C. A. Elton (1815), J. Banks (1856), and specially by A. W. Mair, with introduction and appendices (Oxford Library of Transla- tions, 1908); in German (metrical version) with valuable intro- ductions and notes by R. Peppmuller (1896) and in other modern languages. (J. Da.; J. H. F.)

HESPERIDES, in Greek mythology, maidens who guarded the golden apples which Earth gave Hera on her marriage to Zeus. According to Hesiod (Theogony, 215) they were the daughters of Erebus and Night; in later accounts, of Atlas and Hesperis, or of Phorcys and Ceto (schol. on Apoll. Rhod. iv. 1399; Diod. Sic. iv. 27) They were usually supposed to be three in number — Aegle, Erytheia, Hesperis (or Hesperethusa) ; according to some, four, or even seven. They lived far away in the west at the borders of Ocean, where the sun sets. Hence the sun (according to Mimnermus ap. Athenaeum xi. p. 470) sails in the golden bowl made by Hephaestus from the abode of the Hesperides to the land where he rises again. According to other accounts their home was among the Hyperboreans. The golden apples grew on a tree guarded by Ladon, the ever- watchful dragon. The sun is often in German and Lithuanian legends described as the apple that hangs on the tree of the nightly heaven, while the dragon, the envious power, keeps the light back from men till some beneficent power takes it from him. Heracles is the hero who brings back the golden apples to mankind again. Like Perseus, he first applies to the Nymphs, who help him to learn where the garden is. Arrived there he slays the dragon and carries the apples to Argos; and finally, like Perseus, he gives them to Athena. The Hesperides are, like the Sirens, possessed of the gift of delightful song. The apples appear to have been the symbol of love and fruitfulness, and are introduced at the marriages of Cadmus and Harmonia and Peleus and Thetis. The golden apples, the gift of Aphrodite to Hippomenes before his race with Atalanta, were also plucked from the garden of the Hesperides.

HESPERUS (Gr. "Eawepos, Lat. Vesper), the evening star, son or brother of Atlas. According to Diodorus Siculus (iii. 60, iv. 27), he ascended Mount Atlas to observe the""motions of the stars, and was suddenly swept away by a whirlwind. Ever afterwards he was honoured as a god, and the most brilliant star in the heavens was called by his name. Although as a mytho- logical personality he is regarded as distinct from Phosphoros or Heosphoros (Lat. Lucifer), the morning star or bringer of light, the son of Astraeus (or Cephalus) and Eos, the two stars were early identified by the Greeks.

Diog. Laert. viii. 1. 14; Cicero, De nat. deorum, ii. 20; Pliny, Nat. Hist. iL 6 [8].

HESS, the name of a family of German artists.

Heinrich Maria Hess (1798-1863) — von Hess, after he received a patent of personal nobility — was born at Dusseldorf and brought up to the profession of art by his father, the engraver Karl Ernst Christoph Hess (1755-1828). Karl Hess had already acquired a name when in 1806 the elector of Bavaria, having been raised to a kingship by Napoleon, transferred the Dusseldorf academy and gallery to Munich. Karl Hess accompanied the academy to its new home, and there continued the education of his children. In time Heinrich Hess became sufficiently master of his art to attract the attention of King Maximilian. He was sent with a stipend to Rome, where a copy which he made of Raphael's Parnassus, and the study of great examples of monumental design, probably caused him to become a painter of ecclesiastical subjects on a large scale. In 1828 he was made professor of painting and director of all the art collections "at Munich. He decorated the Aukirche, the Glyptothek and the Allerheilige ncapelle at Munich with frescoes; and his cartoons were selected for glass windows in the cathedrals of Cologne and Regensburg. Then came the great cycle of frescoes in the basilica of St Boniface at Munich, and the monumental picture of the Virigin and Child enthroned between the four doctors, and receiving the homage of the four patrons of the Munich churches (:now in the Pinakothek). His last work, the " Lord's Supper," was found unfinished in his atelier after his death in 1863.,. Before testing his strength as a composer Heinrich Hess

tried genre, an example of which is the Pilgrims entering Rome, now in the Munich gallery. He also executed portraits, and twice had sittings from Thorwaldsen (Pinakothek and Schack collections). But his fame rests on the frescoes representing scenes from the Old and New Testaments in the Allerheiligen- capelle, and the episodes from the life of St Boniface and other German apostles in the basilica of Munich. Here he holds rank second to none but Overbeck in monumental painting, being always true to nature though mindful of the traditions of Christian art, earnest and simple in feeling, yet lifelike and powerful in expression. Through him and his pupils the sentiment of religious art was preserved and extended in the Munich school. Peter Hess (1702-1871) — afterwards von Hess — was born at Diisseldorf and accompanied his younger brother Heinrich Maria to Munich in 1806. Being of an age to receive vivid impressions, he felt the

stirring impulses of the time and became a painter of skirmishes and battles. In 1813-1815 he was allowed to join the staff of General Wrede, who commanded the Bavarians in the military operations which led to the abdication of Napoleon; and there he gained novel experiences of war and a taste for extensive travel. In the course of years he successively visited Austria, Switzerland and Italy. On Prince Otho's election to the Greek throne King Louis sent Peter Hess to Athens to gather materials for pictures of the war of liberation. The sketches which he then made were placed, forty in number, in the Pina- kothek, after being copied in wax on a large scale (and little to the edification of German feeling) by Nilsen, in the northern arcades of the Hofgarten at Munich. King Otho's entrance into Nauplia was the subject of a large and crowded canvas now in the Pinakothek, which Hess executed in person. From these, and from battlepieces on a scale of great size in the Royal Palace, as well as from military episodes executed for the czar Nicholas, and the battle of Waterloo now in the Munich Gallery, we gather that Hess was a clever painter of horses. His con- ception of subject was lifelike, and his drawing invariably correct, but his style is not so congenial to modern taste as that of the painters of touch. He finished almost too carefully with thin medium and pointed tools; and on that account he lacked to a certain extent the boldness of Horace Vernet, to whom he was not unaptly compared. He died suddenly, full of honours, at Munich, in April 1871. Several of his genre pictures, horse hunts, and brigand scenes may be found in the gallery of Munich. Karl Hess (1801-1874), the third son of Karl Christoph Hess, born at Diisseldorf, was also taught by his father, who hoped that he would obtain distinction as an engraver. Karl, however, after engraving one plate after Adrian Ostade, turned to painting under the guidance of Wagenbauer of Munich, and then studied under his elder brother Peter. But historical composition proved to be as contrary to his taste as engraving, and he gave himself exclusively at last to illustrations of peasant life in the hill country of Bavaria. He became clever alike in representing the people, the animals and the landscape of the Alps, and with constant means of reference to nature in the neighbourhood of Reichenhall, where he at last resided, he never produced anything that was not impressed with the true stamp of a kindly realism. Some of his pictures in the museum of Munich will serve as examples of his manner. He died at Reichenhall on the 16th of November 1874.

HESS, HEINRICH HERMANN JOSEF, Freiherr von (1788-1870), Austrian soldier, entered the army in 1805 and was soon employed as a staff officer on survey work. He distinguished himself as a subaltern at Aspern and Wagram, and in 1813, as a captain, again served on the staff. In 1815 he was with Schwarz- enberg. He had in the interval between the two wars been employed as a military commissioner in Piedmont, and at the peace

resumed this post, gaining knowledge which later proved invaluable to the Austrian army. In 183T, when Radetzky became commander-in-chief in Austrian Italy, he took Hess as his chief- of -staff, and thus began the connexion between two famous soldiers which, like that of Blucher and Gneisenau, is a classical example of harmonious co-operation of commander and chief-of-staff. Hess put into shape Radetzky's military ideas, in

the form of new drill for each arm, and, under their guidance, the Austrian army in North Italy, always on a war footing, became the best in Europe. From 1834 to 1848 Hess was employed in Moravia, at Vienna, &c, but, on the outbreak of revolution and war in the latter year, was at once sent out to Radetzky as chief-of-staff. In the two campaigns against King Charles Albert which followed, culminating in the victory of Novara, Hess's assistance to his chief was made still more valuable by his knowledge of the enemy, and the old field-marshal acknowledged his services in general orders. Lieut.-Fieldmarshal Hess was at once promoted Feldzeugmeisler, made a member of the emperor's council, and Freiherr, assuming at the same time the duties of the quartermaster-general. Next year he became chief of the staff to the emperor. He was often employed in missions to various capitals, and he appearedin the fieldin 1854 at the head of the Austrian army which intervened so effectually in the Crimean war. In 1859 he was sent to Italy after the early defeats. He became field-marshal in i860, and a year later, on resigning his position as chief-of-staff, he was made captain of the Trabant guard. He died in Vienna in 1870.

See " General Hess " in Lebensgeschichtlichen Hinrissen (Vienna,

1855)-

HESSE (Lat. Hessia, Ger. Hessen), a grand duchy forming a state of the German empire. It was known until 1866 as Hesse- Darmstadt, the history of which is given under a separate heading below. It consists of two main parts, separated from each other by a narrow strip of Prussian territory. The northern part is the province of Oberhessen; the southern consists of the contiguous provinces of Starkenburg and Rheinhessen. There are also eleven very small exclaves, mostly grouped about Homburg to the south-west of Oberhessen; but the largest is Wimpfen on the north-west frontier of Wurttemberg. Oberhessen is hilly; though of no great elevation it extends over the water-parting between the basins of the Rhine and the Weser, and in the Vogelsberg it has as its culminating point the Taufstein (2533 ft.). In the north-west it includes spurs of the Taunus. Between these two systems of hills lies the fertile undulating tract known as the Wetterau, watered by the Wetter, a tributary of the Main. Starkenburg occupies the angle between the Main and the Rhine, and in its south-eastern part includes some of the ranges of the Odenwald, the highest part being the Seidenbucher Hohe (1965 ft.). Rheinhessen is separated from Starkenburg by the Rhine, and has that river as its northern as well as its eastern frontier, though it extends across it at the north-east corner, where the Rhine, on receiving the Main, changes its course abruptly from south to west. The territory consists of a fertile tract of low hills, rising towards the south-west into the northern extremity of the Hardt range, but at no point

reaching a height of more than 1050 ft.

The area and population of the three provinces of Hesse are as follow :

Oberhessen Starkenburg . Rheinhessen .

Total

Area.

Population.

sq. m.

1895.

1905.

1267

1 169

530

271,524 444,562 322,934

296,755 542,996 369,424

2966

1,039,020

1,209,175

The chief towns of the grand duchy are Darmstadt (the capital) and Offenbach in Starkenburg, Mainz and Worms rn Rheinhessen and Giessen in Oberhessen. More than two-thirds of the inhabitants are Protestants; the majority of the remainder are Roman Catholics, and there are about 25,000 Jews. The grand duke is head of the Protestant church. Education is compulsory, the elementary schools being communal, assisted by state grants. There are a university at Giessen and a technical high school at Darmstadt. Agriculture is important, more than three-fifths of the total area being under cultivation. The largest grain crops are rye and barley, and nearly 40,000 acres are under vines. Minerals, in which Oberhessen is much richer

than the two other provinces, include iron, manganese, salt and some coal.

The constitution dates from 1820, but was modified in 1856, 1862, 1872 and 1900. There are two legislative chambers. The upper consists of princes of the grand-ducal family, heads of mediatized houses, the head of the Roman Catholic and the superintendent of the Protestant church, the chancellor of the university, two elected representatives of the land-owning nobility, and twelve members nominated by the grand duke. The lower chamber consists of ten deputies from large towns and forty from small towns and rural districts. They are indirectly elected, by deputy electors (Wahlmanner) nominated by the electors, who must be Hessians over twenty-five years old, paying direct taxes. The executive ministry of state is divided into the departments of the interior, justice and finance. The three provinces are divided for local administration into 18 circles and 989 communes. The ordinary revenue and expenditure amount each to about £4,000,000 annually, the chief taxes being an income-tax, succession duties and stamp tax. The public debt, practically the whole of which is on railways, amounted to £19,097,468 in 1907.

History. — The name of Hesse, now used principally for the grand duchy formerly known as Hesse-Darmstadt, refers to a country which has had different boundaries and areas at different times. The name is derived from that of a Frankish tribe, the Hessi. The earliest known inhabitants of the country were the Chatti, who lived here during the 1st century a.d. (Tacitus, Germania, c. 30), and whose capital, Mattium on the Eder, was burned by the Romans about a.d. 15. " Alike both in race and language," says Walther Schultze, " the Chatti and the Hessi are identical." During the period of the V blkerwanderung many of these people moved westward, but some remained behind to give their name to the country, although it was not until the 8th century that the word Hesse came into use. Early Hesse was the district around the Fulda, the Werra, the Eder and the Lahn, and was part of the Frankish kingdom both during Merovingian and during Carolingian times. Soon Hessegau is mentioned, and this district was the headquarters of Charlemagne during his campaigns against the Saxons. By the treaty of Verdun in 843 it fell to Louis the German, and later it seems to have been partly in the duchy of Saxony and partly in that of Franconia. The Hessians were converted to Christianity mainly through the efforts of St Boniface; their land was included in the arch- bishopric of Mainz; and religion and culture were kept alive among them largely owing to the foundation of the Benedictine abbeys of Fulda and Hersfeld. Like other parts of Germany during the 9th century Hesse felt the absence of a strong central power, and, before the time of the emperor Otto the Great, several counts, among whom were Giso and Werner, had made themselves

practically independent; but after the accession of Otto in 936 the land quietly accepted the yoke of the medieval emperors. About 11 20 another Giso, count of Gudensberg, secured possession of the lands of the Werners; on his death in 1 137 his daughter and heiress, Hedwig, married Louis, land- grave of Thuringia; and from this date until 1247, when the Thuringian ruling family became extinct, Hesse formed part of Thuringia. The death of Henry Raspe, the last landgrave of Thuringia, in 1247, caused a long war over the disposal of his lands, and this dispute was not settled until 1264 when Hesse, separated again from Thuringia, was secured by his niece Sophia (d. 1 284) , widow of Henry II. , duke of Brabant. In the following year Sophia handed over Hesse to her son Henry (1 244-1308), who, remembering the connexion of Hesse and Thuringia, took the title of landgrave, and is the ancestor of all the subsequent rulers of the country. In 1292 Henry was made a prince of the Empire, and with him the history of Hesse properly begins.

For nearly 300 years the history of Hesse is comparatively uneventful. The land, which fell into two main portions, upper Hesse round Marburg, and lower Hesse round Cassel, was twice divided between two members of the ruling family, but no per- manent partition took place before the Reformation. A Landtag was first called together in 1387, and the landgraves were con-

stantly at variance with the electors of Mainz, who had large temporal possessions in the country. They found time, however, to increase the area of Hesse. Giessen, part of Schmalkalden, Ziegenhain, Nidda and, after a long struggle, Katzenelnbogen were acquired, while in 1432 the abbey of Hersfeld placed itself under the protection of Hesse. The most noteworthy of the landgraves were perhaps Louis I. (d. 1458), a candidate for the German throne in 1440, and William II. (d. 1509), a comrade of the German king, Maximilian I. In 1509 William's young son, Philip (q.v.), became landgrave, and by his vigorous personality brought his country into prominence during the religious troubles of the 1 6th century. Following the example of his ancestors Philip cared for education and the general welfare of his land, and the Protestant university of Marburg, founded in 1527, owes to him its origin. When he died in 1567 Hesse was divided between his four sons into Hesse-Cassel, Hesse-Darmstadt, Hesse-Marburg and Hesse-Rheinfels. The lines ruling in Hesse- Rheinfels and Hesse-Marburg, or upper Hesse, became extinct in 1583 and 1604 respectively, and these lands passed to the two remaining branches of the family. The small landgraviate of Hesse-Homburg was formed in 1622 from Hesse-Darmstadt. After the annexation of Hesse-Cassel and Hesse-Homburg by Prussia in 1866 Hesse-Darmstadt remained the only independent part of Hesse, and it generally receives the common name.

Hesse-Philippsthal is an offshoot of Hesse-Cassel, and was founded in 1685 by Philip (d. 1721), son of the Landgrave William VI. In 1909 the representative of this family was the Landgrave Ernest (b. 1846). Hesse-Barchfeld was founded in 1721 by Philip's son, William (d. 1761), and in 1909 its repre- sentative was the Landgrave Clovis (b. 1876). The lands of both these princes are now mediatized. Hesse-Nassau is a province of Prussia formed in 1866 from part of Hesse-Cassel and part of the duchy of Nassau.

See H. B. Wenck, Hessische Landesgeschichte- (Frankfort, 1783- 1803); C. von Rommel, Geschichte von Hesse (Cassel, 1820- 1858); F. Miinscher, Geschichte von Hesse (Marburg, 1894); F. Gundlach, Hesse und die Maimer Stiftsfehde (Marburg, 1899); Walther, Literarisches Handbuch fur Geschichte und Landeskunde von Hesse (Darmstadt, 1841 ; Supplement, 1850-1869) ; K. Ackermann, Bibliotheca Hessiaca (Cassel, 1884-1899) ; Hoffmeister, Hislorisch- genealogisches Handbuch iiber alle Linien des Regenlenhauses Hesse (Marburg, 1 874) , and the Zeitschrift des Vereinsfiir hessische Geschichte

(1837-1904).

HESSE-CASSEL (in German Kurhessen, i.e. Electoral Hesse), now the government district of Cassel in the Prussian province of Hesse-Nassau. It was till 1866 a landgraviate and electorate of Germany, consisting of several detached masses of territory, to the N.E. of Frankfort-on-the-Main. It contained a superficial area of 3699 sq. m., and its population in 1864 was 745,063.

History. — The line of Hesse-Cassel was founded by William IV., surnamed the Wise, eldest son of Philip the Magnanimous. On his father's death in 1567 he received one half of Hesse, with Cassel as his capital; and this formed the landgraviate of Hesse- Cassel. Additions were made to it by inheritance from his brother's possessions. His son, Maurice the Learned (1592-1627), turned Protestant in 1605, became involved later in the Thirty Years' War, and, after being forced to cede some of his territories to the Darmstadt line, abdicated in favour of his son William V. (1627-1637), his younger sons receiving apanages which created several cadet lines of the house, of which that of Hesse-Rheinfels- Rotenburg survived till 1834. On the death of William V., whose territories had been conquered by the Imperialists, his widow Amalie Elizabeth, as regent for her son William VI. (1637-1663), reconquered the country and, with the aid of the- French and Swedes, held it, together with part of Westphalia. At the peace of Westphalia (1648), accordingly, Hesse-Cassel was augmented by the larger part of the countship of Schaum- burg and by the abbey of Hersfeld, secularized as a principality of the Empire. The Landgravine

Amalie Elizabeth introduced the rule of primogeniture. William VI., who came of age in 1650, was an enlightened patron of learning and the arts. He was succeeded by his son William VII. , an infant, who died in 1670, and was succeeded by his brother Charles (1670-1730). Charles's chief claim to remembrance is that he was the first ruler to adopt

the system of fairing his soldiers out to foreign powers as mer- cenaries, as a means of improving the national finances. Frederick I., the next landgrave (1730-1751), had become by marriage king of Sweden, and on his death was succeeded in the landgraviate by his brother William VIII. (1751-1760), who fought as an ally of England during the Seven Years' War. From his successor Frederick II. (1760-1785), who had become a Roman Catholic, 2 2 ,000 Hessian troops were hired by England for about £3,191 ,000, to assist in the war against the North American colonies. This action, often bitterly criticized, has of late years found apologists (cf. v. Werthern, Die hessischen Hilfstruppen im nordamerika- nischen Unabhangigkeitskriege, Cassel, 1895). It is argued that the troops were in any case mercenaries, and that the practice was quite common. Whatever opinion may be held as to this, it is certain that Frederick spent the money well: he did much for the development of the economic and intellectual improvement of the country. The reign of the next landgrave, William IX. (1785-1821), was an important epoch in the history of Hesse-Cassel. Ascending the throne in 1785, he took part in the war against France a few years later, but in 1795 peace was arranged by the treaty of Basel. For the loss in 1801 of his possessions on the left bank of the Rhine he was in 1803 compensated by some of the former French territory round Mainz, and at the same time was raised to the dignity of Elector (Kurfurst) as William I. In 1806 he made a treaty of neutrality with Napoleon, but after the battle of Jena the latter, suspect- ing William's designs, occupied his country, and expelled him. Hesse-Cassel was then added to Jerome Bonaparte's new kingdom of Westphalia; but after the battle of Leipzig in 18 13 the French were driven out and on the 21st of November the elector returned in triumph to his capital. A treaty concluded by him with the Allies (Dec. 2) stipulated that he was to receive back all his former territories, or their equivalent, and at the same time to restore the ancient constitution of his country. This treaty, so far as the territories were concerned, was carried out by the powers at the congress of Vienna. They refused, however, the elector's request to be recognized as " King of the Chatti " (Konig der Katten), a request which was again rejected at the conference of Aix-la-Chapelle (1818). He therefore retained the now meaningless title of elector, with the predicate of " royal highness."

The elector had signalized his restoration by abolishing with a stroke of the pen all the reforms introduced under the French regime, repudiating the Westphalian debt and declaring null and void the sale of the crown domains. Everything was set back to its condition on the 1st of November 1806; even the officials had to descend to their former rank, and the army to revert to the old uniforms and powdered pigtails. The estates, indeed, were summoned in March 1815, but the attempt to devise a constitution broke down; their appeal to the federal diet at Frankfort to call the elector to order in the matter of the debt and the domains came to nothing owing to the inter- vention of Metternich; and in May 1816 they were dissolved, never to meet again. William I. died on the 27th of February 1 82 1, and was succeeded by his son, William II. Under him the constitutional crisis in Hesse-Cassel came to a head. He was arbitrary and avaricious like his father, and moreover shocked public sentiment by his treatment of his wife, a popular Prussian princess, and his relations with his mistress, one Emilie Ortlopp, created countess of Reichenbach, whom he loaded with wealth. The July revolution in Paris gave the signal for disturbances; the elector was forced to summon the estates; and on the 5th of January 1831 a constitution on the ordinary Liberal basis was signed. The elector now retired to Hanau, appointed his son Frederick William regent, and took no further part in public affairs.

The regent, without his father's coarseness, had a full share of his arbitary and avaricious temper. Constitutional restric- tions were intolerable to him; and the consequent friction with the diet was aggravated when, in 1832, Hassenpflug (q.v.) was placed at the head of the administration. The whole efforts of the elector and his minister were directed to nullifying the

constitutional control vested in the diet; and the Opposition was fought by manipulating the elections, packing the judicial bench, and a vexatious and petty persecution of political " suspects," and this policy continued after the retirement of Hassenpflug in 1837. The situation that resulted issued in the revolutionary year 1848 in a general manifestation of public discontent; and Frederick William, who had become elector on his father's death (November 20, 1847), was forced to dismiss his reactionary ministry and to agree to a comprehensive pro- gramme of democratic reform. This, however, was but short- lived. After the breakdown of the Frankfort National Parlia- ment, Frederick William joined the Prussian Northern Union, and deputies from Hesse-Cassel were sent to the Erfurt parlia- ment. But as Austria recovered strength, the elector's policy changed. On the 23rd of February 1850 Hassenpflug was again placed at the head of the administration and threw himself with renewed zeal into the struggle against the constitution and into opposition to Prussia. On the 2nd of September the diet was dissolved; the taxes were continued by electoral ordinance; and the country was placed under martial law. It was at once

clear, however, that the elector could not depend on his officers or troops, who remained faithful to their oath to the constitution. Hassenpflug persuaded the elector to leave Cassel secretly with him, and on the 15th of October appealed for aid to the recon- stituted federal diet, which willingly passed a decree of " inter- vention. " On the 1st of November an Austrian and Bavarian force marched into the electorate.*

This was a direct challenge to Prussia, which under conventions with the elector had the right to the use of the military roads through Hesse that were her sole means of communication with her Rhine provinces. War seemed imminent; Prussian troops also entered the country, and shots were actually exchanged between the outposts. But Prussia was in no condition to take up the challenge; and the diplomatic contest that followed issued in the Austrian triumph at Olmiitz (1851). Hesse was surrendered to the federal diet; the taxes were collected by the federal forces, and all officials who refused to recognize the new order were dismissed. In March 1852 the federal diet abolished the constitution of 1831, together with the reforms of 1848, and in April issued a new provisional constitution. The new diet had, under this, very narrow powers; and the elector was free to carry out his policy of amassing money, forbidding the con- struction of railways and manufactories, and imposing strict orthodoxy on churches and schools. In 1855, however, Hassen- pflug — who had returned with the elector— was dismissed; and five years later, after a period of growing agitation, a new constitution was granted with the consent of the federal diet (May 30, i860). The new chambers, however, demanded the constitution of 183 1; and, after several dissolutions which always resulted in the return of the same members, the federal diet decided to restore the constitution of 1831 (May 24, 1862). This had been due to a threat of Prussian occupation; and it needed another such threat to persuade the elector to reassemble the chambers, which he had dismissed at the first sign of opposi- tion; and he revenged himself by refusing to transact any public business. In 1866 the end came. The elector, full of grievances against Prussia, threw in his lot with Austria; the electorate was at once overrun with Prussian troops; Cassel was occupied (June 20) ; and the elector was carried a prisoner to Stettin. By the treaty of Prague Hesse-Cassel was annexed to Prussia. The elector Frederick William (d. 1875) had been, by the terms of the treaty of cession, guaranteed the entailed property of his house. This was, however, sequestered in 1868 owing to his intrigues against Prussia; part of the income was paid, however, to the eldest agnate, the landgrave Frederick (d. 1884), and part, together with certain castles and palaces, was assigned to the cadet lines of Philippsthal and Philippsthal- Barchfeld.

See K. W. Wippermann, Kurhessen seit den Freiheitskriegen

(Cassel, 1850); Roth, Geschichte von Hessen-Kassel (Cassel, 1856;

2nd ed. continued by Stamford, 1883-1885); H. Grafe, Der Ver-

fassungskampf in Kurhessen (Leipzig, 1851) and works under

I Hesse.

HESSE-DARMSTADT, a grand-duchy in Germany, the history of which begins with the partition of Hesse in 1567. George I. (1547-1597), the youngest son of the landgrave Philip, received the upper county of Katzenelnbogen, and, selecting Darmstadt as his residence, became the founder of the Hesse-Darmstadt line. Additions to the landgraviate were made both in the reigns of George and of his son and successor, Louis V. (1577- 1626), but in 1622 Hesse-Homburg was cut off to form an apanage for George's youngest son, Frederick (d. 1638). Although Louis V., who founded the university of Giessen in 1607, was a Lutheran, he and his son, George II. (1605-1661), sided with the im- perialists in the Thirty Years' War, during which Hesse-Darm- stadt suffered very severely from the ravages of the Swedes. In this struggle Hesse-Cassel took the other side, and the rivalry between the two landgraviates was increased by a dispute over Hesse-Marburg, the ruling family of which had become extinct in 1604. This quarrel was interwoven with the general thread of the Thirty Years' War, and was not finally settled until 1648, when the disputed territory was divided between the two claim- ants. Louis VI. (d. 1678), a careful and patriotic prince, followed the policy of the three previous landgraves, but the anxiety of his son, Ernest Louis (d. 1739), to emulate the French court under Louis XIV. led his country into debt. Under Ernest Louis and his son and successor, Louis VIII. (d. 1768), another dispute occurred between Darmstadt and Cassel; this time it was over the succession to the county of Hanau, which was eventually divided, Hesse-Darmstadt receiving Lichtenberg. During the 18th century the War of the Austrian Succession and the Seven Years' War dealt heavy blows at the prosperity of the landgraviate, which was always loyal to the house of Austria. Louis IX. (1 719-1790). who served in the Prussian army under Frederick the Great, is chiefly famous as the husband of Caroline (1721-1774), "the great landgravine," who counted Goethe, Herder and Grimm among her friends and was described by Frederick the Great as femina sexu, ingenio vir. In April 1790, just after the outbreak of the French Revolution, Louis X. (1753-1830), an educated prince who shared the tastes and friendships of his mother, Caroline, became landgrave. In 1792 he joined the allies against France, but in 1799 he was compelled to sign a treaty of neutrality. In 1803, having formally sur- rendered the part

of Hesse on the left bank of the Rhine which had been taken from him in the early days of the Revolution, Louis received in return a much larger district which had formerly belonged to the duchy of Westphalia, the electorate of Mainz and the bishopric of Worms. In 1806, being a member of the confederation of the Rhine, he took the title of Louis I., grand- duke of Hesse; he supported Napoleon with troops from 1805 to 1813, but after the battle of Leipzig he joined the allies. In 1815 the congress of Vienna made another change in the area and boundaries of Hesse-Darmstadt. Louis secured again a district on the left bank of the Rhine, including the cities of Mainz and Worms, but he made cessions of territory to Prussia and to Bavaria and he recognized the independence of Hesse- Homburg, which had recently been incorporated with his lands. However, his title of grand-duke was confirmed, and as grand- duke of Hesse and of the Rhine he entered the Germanic con- federation. Soon the growing desire for liberty made itself felt in Hesse, and in 1820 Louis gave a constitution to the land; various forms were carried through; the system of government was reorganized, and in 1828 Hesse-Darmstadt joined the Prussian Zollverein. Louis I., who did a great deal for the welfare of his country, died on the 6th of April 1830, and was followed on the throne by his son, Louis II. (1777-1848). This grand-duke had some trouble with his Landtag, but, dying on the 16th of June 1848, he left his son, Louis III. (1806-1877), to meet the fury of the revolutionary year 1848. Many conces- sions were made to the popular will, but during the subsequent reaction these were withdrawn, and the period between 1850 and 187 1, when Karl Friedrich Reinhard, Freiherr von Dalwigk (1802-1880), was chiefly responsible for the government of Hesse- Darmstadt, was one of repression, although some benefits were conferred upon the people. Dalwigk was one of Prussia's

enemies, and during the war of 1866 the grand-duke fought on the Austrian side, the result being that he was compelled to pay a heavy indemnity and to cede certain districts, including Hesse-Homburg, which he had only just acquired, to Prussia. In 1867 Louis entered the North German Confederation, but only for his lands north of the Main, and in 1871 Hesse-Darmstadt became one of the states of the new German empire. After the withdrawal of Dalwigk from public life at this time a more liberal policy was adopted in Hesse. .Many reforms in ecclesi- astical, educational, financial and administrative matters were introduced, and in general the grand-duchy may be said to have passed largely under the influence of Prussia, which, by an arrangement made in 1896, controls the Hessian railway system. The constitution of 1820, subject to four subsequent modifica- tions, is still the law of the land, the legislative power being vested in two chambers and the executive power being exercised by the three departments of the ministry of state. Since the annexation of

Hesse-Cassel by Prussia in 1866 the grand-duchy has been known simply as Hesse. Louis III. died on the 13th of June 1877, and was succeeded by his nephew, Louis IV. (1837-1892), a son-in-law of Queen Victoria; he died on the 13th of March 1892, and was succeeded by his son, Ernest Louis (b. 1868). This grand-duke's marriage with Victoria (b. 1876), daughter of Alfred, duke of Saxe-Coburg and Gotha, was dissolved in 1901. The union was childless, and consequently in 1902 a law regulating the succession was passed. By this the landgrave Alexander Frederick (b. 1863), the representative of the family which ruled Hesse-Cassel until 1866, was declared the heir to Hesse in case the grand-duke died without sons. However, in 1905 Ernest Louis married Elenore, princess of Solms-Hohensolms-Lich (b. 1871), by whom he had a son George (b. 1906).

See L. Baur, Urkunden zur hessischen Landes-, Orts- und Familien-geschichte (Darmstadt, 1846-1873); Steiner, Geschichte des Gross-herzogtums Hessen (Darmstadt, 1 833-1 834); Klein, Das Gruss-herzogtum Hessen (Mainz, 1861); Ewald, Historische Vbersicht der Territorialverdnderungen der Landgrafschaft Hessen und des Gross-herzogtums Hessen (Darmstadt, 1872); F. Soldan, Geschichte des Grossherzogtums Hessen (Giessen, 1896); H. Heppe, Kirchengeschichte beider Hessen (Marburg, 1876-1878) ; C. Hessler, Geschichte von Hessen (Cassel, 1891), and Hessische Landes- und Volkskunde (Marburg, 1904-1906) ; F. Kiichler, A. E. Braun and A. K. Weber, Verfassungs-und Verwaltungsrecht des Grossherzogtums Hessen (Darm- stadt, 1 894-1 897); H. Kunzel, Grossherzogtum Hessen (Giessen, 1893); and W. Zeller, Handbuch der Verfassung und Verwaltung im Grossherzogtum Hessen (Darmstadt, 1885-1893). See also Archiv fur hessische Geschichte und Altertumskunde (Darmstadt, 1894 fol.) and Hessisches Urkundenbuch (Leipzig, 1879 fol.).

HESSE-HOMBURG, formerly a small landgraviate in Germany. It consisted of two parts, the district of Homburg on the right side of the Rhine, and the district of Meisenheim, which was added in 181 5, on the left side of the same river. Its area was about 100 sq. m., and its population in 1864 was 27,374. Homburg now forms part of the Prussian province of Hesse-Nassau, and Meisenheim of the province of the Rhine. Hesse- Homburg was formed into a separate landgraviate in 1622 by Frederick I. (d. 1638), son of George I., landgrave of Hesse- Darmstadt, although it did not become independent of Hesse- Darmstadt until 1768. By two of Frederick's sons it was divided into Hesse-Homburg and Hesse-Homburg-Bingenheim ; but these parts were again united in 1681 under the rule of Frederick's third son, Frederick II. (d. 1708). In 1806, during the long reign of the landgrave Frederick V., which extended from 1751 to 1820, Hesse-Homburg was mediatized, and incorporated with Hesse-Darmstadt; but in 1815 by the congress of Vienna the latter state was compelled to recognize

the independence of Hesse-Homburg, which was increased by the addition of Meisen- heim. Frederick V. joined the German confederation as a sovereign prince in 181 7, and after his death his five sons in succession filled the throne. The last of these, Ferdinand, who succeeded in 1848, granted a liberal constitution to his people, but cancelled it during the reaction of 1852. When he died on the 24th of March 1866, Hesse-Homburg was inherited by Louis III., grand-duke of Hesse-Darmstadt, while Meisenheim fell to Prussia. In the following September, however, Louis

was forced to cede his new possession to Prussia, as he had supported Austria during the war between these two powers.

See R. Schwartz, Landgraf Friedrich V. von Hessen-Homburg und seine Familie (1878); and von Herget, Das landgrafliche Haus Homburg (Homburg, 1903).

HESSE-NASSAU (Ger. Hessen-Nassau), a province of Prussia, bounded, from N. to E., S. and W., successively by Westphalia, Waldeck, Hanover, the province of Saxony, the Thuringian States, Bavaria, Hesse and the Rhine Province. There . are small detached portions in Waldeck, Thuringia, &c; on the other hand the province enclaves the province of Oberhessen belonging to the grand-duchy of Hesse, and the circle of Wetzlar belonging to the Rhine Province. Hesse-Nassau was formed in 1867-1868 out of the territories which accrued to Prussia after the war of 1866, namely, the landgraviate of Hesse-Cassel and the duchy of Nassau, in addition to the greater part of the territory of Frankfort-on-Main, parts of the grand-duchy of Hesse, the territory of Homburg and the countship of Hesse- Homburg, together with certain small districts which belonged to Bavaria. It is now divided into the governments of Cassel and Wiesbaden, the second of which consists mainly of the former territory of Nassau (q.v.).

The province has an area of 6062 sq. m., and had a population in 1905 of 2,070,052, being the fourth most densely populated province in Prussia, after Berlin, the Rhine Province and Westphalia. The east and north parts lie in the basin of the river Fulda, which near the north-eastern boundary joins with the Werra to form the Weser. The Main forms part of the southern boundary, and the Rhine the south-western; the western part of the province lies mostly in the basin of the Lahn, a tributary of the Rhine. The province is generally hilly, the highest hills occurring in the east and west. The Fulda rises in the Wasserkuppe (3117 ft.), an eminence of the Rhonge- birge, the highest in the province. In the south-west are the

Taunus, bordering the Main, and the Westerwald, west of the Lahn, in which the highest points respectively are the Grosser Feldberg (2887 ft.) and the Fuchskauten (2155 ft.). The congeries of small groups of lower hills in the north are known as the Hessische Bergland.

The province is not notably well suited to agriculture, but in forests it is the richest in Prussia, and the timber trade is large. The chief trees are beech, oak and conifers. Cattle- breeding is extensively practised. The vine is cultivated chiefly on the slopes of the Taunus, in the south-west, where the names of several towns are well known for their wines — Schierstein, Erbach (Marcobrunner), Johannisberg, Geisenheim, Riidesheim, Assmannshausen. Iron, coal, copper and manganese are mined. The mineral springs are important, including those at Wiesbaden, Homburg, Langenschwalbach, Nenndorf, Schlan- genbad and Soden. The chief manufacturing centres are Cassel, Diez, Eschwege, Frankfort, Fulda, Gross Almerode, Hanau and Hersfeld. The province is divided for administration into 42 circles (Kreise), 24 in the government of Cassel and 18 in that of Wiesbaden. It returns 14 representatives to the Reichstag. Marburg is the seat of a university.

HESSE-ROTENBURO, a German landgraviate which was broken up in 1834. In 1627 Ernest (1623-1693), a younger son of Maurice, landgrave of Hesse-Cassel (d. 1632), received Rheins- fels and lower Katzenelnbogen as his inheritance, and some years later, on the deaths of two of his brothers, he added Eschwege, Rotenburg, Wanfried and other districts to his possessions. Ernest, who was a convert to the Roman Catholic Church, was a great traveller and a voluminous writer. About 1700 his two sons, William (d. 1725) and Charles (d. 1711), divided their territories, and founded the families of Hesse-Rotenburg and Hesse-Wanfried. The latter family died out in 1755, when William's grandson, Constantine (d. 1778), reunited the lands except Rheinfels, which had been acquired by Hesse-Cassel in 1735, and ruled them as landgrave of Hesse-Rotenburg. At the peace of Luneville in 1801 the part of the landgraviate on the left bank of the Rhine was surrendered to France, and in 181 5 other parts were ceded to Prussia, the landgrave Victor

Amadeus being compensated by the abbey of Corvey and the Silesian duchy of Ratibor. Victor was the last male member of his family, so, with the consent of Prussia, he bequeathed his allodial estates to his nephews the princes Victor and Chlodwig of Hohenlohe-Waldenburg-Schillingsfurst (see Hohenlohe). When the landgrave died on the 12th of November 1834 the remaining parts of Hesse-Rotenburg were united with Hesse- Cassel according to the arrangement of 1627. It may be noted that Hesse-Rotenburg was never completely independent of Hesse-Cassel. Perhaps the most celebrated member of this family was Charles Constantine (1 752-1

821), a younger son of the landgrave Constantine, who was called " citoyen Hesse," and who took part in the French Revolution.

HESSIAN, the name of a jute fabric made as a plain cloth ; in various degrees of fineness, width and quality. The common, or standard, hessian is 40 in. wide, weighs io| oz. per yd., and in the finished state contains about 12 threads and 125 picks per in. The name is probably of German origin, and the fabric was originally made from flax and tow. Small quantities of cloth are still made from yarns of these fibres, but the jute fibre, owing to its comparative cheapness, has now almost supplanted all others.

This useful cloth is employed in countless ways, especially for packing all kinds of dry goods, while large quantities, of different qualities, are made up into bags for sugar, flour, coffee, grain, ore, manure, sand, potatoes, onions, &c. Indeed, bags made from one or other quality of this cloth, or from sacking, bagging or tarpaulin, form the most convenient, and at the same time the cheapest covering for any kind of goods which are not damaged by being crushed.

Certain types are specially treated, dyed black, tan or other colour, or left in their natural colour, stiffened and used for paddings and linings for cheap clothing, boots, shoes, bags and other articles. When dyed in art shades the cloth forms an attractive decoration for stages and platforms, and generally for any temporary erection, and in many cases it is stencilled and then used for wall decoration.

The great linoleum industry depends upon certain types of this fabric for the foundation of its products, while large quantities are used for the backs of fringe rugs, spring mattresses and the upholstery of furniture.

The great centres for the manufacture of this fabric are Dundee and Calcutta, and every variety of the cloth, and all kinds of hand- and machine-sewn, as well as seamless bags, are made in the former city. The American name for hessian is burlap; this particular kind is 40 in. wide, and is now largely made in Calcutta as well as in Dundee and other places.

HESSUS, HELIUS EOBANUS (1488-1540), German Latin poet, was born at Halgehausen in Hesse-Cassel, on the 6th of January 1488. His family name is said to have been Koch; Eoban was the name of a local saint ;Hessus indicates the land of his birth, Helius the fact that he was born on Sunday. In 1504 he entered the university of Erfurt, and soon after his graduation was appointed rector of the school of St Severus. This post he soon lost, andspentthe years 1509-1513 at the court of the bishop of Riesenburg. Returning to Erfurt, he was reduced to great straits owing to

his drunken and irregular habits. At length (in 1517) he was appointed professor of Latin in the university. He was prominently associated with the distinguished men of the time (Johann Reuchlin, Conrad Peutinger, Ulrich von Hutten, Conrad Mutianus), and took part in the political, religious and literary quarrels of the period, finally declaring in favour of Luther and the Reformation, although his subsequent conduct showed that he was actuated by selfish motives. The university was seriously weakened by the growing popularity of the new university of Wittenberg, and Hessus endeavoured (but without success) to gain a living by the practice of medicine. Through the influence of Camerarius and Melanchthon, he obtained a post at Nuremberg (1526), but, finding a regular life distasteful, he again went back to Erfurt (1533). But it was not the Erfurt he had known; his old friends were dead or had left the place; the university was deserted. A lengthy poem gained him the favour

of the landgrave of Hesse, by whom he was summoned in 1536 as professor of poetry and history to Marburg, where he died on the 5th of October 1540. Hessus, who was considered the foremost Latin poet of his age, was a facile verse-maker, but not a true poet. He wrote what he thought was likely to pay or secure him the favour of some important person. He wrote local, historical and military poems, idylls, epigrams and occasional pieces, collected under the title of Sylvae. His most popular works were translations of the Psalms into Latin distichs (which reached forty editions) and of the Iliad into hexameters. His mcst original poem was the Heroides in imitation of Ovid, consist- ing of letters from holy women, from the Virgin Mary down to Kunigunde, wife of the emperor Henry II.

His Epistolae were edited by his friend Camerarius, who also wrote his life (1553). There are later accounts of him by M. Hertz (i860), G. Schwertzell (1874) and C. Krause (1879); see also D. F. Strauss, Ulrich von Hutten (Eng. trans., 1874). His poems on Nuremberg and other towns have been edited with commentaries and 16th- century illustrations by J. Neff and V. von Loga in M. Herrmann and S. Szamatolski's Lateinische Literaturdenkmaler des XV. u. XVI. Jahrhunderts (Berlin, 1896).

HESTIA, in Greek mythology, the " fire-goddess," daughter of Cronus and Rhea, the goddess of hearth and home. She is not mentioned in Homer, although the hearth is recognized as a place of refuge for suppliants; this seems to show that her worship was not universally acknowledged at the time of the Homeric poems. In post-Homeric religion she is one of the

twelve Olympian deities, but, as the abiding goddess of the household, she never leaves Olympus. When Apollo and Poseidon became suitors for her hand, she swore to remain a maiden for ever; whereupon Zeus bestowed upon her the honour of presiding over all sacrifices. To her the opening sacrifice was offered; to her at the sacrificial meal the first and last libations were poured. The fire of Hestia was always kept burning, and, if by any accident it became extinct, only' sacred fire produced by friction, or by burning glasses drawing fire from the sun, might be used to rekindle it. Hestia is the goddess of the family union, the personification of the idea of home; and as the city union is only the family union on a large scale, she was regarded as the goddess of the state. In this character her special sanctuary was in the prytaneum, where the common hearth-fire round which the magistrates meet is ever burning, and where the sacred rites that sanctify the concord of city life are performed. From this fire, as the representative of the life of the city, intend- ing colonists took the fire which was to be kindled on the hearth of the new colony. Hestia was closely connected with Zeus, the god of the family both in its external relation of hospitality and its internal unity round its own hearth; in the Odyssey a form of oath is by Zeus, the table and the hearth. Again, Hestia is often associated with Hermes, the two representing home and domestic life on the one hand, and business and outdoor life on the other; or, according to others, the association is local — that of the god of boundaries with the goddess of the house. In later philosophy Hestia became the hearth of the universe — the personification of the earth as the centre of the universe, identified with Cybele and Demeter. As Hestia had her home in the prytaneum, special temples dedicated to her are of rare occurrence. She is seldom represented in works of art, and plays no important part in legend. It is not certain that any really Greek statues of Hestia are in existence, although the Giustiniani Vesta in the Torlonia Museum is usually accepted as such. In this, she is represented standing upright, simply robed, a hood over her head, the left hand raised and pointing upwards. The Roman deity corresponding to the Greek Hestia is Vesta (q.v.).

See A. Preuner, Hestia-Vesta (1864), the standard treatise on the subject, and his article in Roscher's Lexikon der Mythologie; J. G. Frazer, " The Prytaneum," &c, in Journal of Philology, xiv. (1885); G. Hagemann, De Graecorum prytaneis (1881), with bibliography and notes; Homeric Hymns, xxix., ed. T. W. Allen and E. E. Sikes

(1904) ; Farnell, Cults, the Greek States, v. (1909).

HESYCHASTS {fiavxaaral or ficrvxtfovTes, from fcvxos, quiet, also called 6naK6\j/vxot., Umbilicanimi, and sometimes referred to as Euchites, Massalians or Palamites) , a quietistic sect which arose, during the later period of the Byzantine

empire, among the monks of the Greek church, especially at Mount Athos, then at the height of its fame and influence under the reign of Andronicus the younger and the abbacy of Symeon. Owing to various adventitious circumstances the sect came into great prominence politically and ecclesiastically for a few years about the middle of the 14th century. Their opinion and practice will be best represented in the words of one of their early teachers (quoted by Gibbon, Decline and Fall, c. 63): " When thou art alone in thy cell shut thy door, and seat thyself in a corner; raise thy mind above all things vain and transitory; recline thy beard and chin on thy breast; turn thine eyes and thy thought towards the middle of thy belly, the region of the navel (dfiˆaXds) ; and search the place of the heart, the seat of the soul. At first all will be dark and comfortless; but if thou persevere day and night, thou wilt feel an ineffable joy; and no sooner has the soul discovered the place of the heart than it is involved in a mystic and ethereal light." About the year 1337 this hesychasm, which is obviously related to certain well-known forms of Oriental mysticism, attracted the attention of the learned and versatile Barlaam, a Calabrian monk, who at that time held the office of abbot in the Basilian monastery of St Saviour's in Constantinople, and who had visited the fraternities of Mount Athos on a tour of inspection. Amid much that he disapproved, what he specially took exception to as heretical and blasphemous was the doctrine entertained as to the nature of this divine light, the fruition of which was the supposed reward of hesychastic contemplation. It was maintained to be the pure and perfect essence of God Himself, that eternal light which had been manifested to the disciples on Mount Tabor at the transfiguration. This Barlaam held to be polytheistic, inasmuch as it postulated two eternal substances, a visible and an invisible God. On the hesychastic side the controversy was taken up by Gregory Palamas, after- wards archbishop of Thessalonica, who laboured to establish a distinction between eternal ovaia. and eternal ivipyeia. In 1 34 1 the dispute came before a synod held at Constantinople and presided over by the emperor Andronicus; the assembly, influenced by the veneration in which the writings of the pseudo-Dionysius were held in the Eastern Church, overawed Barlaam, who recanted and returned to Calabria, afterwards becoming bishop of Hierace in the Latin communion. One of his friends, Gregory Acindynus, continued the controversy, and three other synods on the subject were held, at the second of which the Barlaamites gained a brief victory. But in 1351 under the presidency of the emperor John Cantacuzenus, the uncreated light of Mount Tabor was established as an article of faith for the Greeks, who ever since have been ready to recognize it as ah additional ground of separation from the Roman Church. The contemporary historians Cantacuzenus and Nicephorus Gregoras deal very copiously with this subject, taking the Hesychast and Barlaamite sides respectively. It may be mentioned that in the time of Justinian the word hesychast was applied to monks in general

simply as descriptive of the quiet and contemplative character of their pursuits.

See article " Hesychasten " in Herzog-Hauck, Realencyklopadie (3rd ed., 1900), where further references are given.

HESYCHIUS, grammarian of Alexandria, probably flourished in the 5th century a.d. He was probably a pagan; and the explanations of words from Gregory of Nazianzus and other Christian writers (glossae sacrae) are interpolations of a later time. He has left a Greek dictionary, containing a copious list of peculiar words, forms and phrases, with an explanation of their meaning, and often with a reference to the author- who used them or to the district of Greece where they were current. Hence the book is of great value to the student of the Greek dialects; while in the restoration of the text of the classical authors generally, and particularly of such writers as Aeschyjus and Theocritus, who used many unusual words, its value can hardly be exaggerated. The explanations of many epithets and phrases reveal many important facts about the religion and social life of the ancients. In a prefatory letter Hesychius mentions that his lexicon is based on that of Diogenianus (itself extracted from an earlier work by Pamphilus),

but that he has also used similar works by Aristarchus, Apion, Heliodorus and others.

The text is very corrupt, and the order of the words has often been disturbed. There is no doubt that many interpolations, besides the Christian glosses, have been made. The work has come down to us from a single MS., now in the library at Venice, from which the editio princeps was published. The best edition is by M. Schmidt (1858-1868); in a smaller edition (1867) he attempts to distinguish the additions made by Hesychius to the work of Diogenianus.

HESYCHIUS OF MILETUS, Greek chronicler and biographer, surnamed Illuslrius, son of an advocate, flourished at Con- stantinople in the 5th century a.d. during the reign of Justinian. According to Photius (cod. 69) he was the author of three important works. (1) A Compendium of Universal History in six books, from Behis, the reputed founder of the Assyrian empire, to Anastasius I. (d. 518). A considerable fragment has been preserved from the sixth book, entitled Uarpia K(j)v

Editions: J. C. Orelli (1820) and J. Flach (1882); fragments in C. W.

Muller, Frag. hist. Graec. iv. 143 and in T. Preger's Scriptores originis Constantinopolitanae, i. (1901); Pseudo-Hesychius, by J. Flach (1880); see generally C. Krumbacher, Geschichte derbyzanti- niscken Literatur (1897).

HETAERISM (Gr. fraipa a mistress), the term employed by anthropologists to express the primitive condition of man in his sexual relations. The earliest social organization of the human race was characterized by the absence of the institu- tion of marriage in any form. Women were the common property of their tribe, and the children never knew their fathers. HETEROKARYOTA, a zoological name proposed by S. J. Hickson for the Infusoria (q.v.) on the ground of the differentia- tion of their nuclear apparatus into meganucleus and micro- nucleus (or nuclei).

See Lankester's Treatise of Zoology, vol. i. fasc. I (1903).

HETERONOMY (from Gr. irepos and i>6/uos, the rule of another) , the state of being under the rule of another person. In ethics the term is specially used as the antithesis of " autonomy," which, especially in Kantian terminology, treats of the true self as will, determining itself by its own law, the moral law. " Heteronomy " is therefore applied by Kant to all other ethical systems, inasmuch as they place the individual in subjection to external laws of conduct.

HETMAN (a Polish word, probably derived from the Ger. Hauptmann, head-man or captain; the Russian form is ataman), a military title formerly in use in Poland; the Hetman Wielki, or Great Hetman, was the chief of the armed forces of the nation, and commanded in the field, except when the king was present in person. The office was abolished in 1792. From Poland the word was introduced into Russia, in the form ataman, and was adopted by the Cossacks, as a title for their head, who was practically an independent prince, when under the suzerainty of Poland. After the acceptance of Russian rule

by the Cossacks in 1654, the post was shorn of its power. The title of " ataman " or " hetman of all the Cossacks " is held by the Cesarevitch. "Ataman" or "hetman" is also the name of the elected elder of the stanitsa, the unit of Cossack administration. (See Cossacks.)

HETTNER, HERMANN THEODOR (1821-1882), German literary historian and writer on the history of art, was born at Leisersdorf, near Goldberg, in Silesia, on the 12th of March 1821. At the universities of Berlin, Halle and Heidelberg he devoted himself chiefly to the study of philosophy, but in 1843 turned his attention to aesthetics, art and literature. With a view to furthering these studies, he spent three years in

Italy, and, on his return, published a Vorschule zur bildenden Kunst der Alten (1848) and an essay on Die neapolitanischen Maler- schulen. He became Privatdozent for aesthetics and the history of art at Heidelberg and, after the publication of his suggestive volume on Die romantische Schule in ihrem Zusammenhang mit Goethe und Schiller (1850), accepted a call as professor to Jena where he lectured on the history of both art and literature. In 1855 he was appointed director of the royal collections of antiquities and the museum of plaster casts at Dresden, to which posts were subsequently added that of director of the historical museum and a professorship at the royal Polytechnikum. He died in Dresden on the 29th of May 1882. Hettner's chief work is his Literatur geschichte des i8ten Jahrhunderts, which appeared in three parts, devoted respectively to English, French and German literature, between 1856 and 1870 (5th ed. of I. and II., revised by A. Brandl and H. Morf, 1894; 4th of III., revised by O. Harnack, 1894). Although to some extent influenced by the political and literary theories of the Hegelian school, which, since Hettner's day have fallen into discredit, and at times losing sight of the main issues of literary development over questions of social evolution, this work belongs to the best histories that the 19th century produced. Hettner's judgment is sound and his point of view always original and stimulating. His other works include Griechische Reiseskizzen (1853), Das modeme Drama (1852) — a book that arose from a correspondence with Gottfried Keller — Italienische Siudien (1879), and several works descriptive of the Dresden art collections. His Kleine Schriften were collected and published in 1884.

See A. Stern, Hermann Hettner, ein Lebensbild (1885); H. Spitzer, H. Hettners kunstphilosophische Anfange und Literaturasthetik (1903).

HETTSTEDT, a town of Germany, in Prussian Saxony, on the Wipper, and at the junction of the railways Berlin-Blanken- heim and Hettstedt-Halle, 23 m. N.W. of the last town. Pop. (1905), 9230. It has a Roman Catholic and four Evangelical churches, and has manufactures of machinery, pianofortes and artificial manure. In the neighbourhood are mines of argenti- ferous copper, and the surrounding district and villages are occupied with smelting and similar works. Silver and sulphuric acid are the other chief products; nickel and gold are also found in small quantities. In the Kaiser Friedrich mine close by, the first steam-engine in Germany was erected on the 23rd of August 1785. Hettstedt is mentioned as early as 1046; in 1220 it possessed a castle; and in 1380 it received civic privileges. When the countship of Mansfeld was sequestrated, Hettstedt came into the possession of Saxony, passing to Prussia in 181 5.

HEUGLIN, THEODOR VON (1824-1876), German traveller in north-east Africa, was born on the 20th of March 1824 at Hirschlanden near

Leonberg in Wiirttemberg. His father was a Protestant pastor, and he was trained to be a mining engineer. He was ambitious, however, to become a scientific investigator of unknown regions, and with that object studied the natural sciences, especially zoology. In 1850 he went to Egypt where he learnt Arabic, afterwards visiting Arabia Petraea. In 1852 he accompanied Dr Reitz, Austrian consul at Khartum, on a journey to Abyssinia, and in the next year was appointed Dr Reitz's successor in the consulate. While he held this post he travelled in Abyssinia and Kordofan, making a valuable collection of natural history specimens. In 1857 he journeyed through the coast lands of the African side of the Red Sea, and along the Somali coast. In i860 he was chosen

leader of an expedition to search for Eduard Vogel, his com- I panions including Werner Munzinger, Gottlob Kinzelbach, and Dr Hermann Steudner. In June 1861 the party landed at Massawa, having instructions to go direct to Khartum and thence to Wadai, where Vogel was thought to be detained. Heuglin, accompanied by Dr Steudner, turned aside and made a wide detour through Abyssinia and the Galla country, and in consequence the leadership of the expedition was taken from him. He and Steudner reached Khartum in 1862 and there joined the party organized by Miss Tinne. With her or on their own account, they travelled up the White Nile to Gondokoro and explored a great part of the Bahr-el-Ghazal, where Steudner died of fever on the 10th of April 1863. Heuglin returned to Europe at the end of 1864. In 1870 and 1871 he made a valuable series of explorations in Spitsbergen and Novaya Zemlya; but 1875 found him again in north-east Africa, in the country of the Beni Amer and northern Abyssinia. He was preparing for an exploration of the island of Sokotra, when he died, at Stuttgart, on the 5th of November 1876. It is principally by his zoological, and more especially his ornithological, labours that Heuglin has taken rank as an independent authority.

His chief works are Systematische Ubersicht der Vogel Nordost- Afrikas (1855).; Reisen in Nordost-Afrika, 1852-1853 (Gotha, 1857); Syst. Ubersicht der Saugetiere Nordosl-Afrikas (Vienna, 1867); Reise nach Abessinien, den Gala-Ldndern, &c, 1861-1862 (Jena, 1868); Reise in das Gebiet des Weissen Nil, &c. 1862-1864 (Leipzig, 1869) ; Reisen nach dent Nordpolarmeer, 1870-1871 (Bruns- wick, 1872-1874); Ornithologie von Nordost-Afrika (Cassel, 1869- 1875); Reise in Nordost-Afrika (Brunswick, 1877, 2 vols.). A list of the more important of his numerous contributions to Petertnann's Mitteilungen will be found in that serial for 1877 at the close of the necrological notice.

HEULANDITE, a mineral of the zeolite group, consisting of hydrous calcium and aluminium silicate, H^CaAkCSiO^e + 3H 2 0. Small amounts of sodium and potassium are usually present replacing part of the calcium. Crystals are monoclinic, and have a characteristic coffin-shaped habit. They have a perfect cleavage parallel to the plane of symmetry (M in the figure), on which the lustre is markedly pearly; on other faces the lustre is of the vitreous type. The mineral is usually colourless or white, sometimes brick-red, and varies from transparent to translucent. The hardness is 35-4, and the specific gravity 2-2.

Heulandite closely resembles stilbite (q.v.) in appearance, and differs from it chemically only in containing rather less water of crystallization. The two minerals may, however, be readily dis- tinguished by the fact that in heulandite the acute positive bisectrix of the optic axes emerges perpendicular to the cleavage. Heulandite was first separated from stilbite by A. Breithaupt in 1818, and named by him euzeolite (meaning beautiful zeolite); independ- ently, in 1822, H. J. Brooke arrived at the same result, giving the name heulandite, after the mineral collector,- Henry Heuland. Heulandite occurs with stilbite and other zeolites in the amygdaloidal cavities of basaltic volcanic rocks, and occasion- ally in gneiss and metalliferous veins. The best specimens are from the basalts of Berufjord, near Djupivogr, in Iceland and the Faroe Islands, and the Deccan traps of the Sahyadri mountains near Bombay. Crystals of a brick-red colour are from Campsie Fells in Stirlingshire and the Fassathal in Tirol. A variety known as beaumontite occurs as small yellow crystals on syenitic schist near Baltimore in Maryland.

Isomorphous with heulandite is the strontium and barium zeolite brewsterite, named after Sir David Brewster. The greyish monoclinic crystals have the composition H 4 (Sr, Ba, Ca)Al2(Si03)6 + 3H 2 0, and are found in the basalt of the Giant's Causeway in Co. Antrim, and with harmotome in the lead mines at Strontian in Argyllshire. (L. J. S.)

HEUSCH, WILLEM, or Guilliam de, a Dutch landscape painter in the 17th century at Utrecht. The dates of this artist's birth and death are unknown. Nothing certain is recorded of him except that he presided over the gild of Utrecht, whilst Cornells Poelemburg, Jan Both and Jan Weenix formed the

council of that body, in 1649. According to the majority of historians, Heusch was born in 1638, and was taught by Jan Both. But each of these statements seems open to doubt; and although it is obvious that the style of Heusch is identical with that of Both, it may be that the two masters during their travels in Italy fell under the influence of Claude Lorraine, whose " Arcadian " art they imitated. Heusch certainly painted the same effects of evening in wide expanses of country varied by rock formations and lofty

thin-leaved arborescence as Both. There is little to distinguish one master from the other, except that of the two Both is perhaps the more delicate colourist. The gild of Utrecht in the middle of the 17th century was composed of artists who clung faithfully to each other. Poelemburg, who painted figures for Jan Both, did the same duty for Heusch. Sometimes Heusch sketched landscapes for the battlepieces of Molenaer. The most important examples of Heusch are in the galleries of the Hague and Rotterdam, in the Belvedere at Vienna, the Stadel at Frankfort and the Louvre. His pictures are signed with the full name, beginning with a monogram combining a G (for Guilliam), D and H. Heusch's etchings, of which thirteen are known, are also in the character of those of Both.

After Guilliam there also flourished at Utrecht his nephew, Jacob de Heusch, who signs like his uncle, substituting an initial J for the initial G. He was born at Utrecht in 1657, learnt drawing from his uncle, and travelled early to Rome, where he acquired friends and patrons for whom he executed pictures after his return. He settled for a time at Berlin, but finally retired to Utrecht, where he died in 1701. Jacob was an " Arcadian," like his relative, and an imitator of Both, and he chiefly painted Italian harbour views. But his pictures are now scarce. Two of his canvases, the " Ponte Rotto " at Rome, in the Brunswick Gallery, and a lake harbour with shipping in the Lichtenstein collection at Vienna, are dated 1696. A harbour with a tower and distant mountains, in the Belvedere at Vienna, was executed in 1699. Other examples may be found in English private galleries, in the Hermitage of St Petersburg and the museums of Rouen and Montpellier.

HEVELIUS [Hevel or Howelcke], JOHANN (1611-1687),

German astronomer, was born at Danzig on the 28th of January

161 1. He studied jurisprudence at Leiden in 1630; travelled

in England and France; and in 1634 settled in his native town

as a brewer and town councillor. From 1639 his chief interest

became centred in astronomy, though he took, throughout his

life, a leading part in municipal affairs. In 1641 he built an

observatory in his house, provided with a splendid instrumental

outfit, including ultimately a tubeless telescope of 150 ft. focal

length, constructed by himself. It was visited, on the 29th

of January 1660, by John II. and Maria Gonzaga, king and queen of Poland. Hevelius made observations of sunspots, 1642-1645, devoted four years to charting the lunar surface, discovered the moon's libration in longitude, and published his results in Selenographia (1647), a work which entitles him to be called the founder of lunar topography. He discovered four comets in the several years 1652, 1661, 1672 and 1677, and suggested the revolution of such bodies in parabolic tracks round the sun. On the 26th of September 1679, his observatory, instruments and books were maliciously destroyed by fire, the catastrophe being described in the preface to his Annus climactericus (1685). He promptly repaired the damage, so far as to enable him to observe the great comet of December 1680; but his health suffered from the shock, and he died on the 28th of January 1687-. Among his works were: Prodromus comelicus (1665); Cotnetographia (1668); Machina coelestis (first part, 1673), containing a description of his instruments; the second part (1679) is extremely rare, nearly the whole issue having perished in the conflagration of 1679. The observations made by Hevelius on the variable star named by him " Mira " are included in Annus climactericus. His catalogue of 1564 stars appeared posthumously in Prodromus astronomiae (1690). Its value was much impaired by his preference of the antique " pinnules " to telescopic sights on quadrants. This led to an acrimonious

controversy with Robert Hooke. In an Atlas of 56 sheets, corresponding to his catalogue, and entitled Firmamenlum Sobiescianum (1690), he delineated seven new constellations, still in use. Hevelius had his book printed in his own house, at lavish expense, and himself not only designed but engraved many of the plates.

See J. H. Westphal, Leben, Studien, und Schriften des Astronomen Johann Hevelius (1820); C. B. Lengnich, Anekdoten und Nachrichten (1780); Allgemeine deutsche Biographie (C. Bruhns); J. B. J. Delambre, Histoire de I'astronomie moderne, ii. 471 ; J. F. Weidler, Historia astronomiae, p. 486; F. Baily's edition of the Catalogue of Hevelius, Memoirs Roy. Astr. Society, xiii. (1843); R. Wolf, Geschichte der Astronomie, p. 396; J. C. PoggendorfT, Biog.-lit. Handworterbuch. For an account of the epistolary remains of Hevelius, see C. G. Hecker, Monatl. Correspondenz, viii. 30; also Astr. Nachrichten, vols, xxiii., xxiv. (A. M. C.)

HEWETT, SIR PRESCOTT GARDNER, Bart. (18×2-1891), British surgeon, was born on the 3rd of July 181 2, being the son of a Yorkshire country gentleman. He lived for some years in early life in Paris, and started on a career as an artist, but abandoned it for surgery. He entered St George's Hospital, London (where his half-brother, Dr Cornwallis Hewett, was physician from 1825 to 1833) becoming demonstrator of anatomy and curator of the museum. He was the pupil and intimate friend of Sir B. C. Brodie, and helped him in much of his work. Eventually he rose to be anatomical lecturer, assistant-surgeon and surgeon to the hospital. In 1876 he was president of the College of Surgeons; in 1877 he was made serjeant-surgeon extraordinary to Queen Victoria, in 1884 serjeant-surgeon, and in 1883 he was created a baronet. He was a very good lecturer, but shrank from authorship ; his lectures on Surgical Affections of the Head were, however, embodied in his treatise on the subject in Holmes's System of Surgery. As a surgeon he was always extremely conservative, but hesitated at no operation, however severe, when convinced of its expediency. He was a perfect operator, and one of the most trustworthy of counsellors. He died on the 19th of June 1891.

HEWITT, ABRAH STEVENS (1822-1903), American manu- facturer and political leader, was born in Haverstraw, New York, on the 31st of July 1822. His father, John, a Staffordshire man, was one of a party of four mechanics who were sent by Boulton and Watt to Philadelphia about 1790 to set up a steam engine for the city water-works and who in 1 793-1 794 built at Belleville, N.J., the first steam engine constructed wholly in

America; he made a fortune in the manufacture of furniture, but lost it by the burning of his factories. The boy's mother was of Huguenot descent. He graduated with high rank from Columbia College in 1842, having supported himself through his course. He taught mathematics at Columbia, and in 1845 was admitted to the bar, but, owing to defective eyesight, never practised. With Edward Cooper (son of Peter Cooper, whom Hewitt greatly assisted in organizing Cooper Union, and whose daughter he married) he went into the manufacture of iron girders and beams under the firm name of Cooper, Hewitt & Co. His study of the making of gun-barrel iron in England enabled him to be of great assistance to the United States government during the Civil War, when he refused any profit on such orders. The men in his works never struck — indeed in 1873-1878 his plant was run at an annual loss of $100,000. In politics he was a Democrat. In 187 1 he was prominent in the re-organization of Tammany after the fall of the " Tweed Ring "; from 1875 until the end of 1886 (except in 1879-1881) he was a representative in Congress ; in 1876 he left Tammany for the County Democracy; in the Hayes-Tilden campaign of that year he was chairman of the Demo- cratic National Committee, and in Congress he was one of the House members of the joint committee which drew up the famous Electoral Count Act providing for the Electoral Commission. In 1886 he was elected mayor of New York City, his nomination having been forced upon the Democratic Party by the strength of the other nominees, Henry George and Theodore Roosevelt; his administration (1887-1888) was thoroughly efficient and creditable, but he broke with Tammany, was not renominated, ran independently for re-election, and, was defeated. In 1896

and 1900 he voted the Republican ticket, but did not ally himself with the organization. He died in New York City on the 18th of January 1903. In Congress he was a consistent defender of sound money and civil service reform; in municipal politics he was in favour of business administrations and opposed to partisan nominations. He was a leader of those who contended for reform in municipal government, was conspicuous for his public spirit, and exerted a great influence for good not only in New York City but in the state and nation. His most famous speech was that made at the opening of the Brooklyn Bridge in 1883. He was a terse, able and lucid speaker, master of wit and sarcasm, and a fearless critic. He gave liberally to Cooper Union, of which he was trustee and secretary, and which owes much of its success to him; was a trustee of Columbia University from 1 901 until his death, chairman of the board of trustees of Barnard College, and was one of the original trustees, first chairman of the board of trustees, and a member of the executive committee of the Carnegie Institution.

HEWLETT, MAURICE HENRY (1861-), English novelist, was born on the 22nd of January 1861, the eldest son of Henry Gay Hewlett, of Shaw Hall,

Addington, Kent. He was educated at the London International College, Spring Grove, Isleworth, and was called to the bar in 1891. From 1896 to 1900 he was keeper of the land revenue records and enrolments. He published in 1895 two books on Italy, Earthwork out of Tuscany, and (in verse) The Masque of Dead Florentines. Songs and Meditations followed in 1897, and in 1898 he won an immediate reputation by his Forest Lovers, a romance of medieval England, full of rapid movement and passion. In the same year he printed the pastoral and pagan drama of Pan and the Young Shepherd, shortened for purposes of representation and produced at the Court Theatre in March 1905, when it was followed by the Youngest of the Angels, dramatized from a chapter in his Fool Errant. In Little Novels of Italy (1899), a collection of brilliant short stories, he showed again his power of literary expression together with a close knowledge of medieval Italy. The new and vivid portraits of Richard Cceur de Lion in his Richard Yea-and- Nay (1900), and of Mary, queen of Scots, in The Queen's Quair (1904) showed the combination of fiction with real history at its best. The New Canterbury Tales (1901) was another volume of stories of English life, but he returned to Italian subjects with The Road in Tuscany (1904); in Fond Adventures, Tales of the Youth of the World (1905), two are Italian tales, and The Fool Errant (1905) purports to be the memoirs of Francis Antony Stretley, citizen of Lucca. Later works were the novel The Stooping Lady (1907), and a volume of poems, Artemision

(1909).

HEXAMETER, the name of the earliest and most important form of classical verse in dactylic rhythm. The word is due to each line containing six feet or measures Guerpa), the last of which must be a spondee and the penultimate a dactyl, though occasionally, for some special effect, a spondee may be allowed in the fifth foot, when the line is said to be spondaic. The four other feet may be either spondees or dactyls. All the great heroic and epic verse of the Greek and Roman poets is in this metre, of which the finest examples are to be found in Homer and in Virgil. Varied cadences and varied caesura are essential to this form of verse, otherwise the monotony is wearying to the ear. The most usual places for the caesura are at the middle of the third, or the middle of the fourth foot: the former is known as the penthemimeral and the latter as hepthemimeral caesura. There are several more or less successful examples of English poems in this metre, for example Longfellow's Evan- geline, Kingsley's Andromeda and Clougn's Bothie of Tober-na- Vuoilich, but it does not really suit the genius of the English language. In English the lack of true spondees is severely felt, even though the English metre depends, not, as in Greek and Latin, on the distinction between long and short syllables, but on that between accented and unaccented syllables. The accent must always (or it sounds very ugly) fall on the first syllable, whatever may have been the case in Greek and

Latin — Voss, Klopstock and Goethe have written hexameter poems

*4*8*

HEXAPLA— HEXAPODA

of varying merit and the metre suits the German language distinctly better than the English. The customary form of hexameter in English verse is exemplified by Coleridge's descrip- tive line: —

" In the hex | ameter | rises the | fountain's | silvery | column." Several modern poets, and in particular Robert Browning, and Lord Bowen (1835-1894) have used with effect a truncated hexameter consisting of the usual verse deprived of its last syllable. Thus Browning: —

" Well, it is I gone at | last, the | palace of | music I | reared." It is not sufficiently observed that even the classic Greek poets introduced considerable variations into their treatment of the hexameter. These have been treated with erudition in G. Hermann's De aetate scriptoris Argonauticorum. The differ- ences in the hexameters of the Latin poets were not so remarkable, but even these varied, in various epochs, their treatment of the separate feet, and the position of the caesura. The satirists in particular allowed themselves an extraordinary licence: these hexameters, from Persius, are as far removed from the rhythm of Homer, or even of Virgil, as possible, if they are to remain hexameters: —

" Mane piger stertis. ' Surge ! ' inquit Avaritia, ' heia (Surge ! negas; instat ' Surge ! ' inquit ' Non queo.' ' Surge ! ' Lt quid agam ? ' ' Rogitas ? en saperdam advehe Ponto. " It is also to be noted that various prosodical liberties, due origin- ally to the extreme antiquity of the hexameter, and long reformed and repressed by the culture of poets, were apt to be revived in later ages, by writers who slavishly copied the most antique examples of the art of verse.

See Wilhelm Christ, Metrik der Griechen und Romer, 2te Aufl

(1879).

HEXAPLA (Gr. for " sixfold "), the term for an edition of the Bible in six versions, and especially the edition of the Old Testament compiled by Origen, which placed side by side (1) Hebrew, (2) Hebrew in Greek character, (3)' Aquila, (4) Symmachus, (5) Septuagint, (6) Theodotion. See Bible: Old Testament, Texts and Versions.

HEXAPODA (Gr. < =£, six, and wovs, foot), a term used in systematic zoology for that class of the Arthropoda, popularly known as insects.

Linnaeus in his Sy sterna naturae (1735) grouped under the class Insecta all segmented animals with firm exoskeleton and jointed limbs — that is to say, the insects, centipedes, millipedes, crustaceans, spiders, scorpions and then- allies. This assemblage is now generally regarded as a great division (phylum or sub-phylum) of the animal kingdom and known by K. T. E. von Siebold's (1848) name of Arthropoda. For the class of the true insects included in this phylum, Lin- naeus's old term Insecta, first used in a restricted sense by M. J. Brisson (1756), is still adopted by many zoologists, while others prefer the name Hexapoda, first used systematically in its modern sense by P. A. Latreille in 1825 {Families nalurelles du regne animal), since it has the advantage of expressing, in a single word, an important characteristic of the group. The terms " Hexapoda " and " hexapod " had already been used by F. Willughby, J. Ray and others in the late 17th century to include the active larvae of beetles, as well as bugs, lice, fleas and other insects with undeveloped wings.

Characters. A true insect, or member of the class Hexapoda, may be known by the grouping of its body-segments in three distinct regions— a head, a thorax and an abdomen — each of which consists of a definite number of segments. In the terminology proposed by E. R. Lankester the arrangement is ” nomomer- istic ” and ” nomotagmic.” The head of an insect carries usually four pairs of conspicuous appendages — feelers, mandibles and two pairs of maxillae, so that the presence of four primitive somites is immediately evident. The compound eyes of insects resemble so closely the similar organs in Crustaceans that there can hardly be reasonable doubt of their homology, and the primitively appendicular nature of the eyes in the latter class suggests that in the Hexapoda also they re D resent the

appendages of an anterior (protocerebral) segment. Behind the antennal (or deutocerebral) segment an ” intercalary ” or tritocerebral segment has been demonstrated by W. M. Wheeler (1893) and others in various insect embryos, while in the lowest insect order — the Aptera — a pair of minute jaws — the maxillulae — in close association with the tongue are present, as has been shown by H. J. Hansen (1893) and J. W. Folsom (1900). Distinct vestiges of the maxillulae exist also in the earwigs and booklice, according to G. Enderlein and C. Borner (1904), and they are very evident in larval may-flies. The number of limb-bearing somites in the insectan head is thus seen to be seven. AH of these are to be regarded as primitively post-oral, but in the course of development the mouth moves back to the mandibular segment, so that the first three somites- ocular, antennal and intercalary — lie in front of it. In Lan- kester’s terminology, therefore, the head of an insect is ” tripros- thomerous.” The maxillae of the hinder pair become more or less fused together to form a ” lower lip ” or labium, and

the segment of these appendages is, in some insects, only imperfectly united with the head-capsule.

The thorax is composed of three segments; each bears a pair of jointed legs, and in the vast majority of insects the two hind- most bear each a pair of wings. From these three pairs of thoracic legs comes the name— Hexapoda — which distinguishes the class. And the wings, though not always present, are highly characteristic of the Hexapoda, since no other group of the Arthropoda has acquired the power of flight. In the more generalized insects the abdomen evidently consists of ten seg- ments, the hindmost of which often carries a pair of tail-feelers,, (cerci or cercopods) and a terminal anal segment. In some cases^ however, it can be shown that the cerci really belong to an eleventh abdominal segment which usually becomes fused with the tenth. With very few exceptions the abdomen is without loco- motor limbs. Paired processes on the eighth and ninth abdominal segments may be specialized as external organs of reproduction, but these are probably not appendages. The female genital opening usually lies in front of the eighth abdominal segment, the male duct opens on the ninth.

In all main points of their internal structure the Hexapoda agree with other Arthropoda. Specially characteristic of the class, however, is the presence of a complex system of air-tubes (tracheae) for respiration, usually opening to the exterior by a series of paired spiracles on certain of the body segments. The possession of a variable number of excretory tubes (Malpighian tubes), which are developed as outgrowths of the hind-gut and pour their excretion into the intestine.is also a distinctive character of the Hexapoda.

The wings of insects are, in all cases, developed after hatching-, the younger stages being wingless, and often unlike the parent in other respects. In such cases the development of wings and the attainment of the adult form depend upon a more or less profound transformation or metamorphosis.*

With this brief summary of the essential characters of the Hexapoda, we may pass to a more detailed account of their structure.

Exoskeleton

The outer cellular layer (ectoderm or " hypodermis ") of insects as of other Arthropods, secretes a chitinous cuticle which has to be periodically shed and renewed during the growth of the animal The regions of this cuticle have a markedly segmental arrangement' and the definite hardened pieces (sclerites) of the exoskeleton are in close contact with one another along

linear sutures, or are united by regions of the cuticle which are less chitinous and more membran- ous, so as to permit freedom of movement.

Head.— The head-capsule of an insect (figs. 1, 2) is composed of 4 number of sclerites firmly sutured together, so that the primitive segmentation is masked. Above is the crown (vertex or eptcranium), on which or on the " front "may be seated three simple eyes (ocelli). Below this comes the front, and then the face or clypeus, to which a very distinct upper lip (labrwm) is usually jointed. Behind the labium arises a process— rthe epipharynx — which in some blood-sucking insects becomes a formidable piercing-organ. On either side a variable amount of convex area is occupied by the compound eye; in many insects of acute sense and accurate flight these eyes are very large and sub-globular, almost meeting on the middle line of the*

bead. Below each eye is a cheek area (gena), often divided into an anterior and a posterior part, while a distinct chin-sclerite (g«/o) is often developed behind the mouth.

Feelers. — Most conspicuous among the appendages of the head are the feelers or antennae, which correspond to the anterior feelers

From Miall and Denny, The Cockroach, Lovell Reeve & Co.

Fig. i. — Head and Jaws of Cockroach (Blatta). Magnified 10 times. A, Front; B, side; C, back; v, vertex; /, frons; cl, clypeus; Ibr, labrum; oc, compound eye; ge, gena; mn, mandible; ca, st, pa, ga, la, cardo, stipes, palp, galea, lacinia of first maxilla; sm,m, pa',pg, submentum, mentum, palp, galea of 2nd maxilla.

(antennules) of Crustacea. In their simpler condition they are long and many-jointed, the segments bearing numerous olfactory and tactile nerve-endings. Elaboration in the form of the feelers, often a secondary sexual character in male insects, may result from a distal broadening of the segments, so that the appendage becomes serrate, or from the development of processes bearing sensory organs, so that the structure is pinnate or feather-like. On the other hand, the number of segments may be reduced, certain of them often becoming highly modified in form.

Jaws. — The mandibles of the Hexapoda are usually strong jaws with one

or more teeth at the apex (fig. 1, A,- B, mn), articulating at their bases with the head-capsule by sub-globular condyles, and provided with abductor and adductor muscles by means of which they can be separated or drawn together so as to bite solid food, or seize objects which have to be carried about. They never bear seg- mented limbs (palps) and only exception- ally (as in the chafers) the skeleton com- posed of more than one sclerite. The mandibles often furnish a good example of "secondary sexual characters, ' being more strongly developed in the male than in the female of the same species. In most insects that feed by suction the mandi- bles are modified. In . ,[ji I , iv bugs (Heteroptera) and

\ f c| many flies, for example,

\»f/ h ' / "■'• e they are changed into

T|K / needle-like piercers (fig.

I / \ I ' 2 > II)' w hile in moths

' > ' and caddis-flies they

are reduced to mere vestiges or altogether . (U.S. Dept. Agric.). suppressed. r . T As previously men-

front view, la, tioned, a pair of minute pointed labrum j aws _ the maxillulae— 111, nrst are present in the c, piercer),] owes t order of insects, IV, second between the mandibles c ' and the first maxillae. They usually consist of an inner and an outer lobe arising from a basal piece, which bears also in some genera a small palp (see Aptera).

In their typical state of development, the first maxillae offer a striking contrast to the mandibles, being composed of a two-segmented basal piece {cardo and stipes, fig. 1, C, ca, st) bearing a distinct inner and outer lobe (lacinia and galea, fig. 1, C, la, ga) and externally a

After Martatt Entom. Bull.

Fig. 2.— Head of Cicad, frons; b, clypeus (the beneath it); II, mandible; maxilla; (a, base; fr, sheath; III', inner view of sheath; maxillae forming rostrum (b, mentum; ligula).

jointed limb or palp (fig 1, C, pa). Such maxillae are lound in most biting insects. In insects whose mouths are adapted for sucking and piercing, remarkable modifications may occur. In many blood- sucking flies, for example, the galea is absent, while the lacinia becomes a strong knife-like piercer and the palp is well developed. In bugs and aphids the lacinia is a

slender needle-like piercer (fig. 2, III), while the palp is wanting. In butterflies and moths the lacinia is absent while the galea becomes ˆ flexible process, grooved on its inner face, so as to make with its fellow a hollow sucking-trunk, and the palp is usually very small.

The second pair of maxillae are more or less completely fused together to form what is known as the labium or " lower lip." In generalized biting insects, such as cockroaches and locusts (Orthoptera), the parts of a typical maxilla can be easily recognized in the labium. The fused cardines form a broad basal plate (sub-mentum) and the stipites a smaller plate (mentum) — see fig. 1, C, sm, m — jointed on to the sub- mentum, while the galeae, laciniae and palps remain distinct. In specialized biting insects, such as beetles (Coleo- ptera), the labium tends to become a hard transverse plate bearing the pair of palps, a median structure — known as the ligula — formed of the conjoined laciniae, and a pair of small rounded processes — the reduced galeae — often called the " paraglossae," a term better avoided since it has been applied also to the maxillulae of Aptera, entirely different structures. The long sucking " tongue " of bees is probably a modification of the ligula. In bugs and aphids (Hemiptera), the fused second maxillae form a jointed grooved beak or rostrum (fig. 2, IV) in which the slender piercers (mandibles and first maxillae) work to and fro.

This second pair of maxillae (or labium) form then the hinder or lower boundary of the mouth. In front or above the mouth is bounded by the labrum, while the mandibles and first maxillae lie on either side of it. A median process, known as the hypopharynx or tongue, arises from the floor of the mouth in front of the labium, and becomes most variously developed or specialized in different insects. The salivary duct opens on its hinder surface. It does not appear to represent a pair of appendages, but the maxillulae of the Aptera become closely associated with it. According to the view of R. Heymons, the hypopharynx represents the sterna of all the jaw-bearing somites, but other students consider that it belongs to the mandibular and first maxillary segments, or entirely to the segment of the first maxillae.

Neck. — The head is usually connected with the thorax by a distinct membranous neck, strengthened in the more generalized orders with small chitinous plates (cervical sclerites)._ These have been inter- preted as indicating one or more primitive segments – between' the head and thorax. Probably, however, as suggested by T. H. Huxley (Anat. Invert. Animals, 1877), they really belong to the labial segment which has not become completely fused with the head- capsule. It has been shown by C. Janet (1889), from careful studies of the musculature, that the greater part of the head-capsule is built up of the four anterior head-segments, the hindmost of which has the mandibles for its appendages, and this

conclusion is in the main supported by the recent work on the head skeleton of J. H. Comstock and C. Kochi (1902) and W. A. Riley (1904)-

Thorax.— The three segments which make up the thorax or fore- trunk are known as the prothorax, mesothorax and metathorax (see fig- 3)- The dorsal area of the prothorax is occupied by a single sclerite, the pronotum (fig. 3, d), which is large and conspicuous in those insects, such as cockroaches, bugs (Heteroptera) and beetles, which have the prothorax free — i.e. readily movable on the segment (mesothorax) immediately behind — smaller and of less importance where the prothorax is fixed to the mesothorax, as in bees and flies. The dorsal area of the mesothorax, and also of the metathorax, may be made up of a series of sclerite's arranged one behind the other — prescutum, scutum, scutellum and post-scutellum (fig. 3, e, /, g, h), the scutellum of the mesothorax being often especially conspicuous. Ventrally, each segment of the thorax has a sternum with which a median presternum and paired episterna and epimera are often associated (see figs. 3, 4). The recent suggestion of K. W. Verhoeff (1904) that the hexapodan thorax in reality contains six primitive segments is entirely without embryological support.

Legs. — Each segment of the thorax carries a pair of legs. In most insects the leg is built up of nine segments: (1) a broad triangular, sub-globular, conical or cylindrical haunch (coxa) ; (2) a small trochanter; (3) an elongate stout thigh (femur) ; (4) a more slender shin (tibia) ; and (5-9) a foot consisting of five tarsal segments. The fifth (distal) tarsal segment carries a median adhesive pad— the pulvillus — on either side of which is a claw. The pulyillus is

probably to be regarded as a true terminal (tenth) segment of the leg, while the claws are highly modified bristles. Numerous bristles are

Mta Marlatt, Ent. Bull, j, n. ». (U.S. Dept. Agr.).

Fig. 3. — Thorax of Saw-Fly {Pachynematus).

1, Dorsal view. II, Ventral view. Ill, Lateral view. IV, Lateral view with segments separated. Prothorax : a, Episternum. 6, Sternum.

Coxa of fore-leg.

/,

d, Pronotum. Mesothorax :

e, Prescutum. /, Scutum.

f, Scutellum. , Post-scutellum. i, Mesophragma. j, Epimeron. k, Episternum.

usually present on the thighs, shins and feet of insects, some of them so delicate as to be termed ” hairs ” others so stout and hard that

Coxa of middle leg.

Metalhorax : m, Scutum. o, Epimeron. p, Coxa of hind leg. n, First Abdominal

Segment. t, Tegula at base of

fore-wing.

variety, dependent on the order to which the insect belongs, and the special function — walking, running, climbing, digging or swimming — for which the limb is adapted. The walking of insects has been carefully studied by V. Graber (1877) and J. Demoor (1890), who find that the legs are usually moved in two sets of three, the first and third legs of one side moving with the second leg of the other. One tripod thus affords a firm base of support while the legs of the other tripod are brought forward to their new positions.

Wings. — Two pairs of wings are present in the vast majority of insects, borne respectively on the mesothorax and metathorax. At the base of the wing, i.e. its attachment to the trunk, we find a highly complex series of small sclerites adapted for the varied movements necessary for flight. Those of the dragon-flies (Odonata) have been described in detail by R. von Lendenfeld (1881). The long axis of the wings, when at rest, lies parallel to the body axis. In this position the outer margin of the wing is the casta, the inner the dorsum, and the hind-margin the termen. The angle between the costa and termen is the apex. When the wing is spread, its long axis is more or less at a right angle to the body axis. A wing is an out- growth from the dorsal and pleural regions of the thoracic segment that bears it, and microscopic examination shows it to consist of a double layer of cuticularized skin, the two layers being in contact except where they are thickened and folded to form the firm tubular nervures, which serve as a supporting framework for the wing membrane, enclose air-tubes, and convey blood. These nervures consist of a series of trunks radiating from the wing-base and usually branching as they approach the wing-margins,

the branches being often connected by short transverse nervures, so that the wing-area is marked off into a number of " cells " or areolets.

The details of the nervuration vary greatly in the different orders, but J. H. Comstock and J. G. Needham have lately (1898-1899) shown that a common arrangement underlies all, six series of longi- tudinal or radiating nervures being present in the typical wing (see fig. 5). Along the costa runs a costal nervure. This is followed by a sub-costal which some- times shows two main branches. Then comes the radial — usually the most important nervure pf the wing — typically with five branches, and the median with four. These sets arise from a main trunk towards the front region of the wing-base. From another hinder trunk arise the two-branched cubital nervure and three separate anal nervures. In the hind-wing of many insects the number of radial branches becomes re- duced, while the anal area is especially well developed and undergoes a fan-like folding when the wings are closed. Great diversity exists in the texture and functions of fore and hind-wings in different in- sects;

After Miall and Denny, The Cockroach, Lovell Reeve & Co. Fig. 4. — Legs and Ventral Thoracic Sclerites of Female Cockroach (Blatta). I, Fore-leg and pro-sternum (S) to, Tarsal segments.

in front of which are the

ventral cervical sclerites

(C). ex. Coxa. tr, Trochanter. fe, Thigh. tb, Shin.

*they are named " spines " or " spurs." In the relative development *nd shape of the various segments of the leg there is almost endless*

II, Middle leg and mesosternum.

III, Hind- leg and metasternum. In IIIa, the episternum (o) and

epimeron (b) are slightly separ- ated.

After Quail, Natural Science, . M. Dent & Co.

Fig. 5. — Wing-Neuration in a Cossid Moth. 2, sub-costal; 3, radial; 4, median; 5, cubital'; 6, 7, 8, anal nervures.

these "differences are discussed in the descriptions of the various orders. The wings often afford secondary sexual characters, being not infrequently absent or reduced in the female when well developed in the male (see fig. 6). Rarely the male is the wingless sex.

In addition to the wings there are smaller dorsal outgrowths of the thorax in many insects. Paired erectile plates (patagia) are borne on the prothorax in moths, while in moths, sawflies, wasps, bees and other insects there are small plates (tegulae) — see Fig. 3, t — on the mesothorax at the base of the fore-wings.

Abdomen.— In the abdominal exoskeleton the segmental structure is very clearly marked, a series of sclerites — dorsal terga and abdominal sterna — being connected by pale, feebly chitinized cuticle, so that considerable freedom of movement between the segments is possible. The first and second abdominal sterna are often suppressed or reduced, on account of the strong development of the hind-legs. In many insects ten, and in a few eleven, abdominal segments can be clearly distinguished in addition to a small terminal anal segment. The female genital opening usually lies between the seventh and eighth segments, the male on the ninth. Prominent paired limbs are often borne on the tenth segment, the elongate tail-feelers (cerci) of bristle-tails and may-flies, or the forceps of earwigs, for example. In the Embiidae, a family of Isoptera, it has been shown by G. Eriderlein (1901) that these cerci clearly belong to a partially suppressed eleventh segment, and R. Heymons (1805- 1896) has proved by embryological study that in all cases they really belong to this eleventh segment, which in the course of development becomes fused with the tenth. Smaller appendages (such as the stylets of male cockroaches) may be carried on the ninth segment. Pairs of processes carried on the eighth and ninth segments often become specialized to form the ovipositor of the female_ (see fig. 14) and the genital armature of the male. A marked modifica- tion of the hinder abdominal segments may be noticed in most insects,

the sclerites of the eighth and ninth being frequently hidden by those of the seventh. In the higher orders several of the hinder segments may be altogether suppressed.

From Miall and Denny, The Cockroach, Lovell Reeve it Co.

Fig. 6. — Outline of Male (<-?) and Female (?) Cockroaches (Blatta) from the side, showing Abdominal Segments (numbered 1-10).

Internal Organs Nervous System. — The nervous system in the Hexapoda is built up on the'typical arthropodan plan of a double ventral nerve-cord with a pair of ganglia in each segment, the cords passing on either side of

the gullet and connecting with an anterior nerve-centre or brain (fig. 7) in the head. The brain innervates the eyes and feelers,

and must be regarded as a " syncerebrum " repre- senting the ganglia of the three foremost limb-bear- ing somites united with the primitive cephalic lobes. Behind the gullet lies the sub-oesophageal nerve-centre (fig. 7, sb), composed of the ganglia of the four hinder head- somites and sending nerves to the jaws. A pair of ganglia in each thoracic segment is usual (fig. 8), and as many as eight distinct pairs of abdominal ganglia may _ s j) often be distinguished, the hindmost of which repre- sents the fused ganglia of the last four seg- ments. But in many highly organized insects a remark- able concentration of the trunk-ganglia takes place, all the nerve-centres of the thorax and abdo- men in the chafers and in the Hemi- ptera, for instance, being represented by a single mass situated in the thorax. The legs, wings and other organs of the trunk receive their nerves from the thoracic and abdominal ganglia, and the fusion of several pairs of these ganglia may be regarded as corresponding to a centralization of individuality. A special " sympathetic " system arises by paired nerves from the oesophageal connectives; these nerves unite, and send back a median recurrent nerve associated with ganglia on the gullet and crop, whence proceed cords to various parts of the digestive system.

In connexion with the central nervous system there are usually numerous organs of special sense. Most insects possess a pair of compound eyes, and many have, in addi- tion, three simple eyes or ocelli on the vertex. The nature of these organs is described in the article Arthropoda. The surface of a compound eye is seen to be covered with a large number of hexagonal corneal facets, each of which over- lies an ommatidium or series of cell elements (fig. 9, A, B). There are over 25,000 ommatidia in the eye of a hawk moth.

Head muscles'

Add. of Coxa

Abd. of Coxa

either side of the first abdominal segment; on the inner surface of this membrane are two horn-like processes in contact with a delicate sac con- taining fluid, con- nected with which are the actual nerve-endings. In the nearly-related crickets and long- horned grasshop- pers (Locustidae) the ears are situ- ated in the shins of the fore-legs (see fig. 9. F). Just below the knee- joint there is a swelling, along which two narrow slits run length wise. They lead into chambers, formed by inpushing of the cuticle, whose delicate inner walls are in contact with air-tubes; on the outer surface of

these latter are ridges, along which the special nerve- endings are ar- ranged. An ear of another type is found in the swollen second segment of the feeler in many male gnats and After Miall and Denny, The Cockroach, Lovell Reeve & Co. midges, the cuticle Fig. 8. — Ventral Muscles and Nerve Cord of between this seg- Cockroach,

ment and the third

forming an annular drum which is connected with numerous nerve- endings, while the fine bristles on the more distal segments vibrate in response to the note produced by the humming of the female.

Many of the numerous hairs (fig. 9, E) that cover the body of an insect have a tactile function. The sense of smell resides chiefly in the feelers, on whose segments occur tiny pits, often guarded by peg-like or tooth-like structures and containing rod-like cells (fig. 9, C) in connexion with large nerve-cells. It is said that 13,000 such olfactory organs are present on the feeler of a wasp, and 40,000 on

Long stern.

Obi. sternal

Tergo-stern.

From Miall and Denny (after Newton), The Cock- roach, Lovell Reeve & Co.

Fig. 7. — Brain of Cockroach from side, oe, Gullet; op, optic nerve; sb, sub-oesophageal ganglion; mn, mx, mx' , nerves to jaws; /, tentorium.

From Ridley, Insect Life, vol. 7 (U.S. Dept. Agr.).

Fig. 9.— Single Ommatidium of Cockroach's Eye (after Grenacher). B, Section through compound eye (after Miall and Denny) ; C, organs of smell , -• – in cockchafer (after Kraepelin); D, a, b, sensory pits on cercopods of

Auditory organs of a simple type are present in most golden-eye fly; c, sensory pit on palp of stone-fly (after Packard); E r insects. These consist of fine rods suspended between two sen sory hair (after Miall and Denny) ; F, ear of long-horned grasshopper ; points of the cuticle, and connected with nerve-fibres; they a? Front shin showing outer opening and air-tube; 6, section (after are known as chordotonal organs. In many cases a more Graber); G, ear of locust from within (after Graber). All highly magnified, complex ear is developed, which may be situated in strangely

diverse regions of the insect's bodv. In locusts (Acridiidae) a 1 the complex antennae of a male cockchafer. Organs of similar type on large ovate, tympanic membrane (fig. 9, G) is conspicuous on 1 the maxillae and epipharynx appear to exercise the function of taste,

Had muscles-

Lateral thoracic External femoral /,

Longit. tergal Adductor of coxa

Longit. tergal

Oblique tergal

Alary tendon of pericardium

Tergo-stemal

Muscular System. — The muscles in the Hexapoda are striated, as in Arthropods generally, the large fibres being associated in

bundles which are at- tached from point to point of the cuticle, so as to move adjacent scler- ites with respect to one another (see figs. 8, 10). For example, the con- traction of the tergo- sternal muscles, connect- ing the dorsal with the ventral sclerites of the abdomen, lessens the capacity of the abdo- minal region, while the contraction of the power- ful muscles arising from the thoracic walls, and inserted into the proxi- mal ends of the thighs, flexes or extends the legs. Circulatory System. — Insects afford an excel- lent illustration of the remarkable type of blood- system characterizing £he Arthropoda. The dorsal vessel is an elongate tube, whose abdominal portion is usually cham bered, forming a contractile heart (fig. 10). At the constrictions between the chambers are paired slits, through which the blood passes from the surround- ing pericardial sinus. The dorsal vessel is prolonged anteriorly into an aorta, through which the blood is propelled into the great After Miall and Denny, The Cockroach, Lovell body-cavity or haemo- Reeve&Co. coel. After bathing the

Fig. io. — Dorsal Muscles, Heart and various tissues and Pericardial Tendons of Cockroach, organs, the blood returns

dorsalwards into the peri- cardial sinus through fine perforations of its floor, and so makes its

way into the heart again. Some water-bugs, e.g. of the families Belo- stomatidae, Nepidae, Corixidae and Hydrometridae have a pulsating sac at each knee-joint to assist the flow of blood through the legs, while in dragon- flies and locusts (Acridiidae) there is a ventral pulsating dia- phragm, which forms the roof of a sinus enclosing the nerve-cords.

Respiratory System. — As mentioned above, respiration by means of air- tubes (tracheae) is a most character- istic feature of the Hexapoda. An air- tube consists of an epithelium of large polygonal cells with a thin basement- membrane externally and a chitinous layer internally, the last- named being continuous with the outer cuticle. The chitinous layer is usually strengthened by thread-like thickenings which, in the region close to the outer opening of the tube, form a network enclosing polygonal areas, but which, through most of the tracheal system, are arranged spirally, the strengthening thread not forming a continuous spiral, but being interrupted after a few turns around the tube. The tracheal system in Hexapods is very complex, forming a series of longitudinal trunks with transverse anastomosing con- nexions (fig. 11), and extending by the finest sub- division and by re- After Miall and Denny, The Cock- peate(i branching into all parts of roach, Lovell Reeve & Co ˆ body Jn . ˆˆ q{ ˆˆ fl ; ght

, .9”.! 1 ; – . nt !r? fortion the tubes swell out into numerous of Air-Tubes in Cockroach. aiT , sa ˆ i by wn jch the breathing

capacity is much increased. • Atmospheric air gains access to the air-tubes through paired Spiracles or stigmata, which usually occur laterally on most of the

body-segments. These spiracles have firm chitinous edges, and can be closed by valves moved by special muscles. When the spiracles are open and the body contracts, air is expired. The subsequent expansion of the body causes fresh air to enter the tracheal system, and if the spiracles be then closed and the body again contracted, this air is driven to the finest branches of the air-tubes, where a direct oxygenation of the tissues takes place. The physiology of respiration has been carefully studied by F. Plateau (1884). In aquatic insects various devices for obtaining or entangling air are found; these modifications are described in the special articles on the various orders of insects (Coleoptera, Hemiptera,&c). Many insects have aquatic larvae, some of which take in atmospheric air at intervals, while others breathe dissolved air by means of tracheal gills. These modifications are mentioned below in the section on metamorphosis. Digestive System. — A striking feature in the food-canal of the Hexapoda,

as in other Arthropods, is the great extent of the " fore- gut " and " hind-gut," lined with a chitinous cuticle, continuous with the exoskeleton. The fore-gut is composed of a tubular gullet, a large sac-like crop (fig. 12, c) and a proventriculus or

" gizzard," whose func- tion is to strain the food- substances before they

pass on into the tubular

stomach, which has no

chitinous lining. This

organ, usually regarded as

a " mid-gut, gives off a

number of secretory caecal

tubes (fig. 12, coe). At

its hinder end it is con- tinuous with the hind-gut, which is usually differen- tiated into a tubular coiled intestine (fig. 12, i) and a swollen rectum (fig. 12, r). From the fore-end of the hind-gut arise the slender Malpighian tubes (fig. 12, k), which have a renal function. On either side of the gullet are from one to ten pairs of salivary glands (fig. 12, s) whose ducts open into the mouth. Some of these glands may be modified for special purposes — as silk-producing glands in caterpillars or as poison- glands in blood-sucking flies and bugs. The food passing into the crop is there acted on by the saliva and also by an acid gastric juice which

passes forwards from the

stomach through the pro-

ventriculus. As the

various portions of the

food undergo digestion,

From Miall and Denny, The Cockroach. Lovell Reeve & Co.

Fig. 12. — Food Canal of Cockroach.

s, e, coe,

Salivary glands and reservoir.

Crop (the gizzard below it).

Caecal tubes (below them the stomach).

Kidney tubes.

Intestine.

Rectum, they are allowed to pass through the proventriculus into the stomach, where the nutrient substances are absorbed.

Excretory System. — Nitrogenous waste-matter is removed from the body by the Malpighian tubes which open into the food-canal, usually where the hind-gut joins the stomach. These tubes vary in number from four to over a hundred in different orders of insects. The cells which line them and also the cavities of the tubes contain urates, which are excreted from the blood in the surrounding body- cavity. This cavity contains an irregular mass of whitish tissue, the fat-body, consisting of fat-cells which undergo degradation and become more or less filled with urates. When the worn-out cells are broken down, the urates are carried dissolved in the blood to the Malpighian tubes for excretion. The fat-body is therefore the seat of important metabolic processes in the hexapod body.

Reproductive System. — All the Hexapoda are of separate sexes. The ovaries (fig. 13) in the female are paired, each ovary, consisting of a variable number of tubes (one in the bristle- tail Campodea and fifteen hundred in a queen termite) in which the eggs are developed. From each ovary an oviduct (fig. 13, od) leads, and in some of the more primitive insects (bristle-tails, earwigs, may-flies) the two oviducts open separately

direct to the exterior. Usually they open into a median vagina, formed by an ectodermal inpushing and lined with chitin. The vagina usually opens in front of the eighth abdominal sternite. Behind it is situated a spermatheca (fig. 14, sP)

and the ovipositor previously mentioned, with its three pairs of processes (Fig. 14, G, g).

The paired testes of the male consist of a variable number of seminal

From Miall and Denny, The Cockroach, Lovell Reeve & Co.

Fig. 13. — Ovaries of Cockroach, with Oviducts Od and Colleterial Glands CG.

tubes, those of each testis opening into a vas deferens. In some bristle-tails and may-flies, the two vasa deferentia open separately, but usually they lead into a sperm-reservoir, whence issues a median

From Miall and Denny, The Cockroach, Lovell Reeve & Co.

Fig. 14. — Hinder Abdominal Segment and- Ovipositor of Female Cockroach. Magnified.

T 8 &c. Tergites. Od, Vagina.

S 7 , 7th Sternite. sj>, Spermatheca.

S», Sclerite between 7th and 8th G, Anterior, and g, pos-

S", 8th Sclerite. [sterna. terior gonapophyses.

ejaculatory duct. The male opening is on the ninth abdominal segment, to which belong the processes that form the claspers or genital armature. Accessory glands are commonly present in con- nexion both with the male and the female reproductive organs. The poison-glands of the sting in wasps and bees are well-known examples of these.

Embryology

The Egg. — Among the Hexapoda, as in Arthropods generally, the egg is

large, containing an accumulation of yolk for the nourish- ment of the growing embryo. Most insect eggs are of an elongate oval shape; some are globular, others flattened, while others again are flask-shaped, and the outer envelope {chorion) is often beautifully sculptured (figs. 20, d; 21, a, b). Various devices are adopted for the protection of the eggs from mechanical injury or from the attacks of enemies, and for fixing them in appropriate situations. For example, the egg may be raised above the surface on which it is laid by an elongate stalk ; the eggs may be protected by a secretion, which in some cases forms a hard protective capsule or " purse " ; or they may be covered with shed hairs of the mother, while among water- insects a gelatinous envelope, often of rope-like form, is common. In various groups of the Hexapoda — aphids and some flesh-flies (Sarcophaga), for example — the egg undergoes development within the body of the mother, and the young insect is born in an active state; such insects are said to be " viviparous."

Parthenogenesis. — A number of cases are known among the Hexapoda of the development of young from the eggs of virgin females. In insects so widely separated as bristle-tails and moths this occurs occasionally. In certain gall-flies (Cynipidae) no males are known to exist at all, and the species seems to be preserved entirely by successive parthenogenetic generations. In other gall- flies and in aphids we find that a sexual generation alternates with one or with many virgin generations. The offspring of. the virgin females are in most of these instances females ; but among the bees and wasps parthenogenesis occurs normally and always results in the development of males, the " queen " insect laying either a fertilized or unfertilized egg at will.

Maturation, Fertilization and Segmentation. — Polar bodies were first observed in the eggs of Hexapoda by F. Blochmann in 1887. The two nuclei are successively divided from the egg nucleus in the usual way, but they frequently become absorbed in the peripheral protoplasm instead of being extruded from the egg-cell altogether. It appears that in parthenogenetic eggs two polar nuclei are formed. According to A. Petrunkevich (1901-1903), the second polar nucleus uniting with one daughter-nucleus of the first polar body gives rise to the germ-cells of the parthenogenetically-produced male. There is no reunion of the second polar nucleus with the female pronucleus, but, according to the recent work of L. Doncaster (1966-1907) on the eggs of sawflies, the number of chromosomes is not reduced in parthenogenetic egg-nuclei, while, in eggs capable of fertilization, the usual reduction-divisions occur. Fertilization takes place as the egg is laid, the spermatozoa being ejected from the spermatheca of the female and making their way to the protoplasm of the egg through openings (micropyles) in its firm envelope. The segmenta- tion of the fertilized nucleus results in the formation of a number of nuclei

which arrange themselves around the periphery of the egg and, the protoplasm surrounding them becoming constricted, a blastoderm or layer of cells, enclosing the central yolk, is formed. Within the yolk the nuclei of some " yolk cells " can be distinguished.

Germinal Layers and Food- Canal. — The embryo begins to develop as an elongate, thickened, ventral region of the blastoderm which is known as the ventral plate or germ band. Along this band a median furrow ap- pears, and a mass of cells sinks within, the one-layered germ band thus becoming transformed into a band of two cell-layers (fig. 15). In some cases the inner layer is formed not by in- vagination but by proliferation or by de-

\tˆ Ii ˆ(tl ?\H' a Tilf From Nussl >aum in Miall and Denny's, Cockroach, LotiO. outer Ot these two Reeve & Co.

layers (fig. 15, E) is the ectoderm. With regard to the inner layer (endoblast of some authors, fig. 15

Fig. 15. — Diagram showing Formation of Germinal Layers. E, ectoderm; M, inner layer. Magnified.

M) much difference of opinion has pre- vailed. It has usually been regarded as representing both endoderm and mesoderm, and the groove which usually leads to its forma- tion has been compared to the abnormally elongated blastopore of a typical gastrula. No doubt can be entertained that the greater part of the inner layer corresponds to the mesoderm of more ordinary embryos, for the coelomic pouches, the germ-cells, the musculature and the vascular system alt arise from it. Further, there is general agreement that the chitin-lined fore-gut and hind- gut, which form

the greater part of the digestive tract, arise from ectodermal invagina- tions (stomodaeum and proctodaeum respectively) at the positions of the future mouth and anus. The origin of the mid-gut (mesenteron) , that has no chitinous lining in the developed insect, is the disputed point. According to the classical researches of A. Kowalevsky (1871 and 1887) on the embryology of the water-beetle Hydrophilus and of the muscid flies, an anterior and a posterior endoderm- rudiment both derived from the " endoblast " become apparent at an early stage, in close association with the stomodaeum and the proctodaeum respectively. These two endoderm- rudiments ultimately grow together and give rise to the epithelium of the

mid- gut. These results were confirmed by the observations of K. Heider and W. M. Wheeler (1889) on the embryos of two beetles— Hydro- philus and Doryphora respectively. V. Graber, however (1889), stated that in the Muscidae, while the anterior endoderm-rudiment arises as Kowalevsky had observed, the posterior part of the " mid- gut " has its origin as a direct outgrowth from the proctodaeum. The recent researches of R. Heymons (1895) on the Orthoptera, and of A. Lecaillon (1898) on various leaf beetles, tend to show that the whole of the " mid-gut " arises from the proliferation of cells at the extremity of the stomadaeum and of the proctodaeum. On this view the entire food-canal in most Hexapoda must be regarded as of ectodermal origin, the " endoblast ' represents mesoderm only, and the median furrow whence it arises can be no longer compared with the blastopore. According to Heymons, the yolk-cells must be regarded as the true endoderm in the hexapod embryo, for he states (1897) that in the bristle-tail Lepisma and in dragon-flies they give rise to the mid-gut. These views are not, however, supported by other recent observers. J. Carriere's researches (1897) on the embryology of the mason bee (Chalicodoma) agree entirely with the interpretations of Kowalevsky and Heider, and so on the whole do those of F. Schwangart, who has studied (1904) the embryonic development of Lepidoptera. He finds that the endoderm arises from an anterior and a posterior rudiment derived from the " endo- blast," that many of the cells of these rudiments wander into the yolk, and that the mesenteric epithelium becomes reinforced by cells that migrate from the yolk. K. Escherich (1901), after a new research on the embryology of the muscid Diptera, claims that the fore and hind endodermal rudiments arise from the blastoderm by invagination, and are from their origin distinct from the mesoderm. On the whole it seems likely that the endoderm is represented in part by the yolk, and in part by those anterior and posterior rudiments which usually form the mesenteron, but that in some Hexapoda the whole digestive tract may be ectodermal, ft must be admitted that some of the later work on insect embryology has justified the growing scepticism in the universal applicability of the " germ-layer theory." Heider has suggested, however, that the apparent origin of the mid-gut from the stomodaeum and proctodaeum may be explained by the presence of a " latent endoderm-group " in those invaginations.

Embryonic Membranes. — A remarkable feature in the embryonic development of most Hexapoda is the formation of a protective

From Nussbaum in Miall and Denny, The Cockroach, Lovell Reeve & Co.

Fig. 16. — Cross section of Embryo of German Cockroach (Phyllo-dromia). S, serosa; A, amnion; E, ectoderm; N, rudiment of nerve cord ; M , mesodermal pouches. ■ ■ – . • – - > ^_

membrane analogous to the amnion of higher Vertebrates and known by the same term. Usually there arises^ around the edge

of the germ band a double fold in the undifferentiated blastoderm, which grows over the surface of the embryo, so that its inner and outer layers become continuous, forming respectively the amnion and the serosa (fig. 16, A, S). The embryo of a moth, a dragon-fly or a bug is invaginated into the yolk at the head end, the portion of the blastoderm necessarily pushed in with it forming the amnion. The embryo thus becomes transferred to the dorsal face of the egg, but at a later stage it undergoes reversion to its original ventral position. In some parasitic Hymenoptera there is only a single embryonic membrane formed by delamination from the blastoderm, while in a few insects, including the wingless spring-tails, the em- bryonic membranes are vestigial or entirely wanting. In the bristle- tails Lepisma and Machilis, an interesting transitional condition of the embryonic membranes has lately been shown by Heymons. The embryo is invaginated into the yolk, but the surface edges of the blastoderm do not close over, so that a groove or pore puts the insunken space that represents the amniotic cavity into com- munication with the outside. Heymons believes that the " dorsal organ " in the embryos of the lower Arthropoda corresponds with the region invaginated to form the serosa of the hexapod embryo. Wheeler, however, compares with the " dorsal organ " the peculiar extra embryonic membrane or indusium which he has observed between serosa and amnion in the embryo of the grasshopper Xiphidium.

Metameric Segmentation. — The segments are perceptible at a very early stage of the development as a number of transverse bands arranged in a linear sequence. The first segmentation of the ventral plate is not, however, very definite, and the segmentation does not make its appearance simultaneously throughout the whole length of the plate ; the anterior parts are segmented before the posterior. In Orthoptera and Thysanura, as well as some others of the lower insects, twenty-one of these divisions — not, however, all similar- may be readily distinguished, six of which subsequently enter into the formation of the head, three going to the thorax and twelve to the abdomen. In Hemiptera only eleven and in Collembola only six abdominal segments have been detected. The first and last of these twenty-one divisions are so different from the others that they can scarcely be considered true segments.

Head Segments. — In the adult insect the head is insignificant in size compared with the thorax or abdomen, but in the embryo it forms a much larger portion of the body than it does in the adult. Its composition has been the subject of prolonged difference of opinion. Formerly it was said that the head consisted of four divisions, viz. three segments and the procephalic or prae-oral lobes. It is now ascertained that the procephalic

lobes consist of three divisions, so that the head must certainly be formed from at least six segments. The first of these, according to the nomenclature of Heymons (see fig. 17), is the mouth or oral piece; the second, the antennal segment; the third, the intercalary or prae-mandibular segment; while the fourth, fifth, and sixth are respectively the segments of the mandibles and of the first and second maxillae. These six divisions of the head are diverse in kind, and subsequently undergo so much change that the part each of them takes in the formation of the head-capsule is not finally determined. The labrum and clypeus are developed as a single prolongation of the oral piece, not as a pair of appendages. The antennal segment apparently entirely disappears, with the exception of a pair of appendages it bears; these become the antennae; it is possible that the original segment, or some part of it, may even become a portion of the actual antennae. The intercalary segment has no appendages, nor rudiments thereof, except, according to H. Uzel (1897), in the thysanuran Campodea, and probably entirely dis- appears, though J. H. Comstock and C. Kochi believe that the labrum belongs to it. The appendages of the posterior three or u trophal segments become the parts of the mouth. The ap- U pendages of the two maxillary segments arise as treble instead .1 of single projections, thus differing from other appendages. From these facts it appears that the anterior three divisions of the head differ strongly from the posterior three, which greatly resemble thoracic segments; hence it has been thought possible that the anterior divisions may represent a primitive head, to which three segments and their leg-like appendages were sub- sequently added to form the head as it now exists. This is, how- ever, very doubtful, and an entirely different inference is possible. Besides the five limb-bearing somites just enumerated, two others must now be recognized in the head. One of these is the ocular segment, in front of the antennal, and behind the primitive pre- oral segment. The other is the segment of the maxillulae (see" above, under Jaws), behind the mandibular somite; the presence of this in the embryo of the collembolan Anurida has been lately shown (1900) by J. W. Folsom (fig. 18, v. 5), who terms the maxillulae " superlinguae " on account of their close association with the hypopharynx or lingua. In reference to the structure of the head-capsule in the imago, it appears that the clypeus and labrum represent, as already said, an unpaired median' outgrowth of the oral piece. According to W. A. Riley (1904) the epicranium or " vertex," the compound eyes and the front divisions of the genae are formed by the cephalic lobes of the embryo (belonging to the ocular segment), while the mandibular and maxillary segments form the hinder parts of the genae and the hypopharynx.

EMBRYOLOGY]

HEXAPODA

Obcl

-Pre

-_ Ul

Ant

.Tre

-m,

-Mi,

-Ate,

Great difference of opinion exists as to the hypopharynx, which has even been thought to represent a distinct segment, or the pair of appendages of a distinct segment. Heymons considers that it represents the stermtes of the three trophal segments, and that the gula is merely a secondary development. Folsom looks on the

hypopharynx as a secondary development. Riley holds that the hypopharynx be- longs to the mandibular and maxillary segments, while the cervical sclerites or gula represent the ster- num of the labial segment. The ganglia of the nervous system offer some important evidence as to the mor- phology of the head, and are alluded to below.

Thoracic Segments. • — ■ These are always three in number. The three pairs of legs appear very early as rudiments. Though the -»-Trn, thoracic segments bear the wings, no trace of these appendages exists till the close of the embryonic life, nor even, in many cases, till much later. The thoracic segments, as seen in an early stage of the ventral plate, display in a well-marked manner the essential ele- ments of the insect seg- ment. These elements are a central piece or sternite, and a lateral field on each side bearing the leg-rudi- ment. The external part of the lateral field subsequently grows up, and by coalescence with its fellow forms the tergite or dorsal part of the segment.

Abdominal Segments and Appendages. — We have al- ready seen that in numerous lower insects the abdomen is formed from twelve divi- sions placed in linear fashion. Eleven of these may perhaps be considered as true seg- ments, but the twelfth or terminal one is different, and After Heymons. is called by Heymons a

Fig. 17.— Morphology of an Inset- te 'T ; •<;'" k is ,P laced the the embryo

*of CrylhUdpa, somewha "? onfi "j> a " d the mass diagrammatic. The longitudinal seg- ^^? U a C "5 ,y , beCOmeS – the merited band along the middle line ri "£?£ a £? J OW ? r , lamlnae presents the early segmentation of the fS^f" :„ "h^ 1 ^ ^ nervous system and the subsequent £ £?" r 2 a ^ sen V a " d t. he median field of each sternite; the lateral ^L 00 ^ '- S P > ced ,?' u ' te transverse unshaded bands are the tL l he f . te "n,nation of the lateral fields of each segment; the ^Z '^^ °T shaded areas indicate the more inter- ZZl I °" ^ ab " nally placed mesoderm layer. The seg- d ? me " ? h f ows at . first a mentsarenumberedl-2i| i-6willform dlv ^ i;)n mto only nine seg- the head, 7-9 the thorax, 10-21 the abdo- JW h"} * ? ermina ' mass ' men. .4, anus; Abx, Abx n , appendage whlch la , s ? wbsequently be- of .st and of nth abdominal segment!; S™ 58 dlvlded fflto , to Ans, anal piece = telson or 12th abdo- TA e a PPendages of the minal segment; Ant, antenna; De, ab °° men are called cerci, deuterencephalon; Md, mandible £ y a-« g°" a P°P h y^s. Mx u first maxilla; Mx lt second . T} e Z d f. er , m ^h according maxilla or labium; 0, mouth; Obcl, *° *r kmd , of mse ?. t ' and rudimentary labrum and clypeus; m the a u * acco / dln g . to Pre, protencephalon; St u 5t 10 , stie- S6X \ D ™ erence ° f opinion mata 1 and 10; Terg, tergite; Thx 1} a ?, ■ f " atllr f of the appendage of first thoracic segment abdomina l appendages pre- Tre, tritencephalon; Ul, a thickening val!s – The cerci '. when at hinder margin of the mouth. present, appear in the*

mature insect to be attached ,. , IT , „ to the tenth segment, but

according to Heymons they are really appendages of the eleventh seg- ment, their connexion with the tenth being secondary and the result of considerable changes that take place in the terminal segments It has been disputed whether any true cerci exist in the higher insects but they are probably represented in the Diptera and in the scorpion- Hies (Mecaptera). In those insects in which a median terminal appendage exists between the two cerci this is considered to be a

~Abx„,

prolongation of the eleventh tergite. The stylets, when present, are placed on the ninth segment, and in some Thysanura exist ahxJ on the eighth segment; their development takes place later in life than that of the cerci The gonapophyses are the projections near the extremity of the body that surround the sexual orifices and vary extremely according to the kind of insect. They have chiefly been studied in the female, and form the sting and ovipositor, organs peculiar to this sex. They are developed on the Ventral surface of the body and are six in number, one pair arising from the eighth

ventral plate and two pairs from the ninth. This has been found to be the case in insects so widely different as Orthoptera and Aculeate Hymenoptera. The genital armature of the male is formed to a considerable extent by modifications of the segments them- selves The development of the armature has been little studied and the question whether there may be present gonapophyses homo- logous with those of the female is open. ”

In the adult state no insect possesses more than six legs, and they are always attached to the thorax; in many Thysanura there are, however, processes on the abdomen that, as to their position are similar to egs. In the embryos of many insects there are pro- jections from the segments of the abdomen similar, to a considerable extent, to the rudimentary thoracic legs. The question whether these projections can be considered an indication of former polypody in insects has been raised. They do not long persist in the embryo, but disappear, and the area each one occupied becomes part of the sternite. In some embryos there is but a single pair of these rudiments (or vestiges) situate on the first abdominal segment, and in some cases they become invagina- tions of a glandular nature. Whether cerci, stylets and gonapophyses are developed from these rudiments has been much debated. It appears that it is possible to accept cerci and stylets as modifications of the temporary pseudo- pods, but it is more difficult to believe that this is the case with the gona- pophyses, for they apparently commence A. ~ After Wheeler, j mm their development considerably later Uarph. vol. viii., ,-nd Folsom, than cerci and stylets and only after the £ n”’ «!”• #?’ w ‘. MI ™. apparently complete disappearance of the Fir iS F m h r t*

*embryonic pseudopods. The fact that c ■ ‘ l8 ;— kmb/yos of there are two pairs of gonapophyses on *£%ˆtf nW % a ? ai r the ninth abdominal se| menV would be £r I . Ma S nlfied – A ‘ fatal to the view that they are in any way bl nd rfˆV °Ku 8Wm homologous with legs, were it not that headend thorax °Tˆ there is some evidence that the division „*f,; *”? th ° ra u The into two pairs is secondary and incom” AratT thtT &h °T m plete. But another and apparently in- C r ˆ c, . the a PP e ? da ges superable objection may be raised — that the appendages of the ninth segment are the stylets, and that the gonapophyses cannot therefore be appendicular. The pseudopods that exist on the abdomen of numerous caterpillars may possibly arise from the embryonic pseudopods, but this also is far from being established.*

Nervous System. — The nervous system is ectodermal in origin, and is developed and segmented to a large extent in connexion with the outer part of the body, so that it affords important evidence as to the segmentation thereof. The continuous layer of cells from which the nervous system is developed undergoes a segmentation analogous with that we have described

as occurring in the ventral plate; there is thus formed a pair of contiguous ganglia for each segment of the body, but there is no ganglion for the telson The ganglia become greatly changed in position during the later life and it is usually said that there are only ten pairs of abdominal ganglia even in the embryo. In Orthoptera, Heymons has demon- strated the existence of eleven pairs, the terminal pair becoming however, soon united with the tenth. The nervous system of the embryonic head exhibits three ganglionic masses, anterior to the thoracic ganglionic masses; these three masses subsequently amal- gamate and form the sub-oesophageal ganglion, which supplies th? trophal segments. In front of the three masses that will form the sub-oesophageal ganglion the mass of cells that is to form the nervous system is very large, and projects on each side; this anterior or brain mass consists of three lobes (the prot-, deut-, and trit- encephalon of Viallanes and others), each of which might be thought to represent a segmental ganglion. But the protocerebrum con- tains the ganglia of the ocular segment in addition to those of the procephahc lobes. These three divisions subsequently form the supra-oesophageal ganglion or brain proper. There are other ganglia in addition to those of the ventral chain, and Janet supposes that the ganglia of the sympathetic system indicate the existence ot three anterior head-segments; the remains of the segments themselves are, in accordance with this view, to be sought in the

in Roman numerals. I, Ocular segment. Antennal. Trito-cerebral. Mandibular. Maxillular. Maxillary. Labial. Prothoracic. Mesothoracic. Meta thoracic.

2, 3. 4, 5, 6, 7, 8, 9. 10,

stomodaeum. Folsom has detected in the embryo of Anurida a pair of ganglia (fig. 18, 5) belonging to the maxillular (or superlingual) segment, thus establishing seven sets of cephalic ganglia, and sup- porting his view as to the composition of the head.

Air-tubes.— The air-tubes, like the food-canal, are formed by in- vaginations of the ectoderm, which arise close to the developing appendages, the rudimentary spiracles appearing soon after the budding limbs. The pits leading from these lengthen into tubes and undergo repeated branching as development proceeds.

Dorsal Closure.— The germ band evidently marks the ventral aspect of the developing insect, whose body must be completed by the extension of the

embryo so as to enclose the yolk dorsally 1 he method of this dorsal closure varies in different insects. In the Colorado beetle (Doryphora), whose development has been studied by W. M. Wheeler, the amnion is ruptured and turned back from covering the germ band, enclosing the yolk dorsally and becoming finally absorbed, as the ectoderm of the germ band itself spreads to form the dorsal wall. In some midges and in caddis-flies the serosa becomes ruptured and absorbed, while the germ band, still clothed with the amnion, grows around the yolk. In moths and certain saw-flies there is no rupture of the membranes; the Russian zoologists Tichomirov and Kovalevsky have described the growth of both amnion and embryonic ectoderm around the yolk the embryo being thus completely enclosed until hatching time by'both amnion and serosa. V. Graber has described a similar method of dorsal closure in the saw-fly Hylotoma.

Mesoderm, Coelom and Blood-System.— From the mesoderm most of the organs of the body— muscular, circulatory, reproductive —

take their origin. The h mass of cells undergoes

segmentation corre- sponding with the outer segmentation of the embryo, and a pair of cavities — the coelomic pouches (fig. 16, M) — sp are formed in each seg- f ment. Each coelomic pouch — as traced by s Heymons in his study ec on the development of the cockroach (Phyllo- dromia) — divides into m three parts, of which the most dorsal con- tains the primitive germ-cells, the median disappears, and the ventral loses its boun- daries as it becomes filled up with the grow- ing fat body (fig. 19). This latter, as well as the heart and the walls of the blood spaces, arises by the modification of mesodermal cells, and the body cavity is formed by the enlarge

After Heymons, Zeil. Wiss. Zoolog. vol. 53.

Fig. 19. — Cross sections through Ab- domen of German Cockroach Embryo. A (later than fig. 16) magnified. B (still more advanced, dorsal closure complete) magnified. ec, Ectoderm. en, Endoderm.

sp, Splanchnic layer of mesoderm. y, Yolk. h, Heart.

p, Pericardial septum.

*c, Coelom. luimcu uy uie einarge- g, Germ-cells surrounded by rudiment- cells ' ment and coalescence of ovarian tubes. n ^ *~^ a va^^a ~u„ 1„*

Muscle-rudiment.

Nerve-chain.

Fat body.

Inpushing of ectoderm to form air-tubes

Secondary body-cavity.

m,

n,

f,

s,

x,

of the blood channels and by the splitting of the fat body. It is therefore a haemocoel, the coelom of the de- veloped insect being ,, . . , , represented only by

the cavities of the genital glands and their ducts.

Reproductive Organs.— In the cockroach embryo, before the seg- mentation of the germ-band has begun, the primitive germ-cells can be recognized at the hinder end of the mesoderm, from whose ordinary cells they can be distinguished by their larger size. At a later stage further germ-cells arise from the epithelium of the coelomic

Couches from the second to the seventh abdominal segments, and ecome surrounded by other mesoderm cells which form the ovarian or testicular tubes and ducts (fig. 19, g). In the male of Phyllo- dromia the rudiment of a vestigial ovary becomes separated from the developing testis, indicating perhaps an originally hermaphrodite condition. An exceedingly early differentiation of the primitive PJSTf • , occurs ln certain Diptera. E. Metchnikoff observed (1866) in the development of the parthenogenetic eggs produced by the precocious larva of the gall-midge Cecidomyia that a large

polar-cell ” appeared at one extremity during the primitive cell-segmentation. This by successive divisions forms a group of four to eight cells, which subsequently pass through the blastoderm, and dividing into two groups become symmetrically arranged and surrounded by the rudiments of the ovarian tubes. E. G. Balbiani and R. Ritter (1890) have since observed a similar early origin for thegerm-cells in the midge Chironomus and in the Aphidae.

The paired oviducts and vasa deferentia are, as we have seen,

mesodermal in origin. The median vagina, spermatheca and ejaculatory duct are, on the other hand, formed by ectodermal inpushings. The classical researches of J. A. Palmen (1884) on these ducts have shown that in may-flies and in female earwigs the paired mesodermal ducts open directly to the exterior, while in male earwigs there is a single mesodermal duct, due either to the coalescence of the two or to the suppression of one. In the absence of the external ectodermal ducts usual in winged insects, these two groups resemble therefore the primitive Aptera. The presence of rudiments of the genital ducts of both sexes in the embryo of either sex is interesting and suggestive. The ejaculatory duct which opens on the ninth abdominal sternum in the adult male arises in the tenth abdominal embryonic segment and subsequently moves forward.

Growth and Metamorphosis After hatching or birth an insect undergoes a process of growth and change until the adult condition is reached. The varied

After Marlatt, Enl. Bull. 4, n. s. (U.S. Dept. Agr.).

Fig. jo.— a. Bed-bug (Cimex lectularius, Linn.) ; newly hatched young trom beneath; 6, from above; d, egg, magnified; c, foot with claws ; e, serrate spine, more highly magnified.

details of this post-embryonic development furnish some of the most interesting facts and problems to the students of the Hexapoda. Wingless insects, such as spring-tails and lice, make their appearance in the form of miniature adults. Some winged insects— cockroaches, bugs (fig. 20) and earwigs, for example— when young closely resemble their parents, except for the absence of wings. On the other hand, we find in the vast majority of the Hexapoda a vpry marked difference between the perfect insect (imago) and tie ycrang animal when newly hatched and for some time after hatching. From the moth's egg comes a crawling caterpillar (fig. 21, c), from the fly's a legless maggot (fig. 25, a).

From Mally, Enl. Bull. 24 (U.S. Dept. Agr.).

Fig 21. — e,f, Owl moth (Heliothis armigera); a,b, egg, highly magnified; c, larva or caterpillar; d, pupa in earthen cell.

Such a young insect is a larva— a. term used by zoologists for young animals generally that are decidedly unlike their parents. It is obvious that the hatching of the young as a larva necessitates

a more or less profound transformation or metamorphosis before the perfect state is attained. Usually this transformation comes with apparent suddenness, at the penultimate stage of the insect's life-history, when the passive pupa (fig. 21, d) is revealed, exhibiting the wings and other imaginal structures, which have been developed unseen beneath the cuticle of the larva. Hexapoda with this resting pupal stage in their life-history are said to undergo " a complete transformation," to be metabolic, or holometabolic, whereas those insects in which the young form resembles the parent are said to be ametabolic. Such insects as dragon- flies and may-flies, whose young, though unlike theparent, develop into the adult form without a resting pupal stage are said to undergo an " incomplete transformation " or to be hemimetabolic. The absence of the pupal stage depends upon the fact that in the ametabolic and hemimetabolic Hexapoda the wing-rudiments appear as lateral outgrowths (fig. 22) of the two hinder thoracic segments and are visible externally throughout the life-history, becoming larger after each moult or casting of the cuticle. Hence, as has been pointed out by D. Sharp (1898), the marked divergence among the Hexapoda, as regards life-history, is between insects whose wings develop outside the cuticle (Exopterygota) and those whose wings develop inside the cuticle (Endopterygota), becoming visible only when the casting of the last larval cuticle reveals the pupa. Metamorphosis among the Hexapoda depends upon the universal acquisition of wings

After Howard, Insect Life, vol. vii.

Fig. 22. — Nymph of Locust {Schistocera americana), showing wing-rudiments.

during post-embryonic development — no insect being hatched with the smallest external rudiments of those organs— and on the necessity for successive castings or " moults " (ecdyses) of the cuticle.

Ecdysis. — The embryonic ectoderm of an insect consists of a layer of cells forming a continuous structure, the orifices in it — mouth, spiracles, anus and terminal portions of the genital ducts — being invaginations of the outer wall. This cellular layer is called the hypodermis; it is protected externally by a cuticle, a layer of matter it itself excretes, or in the excretion of which it plays, at any rate, an important part. The cuticle is a dead substance, and is composed in large part of chitin. The cuticle

contrasts strongly in its nature with the hypodermis it protects. It is different in its details in different insects and in different stages of the life of the same insect. The " sclerites " that make up the skeleton of the insect (which skeleton, it should be remembered, is entirely external) are composed of this chitinous excretion. The growth of an insect is usually rapid, and as the cuticle does not share therein, it is from time to time cast off by moulting or ecdysis. Before a moult actually occurs the cuticle becomes separated from its connexion with the underlying hypodermis. Concomitant with this separation there is commencement of the formation of a new cuticle within the old one, so that when the latter is cast off the insect appears with a partly completed new cuticle. The new instar— or temporary form — is often very different from the old one, and this is the essential fact of meta- morphosis. Metamorphosis is, from this point of view, the sum of the changes that take place under the cuticle of an insect between the ecdyses, which changes only become externally displayed when the cuticle is cast off. The hypodermis is the immediate agent in effecting the external changes.

Adapted from Koerschelt and Herder, and Lowne.

Fig. 23. — Diagram show-

The study of the physiology of ecdysis in its simpler forms has un- fortunately been somewhat neglected, investigators having directed their attention chiefly to the cases that are most striking, such as the transformation of a maggot into a fly, or of a caterpillar into a butterfly. The changes have been found to be made up of two sets of processes: histolysis, by_ which the whole or part of a structure disappears: and histogenesis, or the formation of the new structure. By histolysis certain parts of the hypodermis are destroyed, while other portions of it develop into the new structures. The hypo- dermis is composed of parts of two different kinds, viz. (1) the larger part of the hypodermis that exists in the maggot or caterpillar and is dis- solved at the metamorphosis; (2) parts that remain comparatively quiescent previously, and that grow and develop when the other parts degenerate. These centres of renovation are called imaginal disks or folds. The adult caterpillar may be described as a creature the hypodermis of which is studded with buds that expand and form the butter fly, whilejthe parts around them de- .

generate. In some insects (e.g. the mg position of imaginal buds maggots of the blowfly, Calliphora In f arv a of fly. I., II., III., vomitoria) the imaginal disks are to all tne three thoracic segments appearance completely separated from ° the larva; 1, 2, 3, buds the hypodermis, with which they are, of the legs of the imago ; h, however, really organically connected bud of head-lobes; /, of by strings or pedicels. This connexion feeler ; e,of eye;*

b, brain, was not at first recognized and the true nature of imaginal disks was not at first perceived, even by Weismann, to whom their discovery in Diptera is due. In other insects the imaginal disks are less completely disconnected from the superficies of the larval hypodermis, and may indeed be merely patches thereof. The number of imaginal disks in an individual is large, upwards of sixty having been discovered to take part in the formation of the outer body of a fly. With regard to the internal organs, we need only say that transformation occurs in an essentially similar manner, by means of a development from centres distributed in the various organs. The imaginal disks for the outer wall of the body, some of them, at any rate, include meso- dermal rudiments (from which the muscles are developed) as well as hypodermis. The imaginal disks make their appearance (that is, have been first detected) at very different epochs in the life; their absolute origin has been but little investigated. Pratt has traced them in the sheep-tick (Melophagus) to an early stage of the embryonic life.

Histolysis and Histogenesis. — The process of destruction of the larval tissues was first studied in the forms where metamorphosis is greatest and most abrupt, viz. in the Muscid Diptera. It was found that the tissues were attacked by phagocytic cells that became enlarged and carried away fragments of the tissue; the cells were subsequently identified as leucocytes or blood-cells. Hence the opinion arose that histolysis is a process of phagocytosis. It has, however, since been found that in other kinds of insects the tissues degenerate and break down without the intervention of phagocytes. It has, moreover, been noticed that even in cases where phagocytosis exists a greater or less extent of degeneration of the tissue may be observed before phagocytosis occurs. This process can therefore only be looked on as a secondary one that hastens and perfects the destruction necessary to permit of. the accompanying histogenesis. This view is confirmed by the fate of the phagocytic cells. These do not take a direct part in the formation of the new tissue, but it is believed merely yield their surplus acquisitions, becoming ordinary blood-cells or disappearing altogether. As to the nature of histogenesis, nothing more can be said; than that it appears to be a phenomenon similar to embryonic growth, though limited to certain spots. Hence we are inclined to look on the imaginal disks as cellular areas that possess in a latent condition the powers of growth and development that exist in the embryo, powers that only become evident in certain special conditions of the organism. What the more essential of these conditions may be is a question on which very little light has been thrown, though it has been widely discussed.

Much consideration has been given to the nature of meta- morphosis in insects, to its value to the creatures and to the mode of it? origin. Insect metamorphosis may be briefly described as phenomena of development characterized by abrupt changes of appearance and of structure, occurring

during the period subsequent to embryonic development and antecedent to the reproductive state. It is, in short, a peculiar mode of growth and adolescence. The differences in appearance between the caterpillar and the butterfly, striking as they are to the eye, do not sufficiently represent the phenomena of metamorphosis to the intelligence. The changes that take place involve a revolution in the being, and may be summarized under three headings: (1) The food-relations of the individual are profoundly changed, an entirely different set of mouth-organs appears and the kind and

quantity of the food taken is often radically different. (2) A wingless, sedentary creature is turned into a winged one with superlative powers of aerial movement. (3) An individual in which the reproductive organs and powers are functionally absent becomes one in which these structures and powers are the only reason for existence, for the great majority of insects die after a brief period of reproduction. These changes are in the higher insects so extreme that it is difficult to imagine how they could be increased. In the case of the common drone-fly, Eristalis tenax, the individual, from a sedentary maggot living in filth, without any relations of sex, and with only unimportant organs for the ingestion of its foul nutriment, changes to a creature of extreme alertness, with magnificent powers of flight, living on the products of the flowers it frequents, and endowed with highly complex sexual structures.

Forms of Larva. — The unlikeness of the young insect to its parent is one of the factors that necessitates metamorphosis. It is instructive, further, to trace among metabolic insects an increase in the degree of this dissimilarity. An adult Hexapod is provided with a firm, well-chitinized cuticle and six conspicuous jointed legs. Many larval Hexapods might be defined in similar general terms, unlike as they are to their parents in most points of detail. Examples of such are to be seen in the grubs of may-flies, dragon-flies, lace- wing-flies and ground-beetles (fig. 24). This type of active, armoured larva — often bearing conspicuous feelers on the head and long jointed cercopods on the tenth abdominal segment — was styled cam- podeiform by F. Brauer (1869), on account of its likeness in shape to the bristle-tail Campodea. As an extreme contrast to this ‘ campodeiform type, we take the maggot of the house-fly (fig. 25) — a vermiform podeiform Larva of larva, with soft, white, feebly-chitinized a Ground – Beetle cuticle and without either head-capsule or legs. Between these two

extremes, numerous intermediate forms can be traced: the grub (wireworm) of a click-beetle, with narrow elongate well-armoured body, but with the legs very short; the grub of a chafer, with the legs fairly developed, but with the cuticle of all the trunk-segments soft and feebly chitinized; the well- known caterpillar of a moth (fig. 21, e) or saw-fly, with its long cylindrical body, bearing the six shortened thoracic legs and a variable number of pairs of " pro-legs " on the abdomen (this being the eruciform type of larva); the soft, white, wood-

' Westwood, Classification.

Fig. 24. — Cani-

ty «£uj marinus). Magnified.

After Howard, Ent. Bull. 4, n. s. {U.S. DtpL Af.).

Fig. 25. — Vermiform Larva (maggot) of House-fly (Musea domes tica). Magnified, b, spiracle on prothorax; c, protruded head re- gion; d, tail-end with functional spiracles; e, f, head region with mouth hooks protruded; g, hooks retracted; h, eggs. All magnified.

boring grub of a longhorn-beetle or of the saw-fly Sirex, with its stumpy vestiges of thoracic legs; the large-headed but entirely legless, fleshy grub of a weevil; and the legless larva, with greatly reduced head, of a bee. The various larvae of the above series, however, have all a distinct head-capsule, which is altogether wanting in the degraded fly maggot. These differences in larval form depend in part on the surroundings

among which the larva finds itself after hatching; the active, armoured grub has to seek food for itself and to fight its own battles, while the soft, defenceless maggot is provided with abundant nourishment. But in general we find that elaboration of imaginal structure is assodated with degradation in the nature of the larva, eruciform and vermiform larvae being characteristic of the highest orders of the Hexapoda, so that unlikeness between parent and offspring has increased with the evolution of the class.

Hypermetamorphosis. — Among a few of the beetles or Coleo- ptera (q.v.), and also in the neuropterous genus Mantispa, are found life-histories in which the earliest instar is campodeiform and the succeeding larval stages eruciform. These later stages, comprising the greater part of the larval history, are adapted for an inquiline or a parasitic life, where shelter is assured and food abundant, while the short-lived, active condition enables the newly-hatched insect to make its way to the spot favourable for its future development, clinging, for example, in the case of an oil-beetle's

larva, to the hairs of a bee as she flies towards her nest. The presence of the two successive larval forms in the life-history constitutes what is called hyper- metamorphosis. Most significant is the precedence of the eruciform by the campodeiform type. In conjunction with the association mentioned above of the most highly developed imaginal with the most degraded larval structure, it indicates clearly that the active, armoured grub preceded the sluggish soft-skinned caterpillar or maggot in the evolution of the Hexapoda.

Nymph. — The term nymph is applied by many writers on the Hexapoda to all young forms of insects that are not sufficiently unlike their parents to be called larvae. Other writers apply the term to a " free " pupa (see infra). It is in wellnigh universal use for those instars of ametabolous and hemimetabolous insects in which the external wing-rudiments have become conspicuous (fig. 27). The mature dragon-fly nymph, for example, makes its way out of the water in which the early stages have been passed and, clinging to some water-plant, undergoes .the final ecdysis that the imago may emerge into the air. Like most ametabolic and hemimetabolic Hexapoda, such nymphs continue to move and feed throughout their lives. But examples are not wanting of a more or less complete resting habit during the latest nymphal instar. In some cicads the mature nymph ceases to feed and remains quiescent within a pillar-shaped earthen chamber. The nymph of a thrips-insect (Thysanoptera) is sluggish, its legs and wings being sheathed by a delicate membrane, while the nymph of the male scale-insect rests enclosed beneath a waxy covering.

Sub-imago. — Among the Hexapoda generally there is no subsequent ecdysis nor any further growth after the assumption of the winged state. The may-flies, however, offer a remarkable exception to this rule. After a prolonged aquatic larval and nymphal life-history, the winged insect appears as a sub-imago, whence, after the casting of a delicate cuticle, the true imago emerges.

Pupa. — In the metabolic Hexapoda the resting pupal instar shows externally the wings and other characteristic imaginal organs which have been gradually elaborated beneath the larval cuticle. It is usual to distinguish between the free pupae (fig. 26, V) — of Coleoptera and Hymenoptera, for example — in which the wings, legs and other appendages are not fixed to the trunk, and the obtect pupae (fig. 21, d) — such as may be noticed in the majority of the Lepidoptera — whose append-" ages are closely and immovably pressed to the body by a general hardening and fusion of the cuticle. In the degree of mobility there is great diversity among pupae. A gnat pupa swims through the water by powerful strokes of its abdomen, while the caddis-fly pupa, in preparation for its final ecdysis, bites its way out of its subaqueous protective case and rises

through the water, so that the fly may emerge into the air. Some pupae are thus more active than some nymphs; the essential character of a pupa is not therefore its passivity, but that it is the instar in which the wings first become evident externally.

specimen of the style: and at Avantipur, Vangath, Payer and Pandrethan are other interesting examples of the style. That at Pandrethan about 3 m. from Srinagar is a well-preserved little temple, built between a.d. 906 and 921, and perhaps exhibits the most clearly the characteristics of the style.

In the Himalayas the architecture is still largely wooden, raised on stone basements and is often picturesque. In the Nepal valley we meet with hemispherical chaityas or stupas

on low bases with lofty brick spires, and some of them of great antiquity, along with temples having three o'r four storeys divided by sloping roofs, and others in the modern Hindu style of northern India.

In South Kanara, especially at Mudbi- dare (Mudbidri), there are also Jain temples and tombs with double and triple sloping roofs that resemble the native temples of Nepal, with which, however, they had no connexion. The whole style is closely in imitation of wooden originals, the forms of which have been derived from the local thatched dwellings of the district. The interiors of the Kanara temples are often very rich in carving, the massive pillars being carved like ivory or the precious metals. Associated with these and other temples are elegant, monolithic pillars placed on square bases, the shafts richly carved and the capitals wide- spreading, some of them supporting, on four very small colon- nettes, a square roof elaborately modelled. These stambhas or pillars are the representatives of the early Buddhist lats or columns raised at their temples, and bear emblems distinctive of the sects to which they respectively belong.

The southern portion of the peninsula is peopled by a race known as Dravidians, and to the style of architecture practised over most of this area we may conveniently apply the name of the race. This Dravidian architecture was essentially different from that of other regions of India and is of one type. One of the best-known groups of monuments in this style is that of the

Fig. 3. — Temple of Pandrethan.

Fig. 4.— Kailas at Ellora. " Seven Pagodas " or the Mamallapuram raths,

on the seashore, south from Madras. These raths are each hewn out of a block of granite, and are rather models of temples than such. They are the earliest forms of Dravidian architecture and belong to the 7th century. To the same age belongs the temple of Kailasanath

at Conjeeveram, and to the following century some of the temples in the south of the Bombay Presidency, and the famous monolithic temple of the Kailas at Ellora near Aurangabad.

Buildings in the Dravidian style are very numerous in propor- tion to the extent of the area in which they are found. The temples generally consist of a square base, ornamented externally by thin tall pilasters, and containing the cell in which the image is kept. In front of this may be added a mantapam or hall, or even two such. Over the shrine rises the spire, of pyramidal form, but always divided into storeys and crowned by a small dome, either circular or polygonal in shape. The cornices are of double curvature, whilst in other Indian styles they are mostly straight with a downward slope. Another feature of these temples, especially those of later date, is the gopurams or great gateways, placed at the en- trances to the sur- rounding courts, and often on all four sides. In general design they are like the spires over the shrines, but about twice as wide as deep, and very fre- quently far more imposing than the temples them- selves.

The style is dis- tinctly of wooden origin, and of this the very attenu- ated pilasters on the outer walls and the square pillars of small section are evi- dences. As the contemporary – , .

r,r,rtVi«>rn atvlpxnrp Reproduced, by permission of Mr John Murray, from Dr

nortnern styles are Burgess . s The Cmt T empus of India. characterized by FlG> 5 _pian of Kailas at Ellora.

the prevalence of vertical lines, the

Dravidian is marked by horizontal mouldings and shadows, and the towers and gopurams are storeyed- The more- important temples are also surrounded by courts enclosing great corridors and pillared halls.

One of the best examples of this style is the great temple at Tanjore. It would appear to have been begun on a definite plan, and not as a series of extensions of some small temple which, by accident, had grown famous and acquired wealth by which successively to enlarge its courts, as that at Tiruvallur seems to have grown by a series of accretions. The body of the Tanjore temple is of two storeys and fully 80 ft. high, whilst the sikhara or pyramidal tower rises in eleven storeys to a total height of 190 ft. This

dominates the gopurams over the entrances to the court in which it stands, and to an outer court, added in front of the first, but which does not, as in other cases, surround it. The central shrine, so far as we know, was erected about a.d. 1025. _

The Srirangam temple in Trichinopoly, the largest in India, is architecturally the converse of this: it is one of the latest in date, the fifth court having been left unfinished in the middle of the 1 8th century. The shrine is quite insignificant and distinguished only by a gilt dome, whilst proceeding outwards, the gopurams to each court are each larger and more decorative than the preceding. The successive independent additions, however, proved incompatible with any considered design or arrangement of parts.

Most of the Deccan was ruled by the Chalukya dynasty from early in the 6th century, and the style prevailing over this area,

GROWTH AND CHANGE)

HEXAPODA

429

The division of the winged Hexapoda into Exopteryga and Endopteryga is thus again justified.

If we admit that the larva has, in the phylogeny of insects, gradually diverged from the imago, and if we recollect that in the ontogeny the larva has always to become the imago (and of course still does so) notwithstanding the increased difficulty of the transformation, we cannot but recognize that a period of helplessness in which the transformation may take place is to be expected. It is generally considered that this is sufficient as an explanation of the existence of the pupa. This, however, is not the case, because the greater part of the transformation precedes the disclosure of the pupa, which, as L. C. Miall remarks, is structurally little other " than the fly enclosed in a temporary skin." Moreover, in many insects with imperfect metamorphosis the change from larva or (as the later stage of the larva is called in these cases) nymph to imago is about as great as the corresponding change in the Holometabola, as the student will recognize if he recalls the histories of Ephemeridae, Odonata and male Coccidae. But in none of these latter cases have the wings to be changed from a position inside the body to become external and actively functional organs. The difference between the nymph or false pupa and the true pupa is that in the latter a whole stage is devoted to the perfecting of the wings and body-wall after the wings have become external organs ; the stage is one in which no

food is or can be taken, however prolonged may be its existence. Amongst insects with imperfect metamorphosis the nearest approximations to the true pupa of the Holometabola are to be found in the subimago

From Chittenden, Bull. 4 (n.s.) Da. Enl. U.S. Depl. Air.

Fig. 26. — a, Saw-toothed Grain-Beetle (Silvanus surinamensis) ; A, pupa; c, larva, magnified — ; d, feeler of larva.

of Ephemeridae and in the quiescent or resting stages of Thysanoptera, Aleurodidae and Coccidae. A much more thorough appreciation than we yet possess of the phenomena in these cases is necessary in order completely to demonstrate the (Special characteristics of the holometabolous transformation. But even at present we can cor- rectly state that the true pupa is invariably connected with the transference of the wings from the interior to the exterior of the body. It cannot but suggest itself that this transference was induced by some peculiarity as to formation of cuticle, causing the growth of the wings to be directed inwards instead of outwards. We may remark that fleas possess no wings, but are understood to possess a true pupa. This is a most remarkable case, but unfortunately very little informa- tion exists as to the details of metamorphosis in this group.

Life- Relations. — Only a brief reference can be made here to the fascinating subject of the life-relations of the larva, nymph and pupa, as compared with those of the imago. For details, the reader may consult the special articles on the various orders and groups of insects. A common result of metamor- phosis is that the larva and imago differ markedly in their habitat and mode of feeding. The larva may be aquatic, or subterranean, or a burrower in wood, while the imago is aerial. It may bite and devour solid food, while the imago sucks liquids. It may eat roots or refuse, while the imago lives on leaves and flowers. The aquatic habit of many larvae is associated with endless beautiful adaptations for respiration. The series of paired spiracles on most of the trunk-segments is well displayed, as a rule, in terrestrial larvae — caterpillars and the grubs of most beetles, for example. In many aquatic larvae we find that all the spiracles are closed up, or become functionless, except a pair at the hinder end which are associated with some arrange- ment — such as the valvular flaps of the gnat larva or the tele- scopic ; ‘ tail ” of the drone-fly larva — for piercing the surface film and drawing periodical supplies of atmospheric air. A similar restriction of the functional spiracles to the tail-end

*From Miall and Denny (after Vayssiere), The Cock**

(fig. 25, d) is seen in many larvae of flies (Diptera) that live and feed

buried in carrion or excrement. Other aquatic larvae have the tracheal system entirely closed, and are able to breathe dissolved air by means of tubular or leaf-like gills. Such are the grubs of stone-flies, may-flies (fig. 27) and some dragon-flies and midges. An interesting feature is the difference often to be observed between an aquatic larva and pupa of the same insect in the matter of breathing. The gnat larva, for example, breathes at the tail-end, hanging head-downwards from the surface-film. But the pupa hangs from the surface by means of paired respiratory trumpets on the prothorax, the dorsal thoracic sur- face, where the cuticle splits to allow the emergence of the fly, being thus directed towards the upper air.

A marked disproportion between the life-term of larva and imago is common; 'the former often lives for months or years, while the latter only survives for weeks or days or hours. Generally the larval is the feeding, the imaginal the breeding, stage of the life-cycle. The extreme of this " division of labour " is seen in those insects whose jaws are vestigial in the winged state, when, the need for feeding all behind them, they have but to pair, to lay eggs and to die. The acquisition of wings is the sign of developed reproductive power.

Paedo genesis. — Nevertheless, the f unc- roach, Loveu'ˆReeve & CoT tion of reproduction is occasionally exer- Fig. 27. — Nymph of cised by larvae. In 1865 N. Wagner May-fly (Chloeon dip- made his classical observations on the ˆ ˆfanTtfachetl production of larvae from unfertilized gill-plates (6, b). Mag- eggs developed in the precociously- nified — . (The feelers formed ovaries of a larval gall-midge and legs are cut short.) (Cecidomyid), and subsequent observers

have confirmed his results by studies on insects of the same family and of the related Chironomidae. The larvae produced by this remarkable method (paedogenesis) of virgin-reproduction are hatched within the parent larva, and in some cases escape by the rupture of its body.

Polyembryony. — Occasionally the power of reproduction is thrown still farther back in the life-history, and it is found that from a single egg a large number of embryos may be formed. P. Marchal has (1904) described this power in two small parasitic Hymenoptera — a Chalcid (Encyrtus) which lays eggs in the developing eggs of the small moth Hyponomeula, and a Procto- trypid (Polygnotus) which infests a gall-midge (Cecidomyid) larva. In the egg of these insects a small number of nuclei are formed by the division of the nucleus, and each of these nuclei originates by division the cell-layers of a separate embryo. Thus a mass or chain of embryos is produced, lying in a common cyst, and developing as their larval host develops. In this way over a hundred embryos may result from a single egg.

Marchal points out the analogy of this phenomenon to the artificial polyembryony that has been induced in Echinoderm and other eggs by separating the blastomeres, and suggests that the abundant food-supply afforded by the host-larva is favourable for this multiplication of embryos, which may be", in the first instance, incited by the abnormal osmotic pressure on the egg.

Duration of Life. — The flour-moth (Ephesiia kuhnielld) sometimes passes through five or six generations in a single year. Although one of the characteristics of insects is the brevity of their adult lives, a considerable number of exceptions to the general rule have been discovered. These exceptions may be briefly summarized as follows: (1) Certain larvae, provided with food that may be adequate in quantity but deficient in nutriment, may live and go on feeding for many

Young resembling parents, but aquatic in habit, breathing dissolved air by thoracic tracheal gills

Includes the single family of the Perlidae (Stone-flies), formerly grouped with the Neuroptera.

Order : Isoptera. Biting mandibles; second maxillae incompletely fused. Fore- wings similar in shape and texture to hind-wings, which do not fold. In most species the majority of individuals are wingless. Short, jointed cerci. Six or eight Malpighian tubes. Young resembling adults; terrestrial throughout life.

Includes two families, formerly reckoned among the Neuroptera —the Embiidae and tile TermiHdae or " White Ants " (see Termite). Order: Corrodentia. Biting mandibles; second maxillae incompletely fused; maxillulae often distinct. Cerci absent. Four Malpighian tubes. Includes two sub-orders, formerly regarded as Neuroptera : — i. Copeognatha : Corrodentia with delicate cuticle._ Wings usually developed; the fore- wings much larger than the hind-wings. One family, the Psocidae (Book-lice). These minute insects are found amongst old books and furniture.

2. Mallophaga: Parasitic wingless Corrodentia (Bird-lice).

Order: Ephemeroptera. Jaws vestigial. Fore-wings much larger than hind-wings. Elon- gate, jointed cerci. Genital ducts paired and entirely

mesodermal. Malpighian tubes numerous (40). Aquatic larvae with distinct maxillulae, breathing dissolved air by abdominal tracheal gills. Penultimate instar a flying sub-imago. [Includes the single family of the Ephemeridae or may-flies. See also Neuroptera, in which this order was formerly comprised.]

Order: Odonata. Biting mandibles. Wings of both pairs closely alike; firm and glassy in texture. Prominent, unjointed cerci, male with genital armature on second abdominal segment. Malpighian tubes numer- ous (50-60). Aquatic larvae with caudal leaf-gills or with rectal tracheal system.

Includes the three families of dragon-flies. Formerly comprised among the Neuroptera.

Order: Thysanoptera. Piercing mandibles, retracted within the head-capsule. First maxillae also modified as piercers; maxillae of both pairs with distinct palps. Both pairs of wings similar, narrow and fringed. Four Malpighian tubes. Cerci absent. Ovipositor usually present. Young resembling parents, but penultimate instar passive and enclosed in a filmy pellicle.

Includes three families of Thrips (see Thysanoptera).

Order : Hemiptera. Mandibles and first maxillae modified as piercers; second maxillae fused to form a jointed, grooved rostrum. Wings usually present. Four Malpighian tubes. Cerci absent. Ovipositor developed. Includes two sub-orders: —

1. Heteroptera: Rostrum not in contact with haunches of fore-legs. Fore-wings partly coriaceous. Young resembling adults.

Includes the bugs, terrestrial and aquatic.

2. Homoptera: Rostrum in contact with haunches of fore-legs. Fore-wings uniform in texture. Young often larvae. Penultimate instar passive in some cases.

Includes the cicads, aphides and scale-insects (see Hemiptera). Order: Anoplura.

Piercing jaws modified and reduced, a tubular, protrusible sucking- trunk being developed ; mouth with hooks. Wingless, parasitic forms. Cerci absent. Four Malpighian tubes. Young resembling adults.

Includes the family of the Lice (Pediculidae), often reckoned as Hemiptera

(q.v.). See also Louse.

Sub-class: Endopterygota.

Hexapoda mostly with wings ; the wingless forms clearly degraded or modified. Maxillulae vestigial or absent. No locomotor abdominal appendages (except in certain larvae). Young animals always unlike parents, the wing-rudiments developing beneath the larval cuticle and only appearing in a penultimate pupal instar, which takes no food and is usually passive.

Order: Neuroptera.

Biting mandibles; second maxillae completely fused. Prothorax large and free. Membranous, net-veined wings, those of the two

Eairs closely alike. Six or eight Malpighian tubes. Cerci absent, arva campodeiform, usually feeding by suction (exceptionally hypermetamorphic with subsequent eruciform instars). Pupa free. Includes the alder-flies, ant-lions and lacewing-flies. See Neuro- ptera.

Order: Coleoptera. Biting mandibles; second maxillae very intimately fused. Pro- thorax large and free. Fore- wings modified into firm elytra, beneath which the membranous hind-wings (when present) can be folded. Cerci absent. Four or six Malpighian tubes. Larva cam- podeiform or eruciform. Pupa free.

Includes the beetles and the parasitic Stylopidae, often regarded as a distinct order (Strepsiptera). (See Coleoptera.) Order: Mecaptera. Biting mandibles; first maxillae elongate; second maxillae com- pletely fused. Prothorax small. Two pairs of similar, membranous wings, with predominantly longitudinal neuration. Six Malpighian tubes. Larva eruciform. Pupa free. Cerci present.

Includes the single family of Panorpidae (scorpion-flies), often com- prised among the Neuroptera.

Order: Trichoptera. Mandibles present in pupa, vestigial in imago; maxillae suctorial without specialization; first maxillae with lacinia, galea and palp. Prothorax small. Two pairs of membranous, hair-covered wings, with predominantly longitudinal neuration. Larvae aquatic and eruciform. Pupa free. Six Malpighian tubes. Cerci absent.

Includes the caddis-flies. See Neuroptera, among which these insects were formerly comprised.

Order: Lepidoptera. Mandibles absent in imago, very exceptionally present in pupa; first maxillae nearly always without laciniae and often without palps, or only with vestigial palps, their galeae elongated and grooved inwardly so as to form' a sucking trunk. Prothorax small. Wings with predominantly longitudinal neuration, covered with flattened scales. Fore-wings larger than hind-wings. Cerci absent. Four (rarely 6 or 8) Malpighian tubes. Larvae eruciform, with rarely more than five pairs of abdominal prolegs. Pupa free in the lowest families, in most cases incompletely or completely obtect. Includes the moths and butterflies. See Lepidoptera.

Order: Diplera. Mandibles rarely present, adapted for piercing; first maxillae with palps; second maxillae forming with hypopharynx a suctorial

Proboscis. Prothorax small, intimately united to mesothorax. ore-wings well developed; hind-wings reduced to stalked knobs (" halteres "). Cerci present but usually reduced. Four Malpi- ghian tubes. Larvae eruciform without thoracic legs, or vermiform without head-capsule. Pupa incompletely obtect or free, and enclosed in the hardened cuticle of the last larval instar (puparium). Includes the two- winged flies (see Diptera), which may be divided into two sub-orders: —

1. Orthorrhapha : Larva eruciform. Cuticle of pupa or puparium splitting longitudinally down the back, to allow escape of imago.

Comprises the midges, gnats, crane-flies, gad-flies, Sec.

2. Cyclorrhapha: Larva vermiform (no head-capsule). Puparium opening by an anterior " lid."

Comprises the hover-flies flesh-flies, bot-flies, &c. Order: Siphonaptera.*

Mandibles fused into a piercer ; first maxillae developed as piercers ; palps of both pairs of maxillae present ; hypopharynx wanting. Prothorax large. Wings absent or vestigial. Larva eruciform, limbless.

Includes the fleas.

Order: Hymenoptera.

Biting mandibles; second maxillae incompletely or completely fused; often forming a suctorial proboscis. Prothorax small, and united to mesothorax. First abdominal segment united to meta- thorax. Wings membranous, fore-wings larger than hind-wings. Ovipositor always well developed, and often modified into a sting. Numerous (20-150) Malpighian tubes (in rare cases, 6-12 only). Larva eruciform, with seven or eight pairs of abdominal

prolegs, or entirely legless. Pupa free.

Includes two sub-orders; —

1. Sympkyta: Abdomen not basally constricted. Larvae cater- pillars with thoracic legs and abdominal prolegs.

Comprises the saw-flies.

2. Apocrita: Abdomen markedly constricted at second segment. Larvae legless grubs.

Comprises gall-flies, ichneumon-flies, ants, wasps, bees. See Hymenoptera.

Geological History

The classification just given has been drawn up with reference to existing insects, but the great majority of the extinct forms that have been discovered can be referred with some confidence, to the same orders, and in many cases to recent families. The Hexapoda, being aerial, terrestrial and fresh-Tvater animals, are but occasionally preserved in stratified rocks, and our know- ledge of extinct members of the class is therefore fragmentary, while the description, as insects, of various obscure fossils, which are perhaps not even Arthropods, has not tended to the advancement of this branch of zoology. Nevertheless, much progress has been made. Several Silurian fossils have been identified as insects, including a Thysanuran from North America, but upon these considerable doubt has been cast.

[GEOGRAPHICAL DISTRIBUTION

The Devonian rocks of Canada (New Brunswick) have yielded several fossils which are undoubtedly wings of Hexapods. These have been described by S. H. Scudder, and include gigantic forms related to the Ephemeroptera.

In the Carboniferous strata (Coal measures) remains of Hexapods become numerous and quite indisputable. Many European forms of this age have been described by C. Brongniart, and American by S. H. Scudder. The latter has established, for all the Palaeozoic insects, an order Palaeodictyoptera, there being a closer similarity between the fore-wings and the hind-wings than is to be seen in most living orders of Hexapoda,

while affinities are shown to several of these orders — notably the Orthoptera, Ephemeroptera, Odonata and Hemiptera. It is probable that many of these Carboniferous insects might be referred to the Isoptera, while others would fall into the existing orders to which they are allied, with some modification of our present diagnoses. Of special interest are cockroach- like forms, with two pairs of similar membranous wings and a long ovipositor, and gigantic insects allied to the Odonata, that measured 2 ft. across the outspread .wings. A remark- able fossil from the Scottish Coal-measures (Lithomantis) had apparently small wing-like structures on the prothorax, and in allied genera small veined outgrowths— like tracheal gills — ■ occurred on the abdominal segments. To the Permian period belongs a remarkable genus Eugereon, that combines hemipteroid jaws with orthopteroid wing-neuration. With the dawn of the Mesozoic epoch we reach Hexapods that can be unhesitatingly referred to existing orders. From the Trias of Colorado, Scudder has described cockroaches intermediate between their Carboni- ferous precursors and their present-day descendants, while the existence of endopterygotous Hexapods is shown by the remains of Coleoptera of several families. In the Jurassic rocks are found Ephemeroptera and Odonata, as well as Hemiptera, referable to existing families, some representatives of which had already appeared in the oldest of the Jurassic ages — the Lias. To the Lias also can be traced back the Neuroptera, the Trichoptera, the orlhorrhaphous Diptera and, according to the determination of certain obscure fossils, also the Hymeno- ptera (ants). The Lithographic stone of Kimmeridgian age, at Solenhofen in Bavaria, is especially rich in insect remains, cyclorrhaphous Diptera appearing here for the first time. In Tertiary times the higher Diptera, besides Lepidoptera and Hymenoptera, referable to existing families, become fairly abundant! Numerous fossil insects preserved in the amber of the Baltic Oligocene have been described by G. L. Mayr and others, while Scudder has studied the rich Oligocene faunas of Colorado (Florissant) and Wyoming (Green River). The Oeningen beds of Baden, of Miocene age, have also yielded an extensive insect fauna, described fifty years ago by O. Heer. Further details of the geological history of the Hexapoda will be found in the special articles on the various orders. Frag- mentary as the records are, they show that the Exopterygota preceded the Endopterygota in the evolution of the class, and that among the Endopterygota those orders in which the greatest difference exists between imago and larva — the Lepidoptera, Diptera and Hymenoptera — were the latest to take their rise.

Geographical Distribution

The class Hexapoda has a world-wide range, and so have most of its component orders. The Aptera have perhaps the most extensive distribution of all animals, being found in Franz Josef Land and South Victoria Land,

on the snows of Alpine glaciers, and in the depths of the most extensive caves. Most of the families and a large proportion of the genera of insects are exceedingly widespread, but a study of the genera and species in any of the more important families shows that faunas can be distinguished whose headquarters agree fairly with the regions that have been proposed to express the distribution of the higher vertebrates. Many insects, however, can readily extend their range, and a careful study of their distribution leads us to dis- criminate between faunas rather than definitely to map regions.

A large and dominant Holoarctic fauna, with numerous sub- divisions, ranges over the great northern continents, and is characterized by the abundance of certain families like the Carabidae and Staphylinidae among the Coleoptera and the Tenthredinidae among the Hymenoptera. The southern territory held by this fauna is invaded by genera and species distinctly tropical. Oriental types range far northwards into China and Japan. Ethiopian forms invade the Mediterranean area. Neotropical and distinctively Sonoran insects mingle with members of the Holoarctic fauna across a wide " transition zone " in North America. " Wallace's line " dividing the Indo-Malayan and Austro-Malayan sub-regions is frequently transgressed in the range of Malayan insects. The Australian fauna is rich in characteristic and peculiar genera, and New Zealand, while possessing some remarkable insects of its own, lacks entirely several families with an almost world-wide range — forexample, the Notodontidae, Lasiocampidae, and other families of Lepidoptera. Interesting relationships between the Ethiopian and Oriental, the Neotropical and West African, the Patagonian and New Zealand faunas suggest great changes in the distribution of land and water, and throw doubt on the doctrine of the permanence of continental areas and oceanic basins. Holoarctic types reappear on the Andes and in South Africa, and even in New Zealand. The study of the Hexapoda of oceanic islands is full of interest. After the determination of a number of cosmopolitan insects that may well have been artificially introduced, there remains a large proportion of 'endemic species — sometimes referable to distinct genera — which suggest a high antiquity for the truly insular faunas.

Relationships and Phylogeny

The Hexapoda form a very clearly defined class of the Arthro- poda, and many recent writers have suggested that they must have . arisen independently of other Arthropods from annelid worms, and that the Arthropoda must, therefore, be regarded as an " unnatural," polyphyletic assemblage. The cogent argu- ments against this view are set forth in the article on Arthropoda. A near relationship between the Apterygota and the Crustacea has been ably advocated by H. J. Hansen (1893). It is admitted

on all hands that the Hexapoda are akin to the Chilopoda. Verhoeff has lately (1904) put forward the view that there are really six segments in the hexapodan thorax and twenty in the abdomen — the cerci belonging to the seventeenth abdominal segment thus showing a close agreement with the centipede Scolopendra. On the other hand, G. H. Carpenter (1899, 1902-1904) has lately endeavoured to show an exact numerical correspondence in segmentation between the Hexapoda, the Crustacea, the Arachnida, and the most primitive of the Diplopoda. On either view it may be believed that the Hexapoda arose with the allied classes from a primitive arthropod stock, while the relationships of the class are with the Crustacea, the Chilopoda and the Diplopoda, rather than with the Arachnida.

Nature of Primitive Hexapoda. — Two divergent views have been held as to the nature of the original hexapod stock. Some of those zoologists who look to Peripatus, or a similar worm-like form, as representing the direct ancestors of the Hexapoda have laid stress on a larva like the caterpillar of a moth or saw-fly as representing a primitive stage. On the other hand, the view of F. Muller and F. Brauer, that the Thysanura represent more nearly than any other existing insects the ancestors of the class, has been accepted by the great majority of students. And there can be little doubt that this belief is justified. The caterpillar, or the maggot, is a specialized larval form characteristic of the most highly developed orders, while the campodeiform larva is the starting-point for the more primitive insects. The occurrence in the hypermetamorphic Coleoptera (see supra) of a campodei- form preceding an eruciform stage in the life-history is most suggestive. Taken in connexion with the likeness of the your>g among the more generalized orders to the adults, it indicate clearly a thysanuroid starting-point for the evolution of the hexapod orders. And we must infer further that the specializa- tion of the higher orders has been accompanied by an increase in

the extent of the metamorphosis — a very exceptional condition among animals generally, as has been ably pointed out by L. C. Miall (1895).

Origin of Wings. — The post-embryonic growth of Hexapods with or without metamorphosis is accompanied in most cases by the acquisition of wings. These organs, thus acquired during the lifetime of the individual, must have been in some way acquired during the evolution of the class. Many students of the group, following Brauer, have regarded the

Apterygota as representing the original wingless progenitors of the Pterygota, and the many primitive characters shown by the former group lend support to this view. On the other hand, it has been argued that the presence of wings in a vast majority of the Hexapoda suggests their presence in the ancestors of the whole class. It is most unlikely that wings have been acquired independently by various orders of Hexapoda, and if we regard the Thysanura as the slightly modified representatives of a primitively wingless stock, we must postulate the acquisition of wings by some early offshoot of that stock, an offshoot whence the whole group of the Pterygota took its rise. How wings were acquired by these primitive Pterygota must remain for the present a subject for speculation. Insect wings are specialized outgrowths of certain thoracic segments, and are quite unrepresented in any other class of Arthropods. They are not, therefore, like the wings of birds, modified from some pre-existing structures (the fore-limbs) common to their phylum; they are new and peculiar structures. Comparison of the tracheated wings with the paired tracheated outgrowths on the abdominal segments of the aquatic campodei-form larva of may-flies (see fig. 27) led C. Gegenbaur to the brilliant suggestion that wings might be regarded as specialized and transformed gills. But a survey of the Hexapoda as a whole, and especially a comparative study of the tracheal system, can hardly leave room for doubt that this system is primitively adapted for atmospheric breathing, and that the presence of tracheal gills in larvae must be regarded as a special adaptation for temporary aquatic life. The origin of insect wings remains, therefore, a mystery, deepened by the difficulty of imagining any probable use for thoracic outgrowths, comparable to the wing- rudiments of the Exopterygota, in the early stages of their evolution.

Origin of Metamorphosis. — In connexion with the question whether metamorphosis has been gradually acquired, we have to consider two aspects, viz. the bionomic nature of metamorphosis, and to what extent it existed in primitive insects. Bionomically, metamorphosis may be defined as the sum of adaptations that have gradually fitted the larva (caterpillar or maggot) for one kind of life, the fly for another. So that we may conclude that the factors of evolution would favour its development. With regard to its occurrence in primitive insects, our knowledge of the geological record is most imperfect, but so far as it goes it supports the conclusion that holometabolism (i.e. extreme metamorphosis) is a comparatively recent phenomenon of insect life. None of the groups of existing Endopterygota have been traced with certainty farther back than the Mesozoic epoch, and all the numerous Palaeozoic insect-fossils seem to belong to forms that possessed only imperfect metamorphosis. The only doubt arises from the existence of insect remains, referred to the order ("oleoptera, in the Silesian Culm of Steinkunzendorf near Reichenbach. The oldest larva known,

Mormolucoides arti- atlatus, is from the New Red Sandstone of Connecticut; it belongs to the Sialidae, one of the lowest forms of Holometabola. It is now, in fact, generally admitted that metamorphosis has been acquired comparatively recently, and Scudder in his review of the earliest fossil insects states that " their meta- morphoses were simple and incomplete, the young leaving the egg with the form of the parent, but without wings, the assump- tion of which required no quiescent stage before maturity."

It has been previously remarked that the phenomena of hoiometabolism are connected with the development of wings inside the body (except in the case of the fleas, where there are no wings in the perfect insect). Of existing insects 90% belong to the Endopterygota. At the same time we have no

evidence that any Endopterygota existed amongst Palaeozoic insects, so that the phenomena of endopterygotism are compara- tively recent, and we are led to infer that the Endopterygota owe their origin to the older Exopterygota. In Endopterygota the wings commence their development as invaginations of the hypodermis, while in Exopterygota the wings begin — and always remain — as external folds or evaginations. The two modes of growth are directly opposed, and at first sight it appears that this fact negatives the view that Endopterygota have been derived from Exopterygota.

Only three hypotheses as to the origin of Endopterygota can be suggested as possible, viz.: — (1) That some of the Palaeo- zoic insects, though we infer them to have been exopterygotous, were really endopterygotous, and were the actual ancestors of the existing Endopterygota; (2) that Endopterygota are not descended from Exopterygota, but were derived directly from ancestors that were never winged; (3) that the predominant division — i.e. Endopterygota — of insects of the present epoch are descended from the predominant — if not the sole — group that existed in the Palaeozoic epoch, viz. the Exopterygota. The first hypothesis is not negatived by direct evidence, for we do not actually know the ontogeny of any of the Palaeozoic insects; it is, however, rendered highly improbable by the modern views as to the nature and origin of wings in insects, and by the fact that the Endopterygota include none of the lower existing forms of insects. The second hypothesis — to the effect that Endopterygota are the descendants of apterous insects that had never possessed wings {i.e. the Apterygogenea of Brauer and others, though we prefer the shorter term Aptery- gota) — is rendered improbable from the fact that existing Apterygota are related to Exopterygota, not to Endopterygota, and by the knowledge that has been gained as to the morphology and development of wings, which suggest that — if we may so phrase it — were an apterygotous insect gradually to develop wings, it would be on the

exopterygotous system. From all points of view it appears, therefore, probable that Endopterygota are descended from Exopterygota, and we are brought to the question as to the way in which this has occurred.

It is almost impossible to believe that any species of insect that has for a long period developed the wings outside the body could change this mode of growth suddenly for an internal mode of development of the organs in question, for, as we have already explained, the two modes of growth are directly opposed. The explanation has to be sought in another direction. Now there are many forms of Exopterygota in which the creatures are almost or quite destitute of wings. This phenomenon occurs among species found at high elevations, among others found in arid or desert regions, and in some cases in the female sex only, the male being winged and the female wingless. This last state is very frequent in Blattidae, which were amongst the most abundant of Palaeozoic insects. The wingless forms in question are always allied to winged forms, and there is every reason to believe that they have been really derived from winged forms. There are also insects (fleas, &c.) in which metamorphosis of a " complete " character exists, though the insects never develop wings. These cases render it highly probable that insects may in some circumstances become wing- less, though their ancestors were winged. Such insects have been styled anapterygotous. In these facts we have one possible clue to the change from exopterygotism to endopterygotism, namely, by an intermediate period of anapterygotism.

Although we cannot yet define the conditions under which exopterygotous wings are suppressed or unusually developed, yet we know that such fluctuations occur. There are, in fact, existing forms of Exopterygota that are usually wingless, and that nevertheless appear in certain seasons or localities with wings. We are therefore entitled to assume that the suppressed wings of Exopterygota tend to reappear; and, speaking of the past, we may say that if after a period of suppression the wings began to reappear as hypodermal buds while a more rigid pressure was exerted by the cuticle, the growth of the buds would neces- I sarily be inwards,, and we should have incipient endopterygotism.

The change that is required to transform Exopterygota into Endopterygota is merely that a cell of hypodeimis should proliferate inwards instead of outwards, or that a minute hypo- dermal evaginated bud should be forced to the interior of the body by the pressure of a contracted cuticle.

If it should be objected that the wings so developed would be rudimentary, and that there would be nothing to encourage their development into perfect functional organs, we may remind the reader that we have already pointed out that im- perfect wings of Exopterygota do, even at the present time under certain conditions, become perfect organs; and we may also add that there are, even among existing Endopterygota, species in which the wings are usually vestiges and yet sometimes become perfectly developed. In fact, almost every condition that is required for the change from exopterygotism to endo- pterygotism exists among the insects that surround us.

But it may perhaps be considered improbable that organs like the wings, having once been lost, should have been re- acquired on the large scale suggested by the theory just put forward. If so, there is an alternative method by which the endopterygotous may have arisen from the exopterygotous condition. The sub-imago of the Ephemeroptera suggests that a moult, after the wings had become functional, was at one time general among the Hexapoda, and that the resting nymph of the Thysanoptera or the pupa of the Endopterygota represents a formerly active stage in the life-history. Further, although the wing-rudiments appear externally in an early instar of an exopterygotous insect, the earliest instars are wingless and wing-rudiments have been previously developing beneath the cuticle, growing however outwards, not inwards as in the larva of an endopterygote. The change from an exopterygote to an endopterygote development could, therefore, be brought about by the gradual postponement to a later and later instar of the appearance of the wing-rudiments outside the body, ; and their correlated growth inwards as imaginal disks. For in the post-embryonic development of the ancestors of the Endopterygota we may imagine two or three instars with wing-rudiments to have existed, the last represented by the sub-imago of the may-flies. As the life-conditions and feeding- habits of the larva and imago become constantly more divergent, the appearance of the wing-rudiments would be postponed to the pre-imaginal instar, and that instar would become pre- dominantly passive.

Relationships of the Orders. — Reasons have been given for regarding the Thysanura as representing, more nearly than any other living group, the primitive stock of the Hexapoda. It is believed that insects of this group are represented among Silurian fossils. We may conclude, therefore, that they

were pre- ceded, in Cambrian times or earlier, by Arthropods possessing well developed appendages on all the trunk-segments. Of such Arthro- pods the living Symphyla — of which the delicate little Scutigerella is a fairly well-known example — give us some representation.

No indications beyond those furnished by comparative anatomy help us to unravel the phylogeny of the Collembola. In most respects, the shortened abdomen, for example, they are more specialized than the Thysanura, and most of the features in which they appear to be simple, such as the absence of a tracheal system and of compound eyes, can be explained as the result of degradation. In their insunken mouth and their jaws retracted within the head-capsule, the Collembola resemble the entotrophous division of the Thysanura (see Aptera), from which they are probably descended.

From the thysanuroid stock of the Apterygota, the Exoptery- gota took their rise. We have undoubted fossil evidence that winged insects lived in the Devonian and became numerous in the Carboniferous period. These ancient Exopterygota were synthetic in type, and included insects that may, with probability, be regarded as ancestral to most of the existing orders. It is hard to arrange the Exopterygota in a linear series, for some of the orders that are remarkably primitive in some respects are rather highly specialized in others. As regards wing-structure, the Isoptera with the two pairs closely

similar are the most primitive of all winged insects; while in the paired mesodermal genital ducts, the elongate cerci and the conspicuous maxillulae of their larvae the Ephemeroptera retain notable ancestral characters. But the vestigial jaws, numerous Malpighian tubes, and specialized wings of may-flies forbid us to consider the order as on the whole primitive. So the Dermaptera, which retain distinct maxillulae and have no ectodermal genital ducts, have either specialized or aborted wings and a large number of Malpighian tubes. The Corrodentia retain vestigial maxillulae and two pairs of Malpighian tubes, but the wings are somewhat specialized in the Copeognatha and absent in the degraded and parasitic Mallophaga. The Pleco- ptera and Orthoptera agree in their numerous Malpighian tubes and in the development of a folding anal area in the hind-wing. As shown by the number and variety of species, the Orthoptera are the most dominant order of this group. Eminently terres- trial in habit, the differentiation of their fore-wings and hind- wings can be traced from Carboniferous, isopteroid ancestors through intermediate Mesozoic forms. The Plecoptera resemble the Ephemeroptera and Odonata in the aquatic habits of their larvae, and by the occasional presence of tufted thoracic gills in the imago exhibit an aquatic character unknown in any other winged insects. The Odonata are in many imaginal and larval characters highly specialized; yet they probably arose with the Ephemeroptera as a divergent offshoot of the same primitive isopteroid stock which developed

more directly into the living Isoptera, Plecoptera, Dermaptera and Orthoptera.

All these orders agree in the possession of biting mandibles, while their second maxillae have the inner and outer lobes usually distinct. The Hemiptera, with their piercing mandibles and first maxillae and with their second maxillae fused to form a jointed beak, stand far apart from them. This order can be traced with certainty back to the early Jurassic epoch, while the Permian fossil Eugereon, and the living order — specially modified in many respects — of the Thysanoptera indicate steps by which the aberrant suctorial and piercing mouth of the Hemi- ptera may have been developed from the biting mouth of primitive Isopteroids, by the elongation of some parts and the suppression of others. The Anoplura may probably be regarded as a degraded offshoot of the Hemiptera.

The importance of great cardinal features of the life-history as indicative of relationship leads us to consider the Endoptery- gota as a natural assemblage of orders. The occurrence of weevils — among the most specialized of the Coleoptera — in Triassic rocks shows us that this great order of metabolous insects had become differentiated into its leading families at the dawn of the Mesozoic era, and that we must go far back into the Palaeozoic for the origin of the Endopterygota. In this view we are confirmed by the impossibility of deriving the Endopterygota from any living order of Exopterygota. We conclude, therefore, that the primitive stock of the former sub- class became early differentiated from that of the latter. So widely have most of the higher orders of the Hexapoda now diverged from each other, that it is exceedingly difficult in most cases to trace their relationships with any confidence. The Neuroptera, with their similar fore- and hind-wings and their campodeiform larvae, seem to stand nearest to the presumed isopteroid ancestry, but the imago and larva are often specialized. The campodeiform larvae of many Coleoptera are indeed far more primitive than the neuropteran larvae, and suggest to us that the Coleoptera — modified as their wing-structure has become— arose very early from the prfmitive metabolous stock. The antiquity of the Coleoptera is further shown by the great diversity of larval form and habit that has arisen in the order, and the proof afforded by the hypermetamorphic beetles that the campodeiform preceded the eruciform larva has already been emphasized.

In all the remaining orders of the Endopterygota the larva is eruciform or vermiform. The Mecaptera, with their pre- dominantly longitudinal wing-nervuration, serve as a link between the Neuroptera and the Trichoptera, their retention of small cerci being an archaic character which stamps them as

synthetic in type, but does not necessarily remove them from orders which agTee with them in most points of structure but which have lost the cerci. The standing of the Trichoptera in a position almost ancestral to the Lepidoptera is one of the assured results of recent morphological study, the mobile mandi- bulate pupa and the imperfectly suctorial maxillae of the Trichoptera reappearing in the lowest families of the Lepi- doptera. This latter order, which is not certainly known to have existed before Tertiary times, has become the most highly specialized of all insects in the structure of the pupa. Diptera of the sub-order Orthorrhapha occur in the Lias and Cyclor- rhapha in the Kimmeridgian. The order must therefore be ancient, and as no evidence is forthcoming as to the mode of reduction of the hind-wings, nor as to the stages by which the suctorial mouth-organs became specialized, it is difficult to trace the exact relationship of the group, but the presence of cerci and a degree of correspondence in the nervuration of the fore- wings suggest the Mecaptera as possible allies. There seems no doubt that the suctorial mouth-organs of the Diptera have arisen quite independently from those of the Lepidoptera, for in the former order the sucker is formed from the second maxillae, in the latter from the first. The eruciform larva of the Orthorrhapha leads on to the headless vermiform maggot of the Cyclorrhapha, and in the latter sub-order we find meta-morphosis carried to its extreme point, the muscid flies being the most highly specialized of all the Hexapoda as regards structure, while their maggots are the most degraded of all insect larvae. The Siphonaptera appear by the form of the larva and the nature of the metamorphosis to be akin to the Orthorrhapha — in which division they have indeed been included by many students. They differ from the Diptera, however, in the general presence of palps to both pairs of maxillae, and in the absence of a hypopharynx, so it is possible that their relationship to the Diptera is less close than has been supposed. The affinities of the Hymenoptera afford another problem of much difficulty. They differ from other Endopterygota in the multiplication of their Malpighian tubes, and from all other Hexapoda in the union of the first abdominal segment with the thorax. Specialized as they are in form, development and habit, they retain mandibles for biting, and in their lower sub-order — the Symphyta — the maxillae are hardly more modified than those of the Orthoptera. From the evidence of fossils it seems that the higher sub-order — Apocrita — can be traced back to the Lias, so that we believe the Hymenoptera to be more ancient than the Diptera, and far more ancient than the Lepidoptera. They afford an example— paralleled in other classes of the animal kingdom —

of an order which, though specialized in some respects, retains many primitive characters, and has won its way to dominance rather by per- fection of behaviour, and specially by the development of family life and helpful socialism, than by excessive elaboration of structure. We would trace the Hymenoptera back therefore to the primitive endopterygote stock. The specialization of form in the constricted abdomen and in the suctorial " tongue " that characterizes the higher families of the order is correlated with the habit of careful egg-laying and provision of food for the young. In some way it is assured among the highest of the Hexapoda — the Lepidoptera, Diptera and Hymenoptera — that the larva finds itself amid a rich food-supply. And thus per- fection of structure and instinct in the imago has been accom- panied by degradation in the larva, and by an increase in the extent of transformation and in the degree of reconstruction before and during the pupal stage. The fascinating difficulties presented to the student by the metamorphosis of the Hexapoda are to some extent explained, as he ponders over the evolution of the class.

Bibliography.— References to the older classical writings on the Hexapoda are given in the article on Entomology. At present about a thousand works and papers are published annually, and in this place it is possible to enumerate only a few of the most important among (mostly) recent memoirs that bear upon the Hexapoda generally. Further references will be found appended to the special articles on the orders (AptEra, ColeoptERA, &c).

General Works. — A. S. Packard, Text-book of Entomology (London, 1898); V. Graber, Die Insekten (Munich, 1877-1879); D. Sharp, Cambridge Natural History, vols, v., vi. (London, 1895-1899) ; L. C. Miall and A. Denny, Structure and Life-history of the Cockroach (London, 1886); B. T. Lowne, The Anatomy, Physiology, Morpho- logy and Development of the Blow-fly (2 vols., London, I 890- 1 895); G. H. Carpenter, Insects: their Structure and Life (London, 1899); L. F. Henneguy, Les Insectes (Paris, 1904) ; J. W. Folsom, Entomology (New York and London, 1906) ; A. Berlese, Gli Insetti (Milan, 1906), &c. (Extensive bibliographies will be found in several of the above.)

Head and Appendages. — J. C. Savigny, Mimoires sur les animaux sans verthbres (Paris, 1816); C. Janet, Essai sur la constitution morphologique de la tete de I'insecte (Paris, 1899) ; J. H. Comstock and C. Kochi {American Naturalist, xxxvi., 1902); V. L. Kellogg (ibid.); W. A. Riley {American Naturalist, xxxviii., 1904) ; F. Meinert

{Entom. Tidsskr. i., 1880); H. J. Hansen (Zool. Anz. xvi., 1893); J. B. Smith {Trans. Amer. Phil. Soc. xix., 1896); H. Holmgren

{Zeitsch. wiss. Zoolog. lxxvi., 1904); K. W. Verhoeff {Abhandl. K. Leop.- Carol. Akad. lxxxiv., 1905).

Thorax, Legs and Wings. — K. W. Verhoeff (Abhandl. K. Leop.- Carol. Akad. lxxxii., 1903); F. Voss (Zeits. wiss. Zool. lxxviii.,

1905); F. Dahl (Arch. f. Naturgesch. 1, 1884); J. Demoor (Arch, de biol. x., 1890); J. Redtenbacher (Ann. Kais. naturhist. Museum,

Wien, i., 1886) ; R. von Lendenfeld (S. B. Akad. Wissens., Wien,

lxxxiii., 1881); J. H. Comstock and J. G. Needham (Amer. Nat.,

xxxii., xxxiii., 1 898-1 899); C. W. Woodworth (Univ. California

Entom. Bull. i., 1906).

Abdomen and Appendages. — E. Haase (Morph. Jahrb. xv.,

1889); R. Heymons (Morph. Jahrb. xxiv., 1896; Abhandl. K.

Leop.-Carol. Akad. lxxiv., 1899); K. W. Verhoeff (Zool. Anz. xix.,

xx., 1896-1897); S. A. Peytoureau, Contribution a Vetude de la

morphologie de I'armure ginitale des insectes (Bordeaux, 1895); H.

Dewitz (Zeits. wiss. Zool. xxv., xxviii., 1874, 1877); E. Zander (ibid.

lxvi., lxvii., 1899-1900).

Nervous System.— H. Viallanes (Ann. Sci. Nat. Zool. [6], xvii.,

xviii., xix., [7] ii., iv., 1884-1887); S. J. Hickson (Quart. Journ. Micr.

Sci. xxv., 1885); W. Patten (Journ. Morph. i., ii., 1887-1888);

F. Plateau (Mem. Acad. Belg. xliii., 1888); V. Graber (Arch. mikr.

Anat. xx., xxi., 1882).

Respiratory System. — J. A. Palmen, Zur Morphologie des

Tracheensystems (Leipzig, 1877); F. Plateau (Mem. Acad. Belg.

xiv., 1884) ; L. C. Miall, Natural History of Aquatic Insects (London,

1895).

Digestive System, &c. — L. Dufour (Ann. Sci. Nat., 1824-1860);

V. Faussek (Zeits. wiss. Zool. xlv., 1887).

Malpighian Tubes. — E. Schindler (Zeits. wiss. Zool. xxx., 1878);

W. M. Wheeler (Psyche vi., 1893); L. Cuenot (Arch, de biol. xiv.,

1895)-

Reproductive Organs. — H. V. Wielowiejski (Zool. Anz. ix., 1886) ; J. A. Palmen, Uber paarige Ausfuhrungsgange der Geschlechtsorgane bei Insekten (Helsingfors, 1884); H. Henking (Zeits. wiss. Zool. xlix., Ii., liv., 1890-1892); F. Leydig (Zool. Jahrb. Anat. iii., 1889). Embryology. — F. Blochmann (Morph. Jahrb. xii., 1887); A. Kovalevsky (Mem. Acad. St-Petersbourg, xvi., 1871; Zeits. wiss. Zool. xlv., 1887); V. Graber (Denksch. Akad. Wissens., Wien, lvi., 1889); K. Heider, Die Embryonalentwicklung von Hydrophilus piceus (Jena, 1889); W. M. Wheeler (Journ. Morph. iii., viii., 1889- 1893); E. Korschelt and K. Heider, Handbook of the Comparative Embryology of Invertebrates (trans. M. Bernard), (vol. iii., London, 1899); R. Heymons, Die Embryonalentwicklung von Dermapteren und Orthopteren (Jena, 1895) (also Zeits. wiss. Zool. liii., 1891, lxii., 1897; Anhang zu den Abhandl. K. Akad. d. Wissens., Berlin, 1896); A. Lecaillon (Arch, d'anat. micr. ii., 1898); J. Carridre and 0. Burger (Abhandl. K. Leop.-Carol. Akad. Ixix., 1897); K. Escherich (ibid, lxxvii., 1901); F. Schwangart (Zeits. wiss. Zool. lxxvi., 1904); R. Ritter (ib. Ii., 1890); E. Metchnikoff (ib. xvi., 1866); H. Uzel (Zool. Anz. xx., 1897); J. W. Folsom (Bull. Mus. Comp. Zool. Harvard., xxxvi., 1900).

Parthenogenesis and Paedogenesis. — T. H. Huxley (Trans. Linn. Soc. xxii. , 1 858) ; R. Leuckart, Zur Kenntnis des Generations- wechsels und der Parthogenesis bei den Insekten (Frankfurt, 1858) ; N. Wagner (Zeits. wiss. Zool. xv., 1865) ; L. F. Henneguy {Bull. Soc. Philomath. [9], i. 1899); A. Petrunkevich (Zool. Jahrb. Anat. xiv., xvii., 1901-1903); P. Marchal (Arch. zool. exp. et gen. [4], ii.,1904); L. Doncaster (Quart. Journ. Micr. Sci. xlix., Ii., 1906-1907).

Growth and Metamorphosis. — A. Weismann (Zeits. wiss. Zool. xiii., xiv., 1863-1864); F. Brauer (Verh. zool.-bot. Gesellsch., Wien, xix., 1869); Sir J. Lubbock (Lord Avebury), Origin and Metamorphosis of Insects (London, 1874); L. C. Miall (Nature, liii., 1895); L. C. Miall and A. R. Hammond, Structure and Life-history of the Harlequin- fly (Oxford, 1900); J. Gonin (Bull. Soc. Vaud. Sci. Nat. xxx., 1894); C. de Bruyne (Arch, de biol. xv.(1898) ; D. Sharp (Proc. Inter. Zool. Congress, 1898); E. B. Poulton (Trans. Linn. Soc. v., 1891); T. A. Chapman (Trans. Ent. Soc, 1893).

Classification.— F. Brauer (S. B. Akad. Wiss., Wien, xci., 1885) ; A. S. Packard (Amer. Nat. xx. ; 1886); C. Borner, A. Handlirsch, F. Klapalek (Zool. Anz. xxvii., 1904); G. Enderlein (Zool. Anz. xxvi., 1903).

Palaeontology.— S. H. Scudder, in Zittel's Palaeontology (French

trans., vol. ii., Paris, 1887, and Eng. trans., vol. i., London, 1900); C. Brongniart, Insectesfossiles des temps primaires (St-Etienne, 1 894) ; A. Handlirsch, Die fossilen Insekten und die Phylogenie der rezenten Formen (Leipzig, 1906).

Phylogeny. — Brauer, Lubbock, Sharp, Borner, &c. {opp. tit.) ; P. Mayer {Jena, Zeits. Naturw. x., 1876); B. Grassi {Atti R. Accad. dei Lincei, Roma [4], iv., 1888, and Archiv ital. biol. xi., 1889); F. Miiller, Facts and Arguments for Darwin (trans. W. S. Dallas, London, 1869); N. Zograf {Congr. Zool. Int., 1892); E. R. Lankester {Quart. Journ. Micr. Sci. xlvii., 1904); G. H. Carpenter {Proc. R. Irish Acad, xxiv., 1903; Quart. Journ. Micr. Sci. xlix., 1905).

(D.S.;G.H.C)*

HEXASTYLE (Gr. I J, six, and arOXos, column), an archi- tectural term given to a temple in the portico of which there are six columns in front.

HEXATEUCH, the name given to the first six books of the Old Testament (the Pentateuch and Joshua), to mark the fact that these form one literary whole, describing the early traditional history of the Israelites from the creation of the world to the conquest of Palestine and the origin of their national institu- tions. These books are the result of an intricate literary process, on which see Bible (Old Testament: Canon), and the articles on the separate books (Genesis, Exodus, Leviticus, Numbers, Deuteronomy and Joshua).

HEXHAM, a market town in the Hexham parliamentary division of Northumberland, England, 21 m. W. from Newcastle by the Carlisle branch of the North-Eastern railway, served also from Scotland by a branch of the North British railway. Pop. of urban district (1901) 7107. It is pleasantly situated beneath the hills on the S. bank of the Tyne, and its market square and narrow streets bear many marks of antiquity. It is famous for its great abbey church of St Andrew. This building, as renovated in the 12th century, was to consist of nave and transepts, choir and aisles, and massive central tower. The Scots are believed to have

destroyed the nave in 1 296, but it may be doubted if it was ever completed. In 1536 the last prior was hanged for being concerned in the insurrection called the Pilgrimage of Grace. The church as it stands is a fine monument of Early English work, with Transitional details. Within, although it suffered much loss during a restoration c. 1858, there are several objects of interest. Among these are a Roman slab, carved with figures of a horseman trampling upon an enemy, several fine tombs and stones of the 13th and 14th centuries, the frith or fridstool of stone, believed to be the original bishop's throne, and the fine Perpendicular roodscreen of oak, retaining its loft. The crypt, discovered in 1726, is part of the Saxon church, and a note- worthy example of architecture of the period. Its material is Roman, some of the stones having Roman inscriptions. These were brought from the Roman settlement at Corbridge, 4 m. E. of Hexham on the N. bank of the Tyne ; for Hexham itself was not a Roman station. In 1832 a vessel containing about 8000 Saxon coins was discovered in the churchyard. Fragments of the monastic buildings remain, and west of the churchyard is the monks' park, known as the Seal, and now a promenade, command- ing beautiful views. In the town are two strong castellated towers of the 14th century, known as the Moot Hall and the Manor Office. Their names explain their use, but they were doubtless also intended as defensive works. In the interesting and beautiful neighbourhood of Hexham there should be noticed Aydon castle near Corbridge, a fortified house of the late 13th century; and Dilston or Dyvilston, a typical border fortress dating from Norman times, of which only a tower and small chapel remain. It is replete with memories of the last earl of Derwentwater, who was beheaded in 17 16 for his part in the Stuart rising of the previous year, and was buried in the chapel. There is an Elizabethan grammar school. Hexham and Newcastle form a Roman Catholic bishopric, with the cathedral at New- castle. There are manufactures of leather gloves and other goods, and in the neighbourhood barytes and coal mines and extensive market gardens.

The church and monastery at Hexham (Hextoldesham) were founded about 673 by Wilfrid, archbishop of York, who is said to have received a grant of the whole of Hexhamshire from ˆthel- hryth, queen of Northumbria, and a grant of sanctuary in his

church from the king. The church in 678 became the head of the new see of Bernicia, which was united to that of Lindisfarne about 821, when the bishop of Lindisfarne appears to have taken possession of the lordship which he and his successors held until it was restored to the archbishop of York by Henry II. The archbishops appear to have had almost royal power throughout the liberty, including the rights of trying all pleas of the crown in their court, of taking inquisitions and of taxation. In 1 545 the archbishop exchanged Hexhamshire with the king for other property, and

in 1572 all the separate privileges which had belonged to him were taken away, and the liberty was annexed to the county of Northumberland. Hexham was a borough by prescription, and governed by a bailiff at least as early as 1276, and the same form of government continued until 1853. In 1343 the men of Hexham were accused of pretending to be Scots and imprisoning many people of Northumberland and Cumberland, killing some and extorting ransoms for others. The Lancastrians were defeated in 1464 near Hexham, and legend says that it was in the woods round the town that Queen Margaret and her son hid until their escape to Flanders. In 1522 the bishop of Carlisle complained to Cardinal Wolsey, then archbishop of York, that the English thieves committed more thefts than " all the Scots of Scotland," the men of Hexham being worst of all, and appearing 100 strong at the markets held in Hexham, so that the men whom they had robbed dared not complain or " say one word to them." This state of affairs appears to have continued until the accession of James I., and in 1595 the bailiff and constables of Hexham were removed as being " infected with combination and toleration of thieves." Hexham was at one time the market town of a large agricultural district. In 1 227 a market on Monday and a fair on the vigil and day of St Luke the Evangelist were granted to the archbishop, and in 1320 Archbishop Melton obtained the right of holding two new fairs on the feasts of St James the Apostle lasting five days and of SS. Simon and Jude lasting six days. The market day was altered to Tuesday in 1662, and Sir William Fenwick, then lord of the manor, received a grant of a cattle market on the Tuesday after the feast of St Cuthbert in March and every Tuesday fortnight until the feast of St Martin. The market rights were purchased from Wentworth B. Beaumont, lord of the manor, in 1886. During the 17th and 18th centuries Hexham was noted for the leather trade, especially for the manufacture of gloves, but in the 19th century the trade began to decline. Coal mines which had belonged to the archbishop, were sold to Sir John Fenwick, Kt., in 1628. Hexham has never been represented in parliament, but gives its name to one of the four parliamentary divisions of the county.

See Edward Bateson and A. B. Hinds, A History of Northumberland vol. iii. (1893-1896); A. B. Wright, An Essay towards the History 0} Hexham (1823); James Hewitt, A Handbook to Hexham and its Antiquities (1879).

HEYDEN, JAN VAN DER (1637-1712), Dutch painter, was born at Gorcum in 1637, and died at Amsterdam on the 12th of September 1712. He was an architectural landscape painter, a con- temporary of Hobbema and Jacob Ruysdael, with the advantage, which they lacked, of a certain professional versatility; for, whilst they painted admirable pictures and starved, he varied the practice of art with the study of mechanics, improved the fire engine, and died superintendent of the lighting and director of the

firemen's company at Amsterdam. Till 1672 he painted in partner- ship with Adrian van der Vclde. After Adrian's death, and probably because of the loss which that event entailed upon him, he accepted the offices to which allusion has just been made. At no period of artistic activity had the system of division of labour been more fully or more constantly applied to art than it was in Holland towards the close of the 17th century. Van der Heyden, who was perfect as an architectural draughtsman in so far as he painted the outside of buildings and thoroughly mastered linear perspective, seldom turned his hand to the delineation of any- thing but brick houses and churches in streets and squares, or rows along canals, or " moated granges," common in his native country. He was a travelled man, had seen The Hague, Ghent and Brussels, and had ascended the Rhine past Xanten to

Cologne, where he copied over and over again the tower and crane of the great cathedral. But he cared nothing for hill or vale, or stream or wood. He could reproduce the rows of bricks in a square of Dutch houses sparkling in the sun, or stunted trees and lines of dwellings varied by steeples, all in light or thrown into passing shadow by moving cloud. He had the art of painting microscopically without loss of breadth or keeping. But he could draw neither man nor beast, nor ships nor carts; and this was his disadvantage. His good genius under these circumstances was Adrian van der Velde, who enlivened his compositions with spirited figures; and the joint labour of both is a delicate, minute, transparent work, radiant with glow and atmosphere.

HEYLYN (or Heylin), PETER (1600-1662), English historian and controversialist, was born at Burford in Oxfordshire. Having made great progress in his studies, he entered Hart Hall, Oxford, in 1613, afterwards joining Magdalen College; and in 1618 he began to lecture on cosmography, being made fellow of Magdalen in the same year. His lectures, under the title of Mt/cpo/cooyxos, were published in 1621, and many editions of this useful book, each somewhat enlarged, subsequently appeared. Having been ordained in 1624 Heylyn attracted the notice of William Laud, then bishop of Bath and Wells; and in 1628 he married Laetitia, daughter of Thomas Highgate, or Heygate, of Hayes, Middlesex; but he appears to have kept his marriage secret and did not resign his fellowship. After serving as chaplain to Danby in the Channel Islands, he became chaplain to Charles I. in 1630, and was appointed by the king to the rectory of Hemingford, Huntingdonshire. John Williams, bishop of Lincoln, however, refused to institute Heylyn to this living, owing to his

friendship with Laud; and in return Charles appointed him a prebendary of Westminster, where he made himself very objectionable to Williams, who held the deanery in commendam. In 1633 he became rector of Alrcsford, soon afterwards vicar of South Warnborough, and he became treasurer of Westminster Abbey in 1637; but before this date he was widely known as one of the most prominent and able controversialists among the high-church party. Enter- ing with great ardour into the religious controversies of the time he disputed with John Prideaux, regius professor of divinity at Oxford, replied to the arguments of Williams in his pamphlets, " A Coal from the Altar " and " Antidotum Lincolnense," and was hostile to the Puritan element both within and without the Church of England. He assisted William Noy to prepare the case against Prynne for the publication of his Histriomaslix, and made himself useful to the Royalist party in other ways. However, when the Long Parliament met he was allowed to retire to Alresford, where he remained until he was disturbed by Sir William Waller's army in 1642, when he joined the king at Oxford. At Oxford Heylyn edited Mercurius Aulicus, a vivacious but virulent news-sheet, which greatly annoyed the Parliamentarians; and consequently his house at Alresford was plundered and his library dispersed. Subsequently he led for some years a wandering life of poverty, afterwards settling at Winchester and then at Minster Lovel in Oxfordshire; and he refers to his hardships in his pamphlet " Extraneus Vapulans," the cleverest of his controversial writings, which was written in answer to Hamon l'Estrange. In 1653 he settled at Lacy's Court, Abingdon, where he resided undisturbed by the govern- ment of the Commonwealth, and where he wrote several books and pamphlets, both against those of his own communion, like Thomas Fuller, whose opinions were less unyielding than his own, and against the Presbyterians and others, like Richard Baxter.

His works, all of which are marred by political or theological rancour, number over fifty. Among the most important are : a legendary and learned History of St. George of Cappadocia, written in 1631; Cyprianus Anglicus, or the history of the Life and Death of William Laud, a defence of Laud and a valuable authority for his life; Ecclesia restaurata, or the History of the Reformation of the Church of England (1661; ed. J. C. Robertson, Cambridge, 1849); Ecclesia vindicate, or the Church of England

justified; Aerius redivivus, or History of the Presbyterians; and Help to English History, an edition of which, with additions by P. Wright, was published in 1773. In 1636 he wrote a History of the Sabbath, by order of Charles I. to answer the Puritans; and in consequence of a journey through France in 1625 he wrote A Survey of France, a work, frequently reprinted, which was termed by Southey " one of the liveliest books of travel in its lighter parts, and one of the wisest and most replete with information that was ever written by a young man." Some verses of merit also came from

his active pen, and his poetical memorial of William of Waynflete was published by the Caxton Society in 1851.

Heylyn was a diligent writer and investigator, a good ecclesi- astical lawyer, and had always learning at his command. His principles, to which he was honestly attached, were defended with ability; but his efforts to uphold the church passed un- recognized at the Restoration, probably owing to his physical infirmities. His sight had been very bad for several years; yet he rejoiced that his " bad old eyes " had seen the king's return, and upon this event he preached before a large audience in Westminster Abbey on the 29th of May 1661. He died on the 8th of May 1662 and was buried in Westminster Abbey, where he had been sub-dean for some years.

Lives of Heylyn were written by his son-in-law Dr John Barnard or Bernard, and by George Vernon (1682). Bernard's work was reprinted with Robertson's edition of Heylyn's History of the Reformation in 1849.

HEYN, PIETER PIETERZOON [commonly abbreviated to Piet] (1578-1629), Dutch admiral, was born at Delfshaven in 1578, the son of Pieter Hein, who was engaged in the herring fishery. The son went early to sea. In his youth he was taken prisoner by the Spaniards, and was forced to row in the galleys during four years. Having recovered his freedom by an ex- change of prisoners, he worked for several years as a merchant skipper with success. The then dangerous state of the seas at all times, and the continuous war with Spain, gave him ample opportunity to gain a reputation as a resolute fighting man. Wills which he made before 1623 show that he had been able to acquire considerable property. When the Dutch West India Company was formed he was Director on the Rotter- dam Board, and in 1624 he served as second in command of the fleet which took San Salvador in'Bahia de Todos os Santos in Brazil. Till 1628 he continued to serve the Company, both on the coast of Brazil, and in the West Indies. In the month of September of that year he made himself famous, gained immense advantage for the Company, and inflicted ruinous loss on the Spaniards, by the capture of the fleet which was bringing the bullion from the American mines home to Spain. The Spanish ships were outnumbered chiefly because the convoy had become scattered by bad management and bad seamanship. The more valuable part of it, consisting of the four galleons, and eleven trading ships in which the king's share of the treasure was being carried, became separated from the rest, and on being chased by the superior force of Heyn endeavoured to take refuge at Matanzas in the island of Cuba, hoping to be able to land the bullion in the bush before the Dutchman could come up with them. But Juan de Benavides, the Spanish commander, failed to act with decision, was overtaken, and his ships captured in the harbour before the silver could be discharged. The total loss was estimated by the Spaniards at four millions

of ducats. Piet Heyn ndw returned home, and bought himself a house at Delft with the intention of retiring from the sea. In the following year, however, he was chosen at a crisis to take command of the naval force of the Republic, with the rank of Lieutenant-Admiral of Holland, in order to clear the North Sea and Channel of the Dunkirkers, who acted for the king of Spain in his possessions in the Nether- lands. In June of 1629 he brought the Dunkirkers to action, and they were severely beaten, but Piet Heyn did not live to enjoy his victory. Pie was struck early in the battle by a cannon shot on the shoulder and fell dead on the spot. His memory has been preserved by his capture of the Treasure

ˆ

HEYNEˆHEYWOOD, J.

Galleons, which had never been taken so far, but he is also the traditional representative of the Dutch " sea dogs " of the 17th century.

See de Jonge, Geschiedenis van het Nederlandsche Zeewezen; I. Dura, Armada espanpla, iv. ; der Aa, Biograph. Woordenboek der Nederlanden. , (D. H.)

HEYNE, CHRISTIAN GOTTLOB (1729-1812), German classical scholar and archaeologist, was born on the 25th of September 1729, at Chemnitz in Saxony. His father was a poor weaver, and the expenses of his early education were paid by one of his godfathers. In 1748 he entered the university of Leipzig, where he was frequently in want of the necessaries of life. His distress had almost amounted to despair, when he procured the situation of tutor in the family of a French merchant in Leipzig, which enabled him to continue his studies. After he had completed his university course, he was for many years in very straitened circumstances. An elegy written by him in Latin on the 'death of a friend attracted the attention of Count von Bruhl, the prime minister, who expressed a desire to see the author. Accordingly, in April 1752, Heyne journeyed to Dresden, believing that his fortune was made. He was well received , promised a secretaryship and a good salary, but nothing came of it. Another period of want followed, and it was only by persistent solicitation that Heyne was able to obtain the post of under-clerk in the count's library, with a salary of some-what less than twenty pounds sterling. He increased his scanty pittance by translation; in addition to some French novels, he rendered into German ihe,(Zha&jteas and Callirrkoehl Chariton, the. Greek romance writer. He published his first edition of Tibullus in 17SS1 and in 1756 his Epictetus. In the latter year the Seven Years' War broke out, and Heyne was once more in a state of destitution. In 1757 he was offered a tutorship in the household of Frau von Schbnberg, where he met his future wife. In January

1759 he accompanied his pupil to the univer- sity of Wittenberg, from which he was driven in 1760 by the Prussian cannon. The bombardment of Dresden (to which city he had meanwhile returned) on the 18th of July 1760, destroyed all his possessions, including an almost finished edition of Lucian, based on a valuable codex of the Dresden Library. In the summer of 1761, although still without any fixed income, he married, and for some time he found it necessary to devote himself to the duties of land-steward to the Baron von Loben in Lusatia. At the end of 1762, however, he was enabled to return to; Dresden, where he was commissioned by P. D. Lippert to prepare the Latin text of the third volume of his Dactyliolheca (an account < of a, collection of gems); On the death of Johann Matthias Gesner at Gottingen in 1761, the vacant chair was refused first by Ernesti and then by Ruhn- ken, who persuaded Munchhausen, the Hanoverian minister and principal curator of the university;, to bestow it on Heyne (1763). His emoluments were gradually augmented, and his growing celebrity brought him most advantageous offers from other German governments, which he persistently refused. After a long and useful career, he died on the 14th of July 1812. Unlike Gottfried Hermann, Heyne regarded the study of grammar and language only as the means to an end, not as the chief object of philology. But, although not a critical scholar, he was the first to. attempt a scientific treatment of Greek mythology, and he gave an undoubted impulse to philo- logical studies. .

Of Heyne's numerous writings, the following may be mentioned. Editions, with copious commentaries, of Tibullus (ed. E. C- Wunder- lich, 18 1 7), Virgil (ed. G. P. Wagner, 1830-1841), Pindar (3rd ed. by G. H. Schafer, 1817), Apoilodorus, Bibliotheca Graeca (1803), Homer, Iliad (1802); Opuscula academica (1785ˆ1812), containing more than a hundred academical dissertations, of which the most valuable are those relating to the colonies of Greece and the anti- quities of Etruscan art and history. His Antiquarische Aufsdtze (1778-1779) is a valuable collection of essays connected with the history of ancient art. His contributions to the Gbttingische gelehrte Anzeigen ate said to have been between 7000 and 8000 in number. See biography by A. H. Heeren (1813) which forms the basis of the interesting essay by Carlyle (Misc. Essays, ii.) ; H. Sauppe, Gottinger Professoren (1872) ; C. Bursian in Allgemeine deutsche Biographie, xii. ; J. E» Sandys, Hist. Class. Schol. iii. 36-44.

HKYSE, PAUL JOHANN LUDWIG (1830-), German novelist, dramatist and poet, was born at Berlin on the 15th of March 1830, the son of the distinguished philologist Karl Wilhelm Ludwig Heyse (1797-1855). After attending the Friedrich Wilhelm Gymnasium in Berlin, he went, in 1849, to Bonn University as a student of the Romance languages, and in 1852 took his doctor's degree. He had already given proof of great literary ability in the production in 1850 of Der Jung- brunnen, M&rchen eines fahrenden

Schulers and of the tragedy Francesca von Rimini, when after a year's stay in Italy, he was summoned, early in 1854, by King Maximilian II. to Munich, where he subsequently lived. Here he turned his attention to novel-writing. He published at Munich in 1 8 5 5 four short stories in one volume, one of which, at least, L' Arrabbiata, was a master- piece 'Of its kind. These were the precursors of a series of similar volumes, necessarily unequal at times, but on the whole con- stituting such a mass of highly complex miniature fiction as seldom before had proceeded from the pen of a single writer. Heyse works in the spirit of a sculptor; he seizes upon some picturesque incident or situation, and chisels and polishes until all the effect which it is capable of producing has been extracted from it. The success of the story usually depends upon the theme, for the artist's skill is generally much the same, and the. situation usually leaves a deeper impression than the characters^ Heyse is also the author of several novels on a larger scafe, all of which have gained success and provoked abundant dis- cussion. The more important are Kinder der Welt (1873), Im Paradiese (1875)— -the one dealing with the religious and social problems of its time, the other with artist-life in Munich — Der Roman der Stiftsdame (1888), and Merlin (1892), a novel directed against the modern realistic movement of which Heyse had been the leading opponent in Germany. He has also been a prolific dramatist, but his plays are deficient in theatrical qualities and are rarely seen on the stage. Among the best of them are Die Sabinerinnen (1859); Hans Lange (1866),. Kolberg (1868), Die Weisheit Salomos (1886), and Maria von. Magdala (1903). There are masterly translations by him of Leopardi, Giusti, and other Italian poets {Ilalienische Dichter sett der Mitte des i8ten J ahrhundert) (4 vols., 1889-1890).

Heyse's Gesammelte Werke appeared in 29 vols. (1897-1899); there is also a popular edition of his Romane (8 vols., 1902-1904). and Novellen (10 vols., 1904-1906). See his autobiography, Jugenderinnerungen und Bekenntnisse (1901); also O. Kraus, PomI Heyses Novellen und Romane (1888); E. Petzet, Paul Heyse ats Dramatiker (1904), and the essays by T. Ziegler (in Studien mtd Studienkopfe, 1877), and G. Brandes (in Moderne Geister, 1887}.

HEYSHAM, a seaport in the Lancaster parliamentary division of Lancashire, England, on the south shore of Morecambe Bay, served by the Midland railway. Pop. (1901) 3381. Under powers obtained from parliament in 1896, the Midland Railway Company constructed, and opened in 1904, a harbour, enclosed by breakwaters, for the development of traffic with Belfast and other Irish ports, a daily passenger-service of the first class being established to Belfast. The barbour has a depth at low tide of 17 ft., and extensive accommodation for live-stock and goods of all kinds is provided. Heysham is in some favour as a watering-place. The church of St Peter is mainly Norman,

i and has fragments of even earlier date. Ruins of a very ancient oratory stand near it. This was dedicated to St Patrick, and is traditionally said to have been erected as a place of prayer

I for those at sea.

HEYWOOD, JOHN (b. 1497), English dramatist and epigram- matist, is generally said to have been a native of North Mimms,, near St Albans, Hertfordshire, though Bale says he was bom in London. A letter from a John Heywood, who may fairly be identified with him, is dated from Malines in 1575, when he called himself an old man of seventy-eight, which would fix his birth in 1497. He was a chorister of the Chapel Royal, and is said to have been educated at Broadgates Hall (Pembroke College), Oxford. From 15 21 onwards his name appears in the king's accounts as the recipient of an annuity of ten marks as player of the virginals, and in 1538 he received forty shillings for

" playing an interlude with his children " before the Princess Mary. He is said to have owed his introduction to her to Sir Thomas More, at whose seat at Gobions near St Albans he wrote his Epigrams, according to Henry Peacham. More took a keen interest in the drama, and is represented by tradition as stepping on to the stage and taking, an impromptu part in the dialogue. William Rastell, the printer of four of Heywood's plays, was the son of More's brother-in-law, John Rastell, who organized dramatic representations, and possibly wrote plays himself. Mr A. W. Pollard sees in Heywood's firm adherence to Catholicism and his free satire of legal and social abuses a. reflection of the. ideas of More and his friends, which counts for much in his dramatic development. His skill in music and his inexhaustible wit made him a favourite both with Henry VIII. and Mary. Under Edward VI. he was accused of denying the king's supremacy over the church, and had to make a public recantation in 1554; but with the accession of Mary his prospects brightened. He made a Latin speech to her in St Paul's Churchyard at her coronation, and wrote a poem to celebrate her marriage. Shortly before her death she granted him the lease of a manor and lands in Yorkshire. When Elizabeth succeeded to the throne he fled to Malines, and is said to have returned in 1577. In .1587 he is spoken of as " dead and gone " in Thomas Newton's epilogue to his works.

John Heywood is important in the history of English drama as the first writer to turn the abstract characters of the morality plays into real persons. His interludes link the morality plays to the modern drama, and

were very popular in their day. They represent ludicrous incidents of a homely kind in a style of the broadest farce, and approximate to the French dramatic render- ings of the subjects of the fabliaux. The fun in them still survives in spite of the long arguments between the characters and what one of their editors calls his "humour of filth." Hey- wood's name was actually attached to four interludes. The Playe called the foure PP; a newe and a very mery interlude of a palmer, a pardoner, a potycary, a pedler (not dated) is a contest in lying, easily won by Palmer, who said he had never known a woman out of patience. The Play of the Wether, a new and a very mery interlude of all matter of Wethers (printed 1 533) describes the chaotic results of Jupiter's attempts to suit the weather to the desires of a number of different people. The Play of Love (printed 1533) is an extreme instance of the author's love of wire-drawn argument. It is a double dispute between " Loving not Loved " and " Loved not Loving " as to which is the more wretched, and between " Both Loved and Loving " and " Neither Loving nor Loved " to decide which is the happier. The only action in this piece is indicated by the stage direction marking the entrance of " Neither loved nor loving," who is to run about the audience with a huge copper tank on his head full of lighted squibs, and is to cry " Water, water! Fire, fire! " The Dialogue of Wit and Folly is more of an academic dispute than a play. But two pieces universally assigned to Heywood, although they were printed by Rastell without any author's name, combine action with dialogue, and are much more dramatic. In The Mery Play between the Pardoner and the Frere, the Curate and Neybour Pratte (printed 1533, but probably written much earlier) the Pardoner and the Friar both try to preach at the same time, and, coming at last to blows, are separated by the other two personages of the piece. The Mery Play betwene Johan Johan the Husbande, Tyb the Wyfe, and Syr Jhan the Preest Sprinted 1533) is the best constructed of all his pieces. Tyb and Syr Jhan eat the " Pye " which is the central " property " of the piece, while Johan Johan is made to chafe wax at the fire to stop a hole in a pail. This incident occurs in a French Farce nouvelle tres bonne et fort joyeuse de Pernet qui va au vin. Hey- wood has sometimes been credited with the authorship of the dialogue of Gcnlylnes and Nobylyte printed by Rastell without date, and Mr Pollard adduces some ground for attributing to him the anonymous New Enterlude called Thersytes (played 1538). Heywood's other works are a collection of proverbs and epigrams, the earliest extant edition of which is dated 1562; some ballads, one of them being the " Willow Garland," known to Desdemona;

and a long verse allegory of over 7000 lines entitled The Spider and the Flie (1556). A contemporary writer in Holinshed's Chronicle said that neither its author nor any one else could " reach unto the meaning thereof." But the flies are generally taken to represent the Roman Catholics

And the spiders the Protestants, while Queen Mary is represented by the housemaid who with her broom (the sword) executes the commands of her master (Christ) and her mistress (the church). Dr A. W. Ward speaks of its " general lucidity and relative variety of treatment." Heywood says that he laid it aside for twenty years before he finished it, and, whatever may be the final interpretation put upon it, it contains a very energetic statement of the social evils of the time, and especially of the deficiencies of English law.

The proverbs and epigrams were reprinted by the Spenser Society in 1867, the Dialogue on Wit and Folly by the Percy Society from an MS. in the British Museum in 1846, with an account of Heywood by F. W. Fairholt, and there are modern reprints of Johan Johan (Chiswick Press. 1819), The Foure PP. (Dpdsley's Old Plays, 1825, 1874), and The Pardoner and the, Frere (Dodsley's Old Plays, 1874). The Spider and the Flie was edited by A. W. Ward for the Spenser Society in 1894. For notes and strictures on that edition see J. Haber in Litterdrhistorische Forschungen, vol. xv. (1900). See also A. W. Pollard's introduction to the reprint of the Play of the Wether and Johan Johan in Representative English Comedies (1903), and The Dramatic Writings of John Heywood, edited by John S. Farmer for the Early English Drama Society (1905).

His' son, Jasper Heywood (1533-1598), who translated into English three plays of Seneca, the Troas (1559), the Thyestes (1560) and Hercules Furens (1561), was a fellow of Merton College, Oxford, but was compelled to resign from that society in 1558. In the same year he was elected a fellow of All Souls College, but, refusing to conform to the changes in religion at the beginning of the reign of Elizabeth, he gave up his fellowship and went to Rome, where he was received into the Society of Jesus. For seventeen years he was professor of moral theology and controversy in the Jesuit College at Dillingen, Bavaria. In 1 58 1 he was sent to England as superior of the Jesuit mission, but his leniency in that position led to his recall. He was on his way back to the Continent when a violent storm drove hirfl back to the English coast. He was arrested on the charge of being a priest, but, although extraordinary efforts were made to induce him to abjure his opinions, he remained firm. He was condemned to perpetual exile on pain of death, and died at Naples on the 9th of January 1598. His translations ' of Seneca were supplemented by other plays contributed by Alexander Neville, Thomas Nuce, John Studley and Thomas Newton. Newton collected these translations in one volume, Seneca, his tenne tragedies translated into Englysh (1581). The importance of this work in the development of English drama can hardly be over-estimated.

See Dr J. W. Cunliffe, On the Influence of Seneca upon Elizabethan Tragedy (1893).

■ *HEYWOOD, THOMAS (d. c. 1650), English dramatist and miscellaneous author, was a native of Lincolnshire, born about 1575, and said to have been educated at Cambridge and to have become a fellow of Peterhouse. Heywood is mentioned by Philip Henslowe as having written a book or play for the Lord Admiral's company of actors in October 1596; and ip 1598 he was regularly engaged as a player in the company, in which he presumably had a share, as no wages are mentioned. He was also a member of other companies, of Lord Southampton's, of the earl of Derby's and of the earl of Worcester's players', afterwards known as the Queen's Servants. In his preface to the English Traveller (1633) he describes himself as having had " an entire hand or at least a main finger in two hundred and twenty plays." Of this number, probably considerably in- creased before the close of his dramatic career, only twenty-three survive. He wrote for the stage, not for the press, and protested against the printing of his works, which he said he had no time to revise. He was, said Tieck, the " model of a light and rapid talent," and his plays, as might be expected from his rate of production, bear little trace of artistic elaboration. Charles*

Lamb called him a " prose Shakespeare "; Professor Ward, one of Heywood's most sympathetic editors, points out that this epigrammatic statement can only be accepted with reservations. Heywood had a keen eye for dramatic situations, and great constructive skill, but his powers of characterization were not on a par with his stagecraft. He delighted in what he called " merry accidents," that is, in coarse, broad farce; his fancy and invention were inexhaustible. It was in the domestic drama of sentiment that he won his most distinctive success. For this he was especially fitted by his genuine tenderness and his freedom from affectation, by the sweetness and gentleness for which Lamb praised him. His masterpiece, A Woman kilde with kindnesse (acted 1603; printed 1607), is a type of the comidie larmoyanle, and The English Traveller (1633) is a domestic tragedy scarcely inferior to it in pathos and in the elevation of its moral tone. His first play was probably The Foure Prentises of London: With the Conquest of Jerusalem (printed 161 5, but acted some fifteen years earlier). This may have been intended as a burlesque of the old romances, but it is more likely that it was meant seriously to attract the apprentice public to whom it was dedicated, and its popularity was no doubt aimed at in Beaumont and Fletcher's travesty of the City taste in drama in their Knight of the Burning Pestle. The two parts of King Edward the Fourth (printed 1600), and of // you know not me, you know no bodie; Or, The Troubles of Queene Elizabeth (1605 and 1606) are

chronicle histories. His other comedies include: The Royall King, and the Loyall subject (acted c. 1600; printed 1637); the two parts of The Fair Maid of the West; Or, A Girle worth Gold (two parts, printed 1631); The Fayre Maid of the Exchange (printed anonymously 1607); The Late Lancashire Witches (1634), written with Richard Brome, and prompted by an actual trial in the preceding year; A Pleasant Comedy, called A Mayden- Head well lost (1634;; A Challenge for Beautie (1636); The Wise-Woman of Hogsdon (printed 1638), the witchcraft in this case being matter for comedy, not seriously treated as in the Lancashire play; and Fortune by Land and Sea (printed 1655), with William Rowley. The five plays called respectively The Golden, The Silver, The Brazen and The Iron Age (the last in two parts), dated 1611, 1613, 1613, 1632, are series of classical stories strung together with no particular connexion except that " old Homer " introduces the performers of each act in turn. Loves Maistresse; Or, The Queens Masque (printed 1636) is on the story of Cupid and Psyche as told by Apuleius; and the tragedy of the Rape of Lucrece (1608) is varied by a " merry lord," Valerius, who lightens the gloom of the situation by singing comic songs. A series of pageants, most of them devised for the City of London, or its guilds, by Heywood, were printed in 1637. In vol. iv. of hisCollection of Old English Plays (1885), Mr A. H. Bullen printed for the first time a comedy by Heywood, The Captives, or The Lost Recovered (licensed 1624), and in vol. ii. of the same series, Dicke of Devonshire, which he tentatively assigns to the same hand.

Besides his dramatic works, twelve of which were reprinted by the " Shakespeare Society," and were published by Mr John Pearson in a complete edition of six vols, with notes and illustra- tions in 1874, he was the author of Troia Britannica, or Great Britain's Troy (1609), a poem in seventeen cantos "intermixed with many pleasant poetical tales " and " concluding with an universal chronicle from the creation until the present time"; An Apology for Actors, containing three brief treatises (161 2) edited for the Shakespeare Society in 1841; Tvpauttov or nine books of various history concerning women (1624); England's Elizabeth, her Life and Troubles during her minority from the Cradle to the Crown (1631); The Hierarchy of the Blessed Angels (1635), a didactic poem in nine books; Pleasant Dialogue, and Dramas selected out of Lucian, &c. (1637; ed. W. Bang, Louvain, 1903); and The Life of Merlin surnamed Ambrosius

(1641).

See A. W. Ward, History of English Dram. Lit. ii. ' 550 seq. (1899); the same author's Introduction to A woman killed with kindness ("Temple Dramatists," 1897); J. A. Symonds in the Introduction to Thomas Heywood in the " Mermaid " series (new issue, 1903).

HEYWOOD, a municipal borough in the Heywood parlia- mentary division of Lancashire, England, 9 m. N. of Manchester on the Lancashire and Yorkshire railway. Pop. (1901) 25,458. It is of modern growth and possesses several handsome churches, chapels and public buildings. The Queen's Park, purchased and laid out at a cost of £1 1,000 with money which devolved to Queen Victoria in right of her duchy and county palatine of Lancaster, was opened in 1879. Heywood Hall in the neighbour- hood of the town was the residence of Peter Heywood, who contributed to the discovery of the Gunpowder Plot. Heywood owes its rise to the enterprise of the Peels, its first manufactures having been introduced by the father of the first Sir Robert Peel. It is an important seat of the cotton manufacture, and there are power-loom factories, iron foundries, chemical works, boiler-works and railway wagon works. Coal is worked exten- sively in the neighbourhood. Heywood was incorporated in 1 881, and the corporation consists of a mayor, 6 aldermen and 18 councillors. Area, 3660 acres.

HEZEKIAH (Heb. for " [my] strength is [of] Yah "), in the Bible son of Ahaz, one of the greatest of the kings of Judah. He flourished at the end of the 8th and beginning of the 7 th century B.C., when Palestine passed through one of the most eventful periods of its history. There is much that is uncertain in his reign, and with the exception of the great crisis of 701 B.C. its chronology has not been unanimously fixed. Whether he came to the throne before or after the fall of Samaria (722- 721 B.C.) is disputed, 1 nor is it clear what share Judah took in the Assyrian conflicts down to 701. 2 Shortly before this date the whole of western Asia was in a ferment; Sargoti had died and Sennacherib had come to the throne (in 705) ; vassal kings plotted to recover their independence and Assyrian puppets were removed by their opponents. Judah was in touch with a general rising in S.W. Palestine, in which Ekron, Lachish, Ascalon (Ashkelon) and other towns of the Philistines were supported by the kings of Musri and Meluhha. 3 Sennacherib completely routed them at Eltekeh (a Danite city), and thence turned against Hezekiah, who had been in league with Ekron and had imprisoned its king Padi, an Assyrian vassal. In this invasion of Judah the Assyrian claims entire success; 46 towns of Judah were captured, 200,150 men and many herds of cattle were carried off among the spoil, and Jerusalem itself was closely invested. Hezekiah was imprisoned " like a bird in a cage " 4 — to quote Sennacherib, and the Urbi (Arabian?) troops in Jerusalem laid down their arms. Thirty talents of gold, eight hundred of silver, precious stones, couches and seats of ivory — " all kinds of valuable treasure ", — the ladies of the court, male and female attendants (perhaps " singers ") were carried away to Nineveh. Here the Assyrian record ends somewhat abruptly, for, in the meanwhile, Babylonia had again revolted (700 B.C.) and Sennacherib's presence was urgently needed nearer home.
■ *At what precise period the Babylonian Merodach (i.e. Marduk)-*

Baladan sent his embassy to Hezekiah is disputed. Although ostensibly to congratulate the king upon his recovery from a sickness, it was really sent in the hope of enlisting his support, and the excessive courtesy and complaisance with which it was received suggest that it found a ready ally in Judah (2 Kings xx. 12 sqq.; Isa. xxxix.). Merodach-Baladan was overthrown by Sargon in 710 B.C., but succeeded in making a fresh revolt some years later (704-703 B.C.), and opinion is much divided whether his embassy was to secure the friendship of the

1 See W. R. Smith, Prophets of Israel, 2 415 sqq. ; O. C. White- house, Isaiah, pp. 20 sqq., 372; J. Skinner, Kings, p. 43 seq.; T. K. Cheyne, Ency. Bib. col. 2058, n. 1, and references.

2 The chief dates are: 720, defeat of a coalition (Hamath, Gaza and Musri) at Karijar in north Syria and Raphia (S. Palestine) ; 715, a rising of Musri and Arabian tribes; 713-711. revolt and capture of Ashdod (cp. Is. xx.). That Judah was invaded on this latter occasion is not improbable.

3 Meluhha is held by many critics to be N.W. Arabia ; the identi- fication of Musri is uncertain, see below.

4 The phrase was a favourite one of Rib-Addi, king of Gebal (Byblus), in the 15th century B.C.; I 'ell-el- Amarna Letters (ed. Knudtzon), Nos. 74, 79, &c. Jeremiah (v. 27) uses the simile in a different way. For a discussion of Sennacherib's record, see Wilke, Jcsaja u. Assur (Leipzig, 1905), pp. 97 sqq.

youthful Hezekiah at his succession or is to be associated with the later widespread attempt to remove the Assyrian yoke. 1

The brief account of the Assyrian invasion, Hezekiah's sub- mission, and the payment of tribute in 2 Kings xviii. 14-16, supplements the Assyrian record by the statement that Sen- nacherib besieged Lachish, a fact which is confirmed by a bas- relief (now in the British Museum) depicting the king in the act of besieging that town. 2 This thoroughly historical fragment is followed by two narratives which tell how the king sent an official from Lachish to demand the submission of Hezekiah and conclude with the unexpected deliverance of Jerusalem. Both these stories appear to belong to a biography of Isaiah, and, like the similar biographies of Elijah and Elisha, are open to the suspicion that historical facts have been subordinated to idealize the work of the prophet. See Kings, Books of.

The narratives are (a) 2 Kings xviii. 13, 17-xix. 8; cf. Isa. xxxvi. i-xxxvii. 8, and (6) xix. 96-35; cp. Isa. xxxvii. 9-36 (2 Chron. xxxii. 9 sqq. is based on both), and Jerusalem's deliverance is attributed to a certain rumour (xix. 7), to the advance of Tirhakah, king of Ethiopia (v. 9), and to a remarkable pestilence {v. 35) which finds an echo in a famous story related, not without some confusion of essential facts, by Herodotus (ii. 141; cf. Josephus Antiq. x. i. 5).' It is difficult to decide whether xix. 9a belongs to the first or second of these narratives; and whether the " rumour " refers to the approach of Tirhakah, or rather to the serious troubles which had arisen in Babylonia. It is equally difficult to determine whether Tirhakah actually appeared on the scene in 701, and the precise application of the term Musri (Mizraim) is much debated. Unless the two narra- tives are duplicates of the same event, it may be urged that Sennacherib's attack upon Arabia (apparently about 689) involved an invasion of Judah, by which time Egypt was in a position to be of material assistance (cf. Isa. xxx. 1-5, xxxi. 1-3?). This theory of a second campaign (first suggested by Sir Henry Rawlinson) has been contested, although it is pointed out that Sennacherib at all events did not invade Egypt, and that 2 Kings xix. 24 (Isa. xxxvii. 25) can only refer to his successor. The allusion to the murder of Sennacherib (xix. 36 sq.) 4 points to the year 681, but it is uncertain to which of the above narratives it belongs. On the whole, the question must be left open, and with it both the problem of the extension of the name Musri and Mizraim outside Egypt in the Assyrian and Hebrew records of this period and the true historical background of a number of thelsaianic prophecies. It isquite possible that later events which belong to the time of the Egyptian supremacy and the wars of Esarhaddon have been confused with the history of Sennacherib's invasion.

It is not certain whether Hezekiah's conflict with the Philis- tines as far as Gaza or his preparations to secure for Jerusalem a good water supply (xviii. 8, xx. 20; 2 Chron. xxxii. 30; Ecclus. xlviii. 17 sq.) 5 should precede or follow the events which have been discussed. On the other hand, the reforms which the compiler of the book has attributed to the early part of the reign were doubtless much later (2 Kings xviii. 1-8). Not the fall of Samaria, but the crisis of 701, is the earliest date that could safely be chosen, and the extent of these reforms must not be overestimated. They are related in terms that imply an acquaintance with the great " Deuteronomic " movement (see Deuteronomy), and are magnified further with character- istic detail by the chronicler (2 Chron. xxix.-xxxi.). The most remarkable was the destruction of a brazen serpent, the cult of which was traditionally traced back to the time of Moses (Num. xxi. g). 6 This persistence of serpent-cult, and the

1 For the early date (between 720 and 710), Winckler, Alttest. Vnt. '39 sqq., Burney, Kings, 350 sq. ; Driver; Kuchler, &c. ; for the later,

Whitehouse, Isaiah, 29 sq., in agreement with Schrader, Well- hausen, VV. R. Smith, Cheyne, M'Curdy, Paton, &c.

2 Isa. x. 28-32 may perhaps refer to this invasion. Allusions to the Assyrian oppression are found in Isa. x. 5-15, xiv. 24-27, xvii. 12-14; and to internal Judaean intrigues perhaps in Isa. xxii. 15-18, xxix. 15. For a picture of the ruins in Jerusalem, see Isa. xxii. 9-11. But see further Isaiah (Book).

3 See, on the story, Griffith, in D. Hogarth's Authority and Archaeology, p. 167, n. 1.

- *The house of Nisroch should probably be that of the god Nusku ; see also Driver in Hogarth, op. cit. p. 109; Winckler, op. cit. p. 84.*

6 It is commonly believed that Hezekiah constructed the conduit of Siloam, famous for its Hebrew inscription (see Inscriptions, Jerusalem). But Isa. viii. 6, would seem to show that the pooi was already in existence, and, for palaeographical details, see Pal. Explor. Fund, Quart. Stat. (1909), pp. 289, 305 sqq.

6 The name Nehushtan (2 Kings xviii. 4, cp. nfihash, " serpent ") is obscure : see the commentaries.

idolatry (necromancy, tree-worship) which the contemporary prophets denounce, do not support the view that the apparently radical reforms of Hezekiah were extensive or permanent, and Jer. xxvi. 17-19 (which suggests that Micah had a greater influence than Isaiah) throws another light upon the conditions during his reign. Hezekiah was succeeded by his son Manasseh (q.v.).

See further W. R. Smith, Prophets, 359-364, and Hebrew Re- ligion. According to Prov. xxv. I, Hezekiah was a patron of literature (see Proverbs). The hymn which is ascribed to the king (Isa. xxxviii. 9-20, wanting in 2 Kings) is of post-exilic origin (see Cheyne, Inirod. to Isaiah, 222 sq.), but is further proof of the manner in which the Judaean king was idealized in subsequent ages, partly, perhaps, in the belief that the deliverance of Jerusalem was the reward for his piety. For special discussions, see Stade, Zeits. d. alttest. Wissenschafl, 1886, pp. 173 sqq.; Winckler, Alttest. Unter- such., 26 sqq. ; Schrader, Cuneiform Inscr. and Old Test, (on 2 Kings, I.e.); Driver, Isaiah, his Life and Times, pp. 43-83; A. Jeremias, Alte Test. 304-310; Nagel, Zug d. Sanherib gegen Jerus. (Leipzig, 1903, conservative) ; and especially Prasek, Sanherib's " Feldziige gegen Juda " (Mitteil. d. vorderasiat. Gesell., 1903, pp. 1 13-158), K. Fullerton, Bibliotheca sacra, 1906, pp. 577-634, A. Alt, Israel u. Agypten

(Leipzig, 1909) ; also the bibliography to Isaiah. – (S. A. C.)

HIATUS (Lat. for gaping, or gap), a break in continuity, whether in speech, thought or events, a lacuna. In anatomy the term is used for an opening or foramen, as the hiatus Fallopii, a foramen of the temporal bone. In logic a hiatus occurs when a step or link in reasoning is wanting; and in grammar it is the pause made for the sake of euphony in pronouncing two successive vowels, which are not separated by a consonant.

HIAWATHA (" he makes rivers "), a legendary chief (c. 1450) of the Onondaga tribe of North American Indians. The forma- tion of the League of Six Nations, known as the Iroquois, is attributed to him by Indian tradition. In his miraculous character Hiawatha is the incarnation of human progress and civilization. He teaches agriculture, navigation, medicine and the arts, conquering by his magic all the powers of nature which war against man.

See J. N. B. Hewitt, in Amer. Anthrop. for April 1892.

HIBBING, a village of St Louis county, Minnesota, U.S.A., 75 m. N.W. of Duluth. Pop. (1900) 2481; (1905 state census) 6566; of whom 3537 were foreign-born (1169 Finns, 516 Swedes, 498 Canadians, 323 Austrians arid 314 Norwegians); (1910) 8832. Hibbing is served by the Great Northern and the Duluth, ' Missabe & Northern railways. It lies in the midst of the great Mesabi iron-ore deposits of the state; in 1907 forty iron mines were in operation within 10 m. of the village. Lumbering and farming are also important industries. The village owns and operates the water-works and electric-lighting plant. Hibbing was settled in 1892 and was incorporated in 1893.

HIBERNACULUM (Lat. for winter quarters), in botany a term for a winter bud; in botanic gardens, the winter quarters for plants; in zoology, the winter bud of a polyzoan.

HIBERNATION (winter sleep), the dormant condition in which certain animals pass the winter in cold latitudes. Aestiva- tion (summer sleep) is the similar condition in which other species pass periods of heat or drought in warm latitudes. The origins of these kindred phenomena are probably to be sought in the regularly recurrent failure of food supply or of other factors essential to existence due to the seasonal onset of cold in the one case and of excessively dry hot weather in the other. They are means whereby certain non-migratory species are enabled to live through unfavourable climatic conditions which, would end fatally in starvation or desiccation were the animals to maintain their normal state of activity.

I. The Physiology of Hibernation. Hibernation and Aestiva- tion. — The physiology of hibernation, as exemplified in mam- malia, has been worked out in detail by several observers in the case of some European species, notably bats, hedgehogs, dormice and marmots. Of the physiology of aestivation nothing definite appears to have been ascertained. It seems probable, however, from observations upon the dormant animals that the physiological accompaniments of winter and summer sleep are I to all intents and purposes the same. The state of hibernation.

for example, in the European hedgehog {Erinaceus europaeus) is not distinguished by external signs from the state of aestiva : tion of the allied Mascarene genus, the tenrec {Centetes ecaudatus). The lethargy in both cases appears to be directly due to fall in the temperature of the organisms; and the fall in temperature proceeds pari passu with the slowing down and weakening of the respiration and with retardation in the cir- culation of the blood; Similarity, moreover, between hiberna- tion and aestivation is shown not only in their physiological accompaniments but also in the species of animals which become seasonally dormant. Birds neither hibernate nor aestivate; The tenrec {Centetes) of Madagascar, which aestivates, closely resembles the hedgehog {Erinaceus) in habits and belongs to the same order of mammalia. In the case of reptiles and batrachians, snakes, lizards, tortoises, frogs and toads sleep the winter through in cold countries; and some species of these groups habitually bury themselves in the sand or mud in tropical latitudes where drought is of periodical occurrence. Terrestrial molluscs lie dormant in the winter in cold and temperate latitudes and their tropical allies aestivate in districts where conditions enforce the habit. Some fresh-water molluscs bury themselves in the mud at the bottom of ponds when the surface is covered with ice; others take refuge in the same way when pools and tanks become exhausted during the dry season in the tropics. In temperate and north temperate countries insects and arachnida either die or retire to winter quarters during the cold weather, and in the tropics they similarly dis- appear during times of drought.

Predisposing Causes of Hibernation. — The likeness between hibernation and aestivation and the coincidence of the one with cold and of the other with heat arrest the conclusion that the temperature of the surrounding medium, whether atmo- spheric or aquatic, is the prime, much less the sole, cause of either. The effect of extreme cold is to rouse the hibernating animal from its slumber; and its continuance thereafter brings about a state of torpor which proves fatal. This at least appears to be the case with mammals, where actual freezing of the tissues is followed by death because

the gases are expelled from the fluids as bubbles and the salts separate in the form of crystals. Some cold-blooded animals, however, may be cooled to o° G. Fish have been resuscitated after solidification in blocks of ice, and frogs have been known to recover when ice has been formed in the blood and in the lymph of the peritoneal cavity (Landois). For the reasons given, all hibernating mammals take pie- cautions against exposure to extreme cold. They either bury themselves in the soil or under the snow or seek the shelter of hollow trees or of caves, not infrequently congregating in the same spot so that the temperature is kept up by corporeal contact. Again the hibernating instinct may be suspended unless the conditions are favourable for safely entering upon winter sleep. It is alleged that bears in Scandinavia do not hibernate unless food has been sufficiently plentiful during the summer and autumn to fatten them for their winter fast; and hedgehogs and dormice in captivity have been known to remain active in the cold until warm sleeping-quarters were insured by placing hay and cotton- wool in their cages. Finally the wood-chucks {Arctomys monax) in the Adirondacks retire to winter quarters at about the time of the autumnal equinox, when the weather is warm and pleasant, and emerge at the vernal equinox before the snows of winter have vanished from the ground. These and other facts justify Marshall Hall's conclusion that cold is merely a predisposing cause of hibernation in the sense that it is a predisposing cause of ordinary sleep. It has also been shown that the state of hibernation cannot be forced upon snails in summer by submitting them to artificial cold even almost to freezing point; but that at the proper season they prepare for winter quarters at temperatures varying from 3 7 to 7 7 Fahr. Again insects sometimes retire to winter quarters in the autumn when the temperature of the atmosphere is higher than that of preceding days during which they retain their activity. Thus the oncoming and ceasing both of winter and summer sleep depend to a considerable extent upon conditions of existence

other than those of temperature. Darwin saw scarcely a sign of a living thing on his arrival at Bahia Blanca, Argentina, on the 7th of Sept., although by digging several insects, large spiders and lizards were found in a half-torpid state. During the days of his visit when nature was dormant the mean tempera- ture was 51 , the thermometer seldom rising above 55° at mid-day. But during the succeeding days when the mean temperature was 58 and that of the middle of the day between 60° and 70 both insect and reptilian life was in a state of activity. Nevertheless at Montevideo, lying only four degrees further north, between the 26th of July and the 19th of August when the mean temperature was 58-4° and the mean highest temperature of mid-day 65-5° almost every beetle, several genera of spiders, land molluscs, toads and lizards were all lying dormant beneath stones. Thus the animal-life at Montevideo remained dormant at a

temperature which roused that at Bahia Blanca from its torpidity. Darwin unfortunately does not record whether the species observed were identical in the two localities.

The temperature of animals in a profound state of hibernation is approximately the same as that of the surrounding medium or at most a degree or two higher. If, however, the temperature of the chosen hibernaculum (winter quarters) falls as low as freezing point, life is endangered at least in the case of mammals. In most cold-blooded animals, like reptiles, the temperature is normally only a little above that of the atmosphere, the two rising and falling together. But, setting aside the young, especially of those species in which the offspring are born or hatched at a comparatively early stage of development, the majority of warm-blooded animals are able to maintain a high and approximately level temperature irrespective of decline in the temperature of the surrounding medium. This faculty of temperature adjustment, however, appears to be absent or weakened in most if not in all hibernating mammals both in their normal nocturnal or diurnal sleep and in their winter sleep. In the case of European bats it has been shown that the ordinary day sleep in summer differs only in the matter of duration from the prolonged slumber of the same animals in winter. The temperature falls w°th that of the atmosphere, respiration practically ceases and immersion in water for as many as eleven minutes has been known to prove innocuous. At moderate temperatures ranging from 45° to 50° F., dormice {Muscardinus avellanarius) and hedgehogs {Erinaceus europaeus) alternately wake to feed and sink into slumber. Dormice awake once in every twenty-four hours; the sleep of the hedgehogs may last for two or three days. The temperature of the hedgehog, when awake and active, rises to about 87° F., that of the dormouse to 92° or 94 F.; but during sleep the temperature of both species falls to about that of the atmosphere. In other words, all the phenomena characteristic of hibernation are exhibited in these animals during the periods of sleep interrupting their periods of wakeful activity. Sleep of this nature, for which the term " diurnation " has been proposed, because it has only been observed in nocturnal animals, lies phenomenally midway between the normal sleep of non-hibernating mammals and the dormant condition in winter of hibernating species. The stimulus of hunger appears to be the prime cause of its periodic cessation. Since then the faculty of temperature adjustment is in abeyance during the ordinary diurnal summer sleep in hibernating mammals, which in this physiological particular resemble reptiles, it seems probable that hibernation can only be practised by those species in which the power to maintain, when sleeping, a permanent average high temperature has been lost or perhaps never acquired. That there is no broad line of demarcation between the ordinary sleep of these hibernating mammals in which the temperature is known to

drop considerably and that of non-hibernating species is indicated by the fact that the temperature of human beings and possibly of all non-hibernating species falls to a certain, though to a limited, extent in ordinary sleep.

The relation between the internal body-temperature and the respiratory movements has been worked out in hibernating dormice, hedgehogs, marmots and bats. When the temperature

is below 12° C., the torpid animal exhibits long periods of apnoea of several minutes' duration and interrupted by a few respirations. With the temperature rising above 13° C, the periods of apnoea in the still inactive animal become shorter, the respiration suddenly commencing and ceasing (Biot's type), or gradually waxing and waning (Cheyne-Stokes' type). When the tempera- ture is at about 16 C, the periods of apnoea in the gradually awaking animal are very short and infrequent. When the temperature is about 20 and rising apace, respiration becomes continuous and rapid and the animal is awake. These stages have been especially recorded in the case of dormice. In the last stage the respiration of hedgehogs and marmots is somewhat different, there being a series of rapid respirations, often followed by a single deep sighing respiration.

Respiration appears to be totally suspended in animals in a complete state of hibernation, if left undisturbed. It may however, be readily re-excited by the slightest stimulus; and to this fact may perhaps be attributed the belief that breathing does not actually cease. If a hibernating hedgehog; be lightly touched it draws a deep breath, and breathing is maintained for a longer or shorter time before again ceasing; but if at the same time the temperature of the atmosphere be raised, respiration becomes continuous and lethargy is succeeded by activity (Marshall Hall) . The opinion that respiration is totally suspended is supported by a number of facts. Hibernating marmots and bats, for example, have been known to live four hours in carbon dioxide, a gas which proves almost instantly fatal to mammals in a state of normal activity (Spallanzani). A hedgehog which may be drowned in about three minutes when awake and active, has been removed from water uninjured when in deep winter sleep after twenty-two and a half minutes' submergence. A hibernating noctule bat, when similarly treated, survived sixteen minutes' immersion. Further proof of the suspension of respiration has been furnished by experiments upon a bat which while in a deep and undisturbed state of lethargy was kept in a pneumatometer for ten hours without appreciably affecting the percentage of oxygen in the air. The same

animal, when active, removed over 5 cub. in. of oxygen in the space of one hour from the instrument.

As in the case of respiration, alimentation and excretion are suspended during hibernation.

The circulation oftiie blood, on the other hand, continues without interruption, though its rapidity is greatly retarded. This fact may be observed by microscopic examinationof the wings of bats in a state of winter sleep. Moreover, in the case of a hedgehog lethargic from hibernation, it was experimentally shown that when the spinal cord was severed behind the occipital foramen, the brain removed and the entire spinal cord gently destroyed, the heart continued to beat strongly and regularly for several hours, the contraction of the auricles and ventricles being quite perceptible, though feeble, even after the lapse of ten hours. After eleven hours the organ was motionless; but resumed its activity when stimulated by a knife-point. Even after twelve hours both auricles responded to the same stimulus, though the ventricles remained motionless. Shortly afterwards the auricles gave no response. On the other hand, when the spinal cord of a hedgehog in a normal state of activity was severed at the occiput, the left ventricle ceased to beat almost at once, and the left auricle in less than fifteen minutes; the right auricle was the next to cease, whereas the right ventricle continued its contraction for about two hours. Experiments upon marmots have yielded very similar results. The heart of a marmot decapitated in a state of lethargy continued to beat for over three hours. The pulsations, at first strong and frequent and varying from 16 to 18 per minute, became gradually weaker and less frequent, until at the end of the third hour only 3 were recorded in the same length of time. Excised pieces of voluntary muscular tissue contracted vigorously three hours after death under electric stimulus. Only at the end of four hours did they cease to respond. The heart of an active marmot killed in the same way contracted about 28 times a minute at first, the number of pulsations falling to about 12 at the end of fifteen

minutes, to 8 at the end of thirty minutes, and ceasing altogether at the end of fifty minutes. Similarly the response of the muscles to galvanic shock failed at a correspondingly rapid rate. It is evident, therefore, that during hibernation the irritability of the heart is augmented in a marked degree, and that the irritability of the left side of the organ is scarcely less pronounced than that of the right side. Similar reduction in the rate of the circulation has been demonstrated in certain hibernat- ing mollusca, Mr C. Ashford having proved experimentally that the number of pulsations of the heart per minute gradually lessens with a falling temperature. At a temperature of 52 F. the' number was 22 in the common garden snail (Helix hortensis), and 21 in the cellar slug (Hyalinia cellaria). At a

temperature of 30° F. the pulsation fell to 4 in the former and to 3 in the latter animal.

The nature of hibernation, and probably also of aestivation, and the principal physiological phenomena connected with them, may be briefly summarized as follows: —

I. During hibernation death from starvation and wasting of the tissues is prevented by the absorption of fat, which; at least in the case of mammalia, is stored in considerable quantities, sometimes in definite parts of the body, during the weeks of activity im- mediately preceding the period of winter sleep.

_ 2. Every gradation seems to exist between ordinary sleep arid hibernation; the differences between the ordinary diurnal or nocturnal sleep in summer of hibernating animals and their pro- longed and lethargic quiescence in winter are merely differences of degree, differences; that is to say, of intensity and duration.

3. The physiological accompaniments, . of hibernation are: (a) Cessation of all activities associated with alimentation and excre- tion; (b) lowering of the body temperature to that of the surrounding medium or to within a few degrees of it; (c) total or almost total cessation of respiration, accompanied by power to survive immersion for a considerable time in water or asphyxiating gases, which prove rapidly fatal to the same animals when normally active ; (d) marked increase in the irritability of the muscles, especially of those of the left side of the heart, whereby the pulsations of that organ, although retarded, are uninterruptedly ; maintained ; {e\ a slight exchange of gases in the lungs is kept up by the cardio- pneumatic movement.

4. Amongst cold-blooded animals, both vertebrate and inverte- brate, devoid of the faculty of temperature adjustment, the pheno-. menon of hibernation or aestivation is of general ocgurrence whereyw the conditions of existence accompanying the onset of cold or drought are inimical to active life. In hot-blooded vertebrates, on the con- trary, the phenomena are non-existent so far as birds are concerned ; aestivation is of very rare occurrence in mammalia, while hibernation is practised by a comparatively small number of species; and in these the faculty of temperature adjustment appears to be temporarily at all events in abeyance.

II. The Zoology of Hibernation and Aestivation,— Owing. to the extreme difficulty of keeping wild animals under observation in their natural haunts for any lengthened time, it is almost im- possible to get accurate knowledge of the details of this state of existence. In a general way it is known, or

assumed from their disappearance, that certain species retire to winter quarters in particular districts, but on such important points as whether the winter sleep is continuous or interrupted, light or profound, assured information is for the most part not forthcoming. This is true even of familiar species inhabiting Europe and North America, which have been objects of study for many years. It is still more true of species occurring in countries uninhabited and rarely visited, especially in winter, by naturalists interested in such questions. The Chiroptera (bats) furnish an illustration of this truth. It was formerly assumed that the winter sleep of these animals in north and temperate Europe was complete and uninterrupted. Marshall Hall, for example, remarked that " perhaps the bat may be the only animal which sleeps profoundly the winter through without awaking to take, food." It was known, it is true, that in countries where gnats and other winged insects disappear with the first frosts of winter, bats which feed upon them retire to winter quarters in hollow tree's, caves, sheds or other places likely to afford them sufficient shelter. Here they hang suspended, solitary or in companies according to the species. But a mild spell of weather in mid-winter will .sometimes entice a few to take wing while it lasts, although they never appear in any numbers until crepuscular and nocturnal insects are plentiful. But Mr T. A. Coward has

recently shown in the case of the greater and lesser horseshoe bats (Rhinolophus ferrum-equinum and R. hipposiderus) , that during the early period of their occupation of the winter retreat ; hiberna- tion, in the strict sense of the word, does not take place, and that even later in the season the sleep is constantly interrupted, especially when the temperature of the air rises above 46 F., and that during their wakeful intervals they crawl about and feed apparently upon the insects which live throughout the year in the caves. This is also true of the long-eared bat (Plecotus auritus), and probably of other species of this group. At Mussoorie in the Himalayas, and in other parts of northern India, insectivorous bats, such as Rhinolophus luctus and Rk. affinis, pass the winter in a semi-torpid state, and are rarely seen abroad during the cold season. The fruit-eating bats, on the contrary (Pteropidae) , which are more southern in their distribution and are restricted in the Himalayas to the warmer valleys and lower slopes of the mountains, are as active in the winter as at other times of the year (Blanford).

Although almost as exclusively insectivorous as bats, moles and shrews do not, so far as is known, hibernate. This distinction between two groups so nearly alike in diet, no doubt depends upon the difference in their habitats

and in those of the creatures they live upon. By tunnelling deeper in winter than in summer, moles are still able to find worms and various insects buried in the earth beyond the reach of frost; and shrews hunt out spiders, centipedes and insects which in their larval, pupal or sexual stages have taken shelter and lie dormant in holes and crannies of the soil, beneath the leaves of ground plants or under stones and logs of wood. In view of the perennially active life of the two insectivora just mentioned, it is a singular fact that the common hedgehog {Erinaceus europaeus) — the only member of this order besides genera referable to the moles (Talpidae) and shrews (Soricidae) that inhabits temperate and north-temperate latitudes in Europe and Asia— passes the winter in a state of torpor unsurpassed in profundity by that of any species of mammal so far as is known. Possibly the explanation of this seeming anomaly may be found in the bionomial differences between the three animals. The sub- terranean feeding habits of the mole render hibernation un- necessary on his part. Therefore the shrew and the hedgehog, both surface feeders for the most part, need only be considered in this connexion. As compared with shrews, amongst the smallest of palaearctic mammals, the hedgehog is of considerable size. Moreover, in point of vivacious energy it would be difficult to find two mammals of the same order more utterly unlike. Hence in winter when insects are scarce and demand active and diligent search, it is quite intelligible that the shrews, in virtue of their smallness and rapidity of movement, are able to procure sufficient food for their needs; whereas the hedgehogs, requiring a far larger quantity and handicapped by lack of activity, would probably starve under the same conditions. Like the common hedgehog of Europe, the long-eared hedge- hog {Erinaceus megalotis) hibernates in Afghanistan from November till February. The tenrec (Centetes ecaudatus), a large insectivore from Madagascar, aestivates during the hottest weeks of the year; and specimens exhibited in the Zoo- logical Gardens in London preserved the habit although kept at a uniform temperature and regularly supplied with food.

Amongst the Rodentia, no members of the Lagomorpha (hares, rabbits and picas) are known to hibernate, although some of the species, like the mountain hare (Lepus timidus), extend far to the north in the palaearctic region, and the picas {Ochotona) live at high altitudes in the Himalayas and Central Asia, where the cold of winter is excessive, and where the snow lies deep for many months. It is probable that the picas live in fissures and burrows beneath the snow, and feed on stores of food accumulated during the summer and autumn. The Hystrico-morpha also are non-hibernators. It is true 1 that the common porcupine (Hystrix cristata) of south Europe and north Africa is alleged to hibernate; the statement cannot, however, be accepted without confirmation, because the cold is

seldom excessive in the countries it frequents, and specimens exhibited in

the Zoological Gardens in London remain active throughout the year, although kept in enclosures without artificial heat of any kind. Even the most northerly repre- sentative of this group, the Canadian porcupine (Erethizon dorsatus), which inhabits forest-covered tracts in the United States and Canada, may be trapped and shot in the winter. Some members of this group, like capybaras (Hydrochaerus capybara) and coypus (Myocastors coypus) which live in tropical America, are unaffected by the winter cold of temperate countries, and live in the open all the year round in parks and zoological gardens in England. Several of the genera of Myomorpha contain species inhabiting the northern hemisphere, which habitually hibernate. The three European genera of dormice (Myoxidae) , namely Muscardinus, Eliornys and Glis, sleep soundly practically throughout the winter; and examples of the South African genus Graphiurus practise the same habit when imported to Europe. If a warm spell in the winter rouses dormice from their slumbers, they feed upon nuts or other food accumulated during the autumn, but do not as a rule leave the nests constructed for shelter during the winter. According to the weather, the sleep lasts from about five to seven months. In the family Muridae, the true mice and rats (Murinae) and the voles and lemmings (Arvicolinae) seem to remain active through the winter, although some species, like the lemmings, range far to the north in Europe and Asia; but the white-footed mice (Hesperomys) of North America, belonging to the Cricetinae, spend the winter sleeping in underground burrows, where food is laid up for consumption in the early spring. The Canadian jumping mouse (Zapus hudsonianus) , one of the Jaculidae, also hibernates, although the sleep is frequently interrupted by milder days. Some of the most northerly species of jerboas (Jaculidae), namely Alactaga decumana of the Kirghiz Steppes and A. indica of Afghanistan, sleep from September or October till April; and the Egyptian species (Jaculus jaculus) and the Cape jumping hare (Pedetes coffer), one of the Hystricomorpha, remain in their burrows during the wet season in a state analogous to winter sleep. The sub-order Sciuromorpha also contains many hibernating species. None of the true squirrels, however, appear to sleep throughout the winter. Even the red squirrel (Sciurus hudsonianus) of North America retains its activity in spite of the sub-arctic conditions that prevail. The same is true of its European ally Sc. vulgaris. The North American grey squirrel (Sc. cinereus), although more southerly in its distribution than the red squirrel of that country, hiber- nates partially. Specimens running wild in the Zoological Gardens in London disappear for a day or two when the cold is exceptionally keen, but for the most part they may be seen abroad throughout the season. On the other hand, ground squirrels like the chipmunks (Tamias) and the susliks or gophers (Spermophilus) of North America and Central Asia, at all events in the more northern districts of their range, sleep from the late autumn till the spring in their subterranean

burrows, where they accumulate food for use in early spring and for spells of warmer weather in the winter which may rouse them from their slumbers. The North American flying squirrel (Sciuropterus volucella) and its ally Pteromys inornatus are believed to hibernate in hollow trees. All the true marmots (Arctomys) , a genus of which the species live at tolerably high altitudes in Central Europe, Asia and North America, appear to spend the winter in uninterrupted slumber buried deep in their burrows. They apparently lay up no store of food, but accumulate a quantity of fat as the summer and autumn advance, and frequently, as in the case of the woodchuck {A. moriax) of the Adirondacks, retire to winter quarters in the autumn long before the onset of the winter cold. The prairie marmots or prairie dogs (Cynomys ludovicianus) of North America, which live in the plains, do not hibernate to the same extent as the true marmots, although they appear to remain in their burrows during the coldest portions of the winter. Beavers (Castor), although formerly at all events extending in North America from the tropic of Cancer up to the Arctic circle, do not hibernate. When the ground

is deep in snow and the river frozen over, they are still able to feed on aquatic plants beneath the ice.

Amongst the terrestrial carnivora hibernation appears to be practised, with one possible exception, only by species belonging to the group Arctoidea. In north temperate latitudes both in Europe and Asia, as well as in the Himalayas, brown bears (Ursus arctos) hibernate, so also does the North American grizzly bear (U. horribilis), at least in the more northern districts of its range. The smaller black bear of the Himalayas {U. tibetanus) appears to lapse into a state of semi-torpor during the winter, only emerging from his retreat to hunt for food when occasional breaks in the weather occur. In the case of the American black bear (U. americanns) the female seeks winter quarters comparatively early in the season in preparation for the birth of her progeny soon after the turn of the year; but the males remain active so long as plenty of food is to be found. In the case of all bears, except the Polar bear {U. marilimus), the site chosen as the hibernaculum is either a cave or hole or some sheltered spot beneath a ledge of rock, or the roots of large trees, more or less overgrown with brushwood which holds the snow until it freezes into a solid roof over the hollow where the sleeping animal lies. In the hibernating brown and black bears the intestine is blocked by a plug commonly called ” tappen ” and composed principally of pine leaves, which is usually not evacuated until the spring. There is much diversity of opinion on the subject of the

hibernation of Polar bears. Their absence during the winter from particular spots in the Arctic regions where ice- bound ships have spent the winter, and the occasional discovery of specimens buried beneath the snow, have led to the belief that these animals habitually retire to winter quarters through the cold sunless months of the year. This may possibly be the true explanation at least for certain districts. But it has been alleged that bears, both adult and half-grown, may be seen throughout the winter; and it is known that pregnant females bury them- selves in the autumn under the snow, where they remain without feeding with their newly-born young until the spring of the following year. Hence the absence of bears in the winter from the neighbourhood of icebound ships may be explained on the supposition that the adult females alone hibernate for breeding purposes, while the full-grown males and half-grown specimens of both sexes migrate in the winter to the edges of the ice-floes and to coast lines, where the water is open. Before retiring to winter quarters the pregnant females store up sufficient quantity of fat in their tissues not only to sustain themselves but also to supply milk for their cubs. In the Adirondack region and probably in other districts of the same or more northern latitudes in North America, raccoons {Procyon lotor) retire in the winter to some sheltered place, such as a hollow tree-trunk, and pass the severest part of the season in sleep, emerging in February or March when the snow has begun to disappear. In the same country, the skunks {Mephitis mephitica), a member of the weasel family, also seek shelter during the coldest portion of the winter. Merriam believes that the hibernation of this animal is determined by cold, and not by failure of food-supply, for he observes that skunks may frequently be seen in numbers on snow lying 5 ft. deep a»t a time of the year when they feed almost entirely upon mice and shrews which do not hibernate even when the thermometer registers over twelve degrees of frost. In British North America the badger (Taxidea americana) is said to hibernate from October till April; but the duration of the period probably depends, as in the case of its European ally {Mcles meles), upon the length and severity of the inclement season. In the last-named species the winter repose is not as a rule sufficiently profound to prevent a break in the weather rousing the animal from sleep to sally forth in search of food. This interrupted hibernation takes place at least in England and even in Scandinavia; but in countries where frost is continuous throughout the winter it is probable that the badger's sleep is unbroken.

The one exception to the general rule that hibernation in the carnivora is restricted to the Arctoidea, is supplied by the raccoon dog (Nyctereutes procyonoides) of Japan and north-eastern Asia, which is said by Radde to hibernate in burrows in Amur-

land if food has been sufficiently plentiful in late summer and autumn to enable the animal to lay on enough fat to resist the cold and sustain a long

period of fast. If, however, food has been scarce, this dog is compelled to remain active all through the winter. The Arctic fox (Vulpes lagopus), although considerably more northern in range than the raccoon dog, does not hibernate. It was long a mystery how these animals obtained food in winter, but it has been ascertained that in some districts they migrate southwards in large numbers in the late autumn, whereas in other districts apparently they lay up stores of dead lemmings or hares, for food during the winter months. In Australia the porcupine ant-eater {Echidna aculeata) hibernates; and the habit is retained by specimens imported to Europe if exposed to the cold in outdoor cages.

Instances of quasi-hibernation have been recorded in the case of man. For example, in the government of Pskov in Russia, where food is scarce throughout the year and in danger of ex- haustion during the winter, the peasants are said to resort to a practice closely akin to hibernation, spending at least one-half of the cold weather in sleep. From time immemorial it has been the custom when the first snows fall for families to shut themselves up in their huts, huddle round the stove and lapse into slumber, each member taking his turn to keep the fire alight. Once a day only do the inmates rouse themselves from sleep to eat a little dry bread.

Reptiles in which the body-temperature falls with that of the surrounding medium pass the winter in temperate countries in a state of lethargy; and specimens exported from the tropics into northern latitudes become dormant when exposed to cold in virtue of their inability to maintain their temperature at a higher level than that of the atmosphere. The common land tortoise (Testudo graeca) of South Europe buries itself in the soil during the winter in its natural habitat, and even when imported to England is able, in some cases at least, to withstand the more rigorous winter by practising the same habit, as Gilbert White originally recorded. In Pennsylvania the box-tortoise {Cistudo Carolina) passes the winter in a burrow; and Testudo elegans, which inhabits dry hilly districts in north India, takes shelter beneath tufts of grass or bushes as the cold weather approaches and remains in a semi- lethargic state until the return of the warmth. The European pond tortoise {Emys orbicularis) also hibernates buried in the soil; and the North American salt-water terrapin {Malacoclemmys concentrica) , abundant in the salt-marshes round Charleston, S. Carolina, retires into the muddy banks to spend the cold months of the year. In certain parts of the tropics tortoises protect themselves from the excessive heat by burrowing into the soil which afterwards becomes indurated. When drought sets in with the dry season and the tanks become exhausted and food unobtainable, crocodiles and alligators sometimes wander across country in search of water, but more commonly bury themselves in the mud and remain in a state of quiescence until the return of the rains; and according to Humboldt, large snakes,

anacondas or boa constrictors are often found by the Indians in South America buried in the same lethargic state. Snakes and lizards in all countries where there is any considerable seasonal variation in temperature become dormant or semi- dormant during the colder months.

Batrachians, like reptiles, hibernate in Europe and other countries situated in temperate latitudes. Frogs bury them- selves in the mud at the bottom of tanks and ponds, often congregating in numbers in the same spot. Toads retire to burrows or other secluded places on the land, and newts either bury themselves in the mud of ponds, like frogs, or lie up beneath stones and pieces of wood on the land. According to Mr G. A. Boulenger, however, European frogs and toads do not pass the winter in profound torpor, but merely in a state of sluggish quiescence. In tropical countries, where wet and dry seasons alternate, frogs which, like the rest of the batrachians, are for the most part intolerant of great heat, especially when accompanied by dryness of atmosphere, bury themselves deep in the soil during the time of drought and emerge from their retreats in numbers with the breaking of the rains.

This habit of passing the dry season in the hardened mud forming the bottom of exhausted pools and rivers is practised by several species of tropical freshwater fishes, belonging princi- pally to the family Siluridae. The members of this group are able to exist and thrive in moist mud, and can even support life for a comparatively long time out of water altogether. The instinct is exhibited by species occurring both in the eastern and western hemispheres, as is shown by its record in the case of species of Callicthys and Loricaria in Guiana and by Claries lazera in Senegambia. It is also met with, according to Tennent, in a species of climbing perch (Anabas oligolepis) found in Ceylon and belonging to the family Anabantidae, all the species of which are able to live for a certain length of time out of water, and may sometimes be found crawling across land in search of fresh pools. The habit is also common to some species of mud fishes of the order Dipneusti, in which the air bladder plays the part of lungs. Protopterus, from tropical Africa, for instance, burrows into the mud and remains for nearly half the year coiled up at the bottom in a slightly enlarged chamber. The walls of this are lined with a layer of slime secreted from the fish's skin, and the orifice is closed with a lid the centre of which is perforated and forms an inturned tube by means of which air is conducted to the fish's mouth. The aestivating burrow of the Brazilian mudfish (Lepidosiren) is similar, except that the lid is perforated with several apertures. The Australian mudfish (Ceraiodus) is not known to

hibernate or aestivate.

In countries where winter frosts arrest the growth of vegeta- tion terrestrial mollusca seek hibernacula beneath stones or fallen tree trunks, in rock crannies, holes in walls, in heaps of dead leaves, in moss or under the soil, and remain quiescent until the coming of spring. Amongst pulmonate gastropods, most species of snails (Helix, Clausilia) close the mouth of the shell at this period with a membranous or calcified plate, the epiphragm. Slugs (Limax, Arion), on the contrary, he buried in the earth encysted in a coating of slime. Similarly in the tropics members of this group, such as Achatina in tropical Africa and Orthalicus in Brazil, aestivate during the dry season, the epiphragm preserving them against desiccation; and examples of two species of Achatina from east and west Africa exhibited in the Zoological Gardens in London remained con- cealed in their shells during the winter, although kept in an artificially warmed house, and resumed their activity in the summer.

Freshwater Pulmonata do not appear to hibernate, such forms as Limnaca and Planorbis having been frequently seen crawling about beneath the ice of frozen ponds. During periods of drought in England, however, they commonly bury them- selves in the mud, a habit which is also practised during the dry season in the tropics by species of Prosobranchiate Gastropods belonging to the genera Ampullaria, Melania and others, which lie dormant until the first rains rouse them from their lethargy. Freshwater Pelecypoda (Anodonta, Unio) spend the European winter buried deep in the muddy bottom of ponds and streams. In cold and temperate latitudes a great majority of insects pass the winter in a dormant state, either in the larval, pupal or imaginal (reproductive) stages. In some the state of hiberna- tion is complete in the sense that although the insects may be roused from their lethargy to the extent of movement by spells of warm weather, they do not leave their hibernacula to feed; in others it is incomplete in the sense that the insects emerge to feed, as in the case of the caterpillar of Euprepia fuliginosa, or to take the wing as in the case of the midge Trichocera hiemalis. Others again, like Podura nivalis and Boreus hiemalis, never appear to hibernate, at least in England. The insects which hibernate as larvae belong to those species which pass more than one season in that stage, such as the goat-moth (Cossus ligniperda), cockchafers (Melolontha), stagbeetles (Lucanus) and dragon-flies (Libellula) , &c; and to some species which, although they only live a few months in this immature state, are hatched in the autumn or summer and only reach the final stage of growth in the following spring, like the butterflies of the genus Argynnis (paphia, aglaia, &c.) in England. As an

instance of species which survive the winter in the pupal or chrysalis stage may be cited the swallow-tailed butterfly of Europe (Papilio machaon);

while to the category of species which hibernate as perfect insects belong many of the Coleoptera (Rhyncophora, Coccinellidae), &c, as well as some Hemiptera, Hymenoptera, Diptera and Lepidoptera (Vanessa io, urticae, &c). In the case of the social Hymenoptera it is only the fertilized queen wasp out of the nest that survives the frost of winter, all the workers dying with the onset of cold in the autumn; the common hive bees (Apis mellifica), although they retire to the hive, do not hibernate, the numbers and activity of the individuals within the hive being sufficient to keep up the temperature above soporific point. Ants also remain actively at work underground unless the temperature falls several degrees below zero.

Spiders, like nearly all insects, hibernate in cold temperate latitudes. Burrowing species like trap-door spiders of the family Ctenizidae and some species of Lycosidae seal the doors of their burrows with silk or close up the orifice with a sheet of that material. Other non-burrowing species, like some species of Clubionidae and Drassidae, lie up in silken cases attached to the underside of stones or of pieces of loose bark, or buried under dead leaves or concealed in the cracks of walls. Other species, on the contrary, pass the winter in an immature state protected from the cold by the silken cocoon spun by the mother for her eggs before she dies in the late autumn, as in the " garden spider" (Aranea diadema). Commonly, however, when the cocoons are later in the making, or the cold weather sets in early, f he eggs of this and of allied species do not hatch until the spring; but in either case the young emerge in the warm weather, become adult during the summer and die in the autumn after pairing and oviposition. Some members of this family, nevertheless, like ZUla x-notata, which live in the corners of windows, or in outhouses where the habitat affords a certain degree of pro- tection from the cold, may survive the winter in the adult stage and be roused from lethargy by breaks in the weather and tempted by the warmth to spin new webs. Typical members of the Opiliones or harvest spiders, belonging to the family Phalangiidae, do not hibernate in temperate and more northern latitudes in Europe and America, but perish in the autumn, leaving their eggs buried in the soil to hatch in the succeeding spring. During the early summer, therefore, only immature individuals are found. Other species of this order, belonging to the family Trogulidae, spend the winter in a dormant state under stones or buried in the soil. False scorpions (Pseudo- scorpiones) also hibernate in temperate latitudes, passing the cold months, like many spiders, enclosed in silken cases attached to the underside of stones or loosened pieces of bark. Centi- pedes and millipedes bury themselves in the earth, or lie up in some secluded shelter such as stones or fallen tree trunks afford during the winter; and in the tropics millipedes lie dormant during seasons of drought.

What is true of the dormant condition of arthropod life in the winter of the northern hemisphere is also true in a general way of that of the southern

hemisphere at the same season of the year. This is proved — to mention no other cases — by the observations of Darwin on the hibernation of insects and spiders at Montevideo and Bahia Blanca in South America, and by Distant's account of the paucity of insect life in the winter in South Africa; by his discovery under stones of hibernating semi-torpid Coleoptera and Hemiptera at the end of August in the Transvaal, and of the gradual increase in the ;numbers of individuals and species of insects in that country as the spring advanced and the dry season came to an end.

Bibliography. — T. Bell, A History of British Reptiles (and Amphibians) (1849); W. T. Blanford, Fauna of British India: Mammalia (1889-1891); G. A. Boulenger, Monograph of the Tailless Batrachians of Europe, edited by the Ray Society; " Teleostei " in Cambridge Natural History, vii. 541-727 (1904); T. W. Bridge, " Dipneustei " in Cambridge Natural History, vii. 505-520 (1904); A. H. Cooke, " Molluscs" in Cambridge Natural History, iii. 25-27 (1895); T. A. Coward, P.Z.S, pp. 849- 8 55 (1906), and pp. 312-324 (1907); C. Darwin, A Naturalist's

Voyage Round the World, pp. 97-98 (1907 ed.) ; W. L. Distant, A Naturalist in the Transvaal, ch. iii. (1892); Marshall Hall, " Hibernation, " in Todd's Cyclopaedia of Anatomy and Physi- ology, pp. 764-776 (1839) (Bibliography); Phil. Trans. Roy. Soc. (1832); John Hunter, Observations on parts of the Animal Economy (1837); Index Catalogue of the Library of the Surgeon-General's Office of the U.S. Army, vii. (1902), Bibliography relating to physio- logy of Hibernation; W. Kirby and W. Spence, An Introduction to Entomology, ed. 17, pp. 517-533 (1856); L. Landois, A Text-book of Human Physiology, translated by W. Stirling, i. 410 (1904) ; V. Laporte, " Suspension of Vitality in Animals," Pop. Sci. Monthly, xxxvi. 257-259 (New York, 1889-1890); Mangili, " Essai sur la lethargie periodique," Annates du Museum, x. 453-456 (1807); C. Hart Merriam, North American Pocket Mice (Washington, 1889); W. Miller, "Hibernation and Allied States in Animals," Trans. Pan-Amer. Med. Congr. (1893), pt. ii. pp. 1274-1285 (Washington, 1895) ; M. S. Pembrey and A. G. Pitts, The Relation between the Internal Temperature and the Respiratory Movements of Hibernating Animals," Journ. Physiol. (London, 1899), pp. 305- 316; Prunelle, " Recherches sur les phenomenes et sur les causes du sommeii hivernal," Annates du Museum, xviii. ; J. A. Saissy, Reclierches sur les animaux hivernans (1808); L. Spallanzani, Memoires sur la respiration (1803); J. Emerson Tennent, Sketches of the Natural History of Ceylon, pp. 351-358 (1861); Volkov, " Le Sommeii hivernal chez les paysans russes," Bull. Mem. Soc. Anthropol. (Paris, 1900), i. 67; abstract

in Brit. Med, Journ. (1900), i. 1554- (R- I- P-)

HIBERNIA, in ancient geography, one of the names by which Ireland was known to Greek and Roman writers. Other names were Ierne, Iuverna, Iberio. All these are adaptations of a stem from which also Erin is descended. The island was well known to the Romans through the reports of traders, so far at least as its coasts. But it never became part of the Roman empire. Agricola (about a.d. 80) planned its conquest, which he judged an easy task, but the Roman government vetoed the enterprise. During the Roman occupation of Britain, Irish pirates seem to have been an intermittent nuisance, and Irish emigrants may have settled occasionally in Wales; the best attested emigration is that of the Scots into Caledonia. It was only in post-Roman days that Roman civilization, brought perhaps by Christian missionaries like Patrick, entered the island.

HICKERINGILL (or Hickhorngill), EDMUND (1631-1708), English divine, lived an eventful life in the days of the Common- wealth and the Restoration. After graduating at Caius College, Cambridge, where he was junior fellow in 1651-1652, he joined Lilburne's regiment as chaplain, and afterwards served in the ranks in Scotland and in the Swedish service, ultimately becoming a captain in Fleetwood's regiment. He then lived for a time in Jamaica, of which he published an account in 1661. In the same year he was ordained by Robert Sanderson, bishop of Lincoln, having already passed through such shades of belief as are connoted by the terms Baptist, Quaker and Deist. From 1662 until his death in 1708 he was vicar of All Saints', Colchester. He was a vigorous pamphleteer, and came into collision with Henry Compton, bishop of London, to whom he had to pay heavy damages for slander in 1682. He made a public recantation in 16S4, was excluded from his living in 1685-1688, and ended his career by being convicted for forgery in 1707.

HICKES, GEORGE (1642-1715), English divine and scholar, was born at Xewsham near Thirsk, Yorkshire, on the 20th of June 1(142. In 1659 he entered St John's College, Oxford, whence after the Restoration he removed to Magdalen Col- lege and then to Magdalen Hall. In 1664 he was elected fellow of Lincoln College, and in the following year proceeded M.A In 1673 he graduated in divinity, and in 1675 he was appointed rector of St Ebbe's, Oxford. In 1676, as private chaplain, he accompanied the duke of Lauderdale, the royal commissioner, to Scotland, and shortly afterwards received the degree of D.D. from St Andrews. In 1680 he became vicar of All Hallows, Barking, London; and after having been made chaplain to the king in 1681, he was in 1683 promoted to the deanery of Worcester. He opposed both James II. 's declaration of indulgence and Monmouth's rising, and he tried in vain to save from death his nonconformist brother John Hickes (1633-1685), one of the Sedgemoor refugees harboured by Alice

Lisle. At the revolution of 1688, having declined to take the oath of allegiance, Hickes was first suspended and afterwards deprived of his

deanery. When he heard of the appointment of a successor he affixed to the cathedral doors a " protestation and claim of right." After remaining some time in concealment in London, he was sent by Sancroft and the other nonjurors to James II. in France on matters connected with the continuance of their episcopal succession; upon his return in 1694 he was himself consecrated suffragan bishop of Thetford. His later years were largely occupied in controversies and in writing, while in 1713 he persuaded two Scottish bishops, James Gadderar and Archibald Campbell, to assist him in consecrating Jeremy Collier, Samuel Hawes and Nathaniel Spinckes as bishops among the nonjurors. He died on the 15th of December 171 5.

The chief writings of Hickes are the Institutiones Grammaticae Anglo-Saxonicae et Moeso-Gothicae (1689), and Linguarum veterum Septentrionalium Thesaurus grammatico-criticus et archaeologicus (1703-1705), a work of great learning and industry.

Apart from these two works Hickes was a voluminous and laborious author. His earliest writings, which were anonymous, were sug- gested by contemporary events in Scotland that gave him great satisfaction — the execution of James Mitchell on a charge of having attempted to murder Archbishop Sharp, and that of John Kid and John King, Presbyterian ministers, " for high treason and rebellion " (Ravillac Redivivus, 1678 ; The Spirit of Popery speaking out of the Mouths of Phanatical Protestants, 1680). In his Jovian (an answer to S. Johnson's Julian the Apostate, 1683), he endeavoured to show that the Roman empire was not hereditary, and that the Christians under Julian had recognized the duty of passive obedience. His two treatises, one Of the Christian Priesthood and the other Of the Dignity of the Episcopal Order, originally published in 1707, have been more than once reprinted, and form three volumes of the Library of Anglo Catholic Theology (1847). In 1705 and 1710 were published Collections of Controversial Letters, in 171 1 a collection of Sermons, and in 1726 a volume of Posthumous Discourses. Other treatises, such as the Apologetical Vindication of the Church of England, are to be met with in Edmund Gibson's Preservative against Popery. There is a manuscript in the Bodleian Library which sketches his life to the year 1689, and many of his letters are extant in various collections. A posthumous publication of his The Con stitution of the Catholick Church and the Nature and Consequences of Schism (17 16) gave rise to the celebrated Bangorian controversy;

See the article by the Rev. W. D. Macray in the Dictionary of National

Biography, vol. xxvi. (1891); and J. H. Overton, The Nonjurors (1902).

HICKOK, LAURENS PERSEUS (1798-1888), American philo- sopher and divine, was born at Bethel, Connecticut, on the 29th of December 1798. He took his degree at Union College in 1820. Until 1836 he was occupied in active pastoral work, and was then appointed professor of theology at the Western Reserve College, Ohio, and later (1844-1852) at the Auburn (N.Y.) Theo- logical Seminary. From this post he was elected vice-president of Union College and professor of mental and moral science. In 1866 he succeeded Dr E. Nott as president, but in July 1868 retired to Amherst, Massachusetts, where he devoted himself to writing and study. A collected edition of his principal works was published at Boston in 1875. He died at Amherst on the 7th of May 1888. He wrote Rational Psychology (1848), System of Moral Science (1853), Empirical Psychology (1854), Rational Cosmology (1858), Creator and Creation, or the Knowledge in the Reason of God and His Work (1872), Humanity Immortal (1872), Logic of Reason (1874).

HICKORY, a shortened form of the American Indian name pohickery. Hickory trees are natives of North America, and belong to the genus Carya. They are closely allied to the walnuts {Juglans), the chief or at least one very obvious difference being that, whilst in Carya the husk which covers the shell of the nut separates into four valves, in Juglans it consists of but one piece, which bursts irregularly. The timber is both strong and heavy, and remarkable for its extreme elasticity, but it decays rapidly when exposed to heat and moisture, and is peculiarly subject to the attacks of worms. It is very extensively employed in manufacturing musket stocks, axle-trees, screws, rake teeth, the bows of yokes, the wooden rings used on the rigging of vessels, chair-backs, axe-handles, whip-handles and other purposes requiring great strength and elasticity. Its principal use in America is for hoop-makmg; and it is the only American wood found perfectly fit for that purpose.

The wood of the hickory is of great value as fuel, on account of the brilliancy with which it burns and the ardent heat which it

gives out, the charcoal being heavy, compact and long-lived. The species which furnish the best wood are Carya alba (shell- bark hickory), C. tomentosa (mockernut), C. olivaeformis (pecan or pacane nut), and C. porcina (pig-nut), that of the last named, on account of its extreme tenacity, being preferred for axle-trees

Fig. i. — Shell-bark Hickory (Carya alba) in flower,

and axle-handles. The wood of C. alba splits very easily and is very elastic, so that it is much used for making whip-handles and baskets. The wood of this species is also used in the neighbour- hood of New York and Philadelphia for making the back bows of Windsor chairs. The timber of C. amara and C. aquatica is considered of inferior quality.

Most of the hickories form fine-looking noble trees of from 60 to 90 ft. in height, with straight, symmetrical trunks, well-balanced ample heads, and bold, handsome, pinnated foliage. When confined in the forest they shoot up 50 to 60 ft. without branches, but when standing alone they expand into a fine head, and produce a lofty round-headed pyramid of foliage. They have all the qualities necessary to constitute fine graceful park trees. The most ornamental of the species are C. olivaeformis, C. alba and C. porcina, the last two also producing delicious nuts, and being worthy of cultivation for their fruit alone.

The husk of the hickory nut, as already stated, breaks up into four equal valves or separates into four equal portions in the upper part, while the nut itself is tolerably even on the surface, but has four or more blunt angles in its transverse outline. The

Fig. 2. — 1, Fruit of Carya alba; 2, Hickory Nut; 3, Cross Section of Nut; 4, Vertical Section of the Seed.

hickory nuts of the American markets are the produce of C. alba, called the shell-hark hickory because of the roughness of its bark, which becomes loosened from the trunk in long scales bending outwards at the extremities and adhering only by the middle. The nuts are much esteemed in all parts of the States, and are exported in considerable quantities to Europe. The pecan-nuts,

which come from the Western States, are from 1 in. to \ in. taiig, smooth, cylindrical, pointed at the ends and thin-shelled, with the kernels full, not like those of most of the hickories divided by partitions, and of delicate and agreeable flavour. The thick- shelled fruits of the pig-nut are generally left on the ground for swine, squirrels, &c, to devour. In C. amara the kernel is so bitter that even squirrels refuse to eat it.

HICKS, ELI AS (1 748-1830), American Quaker, was born in Hempstead township, Long Island, on the 19th of March 1748. His parents were Friends, but he took little interest in religion until he was about twenty; soon after that time he gave up the carpenter's trade, to which he had been apprenticed when seventeen, and became a farmer. By 1775 he had "

openings leading to the ministry " and was " deeply engaged for the right administration of discipline and order in the church," and in 1779 he first set out on his itinerant preaching tours between Vermont and Maryland. He attacked slavery, even when preaching in Maryland; wrote Observations on the Slavery of the Africans and their Descendants (181 1); and was influential in procuring the passage (in 1817) of the act declaring free after 1827 all negroes born in New York and not freed by the Act of 1799. He died at Jericho, Long Island, on the 27th of February 1830. His preaching was practical rather than doctrinal and he was heartily opposed to any set creed ; hence his successful opposi- tion at the Baltimore yearly meeting of 1817 to the proposed creed which would make the Society in America approach the position of the English Friends by definite doctrinal statements. His Doctrinal Epistle (1824) stated his position, and a break ensued in 1827-1828, Hicks's followers, who call themselves the " Liberal Branch," being called " Hicksites " by the " Orthodox " party, which they for a time outnumbered. The village of Hicksville, in Nassau County, New York, 15 m. E. of Jamaica, lies in the centre of the Quaker district of Long Island and was named in honour of Elias Hicks.

See A Series of Extemporaneous Discourses . . . by Elias Hicks (Philadelphia, 1825) ; The Journal of the Life and Labors of Elias Hicks (Philadelphia, 1828), and his Letters (Philadelphia, 1834).

HICKS, HENRY (1837-1899), British physician and geologist, was born on the 26th of May 1837 at St David's, in Pembroke- shire, where his father, Thomas Hicks, was a surgeon. He studied medicine at Guy's Hospital, London, ■ qualifying as M.R.C.S. in 1862. Returning to his native place he commenced a practice which he continued until 187 1, when he removed to Hendon. He then devoted special attention to mental diseases, took the degree of M.D. at St Andrews in 1878, and continued his medical work until the close of his life. In Wales he had been attracted to geology by J. W. Salter (then palaeontologist to the Geological Survey), and his leisure time was given to the study of the older rocks and fossils of South Wales. In conjunc- tion with Salter, he established in 1865 the Menevian group (Middle Cambrian) characterized by the trilobite Paradoxides. Subsequently Hicks contributed a series of important papers on the Cambrian and Lower Silurian rocks, and figured and described many new species of fossils. Later he worked at the Pre-Cambrian rocks of St David's, describing the Dimetian (granitoid rock) and the Pebidian (volcanic series), and his views, though contested, have been generally accepted. At Hendon Dr Hicks gave much attention to the local geology and also to the Pleistocene deposits of the Denbighshire caves. For a few years before his death he had laboured at the Devonian rocks. With his keen eye for fossils he detected organic remains in the Morte slates, previously regarded as unfossiliferous, and these he regarded as including representa- tives of

Lower Devonian and Silurian. His papers were mostly published in the Geol. Mag. and Quart. Journ. Geol. Soc. He was elected F.R.S. in 1885, and president of the Geological Society of London 1896-1898. He died at Hendon on the 18th of November 1899.

HICKS, WILLIAM (1830-1883), British soldier, entered the Bombay army in 1849, an d served through the Indian mutiny, being mentioned in despatches for good conduct at the action of Sitka Ghaut in 1859. In 1861 he became captain, and in the

Abyssinian expedition of 1867-68 was a brigade major, being again mentioned in despatches and given a brevet majority. He retired with the honorary rank of colonel in 1880. After the close of the Egyptian war of 1882, he entered the khedive's service and was made a pasha. Early in 1883 he went to Khar- tum as chief of the staff of the army there, then commanded by Suliman Niazi Pasha. Camp was formed at Omdurman and a new force of some 8000 fighting men collected — mostly recruited from the fellahin of Arabi's disbanded troops, sent in chains from Egypt. After a month's vigorous drilling Hicks led 5000 of his men against an equal force of dervishes in Sennar, whom he defeated, and cleared the country between the towns of Sennar and Khartum of rebels. Relieved of the fear of an immediate attack by the mahdists the Egyptian officials at Khartum intrigued against Hicks, who in July tendered his resignation. This resulted in the dismissal of Suliman Niazi and the appointment of Hicks as commander-in-chief of an expeditionary force to Kordofan with orders to crush the mahdi, who in January 1883 had captured El Obeid, the capital of that province. Hicks, aware of the worthlessness of his force for the purpose contemplated, stated his' opinion that it would be best to " wait for Kordofan to settle itself " (telegram of the 5th of August). The Egyptian ministry, however, did not then believe in the power of the mahdi, and the expedition started from Khartum on the 9th of September. It was made up of 7000 infantry, 1000 cavalry and 2000 camp followers and included thirteen Europeans. On the 20th the force left the Nile at Duem and struck inland across the almost waterless wastes of Kordofan for Obeid. On the 5th of November the army, misled by treacherous guides and thirst-stricken, was ambuscaded in dense forest at Kashgil, 30 m. south of Obeid. With the exception of some 300 men the whole force was killed. According to the story of Hicks's cook, one of the survivors, the general was the last officer to fall, pierced by the spear of the khalifa Mahommed Sherif. After emptying his revolver the pasha kept his assailants at bay for some time with his sword, a body of Baggara who fled before him being known

afterwards as " Baggar Hicks " (the cows driven by Hicks), a play on the words baggara and baggar, the former being the herdsmen and the latter the cows. Hicks's head was cut off and taken to the mahdi.

See Mahdiism arid the Egyptian Sudan, book iv., by Sir F. R. Wingate (London, 1891), and With Hicks Pasha in the Soudan, by J. Colborne (London, 1884). Also Egypt: Military Operations.

HIDALGO, an inland state of Mexico, bounded N. by San Luis Potosi and Vera Cruz, E. by Vera Cruz and Puebla,S.by Tlax- cala and Mexico (state), and W. by Quer6taro. Pop. (1895) 551,817, (1900) 605,051. Area, 8917 sq. m. The northern and eastern parts are elevated and mountainous, culminating in the Cerro de Navajas (10,528 ft.). A considerable area of this region on the eastern side of the state is arid and semi- barren, being part of the elevated tableland of Apam where the maguey (American aloe) has been grown for centuries. The southern and western parts of the state consist of rolling plains, in the midst of which is the large lake of Metztitlan. Hidalgo produces cereals in the more elevated districts, sugar, maguey, coffee, beans, cotton and tobacco. Maguey is cultivated for the production of pulque, the national drink. The chief industry, however, is mining, the mineral districts of Pachuca, El Chico, Real del Monte, San Jose del Oro, and Zimapan being among the richest in Mexico. The mineral products include silver, gold, mercury, copper, iron, lead, zinc, antimony, manganese and plumbago. Coal, marble and opals are also found. Rail- way facilities are afforded by a branch of the Vera Cruz and Mexico line, which runs from Ometusco to Pachuca, the capital of the state, and by the Mexican Central. Among the principal towns are Tulancingo (pop. 9037), a rich mining centre 24 m. E. of Pachuca, Ixmiquilpan (about 9000) with silver mines 80 m. N. by W. of the Federal Capital, and Actopan (2666), the chief town of the district N.N.W. of Pachuca, inhabited principally by Indians of the Othomies nation.

HIDALGO (a Spanish word, contracted from hijo d'algo or hijo de algo, son of something, or somewhat), originally a Spanish title of the lower nobility; the hidalgo being the lowest grade of nobility which was entitled to use the prefix " don." The term is now used generally to denote one of gentle birth. The Portuguese fidalgo has a similar history and meaning.

HIDALGO Y COSTILLA, MIGUEL (1753-1811), Mexican patriot, was born on the 8th of May 1753, on a farm at Corralejos, near Guanajuato. His mother's maiden name was Gallaga, but contrary to the usual custom of the Spaniards he used only the surname of his father, Cristobal Hidalgo y Costilla. He was educated at Valladolid in Mexico, and wasordained priest in 1779. Until 1809 he was known only as a man of pious life who exerted himself to introduce various forms of industry, including the

cultivation of silk, among his parishioners at Dolores. But Napoleon's invasion of Spain in 1808 caused a widespread commotion. The colonists were indisposed to accept a French ruler and showed great zeal in proclaiming Ferdinand VII. as king. The societies they formed for their professedly loyal purpose were regarded, however, by the Spanish authorities with suspicion as being designed to prepare the independence of Mexico. Hidalgo and several of his friends, among whom was Miguel Dominguez, mayor of Queretaro, engaged in consultation and preparations which the authorities considered treasonable. Dominguez was arrested, but Hidalgo was warned in time. He collected some hundred of his parishioners, and on the 1 6th of September 1810 they seized the prison at Dolores. This action began what was in fact a revolt against the Spanish and Creole elements of the population. With what is known as the " grito " or cry of Dolores as their rallying shout, a multitude gathered round Hidalgo, who took for his banner a wonder-working picture of the Virgin belonging to a popular shrine. At first he met with some success. A regiment of dragoons of the militia joined him, and some small posts were stormed. The whole tumultuous host moved on the city of Mexico. But here the Spaniards and Creoles were concentrated. Hidalgo lost heart and retreated. Many of his followers deserted, and on the march to Queretaro he was attacked at Aculco by General Felix Calleja on the 7th of November 1810, and routed. He endeavoured to continue the struggle, and did succeed in collecting a mob estimated at 100,000 about Guadalajara. With this ill-armed and undisciplined crowd he took up a position on the bridge of Calderon on the river Santiago. On the 17th of January 181 1 he was completely beaten by Calleja and a small force of soldiers. Hidalgo was deposed by the other leaders, and soon afterwards all of them were betrayed to the Spaniards. They were tried at Chihuahua, and condemned. Hidalgo was first degraded from the priesthood and then shot as a rebel, on the 31st of July or the 1st of August

1811.

See H. H. Bancroft, The Pacific Slates, vol. vii., which contains a copious bibliography.

HIDDENITE, a green transparent variety of spodumene, (q.v.) used as a gem-stone. It was discovered by William E. Hidden (b 1853) about 1879 at Stonypoint, Alexander county, North Caro- lina, and was at first taken for diopside. In 1881 J. Lawrence Smith proved it to be spodumene, and named it. Hiddenite occurs in small slender monoclinic crystals of prismatic habit, often pitted on the surface. A well-marked prismatic cleavage renders the mineral rather difficult to cut. Its colour passes from an emerald green to a greenish-yellow, and is often unevenly distributed through the stone. The mineral is dichroic in a marked degree, and shows much " fire " when*

properly cut. The composition of the mineral is represented by the formula LiAl(Si0 3)2, the green colour being probably due to the presence of a small proportion of chromium. The presence of lithia in this green mineral suggested the inappropriate name of lithia emerald, by which it is sometimes known. Hiddenite was originally found as loose crystals in the soil, but was after- wards worked in a veinstone, where it occurred in association with beryl,, quartz, garnet, mica, rutile, &c.

HIDE 1 (Lat. hida, A.-S. higid, hid or hiwisc, members of a household), a measure of land. The word was in general use in England in Anglo-Saxon and early English times, although its meaning seems to have varied somewhat from time to time. Among its Latin equivalents are terra unius familiae, terra unius cassati and mansio; the first of these forms is used by Bede, who, like all early writers, gives to it no definite area. In its earliest form the hide was the typical holding of the typical family. Gradually, this typical holding came to be regarded as containing 120 " acres " (not 120 acres of 4840 sq. yds. each, but 120 times the amount of land which a ploughteam of eight oxen could plough in a single day). This definition appears to have been very general in England before the Norman Conquest, and in Domesday Book 30, 40, 50 and 80 acres are repeatedly mentioned as fractions of a hide. Some historians, however, have thought that the hide only contained 30 acres or thereabouts.

" The question about the hide," says Professor Maitland in Domes- day Book and Beyond, " is ' pre-judicial ' to all the great questions of early English history." The main' argument employed by J. M, Kemble (The Saxons in England) in favour of the " small ' hide is that the number of hides stated to have existed in the various parts of England gives an acreage far in excess of the total acreage of these parts, making due allowance for pasture and for woodland, an allowance necessary because the hide was only that part of the land which came under the plough, and each hide must have carried with it a certain amount of pasture. Two illustrations in support of Kemble's theory must suffice. Bede says the Isle of Wight contained 1200 hides. Now 1200 hides of 120 acres each gives a total acreage of 144,000 acres, while the total acreage of the island to-day is only 93,000 acres. Again a document called The Tribal Hidage puts the number of hides in the whole of England at nearly a quarter of a million. This gives in acres a figure about equal to the total acreage of England at the present time, but it leaves no room for pasture and for the great proportion of land which was still woodland. On these grounds Kemble regarded the hide as containing 30 or 33, certainly not more than 40

acres, and thought that each acre contained about 4000 sq. yds., i.e. that it was roughly equal to the modern acre. Another argument brought forward is that 30 or 40 acres was enough land for the support of the average family, in other words that it was the terra unius familiae of Bede. Another Domesday student, R. W. Eyton, puts down the hide at 48 acres.

But formidable arguments have been advanced against the " small " hide. There is no doubt that at the time of Domesday the hide was equated with 120 and not with 30 acres. Then, taking the word familia in its proper sense, a household with many de- pendent members, and making an allowance for primitive methods of agriculture, it is questionable whether 30 or 40 acres were sufficient for its support; and again if the equation 1 hide — 120 acres is re- jected there is no serious evidence in favour of any other. A possible explanation is that, although in early Anglo-Saxon times the hide consisted of 30 acres or thereabouts, it had come before the time of Domesday to contain 120 acres. But no trace of such change can be found; there is no break in the continuity of the land- charters which refer to hides and manses. Reviewing the whole question Professor Maitland accepts the view that the hide contained 120 acres. The difficulties are serious but they are not insuperable. Bede, writing in a primitive age and speaking for the most part of lands far away from Northumbria, uses figures in a vague and general fashion; then the hide of 120 acres does not mean 120 times 4840 yds., it means much less; and lastly at the time of Domesday the hide was not a unit of measurement, it was a. unit for pur- poses of taxation. On the other hand, Mr; H. M. Chadwick (Studies on Anglo-Saxon Institutions) says there is no evidence that the hide contained 120 acres before the 10th century. He suggests that possibly the size of the hide in Mercia may have been fixed at 40 acres, while in Wessex it was regarded as containing 120 acres. Dr Stubbs (Const. Hist, i.) suggests that the confusion may have arisen because the word was used " to express the whole share of one man in all the fields of the village." Thus it might refer to 30 acres, his share in one field, or to 120 acres, his share in the four fields. He adds, however, that this explanation is not adequate for all cases. But these differences about the size of the hide are not peculiar to modern times. Henry of Huntingdon says, Hida Anglice vocatur terra unius aratri culturae sufficiens per annum, while the

1 The homonym " hide," meaning to conceal, is in O. Eng. hydan ; the word appears in various forms in Old Teutonic languages. The root is probably seen in Gr. Ktifitiv to hide, or may be the same as in " hide," skin, O. Eng. h$d, which is also seen in Ger. Haul, Dutch huid; the root appears in "Lat. cutis, Gr. kOtos. The Indo-European root ku-, weakened form of sku-, seen in " sky," and meaning " to cover," may be the ultimate source of both words. The slang use of " to hide," to flog or whip, means " to take the skin off, to flay."

Dialogus de seaccario puts its size at 100 acres, though this may he the long hundred, or 120. Perhaps, therefore, Selden is wisest when he says, " hides were of an incertain quantity." Certainly he gives a very good description of the early hide when he says (Titles of Honour): "Now a hide of land regularly is and was (as I think) as much land as might be well manured with one plough, together with pasture, meadow and wood competent for the maintenance of that plough, and the servants of the family." The view that the size of the hide varied from district to district is borne out by Professor Vinogradoff's more recent researches. In his English Society in the Eleventh Century he mentions that there was a hide of 48 acres in Wiltshire and one of 40 acres in Dorset. In addition some authorities distinguish between English hides and Welsh hides, and in Sussex the hide often contained 8 virgates. Some- times again in the nth Century hides were not merely fiscal units; they were shares in the land itself.

The fact that the hide was a unit of assessment, has been established by Mr J. H. Round in his Feudal England, and is regarded as throwing a most valuable light upon the many problems which present themselves to the student of Domesday. The process which converted the hide from a unit of measure- ment to a unit for assessment purposes is probably as follows. Being in general use to denote a large piece of land, and such pieces of land being roughly equal all over England, the hide was a useful unit on which to levy taxation, a use which dates doubtless from the time of the Danegeld. For some time the two meanings were used side by side, but before the Norman Conquest the hide, a unit for taxation, had quite supplanted the hide, a measure of land, and this was the state of affairs when in 1086 William L ordered his great inquest to be made. The formula used in Domesday varies from county to county, but a single illustration may be given. Huntedun Burg defendebat se ad geldum regis pro quarta parte de Hyrstingestan hundred pro L. hidis. This does not mean that the town of Huntingdon contained a certain, fixed number of square yards multiplied by 50, but that for purposes of taxation Huntingdon was regarded as worth 50 times a certain fiscal unit.

This view of the nature of the hide was hinted at by R. W. Eyton in A Key to Domesday and was accepted by Maitland. Its proof rests primarily upon the prevalence of the five-hide unit. By collating various documents which formed part of the Domesday inquest Mr Round has brought together for certain parts of England, especially for Cambridgeshire and Bedfordshire, the holdings of the various lords in the different vills, and vill after vill shows a total of 5 hides or 10 hides or only a slight discrepancy therefrom. A similar result is shown for the hundreds where multiples of 5 are almost universal, and the total hidage for the county of Worcester is very near the round figure of 1200, This arrangement is obviously artificial; it must have

been imposed upon the counties or the hundreds by the central authority and then divided among the vills. Another proof is found in what is called " beneficial nidation." It is shown that in certain cases the number of hides in a hundred has been reduced since the time of Edward the Confessor, and that this reduction had been transferred pro rata to the vills in the hundred. Thus Mr Round concludes that the hide was fixed " independently of area or value." Some slight criticism has been directed against the idea of " artificial hidation," but the most that can be said against it is that its proof rests upon isolated cases, a reproach which further research will doubtless remove. However, Professor Vinogradoff accepts the hide primarily as a fiscal unit " which corresponds only in a very rough way to the agrarian reality," and Maitland says the fiscal hide is " at its best a lame compromise between a unit of area and a unit of value."

What is the origin of the five-hide unit? Various conjectures have been hazarded, and the unit is undoubtedly older than the Danegeld. Rejecting the idea that it is of Roman or of British origin, and pointing to the serious difference in the rates at which the various counties were assessed, Mr Round thinks that it dates from the time when the various Anglo-Saxon kingdoms were independent. Possibly it was the unit of assess- ment for military service, possibly it was the recognized endow- ment of a Saxon thegn. In Anglo-Saxon times a man's stand- ing in society was dependent to a great extent upon the number of hides which he possessed; this statement is fully proved from the laws. Moreover, in the laws of the Wessex king, Ine, the value of a man's oath is expressed in hides, the oath for a king's thegn being probably worth 60 hides and that of a ceorl 5 hides.

The usual division of the hide was into virgates, a virgate being, after the Conquest at least, the normal holding of the

villein with two oxen. Mr Round holds that in Domesday at all events the hide always consisted of four virgates; Mr F. Seebohm in The English Village Community, although thinking that the normal hide " consisted as a rule of four virgates of 30 acres each," says that the Hundred Rolls for Huntingdon- shire show that " the hide did not always contain the same number of virgates." The virgate, it may be noted, consisted of a strip of land in each acre of the hide, and there is undoubtedly a strong case in favour of the equation 1 hide = 4 virgates.

Mr Seebohm, propounding his theory that English institutions are rooted in those of Rome, argues for some resemblance between the methods of

taxation of land in Rome and in England; he sees some connexion between the Roman centuria and the hide, and between the Roman system of taxation called jugatio and the English hidage. Professor Vinogradoff {Villainage in England) summarizes the views of those who hold a contrary opinion thus: " The curious fact that the normal holding, the hide, was equal all over England can be explained only by its origin; it came full-formed from Germany and remained unchanged in spite of all diversities of geographical and economical conditions."

In the Danish parts of England, or rather in the district of the " Five Boroughs," the carucate takes the place of the hide as the unit of value, and six supplants five, six carucates being the unit of assessment. In Leicestershire and in part of Lancashire the hide is quite different from what it is elsewhere in England. According to Mr Round the Leicestershire hide consisted of 18 carucates; Mr W. H. Stevenson {English Historical Review, vol. v.) argues that it contained only 12 and that it was a hundred and not a hide. Mr Seebohm thinks there was a solanda or double hide of 240 acres in Essex and other southern counties, but Mr Round does riot think that this word refers to a measure or unit of assessment at all. For Kent, however, the word sullung or solin, is used in Domesday Book and in the charters instead of hide and carucate as elsewhere, and Vinogradoff thinks that this contained from 180 to 200 acres.

Under the Norman and early Plantagenet kings a levy of two or more shillings on each hide of land was a usual and recognized method of raising money, royal and some other estates, however, as is seen from Domesday, not being hidated and not paying the tax. This geld, or tax, received several names, one of the most general being hidage (Lat. hidagium). "Hidage," says Vinogradoff, " is historically connected with the old English Danegeld system," and as Danegeld and then hidage it was levied long after its original purpose was forgotten, and was during the nth century " the most sweeping and the heaviest of all the taxes." Henry of Huntingdon says its usual rate was 2s. on each hide of land, and this was evidently the rate at the time of the famous dispute between Henry II. and Becket at Woodstock in 1163, but it was not always kept at this figure, as in 1084 William I. had levied a tax of 6s. on each hide, an unusual extortion. The feudal aids were levied on the hide. Thus in 1109 Henry I. raised one at the rate of 3s. . pef hide for the marriage of his daughter Matilda with the emperor Henry V., and in 1194, when money was collected for the ransom of Richard I., some of the taxation for this purpose seems to have been assessed according to the hidage given in Domesday Book.

By this time the word hidage as the designation of the tax was disappearing, its place being taken by the word carucage. The carucate (Lat. caruca, a plough) was a measure of land which prevailed in the north

of England, the district inhabited by people of Danish descent. Some authorities regard it as equivalent to the hide, others deny this identity. In n 98, however, when Richard I. imposed a tax of 5s. on each carucata terrae sive hyda, the two words were obviously interchangeable, and about the same time the size of the carucate was fixed at roo acres. The word carucage remained in use for some time longer, and then other names were given to the various taxes on land.

One or two other questions with regard to the hide still remain unsolved. What is the connexion, if any, between the hundred and a hundred hides? Again, was the size of the hide fixed at 120 acres to make the work of reckoning the amount of Danegeld, or hidage, a simple process? 120 acres to the hide, 240 pence to the pound, makes calculations easy. Lastly, is the English hide derived from the German hufe or huba? (A. W. H.)*

' HIEL, EMMANUEL (1834-1809), Belgian-Dutch poet and prose Writer, Was born at Dendermonde, in Flanders, in May 1834. He acted in various functions, from teacher and govern- ment official to journalist and bookseller, busily writing all the time both for the theatre and the magazines of North and South Netherlands. His last posts were those of librarian at the Industrial Museum and professor of declamation at the Conservatoire in Brussels. Among his better-known poetic works may be cited Looverkens ("Leaflets," 1857); Nieuwe Liedekens {" New Poesies," 1861); Gedichten ■(" Poems," 1863); Psalmen, Zangen, en Oratorios (" Psalms, Songs, and Oratorios," 1869); De Wind (1869), an inspiriting cantata, which had a large measure of success and was crowned; De Liefde in 't Leven ("Love in Life," 1870); Elle and Isa (two musical dramas, 1874); Liederen voor Groote en Kleine Kinderen ("Songs for Big and Small Folk," 1879); Jakoba van Beieren {" Jacquelein of Bavaria," a poetic drama, 1886); Mathilda van Denemarken (a lyrical drama, 1890). His collected poetical works were pub- lished in three volumes at Rousselaere in 1885. Hiel took an active and prominent part in the so-called " Flemish movement " in Belgium, and his name is constantly associated with those of Jan van Beers, the Willems and Peter Benoit. The last wrote some of his compositions to Hiel's verses, notably to his oratorios Lucifer (performed in London at the Royal Albert Hall and elsewhere) and De Schelde {" The Scheldt ") ; whilst the Dutch composer, Richard Hoi (of Utrecht), composed the music to Hiel's " Ode to Liberty," and van Gheluwe to the poet's " Songs for Big and Small Folk " (second edition, much enlarged, 1879), which has greatly contributed to their popularity in schools and among Belgian choral societies. Hiel also trans- lated several foreign lyrics. His rendering of Tennyson's Dora appeared at Antwerp in 187 1. For the national festival of 1880 at Brussels, to commemorate the fiftieth anniversary of Belgian independence, Hiel composed two cantatas, Belgen- land {" The Land of the Belgians ") and Eer Belgenland (" Honour to

Belgium "), which, set to music, were much appreciated. He died at Schaerbeek, near Brussels, on the 27th of August 1899. Hiel's efforts to counteract Walloon influences and bring about a rapprochement between the Netherlanders in the north and the Teutonic racial sympathizers across the Rhine made him very popular with both, and a volume of his best poems was in 1874 the first in a collection of Dutch authors published at Leipzig.

HIEMPSAL, the name of the two kings of Numidia. For Hiempsal I. see under Jugurtha. Hiempsal II. was the son of Gauda, the half-brother of Jugurtha. In 88 B.C., after the triumph of Sulla, when the younger Marius fled from Rome to Africa, Hiempsal received him with apparent friendliness, his real intention being to detain him as a prisoner. Marius discovered this intention in time and made good his escape with the assistance of the king's daughter. In 81 Hiempsal was driven from his throne by the Numidians themselves, or by Hiarbas, ruler of part of the kingdom, supported by Cn. Domitius Ahenobarbus, the leader of the Marian party in Africa. Soon afterwards Pompey was sent to Africa by Sulla to reinstate Hiempsal, whose territory was subsequently increased by the addition of some land on the coast in accordance with a treaty concluded with L. Aurelius Cotta. When the tribune P. Servilius Rullus introduced his agrarian law (63), these lands, which had been originally assigned to the Roman people by Scipio Africanus, were expressly exempted from sale, which roused the indignation of Cicero {De lege agraria, i. 4, ii. 22). From Suetonius {Caesar', 71) it is evident that Hiempsal was alive in 62. According to Sallust {Jugurtha, 17), he was the author of an historical work iri the Punic language.

Plutarch, Marius, 40, Pompey, 12; Appian, Bell, civ., i. 62. 80; Dio Cassius xli. 41.

HIERAPOLIS. 1. (Arabic Manbij or Mumbij) an ancient Syrian town occupying one of the finest sites in Northern Syria, in a fertile district about 16 m. S.W. of the confluence of the Sajur and Euphrates. There is abundant water supply from large springs. In 1879, after the Russo-Turkish war, a colony of

Circassians from Vidin (Widdin) was planted in the ruins, and the' result has been the constant discovery of antiquities, which find their way into the bazaars of Aleppo and Aintab. The place first appears in Greek as Bambyce, but Pliny (v. 23) tells us its Syrian name was Mabog. It was

doubtless an ancient Commagenian sanctuary; but history knows it first under the Seleucids, who made it the chief station on their main road between Antioch and Seleucia-on-Tigris; and as a centre of the worship of the Syrian Nature Goddess, Atargatis(.), it became known to the Greeks as the city of the sanctuary 'IepojroXis, and finally as the Holy City ' IepdxoXis. Lucian, a native of Commagene (or some anonymous writer) has immortalized this worship in the tract De Dea Syria, wherein are described the orgiastic luxury of the shrine and the tank of sacred fish, of which Aelian also relates marvels. Accord- ing to the De Dea Syria, the worship was of a phallic character, votaries offering little male figures of wood and bronze. There were also huge phalli set up like obelisks before the temple, which were climbed once a year with certain ceremonies, and decorated. For the rest the temple was of Ionic character with golden plated doors and roof and much gilt decoration. Inside was a holy chamber into which priests only were allowed to enter. Here were statues of a goddess and a god in gold, but the first seems to have been the more richly decorated with gems and other ornaments. Between them stood a gilt xoanon, which seems to have been carried outside in sacred processions. Other rich furniture is described, and a mode of divination by move- ments of a xoanon of Apollo. A great bronze altar stood in front, set about with statues, and in the forecourt lived numerous sacred animals and birds (but not swine) used for sacrifice. Some three hundred priests served the shrine and there were numerous minor ministrants. The lake was the centre of sacred festivities and it was customary for votaries to swim out and decorate an. altar standing in the middle of the water. Self-mutilation and other orgies went on in the temple precinct, and there was an elaborate ritual on entering the city and first visiting the shrine under the conduct of local guides, which reminds one of the Meccan Pilgrimage.

The temple was sacked by Crassus on his way to meet the Parthians (53 b. c); but in the 3rd century of the empire the city was the capital of the Euphratensian province and one of the great cities of Syria. Procopius called it the greatest in that part of the world. It was, however, ruinous when Julian collected his troops there ere marching to his defeat and death in Meso- potamia, and Chosroes I. held it to ransom after Justinian had failed to put it in a state of defence. Harun restored it at the end of the 8th century and it became a bone of contention between Byzantines, Arabs and Turks. The crusaders captured it from the Seljuks in the 12th century, but Saladin retook it (n 75), and later it became the headquarters of Hulagu and his Mongols, who completed its ruin. The remains are extensive, but almost wholly of late date, as is to be expected in the case of a city which survived into Moslem times. The walls are Arab, and no ruins of the great temple survive. The most noteworthy relic of antiquity is the sacred lake, on two sides of which can still be seen stepped quays and water-stairs. The

first modern account of the site is in a short narrative appended by H. Maundrell to his Journey from Aleppo to Jerusalem. He was at Mumbij in 1699.

The coinage of the city begins in the 4th century B.C. with an Aramaic series, showing the goddess, either as a bust with mural crown or as riding on a lion. She continues to supply the chief type even during imperial times, being generally shown seated with the tympanum in her hand. Other coins substitute the legend Geas Suptas 'lepoiroXiruv, within a wreath. It is interesting to note that from Bambyce (near which much silk was produced) were derived the bombycina veslis of the Romans and, through the crusaders, the bombazine of modern commerce.

See F. R. Chesney, Euphrates Expedition (1850) ; W. F. Ainsworth, Personal Narrative of the Euphrates Expedition (1888) ; E. Sachau, Reise in Syrien, &c. (1883); D. G. Hogarth in Journal of Hellenic Studies (1909).

2. A Phrygian city, altitude 1200 ft. on the right bank of the Churuk Su (Lycus). about 8 m. above its junction with the

Menderes (Maeander), situated on a broad terrace, 200 ft. above the valley and 6 m. N. of Laodicea. On the terrace rise calcareous springs, that have deposited vast incrustations of snowy white- ness. To these springs, which are warm and slightly sulphureous, and to the " Plutonium " — a hole reaching deep into the earth, from which issued a mephitic vapour — the place owed its celebrity and sanctity. Here, at an early date, a religious establishment (hieron) existed in connexion with the old Phrygian Kydrara, a settlement of the tribe Hydrelitae; and the town which grew round it became one of the greatest centres of Phrygian native life but of non-political importance. The chief religious festival was the Letoia, named after the goddess Leto, a local variety of the Mother Goddess (Cybele), who was honoured with orgiastic rites in which elements of the original Anatolian matriarchate and Nature-cult survived: there was also a worship of Apollo Lairbenos. Hierapolis was the seat of an early church (Col. iv. 13), with which tradition closely connects the apostle Philip. Epictetus, the philosopher, and Papias, a disciple of St John and author of a lost work on the Sayings of Jesus, were born there. Hierapolis is now easily reached from Gonjeli, a station on the Dineir railway about 7 m. distant. A village of Yuruks has gradually grown below the site. The native name for the place is apparently Pambuk Kale (though doubt has been thrown on the statement), and this has always been explained by the cotton- like appearance of the white incrustations. It should be noted, however, that this name, if genuine, is curiously like that given by the Syrians to the Commagenian Hierapolis (above), Bambyce, the origin of which it has been

suggested was a native name of the goddess Pambe or Mambe (whence Mabog). Considering that cotton is a comparatively modern phenomenon in Anatolia, it is worth suggesting that Pambuk in this case may be a survival of a primitive name, derived from the same goddess, Pambe. The goddesses of the two Hierapoleis were in any case closely akin. If an old native name has reappeared here after the decline of Greek influence, and been given a meaning in modern Turkish, it affords another instance of a very common feature of west Asian nomenclature. Combined with the petrified terraces, the ruins of Hierapolis present the most attractive of the easily accessible spectacles in Asia Minor. They are remarkable for the long avenue of tombs, mostly inscribed sarcophagi on plinths, by which the city is approached from the W., and for a very perfect theatre partly excavated in the hill at the N. side of the site. Stage buildings as well as auditorium are well preserved. On the S., just above the white terraces and largely blocked with petrified deposit, stand large baths, into which the natural warm spring was once conducted. Behind these is a fine triumphal arch, whence runs a colonnade. Ruins of several churches survive, and also of a large basilica. There is a sulphureous pool which may represent the " Plutonium," but it has no such deadly power as was ascribed to that pond. Ramsay thinks that the " Plu- tonium " was obliterated by Christians in the 4th century. Over 300 inscriptions have been collected, mostly sepulchral, whence Ramsay has deduced interesting facts about the very early Christian community which existed here. The site has been often visited and described, and was systematically examined in 1887 by parties under W. M. Ramsay and K. Humann respectively.

See K. Humann, Altertilmer v. Hierapolis (1888); Sir W. M. Ramsay, Cities and Bishoprics of Phrvgia, vol. i. (1895).

(C.W.W.; D. G. H.)

HIERARCHY (Gr. Upos, holy, and apxw, to rule), the office of a steward or guardian of holy things, not a " ruler of priests " or "priestly ruler" (see Boeckh, Corp. inscr. Gr. No. 1570), a term commonly used in ecclesiastical language to denote the aggregate of those persons who exercise authority within the Christian Church, the patriarchate, episcopate or entire three- fold order of the clergy. The word wpapxia, which does not occur in any classical Greek writer, owes its present extensive currency to the celebrated writings of Dionysius Areopagiticus. Of these the most important are the two which treat of the celestial and of the ecclesiastical hierarchy respectively. De- fining hierarchy as the " function which comprises all sacred things," or, more fully, as " a sacred order and science and

activity, assimilated as far as possible to the godlike, and elevated to the imitation of God proportionately to the Divine illuminations conceded to it," the author proceeds to enumerate the nine orders of the heavenly host, which are subdivided again into hierarchies or triads, in descending order, thus: Seraphim, Cherubim, Thrones; Dominations, Virtues, Powers; Principalities, Archangels, Angels. These all exist for the common object of raising men through ascending stages of purification and illumination to perfection. The ecclesiastical or earthly hierarchy is the counterpart of the other. In it the first or highest triad is formed by baptism, communion and chrism. The second triad consists of the three orders of the ministry, bishop or hierarch, priest and minister or deacon (lepapxvs, lep€vs, \urovpyos); this is the earliest known in- stance in which the title hierarch is applied to a bishop. The Ihird or lowest triad is made up of monks, "initiated" and catechumens. To Dionysius may be traced, through Thomas Aquinas and other Catholic writers of the intervening period, the definition of the term usually given by Roman Catholic writers — " coetus seu ordo praesidum et sacrorum ministrorum ad regendam ecclesiam gignendamque in hominibus sanctitatem divinitus institutus" 1 — although it immediately rests upon the authority of the sixth canon of the twenty-third session of the council of Trent, in which anathema is pronounced upon all who deny the existence within the Catholic Church of a hierarchy instituted by divine appointment, and consisting of bishops, priests and ministers.' 2 (See Order, Holy).

HIERATIC, priestly or sacred (Gr. lepaTiKos, iepos, sacred), a term particularly applied to a style of ancient Egyptian writing, which is a simplified cursive form of hieroglyphic. The name was first given by Champollion (see Egypt, § Language).

HIERAX, or Hieracas, a learned ascetic who flourished about the end of the 3rd century at Leontopolis in Egypt, where he lived to the age of ninety, supporting himself by calligraphy and devoting his leisure to scientific and literary pursuits, especially to the study of the Bible. He was the author of Biblical commentaries both in Greek and Coptic, and is said to have composed many hymns. He became leader of the so-called sect of the Hieracites, an ascetic society from which married persons were excluded, and of which one of the leading tenets was that only the celibate could enter the kingdom of heaven. He asserted that the suppression of the sexual impulse was emphatically the new revelation brought by the Logos, and appealed to 1 Cor. vii., Heb. xii. 14, and Matt. xix. 12, xxv. 21. Hierax may be called the connecting link bet ween Origen and the Coptic monks. A man of deep learning and prodigious memory, he seems to have developed Origen's Christology in the direction of Athanasius. He held that the Son was a torch lighted at the torch of the Father, that Father and Son are a

bipartite light. He repudiated the ideas of a bodily resurrection and a material paradise, and on the ground of 2 Tim. ii. 5 questioned the salvation of even baptized infants, " for without knowledge no conflict, without conflict no reward." In his insistence on virginity as the specifically Christian virtue he set up the great theme of the church of the 4th and 5th centuries.

HIERO (strictly Hieron), the name of two rulers of Syracuse.

Hif.ro' I. was the brother of Gelo, and tyrant of Syracuse from 478 to 467/6 B.C. During his reign he greatly increased the power of Syracuse. He removed the inhabitants of Naxos and Catana to Leontini, peopled Catana (which he renamed Aetna) with Dorians, concluded an alliance with Acragas (Agrigentum), and espoused the cause of the Locrians against Anaxilaus, tyrant of Rhegium. His most important achieve- ment was the defeat of the Etruscans at Cumae (474), by which he saved the Greeks of Campania. A bronze helmet (now in the British Museum), with an inscription commemorating

1 Perrone, De locis theologicis, pt. i., sec. i. cap. 2.

2 Si quis dixerit in ecclesia catholica non esse hierarchiam divina ordinatione institutam, quae constat ex cpiscopis, presbyteris, et ministris: anathema sit.

the event, was dedicated at Olympia. Though despotic in his rule Hiero was a liberal patron of literature. He died at Catana in 467.

See Diod. Sic. xi. 38-67; Xenophon, Hiero, 6. 2 ; E. Liibbert, Syrakus zur Zeit des Gelon und Hieron (1875); for his coins see Numismatics (section Sicily).

Hiero II., tyrant of Syracuse from 270 to 216 B.C., was the illegitimate son of a Syracusan noble, Hierocles, who claimed descent from Gelo. On the departure of Pyrrhus from Sicily (275) the Syracusan army and citizens appointed him commander of the troops. He materially strengthened his position by marrying the daughter of Leptines, the leading citizen. In the meantime, the Mamertines, a body of Campanian mercenaries who had been employed by Agathocles, had seized the strong- hold of Messana, whence they harassed the Syracusans. They were finally defeated in a pitched battle near Mylae by Hiero, who was only prevented from capturing Messana by Carthaginian interference. His grateful countrymen then chose him king (270). In 264 he again returned to the attack, and the Mamer- tines called in the aid of Rome. Hiero at once joined the Punic leader Hanno, who had recently landed in Sicily; but being defeated by the

consul Appius Claudius, he withdrew to Syracuse. Pressed by the Roman forces, in 263 he was compelled to conclude a treaty with Rome, by which he was to rule over the south-east of Sicily and the eastern coast as far as Tauromenium (Polybius i. 8-16; Zonaras viii. 9). From this time till his death in 216 he remained loyal to the Romans, and frequently assisted them with men and provisions during the Punic wars (Livy xxi. 49-51, xxii. 37, xxiii. 21). He kept up a powerful fleet for defensive purposes, and employed his famous kinsman Archimedes in the construction of those engines that, at a later date, played so important a part during the siege of Syracuse by the Romans.

A picture of the prosperity of Syracuse during his rule is given in the sixteenth idyll of Theocritus, his favourite poet. See Diod. Sic. xxii. 24-xxvi. 24; Polybius i. 8-vii. 7; Justin xxiii. 4.

HIEROCLES, proconsul of Bithynia and Alexandria, lived during the reign of Diocletian (a.d. 284-305). He is said to have been the instigator of the fierce persecution of the Christians under Galerius in 303. He was the author of a work (not extant) entitled X6701. (piXaXriOeis wpos tovs Xpicmavovs in two books, in which he endeavoured to persuade the Christians that their sacred books were full of contradictions, and that in moral influence and miraculous power Christ was inferior to Apollonius of Tyana. Our knowledge of this treatise is derived from Lactantius {Instit. div. v. 2) and Eusebius, who wrote a refutation entitled 'AvTippr/Tuids 7rpos ra Tepo/cXeoiis.

HIEROCLES OF ALEXANDRIA, Neoplatonist writer, flourished c. a.d. 430. He studied under Jhe celebrated Neo- platonist Plutarch at Athens, and taught for some years in his native city. He seems to have been banished from Alexandria and to have taken up his abode in Constantinople, where he gave such offence by his religious opinions that he was thrown into prison and cruelly flogged. The only complete work of his which has been preserved is the commentary on the Carmina Aurea of Pythagoras. It enjoyed a great reputation in middle age and Renaissance times, and there are numerous translations in various European languages. Several other writings, especi- ally one on providence and fate, a consolatory treatise dedicated to his patron Olympiodorus of Thebes, author of loropuot X6701, are quoted or referred to by Photius and Stobaeus. The collection of some 260 witticisms (aarela) called $tXo7e\&;s (ed. A. Eberhard, Berlin, 1869), attributed to Hierocles and Philagrius, has no connexion with Hierocles of Alexandria, but is probably a compilation of later date, founded on two older collections. It is now agreed that the fragments of the Elements of Ethics ('II0ikij oroixwoxm) preserved in Stobaeus are from a work by a Stoic named Hierocles, contemporary of Epictetus, who has been identified with the " Hierocles Stoicus vir sanctus et gravis " in Aulus

Gellius (ix. 5. 8). This theory is confirmed by the discovery of a papyrus (ed. H. von Arnim in Berliner Klassikertexte, iv. 1906; see also C. Prachter, Hierokles der Sloikcr, 1901).

There is an edition of the commentary by F. W. Mullach in Fragmenta philosophorum Graecorum (i860), 1. 408, including full information concerning Hierocles, the poem and the commentary; see also E. Zeller, Philosophic der Griechen (2nd ed.), iii. 2, pp. 681-687; W. Christ, Geschichte der griechischen Literatur (1898), pp. 834, 849.

Another Hierocles, who flourished during the reign of Justinian, was the author of a list of provinces and towns in the Eastern Empire, called SwUSrinos (" fellow-traveller " ; ed. A. Burckhardt, 1893); it was one of the chief authorities used by Constantine Porphyrogenitus in his work on the " themes " of the Roman Empire (see C. Krumbacher, Geschichte der byzantinischen Literatur, 1897, p. 417). In Fabricius's Bibliotheca Graeca (ed. Harles), i. 791, sixteen persons named Hierocles, chiefly literary, are men- tioned.

HIEROGLYPHICS (Gr. Upas, sacred, and 7X1xˆ7, carving), the term used by Greek and Latin writers to describe the sacred characters of the ancient Egyptian language in its classical phase. It is now also used for various systems of writing in which figures of objects take the place of conventional signs. Such characters which symbolize the idea of a thing without expressing the name of it are generally styled " ideographs " (Gr. Idea, idea, and ypcupav, to write), e.g. the Chinese characters.

See Egypt, Language; Cuneiform; Inscriptions and Writing.

HIERONYMITES, a common name for three or four con- gregations of hermits living according to the rule of St Augustine with supplementary regulations taken from St Jerome's writings. Their habit was white, with a black cloak. (1) The Spanish Hieronymites, established near Toledo in 1374. The order soon became popular in Spain and Portugal, and in 141 5 it numbered 25 houses. It possessed some of the most famous monasteries in the Peninsula, including the royal monastery of Belem near Lisbon, and the magnificent monastery built by Philip II. at the Escurial. Though the manner of life was very austere the Hierpnymites devoted themselves to studies and to the active work of the ministry, and they possessed great influence both at the Spanish and the Portuguese courts. They went to Spanish and Portuguese America and played a considerable part in

Christianizing and civilizing the Indians. There were Hieronymite nuns founded in 1375, who became very numerous. The order decayed during the 18th century and was completely suppressed in 1835. (2) Hieronymites of the Observance, or of Lombardy: a reform of (1) effected by the third general in 1424; it embraced seven houses in Spain and seventeen in Italy, mostly in Lombardy. It is now extinct. (3) Poor Hermits of St Jerome, established near Pisa in 1377: it came to embrace nearly fifty houses whereof only one in Rome and one in Viterbo survive. (4) Hermits of St Jerome of the congregation of Fiesole, established in 1406: they had forty houses but in 1668 they were united to (3).

See Helyot, Histofre des ordres religieux (1714), iii. cc. 57-60, iv. cc. 1-3; Max Heimbucher, Orden und Kongregationen (1896), i. §70; and art. " Hieronymiten " in Herzog-Hauck, Realencyklopadie (ed. 3), and in Welte and Wetzer, Kirchenlexicon (ed. 2). (E. C B.)

HIERONYMUS OF CARDIA, Greek general and historian, contemporary of Alexander the Great. After the death of the king he followed the fortunes of his friend and fellow-countryman Eumenes. He was wounded and taken prisoner by Antigonus, who pardoned him and appointed him superintendent of the asphalt beds in the Dead Sea. He was treated with equal friendliness by Antigonus's son Demetrius, who made him pole-march of Thespiae, and by Antigonus Gonatas, at whose court he died at the age of 104. He wrote a history of the Diadochi and their descendants, embracing the period from the death of Alexander to the war with Pyrrhus (323-272 B.C.), which is one of the chief authorities used by Diodorus Siculus (xviii.-xx.) and also by Plutarch in his life of Pyrrhus. He made use of official papers and was careful in his investigation of facts. The simplicity of his style rendered his work unpopular, but it is probable that it was on a high level as compared with that of his contemporaries. In the last part of his work he made a praiseworthy attempt to acquaint the Greeks with the character and early history of the Romans. He is reproached by Pausanias (i. 9. 8) with unfairness towards all rulers with the exception of Antigonus Gonatas.

See Lucian, Macrobii, 22; Plutarch, Demetrius, 39; Diod. Sic. xviii. 42. 44. 50, xix. 100; Dion. Halic. Antiq. Rom. i. 6; F. Bruckner, " De vita et scriptis Hieronymi Cardii " in Zeitschrijt fur die Alterthumswissenschaft (1842) ; F. Reuss, Hieronymos von Kardia (Berlin, 1876); C. Wachsmuth, Einleitung in das Studium der alien Geschichte (1895) '< fragments in C. W. Miiller, Frag. hist. Graec. ii. 450-461.

HIERRO, or Ferro, an island in the Atlantic Ocean, forming part of the Spanish archipelago of the Canary Islands (q.v.). Pop. (1900) 6508; area 107 sq. m. Hierro, the most westerly and the smallest island of the group,

is somewhat crescent- shaped. Its length is about 18 m., its greatest breadth about 15 ni., and its circumference 50 m. It lies 92 m. W.S.W. of Teneriffe. Its coast is bound by high, steep rocks, which only admit of one harbour, but the interior is tolerably level. Its hill-tops in winter are sometimes wrapped in snow. Better and more abundant grass grows here than on any of the other islands. Hierro is exposed to westerly gales which frequently inflict great damage. Fresh water is scarce, but there is a sulphurous spring, with a temperature of 102 Fahr. The once celebrated and almost sacred Til tree, which was reputed to be always distilling water in great abundance from its leaves, no longer exists. Only a small part of the cultivable land is under tillage, the inhabitants being principally employed in pasturage. Valverde (pop. about 3000) is the principal town. Geographers were formerly in the habit of measuring all longitudes from Ferro, the most westerly land known to them. The longitude assigned at first has, however, turned out to be erroneous; and the so-called " Longitude of Ferro " does not coincide with the actual longitude of the island.

HIGDON (or Higden), RANULF (c. 1299-c. 1363), English chronicler, was a Benedictine monk of the monastery of St Werburg in Chester, in which he lived, it is said, for sixty-four years, and died " in a good old age," probably in 1363. Higdon was the author of a long chronicle, one of several such works based on a plan taken from Scripture, and written for the amusement and instruction of his society. It closes the long series of general chronicles, which were soon superseded by the invention of printing. It is commonly styled the Polychronicon, from the longer title Ranulphi Castrensis, cognomine Higdon, Polychronicon (sive Historia Polycratica) ab initio mundi usque ad mortem regis Edwardi III. in septem libros dispositum. The work is divided into seven books, in humble imitation of the seven days of Genesis, and, with exception of the last book, is a summary of general history, a compilation made with con- siderable style and taste. It seems to have enjoyed no little popularity in the 15th century. It was the standard work on general history, and more than a hundred MSS. of it are known to exist. The Christ Church MS. says that Higdon wrote it down to the year 1342; the fine MS. at Christ's College, Cam- bridge, states that he wrote to the year 1344, after which date, with the- omission of two years, John of Malvern, a monk of Worcester, carried the history on to 1357, at which date it ends. According, however, to its latest editor, Higdon's part of the work goes no further than 1326 or 1327 at latest, after which time it was carried on by two continuators to the end. Thomas Gale, in his Hist. Brit. &°c, scriptores, xv. (Oxon., 1691), published that portion of it, in the original Latin, which comes down to 1066. Three early translations of the Polychronicon exist. The first was made by John of Trevisa, chaplain to Lord Berkeley, in 1387, and was

printed by Caxton in 1482; the second by an anonymous writer, was written between 1432 and 1450; the third, based on Trevisa's version, with the addition of an eighth book, was prepared by Caxton. These versions are specially valuable as illustrating the change of the English language during the period they cover.

The Polychronicon, with the continuations and the English versions, was edited for the Rolls Series (No. 41) by Churchill Babington (vols. i. and ii.) and Joseph Rawson Lumby (1865-1886). This edition was adversely criticized by Mandell Creighton in the Eng. Hist. Rev. for October 1888.

HIGGINS, MATTHEW JAMES (1810-1868), British writer over the nom-de-plume " Jacob Omnium," which was the title of his first magazine article, was born in County Meath, Ireland,

on the 4th of December 1810. His letters in The Times were instrumental in exposing many abuses. He was a frequent con- tributor to the Cornhill, and was a friend of Thackeray, who dedicated to him The Adventures of Philip, and one of his ballads, " Jacob Omnium's Hoss," deals with an incident in Higgins's career. He died on the 14th of August 1868. Some of his articles were published in 1875 as Essays on Social Subjects.

HIGGINSON, THOMAS WENTWORTH (1823-1911), American author and soldier, was born in Cambridge, Massachusetts, on the 22nd of December 1823. He was a descendant of Francis Higginson (1588-1630), who emigrated from Leicestershire to the colony of Massachusetts Bay and was a minister of the church of Salem, Mass., in 1629-1630; and a grandson of Stephen Higginson (1743-1828), a Boston merchant, who was a member of the Continental Congress in 1783, took an active part in sup- pressing Shay's Rebellion, was the author of the " Laco " letters (1789), and rendered valuable services to the United States government as navy agent from the nth of May to the 22nd of June 1798. Graduating from Harvard in 1841, he was a school- master for two years, studied theology at the Harvard Divinity School, and was pastor in 1847-18500! the First Religious Society (Unitarian) of Newburyport. Massachusetts, and of the Free Church at Worcester in 1852-1858. He was a Free Soil candi- date ior Congress (1850), but was defeated; was indicted with Wendell Phillips and Theodore Parker for participation in the attempt to release the fugitive slave, Anthony Burns, in Boston (1853); was engaged in the effort to make Kansas a free state after the passage of the Kansas-Nebraska Bill of 1854; and during the Civil War was captain in the 51st Massachusetts

Volunteers, and from November 1862 to October 1864, when he was retired because of a wound received in the preceding August, was colonel of the First South Carolina Volunteers, the first regiment recruited from former slaves for the Federal service. He de- scribed his experiences InArmy Life in a Black Regiment (1870). In politics Higginson was successively a Republican, an Inde- pendent and a Democrat. His writings show a deep love of nature, art and humanity, and are marked by vigour of thought, sincerity of feeling, and grace and finish ot style. In his Common Sense About Women (1881) and his Women and Men (1888) he advocated equality of opportunity and equality of rights for the two sexes.

Among his numerous books are Outdoor Papers (1863) ; Malbone: an Oldport Romance (1869); Life of Margaret Fuller Ossoli (in " American Men of Letters " series, 1884) ; A Larger History of the United States of America to the Close of President Jackson's Ad- ministration (1885); The Monarch of Dreams (1886); Travellers and Outlaws (1889); The Afternoon Landscape (1889), poems and translations; Life of Francis Higginson (in " Makers of America," 1 891); Concerning All of Us (1892); The Procession of the Flowers and Kindred Papers (1897); Henry Wadsworth Longfellow (in " American Men of Letters " series, 1902); John Greenleaf Whittier (in " English Men of Letters" series, 1902); A Reader's History of American Literature (1903), the Lowell Institute lectures for 1903, edited by Henry W. Boynton; and Life and Times of Stephen Higginson (1907). His volumes of reminiscence, Cheerful Yesterdays (1898), Old Cambridge (1899), Contemporaries (1899), and Part of a Man's Life (1905), are characteristic and charming works. His collected works were published in seven vols. (1900).

HIGHAM FERRERS, a market town and municipal borough in the Eastern parliamentary division of Northamptonshire, England, 63 m. N.N.W. from London, on branches of the London & North- Western and Midland railways. Pop. (1901), 2540. It is pleasantly situated on high ground above the south bank of the river Nene. The church of St Mary is among the most beautiful of the many fine churches in Northamptonshire. To the Early English chancel a very wide north aisle, resembling a second nave, was added in the Decorated period, and the general appear- ance of the chancel, with its north aisle and Lady-chapel, is Decorated. The tower with its fine spire and west front was partially but carefully rebuilt in the 17th century. Close to the church, but detached from it, stands a beautiful Perpendicular building, the school-house, founded by Archbishop Chichele in 1422. The Bede House, a somewhat similar structure by the same founder, completes a striking group of buildings. In the town are remains of Chichele's college. Higham Ferrers shares

in the widespread local industry of shoemaking. The town is governed by a

mayor, 4 aldermen and 12 councillors, Area, 1945 acres.

Higham (Hecham, Heccam, Hegham Ferers) was evidently a large village before the Domesday Survey. It was then held by. William Peverel of the king, but on the forfeiture of the lordship by his son it was granted in 1199 to William Ferrers, earl of Derby. On the outlawry of Robert his grandson it passed to Edmund, earl of Lancaster, and, reverting to the crown in 1322, was granted to Aymer de Valence, earl of Pembroke, but escheated to the crown in 1327, and was granted to Henry, earl of Lancaster. The castle, which may have been built before Henry III. visited Higham in 1229, is mentioned in 1322, but had been destroyed by 1540. It appears by the confirmation of Henry III. in 1251 that the borough originated in the previous year when William de Ferrers, earl of Derby, manumitted by charter ninety-two persons, granting they should have a free borough. A mayor was elected from the beginning of the reign of Richard II., while a : town hall is mentioned in 1395. The revenues of Chichele's college were given to the corporation by the charter of 1566, whereby the borough returned one representative to parliament, a privilege enjoyed until 1832. James I. in 1604 gave the mayor the commission of the peace with other privileges which were confirmed by Charles II. in 1664. The old charters were sur- rendered in 1684 and a new grant obtained; a further charter was granted in 1887.

HIGHGATE, a northern district of London, England, partly in the metropolitan borough of St Pancras, but extending into Middlesex. It is a high-lying district, the greatest elevation being 426 ft. The Great North Road passes through Highgate, which is supposed to have received its name from the toll-gate erected by the bishop of London when the road was formed through his demesne in the 14th century. It is possible, however, that " gate " is used here in its old signification, and that the name means simply high road. The road rose so steeply here that in 181 2 an effort was made to lessen the slope for coaches by means of an archway, and a new way was completed in 1900. In the time of stage-coaches a custom was introduced of making ignorant persons believe that they required to be sworn and admitted to the freedom of the Highgate before being allowed to pass the gate, the fine of admission being a bottle of wine. Not a few famous names occur among the former residents of Highgate. Bacon died here in 1626; Coleridge and Andrew Marvell, the poets, were residents. Cromwell House, now a convalescent home, was presented by Oliver Cromwell to his eldest daughter Bridget on her marriage with Henry Ireton (January 15, 1646/7). Lauderdale House, now attached to the public grounds of Wateriow Park, belonged to the Duke of Lauderdale, one of the " Cabal " of Charles II. Among various institutions may be mentioned Whittington's almshouses, near Whittington Stone, at the foot of Highgate Hill, on which the future mayor of London is reputed to have been resting when he heard the peal of Bow bells and " turned again." Highgate

grammar school was founded (1 562-1 565) by Sir Roger Cholmley, chief-justice. St Joseph's Retreat is the mother-house of the Passionist Fathers in England. There is an extensive and beautiful cemetery on the slope below the church of St Michael. HIGHLANDS, THE, that part of Scotland north-west of a line drawn from Dumbarton to Stonehaven, including the Inner and Outer Hebrides and the county of Bute, but excluding the Orkneys and Shetlands, Caithness, the flat coastal land of the., shires of Nairn, Elgin and Banff, and all East Aberdeenshire (see Scotland). This area is to be distinguished frorn the Lowlands by language and race, the preservation of the Gaelic speech being characteristic. Even in a historical sense the. Highlanders were a separate people from the Lowlanders, with whom, during many centuries, they shared nothing in common. The town of Inverness is usually regarded as the capital of the Highlands. The Highlands consist of an old dissected plateau, or block, of ancient crystalline rocks with incised valleys and lochs carved by the action of mountain streams and by ice, the resulting topography being a wide area of irregularly distributed

mountains whose summits have nearly the same height above sea-level, but whose bases depend upon the amount of denuda- tion to which the plateau has been subjected in various places. The term " highland " is used in physical geography for any elevated mountainous plateau.

HIGHNESS, literally the quality of being lofty or high, a term used, as are so many abstractions, as a title of dignity and honour, to signify exalted rank or station. These abstractions arose in great profusion in the Roman empire, both of the East and West, and " highness " is to be directly traced to the altitudo and celsitudo of the Latin and the vˆ/tfhcrrqs of the Greek emperors. Like other " exorbitant and swelling attri- butes " of the time, they were conferred on ruling princes generally. In the early middle ages such titles, couched in the second or third person, were " uncertain and much more arbitrary (according to the fancies of secretaries) than in the later times " (Selden, Titles of Honour, pt. i. ch. vii. ioo). In English usage, " Highness " alternates with " Grace " and " Majesty," as the honorific title of the king and queen until the time of James I. Thus in documents relating to the reign of Henry VIII. all three titles are used indiscriminately; an example is the king's judgment against Dr Edward Crome (d. 1562), quoted, from the lord chamberlain's books, ser. 1, p. 791, in Trans. Roy. Hist. Soc. N.S. xix. 299, where article

15 begins with "Also the Kinges Highness" hath ordered,

16 with " Kinges Majestie," and 17 with " Kinges Grace." In the Dedication of the Authorized Version of the Bible of 161 1 James I. is still styled " Majesty " and " Highness "; thus, in the first paragraph, " the appearance of Your Majesty, as of the Sun in his strength, instantly dispelled those supposed and surmised mists . . . especially when we beheld the government established in Your Highness and Your hopeful Seed, by an undoubted title." It was, however, in James I.'s reign that " Majesty " became- the official title. It may be noted that Cromwell, as lord protector, and his wife were styled " Highness." In present usage the following members of the British Royal Family are addressed as " Royal Highness" (H.R.H.): all sons and daughters, brothers and sisters, uncles and aunts of the reigning sovereign, grandsons and granddaughters if children of sons, and also great grand- children (decree of 31st of May 1898) if children of an eldest son of any prince of Wales. Nephews, nieces and cousins and grandchildren, offspring of daughters, are styled " Highness " only. A change of sovereign does not entail the forfeiture of the title " Royal Highness," once acquired, though the father of the bearer has become a nephew and not a grandson of the sovereign. The principal feudatory princes of the Indian empire are also styled " Highness."

As a general rule the members of the blood royal of an Imperial or Royal house are addressed as " Imperial " or " Royal High- ness " (Allesse Imperiale, Royale, Kaiserliche, Konigliche Hoheit) respectively. In Germany the reigning heads of the Grand Duchies bear the title of Royal or Grand Ducal Highness {Konigliche or Gross-Herzogliche Hoheit), while the members of the family are addressed as Hoheit, Highness, simply. Hoheit is borne by the reigning dukes and the princes and princesses of their families. The title " Serene Highness " has also an antiquity equal to that of " highness," for yaXrjvoTris and 17/jeponjs were titles borne by the Byzantine rulers, and serenitas and serenissimus by the emperors Honorius and Arcadius. The doge of Venice was also styled Serenissimus. Selden (op. cit. pt. ii. ch. x. 739) calls this title " one of the greatest that can be given to any Prince that hath not the superior title of King." In modern times " Serene Highness " (Allesse Serinissime) is used as the equivalent of the German Durchlaucht, a stronger form of Erlaucht, illustrious, represented in the Latin honorific superillustris. Thackeray's burlesque title " Transparency " in the court at Pumpernickel very accurately gives the meaning. The title of Dttrchlaucht was granted in 1375 by the emperor Charles IV. to the electoral princes (Kur- fiirsten). In the 17th century it became the general title borne by the heads of the reigning princely states of the empire

(reichstandische Fursten), as Erlaucht by those of the countly houses (reichstandische Grafen). In 1825 the German Diet agreed to grant the title Durchlaucht to the heads of the media- tized princely houses whether

domiciled in Germany or Austria, and it is now customary to use it of the members of those houses. Further, all those who are elevated to the rank of prince (Filrst) in the secondary meaning of that title (see Prince) are also styled Durchlaucht. In 1829 the title of Erlaucht, which had formerly been borne by the reigning counts of the empire, was similarly granted to the mediatized countly families (see Almanack de Gotha, 1909, 107).

HIGH PLACE, in the English version of the Old Testament, the literal translation of the Heb. bamah. This rendering is etymologically correct, as appears from the poetical use of the plural in such expressions as to ride, or stalk, or stand on the high places of the earth, the sea, the clouds, and from the corresponding usage in Assyrian; but in prose bamah is always a place of worship. It has been surmised that it was so called because the places of worship were originally upon hill-tops, or that the bamah was an artificial platform or mound, perhaps imitating the natural eminence which was the oldest holy place, but neither view is historically demonstrable. The development of the religious significance of the word took place probably not in Israel but among the Canaanites, from whom the Israelites, in taking possession of the holy places of the land, adopted the name also.

. In old Israel every town and village had its own place of sacrifice, and the common name for these places was bamah, which is synonymous with mikddsh, holy place (Amos vii. 9; Isa. xvi. 12, &c). From the Old Testament and from existing remains a good idea may be formed of the appearance of such a place of worship. It was often on the hill above the town, as at Ramah (1 Sam. ix. 12-14); there was a stele (massebah), the seat of the deity, and a wooden post or pole (asherdh), which marked the place as sacred and was itself an object of worship; there was a stone altar, often of con- siderable size and hewn out of the solid rock 1 or built of unhewn stones (Ex. xx. 25; see Altar), on which offerings were burnt (mizbeh, lit. "slaughter place"); a cistern for water, and perhaps low stone tables for dressing the victims; sometimes also a hall (lishkah) for the sacrificial feasts.

Around these places the religion of the ancient Israelite centred; at festival seasons, or to make or fulfil a vow, he might journey to more famous sanctuaries at a distance from his home, but ordinarily the offerings which linked every side of his life to religion were paid at the bamah of his own town. The building of royal temples in Jerusalem or in Samaria made no change in this respect; they simply took their place beside the older sanctuaries, such as Bethel, Dan, Gilgal, Beersheba, to which they were, indeed, inferior in repute.

The religious reformers of the 8th century assail the popular religion as corrupt and licentious, and as fostering the mon- strous delusion that

immoral men can buy the favour of God by worship; but they make no difference in this respect between the high places of Israel and the temple in Jerusalem (cf. Amos v. 21 sqq.; Hos. iv.; Isa. i. 10 sqq.); Hosea stigmatizes the whole cultus as pure heathenism — Canaanite baal-worship adopted by apostate Israel. The fundamental law in Deut. xii. prohibits sacrifice at every place except the temple in Jerusalem ; in accord- ance with this law Josiah, in 621 B.C., destroyed and desecrated the altars (bamoth) throughout his kingdom, where Yahweh had been worshipped from time immemorial, and forcibly removed their priests to Jerusalem, where they occupied an inferior rank in the temple ministry. In the prophets of the 7th and 6th centuries the word bamoth connotes " seat of heathenish or idolatrous worship "; and the historians of the period apply the term in this opprobrious sense not only to places sacred to other gods but to the old holy places of Yahweh in the cities and villages of Judah, which, in their view, had been illegitimate from the building of Solomon's temple, and therefore not really seats of the worship of Yahweh; even the most pious kings of 1 Several altars of this type have been preserved.*

Judah are censured for tolerating their existence. The reaction which followed the death of Josiah (608 B.C.) restored the old altars of Yahweh; they survived the destruction of the temple in 586, and it is probable that after its restoration (520-516 B.C.) they cnly slowly disappeared, in consequence partly of the natural predominance of Jerusalem in the little territory of Judaea, partly of the gradual establishment of the supremacy of the written law over custom and tradition in the Persian period.

It may not be superfluous to note that the deuteronomic dogma that sacrifice can be offered to Yahweh only at the temple in Jerusalem was never fully established either in fact or in legal theory. The Jewish military colonists in Elephantine in the 5th century B.C. had their altar of Yahweh beside the high way; the Jews in Egypt in the Ptolemaic period had, besides many local sanctuaries, one greater temple at Leontopolis, with a priesthood whose claim to " valid orders " was much better than that of the High Priests in Jerusalem, and the legitimacy of whose worship is admitted even by the Palestinian rabbis.

See Baudissin, " Hohendienst," Protestantische Realencyklopadie (viii. 177-195); Hoonacker, Le Lieu du culte dans la legislation rituelledesHebreux (1894); v. Gall, Altisraelilische Kultstadte (1898).*

HIGH SEAS, an expression in international law meaning all those parts of

the sea not under the sovereignty of adjacent states. Claims have at times been made to exclusive dominion over large areas of the sea as well as over wide margins, such as a 100 m., 60 m., range of vision, &c, from land. The action and reaction of the interests of navigation, however, have brought states to adopt a limitation first enunciated by Bynkershoek in the formula " terrae dominium finitur ubi finitur armorum vis." Thenceforward cannon-shot range became the determining factor in the fixation of the margin of sea afterwards known as " territorial waters " (q.v.). With the exception of these terri- torial waters, bays of certain dimensions and inland waters surrounded by territory of the same state, and serving only as a means of access to ports of the state by whose territory they are surrounded, and some waters allowed by immemorial usage to rank as territorial, all seas and oceans form part of the high sea. The usage of the high sea is free to all the nations of the world, subject only to such restrictions as result from respect for the equal rights of others, and to those which nations may contract with each other to observe. An interesting case affecting land-locked seas was that of the Emperor of Japan v. The Peninsular and Oriental Steam. Navigation Company, in which a collision had taken place in the inland sea of Japan. The British Supreme Court at Shanghai declared this sea to form part of the high sea. On appeal to the privy council, the appellants were successful. Though the decision of the Shanghai court on the point in question was not dealt with by the privy council, Japan continues to treat her inland sea as under her exclusive jurisdiction. (T. Ba.)

HIGHWAY, a public road over which all persons have full right of way — walking, riding or driving. Such roads in England for the most part either are of immemorial antiquity or have been created under the authority of an act of parliament. But a private owner may create a highway at common law by dedicat- ing the soil to the use of the public for that purpose; and the using of a road for a number of years, without interruption, will support the presumption that the soil has been so dedicated. At common law the parish is required to maintain all highways within its bounds; but by special custom the obligation may attach to a particular township or district, and in certain cases the owner of land is bound by the conditions of his holding to keep a highway in repair. Breach of the obligation is treated as a criminal offence, and is prosecuted by indictment. Bridges, on the other hand, and so much of the highway as is immediately connected with them, are as a general rule a charge on the county; and by 22 Henry VIII. c. 5 the obligation of the county is extended to 300 yds. of the highway on either side of the bridge. A bridge, like a highway, may be a burden on neighbouring land ratione tennrae. Private owners so burdened may sometimes claim a special toll from passengers, called a " toll traverse." Extensive changes in the English law of highways have been

made by various highway acts, viz. the Highway Act 1835, and amending acts of 1862, 1864, 1878 and 1891. The leading principle of the Highway Act 1835 is to place the highways under the direction of parish surveyors, and to provide for the necessary expenses by a rate levied on the occupiers of land. It is the duty of the surveyor to keep the highways in repair; and if a highway is out of repair, the surveyor may be summoned before justices and convicted in a penalty not exceeding £5, and ordered to complete the repairs within a limited time. The surveyor is likewise specially charged with the removal of nuisances on the highway. A highway nuisance may be abated by any person, and may be made the subject of indictment at common law. The amending acts, while not interfering with the operation of the principal act, authorize the creation of highway districts on a larger scale. The justices of a county may convert it or any portion of it into a highway district to be governed by a highway board, the powers and responsibilities of which will be the same as those of the parish surveyor under the former act. The board consists of representatives of the various parishes, called " way wardens " together with the justices for the county residing within the district. Salaries and similar expenses incurred by the board are charged on a district fund to which the several parishes contribute; but each parish remains separately responsible for the expenses of main- taining its own highways. By the Local Government Act 1888 the entire maintenance of main roads was thrown upon county councils. The Public Health Act 1875 vested the powers and duties of surveyors of highways and vestries in urban authorities, while the Local Government Act 1894 transferred to the district councils of every rural district all the powers of rural sanitary authorities and highway authorities (see England: Local Government) .

The Highway Act of 1835 specified as offences for which the driver of a carriage on the public highway might be punished by a fine, in addition to any civil action that might be brought against him — riding upon the cart, or upon any horse drawing it, and not having some other person to guide it, unless there be some person driving it; negligence causing damage to person or goods being conveyed on the highway; quitting his cart, or leaving control of the horses, or leaving the cart so as to be an obstruction on the highway; not having the owner's name painted up; refusing to give the same; and not keeping on the left or near side of the road, when meeting any other carriage or horse. This rule does not apply in the case of a carriage meeting a foot-passenger, but a driver is bound to use due care to avoid driving against any person crossing the highway on foot. At the same time a passenger crossing the highway is also bound to use due care in avoiding vehicles, and the mere fact of a driver being on the wrong side of the road would not be evidence of negligence in such a case.

The " rule of the road " given above is peculiar to the United Kingdom.

Cooley's treatise on the American Law of Torts states that " the custom of the country, in some states enacted into statute law, requires that when teams approach and are about to pass on the highway, each shall keep to the right of the centre of the travelled portion of the road." This also appears to be the general rule on the continent of Europe.

By the Lights on Vehicles Act 1907, all vehicles on highways in England and Wales must display to the front a white light during the period between one hour after sunset and one hour before sunrise. Locomotives and motor cars, being dealt with by special acts, are excluded from the operation of the act, assure bicycles and tricycles (dealt with by the Local Government Act 1888), and vehicles drawn or propelled by hand, but every machine or implement drawn by animals comes within the act. There are two exceptions: (1) vehicles carrying inflammable goods in the neighbourhood of places where inflammable goods are stored, and (2) vehicles engaged in harvesting. The public have a right to pass along a highway freely, safely and conveniently, and any wrongful act or omission which prevents them doing so is a nuisance, for the prevention and abatement of which the highways and other acts contain provisions. Generally, nuisance

to highway may be caused by encroachment, by interfering with the soil of the highway, by attracting crowds, by creating danger or inconvenience on or near the highway, by placing obstacles on the highway, by unreasonable user, by offences against decency and good order, &c.

The use of locomotives, motor cars and other vehicles on high- ways is regulated by acts of 1861-1903.

Formerly under the Turnpike Acts many of the more important highways were placed under the management of boards of commissioners or trustees. The" trustees were required and empowered to maintain, repair and improve the roads committed to their charge, and the expenses of the trust were met by tolls levied on persons using the road. The various grounds of exemp- tion from toll on turnpike roads were all of a public character, e.g. horses and carriages attending the sovereign or royal family, or used by soldiers or volunteers in uniform, were free from toll. In general horses and carriages used in agricultural work were free from toll. By the Highways and Locomotives Act of 1878 disturnpiked roads became " main roads." Ordinary highways might be declared to be " main roads," and " main roads " be reduced to the status of ordinary highways.

In Scotland the highway system is regulated by the Roads and Bridges Act 1878 and amending acts. The management and maintenance of the highways and bridges is vested in county road trustees, viz. the commissioners of supply, certain elected trustees representing ratepayers in parishes and others. One of the consequences of the act was the abolition of tolls, statute- k.bour, causeway mail and other exactions for the maintenance of bridges and highways, and all turnpike roads became high-ways, and all highways became open to the public free of tolls and other exactions. The county is divided into districts under district committees, and county and district officers are appointed. The expenses of highway management in each district (or parish) , together with a proportion of the general expenses of the act, are levied by the trustees by an assessment on the lands and heritages within the district (or parish).

Highway, in the law of the states of the American Union, generally means a lawful public road, over which all citizens are allowed to pass and repass on foot, on horseback, in carriages and waggons. Sometimes it is held to be restricted to county roads as opposed to town-ways. In statutes dealing with offences con- nected with the highway, such as gaming, negligence of carriers, &c, " highway " includes navigable rivers. But in a statute punishing with death robbery on the highway, railways were held not to be included in the term. In one case it has been held that any way is a highway which has been used as such for fifty years.

See Glen, Law Relating to Highways; Pratt, Law of Highways, Main Roads and Bridges.

HIGINBOTHAM, GEORGE (1827-1893), chief-justice of Victoria, Australia, sixth son of T. Higinbotham of Dublin, was born on the 19th of April 1827, and educated at the Royal School, Dungannon, and at Trinity College, Dublin. After entering as a law student at Lincoln's Inn, and being engaged as reporter on the Morning Chronicle in 1849, he emigrated to Victoria, where he contributed to the Melbourne Herald and practised at the bar (having been " called " in 1853) with much success. In 1850 he became editor of the Melbourne Argus, but resigned in 1859 and returned to the bar. He was elected to the legislative assembly in 1861 for Brighton as an independent Liberal, was rejected at the general election of the same year, but was returned nine months later. In 1863 he became attorney-general. Under his influence measures were passed through the legislative assembly of a somewhat extreme character, completely ignoring the rights of the legislative council, and the government was carried on without any Appropriation Act for more than a year. Mr Higinbotham, by his eloquence and earnestness, obtained great influence amongst the members of the legislative assembly, but his colleagues were not prepared to follow him as far as he desired to go. He contended that in a constitutional colony like

Victoria the secretary of state for the colonies had no right to ietter the discretion of the queen's representative. Mr Higin-

botham did not return to power with his chief, Sir James M'Culloch, after the defeat of the short-lived Sladen administra- tion; and being defeated for Brighton at the next general election by a comparatively unknown man, he devoted himself to his practice at the bar. Amongst his other labours as attorney- general he had codified all the statutes which were in force throughout the colony. In 1874 he was returned to the legis- lative assembly for Brunswick, but after a few months he resigned his seat. In 1 880 he was appointed a puisne judge of the supreme court, and in 1886, on the retirement of Sir William Stawell, he was promoted to the office of chief justice. Mr Higinbotham was appointed president of the International Exhibition held a't Melbourne in 1 888-1 889, but did not take any active part in its management. One of his latest public acts was to subscribe a sum of £10, 10s. a week towards the funds of the strikers in the great Australian labour dispute of 1890, an act which did not meet with general approval. He died in 1893.

HILARION, ST (c. 290-371), abbot, the first to introduce the monastic system into Palestine. The chief source of information is a life written by St Jerome; it was based upon a letter, no longer extant, written by St Epiphanius, who had known Hilarion. The accounts in Sozomen are mainly based on Jerome's Vita; but Otto Zocker has shown that Sozomen also had at his disposal authentic local traditions (see " Hilarion von Gaza " in the Neue Jahrbiicher fur deutsche Theologie, 1894), the most important study on Hilarion, which is written against the hypercritical school of Weingarten and shows that Hilarion must be accepted as an historical personage and the Vita as a sub- stantially correct account of his career. He was born of heathen parents at Tabatha near Gaza about 290; he was sent to Alexandria for his education and there became a convert to Christianity; about 306 he visited St Anthony and became his disciple, embracing the eremitical life. He returned to his native place and for many years lived as a hermit in the desert by the marshes on the Egyptian border. Many disciples put them- selves under his guidance; but his influence must have been limited to south Palestine, for there is no mention of him in Palladius or Cassian. In 356 he left Palestine and went again to Egypt; but the accounts given in the Vita of his travels during the last fifteen years of his life must be taken with extreme caution. It is there said that he went from Egypt to Sicily, and thence to Epidaurus, and finally to Cyprus where he met Epiphanius and died in 371.

An abridged story of his life will be found in Alban Butler's Lives of the Saints, on the 21st of October, and a critical sketch with full references in Herzog-Hauck, Reahncyklopddie (ed. 3). (E. C. B.)

HILARIUS (Hilary 1), ST (c. 300-367), bishop of Pictavium (Poitiers), an eminent " doctor " of the Western Church, some- times referred to as the " malleus Arianorum " and the " Athan- asius of the West," was born at Poitiers about the end of the 3rd century a.d. His parents were pagans of distinction. He received a good education, including what had even then become somewhat rare in the West, some knowledge of Greek. He studied, later on, the Old and New Testament writings, with the result that he abandoned his neo-platonism for Christianity, and with his wife and his daughter received the sacrament of baptism. So great was the respect in which he was held by the citizens of Poitiers that about 353, although still a married man, he was unanimously elected bishop. At that time Arianism was threatening to overrun the Western Church; to repel the irruption was the great task which Hilary undertook. One of his first steps was to secure the excommunication, by those of the Gallican hierarchy who still remained orthodox, of Satur- ninus, the Arian bishop of Aries and of Ursacius and Valens, two of his prominent supporters. About the same time he wrote to the emperor Constantius a remonstrance against the persecutions by which the Arians had sought to crush their opponents (Ad Constantium Augustum liber primus, of which the most probable date is 355). His efforts were not at first success- ful, for at the synod of Biterrae (Beziers), summoned in 356 by

1 The name is derived from Gr. JXopos, gay, cheerful, whence hilarious, hilarity.

Constantius with the professed purpose of settling the long- standing disputes, Hilary was by an imperial rescript banished with Rhodanus of Toulouse to Phrygia, in which exile he spent nearly four years. Thence, however, he continued to govern his diocese; while he found leisure for the preparation of two of the most important of his contributions to dogmatic and polemical theology, the De synodis or De fide Orientalium, an epistle addressed in 358 to the Semi-Arian bishops in Gaul, Germany and Britain, expounding the true views (sometimes veiled in ambiguous words (of the Oriental bishops on the Nicene controversy, and the De trinitate libri xii., 1 com- posed in 359 and 360, in which, for the first time, a successful attempt was made to express in Latin the theological subtleties elaborated in the original Greek. The former of these works was not entirely approved by some members of his own party, who thought he had shown too great forbearance towards the Arians; to their criticisms he replied in the Apologetica ad reprehensores libri de synodis responsa. In 359 Hilary attended the convocation of bishops at Seleucia in Isauria, where, with the Egyptian Athanasians, he joined the Homoiousian majority against the Arianizing party headed by Acacius of Caesarea; thence he went to

Constantinople, and, in a petition (Ad Con- stantium Augustum liber secundus) personally presented to the emperor in 360, repudiated the calumnies of his enemies and sought to vindicate his trinitarian principles. His urgent and repeated request for a public discussion with his opponents, especially with Ursacius and Valens, proved at last so inconvenient that he was sent back to his diocese, which he appears to have reached about 361, within a very short time of the accession of Julian. He was occupied for two or three years in combating Arianism within his diocese; but in 364, extending his efforts once more beyond Gaul, he impeached Auxentius, bishop of Milan, and a man high in the imperial favour, as heterodox. Summoned to appear before the emperor (Valentinian) at Milan and there maintain his charges, Hilary had the mortification of hearing the supposed heretic give satisfactory answers to all the questions proposed; nor did his (doubtless sincere) denunciation of the metropolitan as a hypocrite save himself from an ignominious expulsion from Milan. In 365 he published the Contra Arianos vel Aux.en.tium Mediolanensem liber, in connexion with the controversy; and also (but perhaps at a somewhat earlier date) the Contra Constantium Augustum liber, in which he pronounced that lately deceased emperor to have been Antichrist, a rebel against God, " a tyrant whose sole object had been to make a gift to the devil of that world for which Christ had suffered." Hilary is sometimes regarded as the first Latin Christian hymn- writer, but none of the compositions assigned to him is indis- putable. The later years of his life were spent in comparative quiet, devoted in part to the preparation of his expositions of the Psalms (Traclatus super Psalmos), for which he was largely indebted to Origen; of his Commentarius in Evangelium Mat- thaei, a work on allegorical lines of no exegetical value; and of his no longer extant translation of Origen's commentary on Job. While he thus closely followed the two great Alexandrians, Origen and Athanasius, in exegesis and Christology respectively, his work shows many traces of vigorous independent thought. He died in 367; no more exact date is trustworthy. He holds the highest rank among the Latin writers of his century. Desig- nated already by Augustine as " the illustrious doctor of the churches," he by his works exerted an increasing influence in later centuries; and by Pius IX. he was formally recognized as " universae ecclesiae doctor " at the synod of Bordeaux in 1851. Hilary's day in the Roman calendar is the 13th of January. 2

1 Hilary's twn title was De fide contra Arianos. It really deals less with the doctrine of the Trinity than with that of the Incarnation. That it is not an easy work to read is due partly to the nature of the subject, partly to the fact that it was issued in detached portions.

2 " Hilary " was the name of one of the four terms of the English legal year. These terms were abolished by the Judicature Act, 1873, s – 2 ˆ, and

” sittings ” substituted. It is now the name of the sitting of the Supreme Court of Judicature which commences on the nth of January and terminates on the Wednesday before

Editions. — Erasmus (Basel, 1523, 1526, 1528); P. Coustant (Benedictine, Paris, 1693); Migne (Patrol. Lat.ix.,x.). ThtTractatus de mysteriis, ed. J. F. Gamurriiii (Rome, 1887), and the Tractatus super Psalmos, ed. A. Zingerle in the Vienna Corpus scrip, eccl. Lat. xxii. Translation by E. W. Watson in Nicene and Post-Nicene Fathers, ix.

Literature. — The life by (Venantius) Fortunatus c. 550 is almost worthless. More trustworthy are the notices in Jerome (De vir. illus. 100), Sulpicius Severus (Chron. ii. 39-45) and in Hilary’s own writings. H. Reinkens, Hilarius von Poicliers (1864) ; O. Barden- hewer, Patrologie; A. Harnack, Hist, of Dogma, esp. vol. iv. ; F- Loofs, in Herzog-Hauck’s Realencyk. viii.

HILARIUS, or Hilarus (Hilary), bishop of Rome from 461 to 468, is known to have been a deacon and to have acted as legate of Leo the Great at the ” robber ” synod of Ephesus in 449. There he so vigorously defended the conduct of Flavian in deposing Eutyches that he was thrown into prison, whence he had great difficulty in making his escape to Rome. He was chosen to succeed Leo on the 19th of November 461. In 465 he held at Rome a council which put a stop to some abuses, particularly to that of bishops appointing their own successors. His pontificate was also marked by a successful encroachment of the papal authority on the metropolitan rights of the French and Spanish hierarchy, and by a resistance to the toleration edict of Anthemius, which ultimately caused it to be recalled. Hilarius died on the 17th of November 467, and was succeeded by Simplicius.

HILARIUS (fl. 1 1 25), a Latin poet who is supposed to have been an Englishman. He was one of the pvfpils of Abelard at his oratory of Paraclete, and addressed to him a copy of verses with its refrain in the vulgar tongue, ” Tort avers vos li mestre,” Abelard having threatened to discontinue his teaching because of certain reports made by his servant about the conduct of the scholars. Later Hilarius made his way to Angers. His poems are contained in MS.supp.lat. ioo8oftheBibiiothequeNationale, Paris, purchased in 1837 at the sale of M. de Rosny. Quotations from this MS. had appeared before, but in 1838 it was edited by Champollion Figeac as Hilarii versus et ludi. His works consist chiefly of light verses of the goliardic type. There are verses addressed to an English nun named Eva, lines to Rosa, ” Ave splendor puellarum, generosa domina,” and another

poem describes the beauties of the priory of Chaloutre la Petite, in the diocese of Sens, of which the writer was then an inmate. One copy of satirical verses seems to aim at the pope himself. He also wrote three miracle plays in rhymed Latin with an ad- mixture of French. Two of them, Suscitatio Lazari and Historia de Daniel repraesentanda, are of purely liturgical type. At the end of Lazarus is a stage direction to the effect that if the per- formance has been given at matins, Lazarus should proceed with the Te Deum, if at vespers, with the Magnificat. The third, Ludus super iconia Sancti Nicholai, is founded on a sufficiently foolish legend. Petit de Julleville sees in the play a satiric intention and a veiled incredulity that put the piece outside the category of liturgical drama.

A rhymed Latin account of a dispute in which the nuns of Ronceray at Angers were concerned, contained in a cartulary of Ronceray, is also ascribed to the poet, who there calls himself Hilarius Canonicus. The poem is printed in the Bibliothbque de I'&ole des Chartes (vol. xxxvh. 1876), and is dated by P. Marchegay from 1 121. See also a notice in Hist. litt. de la France (xii. 251-254), sup- plemented (in xx. 627-630), s.v. Jean Bodel, by Paulin Paris; also Wright, Biographic. Britannica literaria, Anglo-Norman Period (1846); and Petit de Julleville, Les Mysteres (vol. i. 1880).

HILARIUS (Hilary), ST (c. 403-449), bishop of Aries, was born about 403. In early youth he entered the abbey of Lerirrs, then presided over by his kinsman Honoratus (St Honor6), and succeeded Honoratus in the bishopric of Aries in 429. Following the example of St Augustine, he is said to have organized his cathedral clergy into a " congregation," devoting a great part of their time to social exercises of ascetic religion. He held the rank of metropolitan of Vienne and Narbonne, and attempted to realize the sort of primacy over the church of south Gaul

Easter. In the Inns of Court, Hilary is one of the four dining terms; it begins on the nth of January and ends on the 1st of February. It is also the name of one of the terms at the universities of Oxford (more usually " Lent term ") and Dublin.

which seemed implied in the vicariate granted to his predecessor Patroclus (417). Hilarius deposed the bishop of Besancon (Chelidonus), for ignoring this primacy, and for claiming a metropolitan dignity for Besangon. An appeal was made to Rome, and Leo I. used it to extinguish the Gallican vicariate (a.d. 444). Hilarius was deprived of his rights as metropolitan to

consecrate bishops, call synods, or exercise ecclesiastical over- sight in the province, and the pope secured the edict of Valen- tinian III., so important in the history of the Gallican church, " ut episcopis Gallicanis omnibusque pro lege esset quidquid apostolicae sedis auctoritas sanxisset." The papal claims were made imperial law, and violation of them subject to legal penalties (Novellae Valent. iii. tit. 16). Hilarius died in 449, and his name was afterwards introduced into the Roman martyro- logy for commemoration on the 5th of May. He enjoyed during his lifetime a high reputation for learning and eloquence as well as for piety; his extant works {Vita S. Honorati Arelatensis episcopi and Metrum in Genesin) compare favourably with any similar literary productions of that period.

A poem, De providentia, usually included among the writings of Prosper, is sometimes attributed to Hilary of Aries.

HILDA, ST, strictly Hixd (614-680), was the daughter of Hereric, a nephew of Edwin, king of Northumbria. She was converted to Christianity before 633 by the preaching of Paulinus. According to Bede she took the veil in 614, when Oswio was king of Northumbria and Aidan bishop of Lindisfarne, and spent a year in East Anglia, where her sister Hereswith had married iEthelhere, who was to succeed his brother Anna, the reigning king. In 648 or 649 Hilda was recalled to Northumbria by Aidan, and lived for a year in a small monastic community north of the Wear. She then succeeded Heiu, the foundress, as abbess of Hartlepool, where she remained several years. From Hartle- pool Hilda moved to Whitby, where in 657 she founded the famous double monastery which in the time of the first abbess included among its members five future bishops, Bosa, .(Etta, Oftfor, John and Wilfrid II. as well as the poet Casdmon. Hilda exercised great influence in Northumbria, and ecclesiastics from all over Christian England and from Strathclyde and Dalriada visited her monastery. In 655 after the battle of Winwsed Oswio entrusted his daughter ˆElfled to Hilda, with whom she went to Whitby. At the synod of Whitby in 664 Hilda sided with Colman and Cedd against Wilfrid. In spite of the defeat of the Celtic party she remained hostile to Wilfrid until 679 at any rate. Hilda died in 680 after a painful illness lasting for seven years.

See Bede, Hist. eccl. (ed. C. Plummer, Oxford, 1869), iii. 24, 25, iv. 23; Eddius, Vita Wilfridi (Raine, Historians of Church of York, Rolls Series, vol. i., 1879), c. liv.

HILDBURGHAUSEN, a town of Germany, in the duchy of Saxe-Meiningen, situated in a wide and fruitful valley on the river Werra, 19 m. S.E. of Meiningen, on the railway Eisenach- Lichtenfels. Pop. (1905) 7456. The principal buildings are a ducal palace, erected 1685-1695, now used as barracks, with a park in which there is a monument to Queen Louisa of

Prussia, the old town hall, two Evangelical and a Roman Catholic church and a theatre. A technical college occupies the premises in which Meyer's Bibliographisches Institut carried on business from 1828, when it removed hither from Gotha, until 1874, when it was transferred "to Leipzig. A monument has been erected to those citizens who died in the Franco-Prussian War of 1870-71. The manufactures include linen fabrics,- cloth, toys, buttons, optical instruments, agricultural machines, knives, mineral waters, condensed soups and condensed milk. Hildburghausen (in records Hilpershusia and Villa Hilperti) belonged in the r3th century to the counts of Henneberg, from whom it passed to the landgraves of Thuringia and then to the dukes of Saxony. In 1683 it became the capital of a principality which in 1826 was united to Saxe-Meiningen.

See R. A. Human, Chronik der Stadt Hildburghausen (Hildburg- hausen, 1888).

HILDEBERT, Hydalbert, Gildebert or Aldebert (c. 1955-1133), French writer and ecclesiastic, was born of poor Barents at Lavardin, near Vendome, and was intended for the

church. He was probably a pupil of Berengarius of Tours, and became master (scholaslicus) of the school at Le Mans; in 1091 he was made archdeacon and in 1096 bishop of Le Mans. He had to face the hostility of a section of his clergy and also of the English king, William II., who captured Le Mans and carried the bishop with him to England for about a year. Hildebert then travelled to Rome and sought permission to resign his bishopric, which Pope Paschal II. refused. In n 16 his diocese was thrown into great confusion owing to the preaching of Henry of Lausanne, who was denouncing the higher clergy, especially the bishop. Hildebert compelled him to leave the neighbourhood of Le Mans, but the effects of his preaching remained. In n 25 Hildebert was translated very unwillingly to the archbishopric of Tours, and there he came into conflict with the French king Louis VI. about the rights of ecclesiastical patronage and with the bishop of Dol about the authority of his see in Brittany. He presided over the synod of Nantes, and died at Tours probably on the 18th of December 1133. Hildebert, who built part of the cathedral at Le Mans, has received from some writers the title of saint, but there appears to be no authority for this. He was not a man of very strict life; his contemporaries, however, had a very high opinion of him and he was called egregius versificator.

The extant writings of Hildebert consist of letters, poems, a few sermons, two lives and one or two treatises. An edition of his works prepared by the Maurist, Antoine Beaugendre, and entitled Venerabilis Hildeberti, primo Cenomannensis episcopi, deinde Turonensis archicpiscopi, opera tarn edita quam inedita, was published in Paris in 1708 and was reprinted with

additions by J. J. Bourasse in 1854. These editions, however, are very faulty. They credit Hildebert with numerous writings which are the work of others, while some genuine writings are omitted. The revelation of this fact has affected Hildebert 's position in the history of medieval thought. His standing as a philosopher rested upon his supposed authorship of the important Tractatus theologicus; but this is now regarded as the work of Hugh of St Victor, and consequently Hildebert can hardly be counted among the philosophers. His genuine writings include many letters. These Epistolae enjoyed great popularity in the 12th and 13th centuries, and were frequently used as classics in the schools of France and Italy. Those which concern the struggle between the emperor Henry V. and Pope Paschal II. have been edited by E. Sackur and printed in the Monumenta Germaniae historica. Libelli de lite ii. (1893). His poems, which deal with various subjects, are disfigured by many defects of style and metre, but they too were very popular. Hildebert attained celebrity also as a preacher both in French and Latin, but only a few of his sermons are in existence, most of the 144 attributed to him by his editors being the work of Peter Lombard and others. The Vitae written by Hildebert are the lives of Hugo, abbot of Cluny, and of St Radegunda. Undoubtedly genuine is also his Liber de querimonia el confliclu carnis et spirilus seu animae. Hildebert was an excellent Latin scholar, being acquainted with Cicero, Ovid and other authors, and his spirit is rather that of a pagan than of a Christian writer.

See B. Haureau, Les Melanges poetiques d'Hildebert de Lavardin (Paris, 1882), and Notices et extraits de quelques manuscrits latins de la Bibliothhque nationale (Paris, 1 890-1 893); Comte P. de D6ser- villers, Un Eveque au XII" siecle, Hildebert et son temps (Paris, 1876) ; E. A. Freeman, The Reign of Rufus, vol. ii. (Oxford, 1882); tome xi. of the Histoire litteraire de la France, and H. Bohmer in Band viii. of Herzog-Hauck's Realencyklopddie (1900). The most important work, however, to be consulted is L. Dieudonnfi's Hildebert de Lavardin, eveque du Mans, archeveque de Tours. Sa vie, ses lettres (Paris, 1898).

HILDEBRAND, LAY OF (Das Hildebrandslied), a unique example of Old German alliterative poetry, written about the year 800 on the first and last pages of a theological manuscript, by two monks of the monastery of Fulda. The fragment, or rather fragments, only extend to sixty-eight lines, and the conclusion of the poem is wanting. The theory propounded by Karl Lachmann, that the poem hac? been written in its present form from memory, has been discredited by later philological investigation; it is clearly a transcript of an older original,

which the copyists — or more probably the writer to whom we owe the older version — -imperfectly understood. The language of the poem shows a curious mixture of Low and High German forms; as the High German elements point to the dialect of Fulda, the inference is that the copyists were reproducing an originally Low German lay in the form in which it was sung in Franconia.

The fragment is mainly taken up with a dialogue between Hildebrand and his son Hadubrand. When Hildebrand followed his master, Theodoric the Great, who was fleeing eastwards before Odoacer, he left his young wife and an infant child behind him. At his return to his old home, after thirty years' absence among the Huns, he is met by a young warrior and challenged to single combat. Before the fight begins, Hildebrand asks for the name of his opponent, and discovering his own son in him, tries to avert the fight, but in vain; Hadubrand only regards the old man's words as the excuse of cowardice. " In sharp showers the ashen spears fall on the shields, and then the warriors seize their swords and hew vigorously at the white shields until these are beaten to pieces. ..." With these words the fragment breaks off abruptly, giving no clue as to the issue of the combat. There is little doubt, however, that, as in the Old Norse Asmandar saga, where the tale is alluded to, the fight must have been fatal to Hadubrand. But in the later traditions, both of the Old Norse Thidreks saga (13th century), and the so-called Jungere Hildebrandslied — a German popular lay, preserved in several versions from the 15th to the 17th century — Hadubrand is simply represented as defeated, and obliged to recognize his father. The Old High German Hildebrandslied is dramatically conceived, and written in a terse, vigorous style; it is the only remnant that has come down from early Germanic times of an undoubtedly extensive ballad literature, dealing with the national sagas.

The MS. of the Hildebrandslied, originally in Fulda, is now pre- served in the Landesbibliothek at Cassel. The literature on the poem will be found most conveniently in K. Mullenhoff and W. Scherer, Denkmdler deulscher Poesie und Prosa aus dem VIII. bis XI. Jahrh., 3rd ed. (1892), and in W. Braune, Althochdeutsches Lesebuch, 5th ed. (1902), to which authorities the reader is referred for a critical text. The poem was discovered and first printed (as prost) by J. G. von Eckhart, Commentarii de rebus Franciae orientalis (1729), i. 864 ff.; the first scholarly edition was that of the brothers Grimm (1812). Facsimile reproductions of the MS. have been published by W. Grimm (1830), E. Sievers (1872), G. Konnecke in his Bilderatlas (1887; 2nd ed., 1895) and M. Enneccerus (1897). See also K. Lachmann, Uber das Hildebrandslied (1833) in Kleine Schriften, i. 407 ff. ; C. W. M . Grein, Das Hildebrandslied (1858; 2nd ed., 1880); O. Schroder, Bemerkuneen zum Hilde- brandslied (1880) ; H. Moller, Zur althochdeutschen Alliteralionspcesie (1888) ; R. Heinzel, Ober die

ostgotische Heldensage (1889) ; B. Busse, " Sagengeschichtliches zum Hildebrandslied," in Paul und Braune's Beilrdge, xxvi. (1901), pp. 1 ff . ; R. Koegel, Geschichte der deutschen Literatur bis zum Aussang des Mittelalters, i. (1894), pp. 210 ff. ; and R. Koegel and W. Bruckner, in Paul's Grundriss der germanischen Philologie, 2nd ed., ii. (1901), pp. 71 ff. (J. G. R.)

HILDEBRANDT, EDUARD (1818-1868), German painter, was born in 1818, and served as apprentice to his father, a house-painter at Danzig. He was not twenty when he came to Berlin, where he was taken in hand by Wilhelm Krause, a painter of sea pieces. Several early pieces exhibited after his death — a breakwater, dated 1838, ships in a breeze off Swine- miinde (1840), and other canvases of this and the following year — show Hildebrandt to have been a careful student of nature, with inborn talents kept down by the conventionalisms of the formal school to which Krause belonged. Accident made him acquainted with masterpieces of French art displayed at the Berlin Academy, and these awakened his curiosity and envy. He went to Paris, where, about 1842, he entered the atelier of Isabey and became the companion of Lepoittevin. In a short time he sent home pictures which might have been taken for copies from these artists. Gradually he mastered the mysteries of touch and the secrets of effect in which the French at this period excelled. He also acquired the necessary skill in painting figures, and returned to Germany, skilled in the rendering of many kinds of landscape forms. His pictures of French street life, done about 1843, while impressed with the stamp of the

Paris school, reveal a spirit eager for novelty, quick at grasping, equally quick at rendering, momentary changes of tone and atmosphere. After 1843 Hildebrandt, under the influence of Humboldt, extended his travels, and in 1864-1865 he went round the world. Whilst his experience became enlarged his powers of concentration broke down. He lost the taste for detail in seeking for scenic breadth, and a fatal facility of hand diminished the value of his works for all those who look for composition and harmony of hue as necessary concomitants of tone and touch. In oil he gradually produced less, in water colours more, than at first, and his fame must rest on the sketches which he made in the latter form, many of them represented by chromo-lithography. Fantasies in red, yellow and opal, sunset, sunrise and moonshine, distances of hundreds of miles like those of the Andes and the Himalaya, narrow streets in the bazaars of Cairo or Suez, panoramas as seen from mastheads, wide cities like Bombay or Pekin, narrow strips of desert with measure- less expanses of sky — all alike display his quality of bravura. Hildebrandt died at Berlin on the 25th of October 1868.

HILDEBRANDT, THEODOR (1804-1874), German painter, was born at

Stettin. He was a disciple of the painter Schadow, and, on Schadow's appointment to the presidency of a new academy in the Rhenish provinces in 1828, followed that master to Diisseldorf. Hildebrandt began by painting pictures illustra- tive of Goethe and Shakespeare; but in this form he followed the traditions of the stage rather than the laws of nature. He produced rapidly " Faust and Mephistopheles " (1824), " Faust and Margaret " (1825), and " Lear and Cordelia " (1828). He visited the Netherlands with Schadow in 1829, and wandered alone in 1830 to Italy; but travel did not alter his style, though it led him to cultivate alternately eclecticism and realism. At Diisseldorf, about 1830, he produced " Romeo and Juliet," " Tancred and Clorinda," and other works which deserved to be classed with earlier paintings; but during the same period he exhibited (1829) the " Robber " and (1832) the " Captain and his Infant Son," examples of an affected but kindly realism which captivated the public, and marked to a certain extent an epoch in Prussian art. The picture which made Hildebrandt's fame is the " Murder of the Children of King Edward " (1836), of which the original, afterwards frequently copied, still belongs to the Spiegel collection at Halberstadt. Comparatively late in life Hildebrandt tried his powers as an historical painter in pictures representing Wolsey and Henry VIII., but he lapsed again into the romantic in " Othello and Desdemona." After 1847 Hildebrandt gave himself up to portrait-painting, and in that branch succeeded in- obtaining a large practice. He died at Diisseldorf in 1874.

*HILDEGARD, ST (1098-1179), German abbess and mystic, was born of noble parents at Bockelheim, in the countship of Sponheim, in 1098, and from her eighth year was educated at the Benedictine cloister of Disibodenberg by Jutta, sister of the count of Sponheim, whom she succeeded as abbess in 1136. From earliest childhood she was accustomed to see visions, which increased in frequency and vividness as she approached the age of womanhood; these, however, she for many years kept almost secret, nor was it until she had reached her forty- third year (1141) that she felt constrained to divulge them. Committed to writing by her intimate friend the monk Godefridus, they now form the first and most important of her printed works, entitled Scivias (probably an abbreviation for " sciens vias " or " nosce vias Domini ") j. visionum et revelatianum libri Hi., and completed in 1151. In 1147 St Bernard ^*of Clairvaux, while at Bingen preaching the new crusade, heard of Hildegard's revelations, and became so convinced of their reality that he not only wrote to her a letter cordially acknow- ledging her as a prophetess of God, but also successfully advocated her recognition as such by his friend and former pupil Pope Eugenius III. in the synod of Treves (1148). In the same year Hildegard migrated along with eighteen of her nuns to a new convent on the Rupertsberg near Bingen, over which she presided during the remainder of*

her life. By means of voluminous correspondence, as well as by extensive journeys,

in the course of which she was unwearied in the exercise of her gift of prophecy, she wielded for many years an increasing influence upon her contemporaries — an influence doubtless due to the fact that she was imbued with the most widely diffused feelings and beliefs, fears and hopes, of her time. Amongst her correspondents were Popes Amastasius IV. and Adrian IV., the emperors Conrad III. and Frederick L, and also the theologian Guibert of Gembloux, who submitted numerous questions in dogmatic theology for her determination. She died in n 79, but has never been canonized; her name, however, was received into the Roman martyrology in the 15th century, September 17th being the day fixed for her commemoration.

Her biography, which was written by two contemporaries, Gode- fridus and Theodoricus, was first printed at Cologne in 1566. Hildegard's writings, besides the Scivias already mentioned and first printed in Paris in 1513, include the Liber divinorum operum, Explanatio regulae S. Benedicti, Physica and the Letters, &c., are contained in Migne, Patr. Lat, t. cxcvii., and in Cardinal Pitra's Analecta sacra spicilegio Solesmensi parata; Nova S. Hildegardis opera (Paris, 1882).

For a modern study of the saint's writings, see Sainte Hildegarde by Pal Franche, " Les Saints " series (Paris, 1903) ; and U. Chevalier, Repertoire des sources historiques, bio.-bibl. 2153.

HILDEN, a town in the Prussian Rhine province on the Itter, 9 m. S.E. of Diisseldorf by rail. Pop. (1905) 13,946. It possesses an Evangelical and a Roman Catholic church and a monument to the emperor William I. Its manufactures include silks, velvets, carpets, calico-printing, machinery and brick- making.

HILDESHEIM, a town and episcopal see of Germany, in the Prussian province of Hanover, beautifully situated at the north foot of the Harz Mountains, on the right bank of the Innerste, 18 m. S.E. of Hanover by railway, and on the main line from Berlin, via Magdeburg to Cologne. Pop. (1885) 20,386, (1905) 47,060. The town consists of an old and a new part, and is surrounded by ramparts which have been converted into promenades. Its streets are for. the most part narrow and irregular, and contain many old houses with overhanging upper storeys and richly and

curiously adorned wooden facades. Its religious edifices are five Roman Catholic and four Evangelical churches and a synagogue. The most interesting is the Roman Catholic cathedral, which dates from the middle of the nth century and occupies the site of a building founded by the emperor Louis the Pious early in the gth century. It is famous for its antiquities and works of art. These include the bronze doors executed by Bishop Bernward, with reliefs from the history of Adam and of Jesus Christ; a brazen font of the 13th century; two large candelabra of the jith century; the sarcophagus of St Godehard; and the tomb of St Epiphanius. In the cathedral also there is a bronze column 15 ft. high, adorned with reliefs from the life of Christ and dating from 1022, and another column, at one time thought to be an Irminsaule erected in honour of the Saxon idol Irmin, but now regarded as belonging to a Roman aqueduct. On the wall of the Roman- esque crypt, which was restored in 1896, is a rose-bush, alleged to be a thousand years old; this sends its branches to a height of 24 ft. and a breadth of 30 ft., and they are trained to interlace one of the windows. Before the cathedral is the pretty cloister garth, with the chapel of St Anne, erected in 132 1 and restored in 1888; The Romanesque church of St Godehard was built in the 12th century and restored in the 19th. The church of St Michael, founded by Bishop Bernward early in the nth century and restored after injury by fire in 1186, contains a unique painted ceiling of the 12th century, the sarcophagus and monument of Bishop Bernward, and a bronze font; it is now a Protestant parish church, but the crypt is used by the Roman Catholics. The church of the Magdalene possesses two candelabra, a gold cross, and various other works in metal by Bishop Bernward; and the Lutheran church of St Andrew has a choir dating from 1389 and a tower 385 ft. high. In the suburb of Moritzberg there is an abbey church founded in 1040, the only pure columnar basilica in north Germany.

The chief secular buildings are the town-hall (Rathaus), which dates from the 15th century and was' restored in 1883- 1892, adorned with frescoes illustrating the history of the city; the Tempelherrenhaus, in Late Gothic erroneously said to have been built by the Knights Templars; the Knochenhaueramthaus, formerly the gild-house of the butchers, which was restored after being damaged by fire in 1884, and is probably the finest specimen of a wooden building in Germany; the Michaelis monastery, used as a lunatic asylum; and the old Carthusian monastery. The Romer museum of antiquities and natural history is housed in the former church of St Martin; the buildings of Trinity hospital, partly dating from the 14th century, are now a factory; and the Wedekindhaus (1598) is now a savings- bank. The educational establishments include a Roman Catholic and a Lutheran gymnasium, a Roman Catholic school and college and two technical institutions, the Georgstift for daughters of state servants and a conservatoire of music. Hildes- heim is the seat of considerable industry. Its

chief productions are sugar, tobacco and cigars, stoves, machines, vehicles, agricultural implements and bricks. Other trades are brewing and tanning. It is connected with Hanover by an electric tram line, 19 m. in length.

Hildesheim owes its rise and prosperity to the fact that in 822 it was made the seat of the bishopric which Charlemagne had founded at Elze a few years before. Its importance was greatly increased by St Bernward, who was bishop from 993 to 1022 and walled the town. By his example and patronage the art of working in, metals was greatly stimulated. In the 13th century Hildesheim became a free city of the Empire; in 1 249 it received municipal rights and about the same time it joined the Hanseatic league. Several of its bishops belonged to one or other of the great families of Germany; and gradually they became practically independent. The citizens were fre- quently quarrelling with the bishops, who also carried on wars with neighbouring princes, especially with the house of Bruns- wick-Ltineburg, under whose protection Hildesheim placed itself several times. The most celebrated of these struggles is the one known as the Hildesheimer Stiflsfehde, which broke out early in the 16th century when John, duke of Saxe-Lauenburg; was bishop. At first the bishop and his allies were successful, but in 1521 the king of Denmark and the duke of Brunswick overran his lands and in 1523 he made peace, surrendering nearly all his possessions. Much, however, was restored when Ferdinand, prince of Bavaria, was bishop (1612-1650), as this warlike prelate took advantage of the disturbances caused by the Thirty Years' War to seize the lost lands, and at the begin- ning of the 19th century the extent of the prince bishopric was ; 682 sq. m. In 1801 the bishopric was secularized and in 1803 was granted to Prussia; in 1807 it was incorporated with the kingdom of Westphalia and in 1813 was transferred to Hanover, In 1866, along with Hanover, it was annexed by Prussia. In 1803 a new bishopric of Hildesheim 4 a spiritual. organization only, was established, and this has jurisdiction over all the Roman Catholic churches in the centre of north Germany.

In October 1868 a unique collection of ancient Augustan silver plate was discovered on the Galgenberg near Hildesheim by some soldiers who were throwing up earthworks. This Hildesheimer Silberfund excited great interest among classical archaeologists. Some authorities think that it is the. actual plate which belonged to Drusus himself. The most noteworthy pieces are a crater richly ornamented with arabesques and figures of children, a platter with a representation of Minerva, another with one of. the boy Hercules and another with one of Cybele. The collection is in the Kunstgewerbemuseum in Berlin. See the Urkundenbuch der Stadt Hildesheim, edited by R. Dobner (Hildesheim, 1881-1901); the Urkundenbuch des Hochstifts Hildesheim, edited by K. Janicke and H. Hoogeweg (Leipzig and Hanover; 1896-1903) ; : C. Bauer, Geschichte von

Hildesheim (Hildesheim, 1892); A. Bertram, Geschichte des Bistums Hildesheim (Hildesheim, 1899 fpl.); C. Euling, Hildesheimer Land und Leute des idten Jahrhunderts (Hildesheim, 1892) ; O. Fischer, Die Stadt Hildesheim wdhrenS des dreissigjdhrigen Krieges (Hildesheim, 1897); A. Grebe, Auf Hildesheimschem Boden (Hildesheim, 1884); H. Cuno, Hildesheims KUnsller im Mittelalter (Hildesheim, 1886);

W. Wachsmuth, Geschichte von Hochstift und Stadt Hildesheim (Hildesheim, 1863); R. Dobner, Studien zur Hildesheimischen Geschichte (Hildesheim, 1901); Lachner, Die Holzarchitektur Hildes- heims (Hildesheim, 1882); Seifart, Sagen, Mdrchen, Schwanke und Gebrduche aus Stadt und Stift Hildesheims (Hildesheim, 1889). For the Hildesheimer Stiftsfehde, see H. Delius, Die Hildeskeimische Stiftsfehde 1519 (Leipzig, 1803). For the Hildesheimer Silberfund, see Wieseler, Der Hildesheimer Silberfund (Gottingen, 1869) ; Holzer, Der Hildesheimer antike Silberfund (Hildesheim, 1871); and E. Pernice and F. Winter, Der Hildesheimer Silberfund der koniglichen Museen zu Berlin (Berlin, 1901)

HILDRETH, RICHARD (1807-1865), American journalist and author, was born at Deerfield, Massachusetts, on the 28th of June 1807, the son of Hosea Hildreth (1782-1835), a teacher of mathematics and later a Congregational minister. Richard graduated at Harvard in 1826, and, after studying law at Newburyport, was admitted to the bar at Boston in 1830. He had already taken to journalism, and in 1832 he became joint founder and editor of a daily newspaper, the Boston Atlas. Having in 1834 gone to the South for the benefit of his health, he was led by what he witnessed of the evils of slavery (chiefly in Florida) to write the anti-slavery novel The Slave: or Memoir of Archy Moore (1836; enlarged edition, 1852, The While Slave). In 1837 ne wrote for the Atlas a series of articles vigorously opposing the annexation of Texas. In the same year he published Banks, Banking, and Paper Currencies, a work which helped to promote the growth of the free banking system in America. In 1838 he resumed his editorial duties on the Atlas, but in 1840 removed, on account of his health, to British Guiana, where he lived for three years and was editor of two weekly news- papers in succession at Georgetown. He published in this year (1840) a volume in opposition to slavery, Despotism in America (2nd ed., 1854). In 1849 he published the first three volumes of his History of the United States, two more volumes of which were published in 1851 and the sixth and last in 1852. The first three volumes of this history, his most important work, deal with the period 1492-1789, and the second three with the period 1 789-1821. The history is notable for its painstaking

accuracy and candour, but the later volumes have a strong Federalist bias. Hildreth's Japan as It Was and Is (1855) was at the time a valuable digest of the information contained in other works on that country (new ed., 1906). He also wrote a campaign biography of William Henry Harrison (1839); Theory of Morals (1844) ; and Theory of Politics (1853), as well as' Lives of Atrocious Judges (1856), compiled from Lord Campbell's two works. In 1 86 1 he was appointed United States consul at Trieste, but ill-health compelled him to resign and remove to Florence, where he died on the nth of July 1865.

HILGENFELD, ADOLF BERNHARD CHRISTOPH (1823- 1907), German Protestant divine, was born at Stappenbeck near Salzwedel in Prussian Saxony on the 2nd of June 1823. He studied at Berlin and Halle, and in 1890 became professor ordinarius of theology at Jena. He belonged to the Tubingen school. " Fond of emphasizing his independence of Baur, he still, in all important points, followed in the footsteps of his master; his method, which he is wont to contrast as Literarkritik with Baur's Tendenzkritik, is nevertheless essentially the same as Baur's " (Otto Pfleiderer). On the whole, however, he modified the positions of the founder of the Tubingen school, going beyond him only in his investigations into the Fourth Gospel. In 1858 he became editor of the Zeitschrift fur wissen- schaflliche Theologie. He died on the 12th of January 1907.

His works include: Die elementarischen Recognitionen und Homilien (1848); Die Evangelien und die Brief e des Johannes nach ihrem Lehrbegriff (1849); Das Markusevangelium (1850); Die Evangelien nach ihrer Entstehung und geschichtlichen Bedeutung (1854); Das Unchristentum (1855); JOd. Apokalyptik (1857); Novum Testamentum extra canonem receptum (4 parts, 1866; 2nd ed., 1876-1884); Histor .-kritische Einleitung in das Neue Testament (1875); Acta Apostolorum graece el latine secundum antiquissimos testes (1899); the first complete edition of the Shepherd of Hermas (1887); Ignatii et Polycarpi epistolae (1902).

HILL, AARON (1685-1750), English author, was born in London on the 10th of February 1685. He was the son of George Hill of Malmesbury Abbey, Wiltshire, who contrived to sell an estate entailed on his son. In his fourteenth year he

left Westminster School to go to Constantinople, where William, Lord Paget de Beaudesert (1637-1713), a relative of his mother, was ambassador. Paget sent him, under care of a tutor, to travel in Palestine and Egypt, and he returned to England in 1703. He was estranged from his patron by the " envious fears and malice of a certain female," and again went abroad as companion to Sir William Wentworth. On his return home in 1709 he pub-

lished A Full and Just Account of the Present State of the Ottoman Empire, a production of which he was afterwards much ashamed, and' he addressed his poem of Camillus to Charles Mordaunt, earl of Peterborough. In the same year he is said to have been manager of Drury Lane theatre and in 17 10 of the Haymarket. His first play, Elf rid: or The Fair Inconstant (afterwards revised as Athelwold) , was produced at Drury Lane in 1709. His connexion with the theatre was of short duration, and the rest of his life was spent in ingenious commercial enterprises, none of which were successful, and in literary pursuits. He formed a company to extract oil from beechmast, another for the colonization of the district to be known later as Georgia, a third to supply wood for naval construction from Scotland, and a fourth for the manufacture of potash. In 1730 he wrote The Progress of Wit, being a caveat for the use of an Eminent Writer. The " eminent writer " was Pope, who had introduced him into The Dunciad as one of the competitors for the prize offered by the goddess of Dullness, though the satire was qualified by an oblique compliment. A note in the edition of 1729 on the obnoxious passage, in which, however, the original initial was replaced by asterisks, gave Hill great offence. He wrote to Pope complaining of his treatment, and received a reply in which Pope denied responsibility for the notes. Hill appears to have been a persistent correspondent, and inflicted on Pope a series of letters, which are printed in Elwin & Courthope's edition (x. 1-78). Hill died on the 8th of February 1750, and was buried in Westminster Abbey. The best of his plays were Zara (acted 1735) and Merope (1749), both adaptations from Voltaire. He also published two series of periodical essays, The Prompter (1735) and, with William Bond, The Plaindealer (1724). He was generous to fellow-men of letters, and his letters to Richard Savage, whom he helped considerably, show his character in a very amiable light.

The Works of the late Aaron Hill, consisting of letters . . ., original poems. . . . With an essay on the Art of Acting appeared in 1753, and his Dramatic Works in 1760. His Poetical Works are included in Anderson's and other editions of the British poets. A full account of his life is provided by an anonymous writer in Theophilus Cibber's Lives of the Poets, vol. v.

HILL, AMBROSE POWELL (1825-1865), American Con- federate soldier, was born in Culpeper county, Virginia, on the 9th of November 1825, and graduated from West Point in 1847, being appointed to the 1st U.S. artillery. He served in the Mexican and Seminole Wars, was promoted first lieutenant in September 1851, and in 185 5-1860 was employed on the United States' coast survey. In March 1861, just before the outbreak of the Civil War, he resigned his commission, and when his state seceded he was made colonel of a Virginian infantry regiment, winning promotion to the rank of brigadier-general on the field of Bull Run. In the Peninsular campaign of 1862 he gained further promotion, and as a major-general

Hill was one of the most prominent and successful divisional commanders of Lee's army in the Seven Days', Second Bull Run, Antietam and Fredericksburg campaigns. His division formed part of " Stone- wall "Jackson's corps, and he was severely wounded in the flank attack of Chancellorsville in May 1863. After Jackson's death Hill was made a lieutenant-general and placed in command of the 3rd corps of Lee's army, which he led in the Gettysburg campaign of 1863, the autumn campaign of the same year, and the Wilder- ness and Petersburg operations of 1864-65. He was killed in front of the Petersburg lines on the 2nd of April 1865. His reputation as a troop leader in battle was one of the highest amongst the generals of both sides, and both Lee and Jackson, when on their death-beds their thoughts wandered in delirium to the battlefield, called for " A. P. Hill " to deliver the decisive blow.

HILL, DANIEL HARVEY (1821-188Q), American Confederate soldier, was born in York district, South Carolina, on the 12th of July 1821, and graduated at the United States Military Academy in 1842, being appointed to the 1st United States artillery. He distinguished himself in the Mexican War, being breveted captain and major for bravery at Contreras and Churubusco and at Chapultepec respectively. In February 1849 he resigned his commission and became a professor of mathematics at Washing- ton College (now Washington and Lee University), Lexington, Virginia. In 1854 he joined the faculty of Davidson College, North Carolina, and was in 1859 made superintendent of the North Carolina Military Institute of Charlotte. At the outbreak of the Civil War, D. H. Hill was made colonel of a Confederate infantry regiment, at the head of which he won the action of Big Bethel, near Fortress Monroe, Va., on the 10th of June 1861. Shortly after this he was made a brigadier-general. He took part in the Yorktown and Williamsburg operations in the spring of 1862, and as a major-general led a division with great distinction in the battle of Fair Oaks and the Seven Days. He took part in the Second Bull Run campaign in August-September 1862, and in the Antietam campaign the stubborn resistance of D. H. Hill's division in the passes of South Mountain enabled Lee to con- centrate for battle. The division bore a conspicuous part in the battles of the Antietam and Fredericksburg. On the reorgan- ization of the army of Northern Virginia after Jackson's death, D. H. Hill was not appointed to a corps command, but some- what later in 1863 he was sent to the west as a lieutenant-general and commanded one of Bragg's corps in the brilliant victory of Chickamauga. D. H. Hill surrendered with Gen. J. E. Johnston on the 26th of April 1865. In 1866-1869 he edited a magazine, The Land we Love, at Charlotte, N.C., which dealt with social and historical subjects

and had a great influence in the South. In 1877 he became president of the university of Arkansas, a post which he held until 1884, and in 1885 president of the Military and Agricultural College of Milledgeville, Georgia. General Hill died at Charlotte, N.C., on the 24th of September 1889.

HILL, DAVID BENNETT (1843-1010), American politician, was born at Havana, New York, on the 29th of August 1843. In 1862 he removed to Elmira, New York, where in 1864 he was admitted to the bar. He at once became active in the affairs of the Democratic party, attracting the attention of Samuel J. Tilden, one of whose shrewdest and ablest lieutenants he became. In 1871 and 1872 he was a member of the New York State' Assembly, and in 1877 and again in 1881 presided over the Democratic State Convention. In 1882 he was elected mayor of Elmira, and in the same year was chosen lieutenant-governor of the state, having been defeated for nomination as governor by Grover Cleveland. In January 1885, however, Cleveland having resigned to become president, Hill became governor, and in November was elected for a three-year term, and subsequently re-elected. In 1891-1897 he was a member of the United States Senate. During these years, and in 1892, when he tried to get the presidential nomination, he was prominent in working against Cleveland. In 1896 he opposed the free silver plank in the platform adopted by the Democratic National Convention which nominated W. J. Bryan; in the National Convention of 1900, however, the free-silver issue having been subordinated to anti-imperialism, he seconded Bryan's nomination. After 1897 he devoted himself to his law practice, and in 1905 retired from polities. He died in Albany on the t,q\i\ of October 1910.

HILL, GEORGE BIRKBECK NORMAN (1835-1903), English author, son of Arthur Hill, head master of Brute Castle school, was born at Tottenham, Middlesex, on the 7th of June r.835. Arthur Hill, with his brothers Rowland Hill, the postal reformer, and Matthew Davenport Hill, afterwards recorder of Birmingham, had worked out a system of education which Was to exclude com- pulsion of any kind. The school at Bruce Castle, of which Arthur Hill was head master, was founded to carry into execution their theories, known as the Hazelwood system. George Birkbeck Hill was educated in his father's school and at Pembroke College, Oxford. In 1858 he began to teach at Bruce Castle school, and

from 1868 to 1S77 w as head master. In 1869 he became a regular contributor to the Saturday Review, with which he re- mained in connexion until 1884. On his retirement from teaching he devoted himself to the study of English 18th-century literature, and established his reputation as the most learned commentator on the works of Samuel Johnson. He settled at Oxford in 1887, but from 1891 onwards his winters were usually spent abroad. He died at Hampstead, London, on the 27th of February 1903.

His works include: Dr Johnson, his Friends and his Critics (1878); an edition of Boswell's Correspondence (1879); a laborious edition of Boswell's Life of Johnson, including Boswell's Journal of a Tour . to the Hebrides, and Johnson's Diary of a Journey into North Wales (Clarendon Press, 6 vols., 1887) ; Wit and Wisdom of Samuel Johnson (1888); Select Essays of Dr Johnson (1889); Footsteps of Dr Johnson in Scotland (1890); Letters of Johnson (1892); Johnsonian Miscellanies (2 vols., 1897); an edition (1900) of Edward Gibbon's Autobiography; Johnson's Lives of the Poets (3 vols., 1905), and other works on the 18th- century topics. Dr Birkbeck Hill's elaborate edition of Boswell's Life is a monumental work, invaluable to the student.

See a memoir by his nephew, Harold Spencer Scott, in the edition of' the Lives of the English Poets (1905), and the Letters edited by his daughter, Lucy Crump, in 1903.

HILL, JAMES J. (1838-), American railway capitalist, was born near Guelph, Ontario, Canada, on the 1 6th of September 1838, and was educated at Rockwood (Ont.) Academy, a Quaker institution. In 1856 he settled in St Paul, Minnesota. Abandon- ing, because of his father's death, his plans to study medicine, he became a clerk in the office of a firm of river steamboat agents and shippers, and later the agent for a line of river packets; he established about 1870 transportation lines on the Mississippi and on the Red River (of the North) . He effected a traffic arrangement between the St Paul Pacific Railroad and his steamboat lines; and when the railway failed in 1873 for $27,000,000, Hill interested Sir Donald A. Smith (Lord Strathcona), George Stephen (Lord Mount Stephen), and other Canadian capitalists, in the road and in the wheat country of the Red River Valley; he got control of the bonds (1878), foreclosed the mortgage, reorganized the road as the St Paul, Minneapolis & Manitoba, and began to extend the line, then only 380 m. long, toward the Pacific; and in 1883 he became its president. He was president of the Great Northern Railway (comprehending all his secondary lines) from 1893 to April 1907, when he became chairman of its board of directors. In the extension (1883-1893) of this railway westward to Puget Sound (whence it has direct steamship connexions with China and Japan), the line was built by the company itself, none of the work being handled by contractors. Subsequently his financial interests in American railways caused constant sensa- tions in the stock-markets. The Hill interests obtained control not only of the Great-Northern system, but of the Northern Pacific and the Chicago, Burlington & Quincy, and proposed the construction of another northern line to the Pacific coast. Hill was the president of the Northern Securities Company, which in 1904 was declared by the United States Supreme Court to be 'in conflict with the Sherman Anti-Trust Law. (See Vol. 27, p. 733.) Among Hill's gifts to public institutions was one of $500,000 to the St. Paul

Theological Seminary (Roman Catholic).

HILL, JOHN (c. 1716-1775), called from his Swedish honours, " Sir " John Hill, English author, son of the Rev. Theo- phiLus Hill, is said to have been born in Peterborough in 17.16. He was apprenticed to an apothecary and on the completion of his apprenticeship he set up in a small shop in St Martin's Lane, Westminster. He also travelled over the country in search of rare herbs, with a view to publishing a hortus siccus, but the plan failed. His first publication was a translation of Theophrastus's History of Stones (1746). From this time forward he was an indefatigable writer. He edited the British Magazine (1746-1750). and for two years (1751-1753) he wrote a daily letter, " The Inspector," for the London Advertiser and Literary Gazette. He also produced novels, plays and scientific works, and was a large contributor to the supplement of Ephraim.

Chambers's Cyclopaedia. His personal and scurrilous writings involved him in many quarrels. Henry Fielding attacked him in the Covent Garden Journal, Christopher Smart wrote a mock-epic, The Hilliad, against him, and David Garrick replied to his strictures against him by two epigrams, one of which runs : — •

" For physics and farces, his equal there scarce is; His farces are physic, his physic a farce is."

He had other literary passages-at-arms with John Rich, who accused him of plagiarizing his Orpheus, also with Samuel Foote and Henry Woodward. From 1759 to 1775 he was engaged on a huge botanical work — The Vegetable System (26 vols, fol.) — adorned by 1600 copperplate engravings. Hill's botanical labours were underaken at the request of his patron, Lord Bute, and he was rewarded by the order of Vasa from the king of Sweden in 1774. He had a medical degree from Edinburgh, and he now practised as a quack doctor, making considerable sums by the preparation of vegetable medicines. He died in London on the 21st of November 1775.

Of the seventy-six separate works with which he is credited in the Dictionary of National Biography, the most valuable are those that deal with botany. He is said to have been the author of the second part of The Oeconomy of Human Life (1751), the first part of which is by Lord Chesterfield, and Hannah Glasse's famous manual of cookery was generally ascribed to him (see Boswell, ed. Hill, iii. 285). Dr Johnson said

of him that he was " an ingenious man, but had no veracity."

See a Short Account of the Life, Writings and Character of the late Sir John Hill (1779), which is chiefly occupied with a descriptive catalogue of his works; also Temple Bar (1872, xxxv. 261-266).

HILL, MATTHEW DAVENPORT (1 792-1872), English lawyer and penologist, was born on the 6th of August 1792, at Birming- ham, where his father, T. W. Hill, for long conducted a private school. He was a brother of Sir Rowland Hill. He early acted as assistant in his father's school, but in 1819 was called to the bar at Lincoln's Inn. He went the midland circuit. In 1832 he was elected one of the Liberal members for Kingston- upon-Hull, but he lost his seat at the next election in 1834. On the incorporation of Birmingham in 1839 he was chosen recorder; and in 1851 he was appointed commissioner in bankruptcy for the Bristol district. Having had his interest excited in questions relating to the treatment of criminal offenders, he ventilated in his charges to the grand juries, as well as in special pamphlets, opinions which were the means of introducing many important reforms in the methods of dealing with crime. One of his principal coadjutors in these reforms was his brother Frederick Hill (1803-1896), whose Amount, Causes and Remedies of Crime, the result of his experience as inspector of prisons for Scotland, marked an era in the methods of prison discipline. Hill was one of the chief promoters of the Society for the Diffusion of Useful Knowledge, and the originator of the Penny Magazine. He died at Stapleton, near Bristol, on the 7th of June 1872.

His principal works are Practical Suggestions to the Founders of Reformatory Schools (1855); Suggestions for the Repression of Crime (1857), consisting of charges addressed to the grand juries of Birmingham; Mettray (1855); Papers on the Penal Servitude Acts (1864); Journal of a Third Visit to the Convict Gaols, Refuges and Reformatories of Dublin (1865) ; Addresses delivered at the Birmingham and Midland Institute (1867). See Memoir of Matthew Davenport Hill, by his daughters Rosamond and Florence Davenport Hill (1878).

HILL, OCTAVIA (1838-) and MIRANDA (1836-1910), English philanthropic workers, were born in London, being daughters of Mr James Hill and granddaughters of Dr South- wood Smith, the pioneer of sanitary reform. Miss Octavia Hill's attention was early drawn to the evils of London housing, and the habits of indolence and lethargy induced in many of the lower classes by their degrading surroundings. She conceived the idea of trying to free a few poor people from such influences, and Mr Ruskin, who sympathized with her plans, supplied the money for starting the work. For £750 Miss Hill purchased the 56 years' lease of three houses in one of

the poorest courts of Marylebone. Another £78 was spent in building a large room at the back of her own house where she could meet the tenants. The houses were put in repair, and let out in soli of two rooms. At the end of eighteen months

it was possible to pay 5% interest, to repay £48 of the capital, as well as meet all expenses for taxes, ground rent and insurance. What specially distinguished this scheme was that Miss Hill herself collected the rents, thus coming into contact with the tenants and helping to enforce regular and self-respecting habits. The success of her first attempt encour- aged her to continue. Six more houses were bought and treated in a similar manner. A yearly sum was set aside for the repairs of each house, and whatever remained over was spent on such additional appliances as the tenants themselves desired. This encouraged them to keep their tenements in good repair. By the help of friends Miss Hill was now enabled to enlarge the scope of her work. In 1869 eleven more houses were bought. The plan was to set a visitor over a small court or block of buildings to do whatever work in the way of rent-collecting, visiting for the School Board, &c, was required. As years went on Miss Octavia Hill's work was largely increased. Numbers of her friends bought and placed under her care small groups of houses, over which she fulfilled the duties of a conscientious landlord. Several large owners of tenement houses, notably the Ecclesiastical Commissioners, entrusted to her the manage- ment of such property, and consulted her about plans of re- building; and a number of fellow-workers were trained by her in the management of houses for the poor. The results in Southwark (where Red Cross Hall was established) and elsewhere were very beneficial. Both Miss Miranda and Miss Octavia Hill took an interest in the movement for bringing beauty into the homes of the poor, and the former was practically the founder of the Kyrle Society, the first suggestion of which was contained in a paper read to a small circle of friends. Both sisters worked for the preservation of open spaces, and helped to promote the work of the Charity Organization Society, and for several years Miss Miranda Hill (who died on the 31st of May 1 910) did admirable work in Marylebone as a member of the Board of Guardians.

HILL, ROWLAND (1744-1833), English preacher, sixth son of Sir Rowland Hill, Bart. (d. 1783), was born at Hawkstone, Shropshire, on the 23rd of August 1744. He was educated at Shrewsbury, Eton and St John's College, Cambridge. Stimu- lated by George Whitefield's example, he scandalized the uni- versity authorities and his own friends by preaching and visiting the sick before he had taken orders. In 1773 he was appointed to the parish of Kingston, Somersetshire, where he soon attracted great crowds to his open-air services. Having inherited consider- able property, he built for his own use Surrey Chapel, in the Blackfriars Road, London (1783). Hill conducted his services in accordance with the forms of the

Church of England, in whose communion he always remained. Both at Surrey Chapel and in his provincial " gospel tours " he had great success. His oratory was specially adapted for rude and uncultivated audiences. He possessed a voice of great power, and according to Southey " his manner " was " that of a performer as great in his own line as Kean or Kemble." His earnest and pure purposes more than made up for his occasional lapses from good taste and the eccentricity of his wit. He helped to found the Religious Tract Society, the British and Foreign Bible Society, and the London Missionary Society, and was a stout advocate of vaccination. His best-known work is the Village Dialogues, which first appeared in 1810, and reached a 34th edition in 1839. He died on the nth of April 1833.

See Life by E. Sidney (1833): Memoirs, by William Jones (1834); and Memorials, by Jas. Sherman (1857).

HILL, SIR ROWLAND (1795-1879), English administrator, author of the penny postal system, a younger brother of Matthew Davenport Hill, and third son of T. W. Hill, who named him after Rowland Hill the preacher, was born on the 3rd of December 1795 at Kidderminster. As a young child he had, on account of an affection of the spine, to maintain a recumbent position, and his principal method of relieving the irksomeness of his situation was to repeat figures aloud consecutively until he had reached very high totals. A similar bent of mind was manifested when he entered school in 1802, his aptitude for mathematics

being quite exceptional. But he was indebted for the direction of his abilities in no small degree to the guidance of his father, a man of advanced political and social views, which were qualified and balanced by the strong practical tendency of his mind. At the age of twelve Rowland began to assist in teaching mathe- matics in his father's school at Hilltop, Birmingham, and latterly he had the chief management of the school. On his suggestion the establishment was removed in 1819 to Hazelwood, a more commodious building in the Hagley Road, in order to have the advantages of a large body of boys, for the purpose of properly carrying out an improved system of education. That system, which was devised principally by Rowland, was expounded in a pamphlet entitled Plans for the Government and Education of Boys in Large Numbers, the first edition of which appeared in 1822, and a second with additions in 1827. The principal feature of the system was " to leave as much as possible all power in the hands of the boys themselves"; and it was so successful that, in a circular issued six years after the experiment had been in operation, it was

announced that " the head master had never once exercised his right of veto on their proceedings." It may be said that Rowland Hill, as an educationist, is entitled to a place side by side with Arnold of Rugby, and was equally successful with him in making 1 moral influence of the highest kind the predominant power in school discipline. After his marriage in 1827 Hill removed to a new school at Bruce Castle, Tottenham, which he conducted until failing health compelled him to retire in 1833. About this time he became secretary of Gibbon Wakefield's scheme for colonizing South Australia, the objects of which he explained in 1832 in a pamphlet on Home Colonies, afterwards partly reprinted during the Irish famine under the title Home Colonies for Ireland. It was in 1835 that his zeal as an administrative reformer was first directed to the postal system. The discovery which resulted from these investigations is when stated so easy of comprehension that there is great danger of losing sight of its originality and thorough- ness. A fact which enhances its merit was that he was not a post-office official, and possessed no practical experience of the details of the old system. After a laborious collection of statistics he succeeded in demonstrating that the principal expense of letter carriage was in receiving and distributing, and that the cost of conveyance differed so little with the distance that a uniform rate of postage was in reality the fairest to all parties that could be adopted. Trusting also that the deficiency in the postal rate would be made up by the immense increase of correspondence, and by the saving which would be obtained from prepayment, from improved methods of keeping accounts, and from lessening the expense of distribution, he in his famous pamphlet published in 1837 recommended that within the United Kingdom the rate for letters not exceeding half an ounce in weight should be only one penny. The employment of postage stamps is mentioned only as a suggestion, and in the following words: " Perhaps the difficulties might be obviated by using a bit of paper just large enough to bear the stamp, and covered at the back with a glutinous wash which by applying a little moisture might be attached to the back of the letter." Proposals so striking, and novel in regard to a subject in which every one had a personal interest commanded immediate and general attention. So great became the pressure of public opinion against the opposition offered to the measure by official pre- possessions and prejudices that in 1838 the House of Commons appointed a committee to examine the subject. The committee having reported favourably, a bill to carry out Hill's recom- mendations was brought in by the government. The act received the royal assent in 1839, and after an intermediate rate of four- pence had been in operation from the 5th of December of that year, the penny rate commenced on the 10th of January 184Q. Hill received an appointment in the Treasury in order to super- intend the introduction of his reforms, but. he was compelled to retire when the Liberal government resigned office in 1S41. In consideration of the loss he thus sustained, and to mark the public

appreciation of his services, he was in 1846 presented with the sum of £13,360. On the Liberals returning to office

in the same year he was appointed secretary to the postmaster- general and in 1854 he was made chief secretary. His ability as a practical administrator enabled him to supplement his original discovery by measures realizing its benefits in a degree commensurate with continually improving facilities of com- munication, and in a manner best combining cheapness with efficiency. In i860 his services were rewarded with the honour of knighthood; and when failing health compelled him to resign his office in 1864, he received from parliament a grant of £20,000 and was also allowed to retain his full salary of £2000 a year as retiring pension. In 1864 the university of Oxford conferred on him the degree of D.C.L., and on the 6th of June 1879 he was presented with the freedom of the city of London. The pre- sentation, on account of his infirm health, took place at his residence at Hampstead, and he died on the 27th of AugUat following. He was buried in Westminster Abbey.

He wrote, in conjunction with his brother, Arthur Hill, a History of. Penny Postage, published in 1880, with an introductory memoir by his nephew, G. Birkbeck Hill. See also Sir Rowland Hill, the Story of a Great Reform, told by his daughter (1907). To commemorate his memory the : Rowland Hill Memorial and Benevolent Fund was founded shortly after his death for the purpose of relieving distressed persons connected with the post office who were outside the scope of the Superannuation Act. See also Post and Postal Service.

HILL, ROWLAND HILL, ist Viscount (1772-1842), British general, was the second son of (Sir) John Hill, of Hawkstone, Shropshire, and nephew of the Rev. Rowland Hill (1744-1833), was born at Prees Hall near Hawkstone on the nth of August 1772. He was gazetted to the 38th regiment in 1790, obtaining permission at the same time to study in a military academy at Strassburg, where he continued after removing into the 53rd regiment with the rank of lieutenant in 179 1. In the beginning of 1793 he raised a company, and was promoted to the rank of captain. The same year he acted as assistant secretary to the British minister at Genoa, and served with distinction as a staff officer in the siege of Toulon. Hill took part in many minor expeditions in the following years. In 1800, when only twenty- eight, he was made a brevet colonel, and in 1801 he served with distinction in Sir Ralph Abercromby's expedition to Egypt, and was wounded at the battle of Alexandria. He continued to command his regiment, the 90th, until 1803, when he became a brigadier-general. During his regimental command he introduced a regimental school and a sergeants' mess. He held various commands as brigadier, and after 1805 as major-general, in Ireland. In 1805 he commanded a brigade in the abortive

Hanover expedition. In 1808 he was appointed to a brigade in the force sent to Portugal, and from Vimeira to Vittoria, in advance or retreat, he proved himself Wellington's ablest and most indefatigable coadjutor. He led a brigade at Vimeira, at Corunna and at Oporto, and a division at Talavera (see Peninsular War). His capacity for independent command was fully demonstrated in the campaigns of 181 o, 1811 and 1812. In 1811 he annihilated a French detachment under Girard at Arroyo-dos-Molinos, and early in 1812, having now attained a rank of lieutenant-general (January 1812) and become a K.B. (March), he carried by assault the important works of Almaraz on the Tagus. Hill led the right wing of Wellington's army in the Salamanca campaign in 181 2 and at the battle of Vittoria in 1 813. Later in this year he conducted the investment of Pampeluna and fought with the greatest distinction at the Ni velle and the Nive. In the invasion of France ini8i4hiscorps was victoriously engaged both at Orthez and at Toulouse. Hill was one of the general officers rewarded for their services by peerages, his title being at first Baron Hill of. Almaraz and Hawkstone, and he received a pension, the thanks of parliament and the freedom of the city of London. For about two years previous to his elevation to the peerage, he had been M.P. for Shrewsbury. In 181 5 the news of Napoleon's return from Elba was followed by the assembly of an Anglo-Allied army (see Waterloo Campaign) in the Netherlands, and Hill was appointed to one of the two corps commands in this army. At Waterloo he led the famous charge of Sir Frederick Adams's brigade against the Imperial Guard, and for some time it was thought that he

had fallen in the melee. He escaped, however, without a wound, and continued with the army in France until its withdrawal in 1 818. Hill lived in retirement for some years at his estate of Hardwicke Grange. He carried the royal standard at the corona- tion of George IV. and became general in 1825. When Wellington became premier in 1828, he received the appointment of general commanding-in-chief, and on resigning this office in 1842 he was created a viscount. He died on the 10th of December of the same year. Lord Hill was, next to Wellington, the most popular and able soldier of his time in the British service, and was so much beloved by the troops, especially those under his immediate command, that he gained from them the title of " the soldier's friend." He was a G.C.B. and G.C.H., and held the grand crosses of various foreign orders, amongst them the Russian St George anrl the Austrian Maria Theresa.

The Life of Lord Hill, G.C.B. , by Rev. Edwin Sidney, appeared in

HILL (O. Eng. kyll; cf. Low Ger. hull, Mid. Dutch hul, allied to Lat. celsus, high, collis, hill, &c), a natural elevation of the earth's surface. The term is now usually confined to elevations lower than a mountain, but formerly was used for all such elevations, high or low.

HILLAH, a town of Asiatic Turkey, in the pashalik of Bagdad, 60 m. S. of the city of Bagdad, in 32 28′ 35″ N., 44 48′ 4 o|" E., formerly the capital of a sanjak and the residence of a mutasserif, who in 1893 was transferred to Diwanieh. It is situated on both banks of the Euphrates, the two parts of the town being con- nected by a floating bridge, 450 ft. in length, in the midst of a very fertile district. The estimated population, which includes a large number of Jews, varies from 6000 to 12,000. The town has suffered much from the periodical breaking of the Hindieh dam and the consequent deflection of the waters of the Euphrates to the westward, as a result of which at times the Euphrates at this point has been entirely dry. This deflection of water has also seriously interfered with the palm groves, the cultivation of which constitutes a large part of the industry of the surrounding country along the river. The bazaars of Hillah are relatively large and well supplied. Many of the houses in the town are built of brick, not a few bearing an inscription of Nebuchadrezzar, obtained from the ruins of Babylon, which lie less than an hour away to the north.

Bibliography. — C. J. Rich, Babylon and Persepolis (1839): J. R. Peters, Nippur (1857); H. Rassam, Asshur and the Land of Ntmrod (1897); H. V. Geere, By Nile and Euphrates (1904). (J. P. Pe.)

HILLARD, GEORGE STILLMAN (1808-1879), American lawyer and author, was born at Machias, Maine, on the 22nd of September 1808. After graduating at Harvard College in 1828, he taught in the Round Hill School at Northampton, Massa- chusetts. He graduated at the Harvard Law School in 1832, and in 1833 he was admitted to the bar in Boston, where he entered into partnership with Charles Sumner. He was a member of the state House of Representatives in 1836, of the state Senate in 1850, and of the state constitutional convention of 1853, and in 1866-70 was United States district attorney for Massa- chusetts. He devoted a large portion of his time to literature. He became a member of the editorial staff of the Christian Register, a Unitarian weekly, in 1833; in 1834 he became editor of The American Jurist (1820-1843), a legal journal to which Sumner, Simon Greenleaf and Theron Metcalf contributed; and from 1856 to 1861 he was an associate editor of the Boston Courier. His publications include an edition of Edmund Spenser's works (in 5 vols., 1839); Selections from the Writings of Walter Savage Landor (1856) ; Six Months in Italy (2 vols., 1853) ; Life and Campaigns of George B. McClellan

(1864); a part of the Life, Letters, and Journals of George Ticknor (1876); besides a series of school readers and many articles in periodicals and encyclopaedias. He died in Boston on the 21st of January

1879.

HILLEBRAND, KARL (1829-1884), German author, was born at Giessen on the 17th of September 1829, his father Joseph Hillebrand (1 788-1871) being a literary historian and writer on philosophic subjects. Karl Hillebrand became involved, as a student in Heidelberg, in the Baden revolutionary move-

ment, and was imprisoned in Rastatt. He succeeded in escaping and lived for a time in Strassburg, Paris — where for several months he was Heine's secretary — and Bordeaux. He continued his studies, and after obtaining the doctor's degree at the Sorbonne, he was appointed teacher of German in the Ecolt militaire at St Cyr, and shortly afterwards, professor of foreign literatures at Douai. On the outbreak of the Franco-German War he resigned his professorship and acted for a time as correspondent to The Times in Italy. He then settled in Florence, where he died on the 19th of October 1884. Hille- brand wrote with facility and elegance in French, English and Italian, besides his own language. His essays, collected under the title Zeiten, V biker und Menschen (Berlin, 1874-1885), show clear discernment, a finely balanced cosmopolitan judgment and grace of style. He undertook to write the Geschichte Frank- reichs von der Thronbesteigung Ludwig Philipps bis zum Fall Napoleons III., but only two volumes were completed (to 1848) (2nd ed., 1881-1882). In French he published Des conditions de la bonne comedie (1863), La Prusse contemporaine (1867), £tudes italiennes (1868), and a translation of O. Muller's Griechi- sche Literaturgeschichte (3rd ed., 1883). In English he published his Royal Institution Lectures on German Thought during the Last Two Hundred Years (1880). He also edited a collection of essays dealing with Italy, under the title Italia (4 vols., Leipzig, 1874-1877).

See H. Homberger, Karl Hillebrand (Berlin, 1884).

HILLEL, Jewish rabbi, of Babylonian origin, lived at Jeru- salem in the time of King Herod. Though hard pressed by poverty, he applied himself to study in the schools of Shemaiah and Abtalion (Sameas and Pollion in Josephus). On account of his comprehensive learning and his rare qualities he was numbered among the recognized leaders of the Pharisaic scribes. Tradition assigns him the highest dignity of the Sanhedrin, under the title of nasi (" prince "), about a hundred years before the destruction of Jerusalem, i.e. about 30 b.c. The date at least can be recognized as historic; the fact that Hillel took a leading position in the council can also

be established. The epithet ha-zaken (" the elder "), which usually accompanies his name, proves him to have been a member of the Sanhedrin, and according to a trustworthy authority Hillel filled his leading position for forty years, dying, therefore, about a.d. 10. His descendants remained, with few exceptions, at the head of Judaism in Palestine until the beginning of the 5th century, two of them, his grandson Gamaliel I. and the latter's son Simon, during the time when the Temple was still standing. The fact that Josephus {Vita 38) ascribes to Simon descent from a very distinguished stock (yfrovs crcpoSpa'Ka.fj.irpov), shows in what degree of estimation Hillel's descendants stood. When the dignity of nasi became afterwards hereditary among them, Hillel's ancestry, perhaps on the ground of old family traditions, was traced back to David. Hillel is especially noted for the fact that he gave a definite form to the Jewish traditional learning, as it had been developed and made into the ruling and conserving factor of Judaism in the latter days of the second Temple, and particularly in the centuries following the destruction of the Temple. He laid down seven rules for the interpretation of the Scriptures, and these became the foundation of rabbinical hermeneutics; and the ordering of the traditional doctrines into a whole, effected in the Mishna by his successor Judah I., two hundred years after Hillel's death, was probably likewise due to his instigation. The tendency of his theory and practice in matters pertaining to the Law is evidenced by the fact that ' in general he advanced milder and more lenient views in op- position to his colleague Shammai, a contrast which after the death of the two masters, but not until after the destruction of the Temple, was maintained in the strife kept up between the two schools named the House of Hillel and the House of Shammai. The well-known institution of the Prosbol {irpoo-fioKij) , introduced by Hillel, was intended to avert the evil consequences of the scriptural law of release in the seventh year (Deut. xv. 1). He was led to this, as is expressly set forth (M . Gittin, iv. 3), by a regard for the welfare of the community. Hillel lived in the

memory of posterity chiefly as the great teacher who enjoined and practised the virtues of charity, humility and true piety. His proverbial sayings, in particular, a great number of which were written down partly in Aramaic, partly in Hebrew, strongly affected the spirit both of his contemporaries and of the succeed- ing generations. In his Maxims (Aboth, i. 12) he recommends the love of peace and the love of mankind beyond all else, and his own love of peace sprang from the tenderness and deep humility which were essential features in his character, as has been illustrated by many anecdotes. Hillel's patience has become proverbial. One of his sayings commends humility in the following paradox: " My

abasement is my exaltation." His charity towards men is given its finest expression in the answer which he made to a proselyte who asked to be taught the commandments of the Torah in the shortest possible form: " What is unpleasant to thyself that do not to thy neighbour; this is the whole Law, all else is but its exposition." This allusion to the scriptural injunction to love one's neighbour (Lev. xix. 18) as the fundamental law of religious morals, became in a certain sense a commonplace of Pharisaic scholasticism. For the Pharisee who accepts the answer of Jesus regarding that funda- mental doctrine which ranks the love of one's neighbour as the highest duty after the love of God (Mark xii. 3$), does so because as a disciple of Hillel the idea is familiar to him. St Paul also (Gal. v. 14) doubtless learned this in the school of Gamaliel. Hillel emphasized the connexion between duty towards one's neighbour and duty towards oneself in the epi- grammatic saying: " If I am not for myself, who is for me? And if I am for myself alone, what then am I ? And if not now, then when?" (Aboth, i. 14). The duty of working both with and for men he teaches in the sentence: " Separate not thyself from the congregation " (ib. ii. 4). The duty of considering oneself part of comman humanity, of not differing from others by any peculiarity of behaviour, he sums up in the words: " Appear neither naked nor clothed, neither sitting nor standing, neither laughing nor weeping " (Tosef. Ber. c. ii.). The command to love one's neighbour inspired also Hillel's injunction (Aboth, ii. 4): " Judge not thy neighbour until thou art in his place " (cf. Matt. vii. 1). The disinterested pursuit of learning, study for study's sake, is commended in many of Hillel's sayings as being what is best in life: " He who wishes to make a name for himself loses his name; he who does not increase [his know- ledge] decreases it; he who does not learn is worthy of death; he who works for the sake of a crown is lost " (Aboth, i. 13). " He who occupies himself much with learning makes his life " (ib. ii. 7). " He who has acquired the words of doctrine has acquired the life of the world to come " (ib.). " Say not: When I am free from other occupations I shall study; for may be thou shalt never at all be free " (ib. 4). One of his strings of proverbs runs as follows: " The uncultivated man is not innocent; the ignorant man is not devout; the bashful man learns not; the wrathful man teaches not; he who is much absorbed in trade cannot become wise; where no men are, there strive thyself to be a man " (ib. 5). The almost mystical profundity of Hillel's conciousness of God is shown in the words spoken by him on the occasion of a feast in the Temple — words alluding to the throng of people gathered there which he puts into the mouth of God Himself: "If I am here every one is here; if I am not here no one is here " (Sukkah 53a). In like manner Hillel makes God say to Israel, referring to Exodus xx. 24: " Whither I please, thither will I go; if thou come into my house I come into thy house; if thou come not into my house, I come not into thine " (ib.).

It is noteworthy that no miraculous legends are connected with Hillel's life. A scholastic tradition, however, tells of a voice from heaven which made itself heard when the wise men had assembled in Jericho, saying: "Among those here present is one who would have deserved the Holy Spirit to rest upon him, if his time had been worthy of it." And all eyes turned towards Hillel (Tos. Sotah, xiii. 3). When he died lamentation was made for him as follows: " Woe for the humble, woe for the pious, woe for the disciple of Ezra! " (ib.)

Hillel II., one of the patriarchs belonging to the family of Hillel I., lived in Tiberias about the middle of the 4th century, and introduced the arrangement of the calendar through which the Jews of the Diaspora became independent of Palestine in the uniform fixation of the new moons and feasts.

The Rabbi Hillel, who in the 4th century made the remarkable declaration that Israel need not expect a Messiah, because the promise of a Messiah had already been fulfilled in the days of King Hezekiah (Babli, Sanhedrin, 99a), is probably Hillel, the son of Samuel ben Nabman, a well-known expounder of the scriptures. (W. Ba.)

HILLER, FERDINAND (1811-1885), German composer, was born at Frankfort-on-Main, on the 24th of October 1811. His first master was Aloys Schmitt, and when he was ten years of age his compositions and talent led his father, a well-to-do man, to send him to Hummel in Weimar. There he devoted himself to composition, among his work being the entr'actes, to Maria Stuart, through which he made Goethe's acquaintance. Under Hummel, Hiller made great strides as a pianist, so much so that early in 1827 he went onatourto Vienna, where he metBeethoven and produced his first quartet. After a brief visit home Hiller went to Paris in 1829, where he lived till 1836. His father's death necessitated his return to Frankfort for a time, but on the 8th of January 1839 he produced at Milan his opera La Romilda, and began to write his oratorio Die Zerstorung Jerusalem., one of his best works. Then he went to Leipzig, to his friend Mendels- sohn, where in 1843-1844 he conducted a number of the Gewand- haus concerts and produced his oratorio. After a further visit to Italy to study sacred music, Hiller produced two operas, Ein Traum and Conradin, at Dresden in 1845 and 1847 respectively; he went as conductor to Diisseldorf in 1847 and Cologne in 1850, and conducted at the Opera Italien in Paris in 1851 and 1852. At Cologne he became a power as conductor of the Gurzenich concerts and head of the Conservatorium. In 1884 he retired, and died on the 12th of May in the following year. Hiller frequently visited England. He composed a work for the opening of the Royal Albert Hall, his Nala and Damayanti was performed at Birmingham, and he gave a series of pianoforte recitals of his own compositions at the*

Hanover Square Rooms in 1 87 1. He had a perfect mastery over technique and form in musical composition, but his works are generally dry. He was a sound pianist and teacher, and occasionally a brilliant writer on musical matters. His compositions, numbering about two hundred, include six operas, two oratorios, six or seven cantatas, much chamber music and a once-popular pianoforte concerto.

HILLER, JOHANN ADAM (1728-1804), German musical composer, was born at Wendisch-Ossig near Gorlitz in Silesia on the 25th of December 1728. By the death of his father in 1734 he was left dependent to a large extent on the charity of friends. Entering in 1747 the Kreuzschule in Dresden, the school attended many years afterwards by Richard Wagner, he subsequently went to the university of Leipzig, where he studied jurisprudence, supporting himself by giving music lessons, and also by performing at concerts both on the flute and as a vocalist. Gradually he adopted music as his sole profession, and devoted himself more especially to the permanent establishment of a concert institute at Leipzig. It was he who in 1781 originated the celebrated Gewandhaus concerts which still flourish at Leipzig. In 1789 he became "cantor" of the Thomas school there, a position previously held by John Sebastian Bach. He died in Leipzig on the 1 6th of June 1804. Two of his pupils placed a monument to his memory in front of the Thomas school. Hiller's compositions comprise almost every kind of church music, from the cantata to the simple chorale. But much more important are his operettas', 14 in number, which for a long time retained their place on the boards, and had considerable influence on the development of light dramatic music in Germany. The Jolly Cobbler, Love in the Country and the Village Barber were amongst the most popular of his works. Hiller also excelled in sentimental songs and ballads. With great simplicity of structure his music combines a considerable amountof genuine melodic invention. Although an admirer and imitator of the Italian school, Hiller fully appreciated the greatness of Handel, and did much for the appreciation of his music in Germany. It was under his direction that the Messiah

was for the first time given at Berlin, more than forty years after the composition of that great work. Hiller was also a writer on music, and for some years (1766-1770) edited a musical weekly periodical named IVochentliche Nachrichtenund Anmcrkungcn die Musik betrcfend.

HILLIARD, LAWRENCE (d. 1640), English miniature painter. The date of his birth is not known, but he died in 1640. He was the son of Nicholas

Hilliard, and evidently derived his Christian name from that of his grandmother. He adopted his father's profession and worked out the unexpired time of his licence after Nicholas Hilliard died. It was from Lawrence Hilliard that Charles I. received the portrait of Queen Elizabeth now at Montagu House, since van der Dort's catalogue describes it as ' ' done by old H illiard, and bought by the king of young Hilliard. ' ' In 1624 he was paid £42 from the treasury for five pictures, but the warrant does not specify whom they represented. His portraits are of great rarity, two of the most beautiful being those in the collections of Earl Beauchamp and Mr J. Pierpont Morgan. They are as a rule signed L.H., but are also to be distinguished by the beauty of the calligraphy in which the inscriptions round the portraits are written. The writing is as a rule very florid, full of exquisite curves and flourishes, and more elaborate than the more formal handwriting of Nicholas Hilliard. The colour scheme adopted by the son is richer and more varied than that used by the father, and Lawrence Hilliard's miniatures are not so hard as are those of Nicholas, and are marked by more shade and a greater effect of atmosphere. (G. C. W.)

HILLIARD, NICHOLAS (c. 1537-1619), the first true English miniature painter, is said to have been the son of Richard Hilliard of Exeter, high sheriff of the city and county in 1560, by Lawrence, daughter of John Wall, goldsmith, of London, and was born probably about 1537. He was appointed goldsmith, carver and portrait painter to Queen Elizabeth, and engraved the Great Seal of England in 1 586. He was in high favour with James I. as well as with Elizabeth, and from the king received a special patent of appointment, dated the 5th of May i6i7,and granting him a sole licence for the royal work for twelve years. He is believed to have been the author of an important treatise on miniature painting, now preserved in the Bodleian Library, but it seems more probable that the author of that treatise was John de Critz, Serjeant Painter to James I. It is probable, however, that the treatise was taken down from the instructions of Hilliard, for the benefit of one of his pupils, perhaps Isaac Oliver.

The esteem of his countrymen for Hilliard is testified to by Dr Donne, who in a poem called " The Storm " (1597) praises the work of this artist. He painted a portrait of himself at the age of thirteen, and is said to have executed one of Mary queen of Scots when he was eighteen years old. He died on the 7th of January 1619, and was buried in St Martin's-in-the-Fields, Westminster, leaving by his will twenty shillings to the poor of the parish, £30 between his two sisters, some goods to his maid- servant, and all the rest of his effects to his son, Lawrence Hilliard, his sole executor.

It seems to be prˆftv certain that he visited France, and that he is the artist alludea 10 in the papers of the due d'Alencxm under the name of "Nicholas Belliart, peintre anglois" who was painter to this prince in 1577,

receiving a stipend of 200 livres. The miniature of Mademoiselle de Sourdis, in the collection of Mr J. Pierpont Morgan, is certainly the work of Hilliard, and is dated 1577, in which year she was a maid of honour at the French Court; and other portraits which are his work are believed to represent Gabrielle d'Estrees, niece of Madame de Sourdis, la Princesse de Conde and Madame de Montgomery.

For further information respecting Hilliard's sojourn in France, see the privately printed catalogue of the collection of miniatures belonging to Mr J. Pierpont Morgan, compiled by Dr G. C. Williamson. (G. C. W.)

HILLSDALE, a city and the county-seat of Hillsdale county, Michigan, U.S.A., about 87 m. W. by S. of Detroit. Pop.

dgoo) 4151, of whom 300 were foreign-born; (1904) 4809; (iqio) 5001. Hillsdale is served by the Lake Shore & Michigan Southern railway. It has a public library, and is the seat of

Hillsdale College (co-educational, Free Baptist), which was opened as Michigan Central College, at Spring Arbor, Michigan, in 1844, was removed to Hillsdale and received its present name in 1853 and was re-opened here in 1855- The college in 1907-1908 had 22 instructors and 345 students. The city is a centre for a rich farming region; among its manufactures are gasoline and gas engines, screen doors, wagons, barrels, shoes, fur-coats and flour. Hillsdale was first settled in 1837, was incorporated as a village in 1847, and was chartered as a city in 1869.

HILL TIPPERA, or Tripura, a native state of India, adjoining the British district of Tippera, in Eastern Bengal and Assam. Area, 4086 sq. m.; pop, (1901) 173,325; estimated revenue, £55,000. Six parallel ranges of hill cross it from north to south, at an average distance of 12 m. apart. The hills are covered for the most part with bamboo jungle, while the low ground abounds with trees of various kinds, canebrakes and swamps. The principal crop and food staple is rice. The other articles of produce are cotton, chillies and vegetables. The chief exports are cotton, timber, oilseeds, bamboo canes, thatching-grass and firewood, on all of which tolls are levied. The chief rivers are the Gumti, Haora, Khoyai, Dulai, Manu and Fenny (Pheni). During the heavy rains the people in the plains use boats as almost the sole means of conveyance.

The history of the state includes two distinct periods — the traditional period described in the Rajmala, or " Chronicles of the Kings of Tippera," and the period since a.d. 1407. The Rajmala is a history in Bengali verse, compiled by the Brahmans of the court of Tripura. In the early history of the state, the rajas were in a state of chronic feud with all the neighbouring

countries. The worship of Siva was here, as elsewhere in India, associated with the practice of human sacrifice, and in no part of India were more victims offered. It was not until the beginning of the 17th century that the Moguls obtained any footing in this country. When the East India Company obtained the diwani or financial administration of Bengal in 1765, so much of Tippera as had been placed on the Mahommedan rent-roll came under British rule. Sin:e 1808, each successive ruler has received investiture from the British government. In October 1905 the state was attached to the new province of Eastern Bengal and Assam. It has a chronological era of its own, adopted by Raja Birraj, from whom the present raja is 93rd in descent. The year 1875 corresponded with 1285 of the Tippera era.

Besides being the ruler of Hill Tippera, the raja holds an estate in the British district of Tippera, called chakla Roshnabad, which is far the most valuable of his possessions. The capital is Agartala (pop. 9513), where there is an Arts College. The raja's palace and other public buildings were seriously damaged by the earthquake of the 12th of June 1897. The late raja, who died from the result of a motor-car accident in 1909, succeeded his father in 1896, but he had taken a large share in the administration of the state for some years previously. The principle of succession, which had often caused serious disputes, was defined in 1904, to the effect that the chief may nominate any male descendant through males from himself or from any male ancestor, but failing such nomination, then the rule of primogeniture applies.

HILTON, JOHN (1804-1878), British surgeon, was born at Castle Hedingham, in Essex, in 1804. He entered Guy's Hos- pital in 1824. He was appointed demonstrator of anatomy in 1828, assistant-surgeon in 1845, surgeon 1849. In 1867 he was president of the Royal College of Surgeons, of which he became member in 1827 and fellow in 1843, and he also delivered the Hunterian oration in 1867. As Arris and Gale professor (1859-1862) he delivered a course of lectures on " Rest and Pain," which have become classics. He was also surgeon-extraordinary to Queen Victoria. Hilton was the greatest anatomist of his time, and was nick named " Ana- tomical John." It was he who, with Joseph Towne the artist, enriched Guy's Hospital with its unique collection of models. In his grasp of the structure and functions of the brain and

spinal cord he was far in advance of his contemporaries. As an operator he was more cautious than brilliant. This was doubtless due partly to his living

in the pre-anaesthetics period, and partly to his own consummate anatomical knowledge, as is indicated by the method for opening deep abscesses which is known by his name. But he could be bold when necessary; he was the first to reduce a case of obturator hernia by abdominal section, and one of the first to practise lumbar colostomy. He died at Clapham on the 14th of September 1878.

HILTON, WILLIAM (1786-1839), English painter, was born in Lincoln on the 3rd of June 1786, son of a portrait-painter. In 1800 he was placed with the engraver J. R. Smith, and about the same time began studying in the Royal Academy school. He first exhibited in this institution in 1803, sending a " Group of Banditti "; and he soon established a reputation for choice of subject, and qualities of design and colour superior to the great mass of his contemporaries. He made a tour in Italy with Thomas Phillips, the portrait-painter. In 1813, having exhibited "Miranda and Ferdinand with the Logs of Wood," he was elected an associate of the Academy, and in 1820 a full academician, his diploma-picture representing " Ganymede." In 1823 he produced " Christ crowned with Thorns," a large and important work, subsequently bought out of the Chan trey Fund; this maybe regarded as his master- piece. In 1827 he succeeded Henry Thomson as keeper of the Academy. He died in London on the 30th of December 1839. Some of his best pictures remained on his hands at his decease — such as the " Angel releasing Peter from Prison " (life-size), painted in 1831, " Una with the Lion entering Corceca's Cave " (1832), the " Murder of the Innocents," his last exhibited work (1838), " Comus," and " Amphitrite." The National Gallery now owns " Edith finding the Body of Harold " (1834), " Cupid Disarmed," " Rebecca and Abraham's Servant " (1829), " Nature blowing Bubbles for her Children " (1821), and " Sir Calepine rescuing Serena " (from the Faerie Queen) (1831). In the National Portrait Gallery is his likeness of John Keats, with whom he was acquainted. In a great school or period Hilton could not count as more than a respectable subordinate; but in the British school of the earlier part of the 19th century he had sufficient elevation of aim and width of attainment to stand conspicuous.

HILVERSUM, a town in the province of North Holland, 18 m. by rail S.E. of Amsterdam. It is connected with Amster- dam by a steam tramway, passing by way of the small fortified towns of Naarden and Muiden on the Zuider Zee. Pop. (1900) 20,238. It is situated in the middle of the Gooi, a stretch of hilly country extending from the Zuider Zee to about 5 m. south of Hilversum, and composed of pine woods and sandy heaths. A convalescent home, the Trompenberg, was established here in 1874, and there are a town hall, middle-class and technical schools, and various places of worship, including a synagogue. Hilversum manufactures large quantities of floor-cloths and horse-blankets.

HIMALAYA, the name given to the mountains which form the northern boundary of India. The word is Sanskrit and literally signifies " snow-abode," fr.om him, snow, and dlaya, abode, and might be translated " snowy-range," although that expression is perhaps more nearly the equivalent of Himachal, another Sanskrit word derived from him, snow, and dchal, mountain, which is practically synonymous with Himalaya and is often used by natives of northern India. The name was converted by the Greeks into Emodos and Imaos.

Modern geographers restrict the term Himalaya to that portion of the mountain region between India and Tibet enclosed within the arms of the Indus and the Brahmaputra. From the bend of the Indus southwards towards the plains of the Punjab to the bend of the Brahmaputra southwards towards the plains of Assam, through a length of 1500 m., is Himachal or Himalaya. Beyond the Indus, to the north-west, the region of mountain ranges which stretches to a junction with the Hindu Rush south of the Pamirs, is usually known as Trans-Himalaya. Thus the Himalaya represents the southern face of the great central

upheaval — the plateau of Tibet — the northern face of which is buttressed by the Kuen Lun.

Throughout this vast space of elevated plateau and mountain face geologists now trace a system of main chains, or axes, extending from the Hindu Rush to Assam, st ™f tun arranged in approximately parallel lines, and m wa i aya traversed at intervals by main lines of drainage obliquely. Godwin- Austen indicates six of these geological axe ; as follows:

1. The main Central Asian axis, the Kuen Lun forming the northern edge or ridge of the Tibetan plateau.

2. The Trans-Himalayan chain of Muztagh (or Karakoram), which is lost in the Tibetan uplands, passing to the north of the sources of the Indus.

3. The Ladakh chain, partly north and partly south of the Indus — for that river breaks across it about 100 m. above Leh. This chain continues south of the Tsanpo (or Upper Brahmaputra), and becomes part of the Himalayan system.

4. The Zaskar, or main chain of the Himalaya, i.e. the " snowy range " par excellence which is indicated by Nanga Parbat (over- looking the Indus), and passes in a south-east direction to the southern side of the Deosai plains. Thence, bending slightly south, it extends in the line of snowy peaks which are seen from Simla to the famous peaks of Gangotri and Nanda Devi. This is the best known range of the Himalaya.

5. The outer Himalaya or Pir Panjal-Dhaoladhar ridge.

6. The Sub-Himalaya, which is " easily defined by the fringing line of hills, more or less broad, and in places very distinctly marked off from the main chain by open valleys (dhuns) or narrow valleys, parallel to the main axis of the chain." These include the Siwaliks.

Interspersed between these main geological axes are many other minor ridges, on some of which are peaksof great elevation. In fact, the geological axis seldom coincides with the line of highest elevation, nor must it be confused with the main lines of water-divide of the Himalaya.

On the north and north-west of Rashmir the great water- divide which separates the Indus drainage area from that of the Yarkand and other rivers of Chinese Turkestan The gnat has been explored by Sir F. Younghusband, and sub- northern sequently by H. H. P. Deasy. The general result watershed of their investigations has been to prove that the 0,,naa – Muztagh range, as it trends south-eastwards and finally forms a continuous mountain barrier together with the Rarakoram, is the true water-divide west of the Tibetan plateau. Shutting off the sources of the Indus affluents from those of the Central Asian system of hydrography, this great water-parting is dis- tinguished by a group of peaks of which the altitude is hardly less than that of the Eastern Himalaya. Mount Godwin-Austen (28,250 ft. high), only 750 ft. lower than Everest, affords an excellent example in Asiatic geography of a dominating, peak- crowned water-parting or divide. From Railas on the far west to the extreme north-eastern sources of the Brahmaputra, the great northern water-parting of the Indo-Tibetan highlands has only been occasionally touched. Littledale, du Rhins and Bonvalot may have stood on it as they looked southwards towards Lhasa, but for some 500 or 600 m. east of Railas it appears to be lost in the mazes of the minor ranges and ridges of the Tibetan plateau. Nor can it be said to be as yet well defined to the east of Lhasa.

The Tibetan plateau, or Chang, breaks up about the meridian of 92 E., and to the east of this meridian the affluents of the Tsanpo (the same river as the Dihong and subsequently as the Brahmaputra) drain no longer from the elevated Tibet. plateau, but from the rugged slopes of a wild region of mountains which assumes a systematic conformation where its successive ridges are arranged in concentric curves aroun'd the great bend of the Brahmaputra, wherein are hidden the sources of all the great rivers of Burma and China. Neither immediately beyond this great bend, nor within it in the Hima- layan regions lying north of Assam and east of Bhutan, have scientific investigations yet been systematically carried out; but it is known that the largest of the Himalayan affluents of the Brahmaputra west of the bend derive their sources from the Tibetan plateau, and break down

through the containing bands of hills, carrying deposits of gold from their sources to the plains, as do all the rivers of Tibet.

Although the northern limits of the Tsanpo basin are not sufficiently well known to locate the Indo-Tibetan watershed even approximately, there exists some scattered aortn'of" evidence of the nature of that strip of Northern Hima- the central laya on the Tibeto-Nepalese border which lies between chain of the line of greatest elevation and the trough of the oeaks Tsanpo. Recent investigations show that all the chief rivers of Nepal flowing southwards to the Tarai take their rise north of the line of highest crests, the " main range " of the Himalaya; and that some of them drain long lateral high-level valleys enclosed between minor ridges whose strike is parallel to the axis of the Himalaya and, occasionally, almost at right angles to the course of the main drainage channels breaking down to the plains. This formation brings the southern edge of the Tsanpo basin to the immediate neighbour- hood of the banks of that river, which runs at its foot like a drain flanking a wall. It also affords material evidence of that wrinkling or folding action which accompanied the process of upheaval, when the Central Asian highlands were raised, which is more or less marked throughout the whole of the north-west Indian borderland. North of Bhutan, between the Himalayan crest and Lhasa, this formation is approximately maintained ; farther east, although the same natural forces first resulted in the same effect of successive folds of the earth's crust, forming extensive curves of ridge and furrow, the abundant rainfall and the totally distinct climatic conditions which govern the processes of denudation subsequently led to the erosion of deeper valleys enclosed between forest-covered ranges which rise steeply from the river banks.

*Although suggestions have been made of the existence of higher peaks north of the Himalaya than that which dominates the Everest group, no evidence has been adduced to «;'■/ °f support such a contention. On the other hand the peaks. * observations of Major Ryder and other surveyors who explored from Lhasa to the sources of the Brahmaputra and Indus, at the conclusion of the Tibetan mission in 1904, conclusively prove that Mount Everest, which appears from the Tibetan plateau as a single dominating peak, has no rival amongst Himalayan altitudes, whilst the very remarkable investigations made by permission of the Nepal durbar from peaks near Kath- mandu in 1903, by Captain Wood, R.E., not only place the Everest group apart from other peaks with which they have been confused by scientists, isolating them in the topographical system of Nepal, but clearly show that there is no one dominating and continuous range*

indicating a main Himalayan chain which includes both Everest and Kinchinjunga. The main features of Nepalese topography are now fairly well defined. So much controversy has been aroused on the subject of Himalayan altitudes that the present position of scientific analysis in relation to them may be shortly stated. The heights of peaks determined by exact processes of trigonometrical observation are bound to be more or less in error for three reasons: (1) the extraordinary geoidal deformation of the level surface at the observing stations in submontane regions; (2) ignorance of the laws of refraction when rays traverse rarefied air in snow-covered regions; (3) ignorance of the variations in the actual height of peaks due to the increase, or decrease, of snow. The value of the heights attached to the three highest mountains in the world are, for these reasons, adjudged by Colonel S. G. Burrard, the Supt. Trigonometrical Surveys in India, to be in probable error to the following extent :

Present Survey Value of Height

Most probable Value.

Mount Everest

K2 (Godwin Austen) .

Kinchinjunga

29,002 28,250 28,146

29,141 28,191

28,225

These determinations have the effect of placing Kinchinjunga second and K 2 third on the list. (T. H. H.)*

Geology. — The Himalaya have been formed by violent crumpling of the earth's crust along the southern margin of the great tableland of Central Asia. Outside the arc of the mountain chain no sign of

this crumpling is to be detected except in the Salt Range, and the Peninsula of India has been entirely free from folding of any im- portance since early Palaeozoic times, if not since the Archcan period itself. But the contrast between the Himalaya and the Peninsula is not confined to their structure : the difference in the rocks themselves is equally striking. In the Himalaya the geological sequence, from the Ordovician to the Eocene, is almost entirely marine; there are indeed occasional breaks in the series, but during nearly the whole of this long period the Himalayan region, or at least its

northern part, must have been beneath the sea — the Central Mediterranean Sea of Neumayr or Tethys of Suess. In the peninsula, however, no marine fossils have yet been found of earlier date than Jurassic and Cretaceous, and these are confined to the neighbourhood of the coasts; the principal fossiliferous deposits are the plant- bearing beds of the Gondwana series, and there can be no doubt that, at least since the Carboniferous period, nearly the whole of the Peninsula has been land. Between the folded marine beds of the Himalaya and the nearly horizontal strata of the peninsula lies the Indo-Gangetic plain, covered by an enormous thickness of alluvial and wind-blown deposits of recent date. The deep boring at Luck- now passed through 1336 ft. of sands — reaching nearly to 1000 ft. below sea-level — without any sign of approaching the base of the alluvial series. It is clear, then, that in front of the Himalaya there is a great depression, but as yet there is no indication that this depression was ever beneath the sea.

In the light thrown by recent researches on the structure and origin of mountain chains the explanation of these facts is no longer difficult. From early Palaeozoic times the peninsula of India has been dry land, a part, indeed, of a great continent which in Mesozoic times extended across the Indian Ocean towards South Africa. Its northern shores were washed by the Sea of Tethys, which, at least in Jurassic and Cretaceous times, stretched across the Old World from west to east, and in this sea were laid down the marine deposits of the Himalaya. The tangential pressures which are known to be set up in the earth's crust — either by the contraction of the interior or in some other way — caused the deposits of this sea to be crushed up against the rigid granites and other old rocks of the peninsula and finally led to the whole mass being pushed forward over the edge of the part which did not crumple. The Indo-Gangetic depression was formed by the weight of the over-riding mass bending down the edge over which it rode, or else it is the lower limb of the S-shaped fold which would necessarily result if there were no fracture — the Himalaya representing the upper limb of the S-

Geologically, the Himalaya may be divided into three zones which correspond more or less with orographical divisions. The northern zone is the Tibetan, in which fossiliferous beds of Palaeozoic and Mesozoic age are largely developed — excepting in the north-west no such rocks are known on the southern flanks. The second is the zone of the snowy peaks and of the lower Himalaya, and is composed chiefly of crystalline and metamorphic rocks together with un- fossiliferous sedimentary beds supposed to be of Palaeozoic age. The southern zone comprises the Sub-Himalaya and consists entirely of Tertiary beds, and especially of the upper Tertiaries. The oldest beds which have hitherto yielded fossils, belong to the Ordovician system, but it is highly probable that the underlying "

Haimantas " of the central Himalaya are of Cambrian age. From these beds up to the top of the Carboniferous there appears to be no break; but the Carboniferous beds were in some places eroded before the de- position of the Productus shales, which belong to the Permian period. It is, however, possible that this erosion was merely local, for in other places there seems to be a complete passage from the Carbon- iferous to the Permian. From the Permian to the Lias the sequence in the central Himalaya shows no sign of a break, nor has any un- conformity been proved between the Liassic beds and the overlying Spiti shales, which contain fossils of Middle and Upper Jurassic age. The Spiti shales are succeeded conformably by Cretaceous beds (Gieumal sandstone below and Chikkim limestone above), and these are followed without a break by Nummulitic beds of Eocene age, much disturbed and altered by intrusions of gabbro and syenite. Thus, in the Spiti area at least, there appears to have been continuous deposition of marine beds from the Permian Productus shales to the Eocene Nummulitic formation. The next succeeding deposit is a sandstone, often highly inclined, which rests unconformably upon the Nummulitic beds and resembles the Lower Siwaliks of the Sub- Himalaya (Pliocene) but which as yet has yielded no fossils of any kind. The whole is overlaid unconformably by the younger Terti- aries of Hundes, which are perfectly horizontal and have been quite unaffected by any of the folds. ... .

From the absence of any well-marked unconformity it is evident .that in the northern part of the Himalayan belt, at least in the Spiti area, there can have been no post-Archaean folding of any magnitude until after the deposition of the Nummulitic beds, and that the folding was completed before the later Tertiaries of Hundes were laid down. It was, therefore, during the Miocene period that the elevation of this part of the chain began, while the disturbance of the Siwalik-like sandstone indicates that the folding continued into the Pliocene period. Along the southern flanks of the Himalaya the history of the chain is still more clearly shown. The sub-Himalaya are formed of Tertiary beds, chiefly Siwalik or upper Tertiary, while the lower Himalaya proper consist mainly of pre-Tertiary rocks

without fossils. Throughout the whole length of the chain, wherever the junction of the Siwaliks with the pre-Tertiary rocks has been seen, it is a great reversed fault. West of the Bias river a similar reversed fault forms the boundary between the lower Tertiaries and the pre-Tertiary rocks of the Himalaya, while between the Sutlej arid the Jumna rivers, where the lower Tertiaries help to form the lower Himalaya, the fault lies between them and the Siwaliks. The hade of the fault is constantly inwards, towards the

centre of the chain, and the older rocks which form the Himalaya proper, have been pushed forward over the later beds of the sub-Himalaya. But the fault is more than an ordinary reversed fault: it was, nearly every- where, the northern boundary of deposition of the Siwalik beds, and only in a few instances do any of the Siwalik deposits extend even to a short distance beyond it. The fault in fact was being formed during the deposition of the Siwalik beds, and as the beds were laid down, the Himalaya were pushed forward over them, the Siwaliks themselves being folded and upturned during the process. Accord- ingly, in some places the Siwaliks now form a continuous and con- formable series from base to summit, in other places the middle beds are absent and the upper beds of the series rest upon the upturned and denuded edges of the lower beds. The Siwaliks are fluviatile and torrential deposits similar to those which are now being formed at the foot of the mountains, in the Indo-Gangetic plain; and their relations to the older rocks of the Himalaya proper were very similar to those which now exist between the deposits of the plain and the Siwaliks themselves. But the great fault just described is not the only one of this character. There is a series of such faults, approximately parallel to one another, and although they have not been traced throughout the whole chain, yet wherever they occur they seem to have formed the northern boundary of deposition of the deposits immediately to the south of them. It appears, therefore, that the Himalaya grew southwards in a series of stages. A reversed fault was formed at the foot of the chain, and

Heat Katagarh

Ramqanqa ft Pamganqa R,

arranged between the same parallel system of folds as we see on the western frontier, connected by short transverse gaps where the rivers cross the folds, frequently to resume a course parallel to that origin- ally held. An instance of this occurs where the Indus suddenly breaks through the well-defined Ladakh range in the North-west Himalaya to resume its north-westerly course after passing from the northern to the southern side of the range. The reason assigned for these extraordinary diversions of the drainage right across the general strike of the ridges is that it is antecedent — i.e. that the lines of drainage were formed ere the folds or anticlinals were raised ; and that the drainage has merely maintained the course originally held, by the power of erosion during the gradual process of upheaval.

In the outer valleys of the Himalaya the sides are generally steep, so steep as to be liable to landslip, whilst the streams are still cutting down the river beds and have not yet reached the stage of equilibrium. Here and there a valley has become filled with alluvial detritus owing to some local

impediment in the drainage, and when this occurs there is usually to be found a fertile and productive field for agriculture. The straits of the Jhelum, below Baramulla, probably account for the lovelv vale of Kashmir, which is in form (if not in principles of construction) a repetition on grand scale of the Maidan of the Afridi Tirah, where the drainage from the slopes of a great amphitheatre of hills is collected and then arrested by the gorge which marks the outlet to the Bara.

Other rivers besides the Indus and the Brahmaputra begin by draining a considerable area north of the snowy range — the Sutlej, the Kosi, the Gandak and the Subansiri, for example. g enera i All these rivers break through the main snowy range ere w/ ma / a „ an they twist their way through the southern hills to the f ormat i on plains of India. Here the " antecedent " theory will not i S i yp i ca i, suffice, for there is no sufficient catchment area north of the snows to support it. Their formation is explained by a process of " cutting back," by which the heads of these streams are gradually

N.

Sidhpur Dhar

b b c c deb b c c b b d n o I

*f. = Recenti d = Upper siwalik conglomerate; c < *JHiddle siwalik sandstones; b = Lower rNahani siwaliks: a. = Nummutitic; n = Older rocks of Himalayas*

C 6 MuKflanus

Section across the sub-Himalayan zone.

upon this fault the mountains were pushed forward over the beds deposited at their base, crumpling and folding them in the process, and forming a sub-Himalayan ridge in front of the main chain. After a time a new fault originated at the foot of the sub-Himalayan zone thus raised, which now became part of the Himalaya themselves, and a new sub-Himalayan chain was formed in front of the previous one. The earthquakes of the present day show that the process is still in operation, and in time the deposits of the present Indo- Gangetic plain will be involved in the folds.

The regular form of the Himalaya, constituting an arc of a true circle, appears to indicate that the whole chain has been pushed forward as one mass upon a gigantic thrust-plane; but, if so, the dip of the plane must be low, for a line drawn along the southern foot of the Himalaya would coincide with the outcrop of a plane inclined to the surface at an angle of

about 14°. The thrust-plane, then, does not coincide with any of the boundary iaults already mentioned, which are usually inclined at angles of 50 or 6o°. The latter are due to the fact that, although, perhaps, the whole mass above the thrust-plane may move, yet the pressure which pushes it forwards necessarily proceeds from behind. The back, accordingly, moves faster than the front, and the whole is packed together; as when an ice-floe drives against the shore, the ice breaks and the outer fragments ride over those within. The great thrust-plane which is thus imagined to exist at the base of the Himalaya, corre- sponds with the " major thrusts " of the N.VV. Highlands of Scotland, and the reversed faults which appear at the surface with the " minor thrusts." (P. La.)

Such is the general outline of Himalayan evolution as now under- stood, and the process of it has led to certain marked features of _ m scenery and topography. Within the area of the trans-

0P °hl I Indus mountains we have beds of hard limestone or sand- nsultˆif stonc alternating with soft shales, which leads to the evo/u- scooping out by erosion of long narrow valleys where the

tloa. shales occur, and the passage of the streams through deep

rifts or gorges across the hard limestone anticlinals, which stand in irregular series of parallel ridges with the eroded valleys between. The great mass of the Himalaya exhibits the same structure, due to the same conditions acting for longer periods and on a much larger scale; but the structure is varied in the eastern portions of the mountains by the effect of different climatic conditions, and especially by the greater rainfall. Instead of wide, barren, wind-swept valleys, here are found fertile alluvial plains — such as Manipur — but for the most part the erosive action of the river has been able to keep pace with the rite of the river bed, and wc have deep, steep-sided valleys

eating their way northwards owing to the greater rainfall on the southern than on the northern slopes. The result of this process is well exhibited in the relative steepness of slope on the Indian and Tibetan sides of the passes to the Indus plateau. On the southern or Indian side the routes to Tibet and Ladakh follow the levels of Himalayan valleys with no remarkably steep gradients till they near the approach to the water-divide. The slope then steepens with the ascending curve to the summit of the pass, from which point it falls with a comparatively gentle gradient to the general level of the plateau. The Zoji La, the Kashmir water-divide between the Jhelum and the Indus, is a prominent case in point, and all the passes from the Kumaon and Garhwal hills into Tibet exhibit this formation in a marked degree. Taking the average elevation of the central axial line of snowy peaks as

19,000 ft., the average height of the passes is not more than 10,000 owing to this process of cutting down by erosion and gradual encroachment into the northern basin.

Meteorology. — Independently of the enormous variety of topo- graphical conformation contained in the Himalayan system, the vast altitude of the mountains alone is sufficient to cause modifications of climate in ascending over their slopes such as are not surpassed by those observed in moving from the equator to the poles. One half of the total mass of the atmosphere and three-fourths of the water suspended in it in the form of vapour lie below the average altitude of the Himalaya; and of the residue, one-half of the air and virtually almost all the vapour come within the influence of the highest peaks. The regular variations in pressure of the air indicated by the baro- meter and the annual and diurnal oscillations are as well marked in the Himalaya as elsewhere, but the amount of vapour held in sus- pension diminishes so rapidly with the akitude that not more than one-sixth (sometimes only one-tenth) of that observed at the foot -of the mountains is found at the greatest heights. This is dependent on the temperature of the air which rapidly decreases with altitude. On the mountains every altitude has its corresponding temperature, I an elevation of 1000 ft. producing a fall of 3 \°, or about 1 to each [300 ft. The mean winter temperature at 7000 ft. (which is about the average height of Himalayan " hill stations ")' is 44 ° F. and the I summer mean about 65 ° F. At 9000 ft. the mean temperature of i the coldest month is 32 F. At 12.000 ft. the thermometer never falls below freezing-point from the end of May to the middle of October, and at 15,000 ft. it is seldom above that point even in the height of summer. It should be noted that the thermometrical conditions of Tibet vary considerably from those of the Himalaya. At 12,000 ft. in Tibet the mean of the hottest month is about 60° F. and of the coldest about 10° F. whilst, at 15,000 ft. the frost is only permanent

from the end of October to the end of April. The distribution of vegetation and topographical conformation largely influence the question of local temperature. For instance it may be found that the difference of temperature between forest-clad ranges and the Indian plains is twice as much in April and May as in December or January; and the difference between the temperature of a well- wooded hill top and the open valley below may vary from 9° to 24° within twenty-four hours. The general relations of temperature to altitude as determined by Himalayan observations are as follows: (1) The decrease of temperature with altitude is most rapid in summer. (2) The annual range diminishes with the

elevation. (3) The diurnal range diminishes with the elevation. Comparisons are, however, apt to become anomalous when applied to elevated zones with a dense covering of forest and a great quantity of cloud and open and uncloudy regions both above and below the forest-clad tracts.

The chief rainfall occurs in the summer months between May and October (i.e. the period of the monsoon rains of India) the remainder Rainfall °^ t ‘ le year ˆeing comparatively dry. The fall of rain over the great plain of northern India gradually dimin- ishes in quantity, and begins later, as we pass from east to west. At the same time the rain is heavier as we approach the Himalaya and the greatest falls are measured in its outer ranges; but the quantity again diminishes as we pass onward across the chain, and on arriving at the border of Tibet, behind the great line of snowy peaks, the rain falls in such small quantities as to be hardly susceptible of measurement. Diurnal currents of wind, which are established from the plains to the mountains during the day, and from the hills to the plains during the night, are im- portant agents in distributing the rainfall. The condensation of vapour from the ascending currents and their gradual exhaustion as they are precipitated on successive ranges is very obvious in the cloud effects produced during the monsoon, the southern or windward face of each range being clothed day after day with a white crest of cloud whilst the northern slopes are often left entirely free. This shows how large a proportion of the vapour is arrested and how it is that only by drifting through the deeper gorges can any moisture find its way to the Tibetan table-land.

The yearly rainfall, which amounts to between 60 and 70 in. in the delta of the Ganges, is reduced to about 40 in. when that river issues from the mountains, and diminishes to 30 in. at the debouch- ment of the Indus into the plains. At Darjeeling (7000 ft. altitude) on the outer ranges of the eastern Himalaya it amounts to about 120 in. At Naini Tal north of the United Provinces it is about 90 in. ; at Simla about 80 in., diminishing still further as one approaches the north-western hills. All these stations are about the same altitude.

In the eastern Himalaya the ordinary winter limit of snow is 6000 ft. and it never lies for many days even at 7000 ft. In Kumaon, Snowfall on ‘^ e wcst > ‘t usu ally reaches down to the 5000 ft. level and occasionally to 2500 ft. Snow has been known to fall at Peshawar. At Leh, in western Tibet, hardly 2 ft. of snow are usually registered and the fall on the passes between 17,000 and 19.000 ft. is not generally more than 3 ft., but on the Himalayan passes farther east the falls are much heavier. Even in September these passes may be quite blocked and they are not usually open till the middle of June. The snow-line, or the level to which snow recedes in

the course of the year, ranges from 15,000 to 16,000 ft. on the southern exposures of the Himalaya that carry perpetual snow, along all that part of the system that lies between Sikkim and the Indus. It is not till December that the snow begins to descend for the winter, although after September light falls occur which cover the mountain sides down to 12,000 ft., but these soon disappear. On the snowy range the snow-line is not lower than 18,500 ft. and on the summit of the table-land it reaches to 20,000 ft. On all the passes into Tibet vegetation reaches to about 17,500 ft., and in August they may be crossed in ordinary years up to 18,400 ft. without finding any snow upon them ; and it is as impossible to find snow in the summer in Tibet at 15,500 ft. above the sea as on the plains of India.

Glaciers. — The level to which the Himalayan glaciers extend is greatly dependent on local conditions, principally the extent and elevation of the snow basins which feed them, and the slope and position of the mountain on which they are formed. Glaciers on the outer slopes of the Himalaya descend much lower than is commonly the case in Tibet, or in the most elevated valleys near the snowy range. The glaciers of Sikkim and the eastern mountains are believed not to reach a lower level than 13,500 or 14,000 ft. In Kumaon many of them descend to between 11,500 and 12,500 ft. In the higher valleys and Tibet 15,000 and 16,000 ft. is the ordinary level at which they end, but there are exceptions which descend far lower. In Europe the glaciers descend between 3000 and 5000 ft. below the snow-line, and in the Himalaya and Tibet about the same holds good. The summer temperatures of the points where the glaciers end on the Himalaya also correspond fairly with those of the corresponding positions in European glacfers, viz. for July a little below 6o° F., August 58° and September 55°.

Measurements of the movement of Himalayan glaciers give results according closely with those obtained under analogous conditions in the Alps, viz. rates from 9ˆ to 14ˆ in. in twenty-four hours. The motion of one dacier from the middle of May to the middle of October

averaged 8 in. in the twenty-four hours. The dimensions of the glaciers on the outer Himalaya, where, as before remarked, the valleys descend rapidly to lower levels, are fairly comparable with those of Alpine glaciers, though frequently much exceeding them in length — 8 or 10 m. not being unusual. In the elevated valleys of northern Tibet, where the destructive action of the summer heat is far less, the development of the glaciers is enormous. At one locality in north-western Ladakh there is a continuous mass of snow and ice extending across a snowy ridge, measuring 64 m. between the extremities of the two glaciers at its opposite ends. Another single glacier has been surveyed 36 m. long.

1 he northern tributaries cf the Gilgit river, which joins the Indus near its south-westerly bend towards the Punjab, take their rise from a glacier system which is probably unequalled in the world for its extent and magnificent proportions. Chief amongst them are the glaciers which have formed on the southern slopes of the Muztagh mountains below the group of gigantic peaks dominated by Mount Godwin-Austen (28,250 ft. high). The Biafo glacier system, which lies in a long narrow trough extending south-west from Nagar on the Hunza to near the base of the Muztagh peaks, may be traced for 90 m. between mountain walls which tower to a height of from 20,000 to 25,000 ft. above sea-level on either side.

In connexion with almost all the Himalayan glaciers of which precise accounts are forthcoming are ancient moraines indicating some previous condition in which their extent was much larger than now. In the east these moraines are very remarkable, extending 8 or 10 m. In the west they seem not to go beyond 2 or 3 m. reach. They have been observed on the summit of the table-land as well as on the Himalayan slope. The explanation suggested to account for the former great extension of glaciers in Norway would seem applic- able here. Any modification of the coast-line which should sub- merge the area now occupied by the North Indian plain, or any considerable part of it, would be accompanied by a much wetter and more equable climate on the Himalaya; more snow would fall on the highest ranges, and less summer heat would be brought to bear on the destruction of the glaciers, which would receive larger supplies and descend lower.

Botany. — Speaking broadly, the general type of the flora of the lower, hotter and wetter regions, which extend along the great plain at the foot of the Himalaya, and include the valleys of the larger rivers which penetrate far into the mountains, does not differ from that of the contiguous peninsula and islands, though the tropical and insular character gradually becomes less marked going from east to west, where, with a greater elevation and distance from the sea and higher latitude, the rainfall and humidity diminish and the winter cold increases. The vegetation of the western part of the plain and of the hottest zone of the western mountains thus becomes closely allied to, or almost identical with, that of the drier parts of the Indian peninsula, more especially of its hilly portions; and, while a general tropical character is preserved, forms are observed which indicate the addition of an Afghan as well as of an African element, of which last the gay lily Gloriosa superba is an example, pointing to some previous connexion with Africa.

The European flora, which is diffused from the Mediterranean along the high lands of Asia, extends to the Himalaya; many European species reach the central parts of the chain, though few reach its eastern end, while genera common to Europe and the Himalaya are abundant throughout and

at all elevations. From the opposite quarter an influx of Japanese and Chinese forms, such as the rhodo- dendrons, the tea plant, Aucuba, Helwingia, Skimmia, Adamia, Goughia and others, has taken place, these being more numerous in the east and gradually disappearing in the west. On the higher and therefore cooler and less rainy ranges of the Himalaya the conditions of temperature requisite for the preservation of the various species are readily found by ascending or descending the mountain slopes, and therefore a greater uniformity of character in the vegetation is maintained along the whole chain. At the greater elevations the species identical with those of Europe become more frequent, and in the alpine regions many plants are found identical with species of the Arctic zone. On the Tibetan plateau, with the increased dryness, a Siberian type is established, with many true Siberian species and more genera ; and some of the Siberian forms are further dissemin- ated, even to the plains of Upper India. The total absence of a few of the more common forms of northern Europe and Asia should also be noticed, among which may be named Tilia, Fagus, Arbutus, Erica, Azalea and Cistacae.

In the more humid regions of the east the mountains are almost everywhere covered with a dense forest which reaches up to 12,000 or 13,000 ft. Many tropical types here ascend to 7000 ft. or more. To the west the upper limit of forest is somewhat lower, from 11,500 to 12,000 ft. and the tropical forms usually cease at 5000 ft.

In Sikkim the mountains are covered with dense forest of tall umbrageous trees, commonly accompanied by a luxuriant growth of under shrubs, and adorned with climbing and epiphytal plants in wonderful profusion. In the tropical zone large figs abound, Termin- alia, Shorea (sal), laurels, many Leguminosae, Bombax, Artocarpus, bamboos and several palms, among which species of Calamus are remarkable, climbing over the largest trees ; and this is the western limit of Cycas and Myristica (nutmeg). Plantains ascend to 7000 ft. Pandanus and tree-ferns abound. Other ferns, Scitamineae, orchids

and climbing Arotdeae are very numerous, the last named profusely adorning the forests with their splendid dark-green foliage. Various oaks descend within a few hundred feet of the sea-level, increasing in numbers at greater altitudes, and becoming very frequent at 4000 ft , at which elevation also appear Aucuba, Magnolia, cherries Pyrus, » £i 6 ‘ t’ 3nd bl o Ch ‘ V th man y Aroliaceae, Hollbollea, Skimmia, Daphne, Myrsme ■ Symplocos and Rubus. Rhododendrons begin at about 6000 ft. and become*

abundant at 8000 ft., from 10,000 to 14 000 ft forming in many places the mass of the shrubby vegetation which extends some 2000 ft. above the forest. Epiphytal orchids are extremely numerous between 6000 and 8000 ft. Of the Coniferae Podocarpus and Pmus longifolia alone descend to the tropical zone 1 Abies Brunoniana and Smithiana and the larch (a genus not seen in w hT ster " mountal "s) are found at 8000, and the yew and Picea WebbianaaX 10,000 ft. Pmus excelsa, which occurs in Bhutan, is absent in the wetter climate of Sikkim.

On the drier and higher mountains of the interior of the chain the forests become more open, and are spread less uniformly over the hill-s.des a luxuriant herbaceous vegetation appears, and the number ot shrubby Leguminosae, such as Desmodium and Indigofera in- creases, as well as Ranunculaceae, Rosaceae, Umbelliferae, Labiatae, Gramineae, Cyperaceae and other European genera

Passing to the westward, and viewing the flora of Kumaon, which

we°finH e f h° l d f h a Cent r' ?T ti ° n ° n ˆ chain – on the 8 °th meridian, we find that the gradual decrease of moisture and increase of high summer heat are accompanied by a marked change of the vegetation The tropical forest is characterized by the trees of the hotter and drier parts of southern India, combined with a few of European tvDe Ferns are more rare, and the tree-ferns have disappeared The species of palm are also reduced to two or three, and bamboos, though abundant, are confined to a few species. 8

The outer ranges of mountains are mainly covered with forests of Pmus longifolia, rhododendron, oak and Pieris. At Naini Tal cvoress is abundant The shrubby vegetation comprises Rosa, Rubus, Indigofera Desmodium, Berbens, Boehmeria, Viburnum, Clematis

Xr n 7u Ar r ndinaria -T? { l h r rhace S us plants s P ecies oiRanMus, Fotenhlla, Geranium, Thahctrum, Primula, Gentiana and many other

huropean forms are common. In the less exposed localities, on northern slopes and sheltered valleys, the European forms become more numerous, ana we find species of alder, birch, ash, elm, maple, holly, hornbeam, Pyrus, &c At greater elevations in the interior besides the above are met Corylus, the common walnut, found wild throughout the range, horse chestnut, yew, also Picea Webbiana Pmus excelsa, Abies Smithiana, Cedrus Deodara (which treedoes not grow spontaneously east of Kumaon), and several junipers The denser forests are commonly found on the northern faces of theWher ranges, or in the deeper valltys, between 8000 and io,soo ft The woods on the outer ranges from 3000 up to 7000 ft. are more open and consist mainly of evergreen trees.

The herbaceous vegetation does not differ greatly, genericallv from that of the east, and many species of Primulaceae, Ranuncul- aceae Cruciferae, Labiatae and Scrophulariaceae occur; balsams abound, also beautiful forms of Campanulaceae, Gentiana, MeconoPsis baxifraga and many others. F '

K £ Ul A?u tion hardly exten , ds above 70CO ft., except in the valleys behind the great snowy peaks, where a few fields of buckwheat arid lioetan barley are sown up to 11,000 or 12,000 ft. At the lower elevations rice, maize and millets are common, wheat and barley at a somewhat higher level, and buckwheat and amaranth usually on the poorer lands, or those recently reclaimed from forest. Besides these most of the ordinary vegetables of the plains are reared, and potatoes have been introduced in the neighbourhood of all the British stations

As we pass to the west the species of rhododendron, oak and Magnolia are much reduced in number as compared to the eastern region, and both the Malayan and Japanese forms are much less common The herbaceous tropical and semi-tropical vegetation likewise by degrees disappears, the Scitamineae, epiphytal and teirestnal OrchideaeAraceae, Cyrtandraceae and Begoniae only occur in small numbers in Kumaon, and scarcely extend west of the Sutlei In like manner several of the western forms suited to drier climates hnd their eastern limit in Kumaon. In Kashmir the plane and Lombardy poplar flourish, though hardly seen farther east, the cherrv is cultivated in orchards, and the vegetation presents an eminently European cast. The alpine flora is slower in changing its character as we pass from east to west, but in Kashmir the vegetation of the 'f £ -T Un p mS – har ˆy. differs from that of the mountains of Afghanistan, Persia and Siberia, even in species*

The total number of flowering plants inhabiting the range amounts probably to 5000 or 6000 species, among which may be reckoned several hundred common English plants chiefly from the temperate and alpine regions; and the characteristic of the flora as a whole is almnl 1 contains a general and tolerably complete illustration of almost all the chief natural families of all parts of the world, and has comparatively few distinctive features of its own.

1 he timber trees of the Himalaya are very numerous, but few of

*v; SZh£ f n r n f to be ofmuch val £ e – The " Sal " is one of the mos **

valuable of the trees; with the " Toon " and " Sissoo," it grows in the outer ranges most accessible from the plains. The " Deodar" is also much used, but the other pines produce timber that is not durable. Bamboos grow

everywhere along the outer ranges, and

of India! thC eaStWard ‘ and are lar g e ‘y exported for use in the plains

*forllrˆL m Spe * ie A ° f C ° ffee is indi g en .°“s ˆ the hotter Himalayan forests, the climate does not appear suitable for the growth of the plant which supplies the coffee of commerce. The cultivation of tea however, is carried on successfully on a large scale, both in the east and west of the mountains. In the western Himalaya the cultivated variety of the tea plant of China succeeds well; on the east the indigenous tea of Assam, which is not specifically different, and is perhaps the original parent of the Chinese variety, is now almost everywhere preferred. The produce of the Chinese variety in theta tr,l C U cl,mat «of the easte ™ Himalaya, Assam and eastern Bengal di enous i° Undant nor so hl S hl y flavoured as that of the in-*

intTnH cul , tivation ° f th e cinchona, several species of which have been introduced from South America and naturalized in the Sikkim Himalaya, promises to yield at a comparatively small cost an ample supply of the febrifuge extracted from its bark. At present the manufacture is almost wholly in the hands of the Government, and the drug prepared is all disposed of in India

m.ˆT”” – The gene 5 al – distribution of animal life is determined by much the same conditions that have controlled the vegetation

Lr e ,tf 0nn f Xl0 “.i, W, ˆ Eur0pe L 0rl the n orth-west, with Chin! on the north-east, with Africa on the south-west, and with the Malayan

ˆ 10 nf°ˆ p S ° Uth ” eaSt ‘J manifest ; a “d the greater or less preval- ence of the European and Eastern forms varies according to more western or eastern position on the chain. So far as is known these remarks will apply to the extinct as well as to the existing fauna The Palaeozoic forms found in the Himalaya are very close to those of Europe, and in some cases identical. The Triassic fossils are still more closely allied, more than a third of the species being identical f™f’ he Jˆ assi £Mol lusca, also, are many species that are common is «£££ rt The , S . lwahk / ossl ls contain 84 species of mammals of 45 genera, the whole bearing a marked resemblance to the Miocene fauna of Europe, but containing a larger number of genera still existing especially of ruminants, and now held to be of Pliocene age The fauna of the Tibetan Himalaya is essentially European or rather that of the northern half of the old continent, which region has by zoologists been termed Palaearctic. Among the characteristic animals may be named the yak, from which is reared a cross breed with the ordinary horned cattle of India, many wild sheep, and two antelopes, as we 1 as the musk-deer;

several hares and some burrow- ing animals, including pikas (Lagomys) and two or three species of marmot; certain arctic forms of carnivora—fox, wolf, lynx ounce M and , ermme : f a,so f M a ˆes. Among birds are found bustard and species of sand-grouse and partridge; water-fowl in great variety which breed on the lakes in summfr and migrate to the plains of India in winter; the raven, hawks, eagles and owls a magpie, and two kinds of chough; and many smaller birds of the passerine order, amongst which are several finches. Reptiles as might be anticipated are far from numerous, but a few lizards'are found, belonging for the most part to types, such as Phrynocephalus, characteristic of the Central-Asiatic area. The fishes from the head- waters of the Indus also belong, for the most part, to Central-Asiatic types, with a small admixture of purely Himalayan forms. Amongst ˆ,°™ r are several pecuhar small-scaled carps, belonging to the genus Schizothorax and its allies.

The ranges of the Himalaya, from the border of Tibet to the plains, form a zoological region which is one of the richest of the world particularly in respect to birds, to which the forest-clad mountains offer almost every range of temperature

Only two or three forms of monkey enter the mountains the angur, a species of Semnopithecus, ranging up to 12,000 ft No lemurs occur, although a species is found in Assam, and another in southern India Bats are numerous, but the species are for the most

? ar ,h n £- E eCU '! ar t0 the a !i ea; several European forms are f"ˆ.smaller than a domestic cat/to animals like the clouded leopard availing a leopard in size. Leopards are common! and the tiger wanders to a considerable elevation, but can hardly te considered a permanent inhabitant, except in the lower valleyˆ Civets, the rnungoose (Herpestes), and toddy cats (Paradoxurus) Ire only found at the lower elevations. Wild dogs {Cyan) are common but neither foxes nor wolves occur in the forest area. Besidef these carnivora some very peculiar forms are found, the most remarkable of which ,s Aelurus, sometimes called the cat-bear, a type akin to the American racoon Two other genera, Helictis, an abeyant badger! and linsang an aberrant civet, are representatives of Malayan types Amongst the rodents squirrels abound, and the so-called flying DoZk L?/ e H'ˆ d >?y several species. Rats and mice swim both kinds and individuals being numerous, but few present much peculiarity ,a bamboo rat (Rhizomys) from the base of fhe eastern Himalaya being perhaps most worthy of notice. Two or three speaes of vole (Arvuola) have been detected, and porcupines are

HIMERA

common. The elephant is found in the outer forests as far as the Jumna, and the rhinoceros as far as the Sarda; the spread of both of these animals as far as the Indus and into the plains of India, far beyond their present limits, is authenticated by historical records; they have probably retreated before the advance of cultivation and fire-arms. Wild pigs are common in the lower ranges, and one peculiar species of pigmy-hog (Sus salvanius) of very small size inhabits the forests at the base of the mountains in Nepal and Sikim. Deer of several kinds are met with, but do not ascend very high on the hillsides, and belong exclusively to Indian forms. The musk deer keeps to the greater elevations. The chevrotains of India and the Malay countries are unrepresented. The gaur or wild ox is found at the base of the hills. Three very characteristic ruminants, having some affinities with goats, inhabit the Himalaya; these are the " serow " (Nemorhaedus), " goral " (Cemas) and " tahr " (Hemi- tragus), the last-named ranging to rather high elevations. Lastly, the pangolin (Manis) is represented by two species in the eastern Himalaya. A dolphin (Platanista) living in the Ganges ascends that river and its affluents to their issue from the mountains.

Almost all the orders of birds are well represented, and the marvellous variety of forms found in the eastern Himalaya is only rivalled in Central and South America. Eagles, vultures and other birds of prey are seen soaring high over the highest of the forest-clad ranges. Owls are numerous, and a small species, Glaucidium, is conspicuous, breaking the stillness of the night by its monotonous though musical cry of two notes. Several kinds of swifts and night- jars are found, and gorgeously-coloured trogons, bee-eaters, rollers, and beautiful kingfishers and barbets are common. Several large hornbills inhabit the highest trees in the forest. The parrots are restricted to parrakeets, of which there are several species, and a single small lory. The number of woodpeckers is very great and the variety of plumage remarkable, and the voice of the cuckoo, of which there are numerous species, resounds in the spring as in Europe. The number of passerine birds is im- mense. Amongst them the sun-birds resemble in appearance and almost rival in beauty the humming-birds of the New Continent. Creepers, nuthatches, shrikes, and their allied forms, flycatchers and swallows, thrushes, dippers and babblers (about fifty species), bul- buls and orioles, peculiar types of redstart, various sylviads, wrens, tits, crows, jays and magpies, weaver-birds, avadavats, sparrows, crossbills and many finches, including the exquisitely coloured rose- finches, may also be mentioned. The pigeons are represented by several wood-pigeons, doves and green pigeons. The gallinaceous birds include the peacock, which everywhere adorns the forest border- ing on the plains, jungle fowl and several pheasants; partridges, of which the chikor may be named as most abundant, and snow- pheasants and partridges, found only at the greatest

elevations. Waders and waterfowl are far less abundant, and those occurring are nearly all migratory forms which visit the peninsula of India — the only important exception being two kinds of solitary snipe and the red-billed curlew.

Of the reptiles found in these mountains many are peculiar. Some of the snakes of India are to be seen in the hotter regions, including the python and some of the venomous species, the cobra being found as high up as 8000 or 9000 ft., though not common. Lizards are numerous, and as well as frogs are found at all elevations from the plains to the upper Himalayan valleys, and even extend to Tibet.

The fishes found in the rivers of the Himalaya show the same general connexion with the three neighbouring regions, the Palae- arctic, the African and the Malayan. Of the principal families, the Acanthopterygii, which are abundant in the hotter parts of India, hardly enter the mountains, two genera only being found, of which one is the peculiar amphibious genus Ophiocephalus. None of these fishes are found in Tibet. The Siluridae, or scaleless fishes, and the Cyprinidae, or carp and loach, form the bulk of the mountain fish, and the genera and species appear to be organized for a mountain- torrent life, being almost all furnished with suckers to enable them to maintain their positions in the rapid streams which they inhabit. A few Siluridae have been found in Tibet, but the carps constitute the larger part of the species. Many of the Himalayan forms are Indian fish which appear to go up to the higher streams to deposit their ova, and the Tibetan species as a rule are confined to the rivers on the table-land or to the streams at the greatest elevations, the characteristics of which are Tibetan rather than Himalayan. The Salmonidae are entirely absent from the waters of the Himalaya proper, of Tibet and of Turkestan east of the Terektag.

The Himalayan butterflies are very numerous and brilliant, for the most part belonging to groups that extend both into the Malayan and European regions, while African forms also appear. There are large and gorgeous species of Papilio, Nymphalidae, Morphidae and Danaidae, and the more favoured localities are described as being only second to South America in the display of this form of beauty and variety in insect life. Moths, also, of strange forms and of great size are common. The cicada's song resounds among the woods in the autumn; flights of locusts frequently appear after the summer, and they are carried by the prevailing winds even among the glaciers and eternal snows. Ants, bees and wasps of many species, and flies and gnats abound, particularly during the summer rainy season, and at all elevations.

Mountain Scenery. — Much has been written about the impressive-

ness of Himalayan scenery. It is but lately, however, that any adequate conception of the magnitude and majesty of the most stupendous of the mountain groups which mass themselves about the upper tributaries and reaches of the Indus has been presented to us in the works of Sir F. Younghusband, Sir W. M. Conway, H. C. B. Tanner and D. Freshfield. It is not in comparison with the pictur- esque beauty of European Alpine scenery that the Himalaya appeals to the imagination, for amongst the hills of the outer Himalaya — the hills which are known to the majority of European residents and visitors — there is often a striking absence of those varied incidents and sharp contrasts which are essential to picturesqueness in mountain landscape. Too often the brown, barren, sun-scorched ridges are obscured in the yellow dust haze which drifts upwards from the plains; too often the whole perspective of hill and vale is blotted out in the grey mists that sweep in soft, resistless columns against these southern slopes, to be condensed and precipitated in ceaseless, monotonous rainfall. Few Europeans really see the Himalaya; fewer still are capable of translating their impressions into language which is neither exaggerated nor inadequate.

Some idea of the magnitude of Himalayan mountain construction —a magnitude which the eye totally fails to appreciate — may, however, be gathered from the following table of comparison of the absolute height of some peaks above sea-level with the actual amount of their slopes exposed to view : —

Relative Extent of Snow Slopes Visible.

Height

Amount

Name of Mountain.

Place of Observation.

above

of Slope

sea.

exposed.

Everest ….

Dewanganj .

29,002

8,000

,, ….

Sandakphu

,,

12,000

K2 or Godwin-Austen

Between Gilgit and

Gor, 16,000 ft.

28,250

Pk. XIII. or Makalu

Purnea, 200 ft. .

27,800

8,000

,, ,,

Sandakphu, 12,000 ft.

,,

9,000

Nanga Parbat

Gor, 16,000 ft. .

26,656

23,000

Tirach Mir

Between Gilgit and

Chitral, 8000 ft. .

25,400

17-18,000

Rakapushi .

C haprot (Gilgit),

13,000 ft. .

25.560

18,000

Kinchinjunga Mont Blanc .

Darjeeling, 7000 ft.

28,146

16,000

Above Chamonix,

7000 ft.

I5,78i

11,500

It will be observed from this table that it is not often that a greater slope of snow-covered mountain side is observable in the Himalaya than that which is afforded by the familiar view of Mont Blanc from Chamonix. (T. H. H.)*

Authorities. — Drew, Jammu and Kashmir (London, 1875) ; G. W. Leitner, Dardistan (1887) ; J. Biddulph, Tribes of the Hindu Kush (Calcutta, 1880) ; H. H. Godwin-Austen, " Mountain Systems of the Himalaya," vols. y. and vi. Proc. R. G. S. (1883-1884); C. Ujfalvy, Aus dem westlichen Himalaya (Leipzig, 1884); H. C. B. Tanner, " Our Present Knowledge of the Himalaya," vol. xiii. Proc. R. G. S. (1891); R. D.

Oldham, "The Evolution of Indian Geo- graphy," vol. iii. Jour. R. G. S.; W. Lawrence, Kashmir (Oxford, 1895) ; Sir W. M. Conway, Climbing and Exploring in the Karakoram (London, 1898) ; F. Bullock Workman, In the Ice World of Himalaya (1900) ; F. B. and W. H. Workman, Ice-bound Heights of the Mustagh (1908); D. W. Freshfield, Round Kangchenjunga (1903).

For geology see R. Lydekker, " The Geology of Kashmir," &c, Mem. Geol. Surv. India, vol. xxii. (1883); C. S. Middlemiss, " Physical Geology of the Sub-Himalaya of Gahrwal and Kumaon," ibid., vol. xxiv. pt. 2 (1890); C. L. Griesbach, Geology of the Central Himalayas, vol. xxiii. (1891); R. D. Oldham, Manual of the Geology of India, chap, xviii. (2nd ed., 1893). Descriptions of the fossils, with some notes on stratigraphical questions, will be found in several of the volumes of the Palaeontologia Indica, published by the Geological Survey of India, Calcutta.

HIMERA, a city on the north coast of Sicily, on a hill above the east bank of the Himeras Septentrionalis. It was founded in 648 B.C. by the Chalcidian inhabitants of Zancle, in company with many Syracusan exiles. Early in the 5th century the tyrant Terillas, son-in-law of Anaxilas of Rhegium and Zancle; appealed to the Carthaginians, who came to his assistance, but were utterly defeated by Gelon of Syracuse in 480 B.C. — on the same day, it is said, as the battle of Salamis. Thrasydaeus, son of Theron of Agrigentum, seems to have ruled the city oppres- sively, but an appeal made to Hiero of Syracuse, Gelon's brother, was betrayed by him to TheTon; the latter massacred all his enemies and in the following year resettled the town. In 415 it refused to admit the Athenian fleet and remained an ally of Syracuse. In 408 the Carthaginian invading army under Hannibal, after capturing Selinus, invested and took Himera

and razed the city to the ground, founding a new town close to the hot springs (Thermae Himeraeae), 8 m. to the west. The only relic of the ancient town now visible above ground is a small portion (four columns, lower diameter 7 ft.) of a Doric temple, the date of which (whether before or after 480 B.C.) is uncertain.

HIMERIUS (c. a.d. 315-386), Greek sophist and rhetorician, was born at Prusa in Bithynia. He completed his education at Athens, whence he was summoned to Antioch in 362 by the emperor Julian to act as his private secretary. After the death of Julian in the following year Himerius returned to Athens, where he established a school of rhetoric, which he compared

with that of Isocrates and the Delphic oracle, owing to the number of those who flocked from all parts of the world to hear him. Amongst his pupils were Gregory of Nazianzus and Basil the Great, bishop of Caesarea. In recognition of his merits, civic rights and the membership of the Areopagus were conferred upon him. The death of his son Rufinus (his lament for whom, called ixovuSia, is extant) and that of a favourite daughter greatly affected his health; in his later years he became blind and he died of epilepsy. Although a heathen, who had been initiated into the mysteries of Mithra by Julian, he shows no prejudice against the Christians. Himerius is a typical repre- sentative of the later rhetorical schools. Photius (cod. 165, 243 Bekker) had read 71 speeches by him, of 36 of which he has given an epitome; 24 have come down to us complete and fragments of 10 or 12 others. They consist of epideictic or "display" speeches after the style of Aristides, the majority of them having been delivered on special occasions, such as the arrival of a new governor, visits to different cities (Thessalonica, Constanti- nople), or the death of friends or well-known personages. The Polemarchicas, like the Menexenus of Plato and the Epitaphios Logos of Hypereides, is a panegyric of those who had given their lives for their country; it is so called because it was originally the duty of the polemarch to arrange the funeral games in honour of those who had fallen in battle. Other declamations, only known from the excerpts in Photius, were imaginary orations put into the mouth of famous persons — Demosthenes advocating the recall of Aeschines from banishment, Hypereides supporting the policy of Demosthenes, Themistocles inveighing against the king of Persia, an orator unnamed attacking Epicurus for atheism before Julian at Constantinople. Himerius is more of a poet than a rhetorician, and his declamations are valuable as giving prose versions or even the actual words of lost poems by Greek lyric writers. The prose poem on the marriage of Severus and his greeting to Basil at the beginning of spring are quite in the spirit of the old lyric. Himerius possesses vigour of language and descriptive powers, though his productions are spoilt by too frequent use of imagery, allegorical and metaphorical obscurities, mannerism and ostentatious learning. But they are valuable for the history and social conditions of the time, although lacking the sincerity characteristic of Libanius.

See Eunapius, Vitae sophistarum ; Suidas, s.v. ; editions by G. Wernsdorf (1790), with valuable introduction and commentaries, and by F. Dubner (1849) in the Didot series; C. Teuber, Quaestiones Himerianae (Breslau, 1882); on the style, E. Norden, Die antike Kunstprosa (1898).

HI1HLY (LOUIS), AUGUSTE (1823-1906), French historian and geographer, was born at Strassburg on the 28th of March 1823. After studying in his native town and taking the university course in Berlin (1842-1843) he went to Paris, and passed first in the examination for

fellowship (agregation) of the lycees (1845), first in the examinations on leaving the Ecole des Chartes, and first in the examination for fellowship of the faculties (1849). In 1849 he took the degree of doctor of letters with two theses, one of which, Wala et Louis le Debonnaire (published in Paris in 1S49), placed him in the front rank of French scholars in the province of Carolingian history. Soon, however, he turned his attention to the study of geography. In 1858 he obtained an appointment as teacher of geegraphy at the Sorbonne, and henceforth devoted himself to that subject. It was not till 1876 that he published, in two volumes, his remarkable Histoire de la formation territorialc des etats de V Europe cctitrale, in which he showed with a firm, but sometimes slightly heavy touchy

the reciprocal influence exerted by geography and history. While the work gives evidence throughout of wide and well- directed research, he preferred to write it in the form of a student's manual; but it was a manual so original that it gained him admission to the Institute in 1881. In that year he was appointed dean of the faculty of letters, and for ten years he directed the intellectual life of that great educational centre during its development into a great scientific body. He died at Sevres on the 6th of October 1906.

' HIMMEL, FREDERICK HENRY (1765-1814), German com- poser, was born on the 20th of November 1765 at Treuen- brietzen in Brandenburg,, Prussia, and originally studied theology at Halle. During a temporary stay at Potsdam he had an opportunity of showing his self-acquired skill as a pianist before King Frederick William II., who thereupon made him a yearly allowance to enable him to complete his musical studies. This he did under Naumann, a German composer of the Italian school, and the style of that school Himmel himself adopted in his serious operas. The first of these, a pastoral opera, 11 Primo Navigatore, was produced at Venice in 1794 with great success. In 1792 he went to Berlin, where his oratorio Isaaco was produced, in consequence of which he was made court Kapellmeister to the king of Prussia, and in that capacity wrote a great deal of official music, including cantatas, and a coronation Te Deum. His Italian operas, successively composed for Stockholm, St Peters- burg and Berlin, were all received with great favour in their day. Of much greater importance than these is an operetta to German words by Kotzebue, called Fanchon, an admirable specimen of the primitive form of the musical drama known in Germany as the Singspiel. Himmel's gift of writing genuine simple melody is also observable in his songs, amongst which one called " To Alexis " is the best. He died in Berlin on the 8th of June 1814.

HINCKLEY, a market town in the Bosworth parliamentary division of Leicestershire, England, 14I m. S.W. from Leicester on the Nuneaton-Leicester branch of the London & North- western railway, and near the

Ashby-de-la-Zouch canal. Pop. of urban district (1901), 11,304. The town is well situated on a considerable eminence. Among the principal buildings are the church of St Mary, a Decorated and Perpendicular structure, with lofty tower and spire; the Roman Catholic academy named St Peter's Priory, and a grammar school. The ditch of a castle erected by Hugh de Grentismenil in the time of William Rufus is still to be traced. Hinckley is the centre of a stocking- weaving district, and its speciality is circular hose. It also possesses a boot-making industry, brick and tile works, and lime works. There are mineral springs in the neighbourhood.

HINCKS, EDWARD (1792-1866), British assyriologist, was born at Cork, Ireland,and educated at Trinity College, Dublin. He took orders in the Protestant Church of Ireland, and was rector of Killyleagh, Down, from 1825 till his death on the 3rd of December 1866. Hincks devoted his spare time to the study of hieroglyphics, and to the deciphering of the cuneiform script (see Cuneiform), in which he was a pioneer, working out con- temporaneously with Sir H. Rawlinson, and independently of him, the ancient Persian vowel system. He published a number of original and scholarly papers on assyriological questions of the highest value, chiefly in the Transactions of the Royal Irish Academy.

HINCKS, SIR FRANCIS (1807-1885), Canadian statesman, was born at Cork, Ireland, the son of an Irish Presbyterian minister. In 1832 he engaged in business in Toronto, became a friend of Robert Baldwin, and in 1835 was chosen to examine the accounts of the Welland Canal, the management of which was being attacked by W. L. Mackenzie. This turned his atten- tion to political life and in 1838 he founded the Examiner, a weekly paper in the Liberal interest. In 1841 he was elected M.P. for the county of Oxford, and in the following year was appointed inspector-general, the title then borne by the finance minister, but in 1843 resigned with Baldwin and the other ministers on the question of responsible government. In 1848 he again became inspector-general in., the Baldwin-Lafontaine

ministry, and on their retirement in 1851 became premier of Canada, his chief colleague being A. N. Morin (1803-1865). While premier he was prominent in the negotiations which led to the construction of the Grand Trunk railway, and in co- operation with Lord Elgin negotiated with the United States the reciprocity treaty of 1854. In the same year the bitter hostility of the " Clear Grits " under George Brown compelled his resignation, and he was prominent in the formation of the Liberal-

Conservative Party. In 1855 he was chosen governor of Barbados and the Windward Islands, and subsequently governor of British Guiana. In 1869 he was created K.C.M.G. and returned to Canada, becoming till 1873 finance minister in the cabinet of Sir John Macdonald. In February of that year he resigned, but continued to take an active part in public life. In 1879 the failure of the Consolidated Bank of Canada, of which he was president, led to his being tried for issuing false statements. Though found guilty on a technicality (see Journal of the Canadian Bankers' Association, April 1906) judgment was suspended, his personal credit remained unimpaired, and he continued to take part in the discussion of public questions till his death on the 18th of August 1885.

His writings include : The Political History of Canada between 1840 and 185$ (1877); The Political Destiny of Canada (1878), and his Reminiscences (1884).

HINCMAR (c. 805-882), archbishop of Reims, one of the most remarkable figures in the ecclesiastical history of France, belonged to a noble family of the north or north-east of Gaul. Destined, doubtless, to the monastic life, he was brought up at St Denis under the direction of the abbot Hilduin (d. 844), who brought him in 822 to the court of the emperor Louis the Pious. When Hilduin was disgraced in 830 for having joined the party of Lothair, Hincmar accompanied him into exile at Corvey in Saxony, but returned with him to St Denis when the abbot was reconciled with the emperor, and remained faithful to the emperor during his struggle with his sons. After the death of Louis the Pious (840) Hincmar supported Charles the Bald, and received from him the abbacies of Notre-Dame at Compiegne and St Germer de Fly. In 845 he obtained through the king's support the archbishopric of Reims, and this choice was confirmed at the synod of Beauvais (April 845). Archbishop Ebbo, whom he replaced, had been deposed in 835 at the synod of Thionville (Diedenhofen) for having broken his oath of fidelity to the emperor Louis, whom he had deserted to join the party of Lothair. After the death of Louis, Ebbo succeeded in regaining possession of his see for some years (840-844), but in 844 Pope Sergius II. con- firmed his deposition. It was in these circumstances that Hincmar succeeded, and in 847 Pope Leo IV. sent him the pallium.

One of the first cares of the new prelate was the restitution to his metropolitan see of the domains that had been alienated under Ebbo and given as benefices to laymen. From the beginning of his episcopate Hincmar was in constant conflict with the clerks who had been ordained by Ebbo during his reappearance. These clerks, whose ordination was regarded as invalid by Hincmar and his adherents, were condemned in 853 at the council of Soissons, and the decisions of that council were confirmed in 855 by Pope Benedict III. This conflict, however, bred an antagonism of

which Hincmar was later to feel the effects. During the next thirty years the archbishop of Reims played a very prominent part in church and state. His authoritative and energetic will inspired, and in great measure directed, the policy of the west Frankish kingdom until his death. He took an active part in all the great political and religious affairs of his time, and was especially energetic in defending and extending the rights of the church and of the metropolitans in general, and of the metro- politan of the church of Reims in particular. In the resulting conflicts, in which his personal interest was in question, he displayed great activity and a wide knowledge of canon law, but did not scruple to resort to disingenuous interpretation of texts. His first encounter was with the heresiarch Gottschalk, whose predestinarian doctrines claimed to be modelled on those of St Augustine. Hincmar placed himself at the head of the party

that regarded Gottschalk's doctrines as heretical, and succeeded in procuring the arrest and imprisonment of his adversary (849). For a part at least of his doctrines Gottschalk found ardent defenders, such as Lupus of Ferrieres, the deacon Florus and Amolo of Lyons. Through the energy and activity of Hincmar the theories of Gottschalk were condemned at Quierzy (853) and Valence (855), and the decisions of these two synods were con- firmed at the synods of Langres and Savonnieres, near Toul (859). To refute the predestinarian heresy Hincmar composed his De praedestinalione Dei et libero arbitrio, and against certain propositions advanced by Gottschalk on the Trinity he wrote a treatise called De una et non trina dcitate. Gottschalk died in prison in 868. The question of the divorce of Lothair II., king of Lorraine, who had repudiated his wife Theutberga to marry his concubine Waldrada, engaged Hincmar's literary activities in another direction. At the request of a number of great personages in Lorraine he composed in 860 his De divortio Lotharii et Teutbergae, in which he vigorously attacked, both from the moral and the legal standpoints, the condemnation pronounced against the queen by the synod of Aix-la-Chapelle (February 860). Hincmar energetically supported the policy of Charles the Bald in Lorraine, less perhaps from devotion to the king's interests than from a desire to see the whole of the ecclesi- astical province of Reims united under the authority of a single sovereign, and in 869 it was he who consecrated Charles at Metz as king of Lorraine.

In the middle of the 9th century there appeared in Gaul the collection of false decretals commonly known as the Pseudo- Isidorian Decretals. The exact date and the circumstances of the composition of the collection are still an open question, but it is certain that Hincmar was one of the first to know of their existence, and apparently he was not aware that the documents were forged. The importance assigned by these decretals to the bishops and the provincial councils, as well as to the direct intervention of the Holy See, tended to curtail the rights of the metropolitans, of which

Hincmar was so jealous. Rothad, bishop of Soissons, one of the most active members of the party in favour of the pseudo- Isidorian theories, immediately came into collision with his archbishop. Deposed in 863 at the council of Soissons, presided over by Hincmar, Rothad appealed to Rome. Pope Nicholas I, supported him zealously, and in 865, in spite of the protests of the archbishop of Reims, Arsenius, bishop of Orta and legate of the Holy See, was instructed to restore Rothad to his episcopal see. Hincmar experienced another check when he endeavoured to prevent Wulfad, one of the clerks deposed by Ebbo, from obtain- ing the archbishopric of Bourges with the support of Charles the Bald. After a synod held at Soissons, Nicholas I. pronounced himself in favour of the deposed clerks, and Hincmar was con- strained to make submission (866). He was more successful in his contest with his nephew Hincmar, bishop of Laon, who was at first supported both by the king and by his uncle, the arch- bishop of Reims, but soon quarrelled with both. Hincmar of Laon refused to recognize the authority of his metropolitan, and entered into an open struggle with his uncle, who exposed his errors in a treatise called Opusculum LV. capltdorum, and pro- cured his condemnation and deposition at the synod of Douzy (871). The bishop of Laon was sent into exile, probably to Aquitaine, where his eyes were put out by order of Count Boso. Pope Adrian protested against his deposition, but it was con- firmed in 876 by Pope John VIII., and it was not until 878, at the council of Troyes, that the unfortunate prelate was reconciled with the Church. A serious conflict arose between Hincmar" on the one side and Charles and the pope on the other in 876, when Pope John VIII., at the king's request, entrusted Ansegisus, archbishop of Sens,- with the primacy of the Gauls and of Germany, and created him vicar apostolic. In Hincmar's eyes this was an encroachment on the jurisdiction of the archbishops, and it was against this primacy that he directed his treatise Dejure metropolitanorum. At the same time he wrote a life of St Remigius, in which he endeavoured by audacious falsifications to prove the supremacy of the church of Reims over the other churches. Charles the Bald, however, upheld the rights of

Ansegisus at the synod of Ponthion. Although Hincmar had been very hostile to Charles's expedition into Italy, he figured among his testamentary executors and helped to secure the sub- mission of the nobles to Louis the Stammerer, whom he crowned at Compiegne (8th of December 877).

During the reign of Louis, Hincmar played an obscure part. He supported the accession of Louis III. and Carloman, but had a dispute with Louis, who wished to instal a candidate in the episcopal see of Beauvais without

the archbishop's assent. To Carloman. on his accession in 882, Hincmar addressed his De ordine palalii, partly based on a treatise (now lost) by Adalard, abbot of Corbie (c. 814), in which he set forth his system of govern- ment and his opinion of the duties of a sovereign, a subject he had already touched in his De regis persona et regio ministerio, dedicated to Charles the Bald at an unknown date, and in his Instructio ad Ludovicum regent, addressed to Louis the Stammerer on his accession in 877. In the autumn of 882 an irruption of the Normans forced the old archbishop to take refuge at Epernay, where he died on the 21st of December 882. Hincmar was a prolific writer. Besides the works already mentioned, he was the author of several theological tracts; of the De villa Noviliaco, concerning the claiming of a domain of his church; and he con- tinued from 861 the Annales Bertiniani, of which the first part was written by Prudentius, bishop of Troyes, the best source for the history of Charles the Bald. He also wrote a great number of letters, some of which are extant, and others embodied in the chronicles of Flodoard.

Hincmar's works, which are the principal source for the history of his life, were collected by Jacques Sirmond (Paris, 1645), and reprinted by Migne, Patrol. Latina, vol. cxxv. and cxxvi. See also C. von Noorden, Hinkmar, Erzbischof von Reims (Bonn, 1863), and, especially, H. Schrors, Hinkmar, Erzbischof von Reims (Freiburg- im-Breisgau, 1884). For Hincmar's political and ecclesiastical theories see preface to Maurice Prou's edition of the De ordine palatii (Paris, 1885), and the abbe Lesne, La Hierarchie episcopate en Gaule et en Germanie (Paris, 1905). (R. Po.)

HIND, the female of the red-deer, usually taken as being three years old and over, the male being known as a " hart. It is sometimes also applied to the female of other species of deer. The word appears in several Teutonic languages, cf. Dutch and Ger. Hinde, and has been connected with the Goth. hin] > an {kinthan), to seize, which may be connected ultimately with " hand " and " hunt." " Hart," from the O.E. heort, may be in origin connected with the root of Gr. xkpas, horn. " Hind " (O.E. hine, probably from the O.E. hinan, members of a family or household), meaning a servant, especially a labourer on a farm, is another word. In Scotland the " hind " is a farm servant, with a cottage on the farm, and duties and responsibilities that make him superior to the rest of the labourers. Similarly " hind " is used in certain parts of northern England as equivalent to " bailiff."

HINDERSIN, GDSTAV EDUARD VON (1804-1872), Prussian general, was born at Wernigerode near Halberstadt on the 1 8th of July 1804. He was the son of a priest and received a good education. His earlier life was spent in great poverty, and the struggle for existence developed in him an iron strength of character. Entering the Prussian artillery in 1820 he

became an officer in 1825. From 1830 to 1837 he attended the Allgemeine Kriegsakademie at Berlin, and in 1841, while still a subaltern, he was posted to the great General Staff, in which he afterwards directed the topographical section. In 1849 he served with the rank of major on the staff of General Peucker, who commanded a federal corps in the suppression of the Baden insurrection. He fell into the hands of the insurgents at the action of Ladenburg, but was released just before the fall of Rastadt. In the Danish war of 1864 Hindersin, now lieutenant-general, directed the artillery operations against the lines of Diippel, and for his services was ennobled by the king of Prussia. Soon afterwards he became inspector-general of artillery. His experience at Diippel had convinced him that the days of the smooth-bore gun were past, and he now devoted himself with unremitting zeal to the rearmament and reorganization of the Prussian artillery. The available funds were small, and grudgingly

voted by the parliament. There was a strong feeling moreover that the smooth-bore was still tactically superior to its rival (see Artillery, § 19). There was no practical training for war in either the field or the fortress artillery units. The latter had made scarcely any progress since the days of Frederick the Great, and before von Hindersin's appointment had practised with the same guns in the same bastion year after year. All this was altered, the whole " foot-artillery " was reorganized, manoeuvres were instituted, and the smooth-bores were, except for ditch defence, eliminated from the armament of the Prussian fortresses. But far more important was his work in connexion with the field and horse batteries. In 1864 only one battery in four had rifled guns, but by the unrelenting energy of von Hindersin the outbreak of war with Austria one and a half years later found the Prussians with ten in every sixteen batteries armed with the new weapon. But the battles of 1866 showed, besides the superiority of the rifled gun, a very marked absence of tactical efficiency in the Prussian artillery, which was almost always outmatched by that of the enemy. Von Hindersin had pleaded, in season and out of season, for the establishment of a school of gunnery; and in spite of want of funds, such a school had already been established. After 1866, however, more support was obtained, and the improvement in the Prussian field artillery between 1866 and 1870 was extraordinary, even though there had not been time for the work of the school to leaven the whole arm. Indeed, the German artillery played by far the most important part in the victories of the Franco- German war. Von Hindersin accompanied the king's headquarters as chief of artillery, as he had done in 1866, and was present at Gravelotte, Sedan and the siege of Paris. But his work, which was now accomplished, had worn out his physical powers, and he died on the 23rd of January 1872 at Berlin.

See Bartholomaus, Der General der Infanlerie von Hindersin (Berlin, 1895), and Prince Kraft zu Hohenlohe-Ingelfingen, Letters on Artillery

(translated by Major Walford, R.A.), No.xi.

HINDI, EASTERN, one of the " intermediate " Indo- Aryan languages (see Hindostani). It is spoken in Oudh, Baghelkhand and Chhattisgarh by over 22,000,000 people. It is derived from the Apabhrarhsa form of Ardhamagadhi Prakrit (see Prakrit), and'possesses a large and important literature. Its most famous writer was Tulsl Das, the poet and reformer, who died early in the r7th century, and since his time it has been the North-Indian language employed for epic poetry.

HINDI, WESTERN, the Indo-Aryan language of the middle and upper Gangetic Doab, and of the country to the north and south. It is the vernacular of over 40,000,000 people. Its standard dialect is Braj Bhasha, spoken near Muttra, which has a considerable literature mainly devoted to the religion founded on devotion to Krishna. Another dialect spoken near Delhi and in the upper Gangetic Doab is the original from which Hindostani, the great lingua franca of India, has developed (see Hindostani). Western Hindi, like Punjabi, its neighbour to the west, is descended from the Apabhrarhsa form of SaurasenI Prakrit (see Prakrit), and represents the language of the MadhyadeSa or Midland, as distinct from the intermediate and outer Indo-Aryan languages.

HINDKI, the name given to the Hindus who inhabit Afghani- stan. They are of the Khatri class, and are found all over the country even amongst the wildest tribes. Bellew in his Races of Afghanistan estimates their number at about 300,000. The name Hindki is also loosely used on the upper Indus, in Dir, Bajour, &c, to denote the speakers of Punjabi or any" of its dialects. It is sometimes applied in a historical sense to the Buddhist inhabitants of the Peshawar Valley north of the Kabul river, who were driven thence about the 5th or 6th century and settled in the neighbourhood of Kandahar.

HINDLEY, an urban district in the Ince parliamentary division of Lancashire, England, 2 m. E.S.E. of Wigan, on the Lancashire & Yorkshire and Great Central railways. Pop. (1901) 23,504. Cotton spinning and the manufacture of cotton goods are the principal industries, and there are extensive coal-mines in the neighbourhood. It is recorded that in the time of the

Puritan revolution Hindley church was entered by the Cavaliers, who played at cards in the pews, pulled down the pulpit and tore the Bible in

pieces.

HINDOSTANI (properly Hindostani, of or belonging to Hindostan 1), the name given by Europeans to an Indo- Aryan dialect (whose home is in the upper Gangetic Doab and near the city of Delhi), which, owing to political causes, has become the great lingua franca of modern India. The name is not employed by natives of India, except as an imitation of the English nomenclature. Hindostani is by origin a dialect of Western Hindi, and it is first of all necessary to explain what we mean by the term " Hindi " as applied to language. Modern Indo-Aryan languages fall into three groups, — an outer band, the language of the Midland and an intermediate band. The Midland consists of the Gangetic Doab and of the country to its immediate north and south, extending, roughly speaking^ from the Eastern Punjab on the west, to Cawnpore on its east. The language of this tract is called "Western Hindi"; to its west we have Panjabi (of the Central Punjab), and to the east, reaching as far as Benares, Eastern Hindi, both Intermediate languages. These three will all be dealt with in the present article. Panjabi and Western Hindi are derived from SaurasenI, and Eastern Hindi from Ardham gadha Prakrit, through the corresponding Apabhramsas (see Prakrit). Eastern Hindi differs in many respects from the two others, but it is customary to consider it together with the language of the Midland, and this will be followed on the present occasion. In 1901 the speakers of these three languages numbered: Panjabi, 17,070,961; Western Hindi, 40,714,925; Eastern Hindi, 22,136,358.

Linguistic Boundaries. — Taking the tract covered by these three forms of speech, it has to its west, in the western Punjab, Lahnda (see Sindhi), a language of the Outer band. The parent of Lahnda once no doubt covered the whole of the Punjab, but, in the process of expansion of the tribes of the Midland described in the article Indo-Aryan Languages, it was gradually driven back, leaving traces of its former exist- ence which grow stronger as we proceed westwards, until at about the 74th degree of east longitude there is a mixed, transi- tion dialect. To the west of that degree Lahnda may be said to be established, the deserts of the west-central Punjab forming a barrier and protecting it, just as, farther south, a continuation of the same desert has protected Sindhi from Rajasthani. It is the old traces of Lahnda which mainly differentiate Panjabi from Hindostani. To the south of Panjabi and Western Hindi lies Rajasthani. This language arose in. much the same way as Panjabi. The expanding Midland language was stopped by the desert from reaching Sindhi, but to the south-west it found an unobstructed way into Gujarat, where, under the form of Gujarati, 1 " Hindostan " is a Persian word, and in modern Persian is pronounced " Hindustan." It means the country of the Hindus. In medieval Persian the word was " Hindostan," with an 0, but in the modern language the distinctions between e and i and between 6 and u have been lost. Indian

languages have borrowed Persian words in their medieval form. Thus in India we have sher, a tiger, as compared with modern Persian shir; go, but modern Pers. gw; bostan, but modern Pers. busl&n. The word " Hindu " is in medieval Persian " Hindo " representing the ancient Avesta kendaua (Sanskrit, saindhava), a dweller on the Sindhu or Indus. Owing to the influence of scholars in modern Persian the word " Hindu " is now established in English and, through English, in the Indian literary languages; but " Hindo " is also often heard in India. " Hindostan " with is much more common both in English and in Indian languages, although " Hindustan " is also employed. Up to the days of Persian supremacy inaugurated in Calcutta by Gilchrist and his friends, every traveller in India spoke of " Indostan " or some such word, thus bearing testimony to the current pronunciation. Gilchrist intro- duced " Hindoostan," which became " Hindustan " in modern spelling. The word is not an Indian one, and both pronunciations, with 6 and with u, are current in India at the present day, but that with is unquestionably the one demanded by the history of the word and of the form which other Persian words take on Indian soil. On the other hand " Hindu " is too firmly established in Eng- lish for us to suggest the spelling "Hindo.". The word " Hindi " has another derivation, being formed from the Persian Hind, India (Avesta hindu, Sanskrit sindhu, the Indus). " Hindi " means "of or belonging to India," while " Hindu " now means " a person of the Hindu religion." (Cf. Sir C. J. Lyall, A Sketch of the Hindustani Language, p. 1).

it broke the continuity of the Outer band. Eastern Hindi y as an Intermediate form of speech, is of much older lineage. It has been an Intermediate language since, at least, the institu- tion of Jainism (say, 500 B.C.), and is much less subject to the influence of the Midland than is Panjabi. To its east it has Bihari, and, stretching far to the south, it has Marathi as its neighbour in that direction, both of these being Outer languages. Dialects. — The only important dialect of Eastern Hindi is AwadhI, spoken in Oudh, and possessing a large literature of great excellence. Chhattisgarhi and Baghell, the other dialects, have scanty literatures of small value. Western Hindi has four main dialects, Bundeli of Bundelkhand, Braj Bhasha (properly " Braj Bhasa ") of the country round Mathura (Muttra), Kanauji of the central Doab and the country to its north, and vernacular Hindostani of Delhi and the Upper Doab. West of the Upper Doab, across the Jumna, another dialect, Bangaru, is also found. It possesses no literature. Kanauji is very closely allied to Braj Bhasha, and these two share with Awadhi the honour of being the great literary speeches of northern India. Nearly all the classical literature of India is religious in character, and we may say that, as a broad rule, Awadhi literature is devoted to the Ramaite religion and the epic poetry connected with it, while that of Braj Bhasha is concerned with the religion of Krishna. Vernacular

Hindostani has no literature of its own, but as the lingua franca now to be described it has a large one. Panjabi has one dialect, Dogri, spoken in the Himalayas.

Hindostani as a Lingua Franca. — It has often been said that Hindostani is a mongrel " pigeon " form of speech made up of contributions from the various languages which met in Delhi bazaar, but this theory has now been proved to be unfounded, owing to the discovery of the fact that it is an actual living dialect of Western Hindi, existing for centuries in its present habitat, and the direct descendant of SaurasenI Prakrit. It is not a typical dialect of that language, for, situated where it is, it represents Western Hindi merging into Panjabi (Braj Bhasha being admittedly the standard of the language), but to say that it is a mongrel tongue thrown together in the market is to reverse the order of events. It was the natural language of the people in the neighbourhood of Delhi, who formed the bulk of those who resorted to the bazaar, and hence it became the bazaar language. From here it became the lingua franca of the Mogul camp and was carried everywhere in India by the lieutenants of the empire. It has several recognized varieties, amongst which we may mention DakhinI, Urdu, Rgkhta and Hindi. Dakhini or " southern," is the form current in the south of India, and was the first to be employed for literature. It contains many archaic expressions now extinct in the standard dialect. Urdu, or Urdu zaban, " the language of the camp," is the name usually employed for Hindostani by natives, and is now the standard form of speech used by Mussulmans. All the early Hindostani literature was in poetry, and this literary form of speech was named " Rekhta," or " scattered," from the way in which words borrowed from Persian were " scattered " through it. The name is now reserved for the dialect used in poetry, Urdu being the dialect of prose and of conversation. The introduction of these borrowed words, which has been carried to even a greater extent in Urdu, was facilitated by the facts that the latter was by origin a " camp " language, and that Persian was the official language of the Mogul court. In this way Persian (and, with Persian, Arabic) words came into current use, and, though the language remained Indo-Aryan in its grammar and essential characteristics, it soon became un- intelligible to any one who had not at least a moderate acquaint- ance with the vocabulary of Iran. This extreme Persianization of Urdu was due rather to Hindu than to Persian influence. Although Urdu literature was Mussulman in its origin, the Persian element was first introduced in excess by the pliant Hindu officials employed in the Mogul administration, and acquainted with Persian, rather than by Persians and Per- sianized Moguls, who for many centuries used only their own languages for literary purposes. 2 Prose Urdu literature took its 2 Sir C. J. Lyall, op. cit. p. 9.

origin in the English occupation of India and the need for text- books for the college of Fort William. It has had a prosperous career since the commencement of the 19th century, but some writers, especially those of Lucknow, have so overloaded it with Persian and Arabic that little of the original Indo-Aryan char- acter remains, except, perhaps, an occasional pronoun or auxiliary verb. The Hindi form of Hindostani was invented simultane- ously with Urdu prose by the teachers at Fort William. It was intended to be a Hindostani for the use of Hindus, and was derived from Urdu by ejecting all words of Persian or Arabic birth, and substituting for them words either borrowed from Sanskrit (tatsamas) or derived from the old primary Prakrit (tadbkavas) (see Indo-Aryan Languages). Owing to the popu- larity of the first book written in it, and to its supplying the need for a lingua franca which could be used by the most patriotic Hindus without offending their religious prejudices, it became widely adopted, and is now the recognized vehicle for writing prose by those inhabitants of northern India who do not employ Urdu. This Hindi, which is an altogether artificial product of the English, is hardly ever used for poetry. For this the indigenous dialects (usually Awadhi or Braj Bhasha) are nearly always employed by Hindus. Urdu, on the other hand, having had a natural growth, has a vigorous poetical literature. Modern Hindi prose is often disfigured by that too free borrowing of Sanskrit words instead of using home-born tadbkavas, which has been the ruin of Bengali, and it is rapidly becoming a Hindu counterpart of the Persianized Urdu, neither of which is in- telligible except to persons of high education.

Not only has Urdu adopted a Persian vocabulary, but even a few peculiarities of Persian construction, such as reversing the positions of the governing and the governed word {e.g. bap titer a for merd bap), or of the adjective and the substantive it qualifies, or such as the use of Persian phrases with the pre- position ba instead of the native postposition of the ablative case (e.g. ba-khushi for khuski-se, or ba-kukm sarkar-ke instead of sarkar-ke huhn-se) are to be met with in many writings; and these, perhaps, combined with the too free indulgence on the part of some authors in the use of high-flown and pedantic Persian and Arabic words in place of common and yet chaste Indian words, and the general use of the Persian instead of the Nagarl character, have induced some 10 regard Hindostani or Urdu as a language distinct from Hindi. But such a view betrays a radical misunderstanding of the whole question. We must define Urdu as the Persianized Hindostani of educated Mussulmans, while Hindi is the Sanskritized Hindostani of educated Hindus. As for the written character, Urdu, from the number of Persian words which it contains, can only be written conveniently in the Persian character, while Hindi, for a parallel reason, can only be written in the Nagari or one of its related alphabets

(see Sanskrit). On the other hand, •' Hindostani " implies the great lingua franca of India, capable of being written in either character, and, without purism, avoiding the excessive use of either Persian or Sanskrit words when employed for literature. It is easy to write this Hindostani, for it has an opulent vocabulary of ladbkava words understood everywhere by both Mussulmans and Hindus. While " Hindo- stani," " Urdu " and " Hindi " are thus names of dialects, it should be remembered that the terms " Western Hindi " and " Eastern Hindi " connote, not dialects, but languages.

The epoch of Akbar, which first saw a regular revenue system established, with toleration and the free use of their religion to the Hindus, was, there can be little doubt, the period of the formation of the language. But its final consolidation did not take place till the reign of Shah Jahan. After the date of this monarch the changes are comparatively immaterial until we come to the time when European sources began to mingle with those of the East. Of the contributions from these sources there is little to say. Like the greater part of those from Arabic and Persian, they are chiefly nouns, and may be regarded rather as excrescences which have sprung up casually and have attached themselves to the original trunk than as ingredients duly in-corporated in the body. In the case of the Persian and Arabic

element, indeed, we do find not a few instances in which nouns have been furnished with a Hindi termination, e.g. kjjflridna, badalnd, guzarna, dagkna, bakkskna, kamlnapan, &c; but the European element cannot be said to have at all woven itself into the grammar of the language. It consists, as has been observed, solely of nouns, principally substantive nouns, which on their admission into the language are spelt phonetically, or according to the corrupt pronunciation they receive in the mouths of the natives, and are declined like the indigenous nouns by means of the usual postpositions or case-affixes. A few examples will suffice. The Portuguese, the first in order of seniority, contributes a few words, as kamara or kamrd (camera), a room; martsl (marlello), a hammer; nilam (leilao), an auction, &c. &c. Of French and Dutch influence scarcely a trace exists. English has contributed a number of words, some of which have even found a place in the literature of the language; e.g. kamiskanar (commissioner); jaj (judge); daktar (doctor); ddktari, " the science of medicine " or " the profession of physicians"; inspektar (inspector); istant (assistant) ; sosayati (society); apll (appeal); apU kamd, "to appeal"; dikri or digri (decree) ; digri (degree) ; inc (inch) ; fut (foot) ; and many more, are now words commonly used. Some borrowed words are distorted into the shape of genuine Hindostani words familiar to the speakers; e.g. the English railway term " signal " has become sikandar, the native name for Alexander the Great, and " signal-man " is sikandar -man, or " the pride of Alexander." How far the free use of Anglicisms will be adopted as the language progresses is a question upon which it would be hazardous to pronounce an

opinion, but of late years it has greatly increased in the language of the educated, especially in the case of technical terms. A native veterinary surgeon once said to the present writer, " kulte-kd saliva bakut antiseptic kai " for " a dog's saliva is very antiseptic," and this is not an extravagant example. 1

The vocabulary of Panjabi and Eastern Hindi is very similar to that of Western Hindi. Panjabi has no literature to speak of and is free from the burden of words borrowed from Persian or Sanskrit, only the commonest and simplest of such being found in it. Its vocabulary is thus almost entirely tadbkava, and, while capable of expressing all ideas, it has a charming rustic flavour, like the Lowland Scotch of Burns, indicative of the national character of the sturdy peasantry that employs it. Eastern Hindi is very like Panjabi in this respect, but for a different reason. In it were written the works of Tulsl Das, one of the greatest writers that India has produced, and his influence on the language has been as great as that of Shake- speare on English. The peasantry are continually quoting him without knowing it, and his style, simple and yet vigorous, thoroughly Indian and yet free from purism, has set a model which is everywhere followed except in the large towns where Urdu or Sanskritized Hindi prevails. Eastern Hindi is written in the Nagarl alphabet, or in the current character related to it called " Kaithi " (see Bihari). The indigenous alphabet of the Punjab is called Larida or " clipped." It is related to Nagarl, but is hardly legible to any one except the original writer, and sometimes not even to him. To remedy this defect an improved form of the alphabet was devised in the 16th century by Angad, the fifth Sikh Guru, for the purpose of recording the Sikh scriptures. It was named Gurmukki, " proceeding from the mouth of the Guru," and is now generally used for writing the language.

Grammar. — In the following account we use these contractions: Skr. = Sanskrit; Pr. = Prakrit; Ap. = Apabhramsa ; W.H. = =. Western Hindi; E.H. = Eastern Hindi; H. = Hindostani; Br. = Brai Bhasha; P. = Panjabi.

(A) Phonetics. — The phonetic system of all three languages is nearly the same as that of the Apabhrarhsas from which they are derived. With a few exceptions, to be noted below, the letters of the alphabets of the three languages are the same as in Sanskrit. Panjabi, and the western dialects of Western Hindi, have preserved the old Vedic cerebral /. There is a tendency for concurrent vowels to run into each other, and for the semi-vowels y and v to become vowels. Thus, Skr. carmakaras, Ap. cammaaru, a leather-worker,

1 This and the preceding paragraph are partly taken from Mr Platts's article in vol. xi. of the 9th edition of this encyclopaedia.

becomes H. camdr; Skr. rajani, Ap. ra(y)ani, H. rain, night; Skr. dhavalakas, Ap. dhavalau, H. dhauid, white. Sometimes the semi- vowel is retained, as in Skr. kdtaras, Ap. kd(y)aru, H. kdyar, a coward. Almost the only compound consonants which survived in the Pr. stage were double letters, and in W.H. and E.H. these are usually simplified, the preceding vowel being lengthened and sometimes nasalized, in compensation. P., on the other hand, pre- fers to retain the double consonant. Thus, Skr. karma, Ap. kammu, W.H. and E.H. kam, but P. kamm, a work; Skr. satyas, Ap. saccu, W.H. and E.H. sac, but P. sacc, true (H., being the. W.H. dialect which lies nearest to P., often follows that language, and in this instance has sacc, usually written sac) ; Skr. hastas, Ap. hatthu, W.H. and E.H. hath, but P. hatth, a hand. The nasalization of vowels is very frequent in all three languages, and is here represented by the sign – over the vowel. Sometimes it is compensatory, as in sac, but it often represents an original m, as in kawal from Skr. kamalas, a lotus. Final short vowels quiesce in prose pronunciation, and are usually not written in transliteration; thus the finaLa, 4 or w has been lost in all the examples given above, and other tatsama examples are Skr. mati- which becomes mat, mind, and Skr. vastn-, which be- comes bast, a thing. In all poetry, however (except in the Urdu poetry formed on Persian models, and under the rules of Persian prosody), they reappear and are necessary for the scansion.

In tadbhava words an original long vowel in any syllable earlier than the penultimate is shortened. In P. and H. when the long vowel is e or it is shortened to i or u respectively, but in other W.H. dialects and in E.H. it is shortened to e or 0; thus, befl, daughter, long form H. biliya, E.H. beliyd; ghdri, mare, long form H. ghuriyd, E.H. ghoriya. The short vowels e and are very rare in P. and H., but are not uncommon (though ignored by most grammars) in E.H. and the other W.H. dialects. A medial d is pronounced as a strongly burred cerebral r, and is then written as shown, with a supposited dot. All these changes and various contractions of Prakrit syllables have caused considerable variations in the forms of words, but generally not so as to obscure the origin.

(B) Declension. — The nominative form of a tadbhava word is de- rived from the nominative form in Sanskrit and Prakrit, but tatsama words are usually borrowed in the form of the Skr. crude base; thus, Skr. hastin-, nom. hasli, Ap. nom. hatthl, H. hathl, an elephant; Skr. base mati-, nom. matis, H. (tatsama) mati, or, with elision of the final short vowel, mat. Some talsamas are, however, borrowed in the nominative form, as in Skr. dhanin-, nom. dhani, H. dharii, a rich man. As another example of a

tadbhava word, we may take the Skr. nom. ghotas, Ap. ghodu, H. ghbr, a horse. Here again the final short vowel has been elided, but in old poetry we should find ghoru, and corresponding forms in u are occasionally met with at the present day.

*In the article Prakrit attention is drawn to the frequent use of pleonastic suffixes, especially ka (fcm.-(i)ka). With such a suffix we have the Skr. ghd(a-kas, Ap. ghoda-u, Western Hindi ghor.au, or in P. and H. (which is the W.H. dialect nearest in locality to P.) ghora, a horse; Skr. ghoti-ka, Ap. ghodi-d, W.H. and P. ghodi, a mare. Such modern forms made with one pleon- astic suffix are called " strong forms," while those made without it are called " weak forms." All strong forms end in au (or a) in the masculine, and in 1 in the feminine, whereas, in Skr., and hence in tatsamas, both a and 1 are generally typical of feminine words, though sometimes employed for the mascu- line. It is shown in the article Prakrit that these pleonastic suffixes can be doubled, or even trebled, and in this way we have a new series of tadbhava forms. Let us take the imaginary Skr. * ghbta-ka-kas with a double suffix. From this we have the Ap. ghoda-a-u, and modern ghoraivd (with euphonic w in- serted), a horse. Similarly for the feminine we have Skr. "gholi-ka-kd, Ap. ghbdi-a-a, modern ghoriya (with euphonic y inserted), a marc. Such forms, made with two suffixes, are called " long forms," and are heard in*

familiar conversation, the feminine also serving as diminutives. There is a further stage, built upon three suffixes, and called the " redundant form," which is mainly used by the vulgar. As a rule masculine long forms end in -awd, -iya or -mo, and feminines in -iyd, although the matter is complicated by the occasional use of pleonastic suffixes other than the ka which we have taken for our example, and is the most common. Strong forms are rarely met with in E.H., but on the other hand long forms are more common in that language. There are a few feminine terminations of weak nouns which may be noted. These are -ini, -in, -an, -ni (Skr. -ini, Pr. -ini) ; and -dm, -ani, -din (Skr. -dni, Pr. -ant). These are found not only in words derived from Prakrit, but are added to Persian and even Arabic words; thus, hathim, hathnl, hdthin (Skr. hastinl, Pr. hatthini), a she-elephant; sundrin, sundran, a female goldsmith (sonar); shrrni, a tigress (Persian shir, a tiger); Naslban, a proper name (Arabic naslb); pandildnl, the wife of a pandit; caudhrdin , the

wife of a caudhrl or head man; mehtrdni, the wife of a sweeper (Pres. mehtar, a sweeper). With these exceptions weak forms rarely have any terminations distinctive of gender. 1

The synthetic declension of Sanskrit and Prakrit has disappeared. We see it in the actual stage of disappearance in Apabhrarhsa (see Prakrit), in which

the case terminations had become worn down to -hu, -ho, -hi, -hi and. -ha, of which -hi and -hi were employed for several cases, both singular and plural. There was also a marked tendency for these terminations to be confused, and in the earliest stages of the modern vernaculars we find -hi freely employed for any oblique case of the singular, and -hi for any oblique case of the plural, but more especially for the genitive and the locative. In the case of modern weak nouns these terminations have disappeared altogether in W.H. and P. except in sporadic forms of the locative such as gawe (for glivahi), in the village. In E.H. they are still heard as the termination of a form which can stand for any ob!iqi:e case, and is called the "oblique form" or the "oblique case." Thus, from ghar, a house (a weak noun), we have W.H. and P. oblique form ghar, E.H. gharahi, ghare or ghar. In the plural, the oblique form is sometimes founded on the Ap. terminations -ha and -hu, and sometimes on the Skr. termination of the genitive plural -andm (Pr. -ana, -anham), as in P. gharS., W.H. gkaraU, gharo,. gharani, E.H. gharan. In the case of masculine weak forms, the plural nominative has dropped the old termination, except in E.H., where it has adopted, the oblique plural form for this case also, thus gharan. The nominative plural of feminine weak forms follows the example of the masculine in E.H. In P. it also takes the oblique plural form, while in W.H. it takes the old singular oblique form in -ahi, which it weakens to al or (H.) F; thus bdt (fem.), a word, nom. plur. E.H. bdt-an, P. bat-5, W.H. b&tal or (H.) bate.

Strong masculine bases in Ap. ended in -a-a (nom. -a-u) ; thus ghoda-a- (nom. ghoda-u), and adding -hi we get ghdda-a-hi, which becomes contracted ghaddhi. and finally to ghore. The nominative plural is the same as the oblique singular, except in E.H. where it follows the oblique plural. The oblique plural of all closely follows in principle the weak forms/ Feminine strong forms in Ap. ended in -i-a, contracted to 1 in the modern languages. Except in E.H. the hi of the original oblique form singular disappears, so that we have E.H. ghorihi or ghorl, others only ghdri. The nominative plural of feminine strong forms exhibits some irregularities. In E.H., as usual, it follows the plural oblique forms. In W.H. (except Hindostani) it simply nasalizes the oblique form singular (i.e. adds -hi instead of -hi), as in ghorl. P. and H. adopt the oblique long form for the plural and nasalize it, thus, P. ghbria, H. ghoriya. The oblique plurals call for no further remarks. We thus get the following summary, illustrating the way in which these nominative and oblique forms are made.

Panjabi.

Hindostani.

Braj Bhasha.

Eastern Hindi.

Weak Noun Masc. —

Nom. Sing.

ghar

‘ ghar

ghar

ghar

Obi. Sing. . . .

ghar

ghar

ghar

ghar, gharahi

Nom. Plur. . .

ghar

ghar

ghar

gharan

Obi. Plur. . . .

gharS-

gharo

gharau, gharani

gharan

Strong Noun Masc. —

Nom. Sing.

ghora

ghora

ghorau

ghora

Obi. Sing. . . .

ghore

ghore

ghore, ghorai

ghora, ghore

Nom. Plur.

ghore

ghore

ghore

ghoran

Obi. Plur. . . .

ghoriS,

ghdr.5

ghorau, ghdrani

ghoran

Weak Noun Fem. —

Nom. Sing.

bat

bat

bat

bat

Obi. Sing. . . .

bdt

bat

bat

bat

Nom. Plur.

bdtS.

hate

bdtat

bdtan

Obi. Plur. . . .

bala

bdto

bdlau, bdtani

batan

Strong Noun Fem. —

Nom. Sing.

ghort

ghorl

ghorl

ghorl

OH. Sing. . . .

ghdri

ghdri

ghorl

ghorl, ghorihi

Nom. Plur.

ghoriS

ghoriyU

ghdri

ghorin

Obi. Plur. . . .

ghorii

ghoriyo

ghoriyau, ghoriyani

ghdrin

We have seen that the oblique form is the resultant of a general melting down of all the oblique cases of Sanskrit and Prakrit, and that in consequence it can be used for any oblique case. It is obvious that if it were so employed it would often give rise to great confusion. Hence, when it is necessary to show clearly what particular case is intended, it is usual to add defining particles corresponding to the English prepositions " of," " to," " from," " by," &c, which, as in all Indo-Aryan languages they follow the main word, are here called " postpositions." The following are the postpositions commonly employed to form cases in our three languages : —

1 In some dialects of W.H. weak forms have masculines ending in u and corresponding feminines in i, but these are nowadays rarely met in the literary forms of speech. In old poetry they are common. In Braj Bhasha they have survived in the present participle.

Agent.

Genitive.

Dative.

Ablative.

Locative.

Panjabi Hindostani Braj Bhasha Eastern Hindi

nai ne tie None

da ka kau ker, k

nu ko kau kS

te

se

tl, sau

se

vice me mai me, bikhe

The agent case is the case which a noun takes when it is the subject of a transitive verb in a tense formed from the past participle. This participle is passive in origin, and must be construed passively. In the Prakrit stage the subject was in such cases put into the instrumental case (see Prakrit), as in the phrase aharn tena mat id, I by-him (was) struck, i.e. he struck me. In Eastern Hindi this is still the case, the old instrumental being represented by the oblique form without any suffix. The other two languages define the fact that the subject is in the instrumental (or agent) case by the ad- dition of the postposition ne, &c, an old form employed elsewhere to define the dative. It is really the oblique form (by origin a loca- tive) of nd or no, which is employed in Gujarati (q.v.) for the genitive. As this suffix is never employed to indicate a material instrument but here only to indicate the agent or subject of a verb, it is called the postposition of the " agent " case.

The genitive postpositions have an interest- ing origin. In Buddhist Sanskrit the words krtas, done, and krjyas, to be done, were added to a noun to form a kind of genitive. A synonym of krtyas was karyas. These three words were all adjectives, and agreed with the thing possessed in gender, number, and case; thus, mdla-krte karande, in the basket of the garland, literally, in the garland- made basket. In the various dialects of Apabhrariisa Prakrit krtas became (strong form) kida-u or kia-u, krtyas

became kicca-u, and karyas became kera-u or kajja-u, the initial k of which is liable to elision after a vowel. With the exception of Gujarati (and perhaps Marathi, q.v.) every Indo-Aryan lan- guage has genitive postpositions derived from one or other of these forms. Thus from (ki)da-u we have Panjabi da; from kia-u we have H. ka, Br. kau, E.H. and Bihari k and Naipali ko; from (ki)cca-u we have perhaps Marathi ca; from kera-u, E.H. and Bihari ker, kar, Bengali Oriya and Assamese -r, and Rajasthani -ro; while from (ka)jja-u we have the Sindhi jo. It will be observed that while k, ker, kar, and r are weak forms, the rest are strong. As already stated, the genitive is an adjective. Bap means " father," and bap-ka ghora is literally " the paternal horse." Hence (while the weak forms as usual do not change) these genitives agree with the thing possessed in gender, number, and case. Thus, bap-ka ghora, the horse of the father, but bap-ki ghon, the mare of the father, and bap-ke ghore-ko, to the horse of the father, the ka being put into the oblique case masculine ke, to agree with ghore, which is itself in an oblique case. The details of the agreement vary slightly in P. and W.H., and must be learnt from the grammars. The E.H. weak forms do not change in the modern language. Finally, in Prakrit it was customary to add these postpositions {kera-u, &c.) to the genitive, as in mama or mama kera-u, of me. Similarly these postpositions are, in the modern languages, added to the oblique form.

The locative of the Sanskrit krtas, krte, was used in that language as a dative postposition, and it can be shown that all the dative postpositions given above are by origin old oblique forms of some genitive postposition. Thus H. ko, Br. kau, is a contraction of kahu, an old oblique form of kia-u. Similarly for the others. The origin of the ablative postpositions is obscure. To the present writer they all seem (like the Bengal ha'ite) to be connected with the verb substantive, but their derivation has not been definitely fixed. The locative postpositions me and mai are derived from the Skr. madhye, in, through majjhi, mahi, and so on. The derivation of vice and bikhe is obscure.

The pronouns closely follow the Prakrit originals. This will be evident from the preceding table of the first two personal pronouns compared with Apabhrariisa.

It will be observed that in most of the nominatives of the first person, and in the E.H. nominative of the second person, the old nominative has disappeared, and its place has been supplied by an oblique form, exactly as we have observed in the nominative plural of nouns substantive. The P. asi, tusl, &c, are survivals from the old Lahnda (see Linguistic Boundaries, above). The genitives of these two pronouns are rarely used, possessive pronouns (in H. merd, my; hamard, our; terd, thy; tumhdrd, your) being employed instead. They can all (except P. asada, our; tusddd, your, which

are Lahnda) be referred to corresponding Ap. forms.

There is no pronoun of the third person, the demonstrative pronouns being used instead. The following table shows the principal remaining pronominal forms, with their derivation from Ap.:—

Apabhrariisa.

Panjabi.

Hindostani.

Braj Bhasha.

Eastern Hindi.

THAT, HE, Nom.

?

uh

woh

wo

U

Obi.

?

uh

us

wd

THOSE, THEY, Nom.

oi

oh

we

•mat

unh

Obi.

?

unha

unh

uni

unh

this, he, Nom.

ehu

ih

yeh

yah

i

Obi.

ehasu, ehaho

ih

is

yd

e

THESE, THEV, Nom.

ei

eh

ye

yai

ink

Obi.

ehdna

inha

ink

mi

ink

THAT, Nom.

so

so

so

so

se

Obi.

tasu, taho

tih

lis

td

te

THOSE, Nom.

se

so

so

so

se

Obi.

tana

tinha

tinh

tint-

tenh

who, Nom.

jo

JO

JO

jo

je

Obi.

jasu, jaho

jih

JIS

ja

je

who (pi.), Nom.

J e

J° –

jo

jo

je

Obi.

jana

jinha

jink

jim

jenh

who? Nom.

ko, kawanu

kaun

kaun

ko

ke

Obi.

kasu, kaho

kih

kis

ka

ke

who? (pi.), Nom.

ke

kaun

kaun

ko

ke

Obi.

kana

kinha

kinh

kini

kenh

WHAT?(Neut.),Nom.

kim

t kid

kyd

kaha

ka

Obi.

kaha, kasU

kdh,kas

kdhe

kdhe

kdhe

Apabhrariisa.

Panjabi.

Hindostani.

Braj Bhasha.

Eastern Hindi.

1, Nom. Obi.

WE, Nom. Obi.

thou, Nom. Obi.

YOU, Nom. Obi.

hau

mai, mahu,

majjhu amhe amahi

tuhu tat, tuha, tujjhu tumhe tumhaha

mai mai

ast asd

tu tai

tusl tusd

mai mujh

ham _ hamo

tu tujh

turn tumho

hail mohi

ham hamau,

hamani tu tohi

turn turn hail

mai mo

ham ham

tai to

turn turn

The origin 1 of the first pronoun given above (that, he; those, they) cannot be referred to Sanskrit. It is derived from an Indo- Aryan base which was not admitted to the classical literary language, but of which we find sporadic traces in Apabhrariisa. The existence of this base is further vouched for by its occurrence in the Iranian language of the Avesta under the form ava~. The base of the second pronoun is the same as the base of the first syllable in the Skr. e-sas, this, and other connected pronouns, and also occurs in the Avesta. Ap. ehu is directly derived from e-sas.

There are other pronominal forms upon which, except perhaps koi (Pr. ko-vi, Skr. ko-'pi), any one, it is unnecessary to dwell. The phrase koi hai? " Is any one (there)?" is the usual formula for calling a servant in upper India, and is the origin of the Anglo- Indian word " Qui-hi." The reflexive pronoun is dp (Ap. appu, Skr. alma), self, which, something like the Latin suus (Skr. svas), always refers to the subject of the sentence, but to all persons, not only to the third. Thus mai apne (not mere) bdp-ko dekhld-hu, " I see my father."

C. Conjugation. — The synthetic conjugation was already com- mencing to disappear in Prakrit, and in the modern languages the only original tenses which remain are the present, the imperative, and here and there the future. The first is now generally employed as a present subjunctive. In the accompanying table we have the con- jugation of this tense, and also the three participles, present active, and past and future passive, compared with Apabhrariisa, the verb selected being the intransitive root call or cal, go. In Ap. the word may be spelt with one or with two Is, which accounts

for the varia- tions of spelling in the modern languages.

The imperative closely resembles the old present, except that it drops all terminations in the 2nd person singular; thus, cal, go thou. In P. and H. a future is formed by adding the syllable gd (fern, g?) to the simple present. Thus, H. calu-ga, I shall go. The gd is commonly said to be derived from the Skr. galas (Pr. gad), gone, but this suggestion is not altogether acceptable to the present writer, although he is not now able to pro- pose a better. Under the form of -gau the same termination is used in Br., but in that dialect the old future has also survived, as in calihau (Ap. calihaii, Skr. calisyami), I shall go, which is conjugated like the simple present. The E.H. formation of the future is closely analogous to what we find in Bihari (q.v.). The third person is formed as in Braj Bhasha, but the first and second persons are formed by adding pronominal suffixes, meaning " by me," " by thee," &c, to the future passive participle.

Apabhrarhsa.

Panjabi.

Hindostani.

Braj Bhasha,

Eastern Hindi.

Old Present-

Singular 1 . . . .

cattail

calls,

calu '■

calau

calaU

2. . . .

callasi, callahi

calle

call:.

calai

colas

3. . . .

callai

colli

call

calai

calai

Plural 1. . . .

callahu

cailiye

cale

calai

calai

,, 2.

callahu

callo

cold

calau

calau

3 • • •

callanti, callahi

callan

cale

calai

calai

Present Participle

callanta-u

callda

calta

calatu

calat

Past Part. Passive

callia-u

callid

cala

calyau

cala

Future Part. Passive .

callania-u

callnd

calnd

calnaii

calliawa-u

caliwaU

calab

Thus, calab-u, it-is-to-be-gone by-me, I shall go. We thus get the following forms. It will be observed that, as in many other Indo- Aryan languages, the first person plural has no suffix: — Sing. Plur.

1. calabu calab

2. calabe calabo

3. calihai calihaT In, old E.H. the future participle passive, calab, takes no suffix for any person, and is used for all persons.

The last remark leads us to a class of tenses in P. and W.H., in which a participle, by itself, can be employed for any person of a finite tense. A few examples of the use of the pfesent and past participles will show the construction. They are all taken from Hindostani. Woh calta, he goes; woh calfi, she goes; mat cala, I went ; woh call, she went ; we call, they went. The present participle in this construction, though it may be used to signify the present, is more commonly employed to signify a past [con- ditional " (if) he had gone." It will have been observed that in the above examples, in all of which the verb is intransitive, the; past as well as the present participle agrees with the subject in gender and number; but, if the verb be transitive, the passive meaning of the past participle comes into force. The subject must be put into the case of the agent, and the participle inflects to agree with the object. If the object be not expressed, or, as sometimes happens, be expressed in the dative case, the participle is construed im- personally, and takes the masculine (for want of a neuter) form, Thus, mai-ne kaha, by-me it-was-said, i.e. I said; us-nl ciffhi likhi, by-him a-letter (fern.) was-written, he wrote a letter; rajd-ne sherni-kd mora, the king killed the tigress, lit., by-the-king, with- reference-to-the-tigress, it (impersonal) -was-killed. In the article Prakrit it is shown that the same construction obtained in that language.

In E.H. the construction is the same, but is obscured by the fact that (as in the future) pronominal suffixes are added to the participle to indicate the person of the subject or of the agent, as in calat-eu, (if) I had gone; cal-eu, I went; m&r-eu (transitive), I struck, lit., struck-by-me ; mar-es, struck-by-him, he struck. If the participle has to be feminine, it (although a weak form) takes the feminine termination i, as in mari-u, I struck her; calati-u, (if) I (fern.) had gone; cali-u, I (fem.) went.

Further tenses are formed by adding the verb substantive to these participles, as in H. mal caltd-hu, I am going; mal caltd-tha, I was going ; mal cald-hu, I have gone ; mal cala-tha, I had gone. These and other auxiliary verbs need not detain us long. They differ in the various languages. For " I am " we have P. hd, H. hu, Br. haii, E.H. bdtyeii or

aheil. For " I was " we have P. si or sa, H. thd, Br. hau or hutau, E.H. raheu. The H. hu is thus con- jugated : —

Sing. Plur.

i. hH hat

2. hai ho

3. hai hal The derivation of ha, hu, hau, and aheu is uncertain. They are

usually derived from the Skr. asmi, I am ; but this presents many difficulties. An old form of the third person singular is hwai, and this points to the Pr. havai, he is, equivalent to the Skr. bhavati, he becomes. On the other hand this does not account for the initial o of aheu-. This last word is in the form of a past tense, and it may be a secondary formation from asmi. The P. si is not a feminine of sa, as usually stated, but is a survival of the Skr. asit, Pr. asi, was. As in the Prakrit form, si is employed for both genders, both numbers and all persons. Sa is a secondary forma- tion from this, on the analogy of the H. thd, which is from the Skr. sthitas, Pr. thio, stood, and is a participial form like cala; thus, woh thd. he was; woh (hi, she was. The Br. hau is a modern past of haii, while hutau is probably by origin a present participle of the Skr. bhii, become, Pr. huntad. The E.H. ba(eU, is the Skr. varte, Ap. vattail. Raheu is the past tense of the root rah, remain.

The future participle passive is everywhere freely used as an infinitive or verbal noun; thus, H. calnd, E.H. calab, the act of

going, to go. There is a whole series of derivative verbal forms, | for the literary form of Urdu.

making potential passives and transitives from intransitives, and causals (and even double causals) from transitives. Thus dikhnd, to be seen; potential passive, dikhand, to be visible; transitive, dekhna, to see; causal, dikhldnd, to show.

D. Literature. — The literatures of Western and Eastern Hindi form the subject of a separate 'article (see Hindostani Litera- ture). Panjabi has no formal literature. Even the Granth, the sacred book of the Sikhs, is mainly in archaic Western Hindi, only a small portion being in Panjabi. On the other hand, the language is peculiarly rich in folksongs and ballads, some of considerable length and great poetic beauty. The most famous is the ballad of Hir and Rdnjhd by Waris Shah, which is considered to be a model of pure Panjabi. Colonel Sir Richard Temple has published an important collection of these songs under the title of The Legends of the

Punjab (3 vols., Bombay and London, 1884-1900), in which both texts and translations of nearly all the favourite ones are to be found.

Authorities. — (a) General : The two standard authorities are the comparative grammars of J. Beames (1872-1879) and A. F, R. Hoernle (1880), mentioned in the article Indo-Aryan Languages. To these may be added G. A. Grierson, " On the Radical and Participial Tenses of the Modern Indo-Aryan Languages " in the Journal of the Asiatic Society of Bengal, vol. lxiv. (1895), part i. pp. 352 et seq. ; and " On Certain Suffixes in the Modern Indo- Aryan Vernaculars " in the Zeitschrift fur vergleichende Sprachfor- schung auf dem Gebiete der indogermanischen Sprachen for 1903, pp. 473 et seq.

(b) For the separate languages, see C. J. Lyall, A Sketch of the Hindustani Language (Edinburgh, 1880); S. H. Kellogg, A Grammar of the Hindi Language (for both Western and Eastern Hindi), (2nded., London, 1893); J. T. Platts, A Grammar of the Hindustani or Urdu Language (London, 1874); and A Dictionary of Urdu, Classical Hindi and English (London, 1884) ; E. P. Newton, Panjabi Grammar: with Exercises and Vocabulary (Ludhiana, 1898); and Bhai Maya Singh, The Panjabi Dictionary (Lahore, . 1895). The Linguistic Survey of India, vol. vi., describes Eastern Hindi, and vol. ix., Hindostani and Panjabi, in each instance in great detail.

(G. A. Gr.)

HINDOSTANI LITERATURE. The writings dealt with in this article are those composed in the vernacular of that part of India which is properly called Hindostan, — that is, the valleys of the Jumna and Ganges rivers as far east as the river Kos, and the tract to the south including Rajputana, Central India (Bundelkhand and Baghelkhand), the Narmada (Nerbudda) valley as far west as Khandwa, and the northern half of the Central Provinces. It does not include the Punjab proper (though the town population there speak Hindostani), nor does it extend to Lower Bengal.

In this region several different dialects prevail. The people of the towns everywhere use chiefly the form of the language called Urdu or Rekhta, 1 stocked with Persian words and phrases, and ordinarily written in a modification of the Persian character. The country folk (who form the immense majority) speak different varieties of Hindi, of which the word-stock derives from the Prakrits and literary Sanskrit, and which are written in the Dgvanagari or KaithI character. Of these the most im- portant from a literary point of view, proceeding from west to east, are Marwari and Jaipuri (the languages of Rajputana), Brajbhashd (the language of the country about Mathura and Agra), Kanauji (the language of the lower Ganges- Jumna Doab and western Rohilkhand), Eastern Hindi, also called

Awadhi and Baiswdri (the language of Eastern Rohilkhand, Oudh and the Benares division of the United Provinces) and Bihdri (trie, language of Bihar or Mithila, comprising several distinct dialects),. What is called High Hindi is a modern development, for literary purposes, of the dialect of Western Hindi spoken in the neighbour- hood of Delhi and thence northwards to the Himalaya, which has formed the vernacular basis of Urdu; the Persian words in the latter have been eliminated and replaced by words of Sanskritic origin, and the order of words in the sentence which is proper to 1 Urdu is a Turkish word meaning a camp or army with its followers, and is the origin of the European word horde. Rekhta means " scattered, strewn," referring to the way in which Persian words are intermixed with those of Indian origin; it is used chiefly

Hindi literature,' the worksOf the Bhagats, mention may be made here of a remarkable composition, 4 poem entitled the Padm&wat, the materials of Which are derived from the heroic legends of Rajputana, but which is not the work of a bard nor even of a Hindu. The author, Malik Muhammad of Ja'is, in Oudh, was a venerated Muslim devotee, to whom the Hindu raja of AmethI was greatly attached. Malik Muhammad wrote the Padmawat in 1540, the year in which Sh€r Shah Sur ousted Humayan from the throne of Delhi. The poem is composed in the purest vernacular Awadhl, with no admixture of traditional Hindu learning, and is generally to be found written in the Persian character, though the metres and language are thoroughly Indian. It professes to tell the tale of Padmawati or Padmini, a princess celebrated for her beauty who was the wife of the Chauhan raja of Chitor in Mewar. The historical Padminl's husband was named Bhlm Singh, but Malik Muhammad calls him Ratan Sgn; and the story turns upon the attempts of 'Ala'uddin Khiljl, the sovereign of Delhi, to gain possession of her person. The tale of the siege of Chitor in 1303 by "Ala uddin, the heroic stand made by its defenders, who perished to the last man in fight with the Sultan's army, and the self- immolation of Padmini and the other Women, the wives and daughters of the warriors, by the fiery death called johar, will be found related in Tod's Rtijasthan, i. 262 sqq. Malik Muhammad takes great liberties with' the history, and explains at the end of the poem that all is an allegory, and that the personages represent the human soul, Divine wisdom, Satan, delusion and other mystical thaTacters.

Both on accbunt of its interest as a true vernacular work, and as the composition of a Musalman who has taken the incidents of his morality from the legends of his: country and not from an exotic source, the poem is

: memorable. 'ft has often been lithographed, and is very popular; a translation has even been made into Sanskrit. A critical edition has been prepared by Dr G. A. Grierson andPancUt Siidhakar. Dwivedi.

The other class of composition which is characteristic of the period of early Hindi, the literature of the Bhagats, or Vaishnava saints, who propagated the doctrine of bhakli, or faith in Vishnu, as the popular religion of Hindostan, has exercised a much more powerful influence both upon the national speech and upon the themes chosen for poetic treatment. It is also, as a body of literature, of high intrinsic interest for its form and content. Nearly the whole of subsequent poetical composition in Hindi is impressed with one or other type of Vaishnava doctrine, which, like Buddhism many centuries before, was essentially a reaction against Brahmanieal influence and the chains of caste, a claim for the rights of humanity in face of the monopoly which the " twice-born " asserted of learning, of worship, of righteousness. A large proportion of the writers were non-Brahmans, and many of them of the lowest castes. As Siva was the popular deity of the Brahmans, so was Vishnu of the people; and while the literature of the Saivas and Saktas 1 is almost entirely in. Sanskrit, and exercised little or no influence on the popular mind in northern India, that of the Vaishnavas is largely in Hindi, and in itself constitutes the great bulk of what has been written in that language.

The Vaishnava doctrine is commonly carried back to Ramanuja, a Brahman who was born about the end of the nth century, at Perambup in the neighbourhood of the modern Madras, and spent his fife in southern India. His works, which are in Sanskrit and consist of commentaries on the Vedanta Sutras, are devoted to establishing " the personal existence of a Supreme Deity, possessing every gracious attribute, full of love and pity for the sinful beings who adore him, and granting the released soul a home of eternal bliss near him— a home where each soul never loses its identity, and whose state is one of perfect peace." 2 In the Deity's infinite love and pity he has on several occasions become incarnate for the salvation of mankind; and of these incarnations two, Ramachandra, the prince of Ayodhya, and Krishna, the chief of the Yadava clan and son of Vasudeva,

1 Worshippers of the energic power — SakH — of Siva, represented by his consort Parvati or Bhawanf.

2 Quoted from G. A. Grierson, chapter on " Literature," in the India Gazetteer (ed. 1907).

ar« pre-eminently those in which it is most fitting that he should be worshipped. Both of these incarnations had for many centuries 3 attracted popular veneration, and their histories had been celebrated by poets in

epics and by weavers of religious myths in Puranas or "old stories"; but it was apparently Ramanuja's teaching which secured for them, and especially for Ramachandra, their exclusive place as the objects of bhakli — ardent faith and personal devotion addressed to the Supreme. The adherents of Ramanuja were, however, all Brahmans, and observed very strict rules in respect of food, bathing and dress; the new doctrine had not yet penetrated to the people.

Whether Ramanuja himself gave the preference to Rama against Krishna as the form of Vishnu most worthy of worship is uncertain. He dealt mainly with philosophic conceptions of the Divine Nature, and probably busied himself little with mythological legend. His mantra, or formula of initiation, if Wilson 4 was correctly informed, implies devotion to Rama; but Vasudeva (Krishna) is also mentioned as a principal object of adoration, and Ramanuja himself dwelt for several years in Mysore, at a temple erected by the raja at Yadavagiri in honour of Krishna in his form Ranchhor. 6 It is stated that in his worship of Krishna he joined with that god as his Sakti, or Energy, his wife RukminI; while the later varieties of Krishna-worship prefer to honour his mistress Radha. The great difference, in temper and influence Upon life, between these two forms of Vaishnava faith appears to be a development subsequent to Ramanuja; but by the time of Jaideo (about 1256) it is clear that the theme of Krishna and Radha, and the use of passionate language drawn from the relations of the sexes to express the longings of the soul for God, had become fully established; and from that time onwards the two types of Vaishnava religious emotion diverged more and more from one another. .

The cult of Rama is founded on family life, and the relation of the worshipper to the Deity is that of a child to a father. The morality it inculcates springs from the sacred sources of human piety which in all religions have wrought most in favour of pureness of life, of fraternal helpfulness and of humble devotion to a loving and tender Parent, who desires the good of mankind, His children, and hates violence and wrong. That of Krishna, on the other hand, had for its basis the legendary career of a less estimable human hero, whose exploits are marked by a kind of elvish and fantastic wantonness; it has more and more spent its energy in developing that side of devotion which is perilously near to sensual thought, and has allowed the imagination and ingenuity of poets to dwell on things unmecl for verse or even for speech. It is claimed for those who first opened this way to faith that their hearts were pure and their thoughts innocent, and that the language of erotic passion which they use as the vehicle of their religious emotion is merely mystical and allegorical. This is probable; but that these beginnings were followed by corruption in the multitude, and that the fervent impulses of adoration made way in later times for those of lust and lasciviousness, seems beyond dispute.

The worship of Krishna, especially in his infant and youthful form (which appeals chiefly to women), is widely popular in the neighbourhood of Mathura, the capital of that land of Braj where as a boy he lived. Its literature is mainly composed in the dialect of this region, called Brajbhasha. That of Rama,

3 The worship of Krishna is as old as Megasthenes (about 300 B.C.), who calls him Herakles, and was then, as now, located at Mathura on the Jumna river. That of Rama is probably still more ancient ; the name occurs in stories of the Buddha.

4 Religious Sects of the Hindus, p. 40.

5 This name of Krishna, which means " He who quits the battle," is connected with the story of the transfer of the Yadava clan from Mathurato the new. capital on the coast of the peninsula of Kathiawar, the city of Dwaraka. This migration was the result of an invasion of Braj by Jarasandha, king of Magadha, before whom Krishna resolved to retreat. As his path southwards took him through Rajputana and Gujarat, it is in these regions that his form Ranchhor is most generally venerated as a symbol of the shifting of the centre of divine life from Gangetic to southern India.

the indigenous speech is more strictly adhered to than in Urdu, which under the influence of Persian constructions has admitted many inversions.

As in many other countries, nearly all the early vernacular literature of Hindostan is in verse, and works in prose are a modern growth. 1 Both Hindi and Urdu are, in their application to literary purposes, at first intruders upon the ground already occupied by the learned languages Sanskrit and Persian, the former representing Hindu and the latter Musalman culture. But there is this difference between them, that, whereas Hindi has been raised to the dignity of a literary speech chiefly by impulses of revolt against the monopoly of the Brahmans, Urdu has been cultivated with goodwill by authors who have themselves highly valued and dexterously used the polished Persian. Both Sanskrit and Persian continue to be employed occasionally for composition by Indian writers, though much fallen from their former estate; but for popular purposes it may be said that their vernacular rivals are now almost in sole possession of the field.

The subject may be conveniently divided as follows: —

1. Early Hindi, of the period during which the language was being fashioned as a literary medium out of the ancient Prakrits, represented by the old heroic poems of Rajputana and the literature of the early Bhagats or Vaishnava reformers, and extending from about A.D. Iioo to 1550;

2. Middle Hindi, representing the best age of Hindi poetry, and reaching from about 1550 to the end of the 18th century;

3. The rise and development of literary Urdu, beginning about the end of the 16th century, and reaching its height during the 18th;

4. The modern period, marked by the growth of a prose literature in both dialects, and dating from the beginning of the 19th century.

1. Early Hindi. — Our knowledge of the ancient metrical chronicles of Rajputana is still very imperfect, and is chiefly derived from the monumental work of Colonel James Tod, called The Annals and Antiquities of Rdjasthdn (published in 1829- 1832), which is founded on them. It is in the nature of com- positions of this character to be subjected to perpetual revision and recasting; they are the production of the family bards of the dynasties whose fortunes they record, and from generation to generation they are added to, and their language constantly modified to make it intelligible to the people of the time. Round an original nucleus of historical fact a rich growth of legend accumulates; later redactors endeavour to systematize and to assign dates, but the result is not often such as to inspire con- fidence; and the mass has more the character of ballad literature than of serious history. The materials used by Tod are nearly all still unprinted; his manuscripts are now deposited in the library of the Royal Asiatic Society in London; and one of the tasks which, on linguistic and historical grounds, should first be undertaken by the investigator of early Hindi literature is the examination and sifting, and the publication in their original form, of these important texts.

Omitting a few fragments of more ancient bards given by compilers of accounts of Hindi literature, the earliest author of whom any portion has as yet bee« published in the original text is Chand Bardal, the court bard of Prithwi-Raj, the last Hindu sovereign of Delhi. His poem, entitled Prithi-Rdj Rdsau (or Ray so), is a vast chronicle in 69 books or cantos, comprising a general history of the period when he wrote. Of this a small portion has been printed, partly under the editorship of the late Mr John Beames and partly under that of Dr Rudolf Hoernle, by the Asiatic Society of Bengal; but the excessively difficult nature of the task prevented both scholars from making much progress. 2 Chand, who came of a family of bards, was a native of Lahore, which had for nearly 170 years (since 1023) been under Muslim rule when he flourished, and the language of the poem exhibits a

considerable leaven of Persian words. In its present form the work is a redaction made by Amar Singh of Mewar, about the beginning of the 17th century, and therefore more

1 The only known exceptions are a work in Hindi called the Chaurasi Varta (mentioned below) and a few commentaries on poems ; the latter can scarcely be called literature.

2 A fresh critical edition of the text by Paod't Mohan Lai Vishnu Lai Pandia at Benares, under the auspices of the N&gari Prach&rim Sabha, had reached canto xxiv. in 1907.

than 400 years after Chand's death, with his patron Prithwi-Raj, in 1 1 93. There is, therefore, considerable reason to doubt whether we have in it much of Chand's composition in its original shape; and the nature of the incidents described enhances this doubt. The detailed dates contained in the Chronicle have been shown by Kabiraj Syamal Das 3 to be in every case about ninety years astray. It tells of repeated conflicts between the hero Prithwl-Raj and Sultan Shihabuddin, of Ghor (Muhammad Ghori), in which the latter always, except in the last great battle, comes off the worst, is taken prisoner and is released on pay- ment of a ransom; these seem to be entirely unhistorical, our contemporary Persian authorities knowing of only one encounter (that of Tiraurl (Tirawari) near Thenesar, fought in 1191) in which the Sultan was defeated, and even then he escaped un-captured to Lahore. The Mongols (Book XV.) are brought on the stage more than thirty years before they actually set foot in India, and are related to have been vanquished by the redoubt- able Prithwl-Raj. It is evident that such a record cannot possibly be, in its entirety, a contemporary chronicle; but nevertheless it appears to contain a considerable element which, from its language, may belong to Chand's own age, and represents the earliest surviving document in Hindi. " Though we may not possess the actual text of Chand, we have certainly in his writings some of the oldest known specimens of Gaudian literature, abounding in pure Apabhramsa SaurasenI Prakrit forms " (Grierson).

It is very difficult now to form a just estimate of the poem as literature. The language, essentially transitional in character, con- sists largely of words which have long since died out of the vernacular speech. Even the most learned Hindus of the present day are unable to interpret it with confidence; and the meaning of the verses must be sought by investigating the processes by which Sanskrit and Prakrit forms have been transfigured in their progress into Hindi. Chand appears, on the whole, to exhibit the merits and defects of ballad chroniclers in general. There is much that is lively and spirited in his descriptions of fight or council ; and the characters of the Rajput warriors who surround his hero are often sketched in their

utterances with skill and animation. The sound, however, frequently predominates over the sense; the narrative is carried on with the wearisome iteration and tedious unfolding of familiar themes and images which characterize all such poetry in India; and his value, for us at least, is linguistic rather than literary.

Chand may be taken as the representative of a long line of successors, continued even to the present day in the Rajput states. Many of their compositions are still widely popular as ballad literature, but are known only in oral versions sung in Hindostan by professional singers. One of the most famous of these is the Alha-khand, reputed to be the work of a contemporary of Chand called Jagnik or Jagnayak, of Mahoba in Bundelkhand, who sang the praises of Raja-Parmal, a ruler whose wars with Prithwl-Raj are recorded in the Mahoba-Khand of Chand's work. Alha and Udal, the heroes of the poem, are famous warriors in popular legend, and the stories connected with them exist in an eastern recension, current in Bihar, as well as in the Bundelkhandl or western form which is best known. Two versions of the latter have been printed, having been taken down as recited by illiterate professional rhapsodists. Another celebrated bard was Sarangdhar of Rantambbor, who flourished in 1363, and sang the praises of Hammir Deo (Hamir Deo), the Chauhan chief of Rantambhor who fell in a heroic struggle against Sultan 'Ala'uddln Khiljl in 1300. He wrote the Hammir Kdvya and Hammir Rdsau, of which an account is given by Tod; 4 he was also a poet in Sanskrit, in which language he compiled, in 1363, the anthology called Sdrngadhara r Paddhati. Another work which may be mentioned (though much more modern) is the long chronicle entitled Chhattra- Prakds, or the history of Raja Chhatarsal, the BundelS raja of Panna, who was killed, fighting on behalf of Prince Dara-Shukoh, in the battle of Dholpur won by Aurangzeb in 1658. The author, Lai Kabi, has given in this work a history of the valiant Bundela nation which was rendered into English by Captain W. R. Pogson in 1828, and printed at Calcutta.

Before passing on to the more important branch of early

3 See J.A.S.B, (1886), pp. 6 sqq.

1 Annals and Antiquities, ii. 452 n. and 472 n.

4 86

HINDOSTAN! LITERATURE

though general throughout Hindostan, has since the time of Tulsi Das adopted for poetic use the language of Oudh, called AwadhI or Baiswarl, a

form of Eastern Hindi easily understood throughout the whole of the Gangetic valley. Thus these two dialects came to be, what they are to this day, the standard vehicles of poetic expression.

Subsequently to Ramanuja his doctrine appears to have been set forth, about 1250, in the vernacular of the people by Jaideo, a Brahman born at Kinduvilva, the modern Kenduli, in the Birbhum district of Bengal, author of the Sanskrit Gita Govinda, and by Namdeo or Nama, a tailor 1 of Maharashtra, of both of whom verses in the popular speech are preserved in the Ad i Granth of the Sikhs. But it was not until the beginning of the 15th century that the Brahman Ramanand, a prominent Gosain of the sect of Ramanuja, having had a dispute with the members of his order in regard to the stringent rules observed by them, left the community, migrated to northern India (where he is said to have made his headquarters Galta in Raj- putana), and addressed himself to those outside the Brahman caste, thus initiating the teaching of Vaishnavism as the popular faith of Hindostan. Among his twelve disciples or apostles were a Rajput, a Jat, a leather-worker, a barber and a Musal- man weaver; the last-mentioned was the celebrated KabIr (see separate article). One short Hindi poem by Ramanand is contained in the Adi Granth, and Dr Grierson has collected hymns (bhajans) attributed to him and still current in Mithila or Tirhut, Both Ramanand and KabIr were adherents of the form of Vaishnavism where devotion is specially addressed to Rama, who is regarded not only as an incarnation, but as himself identical with the Deity. A contemporary of Ramanand, Bidyapati Thakur, is celebrated as the author of numerous lyrics in the Maithill dialect of Bihar, expressive of the other side of Vaishnavism, the passionate adoration of the Deity in the person of Krishna, the aspirations of the worshipper being mystically conveyed in the character of Radha, the cowherdess of Braj and the beloved of the son of Vasudeva. These stanzas of Bidyapati (who was a Brahman and author of several works in Sanskrit) afterwards inspired the Vaishnava literatureof Bengal,whosemostcelebratedexponentwasChaitanya (b. 1484). Another famous adherent of the same cult was Mlra Bal, " the one great poetess of northern India " (Grierson). This lady, daughter of Raja Ratiya Rana, Rathor, of Merta in Rajputana, must have been born about the beginning of the 15th century; she was married in 1413 to Raja Kumbhkaran of Mewar, who was killed by his son Uday Rana in" 1469. She was devoted to Krishna in the form of Ranchhor, and her songs have a wide currency in northern India.

An important compilation of the utterances of the early Vaishnava saints or Bhagals is contained in the sacred book, or Adi Granth, of the Sikh Gurus. Nanak, the founder of this sect (1469-1538), though a native of the Punjab (born at Talvandi on the Ravi near Lahore), took his doctrine from the Bhagats (see Kabir) ; and each of the thirty-one rags, forming the body

of the Granth, is followed by a compilation of texts from the utterances of Vaishnava saints, chiefly of Kabir, in confirmation of the teaching of the Gurus, while the whole book is closed by a bhog or conclusion, containing more verses by the same authors, as well as by a celebrated Indian Sufi, Shekh Farid of Pakpahan. The body of the Granth (q.v.), being in old Panjabi, falls outside the scope of this article; but the extracts included in it from the early writers of old Hindi are a precious store of specimens of authors some of whom have left no other record in the surviving literature. The Adi Granth, which was put together about 1600 by Arjun, the fifth Guru of the Sikhs, sets forth the creed of the sect in its original pietistic form, before it assumed the militant character which afterwards distinguished it under the five Gurus who suc- ceeded him.

2. Middle Hindi. — The second period, that of middle Hindi, begins with the reign of the Emperor Akbar (1556-1605); and it is not improbable that the broad and liberal views of this great monarch, his active sympathy with his Hindu subjects, the interest which he took in their religion and literature, and the peace which his organization of the empire secured for Hindo-

1 In the Granth Namdeo is called a calico-printer, Chhipi. The Marathi tradition is that he was a tailor, Shimpl; it is probable that the latter word, being unknown in northern India, has been wrongly rendered by the former.

Stan, had an important effect on the great development of Hindi poetry which now set in. 2 Akbar's court was itself a centre of poetical composition. The court musician Tan Sen (who was also a poet) is still renowned, and many verses composed by him in the Emperor's name live to this day in the memory of the people. Akbar's favourite minister and companion, Raja Birbal (who fell in battle on the north-western frontier in 1583), was a musician and a poet as well as a politician, and held the title, conferred by the Emperor, of Kabi-Ray, or poet laureate; his verses and witty sayings are still extremely popular in northern India, though no complete work by him is known to exist. Other nobles of the court were also poets, among them the Khdn-khanan 'Abdur-Rahim, son of Bairam Khan, whose Hindi dohas and kabittas are still held in high estimation, and Faizi, brother of the celebrated Abul-Fazl, the Emperor's annalist.

By this time the worship of Krishna as the lover of Radha (Radha-ballabh) had been systematized, and a local habitation found for it at Gokul, opposite Mathura on the Jumna, some 30 m. upstream from Agra, Akbar's capital, by Vallabhacharya, a Tailinga Brahman from Madras. Born in 1478, in 1497 he chose the land of Braj as his headquarters, thence making missionary tours throughout India. He wrote chiefly, if not entirely,

in Sanskrit; but among his immediate followers, and those of his son Bitthalnath (who succeeded his father on the latter's death in 1530), were some of the most eminent poets in Hindi. Four disciples of Vallabhacharya and four of Bitthal- nath, who flourished between 1550 and 1570, are known as the Asht Chhap, or " Eight Seals," and are the acknowledged masters of the literature of Braj-bhasha, in which dialect they all wrote. Their names are Krishna-Das Pay-ahari, Sur Das (the Bhat), Parmanand Das, Kumbhan Das, Chaturbhuj Das, Chhit Swami, Nand Das and Gobind Das. Of these much the most celebrated, and the only one whose verses are still popular, is Sur Das. The son of Baba Ram Das, who was a singer at Akbar's court, Sur Das was descended, according to his own statement, from the bard of Prithwi-Raj, Chand Bardai. A tradition gives the date of his birth as 1483, and that of his death as 1573; but both seem to be placed too early, and in Abul-Fazl's Aln-i Akbari he is mentioned as living when that work was completed (1596/7). He was blind, and entirely devoted to the worship of Krishna, to whose address he composed a great number of hymns (bhajans), which have been collected in a compilation entitled the SHr Sagar, said to contain 60,000 verses; this work is very highly esteemed as the high-water mark of Braj devotional poetry, and has been repeatedly printed in India. Other compositions by him were a translation in verse of the Bhagavata Purana, and a poem dealing with the famous story of Nala and Dama- yanti; of the latter no copies are now known to exist.

The great glory of this age is Tulsi Das (q.v.). He and Stir Das between them are held to have exhausted the possibilities of the poetic art. It is somewhat remarkable that the time of their appearance coincided with the Elizabethan age of English literature.

To these great masters succeeded a period of artifice and reflection, when many works were composed dealing with the rules of poetry and the analysis and the appropriate language of sentiment. Of their writers the most famous is Kesab Das, a Brahman of Bundelkhand, who flourished during the latter part of Akbar's reign and the beginning of that of Jahanglr. His works are the Rasik-priya, on composition (1591), the Kavi-priya, on the laws of poetry (1601), a highly esteemed poem dedicated to Parbin Rai Paturi, a celebrated courtesan of Orchha in Bundel- khand, the Ramachandriha, dealing with the history of Rama, (1610), and the Vigyan-gitd (1610). The fruit of this elaboration of the poetic art reached its highest perfection in Bihari Lal, whose Sal-sat, or " seven centuries " (1662), is the most remark- able example in Hindi of the rhetorical style in poetry (see separate article).

2 It wil| be remembered that Akbar's reign was remarkable for the

I translation into Persian of a large number of Sanskrit works of religion and philosophy, most of the versions being made by, or in the names of, members of his court.

HINDOSTAHI literature

487

Side by side with this cultivation of the literary use of the themes of Rama and Krishna, there grew up a class of composi- tions dealing, in a devotional spirit, with the lives and doings of the holy men from whose utterances and example the develop- ment of the popular religion proceeded. The most famous of these is the Bhakta-mdld, or " Roll of the Bhagals," by Narayan Das, otherwise called Nabha Das, or Nabhaji. This author, who belonged to the despised caste of Doms and was a native of the Deccan, had in his youth seen Tulsl Das at Mathura, and himself flourished in the first half of the 17th century. His work con- sists of 108 stanzas in chhappdi metre, each setting forth the characteristics of some holy personage, and expressed in a style which is extremely brief and obscure. Its exact date is unknown, but it falls between 1585 and 1623. The book was furnished with a ika (supplement or gloss) in the kabitta metre, by Priya Das in 17 13, gathering up, in an allusive and disjointed fashion, all the legendary stories related of each saint. This again was expanded about a century later by a modern author named Lachhman into a detailed work of biography, called the Bhakta- sindhu. From these nearly all our knowledge (such as it is) of the lives of the Vaishnava authors, both of the Rama and the Krishna cults, is derived, and much of it is of a very legendary and untrustworthy character. Another work, somewhat earlier in date than the Bhakta-mala, named the Chaurasl Vdrta, is devoted exclusively to stories of the followers of Vallabhacharya. It is reputed to have been written by Gokulnath, son of Bitthal- nath, son of Vallabhacharya, and is dated in 1551.

The matter of these tales is justly characterized by Professor Wilson 1 (who gives some translated specimens) as " marvellous and insipid anecdotes "; but the book is remarkable for being in very artless prose, and, though written more than 300 years ago, shows that the current language of Braj was then almost precisely identical with that now spoken in that region. A specimen of the text will be found at p. 296 of Mr F. S. Growse's Mathura, a District Memoir (3rd ed.,

1883).

It would be tedious to enumerate the many authors who succeeded the great period of Hind poetical composition which extended through the

reigns of Akbar, Jahangir and Shahjahan. None of them attained to the fame of Stir Das, Tuls Das or Biharl Lai. Their themes exhibit no novelty, and they repeat with a wearisome monotony the sentiments of their predecessors. The list of Hindi authors drawn up by Dr G. A. Grierson, and printed in the Journal of the Asiatic Society of Bengal in 1889, may be consulted for the names and works of these epigoni. The courts of Chhatarsal, raja, of Panna in Bundelkhand, who was killed in battle with Aurangzeb in 1658, and of several rajas of Bandho (now called Rlwan or Rewah) in Baghelkhand, were famous for their patronage of poets; and the Mogul court itself kept up the office of Kabi-Rdy or poet laureate even during the fanatical reign of Aurangzeb.

Such, in the briefest outline, is the character of Hind literature during the period when it grew and flourished through its own original forces. Founded by a popular and religious impulse in many respects comparable to that which, nearly 1600 years before, had produced the doctrine and literature, in the vernacular tongue, of Jainism and Buddhism, and cultivated largely (though by no means exclusively) by authors not belonging to the Brah- manical order, it was the legitimate descendant in spirit, as Hindi is the legitimate descendant in speech, of the Prakrit litera- ture which preceded it. Entirely in verse, it adopted and elabor- ated the Prakrit metrical forms, and carried them to a pitch of perfection too often overlooked by those who concern themselves rather with the substance than the form of the works they read. It covers a wide range of style, and expresses, in the works of its greatest masters, a rich variety of human feeling. Little studied by Europeans in the past, it deserves much more attention than it has received. The few who have explored it speak of it as an " enchanted garden " (Grierson), abounding in beauties of thought and phrase. Above all it is to be remembered that it is genuinely popular, and has reached strata of society scarcely touched by literature in Europe. The ballads of Rajput prowess, the aphorisms of Kabir, Tulsl Das's Rdmdyan, and the bhajans of 1 , Religious Sects, p. 132.

Stir Das are to this day carried about everywhere by wandering minstrels, and have found their way, throughout the great plains of northern India and the uplands of the Vindhya plateau, to the hearts of the people. There is no surer key to unlock the con- fidence of the villager than an apt quotation from one of these inspired singers.

3. Literary Urdu. — The origines of Urdu as a literary language are somewhat obscure. The popular account refers its rise to the time of Tlmur's invasion (1398). Some authors even claim for it a higher antiquity, asserting that a diwdn, or collection of poems, was composed in Rekhta by Mas'ud, son of Sa'd, in the last half of the nth or beginning of the 12th century, and that Sa'di of Shlraz and his friend Amir Khusrau 2

of Delhi likewise made verses in that dialect before the end of the 13th century. This, however, is very improbable. It has already been seen that during the early centuries of Muslim rule in India adherents of that faith used the language and metrical forms of the country for their compositions. Persian words early made their way into the popular speech; they are common in Chand, and in Kablr's verses (which are nevertheless unquestionable Hindi) they are in many places used as freely as in the modern dialect. Much of the confusion which besets the subject is due to the want of a clear understanding of what Urdu, as opposed to Hindi, really is.

Urdu, as a literary language, differs from Hindi rather in its form than in its substance. The grammar, and to a large extent the vocabulary, of both are the same. The really vital point of difference, that in which Hindi and Urdu are incommensurable, is the prosody. Hardly one of the metres taken over by Urdu poets from Persian agrees with those used in Hindi. In the latter language it is the rule to give the short a inherent in every consonant or nexus of consonants its full value in scansion (though in prose it is no longer heard), except occasionally at the metrical pause; in UrdQ this is never done, the words being scanned generally as pronounced in prose, with a few exceptions which need not be mentioned here. The great majority of Hindi metres are scanned by the number of matrds or syllabic instants — the value in time of a short syllable — of which the lines consist; in Urdu, as in Persian, the metre follows a special order of long and short syllables.

The question, then, is not When did Persian first become intermixed With Hindi in the literary speech? — for this process began with the first entry of Muslim conquerors into India, and continued for centuries before a line of Urdu verse was composed; nor When was the Persian character first employed to write Hindi? — for the written form is but a subordinate matter; as already mentioned, the MSS. of Malik Muhammad's purely Hindi poem, the Padmawat, are ordinarily found to be written in the Persian character; and copies lithographed in Devanagarl of the popular compositions of the Urdu poet Nazlr are commonly procurable in the bazars. We must ask When was the first verse composed in Hindi, whether with or without foreign admixture, according to the forms of Persian prosody, and not in those of the indigenous metrical system? Then, and not till then, did Urdu poetry come into being. This appears to have happened, as already mentioned, about the end of the 1 6th century. Meantime the vernacular speech had been gradually permeated with Persian words and phrases. The impulse which Akbar's interest in his Hindu subjects had given to the translation of Sanskrit works into Persian had brought the indigenous and the foreign literatures into contact. The current language of the neighbourhood of the capital, the Hindi spoken about Delhi and thence

northwards to the Hima- laya, was naturally the form of the vernacular which was most subject to foreign influences; and with the extension of Mogul

5 Amir Khusrau is credited with the authorship of many still popular rhymes, riddles or punning verses (called pahelis and mukuris) ; but these, though often containing Persian words, are in Hindi and scanned according to the prosody of that language; they are, therefore, like- Malik Mohammad's Padmawat, not Urdu or Rekhta verse (see Professor Azad's A bi-Hayat, pp. 72-76). A late Dakkhani poet who used the takkaUus of Sa'di is said by Azad (p. 79) to have been confused by Mirza Rafi'us-Sauda in his Tazkira with Sa'di of Shiraz.

territory by the conquests in the south of Akbar and his suc- cessors, this idiom was carried abroad by their armies, and was adopted by the Musalman kingdoms of the Deccan as their court language some time before their overthrow by the cam- paigns of Aurangzeb.

It is not a little remarkable that, as happened with the Vaish- nava reformation initiated by Ramanuja and Ramanand, and with the Vallabhacharya cult of Krishna established at Mathura, the first impulse to literary composition in Urdu should have been given, not at the headquarters of the empire in the north, but at the Muhammadan courts of Golkonda and Bijapur in the south, the former situated amid an indigenous population speaking Telugu, and the latter among one whose speech was Kanarese, both Dravidian languages having nothing in common with the Aryan tongues of the north. This fact of itself defines the nature of- the literature thus inaugurated. It had nothing to do with the idiom or ideas of the people among whom it was born, but was from the beginning an imitation of Persian models. It adopted the standards of form and content current among the poets of Eran. The qasida or laudatory ode, the gkazal or love-sonnet, usually of mystical import, the mar$iya or dirge, the masnavi or narrative poem with coupled rhymes, the hija or satire, the tubal or epigram — these were the types which Urdu took over ready-made. And with the forms were ap- propriated also all the conventions of poetic diction. The Persians, having for centuries treated the same themes with a fecundity which most Europeans find extremely wearisome, had elaborated a system of rhetoric and a stock of poetic images which, in the exhaustion of original matter, made the success of the poet depend chiefly upon dexterity of artifice and clever- ness of conceit. Pleasing hyperbole, ingenious comparison, antithesis, alliteration, carefully arranged gradation

of noun and epithet, are the means employed to obtain variety; and few of the most eloquent passages of later Persian verse admit of translation into any other language without losing that which in the original makes their whole charm. What is true of Persian is likewise true of Urdu poetry. Until quite modern times, there is scarcely anything in it which can be called original. 1 Differences of school, which are made much of by native critics, are to us hardly perceptible; they consist in the use of one or other range of metaphor or comparison, classed, according as they repeat the well-worn poetical stock-in-trade of the Persians, or seek a slightly fresher and more Indian field of sentiment, as the old or the new style of composition.

Shuja'uddin Nun, a native of Gujarat, a friend of FaizI and con- temporary of Akbar, is mentioned by the native biographers as the most ancient Urdu poet after Amir Khusrau. He was tutor of the son of the viazlr of Sultan Abu-1-Hasan Kutb Shah of Golkonda, and several ghazals by him are said to survive. Kuli Kutb Shah of Golkonda, who reigned from 1581, and his successor 'Abdullah Kuˆb Shah, who came to the throne in 161 1, have both left collections of verse, including ghazals, ruba'ls, masnavis and qasldas. And during the reign of the latter Ibn Nishati wrote two works which are still famous as models of composition in Dakhni; they are masnavis entitled the Tufi-nama, or " Tales of a Parrot," and the Phiil-ban. The first, written in 1639, is an adaptation of a Persian work by Nakhshabi, but derives ultimately from a Sanskrit original entitled the Suka-saptati; this collection has been frequently rehandled in Urdu, both in verse and prose, and is the original of the Tota- KahO.nl, one of the first works in Urdu prose, composed in 1801 by Muhammad Haidar-bakhsh Haidarl of the Fort William College. The Phul-ban is a love tale named from its heroine, said to be trans- lated from a Persian work entitled the Basatin. Another famous work which probably belongs to the same place and time is the Story of Kamrup and Kala by Tabsinuddin, a masnavi which has been published (1836) by M. Garcin de Tassy; what makes this poem remarkable is that, though the work of a Musalman, its personages are Hindu. Kamrup, the hero, is son of the king of Oudh, and the heroine, Kala, daughter of the king of Ceylon; the incidents some- what resemble those of the tale of as-Sindibad in the Thousand and One Nights; the hero and heroine dream one of the other, and the former sets forth to find his beloved; his wanderings take him to

1 An exception may be made to this general statement in favour of the genre pictures of city and country life contained in the masnavis of Sauda and N'azir. These are often satires (in the vein of Horace rather than Juvenal), and are full of interest as pictures of society. In Siuda, however, the conventional language used in description is often Persian rather than Indian.

many strange countries and through many wonderful adventures, ending in a happy marriage.

The court of Bijapur was no less distinguished in literature. Ibrahim 'Adil Shah (1579-1626) was the author of a work in verse on music entitled the Nau-ras or " Nine Savours," which, however, appears to have been in Hindi rather than Urdu; the three prefaces (dlbajas) to this poem were rendered into Persian prose by Maula ZuhOri, and, under the name of the Sih nasr-i Zuhurl, are well-known models of style. A successor of this prince, 'AH 'Adil Shah, had as his court poet a Brahman known poetically as Nusrati, who in 1657 composed a masnavi of some repute entitled the Gulshan-i 'Isliq, or " Rose-garden of Love," a romance relating the history of Prince Manohar and Madmalati, — like the Kamrup, an Indian theme. The same poet is author of an extremely long masnavi entitled the 'All-ndrna, celebrating the monarch under whom he lived.

These early authors, however, were but pioneers; the first generally accepted standard of form, a standard which suffered little change in two centuries, was established by Wall of Aurangabad (about 1 680-1 720) and his contemporary and fellow-townsman Siraj. The former of these is commonly called " the Father of Rekhtah " — Baba-e Rekhta; and all accounts agree that the immense development attained by Urdu poetry in northern India during the 1 8th century was due to his example and initiative. Very little is known of Wall's life ; he is believed to have visited Delhi towards the end of the reign of Aurangzeb, and is said to have there received instruction from Shah Gulshan in the art of clothing in a vernacular dress the ideas of the Persian poets. His Kulllyat or complete works have been published by M. Garcin de Tassy, with notes and a translation of selected passages (Paris, 1834-1836), and may be com- mended to readers desirous of consulting in the original a favourable specimen of Urdu poetical composition.

The first of the Delhi school of poets was Zuhuruddin Hatim, who was born in 1699 and died in 1792. In the second year of Muhammad Shah (1719), the dlwan of Wall reached Delhi, and excited the emula- tion of scholars there. Hatim was the first to imitate it in the Urdu of the north, and was followed by his friends Naji, Mazmun and Abru. Two dlwans by him survive. He became the founder of a school, and one of his pupils was Rail us-Sauda, the most distinguished poet of northern India. Khan Arzu (1689-1756) was another of the fathers of Urdu poetry in the north. This author is chiefly renowned as a Persian scholar, in which language he not only composed much poetry, but one of the best of Persian lexicons, the Siraju-l-lughat; but his compositions in Urdu are also highly esteemed. He was the master of Mir Taqi, who ranks next to Sauda as the most eminent Urdu poet. Arzu died at Lucknow, whither he betook himself after the

devastation of Delhi by Nadir Shah (1739). Another of the early Delhi poets who is considered to have surpassed his fellows was In'amullah Khan Yaqin, who died during the reign of Ahmad Shah (1748-1754), aged only twenty-five. Another was Mir Dard, pupil of the same Shah Gulshan who is said to have instructed Wall ; his dlwan is not, long, but extremely popular, and especially esteemed for the skill with which it develops the themes of spiritualism. In his old age he became a darwesh of the Naqshbandl following, and died in 1793.

Sauda and Mir Taqi are beyond question the most distinguished Urdu poets. The former was born at Delhi about the beginning of the 1 8th century, and studied under Hatim. He left Delhi after its' devastation, and settled at Lucknow, where the Nawab A?afud- daulah gave him a jaglr of Rs. 6000 a year, and where he died in 1780. His poems are very numerous, and cover all the styles of Urdu poetry; but it is to his satires that his fame is chiefly due, and in these he is considered to have surpassed all other Indian poets. Mir Taqi was born at Agra, but early removed to Delhi) where he studied under Arzii; he was still' living there at the time of Sauda's death, but in 1782 repaired to Lucknow, where he likewise received a pension; he died at a very advanced age in 1 810. His works are very voluminous, including no less than six dlwans. Mir is counted the superior of Sauda in the ghazal and masnavi, while the latter excelled him in the satire and qasida. Sayyid Ahmad, an excellent authority, and himself_pne of the best of modern authors in Urdu, says of him in his Asaru-s-Sanadid: " Mir's language is so pure, and the expressions which he employs so suit- able and natural, that to this day all are unanimous in his praise. Although the language of Sauda is also excellent, and he is superior to Mir in the point of his allusions, he is nevertheless inferior to him in style."

The tremendous misfortunes which befell Delhi at the hands of Nadir Shah (1739). Ahmad Shah Durrani (1756), and the Marathas ('759), and the rapid decay of the Mogul empire under these repeated shocks, transferred the centre of the cultivation of literature from that city to Lucknow, the capital of the newly founded and flourish- ing state of Oudh. It has been mentioned how Arzu, Sauda.and Mir betook themselves to this refuge and ended their days there; they were followed in their new residence by a school of poets hardly inferior to those who had made Delhi illustrious in the first half of the century. Here they were joined by Mir Hasan (d. 1786), Mir Soz (d. 1800) and Qalandar-bakhsh Jur'at (d. 1810), also like them- selves refugees from Delhi, and illustrious poets. Mir Hasan was a friend and collaborator of Mir Dard, and first established himself at Faizabad and subsequently at Lucknow; he excelled in the ghazal.

HINDOSTANI LITERATURE

ruba'i, masnavi and marsiya, and is counted the third, with Sauda and Mir Taqi, among the most eminent of Urdu poets. His fame chiefly rests upon a much admired masnavi, entitled the Sihru-l- bayan, or " Magic of Eloquence," a romance relating the loves of Prince Be-nazir and the Princess Badr-i Munir; his masnavi called the Gulzdr-i Iram (" Rose-garden of Iram," the legendary 'Adite paradise in southern Arabia), in praise of Faizabad, is likewise highly esteemed. Mir Muhammadi Soz was an elegant poet, re- markable for the success with which he composed in the dialect of the harem called Rekhtl, but somewhat licentious in his verse ; he became a darwesh and renounced the world in his later years. Jur'at was also a prolific poet, but, like Soz, his ghazals and masnavis are licentious and full of double meanings. He imitated Sauda in satire with much success; he also cultivated Hindi poetry, and composed dohas and kabittas. Miskin was another Lucknow poet of the same period, whose marsiyas are especially admired; one of them, that on the death of Muslim and his two sons, is considered a masterpiece of this style of composition. The school of Lucknow, so founded and maintained during the early years of the century, continued to flourish till the dethronement of the last king, Wajid 'All, in 1856. Atash and Nasikh (who died respectively in 1847 and 1841) are the best among the modern poets of the school in the ghazal; Mir Anis,a grandson of Mir Hasan, and his contemporary Dabir, the former of whom died in December 1 875 and the latter a few months later, excelled in the marsiyah. Rajab All Beg Surur, who died in 1869, was the author of a much-admired romance in rhyming prose entitled the Fisunah-e 'Ajaib or " Tale of Marvels," besides a diwan. The dethroned prince Wajid 'All himself, poetically styled Akhtar, was also a poet; he published three diwdns, among them a quantity of poetry in the rustic dialect of Oudh which is philologically of much interest.

Though Delhi was thus deserted by its brightest lights of literature, it did not altogether cease to cultivate the poetic art. Among the last Moguls several princes were themselves creditable poets. Shah Alam II. (1 761-1806) wrote under the name of Aftab, and was the author of a romance entitled Manzum-i Aqdas, besides a diwdn. His son Sulaiman-shukoh, brother of Akbar Shah II., who had at first, like his brother authors, repaired to Lucknow, returned to Delhi in 1815, and died in 1838; he also has left a diwan. Lastly, his nephew Bahadur Shah II., the last titular emperor of Delhi (d. 1862), wrote under the name of Zafar, and was a pupil in poetry of Shaikh Ibrahim Zauq, a distinguished writer; he has left a voluminous diwan, which has been printed at Delhi. MashafI (Ghulam-i Ham- dani), who died about 1814, was one of the most distinguished of the revived poetic school of Delhi, and was himself one of its founders. Originally of Lucknow, he left that city for Delhi in 1777, and

held conferences of poets, at which several authors who afterwards acquired repute formed their style; he has left five diwdns, a Tazkira or biography of Urdu poets, and a Shdh-ndma or account of the kings of Delhi down to Shah 'Alam. Qaim (Qiyamuddin "All) was one of his society, and died in 1792; he has left several works of merit. Cihalib, otherwise Mirza Asadullah Khan Naushah, laureate of the last Mogul, who died in 1869, was undoubtedly the most eminent of the modern Delhi poets. He wrote chiefly in Persian, of which language, especially in the form cultivated by Firdausi, free from intermixture of Arabic words, he was a master; but his Urdu diwan, though short, is excellent in its way, and his reputation spread far and wide. To this school, though he lived and died at Agra, may be attached Mir Wall Muhammad Nazir (who died in the year 1832); his masnavis entitled Jogi-ndma, Kaurl-ndma, Banjdre- nama, and Burhdpe-ndma, as well as his diwan, have been frequently reprinted, and are extremely popular. His language is less artificial than that of the generality of Urdu poets, and some of his poems have been printea in Nagari, and are as well known and as much esteemed by Hindus as by Mahommedans. His verse is defaced by much obscenity.

4. Modern Period. — While such, in outline, is the history of the literary schools of the Deccan, Delhi and Lucknow, a fourth, that of the Fort William College at Calcutta, was being formed, and was destined to give no less an impulse to the cultivation of Urdu prose than had a hundred years before been given to that of poetry by Wall. At the commencement of the 19th century Dr John Gilchrist was the head of this institution, and his efforts were directed towards getting together a body of literature suitable as text-books for the study of the Urdu language by the European officers of the administration. To his exertions we owe the elaboration of the vernacular as an official speech, and the possibility of substituting it for the previously current Persian as the language of the courts and the government. He gathered together at Calcutta the most eminent vernacular scholars of the time, and their works, due to his initiative, are still notable as specimens of elegant and serviceable prose composition, not only in Urdu, but also in Hindi. The chief authors of this school are Haidarl (Sayyid Muhammad Haidar-bakhsh), Husaini (Mir Bahadur e All), Mir

Amman Lutf, Haflzuddin Ahmad, Sher 'All Afsos, Nihal Chand of Lahore, Kazim 'All Jawan, Lallu Lai Kavi, Mazhar 'All Wila and Ikram 'All.

Haidarl died in 1828. He composed the To{d-Kahdnl (1801), a prose redaction of the Tufi-ndmah which has been already mentioned ; a romance named Ardish-i Mahfil (" Ornament of the Assembly "), detailing the adventures of the famous Arab chief Hatim-i Tai ; the Gul-i Maghfirat or Dah Majlis, an account of the holy persons of the Muhammadan faith; the Gulzdr-i Danish, a translation of the Bahdr-i Danish, a Persian work

containing stories descriptive of the craft and faithlessness of women; and the Tarlkh-i Nddirl, a trans- lation of a Persian history of Nadir Shah. Husaini is the author of an imitation in prose of Mir Hasar»'s Sihru-l-baydn, under the name of Nasr-i Benazir (" the Incomparable Prose," or " the Prose of Benazir," the latter being the name of the hero), and of a work named Akhlda-i Hindi, or " Indian Morals," both composed in 1802. The Akhtaq-i Hindi is an adaptation of a Persian work called the Mujarrihu-l-qulub (" the Delighter of Hearts "), itself a version of the Hilopadesa. Mir Amman was a native of Delhi, which he left in the time of Ahmad Shah Durrani for Patna, and in 1801 repaired to Calcutta. To him we owe the Bdgh Bahdr (1801-1802), an adapta- tion of Amir Khusrau's famous Persian romance entitled the Chahdr Darwesh, or " Story of the Four Dervishes." Amman's work is not itself directly modelled on the Persian, but is a rehandling of an almost contemporary rendering by Tahsin of Etawa, called the Nau-larz-i Murassa'. The style of this composition is much admired by natives of India, and editions of it are very numerous. Amman also composed an imitation of Husain Wa'iz Kashifi's Akhldq-i Muhsini under the name of the Ganj-i Khubi (" Treasure of Virtue "), produced in 1802. Haflzuddin Ahmad was a professor at the Fort William College; in 1803 he completed a translation of Abu-1-Fazl's 'Iydr-i Danish, under the name of the Khirad-afroz (" Enlightener of the Understanding "). The 'Iydr-i Danish (" Touchstone of Wisdom ") is one of the numerous imitations of the originally Sanskrit collection of apologues known in Persian as the Fables of Bidpdi, or Kalilah and Dimna. Afsos was one of the most illustrious of the Fort William school ; originally of Delhi, he left that city at the age of eleven, and entered the' service of Qasim 'All Khan, Nawab of Bengal; he afterwards repaired to Hyderabad in the Deccan, and thence to Lucknow, where he was the pupil of Mir Hasan, Mir Soz and Mir Haidar 'All Hairan. He joined the Fort William College in 1800, and died in 1809. He is the author of a much esteemed dlwdn; but his chief reputation is founded on two prose works of great excellence, the Ardish-i Mahfil (1805), an account of India adapted from the introduction of the Persian Khuldsatu-t- tawdrikh of Sujan Rae, and the Bdgh-i Urdu (1808), a translation of Sa'di's Gulistdn. Nihal Chand translated into Urdu a masnavi, entitled the Gul-i Bakdwali, under the name of Mazhab-i 'Ishq ("Religion of Love"); this work is in prose intermingled with verse, was composed in 1804, and has been frequently reproduced. Jawan, like most of his collaborators, was originally of Delhi and afterwards of Lucknow; he joined the College in 1800. He is the author of a version in Urdu of the well-known story of Sakuntala, under the name of Sakuntala Ndtak; the Urdu was rendered from a previous" Braj-bhasha version by Nawaz Kabishwar made in 1716, and was printed in 1 802 . He also composed a Bdrah-mdsd, or poetical description of the twelve months (a very popular and often-handled form of composition), with accounts of the various

Hindu and Muhammadan festivals, entitled the Dastur-i Hind (" Usages of India "), printed in 1812. Ikram 'AH translated, under the name of the Ikhwdnu-s-safd, or " Brothers of Purity " (1810), a chapter of a famous Arabian collection of treatises on science and philosophy entitled Rasdilu Ikhwdni-s-safd, and composed in the 10th century. The complete collection, due to different writers who dwelt .at Basra, has recently been made known to European readers by the translation of Dr F. Dieterici (1858-1879); the chapter selected by Ikram 'Ali is the third, which records an allegorical strife for the mastery between men and animals before the king of the Jinn. The translation is written in excellent Urdu, and is one of the best of the Fort William productions.

Sri Lallu Lai was a Brahman, whose family, originally of Gujarat, had long been settled in northern India. What was done by the other Fort William authors for Urdu prose was done by Lallu Lai almost alone for Hindi. He may indeed without exaggeration be said to have created " High Hindi " as a literary language. His Prem Sagar and Rdjnlti, the former a version in pure Hindi of thte loth chapter of the Bhdgavata Purdna, detailing the history of Krishna, and founded on a previous Braj-bhasha version by Chatur- bhuj Misr, and the latter an adaptation in Braj-bhasha prose of the Hitopadesa and part of the Pancha-tantra, are unquestionably the most important works in Hindi prose. The Prem Sagar was begun in 1804 and ended in 1810; it enjoys immense popularity in northern India, has been frequently reproduced in a lithographed form, and has several times been printed. The Rdjniti was composed in 1809; it is much admired for its sententious brevity and the purity of its language. Besides these two works, Lallu Lai was the author of a collection of a hundred anecdotes in Hindi and Urdu entitled Latdif-i Hindi, an anthology of Hindi verse called the Sabhd-bilas.

a Sat-sai in the style of Bihari-Lal called Sapta-satika and several other works. He and Jawan worked together at the Singhasan Batfist (1801), a redaction in mixed Urdu and Hindi (Devan&gari character) of a famous collection of legends relating the prowess of King Vikramaditya ; and he also aided the latter author in the production of the Sakuntala Natak. Mazhar 'All Wila was his colla- borator in the Baital Pachisi, a collection of stories similar in many respects to the Singhasan Battlsi, and also in mixed Urdu-Hindi; and he aided Wila, in the preparation in Urdu of the Story of Madhonal, a romance originally composed in Braj-bhasha by Moti Ram.

The works of these authors, though compiled and published under the superintendence of Dr Gilchrist, Captain Abraham Lockett, Professor J. W. Taylor, Dr W. Hunter and other European officers of the college of Fort William, and originally intended for the in- struction of the Company's officers in the vernacular, are essentially Indian in taste and style, and, until superseded by the more recent developments of literature noticed below, enjoyed a very wide reputation and popularity. They may, indeed, be said to have set the standard of prose composition in Urdu and Hindi, and for the first half of the 19th century their influence in this respect continued almost unchallenged. Side by side with them, among the Musal- man population of northern India, another almost contemporaneous impulse did much for the expansion of the Urdu language, and, like the work of the Vaishnava reformers in moulding literary Hindi, gave an impetus to composition which might otherwise have been lacking. This was the reform in Islam led by Sayyld Ahmad 1 and his followers. In all Eastern countries religion is the first and chief subject of literary production; and the controversies which the new preaching aroused in India at once afforded abundant material for authorship in Urdu, and interested deeply the people to whom the works were addressed.

Sayyid Ahmad was born in 1782, and received his early education at Delhi; his instructors were two learned Muslims, Shah 'Abdu-1- 'Aziz, author of a celebrated commentary on the Qur'an (the Tafslr-i 'Aslziyyah), and his brother 'Abdu-1-Qadir, the writer of the first translation of the holy volume into Urdu. Under their guidance Sayyid Ahmad embraced the doctrines of the Wahhabis, a sect whose preaching appears at this time to have first reached India. He gathered round him a large number of fervent disciples, among others Isma'fl Haji, nephew of 'Abdu-rAziz and 'Abdu-1-Qadir, the chief author of the sect. After a course of preaching and apostleship at Delhi, Sayyid Ahmad set out in 1820 for Calcutta, attended by numerous adherents. Thence in 1822 he started on a pilgrimage to Mecca, whence he went to Constantinople, and was there received with distinction and gained many disciples. He travelled for nearly six years in Turkey and Arabia, and then returned to Delhi. The religious degradation and coldness which he found in his native country strongly impressed him after his sojourn in lands where the life of Islam is stronger, and he and his disciples established a propaganda throughout northern India, reprobating the super- stitions which had crept into the faith from contact with Hindus, and preaching a jihad or holy war against the Sikhs. In 1828 he started for Peshawar, attended by, it is said, upwards of 100,000 Indians, and accompanied by his chief followers, Haji Isma'Il and Abdu-1-Hayy. He was furnished with means by a general sub- scription in northern India, and by several Muhammadan princes who had embraced his doctrines. At the beginning of 1829 he declared war against the Sikhs, and in the course of

time made himself master of Pesh&war. The Afghans, however, with whom he had allied himself in the contest, were soon disgusted by the rigour of his creed, and deserted him and his cause. He fled across the Indus and took refuge in the mountains of Pakhli and Dhamtor, where in 183 1 he encountered a detachment of Sikhs under the command of Sher Singh, and in the combat he and Haji Isma'il were slain. His sect is, however, by no means extinct ; the WahhUbi doctrines have continued to gain ground in India, and to give rise to much controversial writing, down to our own day.

The translation of the Quran by 'Abdu-1-Qadir was finished in 1803, and first published by Sayyid 'Abdullah, a fervent disciple of Sayyid Ahmad, at Hughli in 1829. The Tambihu-l-ghafilin, or " Awakener of the Heedless," a work in Persian by Sayyid Ahmad, was rendered into Urdu by 'Abdullah, and published at the same press in 1830. Haji Ism&'Il was the author of a treatise in Urdu entitled Taqwiyatu-l-Iman (" Confirmation of the Faith "), which had great voˆue among the following of the Sayyid. Other works by the disciples of the Tariqah-e Muhammadiyyah (as the new preaching was called) are the Targhib-i Jihad (" Incitation to Holy War "), Hid&yalu-l-Muminln (" Guide of the Believers "), Muzihu- l-Kabair wa-l-Bid'ah (" Exposition of Mortal Sins and Heresy "), Naslhatu-l-Muslimln (" Admonition to Muslims "), and the Mi'al Mas&il, or " Hundred Questions."

Printing was first used for vernacular works by the College Press at Fort William, at the end of the 18th and the beginning of the 19th century, and all the compositions prepared for Dr Gilchrist and his successors which have been mentioned were thus given to the public. But the expense of this method of reproduction long precluded its extensive use in India, and movable types, though

1 To be carefully distinguished from the reformer of the same name who flourished half a century later.

well suited for alphabets derived from the Sanskrit, were not equally applicable to the flowing and graceful characters of Persian. Lithography was introduced about 1 837, when the first press was set up at Delhi, and immediately gave a powerful stimulus to the multiplication of literature, both original and editions of older works. In 1833 the vernaculars were substituted for Persian as the official language of the courts and the acts of the legislature, and this at once led to the transfer to the former of a mass of techni- cal and forensic terms which had previously been only to a limited extent in popular use. Thirdly, the spread of education in subjects of Western learning, for which text-books (many of them transla- tions from English) were required, not only greatly enlarged the vocabulary of the common speech, but led by degrees to the use of a simpler and more direct

style, and the abandonment wholesale of the florid and artificial ornament which was the legacy of the Persian literature upon which Urdu prose had at first modelled itself. Lastly, the establishment of a vernacular newspaper press, which lithography had rendered possible, placed within the reach of a continually widening public the means of becoming acquainted with new ideas in every department of culture, and practised the writers who contributed to it in the art of wielding their mother- tongue with effect in its application to European themes.

All these revolutionary agencies were at work, though in a tenta- tive and limited fashion, when the great change, following on the Mutiny of 1857, of the transfer of the government of India from the Company to the Crown inaugurated a new era. Since i860 their operation has become extremely rapid and far-reaching. The use of lithography both for Urdu and Hindi annually gives birth to hundreds of works. The extension of education through both public and private agency has created an immense mass of school- books, and the spread of instruction in English and the activity of translators have filled the vernaculars with a multitude of new words drawn from that language. The newspaper press, in Urdu and Hindi, now counts over two hundred journals, the majority issued in the United Provinces of Agra and Qudh and in the Punjab, but a few at Madras, Hyderabad, Bangalore, Bombay and Calcutta. Of this great body of literary production it is possible to speak only in general terms. Style and vocabulary are still in a somewhat fluid and unsettled condition, and the subjects treated are almost as various as they are in European literatures. Much, indeed, of the work produced has scarcely any claim to literary excellence, and in the crowd of writers we may content ourselves with mention- ing only a few whose influence and authority make it probable that they will hereafter be known as leaders in the new culture.

One of the first effects of the new literary inspiration seemed to be the extinction of poetical composition as previously practised. With the deaths of gauq (1854) and Ghalib (1869) of the Delhi school, and those of Anis (1875) and Dabir (1876) of Lucknow, the end of Urdu poetry appeared to have come. The new age was intensely practical and eager to engage in the race for material and political advancement, and had no time for sentiment, or taste for mystical conceits. Moreover, poetical composition in India, as in other Eastern countries, has always owed much to the patronage of courts and princes. The thrones of Delhi and Lucknow had passed away, and the new rulers showed little interest in this form of achievement. Only at Hyderabad in the Deccan, under the patron- age of the Nizam, were laureates still honoured; the last of these, Mirza Khan Dagh (1831-1905), enjoyed a wide reputation as a graceful and eloquent master of the poetic art.

But prose and material prosperity did not succeed in monopolizing the genius of the people. The great movement of reform and liberalism in Islam led by Sir Sayyid AhmadKh&n (1817-1898) found its bard in Sayyid Altaf Husain of Panipat, poetically styled Hali — an ambiguous nam-de-plume now generally taken in the sense of " modern," or " up-to-date." Hali in his youth was a pupil of the famous Ghalib, whose life he has written and of whose writings he has published an able criticism. At the age of forty he came under the influence of Sir Sayyid Ahmad Khan, and from that time devoted his great poetic gifts to the service of his co- religionists. He has published much verse, of which an interesting specimen will be found in the edition of his Ruba'ls or quatrains (101 in number), with an English translation, by Mr G. E. Ward (Oxford, 1904) ; in this is included a famous poem addressed to his muse, setting forth his ideals in poetry — simplicity, avoidance of exaggeration and unreality, direct and emotional appeal to the heart, and above all sincerity. There can be no doubt that he has succeeded in becoming the leader of a new poetic school, which shows much vigour and promise.

Perhaps the most memorable of all Hull's compositions is his long poem in six-line stanzas (called musaddas) on " the flow and ebb of Islam " (1879), which has had an extraordinary influence in stimu- lating enthusiasm in the cause of progress among the Musalmans of the north of India. In it he draws, in simple and direct but searching and eloquent language, a rapid sketch of the glories of Islam in the past, its principles and precepts, and the sources of its strength; and then turns to contrast with this picture the degradation and decay into which it had, when he wrote, fallen in Hindostan. Never have the vices and shortcomings of a people been lashed by one of themselves with more vigorous denunciation, or with more earnestness of moral purpose. In his preface he

explains how the poem came to be written — after a youth spent in heedlessness and unsettlement, at the instigation of Sir Sayyid Ahmad Khan, and in the cause of that great reformer. The poem is still recited and imitated by Muslims in the Punjab and United Provinces, though the picture which it presents of Indian Musal- mans is no longer wholly applicable to the community, rjall has r ecently completed a life of Sir Sayyid Ahmad Khan in two volumes, entitled Haydt-i Javid (".eternal life"), a work of great merit.

Another writer whose work, though chiefly in prose,_deals with poetry and poetic style, is Maulavl Muhammad Husain Azad, lately professor of

Arabic at the Government College, Lahore. He has not himself composed much verse; but his. biographies of Urdu poets, with criticisms of their works, entitled Ab-i Hayat (" Water of Life," Lahore, 1883), is by far the best book dealing with the subject. His prose style is much admired. As Hall was the pupil of Ghalib, so was Azad that of Zauq, of whose poems he has published a re- vised and annotated edition. His other works in prose are Qisas-i Hind, episodes of Indian history arranged for schools; Nairang-i Khaydl, an allegory dealing with human life; and Darbdr-i Akbarl, an account of the reign of Akbar.

Sir Sayyid Ahmad Khan's life and work are dealt with elsewhere. Among his literary achievements may be mentioned the Asdrus- Sanddid (" Vestiges of Princes "), an excellent account of Delhi and its monuments, which has passed through several editions since it was first lithographed in 1847. His essays and occasional papers, published in the Attgarh Institute Gazette (started in 1864), and afterwards (from 1870 onwards) in a periodical entitled Tahzlbul- Akhlaq (or " Muhammadan Social Reformer "), handle all the pro- blems of religious, social and educational advancement among Indian Musalmans — the cause with which his life was identified. His great Commentary on the Quran, in seven volumes, the last finished only a few days before his death in 1898, is carried to the end of Surah xx., a little more than half the book. In him Urdu prose found its most powerful wielder for the diffusion of modern ideas, and the movement which he set on foot has been the spring of the best literature in the language during recent years.

Another excellent writer of Urdu is Shamsul-'Ulama Maulavi Nazir Ahmad of Delhi, who is the author of a series of novels de- scribing domestic life, of a somewhat didactic character, which have had a wide popularity, and from their admirable moral tone have been specially serviceable in the education of Indian women. These are entitled the Mir 'atul- Arils (or " Brides' Mirror ") ; Taubatun- Nasiih (" the Repentance of Nasuh "), Bandtun-Na'sh (" the Seven Stars of the Great Bear "), Ibnul-Waqt (" Son of the Age "), and Ayamd (" Widows "). But Nazir Ahmad is a man of many sides; before he took to novel-writing he was the principal translator into Urdu of the Indian Penal Code (1861), which is reckoned a masterpiece in the exact rendering of European legal ideas; and more lately he gave to the world the best Urdu version of the Quran. He has been a popular lecturer on social subjects, displaying a rich vein of humour, and in his old age even ventured upon verse. During the latter portion of his life he was most closely associated with Sir Sayyid Ahmad Khan.

The novel is one of the most noteworthy features of recent literary composition in Urdu. India has from time immemorial been rich in stories and romances of adventure; but the description of actual life and character

in action, as the modern novel is under- stood in Europe, is quite a new development. The most admired production of this kind in Urdu is a work entitled Fisdna-e Azad, by Pandit Ratan-nath Sarshar of Lucknow. The story, which is very long, is remarkable for the faithful and vivid pictures of Lucknow society which it presents, and its exact and lifelike delineation of character; it appeared originally as a feuilleton of the Awadh A khbdr, of which paper the author was at the time editor. Another good writer in the same branch of literature is Maulavl 'Abdul- Halim Sharar, also a native of the neighbourhood of Lucknow, but settled at Hyderabad. He was editor of a monthly periodical called the Dit-gudaz (" melter of hearts "), which contained essays and papers in European style, and in it his novels, which are all of an historical character, in the style of Sir Walter Scott, originally appeared. The best are 'Aziz and Virgina, a tale of the Crusades, and Mansur and Mohind, a story of which the scene is laid in India at the time of the invasions of Sultan Mahmud of Ghazni.

Although Urdu chiefly represents Musalman culture, its use is by no means confined to adherents of that faith. It has just been mentioned that the most popular Urdu novelist is a Hindu (a Brahman from Kashmir) ; and the statistics of the vernacular press show that this form of the language is widely used by Hindus as well as Musalmans. Thus, of eighty periodicals in Urdu pub- lished in the United Provinces, twenty-nine are conducted by Hindus; similarly, in the Punjab, of forty-eight Urdu journals, twenty are edited by Hindus.

" High Hindi " has scarcely adapted itself to modern requirements with the thoroughness displayed by Urdu. It is taught in the schools where the population is mainly Hindu, and books of science have been written in it with a terminology borrowed from Sanskrit, in place of the Persian terms used in the other dialect. But Sanskrit is far removed from the daily life of the people, and the majority of works in this style are read only by Pandits, the great bulk of them dealing

with religion, philosophy and the ancient literature. There are thirty-seven Hindi and four Hindi- Urdu journals in the United Provinces; but many of them are exclusively religious in their character, and several, though written in Devanagari, employ a mixed language which admits Persian words freely. The old dialects of literature, Awadhi and Braj-bhasha, are now only used for poetry; High Hindi has been a complete failure for this purpose.

The most noticeable authors in Hindi since the middle of the 19th century have been Babu Harishchandra and Raja Siva Prasad, both of Benares. The former, during his short life (1850-1885), was an enthusiastic cultivator of the old poetic art, using the dialects just mentioned. He

published in the Sundari Tilak an anthology of the best Hindi poetry, and in the Kabi-bachan-Sudhd (" ambrosia of the words of poets ") and the magazine called Harishchandrikd a quantity of old texts, with much added matter. He also wrote a volume of biographies of famous men, European and Indian, and many critical studies, historical and literary. In history especially he cleared up many problems, and traced the lines for further investigation. In his Kashmir Kusum, or history of Kashmir, a list is given of about a hundred works by him. He was also the real founder of the modern Hindi drama; he wrote plays himself, and inspired others. Raja Siva Prasad (1823-1895) served for many years in the educational department, and published a number of works intended for use in schools, which have greatly contributed to the formation of a sound vernacular form of Hindi, not excessively Sanskritized, and not rejecting current Persian forms. The society at Benares called the Nagarl prachdrini Sabhd (" Society for promoting the use of the Nagari character ") has, since the death of Harishchandra, been active in procuring the publication of works in Hindi, and has issued many useful books, besides conducting a systematic search for old MSS.

Bibliography. — The best account in English of Hindi literature is Dr G. A. Grierson's Modern Vernacular Literature of Hindosidn, issued by the Asiatic Society of Bengal in 1889; the dates in this work, which is founded on indigenous compilations, have, however, in many cases to be received with caution. Before it appeared, Garcin de Tassy's Hisloire de la litterature Hindouie et Hindoustanie, and his annual summaries of the progress made from 1850 to 1877, were our chief authority, and may still be consulted with advantage. For the religious literature of the Vaishnava sects, Professor H. H. Wilson's Essay on the Religious Sects of the Hindus (vol. i. of his collected works) has not yet been superseded.

For Urdu poets, Professor Azad's Ab-i Hayat (in Urdu) is the most trustworthy record. For the new school of Urdu literature reference may be made to a series of lectures (in English) by Shaikh 'Abdul- Qadir of Lahore, printed in 1898. The catalogues by Professor Blum- hardt of HindostanI and Hindi books in the libraries of the British Museum and the India Office will give a good idea of the volume of the recent productions of the press in those languages. (C. J. L.)

HINDU CHRONOLOGY. The subject of Hindu chronology divides naturally into three parts: the calendar, the eras, and other reckonings.

I. The Calendar

The Hindus have had from very ancient times the system of lunisolar cycles, made by the combination of solar years, regulated by the course of

the sun, and lunar years, regulated by the course of the moon, but treated in such a manner as to keep the beginning of the lunar year near the beginning of the solar year. The exact manner in which they arranged the details of their earliest calendar is still a subject of research. We deal here with their calendar as it now stands, in a form which was developed from about a.d. 400 under the influence of the Greek astronomy which had been introduced into India at no very long time previously.

The Hindu calendar, then, is determined by years of two kinds, solar and lunar. For civil purposes, solar years are used in Bengal, including Orissa, and in the Tamil and Malayalam districts of Madras, and lunar years throughout the rest of India. But the lunar year regulates everywhere the general religious rites and festivals, and the details of private and domestic life, such as the selection of auspicious occasions for marriages and for starting on journeys, the choice of lucky moments for shaving, and so on. Consequently, the details of the lunar year are shown even in the almanacs which follow the solar year. On the other hand, certain details of the solar year, such as the course of the sun through the signs and other divisions of the zodiac, are shown in the almanacs which follow the lunar year. We will treat the solar year first, because it governs the luni- solar system, and the explanation of it will greatly simplify the process of explaining, the lunar calendar.

solar year.

The civil solar year is determined by the astronomical solar year. The latter professes to begin at the vernal equinox, The astro- but the actual position is as follows. In our Western mimical astronomy the signs of the zodiac have, in consequence of the precession of the equinoxes, drawn away to a large extent from the constellations from which they derived their names; with the result that the sun now conies to the vernal equinox, at the first point of the sign Aries, not in the constellation Aries, but at a point in Pisces, about 28 degrees before the beginning of Aries. The Hindus, however, have disregarded precession in connexion with their calendar from the time (a.d. 499, 522, or 527, according to different schools) when, by their system, the signs coincided with the constella- tions; and their sign Aries, called Mesha by them, is still their constellation Aries, beginning, according to them, at or near the star f Piscium. Their astronomical solar year is, in fact, not the tropical year, in the course of which the sun really passes from one vernal equinox to the next, but a sidereal year, the period during which the earth makes one revolution in its

orbit round the sun with reference to the first point of Mesha; its beginning is the moment of the Mesha-samkranti, the entrance of the sun into the sidereal sign Mesha, instead of the tropical sign Aries; and it begins, not with the true equinox, but with an artificial or nominal equinox.

The length of this sidereal solar year was determined in the following manner. The astronomer selected what the Greeks termed an exeiigmos, the Romans an annus magnus or mundanus, a period in the course of which a given order of things is completed by the sun, moon, and planets returning to a state of conjunction from which they have started. The usual Hindu exeiigmos has been the Great Age of 4,320,000 sidereal solar years, the aggregate of the Krita or golden age, the Treta or silver age, the Dvapara cr brazen age, and the Kali or iron age, in which we now are; but it has sometimes been the Kalpa or aeon, consisting according to one view of 1000, according to another view of i9o8, Great Ages. He then laid down the number of revolutions, in the period of his exeiigmos, of the nakshatras, certain stars and groups of stars which will be noticed more definitely in our account of the lunar year; that is, the number of rotations of the earth on its axis, or, in other words, the number of sidereal days. A deduction of the number of the years from the number of the sidereal days gave, as remainder, the number of civil days in the exeiigmos. And, this remainder being divided by the number of the years, the quotient gave the length of the sidereal solar year : refinements, suggested by experience, inference, or extraneous information, were made

by increasing or decreasing the number of sidereal days assigned to the exeiigmos. The Hindus now recognize three standard sidereal solar years determined in that manner, (r) A year of 365 days 6 hrs. 12 min. 30 sec. according to the Aryabhaliya, otherwise called the First Arya-Siddhdnta, which was written by the astronomer Aryabhata (b. a.d. 476) : this year is used in the Tamil and Malayalam districts, and, we may add, in Ceylon. (2) A year of 365 days 6 hrs. 12 min. 30-915 sec. according to the Rdjamrigd ka, a treatise based on the Brdhma-Siddhdnta of Brahmagupta (b. a.d. 598) and attributed to king Bhoja, of which the epoch, the point of time used in it for calculations, falls in a.d. 1042: this year is used in parts of Gujarat (Bombay) and in Rajputana and other western parts of Northern India. (3) A year of 365 days 6 hrs. 12 min. 36-56 sec. according to the present Surya-Siddhdnta, a work of unknown authorship which dates from probably about A.D. 1000: this year is used in almost all the other parts of India. It may be remarked that, according to modern science, the true mean sidereal solar year measures 365 days 6 hrs. 9 min. 9-6 sec., and the mean tropical year measures 365 days 5 hrs. 48 min. 46-054440 sec.

The result of the use of this sidereal solar year is that the beginning of the Hindu astronomical solar year, and with it the civil solar year and the lunar year and the nominal incidence of the seasons, has always been, and still is, travelling slowly forward in our calendar year by an amount which varies accord-

ing to the particular . authority. 1 For instance, Aryabhafa's year exceeds the Julian year by 12 min. 30 sec. This amounts to exactly one day in 115ˆ years, and five days in 576 years. Thus, if we take the longer period and confine ourselves to a time when the Julian calendar (old style) was in use, according to Aryabhata the Mesha-samkranti began to occur in a.d. 603 on 20th March, and in a.d. 1179 on 25th March. The inter- mediate advances arrange themselves into four steps of one day each in 116 years, followed by one step of one day in 112 years: thus, the Mesha-sarhkranti began to occur on 21st March in a.d. 719, on 22nd March in a.d. 835, on 23rd March in a.d. 951, and on 24th March in a.d. 1067 (whence 112 years take us to 25th March in a.d. 1179). It is now occurring some- times on nth April, sometimes on the 12th; having first come to the 12th in a.d. 1871.

The civil solar year exists in more varieties than one. The principal variety, conveniently called the Meshadi year, i.e. " the year beginning at the Mesha-sarhkranti," is the only one that we need notice at this point. The … beginning of it is determined directly by the astrono- yea r. mical solar year; and for religious purposes it begins, with that year, at the moment of the Mesha-sarhkranti. Its first civil day, however, may be either the day on which the samkranti occurs, or the next day, or even the day after that: this is determined partly by the time of day or night at which the samkranti occurs, which, moreover, of course varies in accordance with the locality as well as the particular authority that is followed; partly by differing details of practice in different parts of the country. In these circumstances an exact equivalent of the Meshadi civil solar year cannot be stated; but it may be taken as now beginning on or closely about the 12th of April.

The solar year is divided into twelve months, in accordance with the successive samkrantis or entrances of the sun into the (sidereal) signs of the zodiac, which, as with us, are twelve in y lle s0 / ar number. The names of the signs in Sanskrit are as mouth. follows: Mesha, the ram (Aries); Vrishabha, the bull (Taurus) ; Mithuna, the pair, the twins (Gemini) ; Karka, Karkata, Karkataka, the crab (Cancer) ; Sirhha, the lion (Leo) ; Kanya, the maiden (Virgo) ; Tula, the scales (Libra) ; Vrischika, the scorpion (Scorpio) ; Dhanus, the bow (Sagittarius) ; Makara, the sea-monster (Capricornus) ; Kumbha, the water-pot (Aquarius); and Mina, the fishes (Pisces). The solar months are known in some parts by the names of the signs or by corrupted forms of them; and these are the best names for them for general use, because they lead to no confusion. But they have elsewhere another set of names, preserving the connexion of them with the lunar months: the Sanskrit forms of these names are Chaitra, Vaisakha, Jyaishtha, Ashadha, Sravana, Bhadrapada, Asvina or Asvayuja, Karttika, Margasira or Margasirsha (also known as Agrahayana), Pausha, Magha, and Phalguna: in some localities these names are used in corrupted forms,

and in others vernacular names are substituted for some of them; and, while in some parts the name Chaitra is attached to the month Mesha, in other parts it is attached to the month Mina, and so on throughout the series in each case. The astronomical solar month runs from the moment of one samkranti of the sun to the moment of the next samkranti; and, as the signs of the Hindu zodiac are all of equal length, 30 degrees, as with us, while the speed of the sun (the motion of the earth in its orbit round the sun) varies according to the time of the year, the length of the month is variable: the shortest month is Dhanus; the

1 The disregard of precession, and the consequent travelling forward of the year through the natural seasons, is, of course, a serious defect in the Hindu calendar, the principles of which are otherwise good. Accordingly, an attempt was made by a small band of reformers to rectify this state of things by introducing _a precessional calendar, taking as the first lunar month the synodic lunation in which the sun enters the tropical Aries, instead of the sidereal Mesha; and the publication was started, in or about 1886, of the Sayana-Panchang or " Precessional Almanac."

Further, the Hindu sidereal solar year is in excess of the true mean sidereal year by (if we use Aryabhata's value) 3 min. 20-4 sec. If we take this, for convenience, at 3 min. 20 sec, the excess amounts to exactly one day in 432 years. And so even the sidereal Mesha-sarhkranti is now found to occur three or four days later than the day on which it should occur. Accordingly, another re- former had begun, in or about 1865, to publish the Navin athava Patwardhani Panchang, the " New or Patwardham Almanac," in which he determined the details of the year according to the proper Mesha-samkranti.

The seasons,

longest is Mithuna. The civil solar month begins with its first civil day, which is determined, in different localities, in the same manner with the first civil day of the Meshadi year, as indicated above. The civil month is of variable length ; partly for that reason, partly because of the variation in the length of the astronomi- cal month. No exact equivalents of the civil months, therefore, can be stated ; but, speaking approximately, we may say that, while the month Mesha now begins on or closely about I2th April, the beginning of a subsequent month may come as late as the 16th day of the English month in which it falls.

The solar year is also divided into six seasons, the Sanskrit names of which are Vasanta, spring ;,Grishma, the hot weather; Varsha, the rainy season; Sarad, autumn; Hemanta, the cold weather; and Sisira, the dewy season. Vasanta begins at the Mina-samkranti ; the other seasons begin at each successive second samkrdnti from that. Originally, this scheme was laid out with reference to the true course of the sun, and the starting- point of it was the real winter solstice, with Sisira, as the first season, beginning then: now, owing partly to the disregard of precession, partly to our introduction of New Style, each season comes about three weeks too late; Vasanta begins on or about I2th March, instead of 19th or 20th February, and so on with the rest. It may be added that in early times the year was also divided into three or four, and even into five or seven, seasons; and there appears to have been also a practice of reckoning the seasons ac- cording to the lunar months, which, however, would only give a very varying arrangement, in addition to neglecting the point that the seasons are naturally determined by the course of the sun, not of the moon. But there is now recognized only the division into six seasons, determined as stated above.

The solar year is also divided into two parts called Uttarayana, the period during which the sun is moving to the north, and Dak- shinayana, the period during which it is moving to the south. The Uttarayana begins at the nominal winter solstice, titii' as mar ' ce d by the Makara-samkranti ; and the day on a" isi n w 'hich this solstice occurs, usually 12th January at Jf t h? S present, is still a special occasion of festivity and re- year joicing; the Dakshinayana begins at the nominal summer solstice, as marked by the Karka-samkranti. It may be added here that, while the Hindus disregard precession in the actual computation of their years and the regulation of their calendar, they pay attention to it in certain other respects, and notably as regards the solstices: the precessional solstices are looked upon as auspicious occasions, as well as the non-precessional solstices, and are customarily shown in the almanacs; and some of the almanacs show also the other precessional samkrantis of the sun.

The civil days of the solar month begin at sunrise. They are

numbered 1, 2, 3, &c, in unbroken succession to the end of the

Th 1 •> nionth. And, the length of the month being variable

eevi j or t j ie reasons stated above, the number of the civil

y ' days may range from twenty-nine to thirty-two.

The civil days are named after the weekdays, of which the usual

appellations (there are various synonyms in each case, and some

of the names are used in corrupted forms) are in Sanskrit

The week- Adityavara or Ravivara, the day of the sun, sometimes

y ‘ called Adivara, the beginning-day (Sunday) ; Somavara,

the- day of the moon (Monday); Mangalavara, the day of Mars

(Tuesday) ; Budhavara, the day of Mercury (Wednesday) ; Brihas-

pativara or Guruvara, the day of Jupiter (Thursday) ; Sukravara,

the day of Venus (Friday); and Sanivara, the day of Saturn

(Saturday). It may be mentioned, as a matter of archaeological

interest, that, while some of the astronomical books perhaps postulate

an earlier knowledge of the ” lords of the days,” and other writings

indicate a still earlier use of the period of seven days, the first

proved instance of the use of the name of a weekday is of the year

a.d. 484, and is furnished by an inscription in the Saugor district,

Central India.

The divisions of the civil day, as far as we need note them, are 60 vipalas = i pala — 21ˆ seconds; 60 palas = lgha(ika = 24 minutes; nl ■ 1 6o ghatikas = 2\ hours = 1 day. There is also the muhiirta

Divisions _ 2 ghatikas = 48 minutes: this is the nearest approach of the tQ (.j, e ” hour.” The comparative value of these measures

day ‘ of time may perhaps be best illustrated thus: 25 muhurtas

— 2 hours; 2\ gha(ikas = i hour; 2j palas = l minute; 2§ vipalas = 1 second.

As their civil day begins at sunrise, the Hindus naturally count all their times, in ghatikas and palas, from that moment. But the moment is a varying one, though not in India to anything like the extent to which it is so in European latitudes; and under the British Government the Hindus have recognized the advantage, and in fact the necessity, especially in connexion with their lunar calendar, of having a convenient means of referring their own times to the time which prevails offici- ally. Consequently, some of the

almanacs have adopted the European practice of showing the time of sunrise, in hours and minutes, from midnight; and some of them add the time of sunset from noon.

The lunar year consists primarily of twelve lunations or lunar months, of which the present Sanskrit names, generally

Civil time.

used in more or less corrupted forms, are Chaitra, VaisSkha, &c, to Phalguna, as given above in connexion with the solar months. It is of two principal varieties, according as it begins with a certain day in the month Chaitra, or

The luaar year.

with the corresponding day in Karttika: the former variety is conveniently known as the Chaitradi year; the latter as the Karttikadi year. For religious purposes the lunar year begins with its first lunar day: for civil purposes it begins with its first civil day, the relation of which to the lunar day will be explained below. Owing to the manner in which, as we shall explain, the beginning of the lunar year is always shifting backwards and forwards, it is not practicable to lay down any close equivalents for comparison: but an indication may be given as follows. The first civil day of the Chaitradi year is the day after the new-moon conjunction which occurs next after the entrance of the sun into Mlna, and it now falls from about 13th March to about nth April: the first civil day of the Karttikadi year is the first day after the new-moon conjunction which occurs next after the entrance of the sun into Tula, and it now falls from about 17th October to about 15th November.

*The present names of the lunar months, indicated above, were derived from the nakshatras, which are certain conspicuous stars and groups of stars lying more or less along the neigh- bourhood of the ecliptic. The nakshatras are regarded th***

sometimes as twenty-seven in number, sometimes as moata – twenty-eight, and are grouped in twelve sets of two or three each, beginning, according to the earlier arrangement of the list, with the pair Krittika and R5hini, and including in the sixth place Chitra and Svati, and ending with the triplet Revati, Asvini and Bharani. They are sometimes styled lunar mansions, and are sometimes spoken of as the signs of the lunar zodiac; and it is, no doubt, chiefly in connexion with the moon that they are now taken into consideration. But they mark divisions of the ecliptic: according to one system, twenty-seven divisions, each of 13 degrees 20 minutes; according to

two other systems, twenty-seven or twenty-eight unequal divisions, which we need not explain here. The almanacs show the course of the sun through them, as well as the course of the moon; and the course of the sun was marked by them only, before the time when the Hindus began to use the twelve signs of the solar zodiac. So there is nothing exclusively lunar about them. The present names of the lunar months were derived from the nakshatras in the following manner: the full-moon which occurred when the moon was in conjunction with Chitra (the star a Virginis) was named Chaitri, and the lunar month, which contained the Chaitri full-moon, was named Chaitra; and so on with the others. The present names have superseded another set of names which were at one time in use concurrently with them ; these other names are Madhu (= Chaitra), Madhava, Sukra, Suchi, Nabhas, Nabhasya, Isha, Urja (= Karttika), Sahas, Sahasya, Tapas, and Tapasya (= Phalguna) : they seem to have marked originally solar season- months of the solar year, rather than lunar months of the lunar year.

A lunar month may be regarded as ending either with the new- moon, which is called amavasya, or with the full-moon, which is called purnamasl, purnima: a month of the former kind is termed amanta, " ending with the new-moon," or sukladi, " beginning with the bright fortnight;" a month of the latter kind is termed purni- manta, " ending with the full-moon," or krishnddi, " beginning with the dark fortnight." For all purposes of the calendar, the amanta month is used in Southern India, and the purnimanta month in Northern India. But only the amanta month, the period of the synodic revolution of the moon, is recognized in Hindu astronomy, and for the purpose of naming the lunations and adjusting the lunar to the solar year by the intercalation and suppression of lunar months; and the rule is that the lunar Chaitra is the amanta or synodic month at the first moment of which the sun is in the sign Mina, and in the course of which the sun enters Mesha: the other months follow in the same way; and the lunar Karttika is the amanta month at the first moment of which the sun is in Tula, and in the course of which the sun enters Vrischika. The connexion" between the lunar and the solar months is maintained by the point that the name Chaitra is applied according to one practice to the solar Mfna, in which the lunar Chaitra begins, and according to another practice to the solar Mesha, in which the lunar Chaitra ends. Like the lunar year, th'e lunar month begins for religious purposes with its first lunar day, and for civil purposes with its first civil day.

One mean lunar year of twelve lunations measures very nearly 354 days 8 hrs. 48 min. 34 sec. ; and one Hindu solar year measures 365 days 6 hrs. 12 min. 30 sec. according to Aryabhata, or slightly more according to the other two authorities. Consequently, the beginning of a lunar year pure and

simple would be always travel- ling backwards through the solar year, by about e'even days on

intercala- tion and suppres- sion of i j oar months.

each occasion, and would in course of time recede entirely through the solar year, as it does in the Mahommedan calendar. The Hindus prevent that in the following manner. The length of the Hindu astronomical solar month, measured by the samkrdntis of the sun, its successive entrances into the signs of the zodiac, ranges, in accordance with periodical variations in the speed of the sun, from about 29 days 7 hrs. 38 min. up to about 31 days 15 hrs. 28- min. The length of the amanta or synodic lunar month ranges, in accordance with periodical variations in the speed of the moon and the sun, from about 29 days 19 hrs. 30 min. down to about 29 days 7 hrs. 20 min. Consequently, it happens from time to time that there are two new-moon conjunctions, so that two luna- tions begin, in one astronomical solar month, between two sam- krdntis of the sun, while the sun is in one and the same sign of the zodiac, and there is no samkrdnti in the lunation ending with the second new-moon : when this is the case, there are two lunations to which the same name is applicable, and so there is an additional or intercalated month, in the sense that a name is repeated: thus, when two new-moons occur while the sun is in Mesha, the lunation ending with the first of them, during which 'the sun has entered Mesha, is Chaitra; the next lunation, in which there is no samkrdnti, is Vaisakha, because it begins when the sun is in Mesha; and the next lunation after that is again Vaisakha, for the same reason, and also because the sun enters Vfishabha in the course of it: in these circumstances, the first of the two Vaisakhasis called Adhika- Vaisakha, " the additional or intercalated Vaisakha," and the second is called simply Vaisakha, or sometimes Nij a- Vaisakha, " the natural Vaisakha." On the other hand, it occasionally happens, in an autumn or winter month, that there are two sam- krdntis of the sun in one and the same amanta or synodic lunar month, between two new-moon conjunctions, so that no lunation begins between the two samkrdntis: when this is the case, there is one lunation to which two names are applicable, and there is a suppressed month, in the sense that a name is omitted : thus, if the sun enters both Dhanus and Makara during one synodic lunation, that lunation is Margasira, because the sun was in Vripchikaat the first moment of it and enters Dhanus in the course of it; 1 the next lunation is Magna, because the sun is in Makara by the time when it begins and will enter Kumbha in the course of it; and the name Pausha, between Margasira and Magha, is omitted. When a month is thus

suppressed, there is always one intercalated month, and sometimes two, in the same Chaitradi lunar year, so that the lunar year never contains less than twelve months, and from time to time consists of thirteen months. There are normally seven inter- calated months, rising to eight when a month is suppressed, in 19 solar years, which equal very nearly 235 lunations; 2 and there is never less than one year without an intercalated month between two years with intercalated months, except when there is only one such month in a year in which a month is suppressed; then there is always an intercalated month in the next year also. The suppression of a month takes place at intervals of 19 years and upwards, regarding which no definite statement can conveniently be made here. It may be added that an intercalated Chaitra or Karttika takes the place of the ordinary month as the first month of the year ; an intercalated month is not rejected for that purpose, though it is tabooed from the religious and auspicious points of view.

The manner in which this arrangement of intercalated and sup- pressed months works out, so as to prevent the beginning of the Chaitradi lunar year departing far from the beginning of the Meshadi

1 It might also be called Pausha, because the sun enters Makara in the course of it; and it may be observed that, in accordance with a second rule which formerly existed, it would have been named Pausha because it ends while the sun is in Makara, and the omitted name would have been Margasira. But the more important condition of the present rule, that Pausha begins while the sun is in Dhanus, is not satisfied.

*2 The well-known Metonic cycle, whence we have by rearrange- ment our system of Golden Numbers, naturally suggests itself; and we have been told sometimes that that cycle was adopted by the Hindus, and elsewhere that the intercalation of a month by them generally takes place in the years 3, 5, 8, 11, 14, 16, and 19 of each cycle, differing only in respect of the 14th year, instead of the 13th, from the arrangement which is said to have been fixed by Meton. As regards the first point, however, there is no evidence that a special period of 19 years was ever actually used by the Hindus during the period with which we are dealing, beyond the extent to which it figures as a component of the number of years, 19 X 150 *= 2850, forming the lunisolar cycle of.an early work entitled Rdmaka- Siddhdnta; and, as was recognized by Kalippos not long after the time of Meton himself, the Metonic cycle has not, for any length of time, the closeness of results which has been sometimes supposed to attach to it; it requires to be readjusted periodically. As regards the second point, the precise years of the intercalated months depend upon, and vary with; the year that we may select as the apparent first year of a set of 19 years, and it is not easy to arrange the Hindu years in sets answering to a direct continuation of the*

Metonic cycle.

solar year, may be illustrated as follows. In a.d. 1815 the Mesha-samkranti occurred on I Ith April ; and the first civil day of the Chaitradi year was 10th April. In a.d. 1816 and 1817 the first civil day of the Chaitradi year fell back to 29th March and 1 8th March. In A.D. 1817, however, there was an intercalated month, Sravana; with the result that in a.d. 1818 the first civil day of the Chaitradi year advanced to 6th April. And, after various shiftings of the same kind — including in a.d. 1822 an intercalation of Asvina and a suppression of Pausha, followed in a.d. 1823, when the first civil day of the Chaitradi year had fallen back to 13th March, by an intercalation of Chaitra itself — in a.d. 1834, when the Mesha- sarhkranti occurred again on nth April, the first civil day of the Chaitradi year was again 10th April.

The lunar month is divided into two fortnights (paksha), called bright and dark, or, in Indian terms, sukla or suddha, sudi, sudi, and krishna or bahula, badi, vadi: the bright fortnight, ~. . sukla-paksha, is the period of the waxing moon, ending fyZ.”””” at the full-moon; the dark fortnight, krishna- paksha, n j„ht is the period of the waning moon, ending at the new- moon. In the amanta or suklddi month, the bright fortnight pre- cedes the dark; in the purnimdnta or krishnadi month, the dark fortnight comes first; and the result is that, whereas, for instance, the bright fortnight of Chaitra is the same period of time throughout India, the preceding dark fortnight is known in Northern India as the dark fortnight of Chaitra, but in Southern India as the dark fortnight of Phalguna. This, however, does not affect the period covered by the lunar year; the Chaitradi and Karttikadi years begin everywhere with the bright fortnight of Chaitra and Karttika respectively; simply, by the amanta system the dark fortnights of Chaitra and Karttika are the second fortnights, and by the purnimdnta system they are the last fortnights, of the years. Like the month, the fortnight begins for religious purposes with its first lunar day, and for civil purposes with its first civil day.

The lunar fortnights are divided each into fifteen tithis or lunar days. 3 The tithi is the time in which the moon increases her distance from the sun round the circle by twelve degrees; and the _. almanacs show each tithi by its ending-time; that is, “, lanat by the moment, expressed in ghafihds and palas, after y ” sunrise, at which the moon completes that distance. In accordance With that, the tithi is usually used and cited with the weekday on which it ends; but there are special rules regarding certain rites, festivals, &c, which sometimes require the tithi to be used and cited with the weekday on which it begins or is current at a particular time. The first tithi of each fortnight begins immediately after the moment of new-moon and full- moon respectively; the last tithi ends at the moment of full-moon

and new-moon. The tithis are primarily denoted by the numbers 1, 2, 3, &c, for each fortnight; but, while the full- moon tithi is always numbered 15, the new-moon tithi is generally numbered 30, even where the purnimdnta month is used. The tithis may be cited either by their figures or by the Sanskrit ordinal words prathamd, " first," dvitiya, " second," &c, or corruptions of them. But usually the first tithi of either fortnight is cited by the term pratipad, pratipadd, and the new-moon and full- moon tithis are cited by the terms amdvdsyd and purnimd ; or here, again, corruptions of the Sanskrit terms are used. And special names are sometimes prefixed to the numbers of the tithis, according to the rites, festivals, &c, prescribed for them, or events or merits assigned to them: for instance, Vaisakha sukla 3 is Akshaya or Akshayya-tritfya, the third tithi which ensures permanence to acts performed on it; Bhadrapada sukla 4 is Ganesa-chaturthI, the fourth tithi dedicated to the worship of the god Ganesa, Ganapati, and the amdnta Bhadrapada or purnimdnta Asvina krishna 13 is Kaliyugadi-trayodasI, as being regarded (for some reason which is not apparent) as the anniversary of the beginning of the Kaliyuga, the present Age. The first tithi of the year is styled Samvatsara-pratipada, which term answers closely to our " New Year's Day."

*The civil days of the lunar month begin, like those of the solar month, at sunrise, and bear in the same way the names of the weekdays. But they are numbered in a different manner; _,. . ., fortnight by fortnight and according to the tithis. The . * c v general rule is that the civil day takes the number of the tithi which is current at its sunrise. And the results are as follows. As the motions of the sun and the moon vary periodically, a tithi is of variable length, ranging, according to the Hindu calculations, from 21 hrs. 34 min. 24 sec. to 26 hrs. 6 min. 24 sec. : it may, there- fore, be either shorter or longer than a civil day, the duration of which is practically 24 hours (one minute, roughly, more or less, according to the time of the year). A tithi may end at any moment during the civil day; and ordinarily it ends on the civil day after that on which it begins, and covers only one sunrise and gives its number to the day on which it ends. It may, however, begin on*

3 It is customary to render the term tithi by "lunar day:" it is, in fact, explained as such in Sanskrit works; and, as the tithis do mark the age of the moon by periods approximating to 24 hours, they are, in a sense, lunar days. But the tithi must not be confused with the lunar day of western astronomy, which is the interval, with a mean duration of about 24 hrs. 54 min., between two suc- cessive meridian passages of the moon.

The Karana.

*one civil day and end on the next but one, and so cover two sun- rises; and it is then treated as a repeated tithi, in the sense that its number is repeated : for instance, if the seventh tithi so begins and ends, the civil day on which it begins is numbered 6, from the tithi which is current at the sunrise of that day and ends on it ; the day covered entirely by the seventh tithi is numbered 7, because that tithi is current at its sunrise; the next day, at the sunrise of which the seventh tithi is still current and during which it ends, is again numbered 7; and the number 8 falls to the next day after that, when the eighth tithi is current at sunrise. 1 On the other hand, a tithi may begin and end during one and the same civil day, so as not to touch a sunrise at all: in this case, it exists for any practical purposes for which it may be wanted (it is, however, to be avoided if possible, as being an unlucky occasion), but it is sup- pressed or expunged for the numbering of the civil day, in the sense that its number is omitted; for instance, if the seventh tithi begins and ends during one civil day, that day is numbered 6 from,. as before, the tithi which is current at its sunrise and ends when the seventh tithi begins; the next day is numbered 8, because the eighth tithi is current at its sunrise; and there is, in this case, no: civil day bearing the number seven. In consequence of this method of numbering, it sometimes happens, as the result of the suppression of a tithi, that the day of a full-moon is numbered 14 instead of 15; that the day of a new-moon is numbered 14 instead of 30; and that the first day of a fortnight, and even the first day of a lunar year, is numbered 2 instead of 1. *

There are, on an average, thirteen suppressed tithis and seven repeated tithis in twelve lunar months; and so the lunar year averages 354 days, rising to about 384 when a month is intercalated.; It occasionally happens that there are two suppressions of tithis in one and the same fortnight; and the almanacs show such a case in the bright fortnight of Jyaish(;ha, A.D. 1878: but this occurs only after very long intervals.

The tithi is divided into two karanas; each karana being the time in which the moon increases her distance from the sun by six degrees. But this is a detail of astrological rather than chronological interest. So, also, are two other details to which a prominent place is given in the lunar calendars ; to yoga, or time in which the joint motion in longitude, the sum of the motions of the sun and the moon, is increased by 13 degrees 20 minutes ; and the nakshatra, the position of the moon as referred to the ecliptic by means of the stars and groups of stars which have been mentioned above under the lunar month.

In the Indian calendar everything depends upon exact times, which differ, of course, on every different meridian; and (to cite what is perhaps the

most frequent and generally important occur- rence) suppression and repetition may affect one tithi and civil day in one locality, and another tithi and civil day in another locality not very far distant. Consequently, neither for the lunar nor for the solar calendar is there any almanac which is applicable to even the whole area in which any particular length of the astronomical solar year prevails; much less, for the whole of India. Different almanacs are prepared and published for places of leading im- portance; details for minor places, when wanted, have to be worked out by the local astrologer, the modern representative of an ancient official known as Samvatsara, the " clerk of the year."

II. Eras

As far as the available evidence goes (and we have no reason to expect to discover anything opposed to it), any use of eras, in the sense of continuous reckonings which originated in historical occurrences or astronomical epochs and were employed for official and other public chronological purposes, Bid not prevail in India before the 1st century B.C. Prior to that time, there existed, indeed, in connexion with the sacrificial calendarˆ a five-years lunisolar cycle, and possibly some extended cycles of the same nature; and there was in Buddhist circles a record of the years elapsed since the death of Buddha, which we shall mention again further on. But, as is gathered from books and is well illustrated by the edicts of Asoka (reigned 264-227 B.C.) and the inscriptions of other rulers, the years of the reign of each successive king were found sufficient for the public dating of pro- clamations and the record of events. There is no known case in which any Indian king, of really ancient times, deliberately applied himself to the foundation of an era: and we have no reason for thinking that such a thing was ever done, or that any Hindu reckoning at all owes its existence to a recognition of historical requirements. The eras which came into existence

1 We illustrate the ordinary occurrences. But there are others. Thus, a repeated tithi may occasionally be followed by a suppressed one: in this case the numbering of the civil days would be 6, 7, 7, 9, &c, instead of 6, 7, 7, 8, 9, &c. Or it may occasionally be preceded by a suppressed one: in this case the numbering would be 5, 7, 7, 8, &c., instead of 5, 6, 7, 7,8, &c.

from the 1st century B.C. onwards mostly had their origin in the fortuitous extension of regnal reckonings. The usual course has been that, under the influence of filial piety, pride in ancestry, loyalty to a paramount sovereign, or some other such motive, the successor of some king continued the regnal reckoning of hir predecessor, who was not necessarily the first king in the dynasty, and perhaps did not even reign for any long time, instead of

starting a new reckoning, beginning again with the year 1, according to the years of his own reign. Having thus run for two reigns, the reckoning was sufficiently well established to con- tinue in the same form, and to eventually develop into a generally accepted local era, which might or might not be taken over by subsequent dynasties ruling afterwards over the same territory. In these circumstances, we find the establisher of any particular era in that king who first continued his predecessor's regnal reckoning, instead of replacing it by his own; but we regard as the founder of the era that king whose regnal reckoning was so continued. We may add here that it was only in advanced stages that any of the Hindu eras assumed specific names: during the earlier period of each of them, the years were simply cited by the term samvatsara or varsha, " the year (bearing such and-such a number)," or by the abbreviations samvat and sam, without any appellative designation.

The Hindus have had two religious reckonings, which it will be convenient to notice first. Certain, statements in the Ceylonese chronicles, the Dipavamsa and Mahdvamsa, endorsed by an entry in a record of Asoka, show that in dhist aa ' d the 3rd century B.C. there existed among the Buddhists Jala re- a record of the time elapsed since the death of Buddha ".?' ous in 4% B.C., from which it was known that Asoka was ™g°"' anointed to the sovereignty 218 years after the death. The reckoning, however, was confined to esoteric Buddhist circles, and did not commend itself for any public use; and the only known inscriptional use of it, which also furnishes the latest known date recorded in it, is found in the Last Edict of Asoka, which presents his dying speech delivered in 226 B.C., 256 years after the death of Buddha. In Ceylon, where, also the original reckoning was not maintained, there was devised in the 1 2th century a.d. a reckoning styled Buddhavarsha, " the years of Buddha," which still exists, and which purports to run from the death of Buddha, but has set up an erroneous date for that event in 544 B.C. This later reckoning spread from Ceylon to Burma and Siam, where, also, it is still used. It did not obtain any general recognition in India, because, when it was devised, Buddhism had practically died out there, except at Bodh-Gaya. But, as there seems to have been constant intercourse between B5dh-Gaya and Ceylon as well as other foreign Buddhist countries, we should not be surprised to find an occasional instance of its use at Bodh-Gaya: and it is believed that one such instance, belonging to a.d. 1270, has been obtained.

The Jains have had, and still maintain, a reckoning from the death of the founder of their faith, Vira, Mahavira, Vardha- mana, which event is placed by them in 528 B.C. This reckon- ing figures largely in the Jain books, which put forward dates in it for very early times. But the earliest known synchronous date in it — by which we mean a date given by a writer who recorded the year in which he himself was writing — is one of

the year 980, or, according to a different view mentioned in the passage itself, of the year 993. This reckoning, again, did not commend itself for any official or other public use. And the only known inscrip- tional instances of the use of it are modern ones, of the 19th century. While it is certain that the Jain reckoning, as it exists, has its initial point in 528 B.C. it has not yet been determined whether that is actually the year in which Vira died. All that can be said on this point is that the date is not inconsistent with certain statements in Buddhist books, which mention, by a Prakrit name of which the Sanskrit form is Nirgrantha-Jnata- putra, a contemporary of Buddha, in whom there is recognized the original of the Jain Vira, Mahavira, or Vardhamana, and who, the same books say, died while Buddha was still alive. But there are some indications that Nirgrantha-Jnataputra may have died only a short time before Buddha himself; and the ever-t may

Bygone Bras of royal origin.

easily have been set back to 528 B.C. in circumstances, attending a determination of the reckoning long after the occurrence, analogous to those in which the Ceylonese Buddhavarsha set up the erroneous date of 544 B.C. for the death of Buddha.

In the class of eras of royal origin, brought into existence in the manner indicated above, the Hindus have had various reckonings which have now mostly fallen into disuse. We may mention them, without giving them the detailed treat- ment which the more important of the still existing reckonings demand.

The Kalachuri or Chedi era, commencing in a.d. 248 or 249, is known best from inscriptional records, bearing dates which range from the 10th to the 13th century a.d., of the Kalachuri kings of the Chedi country in Central India; and it is from them that it derived the name under which it passes. In earlier times, however, we find this era well established, without any appellation, in Western India, in Gujarat and the Thana district of Bombay, where it was used by kings and princes of the Chalukya, Gurjara, Sendraka, Katachchuri and Traikutaka families. It is traced back there to a.d. 457, at which time there was reigning a Traikutaka king named Dahrasena. Beyond that point, we have at present no certain knowledge about it. But it seems probable that the founder of it may be recognized in an Abhira king Isvarasena, or else in his father Sivadatta, who was reigning at Nasik in or closely about

A.D. 248-49.

The Gupta era, commencing in A.D. 320, was founded by Chandra- gupta I., the first paramount king in the great Gupta dynasty of Northern India. When the Guptas passed away, their reckoning was taken over by the Maitraka kings of Valabhi, who succeeded them in Kathiawar and some of the neighbouring territories; and so it became also known as the Valabhi era.

From Halsi in the Belgaum district, Bombay, we have a record of the Kadamba king Kakusthavarman, which was framed during the time when he was the Yuvaraja or anointed successor to the sovereignty, and may be referred to about A.D. 500. It is dated in " the eightieth victorious year," and thus indicates the preserva- tion of a reckoning running from the foundation of the Kadamba dynasty by Mayuravarman, the great-grandfather of Kakusthavar- man. But no other evidence of the existence of this era has been obtained.

The records of the Ganga kings of Kalinganagara, which is the modern Mukhalingam-Nagarikatakam in the GanjSm district, Madras, show the existence of a Ganga era which ran for at any rate 254 years. And various details in the inscriptions enable us to trace the origin of the Gahga kings to Western India, and to place the initial point of their reckoning in A.D. 590, when a certain Satyasraya-Dhruvaraja-Indravarman, an ancestor and probably the grandfather of the first Ganga king Rajasimha-Indravarman I., commenced to govern a large province in the Konkan under the Chalukya king Kirtivarman I.

An era commencing in a.d. 605 or 606 was founded in Northern India by the great king Harshavardhana, who reigned first at Thanesar and then at Kanauj, and who was the third sovereign in a dynasty which traced its origin to a prince named Naravardhana. A peculiarity about this era is that it continued in use for apparently four centuries after Harshavardhana, in spite of the fact that his line ended with him.

The inscriptions assert that the Western Chalukya king Vikrama or Vikramaditya VI. of Kalyani in the Nizam's dominions, who reigned from a.d. 1076 to 1 126, abolished the use of the Saka era in his dominions in favour of an era named after himself. What he or his ministers did was to adopt, for the first time in that dynasty, the system of regnal years, according to which, while the Saka era also remained in use, most of the records of his time are dated, not in that era, but in the year so-and-so of the Chalukya-Vikrama-ka!a or Chalukya- Vikrama-varsha, " the time or years of the Chalukya Vikrama." There is some evidence that this reckoning survived Vikramaditya VI. for a short time. But his successors

introduced their own regnal reckonings; and that prevented it from acquiring permanence.

In Tirhut, there is still used a reckoning which is known as the Lakshmanasena era from the name of the king of Bengal by whom it was founded. There is a difference of opinion as to the exact initial point of this reckoning; but the best conclusion appears to be that which places it in A.D. 11 19. This era prevailed at one time throughout Bengal: we know this from a passage in the Akbarnama, written in a.d. 1584, which specifies the Saka era as the reckoning of Gujarat and the Dekkan, the Vikrama era as the reckoning of Malwa, Delhi, and those parts, and the Lakshmanasena era as the reckoning of Bengal.

The last reckoning that we have to mention here is one known as the Rajyabhisheka-Saka, " the era of the anointment to the sovereignty," which was in use for a time in Western India. It dated from the day Jyaishtha sukla 13 of the Saka year 1597 current, = 6 June, a.d. 1674, when Sivaji, the founder of the Maratha kingdom, had himself enthroned.

There are four reckonings which it is difficult at present to class exactly. Two inscriptions of the 15th and 17th centuries, recently

brought to notice from Jesalmer in Rajputana, present a reckoning which postulates an initial point in a.d. 624 or in the preceding or the following year, and bears an appellation, Bhatika, which seems to be based on the name of the Bhatti mlscel- tribe, to which the rulers of Jesalmer belong. No histori- laneoui cal event is known, referable to that time, which can bras. have given rise to an era. It is possible that the apparent initial date represents an epoch, at the end of the Saka year 546 or there- abouts, laid down in some astronomical work composed then or soon afterwards and used in the Jesalmer territory. But it seems more probable that it is a purely fictitious date, set up by an attempt to evolve an early history of the ruling family.

In the Tinnevelly district of Madras, and in the territories of the same presidency in which the Malayajam language prevails, namely, South Kanara below Mangalore, the Malabar district, and the Cochin and Travancore states, there is used a reckoning which is known sometimes as the Kollam or Kolamba reckoning, sometimes as the era of Parasurama. The years of it are solar: in the southern parts of the territory in which it is current, they begin with the month Sirhha; in the northern parts, they begin with the next month, Kanya. The initial point of the reckoning is in a.d. 825; and the year 1076 commenced in a.d. 1900. The popular view about this reckoning is that it consists of cycles of 1000 years; that we are now in the fourth cycle; and that the reckoning originated in 1 1 76 B.C. with the

mythical Parasurama, who exterminated the Kshatriya or warrior caste, and reclaimed the Konkan countries, Western India below the Ghauts, from the ocean. But the earliest known date in it, of the year 149, falls in A.D. 973; and the reckon- ing has run on in continuation of the thousand, instead of beginning afresh in a.d. 1825. It seems probable, therefore, that the reckoning had no existence before A.D. 825. The years are cited sometimes as "the Kollam year (of such-and-such a number)," sometimes as "the year (so-and-so) after Kollam appeared;" and this suggests that the reckoning may possibly owe its origin to some event, occurring in a.d. 825, connected with one or other of the towns and ports named Kollam, on the Malabar coast; perhaps Northern Kollam in the Malabar district, perhaps Southern Kollam, better known as Quilon, in Travancore. But the introduction of Para- surama into the matter, which would carry back (let us say) the foundation of Kollam to legendary times, may indicate, rather, a purely imaginative origin. Or, again, since each century of the Kollam reckoning begins in the same year a.d. with a century of the Saptarshi reckoning (see below under III. Other Reckonings), it is not impossible that this reckoning may be a southern offshoot of the Saptarshi reckoning, or at least may have had the same astrological origin.

In Nepal there is a reckoning, known as the Newar era and com- mencing in A.D. 879, which superseded the Gupta and Harsha eras there. One tradition attributes the foundation of it to a king Raghavadeva ; another says that, in the time and with the per- mission of a king Jayadevamalla, a merchant named Sakhwal paid off, by means of wealth acquired from sand which turned into gold, all the debts then existing in the country, and introduced the new era in commemoration of the occurrence. It is possible that the era may have been founded by some ruler of Nepal : but nothing authentic is known about the particular names mentioned in con- nexion with it. This era appears to have been discarded for state and official purposes, in favour of the Saka era, in A.D. 1768, when the Gurkhas became masters of Nepal ; but manuscripts show that in literary circles it has remained in use up to at any rate A.D. 1 875. Inscriptions disclose the use in Kathiawar and Gujarat, in the 12th and 13th centuries, of a reckoning, commencing in a.d. 1114, which is known as the Simha- sarhvat. No historical occurrence is known, on which it can have been based ; and the origin of it is obscure.

Three great Bras In general use.

The eras mentioned above have for the most part served their purposes and died out. But there are three great reckonings, dating from a very respectable antiquity, which have held their own and survived to the present day. These are the Kaliyuga, Vikrama, and Saka eras. It will be convenient to treat the Kaliyuga first, though, in spite of having the greatest

apparent antiquity, it is the latest of the three in respect of actual date of origin.

The Kaliyuga eta is the principal astronomical reckoning of the Hindus. It is frequently, if not generally, shown in the almanacs: but it can hardly be looked upon as being fheKali- now in practical use for civil purposes; and, as regards yu ga Era the custom of previous times as far as we can judge it of 3102 from the inscriptional use, which furnishes a good B,c ‘ guide, the position is as follows: from Southern India we have one such instance of A.r>. 634, one of a.d. 770, three of the 10th century, and then, from the 12th century onwards, but more particularly from the 14th, a certain number of instances, not exactly very small in itself, but extremely so in comparison

with the number of cases of the use of the Vikrama and Saka eras and other reckonings: from Northern India the earliest known instance of is a.d. i 169 or n 70, and the later ones number only four. Its years are by nature sidereal solar years, com- mencing with the Mesha-samkranti, the entrance of the sun into the Hindu constellation and sign Mesha, i.e. Aries (for this and other technical details, see above, under the Calendar) ; x but they were probably cited as lunar years in the inscriptional records which present the reckoning; and the almanacs appear to treat them either as Meshadi civil solar years with solar months, or as Chaitradi lunar years with lunar months amanta (ending with the new-moon) or purnimdnta (ending with the full-moon) as the case may be, according to the locality. Its initial point lies in 3102 B.C.; and the year 5002 began in a.d. 1900. 2

This reckoning is not an historical era, actually running from 3102 B.C. It was devised for astronomical purposes at some time about a.d. 400, when the Hindu astronomers, having taken over the principles of the Greek astronomy, recognized that they required for purposes of computation a specific reckoning with a definite initial occasion. They found that occasion in a conjunction of the sun, the moon, and the five planets which were then known, at the first point of their sign Mesha. There was not really such a con- junction; nor, apparently, is it even the case that the sun “was actually at the first point of Mesha at the moment arrived at. But there was an approach to such a conjunction, which was turned into an actual conjunction by taking the mean instead of the true positions of the sun, the moon, and the planets. And, partly from the reckoning which has come down to us, partly from the astro- nomical books, we know that the moment assigned to the assumed conjunction was according to one school

the midnight between Thursday the 17th, and Friday the 18th, February, 3102 B.C., and according tc another school the sunrise on the Friday.

The reckoning thus devised was subsequently identified with the Kaliyuga as the iron age, the last and shortest, with a duration of 432,000 years, of the four ages in each cycle of ages in the Hindu system of cosmical periods. Also, traditional history was fitted to it by one school, represented notably by the Puranas, which, referring the great war between the Paijdavas and the Kurus, which is the topic of the Mahabharata, to the close of the preceding age, the Dvapara, placed on the last day of that age the culminating event which ushered in the Kali age; namely, the death of Krishna (the return to heaven of Vishnu on the termination of his incarnation as Krishna), which was followed by the abdication of the Paijdava king Yudhishthira, who. having installed his grand-nephew Parikshit as his successor, then set out on his own journey to heaven. Another school, however, placed the Paijdavas and the Kurus 653 years later, in 2449 B.C. A third school places in 3102 B.C. the anointment of Yudhishthira to the sovereignty, and treats that event as inaugurating the Kali age; from this point of view, the first 3044 years of the Kaliyuga — the period from its commencement in 3102 B.C. to the commencement of the first historical era, the so-called Vikrama era, in 58 B.C. — are also known as " the era of Yudhishthira."

The Vikrama era, which is the earliest of all the Hindu eras in respect of order of foundation, is the dominant era and the The vik- g reat historical reckoning of Northern India — that ramaEra is, of the territory on the north of the rivers Narbada ° f 58 and MahanadI — to which part of the country its use

has always been practically confined. Like, indeed, the Kaliyuga and Saka eras, it is freely cited in almanacs in any part of India ; and it is sometimes used in the south by immigrants from the north: but it is, by nature, so essentially foreign to the south that the earliest known inscriptional instance of the use of it in Southern India only dates from a.d. 12 18, and the very few later instances that have been obtained, prior to the 15th century a.d., come, along with the instance of a.d. 1218, from the close neighbourhood of the dividing-line between the

1 It is always to be borne in mind that, as already explained, while the Hindu Mesha answers to our Aries, it does not coincide with either the sign or the constellation Aries.

2 We select a.d. 1900 as a gauge-year, in preference to the year in which we are writing, because its figures are more convenient for comparative purposes. In accordance with the general tendency of the Hindus to cite

expired years, the almanacs would mostly show 5001 (instead of 5002) as the number for the Kaliyuga year answering to a.d. 1900-1901. And, for the same reason, this reckoning has often been called the Kaliyuga era of 3101 B.C. There is, perhaps, no particular objection to that, provided that we then deal with the Vikrama and Saka eras on the same lines, and bear in mind that in each case the initial point of the reckoning really lies in the preceding year. But we prefer to treat these reckonings with exact correctness.

north and the south. The Vikrama era has never been used for astronomical purposes. Its years are lunar, with lunar months, but seem liable to be sometimes regarded as solar, with solar months, when they are cited in almanacs of Southern India which present the solar calendar. Originally they were Kartti- kadi, with purnimdnta months (ending with the full-moon). They now exist in the following three varieties: in Kathiawar and Gujarat, they are chiefly Karttikadi, with amanta months (ending with the new-moon); and they are shown in this form in almanacs for the other parts of the Bombay Presidency: but there is also found in Kathiawar and that neighbourhood an Ashadhadi variety, commencing with Ashadha sukla 1, similarly with amanta months; in the rest of Northern India, they are Chaitradi, with purnimdnta. months. The era has its initial point in 58 B.C., and its first civil day, Karttika sukla 1, is 19th September in that year if we determine it with reference to the Hindu Tula-sarhkranti, or 18th October if we determine it with reference to the tropical equinox. The years of the three varieties, Chaitradi, Ashadhadi, and Karttikadi, all commence in the same year a.d.; and the year 1958 began in a.d. 1900.

Hindu legend connects the foundation of this era with a king Vikrama or Vikramaditya of Ujjain in Malwa, Central India: one version is that he began to reign in 58 B.C. ; another is that he died in that year, and that the reckoning commemorates his death. Modern research, however, based largely on the inscriptional re- cords, has shown that there was no such king, and that the real facts are very different. The era owes its existence to the Kushan king Kanishka, a foreign invader, who established himself in Northern India and commenced to reign there in B.C. 58. 3 He was the founder of it, in the sense that the opening years of it were the years of his reign. It was established and set going as an era by his successor, who continued the reckoning so started, instead of breaking it by introducing another according to his own regnal years. And it was perpetuated as an era, and transmitted as such to posterity by the Malavas, the people from whom the modern territory Malwa derived its name, who were an important section of the subjects of Kanishka and his successors. In consonance with that, records ranging in date from A.D. 473 to 879 style it " the reckoning of the Malavas, the years of the Malava lords, the Malava time or era." Prior to that, it had no specific name; the years of it

were simply cited, in ordinary Hindu fashion, by the term samvatsara, " the year (of such-and-such a number)," or by its abbreviations samvat and safn: and the same was frequently done in later times also, and is habitually done in the present day; and so, in modern times, this era has often been loosely styled " the Samvat era." The idea of a king Vikrama in connexion with it appears to date from only the 9th or loth century A.D.

The Saka era, though it actually had its origin in the south- west corner of Northern India, is the dominant era and the great historical reckoning of Southern India; that is, of the territory below the rivers Narbada and The Saka MahanadI. It is also the subsidiary astronomical AD- 7g> reckoning, largely used, from the 6th century a.d. onwards, in the Karanas, the works dealing with practical details of the calendar, for laying down epochs or points of time furnishing convenient bases for computation. As a result of that, it came to be used in past times for general purposes also, to a limited extent, in parts of Northern India where it was not indigenous. And it is now used more or less freely, and is cited in almanacs everywhere. Its years are usually lunar, Chaitradi, and its months are purnimdnta (ending with the full-moon) in Northern India, and amanta (ending with the new-moon) in Southern India; but in times gone by it was sometimes treated for purposes of calculation as having astro- nomical solar years, and it is now treated as having Mesh di civil solar years and solar months in those parts of India where that form of the solar calendar prevails. It has its initial point in a.d. 78; and its first civil day, Chaitra iukla 1, is 3rd March

3 It may be remarked that there are about twelve different views regarding the date of Kanishka and the origin of the Vikrama era. Some writers hold that Kanishka began to reign in a.d. 78, and founded the so-called Saka era beginning in that year; one writer would place his initial date about a.d. 123, others would place it in A.D. 278. The view maintained by the present writer was held at one time by Sir A. Cunningham : and, as some others have already begun to recognize, evidence is now steadily accumulating in support of the correctness of it.

in that year, as determined with reference either to the Hindu M 'na-sarhkranti or to the entrance of the sun into the tropical Pisces. The year 1823 began in a.d. 1900.

Regarding the origin of the Saka era, there was current in the 10th and nth centuries a.d. a belief which, ignoring the difference of a hundred and thirty-five years between the two reckonings, connected the legendary king

Vikramaditya of Ujjain, mentioned above under the Vikrama era, with the foundation of this era also. The story runs, from this point of view, that the Sakas were a barbarous people who established themselves in the western and north-western dominions of that king, but were met in battle and destroyed by him, and that the era was established in celebration of that event. The modern belief, however, ascribes the foundation of this era to a king Salivahana of Pratishthana, which is the modern Paithan, on the Godavarl, in the Nizam's dominions. But in this case, again, research has shown that the facts are very different. Like the Vikrama era, the Saka era owes its existence to foreign invaders. It was founded by the Chhaharata or Kshaharata king Nahapana, who appears to have been a Pahlava or Palhava, i.e. of Parthian extraction, and who reigned from a.d. 78 to about 125. 1 He established himself first in Kathiawar, but subsequently brought under his sway northern Gujarat (Bom- bay) and Ujjain, and, below the Narbada, southern Gujarat, Nasik and probably Khandesh. His capital seems to have been Dohad, in the Pafich Mahals. And he had two viceroys: one, named Bhumaka, of the same family with himself, in Kathiawar; and another, Chashtana, son of Ghsamotika, at Ujjain. Soon after a.d. 125, Nahapana was overthrown, and his family was wiped out, by the Satavahana-Satakarni king Gautamlputra- Sri-Satakarni, who thereby recovered the territories on the south of the Narbada, and perhaps secured for a time Kathiawar and some other parts on the north of that river. Very soon, however, Chashtana, or else his son Jayadaman, established his sway over all the territory which had belonged to Nahapana on. the north of the Narbada; founded a line of Hinduized foreign kings, who ruled there for more than three centuries; and, continuing Nahapana's regnal reckoning, established the era to which the name Saka eventually became attached. Inscriptions and coins show that, up to at least the second decade of its fourth century, this reckoning had no specific appella- tion; its years were simply cited, in the usual fashion, as varsha, " the year (of such-and-such a number)." The reckoning was then taken up by the astronomers. And we find it first called Sakakala, " the time or era of the Sakas," in an epochal date, the end of the year 427, falling in A.d. 50s, which was used by the astronomer Varahamihira (d. a.d. 587) in his Panchasiddhan- tika. That this name came to be attached to it appears to be due to the points that, along with some of the Pahlavas or Pal- havas and the Yavanas or descendants of the Asiatic Greeks, some of the Sakas, the Scythians, had made their way into Kathiawar and neighbouring parts by about a.d. 100, and that the Sakas incidentally came to acquire prominence in the memory of the Hindus regarding these occurrences, in such a manner that their name was selected when the occasion arose to devise an appellation for an era the exact origin of which had been forgotten. The name of the imaginary king Salivahana first figures in connexion with the era in a record of a.d. 1272, and seems plainly to have

been introduced in imitation of the coupling of the name Vikrama, Vikramaditya, with the era of B.C. 58.

That the Saka era, though it had its origin in the south-west corner of Northern India, is essentially an era of Southern India, is proved by its inscriptional and numismatic history. During the period before the time when it was taken up by the astronomers, it is found only in the inscriptions of Nahapana, and in the similar records and on the coins of the descendants of Chashtana. After that same time, it figures first in a record of the Chalukya king Kirtivarman I., at Badami in the Bijapur district, Bombay, which is dated on the full-moon day of the month Karttika, falling in A.D. 578, " when there had elapsed five centuries of the years of the anointment of the Saka king to the sovereignty." And from this date onwards the records of a large part of Southern India are mostly dated in this era, by various expressions all of which include

1 Sue the preceding note.

the term Saka or Saka. In Northern India the case is very different. We have a record dated in the month Karttika, the Saka year 631 (expired), falling in A.D. 709: it comes from Multai in the Betul district, Central Provinces, that is, from the south of the Narbada; but it belongs to Gujarat (Bombay), and perhaps to the north, though more probably to the south, of that province. But, setting that aside, the earliest inscriptional instance of the use of this era in Northern India, outside Kathiawar and Gujarat, is found in a record of A.D. 862 at Deogarh near Lalitpur, the headquarters town of the Lalitpur district, United Provinces of Agra and Oude; here, however, the record is primarily dated, with the full details of the month, &c, in " Sarhvat 919," that is,_ in the Vikrama year 919 ; it is only as a subsidiary detail that the Saka year 784 is given in a separate passage at the end of the record, a sort of postscript. From this date onwards the era is found in other records of Northern India, but to any appreciable extent only from A.D. 1137, and to only a very small extent in comparison with the Vikrama and other northern eras ; and the cases in which it was used exclusively there, without being coupled with one or other of the northern reckonings, are still more conspicuously few. In short, the general position is that the Saka era has been essentially foreign to Northern India until recent times; it was used there quite exceptionally and sporadically, and in very few cases indeed at any appreciable distance from the dividing-line between the north and the south. That it found its way into Northern India, outside Kathiawar and northern Gujarat at all, is unquestionably due to its use by the astronomers. It also travelled, across the sea, by the 7th century a.d. to Cambodia, and somewhat later to Java; to which parts it was doubtless taken in almanacs, or in invoices, statements of account, &c, by the persons engaged in the trade between Broach and the far east via

Tagara (Ter) and the east coast. It also found its way in subsequent times to Assam and Ceylon, and more recently still to Nepal.

III. Other Reckonings

We come now to certain reckonings consisting of cycles, and will take first the cycles of Guru or Brihaspati, Jupiter. This planet, a very conspicuous object in eastern

The Cycles of

skies, requires a period of 4332-6 days, = 50-4 days less than twelve Julian years, to make a circuit of the Jupiter. heavens, and has provided the Hindus with two reckon- ings, each in more than one variety; a cycle of twelve years, and a cycle of sixty years. The years of Jupiter, in all their varieties, are usually styled samvatsara; and it is convenient to use this term here, in order to preserve clearly the distinction between them and the solar and lunar years. The samvatsaras have no divisions of their own; the months, days, &c, cited with them are those of the ordinary solar or lunar calendar, as the case may be.

The older reckoning of Jupiter appears to be that of the 12- years cycle, which is found in two varieties; in both of them the samvatsaras bear, according to certain rules which need not be explained here, the same names with the ,2 '

lunar months, Chaitra, Vaisakha, &c. In one variety, cycle. each samvatsara runs from one of the planet's heliacal risings — that is, from the day on which it becomes visible as a morning star on the eastern horizon — to the next such rising; and the length of such a samvatsara, according to the Hindu data, is from 392 to 405 days, with an average of 399 days. Inscrip- tional instances of the use of this cycle are found in six of the Gupta records of Northern India, ranging from a.d. 475 to 528.

In the other variety of the 12-years cycle, which is mentioned in astronomical works from the time of Aryabhata onwards (b. a.d. 476), the samvatsaras are regulated by Jupiter's course with reference to his mean motion and mean longitude: a samvatsara of this variety commences when Jupiter thus enters a sign of the zodiac, and lasts for the time occupied by him in traversing that sign from the same point of view; and the period taken by him to do that — that is, the duration of such a sam- vatsara — is slightly in excess, according to the Hindu data, of 361-02 days, which amount is very close to the actual fact, 361-05 days. Inscriptional instances of the use of this cycle are perhaps found in two records of Southern India of the Kadamba series, belonging to about a.d. 575.

The 12-years mean-sign cycle seems to be still used in some parts. And the heliacal risings of Jupiter, as also, indeed, those of the other planets, are shown in almanacs for astrological purposes. In either variety, however, the 12-years cycle is now chiefly of antiquarian interest.

years cycle.

The cycle of Jupiter now in general use is a cycle of sixty years, the satiivatsaras of which bear certain special names, The 60- Prabhava, Vibhava, Sukla, Pramoda, &c, again in accordance with certain rules which we need not explain here. This cycle exists in three varieties. According to the original constitution of this cycle, the satii- vatsaras are determined as in the second or mean-sign variety of the 12-years cycle: each sarhvatsara commences when Jupiter enters a sign of the zodiac with reference to his mean motion and longitude; and it lasts for slightly more than 361-02 days. This variety is traced back in inscriptional records to a.d. 602, and is still used in Northern India.

Now, the satiivatsaras are calculated by means of the astro- nomical solar year commencing with the Mesha-sarhkranti, the entrance of the sun into the sign Mesha (Aries). The process gives the number of the samvatsara last expired before any particular Mesha-sarhkranti, with a remainder denoting the portion of the current samvatsara elapsed up to the same time; and the remainder, reduced to months, &c, gives the moment of the commencement of the current samvatsara, by reckoning back from the Mesha-sarhkranti. As the result, apparently, of unwill- ingness to take the trouble to work out the full details, at some time about a.d. 800 a practice arose, in some quarters, according to which that samvatsara of the 60-years cycle which was current at any particular Mesha-sarhkranti was taken as coinciding with the astronomical solar year beginning at that samkranti, and with the Chaitradi lunar year belonging to that same solar year. And this practice set up a lunisolar variety of the cycle, in con- nexion with which we have to notice the following point. While the duration of a mean-sign samvatsara is closely about 361-02 days, the length of the Hindu astronomical solar year is closely about 365.258 days. It consequently happens, after every 85 or 86 years, that a mean-sign samvatsara begins and ends between two successive Mesha-samkrantis. In the mean-sign cycle, such a samvatsara retains its existence unaffected; and the names Prabhava, Vibhava, &c, run on without any interruption. Ac- cording to the lunisolar system, however, the position is different; the samvatsara beginning and eliding between the two Mesha- saihkrantis is

expunged or suppressed, in the sense that its name is omitted and is replaced by the next name on the list. The second variety of the 60-years cycle, thus started, ran on alongside of the mean-sign variety, and, being eventually transferred, with that variety, to Northern India, is now known as the northern lunisolar variety. It preserves a connexion between the satii- vatsaras and the movements of Jupiter: but the connexion is an imperfect one; and both in this variety, and still more markedly in the remaining one still to be described, the satiivatsaras prac- tically became mere appellations for the solar and lunar years.

Meanwhile, just after a.d. 900, another development occurred, and there was started a third variety, which is now known as the southern lunisolar variety. The precise year in which this hap- pened depends on the particular authority that we follow. If we take the elements adopted in the Surya-Siddhanta as the proper data for that time and for the locality — Western India below the Narbada — to which the early history of the cycle belongs, the position was as follows. At the Mesha-sarhkranti in a.d. 908 there was current, by the mean-sign system, the samvatsara No. 2, Vibhava: but No. 4, Pramoda, was current by the same system at the Mesha-sarhkranti in a.d. 909; and No. 3, Sukla, began and ended between the two Mesha-sarhkrantis. Accord- ingly, No. 2, Vibhava, was the lunisolar samvatsara for the Meshadi solar year and the Chaitradi lunar year commencing in a.d. 908; and by the strict lunisolar system, which was adhered to by some people and is now known as the northern lunisolar system, it was followed in a.d. 909 by No. 4, Pramoda, the name of the intermediate samvatsara, No. 3, Sukla, being passed over. On the other hand, whether through oversight, or whatever the reason may have been, by other people the name of No. 3, Sukla, was not passed over, but that samvatsara was taken as the luni- solar samvatsara for the Meshadi solar year and the Chaitradi lunar year beginning in a.d. 909, and No. 4, Pramoda, followed it in a.d. qio. On subsequent similar occasions, also, there was, in

the same quarters, no passing over of the name of any samvatsara. And this practice established itself in S6uthern India, to the exclusion there of the mean-sign and the northern lunisolar varieties; the discrepancy between the last-mentioned variety and the variety thus set up continuing, of course, to increase by one samvatsara after every 85 or 86 years. In this variety, the southern lunisolar variety, all connexion between the satiivatsaras and the movements of Jupiter has now been lost.

The present position of the 60-years cycle in its three varieties maybe illustrated thus. In Northern India, by the mean-sign system the samvatsara No. 46, Paridhavin, began, according to different authorities, in August, September or October, a.d. 1899. Conse- quently, by the northern or

expunging lunisolar system, that same samvatsara, No. 46, Paridhavin, coincided with the Meshadi civil solar year beginning with or just after 12th April, and with the Chaitradi lunar year beginning with 31st March, a.d. 1900. But by the southern or non-expunging lunisolar system those same solar and lunar years were No. 34, Sarvarin.

The treatment of the cycles of Jupiter in the Sanskrit books shows that it was primarily from the astrological point of view that they appealed to the Hindus; it was only as a secondary consideration that they acquired anything of a chronological nature. For the practical application of any of them to historical purposes, it is, of course, necessary that, along with the mention of a samvatsara, there should always be given the yea,r of some known era, or some other specific guide to the exact period to which that samvatsara is to be referred. But it is fortunately the case that the satiivatsaras have been but 'rarely cited in the inscriptional records without such a guide, of some kind or another.

*The Saptarshi reckoning is used in Kashmir, and in the Kangra district and some of the Hill states on the south-east of Kashmir; some nine centuries ago it was also in use in the Punjab, Th s and apparently in Sind. In addition to being cited by tars hi such expressions as Saptarshi-sarhvat, " the year (so- reckon- and-so) of the Saptarshis," and Sastra-sarhvatsara, ** " the year (so-and-so) of the scriptures," it is found mentioned as Lokakala, " the time or era of the people," and by other terms which mark it as a vulgar reckoning. And it appears that modern popular names for it are Paharl-sarhvat and Kachcha-sarhvat, which we may render by " the Hill era " and " the crude era." The years of this reckoning are lunar, Chaitradi; and the months are purnimdnta (ending with the full-moon). As matters stand now, the reckoning has a theoretical initial point in 3077 B.C.; and the year 4976, more usually called simply 76, began in a.d. 1900; but there are some indications that the initial f>oint was originally placed one year earlier.*

The idea at the bottom of this reckoning is a belief that the Saptarshis, " the Seven Rishis or Saints," Marlchi and others, were translated to heaven, and became the stars of the constellation Ursa Major, in 3076 B.C. (or 3077); and that these stars possess an independent movement of their own, which, referred to the ecliptic, carries them round at the rate of 100 years for each nakshatra or twenty-seventh division of the circle. Theoretically, therefore, the Saptarshi reckoning consists of cycles of 2700 years; and the numbering of the years should run from 1 to 2700, and then com- mence afresh. In practice, however, it has been treated quite differently. According to the general custom, which has distinctly prevailed in Kashmir from the earliest use of the reckoning for chronological purposes, and is illustrated by Kalhana in his history of Kashmir, the Rajatarathginl, written in a.d.

1148-1150, the num- eration of the years has been centennial ; whenever a century has been completed, the numbering has not run on 101, 102, 103, &c, but has begun again with 1, 2, 3, &c. Almanacs, indeed, show both the figures of the century and the full figures of the entire reckoning, which is treated as running from 3076 B c, not from 376 B.C. as the commencement of a new cycle, the second; thus, an almanac for the year beginning in a.d. 1793 describes that year as "the year 4869 according to the course of the Seven Rishis, and similarly the year 69." And elsewhere sometimes the full . figures are found, sometimes the abbreviated ones; thus, while" a. manuscript written in a.d. 1648 is dated in " the year 24 " (for 4724), another, written in A.D. 1224 is dated in "the year 4300." But, as in the Rajatarathginl, so also in inscriptions, which range from A.D. 1204 onwards, only the abbreviated figures have hitherto been found. Essentially, therefore, the Saptarshi reckoning is a centennial reckoning, by suppressed or omitted hundreds, with its earlier centuries commencing in 3076, 2976 B.C., and so on, and its later centuries commencing in a.d. 25, 125, 225, &c. ; on precisely the same lines with those according to which we may use, e.g. 98 to mean a.d. 1798, and 57 to mean a.d. 1857, and 9 to mean a.d. 1909. And the practical difficulties attending the use of such a system for chronological purposes are obvious; isolated dates recorded in such a fashion cannot be allocated without some explicit clue to

the centuries to which they belong. Fortunately, however, as regards Kashmir, we have the necessary guide in the facts that Kalhana recorded his own date in the baka era as well as in this reckoning, and gave full historical details which enable us to deter- mine unmistakably the equivalent of the first date in this reckoning cited by him, and to arrange with certainty the chronology presented by him from that time.

The belief underlying this reckoning according to the course of the Seven Rishis is traced back in India, as an astrological detail, to at least the 6th century a.d. But the reckoning was first adopted for chronological purposes in Kashmir and at some time about a.d. 800; the first recorded date in it is one of "the year 89," meaning 3889, = a.d. 813-814, given by Kalhana. It was intro- duced into India between a.d. 925 and 1025.

The Grahaparivritti is a reckoning which is used in the

southernmost parts of Madras, particularly in the Madura

district. It consists of cycles of 90 Meshadi solar

7 he Orait- vears an d is said, in conformity with its name, which

aparivrittl J ‘ (, ‘, . , . J „ , ‘

cycle. means the revolution of planets, to be made up

by the sum of the days in 1 revolution of the sun, 22 of Mercury, 5 of Venus, 15 of Mars, 11 of Jupiter, and 29 of Saturn. The first cycle is held to have commenced in 24 B.C., the second in a.d. 67, and so on; and, in accordance with that view, the year 34, which began in a.d. 1900, was the 34th year of the 22nd cycle.

No inscriptional use of this cycle has come to notice. There seems no substantial reason for believing that the reckoning was really started in 24 B.C. The alleged constitution of the cycle, which appears to be correct within about twelve days, and might possibly be made apparently exact, suggests an astrological origin. And, if a guess may be hazarded, we would conjecture that the reckoning is an offshoot of the southern lunisolar variety of the 60-years cycle of Jupiter, and had its real origin in some year in which a Prabhava samvatsara of that variety commenced, and to which the first year of a Grahaparivritti cycle can be referred: that was the case in a.d. 967 and at each subsequent 180th year.

In part of the Ganjam district, Madras, there is a reckoning, known as the Onko or Anka, i.e. literally ” the number or numbers,” consisting of lunar years, each commencing cycle with Bhadrapada sukla 12, which run theoretically

in cycles of 59 years. But the reckoning has the peculiarity that, whether the explanation is to be found in a superstition about certain numbers or in some other reason, the year 6, and any year the number of which ends with 6 or o (except the year 10), is omitted from the numbering; so that, for instance, the year 7 follows next after the year 5. The origin of the reckoning is not known. But the use of it seems to be traceable in records of the Ganga kings who reigned in that part of the country and in Orissa in the 12th and following centuries. And the initial day, Bhadrapada sukla 12, which figures again in the Vilayati and Amli reckoning of Orissa (see farther on) , is perhaps to be accounted for on the view that this day was the day of the anointment, in the 7th century, of the first Ganga king, Rajasirhha-Indravarman I.

In the Chittagong district, Bengal, there is a solar reckoning, known by the name Maghi, of which the year 1262 either began or ended in a.d. 1900; so that it has an initial point TheMaghi ; n AD gˆg or gˆg_ j t appears that Chittagong was conquered by the king of Arakan in the 9th century, and

remained usually in the possession of the Maghs — the Arakanese or a class of them — till a.d. 1666, when it was finally annexed to the Mogul empire. In these circumstances it is plain that the Magh reckoning took its name from the Maghs; its year, which is Meshadi, from Bengal; and its numbering from the Sakkaraj, the ordinary era of Arakan and Burma, which has its initial point in a.d. 638.

The Hijra (Hegira) era, the reckoning from the flight of Mahomet, which dates from the 16th of July, a.d. 662, is, of ffinduizcd course ; used by the Mahommedans in India, and is offshoots customarily shown, with the details of its calendar, of the in the Hindu almanacs. An account of it does not

Hl l ra fall within the scope of this article. But we have

era. . , ˆ . TT . ,

to mention it because we come now to certain Hmdu-

ized reckonings which are hybrid offshoots of it. We need

only say, however, in explanation of some of the following

figures, that the years of the Hijra era are purely lunar, consisting

of twelve lunar months and no more; with the result that the

reckon log.*

initial day of the year is always travelling backwards through the Julian year, and makes a complete circuit in thirty-four years. The reckonings derived from it, which we have to describe, have apparent initial points in a.d. 591, 593, 594, and 600. They had their real origin, however, in the 14th, 16th, and 17th centuries.

The emperor Akbar succeeded to the throne in February, a.d. 1556, in the Hijra year 963, which ran from 16th November J555 to 3rd November 1556. Amongst the reforms aimed at by him and his officials, one was to abolish, or at least minimize, by introducing uniformity of numbering, the confusion due to the existence of various reckonings, both Mahommedan and Hindu. And one step taken in that direction was to assign to the Hindu year the same number with the Hijra year. It is believed that this was first done by the Persian clerks of the revenue and financial offices at an early time in Akbar 's reign, and that it received authoritative sanction in the Hijra year 971 (21st August 1563 to 8th August 1564). At any rate, the innovation was certainly first made in Upper India; and the numbering

started there was introduced into Bengal and those parts as Akbar extended his dominions, but without interfering with local customs as to the commencement of the Hindu year. The result is that we now have the following reckonings, the years of which are used as revenue years : —

In the United Provinces and the Punjab, there is an Asvinadi lunar reckoning, known as the Fasli, according to which the year 1308 began in a.d. 1900; so that the reckoning has an apparent initial point in a.d. 593. The name of this ‘ ” Fas ” reckoning is derived from fasl, ” a harvest,” of which r “ on ‘ n # there are two; the fasl-i-rabi or ” spring harvest,” °’UPI> er commencing in February ,and the fasl-i-kharlf , or “autumn ‘ 1 ” , ‘ a ‘ harvest ” commencing in October. The years of this reckoning begin with the pilrnimdnta Asvina krishna 1, which now falls in September. A peculiar feature of it is that, though the months are lunar, they are not divided into fortnights, and the numbering of the days runs on, as in the Mahommedan month, from the first to the end of the month without being affected by any expunction and repetition of tithis; and, for this and other reasons, it seems that in this case a new form of Hindu year was devised, of such a kind as to enable the agriculturists %o realize their produce and pay their assessments comfortably within the year. The Hijra era has, of course, now drawn somewhat widely away from this and the other reckonings derived from it; the Hijra year com- mencing in a.d. 1900 was 1318, ten years in advance of the Fasli year.*

In Orissa and some other parts of Bengal, there is a reckoning, or two almost identical reckonings, the facts of which are not quite clear. According to one account, the term Amli-san, ” the official year,” is only another name of the Vilayati- ” v ‘ia- san, ” the year received from the vilayat or province i” s f”,, of Hindustan.” But we are also told that the Vilayati- Amu-

san is a Kanyadi solar year, whereas the Amli-san, i a f though it too has solar months, changes its number on rssa – the lunar day Bhadrapada sukla 12 (mentioned above in connexion with the Onko cycle of Orissa), which comes sometimes in Kanya, but sometimes in the preceding month, Sirhha. Elsewhere, again, it is the Vilayati-san which is shown as changing its number or. Bhadrapada sukla 12. In either case, the year 1308 of this reckon- ing, also, began in a.d. 1900; and so, like the Fasli of Upper India, this reckoning, too, has an apparent initial point in a.d. 593. The day Bhadrapada sukla 12 now usually falls in September, but may come during the last three days of August. The first day of the solar month Kanya now falls on 15th or 16th September.

In Bengal there is in more general use a Meshadi solar reckoning, known as the Bengali-san or ” Bengal year,” according to which the year 1307 began

in a.d. 1900; so that this _ ‘ reckoning has an apparent initial point in a.d. 594. The ga ” san * initial day of the year is the first day of the solar month Mesba, now falling on 12th or 13th April.*

The system of Fasli reckonings was introduced into Southern India under the emperor Shah Jahan, at some time in the Hijra? year 1046, which ran from 26th May, a.d. 1636, to 15th „. May, a.d. 1637. But the numbering which was current f t as J in Northern India was not taken over. A new start was “h-Jaind made; and, as the year of the Hijra had gone back, Madras during the intervening seventy-three Julian years, by two years and a quarter (less by only five days) from the date of its commencement in the year 971, the Fasli reckoning of Southern India began with a nominal year 1046 (instead of 971 + 73 = 1044), commencing in a.d. 1636. The Fasli reckoning of Southern India exists in two varieties. The years of the Bombay Fasli are popularly known as Mrigasal years, because they commence when the sun enters the nakshatra Mrigasiras, which occurs now on 6th or 7th June:

san or Arab!’

the reckoning seems to have taken over this initial day from the .Maratha Sur-san (see below). The Fasli years of Madras originally began at the Karka-sarhkranti, the nominal summer solstice: under the British government, the commencement of them was first fixed to 12th July, on which day the sathkrdnti was then usually occurring; but it was afterwards changed to 1st July as a more convenient date. The years of the Bombay and Madras Fasli have no division of their own into months, fortnights, &c. ; the year is always used along with one or other of the real Hindu reckonings, and the details are cited according to that reckoning.

Another offshoot of the Hijra era, but one of earlier date and not belonging to the class of Fasli reckonings, is found, in the Maratha country, in the Sur-san or Shahur-san, ” the year of th-” mon th s >” also known as Arabi-san, ” the Arab year.” afna Sur- fˆis reckoning, which is met with chiefly in old sanads or charters, appears to have branched off in or closely about the Hijra year 745, which ran from 15th May, a.d. 1344, to 3rd May, A.D. 1345; but the exact circumstance in which it originated is not known. The years of this reckoning begin, like those of the Bombay Fasli, with the entrance of the sun into the nakshatra Mrigasiras, which now occurs on 6th or 7th June; but the months and days are those of the Hijra year. The Sur-san year 1301 began in a.d. 1900; and so the reckoning has*

an apparent initial point in a.d. 600. A peculiarity attending this reckoning is that, whatever may be the vernacular of a clerk, he uses the Arabic numeral words in reading out the year; and the same words are given alongside of the figures in the Hindu almanacs.

Authorities. — The Hindu astronomy had already begun to attract attention before the close of the 18th century. The inves- tigation, however, of the calendar and the eras, along with the verification of dates, was started by Warren, whose Kala Sankalila was published in 1825. .The inquiry was carried on by Prinsep in his Useful Tables (1834-1836) by Cowasjee Patell in his Chronology (1866), and by Cunningham in his Book of Indian Eras (1883). But Warren's processes, though mostly giving accurate results, were lengthy and troublesome; and calculations made on the lines laid down by his successors gave results which might or might not be correct, and could only be cited as approximate results. The exact calculation of Hindu dates by easy processes was started byShankar Balkrishna Dikshit, in an article published in the Indian Antiquary, vol. 16 (1887). This was succeeded by methods and tables devised by Jacobi, which were published in the next volume of the same journal. There then followed several contributions in the same line by other scholars, some for exact, others for closely approximate, results, and some valuable articles by Kielhorn on some of the principal Hindu eras and other reckonings, which were published in the same journal, vols. 17 (1888) to 26 (1897). And the treat- ment of the matter culminated for the time being in the publication, in 1896, of Sewell and Dikshit 's Indian Calendar, which contains an appendix by Schram on eclipses of the sun in India, and was supple- mented in 1898 by Sewell's Eclipses of the Moon in India. The present article is based on the above-mentioned and various de- tached writings, supplemented by original research. For the exact calculation of Hindu dates and the determination of the European equivalents of them, use may be made either of Sewell and Dikshit's works mentioned above, or of the improved tables by Jacobi which were published in the Epigraphia Indica, vols. I and 2 (1892-1894). (J. F. F.)

HINDUISM, a term generally employed to comprehend the social institutions, past and present, of the Hindus who form the great majority of the people of India; as well as the multitudinous crop of their religious beliefs which has grown up, in the course of many centuries, on the foundation of the Brahmanical scriptures. The actual proportion of the total population cf India (294 millions) included under the name of " Hindus " has been computed in the census report for 1901 at something like 70% (206 millions); the remaining 30% being made up partly of the followers of foreign creeds, such as Mahommedans, Parsees, Christians and Jews, partly of the votaries of indigenous forms of belief which have at various times separated from the main stock, and developed into

independent systems, such as Buddhism, Jainism and Sikhism; and partly of isolated hill and jungle tribes, such as the Santals, Bhils (Bhilla) and Kols, whose crude animistic tendencies have hitherto kept them, either wholly or for the most part, outside the pale of the Brahmanical community. The name " Hindu " itself is of foreign origin, being derived from the Persians, by whom the river Sindhu was called Hindhu, a name subsequently applied to the inhabitants of that frontier district, and gradually ex- tended over the upper and middle reaches of the Gangetic valley, whence this whole tract of country between the Himalaya and the Vindhya mountains, west cf Bengal, came to be called by the foreign conquerors " Hindustan." or the abode of the

Hindus; whilst the native writers called it " Aryavarta," or the abode of the Aryas.

But whilst, in its more comprehensive acceptation, the term Hinduism would thus range over the entire historical develop- ment of Brahmanical India, it is also not infrequently used in a narrower sense, as denoting more especially the modern phase of Indian social and religious institutions — from the earlier centuries of the Christian era down to our own days — as distin- guished from the period dominated by the authoritative doctrine of pantheistic belief, formulated by the speculative theologians during the centuries immediately succeeding the Vedic period (see Brahmanism). In this its more restricted sense the term may thus practically be taken to apply to the later bewildering variety of popular sectarian forms of belief, with its social concomitant, the fully developed caste-system. But, though one may at times find it convenient to speak of " Brahmanism and Hinduism," it must be clearly understood that the distinc- tion implied in the combination of these terms is an extremely vague one, especially from the chronological point of view. The following considerations will probably make this clear.

The characteristic tenet of orthodox Brahmanism consists in the conception of an absolute, all-embracing spirit, the Brahma (neutr.), being. the one and only reality, itself un- connexion conditioned, and the original cause and ultimate W uh goal of all individual souls (Jiva, i.e. living things). Brah- Coupled with this abstract conception are two other mamsm – doctrines, viz. first, the transmigration of souls {samsara), regarded by Indian thinkers as the necessary complement of a belief in the essential sameness of all the various spiritual units, however contaminated, to a greater or less degree, they may be by their material embodiment; and in their ultimate re-union with the Paramatman, or Supreme Self; and second, the assumption of a triple manifestation of the ceaseless working of that Absolute Spirit as a creative, conservative and destruc- tive principle, represented respectively by the divine per- sonalities of Brahma (masc),

*Vishnu and Siva, forming the Trimurti or Triad. As regards this latter, purely exoteric, doctrine, there can be little doubt of its owing its origin to considerations of theological expediency, as being calculated to supply a sufficiently wide formula of belief for general ac- ceptance; and the very fact of this divine triad including the two principal deities of the later sectarian worship, Vishnu and Siva, goes far to show that these two gods at all events must have been already in those early days favourite objects of popular adoration to an extent sufficient to preclude their being ignored by a diplomatic priesthood bent upon the formulation of a common creed. Thus, so far from sectarianism being a mere modern development of Brahmanism, it actually goes back to beyond the formulation of the Brahmanical creed. Nay, when, on analysing the functions and attributes of those two divine figures, each of them is found to be but a compound of several previously recognized deities, sectarian worship may well be traced right up to the Vedic age. That the theory of the triple manifestation of the deity was indeed only a com- promise between Brahmanical aspirations and popular worship, probably largely influenced by the traditional sanctity of the number three, is sufficiently clear from the fact that, whilst Brahma, the creator, and at the same time the very embodi- ment of Brahmanical class pride, has practically remained a mere figurehead in the actual worship of the people, Siva, on the other hand, so far from being merely the destroyer, is also the unmistakable representative of generative and reproductive * power in nature. In fact, Brahma, having performed his legiti- mate part in the mundane evolution by his original creation of the universe, has retired into the background, being, as it were, looked upon as functus officio, like a venerable figure of a former generation, whence in epic poetry he is commonly styled pitamaha, " the grandsire." But despite the artificial character of the Trimurti, it has retained to this day at least its theoretical validity in orthodox Hinduism, whilst it has also undoubtedly exercised considerable influence in shaping sectarian belief, in promoting feelings of toleration towards the claims*

of rival deities; and in a tendency towards identifying divine figures newly sprung into popular favour with one or other of the principal deities, and thus helping to bring into vogue that notion of avatars, or periodical descents or incarnations of the deity, which has become so prominent a feature of the later sectarian belief.

Under more favourable political conditions, ' the sacerdotal class might perhaps, in course of time, have succeeded in imposing something like an effective common creed on the heterogeneous medley of races and tribes

scattered over the peninsula, just as they certainly did succeed in establishing the social prerogative of their own order over the length and breadth of India. They were, however, fated to fall far short of such a consummation; and at all times orthodox Brahmanism has had to wink at, or ignore, all manner of gross superstitions and repulsive practices, along with the popular worship of countless hosts of godlings, demons, spirits and ghosts, and mystic objects and symbols of every description. Indeed, according to a recent account by a close observer of the religious practices prevalent in southern India, fully four-fifths of the people of the Dravidian race, whilst nominally acknowledging the spiritual guidance of the Brahmans, are to this day practically given over to the worship of their nondescript local village deities (grdma-devata) , usually attended by animal sacrifices frequently involving the slaughter, under revolting circumstances, of thousands of victims. Curiously enough these local deities are nearly all of the female, not the male sex. In the estimation of these people " Siva and Vishnu may be more dignified beings, but the village deity is regarded as a more present help in trouble, and more intimately concerned with the happiness and prosperity of the villagers. The origin of this form of Hinduism is lost in antiquity, but it is probable that it represents a pre-Aryan religion, more or less modified in various parts of south India by Brahmanical influence. At the same time, many of the deities themselves are of quite recent origin, and it is easy to observe a deity in making even at the present day." 2 It is a significant fact that, whilst in the worship of Siva and Vishnu, at which no animal sacrifices are offered, the officiating priests are almost invariably Brahmans, this is practically never the case at the popular performance of those " gloomy and weird rites for the propitia- tion of angry deities, or the driving away of evil spirits, when the pujaris (or ministrants) are drawn from all other castes, even from the Pariahs, the out-caste section of Indian society." As from the point of view of religious belief, so also from that of social organization no clear line of demarcation can be drawn between Brahmanism and Hinduism. Though it was not till later times that the network of class divisions and subdivisions attained anything like the degree of intricacy which it shows in these latter days, still in its origin the caste-system is undoubtedly coincident with the rise of Brah- manism, and may even be said to be of the very essence of it. 3 The cardinal principle which underlies the system of caste is the preservation of purity of descent, and purity of religious belief and ceremonial usage. Now, that same principle had been operative from the very dawn of the history of Aryanized India. The social organism of the Aryan tribe did not probably differ essentially from that of most communities at that primitive stage of civilization; whilst the body of the people — the ViS (or aggregate of Vaisyas) — would be mainly occupied with agricultural and pastoral pursuits, two professional classes — those of the warrior and the priest —

had already made good their claim to social distinction. As yet, however, the tribal com- munity would still feel one in race and traditional usage. But

1 " It is, perhaps, by surveying India that we at this day can best represent to ourselves and appreciate the vast external reform worked upon the heathen world by Christianity, as it was organized and executed throughout Europe by the combined authority of the Holy Roman Empire and the Church Apostolic." Sir Alfred C. Lyall, Asiatic Studies, i. 2.

- Henry Whitehead, D.D., bishop of Madras, The Village Deities of Southern India (Madras, 1907).

n " The effect of caste is to give all Hindu society a religious iiasis." Sir A. C. Lyall, Brahmanism.

Caste.

when the fair-coloured Aryan immigrants first came in contact with, and drove back or subdued the dark-skinned race that occupied the northern plains — doubtless the ancestors of the modern Dravidian people — the preservation of their racial type and traditionary order of things would naturally become to them a matter of serious concern. In the extreme north- western districts — the Punjab and Rajputana, judging from the fairly uniform physical features of the present population of these parts — they seem to have been signally successful in their endeavour to preserve their racial purity, probably by being able to clear a sufficiently extensive area of the original occupants for themselves with their wives and children to settle upon. The case was, however, very different in the adjoining valley of the Jumna and Ganges, the sacred Modhya- desa or Middle-land of classical India. Here the Aryan immi- grants were not allowed to establish themselves without under- going a considerable admixture of foreign blood. It must remain uncertain whether it was that the thickly-populated character of the land scarcely admitted of complete occupa- tion, but only of a conquest by an army of fighting men, starting from the Aryanized region — who might, however, subsequently draw women of their own kin after them — or whether, as has been suggested, a second Aryan invasion of India took place at that time through the mountainous tracts of the upper Indus and northern Kashmir, where the nature of the road would render it impracticable for the invading bands to be accompanied by women and children. Be this as it may, the physical appear- ance of the population of this central region of northern India — Hindustan and Behar — clearly points to an intermixture of the tall, fair-coloured, fine-nosed Aryan with the short-sized, dark-skinned, broad-nosed Dravidian; the latter type becoming more pronounced towards the lower strata of the social

order. 4 Now, it was precisely in this part of India that mainly arose the body of literature which records the gradual rise of the Brahmanical hierarchy and the early development of the caste- system.

The problem that now lay before the successful invaders was how to deal with the indigenous people, probably vastly outnumbering them, without losing their own racial identity. They dealt with them in the way the white race usually deals with the coloured race — they kept them socially apart. The land being appropriated by the conquerors, husbandry, as the most respectable industrial occupation, became the legitimate calling of the Aryan settler, the VaiSya ; whilst handicrafts, gradually multiplying with advancing civilization and menial service, were assigned to the subject race. The generic name applied to the latter was Sudra, originally probably the name of one of the subjected tribes. So far the social development proceeded on lines hardly differing from those with which one is familiar in the history of other nations. The Indo-Aryans, however, went a step farther. What they did was not only to keep the native race apart from social intercourse with them- selves, but to shut them out from all participation in their own higher aims, and especially in their own religious convictions and ceremonial practices. So far from attempting to raise their standard of spiritual life, or even leaving it to ordinary intercourse to gradually bring about a certain community of intellectual culture and religious sentiment, they deliberately set up artificial barriers in order to prevent their own traditional modes of worship from being contaminated with the obnoxious practices of the servile race. The serf, the Sudra, was not to worship the gods of the Aryan freemen. The result was the – system of four castes (varna, i.e. "colour"; or jali, "gens"). Though the Brahman, who by this time had firmly secured his supremacy over the kshatriya, or noble, in matters spiritual as well as in legislative and administrative functions, would naturally be the prime mover in this regulation of the social 4 Thus, in Berar, " there is a strong non-Aryan leaven in the dregs of the agricultural class, derived from the primitive races which have gradually melted down into settled life, and thus become fused with the general community, while these same races are still distinct tribes in the wild tracts of hill and jungle." Sir Alfred C. Lyall, As. St., i. 6.

order, there seems no reason to believe that the other two upper classes were not equally interested in seeing their hereditary privileges thus perpetuated by divine sanction. Nothing, indeed, is more remarkable in the whole development of the caste-system than the jealous pride which every caste, from the highest to the lowest, takes in its own peculiar occupation

and sphere of life. The distinctive badge of a member of the three upper castes was the sacred triple cord or thread (sutra) — made of cotton, hemp or wool, according to the respective caste — with which he was invested at the upanayana ceremony, or initiation into the use of the sacred savitri, or prayer to the sun (also called gdyatri), constituting his second birth. Whilst the Arya • was thus a dvi-ja, or twice-born, the Sudra remained unregenerate during his lifetime, his consolation being the hope that, on the faithful performance of his duties in this life, he might hereafter be born again into a higher grade of life. In later times, the strict adherence to caste duties would naturally receive considerable support from the belief in the transmigration of souls, already prevalent before Buddha's time, and from the very general acceptance of the doctrine of karma (" deed "), or retribution, according to which a man's present station and manner of life are the result of the sum-total of his actions and thoughts in his former existence; as his actions here will again, by the same automatic process of retribution, determine his status and condition in his next existence. Though this doctrine is especially insisted upon in Buddhism, and its designation as a specific term (Pali, Kamma) may be due to that creed, the notion itself was doubtless already prevalent in pre-Buddhist times. It would even seem to be necessarily and naturally implied in Brahmanical belief in metempsychosis; whilst in the doctrine of Buddha, who admits no soul, the theory of the net result or fruit of a man's actions serving here-after to form or condition the existence of some new individual who will have no conscious identity with himself, seems of a peculiarly artificial and mystic character. But, be this as it may, " the doctrine of karma is certainly one of the firmest beliefs of all classes of Hindus, and the fear that a man shall reap as he has sown is an appreciable element in theaverage morality . . . the idea of forgiveness is absolutely wanting; evil done may indeed be outweighed by meritorious deeds so far as to ensure a better existence in the future, but it is not effaced, and must be atoned for " {Census Report, i. 364).

In spite, however, of the artificial restrictions placed on the intermarrying of the castes, the mingling of the two races seems to have proceeded at a tolerably rapid rate. Indeed, the paucity of women of the Aryan stock would probably render these mixed unions almost a necessity from the very outset; and the vaunted purity of blood which the caste rules were calculated to perpetuate can scarcely have remained of more than a relative degree even in the case of the Brahman caste. Certain it is that mixed castes are found referred to at a com- paratively early period; and at the time of Buddha — some five or six centuries before the Christian era — the social organization would seem to have presented an appearance not so very unlike that of modern times. It must be con- fessed, however, that our information regarding the develop- ment of the caste-system is far from

complete, especially in its earlier stages. Thus, we are almost entirely left to conjecture on the important point as to the original social organization of the subject race. Though doubtless divided into different tribes scattered over an extensive tract of land, the subjected aborigines were slumped together under the designation of Sudras. whose duty it was to serve the upper classes in all the various departments of manual labour, save those of a downright sordid and degrading character which it was left to vratyas or outcasts to perform. How, then, was the distribution of crafts and habitual occupations of all kinds brought about? Was the process one of spontaneous growth adapting an already existing social organization to a new order of things; or was it originated and perpetuated by regulation from above? Or was it rather that the status and duties of existing offices and trades came to be determined and made hereditary by some

such artificial system as that by which the Theodosian Code succeeded for a time in organizing the Roman society in the 5th century of our era ? " It is well known " (says Professor Dill) " that the tendency of the later Empire was to stereotype society, by compelling men to follow the occupation of their fathers, and preventing a free circulation among different callings and grades of life. The man who brought the grain from Africa to the public stores at Ostia, the baker who made it into loaves for distribution, the butchers who brought pigs from Samnium, Lucania or Bruttium, the purveyors of wine and oil, the men who fed the furnaces of the public baths, were bound to their callings from one generation to another. It was the principle of rural serfdom applied to social functions. Every avenue of escape was closed. A man was bound to his calling not only by his father's but also by his mother's condition. Men were not permitted to marry out of their gild. If the daughter of one of the baker caste married a man not belonging to it, her husband was bound to her father's calling. Not even a dispensation obtained by some means from the imperial chancery, not even the power of the Church could avail to break the chain of servitude." It can hardly be gainsaid that these artificial arrangements bear a very striking analogy to those of the Indian caste-system; and if these class restrictions were comparatively short-lived on Italian ground, it was not perhaps so much that so strange a plant found there an ethnic soil less congenial to its permanent growth, but because it was not allowed sufficient time to become firmly rooted; for already great political events were impending which within a few decades were to lay the mighty empire in ruins. In India, on the other hand, the institution of caste — even if artificially contrived and imposed by the Indo-Aryan priest and ruler — had at least ample time allowed it to become firmly established in the social habits, and even in the affections, of the people. At the same time, one could more easily understand how such a system could have found general acceptance all over the Dravidian region of southern India, with its merest sprinkling of

Aryan blood, if it were possible to assume that class arrangements of a similar kind must have already been prevalent amongst the aboriginal tribes prior to the advent of the Aryan. Whether a more intimate acquaintance with the manners and customs of those rude tribes that have hitherto kept themselves com- paratively free from Hindu influences may yet throw some light on this question, remains to be seen. But, by this as it may, the institution of caste, when once established, certainly appears to have gone on steadily developing; and not even the long period of Buddhist ascendancy, with its uncompromising resistance to the Brahman's claim to being the sole arbiter in matters of faith, seems to have had any very appreciable retardant effect upon the progress of the movement. It was not only by the formation of ever new endogamous castes and sub-castes that the system gained in extent and intricacy, but even more so by the constant subdivision of the castes into numerous exogamous groups or septs, themselves often involving gradations of social status important enough to seriously affect the possibility of intermarriage, already hampered by various other restrictions. Thus a man wishing to marry his son or daughter had to look for a suitable match outside his sept, but within his caste. But whilst for his son he might choose a wife from a lower sept than his own, for his daughter, on the other hand, the law of hypergamy compelled him, if at all possible, to find a husband in a higher sept. This would naturally lead to an excess of women over men in the higher septs, and would render it difficult for a man to get his daughter respectably married without paying a high price for a suitable bridegroom and incurring other heavy marriage expenses. It can hardly be doubted that this custom has been largely responsible for the crime of female infanticide, formerly so prevalent in India; as it also probably is to some extent for infant marriages, still too common in some parts of India, especially Bengal; and even for the all but universal repugnance to the re-marriage of widows, even when these had been married in early childhood and had never joined their husbands. Yet violations of these

rules are jealously watched by the other members of the sept, and are liable — in accordance with the general custom in which communal matters are regulated in India — to be brought before a special council (panchdyal) , originally consisting of live (pancha) , but now no longer limited to that number, since it is chiefly the greater or less strictness in the observance of caste rules and the orthodox ceremonial generally that determine the status of the sept in the social scale of the caste. Whilst community of occupation was an important factor in the original formation of non-tribal castes, the practical exigencies of life have led to considerable laxity in this respect —

not least so in the case of Brahmans who have often had to take to callings which would seem altogether incompatible with the proper spiritual functions of their caste. Thus, " the prejudice against eating cooked food that has been touched by a man of an inferior caste is so strong that, although the Shastras do not prohibit the eating of food cooked by a Kshatriya or Vaisya, yet the Brahmans, in most parts of the country, would not eat such food. For these reasons, every Hindu household — whether Brahman, Kshatriya or Sudra — that can afford to keep a paid cook generally entertains the services of a Brahman for the performance of its cuisine — the result being that in the larger towns the very name of Brahman has suffered a strange degradation of late, so as to mean only a cook " (Jogendra Nath Bhattacharya, Hindu Castes and Sects). In this caste, however, as in all others, there are certain kinds of occupation to which a member could not turn for a livelihood without incurring serious defilement. In fact, adherence to the traditional ceremonial and respectability of occupation go very much hand-in-hand. Thus, amongst agricultural castes, those engaged in vegetable-growing or market-gardening are inferior to the genuine peasant or yeoman, such as the Jat and Rajput; whilst of these the Jat who practises widow-marriage ranks below the Rajput who prides himself on his tradition of ceremonial orthodoxy — though racially there seems little, if any, difference between the two; and the Rajput, again, is looked down upon by the Babhan of Behar because he does not, like himself, scruple to handle the plough, instead of invariably employing low-caste men for this manual labour. So also when members of the Baidya, or physician, caste of Bengal, ranging next to that of the Brahman, farm land on tenure, " they will on no account hold the plough, or engage in any form of manual labour, and thus necessarily carry on their cultivation by means of hired servants " (H. H. Risley, Census Report).

The scale of social precedence as recognized by native public opinion is concisely reviewed (ib.) as revealing itself " in the facts that particular castes are supposed to be modern representatives of one or other of the original castes of the theoretical Hindu system ; that Brahmans will take water from certain castes; that Brahmans of high standing will serve particular castes; that certain castes, though not served by the best Brahmans, have nevertheless got Brahmans of their own whose rank varies according to circumstances ; that certain castes are not served by Brahmans at all but have priests of their own ; that the status of certain castes has been raised by their taking to infant-marriage or abandoning the re- marriage of widows; that the status of others has been modified by their pursuing some occupations in a special or peculiar way; that some can claim the services of the village barber, the village palanquin-bearer, the village midwife, &c, while others cannot; that some castes may not enter

the courtyards of certain temples; that some castes are subject to special taboos, such as that they must not use the village well, or may draw water only with their own vessels, that they must live outside the village or in a separate quarter, that they must leave the road on the approach of a high-caste man and must call out to give warning of their approach." . . " The first point to observe is the predominance throughout India of the influence of the traditional system of four original castes. In every scheme of grouping the Brahman heads the list. Then come the castes whom popular opinion accepts as the modern representatives of the Kshatriyas; and these are followed by the mercantile groups supposed to be akin to the Vaisyas. When we leave the higher circles of the twice-born, the difficulty of finding a uniform basis of classification becomes apparent. The anc ent designation Sudra finds no great favour in modern times, and we can point to no group that is generally recognized as representing it. The term is used in Bombay, Madras and Bengal to denote a considerable number of castes of moderate respectability, the higher of whom are considered ' clean ' Sudras, while the precise status of the lower is a question which lends itself to endless controversy."

. . . In northern and north-western India, on the other hand, " the grade next below the twice-born rank is occupied by a number of castes from whose hands Brahmans and members of the higher castes will take water and certain kinds of sweetmeats. Below these again is rather an indeterminate group from whom water is taken by some of the higher castes, not by others. Further down, where the test of water no longer applies, the status of the caste depends on the nature of its occupation and its habits in respect of diet. There are castes whose touch defiles the twice-born, but who do not commit the crowning enormity of eating beef …. In western and southern India the idea that the social state of a caste depends on whether Brahmans will take water and sweetmeats frcm its members is unknown, for the higher castes will as a rule take water only from persons of their own caste and sub-caste. I n Madras especially the idea of ceremonial pollution by the proximity of an unclean caste has been developed with much elaboration. Thus the table of social precedence attached to the Cochin report shows that while a Nayar can pollute a man of a higher caste only by touching him, people of the Kammalan group, including masons, blacksmiths, carpenters and workers in leather, pollute at a distance of 24 ft., toddy-drawers at 36 ft., Pulayan or Cheruman cultivators at 48 ft., while in the case of the Paraiyan (Pariahs) who eat beef the range of pollution is no less than 64 ft."

In this bewildering maze of social grades and class distinctions, the Brahman, as will have been seen, continues to hold the dominant position, being respected and even worshipped by all the others. " The more orthodox Sudras carry their veneration for the priestly class to such a

degree that they will not cross the shadow of a Brahman, and it is not unusual for them to be under a vow not to eat any food in the morning, before drinking Bipracharanamrita, i.e. water in which the toe of a Brahman has been dipped. On the other hand, the pride of the Brahmans is such that they do not bow to even the images of the gods worshipped in a Sudra's house by Brahman priests " (Jog. Nath Bh.). There are, however, not a few classes of Brahmans who, for various reasons, have become degraded from their high station, and formed separate castes with whom respectable Brahmans refuse to intermarry and consort. Chief amongst these are the Brahmans who minister for " unclean " Sudras and lower castes, including the makers and dealers in spirituous liquors; as well as those who officiate at the great public shrines or places of pilgrimage where they might be liable to accept forbidden gifts, and, as a matter of fact, often amass considerable wealth; and those who officiate as paid priests at cremations and funeral rites, when the wearing apparel and bedding of the de- ceased are not unfrequently claimed by them as their perquisites. As regards the other two " twice-born " castes, several modern groups do indeed claim to be their direct descendants, and in vindication of their title make it a point to perform the upanayana ceremony and to wear the sacred thread. But though the Brahmans, too, will often acquiesce in the reasonable- ness of such claims, it is probably only as a matter of policy that they do so, whilst in reality they regard the other two higher castes as having long since disappeared and been merged by miscegenation in the Sudra mass. Hence, in the later classical Sanskrit literature, the term dv;ja,or twice-born, is used simply as a synonym for a Brahman. As regards the numerous groups included under the term of Sudras, the distinction between " clean " and " unclean " Sudras is of especial importance for the upper classes, inasmuch as only the former — of whom nine distinct castes are usually recognized — are as a rule considered fit for employment in household service.

The picture thus presented by Hindu society — as made up of a confused congeries of sDcial groups of the most varied standing, each held together and kept separate from others by a traditional body of ceremonial rules and by the notion of social gradations being due to a divinely instituted order of things — finds something like a counterpart in the religious life of the people. As in the social sphere, so also in the sphere of religious belief, we find the whole scale of types •represented from the lowest to the highest; and here as there, we meet with the same failure of welding the confused mass into a well-ordered whole. In their theory of a triple manifesta- tion of an impersonal deity, the Brahmanical theologians, as we have seen, had indeed elaborated a doctrine which might have seemed to form a reasonable, authoritative creed for

Theo- logy.

storm-god Rudra, the " Roarer," with certain additional features derived from other deities, especially Pushan, the guardian of flocks and bestower of prosperity, worked up therewith. The exact process of the evolution of the two deities and their advance in popular favour are still somewhat obscure. In the epic poems which may be assumed to have taken their final shape in the early centuries before and after the Christian era, their popular character, so strikingly illustrated by their inclusion in the Brahmanical triad, appears in full force; whilst their cult is likewise attested by the coins and inscriptions of the early centuries of our era. The co-ordination of the two gods in the Trimurti does not by any means exclude a certain rivalry between them; but, on the contrary, a supreme position as the true embodiment of the Divine Spirit is claimed for each of them by their respective votaries, without, however, an honourable, if subordinate, place being refused to the rival deity, wherever the latter, as is not infrequently the case, is not actually repre- sented as merely another form of the favoured god. Whilst at times a truly monotheistic fervour manifests itself in the adoration of these two gods, the polytheistic instincts of the people did not fail to extend the pantheon by groups of new deities in connexion with them. Two of such new gods actually pass as the sons of Siva and his consort Parvati, viz. Skanda — also called Kumara (the youth), Karttikeya, or Subrahmanya (in the south) — the six-headed war-lord of the gods; and Ganese, the lord (or leader) of Siva's troupes of attendants, being at the same time the elephant-headed, paunch-bellied god of wisdom; whilst a third, Kama (Kamadeva) or Kandarpa, the god of love, gets his popular epithet of Ananga, " the bodiless," from his having once, in frolicsome play, tried the power of his arrows upon Siva, whilst engaged in austere practices, when a single glance from the third (forehead) eye of the angry god reducedthe mischievous urchin to ashes. For his chief attendant , the great god (Mahadeva, Mahesvara) has already with him the " holy " Nandi — presumably, though his shape is not specified, identical in form as in name with Siva's sacred bull of later times, the appropriate symbol of the god's reproductive power. But, in this repect, we also meet in the epics with the first clear evidence of what in after time became the promi- nent feature of the worship of Siva and his consort all over India, viz. the feature represented by the linga, or phallic symbol.

As regards Vishnu, the epic poems, including the supplement to the Mahabharata, the Harivamsa, supply practically the entire framework of legendary matter on which the later Vaish- nava creeds are based. The theory of Avataras which makes the deity — also variously called Narayana, Purushottama, or Yasudeva — periodically assume some

material form in order to rescue the world from some great calamity, is fully developed; the ten universally recognized " descents " being enumerated in the larger poem. Though Siva, too, assumes various forms, the incarnation theory is peculiarly characteristic of Vaishnav- ism; and the fact that the principal hero of the Ramayana (Rama), and one of the prominent warriors of the Mahabharata (Krishna) become in this way identified with the supreme god, and remain to this day the chief objects of the adoration of Vaishnava sectaries, naturally imparts to these creeds a human interest and sympathetic aspect which is wholly wanting in the worship of Siva. It is, however, unfortunately but too true that in some of these creeds the devotional ardour has developed features of a highly objectionable character.

Even granting the reasonableness of the triple manifestation of the Divine Spirit, how is one to reconcile all these idolatrous practices, this worship of countless gods and godlings, demons and spirits indwelling in every imaginable object round about us, with the pantheistic doctrine of the Ekam Advitiyam, " the One without a Second"? The Indian theosophist would doubtless have little difficulty in answering that question. For him there is only the One Absolute Being, the one reality that is all in all ; whilst all the phenomenal existences and occurrences that crowd upon our senses are nothing more than an illusion of the individual soul estranged for a time from its divine source— an illusion only to be dispelled in the end by the soul's fuller knowledge of its own true nature and its being one with the eternal fountain of blissful being. But

to the man of ordinary understanding, unused to the rarefied atmo- sphere of abstract thought, this conception of a transcendental, impersonal Spirit and the unreality of the phenomenal world can have no meaning : what he requires is a deity that stands in intimate relation to things material and to all that affects man's life. Hence the exoteric theory of manifestations of the Supreme Spirit ; and that not only the manifestations implied in the triad of gods repre- senting the cardinal processes of mundane existence — creation, preservation, and destruction or regeneration — but even such as would tend to supply a rational explanation for superstitious imaginings of every kind. For " the Indian philosophy does not ignore or hold aloof from the religion of the masses: it underlies, supports and interprets their polytheism. This may be accounted the keystone of the fabric of Brahmanism, which accepts and even encourages the rudest forms of idolatry, explaining everything by giving it a higher meaning. It treats all the worships as outward, visible signs of some spiritual truth, and is ready to show how each particular image or rite is the symbol of some aspect of universal divinity. The Hindus, like the pagans of antiquity, adore natural objects and forces — a mountain, a river or an animal. The Brahman holds all nature to be the vesture or cloak of indwelling, divine energy, which inspires everything that produces awe or passes man's understanding " (Sir Alfred C. Lyall, Brahminism).

During the early centuries of our era, whilst Buddhism, where countenanced by the political rulers, was still holding its own by the side of Brahmanism, sectarian belief in the Hindu gods seems to have made steady progress. The caste- a e „i Sm ' system, always calculated to favour unity of religious practice within its social groups, must naturally have contributed to the advance of sectarianism. Even greater was the support it received later on from the Puranas, a class of poetical works of a partly legendary, partly discursive and controversial charac- ter, mainly composed in the interest of special deities, of which eighteen principal (maha-purona) and as many secondary ones (upa-purana) are recognized, the oldest of which may go back to about the 4th century of our era. It was probably also during this period that the female element was first definitely admitted to a prominent place amongst the divine objects of sectarian worship, in the shape of the wives of the principal gods viewed as their sakti, or female energy, theoretically identi- fied with the Maya, or cosmic Illusion, of the idealistic Vedanta, and the Prakriti, or plastic matter, of the materialistic Sankhya philosophy, as the primary source of mundane things. The connubial relations of the deities may thus be considered " to typify the mystical union of the two eternal principles, spirit and matter, for the production and reproduction of the universe." But whilst this privilege of divine worship was claimed for the consorts of all the gods, it is principally to Siva's consort, in one or other of her numerous forms, that

adoration on an extensive scale came to be offered by a special sect of votaries, the Saktas.

In the midst of these conflicting tendencies, an attempt was made, about the latter part of the 8th century, by the dis- tinguished Malabar theologian and philosopher San- kara Acharya to restore the Brahmanical creed to something like its pristine purity, and thus once more to bring about a uniform system of orthodox Hindu belief. Though himself, like most Brahmans, apparently by predilection a follower of Siva, his aim was the revival of the doctrine of the Brahma as the one self-existent Being and the sole cause of the universe; coupled with the recognition of the practical worship of the orthodox pantheon, especially the gods of the Trimurti, as manifestations of the supreme deity. The practical result of his labours was the foundation of a new sect, the Smartas, i.e. adherents of the smriti or tradition, which has a numerous following amongst southern Brahmans, and, whilst professing Sankara's doctrines, is usually classed as one of the Saiva sects, its members adopting the horizontal sectarial mark peculiar to Saivas, consisting in their case of a triple line, the tripundra, prepared from the ashes of burnt cow-dung and painted on the forehead. Sankara also founded four Maths, or convents, for Brahmans; the chief one being that of Sringeri in Mysore, the spiritual head {Guru) of which wields consider- able power, even that of excommunication, over the Saivas of southern India. In northern India, the professed followers of Sankara are mainly limited to certain classes of mendicants

and ascetics, although the tenets of this great Vedanta teacher may be said virtually to constitute the creed of intelligent Brahmans generally.

Whilst Sankara's chief title to fame rests on his philosophical works, as the upholder of the strict monistic theory of Vedanta, he doubtless played an important part in the partial remodelling of the Hindu system of belief at a time when Buddhism was rapidly losing ground in India. Not that there is any evidence of Buddhists ever having been actually persecuted by the Brahmans, or still less of Sankara himself ever having done so; but the traditional belief in some personal god, as the principal representative of an invisible, all-pervading deity, would doubtless appeal more directly to the minds and hearts of the people than the colourless ethical system promulgated by the Sakya saint. Nor do Buddhist places of worship appear as a rule to have been destroyed by Hindu sectaries, but they seem rather

to have been taken over by them for their own religious uses; at any rate there are to this day not a few Hindu shrines, especially in Bengal, dedicated to Dharmaraj, " the prince of righteousness," as the Buddha is commonly styled. That the tenets and practices of so characteristic a faith as Buddhism, so long prevalent in India, cannot but have left their marks on Hindu life and belief may readily be assumed, though it is not so easy to lay one's finger on the precise features that might seem to betray such an influence. If the genera! tenderness towards animals, based on the principle of ahimsa, or inflicting no injury on sentient beings, be due to Buddhist teaching, that influence must have made itself felt at a comparatively early period, seeing that senti- ments of a similar nature are repeatedly urged in the Code of Manu. Thus, in v. 46-48, " He who does not willingly cause the pain of confinement and death to living beings, but desires the good of all, obtains endless bliss. He who injures no creature obtains without effort what he thinks of, what he strives for, and what he fixes his mind on. Flesh-meat cannot be procured without injury to animals, and the slaughter of animals is not conducive to heavenly bliss: from flesh-meat, therefore, let man abstain." Moreover, in view of the fact that Jainism, which originated about the same time as Buddhism, inculcates the same principle, even to an extravagant degree, it seems by no means improbable that the spirit of kindliness towards living beings generally was already widely diffused among the people when these new doctrines were promulgated. To the same tendency doubtless is due the gradual decline and ultimate discontinuance of animal sacrifices by all sects except the extreme branch of Sakti-worshippers. In this respect, the veneration shown to serpents and monkeys has, however, to be viewed in a some- what different light, as having a mythical background; whilst quite a special significance attaches to the sacred character assigned to the cow by all classes of Hindus, even those who are not prepared to admit the claim of the Brahman to the exalted position of the earthly god usually conceded to him. In the Veda no tendency shows itself as yet towards rendering divine honour to the cow; and though the importance assigned her in an agricultural com- munity is easily understood, still the exact process of her deification and her identification with the mother earth in the time of Manu and the epics requires further elucidation. An idealized type of the useful quadruped — likewise often identified with the earth — presents itself in the mythical Cow of Plenty, or " wish-cow " (Kamadhenu, or Kamadugha, i.e. wish-milker), already appearing in the Atharvaveda, and in epic times assigned to Indra, or identified with Surabhi, " the fragrant," the sacred cow of the sage Vasishtha. Possibly the growth of the legend of Krishna — his being reared at Go-kula (cow-station) ; his tender relations to the gopis, or cow-herdesses, of Vrindavana; his epithets Gopala, "the cowherd," and Govinda, " cow-finder," actually explained as " recoverer of the earth " in the great epic, and the go-loka, or " cow-world," assigned to him as his

heavenly abode — may have some connexion with the sacred character ascribed to the cow from early times.

Since the time of Sankara, or for more than a thousand years, the gods Vishnu and Siva, or Hart and Hara as they are also commonly called — with their wives, especially that of the latter god — have shared between them the practical worship of the vast majority of Hindus. But, though the people have thus been divided between two different religious camps, sectarian animosity has upon the whole kept within reasonable limits. In fact, the respectable Hindu, whilst owning special allegiance to one of the two gods as his ishtd devata (favourite deity), will not withhold his tribute of adoration from the other gods of the pantheon. The high-caste Brahman will probably keep at his home a salagram stone, the favourite symbol of Vishnu, as well as the characteristic emblems of Siva and his consort, to both of which he will do reverence in the morn- ing; and when he visits some holy place of pilgrimage, he will not fail to pay his homage at both the Saiva and the Vaishnava shrines there. Indeed. " sectarian bigotry and exclusiveness are to be found chiefly among the professional leaders of the

Worship.

modern brotherhoods and their low-caste followers, who are taught to believe that theirs are the only true gods, and that the rest do not deserve any reverence whatever " (Jog. Nath). The same spirit of toleration shows itself in the celebration of the numerous religious festivals. Whilst some of these — e.g. the Sankranti (called Pongal, i.e. " boiled rice," in the south), which marks the entrance of the sun into the sign of Capricorn and the beginning of its northward course (uttardyana) on the 1st day of the month Magha (c. Jan. 12); the GaneSa-cat-urthi, or 4th day of the light fortnight of Bhadra (August-September), considered the birthday of Ganesa, the god of wisdom; and the Holt, the Indian Saturnalia in the month of Phalguna (February to March) — have nothing of a sectarian tendency about them ; others again, which are of a distinctly sectarian character- such as the Krishna-janmashtami, the birthday of Krishna on the 8th day of the dark half of Bhadra, or (in the south) of Sravana (July- August), the Durgapuja and the Dipavali, or lamp feast, celebrating Krishna's victory over the demon Narakasura, on the last two days of Asvina (September-October) — are likewise observed and heartily joined in by the whole community irrespective of sect. Widely different, however, as is the character of the two leading gods are also the modes of worship practised by their votaries.

Siva has at all times been the favourite god of the Brahmans, 1 and his worship is accordingly more widely extended than that of his rival, especially in southern India. Indeed there is hardly a village in India which cannot boast of a shrine dedicated to Siva, and containing the emblem of

his reproductive power; for almost the only form in which the " Great God " is adored is the Linga, consisting usually of an upright cylindrical block of marble or other stone, mostly resting on a circular perforated slab. The mystic nature of these emblems seems, however, to be but little understood by the common people; and, as H. H. Wilson remarks, " notwithstanding the acknowledged purport of this worship, it is but justice to state that it is un- attended in Upper India by any indecent or indelicate cere- monies, and it requires a rather lively imagination to trace any resemblance in its symbols to the objects they are supposed to represent." In spite, however, of its wide diffusion, and the vast number of shrines dedicated to it, the worship of Siva has never assumed a really popular character, especially in northern India, being attended with scarcely any solemnity or display of emotional spirit. The temple, which usually stands in the middle of a court, is as a rule a building of very moderate dimensions, consisting either of a single square chamber, sur- mounted by a pyramidal structure, or of a chamber for the linga and a small vestibule. The worshipper, having first circum- ambulated the shrine as often as he pleases, keeping it at his right-hand side, steps up to the threshold of the sanctum, and presents his offering of flowers or fruit, which the officiating priest receives; he then prostrates himself, or merely lifts his hands — joined so as to leave a hollow space between the palms — to his forehead, muttering a short prayer, and takes his departure. Amongst the many thousands of Lingas, twelve are usually regarded as of especial sanctity, one of which, that of Somnath in Gujarat, where Siva is worshipped as " the lord of Soma," was, however, shattered by Mahmud of Ghazni; whilst another, representing Siva as Visvesvara, or " Lord of the Universe," is the chief object of adoration at Benares, the great centre of Siva-worship. The Saivas of southern India, on the other hand, single out as peculiarly sacred five of their temples which are supposed to enshrine as many characteristic aspects (linga) of the god in the form of the five elements, the most holy of these being the shrine of Chidambaram (i.e. " thought- ether ") in S. Arcot, supposed to contain the ether-linga. Accord- ing to Pandit S. M. Natesa (Hindu Feasts, Fasts and Ceremonies), " the several forms of the god Siva in these sacred shrines are considered to be the bodies or casements of the soul whose

1 Siva is said to have first appeared in the beginning of the present age as Sveta, the White, for the purpose of benefiting the Brahmans, and he is invariably painted white; whilst Vishnu, when pictured, is always of a dark-blue colour.

natural bases are the five elements — earth, water, fire, air and ether. The apprehension of God in the last of these five as ether is, according to the Saiva school of philosophy, the highest form of worship, for it is not the worship of God in a tangible form, but the worship of what, to ordinary minds, is vacuum, which nevertheless leads to the attainment of a knowledge of the all-pervading without physical accessories in the shape of any linga, which is, after all, an emblem. That this is the case at Chidambaram is known to every Hindu, for if he ever asks the priests to show him the God in the temple he is pointed to an empty space in the holy of holies, which has been termed the Akasa, or ether-linga." But, however congenial this refined symbolism may be to the worshipper of a speculative turn of mind, it is difficult to see how it could ever satisfy the religious wants of the common man little given to abstract conceptions of this kind.

From early times, detachment from the world and the practice of austerities have been regarded in India as peculiarly con- ducive to a spirit of godliness, and ultimately to a Meadl- state of ecstatic communion with the deity. On these orders. grounds it was actually laid down as a rule for a man solicitous for his spiritual welfare to pass the last two of the four stages (dsrama) of his life in such conditions of renunciation and self-restraint. Though there is hardly a sect which has not contributed its share to the element of religious mendicancy and asceticism so prevalent in. India, it is in con- nexion with the Siva-cult that these tendencies have been most extensively cultivated. Indeed, the personality of the stern God himself exhibits this feature in a very marked degree, whence the term mahdyogi or " great ascetic " is often applied to him.

Of Saiva mendicant and ascetic orders, the members of which are considered more or less followers of. Sankara Acharya, the followirg may be mentioned: (i) Dandis, or staff-bearers, who carry a wand with a piece of red cloth, containing the sacred cord, attached to it, and also wear one or more pieces of cloth of the same colour. They worship Siva in his form of Bhairava, the " terrible." A sub-section of this order are the Dandi Dasnamis, or Dandi of ten names, so called from their assuming one of the names of Sankara's four disciples, and six of their pupils. (2) Yogis (or popularly, Jogis), i.e. adherents of the Yoga philosophy and the system of ascetic practices enjoined by it with the view of mental abstraction and the supposed attainment of superhuman powers — practices which, when not merely pretended, but rigidly carried out, are only too apt to produce vacuity of mind and wild fits of frenzy. In these degenerate days their supernatural powers consist chiefly in con- juring, sooth-saying, and feats of jugglery, by which they seldom fail in imposing upon a credulous public. (3) Sannyasis, devotees who " renounce " earthly concerns, an order not confined either to the Brahmanical caste or to the Saiva persuasion. Those of the latter are in the habit of smearing their bodies with ashes, and

wearing a tiger-skin and a necklace or rosary of rudrakska berries (Elaeocarpus Ganitrus, lit. " Rudra's eye "), sacred to Siva, and allowing their hair to grow till it becomes matted and filthy. (4) Parama-hamsas, i.e. " supreme geese (or swans)," a term applied to the world-soul with which they claim to be identical. This-is the highest order of asceticism, members of which are supposed to be solely engaged in meditating on the Brahma, and to be " equally indifferent to pleasure or pain, insensible of heat or cold, and in- capable of satiety or want." Some of them go about naked, but the majority are clad like the Dandis. (5) Aghora Panihis, a vile and disreputable class of mendicants, now rarely met with. Their filthy habits and disgusting practices of grosj promiscuous feeding, even to the extent of eating offal and dead men's flesh, look almost like a direct repudiation of the strict Brahmanical code of ceremonial purity and cleanliness, and of the rules regulating the matter and manner of eating and drinking; and they certainly make them objects of loathing and terror wherever they are seen.

On the general effect of the manner of life led by Sadhus or " holy men," a recent observer (J. C. Oman, Mystics, Ascetics and Saints of India, p. 273) remarks: " Sadhuism, whether perpetuating the peculiar idea of the efficiency of austerities for the acquisition of far-reaching powers over natural phenomena, or bearing its testi- mony to the belief in the indispensableness of detachment from the world as a preparation for the ineffable joy of ecstatic communion with the Divine Being, has undoubtedly tended to keep before men's eyes, as the highest ideal, a life of purity, self-restraint, and contempt of the world and human affairs. It has also necessarily maintained amongst the laity a sense of the righteous claims of the poor upon the charity of the more affluent members of the community. Moreover, sadhuism, by the multiplicity of the inde- pendent sects which have arisen in India, has engendered and

favoured a spirit of tolerance which cannot escape the notice of the most superficial observer."

An independent Saiva sect, or, indeed, the only strictly Saiva sect, are the Vira Saivas, more commonly called Linga- yats (popularly Lin gaits) or Lingavats, from their practice of wearing on their person a phallic emblem fiˆte of Siva, made of copper or silver, and usually enclosed in a case suspended from the neck by a string. Apparently from the movable nature of their badge, their Gurus are called Janga- mas (" movable ")• This sect counts numerous adherents in southern India; the Census Report of 1901 recording nearly a million and a half, including some 70 or 80 different, mostly endogamous, castes. The reputed founder, or rather reformer, of the sect was Basava (or Basaba), a Brahman of the Belgaum district who seems to have lived in the nth or 12th century. According to the Basava-

purana he early in life renounced his caste and went to reside at Kalyana, then the capital of the Chalukya kingdom, and later en at Sangamesvara near Rat- nagiri, where he was initiated into the Vira Saiva faith which he subsequently made it his life's work to propagate. His doctrine, which may be said to constitute a kind of reaction against the severe sacerdotalism of Sankara, has spread over all classes of the southern community, most of the priests of Saiva temples there being adherents of it; whilst in northern India its votaries are only occasionally met with, and then mostly as mendicants, leading about a neatly caparisoned bull as representing Siva's sacred bull Nandi. Though the Lingayats still show a certain animosity towards the Brahmans, and in the Census lists are accordingly classes as an independent group beside the Hindus, still they can hardly be excluded from the Hindu community, and are sure sooner or later to find iheir way back to the Brahmanical fold.

Vishnu, whilst less popular with Brahmans than his rival, has from early times proved to the lay mind a more attractive object of adoration on account of the genial and, so to speak, romantic character of his mythical per- sonality. It is not, however, so much the original figure of the god himself that enlists the sympathies of his adherents as the additional elements it has received through the theory of periodical " descents " (avatdra) or incarnations applied to this deity. Whilst the Saiva philosophers do not approve of the notion of incarnations, as being derogatory to the dignity of the deity, the Brahmans have nevertheless thought fit to adopt it as apparently a convenient expedient for bringing certain tendencies of popular worship within the pale of their system, and probably also for counteracting the Buddhist doctrines; and for this purpose Vishnu would obviously offer himself as the most attractive figure in the Brahmanical trinity. Whether the incarnation theory started from the original solar nature of the god suggestive of regular visits to the world of men, or in what other way it may have originated, must remain doubtful. Certain, however, it is that at least one of his Avatars is clearly based on the Vedic conception of the sun-god, viz. that of the dwarf who claims as much ground as he can cover by three steps, and then gains the whole universe by his three mighty strides. Of the ten or more Avatars, assumed by different authorities, only two have entered to any considerable extent into the religious worship of the people, viz. those of Rama (or Rama-chandra) and Krishna, the favourite heroes of epic romance. That these, two figures would appeal far more strongly to the hearts and feelings of the people, especially the warlike Ksha- triyas, 1 than the austere Siva is only what might have been expected; and, indeed, since the time of the epics their cult seems never to have lacked numerous adherents. But, on the other hand, the essentially human nature of these two gods

1 As in the case of Siva's traditional white complexion, it may not be

without significance, from a racial point of view, that Vishnu, Rama and Krishna have various darker shades of colour attributed to them, viz. blue, hyacinthine, and dark azure or dark brown re- spectively. The names of the two heroes meaning simply "black " or " dark," the blue tint may originally have belonged to Vishnu, who is al°n called pi.tavasas, dressed in yellow garment, i.e. thft colours of sky and sun combined.

would naturally tend to modify the character of the relations between worshipper and worshipped, and to impart to the modes and forms of adoration features of a more popular and more human kind. And accordingly it is exactly in connexion with these two incarnations of Vishnu, especially that of Krishna, that a new spirit was infused into the religious life of the people by the sentiment of fervent devotion to the deity, as it found expression in certain portions of the epic poems, especially the Bhagavadgita, and in the Bkagavatapurana (as against the more orthodox Vaishnava works of this class such as the Vishnu- purana), and was formulated into a regular doctrine of faith in the Sandilya-sutra, and ultimately translated into practice by the Vaishnava reformers.

The first successful Vaishnava reaction against Sankara's reconstructed creed was led by Ramanuja, a southern Brahman

of the 1 2th century. His followers, the Ramanujas, aulas' or Sri-Vaishnavas as they are usually called, worship

Vishnu (Narayana) with his consort Sri or Lakshmi (the goddess of beauty and fortune), or their incarnations Rama with Sita and Krishna with Rukmini. Ramanuja's doctrine, which is especially directed against the Linga-worship, is essenti- ally based on the tenets of an old Vaishnava sect, the Bhagavatas or Pancharatras, who worshipped the Supreme Being under the name of Vasudeva (subsequently identified with Krishna, as the son of Vasudeva, who indeed is credited by some scholars with the foundation of that monotheistic creed). The sectarial mark of the Ramanujas resembles a capital U (or, in the case of another division, a Y), painted with a white clay called gopi- chandana, between the hair and the root of the nose, with a red or yellow vertical stroke (representing the female element) between the two white lines. They also usually wear, like all Vaishnavas, a necklace of tulasi, or basil wood, and a rosary of seeds of the same shrub or of the lotus. Their most important shrines are those of Srirangam near Trichinopoly, Mailkote in Mysore, Dvaraka (the city of Krishna) on the Kathiawar coast, and Jagannath in Orissa; all of them decorated with

Vishnu's emblems, the tulasi plant and salagram stone. The Ramanuja Brahmans are most punctilious in the preparation of their food and in regard to the privacy of their meals, before taking which they have to bathe and put on woollen or silk garments. Whilst Sankara's mendicant followers were pro- hibited to touch fire and had to subsist entirely on the charity of Brahman householders, Ramanuja, on the contrary, not only allowed his followers to use fire, but strictly forbade their eating any food cooked, or even seen, by a stranger. On the speculative side, Ramanuja also met Sankara's strictly monistic theory by another recognizing Vishnu as identical with Brahma as the Supreme Spirit animating the material world as well as the individual souls which have become estranged from God through unbelief, and can only attain again conscious union with him through devotion or love (bhakti). His tenets are expounded in various works, especially in his commentaries on the Vedanta- sutras and the Bhagavadgita. The followers of Ramanuja have split into two sects, a northern one, recognizing the Vedas as their chief authority, and a southern one, basing their tenets on the Nalayir, a Tamil work of the Upanishad order. In point of doctrine, they differ in their view of the relation between God Vishnu and the human soul; whilst the former sect define it by the ape theory, which makes the soul cling to God as the young ape does to its mother, the latter explain it by the cat theory, by which Vishnu himself seizes and rescues the souls as the mother cat does her young ones.

Madhva Acharya, another distinguished Vedanta teacher and founder of a Vaishnava sect, born in Kanara inA.D. 1199,

was less intolerant of the Linga cult than Ramanuja,

but seems rather to have aimed at a reconciliation of the Saiva and Vaishnava forms of worship. The Madhvas or Madhvacharis favour Krishna and his consort as their special objects of adoration, whilst images of Siva, Parvati, and their son Ganesa are, however, likewise admitted and worshipped in some of their temples, the most important of which is at Udipi Jn South Kanara, with eight monasteries connected with it.

Madhvas.

This shrine contains an image of Krishna which is said to have been rescued from the wreck of a ship which brought it from Dvaraka, where it was supposed to have been set up of old by no other than Krishna's friend Arjuna, one of the five Pandava princes. Followers of the Madhva creed are but rarely met with> in Upper India. Their sectarial mark is like the U of the Sri- Vaishnavas, except that their central line is black instead of red or yellow. Madhva — who after his initiation assumed the name

Anandatirtha — composed numerous Sanskrit works, including commentaries on the Brahma sutras {i.e. the Vedanta aphorisms), the Gita, the Rigveda and many Upanishads. His philosophical theory was a dualistic one, postulating dis- tinctness of nature for the divine and the human soul, and hence independent existence, instead of absorption, after the completion of mundane existence.

The Ramanandis or Ramavats (popularly Ramats) are a numerous northern sect of similar tenets to those of the Rama- nujas. Indeed its founder, Ramananda, who probably „ flourished in the latter part of the 14th century, according to the traditional account, was originally a Sri-Vaishnava monk, and, having come under the suspicion of laxity in observing the strict rules of food during his peregrinations, and been ordered by his superior (Mahant) to take his meals apart from his brethren, left the monastery in a huff and set up a schismatic math of his own at Benares. The sectarial mark of his sect differs but slightly from that of the parent stock. The distinctive features of their creed consist in their making Rama and Sita, either singly or conjointly, the chief objects of their adoration, instead of Vishnu and Lakshmi, and their attach- ing little or no importance to the observance of privacy in the cooking and eating of their food. Their mendicant members, usually known as Vairagis, are, like the general body of the sect, drawn from all castes without distinction. Thus, the founder's twelve chief disciples include, besides Brahmans, a weaver, a currier, a Rajput, a Jat and a barber — for, they argue, seeing that Bhagavan, the Holy One (Vishnu), became incarnate even in animal form, a Bhakta (believer) may be born even in the lowest of castes. Ramananda's teaching was thus of a distinctly levelling and popular character; and, in accordance therewith, the Bhakta-mala and other authoritative writings of the sect are composed, not in Sanskrit, but in the popular dialects. A follower of this creed was the distinguished poet Tulsidas, the composer of the beautiful Hindi version of the Ramayana and other works which " exercise more influence upon the great body of Hindu population than the whole voluminous series of Sanskrit composition " (H. H. Wilson).

The traditional list of Ramananda's immediate disciples inch- Jes the name of Kabir, the weaver, a remarkable man who would accordingly have lived in the latter part KaMr of the 1 5th century, and who is claimed by both Hindus and Moslems as having been born within their fold. The story goes that, , having been deeply impressed by Ramananda's teaching, he sought to attach himself to him; and, one day at Benares, in stepping down the ghat at daybreak to bathe in the Ganges, and putting himself in the way of the teacher, the latter, having inadvertently struck him with his foot, uttered his customary exclamation " Ram Ram," which, being also the initiatory formula of the sect, was claimed by Kabir as such, making him Ramananda's disciple. Be this as it may, Kabir's own reformatory activity

lay in the direction of a compromise between the Hindu and the Mahommedan creeds, the religious practices of both of which, he criticized with equal severity. His followers, the Kabir Panthis (" those following Kabir's path "), though neither worshipping the gods of the pantheon, nor observing the rites and ceremonial of the Hindus, are never- theless in close touch with the Vaishnava sects, especially the Ramavats, and generally worship Rama as the supreme deity, when they do not rather address their homage, in hymns and otherwise, to the founder of their creed himself. Whilst very numerous, particularly amongst the low-caste population, in western, central and northern India, resident adherents of Kabir's doctrine are rare in Bengal and the south; although

" there is hardly a town in India where strolling beggars may not be found singing songs of Kabir in the original or as trans- lated into the local dialects." The mendicants of this creed, however, never actually solicit alms; and, indeed, "the quaker- ,like spirit of the sect, their abhorrence of all violence, their regard for truth and the inobtrusiveness of their opinions render them very inoffensive members of the state " (H. H. Wilson). The doctrines of Kabir are taught, mostly in the form of dia- logues, in numerous Hindi works, composed by his disciples and adherents, who, however, usually profess to give the teacher's own words.

The peculiar conciliatory tendencies of Kabir were carried on with even greater zeal from the latter part of the 15th century by one of his followers, Nanak Shah, the promulgator of the creed of the Nanak Shahis or Sikhs — i.e. (Sanskr.) sishya, dis- ciples, whose guru, or teacher, he called himself — a peaceful sect at first until, in consequence of Mahommedan persecution, a martial spirit was infused into it by the tenth, and last, guru, Govind Shah, changing it into a political organization. Whilst originally more akin in its principles to the Moslem faith, the sect seems latterly to have shown tendencies towards drifting back to the Hindu pale.

Of Ramananda's disciples and successors several others, besides Kabir, have established schismatic divisions of their own, which do not, however, offer any very marked differences of creed. The most important of these, the Dadu Panthi sect, founded by Dadu about the year 1600, has a numerous following in Ajmir and Marwar, one section of whom, the Nagas, engage largely in military service, whilst the others are either householders or mendicants. The followers of this creed wear no distinctive sectarial mark or badge, except a skull-cap; nor do they worship any visible image of any deity, the repetition (japa) of the name of Rama being the

only kind of adoration practised by them.

Although the Vaishnava sects hitherto noticed, in their adoration of Vishnu and his incarnations, Krishna and Rama- Erotkism chandra, usually associate with these gods their and wives, as their saktis, or female energies, the sexual

Krishna element is, as a rule, only just allowed sufficient scope worn p. tQ ennance tne emotional character of the rites of worship. In some of the later Vaishnava creeds, on the other hand, this element is far from being kept within the bounds of moderation and decency. The favourite object of adoration with adherents of these sects is Krishna with his mate — but not the devoted friend and counsellor of the Pandavas and deified hero of epic song, nor the ruler of Dvaraka and wedded lord of Rukmini, but the juvenile Krishna, Govinda or Bala Gopala, " the cowherd lad," the foster son of the cowherd Nanda of Gokula, taken up with his amorous sports with the Gopis, or wives of the cowherds of Vrindavana (Brindaban,near Mathura on the Yamuna), especially his favourite mistress Radha or Radhika. This episode in the legendary life of Krishna has every appearance of being a later accretion. After barely a few allusions to it in the epics, it bursts forth full-blown in the Harivansa, the Vishnu-purana, the Narada-Pancharatra and the Bhagavata-purana, the tenth canto of which, dealing with the life of Krishna, has become, through vernacular versions, especially the Hindi Prem-sagar, or " ocean of love," a favourite romance all over India, and has doubtless helped largely to popularize the cult of Krishna. Strange to say, however, no mention is as yet made by any of these works of Krishna's favourite Radha; it is only in another Purana — though scarcely deserving that designation — that she makes her appearance, viz. in the Brahma-vaivarta, in which Krishna's amours in Nanda's cow-station are dwelt upon in fulsome and wearisome detail; whilst the poet Jayadeva, in the 12th century, made her love for the gay and inconstant boy the theme of his beautiful, if highly voluptuous, lyrical drama, Gita-govinda.

The earliest of the sects which associate Radha with Krishna in their worship is that of the Nimavats, founded by Nimbaditya or Nimbarka {i.e. " the sun of the Nimba tree"), a teacher of un- certain date, said to have been a Telugu Brahman who subsequently established himself at Mathura (Muttra) on the Yamuna, where the headquarters of his sect have remained ever since. The Mahant of their monastery at Dhruva Kshetra near Mathura, who claims direct descent from Nimbarka. is said to place the foundation of that establishment as far back as the 5th centHjry- ˆdbubtless an

exaggerated claim; but if Jayadeva, as is alleged, and seems by no means

improbable, was really a follower of Nimbarka, this teacher must have flourished, at latest, in the early part of the 1 2th century. He is indeed taken by some authorities to be identical with the mathematician Bhaskara Acharya, who is known to have completed his chief work in a.d. 1150. It is worthy of remark, in this respect, that— in accordance with Ramanuja's and Nimbarka's philosophical theories— Jayadeva's presentation of Krishna's fickle love for Radha is usually interpreted in a mystical sense, as allegorically depicting the human soul's striving, through love, for reunion with God, and its ultimate attainment, after many backshdings, of the longed-for goal. As the chief authority of their tenets, the Nimavats recognize the Bhagavata-purana; though several works, ascribed to Nimbarka— partly of a devotional char- acter and partly expository of Vedanta topics— are still extant. Adherents of this sect are fairly numerous in northern India, their frontal mark consisting of the usual two perpendicular white lines, with, however, a circular black spot between them.

Of greater importance than the sect just noticed, because of their far larger following, are the two sects founded early in the 1 6th century by Vallabha (Ballabha) Acharya and Chaitanya. In the forms of worship favoured by votaries of these creeds the emotional and erotic elements are allowed yet freer scope than in those that preceded them; and, as an effective auxiliary to these tendencies, the use of the vernacular dialects in prayers and hymns of praise takes an important part in the religious service. The VaUabhacharis, or, as they are usually called, from the title of their spiritual heads, the Gokulastha Gosains, i.e. " the cow-lords (gosvamin) residing in Gokula," are very numerous in western and central India. Vallabha, the son of a Telinga Brahman, after extensive journeyings all over India, settled at Gokula near Mathura, and set up a shrine with an image of Krishna Gopala. Ab ™' the year 1673, in consequence of the fanatical persecutions of the Mogul emperor, this image was transferred to Nathdvara in Udaipur (Mewar), where the shrine of Srinatha (" the lord of Sri," i.e. Vishnu) continues to be the chief centre of worship for adherents of this creed ; whilst seven other images, transferred from Mathura ft the same time, are located at different places in Rajputana. Vallabha himself went subsequently to reside at Benares, where he died. In the doctrine of this Vaishnava prophet, the adualistic theory of Sankara is resorted to as justifying a joyful and voluptuous cult of the deity. For, if the human soul is identical with God, the practice of austerities must be discarded as directed against God, and it is rather by a free indulgence of the natural appetites and the pleasures of life that man's love for God will best be shown. The followers of his creed, amongst whom there are many wealthy merchants and bankers, direct their worship chiefly to Gopal Lai, the boyish Krishna of Vrindavana, whose image is sedulously attended like a

revered living person eight times a day — from its early rising from its couch up to its retiring to repose at night. The sectarial mark of the adherents consists of two red perpendicular lines, meeting in a semicircle at the root of the nose, and having a round red spot painted between them. Their principal doctrinal authority is the Bhagavata-purana, as commented upon by Val- labha himself, who was also the author of several other Sanskrit works highly esteemed by his followers. In this sect, children are solemnly admitted to full membership at the early age of four, and even two, years of age, when a rosary, or necklace, of 108 beads of basil (tulsi) wood is passed round their necks, and they are taught the use of the octo-syllabic formula Sri-Krishnah saranam mama, " Holy Krishna is my refuge." Another special feature of this sect is that their spiritual heads, the Gosains, also called Maharajas, so far from submitting themselves to self-discipline and austere practices, adorn themselves in splendid garments, and allow them- selves to be habitually regaled by their adherents with choice kinds of food; and being ˆregarded as the living representatives of the " lord of the Gopis " himself, they claim and receive in their own persons all acts of attachment and worship due to the deity, even, it is alleged, to the extent of complete self-surrender. In the final judgment of the famous libel case of the Bombay Maharajas, before the Supreme Court of Bombay, in January 1862, these impro- prieties were severely commented upon; and though so unsparing a critic of Indian sects as Jogendra Nath seems not to believe in actual immoral practices on the part of the Maharajas, still he admits that " the corrupting influence of a religion, that can make its female votaries address amorous songs to their spiritual guides, must be very great."

A modern offshoot of Vallabha's creed, formed with the avowed object of purging it of its objectionable features, was started, in the early years of the 19th century, by Sahajananda, a Brahman of the Oudh country, who subsequently assumed the name of Svami Narayana. Having entered on his missionary labours at Ahmada- bad, and afterwards removed to Jetalpur, where he had a meeting with Bishop Heber, he subsequently settled at the village of Wartal, to the north-west of Baroda, and erected a temple to Lakshmi- Narayana, which, with another at Ahmadabad, forms the two chief centres of the sect, each being presided over by a Maharaja, Their worship is addressed to Narayana, i.e. Vishnu, as the Supreme Being, together with Lakshmi, as well as to Krishna and Radha. The sect is said to be gatrfhTg grdttrid in Gufar'at. Chaitanya, the

founder of the great Vaishnava sect of Bengal, was the son of a high-caste

Brahman of Nadiya, the famous Bengal seat of Sanskrit learning, where he was born in 1485, two years after the birth of Martin Luther, the German reformer. Having married in due time, and a second time after the death of his first wife, he lived as a " householder " (grihastha) till the age of 24, when he renounced his family ties and set out as a religious mendicant {vairagin), visiting during the next six years the principal places of pilgrimage in northern India, and preaching with remarkable success his doctrine of Bhakti, or passionate devotion to Krishna, as the Supreme Deity. He subsequently made over to his principal disciples the task of consolidating his community, and passed the last twelve years of his life at Puri in Orissa, the great centre of the worship of Vishnu as Jagannatha, or " lord of the world," which he remodelled in accordance with his doctrine, causing the mystic songs of Jayadeva to be recited before the images in the morning and evening as part of the daily service; and, in fact, as in the other Vaishnava creeds, seeking to humanize divine adoration by bringing it into accord with the experience of human love. To this end, music, dancing, singing-parties (sankirtan) , theatricals — in short anything calculated to produce the desired impression — would prove welcome to him. His doctrine of Bhakti distinguishes five grades of de- votional feeling in the Bhaktas, or faithful adherents: viz. (santi) calm contemplation of the deity ; (dasya) active servitude ; (sakhya) friendship or personal regard ; (vatsalya) tender affection as between parents and children ; {madhurya) love or passionate attachment, like that which the Gopis felt for Krishna. Chaitanya also seems to have done much to promote the celebration on an imposing scale of the great Puri festival of the Ratha-yatra, or " car-pro- cession," in the month of Ashadha, when, amidst multitudes of pilgrims, the image of Krishna, together with those of his brother Balarama and his sister Subhadra, is drawn along, in a huge car, by the devotees. Just as this festival was, and continues to be, attended by people from all parts of India, without distinction of caste or sex, so also were all classes, even Mahommedans, admitted by Chaitanya as members of his sect. Whilst numerous observances are recommended as more or less meritorious, the ordinary form of worship is a very simple one, consisting as it does mainly of the constant repetition of names of Krishna, or Krishna and Radha, which of itself is considered sufficient to ensure future bliss. The partaking of flesh food and spirituous liquor is strictly prohibited. By the followers of this sect, also, an extravagant degree of reverence is habitually paid to their gurus or spiritual heads. Indeed, Chait- anya himse'lf, as well as his immediate disciples, have come to be regarded as complete or partial incarnations of the deity to whom adoration is due, as to Krishna himself; and their modern suc- cessors, the Gosains, share to the fullest extent in the devout atten- tions of the worshippers. Chaitanya's movement, being chiefly directed against the vile practices of the Saktas, then very prevalent in Bengal, was doubtless prompted by the best and purest of in- tentions; but

his own doctrine of divine, though all too human, love was, like that of Vallabha, by no means free from corruptive tendencies, — yet, how far these tendencies have worked their way, who would say? On this point, Dr W. W. Hunter — who is of opinion that " the death of the reformer marks the beginning of the spiritual decline of Vishnu-worship," observes {Orissa, i. m), " The most deplorable corruption of Vishnu-worship at the present day is that which has covered the temple walls with indecent sculptures, and filled its innermost sanctuaries with licentious rites" . . . yet. . . "it is difficult for a person not a Hindu to pronounce upon the real extent of the evil. None but a Hindu can enter any of the larger temples, and none but a Hindu priest really knows the truth about their inner mysteries " ; whilst the well-known native scholar Babu Rajendralal Mitra points out (Antiquities of Orissa, i. m) that " such as they are, these sculptures date from centuries before the birth of Chaitanya, and cannot, therefore, be attributed to his doctrines or to his followers. As a Hindu by birth, and a Vaishnava by family religion, I have had the freest access to the innermost sanctuaries and to the most secret of scriptures. I have studied the subject most extensively, and have had opportunities of judging which no European can have, and I have no hesitation in saying that, ' the mystic songs' of Jayadeva and the ' ocean of love ' notwithstanding, there is nothing in the rituals of Jagannatha which can be called licentious." Whjjst in Chaitanya's creed, Krishna, in his relations to Radha, remains at least theoretically the chief partner, an almost inevitable step was taken by some minor sects in attaching the greater im- portance to the female element, and making Krishna's love for his mistress the guiding sentiment of their faith. Of these sects, it will suffice to mention that of the Radha-Vallabhis, started in the latter part of the 16th century, who worship Krishna as Radha-vallabha, " the darling of Radha." The doctrines and practices of these sects clearly verge upon those obtaining in the third principal division of Indian sectarians which will now be considered.

The Saktas, as we have seen, are worshippers of the sakti, or the female principle as a primary factor in the creation and reproduction of the universe. And # as each of the principal gods is supposed to have associated with him his own

particular sakti, as an indispensable complement enabling him to properly perform his cosmic functions, adherents of this persuasion might be expected to be recruited from all gaktas sects. To a certain extent this is indeed the case; but though Vaishnavism, and especially the Krishna creed, with its luxuriant growth of erotic legends, might have seemed peculiarly-favourable to a development in this direction, it is practically only in connexion with the Saiva system that an independent cult of the female principle has been developed; whilst in other sects — and, indeed, in the ordinary Saiva cult as well — such worship, even where it is at all

prominent, is combined with, and subordinated to, that of the male principle. What has made this cult attach itself more especially to the Saiva creed is doubtless the character of Siva as the type of reproductive power, in addition to his function as destroyer which, as we shall see, is likewise reflected in some of the forms of his Sakti. The theory of the god and his Sakti as cosmic principles is perhaps already foreshadowed in the Vedic couple of Heaven and Earth, whilst in the speculative treatises of the later Vedic period, as well as in the post- Vedic Brahmanical writings, the assumption of the self -existent being dividing himself into a male and a female half usually forms the starting-point of cosmic evolution. 1 In the later Saiva mythology this theory finds its artistic repre- sentation in Siva's androgynous form of Ardha-narisa, or " .half- woman-lord," typifying the union of the male and female energies; the male half in this form of the deity occupying the right-hand, and the female the left-hand side. In accordance with this type of productive energy, the Saktas divide themselves into two distinct groups, according to whether they attach the greater importance to the male or to the female principle; viz. the Dakshinacharis, or " right-hand-observers " (also called Dak- shina-margis, or followers " of the right-hand path "), and the Vamacharis, or " left-hand-observers " (or Vama-margis, followers " of the left path "). Though some of the Puranas, the chief repositories of sectarian doctrines, enter largely into Sakta topics, it is only in the numerous Tantras that these are fully and systematically developed. In these works, almost invariably composed in the form of a colloquy, Siva, as a rule, in answer to questions asked by his consort Parvati, unfolds the mysteries of this occult creed.

The principal seat of Sakta worship is the north-eastern part of India — Bengal, Assam and Behar. The great majority of its adherents profess to follow the right-hand practice; and apart from the implied purport and the emblems of the cult, their mode of adoration does not seem to offer any very objectionable features. And even amongst the adherents of the left-hand mode of worship, many of these are said to follow it as a matter of family tradition rather than of religious conviction, and to practise it in a sober and temperate manner; whilst only an extreme section — the so-called Kaulas or Kulinas, who appeal to a spurious Upanishad, the Kaulo-panishad, as the divine authority of their tenets — persist in carrying on the mystic and licentious rites taught in many of the Tantras. But strict secrecy being enjoined in the performance of these rites, it is not easy to check any statements made on this point. The Sakta cult is, however, known to be especially prevalent — though apparently not in a very extreme form — amongst members of the very respectable Kayastha or writer caste of Bengal, and as these are largely employed as clerks and accountants in Upper India, there is reason to fear that their vicious practices are gradually being disseminated through them.

The divine object of the adoration of the Saktas, then, is Siva's wife — the Devi (goddess), Mahadevi (great goddess), or Jagan-mata (mother of the world) — in one or other of her numerous forms, benign or terrible. The forms in which she is worshipped in Bengal are of the latter category, viz. Durga, " the unapproachable," and Kali, " the black one," or, as some take it, the wife of Kala, " time," or death the great dissolver, viz. Siva. In honour of the former, the Durga-puja is celebrated

1 This notion not improbably took its origin in the mystic cos- mogonic hymn, Rigv. x. 129, where it is said that — " that one (existent, neutr.) breathed breathless by (or with) its svadha (? in- herent power, or nature), beyond that there was nothing whatever . . . that one live (germ) which was enclosed in the void was generated by the power of heat (or fervour) ; desire then first came upon it, which was the first seed of the mind . . . fertilizing forces there were, svadha below, prayati (? will) above."

a community already strongly imbued with pantheistic notions; yet, at best, that creed could only appeal to the sympathies of a comparatively limited portion of the people. Indeed, the sacerdotal class themselves had made its universal acceptance an impossibility, seeing that their laws, by which the relations of the classes were to be regulated, aimed at permanently ex- cluding the entire body of aboriginal tribes from the religious life of their Aryan masters. They were to be left for all time coming to their own traditional idolatrous notions and practices. However, the two races could not, in the nature of things, be permanently kept separate from each other. Indeed, even prior to the definite establishment of the caste-system, the mingling of the lower race with the upper 1 classes, especially with the aristocratic landowners and still more so with the yeomanry, had probably been going on to such an extent as to have resulted in two fairly well- defined intermediate types of colour between the priestly order and the servile race and to have facilitated the ultimate division into four "colours" (varna). In course of time the process of intermingling, as we have seen, assumed such proportions that the priestly class, in their pride of blood, felt naturally tempted to recognize, as of old, only two " colours," the Aryan Brahman and the non-Aryan Sudra. Under these conditions the religious practices of the lower race could hardly have failed in the long run to tell seriously upon the spiritual life of the lay body of the Brahmanical community. To what extent this may have been the case, our limited know- ledge of the early phases of the sectarian worship of the people does not enable us to determine. But, on the other hand, the same process of racial intermixture also tended to gradually draw the lower race more or less

under the influence of the Brah- manical forms of worship, and thus contributed towards the shaping of the religious system of modern Hinduism. The grossly idolatrous practices, however, still so largely prevalent in the Dravidian South, show how superficial, after all, that influence has been in those parts of India where the admixture of Aryan blood has been so slight as to have practically had no effect on the racial characteristics of the people. These present- day practices, and the attitude of the Brahman towards them, help at all events to explain the aversion with which the strange rites of the subjected tribes were looked upon by the worshippers of the Vedic pantheon. At the same time, in judging the apparently inhuman way in which the Sudras were treated in the caste rules, one has always to bear in mind the fact that the belief in metempsychosis was already universal at the time, and seemed to afford the only rational explanation of the apparent injustice involved in the unequal distribution of the good things in this world; and that, if the Sudra was strictly excluded from the religious rites and beliefs of the superior classes, this exclusion in no way involved the question of his ultimate emancipation and his union with the Infinite Spirit, which were as certain in his case as in that of any other sentient being. What it did make impossible for him was to attain that union immediately on the cessation of his present life, as he would first have to pass through higher and purer stages of mundane existence before reaching that goal; but in this respect he only shared the lot of all but a very few of the saintliest in the higher spheres of life, since the ordinary twice-born would be liable to sink, after his present life, to grades yet lower than that of the Sudra.

To what extent the changes, which the religious belief of the Aryan classes underwent in post-Vedic times, may have been due to aboriginal influences is a question not easily answered, though the later creeds offer only too many features in which one might feel inclined to suspect influences of that kind. The literary documents, both in Sanskrit and Pali, dating from about the time of Buddha onwards — particularly the two epic poems, the Mahabharala and Ramayana — still show us in the main the personnel of the old pantheon; but the character of the gods has changed; they have become anthropomorphized and almost purely mythological figures. A number of the chief gods, sometimes four, but generally eight of them, now appear as lokapalas or world-guardians, having definite quarters or intermediate quarters of the compass assigned to them as their

special domains. One of them, Kubera, the god of wealth, is a new figure; whilst another, Varuna, the most spiritual and ethical of Vedic deities — the king of the gods and the universe; the nightly, star-spangled firmament — has become the Indian Neptune, the god of waters. Indra, their chief, is virtually a kind of superior raja, residing in svarga, and as such is on visiting terms with earthly kings, driving about in mid-air with his

charioteer Matali. As might happen to any earth-lord, Indra is actually defeated in battle by the son of the demon-king of Lanka (Ceylon), and kept there a prisoner till ransomed by Brahma and the gods conferring immortality on his con- queror. A quaint figure in the pantheon of the heroic age is Hanuman, the deified chief of monkeys — probably meant to represent the aboriginal tribes of southern India — whose wonder- ful exploits as Rama's ally on the expedition to Lanka Indian audiences will never weary of hearing recounted. The Gand- harvas figure already in the Veda, either as a single divinity, or as a class of genii, conceived of as the body-guard of Soma and as connected with the moon. In the later Vedic times they are represented as being fond of and dangerous to, women; the Apsaras, apparently originally water-nymphs, being closely associated with them. In the heroic age the Gandharvas have become the heavenly minstrels plying tru.ir art at Indra's court, with the Apsaras as their wives or mistresses. These fair damsels play, howevei, yet another part, and one far from complimentary to the dignity of the gods. In the epics consider- able merit is attached to a life of seclusion and ascetic practices by means of which man is considered capable of acquiring supernatural powers equal or even superior to those of the gods — – a notion perhaps not unnaturally springing from the pantheistic conception. Now, in cases of danger being threatened to their own ascendancy by such practices, the gods as a rule proceed to employ the usually successful expedient of despatching some lovely nymph to lure the saintly men back to worldly pleasures. Seeing that the epic poems, as repeated by pro- fessional reciters, either in their original Sanskrit text, or in their vernacular versions, as well as dramatic compositions based on them, form to this day the chief source of intellectual enjoy- ment for most Hindus, the legendary matter contained in these heroic poems, however marvellous and incredible it may appear, still enters largely into the religious convictions of the people. " These popular recitals from the Ramayan are done into Gujarati in easy, flowing narrative verse … by Premanand, the sweetest of our bards. They are read out by an intelligent Brahman to a mixed audience of all classes and both sexes. It has a perceptible influence on the Hindu character. I believe the remarkable freedom from infidelity which is to be seen in most Hindu families, in spite of their strange gregarious habits, can be traced to that influence; and little wonder " (B. M. Malabari, Gujarat and the Gujaratis). Hence also the universal reverence paid to serpents (naga) since those early days; though whether it simply arose from the superstitious dread inspired by the insidious reptile so fatal to man in India, or whether the verbal coincidence with the name of the once-powerful non- Aryan tribe of Nagas had something to do with it must remain doubtful. Indian myth represents them as a race of demons sprung from Kadru, the wife of the sage Kasyapa, with a jewel in their heads which gives them their sparkling look; and inhabiting one of the seven beautiful worlds below the earth (and

above the hells), where they are ruled over by three chiefs or kings, Sesha, Vasuki and Takshaka; their fair daughters often entering into matrimonial alliances with men, like the mermaids of western legend.

In addition to such essentially mythological conceptions, we meet in the religious life of this period with an element of more serious aspect in the two gods, on one or other of whom the religious fervour of the large majority of Hindus has ever since concentrated itself, viz. Vishnu and Siva. Both these divine figures have grown out of Vedic conceptions — the genial Vishnu mainly out of a not very prominent solar deity of the same name; whilst the stern Siva, i.e. the kind or gracious one — doubt- less a euphemistic name — has his prototype in the old fierce

during ten days at the time of the autumnal equinox, in com- memoration of her victory over the buffalo-headed demon Mahishasura; when the image of the ten-armed goddess, holding a weapon in each hand, is worshipped for nine days, and cast into the water on the tenth day, called the Dasahara, whence the festival itself is commonly called Dasara in western India. Kali, on the other hand, the most terrible of the goddess's forms, has a special service performed to her, at the Kali-puja, during the darkest night of the succeeding month; when she is repre- sented as a naked black woman, four-armed, wearing a garland of heads of giants slain by her, and a string of skulls round her neck, dancing on the breast of her husband (Mahakala), with gaping mouth and protruding tongue; and when she has to be propitiated by the slaughter of goats, sheep and buffaloes. On other occasions also Vamacharis commonly offer animal sacri- fices, usually one or more kids; the head of the victim, which has to be severed by a single stroke, being always placed in front of the image of the goddess as a blood-offering (ball), with an earthen lamp fed with ghee burning above it, whilst the flesh is cooked and served to the guests attending the ceremony, except that of buffaloes, which is given to the low-caste musicians who perform during the service. Even some adherents of this class have, however, discontinued animal sacrifices, and use certain kinds of fruit, such as coco-nuts or pumpkins, instead. The use of wine, which at one time was very common on these occasions, seems also to have become much more restricted; and only members of the extreme section would still seem to adhere to the practice of the so-called five m's prescribed by some of the Tantras, viz. mamsa (flesh), matsya (fish), madya (wine), maithuna (sexual union), and mudra (mystical finger signs) — probably the most degrading cult ever practised under the pretext of religious worship.

In connexion with the principal object of this cult, Tantric theory has devised an elaborate system of female figures representing either special forms and personifications or attendants of the " Great Goddess." They are generally arranged in groups, the most im- portant of which are the Mahavidyas (great sciences), the 8 (or 9) Malar as (mothers) or Mahamataras (great mothers), consisting of the wives of the principal gods; the 8 Nayikas or mistresses; and different classes of sorceresses and ogresses, called Yoginis, Dakinis and Sakinis. A special feature of the Sakti cult is the use of obscure Vedic mantras, often changed so as to be quite meaningless and on that very account deemed the more efficacious for the acquisition of superhuman powers; as well as of mystic letters and syllables . railed bija (germ), of magic circles (chakra) and diagrams {yantra), and of amulets of various materials inscribed with formulae of fancied mysterious import.

This survey of the Indian sects will have shown how little the character of their divine objects of worship is calculated to

exert that elevating and spiritualizing influence, General so characteristic of true religious devotion. In all siotts.' hut a few of the minor groups religious fervour is

only too apt to degenerate into that very state of sexual excitation which devotional exercises should surely tend to repress. If the worship of Siva, despite the purport of his chief symbol, seems on the whole less liable to produce these undesirable effects than that of the rival deity, it is doubt- less due partly to the real nature of that emblem being little realized by the common people, and partly to the somewhat repellent character of the " great god," more favourable to evoking feelings of awe and terror than a spirit of fervid devotion. All the more are, however, the gross stimulants, connected with the adoration of his consort, calculated to work up the carnal instincts of the devotees to an extreme degree of sensual frenzy. In the Vaishnava camp, on the other hand, the cult of Krishna, and more especially that of the youthful Krishna, can scarcely fail to exert an influence which, if of a subtler and more in- sinuating, is not on that account of a less demoralizing kind. Indeed, it would be hard to find anything less consonant with godliness and divine perfection than the pranks of this juvenile god; and if poets and thinkers try to explain them away by dint of allegorical interpretation, the plain man will not for ill their refinements take these amusing adventures any the less lu pied de la lettre. No fault, in this respect, can assuredly be

found with the legendary Rama, a very paragon of knightly honour and virtue, even as his consort Sita is the very model of a noble and faithful wife; and yet this cult has perhaps retained even more of the character of

mere hero-worship than that of Krishna. Since by the universally accepted doctrine of karman (deed) or karmavipaka ("the maturing of deeds") man himself — either in his present, or some future, existence — enjoys the fruit of, or has to atone for, his former good and bad actions, there could hardly be room in Hindu pantheism for a belief in the remission of sin by divine grace or vicarious sub- stitution. And accordingly the " descents " or incarnations of the deity have for their object, not so much the spiritual regenera- tion of man as the deliverance of the world from some material calamity threatening to overwhelm it. The generally recognized principal Avatars do not, however, by any means constitute the only occasions of a direct intercession of the deity in worldly affairs, but — in the same way as to this day the eclipses of the sun and moon are ascribed by the ordinary Hindu to these luminaries being temporarily swallowed by the dragon Rahu (or Graha, " the seizer ")- — so any uncommon occurrence would be apt to be set down as a special manifestation of divine power; and any man credited with exceptional merit or achievement, or even remarkable for some strange incident connected with his life or death, might ultimately come to be looked upon as a veritable incarnation of the deity, capable of influencing the destinies of man, and might become an object of local adoration or superstitious awe and propitiatory rites to multitudes of people; That the transmigration theory, which makes the spirit of the departed hover about for a time in quest of a new corporeal abode, would naturally lend itself to superstitious notions of this kind can scarcely be doubted. Of peculiar importance in this respect is the worship of the Pitris (" fathers ") or deceased ancestors, as entering largely into the everyday life and family relations of the Hindus. At stated intervals to offer reverential homage and oblations of food to the forefathers up to the third degree is one of the most sacred duties the devout Hindu has to discharge. The periodical performance of the commemorative rite of obsequies called Sraddha — i.e. an oblation " made in faith " {sraddha, Lat. credo) — is the duty and privilege of the eldest son of the deceased, or, failing him, of the nearest relative who thereby establishes his right as next of kin in respect of inheritance; and those other relatives who have the right to take part in the ceremony are called sapinda, i.e. sharing in the pindas (or balls of cooked rice, constituting along with libations of water the usual offering to the Manes) — such relationship being held a bar to intermarriage. The first Sraddha takes place as soon as possible after the antyeshti (" final offering ") or funeral ceremony proper, usually spread over ten days; being afterwards repeated once a month for a year, and subsequently at every anniversary and otherwise voluntarily on special occasions. Moreover, a simple libation of water should be offered to the Fathers twice daily at the morning and evening devotion called sandhya (" twilight "). It is doubtless a sense of filial obligation coupled with sentiments of piety and reverence that gave rise to this practice of offering gifts of food and drink to the

deceased ancestors. Hence also frequent allusion is made by poets to the anxious care caused to the Fathers by the possibility of the living head of the family being afflicted with failure of offspring; this dire prospect compelling them to use but sparingly their little store of provisions, in case the supply should shortly cease altogether. At the same time one also meets with frank avowals of a superstitious fear lest any irregularity in the performance of the obsequial rites should cause the Fathers to haunt their old home and trouble the peace of their undutiful descendant, or even prematurely draw him after them to the Pitri-loka or world of the Fathers, supposed to be located in the southern region. Terminating as it usually does with the feeding and feeing of a greater or less number of Brahmans and the feasting of members of the performers' own caste, the Sraddha, especially its first performance, is often a matter of very considerable expense; and more than ordinary benefit to the deceased is supposed to accrue from it when it takes place at a spot of recognized sanctity, such as one of the great

places of pilgrimage like Prayaga (Allahabad, where the three sacred rivers, Ganga, Yamuna and Sarasvati, meet), Mathura, and especially Gaya and Kasi (Benares). But indeed the tirtha- yatra, or pilgrimage to holy bathing-places, is in itself considered an act of piety conferring religious merit in proportion to the time and trouble expended upon it. The number of such places is legion and is constantly increasing. The banks of the great rivers such as the Ganga (Ganges), the Yamuna (Jumna), the Narbada, the Krishna (Kistna), are studded with them, and the water of these rivers is supposed to be imbued with the essence of sanctity capable of cleansing the pious bather of all sin and moral taint. To follow the entire course of one of the sacred rivers from the mouth to the source on one side and back again on the other in the sun-wise (pradakshina) direction — that is, always keeping the stream on one's right-hand side — is held to be a highly meritorious undertaking which it requires years to carry through. No wonder that water from these rivers, especially the Ganges, is sent and taken in bottles to all parts of India to be used on occasion as healing medicine or for sacramental purposes. In Vedic times, at the Rajasuya, or inauguration of a king, some water from the holy river Sarasvati was mixed with the sprinkling water used for consecrating the king. Hence also sick persons are frequently conveyed long distances to a sacred river to heal them of their maladies; and for a dying man to breathe his last at the side of the Ganges is devoutly believed to be the surest way of securing for him salvation and eternal bliss.

Such probably was the belief of the ordinary Hindu two thousand years ago, and such it remains to this day. In the light of facts such as these, who could venture to say what the future of Hinduism is likely to be? Is the regeneration of India to be brought about by the modern theistic movements, such as the Brahma-samaj and Arya-samaj, as so close and sympathetic an observer of Hindu life and thought as Sir A. Lyall seems to think ? " The Hindu mind," he remarks, "is essentially speculative and transcendental; it will never consent to be shut up in the prison of sensual experience, for it has grasped and holds firmly the central idea that all things are manifestations of some power outside phenomena. And the tendency of contemporary religious discussion in India, so far as it can be followed from a distance, is towards an ethical reform on the old foundations, towards searching for some method of reconciling their Vedic theology with the practices of religion taken as a rule of conduct and a system of moral government. One can already discern a movement in various quarters towards a recognition of impersonal theism, and towards fixing the teaching of the philosophi- cal schools upon some definitely authorized system of faith and morals, which may satisfy a rising ethical standard, and may thus permanently embody that tendency to substitute spiritual devotion for external forms and caste rules which is the characteristic of the sects that have from time to time dissented from orthodox Brahminism."

Authorities. — Census of India (1901), vol. i. part i. ; India, by H. H. Risley and E. A. Gait; vol. i. Ethnographical Appendices, by H. H. Risley; The Indian Empire, vol. i. (new ed., Oxford, 1907); J. Muir, Original Sanskrit Texts (2nd ed., 5 vols., London, 1873); Monier Williams, Religious Thought and Life in India (London, 1883); Modern India and the Indians (London, 1878, 3rd ed. 1879); Hinduism (London, 1877); Sir Alfred C. Lyall, Asiatic Studies (2 series, London, 1899); " Hinduism " in Religious Systems of the World (London, 1904) ; " Brahminism " in Great Religions of the World (New York and London, 1902) ; W. J. Wilkins, Modern Hinduism (London, 1887); J. C. Oman, Indian Life, Religious and Social (London, 1879); The Mystics, Ascetics' and Saints of India (London, 1903) ; The Brahmans, Theists and Muslims of India (London, 1907) ; S. C. Bose, The Hindus as they are (2nd ed., Calcutta, 1883); J. Robson, Hinduism and Christianity (Edinburgh and London, 3rd ed., 1905); J. Murray Mitchell, Hinduism Past and Present (2nd ed., London, 1897); Jogendra Nath Bhattacharya, Hindu Castes and Sects (Calcutta, 1896); A. Barth, The Religions of India (London, 1882); E. W. Hopkins, The Religions of India (London, 1896). (J. E.)

HINDU KUSH, a range of mountains in Central Asia. Through- out 500 m. of its length, from its roots in the Pamir regions till it fades into the Koh-i-Baba to the west of Kabul, this great range forms the water-divide between

the Kabul and the Oxus basins, and, for the first 200 m. reckoning westwards, the southern boundary of Afghanistan. It may be said to spring from the head of the Taghdumbash Pamir, where ft unites with the great meridional system of Sarikol stretching northwards, and the yet more impressive mountain barrier of Muztagh, the northern base of which separates China from the semi-independent territory of

xm, 17

Kanjut. The Wakhjir pass, crossing the head of the Taghdumbash Pamir into the sources of the river Hunza, almost marks the tri- junction of the three great chains of mountains. As the Hindu Kush strikes westwards, after first rounding the head of an Oxus tributary (the Ab-i-Panja, which Curzon considers to be the true source of the Oxus), it closely overlooks the trough of that glacier-fed stream under its northern spurs, its crest at the nearest point being separated from the river by a distance which cannot much exceed 10 m. As the river is here the northern boundary of Afghanistan, and the crest of the Hindu Kush the southern boundary, this distance represents the width of the Afghan kingdom at that point.

Physiography.— -For the first 100 m. of its length the Hindu Kush is a comparatively flat-backed range of considerable width, per- mitting the formation of small lakes on the crest, and possessing no considerable peaks. It is crossed by many passes, varying in height from 12,500 ft. to 17,500 ft., the lowest and the easiest being the well-known group about Baroghil, which has from time immemorial offered a line of approach from High Asia to Chitral and Jalalabad. As the Hindu Kush gradually recedes from the Ab-i-Panja and turns south-westwards it gains in altitude, and we find prominent peaks on the crest which measure more than 24,000 ft. above sea-level. Even here, however, the main central water-divide, or axis of the chain, is apparently not the line of highest peaks, which must be looked for to the south, where the great square-headed giant called Tirach Mir dominates Chitral from a southern spur. For some 40 or 50 m. of this south-westerly bend, bearing away from the Oxus, where the Hindu Kush overlooks the mountain wilderness of Badak- shan to the west, the crest is intersected by many passes, of which the most important is the Dorah group (including the Minjan and the Mandal), which rise to about 15,000 ft., and which are, under favourable conditions, practicable links between the Oxus and Chitral basins.

From the Dorah to the Khawak pass (or group of passes, for it is seldom that one line of approach only is to be found across the Hindu Kush), which is between 11,000 and 12,000 ft. in altitude, the water-divide overlooks Kafiristan and Ka ™ ista n Badakshan. Here its exact position is matter of con- seet ‘ on – jecture. It lies amidst a wild, inaccessible region

of snow- bound crests, and is certainly nowhere less than 15,000 ft. above sea-level. There is a tradition that Timur attempted the passage of the Hindu Kush by one of the. unmapped passes hereabouts, and that, having failed, he left a record of his failure engraved on a rock in the pass.

The Khawak, at the head of the Panjshir tributary of the Kabul river, leading straight from Badakshan to Charikar and the city of Kabul, is now an excellent kafila route, the road having been engineered under the amir Abdur Rahman's direction, p osses. and it is said to be available for traffic throughout the year. From the Khawak to the head of the Ghorband (a river of the Hindu Kush which, rising to the north-west of Kabul, flows north-east to meet the Panjshir near Charikar, whence they run united into the plains of Kohistan) the Hindu Kush is intersected by passes at intervals, all of which were surveyed, and several utilized, during the return of the Russo-Afghan boundary commission from the Oxus to Kabul in 1886. Those utilized were the Kaoshan (the " Hindu Kush " pass par excellence), 14,340 ft.; the Chahardar (13,900 ft.), which is a link in one of the amir of Afghanistan's high roads to Turkestan ; and the Shibar (9800 ft.), which is merely a diversion into the upper Ghorband of that group of passes between Bamian and the Kabul plains which are represented by the Irak, Hajigak, Unai, &c. About this point it is geographically correct to place the southern extremity of the Hindu Kush, for here commences the Koh-i-Baba system into which the Hindu Kush is merged.

*The general conformation of the Hindu Kush system south of the Khawak, no less than such fragmentary evidence of its rock composition as at present exists to the north, points to 0e _ era i its construction under the same conditions of upheaval con t orma . and subsequent denudation as are common to the western ,, Himalaya and the whole of the trans-Indus borderland. Its upheaval above the great sea which submerged all the north-west of the Indian peninsula long after the Himalaya had massed itself as a formidable mountain chain, belongs to a com- paratively recent geologic period, and the same thrust upwards*of vast masses of cretaceous limestone has disturbed the overlying recent beds of shale and clays with very similar results to those which have left so marked an impress on the Baluch frontier. Suc- cessive flexures or ridges are ranged in more or less parallel lines, and from between the bands of hard, unyielding rock of older formation the soft beds of recent shale have been washed out, to be carried through the enclosing ridges by rifts which break across their axes. The Hindu Kush is, in fact, but the face of a great upheaved mass of plateau-land lying beyond it northwards, just as the Himalaya forms the southern face of the great central table- land of Tibet, and its general physiography, exhibiting long, narrowˆ lateral valleys and transverse lines of " antecedent " drainage, is*

similar. There are few passes across the southern section of the Hindu Kush (and this section is, from the politico-geographical point of view, more important to India than the whole Himalayan system) which have not to surmount a succession of crests or ridges as they cross from Afghan Turkestan to Afghanistan. The ex- ceptions are, of course, notable, and have played an important part in the military history of Asia from time immemorial. From a little ice-bound lake called Gaz Kul, or Karambar, which lies on the crest of the Hindu Kush near its northern origin at the head of the Taghdumbash Pamir, two very important river systems (those of Chitral and Hunza) are believed to originate. The lake really lies on the watershed between the two, and is probably a glacial relic. Its contribution to either infant stream appears to depend on conditions of overflow determined by the blocking of ice masses towards one end. It marks the commencement of the water-divide which primarily separates the Gilgit basin from that of the Yashkun, or Chitral, river, and subsequently divides the drainage of Swat and Bajour from that of the Chitral (or Kunar). The Yashkun- Chitral-Kunar river (it is called by all three names) is the longest affluent of the Kabul, and it is in many respects a more important river than the Kabul. Throughout its length it is closely flanked on its left bank by this main water-divide, which is called Moshabar or Shandur in its northern sections, and owns a great variety of names where it divides Bajour from the Kunar valley. It is this range, crowned by peaks of 22,000 ft. altitude and maintaining an average elevation of some 10,000 ft. throughout its length of 250 m., that is the real barrier of the north — not the Hindu Kush itself. Across it, at its head, are the glacial passes which lead to the foot of the Baroghil. Of these Darkot, with a glacial staircase on each side, is typical. (See Gilgit.) Those passes (the Kilikand Mintaka) from the Pamir regions, which lead into the rocky gorges and defiles of the upper affluents of the Hunza to the east of the Darkot, belong rather to the Muztagh system than to the Hindu Kush. Other passes across this important water-divide are the Shandur (12,250 ft.), between Gilgit and Mastuj ; the Lowarai (10,450 ft.), between the Panjkora and Chitral valleys; and farther south certain lower crossings which once formed part of the great highway between Kabul and India.

Deep down in the trough of the Chitral river, about midway between its source and its junction with the Kabul at Jalalabad, is Chitral tne vn ‘ a S e an d f° rt °f Chitral (q.v.). Facing Chitral, on the right bank of the river, and extending for some 70 m. from the Hindu Kush, is the lofty snow-clad spur of the Hindu Kush known as Shawal, across which one or two difficult passes lead into the Bashgol valley of Kafiristan. This spur carries the

boundary of Afghanistan southwards to Arnawai (some 50 m. below Chitral), where it crosses the river to the long Shandur watershed. South of Arnawai the Kunar valley becomes a part of Afghanistan (see Kunar). The value of Chitral as an outpost of British India may be best gauged by its geographical position. It is about 100 m. (direct map measurement) from the outpost of Russia at Langar Kisht on the river Panja, with the Dorah pass across the Hindu Kush intervening. The Dorah may be said to be about half-way between the two outposts, and the mountain tracks leading to it on either side are rough and difficult. The Dorah, however, is not the only pass which leads into the Chitral valley from the Oxus. The Mandal pass, a few miles south of the Dorah, is the connecting link between the Oxus and the Bashgol valley of Kafiristan; and the Bashgol valley leads directly to the Chitral valley at Arnawai, about 50 m. below Chitral. Nor must we overlook the connexion between north and south of the Hindu Kush which is afforded by the long narrow valley of the Chitral (or Yashkun) itself, leading up to the Baroghil pass. This route was once made use of by the Chinese for purposes of pilgrimage, if not for invasion. Access to Chitral from the north is therefore but a matter of practicable tracks, or passes, in two or three directions, and the measure of practic- ability under any given conditions can best be reckoned from Chitral itself. By most authorities the possibility of an advance in force from the north, even under the most favourable conditions, is con- sidered to be exceedingly small; but the tracks and passes of the Hindu Kush are only impracticable so long as they are left as nature has made them.

Historical Notices. — Hindu Kush is the Caucasus of Alexander's historians. It is also included in the Paropamisus, though the latter term embraces more, Caucasus being apparently used only when the alpine barrier is in question. Whether the name was given in mere vanity to the barrier which Alexander passed (as Arrian and others repeatedly allege), or was founded also on some verbal confusion, cannot be stated. It was no doubt regarded (and perhaps not altogether untruly) as a part of a great alpine zone believed to traverse Asia from west to east, whether called Taurus, Caucasus or Imaus. Arrian himself applies Caucasus distinctly to the Himalaya also. The applica- tion of the name Tanais to the Syr seems to indicate a real con- fusion with Colchian Caucasus. Alexander, after building rn Alexandria at its foot (probably at Hupian near Chariknr),

crossed into Bactria, first reaching Drapsaca, or Adrapsa. This has been interpreted as Anderab, in which case he probably crossed the Khawak Pass, but the identity is uncertain. The ancient Zend name is, according to Rawlinson, Paresina, the essential part of Paropamisus; this accounts for the great Asiastic Parnassus of Aristotle, and the Pho-lo-sin-a of Hstian Tsang.

The name Hindu Kush is used by Ibn Batuta, who crossed (c. 1332) from Anderab, and he gives the explanation of the name which, however doubtful, is still popular, as (Pers.) Hindu-Killer, " because of the number of Indian slaves who perished in passing" its snows. Baber always calls the range Hindu Kush, and the way in which he speaks of it shows clearly that it was a range that was meant, not a solitary pass or peak (according to modern local use, as alleged by Elphinstone and Burnes). Probably, however, the title was confined to the section from Khawak to Koh-i-Baba. The name has by some later Oriental writers been modified into Hindu Koh (mountain), but this is factitious, and throws no more light on the origin of the title. The name seems to have become known to European geographers by the Oriental translations of the two Petis de la Croix, and was taken up by Delisle and D'Anville. Rennell and Elphinstone familiarized it. Burnes first crossed the range (1832). A British force was stationed at Bamian beyond it in 1840, with an outpost at Saighan.

The Hindu Kush, formidable as it seems, and often as it has been the limit between petty states, has hardly ever been the boundary of a considerable power. Greeks, White Huns, Samanidae of Bokhara, Ghaznevides, Mongols, Timur and Timuridae, down to Saddozais and Barakzais, have ruled both sides of this great alpine chain.

Authorities. — Information about the Hindu Kush and Chitral is now comparatively exact. The Russo- Afghan Boundary Commission of 1884 and the Chitral expedition of 1895 opened up a vast area for geographical investigation, and the information collected is to be found in the reports and gazetteers of the Indian government. The following are the chief recent authorities : — Report of the Russo- Afghan Boundary Commission (1886); Report of Lockhart's Mission (1886);. Report of Asmar Boundary Commission (1895); Report of Pamir Boundary Commission (1896); J. Biddulph, Tribes of the Hindu Kush (Calcutta, 1880); W. M'Nair, " Visit to Kafiri- stan," vol. vi. R.G.S. Proc, 1884; F. Younghusband, " Journeys on the Pamirs, &c," vol. xiv. R.G.S. Proc, 1892; Colonel Durand, Making a Frontier (London, 1899); Sir G. Robertson, Chitral (London, 1899). (T. H. H.)*

HINDUR, or Nalagarh, one of the Simla hill states, under the government of the Punjab, India. Pop. (1901) 52,551; area, 256 sq. m.; estimated revenue, £8600. The country was overrun by the Gurkhas for some years before 181 5, when they were driven out by the British, and the raja was confirmed in possession of the territory. The principal products are grain and opium.

HINGANGHAT, a town of British India in Wardha district, Central Provinces, 21 m. S.W. of Wardha town. Pop (1901) 12,662. It is a main

seat of the cotton trade, the cotton here produced in the rich Wardha valley having given its name to one of the best indigenous staples of India. The principal native traders are Marwaris, many of whom have large transactions and export on their own account; but the greater number act as middle-men. There are two cotton-mills and several ginning and pressing factories.

HINGE (in Mid. Eng. henge or heeng, from hengen, to hang), a movable joint, particularly that by which a door or window " hangs " from its side-post, or by which a lid or cover is attached to that which it closes; also any device which allows two parts to be joined together and move upon each other (see Joinery). Figuratively the word is used of that on which something depends, a cardinal or turning point, a crisis.

HINGHAM, a township of Plymouth county, Massachusetts, U.S.A., on Massachusetts Bay. Pop (1890) 4564; (1900) 5059 (969 being foreign-born); (1905, state census) 4819; (1910) 4965. Area, about 30 sq. m. The township is traversed by the New York, New Haven & Hartford railway, and contains the villages of Hingham, West Hingham, Hingham Center, and South Hingham. Derby Academy, a co-educational school

founded and endowed with about £12,000 in 1784 by Sarah Derby (1714-1700), was opened in 1791. Hingham has a public library (1868), with 12,000 volumes in 1908. The Old Meeting House, erected in 1681, is one of the oldest church buildings in the country used continuously. Manufactures were relatively much more important in the 17th and 18th centuries than since. There were settlers here as early as 1633, some of them — notably Edmund Hobart, ancestor of Bishop John Henry Hobart, — being natives of Hingham, Norfolk, England, whence the name; and in 1635 common land called Barecove became the township of Hingham.

See History of Die Town of Hingham (4 vols., Hingham, 1893).

HINRICHS, HERMANN FRIEDRICH WILHELM (1 794-1861), German philosopher, studied theology at Strassburg, and philo- sophy at Heidelberg under Hegel (q.v.), who wrote a preface to his Religion im innern Verhaltniss zur Wissenschaft (Heidelberg, 1722). He became a Privatdozent in 1819, and held professor- ships at Breslau (1822) and Halle (1824).

Works. — (1) Philosophical: Grundlinien der Philosophie der Logik (Halle, 1826); Genesis des Wissens (Heidelberg, 1835). (2) On aesthetics:

Vorlesungen uber Goethes Faust (Halle, 1825); Schillers Dichtungen nach threw, historischen Zusammenhang (Leipzig, 1837-1839). By these works he became a recognized exponent of orthodox Hegelianism. (3) Historical: Geschichte der Rechts- und Staatsprinzipien seit der Reformation bis auf die Gegenwart (Leipzig, 1848-1852); Die Kbnige (2nd ed., Leipzig, 1853).

HINSCHIUS, PAUL (1835-1898), German jurist, was the son of Franz Sales August Hinschius (1807-1877), and was born in Berlin on the 25th of December 1835. His father was not only a scientific jurist, but also a lawyer in large practice in Berlin. After working under his father, Hinschius in 1852 began to study jurisprudence at Heidelberg and Berlin, the teacher who had most influence upon him being Aemilius Ludwig Richter (1808-1864), to whom he afterwards ascribed the great revival of the study of ecclesiastical law in Germany. In 1855 Hinschius took the degree of doctor utriusque juris, and in 1859 was admitted to the juridical faculty of Berlin. In 1863 he went as professor extraordinarius to Halle, returning in the same capacity to Berlin in 1865; and in 1868 became professor ordinarius at the university of Kiel, which he represented in the Prussian Upper House (1 870-1871). He also assisted his father in editing the Preussische Anwaltszeitung from 1862 to 1866 and the Zeitschrift fiir Geselzgebung und Rechts pflege in Preussen from 1867 to 1871. In 1872 he was appointed professor ordinarius of ecclesiastical law at Berlin. In the same year he took part in the conferences of the ministry of ecclesiastical affairs, which issued in the famous " Falk laws." In connexion with the developments of the Kulturkampf which resulted from the " Falk laws," he wrote several treatises: e.g. on " The Attitude of the German State Governments towards the Decrees of the Vatican Council " (1871), on " The Prussian Church Laws of 1873 " (1873), " The Prussian Church Laws of the years 1874 and 1875 " (1875), a "d " The Prussian Church Law of 14th July 1880 " (1881). He sat in the Reichstag as a National Liberal from 1872 to 1878, and again in 18S1 and 1882, and from 1889 onwards he repre- sented the university of Berlin in the Prussian Upper House. He died on the 13th of December 1898.

The two great works by which Hinschius established his fame are the Deer dales Pseudo-Isidorianae et capitula Angilramni (2 parts, Leipzig, 1863) and Das Kirchenrecht der Katholiken und Protestanlen in Deulschland, vols, i.-vi. (Berlin, 1869-1877). The first of these, for which during i860 and 1861 he had gathered materials in Italy, Spain, France, England, Scotland, Ireland, Holland and Belgium, was the first critical edition of the False Decretals. His most monumental work, however, is the Kirchen-recht, which remains incomplete. The six volumes actually published (System des katholischen Kirchenrechts) cover only book i. of the work as planned; they are devoted to an exhaustive historical and analytical study of the Roman Catholic hierarchy and its government of the church. The

work is planned with special reference to Germany; but in fact its scheme embraces the whole of the Roman Catholic organization in its principles and practice. Unfortunately even this part of the work remains

incomplete; two chapters of book i. and the whole of book ii., which was to have dealt with " the rights and duties of the members of the hierarchy," remain unwritten; the most notable omission is that of the ecclesiastical law in relation to the regular orders. Incomplete as it is, however, the Kirchenrecht remains a work of the highest scientific authority. Epoch-making in its application of the modern historical method to the study of ecclesiastical law in its theory and practice, it has become the model for the younger school of canonists.

See the articles s.v. by E. Seckel in Herzog-Hauck, Realencyklo- pddie (3rd ed., 1900), and by Ulrich Steitz in the A llgemeine deutsche Biographic, vol. 50 (Leipzig, 1905).

HINTERLAND (German for " the land behind "), the region lying behind a coast or river line, or a country dependent for trade or commerce on any other region. In the purely physical sense " interior " on " back country " is more commonly used, but the word has gained a distinct political significance. It first came into prominence during 1883-1885, when Germany insisted that she had a right to exercise jurisdiction in the territory behind those parts of the African coast that she had occupied. The " doctrine of the hinterland " was that the possessor of the littoral was entitled to as much of the back country as geographically, economically or politically was dependent upon the coast lands, a doctrine which, in the space of ten years, led to the partition of Africa between various European powers.

HINTON, JAMES (1822-1875), English surgeon and author, son of John Howard Hinton (1791-1873), Baptist minister and author of the History and" Topography of the United States and other works, was born at Reading in 1822. He was educated at his grandfather's school near Oxford, and at the Noncon- formist school at Harpenden, and in 1838, on his father's removal to London, was apprenticed to a woollen-draper in Whitechapel. After retaining this situation about a year he became clerk in an insurance office. His evenings were spent in intense study, and this, joined to the ardour, amounting to morbidness, of his interest in moral problems, so affected his health that in his nineteenth year he resolved to seek refuge from his own thoughts by running away to sea. His intention having, however, been discovered, he was sent, on the advice of the physician who was consulted regarding his health, to St Bartholomew's Hospital to study for the medical profession. After receiving his diploma in 1847, ne was lor some time assistant surgeon at Newport, Essex, but the

same year he went out to Sierra Leone to take medical charge of the free labourers on their voyage thence to Jamaica, where he stayed some time. He returned to England in 1850, and entered into partnership with a surgeon in London, where he soon had his interest awakened specially in aural surgery, and gave also much of his attention to physiology. He made his first appearance as an author in 1856 by contribut- ing papers on physiological and ethical subjects to the Christian Spectator; and in 1859 he published Man and his Dwelling- place. A series of papers entitled " Physiological Riddles," in the Cornhill Magazine, afterwards published as Life in Nature (1862), as well as another series entitled Thoughts on Health (1871), proved his aptitude for popular scientific exposition. After being appointed aural surgeon to Guy's Hospital in 1863, he speedily acquired a reputation as the most skilful aural surgeon of his day, which was fully borne out by his works, An Atlas of Diseases of the membrana tympani (1874), and Questions of Aural Surgery (1874). But his health broke down, and in 1874 he gave up practice; and he died at the Azores. of acute inflammation of the brain on the 16th of December 1875. In addition to the works already mentioned, he was the author of The Mystery of Pain (1866) and The Place of the Physician (1874). On account of their fresh and vigorous discussion of many of the important moral and social problems of the time, his writings had a wide circulation on both sides of the Atlantic. His Life and Letters, edited by Ellice Hopkins, with an introduction by Sir W. W. Gull, appeared in 1878.*

HIOGO [Hyogo], a town of Japan in the province of Settsu, Nippon, on the western shore of the bay of Osaka, adjoining the foreign settlement of Kobe, 21 m. W. of Osaka by rail. The

growth of its prosperity has been very remarkable. Its popula- tion, including that of Kobe, was 135,639 in 1891, and 285,002 in 1903. From 1884 to the close of the century its trade increased nearly eightfold, and the increase was not confined to a few staples of commerce, but was spread over almost the whole trade, in which silk and cotton fabrics, floor-mats , straw-plaits, matches, and cotton yarns are specially important. Kobe owes much of its prosperity to the fact of serving largely as the shipping port of Osaka, the chief manufacturing town in Japan. The foreign community, exclusive of Chinese, exceeds 1000 persons. Kobe is considered the brightest and healthiest of all the places assigned as foreign settlements in Japan, its pure, dry air and granite subsoil constituting special advantages. It is in rail- way communication with all parts of the country, and wharves admit of steamers of large size loading and discharging cargo without the

aid of lighters. The area originally appropriated for a foreign settlement soon proved too restricted, and foreigners received permission to lease lands and houses direct from Japanese owners beyond the treaty limits, a privilege which, together with that of building villas on the hills behind the town, ultimately involved some diplomatic complications. Kobe has a shipbuilding yard, and docks in its immediate neighbourhood. Hiogo has several temples of interest, one of which has near it a huge bronze statue of Buddha, while by the Minatogawa, which flows into the sea between Hiogo and Kobe, a temple commemorates the spot where Kusunoki Masashige, the mirror of Japanese loyalty, met his death in battle in 1336. The temple of Ikuta was erected on the site of the ancient fane built by Jingo on her return from Korea in the 3rd century.

Hiogo's original name was Bako. Its position near the entrance of the Inland Sea gave it some maritime importance from a very early period, but it did not become really prominent until the 1 2th century, when Kiyomori, chief of the Taira clan, transferred the capital from Kioto to Fukuhara, in Hiogo's immediate neighbourhood, and undertook various public works for improving the place. The change of capital was very brief, but Hiogo benefited permanently from the distinction.

HIP. (1) (From O. Eng. hype, a word common in various forms to many Teutonic languages; cf. Dutch heup, and Ger. Hufle), the projecting part of the body formed by the top of the thigh- bone and the side of the pelvis, in quadrupeds generally known as the haunch (see Joints). (2)(0. Eng. Mope, from same root as M.H. Ger. hicfe, a thorn-bush), the fruit of the dog-rose (Rosa canina); "hips" are usually joined with "haws," the fruit of the hawthorn.

HIP-KNOB, in architecture, the finial on the hip of a roof, between the barge-boards of a gable.

HIPPARCHUS (fl. 146-126 B.C.), Greek astronomer, was born at Nicaea in Bithynia early in the 2nd century B.C. He observed in the island of Rhodes probably from 161, certainly from 146 until about 126 B.C., and made the capital discovery of the precession of the equinoxes in 130 (see Astronomy: History). The outburst of a new star in 134 B.C. is stated by Pliny (Hist, nat. ii. 26) to have prompted the preparation of his catalogue of 1080 stars, substantially embodied in Ptolemy's Almagest. Hipparchus founded trigonometry, and compiled the first table of chords. Scientific geography originated with his invention of the method of fixing terrestrial positions by circles of latitude and longitude. There can be little doubt that the fundamental part of his astronomical knowledge was derived from Chaldaea. None of his many works has survived except a Commentary on the Phaenomena of Aratus and Eudoxus, published by P. Victorius at

Florence in 1567, and included by D. Petavius in his Uranologium (Paris, 1630). A new edition was published by Carolus Manitius (Leipzig, 1894).

See J. B. J. Delambre, Histoire de I' astronomie ancienne, i. 173; P. Tannery, Recherches sur Vhistoire de I'astr. ancienne, p. 130; A. Berry, Hist, of Astronomy, pp. 40-61 ; M. Marie, Hist, des sciences, i. 207; G. Cornewall Lewis, Astronomy of the Ancients, p. 207; R. Grant, Hist, of Phys. Astronomy, pp. 318, 437; F. Boll, Sphaera, p. 61 (Leipzig, 1903); R. Wolf, Geschichte der Astronomie, p. 45; J. F. Montucla, Hist, des mathematiques, t. i. p. 257; J. A. Schmidt, Variorum philosophicorum decas, cap. i. (Jenae, 1691). (A. M. C.)

HIPPASUS OF METAPONTUM, Pythagorean philosopher, was one of the earliest of the disciples of Pythagoras. He is mentioned both by Diogenes Laertius and by Iamblichus, but nothing is known of his life. Diogenes says that he left no writings, but other authorities make him the author of a / jwtikos \670s directed against the Pythagoreans. According to Aristotle (Metaphysica, i. 3), he was an adherent of the Heraclitean fire- doctrine, whereas the Pythagoreans maintained the theory that number is the principle of everything. He seems to have regarded the soul as composed of igneous matter, and so approxi- mates the orthodox Pythagorean doctrine of the central fire, or Hestia. to the more detailed theories of Heraclitus. In spite of this divergence, Hippasus is always regarded as a Pythagorean.

See Diogenes viii. 84; Brandis, History of Greek and Roman Philosophy; also Pythagoras.

HIPPEASTRUM, in botany, a genus of the natural order Amaryllidaceae, containing about 50 species of bulbous plants, natives of tropical and sub-tropical South America. In cultiva- tion they are generally known as Amaryllis. The handsome funnel-shaped flowers are borne in a cluster of two to many, at the end of a short hollow scape. The species and the numerous hybrids which have been obtained artificially, show a great variety in size and colour of the flower, including the richest deep crimson and blood-red, white, or with striped, mottled or blended colours. They are of easy culture, and free-blooming habit. Like other bulbs they are increased by offsets, which should be carefully removed when the plants are at rest, and should be allowed to attain a fair size before removal. These young bulbs should be potted singly in February or March, in mellow loamy soil with a moderate quantity of sand, about two-thirds of the bulb being kept above the level of the soil, which should be made quite solid. They should be removed to a temperature of 6o° by night and 70 by day, very carefully watered until the roots have begun to grow freely, after which the soil should be kept moderately moist. As they advance the temperature should be raised to 70 at night, and to 80° or higher with sun

heat by day. They do not need shading, but should have plenty of air, and be syringed daily in the afternoon. When growing they require a good supply of water. After the decay of the flowers they should be returned to a brisk moist temperature of from 70 to 8o° by day during summer to perfect their leaves, and then be ripened off in autumn. Through the winter they should have less water, but must not be kept entirely dry. The minimum temperature should now be about 55°, to be increased io° or 15° in spring. As the bulbs get large they will occasionally need shifting into larger pots. Propagation is also readily effected by seeds for raising new varieties. Seeds are sown when ripe in well drained pans of sandy loam at a temperature of about 65°. The seedlings when large enough to handle are placed either singly in very small pots or several in a pot or shallow pan, and put in a bottom heat, in a moist atmosphere with a temperature from 60° to 70°. H. Ackermanni, with large, handsome, crimson flowers — itself a hybrid — is the parent of many of the large-flowered forms ; H. equeslre (Barbados lily), with yellowish-green flowers tipped with scarlet, has also given rise to several handsome forms; H. aulicum (flowers crimson and green), H. pardinum (flowers creamy- white spotted with crimson), and H. vittatum (flowers white with red stripes, a beautiful species and the parent of many varieties), are stove or warm greenhouse plants. These kinds, however, are now only regarded as botanical curiosities, and are rarely grown in private or commercial establishments. They have been ousted by the more gorgeous looking hybrids, which have been evolved during the past 100 years. H. Johnsoni is named after a Lancashire watchmaker who raised it in 1799 by crossing H. Reginae with H. vittatum. Since that time other species have been used for hybridizing, notably H. reticulatum, H. aulicum, H. solandriflorum, and sometimes H. equeslre and H. psitlacinum. The finest forms since 1880 have been evolved from H. Leopoldi and H. pardinum. (J. Ws.)

HIPPED ROOF, the name given in architecture to a roof which slopes down on all four sides instead of terminating on

two sides against a vertical gable. Sometimes a compromise is made between the two, half the roof being hipped and half resting on the vertical wall; this gives much more room inside the roof, and externally a most picturesque effect, which is one of the great attractions of domestic architecture in the south of England, and is rarely found in other countries.

HIPPEL, THEODOR GOTTLIEB VON (1741-1706), German satirical and humorous writer, was born on the 31st of January 1741, at Gerdauen in

East Prussia, where his father was rector of a school. He enjoyed an excellent education at home, and in his sixteenth year he entered Konigsberg university as a student of theology. Interrupting his studies, he went, on the invitation of a friend, to St Petersburg, where he was introduced at the brilliant court of the empress Catherine II. Returning to Konigsberg he became a tutor in a private family; but, falling in love with a young lady of high position, his ambition was aroused, and giving up his tutorship he devoted himself with enthusiasm to legal studies. He was successful in his profession, and in 1780 was appointed chief burgomaster in Konigsberg, and in 1786 privy councillor of war and president of the town. As he rose in the world, however, his inclination for matrimony vanished, and the lady who had stimulated his ambition was forgotten. He died at Konigsberg on the 23rd of April 1796, leaving a considerable fortune. Hippel had extraordinary talents, rich in wit and fancy; but his was a character full of contrasts and contradictions. Cautiousness and ardent passion, dry pedantry and piety, morality and sensuality; simplicity and ostentation composed his nature; and, hence, his literary productions never attained artistic finish. In his Lebenslauje nach aufsteigender'Linie (1778-1781) he intended to describe the lives of his father and grandfather, but he eventually confined himself to his own. It is an autobiography, in which persons well known to him are introduced, together with a mass of heterogeneous reflections on life and philosophy. Kreuz- und Querzilge des Ritlers A bis Z(i 793-1 794) is a satire levelled against the follies of the age — ancestral pride and the thirst for orders, decoration and the like. Among others of his better known works are Uber die Ehe (1774) and Uber die bttrgerliche Ver- besserung dcr Weiber (1792). Hippel has been called the fore- runner of Jean Paul Richter, and has some resemblance to this author, in his constant digressions and in the interweaving of scientific matter in his narrative. Like Richter he was strongly influenced by Laurence Sterne.

In 1827-1838 a collected edition of Hippel's works in 14 vols., was issued at Berlin. Uber die Ehe has been edited by E. Brenning (Leipzig, 1872), and the Lebenslauje nach aufsteigender Linie has in a modernized edition by A. von Ottingen (1878), gone through several editions. See J. Czerny, Sterne, Hippel und Jean Paul (Berlin, 1904).

HIPPIAS OF ELIS, Greek sophist, was born about the middle of the 5th century B.C. and was thus a younger contemporary of Protagoras and Socrates. He was a man of great versatility and won the respect of his fellow-citizens to such an extent that he was sent to various towns on important embassies. At Athens he made the acquaintance of Socrates and other leading thinkers. With an assurance characteristic of the later sophists, he claimed to be regarded as an authority on all subjects, and lectured, at all events with financial success, on poetry, grammar, history,

politics, archaeology, mathematics and astronomy. He boasted that he was more popular than Protagoras, and was prepared at any moment to deliver an extempore address on any subject to the assembly at Olympia. Of his ability there is no question, but it is equally certain that he was superficial. His aim was not to give knowledge, but to provide his pupils with the weapons of argument, to make them fertile in discussion on all subjects alike. It is said that he boasted of wearing nothing which he had not made with his own hands. Plato's two dialogues, the Hippias major and minor, contain an expose of his methods, exaggerated no doubt for purposes of argument but written with full knowledge of the man and the class which he represented. Ast denies their authenticity, but they must have been written by a contemporary writer (as they are mentioned in the literature of the 4th century), and undoubtedly

represent the attitude of serious thinkers to the growing influence of the professional Sophists. There is, however, no question that Hippias did a real service to Greek literature by insisting on the meaning of words, the value of rhythm and literary style. He is credited with an excellent work on Homer, collections of Greek and foreign literature, and archaeological treatises, but nothing remains except the barest notes. He forms the connecting link between the first great sophists, Protagoras and Prodicus, and the innumerable eristics who brought their name into disrepute.

For the general atmosphere in which Hippias moved see Sophists; also histories of Philosophy (e.g. Windelband, Eng. trans, by Tufts, pt. 1, c. 2, §§ 7 and 8).

HIPPO, a Greek philosopher and natural scientist, classed with the Ionian or physical school. He was probably a con- temporary of Archelaus and lived chiefly in Athens. Aristotle declared that he was unworthy of the name of philosopher, and, while comparing him with Thales in his main doctrine, adds that his intellect was too shallow for serious consideration. He held that the principle of all things is moisture (jo vypdv) ; that fire develops from water, and from fire the material universe. Further he denied all existence save that of material things as known through the senses, and was, therefore, classed among the " Atheists." The gods are merely great men canonized by popular tradition. It is said that he composed his own epitaph, wherein he claims for himself a place in this company.

HIPPOCRAS, an old medicinal drink or cordial, made of wine mixed with spices — such as cinnamon, ginger and sugar — and strained through woollen cloths. Theearlyspellingusual in English was ipocras, or ypocras. The word is an adaptation of the Med. Lat. Vinum Hippocraticum, or wine of Hippocrates, so called, not because it was supposed to be a receipt of the physician, but from an apothecary's name for a strainer or sieve,

'Hippocrates' sleeve " (see W. W. Skeat, Chaucer, note to the Merchant's Tale). HIPPOCRATES, Greek philosopher and writer, termed the " Father of Medicine," was born, according to Soranus, in Cos, in the first year of the 80th Olympiad, i.e. in 460 B.C. He was a member of the family of the Asclepiadae, and was believed to be either the nineteenth or seventeenth in direct descent from Aesculapius. It is also claimed for him that he was descended from Hercules through his mother, Phaenarete. He studied medicine under Heraclides, his father, and Herodicus of Selymbria; in philosophy Gorgias of Leontini and Democritus of Abdera were his masters. His earlier studies were prosecuted in the famous Asclepion of Cos, and probably also at Cnidos. He travelled extensively, and taught and practised his profession at Athens, probably also in Thrace, Thessaly, Delos and his native island. He died at Larissa in Thessaly, his age being variously stated as 85, 90, 104 and 109. The incidents of his life are shrouded by uncertain traditions, which naturally sprang up in the absence of any authentic record; the earliest biography was by one of the Sorani, probably Soranus the younger of Ephesus, in the 2nd century; Suidas, the lexicographer, wrote of him in the nth, and Tzetzes in the 12th century. In all these biographies there is internal evidence of confusion; many of the incidents related are elsewhere told of other persons, and certain of them are quite irreconcilable with his character, so far as it can be judged of from his writings and from the opinions expressed of himbyhis contemporaries; we may safely reject, for instance, the legends that he set fire to the library of the Temple of Health at Cnidos, in order to destroy the evidence of plagiarism, and that he refused to visit Persia at the request of Artaxerxes Longimanus, during a pestilential epidemic, on the ground that he would in so doing be assisting an enemy. He is referred to by Plato (Protag. p. 283; Phaedr. p. 211) as an eminent medical authority, and his opinion is also quoted by Aristotle. The veneration in which he was held by the Athenians serves to dissipate the calumnies which have been thrown on his character by Andreas, and the whole tone of his writings bespeaks a man of the highest integrity and purest morality.

*Born of a family of priest-physicians, and inheriting all its traditions and prejudices, Hippocrates was the first to ca*t*

superstition aside, and to base the practice of medicine on the prin- ciples of inductive philosophy. It is impossible to trace directly the influence exercised upon him by the great men of his time, but one cannot fail to connect his emancipation of medicine from superstition with the widespread power exercised over Greek life and thought by the living work of Socrates,

Plato, Aeschylus, Sophocles, Euripides, Herodotus and Thucydides. It was a period of great intellectual development, and it only needed a powerful mind such as his to bring to bear upon medicine the same influences which were at work in other sciences. It must be remembered that his training was not altogether bad, although superstition entered so largely into it. He had a great master in Democritus, the originator of the doctrine of atoms, and there is every reason to believe that the various " asclepia " were very carefully conducted hospitals for the sick, possessing a curious system of case-books, in the form of votive tablets, left by the patients, on which were recorded the symptoms, treatment and result of each case. He had these records at his command; and he had the opportunity of observing the system of training and the treatment of injuries in the gymnasia. One of his great merits is that he was the first to dissociate medicine from priest- craft, and to direct exclusive attention to the natural history of disease. How strongly his mind revolted against the use of charms, amulets, incantations and such devices appears from his writings; and he has expressly recorded, as underlying all his practice, the conviction that, however diseases may be regarded from the religious point of view, they must all be scientifically treated as subject to natural laws (De a'ere, 29). Nor was he anxious to maintain, the connexion between philosophy and medicine which had for long existed in a confused and confusing fashion. 1 His knowledge of anatomy, physiology and pathology was necessarily defective, the respect in which the dead body was held by the Greeks precluding him from practising dissection; thus we find him writing of the tissues without distinguishing between the various textures of the body, confusing arteries, veins and nerves, and speaking vaguely of the muscles as " flesh." But when we come to study his observations on the natural history of disease as presented in the living subject, we recognize at once the presence of a great clinical physician. Hippocrates based his principles and practice on the theory of the existence of a spiritual restoring essence or principle, vtns, the vis medicatrix naturae, in the management of which the art of the physician consisted. This art could, he held, be only obtained by the application of experience, not only to disease at large, but to -disease in the individual. He strongly deprecated blind empiricism; the aphorism " 17 ■wttpa aa\epri, 17 Kpicis xaXexij " (whether it be his or not), tersely illustrates his position. Holding firmly to the principle, vovauv #wt« Irrrpoi, he did not allow himself to remain inactive in the presence of disease; he was not a merely " expectant " physician; as Sydenham puts it, his practice was " the support of enfeebled and the coercion of outrageous nature." He largely employed powerful medicines and blood-letting both ordinary and by cupping. He advises, however, great caution in their application. He placed great dependence on diet and regimen, and here, quaint as many of his directions may now sound, not only in themselves, but in the reasons given, there is much which is still adhered to at the present day. His treatise

Hepl aepoov, vdarcav, Kalrfrirwv (Airs, Waters, and Places) contains the first enunciation of the principles of public health. Although the treatises Hepl Kpialiioiv cannot be accepted as authentic, we find in the TlpoyvwaT lk6v evidence of the acuteness of observation in the manner in which the occur- rence of critical days in disease is enunciated. His method of reporting cases is most interesting and instructive; in them we can read how thoroughly he had separated himself from the priest-physician. Laennec, to whom we are indebted for the practice of auscultation, freely admits that the idea was suggested to him by study of Hippocrates, who, treating of the presence of morbid fluids in the thorax, gives very particular directions, by

1 " Hippocrates Cous, primus quidem ex omnibus memoria dignus, ab studio sapientiae disciplinam hanc separavit, vir et arte et facundia in = ignis " (Celsus, De medicina).

means of succussion, for arriving at an opinion regarding their nature. Laennec says, " Hippocrate avait tente l'auscultation immediate." Although the treatise Jh.pl vowwv is doubtfully from the pen of Hippocrates, it contains strong evidence of having been the work of his grandson, representing the views of the Father of Medicine. Although not accurate in the conclusions reached at the time, the value of the method of diagnosis is shown by the retention in modern medicine of the name and the practice of " Hippocratic succussion." The power of graphic description of phenomena in the Hippocratic writings is illus- trated by the retention of the term " facies Hippocratica," applied to the appearance of a moribund person, pictured in the Prognostics. In surgery his writings are important and interest- ing, but they do not bear the same character of caution as the treatises on medicine; for instance, in the essay On Injuries of the Head, he advocates the operation " of trephining " more strongly and in wider classes of cases than would be warranted by the experience of later times.

The Hippocratic Collection consists of eighty-seven treatises, of which a part only can be accepted as genuine. The collection has been submitted to the closest criticism in ancient and modern times by a large number of commentators (for full list of the early com- mentators, see Adams's Genuine Works of Hippocrates, Sydenham Society, i. 27, 28). The treatises have been classified according to (1) the direct evidence of ancient writers, (2) peculiarities of style and method, and (3) the presence of anachronisms and of opinions opposed to the general Hippocratic teaching — greatest weight being attached to the opinions of Erotian and Galen. The general estimate of commentators is thus stated by Adams: " The peculiar style and method of Hippocrates are held to be conciseness of expression, great condensation of matter, and disposition to regard all professional subjects in a practical point of view, to eschew subtle hypotheses and modes of treatment based on vague ab- stractions." The treatises have been

grouped in the four following sections: (1) genuine; (2) those consisting of notes taken by students and collected after the death of Hippocrates; (3) essays by disciples ; (4) those utterly spurious. Littre' accepts the following thirteen as absolutely genuine: (1) On Ancient Medicine (Hepl dpxaiijs lijTpuijs) ; (2) The Prognostics (npoyfacmKov) ; (3) The Aphorisms (' \opuj)iol) ; (4) The Epidemics, i. and iii. ('E7r iStmi&v a Kaiy'); (5) On Regimen in Acute Diseases (Hepl StoiTijs o^eoiv);

(6) On Airs, Waters, and Places (Hepl aepav, viaruv, aal totoiv);

(7) On the Articulations (Hepl &pdpcov) ; (8) On Fractures (Hepl i.yp.Siv) ; (9) The Instruments of Reduction (MoxXocis) ; (10) The Physician's Establishment, or Surgery (Kar' 1-qTpeiov); (11) On Injuries of the Head (Hepl t£>v iv Kea\jj Tpattaruv); (12) The Oath ("Opuos); (13) The Law (Nv) ; (17) On the Sacred Disease (Hepl lepijs vciaov). According to the sceptical and somewhat subjective criticism of Ermerins, the whole collection is to be regarded as spurious except Epidemics, books i. and iii. (with a few interpolations), On Airs, Waters, and Places, On Injuries of the Head (" insigne fragmentum libri Hippocratei "), the former portion of the treatise On Regimen in Acute Diseases, and the " obviously Hippocratic " fragments of the Coan Prognostics. Perhaps also the Oath may be accepted as genuine ; its comparative antiquity is not denied. The Aphorisms are certainly later and inferior. In the other non-Hippocratic writings Ermerins thinks he can distinguish the hands of no fewer than nineteen different authors, most of them anonymous, and some of them very late.

The earliest Greek edition of the Hippocratic writings is that which was published by Aldus and Asulanus at Venice in 1526 (folio); it was speedily followed by that of Frobenius, which is much more accurate and complete (fol., Basel, 1538). Of the numerous sub- sequent editions, probably the best was that of Foesius (Frankfort, : 595. 1621, Geneva, 1657), until the publication of the great works of Littre, CEuvres completes d'Hippocrate, traduction nouvelle avec le texte grec en regard, collationnee sur les manuscrits et toutes les iditions, accompagnee d'une introduction, de commentaires medicaux, de variantes, et de notes philologiques (10 vols., Paris, 1839-1861), and of F. Z. Ermerins, Hippocratis et aliorum medicorum veterum reliquiae (3 vols., Utrecht, 1859-1864). See also Adams (as cited above), and Reinhold's Hippocrates (2 vols., Athens, 1864-1867). Daremberg's edition of the QLuvres choisies (2nd ed., Paris, 1855) includes the Oath, the Law, the Prorrhetics, book i., the Prognostics, On Airs, Waters, and Places, Epidemics, books i. and iii., Regimen, and Aphorisms. Of the sepaiate works attributed to Hippocrates the editions and translations are almost innumerable; of the Prognostics, for example, seventy editions are known, while of the Aphorisms there are said to exist as many as three hundred. For some notice of the Arabic, Syriac and

professedly by Hippocrates (Ibukrat or Bukrat), the number of which greatly exceeds that of the extant Greek originals, reference may be made to Flilgel's contribution to the article " Hippokrates " in the Encyklopadie of Ersch and Gruber. They have been partially catalogued by Fabricius in his Bibliotheca Graeca. (J. B. T.)

HIPPOCRENE (the " fountain of the horse," 17 Itttov Kpj)in\), the spring on Mt Helicon, in Boeotia, which, like the other spring there, Aganippe, was sacred to the Muses and Apollo, and hence taken as the source of poetic inspiration. The spring, surrounded by an ancient wall, is now known as Kryopegadi or the cold spring. According to the legend, it was produced by the stamping of the hoof of Bellerophon's horse Pegasus. The same story accounts for the Hippocrene in Troezen and the spring Peirene at Corinth.

HIPPODAMUS, of Miletus, a Greek architect of the 5th century B.C. It was he who introduced order and regularity into the planning of cities, in place of the previous intricacy and confusion. For Pericles he planned the arrangement of the harbour-town Peiraeus at Athens. When the Athenians founded Thurii in Italy he accompanied the colony as architect, and afterwards, in 408 B.C., he superintended the building of the new city of Rhodes. His schemes consisted of series of broad, straight streets, cutting one another at right angles.

HIPPODROME (Gr. hnrbSpoixos, from wnros, horse, and 5p6fu>s, racecourse), the course provided by the Greeks for horse and chariot racing; it corresponded to the Roman circus, except that in the latter only four chariots ran at a time, whereas ten or more contended in the Greek games, so that the width was far greater, being about 400 ft., the cource being 600 to 700 ft. long. The Greek hippodrome was usually set out on the slope of a hill, and the ground taken from one side served to form the embankment on the other side. One end of the hippodrome was semicircular, and the other end square with an extensive portico, in front of which, at a lower level, were the stalls for the horses and chariots. The modern hippodrome is more for equestrian and other displays than for horse racing. The Hippodrome in Paris somewhat resembles the Roman amphitheatre, being open in the centre to the sky, with seats round on rising levels.

HIPPOLYTUS, in Greek legend, son of Theseus and Hippolyte, queen of the Amazons (or of her sister Antiope), a famous hunter and charioteer and favourite of Artemis. His stepmother Phaedra became enamoured of him, but, finding her advances rejected, she hanged herself, leaving a letter in which she accused Hippolytus of an attempt upon her virtue. Theseus thereupon drove his son from his presence with curses and called upon his father Poseidon to destroy him. While Hippolytus was driving along the shore at Troezen (the scene of the Hippolytus of Euripides), a sea-monster (a bull or phoca) sent by Poseidon emerged from the waves; the horses were scared, Hippolytus was thrown out of the chariot, and was dragged along, entangled in the reins, until he died. According to a tradition of Epidaurus, Asclepius restored him to life at the request of Artemis, who removed him to Italy (see Virbius). At Troezen, where he had a special sanctuary and priest, and was worshipped with divine honours, the story of his death was denied. He was said to have been rescued by the gods at the critical moment, and to have been placed amongst the stars as the Charioteer (Auriga) . It was also the custom of the Troezenian maidens to cut off a lock of their hair and to dedicate it to Hippolytus before marriage (see Frazer on Pausanias ii. 32. 1). Well-known classical parallels to the main theme are Bellerophon and Antea (or Stheneboea) and Peleus and Astydamia. The story was the subject of two plays by Euripides (the later of which is extant), of a tragedy by Seneca and of Racine's Pkedre. A trace of it has survived in the legendary death of the apocryphal martyr Hippolytus, a Roman officer who was torn to pieces by wild horses as a convert to Christianity (see J. J. Dollinger, Hip- polytus and Callistus, Eng. tr. by A. Plummer, 1876, pp. 28-39,

51-60).

According to the older explanations, Hippolytus represented the sun, which sets in the sea (cf. the scene of his death and the story of Phaethon), and Phaedra the moon, which travels behind

the sun, but is unable to overtake it. It is more probable, however, that he was a local hero famous for his chastity, perhaps originally a priest of Artemis, worshipped as a god at Troezen, where he was closely connected and sometimes confounded with Asclepius. It is noteworthy that, in a speech put into the mouth of Theseus by Euripides, the father, who of Course believes his wife's story and regards Hippolytus as a hypocrite, throws his son's pretended misogyny and asceticism (Orphism) in his teeth. This seems to point to a struggle between a new ritual and that of Poseidon, the chief deity of Troezen, in which the representative of the intruding religion meets his death through the agency of the offended god, as Orpheus (q.v.) was torn to pieces by the votaries of the jealous Dionysus. According to S. Reinach (Archiv fiir Religionswissenschaft,x., 1907, p. 47), the

Troezenian Hippolytus was a horse, the hypostasis of an equestrian divinity periodically torn to pieces by the faithful, who called themselves, and believed themselves to be, horses. Death was followed by resuscitation, as in the similar myths of Adonis (the sacred boar), Orpheus (the fox), Pentheus (the fawn), Phaethon (the white sun-horse).

See Wilamowitz-Mollendorff's Introduction to his German transla- tion of Euripides' Hippolytus (1891); A. Kalkmann, De Hippolytis Euripideis (Bonn, 1882); and (for representations in art) " fjber Darstellung der Hippolytussage " in Archdologische Zeitung (xli. 1883); J. E. Harrison, Mythology and Monuments of Ancient Athens (1890), cl.

HIPPOLYTUS, a writer of the early Church. The mystery which enveloped the person and writings of Hippolytus, 1 one of the most prolific ecclesiastical writers of early times, had some light thrown upon it for the first time about the middle of the 19th century by the discovery of the so-called Philosophumena (see below) . Assuming this writing to be the work of Hippolytus, the information given in it as to the author and his times can be combined with other traditional dates to form a tolerably clear picture. Hippolytus must have been born in the second half of the 2nd century, probably in Rome. Photius describes him in his Bibliotheca (cod. 121) as a disciple of Irenaeus, and from the context of this passage it is supposed that we may conclude that Hippolytus himself so styled himself. But this is not certain, and even if it were, it does not necessarily imply that Hippolytus enjoyed the personal teaching of the celebrated Gallic bishop; it may perhaps merely refer to that relation of his theological system to that of Irenaeus which can easily be traced in his writings. As a presbyter of the church at Rome under Bishop Zephyrinus (199-217), Hippolytus was distinguished for his learning and eloquence. It was at this time that Origen, then a young man, heard him preach (Hieron. Vir. ill. 61; cp. Euseb. H.E. vi. 14, 10). It was probably not long before questions of theology and church discipline brought him into direct conflict with Zephyrinus, or at any rate with his successor Calixtus I. (q.v.). He accused the bishop of favouring the Christological heresies of the Monarchians, and, further, of subverting the discipline of the Church by his lax action in receiving back into the Church those guilty of gross offences. The result was a schism, and for perhaps over ten years Hippolytus stood as bishop at the head of a separate church. Then came the persecution under Maximinus the Thracian. Hippolytus and Pontius, who was then bishop, were transported in 235 to Sardinia, where it would seem that both of them died. From the so-called chronograph of the year 354 (Catalogus Liberianus) we learn that on the 13th of August, probably in 236, the bodies of the exiles were interred in Rome and that of Hippolytus in the cemetery on the Via Tiburtina: So we must suppose that before his death the schismatic was received again into the bosom of the Church, and this is

confirmed by the fact that his memory was henceforth celebrated in the Church as that of a holy martyr. Pope Damasus I. dedicated to him one of his famous epigrams, and Fradentms(Peristephanofl, 1 1) drew a highly coloured picture of his gruesome death, the details of which are certainly purely legendary: the myth of Hippolytus the son of Theseus was transferred to the Christian martyr. Of the historical Hippolytus little remained in the memory of after

1 According to the legend St Hippolytus was a Roman soldier who was converted by St Lawrence.

ages. Neither Eusebius (H.E. vi. 20, 2) nor Jerome (Vir. ill. 61) knew that the author so much read in the East and the Roman saint were one and the same person. The notice in the Chronicon Paschale preserves one slight reminiscence of the historical facts, namely, that Hippolytus's episcopal see was situated at Portus near Rome. In 1551 a marble statue of a seated man was found in the cemetery of the Via Tiburtina: on the sides of the seat were carved a paschal cycle, and on the back the titles of numerous writings. It was the statue of Hippolytus, a work at any rate of the 3rd century; at the time of Pius IX. it was placed in the Lateran Museum, a record in stone of a lost tradition.

Hippolytus's voluminous writings, which for variety of subject can be compared with those of Origen, embrace the spheres of exegesis, homiletics, apologetics and polemic, chrono- graphy and ecclesiastical law. His works have unfortunately come down to us in such a fragmentary condition that it is difficult to obtain from them any very exact notion of his intel- lectual and literary importance. Of his exegetical works the best preserved are the Commentary on the Prophet Daniel and the Commentary on the Song of ', Songs. In spite of many instances of a want of taste in his typology, they are distinguished by a certain sobriety and sense of proportion in his exegesis. We are unable to form an opinion of Hippolytus as a preacher, for the Homilies on the Feast of Epiphany which go under his name are wrongly attributed to him. He wrote polemical words directed against the pagans, the Jews and heretics. The most important of these polemical treatises is the Refutation of all Heresies, which has come to be known by the inappropriate title of the Philoso- phumena. Of its ten books, the second and third are lost; Book i. was for a long time printed (with the title Philoso- phumena) among the works of Origen; Books iv.-x. were found in 1842 by the Greek Minoides Mynas, without the name of the author, in a MS. at Mount Athos. It is nowadays universally admitted that Hippolytus

was the author, and that Books i. and iv.x belong to the same work. The importance of the work has, however, been much overrated; a close examination of the sources for the exposition of the Gnostic system which is con tained in it has proved that the information it gives is not always trustworthy. Of the dogmatic works, that on Christ and Antichrist survives in a complete state. Among other things it includes a vivid account of the events preceding the end of the world, and it was probably written at the time of the persecu- tion under Septimius Severus, i.e. about 202. The influence of Hippolytus was felt chiefly through his works on chronographic and ecclesiastical law. His chronicle of the world, a compilation embracing the whole period from the creation of the world up to the year 234, formed a basis for many chronographical works both in the East and West. In the great compilations of eccle- siastical law which arose in the East since the 4th century (see below: also Apostolic Constitutions) much of the material was taken from the writings of Hippolytus; how much of this is genuinely his, how much of it worked over, and how much of it wrongly attributed to him, can no longer be determined beyond dispute even by the most learned investigation.

Bibliography.— The edition of J. A. Fabricius, Hippolyti opera graece et lattne (2 vols., Hamburg, 1716-1718, reprinted in Gallandi, Bibliotheca veterum patrum (vol. ii., 1766), and Migne, Cursus patrol, ser. Graeca, vol. x.) is out of date. The preparation of a complete critical edition has been undertaken by the Prussian Academy of Sciences. The task is one of extraordinary difficulty, for the textual problems of the various writings are complex and confused: the Greek original is extant in a few cases only (the Commentary on Daniel, the Refutation, on Antichrist, parts of the Chronicle, and some fragments) ; for the rest we are dependent on fragments of translations, chiefly Slavonic, all of which are not even published. Of the Academy's edition one volume was published at Berlin in 1897, containing the Commentaries on Daniel and on the Song of Songs, the treatise on Antichrist, and the Lesser Exege- tical and Homiletic Works, edited by Nathanael Bonwetsch and Hans Achelis. The Commentary on the Song of Songs has also been published by Bonwetsch (Leipzig, 1902) in a German translation based on a Russian translation by N. Marr of the Grusian (Georgian) text, and he added to it (Leipzig, 1904) a translation of various small exegetical pieces, which are preserved in a Georgian version only {The Blessing of Jacob, The Blessing of Moses, The Narrative of

David and Goliath). A great part of the original of the Chronicle has been published by Adolf Bauer (Leipzig, 1905) from the Codex Matritensis Graecus, 221. For the Refutation we are still dependent on the editions of Miller (Oxford, 1851), Duncker and Schneidewin (Gottingen, 1859), and Cruice (Paris, i860). An English translation is to be found in the Ante-

Nicene Christian Library (Edinburgh,

1868-1869).

See Bunsen, Hippolytus and his Age (1852, 2nd ed., 1854; Ger. ed., 1853); Dollinger, Hippolytus und Kallistus (Regensb. 1853; Eng. transl., Edinb., 1876); Gerhard Ficker, Studien zur Hippolyt- frage (Leipzig, 1893); Hans Achelis, Hippolytstudien (Leipzig, 1897); Karl Johannes Neumann, Hippolytus von Rom in seiner Stellung zu Staat und Welt, part i. (Leipzig, 1902) ; Adhemar d'Ales, La Theologie de Saint Hippolyte (Paris, 1906). (G. K.)

HIPPOLYTUS, THE CANONS OF. This book stands at the head of a series of Church Orders, which contain instructions in regard to the choice and ordination of Christian ministers, regula- tions as to widows and virgins, conditions of reception of converts from heathenism, preparation for and administration of baptism, rules for the celebration of the eucharist, for fasting, daily prayers, charity suppers, memorial meals, first-fruits, &c. We shall give (1) a description of the book as we have it at present; (2) a brief statement of its relation to allied documents; (3) some remarks on the evidence for its date and authorship.

1, We possess the Canons of Hippolytus only in an Arabic version, itself made from a Coptic version of the original Greek. Attention was called to the book by Wansleben and Ludolf towards the end of the 17th century, but it was only in 1870 that it was edited by Haneberg, who added a Latin translation, and so made it generally accessible. In 1891 H. Achelis reproduced this translation in a revised form, embodying it in a synopsis of allied documents. He suspected much interpolation and derangement of order, and consequently rearranged its con- tents with a free hand. In 1900 a German translation was made by H. Riedel, based on fresh MSS. These showed that the book, as hitherto edited, had been thrown into disorder by the displace- ment of two pages near the end; they also removed other difficulties upon which the theory of interpolation had been based. Further discoveries, to be spoken of presently, have added to our materials for the study of the book.

The book is attributed to " Hippolytus, the chief of the bishops of Rome," and is divided into thirty-eight canons, to which short headings are prefixed. This division is certainly not original, but it is convenient for purposes of reference. Canon 1 is prefatory; it contains a brief confession of faith in the Trinity, and especially in the Word, the Son of God; and it speaks of the expulsion of heretics from the Church. Canons 2-5 give regulations for the selection and ordination of bishops, presbyters and deacons. The bishop is chosen by the whole congregation: " one of the

bishops and presbyters " is to lay hands upon him and say a prayer which follows (3): he is at once to proceed with "the offering," taking up the eucharistic service at the point where the sursum corda comes in. A presbyter (4) is to be ordained with the same prayer as a bishop, " with the exception of the word bishop "; but he is given no powerof ordination (this appears to be inconsistent with c. 2). The duties of a deacon are described, and the prayer of his ordination follows (5). Canons 6-9 deal with various classes in the Church. One who has suffered punishment for the faith (6) is to be counted a presbyter without ordination: " his confession is his ordination." Readers and sub-deacons (7) are given the Gospel, but are not ordained by laying-on of hands. A claim to ordination on the ground of gifts of healing (8) is to be admitted, if the facts are clear and the healing is from God. Widows are not ordained (9)_: " ordination is for men only." Canons 10-15 describe con- ditions for the admission of converts. Certain occupations are incompatible with Christian life: only under compulsion may a Christian be a soldier. Canons 16-18 deal chiefly with regulations concerning women. Canon 19 is a long one dealing with catechumens, preparation for baptism, administration of that sacrament, and of the eucharist for the newly baptized. The candidate is twice anointed: first, with the oil of exorcism, after he has said, with his face westward, " I renounce thee, O devil, and all thy following "; and, again, immediately after the baptism. As he stands in the water, he declares his faith in response to an interrogatory creed; and after each of the three clauses he is immersed. After the second anointing the bishop gives thanks " for that Thou hast made them worthy that they should be born again, and hast poured out Thy Holy Ghost upon them, so that they may belong, each one of them, to the body of the Church " : he signs them with the cross on their foreheads, and kisses them. The eucharist then proceeds:

the bishop gives them of the body of Christ and says, This is the body of Christ, and they answer Amen " ; and similarly for the cup.

Milk and honey are then given to them as being " born a second time as little children." A warning is added against eating anything before communicating. Canons 20-22 deal with fast-days, daily services in church, and the fast of the passover-week. Canon 23 seems as if it closed the series, speaking, as it does, of " our brethren the bishops " who in their cities have made regulations " according to the commands of our fathers the apostles ": " let none of our successors alter them; because it saith that the teaching is greater than the sea, and hath no end." We pass on, however, to regulations about the sick (24) who are to be visited by the

bishop, " because it is a great thing for the sick that the high-priest should visit them (for the shadow of Peter healed the sick)." Canons 25-27 deal again with prayers and church-services. The " seven hours " are specified, with reasons for their observance (25) : attendance at sermons is urged (26), " for the Lord is in the place where his lordship is pro- claimed " (comp. Didache 4, part of the Two Ways). When there are no prayers in church, reading at home is enjoined (27): " let the sun each morning see the book upon thy knees " (comp. Ath. Ad virg., § 12, " Let the sun when he ariseth see the book in thy hands "). Prayer must be preceded by the washing of the hands. "No believer must take food before communicating, especially on fast-days ": only believers may communicate (28). The sacred elements must be guarded, " lest anything fall into the cup, and it- be a sii. unto death for the presbyters." No crumb must be dropped, " lest an evil spirit get possession of it." . Canons 30-35 contain various rules, and specially deal with suppers for the poor (i.e. agapae) and memorial feasts. Then we have a prayer for the offering of first-fruits (36) ; a direction that ministers shall wear fair garments at "the mysteries" (37); and a command to watch during the night of the resurrection (38). The last canon hereupon passes into a general exhortation to right living, which forms a sixth part of the whole book. In Riedcl's translation we read this for the first time as a connected whole. It falls into two parts, and describes, first, the true life of ordinary Christians, warning them against an empty profession, and laying down many precepts of morality; and then it addresses itself to the " ascete " who " wishes to belong to the rank of the angels," and who lives a life of solitude and poverty. He is encouraged by an exposition, on somewhat strange lines, of the temptations of our Lord, and is specially warned against spiritual pride and contempt of other men. The book closes with an appeal for love and mutual service, based on the parables in St Matthew xxv.

2. It is impossible to estimate the position of the Canons of Hippolytus without some reference to allied documents (see Apostolical Constitutions), (a) The most important of these is what is now commonly called the Egyptian Church Order. This is preserved to us in Coptic and Aethiopic versions, of which Achelis, in his synopsis, gives German translations. The subject-matter and arrangement of these canons correspond generally to those of Hippolytus; but many of the details are modified to bring them into accord with a later practice. A new light was thrown on the criticism of this work by Hauler's discovery (1900) of a Latin version (of which, unfortunately, about half ' is missing) in the Verona palimpsest, from which he has also given us large Latin fragments of the Didascalia (which underlies books i.-vi. of the Apostolic Constitutions, and which hitherto we have only known from the Syriac) . The Latin of the Egyptian Church Order is somewhat more primitive than the Coptic, and approaches more

nearly, at some points, to the Canons of Hippolytus. It has a preface which refers to a treatise Concerning Spiritual Gifts, as having immediately preceded it; but neither this nor the Coptic-Aethiopic form has either the introduction or concluding exhortation which is found in the Canons of Hippolytus. (b) The Testament of the Lord is a docu- ment in Syriac, of which the opening part had been published by Lagarde, and of which Rahmani(i8oo) has given us the whole. It professes to contain instructions given by our Lord to the apostles after the resurrection. After an introduction containing apocalyptical matter, it passes on to give elaborate directions for the ordering of the Church, embodying, in a much-expanded form, the Egyptian Church Order, and showing a knowledge of the preface to that document which appears in the Latin version. It cannot be placed with probability earlier than' the latter part of the 4th century, (e) The Apostolic Constitutions is a composite document, which probably belongs to the end of the 4th century. Its first six books are an expanded edition of a Didascalia which we have already mentioned: its seventh book similarly expands and modifies the Didache; its eighth book begins by treating of " spiritual gifts," and then in c. 3 passes on to expand in like manner the Egyptian Church Order. The hand which has

wrought up all these documents has been shown to be that of the interpolator of the Ignatian Epistles in the longer Greek recension, (d) The Canons of Basil is the title "of an Arabic work, of which a German translation has been given us by Riedel, who thinks that they have come through Coptic from an original Greek book. They embody, in a modified form, considerable portions of the Canons of Hippolytus.

3. We now approach the difficult questions of date and author- ship. Much of the material has been quite recently brought to light, and criticism has not had time to investigate and pronounce upon it. Some provisional remarks, therefore, are all that can prudently be made. It seems plain that we have two lines of tradition: (1) The Canons of Hippolytus, followed by the Canons of Basil; (2) the Egyptian Church Order, itself repre- sented (a) by the Latin version, the Testament of the Lord, and the Apostolic Constitutions, which are linked together by the same preface (or portions of it) ; (b) by the Coptic and Aethiopic versions. Now, the preface of the Latin version points to a time when the canons were embodied in a corpus of similar materials, or, at the least, were preceded by a work on "Spiritual Gifts." The Canons of Hippolytus have a wholly different preface, and also a long exhortation at the close. The question which criticism must endeavour to answer is, whether the Canons of Hippolytus are the original from which the Egyptian Church Order is derived, or whether an earlier body of canons lies behind them both. At present it is probably wise to assume that the latter is the true explanation. For the Canons of Hippolytus appear to contain contradictory regulations (e.g. cc. 2 and 4 of the

presbyters), and also suggest that they have received a consider- able supplement (after c. 23). There is, however, no doubt that they present us with a more primitive stage of Church life than we find in the Egyptian Church Order. The mention of sub- deacons (which, after Riedel's fresh manuscript evidence, cannot now be dismissed as due to interpolation) makes it difficult to assign a date much earlier than the middle of the 3rd century.

The Puritan severity of the canons well accords with the temper of the writer to whom the Arabic title attributes them; and it is to be noted that the exhortation at the close contains a quotation from 2 Peter actually attributed to the apostle, and Hippolytus is perhaps the earliest author who can with certainty be said to have used this epistle. But the general style of Hippolytus, which is simple, straight- forward and strong, is in marked contrast with that of the closing passage of the canons; moreover, his mind, as presented to us in his extant writings, appears to be a much larger one than that of the writer of these canons; it is as difficult to think of Hippolytus as it would be to think of Origen in such a connexion. How, then, are we to account for the attribution? There is evidence to show that Hippolytus was highly reverenced through- out the East: his writings, which were in Greek, were known, but his history was entirely unknown. He was supposed to be " a pupil (yv&pinos) of apostles " (Palladius, 4th century), and the Arabic title calls him " chief of the bishops of Rome," i.e. archbishop of Rome. It is hard to trust this attribution more than the attribution of a Coptic discourse on the Dormitio Mariae to " Evodius, archbishop of the great city Rome, who was the second after Peter the apostle " (Texts and Studies, iv. 2-44) — Evodius being by tradition first bishop of Antioch. A whole group of books on Church Order bears the name of Clement of Rome; and the attribution of our canons to Hip- polytus may be only an example of the same tendency. The fact that Hippolytus wrote a treatise Concerning Spiritual Gifts, and that some such treatise is not only referred to in the Latin preface to the Egyptian Church Order, but is actually found at the beginning of book viii. of the Apostolic Constitutions, introduces an interesting complication; but we cannot here pursue the matter further. Dom Morin's ingenious attribution of the canons to Dionysius of Alexandria (on the ground of Eusebius, H.E. vi.46., 5) cannot be accepted in view of the broader church policy which that writer represents. If the Hippolytean authorship be given up, it is probable that Egypt will make

the strongest claim to be the locality in which the canons were compiled in

their present form.

The authorities of chief practical importance are H. Achelis, Texte u. Vnlers. vi. 4 (1891); Rahmani, Testamentum Domini (1899); Hauler, Didascaliae Apostolorum (1900) ; Riedel, Kirchen- rechtsquellen des Palriarchats Alexandrien (1900). (J. A. R.)

HIPPONAX, "of Ephesus, Greek iambic poet. Expelled from Ephesus in 540 B.C. by the tyrant Athenagoras, he took refuge in Clazomenae, where he spent the rest of his life in poverty. His deformed figure and malicious disposition exposed him to the caricature of the Chian sculptors Bupalus and Athenis, upon whom he revenged himself by issuing against them a series of satires. They are said to have hanged themselves like Lycambes and his daughters when assailed by Archilochus, the model and predecessor of Hipponax. His coarseness of thought and feeling, his rude vocabulary, his want of grace and taste, and his numerous allusions to matters of merely local interest prevented his becom ing a favourite in Attica. He was considered the inventor of parody and of a peculiar metre, the scazon or choliambus, which substitutes a spondee for the final iambus of an iambic senarius, and is an appropriate form for the burlesque character of his poems.

Fragments in Bergk, Poetae lyrici Graeci; see also B. J. Peltzer, De parodica Graecorum pohsi (1855), containing an account of Hipponax and the fragments.

HIPPOPOTAMUS (" river-horse," Gr. unros, horse and ■Kora-iim, river), the name of the largest representative of the non-ruminating artiodactyle ungulate mammals, and its living and extinct relatives. The common hippopotamus (Hippo- potamus amphibius), which formerly inhabited all the great rivers of Africa but whose range has now been much restricted, is most likely the behemoth of Scripture, and may very probably in Biblical times have been found in the Jordan valley, since at a still earlier (Pleistocene) epoch it ranged over a large part of Europe. It typifies not only a genus, but likewise a family, Hippopotamidae, distinguished from its relatives the pigs and

The Hippopotamus (Hippopotamus amphibius).

peccaries, or Suidac, by the following assemblage of characters: Muzzle very broad and rounded. Feet short and broad, with four subequal toes, bearing short rounded hoofs, and all reaching the ground in walking. Incisors not rooted but continuously growing; those of the upper jaw curved and directed down- wards; those of the lower straight and procumbent. Canines very large, curved, continuously growing; upper ones directed

downwards. Premolars |; molars f. Stomach complex. No caecum.

In form the hippopotamus is a huge, unwieldy creature, measuring in the largest specimens fully 14 ft. from the ex- tremity of the upper lip to the tip of the tail, while it ordinarily attains a length of 12 ft., with a height of 5 ft. at the shoulders, and a girth round the thickest part of the body almost equal to its length. The small ears are exceedingly flexible, and kept in constant motion when the animal is seeking to catch a distant

sound; the eyes are placed high up on the head, but little below the level of the ears; while the gape is wide, and the upper lip thick and bulging so as to cover over even its large tusks when the mouth is closed. The molars, which show trefoil-shaped grinding- surfaces are well adapted for masticating vegetable substances, while the formidable array of long spear-like incisors and curved chisel-edged canines or tusks root up rank grass like an agri- cultural implement. The legs are short, so that the body is but little elevated above the ground; and the feet, which are small in proportion to the size of the animal, terminate in four short toes each bearing a small hoof. With the exception of a few tufts of hair on the lips, on the sides of the head and neck, and at the extremity of the short robust tail, the skin of the hippopotamus, some portions of which are 2 in. in thickness, is destitute of covering. Hippopotamuses are gregarious animals, living in herds of from 20 to 40 individuals on the banks and in the beds of rivers, in the neighbourhood of which they most readily find appropriate food. This consists chiefly of grass and of aquatic plants, of which these animals consume enormous quantities, the stomach being capable of containing from 5 to 6 bushels. They feed principally by night, remaining in the water during the day, although in districts where they are little disturbed they are less exclusively aquatic. In such remote quarters, they put their heads boldly out of the water to blow, but when rendered sus- picious they become exceedingly cautious in this respect, only exposing their nostrils above the water, and even this they prefer doing amid the shelter of water plants. In spite of their enormous size and uncouth form, they are expert swimmers and divers, and can remain easily under the water from five to eight minutes. They walk on the bottoms of rivers, beneath at least 1 ft. of water. At nightfall they come on land to feed; and when, as often happens on the banks of the Nile, they reach cultivated ground, they do immense damage to growing crops, destroying by their ponderous tread even more than they devour. To scare away these unwelcome visitors the natives in such districts are in the habit of kindling fires at night. Although hippopotamuses do not willingly go far from the water on which their existence depends, they occasionally travel long distances by night in search of food, and in spite of their clumsy appearance are able to climb steep banks and precipitous ravines with ease. Of a wounded hippopotamus which Sir S. Baker saw leaving the water and galloping inland, he writes: ”

I never could have imagined that so unwieldy an animal could have exhibited such speed. No man could have had a chance of escape." The hippopotamus does not confine itself to rivers and lakes, but has been known to prefer the waters of the ocean as its home during the day. Of a mild and inoffensive disposition, it seeks to avoid collision with man; when wounded, however, or in defence of its young, it exhibits great ferocity, and native canoes are capsized and occasionally demolished by its infuriated attacks; the bellowing grunt then becoming loud enough to be heard a mile away. As among elephants, so also among hippopotamuses there are " rogues " — old bulls which have become soured in solitude, and are at all times dangerous. Assuming the offensive on every occasion, they attack all and sundry without shadow of provocation; and the natives avoid their haunts, which are usually well known.

The only other living species is the pygmy hippopotamus, H. (Choeropsis) liberiensis, of West Africa, an animal not larger than a clumsily made pig of full dimensions, and characterized by having generally one (in place of two) pair of incisors. It is . much less aquatic than its giant relative, having, in fact, the habits of a pig.

A small extinct species (H. lemerlei) inhabited Madagascar at a comparatively recent date; while other dwarf kinds were natives of Crete (H. minutus) and Malta and Sicily (H. pentlandi) during the Pleistocene. A large form of the ordinary species (H. amphibius major) w r as distributed over Europe as far north as Yorkshire at the same epoch; while an allied species (H. palaeindicus) inhabited Pleistocene India. Contemporary with. the latter was, however, a species (H. namadicus) with three pairs of incisors; and " hexaprotodont " hippopotamuses are

also characteristic of the Pliocene of India and Burma (H. sivalensis and H. irawdicus) , and of Algeria, Egypt and southern Europe (H. hipponensis) .

For the ancestral genera of the hippopotamus line, see Artio- dactyla. (R. L.)*

HIPPURIC ACID (Gr. 'Uwos, horse, ovpov, urine), ben- zoyl glycocoll or benzoyl amidoacetic acid, C9H9NO3 or C6H 5 CO-NH-CH2-C0 2 H, an organic acid found in the urine of horses and other herbivorae. It is excreted when many aromatic compounds, such as benzoic acid and toluene, are taken in- ternally. J. v. Liebig in 1829 showed that it differed

from benzoic acid, and in 1839 determined its constitution, while in 1853 V. Dessaignes (Ann. 87, p. 325) synthesized it by acting with benzoyl chloride on zinc glycocollide. It is also formed by heating benzoic anhydride with glycocoll (Th. Curtius, Ber., 1884, 17, p. 1662), and by heating benzamide with monochloracetic acid. It crystallizes in rhombic prisms which are readily soluble in hot water, melt at 187 C. and decompose at about 240 C. It is readily hydrolysed by hot caustic alkalis to benzoic acid and glycocoll. Nitrous acid converts it into benzoyl glycollic acid, CeHsCO-OCIL-COaH. Its ethyl ester reacts with hydrazine to form hippuryl hydrazine, CeHsCO-NH-CHrCO-NH-NHz, which was used by Curtius for the preparation of azoimide (q.v.).

HIPURNIAS, a tribe of South American Indians, 2000 or 3000 in number, living on the river Purus, western Brazil. Their houses are long, low and narrow: the side walls and roof are one, poles being fixed in the ground and then bent together so as to meet and form a pointed arch for the cross-sections. They use small bark canoes. Their chief weapons are poisoned arrows. They have a native god called Guintiniri.

HIRA, the capital of an Arabian kingdom, founded in the 2nd century a.d., on the western edge of Irak, was situated at 32 N., 44° 20′ E., about 4 m. S.E. of modern Nejef, by the Sa'ade canal, on the shore of the Bahr Nejef or Assyrium Stagnum. Its kings governed the western shore of the lower Euphrates and of the Persian Gulf, their kingdom extending inland to the con- fines of the Nejd. This Lakhmid kingdom was more or less dependent, during the four centuries of its existence, on the Sassanian empire, to which it formed a sort of buffer state towards Arabia. After the battle of Kadesiya and the founding of Kufa by the Arabs, Hira lost its importance and fell into decay. The ruin mounds covering the ancient site, while ex- tensive, are insignificant in appearance and give no indications of the existence of important buildings.

HIRADO, an island belonging to Japan, ig J m. long and 6 m. wide, lying off the west coast of the province of Hizen, Kiushiu, m 33° l 5′ N. and 129° 25′ E. It is celebrated as the site of the original Dutch factory — often erroneously written Firando — and as the place where one of the finest blue-and-white porcelains of Japan (Hiradoyaki) was produced in the 17th and 18th centuries. The kilns are still active.

HIRE-PURCHASE AGREEMENT, in the law of contract, a form of bailment of goods, on credit, which has extended very considerably of late years. Originally applied to the sale of the more expensive kinds of goods, such as pianos and articles of furniture, the hire-purchase apreement has now been extended to almost every description. The agreement is usually in writing, with a stipulation that the payments to purchase shall be by

weekly, monthly orotherinstalments. The agreement is virtually one to purchase, but in order that the vendor may be able to recover the goods at any time on non-payment of an instalment, it is treated as an agreement to let and hire, with a provision that when the last instalment has been paid the goods shall become the property of the hirer. A clause provides that in case of default of any instalment, or breach of any part of the agreement, all previous payments shall be forfeited to the lender, who can forcibly recover the goods. Such agreements, therefore, do not pass the property in the goods, which remains in the lender until all the instalments have been paid. But the terms of the agreement may sometimes purposely obscure the nature of the transaction between the parties, where, for example, the hire-purchase is merely to create a security for money. In such

a case a judge will look to the true nature of the transaction. If it is not a real letting and hiring, the agreement will require registration under the Bills of Sale Acts. If the agreement contains words to the effect that a person has " bought or agreed to buy " goods, the transaction comes under the Factors Act 1889, and the person in possession of the goods may dispose of them and give a good title. The doctrine of reputed ownership, by which a bankrupt is deemed the reputed owner of goods in his apparent possession, has been somewhat modified by trade customs, in accordance with which property is frequently let out on the hire-purchase system (see Bankruptcy).

HIRING (from 0. Eng. hyrian, a word common to many Teutonic languages cf. Ger. heuern, Dutch huren, &c), in law, a contract by which one man grants the use of a thing to another in return for a certain price. It corresponds to the locatio-conductio of Roman law. That contract was either a letting of a thing (locatio-conductio rei) or of labour (locatio operarum). The distinguishing feature of the contract was the price. Thus the contracts of mutuum, commodalum, depositum and mandalum, which are all gratuitous contracts, become, if a price is fixed, cases of locatio-conductio. In modern English law the term can scarcely be said to be used in a strictly technical sense. The contracts which the Roman law grouped together under the head of locatio-conductio — such as those of landlord and tenant, master and servant, &c. — are not in English law treated as cases of hiring but as independent varieties of contract. Neither in law books nor in ordinary discourse could a tenant farmer be said to hire his land. Hiring would generally be applied to contracts in which the services of a man or the use of a thing are engaged for a short time.

Hiring Fairs, or Statute Fairs, still held in Wales and some parts of England, were formerly an annual fixture in every important country town. These fairs served to bring together masters and servants. The men and maids seeking work stood in rows, the males together and the females

together, while masters and mistresses walked down the lines and selected those who suited them. Originally these hiring-fairs were always held on Martinmas Day (nth of November). Now they are held on different dates in different towns, usually in October or November. In Cumberland the men seeking work stood with straws in their mouths. In Lincolnshire the bargain between employer and employed was closed by the giving of the " fasten-penny," the earnest money, usually a shilling, which " fastened " the contract for a twelvemonth. Some few days after the Statute Fair it was customary to hold a second called a Mop Fair or Runaway Mop. " Mop " (from Lat. mappa, napkin, or small cloth) meant in Old English a tuft or tassel, and the fair was so called, it is suggested, in allusion to tufts or badges worn by those seeking employment. Thus the carter wore whipcord on his hat, the cowherd a tuft of cow's hair, and so on. Another possible explanation would be to take the word " mop " in its old provincial slang sense of " a fool," mop fair being the fools' fair, a sort of last chance offered to those who were too dull or slovenly-looking to be hired at the statute fair. Perhaps " run- away " suggests the idea of those absent through drunkenness, or those who simply feared to face the ordeal of the larger hiring and so ran away.

HIROSAKI, a town of Japan in the province of Michmoku or Rikuchiu, north Nippon, 22 m. S.W. of Aomori by rail. Pop. about 37,000. The fine isolated cone of Iwakisan, a mountain of pilgrimage, rises to the west. Hirosaki is a very old place, formerly residence of a great daimio (or daimyo) and capital of a vast principality, and still the seat of a high court with juris- diction over the surrounding districts of Aomori and Akita. Like most places in north Nippon, it is built with continu- ous verandas extending from house to house, and affording a promenade completely sheltered from the snows of winter. Apples of fine flavour grow in the district, which also enjoys some reputation for its peculiar green lacquer-ware.

HIROSHIGE (1 797-1858), Japanese artist, was one of the principal members of that branch of the Ukiyo-ye or Popular School of Painting in Japan, a school which chiefly made

colour-prints. His family name was Ando Tokitaro; that under which he is known having been, in accordance with Japanese practice, adopted by him in recognition of the fact that he was a pupil of Toyohiro. The earliest reference to him is in the account given by an inhabitant of the Lu-chu islands of a visit to Japan; where a sketch of a procession drawn with great

skill by Hiroshige at the age of ten years only is mentioned as one of the remarkable sights seen. At the age of fifteen he applied unsuccessfully to be admitted to the studio of the elder Toyokuni; but was eventually received by Toyohiro. On the death of the latter in 1828, he began to practise on his own account, but finding small encouragement at Yedo (Tokyo) he removed to Kioto, where he published a set of landscapes. He soon returned to Yedo, where his work soon became popular, and was imitated by other artists. He died in that city on the 6th day of the 9th month of the year, Ansei 5th, at the age of sixty-two, and was buried at Asakusa. One of his pupils, Hironobu, received from him the name of Hiroshige II. and another, Ando Tokubei, that of Hiroshige III. All three were closely associated with the work signed with the name of the master. Hiroshige II. some time after the year 1863 fell into disgrace and was compelled to leave Yedo for Nagasaki, where he died; Hiroshige III. then called himself Hiroshige II. He died in 1896. The earlier prints by these artists, whose work can hardly be separated, are of extraordinary merit. They applied the process of colour block printing to the purposes of depicting landscape, with a breadth, skill and suitability of convention that has been equalled only by Hokusai in Japan, and by no European. Most of their subjects were derived from the neighbourhood of Yedo, or were scenes on the old high road — the Tokaido — that ran from that city to Kioto. The two elder of the name were competent painters, and pictures and drawings by them are occasionally to be met with.

See E. F. Strange, "Japanese Colour-prints" (Victoria and Albert Museum Handbook, 1904). (E. F. S.)

HIROSHIMA, a city and seaport of Japan, capital of the government of its name in central Nippon. Pop. (1903) 113,545. It is very beautifully situated on a small plain surrounded by hills, the bay being studded with islands. In its general aspect it resembles Osaka, from which it is 190 m. W. by rail, and next to that place and Hiogo it is the most important commercial centre on the Inland Sea. The government has an area of about 3000 sq. m., with a population of about 1,500,000. Hiroshima is famous all over Japan owing to its association with the neighbour- ing islet of Itaku-Shima, " Island of Light," which is dedicated to the goddess Bentin and regarded as one of the three wonders of Japan. The chief temple dates from the year 587, and the island, which is inhabited largely by priests and their attendants, is annually visited by thousands of pilgrims. But the hallowed soil is never tilled, so that all provisions have to be brought from the surrounding districts.

HIRPINI (from an Oscan or Sabine stem hirpo-, "wolf "), an inland Samnite tribe in the south of Italy, whose territory was bounded by that of the Lucani on the S., the Campani on the S.W., the Appuli (Apuli) and

Frentani on the E. and N.E. On the N. we find them, politically speaking, identified with the Pentri and Caraceni, and with them constituting the Samnite alliance in the wars of the 4th century B.C. (see Samnites). The Roman policy of separation cut them off from these allies by the foundation of Beneventum in 268 B.C., and henceforward they are a separate unit; they joined Hannibal in 216 B.C., and re- tained their independence until, after joining in the Social war, which in their part of Italy can hardly be said to have ceased till the final defeat of the Samnites by Sulla in 83 B.C., they received the Roman franchise. Of their Oscan speech, besides the evidence of their place-names, only a few fragments survive (R. S. Conway, The Italic Dialects, pp. 170 ff.; and for hirpo-, ib. p. 200). In the ethnology of Italy the Hirpini appear from one point of view as the purest type of Safine stock, namely, that in which the proportion of ethnica formed with the suffix no is, highest, thirty-three out of thirty-six tribal or municipal epithets being formed thereby {e.g. Caudini, Compsani) and only

one with the suffix ti (Abellinates) , where it is clearly second- ary. On the significance of this see Sabini. (R. S. C.)

HIRSAU (formerly Hirschau), a village of Germany, in the kingdom of Wurttemberg, on the Nagold and the Pforzheim- Horb railway, 2 m. N. of Calw. Pop. 800. Hirsau has some small manufactures, but it owes its origin and historical interest to its former Benedictine monastery, Monasterium Hirsaugiense, at one period one of the most famous in Europe. Its picturesque ruins, of which only the chapel with the library hall are still in good preservation, testify to the pristine grandeur of the establish- ment. It was founded about 830 by Count Erlafried of Calw, at the instigation of his son, Bishop Notting of Vercelli, who en- riched it with, among other treasures, the body of St Aurelius. Its first occupants (838) were a colony of fifteen monks from Fulda, disciples of Hrabanus Maurus and Walafrid Strabo, headed by the abbot Liudebert. During about a century and a half, under the fostering care of the counts of Calw, it enjoyed great prosperity, and became an important seat of learning ; but towards the end of the 10th century the ravages of the pestilence combined with the rapacity of its patrons, and the selfishness and immorality of its inmates, to bring it to the lowest ebb. After it had been desolate and in ruins for upwards of sixty years it was rebuilt in 1059, and under Abbot William — Wilhelm von Hirsau — abbot from 1069 to 1091, it more than regained its former splendour. By his Constitutiones Hirsaugienses, a new religious order, the Ordo Hirsaugiensis, was formed, the rule of which was afterwards adopted by many monastic establishments throughout Germany, such as those of Blaubeuren, Erfurt and Schaffhausen. The friend and correspondent of Pope Gregory VII., and of Anselm of Canterbury, Abbot William took active part in the politico-ecclesiastical controversies of his time; while a

treatise from his pen, De musica et tonis, as well as the Philosophicarum et astronomicarum institutionum libri Hi., bears witness to his interest in science and philosophy. About the end of the 1 2th century the material and moral welfare of Hirsau was again very perceptibly on the decline; and it never after- wards again rose into importance. In consequence of the Reformation it was secularized in 1558; in 1692 it was laid in ruins by the French. The Chronicon Hirsaugiense, or, as in the later edition it is called, Annales Hirsaugienses of Abbot Trithe- mius (Basel, 1559; St Gall, 1690), is, although containing much that is merely legendary, an important source of information, not only on the affairs of this monastery, but also on the early history of Germany. The Codex Hirsaugiensis was edited by A. F. Gfrorer and printed at Stuttgart in 1843.

See Steck, Das Kloster Hirschau (1844) ; Helmsdorfer, Forschungen zur Geschichte des Abts Wilhelm von Hirschau (Gottingen, 1874); Weizsacker, Fiihrer durch die Geschichte des Klosters Hirschau (Stuttgart, 1898); Sussmann, Forschungen zur Geschichte des Klosters Hirschau (Halle, 1903) ; Giseke, Die Hirschauer wdhrend des Investiturstreits (Gotha, 1883) ; C. H. Klaiber, Das Kloster Hirschau (Tubingen, 1886); and Baer, Die Hirsauers Bauschule (Freiburg, 1897).

HIRSCH, MAURICE DE, Baron Hirsch auf Gereuth, in the baronage of Bavaria (1 831-1896), capitalist and philanthropist (German by birth, Austro-Hungarian by domicile), was born at Munich, 9th December 1831. His grandfather, the first Jewish landowner in Bavaria, was ennobled with the pradikat " auf Gereuth " in 1818; his father, who was banker to the Bavarian king, was created a baron in 1869. The family for generations has occupied a prominent position in the German Jewish community. At the age of thirteen young Hirsch was sent to Brussels to school,, but when seventeen years old he went into business. In 1855 he became associated with the banking house of Bischoffsheim & Goldschmidt, of Brussels, London and Paris. He amassed a large fortune, which he increased by purchasing and working railway concessions in Austria, Turkey and the Balkans, and by speculations in sugar and copper. While living in great splendour in Paris and London and on his estates in Hungary, he devoted much of his time to schemes for the relief of his Hebrew co- religionists in lands where they were persecuted and oppressed. He took a deep interest in the educational work of the Alliance Israelite Universelle, and on two occasions presented the society

with gifts of a million francs. For some years he regularly paid the deficits

in the accounts of the Alliance, amounting to several thousand pounds a year. In 1889 he capitalized his donations and presented the society with securities producing an annual income of £16,000. On the occasion of the fortieth anniversary of the emperor Francis Joseph's accession to the Austrian throne he gave £500,000 for the establishment of primary and technical schools in Galicia and the Bukowina. The greatest charitable enterprise on which he embarked was in connexion with the persecution of the Jews in Russia (see Anti-Semitism). He gave £10.000 to the funds raised for the repatriation of the refugees in 1882, but, feeling that this was a very lame conclusion to the efforts made in western Europe for the relief of the Russian Jews, he offered the Russian Government £2,000,000 for the en- dowment of a system of secular education to be established in the Jewish pale of settlement. The Russian Government was willing to accept the money, but declined to allow any foreigner to be concerned in its control or administration. Thereupon Baron de Hirsch resolved to devote the money to an emigration and colonization scheme which should afford the persecuted Jews opportunities of establishing themselves in agricultural colonies outside Russia. He founded the Jewish Colonization Association as an English society, with a capital of £2,000,000, and in 1892 he presented to it a further sum of £7,000,000. On the death of his wife in 1899 the capital was increased to £11,000,000, of which £1,250,000 went to the Treasury, after some litigation, in death duties. This enormous fund, which is probably the greatest charitable trust in the world, is now managed by delegates of certain Jewish societies, chiefly the Anglo- Jewish Association of London and the Alliance Israelite Universelle of Paris, among whom the shares in the association have been divided. The association, which is prohibited from working for profit, possesses large colonies in South America, Canada and Asia Minor. In addition to its vast agricultural work it has a gigantic and complex machinery for dealing with the whole problem of Jewish persecu- tion, including emigration and distributing agencies, technical schools, co-operative factories, savings and loan banks and model dwellings in the congested Russian Jewries. It also subventions and assists a large number of societies all over the world whose work is connected with the relief and rehabilitation of Jewish refugees. Besides this great organization, Baron de Hirsch founded in 1891 a benevolent trust in the United States for the benefit of Jewish immigrants, which he endowed with £493,000. His minor charities were on a princely scale, and during his residence in London he distributed over £100,000 among the local hospitals. It was in this manner that he disposed of the whole gross proceeds derived from his successes on the English turf, of which he was a lavish patron. He raced, as he said himself, " for the London hospitals," and in 1892, when his filly, La Fleche, won the Oaks, St Leger and One Thousand Guineas, his donations from this source amounted to about £40,000. Baron de Hirsch married on 28th June 1855 Clara, daughter of

Senator Bischoffsheim of Brussels (b. 1833), by whom he had a son and daughter, both of whom predeceased him. He died at Ogyalla, near Komorn, in Hungary, 21st April 1896. The baroness, who seconded her husband's charitable work with great munificence — their total benefactions have been estimated at £18,000,000, — died at Paris on the 1st of April 1899.

For details of Baron de Hirsch's chief charities see the annual reports of the Alliance Israelite Universelle and of the " Adminis- tration Centrale " of the Jewish Colonization Association. (L. W.)

HIRSCH, SAMSON RAPHAEL (1808-1888), Jewish theologian, was born in Hamburg in 1808 and died at Frankfort-on-the-Main in 1888. He opposed the reform tendency of Geiger (q.v.), and presented Jewish orthodoxy in a new and attractive light. His philosophical conception of tradition, associated as it was with conservatism in ritual practice, created what is often known as the Frankfort " Neo-Orthodoxy." Hirsch exercised a profound influence on the Synagogue and undoubtedly stemmed the tide of liberalism. His famous Nineteen Letters (1836), with which the Neo-Orthodoxy began, were translated into English by Drachmann (New York, 1899). Other works by Hirsch were

Horeb, and commentaries on the Pentateuch and Psalms. These are marked by much originality, but their exegesis is fanciful. Three volumes of his essays have been published (1 902-1 908); these were collected as Gesammelte Schriften from his periodical Jeschurun.

For Hirsch's religious philosophy see S. A. Hirsch, A Book of Essays (London, 1905). (I. A.)

HIRSCHBERG, a town of Germany, in the Prussian province of Silesia, beautifully situated at the confluence of the Bober and Zacken, 11 20 ft. above the sea-level, 48 m. S.E. of Gorlitz, on the railway to Glatz, with branches to Griinthal and Schmiedeberg. Pop. (1905) 19,317. It is surrounded by pleasant promenades occupying the site of its former fortifications. It possesses an Evangelical church, the church of the Holy Cross, one of the six Gnaden Kirchen for the Silesian Protestants stipulated for in the agreement at Altranstadt between Charles XII. of Sweden and the emperor Joseph I. in 1707, four Roman Catholic churches, one of which dates from the 14th century, a synagogue, several schools, an orphanage and an asylum. The town is the principal emporium of commerce in the Silesian mountains, and its industries include the carding and spinning of wool, and the manufacture of linen and cotton fabrics, yarn, artificial flowers, paper, cement, porcelain, sealing-wax, blacking, chemicals and cider. There is also a lively trade in corn, wine and agricultural produce.

The town is celebrated for its romantic surroundings, including the Cavalierberg, from which there is a splendid view, the Hausberg, the Helicon, crowned by a small Doric temple, the Kreuzberg, with walks commanding beautiful views, and the Sattler ravine, over which there is a railway viaduct. Hirschberg was in existence in the nth century, and obtained town rights in 1 108 from Duke Boleslaus of Poland. It withstood a siege by the Hussites in 1427, and an attack of the imperial troops in 1640. The foundation of its prosperity was laid in the 16th century by the introduction of the manufacture of linen and veils.

Hirschberg is also the name of a town of Thuringia on the Saale with manufactures of leather and knives. Pop. 2000.

HIRSON, a town of northern France in the department of Aisne, 35 m. by rail N.E. of Laon, on the Oise. Pop. (1906) §335- It occupies an important strategic position close to the point of intersection of several railway lines, and not far from the Belgian frontier. For its defence there are a permanent fort and two batteries, near the railway junction. The town carries on the manufacture of glass bottles, tiles, iron and tin goods, wool-spinning and brewing.

HIRTIUS, AULUS (c. 90-43 B.C.), Roman historian and states- man. He was with Julius Caesar as legate in Gaul, but after the civil war broke out in 49 he seems to have remained in Rome to protect Caesar's interests. He was also a personal friend of Cicero. He was nominated with C. Vibius Pansa by Caesar for the consulship of 43; and after the dictator's assassination in March 44, he and his colleague supported the senatorial party against M. Antonius, with whom Hirtius had at first sided. The consuls set out for Mutina, where Antonius was besieging Decimus Brutus. On the 15th of April, Pansa was attacked by Antonius at Forum Gallorum, about 8 m. from Mutina, and lost his life in the engagement. Hirtius, however, compelled Antonius to retire on Mutina, where another battle took place on the 25th (or 27th) of April, in which Hirtius was slain % Of the continua- tions of Caesar's Commentaries — the eighth book of the Gallic war, the history of the Alexandrian, African and Spanish wars — the first is generally allowed to be by Hirtius; the Alexandrian war is perhaps by him (or Oppius) ; the last two are supposed to have been written at his request, by persons who had taken part in the events described, with a view to subsequent revision and incorpora- tion in his proposed work on military commanders. The language of Hirtius is good, but his style is monotonous and lacks vigour.

Hirtius and the other continuators of Caesar are discussed in M. Schanz, Geschichle der romischen Literatur, i. ; also R. Schneider, Bellum Africanum (1905). For the history of the period see under Antonius ;

Cicero's Letters (ed. Tyrrell and Purser) ; G. Boissier, Cicero and his Friends (Eng. trans., 1897).

HISHAM IBN AL-KALBl [Abu-1 Mundhir Hisham ibn Mahommed ibn us-Sa'ib ul-Kalb] d. c. 819), Arabic historian,

was born in Kufa, but spent much of his life in Bagdad. Like his father, on whose authority he relied largely, he collected informa- tion about the genealogies and history of the ancient Arabs. According to the Fihrist (see Nadim) he wrote 140 works. As independent works they have almost entirely ceased to exist, but his account of the genealogies of the Arabs is continually quoted in the Kildb ul-Aghdni.

Large extracts from another of his works, the Kitab ul-Asnam, are contained in the Khizanat ul-Adab (iii. 242-246) and in the geography of Yaqut (q.v.). These latter have been translated with comments by J. Wellhausen in his Reste des arabischen Heidentums (2nd ed., Berlin, 1897). (G. W. T.)

HISPELLUM (mod. Spello, q.v.), an ancient town of Umbria, Italy, 3 m. N. of Fulginiae, on the road between it and Perusia, 1030 ft. above sea-level. It does not appear to be mentioned before the time of Augustus, who founded a colony there (Colonia Iulia Hispellum) and extended its territory to the springs of the Clitumnus, which had originally belonged to the territory of Mevania. It received the name of Flavia Constans by a rescript of the emperor Constantine, a copy of which on a marble tablet is still preserved at Spello. The gate by which the town is entered is ancient and has three portrait statues above it; two other gates and a part of the city wall, built of rectangular blocks of local limestone, may still be seen, as also the ruins of what is possibly a triumphal arch (attributed to Augustus) and an amphitheatre, and perhaps of a theatre, close to the modern high-road, outside the town. (T. As.)

HISSAR, a district in Central Asia, lying between 66° 30′ and 70 E. and 39° 15′ and 37° N. and dependent on the amir of Bokhara. It forms that part of the basin of the Amu-darya or Oxus which lies on the north side of the river, opposite the Afghan province of Balkh. The western prolongation of the Tian-shan, which divides the basin of the Zarafshan from that of the upper Amu, after rising to a height of 12,300 ft., bifurcates in 67 45′ E. The main chain, the southern arm of this bifurcation, designated the Hissar range, but sometimes called also Koh-i-tau, forms the N. and N.W.

boundaries of Hissar. On the W. it is wholly bounded by the desert; the Amu limits it on the S. and S.E.; and Kara- teghin and Darvaz complete the boundary on the E. Until 1875 ˆ was one ˚f th e least known tracts of Central Asia. Hissar is traversed from north to south by four tributaries of the Amu, viz. the Surkhab or Vakhsh, Kafirnihan, Surkhan and Shirabad-darya, which descend from the snowy mountains to the north and form a series of fertile valleys, disposed in a fan-shape, within which lie the principal towns. In the N.W. boundary range between Khuzar and Derbent is situated the defile formerly called the Iron Gate (Caspian Gates, Bab-al-Hadid, Dar Ahanin and in Chinese T'ie-men-kuan) but now styled Buzghol-khana or the Goat-house. It was also called Kobluga, said to be a Mongol word meaning barrier. This pass is described as a deep but narrow chasm in a transverse range, whose rocks overhang and threaten to choke the tortuous and gloomy corridor (in places but five paces wide) which affords the only exit from the valley. In ancient times it was a vantage point of much im- portance and commanded one of the chief routes between Turkestan and India. Hsiian Tsang, the Chinese traveller, who passed through it in the 7th century, states that there were then two folding doors or gates, cased with iron and hung with bells, placed ˆcross the pass. Clavijo, the Spanish ambas- sador to the court of Timur, heard of this when he passed through the defile nearly 800 years later, but the gates had then disappeared.

The Surkhan valley is highly cultivated, especially in its upper portion. It supplies Bokhara with corn and sheep, but its chief products are rice and flax. The town of Hissar (pop. 15,000) commands the entrance into the fertile valleys of the Surkhan and Kafirnihan, just as Kabadian at the southern end of the latter defends them from the south. Hissar was long famous for its damascened swords and its silk goods. Kulab produces wheat in abundance, and gold is brought thither from the surrounding districts. Kabadian is a large, silk-producing town, and is surrounded with rice-fields. The population consists principally of Uzbegs and Tajiks,

the former predominating and gradually pushing the Tajiks into the hills. On the banks of the Amu there are Turkomans who work the ferries, drive sheep and accompany caravans. Lyuli (gipsies), Jews, Hindus and Afghans are other elements of the population. The climate of the valleys of Hissar and Kulab is pleasant, as they are protected by mountains to the north and open towards the south. They produce all the cereals and garden plants indigenous to Central Asia. Cotton is grown in the district of Shirabad; and cotton, wheat, flax, sheep and rock-salt are all exported.

History. — This country was anciently part of the Persian empire of the Achaemenidae, and probably afterwards of the Graeco-Bactrian kingdom, and then subject to the invading Asiatic tribes who broke up that kingdom,

e.g. the Yue-chi. It was afterwards conquered by the Ephthalites or White Huns, who were subdued by the Turks in the early part of the 7 th century. It then became subject successively to the Mahom- medan invaders from Persia, and after to the Mongol dynasty of Jenghiz Khan, and to Timur and his successors. It subse- quently became a cluster of Uzbeg states and was annexed by the amir of Bokhara (q.v.) in 1869-1870, soon after the Russian occupation of Samarkand. (J. T. Be.; C. El.)

HISSAR, a town and district of British India, in the Delhi division of the Punjab. The town is situated on the Rajputana railway and the Western Jumna canal, 102 m. W.N. W. of Delhi. Pop. (1001) 17,647. It was founded in 1356 by the emperor Feroz Shah, who constructed the canal to supply it with water; but this fell into decay during the 18th century, owing to the constant inroads of marauders. Hissar was almost completely depopulated during the famine of 1783, but was afterwards occupied by the famous Irish adventurer George Thomas, who built a fort and collected inhabitants. It is now chiefly known for its cattle and horse fairs, and has a cotton factory.

The District comprises an area of 5217 sq. m. It forms the western border district of the great Bikanir desert, and consists for the most part of sandy plains dotted with shrub and brushwood, and broken by undulations towards the south, which rise into hills of rock like islands out of a sea of sand. The Ghaggar is its only river, whose supply is uncertain, depending much on the fall of rain in the lower Himalayas; its overflow in times of heavy rain is caught by jhils, which dry up in the hot season. The Western Jumna canal crosses the district from east to west, irrigating many villages. The soil is in places hard and clayey, and difficult to till; but when sufficiently irrigated it is highly productive. Old mosques and other buildings exist in parts of the district. Hissar produces a breed of large milk-white oxen, which are in great request for the carriages of natives. The district has always been subject to famine. The first calamity of this kind of which there is authentic record was in 1783; and Hissar has suffered severely in more recent famines. Its population in 1901 was 781,717, showing practically no increase in the decade, whereas in the previous decade there had been an increase of 15%. The climate is very dry, hot westerly winds blowing from the middle of March till July. Cotton weaving, ginning and pressing are carried on. The district is served by the Rajputana-Malwa, the Southern Punjab and the Jodhpur- Bikanir railways. The chief trading centres are Bhiwani, Hansi, Hissar and Sirsa.

Before the Mahommedan conquest, the semi-desert tract of which Hissar district now forms part was the retreat, of Chauhan Rajputs. Towards the end of the 18th century the Bhattis of Bhattiana gained ascendancy after bloody struggles. To complete the ruin brought on by these conflicts, nature

lent her aid in the great famine of 1783. Hissar passed nominally to the British in 1803, but they could not enforce order till 1810. Early in the mutiny of 1857 Hissar was wholly lost for a time to British rule, and all Europeans were either murdered or compelled to fly. The Bhattis rose under their hereditary chiefs, and the majority of the Mahommedan population followed their example. Before Delhi had been recovered, the rebels were utterly routed.

HISTIAEUS (d. 494 B.C.), tyrant of Miletus under the Persian king Darius Hystaspis. According to Herodotus he rendered great service to Darius while he was campaigning in Scythia by persuading his fellow-despots not to destroy the bridge over the Danube by which the Persians must return. Choosing his own reward for this service, he became possessor of territory near Myrcinus (afterwards Amphipolis), rich in timber and minerals. The success of his enterprise led to his being invited to Susa, where in the midst of every kind of honour he was virtually a prisoner of Darius, who had reason to dread his growing power in Ionia. During this period the Greek cities were left under native despots supported by Persia, Aristagoras,- son-in- law of Histiaeus, being ruler of Miletus in his stead. This prince, having failed against Naxos in a joint expedition with the satrap Artaphernes, began to stir up the Ionians to revolt, and this result was brought to pass, according to Herodotus, by a secret message from Histiaeus. The revolt assumed a formidable character and Histiaeus persuaded Darius that he alone could quell it. He was allowed to leave Susa, but on his arrival at the coast found himself suspected by the satrap, and was ulti- mately driven to establish himself (Herodotus says as a pirate; more probably in charge of the Bosporus route) at Byzantium. After the total failure of the revolt at the battle of Lade, he made various attempts to re-establish himself, but was captured by the Persian Harpagus and crucified by Artaphernes at Sardis. His head was embalmed and sent to Darius, who gave it honour- able burial. The theory of Herodotus that the Ionian revolt was caused by the single message of Histiaeus is incredible; there is evidence to_ show that the Ionians had been meditating since about 512 a patriotic revolt against the Persian domination and the "tyrants" on whom it rested (see Grote, Hist, of Greece, ed. 1007, especially p. 122 note; art. Ionia, and authorities; also S. Heinlein in Klio, 1909, pp. 341-351).

HISTOLOGY (Gr. iotos, web, tissue, properly the web-beam of the loom, from ujto.vo.1, to make to stand), the science which deals with the structure of the tissues of plants and animals (see Cytology).

HISTORY. The word ’” history ” is used in two senses. It may mean either the record of events, or events themselves. Originally (see below) limited to inquiry and statement, it was only in comparatively modern times that the meaning of the word was extended to include the phenomena which form or might form their subject. It was perhaps by a somewhat careless transference of ideas that this extension was brought about. Now indeed it is the commoner meaning. We speak of the ” history of England ” without reference to any literary narrative. We term kings and statesmen the ” makers of history,” and some- times say that the historian only records the history which they make. History in this connexion is obviously not the record, but the thing to be recorded. It is unfortunate that such a double meaning of the word should have grown up, for it is productive of not a little confusion of thought.

History in the wider sense is all that has happened, not merely all the phenomena of human life, but those of the natural world as well. It includes everything that undergoes change; and as modern science has shown that there is nothing absolutely static, therefore the whole universe, and every part of it, has its history. The discovery of ether brought with it a recon- struction of our ideas of the physical universe, transferring the emphasis from the mathematical expression of static relationships to a dynamic conception of a universe in constant transformation; matter in equipoise became energy in gradual readjustment. Solids are solids no longer. The universe is in motion in every particle of every part; rock and metal merely a transition stage between crystallization and dissolution. This idea of universal activity has in a sense made physics itself a branch of history. It is the same with the other sciences — especially the biological division, where the doctrine of evolution has induced an attitude nf mind which is distinctly historical.

But the tendency to look at things historically is not merely the attitude of men of science. Our outlook upon life differs in just this particular from that of preceding ages. We recognize the

unstable nature of our whole social fabric, and are therefore more and more capable of transforming it. Our institutions are no longer held to be inevitable and immutable creations. We do not attempt to fit them to absolute formulae, but continually adapt them to a changing environment. Even modern aichi- tecture, notably in America, reflects the consciousness of change. The permanent character of ancient or medieval buildings was fitted only to a society dominated by static ideals. Now the architect builds, not for all time, but for a set of conditions which will inevitably cease in the not distant future. Thus our whole society not only bears the marks of its evolution, but shows its growing consciousness of the fact in the most evident of its arts. In literature, philosophy and political science, there is

the same historical trend. Criticism no longer judges by absolute standards; it applies the standards of the author's own environ- ment. We no longer condemn Shakespeare for having violated the ancient dramatic laws, nor Voltaire for having objected to the violations. Each age has its own expression, and in judging each we enter the field of history. In ethics, again, the revolt against absolute standards limits us to the relative, and morals are investigated on the basis of history, as largely conditioned by economic environment and the growth of intellectual freedom. Revelation no longer appeals to scientific minds as a source of knowledge. Experience on the other hand is history. As for political science, we do not regard the national state as that ultimate and final product which men once saw in the Roman Empire. It has hardly come into being before forces are evident which aim at its destruction. Internationalism has gained ground in Europe in recent years; and Socialism itself, which is based upon a distinct interpretation of history, is regarded by its followers as merely a stage in human progress, like those which have gone before it. It is evident that Freeman's definition of history as " past politics " is miserably inadequate. Political events are mere externals. History enters into every phase of activity, and the economic forces which urge society along are as much its subject as the political result.

In short the historical spirit of the age has invaded every field. The world-picture presented in this encyclopaedia is that of a dynamic universe, of phenomena in process of ceaseless change. Owing to this insistent change all things which happen, or seem to happen, are history in the broader sense of the word. The encyclopaedia itself is a history of them in the stricter sense, — the description and record of this universal process. This narrower meaning is the subject of the rest of this article.

The word " history " comes from the Gr. Urropia, which was used by the Ionians in the 6th century B.C. for the search for knowledge in the widest sense. It meant inquiry, investigation, not narrative. It was not until two centuries later that the historikos, the reciter of stories, superseded the his/ oreon (laropioiv) , the seeker after knowledge. Thus history began as a branch of scientific research, — much the same as what the Athenians later termed philosophy. Herodotus himself was as much a scientific explorer as a reciter of narrative, and his life-long investigation was historic in his Ionian speech. Yet it was Herodotus himself who first hinted at the new use of the word, applied merely to the details accumulated during a long search for knowledge. It is not until Aristotle, however, that we have it definitely applied to the literary product instead of the inquiry which precedes it. From Aristotle to modern times, history (Lat. historic) has been a form of literature. It is only in the scientific environment of to-day that we recognize once more, with those earliest of the forerunners of Herodotus, that history involves two distinct operations, one of which, investigation, is

in the field of science, while the other, the literary presentation, is in the field of art.

The history of history itself is therefore two-fold. History as art flourishes with the arts. It calls upon the imagination and the literary gifts of expression. Its history does not run parallel with the scientific side, but rather varies in inverse ratio with scientific activity. Those periods which have been dominated by the great masters of style have been less interested in the criticism of the historian's methods of investigation than in the beauty of his rhetoric. The scientific historian, deeply interested

in the search for truth, is generally but a poor artist, and his uncoloured picture of the past will never rank in literature beside the splendid distortions which glow in the pages of a Michelet or Macaulay. History the art, in so far as it is conditioned upon genius, has no single traceable line of development. Here the product of the age of Pericles remains unsurpassed still; the works of Herodotus and Thucydides standing along with those of Pheidias as models for all time. On the other hand, history the science has developed so that it has not only gained recogni- tion among historians as a distinct subject, but it has raised with it a group of auxiliary sciences which serve either as tools for investigation or as a basis for testing the results. The advance in this branch of history in the 19th century was one of its greatest achievements. The vast gulf which lies between the history of Egypt by Herodotus and that by Flinders Petrie is the measure of its achievement. By the mechanism now at his disposal the scientific explorer can read more history from the dust -heaps of Abydos than the greatest traveller of antiquity could gather from the priests of Sals. In tracing the history of history we must therefore keep in mind the double aspect.

History itself, this double subject, the science and the art combined, begins with the dawn of memory and the invention of speech. It is wrong to term those ages pre-historic whose history has not come down to us, including in one category the pre-literary age and the literary whose traces have been lost. Even the pre-literary had its history, first in myth and then in saga. The saga, or epos, was a great advance upon the myth, for in it the deeds of men replace or tend to replace the deeds of the gods. But we are still largely in the realm of imagination. Poetry, as Thucydides complained, is a most imperfect medium for fact. The bard will exaggerate or distort his story. True history, as a record of what really has happened, first reached maturity in prose. Therefore, although much of the past has been handed down to us in epic, in ballad and in the legends of folk-lore, we must turn

from them to what became history in the narrower sense.

The earliest prose origins of history are the inscriptions. Their inadequacy is evident from two standpoints. Their permanence depends not upon their importance, but upon the durability of the substance on which they are inscribed. A note for a wedding ring baked into the clay of Babylon has been preserved, while the history of the greatest events has perished. In the second place they are sealed to all but those who know how to read them, and so they lie forgotten for centuries while oral tradition flourishes, — being within the reach of every man. It is only recently that archaeology, turning from the field of art, has undertaken to interpret for us this first written history. The process by which the modern fits together all the obtainable remains of an antiquity, and reconstructs even that past which left no written record, lies outside the field of this article. But such enlargement of the field of history is a modern scientific product, and is to be distinguished from the imperfect beginnings of history-writing which the archaeologist is able to decipher.

Next to the inscriptions, — sometimes identical with them, — are the early chronicles. These are of various kinds. Family chronicles preserved the memory of heroic ancestors whose deeds in the earliest age would have passed into the keeping of the bards. Such family archives were perhaps the main source for Roman historians. But they are not confined to Rome or Greece. Genealogies also pass from the bald verse, which was the vehicle for oral transmission, to such elaborate tables as those in which Manetho has preserved the dynasties of Egyptian Pharaohs.

In this field the priest succeeds the poet. The temple itself became the chief repository of records. There were simple religious annals, votive tablets recording miracles accomplished atashrine,listsof priests and priestesses, accounts of benefactions, of prodigies and portents. In some cases, as in Rome, the pontiffs kept a kind of register, not merely of religious history, but of important political events as well. Down to the time of the Gracchi (131 B.C.) the Pontifex Maximus inscribed the year's events upon annual tablets of wood which were preserved in the Regia, the official residence of the pontiff in the Forum. These

pontifical " annals " thus came to be a sort of civic history. Chronicles of the Greek cities were commonly ascribed to mythical authors, as for instance that of Miletus, the oldest, to Cadmus the inventor of letters. But they were continued and edited by men in whom the critical spirit was awakening, as when the chroniclers of Ionian towns began the criticism of Homer.

The first historians were the logographi of these Ionian cities; men who

carried their inquiry (historie) beyond both written record and oral tradition to a study of the world around them. Their "saying " (logos) was gathered mostly from contempo- raries; and upon the basis of a widened experience they became critics of their traditions. The opening lines of Hecataeus of Miletus begin the history of the true historic spirit in words which read like a sentence from Voltaire. " Hecataeus of Miletus thus speaks: I write as I deem true, for the traditions of the Greeks seem to me manifold and laughable." Those words mark an epoch in the history of thought. They are the introduc- tion to historical criticism and scientific investigation. Whatever the actual achievement of Hecataeus may have been, from his time onward the scientific movement was set going. Herodotus of Heraclea struggled to rationalize mythology, and estab- lished chronology on a solid basis. And finally Herodotus, a pro- fessional story-teller, rose to the height of genuine scientific investigation. Herodotus' inquiry was not simply that of an idle tourist. He was a critical observer, who tested his evidence. It is easy for the student now to show the inadequacy of his sources, and his failure here or there to discriminate between fact and fable. But given the imperfect medium for investigation and the absence of an archaeological basis for criticism, the work of Herodotus remains a scientific achievement, as remarkable for its approximation to truth as for the vastness of its scope. Yet it was Herodotus' chief glory to have joined to this scientific spirit an artistic sense which enabled him to cast the material into the truest literary form. He gathered all his knowledge of the ancient world, not simply for itself, but to mass it around the story of the war between the east and west, the Greeks and the Persians. He is first and foremost a story-teller; his theme is like that of the bards, a heroic event. His story is a vast prose epos, in which science is to this extent subordinated to art. " This is the showing forth of the Inquiry of Herodotus of Halicarnassus, to the end that neither the deeds of men may be forgotten by lapse of time, nor the works, great and marvellous, which have been produced, some by Hellenes, some by Barbarians, may lose their renown, and especially that the causes may be remembered for which these waged war with one another" (i.e. the Persian war).

In Thucydides a higher art than that of Herodotus was com- bined with a higher science. He scorned the story-teller " who seeks to please the ear rather than to speak the truth," and yet his rhetoric is the culmination of Greek historical prose. He withdrew from vulgar applause, conscious that his narrative would be considered " disappointing to the ear," yet he recast the materials out of which he constructed it in order to lift that narrative into the realm of pure literature. Speeches, letters and documents are reworded to be in tone with the rest of the story. It was his art, in fact, which really created the Peloponnesian war out of its separate parts. And

yet this art was merely the language of a scientist. The " laborious task " of which he speaks is that of consulting all possible evidence, and weighing conflicting accounts. It is this which makes his rhetoric worth while, "an everlasting possession, not a prize competition which is heard and forgotten."

From the sublimity of Thucydides, and Xenophon's straight- forward story, history passed with Theopompus and Ephorus into the field of rhetoric. A revival of the scientific instinct of investigation is discernable in Timaeus the Sicilian, at the end of the 4th century, but his attack upon his predecessors was the text of a more crushing attack upon himself by Polybius, who declares him lacking in critical insight and biased by passion. Polybius' comments upon Timaeus reach the dignity of a treatise upon history. He protests against its use for controversial pamphlets which distort the truth. " Directly a man assumes the moral attitude of an historian he ought to forget all

considerations, such as love of one's friends, hatred of one's

enemies He must sometimes praise enemies and blame friends.

For as a living creature is rendered useless if deprived of its eyes, so if you take truth from History, what is left but an improfit- able tale " (bk. xii. 14). These are the words of a Ranke. Un- fortunately Polybius, like most modern scientific historians, was no artist. His style is the very opposite of that of Isocrates and the rhetoricians. It is often only clear in the light of inscriptions, so closely does it keep to the sources. The style found no imitator; history passed from Greece to Rome in the guise of rhetoric. In Dionysius of Halicarnassus the rhetoric was combined with an extensive study of the sources; but the influence of the Greek rhetoricians upon Roman prose was deplorable from the stand- point of science. Cicero, although he said that the duty of the historian is to conceal nothing true, to say nothing false, would in practice have written the kind of history that Polybius denounced. He finds fault with those who are non exornatores rerum sed lantum narratores. History for him is the mine from which to draw argument in oratory and example in education. It is not the subject of a scientific curiosity.

It should be noted before we pass to Rome that with the expansion of Hellenism the subject of historians expanded as well. Universal history was begun by Ephorus, the rhetorician, and formed the theme of Polybius and

Deodorus. Exiled Greeks were the first to write histories of Rome worthy of the name. The Alexandrian Eratosthenes placed chronology upon the scientific basis of astronomy, and Apollodorus drew up the most important chronica of antiquity.

History-writing in Rome, — except for the Greek writers resident there, — was until the first half of the 1st century B.C. in the form of annals. Then came rhetorical ornamentation, — and the Ciceronian era. The first Roman historian who rose to the conception of a science and art combined was Sallust, the student of Thucydides. The Augustan age produced in Livy a great popular historian and natural artist and a trained rhetorician (in the speeches), — but as uncritical and inaccurate as he was brilliant. From Livy to Tacitus the gulf is greater than from Herodotus to Thucydides. Tacitus is at least a consummate artist. His style ranges from the brilliancy of his youth to the sternness and sombre gravity of age, passing almost to poetic expression in its epigrammatic terseness. Yet in spite of his searching study of authorities, his keen judgment of men, and his perception of underlying principles of moral law, his view was warped by the heat of faction, which glows beneath his external objectivity. After him Roman history-writing speedily degener- ated. Suetonius ' Lives of the Caesars is but a superior kind of journalism. But his gossip of the court became the model for historians, whose works, now lost, furnish the main source for the Hisloria Augusta. The importance to us of this uncritical collection of biographies is sufficient comment on the decline of history-writing in the latter empire. Finally, from the 4th century the epitomes of Eutropius and Festus served to satisfy the lessening curiosity in the past and became the handbooks for the middle ages. The single figure of Ammianus Marcellinus stands out of this age like a belated disciple of Tacitus. But the world was changing from antique to Christian ideals just as he was writing, and with him we leave this outline of ancient history.

The 4th and 5th centuries saw a great revolution in the history of history. The story of the pagan past slipped out of mind, and in its place was set, by the genius of Eusebius, the story of the world force which had superseded it, Christianity, and of that small fraction of antiquity from which it sprang,— the Jews. Christianity from the first had forced thinking men to recon struct their philosophy of history, but it was only after the Church's triumph that its point of view became dominant in historiography. Three centuries more passed before the pagan models were quite lost to sight. But from the 7th century to the 17th — from Isidore of Seville and the English Bede for a thousand years, — mankind was to look back along the line of Jewish priests and kings to the Creation. Egypt was of interest only as it came into Israelite history, Babylon and Nineveh were

to illustrate the judgments of Yahweh, Tyre and Sidon to reflect the glory

of Solomon. The process by which the " gentiles " have been robbed of their legitimate history was the inevitable result of a religion whose sacred books make them lay figures for the history of the Jews. Rejected by the Yahweh who became the Christian God, they have remained to the present day, in Sunday schools and in common opinion, not nations of living men, with the culture of arts and sciences, but outcasts who do not enter into the divine scheme of the world's history. When a line was drawn between pagan and Christian back to the creation of the world, it left outside the pale of inquiry nearly all antiquity. But it must be remembered that that antiquity was one in which the German nations had no personal interest. Scipio and the Gracchi were essentially unreal to them. The one living organiza- tion with which they came into touch was the Church. So Cicero and Pompey paled before Joshua and Paul. Diocletian, the organizing genius, became a bloodthirsty monster,' and Constantine, the murderer, a saint.

Christian history begins with the triumph of the Church. With Eusebius of Caesarea the apologetic pamphlets of the age of persecutions gave way to a calm review of three centuries of Christian progress. Eusebius' biography of Constantine shows what distortion of fact the father of Church history permitted himself, but the Ecclesiastical History was fortunately written for those who wanted to know what really happened, and remains to-day an invaluable repository of Christian antiquities. With the continuations of Socrates, Sozomen and Theodoret, and the Latin manual which Cassiodorus had woven from them (the Historia tripartita), it formed the body of Church history during all the middle ages. An even greater influence, however, was exercised by Eusebius' Chronica. Through Jerome's translation and additions, this scheme of this world's chronology became the basis for all medieval world chronicles. It settled until our own day the succession of years from the Creation to the birth of Christ, — fitting the Old Testament story into that of ancient history. Henceforth the Jewish past, — that one path back to the beginning of the world, — was marked out by the absolute laws of mathematics and revelation. Jerome had marked it out; Sulpicius Severus, the biographer of St Martin, in his Historia sacra, adorned it with the attractions of romance. Sulpicius was admirably fitted to interpret the miraculous Bible story to the middle ages. But there were few who could write like him, and Jerome's Chronicle itself, or rather portions of it, became, in the age which followed, a sort of universal preface for the monastic chronicler. For a time there were even attempts to continue " imperial chronicles," but they were insignificant compared with the influence of Eusebius and Jerome.

From the first, Christianity had a philosophy of history. Its earliest apologists sought to show how the world had followed a divine plan in its long preparation for the life of Christ. From this central fact of all history, mankind should continue through war and suffering until the divine plan

was completed at the judgment day. The fate of nations is in God's hands; history is the revelation of His wisdom and power. Whether He inter- venes directly by miracle, or merely sets His laws in operation, He is master of men's fate. This idea, which has underlain all Christian philosophy of history, from the first apologists who prophesied the fall of the Empire and the coming of the millen- nium, down to our own day, received its classic statement in St Augustine's City of God. The terrestrial city, whose eternity had been the theme of pagan history, had just fallen before Alaric's Goths. Augustine's explanation of its fall passes in review not only the calamities of Roman history — combined with a pathetic perception of its greatness, — but carries the survey back to the origin of evil at the creation. Then over against this civitas terrena he sets the divine city which is to be realized in Christen- dom. The Roman Empire, — the last general form of the earthly city, — gives way slowly to the heavenly. This is the main thread of Augustine's philosophy of history. The mathematical demonstration of its truth was left by Augustine for his disciple, Paulus Orosius. Orosius' Seven Books of Histories against the Pagans, written

as a supplement to the City of God, is the first attempt at a Christian " World History." This manual for the middle ages arranged the rise and fall of empires with convincing exactness. The history of antiquity, according to it, begins with Ninus. His realm was overthrown by the Medes in the same year in which the history of Rome began. From the first year of Ninus' reign until the rebuilding of Babylon by Semiramis there were sixty-four years; the same between the first of Procas and the building of Rome. Eleven hundred and sixty-four years after each city was built, it was taken, — Babylon by Cyrus, Rome by Alaric, and Cyrus' conquest took place just when Rome began the Republic. But before Rome becomes a world empire, Macedon and Carthage intervene, guardians of Rome's youth, (tutor curatorque). This scheme of the four world-monarchies, which was to prevail through all the middle ages, was developed through seven books filled with the story of war and suffering. As it was Orosius' aim to show that the world had improved since the coming of Christ, he used Trogus Pompeius' war history, written to exalt Roman triumphs, to show the reverse of victory, — disaster and ruin. Livy, Caesar, Tacitus and Suetonius were plundered for the story of horrors; until finally even the Goths in Spain shine by contrast with the pagan heroes; and through the confusion of the German invasions one may look forward to Christendom, — and its peace.

The commonest form of medieval historical writing was the chronicle,

which reaches all the way from monastic annals, mere notes on Easter tables, to the dignity of national monuments. Utterly lacking in perspective, and dominated by the idea of the miraculous, they are for the most part a record of the trivial or the marvellous. Individual historians sometimes recount the story of their own times with sober judgment, but seldom know how to test their sources when dealing with the past. Contra- dictions are often copied down without the writer noticing them; and since the middle ages forged and falsified so many docu- ments, — monasteries, towns and corporations gaining privileges or titles of possession by the bold use of them, — the narrative of medieval writers cannot be relied upon unless we can verify it by collateral evidence. Some historians, like Otto of Freising, Guibert of Nogent or Bernard Gui, would have been scientific if they had had our appliances for comparison. But even men like Roger Bacon, who deplored the inaccuracy of texts, had worked out no general method to apply in their restoration. Toward the close of the middle ages the vernacular literatures were adorned with Villani's and Froissart's chronicles. But the merit of both lies in their journalistic qualities of contemporary narrative. Neither was a history in the truest sense.

The Renaissance marked the first great gain in the historic sense, in the efforts of the humanists to realize the spirit of the antique world. They did not altogether succeed; antiquity to them meant largely Plato and Cicero. Their interests were literary, and the un-Ciceronian centuries were generally ignored. Those in which the foundations of modern Europe were laid, which produced parliaments, cathedrals, cities, Dante and Chaucer, were grouped alike on one dismal level and christened the middle ages. The perspective of the humanists was only one degree better than that of the middle ages. History became the servant to literature, an adjunct to the classics. Thus it passed into the schools, where text-books still in use devote 200 pages to the Peloponnesian war and two to the Athens of Pericles. But if the literary side of humanism has been a barrier to the progress of scientific history, the discovery and elucidation of texts first made that progress possible. Historical criticism soon awoke. Laurentius Valla's brilliant attack on the " Dona- tion of Constantine " (1440), and Ulrich von Hutten's rehabilita- tion of Henry IV. from monkish tales mark the rise of the new science. One sees at a glance what an engine of contro- versy it was to be; yet for a while it remained but a phase of humanism. It was north of the Alps that it parted company with the grammarians. Classical antiquity was an Italian past, the German scholars turned back to the sources of their national history. Aeneas Sylvius Piccolomini (Pius II.) had discovered Otto of Freising and Jordanes. Maximilian I. encouraged the

search for manuscripts, and Vienna became a great humanistic centre. Conrad Celtes left his Germania illustrate unfinished, but he had found the works of Hroswitha. Conrad Peutinger gathered all sorts of Chronicles in

his room in Vienna, and published several, — among them Gregory of Tours. This national movement of the 15th century was not paralleled in France or England, where the classical humanities reigned. The Reformation meanwhile gave another turn to the work of German scholars.

The Reformation, with its heated controversies, seems a strange starting-point for science, yet it, even more than the Renaissance, brought out scientific methods of historical in- vestigation. It not only sobered the humanist tendency to sacrifice truth for aesthetic effect, it called for the documents of the Church and subjected them to the most hostile criticism. Luther himself challenged them. Then in the Magdeburg Centuries (1559-1574) Protestantism tried to make good its attack on the medieval Church by a great collection of sources accompanied with much destructive criticism. This gigantic work is the first monument of modern historical research. The reply of Cardinal Baronius (Annates ecclesiastici, 1 588-1697) was a still greater collection, drawn from archives which till then had not been used for scientific history. Baronius' criticism and texts are faulty, though far surpassing anything before his day, and his collection is the basis for most subsequent ones,— in spite of J. J. Scaliger's refutation, which was to con- tain an equal number of volumes of the errors in Baronius.

The movement back to the sources in Germany until the Thirty Years' War was a notable one. Collections were made by Simon Schard (1535-1573), Johannes Pistorius (1576-1608), Marquard Freher (1565-1614), Melchior Goldast (1576-1635) and others. After the war Leibnitz began a new epoch, both by his philosophy with its law of continuity in phenomena, and by his systematic attempt to collect sources through an associa- tion (1670). His plan to have documents printed as they were, instead of " correcting " them, was a notable advance. But from Leibnitz until the 19th century German national historio- graphy made little progress, — although church historians like Mosheim and Neander stand out among the greatest historians of all time.

France had not paralleled the activity of Maximilian's Renaissance historians. The father of modern French history, or at least of historical research, was Andre Duchesne (1584- 1640), whose splendid collections of sources are still in use. Jean Bodin wrote the first treatise on scientific history (Methodus ad facilem historiarum cognitionem, 1566), but he did not apply his own principles of criticism; and it was left for the Benedictine monks of the Congregation of St Maur to establish definitely the new science. The place of this school in the history of history is absolutely without a parallel. Few of those in the audiences of Moliere, returning home under the grey walls of St Germain- des-Pres, knew that within that monastery the men whose midnight they disturbed were laying the basis for

all scientific history; and few of the later historians of that age have been any wiser. But when Luc d'Achery turned from exegetics to patristics and the lives of the saints, as a sort of Christian humanist, he led the way to that vast work of collection and comparison of texts which developed through Mabillon, Mont- faucon, Ruinart, Martene, Bouquet and their associates, into the indispensable implements of modern historians. Here, as in the Reformation, controversy called out the richest product. Jean Mabillon's treatise, De re diplomatica (1681), was due to the criticisms of that group of Belgian Jesuits whose Acta Sanctorum quolquot toto orbe coluntur (1643, &c, see Bollandists) was destined to grow into the greatest repository of legend and biography the world has seen. In reply to D. Papebroch's criticisms of the chronicle of St Denis, Mabillon prepared this manual for the testing of medieval documents. Its canons are the basis, indeed, almost the whole, of the science of diplomatic (q.v.), the touchstone of truth for medieval research. Hence- forth even the mediocre scholar had a body of technical rules by which to sort out the vast mass of apocrypha in medieval

documentary sources. Scientific history depends upon imple- ments. Without manuals, dictionaries, and easy access to texts, we should go as far astray as any medieval chronicler. The France of the Maurists supplied the most essential of these instruments. The great " glossary " of Ducange is still in enlarged editions the indispensable encyclopaedia of the middle ages. Chronology and palaeography were placed on a new footing by Dom Bernard de Montfaucon's Palaeographia graeca (1708), the monumental Art de virifier les dates (3rd ed., 1818- 1831, in 38 vols.), and the Nouveau Traite de diplomatique (1750- 1765) of Dom Tassin and Dom Toustain. The collections of texts which the Maurists published are too many and too vast to be enumerated here (see C. Langlois, Manuel de bibliographie historique, pp. 293 ff.). Dom Bouquet's Historiens de la Gaule et de la France — the national repertory for French historians — is but one of a dozen tasks of similar magnitude. During the 1 8th century this deep under- work of scientific history continued to advance, though for the most part unseen by the brilliant writers whose untrustworthy generalities passed for history in the salons of the old regime. Interrupted by the Revolution, it revived in the 19th century, and the roll of honour of the French Ecole des Chartes has almost rivalled that of St- Germain- des-Pres.

The father of critical history in Italy was L. A. Muratori (1672-1750), the Italian counterpart of Leibnitz. His vast collection of sources (Rerum Italicarum scriptores), prepared amid every discouragement, remains to-day the national monu- ment of Italian history; and it is but one of his collections. His output is perhaps the greatest of any isolated worker in the whole history of historiography. The same haste, but much less care, marked the work of J. D. Mansi (d. 1769), the compiler of the fullest collection of the Councils. Spain, stifled by the Inquisition, produced no national collection of sources during the 17th and 18th centuries, although Nicolas Antonio (d. 1684) produced a national literary history of the first rank.

England in the 16th century kept pace with Continental historiography. Henry VIII. 's chaplain, John Leland, is the father of English antiquaries. Three of the most precious collections of medieval manuscripts still in existence were then begun by Thomas Bodley (the Bodleian at Oxford), Archbishop Matthew Parker (Corpus Christi at Cambridge), and Robert Cotton (the Cottonian collection of the British Museum). In Elizabeth's reign a serious effort was made to arrange the national records, but until the end of the 18th century they were scattered in not less than fifteen repositories. In the 17th and 18th centuries English scholarship was enriched by such monuments of research as William Dugdale's Monasticon, Thomas Madox's History of the Exchequer, Wilkins's Concilia, and

Thomas Rymer's Foedera. But these works, important as they were, gave but little idea of the wealth of historical sources which the 19th century was to reveal in England.

In the 19th century the science of history underwent a sort of industrial revolution. The machinery of research, invented by the genius of men like Mabillon, was perfected and set going in all the archives of Europe. Isolated workers or groups of workers grew into national or international associations, producing from archives vast collections of material to be worked up into the artistic form of history. The. result of this movement has been to revolutionize the whole subject. These men of the factory — devoting their lives to the cataloguing of archives and libraries, to the publication of material, and then to the gigantic task of indexing what they have produced — have made it possible for the student in an American or Australian college to master in a few hours in his library sources of history which baffled the long years of research of a Martene or Rymer. The texts themselves have mostly become as correct as they can ever be, and manuals and bibliographies guide one to and through them, so that no one need go astray who takes the trouble to make use of the mechan- ism which is at his hand. For example, since the papal archives were opened, so many regesla have appeared that soon it will be possible to follow the letter-writing of the medieval popes day by day far century after century.

The apparatus for this research is too vast to be described here. Archives have been reformed, their contents catalogued or calendared; government commissions have rescued numberless documents from oblivion or destruction, and learned societies have supplemented and criticized this work and co-ordinated the results. Every state in Europe now has published the main sources for its history. The " Rolls " series, the Monumenta Germaniae historica, and the Documents inedits axe but the more notable of such national products. A series of periodicals keeps watch over this enormous output. The files and indices of the English Historical Review, Hislorische Zeitschrift, Revue, historique, or American Historical Review will alone reveal the strength and character of historical research in the later 19th century.

Every science which deals with human phenomena is in a way an implement in this great factory system, in which the past is welded together again. Psychology has been drawn upon to interpret the movements of revolutions or religions, anthropology and ethnology furnish a clue to problems to which the key of documents has been lost. Genealogy, heraldry and chronology run parallel with the wider subject. But the real auxiliary sciences to history are those which deal with those traces of the past that still exist, the science of language (philology), of writing (palaeography), of documents (diplomatic), of seals (sphragistics), of coins (numismatics), of

weights and measures, and archaeology in the widest sense of the word. These sciences underlie the whole development of scientific history. Dictionaries and manuals are the instruments of this industrial revolu- tion. Without them the literary remains of the race would still be as useless as Egyptian inscriptions to the fellaheen. Archae- ology itself remained but a minor branch of art until the machinery was perfected which enabled it to classify and in- terpret the remains of the " pre-historic " age.

This is the most remarkable chapter in the whole history of history — the recovery of that past which had already been lost when our literary history began. The perspective stretches out as far the other side of Homer as we are this. The old " provi- dential " scheme of history disintegrates before a new interest in the " gentile " nations to whose high culture Hebrew sources bore unwilling testimony. Biblical criticism is a part of the historic process. The Jewish texts, once the infallible basis of history, are now tested by the libraries of Babylon, from which they were partly drawn, and Hebrew history sinks into its proper place in the wide horizon of antiquity. The finding of the Rosetta stone left us no longer dependent upon Greek, Latin or Hebrew sources, and now fifty centuries of Egyptian history lie before us. The scientific historian of antiquity works on the hills of Crete, rather than in the quiet of a library with the classics spread out before him. There he can reconstruct the splendour of that Minoan age to which Homeric poems look back, as the Germanic epics looked back to Rome or Verona. His discoveries, co-ordinated and arranged in vast corpora inscriptionum, stand now along- side Herodotus or Livy, furnishing a basis for their criticism. Medieval archaeology has, since Quicherat, revealed how men were living while the monks wrote chronicles, and now cathedrals and castles are studied as genuine historic documents.

The immense increase in available sources, archaeological and literary, has remade historical criticism. Ranke's application of the principles of " higher criticism " to works written since the invention of printing (Kritik neuerer Geschichtsschreiber) was an epoch-making challenge of narrative sources. Now they are everywhere checked by contemporary evidence, and a clearer sense of what constitutes a primary source has discredited much of what had been currently accepted as true. This is true not only of ancient history, where last year's book may be a thousand years out of date, but of the whole field. Hardly an " old master " remains an authoritative book of reference. Gibbon, Grote, Giesebrecht, Guizot stand to-day by reason of other virtues than their truth. Old landmarks drop out of sight — e.g. the fall of the Western Empire in 476, the coming of the Greeks to Italy in 1450, dates which once enclosed the middle ages. The per- spective changes'— the Renaissance grows less and the middle

ages more; the Protestant Revolution becomes a complex of economics and politics and religion; the French Revolution a vast social reform in which the Terror was an incident, &c, &c. The result has been a complete transformation of history since the middle of the 19th century.

In the 17th century the Augustinian scheme of world history received its last classic statement in Bossuet's Histoire universale. Voltaire's reply to it in the 18th (Essai sur les mceurs) attacked its limitations on the basis of deism, and its miraculous procedure on that of science. But while there are foreshadowings of the evolutionary theory in this work, neither the philosophe historians nor Hume nor Gibbon arrived at a constructive principle in history which could take the place of the Providence they rejected. Religion, though false, might be a real historic force. History became the tragic spectacle of a game of dupes — the real movers being priests, kings or warriors. The pawns slowly acquired reason, and then would be able to regulate the moves themselves. But all this failed to give a satisfactory explanation of the laws which determine the direction of this evolutioa Giovanni Battista Vico (1668-1744) was the first to ask why there is no science of human history. But his lonely life and un- recognized labours leave him apart from the main movement, until his works were discovered again in the 19th century. It was A. L. H. Heeren who, at the opening of the 19th century, first laid that emphasis upon the economic factors in history which is to-day slowly replacing the Augustinian explanation of its evolution. Heeren's own influence, however, was slight. The first half of the century (apart from the scientific activity of Pertz, Guizot, &c.) was largely dominated by the romanticists, with their exaggeration of the individual. Carlyle's " great man theory of history " is logically connected with the age of Scott. It was a philosophy of history which lent itself to magnificent dramatic creations; but it explained nothing. It substituted the work of the genius for the miraculous intervention of Providence, but, apart from certain abstract formulae such as Truth and Right, knew nothing of why or how. It is but dealing in words to say that the meaning of it all is God's revela- tion of Himself. Granting that, what is the process? Why does it so slowly reveal the Right of the middle ages (as in slavery for instance) to be the Wrong to-day? Carlyle stands to Bossuet as the sage to the myth. Hegel got no closer to realities. His idealistic scheme of history, which makes religion the keynote of progress, and describes the function of each — Judaism to typify duty, Confucianism order, Mahommedanism justice, Buddhism patience, and Christianity love — does not account for the facts of the history enacted by the devotees. It characterizes, not the real process of evolution, but an ideal Which history has not realized. Besides, it does not face the question how far religion itself is a product or a cause, or both combined.

In the middle of the century two men sought to incorporate in their philosophy the physical basis which Hegel had ignored in his spiritism — recognizing that life is conditioned by an environ- ment and not an abstraction for metaphysics. H. T. Buckle, in his History of Civilization in England (1857), was the first to work out the influences of the material world upon history, developing through a wealth of illustration the importance of food, soil and the general aspect of nature upon the formation of society. Buckle did not, as is generally believed, make these three factors dominate all history. He distinctly stated that " the advance of European civilization is characterized by a diminishing influence of physical laws and an increasing influence of mental laws," and " the measure of civilization is the triumph of mind over external agents." Yet his challenge, not only to the theologian, but also to those " historians whose indolence of thought " or " natural incapacity " prevented them from attempting more than the annalistic record of events, called out a storm of protest from almost every side. Now that the controversy has cleared away, we see that in spite of Buckle's too confident formulation of his laws, his pioneer work in a great field marks him out as the Augustine of the scientific age. Among historians, however, Buckle's theory received but little favour for another generation. Meanwhile the economists had themselves taken up the problem,

and it was from them that the historians of to-day have learned it. Ten years before Buckle published his history, Karl Marx had already formulated the " economic theory of history." Accept- ing with reservation Feuerbach's attack on the Hegelian " absolute idea," based on materialistic grounds (Der Mensch isl, was er isst), Marx was led to the conclusion that the causes of that process of growth which constitutes the history of society are to be found in the economic conditions of existence. From this he went on to socialism, which bases its militant philosophy upon this inter- pretation of history. But the truth or falseness of socialism does not affect the theory of history. In 1845 Marx wrote of the Young-Hegelians that to separate history from natural science and industry was like separating the soul from the body, and " finding the birthplace of history, not in the gross material production on earth, but in the misty cloud formation of heaven " (Die heilige Familie, p. 238). In his Misere de la philosophic

(1847) he Ws down the principle that social relationships largely depend upon modes of production, and therefore the principles, ideas and categories which are thus evolved are no more eternal than the relations they express, but are historical and transitory products. In the famous Manifesto of the Communist Party

(1848) the theory was applied to show how the industrial revolu- tion had replaced feudal with modern conditions. But it had little vogue, except

among Socialists, until the third volume of Das Kapital was published in 1894, when its importance was borne in upon continental scholars. Since then the controversy has been almost as heated as in the days of the Reformation. It is an exaggeration of the theory which makes it an explanation of all human life, but the whole science of dynamic sociology rests upon the postulate of Marx.

The content of history always reflects the interests of the age in which it is written. It was so in Herodotus and in medieval chronicles. Modern historians began with politics. But as the complex nature of society became more evident in the age of democracy, the economic or sociological history gained ground. Histories of commerce and cities now rank beside those on war and kings, although there are readers still who prefer to follow the pennants of robber barons rather than to watch the slow evolution of modern conditions. The drum-and-trumpet history has its place like that of art, jurisprudence, science or philosophy. Only now we know that no one of these is more than a single glimpse at a vast complex of phenomena, most of which lie for ever beyond our ken.

This expansion of interest has intensified specialization. Historians no longer attempt to write world histories; they form associations of specialists for the purpose. Each historian chooses his own epoch or century and his own subject, and spends his life mastering such traces of it as he can find. His work there enables him to judge of the methods of his fellows, but his own remains restricted by the very wealth of material which has been accumulated on the single subject before him. Thus the great enterprises of to-day are co-operative — the Cambridge Modern History, Lavisse and Rambaud's Histoire gintrale, or Lavisse's Histoire de France, like Hunt and Poole's Political History of England, and Oncken's Allgemeine Geschichte in Einzeldarstellungen. But even these vast sets cover but the merest fraction of their subjects. The Cambridge history passes for the most part along the political crust of society, and seldom glances at the social forces within. This limitation of the pro- fessed historian is made up for by the growingly historical treatment of all the sciences and arts — a tendency noted before, to which this edition of the Encyclopaedia Britannica is itself a notable witness. Indeed, for a definition of that limitless subject which includes all the phenomena that stand the warp and stress of change, one might adapt a famous epitaph — si historiam requiris, circumspice.

Bibliography. — See Ch. V. Langlois, Manuel de bibliographie historique (2 vols., 1904). This forms the logical bibliography of this article. It is a general survey of the whole apparatus of histori- cal research, and is the indispensable guide to the subject. Similar bibliographies covering sections of history are noted with the articles where they properly belong, e.g. in English medieval history the manual of Chas. Gross, Sources and Literature

in German history the Quettenkunde of Dahlmann-Waitz (7th ed.) ; for France the Bibliographie de I'histoire de France of G. Monod (antiquated, 1888), or the Sources de I'histoire de France so ably begun by A. Molinier's volumes on the medieval period. Perhaps the sanest survey of the present scientific movement in history is the clear summary of Ch. V. Langlois and Ch. Seignobos, Intro- duction to the Study of History (trans, with preface by F. York Powell, London, 1898). Much more ambitious is E. Bernheim's Lehrbuch der historischen Methode und der Geschichtsphilosophie mit Nachweis der wichligsten Quellen und Hilfsmittel zum Studium der Geschichte (3rd and 4th ed., Leipzig, 1903). (J. T. S.)*

HIT, a town of Asiatic Turkey, in the vilayet of Bagdad, on the west bank of the Euphrates, 70 m. W.N.W. of Bagdad, in 33° 38′ 8″ N., 42° 52′ 15″ E. It is picturesquely situated on a line of hills, partly natural, but in large part certainly artificial, the accumulation of centuries of former habitation, from 30 to 100 ft. in height, bordering the river. The houses are built of field stones and mud. A striking feature of the town is a lofty and well-proportioned minaret, which leans quite perceptibly. Behind and around Hit is an extensive but utterly barren plain, through which flow several streams of bitter water, coming from mineral springs. Directly behind the town are two bitumen springs, one cold and one hot, within 30 ft. of one another. The gypsum cliffs on the edge of the plain, and the rocks which crop out here and there in the plain, are full of seams of bitumen, and the whole place is redolent of sulphuretted hydrogen. Across the river there are naphtha springs. Indeed, the entire region is one possessing great potential wealth in mineral oils and the like. Hit, with its fringe of palms, is like an oasis in the desert occasioned by the outcrop of these deposits. From time immemorial it has been the chief source of supply of bitumen for Babylonia, the prosperity of the town depending always upon its bitumen fountains, which are still the property of the govern- ment, but are rented out to any one who wishes to use them. There is also a shipyard at Hit, where the characteristic Baby- lonian boats are still made, smeared within and without with bitumen. Hit is the head of navigation on the Euphrates. It is also the point from which the camel-post starts across the desert to Damascus. About 8 m. inland from Hit, on a bitter stream, lies the small town of Kubeitha. Hit is mentioned, under the name of 1st, in the Karnak inscription as paying tribute to Tethmosis (Thothmes) III. In the Bible (Ezra viii. 1 5) it is called Ahava; the original Babylonian name seems to have been I hi, which becomes in the Talmud Ihidakira, in Ptolemy Idt-napa,

and in Zosimus and Ammianus Aanipa and Diacira.

See Geo. Rawlinson's Herodotus, i. 1 79, and note by H. C. Rawlin- son; J. P. Peters, Nippur (1897); H. V. Geere, By Nile and Euphrates (1904). (J. P. Pe.)

HITA, GINES PEREZ DE (1544 ?-i6os ?), Spanish novelist and poet, was born at Mula (Murcia) about the middle of the 16th century. He served in the campaign of 1560-15 71 against the Moriscos, and in 1572 wrote a rhymed history of the city of Lorca which remained unpublished till 1889. He owes his wide celebrity to the Hisloria de los bandos de Zegries y Abencerrajes (i595 – 1604), better known as the Guerras civiles de Granada, which purports to be a chronicle based on an Arabic original ascribed to a certain Aben-Hamin. Aberi-Hamin is a fictitious personage, and the Guerras de Granada is in reality a historical novel, perhaps the earliest example of its kind, and certainly the first historical novel that attained popularity. In the first part the events which led to the downfall of Granada are related with uncommon brilliancy, and Hita's sympathetic transcription of life at the Emir's court has clearly suggested the conventional presentation of the picturesque, chivalrous Moor in the pages of Mile de Scudery, Mme de Lafayette, Chateaubriand and Washington Irving. The second part is concerned with the author's personal experiences, and the treatment is effective; yet, though Calderon's play, Amar despuis de la muerte, is derived from it, the second part has never enjoyed the vogue or influence of the first.

The exact date of Hita's death is unknown. His blank verse

rendering of the Cronica Troyana, written in 1596, exists in

manuscript.

HITCHCOCK, EDWARD (7793-1864), American geologist, was born of poor parents at Deerfield, Massachusetts, on the 24th of May 1793. He owed his education chiefly to his own

exertions, and was preparing himself to enter Harvard College when he was compelled to interrupt his studies from a weakness in his eyesight. In 181 5 he became principal of the academy of his native town; but he resigned this office in 1818 in order to study for the ministry. Having been ordained in 182 1 pastor of the Congregational church of Conway, Mass., he employed his leisure in making a scientific survey of the western counties of the state. From 1825 to 1845 ne was professor of chemistry and natural history, from 1845 t0 1864 was professor of natural theology and geology at Amherst College, and from 1845 to 1854 was president; the college owed its early success largely to his energetic efforts, especially during the period of his presid ency. In 1 830 he was appointed state geologist of Massachusetts, and in 1836 was made geologist of the first district of the state of New York. In 1840 he received the degree of LL.D. from Harvard, and in 1846 that of D.D. from Middlebury College, Vermont. Besides his constant labours in geology, zoology and botany, Hitchcock took an active interest in agriculture, and in 1850 he was sent by the Massachusetts legislature to examine into the methods of the agricultural schools of Europe. In geology he made a detailed examination and exposition of the fossil footprints from the Triassic sandstones of the Connecticut valley. His collection is preserved in the Hitchcock Ichnological Museum of Amherst College, and a description of it was published in 1858 in his report to the Massachusetts legislature on the ichnology of New England. The footprints were regarded as those of reptiles, amphibia and birds (?). In 1857 he undertook, with the aid of his two sons, the geological survey of Vermont, which was completed in 186 1. As a writer on geological science, Hitchcock was largely concerned in determining the connexion between it and religion, and employing its results to explain and support what he regarded as the truths of revelation. He died at Amherst, on the 27th of February 1864.

His son,. Charles Henry Hitchcock (1836-), did good service in geology, in Vermont, New Hampshire (1868-1878), and other parts of America, and became professor of geology at Dart- mouth in 1868.

The following are Edward Hitchcock's principal works: Geology of the

Connecticut Valley (1823) ; Catalogue of Plants growing without cultivation in the vicinity of Amherst (1829); Reports on the Geology of Massachusetts (1833-1841); Elementary Geology (1840; ed. 2, 1841; and later ed. with C. H. Hitchcock, 1862); Fossil Footmarks in the United States (1848); Outline of the Geology of the Globe and of the United Stales in particular (1853): Illustrations of Surface Geology (1856); Ichnology of New England (1858); The Religion of Geology and its Connected Sciences (1851; new ed., 1869); Reminis- cences of Amherst College (1863) ; and various papers in the American Journal of Science, and other periodicals.

HITCHCOCK, GEORGE (1850-), American artist, was born at Providence, Rhode Island, in 1850. He graduated from Brown University in 1872 and from the law school of Harvard University in 1874; then turned his attention to art and became a pupil of Bbulanger and Lefebvre in Paris. He attracted notice in the Salon of 1885 with his " Tulip Growing," a Dutch garden which he painted in Holland. He had for years a studio at Egmond, in the Netherlands. He became a Chevalier of the Legion of Honour, France; a member of the Vienna Academy of Arts, the Munich Secession Society, and other art bodies;, and is represented in the Dresden gallery; the imperial collection, Vienna; the Chicago Art Institute, and the Detroit Museum of Fine Arts.

HITCHCOCK, ROSWELL DWIGHT (1817-! 887), American divine, was born at East Machias, Maine, on the 1.5th of August 181 7, graduated at Amherst College in 1836, and later studied at Andover Theological Seminary, Mass. After a visit to Germany he was a tutor at Amherst in 1839-1842, and was minister of the First (Congregational) Church, Exeter, New Hampshire, in 1845- 1852. He became professor of natural and revealed religion in Bowdoin College, Brunswick, Maine, in 1852, and in 1855 professor of church history in the Union Theological Seminary in New York, of which he was president in 1880-1887. He died at Somerset, Mass., on the 16th of June 1887.

Among his works are: Life of Edward Robinson (1863); Socialism (1879) ; Carmina Sanctorum (with Z. Eddy and L. W. Mudge, 1885) ; and Eternal Atonement (1888).

HITCHIN, a market town in the Hitchin parliamentary division of Hertfordshire, England, on the small river Hiz, 32 m. N. from London by the Great Northern railway. Pop. of urban district (1901) 10,072. It is the junction of the main line with the Cambridge branch, and with a branch of

the Midland railway to Bedford.- The church of St Mary is Perpendicular, with a fine porch, a painting of the Adoration of the Magi, attributed to Rubens, a small crypt said to have been used by Cromwell as a prison for the Royalists, and many interesting monuments. Hitchin Priory is a mansion on the site of a Carmelite foundation of the early 14th century. A Gilbertine nunnery, founded later in the same century, stood adjacent to the church, and portions of the buildings appear in an existing block of almshouses. The grammar school (1632) was reconstituted in 1889 for boys and girls. Straw-plaiting, malting, brewing, and the cultivation and distillation of lavender and peppermint are carried on.

HITTITES, an ancient people, alluded to frequently in the earlier records of Israel, and also, under slightly variant names, in Egyptian records of the XVIIIth, XlXth and XXth Dynasties, and in Assyrian from about 1100 to 700 b.c. They appear also in the Vannic cuneiform texts, and are believed to be the authors of a class of monuments bearing inscriptions in a peculiar picto- graphic character, and widely distributed over Asia Minor and N. Syria, around which much controversy has raged during the past thirty years.

1. The Bible. — In the Old Testament the name of the race is written Heth (with initial aspirate), .members of it being Hitti, Hittim, which the Septuagint renders xˆ, x erra "> s > X 67 "?' 6 "' or Xerreln, keeping, it will be noted, e in the stem throughout. The race appears in two connexions, (a) In pre-Israelite Palestine, it is resident about Hebron (Gen. xxiii. 3), and in the central uplands (Num. xiii. 29). To Joshua (i. 4) is promised " from the wilderness and this Lebanon even unto the great river, the river Euphrates, all the land of the Hittites." The term " wilderness " here is of geographical ambiguity; but the promise is usually taken to mean that Palestine itself was part of the Hittite land before the coming of Israel; and an apostrophe of Ezekiel (xvi. 3) to Jerusalem, " thy mother (was) an Hittite," is quoted in confirmation. Under the monarchy we hear frequently of Hittites within the borders of Israel, but either as a small subject people, coupled with other petty tribes, or as individuals in the Jewish service (e.g. Uriah, in the time of David). It appears, therefore, that there survived in Palestine to late times a de- tached Hittite population, with which Hebrews sometimes intermarried (Judges iii. 5-6 ; Gen. xxvi. 34) and lived in relations now amicable, now tyrannical (e.g. Hittites were made tributary bondsmen by Solomon, 1 Kings ix. 20, 21; 2 Chron. viii. 7, 8). (b) An independent and powerful Hittite people was domiciled N. of Palestine proper, organized rather as a confederacy of tribes than a single monarchy (1 Kings x. 28; 2 Kings vii. 6). Presum- ably it was a daughter of these Hittites that Solomon took to wife. If the emendation of 2 Sam. xxiv. 64, " Tahtim-hodshi," based on the Septuagint version yqv xˆiˆ'M xaSˆs be accepted, we hear of them at Kadesh on Orontes; and some minor Hittite

cities are mentioned, e.g. Luz; but no one capital city of the race is clearly indicated. Carchemish, on the Euphrates, though mentioned three times (2 Chron. xxxv. 20; Isa. x. 9; Jer. xlvi. 2), is not connected explicitly with Hittites, a fact which is not surprising, since that city was no longer under a Hatti dynasty at the epoch of the Old Testament references. So far as the Old Testament goes, therefore, we gather that the Hittites were a considerable people, widely spread in Syria, in part subdued and to some extent assimilated by Israel, but in part out of reach. The latter portion was not much known to the Hebrews, but was vaguely feared as a power in the early days of the monarchy, though not in the later pre-Captivity period. The identification of the northern and southern Hittites, however, presents certain difficulties not yet fully explained; and it seems that we must assume Heth to have been the name both of a country in the north and of a tribal population not confined to that country.

2. Egyptian Records. ˆ-The decipherment of the insciiptions of the XVIIIth Theban Dynasty led, before the middle of the

19th century, to the discovery of the important part played in the Syrian campaigns of Tethmosis (Thothmes) III. by the H-t 8 (vulgarly transliterated Kheta, though the vocalization is un- certain). The coincidence of this name, beginning with an aspirate, led H. K. Brugsch to identify the Kheta with Heth. That identification stands, and no earlier Egyptian mention of the race has been found. Tethmosis III. found the Kheta (" Great " and " Little ") in N. Syria, not apparently at Kadesh, but at Carchemish, though they had not been in possession of the latter place long (not in the epoch of Tethmosis I.'s Syrian campaign). They were a power strong enough to give the Pharaoh cause to vaunt his success (see also Egypt: Ancient History, § " The New Empire "). Though he says he levied tribute upon them, his successors in the dynasty nearly all record fresh wars with the Kheta who appear as the northern- most of Pharaoh's enemies, and Amenophis or Amenhotep III. saw fit to take to wife Gilukhipa, a Syrian princess, who may or may not have been a Hittite. This queen is by some supposed to have introduced into Egypt certain exotic ideas which blossomed in the reign of Amenophis IV. The first Pharaoh of the succeeding dynasty, Rameses I., came to terms with a Kheta king called Saplel or Saparura; but Seti I. again attacked the Kheta (1366 B.C.), who had apparently pushed southwards. Forced back by Seti, the Kheta returned and were found holding Kadesh by Rameses II., who, in his fifth year, there fought against them and a large body of allies, drawn probably in part from beyond Taurus, the battle which occasioned the monumental poem of Pentaur. After long struggles, a treaty was concluded in Rameses's twenty-first year, between Pharaoh and " Kheta- sar " (i.e. Kheta-king), of which we possess an Egyptian copy. The discovery of a cuneiform tablet containing a copy of this same treaty, in the Babylonian language, was

reported from Boghaz Keui in Cappadocia by H. Winckler in 1907. It argues the Kheta a people of considerable civilization. The Kheta king subsequently visited Pharaoh and gave him his daughter to wife. Rameses' successor, Mineptah, remained on terms with the Kheta folk; but in the reign of Rameses III. (Dyn. XX.) the latter seem to have joined in the great raid of northern tribes on Egypt which was checked by the battle of Pelusium. From this point (c. 1 1 50 B.C.) — the point at which (roughly) the monarchic history of Israel in Palestine opens — Egyptian records cease to mention Kheta; and as we know from other sources that the latter continued powerful in Carchemish for some centuries to come, we must presume that the rise of the Israelite state inter- posed an effective political barrier.

3. Assyrian Records. — In an inscription of Tiglath Pileser I. (about 1100 B.C.), first deciphered in 1857, a people called Khatti is mentioned as powerful in Girgamish on Euphrates (i.e. Carchemish); and in other records of the same monarch, sub- sequently read, much mention is made of this and of other N. Syrian names. These Khatti appear again in the inscriptions of Assur-nazir-pal (early 9th century B.C.), in whose time Car- chemish was very wealthy, and the Khatti power extended far over N. Syria and even into Mesopotamia. Shalmaneser II. (d. 825 B.C.) raided the Khatti and their allies year after year; and at last Sargon III., in 717 B.C., relates that he captured Carchemish and its king, Pisiris, and put an end to its independ- ence. We hear no more of it thenceforward. These Khatti, there is no reasonable doubt, are identical with Kheta. (For the chronology see further under Babylonia and Assyria.)

4. Other Cuneiform Records. — The name of the race appears in certain of the Tel-el-Amarna letters, tablets written in Baby- lonian script to Amenophis (Amenhotep) IV. and found in 1892 on the site of his capital. Some of his governors in Syrian districts (e.g. one Aziru of Phoenicia) report movements of the Hittites, who were then pursuing an aggressive policy (about 1400 B.C.). There are also other letters from rulers of princi- palities in N. Syria (Mitanni) and E. Asia Minor (Arzawa), who write in Hon-Semitic tongues and are supposed to have been Hittites.

Certain Kkdte ot Khali are mentioned in the Vannic inscriptions (deciphered partially by A. H. Sayce and others) as attacked by

kings of Bianas (Van), and apparently domiciled on the middle Euphrates N. of Taurus in the 9th century B.C. This name again may safely be

identified with Khatti-Kheta.

The Khatti also appear on a " prophecy-tablet," referring ostensibly to the time of Sargon of Agade (middle of 4th millennium b. c.) ; but the document is probably of very much later date. Lastly, a fragmentary chronicle of the 1st Babylonian Dynasty mentions an invasion of Akkad by them about 1800 B.C.

From all these various sources we should gather that the Hittites were among the more important racial elements in N. Syria and S.E. Asia Minor for at least a thousand years. The limits at each end, however, are very ill defined, the superior falling not later than 2000 B.C. and the inferior not earlier than 600 B.C. This people was militant, aggressive and unsettled in the earlier part of that time; commercial, wealthy and enervated in the latter. A memorial of its trading long remained in Asia in the shape of the weight-measure called in cuneiform records the maneh " of Carchemish." These Hittites had close relations with other Asia Minor peoples, and at times headed a confederacy. During the later part of their history they were in continual contact with Assyria, and, as a Syrian power, and perhaps also as a Cappadocian one, they finally succumbed to Assyrian pressure.

*The " Hittite " Monuments. — It remains to consider in the light of the foregoing evidence a class of monuments to which attention began to be called about 1870. In that year two Americans, Consul J. A. Johnson and the Rev. S. Jessup, rediscovered, at Hamah (Hamath) on Orontes, five basaltic blocks bearing pictographic inscriptions in relief, one of which had been reported by J. L. Burckhardt in 181 2. In spite of their efforts and subsequent attempts made by Tyrwhitt Drake and Richard Burton, when consul at Damascus, proper copies could not be obtained; and it was not till the end of 1872 that, thanks to W. Wright of Beirut, casts were taken and the stones themselves sent to Constantinople by Subhi Pasha of Damascus. As usually happens when a new class of antiquities is announced, it was soon found that the " Hamathite " inscriptions did not stand alone. A monument in the same script had been seen in Aleppo by Tyrwhitt Drake and George Smith in 1872. It still exists, built into a mosque on the western wall of the city. Certain clay sealings, eight of which bore pictographic signs, found by A. H. Layard in the palace of Assur-bani-pal at Kuyunjik (Nineveh), as long ago as 185 1 and noticed then as in a " doubtful character," were compared by Hayes Ward and found to be of the Hamathite class. A new copy of the long known rock-sculpture at Ivriz * in S.W. Cappadocia was published by E. J. Davis in 1876, and clearly showed Hamathite characters accompanying the figures. Davis also reported, but did not see, a similar inscription atBulgar Maden, not far away. Sculptures seen by W. Skene and George Smith at Jerablus, on the middle Euphrates, led to excavations being undertaken there, in*

1878, by the British Museum, and to the discovery of certain Hamathite inscriptions accompanying sculptures, a few of which were brought to London. The conduct of these excavations, owing to the death of George Smith, devolved on Consul Henderson of Aleppo, and was not satis- factorily carried out. Meanwhile Wright, Ward and Sayce had all suggested " Hittite " as a substitute for " Hamathite," because no other N. Syrian people loomed so large in ancient records as did the Hittites, and the suggestion began to find acceptance. Jerablus was confidently identified with Car- chemish (but without positive proof to this day), and the occur- rence of Hamathite monuments there was held to confirm the Hittite theory.

In 1876 Sayce pointed out the resemblance between certain Hittite signs and characters in the lately deciphered Cypriote syllabary, and suggested that the comparison might lead to a beginning of decipherment; but the hope has proved vain. To

1 First described by the Turk, Hajji Khalifa, in the 17th century; first seen by the Swedish traveller Otter in 1736, and first published in 1840 in Ritter's Erdkunde, iii., after a drawing by Major Fischer, made in 1837.

this scholar, however, is owed the next great step ahead. In 1879 it first occurred to him to compare the rock-monuments at Boghaz Keui (see Pteria) and Euyuk in N. Cappadocia, discovered by Texier and Hamilton in 1835 and subsequently explored by G. Perrot and E. Guillaume. These, he now saw, bore Hittite pictographs. Other rock-sculptures at Giaur Kalessi, in Galatia, and in the Karabel pass near Smyrna, he suspected of belonging to the same class 2 ; and visiting the last-named locality in the autumn, he found Hittite pictographs accompanying one of the two figures. 3 He announced his dis- coveries in 1880, and proclaimed the fact that a great Hittite empire, extending from Kadesh to Smyrna, had risen from the dead. A month later he had the good fortune to recover copies of a silver boss, or hilt-top, offered to various museums about i860, but rejected by them as a meaningless forgery and for a long time lost again to sight. Round the rim was a cuneiform legend, and in the field a Hittite figure with six Hittite symbols engraved twice over on either hand of it. Reading the cuneiform as Tarqu-dimme sar mat Erme {i.e. " T. king of the country E."), Sayce distributed phonetic values, corresponding to the syllables of the two proper names, among four of the Hittite characters, reserving two as " ideograms " of " king " and " country," and launched into the field of decipherment. But he subse- quently recognized that this was a false start, and began afresh from another basis. Since then a number of other monuments have been found, some on new sites, others on sites already known to be Hittite, the distribution of which can be seen by reference to the accompanying map. It will be observed that, so far as at present known,

they cluster most closely in Commagene, Cappadocia and S. Phrygia. The following notes supplement the map: —

A. West Asia Minor. — " Niobe " (Suratlu Task) and Karabel (two) ; rock-cut figures with much defaced hieroglyphs in relief. Remains of buildings, not yet explored, lie near the " Niobe " figure. Nothing purely Hittite has been found at Sardis or in any W. Asian excavation; but small Hittite objects have been sold in Smyrna and Aidin.

B. Phrygia.— -Giaur-Kalessi; rock-cut figures and remains of a stronghold, but no inscriptions. Doghanludere and Beikeui in the Phrygian rock-monument country; at the first is a sculptured rock-panel with a few pictographs in relief; at the latter a fragment of an inscription in relief was disinterred from a mound. Kolitolu Yaila, near Ilghin ; block inscribed in relief, disinterred from mounds apparently marking a camp or palace-enclosure. Efiatun Bunar (= Plato's Spring), W. of Konia; megalithic building with rude and greatly defaced reliefs, not certainly Hittite: no inscription. Fassiler, W. of Konia; gigantic stela, or composite statue (figure on animals), not certainly Hittite; no inscription. Konia; relief of warrior, drawn by Texier in 1835 and since lost; of very doubtful Hittite character. A gold inscribed Hittite ring, now at Oxford, was bought there in 1903. Emirghazi (anc. Ardistama?); three inscriptions in relief (two on altars) and large mounds. Evidently an important Hittite site. Kara-Dagh; hill-sanctuary with incised carving of seated figure and inscriptions, found by Miss G. L. Bell and Sir W. M. Ramsay in 1907 (see their Thousand and One Churches,

1909).

C. North Cappadocia. — Boghaz Keui (see Pteria) ; largecity with remains of palace, citadel, walls, &c. Long rock-cut inscription of ten lines in relief, two short relief inscriptions cut on blocks, and also cuneiform tablets in Babylonian and also in a native language, first found in situ in 1893, and showing the site to be the capital of Arzawa, whence came two of the Tell el-Amarna letters. Near the site are .the rock reliefs of Yasili Kaya in two hypaethral galleries, showing, in the one, two processions composed of over sixty figures meeting at the head of the gallery; in the other, isolated groups of figures, fifteen in number (see for detailed description Murray's Guide to Asia Minor, 1895, pp. 23 ff.). Pictographs accompany many of the figures. The whole makes the most extensive group of Hittite remains yet known. Boghaz Keui was never thoroughly explored until 1907, the survey of Perrot and Guillaume having been superficial only and the excavations of E. Chantre (1894) very slight. In 1906 a German expedition under Professor H. Winckler under- took the work, and great numbers of cuneiform tablets were found. These refer to the reigns of at least four kings

from Subbiluliuma (= Saplel, see above) to Hattusil II. or Khattusil (= Khetasar, see above). The latter was an ally of Katashmanturgu of Babylon,

2 The "Niobe " statue near Manisa was not definitely known for " Hittite " till 1882, when G. Dennis detected pictographs near it.

3 The " pseudo-Sesostres " of Herodotus, already demonstrated non-Egyptian by Rosellini. The second figure was unknown, till found by Dr Beddoe in 1856.

*■y '** " ■*

$it& u/aere tiittite remains fiaue been

*discouered arc shown thus – * Boghaz Keui*

? after a name implies Uuubt «rf io real provenance

of the remains or their iJLWte character.

? before a name ftpptjjes doubt as to the exact

*situation of the site**

"B

3EouK'ttinlt' Ea

and powerful enough to write to the Babylonian court as a sovereign of equal standing. His letter shows that he considered the rise of Assyria a menace to himself. Winckler claims to read Haiti as the name of the possessors of Boghaz Keui, and to find in this name the proof of the Hittite character of Syro-Cappadocian power and of the imperial predominance of the city. But it remains to be proved whether these tablets were written there, and not rather, being in a foreign script, abroad, like most of the Tell el-Amarna archives. O. Puchstein has cleared and studied important architectural remains. Euyuk; large mound with remains of palace entered between sphinxes. Sculptured wall-dados, but no Hittite inscriptions. Cuneiform tablets; some Babylonian, others in a native language. Also inscriptions in early Phrygian character and language, found in 1894. The most famous of Hittite reliefs is here — a double-headed eagle " displayed " on the flank of one of the gateway sphinxes. This is supposed to have

suggested to the Seljuks of Konia their heraldic device adopted in the 13th century, which, brought to Europe by the Crusaders, became the emblem of Teutonic empire in 1345. This derivation must be taken, how- ever, cum grano, proof of its successive steps being wanting. Kara- Euyuk; a mound near Dedik, partially excavated by E. Chantre in 1894. Cuneiform tablets and small objects possibly, but not certainly, Hittite. A colossal eagle was found on a deserted site near Yamuli on the middle Halys, in 1907 by W. Attmore Robinson. D. South C appadocia.— Karaburna ; long, incised rock-inscription. Bogja, eight hours west of Kaisariye; four-sided stela with incised inscription. Assarjik, on the side of Mt. Argaeus; incised rock-inscription. Ekrek; a fragmentary inscription in relief and an incised inscription on a stela of very late appearance. Fraktin or Farakdin (probably anc. Das-tarkon) ; sculptured rock-panel showing two groups of figures in act ot cult, with hieroglyphs in relef. Arslan Tash, near Comana (Cappadocia), on the Soghan Dagh ; two colossal lions, one with incised inscription. Tashji in the Zamanti valley; rock-relief with rudely incised inscription. Andaval and Bor; inscriptions incised on sculptured stelae of kings (?), probably from Tyana (Ekuzli Hissar). All are now in Constanti-nople. A silver seal with hieroglyphs, now at Oxford, came also from Bor. Nigdeh; basalt drum or altar with incised inscription. Ivriz; rock-sculpture of king adoring god, with three inscriptions in relief. A second sculpture, similar in subject but smaller and much defaced, was found hard by in 1906., Bulgar Maden; long incised rock inscription, near silver-mines. Gorun (Gurun) ; two rock-inscriptions in relief, much damaged. Arslan-Tepe, near Ordasu (two hours from Malatia) ; large mound whence two sculp- tured stelae or wall-blocks with inscriptions in relief have been unearthed ("now in Constantinople and the Louvre). Four other

reliefs, reported found near Malatia and published by J. Garstang in Annals Arch, and Anlhrop., 1908, probably came also from Arslan Tepe. Palanga; lower aniconic half of draped statue with incised inscription, now in Constantinople. Also a small basalt lion. Arslan Tash, near Palanga ; two rude gateway lions, uninscribed. Yapalak ; defaced inscription, reported by J. S. Sterrett but never copied. Izgin; obelisk with long inscription in relief on all four faces, now in Constantinople. These last four places seem to lie on a main road leading from Cappadocia to Marash and the Syrian sites. The expedition sent out by Cornell University in 1907 found several Hittite inscriptions on rocks near Darende in the valley of the Tokhma Su.

E. North Syria. — M arash ; several monuments (stelae, wall-blocks and two lions) with inscriptions, both in relief and incised (part are now at Constantinople, part in Berlin and America) ; ev'dently one of the most important of Hittite sites. Karaburshlu, Arbistan, Gerchin, Sinjerli; mounds about the head-waters of the Kara Su. The last-named mound, brought to

O. Puchstein's notice in 1882 by the chance discovery of sculptured wall-dados, now in Con- stantinople, was the scene of extensive German excavations in 1 893-1 894, directed by F. v. Luschan and K. Koldewey, and was found to cover a walled town with central fortified palace. Hittite, cuneiform and old Aramaean monuments were found with many small objects, most of which have been taken to Berlin; but no Hittite inscriptions came to light. Sakchegeuzu (Sakchegozu), a site with several mounds between Sinjerli and Aintab; series of reliefs, once wall-dados, now in Berlin and Constantinople. This site is in process of excavation by Professor J. Garstang of the University of Liverpool. A sculptured portico has come to light in the smallest of the five mounds, and much pottery, with incised and painted decoration, has been recovered. Aintab; fragment of relief inscription. Samsat (Samosata) ; sculptured stela with incised inscription much defaced. Jerablus; see above. Several Hittite objects sent from Birejik and Aintab to Europe probably^ came from Jerablus, others from Tell Bashar on the Sajur. Kellekli, near Jerablus; two stelae, one with relief inscription. Iskanderun (Alexandretta) ; source of a long inscription cut on both sides of a spheroidal object of unknown origin. Kirchoglu^ a site on the Afrin, whence a fragmentary draped statue with incised inscription was sent to Berlin. Aleppo; inscription in relief (see above). Tell Ahmar (on left bank of Euphrates); large stela with sculpture and long relief inscription, found in 1908 with several sculptured slabs and two gateway lions, inscribed in cuneiform. Two hours south, a lion and a fragment of a relief inscription were found in 1909 by Miss G. L. Bell. Tell Halaf in Mid-Mesopotamia, near Ras el-Ain; sculptures on portico of a temple or palace; cuneiform inscriptions

/

and large mounds, explored in 1902 by Oppenheim. Hamah; five blocks inscribed in relief (see above).

F. Outlying Sites. — Erzerum; source of an incised inscription, perhaps not originally found there. Kedabeg ; metal boss or hilt-top with pictographs, found in a tomb and stated by F. Hommel to be Hittite, but doubtful. Toprak Kaleh; bronze fragments with two pictographs; doubtful if Hittite. Nineveh; sealings, see above. Babylon; a bowl and a stela of storm-god, both with incised in- scriptions; doubtless spoil of war or tribute brought from Syria. The bowl is inscribed round the outside, the stela on the back.

(For a detailed description of the subjects of the reliefs, &c, with the

necessary illustrations, see the works indicated in the biblio- graphy.)

Structures. — The structural remains found as yet on Hittite sites are few, scanty and far between. They consist of: (a) Ground plans of a palatial building and three temples and fortifications with sculptured gate at Boghaz Keui. The palace was built round a central court, flanked by passages and entered by a doorway of three battants hung on two columns. The whole plan bears more than a superficial resemblance to those of Cretan palaces in the later Minoan period. Only the rough core of the walls is standing to a height of about 3 ft. The fortifications of the citadel have an elaborate double gate with flanking towers, (b) Fortifications, palace, &c, at Sinjerli. The gates here are more elaborate than at Boghaz Keui, but planned with the same idea — that of entrapping in an enclosed space, barred by a second door, an enemy who may have forced the first door, while flanking towers would add to his discom- fiture. The palace plan is again rectangular, with a central pillared hall, and very similar in plan to that of Boghaz Keui. The massive walls are also of similar construction. Dados of relief-sculpture run round the inner walls; this feature seems to have been common to Hittite buildings of a sumptuous kind, and accounts for most of the sculptured blocks that have been found, e.g. at Jerablus, Sakhchegeuzu, Euyuk, Arslan Tepe, &c. Columns, probably of wood, rested on bases carved as winged lions, (c) Gate with sculptured approach at Euyuk. The ground plan of the gate is practically the same in idea as that at Sinjerli. Structures were found at Jerablus, but never properly uncovered or planned, (d) Sculptured porticoes of temples or palaces uncovered at Sakchegeuzu and Tell Halaf (see above). On other sites, e.g. Arslan Tepe (Ordasu), Arbistan, Marash (above the modern town and near the springs), Beikeui, mounds, doubtless covering structures, may be seen, and sculptured slabs have been recovered. The mounds, probably Hittite, in N. Syria alone are to be counted by hundreds. No tombs certainly Hittite have been found, 1 though it is possible that some of the reliefs (e.g. at Fraktin) are of funerary character. Sculptures and other Objects of Art. — The sculptures hitherto found consist of reliefs on rocks and on stelae, either honorific or funerary; reliefs on blocks forming parts of wall-dados; and a few figures more or less in the round, though most of these (e.g. the sphinxes of Euyuk and the lions of Arslan Tash and Marash) are not completely disengaged from the block. The most considerable sculptured rock-panels are at Boghaz Keui (see Pteria) ; the others (Ivriz, Fraktin, Karabel, Giaur Kalessi, Doghanludere), it should be observed, all lie N. of Taurus — a fact of some bearing on the problem of the origin and local domicile of the art, since rock-reliefs, at any rate, cannot be otherwise than in situ. Sculptured stelae, honorific or funerary, all with pyramidal or slightly rounded upper ends, and showing a single regal or divine figure or two figures, have come to light at Bor, Marash, Sinjerli, Jerablus, Babylon,

&c. These, like most of the rock-panels, are all marked as Hittite by accompany- ing pictographic inscriptions. The wall-blocks are seldom in- scribed, the exceptions (e.g. the Arslan Tepe lion-hunt and certain blocks from Marash and Jerablus) being not more certainly wall-dados than stelae. The only fairly complete anthropoid statue known is the much-defaced " Niobe " at Suratlu Tash, engaged in the rock behind. The aniconic lower part of an inscribed statue wholly in the round was found at Palanga, and parts of others at Kirchoglu and Marash. Despite considerable

1 Five intramural graves were explored at Sinjerli, but whether of the Hittite or of the Assyrian occupation is doubtful.

differences in execution and details, all these sculptures show one general type of art, a type which recalls now Babylonian, now Assyrian, now Egyptian, now archaic Ionian, style, but is always individual and easily distinguishable from the actual products of those peoples. The figures, whether of men or beasts, are of a squat, heavy order, with internal features (e.g. bones, muscles, &c.) shown as if external, as in some Mesopotamian sculptures. The human type is always very brachycephalic, with brow receding sharply and long nose making almost one line with the sloping forehead. In the sculptures of the Com- magene and the Tyana districts, the nose has a long curving tip, of very Jewish appearance, but not unlike the outline given to Kheta warriors in Egyptian scenes. The lips are full and the chin short and shaven. The whole physiognomy is fleshy and markedly distinct from that of other Syrians. At Boghaz Keui, Euyuk and Jerablus, the facial type is very markedly non-Semitic. But not much stress can be laid on these differences owing to (1) great variety of execution in different sculptures, which argues artists of very unequal capacity; (2) doubt whether individual portraits are intended in some cases and not in others. The hair of males is sometimes, but not always, worn in pigtail. The fashions of head-covering and clothes are very various, but several of them — e.g. the horned cap of the Ivriz god; the conical hat at Boghaz Keui, Fraktin, &c; the "jockey-cap" on the Tarkudimme boss; the broad-bordered over-robe, and the upturned shoes — are not found on other Asiatic monuments, except where Hittites are portrayed. Animals in profile are represented more naturalistically than human beings, e.g. at Yasili Kaya, and especially in some pictographic symbols in relief (e.g. at Hamah). This, however, is a feature common to Mesopotamian and Egyptian, and perhaps to all primitive art. The subjects depicted are processions of figures, human and divine (Yasili Kaya, Euyuk, Giaur Kalessi) ; scenes of sacrifice or adoration, or other cult-practice (Yasili Kaya, Euyuk, Fraktin, Ivriz, and perhaps the figures seated beside tables at Marash Sakchegeuzu, Sinjerli, &c); of the chase (Arslan Tepe, Sak- chegeuzu); but not, as known at present, of battle. Both at Euyuk and

Yasili Kaya reliefs in one and the same series are widely separated in artistic conception and execution, some showing the utmost naivete, others expressing both outline and motion with fair success. The fact warns us against drawing hasty inductions as to relative dates from style and execution.

Besides sculptures, well assured, Hittite art-products include a few small objects in metal (e.g. heavy, inscribed gold ring bought by Sir W. M. Ramsay at Konia; base silver seal, sup- ported on three lions' claws, bought by D. G. Hogarth at Bor; inscribed silver boss of " Tarkudimme," mentioned above, &c, &c); many intaglios in various stones (chiefly in steatite), mostly either spheroidal or gable-shaped, but a few scarabaeoid, conical or cylindrical, bearing sometimes pictographic symbols, sometimes divine, human or animal figures. The best collection is at Oxford. The majority are of very rude workmanship, bodies and limbs being represented by mere skeleton lines or unfilled outlines; a few vessels (e.g. inscribed basalt bowl found at Babylon) and fragments of ware painted with dark ornament on light body-clay, or in polychrome on a cream- white slip, or black burnished, found on N. Cappadocian sites, &c. The bronzes hitherto claimed as Hittite have been bought on the Syrian coast or come from not certainly Hittite sites in Cappa- docia (see E. Chantre, Mission en Cappadocie) . A great many small objects were found in the excavations at Sinjerli, including carved ivories, seals, toilet-instruments, implements, &c," but these have not been published. Nor, except provisionally, has the pottery, found at Sakchegeuzu.

Inscriptions. — These, now almost sixty in number (excluding seals), are all in a pictographic character which employed symbols somewhat elaborately depicted in relief, but reduced to conventional and " shorthand " representations in the incised texts. So far, the majority of our Hittite inscriptions, like those first found at Hamah, are in relief (cameo); but the incised characters, first observed in the Tyana district, have since been shown, by discoveries at Marash, Babylon, &c, to have had a

wider range. It has usually been assumed that the incised inscriptions, being the more conventionalized, are all of later date than those in relief; but comparison of Egyptian inscriptions, wherein both incised and cameo characters coexisted back to very early times, suggests that this assumption is not necessarily correct. The Hittite symbols at present known show about two hundred varieties; but new inscriptions continually add to the list, and great uncertainty remains as to the distinction of many symbols (i.e.

whether mere variants or not), and as to many others which are defaced or broken in our texts. The objects represented by these symbols have been certainly identified in only a few instances. A certain number are heads (human and animal) detached from bodies, in a manner not known in the Egyptian hieroglyphic system, with which some of the other symbols show obvious analogies. Articles of dress, weapons, tools, &c, also appear. The longer inscriptions are disposed in horizontal zones or panels, divided by lines, and, it seems, they were to be read boustrophedon, not only as regards the lines (which begin right to left) but also the words, which are written in columnar fashion, syllable below syllable, and read downwards and upwards alternately. The direction of reading is towards any faces which may be shown among the pictographs. The words are perhaps distinguished in some texts by punctua- tion marks.

Long and patient efforts have been made to decipher this script, ever since it was first restored to our knowledge; and among the would-be decipherers honourable mention must be made, for persistence and courage, of Professor A. H. Sayce and of Professor P. Jensen. Other interpretations have been put forward by F. E.-Peiser (based on conjectures as to the names on the Nineveh sealings), C. R. Conder (based largely on Cypriote comparisons and phonetic values transferred from these) and C. J. Ball (based on Hittite names recorded on Egyptian and Assyrian monuments, and applied to word-groups on the Hittite monuments). These, however, as having arbitrary and inadequate foundations, and for other reasons, have not been accepted. F. Hommel, J. Halevy and J. Menant have done useful work in distinguishing word-groups, and have essayed partial interpretations. No other decipherers call for mention. A. H. Sayce and P. Jensen alone have enlisted any large body of adherents; and the former, who has worked upon his system for thirty years and published in the Proceedings of the Society for Biblical Archaeology for 1907 a summary of his method and results, has proceeded on the more scientific plan. His system, however, like all others, is built in the main upon hypotheses incapable at present of quite satisfactory verification, such, for example, as the conjectural reading " Gargamish " for a group of symbols which recurs in inscriptions from Jerablus and elsewhere. In this case, to add to the other obvious elements of uncertainty, it must be borne in mind that the location of Carchemish at Jerablus is not proved, though it is very probable. Other conjectural identifications of groups of symbols with the place-names Hamath, Marash, Tyana are bases of Sayce's system. Jensen's system may be said to have been effectually demolished by L. Messerschmidt in his Bemerkungen (1898); but Sayce's system, which has been approved by Hommel and others, is probably in its main lines correct. Its frequent explanation, however, of incompatible symbols by the doctrines of phonetic variation and interchange, or by alternative values of the same

symbol used as ideograph, determinative or phonetic complement, and the occasional use of circular argument in the process of " verification," do not inspire confidence in other than its broader results. Sayce's phonetic values and interpretations of determinatives are his best assured achieve- ments. But the words thus arrived at represent a language on which other known tongues throw little or no light, and their meaning is usually to be guessed only. In some significant cases, however, the Boghaz Keui tablets appear to give striking confirmation of Sayce's conjectures.

Writing in 1903 L. Messerschmidt, editor of the best collection of Hittite texts up to date, made a tabula rasa of all systems of decipherment, asserting that only one sign out of two hundred —

the bisected oval, determinative of divinity — had been inter- preted with any certainty; and in view of this opinion, coupled with the steady refusal of historians to apply the results of any Hittite decipherment, and the obvious lack of satisfactory verification, without which the piling of hypothesis on hypothesis may only lead further from probability, there is no choice but to suspend judgment for some time longer as to the inscriptions and all deductions drawn from them.

Are the Monuments Hittite? — It is time to ask this question, although a perfectly satisfactory answer can only be expected when the inscriptions themselves have been deciphered. Almost all " Hittitologues " assume a connexion between the monu- ments and the Kheta-Khatti-Hittites, but in various degrees; e.g. while Sayce has said roundly that common sense demands the acceptance of all as the work of the Hittites, who were the dominant caste throughout a loosely-knit empire extending at one time from the Orontes to the Aegean, Messerschmidt has stated with equal dogmatism that the Hittites proper were only one people out of many 1 in N. Syria and Asia Minor who shared a common civilization, and that therefore they were authors of a part of the monuments only — presumably the N. Syrian, Com- magenian and Cataonian groups. O. Puchstein 2 has denied to the Hittites some of the N. Syrian monuments, holding these of too late a date (judged by their Assyrian analogies) for the flourishing period of the Kheta-Khatti, as known from Egyptian and Assyrian records. He would ascribe them to the Kummukh (Commagenians), who seem to have succeeded the Khatti as the strongest opponents of Assyria in these parts. He was possibly right as regards the Sinjerli and Sakchegeuzu sculptures, which are of provincial appearance. The following considerations, how- ever, may be stated in favour of the ascription of the monuments to the Hittites: —

(1) The monuments in question are found frequently where- ever, from other records, we know the Hittites to have been domiciled at some period,

i.e. throughout N. Syria and in Cataonia. (2) It was under the Khatti that Carchemish was a flourishing commercial city; and if Jerablus be really Car- chemish, it is significant that apparently the most numerous and most artistic of the monuments occur there. (3) Among all the early peoples of N. Syria and Asia Minor known to us from Egyptian and Assyrian records, the Kheta-Khatti alone appear frequently as leading to war peoples from far beyond Taurus. (4) The Kheta certainly had a system of writing and a glyptic art in the time of Rameses II., or else the Egyptian account of their copy of the treaty would be baseless. (5) The physiognomy given to Kheta warriors by Egyptian artists is fairly representa- tive of the prevailing type shown in the Hittite sculptures.

Furthermore, the Boghaz Keui tablets, though only partially deciphered as yet, go far to settle the question. They show that whether Boghaz Keui was actually the capital of the Hatti or not, it was a great city of the Hatti, and that the latter were an important element in Cappadocia from very early times. Before the middle of the 16th century b. c. the Cappadocian Hatti were already in relations, generally more or less hostile, with a rival power in Syria, that of Mitanni; and Subbiluliuma (= Saplel or Saparura), king of these Hatti, a contemporary of Amenophis IV. and Rameses I., seems to have obtained lasting dominion in Syria by subduing Dushratta of Mitanni. Car- chemish thenceforward became a Hatti city and the southern capital of Cappadocian power. Since all the Syrian monuments of the Hittite class, so far known, seem comparatively late (most show such strong Assyrian, influence that they must fall- after 1 100 B.C. and probably even considerably later), while the North Cappadocian monuments (as Sayce, Ramsay, Perrot and others saw long ago) are the earlier in style, we are bound to ascribe the origin of the civilization which they represent to the Cappadocian Hatti.

1 The Assyrian records, as well as the Egyptian, distinguish many peoples in both areas from the Kheta-Khatti ; and the most we can infer from these records is that there was an occasional league formed under the Hittites, not any imperial subjection or even a continuous federation.

- Pseudo-Hethitische Kunst (Berlin, 1890).

Whether the Mitanni had shared in that civilization while independent, and whether they were racially kin to the Hatti, cannot be determined at present. Winckler has adduced evidence from names of local gods to show that there was an Indo-European racial element in Mitanni; but none for a

similar element in the Hatti, whose chief god was Teshub. The majority ot scholars has always regarded the Hittites proper as, at any rate, non-Semitic, and some leading authorities have called them proto-Armenian, and believed that they have modern descendants in the Caucasus. This racial question can hardly be determined till those Hatti records, whether in cunei- form or pictographic script, which are couched in a native tongue, not in Babylonian, are read. In the meantime we have proper names to argue from; and these give us at least the significant indication that the Hittite nominative ended in s and the accusative in m. In any case the connexion of the Hatti with the peculiar class of monuments which we have been describing, can hardly be further questioned; and it has become more than probable that the Hatti of Cappadocia were responsible in the beginning for the art and script of those monuments and for the civilization of which they are memorials. Other peoples of north Syria and Asia Minor (e.g. the Kummukh or Comma- genians and the Muski or Phrygians) came no doubt under the influence of this civilization and imitated its monuments, while subject to or federated with the Hatti. Through Phrygia and Lydia {qx.) influences of this same Cappadocian civilization passed towards the west; and indeed, before the Greek coloniza- tion of Asia Minor, a loosely knit Hatti empire may have stretched even to the Aegean. The Nymphi (Kara Bel) and Niobe sculptures near Smyrna are probably memorials of that extension. Certainly some inland Anatolian power seems to have kept Aegean settlers and culture away from the Ionian coast during the Bronze Age, and that power was in all likelihood the Hatti kingdom of Cappadocia. Owing perhaps to Assyrian aggression, this power seems to have begun to suffer decay about iooo B.C. and thereafter to have shrunk inwards, leaving the coasts open. The powers of Phrygia and Lydia rose successively out of its ruins, and continued to offer westward passage to influences of Mesopotamian culture till well into historic times. The Greeks came too late to Asia to have had any contact with Hatti power obscured from their view by the intermediate and secondary state of Phrygia. Their earliest writers regarded the latter as the seat of the oldest and most godlike of mankind. Only one Greek author, Herodotus, alludes to the prehistoric Cappadocian power and only at the latest moment of its long decline. At the same time, some of the Greek legends seem to show that peoples, with whom the Greeks came into early con- tact, had vivid memories of the Hatti. Such are the Amazon stories, whose local range was very extensive, and the myths of Memnon and Pelops. The real reference of these stories, how- ever, was forgotten, and it has been reserved to our own generation to rediscover the records of a power and a civilization which once dominated Asia Minor and north Syria and occupied all the continental roads of communication between the East and the West of the ancient world. The credit of having been the first to divine this importance of the Hittites should always be ascribed to Sayce.

The history of the Hatti and their civilization, then, would appear to have been, very briefly, this. They belonged to an ethnic scattered widely over Eastern Asia Minor and Syria at an early period (Khatti invaded Akkad about 1800 B.C. in the reign of Samsuditana); but they first formed a strong state in Cappadocia late in the 16th century b.c. Subbiluliuma became their first great king, though he had at least one dynastic predecessor of the name of Hattusil. The Hatti now pushed southwards in force, overcame the kingdom of Mitanni and proceeded partly to occupy and partly to make tributary both north Syria and western Mesopotamia where some of their congeners were already settled. They came early into collision with Egypt, and at the height of their power under Hattusil II. fought the battle of Kadesh with Rameses II., on at least equal terms. Both now and previously the diplomatic correspondence

of the Hatti monarchs shows that they treated on terms of practical equality with both the Babylonian and the Egyptian courts; and that they waged constant wars in Syria, mainly with the Amorite tribes. At this time the Hatti empire or confederacy probably included, on the west, both Phrygia and Lydia. The Boghaz Keui correspondence ceases to be important with the generation following Hattusil II., and in the Assyrian records, which begin about a couple of centuries later, we find Carchemish the chief Hatti city and N. Syria called the Hatti- land. It is possible therefore that a change of imperial centre took place after the Hatti had ceased to fear Egypt in north Syria. If so, the continuation of Hittite history will have to be sought among the remains at Jerablus and other middle Euphratean sites, rather than in those at Boghaz Keui. The establishment of the Hatti at Carchemish not only made them a commercial people and probably sapped their highland vigour, but also brought them into closer proximity to the rising North Semitic power of Assyria, whose advent had been regarded with apprehension by Hattusil II. (see above). One of his successors, Arnaunta (late 13th century?), was already feeling the effect of Assyrian pressure, and with the accession of Tiglath Pileser I., about a century later, a long but often interrupted series of Assyrian efforts to break up the Hatti power began. A succession of Ninevite armies raided north Syria and even south-east Asia Minor, and gradually reduced the Hatti. But the resistance of the latter was sturdy and prolonged. They remained the strongest power in Syria and eastern Asia Minor till well into the first millennium B.C., and their Syrian seat was not lost finally till after the great extension of Assyrian power which took place in the latter part of the qth century. What had been happening to their Cappadocian province meanwhile we do not yet know; but the presence of Phrygian inscriptions at Euyuk and Tyana, ancient seats of their power, suggests that the client monarchy in the Sangarius valley shook itself free during the early part of the Hittite struggle with Assyria, and in the day of Hatti weakness extended

its dominion over the home territory of its former suzerain. " White Syrians," however, were still in Cappadocia even after the Cimmerians had destroyed the Phrygian monarchy, allowing Lydia to become independent under the Mermnad dynasty. Croesus found them centred at Pteria in the 6th century and dealt them a final blow. But much of their secular or religious custom lived on to be recorded by Greek writers, and regarded by modern scholars as typically " Anatolian."

Bibliography. — General summaries: L. Messerschmidt, The Hittites ("Ancient East" series, vi., 1903); A. H. Sayce, The Hittites (" Bypaths of Biblical Knowledge " series, xii., 2nd ed. 1892); G. Perrot and C. Chipiez, History of Art in Sardinia, Judaea, Syria and Asia Minor (Eng. trans., vol. ii., 1890); L. Lantsheere, De la race et de la langue des Heteens (1891) ; P. Jensen, Hittiter und Armenier (1898); M. Jastrow, final chapter in H. V. Hilprecht, Exploration in Bible Lands (1903); W. Wright, Empire of the Hittites (1884); F. Hommel, Hettiter und Skythen (1898); D. G. Hogarth, Ionia and the East (1909); W. Max Muller, Asien und Europa, chap. xxv. (1893). See also authorities for Egyptian and Assyrian history.

Inscriptions: L. Messerschmidt, "Corpus inscr. Hettiticarum," Zeitsch. d. d. morgenland. Gesellschaft (1900, 1902, 1906, &c), and " Bemerkungen zu d. Heth. Inschriften," Mitteil. d. vorderasiat. Gesellschaft (1898); P. Jensen, " Grundlagen fur eine Entzifferung der,(Hat. oder) Cilicischen Inschriften," Zeitschr. d. d. morgenland. Gesellschaft (1894); F. E. Peiser, Die Hettitischen Inschriften (1892); A. H. Sayce, " Decipherment of the Hittite Inscriptions," Proc. Soc. of Bibl. Archaeology (1903), and " Hittite Inscriptions, trans- lated and annotated," ibid. (1905, 1907); J. Menant, "Etudes Hcteennes," Recueil de travaux rel. d la philologie, &c, and Mem + de I' Acad. Inscr., vol. xxxiv. (1890); J. HaleVy in Revue semitiqut, vol. i. Also divers articles by A. H. Sayce, F. Hommel and others in Proc. and Trans. Soc. Bibl. Arch, since 1876, and in Recueil de travaux, &c, since its beginning.

Exploration : G. Perrot and E. Guillaume, Exploration arch, de la Galatie, &c. (1 862-1 872): E. Chantre, Mission en Cappadocie (1898); Sir W. M. Ramsay, " Syro-Cappadocian Monuments," in Athen. Mitteilungen (1889), with D. G. Hogarth, " Pre-Hellenic Monuments of Cappadocia," in Recueil de travaux, &c. (1892-1895) ; and with Miss Gertrude Bell, The Thousand and One Churches (1909) ; C. Humann and O. Puchstein, Reisen in Nord-Syrien, &c. (1890). J. Garstang in Annals of Archaeology and Anthropology, i. (1908) I and following numbers. Reports on excavations at Sinjerli in Berl.

Philol. Wochenschrift (1891), pp. 803, 951 ; and F. von Luschan, and others, " Ausgrabungen in Sendschirli " in Mitteil. Orient- Sammlungen (Berlin Museum, 1893 ff.); and on excavations at t5oghaz-Keui, H. Winckler in Orient. Liter aturzeitung (Berlin, 1907) ; Mitteil. Orient-Gesellschaft (Dec. 1007). See also s.v. Pteria.

(D. G. H.)

HITTORFF, JACQUES IGNACE (1 792-1867), French architect, was born at Cologne on the 20th of August 1792. After serving an apprenticeship to a mason in his native town, he went in 1 8 10 to Paris, and studied for some years at the Academy of Fine Arts, where he was a favourite pupil of Belanger, the government architect, who in 1814 appointed him his principal inspector. Succeeding Belanger as government archi- tect in 1818, he designed many important public and private buildings in Paris and also in the south of France. From 1819 to 1830 in collaboration with le Cointe he directed the royal fetes and ceremonials. After making architectural tours in Germany, England, Italy and Sicily, he published the result of his observations in the latter country in the work Architecture antique de la Sidle (3 vols., 1826-1830; new edition, 1866-1867), and also in Architecture moderne de la Sidle (1826-1835). One of his important discoveries was that colour had been made use of in ancient Greek architecture, a subject which he especially discussed in Architecture polychrome chez les Grecs (1830) and in Restitution du temple d'Empedocle a Selinunte (1851); and in accordance with the doctrines enunciated in these works he was in the habit of making colour an important feature in most of his architectural designs. His principal building is the church of St Vincent de Paul in the basilica style, which was constructed between 1830 and 1844. He also designed the two fountains in the Place de la Concorde, the Circus of the Empress, the Rotunda of the panoramas, many cafes and restaurants of the Champs Elysees, the houses forming the circle round the Arc de Triomphe de l'Etoile, besides many embellishments of the Bois de Boulogne and other places. In 1833 ne was elected a member of the Academy of Fine Arts. He died in Paris on the 25th of March 1867.

HITZACKER, a town of Germany, in the Prussian province of Hanover at the influx of the Jeetze into the Elbe, 33 m. N.E. of Liineburg by the railway to Wittenberge. Pop. (1905) 1106. It has an Evangelical church and an old castle and numerous medieval remains. There are chalybeate springs and a hydro- pathic establishment in the town. The famous library now in Wolfenbuttel was originally founded here by Augustus, duke of Brunswick (d. 1666) and was removed to its present habitation in 1643.

HITZIG, FERDINAND (1807-1875), German biblical critic, was born at Hauingen, Baden, where his father was a pastor, on the 23rd of June 1807. He studied theology at Heidelberg under H. E. G. Paulus, at Halle under Wilhelm Gesenius and at Gottingen under Ewald. Returning to Heidelberg he became Privatdozent in theology in 1829, and in 1831 published his Begrijf der Kritik am Alten Testamente praktisch erortert, a study of Old Testament criticism in which he explained the critical principles of the grammatico-historical school, and his Des Propheten Jonas Orakel iiber Moab, an exposition of the 15th and 16th chapters of the book of Isaiah attributed by him to the prophet Jonah mentioned in 2 Kings xiv. 25. In 1833 he was called to the university of Zurich as professor ordinarius of theology. His next work was a commentary on Isaiah with a translation (Vbersetzung u. Auslegung des Propheten Jesajas), which he dedicated to Heinrich Ewald, and which Hermann Hupfeld (1 796-1866), well known as a commentator on the Psalms (1855-1861), pronounced to be his best exegetical work. At Zurich he laboured for a period of twenty-eight years, during which, besides commentaries on The Psalms (1835-1836; 2nd ed… 1863-1865), The Minor Prophets (1838; 3rd ed., 1863), Jeremiah (1841; 2nd ed., 1866), Ezekiel (1847), Daniel (1850), Ecclesiastes (1847), Canticles (1855), and Proverbs (1858), he published a monograph, Uber Johannes Marhus u. seine Schriften (1843), in which he maintained the chronological priority of the second gospel, and sought to prove that the Apocalypse was written by the same author. He also published various treatises

of archaeological interest, of which the most important aie

Die Erfindung des Alphabets (1840), Urgeschichte u. Mythologie der Philistder (1845), an(i Die Grabschrift des Eschmunezar{i&5$) . After the death of Friedrich Umbreit (1795-1860), one of the founders of the well-known Studien und Kritiken, he was called in 1 86 1 to succeed him as professor of theology at Heidelberg. Here he wrote his Geschichte des Volkes Israel (1860-1870), in two parts, extending respectively to the end of the Persian domination and to the fall of Masada, a.d. 72, as well as a work on the Pauline epistles, Zur Kritik Paulinischer Briefe (1870), on the Moabite Stone, Die Inschrift des Mescha (1870), and on Assyrian, Sprache u. Sprachen Assyriens (1871), besides revising the commentary on Job by Ludwig Hirzel (1801-1841), which was first published in 1839. He was also a contributor to the M onatsschrift des wissenschajtlichen Vereins in Zurich, the Zeitschrift der deutschen morgenldndischen Gesellschaft, the Theologische Studien u. Kritiken, Eduard Zeller's Theologische Jahrbiicher, and Adolf Hilgenfeld's Zeitschrift fiir wissenschaft- liche Theologie. Hitzig died at Heidelberg on the 22nd of January 1875. As a Hebrew philologist he holds high rank; and as a constructive critic he is remarkable for acuteness and sagacity. As a historian, however, some of his speculations

have been considered fanciful. " He places the cradle of the . Israelites in the south of Arabia, and, like many other critics, makes the historical times begin only with Moses " (F. Lichten- berger, History of German Theology, p. 569).

His lectures on biblical theology (Vorlesungen iiber biblische Theologie u. messianische Weissagungen) were published in 1880 after his death, along with a portrait and biographical sketch by , his pupil, J. J. Kneucker (b. 1840), professor of theology at Heidel- berg. See Heinrich Steiner, Ferdinand Hitzig (1882); and Adolf Kamphausen's article in Herzog-Hauck's Realencyklopddie.

HIUNG-NU, Hiong-ntj, Heung-nu, a people who about the end of the 3rd century B.C. formed, according to Chinese records, a powerful empire from the Great Wall of China to the Caspian. Their ethnical affinities have been much discussed; but it is most probable that they were of the Turki stock, as were the Huns, their later western representatives. They are the first Turkish people mentioned by the Chinese. A theory which seems plausible is that which assumes them to have been a heterogenous collection of Mongol, Tungus, Turki and perhaps even Finnish hordes under a Mongol military caste, though the Mongolo-Tungus element probably predominated. Towards the close of the 1st century of the Christian era the Hiung-nu empire broke up. Their subsequent history is obscure. Some of them seem to have gone westward and settled on the Ural river. These, de Guiques suggests, were the ancestors of the Huns, and many ethnologists hold that the Hiung-nu were the ancestors of the modern Turks.

See Journal Anthropological Institute for 1874; Sir H. H. Howorth, History of the Mongols (1876-1880); 6th Congress of Orientalists, Leiden, 1883 (Actes, part iv. pp. 177-195); de Guiques, Histoire generate des Huns, des Turcs, des Mongoles, et des autres lartares occidentaux (1756-1758).

HIVITES, an ancient tribe of Palestine driven out by the invading Israelites. In Josh. ix. 7, xi. 19 they are connected with Gibeon. The meaning of the name is uncertain; Well- hausen derives it from mo " Eve," or " serpent," in which case the Hivites were originally the snake clan; others explain it from the Arabic hayy, " family," as meaning " dwellers in (Bedouin) encampments." (See Palestine; Jews.)

HJORR.ING, an ancient town of Denmark, capital of the amt (county) of its name, in the northern insular part of the peninsula of Jutland. Pop. (1901) 7901. It lies 7 m. inland from the shore of Jammer Bay, a stretch of coast notoriously dangerous to shipping. On the coast is Lonstrup, a favoured seaside resort. In this neighbourhood as well as to the south-east of Hjorring, slight elevations are seen, deserving the name of hills in this

low-lying district. Hjorring is on the northern railway of Jutland, which here turns eastward to the Cattegat part of Frederikshavn (23 m.), a harbour of refuge.

HKAMTI L6NG (called Kantigyi by the Burmese, and Bor Hkampti by the peoples on the Assam side), a collection of seven

Shan states subordinate to Burma, but at present beyond the administrative border. Estimated area, 900 sq. m.; estimated pop. 11,000. It lies between 27 and 28 N. and 97 and 98 E., and is bordered by the Mishmi country on the N., by the Patkai range on the W., by the Hukawng valley on the S. and E., and indeed all round by various Chingpaw or Kachin communities. The country is little known. It was visited by T. T. Cooper, the Chinese traveller and political agent at Bharno, where he was murdered; by General Woodthorpe and Colonel Macgregor in 1884, by Mr Errol Grey in the following year, and by Prince Henry of Orleans in 1895. All of these, however, limited their explorations to the valley of the Mali-hka, the western branch of the Irrawaddy river. Hkamti has shrunk very much from its old size. It was no doubt the northernmost province of the Shan kingdom, founded at Mogaung by Sam Long-hpa, the brother of the ruler of Kambawsa, when that empire had reached its greatest extension. The irruption of Kachins or Chingpaw from the north has now completely hemmed the state in. Prince Henry of Orleans described it as " a splendid territory, fertile in soil and abundant in water, where tropical and temperate culture flourish side by side, and the inhabitants are protected on three fronts by mountains." According to him the Kiutze, the people of the hills between the Irrawaddy and the Salween, call it the kingdom of Moam.

HLOTHHERE, king of Kent, succeeded his brother Ecgberht in 673, and appears for a time to have reigned jointly with his nephew Eadric, son of Ecgberht, as a code of laws still extant was issued under both names. Neither is mentioned in the account of the invasion of -rEthelred in 676. In 685 Eadric, who seems to have quarrelled with Hlothhere, went into exile and led the South Saxons against him. Hlothhere was defeated and died of his wounds.

See Bede, Hist. eccl. (Plummer), iv. 5, 17, 26, v. 24; Saxon Chronicle (Earle and Plummer), s.a. 685; Schmid, Gesetze, pp. 10 sqq. ; Thorpe, Ancient Laws, j. 26 sqq.

HOACTZIN, or Hoatzin, a bird of tropical South America, thought by

Buffon to be that indicated by Hernandez or Fer- nandez under these names, the Opistkocomus hoazin or O. crislatus of modern ornithologists — a very curious and remarkable form, which has long exercised the ingenuity of classifiers. Placed by Buffon among his " Hoccos " (Curassows), and then by P. L. S. Miiller and J. F. Gmelin in the Linnaean genus Phasianus, some of its many peculiarities were recognized by J. K. W. Illiger in 181 1 as sufficient to establish it as a distinct genus, Opisthocomus; but various positions were assigned to it by subsequent systematic authors. L'Herminier was the first to give any account of its anatomy (Comptes rendus, 1837, v. 433), and from his time our knowledge of it has been successively increased by Johannes Miiller (Ber. Akad. Wissensch. Berlin, 1841, p. 177), Deville {Rev. et mag. de zoologie, 1852, p. 217), Gervais (Castelnau, Expid. Amerique du Sud, zoologie, analomie, p. 66), Huxley (Proc. Zool. Society, 1868, p. 304), Perrin (Trans. Zool. Society, ix. p. 353), and A. H. Garrod (Proc. Zool. Society, 1879, p. 109). After a minute description of the skeleton of Opisthocomus, with the especial object of determining its affinities, Huxley declared that it " resembles the ordinary gallinaceous birds and pigeons more than it does any others, and that when it diverges from them it is either sui generis or approaches the Musophagidae." He ac- cordingly regarded it as the type and sole member of a group, named by him Heteromorphae, which sprang from the great Carinate stem later than the Tinamomorphae, Turnicomorphae, or Charadriomorphae, but before the Peristeromorpkae, Pteroclo- morphae or Alcctoromorphae. This conclusion is substantially the same as that at which A. H. Garrod subsequently arrived after closely examining and dissecting specimens preserved in spirit; but the latter has gone further and endeavoured to trace more particularly the descent of this peculiar form and some others, remarking that the ancestor of Opisthocomus must have left the parent stem very shortly before the true Gallinae first appeared, and at about the same time as the independent pedi- gree of the Cuculidae and Musophagidae commenced — these two groups being, he believed, very closely related, and Opisthocomus serving to fill the gap between then

The first thing that strikes the observer of its skeleton is the extraordinary structure of the sternal apparatus, which is wholly unlike that of any other bird known. The keel is only developed on the posterior part of the sternum — the fore part being, as it were, cut away, while the short furcula at its symphysis meets the manubrium, with which it is firmly consolidated by means of a prolonged and straight hypocleidium, and anteriorly ossifies with the coracoids. This unique arrangement seems to be correlated with the enormously capacious crop, which rests upon the furcula and fore part of the sternum, and is also received in a cavity formed on the surface of each of the great pectoral muscles. Furthermore this crop is extremely

muscular, so as more to resemble a gizzard, and consists of two portions divided by a partial constriction, after a fashion of which no other example is known among birds. The true gizzard is greatly reduced.

The hoactzin appears to be about the size of a small pheasant, but is really a much smaller bird. The beak is strong, curiously denticulated along the margin of the maxilla near the base, and is beset by diverging bristles. The eyes, placed in the middle of a patch of bare skin, are furnished with bristly lashes, re- sembling those of horn-bills and some few other birds. The head bears a long pendant crest of loose yellowish feathers. The body is olive-coloured, varied with white above, and beneath

Hoactzin.

*is of a dull bay. The wings are short and rounded. The tail is long and tipped with yellow. The legs are rather short, the feet stout, the tarsi reticulated, and the toes scutellated; the claws long and slightly curved. According to all who have observed the habits of this bird, it lives in bands on the lower trees and bushes bordering the streams and lagoons, feeding on leaves and various wild fruits, especially, says H. W. Bates (Naturalist on the River Amazons, i. 120), those of a species of Psidium, and it is also credited with eating those of an arum (Caladium arborescens) , which grows plentifully in its haunts. " Its voice is a harsh, grating hiss," continues the same traveller, and " it makes the noise when alarmed, all the individuals sibilating as they fly heavily away from tree to tree, when dis- turbed by passing canoes." It exhales a very strong odo_ur — wherefore it is known in British Guiana as the " stink-bird ** — compared by Bates to " musk combined with wet hides," and by Deville to that of a cow-house. The species is said to be polygamous; the nest is built on trees, of sticks placed above one another, and softer materials atop. Therein the hen lays her eggs to the number of three or four, of a dull-yellowish white, somewhat profusely marked with reddish blotches and spots, so as to resemble those of some of the Rallidae (Proc. Zool. Society, 1867, pi. xv. fig. 7. p. 164). The young are covered only with very scanty hair, like down, and have well-developed claws on the first and second fingers of the wing, which they use*

in clambering about the twigs in a quadrupedal manner; if placed in the water they swim and dive well, although the adults seem to be not at all aquatic. (A. N.)

HOADLY, BENJAMIN (1676-1761), English divine, was born at Westerham, Kent, on the 14th of November 1676. In 1691 he entered Catharine Hall, Cambridge, where he graduated M.A. and was for two years tutor, after which he held from 1701 to 1 71 1 the lectureship of St Mildred in the Poultry, and along with it from 1704 the rectory of St Peter-le-Poer, London. His first important appearance as a controversialist was against Edmund Calamy " the younger "in reference to conformity (1703-1707), and after this he came into conflict with Francis Atterbury, first on the interpretation of certain texts and then on the whole Anglican doctrine of non-resistance. His principal treatises on this subject were the Measures of Submission to the Civil Magistrate and The Origin and Institution of Civil Government discussed; and his part in the discussion was so much appreciated by the Commons that in 1709 they presented an address to the queen praying her to " bestow some dignity in the church on Mr Hoadly for his eminent services both to church and state." The queen returned a favourable answer, but the dignity was not conferred. In 17 10 he was presented by a private patron to the rectory of Streatham in Surrey. In 1715 he was appointed chaplain to the king, and the same year he obtained the bishopric of Bangor. He held the see for six years, but never visited the diocese. In 1716, in reply to George Hickes {q.v.),he published a Preservative against the Principles and Practices of Nonjurors in Church and State, and in the following year preached before the king his famous sermon on the Kingdom of Christ, which was immediately published by royal command. These works were attacks on the divine authority of kings and of the clergy, but as the sermon dealt more specifically and distinctly with the power of the church, its publication caused an ecclesiastical ferment which in certain aspects has no parallel in religious history. It was at once resolved to proceed against him in convocation, but this was prevented by the king proroguing the assembly, a step which had consequences of vital bearing on the history of the Church of England, since from that period the great Anglican council ceased to transact business of a more than formal nature. The restrained sentiments of the council in regard to Hoadly found expression in a war of pamphlets known as the Bangorian Controversy, which, partly from a want of clearness in the statements of Hoadly, partly from the disingenuousness of his opponents and the confusion resulting from exasperated feelings, developed into an intricate and bewildering maze of side discussions in which the main issues of the dispute were concealed almost beyond the possibility of discovery. But however vague and uncertain might be the meaning of Hoadly in regard to several of the important bearings of the questions around which he aroused discussion, he was explicit in denying the power of the Church over the conscience, and its right to determine the condition of men in relation to the favour of God. The most able of his opponents was William Law; others we:e Andrew Snape, provost of Eton, and Thomas

Sherlock, dean of Chichester. So exercised was the mind of the religious world over the dispute that in July 1717 as many as seventy-four pamphlets made their appearance; and at one period the crisis became so serious that the business of London was for some days virtually at a stand-still. Hoadly, being not unskilled in the art of flattery, was translated in 1721 to the see of Hereford, in 1723 to Salisbury and in 1734 to Winchester. He died at his palace at Chelsea on the 17th of April 1761. His controversial writings are vigorous if prolix and his theological essays have little merit. He must have been a much hated man, for his latitudinarianism offended the high church party and his rationalism the other sections. He was an intimate friend of Dr Samuel Clarke, of whom he wrote a life.

Hoadly 's brother, John Hoadly (1678-1746), was archbishop of Dublin from 1730 to 1742 and archbishop of Armagh from the latter date until his death on the 19th of July 1746. In early life the archbishop was very intimate with Gilbert Burnet, then

bishop of Salisbury, and in later life he was a prominent figure in Irish politics.

The works of Benjamin Hoadly were collected and published by his son John in 3 vols. (1773). To the first volume was prefixed the article " Hoadly" from the supplement to the Biographia Brilannica. See also L. Stephen, English Thought in the 18th Century.

HOAR, SAMUEL ˆ778-1856), American lawyer, was born in Lincoln, Massachusetts, on the 18th of May 1778. He was the son of Samuel Hoar, an officer in the American army during the War of Independence, for many years a member of the Massa- chusetts General Court, and a member in 1820-1821 of the state Constitutional Convention. The son graduated at Harvard in 1802, was admitted to the Massachusetts bar in 1805 and began practice at Concord. His success in his profession was immediate, and for a half-century he was one of the leading lawyers of Massachusetts. He was in early life a Federalist and was later an ardent Whig in politics. He was a member of the state senate in 1825, 1832 and 1833, and of the national house of representatives in 1835-1837, during which time he made a notable speech in favour of the constitutional right of congress to abolish slavery in the District of Columbia. In November 1844, having retired from active legal practice some years before, he went to Charleston, S.C., at the request of Governor George Nixon Briggs (1796-1861), to test in the courts of South Carolina the constitutionality of the state law which provided that " it shall not be lawful for any free negro, or person of color, to come into this state on board any vessel, as a cook, steward or mariner, or in any other employment," and that such free negroes should be seized and locked up until the vessels on which they had come were ready for sea,

when they should be returned to such vessels. His visit aroused great excitment, he was threatened with personal injury, the state legislature passed resolutions calling for his expulsion, and he was compelled to leave early in December. In 1848 he was prominent in the Free Soil movement in Massachusetts, and subsequently assisted in the organization of the Republican Party. In 1850 he served in the Massachusetts house of representatives. He married a daughter of Roger Sherman of Connecticut. He died at Concord, Massachusetts, on the 2nd of November 1856.

See a memoir by his son G. F. Hoar in Memorial Biographies oj the New England Historic Genealogical Society, vol. iii. (Boston, 1883) ; the estimate by R. W. Emerson in Lectures and Biographical Sketches (Boston, 1903) ; and " Samuel Hoar's Expulsion from Charleston," Old South Leaflets, vol. vi. No. 140.

*His son, Ebenezer Rockwood Hoar (i8i6-*i895), was born at Concord, Massachusetts, on the 21st of February 1816. He graduated at Harvard in 1835 and at the Harvard Law School in 1839, and was admitted to the Massachusetts bar in 1840. From 1849 to 1855 he was a judge of the Massachusetts court of common pleas, from 1859 to 1869 a judge of the state supreme court, and in 1869-1870 attorney-general of the United States in the cabinet of President Grant, and in that position fought unmerited " machine " appointments to offices in the civil service until at the pressure of the " machine " Grant asked for his resignation from the cabinet. The Senate had already shown its disapproval of Hoar's policy of civil service reform by its failure in 1870 to confirm the President's nomination of Hoar as associate-justice of the supreme court. In 1871 he was a member of the Joint High Commission which drew up the Treaty of Washington. In 1872 he was a presidential elector on the Republican ticket, and in 1873-1875 was a representative in Congress. He was a member of the Board of Overseers of Harvard University from 1868 to 1880 and from. 1881 to 1887., and was president of the Board in 1878-1880 and in 1881-1887." He was also prominent in the affairs of the Unitarian church. He was a man of high character and brilliant wit. He died at Concord on the 31st of January 1895.*

Another son, George Frisbie Hoar (1826-1904), was born in Concord, Massachusetts, on the 29th of August 1826. He graduated at Harvard in 1846 and at the Harvard Law School in 1849. He settled in the practice of law in Worcester, Massa- chusetts, where in 1852 he became a partner of Emory Washburn (1800-1877). In 1852 he was elected as a Free-Soiler to the

Massachusetts House of Representatives, and during his single term of service became the leader of his party in that body. He was active in the organization of the Republican party in Massa- chusetts, and in 1857 was elected to the State senate, but declined a re-election. During 1856-1857 he was active in behalf of the Free-State cause in Kansas. He was a member of the National House of Representatives from 1869 until 1877, and in this body took high rank as a ready debater and a conscientious committee worker. He was prominent as a defender and supporter of the Freedman's Bureau, took a leading part in the later reconstruction legislation and in the investigation of the Credit Mobilier scandal, and in 1876 was one of the House managers of the impeachment of General W. W. Belknap, Grant's secretary of war. In 1877 he was a member of the Electoral Commission which settled the disputed Hayes-Tilden election. From 1877 until his death he was a member of the United States senate. In the senate almost from the start he took rank as one of the most influential leaders of the Republican party; he was a member from 1882 until his death of the important Judiciary Committee, of which he was chairman in 1891-1893 and in 1895-1904. His most important piece of legislation was the Presidential Succession Act of 1886. He was a delegate to every Republican National Convention from 1876 to 1904, and presided over that at Chicago in 1880. He was a conservative by birth and training, and although he did not leave his party he disagreed with its policy in regard to the Philippines, and spoke and voted against the ratification of the Spanish Treaty. He was regent of the Smithsonian Institution in 1 880- 1 88 1, and long served as an overseer of Harvard University (1896- 1 904) and as president of its alumni association. He was also president of the American Historical Association (1894- 1895) and of the American Antiquarian Society (1884-1887). Like his brother, he was a leading Unitarian, and was president of its National Conference from 1894 to 1902. He died at Worcester, Massachusetts, on the 30th of September 1904. A memorial statue has been erected there.

See his Recollections of Seventy Years (New York, 1903). HOARE, SIR RICHARD COLT, Bart. (1758-1838), English antiquary, was the eldest son of Richard Hoare, who was created a baronet in 1786, and was born on the 9th of December 1758. He was descended from Sir Richard Hoare (1648-17 18), lord mayor of London, the founder of the family banking business. An ample allowance from his grandfather, Henry Hoare, enabled him to pursue the archaeological studies for which he had already shown an inclination. In 1783 he married Hester, daughter of William Henry, Lord Lyttelton, and after her death in 1785 he paid a prolonged visit to France, Italy and Switzer- land. He succeeded to the baronetcy in 1787, and in 1788 made a second continental tour, the record of his travels

appearing in 1 819 under the title A Classical Tour through Italy and Sicily. A journey through Wales was followed by a translation of the Itinerarium Cambriae and of the Descriptio Cambriae of Giraldus Cambrensis, Hoare adding notes and a life of Giraldus to the translation. This was first published in 1804, and has been revised by T. Wright (London, 1863). Sir Richard died at Stourhead, Wiltshire, on the 19th of May 1838, being succeeded in the baronetcy by his half-brother, Henry Hugh Hoare. Hoare's most important work was his Ancient History of North and South Wiltshire (1812-1819); he also did some work on the large History of Modern Wiltshire (1822-1844).

For notices of him and a list of his works, many of which were printed privately, see the Gentleman's Magazine for July 1838, and the Diet. Nat. Biog. vol. xxvii. (1891). See also E. Hoare, History of the Hoare Family (1883).

' HOBART, GARRET AUGUSTUS (1844-1899), Vice-President of the United States 1897-1899, was born at Long Branch, N.J., on the 3rd of June 1844. He graduated at Rutgers College in 1863, was admitted to the bar in 1869, practised law at Paterson, N.J., and rose to prominence in the State. He was long con- spicuous in the State Republican organization, was chairman of the New Jersey State Republican Committee from 1880 to 1890, became a member in 1884 of the Republican National Committee, and was the delegate-at-large from New Jersey to five successive Republican national nominating conventions.

He served in the New Jersey Assembly in 1873-1874, and in the New Jersey Senate in 187 7-1 882, and was speaker of the Assembly in 1874 and president of the Senate in 1881 and 1882. He was also prominent and successful in business and accumulated a large fortune. He accepted the nomination as Vice-President in 1896, on the ticket with President McKinley, and was elected; but while still in office he died at Paterson, N.J., on the 21st of November 1899. See the Life (New York, 1910) by David Magie. HOBART, JOHN HENRY (1775-1830), American Protestant Episcopal bishop, was born in Philadelphia, Pennsylvania, on the 14th of September 1775, being fifth in direct descent from Edmund Hobart, a founder of Hingham, Massachusetts. He was educated at the Philadelphia Latin School, the College of Philadelphia (now the University of Pennsylvania), and Prince- ton, where he graduated in 1793. After studying theology under Bishop William White at Philadelphia, he was ordained deacon in 1 798, and priest two years later. He was elected assistant bishop of New York, with the right of succession, in 1811, and was acting diocesan from that date because of the ill-health of Bishop Ben- jamin Moore, whom he formally succeeded on the latter's death in February 1816. He was one of the founders of the General Theological

Seminary, became its professor of pastoral theology in 1 82 1, and as bishop was its governor. In his zeal for the his- toric episcopacy he published in 1807 An Apology for Apostolic Order and its Advocates, a series of letters to Rev. John M. Mason, who, in The Christian's Magazine, of which he was editor, had attacked the Episcopacy in general and in particular Hobart's Collection of Essays on the Subject of Episcopacy (1 806) . Hobart's zeal for the General Seminary and the General Convention led him to oppose the plan of Philander Chase, bishop of Ohio, for an Episcopal seminary in that diocese; but the Ohio seminary was made directly responsible to the House of Bishops, and Hobart approved the plan. His strong opposition to " dissenting churches " was nowhere so clearly shown as in a pamphlet published in 1816 to dissuade all Episcopalians from joining the American Bible Society, which he thought the Protestant Episcopal Church had not the numerical or the financial strength to control. In 1818, to counterbalance the influence of the Bible Society and especially of Scott's Commentaries, he began to edit with selected notes the Family Bible of the Society for Promoting Christian Knowledge. He delivered episcopal charges to the clergy of Connecticut and New York entitled The Church- man (1819) and The High Churchman Vindicated (1826), in which he accepted the name " high churchman," and stated and explained his principles " in distinction from the corruptions of the Church of Rome and from the Errors of Certain Protestant Sects." He exerted himself greatly in building up his diocese, attempting to make an annual visit to every parish. His failing health led him to visit Europe in 1823-1825. Upon his return he preached a characteristic sermon entitled The United States of America compared with some European Countries, particularly England (published 1826), in which, although there was some praise for the English church, he so boldly criticized the establish- ment, state patronage, cabinet appointment of bishops, lax discipline, and the low requirements of theological education, as to rouse much hostility in England, where he had been highly praised for two volumes of Sermons on the Principal Events and Truths of Redemption (1824). He died at Auburn', New York, on the 1 2th of September 1830. He was able, impetuous, frank, perfectly fearless in controversy, a speaker and preacher of much eloquence, a supporter of missions to the Oneida Indians in his diocese, and the compiler of the following devotional works: A Companion for the Altar (1804), Festivals and Fasts (1804), A Companion to the Book of Common Prayer (1805), and A Clergyman's Companion (1805).

See Memorial of Bishop Hobart, containing a Memoir (New York, 1831); John McVickar, The Early Life and Professional Years of Bishop Hobart (New York, 1834), and The Closing Years of Bishop Hobart (N«w York, 1836).

HOBART PASHA, Augustus Charles Hobart-Hampden (1822-1886),

English naval captain and Turkish admiral, was

born in Leicestershire on the ist of April 1822, being the third son of the 6th Earl of Buckinghamshire. In 1835 he entered the Royal Navy and served as a midshipman on the coast of Brazil in the suppression of the slave trade, displaying much gallantry in the operations. In 1855 he took part, as captain of the " Driver," in the Baltic Expedition, and was actively engaged at Bomarsund and Abo. In 1862 he retired from the navy with the rank of post-captain; but his love of adventure led him, during the American Civil War, to take the command of a blockade-runner. He had the good fortune to run the blockade eighteen times, conveying war material to Charleston and returning with a cargo of cotton. In 1867 Hobart entered the Turkish service, and was immediately nominated to the command of that fleet, with the rank of " Bahrie Limassi " (rear-admiral). In this capacity he performed splendid service in helping to suppress the insurrection in Crete, and was rewarded by the Sultan with the title of Pasha (1869). In 1874 Hobart, whose name had, on representations made by Greece, been removed from the British Navy List, was reinstated ; his restoration did not, however, last long, for on the outbreak of the Russo-Turkish war he again entered Turkish service. In command of the Turkish squadron he completely dominated the Black Sea, blockading the ports of South Russia and the mouths of the Danube, and paralysing the action of the Russian fleet. On the conclusion of peace Hobart still remained in the Turkish service, and in 1881 was appointed Mushir, or marshal, being the first Christian to hold that high office. His achieve- ments as a blockade-runner, his blockade of Crete, and his handling of the Turkish fleet against the torpedo-lined coasts of Russia, showed him to be a daring, resourceful, and skilful commander, worthy to be ranked among the illustrious names of British naval heroes. He died at Milan on the 19th of June

1886.

See his Sketclies of My Life (1886), which must, however, be used with caution, since it contains many proved inaccuracies.

HOBART, the capital of Tasmania, in the county of Bucking- ham, on the southern coast of the island. It occupies a site of great beauty, standing on a series of low hills at the foot of Mount Wellington, a lofty peak (4166 ft.) which is snow-clad for many months in the year. The town fronts Sullivan's Cove, a picturesque bay opening into the estuary of the river Derwent, and is nearly square in form, laid out with wide streets

intersecting at right angles, the chief of which are served by electric tramways. It is the seat of the Anglican bishop of Tasmania, and of the Roman Catholic archbishop of Hobart. The Anglican cathedral of St David dates from 1873, though its foundations were laid as early as 181 7. St Mary's Roman Catholic cathedral is a beautiful building; but perhaps the most notable ecclesiastical building in Hobart is the great Baptist tabernacle in Upper Elizabeth Street. The most prominent public buildings are the Houses of Parliament, to which an excellent library is attached; the town hall, a beautiful building of brown and white Tasmanian freestone in Italian style; the museum and national art gallery, and the general post office (1904) with its lofty clock-tower. Government House, the residence of the governor of Tasmania, a handsome castellated building, stands in its domain on the banks of the Derwent, to the north of the town. The botanical gardens adjoin. Of the parks and public gardens, the most extensive is the Queen's Domain, covering an area of about 700 acres, while the most central is Franklin Square, adorned with a statue of Sir John Franklin, the famous Arctic explorer, who was governor of Tasmania from 1837 to 1843. The uni- versity of Tasmania, established in 1890, and opened in 1893, has its headquarters at Hobart. The town is celebrated for its invigorating climate, and its annual regatta on the Derwent attracts numerous visitors. The harbour is easy of access, well sheltered and deep, with wharf accommodation for vessels of the largest tonnage. It is a regular port of call for several intercolonial lines from Sydney and Melbourne, and for lines from London to New Zealand. The exports, of an average value of £850,000 annually, consist mainly of fruit, hops, grain, timber and wool. The industries comprise brewing, saw-milling,

iron-founding, flour-milling, tanning, and the manufacture of pottery and woollen goods. Hobart is the centre of a large fruit-growing district, the produce of which, for the most part, is exported to London and Sydney. The city was founded in 1804 and takes its name from Lord Hobart (see Buckingham- shire, Earls of), then secretary of state for the colonies. It was created a municipality in 1853, and a city in 1857; and in 1 88 1 its name was changed from Hobart Town to the present form. The chief suburbs are Newton, Sandy Bay, Wellington, Risdon, Glenorchy, Bellerive and Beltana. The population of the city proper in 1901 was 24,652, or including suburbs, 34,182.

HOBBEMA, MEYNDERT (c. 1 638-1 709), the greatest land- scape painter of the Dutch school after Ruysdael, lived at Amsterdam in the second half of the 17th century. The facts of his life are somewhat obscure. Nothing is more disappointing than to find that in Hobbema's case chronology and signed pictures substantially contradict each other. According to the latter his practice lasted from 1650 to 1689; according to the former his birth occurred in 1638, his death as late as 1709. If the

masterpiece formerly in the Bredel collection, called " A Wooded Stream, " honestly bears the date of 1650, or " The Cottages under Trees " of the Ford collection the date of 1652, the painter of these canvases cannot be Hobbema, whose birth took place in 1638, unless indeed we admit that Hobbema painted some of his finest works at the age of twelve or fourteen. For a considerable period it was profitable to pass Hobbemas as Ruysdaels, and the name of the lesser master was probably erased from several of his productions. When Hobbema's talent was recognized, the contrary process was followed, and in this way the name, and perhaps fictitious dates, reappeared by fraud. An experienced eye will note the differences which occur in Hobbema's signatures in such well-known examples as adorn the galleries of London and Rotterdam, or the Grosvenor and van der Hoop collections. Meanwhile, we must be content tp know that, if the question of dates could be brought into accordance with records and chronology, the facts of Hobbema's life would be as follows.

Meyndert Hobbema was married at the age of thirty to Eeltije Vinck of Gorcum, in the Oudekerk or old church at Amsterdam, on the 2nd of November 1668. Witnesses to the marriage were the bride's brother Cornelius Vinck and Jacob Ruysdael. We might suppose from this that Hobbema and Ruysdael, the two great masters of landscape, were united at this time by ties of friendship, and accept the belief that the former was the pupil of the latter. Yet even this is denied to us, since records tell us that there were two Jacob Ruysdaels, cousins and contemporaries, at Amsterdam in the middle of the 1,7th century — one a framemaker, the son of Solomon, the other a painter, the son of Isaac Ruysdael. Of Hobbema's marriage there came between 1668 and 1673 four children. In 1704 Eeltije died, and was buried in the pauper section of the Leiden cemetery at Amsterdam. Hobbema himself survived till December 1709, receiving burial on the 14th of that month in the pauper section of the Westerkerk cemetery at Amsterdam. Husband and wife had lived during their lifetime in the Rozen- gracht, at no great distance from Rembrandt, who also dwelt there in his later and impoverished days. Rembrandt, Hals, Jacob Ruysdael, and Hobbema were in one respect alike. They all died in misery, insufficiently rewarded perhaps for their toil, imprudent perhaps in the use of the means derived from their labours. Posterity has recognized that Hobbema and Ruysdael together represent the final development of landscape art in Holland. Their style is so related that we cannot suppose the first to have been unconnected with the second. Still their works differ in certain ways, and their character is generally so marked that we shall find little difficulty in distinguishing them, nor indeed shall we hesitate in separating those of Hobbema from the feebler productions of his imitators and predecessors- Isaac Ruysdael, Rontbouts, de Vries, Dekker, Looten, Verboom, du Bois, van Kessel, van der Hagen, even Philip de Koningk. In

the exercise of his craft Hobbema was patient beyond all conception. It is doubtful whether any one ever so completely

mastered as he did the still life of woods and hedges, or mills and pools. Nor can we believe that he obtained this mastery otherwise than by constantly dwelling in the same neighbourhood, say in Guelders or on the Dutch Westphalian border, where day after day he might study the branching and foliage of trees and underwood embowering cottages and mills, under every variety of light, in every shade of transparency, in all changes produced by the seasons. Though his landscapes are severely and mode- rately toned, generally in an olive key, and often attuned to a puritanical grey or russet, they surprise us, not only by the variety of their leafage, but by the finish of their detail as well as the boldness of their touch. With astonishing subtlety light is shown penetrating cloud, and illuminating, sometimes transiently, sometimes steadily, different portions of the ground, shining through leaves upon other leaves, and multiplying in an endless way the transparency of the picture. If the chance be given him he mirrors all these things in the still pool near a cottage, the reaches of a sluggish river, or the swirl of the stream that feeds a busy mill. The same spot will furnish him with several pictures. One mill gives him repeated opportunities of charming our eye; and this wonderful artist, who is only second to Ruysdael because he had not Ruysdael's versatility and did not extend his study equally to downs and rocky eminences, or torrents and estuaries — this is the man who lived penuriously, died poor, and left no trace in the artistic annals of his country! It has been said that Hobbema did not paint his own figures, but transferred that duty to Adrian van de Velde, Lingelbach, Barendt Gael, and Abraham Storck. As to this much is conjecture.

The best of Hobbema's dated pictures are those of the years 1663 to 1667. Of the former, several in the galleries of Brussels and St Petersburg, and one in the Holford collection, are celebrated. Of 1665 tine specimens are at Grosvenor House and the Wallace collection. Of seven pieces in the National Gallery, including the " Avenue at Middelharnis," which some assign to 1689, and the " Ruins of Breberode Castle," two are dated 1667. A sample of the last of these years is also in the Fitzwilliam Museum at Cambridge. Amongst the masterpieces in private hands in England may be noticed two landscapes in Buckingham Palace, two at Bridgewater House, and one belonging to Mr Walter of Bearwood. On the continent are a " Wooded Landscape " in the Berlin gallery, a " Forest " belonging to the duchess of Sagan in Paris, and a 'Glade" in the Louvre. There are other

fine Hobbemas in the Antwerp Museum, the Arenberg gallery at Brussels, and the Belvedere at Vienna. (J. A. C.)

HOBBES, THOMAS (1588-1679), English philosopher, second son of Thomas Hobbes, was born at Westport (now part of Malmesbury, Wiltshire) on the 5th of April 158S. His father, vicar of Charlton and Westport, an illiterate and choleric man, quarrelled, it is said, with a brother clergyman at the church door, and was forced to decamp, leaving his three children to the care of an elder brother Francis, a flourishing glover at Malmesbury. Thomas Hobbes was put to school at Westport church at the age of four, passed to the Malmesbury school at eight, and was taught again in Westport later at a private school kept by a young man named Robert Latimer, fresh from Oxford and " a good Grecian." He had begun Latin and Greek early, and under Latimer made such progress as to be able to translate the Medea of Euripides into Latin iambic verse before he was fourteen. About the age of fifteen he was sent to Oxford and entered at Magdalen Hall. During his residence, the first principal of Magdalen Hall, John Hussee, was succeeded by John Wilkinson, who ruled in the interest of the Calvinistic party in the university. Thus early was he brought into contact with the aggressive Puritan spirit. Apart from this, Hobbes owed little-to his uni- versity training, which was based on the scholastic logic then prevalent. We have from himself a lively record of his student life (Vit. carm. exp. p. lxxxv.), which, though penned in extreme old age, may be ta ken as trustworthy. He tells how, when he had slowly taken in the doctrine of logical figures and moods, he put it aside and would prove things only in his own way; how he then heard about bodies as consisting of matter and form, as throwing off species of themselves for perception, and as moved by sympathies and antipathies, with much else of a like sort, all beyond his comprehension; and how he therefore turned to his

old books again, fed his mind on maps and charts of earth and sky, traced the sun in his path, followed Drake and Cavendish girdling the main, and gazed with delight upon pictured haunts of men and wonders of unknown lands. Very characteristic is the interest in men and things, and the disposition to cut through questions in the schools after a trenchant fashion of his own. He was little attracted by the scholastic learning, though it would be wrong to take his words as evidence of a precocious insight into its weakness. The truth probably is that he took no interest in studies which there was no risk in neglecting, and thought as little of rejecting as of accepting the traditional doctrines. He adds that he took his degree at the proper time; but in fact, upon any computation and from whatever cause, he remained at Magdalen Hall five, instead of the required four, years, not being admitted as bachelor till the 5th of February

1608.

In the same year Hobbes was recommended by Wilkinson as tutor to the son of William Cavendish, baron of Hardwick (after- wards 2nd earl of Devonshire), and thus began a lifelong con- nexion with a great and powerful family. Twice it was loosened — once, for a short time, after twenty years, and again, for a longer period, during the Civil War — but it never was broken. Hobbes spoke of the first years of his tutorship as the happiest of his life. Young Cavendish was hardly younger than Hobbes, and had been married, a few months before, at the instance of the king, to Christiana, the only daughter of Edward, Lord Bruce of Kinloss, though by reason of the bride's age, which was only twelve years, the pair had no establishment for some time. Hobbes was his companion rather than tutor (before becoming secretary); and, growing greatly attached to each other, they were sent abroad together on the grand tour in 1610. During this journey, the duration of which cannot be precisely stated, Hobbes acquired some knowledge of French and Italian, and also made the important discovery that the scholastic philosophy which he had learned in Oxford was almost universally neglected in favour of the scientific and critical methods of Galileo, Kepler and Montaigne. Unable at first to cope with their unfamiliar ideas, he determined to become a scholar, and until 1628 was engaged in a careful study of Greek and Latin authors, the out- come of which was his great translation of Thucydides. But when he had finished his work he kept it lying by him Transla- tor years, being no longer so sure of finding appreciative Hon 0/ readers; and when he did send it forth, in 1628, he was Tlmcy- fain to be content with " the few and better sort." 1 dUes – That he was finally determined to publication by the political troubles of the year 1628 may be regarded as certain, not only from his own express declaration at a later time (Vit. carm. exp.), but also from unmistakable hints in the account of the life and work of his author prefixed to the translation on its appearance. This was the year of the Petition of Right, extorted from the king in the third parliament he had tried within three years of his accession; and, in view of Hobbes's later activity, it is significant that he came forward just then, at the mature age of forty, with his version of the story of the Athenian democracy as the first production of his pen. Nothing else is known 'of his doings 1 The translation, under the title Eight Boohs of the Peloponnesian War, written by Thucydides the son of Olorus, interpreted with faith and diligence immediately out of the Greek by Thomas Hobbes, secre- tary to the late Earl of Devonshire, appeared in 1628 (or 1629), after the death of the earl, to whom touching reference is made in the dedication. It reappeared in 1634, with the date of the dedication altered, as if then newly written. Though Hobbes claims to have performed his work "with much more diligence than elegance," his version is remarkable as a piece of English

writing, but is by no means accurate. It fills vols. viii. and ix. in Molesworth's collection (11 vols., including index vo'.) of Hobbes's English Works (London, Bohn, 1839-1845). The volumes of this collection will here be cited as E.W. Molesworth's collection of the Latin Opera philosophica (5 vols., 1839-1845) will be cited as L.W. The five hundred and odd Latin hexameters under the title De mirabilibus Pecci (L.W. v. 323-340), giving an account of a short excursion from Chatsworth to view the seven wonders of the Derbyshire Peak, were written before 1628 (in 1626 or 1627), though not published till 1636. It was a New Year's present to his patron, who gave him £5 in return. A later edition, in 1678, included an English version by another hand.

before 1628, except that through his connexion with young Cavendish he had relations with literary men of note like Ben Jonson, and also with Bacon and Lord Herbert of Cherbury. If he never had any sympathy with Herbert's intuitionalist principles in philosophy, he was no less eager, as he afterwards showed, than Herbert to rationalize in matters of religious doctrine, so that he may be called the second of the English deists, as Herbert has been called the first. With Bacon he was so intimate (Aubrey's Lives, pp. 222, 602) that some writers have described him as a disciple. The facts that he used to walk with Bacon at Gorham- bury, and would jot down with exceptional intelligence the eager thinker's sudden " notions," and that he was employed to make the Latin version of some of the Essays, prove nothing when weighed against his own disregard of all Bacon's principles, and the other evidence that the impulse to independent thinking came to him not from Bacon, and not till some time after Bacon's death in 1626. 1

So far as we have any positive evidence, it was not before the year 1629 that Hobbes entered on philosophical inquiry. Mean- j

*while a great change had been wrought in his circum- P *'w" stances. His friend and master, after about two years' inquiry. tenure of the earldom of Devonshire, died of the plague in June 1628, and the affairs of the family were so disordered financially that the widowed countess was left with the task of righting them in the boyhood of the third earl. Hobbes went on for a time living in the household; but his services were no longer in demand, and, remaining inconsolable under his personal bereavement, he sought distraction, in 1629, in another engagement which took him abroad as*

tutor to the son of Sir Gervase Clifton, of an old Nottinghamshire family. This, his second, sojourn abroad appears to have been spent chiefly in Paris, and the one important fact recorded of it is that he then first began to look into Euclid. The engagement came to an end in 1631, when he was recalled to train the young earl of Devon- shire, now thirteen years old, son of his previous pupil. In the course of the next seven years in Derbyshire and abroad, Hobbes took his pupil over rhetoric, 2 logic, astronomy, and the principles of law, with other subjects. His mind was now full of the thought of motion in nature, and on the continent he sought out the philosophical speculators or scientific workers. In Florence in 1636 he saw Galileo, for whom he ever retained the warmest admiration, and spent eight months in daily converse with the members of a scientific circle in Paris, held together by Marin Mersenne (q.v.). From that time (the winter of 1636-1637) he too, as he tells us, was numbered among philosophers.

His introduction to Euclid took place accidentally in 1629 (Aubrey's Lives, p. 604). Euclid's manner of proof became the model for his own way of thinking upon all subjects. It is less easy to determine when he awoke to an interest in the physical doctrine of motion. The story told by himself (Vit. p. xx.) is that, hearing the question asked " What is sense ? " he fell to thinking often on the subject, till it suddenly occurred to him that if bodies and their internal parts were at rest, or were always in the same state of motion, there could be no distinction of anything, and consequently no sense; the cause of all things must therefore be sought in diversity of movements. Starting from this principle he was driven to geometry for insight into the ground and modes of motion. The biographies we possess do not tell us where or when this great change of interest occurred. Nothing is said, however, which contradicts a statement that on his third journey in Europe he began to study the doctrine of motion more seriously, being interested in it before; and as he claims more than once (L.W. v. 303; E.W. vii. 468) to have explained light and sound by

1 Hobbes, in minor works dealing with physical questions (L.W. iv. 316; E.W. vii. 112), makes two incidental references to Bacon's writings, but never mentions Bacon as he mentions Galileo, Kepler, Harvey, and others (De corpore, ep. ded.), among the lights of the century. The word " Induction," which occurs in only three or four passages throughout all his works (and these again minor ones), is never used by him with the faintest reminiscence of the import assigned to it by Bacon; and, as will be seen, he had nothing but scorn for experimental work in physics.

2 The free English abstract of Aristotle's Rhetoric, published in 1681, after Hobbes's death, as The Whole Art of Rhetoric {E.W. vi. 423-510), corresponds with a Latin version dictated to his young pupil. Among Hobbes's papers preserved at Hardwick, where he died, there remains the

boy's dictation-book, interspersed with headings, examples, &c. in Hobbes's hand.

a mechanical hypothesis as far back as 1630, the inspiration may be assigned to the time of the second journey. But it was not till the third journey that the new interest became an overpowering passion, and the " philosopher " was on his way home before he had advanced so far as to conceive the scheme of a system of thought to the elaboration of which his life should henceforth be devoted.

Hobbes was able to carry out his plan in some twenty years or more from the time of its conception, but the execution was so broken in upon by political events, and so complicated with other labours, that its stages can hardly be followed without some previous understanding of the relations of the parts of the scheme, as there is reason to believe they were sketched out from the beginning. His scheme was first to work out, in a separate treatise De corpore, a systematic doctrine of Body, showing how physical phenomena were universally explicable in terms of motion, as motion or mecha- nical action was then (through Galileo and others) understood — the theory of motion being applied in the light of mathematical science, after quantity, the subject-matter of mathematics, had been duly considered in its place among the fundamental conceptions of philosophy, and a clear indication had been given, at first starting, of the logical ground and method of all philosophical inquiry. He would then single out Man from the realm of nature, and, in a treatise De homine, show what specific bodily motions were in- volved in the production of the peculiar phenomena of sensation and knowledge, as also of the affections and passions thence resulting, whereby man came into relation with man. Finally he would con- sider, in a crowning treatise De cive, how men, being naturally rivals or foes, were moved to enter into the better relation of Society, and demonstrate how this grand product of human wit must be regulated if men were not to fall back into brutishness and misery. Thus he proposed to unite in one coherent whole the separate phenomena of Body, Man and the State.

Hobbes came home, in 1637, to a country seething with dis- content. The reign of " Thorough " was collapsing, and the forces pent up since 1629 were soon to rend the fabric of the state. By these events Hobbes was distracted from the orderly execution of his philosophic plan. The Short Parliament, as he tells us at a later time (E.W. iv. 414), was not dissolved before he had ready " a little treatise in English," in which he sought to prove that the points of the royal prerogative which the members were determined to dispute before granting supplies " were inseparably annexed to the sovereignty which they did not then deny to be in the king." Now it can be proved that at this time he had written not only his Human Nature

but also his De corpore politico, the two treatises (though published separately ten years later) having been composed as parts of one work; 3 and there cannot be the least question that together they make " the little treatise " just mentioned. We are there- fore to understand, first, that he wrote the earliest draft of his political theory some years before the outbreak of the Civil War, and, secondly, that this earliest draft was not written till, in accordance with his philosophical conception, he had established the grounds of polity in human nature. The first point is to be noted, because it has often been supposed that Hobbes's political doctrine took its peculiar complexion from his revulsion against the state of anarchy before his eyes, as he wrote during the progress of the Civil War. The second point must be main- tained against his own implied, if not express, statement some years later, when publishing his De cive (L.W. ii. 151), that he wrote this third part of his system before he had been able to set down any finished representation of the fundamental doctrines which it presupposed. In the beginning of 1640, therefore, he had written out his doctrine of Man at least, with almost as much elaboration as it ever received from him.

In November 1640 the Long Parliament succeeded to the Short, and sent Laud and Strafford to the Tower, and Hobbes, who had become, or thought he had become, a marked la Par i St man by the circulation of his treatise (of which, " though not printed, many gentlemen had copies "), hastened to Paris, " the first of all that fled." He was now for the fourth and last time abroad, and did not return for eleven years. Apparently he remained the greater part of the time in or about

3 Among the Hardwick papers there is preserved a MS. copy of the work, under the title Elementes of Law Naturall and Politique, with the dedication to the earl of Newcastle, written in Hobbes's own hand, and dated May 9, 1640. This dedication was prefixed to the first thirteen chapters of the work when printed by themselves, under the title Human Nature in 1650.

Paris. He was welcomed back into the scientific coterie about Mersenne, and forthwith had the task assigned him of criticizing the Meditations of Descartes, which had been sent from Holland, before publication, to Mersenne with the author's request for criticism from the most different points of view. Hobbes was soon ready with the remarks that were printed as " Third " among the six (later seven) sets of " Objections " appended, with " Replies " from Descartes, to the Meditations, when published shortly

afterwards in 1641 (reprinted in L.W. v. 249-274). About the same time also Mersenne sent to Descartes, as if they came from a friend in England, another set of objections which Hobbes had to offer on various points in the scientific treatises, especially the Dioptrics, appended by Descartes to his Discourse on Method in 1637; to which Descartes replied without suspecting the common authorship of the two sets. The result was to keep the two thinkers apart rather than bring them together. Hobbes was more eager to bring forward his own philosophical and physical ideas than careful to enter into the full meaning of another's thought; and Descartes was too jealous, and too confident in his conclusions to bear with this kind of criticism. He was very curt in his replies to Hobbes's philosophical objections, and broke off all correspondence on the physical questions, writing privately to Mersenne that he had grave doubts of the Englishman's good faith in drawing him into controversy (L.W. v. 277-307).

Meanwhile Hobbes had his thoughts too full of the political theory which the events of the last years had ripened within him to settle, even in Paris, to the orderly composition of his works. Though connected in his own mind with his view of human nature and of nature generally, the political theory, as he always declared, could stand by itself. Also, while he may have hoped at this time to be able to add much (though he never did) to the sketch of his doctrine of Man contained in the unpublished " little treatise," he might extend, but could hardly otherwise modify, the sketch he had there given of his carefully articulated theory of Body Politic. Possibly, indeed, before that sketch was written early in 1640, he may, under pressure of the political excitement, have advanced no small way in the actual composition of the treatise De Cive, the third section of his projected system. In any case, it was upon this section, before the others, that he set to work in Paris; and before the end of 1641 the book, as we know from the date of the dedication (November 1), was finished. Though it was forthwith printed in the course of the year 1642, he was content to circulate a limited number of copies privately 1 ; and when he found his work received with applause (it was praised even by Descartes), he seems to have taken this recognition of his philosophical achievement as an additional reason for deferring publication till the earlier works of the system were completed. Accordingly, for the next three or four years, he remained steadily at work, and nothing appeared from him in public except a short treatise on optics (Tractatus opticus, L.W. v. 217-248) included in the collection of scientific tracts pub- lished by Mersenne under the title Cogitata physico-mathematica in 1644, and a highly compressed statement of his psychological application of the doctrine of motion (L.W. v. 309-318), incorporated with Mersenne's Ballistica, published in the same year. Thus or otherwise he had become sufficiently known by 1645 to be chosen as a referee, with Descartes, Roberval and others, in the famous

controversy between John Pell (q.v.) and the Dane Longomontanus (q.v.) over that problem of the squaring of the circle which was seen later on to have such a fatal charm for himself. But though about this time he had got ready all or most of the materials for his fundamental work on Body, not even now was he able to make way with its composition,

1 The book, of which the copies are rare (one in Dr Williams's library in London and one in the Bodleian), was printed in quarto size (Paris, 1642), with a pictorial title-page (not afterwards repro- duced) of scenes and figures illustrating its three divisions, " Liber- tas," " Imperium," " Religio." The title Elementorum philosophise sectio tertia, De cive, expresses^ its relation to the unwritten sections, which also comes 01ft in erne or two bsckvreferences m the text.

Levlathaa.

and when he returned to it after a number of years, he returned a different man.

The Civil War had broken out in 1642, and the royalist cause began to decline from the time of the defeat at Marston Moor, in the middle of 1644. Then commenced an exodus of the king's friends. Newcastle himself, who was a cousin of Hobbes's late patron and to whom he dedicated the " little treatise " of 1640, found his way to Paris, and was followed by a stream of fugitives, many of whom were known to Hobbes. The sight of these exiles made the political interest once more predominant in Hobbes, and before long the revived feeling issued in the formation of a new and important design. It first showed itself in the publication of the De cive, of which the fame, but only the fame, had extended beyond the inner circle of friends and critics who had copies of the original impression. Hobbes now entrusted it, early in 1646, to his admirer, the Frenchman Samuel de Sorbiere, by whom it was seen through the Elzevir press at Amsterdam in 1647 — having previously inserted a number of notes in reply to objections, and also a striking preface, in the course of which he explained its relation to the other parts of the system not yet forthcoming, and the (political) occasion of its having been composed and being now published before them. 2 So hopeless, meanwhile, was he growing of being able to return home that, later on in the year, he was on the point of leaving Paris to take up his abode in the south with a French friend, 3 when he was engaged " by the month " as mathematical instructor to the young prince of Wales, who had come over from Jersey about the month of July. This engagement lasted nominally from 1646 to 1648 when Charles went to Holland. Thus thrown more than ever into the company of the exiled royalists, it was then, if not earlier, that he conceived his new design of bringing all his powers of thought and expression to bear upon the

production of an English book that should set forth his whole theory of civil government in relation to the political crisis resulting from the war. The De cive, presently to be published, was written in Latin for the learned, and gave the political theory without its foundation in human nature. The unpublished treatise of 1640 contained all or nearly all that he had to tell concerning human nature, but was written before the terrible events of the last years had disclosed how men might still be urged by their anti-social passions back into the abyss of anarchy. There was need of an exposition at once comprehensive, incisive and popular. The State, it now seemed to Hobbes, might be regarded as a great artificial man or monster (Leviathan), com- posed of men, with a life that might be traced from its generation through human reason under pressure of human needs to its dissolution through civil strife proceeding from human passions. This, we may suppose, was the presiding conception from the first, but the design may have been variously modified in the three or four years of its execution. Before the end, in 1650-1651, it is plain that he wrote in direct reference to the greatly changed aspect of affairs in England. The king being dead, and the royalist cause appearing to be hopelessly lost, he did not scruple, in closing the work with a general " Review and Conclusion," to raise the question of the subject's right to change allegiance when a former sovereign's power to protect was irrecoverably gone. Also he took advantage of the rule of the Commonwealth to indulge much more freely than he might have otherwise dared in rationalistic criticism of religious doctrines; while, amid the turmoil of sects, he could the more, forcibly urge_that the preservation of social order, when again firmly restored, must depend on the assumption by the civil power of the right i L.W. iL 133-134. In this first public edition (i2ino), the title was changed to Elementa philosophica de cive, the references in the text to the previous sections being omitted. The date of the dedi- cation to the young earl of Devonshire was altered from 1641 to

1646.

- *Described as " nobilis Languedocianus " in Vit. ; doubtless the same with the " Dominus Verdusius, nobilis Aquitanus," to whom was dedicated the Exam, et emend, math. hod. (L.W. iv>) in 1660. Du Verdus was ene of Hobbes's profoundest admirers and most frequent correspondents in later years ; there are many of his letters a-nrottg Hobbes's papers at Hardwick.*

to wield all sanctions, supernatural as well as natural, against the

pretensions of any clergy, Catholic, Anglican or Presbyterian, to the exercise of an imperium in imperio.

We know the Leviathan only as it finally emerged from Hobbes's pen. During the years of its composition he remained in or near Paris, at first in attendance on his royal pupil, with whom he became a great favourite. In 1647 Hobbes was overtaken by a serious illness which disabled him for six months. Mersenne begged him not to die outside the Roman Catholic Church, but Hobbes said that he had already considered the matter sufficiently and afterwards took the sacrament according to the rites of the Church of England. On recovering from this illness,which nearly proved fatal, he resumed his literary task, and carried it steadily forward to completion by the year 1650, having also within the same time translated into English, with characteristic force of expression, his Latin treatise. Otherwise the only thing known (from one or two letters) of his life in those years is that from the year 1648 he had begun to think of returning home; he was then sixty and might well be weary of exile. When 1650 came, as if to prepare the way for the reception of his magnum opus, he allowed the publication of his earliest treatise, divided into two separate small volumes (Human Nature, or the Funda- mental Elements of Policy, E.W. iv. 1-76, and De Corpore Politico, or the Elements of Law, Moral and Politic , pp. 77-228) } In 1651 2 he published his translation of the De Cive under the title of Philosophical Rudiments concerning Government and Society (E.W. ii.). Meanwhile the printing of the greater work was proceeding, and finally it appeared about the middle of the same year, 165 1, under the title of Leviathan, or the Matter, Form and Power of a Commonwealth, Ecclesiastical and Civil {E.W. iii.), with a quaint frontispiece in which, from behind hills overlooking a fair landscape of town and country, there towered the body (above the waist) of a crowned giant, made up of tiny figures of human beings and bearing sword and crozier in the two hands. It appeared, and soon its author was more lauded and decried than any other thinker of his time; but the first effect of its publication was to sever his connexion with the exiled royalist party, and to throw him for protection on the revolutionary Government. No sooner did copies of the book reach Paris than he found himself shunned by his former associates, and though he was himself so little conscious of disloyalty that he was forward to present a manuscript copy " engrossed in vellum in a marvellous fair hand " 3 to the young king of the Scots (who, after the defeat at Worcester, escaped to Paris about the end of October), he was denied the royal presence when he sought it shortly afterwards. Straightway, then, he saw himself exposed to a double peril. The exiles had among them desperadoes who could slay; and, besides exciting the enmity of the Anglican clergy about the king, who bitterly resented the secularist spirit of his book, he had compromised himself with the French authorities

by his elaborate attack on the papal system. In the circumstances, no resource was left him but secret flight. Travelling with what speed he could in the depths of a severe winter and under the effects of a recent Isecond) illness, he managed to reach London, where, sending fn his submission to the council of state, he was allowed to subside kito private life.

Though Hobbes came back, after his eleven years' absence, without having as yet publicly proved his title to rank with the natural philosophers of the age, he was sufficiently conscious of what he had been able to achieve in Leviathan; and it was

1 The Human Nature corresponds with cc. i.-xiii. of the first part of the original treatise. The remaining six chapters of the part stand now as Part I. of the De corpore politico. Part II. of the D.C.P. corresponds with the original second part of the whole work.

2 At the beginning of this year he wrote and published in Paris a letter on the nature and conditions of poetry, chiefly epic, in answer to an appeal to his judgment made in the preface to Sir W. Davenant's heroic poem, Gondibert {E.W. iv. 441-458). The letter is dated Jan. 10, 1650 (1650/1).

8 This presentation copy, so described by Clarendon {Survey of the Leviathan, 1676, p. 8), is doubtless the beautifully written and finely bound MS. now to be found in the British Museum (Egerton MSS.

1910).

in no humble mood that he now, at the age of sixty-four, turned to complete the fundamental treatise of his philosophical system. Neither those whom his masterpiece soon roused to enthusiasm, nor those whom it moved to ˆ etur " indignation, were likely to be indifferent to anything London. he should now write, whether it lay near to or far from the region of practice. Taking up his abode in Fetter Lane, London, on his return, and continuing to reside there for the sake of intellectual society, even after renewing his old ties with the earl of Devonshire, who lived in the country till the Restoration, 4 he worked so steadily as to be printing the De corpore in the year 1654. Circumstances (of which more presently) , however, kept the book back till the following year, and meanwhile the readers of Leviathan had a different excitement. In 1654 a small treatise, " Of Liberty and Necessity " (E.W. iv. 229-278), issued from the press, claiming to be an answer to a discourse on the same subject by Bishop Bramhall Contm ' ltn of Londonderry (afterwards archbishop of Armagh, Bramhall. d. 1663), addressed by Hobbes to the marquis of Newcastle. 5 It had grown out of an oral discussion between Hobbes and Bramhall in the marquis's presence at

Paris in 1646. Bramhall, a strong Arminian, had afterwards written down his views and sent them to Newcastle to be answered in this form by Hobbes. Hobbes duly replied, but not for publication, because he thought the subject a delicate one. But it happened that Hobbes had allowed a French acquaintance to have a private translation of his reply made by a young Englishman, who secretly took a copy of the original for himself; and now it was this unnamed purloiner who, in 1654, when Hobbes had become famous and feared, gave it to the world of his own motion, with an extravagantly laudatory epistle to the reader in its front. Upon Hobbes himself the publication came as a surprise, but, after his plain speaking in Leviathan, there was nothing in the piece that he need scruple to have made known, and he seems to have condoned the act. On the other hand, Bramhall, supposing Hobbes privy to the publication, resented the manner of it, especially as no mention was made of his rejoinder. Ac- cordingly, in 1655, he printed everything that had passed between them (under the title of A Defence of the True Liberty of Human Actions from Antecedent or Extrinsic Necessity), with loud complaint against the treatment he had received, and the promise added that, in default of others, he himself would stand forward to expose the deadly principles of Leviathan. About this time Hobbes had begun to be hard pressed by other foes, and, being never more sure of himself than upon the question of the will, he appears to have welcomed the opportunity thus given him of showing his strength. By 1656 he was ready with his Questions concerning Liberty, Necessity and Chance (E.W. v.), in which he replied with astonishing force to the bishop's rejoinder point by point, besides explaining the occasion and circumstances of the whole debate, and reproducing (as Bramhall had done) all the pieces from the beginning. As perhaps the first clear exposition and defence of the psychological doctrine of determin- ism, Hobbes's own two pieces must ever retain a classical importance in the history of the free-will controversy; while Bramhall's are still worth study as specimens of scholastic fence. The bishop, it should be added, returned to the charge in 1658 with ponderous Casligations of Mr Hobbes's Animad- versions, and also made good his previous threat in a bulky

4 During all the time he was abroad he had continued to receive from his patron a yearly pension of £80, and they remained in steafly. correspondence. The earl, having sided with the king in 1642, was declared unfit to sit in the House of Peers, and though, by submission to Parliament, he recovered his estates when they were sequestered later on, he did not sit again till 1660. Among Hobbes's friends at this time are specially mentioned John Selden and William Harvey, who left him a legacy of £10. According to Aubrey, Selden left him an equal bequest, but this seems to be a mistake. Harvey (not Bacon) is the only Englishman he mentions in the dedicatory epistle prefixed to the De corpore, among the founders, before

himself, of the new natural philosophy.

6 The treatise bore the date, " Rouen, Aug. 20, 1652," but it should have been 1646, as afterwards explained by Hobbes himself (E.W. v. 25).

appendix entitled The Catching of Leviathan the Great Whale. Hobbes never took any notice of the Castigations, but ten years later replied to the charges of atheism, &c, made in the non- political part of the appendix, of which he says he then heard for the first time (E.W. iv. 279-384). This Answer was first published after Hobbes's death. 1

We may now follow out the more troublesome conflict, or rather series of conflicts, in which Hobbes became entangled from the time of publishing his De corpore in 1655, and which checkered all his remaining years. In Leviathan he had

ContrO'

\t rs .f. vehemently assailed the system of the universities, as

d s originally founded for the support of the papa! against

Ward,

the civil authority, and as still working social mischief by adherence to the old learning. The attack was duly noted at Oxford, where under the Commonwealth a new spirit of scientific activity had begun to stir. In 1654 Seth Ward (1617- 1689), the Savilian professor of astronomy, replying in his Vindiciae ccademiarum to some other assaults (especially against John Webster's Exaraen of Academies) on the academic system, retorted upon Hobbes that, so far from the universities being now what he- had known them in his youth, he would find his geometrical pieces, when they appeared,, better understood there than he should like. This was said in reference to the boasts in which Hobbes seems to have been freely indulging of having squared the circle and accom- plished other such feats; and, when a year later the De corpore (L.W. i.) finally appeared, it was seen how the thrust had gone home. In the chapter (xx.) of that work where Hobbes dealt with the famous problem whose solution he thought he had found, there were left expressions against Vindex (Ward) at a time when the solutions still seemed to him good; but the solutions themselves, as printed, were allowed to be all in different ways halting, as he naively confessed he had discovered only when he had been driven by the insults of

malevolent men to examine them more closely with the help of his friends. A strange conclusion this, and reached by a path not less strange, as was now to be disclosed by a relentless hand. Ward's colleague, the more famous John Wallis (q.v.), Savilian professor of geometry from 1649, had bee.i privy to the challenge thrown out in 1654, and it was arranged that they should critically dispose of the De corpore between them. Ward was to occupy himself with the philosophical and physical sections, which he did in leisurely fashion, bringing out his criticism in the course of next year (In Th. Hobbii philosophiam exercitalio epistolica). Wallis was to confine himself to the mathematical chapters, and set to work at once with characteristic energy. Obtaining an unbound copy of the De corpore, he saw by the mutilated appearance of the sheets that Hobbes had repeatedly altered his demonstrations before he issued them at last in their actual form, grotesque as it was, rather than delay the book longer. Obtaining also a copy of the work as it had been printed before Hobbes had any doubt of the validity of his solutions, Wallis was able to track his whole course from the time of Ward's provocation — his passage from exultation to doubt, from doubt to confessed impotence, yet still without abandoning the old assumption of confident strength ; and all his turnings and windings were now laid bare in one of the most trenchant pieces of controversial writing ever penned. Wallis's Elenchus geometriae Hobbianae, published in 1655 about three months after the De corpore, contained also an elaborate criticism of Hobbes's whole attempt to relay the foundations of mathematical science in its place within the general body of reasoned knowledge — a criticism which, if it failed to allow for the merit of the conception, exposed only too effectually the utter inadequacy of the result. Taking up mathematics when not only his mind was already formed but his thoughts were crystallizing into a philosophical system, Hobbes had, in fact, never put himself to school and sought to work up gradually to the best knowledge of the time, but had been more anxious from the first to become himself an innovator with whatever insufficient means. The consequence was that, when not spending himself in vain attempts to soWe the impossible problems that have always waylaid the fancy of self-sufficient beginners, he took an interest only in the elements of geometry, and never had any notion of the full scope of mathematical science, undergoing as it then was (and not least at the hands of Wallis) the extraordinary development which made it before the end of the century the potent instrument of physical discovery which it became in the hands of Newton. He was even unable, in dealing with the elementary conceptions of geometry, to work out with any consistency the few original thoughts he had, and thus became the easy sport of Wallis. At his advanced age, however, and with the sense he had of his powers, he was not likely to be brought to a better mind by so insulting an opponent. He did indeed, before allowing an English

1 " The Vit. and. refers to 1676, a ' Letter to William duke of Newcastle on the Controversy about Liberty and Necessity, held with Benjamin Laney, bishop of Ely.' In that year there did appear a (confused) little tract written by Laney against Hobbes's concluding statement of his own ' Opinion ' in the ' Liberty and Necessity ' c "654 (1646), but I can find no trace of any further writing by Hobbes on the subject " (G. Croom Robertson, Hobbes, p. 202).

translation of the De corpore (E.W. i.) to appear in 1656, take care to remove some of the worst mistakes exposed by Wallis, and, while leaving out all the references to Vindex, now profess to make, in altered form, a series of mere " attempts " at quadrature; but he was far from yielding the ground to the enemy. With the translation, 2 in the spring of 1656, he had ready Six Lessons to the Professors of Mathematics, one of Geometry, the other of Astronomy, in the University of Oxford (E.W. vii. 181-356), in which, after reasserting his view of the principles of geometry in opposition to Euclid's, he proceeded to repel Wallis's objections with no lack of dialectical skill, and with an unreserve equal to Wallis's own. He did not scruple, in the ardour of conflict, even to maintain positions that he had resigned in the translation, and he was not alraid to assume the offensive by a counter criticism of three of Wallis's works then published. When he had thus disposed of the " Paralogisms " of his more formidable antagonist in the first five lessons, he ended with a lesson on " Manners " to the two professors together, and set himself gravely at the close to show that he too could be abusive. In this particular part of his task, it must be allowed, he succeeded very well; his criticism of Wallis's works, especially the great treatise Arithmctica infinitorum (1655), only showed how little able he was to enter into the meaning of the modern analysis. Wallis, on his side, was not less ready to keep up the game in English than he had been to begin it in Latin. Swift as before to strike, in three months' time he had deftly turned his own word against the would-be master by administering Due Correction for Mr Hobbes, or School Discipline for not saying his Lessons right, in a piece that differed from the Elenchus only in being more biting and unrestrained. Having an easy task in defending himself against Hobbes's trivial criticism, he seized the opportunity given him by the English translation of the De corpore to track Hobbes again step by step over the whole course, and now to confront him with his incredible inconsistencies multiplied by every new utterance. But it was no longer a fight over mathematical questions only. Wallis having been betrayed originally by his fatal cleverness into the pettiest carping at words, Hobbes had retorted in kind, and then it became a high duty in the other to defend his Latin with great parade of learning and give fresh provocation. One of Wallis's rough sallies in this kind suggested to Hobbes the title of the next rejoinder with which, in 1657, he sought to close the unseemly wrangle.

Arguing in the Lessons that a mathematical point must have quantity, though this were not reckoned, he had explained the Greek word crny,ui7, used for a point, to mean a visible mark made with a hot iron; whereupon he was charged by Wallis with gross ignorance for confounding cny/tr) and oTiyy.o.. Hence the title of his new piece: Xriyttal ayewfierpias, iypoudas, dn-uroXn-eias, iyaBdas, or Marks of the Absurd Geometry, Rural Language, Scottish Church Politics, and Barbarisms of John Wallis, Professor of Geometry and Doctor of Divinity (E. W. vii. 357- 400). He now attacked more in detail but not more happily than before Wallis's great work, while hardly attempting any further defence of his own positions; also he repelled with some force and dignity the insults that had been heaped upon him, and fought the verbal points, but could not leave the field without making political insinuations against his adversary, quite irrelevant in themselves and only noteworthy as evidence of his own resignation to Cromwell's rule. The thrusts were easily and nimbly parried by Wallis in a reply (Hobbiani puncti dispunctio, 1657) occupied mainly with the verbal questions. Irritating as it was, it did not avail to shake Hobbes's determination to remain silent; and thus at last there was peace for a time.

Before the strife flamed up again, Hobbes had published, in 1658, the outstanding section of his philosophical system, and thus com- pleted, after a fashion, the scheme he had planned more than twenty years before. So far as the treatise De homine (L.W. ii. 1 1-32) was concerned, the completion was more in name than in fact. It consisted for the most part of an elaborate theory of vision which, though very creditable to Hobbes's scientific insight, was out of place, or at least out of proportion, in a philosophical consideration of human nature generally. The remainder of the treatise, dealing cursorily with some of the topics more fully treated in the Human Nature and the Leviathan, has all the appearance of having been tagged in haste to the optical chapters (composed years before) 3 as

2 This translation, Concerning Body, though not made by Hobbes, was revised by him; but it is far from accurate, and not seldom, at critical places (e.g. c. vi. § 2), quite misleading.' Philosophical citations from the De corpore should always be made in the original Latin. Molesworth reprints the Latin, not from the. first edition of 1655, but from the modified edition of 1668 — modified, in the mathematical chapters, in general (not exact) keeping with the English edition of 1656. The Vindex episode, referred to in the Six Lessons, becomes intelligible only by going beyond Molesworth to the original Latin edition of 1655.

3 They were composed originally, in a somewhat different and rather more extended form, as the second part of an English treatise on Optics, completed by the year 1646. Of this treatise, preserved in Harleian MSS.

3360, Molesworth otherwise prints the dedication to the marquis of Newcastle, and the concluding paragraphs (E.W. vii. 467-471),

a makeshift for the proper transition required in the system from questions of Body Natural to questions of Body Politic. Hobbes had in fact spent himself in his earlier constructive efforts, and at the age of seventy, having nothing to add to his doctrine of Man as it was already in one form or another before the world, was content with anything that might stand for the fulfilment of his philosophical purpose. But he had still in him more than twenty years of vigorous vitality, and, not conscious to himself of any shortcoming, looked forward, now his hands were free, to doing battle for his doctrines. Rather than remain quiet, on finding no notice taken of his latest production, he would himself force on a new conflict with the enemy. Wallis having meanwhile published other works and especially a comprehensive treatise on the general principles of calculus (Mathesis universalis, 1657), he might take this occasion of exposing afresh the new-fangled methods of mathematical analysis and reasserting his own earlier positions. .Accordingly, by the spring of 1660, he had managed to put his criticism and assertions into five dialogues under the title Examinatio et emendatio mathematicae hodiernae qualis explicatur in libris Johannis Wallisii, with a sixth dialogue so called, consisting almost entirely of seventy or more propositions on the circle and cycloid. 1 Wallis, however, would not take the bait. Hobbes then tried another tack. Next year, having solved, as he thought, another ancient crux, the duplication of the cube, he had his solution brought out anonymously at Paris in French, so as to put Wallis and other critics off the scent and extort a judgment that might be withheld from a work of his. The artifice was successful, and no sooner had Wallis publicly refuted the solution than Hobbes claimed the credit of it, and went more wonderfully than ever astray in its defence. He presently republished it (in modified form), with his remarks, at the end of a new Latin dialogue which he had meanwhile written in defence of another part of his philo- sophical doctrine. This was the Dialogus physicus, sive De natura a'eris (L.W. iv. 233-296), fulminated in. 1661 against Boyle and other friends of Wallis who, as he fancied, under the influence of that malevolent spirit, were now in London, after the Restoration, form- ing themselves into a society (incorporated as the Royal Society in 1662) for experimental research, to the exclusion of himself person- ally, and in direct contravention of the method of physical inquiry enjoined in the De corpore? All the laborious manipulation recorded in Boyle's New Experiments touching the Spring of the Air (1660), which Hobbes chose, without the least warrant, to take as the manifesto of the new "

academicians," seemed to him only to con- firm the conclusions he had reasoned out years before from specu- lative principles, and he warned them that if they were not content to begin where he had left off their work would come to nought. To as much of this diatribe as concerned himself Boyle quickly replied with force and dignity, but it was from Hobbes's old enemy that retribution came, in the scathing satire Hobbius heauton- timoru- menos (1662). Wallis, who had deftly steered his course amid all the political changes of the previous years, managing ever to be on the side of the ruling power, was now apparently stung to fury by a wanton allusion in Hobbes's latest dialogue to a passage of his former life (his deciphering for the parliament the king's papers taken at Naseby), whereof he had once boasted but after the Restoration could not speak or hear too little. The revenge he took was crushing. Professing to be roused by the attack on his friend Boyle, when he had scorned to lift a finger in defence of himself against the earlier dialogues, he tore them all to shreds with an art of which no general description can give an idea. He got, however, upon more dangerous ground when, passing wholly by the political insinuation against himself, he roundly charged Hobbes with having written Leviathan in support of Oliver's title, and deserted his royal master in distress. Hobbes seems to have been fairly bewildered by the rush and whirl of sarcasm with which Wallis drove him anew from every mathe- matical position he had ever taken up, and did not venture forth into the field of scientific controversy again for some years, when he had once followed up the physical dialogue of 1661 by seven shorter ones, with the inevitable appendix, entitled Problemata physica, una cum magnitudine circuit {L.W. iv. 297-384), in 1662. 3

1 L.W. iv. 1-232. The propositions on the circle, forty-six in number (shattered by Wallis in 1662), were omitted by Hobbes when he republished the Dialogues in 1668, in the collected edition of his Latin works from which Molesworth reprints. In the part omitted, at p. 154 of the original edition, Hobbes refers to his first introduction to Euclid, in a way that confirms the story in Aubrey quoted in an earlier paragraph.

2 Remaining at Oxford, Wallis, in fact, took no active part in the constitution of the new society, but he had been, from 1645, one of the originators of an earlier association in London, thus continued or revived. This earlier society had been continued also at Oxford after the year 1649, when Wallis and others of its members received appointments there.

3 The Problemata physica was at the same time put into English (with some changes and omission of part of the mathematical appen- dix), and presented to the king, to whom the work was dedicated in a remarkable letter apologizing for Leviathan. In its English form, as Seven Philosophical Problems and Two Propositions of Geometry (E.W. vii. 1 ?#), the work

Was first published i"n 1682, after Hobbes's death.

But all the more eagerly did he take advantage of Wallis's loose calumny to strike where he felt himself safe. His answer to the personal charges took the form of a letter about himself in the third person addressed to Wallis in 1662, under the title of Considera- tions upon the Reputation, Loyalty, Manners and Religion of Thomas Hobbes (E.W. iv. 409-440). In this piece, which is of great bio- graphical value, he told his own and Wallis's " little stories during the time of the late rebellion " with such effect that Wallis, like a wise man, attempted no further reply. Thus ended the second bout. After a time Hobbes took heart again and began a third period of controversial activity, which did not end, on his side, till his ninetieth year. Little need be added to the simple catalogue of the untiring old man's labours in this last stage of his life. The first piece, published in 1666, De principiis et ratiocinations geome- trarum {L.W. iv. 385-484), was designed, as the sub-title declared, to lower the pride of geometrical professors by showing that there was no less uncertainty and error in their works than in those of physical or ethical writers. Wallis replied shortly in the Philo- sophical Transactions (August 1666). Three years later he brought his three great achievements together in compendious form, Quadra- tura circuli, Cubatio sphaerae, Duplicatio cu'oi, and as soon as they were once more refuted by Wallis, reprinted them with an answer to the objections, in compliment to the grand-duke of Tuscany, who paid him attentions on a visit to England in 1669 {L.W. iv. 485-522). Wallis, who had promised to leave him alone henceforward, refuted him again before the year was out. In 167 1 he worked up his propositions over again in Rosetum geometricum (L.W. v. 1-50), as a fragrant offering to the geometrical reader, appending a criticism (Censura brevis, pp. 50-88) on the first part of Wallis's treatise De tnotu, published in 1669; also he sent Three Papers to the Royal Society on selected points treated very briefly, and when Wallis, still not weary of confuting, shortly replied, published them separ- ately with triumphant Considerations on Dr Wallis's Answer to them (E.W. vii. 429-448). Next year (1672), having now, as he believed, established himself with the Royal Society, he proceeded to complete the discomfiture of Wallis by a public address to the Society on all the points at issue between them from the beginning, Lux Mathe- matica excussa collisionibus Johannis Wallisii et Thomae Hobbesii (L.W. v. 89-150), the light, as the author R. R. (Roseti Repertor) added, being here " increased by many very brilliant rays." Wallis replied in the Transactions, and then finally held his hand. Hobbes's energy was not yet exhausted. In 1674, at the age of eighty-six, he published his Principia et problemata aliquot geometrica, ante desperata nunc breviter explicata et demonstrata (L.W. v. 150-214), containing in the chapters dealing with questions of principle not a few striking observations, which ought not to be overlooked in the study

of his philosophy. His last piece of all, Decameron physio- logicum (E.W. vii. 69-180), in 1678, was a new set of dialogues on physical questions, most of which he had treated in a similar fashion before; but now, in dealing with gravitation, he was able to fire a parting shot at Wallis; and one more demonstration of the equality of a straight line to the arc of a circle, thrown in at the end, appro- priately closed the strangest warfare in which perverse thinker ever engaged. 4

We must now turn back to trace the fortunes of Hobbes and his other doings in the last twenty years of his life. All these controversial writings on mathematics and physics represent but one half of his activity after the age of seventy; though, as regards the other half, it is not possible, for a reason that will be seen, to say as definitely in what order the works belonging to the period were produced. From the time of the Restoration he acquired a new prominence in the public eye. No year had passed since the appearance of Leviathan without some indignant protest against the influence which its trenchant doctrine was calculated to produce upon minds longing above everything for civil repose; but after the Restoration " Hobbism " became a fashionable creed, which it was the duty of every lover of true morality and religion to denounce. Two or three days after Charles's arrival in London, Hobbes drew in the street the notice of his former pupil, and was at once received into favour. The young king, if he had ever himself resented the apparent disloyalty of the " Conclusion " of Leviathan, had not retained the feeling long, and could appreciate the principles of the great book when the application of them happened, as now, to be turned in his own favour. He had, besides, a relish for Hobbes's wit (as he used to say, " Here comes the bear to be baited "), and did not like the old man the less because his presence at court scandalized the bishops or the prim virtue of Chancellor Hyde. He even went the length of bestowing on Hobbes (but not always paying) a pension of £100, and had his portrait hung up in the royal 4 Wallis's pieces were excluded from the collected edition of his I works (1893-1697), and have be'come extremely rare.*

Later Years.

closet. These marks of favour, naturally, did not lessen Hobbes's self-esteem, and perhaps they explain, in his later writings, a certain slavishness toward the regal authority, which is wholly absent from his rational demonstration of absolutism in the earlier works. At all events Hobbes was satisfied with the rule of a king who had appreciated the author of

Leviathan, and protected him when, after a time, protection in a very real sense became necessary. His eagerness to defend himself against Wallis's imputation of disloyalty, and his apologetic dedication of the Problemata physica to the king, are evidence of the hostility with which he was being pressed as early as 1662; but it was not till 1666 that he felt himself seriously in danger. In that year the Great Fire of London, following on the Great Plague, roused the superstitious fears of the people, and the House of Commons embodied the general feeling in a bill against atheism and profaneness. On the 17 th of October it was ordered that the committee to which the bill was referred " should be empowered to receive information touching such books as tend to atheism, blasphemy and profaneness, or against the essence and attributes of God, and in particular the book published in the name of one White, 1 and the book of Mr Hobbes called the Leviathan, and to report the matter with their opinion to the House." Hobbes, then verging upon eighty, was terrified at the prospect of being treated as a heretic, and proceeded to burn such of his papers as he thought might compromise him. At the same time he set himself, with a very characteristic determination, to inquire into the actual state of the law of heresy. The results of his investigation were first announced in three short Dialogues added (in place of the old " Review and Conclusion," for which the day had passed) as an Appendix to his Latin translation of Leviathan (L.W. iii.), included with the general collection of his works published at Amsterdam in 1668. In this appendix, as also in the posthumous tract, published in 1680, An Historical Narration concerning Heresy and the Punish- ment thereof (E.W. iv. 385-408), he aimed at showing that, since the High Court of Commission had been put down, there remained no court of heresy at all to which he was amenable, and that even when it stood nothing was to be declared heresy but what was at variance with the Nicene Creed, as he main- tained the doctrine of Leviathan was not.

The only consequence that came of the parliamentary scare was that Hobbes could never afterwards get permission to print anything on subjects relating to human conduct. The collected edition of his Latin works (in two quarto volumes) appeared at Amsterdam in 1668, because he could not obtain the censor's licence for its publication at London, Oxford or Cambridge. Other writings which he had finished, or on which he must have been engaged about this time, were not made public till after his death — the king apparently having made it the price of his protection that no fresh provocation should be offered to the popular sentiment. The most important of the works composed towards 1670, and thus kept back, is the extremely spirited dialogue to which he gave the title Behemoth: the History of the Causes of the Civil Wars of England and of the Counsels and Artifices by which they were carried on from the year 1640 to the year 1660? To the same period probably belongs the unfinished Dialogue

between a Philosopher and a Student of the Common Laws of England {E.W. vi. 1-160), a trenchant criticism of the con- stitutional theory of English government as upheld by Coke. Aubrey takes credit for having tried to induce Hobbes to write upon the subject in 1664 by presenting him with a copy of Bacon's Elements of the Laws of England, and though the attempt was then unsuccessful, Hobbes later on took to studying the statute- book, with Coke upon Littleton. One other posthumous pro- duction also (besides the tract on Heresy before mentioned) may be referred to this, if not, as Aubrey suggests, an earlier time — the two thousand and odd elagiac verses in which he gave his

: The De medio animarum statu of Thomas White, a heterodox Catholic priest, who contested the natural immortality of the soul. White (who died 1676) and Hobbes were friends.

2 E.W. vi. 161-418. Though Behemoth was kept back at the king's express desire, it saw the light, without Hobbes's leave, in 1679, before his death.

view of ecclesiastical encroachment on the civil power; the quaint verses, disposed in his now favourite dialogue-form, were first published, nine years after his death, under the title Historia ecclesiastica (L.W. v. 341-408), with a preface by Thomas Rymer.

For some time Hobbes was not even allowed to utter a word of protest, whatever might be the occasion that his enemies took to triumph over him. In 1669 an unworthy follower — Daniel Scargil by name, a fellow of Corpus Christi College, Cambridge — had to recant publicly and confess that his evil life had been the result of Hobbist doctrines. In 1674 John Fell, the dean of Christ Church, who bore the charges of the Latin translation of Anthony Wood's History and Antiquities of the University of Oxford (1670), struck out all the complimentary epithets in the account of his life, and substituted very different ones; but this time the king did suffer him to defend himself by publishing a dignified letter (Vit. Auct. pp. xlvii.-l.), to which Fell replied by adding to the translation when it appeared a note full of the grossest insults. And, amid all his troubles, Hobbes was not without his consolations. No Englishman of that day stood in the same repute abroad, and foreigners, noble or learned, who came to England, never forgot to pay their respects to the old man, whose vigour and freshness of intellect no progress of the years seemed able to quench. Among these was the grand-duke of Tuscany (Ferdinand II.), who took away some works and a portrait to adorn the Medicean library.

His pastimes in the latest years were as singular as his labours. The autobiography in Latin verse, with its playful humour, occasional pathos and sublime self-complacency, was thrown off at the age of eighty-four. At

eighty-five, in the year 1673, he sent forth a translation of four books of the Odyssey (ix.-xii.) in rugged but not seldom happily turned English rhymes; and, when he found this Voyage of Ulysses eagerly received, he had ready by 1675 a complete translation of both Iliad and Odyssey [E.W. x.), prefaced by a lively dissertation " Concerning the Virtues of an Heroic Poem," showing his unabated interest in questions of literary style. After 1675, he passed his time at his patron's seats in Derbyshire, occupied to the last with intellectual work in the early morning and in the afternoon hours, which it had long been his habit to devote to thinking and to writing. Even as late as August 1679 he was promising his publisher " somewhat to print in English." The end came very soon afterwards. A suppression of urine in October, in spite of which he insisted upon being conveyed with the family from Chatsworth to Hardwick Hall towards the end of November, was followed by a paralytic stroke, under which he sank on the 4th of December, in his ninety-second year. He lies buried in the neighbouring church of Ault Hucknall.

He was tall and erect in figure, and lived on the whole a temperate life, though he used to say that he had been drunk about a hundred times. His favourite exercise was tennis, which he played regularly even after the age of ˆteJaotei seventy. Socially he was genial and courteous, though istks. in argument he occasionally lost his temper . Asa friend he was generous and loyal. Intellectually bold in the extreme, he was curiously timid in ordinary life, and is said to have had a horror of ghosts. He read little, and often boasted that he would have known as little as other men if he had read as much. He appears to have had an illegitimate daughter for whom he made generous provision. In the National Portrait Gallery there is a portrait of him by J. M. Wright, and two others are in the possession of the Royal Society.*

As already suggested, it cannot be allowed that Hobbes falls into any regular succession from Bacon; neither can it be said that he handed on the torch to Locke. He was the one English thinker of the first rank in the long period ˆˆ, s ' h " of two generations separating Locke from Bacon, but, thought. save in the chronological sense, there is no true relation of succession among the three. It would be difficult even to prove any ground of affinity among them beyond a desposition to take sense as a prime factor in the account of subjective ex- perience: their common interest in physical science was shared

equally by rationalist thinkers of the Cartesian school, and was indeed

*begotten of the time. Backwards, Hobbes's relations are rather with Galileo and the other inquirers who, from the beginning of the 17th century, occupied themselves with the physical world in the manner that has come later to be dis- tinguished by the name of science in opposition to philosophy. But even more than in external nature, Hobbes was interested in the phenomena of social life, presenting themselves so impres- sively in an age of political revolution. So it came to pass that, while he was unable, by reason of imperfect training and too tardy development, with all his pains, to make any contribution to physical science or to mathematics as instrumental in physical research, he attempted a task which no other adherent of the new " mechanical philosophy " conceived — nothing less than such a universal construction of human knowledge as would bring Society and Man (at once the matter and maker of Society) within the same principles of scientific explanation as v/ere found applicable to the world of Nature. The construction was, of course, utterly premature, even supposing it were inherently possible; but it is Hobbes's distinction, in his century, to have conceived it, and he is thereby lifted from among the scientific workers with whom he associated to the rank of those philo- sophical thinkers who have sought to order the whole domain of human knowledge. The effects of his philosophical endeavour may be traced on a variety of lines. Upon every subject that came within the sweep of his system, except mathematics and physics, his thoughts have been productive of thought. When the first storm of opposition from smaller men had begun to die down, thinkers of real weight, beginning with Cumberland and Cudworth, were moved by their aversion to his analysis of the moral nature of man to probe anew the question of the natural springs and the rational grounds of human action; and thus it may be said that Hobbes gave the first impulse to the whole of that movement of ethical speculation that, in modern times, has been carried on with such remarkable continuity in England. In politics the revulsion from his particuar conclusions did not prevent the more clear-sighted of his opponents from recognizing the force of his supreme demonstration of the practical irresponsi- bility of the sovereign power, wherever seated, in the state; and, when in a later a*e the foundations of a positive theory of legisla- tion were laid in England, the school of Bentham — James Mill, Grote, Molesworth — brought again into general notice the writings of the great publicist of the 17th century, who, however he might, by the force of temperament, himself prefer the rule of one, based his whole political system upon a rational regard to the common weal. Finally, the psychology of Hobbes, though too undeveloped to guide the thoughts or even perhaps arrest the attention of Locke, when essaying the scientific analysis of knowledge, came in course of time (chiefly through James Mill) to be connected with the theory of associationism developed from within the school of Locke, in different ways, by Hartley and Hume; nor is it surprising that the later associationists, fin ling their*

principle more distinctly formulated in the earlier thinker, should sometimes have been betrayed into affiliating themselves to Hobbes rather than to Locke. For his ethical thejries see Ethics.

Sufficient information is given in the Vitae Hobbianae auctarium {L.W. i. p. lxv. ff.) concerning the frequent early editions of Hobbes's separate works, and also concerning the works of those who wrote against him, to the end of the 17th century. In the 18th century, after Clarke's Boyle Lectures of 1704-1705, the opposition was less express. In 1750 The Moral and Political Works were collected, with life, &c, by Dr Campbell, in a folio edition, including in order, Human Nature, De corpore politico, Leviathan, Answer to Bramhall's Catching of the Leviathan, Narration concerning Heresy, Of Liberty and Necessity, Behemoth, Dialogue of the Common Laws, the Introduc- tion to the Thucydidss, Letter to Davenant- and two others, the Preface to the Homer, De mirabilihus Peed (with English translation), Con- siderations on the Reputation, &c, of T. H. In 1812 the Human Nature and the Liberty and Necessity (with supplementary extracts from the Questions of 1656) were reorinted in a small edition of 250 copies, with a meritorious memoir (based on Camobell) and dedica- tion to Home Tooke, v y Philip Mallet. Molesworth's edition (1830- 1845), dedicated to Grote, has been referrH to in a former note. Of translations may be mentioned Les Siemens philosophiques du citoyen (1649) and Le Corps politique (1652), both by S. de Sorbiere,

conjoined with Le Traite de la nature humaine, by d'Holbach, in 1787, under the general title Les CEuvres philosophiques et politiques de Thomas Hobbes; a translation of the first section, " Computatio sive logica," of the De corpore, included by Destutt de Tracy with his .Siemens d 'ideologic (1804); a translation of Leviathan into Dutch in 1678, and another(anonymous)into German — Des Engldnders Thomas Hobbes Leviathan oder der kirchliche und biirgerliche Staat (Halle, 1794, 2 vols.); a translation of the De cive by J. H. v. Kirchmann — T. Hobbes: Abhandlung iiber den Burger, &c. (Leipzig, 1873). Im- portant later editions are those of Ferdinand Tonnies, Behemoth (1 889) , on which see Croom Robertson's Philosophical Remains (1 894) . p. 451 ; Elements of Law (1889).

Biographical and Critical Works. — There are three accounts of Hobbes's life, first published together in 1681, two years after his death, by R. B. (Richard Blackbourne, a friend of Hobbes's admirer, John Aubrey), and reprinted, with complimentary verses by Cowley and others, at the beginning of Sir W. Molesworth's collection of the Latin Works: (1) T. H. Malmesb. vita (pp. xiii.-xxi.), wiitten by Hobbes himself, or (as also reported) by T. Rymer, at his dictation ; (2) Vitae Hobbianae auctarium (pp. xxii.lxxx.), turned into Latin from Aubrey's English ; (3) T. H.

Malmesb. vita carmine expressa (pp. lxxxi. xcix.), written by Hobbes at the age of eighty-four (first published by itself in 1680). The Life of Mr T. H. of Malmesburie, printed among the Lives of Eminent Men, in 1813, from Aubrey's papers in the Bodleian, &c. (vol. ii. pt. ii. pp. 593-637), contains some interest- ing particulars not found in the Auctarium. All that is of any importance for Hobbes's life is contained in G. Croom Robertson's Hobbes (1886) in Blackwood's Philosophical Classics, and Sir Leslie Stephen's Hobbes (1904) in the " English Men of Letters " series, both of which deal fully with his philosophy also. See also F. Tennics, Hobbes Leben und Lehre (1896), IIobbes-Analekten (1904 foil.) ; G. Zart, Einfluss der englischen Philosophic sell Bacon auf die deutsche Philosophic des iSten Jahrh. (Berlin, 1881); G. Brandt, Thomas Hobbes; Grundlinien seiner Philosophic (1895); G. Lyon, La Philos. deHobbes (1893) ; J. M. Robertson, Pioneer Humanists (1907); J. Rk kaby, Free Will and Pour English Philosophers (1906), pp. 1-72 ; J. Watson, Hedonistic Theories (1895); W. Graham, English Political Philosophy from Hobbes to Maine (1899) ; W. J. H. Campion, Outlines of Lectures on Political Science (1895). (G. C. R. ; X.)

HOBBY, a small horse, probably from early quotations, of Irish breed, trained to an easy gait so that riding was not fatigu- ing. The common use of the word is for a favourite pursuit or occupation, with the idea either of excessive devotion or of absence of ulterior motive or of profit, &c, outside the occupation itself. This use is probably not derived from the easy ambling gait of the Irish " hobby," but from the " hobby-horse," the mock horse of the old morris-dances, made of a painted wooden horse's head and tail, with a framework casing for an actor's body, his legs being covered by a cloth made to represent the " housings " of the medieval tilting-horse. A hobby or hobby- horse is thus a toy, a diversion. The O. Fr. hobin, or hobi, Mod. aubin, and Ital. ubina are probably adaptations of the English, according to the New English Dictionary. The O. Fr. hober, to move, which is often taken to be the origin of all these words, is the source of a use of " hobby " for a small kind of falcon, falco subbuteo, used in hawking.

HOBHOUSE, ARTHUR HOEHOUSE, ist Baron (1819-1904), English judge, fourth son of Henry Hobhouse, permanent under-secretaryof state in the Home Ofnce,was born atHadspen, Somerset, on the 10th of November 1819. Educated at Eton and Balliol, he was called to the bar at Lincoln's Inn in 1845, and rapidly acquired a large practice as a conveyancer and equity draftsman; he became Q.C. in 1862, and practised in the Rolls Court, retiring in 1866. He was an active member of the charity commission and urged the appropriation of pious bequests to educational and other purposes. In 1872 he began a five years' term of service as legal member of the council of the governor-general of India, his services being acknowledged by v a K.C.S.I.; and in 1881 he was appointed a member of

the judicial committee of the privy council, on which he served for twenty years. He was made a peer in 1885, and consistently supported the Liberal party in the House of Lords. He died on the 6th of December 1904, leaving no heir to the barony 1

His papers read before the Social Science Association on the subject of property were collected in 1880 under the title of Tlie Dead Hand.

HOBOKEN, a small town of Belgium on the right bank of the Scheldt about 4 m. above Antwerp. It is only important on account of the ship-building yard which the Cockerill firm of Seraing has established at Hoboken. Many wealthy Antwerp

merchants have villas here, and it is the headquarters of several of 'he leading rowing clubs on the Scheldt. Pop. (1904) 12,816.

HOBOKEN, a city of Hudson county, New Jersey, U.S.A., on the Hudson river, adjoining Jersey City on the S. and W. and opposite New York city, with which it is connected by ferries and by two subway lines through tunnels under the river. Pop. (1^10) 43,648; (1900) 59,364, of whom 21,380 were foreign-born, 10,843 being natives of Germany ; (1910 census) 70,324. Of the total population in 1900, 48,349 had either one or both parents foreign-born, German being the principal racial element. The city is served by the West Shore, and the Delaware, Lacka- wanna & Western railways, being the eastern terminus of the latter, and is connected by electric railway with the neighbouring cities of north-eastern New Jersey. In Hoboken are the piers of the North German Lloyd, the Hamburg American, the Nether- lands American, the Scandinavian and the Phoenix steamship lines. Hoboken occupies a little more than 1 sq. m. and lies near the foot of the New Jersey Palisades, which rise both on the W. and N. to a height of nearly 200 ft. Much of its surface has had to be filled in to raise it above high tide, but Castle Point, in the N.E., rises from the generally low level about 100 ft. On this Point are the residence and private estate of the founder of the city, John Stevens (1749-1838), Hudson Park, and facing it the Stevens Institute of Technology, an excellent school of mechanical engineering endowed by Edwin A. Stevens (1795-1868), son of John Stevens, opened in 1871, and having in 1909-1910 34 instructors and 390 students. The institute owes much to its first president, Henry Morton (1836-1902), a distinguished scientist, whose aim was " to offer a course of instruction in which theory and practice were carefully balanced and thoroughly combined," and who gave to the institute sums aggregating

$175,000 (see Morton Memorial, History of Stevens Institute, ed. by Furman, 1905). In connexion with the institute there is a preparatory department, the Stevens School (1870). The city maintains a teachers' training school. Among the city's pro- minent buildings are the Delaware, Lackawanna & Western station, the Hoboken Academy (i860), founded by German Americans, and the public library. The city has an extensive coal trade and numerous manufactures, among which are lead pencils, leather goods, silk goods, wall-paper and caskets. The value of the manufactured product increased from $7,151,391 in 1890 to $12,092,872 in 1900, or 69-1%. The factory product in 1905 was valued at $14,077,305, an increase of 34-3% over that for 1900. The site of Hoboken (originally " Hobocan- hackingh," the place of the tobacco pipe) was occupied about 1640 as a Dutch farm, but in 1643 the stock and all the buildings except a brew-house were destroyed by the Indians. In 171 1 title to the place was acquired by Samuel Bayard, a New York merchant, who built on Castle Point his summer residence. During the War of Independence his descendant, William Bayard, was a loyalist, and his home was burned and his estate confiscated. In 1 784 the property was purchased by John Stevens, the inventor, who. in 1804 laid it out as a town. For the next thirty-five years its " Elysian Fields " were a famous pleasure resort of New York City. Hoboken was incorporated as a town in 1849 and as a city in 1855. On the 30th of June 1900 the wharves of the North German Lloyd Steamship Company and three of its ocean liners were almost completely destroyed by a fire, which caused a loss of more than 200 lives and over $5,000000. HOBSON'S CHOICE, i.e. " this or nothing," an expression that arose from the fact that the Cambridge-London carrier, Thomas Hobson (1544-1630), refused, when letting his horses on hire, to allow any animal to leave the stable out of its turn. Among other bequests made by Hobson, and commemorated by Milton, was a conduit for the Cambridge market-place, for which he provided the perpetual maintenance. See Spectator, No. 509 (14th of October 1712).

HOBY, SIR THOMAS (1530-1566), English diplomatist and translator, son of William Hoby of Leominster, was born in 1530. He entered St John's College, Cambridge, in 1545, but in 1547 he went to Strassburg, where he was the guest of Martin Bucer,

whose Gratulation . . . unto the Church of Englande for the

restitution of Christes Religion he translated into English. He then proceeded to Italy, visiting Padua and Venice, Florence and Siena, and in May 1550 he had settled at Rome, when he was summoned by his half-brother, Sir Philip Hoby (1505-1558), then ambassador at the emperor's court, to Augsburg. The brothers returned to England at the end of the year, and Thomas attached himself to the service of the marquis of

Northampton, whom he accompanied to France on an embassy to arrange a marriage between Edward VI. and the princess Elizabeth. Shortly after he returned to England he started once more for Paris, and in 1552 he was engaged on his translation of The Courtyer of Count Baldessar Castillo. His work was probably completed in 1554, and the freedom of the allusions to the Roman church probably accounts for the fact that it was withheld from publication until 1561. The Cortegiano of Baldassare Castiglione, which Dr Johnson called " the best book that ever was written upon good breeding," is a book as entirely typical of the Italian Renaissance as Machiavelli's Prince in another direction. It exercised an immense influence on the standards of chivalry throughout Europe, and was long the recognized authority for the education of a nobleman. The accession of Mary made it desirable for the Hobys to remain abroad, and they were in Italy until the end of 1555. Thomas Hoby married in 1558 Elizabeth, the learned daughter of Sir Anthony Cook, who wrote a Latin epitaph on her husband. He was knighted in 1 566 by Elizabeth, and was sent to France as English ambassador. He died on the 13th of July in the same year in Paris, and was buried in Bisham Church.

His son, Sir Edward Hoby (1560-1617), enjoyed Elizabeth's favour, and he was employed on various confidential missions. He was constable of Queenborough Castle, Kent, where he died on the 1st of March 1617. He took part in the religious contro- versies of the time, publishing many pamphlets against Theo- philus Higgons and John Fludd or Floyd. He translated, from the French of Mathieu Coignet, Politique Discourses on Trueth and Lying (1586).

The authority for Thomas Hoby's biography is a MS. " Booke of the Travaile and lief of me Thomas Hoby, with diverse things worth the noting." This was edited for the Royal Historical Society by Edgar Powell in 1902. Hoby's translation of The Courtyer was edited (1900) by Professor Walter Raleigh for the " Tudor Translations " series.

HOCHE, LAZARE (1768-1797), French general, was born of poor parents near Versailles on the 24th of June 1768. At sixteen years of age he enlisted as a private soldier in the Gardes francaises. He spent his entire leisure in earning extra pay by civil work, his object being to provide himself with books, and this love of study, which was combined with a strong sense of duty and personal courage, soon led to his promotion. When the Gardes francaises were broken up in 1789 he was a corporal, and thereafter he served in various line regiments up to the time of his receiving a commission in 1792. In the defence of Thion- ville in that year Hoche earned further promotion, and he served with credit in the operations of 1792-1793 on the northern frontier of France. At the battle of Neerwinden he was aide-de- camp to General le Veneur, and when

Dumouriez deserted to the Austrians, Floche, along with le Veneur and others, fell under suspicion of treason; but after being kept under arrest and unemployed for some months he took part in the defence of Dunkirk, and in the same year (1793) he was promoted successively chef de brigade, general of brigade, and general of division. In October 1793 he was provisionally appointed to command the Army of the Moselle, and within a few weeks he was in the field at the head of his army in Lorraine. His first battle was that of Kaiserslautern (28th-3oth of November) against Prussians. The French were defeated, but even in the midst of the Terror the Committee of Public Safety continued Hoche in his command. Pertinacity and fiery energy in their eyes outweighed everything else, and Hoche soon showed that he possessed these qualities. On the 22nd of December he stormed the lines of Froschweiler, and the representatives of the Con- vention with his army at once added the Army of the Rhine to his sphere of command. On the 26th of December the French

carried by assault the famous lines of Weissenburg, and Hoche pursued his success, sweeping the enemy before him to the middle Rhine in four days. He then put his troops into winter quarters. Before the following campaign opened, he married Anne Adelaide Dechaux at Thionville (March nth, 1794). But ten days later he was suddenly arrested, charges of treason having been pre- ferred by Pichegru, the displaced commander of the Army of the Rhine, and by his friends. Hoche escaped execution, however, though imprisoned in Paris until the fall of Robespierre. Shortly after his release he was appointed to command against the Vendeans (21st of August 1794). He completed the work of his predecessors in a few months by the peace of Jaunaye (15th of February 1795), but soon afterwards the war was renewed by the Royalists. Hoche showed himself equal to the crisis and inflicted a crushing blow on the Royalist cause by defeating and capturing de Sombreuil's expedition at Quiberon and Penthievre (i6th-2ist of July 1795). .Thereafter, by means of mobile columns (which he kept under good discipline) he succeeded before the summer of 1796 in pacifying the whole of the west, which had for more than three years been the scene of a pitiless civil war. After this he was appointed to organize and command the troops destined for the invasion of Ireland, and he started on this enterprise in December 1796. A tempest, however, separated Hoche from the expedition, and after various adventures the whole fleet returned to Brest without having effected its purpose. Hoche was at once transferred to the Rhine frontier, where he defeated the Austrians at Neuwied (April), though operations were soon afterwards brought to an end by the Preliminaries of Leoben. Later in 1797 he was minister of war for a short period, but in this position he was surrounded by obscure political intrigues, and, finding himself the dupe of Barras and technically guilty of violating the constitution, he quickly laid down his office, returning to his command on the Rhine frontier. But his health grew rapidly worse, and he died at Wetzlar on the 19th of September 1797 of consumption. The belief was widely spread that he had been poisoned, but the suspicion seems to have been without founda- tion. He was buried by the side of his friend Marceau in a fort on the Rhine, amidst the mourning not only of his army but of all France.

See Privat, Notions historiques sur la vie morale, politique et militaire du general Hoche (Strassburg, 1798); Daunou, Hloge du general Hoche (1798), delivered on behalf of the Institut at Hoche's funeral; Rousselin, Vie de Lazare Hoche, general des armies de la republique francaise (Paris, 1798; this work was printed at the public expense and distributed to the schools) ; Dubroca, £loge funhbre du general Hoche (Paris, 1800); Vie et pensees du general Hoche (Bern) ; Champrobert, Notice historique sur

Lazare Hoche, le pacificateur de la Vendee (Paris, 1 840) ; Dourille, Histoire de Lazare Hoche (Paris, 1844); Desprez, Lazare Hoche d'apr'es sa correspon- dance (Paris, 1858; new ed., 1880); Bergounioux, Essai sur la vie de Lazare Hoche (1852); £. de Bonnechose, Lazare Hoche (1867); H. Martin, Hoche et Bonaparte (1875); Dutemple, Vie politique et militaire du general Hoche (1879); Escaude, Hoche en Irlande (1888) ; Cuneo d'Ornano, Hoche (1892); A. Chuquet, Hoche et la lutte pour V Alsace (a volume of this author's series on the campaigns of the Revolution, 1893); E. Charavaray, Le General Hoche (1893); A. Duruy, Hoche et Marceau (1885).

HOCHHEIM, a town of Germany, in the Prussian province of Hesse-Nassau, situated on an elevation not far from the right bank of the Main, 3 m. above its influx into the Rhine and 3 m. E. of Mainz by the railway from Cassel to Frankfort-on- Main. Pop. (1905) 3779. It has an Evangelical and a Roman Catholic church, and carries on an extensive trade in wine, the English word " Hock," the generic term for Rhine wine, being derived from its name. Hochheim is mentioned in the chronicles as early as the 7th century. It is also memorable as the scene of a victory gained here, on the 7th of November 1813 by the Austrians over the French.

See Schuler, Geschichte der Stadl Hochheim am Main (Hochheim,

1

HOCHST, a town of Germany, in the Prussian province of Hesse-Nassau on the Main, 6 m. by rail W. of Frankfort-on-Main. Pop. (1905) 14,121. It is a busy industrial town with large dye-works and manufactures of machinery, snuff, tobacco, waxcloth, gelatine, furniture and biscuits. Brewing is carried

on and there is a considerable river trade. The Roman Catholic church of St Justinus is a fine basilica originally built in the 9th century; it has been restored several times, and a Gothic choir was added in the 15th century. The town has also an Evangelical church and a synagogue, and a statue of Bismarck by Alois Mayer. Hochst belonged formerly to the electors of Mainz who had a palace here; this was destroyed in 1634 with the exception of one fine tower which still remains. In 1622 Christian, duke of Brunswick, was defeated here by Count Tilly, and in 1795 the Austrians gained a victory here over the French.

Hochst is also the name of a small town in Hesse. This has some manufactures, and was formerly the seat of a Benedictine monastery.

HOCHSTADT, a town of Bavaria, Germany, in the district of Swabia, on the left bank of the Danube, 34 m. N.E. of Ulm by rail. Pop. (1905) 2305. It has three Roman Catholic churches, a castle flanked by walls and towers and some small industries, including malting and brewing. Hochstadt, which came into the possession of Bavaria in 1266, has been a place of battles. Here Frederick of Hohenstaufen, vicegerent of the Empire for Henry IV., was defeated by Henry's rival, Hermann of Luxem- burg, in 1081; in 1703 the Imperialists were routed here by Marshal Villars in command of the French; in August 1704 Marlborough and Prince Eugene defeated the French and Bavarians commanded by Max Emanuel, the elector of Bavaria and Marshal Tallard, this battle being usually known as that of Blenheim; and in June 1800 an engagement took place here between the Austrians and the French.

There is another small town in Bavaria named Hochstadt. Pop. 2000. This is on the river Aisch, not far from Bamberg, to which bishopric it belonged from 1157 to 1802, when it was ceded to Bavaria.

HOCHSTETTER, FERDINAND CHRISTIAN VON, Baron (1829-1884), Austrian geologist, was born at Esslingen, Wiirtem- berg, on the 30th of April 1829. He was the son of Christian Ferdinand Hochstetter (1 787-1860), a clergyman and professor at Briinn, who was also a botanist and mineralogist. Having received his early education at the evangelical seminary at Maulbronn, he proceeded to the university of Tubingen; there under F. A. Quenstedt the interest he already felt in geology became permanently fixed, and there he obtained his doctor's degree and a travelling scholarship. In 1852 he joined the staff of the Imperial Geological Survey of Austria and was engaged until 1856 in parts of Bohemia, especially in the Bohmerwald, and in the Fichtel and Karlsbad mountains. His excellent reports established his reputation. Thus he came to be chosen as geolo- gist to the Novara expedition (1 857-1 859), and made numerous valuable observations in the voyage round the world. In 1859 he was engaged by the government of New Zealand to make a rapid geological survey of the islands. On his return he was appointed in i860 professor of mineralogy and geology at the Imperial Polytechnic Institute in Vienna, and in 1876 he was made superintendent of the Imperial Natural History Museum. In these later years he explored portions of Turkey and eastern Russia, and he published papers on a variety of geological, palaeontological and mineralogical subjects. He died at Vienna on the 18th of July 1884.

Publications. — Karlsbad, seine geognoslischen Verhdltnisse und seine Quellen (1858); Neu-Seeland (1863); Geological and Topo- graphical Atlas of New Zealand (1864); Leitfaden der Mineralogie und Geologie (with A. Bisching) (1876, ed. 8, 1890). '

HOCKEY (possibly derived from the " hooked " stick with which it is played; cf. O. Fr. hoquet, shepherd's crook), a game played with a ball or some similar object by two opposing sides, using hooked or bent sticks, with which each side attempts to drive it into the other's goal. In one or more of its variations Hockey was known to most northern peoples in both Europe and Asia, and the Romans possessed a game of similar nature. It was played indiscriminately on the frozen ground or the ice in winter. In Scotland it was called " shinty," and in Ireland " hurley," and was usually played on the hard, sandy sea-shore

with numerous players on each side. The rules were simple and the play very rough.

Modern Hockey, properly so called, is played during the cold season on the hard turf, and owes its recent vogue to the forma- tion of " The Men's Hockey Association " in England in 1875. The rules drawn up by the Wimbledon Club in 1883 still obtain in all essentials. Since 1895 " international " matches at hockey have been played annually between England, Scotland. Ireland and Wales; and in 1907 a match was played between England and France, won by England by 14 goals to. nil. In 1890 Divi- sional Association matches (North, South, West, Midlands) and inter-university matches (Oxford and Cambridge) were in- augurated, and have since been played annually. County matches are also now regularly played in England, twenty-six counties competing in 1907. Of other hockey clubs playing regular matches in 1907, there were eighty-one in the London district, and fifty-nine in the provinces.

The game is played by teams of eleven players on a ground 100 yds. long and 50 to 60 yds. wide. The goals are in the centre of each

end-line, and consist of A) two uprights 7 ft. high surmounted by a hori- zontal bar, enclosing a space 12 ft. wide. In front of each goal is a space enclosed by a curved line, its greatest diameter from the goal- line being 15 ft., called the striking-circle. The positions of the players on each side may be seen on the accompany- ing diagram. Two umpires, one on each side of the centre-line, officiate.

The ball is an ordinary cricket ball painted white. The stick has a hard wood curved head, and a handle of cork or wrapped cane. It must not exceed 2 in. in diameter nor 28 oz. in weight. At the start of the game, which consists of two thirty or thirty-five minute periods, the two centre-

forwards " bully off " the ball in the middle of the field. In " bully- ing off " each centre must strike the ground on his own side of the ball three times with his stick and strike his opponent's stick three times alternately; after which either may strike the ball. Each side then endeavours, by means of striking, passing and dribbling, to drive the ball into its opponents' goal. A player is "off side " if he is nearer the enemy's goal than one of his own side who strikesi the ball, and he may not strike the ball himself until it has been touched by one of the opposing side. The ball may be caught (but not held) or stopped by any part of the body, but may not be picked up, carried, kicked, thrown or knocked except with the stick. An opponent's stick may be hooked, but not an opponent's person, which may not be obstructed in any way. No left-handed play is allowed. Penalties for infringing rules are of two classes; " free hits " and " penalty bullies," to be taken where the foul occurred. For flagrant fouls penalty goals may also be awarded. A " corner " occurs when the ball goes behind the goal- line, but not into goal. If it is hit by the attacking side, or unin- tentionally by the defenders, it must be brought out 25 yds., in a direction at right angles to the goal-line from the point_ where it crossed the line, and there " bullied." But if the ball is driven from within the 25-yd. line unintentionally behind the goal-line by the defenders, a member of the attacking side is given a free hit from a point within 3 yds. of a corner flag, the members of the defending side remaining behind their goal-line. If the ball is hit intentionally behind the goal-line by the attacking side, the free hit is taken from the point where the'ball went over. No goal can be scored from a free hit directly.

Ice Hockey (or Bandy, to give it its original name) is far more popular than ordinary Hockey in countries where there is much ice; in fact in America " Hockey " means Ice Hockey, while the land game is called Field Hockey. Ice Hockey in its simplest form of driving a ball across a given limit with a stick or club has been played for centuries in northern Europe, attaining its greatest popularity in the Low Countries, and there are many 1 6th- and 17th-century paintings extant which represent games of Bandy, the players using an implement formed much like a golf club.

In England Bandy is controlled by the " National Bandy Associa- tion." A team consists of eleven players, wearing skates, and the proper space for play is 200 yds. by 100 yds. in extent. The ball is ot solid india-rubber, between 2j and 2j in. in diameter. The bandies are 2 in. in diameter and about 4 ft. long. The goals, placed in the centre of each goal-line, consist of two upright posts 7 ft. high and 12 ft. apart, connected by a lath. A match is begun by the referee throwing up the ball in the centre of the field, after which it must not be touched other than with the bandy until a goal is scored or the ball passes the boundaries of the course, in which case it is hit into the field in any direction excepting forward from the point where it

went out by the player who touched it last. If the ball is hit across the goal-line but not into a goal, it is hit out by one of the defenders from the point where it went over, the opponents not being allowed to approach nearer than 25 yds. from the goal-line while the hit is made.

In America the development of the modern game is due to the Victoria Hockey Club and McGill University (Montreal). About 1 88 1 the secretary of the former club made the first efforts towards drawing up a recognized code of laws, and for some time afterwards playing rules were agreed upon from time to time whenever an important match was played, the chief teams being, besides those already mentioned, the Ottawa, Quebec, Crystal and Montreal Hockey Clubs, the first general tournament taking place in 1884. Three years later the " Amateur Hockey Association of Canada " was formed, and a definite code of rules drawn up. Soon afterwards, in consequence of exhibitions given by the best Canadian teams in

4 Ud3ˆ Diagram of Hockey Field

G,

Goal.

RW,

Right Wing.

KB,

Right Back. Left Back.

Rl,

Inside Right.

I.H,

CI V ,

Centre Forward

RH,

Right Half.

LI,

Inside Left.

C'H,

Centre Half.

LVV,

Left Wing.

LH,

Left Half.

Hockey Stick.

some of the larger cities of the United States, the new game was taken up by American schools, colleges and athletic clubs, and became nearly as popular in the northern states as in the Dominion. The rules differ widely from those of English Bandy. The rink must be at least 112 ft. long by 58 ft. wide, and seven players form a side. The goals are 6 ft. wide and 4 ft. high and are provided with goal- nets. Instead of the English painted cricket-ball a puck is used, made of vulcanized rubber in the form of a draught-stone, 1 in. thick, and 3 in. in diameter. The sticks are made of one piece of hard wood, and may not be more than 3 in. wide at any part. The game is played for two half-hour or twenty-minute periods with an inter- mission of ten minutes. At the beginning of a match, and also when a goal has been made, the puck is faced, i.e. it is placed in the middle of the rink between the sticks of the two left-centres, and the referee calls " play." Whichever side then secures the ball endeavours by means of passing and dribbling to get the puck into a position from which a goal may be shot. TJ»e puck may be stopped by any part of the person but not carried or knocked except with the stick. No stick may be raised above the shoulder except when actually striking the puck. When the puck is driven off the rink or behind the goal, or a foul has been made behind the goal, it is faced 5 yds. inside the rink. The goal-keeper must maintain a standing position.

There are a number of Hockey organizations in America, all under the jurisdiction of the " American Amateur Hockey League " in the United States and the " Canadian Amateur Athletic League " in Canada. /

Ice Polo, a winter sport similar to Ice Hockey, is almost exclusively played in the New England states. A rubber-covered ball is used and the stick is heavier than that used in Ice Hockey. The radical differ- ence between the two games is that, in Ice Polo, there is no strict off-side rule, so that passes and shots at goal may come from any and often the most unexpected direction. Five men constitute a team: a goal-tend, a half-back, a centre and two rushers. The rushers must be rapid skaters, adepts in dribbling and

passing and good goal shots. The centre supports the rushers, passing the ball to them or trying for goal himself. The half-back is the first defence and the goal-tend the last. The rink is 150 ft. long.

Ring Hockey may be played on the floor of any gymnasium or large room by teams of six, comprising a goal-keeper, a quarter, three

forwards and a centre. The goals consist of two uprights 3 ft. high and 4 ft. apart. The ring, which takes the place of the ball or puck, is made of flexible rubber, and is 5 in. in diameter with a 3-in. opening through the centre. It weighs between 12 and 16 oz. The stick is a wand of light but tough wood, between 36 and 40 in. long, about f in. in diameter, provided with a 5-in. guard 20 in. from the lower end. The method of shooting is to insert the end of the stick in the hole of the ring and drive it towards the goal. A goal shot from the field counts one point, a goal from a foul i point. When a foul is called by the referee a player of the opposing side is allowed a free shot for goal from any point on the quarter line.

Roller Polo, played extensively during the winter months in the United States, is practically Ice Polo adapted to the floors of gym- nasiums and halls, the players, five on a side, wearing roller-skates. The first professional league was organized in 1883.

HOCK-TIDE, an ancient general holiday in England, celebrated on the second Monday and Tuesday after Easter Sunday. Hock- Tuesday was an important term day, rents being then payable, for with Michaelmas it divided the rural year into its winter and summer halves. The derivation of the word is disputed: any analogy with Ger. hoch, ” high,” being generally denied. No trace of the word is found in Old English, and ” hock-day,’-‘ its earliest use in composition, appears first in the 12th century. The characteristic pastime of hock-tide was called binding. On Monday the women, on Tuesday the men, stopped all passers of the opposite sex and bound them with ropes till they bought their release with a small payment, or a rope was stretched across the highroads, and the passers were obliged to pay toll. The money thus collected seems to havegone towards parish expenses. Many entries are found in parish registers under ” Hocktyde money.” The hocktide celebration became obsolete in the beginning of the 18th century. At Coventry there was a play called ” The Old Coventry Play of Hock Tuesday.” This, suppressed at the Reformation owing to the incidental disorder, and revived as part of the festivities on Queen Elizabeth’s visit to Kenilworth in July 1575, depicted the struggle between

Saxons and Danes, and has given colour to the suggestion that hock-tide was originally a commemoration of the massacre of the Danes on St Brice's Day, the 13th of November a.d. 1002, or of the rejoicings at the death of Hardicanute on the 8th of June 1042 and the expulsion of the Danes. But the dates of these anni- versaries do not bear this out.

HOCUS, a shortened form of " hocus pocus," used in the 17th century in the sense of " to play a trick on any one," to " hoax," which is generally taken to be a derivative. " Hocus pocus " appears to have been a mock Latin expression first used as the name of a juggler or conjurer. Thus in Ady's Candle in the Dark (1655), quoted in the New English Dictionary, " I will speak of one man . . . that went about in King James his time . . . who called himself, The Kings Majesties most excellent Hocus Pocus, and so was called, because that at the playing of every Trick, he used to say, Hocus pocus, tontus talontus, vade celeriter jubco, a dark composure of words, to blinde the eyes of the beholders, to make his Trick pass the more currantly without discovery." Tillotson's guess ' (Sermons, xxvi.) that the phrase was a corruption of hoc est corpus and alluded to the words of the Eucharist, " in ridiculous imitation of the priests of the Church of Rome in their trick of' Transubstantiation," has frequently been accepted as a serious derivation, but has no foundation. A connexion with a supposed demon of Scandin- avian mythology, called " OchusBochus," isequally unwarranted. " Hocus " is used as a verb, meaning to drug, stupefy with opium, &c, for a criminal purpose. This use dates from the beginning of the 19th century.

HODDEN (a word of unknown origin), a coarse kind of cloth made of undyed wool, formerly much worn by the peasantry of Scotland. It was usually made on small hand-looms by the peasants themselves. Grey hodden was made by mixing black and white fleeces together in the proportion of one to twelve when weaving.

HODDESDON, an urban district in the Hertford parliamentary division of Hertfordshire, England, near the river Lea. 17 m. N. from London by the Great Eastern railway (Broxbourne and Hoddesdon station on the Cambridge line). Pop. (1001), 471 1. This is the northernmost of a series of populous townships

extending from the suburbs of London along the Lea valley as far as its junction with the Stort, which is close to Hoddesdon. They are in the main residential. Hoddesdon was a famous coacliihg station on the Old North Road; and the Bull posting- house is mentioned in Matthew Prior's " Down Hall." The Lea has been a favourite resort of anglers (mainly for coarse fish in this part) from the time of Izaak Walton, in whose book Hoddesdon is specifically named. The church of St Augustine, Broxbourne, is a fine

example of Perpendicular work, and contains interesting .monuments, including an altar tomb with enamelled brasses of 1473. Hoddesdon probably covers the site of a Romano-British village.

HODEDA (Hodeida, Hadeda), a town in Arabia situated on the Red Sea coast 14° 48′ N. and 42 57′ E. It lies on a beach of muddy sand exposed to the southerly and westerly winds. Steamers anchor more than a mile from shore, and merchandize has to be transhipped by means of sambuks or native boats. But Hodeda has become the chief centre of the maritime trade of Turkish Yemen, and has superseded Mokha as the great port of export of South Arabian coffee. The town is composed of stone-built houses of several storeys, and is surrounded, except on the sea face, by a fortified enceinte. The population is esti- mated at 33,000, and contains, besides the Arab inhabitants and the Turkish officials and garrison, a considerable foreign element, Greeks, Indians and African traders from the opposite coast. There are consulates of Great Britain, United States, France, Germany, Italy and Greece. The steam tonnage entering and clearing the port in 1904 amounted to 78,700 tons, the highest hitherto recorded. Regular services are maintained with Aden, and with Suez, Massowa and the other Red Sea ports. Large dhows bring dates from the Persian Gulf, and occasional steamers from Bombay call on their way to Jidda with cargoes of grain. The imports for 1904 amounted in value to £467,000, the chief items being piece goods, food grains and sugar; the exports amounted to £451,00°, including coffee valued at £229,000.

HODENING, an ancient Christmas custom still surviving in Wales, Kent, Lancashire and elsewhere. A horse's skull or a wooden imitation on a pole is carried round by a party of youths, one of whom conceals himself under a white cloth to simulate the horse's body, holding a lighted candle in the skull. They make a house-to-house visitation, begging gratuities. The " Penitential " of Archbishop Theodore (d. 690) speaks of " any who, on the kalands of January, clothe themselves with the skins of cattle and carry heads of animals." This, coupled with the fact that among the primitive Scandinavians the horse was often the sacrifice made at the winter solstice to Odin for success in battle, has been thought to justify the theory that hodening is a corruption of Odining.

HODGE, CHARLES (1 797-1878), American theologian, was born in Philadelphia, Pennsylvania, on the 28th of December 1797. Hegraduated atthe College of New Jersey (now Princeton) in 181 s, and in 1819 at the Princeton Theological seminary, where he became an instructor in 1820, and the first professor of Oriental and Biblical literature in 1822. Meanwhile, in 1821, he had been ordained as a Presbyterian minister. From 1826 to 1828 he studied under de Sacy in Paris, under Gesenius and Tholuck in Halle, and under Hengstenberg, Neander and- Humboldt in

Berlin. In 1840 he was transferred to the chair of exegetical and didactic theology, to which subjects that of polemic theology was added in 1854, and this office he held until his death. In 1825 he established the quarterly Biblical Reper- tory, the title of which was changed to Biblical Repertory hnd Theological Review in 1830 and to Biblical Repertory and Princeton Review in 1837. With it, in 1840, was merged the Literary and Theological Review of New York, and in 1872 the American Presbyterian Review of New York, the title becoming Presbyterian Quarterly and Princeton Review in 1872 and Princeton Review in 1877. He secured for it the position of theological organ of the Old School division of the Presbyterian church, and continued its principal editor and contributor until 1868, when the Rev. Lyman H. Atwater became his colleague. His mere important essays were republished under the titles Essays and Reviews

(1857), Princeton Theological Essays, and Discussions in Church Polity (1878). He was moderator of the General Assembly (O.S.) in 1846, a member of the committee to revise the Book of Discipline of the Presbyterian church in 1858, and president of the Presbyterian Board of Foreign Missions in 1868-1870. The 24th of April 1872, the fiftieth anniversary of his election to his professorship, was observed in Princeton as his jubilee by between 400 and 500 representatives of his 2700 pupils, and $50,000 was raised for the endowment of his chair. He died at Princeton on the 19th of June 1878. Hodge was one of the greatest of .American theologians.

Besides his articles in the Princeton Review, he published a Commentary on the Epistle to the Romans (1835, abridged 1836, rewritten and enlarged 1864, new ed. 1886), Constitutional History of the Presbyterian Church in the United States (2 vols., 1 839-1 840); The Way of Life (1841); Commentaries on Ephesians (1856); 1 Corinthians (1857); 2 Corinthians (1859); Systematic Tlieology (3 vols., 2200 pp., 1871-1873), probably the best of all modern ex- positions of Calvinistic dogmatic; and What is Darwinism ? (1874), in which he opposed " Atheistic Evolutionism." After his death a volume of Conference Papers (1879) was published. His life, by his son, was published in 1880.

His son, Archibald Alexander Hodge (1 823-1 886), also famous as a Presbyterian theologian, was born at Princeton on the 18th of July 1823. He graduated at the College of New Jersey in 1 84 1, and at the Princeton Theological seminary in 1846, and was ordained in 1847. From 1847 to 1850 he was a mission- ary at Allahabad, India, and was then pastor of

churches successively at Lower West Nottingham, Maryland (1851-1855); at Fredericksburg, Virginia (1855-1861), and at Wilkes-Barre, Pennsylvania (1861-1864). From 1864 to 1877 he was professor of didactic and polemical theology in the Allegheny Theological seminary at Allegheny, Pennsylvania, where he was also from 1866 to 1877 pastor of the North Church (Presbyterian). In 1878 he succeeded his father as professor of didactic theology at the Princeton seminary. He died on the nth of November 1886. Besides writing the biography of his father, he was the author of Outlines of Theology (i860, new ed. 1875; enlarged, 1879); The Atonement (1S67); Exposition of the Confession of Faith (1869); and Popular Lectures on Theological Themes (1887).

See C. A. Salmond's Charles and A. A. Hodge (New York, 1888).

HODGKIN, THOMAS (1831-), British historian, son of John Hodgkin (1800-1875), barrister, was born in London on the 29th of July 1831. Having been educated as a member of the Society of Friends and taken the degree of B.A. at London University, he became a partner in the banking house of Hodgkin, Barnett & Co., Newcastle-on-Tyne, a firm afterwards amalga- mated with Lloyds' Bank. While continuing in business as a banker, Hodgkin devoted a good deal of time to historical stud)-, and soon became a leading authority on the history of the early middle ages, his books being indispensable to all students of this period. His chief works are, Italy and her Invaders (8 vols., Oxford, 1880-1899); The Dynasty of Theodosius (Oxford, 1889); Theodoric the Goth (London, 1891); and an introduction to the Letters of Cassiodorus (London, 1886). He also wrote a Life of Charles the Great (London, 1897); Life of George Fox (Boston, 1896); and the opening volume of Longman's Political History of England (London, 1906).

HODGKINSON, EATON (17S9-1861), English engineer, the son of a farmer, was born at Anderton near Northwich, Cheshire, on the 26th of February 1789. After attending school at North- wich, he began to help his widowed mother on the farm, but to escape from that uncongenial occupation he persuaded her in 181 1 to remove to Manchester and start a pawribroking business. There he made the acquaintance of John Dalton, and began those inquiries into the strength of materials which formed the work of his life. He was associated with Sir William Fairbairn in an important series of experiments on cast iron, and his help was sought by Robert Stephenson in regard to the forms and dimen- sions of the tubes for the Britannia bridge. A paper which he communicated to the Royal Society on" Experimental Researches on the Strength of Pillars of Cast Iron and other Materials," in 1840 gained him a Royal medal in 1841, and he was also elected a fellow. In 1847 he was appointed professor of the mechanical

principles of engineering in University College, London, and at the same time he was employed as a member of the Royal Com- mission appointed to inquire into the application of iron to railway structures. In 1848 he was chosen president of the Manchester Philosophical Society, of which he had been a member since 1826, and to which, both previously and sub- sequently, he contributed many of the more important results of his discoveries. For several years he took an active part in the discussions of the Institution of Civil Engineers, of which he was elected an honorary member in 1851. He died at Eaglesfield House, near Manchester, on the 18th of June 1861.

HODGSON, BRIAN HOUGHTON (1800-1894), English ad- ministrator, ethnologist and naturalist, was born at Lower Beech, Prestbury, Cheshire, on the 1st of February 1800. His father, Brian Hodgson, came of a family of country gentlemen, and his mother was a daughter of William Houghton of Man- chester. In 1816 he obtained an East Indian writership. After passing through the usual course at Haileybury, he went out to India in 1818, and after a brief service at Kumaon as assistant- commissioner was in 1820 appointed assistant to the Resident at Katmandu, the capital of Nepal. In 1823 he obtained an under- secretaryship in the foreign department at Calcutta, but his health failed, and in 1824 he returned to Nepal, to which the whole of his life, whether in or out of India, may be said to have been thenceforth given. He devoted himself particularly to the collection of Sanskrit MSS. relating to Buddhism, and hardly less so to the natural history and antiquities 'of the country, and by 1839 had contributed eighty-nine papers to the Transactions of the Asiatic Society of Bengal. His investigations of the ethnology of the aboriginal tribes were especially important. In 1833 he became Resident in Nepal, and passed many stormy years in conflict with the cruel and faithless court to which he was accredited. He succeeded, nevertheless, in concluding a satis- factory treaty in 1839; but in 1842 his policy, which involved an imperious attitude towards the native government, was upset by the interference of Lord Ellenborough, but just arrived in India and not unnaturally anxious to avoid trouble in Nepal during the conflict in Afghanistan. Hodgson took upon himself to disobey his instructions, a breach of discipline justified to his own mind by his superior knowledge of the situation, but which the governor- general could hardly be expected to overlook. He was, neverthe- less, continued in office for a time, but was recalled in 1843, and resigned the service. In 1845 he returned to India and settled at Darjeeling, where he devoted himself entirely to his favourite pursuits, becoming the greatest authority on the Buddhist religion and on the flora of the Himalayas. It was he who early suggested the recruiting of Gurkhas for the Indian army, and who influenced Sir Jung Bahadur to lend his assistance to the British during the mutiny in 1857. In 1858 he returned to England, and lived

successively in Cheshire and Gloucestershire, occupied with his studies to the last. He died at his seat at Alderley Grange in the Cotswold Hills on the 23rd of May 1894. No man has done so much to throw light on Buddhism as it exists in Nepal, and his collections of Sanskrit manuscripts, presented to the East India Office, and of natural history, presented to the British Museum, are unique as gatherings from a single country. He wrote altogether 184 philological and ethnological and 127 scientific papers, as well as some valuable pamphlets on native education, in which he took great interest. His principal work, Illustrations of the Literature and Religion of Buddhists (1841), was republished with the most important of his other writings in 1872-1880.

His life was written by Sir W. W. Hunter in 1896.

HdDMEZd-VAsARHELY, a town of Hungary, in the county of Csongrad, 135 m. S.E. of Budapest by rail. Pop. (1900) 60,824 of which about two-thirds are Protestants. The town, situated on Lake Hod, not far from the right bank of the Tisza, has a modern aspect. The soil of the surrounding country, of which 383 sq. m. belong to the municipality, is exceedingly fertile, the chief products being wheat, mangcorn, barley, oats, millet, maize and various descriptions of fruit, especially melons. Extensive vineyards, yielding large quantities of both white and

red grapes, skirt the town, and the horned cattle and horses of Hodmezo-V&sarhely have a good reputation; sheep and pigs are also extensively reared. The commune is protected from inunda- tions of the Tisza by an enormous dike, but the town, neverthe- less, sometimes suffers considerable damage during the spring floods.

HODOGRAPH (Gr. 656s, a way, and ypacfeiv, to write), a curve of which the radius vector is proportional to the velocity of a moving particle. It appears to have been used by James Bradley, but for its practical development we are mainly indebted to Sir William Rowan Hamilton, who published an account of it in the Proceedings of the Royal Irish Academy, 1846. If a point be in motion in any orbit and with any velocity, and if, at each instant, a line be drawn from a fixed point parallel and equal to the velocity of the moving point at that instant, the extremities of these lines will lie on a curve called the hodograph. Let PP1P2 be the path of the moving point, and let OT, OTi, OT 2 , be drawn

from the fixed point O parallel and equal to the velocities at P, Pi, P2

respectively, then the locus of T is the hodograph of the orbits described by P (see figure). From this definition we have the following important fundamental property which belongs to all hodographs, viz. that at any point the tangent to the hodograph is parallel to the direction, and the velocity in the hodograph equal to the magnitude of the resultant acceleration at the correspond- ing point of the orbit. This will be evident if we consider that, since radii vectores of the hodograph represent velocities in the orbit, the elementary arc between two consecutive radii vectores of the hodo- graph represents the velocity which must be compounded with the velocity of the moving point at the beginning of any short interval of time to get the velocity at the end of that interval, that is to say, represents the change of velocity for that interval. Hence the elementary arc divided by the element of time is the rate of change of velocity of the moving-point, or in other words, the velocity in the hodograph is the acceleration in the orbit.

Analytically thus (Thomson and Tait, Nat. Phil.) : — Let x, y, z be the coordinates of P in the orbit, £, t\, f those of the correspond- ing point T in the hodograph, then

dy y _dz

~dr

« =

dx

therefore

df

d 2 x dp

■« = di< f =

-

“¥y~dH

dt 2 dt 1

Also, if J be the arc of the hodograph,

1— v(f)’+ (i?)Mfr.

(i)-

(2).

Equation (1) shows that the tangent to the hodograph is parallel to the line of resultant acceleration, and (2) that the velocity in the hodograph is equal to the acceleration.

Every orbit must clearly have a hodograph, and, conversely, every hodograph a corresponding orbit; and, theoretically speaking, it is possible to deduce the one from the other, having given the other circumstances of the motion.

For applications of the hodograph to the solution of kinematical problems see Mechanics.

HODSON, WILLIAM STEPHEN RAIKES (1821-1858), known as " Hodson of Hodson's Horse," British leader of light cavalry during the Indian Mutiny, third son of the Rev. George Hodson, afterwards archdeacon of Stafford and canon of Lichfield, was born on the 19th of March 1821 at Maisemore Court, near Gloucester. He was educated at Rugby and Cambridge, and

accepted a cadetship in the Indian army at the advanced age for those days of twenty-three. Joining the 2nd Bengal Grenadiers he went through the first Sikh War, and was present at the battles of Moodkee, Ferozeshah and Sobraon. In one of his letters home at this period he calls the campaign a " tissue of mismanagement, blunders, errors, ignorance and arrogance ^\ and outspoken criticism such as this brought him many bitter enemies throughout his career, who made the most of undeniable faults of character. In 1847, through the influence of Sir Henry Lawrence, he was appointed adjutant of the corps of Guides, and in 1852 was promoted to the command of the Guides with the civil charge of Yusafzai. But his brusque and haughty demeanour to his equals made him many enemies. In 1855 two separate charges were brought against him. The first was that he had arbitrarily imprisoned a Pathan chief named Khadar Khan, on suspicion of being concerned in the murder of Colonel Mackeson. The man was acquitted, and Lord Dalhousie removed Hodson from his civil functions and remanded him to his regiment on account of his lack of judgment. The second charge was more serious, amounting to an accusation of malversation in the funds of his regiment. He was tried by a court of inquiry, who found that his conduct to natives had been " unjustifiable and oppressive," that he had used abusive language to his native officers and personal violence to his men, and that his system of accounts was " calculated to screen peculation and fraud." Subsequently another inquiry was carried out by Major Reynell Taylor, which dealt simply with Hodson's accounts and found them to be " an honest and

correct record . . . irregularly kept." At this time the Guides were split up into numerous detachments, and there was a system of advances which made the accounts very complicated. The verdicts of the two inquiries may be set against each other, and this particular charge declared " not proven." It is possible that Hodson was careless and extravagant in money matters rather than actually dishonest; but there were several similar charges against him. During a tour through Kashmir with Sir Henry Lawrence he kept the purse and Sir Henry could never obtain an account from him; subsequently Sir George Lawrence accused him of embezzling the funds of the Lawrence Asylum at Kasauli; while Sir Neville Chamberlain in a published letter says of the third brother, Lord Lawrence, " I am bound to say that Lord Lawrence had no opinion of Hodson's integrity in money matters. He has often discussed Hodson's character in talking to me, and it was to him a regret that a man possessing so many fine gifts should have been wanting in a moral quality which made him untrustworthy." Finally, on one occasion Hodson spent £500 of the pay due to Lieutenant Gcdby, and under threat of exposure was obliged to borrow the money from a native banker through one of his officers named Bisharat Ali.

It was just at the time when Hodson's career seemed ruined that the Indian Mutiny broke out, and he obtained the oppor- tunity of rehabilitating himself. At the very outset of the campaign he made his name by riding with despatches from General Anson at Karnal to Meerut and back again, a distance of 1 52 m. in all, in seventy-two hours, through a country swarming with the rebel cavalry. This feat so pleased the commander- in-chief that he empowered him to raise a regiment of 2000 irregular horse, which became known to fame as Hodson's Horse, and placed him at the head of the Intelligence Depart- ment. In his double role of cavalry leader and intelligence officer, Hodson played a large part in the reduction of Delhi and consequently in saving India for the British empire. He, was the finest swordsman in the army, and possessed that daring recklessness which is the most useful quality of leader- ship against Asiatics. In explanation of the fact that he never received the Victoria Cross it was said of him that it was because he earned it every day of his life. But he also had the defects of his qualities, and could display on occasion a certain cruelty and callousness of disposition. Reference has already been made to Bisharat Ali, who had lent Hodson money During the siege of Delhi another native, said to be an enemy of Bisharat Ali's, informed Hodson that he had turned rebel

and had just reached Khurkhouda, a village near Delhi. Hodson thereupon

took out a body of his sowars, attacked the village, and shot Bisharat Ali and several of his relatives. General Crawford Chamberlain states that this was Hodson's way of wiping out the debt. Again, after the fall of Delhi, Hodson obtained from General Wilson permission to ride out with fifty horsemen to Humayun's tomb, 6 m. out of Delhi, and bring in Bahadur Shah, the last of the Moguls. This he did with safety in the face of a large and threatening crowd, and thus dealt the mutineers a heavy blow. On the following day with ioo horsemen he went out to the same tomb and obtained the unconditional surrender of the three princes, who had been left behind on the previous occasion. A crowd of 6000 persons gathered, and Hodson with marvellous coolness ordered them to disarm, which they proceeded to do. He sent the princes on with an escort of ten men, while with the remaining ninety he collected the arms of the crowd. On galloping after the princes he found the crowd once more pressing on the escort and threatening an attack; and fearing that he would be unable to bring his prisoners into Delhi he shot them with his own hand. This is the most bitterly criticized action in his career, but no one but the man on the spot can judge how it is necessary to handle a crowd; and in addition one of the princes, Abu Bukt, heir-apparent to the throne, had made himself notorious for cutting off the arms and legs of English children and pouring the blood into their mothers' mouths. Considering the circum- stances of the moment, Hodson's act at the worst was one of irregular justice. A more unpleasant side to the question is that he gave the king a safe conduct, which was afterwards seen by Sir Donald Stewart, before he left the palace, and presumably for a bribe; and he took an armlet and rings from the bodies of the princes. He was freely accused of looting at the time, and though this charge, like that of peculation, is matter for controversy, it is very strongly supported. General Pelham Burn said that he saw loot in Hodson's boxes when he accom- panied him from Fatehgarh to take part in the siege of Lucknow, and Sir Henry Daly said that he found " loads of loot " in Hodson's boxes after his death, and also a file of documents relating to the Guides case, which had been stolen from him and of which Hodson denied all knowledge. On the other hand the Rev. G. Hodson states in his book that he obtained the inventory of his brother's possessions made by the Committee of Adjustment and it contained no articles of loot, and Sir Charles Gough, president of the committee, confirmed this evidence. This statement is totally incompatible with Sir Henry Daly's and is only one of many contradictions in the case. Sir Henry Norman stated that to his personal knowledge Hodson remitted several thousand pounds to Calcutta which could only have been obtained by looting. On the other hand, again, Hodson died a poor man, his effects were sold for £170, his widow was dependent on charity for her passage home, was given apartments by the queen at Hampton Court, and left only £400 at her death.

Hodson was killed on the nth of March 1858 in the attack on the Begum Kotee at Lucknow. He had just arrived on the spot and met a man going to fetch powder to blow in a door; instead Hodson, with his usual recklessness, rushed into the doorway and was shot. On the whole, it can hardly be doubted that he was somewhat unscrupulous in his private character, but he was a splendid soldier, and rendered inestimable services to the empire.

The controversy relating to Hodson's moral character is very complicated and unpleasant. Upon Hodson's side see Rev. G. Hodson, Hodson of Hodson's Horse (1883), and L. J. Trotter, A Leader of Light Horse (1901); against him, R. Bosworth Smith, Life of Lord Lawrence, appendix to the 6th edition of 1885; T. R. E. Holmes, History of the Indian Mutiny, appendix N to the 5th edition of 1898, and Four Famous Soldiers by the same author, 1889; and General Sir Crawford Chamberlain, Remarks on Captain Trotter's Biography of Major W. S. R. Hodson (1901).

HODY, HUMPHREY (1659-1707), English divine, was born at Odcombe in Somersetshire in 1659. In 1676 he entered Wadham College, Oxford, of which he became fellow in 1685.

In 1684 he published Contra historiam Aristeae de LXX. inter- pretibus dissertatio, in which he showed that the so-called letter of Aristeas, containing an account of the production of the Septuagint, was the late forgery of a Hellenist Jew originally circulated to lend authority to that version. The dissertation was generally regarded as conclusive, although Isaac Vossius published an angry and scurrilous reply to it in the appendix to his edition of Pomponius Mela. In 1689 Hody wrote the Prolegomena to the Greek chronicle of John Malalas, pub- lished at Oxford in 1691. The following year he became chaplain to Edward Stillingfleet, bishop of Worcester, and for his support of the ruling party in a controversy with Henry Dodwell regarding the non-juring bishops he was appointed chaplain to Archbishop Tillotson, an office which he continued to hold under Tenison. In 1698 he was appointed regius professor of Greek at Oxford, and in 1704 was made archdeacon of Oxford. In 1701 he published A History of English Councils and Convocations, and in 1703 in four volumes De Bibliorum texlis originalibus, in which he included a revision of his work on the Septuagint, and published a reply to Vossius. He died on the 20th of January

1707.

A work, De Graecis Illustribus, which he left in manuscript, was published in 1742 by Samuel Jebb, who prefixed to it a Latin life of the author.

HOE, RICHARD MARCH (1812-1886), American inventor, was born in New York City on the 12th of September 1812. He was the son of Robert Hoe (1 784-1833), an English-born American mechanic, who with his brothers-in-law, Peter and Matthew Smith, established in New York City a manufactory of printing presses, and used steam to run his machinery. Richard entered his father's manufactory at the age of fifteen and became head of the firm (Robert Hoe & Company) on his father's death. He had considerable inventive genius and set himself to secure greater speed for printing presses. He discarded the old flat-bed model and placed the type on a revolving cylinder, a model later developed into the well-known Hoe rotary or " lightning " press, patented in 1846, and further improved under the name of the Hoe web perfecting press (see Printing). He died in Florence, Italy, on the 7th of June 1886.

See A Short History of the Printing Press (New York, 1902) by his nephew Robert Hoe (1839-1909), who was responsible for further improvements in printing, and was an indefatigable worker in sup- port of the New York Metropolitan Museum.

HOE (through Fr. houe from O.H.G. houwd, mod. Ger. Haue; the root is seen in " hew," to cut, cleave; the word must be distinguished from " hoe," promontory, tongue of land, seen in place names, e.g. Morthoe, Luton Hoo, the Hoe at Plymouth, &c. ; this is the same as Northern English " heugh " and is connected with "hang"), an agricultural and gardening implement used for extirpating weeds, for stirring the surface-soil in order to break the capillary channels and so prevent the evaporation of moisture, for singling out turnips and other root-crops and similar purposes. Among common forms of hoe are the ordinary

Fig. 1. — Three Forms of Manual Hoe.

garden-hoe (numbered 1 in fig. 1), which consists of a flat blade set transversely in a long wooden handle; the Dutch or thrust- hoe (2), which has the blade set into the handle after the fashion of a spade; and the swan-neck hoe (3), the best manual hoe for agricultural purposes, which has a long curved neck to attach the blade to the handle; the soil falls back over this, blocking is thus avoided and a longer stroke obtained. Several types of horse-drawn hoe capable of working one or more rows at a time are used among root and grain crops. The illustrations show two forms of the implement, the blades of which differ in shape from those of the garden-hoe. Fig. 2 is in ordinary use for hoeing between two lines of beans or turnips or other " roots." Fig. 3

is adapted for the narrow rows of grain crops and is also con- vertible into a root-hoe. In the lever-hoe, which is largely used in grain crops, the blades may be raised and lowered by means

Fig. 2. — Martin's One-Row Horse Hoe.

of a lever. The horse-drawn hoe is steered by means of handles in the rear, but its successful working depends on accurate drilling of the seed, because unless the rows are parallel the roots of the plants are liable to be cut and the foliage injured. Thus Jethro Tull (17th century), with whose name the beginning of

Fig. 3. — Martin's General Purpose Steerage Horse Hoe.

the practice of horse-hoeing is principally connected, used the drill which he invented as an essential adjunct in the so-called " Horse-hoeing Husbandry " (see Agriculture).

HOEFNAGEL, JORIS (1 545-1601), Dutch painter and engraver, the son of a diamond merchant, was born at Antwerp. He travelled abroad, making drawings from archaeological subjects, and was a pupil of Jan Bol at Mechlin. He was afterwards patronized by the elector of Bavaria at Munich, where he stayed eight years, and by the Emperor Rudolph at Prague. He died at Vienna in 1601. He is famous for his miniature work, especi- ally on a missal in the imperial library at Vienna; he painted animals and plants to illustrate works on natural history; and his engravings (especially for Braun's Civitates orbis lerrarum, 1572, and Ortelius's Theatrum orbis terrarum, 1570) give him an interesting place among early topographical draughtsmen.

HOF, a town of Germany, in the Bavarian province of Upper Franconia, beautifully situated on the Saale, on the north- eastern spurs of the Fichtelgebirge, 103 m. S.W. of Leipzig on the main line of railway to Regensburg and Munich. Pop. (1885) 22,257; (1905) 36,348. It has one Roman Catholic and three Protestant churches (among the latter that of St Michael, which was restored in 1884), a town hall of 1563, a gymnasium with an extensive library, a commercial school and a hospital founded in 1262. It is the seat of various flourish- ing industries, notably woollen, cotton and jute spinning, jute weaving, and the manufacture of cotton and half-woollen fabrics. It has also dye-works, flour-mills, saw-mills, breweries, iron-works, and manufactures of machinery, iron and tin wares, chemicals and sugar. In the neighbourhood there are large

marble quarries and extensive iron mines. Hof, originally called Regnitzhof,

was built about 1080. It was held for some time by the dukes of Meran, and was sold in 1373 to the bur- graves of Nuremberg. The cloth manufacture introduced into it in the 15th century, and the manufacture of veils begun in the 16th century, greatly promoted its prosperity, but it suffered severely in the Albertine and Hussite wars as well as in the Thirty Years' War. In 1792 it came into the possession of Prussia; in 1806 it fell to France; and in 18 10 it was incor- porated with Bavaria. In 1823 the greater part of the town was destroyed by fire.

See Ernst, Geschickle und Beschreibung des Bezirks und der Stadt Hof (1866); Tillmann, Die Stadt Hof und ihre Umgebung (Hof, 1899) , and C. Meyer, Quellen zur Geschichte der Stadt Hof (1894-1896).

HOFER, ANDREAS (1767-1810), Tirolese patriot, was born on the 22nd of November 1767 at St Leonhard, in the Passeier valley. There his father kept an inn known as " am Sand," which Hofer inherited, and on that account he was popularly known as the " Sandwirth." In addition to this he carried on a trade in wine and horses with the north of Italy, acquiring a high reputation for intelligence and honesty. In the wars against the French from 1706 to 1805 he took part, first as a sharp-shooter and afterwards as a captain of militia. By the treaty of Pressburg (1805) Tirol was transferred from Austria to Bavaria, and Hofer, who was almost fanatically devoted to the Austrian house, became conspicuous as a leader of the agitation against Bavarian rule. In 1808 he formed one of a deputation who went to Vienna, at the invitation of the arch- duke John, to concert a rising; and when in April 1809 the Tirolese rose in arms, Hofer was chosen commander of the contingent from his native valley, and inflicted an overwhelming" defeat on the Bavarians at Sterzing (April 11). This victory, which resulted in the temporary reoccupation of Innsbruck by the Austrians, made Hofer the most conspicuous of the insurgent leaders. The rapid advance of Napoleon, indeed, and the defeat of the main Austrian army under the archduke Charles, once more exposed Tirol to the French and Bavarians, who reoccupied Innsbruck. The withdrawal of the bulk of the troops, however, gave the Tirolese their chance again; after two battles fought on the Iselberg (May 25 and 29) the Bavarians were again forced to evacuate the country, and Hofer entered Innsbruck in triumph. An autograph letter of the emperor Francis (May 29) assured him that no peace would be concluded by which Tirol would again be separated from the Austrian monarchy, and Hofer, believing his work accomplished, returned to his home. Then came the news of the armistice of Znaim (July 12), by which Tirol and Vorarlberg were sur- rendered by Austria unconditionally and given up to the ven- geance of the French. The country was now again invaded by 40.000 French and Bavarian troops, and Innsbruck fell; but the Tirolese once more organized resistance to the French " atheists and freemasons," and, after a temporary hesitation,

Hofer — on whose head a price had been placed — threw himself into the movement. On the 13th of August, in another battle on the Iselberg, the French under Marshal Lefebvre were routed by the Tirolese peasants, and Hofer once more entered Innsbruck, which he had some difficulty in saving from sack. Hofer was now elected Oberkommandant of Tirol, took up his quarters in the Hofburg at Innsbruck, and for two months ruled the country in> the emperor's name. He preserved the habits of a simple peasant, and his administration was characterized in part by the peasant's shrewd common sense, but yet more by a pious., solicitude for the minutest details of faith and morals. On the 29th of September Hofer received from the emperor a chain and medal of honour, which encouraged him in the belief that Austria did not intend again to desert him; the news of the conclusion of the treaty of Schonbrunn (October 14), by which Tirol was again ceded to Bavaria, came upon him as an overwhelming surprise. The French in overpowering force at once pushed into the country, and, an amnesty having been stipulated in the treaty, Hofer and his companions, after some hesitation, gave in their submission. On the 12th of November, however,

urged on by the hotter heads among the peasant leaders and deceived by false reports of Austrian victories, Hofer again issued a proclamation calling the mountaineers to arms. The summons met with little response; the enemy advanced in irresistible force, and Hofer, a price once more set on his head, had to take refuge in the mountains. His hiding-place was betrayed by one of his neighbours, named Josef Raffl, and on the 27th of January 1810 he was captured by Italian troops and sent in chains to Mantua. There he was tried by court- martial, and on the 20th of February was shot, twenty-four hours after his condemnation. This crime, which was believed to be due to Napoleon's direct orders, caused an immense sensation throughout Germany and did much to inflame popular sentiment against the French. At the court of Austria, too, which was accused of having cynically sacrificed the hero, it produced a painful impression, and Metternich, when he visited Paris on the occasion of the marriage of the archduchess Marie Louise to Napoleon, was charged to remonstrate with the emperor. Napoleon expressed his regret, stating that the execution had been carried out against his wishes, having been hurried on by the zeal of his generals. In 1823 Hofer's remains were removed from Mantua to Innsbruck, where they were interred in the Franciscan church, and in 1834 a marble statue was erected over his tomb. In 1893 a bronze statue of him was also set up on the Iselberg. At Meran his patriotic deeds of heroism are the subject of a festival play celebrated annually in the open air. In 1818 the patent of nobility bestowed upon him by the Austrian emperor in 1809

was conferred upon his

family.

See Leben und Thaten des ehemaligen Tyroler Insurgenten-Chefs Andr. Hofer (Berlin, 1810); Andr. Hofer und die Tyroler Insur- rection im Jahre 1809 (Munich, 1811); Hormayr, Geschichte Andr. Hofer's Sandwirths auf Passeyr (Leipzig, 1845) ; B. Weber, Das Thai Passeyr und seine Bewohner mil besonderer Riicksicht auf Andreas Hofer und das Jahr 1809 (Innsbruck, 1851); Rapp, Tirol im Jahr 1809 (Innsbruck, 1852); Weidinger, Andreas Hofer und seine Kampfgenossen (3rd ed., Leipzig, 1861); Heigel, Andreas Hofer (Munich, 1874); Stampfer, Sandwirt Andreas Hofer (Freiburg, 1874); Schmolze, Andreas Hofer und seine Kampfgenossen (Innsbruck, 1900). His history has supplied the materials for tragediesto B. Auerbach and Immermann, and for numerous ballads, of which some remain very popular in Germany (see Franke, Andreas Hofer im Liede, Innsbruck, 1884).

HOFFDING, HARALD (1843-), Danish philosopher, was born and educated in Copenhagen. He became a school- master, and ultimately in 1883 professor in the university of Copenhagen. He was much influenced by Soren Kierkegaard in the early development of his thought, but later became a positivist, retaining, however, and combining with it the spirit and method of practical psychology and the critical school. His best-known work is perhaps his Den nyere Filosofis Historie (1894), translated into English from the German edition (1895) by B. E. Meyer as History of Modem Philosophy (2 vols., 1900), a work intended by him to supplement and correct that of Hans Brochner, to whom it is dedicated. His Psychology, the Problems of Philosophy (1905) and Philosophy of Religion (1906) also have appeared in English.

Among Hoffding's other writings, practically all of which have been translated into German, are: Den engelske Filosofi i vor Tid •(1874); Etik (1876; ed. 1879); Psychologi i Omrids pad. Grundlag of Erfaring (ed. 1892); Psykologiske Undersogelser (1889); Charles Darwin (1889); Kontinuitelen i Kants filosofiske Udviklingsgang (1893); Del psykologiske Grundlag for logiske Domme (1899); Rousseau und seine Philosophie (1901); Mindre Arbejder (1899).

HOFFMANN, AUGUST HEINRICH (1 798-1874), known as Hoffmann von Fallersleben, German poet, philologist and historian of literature, was born at Fallersleben in the duchy of Luneburg, Hanover, on the 2nd of April 1798, the son of the mayor of the town. He was educated at the classical schools of Helmstedt and Brunswick, and afterwards at the universities of Gottingen and Bonn. His original intention was to study

theology, but he soon devoted himself entirely to literature. In 1823 he was appointed custodian of the university library at Breslau, a post which he held till 1838. He was also made extraordinary professor of the German language and literature at that university in 1830, and ordinary professor in 1835;

but he was deprived of his chair in 1842 in consequence of his Unpolitische Lieder (1840-1841), which gave much offence to the authorities in Prussia. He then travelled in Germany, Switzerland and Italy, and lived for two or three years in Mecklenburg, of which he became a naturalized citizen. After the revolution of 1848 he was enabled to return to Prussia, where he was restored to his rights, and received the Wartegeld — the salary attached to a promised office not yet vacant. He married in 1849, an d during the next ten years lived first in Bingerbriick, afterwards in Neuwied, and then in Weimar, where together with Oskar Schade (1826-1906) he edited the Weimarische Jahrbuch (1854-1857). In i860 he was appointed librarian to the Duke of Ratibor at the monasterial castle of Corvey near Hoxter on the Weser, where he died on the 19th of January 1874. Fallersleben was one of the best popular poets of modern Germany. In politics he ardently sympathized with the pro- gressive tendencies of his time, and he was among the earliest and most effective of the political poets who prepared the way for the outbreak of 1848. As a poet, however, he acquired distinction chiefly by the ease, simplicity and grace with which he gave expression to the passions and aspirations of daily life. Although he had not been scientifically trained in music, he composed melodies for many of his songs, and a considerable number of them are sung by all classes in every part of Germany. Among the best known is the patriotic Deulschland, Deutschland iiber Alles, composed in 1841 on the island of Heligoland, where a monument was erected in 1891 to his memory (subsequently destroyed).

The best of his poetical writings is his Gedichte (1827; 9th ed., Berlin, 1887); but there is great merit also in his Alemannische Lieder (1826; 5th ed., 1843), Soldatenlieder (1851), Soldalenleben (1852), Rheinleben (1865), and in his Filnfzig Kinderlieder , Funfzig neue Kinderlieder, and Alte und neue Kinderlieder. His Unpolitische Lieder, Deutsche Lieder aus der Schweiz and Streiflichter are not without poetical value, but they are mainly interesting in relation to the movements of the age in which they were written. As a student of ancient Teutonic literature Hoffmann von Fallersleben ranks among the most persevering and cultivated of German scholars, some of the chief results of his labours being embodied in his Horae Belgicae, Fundgruben fur Geschichte deutscher Sprache und Literatur, Altdeutsche Blatter, Spenden zur deutschen Literatur geschichte and Findlinge. Among his editions of particular works may be named Reineke Vos, Monumenta Elnonensia and Theophilus. Die deutsche*

Philologie im Grundriss (1836) was at the time of its publication a valuable contribution to philological research, and historians of German literature still attach importance to his Geschichte des deutschen Kirchenliedes bis auf Luther (1832; 3rd ed., 1861), Unsere vclkstumlichen Lieder (3rd ed., 1869) and Die deutschen Gesell- schaftslieder des 16. und 27. Jahrh. (2nd ed., i860). In 1868-1870 Hoffmann published in 6 vols, an autobiography, Mein Leben: Aufzeichnungen und Erinnerungen (an abbreviated ed. in 2 vols., 1894). His Gesammelte Werke were edited by H. Gerstenberg in 8 vols. (1891-1894); his Ausgewahlte Werke by H. Benzmann (1905, 4 vols.). See also Briefe von Hoffmann von Fallersleben und Moritz Haupt an Ferdinand Wolf (1874) ; J. M. Wagner, Hoffmann von Fallersleben, 1818-1868 (1869-1870), and R. von Gottschall, Portraits und Studien (vol. v., 1876).

HOFFMANN, ERNST THEODOR WILHELM (1776-1822), German romance-writer, was born at Konigsberg on the 24th of January 1776. For the name Wilhelm he himself substituted Amadeus in homage to Mozart. His parents lived unhappily together, and when the child was only three they separated. His bringing up was left to an uncle who had neither understand- ing nor sympathy for his dreamy and wayward temperament. Hoffmann showed more talent for music and drawing than for books. In 1792, when little over sixteen years old, he entered the university of Konigsberg, with a view to preparing himself ‘ for a legal career. The chief features of interest, in his student years were an intimate friendship for Theodor Gottlieb von Hippel (1775-1843), a nephew of the novelist Hippel, and an unhappy passion for a lady to whom he gave music lessons; the latter found its outlet, not merely in music, but also, in two novels, neither of which he was able to have published. In the summer of 1795 he began his practical career as a jurist in Konigsberg, but his mother’s death and the complications in which his love-affair threatened to involve him made him decide to leave his native town and continue his legal apprenticeship

in Glogau. In the autumn of 1798 he was transferred to Berlin, where the beginnings of the new Romantic movement were in the air. Music, however, had still the first place in his heart, and the Berlin opera house was the chief centre of his interests. In 1800 further promotion brought him to Posen, where he gave himself up entirely to the pleasures of the hour. Unfortun- ately, however, his brilliant powers of caricature brought him

into ill odour, and instead of receiving the hoped-for preferment in Posen itself, he found himself virtually banished to the little town of Plozk on the Vistula. Before leaving Posen he married, and his domestic happiness alleviated to some extent the monotony of the two years' exile. His leisure was spent in literary studies and musical composition. In 1804 he was transferred to Warsaw, where, through J. E. Hitzig (1 780-1849), he was introduced to Zacharias Werner, and began to take an interest in the later Romantic literature; now, for the first time, he discovered how writers like Novalis, Tieck, and especially Wackenroder, had spoken out of his own heart. But in spite of this literary stimulus, his leisure in Warsaw was mainly occupied by composition; he wrote music to Brentano's Lustige Musikanten and Werner's Kreuz an der Ostsee, and also an opera Lie.be und Eifersucht, based on Calderon's drama La Banda y la Flor.

The arrival of the French in Warsaw and the consequent political changes put an end to Hoffmann's congenial life there, and a time of tribulation followed. A position which he obtained in 1808 as musical director of a new theatre in Bamberg availed him little, as within a very short time the theatre was bankrupt and Hoffmann again reduced to destitution. But these mis- fortunes induced him to turn to literature in order to eke out the miserable livelihood he earned by composing and giving music lessons. The editor of the Allgemeine musikalische Zeibung expressed his willingness to accept contributions from Hoffmann, and here appeared for the first time some of the musical sketches which ultimately passed over into the Phantasie- stilcke in Callots Manier. This work appeared in four volumes in 1814 and laid the foundation of his fame as a writer. Meanwhile, Hoffmann had again been for some time attached, in the capacity of musical director, to a theatrical company, whose headquarters were at Dresden. In 1814 he gladly embraced the opportunity that was offered him of resuming his legal profession in Berlin, and two years later he was appointed councillor of the Court of Appeal (Kammergericht). Hoffmann had the reputation of being an excellent jurist and a conscientious official; he had leisure for literary pursuits and was on the best of terms with the circle of Romantic poets and novelists who gathered round Fouque, Chamisso and his old friend Hitzig. Unfortunately, however, the habits of intemperance which, in earlier years, had thrown a shadow over his life, grew upon him, and his health was speedily undermined by the nights he spent in the wine-house, in company unworthy of him. He was struck down by locomotor ataxy, and died on the 24th of July 1822.

The Phantasiestucke, which had been published with a commendatory preface by Jean Paul, were followed in 181 6 by the gruesome novel — to some extent inspired by Lewis's Monk — Die Elixiere des Teufels, and the even more gruesome and grotesque stories which make up the Nachtsiiicke (1817, 2 vols.). The full range of Hoffmann's powers is first clearly

displayed in the collection of stories (4 vols., 1819-1821) Die Serapionsbrilder, this being the name of a small club of Hoffmann's more intimate literary friends. Die Serapionsbrilder includes not merely stories in which Hoffmann's love for the mysterious and the supernatural is to be seen, but novels in which he draws on his own early reminiscences (Rat Krespel, Fermate), finely outlined pictures of old German life (Der Artushof, Meister Martin der Kiifner und seine Gesellen) . and vivid and picturesque incidents from Italian and French history (Doge und Dogaressa, the story of Marino Faliero, and Das Frdulein von Scuderi). The last-mentioned story is usually regarded as Hoffmann's masterpiece. Two longer works also belong to Hoffmann's later years and display to advantage his powers as a humorist; these are Klein Zaches, genannt Zinnober (1819), and Lebens-

ansichten des Kalers Murr, nebst fragmentarischer Biographic des Kapellmeisters Johannes Kreisler (1821-1822).

Hoffmann is one of the master novelists of the Romantic movement in Germany. He combined with a humour that reminds us of Jean Paul the warm sympathy for the artist's standpoint towards life, which was enunciated by early Romantic leaders like Tieck and Wackenroder; but he was superior to all in the almost clairvoyant powers of his imagination. His works abound in grotesque and gruesome scenes — in this respect they mark a descent from the high ideals of the Romantic school; but the gruesome was only one outlet for Hoffmann's genius, and even here the secret of his power lay not in his choice of subjects, but in the wonderfully vivid and realistic presentation of them. Every line he wrote leaves the impression behind it that it expresses something felt or experienced; every scene, vision or character he described seems to have been real and living to him. It is this realism, in the best sense of the word, that made him the great artist he was, and gave him so extra- ordinary a power over his contemporaries.

The first collected edition of Hoffmann's works appeared in ten volumes (Ausgewdhlte Schriften, 1827-1828); to these his widow added five volumes in 1839 (including the 3rd edition of J. E. Hitzig's Aus Hoffmanns Leben und Nachlass, 1823). Other editions of his works appeared in 1844-1845, 1871-1873, 1879-1883, and, most complete of all, Sdmtliche Werke, edited by E. Grisebach, in 15 vols. (1900). There are many editions of selections, as well as cheap reprints of the more popular stories. All Hoffmann's important works — except Klein Zaches and Kater Murr — have been translated into English: The Devil's Elixir (1824), The Golden Pot by Carlyle (in German Romance, 1827), The Serapion Brethren by A. Ewing (1886-1892), &c. In France Hoffmann was even more popular than in England. Cp. G. Thurau, Hoffmanns Erzdhlungen in Frankreich (1896).

An edition of his CEuvres completes appeared in 12 vols, in Paris in 1830. The best monograph on Hoffmann is by G. Ellinger, E. T. A. Hoffmann (1894) i ˆe a ‘ so O. Klinke, Hoffmanns Leben und Werke vom Slandpunkte eines Irrenarztes (1903) ; and the exhaustive bibliography in Goedeke’s Grundriss zur Geschichte der deutscken Dichtung, 2nd ed., vol. viii. pp. 468 ff. (1905). . (J. G. R.)

HOFFMANN, FRANCOIS BENOIT (1760-1828), French dramatist and critic, was born at Nancy on the nth of July 1760. He studied law at the university of Strassburg, but a slight hesitation in his speech precluded success at the bar, and he entered a regiment on service in Corsica. He served, however, for a very short time, and, returning to Nancy, he wrote some poems which brought him into notice at the little court of Luneville over which the marquise de BoufHers then presided. In 1784 he went to Paris, and two years later produced the opera Phedre. His opera Adrien (1792) was objected to by the govern- ment on political grounds, and Hoffmann, who refused to make the changes proposed to him, ran considerable risk under the revolutionary government. His later operas, which were numerous, were produced at the Opera Comique. In 1807 he was invited by Etienne to contribute to the Journal de V Empire (afterwards the Journal des debats). Hoffmann’s wide reading qualified him to write on all sorts of subjects, and he turned, apparently with no difficulty, from reviewing books on medicine to violent attacks on the Jesuits. His severe criticism of Chateau- briand’s Martyrs led the author to make some changes in a later edition. He had the reputation of being an absolutely con- scientious and incorruptible critic and thus exercised wide . influence. Hoffmann died in Paris on the 25th of April 1828. Among his numerous plays should be mentioned an excellent one-act comedy, Le Roman d’une heure (1803), and an amusing one-act opera Les Rendez-vous bourgeois.

See Sainte-Beuve, ” M. de Feletz et la critique litteraire sous l’Empire ” in Causeries du lundi, vol. i. ˆ

HOFFMANN, FRIEDRICH (1660-1742), German physician, a member of a family that had been connected with medicine for 200 years before him, was born at Halle on the 19th of February 1660. At the gymnasium of his native town he acquired that taste for and skill in mathematics to which he attributed much of his after success. At the age of eighteen he went to study medicine at Jena, whence in 1680 he passed to Erfurt, in order to attend Kasper Cramer’s lectures on chemistry. Next year, returning to Jena, he received hi& doctor’s diploma, and, after publishing a thesis, was permitted to

teach. Constant study then began to tell on his health, and in 1682, leaving his already numerous pupils, he proceeded to Minden in Westphalia to recruit himself, at the request of a relative who held a high position in that town. After practising at Minden for two years, Hoffmann made a journey to Holland and England, where he formed the acquaintance of many illustrious chemists and physicians. Towards the end of 1684 he returned to Minden, and during the next three years he received many flattering appointments. In 1688 he removed to the more promising sphere of Halberstadt, with the title of physician to the principality of Halberstadt; and on the founding of Halle university in 1693, his reputation, which had been steadily increasing, procured for him the primarius chair of medicine, while at the same time he was charged with the responsible duty of framing the statutes for the new medical faculty. He filled also the chair of natural philosophy. With the exception of four years (1708-1712), which he passed at Berlin in the capacity of royal physician, Hoffmann spent the rest of his life at Halle in instruction, practice and study, inter- rupted now and again by visits to different courts of Germany, where his services procured him honours and rewards. His fame became European. He was enrolled a member of many learned societies in different foreign countries, while in his own he became privy councillor. He died at Halle on the 12th of November 1742.

Of his numerous writings a catalogue is to be found in Haller's Bibliotheca medicinae practicae. The chief is Medicina ratio- nalis systematica, undertaken at the age of sixty, and published in 1730. It was translated into French in 1739, under the title of Medecine raisonnee d 'Hoffmann. A complete edition of Hoffmann's works, with a life of the author, was published at Geneva in 1740, to which supplements were added in 1753 and 1760. Editions ap- peared also at Venice in 1745 and at Naples in 1753 and 1793. (See also Medicine.)

HOFFMANN, JOHANN JOSEPH (1805-1878), German scholar, was born at Wiirzburg on the 16th of February 1805. After studying at Wiirzburg he went on the stage in 1825; but owing to an accidental meeting with the German traveller, Dr Philipp Franz von Siebold (1796-1866), in July 1830, his interest was diverted to Oriental philology. From Siebold he acquired the rudiments of Japanese, and in order to take advantage of the instructions of Ko-ching-chang, a Chinese teacher whom Siebold had brought home with him, he made himself acquainted with Malay, the only language except Chinese which the Chinaman could understand. In a few years he was able to supply the translations for Siebold's Nippon; and the high character of his work soon attracted the attention of older scholars. Stanislas Julien invited him to Paris; and he would probably have accepted

the invitation, as a disagree- ment had broken out between him and Siebold, had not M. Baud, the Dutch colonial minister, appointed him Japanese translator with a salary of 1800 florins (£150). The Dutch authorities were slow in giving him further recognition; and he was too modest a man successfully to urge his claims. It was not till after he had received the offer of the professorship of Chinese in King's College, London, that the authorities made him professor at Leiden and the king allowed him a yearly pension. In 1875 he was decorated with the order of the Netherlands Lion, and in 1877 he was elected corresponding member of the Berlin Academy. He died at the Hague on the 23rd of January 1878.

Hoffmann's chief work was his unfinished Japanese Dictionary, begun in 1839 and afterwards continued by L. Serrurier. Unable at first to procure the necessary type, he set himself to the cutting of punches, and even when the proper founts were obtained he had to act as his own compositor as far as Chinese and Japanese were con- cerned. His Japanese grammar {Japanische Sprechlehre) was published in Dutch and English in 1867, and in English and German in 1876. Of his miscellaneous productions it is enough to mention " Japans Beziige mit der koraischen Halbinsel und mit Schina " in Nippon, vii. ; Yo-San-fi-Rok, L'Art d'elever les vers d soie au Japan, par Ouckaki Mourikouni (Paris, 1848); " Die Heilkunde in Japan" in Mitthcil. d. deutsch. Gesellsch. fur Natur- und Volkerk. Ost-Asiens (1873-1874) ; and Japanische Studien (1878).

HOFMANN, AUGUST WILHELM VON (1818-1892), German chemist, was born at Giessen on the 8th of April 1818. Not

intending originally to devote himself to physical science, he first took up the study of law and philology at Gottingen, and the general culture he thus gained stood him in good stead when he turned to chemistry, the study of which he began under Liebig. When, in 1845, a school of practical chemistry was started in London, under the style of the Royal College of Chemistry, Hofmann, largely through the influence of the Prince Consort, was appointed its first director. It was with some natural hesitation that he, then a Privatdozent at Bonn, accepted the position, which may well have seemed rather a precarious one; but the difficulty was removed by his appointment as extraordinary professor at Bonn, with leave of absence for two years, so that he could resume his career in Germany if his English one proved unsatisfactory. Fortunately the college was more or less successful, owing largely to his enthusiasm and energy, and many of the men who were trained there sub- sequently made their mark in chemical history. But in 1864 he returned to Bonn, and in the succeeding year he was selected to succeed E. Mitscherlich as professor of chemistry and director of the laboratory in Berlin University. In leaving England, of which he used to speak as his adopted country, Hofmann was probably influenced by a

combination of causes. The public support extended to the college of chemistry had been dwindling for some years, and before he left it had ceased to have an independent existence and had been absorbed into the School of Mines. This event he must have looked upon as a curtailment of its possibilities of usefulness. But, in addition, there is only too much reason to suppose that he was disappointed at the general apathy with which his science was regarded in England. No man ever realized more fully than he how entirely dependent on the advance of scientific knowledge is the continuation of a country's material prosperity, and no single chemist ever exercised a greater or more direct influence upon industrial development. In England, however, people cared for none of these things, and were blind to the commercial potentialities of scientific research. The college to which Hofmann devoted nearly twenty of the best years of his life was starved; the coal- tar industry, which was really brought into existence by his work and that of his pupils under his direction at that college, and which with a little intelligent forethought might have been retained in England, was allowed to slip into the hands of Germany, where it is now worth millions of pounds annually; and Hofmann himself was compelled to return to his native land to find due appreciation as one of the foremost chemists of his time. The rest of his life was spent in Berlin, and there he died on the 5th of May 1892. That city possesses a permanent memorial to his name in Hofmann House, the home of the German Chemical Society (of which he was the founder), which was formally opened in 1900, appropriately enough with an account of that great triumph of German chemical enterprise, the industrial manufacture of synthetical indigo.

Hofmann's work covered a wide range of organic chemistry, though with inorganic bodies he did but little. His first research, carried out in Liebig's laboratory at Giessen, was on coal-tar, and his investigation of the organic bases in coal-gas naphtha established the nature of aniline. This substance he used to refer to as his first love, and it was a love to which he remained faithful throughout his life. His perception of the analogy between it and ammonia led to his famous work on the amines and ammonium bases and the allied organic phosphorus compounds, while his researches on rosaniline, which he first prepared in 1858, formed the first of a series of investigations on colouring matters which only ended with quinoline red in 1887. But in addition to these and numberless other investigations for which he was responsible the influence he exercised through his pupils must also be taken into account. As a teacher, besides the -power of accurately gauging the character and capabilities of those who studied under him, he had the faculty of infecting them with his own enthusiasm, and thus of stimulating them to put forward their best efforts. In the lecture-room he laid great stress on the importance of experimental demonstrations, paying particular attention to their selection and arrangement, though, since he

himself was a somewhat clumsy manipulator, their actual exhibition was generally entrusted to his assistants. He was the possessor of a clear and graceful, if somewhat florid, style, which showed to special advantage in his numerous obituary notices or encomiums (collected and published in three volumes Zur Erinnerung an vorangegangene Freunde, 1888). He also excelled as a speaker, particularly at gatherings of an international character, for in addition to his native German he could speak English, French and Italian with fluency.

See Memorial Lectures delivered before the Chemical Society, 1893- 1900 (London, 1901).

HOFMANN, JOHANN CHRISTIAN KONRAD VON (1810- 1877), Lutheran theologian and historian, was born on the 21st of December 1810 at Nuremberg, and studied theology and history at the university of Erlangen. In 1829 he went to Berlin, where Schleiermacher, Hengstenberg, Neander, Ranke and Raumer were among his teachers. In 1833 he received an appointment to teach Hebrew and history in the gymnasium of Erlangen. In 1835 he became Repetent, in 1838 Privatdozent and in 1841 professor exlraor dinar ius in the theological faculty at Erlangen. In 1842 he became professor ordinarius at Rostock, but in 1845 returned once more to Erlangen as the successor of Gottlieb Christoph Adolf von Harless (1806-1879), founder of the Zeilschrifl fiir Protestantismus und Kirche, of which Hofmann became one of the editors in 1846, J. F. Hofling (1802-1853) and Gottfried Thomasius (1802-1875) being his collaborators. He was a conservative in theology, but an enthusiastic adherent of the progressive party in politics, and sat as member for Erlangen and Fiirth in the Bavarian second chamber from 1863 to 1868. He died on the 20th of December 1877.

He wrote Die siebzig Jahre des Jeremias u. die siebzig Jahrwochen des Daniel (1836) ;Geschichte des Aufruhrs in den Cevennen (1837); Lehrbuch der Weltgcschichte fiir Gymnasien (1839), which became a text-book in the Protestant gymnasia of Bavaria; Weissagung u. Erfiillungim alien u. neuen Testamente (1841-1844; 2nd ed., 1857-1860); DerSchriftbeweis (1852-1856; 2nd ed., 1857- 1860); Die heilige Schrift des neuen Testaments zusammenhdngend untersucht (1862-1875); Schutzschriften (1856-1859), in which he defends himself against the charge of denying the Atonement; and Theologische Ethik (1878). His most important works are the five last named. In theology, as in ecclesiastical polity, Hofmann was a Lutheran of an extreme type, although the strongly

marked individuality of some of his opinions laid him open to repeated accusations of heterodoxy. He was the head of what has been called the Erlangen School, and " in his day he was unquestionably the chief glory of the University of Erlangen " (Lichtenberger).

See the articles in Herzog-Hauck's Realencyklopadie and the Allgemeine deutsche Biographie; and cf. F. Lichtenberger, History of German Theology in the Nineteenth Century (1889) pp. 446-458.

HOFMANN, MELCHIOR (c. 1498-1543-4), anabaptist, was born at Hall, in Swabia, before 1500 (Zur Linden suggests 1498). His biographers usually give his surname as above ; in his printed works it is Hoffman, in his manuscripts Hoffmann. He was without scholarly training, and first appears as a furrier at Livland. Attracted by Luther's doctrine, he came forward as a lay preacher, combining business travels with a religious mission. Accompanied by Melchior Rinck, also a skinner or furrier, and a religious enthusiast, he made his way to Sweden. Joined by Bernard Knipperdolling, the party reached Stockholm in the autumn of 1524. Their fervid attacks on image worship led to their expulsion. By way of Livonia, Hofmann arrived at Dorpat in November 1524, but was driven thence in the following January. Making his way to Riga, and thence to Wittenberg, he found favour with Luther; his letter of the 22nd of June 1525 appears in a tract by Luther of that year. He was again at Dorpat in May 1526; later at Magdeburg. Returning to Wittenberg, he was coldly received; he wrote there his exposition of Daniel xii. (1527). Repairing to Holstein, he got into the good graces of Frederick I. of Denmark, and was appointed by royal ordinance to preach the Gospel at Kiel. He was extravagant in denunciation, and developed a Zwinglian view of the Eucharist. Luther was alarmed. At a colloquy of

preachers in Flensburg (8th April 1529) Hofmann, John Campanus and others were put on their defence. Hofmann maintained (against the " magic " of the Lutherans) that the function of the Eucharist, like that of preaching, is an appeal for spiritual union with Christ. Refusing to retract, he was banished. At Strassburg to which he now turned, he was well received (1529) till his anabaptist development became apparent. He was in relations with Schwenkfeld and with Carlstadt, but assumed a prophetic role of his own. Journeying to East Friesland, (1530) he founded a community at Emden (1532), securing a large following of artisans. Despite the warning of John Trypmaker, who prophesied for him " six months " in prison, he returned in the spring of 1533 to Strassburg, where we hear of his wife and child. He gathered from the Apocalypse a vision of " resurrections " of apostolic Christianity, first under John Hus, and now under himself. The year 1533 was to inaugurate the new era; Strassburg was to be the seat of the New Jerusalem. In May 1533 he and others were

arrested. Under examination, he denied that he had made common cause with the anabaptists and claimed to be no prophet, a mere witness of the Most High, but refused the articles of faith proposed to him by the provincial synod. Hofmann and Claus Frey, an anabaptist, were detained in prison, a measure due to the terror excited by the Munster episode of 1 533-1 534. The synod, in 1539, made further effort to reclaim him. The last notice of his imprisonment is on the 19th of November 1543; he probably died soon after.

Two of his publications, with similar titles, in 1530, are note- worthy as having influenced Menno Simons and David Joris {Weissagung vsz heiliger gotlicher geschriffi, and Prophecey oder Weissagung vsz warer heiliger gotlicher schrift). Bock treats him as an antitrinitarian, on grounds which Wallace rightly deems inconclusive. With better reason Trechsel includes him among pioneers of some of the positions of Servetus. His Christology was Valentinian. While all are elected to salvation, only the regenerate may receive baptism, and those who sin after regeneration sin against the Holy Ghost, and cannot be saved. His followers were known as Hofmannites or Melchiorites.

See G. Herrmann, Essai sur la vie et les ecrils de M. Hofmann (1852) ; F. O. zur Linden, M. Hofmann, ein Prophet der Wiedertdufer (1885); H. Holtzmann, in Allgemeine deutsche Biographie (1880); Hegler in Hauck's Realencyklopadie (1900) ; Bock, Hist. Antitrin. (1776), ii.; Wallace, Antitrin. Biography (1850) iii., app. iii. ; Trechsel, Prot. Antitrin. vor F. Socin (1839) i. ; Barclay, Inner Life of Rel. Societies (1876). An alleged portrait, from an engrav- ing of 1608, is reproduced in the appendix to A. Ross, Pansebeia (1655). (A. Go.)*

HOFMEISTER, WILHELM FRIEDRICH BENEDICT (1824- 1877), German botanist, was born at Leipzig on the 18th of May 1824. He came of a family engaged in trade, and after being educated at the Realschule of Leipzig he entered business as a music-dealer. Much of his botanical work was done while he was so employed, till in 1863 he was nominated, without intermediate academic steps, to the chair in Heidelberg; thence he was transferred in 1872 to Tubingen, in succession to H. von Mohl. His first work was on the distribution of the Coniferae in the Himalaya, but his attention was very soon devoted to studying the sexuality and origin of the embryo of Phanerogams. His contributions on this subject extended from 1847 till i860, and they finally settled the question of the origin of the embryo from an ovum, as against the prevalent pollen-tube theory .of M. J. Schleiden, for he showed that the pollen-tube does not itself produce the embryo, but only stimulates the ovum already present in the ovule. He soon turned his attention to the embryology of Bryophytes and Pteridophytes, and gave con- tinuous accounts of the germination of the spores and

fertilization in Pilularia, Salvinia, Selaginella. Some of the main facts of the life of ferns and mosses were already known; these, together with his own wider observations, were worked into that great genera' pronouncement published in 1851 under the title, Vergleichende Untersuchungen der Keimung, Entfaltung und Fruchlbildung hoherer Kryptogamen und der Samenbildung der Coniferen.*

HOFMEYR

5ˆ5

This work will always stand in the first rank of botanical books. It antedated the Origin of Species by eight years, but contained facts and comparisons which could only become intelligible on some theory of descent. The plan of life-story common to them all, involving two alternating generations, was demonstrated for Liverworts, Mosses, Ferns, Equiseta, Rhizocarps, Lycopodi- aceae, and even Gymnosperms, with a completeness and certainty which must still surprise those who know the botanical literature of the author's time. The conclusions of Hofmeister remain in their broad outlines unshaken, but rather strengthened by later-acquired details. In the light of the theory of descent the common plan of life-history in plants apparently so diverse as those named acquires a special significance; but it is one of the remarkable features of this great work that the writer himself does not theorize — with an unerring insight he points out his comparisons and states his homologies, but does not indulge in explanatory surmises. It is the typical work of an heroic age of plant-morphology. From 1857 till 1862 Hofmeister wrote occasionally on physiological subjects, such as the ascent of sap, and curvatures of growing parts, but it was in morphology that he found his natural sphere. In 1861, in conjunction with other botanists, a plan was drawn up of a handbook of physio- logical botany, of which Hofmeister was to be editor. Though the original scheme was never completed, the editor himself contributed two notable parts, Die Lehre von der Pflanzenzelle (1867) and Allgemeine Morphologie der Gewackse (1868). The former gives an excellent summary of the structure and relations of the vegetable cell as then known, but it did not greatly modify current views. The latter was notable for its refutation of the spiral theory of leaf arrangement in plants, founded by C. F. Schimper and A. Braun. Hofmeister transferred the discussion from the mere study of mature form to the observation of the development of the parts, and substituted for the " spiral tendency " a mechanical theory based upon the observed fact that new branchings appear over the widest gaps which exist between next older branchings of like nature. With this im-portant work Hofmeister's period of active production closed; he fell into ill-health, and retired from his academic duties some time before his death at Lindenau, near Leipzig, on the 12th of January 1877. (F. O. B.)

HOFMEYR, JAN HENDRIK (1845-1909), South African politician, was born at Cape Town on the 4th of July 1845. He was educated at the South African College, and at an early age turned his attention to politics, first as a journalist. He was editor of the Zuid Afrikaan till its incorporation with Ons Land, and of the Zuid Afrikaansche Tidjschrift. By birth, education and sympathies a typical Dutch Afrikander, he set himself to organize the political power of his fellow-countrymen. / This he did very effectively, and when in 1879 he entered the Cape parliament as member for Stellenbosch, he became the real leader of the Dutch party. Yet he only held office for six months — as minister without portfolio in the Scanlen ministry from May to November 1881. He held no subsequent official post in the colony, though he shared with Sir Thomas Upington and Sir Charles Mills the honour of representing the Cape at the intercolonial conference of 1887. Here he supported the proposal for entrusting the defence of Simon's Town to Cape Colony, leaving only the armament to be provided by the imperial government, opposed trans-oceanic penny postage, and moved a resolution in favour of an imperial customs union. At the colonial conference of 1894 at Ottawa he was again one of the Cape representatives. In 1888 and in 1889 he was a member of the South African customs conference.

His chief importance as a public man was, however, derived from his power over the Dutch in Cape Colony, and his control of the Afrikander Bond. In 1878 he had himself founded the " Farmers' Association," and as the Cape farmers were almost entirely Dutch the Association became a centre of Dutch in- fluence. When the Bond was formed in 1882, with purely political aims, Hofmeyr made haste to obtain control of it, and in 1883 amalgamated the Farmers' Association with it. Under his direction the constitution of the Bond was modified

by the elimination of the provisions inconsistent with loyalty to the British crown. But it remained an organization for obtaining the political supremacy of the Cape Dutch. (See Cape Coiony: History.) His control over the Bond enabled him for many years, while free from the responsibilities of office, to make and unmake ministers at his will, and earned for him the name of " Cabinet-maker of South Africa." Although officially the term " Afrikander " was explained by Hofmeyr to include white men of whatever race, yet in practice the influence of the Bond was always exerted in favour of the Dutch, and its power was drawn from the Dutch districts of Cape Colony. The sympathies of the Bond were thus always strongly with the Transvaal, as the chief centre of Dutch influence in South Africa; and Hofmeyr's position might in many respects be compared with that of Parnell at the head of the Irish Nationalist party in Great Britain. In the Bechuanaland difficulty of 1884 Hofmeyr threw all the influence of the Bond into the scale in favour of the Transvaal. But in the course of the next few years he began to drift away from President Kruger. He resented

the reckless disregard of Cape interests involved in Kruger's fiscal policy; he feared that the Transvaal, after its sudden leap into prosperity upon the gold discoveries of 1886, might overshadow all other Dutch influences in South Africa; above all he was convinced, as he showed by his action at the London conference, that the protection of the British navy was indispensable to South Africa, and he set his face against Kruger's intrigues with Germany, and his avowed intention of acquiring an outlet to the sea in order to get into touch with foreign powers.

In 1890 Hofmeyr joined forces with Cecil Rhodes, who became premier of Cape Colony with the support of the Bond. Hofmeyr's influence was a powerful factor in the conclusion of the Swaziland convention of 1890, as well as in stopping the " trek" to Banyai- land (Rhodesia) in 1891 — a notable reversal of the policy he had pursued seven years before. But the reactionary elements in the Bond grew alarmed at Rhodes's imperialism, and in 1895 Hofmeyr resigned his seat in parliament and the presidency of the Bond. Then came the Jameson Raid, and in its wake there rolled over South Africa a wave of Dutch and anti-British feeling such as had not been known since the days of Majuba. (The proclamation issued by Sir Hercules Robinson disavowing Jameson was suggested by Hofmeyr, who helped to draw up its terms.) Once more Hofmeyr became president of the Bond. By an alteration of the provincial constitution, all power in the Cape branch of the Bond was vested in the hands of a vigilance committee of three, of whom Hofmeyr and his brother were two. As the recognized leader of the Cape Dutch, he protested against such abuses as the dynamite monopoly in the Transvaal, and urged Kruger even at the eleventh hour to grant reasonable concessions rather than plunge into a war that might involve Cape Afrikanderdom and the Transvaal in a common ruin. In July 1899 he journeyed to Pretoria, and vainly supported the proposal of a satisfactory franchise law, combined with a limited representation of the Uitlanders in the Volksraad, and in September urged the Transvaal to accede to the proposed joint inquiry. During the negotiations of 1899, and after the outbreak of war, the official organ of the Bond, Ons Land, was conspicuous for its anti-British attitude, and its violence forced Lord Roberts to suppress it in the Cape Colony district under martial law. Hofmeyr never associated himself publicly with the opinions expressed by OnsXand, but neither did he repudiate them. The tide of race sympathy among his Dutch supporters made his position one of great difficulty, and shortly after the outbreak of war he withdrew to Europe, and refused to act as a member of the " Conciliation Committee " which came to England in 1901 in the interests of the Boer republics.

Towards the close of the war Hofmeyr returned to South Africa and organized the Bond forces for the general election held in Cape Colony at the beginning of 1904, which resulted in the defeat of the Bond party.

Hofmeyr retained his ascendancy over the Cape Dutch, but now began to find himself somewhat out of sympathy with the larger outlook on South African

affairs taken by the younger leaders of the Boers in the Transvaal. During 1906 he gave offence to the extreme section of the Bond by some criticisms of the taal and his use of English in public speeches. At the general election in 1008 the Bond, still largely under his direction, gained a victory at the polls, but Hofmeyr himself was not a candidate. In the renewed move- ment for the closer union of the South African colonies he advocated federation as opposed to unification. When, however, the unification proposals were ratified by the Cape parliament, Hofmeyr procured his nomination as one of the Cape delegates to England in the summer of 1909 to submit the draft act of union to the imperial government. He attended the conferences with the officials of the Colonial Office for the preparation of the draft act, and after the bill had become law went to Germany for a " cure." He returned to London in October 1909, where he died on the 16th of that month. His body was taken to Cape Town for burial.

HOFSTEDE DE GROOT, PETRUS (1802-1886), Dutch theologian, was born at Leer in East Friesland, Prussia, on the 8th of October 1802, and was educated at the Gymnasium and university of Groningen. For three years (1826-1829) he was pastor of the Reformed Church at Ulrum, and then entered upon his lifelong duties as professor of theology at Groningen. With his colleagues L.G. Pareau, J. F. van Vordt, and W. Muurling he edited from 1837 to 1872 the Waarheid in Liefde. In this review and in his numerous books he vigorously upheld the orthodox faith against the Dutch " modern theology " move- ment. Many of his works were written in Latin, including Disputatio, qua ep. ad Hebraeos cum Paulin. epistolis comparatur (1826), Institutiones historiae ecclesiae (1835), Institulio theologiae naturalis (1842), Encyclopaedia theologi christiani (1844). Others, in Dutch, were: The Divine Education of Humanity up to the Coming of Jesus Christ (3 vols., 1846), The Nature of the Gospel Ministry (1858), The "Modern Theology" of the Netherlands (1869), The Old Catholic Movement (1877). He became professor emeritus in 1872, and died at Groningen on the 5th of December

1886.

HOGARTH, WILLIAM (1697-1764), the great English painter and pictorial satirist, was born at Bartholomew Close in London on the 10th of

November 1697, and baptized on the 28th in the church of St Bartholomew the Great. He had two younger sisters, Mary, born in 1699, and Ann, born in 1701. His father, Richard Hogarth, who died in 17 18, was a school- master and literary hack, who had come to the metropolis to seek that fortune which had been denied to him in his native Westmorland. The son seems to have been early distinguished by a talent for drawing and an active perceptive faculty rather than by any close attention to the learning which he was soon shrewd enough to see had not made his parent prosper. " Shows of all sorts gave me uncommon pleasure when an infant," he says, " and mimicry, common to all children, was remarkable in me. . . . My exercises when at school were more remarkable for the ornaments which adorned them than for the exercise itself." This being the case, it is no wonder that, by his own desire, he was apprenticed to a silver-plate engraver, Mr Ellis Gamble, at the sign of the " Golden Angel " in Cranbourne Street or Alley, Leicester Fields. For this master he engraved a shop- card which is still extant. When his apprenticeship began is not recorded; but it must have been concluded before the beginning of 1720, for in April of that year he appears to have set up as engraver on his own account. His desires, however, were not limited to silver-plate engraving. " Engraving on copper was, at twenty years of age, my utmost ambition." For this he lacked the needful skill as a draughtsman; and his account of the means which he took to supply this want, without too much interfering with his pleasure, is thoroughly character- istic, though it can scarcely be recommended as an example. " Laying it down," he says," first as an axiom, that he who could by any means acquire and retain in his memory, perfect ideas of the subjects he meant to draw, would have as clear a knowledge of the figure as a man who can write freely hath of the twenty-four letters of the alphabet and their infinite

combinations (each of these being composed of lines), and would consequently be an accurate designer, ... I therefore en- deavoured to habituate myself to the exercise of a sort of technical memory, and by repeating in my own mind, the parts of which objects were composed, I could by degrees combine and put them down with my pencil." This account, it is possible, has something of the complacency of the old age in which it was written; but there is little doubt that his marvellous power of seizing expression owed less to patient academical study than to his unexampled eye-memory and tenacity of minor detail. But he was not entirely without technical training, since, by his own showing, he occasionally " took the life " to correct his memories, and is known to have studied at Sir James Thornhill's then recently opened art school.

" His first employment " {i.e. after he set up for himself) " seems," says John Nichols, in his Anecdotes, " to have been the engraving of arms and shop bills." After this he was employed in designing "plates for

booksellers." Of these early and mostly insignificant works we may pass over " The Lottery, an Emblematic Print on the South Sea Scheme," and some book illustrations, to pause at " Masquerades and Operas " (1724), the first plate he published on his own account. This is a clever little satire on contemporary follies, such as the masque- rades of the Swiss adventurer Heidegger, the popular Italian opera-singers, Rich's pantomimes at Lincoln's Inn Fields, and last, but by no means least, the exaggerated popularity of Lord Burlington's protege, the architect painter William Kent, who is here represented on the summit of Burlington Gate, with Raphael and Michelangelo for supporters. This worthy, Hogarth had doubtless not learned to despise less in the school of his rival Sir James Thornhill. Indeed almost the next of Hogarth's important prints was aimed at Kent alone, being that memorable burlesque of the unfortunate altarpiece designed by the latter for St Clement Danes, which, in deference to the ridicule of the parishioners, Bishop Gibson took down in 1725. Hogarth's squib, which appeared subsequently, exhibits it as a very masterpiece of confusion and bad drawing. In 1726 he prepared twelve large engravings for Butler's Hudibras. These he himself valued highly, and they are the best of his book illustrations. But he was far too individual to be the patient interpreter of other men's thoughts, and it is not in this direction that his successes are to be sought.

To 1727-1728 belongs one of those rare occurrences which have survived as contributions to his biography. He was engaged by Joshua Morris, a tapestry worker, to prepare a design for the " Element of Earth." Morris, however, having heard that he was " an engraver, and no painter," declined the work when completed, and Hogarth accordingly sued him for the money in the Westminster Court, where, on the 28th of May 1728, the case was decided in his (Hogarth's) favour. It may have been the aspersion thus early cast on his skill as a painter (coupled perhaps with the unsatisfactory state of print- selling, owing to the uncontrolled circulation of piratical copies) that induced him about this time to turn his attention to the production of "small conversation pieces" {i.e. groups in oil of full-length portraits from 12 to 15 in. high), many of which are still preserved in different collections. " This," he says, " having novelty, succeeded for a few years." Among his other efforts in oil between 1728 and 1732 were " The Wanstead Conversation," "The House of Commons examining Bambridge," an infamous warden of the Fleet, and several pictures of the chief actors in Gay's popular Beggar's Opera.

On the 23rd of March 1729 he was married at old Paddington church to Jane Thornhill, the only daughter of Kent's rival above mentioned. The match was a clandestine one, although Lady Thornhill appears to have favoured it. We next hear of him in " lodgings at South Lambeth," where he rendered some assistance to the then well-known Jonathan Tyers, who

opened Vauxhall in 1732 with an entertainment styled a ridotto al fresco. For these gardens Hogarth painted a poor picture of Henry VIII. and Anne Boleyn, and he also permitted Hayman to make copies of the later series of the " Four Times of the Day."

In return, the grateful Tyers presented him with a gold pass ticket " In perpetuam Beneficii Memoriam." It was long thought that Hogarth designed this himself. Mr Warwick Wroth (Numis- matic Chronicle, vol. xviii.) doubts this, although he thinks it probable that Hogarth designed some of the silver Vauxhall passes which are figured in Wilkinson's Londina illustrata. The only engravings between 1726 and 1732 which need be referred to are the " Large Masquerade Ticket " (1727), another satire on masquerades, and the print of "Burlington Gate" (1731), evoked by Pope's Epistle to Lord Burlington, and defending Lord Chandos, who is therein satirized. This print gave great offence, and was, it is said, suppressed.

By 1 73 1 Hogarth must have completed the earliest of the series of moral works which first gave him his position as a great and original genius. This was " A Harlot's Progress," the paintings for which, if we may trust the date in the last of the pictures, were finished in that year. Almost immediately after- wards he must have begun to engrave them — a task he had at first intended to leave to others. From an advertisement in the Country Journal; or, the Craftsman, 29th of January 1732, the pictures were then being engraved, and from later announce- ments it seems clear that they were delivered to the subscribers early in the following April, on the 21st of which month an unauthorized prose description of them was published. We have no record of the particular train of thought which prompted these story-pictures; but it may perhaps be fairly assumed that the necessity for creating some link of interest between the personages of the little " conversation pieces" above referred to, led to the further idea of connecting several groups or scenes so as to form a sequent narrative. " I wished," says Hogarth, " to compose pictures on canvas, similar to representations on the stage. " " I have endeavoured," he says again, "to treat my subject as a dramatic writer; my picture is my stage, and men and women my players, who by means of certain actions and gestures are to exhibit a dumb show." There was never a more eloquent dumb show than this of the " Harlot's Progress." In six scenes the miserable career of a woman of the town is traced out remorselessly from its first facile beginning to its shameful and degraded end. Nothing of the detail is softened or abated; the whole is acted out coram populo, with the hard, uncompassionate morality of the age the painter lived in, while the

introduction here and there of one or two well-known characters such as Colonel Charteris and Justice Gonson give a vivid reality to the satire. It had an immediate success. To say nothing of the fact that the talent of the paintings completely reconciled Sir James Thornhill to the son-in-law he had hitherto refused to acknowledge, more than twelve hundred names of subscribers to the engravings were entered in the artist's book. On the appearance of plate iii. the lords of the treasury trooped to the print shop for Sir John Gonson's portrait which it contained. The story was made into a pantomime by Theophilus Cibber, and by some one else into a ballad opera; and it gave rise to numerous pamphlets and poems. It was painted on fan-mounts and transferred to cups and saucers. Lastly, it was freely pirated. There could be no surer testimony to its popularity.

From the MSS. of George Vertue in the British Museum (Add. MSS. 23069-98) it seems that during the progress of the plates, Hogarth was domiciled with his father-in-law, Sir James Thornhill, in the Middle Piazza, Covent Garden (the " second house eastward from James Street "), and it must have been thence that set out the historical expedition from London to Sheerness of which the original record still exists at the British Museum. This is an oblong MS. volume entitled An Account of what seem'd most Remarkable in the Five Days' Peregrination of the Five Following Persons, vizt., Messieurs Tothall, Scott, Hogarth, Thornhill and Forrest. Begun on Saturday May 27th 1732 and Finish' d On the 31st of the Same Month. Abi tu et fac similiter . Inscription on Dulwich College Porch. The journal, which is written by Ebenezer, the father of Garrick's friend Theodosius Forrest, gives a good idea of what a " frisk " — as Johnson called it— was in those days, while the illustrations were by Hogarth and Samuel Scott the landscape painter.

John Thornhill, Sir James's son, made the map. This version (in prose) was subsequently run into rhyme by one of Hogarth's friends, the Rev. Wm. Gostling of Canterbury, and after the artist's death both versions were published. In the absence of other biographical detail, they are of considerable interest to the student of Hogarth. In 1733 Hogarth moved into the " Golden Head " in Leicester Fields, , which, with occasional absences at Chiswick, he continued to occupy until his death. By December of this year he was already engaged upon the engravings of a second Progress, that of a Rake. It was not as successful as its predecessor. It was in eight plates in lieu of six. The story is unequal; but there is nothing finer than the figure of the desperate hero in the Covent Garden gaming-house, or the admirable scenes in the Fleet prison and Bedlam, where at last his headlong career comes to its tragic termination. The plates abound with allusive suggestion and covert humour; but it is impossible to attempt any detailed description of them here.

“A Rake’s Progress” was dated June 25, 1735, and the engravings bear the words ” according to Act of Parliament.” This was an act (8 Geo. II. cap. 13) which Hogarth had been instrumental in obtaining from the legislature, being stirred thereto by the shameless piracies of rival printsellers. Although loosely drawn, it served its purpose; and the painter comme- morated his success by a long inscription on the plate entitled ” Crowns, Mitres, &c,” afterwards used as a subscription ticket to the Election series. These subscription tickets to his engravings, let us add, are among the brightest and most vivacious of the artist’s productions. That to the ” Harlot’s Progress ” was entitled “Boys peeping at Nature,” while the Rake’s Progress was heralded by the delightful etching known as ” A Pleased Audience at a Play, or The Laughing Audience.”

We must pass more briefly over the prints which followed the two Progresses, noting first ” A Modern Midnight Conversation,” an admirable drinking scene which comes between them in 1733, and the bright little plate of ” Southwark Fair,” which, although dated 1733, was published with ” A Rake’s Progress ” in 1735. Between these and ” Marriage d la mode,” upon the pictures of which the painter must have been not long after at work, come the small prints of the ” Consultation of Physicians ” and ” Sleeping Congregation” (1736), the “Scholars at a Lecture” (1737); the ” Four Times of the Day ” (1738), a series of pictures of 18th century life, the earlier designs for which have been already referred to; the” Strolling Actresses dressing in a Barn” (1738), which Walpole held to be, ” for wit and imagination, without any other end, the best of all the painter’s works “; and finally the admirable plates of the Distrest Poet painfully composing a poem on ” Riches ” in a garret, and the Enraged Musician fulminating from his parlour window upon a discordant orchestra of knife-grinders, milk-girls, ballad-singers and the rest upon the pavement outside. These are dated respectively 1736 and 1741. To this period also (i.e. the period preceding the production of the plates of ” Marriage a la mode “) belong two of those history pictures to which, in emulation of the Haymans and Thornhills, the artist was continually attracted. ” The Pool of Bethesda” and the ” Good Samaritan,” ” with figures seven feet high,” were painted circa 1736, and presented by the artist to St Bartholomew’s Hospital, where they remain. They were not masterpieces; and it is pleasanter to think of his connexion with Captain Coram’s recently established Foundling Hospital (1739)1 which he aided with his money, his graver and his hrush, and for which he painted that admirable portrait of the gbod old philanthropist which is still, and deservedly, one of its chief ornaments.

In ” A Harlot’s Progress ” Hogarth had not strayed much beyond the lower walks of society, and although, in “A Rake’s Progress,” his hero was taken from the middle classes, he can scarcely be said to have quitted those fields

of observation which are common to every spectator. It is therefore more remarkable, looking to his education and antecedents, that his masterpiece, " Marriage A la mode," should successfully depict, as the advertise- ment has it, " a variety of modern occurrences in high life."

Yet, as an accurate delineation of upper class 18th century society, his " Marriage a la mode " has never, we believe, been seriously assailed. The countess's bedroom, the earl's apartment with its lavish coronets and old masters, the grand saloon with its marble pillars and grotesque ornaments, are fully as true to nature as the frowsy chamber in the " Turk's Head Bagnio," the quack-doctor's museum in St Martin's Lane, or the mean opulence of the merchant's house in the city. And what story could be more vividly, more perspicuously, more powerfully told than this godless alliance of sacs et parchemins — this miserable tragedy of an ill-assorted marriage ? There is no defect of in- vention, no superfluity of detail, no purposeless stroke. It has the merit of a work by a great master of fiction, with the addi- tional advantages which result from the pictorial fashion of the narrative; and it is matter for congratulation that it is still to be seen by all the world in the National Gallery in London, where it can tell its own tale better than pages of commentary.- The engravings of " Marriage a la mode " were dated April 1745. Although by this time the painter found a ready market for his engravings, he does not appear to have been equally successful in selling his pictures. The people bought his prints; but the richer and not numerous connoisseurs who purchased pictures were wholly in the hands of the importers and manufacturers of "old masters." In February 1745 the original oil paintings of the two Progresses, the " Four Times of the Day " and the " Strolling Actresses " were still unsold. On the last day of that month Hogarth disposed of them by an ill-devised kind of auction, the details of which may be read in Nichols's Anecdotes, for the paltry sumof £427,73. No better fate attended " Marriage a la mode," which six years later became the property of Mr Lane of Hillingdon for 1 20 guineas, being then in Carlo Maratti frames which had cost the artist four guineas a piece. Something of this was no doubt due to Hogarth's impracticable arrangements, but the fact shows conclusively how completely blind his con- temporaries were to his merits as a painter, and how hopelessly in bondage to the all-powerful picture-dealers. Of these latter the painter himself gave a graphic picture in a letter addressed by him under the pseudonym of " Britophil " to the St James's Evening Post, in June 1737.

But if Hogarth was not successful with his dramas on canvas, he occasionally shared with his contemporaries in the popularity of portrait

painting. For a picture, executed in 1746, of Garrick as Richard III. he was paid £200, " which was more," says he, " than any English artist ever received for a single portrait." In the same year a sketch of Simon Fraser, Lord Lovat, after- wards beheaded on Tower Hill, had an exceptional success.

We must content ourselves with a brief enumeration of the most important of his remaining works. These are " The Stage Coach or Country Inn Yard" (1747); the series of twelve plates entitled "Industry and Idleness" (1747), depicting the career of two London apprentices; the " Gate of Calais " (1749), which had its origin in a rather unfortunate visit paid to France by the painter after the peace of Aix-la-Chapelle; the " March to Finchlcy " (1750); " Beer Street," " Gin Lane" and the "Four Stages of Cruelty" (1751); the admirable representations of election humours in the days of Sir Robert Walpole, entitled " Four Prints of an Election" (1755-1758); and the plate of " Credulity, Superstition and Fanaticism, a Medley " (1762), adapted from an earlier unpublished design called " Enthusiasm Delineated." Besides these must be chronicled three more essays in the " great style of history painting," viz. " Paul before Felix," "Moses brought to Pharaoh's Daughter " and the Altarpiece for St Mary Redcliffe at Bristol. The first two were engraved in 1751-1752, the last in 1794. A subscription ticket to the earlier pictures, entitled " Paul before Felix Burlesqued," had a popularity far greater than that of the prints themselves.

In 1745 Hogarth painted that admirable portrait of himself with his dog Trump, which is now in the National Gallery. In a corner of this he had drawn on a palette a serpentine curve with the words " The Line of Beauty." Much inquiry ensued as to the meaning of this hieroglyphic; and in an unpropitious hour the painter resolved to explain himself in writing. The

result was the well-known Analysis of Beauty (1753), a treatise to fix " the fluctuating ideas of Taste," otherwise a desultory essay having for pretext the precept attributed to Michelangelo that a figure should be always "Pyramidall, Serpent like and multiplied by one two and three." The fate of the book was what might have been expected. By the painter's adherents it was praised as a final deliverance upon aesthetics; by his enemies, and professional rivals, its obscurities, and the minor errors which, notwithstanding the benevolent efforts of literary friends, the work had not escaped, were made the subject of endless ridicule and caricature. It added little to its author's fame, and it is perhaps to be regretted that he ever undertook it. Moreover, there were further humiliations in store for him. In 1759 the success of a little picture called "The Lady's Last Stake," painted for Lord Charlemont, procured him a commission from Sir Richard Grosvenor to paint another picture " upon the same terms." Unhappily on

this occasion he deserted his own field of genre and social satire, to select the story from Boccaccio (or rather Dryden) of Sigismunda weeping over the heart of her murdered lover Guiscardo, being the subject of a picture in Sir Luke Schaub's collection by Furini which had recently been sold for £400. The picture, over which he spent much time and patience, was not regarded as a success; and Sir Richard rather meanly shuffled out of his bargain upon the plea that " the constantly having it before one's eyes, would be too often occasioning melancholy ideas to arise in one's mind." Sigismunda, therefore, much to the artist's mortification, and the delight of the malicious, remained upon his hands. As, by her husband's desire, his widow valued it at £500, it found no purchaser until after her death, when the Boydells bought it for 56 guineas. It was exhibited, with others of Hogarth's pictures, at the Spring Gardens exhibition of 1761, for the catalogue of which Hogarth engraved a Head-piece and a Tail- piece which are still the delight of collectors; and finally, by the bequest of Mr J. H. Anderdon, it passed in 1879 to the National Gallery, where, in spite of theatrical treatment and a repulsive theme, it still commands admiration for its colour, drawing and expression.

In 1 761 Hogarth was sixty-five years of age, and he had but three years more to live. These three years were embittered by an unhappy quarrel with his quondam friends, John Wilkes and Churchill the poet, over which most of his biographers are contented to pass rapidly. Having succeeded John Thornhill in 1757 as Serjeant painter (to which post he was reappointed at the accession of George III.), an evil genius prompted him in 1762 to do some "timed" thing in the ministerial interest, and he accordingly published the indifferent satire of " The Times, plate i." This at once brought him into collision with Wilkes and Churchill, and the immediate result was a violent attack upon him, both as a man and an artist, in the opposition North Briton, No. 17. The alleged decay of his powers, the miscarriage of Sigismunda, the cobbled composition of the Analysis, were all discussed with scurrilous malignity by those who had known his domestic life and learned his weaknesses. The old artist was deeply wounded, and his health was failing. Early in the next year, however, he replied by that portrait of Wilkes which will for ever carry his squinting features to posterity. Churchill retaliated in July by a savage Epistle to William Hogarth, to which the artist rejoined by a print of Churchill as a bear, in torn bands and ruffles, not the most successful of his works. " The pleasure, and pecuniary advantage," writes Hogarth manfully, " which I derived from these two engravings " (of Wilkes and Churchill), " together with occasionally riding on horseback, restored me to as much health as can be expected at my time of life." He produced but one more print, that of " Finis, or The Bathos," March 1764, a strange jumble of "fag ends," intended as a tail-piece to his collected prints; and on the 26th October of

the same year he died of an aneurism at his house in Leicester Square. His wife, to whom he left his plates as a chief source of income, survived him until 1789. He was buried in Chiswick churchyard, where a tomb was erected to him by his friends in 1 77 1, with an epitaph by Garrick. Not far off, on the road

to Chiswick Gardens, still stands the little red-brick Georgian villa in which from September 1749 until his death he spent the summer seasons. After many vicissitudes and changes of ownership it was purchased in 1902 by Lieut.-Colonel Shipway of Chiswick, who turned it into a Hogarth museum and preserved it to the nation.

From such records of him as survive, Hogarth appears to have been much what from his portrait one might suppose him to have been — a blue-eyed, honest, combative little man, thoroughly insular in his prejudices and antipathies, fond of flattery, sensitive like most satirists, a good friend, an intractable enemy, ambitious, as he somewhere says, in all things to be singular, and not always accurately estimating the extent of his powers. With the art connoisseurship of his day he was wholly at war, because, as he believed, it favoured foreign mediocrity at the expense of native talent; and in the heat of argument he would probably, as he admits, often come " to utter blasphemous expressions against the divinity even of Raphael Urbino, Correggio and Michel- angelo." But it was rather against the third-rate copies of third-rate artists — the " ship-loads of dead Christs, Holy Families and Madonnas " — that his indignation was directed; and in speaking of his attitude with regard to the great masters of art, it is well to remember his words to Mrs Piozzi: — "The connoisseurs and I are at war, you know; and because I hate them, they think I hate Titian — and let them! "

But no doubt it was in a measure owing to this hostile attitude of his towards the all-powerful picture-brokers that his con- temporaries failed to recognize adequately his merits as a painter, and persisted in regarding him as an ingenious humorist alone. Time has reversed that unjust sentence. He is now held to have been a splendid painter, pure and harmonious in his colouring, wonderfully dexterous and direct in his handling, and in his composition leaving little or nothing to be desired. As an en- graver his work is more conspicuous for its vigour, spirit and intelligibility than for finish and beauty of line. He desired that it should tell its own tale plainly, and bear the distinct impress of his individuality, and in this he thoroughly succeeded. As a draughtsman his skill has sometimes been debated, and his

work at times undoubtedly bears marks of haste, and even carelessness. If, however, he is judged by his best instead of his worst, he will not be found wanting in this respect. But it is not after all as a draughtsman, an engraver or a painter that he claims his unique position among English artists — it is as a humorist and a satirist upon canvas. Regarded in this light he has never been equalled, whether for his vigour of realism and dramatic power, his fancy and invention in the decoration of his story, or his merciless anatomy and exposure of folly and wickedness. If we regard him — as he loved to regard himself — as " author " rather than " artist," his place is with the great masters of literature. — with the Thackerays and Fieldings, the Cervantes and Molieres.

Authorities. — The main body of Hogarth literature is.to be found in the autobiographical Memoranda, published by John Ireland in 1798, and in the successive Anecdotes of the antiquary John Nichols. Much minute information has also been collected in F. G. Stephens's Catalogue of the Satirical Prints and Drawings in the British Museum. But a copious bibliography of books, pamphlets, &c, relating to Hogarth, together with detailed catalogues of his paintings and prints, will be found in the Memoir of Hogarth by Austin Dobson. First issued in 1879, this was reprinted ana expanded in 1891, 1897, 1902 and finally in 1907. Pictures by Hogarth from private collec- tions are constantly to be found at the annual exhibitions of the Old Masters at Burlington House; but most of the best-known works have permanent homes in public galleries. " Marriage a la mode, " " Sigismunda," " Lavinia Fenton," the " Shrimp Girl," the " Gate of Calais," the portraits of himself, his sister and his servants, are all in the National Gallery; the " Rake's Progress" and the Election Series, in the Soane Museum; and the " March to Finchley " and "Captain Coram" in theFoundling. There are also notable pictures in the Fitzwilliam Museum at Cambridge and the National Portrait • Gallery. At the Print Room in the British Museum there is also a very interesting set of sixteen designs for the series called " Industry and Idleness," the majority of which formerly belonged to Horace YValpole. (A. D.)

HOGG, JAMES (1770-1835), Scottish poet, known as the " Ettrick Shepherd," was baptized at Ettrick in Selkirkshire

on the 9th of December 1770. His ancestors had been shepherds for centuries. He received hardly any school training, and seems to have had difficulty in getting books to read. After spending his early years herding sheep for different masters, he was engaged as shepherd by Mr Laidlaw, tenant of Blackhouse, in the parish of Yarrow, from 1790 till 1799. He was treated with great kindness, and had access to a large collection of books. When this was exhausted he subscribed to a circulating library in Peebles. While attending to his flock, he spent a great deal of time in

reading. He profited by the company of his master's sons, of whom William Laidlaw is known as the friend of Scott and the author of Lucy's Flittin'. Hogg's first printed piece was " The Mistakes of a Night " in the Scots Magazine for October 1794, and in 1801 he published his Scottish Pastorals. In 1802 Hogg became acquainted with Sir Walter Scott, who was then collecting materials for his Border Minstrelsy. On Scott's recommendation Constable published Hogg's mis- cellaneous poems (The Mountain Bard) in 1807. By this work, and by The Shepherd's Guide, being a Practical Treatise on the Diseases of Sheep, Hogg realized about £300. With this money he unfortunately embarked in farming in Dumfriesshire, and in three years was utterly ruined, having to abandon all his effects to his creditors. He returned to Ettrick, only to find that he could not even obtain employment as a shepherd; so he set off in February 18 10 to push his fortune in Edinburgh as a literary adventurer. In the same year he published a collec- tion of songs, The Forest Minstrel, to which he was the largest contributor. This book, being dedicated to the countess of Dalkeith (afterwards duchess of Buccleuch), and recommended to her notice by Scott, was rewarded with a present of 100 guineas. He then began a weekly periodical, The Spy, which he continued from September 18 10 till August 181 1. The appearance of The Queen's Wake in 1813 established Hogg's reputation as a poet; Byron recommended it to John Murray, who brought out an English edition. The scene of the poem is laid in 1561; the queen is Mary Stuart; and the "wake" provides a simple framework for seventeen poems sung by rival bards. It was followed by the Pilgrims of the Sun (1815), and Mador of the Moor (1816). The duchess of Buccleuch, on her death-bed (1814), had asked her husband to do something for the Ettrick bard; and the duke gave him a lease for life of the farm of Altrive in Yarrow, consisting of about 70 acres of moor- land, on which the poet built a house and spent the last years of his life. In order to obtain money to stock his farm Hogg asked various poets to contribute to a volume of verse which should be a kind of poetic " benefit " for himself. Failing in his applications he wrote a volume of parodies, published in 1816, as The Poetic Mirror, or the Living Bards of Great Britain. He took possession of his farm in 181 7; but his literary exertions were never relaxed. Before 1820 he had written the prose tales of The Brownie of Bodsbeck (18 18) and two volumes of Winter Evening Tales (1820), besides collecting, editing and writing part of two volumes of The Jacobite Relics of Scotland (18 19- 1821), and contributing largely to Blackwood's Magaaine. " The Chaldee MS.," which appeared in Blackwood's M agazine (October 1817), and gave such offence that it was immediately withdrawn, was largely Hogg's work.

In 1820 he married Margaret Phillips, a lady of a good Annan- dale family, and found himself possessed of about £1000, a good house and a

well-stocked farm. Hogg's connexion with Blackwood's Magazine kept him continually before the public; his contributions, which include the best of his prose works, were collected in the Shepherd's Calendar (1829). The wit and mischief of some of his literary friends made free with his name as the " Shepherd " of the Nodes Ambrosianae, and represented him in ludicrous and grotesque aspects; but the effect of the whole was favourable to his popularity. " Whatever may be the merits of the picture of the Shepherd [in the Nodes Am- brosianae] — and no one will deny its power and genius," writes Professor Veitch — " it is true, all the same, that this Shepherd was not the Shepherd of Ettrick or the man James Hogg. He was neither a Socrates nor a Falstaff, neither to be credited

with the wisdom and lofty idealizings of the one, nor with the characteristic humour and coarseness of the other." The Three Perils of Woman (1820), and The Three Perils of Man (1822), were followed in 1825 by an epic poem, Queen Hynde, which was unfavourably received. He visited London in 1832, and was much lionized. On his return a public dinner was given to him in Peebles, — Professor Wilson in the chair, — and he acknow- ledged that he had at last " found fame." His health, however, was seriously impaired. With his pen in his hand to the last, Hogg in 1834 published a volume of Lay Sermons, and The Domestic Manners and Private Life of Sir Waller Scott, a book which Lockhart regarded as an infringement on his rights. In 1835 appeared three volumes of Tales of the Wars of Montrose. Hogg died on the 21st of November 1835, and was buried in the churchyard of his native parish Ettrick. His fame had seemed to fill the whole district, and was brightest at its close; his presence was associated with all the border sports and festivities; and as a man James Hogg was ever frank, joyous and charitable. It is mainly as a great peasant poet that he lives in literature. Some of his lyrics and minor poems — his "Skylark," "When the Kye comes Hame," his verses on the " Comet " and " Evening Star," and his " Address to Lady Ann Scott " — are exquisite. The Queen's Wake unites his characteristic excellences — his command of the old romantic ballad style, his graceful fairy mythology and his aerial flights of imagination. In the fairy story of Kilmeny in this work Hogg seems completely transformed; he is absorbed in the ideal and supernatural, and writes under direct and immediate inspiration.

See Hogg's "Memoir of the Author's Life, written by himself," prefixed to the 3rd edition (1821) of The Mountain Bard, also Memorials of James Hogg, the Ettrick Shepherd, edited by his daughter, Mrs M. G. Garden (enlarged edition with preface by Professor Veitch, 1903). and Sir G. B. S.

Douglas, James Hogg (1899) in the " Famous Scots " series ; also The Poems of James Hogg, selected by William Wallace (1903). John Wilson (" Christopher North ") had a real affection for Hogg, but for some reason or other made no use of the materials placed in his hands for a biography of the poet. The memoir mentioned on the title-page of the Works (1838-1840) never appeared, and the memoir prefixed to the edition of Hogg's works published by Blackie & Co. (1865) was written by the Rev. Thomas Thompson. See also Wilson's Noctes Ambrosianae; Mrs Oliphant's Annals of a Publishing House, vol. i. chap. vii. ; Gilfillan s First Gallery of Literary Portraits; Cunningham's Biog. and Crit. Hist, of Lit. : and the general index to Blackwood' s Magazine. A collected edition of Hogg's Tales appeared in 1837 in 6 vols., and a second in 1851; his Poetical Works were published in 1822, 1838-1840 and 1 865- 1 866. For an admirable account of the social entertainments Hogg used to give in Edinburgh, see Memoir of Robert Chambers (1874), by Dr William Chambers, pp. 263-270.

HOGG, THOMAS JEFFERSON (1792-1862), English man of letters, was born at Norton, Durham, on the 24th of May 1792. He was educated at Durham grammar school and at University College, Oxford. Here he became the intimate friend of the poet Shelley, with whom in 181 1 he was expelled from the university for refusing to disclaim connexion with the author- ship of the pamphlet The Necessity for Atheism. He was then sent to study law at York, where he remained for six months. Hogg's behaviour to Harriet Shelley interrupted his relations with her husband for some time, but in 1813 the friendship was renewed in London. In 181 7 Hogg was called to the bar, and became later a revising barrister. In 1844 he inherited £2000 under Shelley's will, and in 1855, in accordance with the wishes of the poet's family, began to write Shelley's biography. The first two volumes of it were published in 1858, but they proved to be far more an autobiography than a biography, and Shelley's representatives refused Hogg further access to the materials necessary for its completion. Hogg died on the 27th of August 1862.

HOGMANAY, the name in Scotland and some parts of the north of England for New Year's Eve, as also for the cake then given to the children,. On the morning of the 31st of December the children in small bands go from door to door singing:

" Hogmanay Trollolay Gie's o' your white bread and nane o' your grey " ;

and begging for small gifts or alms. These usually take the form of an oaten cake. The derivation of the term has been much disputed. Cotgrave (161 1) says: " It is the voice of the country folks begging small presents or New Year's gifts . . . an ancient term of rejoicing derived from the Druids, who

were wont the first of each January to go into the woods, where, having sacrificed and banquetted together, they gathered mistletoe, esteeming it excellent to make beasts fruitful and most soverayne against all poyson." And he connects the word, through such Norman French forms as hoguinane, with the old French aguilanneuf, which he explains as au gui-l' an-neuf , " to the mistletoe! the New Year!" — this being (on his interpreta- tion) the Druidical salutation to the coming year as the revellers issued from the woods armed with boughs of mistletoe. But though this explanation may be accepted as containing the truth in referring the word to a French original, Cotgrave's detailed etymology is now repudiated by scientific philologists, and the identical French aguilanneuf remains, like it, in obscurity.

HOGSHEAD, a cask for holding liquor or other commodities, such as tobacco, sugar, molasses, &c; also a liquid measure of capacity, varying with the contents. As a measure for beer, cider, &c., it equals 54 gallons. A statute of Richard III. (1483) fixed the hogshead of wine at 63 wine-gallons, i.e. 52! imperial gallons. The etymology of the word has been much discussed. According to Skeat, the origin is to be found in the name for a cask or liquid measure appearing in various forms in several Teutonic languages, in Dutch oxhooft (modern okshoofd), Dan. oxehoved, O. Swed. oxhufvod, &c. The word should therefore be " oxhead," and " hogshead " is a mere corruption. It has been suggested that the name arose from the branding of such a measure with the head of an ox (see Notes and Queries, series iv. 2, 46, note by H. Tiedeman). The New English Dictionary does not attempt any explanation of the term, and takes " hogshead " as the original form, from which the forms in other languages have been corrupted. The earlier Dutch forms hukeshovet and hoekshoot are nearer to the English form, and, further, the Dutch for " ox " is os.

HOHENASPERG, an ancient fortress of Germany, in the kingdom of Wurttemberg, 10 m. N. of Stuttgart, is situated on a conical hill, 1100 ft. high, overlooking the town of Asperg. It was formerly strongly fortified and was long the state prison of the kingdom of Wurttemberg. Among the many who have been interned here may be mentioned the notorious Jew financier, Joseph Siiss-Oppenheimer (1692-1738) and the poet C. F. D. Schubart (1739-1791). It is now a reformatory. Hohenasperg originally belonged to the counts of Calw; it next passed to the counts palatine of Tiibingen and from them was acquired in 1308 by Wurttemberg. In 1535 the fortifications were extended and strengthened, and in 1635 the town was taken by the Imperialists, who occupied it until 1649.

See Schon, Die Staatsgefangenen von Hohenasperg (Stuttgart, 1899) ; and Biffart, Geschichte der Wiirttembergischen Feste Hohenasperg (Stuttgart, 1858).

HOHENFRIEDBERG, or Hohenfriedeberg, a village of Silesia, about 6 m. from the small town of Striegau. It gives its name to a battle (also called the battle of Striegau) in the War of the Austrian Succession, fought on the 3rd of June 1745 between the Prussians under Frederick the Great and the Austrians and Saxons commanded by Prince Charles of Lorraine. In May the king, whose army had occupied extended winter, quarters in Silesia, had drawn it together into a position about Neisse whence he could manoeuvre against the Austrians, whether they invaded Silesia by Troppau or Glatz, or joined their allies (who, under the duke of Weissenfels, were on the upper Elbe), and made their advance on Schweidnitz, Breslau or Liegnitz. On the Austrians concentrating towards the Elbe, , Frederick gradually drew his army north-westward along the edge of the mountain country until on the 1st of June it was near. Schweidnitz. At that date the Austro-Saxons were ad- vancing (very slowly owing to the poorness of the roads and the dilatoriness of the Saxon artillery train) from Waldenburg

and Landshut through the mountains, heading for Striegau. After a few minor skirmishes at the end of May, Frederick had made up his mind to offer no opposition to the passage of the Allies, but to fall upon them as they emerged, and the Prussian army was therefore kept concentrated out of sight, while only selected officers and patrols watched the debouches of the mountains. On the other hand the Allies had no intention of delivering battle, but meant only, on emerging from the mountains, to take up a suitable camping position and thence to interpose between Breslau and the king, believing that " the king was at his wits' end, and, once the army really began its retreat on Breslau, there would be frightful consternation in its ranks." But in fact, as even the coolest observers noticed, the Prussian army was in excellent spirits and eager for the " decisive affair " promised by the king. On the 3rd of June, watched by the invisible patrols, the Austrians and Saxons emerged from the hills at Hohenfriedberg with bands playing and colours flying. Their advanced guard of infantry and cavalry spread out into the plain, making for a line of hills spreading north-west from Striegau, where the army was to

|— ! ~ˆ J Eisdorfffi .) S JkjPfigramshain.

_ / nˆZii&s? Contours at intervals

K-C > ~' !j (ˆIfa of 20 metres

571

Scale of 1 mile

HOHENFRIEDBERG June 4, 1745

Prussians tst Stage _.

Prussiansind Stage..

A.l.Austrian lnf.A.C.Austrian Cao, S.I. Saxon Inf. S.C. Saxon Cao.

EracryU'iJJtcr ae.

encamp. But the main body moved slowly, and at last Prince Charles and Weissenfels decided to put off the occupation of the line of hills till the morrow. The army bivouacked therefore in two separate wings, the Saxons (with a few Austrian regiments) between Gunthersdorf and Pilgramshain, the Austrians near Hausdorf. They were about 70,000 strong, Frederick 65,000.

The king had made his arrangements in good time, aided by the enemy's slowness, and in the evening he issued simple orders to move. About o p.m. the Prussians marched off from Alt- Jauernigk towards Striegau, the guns on the road, the infantry and cavalry, in long open columns of companies and squadrons, over the fields on either side — a night march well remembered by contrast with others as having been executed in perfect order. Meanwhile General Dumoulin, who commanded an advanced detachment between Striegau and Stanowitz, broke camp silently and moved into position below the hill north-west of Striegau, which was found to be occupied by Saxon light infantry outposts. The king's orders were for Dumoulin and the right wing of the main army to deploy and advance towards Haslicht against the Saxons, and for the left wing infantry to prolong the line from the marsh to Gunthersdorf, covered by the left-wing cavalry on the plain near Thomaswaldau. On the side of the Austrians, the outlying hussars are said to have noticed and reported the king's movement, for the night was clear and starlit, but their report, if made, was ignored.

At 4 a.m. Dumoulin advanced on Pilgramshain, neglecting the fire of the Saxon outpost on the Spitzberg, whereupon

this promptly retired in order to avoid being surrounded.

Dumoulin then posted artillery on the slope of the hill and

deployed his six grenadier battalions facing the village. The

leading cavalry of the main army came up and deployed on

Dumoulin's left front in open rolling ground. Meantime the duke of Weissenfels had improvised a line of defence, posting his infantry in the marshy ground and about Pilgramshain, and his cavalry, partly in front of Pilgramshain and partly on the intervening space, opposite that of the Prussians. But before the marshy ground was effectively occupied by the duke's infantry, his cavalry had been first shaken by the fire of Dumoulin's guns on the Spitzberg and a heavy battery that was brought up on to the Grabener Fuchsberg, and then charged by the Prussian right-wing cavalry, and in the melee the Allies were gradually driven in confusion off the battlefield. The cavalry battle was ended by 6.30 a.m., by which time Dumoulin's grenadiers, stiffened by the line regiment Anhalt (the " Old Dessauer's " own), were vigorously attacking the garden hedges and walls of Pilgramshain, and the Saxon and Austrian infantry in the marsh was being attacked by Prince Dietrich of Dessau with the right wing of the king's infantry. The line infantry of those days, however, did not work easily in bad ground, and the Saxons were steady and well drilled. After an hour's fight, well supported by the guns and continually reinforced as the rest of the army closed up, the prince expelled the enemy from the marsh, while Dumoulin drove the light troops out of Pilgramshain. By 7 a.m. the Saxons, forming the left wing of the allied army, were in

full retreat.

While his allies were being defeated, Prince Charles of Lorraine had done nothing, believing that the cannonade was merely an outpost affair for the possession of the Spitzberg. His generals indeed had drawn out their respective commands in order of battle, the infantry south of Gunthersdorf, the cavalry near Thomaswaldau, but they had no authority to advance without orders, and stood inactive, while, 1 m. away, the Prussian columns were defiling over the Striegau Water. This phase of the king's advance was the most delicate of all, and the moment that he heard from Prince Dietrich that the marsh was captured he stopped the northward flow of his battalions and swung them westward, the left wing cavalry having to cover their deployment. But when one-third of this cavalry only had crossed at Teichau the bridge broke. For a time the advanced squadrons were in great danger. But they charged boldly, and a disjointed cavalry battle began, during which (Ziethen's hussars having dis- covered a ford) the rest of the left-wing cavalry was able to cross. At last 25 intact squadrons under Lieut.-General von Nassau charged and drove the Austrians in disorder towards Hohenfriedberg. This action was the more creditable to the victors in that 45 squadrons in 3 separate fractions defeated a mass of 60 squadrons that stood already deployed to meet them. Meanwhile the Prussian infantry columns of the centre and left had crossed Striegau Water and deployed to their left, and by 8.30 they were advancing on Gunthersdorf and the Austrian infantry south of that place. Frederick's purpose was to roll up the enemy from their inner flank, and while Prince Dietrich, with most of the troops that had forced the Saxons out of the marsh, pursued Weissenfels, two regiments of his and one of Dumoulin's were brought over to the left wing and sent against the north side of Gunthersdorf. In the course of the general forward movement, which was made in what was for those days a very irregular line, a wide gap opened up between the centre and left, behind which 10 squadrons of the Bayreuth dragoon regiment, with Lieut.-General von Gessler, took up their position. Thus the line advanced. The grenadiers on the extreme left cleared Thomaswaldau, and their fire galled the Austrian squadrons engaged in the cavalry battle to the south. Then Gunthersdorf, attacked on three sides, was also evacuated by the enemy. But although Frederick rode back from the front saying " the battle is won," the Prussian infantry, in spite

of its superior fire discipline, failed for some time to master the defence, and suffered heavily from the eight close-range volleys they received, one or two regiments losing 40 and 50 % of their strength. The Austrians,

however, suffered still more; feeling themselves isolated in the midst of the victorious enemy, they began to waver, and at the psychological moment Gessler and the Bayreuth dragoons charged into their ranks and " broke the equilibrium." These 1500 sabres scattered twenty battalions of the enemy and brought in 2500 prisoners and 66 Austrian colours, and in this astounding charge they themselves lost no more than 94 men. By nine o'clock the battle was over, and the wrecks of the Austro-Saxon army were retreating to the mountains. The Prussians, who had been marching all night, were too far spent to pursue.

The loss of the allies was in all 15,224, 7985 killed and wounded, and 7239 prisoners, as well as 72 guns and 83 standards and colours. The Prussians lost 4666 killed and wounded, 71 missing.

HOHENHEIM, a village of Germany, in the kingdom of Wtirttemberg, 7 m. S. of Stuttgart by rail. Pop. 300. It came in 1768 from the counts of Hohenheim to the dukes of Wtirttem- berg, and in 1785 Duke Karl Eugen built a country house here. This house with grounds is now the seat of the most important agricultural college in Germany; it was founded in 181 7, was raised to the position of a high school in 1865, and now ranks as a technical high school with university status.

See Frohlich, Das Schloss und die Akademie Hohenheim (Stuttgart,

1870).

HOHENLIMBURG, a town of Germany, on the Lenne, in the Prussian prov. of Westphalia, 30 m. by rail S.E. of Dortmund. Pop. (1905) 12,790. It has two Evangelical churches, a Roman Catholic church and a synagogue. The town is the seat of various iron and metal industries, while dyeing, cloth-making and linen- weaving are also carried on here. It is the chief town of the county of Limburg, and formerly belonged to the counts of Limburg, a family which became extinct in 1508. Later it passed to the counts of Bentheim-Tecklenburg. The castle of Hohenlimburg, which overlooks the town, is now the residence of Prince Adolf of Bentheim-Tecklenburg.

HOHENLOHE, a German princely family which took its name from the district of Hohenlohe in Franconia. At first a count- ship, its two branches were raised to the rank of principalities of the Empire in 1744 and 1764 respectively; in 1806 they lost their independence and their lands now form part of the kingdoms of Bavaria and of Wtirttemberg. At the time of the mediatization the area of Hohenlohe was 680 sq. m. and its estimated population was 108,000. The family is first mentioned in the 12th century as possessing the castle of Hohenloch, or Hohenlohe, near Uffenheim, and its influence was soon perceptible in several of the Franconian valleys, including those of the Kocher, the Jagst and the Tauber. Henry I. (d. 1183) was the first to take the title of count of Hohenlohe, and in 1230 his grandsons, Gottfried and Conrad, supporters of the emperor Frederick II., founded the lines of Hohenlohe — Hohenlohe and Hohenlohe-Brauneck, names taken from their respective castles. The latter became extinct in 1390, its lands passing later to Brandenburg, while the former was divided into several branches, only two of which, however, Hohenlohe-Weikersheim and Hohenlohe-Uffenheim-Speckfeld, need be mentioned here. Hohenlohe-

Weikersheim, descended from Count Kraft I. (d. 1313), also underwent several divisions, that which took place after the deaths of Counts Albert and George in 1551 being specially important. At this time the lines of Hohenlohe- Neuenstein and Hohenlohe-Waldenburg were founded by the sons of Count George. Meanwhile, in 1412, the family of Hohenlohe-Uffenheim-Speckfeld had become extinct, and its lands had passed through the marriages of its heiresses into other families.

The existing branches of the Hohenlohe family are descended from the lines of Hohenlohe-Neuenstein and Hohenlohe-Walden- burg, established in 1551. The former of these became Pro- testant, while the latter remained Catholic. Of the family of Hohenlohe-Neuenstein, which underwent several partitions and inherited Gleicben in 1631, the senior line became extinct

in 1805, while in 1701 the junior line divided itself into three branches, those of Langenburg, Ingelfingen and Kirchberg. Kirchberg died out in 1861, but members of the families of Hohenlohe-Langenburg and Hohenlohe-Ingelfingen are still alive, the latter being represented by the branches of Hohenlohe- Ingelfingen and Hohenlohe-Ohringen. The Roman Catholic family of Hohenlohe-Waldenburg was soon divided into three branches, but two of these had died out by 1729. The surviving branch, that of Schillingsf first, was divided into the lines of Hohenlohe-Schillingsfurst and Hohenlohe-Bartenstein; other divisions followed, and the four existing lines of this branch of the family are those of Waldenburg, Schillingsfurst, Jagstberg and Bartenstein. The family of Hohenlohe-Schillingsfurst pos- sesses the duchies of Ratibor and of Corbie inherited in 1824. The principal members of the family are dealt with below. I. Friedrich Ludwig, prince of Hohenlohe-Ingelfingea (1746-1818), Prussian general, was the eldest son of Prince Johann Friedrich (d. 1796) of Hohenlohe-Ingelfingen, and began his military career as a boy, serving against the Prussians in the last years of the Seven Years' War. Entering the Prussian army after the peace (1768), he was on account of his rank at once made major, and in 1775 he became lieutenant-colonel; in 1778 he took part in the War of the Bavarian Succession and about the same time was made a colonel. Shortly before the death of Frederick the Great he was promoted to the rank of major- general and appointed chief of a regiment. For some years the prince did garrison duty at Breslau, until in 1791 he was made governor of Berlin. In 1794 he commanded a corps in the Prussian army on the Rhine and distinguished himself greatly in many engagements, particularly in the battle of Kaisers- lautern on the 20th of September. He was at this time the most popular soldier in the Prussian army. Blucher wrote of him that " he was a leader of whom the Prussian army might well be proud." He succeeded his father in the principality, and acquired additional lands by his marriage with a daughter of Count von Hoym. In 1806 Hohenlohe, now a general of infantry, was appointed to

command the left-wing army of the Prussian forces opposing Napoleon, having under him Prince Louis Ferdinand of Prussia; but, feeling that his career had been that of a prince and not that of a scientific soldier, he allowed his quartermaster-general Massenbach to influence him unduly. Disputes soon broke out between Hohenlohe and the commander-in-chief, the duke of Brunswick, the armies marched hither and thither without effective results, and finally Hohenlohe's army was almost destroyed by Napoleon at Jena (see Napoleonic Campaigns). The prince displayed his usual personal bravery in the battle, and managed to rally a portion of his corps near Erfurt, whence he retired into Prussia. But the pursuers followed him up closely, and, still acting under Massenbach's advice, he surrendered the remnant of his army at Prenzlau on the 28th of October, a fortnight after Jena and three weeks after the beginning of hostilities. Hohenlohe's former popularity and influence in the army had now the worst possible effect, for the commandants of garrisons everywhere lost heart and followed his example. After two years spent as a prisoner of war in France Hohenlohe retired to his estates, living in self-imposed obscurity until his death on the 15th of February 1818. He had, in August 1806, just before the out- break of the French War, resigned the principality to his eldest son, not being willing to become a " mediatized " ruler under Wtirttemberg suzerainty.

II. Ludwig Aloysius, prince of Hohenlohe-Waldenburg Bartenstein (1765-1829), marshal and peer of France, was born on the 18th of August 1765. In 1784 he entered the service of the Palatinate, which he quitted in 1792 in order to take the command of a regiment raised by his father for the service of the emigrant princes of France. He greatly distinguished himself under Conde in the campaigns of 1 792-1 793, especially at the storming of the lines of Weissenburg. Subsequently he entered the service of Holland, and, when almost surrounded by the army of General Pichegru, conducted a masterly retreat from the island of Bommel. From 1794 to 1799 he served as*

colonel in the Austrian campaigns; in 1799 he was named major-general by the archduke Charles; and after obtaining the rank of lieutenant-general he was appointed by the emperor governor of the two Galicias. Napoleon offered to restore to him his principality on condition that he adhered to the con- federation of the Rhine, but as he refused, it was united to WUrttemberg. After Napoleon's fall in 1814 he entered the French service, and in 181 5 he held the command of a regiment raised by himself, with which he took part in the Spanish campaign of 1823. In 1827 he was

created marshal and peer of France. He died at Luneville on the 30th of May 1829.

III. Alexander Leopold Franz Emmerich, prince of Hohenlohe – Waldenburg – Schillingsf iirst (1794-1849), priest and reputed miracle-worker, was born at Kupferzell, near Waldenburg, on the 17th of August 1794. By his mother, the daughter of an Hungarian nobleman, he was from infancy destined for the church; and she entrusted his early education to the ex-Jesuit Riel. In 1804 he entered the " Theresianum " at Vienna, in 1808 the academy at Bern, in 1810 the archi- episcopal seminary at Vienna, and afterwards he studied at Tyrnau and Elhvangen. He was ordained priest in 1815, and in the following year he went to Rome, where he entered the society of the " Fathers of the Sacred Heart." Subsequently, at Munich and Bamberg, he was blamed for Jesuit and ob- scurantist tendencies, but obtained considerable reputation as a preacher. His first co-called miraculous cure was effected, in conjunction with a peasant, Martin Michel, on a princess of Schwarzenberg who had been for some years paralytic. Im- mediately he acquired such fame as a performer of miraculous cures that multitudes from various countries flocked to partake of the beneficial influence of his supposed supernatural gifts. Ultimately, on account of the interference of the authorities with his operations, he went in 1821 to Vienna and then to Hungary, where he became canon at Grosswardein and in 1844 titular bishop of Sardica. He died at Voslau near Vienna on the 17th of November 1849. He was the author of a number of ascetic and controversial writings, which were collected and published in one edition by S. Brunner in 1851.

IV. Kraft, prince of Hohenlohe-Ingelfingen (1827-1892), soldier and military writer, son of Prince Adolf of Hohenlohe- Ingelfingen (1 797-1873), was born at Koschentin in Upper Silesia. He was a nephew of the Prince Hohenlohe noticed above, who commanded the Prussians at Jena. Educated with great rigour, owing to the impoverishment of the family estates during the Napoleonic wars, he was sent into the Prussian army, and commissioned to the artillery at the least expensive arm of the service. He joined the Prussian Guard artillery in 1845, and it was soon discovered that he had unusual aptitudes as an artillery officer. For a time his brother officers resented the presence of a prince, until it was found that he made no attempt to use his social position to secure advancement. After serving as a military attache in Vienna and on the Transylvanian frontier during the Crimean War, he was made a captain on the general staff, and in 1856 personal aide-de-camp to the king, remaining, however, in close touch with the artillery. In 1864, having become in the meanwhile successively major and lieut.- colonel, he resigned the staff appointments to become commander of the new Guard Field Artillery regiment and in the following year he became colonel. In 1866 he saw his first real active

service. In the bold advance of the Guard corps on the Austrian right wing at Koniggratz (see Seven Weeks' War), he led the Guard reserve artillery with the greatest dash and success, and after the short war ended he turned his energies, now fortified by experience, to the better tactical training of the Prussian artillery. In 1868 he was made a major-general and assigned to command the Guard artillery brigade. In this capacity he gained great distinction during the Franco-German war and especially at Gravelotte and Sedan; he was in control of the artillery attack on the fortifications of Paris. In 1873 he was placed in command of an infantry division, and three years later was promoted lieutenant-general. He retired in 1879, was made general of infantry in 1883 and general of artillery

in 1889. His military writings were numerous, and amongst them several have become classics. These are Briefe iiber Artillerie (Eng. trans. Letters on Artillery, 1887); Briefe iiber Strategic (1877; Eng. trans. Letters on Strategy, 1898); and Gesprache iiber Reiterei (1887; Eng. trans. Conversations on Cavalry). The Briefe iiber Infanlerie and Briefe iiber Kavallerie (translated into English, Letters on Infantry, Letters on Cavalry, 1889) are of less importance, though interesting as a reflection of prevailing German ideas. His memoirs (Aus meinem Leben) were prepared in retirement near Dresden, and the first volume (1897) created such a sensation that eight years were allowed to elapse before the publication was continued. Prince Kraft died near Dresden on the 16th of January 1892. (C. F. A.)

V. Chlodwig Karl Victor, prince of Hohenlohe-Schillings- fiirst (1819-1901), statesman, was born on the 31st of March 1819 at Schillingsfiirst in Bavaria. His father, Prince Franz Joseph (1787-1841), was a Catholic, his mother, Princess Konstanze of Hohenlohe-Langenburg, a Protestant. In accord- ance with the compromise customary at the time, Prince Chlodwig and his brothers were brought up in the religion of their father, while his sisters followed that of their mother. In spite of the difference of creed the family was very united, and it was to the spirit that rendered this possible that the prince owed his liberal and tolerant point of view, which was to exercise an important influence on his politcal activity. As the younger son of a cadet line of his house it was necessary for Prince Chlodwig to follow a profession. For a while he thought of obtaining a commission in the British army through the in- fluence of his aunt, Princess Feodora of Hohenlohe-Langenburg {nee princess of Leiningen), Queen Victoria's half-sister. He decided, however, to enter the Prussian diplomatic service. His application to be excused the preliminary steps, which involved several years' work in subordinate positions in the Prussian civil service, was refused by Frederick William IV., and the prince, with great good sense, decided to sacrifice his pride of rank and to accept the king's conditions. As auscultator in the courts at Coblenz he acquired a taste for

jurisprudence, became a Referendar in September 1843, and after some months of travel in France, Switzerland and Italy went to Potsdam as a civil servant (May 13, 1844). These early years were invaluable, not only as giving him experience of practical affairs but as affording him an insight into the strength and weakness of the Prussian system. The immediate result was to confirm his Liberalism. The Prussian principle of " propagating en- lightenment with a stick " did not appeal to him; he " recognized the confusion and want of clear ideas in the highest circles," the tendency to make agreement with the views of the govern- ment the test of loyalty to the state; and he noted in his journal (June 25, 1844) four years before the revolution of '48, " a slight cause and we shall have a rising." " The free press," he notes on another occasion, " is a necessity, progress the condition of the existence of a state." If he was an ardent advocate of German unity, and saw in Prussia the instrument for its attainment, he was throughout opposed to the " Prussifica- tion " of Germany, and ultimately it was he who made the unification of Germany possible by insisting at once on the principle of union with the North German states and at the same time on the preservation of the individuality of the states of the South.

On the 1 2th of November 1834 the landgrave Viktor Amadeus of Hesse-Rotenburg died, leaving to his nephews, the princes Viktor and Chlodwig Hohenlohe, his allodial estates: the duchy of Ratibor in Silesia, the principality of Corvey in Westphalia, and the lordship of Treffurt in the Prussian governmental district of Erfurt. On the death of Prince Franz Joseph on the 14th of January 1841 it was decided that the principality of Schillingsfiirst should pass to the third brother, Philipp Ernst, as the two elder sons, Viktor and Chlodwig, were provided for already under their uncle's will, the one with the duchy of Ratibor, the other with Corvey and Treffurt. The youngest son, Gustav (b. February 28, 1823), the future cardinal, was destined for the Church. On the death of Prince Philipp Ernst

(May 3, 1845) a new arrangement was made: Prince Chlodwig became prince of Schillingsfiirst, while Corvey was assigned to the duke of Ratibor; Treffurt was subsequently sold by Prince Chlodwig, who purchased with the price large estates in Posen. This involved a complete change in Prince Chlodwig's career. His new position as a " reigning " prince and hereditary member of the Bavarian Upper House was incompatible with that of a Prussian official. On the 18th of April 1846 he took his seat as a member of the Bavarian Reichsrath, and on the 26th of June received his formal discharge from the Prussian service.

Save for the interlude of 1848 the political life of Prince Hohenlohe was for the next eighteen years not eventful. During the revolutionary years his sympathies were with the Liberal idea of a united Germany, and he compromised his chances of favour from the king of Bavaria by accepting the task (November 1, 1848) of announcing to the courts of Rome, Florence and Athens the accession to office of the Archduke John of Austria as regent of Germany. But he was too shrewd an observer to hope much from a national parliament which " wasted time in idle babble," or from a democratic victory which had stunned but not destroyed the German military powers. On the 16th of February 1847 he had married the Princess Marie of Sayn- Wittgenstein-Berleburg, the heiress to vast estates in Russia. 1 This led to a prolonged visit to Werki in Lithuania (1851-1853) in connexion with the management of the property, a visit repeated in i860. In general this period of Hohenlohe's life was occupied in the management of his estates, in the sessions of the Bavarian Reichsrath and in travels. In 1856 he visited Rome, during which he noted the baneful influence of the Jesuits. In 1859 he was studying the political situation at Berlin, and in the same year he paid a visit to England. The marriage of his brother Konstantin in 1859 to another princess of Sayn-Wittgenstein-Berleburg led also to frequent visits to Vienna. Thus Prince Hohenlohe was brought into close touch with all the most notable people in Europe. At the same time, during this period (1850-1866) he was endeavouring to get into relations with the Bavarian government, with a view to taking a more active part in affairs. Towards the German question his attitude at this time was tentative. He had little hope of a practical realization of a united Germany, and inclined towards the tripartite divisions under Austria, 'Prussia and Bavaria — the so-called " Trias." He attended the Fiirsten- tag at Frankfort in 1863, and in the Schleswig-Holstein question was a supporter of the prince of Augustenburg. It was at this time that, at the request of Queen Victoria, he began to send her regular reports on the political condition of Germany.

Prince Hohenlohe's importance in history, however, begins with the year 1866. In his opinion the war was a blessing. It had demonstrated the insignificance of the small and middle states, " a misfortune for the dynasties " — with whose feelings a mediatized prince could scarcely be expected to be over- sympathetic — but the best possible good fortune for the German nation. In the Bavarian Reichsrath Hohenlohe now began to make his voice heard in favour of a closer union with Prussia; clearly, if such a union were desirable, he was the man in every way best fitted to prepare the way for it. One of the main obstacles in the way was the temperament of Louis II. of Bavaria, whose ideas of kingship were very remote from those of the Hohenzollerns, whose pride revolted from any concession to Prussian superiority, and who — even during the crisis of

1866 — was more absorbed in operas than in affairs of state. Fortunately Richard Wagner was a politician as well as a composer, and equally fortunately Hohenlohe was a man of culture capable of appreciating " the master's "genius. It was Wagner, apparently, who persuaded the king to place Hohenlohe at the head of his government (Denkwiirdigkeiten, i. 178, 211), and on the 31st of December 1866 the prince was duly appointed minister

1 Through her mother, nie Princess Stephanie Radziwill (d. 1832). Before Prince Wittgenstein's death (1887) anew law had forbidden foreigners to hold land in Russia. Prince Hohenlohe appears, however, to have sold one of his wife's estates and to have secured certain privileges from the Russian court for the rest.

of the royal house and of foreign affairs and president of the council of ministers.

As head of the Bavarian government Hohenlohe's principal task was to discover some basis for an effective union of the South German states with the North German Confederation, and during the three critical years of his tenure of office he was, next to Bismarck, the most important statesman in Germany. He carried out the reorganization of the Bavarian army on the Prussian model, brought about the military union of the southern states, and took a leading share in the creation of the customs parliament {Zollparlament) , of which on the 28th of April 1868 he was elected a vice-president. During the agitation that arose in connexion with the summoning of the Vatican council Hohenlohe took up an attitude of strong opposi- tion to the ultramontane position. In common with his brothers, the duke of Ratibor and the cardinal, he believed that the policy of Pius IX. — inspired by the Jesuits (that " devil's society," as he once called it) — of setting the Church in opposition to the modern State would prove ruinous to both, and that the definition of the dogma of papal infallibility, by raising the pronouncements of the Syllabus of 1864 into articles of faith, would commit the Church to this policy irrevocably. This view he embodied into a circular note to the Catholic powers (April 9, 1869), drawn up by Dollinger, inviting them to exercise the right of sending ambassadors to the council and to combine to prevent the definition of the dogma. The greater powers, however, were for one reason or another unwilling to intervene, and the only practical outcome of Hohenlohe's action was that in Bavaria the powerful ultramontane party combined against him with the Bavarian " patriots " who accused him of bartering away Bavarian independence to Prussia. The combination was too strong for him; a bill which he brought in for curbing the influence of the Church over education was defeated, the elections of 1869 went against him, and in spite of the continued support of the king he was forced to resign (March 7, 1870).

Though out of office, his personal influence continued very great both at Munich and Berlin and had not a little to do with favourable terms of the treaty of the North German Confedera- tion with Bavaria, which embodied his views, and with its acceptance by the Bavarian parliament. 2 Elected a member of the German Reichstag, he was on the 23rd of March 1871 chosen one of its vice-presidents, and was instrumental in found- ing the new groups which took the name of the Liberal Imperial party (Liberate Reichspartei), the objects of which were to support the new empire, to secure its internal development on Liberal lines, and to oppose clerical aggression as represented by the Catholic Centre. Like the duke of Ratibor, Hohenlohe was from the first a strenuous supporter of Bismarck's anti-papal policy, the main lines of which (prohibition of the Society of Jesus, &c.) he himself suggested. Though sympathizing with the motives of the Old Catholics, however, he realized that they were doomed to sink into a powerless sect, and did not join them, believing that the only hope for a reform of the Church lay in those who desired it remaining in her communion. 3 In 1872 Bismarck proposed to appoint Cardinal Hohenlohe Prussian envoy at the Vatican, but his views were too much in harmony with those of his family, and the pope refused to receive him in this capacity. 4

In 1873 Bismarck chose Prince Hohenlohe to succeed Count Harry Arnim as ambassador in Paris, where he remained for seven years. In 1878 he attended the congress of Berlin as third German representative, and in 1880, on the death "of Bernhardt Ernst von Billow (October 20), secretary of state for foreign affairs, he was called to Berlin as temporary head of the Foreign Office and representative of Bismarck during his

2 Speech of December 30, 1870, in the Reichsrath. Denkwilrdig- keiten, ii. 36.

3 " If I wished to leave the Church because of all the scandalous occurrences in the Catholic Church, I should have had to secede while studying Church history," op. cit. ii. 92.

4 Dr Johann Friedrich (q.v.), afterwards one of the Old Catholic leaders, was his secretary at the time of the Vatican council, and supplied historical and theological material to the opposition bishops.

absence through illness. In 1885 he was chosen to succeed Manteuffel as governor of Alsace-Lorraine. In this capacity he had to carry out the

coercive measures introduced by the chancellor in 1887-1888, though he largely disapproved of them; 1 his conciliatory disposition, however, did much to reconcile the Alsace-Lorrainers to German rule. He remained at Strass- burg till October 1894, when, at the urgent request of the emperor, he consented, in spite of his advanced years, to accept the chancellorship in succession to Caprivi. The events of his chancellorship belong to the general history of Germany (g.v.); as regards the inner history of this time the editor of his memoirs has very properly suppressed the greater part of the detailed comments which the prince left behind him. In general, during his term of office, the personality of the chancellor was less conspicuous in public affairs than in the case of either of his predecessors. His appearances in the Prussian and German parliaments were rare, and great independence was left to the secretaries of state. What influence the tact and experience of Hohenlohe exercised behind the scenes on the masterful will and impulsive character of the emperor cannot as yet be generally known.

Prince Hohenlohe resigned the chancellorship on the 17th of October 1900, and died at Ragaz on the 6th of July 1901. On the 16th of February 1897 he had celebrated his golden wedding; on the 21st of December of the same year the princess died. There were six children of the marriage: Elizabeth (b. 1847); Stephanie (b. 1851); Philipp Ernst, reigning prince of Hohenlohe-Schillingsfurst (b. 1853), who married Princess Charielee Ypsilanti; Albert (1857-1866).; Moritz and Alexander, twins (b. 1862).

All other authorities for the life of Prince Hohenlohe have been superseded by the Denkwiirdigkeiten (2 vols., Stuttgart and Leipzig, 1906). With the exception noted above these are singularly full and outspoken, the latter quality causing no little scandal in Germany and bringing down on Prince Alexander, who was responsible for their publication, the disfavour of the emperor. They form not only the record of a singularly full and varied life, but are invaluable to the historian for the wealth of material they contain and for apprecia- tions of men and events by an observer who had the best opportunities for forming a judgment.' The prince himself rhey reveal not only as a capable man of affairs, though falling short of greatness, but as a personality of singular charm, tenacious of his principles, tolerant, broad-minded, and possessed of a large measure of the saving grace of humour.

See generally A. F. Fischer, Geschichte des Hauses Hohenlohe (1866-1871); K. Weller, Hohenlohisches Urkundenbuch, 1153-1350 (Stutt- gart, 1899-1901). and Geschichte des Hauses Hohenlohe (Stuttgart, 1904)- (W. A. P. ; C. F. A.)

HOHENSTAUFEN, the name of a village and ruined castle near Lorsch in Swabia, now in the kingdom of Wiirttemberg, which gave its name to a celebrated Swabian family, members of which were emperors or German

kings from 1138 to 1208, and again from 1214 to 1254. The earliest known ancestor was Frederick, count of Biiren (d. 1094), whose son Frederick built a castle at Staufen, or Hohenstaufen, and called himself by this name. He was a firm supporter of the emperor Henry IV., who rewarded his fidelity by granting him the dukedom of Swabia in 1079, and giving him his daughter Agnes in marriage. In 1081 he remained in Germany as Henry's repre- sentative, but only secured possession of Swabia after a struggle lasting twenty years. In 1105 Frederick was succeeded by his son Frederick II., called the One-eyed, who, together with his brother Conrad, afterwards the German king Conrad III., held south-west Germany for their uncle the emperor Henry V. Frederick inherited the estates of Henry V. in n 25, but failed to secure the throne, and took up an attitude of hostility towards the new emperor, Lothair the Saxon, who claimed some of the estates of the late emperor as crown property. A war broke out and ended in the complete submission of Frederick at Bamberg. He retained, however, his dukedom and estates. In 1138 Conrad of Hohenstaufen was elected German king,

1 He protested against the passport system as likely to lead to a war with France, for which he preferred not to be responsible (Letter to Wilmowski, Detikw. ii. 433), but on the chancellor taking full responsibility consented to retain office.

and was succeeded in 1152, not by his son but by his nephew Frederick Barbarossa, son of his brother Frederick (d. 1147). Conrad's son Frederick inherited the duchy of Franconia which his father had received in 1115, and this was retained by the Hohenstaufen until the death of Duke Conrad II. in 1196. In 1 152 Frederick received the duchy of Swabia from his cousin the German king Frederick I., and on his death in 1167 it passed successively to Frederick's three sons Frederick, Conrad and Philip. The second Hohenstaufen emperor was Frederick Barbarossa's son, Henry VI., after whose death a struggle for the throne took place between Henry's brother Philip, duke of Swabia, and Otto of Brunswick, afterwards the emperor Otto IV. Regained for the Hohenstaufen by Henry's son, Frederick II., in 12 14, the German kingdom passed to his son, Conrad IV., and when Conrad's son Conradin was beheaded in Italy in 1268, the male line of the Hohenstaufen became extinct. Daughters of Philip of Swabia married Ferdinand III., king of Castile and Leon, and Henry II., duke of Brabant, and a daughter of Conrad, brother of the emperor Frederick I., married into the family of Guelph. The castle of Hohenstaufen was destroyed in the 16th century during the Peasants' War, and only a few fragments now remain.

See F. von Raumer, Geschichte der Hohenstaufen und ihrer Zeit (Leipzig, 1878) ; B. F. W. Zimmermann, Geschichte der Hohenstaufen (Stuttgart,

1st ed., 1838; 2nd ed., 1865); F. W. Schirrmacher, Die letzten Hohenstaufen (Gottingen, 187 1).

HOHENSTEIN (Hohenstein-Ernstthal), a town of Germany, in the kingdom of Saxony, on the slopes of the Erzgebirge, and on the railway Reichenbach-Chemnitz, 12 m. N.E. of Zwickau. Pop. (1905) 13,903. Hohenstein possesses two fine Evangelical churches, a town hall, restored in 1876, and several monu- ments to famous men. The principal industries are the spinning and weaving of cotton, the manufacture of machines, stockings, gloves and woollen and silk fabrics, cotton printing and dyeing. Many of the inhabitants are also employed in the neighbouring copper and arsenic mines. Not far from Hohenstein there is a mineral spring, con- nected with which there are various kinds of baths. Hohen- stein is the birthplace of the physicist G. H. von Schubert " and of C. G. Schroter (1699-1782), one of the inventors of the pianoforte. Hohenstein consists of two towns, Hohenstein and Ernstthal, which were united in 1898.

Another place of the same name is a town in East Prussia. Pop. (1900) 2467. This Hohenstein, which was founded by the Teutonic Order in 1359 , has a Roman Catholic and an Evangelical church, a synagogue and several educational establishments.

HOHENZOLLERN, the name of a castle which stood on the hill of Zollern about 15 m. south of Hechingen, and gave its name to the family to which the present German emperor belongs. A vague tradition connects the house with the Colonna family of Rome, or the Colalto family of Lombardy; but one more definite unites the Hohenzollerns with the Burkhardingers, who were counts in Raetia during the early part of the 10th century, and two of whom became dukes of Swabia. Tassilo, a member of this family, is said to have built a castle at Zollern early in the 9th century; but the first historical mention of the name is in the Chronicon of a certain Berthold (d. 1088), who refers to Burkhard and Wezil, or Werner, of Zollern, or Zolorin. These men appear to have been counts of Zollern, and to have met their death in 1061. The family of Wezil died out in 1 194, and the existing branches of the Hohenzollerns are descended from Burkhard and his son Frederick, whose eldest son, Frederick II., was in great favour with the German kings, Lothair the Saxon and Conrad III. Frederick II. died about 1 145, and his son and successor, Frederick III., was a constant supporter of the Hohenstaufen. This count married Sophia, daughter and heiress of Conrad, burgrave of Nuremberg, and about 1192 he succeeded his father-in-law as burgrave, obtaining also some lands in Austria and Franconia. He died about 1200, and his sons, Conrad and Frederick, ruled their lands in common until 1227, when an important division took place. Conrad became burgrave of Nuremberg, and, receiving the lands which

had come into the family through his mother, founded the Franconian branch of the family, which became the more im- portant of the two; while Frederick, receiving the county of Zollern and the older possessions of the family, was the ancestor of the Swabian branch.

Early in the 1 2th century Burkhard, a younger son of Frederick I., secured the county of Hohenberg, and this district remained in the possession of the Hohenzollerns until the death of Count Sigismund in i486. Its rulers, however, with the exception of Count Albert II. (d. 1298), played an unimportant part in German history. Albert, who was a Minnesinger, was loyal to the declining fortunes of the Hohenstaufen, and afterwards supported his brother-in-law, Rudolph of Habsburg, in his efforts to obtain the German throne. He shared in the campaigns of Rudolph and fell in battle in 1298, during the struggle between Adolph of Nassau and Albert of Habsburg (afterwards King Albert I.). When this family became extinct in i486 Hohenberg passed to the Habsburgs.

The Franconian branch of the Hohenzollerns was represented in 1227 by Conrad, burgrave of Nuremberg, whom the emperor Frederick II. appointed guardian of his son Henry, and admi- nistrator of Austria. After a short apostasy, during which he supported Henry Raspe, landgrave of Thuringia, Conrad returned to the side of the Hohenstaufen and aided Conrad IV. He died in 1261, when his son and successor, the burgrave Frederick III., had already obtained Bayreuth through his marriage with Elizabeth, daughter of Otto of Meran (d. 1234). Frederick took a leading part in German affairs, and it is interest- ing to note that he had a considerable share in securing the election of his uncle, Rudolph of Habsburg, as German king in 1273. He died in 1297 and was succeeded by his son, Frederick IV. This burgrave fought for King Albert I. in Thuringia, and supported Henry VII. in his efforts to secure Bohemia for his son John; but in 13 14, forsaking his father's policy, he favoured Louis, afterwards the emperor Louis IV., in his struggle with Frederick, duke of Austria, and by his conduct at the battle of Muhldorf in 1322 and elsewhere earned the designation of " saviour of the empire." Frederick, however, did not neglect his hereditary lands. He did something for the maintenance of peace and the security of traders, gave corporate privileges to villages, and took the Jews under his protection. His services to Louis were rewarded in various ways, and, using part of his wealth to increase the area of his possessions, he bought the town and district of Ansbach in 1331. Dying in 1332, Frederick was succeeded by his son, John II., who, after one of his brothers had died and two others had entered the church, ruled his lands in common with his

brother Albert. About 1338 John bought Culmbach and Plassenburg, and on the strength of a privilege granted to him in 1347 he seized many robber- fortresses and held the surrounding lands as imperial fiefs. In general he continued his father's policy, and when he died in 1357 was succeeded by his son, Frederick V., who, after the death of his uncle Albert in 1361, became sole ruler of Nuremberg, Ansbach and Bayreuth. Frederick lived in close friendship with the emperor Charles IV., who formally invested him with Ansbach and Bayreuth and made him a prince of the empire in 1363. In spite of the troubled times in which he lived, Frederick was a successful ruler, and introduced a regular system of public finance into his lands. In 1397 he divided his territories between his sons John and Frederick, and died in the following year. His elder son, John III., who had married Margaret, a daughter of the emperor Charles IV., was frequently in the company of his brothers-in-law, the German kings Wenceslaus and Sigismund. He died without sons in 1420.

Since 1397 the office of burgrave of Nuremberg had been held by John's brother, Frederick, who in 1415 received Brandenburg from King Sigismund, and became margrave of Brandenburg as Frederick I. (q.v.). On his brother's death in 1420 he reunited the lands of his branch of the family, but in 1427 he sold his rights as burgrave to the town of Nuremberg. The subsequent history of this branch of the Hohenzollerns is identified with ihat of Brandenburg from 1415 to 1701, and with that of Prussia

since the latter date, as in this year the elector Frederick III. became king of Prussia. In 187 1 William, the seventh king, took the title of German emperor. While the electorate of Brandenburg passed according to the rule of primogeniture, the Franconian possessions of the Hohenzollerns, Ansbach and Bayreuth, were given as appanages to younger sons, an arrange- ment which was confirmed by the dispositio Achillea of 1473. These principalities were ruled by the sons and descendants of the elector Albert Achilles from i486 to 1603; and, after reverting to the elector of Brandenburg, by the descendants of the elector John George from 1603 to 1791. In 1791 Prince Charles Alexander (d. 1806), who had inherited both districts, sold his lands to Prussia.

The influence of the Swabian branch of the Hohenzollerns was weakened by several partitions of its lands; but early in the 1 6th century it rose to some eminence through Count Eitel Frederick II. (d. 1512), a friend and adviser of the emperor Maximilian I. Eitel received from this emperor the district of Haigerloch, and in 1534 his grandson Charles (d. 1576) was granted the counties of Sigmaringen and Vohringen by the emperor Charles V. In 1576 the sons of Charles divided their lands, and founded three branches of the family, one of which is still flourishing. Eitel Frederick IV.

took Hohenzollern with the title of Hohenzollern-Hechingen; Charles II. Sigmaringen and Vohringen and the title of Hohenzollern-Sigmaringen; and Christopher took Haigerloch. Christopher's family died out in 1634, but the remaining lines are of some importance. Count John George of Hohenzollern-Hechingen was made a prince in 1623, and John of Hohenzollern-Sigmaringen soon received the same honour. In 1695 these two branches of the family entered conjointly into an agreement with Brandenburg, which provided that, in case of the extinction of either of the Swabian branches, the remaining branch should inherit its lands; and if both branches became extinct the principalities should revert to Brandenburg. During the 17th and 18th centuries and during the period of the Napoleonic wars the history of these lands was very similar to that of the other small estates of Germany. In consequence of the political troubles of 1848 Princes Frederick William of Hohenzollern- Hechingen and Charles Anton of Hohenzollern-Sigmaringen resigned their principalities, and accordingly these fell to the king of Prussia, who took possession on the 12th of March 1850. By a royal decree of the 20th of May following the title of " high- ness," with the prerogatives of younger sons of the royal house, was conferred on the two princes. The proposal to raise Prince Leopold of Hohenzollern-Sigmaringen (1835-1905) to the Spanish throne in 1870 was the immediate cause of the war between France and Germany. In 1908 the head of this branch of the Hohenzollerns, the only one existing besides the imperial house, was Leopold's son William (b. 1864), who, owing to the extinction of the family of Hohenzollern-Hechingen in 1869, was called simply prince of Hohenzollern. In 1866 Prince Charles of Hohenzollern-Sigmaringen was chosen prince of Rumania, becoming king in 1881.

The modern Prussian province of Hohenzollern is a long, narrow strip of territory bounded on the S.W. by Baden and in other directions by Wurttemberg. It was divided into two principalities, Hohenzollern-Sigmaringen and Hohenzollern- Hechingen, until 1850, when these were united. They now form the government of Sigmaringen (q.v.).

The castle of Hohenzollern was destroyed in 1423, but it has been restored several times. Some remains of the old building may still be seen adjoining the present castle, which was built by King Frederick William IV.

See Monumenta Zollerana, edited by R. von Stillfried and T. Marker (Berlin, 1852-1890); Quellen und Untersnchungen zur Geschichte des Hauses Hohenzollern, edited by E. Berner (Berlin, 1901 fol.); R. von Stillfried, Altertumer und Kunstdenkmale des erlauchten Hauses von Hohenzollern (Berlin, – i 852-1 867) and Stammtafeln des Gesamthauses Hohenzollern (Berlin, 1869); L. Schmid, Die iilteste Geschichte des erlauchten Gesamthauses der kiiniglichen und furstlichen Holmnzollern

(Tubingen, 1884-1888); E. Schwartz, Slammlafcl des preussischen Konigshauscs (Breslau

1898) ; Hohenzollernsche Forschungen, Jahrbuch fur die Geschichte der Hohenzollern, edited by C. Meyer (Berlin, 1891-1902); Hohenzollern Jahrbuch, Forschungen und Abbildungen zur Geschichte der Hohen- zollern in Brandenburg-Preussen, edited by Seidel (Leipzig, 1897- !9°3)t and T. Carlyle, History of Frederick the Great (London, 1872- 1873). ‘ (A. W. H.)*

HOKKAIDO, the Japanese name for the northern division of the empire (Hoku = north, kai = sea., and do = road) , including Yezo, the Kuriles and their adjacent islets.

HOKUSAI (1 760-1849), the greatest of all the Japanese painters of the Popular School (Ukiyo-ye), was born at Yedo (Tokyo) in the 9th month of the 10th year of the period Horeki, i.e. October-November 1760. He came of an artisan family, his father having been a mirror-maker, Nakajima Issai. After some practice as a wood-engraver he, at the age of eighteen, entered the studio of Katsugawa Shunsho, a painter and designer of colour-prints of considerable importance. His dis- regard for the artistic principles of his master caused his expul- sion in 1785; and thereafter — although from time to time Hokusai studied various styles, including especially that of Shiba Gokan, from whom he gained some fragmentary knowledge of European methods — he kept his personal independence. For a time he lived in extreme poverty, and, although he must have gained sums for his work which might have secured him comfort, he remained poor, and to the end of his life proudly described himself as a peasant. He illustrated large numbers of books, of which the world-famous Mcmgwa, a pictorial ency- clopaedia of Japanese life, appeared in fifteen volumes from 1812 to 1875. Of his / colour-prints the “Thirty-six Views of Mount Fuji ” (the whole set consisting of forty-six prints) were made between 1823 and 1829; “Views of Famous Bridges” (n), “Waterfalls” (8), and “Views of the Lu-chu Islands” (8), are the best known of those issued in series; but Hokusai also designed some superb broadsheets published separately, and his surimono (small prints made for special occasions and ceremonies) are unequalled for delicacy and beauty. The ” Hundred Views of Mount Fuji ” (1834-1835), 3 vols., in monochrome, are of extraordinary originality and variety. As a painter and draughtsman Hokusai is not held by Japanese critics to be of the first rank, but this verdict has never been accepted by Europeans, who place him among the greatest artists of the world. He

possessed great powers of observation and characterization, a singular technical skill, an unfailing gift of good humour, and untiring industry. He was an eager student to the end of his long life, and on his death-bed said, " If Heaven had lent me but five years more, I should have become a great painter." He died on the 10th of May 1849.

See E. de Goncourt, Hokousa'i (1896); M. Revon, Etude sur Hokusai (1896); E. F. Fenollosa, Catalogue of the Exhibition of Paintings by Hokusai at Tokyo (1901) ; E. F. Strange, Hokusai (1906).

(E. F. S.)

HOLBACH, PAUL HEINRICH DIETRICH, Baron d' (1723- 1789), French philosopher and man of letters, of German origin, was born at Eleideishe minthe palatinate in 1723. Of his family little is known; according to J. J. Rousseau his father was a rich parvenu, who brought his son at an early age to Paris, where the latter spent most of his life. Much of Holbach's fame is due to his intimate connexion with the brilliant coterie of bold thinkers and polished wits whose creed, the new philosophy, is concentrated in the famous Encyclopedic. Possessed of easy means and being of hospitable disposition, he kept open house for Helvetius, D'Alembert, Diderot, Condillac, Turgot, Buffon, Grimm, Hume, Garrick, Wilkes, Sterne, and for a time J. J. Rousseau, guests who, while enjoying the intellectual pleasure of their host's conversation, were not insensible to his excellent cuisine and costly wines. For the Encyclopedic he compiled and translated a large number of articles on chemistry and mineralogy, chiefly from German sources. He attracted more attention, however, in the department of philosophy. In 1767 Christianisme devoile appeared, in which he attacked Christianity and religion as the source of all human evils. This was followed up by other works, and in 1770 by a still more open attack in his most famous book, Le Systeme de la nature, in which it

is probable he was assisted by Diderot. Denying the existence of a deity, and refusing to admit as evidence all a priori arguments, Holbach saw in the universe nothing save matter in spontaneous movement. What men call their souls become extinct when the body dies. Happiness is the end of mankind. " It would be useless and almost unjust to insist upon a man's being virtuous if he cannot be so without being unhappy. So long as vice renders him happy, he should love vice." The restraints of religion were to be replaced by an education developing an enlightened self-interest. The study of science was to bring human desires into line with their natural surroundings. Not less direct and trenchant are his attacks on political government, which, interpreted by the light of after events, sound like the first distant mutterings of revolution. Holbach exposed the logical

consequences of the theories of the Encyclopaedists. Voltaire hastily seized his pen to refute the philosophy of the Sy steme in the article " Dieu " in his Dictionnaire philosophique, while Frederick the Great also drew up an answer to it. Though vigorous in thought and in some passages clear and eloquent, the style of the Systeme is diffuse and declamatory, and asserts rather than proves its statements. Its principles are summed up in a more popular form in Bon Sens, ou idees naturelles opposies aux idies sumaturelles (Amsterdam, 1772), In the Systeme social (1773), the Politique naturelle (1773-1774) and the Morale universelle (1776) Holbach attempts to rear a system of morality in place of the one he had so fiercely attacked, but these later writings had not a tithe of the popularity and influence of his earlier work. He published his books either anonymously or under borrowed names, and was forced to have them printed out of France. The uprightness and sincerity of his character won the friendship of many to whom his philosophy was repug- nant. J. J. Rousseau is supposed to have drawn his portrait in the virtuous atheist Wolmar oi the Nouvelle Helo'ise. He died on the 21st of January 1789.

Holbach is also the author of the following and other works: Esprit du clerge (1767); De I'imposture sacerdotale (1767) ; Pretres demasques (1768); Examen critique de la vie et des ouvrages de St Paul (1770); Histoire critique de Jesus-Christ (1770), and Etho- cratie (1776). For further particulars as to his life and doctrines see Grimm's Correspondance litteraire, &c. (1813); Rousseau's Con- fessions; Morellet's MSmoires (1821) ; Madame de Genlis, Les Diners du Baron Holbach; Madame d'Epinay's Memoires; Avezac-Lavigne, Diderot et la societe du Baron d' Holbach (1875), and Morley's Diderot

(1878).

HOLBEACH, a market town in the Holland or Spalding parliamentary division of Lincolnshire, England, on the Midland and Great Northern joint railway, 23! m. N.E. of Peterborough. Pop. of urban district (1901), 4755. All Saints' Church, with a lofty spire, is a fine specimen of late Decorated work. The grammar school, founded in 1669, occupies a building erected in 1877. Other public buildings are the assembly rooms and a market house. Roman and Saxon remains have been found, and the market dates from the 13th century.

HOLBEIN, HANS, the elder (c. 1460-1524), belonged to a celebrated family of painters in practice at Augsburg and Basel from the close of the 15th to the middle of the 16th century. Though closely connected with Venice by her commercial relations, and geographically nearer to Italy than to Flanders, Augsburg at the time of Maximilian cultivated art after the fashion of the Flemings, and felt the influence of the schools of Bruges and

Brussels, which had branches at Cologne and in many cities about the headwaters of the Rhine. It was not till after the opening of the 16th century, and between that and the era of the Reformation, that Italian example mitigated to some extent the asperity of South German painting. Flemish and German art was first tempered with Italian elements at Augsburg by Hans Holbein the elder. Hans first appears at Augsburg as partner to his brother Sigismund, who survived him and died in 1540 at Berne. Sigismund is described as a painter, but his works have not come down to us. Hans had the lead of the partnership at Augsburg, and signed all the pictures which it produced. In common with Herlen, Schongauer, 1 and other masters of South Germany, he first cultivated a style

akin to that of Memlinc and other followers of the schools of Brussels and Bruges, but he probably modified the systems of those schools by studying the works of the masters of Cologne. As these early impressions waned, they were replaced by others less favourable to the expansion of the master's fame; and as his custom increased between 1499 and 1506, we find him relying less upon the teaching of the schools than upon a mere observa- tion and reproduction of the quaintnesses of local passion plays. Most of his early works indeed are taken from the Passion, and in these he obviously marshalled his figures with the shallow stage effect of the plays, copying their artificial system of group- ing, careless to some extent of proportion in the human shape, heedless of any but the coarser forms of expression, and technically satisfied with the simplest methods of execution. If in any branch of his art he can be said to have had a conscience at this period, we should say that he showed it in his portrait drawings. It is seldom that we find a painted likeness worthy of the name. The drawings of which numbers are still preserved in the galleries of Basel, Berlin and Copenhagen show extraordinary quickness and delicacy of hand, and a wonderful facility for seizing character; and this happily is one of the features which Holbein bequeathed to his more famous son, Hans the younger. It is between 1512 and 1522 that Holbein tempered the German quality of his style with some North Italian elements. A purer taste and more pleasing realism mark his work, which in drapery, dress and tone is as much more agreeable to the eye as in respect of modelling and finish it is smoother and more carefully rounded. Costume, architecture, ornament and colour are applied with some knowledge of the higher canons of art. Here, too, advantage accrued to Hans the younger, whose independent career about this time began.

The date of the elder Holbein's birth is unknown. But his name appears in the books of the tax-gatherers of Augsburg in 1494, superseding that of Michael Holbein, who is supposed to have been his father. Previous to that date, and as early as 1493, ne was a painter of name, and he executed in that year, it is said, for the abbey at Weingarten, the wings of an altar-piece representing Joachim's Offering, the Nativity of the Virgin, Mary's Presentation in the Temple, and the Presentation of Christ, which now hang in separate panels in the cathedral of Augsburg. In these pieces and others of the same period, for instance in two Madonnas in the Moritz chapel and castle of Nuremberg, we mark the clear impress of the schools of Van der Weyden and Memlinc; whilst in later works, such as the Basilica of St Paul (1504) in the gallery of Augsburg, the wane of Flemish influence is apparent. But this altarpiece, with its quaint illustrations of St Paul's life and martyrdom, is not alone of interest because its execution is characteristic of old Holbein. It is equally so because it contains portraits of the master himself, accompanied by his two sons, the painters Ambrose (c. 1494- c. 1519) and Hans the younger. Later pictures, such as the Passion series in the Fiirstenberg gallery at Donaueschingen, or the Martyrdom of St Sebastian in the Munich Pinakothek, contain similar portraits, the original drawings of which are found in old Holbein's sketch-book at Berlin, or in stray leaves like those possessed by the duke of Aumale in Paris. Not one of these fails to give us an insight into the character, or a reflex of the features, of the members of this celebrated family. Old Holbein seems to ape Leonardo, allowing his hair and beard to grow wildly, except on the upper lip. Hans the younger is a plain-looking boy. But his father points to him with his finger, and hints that though but a child he is clearly a prodigy. After 1 5 16 Hans Holbein the elder appears as a defaulter in the registers of the tax-gatherers at Augsburg; but he willingly accepts commissions abroad. At Issenheim in Alsace, where Griinewald was employed in 1516, old Holbein also finds patrons, and contracts to complete an altarpiece. But mis- fortune or a bailiff pursues him, and he leaves Issenheim, abandon- ing his work and tools. According to Sandrart, he wanders to Basel and takes the freedom of its gild. His brother Sigismund and others are found suing him for debt before the courts of Augsburg. Where he lived when he executed the altarpiece,

of which two wings with the date of 1522 are in the gallery of Carlsruhe, is uncertain ; where he died two years later is unknown. He slinks from ken .at the close of a long life, and disappears at last heeded by none but his own son, who claims his brushes and paints from the monks of Issenheim without much ■chance of obtaining them. His name is struck off the books of the Augsburg gild in 1524.

The elder Holbein was a prolific artist, who left many pictures behind him. Earlier than the Basilica of St Paul, already mentioned, is the Basilica of St

Mary Maggiore, and a Passion in eleven pieces, in the Augsburg gallery, both executed in 1499. Another Passion, with the root of Jesse and a tree of the Dominicans, is that preserved in the Staedel, Saalhof, and church of St Leonard at Frankfort. It was executed in 1501. The Passion of Donaueschingen was finished after 1502, in which year was completed the Passion of Kaisheim, a conglomerate of twenty-seven panels, now divided amongst the galleries of Munich, Nuremberg, Augsburg and Schleissheim. An altarpiece of the same class, commissioned for the monastery of St Moritz at Augsburg in 1504-1508, has been dispersed and lost. 1512 is the date of a Conception in the Augsburg gallery, long assigned, in consequence of a forged inscription, to Hans Holbein the younger. A diptych, with a Virgin and Child, and a portrait of an old man, dated 1513, came in separate parts into the collections of Mr Posonyi and Count Lanckoronski at Vienna. The sketch-books of Berlin, Copenhagen and Augsburg give a lively picture of the forms and dress of Augsburg residents at the beginning of the 16th century. • They comprise portraits of the emperor Maximilian, the future Charles V., Kunz von der Rosen, the fool of Maximilian, the Fuggers, friars, merchants, and at rare intervals ladies.

See also the biography by Stodtner (Berlin, 1896).

HOLBEIN, HANS, the younger (1497-1543), German painter, favourite son of Hans Holbein the elder, was probably born at Augsburg about the year 1497. Though Sandrart and Van Mander declare that they do not know who gave him the first lessons, he doubtless received an artist's education from his father. About 1515 he left Augsburg with "Ambrose, his elder brother, to seek employment as an illustrator of books at Basel. His first patron is said to have been Erasmus, for whom, shortly after his arrival, he illustrated with pen-and-ink sketches an edition of the Encomium Moriae, now in the museum of Basel. But his chief occupation was that of drawing titlepage-blocks and initials for new editions of the Bible and classics issued from the presses of Froben and other publishers. His leisure hours, it is supposed, were devoted to the production of rough painter's work, a schoolmaster's sign in the Basel collection, a table with pictures of St Nobody in the library of the university at Zurich. In contrast with these coarse productions, the portraits of Jacob Meyer and his wife in the Basel museum, one of which purports to have been finished in 1516, are miracles of workman- ship. It has always seemed difficult indeed to ascribe such excellent creations to Holbein's nineteenth year; and it is hardly credible that he should have been asked to do things of this kind so early, especially when it is remembered that neither he nor his brother Ambrose were then allowed to matricu- late in the guild of Basel. Not till 1517 did Ambrose, whose life otherwise remains obscure, join that corporation; Hans, not overburdened with practice, wandered into Switzerland, where (1517) he was employed to paint in the house of Jacob

Hertenstein at Lucerne. In 1519 Holbein reappeared at Basel, where he matriculated and, there is every reason to think, married. Whether, previous to this time, he took advantage of his vicinity to the Italian border to cross the Alps is uncertain. Van Mander says that he never was in Italy; yet the large wall-paintings which he executed after 1519 at Basel, and the series of his sketches and pictures which is still extant, might lead to the belief that Van Mander was misinformed. The spirit of Holbein's compositions for the Basel town hall, the scenery and architecture of his numerous drawings, and the cast of form in some of his imaginative portraits, make it more likely that he should have felt the direct influence of North Italian painting than that he should have taken Italian elements from imported works or prints. The Swiss at this period wandered in thousands to swell the ranks of the French or imperial armies fighting on Italian soil, and the road they took may have been followed by Hans on a more peaceful mission. He shows himself at all events familiar with Italian examples

at various periods of his career; and if we accept as early works the " Flagellation," and the " Last Supper " at Basel, coarse as they are, they show some acquaintance with Lombard methods of painting, whilst in other pieces, such as the series of the Passion in oil in the same collection, the modes of Hans Holbein the elder are agreeably commingled with a more modern, it may be said Italian, polish. Again, looking at the " Virgin " and " Man of Sorrows " in the Basel museum, we shall be struck by a searching metallic style akin to that of the Ferrarese; and the " Lais " or the ".Venus and Amor " of the same collection reminds us of the Leonard- esques of the school of Milan. When Holbein settled down to an extensive practice at Basel in 15 19, he decorated the walls of the house " Zum Tanz " with simulated architectural features of a florid character after the fashion of the Veronese; and his wall paintings in the town-hall, if we can truly judge of them by copies, reveal an artist not unfamiliar with North Italian composition, distribution, action, gesture and expression. In his drawings too, particularly in a set representing the Passion at Basel, the arrangement, and also the perspective, form and decorative ornament, are in the spirit of the school of Mantegna. Contemporary with these, however, and almost inexplicably in contrast with them as regards handling, are portrait-drawings such as the likenesses of Jacob Meyer, and his wife, which are finished with German delicacy, and with a power and subtlety of hand seldom rivalled in any school. Curiously enough, the same contrast may be observed between painted compositions and painted portraits. The " Bonifacius Amerbach " of 1519 at Basel is acknowledged to be one of the

most complete examples of smooth and transparent handling that Holbein ever executed. His versatility at this period is shown by a dead Christ (1521), a corpse in profile on a dissecting table, and a set of figures in couples; the " Madonna and St Pantalus," and " Kaiser Henry with the Empress Kunigunde " (1522), originally composed for the organ loft of the Basel cathedral, now in the Basel museum. Equally remarkable, but more attractive, though injured, is the " Virgin and Child between St Ursus and St Nicholas " (not St Martin) giving alms to a beggar, in the gallery of Solothurn. This remarkable picture is dated 1522, and seems to have been ordered for an altar in the minster of St Ursus of Solothurn by Nicholas Conrad, a captain and statesman of the 16th century, whose family allowed the precious heirloom to fall into decay in a chapel of the neighbouring village of Grenchen. Numerous drawings in the spirit of this picture, and probably of the same period in his career, might have led Holbein's contemporaries to believe that he would make his mark in the annals of Basel as a model for painters of altarpieces as well as a model for pictorial composition and portrait. The promise which he gave at this time was immense. He was gaining a freedom in draughts- manship that gave him facility to deal with any subject. Though a realist, he was sensible of the dignity and severity of religious painting. His colour had almost all the richness and sweetness of the Venetians. But he had fallen on evil times, as the next few years undoubtedly showed. Amongst the portraits which he executed in these years are those of Froben, the publisher, known only by copies at Basel and Hampton Court, and Erasmus, who sat in 1523, as he likewise did in 1530, in various positions, showing his face threequarters as at Longford, Basel, Turin, Parma, the Hague and Vienna, and in profile as in the Louvre or at Hampton Court. Besides these, Holbein made designs for glass windows, and for woodcuts, including subjects of every sort, from the Virgin and Child with saints of the old time to the Dance of Death, from gospel incidents extracted from Luther's Bible to satirical pieces illustrating the sale of indulgences and other abuses denounced by Reformers. Holbein, in this way, was carried irresistibly with the stream of the Reformation, in which, it must now be admitted, the old traditions of religious painting were wrecked, leaving nothing behind but unpictorial elements which Cranach and his school vainly used for pictorial purposes.

Once only, after 1526,, and after he had produced the " Lais " and " Venus and Amor," did Holbein with impartial spirit give his services and pencil to the Roman Catholic cause. The burgo-

master Meyer, whose patronage he had already enjoyed, now asked him to represent himself and his wives and children in prayer before the Virgin; and Holbein produced the celebrated altarpiece now in the palace of Prince William of Hesse at Darmstadt, the shape and composition of which are

known to all the world by its copy in the Dresden museum. The drawings for this masterpiece are amongst the most precious relics in the museum of Basel. The time now came when art began to suffer from unavoidable depression in all countries north of the Alps. Holbein, at Basel, was reduced to accept the smallest commissions — even for scutcheons. Then he saw that his chances were dwindling to nothing, and taking a bold resolution, armed with letters of introduction from Erasmus to More, he crossed the Channel to England, where in the one-sided branch of portrait painting he found an endless circle of clients. Eighty-seven drawings by Holbein in Windsor Castle, containing an equal- number of portraits, of persons chiefly of high quality, testify to his industry in the years which divide 1528 from 1543. They are all originals of pictures that are still extant, or sketches for pictures that were lost or never carried out. Sir Thomas More, with whom he seems to have had a very friendly connexion, sat to him for likenesses of various kinds. The drawing of his head is at Windsor. A pen-and-ink sketch, in which we see More surrounded by all the members of his family, is now in the gallery of Basel, and numerous copies of a picture from it prove how popular the lost original must once have been. At the same period were executed the portraits of Warham (Lambeth and Louvre), Wyatt (Louvre), Sir Henry Guildford and his wife (Windsor), all finished in 1527, the astronomer Nicholas Kratzer (Louvre), Thomas Godsalve (Dresden), and Sir Bryan Tuke (Munich) in 1528. In this year, 1528, Holbein returned to Basel, taking to Erasmus the sketch of More's family. With money which he brought from London he purchased a house at Basel wherein to lodge his wife and children, whose portraits he now painted with all the care of a husband and father (1528). He then witnessed the flight of Erasmus and the fury of the iconoclasts, who destroyed in one day almost all the religious pictures at Basel. The municipality, unwilling that he should suffer again from the depression caused by evil times, asked him to finish the frescoes of the town-hall, and the sketches from these lost pictures are still before us to show that he had not lost the spirit of his earlier days, and was still capable as a composer. His " Rehoboam receiving the Israelite Envoys," and " Saul at the Head of his Array meeting Samuel," testify to Holbein's power and his will, also proved at a later period by the " Triumphs of Riches and Poverty," executed for the Steelyard in London (but now lost), to prefer the fame of a painter of history to that of a painter of portraits. But the reforming times still remained unfavourable to art. With the exception of a portrait of Melanchthon (Hanover) which he now completed, Holbein found little to do at Basel. The year 1530, therefore, saw him again on the move, and he landed in England for the second time with the prospect of bettering his fortunes. Here indeed political changes had robbed him of his earlier patrons. The circle of More and Warham was gone. But that of the merchants of the Steelyard took its place, for whom Holbein executed the

long and important series of portraits that lie scattered throughout the galleries and collections of England and the Continent, and bear date after 1532. Then came again the chance of practice in more fashionable circles. In 1533 the "Ambassadors" (National Gallery), and the " Triumphs of Wealth and Poverty " were executed, then the portraits of Leland and Wyatt (Longford), and (1 534) the portrait of Thomas Cromwell. ThroughCromwell Holbein probably became attached to the court, in the pay of which he appears permanently after 1537. From that time onwards he was connected with all that was highest in the society of London. Henry VIII. invited him to make a family picture of himself, his father and family, which obtained a post of honour at Whitehall. The beautiful cartoon of a part of 'this fine piece at Hardwicke Hall enables us to gauge its beauty before the fire which destroyed it in the 17th century. Then Holbein painted Jane Seymour in state (Vienna), employing*

some English hand perhaps to make the replicas at the Hague, Sion House and Woburn; he finished the Southwell of the Ufiizi (copy at the Louvre), the jeweller Morett at Dresden, and last, not least, Christine of Denmark, who gave sittings at Brussels in 1538. During the journey which this work involved Holbein took the opportunity of revisiting Basel, where he made his appearance in silk and satin, and pro forma only accepted the office of town painter. He had been living long and con- tinuously away from home, not indeed observing due fidelity to his wife, who still resided at Basel, but fairly performing the duties of keeping her in comfort. His return to London in autumn enabled him to do homage to the king in the way familiar to artists. He presented to Henry at Christmas a portrait of Prince Edward. Again abroad in the summer of 1539, he painted with great fidelity the princess Anne of Cleves, at Diiren near Cologne, whose form we still see depicted in the great picture of the Louvre. That he could render the features of his sitter without flattery is plain from this one example. Indeed, habitual flattery was contrary to his habits. His portraits up to this time all display that uncommon facility for seizing character which his father enjoyed before him, and which he had inherited in an expanded form. No amount of labour, no laboriousness of finish — and of both he was ever prodigal — betrayed him into loss of resemblance or expression. No painter was ever quicker at noting peculiarities of physiog- nomy, and it may be observed that in none of his faces, as indeed in none of the faces one sees in nature, are the two sides alike. Yet he was not a child of the 16th century, as the Venetians were, in substituting touch for line. We must not look in his works for modulations of surface or subtle contrasts of colour in juxtaposition. His method was to the very last delicate, finished and

smooth, as became a painter of the old school.

Amongst the more important creations of Holbein's later time we should note his " Duke of Norfolk " at Windsor, the hands of which are so perfectly preserved as to compensate for the shrivel that now disfigures the head. Two other portraits of 1 541 (Berlin and Vienna), the Falconer at the Hague, and John Chambers at Vienna (1542), are noble specimens of portrait art; most interesting and of the same year are the likenesses of Holbein himself, of which several examples are extant — one particularly good at Fahna, the seat of the Stackelberg family near Riga, and another at the Uffizi in Florence. Here Holbein appears to us as a man of regular features, with hair just turning grey, but healthy in colour and shape, and evidently well to do in the world. Yet a few months only separated him then from his death-bed. He was busy painting a picture of Henry the VIII. confirming the Privileges of the Barber Surgeons (Lincoln's Inn Fields), when he sickened of the plague and died after making a will about November 1543. His loss must have been seriously felt in England. Had he lived his last years in Germany, he would not have changed the current which decided the fate of painting in that country; he would but have shared the fate of Durer and others who merely prolonged the agony of art amidst the troubles of the Reformation. (J. A. C.)

The early authorities are Karel Van Mander's Het Schilder Boek (1604), and J. von Sandrart, Accademia Todesca (1675). See also R. N. Wornum, Life and Work of Holbein (1867); H. Knackfuss, Holbein (1899); G. S. Davies, Holbein (1903); A. F. G. A. Wolt- mann, Holbein und seine Zeit (1876).

HOLBERG, LUDVIG HOLBERG, Baron (1684-1754), the great Scandinavian writer, was born at Bergen, in Norway, on the 3rd of December 1684. Both Holberg's parents died in his childhood, his father first, leaving a considerable property; and in his eleventh year he lost his mother also. Before the latter event, however, the family had been seriously im- poverished by a great fire, which destroyed several valuable buildings, but notwithstanding this, the mother left to each of her six children some little fortune. In 1695 the boy Holberg was taken into the house of his uncle, Peder Lem, who sent him to the Latin school, and prepared him for the profession of a soldier; but soon after this he was adopted by his cousin Otto Munthe, and went to him up in the mountains. His great

desire for instruction, however, at last induced his family to send him back to Bergen, to his uncle, and there he remained, eagerly studying, until the destruction of that city by fire in 1702, when he was sent to the university of Copenhagen. But he soon exhausted his resources, and, having nothing to live upon, was glad to hurry back to Norway, where he accepted the

position of tutor in the house of a rural dean at Voss. He soon returned to Copenhagen, where in 1704 he took his degree, and worked hard at French, English and Italian. But he had to gain his living, and accordingly he accepted the post of tutor once more, this time in the house of Dr Smith, vice-bishop of Bergen. The good doctor had travelled much, and the reading of his itineraries and note-books awakened such a longing for travel in the young Holberg that at last, at the close of 1704, having scraped together 60 dollars, he went on board a ship bound for Holland. He proceeded as far as Aix-la-Chapelle, where he fell sick of a fever, and suffered so much from weakness and poverty, that he made his way on foot to Amsterdam, and came back to Norway. Ashamed to be seen so soon in Bergen, he stopped at Christianssand, where he lived through the winter, supporting himself by giving lessons in French. In the spring of 1706 he travelled, in company with a student named Bfix, through London to Oxford, where he studied for two years, gaining his livelihood by giving lessons on the violin and the flute. He mentions, with gratitude, the valuable libraries of Oxford, and it is pleasant to record that it was while he was there that it first occurred to him, as he says, " how splendid and glorious a thing it would be to take a place among the authors." Through London and Elsinore he reached Copenhagen a third time, and began to lecture at the university; his lectures were attended, but he got no money. He was asked in 1709 to conduct a rich young gentleman to Dresden, and on his return journey he lectured at Leipzig, Halle and Hamburg. Once more in Copen- hagen, he undertook to teach the children of Admiral Gedde. Weary with this work, he took a post at Borch College in 17 10, where he wrote, and printed in 171 1, his first work, An Introduc- tion to the History of the Nations of Europe, and was permitted to present to King Frederick IV. two manuscript essays on Christian IV. and Frederick III. The king soon after presented him with the title of Professor, and with the Rosenkrantz grant of 100 dollars for four years, the holder of which was expected to travel. Holberg accordingly started in 1 7 14, and visited, chiefly on foot, a great portion of Europe. From Amsterdam he walked through Rotterdam to Antwerp, took a boat to Brussels, and on foot again reached Paris. Walking and skating, he proceeded in the depth of winter to Marseilles, and on by sea to Genoa. On the last-mentioned voyage he caught a fever, and nearly died in that city. On his recovery he pushed on to Civita Vecchia and Rome. When the spring had come, being still very poor and in feeble health, he started homewards on foot by Florence, across the Apennines, through Bologna, Parma, Piacenza, Turin, over the Alps, through Savoy and Dauphine to Lyons, and finally to Paris, where he arrived in excellent health. After spending a month in Paris, he walked on to Amsterdam, took sail to Hamburg, and so went back to Denmark in 1716. He spent the next two years in extreme poverty, and published his Introduction to Natural and Popular Law. But at last, in 1718, his talents

were recognized by his appointment as professor of metaphysics at the university of Copenhagen; and in 1720 he was promoted to the lucrative chair of public eloquence, which gave him a seat in the consistory. His pecuniary troubles were now at an end. Hitherto he had written only on law, history and philology, although in a Latin controversy with the jurist Andreas Hojer of Flensborg his satirical genius had flashed out. But now, and until 1728, he created an entirely new class of humorous literature under the pseudonym of Hans Mikkelsen. The serio-comic epic of Peder Paars, the earliest of the great classics of the Danish language, appeared in 1719. This poem was a brilliant satire on contemporary manners, and enjoyed an extraordinary success. But- the author had offended in it several powerful persons who threatened his life, and if Count Danneskjold had not personally interested the king in

him, Holberg's career might have had an untimely close. During the next two years he published five shorter satires, all of which were well received by the public. The great event of 1721 was the erection of the first Danish theatre in Gronnegade, Copen- hagen; Holberg took the direction of this house, in which was played, in September 1722, a Danish translation of L'Avare. Until this time no plays had been acted in Denmark except in French and German, but Holberg now determined to use his talent in the construction of Danish comedy. The first of his original pieces performed was Den poliliske Kandestober (The Pewterer turned Politician); he wrote other comedies with miraculous rapidity, and before 1722 was closed, there had been performed in succession, and with immense success, Den Vaegcl- sindede (The Waverer), Jean de France, Jeppe paa Bjerget, and Cert the W estphalian. Of these five plays, four at least are masterpieces; and they were almost immediately followed by others. Holberg took no rest, and before the end of 1723 the comedies of Barselstuen (The Lying-in Room), The Eleventh of July, Jakob von Thyboe, Den Bundeslbse (The Fidget), Erasmus Montanus, Don Ranudo, Ulysses of Ithaca, Without Head or Tail, Witchcraft and Melampe had all been written, and some of them acted. In 1724 the most famous comedy that Holberg produced was Henrik and Pernille. But in spite of this unprecedented blaze of dramatic genius the theatre fell into pecuniary difficulties, and had to be closed, Holberg composing for the last night's performance, in February 1727, a Funeral of Danish Comedy. All this excessive labour for the stage had undermined the great poet's health, and in 1725 he had determined to take the baths at Aix-la-Chapelle; but instead of going thither he wandered through Belgium to Paris, and spent the winter there. In the spring he returned to Copenhagen with recovered health and spirits, and worked quietly at his

protean literary labours until the great fire of 1728. In the period of national poverty and depression that followed this event, a puritanical spirit came into vogue which was little in sympathy with Holberg's dramatic or satiric genius. He therefore closed his career as a dramatic poet by publishing in 1731 his acted comedies, with the addition of five which he had no opportunity of putting on the stage. With characteristic versatility, he adopted the serious tone of the new age, and busied himself for the next twenty years with historical, philosophical and statistical writings. During this period he published his poetical satire called Metamorphosis (1726), his Epistolae ad virum perillustrem (1727), his Description of Denmark and Norway (1729), History of Denmark, Universal Church History, Biographies of Famous Men, Moral Reflections, Description of Bergen (1737), A History of the Jews, and other learned and laborious compilations. The only poem he published at this time was the famous Nicolai Klimii iter subterraneum (1741), afterwards translated into Danish by Baggesen. When Christian VI. died in 1747, pietism lost its sway; the theatre was reopened and Holberg was appointed director, but he soon resigned this arduous post. The six comedies he wrote in his old age did not add to his reputation. His last published work was his Epistles, in 5 vols, the last of them posthumous (1754). In 1747 he was created by the new king Baron of Holberg. In August 1753 he took to his bed, and he died at Copenhagen on the 28th of January 1754, in the seventieth year of his age. He was buried at Soro, in Zealand. He had never married, and he bequeathed all his property, which was considerable, to Soro College.

Holberg was not only the founder of Danish literature and the greatest of Danish authors, but he was, with the exception of Voltaire, the first writer in Europe during his own generation. Neither Pope nor Swift, who perhaps excelled him in particular branches of literary production, approached him in range of genius, or in encyclopaedic versatility. Holberg found Denmark provided with no books, and he wrote a library for her. When he arrived in the country, the Danish language was never heard in a gentleman's house. Polite Danes were wont to say that a man wrote Latin to his friends, talked French to the ladies, called Ins dogs in German, and only used Danish to swear at his servants. The single genius of Holberg revolutionized this

system. He wrote poems of all kinds in a language hitherto employed only for ballads and hymns; he instituted a theatre, and composed a rich collection of comedies for it; he filled the shelves of the citizens with works in their own tongue on history, law, politics, science, philology and philosophy, all written in a true and manly style, and representing the extreme attain- ment of European culture at the moment. Perhaps no author who ever lived has had so vast an influence over his country- men, an influence that is still at work after 200 years.

The editions of Holberg's works are legion. Complete editions of the Comedies are too numerous to be quoted ; the best is that brought out in 3 vols, by F. L. Lichtenberg, in 1870. Of Peder Paars there exist at least twenty-three editions, besides translations in Dutch, German and Swedish. The Iter subterraneum has been three several times translated into Danish, ten times into German, thrice into Swedish, thrice into Dutch, thrice into English, twice into French, twice into Russian and once into Hungarian. The life of Holberg was written by Welhaven in 1858 and by Georg Brandes in 1884. Among works on his genius by foreigners may be mentioned an exhaustive study by Robert Prutz (1857), and Holberg considere comme imitateur de Moliere, by A. Legrelle (Paris, 1864). (E. G.)

HOLBORN, a central metropolitan borough of London, England, bounded N.W. by St Pancras, N.E. by Finsbury, S.E. by the City of London, S. and W. by the City of Westminster and St Marylebone. Pop. (1901), 59,405. Area 405-1 acres. Its main thoroughfare is that running E. and W. under the names of Holborn Viaduct, High Holborn and New Oxford Street.

The name of Holborn was formerly derived from Old Bourne, a tributary of the Fleet, the valley of which is clearly seen where Holborn Viaduct crosses Farringdon Street. Of the existence of this tributary, however, there is no evidence, and the origin of the name is found in Hole-bourne, the stream in the hollow, in allusion to the Fleet itself. The fall and rise of the road across the valley before the construction of the viaduct (1869) was abrupt and inconvenient. In earlier times a bridge here crossed the Fleet, leading from Newgate, while a quarter of a mile west of the viaduct is the site of Holborn Bars, at the entrance to the City, where tolls were levied. The better residential district of Holborn, which extends northward to Euston Road in the borough of St Pancras, is mainly within the parish of St George, Bloomsbury. The name of Bloomsbury is commonly derived from William Blemund, a lord of the manor in the 15th century. A dyke called Blemund's Ditch, of unknown origin, bounded it on the south, where the land was marshy. During the 18th century Bloomsbury was a fashionable and wealthy residential quarter. The reputation of the district immediately to the south, embraced in the parish of St Giles in the Fields, was far different. From the 17 th century until modern times this was notorious as a home of crime and poverty. Here occurred some of the earliest cases of the plague which spread over London in 1664-1665. The opening of the thoroughfares of New Oxford Street (1840) and Shaftesbury Avenue (1855) by no means wholly destroyed the character of the district. The circus of Seven Dials, east of Shaftesbury Avenue, affords a typical name in connexion with the lowest aspect of life in London. A similar notoriety attached to Saffron Hill on the eastern confines of the borough. By a singular contrast, the neighbour- ing thoroughfare of Hatton Garden,

leading north from Holborn Circus, is a centre of the diamond trade.

Of the ecclesiastical buildings of Holborn that of first interest is the chapel of St Etheldreda in Ely Place, opening from Holborn Circus. Ely Place takes its name from a palace of the bishops of Ely, who held land here as early as the 13th century. Here died John of Gaunt in 1399. , The property was acquired by Sir Christopher Hatton, Lord Chancellor under Queen Elizabeth, after whom Hatton Garden is named; though the bishopric kept some hold upon it until the 18th century. The chapel, the only remnant of the palace, is a beautiful Decorated structure with a vaulted crypt, itself above ground- level. Both are used for worship by Roman Catholics, by whom the chapel was acquired in 1874 and opened five years later after careful restoration. The present parish church of St Giles in the Fields, between Shaftesbury Avenue and New

Oxford Street, dates from 1734, but here was situated a leper's hospital founded by Matilda, wife of Henry I., in 1101. Its chapel became the parish church on the suppression of the monasteries. The church of St Andrew, the parish of which extends into the City, stands near Holborn Viaduct. It is by Wren, but there are traces of the previous Gothic edifice in the tower. Sacheverell was among its rectors (1713-1724), and Thomas Chatterton (1770) was interred in the adjacent burial ground, no longer extant, of Shoe Lane Workhouse; the register recording his Christian name as William. Close to this church is the City Temple (Congregational).

Two of the four Inns of Court, Lincoln's Inn and Gray's Inn, lie within the borough. Of the first the Tudor gateway opens upon Chancery Lane. The chapel, hall and residential buildings surrounding the squares within, are picturesque, but of later date. To the west lie the fine square, with public gardens, still called, from its original character, Lincoln's Inn Fields. Gray's Inn, between High Holborn and Theobald's Road, and west of Gray's Inn Road, is of similar arrangement. The fabric of the small chapel is apparently of the 14th century, and may have been attached to the manor house of Portpool, held at that period by the Lords Grey of Wilton. Of the former Inns of Chancery attached to these Inns of Court the most note-worthy buildings remaining are those of Staple Inn, of which the timbered and gabled Elizabethan front upon High Holborn is a unique survival of its character in a London thoroughfare; and of Barnard's Inn, occupied by the Mercer's School. Both these were attached to Gray's Inn. Of Furnival's and Thavies Inns, attached to Lincoln's Inn, only the names remain. The site of the first is covered by the fine red brick buildings of the Prudential

Assurance Company, Holborn Viaduct. Among other institutions in Holborn, the British Museum, north of New Oxford Street, is pre-eminent. The varied collections of Sir John Soane, accumulated at his house in Lincoln's Inn Fields, are open to view as the Soane Museum. There may also be mentioned the Royal College of Surgeons, Lincoln's Inn Fields, with museum; the Royal Colleges of Organists, and of Veterinary Surgeons, the College of Preceptors, the Jews' College, and the Metropolitan School of Shorthand. Among hospitals are the Italian, the Homoeopathic, the National for the paralysed and epileptic, the Alexandra for children with hip disease, and the Hospital for sick children. The Foundling Hospital, Guilford Street, was founded by Thomas Coram in

1739-

HOLCROFT, THOMAS (1745-1809), English dramatist and miscellaneous writer, was born on the 10th of December 1745 (old style) in Orange Court, Leicester Fields, London. His father, besides having a shoemaker's shop, kept riding horses for hire; but having fallen into difficulties was reduced ultimately to the necessity of hawking pedlary. The son accompanied his parents in their tramps, and succeeded in procuring the situation of stable boy at Newmarket, where he spent his evenings chiefly in miscellaneous reading and the study of music. Gradually he obtained a knowledge of French, German and Italian. At the end of his term of engagement as stable boy he returned to assist his father, who had again resumed his trade of shoemaker in London; but after marrying in 1765, he became a teacher in a small school in Liverpool. He failed in an attempt to set up a private school, and became prompter in a Dublin theatre. He acted in various strolling companies until 1778, when he produced The Crisis; or, Love and Famine, at Drury Lane. Duplicity followed in 178T. Two years later he went to Paris as correspondent of the Morning Herald. Here he attended the performances of Beaumarchais's Mariage de Figaro until he had memorized the whole. The translation of it, with the title The Follies of the Day, was produced at Drury Lane in 1784. The Road to Ruin, his most successful melodrama, was produced in 1792. A revival in 1873 ran for 118 nights. Holcroft died on the 23rd of March 1809. He was a member of the Society for Constitutional Information, and on that account was, in 1794, indicted of high treason, but was discharged without a trial. Among his novels may be mentioned Alwyn

(1780), an account, largely autobiographical, of a strolling comedian, and Hugh Trevor (1794-1797). He also was the author of Travels from Hamburg through Westphalia, Holland and the Netherlands to Paris, of some volumes of verse and of translations from the French and German.

His Memoirs written by Himself and continued down to the Time of his

Death, from his Diary, Notes and other Papers, by William Hazlitt, appeared in 1816, and was reprinted, in a slightly abridged form, in

1852.

HOLDEN, HUBERT ASHTON (1822-1896), English classical scholar, came of an old Staffordshire family. He was educated at King Edward's school, Birmingham, and Trinity College, Cambridge (senior classic, 1845; fellow, 1847). He was vice- principal of Cheltenham College (1853-1858), and headmaster of Queen Elizabeth's school, Ipswich (1858-1883). He died in London on the 1st of December 1896. In addition to several school editions of portions of Cicero, Thucydides, Xenophon and Plutarch, he published an expurgated text of Aristophanes with a useful onomasticon (re-issued separately, 1902) and larger editions of Cicero's De officiis (revised ed., 1898) and of the Octavius of Minucius Felix (1853). His chief works, however, were his Foliorum silvula (1852), a collection of English extracts for translation into Greek and Latin verse; Folia silvulae (translations of the same) ; and Foliorum centuriae, a companion volume of extracts for Latin prose translation. In English schools these books have been widely used for the teaching of Latin and Greek composition.

HOLDEN, SIR ISAAC, Bart. (1807-1897), English inventor and manufacturer, was the son of Isaac Holden, a native of Cumberland, and was born at Hurlet, a village between Paisley and Glasgow, on the 7 th of May 1807. His early life was passed in very straitened circumstances, but his father spared no pains to give him as much elementary education as possible. At the age of ten he began to work as weaver's draw-boy, and after- wards was employed in a cotton mill. Meanwhile his education was continued at the night schools, and from time to time, as funds allowed, he was taken from work and sent to the grammar-school, to which he at last went regularly for a year or two until he was fifteen, when his father removed to Paisley and apprenticed him to an uncle, a shawl-weaver there. This proving too much for his strength, in 1823 he became assistant teacher in a school at Paisley, and in 1828 he was appointed mathematical teacher in the Queen's Square Academy, Leeds. At the end of six months he was transferred to Lingard's grammar school, near Huddersfield, and shortly afterwards became classical master at Castle Street Academy, Reading. It was here that in 1829 he invented a lucifer match by adopting sulphur as the medium between the explosive material and the wood, but he refused to patent the invention. In 1830 his health again failed, and he returned to Scotland, where a Glasgow friend set up a school for him. After six months, however, he was recommended for the post of bookkeeper to Messrs. Townend Brothers, worsted manufacturers, of Cullingworth, where his interest in machinery soon led to his transfer from the counting-house to the mill. There his experiments led him to the invention of his square

motion wool-comber and of a process for making genappe yarns, a patent for which was taken out by him in conjunction with S. C. Lister (Lord Masham) in 1847. The firm of Lister & Holden, which established a factory near Paris in 1848, carried on a successful business, and in 1859, when Lister retired, was succeeded by Isaac Holden. and Sons, which became the largest wool-combing business in the world, employing upwards of 4000 workpeople. In 1865 Holden's medical advisers insisted on complete change of occupation, and he entered parliament as Liberal member for Knaresborough. From 1868 to 1882 he was without a seat, but in the latter year he was elected for the northern division of the West Riding, and in 1885 for Reighley. He was created a baronet in 1893, and died suddenly at Oakworth House, near Keighley, on the 13th of August 1897.

His son and heir, Sir Angus Holden, was in 1908 created a peer with the title of Baron Holden of Alston.

HOLDERLIN, JOHANN CHRISTIAN FRIEDRICH (1770- 1843), German poet, was born on the 20th of March 1770, at Lauffen on the Neckar. His mother removing, after a second marriage, to Nurtingen, he began his education at the classical school there. He was destined by his relations for the church, and with this view was later admitted to the seminaries at Denkendorf and Maulbronn. At the age of eighteen he entered as a student of theology the university of Tubingen, where he remained till 1793. He was already the writer of occasional verses, and had begun to sketch his novel Hyperion, when he was introduced in this year to Schiller, and obtained through him the post of tutor to the young son of Charlotte von Kalb. A year later he left this situation to attend Fichte's lectures, and to be near Schiller in Jena. The latter recognized in the young poet something of his own genius, and encouraged him by publishing some of his early writings in his periodicals Die neue Thalia and Die Horen. In 1796 Holderlin obtained the post of tutor in the family of the banker J. F. Gontard in Frank- fort-on-Main. For Gontard's beautiful and gifted wife, Susette, the " Diotima " of his Hyperion, he conceived a violent passion; and she became at once his inspiration and his ruin. At the end of two years, during which time the first volume of Hyperion was published (1797), a crisis appears to have occurred in their relations, for the young poet suddenly left Frankfort. In spite of ill-health, he now completed Hyperion, the second volume of which appeared in 1799, and began a tragedy, Der Tod des Empcdokles, a fragment of which is published among his works. His friends became alarmed at the alternate depression and

nervous irritability from which he suffered, and he was induced to go to Switzerland, as tutor in a family at Hauptwill. There his health improved; and several of his poems, among which are Der blinde Sanger, An die Hojfnung and Dichtermul, were written at this time. In 1801 he returned home to arrange for the publication of a volume of his poems; but, on the failure of this enterprise, he was obliged to accept a tutorship at Bordeaux. " Diotima " died a year later, in June 1802, and the news is supposed to have reached Holderlin shortly afterwards, for in the following month he suddenly left Bordeaux, and travelled homewards on foot through France, arriving at Nurtingen destitute and insane. Kind treatment gradually alleviated his condition, and in lucid intervals he occupied himself by writing verses and translating Greek plays. Two of these translations — the Antigone and Oedipus rex of Sophocles — appeared in 1804, and several of his short poems were published by Franz K. L. von Seckendorff in his Musenalmanach, 1807 and 1808. In 1804 Holderlin obtained the sinecure post of librarian to the landgrave Frederick V. of Hesse-Homburg, and went to live in Homburg under the supervision of friends; but two years later becoming irremediably but harmlessly insane, he was taken in the summer of 1807 to Tubingen, where he remained till his death on the 7th of June 1843.

Holderlin's writings are the production of a beautiful and sensitive mind; but they are intensely, almost morbidly, sub- jective, and they lack real human strength. Perhaps his strongest characteristic was his passion for Greece, the result of which was that he almost entirely discarded rhyme in favour of the ancient verse measures. His poems are all short pieces; of his tragedy only a fragment was written. Hyperion, oder der Eremit in Griechenland (1797-1799), is a romance in letters, in which the stormy fervour of the " Sturm und Drang" is combined with a romantic enthusiasm for Greek antiquity. The interest centres not in the story, for the novel has little or none — Hyperion is a young Greek who takes part in the rising of his people against the Turks in 1770 — but in its lyric subjectivity and the dithyrambic beauty of its language.

Holderlin's lyrics, Lyrische Gedichte, were edited by L. Uhland and G. Schwab in 1826. A complete edition of his works, Samtliche

Werke, with a biography by C. T. Schwab, appeared in 1846; also Dichtungen by K. Kostlin (Tubingen, 1884), and (the best edition) Gesammelte Dichtungen by B. Litzmann (2 vols., Stuttgart, 1897). For biography and criticism, see C. C. T. Litzmann, F. Holderlins Leben (Berlin,' 1890), A. Wilbrandt, Holderlin (2nd ed., Berlin, 1891), and C. Miiller, Friedrich Holderlin, sein Leben und sein Dichten

(Bremen, 1894).

HOLDERNESSE, EARL OF, an English title borne by Sir John Ramsay and later by the family of Darcy. John Ramsay (c. 1 580-1 626), a member of the Scottish family of Ramsay of Dalhousie, was knighted for his share in rescuing James VI. from the hands of John Ruthven, earl of Gowrie, in August 1600. In 1606 the king created him Viscount Haddington and Lord Ramsay of Barns, and in 162 1 made him an English peer as earl of Holdernesse. Ramsay died without surviving issue in February 1626, when his titles became extinct. In 1644 Charles I. created his nephew, Prince Rupert, earl of Holdernesse, but when the prince died unmarried in November 1682 the earldom again became extinct. Conyers Darcy (1 599-1689), who was made earl of Holdernesse in 1682 only a few days after the death of Rupert, was the son and heir of Conyers Darcy, Lord Darcy and Conyers (c. 1571-1654), and succeeded his father in these baronies in March 1654. He was succeeded as 2nd earl by his only son Conyers (c. 1620-1692), who was member of parliament for Yorkshire during the reign of Charles II. In his turn he was succeeded by his grandson Robert (1681-1722). Robert's only son, Robert Darcy, 4th earl of Holdernesse (1718- 1778), was a diplomatist and a politician. From 1744 to 1746 he was ambassador at Venice and from 1749 to 1751 he represented his country at the Hague. In 1 7 5 1 he became one of the secretaries of state, and he remained in office until March 1761, when he was dismissed by George III. From 1771 to 1776 he acted as governor to two of the king's sons, a " solemn phantom " as Horace Walpole calls him. He left no sons, and all his titles became extinct except the barony of Conyers, which had been created by writ in 1509 in favour of his ancestor Sir William Conyers (d. 1525). This descended to his only daughter Amelia (1754-1784), the wife of Francis Osborne, afterwards 5th duke of Leeds, and when the 7 th duke of Leeds died in 1859 it passed to his nephew, Sackville George Lane-Fox (1827-1888), falling into abeyance on his death. Hornby castle in Yorkshire, now the principal seat of the dukes of Leeds, came to them through marriage of the 5th duke with the heiress of the families of Conyers and of Darcy.

HOLDHEIM, SAMUEL (1806-1860), Jewish rabbi, a leader of reform in the German Synagogue, was born in Posen in 1806 and died in Berlin in i860. In 1836 he was appointed rabbi at Frankfort-on-the-Oder, in 1840 he was transferred to the rabbinate of Mecklenburg-Schwerin. He then became prominent as an advocate on the one hand of religious freedom (much trammelled at the time by Prussian state laws) and on the other of reform within the Jewish community. Various rabbinical conferences were held, at Brunswick (1844), Frankfort-on-the- Main (1845) and Breslau (1846). At all of these Holdheim was a strong supporter of the policy of modifying ritual (especially with regard to Sabbath observance, marriage laws and liturgical customs). In 1846 he was chosen Rabbi of the new

Berlin congregation and there exercised considerable influence on the course of Jewish reform.

See I. H. Ritter in the Jewish Quarterly Review, i. 202. The same authority has written the life of Holdheim in vol. iii. of his Geschichte der jiidischen Reformation (Berlin, 1865). Graetz in his History passes an unfavourable judgment on Holdheim, and there were admittedly grounds for opposition to Holdheim's attitude. A moderate criticism is contained in Dr D. Philipson's History of the Reform Movement in Judaism (London, 1906).

HOLGUIN, a town of the high plateau country in the interior of Oriente province, Cuba, about 65 m. N.W. of Santiago de Cuba. Pop. (1907) 7592. The town is near the Maranon and Jigiie rivers, on a plain from which hills rise on all sides except the E., on which side it is open to the winds of the plateau. Holguin was long the principal acclimatization station for Spanish troops. The oldest public buildings are two churches built in 1800 and 1809 respectively. Holguin has trade in cabinet woods, tobacco, Indian corn and cattle products, which it exports through its port Gibara, about 25 m. N.N.E., with which it is connected by railway. Holguin was settled about 1720 and became a ciudad (city) in 1751. In the Ten Years' War of 1868-78 and in the revolution of 1895-98 Holguin was an insurgent centre.

HOLIDAY, originally the " holy day," a festival set apart for religious observances as a memorial of some sacred event or sacred person; hence a day on which the ordinary work or business ceases. For the religious sense see Feasts and Festivals, and Sunday. Apart from the use of the term for a single day of rest or enjoyment, it is commonly used in the plural for a recognized and regular period (as at schools, &c.) of absence from work. It is unnecessary here to deal with what may be regarded as private holidays, which are matters of agreement between employer and employed or between the authorities of this or that institution and those who attend it. In recent years there has been a notable tendency in most occupations to shorten the hours of labour, and make holidays more regular. It will suffice to deal here with public holidays, the observance of which is prescribed by the state. In one respect these have been diminished, in so far as saints' days are no longer regarded as entailing non-attendance at the government offices in England, as was the case at the beginning of the 19th century. But while the influence of religion in determining such holidays has waned, the importance of making some com- pulsory provision for social recreation has made itself felt. In England four days, known as Bank Holidays (g.v.),

are set apart by statute to be observed as general holidays, while the sovereign may by proclamation appoint any day to be similarly observed. Endeavours have been made from time to time to get additional days recognized as general holidays, such as Empire Day (May 24th), Arbor Day, &c. In the British colonies there is no uniform practice. In Canada eight days are generally ob- served as public holidays: New Year's Day, Good Friday, Easter Monday, Christmas Day, the birthday of the sovereign, Victoria Day, Dominion Day and Labour Day. Some of the provinces have followed the American example by adding an Arbor Day. Alberta and Saskatchewan observe Ash Wednesday. In Quebec, where the majority of the population is Roman Catholic, the holy days are also holidays, namely, the Festival of the Epiphany, Ash Wednesday, Good Friday, Easter Monday, the Ascension, All Saint's Day, Conception Day, Christmas Day. In 1897 Labour Day was added. In New South Wales, the 1st of January, Good Friday, Easter Eve, Easter Monday, the birthday of the sovereign, the 1st of August, the birthday of the prince of Wales, Christmas Day and the 26th of December, are observed as holidays. In Victoria there are thirteen public holidays during the year, and in Queensland fourteen. In New Zealand the public holidays are confined to four, Christmas Day, New Year's Day, Good Friday and Labour Day. In most of the other British colonies the usual number of public holidays is from six to eight.

In the United States there is no legal holiday in the sense of the English bank holidays. A legal holiday is dependent upon state and territorial legislation. It is usual for the president to proclaim the last Thursday in November as a day of thanks- giving; this makes it only a legal holiday in the District of Columbia, and in the territories, but most states make it a general holiday. Independence Day (July 4th) and Labour Day (first Monday in September) are legal holidays in most states. There are other days which, in connexion with particular events or in remembrance of particular persons, have been made legal holidays by particular states. For example, Lincoln's birthday, Washington's birthday, Memorial Day (May 30th), Patriots' Day (April 19th, Maine and Mass.), R. E. Lee's birthday (Jan. 19th, Ala., Fla., Ga., Va.), Pioneers' Day (July 24th, Utah), Colorado Day (Aug. 1st), Battle of New Orleans (Jan. 8th, La.), Benning- ton BattleDay (Aug. 1 6th, Vt.), Defender's Day (Sept. 12th, Md.), Arbor Day (April 22nd, Nebraska; second Friday in May R.I., &c), Admission Day (September 9th, CaL; Oct. 31st, Nev.), Con- federate Memorial Day (April 26th, Ala., Fla., Ga., Miss., May 10th, N. & S. Car., June 3rd, La., Miss., Texas), &c.

See M 'Curdy, Bibliography of Articles relating to Holidays (Boston, 1905). (T. A. 1.)

HOLINSHED (or Holungshead), RAPHAEL (d. c. 1580), English

chronicler, belonged probably to a Cheshire family, and according to Anthony Wood was educated at one of the English

universities, afterwards becoming a " minister of God's Word." The authenticity of these facts is doubtful, although it is possible that Raphael was the Holinshed who matriculated from Christ's College, Cambridge, in 1544. About 1560 he came to London and was employed as a translator by Reginald or Rftyner Wolfe, to whom he says he was " singularly beholden." Wolfe was already engaged in the preparation of a universal history, and Holinshed worked for some years on this undertaking; but after Wolfe's death in 1573 the scope of the work was abridged, and it appeared in 1578 as the Chronicles of England, Scotland, and Ireland. The work was in two volumes, which were illus- trated, and although Holinshed did a great deal of the work he received valuable assistance from William Harrison (1534-1593) and others, while the part dealing with the history of Scotland is mainly a translation of Hector Boece's Scotorum historiae. Afterwards, as is shown by his will, Holinshed served as steward to Thomas Burdet of Bramcott, Warwickshire, and died about 1580. A second edition of the Chronicles , enlarged and improved but without illustrations, which appeared in 1587, contained statements which were offensive to Queen Elizabeth and her advisers, and im- mediately after publication some of the pages were excised by order of the privy council. These excisions were published separately in 1723. . An edition of the Chronicles, in accordance with the original text, was published in six volumes in 1808. The work contains a large amount of information, and shows that its compilers were men of great industry; but its chief interest lies in the fact that it was largely used by Shakespeare and other Elizabethan dramatists; Shakespeare, who probably used the edition of 1587, obtaining from the Chronicles material for most of his historical plays, and also for Macbeth, King Lear and part of Cymbeline. A single manuscript by Holinshed is known to be extant. This is a translation of Florence of Worcester, and is in the British Museum. See W. G. Boswell- Stone, Shakspere's Holinshed. The Chronicle and the historical plays compared (London, 1896).

HOLKAR, the family name of the Mahratta ruler of Indore (

HOLL, FRANK (1845-1888), English painter, was born in London on the 4th of July 1845, and was educated chiefly at University College School. He was a grandson of William Holl, an engraver of note, and the son of Francis Holl, A.R.A., another engraver, whose profession he originally intended to follow. Entering the Royal Academy schools as a probationer in painting in i860, he rapidly progressed, winning silver and gold medals, and making his d£but as an exhibitor in 1864 with " A Portrait," and " Turned out of Church," a subject picture. "A Fern Gatherer" (1865); "The Ordeal" (1866); "Con- valescent " (the somewhat grim pathos of which

attracted much attention), and " Faces in the Fire " (1867), succeeded. Holl gained the travelling studentship in 1868; the successful work was characteristic of the young painter's mood, being " The Lord gave, and the Lord hath taken away." His insatiable zeal for work of all kinds began early to undermine the artist's health, but his position was assured by the studentship picture, which created a sort of furore, although, as with most of his works, the blackness of its coloration, probably due to his training as an engraver, was even more decidedly against it than the sadness of its theme. Otherwise, this painting ex- hibited nearly all the best technical qualities to which he ever attained, except high finish and clearness, and a very sincere vein of pathos. Holl was much below Millais in portraiture, and far inferior in all the higher ways of design; in technical resources, relatively speaking, he was but scantily provided. The range of his studies and the manner of his painting were narrower than those of Josef Israels, with whom, . except as a portrait-painter, he may better be compared than with Millais. In 1870 he painted " Better is a Dinner of Herbs where Love is, than a Stalled Ox and Hatred therewith "; " No Tidings from the Sea," a scene in a fisherman's cottage, in 1871 — a story told with breath-catching pathos and power; " I am the Resurrection and the Life " (1872); " Leaving Home " (1873), " Deserted " (1874), both of which had great success; "Her First-born," girls carrying a baby to the grave (1876); and " Going Home " (1877). In 1877 he painted the two pictures "Hush" and

" Hushed." " Newgate, Committed for Trial," a very sad and telling piece, first attested the breaking down of the painter's health in 1878. In this year he was elected A.R.A., and exhibited " The Gifts of the Fairies," " The Daughter of the House," " Absconded," and a very fine portrait of Samuel Cousins, the mezzotint engraver. ' This last canvas is a masterpiece, and deserved the success which attended the print engraved from it. Holl was overwhelmed with commissions, which he would not decline. The consequences of this strain upon a constitution which was never strong were more or less, though unequally, manifest in " Ordered to the Front," a soldier's departure (1880); "Home Again," its sequel, in 1883 (after which he was made R.A.). In 1886 he produced a portrait of Millais as his diploma work, but his health rapidly declined and he died at Hampstead, on the 31st of July 1888. Holl's better portraits, being of men of rare importance, attest the command- ing position he occupied in the branch of art he so unflinchingly followed. They include likenesses of Lord Roberts, painted for queen Victoria (1882); the prince of Wales, Lord Dufferin, the duke of Cleveland (1885); Lord Overstone, Mr Bright, Mr Gladstone, Mr Chamberlain, Sir J. Tenniel, Earl Spencer, Viscount Cranbrook, and a

score of other important subjects. (F. G. S.)

HOLLAND, CHARLES (1733-1769), English actor, was born in Chiswick, the son of a baker. He made his first appearance on the stage in the title role of Oroonoko at Drury Lane in 1755, John Palmer, Richard Yates and Mrs Cibber being in the cast. He played under Garrick, and was the original Florizel in the latter's adaptation of Shakespeare's Winter's Tale. Garrick thought highly of him, and wrote a eulogistic epitaph for his monument in Chiswick church.

His nephew, Charles Holland (1768-1849) was also an actor, who played with Mrs Siddons and Kean.

HOLLAND, SIR HENRY, Bart. (1788-1873), English physician and author, was born at Knutsford, Cheshire, on the 27th of October 1788. His maternal grandmother was the sister of Josiah Wedgwood, whose grandson was Charles Darwin; and his paternal aunt was the mother of Mrs Gaskell. After spending some years at a private school at Knutsford, he was sent to a school at Newcastle-on-Tyne, whence after four years he was transferred to Dr J. P. Estlin's school near Bristol. There he at once took the position of head boy, in succession to John Cam Hobhouse, afterwards Lord Broughton, an honour which required to be maintained by physical prowess. On leaving school he became articled clerk to a mercantile firm in Liverpool, but, as the privilege was reserved to him of passing two sessions at Glasgow university, he at the close of his second session sought relief from his articles, and in 1806 began the study of medicine in the university of Edinburgh, where he graduated in 1811. After several years spent in foreign travel, he began practice in 1816 as a physician in London— according

to his own statement, " with a fair augury of success speedily and completely fulfilled." This "success," he adds, "was materially aided by visits for four successive years to Spa, at the close of that which is called the London season." It must also, however, be in a great degree attributed to his happy temperament and his gifts as a conversationalist — qualities the influence of which, in the majority of cases belonging to his class of practice, is often of more importance than direct medical treatment. In 1816 he was elected F.R.S., and in 1S28 F.R.C.S, He became physician in ordinary to Prince Albert in 1840, and was appointed in 1852 physician in ordinary to the queen. In April 1853 he was created a baronet. He was also a D.C.L. of Oxford and a member of the principal learned societies of Europe. He was twice married, his second wife being a daughter of Sydney Smith, a lady of considerable literary talent, who published a biography of her father. Sir Henry Holland at an early period of his practice resolved to devote to his professional duties no more of his time than was necessary to secure an income of £5000 a year, and also to spend two months of every year solely in foreign travel. By the former resolution he secured leisure for a wide acquaintance with general literature, and for a more than superficial cultivation of several branches of science; and the latter enabled him, besides visiting, " and most of them repeatedly, every country of Europe," to make extensive tours in the other three con- tinents, journeying often to places little frequented by European travellers. As, moreover, he procured an introduction to nearly all the eminent personages in his line of travel, and knew many of them in

his capacity of physician, his acquaintance with "men and cities" was of a species without a parallel. The London Medical Record, in noticing his death, which took place on his eighty-fifth birthday, October 27, 1873, remarked that it " had occurred under circumstances highly characteristic of his remarkable career." On his return from a journey in Russia he was present, on Friday, October 24th, at the trial of Marshal Bazaine in Paris, dining with some of the judges in the evening. He reached London on the Saturday, took ill the following day, and died quietly on the Monday afternoon.

Sir Henry Holland was the author of General View of the Agri- culture of Cheshire (1807); Travels in the Ionian Isles, Albania, Thessaly and Greece (1812-1813, 2nd ed., 1819); Medical Notes and, Reflections (1839); Chapters on Mental Physiology (1852); Essays on Scientific and other Subjects contributed to the Edinburgh and Quarterly Reviews (1862) ; and Recollections of Past Life (1872).

HOLLAND, HENRY FOX, ist Baron (1705-1774), English statesman, second son of Sir Stephen Fox, was born on the 28th of September 1705. Inheriting a large share of the riches which his father had accumulated, he squandered it soon after attaining his majority, and went to the Continent to escape from his creditors. There he made the acquaintance of a country-woman of fortune, who became his patroness and was so lavish with her purse that, after several years' absence, he was in a position to return home and, in 173 s, to enter parliament as member for Hindon in Wiltshire. He became the favourite pupil and devoted supporter of Sir Robert Walpole, achieving unequalled and unenviable proficiency in the worst political arts of his master and model. As a speaker he was fluent and self-possessed, imperturbable under attack, audacious in exposition or retort, and able to hold his own against Pitt himself. Thus he made himself a powerin the House of Commons and an indispensable member of several administrations. He was surveyor-general of works from 1737 to 1742, was member for Windsor from 1741 to 1761; lord of the treasury in 1743, secretary at war and member of the privy council in 1746, and in 1755 became leader of the House of Commons, secretary of state and a member of the cabinet under the duke of New- castle. In 1757, in the rearrangements of the government, Fox was ultimately excluded from the cabinet, and given the post of paymaster of the forces. During the war, which Pitt conducted with extraordinary vigour, and in which the nation was intoxicated with glory, Fox devoted himself mainly to accumulating a vast fortune. In 1762 he again accepted the leadership of the House, with a seat in the cabinet, under the earl of Bute, and exercised his skill in cajolery and corruption to induce the House of Commons to approve of the treaty of Paris of 1763; as a recompense, he was raised to the House of Lords with the title of Baron Holland of Foxley, Wiltshire, on the 16th of

April 1763. In 1765 he was forced to resign the paymaster generalship, and four years later a petition of the livery of the city of London against the ministers referred to him as " the public defaulter of unaccounted millions." The proceedings brought against him in the court of exchequer were stayed by a royal warrant; and in a statement published by him he proved that in the delays in making up the accounts of his office he had transgressed neither the law nor the custom of the time. From the interest on the outstanding balances he had, none the less, amassed a princely fortune. He strove, but in vain, to obtain promotion to the dignity of an earl, a dignity upon which he had set his heart, and he died at Holland House, Kensington, on the ist of July 1774, a sorely disappointed man, with a reputation for cunning and unscrupulousness which cannot easily be matched, and with an unpopularity which justifies the conclusion that he was the most thoroughly hated statesman of his day. Lord Holland married in 1744

Lady Georgina Caroline Lennox, daughter of the duke of Richmond, who was created Baroness Holland, of Holland, Lincolnshire, in 1762. There were four sons of the marriage: Stephen, 2nd Lord Holland (d. 1774); Henry (d. an infant); Charles James (the celebrated statesman); and Henry Edward (1755-1811), soldier and diplomatist.

See Walpole's and other memoirs of the time, also the article Fox, Charles James.

HOLLAND, HENRY RICH, ist Earl of (1590-1649), 2nd son of Robert, ist earl of Warwick, and of Penelope, Sir Philip Sidney's " Stella," daughter of Walter Devereux, ist earl of Essex, was baptized on the 19th of August 1590, educated at Emmanuel College, Cambridge, knighted on the 3rd of June 1610, and returned to parliament for Leicester in 1610 and 1614. In 1610 he was present at the siege of Juliers. Favours were showered upon him by James I. He was made gentleman of the bedchamber to Charles, prince of Wales, and captain of the yeomen of the guard; and on the 8th of March 1623 he was raised to the peerage as Baron Kensington. In 1624 he was sent to Paris to negotiate the marriage treaty between Charles and Henrietta Maria. On the 15th of September he was created earl of Holland, and in 1625 was sent on two further missions, first to Paris to arrange a treaty between Louis XIII. and the Huguenots, and later to the Netherlands in company with Buckingham. In October 1627 he was given command of the troops sent to reinforce Buckingham at Rhe, but through delay in starting only met the defeated troops on their return. He succeeded Buckingham as chancellor of Cambridge Uni- versity; was master of the horse in 1628, and was appointed constable of Windsor and high steward

to the queen in 1629. He interested himself, like his elder brother, Lord Warwick, in the plantations; and was the first governor of the Providence company in 1630, and one of the proprietors of Newfoundland in 1637. In 1631 he was made chief-justice-in-eyre south of the Trent, and in this capacity was responsible for the unpopular revival of the obsolete forest laws. He intrigued at court against Portland and against Strafford, who expressed for him the greatest contempt. In 1636 he was disappointed at not obtaining the great office of lord high admiral, but was made instead groom of the stole. In 1639 ne was appointed general of the horse, and drew ridicule upon himself by the fiasco at Kelso. In the second war against the Scots he was superseded in favour of Conway. He opposed the dissolution of the Short Parliament, joined the peers who supported the parliamentary cause, and gave evidence against Strafford. He was, however, won back to the king's side by the queen, and on the 16th of April 1641 made captain general north of the Trent. Dissatisfied, however, with Charles's refusal to grant him the nomination of a new baron, he again abandoned him, refused the summons to York, and was deprived of his office as groom of the stole at the instance of the queen, who greatly resented his ingratitude. He was chosen by the parliament in March and July 1642 to communicate its votes to Charles, who received him, much to his indignation, with studied coldness. He was appointed one of the committee of safety in July; made zealous speeches on behalf of the parliamentary cause to the London citizens; and joined Essex's army at Twickenham, where, it is said, he persuaded him to avoid a battle. In 1643 he appeared as a peacemaker, and after failing to bring over Essex, he returned to the king. His recep- tion, however, was not a cordial one, and he was not reinstated in his office of groom of the stole. After, therefore, accompanying the king to Gloucester and taking part in the first battle of Newbury, he once more returned to the parliament, declaring that the court was too much bent on continuing hostilities, and the influence of the " papists " too strong for his patriotism. He was restored to his estates, but the Commons obliged the Lords to exclude him from the upper house, and his petition in 1645 Ior compensation for his losses and for a pension was refused. His hopes being in this quarter also disappointed, he once again renewed his allegiance to the king's cause; and after endeavouring to promote the negotiations for peace in 1645 and 1647 he took up arms in the second Civil War, received

a commission as general, and put himself at the head of 600 men at Kingston. He was defeated on the 7th of July 1647, captured at St Neots shortly afterwards, and imprisoned at Warwick Castle. He was tried before a " high court of justice " on the 3rd of February 1649, and in spite of his plea that he had received quarter was sentenced to death. He was executed together with Hamilton and Capel on the 9th of March. Clarendon styles

him "a very well-bred man and a fine gentleman in good times." 1 He was evidently a man of shallow character, devoid of ability, raised far above his merits and hopelessly unfit for the great times in which he lived. Lord Holland married Elizabeth, daughter and heiress of Sir Walter Cope of Kensington, and, besides several daughters, had four sons, of whom the eldest, Robert, succeeded him as 2nd earl of Holland, and inherited the earldom of Warwick in 1673.

HOLLAND, HENRY RICHARD VASSALL FOX, 3RD Baron (1 773-1840), was the son of Stephen Fox, 2nd Baron Holland, his mother, Lady Mary Fitzpatrick, being the daughter of the earl of Upper Ossory. He was born at Winterslow House in Wiltshire, on the 21st of November 1773, and his father died in the following year. He was educated at Eton and at Christ Church, Oxford, where he became the friend of Canning, of Hookham Frere, and of other wits of the time. Lord Holland did not take the same political side as his friends in the conflicts of the revolutionary epoch. He was from his boyhood deeply attached to his uncle, C. J. Fox, and remained steadily loyal to the Whig party. In 1791 he visited Paris and became ac- quainted with Lafayette and Talleyrand, and in 1793 he again went abroad to travel in France and Italy. At Florence he met with Lady Webster, wife of Sir Godfrey Webster, Bart., who left her husband for him. She was by birth Elizabeth Vassall (1770-1845), daughter of Richard Vassall, a planter in Jamaica. A son was born of their irregular union, a Charles Richard Fox (1796-1873), who after some service in the navy entered the Grenadiers, and was known in later life as a collector of Greek coins. His collection was bought for the royal museum of Berlin when he died in 1873. He married Lady Mary Fitz- clarence, a daughter of William IV. by Mrs Jordan. Sir Godfrey Webster having obtained a divorce, Lord Holland was enabled to marry on the 6th of July 1797. He had taken his seat in the House of Lords on the 5th of October 1796. During several years he may be said almost to have constituted the Whig party in the Upper House. His protests against the measures of the Tory ministers were collected and published, as the Opinions of Lord Holland (1841), by Dr Moylan of Lincoln's Inn. In 1800 he was authorized to take the name of Vassall, and after 1807 he signed himself Vassall Holland, though the name was no part of his title. In 1800 Lord and Lady Holland went abroad and remained in France and Spain till 1805, visiting Paris during the Peace of Amiens, and being well received by Napoleon. Lady Holland always professed a profound admiration of Napoleon, of which she made a theatrical display after his fall, and he left her a gold snuff-box by his will. In public life Lord Holland took a share proportionate to his birth and opportunities. He was appointed to negotiate with the American envoys, Monroe and W. Pinkney, was admitted to the privy council on the 27th of August 1806, and on the 15th of October entered the cabinet " of all the

talents " as lord privy seal, retiring with the rest of his colleagues in March 1807. He led the opposition to the Regency bill in 1811, and he attacked the " orders in council " and other strong measures of the government taken – to counteract Napoleon's Berlin decrees. He was in fact in politics a consistent Whig, and in that character he denounced the treaty of 1813 with Sweden which bound England to consent to the forcible union of Norway, and he resisted the bill of 1816 for confining Napoleon in St Helena. His loyalty as a Whig secured recognition when his party triumphed in the struggle for parliamentary reform, by his appointment as chancellor of the duchy of Lancaster in the cabinet of Lord Grey and Lord Melbourne, and he was still in office when he died on the 22nd of October 1840. Lord Holland is notable, not for his somewhat 1 Hist, of the Rebellion, xi. 263.

insignificant political career, but as a patron of literature, as a writer on his own account, and because his house was the centre and the headquarters of the Whig political and literary world of the time; and Lady Holland (who died on the 16th of November 1845) succeeded in taking the sort of place in London which had been filled in Paris during the 18th century by the society ladies who kept " salons." Lord Holland's Foreign Reminiscences (1850) contain much amusing gossip from the Revolutionary and Napoleonic era. His Memoirs of the Whig Party (1852) is an important contemporary authority. His small work on Lope de Vega (1806) is still of some value. Holland had two legitimate sons, Stephen, who died in 1800, and Henry Edward, who became 4th Lord Holland. When this peer died in December 1859 the title became extinct.

See The Journal of Elizabeth, Lady Holland, edited by the earl of Ilchester (1908); and Lloyd Sanders, The Holland House Circle

(1908).

HOLLAND, JOSIAH GILBERT (1819-1881), American author and editor, was born in Belchertown, Massachusetts, on the 24th of July 1819. He graduated in 1843 at the Berkshire Medical College (no longer in existence) at Pittsfield, Mass., and after practising medicine in 1844-1847, and making an unsuccessful attempt, with Charles Robinson (1818-1894), later first governor of the state of Kansas, to establish a hospital for women, he taught for a brief period in Richmond, Virginia, and in 1848 was superintendent of schools in Vicksburg, Missis- sippi. In 1849 he became assistant editor under Samuel Bowles, and three years later one of

the owners, of the Springfield (Massa- chusetts) Republican, with which he retained his connexion until 1867. He then travelled for some time in Europe, and in 1870 removed to New York, where he helped to establish and became editor and one-third owner of Scribner's Monthly (the title of which was changed in 1881 to The Century), which absorbed the periodicals Hours at Home, Putnam's Magazine and the Riverside Magazine. He remained editor of this magazine until his death. Dr Holland's books long enjoyed a wide popularity. The earlier ones were published over the pseudonym " Timothy Titcomb." His writings fall into four classes: history and biography, represented by a History of Western Massachusetts (1855), and a Life of Abraham Lincoln (1865); fiction, of which Miss Gilbert's Career (i860) and The Story of Scvenoaks (1875) remain faithful pictures of village life in eastern United States; poetry, of which Bitter-Sweet (1858) and Kathrina, Her Life and Mine (1867) were widely read; and a series of homely essays on the art of living, of which the most characteristic were Letters to Young People, Single and Married (1858), Gold Foil, hammered from Popular Proverbs (1859), Letters to the Jonses (1863), an d Every-Day Topics (2 series, 1876 and 1882). While a resident of New York, where he died on the 12th of October 1881, he identified himself with measures for good government and school reform, and in 1872 became a member and for a short time in 1873 was president of the Board of Education.

See Mrs H. M. Plunkett's Josiah Gilbert Holland (New York,

1894)-

HOLLAND, PHILEMON (1552-1637), English scholar, "the translator-general in his age," was born at Chelmsford in Essex. He was the son of a clergyman, John Holland, who had been obliged to take refuge in Germany and Denmark with Miles Coverdale during the Marian persecution. Having become a fellow of Trinity College, Cambridge, and taken the degree, of M.A., he was incorporated at Oxford (July nth, 1585). Having subsequently studied medicine, about 1595 he settled as a doctor in Coventry, but chiefly occupied himself with translations. In 1628 he was appointed headmaster of the free school, but, owing probably to advancing age, he held office for only eleven months. His latter days were oppressed by poverty, partly relieved by the generosity of the common council of Coventry, which in 1632 assigned him £3, 6s. 8d. for three years, " if he should live so long." He died on the 9th of February, 1636- 1637. His fame is due solely to his translations, which included Livy, Pliny's Natural History, Plutarch's Morals, Suetonius,

Ammianus Marcellinus and Xenophon's Cyropaedia. He published also an English version, with additions, of Camden's Britannia. His Latin

translation of Brice Bauderon's Pharma- copaea and his Regimen sanitatis Salerni were published after his death by his son, Henry Holland (i583~? i65o), who became a London bookseller, and is known to bibliographers for his Bazilhdogla; a Booke of Kings, beeing the true and liuely Effigies of all our English Kings from the Conquest (161 8), and his Hericologia Anglica (1620).

HOLLAND, RICHARD, or Richard de Holande (fl. 1450), Scottish writer, author of the Buke of the Howlat, was secretary or chaplain to the earl of Moray (1450) and rector of Halkirk, near Thurso. He was afterwards rector of Abbreochy, Loch Ness, and later held a chantry in the cathedral of Norway. He was an ardent partisan of the Douglases, and on their over-throw retired to Orkney and later to Shetland. He was employed by Edward IV. in his attempt to rouse the Western Isles through Douglas agency, and in 1482 was excluded from the general pardon granted by James III. to those who would renounce their fealty to the Douglases.

The poem, entitled the Buke of the Howlat, written about 1450, shows his devotion to the house of Douglas: — " On ilk beugh till embrace

Writtin in a bill was

O Dowglass, O Dowglass

Tender and trewe!"

(ii. 400-403).

and is dedicated to the wife of a Douglas —

" Thus for ane Dow of Dunbar drew I this Dyte, Dowit with ane Dowglass, and boith war thei dowis."

but all theories of its being a political allegory in favour of that house may be discarded. Sir Walter Scott's judgment that the Buke is " a poetical apologue . . . without any view whatever to local or natural politics " is certainly the most reasonable. The poem, which extends to 1001 lines written in the irregular alliterative rhymed stanza, is a bird-allegory, of the type familiar in the Parlemsnt of Foules. It has the incidental interest of showing (especially in stanzas 62 and 63) the antipathy of the " Inglis-speaking Scot " to the " Scots-speaking Gael " of the west, as is also shown in Dunbar's Flyting with Kennedy.

The text of the poem is preserved in the Asloan and Bannatyne MSS. Fragments of an early 16th century black-letter edition, discovered by D. Laing, are reproduced in the Adversaria of the Bannatyne Club. The poem

has been frequently reprinted, by Pinkerton, in his Scottish Poems (1792); by D. Laing (Bannatyne Club 1823; reprinted in " New Club " series, Paisley, 1882); by the Hunterian Club in their edition of the Bannatyne MS., and by A. Diebler (Chemnitz, 1893). The latest edition is that by F. J. Amours in Scottish Alliterative Poems (Scottish Text Society, 1897), pp. 47-81. (See also Introduction pp. xx.-xxxiv.)

HOLLAND, officially the kingdom of the Netherlands (Koningrijk der Nederlanden) , a maritime country in the north- west of Europe. The name Holland is that of the former count- ship, which forms part of the political, as well as the geographical centre of the kingdom (see the next article).

Topography. — Holland is bounded on the E. by Germany, on the S. by Belgium, on the W. and N. by the North Sea, and at the N.E. corner by the Dollart. From Stevensweert south- ward to the extreme corner of Limburg the boundary line is formed by the river Maas or Meuse. 1 On the east a natural geographical boundary was formed by the long line of marshy fens extending along the borders of Overysel, Drente and Groningen. The kingdom extends from 53° 32′ 21″ (Groningen Cape on Rottum Island) to 50° 45′ 49″ N. (Mesch in" the province of Limburg), and from 3 23′ 27″ (Sluis in the province of Zeeland) to 7° 12′ 20″ E. (Langakkerschans in the province of Groningen). The greatest length from north to south, viz. that from Rottum Island to Eisden near Maastricht is 164 m., and the greatest breadth from south-west to north-east, or from Zwin hear Sluis to Losser in Overysel, 144 m. The area is subject

1 At Maastricht, however, a portion lies on the left bank of the river, measured, according to the treaty with Belgium, 19th of April 1839, art. 4, by an average radius of 1200 Dutch fathoms (7874 ft.) from the outer glacis of the fortress.

to perpetual variation owing, on the one hand, to the erosion of the coasts, and, on the other, to reclamation of land by means of endiking and drainage – operations. In 1889 the total area was calculated at 12,558 sq. m., and, including the Zuider Zee and the Wadden (2050 sq. m.) and the Dutch portion of the Dollart (23 sq. m.), 14, 613 sq. m. In no country in Europe has the character of the territory exercised so great an influence on the inhabitants as in the Netherlands; and, on the other hand, no people has so extensively modified the condition of its territory as the Dutch. The

greatest importance attaches therefore to the physical conformation of the country.

The coast-line extends in a double curve from south-west to north- east, and is formed by a row of sand dunes, 171 m. in length, fringed Camwt by a broad sandy beach descending very gradually into

the sea. In the north and south, however, this line is broken by the inlets of the sea which form the Frisian and the South Holland and Zeeland islands respectively ; but the dunes themselves are found continued along the seaward side of these islands, thus indicating the original continuity of the coast-line. The breadth of the dunes naturally varies greatly, the maximum width of about 4375 yds. being found at Schoorl, north-west of Alkmaar. The average height of the individual dune-tops is not above 33 ft., but attains a maximum of 197 ft. at the High Blinkert, near Haarlem. The steepness of the dunes on the side towards the sea is caused by the continual erosion, probably traceable, in part at least, to the channel current (which at mean tide has a velocity of 14 or 15 in. per second), and to the strong west or north-west winds which carry off large quantities of material. This alteration of coast-line appears at Loosduinen, where the moor or fenland formerly developed behind the dunes now crops out on the shore amid the sand, being pressed to the compactness of lignite by the weight of the sand drifted over it. Again, the remains of the Roman camp Brittenburg or Huis te Britten, which originally lay within the dunes and, after being covered by them, emerged again in 1520, were, in 1694, x 6oo paces out to sea, opposite Katwijk; while, besides Katwijk itself, several other villages of the west coast, as Domburg, Schevcningen, Egmond, have been removed further inland. The tendency of the dunes to drift off on the landward side is prevented by the planting of bent-grass {Arundo arenaria), whose long roots serve to bind the sand together. It must be further remarked that both the " dune- pans," or depressions, which are naturally marshy through their defective drainage, and the geest grounds — that is, the grounds along the foot of the downs — have been in various places either planted with wood or turned into arable and pasture land; while the numerous springs at the base of the dunes are of the utmost value to the great cities situated on the marshy soil inland, the example set by Amsterdam in 1853 in supplying itself with this water having been readily followed by Leiden, the Hague, Flushing, &c.

As already remarked, the coast-line of Holland breaks up into a series of islands at its northern and southern extremities. The principal sea-inlets in the north are the Texel Gat or Marsdiep and the Vlie, which lead past the chain of the Frisian Islands into the large inland sea or gulf called the Zuider Zee, and the Wadden or " shallows," which extend along the shores of Friesland and Groningen as far as the Dollart and the mouth of the Ems.

The inland sea-board thus formed consists of low coasts of sea-clay protected by dikes, and of some high diluvial strata which rise far enough above the level of the sea to make dikes unnecessary, as in the case of the Gooi hills between Naarden and the Eem, the Veluwe hills between Nykerk and Elburg, and the steep cliffs of the Gaaster- land between Oude Mirdum and Stavoren. The Dollart was formed in 1277 by the inundation of the Ems basin, more than thirty villages being destroyed at once. The Zuider Zee and the bay in the Frisian coast known as the Lauwers Zee also gradually came into existence in the 13th century. The extensive sea-arms forming the South Holland and Zeeland archipelago are the Hont or West Scheldt, the East Scheldt, the Grevelingen (communicating with Krammer and the Volkerak) and the Haringvliet, which after being joined by the Volkerak is known as the Hollandsch Diep. These inlets were formerly of much greater extent than now, but are gradually closing up owing to the accumulation of mud deposits, and no longer have the same freedom of communication with one another. At the head of the Hollandsch Diep is the celebrated railway bridge of the Moerdyk (1868-1871) 1607 yds. in length; and above this bridge lies the Biesbosch (" reed forest "), a group of marshy islands formed by a disastrous inundation in 142 1, when seventy-two villages and upwards of 100,000 lives were destroyed.

Besides the dunes the only hilly regions of Holland are the southern half of the province of Limburg, the neighbourhood of Nijmwegen, the hills of Utrecht, including the Gooi hills, the Veluwe Relief ana reg ; on ; n Gelderland, the isolated hills in the middle and levels. eagt Q f g veryse] ant j thg Hondsrug range in Drente.

The remainder of the country is flat, and shows a regular downward slope from south-east to north-west, in which direction the rivers mainly flow. The elevation of the surface of the country ranges between the extreme height of 1057 ft. near Vaals in the

farthest corner of Limburg, and 16-20 ft. below the Amsterdam zero 1 in some of the drained lands in the western half of the country. In fact, one quarter of the whole kingdom, consisting of the provinces of North and South Holland, the western portion of Utrecht as far as the Vaart Rhine, Zeeland, except the southern part of Zeeland- Flanders, and the north-west part of North Brabant, lies below the Amsterdam zero ; and altogether 38 % of the country, or all that part lying west of a line drawn through Groningen, Utrecht and Antwerp, lies within one metre above the Amsterdam zero and would be submerged if the sea broke down the barrier of dunes and dikes. This difference between the eastern and western divisions of Holland has its counterpart in the landscape and the nature of the soil. The western division consists of low fen or clay soil and presents a monotonous expanse of rich meadow-land, carefully drained in regular

lines of canals bordered by stunted willows, and dotted over with windmills, the sails of canal craft and the clumps of elm and poplar which surround each isolated farm-house. The landscape of the eastern division is considered less typical. Here the soil consists mainly of sand and gravel, and the prevailing scenery is formed of waste heaths and patches of wood, while here and there fertile meadows extend along the banks of the streams, and the land is laid out in the highly regular manner characteristic of fen reclamation (see Drente).

The entire drainage of Holland is into the North Sea. The three principal rivers are the Rhine, the Maas (Meuse) and the Scheldt (Schelde), and all three have their origin outside the „. country, whilst the Scheldt has its mouth only in Holland, fibers. giving its name to the two broad inlets of the sea which bound the Zeeland islands. The Rhine in its course through Holland is merely the parent stream of several important branches, splitting up into Rhine and Waal, Rhine and Ysel, Crooked Rhine and Lek (which takes two-thirds of the waters), and at Utrecht into Old Rhine and Vecht, finally reaching the sea through the sluices at Katwijk as little more than a drainage canal. The Ysel and the Vecht flow to the Zuider Zee; the other branches to the North Sea. The Maas, whose course is almost parallel to that of the Rhine, follows in a wide curve the general slope of the country, receiving the Roer, the Mark and the Aa. Towards its mouth its waters find their way into all the channels intersecting the South Holland archipelago. The main stream joining the Waal at Gorinchem flows on to Dordrecht as the Merwede, and is continued thence to the sea by the Old Maas, the North, and the New Maas, the New Maas being formed by the junction of the Lek and the North. From Gorinchem the New Merwede (constructed in the second half of the 19th century) extends between dykes through the marshes of the Biesbosch to the Hollandsch Diep. These great rivers render very important service as waterways. The mean velocity of their flow seldom exceeds 4-9 ft., but rises to 6-4 ft. when the river is high. In the lower reaches of the streams the velocity and slope are of course affected by the tides. In the Waal ordinary high water is perceptible as far up as Zalt Bommel in Gelderland, in the Lek the maximum limits or ordinary and spring tides are at Vianen and Kuilenburg respectively, in the Ysel above the Katerveer at the junction of the Willemsvaart and past Wyhe midway between Zwolle and Deventer ; and in the Maas near Heusden and at Well in Limburg. Into the Zuider Zee there also flow the Kuinder, the Zwarte Water, with its tributary the Vecht, and the Eem. The total length of navigable channels is about 1 150 m., but sand banks and shallows not infrequently impede the shipping traffic at low water during the summer. The smaller streams are often of great importance. Except where they rise in the fens they call into life a strip of fertile grassland in the midst of the barren sand, and are responsible for the existence of many villages along

their banks. Following the example of the great Kampen irrigation canal in Belgium, artificial irrigation is also practised by means of some of the smaller streams, especially in North Brabant, Drente and Overysel, and in the absence of streams, canals and sluices are sometimes specially constructed to perform the same service. The low-lying spaces at the confluences of the rivers, being readily laid under water, have been not infrequently chosen as sites for fortresses. As a matter of course, the streams are also turned to account in connexion with the canal system — the Dommel, Berkel, Vecht, Regge, Holland Ysel, Gouwe, .Rotte, Schie, Spaarne, Zaan, Amstel, Dieze, Amer, Mark, Zwarte Water, Kuinder and the numerous Aas in Drente and Groningen being the most important in this respect.

It is unnecessary to mention the names of the numerous marshy lalies which exist, especially in Friesland and Groningen, and are- connected with rivers or streamlets. Those of Friesland £,aJkes. are of note for the abundance of their fish and their beauty of situation, on which last account the Uddelermeer in Gelderland is also celebrated. The Rockanje Lake near Brielle is remarkable for the strong salty solution which covers even the growing reeds with a

1 The datum plane, or basis of the measurement of heights, is throughout Holland, and also in some of the border districts of Germany, the Amsterdamsch Peil (A.P.), or Amsterdam water-level, and represents the average high water-level of the Y at Amsterdam at the time when it was still open to the Zuider Zee. Local and provincial ” peils ” are, however, also in use on some water-ways. ,

B

C

D

53

HOLLAND

Scale, i: 1,500,000

English Miles 02 46810 20 ?o 40

Capitals of Countries

Capitals of Provinces ®

Boundaries of Provinces.

Railways .— . — –

Canals — — Marsh _r- —

Fortifications # 1 1

-\

•

*ˆ» (J txˆTaiHsland /j' "Holy**

Dykshoek /-KT + ToV „r.

• frfiswerdX

RoodeS

litfuflitenX %

"jarmsum ifzenf H r "oAnloo, 1

**W*

PetlenJ

vATlScriagen W ~

_ jnlwibrooktvAnhu/zejiE H r 1 bXnlV

Tejre/ Gar jrfftt^uwediefJ . Hindeloopen

Huisauinenˆlpen Hˆljiiet r-» fet/„" OT –

Wieringen Kav tyˆWsf tm

jjWjˆfˆwind ere n –

*"— 4«I#?'»BU«, SM t?'" "s** 2 **r ii!k*u*

iSˆ

halen j A

Alltmaj Egmond-asn Zee

Egmond-Binnin?

Kuinre 1 Bl(

. Vollenhoveˆ

iin” ˆ-i.miiy Enkhuizen “Sfiirˆx enhu faeiv*

\ Edam

nerend

f ‘ £P ‘Marken Monnikendam

NJ Kimper Nfeuwst.

VeenHSrr Elburgˆ Dooms?

Kastr ,._

WykaanZeeff™ Beverwyk’ YmuidergpS” Zand

Zandvoort fcˆJTˆqˆoomˆfljˆSS eter dam ˆn HieroepjT Nu»«peet r- BI (*

NoordwyJ

-feidS

Wassepiarˆ ” Scheveningenˆ

*~. ». * uneven nig*

The Hague Cs Gfavenhag

Loosduin.

”

all tjTrI ‘ : ˆ*

*Voorn**

Rocl _ Hellevfa fc \/

uoeree ˆˆTvw,

trim

UfacfWap

00* 0/ Holland >« _

tSof3fe^^^£^rn«ve Id Befitbergent

‘eswr^oort –

1* -H^sflrSteuv

Nooralantso Zitri\s.zeei

North Beue/ n fo *r

, ^Jag snin) ;en . “^albiirg^Elsf Huil^F H^^^^eml ielo Gent

PeBrtwsch 1

‘t/sch

^eeschX Z««f

prave?

fe,” 5 ^B^r«La”

Sip LschooSlyk ^J* , . . –

AWden

.“r.o.‘JItHefiibii&S “T^S*

kntwer

w

rilburt

PfcoirW OqVschot Hjlva/,Jnb«k y<

\ E\ndh6ven]

\s,W ;i > ’ f , v—v^*\,,

‘» 3^

tcecloo

>A

L^SSpy,

^XokergwgC »'

1

A

(fWstt

SgHdenrf

Tj: Ninoveag'

Hechlin) _<5«

Slostj

?5S

CouvaiaS

Eritodi

DIKES: DRAINAGE]

HOLLAND

589

hard crust. Many of the lakes are nothing more than deep pits or marshes from which the peat has been extracted.

Dikes. — The circumstance that so much of Holland is below the sea-level necessarily exercises a very important influence on the drainage, the climate and the sanitary conditions of the country, as well as on its defence by means of inundation. The endiking of low lands against the sea which had been quietly proceeding during the first eleven centuries of the Christian era, received a fresh impetus in the 12th and 13th centuries from the fact that the level of the sea then became higher in relation to that of the land. This fact is illustrated by the broadening of river mouths and estuaries at this time, and the beginning of the formation of the Zuider Zee. A new feature in diking was the construction of dams or sluices across the mouths of rivers, sometimes with important consequences for the villages situated on the spot. Thus the dam on the Amstel (1257) was the origin of

Amsterdam, and the dam on the Ye gave rise to Edam. But Holland's chief protection against inundation is its long line of sand dunes, in which only two real breaches have been effected during the centuries of erosion. These are represented by the famous sea dikes called the Westkapelle dike and the Honds- bossche Zeewering, or sea-defence, which were begun respectively in the first and second halves of the 1 5th century. The first extends for a distance of over 4000 yds. between the villages of Westkapelle and Domburg in the island of Walcheren; the second is about 4900 yds. long, and extends from Kamperduin to near Petten, whence it is continued for another 1100 yds. by the Pettemer dike. These two sea dikes were reconstructed by the state at great expense between the year i860 and 1884, having consisted before that time of little more than a protected sand dike. The earthen dikes are protected by stone-slopes and by piles, and at the more dangerous points also by zinkstukken (sinking pieces), artificial structures of brushwood laden with stones, and measuring some 400 yds. in circuit, by means of which the current is to some extent turned aside. The West- kapelle dike, 12,468 ft. long, has a seaward slope of 300 ft., and is protected by rows of piles and basalt blocks. On its ridge, 39 ft. broad, there is not only a roadway but a service railway. The cost of its upkeep is more than £6000 a year, and of the Hondsbossche Zeewering £2000 a year. When it is remembered that the woodwork is infested by the pile worm {Teredo navalis), the ravages of which were discovered in 1731, the labour and expense incurred in the construction and maintenance of the sea dikes now existing may be imagined. In other parts of the coast the dunes, though not pierced through, have become so wasted by erosion as to require artificial strengthening. This is afforded, either by means of a so-called sleeping dike (slaper- dyk) behind the weak spot, as, for instance, between Kadzand and Breskens in Zeeland-Flanders, and again between 's Graven- zande and Loosduinen; or by means of piers or breakwaters (hoof den, heads) projecting at intervals into the sea and composed of piles, or brushwood and stones. The first of such breakwaters was that constructed in 1857 at the north end of the island of Goeree, and extends over 100 yds. into the sea at low water. Similar constructions are to be found on the seaward side of the islands of Walcheren, Schouwen and Voorne, and between 's Gravenzande and Scheveningen, and Katwijk and Noordwijk. Owing to the obstruction which they offer to drifting sands, artificial dunes are in course of time formed about them, and in this way they become at once more effective and less costly to maintain. The firm and regular dunes which now run from Petten to Kallantsoog (formerly an island), and thence north- wards toHuisduinen, were thus formed about the Zyper_(i6i7) and Koegras (1610) dikes respectively. From Huisduinen to Nieuwediep the dunes are replaced by the famous Helder sea- wall. The shores of the Zuider Zee and the Wadden, and the Frisian and Zuider Zee islands, are also partially protected by dikes. In more than one quarter the

dikes have been repeatedly extended so as to enclose land conquered from the sea, the work of reclamation being aided by a natural process. Layer upon layer of clay is deposited by the sea in front of the dikes, until a new fringe has been added to the coast-line on which sea-

grasses begin to grow. Upon these clay-lands (kwelders) horses, cattle and sheep are at last able to pasture at low tide, and in course of time they are in turn endiked.

River dikes are as necessary as sea dikes, elevated banks being found only in a few places, as on the Lower Rhine. Owing to the unsuitability of the foundations, Dutch dikes are usually marked by a great width, which at the crown varies between 13 and 26 ft. The height of the dike ranges to 40 in. above high water-level. Between the dikes and the stream lie " fore- lands " (iiiterwaarden), which are usually submerged in winter, and frequently lie 1 or 2 yds, higher than the country within the dikes. These forelands also offer in course of time an opportunity for endiking and reclamation. In this way the towns of Rotterdam, Schiedam, Vlaardingen and Maasluis have all gradually extended over the Maas dike in order to keep in touch with the river, and the small town of Delftshaven is built altogether on the outer side of the same dike.

Impoldering. — The first step in the reclamation of land is to " im- polder " it, or convert it into a " polder " (i.e. a section of artificially drained land), by surrounding it with dikes or quays for the twofold purpose of protecting it from all further inundation from outside and of controlling the amount of water inside. Impoldering for its own sake or on a large scale was impossible as long as the means of drainage were restricted. But in the beginning of the 15th century new possibilities were revealed by the adaptation of the windmill to the purpose of pumping water. It was gradually recognized that the masses of water which collected wherever peat-digging had been carried on were an unnecessary menace to the neighbouring lands, and also that a more enduring source of profit lay in the bed of the fertile sea-clay under the peat. It became usual, therefore, to make the subsequent drainage of the land a condition of the extraction of peat from it, this condition being established by proclamation in 1595.
Drainage. — It has been shown that the western provinces of Holland may be broadly defined as lying below sea-level. In fact the surface of the sea-clay in these provinces is from II J to 16 J ft. below the Amsterdam zero. The ground-water is, therefore, re- latively very high and the capacity of tfife soil for further absorption proportionately low. To increase the reservoir capacity of the polder, as well as to conduct the water to the windmills or engines, it is intersected by a network of ditches cut at right angles to each other, the amount of ditching required being usually one-twelfth of the area to be drained. In modern times pumping engines have

replaced windmills, and the typical old Dutch landscape with its countless hooded heads and swinging arms has been greatly transformed by the advent of the chimney stacks of the pumping-stations. The power of the pumping-engines is taken on the basis of 12 h.p. per 1000 hectares for every metre that the water has to be raised, or stated in another form, the engines must be capable of raising nearly 9 lb of water through 1 yd. per acre per minute. The main ditches, or canals, afterwards also serve as a means of navigation. The level at which it is desired to keep the water in these ditches constitutes the unit of water measurement for the polder, and is called the polder's zomer peil (Z.P.) or summer water-leveL In pasture-polders (koepolders) Z.P. is 1 to ii ft. below the level of the polder, and in agricultural polders 2 J to 3 J ft. below. Owing to the shrinkage of the soil in reclaimed lands, however, that is, lands which have been drained after fen or other reclamation, the sides of the polder are often higher than the middle, and it is necessary by means of small dams or sluices to make separate water-tight compartments (afpolderingen). each having its own unit of measurement. Some polders also have a winter peil as a precaution against the increased fall of water in that season. The summer water-level of the pasture polders south of the former Y is about 4 to 8 ft. below the Amsterdam zero but in the Noorderkwartier to the north, it reaches 10J ft. below A P ' in the Beschotel polder, and in reclaimed lands (droogmakerijen) may be still lower, thus in the Reeuwyk polder north of Gouda it is

2 The drainage of the country is effected by natural or artificial means according to the slope of the ground. Nearly all the polders of Zeeland and South Holland are able to discharge naturally into the sea at average low water, self-regulating sluices being used. But in North Holland and Utrecht on the contrary the polder water has generally to be raised. In some deep polders and drained lands where the water cannot be brought to the required height at once windmills are found at two or even three different levels. The final removal of polder water, however, is only truly effected upon its discharge into the " outer waters " of the country that is the sea itself or the large rivers freely communicating with it; and

this happens with but a small proportion of Dutch polders, such as those of Zeeland, the Holland Ysel and the Noorderkwartier. .

As the system of impoldering extended the small si ugg isfa .rivers were gradually cut off by dikes from the marshy lands through wh ch g they flowed, and by sluices from the wate rs with which 1 they communicated. Their level ranges from about ij to 4 ft- above that of the pasture polders. In addition, various kinds of canals

and endiked or embanked lakes had come into existence, forming altogether a vast network of more or less stagnant waters. These waters are utilized as the temporary reservoirs of the superfluous polder water, each system of reservoirs being termed a boezem (bosom or basin), and all lands watering into the same boezem being considered as belonging to it. The largest boezem is that of Friesland, which embraces nearly the whole province. It sometimes happens that a polder is not in direct contact with the boezem to which it belongs, but first drains into an adjacent polder, from which the water is afterwards removed. In the same way, some boezems discharge first into others, which then discharge into the sea or rivers. This is usually the case where there is a great difference in height between the surface of the boezem and the outer waters, and may be illustrated by the Alblasserwaard and the Rotte boezems in the pro- vinces of South and North Holland respectively. In time of drought the water in the canals and boezems is allowed to run back into the polders, and so serve a double purpose as water-reservoirs. Boezems, like polders, have a standard water-level which may not be ex- ceeded, and as in the polder this level may vary in the different parts of an extended boezem. The height of the boezem peil ranges beween ij ft. above to if ft. below the Amsterdam zero, though the average is about I to if ft. below. Some boezems, again, which are less easily controlled, have a " danger water-level " at which they refuse to receive any more water from the surrounding polders. The Schie or Delflands boezem of South Holland is of this kind, and such a boezem is termed besloten or " sequestered," in con- tradistinction to a " free " boezem. A third kind of boezem is the reserve or berg-boezem, which in summer may be made dry and used for agriculture, while in winter it serves as a special reserve. The centuries of labour and self-sacrifice involved in the making of this complete and harmonious system of combined defence and reclama- tion are better imagined than described, and even at the present day the evidences of the struggle are far less apparent than real.

Geology. — Except in Limburg, where, in the neighbourhood of Maastricht, the upper layers of the chalk are exposed and followed by Oligocene and Miocene beds, the whole of Holland is covered by recent deposits of considerable thickness, beneath which deep borings have revealed the existence of Pliocene beds similar to the " Crags " of East Anglia. They are divided into the Diestien, corresponding in part with the English Coralline Crag, the Scaldisien and Poederlien corresponding with the Walton Crag, and the Amstelien corresponding with the Red Crag of Suffolk. In the south of Holland the total thickness of the Pliocene series is only about 200 ft., and they are covered by about 100 ft. of Quaternary deposits; but towards

the north the beds sink down and at the same time increase considerably in thickness, so that at Utrecht a deep boring reached the top of the Pliocene at a depth of 513 ft. and at 1 198 ft. it had not touched the bottom. At Amsterdam the top of the Pliocene lay 625 ft. below the surface, but the boring, 1098 ft. deep, did not reach the base of the uppermost division of the Pliocene, viz. the Amstelien. Eastward and westward of Amsterdam, as well as southward, the Pliocene beds rise slowly to the surface, and gradually decrease in thickness. They were laid down in a broad bay which covered the east of England and nearly the whole of the Netherlands, and was open to the North Sea. There is evidence that the sea gradually retreated northwards during the deposition of these beds, until at length the Rhine flowed over to England and entered the sea north of Cromer. The appearance of northern shells in the upper divisions of the Pliocene series indicates the approach of the Glacial period, and glacial drift containing Scandinavian boulders now covers much of the country east of the Zuider Zee. The more modern deposits of Holland consist of alluvium, wind-blown sands and peat. 1

Climate. — Situated in the temperate zone between 50 and 53 N. the climate of Holland shows a difference in the lengths of day and night extending in the north to nine hours, and there is a corre- spondingly wide range of temperature; it also belongs to the region of variable winds. On an average of fifty years the mean annual temperature was 49-8° Fahr. ; the maximum, 93-9 ° Fahr. ; the minimum, —5-8° Fahr. The mean annual barometric height is 29-93 •"■; the mean annual moisture, 81%; the mean annual rainfall, 27-99 m – The mean annual number of days with rain is 204, with snow 19, and with thunder-storms 18. The increased rainfall from July to December (the summer and autumn rains), and the increased evaporation in spring and summer (5-2 in. more than the rainfall), are of importance as regards " poldering " and draining operations. The prevalence of south-west winds during nine months of the year and of north-west during three (April-June) has a strong influence on the temperature and rainfall, tides, river mouths and outlets, and also, geologically, on dunes and sand drifts, and on fens and the accumulation of clay on the coast. The west winds of course increase the moisture, and moderate both the winter cold and the summer heat, while the east winds blowing over the

1 See J. Lori6, Contributions a la geologie des Pays-bas (1885-1895), Archives du Mus. Teyler (Haarlem), ser. 2, vol. ii. pp. 109-240, vol. iii. pp. 1-160, 375-461, vol. iv. pp. 165-309 and Bull. soc. beige giol. vol. iii. (1889); Mem. pp. 409-449; F. W. Harmer, " On the Pliocene Deposits of Holland," &c, Quart. Journ. Geol. Soc, London, vol. Iii. (1896) pp. 748-781, pis. xxxiv., xxxv.

continent have an opposite influence. It cannot be said that the climate is particularly good, owing to the changeableness of the weather, which may alter completely within a single day. The heavy atmosphere likewise, and the necessity of living within doors or in confined localities, cannot but exercise an influence on the character and temperament of the inhabitants. Only of certain districts, however, can it be said that they are positively unhealthy; to this category belong some parts of the Holland provinces, Zceland, and Friesland, where the inhabitants are exposed to the exhalations from the marshy ground, and the atmosphere is often burdened with sea-fogs.

Fauna. — In the densely populated Netherlands, with no extensive forests, the fauna does not present any unusual varieties. The otter, martin and badger may be mentioned among the rarer wild animals, and the weasel, ermine and pole-cat among the more common. In the 18th century wolves still roamed the country in such large numbers that hunting parties were organized against them ; now they are unknown. Roebuck and deer are found in a wild state in Gelderland and Overysel, foxes are plentiful in the dry wooded regions on the borders of the country, and hares and rabbits in the dunes and other sandy stretches. Among birds may be reckoned about two hundred and forty different kinds which are regular inhabitants, although nearly two hundred of these are migratory. The woodcock, partridge, hawk, water-ousel, magpie, jay, raven, various kinds of owls, wood-pigeon, golden-crested wren, tufted lark and titmouse are among the birds which breed here. Birds of passage include the buzzard, kite, quail, wild fowl of various kinds, golden thrush, wagtail, linnet, finch and nightingale. Storks are plentiful in summer and might almost be considered the most characteristic feature of the prevailing landscape.

Flora. — The flora may be most conveniently dealt with in the four physiographical divisions to which it belongs. These are, namely, the heath-lands, pasture-lands, dunes and coasts. Heath {Erica tetralix) and ling (Calluna vulgaris) cover all the waste sandy regions in the eastern division of the country. The vegetation of the meadow-lands is monotonous. In the more damp and marshy places the bottom is covered with marsh trefoil, carex, smooth equisetum, and rush. In the ditches and pools common yellow and white water-lilies are seen, as well as water-soldier (Stratiotes aloides), great and lesser reed-mace, sweet flag and bur-reed. The plant forms of the dunes are stunted and meagre as compared with the same forms elsewhere. The most common plant here is the stiff sand-reed (Arundo arenaria), called sand-oats in Drente and Overy- sel, where it is much used for making mats. Like the sand-reed, the dewberry bramble and the shrub of the buckthorn {Hippophae rhamnoides) perform a useful service in helping to bind the sand together. Furze and the common juniper are regular dune plants, and may also be found on the heaths of Drente,

Overysel and Gelderland. Thyme and the small white dune-rose (Rosa pimpinelli- folia) also grow in the dunes, and wall-pepper . (Sedum acre), field fever-wort, reindeer moss, common asparagus, sheep's fescue grass, the pretty Solomon-seal (Polygonatum officinale), and the broad- leaved or marsh orchis (Orchis latifolia). The sea-plants which flourish on the sand and mud-banks along the coasts greatly assist the process of littoral deposits and are specially cultivated in places. Sea-aster flourishes in the Wadden of Friesland and Groningen, the Dollart and the Zeeland estuaries, giving place nearer the shore to sandspurry (Spergularia), or sea-poa or floating meadow grass (Glyceria maritima), which grows up to the dikes, and affords pasture for cattle and sheep. Along the coast of Overysel and in the Bies- bosch lake club-rush, or scirpus, is planted in considerable quantities for the hat-making industry, and common sea-wrack (Zostera marina) is found in large patches in the northern half of the Zuider Zee, where it is gathered for trade purposes during the months of June, July and August. Except for the willow-plots found along the rivers on the clay lands, nearly all the wood is confined to the sand and gravel soils, where copses of birch and alder are common.

Population. — The following table shows the area and popula- tion in the eleven provinces of the Netherlands : —

Province

Area in

Population

Population

. — 1

Density per

sq. m. in

sq. m.

1890.

1900.

1900.

North Brabar

it 1,980

509,628

553,842

280

Gelderland

1,965

512,202

566,549 .

288

South Hollan

i 1,166

949,641

1,144,448

981

North Hollan

d 1,070

829,489

968,131

905

Zeeland

690

199,234

216,295

313

Utrecht .

534

221,007

251,034

470

Friesland .

1,282

335,558

340,262

265

Overysel .

1,291

295,445

333,338

258

Groningen

790

272,786

299,602

379

Drente

1,030

130,704

H8,544

144

Limburg . Total .

850

255,721

281,934

332

12,648

4,5”,4I5

5,104,1372

404

: This total includes 158 persons assigned to no province.

COMMUNICATIONS]

HOLLAND

59i

The extremes of density of population are found in the provinces of North Holland and South Holland on the one hand, and D rente on the other. This divergence is partly explained by the difference of soil — which in Drente comprises the maximum oi waste lands, and in South Holland the minimum — and partly also by the greater facilities which the seaward provinces enjoy of earning a subsistence, and the greater variety of their indus- tries. The largest towns are Amsterdam, Rotterdam, the Hague, Utrecht, Groningen, Haarlem, Arnhem, Leiden, Nijmwegen, Tilburg. Other considerable towns are Dordrecht, Maastricht, Leeuwarden, Zwolle, Delft, ‘s Hertogenbosch, Schiedam, Deventer, Breda, Apeldoorn, Helder, Enschede, Gouda, Zaandam, Kampen, Hilversum, Flushing, Amersfoort, Middelburg, Zutphen and Alkmaar. Many of the smaller towns, such as Assen, Enschede, Helmond, Hengelo, Tiel, Venlo, Vlaardingen, Zaandam, Yerseke, show a great development, and it is a noteworthy fact that the rural districts, taken as a whole, have borne an equal share in the general increase of population. This, taken in conjunction with the advance in trade and shipping, the diminution in emigration, and the prosperity of the savings banks, points to a favourable state in the condition of the people. Communications. — The roads are divided into national or royal roads, placed directly under the control of the waterstaat and sup- Roads ported

by the state; provincial roads, under the direct

control of the states of the provinces, and almost all supported by the provincial treasuries; communal and polder roads, maintained by the communal authorities and the polder boards; and finally, private roads. The system of national roads, mainly constructed between 1821 and 1827, but still in process of extension, brings into connexion nearly all the towns.

The canal system of Holland is peculiarly complete and extends into every part of the country, giving to many inland towns almost Canals a mar 't' rae appearance. The united length of the canals exceeds 1500 m. As a matter of course the smaller streams have been largely utilized in their formation, while the necessity for a comprehensive drainage system has also contributed in no small degree. During the years 1815-1830 a large part of the extensive scheme of construction inaugurated by King William I. was carried out, the following canals, among others, coming into existence in that period: the North Holland ship canal (depth, 16J ft.) from Amsterdam to den Helder, the Grift canal between Apeldoorn and Hattem, the Willemsvaart connecting Zwolle with the Ysel, thc'Zuid Willemsvaart, or South William's canal (6J ft.), from 's Hertogenbosch to Maastricht, and the Ternuzen-Ghent ship canal. After 1849 the canal programme was again taken up by the state, which alone or in conjunction with the provincial authorities constructed the Apeldoorn-Dieren canal (1859-1869), the drainage canals of the " Peel " marsh in North Brabant, and of the eastern provinces, namely, the Deurne canal (1876-1892) from the Maas to Helenaveen, the Almclo (1851-1858) and Overysel (1884-1888) canals from Zwolle, Deventer and Almelo to Koevorden, and the Stieltjes (1880-1884), and Orange (1853-1858 and 1 881-1889) canals in Drente, the North Williams canal (1856-1862) between Assen and Groningen, the Ems (1866-1876) ship canal from Groningen to Delfzyl, and the New Merwede, and enlarged the canal from Har- lingen by way of Leeuwarden to the Lauwars Zee. The large ship canals to Rotterdam and Amsterdam, called the New Waterway and the North Sea canal respectively, were constructed in 1866-1872 and 1865-1876 at a cost of 2\ and 3 million pounds sterling, the former by widening the channel of the Scheur north of Rozenburg, and cutting across the Hook of Holland, the latter by utilizing the bed of the Y and cutting through the dunes at Ymuiden. In 1876 an agreement was arrived at with Germany for connecting the important drainage canals in Overysel, Drente and Groningen with the Ems canal system, as a result of which the Almelo-Noordhorn (1884-1888) and other canals came into existence.

The canals differ in character in the different provinces. In Zeeland they connect the towns of the interior with the sea or the river mouths; for example, the one from Middelburg to Veere and Flushing (1866-1878),

from Goes to the East Scheldt, and from Zierikzec also to the East Scheldt. The South Beveland (1862-1866) canal connects the East and West Scheldt; similarly in South Holland the Voorne canal unites the Haringvliet with the New Maas, which does not allow the passage of large vessels above Brielle; whilst owing lo the banks and shallows in front of Hellevoetsluis the New Waterway was cut to Rotterdam. Of another character is the Zedcrik canal, which unites the principal river of central Holland, the Lek, at Vianen by means of the Linge with the Morwede at Gorkum. Amsterdam is connected with the Lek and the Zederik canal via Utrecht by the Vecht and the Vaart Rhine (1881-1893; depth 10-2 ft.). Again, a totally different character belongs to the canals in North Brabant, and the east and north-east of Holland where, in the absence of great rivers, they form the only waterways which render possible the drainage of the fens and the export of

peat ; and unite the lesser streams with each other. Thus in Overysel, in addition to the canals already mentioned, the Dedems- vaart connects the Vecht with the Zwarte Water near Hasselt; in Drente the Smildervaart and Drentsche Hoofdvaart unites Assen with Meppel, and receives on the eastern side the drainage canals of the Drente fens, namely, the Orange canal and the Hoogeveen Vaart (1850-1860; 1880-1893). Groningen communicates with the Lauwers Zee by the Reitdiep (1873-1876), while the canal to Win- schoten and the Stadskanaal, or State canal (1877-1880), bring it into connexion with the flourishing fen colonies in the east of the province and in Drente. In Friesland, finally, besides the ship canal from Harlingen to the Lauwers Zee there are canals from Leeu- warden to the Lemmer, whence there is a busy traffic with Amster- dam ; and the Caspar Robles or Kolonels Diep, and the Hoendiep connect it with Groningen.

The construction of railways was long deferred and slowly accom- plished. The first line was that between Amsterdam and Haarlem, openedin l839by the Holland railway company (Ko//a«dˆ_ „ Yzeren Spoorweg Moatschappij) . In 1845 the state under- Kauwa y s – took to develop the railway system, and a company of private individuals was formed to administer it under the title of the Maatschappij tot Exploitatie van Staatspoorwegen. In i860, how- ever, the total length of railways was only 208 m., and in that year a parliamentary bill embodying a comprehensive scheme of con- struction was adopted. By 1872 this programme was nearly com- pleted, and 542 m. of new railway had been added. In 1873 and 1875 a second and a third bill provided for the extension of the railway system at the cost of the state, and, in 1876, 1882 and 1890 laws were introduced readjusting the control of the various lines, some of which were transferred to the Holland railway. The state railway system was completed in 1892, and since that time the utmost that the state has done has been to

subsidize new under- takings. These include various local lines such as the line Alkmaar- Hoorn (1898), Ede-Barneveld-Nykerk, Enschede-Ahaus in Germany (1902), Leeuwarden to Franeker, Harlingen and Dokkum, and the line Zwolle-Almelo (junction at Marienberg) Koevorden- Stadskanal-Veendam-Delfzyl, connecting all the fen countries on the eastern borders. The electric railway Amsterdam-Zandvoort was opened in 1904. The frame upon which the whole network of the Dutch railways may be said to depend is formed of two main lines from north and south and four transverse lines from west to east. The two longitudinal lines are the railway den Helder via Haarlem (1862-1867), 1 Rotterdam (1839-1847), and Zwaluwe (1869-1877) to Antwerp (1852-1855), belonging to the Holland railway company, and the State railway from Leeuwarden and Groningen (1870) (junction at Meppel, 1867) Zwolle (1866) — Arnhem (1865)— Nijmwegen (1879) — Venlo (1883) — Maastricht (1865). The four transverse lines belong to the State and Holland railways alter- nately and are, beginning with the State railway: (1) the line Flushing (1872)— Rozendaal (i860)— Tilburg (1863)— Bokstel (whence there is a branch line belonging to the North Brabant and Germany railway company via Vechel to Goch in Germany, opened in 1873) — Eindhoven — Venlo and across Prussian border (1866); (2) the line Hook of Holland — Rotterdam (1893)- — Dordrecht (1872- 1877) — Elst (1882-1885) — Nijmwegen (1879) — Cleves, Germany (1865) ; (3) the line Rotterdam — Utrecht (1866-1869) and Amsterdam — Utrecht — Arnhem (1843-1845) to Emmerich in Germany (1856): this line formerly belonged to the Netherlands-Rhine railway com- pany, but was bought by the state in 1890; and finally (4) the line Amsterdam — Hilversum — Amersfoort — Apeldoorn (1875), whence it is continued (a) via Deventer, Almelo and Hengelo to Salzbergen, Germany (1865); (b) via Zutphen, Hengelo (1865), Enschede (1866) to Gronau, Germany; (c) via Zutphen (1876) and Ruurlo to Winters- wyk (1878). Of these (1) and (2) form the main transcontinental routes in connexion with the steamboat service to England (ports of Queenborough and Harwich respectively). Two other lines of railway, both belonging to the state, also traverse the country west to east, namely, the line Rozendaal — 's Hertogenbosch (1890) — Nijmwegen, and in the extreme north, the line from Harlingen through Leeuwarden (1863) and Groningen (1866) to the border at Nieuwe Schans (1869), whence it was connected with the German railways in 1876. The northern and southern provinces are further connected by the lines Amsterdam — Zaandam (1878) — Enkhuizen (1885), whence there is a steam ferry across the Zuider Zee to Stavoren, from where the railway is continued to Leeuwarden (1883- 1885); the Netherlands Central railway, Utrecht — Amersfoort— Zwoole — Kampen (1863); and the line Utrecht — 's Hertogenbosch (1868-1869) which is continued southward into Belgium by the lines bought in 1898 from the Grand Central Beige railway, namely,*

via Tilburg to Turnhout (1867), and via Eindhoven (1866) to Hasselt. In 1892 Greenwich mean time was adopted on the railways and in the post-offices, making a difference of twenty minutes with mean Amsterdam time.

Since 1877 railway communication has been largely supplemented by steam-tramways, which either run along the main roads or across the country on special embankments, while one of them is

1 The dates indicate the period of construction of the different sections.

carried across the river Ysel at Doesburg on a pontoon bridge. The state first began to encourage the construction of these local _ light railways by means of subsidies in 1893, since when

some of the most prominent lines have come into exist- ways ‘ ence, such as Purmerend — Alkmaar (1898), Zutphen —

Emmerich (1902), along the Dedemsvaart in Overysel (1902), from ‘s Hertogenbosch via Utrecht and Eindhoven to Turnhout in Belgium (1898), and especially those connecting the South Holland and Zeeland islands with the railway, namely, between Rotterdam and Numansdorp on the Hollandsch Diep (1898), and from Breda or Bergen-op-Zoom, via Steenbergen to St Philipsland, Zierikzee and Brouwershaven (1900). An electric tramway connects Haarlem and Zandvoort. The number of passengers carried by the steam- tramways is relatively higher than that of the railways. The value of the goods traffic is’ not so high, owing, principally, to the want of intercommunication between the various lines on account of differ- ences in the width of the gauge.

Agriculture. — Waste lands are chiefly composed of the barren stretches of heaths found in Drente, Overysel, Gelderland and North Brabant. They formerly served to support large flocks of sheep and some cattle, but are gradually transformed by the planting of woods, as well as by strenuous efforts at cultivation. Zeeland and Groningen are the two principal agricultural provinces, and after them follow Limburg, North Brabant, Gelderland and South Holland. The chief products of cultivation on the heavy clay soil are oats, barley and wheat, and on the sand-grounds rye, buckwheat and potatoes. Flax and beetroot are also cultivated on the clay lands. Tobacco, hemp, hops, colza and chicory form special cultures. With the possible exception of oats, the cereals do not suffice for home

consumption, and maize is imported in large quantities for cattle-feeding, and barley for the distilleries and breweries. Horticulture and market-gardening are of a high order, and flourish especially on the low fen soil and geest grounds along the foot of the dunes in the provinces of North and South Holland. The principal market products are cauliflower, cabbage, onions, asparagus, gherkins, cucumbers, beans, peas, &c. The principal flowers are hyacinths, tulips, crocuses, narcissus and other bulbous plants, the total export of which is estimated at over £200,000. Fruit is everywhere grown, and there is a special cultivation of grapes and figs in the Westland of South Holland. The woods, or rather the plantations, covering 6%, consist of (1) the so-called forest timber {opgaandhout; Fr. arbres de haute futaie), including the beech, oak, elm, poplar, birch, ash, willow and coniferous trees; and (2) the copse wood (akkermaal or hakhout), embracing the elder, willow, beech, oak, &c. This forms no unimportant branch of the national wealth.

With nearly 35% of the total surface of the country under permanent pasture, cattle-breeding forms one of the most char- acteristic industries of the country. The provinces of Friesland, North and South Holland, and Utrecht take the lead as regards both quality and numbers. A smaller, hardier kind of cattle and large numbers of sheep are kept upon the heath-lands in the eastern provinces, which also favour the rearing of pigs and bee-culture. Horse-breeding is most important in Friesland, which produces the well-known black breed of horse commonly used in funeral processions. Goats are most numerous in Gelderland and North Brabant. Poultry, especially fowls, are generally kept. Stock-breeding, like agriculture, has considerably improved under the care of the government (state and provincial), which grants subsidies for breeding, irrigation of pasture-lands, the importation of finer breeds of cattle and horses, the erection of factories for dairy produce, schools, &c.

Fisheries. — The fishing industry of the Netherlands may be said to have been in existence already in the 13th century, and in the following century received a considerable impetus from the dis- covery how te cure herring by William Beukelszoon, a Zeeland fisherman. It steadily declined during the 17th and 18th centuries, however, but again began to revive in the last half of the 19th century. The fisheries are commonly divided into four particular fishing areas, namely, the " deep-sea " fishery of the North Sea, and the " inner " (binneneaatsch) fisheries of the Wadden, the Zuider Zee, and the South Holland and Zeeland waters. The deep-sea fishery may be further divided into the so-called " great " or " salt-herring " fishery, mainly carried on from Vlaardingen and Maasluis during the summer and autumn, and the "fresh-herring" fishery, chiefly pursued at Scheveningen, Katwijk and Noordwijk. The value of the herring fisheries is enhanced by the careful methods of smoking and salting, the export of salted fish being

considerable. In the winter the largest boats are laid up and the remainder take to line-fishing.

Live- stock.

Middelharnis, Pernis and Zwartewaal are the centres of this branch of fishery, which yields halibut, cod, ling and haddock. The trawl fisheries of the coast yield sole, plaice, turbot, brill, skate, &c, of which a large part is brought alive to the market. In the Zuider Zee small herring, flat fish, anchovies and shrimps are caught, the chief fishing centres being the islands of Texel, Urk and Wieringen, and the coast towns of Holder, Bunschoten, Huizen, Enkhuizen, Vollendam, Kampen, Harderwyk, Vollenhove. The anchovy fishing which takes place in May, June and July sometimes yields very productive results. Oysters and mussels are obtained on the East Scheldt, and anchovies at Bergen-op-Zoom; while salmon, perch and pike are caught in the Maas, the Lek and the New Merwede. The oyster-beds and salmon fisheries are largely in the hands of the state, which lets them to the highest bidder. Large quantities of eels are caught in the Frisian lakes. The fisheries not only supply the great local demand, but allow of large exports.

Manufacturing Industries. — The mineral resources of Holland give no encouragement to industrial activity, with the exception of the coal-mining in Limburg, the smelting of iron ore in a few furnaces in Overysel and Gelderland, the use of stone and gravel in the making of dikes and roads, and of clay in brick- works and potteries, the quarrying of stone at St Pietersberg, &c. Nevertheless the industry of the country has developed in a remarkable manner since the separation from Belgium. The greatest activity is shown in the cotton industry, which flourishes especially in the Twente district of Overysel, where jute is also worked into sacks. In the manufacture of woollen and linen goods Tilburg ranks first, followed by Leiden, Utrecht and Eindhoven; that of half -woollens is best developed at Roermond and Helmond. Other branches of industry include carpet-weaving at Deventer, the distillation of brandy, gin and liqueurs at Schiedam, Rotterdam and Amsterdam, and beer-brewing in most of the principal towns; shoe-making and leather-tanning in the Langstraat district of North Brabant; paper-making at Apeldoorn, on the Zaan, and in Limburg; the manufacture of earthenware and faience at Maastricht, the Hague and Delft, as well as at Utrecht, Purmerend and Makkum; clay pipes and stearine candles at Gouda; margarine at Osch; chocolate at Weesp and on the Zaan; mat-plaiting and broom-making at' Genemuiden and Blokzyl; diamond- cutting and the manufacture of quinine at Amsterdam; and the making of cigars and snuff at Eindhoven, Amsterdam, Utrecht, Kampen, &c. Shipbuilding is of no small importance in Holland, not only in the greater, but also in the smaller towns along the rivers and

canals. The principal shipbuilding yards are at Amsterdam, Kinderdijk, Rotterdam and at Flushing, where there is a government dockyard for building warships.

Trade and Shipping. — To obtain a correct idea of the trade of Holland, greater attention than would be requisite in the case of other countries must be paid to the inland traffic. It is impossible to state the value of this in definite figures, but an estimate may be formed of its extent from the number of ships which it employs in the rivers and canals, and from the quantity of produce brought to the public market. In connexion with this traffic there is a large fleet of tug boats; but steam- or petroleum-propelled barges are becoming more common. Some of the lighters used in the Rhine transport trade have a capacity of 3000 tons. A great part of the commercial business at Rotterdam belongs to the commission and transit trade. The other principal ports are Flushing, Terneuzen (for Belgium), Harlingen, Delfzyl, Dordrecht, Zaandam, Schiedam, Groningen, den Helder, Middelburg, Vlaardingen. Among the national mail steamship services are the lines to the East and West Indies, Africa and the United States. An examination of its lists of exports and imports will show that Holland receives from its colonies its spiceries, coffee, sugar, tobacco, indigo, cinnamon; from England and Belgium its manufactured goods and coals; petroleum, raw cotton and cereals from the United States; grain from the Baltic provinces, Archangel, and the ports of the Black Sea; timber from Norway and the basin of the Rhine, yarn from England, wine from France, hops from Bavaria and Alsace; iron- ore from Spain ; while in its turn it sends its colonial wares to Germany, its agricultural produce to the London market, its fish to Belgium and Germany, and its cheese to France, Belgium and Hamburg, as well as England. The bulk of trade is carried on with Germany and England; then follow Java, Belgium, Russia, the United States, &c. In the last half of the 19th century the total value of the foreign commerce was more than trebled.

Constitution and Government. — The government of the Nether- lands is regulated by the constitution of 1815, revised in 1848 and 1887, under which the sovereign's person is inviolable and

the ministers are responsible. The age of majority of the sovereign is eighteen. The crown is hereditary in both the male and the female line according to primogeniture; but it is only in default of male heirs that

females can come to the throne. The crown prince or heir apparent is the first subject of the sovereign, and bears the title of the prince of Orange. The sovereign alone has executive authority. To him belong the ultimate direction of foreign affairs, the power to declare war and peace, to make treaties and alliances, and to dissolve one or both chambers of parliament, the supreme command of the army and navy, the supreme administration of the state finances and of the colonies and other possessions of the kingdom, and the prerogative of mercy. By the provisions of the same constitution he establishes the ministerial departments, and shares the legislative power with the first and second chambers of parliament, which constitute the states-general and sit at the Hague. The heads of the departments to whom the especial executive functions are entrusted are eight in number — ministers respectively of the interior, of " water-staat," trade and industry (that is, of public works, including railways, post-office, &c), of justice, of finance, of war, of marine, of the colonies and of foreign affairs. There is a department of agriculture, but without a minister at its head. The heads of departments are appointed and dismissed at the pleasure of the sovereign, usually determined, however, as in all constitutional states, by the will of the nation as indicated by its representatives.

The number of members in the first chamber is 50, South Holland sending 10, North Holland 9, North Brabant and Gelderland each 6, Friesland 4, Ovcryscl, Limburg and Groningen each 3, Zeeland, Utrecht and Drente each 2. According to the fundamental law (Grondwet) of 1887, they are chosen by the provincial states, not only from amongst those who bear the greatest burden of direct taxation in each province, but also from amongst great functionaries and persons of high rank. Those deputies who are not resident in the Hague arc entitled to receive 16s. 8d. a day during the session. The duration of parliament is nine years, a third of the members retiring every three years. The retiring members are eligible for re-election. The members of the second chamber are chosen in the electoral districts by all capable male citizens not under 23 years of age, who pay one or more direct taxes, ranging from a minimum of one guilder (is. 8d.) towards the income tax. The number of members is 100, Amsterdam returning 9, Rotterdam 5, the Hague 3, Groningen and Utrecht 2 members each. Members must be at least thirty years old, and receive an annual allowance of £166, besides travelling expenses. They only, and the govern- ment, have the right of initiating business, and of proposing amendments. Their term is four years, but they are re-eligible. All communications from the sovereign to the states-general and from the states to the sovereign, as well as all measures relating to internal administration or to foreign possessions, are first submitted to the consideration of the council of state, which consists of 14 members appointed by the sovereign, who is the president.

The state council also has the right of making suggestions to the sovereign in regard to subjects of legislation and administration.

The provincial administration is entrusted to the provincial states, which are returned by direct election by the same electors as vote for the second chamber. The term is for six years, but one- half of the members retire every three years subject to re-election or renewal. The president of the assembly is the royal commissioner for the province. As the provincial states only meet a few times in the year, they name a committee of deputy-states which manages current general business, and at the same time exercises the right of control over the affairs of the communes. At the head of every commune stands a communal council, whose members must be not under 23 years of age. They are elected for six years (one-third of the council retiring every- two years) by the same voters as for the provincial states. Communal franchise is further restricted, how- ever, to those electors who pay a certain sum to the communal rates. The number of councillors varies according to the population between 7 and 45. One of the special duties of the council is the super- vision of education. The president of the communal council is the burgomaster, who is named by the sovereign in every instance for six years, and receives a salary varying from £40 to over £600. Provision is made for paying the councillors a certain fee— called

" presence-money " — when required. The burgomaster has the power to suspend any of the council's decrees for 30 days. The executive power is vested in a college formed by the burgomaster and two, three or four magistrates (wethouders) to be chosen by and from the members of the council. The provinces are eleven in number.

National Defence. — The home defence system of Holland is a militia with strong cadres based on universal service. Service in the " militia " or 1st line force is for 8 years, in the 2nd line for 7. Every year in the drill season contingents of militiamen are called up for long or short periods of training, and the maximum peace strength under arms in the summer is about 35,000, of whom half are permanent cadres and half militiamen. In 1908 12,300 of the year's contingent were trained for eight months and more, and 5200 for four months. The war strength of the militia is 105,000, that of the second line or reserve 70,000. The defence of the country is based on the historic principle of concentrating the people and their resources in the heart of the country, covered by a wide belt of inundations. The chosen line of defence is marked by a series of forts which control the sluices, extending from Amsterdam, through Muiden, thence along the Vecht and through Utrecht to Gorinchem (Gorkum) on the Waal. The line continues thence by the Hollandsche Diep and Volkerak to the sea, and the coast also is fortified. The army in the colonies numbers in all about 26,000, all

permanent troops and for the most part voluntarily enlisted European regulars. The military expenditure in 1908 was £2,331,255. The Dutch navy at home and in Indian waters consists (1909) of 9 small battleships, 6 small cruisers and 80 other vessels, manned by 8600 officers and men of the navy and about 2250 marines. Re- cruiting is by voluntary enlistment, with contingent powers of conscription amongst the maritime population.

Justice. — The administration of justice is entrusted (1) to the high council (hooge raad) at the Hague, the supreme court of the whole kingdom, and the tribunal for all high government officials and for the members of the states-general; (2) to the five courts of justice established at Amsterdam, the Hague, Arnhem, Leeu- warden and 's Hertogenbosch ; (3) to tribunals established in each arrondissement ; (4) to cantonal judges appointed over a group of communes, whose jurisdiction is restricted to claims of small amount (under 200 guilders), and to breaches of police regulations, and who at the same time look after the interest of minors. The high council is composed of 12 to 14 councillors, a procureur-general and three advocates-general. Criminal and correctional procedure were formerly divided between the courts of justice and the arrondisse- ment tribunals; but this distinction was suppressed by the penal code of 1886, thereby increasing the importance of the arrondisse- ment courts, which also act as court of appeal of the cantonal courts.

Besides the prisons, which include one built on the cellular prin- ciple at Breda, the state supports three penal workhouses for drunkards and beggars. There are also the penal colonics at Veen- huizen in Drente, which were brought from the Society of Charity (Maatsckappij van Weldadigkeid) in 1859. The inmates practise agriculture, as well as various industries for supplying all the re- quirements of the colony. The objection raised against these establishments is that the prisoners do not represent the real vaga- bondage of the country, but a class of more or less voluntary inmates. Children under 16 years of age are placed in the three state re- formatories, and there is an institution for vagabond women at Rotterdam.

Charitable and other Institutions. — Private charities have always occupied a distinguished position in the Netherlands, and the principle of the law of 1854 concerning the relief of the poor is, that the state shall only interfere when private charity fails. All private and religious institutions have to be inscribed before they can collect public funds. In some cases these institutions are organized and administered conjointly with the civil authorities. At the head of the charitable institutions stand the agricultural colonies belonging to the Society of Charity (see Drente). Of the numerous institutions for the encouragement of the sciences and the fine arts, the following are strictly national — the Royal Academy of Sciences (1855), the Royal Netherlands Meteorological Institute (1854), the National

Academy of the Plastic Arts, the Royal School of Music, the National Archives, besides various other national collections and museums. Provincial scientific societies exist at Middelburg, Utrecht, 's Hertogenbosch and Leeuwarden, and there are private and municipal associations, institutions and collections in a large number of the smaller towns. Among societies of general utility are the Society for Public Welfare (Maatsckappij tot nut van't algemeen, 1785), whose efforts have been mainly in the direction of educational reform ; the Geographical Society at Amsterdam (1873); Teyler's Stichting or foundation at Haarlem (1778), and the societies for the promotion of industry (1777), and of sciences (1752) in the same town; the Institute of Languages, Geography and Ethnology of the Dutch Indies (1851), and the Indian Society – at the Hague, the Royal Institute of Engineers at Delft (1848), the Association for the Encouragement of Music at Amsterdam, &c.

Religion. — Religious conviction is one of the most characteristic traits of the Dutch people, and finds expression in a large number of independent religious congregations. The bond between church

and state which had been established by the synod of Dort (1618) and the organization of the Low-Dutch Reformed Church (Neder- landsche Hervormde Kerk) as the national Protestant church, practi- cally came to an end in the revolution of 1795, and in the revision of the Constitution in 1848 the complete religious liberty and equality of all persons and congregations was guaranteed. The present organization of the Reformed Church dates from 1852. It is governed by a general assembly or " synod " of deputies from the principal judicatures, sitting once a year. The provinces are subdivided into " classes," and the classes again into " circles " (ringen), each circle comprising from 5 to 25 congregations, and each congregation being governed by a " church council " or session. The provincial synods are composed of ministers and elders deputed by the classes; and these are composed of the ministers belonging to the particular class and an equal number of elders appointed by the local sessions. The meetings of the circles have no administrative character, but are mere brotherly conferences. The financial management in each congregation is entrusted to a special court {kerk-voogdij) composed of " notables " and church wardens. In every province there is besides, in the case of the Reformed Church, a provincial com- mittee of supervision for the ecclesiastical administration. For the whole kingdom this supervision is

entrusted to a common " colle- gium " or committee of supervision, which meets at the Hague, and consists of 1 1 members named by the provincial committee and 3 named by the synod. Some congregations have withdrawn from provincial supervision, and have thus free control of their own financial affairs. The oldest secession from the Orthodox Church is that of the Remonstrants, who still represent the most liberal thought in the country, and have their own training college at Leiden. Towards 1840 a new congregation calling itself the Christian Reformed Church (Christelijke Gereformeerde Kerk) arose as a protest against the government and the modern tendencies of the Reformed Church; and for the same reason those who had founded the Free University of Amsterdam (1880) formed themselves in 1886 into an independent body called the Nederlandsche Gereformeerde Kerk. In 1892 these two churches united under the name of the Reformed Churches (Gereformeerde Kerken) with the doctrine and discipline of Dort. They have a theological seminary at Kampen. Other Protestant bodies are the Walloons, who, though possessing an independent church government, are attached to the Low-Dutch Reformed Church; the Lutherans, divided into the main body of Evangelical Lutherans and a smaller division calling themselves the Re-established or Old Lutherans (Herstelde Lutherschen) who separated in 1791 in order to keep more strictly to the Augsburg confession; the Mennonites founded by Menno Simons of Friesland, about the beginning of the 16th century; the Baptists, whose only central authority is the General Baptist Society founded at Amsterdam in 181 1; the Evangelical Brotherhood of Hernhutters or Moravians, who have churches and schools at Zeist and Haarlem; and a Catholic Apostolic Church (1867) at the Hague. There are congregations of English Episcopalians at the Hague, Amsterdam and Rotterdam, and German Evangelicals at the Hague (1857) and Rotterdam (1861). In 1853 the Roman Catholic Church, which before had been a mission in the hands of papal legates and vicars, was raised into an independent ecclesiastical province with five dioceses, namely, the archbishopric of Utrecht, and the suffragan bishoprics of Haarlem, Breda, 's Hertogenbosch and Roermond, each with its own seminary. Side by side with the Roman Catholic hierarchy are the congregations of the Old Catholics or Old Episcopalian Church [Qui Bisschoppelijke Clerezie), and the Jansenists (see Jansenism). The Old Catholics, with whom the Jansenists are frequently confused, date from the 17th century. Besides an archbishop at Utrecht, the Old Catholics have bishops at Deventer and Haarlem, and a training college at Amersfoort. They numbered in 1905 about 9000 (see Utrecht). The large Jewish population in Holland had its origin in the wholesale influx of Portuguese Jews at the end of the 16th, and of German Jews in the beginning of the 17th century. In 1870 they were reorganized under the central authority of the Netherlands Israelite Church, and divided into head and " ring " synagogues and associated churches. The Roman Catholic

element preponderates in the southern provinces of Limburg, and North Brabant, but in Fries- land, Groningen and Drente the Baptists and Christian Reformed are most numerous.

Education. — Every grade of education in the Netherlands is under the control and supervision of the state, being administered by a special department under the ministry for the interior. In 1889 the state recognized private denominational schools, and in 1900 passed a law of compulsory attendance. Infant schools, which are generally in the hands of private societies or the municipal authori- ties, are not interfered with by the state. According to the law of 1889 primary education is carried on in the ordinary and in con- tinuation schools for boys and girls (co-education having been long in vogue). These schools are established in every commune, the state contributing aid at the rate of 25% of the total expenditure. The age of admission is six; and the course is for six years, 7-13 being the legal age limits; the fee, from which poverty exempts, is almost nominal. Nature-study, continued in the secondary schools, is an essential part in the curriculum of these schools, and elementary general history, English, French and German are among

the optional subjects. While the boys are instructed in woodwork, needlework is taught to the girls, its introduction in 1889 having been the first recognition of practical instruction in any form. Continuation schools (herhalingsscholen) must be organized wherever required, and are generally open for six months in winter, pupils of twelve to fourteen or sixteen attending. Secondary schools were established by the law of 1863 and must be provided by every commune of 10,000 inhabitants; they comprise the Burgher-Day- and-Evening schools and the Higher-Burgher schools. The first named schools being mainly intended for those engaged in in- dustrial or agricultural pursuits, the day classes gradually fell into disuse. The length of the course as prescribed by law is two years, but it is usually extended to three or four years, and the instruction, though mainly theoretical, has regard to the special local industries ; the fees, if any, may not exceed one pound sterling per annum. Special mention must be made in this connexion of the school of engineering in Amsterdam (1878) and the Academy of Plastic Arts at Rotterdam. The higher-burgher schools have either a three or a five years' course, and the fees vary from £2, 10s. to £5 a year. The instruction given is essentially non-classical and scientific. In both schools certificates are awarded at the end of the course, that of the higher-burgher schools admitting to the natural science and medical branches of university education, a supplementary examination in Greek and Latin being required for other branches. The gymnasia, or classical schools, fall legally speaking under the head of higher education. By the law of 1876, every town of 20,000 inhabitants, unless specially exempted, must provide a gymnasium. A large proportion of these schools are

subsidized by the state to the extent of half their net cost. The curriculum is classical and philological, but in the two upper classes there is a bifurcation in favour of scientific subjects for those who wish. The fees vary from £5 to £8 a year, but, owing to the absence of scholarships and bursaries, are sometimes remitted, as in the case of the higher- burgher schools. Among the schools which give specialized in- struction, mention must be made of the admirable trade schools (ambachtsscholen) established in 1861, and the corresponding in- dustrial schools for girls; the fishery schools and schools of navi- gation; the. many private schools of domestic science, and of commerce and industry, among which the municipal school at Enschede (1886) deserves special mention; and the school of social work, " Das Huis," at Amsterdam (1900). For the education of medical practitioners, civil and military, the more important in- stitutions are the National Obstetrical College at Amsterdam, the National Veterinary School at Utrecht, the National College for Military Physicians at Amsterdam and the establishment at Utrecht for the training of military apothecaries for the East and West Indies. The organization of agricultural education under the state is very complete, and includes a state professor of agriculture for every province (as well as professors of horticulture in several cases), "winter schools " of agriculture and horticulture, and a state agricultural college at Wageningen (1876) with courses in home and colonial agriculture. The total fees at this college, in- cluding board and lodging, are about £50 a year. According to the law of 1898, the state also maintains or subsidizes experimental or testing-stations. _ Other schools of the same class are the Gerard Adriaan van Swieten schools of agriculture, gardening and forestry in Drente, the school of instruction in butter and cheese making (zuivelbereiding) at Bolsward and the state veterinary college at Utrecht.

There are three state universities in Holland, namely, Leiden (i575)» Groningen (1585) and Utrecht (1634). The ancient athe- naeums of Franeker (1585) and Harderwyk (1603) were closed in 181 1, but that of Amsterdam was converted into a municipal university in 1877. In each of these universities there are five faculties, namely, law, theology, medicine, science and mathe- matics, and literature and philosophy, the courses for which are respectively four, five, eight, and six or seven years for the two last named. The fees amount to 200 florins (£16, 13s. 4d.) per annum and are payable for four years. Two kinds of degrees are conferred, namely, the ordinary (candidaats) and the " doctor's " degrees. Pupils from the higher- burgher schools are only eligible for the first. There is also a free (Calvinistic) university at Amster- dam founded in 1880 and enjoying, since 1905, the right of con- ferring degrees. It has, however, no faculties of law or science. The state polytechnic school at Delft (1864) for the study of en- gineering in all its branches, architecture and naval

construction, . has a nominal course of four years, and confers the degree of " en- gineer." The fees are the same as those of the universities, and as at the universities there are bursaries. A national institution at Leiden for the study of languages, geography and ethnology of the Dutch Indies has given place to communal institutions of the same nature at Delft and at Leiden, founded in 1864 and 1877. The centre of Dutch university life, which is non-residential, Is the students' corps, at the head of which is a " senate," elected annually from among the students of four years' standing. Membership of the corps is gained after a somewhat trying novitiate, but is the only passport to the various social and sports societies.

All teachers in the Netherlands must qualify for their profession by examination. Under the act of 1898 they are trained either in the staˆe training-colleges, or in state-aided muiiicipaj, and private

denominational colleges; or else by means of state or private state-aided courses of instruction. The age of admission to this class of training is from 14 to 18, and the course is for four years. In the last year practice in teaching is obtained at the primary " practice " school attached to each college, and students are also taught to make models explanatory of the various subjects of in- struction after the manner of the Swedish Sloyd (Slojd) system. Assistant-teachers wishing to qualify as head-teachers must have had two years' practical experience. Pupil-teachers can only give instruction under the supervision of a certificated teacher. The minimum salary of teachers is determined by law. The teaching, which follows the so-called " Heuristic " method, and the equipment of schools of every description, are admirable.

Finance. — The following statement shows the revenue and expenditure of the kingdom for the years 1889, 1900-1901 and 1905:—

Revenue.

Source.

Excise . . . .

Direct taxation

Indirect taxation .

Post Office ….

Government telegraphs

Export and Import duties

State domains

Pilot dues

State lotteries

Game and Fisheries

Railways .

Part paid by East Indies on account of interest and redemption of public debt

Netherland Bank contribu tion

It

£

3,678,075 2,300,865 2,004,745

539.405 106,970 440,247 213,186 106,079 54.609 11,660

Total 1 9.475.337

1901.

£

4,042,500

2,900,175

1,805,583

865,750

187,375 801,500 147,000 191,667 54,250 11,000 361,512

11,394,220

1905-

£

4,514,998

3,135.665 1,946,666

1. 1 03. 333

2H.333

930,912 139,000 200,000 52,666

u,75o

349.011

321,916 160,500

14,017,079

Expenditure.

Object.

1889.

1901.

1905-

National Debt

Department of War .

„ Waterstaat „ Finance . „ Marine . ,, Interior . ,, Justice ,, Colonies .

Dcpt. of Foreign Affairs .

Royal Household .

Superior Authorities of the State

Unforeseen Expenditure .

£

2,727,591

1,798,698

1,790,291

1,537,404

1,038,536

815,188

426,343

93,829

57,312

54,!66

52,476 1,745

£

2,906,214 ‘,893,036

2,448,339

2,092,343

1,388,141

1,330,563

529,159

109,768

71,101

66,667

56,792 4,166

£

2,899,770

2,474,011

2,869,951

2,297,180

1,396,137

1,613,134

592,073

251,150

82,403

66,666

58,251 4,166

Total 2 ….

10,393.579

12,896,289

14,907,781

The total debt in 1905 amounted to £96,764,266, the annual interest amounted to £3,396,590. During the years 1850-1905, £27,416,651 has been devoted to the redemption of the public debt. The total wealth of the kingdom is estimated at 900 millions sterling. The various provinces and communes have separate budgets. The following table gives a statement of the provincial and communal finances: — –

Revenue.

1889.

1900.

1905-

Provincial

Communal ….

£

722,583 6,132,000

£

445.333 9,311,666

£

718,199 12,750,083

Expenditure.

1889.

1900.

1905.

Provincial

Communal ….

£

740,333 5,683,800

£

445.333 8,503,250

£

702,718 12,085,250

1 Including various miscellaneous items not specified in detail.

2 Including, besides the ordinary budget, the outlays in payment of annuities, in funding and discharging debt, in railway extension, &c.

Colonies. — The Dutch colonies in the Malay Archipelago have an area of 600,000 sq. m., with a population of 23,000,000, among which are 35,000 Europeans, 319,000 Chinese, 15,000 Arabs, and 10,000 other immigrant Asiatics. The West Indian possessions of Holland include Dutch Guiana or the government of Surinam, and the Dutch Antilles or the government of Curacoa and its dependencies (St Eustatius, Saba, the southern half of St Martin, Curacoa, Bonaire and Aruba), a total area of 60,000 sq. m., with 90,000 inhabitants, of whom a small portion are Europeans, and the rest negroes and other people of colour, and Chinese.

Bibliography. — The chief place is due to the following geo- graphical publications: — Dr H. Blink, Nederland en zijne Bewoners (Amsterdam,

1888-1892), containing a copious bibliography; Tegenwoordige Staat van Nederland (Amsterdam, 1897); R. Schuiling, A ardrijkskunde van Nederland (Zwolle, 1 884) ; A. A. Beekman, De Strijd om het Bestaan (Zutphen, 1887), a manual on the characteristic hydrography of the Netherlands; and E. Reclus' Nouvelle geographic universelle (1879; vol. iv.). The Gedenboek uitgeven ter gelegenheid van het fijftigjarig bestaan van het Koninklijk Instituut van Ingenieurs, 1847-18Q7 ('s Gravenhage, 1898), is an excellent aid in studying technically the remarkable works on Dutch rivers, canals, sluices, railways and harbours, and drainage and irrigation works. The Aardrijkskundig Woordenboek van Nederland, by P. H. Witkamp (Arnhem, 1895), is a complete gazetteer with historical notes, and Nomina Geographica Neerlandica, published by the Netherlands Geographical Society (Amsterdam, 1885, &c), contains a history of geographica! names. Geschiedenis van den Boereastand en den landbouw in Nederland, H. Blink (Groningen, 1902), and the report on agriculture, published at the Hague by the Royal Commission appointed in 1896, furnish special information in connexion with this subject. Of more general interest are: Eene halve Eeuw, 1848-1898, edited by Dr P. H. Ritter (Amsterdam, , containing a series of articles on all subjects connected with

the kingdom during the second half of the 19th century, written by specialists; and Les Pays Bas (Leiden, 1899), and La Hollande geographique, ethnologique, politique, &c. (Paris, 1900), both works of the same class as the preceding.

Books of travel include some of considerable topographical as well as literary interest, from Lodovico Guicciardini (1567) down to Edmondo de Amicis (Holland, translated from the Italian, London, 1883) ; H. Havard, Dead Cities of the Zuider Zee, &c. (translated from the French, London 1876), and D. S. Meldrum, Holland and the Hollanders (London, 1899) in the 19th century. Mention may also be made of Old Dutch Towns and Villages of the Zuider Zee, by W. J. Tuyn (translated from the Dutch, London, 1901), Nieuwe Wander- lingen door Nederland, by J. Craandijk and P. A. Schipperns (Haarlem ,1888); Friesland Meres and through the Netherlands, by H. M. Doughty (London, 1887); On Dutch Waterways, by G. C. Davis (London, 1887); Hollande et hollandais, by H. Durand (Paris, 1893); and Holland and Belgium by Professor N. G. van Kampen (translated from the Dutch, London, i860), the last three being chiefly remarkable for their fine illustrations. Works of historical and antiquarian interest of a high order are Merkwaardige Kasteelen in Nederland, by J. van Lennep and W. J. Hofdyk (Leiden, 1 881-1884); Noord-Hollandsche Oudheden, by G. van Arkel and A. W. Weisman, published by the Royal Antiquarian Society (Am- sterdam, I 891); and Oud Holland, edited by A. D. de Vries and N. de Roever (Amsterdam, 1883-1886), containing miscellaneous con- tributions to the history of ancient Dutch art, crafts and

letters. Natural history is covered by various periodical publications of the Royal Zoological Society " Natura Artis Magistra " at Amsterdam, and the Natuurlijke Historie van Nederland (Haarlem, 1 856-1 863) written by specialists, and including ethnology and flora. Military and naval defence may be studied in De vesting Holland, by A. L. W. Seijffardt (Utrecht, 1887), and the Handbook of the Dutch Army, by Major W. L. White, R.A. (London, 1896); ecclesiastical history in The Church in the Netherlands, by P. H. Ditchfield (London, 1893) ; and education in vol. viii. of the Special Reports on Educational Subjects issued by the Board of Education, London. Statistics are furnished by the annual publication of the Society for Statistics in the Netherlands, Amsterdam.

History from 1579 to Modern Times 3 The political compact known as the Union of Utrecht differed from its immediate predecessors, the Pacification of Ghent, the Union of Brussels and the Perpetual Edict, in its coase-permanence. The confederacy of the northern pro- vinces of the Netherlands which was effected (29th of January 1579) by the exertions of John of Nassau, was destined to be the beginning of a new national life. The foundation was laid on which the Republic of the 3 For the history of the Netherlands previous to the confederacy of the northern provinces in 1579 see Netherlands.

qaeaces of the Union o. Utrecht.

Duke of Anjou.

United Netherlands was to be raised. Its immediate results were far from promising. The falling away of the Walloon provinces and the Catholic nobles from the patriot cause threatened it with ruin. Nothing but the strong personal influence and indefatigable labours of the prince of Orange stood in the way of a more general defection. Everywhere, save in staunch and steadfast Holland and Zeeland, a feeling of wavering and hesitation was spreading through the land. In Holland and Zeeland William was supreme, but elsewhere his aims and his principles were misrepresented and misunder- stood. He saw that unaided the patriotic party could not hope to resist the power of Philip II., and he had therefore resolved to gain the support of France by the offer of the sovereignty of the Netherlands to the duke of Anjou. But Anjou reizaty was a Catholic, and this fact aroused among the Pro- otfered testants a feeling that they were being betrayed. to

the B u t the prince persisted in the policy he felt to be a necessity, and (23rd of Jan. 1581) a treaty was con- cluded with the duke, by which he, under certain conditions, agreed to accept the sovereignty of the Netherland provinces, except Holland and Zeeland. These two provinces The Ban were unwilling to have any sovereign but William against himself, and after considerable hesitation he agreed wmiam of to become their Count (24th of July 1581). He felt Orange. (.j lat jj e was j us tjflecl in taking this step because of the Ban which Philip had published on the 15th of March 1 581, in which Orange had been proclaimed a traitor and miscreant, and a reward offered to any one who would take his life. His practical answer to the king was the act ™^. rt of Abjuration, by which at his persuasion the repre- tion. sentatives of the provinces of Brabant, Flanders,*

Holland, Zeeland, Gelderland and Utrecht, assembled at the Hague, declared that Philip had forfeited his sovereignty over them, and that they held themselves henceforth absolved from their allegiance to him. In a written defence, the famous Apology, published later in the year, William replied at great length to the charges that had been brought against him, and carrying the war into the enemy's camp, endeavoured to prove that the course he had pursued was justified by the crimes and tyranny of the king.

The duke of Anjou was solemnly inaugurated as duke of Brabant (February 1582), and shortly afterwards as duke of Gelderland, count of Flanders and lord of Friesland. o^the William had taken up his residence at Antwerp in Lite of order to give the French prince his strongest personal Orange support, and while there a serious attempt was made Jaunmy u P on ms ^ e (March 18th) by a youth named Jean Jaureguy. He fired a pistol at the prince close to his head, and the ball passed under the right ear and out at the left jaw. It was a terrible wound, but fortunately not fatal. Mean- while Anjou soon grew tired of his dependent position and of the limitations placed upon his sovereignty. He resolved by a secret and sudden attack (17th of January 1583) to make himself master of Antwerp and of the person of Orange. French ^e assau 't was made, but it proved an utter failure. Fury. The citizens resisted stoutly behind barricades, and

the French were routed with heavy loss. The "French Fury " as it was called, rendered the position of Anjou in the Netherlands impossible, and made William himself unpopular in Brabant. He accordingly withdrew to Delft. In the midst of his faithful Hollanders he felt that he could still organize resistance, and stem the progress made by Spanish arms and Spanish influence under the able leadership of Alexander of Parma. Antwerp, with St Aldegonde as its burgomaster, was still in the hands of the patriots and barred the way to the sea, and covered Zeeland from invasion. Never for one moment did William lose heart or relax his efforts and vigilance; he felt that with the two maritime provinces secure the national

cause need not be despaired of. But his own days had now drawn to their end. The failure of Jaureguy did not deter a young Catholic zealot, by name Balthazar Gerard, from attempting to assas- sinate the man whom he looked upon as the arch-enemy of

The Apology.

God and the king. Under the pretext of seeking a passport, Gerard penetrated into the Prinsenhof at Delft, and Assas . firing point blank at William as he left the dining sination hall, mortally wounded him (10th of July 1584). ofwniiam Amidst general lamentations " the Father of his tbe SilenL Country," as he was called, was buried with great state in the Nieuwe Kerk at Delft at the public charge.

But though the great leader was dead, he had not striven or worked in vain. The situation was critical, but there was no panic. Throughout the revolted provinces there was a general determination to continue the struggle to the bitter end. To make head, however, against the victorious advance of Parma, before whose arms all the chief towns of Brabant and Flanders, Bruges, Ghent, Brussels and lastly — after a valiant defence — Antwerp itself had fallen, it was necessary to look for the pro- tection of a foreign ruler. The government, now that the com- manding personal influence of William was no more, was without any central authority which could claim obedience. The States- General were but the delegates of a number of sovereign pro- vinces, and amongst these Holland by its size and wealth (after the occupation by the Spaniards of Brabant and Flanders) was predominant. Maurice of Nassau, Maurice William's second son, had indeed on his father's death Nassau. been appointed captain and admiral-general of the Union, president of the Council of State, and stadholder of Holland and Zeeland, but he was as yet too young, only seventeen , to take a leading part in affairs. Count Hohenloo took the command of the troops with the title of lieutenant-general. Two devoted adherents of William of Orange, Paul Buys, advocate of Holland, and Johan van Oldenbarneveldt, pensionary of Rotterdam, were the statesmen who at this difficult relgnty™' juncture took the foremost part in directing the policy offered of the confederacy. They turned first to France. to Henry The sovereignty of the provinces was offered to Henry d Jl d III., but the king, harassed by civil discords in his own country, declined the dangerous honour (1585). Repelled in this direction, the States-General next turned themselves to England. Elizabeth was alarmed by the successes of the Spanish arms, and especially by the fall of Antwerp; and, though refus- ing the sovereignty, she agreed to send a force of 5000 foot and 1000 horse to the aid of the Provinces under the com- mand of the earl of Leicester, her expenses being Leicester .,,,,. ' , ^ , ° Governor-

guaranteed by the handing over to her the towns general.

of Flushing, Brill and Rammekens as pledges (10th of August 1585). Leicester, on landing in Holland, was in the presence of the States-General and of Maurice of Nassau invested with the title of governor-general and practically sovereign powers (February 1586).

The new governor had great difficulties to contend with. He knew nothing of the language or the character of the people he was called upon to govern; his own abilities both as p a n ore general and statesman were mediocre; and. he was andwith- hampered constantly in his efforts by the niggardliness drawai of and changing whims of his royal mistress. In trying Lelcester – to consolidate the forces of the Provinces for united action and to centralize its government, he undoubtedly did his best, according to his lights, for the national cause. But he was too hasty and overbearing. His edict prohibiting all commercial intercourse with the enemy at once aroused against him the bitter hostility of the merchants of Holland and Zeeland, who thrived by such traffic. His attempts to pack the council of State, on which already two Englishmen had seats, with personal adherents and to override the opposition of the provincial states of Holland to his arbitrary acts, at last made his position impossible. The traitorous surrender of Deventer and Zutphen by their English governors, Stanley and York, both Catholics, rendered all Englishmen suspect. The States of Holland under the leadership of Johan van Oldenbarneveldt, took up an attitude of resolute hostility to him, and the States of Holland dominated the States-General. In the midst of these divided councils the important seaport of Sluis was taken by Parma. Utterly dis- credited, Leicester (6th of August 1587) abandoned the task,

in which he had met with nothing but failure, and returned to England.

Nothing could have been worse than the position of the States at the beginning of 1588. Had Parma had a free hand, in all probability he would have crushed out the revolt Johaa van an(j reconquered the northern Netherlands. But the neveldt. attention of the Spanish king was at this time con- centrated upon the success of the Invincible Armada. The army of Parma was held in readiness for the invasion of England, and the United Provinces had a respite. They were fortunately able to avail themselves of it. The commanding abilities of Oldenbarneveldt, now advocate of Holland,

gradually gathered into his hands the entire administration of the Republic. He became indispensable and, as his influence grew, more and more did the policy of the provinces acquire unity and con- sistency of purpose. At the same time Maurice of Maurice Nassau, now grown to man's estate, began to display Nassau. those military talents which were to gain for him the fame of – being the first general of his time. But Maurice was no politician. He had implicit trust in the advocate, his father's faithful friend and counsellor, and for many years to come the statesman and the soldier worked in harmony together for the best interests of their country (see Oldenbarneveldt, and Maurice, prince of Orange). At the side of Maurice, as a wise adviser, stood his cousin William Louis, stadholder of Friesland, a trained soldier and good commander in the field.

After the destruction of the Armada, Parma had been occupied with campaigns on the southern frontier against the French, and the Netherlander had been content to stand on ot 1591. guard against attack. The surprise of Breda by a stratagem (8th of March 1590) was the only military event of importance up to 1591. But the two stadholders had not wasted the time. The States' forces had been reorganized and brought to a high state of military discipline and training. In 1 591 the States-General, after considerable hesitation, were persuaded by Maurice to sanction an offensive campaign. It was attended by marvellous success. Zutphen was captured on the 20th of May, Deventer on the 20th of June. Parma, who was besieging the fort of Knodsenburg, was forced to retire with loss. Hulst fell after a three days' investment, and finally Nymegen was taken on the 21st of October. The fame of Maurice, a consummate general at the early age of twenty-four, was on all men's lips. The following campaign was signalized by the capture of Steenwyk and Koevorden. On the '8th of December 1592 Parma died, and the States were delivered from their most redoubtable adversary. In 1593 the leaguer of Geertruidenburg put the seal on Maurice's reputation as an invincible besieger. The town fell after an „ investment of three months. Groningen was the

province chief fruit of the campaign of 1 594. With its dependent ofstadt district it was formed into a new province under the en Landen. name f Stadt en Landen. William Louis became the stadholder (see Groningen). The soil of the northern Netherlands was at last practically free from the presence of Spanish garrisons.

The growing importance of the new state was signalized by

the conclusion, in 1596, of a triple alliance between England,

France and the United Provinces. It was of short

ˆf? fe ~ duration and purchased by hard conditions, but it

Alliance . ,. , , r . . , ■',._ T «, , ™ . , ,

of France, implied the recognition by Henry IV. and Elizabeth

England of the States – General, as a sovereign power, with aadtne whom treaties could be concluded. Such a recognition Provinces. was justified by the brilliant successes of the campaign of 1597. It began with the complete rout of a Spanish force of 4500 men at Turnhout in January, with scarcely any loss to the victors. Then in a succession of sieges Rheinberg, Meurs, Groenlo, Bredevoort, Enschede, Ootmarsum, Oldenzaal and Lingen fell into the hands of Maurice.

The relations of the Netherlands to Spain were in 1598 com- pletely changed. Philip II. feeling dearth approaching, resolved to marry his elder daughter, the Infanta Isabel Clara Eugenia,

Death of > , Parma.

to her cousin, the Cardinal Archduke Albert of Austria, who had been governor-general of the Netherlands since 1596, and to erect the Provinces into an independent sove- AibeH and reignty under their joint rule. The instrument was Isabel, executed in May; Philip died in September; the Sovereigns marriage took place in November. In case the rnar- "Sˆ riage should have no issue, the sovereignty of the lands. Netherlands was to revert to the king of Spain. The archdukes (such was their official title) did not make their joyeuse entree into Brussels until the close of 1599. The step was taken too late to effect a reconciliation with the rebel provinces. Peace overtures were made, but the conditions were unacceptable. The States-General never seriously con- sidered the question of giving in their submission to the new sovereigns. The traders of Holland and Zeeland had thriven mightily by the war. Their ships had penetrated to the East and West Indies, and were to be found in every sea. The year 1600 saw the foundation of the Chartered East India Company (see Dutch East India Company). The question of freedom of trade with the Indies had become no less vital to the Dutch people than freedom of religious worship. To both these con- cessions Spanish policy was irreconcilably opposed.

Dunkirk, as a nest of freebooters who preyed upon Dutch commerce, was made the objective jf a daring offensive campaign in 1600 by the orders of the States General under the influence of Oldenbarneveldt in the teeth of the opposi r ft,f ati,e tion of the stadholders Maurice and William Louis. „ ort# By a bold march across Flanders, Maurice reached Nieuport on the 1st of July, and proceeded to invest it. The archduke Albert, however,

followed hard on his steps with an army of seasoned troops, and Maurice, with his communications cut, was forced to fight for his existence. A desperate combat took place on the dunes between forces of equal strength and valour. Only by calling up his last reserves did victory declare for Maurice. The archduke had to fly for his life. Five thousand Spaniards were killed; seven hundred taken, and one hundred and five standards. To have thus worsted the dreaded Spanish infantry in open fight was a great triumph for the States troops and their general, but it was barren of results. Maurice refused to run further risks and led back his army to Holland. For the following three years all the energies alike of the archdukes and the States-General were concentrated on the siege of Ostend (15th of July i6oi-2oth of Sept. 1604), the Ostend. solitary possession of the Dutch in Flanders. The heroic obstinacy of the defence was equalled by the perseverance of the attack, and there was a vast expenditure, especially on the side of the Spaniards, of blood and treasure. At last when reduced to a heap of ruins, Ostend fell before the resolution of Ambrosio de Spinola, a Genoese banker, to whom the command of the besiegers had been entrusted (see Spinola). A month before the surrender, however, another and more commodious seaport, Sluis, had fallen into the possession of the States army under Maurice, and thus the loss of Ostend was discounted.

Spinola proved himself to be a general of a high order, and the campaigns of 1606 and 1607 resolved themselves into a duel of skill between him and Maurice without much ad- vantage accruing to either side. But the archdukes' Negotla- treasury was now empty, and their credit exhausted; Peace. both sides were weary of fighting, and serious negotia- tions for peace were set on foot. The disposition of the Spaniards to make concessions was further quickened by the destruction of their fleet at Gibraltar by the Dutch admiral Heemskerk, (April 1607). But there were many difficulties in the way. The peace party in the United Provinces headed by Olden- barneveldt was opposed by the stadholders Maurice and William Louis, the great majority of the military and naval officers, the Calvinist preachers and many leading merchants. The Spaniards on their side were obdurate on the subjects of freedom of trade in the Indies and of freedom of religious worship. At last, after the negotiations had been repeatedly on the point of breaking off, a compromise was effected by the media'tion of the envoys of France and England. On the 9th of April 1609

a truce for twelve years was agreed upon. On all points the Dutch demands

were granted. The treaty was concluded with The l ˆ e P rovmces i ” i 11 tne quality of free States over

Twelve whom the archdukes made no pretentions.” The uti Years’ possidetis as regards territorial possession was recog- Truce. n i ze d. Neither the granting of freedom of worship to Roman Catholics nor the word ” Indies ” was mentioned, but in a secret treaty King Philip undertook to place no hindrance in the way of Dutch trade, wherever carried on.

One of the immediate results of this triumph of his policy was the increase of Oldenbarneveldt’s influence and authority in the Theo- government of the Republic. But though Maurice logical and his other opponents had reluctantly yielded to strife la the advocate’s skilful diplomacy and persuasive Holland, arguments, a soreness remained between the statesman and the stadholder which was destined never to be healed. The country was no sooner relieved from the pressure of external war than it was torn by internal discords. After a brief inter- ference in the affairs of Germany, where the intricate question of the Cleves-Jiilich succession was already preparing the way for the Thirty Years’ War, the United Provinces became immersed in a hot and absorbing theological struggle with which were mixed up important political issues. The province Arminius Q f u u anc j was tjj e arena j n which it was fought out.

Qomanis. Two professors of theology at Leiden, Jacobus Arminius (see Arminius) and Franciscus Gomarus, became the leaders of two parties, who differed from one another upon certain tenets of the abstruse doctrine of predestination. Gomarus supported the orthodox Calvinist view; Arminius assailed it. The Arminians appealed to the States of Holland (1610) in a Remonstrance in which their theological position „ was defined. They were henceforth known as ” Re-

Remon- ,, , . . , ,,~

straats and monstrants , their opponents were styled Lontra- Coatra- Remonstrants.” The advocate and the States of Remon- Holland took sides with the Remonstrants, Maurice

sXfsb ts

and the majority of the States-General (four provinces out of seven) supported the Contra-Remonstrants. It became a question of the extent of the rights of sovereign princes under the Union. The States-General wished to summon a national synod, the States of Holland refused their assent, and made levies of local militia.(waard-gelders) for the maintenance of order. The States-General (gth of July 1618) took up the challenge, and

the prince of Orange, as captain-general, was placed at the head of a commission to go in the first place to Utrecht, which supported Oldenbarne veldt, and then to the various cities of

Holland to insist on the disbanding of the waard- eefders'. gelders. On the side of Maurice, whom the army

obeyed, was the power of the sword. The opposition collapsed; the recalcitrant provincial states were purged; and the leaders of the party of state rights — the advocate himself, Hugo de Groot (see Grotius), pensionary of Rotterdam, and Hoogerbeets, pensionary of Leiden, were arrested and thrown into prison. The whole proceedings were illegal, and the illegality was consummated by the prisoners being brought before a Olden- special tribunal of 24 judges, nearly all of whom were bame- personal enemies of the accused. The trial was veldt merely a preliminary to condemnation. The advocate

executed. was sentencec i to death, and executed (13th of May 1610) in the Binnenhof at the Hague. The sentences of Grotius and Hoogerbeets were commuted to perpetual imprisonment.

Meanwhile the National Synod had been summoned and had met at Dort on the 13th of November 1618. One hundred

members, many of them foreign divines, composed Dort. " tms S reat assembly, who after 154 sittings gave their

seal to the doctrines of the Netherlands Confession and the Heidelberg Catechism. The Arminians were condemned, their preachers deprived, and the Remonstrant party placed under a ban (6th of May 1610).

In 1621 the Twelve Years' Truce came to an end, and war broke out once more with Spain. Maurice, after the death of Oldenbarneveldt, was supreme in the land, but he missed sorely the wise counsels of the old statesman whose tragic end

he had been so largely instrumental in bringing about. He and Spinola found themselves once more at the head of the armies in the field, but the health of the stad-

Renewal of the war.

holder was undermined, and his military genius was under a cloud. Deeply mortified by his failure to relieve Breda, which was blockaded by Spinola, Maurice fell seriously ill, and died on the 23rd of April 1625. He was Maurice' succeeded in his dignities by his younger brother Frederick Henry

(see Frederick Henry, prince of Orange), who was appointed stadholder of Holland, Zeeland, Utrecht, Overyssel and Gelderland, captain and adjutant-general of the Union and head of the Council of State. Frederick Henry was as a general scarcely inferior to Maurice, and a far more able states- man. The moderation of his views and his conciliatory temper did much to heal the wounds left by civil and religious strife, and during his time the power and influence of the stadholderate attained their highest point. Such was his popularity Tbe and the confidence he inspired that in 1631 his great period of offices of state were declared hereditary, in favour of Frederick his five-year-old son, by the A etc de Survivance. He Het "y- did much to justify the trust placed in him, for the period of Frederick Henry is the most brilliant in the history of the Dutch Republic. During his time the East India Company, which had founded the town of Batavia in Java as their adminis- Tne g ast trative capital, under a succession of able governor- and West generals almost monopolized the trade of the entire India Com- Orient, made many conquests and established a net- oames – work of factories and trade posts stretching from the Cape of Good Hope to Japan (see Dutch East India Company). The West India Company, erected in 162 1, though framed on the same model, aimed rather at waging war on the enemies' com- merce than in developing their own. Their fleets for some years brought vast booty into the company's coffers. The Mexican treasure ships fell into the hands of Piet Heyn, the boldest of their admirals, in 1628; and they were able to send armies across the ocean, conquer a large part of Brazil, and set up a flourishing Dutch dominion in South America (see Dutch West India Company). The operations of these two great chartered companies occupy a place among memorable events of Frederick Henry's stadholderate; they are therefore mentioned here, but for further details the special articles must be consulted.

When Frederick Henry stepped into his brother's place, he found the United Provinces in a position of great danger and of critical importance. The Protestants of Germany were on the point of being crushed by the forces of the p ***?[image] Austrian Habsburgs and the Catholic League. It lay*** *Henry. with the Netherlands to create a diversion in the favour of their co- religionists by keeping the forces of the Spanish Habsburgs fully occupied. But to do so with their flank exposed to imperialist attack from the east, was a task involving grave risks and possible disaster. In these circumstances, Frederick Henry saw the necessity of securing French aid. It was secured by the skilful diplomacy of Francis van Aarssens (q.v.) but on hard conditions. Richelieu required the assistance of the Dutch fleet to enable him to overcome the resistance of the Huguenot stronghold of La Rochelle. The far-sighted stadholder, despite popular opposition, by his powerful personal influence induced the States-General to grant the naval aid, and thus obtain the French alliance on which the safety of the republic*

depended.

The first great military success of Frederick Henry was in 1629. His capture of Hertogenbosch (Bois-le-duc), hitherto supposed to be impregnable, after a siege of five ,. .

months was a triumph of engineering skill. Wesel Herto- also was taken by surprise this same year. In 1631 a genbosch large Spanish fleet carrying a picked force of 6000 \ˆfJˆ aes ~ soldiers, for the invasion of Zeeland, was completely destroyed by the Dutch in the Slaak and the troops made prisoners. The campaign of the following year was made memorable by the siege of Maestricht. This important frontier town lying on both sides of the river Meuse was taken by the prince of Orange in the teeth of two relieving armies, Spanish

Infanta Isabel.

and Imperialist, whose united forces were far larger than his own. This brilliant feat of arms was the prelude to peace negotiations, Death which led to a lengthy exchange of diplomatic notes. of the No agreement, however, was reached. The death of the Infanta Isabel in November 1633, and the reversion of the Netherlands to the sovereignty of the king of Spain, rendered all efforts to end the war, for the time being, fruitless.

At this juncture a strengthening of the French alliance seemed to the prince not merely expedient, but necessary. He had to contend against a strong peace party in Holland A "J t i nce headed by the pensionary Pauw, but with the aid of France. the diplomatic skill of Aarssens all opposition was overcome. Pauw was replaced as pensionary by Jacob Cats, and the objections of Richelieu were met and satisfied. A defensive and offensive alliance with France was concluded early in 1635 against the king of Spain, and each party bound itself not to make a peace or truce without the assent of the other. A large French force was sent into the Netherlands and placed under the command of the prince of Orange. The military results of the alliance were during the first two campaigns inconsiderable. The Cardinal Infant Ferdinand had been appointed governor of the Netherlands, and he proved himself an excellent general, and there were dissensions in the councils of the allies. In 1637 the stadholder was able to add to his fame as an invincible besieger of cities. His failure to relieve Breda had hastened the death of Maurice. It fell in 1625 into the hands of

Spinola after a blockade ofBnda. °^ e l even months; it was now retaken by Frederick Henry after a siege of eleven weeks, in the face of immense difficulties. The reluctance of the States of Holland, and of Amsterdam in particular, to grant adequate supplies caused the campaigns of 1638 and 1639 to be in the main defen- sive and dilatory. An attempted attack on Antwerp was foiled by the vigilance of the Cardinal Infant. A body of 6000 men under Count William of Nassau were surprised and utterly cut to pieces. The year 1639, which had begun with abortive negotiations, and in which the activity of the stadholder had been much hampered by ill-health, was not to end, however, without a signal triumph of the Dutch arms, but it was to be on sea and not on land. A magnificent Spanish armada consisting of 77 vessels, manned by 24,000 soldiers and sailors under the command of Admiral Oquendo, were sent to the Channel in September with orders to drive the Dutch from the narrow seas and land a large body of troops at Dunkirk. Attacked by a small Dutch fleet under Admiral Marten Tromp, B fti tne Spaniards sheltered themselves under the English

Downs. Downs by the side of an English squadron. Tromp kept watch over them until he had received large reinforcements, and then (21st of October) boldly attacked them as they lay in English waters. Oquendo himself with seven vessels escaped under cover of a fog; all the rest of the fleet was destroyed. This crushing victory assured to the Dutch the command of the sea during the rest of the war. The naval power of Spain never in fact recovered from the blow.

The triumph of Tromp had, however, a bad effect on public feeling in England. The circumstances under which the battle p .. . of the Downs was won were galling to the pride of and Dutch the English people, and intensified the growing Com- unfriendliness between two nations, one of whom

possessed and the other claimed supremacy upon the seas. The prosperity of the world-wide Dutch commerce was looked upon with eyes of jealousy across the Channel. Disputes had been constantly recurring between Dutch and English traders in the East Indies and elsewhere, and the seeds were already sown of that stern rivalry which was to issue in a series of fiercely contested wars. But in M /vrn^ e ^o-io^o civil discords in England stood in the way and Mary, of a strong foreign policy, and the adroit Aarssens was able so "to sweeten the bitterness of the pill " as to bring King Charles not merely to " overlook the scandal of the Downs," but to consent to the marriage of the princess

mercial Rivalry.

royal with William, the only son of the stadholder. The wed- ding of the

youthful couple (aged respectively 1-4 and 10 years) took place on the 12th of May 1641 (see William II., prince of Orange). This royal alliance gave added influence and position to the house of Orange-Nassau.

About this time various causes brought about a change in the feelings which had hitherto prevented any possibility of peace between Spain and the United Netherlands, changed The revolt of Portugal (December 1640) weakened relations the Spanish power, and involved the loss to Spain of " ttne the Portuguese colonies. But it was in the Portuguese provinces colonies that the conquests of the Dutch East and with West India Companies had been made, and the France question of the Indies as between Netherlander and andS P aln – Spaniard assumed henceforth quite a different complexion Aarssens, the strongest advocate of the French alliance, passed away in 1641, and his death was quickly followed by those of Richelieu and Louis XIII. The victory of Conde at Rocroy opened the eyes of Frederick Henry to the danger of a French conquest of the Belgian provinces; and, feeling his health growing enfeebled, the prince became anxious before his death to obtain peace and security for his country by means of an accommodation with Spain. In 1643 negotiations were opened which, after many delays and in the face of countless difficulties, were at length, four years later, to terminate successfully.

*The course of the pourparlers would doubtless have run more smoothly but for the infirm health and finally the death of the prince of Orange himself. Frederick Henry _ . expired on the 14th of March 1647, and was buried Frederick by the side of his father and brother in Delft. In Henry — his his last campaigns he had completed with signal ,ast cam ' success the task which, as a military commander, he pa *" s * had set himself, — of giving to the United Provinces a thoroughly defensible frontier of barrier fortresses. In 1644 he captured Sas de Ghent; in 1645 Hulst. That portion of Flanders which skirts the south bank of the Scheldt thus passed into the posses- sion of the States, and with it the complete control of all the waterways to the sea.*

The death of the great stadholder did not. however, long delay the carrying out of the policy on which he had set his heart, of concluding a separate peace with Spain behind the back of France, notwithstanding the compact of 1635 J£ e . with that power. A provisional draft of a treaty had Munster. already been drawn up before the demise of Frederick Henry, and afterwards, despite the strenuous opposition of the new prince of Orange (who, under the Acte de Survivance, had inherited all his father's offices and dignities) and of two of the provinces, Zeeland and Utrecht, the negotiations were by the powerful support of the States of Holland and of the majority of the States- General, quickly brought to a successful issue. The treaty was signed at Munster on the 30th of January 1648. It was a

peace practically dictated by the Dutch, and involved a complete surrender of everything for which Spain had so long fought. The United Provinces were recognized Complete as free and independent, and Spain dropped all her triumph claims; the uti possidetis basis was adopted in respect oftae to all conquests; the Scheldt was declared entirely ac ‘ closed — a clause which meant the ruin of Antwerp for the profit of Amsterdam; the right to trade in the East and West Indies was granted, and all the conquests made by the Dutch from the Portuguese were ceded to them; the two contracting parties agreed to respect and keep clear of each other’s trading grounds; each was to pay in the ports of the other only such tolls as natives paid. Thus, triumphantly for the revolted provinces, the eighty years’ war came to an end. At this moment the republic of the United Netherlands touched, perhaps, the topmost point of its prosperity and greatness.

No sooner was peace concluded than bitter disputes arose between the provincial States of Holland and the prince of Orange, supported by the other six provinces, upon the question of the disbanding of the military forces. William was a young man (he was twenty-one at the time of his father’s death) of

The posi- tion of Holland and

Amster- dam.

tioa in

1650.

the highest abilities and of soaring ambition. He was totally opposed to the- peace with Spain, and wished to bring about a speedy resumption of the war. With this view he of Govern- entere< l mto secret negotiations for a French alliance meat in which, as far as can be gathered from extant records, the had for its objects the conquest and partition by the

United allies of the Belgic provinces, and joint action in voces. En g[anc j on kˆif f Charles II. As a preliminary step William aimed at a centralization of the powers of govern- ment in the United Provinces in his own person. He saw clearly the inherent defects of the existing federation, and he wished to remedy a system which was so complicated as to be at times almost unworkable. The States-General were but the delegates, the

stadholders the servants, of a number of sovereign provinces, each of which had different historical traditions and a different form of government, and one of which — Holland — in wealth and importance outweighed the other six taken together. Between the States of Holland and the States-General there was constant jealousy and friction. And yet strangely enough the States of Holland themselves were not really representative of the people of that province, but only of the limited, self-coopting burgher aristocracies of certain towns, each of which with its rights and liberties had a quasi-independence of its own. Foremost among these was the great commercial capital, Amsterdam, whose rich burgher patriciate did not scruple on occasion to defy the authority of the States-General, the stadholder and even of the States of Holland themselves.

The States of Holland had, in the years that followed the truce of 1609, measured their strength with that of the States- General, but the issue had been decided conclusively The posh [n f aV our of the federal authority by the sword of Maurice. The party and the principles of Olden- barneveldt, however, though crushed, were not extin- guished, and though Frederick Henry by his personal influence and prudent statesmanship had been able to surmount the difficulties placed in his way, he had had to encounter at times strong opposition, and had been much hampered in the conduct both of his campaigns and of his policy. With the conclusion of the peace of Munster and the death of the veteran stadholder the struggle for predominance in the Union between the Orange- federalist and the Hollander States-rights parties was certain to be renewed. The moment seemed to be favourable for the assertion of provincial sovereignty because of the youth and inexperience of the new prince of Orange. But William II., though little more than a boy, was endowed with singular capacity and great strength of will, and he was intent upon ambitious projects, the scope of which has been already indicated. The collision came, which was perhaps inevitable. The States- General in the disbanding of the forces wished to retain the cadres of the regiments complete in case of a renewal of the war. The States of Holland objected, and, although the army was a federal force, gave orders for the general disbanding of the troops in the pay of the province. The officers refused to obey any orders but those of the council of State of the Union. The provincial states, on their part, threatened them with loss of pay. At this juncture the States-General, as in 1618, appointed a commission headed by the prince of Orange to visit the towns of Holland, and provide for the maintenance of order and the upholding of the Union. Both parties put themselves in the wrong, the province by refusing its quota to the federal war-sheet, the generality by dealing with individual towns instead of with the states of the province. The visitation was a failure. The town councils, though most of them willing to receive William in his capacity as stadholder, declined to give a hearing to

the commission. The Amsterdam refused absolutely to admit either stad-

Prisoners holder or commission. In these circumstances William of Loe fen- resolved upon strong measures. Six leading mem- stein. k ers f the states of Holland were seized (30th of

July 16.S0) and imprisoned in Loevenstein Castle, and troops under the command of William Frederick, stadholder of Frics-

The ques- tion of disband- ing the fvrces.

land, were sent to surprise Amsterdam. But the town council had been warned, and the gates were shut and guarded. The coup d'etat nevertheless wfes completely successful. The anti- Orange party, remembering the fate of Oldenbarneveldt, were stricken with panic at the imprisonment of their leaders. The States of Holland and the town council of Amsterdam gave in their submission. The prisoners were released, and public thanks were rendered to the prince by the various provincial states for "his great trouble, care and prudence." William appeared to be master of the situation but his plans for future action were never to be carried into effect. Busily engaged in sudden secret negotiations with France, he had retired to his Death of hunting seat at Dieren, when he fell ill with smallpox William on the 27 th of October. A few days later he expired "• at the Hague (6th of November), aged but twenty-four years. A week after his death, his widow, the princess Mary of England, gave birth to a son who, as William III., was to give added lustre to the house of Orange.

The anti-Orange particularist party, which had just suffered decisive defeat, now lifted up its head again. At the instance of Holland a Grand Assembly was summoned, consisting of delegates from all the provinces, to consider the Tne state of the Union, the army and religion. It met at A ssem bfy. the Hague on the 18th of January 1651. The conclu- sions arrived at were that all sovereign powers resided in the provinces, and that to them severally, each within its own borders, belonged the control of the military forces and of religion. There was to be no captain-general of the Union. All the provinces, except Friesland and Groningen, which remained true to William Frederick of Nassau-Dietz, agreed to leave the office of stadholder vacant. The practical result was the estab- lishment of the hegemony of Holland in the Union, and the handing over of the control of its policy to the patrician oligarchies who formed the town councils of that province.

Such a system would have been unworkable but for the fact that with the revival of the political principles of Oldenbarne- veldt, there was found a statesman of commanding _.. office ability to fill the office in which the famous advocate of Grand of Holland had for so many years been "

minister of Pension- all affairs ” in the forming state. The title of advocate ary ‘ had indeed been replaced by that of grand pensionary {Raad Pensionaris), but the duties assigned to the office remained the same, the only change of importance being that the advocate was appointed for life, the grand pensionary for a term of five years. The grand pensionary was nominally the paid servant of the States of Holland, but his functions were such as to permit a man of talent and industry in the stadholderless republic to exercise control in all departments of policy and of government. All correspondence passed through his hands, he wrote all despatches, conducted the debates over which he presided, kept the minutes, drafted the resolutions, and was ex officio the leader and spokesman of the delegates who represented the Province of Holland in the States-General. Such was the position to which John de Witt, a young man of twenty-eight years of age, belonging to one of the witt. most influential patrician families of Dordrecht (his father, Jacob de Witt, was one of the prisoners of Loevenstein) was appointed in 1653. From that date until 1672 it was his brain and his will that guided the affairs of the United Nether- lands. He was supreme in the States of Holland, and Holland was dominant in the States-General (see John de Witt).

*The death of William II. had left the Dutch republic at trie very highest point of commercial prosperity, based upon an almost universal carrying trade, and the strictest „. . system of monopoly. Friction and disputes had between frequently arisen between the Dutch and the English English traders in different parts of the world, and especially *»< ' Dufc * in the East Indies, culminating in the so-called " Massacre of Amboyna "; and the strained relations between the two nations would, but for the civil discords in England, have probably led to active hostilities during the reign of i Charles I. With the accession of Cromwell to power the breach*

Swedea.

was widened. A strong party in the Provinces were unfriendly to the Commonwealth, and insults were offered in the Hague to the English envoys. The parliament replied by passing the memorable Navigation Act (Oct. 1651), which struck a deadly blow at the Dutch carrying trade. It was the beginning of that struggle for supremacy upon the seas which was to end, after Naval three great wars, in the defeat of the weaker country. struggle The first English war lasted from May 1652 to April g’ th . . 1654,

and within fifteen months twelve sea-fights took

place, which were desperately contested and with varying success. The leaders on both sides — the Netherlanders Tromp (killed in action on the 10th of August 1653) and de Ruyter, the Englishmen Blake and Monk — covered themselves with equal glory. But the losses to Dutch trade were so serious that negotiations for peace were set on foot by the burgher party of Holland, and Cromwell being not unwilling, an agreement

was reached in the Treaty of Westminster, signed on West-" tne 5 tn °f April 1654. The Dutch conceded the minster. striking of the flag and compensation for English

claims against the Dutch in the East Indies and else- where. The act of Seclusion, which barred the young prince of Orange from holding the office of stadholder and of captain- general, had been one of the conditions on which Cromwell had insisted. The consent of the States-General was refused, but by

. . , a secret treaty Holland, under the influence of de

Act of ii" j . . , .

Seclusion. " llt > accepted it in their own name as a sovereign

province. The popular feeling throughout the United Provinces was strongly antagonistic to the act of Seclusion, by which at the dictation of a foreign power a ban of exclusion was pronounced against the house of Orange-Nassau, to which the republic owed its independence.

In 1658, the States-General interfered to save the Danes from Charles Gustavus of Sweden. In 1659 a- treaty of peace was War ith conc l uc 'ed between France, England and the United Provinces with a view to the settlement of the Dano- Swedish question, which ended in securing a northern peace in 1660, and in keeping the Baltic open for Dutch trade. The foreign affairs of the republic were throughout these years ably conducted by de Witt, and the position of Dutch colonial expansion in the Eastern seas made secure and firm. An advantageous peace with Portugal was made in 1662.

Meanwhile the Commonwealth in England had been followed in 1660 by the restoration of the monarchy. To conciliate the new king the act of Seclusion was repealed, and the English education of the young prince of Orange was under- war. taken by the States of Holland under the super-

intendence of de Witt. But Charles owed a grudge against Holland, and he

was determined to gratify it. The Navigation Act was re-enacted, old grievances revived, and finally the Dutch colony of New Netherland was seized in time of peace (1664) and its capital, New Amsterdam, renamed New York. War broke out in 1665, and was marked by a series of terrific battles. On the 13th of June 1665 the Dutch admiral Obdam was completely defeated by the English under the duke of York. The four days' fight (nth-i4th of June 1666) eiided in a hard- won victory by de Ruyter over Monk, but later in this year (August 3rd) de Ruyter was beaten by Ayscue and forced to take refuge in the Dutch harbours. He had his revenge, for on the 22nd of June 1667 the Dutch fleet under de Ruyter and Cornelius de Witt made their way up the Medway as far as Chatham and burnt the English fleet as it lay at anchor. Negotiations between the two countries were already in progress and this event hastened a settlement. The peace of Breda." Breda was signed (31st of July 1667) on terms on the whole favourable to the Dutch. New Netherland was retained by England in exchange for Suriname. In the following year jjy the efforts of Sir William Temple the much vaunted Triple Alliance was concluded between Great Britain, the United Provinces and Sweden to check Alliance, the ambitious designs of Louis XIV. The instability of Charles II., who sold himself to Louis by the treaty of Dover (1670), speedily rendered it of no effect, and left the

The Triple

United Provinces to face unaided the vengeance of the French king.

From 1668 to 1672 Louis made ready to destroy the Dutch, and so well had his diplomacy served him that they were left with- out a friend in Europe. In 1672 the storm broke: the English without a declaration of war tried, unsuccess- T. e . fully, to intercept the Dutch Mediterranean fleet; invasion. and the French at the same time setforthinapparently irresistible strength to overcome the despised traders of Holland. The States were ill-prepared on land though their fleet was strong and ready; party spirit had become intensely bitter as the prince of Orange (see William III.) grew to man's estate, and the ruling burgher party, knowing how great was the popularity of William, especially in the army, had purposely neglected their land forces. Town after town fell before the French armies, and to de Witt and his supporters there seemed to be nothing left but to make submission and accept the best terms that Louis XIV. would grant. The young prince alone rose to the height of the occasion, and set his face against such cowardly counsels, and he had the enthusiastic support wmiam of the great majority of the people. Amidst general ///. stad- acclamation William was elected stadholder, first of holder and Zeeland, then of Holland, and was appointed captain- CaDtala ' general of the Union (June 1672). Meanwhile the fleet under de Ruyter had encountered a combined English

and French force in Solebay (7th of June), and after a desperate fight, in which the French had but slackly supported their allies, had more then held its own. William, in his turn, with an army wholly insufficient to meet Z a gu stl r the French in the open field, was able to persuade war . his countrymen to open the dikes and by flooding the land to prevent its occupation by the enemy. The courage and resourcefulness of their youthful leader inspired Murder the people to make heroic sacrifices for their independ- of the ence, but unfortunately such was the revulsion of ˆ ro ‹ s feeling against the grand pensionary, that he himself and his brother Cornelius were torn in pieces by an infuriated mob at the Hague (20th of August).

William, now supreme in the States, while on land struggling with chequered success against the superior forces of the French, strove by his diplomacy, and not in vain, to gain allies for the republic. The growing power of \ˆ ac f m France caused alarm to her neighbours, and Sweden, minster. Denmark, Spain and the emperor lent a willing ear to the persuasions of the stadholder and were ready to aid his efforts to curb the ambition of Louis. On sea in 1673 de Ruyter, in a series of fiercely contested battles, successfully maintained his strenuous and dogged conflict against the united English and French fleets. In England the war was exceedingly un- popular, and public opinion forced Charles II. to conclude peace. The treaty of Westminster, which provided that all conquests should be restored, was signed on the 14th of February 1674. The French now found themselves threatened on many sides, and were reduced to the defensive. The prince, how- ever, suffered a defeat at Seneff, and was in 1674 uu War prevented from invading France. The war, neverthe- France. less, during the following years was on the whole advantageous to the Dutch. In 1676 a Dutch squadron fought two hard but indecisive battles with a superior French force, off Stromboli (8th of January) and off Messina (22nd of April). In the last-named fight Admiral de Ruyter was badly wounded and died (29th of April). In 1677 negotia- ˆe Ruyter.' tions for peace went on, and were forwarded by the

marriage, at the close of the year, of William of Orange with his cousin the princess Mary, daughter of the duke of York. At last (August 1678) a peace was concluded at Nym-

wegen by which the Dutch secured the integrity

and independence of their country. All the conquests

made by the French were given up.

The aggressive policy of Louis XIV. in the years that followed

the peace of Nymwegen enabled William to lay the foundations

of the famous confederacy which changed the whole aspect

Peace ol

iVym-

wegen.

of European politics. The league of Augsburg (1686), which followed the revocation of the edict of Nantes, placed Orange at the head of the resistance to French domination. League of j [ea g ue was f ormec j by the emperor, Spain, Sweden, the United Provinces and by several German states. In England William and Mary were looked upon as the natural successors to the throne on the death of James II., and William kept up close relations with the malcontents in Church and State, who disliked the arbitrary and papistical policy of his father-in-law. But with the birth of a prince of Wales the situation was changed, and William determined to intervene actively in English affairs. His opportunity came when Louis XIV., having declared war against the Empire, had invaded the Palatinate. The opposition of Amsterdam to an English expedition, in the absence of danger from the side of Revoiu- France, was overcome. The Revolution of 1688 I6S8. ensued, and England became, under William's strong

*rule, the chief member of the Great Coalition against French aggression. In the Grand Alliance of 1689-1690 he was accused of sacrificing Dutch to English interests, but there can be no doubt that William loved his native country better than his adopted one, and was a true patriot. If the United Provinces suffered in prosperity through their close relations with and subordination to Great Britain during a T * e long series of years, it was due not to the policy of*

Alliance. William, but to the fact that the territory of the republic was small, open to attack by great military powers, and devoid of natural resources. The stadholder's authority and popularity continued unimpaired, despite of his frequent absences in England. He had to contend, like his predecessors, with the perennial hostility of the burgher aristo- cracy of Amsterdam, and at times with other refractory town councils, but his power in the States during his life was almost autocratic. His task was

rendered lighter by the influence and ability of Heinsius, the grand pensionary of Holland, William a w ; se anc [p ruc ient statesman, whose tact and modera- Heinsius. t' on m dealing with the details and difficulties of internal administration were conspicuous. The stadholder gave to Heinsius his fullest confidence, and the pensionary on his part loyally supported William's policy and placed his services ungrudgingly at his disposal (see Heinsius).

The conduct of the war by the allies was far from successful. In 1690 (July 1st) Waldeck was defeated by Luxemburg at Fleurus; and the Anglo-Dutch fleet was so severely France. handled by Tourville (10th July) off Beachy Head that for two years the command of the sea remained in the possession of the French. A striking victory off Cape la Hogue (29th of May 1692) restored, however, supremacy to the allies. On land the combined armies fared ill. In 1691 the French took Mons, and in 1692 Namur, in which year after a hard-fought battle William was defeated at Steenkirk and in 1693 at Neerwinden. But William's military genius never shone so brightly as in the hour of defeat; he never knew what it was to be beaten, and in 1695 his recapture of Namur was a real triumph of skill and resolution. At last, after long negotiations, exhaustion compelled the French king to sign the peace of Ryswick in 1697, in which William was recognized Ryswkk. by France as king of England, the Dutch obtaining a favourable commercial treaty, and the right to garrison the Netherland barrier towns. This peace, however, did no more than afford a breathing space during which Louis XIV. prepared for a renewal of the struggle. The great question of the Spanish succession was looming in all men's eyes, and though partition treaties between the interested Death of powers were concluded in 1 698 and 1 700, it is practically IUm certain that the French king held himself little bound

by them. In 1701 he elbowed the Dutch troops out of the barrier towns; he defied England by recognizing James III. on the death of his father; and it was clear that another war was imminent when William III. died in

1702.

In 1672 the stadholdership in five provinces had been made

hereditary in the family of the prince of Orange, but William died childless, and the republican burgher party was strong enough to prevent the posts being filled up. William staIII. was thus preserved, but with the loss of the firm hand and strong personality of that great ruler the United Provinces were relegated to a subordinate place in the councils of the nations, and with the gradual decadence of its navy the Dutch republic ceased to rank as a power to be reckoned with.

In the War of the Spanish Succession, which broke out in 1702, Dutch troops took part in the campaigns of Marlborough and Eugene, and had their share in winning the great w victories of Blenheim (1704), Ramillies (1706), Ouden- of the arde (1708) and Malplaquet (1709). At the peace of Spanish Utrecht, concluded in 1713, the interests of the •Succes- Netherlands were but half-heartedly supported by the English plenipotentiaries, and the French were able to obtain far more favourable terms than they had the power to exact. But they were compelled to abandon all claim to the Spanish Netherlands, which were formally handed over to the United Provinces, as trustees, to be by them, after the conclusion of a satisfactory barrier treaty, given up to the emperor, and be known henceforth as the Austrian Netherlands. Jtrecht. The peace of Utrecht taught the Dutch that the great powers around them, while ready to use their resources for war, would not scruple to abandon them when they wanted peace; they, therefore, determined henceforth to stand clear of all foreign complications. With 17 13 the influence of the United Netherlands upon European politics comes almost to an end.

The ruling party in the States took an active part in securing George I. on the throne of England; and they succeeded in coming to an agreement both with France and with Austria over the difficulties connected with the barrier towns, and were thus able in tranquillity to concentrate their energies upon furthering the interests of their trade. Under the close oligarchical rule of the patrician families, who filled all offices, in the town councils, the States of Holland, in which the influence of Amsterdam was dominant, and which in their turn exercised predominance in the States- General, became more and more an assembly of " shopkeepers " whose policy was to maintain peace for the sake of the commerce on which they thrived. For thirty years after the peace of Utrecht the Provinces kept themselves free from entanglement in' the quarrels" of their neighbours. The foundation of the Ostend East India Company (see Ostend Company), however, Ostend by the emperor Joseph II. in 1723, at once aroused company. the strong opposition of the Amsterdam merchants who looked upon this invasion of their monopoly with alarm, and declared that the Ostend Company had been set up in contravention to the terms of Article V. of the treaty of Munster. In maintaining this position the States had the support of England, but it was not until 1731 that they succeeded in obtaining the suppression of the company by consenting to

Peace policy.

HISTORY FROM 1579]

HOLLAND

*guarantee the Pragmatic Sanction of Charles VI. This step led in 1743 to their being involved in the War of the War of the Austrian Succession, and thus being drawn into hostili- Austrian ties with France, which invaded the barrier country. Succes- j n j- 44 t ne v formed with Great Britain, Austria and * “” Saxony, a Quadruple Alliance, and put a contingent*

of troops in the field. The Dutch took an active part in the campaign of 1745 and suffered heavily at Fontenoy, after which battle Marshal Saxe overran the Austrian Netherlands. The French captured all the barrier towns, and in 1747 Revoiu- entered Dutch Flanders and made an easy conquest. 1ˆ47. The United Provinces, as in 1672, seemed to lie at the

mercy of their enemies, and as in that eventful year, popular feeling broke down the opposition of the burgher oligarchies, and turned to William IV., prince of Orange, as the saviour of the state. John William Friso had died IVm young in 1711, leaving a posthumous son, William

Charles Henry Friso, who was duly elected stadholder by the two provinces, Friesland and Groningen, which were always faithful to his family, and in 1722 he became also, though with very limited powers, stadholder of Gelderland. The other provinces, however, under pressure from Holland, bound them- selves not to elect stadholders, and they refused to revive the office of captain-general of the Union. By the conquest of Dutch Flanders Zeeland was threatened, and the states of that province, in which there were always many Orange partisans, elected (April 1747) William stadholder, captain-general and admiral of Zeeland. The example once given was infectious, and was followed in rapid succession by Holland, Utrecht and Overysel. Finally the States-General (May 4) appointed the prince, who was the first member of his family to be stad- holder of all the seven provinces, captain and admiral-general of the Union, and a little later these offices were declared hereditary in both the male and female lines.

William IV., though not a man of great ability, was sincerely anxious to do his utmost for securing the maintenance of peace, and the development of the resources and commercial am – prosperity of the country, and his powerful dynastic chapeiie. connexions (he had married Anne, eldest daughter of George II.) gave him weight in the councils of Europe. The peace of Aix-la-Chapelle, in 1748, in which the influence of Great Britain was exerted on behalf of the States, though it nominally restored the old condition of things, left the Provinces crippled by debt, and fallen low from their old position among the nations. At first the stadholder’s efforts to promote the trade and welfare of the country were hampered by the

distrust and opposition of Amsterdam, and other strong- holds of anti-Orange feeling, and just as his good wmi intentions were becoming more generally recognized,

iv. William unfortunately died, on the 22nd of October

1 75 1, aged forty years, leaving his three-year-old son, William V., heir to his dignities. The princess Anne of England became regent, but she had a difficult part to play, and on the outbreak of the Seven Years' War in which the e""? °d Provinces were determined to maintain neutrality, Regent. her English leanings brought much unpopularity upon her. She died in 1759, and for the next seven years the regency passed into the hands of the States, and the government was practically stadholderless.

In 1766 William V. was declared to be of age; and his accession to power was generally welcomed. He was, however, a weak wuu v man > without energy or resolution, and he allowed himself to be entirely led by his old guardian the duke of Brunswick, and by his wife Frederica Wilhelmina of Prussia, a woman of marked ability, to whom he entirely deferred. In the American War of Independence William's sympathies were strongly on the English side, while those of the majority of the Dutch people were with the revolted colonies. It is, however, certain that nothing would have driven the Provinces to take part in the war but for the overbearing attitude of the British government with regard to the right of neutral shipping upon the seas, and the heavy losses sustained

Peace of Paris.

by Dutch commerce at the hands of British privateers. The famous agreement, known as the " Armed Neutrality," with which in 1780 the States of the continent at the ihe instigation of Catherine II. of Russia replied to the Armed maritime claims put forward by Great Britain drew the Neu ; Provinces once more into the arena of European politics. '

Every effort was made by the English to prevent the Dutch from joining the league, and in this they were assisted by the stadholder, but at last the States-General, though only by the bare majority of four provinces against three, determined to throw in their lot with the opponents of England. Nothing could have been more unfortunate, for the England. country was not ready for war, and party spirit was too strong for united action to be taken or vigorous preparations to be made. When war broke out Dutch commerce was destroyed, and the Dutch colonies were at the mercy of the English fleet without the possibility of a blow being struck in their defence. An indecisive, but bravely fought action with Admiral Parker at the Dogger Bank showed, however, that the Dutch seamen had lost none of their old

dogged courage, and did much to soothe the national sense of humiliation. In the negotia- tions of the Treaty of Paris (1783) the Dutch found themselves abandoned by their allies, and compelled to accept the disadvantageous but not ungenerous terms accorded to them by Great Britain. They had to sacrifice some of their East Indian possessions and to concede to the English freedom of trade in the Eastern seas.

One result of this humiliating and disastrous war was the strengthening of the hands of the anti-Orange burgher-regents, who had now arrogated to themselves the name of " patriots." It was they, and not the stadholder, who T,p, > ,.. had been mainly responsible for the Provinces joining p ar ty. "the Armed Neutrality," but the consequences of the war, in which this act had involved them, was largely visited upon the prince of Orange. The " patriot " party did their utmost to curtail his prerogatives, and harass him with petty insults, and at last the Prussian king was obliged to i a t ervea . interfere to save his niece, who was even more un- tlon at popular than her weak husband, from being driven the King of from the country. In 1784 the emperor Joseph II. ss,a ' took advantage of the dissensions in the Provinces to raise the question of the opening of the Scheldt. He himself was, however, no more prepared for attack than the Republic for defence, but the Dutch had already sunk so low, that they agreed to pay a heavy indemnity to induce ^^^ the Austrians to drop a demand they were unable to Emperor. enforce. To hold the mouth of the Scheldt and prevent at all costs a revival of Antwerp as a commercial port had been for two centuries a cardinal point of Dutch policy. This difficulty removed, the agitation of the " patriots " against the stadholderate form of government increased in violence, and William speedily found his position untenable. An insult offered to the prince of Orange in 1787 led to an invasion of the country by a Prussian army. Amsterdam invasion. capitulated, the country was occupied, and the patriot leaders declared incapable of holding any office. The Orange party was completely triumphant, and William V., under the protection of Prussia and England, with which states g es t ora . the United Provinces were compelled to ally themselves, tlon to was restored to power. It was, however, impossible power of to make the complicated and creaking machinery of am '.- the constitution of the worn-out republic of the United Nether- lands work smoothly, and in all probability it would have been within a very short time replaced by an hereditary monarchy, had not the cataclysm of the French Revolution swept it away from its path, never to be revived.

When war broke out between the French revolutionary government and the coalition of kings, the Provinces Tne p renc ft remained neutral as long as they could. It was not till invade the Dumouriez had overrun all the Austrian Netherlands Nether- in 1 702, and had thrown open the passage of the Scheldt, "" s ° that they were drawn into the war. The patriot party

sided with

the French, but for various reasons the conquest of the country was delayed until 1795. In the closing months of 1794 Pichegru, at the head of a large and victorious army, invaded the Provinces. The very severe frost of that winter gave his troops an easy passage over all the rivers and low-lying Over- lands; town after town fell before him; he occupied

thmw of Amsterdam, and crossing the ice with his cavalry the Stail- took the Dutch fleet, as it lay frost-bound at the holderate. Texd The sta dholder and his fami i y fled t0 England,

and the disorganized remnants of the allied forces under the duke of York retreated into Germany. The " patriots," as the anti-Orange republicans still styled themselves, wfiiiam v. rece i ve d the French with open arms and public re- joicings, and the government was reorganized so as to bring it into close harmony with that of Paris. The stad- holderate, the offices of captain and admiral-general, and all the ancient organization of the United Netherlands were abolished, and were transformed into the Batavian Republic, in close alliance with France. But the Dutch had soon cause Z . , to regret their revolutionary ardour. French alliance Republic, meant irencn domination, and participation in the wars of the Revolution. Its consequences were the total ruin of Dutch commerce, and the seizure of all the Dutch colonies by the English. Internally one change of government succeeded another; after the States- General came a

Changes national convention; then in I7g8 a constituent of Govern- ' . , , ,

menu assembly with an executive directory; then chambers

of representatives; then a return to the earlier systems under the names of the eight provincial and one central Com- missions (1801). These changes were the outcome of a gradual reaction in a conservative direction.

The peace of Amiens gave the country a little rest, and the

Dutch got back the Cape of Good Hope and their West Indian

colonies; it was, however, but the brief and deceptive

Coasti- interlude between two storms; when war began tution of _, , , , ‘ .,.,11

180$. again England once more took possession of all she

had restored. In 1805 the autocratic will of Napoleon

Bonaparte imposed upon them a new constitution, and Rutger

Jan Schimmelpenninck (1765-1825) was made, under the

ancient title of grand pensionary, head of the government.

In the next year the French emperor added Holland,

as the United Provinces were now named, to the ring of

dependent sovereignties, by means of which he sought to

build up a universal empire, and he forced his brother Louis

to be the unwilling king of an unwilling people. The new

Louis king was a man of excellent intentions and did his

Bonaparte best to promote the interest of his subjects, but finding

King of himself unable to protect them from the despotic

*a ” * overlordship of his brother, after a four years’ reign,*

Louis abdicated. In 1810 the Northern Netherlands by decree

of Napoleon were incorporated in the French empire, and had

to bear the burdens of conscription and of a crushing weight of

taxation. The defeat of Leipzig in 1813 was the signal for a

general revolt in the Netherlands; the prince of Orange (son

of William V.) was recalled, and amidst general

Z . rejoicing accepted at Amsterdam the offer of the

Sovereign ‘ . ° r

Prince. sovereignty under a free constitution (Dec. 1, 1813), with the title

of sovereign prince. On the downfall of Napoleon the great powers determined to create in the Low Countries a powerful state, and by the treaty of London (June 14, 1814) the Belgians were united with the Dutch of the provinces to form the kingdom of the Netherlands,

Kingdom which was also to include the bishopric of Liege and of the the duchy of Bouillon, and the prince of Orange was

placed upon the throne on the 15th of March 181 5 as William I., king of the Netherlands (see William I., king of the Netherlands). The ancestral possessions of the House of Nassau were exchanged for Luxemburg, of which territory King William in his personal capacity dred Days. Decarne grand duke. The carrying out of the treaty was delayed by the Hundred Days' campaign, which for a short time threatened its very existence. The

Nether- lands.

daring invasion of Napoleon, however, afforded the Dutch and Belgian contingents of the allied army the opportunity to fight side by side under the command of William, prince of Orange, eldest son of the new king, who highly distinguished himself by his gallantry at Quatre Bras, and afterwards at Waterloo where he was wounded (see William II., king of the Nether- lands). The Congress of Vienna confirmed the William if. arrangements made by the treaty of London, and Brussels. William I. was crowned king of the Netherlands at Brussels on the 27th of September 1815. Under the constitu- tion the king, as hereditary sovereign, possessed full executive powers, and the initiative in proposing laws. He had consti- the power of appointing his own council of state. tution The legislative body bore the time-honoured title of of the States-General, and was divided into an Upper Nether- Chamber nominated by the king, and a Lower Chamber elected by the people. Freedom of worship, freedom of the press, and political equality were principles of the constitution, guaranteed to all.

The union of the Dutch and Belgian provinces, like so many of the territorial arrangements of the Congress of Vienna, was an attempt to create a strong state out of diverse Dif f ereace and jarring elements. It was an artificial union, between which nothing but consummate tact and statesman- the Dutch ship could have rendered permanent and solid. North aad Be, £ lc and south were divided from one another by religious belief, by laws and usages, by material interests, and by two centuries and a half of widely severed national life. The Belgians were strict Catholics, the Dutch Calvinistic Protestants. The Dutch were chiefly a commercial and sea- faring people, with interests in distant lands and colonial possessions; the Belgians were agriculturists, except where their abundance of minerals made them manufacturers. The national traits of the Dutch were a blend of

German and English, the national leaning of the Belgians was towards France and French ideals. Nevertheless the materials were there out of which a really broad-minded and conciliatory handling of religion and racial difficulties might have gradually built up a Nether- land nation able to hold from its population and resources a considerable place among European powers. For it must not be forgotten that some two-thirds of the Belgian people are by origin and language of the same race as the Dutch. But when difficulties and differences arose between North and South, as they were sure to arise, they were not dealt with wisely. The king had good intentions, but his mind was warped by Dutch prejudices, and he was ill-advised and acted unadvisedly. The consequences were the Belgian Revolution of 1830, The which ended in the intervention of the great powers, Belgian and the setting up, in 1831, of Belgium as an indepen- Revoiu- dent kingdom. The final settlement of outstanding on ‘ questions between the two countries was not reached till 1839 (for an account of the Belgian Revolution, see Belgium). King WilliamI.inthefollowingyear,havingbecomeunpopular through his resistance to reform, resigned his crown to Sm« ° f his son William II., who reigned in peace till his //. death in 1849, when he was succeeded by his eldest son William III. (see William III., king of the Netherlands). His accession marked the beginning of constitutional govern- ment in the Netherlands. William I. had been to Acces- a large extent a personal ruler, but William II., sion of*

though for a time following in his father’s steps, had William been moved by the revolutionary outbreaks of 1848 to concede a revision of the constitution. The fundamental law of 1848 enacted that the first chamber of the States- General should be elected by the Provincial Estates instead of being appointed by the king, and that the ˆ. e 5°”” second chamber should be elected directly by all of 1848. persons paying a certain amount in taxation. Ministers were declared responsible to the States-General, and a liberal measure of self-government was also granted. During the long reign of William III. (1849-1890) the chief struggles of parties in the Netherlands centred round religious education. On

the one side are the liberals, divided into moderates and progressives, the representatives to a large extent of the com- Poiitical mercial towns. Opposed to them is the coalition of parties In the orthodox Protestant conservatives, styled anti- the Nether- revolutionaries, supported by the

Calvinistic peasantry, t ”” ,s – and the Catholics, who represent about one-third of the population and have their headquarters in Dutch Brabant, Dutch Flanders and Limburg. There is also in the Netherlands a small, but very strenuous socialist party, which was founded by the active propaganda of an ex-pastor Domela-Nieuwenhuis. It draws its chief strength from Amsterdam and certain country districts of Friesland.

The liberals were in power from 1871 to 1888 continuously, but a Catholic-anti-revolutionary ministry under Baron Mackay held office from 1888 to 1801, and again a coalition Religious ministry was formed in 1901 with Dr Kuyper at its tion. ” head. From 1894 to 1897 a ministry of moderate liberals supported by a large part of the Catholic and anti-revolutionary parties were in power. The constitu- tion of 1848 made it the duty of the state to provide free primary secular education, but it allowed to members of all creeds the liberty of establishing private schools, and this was carried into effect by a law passed in 1857 by the joint efforts of the liberals and Catholics against the opposition of the orthodox Calvinists. But the long liberal ascendancy closed the ranks of the Catholic— Calvinist coalition, and united them against the neutral schools, and in 1889 they were able to pass a law enabling not only the unsectarian public schools, but all private schools organized by societies and bodies recognized by the law to receive sub- ventions from the state. In 1890 there were 3000 public schools with 450,000 scholars and 1300 private schools with 195,000 scholars.

The subject of the extension of the franchise has also been the cause of violent party strife and controversy. It was taken in hand as early as 1872, but as a revision of the constitution was necessary, no change was actually carried out till 1887. The law of that year lowered the qualification of the payer of a direct tax to 10 fl. Votes were given to all householders paying a certain minimum house duty, and to all lodgers who had for a given time paid a minimum of rent, also to all who possessed certain educational and social qualifications, whose definition was left to be specified by a later law. The passing of such a law was deferred by the coalition (Catholic-Orthodox) ministry of 1888-1891. The liberal ministry of 1891 attempted to deal with the question, and a proposal was made by the minister Tak van Poortvliet, which almost amounted to universal suffrage. The educational qualification was to be Extension a ˆj e t0 wr ; tej tne soc i a i that of not receiving charitable suffrage, relief. This proposal caused a cleavage right through all parties. It was supported by the radical left, by a large portion of the Orthodox-Calvinists under Dr Kuyper, and by some Catholics; it had against it the moderate liberals, the aristocratic section of the Orthodox-Calvinists, the bulk of the Catholics, and a few radicals under an influential leader van Houten. After a fierce electoral fight the Takkians were victors at the first polls, but were beaten at the second

ballots. Of the 46 Takkians, 35 were liberals; of the 54 anti-Takkians, 24 were Catholics. A moderate liberal ministry was formed (1894) and in 1896 carried into law what was known as the van Houten project. It gave the right of voting to all Dutchmen over twenty-five years of age, who paid 1 fl. in direct taxation; were householders or lodgers as defined in 1887, or tenants of a vessel of, at least, 24 tons; were the recipients of certain salaries or had certain deposits in the public funds or savings banks. By this reform the number of electors, which had been raised in 1887 from 140,000 to 300,000, was augmented to 700,000. The question of universal military service serviced has a ' s0 divided parties. The principle of personal service has been strongly opposed by the Catholics and conservatives, but became the law of the land in 1898, though exemptions were conceded in favour of ecclesiastics and certain classes of students.

*The long-continued and costly wars with the sultan of Achin have during a series of years been a source of trouble to Dutch ministries. In 1871-1872 Great Britain, in exchange for certain possessions of Holland on the coast of **Jj*

Guinea, agreed to recognize the right of the Dutch wan

to occupy the north of Sumatra. The sultan of Achin opposed by force of arms the efforts of the Dutch to make their occupation effective, and has succeeded in maintaining a vigorous resistance, the Dutch colonial troops suffering severely from the effects of the insalubrious climate. Until 187 1 the surplus derived from the colonial budget had been turned into a deficit, and the necessity of imposing fresh taxes to meet the war expenses has led to the downfall both of individual ministries and of cabinets.

William III. dying in 1890 was succeeded by his only surviving child, Wilhelmina. The new queen being a minor, her mother, the queen-dowager Emma, became regent. One effect of the accession of Queen Wilhelmina was the S^f^", severance of the bond between the Netherlands and mJfla ' Luxemburg. The grand duchy, being hereditary only in the male line, passed to the nearest agnate, the duke of Nassau. In 1898 the queen, having reached the age of eighteen, assumed the government. She married in 1901 Prince Henry of Mecklenburg. The outbreak of the Boer War in 1899 led to a strong outburst of sympathy among the Dutch on behalf of their kinsmen in South Africa, and there were times during the war, especially after President Kruger had fled from the Transvaal in a Dutch war vessel and had settled in Holland, when it was a task of some difficulty for the Dutch government to prevent the relations between Great Britain and the Nether- lands from becoming strained. The ministry, however, under Dr Kuyper were able to keep the popular feeling in favour of the Boers in restraint, and to maintain towards Great Britain a correct attitude

of strict neutrality. In 1903 the government took strong measures to prevent a threatened general strike of railway employees, the military were called out, and occupied the stations. A bill was passed by the States-General declaring railway strikes illegal. The elections of 1905 for the Second Chamber gave the liberals a narrow majority of four. Dr Kuype- accordingly resigned, and a moderate liberal cabinet was formed by Th. H. de Meester. The fact that up to 1908 the queen had not become a mother gradually caused some public concern as to the succession; but in 1909 Queen Wilhelmina, amid national rejoicings, gave birth to a princess.

Bibliography.— See (for the general history) J. Wagenaar, Vaderlandsche historic to 1751 (21 vols., 1749-1759); continuation by Az. P. Loosjes, from 1751-1810 (48 vols., 1786-1811); W. Bilderdijk, Geschiedenis der Vaderlands (13 vols., 1832-1853); Groen G. van Prinsterer, Handboek der Geschiedenis van het Voder- land (6th ed., 1895); (for particular periods): L. ab Aitzema, Saken van spaet en oorlogh in ende om trent de Vereenigde Nederlanden (1621-1668) (15 vols., 1657-1671); continuation by Lambert van den Bos (Lambertus Sylvius) (4 vols., 1685-1699). The work of Aitzema contains a large number of important diplomatic and other documents; A. de Wicquefort, Histoire des provinces des Pays-Bas depuis la paix de Munster {1648-1658) (2 vols., 1719-1743); in these volumes will be also found a rich collection of original documents; R. Fruin, Tienjaren uit den tactigjarigen oorlog {1588-1598), (6th ed., 1905), a standard work; J. L. Motley, History of the United Nether- lands {1584-160Q), (4 vols., 1860-1868); P. J. Blok, History of the People of the Netherlands, vol. iii. (1568-1621) (trans, by Ruth Putnam, 1900) ; Cambridge Modern History, vol. iii. ch. xix. and vol. iv. ch. xxv. (see the bibliographies) ; Ant. L. Pontales, Vingt annees de r&- publique parlementaire au if me siecle. Jean de Witt, grand pensionnaire de Hollande (1884); E. C. de Gcrlache, Histoire du royaume des Pays-Bas 1814-1830 (3 vols., 1859); Bosch J. de Kemper, Ge- schiedenis van Nederland na 1830 (5 vols., 1873-1882); also the following important works: Groen G. van Prinsterer, Archives ou correspondance inedite de la maison d' Orange-Nassau, 2 e serie (1584-1688) (5 vols., 1857-1860); J. de Witt, Brieven {1652-1660) (6 vols., 1 723-1 725); A. Kluit, Historie der Hcllandsche Staatsregering tot 179$ (5 vols., 1802-1805); G. W. Vreede, Inleiding tot eene ge- schiedenis der Nederlandsche iiplomatie (6 vols., 1850-1865); J. C. de Jonge, Geschiedenis van het Nederlandsche Zeewesen. (6 vols., 1833- 1848); E. Luzac, Holland's Rijkdom (4 vols., 1781); R. Fruin, Geschiedenis der Staatsinstellingen in Nederland tot den vol der Re- publiek, edn. Colenbrander (1901); N. G. van Kampen, Geschiedenis der Nederlanders buiten Europa (4 vols., 1833); W. J. A. Jonckbloet,

Holland.

Geschiedenis dcr,Nederlandsche Letterkunde (2 vols. 1881); C. Busken Hiiet, Het Land van Rembrandt- studien over de Nordnederlandsche beschaving in de i?e eeuw (2 vols., 1886); L. D. Petit, Repertorium der verhandelingen en bijdragen betreffende de geschiedenis des Vater- lands in tijdschriften en mengel werken tot op 1900 verschenen, 2 parts (1905) ; other parts of this valuable repertorium are in course of publication. (G. E.)

HOLLAND, COUNTY AND PROVINCE OF— The first mention of Holland in any document is found in an imperial gift brief dated May 2nd, 1064. In this the phrase " omnis comitatus in Holiandt " occurs, but without any further description of the locality indicated. A comparison with other documentary evidence, however, leads to the identification of Holland with the forestum Merweda, or the bush-grown fenland lying between the Waal, the old Meuse and the Merwe. It is the district surrounding the town of Dordrecht. A portion of the original Holland was submerged by a great inundation in 1421, and its modern appellation of Biesbosch (reed-forest) is descriptive of what must have been the condition of the entire district in early times. The word Holland is indeed by many authorities thought to be a corruption of Holt-land (it was sometimes so spelt by 13th-century writers) and to signify wood-land. The earliest spelling is, however, Holland, and it is more probable that it means lowlying-land (hoi = hollow), a derivation which is equally applicable to the district in Lincolnshire which bears the same name.

The title count of Holland appears to have been first borne by the Frisian count Dirk III., who founded Dordrecht (about 1015) and made it his residence (see below). It was The first notj however, till late in the nth century that his successors adopted the style " Hottandensis comes " as their territorial designation (it is found for the first time on a seal of Dirk V. 1083), and that the name Holland became gradually extended northwards to connote all the land subject to the rule of the counts between Texel and the Maas.

The beginnings of the history of this feudal state (the later Holland) centre round the abbey of Egmont in whose archives its records have been preserved. In 922 Charles the Simple gave in full possession to a count in Frisia, Dirk by name (a shortened form of Diederic, Latin Theodoricus), " the church of Egmont with all that belonged to it from Swit- hardeshage to Kinhem." This man, usually known as Dirk I., died about 939 and was succeeded by his son of the same name. Among the records of the abbey of

Egmont is a document by which the emperor Arnulf gave to a certain count Gerolf the same land " between Swithardeshage and Kinhem," afterwards held by Dirk I. It is generally assumed that this Gerolf was his father, otherwise their deed of gift would not have been preserved among the family papers. Dirk II. was the founder of the abbey of Egmont. His younger son Egbert became archbishop of Treves. His elder son Arnulf married Liutgardis, daughter of Siegfried of Luxemburg and sister-in-law of the emperor Henry II. He obtained from the E tent emperor Otto III., with whom he was in great favour of his in 9S3, a considerable extension of territory, that now domin- covered by the Zuider Zee and southward down to ions. Nijmwegen. In the deed of gift he is spoken of as

holding the three countships of Maasland, Kinhem or Kennemer- land and Texla or Texel; in other words his rule extended over the whole country from the right bank of the Maas or Meuse to the Vlie. He appears also to have exercised authority at Ghent. He died in 988. Arnulf was count till 993, when he was slain in battle against the west Frisians, and was succeeded by his twelve-year-old son Dirk III. During the guardianship of his mother, Liutgardis, the boy was despoiled of almost all his possessions, except Kennemerland and Maasland. But no sooner was he arrived at man's estate than Dirk turned upon his enemies with, courage and vigour. He waged war, successfully with Adelbold, the powerful bishop of Utrecht, and made himself master not only of his ancestral possessions, but of the district on the Meuse known as the Bushland of Merweda (Jorcsium Merweda), hitherto subject to

Dirk I.

Dirk II.

Araulf.

Dirk III.

the see of Utrecht. In the midst of this marshy tract, at a point commanding the courses of the Meuse arid the Waal, he built a castle (about 1015) and began to levy tolls. Around this castle sprang up the town of Thure- P° uad °- drecht or Dordrecht. The possession of this stronghold Dordrecht. was so injurious to the commerce of Tiel, Cologne and the Rhenish towns with England that complaints were made by the bishop of Utrecht and the archbishop of Cologne to the emperor. Henry II. took the part of the complainants and commissioned Duke Godfrey of Lorraine to chastise the young Frisian count. Duke Godfrey Q ef !j? tof t invaded Dirk's lands with a large army, but they were Lorraine. impeded by the swampy nature of the country and totally defeated with heavy loss (July 29, 1018). The duke

was himself taken prisoner. The result was that Dirk was not merely confirmed in his possession of Dordrecht and the Merweda Bushland (the later Holland) but also of the territory of a vassal of the Utrecht see, Dirk Bavo by name, which he g exlan j nx conquered. This victory of 1018 is often regarded as of the the true starting-point of the history of the county of County of Holland. Having thus established his rule in the HoUa ” a – south, Dirk next proceeded to bring into subjection the Frisians in the north. He appointed his brother Siegfrid or Sikka as governor over them. In his later years Dirk went upon a pilgrimage to the Holy Land from which he returned in 1034; and ruled in peace until his death in 1039.

His son, Dirk IV., was one of the most enterprising of his warlike and strenuous race. He began the long strife with the counts of Flanders, as to the lordship over Walcheren and other islands of Zeeland; the quarrel was im- portant, as dealing with the borderland between French and German overlordship. This strife, which lasted 400 years, did not at first break out into actual warfare, because both Dirk and Baldwin V. of Flanders had a common danger in Quarrel the emperor Henry III., who in 1046 occupied the w m, lands in dispute. Dirk allied himself with Godfrey Flanders the Bearded of Lorraine, who was at war with the “”” . emperor, and his territory was invaded by a powerful imperial fleet and army (1047). But Dirk entrenched himself in his stronghold at Vlaardingen, and when winter came on he surrounded and cut off with his light boats a number of the enemy’s ships, and destroyed a large part of their army as they made their way amidst the marches, which impeded their retreat. He was able to recover what he had lost and to make peace on his own terms. Two years later he was again assailed by a coalition headed by the archbishop of Cologne and the bishop of Utrecht. They availed themselves of a very hard winter to penetrate into the land over the frozen water. Dirk offered a stout resistance, but, according to the most trustworthy account, was enticed into an ambuscade and was killed in the fight (1049). He died unmarried and was succeeded by his brother Floris I.*

Floris, like his predecessors, was hard-fighting and tenacious He gradually recovered possession of his ancestral lands. He found a formidable adversary in the able and warlike William, who, becoming bishop of Utrecht in 1054, was determined to recover the lost possessions of his see; and in 1058, in alliance with Hanno, archbishop of Cologne, Egbert, margrave of Brandenburg, the bishop of Liege and others, invaded the Frisian territory. At first success attended the invaders and many places fell into their hands, but finally they were surprised and defeated near Dordrecht. The counts of Guelders and Louvain were among the prisoners that fell into the hands of Floris. The attack was renewed in 1061. In a battle at Nederhemert Floris met with his death in the hour of victory. He is said to have been killed as, wearied with pursuing, he lay asleep under a

tree. He was succeeded by his son, Dirk V., a child, under the guardianship of his mother, Gertrude of Saxony. Bishop William seems now to have seized his opportunity and occupied all the territory that he claimed. In this he was confirmed by two charters of the emperor Henry IV. (April 30 and May 2, 1064). Among the possessions thus assigned to him is found comitatus omnis

Floris I.

DlrkV.

to his stepson,

in Hollandt cum omnibus ad bannum regalem pertinentibus. An examination of these documents shows the possessions of Dirk as in Westflinge et circa oras Rheni, i.e. west of the Vlie and around the mouths of the Rhine. Gertrude and her son appear to have withdrawn to the islands of Frisia (Zeeland), leaving William in undisturbed occupation of the disputed lands. In 1063 Gertrude contracted a marriage with Robert, the second son of Baldwin V. of Flanders, a man famous for his adventurous career (see Flanders). On his marriage his father

invested him with Imperial Flanders, as an apanage t h ° e e including the islands of Frisia (Zeeland) west of the

Frisian Scheldt. He now became guardian to his stepson, guardian i n whose inheritance lay the islands east of the Scheldt.

Robert thus, in his own right and that of Dirk, was

ruler of all Frisia (Zeeland), and thus became known among his Flemish countrymen as Robert the Frisian. The death of his brother Baldwin VI. in 1070 led to civil war in Flanders, the claim of Robert to the guardianship of his nephew Arnulf being disputed by Richilde, the widow of Baldwin. The issue was decided by the decisive victory of Robert at Cassel (February 1071) when Arnulf was killed and Richilde taken prisoner (see Flanders). While Robert was thus engaged in Flanders, an effort was made to recover ” the County of Holland ” and other lands now held by William of Utrecht. The people rose in revolt, but by command of the emperor Henry IV. were speedily brought back under episcopal rule by

an army under the command of Godfrey the Hunchback, Godfrey ,j u k e

of Lower Lorraine. Again in 1076, at the request Hunch- of the bishop, Duke Godfrey visited his domains in back of the Frisian borderland. At Delft, of which town Lorraine tradition makes Godfrey the founder, the duke was C fioUand. treacherously murdered (February 26, 1076). William

of Utrecht died on the 17th of the following April. Dirk V., now grown to man's estate, was not slow to take advantage of the favourable juncture. With the help of Robert

(his stepfather) he raised an army, besieged Conrad, Bishop of tne successor of William, in the castle of Ysselmonde Utrecht and took him prisoner. The bishop purchased his surrenders liberty by surrendering all claim to the disputed lands.

Henceforth the Frisian counts became definitively

known as counts of Holland. Dirk V. died in 1091 and was succeeded by his son Floris II. the Fat. This count had a peaceful and prosperous reign of thirty-one years.

After his death (n 2 2) his widow, Petronilla of Saxony,

governed in the name of Dirk VI., who was a minor. The accession of her half-brother, Lothaire of Saxony, to the imperial throne on the death of Henry V. greatly strengthened

her position. The East Frisian districts, Oostergoo

and Westergoo, were by Lothaire transferred from the rule of the bishops of Utrecht to that of the counts of Holland (n 25). These Frisians proved very troublesome subjects to Dirk VI. In 1132 they rose in insurrection under the leader- ship of Dirk's own brother, Floris the Black. The emperor Conrad III. (1138), who was of the rival house of Hohen- staufen, gave back these Frisian districts to the bishop; it was in truth somewhat of an empty gift. The Frisian peasants and fisher folk loved their independence, and were equally refractory to the rule of any distant overlord, whether count or bishop. Dirk VI. was succeeded in 1157 by Floris III.

Floris III. reversed the traditional policy of his house by allying himself with the Hohenstaufens. He became a devoted

adherent and friend of Frederick Barbarossa. He had in troubles with West Friesland and Groningen, and a

war with the count of Flanders concerning their respective rights in West

Zeeland, in which he was beaten. In 1 170 a great flood caused immense devastation in the north and helped to form the Zuider Zee. In 1189 Floris accompanied Frederick Barbarossa upon the third Crusade, of which he was a Dirk vn distinguished leader. He died in 11 90 at Antioch of

pestilence. His son, Dirk VII., had a stormy, but on the whole successful reign. Contests with the Flemings in West

it to Dirk V.

Floris II.

Dirk VI.

Zeeland and with the West Frisians, stirred up to revolt by his brother William, ended in his favour. The brothers were reconciled and William was made count of East Friesland. In 1202, however, Dirk was defeated and taken prisoner by the duke of Brabant, and had to purchase peace on humiliating terms. He only survived his defeat a short time and died early in 1204, leaving as his only issue a daughter, Ada, 17 years of age. The question of female succession thus raised was not likely to be accepted without a challenge by William. It had been the intention of Dirk VII. to secure the recognition of his daughter's rights by appointing his brother her guardian. His widow Alida, however, an ambitious woman of strong character, as soon as her husband was dead, hurried on a marriage between Ada and Count Louis of Loon; and attempted with the nobles of Holland, who now for the first time make their appearance as a power in the country, to oppose the claim which William had made to the countship as heir in the male line. A struggle ensued. William was supported by the Zeelanders „,.... . and Ada was forced to fly to England. William, by a treaty concluded with Louis of Loon in 1206, became undisputed count. He took an active part in the events of his time. He fought by the side of the emperor Otto IV. in the great battle of Bouvines in 12 14 (see Philip Augustus), and was taken prisoner. Two years later he accompanied Louis, the eldest son of Philip Augustus, in his expedition against King John of England. William is perhaps best known in history by his taking part in the fourth Crusade. He distinguished himself greatly at the capture of Damietta (12 19). He did not long survive his return home, dying in 1222. The earliest charters conveying civic privileges in the county of Holland date from his reign — those of Geertruidenberg (1213) and of Dordrecht (1220). His son Floris IV., being a minor, succeeded p . . /v him under the guardianship of his maternal uncle, Gerard III. of Gelderland. He maintained in later life close relations of friendship with Gerard, and supported him in his quarrel with the bishop of Utrecht (1224-1226). Floris was murdered in 1235 at a tournament at Corbie in Picardy by the

count of Clermont. Another long minority followed his death,' during which his brother Otto, bishop of Utrecht, acted as guardian to his nephew William II.

*William II. became a man of mark. Pope Innocent IV., having deposed the emperor Frederick II., after several princes had refused to allow themselves to be nominated in the place of the Hohenstaufen, caused the young tI am count of Holland to be elected king of the Romans (1247) by an assembly composed chiefly of German ecclesiastics. William took Aachen in 1248 and was there crowned Elected king; and after Frederick's death in 1250, he had a King of considerable party in Germany. He brought a war the with Margaret of Flanders (Black Margaret) to a R° maas – successful conclusion (1 253). He was on the point of proceeding to Rome to be crowned emperor, when in an expedition against the West Frisians he perished, going down, horse and armour, through the ice (1256). Like so many of his predecessors he left his inheritance to a child. Floris V. was but two years old on his father's death; and he was destined during a reign of forty years to leave a deeper impress upon the history of Holland than any other of its counts. Floris was a man of chivalrous character and high capacity, and throughout his reign he proved himself an able and beneficent ruler. Alike in his troubles with his turbulent subjects and in the perennial disputes with his neighboars he pursued a strong, far-sighted and successful policy. But his active interest in affairs was not limited to the Netherlands. He allied himself closely with Edward I. of England ˆm aBce in his strife with France, and secured from the English W nh king great trading advantages for his people; the Edward 1. staple of wool was placed at Dort (Dordrecht) and °' the Hollanders and Zeelanders got fishing rights on * the English coast. So intimate did their relations become that Floris sent his son John to be educated at the court of Edward with a view to his marriage with an English princess. To*

Floris V.

6o8

HOLLAND, COUNTY OF

Murder of Floris V.

John I.

balance the power of the nobles he granted charters to many of the towns. Floris made himself master of Amstelland and First Gooiland; and Amsterdam, destined to become the

Charter to chief commercial town of Holland, counts him the Amster-

founder of its greatness. Its earliest extant charter am ‘ dates from 1275. In 1296 Floris forsook the alliance

of Edward I. for that of Philip IV. of France, probably because Edward had give! support to Guy, count of Flanders, in his dynastic dispute 'with John of Avesnes, count of Hainaut, Floris's nephew (see Flanders). The real motives of his policy will, however, never be known, for shortly afterwards a con- spiracy of disaffected nobles, headed by Gijsbrecht van Amstel, Gerard van Velzen and Wolfert van Borselen, was formed against him. He was by them basely murdered in the castle of Muiden (June 27, 1296). The tragic event has been immortalized in dramas from the pens of Holland's most famous writers (see Vondel, Hooft). The burghers and people, who knew him to be their best friend, took such vengeance on his slayers as permanently to reduce the power of the nobles.*

John I., his son, was in England when his father was murdered; he was but 15 years of age, feeble in body and mind. He was married to Eleanor, daughter of Edward I. His reign was a struggle between John of Avesnes, the young count's guardian and next heir, and Wolfert van Borselen, who had a strong following in Zeeland. In 1299 van Borselen was killed, and a few months later John I. died. John of Avesnes was at once recognized as his successor by the Hollanders. Thus with John I. ended the first line of counts, after a rule of nearly 400 years. Europe has perhaps never seen ti ""I an abler series of princes than these fourteen lineal the first descendants of Dirk I. Excepting the last there tine of is not a weak man among them. Physically handsome Th"f t hi h anc ˆ stron S, model knights of the days of chivalry, character. nar(l fighters, wise statesmen, they were born leaders of men; always ready to advance the commerce of the country, they were the supporters of the growing towns, "and likewise the pioneers in the task of converting a land of marshes and swamps into a fertile agricultural territory rich in flocks and herds. As individuals they had their failings, but one and all were worthy members of a high-souled race.

John of Avesnes, who took the title of John II., was the son

of John of Avesnes, count of Hainaut, and Alida, sister of

John If. William II. of Holland. On his succession to the

of the countship the Hollanders were willing to receive him,

House of but the Zeelanders were hostile; and a long struggle

vesnes. ensuec j before his authority was generally recognized.

In 1301 Bishop William of Utrecht invaded Amstelland, but

was killed in battle. John made use of his victory to secure the

election of his brother Guy as bishop in his place. A war with the Flemings followed, in which the Flemings were at first victorious, but after a struggle of many vicissitudes they were at length driven out of Holland and Zeeland in 1304. John II. died in that year and was succeeded by his son William III., surnamed the Good (1304-1337). In his reign the long-standing quarrel with Flanders, which had during a century and a half w/ _ caused so many wars, was finally settled by the treaty of 1323, by which the full possession of West Zeeland was granted to William, who on his part renounced all claim in Imperial Flanders. The Amstelland with its capital, Amsterdam, which had hitherto been held as a fief of Utrecht, was by William, on the death of his uncle Bishop Guy, finally annexed to Holland. This count did much to encourage civic life and to develop the resources of the country. He had close relations through marriage with the three principal European dynasties of his time. His wife was Jeanne of Valois, niece of the French king; in 1323 the emperor Louis the Bavarian wedded his daughter Margaret; and in 1328 his third daughter, Thilippa of Hainaut, was married to Edward III. of England. By their alliance William III. occupied a position of much dignity and influence, which he used to further the interests and increase the welfare of his hereditary lands. He was in all respects a great prince and a wise and prudent statesman. He was succeeded by his son, William IV., who was the ally of his brother-in-law, Edward III ., in his French wars. He was fond of adven- IV am lure, and in 1343 made a journey to the Holy Land

in disguise, and on his way took part in an expedition of the knights of the Teutonic Order against the infidel Wends and Lithuanians. He was killed in battle against the Frisians in 1345. He left no children, and the question as to the succession now brought on Holland a period of violent civil commotions. His inheritance was claimed by his eldest sister, the empress Margaret, as well as by Philippa of T. he Hainaut, or in other words, by Edward III. of England. Margaret. Margaret came in person and was duly recognized as countess in Holland, Zeeland and Hainaut; but returned to her husband after appointing her second son (the eldest, Louis, renounced his rights) Duke William of Bavaria, as stadholder in her place. William was but sixteen, and disorder and confusion soon reigned in the land. The sudden death of the emperor in r347 added to the difficulties of his position. In 1349 Margaret was induced to resign her sovereignty, and the stadholder became count under the title of William wutlam V. V. This was the time of the formation of the famous of the parties in Holland, known as Kabbeljauws (Cods) House of and Hoeks (Hooks); the former, the burgher party, avara • were the supporters of William (possibly the name was derived from the light blue, scaly looking Bavarian coat of arms), the latter the party of the disaffected nobles, who wanted to catch and devour the fat burgher fish. In 1350 such was the disorder in the land that Margaret, at the request of the nobles, came to Holland to take into her own hands the reins of govern- ment. The struggle between the nobles and the cities broke out into civil war. Edward III. came to Margaret's aid, winning a sea-fight off Veere in 1351; a few weeks later the Hooks and their English allies were defeated by William and the Cods at Vlaardingen — an overthrow which ruined Margaret's cause. Edward III. shortly afterwards changed sides, and the empress saw herself compelled (1354) to come to an understanding with her son, he being recognized as count of Holland and Zeeland, she of Hainaut. Margaret died two years later, leaving William, who had married Matilda of Lancaster, in possession of the entire Holland-Hainaut inheritance (July 1356). His tenure of power was, however, very brief. Before the close of 1357 he showed such marked signs of insanity that his wife, with his own consent and the support of both parties, invited Duke Albert of Bavaria, younger brother of William Bavaria V., to be regent, with the title of Ruward (1358). William lived in confinement for 31 years. Albert died in 1404, having ruled the land well and wisely for 46 years, first as Ruward, then as count. Despite outbreaks from time to time of the Hook and Cod troubles, he was able to make his authority respected, and to help forward in many ways the social progress of the country. The influence of the towns was steadily on the increase, and their government began to fall into the hands of the burgher patrician class, who formed the Cod party. Opposed to them were the nobility and the lower classes, forming the Hook party. In Albert's latter years a fresh outbreak of civil war (1392-1395) was caused by the count's espousing the side of the

Cods, while the Hooks had the support of his eldest son, William. Albert was afterwards reconciled to his son, who succeeded him as William VI. in 1404. On his accession to power William upheld the Hooks, vl a – m and secured their ascendancy. His reign was much troubled with civil discords, but he was a brave soldier, and was generally successful in his enterprises. He died in 141 7, leaving an only child, a daughter, Jacqueline (or Jacoba), who had in her early youth been married to John, Jacque- heir to the throne of France. At a gathering held at Bavaria. the Hague (August 15, 1416) the nobles and repre- sentatives of the cities of Holland and Zeeland had promised at William's request to support his daughter's claims to the suc- cession. But John of France died (April 1417), and William VI.

about a month later, leaving the widowed Jacqueline at 17 years of age face to face with a difficult situation. She was at first welcomed in Holland and Zeeland, but found her claims opposed by her uncle, John of Bavaria, supported by the Cod party. Every one from whom she might have expected help betrayed her in turn, her second husband John IV. of Brabant, her third husband Humphrey of Gloucester, her cousin Philip the Good of Burgundy, all behaved shamefully to her. Her romantic and sad life has rendered the courageous and accomplished Jacqueline the most picturesque figure in the whole history of Holland. She struggled long against her powerful kinsfolk, nor did she know happiness till near the end of her life, when she abandoned the unequal strife, and found repose with Francis of Borselen, Ruward of Holland, her fourth husband. Him Philip the Good, duke of Burgundy, craftily seized; and thereby in 1433 the Duchess Jacqueline was com- pelled to cede her rights over the counties of Holland and Hainaut. Consequently at her death in 1436, as she left no Accession children, Philip succeeded to the full and undisputed of the possession of her lands. He had already acquired by Burgua- inheritance, purchase or force almost all the other

Netherland states; and now, with the extinction of

the Bavarian line of counts, Holland ceased to have an independent existence and became an outlying province of the growing Burgundian power (see Burgundy). During

the years that followed the accession to the sovereignty Qood. S °^ Duke Philip, Holland plays but an insignificant

part. It was governed by a stadholder, and but small respect was shown for its chartered rights and privileges. The quarrels between the Hook and Cod factions still continued, but the outbreaks of civil strife were quickly repressed by the strong hand of Philip. Holland during this time contented Flourish- herself with growing material prosperity. Her lag state herring fishery, rendered more valuable by the curing of process discovered or introduced by Benkelszoon,

a ” ‘ brought her increasing wealth, and her fishermen were already laying the foundations of her future maritime greatness. It was in the days of Duke Philip that Lorenz Koster of Haarlem contributed his share to the discovery of printing. During the reign of Charles the Bold (1467-1477)

the Hollanders, like the other subjects of that warlike

Charles

*the Bold. P rince – suffered much from the burden of taxation. An outbreak at Hoorn was by Charles sternly repressed. The Hollanders were much aggrieved by the establishment of a high court of justice for the entire Netherlands at Mechlin. (1474). This was regarded as a serious breach of their privileges. The succession of Mary of Burgundy led to the grant- Burgvody- ‘ n *> t0 Holland as to the other provinces of the Nether- lands, of the Great Privilege of March 1477, which restored the most important of their ancient rights and liberties (see Netherlands). A high court of justice was established for Holland, Zeeland and Friesland, and the use of the native language was made official. The Hook and Cod troubles again disturbed the country. Hook uprisings took place at Leiden and Dordrecht and had to be repressed by armed force.*

By the sudden death of the Duchess Mary in 1482 her posses- sions, including the county of Holland, passed to her infant son, Philip, under the guardianship of his father the Arch- mi/’” of ˆ uke M axim ihan of Austria. Thus the Burgundian Austria. dynasty was succeeded by that of the Habsburgs. During the regency of Maximilian the turbulence of .he Hooks caused much strife and unrest in Holland. Their leaders. Francis of Brederode and John of Naaldwijk, seized Rotterdam and other places. Their overthrow finally ended the strife between Hooks and Cods. The ” Bread the Fair. an d Cheese War,” an uprising of the peasants in North Holland caused by famine, is a proof of the misery caused by civil discords and oppressive taxation. In 1494, Maximilian having been elected emperor, Philip was declared of age. His assumption of the government was greeted with joy in Holland, and in his reign the province enjoyed rest*

and its fisheries benefited from the commercial treaty con- cluded with

England. The story of Holland during Tfle the long reign of his son and successor Charles III. Emperor (f5o6-i555), better known as the emperor Charles V., Charles V. belongs to the general history of the Netherlands ˆf r,es (see Netherlands) . On the abdication of Charles, his son Philip II. of Spain became Philip III., count of Holland, the ruler whose arbitrary rule in church and state brought about the revolt of the Netherlands. His appointment of William, prince of Orange, as stadholder of Holland p

and Zeeland was destined to have momentous results to the future of those provinces (see William the Silent). The capture of Brill and of Flushing in 1572 by the Sea- William Beggars led to the submission of the greater part of of Orange Holland and Zeeland to the authority of the prince stad- of Orange, who, as stadholder, summoned the states bolier – of Holland to meet at Dordrecht. This act was the beginning of Dutch independence. From this time forward William made Holland his home. It became the bulwark of the y ne nvon \ Protestant faith in the Netherlands, the focus of the of the resistance to Spanish tyranny. The sieges of Haarlem, Nether- A! kmaar and Leiden saved Holland from being lanis – overwhelmed by the armies of Alva and Requesens and stemmed the tide of Spanish victory. The act of federation between Holland and Zeeland brought about by the influence of William was the germ of the larger union of Utrecht utncht° between the seven northern provinces in 1570. But within the larger union the inner and closer union between Holland and Zeeland continued to subsist. In 1580, when the sovereignty of the Netherlands was offered to the … duke of Anjou, the two maritime provinces refused tlon of to acquiesce, and forced William to accept the title Philip's of count of Holland and Zeeland. In the following Save- year William in the name of the two provinces n vy' solemnly abjured the sovereignty of the Spanish king (July 24). After the assassination of William (1584) the title of count of Holland was never revived.

In the long struggle of the united provinces with Spain, which followed the death of Orange, the brunt of the conflict fell upon Holland. More than half the burden of the charges of the war fell upon this one province; and with Zeeland it furnished the fleets which formed the chief defence of the country. Hence the importance attached to the vote of Holland in the assembly of the States-General. That vote was given by deputies at the head of whom was the advocate (in later times called the grand pensionary) of Holland, and who were responsible to, and the spokesmen of, the provincial states. These states, which met at the Hague in the same building as the States-General, consisted of representatives of the burgher oligarchies (regents) of the principal towns, together with representatives of the nobles, who possessed one vote only. The advocate was the paid minister of the states. He presided over their meetings, kept their minutes and conducted all Oovern- correspondence, and, as stated above, was their Holland.

spokesman in the States-General. The advocate (or grand pensionary) of Holland therefore, if an able man, had opportunities for exercising a very considerable influence, becoming in fact a kind of minister of all affairs. It was this influence as exerted by the successive advocates of Holland, Paul Buys and Johan van Oldenbarneveldt, Jonaa vaa

Oldenbar- neveldt. ”

which rendered abortive the well-meant efforts of the earl of Leicester to centralize the government of the United Provinces. After his departure (1587) the advocate of Holland, Oldenbarneveldt, became the indispensable statesman of the struggling republic. The multiplicity of his functions gave to the advocate an almost unlimited authority in the details of administration, and for thirty years the conduct of affairs remained in his hands (see Oldenbarneveldt). This meant the undisputed hegemony of Holland in the federation, in othei words of the burgher oligarchies who controlled the town cor- porations of the province, and especially of Amsterdam. This authority of Holland was, however, more than counterbalanced

by the extensive powers with which the stadholder princes of Orange were invested; and the chief crises in the internal Contest history of the Dutch republic are to be found in between the struggles for supremacy between two, in reality, the Pria- different principles of government. On the one side cipiesof t jj e p r ; nc ipi c f provincial sovereignty which gave to and Pro- the voice of Holland a preponderating weight that was viaciai decisive; on the other side the principle of national Soye- sovereignty personified in the princes of Orange, to n ‘ g ” y ‘ whom the States-General and the provincial states delegated executive powers that were little less than monarchical. The conclusion of the twelve years’ truce in 1609 was a triumph for Oldenbarneveldt and the province of Holland over the opposition of Maurice, prince of Orange. In 161 7 the Prioceof outbreak °f the religious dispute between the Remon- Oraage strant and Contra-remonstrant parties brought on a and John Hfe and death struggle between the sovereign province birn’t-”’ of Holland and the States-General of the union. The veldt. sword of Maurice decided the issue in favour of the

States-General. The claims of Holland were overthrown and the head of Oldenbarneveldt fell upon the scaffold (1619). The stadholder, Frederick Henry of Orange, ruled with well-nigh Frederick monarchical authority (1625-1647), but even he at the Henry height of his power and popularity

had always to Prince of reckon with the opposition of the states of Holland Orange. a0(j Q £ Amsterdam, and many of his plans of campaign were thwarted by the refusal of the Hollanders to furnish supplies. His son William II. was but 21 years of age on succeeding to the stadholdership, and the states of Holland were // 'prince sumc 'ently powerful to carry through the negotiations of Orange. for the peace of Miinster (1648) in spite of his opposi- tion. A life and death conflict again ensued, and once more in 1650 the prince of Orange by armed force crushed the opposition of the Hollanders. The sudden death of William in the hour of his triumph caused a complete revolution in the government of the republic. He left no heir but a posthumous infant, and the party of the burgher regents of Holland was once more in the ascendant. The office of stadholder was abolished, and John de Witt, the grand pensionary (Raad-Pensionaris) of Holland, for two decades held in his hands all the threads of administration, and occupied the same position of undisputed authority in the councils of the land as Oldenbarneveldt had done at the beginning of the century. Amsterdam during this period was the centre and head of the United Provinces. The principle of provincial sovereignty was carried to its extreme point in the separate treaty concluded with Cromwell in 1654, in which the province of Holland agreed to exclude for ever the prince of Orange from the office of stad- holder of Holland or captain-general of the union. In 1672 another revolution took place. John de Witt was m'"pHnce murd ered, and William III. was called to fill the office of Orange, of dignity and authority which had been held by his ancestors of the house of Orange, and the stadholder- ship was declared to be hereditary in his family. But William died without issue (see William III.) and a stadholderless period, during which the province of Holland was supreme in the union, followed till 1737. This change was effected smoothly, for though William had many differences with Amsterdam, he had in Anthony Heinsius (van der Heim), who was grand pensionary of Holland from 1690 to his death in 1720, a statesman whom he thoroughly trusted, who worked with him in the furtherance of his policy during life and who continued to carry out that policy after his death. In 1737 there was once more a reversion to the stadholdership in the person of William IV., iv Prince wrK) se powers were strengthened and declared heredi- ot Orange, tary both in the male and female line in 1747. But until the final destruction of the federal republic by the French armies, the perennial struggle went on between the Holland or federal party (Staatsgesinden) centred at Amsterdam — out of which grew the patriot party under William V. — and the Orange or unionist party (Oranjcgesinden), which was strong in the smaller provinces and had much popular support among

John de Witt.

Consti- tution of the States of Holland.

the lower classes. The French conquest swept away the old condition of things never to reappear; but allegiance to the Orange dynasty survived, and in 1813 became the rallying point of a united Dutch people. At the same time the leading part played by the province of Holland in the history of the republic has not been unrecognized, for the country ruled over by the sovereigns of the house of Orange is always popularly, and often officially, known as Holland.

The full title of the states of Holland in the 17th and 18th centuries was: de Edele Groot Mogende Heeren Staaten van Holland en Westfricsland. After 1608 this assembly consisted of nineteen members, one representing the nobility {ridderschap) , and eighteen, the towns. The member for the nobles had precedence and voted first. The interests of the country districts {het plalte land) were the peculiar charges of the member for the nobles. The nobles also retained the right of appointing repre- sentatives to sit in the College of Deputed Councillors, in certain colleges of the admiralty, and upon the board of directors of the East India Company, and to various public offices. The following eighteen towns sent representatives: South Quarter — (1) Dordrecht, (2) Haarlem, (3) Delft, (4) Leiden, (5) Amsterdam, (6) Gouda, (7) Rotterdam, (8) Gorinchem, (9) Schiedam, (10) Schoonhoven, (n) Brill; North Quarter: — (12) Alkmaar, (13) Hoorn, (14) Enkhuizen, (15) Edam, (16) Monnikendam, (17) Medemblik, (18) Purmerend. Each town (as did also the nobles) sent as many representatives as they pleased, but the nineteen members had only one vote each. Each town's deputa- tion was headed by its pensionary, who was the spokesman on behalf of the representatives. Certain questions such as peace and war, voting of subsidies, imposition of taxation, changes in the mode of government, &c, required unanimity of votes. The grand pensionary (Raad-Pensionaris) was at once the president and chief administrative „ e ”’”’” officer of the states. He presided over all meetings, ary , conducted the business, kept the minutes, and was charged with the maintenance of the rights of the states, with the execution of their resolutions and with the entire correspondence. Nor were his functions only provincial. He was the head and the spokesman of the deputation of the states to the States- General of the union; and in the stadholderless period the influence of such grand pensionaries of Holland as John de Witt and Anthony Heinsius enabled the complicated and intricate machinery of government in a confederacy of many sovereign and semi-sovereign authorities without any recognized head of the state, to work with comparative smoothness and a remark- able unity of policy. This was secured by the indisputable predominance in the union of the province of Holland. ‘ The policy of the states of Holland swayed the policy of the generality, and historical circumstances decreed that the policy of the states of Holland during long and critical periods should be controlled by a*

succession of remarkable men filling the office of grand pensionary. The states of Holland sat at the Hague in the months of March, July, September and November. During the periods of prorogation the continuous oversight of the business and interests of the province was, however, never neglected. This duty was confided to a body called the College college ot of Deputed Councillors (het Kollegie der Gekommitteerde Roden), which was itself divided into two sections, one for the south quarter, another for the north quarter. The more important — that for the south — consisted of ten members, (1) the senior member of the nobility, who sat for life, (2) representatives (for periods of three years) of the eight towns: Dordrecht, Haarlem, Delft, Leiden, Amsterdam, Gouda, Rotterdam and Gorinchem, with a tenth member (usually elected biennially) for the towns of Schiedam, Schoonhoven and Brill conjointly. The grand pensionary presided over the meetings of the college, which had the general charge of the whole provincial administration, especially of finance, the carrying out of the resolutions of the states, the maintenance of defences, and the upholding of the privileges and liberties of the land. With particular regard to this last-

Deputed Council- lors.

quarter

named duty the college deputed two of its members to attend all meetings of the states-general, to watch the proceedings and report at once any proposals which they held to be contrary to the interests or to infringe upon the rights of the province of Holland. The institution of the College of Deputed Councillors might thus be described as a vigilance committee of the states in perpetual session. The existence of the college, with its many weighty and important functions, must never be lost sight of by students who desire to have a clear understanding of the remarkable part played by the province of Holland in the history of the United Netherlands. (G. E.)

HOLLAND, a city of Ottawa county, Michigan, U.S.A., on Macatawa Bay (formerly called Black Lake), near Lake Michigan, and 25 m. W.S.W. of Grand Rapids. Pop. (1890) 3945; (1900) 7790, of whom a large portion were of Dutch descent; (1904) 8966; (1910) 10,490 It is served by the Pere Marquette Railroad, by steamboat lines to Chicago and other lake ports, and by electric lines connecting with Grand Rapids, Saugatuck, and the neighbouring summer resorts. On Macatawa Bay are Ottawa Beach, Macatawa Park, Jenison Park, Central Park, Castle Park and Waukezoo.

In the city itself are Hope College (co-educational; founded in 1851 and incorporated as a college in 1866), an institution of the (Dutch) Reformed Church in America; and the Western Theological Seminary (1869; suspended 1877-1884) of the same denomination. Holland is a grain and fruit shipping centre, and among its manufactures are furniture, leather, grist mill products, iron, beer, pickles, shoes, beet sugar, gelatine, biscuit (Holland rusk), electric and steam launches, and pianos. In 1908 seven weekly, one daily, and two monthly papers (four denominational) were published at Holland, five of them in Dutch. The municipality owns its water-works and electric-lighting plant. Holland was founded in 1847 by Dutch settlers, under the leadership of the Rev. A. C. Van Raalte, and was chartered as a city in 1867. In 1871 much of it was destroyed by a forest fire.

HOLLAND, a cloth so called from the country where it was first made. It was originally a fine plain linen fabric of a brownish colour — unbleached flax. Several varieties are now made: hollands, pale hollands and fine hollands. They are used for aprons, blinds, shirts, blouses and dresses.

HOLLAR, WENZEL or WENCESLAUS [Vaclaf Holar] (1607- 1677), Bohemian etcher, was born at Prague on the 13th of July 1607, and died in London, being buried at St Margaret's church, Westminster, on the 28th of March 1677. His family was ruined by the capture of Prague in the Thirty Years' War, and young Hollar, who had been destined for the law, determined to become an artist. The earliest of his works that have come down to us are dated 1625 and 1626; they are small plates, and one of them is a copy of a Virgin and Child by Diirer, whose influence upon Hollar's work was always great. In 1627 he was at Frankfort, working under Matthew Merian, an etcher and engraver; thence he passed to Strassburg, and thence, in 1633, to Cologne. It was there that he attracted the notice of the famous amateur Thomas, earl of Arundel, then on an embassy to the imperial court ; and with him Hollar travelled to Vienna and Prague, and finally came in 1637 to England, destined to be his home for many years. Though he lived in the household of Lord Arundel, he seems to have worked not exclusively for him, but to have begun that slavery to the publishers which was afterwards the normal condition of his life. In his first year in England he made for Stent, the printseller, the magnificent View of Greenwich, nearly a yard long, and received thirty shillings for the plate, — perhaps a twentieth part of what would now be paid for a single good impression. Afterwards we hear of his fixing the price of his work at fourpence an hour, and measuring his time by a sandglass. The Civil War had its effect on his fortunes, but none on his industry. Lord Arundel left England in 1642, and Hollar passed into the service of the duke of York, taking with him a wife and two children. With other royalist artists, notably Inigo Jones and Faithorne, he stood the long

and eventful siege of Basing House; and as we have some hundred plates from his hand dated during the years

1643 and 1644 he must have turned his enforced leisure to good purpose. Taken prisoner, he escaped or was released, and joined Lord Arundel at Antwerp, and there he remained eight years, the prime of his working life, when he produced his finest.plates of every kind, his noblest views, his miraculous " muffs " and " shells," and the superb portrait of the duke of York. In 1652 he returned to London, and lived for a time with Faithorne the engraver near Temple Bar. During the following years were published many books which he illustrated: — Ogilby's Virgil and Homer, Stapylton's Juvenal, and Dugdale's Warwickshire, St Paul's and Monasticon (part i.). The booksellers continued to impose on the simple-minded foreigner, pretending to decline his work that he might still further reduce the wretched price he charged them. Nor did the Restoration improve his position. The court did nothing for him, and in the great plague he lost his young son, who, we are told, might have rivalled his father as an artist. After the great fire he produced some of his famous " Views of London "; and it may have been the success of these plates which induced the king to send him, in 1668, to Tangier, to draw the town and forts. During his return to England occurred the desperate and successful engagement fought by his ship the " Mary Rose," under Captain Kempthorne, against seven Algerine men-of-war, — a brilliant affair which Hollar etched for Ogilby's Africa. He lived eight years after his return, still working for the booksellers, and retaining to the end his wonderful powers; witness the large plate of Edinburgh (dated 1 670) , one of the greatest of his works. He died in extreme poverty, his last recorded words being a request to the bailiffs that they would not carry away the bed on which he was dying. Hollar's variety was boundless; his plates number some 2740, and include views, portraits, ships, religious subjects, heraldic subjects, landscapes, and still life in a hundred different forms. No one that ever lived has been able to represent fur, or shells, or a butterfly's wing as he has done. His architectural drawings, such as those of Antwerp and Strassburg cathedrals, and his views of towns, are mathematically exact, but they are pictures as well. He could reproduce the decorative works of other artists quite faultlessly, as in the famous chalice after Mantegna's drawing. His Theatrum mulierum and similar collections reproduce for us with literal truth the outward aspects of the people of his day; and his portraits, a branch of art in which he has been unfairly disparaged, are of extraordinary refinement and power.

Almost complete collections of Hollar's works exist in the British Museum and in the library at Windsor Castle. Two admirable catalogues of his plates have been made, one in 1745 (2nd ed. 1759) by George Vertue, and one in 1853 by Parthey. The latter, pub- lished at Berlin, is a model of

German thoroughness and accuracy. HOLLES, DENZIL HOLLES, Baron (1599-1680), English statesman and writer, second son of John Holies, 1st earl of Clare {c. 1564-1637), by Anne, daughter of Sir Thomas Stanhope, was born on the 31st of October 1599. The favourite son of his father and endowed with great natural abilities, Denzil Holies grew up under advantageous circumstances. Destined to become later one of the most formidable antagonists of King Charles's arbitrary government, he was in early youth that prince's playmate and intimate companion. The earl of Clare was, however, no friend to the Stuart administration, being especially hostile to the duke of Buckingham; and on the accession of Charles to the throne the king's offers of favour were rejected. In 1624 Holies was returned to parliament for Mitchell in Cornwall, and in 1628 for Dorchester. He had from the first a keen sense of the humiliations which attended the foreign policy of the Stuart kings. Writing to Strafford, his brother-in-law, on the 29th of November 1627, he severely censures Buckingham's conduct of the expedition to the Isle of Rhe; " since England was England," he declared, " it received not so dishonourable a blow "; and he joined in the demand for Buckingham's impeachment in 1628. To these discontents were now added the abuses arising from the king's arbitrary administration. On the 2nd of March 1629, when Sir John Finch, the speaker, refused to put Sir John Eliot's Protestations and was about to adjourn the House by the king's

command, Holies with another member thrust him back into the chair and swore " he should sit still till it pleased them to rise." Meanwhile Eliot, on the refusal of the speaker to read the Protestations, had himself thrown them into the fire; the usher of the black rod was knocking at the door for admittance, and the king had sent for the guard. But Holies, declaring that he could not render the king or his country better service, put the Protestations to the House from memory, all the members rising to their feet and applauding. In consequence a warrant was issued for his arrest with others on the following day. They were prosecuted first in the Star Chamber and subsequently in the King's Bench. When brought upon his habeas corpus before the latter court Holies offered with the rest to give bail, but refused sureties for good behaviour, and argued that the court had no jurisdiction over offences supposed to have been committed in parliament. On his refusal to plead he was sentenced to a fine of iooo marks and to imprisonment during the king's pleasure. Holies had at first been committed and remained for some time a close prisoner in the Tower of London. The " close " confinement, however, was soon changed to a " safe " one, the prisoner then having leave to take the air and exercise, but

being obliged to maintain himself at his own expense. On the 29th of October Holies, with Eliot and Valentine, was transferred to the Marshalsea. His resistance to the king's tyranny did not prove so stout as that of some of his comrades in misfortune. Among the papers of the secretary Sir John Coke is a petition of Holies, couched in humble and submissive terms, to be restored to the king's favour; 1 having given the security demanded for his good behaviour, he was liberated early in 1630, and on the 30th of October was allowed bail. Being still banished from London he retired to the country, paying his fine in 1637 or 1638. The fine was repaid by the parliament in July 1644, and the judgment was revised on a writ of error in 1668. In 1638 we find him, notwithstanding his recent experiences, one of the chief leaders in his county of the resistance to ship money, though it would appear that he subsequently made submission.

Holies was a member of the Short and Long Parliaments assembled in 1640. According to La id he was now " one of the great leading men in the House of Commons," and in Clarendon's opinion he was " a man of more accomplished parts than any of his party " and of most authority. He was not, however, in the confidence of the republican party. Though he was at first named one of the managers for the impeachment of Strafford, Holies had little share in his prosecution. According to Laud he held out to Strafford hopes of saving his life if he would use his influence with the king to abolish episcopacy, but the earl refused, and Holies advised Charles that Strafford should demand a short respite, of which he would take advantage to procure a commutation of the death sentence. In the debate on the attainder he spoke on behalf of Strafford's family, and later obtained some favours from the parliament for his eldest son. In all other matters in parliament Holies took a principal part. He was one of the chief movers of the Protestation of the 3rd of May 1641, which he carried up to the Lords, urging them to give it their approval. Although, according to Clarendon, he did not wish to change the government of the church, he showed himself at this time decidedly hostile to the bishops. He took up the impeachment of Laud to the House of Peers, supported the Londoners' petition for the abolition of episcopacy and the Root and Branch Bill, and afterwards urged that the bishops impeached for their conduct in the affair of the late canons should be accused of treason. He showed equal energy in the affairs of Ireland at the outbreak of the rebellion, supported strongly the independence and purity of the judicial bench, and opposed toleration of the Roman Catholics. On the 9th of July 1641 he addressed the Lords on behalf of the queen of Bohemia, expressing great loyalty to the king and royal family and urging the necessity of supporting the Protestant religion everywhere. Together with Pym, Holies drew up the Grand Remonstrance, and made a vigorous speech in its support on 1 Hist. MSS. Comm., MSS. of

Earl Cowper, i. 422.

the 22nd of November 1641, in which he argued for the right of one House to make a declaration, and asserted: " If kings are misled by their counsellors we may, we must tell them of it." On the 15th of December he was a teller in the division in favour of printing it. On the great subject of the militia he also showed activity. He supported Hesilriges' Militia Bill of the 7th of December 1641, and on the 31st of December he took up to the king the Commons' demand for a guard under the command of Essex. " Holles's force and reputation," said Sir Ralph Verney, " are the two things that give the success to all actions." After the failure of the attempt by the court, to gain over Holies and others by offering them posts in the administration, he was one of the " five members " impeached by the king. 2 Holies at once grasped the full significance of the king's action, and after the triumphant return to the House of the five members, on the nth of January, threw himself into still more pronounced opposition to the arbitrary policy of the crown. He demanded that before anything further was done the members should be cleared of their impeachment; was himself leader in the impeachment of the duke of Richmond; and on the 31st of January, when taking up the militia petition to the House of Lords, he adopted a very menacing tone, at the same time presenting a petition of some thousands of supposed starving artificers of London, congregated round the House. On the 15th of June he carried up the impeachment of the nine Lords who had deserted the parliament; and he was one of the committee of safety appointed on the 4th of July.

On the outbreak of the Civil War (see Great Rebellion) Holies, who had been made lieutenant of Bristol, was sent with Bedford to the west against the marquess of Hertford, and took part in the unsuccessful siege of the latter at Sherborne Castle. He was present at Edgehill, where his regiment of Puritans recruited in London was one of the few which stood firm and saved the day for the parliament. On the 13th of November his men were surprised at Brentford during his absence, and routed after a stout resistance. In December he was proposed for the command of the forces in the west, an appointment which he appears to have refused. Notwithstanding his activity in the field for the cause of the parliament, the appeal to arms had been distasteful to Holies from the first. As early as September he surprised the House by the marked abatement of his formsr " violent and fiery spirit," and his changed attitude did not escape the taunts of his enemies, who attributed it scornfully to his disaster at Brentford or to his new wife. He probably foresaw that, to whichever side victory fell, the struggle could only terminate in the suppression of the constitution and of the moderate party on which all his hopes were based. His feelings and political opinions, too, were essentially aristocratic, and he regarded with horror the transference of the government of the state from the king and

the ruling families to the parliamentary leaders. He now advocated peace and a settlement of the disputes by concessions on both sides; a proposal full of danger because impracticable, and one therefore which could only weaken the parliamentary resistance and prolong the struggle. He warmly supported the peace negotiations on the 21st of November and the 22nd of December, and his attitude led to a breach with Pym and the more determined party. In June 1643 he was accused of complicity in Waller's plot, but swore to his innocency; and his arrest with others of the peace party was even proposed in August, when Holies applied for a pass to leave the country. The king's successes, however, for the moment put a stop to all hopes of peace; and in April 1644 Holies addressed the citizens of London at the Guildhall, calling upon them " to join with their purses, their persons, and their prayers together " to support the army of Essex. In November Holies and White locke headed the commission appointed to treat with the king at Oxford. He endeavoured to convince the royalists of the necessity of yielding in time, before the " new party of hot men " should gain the upper hand. Holies and Whitelocke had a

2 The speech of January 5 attributed to him and printed in

Thomason Tracts, E 199 (55), is a forgery.

private meeting with the king, when at Charles's request they drew up the answer which they advised him to return to the parliament. This interview was not communicated to the other commissioners or to parliament, and though doubtless their motives were thoroughly patriotic, their action was scarcely compatible with their position as trustees of the parliamentary cause. Holies was also appointed a commissioner at Uxbridge in January 1645 and endeavoured to overcome the crucial difficulty of the militia by postponing its discussion altogether. As leader of the moderate (or Presbyterian) party Holies now came into violent antagonism with Cromwell and the army faction. " They hated one another equally "; and Holies would not allow any merit in Cromwell, accusing him of cowardice and attributing his successes to chance and good fortune. With the support of Essex and the Scottish commissioners Holies endeavoured in December 1644 to procure Cromwell's impeachment as an incendiary between the two nations, and " passionately " opposed the self-denying ordinance. In return Holies was charged with having held secret communications with the king at Oxford and with a correspondence with Lord Digby; but after a long examination by the House he was pronounced innocent on the 19th of July 1645. Determined on Cromwell's destruction, he refused to listen to

the prudent counsels of Sir Anthony Ashley Cooper, who urged that Cromwell was too strong to be resisted or provoked, and on the 29th of March 1647 drew up in parliament a hasty proclamation declaring the promoters of the army petition enemies to the state; in April challenging Ireton to a duel.

The army party was now thoroughly exasperated against Holies. " The}' were resolved one way or other to be rid of him," says Clarendon. On the i6thof June 1647 eleven members including Holies were charged by the army with various offences against the state, followed on the 23rd by fresh demands for their impeachment and for their suspension, which was refused. On the 26th, however, the eleven members, to avoid violence, asked leave to withdraw. Their reply to the charges against them was handed into the House on the 19th of July, and on the 20th Holies took leave of the House in A grave and learned speech . . . After the riot of the apprentices on the 26th, for which Holies disclaimed any responsibility, the eleven members were again (30th of July) recalled to their seats, and Holies was one of the committee of safety appointed. On the flight of the speaker, however, and part of the parliament to the army, and the advance of the latter to London, Holies, whose party and policy were now entirely defeated, left England on the 22nd of August for Sainte-Mere Eglide in Normandy. On the 26th of January 1648 the eleven members, who had not appeared when summoned to answer the charges against them, were expelled. Not long afterwards, however, on the 3rd of June, these proceedings were annulled; and Holies, who had then returned and was a prisoner in the Tower with the rest of the eleven members, was discharged. He returned to his seat on the 14th of August.

Holies was one of the commissioners appointed to treat with the king at Newport on the 18th of September 1648. Aware of the plans of the extreme party, Holies threw himself at the king's feet and implored him not to waste time in useless negotia- tions, and he was one of those who stayed behind the rest in order to urge Charles to compliance. On the 1st of December he received the thanks of the House. On the occasion of Pride's Purge on the 6th of December Holies absented himself and escaped again to France. From his retirement there he wrote to Charles II. in 1651, advising him to come to terms with the Scots as the only means of effecting a restoration; but after the alliance he refused Charles's offer of the secretaryship of state. In March 1654 Cromwell, who in alarm at the plots being formed against him was attempting to reconcile some of his opponents to his government, sent Holies a pass " with notable circumstances of kindness and esteem." His subsequent move- ments and the date of his return to England are uncertain, but in 1656 Cromwell's resentment was again excited against him as the supposed author of a tract, really written by Clarendon.

He appears to have been imprisoned, for his release was ordered by the council on the 2nd of September 1659.

Holies took part in the conference with Monk at Northumber- land House, when the Restoration was directly proposed, and with the secluded members took his seat again in parliament on the 21st of February 1660. On the 23rd of February he was chosen one of the council to carry on the government during the interregnum; on the 2nd of March the votes passed against him and the sequestration of his estates were repealed, and on the 7th he was made custos rotulorum for Dorsetshire. He took a leading part in bringing about the Restoration, was chairman of the committee of seven appointed to prepare an answer to the king's letter, and as one of the deputed Lords and Commons he delivered at the Hague the invitation to Charles to return. He preceded Charles to England to prepare for his reception, and was sworn of the privy council on the 5th of June. He was one of the thirty-four commissioners appointed to try the regicides in September and October. On the 20th of April 1 66 1 he was created Baron Holies of Ifield in Sussex, and became henceforth one of the leading members of the Upper House.

Holies, who was a good French scholar, was sent as ambassador to France on the 7th of July 1663. He was ostentatiously English, and a zealous upholder of the national honour and interests; but his position was rendered difficult by the absence of home support. On the 27th of January 1666 war was declared, but Holies was not recalled till May. Pepys remarks on the 14th of November: " Sir G. Cartaret tells me that just now my Lord Holies had been with him and wept to think in what a condition we are fallen." Soon afterwards he was employed on another disagreeable mission in which the national honour was again at stake, being sent to Breda to make a peace with Holland in May 1667. He accomplished his task successfully, the articles being signed on the 21st of June.

On the 1 2th of December he protested against Lord Clarendon's banishment and was nearly put out of the council in consequence. In 1668 he was manager for the Lords in the celebrated Skinner's case, in which his knowledge of precedents was of great service, and on which occasion he published the tract The Grand Question concerning the Judicature of the House of Peeres (1669). Holies, who was honourably distinguished by Charles as a " stiff and sullen man," and as one who would not yield to solicitation, now became with Halifax and Shaftesbury a leader in the resistance to the domestic and foreign policy of the court. Together with Halifax he opposed both the arbitrary Conventicle Act of 1670 and the Test Oath of 1675, his objection to the latter being chiefly founded on the invasion of the privileges of the peers which it involved; and he defended with vigour the right of the Peers to record their protests. On the 7th of

January 1676 Holies with Halifax was summarily dismissed from the council. On the occasion of the Commons petitioning the king in favour of an alliance with the Dutch, Holies addressed a Letter to Van Beuninghen at Amsterdam on " Love to our Country and Hatred of a Common Enemy," enlarging upon the necessity of uniting in a common defence against French aggres- sion and in support of the Protestant religion. " The People are strong but the Government is weak," he declares; and he attributes the cause of weakness to the transference of power from the nobility to the people, and to a succession of three weak princes. " Save what (the Parliament) did, we have not taken one true step nor struck one true stroke since Queen Elizabeth." He endeavoured to embarrass the government this year in his tract on Some Considerations upon the Question whether th'e parliament is dissolved by its prorogation for 15 months. It was held by the Lords to be seditious and scandalous; while for publishing another pamphlet written by Holies entitled The Grand Question concerning the Prorogation of this Parliament (otherwise The Long Parliament dissolved) the corrector of the proof sheets was committed to the Tower and fined £1000. In order to bring about the downfall of Danby (afterwards duke of Leeds) and the disbanding of the army, which he believed to be intended for the suppression of the national liberties, Holies at this time (1677-1679) engaged, as did many others, in a

dangerous intrigue with Courtin and Barillon, the French envoys, and Louis XIV.; he refused, however, the latter's presents on the ground that he was a member of the council, having been appointed to Sir William Temple's new modelled cabinet in 1679. Barillon described him as at this period in his old age '' the man of all England for whom the different cabals have the most consideration," and as firmly opposed to the arbitrary designs of the court. He showed moderation in the Popish Plot, and on the question of the exclusion followed Halifax rather than Shaftesbury. His long and eventful career closed by his death on the 17 th of February 1680.*

The character of Holies has been drawn by Burnet, with whom he was on terms of friendship. " Hollis was a man of great courage and of as great pride. . . . He was faithful and firm to his side and never changed through the whole course of his life. . . . He argued well but too vehemently; for he could not bear contradiction. He had the soul of an old stubborn Roman in him. He was a faithful but a rough friend, and a severe but fair enemy. He had a true sense of religion; and was a man of an unblameable course of life and of a sound judgment when it was not biased by passion." J Holies was essentially an aristocrat and a Whig in feeling, making Cromwell's

supposed hatred of " Lords " a special charge against him; regarding the civil wars rather as a social than as a political revolution, and attributing all the evils of his time to the transference of political power from the governing families to the " meanest of men." He was an authority on the history and practice of parliament and the constitution, and besides the pamphlets already men- tioned was the author of The Case Stated concerning the Judicature of the House of Peers in the Point of Appeals (1675); The Case Stated of the Jurisdiction of the House of Lords in the point of Impositions (1676); Letter of a Gentleman to his Friend showing that the Bishops are not to be judges in Parliament in Cases Capital (1679); Lord Holies his Remains, being a 2nd letter to a Friend concerning the judicature of the Bishops in Parliament. . . . 2 He also published A True Relation of the unjust accusation of certain French gentlemen (i67i),an account of Holles's intercession on their behalf and of his dispute with Lord Chief Justice Keeling; and he left Memoirs, written in exile in 1649, and dedicated " to the unparalleled Couple, Mr Oliver St John . . . and Mr Oliver Cromwell …" published in 1699 and reprinted in Baron Maseres's Select Tracts relating to the Civil Wars, i. 189. Several speeches of Holies were printed and are extant, and his Letter to Van Beuninghen has been already quoted.

Holies married (1) in 1628 Dorothy, daughter and heiress of Sir Francis Ashley; (2) in 1642 Jane, daughter and co-heiress of Sir John Shirley of Ifield in Sussex and widow of Sir Walter Covert of Slougham, Sussex; and (3) in 1666 Esther, daughter and co-heiress of Gideon Le Lou of Columbiers in Normandy, widow of James Richer. By his first wife he left one son, Francis, who succeeded him as 2nd baron. He had no children by his other wives, and the peerage became extinct in the person of his grandson Denzil, 3rd Baron Holies, in 1694, the estates devolving on John Holies (1662-1711), 4th earl of Clare and duke of Newcastle.

Holles's brother, John Holles, 2nd earl of Clare (1595-1666), was member of parliament for East Retford in three parliaments before succeeding to the peerage in 1637. He took some part in the Civil War, but " he was very often of both parties, and never advantaged either." The earldom of Clare, which had been granted in 1624 by James I. to his father, John Holles, in return for the payment of £5000, became merged in the dukedom of Newcastle in 1694, when John Holles, the 4th earl, was created duke of Newcastle.

Holles's Life has been written by C. H. Firth in the Dictionary of National Biography; by Horace Walpole in Royal and Noble Authors, ii. 28; by Guizot in Monk's Contemporaries (Eng. trans., 1 851); and by A. Collins in Historical Collections of Noble Families (1752), and in the Biographia Britannica. See also S. R. Gardiner,

1 Burnet's History of His Own Times, vi. 257, 268.

2 The rough draft, apparently in Holles's handwriting, is in Egerton MSS. ff. 136-149.

History of England (1883-1884), and History of the Great Civil War (1893); Lord Clarendon, History of the Rebellion, edited by W. D. Macray ; G. Burnet, History of His Own Time (1833) ; and B. White- lock, Memorials (1732). (P. C. Y.)

HOLLOWAY, THOMAS (1800-1883), English patent-medicine vendor and philanthropist, was born at Devonport, on the 22nd of September 1800, of humble parents. Until his twenty-eighth year he lived at Penzance, where he assisted his mother and brother in the baker's shop which his father, once a warrant officer in a militia regiment, had left them at his death. On coming to London he made the acquaintance of Felix Albinolo, an Italian, from whom he obtained the idea for the ointment which was to carry his name all over the world. The secret of his enormous success in business was due almost entirely to advertisement, in the efficacy of which he had great faith. He soon added the sale of pills to that of the ointment, and began to devote the larger part of his profits to advertising. Holloway's first newspaper announcement appeared on the 15th of October 1837, and in 1842 his yearly expenses for publicity had reached the sum of £3000; this expenditure went on steadily increasing as his sales increased, until it had reached the figure of £50,000 per annum at the time of his death. It is, however, chiefly by the two princely foundations — the Sanatorium and the College for Women at Egham (q.v.), endowed by Hollo way towards the close of his life — that his name will be perpetuated, more than a million sterling having been set apart by him for the erection and permanent endowment of these institutions. In the deed of gift of the college the founder credited his wife, who died in 1875, with the advice and counsel that led him to provide what he hoped might ultimately become the nucleus of a uni- versity for women. The philanthropic and somewhat eccentric donor (he had an unconcealed prejudice against doctors, lawyers and parsons) died of congestion of the lungs at Sunninghill on the 26th of December 1883.

HOLLY (Ilex Aquifolium), the European representative of a large genus of trees and shrubs of the natural order Ilicineae, containing about 170 species. The genus finds its chief develop- ment in Central and South America; is well developed in Asia, especially the Chinese Japanese area, and has but few species in Europe, Africa and Australia. In Europe, where /. A quifolium is the sole surviving species, the genus was richly represented during the Miocene period by forms at first South American and Asiatic, and later North American in type (Schimper, Paleont. veget. iii. 204,

1874). The leaves are generally leathery and evergreen, and are alternate and stalked; the flowers are com monly dioecious, are in axillary cymes, fascicles or umbellules, and have a persistent four- to five-lobed calyx, a white, rotate four- or rarely five- or six-cleft corolla, with the four or five stamens adherent to its base in the male, sometimes hypogynous in the female flowers, and a two- to twelve-celled ovary; the fruit is a globose, very seldom ovoid, and usually red drupe, containing two to sixteen one-seeded stones.

The common holly, or Hulver (apparently the KrfhacrTpos of Theophrastus; 3 Ang.Sax. holen or holegn; Mid. Eng. holyn or holin, whence holm and holmtree; 4 Welsh, celyn; Ger. Stech palme, Hulse, Hulst; O.Fi.houx; andFr. houlx), 5 I. Aquifolium, is an evergreen shrub or low tree, having smooth, ash-coloured bark, and wavy, pointed, smooth and glossy leaves, 2 to 3 in. long, with a spinous margin, raised and cartilaginous below, or, as commonly on the upper branches of the older trees, entire

3 Hist. Plant, i. 9. 3, iii. 3. I, and 4. 6, et passim. On the aqui- folium or aquifolia of Latin authors, commonly regarded as- the holly, see A. de Grandsagne, Hist. Nat. de Pline, bk. xvi., " Notes"," pp. 199, 206.

- *The term " holm," as indicative of a prevalence of holly, is stated to have entered into the names of several places in Britain. From itssuperficial resemblance to the holly, the tree Quercus Ilex, the evergreen oak, received the appellation of " holm-oak."*

6 Skeat (Etymolog. Diet., 1879) with reference to the word holly remarks: " The form of the base Kul (=Teutonic Hul) is probably connected with Lat. culmen, a peak, culmus, a stalk; perhaps because the leaves are 'pointed.' " Grimm {Deut. Worterb. Bd. iv.) suggests that the term Hulst, as the O.H.G. Hulis, applied to the butcher's broom, or knee-holly, in the earliest times used for hedges, may have reference to the holly as a protecting (hullender) plant.

— a peculiarity alluded to by Southey in his poem The Holly Tree. The flowers, which appear in May, are ordinarily dioecious, as in all the best of the cultivated varieties in nurseries (Gard. Citron., 1877, i. 149). Darwin (Dijf. Forms of Flow., 1877, p. 297) says of the holly: " During several years I have examined many plants, but have never found one that was really herma- phrodite." Shirley Hibberd, however (Gard. Chron., 1877, ii.

777), mentions the occurrence of "flowers bearing globose anthers well furnished with pollen, and also perfect ovaries. " In his opinion, /. Aquifolium changes its sex from male to female with age. In the female flowers the stamens are destitute of pollen, though but slightly or not at all shorter than in the male flowers; the latter are more numerous than the female, and have a smaller ovary and a larger corolla, to which the filaments adhere for a greater length. The corolla in male plants falls off entire, whereas in fruit-bearers it is broken into separate

Ilex Aquifolium. Shoot bearing leaves and fruit about 5 nat. size.

1. Flower with abortive stamens. 4. Fruit.

2. Flower with abortive pistil. 5. Fruit cut transversely

3. Floral diagram showing arrangement showing the four

of parts in horizontal section. one-seeded stones.

segments by the swelling of the young ovary. The holly occurs in Britain, north-east Scotland excepted, and in western and southern Europe, from as high as 62° N. lat. in Norway to Turkey and the Caucasus and in western Asia. It is found generally in forest glades or in hedges, and does not flourish under the shade of other trees. In England it is usually small, probably on account of its destruction for timber, but it may attain to 60 or 70 ft. in height, and Loudon mentions one tree at Claremont, in Surrey, of 80 ft. Some of the trees on Bleak Hill, Shropshire, are asserted to be 14 ft. in girth at some distance from the groundOV. and Q., 5th ser., xii. 508). The holly is abundant in France, especially in Brittany. It will grow in almost any soil not absolutely wet, but flourishes best in rather dry than moist sandy loam. Beckmann (Hist, of Invent., 1846, i. 193) says that the plant which first induced J. di Castro to search for alum in Italy was the holly, which is there still considered to indicate that its habitat is aluminiferous. The holly is propagated by means of the seeds, which do not normally germinate until their second year, by whip-grafting and budding, and by cuttings of the matured summer shoots, which, placed in sandy soil and kept under cover of a hand-glass in sheltered situations, generally strike root in spring. Transplantation should be performed in damp weather in September and October, or, according to some writers, in spring or on mild days in winter, and care should be taken that the roots are not dried by exposure to the air. It is

rarely injured by frosts in Britain, where its foliage and bright red berries in winter render it a valuable ornamental tree. The yield of berries has been noticed to be less when a warm spring, following on a wet winter season,

has promoted excess of growth. There are numerous varieties of the holly. Some trees have yellow, and others white or even black fruit. In the fruitless variety laurifolia, " the most floriferous of all hollies " (Hibberd), the flowers are highly fragrant; the form known as femina is, on the other hand, remarkable for the number of its berries. The leaves in the unarmed varieties aureo-marginata and albo- marginata are of great beauty, and infer ox they are studded with sharp prickles. The holly is of importance as a hedge-plant, and is patient of clipping, which is best performed by the knife. Evelyn's holly hedge at Say's Court, Deptford, was 400 ft. long, 9 ft. high and 5 ft. in breadth. To form fences, for which Evelyn recommends the employment of seedlings from woods, the plants should be 9 to 12 in. in height, with plenty of small fibrous roots, and require to be set 1 to i| ft. apart, in well- manured and weeded ground and thoroughly watered.

The wood of the holly is even-grained and hard, especially when from the heartwood of large trees, and almost as white as ivory, except near the centre of old trunks, where it is brownish. It is employed in inlaying and turning, and, since it stains well, in the place of ebony, as for teapot handles. For engraving it is inferior to box. When dry it weighs about 47! lb. per cub. ft. From the bark of the holly bird-lime is manufactured. From the leaves are obtainable a colouring matter named ilixanthin, ilicic acid, and a bitter principle, ilicin, which has been variously described by different analytical chemists. They are eaten by sheep and deer, and in parts of France serve as a winter fodder for cattle. The berries provoke in man violent vomiting and purging, but are eaten with immunity by thrushes and other birds. The larvae of the moths Sphinx ligustri and Phoxopteryx naevana have been met with on holly. The leaves are mined by the larva of a fly, Phytomyza ilia's, and both on them and the tops of the young twigs occurs the plant-louse Aphis ilicis (Kaltenbach, Pflanzenfeinde, 1874, p. 427). The custom of employing holly and other plants for decorative purposes at Christmas is one of considerable antiquity, and has been regarded as a survival of the usages of the Roman Saturnalia, or of an old Teutonic practice of hanging the interior of dwellings with ever- greens as a refuge for sylvan spirits from the inclemency of winter. A Border proverb defines an habitual story-teller as one that " lees never but when the hollen is green." Several popular superstitions exist with respect to holly. In the county of Rutland it is deemed unlucky to introduce it into a house before Christmas Eve. In some English rural districts the prickly and non-prickly kinds are distinguished as " he " and " she " holly; and in Derbyshire the tradition obtains that according as the holly brought at Christmas into a house is smooth or rough, the wife or the husband will be master. Holly that has adorned churches at that season is in Worcestershire and Here-fordshire much esteemed and cherished, the possession of a small branch with berries being supposed to bring a lucky year; and Lonicerus mentions

a notion in his time vulgarly prevalent in Germany that consecrated twigs of the plant hung over a door are a protection against thunder.

Among the North American species of Ilex are /. opaca, which resembles the European tree, the Inkberry, /. (Prinos) glabra, and the American Black Alder, or Winterberry, /. (Prinos) verticillata. Hooker (Fl. of Brit. India, i. 598, 606) enumerates twenty-four Indian species of Ilex. The Japanese I. crenata, and I. latifolia, a remark ably hardy plant, and the North American I. Cassine, are among the species cultivated in Britain. The leaves of several species of Ilex are used by dyers. The member of the genus most important economically is i". paraguariensis, the prepared leaves of which con- stitute Paraguay tea, or Mate (?.».). Knee holly is Ruscus aculeatus, or butcher's broom (see Broom); sea holly, Eryngium maritimum, an umbelliferous plant; and the mountain holly of America, Nemo* panthes canadensis, also a member of the order Ilicineae.*

Besides the works above mentioned, see Louden, Arboretum, ii.

506 (1844).

HOLLYHOCK (from M.E. holi— doubtless because brought from the Holy Land, where it is indigenous (Wedg.) — and A.-S.

6i6

HOLLY SPRINGS—HOLMES, O. W.

hoc, a mallow), Althaea rosea, a perennial plant of the natural order Malvaceae, a native of the East, which has been cultivated in Great Britain for about three centuries. The ordinary hollyhock is single-blossomed, but the florists' varieties have all double flowers, of white, yellow, rose, purple, violet and other tints, some being almost black. The plant is in its prime about August, but by careful management examples may be obtained in blossom from July to as late as November. Holly- hocks are propagated from seed, or by division of the root, or by planting out in rich sandy soil, in a close frame, with a gentle bottom heat, single eyes from woodshoots, or cuttings from outgrowths of the old stock or of the lateral offsets of the spike. The seed may be sown in October under cover, the plants obtained being potted in November, and kept under glass till the following April, or, if it be late-gathered, in May or June, in the open ground, whence, if required, the plants are best removed in October or April. In many gardens, when the plants are not disturbed, self-sown seedlings come up in abundance about April and May. Seedlings may also be raised in February or March, by the aid of a gentle heat, in a light and rich moist soil; they should not be watered till they have made their second leaves, and when

large enough for handling should be pricked off in a cold frame; they are subsequently transferred to the flower-bed. Hollyhocks thrive best in a well-trenched and manured sandy loam. The spikes as they grow must be staked; and water and, for the finest blossoms, liquid manure should be liberally supplied to the roots. Plants for exhibition require the side growths to be pinched out; and it is recom- mended, in cold, bleak or northerly localities, when the flowering is over, and the stalks have been cut off 4 to 6 in. above the soil, to earth up the crowns with sand. Some of the finest double- flowered kinds of hollyhock do not bloom well in Scotland. The plant is susceptible of great modification under cultivation. The forms now grown are due to the careful selection and crossing of varieties. It is found that the most diverse varieties may be raised with certainty from plants growing near together.

The young shoots of the hollyhock are very liable to the attacks of slugs, and to a disease occasioned by a fungus, Puccinia malvacearum, which is a native of Chile, attained notoriety in the Australian colonies, and finally, reaching Europe in 1869, threatened the extermination of the hollyhock, the soft parts of the leaves of which it destroys, leaving the venation only remaining. It has been found especially hurtful to the plant in dry seasons. It is also parasitic on the wild mallows. The disease appears on the leaves as minute hard pale-brown pustules, filled with spores which germinate without a resting- period, but when produced late in the season may last as resting- spores until next spring. Spraying early in the season with Bordeaux mixture is an effective preventive, but the best means of treatment is to destroy all leaves as soon as they show signs of being attacked, and to prevent the growth of other host-plants such as mallows, in the neighbourhood. In hot dry seasons, red- spider injures the foliage very much, but may be kept at bay by syringing the plants frequently with plenty of clean water.

HOLLY SPRINGS, a city and the county-seat of Marshall county, Mississippi, U.S.A., in the N. part of the state, 45 m. S.E. of Memphis. Pop. (1890) 2246; (1900) 2815 (1550, negroes); (1910) 2192. Holly Springs is served by the Illinois Central and the Kansas City, Memphis & Birmingham (Frisco System) railways. The city has broad and well-shaded streets, and a fine court-house and court-house square. It is the seat of Rust University (opened in 1867), a Methodist Episcopal institution for negroes; of the Mississippi Synodical College (1905; Presbyterian), for white girls; and of the North Missis- sippi Agricultural Experiment Station. The principal industries are the ginning, compressing and shipping of cotton, and the manufacture of cotton-seed oil, but the city also manufactures pottery and brick from clay obtained in the vicinity, and has an ice factory, bottling works and marble works. The munici- pality owns and operates its water-works and electric-lighting plant. Holly Springs was founded in 1837

and was chartered as a city in 1896. Early in December 1862 General Grant

established here a large depot of supplies designed for the use of the Federal army while on its march toward Vicksburg, but General Earl Van Dorn, with a brigade of cavalry, surprised the post at daylight on the 20th of this month, burned the supplies and took 1500 prisoners. Holly Springs was the home and is the burial-place of Edward Cary Walthall (1831-1898), a Demo- cratic member of the United States Senate in 1885-1894 and in 1895-1898.

HOLMAN, JAMES (1786-1857), known as the "Blind Traveller," was born at Exeter on the 15th of October 1786. He entered the British navy in 1798 as first-class volunteer, and was appointed lieutenant in April 1807. In 1810 he was invalided by an illness which resulted in total loss of sight. In considera- tion of his helpless circumstances he was in 181 2 appointed one of the royal knights of Windsor, but the quietness of such a life harmonized so ill with his active habits and keen interests that he requested leave of absence to go abroad, and in 1819, 1820 and 1821 journeyed through France, Italy, Switzerland, the parts of Germany bordering on the Rhine, Belgium and the Netherlands. On his return he published The Narrative of a Journey through France, &c. (London, 1822). He again set out in 1822 with the design of making the circuit of the world, but after travelling through Russia into Siberia, . he was suspected of being a spy, was arrested when he had managed to penetrate 1000 m. beyond Smolensk, and after being conducted to the frontiers of Poland, returned home by Austria, Saxony, Prussia and Hanover. He now issued Travels through Russia, Siberia, &c. (London, 1825). Shortly afterwards he again set out to accomplish by a somewhat different method the design which had been frustrated by the Russian authorities; and an account of his remarkable achievement was published in four volumes in 1 834-1 83 5,. under the title of A Voyage round the World, including Travels in Africa, Asia, Australasia, America, &˚c, from 182/ to 1832. His last journeys were through Spain, Portugal, Moldavia, Montenegro, Syria and Turkey; and he was engaged in preparing an account of this tour when he died in London on the 29th of July 1857.

HOLMES, OLIVER WENDELL (1800-1894), American writer and physician, was born on the 29th of August 1809 at Cambridge, Mass. His father, Abiel Holmes (1763-1837), was a Calvinist clergyman, the writer of a useful history, Annals of America, and of much very dull poetry. His mother (the second wife of Abiei) was Sarah Wendell, of a distinguished New York family. Through her Dr Holmes was descended from Governors Thomas Dudley and Simon Bradstreet of Massachusetts, and from her he derived his cheerfulness and vivacity, his sympathetic humour and wit.

From Phillips (Andover) Academy he entered Harvard in the " famous class of '29," made further illustrious by the charming lyrics which he wrote for the anniversary dinners from 1851 to 1889, closing with the touching "After the Curfew." After graduation he studied law perfunctorily for a year and dabbled in literature, winning the public ear by a spirited lyric called forth by the order to destroy the old frigate Constitution. These verses were sung all over the land, and induced the Navy Department to revoke its order and save the old ship. Turning next to medicine, and convinced by a brief experience in Boston that he liked it, he went to Paris in March 1833. He studied industriously under Louis and other famous physicians and surgeons in France, and in his vacations visited the Low Countries, England, Scotland and Italy. Re- turning to Boston at the close of 1835, filled with a high pro- fessional ambition, he sought practice, but achieved only moderate success. Social, brilliant in conversation, and a writer of gay little poems, he seemed to the grave Bostonians not suffi- ciently serious. He won prizes, however, for professional papers, and lectured on anatomy at Dartmouth College. He wrote two papers on homoeopathy, which he attacked with trenchant wit; also a valuable paper on the malarial fevers of New England. In 1843 he published his essay on the Contagiousness of Puerperal Fever, which stirred up a fierce controversy and brought upon him bitter personal abuse; but he maintained his position with dignity, temper and judgment; and in time he was honoured

as the discoverer of a beneficent truth. The volume of his medical essays holds some of his most sparkling wit, his shrewdest observation, his kindliest humanity. In 1840 he married Amelia Lee Jackson, daughter of the Hon. Charles Jackson (1775-1855), formerly associate justice of the State supreme judicial court, a lady of rare charm alike of mind and character. She died in the winter of 188 7-1 888. Their first-born child, Oliver Wendell Holmes, afterwards became chief justice of that same bench on which his grandfather sat. In 1847 Dr Holmes was appointed professor of anatomy and ph}'siology in the Medical School of Harvard University, the duties involving the giving of in- struction also in kindred departments, so that, as he said, he occupied " not a chair, but a settee in the school." He delivered the anatomical lectures until November 1882, and in later years these were his only link with the medical profession. They were fresh, witty and lively; and the students were sent to him at . He end of the day, when they were fagged, because he alone c.iL'ld keep them awake. In later years he made few finished contributions to medical knowledge; his eager and impetuous temperament caused him to leave more patient investigators

to push to ultimate results the suggestions thrown out by his fertile and imaginative mind.

In 1836, being in that year the Phi Beta Kappa poet at Harvard University, he published his first volume of Poems, which afterwards reached a second edition. Among these earlier lyrics was " The Last Leaf," one of the most delicate combina- tions of pathos and humour in literature. His collected poetry fills three volumes. In 1856-1857 a Boston publishing house (Phillips, Sampson, and Co.) invited James Russell Lowell to edit a new magazine, which he agreed to do on condition that he could secure the assistance of Dr Holmes. By this urgent invitation the Doctor was equally surprised and flattered, for heretofore he had stood rather outside the literary coterie of Cambridge and Boston. He accepted with pleasure, and at once threw himself into the enterprise with zeal. He christened it The Atlantic Monthly; and, as Mr Howells afterwards said, he " not only named but made " it, for in each number of its first volume there appeared one of the papers of the Autocrat of the Breakfast Table. The opening of the Autocrat — " I was just going to say when I was interrupted " — is explained by the fact that in the old New England Magazine (1831 to 1833) the Doctor had published two Autocrat papers, which, by his wish, have never been reprinted. In the commercial panic of 1857 the new magazine would inevitably have failed had it not been for these fascinating essays. Their originality of conception, their wit and humour, their suggestions of what then seemed bold ideas, and their expression of New Englandism, all combined to make them so popular that the most harassed merchant in that gloomy winter purchased them as a dose of cheering medicine. Thus Dr Holmes made The Atlantic Monthly, which in return made him. A success so immediate and so splendid settled the rest of his career; he ceased to be a physician and became an author. These twelve papers were immediately (1858) published as a volume. No sooner was the Autocrat silent than the Professor (1859) succeeded him at the breakfast table. The Professor was preferred by more thoughtful readers, though it has hardly been so widely popular as the Autocrat. Its theology, which seemed in those days audacious, frightened many of the strict and old-fashioned religionists of New England, though to-day it seems mild enough. Twelve years later, in 1871, the Landlady had another boarder, who took the vacant chair — the Poet (published 1872). But here Holmes fell a little short. In these three books, especially in the Autocrat and the Professor, the Doctor wrote as he talked at many a dinner table in Boston, but less well. The animation and clash of talk roused him. The dinners of the Saturday Club are among Boston's proudest traditions, as they were the chief pleasure of Dr Holmes's life. There he met Emerson, Longfellow, Whittier, Lowell, Sumner, Agassiz, Motley, and many other charming talkers, and among them all he was admitted to be the best.

There were characters and incidents, but hardly a story, in the Autocrat and the Professor. Holmes had an ambition for

more sustained work, and in 1861 his novel, Elsie Venner, at first called The Professor's Story, was published. The book was illuminated throughout by admirable pictures of character and society in the typical New England town. But the rattle- snake element was unduly extravagant, and in other respects the book was open to criticism as a work of art. It was written with the same purpose which informed the greatest part of the Doctor's literary work, and which had already been scented and nervously condemned by the religious world. By heredity the Doctor was a theologian; no other topic enchained him more than did the stern and merciless dogmas of his Calvinist forefathers. His humanity revolted against them, his reason condemned them, and he set himself to their destruction as his task in literature. The religious world of his time was still so largely under the control of old ideas that he was assailed as a freethinker and a subverter of Christianity; though before his death opinions had so changed that the bitterness of the attacks upon him seemed incredible, even to some of those who had most vehemently made them. None the less, undaunted and profoundly earnest, he returned, six years later, to the same line of thought in his second novel, The Guardian Angel (published 1867). This, though less well known than Elsie Venner, is in many respects better. No more lifelike and charming picture of the society of the New England country-town of the middle third of the 19th century has ever been drawn, and every page sparkles with wit and humour. In 1884 and 1885 it was followed, still in the same line, by A Mortal Antipathy, a production inferior to its predecessors.

Holmes generally held himself aloof from politics, and from those " causes " of temperance, abolition and woman's rights which enthralled most of his contemporaries in New England. The Civil War, however, aroused him for the time; finding him first a strenuous Unionist, it quickly converted him into an ardent advocate of emancipation. His interest was enhanced by the career of his elder son Oliver (see below), who was three times severely wounded, and finally rose to the rank of lieut.- colonel in the Northern army. He wrote some ringing war lyrics, and in 1863 delivered the Fourth of July oration in Boston, which showed a masterly appreciation of the stirring public questions of the day. In 1878 Dr Holmes wrote a memoir of the historian John Lothrop Motley, an affectionate tribute to one who had been his dear friend. In 1884 he contributed the life of Emerson to the American " Men of Letters" series. He admired the "Sage of Concord," but was not quite in intellectual sympathy with him. Both were Liberals in thought, but in widely different ways,, But in spite of this handicap the volume proved very popular. In 1888 he began the papers which he happily christened Over the Tea Cups. As a tour de force on the part of a man of

nearly fourscore years they are very remarkable. After his return from Paris in 1835 Dr Holmes lived in Boston, with summer sojournings at Pittsfield and Beverly Farms, and occasional trips to neighbouring cities, until 1886. He then undertook a four months' journey in Europe, and in England had a sort of triumphal progress. On his return he wrote Our Hundred Days in Europe (1887), a courteous recognition of the hospitality and praise which had been accorded to him. During this visit Cambridge University made him Doctor of Letters, Edinburgh University made him Doctor of Laws, and Oxford University made him Doctor of Civil Law. Already, in 1880, Harvard University had made him Doctor of Laws. He died on the 7th of October 1894, and was buried from King's Chapel, Boston, in the cemetery of Mount Auburn. -•

His eldest son Oliver Wendell (b. 1841), who graduated from Harvard in 1861 and fought in the Civil War, retiring from the army as brevet lieut. - colonel in 1864, took up the study of law and was admitted to the bar in Boston in 1866. He was for some years editor of the American Law Review, and after being professor in the Harvard Law School in 1882 was appointed in the same year a judge of the Massachusetts supreme court, rising to be chief justice in 1899. In 1902 he was made a judge of the United States Supreme Court. His work on The Common Law (1881) and his edition (1873) of Kent's Commentaries

are his principal publications; and he became widely recognized as one of the great jurists of his day.

Bibliography. — Holmes's Complete Works, in 13 volumes, were published at Boston in 1891. See J. T. Morse, Life and Letters of Oliver Wendell Holmes (London, 1896); G. B. Ives, Bibliography (Boston, 1907); and the bibliography in P. K. Foley's American Authors (Boston, 1897). An essay by Sir Leslie Stephen is prefixed to the " Golden Treasury " edition (1903) of The Autocrat of the Break- fast Table. See also monographs by William Sloane Kennedy "(Boston, 1882); Emma E. Brown (Boston, 1884). (J. T. Mo.)

HOLMFIRTH, an urban district in the Holmfirth parlia- mentary division of the West Riding of Yorkshire, England, on and Holme and the Ribble, 6 m. S. of Huddersfield, and on the Lancashire and Yorkshire railway. Pop. (1901) 8977. The valley, walled by bold hills, is very picturesque. In 1852 great destruction was wrought in the town by the bursting of a reservoir in the vicinity. The large industrial population is employed in woollen

manufactories, and in the neighbouring stone quarries.

HOLOCAUST (Gr. SboKawrov, or oKonavrov, wholly burnt), strictly a sacrifice wholly destroyed by fire, such as the sacrifices of the Jews, described in the Pentateuch as " whole burnt offerings " (see Sacrifice). The term is now often applied to a catastrophe on a large scale, whether by fire or not, or to a massacre or slaughter.

HOLOCENE (from Gr. 6Xos, whole, /cairos, recent), in geology, the time division which embraces the youngest of all the forma- tions; it is equivalent to the " Recent " of some authors. The name was proposed in i860 by P. Gervais. The oldest deposits that may be included are those containing neolithic implements; deposits of historic times should also be grouped here; pre- sumably the youngest are those to be chronicled by the last man. The Holocene formations obviously include all the varieties of deposits which are accumulating at the present day: the gravels and alluvia of rivers; boulder clays, moraines and fluvio-glacial deposits; estuarine, coastal and abyssal deposits of the seas, and their equivalents in lakes; screes, taluses, wind-borne dust and sand and desert formations; chemical deposits from saline waters; peat, diatomite, marls, foraminiferal and other oozes; coral, algal and shell banks, and other organic deposits; mud, lava and dust deposits of volcanic origin and extrusions of asphalt and pitch; to all these must be added the works of man.

HOLROYD, SIR CHARLES (1861-), British artist, was born in Leeds on the 9th of April 1861. He received his art education under Professor Legros at the Slade School, University College, London, where he had a distinguished career. After passing six months at Newlyn, where he painted his first picture exhibited in the Royal Academy, " Fishermen Mending a Sail " (1885), he obtained a travelling scholarship and studied for two years in Italy, a sojourn which greatly influenced his art. At his return, on the invitation of Legros, he became for two years assistant-master at the Slade School, and there devoted himself to painting and etching. Among his pictures may be mentioned '■ The Death of Torrigiano " (1886), " The Satyr King " (1889), " The Supper at Emmaus," and, perhaps his best picture, " Pan and Peasants " (1893). F° r the church of Aveley, Essex, he painted a triptych altarpiece, " The Adoration of the Shepherds," with wings representing " St Michael " and " St Gabriel," and designed as well the window, " The Resurrection." His portraits, such as that of " G. F. Watts, R.A.," in the Legros manner, show much dignity and distinction. Sir Charles Holroyd has made his chief reputation as an etcher of exceptional ability, combining strength with delicacy, and a profound technical knowledge of the art. Among the best known are the " Monte Oliveto " series, the " Icarus " series, the " Monte Subasio " series, and the " Eve " series, together with the plates, " The Flight into Egypt," " The Prodigal

Son," " A Barn on Tadworth Common " (etched in the open air), and " The Storm." His etched heads of " Professor Legros," "Lord Courtney" and "Night," are admirable alike in knowledge and in likeness. His principal dry-point is " The Bather." In all his work Holroyd displays an impressive sincerity, with a fine sense of composition, and of style, allied to independent and modern feeling. He was appointed the first keeper of the National Gallery of British Art

(Tate Gallery), and on the retirement of Sir Edward Poynter in 1906 he received the directorship of the National Gallery. He was knighted in 1903. His Michael Angelo Buonarotti (London, Duckworth, 1903) is a scholarly work of real value.

HOLSTEIN, FRIEDRICH VON (1837-1909), German states- man, for more than thirty years head of the political department of the German Foreign Office. Holstein's importance began with the dismissal of Bismarck in 1890. The new chancellor, Caprivi, was ignorant of foreign affairs; and Holstein, as the repository of the Bismarckian tradition, became indispensable. This reluctance to emerge into publicity has been ascribed to the part he had played under Bismarck in the Arnim affair, which had made him powerful enemies; it was, however, possibly due to a shrinking from the responsibility of office. Yet the weakness of his position lay just in the fact that he was not ultimately responsible. He protested against the despatch of the " Kruger telegram," but protested in vain. On the other hand, where his ideas were acceptable, he was generally able to realize them. Thus it was almost entirely due to him that Germany acquired Kiao-chau and asserted her interests in China, and the acquisition of Samoa was also largely his work. If the skill and pertinacity with which Holstein carried through his plans in these matters was learned in the school of Bismarck, he had not acquired Bismarck's faculty for foreseeing their ulterior consequences. This is true of his Chinese policy, and true also of his part in the Morocco crisis. The emperor William II. 's journey to Tangier was undertaken on his advice, as a protest against the supposed attempt at the isolation of Germany; but of the later develop- ments of German policy in the Morocco question he did not approve, on the ground that the result would merely be to strengthen the Anglo-French entente; and from the 12th of March 1906 onwards he took no active part in the matter. To the last he believed that the position of Germany would remain unsafe until an understanding had been arrived at with Great Britain, and it was this belief that determined his attitude towards the question of the fleet, " beside which," he wrote in February 1909, " all other questions are of lesser account." His views on this question were summarized in a memorandum of December 1907, of which Herr von Rath gives a rSsumi. He objected to the programme of the German Navy League on three main grounds: (1) the ill-feeling likely to be aroused in South Germany, (2) the

inevitable dislocation of the finances through the huge additional charges involved, (3) the suspicion of Germany's motives in foreign countries, which would bind Great Britain still closer to France. As for the idea that Germany's power would be increased, this— he wrote in reply to a letter from Admiral Galster — was " a simple question of arithmetic "; for how would the sea-power of Germany be rela- tively increased if for every new German ship Great Britain built two? Herr von Holstein retired on the resignation of Prince Biilow, and died on the 8th of May 1909.

See Hermann von Rath, " Erinnerungen an Herrn von Holstein " in the Deutsche Revue for October 1909. He is also frequently mentioned passim in Prince Chlodwig Hohenlohe's Memoirs.

HOLSTEIN, formerly a duchy of Germany. Until about 1110 ' the county of Holstein formed part of the duchy of Saxony, and it was made a duchy in 1472. From 1460 to 1864 it was ruled by members of the house of Oldenburg, some of whom were also kings of Denmark. It is now the southern part of the Prussian province of Schleswig-Holstein. (See Schleswig-Holstein, and for history Schleswig-Holstein Question.

HOLSTEN, KARL CHRISTIAN JOHANN (1825-1897), German theologian, was born at Gtistrow, Mecklenburg, on the 31st of March 1825, and educated at Leipzig, Berlin and Rostock, where in 1852 he became a teacher of religion in the Gymnasium. In 1870 he went to Bern as professor of New Testament studies, passing thence in 1876 to Heidelberg, where he remained until his death on the 26th of January 1897. Holsten was an adherent of the Tubingen school, and held to Baur's views on the alleged antagonism between Petrinism and Paulinism.

Among his writings are Zum Evangelium d. Paulus und d. Petrus (1867); Das Evangelium des Paulus dargestellt (1880); Die syn- optischen Evangelien nach der Form ihres Inhalts (1886).

HOLSTENIUS, LUCAS, the Latinized name of Luc Holste (1506-1661), German humanist, geographer and theological writer, was born at Hamburg. He studied at Leiden university, where he became intimate with the most famous scholars of the age — J. Meursius, D. Heinsius and P. Cluverius, whom he accompanied on his travels in Italy and Sicily. Disappointed at his failure to obtain a post in the gymnasium of his native town, he left Germany for good. Having spent two years in Oxford and London, he went to Paris. Here he obtained the patronage of N. de Peiresc,

who recommended him to Cardinal Francesco Barberini, papal nuncio and the possessor of the most important private library in Rome. On the cardinal's return in 1627 he took Holstenius to live with him in his palace and made him his librarian. Although converted to Roman Catho- licism in 1625, Holstenius showed his liberal-mindedness by strenuously opposing the strict censorship exercised by the Congregation of the Index. He was appointed librarian of the Vatican by Innocent X., and was sent to Innsbruck by Alexander VII. to receive Queen Christina's abjuration of Protestantism. He died in Rome on the 2nd of February 1661. Holstenius was a man of unwearied industry and immense learning, but he lacked the persistency to carry out the vast literary schemes he had planned. He was the author of notes on Cluvier's Italia antiqua (1624); an edition of portions of Porphyrius (1630), with a dissertation on his life and writings, described as a model of its kind; notes on Eusebius Against Efcrocles (1628), on the Sayings of the later Pythagoreans (1638), and the De diis it mundo of the neo-Platonist Sallustius (1638); Notae et castigationes in Stephani Bysantini ethnica (first published in 1684) ; and Codex regularum, Collection of the Early Rules of the Monastic Orders (1661). His correspondence (Epistolae ad divcrsos, ed. J. F. Boisscnade, 1817) is a valuable source of information on the literary history of his time.

See N. Wilckens, Leben des gelehrten Lucae Holstenii (Hamburg, 1723) ; Johann Moller, Cimbria literata, iii. (1744).

HOLSTER, a leather case to hold a pistol, used by a horseman and properly fastened to the saddle-bow, but sometimes worn in the belt. The same word appears in Dutch, from which the English word probably directly derives. The root is hel- or hul- lo cover, and is seen in the O. Eng. heolster, a place of shelter or concealment, anH in " hull " a sheath or covering. The German word for the same object, holfter, is, according to the New English Dictionary, from a different root.

HOLT, SIR JOHN (1642-1710), lord chief justice of England, was born at Thame, Oxfordshire, on the 30th of December 1642. His father, Sir Thomas Holt, possessed a small patrimonial estate, but in order to supplement his income had adopted the profession of law, in which he was not very successful, although he became sergeant in 1677, and afterwards for his political services to the " Tories " was rewarded with knighthood. After attending for some years the free school of the town of Abingdon, of which his father was recorder, young Holt in his sixteenth year entered Oriel College, Oxford. He is said to have spent a very dissipated youth, and even to have been in the habit of taking purses on the highway, but after entering Gray's Inn about 1660 he applied himself with exemplary diligence to the study of law. He was called to the bar in 1663. An ardent supporter of civil and religious liberty, he distinguished himself in the state

trials which were then so common by the able and courageous manner in which he supported the pleas of the defendants. In 1685-1686 he was appointed recorder of London, and about the same time he was made king's sergeant and received the honour of knight- hood. His giving a decision adverse to the pretensions of the king to exercise martial law in time of peace led to his dismissal from the office of recorder, but he was continued in the office of king's sergeant in order to prevent him from becoming counsel for accused persons. Having been one of the judges who acted as assessors to the peers in the Convention parliament, he took a leading part in arranging the constitutional change by which William III. was called to the throne, and after his accession he was appointed lord chief justice of the King's Bench. His merits as a judge are the more apparent and the more remarkable

when contrasted with the qualities displayed by his predecessors in office. In judicial fairness, legal knowledge and ability, clear- ness of statement and unbending integrity he has had few if any superiors on the English bench. Over the civil rights of his countrymen he exercised a jealous watchfulness, more especially when presiding at the trial of state prosecutions, and he was especially careful that all accused persons should be treated with fairness and respect. He is, however, best known for the firmness with which he upheld his own prerogatives in opposition to the authority of the Houses of Parliament. On several occasions his physical as well as his moral courage was tried by extreme tests. Having been requested to supply a number of police to help the soldiery in quelling a riot, he assured the messenger that if any of the people were shot he would have the soldiers hanged, and proceeding himself to the scene of riot he was successful in preventing bloodshed. While steadfast in his sympathies with the Whig party, Holt maintained on the bench entire political impartiality, and always held himself aloof from political intrigue. On the retirement of Somers from the chan- cellorship in 1700 he was offered the great seal, but declined it. His death took place in London on the 5th of March 1710. He was buried in the chancel of Redgrave church.

Reports of Cases determined by Sir John Holt (1681-1710) appeared at London in 1738; and The Judgments delivered in the case of Ashby v. White and others, and in the case of John Paly and others, printed from original MSS., at London (1837). See Burnet's Own Times; Tatler, No. xiv. ; a Life, published in 1764; Wclsby, Lives of Eminent English Judges of the 17th and 18th Centuries (1846) ; Campbell's Lives of the Lord Chief Justices; and Foss, Lives bf the Judges.

HOLTEI, KARL EDUARD VON (1798-1880), German poet and actor, was born at Breslau on the 24th of January 1798, the son of an officer of Hussars. Having served in the Prussian army as a volunteer in 1815, he

shortly afterwards entered the university of Breslau as a student of law; but, attracted by the stage, he soon forsook academic life and made his debut in the Breslau theatre as Mortimer in Schiller's Maria Stuart. He led a wandering life for the next two years, appearing less on the stage as an actor than as a reciter of his own poems. In 1821 he married the actress Luise Rogee (1800-1825), and was appointed theatre-poet to the Breslau stage. He next removed to Berlin, where his wife fulfilled an engagement at the Court theatre. During his sojourn here he produced the vaudevilles Die Wiener in Berlin (1824), and Die Berliner in Wien (1825), pieces which enjoyed at the time great popular favour. In 1825 his wife died; but soon after her death he accepted an engagement at the Konigsstadter theatre in Berlin, when he wrote a number of plays, notably Lenore (1829) and Der alle Feldherr (1829). In 1830 he married Julie Holzbecher (1809ˆ 1839), an actress engaged at the same theatre, and with her played in Darmstadt. Returning to Berlin in 1831 he wrote for the composer Franz Glaser (1798-1861) the text of the opera Des Adlers Horst (1835), and for Ludwig Devrient the drama, Der dumme Peter (1837). In 1833 Holtei again went on the stage and toured with his wife to various important cities, Hamburg, Leipzig, Dresden, Munich and Vienna. In the last his declamatory powers as a reciter, particularly of Shakespeare's plays, made a furore, and the poet-actor was given the appoint- ment of manager of the Josefstadter theatre in the last-named city. Though proud of his successes both as actor and reciter, Holtei left Vienna in 1836, and from 1837 to 1839 conducted the theatre in Riga. Here his second wife died, and after wandering through Germany reciting and accepting a short engagement at Breslau, he settled in 1847 at Graz, where he devoted himself to a literary life and produced the novels Die Vagabunden (1851), Christian Lammfell (1853) and Der leizle Komodiant (1863). The last years of his life were spent at Breslau, where being in poor circumstances he found a home in the Klosler der barm- herzigen Brilder, and here he died on the 12th of February 1880. As a dramatist Holtei may be said to have introduced the "vaudeville" into Germany; as an actor, although remaining behind the greater artists of his time, he contrived to fascinate his audience by the dramatic force of his exposition of character; as a reciter, especially of Shakespeare, he knew no rival. August

Lewald said of Holtei that by the energy of his poetic conception and plastic force he brought his audience round to his own ideas ; and he added, " an eloquence such as his I have never met with in any other German."

Holtei was not only a stage-poet but a lyric-writer of great charm. Notable among such productions are Schlesische Gedichte (1830; 20th ed., 1893), Gedichte (5th ed., 1861), Stimmen des Waldes (2nd ed., 1854). Mention ought also to be made of Holtei's interesting autobiography, Vierzig Jahre (8 vols., 1843-1850; 3rd ed., 1862) with the supplementary volume Noch ein Jahr in Schlesien (1864).

Holtei's Theater appeared in 6 vols. (1867); his Erzdhlende Schrif- len, 39 vols. (1861-1866). See M. Kurnick, Karl von Holtei, ein Lebensbild (1880); F. Wchl, Zeit und Menschen (1889); O. Storch, K. von Holtei (1898).

HOLTY, LUDWIG HEINRICH CHRISTOPH (1748-1776), German poet, was born on the 21st of December 1748 at the village of Mariensee in Hanover, where his father was pastor. In 1769 he went to study theology at Gottingen. Here he formed a close friendship with J. M. Miller, J. H. Voss, H. Boie, the brothers Stolberg and others, and became one of the founders of the famous society of young poets known as the Gotlingcr Dichterbund or Hain. When in 1774 he left the university he had abandoned all intention of becoming a clergyman; but he was not destined to enter any other profession. He died of consumption on the 1st of September 1776 at Hanover. Holty was the most gifted lyric poet of the Gottingen circle. He was influenced both by Uz and Klopstock, but his love for the Volkslied and his delight in nature preserved him from the artificiality of the one poet and the unworldliness of the other. A strain of melancholy runs through all his lyrics. His ballads are the pioneers of the rich ballad literature on English models, which sprang up in Germany during the next few years. Among his most familiar poems may be mentioned lib' immer Treu' und Redlichkeit, Tanzt dent schonen Mai entgegen, Rosen auf dem Weg gcstrent, and Wer wollte sich mil Grillen plagen?

Holty's Gedichte were published by his friends Count Friedrich Leopold zu Stolberg and J. H. Voss (Hamburg, 1783) ; a new edition, enlarged by Voss, with a biography (1804); a more complete but still imperfect edition by F. Voigts (Hanover, 1857). The first complete edition was that of Karl Halm (Leipzig, 1870), who had access to MSS. not hitherto known. See H. Ruete, Holty, sein Leben und Dichlen (Guben, 1883), and A. Sauer, Der Gottinger Dichterbund, vol. ii. (Stuttgart, 1894), where an excellent selection of Holty's poetry will be found.

HOLTZENDORFF, JOACHIM WILHELM FRANZ PHILIPP VON (1829-1889), German jurist, born at Vietmannsdorf, in the Mark of Brandenburg, on the 14th of October 1829, was descended from a family of the old nobility. He was educated at Berlin and at Pforta, afterwards

studying law at the uni- versities of Bonn, Heidelberg and Berlin. The struggles of 1848 inspired him with youthful enthusiasm, and he remained for the rest of his life a strong advocate of political liberty. In 1852 he graduated LL.D. at Berlin; in 1857 he became a Privatdocent, and in i860 he was nominated a professor extra- ordinary. The predominant party in Prussia regarded his political opinions with mistrust, and he was not offered an ordinary professorship until February 1873, after he had decided to accept a chair at the university of Munich. At Munich he passed the last nineteen years of his life. During the thirty years that he was professor he successively taught several branches of jurisprudence, but he was chiefly distinguished as an authority on criminal and international law. He was especially well fitted for organizing collective work, and he has associated his name with a series of publications of the first value. While acting as editor he often reserved for himself, among the independent monographs of which the work was composed, only those on subjects distasteful to his collaborators on account of their obscurity or lack of importance. Among the compilations which he superintended may be mentioned his Encydopddie der Rechtswissenschaft (Leipzig, 1870-1871, 2 vols.; his Handbuch des deutschen Strafrechts (Berlin, 1871- 1877, 4 vols.), and his Handbuch des V blkerrechts auf Grundlage europaischer Staatspraxis (Berlin, 1885-1890, 4 vols.). Among

his many independent works may be mentioned: Das irische Gefangnissystem (Leipzig, 1859), Franzosische Rechtszustdnde (Leipzig, 1859), Die Deportation als Strajmittel (Leipzig, 1859), Die Kiirzungsfdhigkeit der Freiheitsstrafen (Leipzig, 1861), Die Reform der Staatsanwaltschaft in Deutschland (Berlin, 1864), Die Umgestaltung der Staatsanwaltschaft (Berlin, 1865), Die Principien der Polilik (Berlin, 1869), Das Verbrechen des Mordes und die Todesstrafe (Berlin, 1875), Rumdniens Uferrechte an der Donau (Leipzig, 1883; French edition, 1884). He also edited or assisted in editing a number of periodical publications on legal subjects. From 1866 to the time of his death he was associated with Rudolf Ludwig Carl Virchow in editing Samm- lung gemeinverstdndlicher wissenschaftlicher Vortrage (Berlin). Von Holtzendorff died at Munich on the 4th of February 1889.

HOLTZMANN, HEINRICH JULIUS (1832-), German Protestant theologian, son of Karl Julius Holtzmann (1804- 1877), was born on the 17th of May 1832 at Karlsruhe, where his father ultimately became prelate and counsellor to the supreme consistory. He studied at Berlin, -and eventually (1874) was appointed professor ordinarius at Strassburg. A moderately liberal theologian, he became best known as a New Testament critic and exegete, being the author of the Commentary on the Synoptics (1889; 3rd ed., 1901), the Johannine books (1890; 2nd ed., 1893), and the Acts of the Apostles (1901), in the series Handkommentar zum Neuen

Testament. On the question of the relationship

Other noteworthy works are the Lehrbuch der histor.-kritischen Einleilung in das Neue Testament (1885, 3rd ed., 1892), and the Lehrbuch der neutestamentlichen Theologie (2 vols., 1896-1897). He also collaborated with R. ZopfFel in the preparation of a small Lexikonfiir Theologie und Kirchenwesen (1882; 3rd ed., 1895), and in 1 893 became editor of the Theol. Jahresbericht.

HOLUB, EMIL (1847-1902), Bohemian traveller in south- central Africa, was born at Holitz, eastern Bohemia, on the 7th of October 1847. He was educated at Prague University, where he graduated M.D. In 1872 he went to the Kimberley diamond-fields, and with the money earned by his practice as a surgeon undertook expeditions into the northern Transvaal, Mashonaland and through Bechuanaland to the Victoria Falls, making extensive natural history collections, which he brought to Europe in 1879 and distributed among over a hundred museums and schools. In 1883 he went back to South Africa with his wife, intending to cross the continent to Egypt. In June 1886 the party crossed the Zambezi west of the Victoria Falls, and explored the then almost unknown region between that river and its tributary the Kafue. When beyond the Kafue the camp was attacked by the Mashukulumbwe, and Holub was obliged to retrace his steps. He returned to Austria in 1887 with a collection of great scientific interest, of over 13,000 objects, now in various museums. Holub died at Vienna on the 21st of February 1902.

His principal works are : Eine Culturskizze des Marutse-Mambunda- reichs (Vienna, 1879); Sieben Jahre in Sudafrika, &c. (2 vols., Vienna, 1880-1881), of which an English translation appeared ; Die Colonisation Afrikas (Vienna, 1882) ; and Von der Kapstadt ins Land der Maschukulumbe (2 vols., Vienna, 1818-1890).

HOLY, sacred, devoted or set apart for religious worship ˆor observance; a term characteristic of the attributes of perfection and sinlessness of the Persons of the Trinity, as the objects of human worship and reverence, and hence transferred to those human persons who, either by their devotion to a spiritual ascetic life or by their approximation to moral perfection, are considered worthy of reverence. The word in Old Eng- lish was hdlig, and is common to other Teutonic languages; cf. Ger. and Dutch heilig, Swed. helig, Dan. hellig. It is derived from hal, hale, whole, and cognate with "health." The New English Dictionary suggests that the sense-develop- ment may be from " whole," i.e. inviolate, from " health,

well-being," or from " good-omen," " augury." It is impossible to get behind the Christian uses, in which from the earliest times it was employed as the equivalent of the Latin sacer and sanctus.

HOLY ALLIANCE, THE. The famous treaty, or declaration, known by this name was signed in the first instance by Alexander I., emperor of Russia, Francis I., emperor of Austria, and Frederick William III., king of Prussia, on the 26th of September 181 s, and was proclaimed by the emperor Alexander the same day at a great review of the allied troops held on the Champ des Vertus near Paris. The English version of the text is as follows : —

In the name of the Most Holy and Indivisible Trinity. Holy Alliance of Sovereigns of Austria, Prussia and Russia.

Their Majesties the Emperor of Austria, the King of Prussia, and the Emperor of Russia, having, in consequence of the great events which have marked the course of the three last years in Europe and especially of the blessings which it has pleased Divine Providence to shower down upon those States which place their confidence and their hope on it alone, acquired the intimate conviction of the necessity of settling the steps to be observed by the Powers, in their reciprocal relations, upon the sublime truths which the Holy Religion of our Saviour teaches;

Government and Political Relations. They solemnly declare that the present Act has no other object than to publish, in the face of the whole world, their fixed resolution, both in the administration of their respective States, and in their political relations with every other Government, to take for their sole guide the precepts of that Holy Religion, namely, the precepts vu, e ' Chnstlan Charity and Peace, which, far from being applicable only to private concerns, must have an immediate influence on the councils of Princes, and guide all their steps, as being the only means of consolidating human institutions and remedying their imperfections. In consequence, their Majesties have agreed on the following Articles : —

Principles of the Christian Religion.

Art. I. Conformably to the words of the Holy Scriptures which command all men to consider each other as brethren, the Three con- tracting Monarchs will remain united by the bonds of a true and indissoluble fraternity, and, considering each other as fellow country- men, they will, on all occasions and in all places, lend each other aid and assistance; and, regarding themselves towards their subjects and armies as fathers of families, they will lead them, in the same spirit of fraternity with which they are animated, to protect Religion Peace and Justice.

Fraternity and Affection.

Art. II In consequence, the sole principle of force, whether between the said Governments or between their Subjects, shall be that of doing each other reciprocal service, and of testifying by un- alterable good will the mutual affection with which they ought to be animated, to consider themselves all as members of one and the same Christian nation; the three allied Princes looking on themselves as merely delegated by Providence to govern three branches of the One family, namely, Austria, Prussia and Russia, thus confessing that the Christian world, of which they and their people form a part, has in reality no other Sovereign than Him to whom alone power really belongs, because in Him alone are found all the treasures of love science and infinite wisdom, that is to say, God, our Divine Saviour! the Word of the Most High, the Word of Life. Their Majesties consequently recommend to their people, with the most tender solicitude, as the sole means of enjoying that Peace which arises trom a good conscience, and which alone is durable, to strengthen themselves every day more and more in the principles and exercise of the duties which the Divine Saviour has taught to mankind.

Accession of Foreign Powers.

Art III. All the Powers who shall choose solemnly to avow the sacred principles which have dictated the present Act, and shall acknowledge how important it is for the happiness of nations too long agitated, that these truths should henceforth exercise over the destinies of mankind all the influence which belongs to them will be received with equal ardour and affection into this Holy Alliance.

The credit for inspiring this singular document was claimed by the Baroness von Krudener (q.v.) ; in- any case it was the outcome of the tsar's mood of evangelical exaltation, and was in its inception perfectly sincere. Neither Frederick William nor Francis signed willingly, the latter remarking that " if it was a question of politics, he must refer it to his chancellor, if of religion, to his confessor." Metternich called it a " loud-sounding nothing," Castlereagh, "a piece of sublime mysticism and nonsense." None the less, in accordance with its last article, the signatures of all the European sovereigns were invited to the

instrument, the pope and the Ottoman sultan alone being excepted. The prince regent courteously declined to sign, on the constitutional ground that all acts of the British crown required the counter-signature of a minister, but he sent a letter expressing his " entire concurrence with the principles

laid down by the ‘ august sovereigns ‘ and stating that it would always be his endeavour to regulate his conduct by their ‘ sacred maxims.’ ” With these exceptions, all the European sovereigns sooner or later appended their names.

In popular parlance, which has found its way into the language of serious historians, the “Holy Alliance” soon became synonymous with the combination of the great powers by whom Europe was ruled in concert during the period of the congresses, and associated with the policy of reaction which gradually dominated their counsels. For the understanding of the inner history of the diplomacy of this period, however, a clear distinction must be drawn between the Holy Alliance and the Grand or Quadruple (Quintuple) Alliance. The Grand Alliance was established on definite treaties concluded for definite purposes, of which the chief was the preservation of peace on the basis of the territorial settlement of 1815. The Holy Alliance was a general treaty— hardly indeed a treaty at all— which bound its signatories to act on certain vague principles for no well-defined end; and in its essence it was so far from necessarily reactionary that the emperor Alexander at one time declared that it involved the grant of liberal constitutions by princes to their subjects. Its main significance was due to the persistent efforts of the tsar to make it the basis of the ” universal union,” or general con- federation of Europe, which he wished to substitute for the actual committee of the great powers, efforts which were frustrated by the vigorous diplomacy of Castlereagh, acting as the mouthpiece of the British government (see Europe: History; Alexander I. of Russia; Londonderry, Robert Stewart

2ND MARQUIS Of). ‘

As a diplomatic instrument the Holy Alliance never, as a matter of fact, became effective. None the less, its principles and the fact of its signature powerfully affected the course of European diplomacy during the 19th century. It strongly influenced the emperor Nicholas I. of Russia, to whom the brotherhood of sovereigns by divine right was an article of faith, inspiring the principles of the convention of Berlin (between Russia, Austria and Prussia) in 1833, and the tsar’s intervention in 1849 to crush the Hungarian insurrection on behalf of his brother of Austria. That it had become synonymous with a conspiracy against popular liberties was, however, a mere accident of the point of view of those who interpreted its prin- ciples. It was capable of other and more noble interpretations, and it was avowedly the inspiration of the famous rescript of the emperor Nicholas II., embodied in the circular of Count Muraviev to the European courts (August 4 th, 1898), which issued in the first international peace conference at the Hague in 1899. (w A _ p)

HOLYHEAD (Caergybi, the fort of Cybi, the saint mentioned by Matthew Arnold as meeting St Seiriol of Penm6n, Anglesey), a seaport and market-town of Anglesey, N. Wales, situated on the small Holy Island, at the western end of the county. Pop. of urban district (1901) 10,079. Here the London and North- western railway has a terminus, 263! m. from London by rail. Holy Island is connected with Anglesey by an embankment, 1 m. long, over which pass the railway and main road, the tide flowing fast under the central piers. Once a small fishing village, the town has since William IV. 's reign acquired importance <& the Dublin mail steam station. Its magnificent harbour of refuge was begun in 1847 and opened in September 1873. The east breakwater scheme, which would have covered the Platter's rocks— still very troublesome— and the Skinner's, was abandoned for buoys which mark the spots. The north breakwater is 7860 ft. long (instead of 5360, as originally planned). The roadstead (400 acres) and enclosed area (267 acres) together make a magnificent shelter for shipping. The rubble mound of the breakwater was very costly to the railway company, as time afˆr time it was swept away by storms. On it is a centra]

wall of some 38 ft. above low water, and on the wall a promenade sheltered by a parapet. The lighthouse is at the end of the breakwater, of which the whole cost was nearly i| million sterling. Additional works, begun in 1873 by the company, to extend the old harbour and lengthen the quay by 4000 ft., were opened by King Edward VII. (as prince of Wales) in 1880. These cost another half million. George IV. passed through Holyhead in 182 1 on his way to Ireland, and there is a com- memorative tablet on the old harbour pier. The church is said to occupy the site of the old monastery (6th or early 7 th century) of St Cybi, of whom there is a rude figure in the porch. The churchyard wall, 6 ft. thick, is possibly partly Roman. On the south of the harbour is an obelisk in memory of Captain Skinner, of the steam packets, washed overboard in 1833. Pen Caergybi rises perpendicularly from the sea to the height of 719 ft., at some 2 m. from the town; it is a mass of serpentine rocks, off which lie the North and South Stacks, each with a lighthouse with a revolving light, visible for 20 m., and 197 ft. above high water on the South Stack. On the hill are traces of British fortification, including a circular building, probably a Roman watch-tower. Coasting trade and fishing, with some shipbuilding and the Irish traffic, occupy most of the inhabitants. See Hon. W. Stanley's Holy Island and Holyhead.

HOLY ISLAND, or Lindisfarne, an irregularly shaped island in the North

Sea, 2 m. from the coast of Northumberland, in which county it is included. Pop. (1901) 405. It is joined to the mainland at low water by flat sands, over which a track, marked by wooden posts and practicable for vehicles, leads to the island. There is a station on the North-Eastern railway at Beal, 9 m. S.E. of Berwick, opposite the island, but ii m. inland. The island measures 3 m. from E. to W. and i| N. to S., extreme distances. Its total area is 105 1 acres. On the N. it is sandy and barren, but on the S. very fertile and under cultivation. Large numbers of rabbits have their warrens among the sands, and, with fish, oysters and agricultural produce, are exported. There are several fresh springs on the island, and in the north- east is a lake of 6 acres. At the south-west angle is the little fishing village (formerly much larger) which is now a favourite summer watering-place. Here is the harbour, offering good shelter to small vessels. Holy Island derives its name from a monastery founded on it by St Aidan, and restored in 1082 as a cell of the Benedictine monastery at Durham. Its ruins, still extensive and carefully preserved, justify Scott's description of it as a " solemn, huge and dark-red pile." An islet, lying off the S.W. angle, has traces of a chapel upon it, and is believed to have offered a retreat to St Cuthbert and his successors. The castle, situated east of the village, on a basaltic rock about 90 ft. high, dates from c. 1500.

When St Aidan came at the request of King Oswald to preach to the Northumbrians he chose the island of Lindisfarne as the site of his church and monastery, and made it the head of the diocese which he founded in 635. For some years the see con- tinued in peace, numbering among its bishops St Cuthbert, but in 793 the Danes landed on the island and burnt the settle- ment, killing many of the monks. The survivors, however, rebuilt the church and continued to live there until 883, when, through fear of a second invasion of the Danes, they fled inland, taking with them the body of St Cuthbert and other holy relics. The church and monastery were again destroyed and the bishop and monks, on account of the exposed situation of the island, determined not to return to it, and settled first at Chester-le-Street and finally at Durham. With the fall of the monastery the island appears to have become again untenanted, and probably continued so until the prior and convent of Durham established there a cell of monks from their own house. The inhabitants of Holy Island were governed by two bailiffs at least as early as the 14th century, and, according to J. Raine in his History of North Durham (1852), are called " burgesses or freemen " in a private paper dated 1728. In 1323 the bailiffs and community of Holy Island were commanded to cause all ships of the burthen of thirty tons or over to go to Ereswell with their ships provisioned for a month at least and under

double manning to be ready to set out on the kings service. Towards the end of the 16th century the fort on Holy Island was garrisoned for fear of

foreign invasion by Sir William Read, who found it very much in need of repair, the guns being so decayed that the gunners " dare not give fire but by trayne," and the master gunner had been " miserably slain " in discharg- ing one of them. During the Civil Wars the castle was held for the king until 1646, when it was taken and garrisoned by the parliamentarians. The only other historical event connected with the island is the attempt made by two Jacobites in 1715 to hold it for the Pretender.

HOLYOAKE, GEORGE JACOB (1817-1906), English secularist and co-operator, was born at Birmingham, on the 13th of April 181 7. At an early age he became an Owenite lecturer, and in 1 84 1 was the last person convicted for blasphemy in a public lecture, though this had no theological character and the in- criminating words were merely a reply to a question addressed to him from the body of the meeting. He nevertheless under-went six months' imprisonment, and upon his release invented the inoffensive term " secularism " as descriptive of his opinions, and established the Reasoner in their support. He was also the last person indicted for publishing an unstamped newspaper, but the prosecution dropped upon the repeal of the tax. His later years were chiefly devoted to the promotion of the co- operative movement among the working classes. He wrote the history of the Rochdale Pioneers (1857), The History of Co-operation in England (1875; revised ed., 1906), and The Co-operative Movement of To-day (1891). He also published (1892) his autobiography, under the title of Sixty Years of an Agitator's Life, and in 1905 two volumes of reminiscences, Bygones worth Remembering. He died at Brighton on the 22nd of January 1906.

See J. McCabe, Life and Letters of G. J. Holyoake (2 vols., 1908) ; C. W. F. Goss, Descriptive Bibliography of the Writings of G. J. Holyoake (1908).

HOLYOKE, a city of Hampden county, Massachusetts, U.S.A., in a bend of the Connecticut river, about 8 m. N. of Springfield. Pop. (1880) 21,915; (1890) 35,637; (1900) 45,712; (1910 census) 57,730. Of the total population in 1900, 18,921 were foreign-born, including 6991 French-Canadians, 5650 Irish, 1602 Germans and n 18 English; and 33,626 were of foreign parentage (both parents foreign-born), including 12,370 of Irish and 11,050 of French-Canadian parentage. The city's area is about 17 sq. m. The city is served by the Boston & Maine, and the New York, New Haven & Hartford railways, and by an interurban line. Holyoke is characteristically an industrial and mercantile city; it has some handsome public buildings (the city hall and the public library, founded in 1870, being especially noteworthy) and attractive environs. Holyoke is the railway station for Mt Holyoke College, in South Hadley, about 4 m. N. by E. of Holyoke; the city is connected with South Hadley by an electric line. Just above Holyoke the Connecticut leaves the rugged highlands through a

rift between Mt Tom (1214 ft.; ascended by a mountain-railway from Holyoke) and Mt Holyoke (954 ft.), and begins a meandering valley course, falling (in the Hadley Falls) in great volume some 60 ft. in about 15 m. The water-power was unutilized until 1849, when a great dam (1017 ft. long) was completed, which enabled vast power to be developed along a series of canals laid out from the river. This was, in its day, a colossal under- taking; and its success transformed Holyoke from a farming village into a great manufacturing centre — in 1900 and 1905 the ninth largest of the commonwealth. In 1900 a stone dam (1020 ft.), said to be the second largest in New England, was completed at a cost of about $750,000. Cotton manufactures first, and later paper products were chief in importance, and Holyoke now leads all the cities in the United States in the manufacture of fine paper. In 1905 the total value of all factory products was $30,731,332, of which $10,620,255 (or 34-6% of the total) represented paper and wood pulp; $5,019,817, cotton goods; $1,318,409, woollen goods; $1,756,473, book binding and blank books, and $2,022,759, foundry and machine-shop

products. Silk and worsted goods are 'other important manu- factures. Opposite Holyoke, in Hampshire county, is South Hadley Falls. The municipality owns and operates the gas and electric-lighting plants and the water works (the water- supply being derived from natural ponds, some of which are outside the city limits), and owns and leases (to the New York, New Haven & Hartford railroad) a railway extending (10-3 m.) to Westfield, Mass. Holyoke was originally a part of Springfield, and after 1774 of West Springfield. In 1850 it was incorporated as a township, and in 1873 was chartered as a city.

HOLYSTONE, a soft kind of sandstone used by sailors for scrubbing and cleaning the decks of ships. The origin of the word is doubtful. Some authorities hold that it arose from the general practice of scrubbing the decks for Sunday service; while others think the name arises from the fact that the stone so employed is naturally porous and full of holes. A small flint or stone having a natural hole in it, and worn as a charm, is also called a holy- stone.

HOLY WATER, technically the water with which Christian believers sign the cross on their foreheads on entering or leaving church. The edict of Gratian lays down that it should be exorcized and blessed by the priest and sprinkled with exorcized salt. This rite is found in the Gelasian, Gregorian and other sacramentaries. In the East the water was blessed once a month,

in the Latin Church it is now blessed every Sunday. In the 4th century in the East it was usual to wash the hands on entering the church (see Ablution).

In the early church water was not expressly consecrated for baptisms and other lustrations. " Water," says Tertullian in his tract on baptism, " was the abode at the first of the divine Spirit, being more acceptable then (to God) than the other elements." He pictures the world in the beginning: " total darkness, formless as yet, without tending of stars, the melancholy abyss, the earth unprepared, the heaven undevelopt. The liquid alone an ever perfect material, smiling, simple, pure in its own right, as a worthy vehicle underlay the God." Water was similarly pure in itself in the old Persian religion.

The Canons of Hippolylus, or Egyptian church order, of about a.d. 250, give no prayer for consecration of fonts, but enact that " at cock crow the baptismal party shall take their stand near waving water, pure, prepared, sacred, of the sea." The Teaching of the Apostles, c. 100, merely insists on " living," that is, clear and running water. The ancient feeling, especially Jewish, was that in lustrations the same water must not pass twice over the body. A stagnant pool was useless. Bubbling waters too seemed to have a spirit in them.

Either because running water was not always at hand, or as part of the growing tendency of the church to multiply ceremonies, rituals arose late in the 3rd century for consecrating water. The sacramentary of Serapion, c. 350, provides a prayer asking that the divine Word may descend into the water and hallow it, as of old it hallowed the Jordan. In the Roman order of baptism the priest prays that " the font may receive the grace of the only begotten Son from the holy Spirit, and that the latter may impregnate with hidden admixture of His light this water prepared for the regeneration of mankind, to the end that man through a sanctification conceived from the immaculate womb of the divine font, may emerge a heavenly offspring reborn as a new creature." The water is then exorcized and evil spirits warned off, and lastly blessed. During the prayer the priest twice signs the water with the cross, and once blows upon it.

The first mention of a special consecration of water for other ends than baptism is in the Acts of Thomas (? a.d. 200); it is for the purgation of a youth already baptized who had killed his mistress because she would not live chastely with him. The apostle prays: " Fountain sent unto us from Rest, Power of Salvation from that Power proceeding which overcomes and subjects all to its own will, come and dwell within these waters, that the Charisma (gift) of the holy Spirit may be fully perfected through them." The youth then washes his hands, which on touching the sacrament had

withered up, and is healed.

The church shared the universal belief that holiness or the holy

Spirit is quasi-material and capable of being held in suspense in water, just as sin is a half material infection, absorbed and carried away by it. So Tertullian writes: "The water which carried the Spirit of God (probably regarded as a shadow or reflection-soul) borrowed holiness from that which was carried upon it; for every underlying matter must needs absorb and take up the quality of that matter which overhangs it; especially does a corporeal so absorb a spiritual, as this can easily penetrate and settle into it owing to the subtlety of its substance."

" Water, " he continues, " was generically hallowed by the Spirit of God brooding over it at creation, and therefore all special waters are holy, and at once obtain the sacrament of sanctification when God is invoked (over them.) For .the Spirit from heaven instantly supervenes and is upon the waters, hallow- ing them out of itself, and being so hallowed they drink up a power of hallowing."

What is done in material semblance, he then argues, is repeated in the unseen medium of the Spirit. The stains of idolatry, vice and fraud are not visible on the flesh, yet they resemble real dirt. " The waters are medicated in a manner through the intervention of the angel, and the Spirit is corporeally washed in the water and the flesh is spiritually purified in the same."

Tertullian believed that an angel was sent down, when God was invoked, like that which stirred the pool of Bethesda. As regards rival Isiac and Mithraic baptisms, he asserts that their waters are destitute of divine power; nay, are rather tenanted by the devil who in this matter sets himself to rival God. " With- out any religious rite at all," he urges, " unclean spirits brood upon waters, aspiring to repeat that primordial gestation of the divine Spirit." And he instances the " darkling springs and lonely rivers which are said to snatch, to wit by force of a harmful spirit." In the sequel he defines the role of the angel of baptism who does not infuse himself in waters, already holy from the first; but merely presides over the washing of the faithful, and ensures their being made pure for the reception of the holy Spirit in the rite of confirmation which immediately follows. " The devil who till now ruled over us, we leave behind overwhelmed in the water."

From all this we conclude that what is poetry to us — akin to the folk-lore of water-sprites, naiads, kelpies, river-gods and water-worship in general — was to Tertullian and to the genera- tions of believers who fashioned the baptismal rites, ablutions and beliefs of the church, nothing less than grim

reality and unquestionable fact.

See John, marquess of Bute, and E. A. Wallis Budge, The Blessing of the Waters (London, 1901); E. B. Tylor, Primitive Culture (London, 1903). (F. C. C.)

HOLY WEEK (tp'Sojuas fieyakri, ayla or ruv aylwv, %qpo4 > ayLaS, airpaKTOs, also iˆuepcu iraBrip,a.Twv, 17/jepat oraupaxrijuai: hebdomas [or septimana] major, sancta, authentica [i.e. canonizata, du Cange], ultima, poenosa, luctuosa, nigra, inofjiciosa, muta, cruris, lamentationum, indulgentiae) , in the Christian ecclesiastical year the week immediately preceding Easter. The earliest allusion to the custom of marking this week as a whole with special observances is to be found in the Apostolical Constitutions (v. 18, 19), dating from the latter half of the 3rd century a.d. Abstinence from wine and flesh is there commanded for all the days, while for the Friday and Saturday an absolute fast is enjoined. Dionysius Alexandrinus also, in his canonical epistle (260 A.D.), refers to the six fasting days («£ tSjv vr)

in the early church was associated with an expectation that the second advent would occur on an Easter Sunday.

For details of the ceremonial observed in the Roman Catholic Church during this week, reference must be made to the Missal and Breviary. In the Eastern Church the week is marked by similar practices, but with less elaboration and differentiation of rite. See also Easter, Good Friday, Maundy Thursday, Palm Sunday and Passion Week.

HOLYWELL {Tre'fynnon, well-town), a market town and contributory parliamentary borough of Flintshire, N. Wales, situated on a height near the left bank of the Dee estuary, 196 m. from London by the London & North-Western railway (the station being 2 m. distant). Pop. of urban district (1901) 2652. The parish church (1769) has some columns of an earlier building, interesting brasses and strong embattled tower. The remains of Basingwerk Abbey {Maes glas, green field), partly Saxon and partly Early English, are near the station. It is of uncertain origin but was used as a monastery before 1119. In 1131 Ranulph, 2nd earl of Chester, introduced the Cistercians. In 1535, when its revenues were £150, 7s. 3d., it was dissolved, but revived under Mary I. and used as a Roman Catholic burial place in 1647. Scarcely any traces remain of Basingwerk castle, an old fort. Small up to the beginning of the 19th century, Holywell has

increasingly prospered, thanks to lime quarries, lead, copper and zinc mines, smelting works, a shot manufactory, copper, brass, iron and zinc works; brewing, tanning and mineral water, flannel and cement works. St Winifred's holy well, one of the wonders of Wales, sends up water at the rate of 21 tons a minute, of an almost unvarying temperature, higher than that of ordinary spring water. To its curative powers many crutches and ex voto objects, hung round the well, as in the Lourdes Grot, bear ample witness. The stones at the bottom are slightly reddish, owing to vegetable substances. The well itself is covered by a fine Gothic building, said to have been erected by Margaret, countess of Richmond and mother of Henry VII., with some portions of earlier date. The chapel (restored) is used for public service. Catholics and others visit it in great numbers. There are swimming baths for general use. In 1870 a hospice for poorer pilgrims was erected. Other public buildings are St Winifred's (Catholic) church and a convent, a town hall and a market-hall. The export trade is expedited by quays on the Dee.

HOLYWOOD, a seaport of county Down, Ireland, on the east shore of Belfast Lough, 45 m. N.E. from Belfast by the Belfast & County Down railway. Its pleasant situation renders it a favourite residential locality of the wealthier classes in Belfast. There was a religious settlement here from the 7th century, which subsequently became a Franciscan monastery. The old church dating from the late 12th or early 13th century marks its site. A Solemn League and Covenant was signed here in 1644 for the defence of the kingdom, and the document is preserved at Belfast. HOLZMINDEN, a town of Germany, in the duchy of Bruns- wick, on the right bank of the Weser, at the foot of the Sollinger Mountains, at the junction of the railways Scherfede-Holz- minden and Soest-Borssum, 56 m. S.W. of Brunswick. Pop. (1905) 9938. It has an Evangelical and a Roman Catholic church, a gymnasium, an architectural school and a school of engineering. The prosperity of the town depends chiefly on agriculture and the manufacture of iron and steel wares, and of chemicals, but weaving and the making of pottery are also carried on, and there are baryta mills and polishing-mills for sandstone. By means of the Weser it carries on a lively trade. Holzminden obtained municipal rights from Count Otto of Eberstein in 1245, and in 1410 it came into the possession of Brunswick.

HOLZTROMPETE (Wooden Trumpet), an instrument some- what resembling the Alpenhorn (q.v.) in tone-quality, designed by Richard Wagner for representing the natural pipe of the peasant in Tristan and Isolde. This instrument is not unlike the cor anglais in rough outline, being a conical tube of approxi- mately the same length, terminating in a small globular bell, but having neither holes nor keys; it is blown through a cup-shaped mouthpiece made of horn. The Holztrompete is in

the key of C; the scale is produced by overblowing, whereby the upper partials from the 2nd to the 6th are produced. A single piston placed at a third of the distance from the mouth- piece to the bell gives the notes D and F. Wagner inserted a

note in the score concerning the _ˆ ~ˆa

*cor anglais for which the part (tˆˆfpjˆPˆFˆ i~ˆI_I~l was originally scored, and advised *> & -~ 3~~ 4 ? t*

the use of oboe or clarinet to Harmonic Series.

reinforce the latter, the effect intended being that of a powerful natural instrument, unless a wooden instrument with a natural scale be specially made for the part, which would be preferable. The Holztrompete was used at Munich for the first performance of Tristan and Isolde, and was still in use there in 1897. At Bayreuth it was also used for the Tristan performances at the festivals of 1886 and 1889, but in 1891 W. Heckel's clarina, an instrument partaking of the nature of both oboe and clarinet, was substituted for the Holztrompete and has been retained ever since, having been found more effective. 1 (K. S.)

HOMAGE (from homo, through the Low Lat. hominaticum, which occurs in a document of 1035), one °f the ceremonies used in the granting of a fief, and indicating the submission of a vassal to his lord. It could be received only by the suzerain in person. With head uncovered the vassal humbly requested to be allowed to enter into the feudal relation; he then laid aside his sword and spurs, ungirt his belt, and kneeling before his lord, and holding his hands extended and joined between the hands of his lord, uttered words to this effect: " I become your man from this day forth, of life and limb, and will hold faith to you for the lands I claim to hold of you." The oath of fealty, which could be received by proxy, followed the act of homage; then came the ceremony of investiture, either directly on the ground or by the delivery of a turf, a handful of earth, a stone, or some other symbolical object. Homage was done not only by the vassal to whom feudal lands were first granted but by every one in turn by whom they were inherited, since they were not granted absolutely but only on condition of military and other service. An infant might do homage, but he did not thus enter into full possession of his lands. The ceremony was of a preliminary nature, securing that the fief would not be alienated; but the vassal had to take the oath of fealty, and to be formally invested, when he reached his majority. The obligations involved in the act of homage were more general than those associated with the oath of fealty, but they provided a strong moral sanction for more specific engagements. They essentially resembled the obligations undertaken towards a Teutonic chief by the members of his

” comitatus ” or ” gefolge,” one of the institutions from which feudalism directly sprang. Besides homagium ligeum, there was a kind of homage which imposed no feudal duty; this was homagium per paragium, such as the dukes of Normandy rendered to the kings of France, and as the dukes of Normandy received from the dukes of Brittany. The act of liege homage to a particular lord did not interfere with the vassal’s allegiance as a subject to his sovereign, or with his duty to any other suzerain of whom he might hold lands.

The word is also used of the body of tenants attending a manorial court, or of the court in a court baron (consisting of the tenants that do homage and make inquiries and presentments, termed a homage jury) .

HOMBERG, WILHELM (1652-1715), Dutch natural philo- sopher, was the son of an officer of the Dutch East India Company, and was born at Batavia (Java) on the 8th of January 1652. Coming to Europe with his family in 1670, he studied law at Jena and Leipzig, and in 1674 became an advocate at Magdeburg. In that town he made the acquaintance of Otto von Guericke, and under his influence determined to devote himself to natural science. He, therefore, travelled in various parts of Europe for study, and after graduating in medicine at Wittenberg, settled in Paris in 1682. From 1685 to 1690 he practised as a physician at Rome; then returning to Paris in 1691, he was elected a member of the Academy of Sciences and appointed director of 1 Communicated by Madame Wagner, December 28th, 1897.

its chemical laboratory. Subsequently he became teacher of physics and chemistry (1702), and private physician (1705) to the duke of Orleans. His death occurred at Paris on the 24th of September 1715. Homberg was not free from alchetnistical tendencies, but he made many solid contributions to chemical and physical knowledge, recording observations on the prepara- tion of Kunkel’s phosphorus, on the green colour produced in flames by copper, on the crystallization of common salt, on the salts of plants, on the saturation of bases by acids, on the freezing of water and its evaporation in vacuo, &c. Much of his work was published in the Recueil de V Academie des Sciences from 1692 to 1714. The Sal Sedativum Hombergi is boracic acid, which he discovered in 1702, and ” Homberg’s phosphorus” is prepared by fusing sal-ammoniac with quick lime.

HOMBURG-VOR-DER-HOHE, a town and watering-place of Germany, in the Prussian province of Hesse-Nassau, prettily situated at the south-east

foot of the Taunus Mountains, 12 m. N. of Frankfort -on-Main, with which it is connected by rail. Pop. (1905) 13,740. Homburg consists of an old and a new town, the latter, founded by the landgrave of Hesse-Homburg Frederick II. (d. 1708), being regular and well-built. Besides the palatial edifices erected in connexion with the mineral water-cure, there are churches of various denominations, Lutheran, Roman Catholic, Russian-Greek and Anglican, schools and benevolent institutions. On a neighbouring hill i lands the palace of the former landgraves, built in 1680 and subsequently enlarged and improved. The White Tower, 183 ft. in height, is said to date from Roman times, and certainly existed under the lords of Eppstein, who held the district in the 12th century. The palace is surrounded by extensive grounds, laid out in the manner of an English park. The eight mineral springs which form the attraction of the town to strangers belong to the class of saline acidulous chalybeates and contain a considerable proportion of carbonate of lime. Their use is beneficial for diseases of the stomach and intestines, and. ;xternally, for diseases of the skin and rheumatism. The establishments connected with the springs are arranged on a scale of great magnificence, and include the Kurhaus (built 1841-1843), with a theatre, the Kaiser Wilhelmsbad and the Kurhausbad. They lie grouped round a pretty park which also furnishes the visitors with facilities for various recreations, such as lawn tennis, croquet, polo and other games. The industries of Homburg embrace iron founding and the manu- facture of leather and hats, but they are comparatively un-important, the prosperity of the town being almost entirely due to the annual influx of visitors, which during the season from May to October inclusive averages 12,000. In the beautiful neighbourhood lies the ancient Roman castle of Saalburg, which can be reached by an electric tramway.

Homburg first came into repute as a watering-place in 1834, and owing to its gaming-tables, which were set up soon after, it rapidly became one of the favourite and most fashionable health-resorts of Europe. In 1849 the town was occupied by Austrian troops for the purpose of enforcing the imperial decree against gambling establishments, but immediately on their withdrawal the bank was again opened, and play continued unchecked until 1872, when the Prussian government refused to renew the lease for gambling purposes, which then expired. As the capital of the former landgraviate of Hesse-Homburg, the town shared the vicissitudes of that state.

Homburg is also the name of a town in Bavaria. Pop. (1900) 47S5. It has a Roman Catholic and an Evangelical church, and manufactures of iron goods. In the neighbourhood are the ruins of the castles of Karlsberg and of Hohenburg. The family of the counts of Homburg became extinct in the 15th century. The town came into the possession of Zweibriicken in 1755 and later into that of Bavaria.

See Supp, Bad Homburg (7th ed., Homburg, 1903) ;. Baumstark, B'ld Homburg und seine Heilquellen (Wiesbaden, 1901); Schiek, Hombwg und Umgebung (Homburg, 1896); Will, Der Kurort Homburg, seine Mineralquellen (Homburg, 1880); Hoeben, Bad Homburg und sein Heilapparat (Homburg, 1901); and N. E. Yorke- Davies. Homburg and its Waters (London, 1897).

HOME, EARLS OF. Alexander Home or Hume, 1st earl of Home (c. 1566-1619), was the son of Alexander, 5th Lord Heme (d. 1575), who fought against Mary, queen of Scots, at Carberry Hill and at Langside, but was afterwards one of her most stalwart supporters, being taken prisoner when defending Edinburgh castle in her interests in 1573 and probably dying in captivity. He belonged to an old and famous border family, an early member of which, Sir Alexander Home, was killed at the battle of Verneuil in 1424. This Sir Alexander was the father of Sir Alexander Flome (d. 1456), warden of the marches and the founder of the family fortunes, whose son, another Sir Alexander (d. 1491), was created a lord of parliament as Lord Home in 1473, being one of the band of nobles who defeated the forces of King James III. at the battle of Sauchieburn in 1488. Other distinguished members of the family were: the first lord's grandson and successor, Alexander, 2nd Lord Home (d. 1506), chamberlain of Scotland; and the latter's son, Alexander, 3rd Lord Home (d. 1 5 16), a person of great importance during the reign of James IV., whom he served as chamberlain. He fought at Flodden, but before the death of the king he had led his men away to plunder. During the minority of the new king, James V., he was engaged in quarrelling with the regent, John Stewart, duke of Albany, and in intriguing with England. In September 1 5 16 he was seized, was charged with treachery and beheaded, his title and estates being restored to his brother George in 1522. George, who was killed in September 1547 during a skirmish just before the battle of Pinkie, was the father of Alexander, the 5th lord.

Alexander Home became 6th Lord Home on his father's death in August 1575, and took part in many of the turbulent incidents which marked the reign of James VI. He was warden of the east marches, and was often at variance with the Hepburns, a rival border family whose head was the earl of Bo.thwell; the feud between the Homes and the Hepburns was an old one, and it was probably the main reason why Home's father, the 5th lord, sided with the enemies of Mary during the period of her intimacy with Bothwell. Home accompanied James to England in 7603 and was created earl of Home in 1605; he died in April 1619

His son James, the 2nd earl, died childless in 1633 when bis titles passed to a distant kinsman, Sir James Home of Colding- knows (d. 1666), a descendant of the 1st Lord Home. This earl was in the Scottish ranks at the

battle of Preston and lost his estates under the Commonwealth, but these were restored to him in 1661. His descendant, William, the 8th earl (d. 1761) fought on the English side at Prestonpane, and from his brother Alexander, the 9th earl (d. 1786), the present earl of Home is descended. In 1875 Cospatrick Alexander, the nth earl (1 799-1881), was created a peer of the United Kingdom as Baron Douglas, and his son Charles Alexander, the 12th earl (b. 1834), took the additional name of Douglas. The principal strongholds of the Homes were Douglas castle in Haddington and Home castle in Berwickshire.

See H. Drummond, Histories of Noble British Families (1846).

HOME, DANIEL DUNGLAS (1833-1886), Scottish spiritualist, was born near Edinburgh on the 20th of March 1833, his father being said to be a natural son of the 10th earl of Home, and his mother a member of a family credited with second sight. He went with his mother to America, and on her death was adopted by an aunt. In the United States he came out as a spiritualistic medium, though, it should be noted, he never sought to make money out of his exhibitions. In 1855 he came to England and gave numerous seances, which were attended by many well- known people. Robert Browning, the poet, went to one of these, but without altering his contempt for spiritualism, and he subsequently gave his impression of Home in the unflattering poem of "Sludge the Medium" (1864); Home, nevertheless, had many disciples, and gave seances at several European courts. He became a Roman Catholic, but was expelled from Rome as a sorcerer. In 1866 Mrs Lyon, a wealthy widow, adopted him as her son, and settled £60,000 upon him. Repenting, however, of her action, she brought a suit for the return of her money,

on the ground that it had been obtained by " spiritual " influence. It was held that the burden of establishing the validity of the ˆift lay on Home, and as he failed to do so the case was decided against him. He continued, however, to give seances, mostly on the Continent, and in 187 1 appeared before the tsar of Russia and two Russian scientists, who attested the phenomena evoked. Returning to England he submitted to a series of experiments designed to test his pretensions before Professor (subsequently Sir William) Crookes, which the latter declared to be thoroughly genuine; and Professor von Boutlerow, of the Russian Academy of Science, after witnessing a similar series of experiments, expressed the same opinion. Home published two volumes of Incidents of my Life and Lights and Shadows of Spiritualism. He married successively two well-connected

Russian ladies. He died at Auteuil, France, on the 21st of June 1886.

HOME, JOHN (17 22-1808), Scottish dramatic poet, was born on the 22nd of September 1722 at Leith, where his father, Alexander Home, who was distantly related to the earls of Home, filled the office of town-clerk. He was educated at the grammar school of his native town, and at the university of Edinburgh, where he graduated M.A. in 1742. Though he showed a fondness for the profession of arms, he studied divinity, and was licensed by the presbytery of Edinburgh in 1745. In the same year he joined as a volunteer against the Pretender, and was taken prisoner at the battle of Falkirk (1746). With many others he was carried to the castle of Doune in Perthshire, but soon effected his escape. In July 1746 Home was presented to the parish of Athelstaneford, Haddingtonshire, vacant by the death of Robert Blair, the author of The Grave. He had leisure to visit his friends and became especially intimate with David Hume who belonged to the same family as himself. His first play, Agis: a tragedy, founded on Plutarch's narrative, was finished in 1747. He took it to London and submitted it to Garrick for representation at Drury Lane, but it was rejected as unsuitable for the stage. The tragedy of Douglas was sug- gested to him by hearing a lady sing the ballad of Gil Morrice or Child Maurice (F. J. Child, Popular Ballads, ii. 263). The ballad supplied him with the outline of a simple and striking plot. After five years' labour he completed his play, which he took to London for Garrick's opinion. It also was rejected, but on his return to Edinburgh his friends resolved that it should be brought out in that city. It was produced on the 14th of December 1756 with overwhelming success, in spite of the opposition of the presbytery, who summoned Alexander Carlyle to answer for having attended its representation. Home wisely resigned his chapge in 1757, after a visit to London, where Douglas was brought out at Covent Garden on the 14th of March. Peg Woffington played Lady Randolph, a part which found a later exponent in Mrs Siddons. David Hume summed up his admiration for Douglas by saying that his friend possessed " the true theatric genius of Shakespeare and Otway, refined from the unhappy barbarism of the one and licentiousness of the other." Gray, writing to Horace Walpole (August, 1757), said that the author " seemed to have retrieved the true language of the stage, which has been lost for these hundred years," but Samuel Johnson held aloof from the general enthusiasm, and averred that there were not ten good lines in the whole play (Boswell, Life. ed. Croker, 1848, p. 390). In 1758 Home became private secretary to Lord Bute, then secretary of state, and was appointed tutor to the prince of Wales; and in 1760 his patron's influence procured him a pension of £300 per annum and in 1763 a sinecure worth another £300. Garrick produced Agis at Drury Lane on the 21st of February 1758. By dint of good acting and powerful support, according to Genest {Short Account &c, iv. 513 seq.),

the piece kept the stage for eleven days, but it was lamentably inferior to Douglas. In 1760 his tragedy, The Siege of Aquileia, was put on the stage, Garrick taking the part of Aemilius. In 1769 his tragedy of- The Fatal Discovery had a run of nine nights; Alonzo also (1773) had fair success in the representation; but his last tragedy, Alfred (1778), was so coolly received that he gave up writing for the stage. In 1778 he joined a regiment formed by the duke of Buccleuch.

He sustained severe injuries in a fall from horseback which permanently affected his brain, and was persuaded by his friends to retire. From 1767 he resided either at Edinburgh or at a villa which he built at Kilduff near his former parish. It was at this time that he wrote his History of the Rebellion of 1745, which appeared in 1802. Home died at Merchiston Bank, near Edinburgh, on the 5th of September 1808, in his eighty-sixth year.*

The Works of John Home were collected and published by Henry Mackenzie in 1822 with " An Account of the Life and Writings of Mr John Home," which also appeared separately in the same year, but several of his smaller poems seem to have escaped the editor's observation. These are — " The Fate of Caesar," "Verses upon Inveraray," " Epistle to the Earl of Eglintoun," "Prologue on the Birthday of the Prince of Wales, 1759 " and several " Epigrams," which are printed in vol. ii. of Original Poems by Scottish Gentlemen (1762). See also Sir W. Scott, "The Life andWorks of John Home" in the Quarterly Review (June, 1827). Douglas is included in numer- ous collections of British drama. Voltaire published his Le Caffe, ou V Ecossaise (1760), Londres (really Geneva), as a translation from the work of Mr Hume, described as pasteur de I'eglise d' Edimbourg, but Home seems to have taken no notice of the mystification.

HOMEL, or Gomel, a town of Russia, in the government of Mogilev, and 132 m. by rail S.S.E. of the town of Mogilev, on the Sozh, a tributary of the Dnieper. Pop. (1900) 45,081, nearly half of whom are Jews. It is an important junction of the railways from Vilna to Odessa and from Orel to Poland, and is in steamer communication with Kiev and Mogilev. In front of Prince Paskevich's castle stands an equestrian statue of the Polish general Joseph Poniatowski, and in the cathedral is the tomb of the chancellor Nikolai Pctrovich Rumantsev, by Canova. The town carries on a brisk trade in hops, corn and timber; there are also paper-pulp mills and oil factories. Homel was founded in the 12th century, and after changing hands several times between Poles and Russians was annexed to Russia in 1772. In 1648 it suffered at the hands of the Cossack chieftain Bogdan Chmielnicki.

HOME OFFICE, a principal government department in the United Kingdom,

the creation of which dates from 1782, when the conduct of foreign affairs, which had previously been divided between the northern and southern secretaries, was handed over to the northern department (see Foreign Office). The home department retained control of Irish and colonial affairs, and of war business until 1794, when an additional secretary of state was re-appointed. In 1801 the colonial business was transferred from the home department, which now attends only 10 domestic affairs. The head of the department, the principal secretary of state for home affairs, or home secretary, is a member of the government for the time being, and of the cabinet, receiving a salary of £5000 a year. He is the proper medium of communication between the sovereign and the subject, and receives petitions addressed to the crown. He is responsible for the maintenance of the king's peace and attends to the administration of criminal justice, police and prisons, and through him the sovereign exercises his prerogative of mercy. Within his department is the supervision of lunatic asylums, reformatories and industrial schools, and it is his duty to see after the internal well-being of the country, to enforce the rules made for the health or safety of the community generally, and especially of those classes employed in special trades or dangerous occupations. He is assisted by a permanent under- secretary, a parliamentary secretary and several assistant under-secretaries.

See Anson, Law and Custom of the Constitution. (1907).

HOMER 1 ("0p7pcs) , the great epic poet of Greece. Many o? the works once attributed to him are lost; those which remain are the two great epics, the Iliad and the Odyssey, thirty-three Hymns, a mock epic (the Battle of the Frogs and Mice), and some pieces of a few lines each (the so-called Epigrams).

Ancient Accounts of Homer. — Of the date of Homer probably no record, real or pretended, ever existed. Herodotus (ii. 53) maintains that Hesiod and Homer lived not more than 400 years

1 This article was thoroughly revised by Dr D. B. Monro before his death in 1905; a few points have since been added by Mr. T. W. Allen.

before his own time, consequently not much before 850 B.C. From the controversial tone in which he expresses himself it is evident that others had made Homer more ancient; and accord- ingly the dates given by later authorities, though very various, generally fall within the 10th and nth

centuries B.C. But none of these statements has any claim to the character of external evidence.

The extant lives of Homer (edited in Westermann : s Vitarum Scriptores Gr.aeci minores) are eight in number, including the piece called the Contest of Hesiod and Homer. The longest is written in the Ionic dialect, and bears the name of Herodotus, but is certainly spurious. In all probability it belongs to the time which was fruitful beyond all others in literary forgeries, viz. the 2nd century of our era. 1 The other lives are certainly not more ancient. Their chief value consists in the curious short poems or fragments of verse which they have preserved — the so-called Epigrams, which used to be printed at the end of editions of Homer. These are easily recognized as " Popular Rhymes," a form of folk-lore to be met with in most countries, treasured by the people as a kind of proverbs. 2 In the Homeric epigrams the interest turns sometimes on the characteristics of particular localities — Smyrna and Cyme {Epigr. iv.), Erythrae (Epigr. vi., vii.), Mt Ida {Epigr. x.), Neon Teichos {Epigr. i.); others relate to certain trades or occupations — potters {Epigr. xiv.), sailors, fishermen, goat herds, &c. Some may be fragments of longer poems, but evidently they are not the work of any one poet. The fact that they were all ascribed to Homer merely means that they belong to a period in the history of the Ionian and Aeolian colonies when " Homer " was a name which drew to itself all ancient and popular verse.

Again, comparing the " epigrams " with the legends and anecdotes told in the Lives of Homer, we can hardly doubt that they were the chief source from which these Lives were derived. Thus in Epigr. iv. we find a blind poet, a native of Aeolian Smyrna, through which flows the water of the sacred Meles. Here is doubtless the source of the chief incident of the Hcrodotean Life — the birth of Homer " Son of the Meles." The epithet Aeolian implies high antiquity, inasmuch as according to Herodotus Smyrna became Ionian about 688 B.C. Naturally the Ionians had their own version of the story — a version which made Homer come out with the first Athenian colonists.

The same line of argument may be extended to the Hymns, and even to some of the lost works of the post-Homeric or so-called " Cyclic " poets. Thus: —

1. The hymn to the Delian Apollo ends with an address of the poet to his audience. When any stranger comes and asks who is the sweetest singer, they are to answer with one voice, the " blind man that dwells in rocky Chios; his songs deserve the prize for all time to come." Thucydides, who quotes this passage to show the ancient character of the Delian festival, seems to have no doubt of the Homeric authorship of the hymn. Hence we

may most naturally account for the belief that Homer was a Chian.

2. The' Margiles — a humorous poem which kept its ground as the reputed work of Homer down to the time of Aristotle — began with the words, " There came to Colophon an old man, a divine singer, servant of the Muses and Apollo." Hence doubtless the claim of Colophon to be the native city of Homer — a claim supported in the early times of Homeric learning by the Colophonian poet and grammarian Antimachus.

3. The poem called the Cypria was said to have been given by Homer to Stasinus of Cyprus as a daughter's dowry. The connexion with Cyprus appears further in the predominance given in the poem to Aphrodite.

4. The Little Iliad and the Phocais, according to the Herodotean life, were composed by Homer when he lived at Phocaea with a certain Thestorides, who carried them off to Chios and there gained fame by reciting them as his own. The name Thestorides occurs in Epigr. v.

1 See a paper in the Diss. Philol. Halenses, ii. 97-219. 1 Compare the Popular Rhymes of Scotland, published by Robert Chambers.

5. A similar story was told about the poem called the Taking of Oechalia (OtxaXias "AXcoertr), the subject of which was one of the exploits of Heracles. It passed under the name of Creo- phylus, a friend or (as some said) a son-in-law of Homer; but it was generally believed to have been in fact the work of the poet himself.

6. Finally the Thebaid always counted as the work of Homer. As to the Epigoni, which carried on the Theban story, some doubt seems to have been felt.

These indications render it probable that the stories connecting Flomer with different cities and islands grew up after his poems had become known and famous, especially in the new and flourishing colonies of Aeolis and Ionia. The contention for Homer, in short, began at a. time when his real history was lost, and he had become a sort of mythical figure, an " eponymous hero," or personification of a great school of poetry.

An interesting confirmation of this view from the negative side is furnished by the city which ranked as chief among the Asiatic colonies of Greece, viz. Miletus. No legend claims for Miletus even a visit from Homer, or a share in the authorship of any Homeric poem. Yet Arctinus of Miletus was said to have been a " disciple of Homer," and was certainly one of the earliest and most considerable of the " Cyclic " poets. His Aethiopis was composed as a sequel to the Iliad; and the structure and general character of his poems show that he took the Iliad as his model. Yet in his case we find no trace of

the disputed authorship which is so common with other " Cyclic " poems. How has this come about? Why have the works of Arctinus escaped the attraction which drew to the name of Homer such epics as the Cypria, the Little Iliad, the Thebaid, the Epigoni, the Taking of Oechalia and the Phocais. The most obvious account of the matter is that Arctinus was never so far forgotten that his poems became the subject of dispute. We seem through him to obtain a glimpse of an early post-Homeric age in Ionia, when the immediate disciples and successors of Homer were distinct figures in a trustworthy tradition — when they had not yet merged their individuality in the legendary " Homer " of the Epic Cycle.

Recitation of the Poems. — The recitation of epic poetry was called in historical times " rhapsody " {pa\p

The first notice of rhapsody meets us at Sicyon, in the reign of Cleisthenes (600-560 B.C.), who " put down the rhapsodists on account of the poems of Homer, because they are all about Argos and the Argives " (Hdt. v. 67). This description applies very well to the Iliad, in which Argos and Argives occur on almost every page. It may have suited the Thebaid still better, but there is no need to understand it only of that poem, as Grote does. The incident shows that the poems of the Ionic Homer had gained in the 6th century B.C., and in the Doric parts of the Pelo- ponnesus, the ascendancy, the national importance and the almost canonical character which they ever afterwards retained.

At Athens there was a law that the Homeric poems should be • recited (paˆa'S«t

3 Compare the branch of myrtle at an Athenian feast (Aristoph., Nub., 1364).

4 The Iliad was also recited at the festival of the Brauronia, at Brauron in Attica (Hesych. s.v. /SpaepwWois).

which the dialogue mainly consists. The author makes (perhaps wilfully) all the mistakes about the family of Peisistratus which Thucydides notices in a well-known passage (vi. 54-5°) • In one point, however, the writer's testimony is valuable. He tells us that the law required the rhapsodists to recite " taking each other up in order (e£ VTroXrjxpws ee£i)s), as they still do." This recurs in a different form in the statement of Diogenes Laertius (i. 2. 57) that Solon made a law that the poems should be recited " with prompting " (e£ virofioWijs) . The question as between Solon and

Hipparchus cannot be settled; but it is at least clear that a due order of recitation was secured by the presence of a person charged to give the rhapsodists their cue (wo/3dXXete). It was necessary, of course, to divide the poem to be recited into parts, and to compel each contending rhapsodist to take the part assigned to him. Otherwise they would have chosen favourite or show passages.

The practice of poets or rhapsodists contending for the prize at the great religious festivals is of considerable antiquity, though apparently post-Homeric. It is brought vividly before us in the Hymn to Apollo (see the passage mentioned above), and in two Hymns to Aphrodite (v. and ix.). The latter of these may evidently be taken to belong to Salamis in Cyprus and the festival of the Cyprian Aphrodite, in the same way that the Hymn to Apollo belongs to Delos and the Delian gathering. The earliest trace of such contests is to be found in the story of Thamyris, the Thracian singer, who boasted that he could conquer even the Muses in song (II. ii. 594 ff.).

Much has been made in this part of the subject of a family or clan (7evos) of Homeridae in the island of Chios. On the one hand, it seemed to follow from the existence of such a family that Homer was a mere "eponymus," or mythical ancestor; on the other hand, it became easy to imagine the Homeric poems handed down orally in a family whose hereditary occupation it was to recite them, possibly to add new episodes from time to time, or to combine their materials in new ways, as their poetical gifts permitted. But, although there is no reason to doubt the existence of a family of " Homeridae," it is far from certain that they had anything to do with Homeric poetry. The word occurs first in Pindar {Nem. 2. 2), who applies it to the rhapso- dists (' Ojur/ptScu pa-KTUiv eirkuv aoiSoi). On this a scholiast says that the name " Homeridae " denoted originally descendants of Homer, who sang his poems in succession, but afterwards was applied to rhapsodists who did not claim descent from him. He adds that there was a famous rhapsodist, Cynaethus of Chios, who was said to be the author of the Hymn to Apollo, and to have first recited Homer at Syracuse about the 69th Olympiad. Nothing here connects the Homeridae with Chios. The state- ment of the scholiast is evidently a mere inference from the patronymic form of the word. If it proves anything, it proves that Cynaethus, who was a Chian and a rhapsodist, made no claim to Homeric descent. On the other hand our knowledge of Chian Homeridae comes chiefly from the lexicon of Harpocration, where we are told that Acusilaus and Hellanicus said that they were so called from the poet; whereas Seleucus pronounced this to be an error. Strabo also says that the Chians put forward the Homeridae as an argument in support of their claim to Homer. These Homeridae, then, belonged to Chios, but there is no indication of their being rhapsodists. On the contrary, Plato and other Attic writers use the word to include interpreters and admirers — in short, the whole " spiritual kindred " — of Homer. And although we hear of " descendants of Creophylus " as in possession of the Homeric poems, there is no similar story about descendants of Homer himself. Such is the evidence on which so many inferences are based.

The result of the notices now collected is to show that the early history of

epic recitation consists of (1) passages in the Homeric hymns showing that poets contended for the prize at the great festivals, (2) the passing mention in Herodotus of rhapsodists at Sicyon, and (3) a law at Athens, of unknown date, regulating the recitation at the Panathenaea. Let us now compare these data with the account given in the Homeric poems. The word " rhapsode " does not yet exist; we hear only of the

"singer" (6.0186s), who does not carry a wand or laurel-branch, but the lyre (ˆop/u-yi;), with which he accompanies his "song." In the Iliad even the epic " singer " is not met with. It is Achilles himself who sings the stories of heroes (/cXea avdpuv) in his tent, and Patroclus is waiting (respondere paratus), to take up the song in his turn (27. ix. 191). Again we do not hear of poetical contests (except in the story of Thamyris already mentioned) or of recitation of epic poetry at festivals. The Odyssey gives us pictures of two great houses, and. each has its singer. The song is on a subject taken from the Trojan war, at some point chosen by the singer himself, or by his hearers. Phemius pleases the suitors by singing of the calamitous return of the Greeks; Demodocus sings of a quarrel between Ulysses and Achilles, and afterwards of the wooden horse and the capture of Troy.

It may be granted that the author of the Odyssey can hardly have been just such a singer as he himself describes. The songs of Phemius and Demodocus are too short, and have too much the character of improvisations. Nor is it necessary to suppose that epic poetry, at the time to which the picture in the Odyssey belongs, was confined to the one type represented. Yet in several respects the conditions under which the singer finds himself in the house of a chieftain like Odysseus or Alcinous are more in harmony with the character of Homeric poetry than those of the later rhapsodic contests. The subdivision of a poem like the Iliad or Odyssey among different and necessarily unequal performers must have been injurious to the effect. The highly theatrical manner of recitation which was fostered by the spirit of competition, and by the example of the stage, cannot have done justice to the even movement of the epic style. It is not certain indeed that the practice of reciting a long poem by the agency of several competitors was ancient, or that it prevailed elsewhere than at Athens; but as rhapsodists were numerous, and popular favour throughout Greece became more and more confined to one or two great works, it must have become almost a necessity. That it was the mode of recitation contemplated by the author of the Iliad or Odyssey it is impossible to believe.

The difference made by substituting the wand or branch of laurel for the lyre of the Homeric singer is a slighter one, though not without significance. The recitation of the Hesiodic poems was from the first unaccompanied by

the lyre, i.e. they were confessedly said, not sung; and it was natural that the example should be extended to Homer. For it is difficult to believe that the Homeric poems were ever " sung " in the strict sense of the word. We .can only suppose that the lyre in the hands of the epic poet or reciter was in reality a piece of convention, a " sur- vival " from the stage in which narrative poetry had a lyrical character. Probably the poets of the Homeric school — that which dealt with war and adventure — were the genuine descend- ants of minstrels whose " lays " or " ballads " were the amuse- ment of the feasts in an earlier heroic age; whereas the Hesiodic compositions were non-lyrical from the first, and were only in verse because that was the universal form of literature.

It seems, then, that if we imagine Homer as a singer in a royal house of the Homeric age, but with more freedom regarding the limits of his subject, and a more tranquil audience than is allowed him in the rapid movement of the Odyssey, we shall piobably not be far from the truth.

Time and Place of Homer. — The oldest direct references to the Iliad and Odyssey are in Herodotus, who quotes from both poems (ii. 53). The quotation from the Iliad is of interest because it is made in order to show that Homer supported the story of the travels of Paris to Egypt and Sidon (whereas the Cyclic poem called the Cypria ignored them), an4 also because the part of the Iliad from which it comes is cited as the " Aristeia of Diomede." This was therefore a recognized part of the poem. The earliest mention of the name of Homer is found in a fragment of the philosopher Xenophanes (of the 6th century B.C., or possibly earlier), who complains of the false notions implanted through the teaching of Homer. The passage shows, not merely that Homer was well known at Colophon in the time of Xenophanes, but also that the great advance in moral and

religious ideas which forced Plato to banish Homer from his republic had made itself felt in the days of the early Ionic philosophers.

Failing external testimony, the time and place of the Homeric poems can only be determined (if at all) by internal evidence. This is of two main kinds: (a) evidence of history, consisting in a comparison of the political and social condition, the geography, the institutions, the manners, arts and ideas of Homer with those of other times; (b) evidence of language, consisting in a comparison with later dialects, in respect of grammar and vocabulary. To these may be added, as occasion- ally of value, (c) much evidence of the direct influence of Homer upon the subsequent course of

literature and art.

(a) The political condition of Greece in the earliest times known to history is separated from the Greece of Homer by an interval which can hardly be overestimated. The great national names are different: instead of Achaeans, Argives, Danai, we find Hellenes, subdivided into Dorians, lonians, Aeolians — names either unknown to Homer, or mentioned in terms more significant than silence. At the dawn of Greek history Mycenae is no longer the seat of empire; new empires, polities and civilizations have grown up — Sparta with its military discipline, Delphi with its religious supremacy, Miletus with its commerce and numberless colonies, Aeolis and Ionia, Sicily and Magna Graecia.

While the political centre of Homeric Greece is at Mycenae, the real centre is rather to be found in Boeotia. The Catalogue of the Ships begins with Boeotia; the list of Boeotian towns is much the longest; and they sail, not from the bay of Argos, but from the Boeotian harbour of Aulis. This position is not due to its chiefs, who are all of inferior rank. The importance of Boeotia for Greek civilization is further shown by the ancient worship of the Muses on Mount Helicon, and the fact that the oldest poet whose birthplace was known was the Boeotian Hesiod. Next to Boeotia and the neighbouring countries, it appears that the Peloponnesus, Crete and Thessaly were the most important seats of Greek population.

In the Peloponnesus the face of things was completely altered by the Dorian conquest, no trace of which is found in Homer. The only Dorians known in Homer are those that the Odyssey (xix. 177) places in Crete. It is difficult to connect them with the Dorians of history.

The eastern shores of the Aegean, which the earliest historical records represent to us as the seat of a brilliant civilization, giving way before the advance of the great military empires (Lydia and afterwards Persia), are almost a blank in Homer's map. The line of settlements can be traced in the Catalogue from Crete to Rhodes, apd embraces the neighbouring islands of Cos and Calymnos. The colonization of Rhodes by Tlepolemus is related (//. ii. 661 ff.), and seems to mark the farthest point reached in the Homeric age. Between Rhodes and the Troad Homer knows of but one city, Miletus— which is a Carian ally of Troy — and the mouth of one river, the Cayster. Even the Cyclades — Naxos, Paros, Melos— are unknown to the Homeric world. The disposition of the Greeks to look to the west for the centres of religious feeling appears in the mention of Dodona and the Dodonacan Zeus, put in the mouth of the Thessalian Achilles. To the north we find the Thracians, known from the stories of Thamyris the singer (//. ii. 595), and Lycurgus, the enemy of the young god Dionysus (II. vi. 1,30). Here the Trojan empire begins. It does not appear, however, that the

Trojans are thought of as people of a different language. As this is expressly said of the Carians, and of the Trojan allies who were " summoned from afar," the contrary rather is implied regarding Troy itself.

The mixed type of government described by Homer — con- sisting of a king guided by a council of elders, and bringing all important resolutions before the assembly of the fighting men — does not seem to have been universal in Indo-European com- munities, but to have grown up in many different parts of the world under the stress of similar conditions. The king is the commander in war, and the office probably owed its existence to military necessities. It is not surrounded with any special

sacredness. There were ruling families, laying claim to divine descent, from whom the king was naturally chosen, but his own fitness is the essence of his title. The aged Laertes is set aside; the young Telemachus does not succeed as a matter of course. Nor are any very definite rights attached to the office. Each tribe in the army before Troy was commanded by its own king (or kings); but Agamemnon was supreme, and was "more a king " (ftaaiXdrepos) than any other. The assembly is summoned on all critical occasions, and its approval is the ultimate sanction. A king therefore stands in almost as much need of oratory as of warlike skill and prowess. Even the division of the spoil is not made in the Iliad by Agamemnon, but by " the Achaeans " (//. i. 162, 368). The taking »f Brisei's from Achilles was an arbitrary act, and against all rule and custom. The council is more difficult to understand. The "elders" {ykpovres) of the Iliad axe the same as the subordinate "kings"; they are summoned by Agamemnon to his tent, and form a small council of nine or ten persons. In Troy we hear of elders of the people (Stiiwykpovres) who are with Priam, and are men past the military age. So in Ithaca there are elders who have not gone to Troy with the army. It would seem therefore that the meeting in Agamemnon's tent was only a copy or adaptation of the true constitutional "council of elders," which indeed was essentially unfitted for the purposes of military service. The king's palace, if we may judge from Tiryns and Mycenae, was usually in a strong situation on an "acropolis." In the later times of democracy the acropolis was reserved for the temples of the principal gods.

Priesthood in Homer is found in the case of particular temples, where an officer is naturally wanted to take charge of the sacred inclosure and the sacrifices offered within it. It is perhaps an accident that we do not hear of priests in Ithaca. Agamemnon performs sacrifice himself, not because a priestly character was attached to the kingly office, but simply because he was " master in his own house."

The conception of " law " is foreign to Homer. The later words for it (vS/ ms, /Jijrpa) are unknown, and the terms which he uses (6ikj? and 0e,ius)

mean merely " custom." Judicial functions are in the hands of the elders, who " have to do with suits" (5t/catrx6Xot), and "uphold judgments" (deiuaras dpvarai). On such matters as the compensation in cases of homicide, it is evident that there were no rules, but merely a feeling, created by use and wont, that the relatives of the slain man should be willing to accept payment. The sense of anger which follows a violation of custom has the name of " Nemesis " — righteous displeasure.

As there is no law in Homer, so there is no morality. That is to say, there are no general principles of action, and no words which indicate that acts have been classified as good or bad, right or wrong. Moral feeling, indeed, existed and was denoted by " Aidos " ; but the numerous meanings of this word — shame, veneration, pity — show how rudimentary the idea was. And when we look to practice we find that cruel and even treacherous deeds are spoken of without the least sense that they deserve censure. The heroes of Homer are hardly more moral agents than the giants and enchanters of a fairy tale.

The religious ideas of Homer differ in some important points from those of later Greece. The Apollo of the Iliad has the character of a local Asiatic deity — " ruler of Chryse and goodly Cilia and Tenedos." He may be compared with the Clarian and the Lycian god, but he is unlike the Apollo of Dorian times, the " deliverer " and giver of oracles. Again, the worship of Dionysus, and of Demeter and Persephone, is mainly or wholly post-Homeric. The greatest difference, however, lies in the absence of hero-worship from the Homeric order of things. Castor and Polydeuces, for instance, are simply brothers of Helen who died before the expedition to Troy (//. iii. 243.) The military tactics of Homer belong to the age when the chariot was the principal engine of warfare. Cavalry is unknown, and the battles are mainly decided by the prowess of the chiefs. The use of the trumpet is also later. It has been supposed indeed that the art of riding was known in Homer's own time, because it occurs in comparisons. But the riding which he

describes (//. xv. 679) is a mere exhibition of skill, such as we may see in a modem circus. And though he mentions the trumpet (//. xviii. 219), there is nothing to show that it was used, as in historical times, to give the signal for the charge.

The chief industries of Homeric times are those of the carpenter (rknTcov),. the worker in leather (s) — whose implements are the hammer and pincers

— and the potter (/cepctjueus); also spinning and weaving, which were carried on by the women. The fine arts are represented by sculpture in relief, carving in wood and ivory, embroidery. Statuary is later; it appears to have come into existence in the 7th century, about the time when casting in metal was invented by Rhoecusof Samos. In general, as was well shown by A. S. Murray, 1 Homeric art does not rise above the stage of decoration, applied to objects in common use; while in point of style it is characterized by a richness and variety of ornament which is in the strongest contrast to the simplicity of the best periods. It is the work, in short, not of artists but of skilled workmen; the ideal artist is " Daedalus," a name which implies mechanical skill and intricate workmanship, not beauty of design.

One art of the highest importance remains. The question whether writing was known in the time of Homer was raised in antiquity, and has been debated with especial eagerness ever since the appearance of Wolf's Prolegomena. In this case we have to consider not merely the indications of the poems, but also the external evidence which we possess regarding the use of writing in Greece. This latter kind of evidence is much more considerable now than it was in Wolf's time. (See Writing elsewhere in these volumes.)

The oldest known stage of the Greek alphabet appears to be represented by inscriptions of the islands of Thera, Melos and Crete, which are referred to the 40th Olympiad (620 B.C.). The oldest specimen of a distinctively Ionian alphabet is the famous inscription of the mercenaries of Psammetichus, in Upper Egypt, as to which the only doubt is whether the Psammetichus in question is the first or the second, and consequently whether the inscription is to be dated 01. 40 or 01. 47. Considering that the divergence of two alphabets (like the difference of two dialects) requires both time and familiar use, we may gather from these facts that writing was well known in Greece early in the 7th century B.C. 2

The rise of prose composition in the 6th century B.C. has been thought to mark the time when memory was practically superseded by writing as a means of preserving literature — the earlier use of letters being confined to short documents, such as lists of names, treaties, laws, &c. This conclusion, however, is by no means necessary. It may be that down to comparatively iate times poetry was not commonly read, but was recited from memory. But the question is — From what time are we to suppose that the preservation of long poems was generally secured by the existence of written copies? Now, without counting the Homeric poems — which doubtless had exceptional advantages in their fame and popularity — we find a body of literature dating from the 8th century B.C. to which the theory of oral transmission is surely inapplicable. In the Trojan cycle alone we know of the two epics of Arctinus, the Little Iliad of Lesches, the Cypria,

the Nosloi. The Theban cycle is represented by the Thebaid (which Callinus, who was of the 7th century, ascribed to Homer) and the Epigoni. Other ancient epics — ancient enough to have passed under the name of Homer — are the Taking of Oechalia, and the Phocais. Again, there are the numerous works attributed to Hesiod and other

1 Contemporary Review, vol. xxiii. p. 218 ff.

- The fact that the Phoenician Vau (f) was retained in the Greek alphabets, and the vowel u added, shows that when the alphabet was introduced the sound denoted by f was still in full vigour. Other- wise F would have been used for the vowel v, just as the Phoenician consonant Yod became the vowel 1. But in the Ionic dialect the sound of F died out soon after Homer's time, if indeed it was still pronounced then. It seems probable therefore that the introduction of the alphabet is not later than the composition of the Homeric poems.

poets of the didactic, mythological and quasi-historical schools — Eumelus of Corinth, Cinaethon of Sparta, Agias of Troezen, and many more. The preservation of this vast mass can only be attributed to writing, which must therefore have been in use for two centuries or more before there was any considerable prose literature. Nor is this in itself improbable.

The further question, whether the Iliad and Odyssey were originally written, is much more difficult. External evidence does not reach back so far, and the internal evidence is curiously indecisive. The only passage which can be interpreted as a reference to writing occurs in the story of Bellerophon, told by Glaucus in the sixth book of the Iliad. Proetus, king of Corinth, sent Bellerophon to his father-in-law the king of Lycia, and gave him " baneful tokens " (aijpiara Xirypa, i.e. tokens which were messages of death), " scratching on a folded tablet many spirit- destroying things, and bade him show this to his father-in-law, that he might perish." The king of Lycia asked duly (on the tenth day from the guest's coming) for a token {fjrei crvfia. tftkoBai), and then knew what Proetus wished to be done. In this account there is nothing to show exactly how the message of Proetus was expressed. The use of writing for the purpose of the token between " guest-friends " {tessera hospitalis) is certainly very ancient. Mommsen {Rom. Forsch. i. 338 ff.) aptly com- pares the use in treaties, which are the oldest species of public documents. But we may suppose that tokens of some kind- like the marks which the Greek chiefs make on the lots (//. vii. 175 ff.)— were in use before writing was known. In any system of signs there were doubtless means of recommending a friend, or giving warning of the presence of an enemy. There is no difficulty, therefore, in understanding the message of Proetus without alphabetical writing. But, on the other hand, there is no reason for so understanding it.

If the language of Homer is so ambiguous where the use of writing would naturally be mentioned, we cannot expect to find more decisive references elsewhere. Arguments have been founded upon the descriptions of the blind singers in the Odyssey, with their songs inspired directly by the Muse ; upon the appeals of the poet to the Muses, especially in such a place as the opening of the Catalogue; upon the Catalogue itself, which is a kind of historical document put into verse to help the memory; upon the shipowner in the Odyssey, who has " a good memory for his cargo," &c. It may be answered, however, that much of this is traditional, handed down from the time when all poetry was unwritten. Moreover it is one thing to recognize that a literature is essentially oral in its form, characteristic of an age which was one of hearing rather than of reading, and quite another to hold that the same literature was preserved entirely by oral trans- mission.

The result of these various considerations seems to be that the age which we may call the Homeric — the age which is brought before us in vivid outlines in the Iliad and Odyssey — lies beyond the earliest point to which history enables us to Denetrate. And so . far as we can draw any conclusion as to the author (or authors) of the two poems, it is that the whole debate between the cities of Aeolis and Ionia w T as wide of the mark. The author of the Iliad, at least, was evidently a European Greek who lived before the colonization of Asia Minor; and the claims of the Asiatic cities mean no more than that in the days of their prosperity these were the chief seats of the fame of Homer.

This is perhaps the place to consider whether the poems are to be regarded as possessing in any degree the character of historical record. The question is one which in the absence of satisfactory criteria will generally be decided by taste and predilection. A few suggestions, however, may be made.

I. The events of the Iliad take place in a real locality, the general features of which are kept steadily in view. There is no doubt about Sigeum and Rhoeteum, or the river Scamander, or the islands Fmbros, Lemnos and Tenedos. It is at least remarkable that a legend of the national interest of the " tale of Troy " should be so definitely localized, and that in a district, which was never famous as a seat of Greek population. It may be urged, too, that the story of the Iliad is singularly free from the exaggerated and marvellous character which belongs as a rule to the legends of primitive peoples. The apple of discord, the arrows of Philoctetes, the invulnerability oi" Achilles, and similar fancies, are the additions of later poets. This

9obriety, however, belongs not to the whole Iliad, but to the events and characters of the war. Such figures as Bellerophon, Niiobe, the Amazons, which are thought of as traditions from an earlier genera- tion, show the marvellous element at work.

2. Certain persons and events in the story have a distinctly mythical stamp. Helen is a figure of this kind. There was another story according to which she was carried off by Theseus, and re- covered by her brothers the Dioscuri. There are even traces of a third version, in which the Messenian twins, Idas and Lynceus, appear.

3. The analogy of the French epic, the Chanson de Roland, favours the belief that there was some nucleus of fact. The defeat of Koncevaux was really suffered by a part of Charlemagne's army. But the Saracen army is purely mythical, the true enemy having been the Gascons. If similarly we leave, as historical, the plain of Troy, and the name Agamemnon, we shall perhaps not be far wrong.

(b) The dialect of Homer is an early or " primitive " form of the language which we know as that of Attica in the classical age of Greek literature. The proof of this proposition is to be obtained chiefly by comparing the grammatical formation and the syntax of Homer with those of Attic. The comparison of the vocabulary is in the nature of things less conclusive on the question of date. It would be impossible to give the evidence in full without writing a Homeric grammar, but a few specimens may be of interest.

1. The first aorist in Greek being a " weak " tense, i.e. formed by a suffix (-aa), whereas the second aorist is a " strong " tense, distinguished by the form of the root -syllable, we expect to find a constant tendency to diminish the number of second aorists in use. No new second aorists, we may be sure, were formed any more than new " strong " tenses, such as came or sang, can be formed in English. Now in Homer there are upwards of 80 second aorists (not reckoning aorists of " Verbs in in," such as tarty, ifiitv), whereas in all Attic prose not more than 3c are found. In this point therefore the Homeric language is manifestly older. In Attic poets, it is true, the number of such aorists is much larger than in prose. But here again we find that they bear witness to Homer. Of the poetical aorists in Attic the larger part are also Homeric. Others are not really Attic at all, but borrowed from earlier Aeolic and Doric poetry. It is plain, in short, that the later poetical vocabulary was separated from that of prose mainly by the forms which the influence of Homer had saved from being forgotten.

2. While the whole class of " strong " aorists diminished, certain smaller groups in the class disappeared altogether. Thus we find in Homer, but not

in the later language : —

(a) The second aorist middle without the " thematic " e or o: as ?/3\))-to, was struck; iffli-To, perished; a-ro, leaped.

(b) The aorist formed by reduplication: as bkbaev, taught; XcXajSeutfcu, to seize. These constitute a distinct formation, generally with a " causative " meaning; the solitary Attic specimen is fiyayov.

3. It had long been known that the subjunctive in Homer often takes a short vowel (e.g. in the plural, -o/itv, -ere instead of -co/iev, -fire, and in the Mid. -opai, &c. instead of -co/iau, &c). This was generally said to be done by " poetic licence," or metri gratia. In fact, however, the Homeric subjunctive is almost quite " regular," though the rule which it obeys is a different one from the Attic. It may be summed up by saying that the subjunctive takes u or r\ when the indicative has o or c, and not otherwise. Thus Homer has l-H€v, we go, 1-o-iJLtv, let us go. The later i-w-ixev was at first a solecism, an attempt to conjugate a " verb in /it " like the " verbs in a." It will be evident that under this rule the perfect and first aorist subjunctive should always take a short vowel; and this accordingly is the case, with very few exceptions.

4. The article (0, 17, to) in Homer is chiefly used as an independent pronoun (he, she, it), a use which in ˆttic appears only in a few combinations (such as 6 ixiv . . . 6 Si, the one . . . the other). This differ- ence is parallel to the relation between the Latin Me and the article of the Romance languages.

5. The prepositions offer several points of comparison. What the grammarians called " tmesis," the separation of the preposition from the verb with which it is compounded, is peculiar to Homer. The true account of the matter is that in Homer the place of the pre- position is not rigidly fixed, as it was afterwards. Again, " with " is in Homer sbv (with the dative), in Attic prose i±erk with the genitive. Here Attic poetry is intermediate; the use of tsiiv is retained as a piece of poetical tradition.

6. In addition to the particle &v, Homer has another, Ktv, hardly distinguishable in meaning. The Homeric uses of ty and xtv are different in several respects from the Attic, the general result being that the Homeric syntax is more elastic. And yet it is perfectly definite and precise. Homer uses no constructions loosely or without corresponding differences of meaning. His rules are equally strict with those of the later language, but they are not the same rules. And they differ chiefly in this, that the less common combinations of the earlier period were disused altogether in the later.

7. In the vocabulary the most striking difference is that many words appear from the metre to have contained a sound which they

afterwards lost, viz. that which is written in some Greek alphabets by the " digamma " F. Thus the words ai'oj, aarv, ipyov, e?ro!, and many others must -have been written at one time Fava£, Faarv, Ftpyov, f€7ros. This letter, however, died out earlier in Ionic than in most dialects, and there is no proof that the Homeric poems were ever written with it.

These are not, speaking generally, the differences that are produced by the gradual divergence of dialects in a language. They are rather to be classed with those which we find between the earlier and the later stages of every language which has had a long history. The Homeric dialect has passed into New Ionic and Attic by gradual but ceaseless development of the same kind as that which brought about the change from Vedic to classical Sanskrit, or from old high German to the present dialects of Germany.

The points that have been mentioned, to which many others might be added, make it clear that the Homeric and Attic dialects are separated by differences which affect the whole structure of the language, and require a considerable time for their develop- ment. At the same time there is hardly one of these differences which cannot be accounted for by the natural growth of the language. It has been thought indeed that the Homeric dialect was a mixed one, mainly Ionic, but containing Aeolic and even Doric forms; this, however, is a mistaken view of the processes of language. There are doubtless many Homeric forms which were unknown to the later Ionic and Attic, and which are found in Aeolic or other dialects. In general, however, these are older forms, which must have existed in Ionic at one time, and may very well have belonged to the Ionic of Homer's time. So too the digamma is called " Aeolic " by grammarians, and is found on Aeolic and Doric inscriptions. But the letter was one of the original alphabet, and was retained universally as a numeral. It can only have fallen into disuse by degrees, as the sound which it denoted ceased to be pronounced. The fact that there are so many traces of it in Homer is a strong proof of the antiquity of the poems, but no proof of admixture with Aeolic.

There is one sense, however, in which an admixture of dialects may be recognized. It is clear that the variety of forms in Homer is too great for any actual spoken dialect. To take a single instance: it is impossible that the genitives in -010 and in -ov should both have been in everyday use together. The form in 010 must have been poetical or literary, like the old English forms that survive in the language of the Bible. The origin of such double forms is not far to seek. The effect of dialect on style was always recognized in Greece, and the dialect which had once been adopted by a particular kind of poetry Was ever afterwards adhered to. The Epic of

Homer was doubt less formed originally from a spoken variety of Greek, but became literary and conventional with time. It is Homer himself who tells us, in a striking passage (//. iv. 437) that all the Greeks spoke the same language — that is to say, that they understood one another, in spite of the inevitable local differences. Experience shows how some one dialect in a country gains a literary supremacy to which the whole nation yields. So Tuscan became the type of Italian, and Anglian of English. But as soon as the dialect is adopted, it begins to diverge from the colloquial form. Just as modern poetical Italian uses many older grammatical forms peculiar to itself, so the language of poetry, even in Horneric times, had formed a deposit (so to speak) of archaic grammar. There were doubtless poets before Homer, as well as brave men before Agamemnon; and indeed the formation of a poetical dialect such as the Homeric must have been the work of several generations. The use of that dialect (instead of Aeolic) by the Boeotian poet Hesiod, in a kind of poetry which was not of the Homeric type, tends to the conclusion that the literary ascendancy of the epic dialect was anterior to the Iliad and Odyssey, and independent of the influence exercised by these poems.

What then was the original language of Homer? Where and when was it spoken? [The answer given to this question by Aug. Fick (in 1883) and still held, with modifications, by some European scholars can no longer be maintained. Fick's original statement was that in or about the 6th century b.c.

the poems, whi'oh had originally worn an Aeolic dress, were transposed into Ionic- To this it is easily answered that such an event is not only unique in history, but contrary to all that we know of the Greek genius. At the period in question an Aeolic literature, the lyrics of Sappho and Alcaeus, were in existence. If it was found necessary to transpose the Aeolic Homer, why did the Aeolic lyric verse escape? If, however, as is the view of some of Fick's followers, the transposition took place several centuries earlier, before species of literature had appropriated particular dialects, then the linguistic facts upon which Fick relied to distinguish the " Aeolic " and " Ionic " elements in Homer disappear. We have no means of knowing what the Aeolic and Ionic of say the 9th century were, or if there were such dialects at all. Certain prominent historical differences between Aeolic and Ionic (the digamma and d) are known to be unoriginal. The view that Homer underwent at any time a passage from one dialect to another may be dis- missed. The tendency of modern dialectologists is to divide the Greek dialects into Dorian and non-Dorian. The non- Dorian

dialects, Ionic, Attic and the various forms of Aeolic, are regarded as relatively closely akin, and go by the common name " Achaean." They formed the common language of Greece before the Doric invasion. As the scene which Homer depicts is prae-Dorian Greece, it is reasonable to call his language Achaean. The historical divergences of Achaean into Aeolian and Ionic were later than the Migration, and were due to the well-known effects of change of soil and air.

To what local variety of Achaean Homeric Greek belonged it is idle to ask. Thessaly, Boeotia and Mycenae have equal claims. It seems clearer that when once this local variety of Achaean had been used by poets of eminence as their vehicle for national history, it established its right to be considered the one poetical language of Hellas. As the dialect of the Arno in Italy, of Castille in Spain, by the virtue of the genius of the singers who used them, became literary " Italian " and " Spanish," so this variety of Achaean elevated itself to the position of the volgare illustre of Greece. 1] (T. W. A.)

(c) The influence of Homer upon the subsequent course of Greek literature is a large subject, even if we restrict it to the centuries which immediately followed the Homeric age. It will be enough to observe that in the earliest elegiac poets, such as Archilochus, Tyrtaeus and Theognis, reminiscences of Homeric language and thought meet us on every page. If the same cannot be said of the ancient epic poems, that is because of the extreme scantiness of the existing fragments. Much, however, is to be gathered from the arguments of the Trojan part of the Epic Cycle (preserved in the Codex Venelus of the Iliad, a full discussion of which will be found in the Journal of Hellenic Studies, 1884, pp. 1-40). An examination of these arguments throws light on two chief aspects of the relation between Homer and his " cyclic " successors.

1. The later poets sought to complete the story of the Trojan war by supplying the parts which did not fall within the Iliad and Odyssey — the so-called ante-homerica and post-homerica. They did so largely from hints and passing references in Homer. Thus the successive episodes of the siege related at length in the Little Iliad, and ending with the story of the Wooden Horse, are nearly all taken from passages in the Odyssey. Much the same may be said of the Nosti.

2. With this process of expansion and development (so to speak) of Homeric themes is combined the addition of new characters. Such, in the Little Iliad (e.g.), are the story of the Palladium and of the treachery of Sinon. Such, too, in the Cypria are the new legendary figures — Palamedes, Iphigenia, Telephus, Laocoon. These new elements in the narrative are evidently due not only to the natural growth of legend in a

people highly endowed with imagination, but in a large proportion also to the new

1 See D. B. Monro's Homer's Odyssey, books xiii.-xxiv. (Oxford, 1901, p. 455 sqq.), and the abstract of his paper on the Homeric Dialect read to the Congress of Historical Sciences at Rome, 1903 : Atti del Congresso inlernazionale di scienze storiche, it. 152, 153, 1905, " II Dialet.io omerico,"

races and countries with which the Greeks came into contact, as well as to their own rapid advance in wealth and civilization. It will be observed that the two poems of Arctinus are remarkable for the proportion of new matter of the latter kind. The Aethiopis shows us the allies of Troy reinforced by two peoples that are evidently creations of oriental fancy, the Amazons and Memnon with his Aethiopians. The Iliu Persis, again, was the oldest authority for the story of Laocoon and of the con- sequent escape of Aeneas — a story which connected a surviving branch of the house of Priam with the later inhabitants of the Troad. On the other hand the fate of Creusa (sed me magna deum genetrix his detinet oris) is a link with the worship of Cybele. The journey of Calchas to Colophon and his death there, as told in the Nosti, is another instance of the kind. These facts point to a familiarity with the Greek colonies in Asia which contrasts strongly with the silence of the Iliad and Odyssey.

Study of Homer.— The Homeric Question. — The critical study of Homer began in Greece almost with the beginning of prose writing. The first name is that of Theagenes of Rhegium, contemporary of Cambyses (525 B.C.), who is said to have founded the " new grammar " (the older " grammar " being the art of reading and writing), and to have been the inventor of the allegorical interpreta- tions by which it was sought to reconcile the Homeric mythology with the morality and speculative ideas of the 6th century B.C. The same attitude in the " ancient quarrel of poetry and philosophy " was soon afterwards taken by Anaxagoras; and after him by his pupil Metrodorus of Lampsacus, who explained away all the gods, and even the heroes, as elementary substances and forces (Agamem- non as the upper air, &c).

The next writers on Homer of the " grammatical " type were Stesimbrotus of Thasos (contemporary with Cimon) and Antimachus of Colophon, himself an epic poet of mark. The Thebaid of Anti- machus, however, was not popular, and seems to have been a great storehouse of mythological learning rather than a poem of the Homeric school.

Other names of the pre-Socratic and Socratic times are mentioned by Xenophon, Plato and Aristotle. These were the "ancient Homerics " (ol

ii.pxa.toi. 'Omijp«c£), who busied themselves much with the hidden meanings of Homer; of whom Aristotle says, with his profound insight, that they see the small likenesses and overlook the great ones (Metaph. xii.).

The text of Homer must have attracted some attention when Antimachus came to be known as the " corrector " (StopSwrijs) of a distinct edition (&Socm). Aristotle is said himself to have made a recension for the use of Alexander the Great. This is unlikely. His remarks on Homer (in the Poetics and elsewhere) show that he had made a careful study of the structure and leading ideas of the poems, but do not throw much light on the text.

The real work of criticism became possible only when great collec- tions of manuscripts began to be made by the princes of the genera- tion after Alexander, and when men of learning were employed to sift and arrange these treasures. In this way the great Alexandrian school of Homeric criticism began with Zenodotus, the first chief of the museum, and was continued by Aristophanes and Aristarchus. In Aristarchus ancient philology culminated, as philosophy had done in Socrates. All earlier learning either passed into his writings, or was lost; all subsequent research turned upon his critical and grammatical work.

The means of forming a judgment of the Alexandrine criticism are scanty. The literary form which preserved the works of the great historians was unfortunately wanting, or was not sufficiently valued, in the case of the grammarians. Abridgments and newer treatises soon drove out the writings of Aristarchus and other founders of the science. Moreover, a recension could not be repro- duced without new errors soon creeping in. Thus we find that Didymus, writing in the time of Cicero, does not quote the readings of Aristarchus as we should quote a textus receptus. Indeed, the object of his work seems to have been to determine what those readings were. Enough, however, remains to show that Aristarchus had a clear notion of the chief problems of philology (except per- haps those concerning etymology). He saw, for example, that it was not enough to find a meaning for the archaic words (theyX&io-o'cii.'as, they were called), but that common words (such as irocos, 60os) had their Homeric uses, which were to be gathered by due induction. In the same spirit he looked upon the ideas and beliefs of Homer as a consistent whole, which might be determined from the evidence of the poems. He noticed especially the difference between the stories known to Homer and those given by later poets, and made many comparisons between Homeric and later manners, arts and institutions. Again, he was sensible of the paramount value of manuscript authority, and appears to have introduced no readings from mere conjecture. The frequent mention in the Scholia of " better " and " inferior " texts may indicate a classification made by him or by the general opinion

of critics. His use of the " obelus " to distinguish spurious verses, which made so large a part of his fame

in antiquity, has rather told against him with modern scholars. 1 It is chiefly interesting as a proof of the confusion in which the text must have been before the Alexandrian times; for it is impossible to understand the readiness of Aristarchus to suspect the genuineness of verses unless the state of the copies had pointed to the existence of numerous interpolations. On this matter, however, we are left to conjecture.

Our knowledge of Alexandrian criticism is derived almost wholly from a single document, the famous Iliad of the library of St Mark in Venice (Codex Venetus 454, or Ven. A), first published by the French scholar Villoison in 1788 (Scholia antiquissima ad Homeri Iliadem). This manuscript, written in the 10th century, contains (1) the best text of the Iliad, (2) the critical marks of Aristarchus and (3) Scholia, consisting mainly of extracts from four grammatical works, viz. Didymus (contemporary of Cicero) on the recension of Aristarchus, Aristonicus (fl. 24 B.C.) on the critical marks of Aris- tarchus, Herodian (fl. a.d. 160) on the accentuation, and Nicanor (fl. a.d. 127) on the punctuation, of the Iliad.

These extracts present themselves in two distinct forms. One series of scholia is written in the usual way, on a margin reserved for the purpose. The other consists of brief scholia, written in very small characters (but of the same period) on the narrow space left vacant round the text. Occasionally a scholium of this kind gives the substance of one of the longer extracts; but as a rule they are distinct. It would seem, therefore, that after the manuscript was finished the " marginal scholia " were discovered to be extremely defective, and a new series of extracts was added in a form which interfered as little as possible with the appearance of the book. 2

The mention of the Venetian Scholia leads us at once to the Homeric controversy ; for the immortal Prolegomena of F. A. Wolf 3 appeared a few years after Villoison's publication, and was founded in great measure upon the fresh and abundant materials which it furnished. Not that the " Wolfian theory " of the Homeric poems is directly supported by anything in the Scholia; the immediate object of the Prolegomena was not to put forward that theory, but to elucidate the new and remarkable conditions under which the text of Homer had to be settled, viz. the discovery of an

apparatus crilicus of the 2nd century B.C. The questions regarding the original structure and early history of the poems were raised (forced upon him, it may be said) by the critical problem; but they were really originated by facts and ideas of a wholly different order.

The 1 8th century, in which the spirit of classical correctness had the most absolute dominion, did not come to an end before a powerful reaction set in, which affected not only literature but also speculation and politics. In this movement the leading ideas were concentrated in the word Nature. The natural condition of society, natural law, natural religion, the poetry of nature, gained a singular hold, first on the English philosophers from Hume onwards, and then (through Rousseau chiefly) on the general drift of thought and action in Europe. In literature the effect of these ideas was to set up a false opposition between nature and art. As political writers imagined a patriarchal innocence prior to codes of law, so men of letters sought in popular unwritten poetry the freshness and simplicity which were wanting in the prevailing styles. The blind minstrel was the counterpart of the noble savage. The supposed discovery of the poems of Ossian fell in with this train of sentiment, and created an enthusiasm for the study of early popular poetry. Homer was soon drawn into the circle of inquiry. filackwell (Professor of Greek at Aberdeen) had insisted, in a book published in 1735, on the "naturalness" of Homer; and Wood (Essay on the Original Genius of Homer, London, 1769) was the first who maintained that Homer composed without the help of writing, and supported his thesis by ancient authority, and also by the parallel of Ossian. Both these books were translated into German, and their ideas passed into the popular philosophy of the day. Everything in short was ripe for the reception of a book that brought together, with masterly ease and vigour, the old and the new Homeric learning, and drew from it the historical proof that Homer was no single poet, writing according'to art and rule, but a name which stood for a golden age of the true spontaneous poetry of genius and nature.

The part of the Prolegomena which deals with the original form of the Homeric poems occupies pp. xl.-clx. (in the first edition). Wolf shows how the question of the date of writing meets us on the

1 See the chapter in Cobet's Miscellanea critica, pp. 225-239.

2 The existence of two groups of the Venetian Scholia was first noticed by Jacob La Roche, and they were first distinguished in the edition of W. Dindorf (Oxford, 1875). There is also a group of Scholia, chiefly exegetical, a collection of which was published by Villoison from a MS. Ven. 453 (s. xi.) in his edition of 1788, and has been again edited by W. Dindorf (Oxford, 1877). The most im- portant collection of this group is

contained in the Codex Townleianus (Barney 86 s. xi.) of the British Museum, edited by E. Maass, (Oxford, 1887-1888). The vast commentary of Eustathius (of the 1 2th century) marks a third stage in the progress of ancient Homeric learning.

J Prolegomena ad Homerum, sive de operum Homericorum prisca el genuina forma variisque mutationibus el probabili ratione emendandi. •icnpsit Ei id. Aug. Wolfius, volumen i. (.1795).

threshold of the textual criticism of Homer and accordingly enters into a full discussion, first of the external evidence, then of the indications furnished by the poems. Having satisfied himself that writing was unknown to Homer, he is led to consider the real mode of transmission, and finds this in the Rhapsodists, of whom the Homeridae were an hereditary school. And then comes the conclu- sion to which all this has been tending: "the die is cast" — the Iliad and Odyssey cannot have been composed in the form in which we know them without the aid of writing. They must therefore have been, as Bentley had said, " a sequel of songs and rhapsodies," " loose songs not collected together in the form of an epic poem till about 500 years after." This conclusion he then supports by the character attributed to the " Cyclic " poems (whose want of unity showed that the structure of the Iliad and Odyssey must be the work of a later time), by one or two indications of imperfect connexion, and by the doubts of ancient critics as to the genuineness of certain parts. These, however, are matters of conjecture. " Historia loquitur." The voice of antiquity is unanimous in declaring that " Peisistratus first committed the poems of Homer to writing, and reduced them to the order in which we now read them."

The appeal of Wolf to the " voice of all antiquity " is by no means borne out by the different statements on the subject. According to Heraclides Ponticus (pupil of Plato), the poetry of Homer was first brought to the Peloponnesus by Lycurgus, who obtained it from the descendants of Creophylus (Polit. fr. 2). Plutarch in his Life of Lycurgus (c. 4) repeats this story, with the addition that there was already a faint report of the poems in Greece, and that certain de- tached fragments were in the possession of a few persons. Again, the Platonic dialogue Hipparchus (which though not genuine is probably earlier than the Alexandrian times) asserts that Hipparchus, son of Peisistratus, first brought the poems to Athens, and obliged the rhapsodists at the Panathenaea to follow the order of the text, " as they still do," instead of reciting portions chosen at wilj. The earliest authority for attributing any work of the kind to Peisistratus is the well-known passage of Cicero (De Oral. 3. 34: " Quis doctior eisdem temporibus illis, aut cujus eloquentia litteris instructior fuisse traditur quam Pisistrati ? qui primus Homeri libros, confusos antea, sic disposuisse dicitur ut nunc habemus "). To the same effect Pausanias (vii. p, 594) says that the

change of the name Donoessa to Gonoessa (in II. ii. 573) was thought to have been made by " Peisistratus or one of his companions," when he collected the poems, which were then in a fragmentary condition. Finally, Diogenes Laertius (i. 57) says that Solon made a law that the poems should be recited with the help of a prompter so that each rhapsodist should begin where the last left off ; and he argues from this that Solon did more than Peisistratus to make Homer known. The argument is directed against a certain Dieuchidas of Megara, who appears to have maintained that the verses about Athens in the Catalogue (77. ii. 546-556) were interpolated by Peisistratus. The passage is un- fortunately corrupt, but it is at least clear that in the time of Solon, according to Diogenes, there were complete copies of the poems, such as could be used to control the recitations. Hence the account of Diogenes is quite irreconcilable with the notices on which Wolf relied. It is. needless to examine the attempts which have been made to harmonize these accounts. Such attempts usually start with the tacit assumption that each of the persons concerned — Lycurgus, Solon, Peisistratus, Hipparchus — must have done something for the text of Homer, or for the regulation of the rhapsodists. But we have first to consider whether any of the accounts come to us on such evidence that we are bound to consider them as containing a nucleus of truth.

In the first place, the statement that Lycurgus obtained the poems from descendants of Creophylus must be admitted to be purely mythical. But if we reject it, have we any better reason for believing the parallel assertion in the Platonic Hipparchus ? It is true that Hipparchus is undoubtedly a real person. On the other hand it is evident that the Peisistratidae soon became the subject of many fables. Thucydides notices as a popular mistake the belief that Hipparchus was the eldest son of Peisistratus, and that consequently he was the reigning " tyrant " when he was killed by Aristogiton. The Platonic Hipparchus follows this erroneous version, and may therefore be regarded as representing (at best) mere local tradition. We may reasonably go further, and see in this part of the dialogue a piece of historical romance, designed to put the " tyrant " family in a.favourable light, as patrons of literature and learning.

Again, the account of the Hipparchus is contradicted by Diogenes Laertius, who says that Solon provided for the due recitation of the Homeric poems. The only good authorities as to this point are the orators Lycurgus and Isocrates, who mention the law prescribing the recitation, but do not say when or by whom it was enacted. The inference seems a fair one, that the author of the law was really unknown.

With regard to the statements which attribute some work in con- nexion with Homer to Peisistratus, it was noticed by Wolf that Cicero, Pausanias and the others who mention the matter do so nearly in the same words,

and, therefore, appear to have drawn from a common source. This source was in all probability an epigram quoted in two of the short lives of Homer, and there said to have been inscribed en the statue of Peisistratus at Athens. In it Peisistratus is made to say of himself that he "collected Homer, who was formerly sur.o

in fragments, for the golden poet was a citizen of ours, since we Athenians founded Smyrna." The other statements repeat these words with various minor additions, chiefly intended to explain how the poems had been reduced to this fragmentary condition, and how Peisistratus set to work to restore them. Thus all the authority for the work of Peisistratus " reduces itself to the testimony of a single anonymous inscription " (Nutzhorn p. 40). Now, what is the value of that testimony? It is impossible of course to believe that a statue of Peisistratus was set up at Athens in the time of the free republic. The epigram is almost certainly a mere literary exercise. And what exactly does it say? Only that Homer was recited in fragments by the rhapsodists, and that these partial recitations were made into a continuous whole by Peisistratus; which does not necessarily mean more than that Peisistratus did what other authori- ties ascribe to Solon and Hipparchus, viz. regulated the recitation.

Against the theory which sees in Peisistratus the author of the first complete text of Homer we have to set the absolute silence of Herodotus, Thucydides, the orators and the Alexandrian grammarians. And it can hardly be thought that their silence is accidental. Herodotus and Thucydides seem to tell us all that they know of Peisistratus. The orators Lycurgus and Isocrates make a great deal of the recitation of Homer at the Panathenaea, but know nothing of the poems having been collected and arranged at Athens, a fact which would have redounded still more to the honour of the city. Finally, the Scholia of the Veil. A contain no reference or allusion to the story of Peisistratus. As these Scholia are derived ift substance from the writings of Aristarchus, it seems impossible to believe that the story was known to him. The circumstance that it is referred to in the Scholia Townleiana and in Eustathius, gives additional weight to this argument.

The result of these considerations seems to be that nothing rests on good evidence beyond the fact that Homer was recited by law at the Panathenaic festival. The rest of the story is probably the result of gradual expansion and accretion. It was inevitable that later writers should speculate about the authorship of such a law, and that it should be attributed with more or

less confidence to Solon or Peisistratus or Hipparchus. The choice would be deter- mined in great measure by political feeling. It is probably not an accident that Dieuchidas, who attributed so much to Peisistratus, was a Megarian. The author of the Hipparchus is evidently influ- enced by the anti-democratical tendencies in which he only followed Plato. In the times to which the story of Peisistratus can be traced, the 1st century B.C., the substitution of the " tyrant " for the legislator was extremely natural. It was equally natural that the importance of his work as regards the text of Homer should be exaggerated. The splendid patronage of letters by the successors of Alexander, and especially the great institutions which had been founded at Alexandria and Pergamum, had made an impression on the imagination of learned men which was reflected in the current notions of the ancient despots. It may even be suspected that anec- dotes in praise of Peisistratus and Hipparchus were a delicate form of flattery addressed to the reigning Ptolemy. Under these influences the older stories of Lycurgus bringing Homer to the Peloponnesus, and Solon providing for the recitation at Athens, were thrown into the shade.

In the later Byzantine times it was believed that Peisistratus was aided by seventy grammarians, of whom Zenodotus and Aristarchus were the chief. The great Alexandrian grammarians had become figures in a new mythology. It is true that Tzetzes, one of the writers from whom we have this story, gives a better version, accord- ing to which Peisistratus employed four men, viz. Onomacritus, Zopyrus of Heraclea, Orpheus of Croton, and one whose name is corrupt (written JirucoyKuXos) . Many scholars (among them Ritschl) accept this account as probable. Yet it rests upon no better evidence than the other.

The effect of Wolf's Prolegomena was so overwhelming that, although a few protests were made at the time, the true Homeric controversy did not begin till after Wolf's death (1824). His specu- lations were thoroughly in harmony with the ideas and sentiment of the time, and his historical arguments, especially his long array of testimonies to the work of Peisistratus, were hardly challenged.

The first considerable antagonist of the Wolfian school was G. W. Nitzsch, whose writings cover the years 1828-1862, and deal with every side of the controversy. In the earlier part of his Meletemata (1830) he took up the question of written or unwritten literature, on which Wolf's whole argument turned, and showed that the art of writing must be anterior to Peisistratus. In the later part of the same series of discussions (1837), and in his chief work (Die Sagenpoesie der Griechen, 1852), he investigated the structure of the Homeric poems, and their relation to the other epics of the Trojan cycle. These epics had meanwhile been made the subject of a work which for exhaustive learning and delicacy of artistic perception has few

rivals in the history of philology, the Epic Cycle of F. G. Welcker. The confusion which previous scholars had made between the ancient post-Homeric poets (Arctinus, Lesches, &c.) and the learned mythological writers (such as the " scriptor cyclicus " of Horace) was first cleared up by Welcker. Wolf had argued that if the cyclic writers had known the Iliad and Odyssey which we possess, they would have imitated the unity of structure which distinguishes these two poems. The result of YVelckcr's labours was to show that

the Homeric poems had influenced both the form and the substance of epic poetry.

In this way there arose a conservative school who admitted more or less freely the absorption of pre-existing lays in the formation of the Iliad and Odyssey, and also the .existence of considerable inter- polations, but assigned the main work of formation to prehistoric times, and to the genius of a great poet. Whether the two epics were by the same author remained an open question; the tendency • of this group of scholars was decidedly towards separation. Regard- ing the use of writing, too, they were not unanimous. K. O. Miiller, for instance, maintained the view of Wolf on this point, while he strenuously combated the inference which Wolf drew from it.

The Prolegomena bore on the title-page the words " Volumen I."; but no second volume ever appeared, nor was any attempt made by Wolf himself to carry his theory further. The first important steps in that direction were taken by Gottfried Hermann, chiefly in two dissertations, De inter ■polationibus Homeri (Leipzig, 1832), and De iteratis Homeri (Leipzig, 1840), called forth by the writings of Nitzsch. As the word " interpolation " implies, Hermann did not maintain the hypothesis of a congeries of independent " lays." Feeling the difficulty of supposing that all the ancient minstrels sang of the " wrath of Achilles " or the " return of Ulysses " (leaving out even the capture of Troy itself), he was led to assume that two poems of no great compass dealing with these two themes became so famous at an early period as to throw other parts of the Trojan story into the back- ground, and were then enlarged by successive generations of rhapso- dists. Some parts of the Iliad, moreover, seemed to him to be older than the poem on the wrath of Achilles ; and thus in addition to the " Homeric " and " post-Homeric " matter he distinguished a " pre-Homeric " element.

The conjectures of Hermann, in which the Wolfian theory found a modified and tentative application, were presently thrown into the shade by the more trenchant method of Lachmann, who (in two papers read to the Berlin Academy in 1837 and 1841) sought to show that the Iliad was made up of

sixteen independent " lays," with various enlargements and interpolations, all finally reduced to order by Peisistratus. The first book, for instance, consists of a lay on the anger of Achilles (1-347), an d two continuations, the return of Chryseis (430-492) and the scenes in Olympus (348-429, 493-61 1). The second book forms a second lay, but several passages,, among them the speech of Ulysses (278-332), are interpolated. In the third book the scenes in which Helen and Priam take part (in- cluding the making of the truce) are pronounced to be interpolations; and so on. Regarding the evidence on which these sweeping results are founded, opinions will vary. The degree of smoothness or con- sistency which is to be expected on the hypothesis of a single author will be determined by taste rather than argument. The dissection of the first book, for instance, turns partly on a chronological in- accuracy which might well escape the poet as well as his hearers. In examining such points we are apt to forget that the contradictions by which a story is shown to be untrue are quite different from those by which a confessedly untrue story would be shown to be the work of different authors.

Structure of the Iliad. — The subject of the Iliad, as the first line proclaims, is the " anger of Achilles." The manner in which this subject is worked out will appear from the following summary in which we distinguish (1) the plot, i.e. the story of the quarrel, (2) the main course of the war, which forms a sort of underplot, and (3) subordinate episodes.

I. Quarrel of Achilles with Agamemnon and the Greek army — Agamemnon, having been compelled to give up his prize Chryseis, takes Briseis from Achilles — Thereupon Achilles appeals to his mother Thetis, who obtains from Zeus a promise that he will give victory to the Trojans until the Greeks pay due honour to her son — Meanwhile Achilles takes no part in the war. II. Agamemnon is persuaded by a dream sent from

Zeus to take the field with all his forces.

His attempt to test the temper of the army nearly leads to their return.

Catalogue of the army (probably a later addition). Trojan muster — Trojan catalogue. III. Meeting of the Armies — Paris challenges Menelaus —

Truce made.

" Teichoscopy," Helen pointing out to Priam the Greek leaders. The duel — Paris is saved by Aphrodite. IV. Truce broken by Pandarus.

Advance of the armies — Battle. V. Aristeia of Diomede — his combat with Aphrodite

VI. — Meeting with Glaucus — Visit of Hector to the

(1-311) city, and offering of a peplus to Athena.

(312-529) Visit of Hector to Paris — to Andromache.

VII. Return of Hector and Paris to the field.

Duel of Ajax and Hector. Truce for burial of dead. The Greeks build a wall round their camp. VIII. Battle- -The Trojans encamp on the field.

IX. Agamemnon sends an embassy by night, offering Achilles

restitution and full amends— Achilles refuses. X. Doloneia — -Night expedition of Odysseus and

Diomede (in all probability added later). XI. Aristeia of Agamemnon— he is wounded— Wounding

of Diomede and Odysseus. Achilles sends Antilochus to inquire about Machaon. XII. Storming of the wall— the Trojans reach the ships.

XIII. Zeus ceases to watch the field— Poseidon secretly comes to the aid of the Greeks.

XIV. Sleep of Zeus, by the contrivance of Hera.

XV. Zeus awakened— Restores the advantage to trie Tro-

jans — Ajax alone defends the ships. XVI. Achilles is persuaded to allow Patroclus to take the field. Patroclus drives back the Trojans — -kills Sarpedon — is himself killed by Hector. XVII. Battle for the body of Patroclus-Aristeiaof Menelaus.

XVIII. News of the death of Patroclus is brought to Achilles- Thetis comes with the Nereids — promises to obtain new armour for him from Hephaestus.

The shield of Achilles described.

XIX. Reconciliation of Achilles — His grief and desire to avenge Patroclus.

XX. The gods come down to the plain — Combat of Achilles with Aeneas

and Hector, who escape.

XXI. The Scamander is choked with slain — rises against Achilles, who is saved by Hephaestus.

XXII. Hector alone stands against Achilles- — his flight round the walls — he is slain.

XXIII. Burial of Patroclus — Funeral games.

XXIV. Priam ransoms the body of Hector— his burial.

Such is the " action " (7rp££ts) which in Aristotle's opinion showed the superiority of Homer to all later epic poets. But the proof that his scheme was the work of a great poet does not depend merely upon the artistic unity which excited the wonder of Aristotle. A number of separate " lays " might conceivably be arranged and connected by a man of poetical taste in a manner that would satisfy all requirements. In such a case, however, the connecting passages would be slight and weak. Now, in the Iliad these passages are the finest and most character- istic. The element of connexion and unity is the story of the " wrath of Achilles "; and we have only to look at the books which give the story of the wrath to see how essential they are. Even if the ninth book is rejected (as Grote proposed), there remain the speeches of the first, sixteenth and nineteenth books. These speeches form the cardinal points in the action of the Iliad — the framework into which everything else is set; and they have also the best title to the name of Homer.

The further question, however, remains, — What shorter narrative piece fulfilling the conditions of an independent poem has Lachmann succeeded in disengaging from the existing Iliad ? It must be admitted that when tried by this test his '• lays " generally fail. The " quarrel of the chiefs," the " muster of the army," the " duel of Paris and Menelaus," &c, are excellent beginnings, but have no satisfying conclusion. And the reason is not far to seek. The Iliad is not a history, nor is it a series of incidents in the history, of the siege. It turns entirely upon a single incident, occupying a few days only. The several episodes of the poem are not so many distinct stories, each with an interest of its own. They are only parts of a single main event. Consequently the type of epic poem which would be produced by an aggregation of shorter lays is not the type which we have in the Iliad. Rather the Iliad is itself a single lay which has grown with the growth of poetical art to the dimensions of an epic.

But the original nucleus and parts of the incidents may be the work of a single great poet, and yet other episodes may be of different authorship,

wrought into the structure of the poem in later times. Various theories have been based on this supposi- tion. Grote in particular held that the original poem, which he called the Achillei's, did not include books ii.-vii., ix., x., xxiii., xxiv. Such a view may be defended somewhat as follows.

Of the books which relate the events during the absence of Achilles from the Greek ranks (ii.-xv.), the last five are directly related to the main action. They describe the successive steps by which the Greeks are driven back, first from the plain to the rampart, then to their ships. Moreover, three of the chief heroes, Agamemnon, Diomede and Ulysses, are wounded, and

this circumstance, as Lachmann himself admitted, is steadily kept in mind throughout. It is otherwise with the earlier books (especially ii.-vii.). The chief incidents in that part of the poem — the panic rush to the ships, the duels of Paris and Menelaus, and of Hector and Ajax, the Aristeia of Diomede — stand in no relation to the mainspring of the poem, the promise made by Zeus to Thetis. It is true that in the thirteenth and fourteenth books the purpose of Zeus is thwarted for a time by other gods; but in books ii.-vii. it is not so much thwarted as ignored. Further, the events follow without sufficient connexion. The truce of the third book is broken by Pandarus, and Agamemnon passes along the Greek ranks with words of encouragement, but without a hint of the treachery just committed. The Aristeia of Diomede ends in the middle of the sixth book; he is uppermost in all thoughts down to ver. 311, but from this point, in the meetings of Hector with Helen and Andromache, and again in the seventh book when Hector challenges the Greek chiefs, his prowess is forgotten. Once more, some of the incidents seem to belong properly to the beginning of the war. The joy of Menelaus on seeing Paris, Priam's ignorance of the Greek leaders, the speeches of Agamemnon in his review of the ranks (in book iv.), the building of the wall — all these are in place after the Greek landing, but hardly in the ninth year of the siege.

On the other hand, it may be said, the second book opens with a direct reference to the events of the first, and the mention of Achilles in the speech of Thersites (ii. 239 sqq.) is sufficient to keep the main course of events in view. The Catalogue is con- nected with its place in the poem by the lines about Achilles (686-694) . When Diomede is at the height of his Aristeia Helenus says (//. vi. 99), " We did not so fear even Achilles." And when in the third book Priam asks Helen about the Greek captains, or when in the seventh book nine champions come forward to contend with Hector, the want of the greatest hero of all is sufficiently felt. If these passages do not belong to the period of the wrath of Achilles, how are we to account for his con- spicuous absence ?

Further, the want of smoothness and unity which is visible in this part of the Iliad may be due to other causes than difference of date or authorship. A national poet such as the author of the Iliad cannot always choose or arrange his matter at his own will. He is bound by the traditions of his art, and by the feelings and expectations of his hearers. The poet who brought the exploits of Diomede into the Iliad doubtless had his reasons for doing so, which were equally strong whether he was the poet of the Achillei's or a later Homerid or rhapsodist. And if some of the incidents (those of the third book in particular) seem to belong to the beginning of the war, it must be considered that poetically, and to the hearers of the Iliad, the war opens in the third book, and the incidents are of the kind that is required in such a place. The truce makes a pause which heightens the interest of the impending battle; the duel and the scene on the walls are effective in bringing some of the leading characters on the stage, and in making us acquainted with the previous history. The story of Paris and Helen especially, and the general position of affairs in Troy, is put before us in a singularly vivid manner. The book in short forms so good a prologue to the action of the war that we can hardly be wrong in attributing it to the genius which devised the rest of the Iliad.

The case against the remaining books is of a different kind. The ninth and tenth seem like two independent pictures of the night before the great battle of xi.-xvii. Either is enough tp fill the space in Homer's canvas; and the suspicion arises (as when two Platonic dialogues bear the same name) that if either had been genuine, the other would not have come into existence. If one of the two is to be rejected it must be the tenth, which is certainly the less Homeric. It relates a picturesque adventure, conceived in a vein more approaching that of comedy than any other part of the Iliad. Moreover, the language in several places exhibits traces of post-Homeric date. The ninth book, on the other hand, was rejected by Grote, chiefly on the grounds that the embassy to Achilles ought to have put an end to the quarrei, and that it is ignored in later passages, especially in the speeches

of Achilles (xi. 609; xvi. 72, 85). His argument, however, rests on an assumption which we are apt to bring with us to the reading of the Iliad, but which is not borne out by its language, viz. that there was some definite atonement demanded by Achilles, or due to him according to the custom and sentiment of the time. But in the Iliad the whole stress is laid on the anger of Achilles, which can only be satisfied by the defeat and extreme peril of the Greeks. 1 He is influenced by his own feeling, and by nothing else. Accordingly, in the ninth book, when they are still protected by the

rampart (see 348 sqq.), he rejects gifts and fair words alike; in the sixteenth he is moved by the tears and entreaties of Patroclus, and the sight of the Greek ships on fire; in the nineteenth his anger is quenched in grief. But he makes no conditions, either in rejecting the offers of the embassy or in returning to the Greek army. And this conduct is the result, not only of his fierce and inexorable character, but also (as the silence of Homer shows) of the want of any general rules or principles, any code of morality or of honour, which would have required him to act in a different way.

Finally, Grote objected to the two last books that they prolong the action of the Iliad beyond the exigencies of a coherent scheme. Of the two, the twenty-third could more easily be spared. In language, and perhaps in style and manner, it is akin to the tenth; while the twenty-fourth is in the pathetic vein of the ninth, and like it serves to bring out new aspects of the character of Achilles.

Dr E. Kammer has given some strong reasons for doubting the genuineness of the passage in book xx. describing the duel between Achilles and Aeneas (79-352). The incident is certainly very much out of keeping with the vehement action of that part of the poem, and especially with the moment when Achilles returns to the field, eager to meet Hector and avenge the death of his friend. The interpolation (if it is one) is probably due to local interests. It contains the well-known prophecy that the descendants of Aeneas are to rule over the Trojans, — pointing to the existence of an Aenead dynasty in the Troad. So, too, the legend of Anchises in the Hymn to Aphrodite is evidently local ; and Aeneas becomes more prominent in the later epics, especially the Cypria and the 'IXiov irhpais of Arctinus.

Structure of the Odyssey. — In the Odyssey, as in the Iliad, the events related fall within a short space of time. The difficulty of adapting the long wanderings of Ulysses to a plan of this type is got over by the device — first met with in the Odyssey — of making the hero tell the story of his own adventures. In this way the action is made to begin almost immediately before the actual return of Ulysses. Up to the time when he reaches Ithaca it moves on three distinct scenes: we follow the fortunes of Ulysses, of Telemachus on his voyage in the Peloponnesus, and of Penelope with the suitors. The art with which these threads ve woven together was recognized by Wolf himself, who admitted the difficulty of applying his theory to the " admirabilis summa et compages " of the poem. Of the comparatively few attempts which have been made to dissect the Odyssey, the most moderate and attractive is that of Professor A. Kirchhoff of Berlin. 2

According to Kirchhoff, the Odyssey as we have it is the result of additions made to an original nucleus. There was first of all a " Return of Odysseus," relating chiefly the adventures with the Cyclops, Calypso and the

Phaeacians; then a continuation, the scene of which lay in Ithaca, embracing the bulk of books xiii.-xxiii. The poem so formed was enlarged at some time between Ol. 30 and 01. 50 by the stories of books x.-xii. (Circe, the Sirens, Scylla, &c), and the adventures of Telemachus. Lastly, a few passages were interpolated in the time of Peisistratus.

The proof that the scenes in Ithaca are by a later hand than the ancient " Return " is found chiefly in a contradiction discussed by Kirchhoff in his sixth dissertation (pp. 135 sqq., ed. 1869). Sometimes Ulysses is represented as aged and worn by toil, so that Penelope, for instance, cannot recognize him; sometimes he is really in the prime of heroic vigour, and his appearing as a beggarly old man is the work of Athena's wand. The first of these representations is evidently natural, considering the twenty eventful years that have passed; but the second, Kirchhoff holds, is the Ulysses of Calypso's

1 On this point see a paper by Professor Packard in the Trans, of the American Philological Association (1876).

2 Die Composition der Odyssee (Berlin, 1869). A full discussion of this book is given by Dr E. Kammer, Die Einheit der Odyssee (Leipzig,

1873).

island and the Phaeacian court. He concludes that the aged Ulysses belongs to the " continuation " (the change wrought by Athena's wand being a device to reconcile the two views), and hence that the continuation is the work of a different author.

Ingenious as this is, there is really very slender ground for Kirchhoff's thesis. The passages in the second half of the Odyssey which describe the appearance of Ulysses do not give two well- marked representations of him. Sometimes Athena disguises him as a decrepit beggar, sometimes she bestows on him supernatural beauty and vigour. It must be admitted that we are not told exactly how long in each case the effect of these changes lasted. But neither answers to his natural appearance, or to the appearance which he is imagined to present in the earlier books. In the palace of Alcinous, for instance, it is noticed that he is vigorous but "marred by many ills" (Od. viii. 137); and this agrees with the scenes of recognition in the latter part of the poem.

The arguments by which Kirchhoff seeks to prove that the stories of books x.xii. are much later than those of book ix. are not more convincing. He points out some resemblances between these three books and the Argonautic fables, among them the circumstance that a fountain Artacia

occurs in both. In the Argonautic story this fountain is placed in the neighbourhood of Cyzicus, and answers to an actual fountain known in historical times. Kirchhoff argues that the Artacia of the Argonautic story must have been taken from the real Artacia, and the Artacia of the Odyssey again from that of the Argonautic story. And as Cyzicus was settled from Miletus, he infers .that both sets of stories must be comparatively late. It is more probable, surely, that the name Artacia occurred independ ently (as most geographical names are found to occur) in more than one place. Or it may be that the Artacia of the Odyssey suggested the name to the colonists of Cyzicus, whence it was adopted into the later versions of the Argonautic story. The further argument that the Nostoi recognized a son of Calypso by Ulysses but no son of Circe, consequently that Circe was unknown to the poet of the Nostoi, rests (in the first place) upon a conjectural alteration of a passage in Eustathius, and, moreover, has all the weakness of an argument from silence, in addition to the uncertainty arising from our very slight knowledge of the author whose silence is in question. Finally, when Kirchhoff finds traces in books x.-xii. of their having been originally told by the poet himself instead of being put in the mouth of his hero, we feel that inaccuracies of this kind are apt to creep in wherever a fictitious story is thrown into the form of an autobiography.

Inquiries conducted with the refinement which characterizes those of Kirchhoff are always instructive, and his book contains very many just Observations; but it is impossible to admit his main conclusions. And perhaps we may infer that no similar attempt can be more successful. It does not indeed follow that the Odyssey is free from interpolations. The New£a of book xi. may be later (as Lauer maintained), or it may contain additions, which could easily be inserted in a description of the kind. And the last book is pro- bably by a different hand, as the ancient critics believed. But the unity of the Odyssey as a whole is apparently beyond the reach of the existing weapons of criticism.

Chorizontes. — When we are satisfied that each of the great Homeric poems is either wholly or mainly the work of a single poet, a question remains which has been matter of controversy in ancient as well as modern times — Are they the work of the same poet? Two ancient grammarians, Xeno and Hellanicus, were known as the "separators" (ol xwpif ovres) ; and Arist- archus appears to have written a treatise against their heresy. In modern times some of the greatest names have been on the side of the " Chorizontes."

If, as has been maintained in the precedirfg pages, the external evidence regarding Homer is of no value, the problem now before us may be stated in this form: Given two poems of which nothing is known except that they

are of the same school of poetry, what is the probability that they are by the same author? We may find a fair parallel by imagining two plays drawn at hazard from the works of the great tragic writers. It is evident that the burden of proof would rest with those who held them to be by the same hand.

The arguments used in this discussion have been of very various calibre. The ancient Chorizontes observed that the messenger of Zeus is Iris in the Iliad, but Hermes in the Odyssey; that the wife of Hephaestus is one of the Charites in the Iliad, but Aphrodite in the Odyssey; that the heroes in the Iliad do not eat fish; that Crete has a hundred cities according to the Iliad, and only ninety according to the Odyssey; that irpoirapoiffe is used in the Iliad of place, in the Odyssey of time, &c. Modern scholars have added to the list, especially by making careful comparisons of the two poems in respect of vocabulary and

grammatical forms. Nothing is more difficult than to assign the degree of weight to be given to such facts. The difference of subject between the two poems is so great that it leads to the most striking differences of detail, especially in the voca- bulary. For instance, the word 4>6@os, which in Homer means "flight in battle" (not "fear"), occurs thirty-nine times in the Iliad, and only once in the Odyssey; but then there are no battles in the Odyssey. Again, the verb prjyvvfxi, " to break," occurs forty-eight times in the Iliad, and once in the Odyssey, — the reason being that it is constantly used of breaking the armour of an enemy, the gate of a city, the hostile ranks, &c. Once more, the word ctkotos, " darkness," occurs fourteen times in the Iliad, once in the Odyssey. But in every one of the fourteen places it is used of " darkness " coming over the sight of a fallen warrior. On the other side, if words such as dad/xivdos, " a bath," xepwA, " a basin for the hands," \eaxv, " a place to meet and talk," &c, are peculiar to the Odyssey, we have only to remember that the scene in the Iliad is hardly ever laid within any walls except those of a tent. These examples will show that mere statistics of the occurrence of words prove little, and that we must begin by looking to the subject and character of each poem. When we do so, we at once find ourselves in the presence of differences of the broadest kind. The Iliad is much more historical in tone and character. The scene of the poem is a real place, and the poet sings (as Ulysses says of Demodocus) as though he had been present himself, or had heard from one who had been. The supernatural element is confined to an interference of the gods, which to the common eye hardly disturbs the natural current of aifairs. The Odyssey, on the contrary, is full of the magical and romantic

— " speciosa miracula," as Horace called them. Moreover, these marvels — which in their original form are doubtless as old as anything in the Iliad, since in fact they are part of the vast stock of popular tales (Marchen) diffused all over the world — are mixed up in the Odyssey with the heroes of the Trojan war. This has been especially noticed in the case of the story of Polyphemus, one that is found in many countries, and in versions which cannot all be derived from Homer. W. Grimm has pointed out that the behaviour of Ulysses in that story is senseless and foolhardy, utterly beneath the wise and much-enduring Ulysses of the Trojan war The reason is simple; he is not the Ulysses of the Trojan war, but a being of the same world as Polyphemus himself — the world of giants and ogres. The question then is — How long must the name of Ulysses have been familiar in the legend (Sage) of Troy before it made its way into the tales of giants and ogres {Marchen), where the poet of the Odyssey found it ?

Again, the Trojan legend has rtself received some extension between the time of the Iliad and that of the Odyssey. The story of the Wooden Horse is not only unknown to the Iliad, but is of a kind which we can hardly imagine the poet of the Iliad admitting. The part taken by Neoptolemus seems also to be a later addition. The tendency to amplify and complete the story shows itself still more in the Cyclic poets. Between the Iliad and these poets the Odyssey often occupies an inter- mediate position.

This great and significant change in the treatment of the heroic legends is accompanied by numerous minor differences (such as the ancients remarked) in belief, in manners and institutions, and in language These differences bear out the inference that the Odyssey is of a later age. The progress of reflection is especially shown in the higher ideas entertained regarding the gods. The turbulent Olympian court has almost disappeared. Zeus has acquired the character of a supreme moral ruler; and although Athena and Poseidon are adverse influences in the poem, the notion of a direct contest between them is scrupulously avoided. The advance of morality is shown in the more frequent use of terms such as " just " (dUaios), " piety " (bah)), " insolence " (vfipis), "god-fearing" (6tovdris), "pure" (ayvos); and also in the plot of the story, which is distinctly a contest between right and wrong. In matters bearing upon the arts of life it is unsafe to press the silenct of the Iliad. We may note, however,

the difference between the house of Priam, surrounded by distinct dwellings for his many sons and daughters, and the houses of Uly:;es and Alcinous, with many chambers under a single roof. The singer, too, who is so prominent a figure in the Odyssey can hardly be thought to be absent from the Iliad merely because the scene is laid in a camp.

Style of Homer. — A few words remain to be said on the style and general

character of the Homeric poems, and on the com- parisons which may be made between Homer and analogous poetry in other countries.

The cardinal qualities of the style of Homer have been pointed out once for all by Matthew Arnold. ” The translator of Homer, ” he says, ” should above all be penetrated by a sense of four qualities of his author — that he is eminently rapid ; that he is eminently plain and direct, both in the evolution of his thought and in the expression of it, that is, both in his syntax and in his words; that he is eminently plain and direct in the substance of his thought, that is, in his matter and ideas; and, finally, that he is eminently noble ” (On Translating Homer, p. 9).

The peculiar rapidity of Homer is due in great measure to his use of the hexameter verse. It is characteristic of early literature that the evolution of the thought — that is, the grammatical form of the sentence — is guided by the structure of the verse; and the correspondence which consequently obtains between the rhythm and the grammar — the thought being given out in lengths, as it were, and these again divided by tolerably uniform pauses — produces a swift flowing movement, such as is rarely found when the periods have been constructed without direct reference to the metre. That Homer possesses this rapidity without falling into the corresponding faults — that is, without becoming either ” jerky ” or monotonous — is perhaps the best proof of his unequalled poetical skill. The plainness and directness, both of thought and of expression, which characterize Homer were doubtless qualities of his age; but the author of the Iliad (like Voltaire, to whom Arnold happily compares him) must have possessed the national gift in a surpassing degree. The Odyssey is in this respect perceptibly below the level of the Iliad. Rapidity or ease of movement, plainness of expression and plainness of thought, these are not the distinguishing qualities of the great epic poets — Virgil, Dante, Milton. On the contrary, they belong rather to the humbler epico-lyrical school for which Homer has been so often claimed. The proof that Homer does not belong to that school — that his poetry is not in any true sense ” ballad-poetry ” — is furnished by the higher artistic structure of his poems (already discussed), and as regards style by the fourth of the qualities distinguished by Arnold: — the quality of nobleness. It is his noble and powerful style, sustained through every change of idea and subject, that finally separates Homer from all forms of ” ballad-poetry “and ” popular epic.” 1 But while we are on our guard against a once common error, we may recognize the historical connexion between the Iliad and Odyssey and the ” ballad ” literature which undoubtedly preceded them in Greece. It may even be admitted that the swift-flowing movement, and the simplicity of thought and style, which we admire in the Iliad are an inheritance from the earlier ” lays ” — the Kkta dv8pS>v such as Achilles and Patroclus sang to the lyre in their tent. Even the metre — the hexameter verse — may

be assigned to them. But between these lays and Homer we must place the cultivation of epic poetry as an art. 2 The pre-Homeric lays doubtless furnished the elements of such a poetry — the alphabet, so to speak, of the art; but they must have been refined and transmuted before they formed poems" like the Iliad and Odyssey.

A single example will illustrate this. In the scene on the walls of Troy, in the third book of the Iliad, after Helen has pointed out Agamemnon, Ulysses and Ajax in answer to Priam's

1 " As a poet Homer must be acknowledged to excel Shakespeare in the truth, the harmony, the sustained grandeur, the satisfying com- pleteness of his images " (Shelley, Essays, &c, i. 51, ed. 1852).

2 " The old English balladist may stir Sir Philip Sidney's heart like a trumpet, and this is much ; but Homer, but the few artists in the grand style, can do more — they can refine the raw natural man, they can transmute him " (On Translating Homer, p. 61).

questions, she goes on unasked to name Idomeneus. Lachmann, whose mind is full of the ballad manner, fastens upon this as an irregularity. " The unskilful transition from Ajax to Idomeneus, about whom no question had been asked," he cannnot attribute to the original poet of the lay (Betrachtungen, p. 15, ed. 1865). But. as was pointed out by A. Romer l this is exactly the varia- tion which a poet would introduce to relieve the primitive ballad-like sameness of question and answer; and moreover it forms the transition to the lines about the Dioscuri by which the scene is so touchingly brought to a close.

Analogies. — The development of epic poetry (properly so called) out of the oral songs or ballads of a country is a process which in the nature of things can seldom be observed. It seems clear, however, that the hypothesis of epics such as the Iliad and Odyssey having been formed by putting together or even by working up shorter poems finds no support from analogy.

Narrative poetry of great interest is found in several countries (such as Spain and Servia), in which it has never attained to the epic stage. In Scandinavia, in Lithuania, in Russia, accord- ing to Gaston Paris (Histoire poctique de Charlemagne, p. 9), the national songs have been arrested in a

form which may be called intermediate between contemporary poetry and the epic. The true epics are those of India, Persia, Greece, Germany, Britain and France. Most of these, however, fail to afford any useful points of comparison, either from their utter unlikeness to Homer, or because there is no evidence of the existence of anterior popular songs. The most instructive, perhaps the only instructive, parallel is to be found in the French " chansons de geste," of which the Chanson de Roland is the earliest and best example. These poems are traced back with much probability to the 10th century. They are epic in character, and were recited by pro- fessional jongleurs (who may be compared to the hoidol of Homer). But as early as the 7th century we come upon traces of short lays (the so-called cantilenes) which were in the mouths of all and were sung in chorus. It has been held that the chansons de geste were formed by joining together " bunches " of these earlier cantilenes, and this wf.s the view taken by Leon Gautier in the first edition of Les Epopees francaises (1865). In the second edition, of which the first volume appeared in 1878, he abandoned this theory. He believes that the epics were generally composed under the influence of earlier songs. " Our first epic poets," he says, " did not actually and materially patch together pre-existent cantilenes. They were only inspired by these popular songs; they only borrCwed from them the traditional and legendary elements. In short, they took nothing from them but the ideas, the spirit, the life; they ' found ' (ils out trouve) all the rest " (p. 80). But he admits that " some of the old poems may have been borrowed from tradition, without any intermediary" (jbid.); and when it is considered that the traces of the " cantilenes " are slight, and that the degree in which they inspired the later poetry must be a matter of im- pression rather than of proof, it does not surprise us to find other scholars (notably Paul Meyer) attaching less importance to them, or even doubting their existence. 2

When Leon Gautier shows how history passes into legend, and legend again into romance, we are reminded of the difference

1 Die exegelischen Scholien der Ilias, p. vii.

■ *" On comprend que des chants populaires nes d'un 6v6nement (Vlatant. victoire 011 deiaite, puissent contribuer a former la tradition, a en arreter les traits ; ils peuvent aussi devenir le centre de ldgendes qui se torment pour les expliquer; et de la sorte leur substance au moins arrive au poete epique qui Vintroduit dans sa composition. Yoila ce qui a pu se produire pour de chants tres-courts, dont il est d'aillcurs aussi difficile d'afnrmer que de nier l'existence. Mais on peut expliquer la formation des chansons de geste par une autre hypo- these " (Meyer, Recherclies sur I 'epopee franchise, p. 65). " Ce qui a fait naitre la theorie des chants lyrico-6piques ' ou des cantilenes, c'est le syste-me de Wolf sur les poemes homeriques, et de Lachmann sur les Nibelungen. Mais, au moins en ce qui concerne ce*

dernier poeme, le systeme est detruit. . . . On tire encore argument des romances espagnoles, qui, dit-on, sont des ‘ cantilenes ‘ non encore arrivees a l’epopee. . . . Et c’est le malheur de cette theorie : faute de preuves directes, elle cherche des analogies au dehors; en Espagne, elle trouve des ‘ cantilenes,’ mais pas d‘6pop6e; en Allemagne, une £popcV, mais pas do cantilenes ! ” {Ibid. p. 66).

noticed above between the Iliad and the Odyssey, and between Homer and the early Cyclic poems. And the peculiar degradation of Homeric characters which appears in some poets (especially Euripides) finds a parallel in the later chansons de geste. 3

■*The comparison of Homer with the great literary epics calls for more discursive treatment than would be in place here. Some external differences have been already indicated. Like the French epics, Homeric poetry is indigenous, and is distin- guished by this fact, and by the ease of movement and the simplicity which result from it, from poets such as Virgil, Dante and Milton. It is also distinguished from them by the com- parative absence of underlying motives or sentiment. In Virgil’s poetry a sense of the greatness of Rome and Italy is the leading motive of a passionate rhetoric, partly veiled by the ” chosen delicacy ” of his language. Dante and Milton are still more faithful exponents of the religion and politics of their time. Even the French epics are pervaded by the sentiment of fear and hatred of the Saracens. But in Homer the interest is purely dramatic. There is no strong antipathy of race or religion; the war turns on no political event; the capture of Troy lies outside the range of the Iliad. Even the heroes are not the chief national heroes of Greece. The interest lies wholly (so far as we can see) in the picture of human action and feeling.*

Bibliography. — A complete bibliography of Homer would fill volumes. The following list is intended to include those books only which are of first-rate importance.

The editio princeps of Homer, published at Florence in 1488, by Demetrius Chalcondylas, and the Aldine editions of 1504 and 1517, have still some value beyond that of curiosity. The chief modern critical editions are those of Wolf (Halle, 1794-1795; Leipzig, 1804- 1807), Spitzner (Gotha, 1832-1836), Bekker (Berlin, 1843; Bonn, 1858), La Roche {Odyssey, 1867-1868; Iliad, 1873-1876, both at Leipzig); Ludwich {Odyssey, Leipzig, 1889-1891; Iliad, 2 vols., 1901 and 1907); W. Leaf (Iliad, London, 1886-1888; 2nd ed. 1900- 1902); Merry and Riddell (Odyssey i.-xii., 2nd ed., Oxford, 1886); Monro (Odyssey xiii.xxiv. with appendices, Oxford, 1901) ; Monro and Allen (Iliad), and Allen (Odyssey, 1908, Oxford). The com mentaries of Barnes, Clarke and Ernesti are practically super- seded; but Heyne’s Iliad (Leipzig, 1802) and Nitzsch’s commentary

on the Odyssey (books i.-xii., Hanover, 1826-1840) are still useful. Nageibach's Anmerkungen zur Ilias (A, B 1-483, r) is of great value, especially the third edition (by Autenrieth, Nuremberg, 1864). The unique Scholia Veneta on the Iliad were first made known by Villoison (Homeri Ilias ad veteris codicis Veneti fidem recensita, Scholia in earn antiquissima ex eodem codice aliisque nunc primum edidit, cum Asteriscis, Obeliscis, aliisque signis criticis, J oh. Baptista Caspar d'Ansse de Villoison, Venice, 1788); reprinted, with many additions from other MSS., by Bekker (Scholia in Homeri Iliadem, Berlin, 1825-1826). A new edition has been published by the Oxford Press (Scholia Graeca in Homeri Iliadem, ed. Gul. Dindorfius) ; six volumes have appeared (1875-1888), the last two edited by Professor E. Maass. The vast commentary of Eustathius was first printed at Rome in 1542; the last edition is that of Stallbaum (Leipzig, 1827). The Scholia on the Odyssey were published by Buttmann (Berlin, 182 1), and with greater approach to completeness by W. Dindorf (Oxford, 1855). Although Wolf at once perceived the value of the Venetian Scholia on the Iliad, the first scholar who thoroughly ex- plored them was C. Lehrs (De Aristarchi studiis Homericis, Konigs- berg, 1833; 2nd ed.. Leipzig, 1865). Of the studies in the same field which have appeared since, the most important are: Aug. Nauck, Aristophanis Byzantii fragmenta (Halle, 1848); L. Fried- lander, Aristonici iripl orititioiv 'IXiaoos reliquiae (Gottingen, 1853); M. Schmidt, Didymi Chalcenteri fragmenta (Leipzig, 1854); L. Friedlander, Nicanoris ircpl 'lXtaˆfjs any nijs reliquiae (Berlin, 1857); Aug. Lentz, Herodiani Technici reliquiae (Leipzig, 1867); J. La Roche, Die homerische Texlkritik im Alter thum (Leipzig, 1866) and Homerische Untersuchungen (Leipzig, 1869); Ad. Romer, Die Werke der Aristarcheer im Cod. Venet. A. (Munich, 1875); A. Ludwich, Aristarch's Homerische Textkritik (2 vols. Leipzig, 1884-1885); and Die Homervidgata als vor-Alexandrinisch erwiesen (Leipzig, 1898).

The literature of the " Homeric Question " begins practically with Wolf's Prolegomena (Halle, 1795). Of the earlier books Wood's Essay on the Original Genius and Writings of Homer is the most interesting. Wolf's views were skilfully popularized in W. Mtiller's Homerische Vorschule (2nd ed., Leipzig, 1836). G. Hermann's dissertations De inter polationibus Homeri (1832). and De iteratis apud Homerum (1840) are reprinted in his Opuscula. Lachmann's two papers (Betrachtungcn uber Homer's Ilias) were edited together by M. Haupt (2nd ed., Berlin, 1865). Besides the somewhat voluminous writings of Nitzsch, and the discussions contained in the histories of Greek literature by K. O. Miiller, Bernhardy, Ulrici and Th. Bergk, and in Grote's History of Greece, see Welcker, Der epische

3 A. Lang, Contemporary Review, vol. xvii., N.S., p. 588.

Cydus oder die homerischen Didder (Bonn, 1835-1849); on Proclus and the Cycle reference may also be made to Wilamowitz-Mollendorf p. 328 seq.; E. Bethe. Rhein. Mus. (1891), xxvi. p. 593 seq. ; O. Immisch, Festschrift Th. Gomperz dargebracht (1902), p. 237 sq. ; Lauer, Geschichte der homerischen Poesie (Berlin, 1851); Sengebusch' two dissertations prefixed to the two volumes of W. Dindorf's Home'r in the Teubner series (1855-1856); Friedliünder, Die homerische Krihk von 11 olf bis Grole (Berlin, 1853) ; Nutzhorn, Die Entstehungs- weise der homerischen Gedichte, mit Vorwort von J. N. Madvig (Leipzig, 1869); E. Kammer, Zur homerischen Frage (Konigsberg, 1870); and Die Einheit der Odyssee (Leipzig, 1873); A. Kirchhoff Die Composition der Odyssee (Berlin, 1869); Volkmann, Geschichte und Krihk der Wolfschen Prolegomena (Leipzig, 1874); K. SittI, Die Wiederholungen in der Odyssee (Munchen, 1882); U. v. Wilamowitz- Mollendorf, Homerische Untersuchungen (Berlin, 1884)- O Seeck DieQuellen der Odyssee (Berlin, 1887); F. Blass, Die Interpolationen in der Odyssee (Leipzig, 1905). The interest taken in the question by Knglish students is sufficiently shown in the writings of W E (.ladstone, F. A Paley, Henry Hayman (in the Introduction to his Odyssey) P. Geddes, R. C. Jebb and A. Lang (see especially the latter s Homer and his Age, 1907).

The Homeric dialect must be studied in the books (such as those "! °- Curtius) that deal with Greek on the comparative method. Ihe best special work is the brief Griechische Formenlehre of H L Anrens (Gottingen, 1852). Other important works are those of Aug tick: Die homerische Odyssee in der ursprunglichen Sprachform wiederhergestelt (Gottingen, 1883); Die homerisclie Bias {ibid., 1886); _ W. Schulze, Quaestwnes epicae (Gtiterslohe, 1892). On Homeric syntax the chief book is B. Delbriick's Syntactische For- schungen (Halle, 1871-1879), especially vols. i. and iv. ; on metre &c Hartels Homerische Studien (i.-iii., Vienna); Knos, De digammo Homerico quaestwnes (Upsala, 1872-1873-1878) ; Thumb, Zur Geschichte des griech. Digamma, Indogermanische Forschungen (1898), ix. 294 seq. The papers reprinted in Bekker's Homerische Blatter (Bonn, 1863-1872) and Cobet's Miscellanea Critica (Leiden 1876) are of the highest value. Hoffmann's Quaestiones Homericae (Claus- tnal, 1842) is a useful collection of facts. Buttmann's Lexilogus, as an example of method, is still worth study.

The antiquities of Homer— using the word in a wide sense— may be studied in the following books: Volcker, Uber homerische Geographic: und Weltkunde (Hanover, 1830); Nagelsbach's Homeri- sche Theology (2nd ed Nuremberg, 1861) ; H. Brunn. Die Kunst bei Homer (Munich 1868); W. W. Lloyd, On the Homeric Design of the Shield of Achilles (London, 1854) ; Buchholz, Die homerischen Reahen (Leipzig 1871-1873); W. Helbig, Das homerische Epos aus den Denkmalem erldutert (Leipzig, 1884; 2nd ed.,

ibid., 1887V \. Keichel, I per homerische Waff en (Vienna, 1894); C. Robert' Studien zur Ihas (Berlin, 1901); W. Ridgeway, The Earh Age of Greece (Cambridge. 1901); V. Berard, Les Pheniciens et 'V Odyssee

ans. 1902-1903); C. Robert, " Topographische Probleme der luas, in Hermes, xln., 1907, pp. 78-112.

*Among other aids should be mentioned the Index Homericus of Seber (Oxford, 1780); Prendergast's Concordance to the Iliad oo'V t J 5) -' Dl ' nbars id – to the Odyssey and Hymns (Oxford, 1 880); 1-ronwein, Verbum Homericum, (Leipzig, 18*81); Gehring Index Homericus (Leipzig, 1891); the Lexicon Homericum, edited by H Ebehng (Leipzig, 1880-1885) and the facsimile of the rod Veil. A (bijthoff; Leiden, 1901), with an introduction bv D. Comparetti. (D B M) '*

HOMER, WINSLOW (1836-1910), American painter, was born in Boston, U.S.A., on the 24th of February 1836. At the age of nineteen he was apprenticed to a lithographer. Two years later he opened a studio in Boston, and devoted much of his time to making drawings for wood-engravers. In 1859 he re- moved to New York, where he studied in the night-school of the National Academy of Design. During the American Civil War he was with the troops at the front, and contributed sketches to Harper's Weekly. The war also furnished him with the subjects for the first two pictures which he exhibited (1863), one of which was " Home, Sweet Home." His " Prisoners from the Front "— perhaps his most generally popular picture— was exhibited in New York in 1S65. and also in Paris in 1867, where he was spend- ing the year in study. Among his other paintings in oil are "Snap the Whip" (which was exhibited at the Philadelphia Centennial Exhibition of 1876, and, in company with " The Country Schoolroom," at the Paris Salon the following year), " Eating Water-melon," " The Cotton Pickers," " Visit from the Old Mistress. Sunday Morning," " The Life-Line " and " The Coming of the Gale." His genius, however, has perhaps shown better m his works in water-colour, among which are his marine studies painted at Gloucester, Mass., and his " Inside the Bar," " The Voice from the Cliffs " (pictures of English nsherwomen) " fynemouth," "Wrecking of a Vessel" and "Lost on the

Grand Banks." His work, which principally consists of genre pictures, is characterized by strength, rugged directness and unmistakable freshness and originality, rather than by technical excellence, grace of line or beauty of colour. He was little affected by European influences. His types and scenes, apart from his few English pictures, are distinctly American— soldiers in blue, New England children, negroes in the land of cotton, Gloucester fishermen and stormy Atlantic seas. Besides being a member of the Society of Painters in Water-color, New York" he was elected in 1864

an associate and the following year a member of the National Academy of Design.

HOMESTEAD, a borough of Allegheny county, Pennsylvania, U.S.A., on the Monongahela river, 8 m. S.E. of Pittsburg' Pop. (1890) 791 1 ; (1900) 12,554, of whom 3604 were foreign-born and 640 were negroes; (U.S. census, 1910) 18,713. It is served by the Pennsylvania and the Pittsburg & Lake Erie railways, and by the short Union Railroad, which connects with the Bessemer & Lake Erie and the Wabash railways. The borough has a Carnegie library and the CM. Schwab Manual Training School. Partly in Homestead but chiefly in the adjoining borough of Munhall (and therefore not reported as in Homestead by the U.S. Census) is one of the largest plants in the United States for the manufacture of steel used in the construction of bridges and steel-frame buildings and of steel armour-plate, and this is its chief industry; among Homestead's other manufactures are glass and fire-bricks. The water-works are owned and operated by the municipality. Homestead was. first settled in 187 1, and it was incorporated in 1880. In 1892 a labour strike lasting 143 days and one of the most serious in the history of the United States was carried on here by the National Amalgamated Association of Iron and Steel Workers of the United States against the Carnegie Steel Company. The arrival (on the 6th of July) of a force of about 200 Pinkerton detectives from New York and Chicago resulted in a fight in which about 10 men were killed, and to restore order two brigades of the state militia were called out. See Strikes and Lockouts

HOMESTEAD AND EXEMPTION LAWS, laws (principally in the United States) designed primarily either to aid the head of a family to acquire title to a place of residence or to protect the owner against loss of that title through seizure for debt. These laws have all been enacted in America since about the middle of the 19th century, and owe their origin to the demand for a population of the right sort in a new country, to the con- viction that the freeholder rather than the tenant is the natural supporter of popular government, to the effort to prevent insolvent debtors from becoming useless members of society, and to the belief that such laws encourage the stability of the family.

By the cessions of several of the older states, and by various treaties with foreign countries, public lands have been acquired for the United States in every state and territory of the Union except the original thirteen, and Maine, Vermont, Kentucky, Tennessee and Texas. For a time they were regarded chiefly as a source of revenue, but about 1820, as the need of revenue for the payment of the national debt decreased and the in- habitants of an increasing number of new states became eager to have the vacant lands within their bounds occupied, the demand that the public

lands should be disposed of more in the interest of the settler became increasingly strong, and the homestead idea originated. Until the advent of railways, however, the older states of the North were opposed to promoting the develop- ment of the West in this manner, and soon afterwards the Southern representatives in Congress opposed the general homestead bills in the interests of slavery, so that except in isolated cases where settlers were desired to protect some frontier, as in Florida and Oregon, and to a limited extent in the case of the Pre-emption Act of 184 1 (see below), the homestead principle was not applied by the national government until the Civil War had begun. A general homestead bill was passed by Congress in i860, but this was vetoed by President James Buchanan; two years later, however, a similar bill became a law. The act of 1862 originally provided that any citizen of the United States, or applicant for citizenship, who was the head of a family, or

twenty-one years of age, or, if younger, had served not less than fourteen days in the army or navy of the United States during an actual war, might apply for 160 acres or less of unappropriated public lands, and might acquire title to this amount of land by residing upon and cultivating it for five years immediately following, and paying such fees as were necessary to cover the cost of administration; a homestead acquired in this manner was exempted from seizure for any debt contracted prior to the date of issuing the patent. A commutation clause of this act permitted title to be acquired after only six months of residence by paying $1.25 per acre, as provided in the Pre-emption Act of 1841. Act of 1872, amended in 1901, allows any soldier or seaman, who has served at least ninety days in the army or navy of the United States during the Civil War, the Spanish-American War or in the suppression of the insurrection in the Philippines, and was honourably discharged, to apply for a homestead, and permits the deduction of the time of such service, or, if discharged on account of wounds or other disability incurred in the line of duty, the full term of his enlistment, from the five years otherwise required for perfecting title, except that in any case he shall have resided upon and cultivated the land at least one year before the passing of title. Since 1866 mineral lands have been for the most part excluded from entry as homesteads.

In accordance with the provisions of the homestead law, 718, 030 homesteads, containing 96,495,414 acres, were estab- lished in forty-two years, and besides this principal act, Congress has passed several minor ones of a like nature, that is, acts designed to benefit the actual settler who improves the land. Thus the Pre-emption Act of 1841 gave to any head of a

family or any single person over twenty-one years of age, who was a citizen of the United States or had declared his intention to become one, permission to purchase not to exceed 160 acres of public lands after he had resided upon and improved the same for six months; the Timber-Culture Act of 1873 allowed title to 160 acres of public prairie-land to be given to any one who should plant upon it 40 acres of timber, and keep the same in good growing con- dition for ten years; and the Desert-Land Act of 1877 gave to any citizen of the United States, or to any person who had declared his intention to become one, the privilege of acquiring title to 640 acres of such public land as was not included in mineral or timber lands, and would not without irrigation produce an agricultural crop, by paying twenty-five cents an acre and creating for the traGt an artificial water-supply. These several land acts, however, invited fraud to such an extent that in time they promoted the establishment of large land holdings by ranchmen and others quite as much as they encouraged settle- ment and cultivation, and so great was this evil that in 1891 the Timber-Culture and Pre-emption Acts were repealed, the total amount of land that could be acquired by any one person under the several land laws was limited to 320 acres, the Desert-Land Act was so amended as to require an expenditure of at least three dollars an acre for irrigation, and the original Homestead Act was so amended as to disqualify any person who was already proprietor of more than 160 acres in any state or Territory of the Union for acquiring any more land under its provisions; and in 1896 a residence of fourteen months was required before permitting commutation or the purchase of title. But even these measures were inadequate to prevent fraud. In 1894 Congress, in what is known as the Carey Act, donated to Cali- fornia, Oregon, Nevada, Washington, Idaho, Montana, Utah, Wyoming, Arizona, New Mexico and the Dakotas so much of 1.000,000 acres each of desert-lands as each should cause to be iirigated, reclaimed and occupied within ten years, 1 not less than 20 acres of each 160 acres to be cultivated by actual settlers; and in several of these states and territories irrigating companies have been formed and land offered to settlers in amounts not exceeding 160 acres to each, on terms requiring the settler to purchase ample and perpetual water-rights. In 1902, Congress appropriated the proceeds of the sales of public lands in these states and territories to form a reclamation fund to be used for

1 In 1901 it was provided that the ten years should date from the segregation of the lands from the public domain.

the construction and maintenance of irrigation works, and lands reclaimed by this means are open to homestead entries, the entry- man being required to pay for the cost of reclamation in ten equal annual instalments without interest. When Texas was admitted to the Union the disposal of its public lands was reserved to the state, and under its laws every person who is the

head of a family and without a homestead may acquire title to 160 acres of land by residing upon and improving it for three years; every unmarried man eighteen years of age or over may acquire title to 80 acres in the same way.

A short time before the National Homestead Act for aiding citizens to acquire homesteads went into operation, some of the state legislatures had passed homestead and exemption laws designed to protect homesteads or a certain amount of pro- perty against loss to the owners in case they should become insolvent debtors, and by the close of the century the legislature of nearly every state in the Union had passed a law of this nature. These laws vary greatly. In most states the exemption of a homestead or other property from liability for debts can be claimed only by the head of a family, but in Georgia it may be claimed by any aged or infirm person, by any trustee of a family of minor children, or by any person on whom, any woman or girls are dependent for support; and in California, although the head of a family may claim exemption for a homestead valued at $5000, any other person may claim exemption for a homestead valued at $1000. In some states exemptions may be claimed either for a farm limited to 40, 80, 160 or 200 acres, or for a house and one or more lots, usually limited in size, in a town, village or city; in other states the homestead for which exemp- tion may be claimed is limited in value, and this value varies from $500 to $5000. With the homestead are usually included the appurtenances thereto, and the courts invariably interpret the law liberally; but many states also exempt a specified amount of personal property, including wearing apparel, furni- ture, provisions, tools, libraries and in some cases domestic animals and stock in trade. A few states exempt no homestead and only a small amount of personal property; Maryland, for example, exempts only $100 worth of property besides money payable in the nature of insurance, or for relief, in the event of sickness, injury or death. To some debts the exemption does not usually apply; the most common of these are taxes, purchase money, a debt secured by mortgage on the homestead and debts contracted in making improvements upon it; in Maryland the only exception is a judgment for breach of promise to marry or in case of seduction. If the homestead belongs to a married person, the consent of both husband and wife is usually required to mortgage it. Finally, some states require that the homestead for which exemption is to be claimed shall be previously entered upon record, others require only occupancy, and still others permit the homestead to be designated whenever a claim is presented.

Following the example of either the United States Congress or the state legislatures, the governments of several British colonial states and provinces have passed homestead laws. In Quebec every settler on public lands is allowed, after receiving a patent, an exemption of not to exceed 200 acres

from that of his widow, of his, her or their children and descendants in the direct line. In Ontario an applicant for a homestead may have not to exceed 200 acres of unappropriated public land for farming purposes by building a house thereon, occupying it for five years, and bringing at least fifteen acres under cultiva- tion; the exemption of such a homestead from liability to – seizure for debts is, however, limited to twenty years from the date of application for the land, and does not extend even during that period to rates or taxes. Manitoba, British Columbia, Queensland, New South Wales, South Australia, West Australia and New Zealand also have liberal homestead and exemption laws.

See J. B. Sanborn, " Some Political Aspects of Homestead Legisla- tion," in The American Historical Review (1900); Edward Manson, " The Homestead Acts," in the Journal of the Society of Comparative- Legislation (London, 1 899); S. D. Thompson, A Treatise on

Homesteads and Exemptions (San Francisco, 1886); P. Bureau, Le Homestead ou V Insaisissabilite de la petite propriety fonciere (Paris, 1894), and L. Vacher, Le Homestead aux £iats-Unis (Paris, 1899). (N. D. M.)

HOMEYER, KARL GUSTAV (1795-1874), German jurist, was born on the 13th of August 1795 at Wolgast in Pomerania. After studying law at the universities of Berlin, Gottingen and Heidelberg (1813-1817), he settled as a Privatdocent, in 182 1, at the university of Berlin, where he became ordinary professor of law in 1827. His principal works are his edition of the Sachsenspiegel (in 3 vols., 1827, 3rd ed., 1861, containing also some other important sources of Saxon or Low German law), which is still unsurpassed in accuracy and sagacity of research, and his book on Die Haus- und Hofmarken (1870), in which he has given a history of the use of trade-marks among all the Teutonic nations of Europe, and which is full of important elucidations of the history of law and also contains valuable contributions to the history of art and civilization. In 1850 Homeyer was elected a member of the Berlin Academy of Sciences, in the Transactions of which he published various papers exhibiting profound learning (Uber die Heimat, 1852 ; Genealogie dcr Handschriflen des Sachsens pie gels, 1859 ; Die Stadtbiicher des Mittelalters, i860; Der Dreissigste, 1864, &c). He died on the 20th of October 1874.

HOMICIDE (Lat. homicidium) , the general and neutral term for the killing of one human being by another. The nature of the responsibility of the

slayer to the state and to the relatives of the slain has been one of the chief concerns of all systems of law from the earliest times, and it has been variously con- sidered from the points of view of the sanctity of human life, the interests of the sovereign, the injury to the family of the slain and the moral guilt, i.e. the motives and intentions, of the slayer.

The earliest recorded laws (those of Khammurabi) do not contain any sweeping general provision as to the punishment of homicide. The death penalty is freely imposed but not for homicide. " If a man strike a gentleman's daughter that she dies, his own daughter is to be put to death, if a poor man's the slayer pays h mina." In the Mosaic law the general command " Thou shalt not kill " of the Decalogue is in terms absolute. In primitive law homicide, however innocent, subjected the slayer to the lawful vengeance of the kindred of the slain, unless he could make some composition with him. This lex talionis (a life for a life) resulted: (1) in a course of private justice which still survives in the vendetta of Corsica and Albania, and the blood feuds arising out of " difficulties " in the southern and western parts of the United States; (2) in the recognition of sanctuaries and cities of refuge within which the avenger of blood might not penetrate to kill an innocent manslayer; and (3) in the system of wite, bote and wer, by which the life of every man had its assessed price payable to his chief and his next of kin.

It took long to induce the relatives of the slain to appreciate anything beyond the fact of the death of their kinsman or to discriminate between intentional and accidental homicide. By the laws of Khammurabi (206, 208) striking a man in a quarrel without deadly intent but with fatal effect was treated as a matter for compensation according to the rank of the slain. The Pentateuch discriminates between the man " who lieth in wait for" or "cometh presumptuously" on "his neighbour to slay him with guile " (Exodus xxi. 13, 14), and the man "who killeth his neighbour ignorantly whom he hated not in time past" (Deut. xix. 4). But even killing by misadventure exposed the slayer to the avenger of blood. " As a man goeth into the wood with his neighbour to hew wood, and his hand fetcheth a stroke with the axe to cut down a tree and the head slippeth from the helve and lighteth upon his neighbour that he die: he shall flee into one of these cities (of refuge) and live " (Deut. xix. 5).

Under the early laws of Teutonic and Celtic communities the inconveniences of the blood feud were gradually mitigated "see Criminal Law) by the system of wite and wer (or eric),

XIII. 21

but the blood feud continued long in Friesland and Lower Saxony, and in

parts of Switzerland until the 16th century. In England under the Norman system homicide became a plea of the crown, and the rights of the kindred to private vengeance and to compensation were gradually superseded in favour of the right of the king to forfeitures where the homicide amounted to a crime (felony).

Though homicide was thus made a public offence and not a matter for private vengeance, it took long to discriminate between those forms of homicide which should and those which should not be punished.

The terms of act in English law used to describe criminal homicide are murder (mord, meurlre, murdrum), manslaughter and/e/o de se (or suicide by a person of sound mind).

The original meaning of the word " murder " seems to have been secret homicide, — " Murdrum proprie dicilur mors alicujus occulta cujus interfector ignoratur " (Dialogus de Scaccario i. x.) ; and Glanville says: Duo sunt genera homicidii. unum est quod dicitur murdrum quod nullo vidente nulla sciente clam perpetratur, ita quod non assignatur clamor popularis (hue and cry), est et aliud homicidium quod diciter simplex homicidium. After the Conquest, and for the protection of the ruling race, a fine (also called murdrum) was levied for the king on the hundred or other district in which a stranger was found dead, if the slayer was not brought to justice and the blood kin of the slain did not present Englishry, there being a presumption (in favour of the Exchequer) that the deceased was a Frenchman. After the assize of Clarendon (1166) the distinction between the killing of Normans and Englishmen gradually evaporated and the term murder came to acquire its present meaning of deliberate as distinct from secret homicide. In 1267 it was provided that the murder fine should not be levied in cases of death by " misadventure " {per infortunium)?- But at that date and for long afterwards homicide in self-defence or by misadventure or even while of unsound mind involved at the least a forfeiture of goods, and required a pardon. These pardons, and restitution of the goods, became a matter of course, and the judges appear at a later date to have been in the habit of directing an acquittal in such cases. But it was not until 1828 that the innocence of excusable homicide was expressly declared. The rule is now expressed in s. 7 of the Offences against the Person Act 1861: "No punishment or forfeiture shall be incurred by any person who shall kill another by misfortune, or in his own defence, or in any other manner without felony."

The further differentiation between different degrees of criminal homicide was marked by legislation of Henry VIII. (1531) taking away benefit of clergy in the case of "wilful murder with malice prepensed " (aforethought), and that phrase is still the essential element in the

definition of " wilful murder," which is committed " when a person of sound memory and discretion unlawfully killeth any reasonable creature or being and under the king's peace with malice aforethought either express or implied " (3 Co. Inst. 47). The whole development of the substantive law as to murder rests on judicial rulings as to the meaning of malice prepense coupled with the extrajudicial commentaries of Coke, Hale and Foster; for parliament, though often tempted by bills and codes, has never ventured on a legislative definition. Much discussion has ranged round the phrase " malice aforethought," and it has undoubtedly been expanded by judicial decision so as to create what is described as " constructive " murder. According to the view of the criminal code commissioners of 1879 {Pari. Pap., 1879, c. 23, 45, p. 23) the term " malice aforethought " is now a common name for all the following states of mind: —*

1. An intent, preceding the act, to kill or do grievous bodily harm

to the person or to any other person :

2. Knowledge that the act done is likely to produce such conse-

quences, whether coupled with an intention to produce them or not :

3. An intent to commit any felony : or

4. An intent to resist an officer of police in the execution of his duty.

1 See Select Pleas of Crown, I (Selden Society Publ.) ; Pollock and Maitland, Mist. Eng. Law, ii. 458, 476, 478.

The third form of malice aforethought has been much controverted. When it was first recognized as creating a liability for wilful murder almost all felonies were capital offences: but even at the end of the 17 th century Lord Holt expressed a view that it should be limited to felonies involving violence or danger to life, e.g. assault with intent to rob, or setting fire to a dwelling-house. And Sir James Stephen's opinion is that, to justify conviction of murfler by an act done with intent to commit a felony, the act done must be one dangerous to life or known to be likely to cause death.

Starting with the definition above given, English law still retains so much of its medieval character as to presume all homicide to be " malicious, and

therefore murder, unless it is either justified by the command or permission of the law, excused on the ground of accident or self-preservation, or alleviated into manslaughter by being the involuntary consequence of some act not strictly lawful or occasioned by some sudden and suffi- ciently violent provocation." The truth of the facts alleged in justification, excuse or alleviation, is for the jury to determine: the question whether if true they support the plea for which they are put forward is for the court.

In the administration of the English criminal law as to homi- cide the consequences of too strict an .adherence to the technical definitions of the offences are avoided (a) by the exercise of the jury of their powers to convict of manslaughter only even in cases where they are directed that the offence is murder or nothing; (6) by the report of the judge as to the particular circumstances of each case in which a conviction of murder has been followed by the statutory sentence of death; (c) by the examination of all the evidence in the case by the Home Office in order to enable the secretary of state to determine whether the prerogative of mercy should be exercised.

Homicide is justifiable and not criminal when the killing is done in the execution of the law. The most important case of justifiable homicide is the execution of a criminal in due course of public justice. This condition is most stringently interpreted. " To kill the greatest of malefactors deliberately, uncompelled, and extrajudicially is murder. . . . And further, if judgment of death be given by a judge not authorized by lawful commission, and execution is done accordingly, the judge is guilty of murder " (Stephen's Commentaries, book vi. c. iv.). The execution must be carried out by the proper officer or his deputy: any person executing the sentence without such authority, were it the judge himself, would be guilty of murder. And the sentence must be strictly pursued: to execute a criminal by a kind of death other than that to which he has been judicially condemned is murder. Homicide committed by an officer of justice in the course of carrying out his duty, as such, is also justifiable; e.g. where a felon resists a legal arrest and is killed in the effort to arrest him (see 2 Pollock and Maitland, 476); where officers in dispersing a riotous assemblage kill any of the mob, &c. (see Riot). In these cases the homicide must be shown to have been absolutely necessary. Again, homicide is justifiable if committed in the defence of person or property against forcible and heinous crime, such as murder, violent robbery, rape or burglary. In this con- nexion there has been much discussion as to whether the person attacked is under a duty to retreat: and in substance the justification depends on the continuous necessity of attack or defence in order to prevent the commission by the deceased of the crime threatened.

Homicide is excusable and not criminal at all when committed either by

misadventure or in self-defence. In the former case the homicide is excused; where a man in the course of doing some lawful work, accidentally and without intention kills another, e.g. shooting at a mark and undesignedly hitting and killing a man. The act must be strictly lawful, and death by misadventure in unlawful sports is not a case of excusable homicide. Homicide in self-defence is excusable when the slayer is himself in immediate danger of death, and has done all he could to avoid the assault. Accordingly, if he strikes and kills his assailant after the assault is over, this is not excusable homicide. But if the assault has been premeditated, as in the case of a duel, the death of either

antagonist has under English law always been held to be murder and not excusable homicide. The excuse of self-defence covers the case in which a person in defence of others whom it is his duty to protect — children, wife, master, &c. — kills an assailant. It has been considered doubtful whether the plea of self-defence is available to one who has himself provoked a fray, in the course of which he is so pressed by his antagonist that his only resource is to kill him.

In English law the term " manslaughter " is applied to those forms of homicide which though neither justifiable nor excusable are attended by alleviating circumstances which bring them short of wilful murder. The offence is not defined by statute, but only by judicial rulings. Its punishment is as a maximum penal servitude for life, and as a minimum a fine or recognizances to be of good behaviour. The quantum of punishment between the limits above stated is in the discretion of the court, and not, as under continental codes, with fixed minima; and the offence includes acts and omissions of very varying gravity, from acts which only by the charitable appreciation of a jury fall short of wilful murder, to acts or omissions which can only technically be described as criminal, e.g. where one of two persons engaged in poaching, by pure accident gets caught in a hedge so that his gun goes off and kills his fellow-poacher. This may be described as an extreme instance of " constructive crime."

There are two main forms of " manslaughter ": —

1. " Voluntary " homicide under grave and sudden provoca- tion or on a sudden quarrel in the heat of passion, without the slayer taking undue advantage or acting in an unusual manner. The substance of the alleviation of guilt lies in the absence of time for cool reflection or the formation of a premeditated design to kill. Under English law the provocation must be by acts and not by words or gestures, and must be serious and not trivial, and the killing must be immediately after provocation and while the slayer has lost his self-control in consequence of the provocation. The provocation need not be by assault or violence, and perhaps the best-recognized

example is the slaying by a husband of a man found committing adultery with the slayer's wife. In the case of a sudden quarrel it does not matter who began or provoked the quarrel. This used to be called " chance medley."

2. " Involuntary " homicide as a result of great rashness or gross negligence in respect of matters involving danger to human life, e.g. in driving trains or vehicles, or in dealing with dangerous weapons, or in performing surgical operations, or in taking care of the helpless.

The innumerable modes in which criminal liability for killing others has been adjudged under the English definitions of murder and manslaughter cannot be here stated, and can only be studied by reference to the judicial decisions collected and discussed in Russell on Crimes and other English text-books, and in the valuable work by Mr J. D. Mayne on the criminal law of India, in which the English common law rulings are stated side by side with the terms and interpretations of the Indian penal code. Much labour has been expended by many jurists in efforts to create a scientific and acceptable classification of the various forms of unlawful homicide which shall properly define the cases which should be punishable by law and the appropriate punishment. Their efforts have resulted in the establishment in almost every state except the United Kingdom of statutory definitions of the crime, beginning with the French penal code and going down to the criminal code of Japan. In the case of England, as a result of the labours of Sir James Stephen, a code bill was submitted to parliament in 1878. In 1879 a draft code was prepared by Blackburn, Lush and Barry, and was presented to parliament. It was founded on and prepared with Sir J. Stephen, and is a revision of his digest of the criminal law. After defining homicide and culpable homicide, the draft code (cl. 174) declares culpable homicide to be murder in the following cases: (a) if the offender means to cause the death of the person killed; (b) if the offender means to cause to the person killed any bodily injury which is known to the offender to be likely to cause death, and if the offender, whether he does

or does not mean to cause death, is reckless whether death ensues or not; (c) if the offender means to cause death or such bodily injury as aforesaid to one person, so that if that person be killed the offender would be guilty of murder, and by accident or mistake the offender kills another person though he does not mean to hurt the person killed; (d) if the offender for any unlaw- ful object does an act which he knows or ought to have known to be likely to cause death, and thereby kills any person, though he may

have desired that his object should be effected without hurting any one.

Further (cl. 175), it is murder (whether the offender means or not death to ensue, or knows or not that death is likely to ensue) in the following cases: — " (a) if he means to inflict grievous bodily injury for the purpose of facilitating the com- mission of any of the offences hereinafter mentioned, or the flight of the offender upon the commission or attempted com- mission thereof, and death ensues from his violence; (6) if he administers any stupefying thing for either of the purposes aforesaid and death ensues from the effects thereof; (c) if he by any means wilfully stops the breath of any person for either of the purposes aforesaid and death ensues from such stopping of the breath." The following are the offences referred to: — " high treason and other offences against the king's authority, piracy and offences deemed to be piracy, escape or rescue from prison or lawful custody, resisting lawful apprehension, murder, rape, forcible abduction, robbery, burglary, arson." Cl. 176 reduces culpable homicide to manslaughter if the person who , causes death does so "in the heat of passion caused by sudden provocation "; and " any wrongful act or insult of such a nature as to be sufficient to deprive any ordinary person of the power of self-control may be provocation if the offender acts upon it on the sudden, and before there has been time for his passion to cool. Whether any particular wrongful act or insult amounts to provocation and whether the offender was deprived of self- control shall be questions of fact; but no one shall be deemed to give provocation by doing that which he had a legal right to do, or which the offender incited him to do in order to provide an excuse for killing him or doing grievous bodily harm to any person." Further, " an arrest shall not necessarily reduce the offence from murder to manslaughter because an arrest was illegal, but if the illegality was known to the offender it may be evidence of provocation"; (cl. 177) "culpable homicide not amounting to murder is manslaughter."

The definitions embodied in these clauses though not yet accepted by the British legislature, have in substance been embodied in the criminal codes of Canada (1892 ss. 227-230), New Zealand (1893, ss – 163-166), Queensland (1899, ss. 300-305), and Western Australia (1901, ss. 275-280).

From the point of view of civil as distinct from criminal responsibility homicide does not by the common law give any cause of action against the person causing the death of another in favour of the wife or blood relations of the deceased. In early law this was otherwise; and the wer or eric of the deceased came historically before the right of chief or state. But under English law the rights of relations, except by way of appeal for felony, 1 were swept aside in favour of the crown, on the principle that every homicide is presumed felonious (murder) unless the contrary is proved, and

that in all cases of homicide not justifiable by law a forfeiture was incurred. The .rights of the relatives were also defeated by application of the maxim " actio personalis morilur cum persond " (" a personal action dies with the person ") to all proceedings for injury to the person or to reputation. In Scotland the old theory was preserved in the law as to assythement.

In England the law was altered at the instance of Lord Campbell in 1846 (9 & 10 V. c. 93) so as to give a right of a claim by the husband, wife, parent or child of a person killed by a wrongful (or even criminal) act, neglect or default by another which would have given the deceased if he had sur-

1 Appeals remained in the law till 1819, but were long before this disused. In the middle ages they were used as a means of getting compensation.

vived a cause of action against the wrongdoer. The com- pensation payable is what the surviving relative has lost by the death, and under the Workmen's Compensation Act 1906 (in all cases to which it applies) the employer is liable even without negligence to compensate the dependants of an employee killed by an accident arising out of and in the course of the employment; and in such cases even if the death was due to serious and wilful misconduct by the employee, compensation is payable.

In the Indian penal code the definitions of murder are so drawn as to limit the offences to cases where it was actually intended to cause death or bodily injury by the acts or omissions of the slayer, and the definition of culpable homicide short of murder is so drawn as to exclude the forms of unintentional manslaughter due to neglect of duty, e.g. in the conduct of trains or ships or vehicles. This last omission was supplied in 1870. The Indian code does not treat as murder either duelling or helping Hindu widows to commit suttee (s. 301, exception 5). In most of the British possessions in Asia and in east Africa the Indian definitions of homicide have been adopted. In the rest of the colonies, except South Africa, the law of homicide depends on the English common law as modified by colonial codes or statutes. In South Africa it rests mainly on the Roman Dutch law.

Europe. — In European codes distinctions corresponding to those of the English law are drawn between premeditated and other forms of criminal homicide; but more elaborate distinctions are drawn between the degrees of deliberation or criminality manifested in the slaying, and the minimum or maximum penalty is varied accordingly.

In the French penal code voluntary homicide is called murder (meurtre, art. 295): but if committed with premeditation or lying in wait is styled

assassinat (guet-apens) (296-298). Poison- ing (even if the poison is not fatal), is specially punished, as is parricide (on the lines of the obsolete English offence of petty treason), and infanticide, i.e. the killing of newly-born infants. Assassination, poisoning and parricide are at present capital offences; but a bill to abolish the death sentence has been laid before the French parliament.

The German code distinguishes between voluntary homicide which is done with deliberation and such homicide committed without deliberation (ss. 211, 212), and provides for mitigation of punishment where the slaying was provoked without fault in the slayer by any wrongful act or serious insult upon the slayer or his relatives by the slain (213). Parricide and infanti- cide are specially punished (214, 215), as is killing another person at his express and earnest request (216) — an offence which would in England be murder — and it is a separate offence to cause the death of another, the penalty being increased if the offender was peculiarly bound by office, calling or trade to use a care which he did not use (222).

The Italian code punishes as homicide those who with intention to kill cause the death of another (364). The death penalty is not imposed, but scales of punishment are provided to deal with aggravated forms of the offence. Thus ergaslolo (penal servitude for life) is the punishment in the case of homicide of ascendants and descendants, or with premeditation, or under the sole impulse of brutal ferocity or with gross cruelty (gravi sevizie), or by means of arson, inundation, drowning and certain other crimes, or to secure the gains or conceal the commission, or to secure immunity from the consequences, of another crime (366). Personal violence resulting in death inflicted witfiout intention to kill is punishable minore poend (368), and it is criminal to cause the death of another by imprudence, negligence or lack of skill in an art or profession (imperitia netta propria arte professione), or by non-observance of regulations, orders or instructions.

The Spanish code has like those of Italy and France special punishments for parricide (417) and for assassination, in which are included killing for reward or promise of reward or by inundation (418), and for aiding another to commit suicide (421). Both the Italian and the Spanish codes afford a special mitigation

to infanticide committed to avoid dishonour to the mother of the infant or her family.

America. — The most notable difference between England and the United States in .regard to the law on this subject is the recognition by state legislation of degrees in murder. English law treats all unlawful killing not reducible to manslaughter as of the same degree of guilt in law. American statutes seek to discriminate for purposes of punishment between the graver and the less culpable forms of murder. Thus an act of the legislature of Pennsylvania (22nd of April 1794) declares " all murder which shall be perpetrated by means of poison or by lying in wait or by any other kind of wilful, deliberate and premeditated killing, or which shall be committed in the per- petration of or attempt to perpetrate any arson, rape, robbery or burglary shall be deemed murder of the first degree; and all other kinds of murder shall be deemed murder of the second degree." This legislation has been copied or adopted in many if not most of the other states. There are also statutory degrees of manslaughter in the legislation of some of the states. The differences of legislation, coupled with the power of the jury in some states to determine the sentence, and the limitations on the right of the judges to comment on the testimony adduced, lead to very great differences between the administration of the law as to homicide in the two countries.

Authorities.— Stephen, Hist. Cr. Law, Digest Criminal Law, Russell on Crimes (7th ed., 1909) ; Archbold, Criminal Pleading (23rd ed., 1905); Bishop, American Criminal Law (8th ed.); Pollock and Maitland, Hist. English Law, Pike, History of Crime. (W. F. C.)

HOMILETICS (Gr. 6/uX??tik6s, from 6/j.iKitv, to assemble together) , in theology the application of the general principles of rhetoric to the specific department of public preaching. It may be further defined as the science that treats of the analysis, classification, preparation, composition and delivery of sermons. The formation during recent years of such lectureships as the " Lyman Beecher " course at Yale University has resulted in increased attention being given to homiletics, and the published volumes of this series are the best contribution to the subject.

The older literature is cited exhaustively in W. G. Blaikie, For the Work of the Ministry (1873) ; a "d D. P. Kidder, Treatise on Homiletics (1864).

HOMILY, a simple religious address, less elaborate than a sermon, and confining itself to the practical exposition of some ethical topic or some passage of Scripture. The word djuXia from o/xiXeZv (6juo0, ei'Xa)), meaning communion, inter- course, and especially interchange of thought and feeling by means of words (conversation), was early employed in classical Greek to denote the instruction which a philosopher gave to his pupils in familiar talk (Xenophon, Memorabilia, I. ii. 6. 15). This usage of the word was long preserved (Aelian, Varia Historia, iii. 19); and the

dfuKqaas of Acts xx. 11 may safely be taken to assign not only a free and informal but also a didactic character to the apostle Paul's discourse in the upper chamber of Troas, when " he talked a long while, even till break of day." That the " talk " on that occasion partook of the nature of the "exposi- tion " (nyyj) of Scripture, which, undertaken by a priest, elder or other competent person, had become a regular part of the service of the Jewish synagogue, 1 may also with much probability be assumed. The custom of delivering expositions or comments more or less extemporaneous on the lessons of the day at all events passed over soon and readily into the Christian Church, as may be gathered from the first Apology (c. 67) of Justin Martyr, where we read that, in connexion with the practice of reading portions from the collected writings of the prophets and from the memoirs of the apostles, it had by that time become usual for the presiding minister to deliver a discourse in which " he admonishes the people, stirring them up to an imitation of the good works which have been brought before their notice." This discourse, from its explanatory character, and from the easy conversational manner of its delivery, was for a long time called 6/ uXta rather than \iyas: it was regarded as part of

1 See Philo, Quod omnis probns liber, sec. 12 (ed. Mangey ii. 458; cf. ii. 630).

the regular duty of the bishop, but he could devolve it, if he thought fit, on a presbyter or deacon, or even on a layman. An early and well-known instance of such delegation is that mentioned by Eusebius (Hist. Eccl. vi. 19) in the case of Origen (216 a.d.). 2 In course of time the exposition of the lesson for the day came more frequently to assume a more elaborate character, and to pass into the category of a X670S or even 0t\oo p ota or '> but when it did so the fact was as far as possible denoted by a change of name, the word bjiCKia being reserved for the expository or exegetical lecture as dis tinguished from the pulpit oration or sermon. 3 While the church of the 3rd and 4th centuries could point to a brilliant succes- sion of great preachers, whose discourses were wont to be taken down in shorthand and circulated among the Christian public as edifying reading, it does not appear that the supply of ordinary homiletical talent kept pace with the rapidity of church extension throughout the Roman empire. In the smaller and remoter communities it not uncommonly happened that the minister was totally unqualified to undertake the work of preaching; and though, as is curiously shown by the case of Rome (Sozomen, Hist. Eccl. vii. 19), the regular exposition of the appointed lessons was by no means regarded as part of the necessary business of a church, it was generally felt to be advisable that some provision should be made for the public instruction of congregations. Even in Jerome's time (De Vir. III. c. 115), accordingly, it had become usual to read, in the regular meetings of the churches which were not so fortunate as to possess a com- petent preacher,

the written discourses of celebrated fathers; and at a considerably later period we have on record the canon of at least one provincial council (that of Vaux, probably the third, held in 529 a.d.), positively enjoining that if the presbyter through any infirmity is unable himself to preach, " homilies of the holy fathers " (homiliae sanctorum patrum) are to be read by the deacons. Thus the finally fixed meaning of the word homily as an ecclesiastical term came to be a written dis- course (generally possessing the sanction of some great name) read in church by or for the officiating clergyman when from any cause he was unable to deliver a sermon of his own. As the standard of clerical education sank during the dark ages, the habit of using the sermons of others became almost universal. Among the authors whose works were found specially serviceable in this way may be mentioned the Venerable Bede, who is credited with no fewer than 140 homilies in the Basel and Cologne editions of his works, and who certainly was the author of many Homiliae de Tempore which were much in vogue during the 8th and following centuries. Prior to Charlemagne it is probable that several other collections of homilies had obtained considerable popularity, but in the time of that emperor these had suffered so many mutilations and corruptions that an authoritative revision was felt to be imperatively necessary. The result was the well-known Homiliarium, prepared by Paul Warnefrid, otherwise known as Paulus Diaconus (q.v.). 1 It consists of

2 Sozomen (Hist. Eccl. vii. 19) mentions that in Alexandria in his day the bishop alone was in the custom of preaching; but this, he implies, was a very exceptional state of matters, dating only from the time of Arius.

3 To the more strictly exegetical lectures the names elijYijo-eis, Unywo-Ta, l^7)77jTiKa, k-Oeereis, were sometimes applied. But as no popular discourse delivered from the pulpit could ever be exclusively expository and as on the other hand every sermon professing to be based on Scripture required to be more or less " exegetical " and " textual," it would obviously be sometimes very hard to draw the line of distinction between 6iii\la and Xcryos. It would be difficult to define very precisely the difference in French between a " conference" and a " sermon " ; and the same difficulty seems to have been experi- enced in Greek by Photius, who says of the eloquent pulpit orations of Chrysostom, that they were ojxiXitu rather than \6yci.

4 Manuscript copies are preserved at Heidelberg, Darmstadt, Frankfort, Giessen, Cassel and other places. It was first printed at Spires in 1482. In the Cologne edition of 1530 the title runs — Homiliae sen mavis sermones sive condones ad populum, praestantissi- morum ecclesiae doctorum Hieronymi, Augustini, Ambrosii, Gregorii, Origenis, Chrysoslomi, Bedae, fe"c., in hunc ordinem digestae per Alchuinum levitam, idque injungente ei

Carolo M. Rom. Imp. cui a secretis fuit. Though thus attributed here to Alcuin, who is known to have revised the Lectionary or Comes Hieronymi, the compilation

176 homilies arranged in order for all the Sundays and festivals of the ecclesiastical year; and probably was completed before the year 780. Though written in Latin, its discourses were doubtless intended to be delivered in the vulgar tongue; the clergy, however, were often too indolent or too ignorant for this, although by more than one provincial council they were enjoined to exert themselves so that they might be able to -do so. 1 Hence an important form of literary activity came to be the translation of the homilies approved by the church into the vernacular. Thus we find Alfred the Great translating the homilies of Bede; and in a similar manner arose ˆElfric's Anglo-Saxon Homilies and the German Homiliarium of Ottfried of Weissenburg. Such Homiliaria as ware in use in England down to the end of the 15th century were at the time of the Reformation eagerly sought for and destroyed, so that they are now extremely rare, and the few copies which have been preserved are generally in a mutilated or imperfect form. 2

The Books of Homilies referred to in the 35th article of the Church of England originated at a convocation in 1542, at which it was agreed " to make certain homilies for stay of such errors as were then by ignorant preachers sparkled among the people." Certain homilies, accordingly, composed by digni- taries of the lower house, were in the following year produced by th3 prolocutor; and after some delay a volume was published in 1547 entitled Certain sermons or homilies appointed by the King's Majesty to be declared and read by all parsons, vicars, or curates every Sunday in their churches where they have cure. In 1563 a second Book of Homilies was submitted along with the 39 Articles to convocation; it was issued the same year under the title The second Tome of Homilies of such matters as were promised and instituted in the former part of Homilies, set out by the authority of the Queen's Majesty, and to be read in every Parish Church agreeably. Of the twelve homilies contained in the first book, four (the 1st, 2nd, 3rd and 4th) are probably to be attributed to Cranmer, and one (the 12th) possibly to Latimer; one (the 6th) is by Bonner; another (the 5th) is by John Harpsfield, archdeacon of London, and another (the nth) by Thomas Becon, one of Cranmer's chaplains. The authorship of the others is unknown. The second book consists of twenty-one homilies, of which the 1st, 2nd, 3rd, 7th, 8th, 9th, 16th and 17th have been assigned to Jewel, the 4th to Grindal, the 5th and 6th to Pilkington and the 18th to

Parker. See the critical edition by Griffiths, Oxford, 1869. The homilies are not now read publicly, though they are sometimes appealed to in controversies affecting the doctrines of the Anglican Church.

HOMOEOPATHY (from the Greek omoios, like, and irados, feeling). The distinctive system of therapeutics which bears the name of homoeopathy is based upon the law similia similibus curcntur, 3 the originator of which was S. C. F. Hahnemann, a

of the Homiliarium is in the emperor's own commission entrusted to Paul, to whom it is assigned in the earlier printed editions also. A comparison of different editions shows that the contents increased with the ever-growing number of saints' days and festivals, new discourses by later preachers like Bernard being constantly added.

1 Xeander, Church History, v. 174 (Eng. trans, of 1851).

2 An ancient English metrical homiliarium is preserved in the library of the university of Cambridge. Earlier versions of it have existed, and a portion of perhaps the earliest copy, dating from about the middle of the 13th century, was published ; n 1862 by Mr J. Small, librarian to the university of Edinburgh.

3 An interesting controversy has been carried on between the members of the homoeopathic school as to the proper construction of the Latin motto which constitutes its acknowledged basis. For many years the verb at the conclusion of the sentence was used in the indicative mood, curantur, thus making the sentence a positive one. After extended research it has been discovered that Hahnemann himself never employed the word curantur as descriptive of his law of cure, but always wrote curentur, which greatly modifies the meaning of the phrase. If the subjunctive mood be used, the motto reads, " Let similars be treated by similars," or " similars should be treated by similars." The reading similia similibus curentur was officially adopted as the correct reading of the sentence by the American Institute of Homoeopathy at its session held in Atlantic City, N.J., on the 20th of June 1899; and the words are so inscribed on the monument erected to the memory of Hahnemann and unveiled in Washington, D.C., on the 23rd of June 1900, and also are those carved upon the tomb of Hahnemann in Pere-la-Chaise, Paris.

native of Meissen in Germany, who discovered his new principle while he was experimenting with cinchona bark in 1790, and announced it in 1796. 4 The essential tenets of homoeopathy — with which is contrasted the " allopathy " (aXXos, other) of the " orthodox " therapeutics — are that the cure of disease is effected by drugs that are capable of producing in a healthy individual symptoms similar to those of the disease to be treated, and that to ascertain the curative virtues of any drug it must be "proved " upon healthy persons — that is, taken by individuals of both sexes in a state of health in gradually increasing doses. The manifestations of drug action thus produced are carefully recorded, and this record of " drug-diseases," after being verified by repetition on many " provers," constitutes the distinguishing feature of the homoeopathic materia medica, which, while it embraces the sources, preparation and uses of drugs as known to the orthodox pharmacopoeia, contains, in addition, the various " provings " obtained in the manner above described.

Besides the promulgation of the doctrine of similars, Hahne- mann also enunciated a theory to account for the origin of all chronic diseases, which he asserted were derived either directly or remotely from psora (the itch), syphilis (venereal disease) or sycosis (fig- wart disease). This doctrine, although at first adopted by some of the enthusiastic followers of Hahnemann, was almost immediately discarded by very many who had a firm belief in his law of cure. In the light of advancing science such theories are entirely untenable, and it was unfortunate for the system of medicine which he founded that Hahnemann should have promulgated such an hypothesis. It served as a target for the shafts of ridicule showered upon the system by those who were its opponents, and even at the present time there still exists in the minds of many misinformed persons the conviction that homoeopathy is a system of medicine that bases the origin of all chronic disease on the itch or on syphilis or fig-warts.

Another peculiar feature of homoeopathy is its posology or theory of dose. It may be asserted that homoeopathic posology has nothing more to do with the original law of cure than the psora (itch) theory has, and that it was one of the later creations of Hahnemann's mind. Most homoeopathists believe more or less in the action of minute doses of medicine, but it must not be considered as an integral part of the system. The dose is the corollary, not the principle. Yet in the minds of many, infinitesimal doses of medicine stand for homoeopathy itself, the real law of cure being completely put into the background. The question of dose has also divided the members of the homoeo pathic school into bitter factions, and is therefore a matter for careful consideration. Many employ low potencies, 5 i.e. mother

4 Some points of Hahnemann's system were borrowed from previous writers — as he himself, though imperfectly, admits. Not to mention others, he was anticipated by Hippocrates, and especially by Paracelsus (1495-1541). The identical words similia similibus curantur occur in the Geneva edition (1658) of the works of Paracelsus, as a marginal heading of one of the paragraphs; and in the " Frag- menta Medica," Op. Omnia, i. 168, 169, occurs the following passage :

Simile similis cura ; non contrarium.

" Quisquis enim cum laude agere Medicum volet, is has nugas longe valere jubeat. Nee enim ullus unquam morbus calidus per frigida sanatus fuit. nee frigidus per calida. Simile autem suum simile frequenter curavit, scilicet Mercurius sulphur, et sulphur Mercurium; et sal ilia, velut et ilia sal. # Interdum quidem cum proprietate junctum frigidum sanavit calidum; sed id non factum est ratione frigidi, verum ratione naturae alterius, quam a primo illo omnino diversam facimus."

It is very remarkable that in Hahnemann's enumeration of authors who anticipated him in regard to the doctrine of Similia, he makes no mention of the views of Paracelsus, though the very words seem to be taken from the works of that physician. The other point in Hahnemann's doctrine — that medicines should be tried first on healthy persons — he admits to have been enunciated by Haller. Roughly it has been acted on by physicians in all ages, but certainly more systematically since Hahnemann's time. In the most character- istic feature of Hahnemann's practice — " the potentizing," "dynam- izing," of medicinal substances — he appears to have been original.

5 Two methods of preparing medicines are recognized, one on the decimal, the other on the centesimal scale. The pure tinctures are de- nominated " mother tinctures," and represented by the Greek <£. To

tinctures, first, second, sixth dilutions, &c, while others use hundred- thousandths and millionths.

Some homoeopathists of the present day still believe with Hahnemann that, even after the material medicinal particles of a drug have been subdivided to the fullest extent, the continua- tion of the dynamization or trituration or succussion develops a spiritual acurative agency, and that the higher the potency, the more subtle and more powerful is the curative action. Hahne- mann says {Organon, 3rd American edition, p. 101), " It is only by means

of the spiritual influence of a morbific agent that our spiritual vital power can be diseased, and in like manner only by the spiritual operation of medicine can health be restored." This is absolutely denied by others. Thus there exist two schools among the adherents of homoeopathy. On the one hand there are the Hahnemannians-, the " Purists " or " High Potency " men, who still profess to regard the Organon as their Bible, who believe in all the teachings of Hahnemann, who adhere in their prescriptions to the single dose, the single medicine, and the highest possible potency, and regard the doctrine of the spiritual dynamization acquired by trituration and succussion as indubitable. On the other side there are the " Rational " or " Low Potency " men, who believe in the universality of the law of cure, but think that it cannot always be applied, on account of an imperfect materia medica and a lack of know- ledge on the part of the physician. They believe that in many cases of severe and acute pain palliatives are required, and that they are free to use all the adjuvants at present known to science for the relief of suffering humanity — massage, balneology, electricity, hygiene, &c. The American Institute of Homoeo- pathy, the national body of the United States, has adopted the following resolution and ordered it to be published conspicuously in each number of the Transactions of the society: " A homoeo- pathic physician is one who adds to his knowledge of medicine a special knowledge of homoeopathic therapeutics. All that pertains to the great field of medical learning is his by tradition, by inheritance, by right."

It is claimed that the effect produced upon both the laity and the general profession of medicine by the introduction of homoeo- pathy was salutary in many ways. It diminished the quantity of medicine that was formerly considered necessary for the eradication of disease, and thus revealed the fact that the vis medicatrix naturae is often sufficient, with occasional and gentle assistance, to cure many diseases, especially those fevers that run a definite and regular course. Corroboration of the law similia similibus curentnr is seen, accordingto homoeopathists, in the adoption of the serum therapy, which consists in the treatment of the most malignant diseases (diphtheria, lock-jaw, typhoid fever, tuberculosis, bubonic plague) by introducing into the system a modified form (similar) of those poisons that produce them in the healthy individual. Hahnemann un- doubtedly deserves the credit of being the first to break decidedly with the old school of medical practice, in which, forgetful of the teachings of Hippocrates, nature was either overlooked or rudely opposed by wrong and ungentle methods. We can scarcely now estimate the force of character and of courage which was implied in his abandoning the common lines of medicine. More than this, he and his followers showed results in the treatment of disease which compared very favourably with the results of contemporary orthodox practice.

make a first decimal dilution or first decimal trituration, 10 drops of the mother tincture, or 10 grains of a crude substance, are mixed with 90 drops of alcohol, or 90 grains of saccharum lactis (sugar of milk) respectively. The liquid is thoroughly shaken, or the powder care- fully triturated, and the bottles containing them marked 1 X, mean- ing first decimal dilution or trituration. To make the 2 X potency, 10 drops or 10 grains of this first dilution or trituration are mixed with 90 drops of pure alcohol, or 90 grains of milk sugar, and are succussed or triturated as above described, and marked 2 X dilution or trituration. This subdivision of particles may be continued to an indefinite degree. On the Hahnemannian or centesimal scale the medicines are prepared in the same manner, the difference being that I drop or grain is mixed with 99 drops or grains, to make the first centesimal, which is marked I c or I simply, and so on for the second and higher dilutions.

Homoeopathy has given prominence to the therapeutical side of medicine, and has done much to stimulate the study of the physiological action of drugs. It has done service in directing more special attention to various powerful drugs, such as aconite, nux vomica, belladonna, and to the advantage of giving them in simpler forms than were common before the days of Hahnemann. But in the medical profession homoeo- pathy nevertheless" remains under the stigma of being a dissenting sect. It has been publicly announced that if the homoeopathists would abolish the name " homoeopathy," and remove it from their periodicals, colleges, hospitals, dispensaries and asylums, they would be received within the fold of the regular profession These conditions have been accepted by> a few homoeopathists who have become members of the most prominent medical association in the United States.

Homoeopathy as it exists to-day can, in the opinion of its adherents, stand by itself, and its progress for a century in face of prolonged and determined opposition appears to its upholders to be evidence of its truth. There are still, indeed, in both schools of medical thought, men who stand fast by their old principles. There are homoeopathists who can see nothing but evil in the practice of their brothers of the orthodox school, as there are allopathists who still regard homoeopathy as a humbug and a sham. There are, however, liberal-minded men in both schools, who look upon the adoption of any safe and efficient method of curing disease as the birthright of the true physician, and who allow every man to prescribe for his patients as his conscience may dictate, and, provided he be educated in all the collateral branches of medical science, are ready to exchange views for the good of suffering humanity.

Great Britain. — Homoeopathy is not rapidly extending in Great Britain, and its recognition has been slow. The first notice taken of the new system

of therapeutics was by the Medical Society of London in 1826. In 1827 the physician of Prince Leopold of Saxe- Coburg, Dr F. H. F. Quin (1799-1878), who had previously studied homoeopathy in Germany and practised it in Italy, came to England, and it was through his efforts that the system was introduced. Three other physicians, Dr Belluomini, Dr Romani and Dr Tagliani, claimed priority, but careful research established Dr Quin's title. Quin was a successful man professionally and socially, and brought upon himself in a short time the anathema of the Royal College of Physicians. In 1844 Dr William Henderson, professor of pathology in the university of Edinburgh, embraced the Hahnemannian system. A storm of opposition arose, and Professor J. V. Simpson (the dis- coverer of chloroform anaesthesia) published a volume, with the alliterative title, Homoeopathy, its Tenets and Tendencies, Theoretical, Theological, and Therapeutical. This brochure was answered by Professor Henderson, the title of his book being Homoeopathy Fairly Represented. From 1827 to 1837 there were but a dozen practitioners of homoeopathy in London, but during 1837 to 1847 the number increased to between seventy and eighty. In 1857 there were upwards of two hundred practitioners in the kingdom, with thirty- three institutions in which the law of similars was used as a basis of practice. In 1867 the increase was not so rapid, the number being 261. A society was formed about this period for " the protection of homoeopathic practitioners and students," which proved of great value in binding the sect together. In 1870 congresses were estab- lished, and annual meetings held, which have continued to the present time. In 1901 there were over three hundred homoeopathic physicians in the British Isles, of whom between seventy and eighty were in London alone. There were seventy-nine chemists, of whom seventeen were located in London, and eighty-two towns and cities in the country contained from one to ten homoeopathic practitioners each, together with many established chemists for dispensing homoeo- pathic medicines. The British Homoeopathic Society was founded by Quin in 1844, and has numerous members and fellows, besides corresponding members in all portions of the world, including Australia, India and Tasmania. The London Homoeopathic Hospital was founded in 1850, also largely through the efforts of Quin, and .a few years afterwards moved to Great Ormond Street. During the" cholera epidemic of 1854 the statistics of this hospital showed, a mortality of 16-4 %, against 51-8 % of other metropolitan charities. The London Homoeopathic Hospital has a convalescent home under its management at Eastbourne. There are also dispensaries in Ealing and West Middlesex, Kensington, Notting Hill and Bayswater. Similar institutions are located in Bath, Birkenhead, Birmingham, Bootle, Bournemouth, Brighton, Bristol, Bromley, Cheltenham, Cheshire, Croydon, Dublin, Eastbourne, Edinburgh, Folkestone, Hastings and St Leonards, Ipswich, Leeds, Leicester, Liverpool, Newcastle, Northampton, Norwich, Oxford, Plymouth, Torquay, Tunbridge

Wells, Weston-super-Mare. The homoeopathic journals include the Homoeopathic World, the London Homoeopathic Hospital

Reports, the Journal of the British Homoeopathic Society, and the British Homoeopathic Review, the last being issued by the British Homoeopathic Association, which was founded in 1902 for the purpose of developing and extending homoeopathy in Great Britain. The British Journal of Homoeopathy was first published in 1843, and was edited by Drs Drysdale, Russell and Black. For many years it was the foremost homoeopathic journal in the world. Its motto was In certis unitas, in dubiis libertas, in omnibus charitas. One reason why homoeopathy has not advanced as rapidly in the British Isles as in America is said to be the discrimination exercised against it by the General Medical Council, and another is want of cohesion amongst the homoeopaths themselves.

United States. — Homoeopathy was introduced into the United States by Dr Hans Birch Gram, who was born in Boston. His father being Danish, Gram in his eighteenth year went to Copen- hagen, where he graduated in 1814. In 1823 he became acquainted with homoeopathy, and brought a knowledge of it to America in 1825 when he settled in New York. The first homoeopathic associa- tion was formed in 1833 in Philadelphia, the second in New York, 1834, and homoeopathy became known in the different states some- what in the following order: New York, 1825; Pennsylvania, 1828; Louisiana, 1836; Connecticut, 1837; Massachusetts, 1837- 183M; Maryland, 1837; Delaware, 1837; Kentucky, 1837; Ver- mont, 1838; Rhode Island, 1839; Ohio, 1839; New Jersey, 1840; Maine, 1840; New Hampshire, 1840; Michigan, 1841; Georgia, 1842; Wisconsin, 1842; Alabama, 1843; Illinois, 1843; Tennessee, 1844; Missouri, 1844; Texas, 1848; Minnesota, 1852; Nebraska, 1S62; Colorado, 1863; Iowa, 1871. After 1871 the spread of the system was rapid throughout every state in the Union, and it is in the United States that homoeopathy principally flourishes. There are thousands of homoeopathic physicians, and their clients number several millions. It may be noted that departments of homoeopathy are connected with the universities of Boston, Michigan, Iowa, Minnesota and Kansas City.

Canada. — The early history of homoeopathy can be traced back nearly to 1850 in the province of Quebec, In the Dominion of Canada the various provinces control the licensing of physicians, excepting in Quebec, which is the only province having a separate homoeopathic board of examiners. This is under the control of the Montreal homoeopathic Association, and is

known as the College of Homoeopathic Physicians and Surgeons of Montreal. Three examiners are annually appointed by the association. Successful candidates receive the diploma of the college, and are entitled to add to their degree the letters M.C.H.P.S. A certificate of successful examination is forwarded to the lieutenant-governor at Quebec, who, " if satisfied of the loyalty, integrity and good morals of the applicant, may grant him a license to practise surgery, physic and midwifery, or either of them, in the province of Quebec." The word " loyalty " has been decided by the provincial secretary to mean a British subject. This is the only government medical license now issued in the British empire, the others being by provincial boards or colleges of physicians and surgeons. In 1894 there was no homoeopathic institution in the province; at present the Montreal Homoeopathic Hospital is in active operation. Two homoeopathic papers are published monthly — the Homoeopathic Record in Montreal, and the Homoeopathic Messenger in Toronto. In 1870, in the province of Ontario, the three schools, allopathic, homoeopathic and eclectic, united for examining purposes into one board called the medical council, seventeen members repre- senting the old school and five the other two systems. Finally the eclectics were merged in the old school, the board appointing five of Hahnemann's followers for examining purposes. Grace Hospital at Toronto (erected 1892) was begun as a dispensary in 1887.

Germany. — In 1810 Hahnemann published his Organon, which was the starting-point of homoeopathy in Germany. In 181 1 an endeavour was made to found an institution in Leipzig in which practitioners might learn the new method of treatment theoretically and practically, but it was not a success, as the entire tide of pro- fessional opinion was against the system. In 1829, at the celebra- tion of the fiftieth anniversary of Hahnemann's doctorate, the German Central Society was organized, holding its first meeting in 1830. In the university hospital of Munich some experiments were made to test the efficacy ot homoeopathic medicines, but these were not successful. In 1831 the government prohibited homoeopathists from dispensing their own medicines; this was a severe blow to the system. In 1834 there was a division among the homoeopathists themselves, which much retarded the progress of the school. A homoeopathic hospital was established about this time (January 1833) in Leipzig, but there was such constant wrang- ling among the physicians connected with it that its sphere of useful- ness was curtailed, and it was finally converted into a dispensary. The Baden Homoeopathic Society was established in 1834. The homoeopathic hospital in Munich was established in 1836, but suffered a similar fate to that of Leipzig, and was converted into a dispensary. The rather equivocal success of these hospitals in Saxony and Bavaria was in direct contrast to the fate of two newly established hospitals in Austria, one in Vienna and the other in Linz, which were very successful, and aroused

great interest both among physicians and laymen. During the political confusion of 1846 and 1 849 there was complete stagnation of everything medical in Germany. But during all these years, though the public institutions were few,

the literature on homoeopathic subjects became very extensive, and exercised a significant influence upon the system in all parts of the world. Hahnemann died in 1843, and on the 10th of August 1851 a bronze monument to him was unveiled at Leipzig. The Leipzig dispensary lived thirty-three years. From 1842 to 1874 there were treated in this institution 65,106 patients. In 1901 there were about 250 homoeopathic physicians in Germany; they appeared to be strongest at Berlin, in the province of Brandenburg, in Pomerania and Westphalia, Saxony, Hessen and in Wurttemberg.

Austria-Hungary. — Homoeopathy was introduced into Austria about 1817, and in 1819 its practice was forbidden by law. Shortly afterwards the physician attending the archduke John became a homoeopath. In 1825 the doctrine was introduced into Vienna. To test the efficacy of the system Francis I. ordered that experiments be made with homoeopathic medicines, and for this purpose a ward furnished with twelve beds was allotted. The results were satis- factory to the new system, and it made gigantic strides in Vienna. During the cholera epidemic of 1836 an increased impetus was given to the new school by the reported brilliant successes of the treatment. Societies were founded and journals published. In 1846 a second hospital was founded. In 1850 a third hospital was opened, and clinical lectures upon the system were delivered. In 1873 the Society of Homoeopathic Physicians was formed. Between the years 1873 and 1893 homoeopathy declined. In 1901, in thirty-seven cities and towns there were to be found about fifty physicians and two hospitals, and it was estimated that about seventy-five more were scattered in Moravia, Bohemia, Tirol, Salzburg and the coast provinces. There is a professorship of homoeopathy at the University of Budapest, .and homoeopathic clinics are held at the new Rochus Hospital in UUoi Street, and also in the homoeopathic department of the Hospital Bethesda of the Reformed Coinmunity. The Elizabeth Hospital, exclusively homoeopathic, has existed for many years.

Russia. — The homoeopathic system was introduced into Russia in 1823. In 1825 great impetus was given to the new doctrine by the conversion of Dr Bigel, physician to the grand duke Constantine. In 1829 the grand duke ordered a series of experiments to be con- ducted to prove the truth or fallacy of homoeopathy, and they demonstrated the success of the new school. In 1841 a hospital was established in Moscow, and in 1849 similar institutions were founded in Nizhniy-Novgorod. Since then homoeopathy has been steadily practised, and has penetrated to the remotest parts of

Russia. In 1 88 1 the civil engineers proposed to commemorate the virtues of the emperor Alexander II. by the erection of a hospital ; a committee for collecting funds was created, and 58,064 roubles were handed to the Charity Society of the followers of homoeopathy at St Petersburg for the erection and founding of a homoeopathic hospital. The founda- tion stone of the edifice was laid on 19th June 1893, the emperor Alexander III. giving 5000 roubles. The inauguration of a new dispensary and a pharmacy took place on the 19th of April 1898, and the hospital : tself, intended originally for fifty beds, was opened on the 1st of November 1898. There are sixteen free beds, three of them being in the name of the emperor Nicholas, the empress Maria Feodorovna, and the emperor Alexander III. On the 28th of January 1899 an imperial edict was issued granting the rights of public service to the doctors of the hospital and dispensaries of the Charity Society, thus placing them on an equality with the doctors of the prevailing medical school.

France. — Homoeopathy was first introduced into France in 1830 by Count de Guidi, doctor of medicine, doctor of science, and inspector of the university, who practised in Lyons. About the same year Dr Antoine Pctroz, widely known by his Grand diction- naire des sciences mSdicales, began practising homoeopathy in Paris, and his establishment became the headquarters of the new system there. In 1835 Hahnemann himself came to the capital. In 1832 the homoeopathic method of treating disease was introduced into the Hospice de Choisy, and in 1842 into the hospital of Carentan. Tessier practised the new doctrine in his wards in the Hospital St Marguerite, and in the Children's Hospital up to the year 1862, when he retired. The first homoeopathic society was established in 1832 (the Soci6te Gallicain), Hahnemann becoming president in 1835; in 1845 the Societe de Medecine Homeopathique was organized; and in i860 the two were united for the better interests of the school. In 1901 there were at Paris three hospitals — the Hospital St Jacques with fifty-five beds, the Hahnemann Hospital with thirty-five beds, and the new Protestant Hospital for Children with twenty-five-beds. At Lyons there is the Hospital St Luc. The medical journals incr&de V Art medical, La Revue homeopathique beige, Journal beige d'homeo- pathie,,La Therapeutique Integrate, La Revue homeopathique francaise. In the year 1900 the medical officers of the republic having super- vision over the medical department of the International Exhibition officially recognized the members of the homoeopathic school, and arranged for the proper accommodation and reception of the Inter- national Congress of Homoeopathic Physicians held in June. On the 30th of that month, with appropriate ceremonies, the remains of Hahnemann were removed from the cemetery of Montmartre and deposited in Pere-la-Chaise, and a monument beating a suitable inscription was erected to the memory of the founder of homoeopathy.

Italy. — The Austrians when they entered Naples in 1821 brought homoeopathy into Italy, the general in command of the army being

a devoted friend of Hahnemann. In 1828 Dr Count Sebastian de Guidi came from Lyons and assisted in spreading the doctrine. During the period from 1830 to i860 many physicians practised homoeopathy, and the literature on the subject became extensive. A homoeopathic clinic was established and a ward opened in Trinity Hospital at Naples, and a homoeopathic physician was appointed to the count of Syracuse. During the severe cholera epidemics of 1854, '855, 1865 the success of homoeopathic treatment of that disease was so marked under the care of Dr Rubini that the attention of the authorities was directed to the system. In i860 the homoeo- pathic practice was introduced into the Spedale della Cesarea, and since that period homoeopathy has been recognized with more or less favour in most of the cities. The Italian Homoeopathic Institute is recognized by royal warrant as an established institution, and its regulations are approved by the government. In Turin the legal seat of the Homoeopathic Institute, there is a hospital under the management of the State Association. The homoeopathic medical press consists of the Revista Omiopatica, established in 1855. and L'Omiopalico in Italia, the organ of the Italian Homoeopathic Institute, which first appeared in 1884.

Spain. — Homoeopathy was introduced into Spain in 1829 by a physician to the Royal Commission sent by the king of Naples to attend the marriage of Maria Christina with Don Ferdinand VII. Shortly after this, a merchant of Cadiz visited Hahnemann in Coethen, and was cured of a serious disorder; he returned to Spain with a supply of homoeopathic literature, and immediately sent a medical student to Leipzig to study the new system. In 1843 many cases of cholera were treated homoeopathically in Madrid. The civil war, which did not terminate until 1840, arrested all medical investigation in Spain, but in 1843 there still existed in Madrid five pharmacies and a number of homoeopathic physicians. About this time Dr Tosi Nunez returned from an investigation of the new system with Hahnemann, and owing to his success in the treatment of disease was created one of the physicians of the bed- chamber to the queen, who soon afterwards conferred upon him the title of marquis, with the grand crosses of the Charles III. and of the Civil Order of Beneficiencia. This recognition by high authority gave an impetus to homoeopathy which has continued ever since.

Denmark. — Homoeopathy was unknown in Denmark until the year 1821,

when Hans Christian Lund, a medical practitioner, adopted it. Hahnemann, however, had been both before and after that time consulted by Danes, and consequently homoeopathic therapeutics was recognized in different parts of the country. Lund translated many of Hahnemann's works into Danish, as well as those of other eminent members of the new school. (W. T. H.)

HOMONYM (Gr. onavofios, having the same name, from Ojuos, same, alike, and ovofia, name), a term in philology for those words which differ in sense but are alike either in sound or spelling or both. Words alike only in spelling but rot in sound, e.g. " bow," are sometimes called homographs ; and words alike only in sound but not in spelling, e.g. " meat," " meet," homo- phones. Skeat {Etymol. Did.) gives a list of English homonyms.
HOMS, or Hums (anc. Emesa or Emessa, near the Hittite Kadesh), a town of Syria, on the right bank of the Orontes, and capital of a sanjak in the vilayet of Syria (Damascus). Pop. 30,000 (20,000 Moslem, 10,000 Christian). The importance of the place arises from its command of the great north road from Egypt, Palestine and Damascus by the Orontes valley. Invading armies from the south have often been opposed near Horns, from the time of Rameses II., who had to fight the battle of Kadesh, to that of Ibrahim Pasha, who broke the first line of Ottoman defence in 1831 by his victory there. Ancient Emesa, in the district of Apamea, was a very old Syrian city, devoted to the worship of Baal, the sun god, of whose great temple the emperor Heliogabalus was originally a priest (a.d. 218). As a centre of native influences it was overawed by the Seleucid foundation of Apamea; but it opposed the Roman advance. There Aurelian crushed, in a.d. 272, the Syrian national movement led by Zenobia. Caracalla made it a Roman colony, and later it became the capital of a small province, Phoenicia Libanesia or ad Libanum. About 630 it was captured by the Moslem leader, Khalid ibn Walid, who is buried there. It now became the capital of a jund, or military district, which under the Omayyad Caliphs extended from Palmyra to the sea. Under the Arabs it was one of the largest cities in Syria, with walls and a strong citadel, which stood on a hill, occupying perhaps the site of the great sun temple. The ruins of this castle, blown up by Ibrahim Pasha, are still the most con- spicuous feature of Homs, and contain many remains of ancient buildings. Its men were noted for their courage in war, and its

women for their beauty. The climate was extolled for its excellence, and the land for its fertility. A succession of gardens bordered the Orontes, and the vineyards were remarkable for their abundant yield of grapes. When the place capitulated the great church of St John was divided between the Christians and Moslems, an arrangement which apparently lasted until the arrival of the Turks. At the end of the nth century it fell into crusading hands, but was recovered by the Moslems under Saladin in 1187. Its decay

probably dates from the invasion of the Mongols (1260), who fought two important battles with the Egyptians (1281 and 1299) in its vicinity. The construction of a carriage road to Tripoli led to a partial revival of prosperity and to an export of cereals and fruit, and this growth has, in turn, been accentuated by the railway, which now connects it with Aleppo and the Damascus-Beirut line. The district is well planted with mulberries and produces much silk, most of which is worked up on the spot. (D. G. H.)

HO-NAN, a central province of China, bounded N. partly by the Hwang-ho (which it crosses to the west of Ho-nan Fu, forming an arm northwards between the provinces of Shan-si and Chih-li), on the W. by Shen-si, on the S. by Hu-peh, and on the E. by Ngan-hui. It occupies an area of 81,000 sq. m., with a population of about 22,100,000, and contains nine prefectural cities. Its capital is K'ai-feng Fu. The prefecture of Hwai-k'ing, north of the Hwang-ho, consists of a fertile plain, " rendered park-like by numerous plantations of trees and shrubs, among which thick bosquets of bamboo contrast with the gloomy groves of cypress." All kinds of cereals grow luxuriantly, and the general productiveness of the district is indicated by the extreme denseness of the population. The most noticeable feature in that portion of the province which is properly called Ho-nan is the Fu-niu Shan range, which runs east and west across this part of the province. Coal is found on the south of the Hwang-ho in the districts of Ho-nan Fu, the ancient capital, Lushan and Ju Chow. The chief products of the province are, however, agricultural, especially in the valley of the Tang-ho and Pai-ho, which is an extensive and densely populated plain running north and south from the Fu-niu Shan. Cotton is also grown extensively and forms the principal article of export, and a considerable quantity of wild silk is produced from the Fu-niu Shan. Three roads from the east and south unite at Ho-nan Fu, and one from the west. The southern road leads to Ju Chow, where it forks, one branch going to Shi-ki-chen, connecting the trade from Fan-cheng, Han-kow, and the Han river generally, and the other to Chow-kia-k'ow near the city of Ch'en-chow Fu, at the con- fluence of the three rivers which unite to form the Sha-ho; the second road runs parallel with the Hwang-ho to K'ai-feng Fu; the third crosses the Hwang-ho at Mengching Hien, and passes thence in a north-easterly direction to Hwai-k'ing Fu, Sew-wu Hien and Wei-hui Fu, at which place it joins the high road from Peking to Fan-cheng; and the western road follows the southern bank of the Hwang-ho for 250 m. to its great bend at the fortified pass known as the Tung-kwan, where it joins the great wagon road leading through Shan-si from Peking to Si-gan Fu. Ho-nan is now traversed north to south by the Peking- Hankow railway (completed 1905). The line crosses the Hwang- ho by Yung-tse and runs east of the Fu-niu Shan. Branch lines serve Ho-nan Fu and K'ai-feng Fu.

HONAVAR, or Onore, a seaport of British India, in the North Kanara district of Bombay. Pop. (1901) 6929. It is mentioned as a place of trade as early as the 16th century, and is associated with two interesting incidents in Anglo-Indian history. In 1670, the English factors here had a bull-dog which unfortunately killed a sacred bull, in revenge for which they were all murdered, to the number of eighteen persons, by an enraged mob. In 1784 it was bravely defended for three months by Captain Torriano and a detachment of sepoys against the army of Tippoo Sultan.

HONDA, or San Bartolomeo de Honda, a town of the department of Tolima, Colombia, on the W. bank of the Magdalena river, 580 m. above its mouth. In 1906 Mr F. Loraine Petre

estimated the population at 7000. It is about 650 ft. above sea-level and stands at the entrance to a narrow valley formed by spurs of the Central Cordillera, through which a picturesque little stream, called the Guali, flows into the Magdalena. The town overlooks the rapids of the Magdalena, and is shut in closely by spurs of the Eastern and Central Cordilleras. The climate is hot and damp and the temperature frequently rises to 102 F. in the shade. Honda dates back to the beginning of the 17th century, and has been one of the important centres of traffic in South America for three hundred years. Within the city there is an iron bridge across the Guali, and there is a sus- pension bridge across the Magdalena at the head of the rapids. A railway 18 m. long connects with the landing place of LaDorada, or Las Yeguas, where the steamers of the lower Magdalena discharge and receive their cargoes (the old landing at Carocali nearer the rapids having been abandoned), and with Arran- caplumas, \ m. above, where navigation of the upper river begins. Up to 1908 the greater part of the traffic for Bogota crossed the river at this point, and was carried on mule-back over the old camino real, which was at best only a rough bridle- path over which transportation to Bogota (67 m. distant) was laborious and highly expensive; now the transshipment is made to smaller steamboats on the upper river for carriage to Girardot, 93 m. distant, from which place a railway runs to the Bogota plateau. Honda was nearly destroyed by an earthquake in 180S.

HONDECOETER, MELCHIOR D' (c. 1636-1695), Dutch painter, was born at Utrecht, it is said, about 1636, and died at Amsterdam on the 3rd of April 1695. Old historians say that, being the grandson of Gillis and son of Gisbert d'Honde- coeter, as well as nephew of J. B. Weenix, he was brought up by the last two to the profession of painting. Of Weenix we

know that he married one Josina d'Hondecoeter in 1638. Melchior was, therefore, related to Weenix, who certainly influenced his style. As to Gillis and Gisbert some points still remain obscure, and it is difficult to accept the statement that they stood towards each other in the relation of father and son, since both were registered as painters at Utrecht in 1637. Both it appears had practised art before coming to Utrecht, but where they resided or what they painted is uncertain. Unhappily pictures scarcely help us to clear up the mystery. In the Fiirsten- bcrg collection at Donaueschingen there is a " Concert of Birds " ■ dated 1620, and signed with the monogram G. D. H.; and we may presume that G. D. H. is the man whose " Hen and Chickens in a Landscape " in the gallery of Rotterdam is inscribed " G. D. Hondecoeter, 1652 "; but is the first letter of the monogram to stand for Gillis or Gisbert? In the museums of Dresden and Cassel landscapes with sportsmen are catalogued under the name of Gabriel de Heusch (?), one of them dated 1529, and certified with the monogram G. D. H., challenging attention by resemblance to a canvas of the same class inscribed G. D. Hond. in the Berlin Museum. The question here is also whether G. means Gillis or Gisbert. Obviously there are two artists to consider, one of whom paints birds, the other landscapes and sportsmen. Perhaps the first is Gisbert, whose son Melchior also chose birds as his peculiar subject. Weenix too would naturally teach his nephew to study the feathered tribe. Melchior, however, began his career with a different speciality from that by which he is usually known. Mr de Stuers affirms that he produced sea-pieces. One of his earliest works is a " Tub with Fish," dated 1655, in the gallery of Brunswick. But Melchior soon abandoned fish or fowl. He acquired celebrity as a painter of birds only, which he represented not exclusively, like Fyt, as the gamekeeper's perquisite after a day's shooting, or stock of a poulterer's shop, but as living beings with passions, joys, fears and quarrels, to which naturalists will tell us that birds are subject. Without the brilliant tone and high finish of Fyt, his Dutch rival's birds are full of action; and, as Burger truly says, Hondecoeter displays the maternity of the hen with as much tenderness and feeling as Raphael the maternity of Madonnas. But Fyt was at home in depicting the coat of Ji-er and dons us well as plumage. Hondecoeter cultivates a

narrower field, and seldom goes beyond a cock-fight or a display of mere bird life. Very few of his pictures are dated, though more are signed. Amongst the former we should note the "Jack- daw deprived of his Borrowed Plumes " (167 1), at the Hague, of which Earl Cadogan has a variety; or " Game and Poultry " and " A Spaniel hunting a Partridge " (1672), in the gallery of Brussels; or " A Park with Poultry " (1686) at the Hermitage of St Petersburg. Hondecoeter, in great favour with the magnates of the Netherlands, became a member of the painters' academy at the

Hague in 1659. William III. employed him to paint his menagerie at Loo, and the picture, now at the Hague museum, shows that he could at a pinch overcome the difficulty of representing India's cattle, elephants and gazelles. But he is better in homelier works, with which he adorned the royal chateaux of Bensberg and Oranienstein at different periods of his life (Hague and Amsterdam). In 1688 Hondecoeter took the freedom of the city of Amsterdam, where he resided till his death. His earliest works are more conscientious, lighter and more transparent than his later ones. At all times he is bold of touch and sure of eye, giving the motion of birds with great spirit and accuracy. His masterpieces are at the Hague and at Amsterdam. But there are fine examples in private collections in England, and in the public galleries of Berlin, Caen, Carlsruhe, Cassel, Cologne, Copenhagen, Dresden, Dublin, Florence, Glasgow, Hanover, London, Lyons, Montpellier, Munich, Paris, Rotterdam, Rouen, St Petersburg, Stuttgart and Vienna.

HONDURAS, a republic of Central America, bounded on the N. by the Caribbean Sea, F. by Nicaragua, S. by Nicaragua, the Pacific Ocean and Salvador, and W. by Guatemala. (For map see Central America.) Pop. (1905) 500,136; area, about 46,500 sq. m. Honduras is said to owe its name, meaning in Spanish " depths," to the difficulty experienced by its original Spanish explorers in finding anchorage off its shores; Cape Gracias a. Dios (Cape " Thanks to God ") is the name bestowed, for analogous reasons, on its easternmost headland, which shelters a small harbour, now included in Nicaragua. Modern navigators are not confronted by the same difficulty; for, although the north coast is unbroken by any remarkable inlet except the Carataska Lagoon, a land-locked lake on the east, with a narrow entrance from the sea, there are many small bays and estuaries, such as those of Puerto Cortes, Omoa, Ulua, La Ceiba and Trujillo, which serve as harbours. The broad basin of the Caribbean Sea, bounded by Honduras, Guatemala and British Honduras, is known as the bay or gulf of Honduras. Several islets and the important group of the Bay Islands (q.v.) belong to the republic. On the Pacific the Hondurian littoral is short but of great commercial value; for it consists of a frontage of some 60 m. on the Bay of Fonseca (q.v.), one of the finest natural harbours in the world. The islands of Tigre, Sacate Grande and Gueguensi, in the bay, belong to Honduras.

The frontier which separates the republic from Nicaragua extends across the continent from E.N.E to W.S.W. It is defined by the river Segovia, Wanks or Coco, for about one- third of the distance; it then deflects across the watershed on the east and south of the river Choluteca, crosses the main Nicaraguan Cordillera (mountain chain) and follows the river Negro to the Bay of Fonseca. The line of separation from Salvador is irregularly drawn, first in a northerly and then in a westerly direction; beginning at

the mouth of the river Goascoran, in the Bay of Fonseca, it ends 12 m. W. of San Francisco city. At this point begins the Guatemalan frontier, the largest section of which is delimited along the crests of the Sierra de Merendon. On the Caribbean seaboard the estuary of the Motagua forms the boundary between Honduras and Guatemala.

Physical Features. — The general aspect of the country is moun- tainous; its southern half is traversed by a continuation of the main Nicaraguan Cordillera. The chain does not, in this republic, approach within 50 or 60 m. of the Pacific ; nor does it throughout maintain its general character of an unbroken range, but sometimes turns back on itself, forming interior basins or valleys, within which are collected the headwaters of the streams that traverse the country in the direction of '.lie -Atlantic Ocean. Nevertheless, viewed from the

Pacific, it presents the appearance of a great natural wall, with many volcanic peaks towering above it and with a lower range of mountains intervening between it and the sea. It would almost seem that at one time the Pacific broke at the foot of the great mountain barrier, and that the subordinate coast range was subsequently thrust up by volcanic forces. At one point the main range is interrupted by a great transverse valley or plain known as the plain of Comayagua, which has an extreme length of about 40 m., with a width of from 5 to 15 m. From this plain the valley of the river Humuya extends north to the Atlantic, and the valley of the Goascoran extends south to the Pacific. These three depressions collectively constitute a great transverse valley reaching from sea to sea, which was pointed out soon after the conquest as an appropriate course for inter-oceanic communication. The mountains of the northern half of Honduras are not volcanic in character and are inferior in altitude to those of the south, which sometimes exceed 10,000 ft. The relief of all the highlands of the Atlantic watershed is extremely varied; its culminating points are probably in the mountain mass about the sources of the Choluteca, Sulaco and Roman, and in the Sierra de Pija. near the coast. Farther eastward the different ranges are less clearly marked and the surface of the country resembles a plateau intersected by numerous watercourses.

The rivers of the Atlantic slope of Honduras are numerous and some of them of large size and navigable. The largest is the Ulua, with its tributary the Humuya. It rises in the plain of Comayagua and flows north to the Atlantic ; it drains a wide expanse of territory, comprehending nearly one-third of the entire state, and probably discharges a greater amount of water

into the sea than any other river of Central America, the Segovia excepted. It may be navi- gated by steamers of light draught for the greater part of its course. The Rio Roman or Aguan is a large stream falling into the Atlantic near Trujillo, with a total length of about 120 m. Its largest tributary is the Rio Mangualil, celebrated for its gold washings, and it may be ascended by boats of light draft for 80 m. Rio Tinto, Negro or Black River, called also Poyer or Poyas, is a considerable stream, navigable by small vessels for about 60 m. Some English settle- ments were made on its banks during the 18th century. The Patuca rises near the frontier of Nicaragua, and enters the Atlantic east of the Brus or Brewer lagoon. The Segovia is the longest river in Central America, rising within 50 m. of the Bay of Fonseca, and flowing into the Caribbean Sea at Cape Gracias a Dios (see Nicaragua). Three considerable rivers flow into the Pacific- — the Goascoran, Nacaome and Choluteca, the last named having a length of about 150 111. The Goascoran, which almost interlocks with the Humuya, in the plain of Comayagua, has a length of about 80 m. The lake of Yojoa or Taulebe is the only large inland lake in Honduras, and is about 25 m. in length, by 6 to 8 in breadth. Its surface is 2050 ft. above the sea. It has two outlets on the south, the rivers Jaitique and Sacapa, which unite about 15 m. from the lake; and it is drained on the north by the Rio Blanco, a narrow, deep stream falling into the Ulua. It has also a feeder on the north, in the form of a subterranean stream of beautiful clear water, which here conies to the surface. The Carataska or Caratasca lagoon is a shallow salt-water lake connected by a narrow channel with the Atlantic, and near the mouth of the Segovia. It contains several large sandy islands.

Honduras resembles the neighbouring countries in the general character of its geological formations, fauna and flora. Here, as in other Central American states, there arc but two seasons, the wet, from May to November, and the dry, from November to May. On the moist lowlands of the Atlantic coast the climate is oppressive, but on the highlands of the interior it is delightful. At Tegucigalpa, on the uplands, a year's observations showed the maximum tempera- ture to be 90 F. in May, and the minimum to be 50 F. in December, the range of variation during the whole year being within 40 F.

See also Central America: Geology, Fauna, Flora, Climate.

Inhabitants. — The inhabitants of Honduras are in many cases of the Indian or aboriginal type, and the European element is very small, although it shares in the social, political and economic preponderance of the Spanish-speaking half-castes (Ladinos or Mestizos), who are the most numerous section of the population. Throughout the country there are many interesting relics of the native civilization which was destroyed by the Spanish invaders in the 16th century. In the eastern portion of the state,

between the Rio Roman, Cape Gracias a Dios, and the Segovia river, the country is almost exclusively occupied by native Indian tribes, known under the general names of Xicaques and Poyas. In many districts the Indians are known as Lencas, a generic name which includes several tribes akin to the Mayans of Guatemala. Portions of all of these tribes have accepted the Roman Catholic religion, and live in peaceful neighbourhood and good understanding with the white inhabitants. There are, however, considerable numbers, probably about 00,000 in all, who live among the mountains

and still conform closely to the aboriginal modes of life. They all cultivate the soil, and are good and industrious labourers. A small portion of the coast, above Cape Gracias, is occupied by the Sambos, a mixed race of Indians and negroes, which, however, is fast disappearing. Spreading along the entire north coast are the Caribs, a vigorous race, descendants of the Caribs of St Vincent, one of the Windward Islands. These, to the number of 5000, were deported in 1796 by the English and landed on the island of Roatan. They still retain their native language, although it tends to disappear and be replaced by Spanish and a bastard dialect of English; they are active, industrious and provident, forming the chief reliance of the mahogany cutters on the coast. A portion of them, who have a mixture of negro blood, are called the Black Caribs. They profess the Roman Catholic religion, but retain many of their native rites and superstitions. In the departments of Gracias, Comayagua and Choluteca are many purely Indian towns.

The aggregate population, according to an official estimate made in 1905, is 500,136, but a complete and satisfactory census cannot be taken throughout the country, since the ignorant masses of the people, and especially the Indians, avoid a census as in some way connected with military conscription Or taxation. The bulk of the Spanish population exists on the Pacific slope of the continent, while on the Atlantic declivity the country is uninhabited or but sparsely occupied by Indian tribes, of which the number is wholly unknown. In 1905 there were fewer than n inhabitants per sq. m., but all the available data tend to show that the population increases rapidly, owing to the continuous excess of births over deaths. The first census, taken in 1791, gave the total population as only 95,500. There is little emigration or immigration.

Chief Towns. — The capital is Tegucigalpa (pop. 1905, about 35,000); other important towns are Jutigalpa (18,000), Comaya- gua (8000), and the seaports of Amapala (4000), Trujillo (4000), and Puerto Cortes (2500). These are described in separate articles. The towns of Nacaome, La Esperanza, Choluteca and Santa Rosa have upwards of 10,000 inhabitants.

Communications. — Means of communication are very defective. In I905_the only railway in the country was that from Puerto Cortes to La Pimienta, a distance of 57 m. This is a section of the proposed inter-oceanic railway for which the external debt of the republic was incurred. For the completion of the line concessions, one after another, were granted, and expired or were revoked. Other railways are projected, including one along the Atlantic coast, an extension from La Pimienta to La Brea on the Pacific, and a line from Teguci- galpa to the port of San Lorenzo. The capital is connected with other towns by fairly well made roads, which, however, are not kept in good repair. In the interior generally, all travelling and transport are by mules and ox-carts over roads which defy description.

Honduras joined the Postal Union in 1879. The telegraph service is conducted by the government and is inefficient. Telephones are in use in Tegucigalpa and a few of the more important towns.

Commerce and Industry. — Although grants of land for mining and agricultural purposes are readily made by the state to companies and individual capitalists, the economic development of Honduras has been a very slow process, impeded as it has been by political disturbances and in modern times by national bankruptcy, heavy import and export duties, and the scarcity of both- labour and capital. The natural wealth of the country is great and consists especially in its vegetable products. The mahogany and cedar of Honduras are unsurpassed, but reckless destruction of these and of other valuable cabinet-woods and dye-woods has much reduced the supply available for export. Rubber-planting, a. comparatively modern industry, has proved successful, and tends to supplement the almost exhausted stock of wild rubber. Of still greater importance are the plantations of bananas, especially in the northern maritime province of Atlantida, where coco-nuts are also grown. Coffee, tobacco, sugar, oranges, lemons, maize and beans arc produced in alf parts, rice, cocoa, indigo and wheat over more limited areas. Cattle and pigs are bred extensively; cattle are exported to Cuba, and dairy-farming is carried on with success. Sheep-farming is almost an unknown industry. Turtle and fish are obtained in large quantities off the Atlantic seaboard. In its mineral resources Honduras ranks first among the states of Central America. Silver is worked by a British company, gold by an American company. Gold-washing was practised in a primitive manner even before the Spanish conquest, and in the 1 8th century immense quantities of gold and silver were obtained by the Spaniards from mines near Tegucigalpa. Opals, platinum, copper, lead, zinc, nickel, antimony, iron, lignite and

:•' h Q "c bee." foun

enumerated hs

preventer! the exploitation of any of these minerals on a large scale, and the total value of the ores exported was only £174,800 in 1904 and £239,426 in 1905. The total value of the exports in a normal year ranges from about £500,000 to £600,000, and that of the imports from £450,000 to £550,000. Apart from minerals the most valuable commodity exported is bananas (£209,263 in 1905) ; coco-nuts, timber, hides, deer-skins, feathers, coffee, sarsaparilla and rubber are items of minor importance. Nearly 90 % of the exports are shipped to the United States, which also send to Honduras more than half of its imports. These chiefly consist of cotton goods, hardware and provisions. The manufacturing industries of Honduras include the plaiting of straw hats, cigar-making, brick-making and the distilla- tion of spirits.

Finance. — Owing to the greater variety of its products and the possession of a metallic currency, Honduras is less affected by fluctuations of exchange than the neighbouring republics, in which little except paper money circulates. The monetary unit is the silver peso or dollar of 100 cents, which weighs 25 grammes, -900 fine, and is worth alwut is. 8d. ; the gold dollar is worth about 4s. The principal coins in circulation are the 1-cent copper piece, 5, 10, 20, 25 and 50 cents, and 1 peso silver pieces, and 1,5, io and 20 dollar gold pieces. The metric system of weights and measures, adopted officially on the 1st of April 1897, has not supplanted thc_ older Spanish standards in general use. There is only one bank in the republic, the Banco de Honduras, with its head office at Tegucigalpa. Its bills are legal tender for all debts due to the state.

In July 1909 the foreign debt of Honduras, with arrears of interest, amounted to £22,470,510, of which more than £17,000,000 were for arrears of interest. The principal was borrowed between 1867 and 1870, chiefly for railway construction; but it was mainly devoted to other purposes and no interest has been paid since 1872. The republic is thus practically bankrupt. The revenue, derived chiefly from customs and from the spirit, gunpowder and tobacco monopolies reached an average of about £265,000 during the five years 1901- 1905; the expenditure in normal years is about £250,000. The principal spending departments are those of war, finance, public works and education.

Constitution and Government. — The constitution of Honduras, promulgated in 1839 and frequently amended, was to a great extent recast in 1880. It was again remodelled in 1894, when a new charter was proclaimed. This instrument gives the legislative power to a congress of

deputies elected for four years by popular vote, in the ratio of one member for every 10,000 imhabitants. Congress meets on the 1st of January and sits for sixty consecutive days. The executive is entrusted to the president, who is nominated and elected for four years by popular vote, and is re-eligible for a second but not for a third consecutive term. He is assisted by a council of ministers representing the departments of the interior, war, finance, public works, education and justice. For purposes of local administration the republic is divided into sixteen departments. The highest judicial power is vested in the Supreme Court, which consists of live popularly elected judges; there are also four Courts of Appeal, besides subordinate departmental and district t ribunals. The active army consists of about 500 regular soldiers and 20,000 militia, recruited by conscription from all able- bodied males between the ages of twenty and thirty. Service in the reserve is obligatory for a further period of ten years.

Religion and Education. — Roman Catholicism is the creed of a very large majority of the population ; but the constitution grants com- plete liberty to all religious communities, and no Church is supported by public funds or receives any other special privilege. Education is free, secular and compulsory for children between the ages of seven and fifteen. There are primary schools in every convenient centre, but the percentage of illiterates'is high, especially among the Indians. The state maintains a central institute and a university at Teguci- galpa, a school of jurisprudence at Comayagtia, and colleges for secondary education, with special schools for teachers, in each de- partment. The annual cost of primary education is about £1 1 ,000.

History. — It was at Cape Honduras that Columbus first landed on the American continent in 1502, and took possession of the country on behalf of Spain. The first settlement was made in 1524 by order of Hernando Cortes, who had heard rumours of rich and populous empires in this region, and sent his lieutenant Christobal de Olid to found a Spanish colony. Olid endeavoured to establish an independent principality, and, in order to resume control of the settlers, Cortes was compelled to undertake the long and arduous march across the mountains of southern Mexico and Guatemala. In the spring of 1525 he reached the colony and founded the city which is now Puerto Cortes. He entrusted the administration to a new governor,

whose successors were to be nominated by the king, and returned to Mexico in 1526. By 1539, when Honduras was incorporated in the captaincy-general of Guatemala, the mines of the province had proved to be the richest as yet discovered in the New World and several large cities had come into existence. The system under which Honduras was administered from 1539 to 1821, when it repudiated the authority of the

Spanish crown, the effects of that system, the part subsequently played by Honduras in the protracted struggle for Central American unity, and the invasion by William Walker and his fellow-adventurers (1856- 1860), are fully described under Central America.

War and revolution had stunted the economic growth of the country and retarded every attempt at social or political reform; its future was mortgaged by the assumption of an enormous burden of debt in 1869 and 1870. A renewal of war with Guatemala in 187 1, and a revolution three years later in the interests of the ex-president Medina, brought about the intervention of the neighbouring states and the provisional appointment to the presidency of Marco Aurelio Soto, a nominee of Guatemala. This appointment proved successful and was confirmed by popular vote in 1877 and 1880, when a new con- stitution was issued and the seat of government fixed at Teguci- galpa. Fresh outbreaks of civil war occurred frequently between 1883 and 1903; the republic was bankrupt and progress again at a standstill. In 1903 Manuel Bonilla, an able, popular and experienced general, gained the presidency and seemed likely to repeat the success of Soto in maintaining order. As his term of office drew' to a close, and his re-election appeared certain, the supporters of rival candidates and some of his own dissatisfied adherents intrigued to secure the co-operation of Nicaragua for his overthrow. Bonilla welcomed the opportunity of con- solidating his own position which a successful war would offer; Jose Santos Zelaya, the president of Nicaragua, was equally ambitious; and several alleged violations of territory had embittered popular feeling on both sides. The United States and Mexican governments endeavoured to secure a peaceful settlement without intervention, but failed. At the outbreak of hostilities in February 1907 the Hondurian forces were com- manded by Bonilla in person and by General Sotero Barahona his minister of war. One of their chief subordinates was Lee Christmas, an adventurer from Memphis, Tennessee, who had previously been a locomotive-driver. Honduras received active support from his ally, Salvador, and was favoured by public opinion throughout Central America. But from the outset the Nicaraguans proved victorious, largely owing to their remarkable mobility. Their superior naval force enabled them to capture Puerto Cortes and La Ceiba, and to threaten other cities on the Caribbean coast; on land they were aided by a body of Hondurian rebels, who also established a pro- visional government. Zelaya captured Tegucigalpa after severe fighting, and besieged Bonilla in Amapala. Lee Christmas was killed. The surrender of Amapala on the nth of April practically ended the war. Bonilla took refuge on board the United States cruiser "Chicago." A noteworthy feature of the war was the attitude of the American naval officers, who landed marines, arranged the surrender of Amapala, and pre- vented Nicaragua prolonging hostilities. Honduras was

now evacuated by the Nicaraguans and her provisional government was recognized by Zelaya. Miguel R. Davila was president in 1908 and 1909.

Bibliography. — Official documents such as the annual presi- dential message and the reports of the ministries are published in Spanish at Tegucigalpa. Other periodical publications which throw much light on the movement of trade and politics are the British Foreign Office reports (London, annual), United States consular reports (Washington, monthly), bulletins of the Bureau of American Republics (Washington), and reports of the Council of the Corpora- tion of Foreign Bondholders (London, annual). For a more com- prehensive account of the country and its history, the works of K. Sapper, E. G. Squier, A. H. Keane and T. Child, cited under Central America, are important. See also E. Pelletier, Honduras el ses ports: documents officiels sur le ckemin-de-fer inter oceanique (Paris, 1869); E. G. Squier, Honduras: Descriptive, Historical and Statistical (London, 1 870); C. Charles, Honduras (Chicago, 1890); Handbook of Honduras, published by the Bureau of American

Republics (1892); T. R. Lombard, The New Honduras (New York, 1887); H. Jalhay, La Republique de Honduras (Antwerp, 1898); Perry, Directorio national de Honduras (New York, 1899) ; H. G. Bourgeois, Breve nolicia sobre Honduras (Tegucigalpa, 1900).

HONE, NATHANIEL (171S-1784), British painter, was the son of a merchant at Dublin, and without any regular training acquired in his youth much skill as a portrait-painter. Early in his career he left Dublin for England and worked first in various provincial towns, but ultimately settled in London, where he soon made a considerable reputation. His oil-paintings were decidedly popular, but he gained his chief success by his miniatures and enamels, which he executed with masterly capacity. He became a member of the Incorporated Society of Artists and afterwards a foundation member of the Royal Academy; but he had several disagreements with his fellow- members of that institution, and on one occasion they rejected two of his pictures, one of which was regarded as a satire on Reynolds and the other on Angelica Kauffman. Most of his contributions to the Academy exhibitions were portraits. The quality of his work varied greatly, but the merit of his miniatures and enamels entitles him to a place among the ablest artists of the British school. He executed also a few mezzo- tint plates of reasonable importance, and some etchings. His portrait, painted

by himself two years before his death, is in the possession of the Royal Academy.

HONE, WILLIAM (1780-1842), English writer and bookseller, was born at Bath on the 3rd of June 1780. His father brought up his children with the sectarian narrowness that so frequently produces reaction. Hone received no systematic education, and was taught to read from the Bible only. His father having removed to London in 1783, he was in 1790 placed in an attorney's office. After two and a half years spent in the office of a solicitor at Chatham he returned to London to become clerk to a solicitor in Gray's Inn. But he disliked the law, and had already acquired a taste for free-thought and political agitation. Hone married 1:1 1800, and started a book and print shop with a circulating Library in Lambeth Walk. He soon removed to St Martin's Churchyard, where he brought out his first publication, Shaw's Gardener (1806). It was at this time that he and his friend, John Bone, tried to realize a plan for the establishment of popular savings banks, and even had an interview on the subject with the president of the Board of Trade. This scheme, however, failed. Bone joined him next in a bookseller's business; but Hone's habits were not those of a tradesman, and bankruptcy was the result. He was in 181 1 chosen by the booksellers as auctioneer to the trade, and had an office in Ivy Lane. Independ- ent investigations carried on by him into the condition of lunatic asylums led again to business difficulties and failure, but he took a small lodging in the Old Bailey, keeping himself and his now large family by contributions to magazines and reviews. He hired a small shop, or rather box, in Fleet Street but this was on two separate nights broken into, and valuable books lent for show were stolen. In 1815 he started the Traveller newspaper, and endeavoured vainly to exculpate Eliza Fenning, a poor girl, apparently quite guiltless, who was executed on a charge of poisoning. From February 1 to October 25, 181 7, he published the Reformer's Register, writing in it as the serious critic of the state abuses, which he soon after attacked in the famous political squibs and parodies, illustrated by George Cruikshank. In April 181 7 three ex-officio informations were filed against him by the attorney-general, Sir William Garrow. Three separate trials took place in the Guildhall before special juries on the 18th, 19th and 20th of December 1817. The first, for publishing Wilkes's Catechism of a Ministerial Member (1 8 1 7) , was before Mr Justice Abbot (afterwards Lord Tenterden) ; the second, for parodying the litany and libelling the prince regent, and the third, for publishing the Sinecurist's Creed (1817), a parody on the Athanasian creed, were before Lord Ellenborough (q.v.). The prosecution took the ground that the prints were calculated to injure public morals, and to bring the prayer-book and even religion itself into contempt. But there can be no doubt that the real motives of the prosecution were

political; Hone had ridiculed the habits and exposed the cor- ruption of the

prince regent and of other persons in power. He went to the root of the matter when he wished the jury " to understand that, had he been a publisher of ministerial parodies, he would not then have been defending himself on the floor of that court." In spite of illness and exhaustion Hone displayed great courage and ability, speaking on each of the three days for about seven hours. Although his judges were biassed against him he was acquitted on each count, and the result was received with enthusiastic cheers by immense crowds within and without the court. Soon after the trials a subscription was begun which enabled Hone to get over the difficulties caused by his prosecution. Among Hone's most successful political satires were The Political House that Jack built (1819), The Queen's Matrimonial Ladder (1820), in favour of Queen Caroline, The Man in the Moon (1820), The Political Showman (1821), all illustrated by Cruik- shank. Many of his squibs are directed against a certain " Dr Slop," a nickname given by him to Dr (afterwards Sir John) Stoddart, of The Times. In researches for his defence he had come upon some curious and at that time little trodden literary ground, and the results were shown by his publication in 1820 of his Apocryphal New Testament, and in 1823 of his Ancient Mysteries Explained. In 1826 he published the Evcry-day Book, in 1827-1828 the Table-Book, and in 1829 the Year-Book ; all three were collections of curious information on manners, antiquities and various other subjects. These are the works by which Hone is best remembered. In preparing them he had the approval of Southey and the assistance of Charles Lamb, but pecuniarily they were not successful, and Hone was lodged in King's Bench prison for debt. Friends, however, again came to his assistance, and he was established in a coffee-house in Gracechurch Street; but this, like most of his enterprises, ended in failure. Hone's attitude of mind had gradually changed to that of extreme devoutness, and during the latter years of his life he frequently preached in Weigh House Chapel, Eastcheap. In 1830 he edited Strutt's Sports and Pastimes, and he contri- buted to the first number of the Penny Magazine. He was also for some years sub-editor of the Patriot. He died at Tottenham on the 6th of November 1842.

HONE (in O. Eng. hdn, cognate with Swed. hen ; the root appears in Skt. cdna, qo to sharpen), a variety of finely siliceous stone employed for whetting or sharpening edge tools, and for abrading steel and other hard surfaces. Synonyms are hone- stone, whetstone, oilstone and sharpening stone. Hones are generally prepared in the form of flat slabs or small pencils or rods, but some are made with the outline of the special instru- ment they are designed to sharpen. Their abrading action is due to the quartz or silica which is always present in predominat- ing proportion, some kinds consisting of almost pure quartz, while in others the siliceous element is very intimately mixed with aluminous or calcareous matter,

forming a uniform compact stone, the extremely fine siliceous particles of which impart a remarkably keen edge to the instruments for the sharpening of which they are applied. In some cases the presence of minute garnets or magnetite assists in the cutting action. Hones are used either dry, with water, or with oil, and generally the object to be sharpened is drawn with hand pressure backward and forward over the surface of the hone; but sometimes the stone is moved over the cutting edge.

The coarsest type of stone which can be included among hones is the bat or scythe stone, a porous fine-grained sandstone used- for sharpening scythes and cutters of mowing machines, and for other like purposes. Next come the ragstones, which consist of quartzose mica-schist, and give a finer edge than any sandstone. Under the head of oilstones or hones proper the most famous and best-known qualities are the German razor hone, the Turkey oilstone, and the Arkansas stone. The German razor hone, used, as its name implies, chiefly for razors, is obtained from the slate mountains near Ratisbon, where it forms a yellow vein of from 1 to 18 in. in the blue slate. It is sawn into thin slabs, and these are cemented to slabs of slate which serve as a support. Turkey oilstone is a close-grained bluish stone

containing from 70 to 75% of silica in a state of very fine division, intimately blended with about 20 to 25% of calcite. It is obtained only in small pieces, frequently flawed and not tough, so that the slabs must have a backing of slate or wood. It is one of the most valuable of all whetstones, abrading the hardest steel, and possessing sufficient compactness to resist the pressure required for sharpening gravers. The stone comes from the interior of Asia Minor, whence it is carried to Smyrna. Of Arkansas stones there are two varieties, both found in the same district, Garland and Saline counties, Arkansas, United States. The finer kind, known as Arkansas hone, is obtained in small pieces at the Hot Springs, and the second quality, dis- tinguished as Washita stone, comes from Washita or Ouachita river. The hones yield on analysis 98% of silica, with small proportions of alumina, potash and soda, and mere traces of iron, lime, magnesia and fluorine. They are white in colour, extremely hard and keen in grit, and not easily worn down or broken. Geologically the materials are called novaculites, and are supposed to be metamorphosed sandstone silt, chert or limestone resulting from the permeation through the mass of heated alkaline siliceous waters. The finer kind is employed for fine cutting instruments, and also for polishing steel pivots of watch-wheels and similar minute work, the second and coarser quality being used for common tools. Both varieties are largely exported from the United States in the form of

blocks, slips, pencils, rods and wheels. Other honestones are obtained in the United States from New York, New Hampshire, Vermont, Ohio (Deerlick stone) and Indiana (Hindostan or Orange stone). Among hones of less importance in general use may be noted the Charley Forest stone — or Whittle Hill honestone — a good substitute for Turkey oilstone; Water of Ayr stone, Scotch stone, or snake stone, a pale grey carboniferous shale hardened by igneous action, used for tools and for polishing marble and copper-plates; Idwal or Welsh oilstone, used for small articles; and cutlers' greenstone from Snowdon, very hard and close in texture, used for giving the last edge to lancets.

HONEY (Chin, me ; Sansk. madhu, mead, honey; cf. A.S. medo, medu, mead; Gr. fie\i, in which 8 or 5 is changed into X; Lat. mel ; Fr. miel ; A.S. hunig ; Ger. Honig), 1 a sweet viscid liquid, obtained by bees (see Bee, Bee-keeping) chiefly from the nectaries of flowers, i.e. those parts of flowers specially constructed for the elaboration of honey, and, after transportation to the hive in the proventriculus or crop of the insects, discharged by them into the cells prepared for its reception. Whether the nectar undergoes any alteration within the crop of the bee is a point on which authors have differed. Some wasps, e.g. Myrapetra scttellaris 2 and the genus Neclarina, collect honey. A honey-like fluid, which consists of a nearly pure solution of uncrystallizable sugar having the formula C 6 Hi40 7 after drying in vacuo, and which is used by the Mexicans in the preparation of a beverage, is yielded by certain inactive individuals of Myrmecocystus mexicanus, Wesmael, the honey-ants or pouched ants (hormigas mieleras or mochileras) of Mexico. 3 The abdomen in these insects, owing to the distensibility of the membrane connecting its segments, becomes converted into a globular thin-walled sac by the accumulation within it of the nectar supplied to them by their working comrades (Wesmael, Bull, de I' Acad. Roy. de Brux. v. 766, 1838). By the Rev. H. C. M'Cook, who discovered the insect in the Garden of the Gods, Colorado, the honey-bearers were found hanging by their feet, in groups of about thirty, to the roofs of special chambers in their underground nests, their large globular abdomens causing them to resemble " bunches of small Delaware grapes" (Proc. Acad. Nat. Sci. Philad., 1879, p. 197). A bladder-like formation on the metathorax of another ant, Crematogaster inflatus (F. Smith, Cat. of Hymenoplera, pt. vi. pp. 136 and 200, pi. ix. fig. 1),

1 The term honey in its various forms is peculiar to the Teutonic group of languages, and in the Gothic New Testament is wanting, the Greek word being there translated melith.

2 See A. White, in Ann. and Mag. Nat. Hist. vii. 315, pi. 4.

3 Wetherill (Chem. Gaz. xi. 72, 1853) calculates that the average weight

of the honey is 8-2 times that of the body of the ant, or 0-3942 grammes.

which has a small circular orifice at each posterior lateral angle, appears to possess a function similar to that of the abdomen in the honey-ant.

It is a popular saying that where is the best honey there also is the best wool; and a pastoral district, since it affords a greater profusion of flowers, is superior for the production of honey to one under tillage. 4 Dry warm weather is that most favourable to the secretion of nectar by flowers. This they pro- tect from rain by various internal structures, such as papillae, cushions of hairs and spurs, or by virtue of their position (in the raspberry, drooping), or the arrangement of their con- stituent parts. Dr A. W. Bennett (How Flowers are Fertilized, p. 31, 1873) has remarked that the perfume of flowers is generally derived from their nectar; the blossoms of some plants, how- ever, as ivy and holly, though almost scentless, are highly nectariferous. The exudation • of a honey-like or saccharine fluid, as has frequently been attested, is not a function exclusively of the flowers in all plants. A sweet material, the manna of pharmacy, e.g. is produced by the leaves and stems of a species of ash, Fraxinus Ornus ; and honey-secreting glands are to be met with on the leaves, petioles, phyllodes, stipules (as in Vicia sativa), or bracteae (as in the Marcgraviaceae) of a considerable number of different vegetable forms. The origin of the honey- yielding properties manifested specially by flowers among the several parts of plants has been carefully considered by Darwin, who regards the saccharine matter in nectar as a waste product of chemical changes in the sap, which, when it happened to be excreted within the envelopes of flowers, was utilized for the important object of cross-fertilization, and subsequently was much increased in quantity, and stored in various ways (see Cross and Self Fertilization of Plants, pp. 402 sq., 1876). It has been noted with respect to the nectar of the fuchsia that it is most abundant when the anthers are about to dehisce, and absent in the unexpanded flower.

Pettigrew is of opinion that few bees go more than 2 m. from home in search of honey. The number of blossoms visited in order to meet the requirements of a single hive of bees must be very great; for it has been found by A. S. Wilson (" On the Nectar of Flowers," Brit. Assoc. Rep., 1878, p. 567) that 125 heads of common red clover, which is a plant comparatively abundant in nectar, yield but one gramme (15-432 grains) of sugar; and as each head contains about 60 florets, 7,500,000 distinct flower-tubes must on this estimate be exhausted for each kilogramme (2-204lb) of sugar collected. Among the richer sources of honey are reckoned the apple, asparagus, asters, barberry, basswood (Tilia americana), and the European lime or linden (T. europaea), beans, bonesets (Eupatorium), borage, broom, buckwheat, catnip, or catmint (Nepeta Cataria), cherry, cleome, clover, cotton, crocus, currant,

dandelion, eucalyptus, figwort (Scrophularia) , furze, golden-rod (Solidago), gooseberry, hawthorn, heather, hepatica, horehound, hyacinth, lucerne, maple, mignonette, mint, motherwort (Leonurus), mustard, onion, peach, pear, poplar, quince, rape, raspberry, sage, silver maple, snapdragon, sour-wood (Oxydendron arboreum, D.C.), strawberry, sycamore, teasel, thyme, tulip-tree (more especially rich in pollen), turnip, violet and willows, and the " honey-dew " of the leaves of the whitethorn (Bonner), oak, linden, beech and some other trees.

Honey contains dextroglucose and laevoglucose (the former practically insoluble, the latter soluble in \ pt. of cold strong alcohol), cane-sugar (according to some), mucilage, water, wax, essential oil, colouring bodies, a minute quantity of mineral matter and pollen. By a species of fermentation, the cane- sugar is said to be gradually transformed into inverted sugar (laevoglucose with dextroglucose). The pollen, as a source of nitrogen, is of importance to the bees feeding on the honey. It may be obtained for examination as a sediment from a mixture of honey and water. Other substances which have been, dis- covered in honey are mannite (Guibourt), a free acid which precipitates the salts of silver and of lead, and is soluble in water and alcohol (Calloux), and an uncrystallizable sugar, nearly related to inverted sugar (Soubeiran, Compt. Rend, xxviii. 774-775) 1849). Brittany honey contains couvain, a ferment which determines its active decomposition (Wurtz, Diet, de Chem. ii. 430). In the honey of Polybia apicipennis, a wasp 4 Compare Isa. vii. 15, 22, where curdled milk (A.V. " butter ") and honey as exclusive articles of diet are indicative of foreign in- vasion, which turns rich agricultural districts into pasture lands or uncultivated wastes.

of tropical America, cane-sugar occurs in crystals of large size (Karsten, Pogg. Ann., C. 550). Dr J. Campbell Brown ("On the Composition of Honey," Analyst iii. 267, 1878) is doubtful as to the presence of cane-sugar in any one of nine samples, from various sources, examined by him. The following average percentage numbers are afforded by his analyses: laevulose, 36-45; dextrose, 36-57; mineral matter, -15; water expelled at ioo° C, 18-5, and at a much higher temperature, with loss, 7-81: the wax, pollen and insoluble matter vary from a trace to 2-r%. The specific gravity of honey is about 1-41. The rotation of a polarized ray by a solution of 16-26 grammes of crude honey in roo c.c. of water is generally from -3-2° to -5 at 6o° F.; in the case of Greek honey it is nearly -5-5°. Almost all pure honey, when exposed for some time to light and cold, becomes more or less granular in consistency. Any liquid portion can be readily separated by

straining through linen. Honey sold out of the comb is commonly clarified by heating and skimmimg; but according to Bonner it is always best in its natural state. The met dtpuratum of British pharmacy is prepared by heating honey in a water-bath, and straining through flannel previously moistened with warm water.

The term " virgin-honey " (A.-S., huniglear) is applied to the honey of young bees which have never swarmed, or to that which flows spontaneously from honeycomb with or without the application of heat. The honey obtained from old hives, considered inferior to it in quality, is ordinarily darker, thicker and less pleasant in taste and odour. The yield of honey is less in proportion to weight in old than in young or virgin combs. The far-famed honey of Narbonne is white, very granular and highly aromatic; and still finer honey is that procured from the Corbieres Mountains, 6 to 9 m. to the south-west. The honey of Gatinais is usually white, and is less odorous and granulates less readily than that of Narbonne. Honey from white clover has a greenish-white, and that from heather a rich golden-yellow hue. What is made from honey-dew is dark in colour, and disagreeable to the palate, and does not candy like good honey. " We have seen aphide honey from sycamores," says F. Cheshire (Pract. Bee-keeping, p. 74), "as deep in tone as walnut liquor, and where much of it is stored the value of the whole crop is practically nil." The honey of the stingless bees (Meliponia and Trigone) of Brazil varies greatly in quality according to the species of flowers from which it is collected, some kinds being black and sour, and others excellent (F. Smith, Trans. Ent. Soc, 3d ser., i. pt. vi., 1863). That of Apis Peronii, of India and Timor, is yellow, and of very agreeable flavour and is more liquid than the British sorts. A. unicolor, a bee indigenous to Madagascar, and naturalized in Mauritius and the island of Reunion, furnishes a thick and syrupy, peculiarly scented green honey, highly esteemed in Western India. A rose-coloured honey is stated {Card. Chron., 1870, p. 1698) to have been procured by artificial feeding. The fine aroma of Maltese honey is due to its collection from orange blossoms. Narbonne honey being harvested chiefly from Labiate plants, as rosemary, an imitation of it is sometimes prepared by flavouring ordinary honey with infusion of rosemary flowers.

Adulterations of honey are starch, detectable by the microscope, and by its blue reaction with iodine, also wheaten flour, gelatin, chalk, gypsum, pipe-clay, added water, cane-sugar and common syrup, and the different varieties of manufactured glucose. Honey sophisticated with glucose containing copperas as an impurity is turned of an inky colour by liquids containing tannin, as tea. Elm leaves have been used in America for the flavouring of imitation honey. Stone jars should be employed in preference to common earthenware for the storage of honey, which acts upon the lead glaze of the latter.

Honey is mildly laxative in properties. Some few kinds are poisonous, as frequently the reddish honey stored by the Brazilian wasp Nectarina (Polistes, Latr. 1) Lecheguana, Shuck., the effects of which have been vividly described by Aug. de Saint-Hilaire, 2 the spring honey of the wild bees of East Nepaul, said to be rendered noxious by collection from rhododendron

1 M&moires du Musium, xi. 313 (1824).

1 lb. xii. 293, pi. xii. fig. B (1825). The honey, according to Lassaigne (16. ix. 319), is almost entirely soluble in alcohol.

flowers (Hooker, Himalayan Journals, i. 190, ed. 1855;, and the honey of Trebizond, which from its source, the blossoms, it is stated, of Azalea pontica and Rhododendron ponticum (perhaps to be identified with Pliny's Aegolethron) , acquires the qualities of an irritant and intoxicant narcotic, as described by Xenophon (Anab. iv. 8). Pliny (Nat. Hist. xxi. 45) describes as noxious a livid-coloured honey found in Persia and Gaetulia. Honey obtained from Kalmia latifolia, L., the calico bush, mountain laurel or spoon-wood of the northern United States, and allied species, is reputed deleterious; also that of the sour-wood is by some good authorities considered to possess undeniable griping properties; and G. Bidie {Madras Quart. Journ. Med. Sci., Oct, 1861, p. 399) mentions urtication, headache, extreme prostration and nausea, and intense thirst among the symptoms produced by a small quantity only of a honey from Coorg jungle. A South African species of Euphorbia, as was experienced by the missionary Moffat (Miss. Lab. p. 32, 1849), yields a poisonous honey. The nectar of certain flowers is asserted to cause even in bees a fatal kind of vertigo. As a demulcent and flavouring agent, honey is employed in the oxymel, oxymel scillae, mel boracis, confectio piperis, conf. scammonii and conf. terebinthinae of the British Pharmacopoeia. To the ancients honey was of very great importance as an article of diet, being almost their only available source of sugar. It was valued by them also for its medicinal virtues; and in recipes of the Saxon and later periods it is a common ingredient. 3 Of the eight kinds of honey mentioned by the great Indian surgical writer Susruta, four are not described by recent authors, viz. argha ox wild honey, collected by a sort of yellow bee; chhatni, made by tawny or yellow wasps; auddlaka, a bitter and acrid honey like substance found in the nest of white ants; and ddla or unprepared honey occurring on flowers. According to Hindu medical writers, honey when new is laxative, and when more than a year old astringent (U. C. Dutt, Mat. Med. of the Hindus, p. 277, 1877). Ceromel, formed by mixing at a gentle heat one part by weight of yellow wax with four of clarified honey, and straining, is used in India and other tropical countries as a mild stimulant for ulcers in the place of animal fats, which there rapidly become rancid and unfit for

medicinal purposes. The Koran, in the chapter entitled " The Bee," remarks with reference to bees and their honey: " There proceedeth from their bellies a liquor of various colour, wherein is a medicine for men" (Sale's Koran, chap. xvi.). Pills prepared with honey as an excipient are said to remain unindurated, however long they may be kept (Med. Times, 1857, i. 269). Mead, of yore a favourite beverage in England (vol. iv. p. 264), is made by fermentation of the liquor obtained by boiling in water combs from which the honey has been drained. In the pre paration of sack-mead, an ounce of hops is added to each gallon of the liquor, and after the fermentation a small quantity of brandy. Metheglin, or hydromel, is maufactured by ferment- ing with yeast a solution of honey flavoured with boiled hops (see Cooley, Cyclop.). A kind of mead is largely consumed in Abyssinia (vol. i. p. 64), where it is carried on journeys in large horns (Stern, Wanderings, p. 317, 1862). In Russia a drink termed lipez is made from the delicious honey of the linden. The mulsum of the ancient Romans consisted of honey, wine and water boiled together. The clarre, or piment, of Chaucer's time was wine mixed with honey and spices, and strained till clear; a similar drink was bracket, made with wort of ale instead of wine. L. Maurial (L'Insectologie Agricole for 1868, p. 206) reports unfavourably as to the use of honey for the production " of alcohol; he recommends it, however, as superior to sugar for the thickening of liqueurs, and also as a means of sweetening imperfectly ripened vintages. It is occasionally employed for giving strength and flavour to ale. In ancient Egypt it was valued as an embalming material; and in the East, for the preservation of fruit, and the making of cakes, sweetmeats,

3 For a list of fifteen treatises concerning honey, dating from 1625 to 1868, see Waring, Bibl. Therap. ii. 559, New Syd. Soc. (1879). On sundry ancient uses for honev, see Beckmann, Hist, of Invent, i.

287 (1846).

and other articles of food, it is largely consumed. Grafts, seeds and birds' eggs, for transmission to great distances, are some- times packed in honey. In India a mixture of honey and milk, or of equal parts of curds, honey and clarified butter (Sansk., madhu-parka), is a respectful offering to a guest, or to a bride- groom on his arrival at the door of the bride's father; and one of the purificatory ceremonies of the Hindus (Sansk., madhu-prdsana) is the placing of a little honey in the mouth of a new- born male infant. Honey is frequently alluded to by the writers of antiquity as food for children; it is not to this, however, as already mentioned, that Isa. vii.

15 refers. Cream or fresh butter together with honey, and with or without bread, is a favourite dish with the Arabs.

Among the observances at the Fandroana or New Year's Festival, in Madagascar, is the eating of mingled rice and honey by the queen and her guests; in the same country honey is placed in the sacred water of sprinkling used at the blessing of the children previous to circumcision (Sibree, The Great African Is. pp. 219, 314, 1880). Honey was frequently em- ployed in the ancient religious ceremonies of the heathen, but was forbidden as a sacrifice in the Jewish ritual (Lev. ii. 11). With milk or water it was presented by the Greeks as a libation to the dead (Odyss. xi. 27; Eurip. Orest. 115). A honey- cake was the monthly food of the fabled serpent-guardian of the Acropolis (Herod, viii. 41). By the aborigines of Peru honey was offered to the sun.

The Hebrew word translated " honey " in the authorized version of the English Bible is debash, practically synonymous with which are ja'ar or ja'aritk had-debash (1 Sam. xix. 25-27; cf. Cant. v. 1) and nopheth (Ps. xix. io, &c), rendered " honey-comb." Debash de- notes bee-honey (as in Deut. xxxii. 13 and Jud. xiv. 8) ; the manna of trees, by some writers considered to have been the " wild honey " eaten by John the Baptist (Matt. iii. 4) ; the syrup of dates or the fruits themselves ; and probably in some passages (as Gen. xliii. 1 1 and Ez. xxvii. 17) the syrupy boiled juice of the grape, resembling thin molasses, in use in Palestine, especially at Hebron, under the name of dibs (see Kitto, Cyclop., and E. Robinson, Bibl. Res. ii. 81). Joscphus (B.J., iv. 8, 3) speaks highly of a honey produced at Jericho, consisting of the expressed juice of the fruit of palm trees; and Herodotus (iv. 194) mentions a similar preparation made by the Gyzantians in North Africa, where it is still in use. The honey most esteemed by the ancients was that of Mount Hybla in Sicily, and of Mount Hymettus in Attica (iii. 59). Mahaffy (Rambles in Greece, p. 148, 2nd ed., 1878) describes the honey of Hymettus as by- no means so good as the produce of other parts of Greece — not to say of the heather hills of Scotland and Ireland. That of Thebes, and more especially that of Corinth, which is made in the thymy hills towards Cleonae, he found much better (cf. xi. 88). Honey and wax, still largely obtained in Corsica (vi. 440), were in olden times the chief productions of the island. In England, in the 13th and 14th centuries, honey sold at from about 7d. to is. 2d. a gallon, and occasionally was disposed of by the swarm or hive, or ruscha (Rogers, Hist, of Agric. and Prices in Eng., i. 418). At Wrexham, Denbigh, Wales, two honey fairs are annually held, one on the Thursday next after the 1st of September, and the other — the more recently instituted and by far the larger — on the Thursday following the first Wednesday in October. In Hungary the amounts of honey and of wax are in favourable years respectively about 190,000 and 12,000 cwt., and in unfavourable years,

as, e.g. 1874, about 12,000 and 3000 cwt. The hives there in 1870 numbered 617,407 (or 40 per 1000 of the population, against 45 in Austria). Of these 365,711 were in Hungary Proper, and 91,348 (87 per 1000 persons) in the Military Frontier (Keleti, Ubersicht der Bevolk. Ungarns, 1871; Schwicker, Statistik d. K. Vngarn, 1877). In Poland the system of bee-keeping introduced by Dolinowski has been found to afford an average of 40 lb of honey and wax and two new swarms per hive, the common peasant's hive yielding, with two swarms, only 3 lb of honey and wax. In forests and places remote from villages in Podolia and parts of Volhynia, as many as 1000 hives may be seen in one apiary, fn the district of Ostrolenka, in the govern- ment of Plock, and in the woody region of Polesia, in Lithuania, a method is practised of rearing bees in excavated trunks of trees (Stanton, " On the Treatment of Bees in Poland," Technologist, vi. 45, 1866). When, in August, in the loftier valleys of Bormio, Italy, flowering ceases, the bees in their wooden hives are by means of spring-carts transported at night to lower regions, where they obtain from the buckwheat crops the inferior honey which serves them for winter consumption (lb. p. 38).

In Palestine, " the land flowing with milk and honey "' (Ex. iii. 17; Numb. xiii. 27), wild bees are very numerous, especially in the

1 In Sanskrit, madhtt-kulya, a stream of honey, is sometimes used to express an overflowing abundance of good things (Monier Williams, Sansk. -Eng. Diet., p. 736, 1872).

wilderness of Judaea, and the sailing of their produce, obtained from crevices in rocks, hollows in trees and elsewhere, is with many of the inhabitants a means of subsistence. Commenting on 1 Sam. xiv. 26, J. Roberts (Oriental Illust.) remarks that in the East " the forests literally flow with honey ; large combs may be seen hanging on the trees, as you pass along, full of honey." In Galilee, and at Bethlehem and other places in Palestine, bee-keeping is extensively carried on. The hives are sun-burnt tubes of mud, about 4 ft. in length and 8 in. in diameter, and, with the exception of a small central aperture for the passage of the bees, closed at each end with • mud. These are laid together in long rows, or piled pyramidally, and are protected from the sun by a covering of. mud and of boughs. The honey is extracted, when the ends have been removed, by means of an iron hook. (See Tristram, Nat. Hist, of the Bible, pp. 322. sqq., 2nd ed., 1868). Apiculture in Turkey is in. a very rude condition. The Bali-dagh, or " Honey Msmnt," in the plain of Troy, is so called on account of the numerous wild bees tenanting the caves in its precipitous rocks to the south. In various regions of Africa, as on the west, near the Gambia, bees abound. Cameron was informed by his guides that the large quantities of honey at the cliffs by the river Makanyazi were under the protection of an

evil spirit, and not one of his men could be persuaded to gather any (Across Africa, i. 266). On the precipitous slopes of the Teesta valley, in India, the procuring of honey from the pendulous bees'-nests, which are sometimes large enough to be conspicuous features at a mile's. distance, is the only means by which the idle poor raise their annual rent (Hooker, Him. Journ. ii. 41).

*To reach the large combs of A p*s dorsata and A. testacea, the natives of Timor, by whom both the honey and young bees are esteemed delicacies, ascend the trunks of lofty forest trees by the use of a loop of creeper. Protected from the myriads of angry insects by a small torch only, they detach the combs from the under surface of the branches, and lower them by slender cords to the ground (Wallace, Journ. Linn. Soc, Zool., vol. xi.). (F. H. B.)*

HONEYCOMB, a cloth, so called because of the particular arrangement of the crossing of the warp and weft threads which form cells somewhat similar to those of the real honeycomb. They differ from the latter in that they are rectangular instead of hexagonal. The bottom of the cell is formed by those threads and picks which weave " plain," while the ascending sides of the figure are formed by the gradually increasing length of float of the warp and weft yarns.

The figure shows two of the commonest designs which are used for these cloths, design A being what is often termed the " perfect honey- comb " ; in the figure it will be seen that the highest number of successive white squares is seven, while the corresponding highest num- ber of successive black squares is five. Two of each of these maximum floats form the top or highest edges of the cell,

and the number of sue- A B

cessive like squares decreases as the bottom of the cell is reached when the floats are one of black and one of white (see middle of design, &c). The weave produces a reversible cloth, and it is extensively used for the embellishment of quilts and other fancy goods. It is also largely used in the manufacture of cotton and linen towels. B is, for certain purposes, a more suitable weave than A, but both are very largely used for the latter class of goods.

HONEY-EATER, or Honey-sucker, names applied by many writers in a very loose way to a large number of birds, soiree of which, perhaps, have no intimate affinity; here they are used in a more restricted sense for what, in the opinion of a good many recent authorities, 2 should really be deemed the family Meli- pkagidae — excluding therefrom the N

ectariniidae or Sun-birds (q.v.) as well as the genera Promerops and Zosierops with what- ever allies they may possess. Even with this restriction, the extent of the family must be regarded as very indefinite, owing to the absence of materials sufficient for arriving at a satis- factory conclusion, though the existence of such a family is probably indisputable. Making allowance, then, for the imperfect light in which they must at present be viewed, what are here called Meliphagidae include some of the most characteristic forms of the ornithology of the great Australian region — members of the family inhabiting almost every part of it, and a single species only, Ptilotis limbata, being said to occur outside its limits. They all possess, or are supposed to possess, a long

2 Among them especially A. R. Wallace, Geogr. Distr. Animals, ii

275-

m

•

■*V* *

■*V r”*

w

1 m

■

*w * m*

■ *1*

■*h n 1*

■*1*

**h*

• > •

■

■ ■

■ *1*

1

r. * «,

•

m

1 ■

1

■

1 *

■ *i

I

■ ■

■ *1*

■■» *a 1*

m

»

6 5 6

HONEY-GUIDE— HONEYMOON

protrusible tongue with a brush-like tip, differing, it is believed, in structure from that found in any other bird — Promerops perhaps excepted — and capable of being formed into a suctorial tube, by means of which honey is absorbed from the nectary of flowers, though it would seem that insects attracted by the honey furnish the chief nourishment of many species, while others undoubtedly feed to a greater or less extent on fruits. The Meliphagidae, as now considered, are for the most part small birds, never exceeding the size of a missel thrush; and they have been divided into more than 20 genera, containing above 200 species, of which only a few can here be particularized. Most of these species have a very confined range, being found perhaps only on a single island or group of islands in the region, but there are a few which are more widely distributed — such as Glycyphila rufifrons, the white- throated 1 honey-eater, found over the

greater part of Australia and Tasmania. In plumage they vary much. Most of the species of Ptilotis are characterized by a tuft of white, or in others of yellow, feathers springing from behind the ear. In the greater number of the genus Myzomela 2 the males are recognizable by a gorgeous display of crimson or scarlet, which has caused one species, M. sangtiino- lenta, to be known as the soldier-bird to Australian colonists; but in others no brilliant colour appears, and those of several genera have no special ornamentation, while some have a particularly plain appearance. One of the most curious forms is Prosthemadera — the tui or parson-bird of New Zealand, so called from the two tufts of white feathers which hang beneath its chin in great contrast to its dark silky plumage, and suggest a likeness to the bands worn by ministers of several religious denominations when officiating. 3 The bell-bird of the same island, Anthornis melanura — whose melody excited the admira- tion of Cook the morning after he had anchored in Queen Charlotte's Sound — is another member of this family, and unfortunately seems to be fast becoming extinct. But it would be impossible here to enter much further into detail, though the wattle-birds, Anthochaera, of Australia have at least to be named. Mention, however, must be made of the friar-birds, Tropidorhynchus, of which nearly a score of species, five of them belonging to Australia, have been described. With their stout bills, mostly surmounted by an excrescence, they seem to be the most abnormal forms of the family, and most of them are besides remarkable for the baldness of some part at least of their head. They assemble in troops, sitting on dead trees, with a loud call, and are very pugnacious, frequently driving away hawks and crows. A. R. Wallace {Malay Archipelago, ii. 1 5 i53) discovered the curious fact that two species of this genus — T. bourensis and T. subcornutus — respectively inhabit ing the islands of Bouru and Ceram, were the object of natural " mimicry " on the part of two species of oriole of the genus Mimcta, M. bourouensis and M. forsteni, inhabiting the same islands, so as to be on a superficial examination identical in appearance — the honey-eater and the oriole of each island pre- senting exactly the same tints — the black patch of bare skin round the eyes of the former, for instance, being copied in the latter by a patch of black feathers, and even the protuberance on the beak of the Tropidorhynchus being imitated by a similar enlargement of the beak of the Mimeta. The very reasonable explanation which Wallace offers is that the pugnacity of the

1 The young of this species has the throat yellow.

2 VV. A. Forbes published a careful monograph of this genus in the Proceedings of the Zoological Society for 1879, pp. 256-279.

3 This bird, according to Sir Walter Buller {Birds of New Zealand, p. 88), while uttering its wUd notes, indulges in much gesticulation, which adds to the suggested resemblance. It has great power of mimicry, and is a

favourite cage-bird both with the natives and colonists. On one occasion, says Buller, he had addressed a large meeting of Maories on a matter of considerable political importance, when " immediately on the conclusion of my speech, and before the old chief to whom my arguments were chiefly addressed had time to reply, a tui, whose netted cage hung to a rafter overhead, responded in a clear, emphatic way, ' Tito!' (false). The circumstance naturally caused much merriment among my audience, and quite upset the gravity of the venerable old chief, Nepia Taratoa. ' Friend,] said he, laughing, ' your arguments are very good; but my mokai is a very .vise bird, and he is not yet convinced!' "

former has led the smaller birds of prey to respect it, and it is therefore an advantage for the latter, being weaker and less courageous, to be mistaken for it. (A. N.)

HONEY-GUIDE, a bird so called from its habit of pointing out to man and to the ratel {Mellivora capensis) the nests of bees. Stories to this effect have been often told, and may be found in the narratives of many African travellers, from Bruce to Livingstone. But Layard says {B. South Africa, p. 242) that the birds will not infrequently lead any one to a leopard or a snake, and will follow a dog with vociferations, though its noisy cry and antics unquestionably have in many cases the effect signified by its English name. If not its first discoverer, Sparrman, in 1777, was the first who described and figured this bird, which he met with in the Cape Colony {Phil. Trans., lxvii. 42-47, pi. i.), giving it the name of Culculus indicator, its zygodactylous feet with the toes placed in pairs — two before and two behind — inducing the belief that it must be referred to that genus. Vicillot in 1816 elevated it to the rank of a genus, Indicator; but it was still considered to belong to the family Cuculidae (its asserted parasitical habits lending force to that belief) by all systematists except Blyth and Jerdon, until it was shown by Blanford {Obs. Geol. and Zool. Abyssinia, pp. 308, 309) and Sclater {Ibis, 1870, pp. 176-180) that it was more allied to the barbets, Capitonidae, and, in consequence, was then made the type of a distinct family, Indicatoridae. In the mean- while other species had been discovered, some of them differing sufficiently to warrant Sundevall's foundation of a second genus, Prodoliscus, of the group. The honey-guides are small birds, the largest hardly exceeding a lark in size, and of plain plumage, with what appears to be a very sparrow-like bill. Bowdler Sharpe, in a revision of the family published in 1876 (Orn. Miscellany, i. 192-209), recognizes ten species of the genus Indicator, to which another was added by Dr Reichenow {J own. ftir Ornithologie, 1877, p. no), and two of Prodotiscus. Four species of the former, including i". sparrmani, which was the first made known, are found in South Africa, and one of the latter. The rest inhabit other parts of the same continent, except /. archipelagicus, which seems to be peculiar to Borneo, and /. xanthonotus,

which occurs on the Himalayas from the borders of Afghanistan to Bhutan. The interrupted geographical distribution of this genus is a very curious fact, no species having been found in the Indian or Malayan peninsula to connect the outlying forms with those of Africa, which must be regarded as their metropolis. , (A.N.)

HONEY LOCUST, the popular name of a tree, Gleditsia triacanthos, a member of the natural order Leguminosae, and a native of the more eastern United States of North America. It reaches from 75 to 140 ft. in height with a trunk 2 or 3, or sometimes 5 or 6 ft. in diameter, and slender spreading branches which form a broad, flattish crown. The branchlets bear numer- ous simple or three-forked (whence the species-name triacanthos) sharp stiff spines, 3 to 4 in. long, at first red in colour, then chestnut brown; they are borne above the leaf -axils and represent undeveloped branchlets; sometimes they are borne also on the trunk and main branches. The long-stalked leaves are 7 to 8 in. long with eight to fourteen pairs of narrowly oblong leaflets. The flowers, which are of two kinds, are borne in racemes in the leaf -axils; the staminate flowers in larger numbers. The brown pods are often 12 to 18 in. long, have thin, tough walls, and contain a quantity of pulp between the seeds; they contract spirally when drying. The tree was first cultivated in Europe towards the end of the 17 th century by Bishop Compton in his garden at Fulham, near London, and is now extensively planted as an ornamental tree. The name of the genus commemorates Johann Gottlieb Gleditsch (1714-1786), a friend of Linnaeus, and the author of one of the earliest works on scientific forestry.

HONEYMOON, the first month after marriage. Lord Avebury in his Origin of Civilization suggests that the seclusion usually associated with this period is a survival of marriage by capture, and answers to the period during which the husband kept his wife in retirement, to prevent her from appealing to her relatives

for release. Others suggest that as the moon commences to wane as soon as it is at its full, so does the mutual affection of the wedded pair, the " honeymoon " (with this derivation) not necessarily referring to any definite period of time.

HONEYSUCKLE (Mid. Eng., honysocle, i.e. any plant from which honey may be sucked, — cf. A.-S. huni-suge, privet; Ger. Geissblatt; Fr. chevrefeuille) , botanical name Lonicera, a genus of climbing, erect or

prostrate shrubs, of the natural order Caprifoliaceae, so named after the 16th-century German botanist Adam Lonicer. The British species is L. Periclymenum, the woodbine; L. Caprifolium and L. Xylosteum are naturalized in a few counties in the south and east of England. Some of the garden varieties of the woodbine are very beautiful, and are held in high esteem for their delicious fragrance, even the wild plant, with its pale flowers, compensating for its sickly looks " with never-cloying odours." The North American sub- evergreen L. sempervirens, with its fine heads of blossoms,

commonly called the trumpet honeysuckle, the most handsome of all the cultivated honey- suckles, is a distinct and beautiful species pro- ducing both scarlet and yellow flowered varie- ties, and the Japanese L. flexuosa var. aureo- reticulata is esteemed for its charmingly varie- gated leaves netted with golden yellow. The fly honeysuckle, L. Xylos- teum, a hardy shrub of dwarfish, erect habit, and L. tatarica, of similar habit, both European, are amongst the oldest English gar- den shrubs, and bear axillary flowers of various colours, occur- Honeysuckle.— (a) Flowering branch; ring two on a peduncle. (A) flower, nat. size; (c) fruit, slightly There are numerous reduced. other species, many of

them introduced to our gardens, and well worth cultivating in shrubberies or as climbers on walls and bowers, either for their beauty or the fragrance of their blossoms.

In the western counties of England, and generally by agricul- turists, the name honeysuckle is applied to the meadow clover, Yrifolium pratense. Another plant of the same family (Legu- minosae) Hedysarum coronarium, a very handsome hardy jicnnial often seen in old-fashioned collections of garden plants, is commonly called the French honeysuckle. The name is moreover applied with various affixes to several other totally different plants. Thus white honeysuckle and false honeysuckle are names for the North American Azalea viscosa; Australian or heath honeysuckle is the Australian Banksia serrata, Jamaica honeysuckle, Passiflora laurifolia, dwarf honeysuckle the widely spread Cornus suecica, Virgin Mary's honeysuckle the European Pulmonaria officinalis, while West Indian honeysuckle is Tecoma capensis, and is also a name applied to Desmodium.

The wood of the fly honeysuckle is extremely hard, and the clear portions between the joints of the stems, when their pith has been removed, were stated by Linnaeus to be utilized in Sweden for making tobacco-pipes. The wood is also employed to make teeth for rakes; and, like that of L. tatarica, it is a favourite material for walking-sticks.

Honeysuckles (Lonicera) flourish in any ordinary garden soil, but are

usually sadly neglected in regard to pruning. This should be done about March, cutting out some of the old wood, and shortening back some of the younger growths of the pre- ceding year. (J. Ws.)

HONFLEUR, a seaport of north-western France, in the department of Calvados, 57 m. N.E. of Caen by rail. Pop. (1906) 8735. The town is situated at the foot of a semicircle of hills, on the south shore of the Seine estuary, opposite Havre, with which it communicates by steamboat. Honfleur, with its dark narrow lanes and old houses, has the typical aspect of an old- fashioned seaport. The most noteworthy of its buildings is the church of St Catherine, constructed entirely of timber work, with the exception of the facade added in the 18th century, and consisting of two parallel naves, of which the more ancient is supposed to date from the end of the 15th century. Within the church are several antique statues and a painting by J. Jordaens — " Jesus in the Garden of Gethsemane." The church tower stands on the other side of a street. St Leonard's dates from the 17th century, with the exception of its fine ogival portal and rose-window belonging to the 16th, and its octagonal tower erected in the 18th. The ruins of a 16th-century castle known as the Lieutenance and several houses of the same period are also of antiquarian interest. The hotel de ville contains a library and a museum. On the rising ground above the town is the chapel of N6tre-Dame-de-Grace, a shrine much resorted to by pilgrim sailors, which is said to have been founded in 1034 by Robert the Magnificent of Normandy and rebuilt in 1606. The town has a tribunal and a chamber of commerce and a communal college. The port, which is protected from the west winds by the height known as the Cote de Grace, consists of the tidal harbour and four floating basins — The West basin, dating from the 17th century, and the Centre, East and Carnot basins. A reservoir affords the means of sluicing the channel and supplying the basins. The surface available for vessels is about 27 acres. Numerous fishing and coasting vessels frequent the harbour. In 1907 there entered 375 vessels, of 133,872 tons, more than half this tonnage being British. The exports go mainly to England and include poultry, butter, eggs, cheese, chocolate, vegetables, fruit, seeds and purple ore. There is regular com-munication by steamer with Southampton. Timber from Scandinavia, English coal and artificial manures form the bulk of the imports. There are important saw-mills, as well as shipbuilding yards, manufactories of chemical manures and iron foundries.

Honfleur dates from the nth century arid is thus four or five hundred years older than its rival Havre, by which it was supplanted during the 18th century. During the Hundred Years' War it was frequently taken and re-taken, the last occupa- tion by the English ending in 1440. In 1562 the Protestant forces got possession of it only after a regular siege of the suburb of St Leonard; and though Henry IV. effected its capture in 1590 he had

again to invest it in 1594 after all the rest of Normandy had submitted to his arms. In the earlier years of the 17 th century Honfleur colonists founded Quebec, and Hon- fleur traders established factories in Java and Sumatra and a fishing establishment in Newfoundland.

HONG-KONG (properly Hiang-Kiang, the place of "sweet lagoons "), an important British island-possession, situated off the south-east coast of China, opposite the province of Kwang-tung, on the east side of the estuary of the Si-kiang, 38 m. E. of Macao and 75 S.E. of Canton, between 22 9′ and 22 1′ N, and 114 5′ and 114 18′ E. It is one of a small cluster named by the Portuguese " Ladrones " or Thieves, on account of the notorious habits of their old inhabitants. Extremely irregular in outline, it has an area of 29 sq. m., measuring 105 m. in extreme length from N.E. to S.W., and varying in breadth from 2 to s m. A good military road about 22 m. long encircles the island. From the mainland it is separated by a narrow channel, which at Hong-Kong roads, between Victoria, the island capital, and Kowloon Point, is about 1 m. broad, and which narrows at Ly-ee-mun Pass to little over a J m. The southern coast in particular is deeply indented; and there two bold peninsulas, extending for several miles into the sea, form two capacious natural harbours, namely, Deep Water Bay, with the village of Stanley to the east, and Tytam Bay, which has a safe, well-protected entrance showing a depth of

10 to 1 6 fathoms. An in-shore island on the west coast, called Aberdeen, or Taplishan, affords protection to the Shekpywan or Aberdeen harbour, an inlet provided with a granite graving dock, the caisson gate of which is 60 ft. wide, and the Hope dock, opened in 1867, with a length of 425 ft. and a depth of 24 ft. Opposite the same part of the coast, but nearly 2 m. distant, rises the largest of the surrounding islands, Lamma, whose conspicuous peak, Mount Stenhouse, attains a height of 1 140 ft. and is a landmark for local navigation. On the northern shore of Hong-Kong there is a patent slip at East or Matheson Point, which is serviceable during the north-east monsoon, when sailing vessels frequently approach Victoria through the Ly-ee-mun Pass. The ordinary course for such vessels is from the westward, on which side they are sheltered by Green Island and Kellett Bank. There is good anchorage throughout the entire channel separating the island from the mainland, except in the Ly-ee-mun Pass, where the water is deep; the best anchorage is ih ■ Hong-Kong roads, in front of Victoria, where, over good holding ground, the depth is 5 to 9 fathoms. The inner anchorage of Victoria Bay, about \ m. off shore and out of the strength of the tide, is 6 to 7 fathoms. Victoria, the seat of government and

of trade, is the chief centre of population, but a tract on the mainland is covered with public buildings and villa residences. Practically an outlying suburb of Victoria, Kowloon or (Nine Dragons) is free from the extreme heat of the capital, being exposed to the south-west monsoon. Numerous villas have also been erected along the beautiful western coast of the island, while Stanley, in the south, is favoured as a watering-place.

The island is mountainous throughout, the low granite ridges, parted by bleak, tortuous valleys, leaving in some places a narrow strip of level coast-land, and in others overhanging the sea in lofty precipices. From the sea, and especially from the magnificent harbour which faces the capital, the general aspect of Hong-Kong is one of singular beauty. Inland the prospect is wild, dreary and monotonous. The hills have a painfully bare appearance from the want of trees. The streams, which are plentiful, are traced through the uplands and glens by a line of straggling brushwood and rank herbage. Nowhere is the eye relieved by the evidences of cultivation or fertility. The hills, which are mainly composed of granite, serpentine and syenite, rise in irregular masses to considerable heights, the loftiest point, Victoria Peak, reaching an altitude of 1825 ft. The Peak lies immediately to the south-west of the capital, in the extreme north-west corner of the island, and is used as a station for signalling the approach of vessels. Patches of land, chiefly around the coast, have been laid under rice, sweet potatoes and yams, but the island is hardly able to raise a home-supply of vegetables. The mango, lichen, pear and orange are indigenous, and several fruits and esculents have been introduced. One of the chief products is building-stone, which is quarried by the Chinese. The animals are few, comprising a land tortoise, the armadillo, a species of boa, several poisonous snakes and some woodcock. The public works suffer from the ravages of white ants. Water everywhere abounds, and is supplied to the shipping by means of tanks.

Under the Peking Treaty of i860 the peninsula of Kowloon (about 5 m. in area) was added to Hong-Kong. The popula- tion is about 27,000. There are several docks and ware- houses, and manufactures are being developed. territory. Granite is quarried in the peninsula. An agreement was entered into in 1898 whereby China leased to (ˆreat Britain for ninety-nine years the territory behind Kowloon peninsula up to a line drawn from Mirs Bay to Deep Bay and the adjoining islands, including Lantao. The new district, which extends to 376 sq. m. in area, is mountainous, with extensive cultivated valleys of great fertility, and the coast- line is deeply indented by bays. The alluvial soil of the valleys yields two crops of rice in the year. Sugar-cane, indigo, hemp, peanuts, potatoes of different varieties, yam, taro, beans, sesamum, pumpkins and vegetables of all kinds are also grown. The mineral resources are as yet unknown. The population

Victoria.

is estimated at about 100,000. It consists of Puntis (or Cantonese), Hakkas (" strangers ") and Tankas. The Puntis are agricultural and inhabit the valleys, and they make excellent traders. The Hakkas are a hardy and frugal race, belonging mainly to the hill districts. The Tankas are the boat people or floating population. In the government of the new territory the existing organization is as far as possible utilized.

Hong-Kong or Victoria harbour constantly presents an animated appearance, as many as 240 guns having been fired as salutes in a single day. Its approaches are strongly fortified. The steaming distance from Singapore is 1520 m. Victoria, the capital, often spoken of as Hong-Kong (population over 166,000, of whom about 6000 are European or American), stretches for about 4 m. along the north coast. Its breadth varies from | m. in the central portions to 200 or 300 yds. in the eastern and western portions. The town is built in three layers. The " Praya " or esplanade, 50 ft. wide, is given up to shipping. The Praya reclamation scheme provided for the extension of the land frontage of 250 ft. and a depth of 20 ft. at all states of the tide. A further extension of the naval dockyard was begun in 1902, and a new commercial pier was opened in 1900. The main commercial street runs inland parallel with the Praya. Beyond the commercial portion, on each side, lie the Chinese quarters, wherein there is a closely packed population. In 1888, 1600 people were living in the space of a single acre, and over 100,000 were believed to be living within an area not exceeding J m.; and the over crowding does not tend to diminish, for in one district, in 1900, it was estimated that there were at the rate of 640,000 persons on the sq. m. The average, however, for the whole of the city is 126 per acre, or 80,640 per sq. m. The second stratum of the town lies ten minutes' climb up the side of the island. Government house and other public buildings are in this quarter. There abound " beautifully laid out gardens, public and private, and solidly constructed roads, some of them bordered with bamboos and other delicately-fronded trees, and fringed with the luxuriant growth of semi-tropical vegeta- tion." Finally, the third layer, known as "the Peak, "and reached by a cable tramway, is dotted over with private houses and bungalows, the summer health resort of those who can afford them; here a new residence for the governor was begun in 1900. Excellent water is supplied to the town from the Pokfolum and Tytam reservoirs, the former containing 68 million gallons, the latter 390 millions.

Climate. — The temperature has a yearly range of from 45° to 99 , but it occasionally falls below 40°, and ice occurs on the Peak. In January 1893 ice was found at sea-level. The wet season begins in May, after showers in March and April, and continues until the beginning of August. During this

period rain falls almost without intermission. The rainfall varies greatly, but the mean is about 90 in. In 1898 only 57-025 in. fell, while in 1897 there were 100-03 in.; in 1899, 72-7 in. and in 1900, 73-7 in. The damp is extremely penetrating. During the dry season the climate is healthy, but dysentery and intermittent fever are not uncommon. Bilious remittent fever occurs in the summer months, and smallpox prevails from November to March. The annual death-rate per 1000 for the whole population in 1902 was 21-70.

Population, Sfc. — The following table shows the increase ot population : —

Year.

Europe and

American

Civil.

Chinese Civil.

Total (including

Military and Naval

Establishments and

Indians, &c).

1881 1891 1901 1906

3.040

4.195

3,86o

12,174

148,850 208,383

274,543 306,130

160,402 221,441 283,978 326,961

Education is provided by a few government schools and by a large number

receiving grants-in-aid. The foundation-stone of Hong- Kong University was laid in March 1910, the buildings being the gift of Sir Hormusjee Mody, a colonial broker. The Queen's College provides secondary education forbo'ys. There are several hospitals, one of which is a government institution. The Hong-Kong savings bank has deposits amounting to about Si, 100, 000. There is a police force composed of Europeans, Indian Sikhs and Chinese; and a strong military garrison.

Industries. — Beyond the cultivation of vegetable gardens there is practically no agricultural industry in the colony. But although only 400 acres are cultivated on Hong-Kong island, and the same number of acres in Kowloon, there are 90,000 acres under cultiva- tion in the new territory, of which over 7000 acres were in 1900 planted with sugar-cane. Granite quarries are worked. The chief industries are sugar-refining, the manufacture of cement, paper, bamboo and rattan ware, carving in wood and ivory, working in copper and iron, gold-beating and the production of gold, silver and sandal-wood ware, furniture making, umbrella and j'nricksha making, and industries connected with kerosene oil and matches. The manufacture of cotton has been introduced. Ship and boat building, together with subsidiary industries, such as rope and sail making, appear less subject to periods of depression than other industries.

Trade. — Hong-Kong being a free port, there are no official figures as to the amount of trade ; but the value of the exports and imports is estimated as about £ 50,000,000 in the year. Among the principal goods dealt with are tea, silk, opium, sugar, flax, salt, earthenware, oil, amber, cotton and cotton goods, sandal-wood, ivory, betel, vegetables, live stock and granite. There is an extensive Chinese passenger trade. The following are the figures of ships cleared and entered: —

Year.

Tonnage.

British.

1880 1890 1898 1902

8,359,994 13,676,293 17,265,780 19,709,451

3,758,i6o

6,994,919 8,705,648 8,945.976

The Chinese ships rank next to British ships in the amount of trade. German and Japanese ships follow next.

Finance. — The revenue and expenditure are given below: —

Year.

Revenue.

Expenditure.

1880 1890 1898 1902

81,069,948 1,995,220 2,918,159 4,901,073

$ 948,014 1,915,350 2,841,805

4,752,444

The main sources of revenue are licences, rent of government property, the post-office and land sales. The light dues were reduced in 1898 from 2\ cents to 1 cent per ton. There is a public debt of about £340,000, borrowed for public works, which is being paid off by a sinking fund. The only legal tender is the Mexican dollar, and the British and Hong-Kong dollar, or other silver dollars of equivalent value duly authorized by the governor. There are small silver and copper coins, which are legal tenders for amounts not exceeding two dollars and one dollar respectively. There is also a large paper currency in the form of notes issued by the Chartered Bank of India, Australia and China, the Hong-Kong and Shanghai Banking Corporation and the National Bank of China, Limited. The foundation of new law courts was laid in 1900. Administration. — Formerly an integral part of China, the island of Hong-Kong was first ceded to Great Britain in 1841, and the cession was confirmed by the treaty of Nanking in 1842, the charter bearing the date 5th of April 1843. The colony is administered by a governor, executive council and legislative council. The executive council consists of the holders of certain offices and of such other members as the crown may nominate. In 1890 there were nine members. The legislative council consists of the same officials and of six unofficial members. Of these, three are appointed by the governor (of whom one must be, and two at present are, members of the Chinese community); one is elected from the chamber of commerce, and one from the justices of the peace.

Authorities. — SirG. W. des Vceux, Report on Blue-booh of 1888; A Handbook to Hong-Kong (Hong-Kong, 1893); The China Sea Directory

(vol. iii., 3rd ed., 1894); Henry Norman, The Peoples and Politics of the Far East (London, 1895); Sir E. Hertslet, Treaties between Great Britain and China and China and Foreign Powers (London, 1896); A. R. Colquhoun, China in Transformation (London, 1898); Colonial Possessions Report, No. 84;. and other Colonial Annual Reports.

HONITON, a market town and municipal borough in the Honiton parliamentary division of Devonshire, England, pleasantly situated on rising ground on the left bank of the Otter, i6| m. E.N.E. of Exeter by the London & South-Western railway. Pop. (1901) 3271. The town consists of one wide street, down which a stream of water runs, extending for about 1 m., and crossed at right angles by a lesser street. The restored church of St Michael, formerly a parish church, but standing on a hill about 5 m. from the town, was built by Courtenay, bishop of Exeter, about 1482. It retains a curiously carved screen, and the black marble tomb of Queen Elizabeth's physician,

Marwood, who attained the age of 105. Allhallows Grammar School, founded in 1614, was enlarged in 1893; St Margaret's hospital, founded as a lazar-house in the 14th century, is con- verted into almshouses. Honiton is famous for its lace industry, established by refugees from Flanders under Queen Elizabeth. The delicate fabric made by hand on the pillow was long in demand; its sale was, however, greatly diminished by the competition of cheaper machine-made goods, and a school of lace-making was opened to promote its recovery. The town possesses breweries, tanneries, malthouses, flour-mills, saw-mills, brick and tile works, potteries and an iron foundry; its trade in butter is considerable. It is governed by a mayor, 6 aldermen and 18 councillors.. Area, 3134 acres.

Honiton .{Honetona, Huneton) is situated on the British Icknield Street, and was probably the site of an early settlement, but it does not appear in history before the Domesday Survey, when it was a considerable manor, held by Drew (Drogo) under the count of Mortain, who had succeeded Elmer the Saxon, with a subject population of 33, a flock of 80 sheep, a mill and 2 salt- workers. The borough was founded before 121 7 by William de Vernon, earl of Devon, whose ancestor Richard de Redvers had received the manor from Henry I. In the 14th century it passed to the Courtenays, and in 1698 Sir William Courtenay was confirmed in the right of holding court leet, view of frank- pledge and the nomination of a portreeve, these privileges having been surrendered to James II. The borough was repre- sented by two members in parliament in 1300 and 1311, and then not again till 1640, from which date it returned two members until disfranchised by the act of 1868, the returning officer being the portreeve, who was also the chief magistrate of the borough until its incorporation by charter of 1846. In 1221 Falkes de Breaute, then

custodian of the borough, rendered a palfrey for holding a three days' fair'at the feast of All Saints, transferred in 1247 to the feast of St Margaret, and still held under that grant. A great tfnarket for corn and other produce is still held on Saturday by prescription. The wool manufacture flourished at Honiton in the reign of Henry VII., and it is said to have been the first town at which serges were made, but the industry entirely declined during the 19th century. The lace manufacture was introduced by Flemish refugees, and was flourishing in the reign of Charles I.

See Victoria County History, Devonshire ; A. Farquharson, History of Honiton (Exeter, 1868).

HONNEF, a town and climatic health resort of Germany, beautifully situated on the right bank of the Rhine, at the foot of the Siebengebirˆ, 8 m. above Bonn by the railway Cologne- Konigswinter-Horchheim. Pop. (1905) 6183. It has an Evan- gelical and a Roman Catholic church, a sanatorium for con- sumptives, and does a considerable trade in wine. The town is surrounded by vineyards and orchards, and has annually a large number of visitors.' A mineral spring called the Drachenquelle is used both for drinking and bathing.

HONOLULU, a city, port of entry, and the capital of Hawaii, situated in the " city and county of Honolulu," oh the S. coast of the island of Oahu, at the mouth of Nuuanu Valley, 2100 m. S.W. of San Francisco. Pop. (1890) 22,907; (1900) 39,306, of whom 24,746 were males, 14,560 were females; about 10,000 were Hawaiians, 15,000 Asiatics, and 5000 Portuguese; (1910) 52,183. Honolulu is served by the Oahu railway, by electric lines to the principal suburbs, and by steamship lines to San Francisco, Seattle, Vancouver, Manila, Salina Cruz (Mexico), Victoria, Sydney, and Chinese and Japanese ports. The business section and the older residence quarters occupy low ground, but many of the newer residences are built on the sides of neighbouring hills and mountains, of which there are several from 500 to 2000 ft. in height. The Punch Bowl (behind the city), a hill rising about 500 ft. above the sea, Diamond Head, a crater about 760 ft. in height, 4 m. to the S.E., and the Nuuanu Pali, a lofty and picturesque precipice 6 m. up the valley, are especially known for their commanding views. In front of the city is the small harbour, well protected from all winds except those from the S.; in and after 1892 the Hawaiian government*

deepened its entrance from 21 ft. to 30 ft. Six miles to the W. is the much more spacious Pearl Harbor (a U. S. Naval Station), the bar at the entrance of which was removed (1903) by the U.S. government. Pearl Harbor and the harbour of Honolulu are the only safe ports in the archipelago. The streets of Honolulu are wide, and are macadamized with crushed or broken lava. The business houses are mostly of brick or stone, and range from two to six storeys in height. About most of the residences there are many tropical trees, flowering shrubs and plants. Wood is the most common material of which the residences are built; a large portion of these residences are one-storey cottages; broad verandahs are common; and of the more pretentious residences the lanai, a semi-outdoor drawing-room with con- servatories adjoining, is a notable feature. Throughout the city there is a marked absence of poverty and squalor. There are good hotels in the city and its suburbs. The government buildings are extensive and have a pleasing appearance; that of the executive, in a beautiful park, was formerly the royal palace and still contains many relics of royalty. Facing the judiciary building is an heroic statue in bronze of Kamehameha the Great. About 2 m. W. of the business centre of the city is the Bernice Pauahi Bishop Museum, a fine stone building on a com- manding site, and containing a large collection of Hawaiian and Polynesian relics and curios, especially Hawaiian feather-work, and notable collections of fish and of Hawaiian land shells and birds. Four miles S.E. of the business centre, at the foot of Diamond Head, is Waikiki sea-beach, noted for its surf-riding, boating and bathing, and Kapiolani Park, a pleasure resort, near which is a famous aquarium of tropical fishes. Honolulu has other parks, a fine Botanical Garden, created by the Bureau of Agriculture, several public squares, several hospitals, a maternity home, the Lunalilo Home for aged Hawaiians, an asylum for the insane, several schools of high rank both public and private — notably Oahu College on the E. edge of the city, first founded as a school for the children of missionaries in 1841 ; the Honolulu High School, founded in 1833 as the Oahu Charity School, to teach English to the half whites; the Royal School, which was founded in 1840 for the sons of chiefs; and the Normal School, housed in what was in 1906 the most expensive building on the island of Oahu — a library containing about 14,000 volumes and the collections of the Hawaiian Historical Society, a number of benevolent, literary, social and political societies, and an art league, and is the see of both an Anglican and a Roman Catholic bishop. In 1907 the Pacific Scientific Institution for the advancement of scientific knowledge of theJPacific, its islands and their people, was established here. Amoeg the clubs of the city are the Pacific Club, founded in 1853 as the British Club; the Scottish Thistle Club (1891), of which Robert Louis Stevenson was a member; the Hawaii Yacht Club, and the Polo, Country and University Clubs. There are various journals and periodi- cals, five languages being represented. The chief industries are the

manufacture of machinery (especially machinery for sugar- refineries) and carriages, rice-milling and ship-building. Hono- lulu's total exports for the fiscal year 1908 were valued at $42,238,455, and its imports at $19,985,724. There is a privately owned electric street car service in the city. The water-works and electric-lighting plant are owned and operated by the Territorial government, and to the plentiful water-supply is partly due the luxuriant vegetation of the city. Honolulu's safe harbour, discovered in T794, made it a place of resort for vessels (especially whalers) and traders from the beginning of the 19th century. Kamehameha I. (the Great) lived here from 1803 until 181 1. In 1816 was built a fort which stood until 1857. In 1820 the city became the principal residence of the sovereign and soon afterwards of foreign consuls, and thus practically the seat of government. In 1907 an act was passed by which the former county of Oahu, including the island of Oahu and the small islands adjacent, was made a municipal corporation under the name of the " city and county of Honolulu "; this act came into effect on the 1st of January 1909.

HONORIUS, the name of four popes and one antipope (Honorius II.; i.e. 2 below).

1. Honorius L, pope from 625 to 638, was of a noble Roman family, his father Petronius having been consul. He was very active in carrying on the work of Gregory the Great, especially in England; Bede (Hist. Eccl. ii. 17) gives a letter of his to King Edwin of Northumbria, in which he admonishes him diligently to study Gregory's writings; and it was at Edwin's request that Honorius conferred the pallium on the bishops of Canterbury and York (ib. ii. 18). He also admonished the Irish for not following the custom of the Catholic Church in the celebration of Easter (ib. ii. 19), and commissioned Birinus to preach Christianity in Wessex (ib. iii. 7). It is, however, in connexion with the Monothelite heresy that Honorius is most remembered, his attitude in this matter having acquired fresh importance during the controversy raised by the promulgation of the dogma of papal infallibility in 1870. In his efforts to consolidate the papal power in Italy, Honorius had been hampered by the schism of " the three chapters " in Istria and Venetia, a schism that was ended by the deposition in 628 of the schismatic patriarch Fortunatus of Aquileia-Grado and the elevation of a Roman sub-deacon to the patriarchate. It is suggested that help rendered to him in this matter by the emperor Heraclius, or by the Greek exarch, may have inclined the pope to take the emperor's side in the Monothelite controversy, which broke out shortly afterwards in consequence of the formula proposed by the emperor with a view to reconciling the Monophysites and the Catholics. However that may be, he joined the patriarchs of Constantinople and Alexandria in supporting the doctrine of " one will " in Christ, and expounded this view forcibly, if somewhat

obscurely, in two letters to the patriarch Sergius (Epist. 4 and 5 in Migne, Patrologia. Ser. Lat. lxxx. 470, 474). For this he was, more than forty years after his death (October 638), anathematized by name along with the Monothelite heretics by the council of Constantinople (First Trullan) in 681; and this condemnation was subsequently confirmed by more than one pope, particularly by Leo II. See Hefele, Die Irrlehre des Honorius u. die vaticanische Lehre der Unfehlbarkeit (i87r), who, however, modified his view in his Conciliengeschichte (1877). Honorius I. was succeeded by Severinus.

See the articles by R. Zopffel and G. Kriiger in Herzog-Hauck, Realencyklopadie (ed. 1900), and by T. Grisar in Wetzer and Welte's Kirchenlexikon (Freiburg, 1889). In addition to the bibliographies there given see also U. Chevalier, Repertoire des sources hist., &c, Bio-bibliographie, s. " Honorius I. " (Paris, 1905). (W. A. P.)

2. Honorius II. (d. 1072), antipope, was the name taken by Peter Cadalus, who was born at Verona and became bishop of Parma in 1046. After the death of Pope Nicholas II. in July 1061 he was chosen pope by some German and Lombard bishops at Basel in opposition to Alexander II., who had been elected by the party led by Hildebrand, afterwards Pope Gregory VII. Taking the name of Honorius II., Cadalus was thus the repre- sentative of those who were opposed to reforms in the Church. Early in 1062 he advanced towards Rome, and though his supporters defeated the forces of his rival outside the city, he soon returned to Parma to await the decision of the advisers of the young German king, Henry IV., whose mother Agnes had supported his election. About this time, however, Agnes was deprived of her power, and the chief authority in Germany passed to Anno, archbishop of Cologne, who was hostile to Cadalus. Under these circumstances the antipope again marched towards Rome in 1063 and entered the city, but was soon forced to take refuge in the castle of St Angelo. The ensuing war between the rival popes lasted for about a year, and then Cadalus left Rome as a fugitive. Refusing to attend a council held at Mantua in May 1064, he was deposed, and he died in 1072, without having abandoned his claim to the papal chair.

See the article on Honorius II. in Hauck's Realencyklopadie, Band viii. (Leipzig, 1900). (A. W. H.)*

3. Honorius II. (Lamberto Scannabecchi), pope from the 15th of December n 24 to the 13th of February 1130, a native of Fagnano near Imola, of considerable learning and great religious zeal, successively archdeacon at Bologna, cardinal- priest of Sta Prassede under Urban II., cardinal-bishop of Ostia and Velletri under Paschal II., shared the exile of Gelasius II.

in France, and helped Calixtus II. to conclude the Concordat of Worms (112 2), which settled the investiture contest. He owed his election in large measure to force employed by the Frangipani, but was consecrated with general consent on the 21st of December n 24. By means of a close alliance with that powerful family, he was enabled to maintain peace at Rome, and the death of Emperor Henry V. (11 25) further strengthened the papal position. He recognized the Saxon Lothair III. as king of the Romans and later as emperor, and excommunicated his rival. Conrad of Hohenstaufen. He sanctioned the Prae- monstratensian order and that of the Knights Templars. He excommunicated Count William of Normandy for marriage in prohibited degree; brought to an end, through the influence of Bernard of Clairvaux, the struggle with Louis VI. of France; and arranged with Henry I. for the reception of papal legates in England. He laid claim as feudal overlord to the Norman possessions in southern Italy (July n 27), and excommunicated the claimant, Duke Roger of Sicily, but was unable to prevent the foundation of the Neapolitan monarchy, for Duke Roger defeated the papal army and forced recognition in August 1 1 28. Honorius appealed to Lothair for assistance, but died before it arrived. His successor was Innocent II.

The chief sources for the life of Honorius II. are his " Epistolae et Privilegia," in J. P. Migne, Patrol. Lat. vol. 166, and the Vitae of Cardinals Pandulf and Boso in J. M. Watterich, Pontif. Roman. vitae, vol. 2 (Leipzig, 1862); also " Codice diplomatico e bollario di Oncrio II." in Fr. Liverani opere, vol. 4 (Macerata, 1859), and JafFe-Wattenbach, Regesta pontif. Roman. (1885-1888).

See J. Langen, Geschichte der romischen Kirche von Gregor VII. bis Innocenz III. (Bonn, 1893); F. Gregorovius, Rome in the Middle Ages, vol. 4, trans, by Mrs G. W. Hamilton (London, 1896); H. H. Milman, Latin Christianity, vol. 4 (London, 1899); Fr. Liverani, " Lamberto da Fiagnano " in Opere, vol. 3 (Macerata, 1859); A. Wagner, Die unteritalischen Normannen und das papstlum 1086- 11 SO (Breslau, 1885); E. Bernheim, Zur Geschichte des Wormser Concordats (Gottingen, 1878); Volkmar, " Das Verhaltnis Lothars III. zur Investiturfrage," in Forschungen zur deutschen Geschichte, vol. 26. (C. H. Ha.)

4. Honorius III. (Cencio Savelli), pope from the 18th of July 1216 to the 18th of March 1227, a highly-educated and pious Roman, successively canon of Sta Maria Maggiore, cardinal- deacon of Sta Lucia in Silice, vice-chancellor, chamberlain and cardinal-priest of Sti Giovanni e Paolo, was

the successor of Innocent III. He made peace with Frederick II., in accordance with which the emperor was crowned with his wife Constance in St Peter's on the 22nd of November 1220, and swore to accord full liberty to the church and to undertake a crusade. Honorius was eager to carry out the decrees of the Lateran Council of 121 5 against the Albigenses and to further the crusade proclaimed by his predecessor. He crowned Peter of Courtenay emperor of Byzantium in April 121 7; espoused the cause of the young Henry III. of England against the barons; accepted the Isle of Man as a perpetual fief; arbitrated differences between Philip II. of France and James of Aragon; and made special ecclesiastical regulations for the Scandinavian countries. He sanctioned the Dominican order (22nd of November 1216), making St Dominic; papal major-domo in 1218; approved the Franciscan order by bull of the 29th of November 1223; and authorized many of the tertiary orders. He maintained, on the whole, a tranquil rule at Rome; but Frederick II. 's refusal to interrupt his reforms in Sicily in order to go on the crusade gave the pope much trouble. Honorius died in 1227, before the emperor had fulfilled his oath, and was succeeded by Gregory IX.

Honorius III. left many writings which have been collected and published by Abb6 Horoy in the Medii aevi bibliotheca patristica, vols, i.-ii. (Paris, 1879-1883). Among them are five books of decretals, compiled about 1226; a continuation of the Liber Ponti- fical is; a life of Gregory VII.; a coronation form; and a large number of sermons. His most important work is the Liber censuum Romanae ecclesiae, written in 1192 and containing a record of the income of the Roman Church and of its relations with secular authorities. The last named is admirably edited by P. Fabre in Bibliotheque des ecoles francaises d'Athenes et de Rome (Paris, 1892). The letters of Honorius are in F. Liverani, Spicilegium Liberianum (1863). There are good Regesta in Latin and Italian, edited by P. Pressutti (Rome, 1888, &c).

*See J. Clausen, Papst Honorius III. (1895); P. T. Masetti, / Pontefici Onorio III. ed Innocenzo IV. a fronte dell' Imperatore Federico II. nel secolo XIII. (1884); F. Gregorovius, Rome in the Middle Ages, vol. 5, trans, by Mrs G. W. Hamilton (London, 1900- 1902); K. J. von Hefele, Conciliengeschichte, vol. 5, 2nd ed. ; H. H. Milman, Latin Christianity, vol. 5 (London, 1899); T. Frantz, Der grosse Kampf zwischen Kaisertum u. Papstlum zurZeit des Hohenstaufen Friednch II. (Berlin, 1903) ; W. Norden, Das Papsttum u. Byzanz (Berlin, 190*3); M. Tangl, Die pdpstlichen Kanzleiordungen von 1200-1500 (Innsbruck, 1894); Caillemer, Le Pape Honorius III. et le droit civil (Lyons, 1881) ; F. Vernet, Etudes sur les sermons d' Honorius III. (Lyons, 1888). There is an excellent article, with exhaustive bibliography, by H. Schulz in Hauck's Realencyklopadie, 3rd edition. (C. H. Ha.)*

5. Honorius IV. (Jacopo Savelli), pope from the 2nd of April 1285 to the 3rd of April 1287, a member of a prominent Roman family and grand-nephew of Honorius III., had studied at the university of Paris, been made cardinal-deacon of Sta Maria in Cosmedin, and succeeded Martin IV. Though aged and so crippled that he could not stand alone he displayed remarkable energy as pope. He maintained peace in the states of the Church and friendly relations with Rudolph of Habsburg, and his policy in the Sicilian question was more liberal than that of his predecessor. He showed special favours to the mendicant orders and formally sanctioned the Carmelites and Augustinian Eremites. He was the first pope to employ the great banking houses in northern Italy for the collection of papal dues. He died at Rome and was succeeded by Nicholas IV.

See M. Bouquet, Recueil des historiens des Gaules et de la France, new ed., vols. 20-22 (Paris, 1894), for the chief sources; A. Potthast, Regesta pontif. Roman, vol. 2 (Berlin, 1875); M. Prou, " Les registres d'Honorius IV. " in Bibliotheque des ecoles francaises d Athenes et de Rome (Paris, 1888) ; B. Pawlicki, Papst Honorius IV. (Miinster, 1896); F. Gregorovius, Rome in the Middle Ages, vol. 5, trans, by Mrs G. W. Hamilton (London, 1900-1902). (C. H. Ha.)

HONORIUS, FLAVIUS (384-423), son of Theodosius I., ascended the throne as " emperor of the West " in 395. The history of the first thirteen years of the reign of Honorius is inseparably connected with the name of Stilicho (q.v.), his guardian and father-in-law. During this period the revolt of the African prince Gildo was suppressed (398); Italy was successfully defended against Alaric, who was defeated at Pollentia (402) and Verona (403); and the barbarian hordes under the Goth Radagaisus were destroyed (406). After the downfall and murder of Stilicho (408), the result of palace intrigues, the emperor was under the control of incompetent favourites. In the same year Rome was besieged, and in 410, for the second time in its history, taken and sacked by Alaric, who for a short time set up the city prefect Attalus as a rival emperor, but soon deposed him as incapable. Alaric died in the same year, and in 412 Honorius concluded peace with his brother-in-law and successor, Ataulphus (Adolphus), who married the emperor's sister Placidia and removed with his troops to southern Gaul. A number of usurpers laid claim to the throne, the most important of whom was Constantine. In 409 Britain and Armorica declared their independence, which was confirmed by Honorius himself, and were thus practically lost to the empire. Honorius was one of the feeblest emperors who ever occupied the throne, and the dismemberment of the West was only tempor- arily averted by the efforts of Stilicho, and, later, of Constantius, a capable general who overthrew the usurpers and was rewarded with a share in the government. It was only as a supporter of the orthodox church and persecutor of the heathen that Honorius displayed

any energy. In 399 the exercise of the pagan cult was prohibited, and the revenues of the temple, which were to be appropriated for the use of the public or pulled down, were confiscated to defray the expenses of the army. Honorius was equally severe on heretics, such as the Donatists and Manichaeans. He is also to be credited with the abolition of the gladiatorial shows in 404 (although there is said to be evidence of their existence later), a reduction of the taxes, improvements in criminal law, and the reorganization of the defensores civitatum, municipal officers whose duty it was i.4> defend the rights of the people and set forth their grievances. Honorius at first established his court at Milan, but, on the*

report of the invasion of Italy, fled to Ravenna, where he resided till his death on the 27th of August 423.

See Gibbon, Decline and Fall, chs. 28-33 ; J- B. Bury, Later Roman Empire, i. chs. 1-5, ii. chs. 4, 6; E. A. Freeman, " Tyrants of Britain, Gaul and Spain" in Eng. Hist. Review (January 1886); T. Hodgkin, Italy and her Invaders (Oxford, 1892), i. chs. 13, 15-18.

HONOUR (Lat. honos or Junior, honoris; in English the word was spelled with or without the u indifferently until the 17th century, but during the 18th century it became fashion- able to spell the word "honor"; Johnson's and Webster's Dictionaries stereotyped the English and American spellings respectively), a term which may be defined as respect, esteem or deference paid to, or received by, a person in consideration of his character, worth or position; also the state or condition of the person exciting the feeling or expression of such esteem; particularly a high personal character coupled with conduct in accordance with or controlled by a nice sense of what is right and true and due to the position so held. Further, the word is commonly used of the dignities, distinctions or titles, granted as a mark of such esteem or as a reward for services or merit, and quite generally of the credit or renown conferred by a person or thing on the country, town or particular society to which he or it belongs. The standard of conduct may be laid down not only by a scrupulous sense of what is due to lofty personal character but also by the conventional usages of society, hence it is that debts which cannot be legally enforced, such as gambling debts, are called " debts of honour." Similarly in the middle ages and later, courts, known as " courts of honour," sat to decide questions such as precedence, disputes as to coat armour &c. (see Chivalry) ; such courts, chiefly military, are found in countries where duelling has not fallen into desuetude (see Duel). In the British House of Lords, when the peers sit to

try another peer on a criminal charge or at an impeachment, on the question being put whether the accused be guilty or not, each peer, rising in his place in turn, lays his right hand on his breast and returns his verdict " upon my honour." As a title of address, " his 1 honour " or " your honour " is applied in the United States of America to all judges, in the United Kingdom only to county court judges; In university or other examina- tions, those who have won particular distinction, or have under- gone with success an examination of a standard higher than that required for a " pass " degree, are said to have passed " with honours," or an " honours " examination or to have taken an " honours degree." In many games of cards the ace, king, queen and knave of trumps are the " honours. "

Funeral or military honours are paid to a dead officer or soldier. The usual features of such a burial are as follows: the coffin is carried on a gun-carriage and attended by troops; it fe covered by the national flag, on which rests the soldier's head-dress, sword or bayonet; if the deceased had been a mounted soldier, his charger follows with the boots reversed in the stirrups; three volleys are fired over the grave after committal, and " last post " or another call is sounded on the bugles or a roll on the drums is given.

A military force is said to be accorded " the honours of war " when, after a specially honourable defence, it has surrendered its post, and is permitted by the terms of capitulation to march out with colours flying, bands playing, bayonets fixed, &c. and retaining possession of the field artillery, horses, arms and baggage. The force remains free to act as combatants for the remainder of the war, without waiting for exchange or being considered as prisoners. Usually some point is named to which the surrendering troops must be conveyed before recommencing hostilities; thus, during the Peninsular War, at the Convention of Cintra 1808, the French army under Junot was conveyed to France by British transports before being free to rejoin the combatant troops in the Peninsula. By far the most usual case of the granting of the " honours of war " is in connexion with the surrender of a fortress. Of historic examples may be mentioned the surrender of Lille by Marshal Boufflers to Prince Eugene in 1708, that of Huningen by General Joseph Bar- bandgre (1772-1830) to the Austrians in 1815, and that of

Belfort by Colonel P. Denfert Rochereau to the Germans in

1871.

In English law the term " honour " is used of a seigniory of several manors held under one baron or lord paramount. The formation of such lordships dates back to the Anglo-Saxon period, when jurisdiction of sac and soc was frequently given in the case of a group of estates lying close together. The

system was encouraged by the Norman lords, as tending to strengthen the principles of feudal law, but the legislation of Henry II., which increased the power of the central ad- ministration, undoubtedly tended to discourage the creation of new honours. Frequently, they escheated to the crown, retaining their- corporate existence and their jurisdictions; they then either remained in the possession of the king or were regranted, diminished in extent. Although an honour contained several manors, one court day was held for all, but the various manors retained their separate organizations, having their " quasi several and distinct courts."

HONOURABLE (Fr. honorable, from Lat. honorabilis, worthy of honour), a style or title of honour common to the United Kingdom, the British colonies and the United States of America. The terms honorabilis and honorabilitas were in use in the middle ages rather as a form of politeness than as a stereotyped style; and though Gibbon assimilates the late Roman title of clarissi- mus to " honourable," as applied to the lowest of the three grades of rank in the imperial hierarchy, the analogy was good even in his day only in so far as both styles were applicable to those who belonged to the less exalted ranks of the titled classes, for the title " honourable " was not definitely confined to certain classes until later. As a formal address it is found frequently in the Paston Letters (15th century), but used loosely and interchange- able with other styles; thus John, Viscount Beaumont, is addressed alternately as " my worshipful and reverent Lord " (ii. 88, ed. 1904) and as " my right honorabull Lord " (ii. 118), while John Paston, a plain esquire, is " my right honurabyll maister." More than two centuries later Selden, in his Titles of Honor (1672), does not include "honourable" among the courtesy titles given to the children of peers. The style was, in fact, used extremely loosely till well on into the 18th century. Thus we find in the registers of Westminster Abbey records of l he burial (in 17 10) of " The Hon. George Churchill, Esq.," who was only a son of Sir Winston Churchill, and of " The Hon. Sir William Godolphin," who had only been created a baronet; in 1717 was buried "The Hon. Colonel Henry Cornwall," who was only an esquire and the sen of one ; in 1743 a rear-admiral was buried as " The Hon. Sir John Jennings, Kt."; in 1746 " The Hon. Major-General Lowther," whose father was only a Dublin merchant; and finally, in 1747, " The Hon. Lieutenant- General Guest," who is said to have begun life as an hostler. From this time onwards the style of " honourable " tended to become more narrowly applied; but the whole matter is full of obscurity and contradictions. The baronets, for instance, allege that they were usually styled " the honourable " until the end of the 18th century, and in 1835 they petitioned for the style as a prefix to their names. The Heralds' College officially reported on the petition (31st of October 1835) that the evidence did not prove the right of baronets to the style, and that its use " has been no more warranted by authority than

when the same style has been applied to Field Officers in the Army and others." They added that " the style of the Honourable is given to the Judges and to the Barons of the Exchequer with others because by the Decree of 10 James I., for settling the place and precedence " of the Baronets, the Judges and Barons of the Exchequer were declared to have place and precedence before the younger sons of Viscounts and Barons." This seems to make the style a consequence of the precedence; yet from the examples above given it is clear that it was applied, e.g. in the case of field officers, where no question of precedence arose. It is not, indeed, until 1874 that we have any evidence of an authoritative limita- tion of the title. In this year the wives of lords of appeal, life peers, were granted style and precedence as baronesses; but it was provided that their children were not " to assume or use

the prefix of Honourable, or to be entitled to the style, rank or precedence of the children of a Baron." In 1898, however, this was revoked, and it was ordained " that such children shall have and enjoy on all occasions the style and title enjoyed by the children of hereditary Barons together with the rank and precedence, &c." By these acts of the Crown the prefix of " honourable " would seem to have been restricted and stereo- typed as a definite title of honour; yet in legal documents the sons of peers are still styled merely " esquire," with the addition of " commonly called, &c." This latter fact points to the time when the prefix " honourable " was a mark of deference paid by others rather than a style assumed by right, and relics of this doubtless survive in the United Kingdom in the conventions by which an " honourable " does not use the title on his visiting card and is not announced as such.

As to the actual use and social significance of the style, the practice in the United Kingdom differs considerably from that in the colonies or in the United States. In the United Kingdom marquesses are "most honourable"; earls, viscounts and barons " right honourable," a style also borne by all privy councillors, including the lord mayor of London and lord provost of Edinburgh during office. The title of " honourable " is in the United Kingdom, except by special licence of the Crown (e.g. in the case of retired colonial or Indian officials), mainly confined to the sons and daughters of peers, and is the common style of the younger sons of earls and of the children of viscounts, barons and legal life peers. The eldest sons of dukes, marquesses and earls bear " by courtesy " their father's second title, the younger sons of dukes and marquesses having the courtesy title Lord prefixed to their Christian name; while the daughters of dukes, marquesses

and earls are styled Lady. The title of " honourable " is also given to all present or past maids of honour, and to the judges of the high court being lords justices or lords of appeal (who are " right honourable "). A county court judge is, however, " his honour." The epithet is also applied to the House of Commons as a body and to individual members during debate ("the honourable member for X."). Certain other corporate bodies have, by tradition or grant, the right to bear the style; e.g. the Honourable Irish Society, the Inns of Court (Honourable Society of the Inner Temple, &c.) and the Honourable Artillery Company ; the East India Company also had the prefix " honourable." The style may not be assumed by corporate bodies at will, as was proved in the case of the Society of Baronets, whose original style of " Honourable " Society was dropped by command.

In the British colonies the title " honourable " is given to members of the executive and legislative bodies, to judges, &c, during their term of service. It is sometimes retained by royal licence after a certain number of years' service.

In the United States of America the title is very widespread, being commonly given to any one who holds or has held any office of importance in state or nation, more particularly to members of Congress or of the state legislatures, judges, justices, and certain other judicial and executive officials. Popular amenity even sometimes extends the title to holders of quite humble government appointments, and consoles with it the defeated candidates for a post. See also the article Precedence.

HONTHEIM, JOHANN NIKOLAUS VON (1701-1790), German riistorian and theologian, was born on the 27th of January 1701 at Trier. He belonged to a noble family which had been for many generations connected with the court and diocese of the archbishop-electors, his father, Kaspar von Hontheim, being receiver-general of the archdiocese. At the age of twelve young Hontheim' was given by his maternal uncle, Hugo Friedrich von Anethan. canon of the collegiate church of St Simeon (which at that time still occupied the Roman Porta Nigra at Trier), a prebend in his church, and on the 13th of May 1713 he received the tonsure. He was educated by the Jesuits at Trier and at the universities of Trier, Louvaih and Leiden, taking his degree of doctor of laws at Trier in 1724. During the follow- ing years he travelled in various European countries, Spending some time at the German College in Rome; in 1728 he was

ordained priest and, formally admitted to the chapter of St Simeon in 1732, he became a professor at the university of Trier. In 1738 he went to Coblenz as official to the archbishop-elector. In this capacity he had plentiful opportunity of studying the effect of the interference of the Roman Curia in the internal affairs of the Empire, notably in the negotiations that

preceded the elections of the emperors Charles VII. and Francis I. in which Hontheim took part as assistant to the electoral ambassador. It appears that it was the extreme claims of the papal nuncio on these occasions and his interference in the affairs of the electoral college that first suggested to Hontheim that critical examination of the basis of the papal pretensions, the results of which he afterwards published to the world under the pseudonym of " Febronius." In 1747, broken down by overwork, he resigned his position as official and retired to St Simeon's, of which he was elected dean in the following year. In May 1 748 he was appointed by the archbishop-elector Francis George (von Schonborn) as his suffragan, being consecrated at Mainz, in February 1740, under the title of bishop of Myriophiri in partibus. The arch- bishop of Trier was practically a great secular prince, and upon Hontheim as suffragan and vicar-general fell the whole spiritual administration of the diocese; this work, in addition to that of pro-chancellor of the university, he carried on single-handed until 1778, when Jean Marie Cuohot d'Herbain was appointed his coadjutor. On the 21st of April 1779 he resigned the deanery of St Simeon's on the ground of old age. He died on the 2nd of September 1790 at his chateau at Montquentin near Orval, an estate which he had purchased. He was buried at first in St Simeon's; but the church was ruined by the French during the revolutionary wars and never restored, and in 1803 the body of Hontheim was transferred to that of St Gervasius.

As a historian Hontheim's reputation rests on his contributions to the history of Trier. He had, during the period of his activity as official at Coblenz, found time to collect a vast mass of printed and MS. material which he afterwards embodied in three works on the history of Trier. Of these the Historia Trevirensis diplomaiica et pragmatica was published in 3 vols, folio in 1750, the Prodromus hisioriae Trevirensis in 2 vols, in 1757. They give, besides a history of Trier and its constitution, a large number of documents and references to published authorities. A third work, the Hisioriae scriptorum et monnmentarum Trevirensis amplissima collectio, remains in MS. at the city library of Trier. These books, the result of an enormous labour in collation and selection in very unfavourable circumstances, entitle Hontheim to the fame of a pioneer in modern historical methods. It is, however, as " Febronius " that Hontheim is best remembered. The character and effect of his book on " the state of the Church and the lawful power of the Roman pontiff " is described else-where (see Febronianism) . The author of the book was known at Rome almost as soon as it was published; but it was not till some years afterwards (1778) that he was called on to retract. The terrors of the spiritual power were reinforced by a threat of the archbishop-elector to deprive not only him but all his relations of their offices, and Hontheim, after much wavering and correspondence, signed a submission which was

accepted at Rome as satisfactory, though he still refused to admit, as demanded, ui proinde merito monarchicum ecclesiae regimen a catholicis docloribus appelletur. The removal of the censure followed (1781) when Hontheim published at Frankfort what purported to be a proof that his submission had been made of his own free will (Justini Febronii acti commenlarius in suam retractationem, &c). This book, however, which carefully avoided all the most burning questions, rather tended to show — as indeed his correspondence proves — that Hontheim had not essentially shifted his standpoint. But Rome left him thenceforth in peace.

See Otto Mejer, Febronius, WeihbiscJwf Johann Nikolaus von Hontheim und sein Widerruf (Tubingen, 1880), with many original letters. Of later date is the biography by F. X. Kraus in the Allge- meine deutsche Biographie (1881), which gives numerous references.

HONTHORST, GERARD VAN (1590-1656), Dutch painter of Utrecht, was brought up at the school of Bloemart, who

exchanged the style of the Franckens for that of the pseudo- Italians at the beginning of the 16th century. Infected thus early with a mania which came to be very general in Holland, Honthorst went to Italy, where he copied the naturalism and eccentricities of Michelangelo da Caravaggio. Home again about 1614, after acquiring a considerable practice in Rome, he set up a school at Utrecht which flourished exceedingly; and he soon became so fashionable that Sir Dudley Carleton, then English envoy at the Hague, recommended his works to the earl of Arundel and Lord Dorchester. At the same time the queen of Bohemia, sister of Charles I. and electress palatine, being an exile in Holland, gave him her countenance and asked him to teach her children drawing; and Honthorst, thus ap- proved and courted, became known to Charles I., who invited him to England. There he painted several portraits, and a vast allegory, now at Hampton Court, of Charles and his queen as Diana and Apollo in the clouds receiving the duke of Buckingham as Mercury and guardian of the king of Bohemia's children. Charles I., whose taste was flattered alike by the energy of Rubens and the elegance of Van Dyck, was thus first captivated by the fanciful mediocrity of Honthorst, who though a poor executant had luckily for himself caught, as Lord Arundel said, " much of the manner of Caravaggio's colouring, then so much esteemed at Rome." It was his habit to transmute every subject into a night scene, from the Nativity, for which there was warrant in the example of Correggio, to the penitence of the Magdalen, for which there was no warrant at all. But unhappily this

caprice, though " sublime in Allegri and Rembrandt," was but a phantasm in the hands of Honthorst, whose prosaic pencil was not capable of more than vulgar utterances, and art gained little from the repetition of these quaint vagaries. Sandrart gave the measure of Honthorst 's popularity at this period when he says that he had as many as twenty apprentices at one time, each of whom paid him a fee of 100 florins a year. In 1623 he was president of his gild at Utrecht. After that he went to England, returning to settle anew at Utrecht, where he married. His position amongst artists was acknowledged to be important, and in 1626 he received a visit from Rubens, whom he painted as the honest man sought for and found by Diogenes Honthorst. In his home at Utrecht Honthorst succeeded in preserving the support of the English monarch, for whom he finished in 163 1 a large picture of the king and queen of Bohemia " and all their children." For Lord Dorchester about the same period he completed some illustrations of the Odyssey; for the king of Denmark he composed incidents of Danish history, of which one example remains in the gallery of Copenhagen. In the course of a large practice he had painted many likenesses — Charles I. and his queen, the duke of Buckingham, and the king and queen of Bohemia. He now became court painter to the princess of Orange, settled (1637) at the Hague, and painted in succession at the Castle of Ryswick and the House in the Wood. The time not consumed in producing pictures was devoted to portraits. Even now his works are very numerous, and amply represented in English and Continental galleries. His most attractive pieces are those in which he cultivates the style of Caravaggio, those, namely, which represent taverns, with players, singers and eaters. He shows great skill in reproducing scenes illuminated by a single candle. But he seems to have studied too much in dark rooms, where the subtleties of flesh colour are lost in the dusky smoothness and uniform redness of tints procurable from farthing dips. Of great interest still, though rather sharp in outline and hard in modelling, are his portraits of the Duke of Buckingham and Family (Hampton Court), the King and Queen of Bohemia (Hanover and Combe Abbey), Mary de Medici (Amsterdam town-hall), 1628, the Stadtholders and their Wives (Amsterdam and Hague), Charles Louis and Rupert, Charles I.'s nephews (Louvre, St Petersburg, Combe Abbey and Willin), and Lord Craven (National Portrait Gallery). His early form may be judged by a Lute-player (1614) at the Louvre, the Martyrdom of St John in S. M. della Scala at Rome, or the Liberation of Peter ir. the Berlin Museum; his latest style is that of the House in the Wood

(1648), where he appears to disadvantage by the side of Jordaens and others.

Honthorst was succeeded by his brother William, born at Utrecht in 1604, who died, it is said, in 1666. He lived chiefly in his native place,

temporarily at Berlin. But he has left little behind except a portrait at Amsterdam, and likenesses in the Berlin Museum of William and Mary of England.

HOOCH, PIETER DE (1629-? 1678), Dutch painter, was born in 1629, and died in Amsterdam probably shortly after 1677. He was a native of Rotterdam, and wandered early to Haarlem and the Hague. In 1654 we find him again at Rotter- dam, where in that year he married a girl of Delft, Jannetje van der Burch. From 1655 to 1657 he was a member of the painter's gild of Delft, but after that date we have no traces of his doings until about 1668, when his presence is recorded in Amsterdam. His dated pictures prove that he was still alive in 1677, but his death followed probably soon after this year. De Hooch is one of the kindliest and most charming painters of homely subjects that Holland has produced. He seems to have been born at the same time and taught in the same school as van der Meer and Maes. All three are disciples of the school of Rembrandt. Houbraken mentions Nicolas Berchem as De Hooch's teacher. De Hooch only once painted a canvas of large size, and that unfortunately perished in a fire at Rotterdam in 1864. But his small pieces display perfect finish and dexterity of hand, combined with great power of discrimination. Though he sometimes paints open-air scenes, these are not his favourite subjects. He is most at home in interiors illuminated by different lights, with the radiance of the day, in different intensities, seen through doors and windows. He thus brings together the most delicate varieties of tone, and produces chords that vibrate with harmony. The themes which he illustrates are thoroughly suited to his purpose. Some- times he chooses the drawing-room where dames and cavaliers dance, or dine, or sing; sometimes — mostly indeed — he prefers cottages or courtyards, where the housewives tend their children or superintend the labours of the cook. Satin and gold are as familiar to him as camlet and fur; and there is no article of furniture in a Dutch house of the middle class that he does not paint with pleasure. What distinguishes him most besides subtle suggestiveness is the serenity of his pictures. One of his most charming was the canvas formerly in the Ashburton collection, now burnt, where an old lady with a dish of apples walks with a child along a street bounded by a high wall, above which gables and a church steeple are seen, while the sun radiates joyfully over the whole. Fine in another way is the " Mug of Beer " in the Amsterdam Museum, an interior with a woman coming out of a pantry and giving a measure of beer to a little girl. The light flows in here from a small closed window; but through the door to the right we look into a drawing-room, and through the open sash of that room we see the open air. The three lights are managed with supreme cunning. Beautiful for its illumination again is the " Music Party," with its contending indoor and outdoor lights, a gem in the late A. Thieme collection at Leipzig. More subtly suggestive, in the museum of Berlin, is the

" Mother seated near a Cradle." " A Card Party," dated 1658, at Buckingham Palace, is a good example of De Hooch's drawing-room scenes, counterpart as to date and value of a " Woman and Child " in the National Gallery, and the " Smoking Party," formerly in Lord Enfield's collection. Another very fine example is the " Interior " with two women, bought by Sir Julius Wernher. Other pictures later in the master's career are — the " Lady and Child in a Courtyard," of 1665, in the National Gallery, and the " Lady receiving a Letter," of 1670, in the Amsterdam Museum (Van der Hoop collection).

It ; s possible to bring together over 250 examples of De Hooch. There are three at St Petersburg, three in Buckingham Palace, three in the National Gallery, two in the Wallace Collection, six in the Am- sterdam Museum, some in the Louvre and at Munich and Darmstadt ; many others are in private galleries in England. For England was the first country to recognize tbe merit of De Hooch who onlj"

began to be valued in Holland in the middle of the 18th century. A celebrated picture at Amsterdam, sold for 450 florins in 1765, fetched 4000 in 1817, and in 1876 the Berlin Museum gave £5400 for a De Hooch at the Schneider sale — "A Dutch Dwelling-room" (820 B). See Hofstede de Groot's Catalogue raisonne, vol. i., London, 1907. HOOD, JOHN BELL (1831-1879), American soldier, lieut.- general of the Confederate army, was born at Owingsville, Kentucky, in 1831, and graduated from West Point military academy in 1853. As an officer of the 2nd U.S. cavalry (Colonel Sidney Johnston) he saw service against Indians, and later he was cavalry instructor at West Point. He resigned from the U.S. service in 1861, and became a colonel in the Confederate army. He was soon promoted brigadier-general, and at the battle of Gaines's Mill, where he was wounded, won the brevet of major-general for his gallant conduct. With the famous. " Texas brigade " of the Army of Northern Virginia he served throughout the campaign of 1862. At Gettysburg he commanded one of the divisions of Longstreet's corps, receiving a wound which disabled his arm. With Longstreet he was transferred in the autumn of 1863 to the Army of Tennessee. At the battle of Chickamauga (September 19th, 20th) Hood was severely wounded again and his leg was ampu- tated, but after six months he returned to duty undaunted. He remained with the Army of Tennessee as a corps commander, and when the general dissatisfaction with the Fabian policy of General J. E. Johnston brought about the removal of that officer, Hood was put in his place with the temporary rank of general. He had won a great

reputation as a fighting general, and it was with the distinct understanding that battles were to be fought that he was placed at the head of the Army of Tennessee. But in spite of skill and courage he was uniformly unsuccessful in the battles around Atlanta. In the end he had to abandon the place, but he forthwith sought to attack Sherman in another direction, and finally invaded Tennessee. His march was pushed with the greatest energy, but he failed to draw the main body of the enemy after him, and, while Sherman with a picked force made his " March to the Sea," Thomas collected an army to oppose Hood. A severe battle was fought at Franklin on the 30th of November, and finally Hood was defeated and his army almost annihilated in the battle of Nashville. He was then relieved at his own request (January 23rd, 1865). After the war he was engaged in business in New Orleans, where he died of yellow fever on the 30th of August 1879. His experiences in the Civil War are narrated in his Advance and Retreat (New Orleans, 1880). Hood's reputation as a bold and energetic leader was well deserved, though his reckless vigour proved but a poor substitute for Johnston's careful husbanding of his strength at this declining stage of the Confederacy.

HOOD, SAMUEL HOOD, Viscount (1724-1816), British admiral, was the son of Samuel Hood, vicar of Butleigh in Somerset, and prebendary of Wells. He was born on the 12th of December 1724, and entered the navy on the 6th of May 1 741. He served part of his time as midshipman with Rodney in the " Ludlow," and became lieutenant in 1746. He was fortunate in serving under active officers, and had opportunities of seeing service in the North Sea. In 1753 he was made com- mander of the " Jamaica " sloop, and served in her on the North American station. In 1756, while still on the North American station, he attained to post rank. In 1757, while in temporary command of the " Antelope " (50), he drove a French ship ashore in Audierne Bay, and captured two privateers. His zeal attracted the favourable notice of the Admiralty and he was appointed to a ship of his own. In 1759, when captain of the " Vestal " (32), he captured the French " Bellona " (3 2) after a sharp action. During the war his services were wholly in the Channel, and he was engaged under Rodney in 1759 in destroying the vessels collected by the French to serve as transports in the proposed invasion of England. In 1778 he accepted a command which in the ordinary course would have terminated his active career. He became commissioner of the dockyard at Portsmouth and governor of the Naval Academy. These posts were generally given to officers who were retiring from the sea. In 1780, on the occasion of the king's visit to

Portsmouth, he was made a baronet. The circumstances of the time were not ordinary. Many admirals declined to serve under Lord Sandwich, and Rodney, who then commanded in the West Indies, had complained of want of proper support from his subordinates, whom he accused of disaffection. The Admiralty was naturally anxious to secure the services of trustworthy flag officers, and having confidence in Hood pro- moted him rear-admiral out of the usual course on the 26th of September 1780, and sent him to the West Indies to act as second in command under Rodney, to whom he was personally known. He joined Rodney in January 1781, and remained in the West Indies or on the coast of North America till the close of the War of American Independence. The calculation that he would work harmoniously with Rodney was not altogether justified by the results. The correspondence of the two shows that they were far from being on cordial personal terms with one another, but Hood always discharged his duty punctually, and his capacity was so great, and so signally proved, that no question of removing him from the station ever arose. The unfortunate turn taken by the campaign of 1781 was largely due to Rodney's neglect of his advice. If he had been allowed to choose his own position there can be no doubt that he could have prevented the comte de Grasse (1722-1788) from reaching Fort Royal with the reinforcements from France in April (see Rodney, Lord). When the fleet went on to the coast of North America during the hurricane months of 1781 he was sent to serve with Admiral Graves (i725?i8o2) in the unsuccessful effort to relieve the army at Yorktown. But his subordinate rank gave him no chance to impart a greater measure of energy to the naval operations. When, however, he returned to the West Indies he was for a time in independent command owing to Rodney's absence in England for the sake of his health. The French admiral, the comte de Grasse, attacked the British islands of St Kitts and Nevis with a much superior force to the squadron under Hood's command. The attempt Hood made in January 1782 to save them from capture, with 22 ships to 29, was not successful, but the series of bold movements by which he first turned the French out of their anchorage at the Basse Terre of St Kitts, and then beat off the attacks of the enemy, were the most brilliant things done by any British admiral during the war. He was made an Irish peer for h_is share in the defeat of the comte de Grasse on the 9th and 1 2th of April near Dominica. During the peace he entered parliament as member for West minster in the fiercely contested election of 1784, was promoted vice-admiral in 1787, and in July of 1788 was appointed to the Board of Admiralty under the second earl of Chatham. On the outbreak of the revolutionary war he was sent to the Medi- terranean as commander-in-chief. His period of command, which lasted from May 1793 to October 1794, was very busy. In August he occupied Toulon on the invitation of the French royalists, and in co-operation with the

Spaniards. In December of the same year the allies, who did not work harmoniously together, were driven out, mainly by the generalship of Napoleon. Hood now turned to the occupation of Corsica, which he had been invited to take in the name of the king of England by Paoli. The island was for a short time added to the dominions of George III., chiefly by the exertions of the fleet and the co-operation of Paoli. While the occupation of Corsica was being effected, the French at Toulon had so far recovered that they were able to send a fleet to sea. In June Hood sailed in the hope of bringing it to action. The plan which he laid to attack it in the Golfe Jouan in June may possibly have served to Some extent as an inspiration, if not as a model, to Nelson for the battle of the Nile, but the wind was unfavourable, and the attack could not be carried out. In October he was recalled to England in consequence of some misunderstanding with the admiralty, or the ministry, which has never been explained. He had attained the rank of full admiral in April of 1 794. He held no further command at sea, but in 1796 he was named governor of Greenwich Hospital, a post which he held till his death on the 27th of January 1816. A peerage of Great Britain was conferred on his wife as Baroness Hood of Catherington in

1795, and he was himself created Viscount Hood of Whitley in

1796. The titles descended to his son, Henry (1753-1836), the ancestor of the present Viscount Hood. There are several portraits of Lord Hood by Abbot in the Guildhall and in the National Portrait Gallery. He was also painted by Reynolds and Gainsborough.

There is no good life of Lord Hood, but a biographical notice of him by M 'Arthur, his secretary during the Mediterranean command, is in the Naval Chronicle, vol. ii. Charnock's Biogr. Nav. vi., Ralfe, Nav. Biog. i., may also be consulted. His correspondence during his command in America has been published by the Navy Record Society. The history of his campaigns will be found in the historians of the wars in which he served: for the earlier years, Beatson's Naval and Military Memoirs; for the later, James's Naval History, vol. i., for the English side, and for the French, Troudes, Batailles navales de la France, ii. and Hi., and Chevalier's Histoire de la marine francaise pendant la guerre de V independan.ee americaine and Pendant 'la Ripublique. (D. H.)

HOOD, SIR SAMUEL (1762-1814), British vice-admiral, cousin of Lord Hood and of Lord Bridport, entered the Royal Navy in 1776. His first engagement was the battle off Ushant in 1778, and, soon afterwards transferred to the West Indies, he was present, under the command of his cousin Sir Samuel Hood, at all the actions which culminated in Rodney's victory of April 12th, 1782. After the peace, like many other British naval officers, he spent some time in France, and on his return to England was given the command of a sloop, from which he proceeded in succession to various frigates. In the " Juno " his gallant rescue of some shipwrecked seamen won him a vote of thanks and a sword of honour from the Jamaica assembly. Early in 1793 the "Juno " went to the Mediterranean under Lord Hood, and her captain distinguished himself by an audacious feat of coolness and seamanship in extricating his vessel from the harbour of Toulon, which he had entered in ignorance of Lord Hood's withdrawal. Soon afterwards he was put in com- mand of a frigate squadron for the protection of Levantine commerce, and in 1797 he was given the " Zealous " (74), in which he was present at Nelson's unsuccessful attack on Santa Cruz. It was Captain Hood who conducted the negotiations which relieved the squadron from the consequences of its failure. The part played by the " Zealous " at the battle of the Nile was brilliant. Her first opponent she put out of action in twelve minutes, and, passing on, Hood immediately engaged other ships, the " Guerrier " being left powerless to fire a shot. When Nelson left the coast of Egypt, Hood commanded the blockading force off Alexandria and Rosetta. Later he rejoined Nelson on the coast of the two Sicilies, receiving for his services the order of St Ferdinand.

In the " Venerable " Hood was present at the action of Algesiras and the battle in the Straits of Gibraltar (1801). In the Straits his ship suffered heavily, losing 130 officers and men. A year later Captain Hood was employed in Trinidad as a com- missioner, and, upon the death of the flag officer commanding the Leeward station, he succeeded him as Commodore. Island after island fell to him, and soon, outside Martinique, the French had scarcely a foothold in the West Indies. Amongst other measures taken by Hood may be mentioned the garrisoning of Diamond Rock, which he commissioned as a sloop-of-war to blockade the approaches of Martinique (see James, Naval History, iii. 245). For these successes he received, amongst other rewards, the K.B. In command next of the squadron blockading Rochefort, Sir Samuel Hood had a sharp fight, on 25th September 1805, with a small French squadron which was trying to escape. Amongst the few casualties on this occasion was the Commodore, who lost an arm. Promoted rear-admiral a few days after this action, Hood was in 1807 entrusted with the operations against Madeira, which he brought to a successful conclusion, and a year later went to the Baltic, with his flag in the " Centaur," to take part in the war between Russia and Sweden. In one

of the actions of this war the " Centaur " and " Implacable," unsupported by the Swedish ships (which lay to leeward), cut out the Russian 80-gun ship " Sevolod " from the enemy's line and, after a desperate fight, forced her to strike. The king of Sweden rewarded the admiral with the

Grand Cross of the Order of the Sword. Present in the roads of Corunna at the re-embarkation of the army of Sir John Moore, Hood thence returned to the Mediterranean, where for two years he commanded a division of the British fleet. In 181 1 he became vice-admiral. In his last command, that of the East Indies station, he carried out many salutary reforms, especially in matters of discipline and victualling. He died at Madras, 24th December 1814. A lofty column was raised to his memory on a hill near Butleigh, Somersetshire, and in Butleigh Church is another memorial, with an inscription written by Southey.

See Naval Chronicle, xvii. 1 (the material was furnished by Hood himself; it does not go beyond 1806).

His elder brother, Captain Alexander Hood (1758-1798), entered the Royal Navy in 1767, and accompanied Captain Cook in his second voyage round the world. Under Howe and Rodney he distinguished himself in the West Indies, and at the victory of April 12th, 1782, he was in command of one of Rodney's frigates. Under Sir Samuel Hood he then proceeded to the Mona passage, where he captured the French corvette " Ceres." With the commander of his prize, the Baron de Peroy, Hood became very intimate, and during the peace he paid a long visit to France as his late prisoner's guest. In the early part of the Revolutionary war, ill health kept him at home, and it was not until 1797 that he went afloat again. His first experience was bitter; his ship, the " Mars," was unenviably prominent in the mutiny at Spithead. On April 21st, 1798, occurred the famous duel of the " Mars " with the " Hercule," fought in the dusk near the Bee du Raz. The two ships were of equal force, but the " Hercule " was newly commissioned, and after over an hour's fighting at close quarters she struck her flag, having lost over three hundred men. The captain of the " Mars " was mortally wounded early in the fight, and died as the sword of the French captain was being put in his hand. The latter, L'Heritier, also died of his wounds.

See Naval Chronicle, vi. 175; Ralfe, Naval Biographies, iv. 48; James, Naval History, and Chevalier, Hist, de la marine francaise sous la premiere republique.

HOOD, THOMAS (1799-1845), British humorist and poet, the son of Thomas Hood, bookseller, was born in London on the 23rd of May 1799. " Next to being a citizen of the world," writes Thomas Hood in his Literary

Reminiscences, " it must be the best thing to be born a citizen of the world's greatest city." On the death of her husband in 181 1 Mrs Hood removed to Islington, where Thomas Hood had a schoolmaster who appreciated his talents, and, as he says, " made him feel it im- possible not to take an interest in learning while he seemed so interested in teaching." Under the care of this " decayed dominie," whom he has so affectionately recorded, he earned a few guineas — his first literary fee — by revising for the press a new edition of Paul and Virginia. Admitted soon after into the counting-house of a friend of his family, he " turned his stool into a Pegasus on three legs, every foot, of course, being a dactyl or a spondee "; but the uncongenial profession affected his health, which was never strong, and he was transferred to the care of his father's relations at Dundee. There he led a healthy outdoor life, and also became a large and indiscriminate reader, and before long contributed humorous and poetical articles to the provincial newspapers and magazines. As a proof of the seriousness with which he regarded the literary vocation, it may be mentioned that he used to write out his poems in printed characters, believing that that process best enabled him to under- stand his own peculiarities and faults, and probably unconsciouS- that Coleridge had recommended some such method of criticism when he said he thought " print settles it." On his return to London in 1818 he applied himself assiduously to the art of engraving, in which he acquired a skill that in after years became a most valuable assistant to his literary labours, and enabled him to illustrate his various humours and fancies by a pro- fusion of quaint devices, which not only repeated to the eye the impressions of the text, but, by suggesting amusing analogies and contrasts, added considerably to the sense and effect of the work.

In 1821 Mr John Scott, the editor of the London Magazine, was killed in a duel, and that periodical passed into the hands of some friends of Hood, who proposed to make him sub-editor. His installation into this congenial post at once introduced him to the best literary society of the time; and in becoming the associate of Charles Lamb, Cary, de Quincey, Allan Cunningham, Troctor, Talfourd, Hartley Coleridge, the peasant-poet Clare and other contributors to the magazine, he gradually developed his own intellectual powers, and enjoyed that happy intercourse with superior minds for which his cordial and genial character was so well adapted, and which he has described in his best manner in several chapters of Hood's Own. He had married in 1825, and Odes and Addresses — his first work— was written in conjunction with his brother-in-law Mr J. H. Reynolds, the friend of Keats. S. T. Coleridge wrote to Charles Lamb averring that the book

must be his work. The Plea of the Midsummer Fairies (1827) and a dramatic romance, Lamia, published later, belong to this time. The Plea of the Midsummer Fairies was a volume of serious verse, in which Hood showed himself a by no means despicable follower of Keats. But he was known as a humorist, and the public, which had learned to expect jokes from him, rejected this little book almost entirely. There was much true poetry in the verse, and much sound sense and keen observation in the prose of these works; but the poetical feeling and lyrical facility of the one, and the more solid qualities of the other, seemed best employed when they were subservient to his rapid wit. and to the ingenious coruscations of his fancy. This impression was confirmed by the series of the Comic Annual, dating from 1830, a kind of publication at that time popular, which Hood undertook and continued, almost unassisted, for several years. Under that somewhat frivolous title he treated all the leading events of the day in a fine spirit of caricature, entirely free from grossness and vulgarity, without a trait of personal malice, and with an under-current of true sympathy and honest purpose that will preserve these papers, like the sketches of Hogarth, long after the events and manners they illustrate have passed from the minds of men. But just as the agreeable jester rose into the earnest satirist, one of the most striking peculiarities of his style became a more manifest defect. The attention of the reader was distracted, and his good taste annoyed, by the incessant use of puns, of which Hood had written in his own vindication: —

" However critics may take offence, A double meaning has double sense."

Now it is true that the critic must be unconscious of some of the subtlest charms and nicest delicacies of language who would exclude from humorous writing all those impressions and surprises which depend on the use of the diverse sense of words. The history, indeed, of many a word lies hid in its equivocal uses; and it in no way derogates from the dignity of the highest poetry to gain strength and variety from the ingenious application of the same sounds to different senses, any more than from the contrivances of rhythm or the accom- paniment of imitative sounds. But when this habit becomes the characteristic of any wit, it is impossible to prevent it from degenerating into occasional buffoonery, and from supplying a cheap and ready resource, whenever the true vein of humour becomes thin or rare. Artists have been known to use the left hand in the hope of checking the fatal facility which practice had conferred on the right; and if Hood had been able to place under some restraint the curious and complex machinery of words and syllables which his fancy was incessantly pro- ducing, his style would have been a great gainer, and much real earnestness of object, which now lies confused by the brilliant kaleidoscope of language, would have remained definite and clear. He was probably not unconscious of this danger; for, as he gained experience as a

writer, his diction became more simple, and his ludicrous illustrations less frequent. In another annual called 1 he Gem appeared the poem on the story of "Eugene Aram," which first manifested the full extent of that poetical vigour which seemed to advance just in proportion as his physical health declined. He started a magazine in his own name,

for which he secured the assistance of many literary men of reputation and authority, but which was mainly sustained by his own intellectual activity. From a sick-bed, from which he never rose, he conducted this work with surprising energy, and there composed those poems, too few in number, but im- mortal in the English language, such as the " Song of the Shirt " (which appeared anonymously in the Christmas number of Punch, 1843), the "Bridge of Sighs" and the "Song of the Labourer," which seized the deep human interests of the time, and transported them from the ground of social philosophy into the loftier domain of the imagination. They are no clamor- ous expressions of anger at the discrepancies and contrasts of humanity, but plain, solemn pictures of conditions of life, which neither the politician nor the moralist can deny to exist, and which they are imperatively called upon to remedy. Woman , in her wasted life, in her hurried death, here stands appealing to the society that degrades her, with a combination of eloquence and poetry, of forms of art at once instantaneous and permanent, and with great metrical energy and variety.

Hood was associated with the Athenaeum, started in 1828 by J. Silk Buckingham, and he was a regular contributor for the rest of his life. Prolonged illness brought on straitened circumstances; and application was made to Sir Robert Peel to place Hood's name on the pension list with which the British state so moderately rewards the national services of literary men. This was done without delay, and the pension was con- tinued to his wife and family after his death, which occurred on the 3rd of May 1845. Nine years after a monument, raised by public subscription, in the cemetery of Kensal Green, was inaugurated by Monckton Mimes (Lord Houghton) with a concourse of spectators that showed how well the memory of the poet stood the test of time. Artisans came from a great distance to view and honour the image of the popular writer whose best efforts had been dedicated to the cause and the sufferings of the workers of the world; and literary men of all opinions gathered round the grave of one of their brethren whose writings were at once the delight of every boy and the instruction of every man who read them. Happy the humorist whose works and life are an illustration of the great moral truth that the sense of humour is the just balance of all the faculties of man, the best security against the pride of knowledge and the conceits of the imagination, the strongest inducement to submit with a wise and pious patience to the vicissitudes of human existence. This was the lesson that Thomas Hood left behind him. (H.)

Bibliography. — The list of Hood's separately published works is as follows: Odes and Addresses to Great People (1825); Whims and Oddities (two series, 1826 and 1827); The Plea of the Midsummer Fairies, Hero and Leander, Lycus the Centaur and other Poems (1827), his only collection of serious verse; The Dream of Eugene Aram, the Murderer (1831); Tylney Hall, a novel (3 vols., 1834); The Comic Annual (1830-1842) ; Hood's Own; or, Laughter from Year to Year (1838, second series, 1861); Up the Rhine (1840); Hood's Magazine and Comic Miscellany (1844-1848); National Tales (2 vols., 1837), a collection of short novelettes; Whimsicalities (1844), with illustra- tions from Leech's designs; and many contributions to contempo- rary periodicals.

The chief sources of his biography are: Memorials of Thomas Hood, collected, arranged and edited by his daughter (i860); his " Literary Reminiscences " in Hood's Own; Alexander Elliot, Hood in Scotland (1885). See also the memoir of Hood's friend C. W. Dilke, by his grandson Sir Charles Dilke, prefixed to Papers of a Critic ; and M. H. Spielmann's History of Punch. There is an excellent edition of the Poems of Thomas Hood (2 vols., 1897), with a biographical intro- duction of great interest by Canon Alfred Ainger.

HOOD, TOM (1835-1874), English humorist, son of the poet Thomas Hood, was born at Lake House, Wanstead, Essex, on the 19th of January 1835. After attending University College School and Louth Grammar School he entered Pembroke College, Oxford, in 1853, where he passed all the examinations for the degree of B.A., but did not graduate. At Oxford he wrote his Farewell to the Swallows (1853) and Pen and Pencil Pictures (1857). fie began to write for the Liskeard Gazette in 1856, and edited that paper in 1858-1859. He then obtained a position in the War Office, which he filled for five years, leaving in 1865

to become editor of Fun, the comic paper, which became very popular under his direction. In 1867 he first issued Tom Hood's Comic Annual. In 1861 had appeared The Daughters of King Daker, and other Poems, after which he published in conjunction with his sister, Frances Freeling Broderip, a number of amusing books for children. His serious novels, of which Captain M asters' s Children (1865) is the best, were not so successful. Hood drew with considerable facility, among his illustrations being those of several of his father's comic verses. In private life his geniality and sincere friendliness secured him the affection and esteem of a wide circle of acquaintance. He died on the 20th of November

1874.

A memoir by his sister, F. F. Broderip, is prefixed to the edition of his poems published in 1877.

HOOD OF AVALON, ARTHUR WILLIAM ACLAND HOOD,

Baron (1824-11901), English admiral, born on the 14th of July 1824, was the younger son of Sir Alexander Hood of St Andries, Somerset, 2nd baronet, and grandson of Captain Alexander Hood, R.N., who, when in command of the " Mars," fell in action with the French 74-gun ship " Hercule," 21st of April 1798. At the age of twelve Hood entered the navy, and whilst still a boy saw active service on the north coast of Spain, and afterwards on the coast of Syria. After passing through the established course of gunnery on board the " Excellent " in 1844-1845, he went out to the Cape of Good Hope as gunnery mate of the " President," the flagship of Rear-Admiral Dacres, by whom, on the 9th of January 1846, he was promoted to be lieutenant. As gunnery lieutenant he continued in the " Presi- dent " till 1849; and in the following year he was appointed to the " Arethusa " frigate, then commissioned for the Medi- terranean by Captain Symonds, afterwards the well-known admiral of the fleet. The outbreak of the Russian war made the commission a very long one; and on the 27th of November

1854 Hood was promoted to be commander in recognition of his service with the naval brigade before Sebastopol. In

1855 he married Fanny Henrietta, daughter of Sir C. F. Maclean. In 1856 he commissioned the " Acorn " brig for the China station, and arrived in time to take part in the destruction of the junks in Fatshan creek on the 1st of June 1857, an d in the capture of Canton in the following December, for which, in February 1858, he received a post-captain's commission. From 1862 to 1866 he commanded, the " Pylades " on the North American station, and was then appointed to the command of the " Excellent " and the government of the Royal Naval College at Portsmouth. This was essentially a gunnery appoint- ment, and on the expiration of three years Hood was made Director of Naval Ordnance. He was thoroughly acquainted with the routine work of the office and the established armament of the navy, but he had not the power of adapting himself to the changes which were being called for, and still less of initiating them; so that during his period of office the armament of the ships remained sadly behind the general advance. In June 1874 he was appointed to the command of the " Monarch " in the Channel Fleet, from which he was relieved in March 1876 by his promotion to flag rank. From 1877 to 1879 he was a junior lord of the Admiralty, and from 1880 to 1882 he com-

manded the Channel Fleet, becoming vice-admiral on 23rd July 1880. In June 1885 he was appointed first sea lord of the Admiralty. The intense conservatism of his character, however, and his antagonistic attitude towards every change, regardless of whether it was necessary or not, had much to do with the alarming state of the navy towards 1889. In that year, on attaining the age of sixty-five, he was placed on the retired list and resigned his post at the Admiralty. After two years of continued ill-health, he died on the 15th of November 1901, and was buried at Butleigh on the 23rd. He had been promoted to the rank of admiral on the 18th of January 1886; was made K.C.B. in December 1885; G.C.B. in September 1889; and in February 1892 was raised to the peerage as Lord Hood of Avalon, but on his death the title became extinct. (J. K. L.)

HOOD, a covering for the head. The word is in O. Eng. hod, cognate with Dutch hoed and Ger. Hut, hat, both masculine;

" hood " and " hat " are distantly related; they may be con- nected with the feminine hoed or Hut, meaning charge, care, Eng. " heed." Some form of hood as a loose covering easily drawn on or off the head has formed a natural part of outdoor costume both for men and women at all times and in all quarters of the globe where climatic conditions called for it. In the middle ages and later both men and women are found wearing it, but with men it tended to be superseded by the hat before it became merely an occasional and additional head-covering in time of bad weather or in particularly rigorous climates. For illustrations and examples of the hood as worn by men and women in medieval and later times see the article Costume; for the hood or cowl as part of the dress of a religious see Cowl, and as forming a distinctive mark of degree in academic costume see Robes. The word is applied to many objects resembling a hood in function or shape, such as a folding cover for a carriage to protect the occupants from rain or wind, the belled covering for the head of a hawk trained for falconry, the endmost planks in a ship's bottom at bow or stern, and, in botany and zoology, certain parts of a flower or of the neck of an animal which in arrangement of structure or of colour recall this article of dress.

In architecture a " hood-mould " is a projecting moulding carried outside the arch of a door or window; it is weathered underneath, and when continued horizontally is better known as a dripstone. The ends of the hood-mould are generally stopped on a corbel, plain or carved with heads in European churches, but in those of central Syria terminating in scrolls. Although in its origin the object of the projecting and weathered hood-mould was to protect the face of the wall below from rain, it gives more importance to, and emphasizes, the arch-moulds, so that it is often employed decoratively inside churches.

The suffix " -hood," like the cognate " -head," was originally a substantive meaning rank, status or quality, and was constantly used in combination with other substantives ; cf . in O. Eng. cild-hod, child- hood ; later it ceased to be used separately and became a mere suffix denoting condition added to adjectives ; cf. "falsehood," as well as to substantives.

HOOFT, PIETER CORNELISSEN (1581-1647), Dutch poet and historian, was born at Amsterdam on the 16th of March 1 581. His father was one of the leading citizens of Holland, both in politics and in the patronage of letters, and for some time burgomaster of Amsterdam. As early as 1598 the young man was made a member of the chamber of rhetoric In Licjde bloeknde, and produced before that body his tragedy of Achilles and Polyxena, not printed until 1614. In June 1598 he left Holland and proceeded to Paris, where on the 10th of April

1 599 he saw the body of Gabrielle d'Estrees lying in state. He went a few months later to Venice, Florence and Rome, and in

1600 to Naples. During his Italian sojourn he made a deep and fruitful study of the best literature of Italy. In July 1600 he sent home to the In Liefde bloeiende a very fine letter in verse, expressing his aspirations for the development of Dutch poetry. He returned through Germany, and after an absence of three years and a half found himself in Amsterdam again on the 8th of May 1601. In 1602 he brought out his second tragedy, Theseus and Ariadne, printed at Amsterdam in 1614. In 1605 he completed his beautiful pastoral drama Granida, not published until 161 5. He studied law and history at Leiden from 1606 to 1609, and in June of the latter year received from Prince Maurice of Orange the appointment of steward of Muiden, bailiff of Gooiland, and lord of Weesp, a joint office of great emolument. He occupied himself with repairing and adorning the decayed castle of Muiden, which was his residence during the remainder of his life. There he entertained the poet Vondel, the scholar Barlaeus, l Constantin Huygens, Vossius, Laurens Reael and others. Hooft had been a suitor for the hand of Anna Roemer Visscher, and after the death of Roemer Visscher both the sisters visited Muiden. Anna's sympathies were in time diverted to the school of Jacob Cats, but Marie Tesselschade maintained close ties with Hooft, who revised her translation of Tasso. In August 1610 he married Christina van Erp, an

1 Kaspar van Baerle (1584-1648), professor of rhetoric at Amsterdam, and famous as a Latin poet.

accomplished lady who died in 1623, and four years later he married Eleonora Hellemans. In 161 2 Hooft produced his national tragedy of Geeraerdt van Velzen (pr. 1613), a story of the reign of Count Floris V. In 16 14 was performed at Coster's academy Hooft's comedy of Ware-nar, an adaptation of the Aulularia of Plautus, first printed in 1617. In 1616 he wrote another tragedy, Baeto, or the Origin of the Dutch, not printed until 1626. It was in 16 18 that he abandoned poetry for history, and in 1626 he published the first of his great prose works, the History of Henry the Great (Henry IV. of France). His next production was his Miseries of the Princes of the House of Medici (Amsterdam, 1638). In 1642 he published at Amsterdam a folio comprising the first twenty books of his Dutch History, embracing the period from 1555 to 1585, a magnificent per-formance, to the perfecting of which he had given fifteen years of labour. The seven concluding books were published posthum- ously in 1654. His idea of history was gained from Tacitus, whose works he translated. Hooft died on a visit to the Hague, whither he had gone to attend the funeral of Prince Frederick Henry, on the 21st of May 1647, and was buried in the New Church at Amsterdam.

Hooft is one of the most brilliant figures that adorn Dutch literature at its best period. He was the first writer to introduce a modern and European tone into belles lettres, and the first to refresh the sources of native thought from the springs of antique and Renaissance poetry. His lyrics and his pastoral of Granida are strongly marked by the influence of Tasso and Sannazaro; his later tragedies belong more exactly to the familiar tone of his native country. But high as Hooft stands among the Dutch poets, he stands higher— he holds perhaps the highest place — among writers of Dutch prose. His historical style has won the warmest eulogy from so temperate a critic as Motley, and his letters are the most charming ever published in the Dutch language. After Vondel, he may on the whole be considered the most considerable author that Holland has produced.

Hooft's poetical and dramatic works were collected in two volumes (1871, 1875) by P. Leendertz. His letters were edited by B. Huyde- coper (Leiden, 1738) and by van Vloten (Leiden, 4 vols., 1855). The best original account of Hooft is given by G. Brandt in his Leven van P. C. Hooft (1677), and his funeral address (1647), edited together by J. C. Matthes (Groningen, 1874). There is an account of the Muiden circle in Edmund Gosse's Literatures of Northern Europe. Many editions exist of his prose works.

HOOGSTRATEN, SAMUEL DIRKSZ VAN, Dutch painter, was born, it is said, in 1627 at the Hague, and died at Dort on the 19th of October 1678. This artist, who was first a pupil of his father, lived at the Hague and at Dort till about 1640, when on the death of Dirk Hoogstraten he changed

his residence to Amsterdam and entered the school of Rembrandt. A short time afterwards he started as a master and painter of portraits, set out on a round of travels which took him (1651) to Vienna, Rome and London, and finally retired to Dort, where he married in 1656, and held an appointment as " provost of the mint." Hoogstraten's works are scarce; but a sufficient number of them has been preserved to show that he strove to imitate different styles at different times. In a portrait dated 1645 in the Lichtenstein collection at Vienna he imitates Rembrandt ; and he continues in this vein as late as 1653, when he produced that wonderful figure of a Jew looking out of a casement, which is one of the most characteristic examples of his manner in the Belvedere at Vienna. A view of the Vienna Hofburg, dated 1652, in the same gallery displays his skill as a painter of archi- tecture, whilst in a piece at the Hague representing a Lady Reading a Letter as she crosses a Courtyard, or a Lady Consulting a Doctor, in the Van der Hoop Museum at Amsterdam, he imitates de Hooch. One of his latest works is a portrait of Mathys van den Brouck, dated 1670, in the gallery of Amsterdam. The scarcity of Hoogstraten's pictures is probably due to his versatility. Besides directing a mint, he devoted some time to literary labours, wrote a book on the: theory of painting (1678) and composed sonnets and a tragedy. We are indebted to him for some of the familiar sayings of Rembrandt. He

was an etcher too, and some of his plates are still pre- served. His portrait, engravedby himself at the age of fifty, still exists.

HOOK, JAMES CLARKE (1819-1907), English painter, was born in London on the 21st of November 1819. His father, James Hook, a Northumbrian by descent, Judge Arbitrator of Sierra Leone, married the second daughter of Dr Adam Clarke, the commentator on the Bible, who gave to the painter his second name. Young Hook's first taste of the sea was on board the Berwick smacks which took him on his way to Wooler. He drew with rare facility, and determined to become an artist; and accordingly, without any supervision, he set to work for more than a year in the sculpture galleries of the British Museum. In 1836 he was admitted a student of the Royal Academy, where he worked for three years, and elsewhere learned a good deal of the scientific technique of painting from a nephew of Opie. His first picture, called " The.Hard Task," was exhibited in 1837, and represented a girl helping her sister with a lesson. Unusual facility in portraiture and a desire to earn his own living took the student into Ireland to paint likenesses of the Waterford family and others; here he produced landscapes of the Vale of Avoca, and much developed his taste for pastoral art ; later, he was similarly engaged in Kent and Somersetshire. In 1842 his second exhibited work was a portrait of " Master J. Finch Smith ": in this year he gained silver medals at the Royal Academy, and in 1843 he was one of the competitors in the exhibition of cartoons in

Westminster Hall, with a 10 by 7 ft. design of " Satan in Paradise." In 1844 the Academy contained a picture of a kind with which his name was long associated, an illustration of the Decameron, called " Pamphilius relating his Story," a meadow scene in bright light, with sumptuous ladies, richly clad, reclining on the grass. The British Institution, 1844 and 1845, set forth two of Hook's idylls, subjects taken from Shakespeare and Burns, which, with the above, showed him to be cultivating those veins of romantic sentiment and the picturesque which were then in vogue, but in a character- istically fresh and vigorous manner. " The Song of Olden Times " (Royal Academy, 1845) marked the artist's future path distinctly in most technical respects. It was in this year Hook won the Academy gold medal for an oil picture of " The Finding the Body of Harold." The travelling studentship in painting was awarded to him for " Rizpah watching the Dead Sons of Saul " in 1846; and he went for three years to Italy, having married Miss Rosalie Burton before he left England. Hook passed through Paris, worked diligently for some time in the Louvre, traversed Switzerland, and, though he stayed only part of three years in Italy, gained much from studies of Titian, Tintoret, Carpaccio, Mansueti and other Venetians. Their influence thenceforth dominated the coloration of his pictures, and enabled him to apply the principles to which they had attained to the representation (as Bonington before him had done) of romantic subjects and to those English themes of the land and sea with which the name of the artist is inseparably associated. " A Dream of Ancient Venice " (R.A., 1848) — the first fruit of these Italian studies — " Bayard of Brescia " (R.A., 1849), " Venice " (B.I., 1849) and other "works assured for Hook the Associateship of the Royal Academy in 1851. Soon afterwards an incomparable series of English subjects was begun, in many pastorals and fine brilliant idylls of the sea and rocks. " A Rest by the Wayside " and " A Few Minutes to Wait before Twelve o'clock " proved his title to appear, in 1854, as a new and original painter. After these came " A Signal on the Horizon " (1857), " A Widow's Son going to Sea," " The Ship-boy's Letter," "Children's Children are the Crown of Old Men," " A Coast-boy gathering Eggs," a scene at Lundy; the perfect "Luff, Boy!" (1859), about which Ruskin broke into a dithyrambic chant, " The Brook," " Stand Clear ! " " O Well for the Fisherman's Boy ! " (i860), " Leaving Cornwall for the Whitby Fishing," " Sea Urchins," and a score more as fine as these. The artist was elected a full Academician on the 6th of March i860, in the place of James Ward. He died I on the 14th of April 1907.

See A. H. Palmer, "J. C. Hook, R.A.," Portfolio (1888) ; F. G. Stephens, " J. C. Hook, Royal Academician: His Life and Work," Art Annual (London,

1888); P. G. Hamerton, Etching and Etchers (London, 1877).

HOOK, THEODORE EDWARD (1788-1841), English author, was born in London on the 22nd of September 1788. He spent a year at Harrow, and subsequently matriculated at Oxford, but he never actually resided at the university. His father, James Hook (1746-182 7), the composer of numerous popular songs, took great delight in exhibiting the boy's extraordinary musical and metrical gifts, and the precocious Theodore became " the little pet lion of the green room." At the age of sixteen, in conjunction with his father, he scored a dramatic success with The Soldier's Return, a comic opera, and this he rapidly followed up with a series of over a dozen sparkling ventures, the instant popularity of which was hardly dependent on the inimitableactingof JohnListon and Charles Mathews. But Hook gave himself up for some ten of the best years of his life to the pleasures of the town, winning a foremost place in the world of fashion by his matchless powers of improvisation and mimicry, and startling the public by the audacity of his practical jokes. His unique gift of improvising the words and the music of songs eventually charmed the prince Regent into a declaration that " something must be done for Hook." The prince was as good as his word, and Hook, in spite of a total ignorance of accounts, was appointed accountant-general and treasurer of the Mauritius with a salary of £2000 a year. For five delightful years he was the life and soul of the island, but in 1817, a serious deficiency having been discovered in the treasury accounts, he was arrested and brought to England on a criminal charge. A sum of about £12,000 had been abstracted by a deputy official, and for this amount Hook was held responsible.

During the tardy scrutiny of the audit board he lived obscurely and maintained himself by writing for magazines and newspapers. In 1820 he launched the newspaper John Bull, the champion of high Toryism and the virulent detractor of Queen Caroline. Witty, incisive criticism and pitiless invective secured it a large circulation, and from this source alone Hook derived, for the first year at least, an income of £2000. He was, however, arrested for the second time on account of his debt to the state, which he made no effort to defray. In a sponging-house, where he was confined for two years, he wrote the nine volumes of stories afterwards collected under the title of Sayings and Doings (1826-1829). In the remaining twenty-three years of his life he poured forth no fewer than thirty-eight volumes, besides numberless articles, squibs and sketches. His novels are not works of enduring interest, but they are saved from mediocrity by frequent passages of racy narrative and vivid portraiture. The best are Maxwell (1830), Love and Pride (1833), the autobio- graphic Gilbert Gurney (1836), Jack Brag (1837), Gurney Married (1838), and Peregrine Bunce (1842). Incessant work had already begun to tell on his health, when Hook returned to his old social habits, and a prolonged attempt to combine industry and dissipa-

tion resulted in the confession that he was " done up in purse, in mind and in body too at last." He died on the 24th of August 1841. His writings in great part are of a purely ephemeral character; and the greatest triumphs of the improvisatore may be said to have been writ in wine. Putting aside, however, his claim to literary greatness, Hook will be remembered as one of the most brilliant, genial and original figures of Georgian times.

See the Rev. R. H. D. Barham's Life and Remains of Hook (3rd ed., 1877); and an article by J. G. Lockhart in the Quarterly Review (.May 1843).

HOOK, WALTER FARQUHAR (1798-1875), English divine, nephew of the witty Theodore, was born in London on the 13th of March 1798. Educated at Tiverton and Winchester, he graduated at Oxford (Christ Church) in 182 1, and after holding an incumbency in Coventry, 1829-1837, and in Leeds, 1837- 1859, was nominated dean of Chichester by Lord Derby. Ho received the degree of D.D. in 1837. His friendship towards the Tractarians exposed him to considerable persecution, but his simple manly character and zealous devotion to parochial

work gained him the support of widely divergent classes. His stay in Leeds was marked by vigorous and far-reaching church extension, and his views on education were far in advance of his time. Among his many writings are An Ecclesiastical Biography, containing the Lives of Ancient Fathers and Modern Divines (8 vols., 1845-1852), A Church Dictionary, The Means of Rendering more Effectual the Education of the People, The Cross of Christ (1873), The Church and its Ordinances (sermons, 4 vols., 1876), and Lives of the Archbishops of Canter- bury (12 vols., 1860-1876). He died on the 20th of October

1875.

See Life and Letters of Dean Hook, by his son-in-law, W. R. W. Stephens (2 vols., 1878).

HOOKAH (the English spelling of the Persian and Hindustani huqqu, an adaptation of the Arabic huqqah, a vase or casket, and by transference a pipe for smoking, probably derived from the Arabic huqq, a hollow place), a pipe with a long flexible tube attached to a large bowl containing water, often scented, and resting upon a tripod or stand. The smoke of the tobacco is made to pass through the water in the bowl, and is thus cooled before reaching the smoker. The narghile of India is in principle the same as that of the hookah; the word is derived from nargil, an Indian name for the coco-nut tree, as when the narghile was first made the water was placed in a coco-nut. This re- ceptacle is now often made of porcelain, glass or metal. In the hubble-bubble the pipe is so contrived that the water in the bowl

makes a bubbling noise while the pipe is being smoked. This pipe is common in India, Egypt and the East generally.

HOOKE, ROBERT (1635-1703), English experimental philosopher, was born on the 18th of July 1635 at Freshwater, in the Isle of Wight, where his father, John Hooke, was minister of the parish. After working for a short time with Sir Peter Lely, he went to Westminster school; and in 1653 he entered Christ Church, Oxford, as servitor. After 1655 he was employed and patronized by the Hon. Robert Boyle, who turned his skill to account in the construction of his air-pump. On the 12th of November 1662 he was appointed curator of experiments to the Royal Society, of which he was elected a fellow in 1663, and filled the office during the remainder of his life. In 1664 Sir John Cutler instituted for his benefit a mechanical lectureship of £S° a year, and in the following year he was nominated professor of geometry in Gresham College, where he subsequently resided. After the Great Fire of 1666 he constructed a model for the rebuilding of the city, which was highly approved, although the design of Sir C. Wren was preferred. During the progress of the works, however, he acted as surveyor, and accumulated in that lucrative employment a sum of several thousand pounds, discovered after his death in an old iron chest, which had evidently lain unopened for above thirty years. He fulfilled the duties of secretary to the Royal Society during five years after the death of Henry Oldenburg in 1677, publishing in 1681- 1682 the papers read before that body under the title of Philo- sophical Collections. A protracted controversy with Johann Hevelius, in which Hooke urged the advantages of telescopic over plain sights, brought him little but discredit. His reasons were good; but his ciffensive style of argument rendered them unpalatable and himself unpopular. Many circumstances concurred to embitter the latter years of his life. The death, in 1687, of his niece, Mrs Grace Hooke, who had lived with him for many years, caused him deep affliction; a law-suit with Sir John Cutler about his salary (decided, however, in his favour in 1696) occasioned him prolonged anxiety; and the repeated anticipation of his discoveries inspired him with a morbid jealousy. Marks of public respect were not indeed wanting to him. A degree of M.D. was conferred on him at Doctors' Commons in 1691, and the Royal Society made him, in 1696, a grant to enable him to complete his philosophical inventions. While engaged on this task he died, worn out with disease, on the 3rd of March 1703 in London, and was buried in St Helen's Church, Bishopsgate Street.

In personal appearance Hooke made but a sorry show. His

figure was crooked, his limbs shrunken; his hair hung in dis- hevelled locks over his haggard countenance. His temper was irritable, his habits penurious and solitary. He was, however, 'blameless in morals and reverent in religion. His scientific achievements would probably have been more striking if they had been less varied. He originated much, but perfected little. His optical investigations led him to adopt in an imperfect form the undulatory theory of light, to anticipate the doctrine of interference, and to observe, independently of though sub- sequently to F. M. Grimaldi (1618-1663), the phenomenon of diffraction. He was the first to state clearly that the motions of the heavenly bodies must be regarded as a mechanical problem, and he approached in a remarkable manner the discovery of universal gravitation. He invented the wheel barometer, discussed the application of barometrical indications to meteoro- logical forecasting, suggested a system of optical telegraphy, anticipated E.F.F. Chladni's experiment of strewing a vibrating bell with flour, investigated the nature of sound and the function of the air in respiration and combustion, and originated the idea of using the pendulum as a measure of gravity. He is credited with the invention of the anchor escapement for clocks, and also with the application of spiral springs to the balances of watches, together with the explanation of their action by the principle Ut lensio sic vis (1676).

His principal writings are Micrographia (1664) ; Lectiones Cutler- ianae (1674-1679); and Posthumous Works, containing a sketch of his " Philosophical Algebra," published by R. Waller in 1705.

HOOKER, JOSEPH (1814-1879), American general, was born in Hadley, Massachusetts, on the 13th of November 1814. He was educated at the military academy at West Point (1833- 1837). and on graduating entered the 1st U. S. Artillery. In the war with Mexico (1846-48) he served as a staff officer, and rose by successive brevets for meritorious services to the rank of lieutenant-colonel. In 1853 he left the service and bought a large farm near Sonoma, Cal., which he managed successfully till 1858, when he was made superintendent of military roads in Oregon. Upon the opening of hostilities in the Civil War of 1861-65, he sacrificed his fine estate and offered his sword to the Federal Government. He was commissioned brigadier-general of volunteers on the 17th of May 1861 and major-general on the 5th of May 1862. The engagement of Williamsburg (May 5th) brought him and his subordinate Hancock into prominence, and Hooker received the soubriquet of " Fighting Joe." He was engaged at the battle of Fair Oaks, and did splendid service to the Union army during the " Seven Days." In the campaign of Northern Virginia, under General Pope (August 1862), he led his division with fiery energy at Bristoe Station, Manassas and Chantilly. In the Maryland campaign (September) he was at the head of the I. corps, Army of the Potomac, forced the defile of South

Mountain and opened the way for the advance of the army. The I. corps opened the great battle of the Antietam, and sustained a sanguinary fight with the Confederates under Stonewall Jackson. Hooker himself was severely wounded. He was commissioned brigadier-general in the United States army on the 20th of September 1862, and in the battle of Fredericksburg (q.v.), under Burnside, he com- manded the centre grand division (III. and V. corps). He had protested against the useless slaughter of his men on that disastrous field, and when Burnside resigned the command Hooker succeeded him. The new leader effected a much-needed re-organization in the army, which had fought many battles without success. In this task, as in subordinate commands in battle, Hooker was excelled by few. But his grave defects as a commander-in-chief were soon to be obvious. By a well- planned and well-executed flanking movement, he placed himself on the enemy's flank, but at the decisive moment he checked the advance of his troops. Lee turned upon him, Jackson surprised and destroyed a whole army corps, and the battle of Chancellorsville (see Wilderness), in which Hooker was himself disabled, ended in a retreat to the old position. Yet Hooker had not entirely forfeited the confidence of his men, to whom he was still " Fighting Joe." The second aidvance of Lee into

Union territory, which led to the battle of Gettysburg, was strenuously resisted by Hooker, who would have inflicted a heavy blow on Lee's scattered forces had he not been condemned to inaction by orders from Washington. Even then Hooker followed the Confederates a day only behind them, until, finding himself distrusted and forbidden to control the movements of troops within the sphere of operations, he resigned the command on the eve of the battle (June 28, 1863). Faults of temper and an excessive sense of responsibility made his continued occupation of the command impossible, but when after a signal defeat Rosecrans was besieged in Chattanooga, and Grant- with all the forces of the West was hurried to the rescue, two corps of the Army of the Potomac were sent over by rail, and Hooker, who was at least one of the finest fighting generals of the service, went with them in command. He fought and won the " Battle above the Clouds " on Lookout Mountain which cleared the way for the crowning victory of the army of the Cumberland on Missionary Ridge (see Chattanooga). And in command of the same corps (consolidated as the XX. corps) he took part in all the battles and combats of the Atlanta campaign of 1864. When General McPherson was killed before Atlanta, the command of Grant's old Army of the Tennessee fell vacant. Hooker, who, though only a corps commander, was senior to the other army commanders, Thomas and Schofield, was normally entitled to receive it, but General Sherman feared to commit a whole army to the guidance of a man of Hooker's peculiar temperament, and the place was given, to Howard. Hooker thereupon left the army. He was commissioned brevet-

major-general in the United States army on the 13th of March 1865, and retired from active service with the full rank of major- general on the 15th of October 1868, in consequence of a paralytic seizure. The last years of his life were passed in the neighbourhood of New York. He died at Garden City, Long Island, on the 31st of October 1879.

HOOKER, SIR JOSEPH DALTON (1817- , English

botanist and traveller, second son of the famous botanist Sir W.J.Hooker, was born on the 30th of June 1817, at Halesworth, Suffolk. He was educated at Glasgow University, and almost immediately after taking his M.D. degree there in 1839 joined Sir James Ross's Antarctic expedition, receiving a commission as assistant-surgeon on the " Erebus." The botanical fruits of the three years he thus spent in the Southern Seas w 7 ere the Flora Antarctica, Flora Novae Zclandiae and Flora Tasmanica, which he published on his return. His next expedition was to the northern frontiers of India (1847-1851), and the expenses in this case also were partially defrayed by the government. The party had its full share of adventure. Hooker and his friend Dr Campbell were detained in prison for some time by the raja of Sikkim, but nevertheless they were able to bring back important results, both geographical and botanical. Their survey of hitherto unexplored regions was published by the Calcutta Trigonometrical Survey Office, and their botanical observations formed the basis of elaborate works on the rhododendrons of the Sikkim Himalaya and on the flora of India. Among other journeys undertaken by Hooker may be mentioned those to Palestine (i860), Morocco (1871), and the United States (1877), all yielding valuable scientific information. In the midst of all this travelling in foreign countries he quickly built up for himself a high scientific reputation at home. In 1855 he was appointed assistant-director of Kew Gardens, and in 1865 he succeeded his father as full director, holding the post for twenty years. At the early age of thirty he was elected a fellow of tie Royal Society, and in 1873 he was chosen its president; he received three of its medals — a Royal in 1854, the Copley in 1887 and the Darwin in 1892. He acted as president of the British Association at its Norwich meeting of 1868, when his address was remarkable for its championship of Darwinian theories. Of Darwin, indeed, he was an early friend and supporter: it was he who, with Lyell, first induced Darwin to make his views public, and the author of The Origin of Species has recorded his indebtedness to Hooker's wide knowledge and balanced judgment. Sir Joseph Hooker is the author of numerous

scientific papers and monographs, and his larger books include, in addition to those already mentioned, a standard Student's Flora of the British Isles and a monumental work, the Genera plantariim, based on the collections at Kew, in which he had the assistance of Bentham. On the publication of the last part of his Flora of British India in 1897 he was created G.C.S.I., of which order he had been made a knight commander twenty years before; and twenty years later, on attaining the age of ninety, he was awarded the Order of Merit.

HOOKER, RICHARD (1553-1600), English writer, author of the Laws of Ecclesiastical Polity, son of Richard Vowell or Hooker, was born at Heavitree, near the city of Exeter, about the end of 1553 or beginning of 1554. Vowell was the original name of the family, but was gradually dropped, and in the 15th century its members were known as Vowell alias Hooker. At school, not only his facility in mastering his tasks, but his intellectual inquisitiveness and his fine moral qualities, attracted the special notice of his teacher, who strongly recommended his parents to educate him for the church. Though well connected, they were, however, somewhat straitened in their worldly circum- stances, and Hooker was indebted for admission to the university to his uncle, John Hooker alias Vowell, chamberlain of Exeter, and in his day a man of some literary repute, who induced Bishop Jewel to become his patron and to bestow on him a clerk's place in Corpus Christi College, Oxford. To – this Hooker was admitted in 1568. Bishop Jewel died in September 1571, but Dr William Cole, president of the college, from the strong interest he felt in the young man, on account at once of his character and his abilities, spontaneously offered to take the bishop's place as his patron; and shortly afterwards Hooker, by his own labours as a tutor, became independent of gratuitous aid. Two of his pupils, and these his favourite ones, were Edwin Sandys, afterwards author of Europae speculum, and George Cranmer, grand-nephew of the archbishop. Hooker's reputation as a tutor soon became very high, for he had employed his five years at the university to such good purpose as not only to have acquired great proficiency in the learned languages, but to have joined to this a wide and varied culture which had delivered him from the bondage of learned pedantry; in addition to which he is said to have possessed a remarkable talent for communicating knowledge in a clear and interesting manner, and to have exercised a special influence over his pupils' in- tellectual and moral tendencies. In December 1573 he was elected scholar of his college; injuly 1577 he proceeded to M.A., and in September of the same year he was admitted a fellow. In 1579 he was appointed by the chancellor of the university to read the public Hebrew lecture, a duty which he continued to discharge till he left Oxford. Not long after his admission into holy orders, about 1581, he was appointed to preach at St Paul's Cross; and, according to Walton, he was so kindly

entertained by Mrs Churchman, who kept the Shunamite's house where the preachers were boarded, that he permitted her to choose him a wife, " promising upon a fair summons to return to London and accept of her choice." The lady selected by her was" her daughter Joan," who, says the same authority, " found him neither beauty nor portion; and for her conditions they were too like that "wife's which is by Solomon compared to a dripping house." It is probable that Walton has exaggerated the simplicity and passiveness of Hooker in the matter, but though, as Keble observes with justice, his writings betray uncommon shrewdness and quickness of observation, as well as a vein of keenest humour, it would appear that either gratitude or some other impulse had on this occasion led his judgment astray. After his marriage he was, about the end of 1584, presented to the living of Drayton Beauchamp in Buckinghamshire. In the following year he received a visit from his two pupils, Edwin Sandys and George Cranmer, who found him with the Odes of Horace in his hand, tending the sheep while the servant was at dinner, after which, when they on the return of the servant accompanied him to his house, " Richard was called to rock the cradle." Finding him so engrossed by worldly and domestic cares, " they stayed but till the next morning,"

and, greatly grieved at his narrow circumstances and unhappy domestic condition, " left him to the company of his wife Joan." The visit had, however, results of the highest moment, not only in regard to the career of Hooker, but in regard to English ■ literature and English philosophical thought. Sandys prevailed on his father, the archbishop of York, to recommend Hooker for presentation to the mastership of the Temple, and Hooker, though his " wish was rather to gain a better country living," having agreed after some hesitation to become a candidate, the patent conferring upon him the mastership was granted on the 17th of March 1584/5. The rival candidate was Walter Travers, a Presbyterian and evening lecturer in the same church. Being continued in the lectureship after the appointment of Hooker, Travers was in the habit of attempting a refutation in the even- ing of what Hooker had spoken in the morning, Hooker again replying on the following Sunday; so it was said " the forenoon sermon spake Canterbury, the afternoon Geneva." On account of the keen feeling displayed by the partisans of both, Archbishop Whitgift deemed it prudent to prohibit the preaching of Travers, whereupon he presented a petition to the council to have the prohibition recalled. Hooker published an Answer to the Petition of Mr Travers, and also printed several sermons bearing on special points of the controversy; but, feeling strongly the unsatisfactory nature of such an isolated and fragmentary discussion of separate points, he resolved to compose an elaborate and exhaustive treatise, exhibiting the fundamental principles by which the question in dispute must be decided. It is probable that the work was begun in the latter

half of 1586, and he had made considerable progress with it before, with a view to its completion, he petitioned Whitgift to be removed to a country parsonage, in order that, as he said, " I may keep myself in peace and privacy, and behold God's blessing spring out of my mother earth, and eat my own bread without oppositions." His desire was granted in 1 59 1 by a presentation to the rectory of Boscombe near Salisbury. There he completed the volume containing the first four of the proposed Eight Books of the Laws of Ecclesiastical Polity. It was entered at Stationers' Hall on the 9th of March 1592, but was not published till 1593 or 1594. In July 1595 he was promoted by the crown to the rectory of Bishopsbourne near Canterbury, where he lived to see the completion of the fifth book in 1597. In the passage from London to Gravesend some time in 1600 he caught a severe cold from which he never recovered; but, notwithstanding great weakness and constant suffering, he " was solicitous in his study," his one desire being " to live to finish the three remaining books of Polity." His death took place on the 2nd of November of the same year. A volume professing to contain the sixth and eighth books of the Polity was published at London in 1648, but the bulk of the sixth book, as has been shown by Keble, is an entire deviation from the subject on which Hooker proposed to treat, and doubtless the genuine copy, known to have been completed, has been lost. The seventh book, which was published in a new edition of the work by Gauden in 1662, and the eighth book, may be regarded as in substance the composition of Hooker; but, as, in addition to wanting his final revision, they have been very unskilfully edited, if they have not been manipulated for theo- logical purposes, their statements in regard to doubtful matters must be received with due reserve, and no reliance can be placed on their testimony where their meaning contradicts that of other portions of the Polity.

The conception of Hooker in his later years, which we form from the various accessible sources, is that of a person of low- stature and not immediately impressive appearance, much bent by the influence of sedentary and meditative habits, of quiet and retiring manners, and discoloured in complexion and worn and marked in feature from the hard mental toil which he had expended on his great work. There seems, however, exaggera- tion in Walton's statement as to the meanness of his dress; and Walton certainly misreads his character when he portrays him as a kind of ascetic mystic. Though he was unworldly and simple in his desires, and engrossed in the purpose to which he had devoted his life — the " completion of the Polity " — his

writings indicate that he possessed a cheerful and healthy disposition, and that he was capable of discovering enjoyment in everyday pleasures, and of appreciating human life and cha- racter in a wide variety of aspects. He seems to have had a special delight in outward nature — as he expressed it, he loved " to see God's blessing spring out of his mother earth "; and he spent much of his spare time in visiting his parishioners, his deference towards them, if excessive, being yet mingled with a grave dignity which rendered unwarrantable liberties impossible. As a preacher, though singularly devoid of the qualities which win the applause of the multitude, he always excited the interest of the more intelligent, the breadth and finely balanced wisdom of his thoughts and the fascination of his composition greatly modifying the impression produced by his weak voice and ineffective manner. Partly, doubtless, on account of his dim- sightedness, he never removed his eye from his manuscript, and, according to Fuller, " he may be said to have made good music with his fiddle and stick alone, having neither pronuncia- tion nor gesture to grace his matter."

To accede without explanation to the claim put forth for the Ecclesiastkal Polity of Hooker, that it marks an epoch in English prose literature and English thought, would both be to do some injustice to writers previous to him, and, if not to overestimate his influence, to misinterpret its character. By no means can his ex- cursions in English prose be regarded as chiefly those of a pioneer; and not only is his intellectual position inferior to that of Shake- speare, Spenser and Bacon, 1 who alone can be properly reckoned as the master spirits of the age, but in reality what effect he may have had upon the thought of his contemporaries was soon dis- regarded and swept out of sight in the hand-to-hand struggle with Puritanism, and his influence, so far from being immediate and confined to one particular era, has since the reaction against Puritan- ism been slowly and imperceptibly permeating and colouring English thought. His work is, however, the earliest in English prose with enough of the preserving salt of excellence to adapt it to the mental palate of modern readers. Attempts more elaborate than those of the old chroniclers had been made two centuries previously to employ English prose both for narrative and for discussion; and, a few years before him, Roger Ascham, Sir Thomas More, Latimer, Sir Philip Sidney, the compilers of the prayer book, and various translators of the Bible, had in widely different departments of literature brought to light many samples of the rich wealth of expression that was latent in the language; but Hooker's is the first independent work in English prose of notable power and genius, and the vigour and grasp of itc thought are not more remarkable than the felicity of its literary style. Its more usual and obvious excellences are clearness of expression, notwithstanding occasionally complicated methods; great aptness and conciseness in the formation of individual clauses, and such a fine sense of proportion and

rhythm in their arrange- ment as almost conceals the difficulties of syntax by which he was hampered; finished simplicity, notwithstanding a stateliness too uniform and unbroken; a nice discrimination in the choice of words and phrases, so as both to portray the exact shade of his meaning, and to express each of his thoughts with that degree of emphasis appropriate to its place in his composition. In regard to qualities more relating to the matter than the manner we may note the subtle and partly hidden humour; the strong enthusiasm underlying that seemingly calm and passionless exposition of principles which continu- ally led him away from the minutiae of temporary disputes, and has earned for him the somewhat misleading epithet of " judicious;" the solidity of learning, not ostentatiously displayed, but indicated in the character and variety of his illustrations and his compre- hensive mastery of all that relates to his subject ; the breadth of his conceptions, and the sweep and ease of his movements in the highest regions of thought ; the fine poetical descriptions occasionally intro- duced, in which his eloquence attains a grave, rich and massive harmony that compares not unfavourably with the finest prose of Milton. His manner is, of course, defective in the flexibility and variety characteristic of the best models of English prose literature after the language had been enriched and perfected by long use, and his sentences, constructed too much according to Latin usages, are often tautological and too protracted into long concatenations of clauses; but if, when regarded superficially, his style presents in some respects a stiff and antiquated aspect, it yet possesses an original and innate charm that has retained its freshness after the lapse of nearly three centuries.

The direct interest in the Ecclesiastical Polity is now philosophical and political rather than theological, for what theological importance it possessed was rather in regard to the spirit and method in which theology should be discussed than in regard to the decision of strictly theological points. Hooker bases his reasoning on principles which

1 If Bacon was the author of The Christian Paradoxes, his philo- sophical standpoint in reference to religion was not only less advanced than that of Hooker, but in a sense directly opposed to it.

he discovered in Augustine and Thomas Aquinas, but the intellectual atmosphere of his age was different from that which surrounded them ; he was acted upon by new and more various impulses enabling him to imbibe more thoroughly the spirit of Greek thought which was the source of their inspiration, and thus to reach a higher and freer region than scholasticism, and in a sense to inaugurate modern philosophy in England. It may be admitted that his principles are only partially and in some degree capriciously wrought out — that if he is not under the dominion of intellectual tendencies leading to opposite results there are occasional

blanks and gaps in his argument where he seems sometimes to be groping after a meaning which he cannot fully grasp; but he is often charged with obscurity simply because readers of various theological schools, beholding in his principles what seem the outline and justification of their own ideas, are disappointed when they find that these outlines instead of ac- quiring as they narrowly examine them the full and definite form of their anticipations, widen out into a region beyond their notions and sympathies, and therefore from their point of view enveloped in mist and shade. It is the exposition of philosophical principles in the first and second books of the Polity, and not the application of these principles in the remaining books that gives the work its standard place in English literature. It was intended to be an answer to the attacks of the Presbyterians on the Episcopalian polity and customs, but no attempt is made directly to oust Presbyterianism from the place it then held in the Church of England. The work must rather be regarded as a remonstrance against the narrow ground chosen by the Presbyterians for their basis of attack, Hooker's exact position being that " a necessity of polity and regiment may be held in all churches without holding any form to be necessary."

The general purpose of his reasoning is to vindicate Episcopacy from objections that had been urged against it, but he attains a result which has other and wider consequences than this. The fundamental principle on which he bases his reasoning is the unity and all- embracing character of law — law " whose seat," he beautifully says, " is the bosom of God, whose voice the harmony of the world." Law — as operative in nature, as regulating each man's individual character and actions, as seen in the formations of societies and governments — is equally a manifestation and development of the divine order according to which God Himself acts, is the expression in various forms of the divine reason. He makes a distinction between natural and positive laws, the one being eternal and immutable, the other varying according to external necessity and expediency; and he includes all the forms of government under laws that are positive and therefore alterable according to circumstances. Their application is to be determined by reason, reason enlightened and strengthened by every variety of knowledge, discipline and experience. The leading feature in his system is the high place assigned to reason, for, though affirming that certain truths necessary to salvation could be made known only by special divine revelation, he yet elevates reason into the criterion by which these truths are to be judged, and the standard to determine what in revelation is temporal and what eternal. " It is not the word of God itself," he says, " which doth or possibly can assure us that we do well to think it His word." At the same time he saves himself from the dangers of abstract and rash theorizing by a deep and absolute regard for facts, the diligent and accurate study of which he makes of the first importance to the proper use

of reason. " The general and perpetual voice of men is," he says, " as the sentence of God Himself. For that which all men have at all times learned, nature herself must needs have taught ; and, God being the author of nature, her voice is but His instrument." Applying his principles to man individually, the foundation of morality is, ac- ' cording to Hooker, immutable, and rests ' ' on that law which God from the beginning hath set Himself to do all things by " ; this law is to be discovered by reason ; and the perfection which reason teaches us to strive after is stated, with characteristic breadth of conception and regard to the facts of human nature, to be " a triple perfection: first a sensual, consisting in those things which very life itself requireth, either as necessary supplements, or as beauties or ornaments there- of; then an intellectual, consisting in those things which none underneath man is either capable of or acquainted with ; lastly, a spiritual or divine, consisting in those things whereunto we tend by supernatural means here, but cannot here attain unto them. ' Applying his principles to man as a member of a community, he assigns practically the same origin and sanctions to ecclesiastical as to civil government. His theory of government forms the basis of the Treatise on Civil Government by Locke, although Locke developed the theory in a way that Hooker would not have sanctioned. The force and justification of government Hooker derives from public approbation, either given directly by the parties immediately concerned, or indirectly through inheritance from their ancestors. " Sith men," he says, " naturally have no full and perfect power to command whole politic multitudes of men, therefore utterly without our consent we could in such sort be at no man's commandment living. And to be commanded we do consent, when that society whereof we are part hath at any time before consented, without revoking the same after, by the like universal agreement." His theory as he stated it is in various of its aspects and applications ' liable to objection; but taken as a whole it is the first philosophical statement of the principles which, though disregarded in the suc- ceeding age, have since regulated political progress in England

and gradually modified its constitution. One of the corollaries of his principles is his theory of the relation of church and state, according to which, with the qualifications implied in his theory of govern- ment, he asserts the royal supremacy in matters of religion, and identifies the church and commonwealth as but different aspects of the same government.

Bibliography. — A life of Hooker by Dr Gauden was published in his

edition of Hooker's works (London, 1662). To correct the errors in this life Walton wrote another, which was published in the 2nd edition of Hooker's works in 1666. The standard modern edition of Hooker's works is that by Keble, which first appeared in 1836, and has since been several times reprinted (1888 edition, revised by Dean Church and Bishop Paget). The first book of the Laws of Ecclesi- astical Polity was edited for the Clarendon Press by Dean R. W. Church (1868-1876). (T. F. H.)

HOOKER, THOMAS (1586-1647), New England theologian, was born, probably on the 7th of July 1586, at Marfield, in the parish of Tilton, County of Leicester, England. He graduated B.A. in 1608 and M.A. in 1611 at Emmanuel College, Cambridge, the intellectual centre of Puritanism, remained there as a fellow for a few years, and then preached in the parish of Esher in Surrey. About 1626 he became lecturer to the church of St Mary at Chelmsford, Essex, delivering on market days and Sunday afternoons evangelical addresses which were notable for their moral fervour. In 1629 Archbishop Laud took measures to suppress church lectureships, which were an innovation of Puritanism. Hooker was placed under bond and retired to Little Baddow, 4 m. from Chelmsford. In 1630 he was cited to appear before the Court of High Commission, but he forfeited his bond and fled to Holland, whence in 1633 he emigrated to the Colony of Massachusetts Bay in America, and became pastor at Newtowne (now Cambridge), Mass., of a company of Puritans who had arrived from England in the previous year and in expectation of his joining them were called " Mr Hooker's Company." Hooker seems to have been a leader in the formation of that sentiment of discontent with the Massachusetts govern- ment which resulted in the founding of Connecticut. He publicly criticized the limitation of suffrage to church members, and, according to a contemporary historian, William Hubbard (Genera! History of New England), " after Mr Hooker's coming over it was observed that many of the freemen grew to be very jealous of their liberties." He was a leader of the emigrants who in 1636 founded Hartford, Connecticut. In a sermon before the Connecticut General Court of 1638, he declared that " the choice of public magistrates belongs unto the people by God's own allowance" and that " they who have the power to appoint officers and magistrates, it is in their power, also, to set the bounds and limitations of the power and place unto which they call them." Though this theory was in advance of the age, Hooker had no idea of the separation of church and state — " the privilege of election, which belongs to the people," he said, must be exercised " according to the blessed will and law of God." He also defended the right of magistrates to convene synods, and in the Fundamental Orders of Connecticut (1639), which he probably framed, the union of church and state is presupposed. Hooker was pastor of the Hartford church until his death on the 7th of July 1647. He was active in

the negotiations which preceded the formation of the New England Confederation in 1643. In the same year he attended the meeting of Puritan ministers at Boston, whose object was to defend Congregationalism, and he wrote a Survey of the Swnme of Church Discipline (1648) in justification of the New England church system. His other works deal chiefly with the experimental phases of religion, especially the experience precedent to con- version. In The Soule's Humiliation (1637), he assigns as a test of conversion a willingness of the convert to be damned if that be God's will, thus anticipating the doctrine of Samuel Hopkins in the following century.

See George L. Walker's Thomas Hooker (New York, 1891); the appendix of which contains a bibliography of Hooker's published works.

HOOKER, SIR WILLIAM JACKSON (1785-1865), English botanist, was born at Norwich on the 6th of July 1785. His father, Joseph Hooker of Exeter, a member of the same family as the celebrated Richard Hooker, devoted much of his time

to the study of German literature and the cultivation of curious plants. The son was educated at the high school of Norwich, on leaving which his independent means enabled him to travel and to take up as a recreation the study of natural history, especially ornithology and entomology. He subsequently con- fined his attention to botany, on the recommendation of Sir James E. Smith, whom he had consulted respecting a rare moss. His first botanical expedition was made in Iceland, in the summer of 1809, at the suggestion of Sir Joseph Banks; but the natural history specimens which he collected, with his notes and drawings, were lost on the homeward voyage through the burning of the ship, and the young botanist himself had a narrow escape with his life. A good memory, however, aided him to publish an account of the island, and of its in- habitants and flora (Tour in Iceland, 1809), privately circulated in 1811, and reprinted in 1813. In 1810-1811 he made extensive preparations, and sacrifices which proved financially serious, with a view to accompany Sir R. Brownrigg to Ceylon, but the disturbed state of the island led to the abandonment of the projected expedition. In 1814 he spent nine months in botanizing excursions in France, Switzerland and northern Italy, and in the following year he married the eldest daughter of Mr Dawson Turner, banker, of Yarmouth. Settling at Halesworth, Suffolk, he devoted himself to the formation of his herbarium, which became of world-wide renown among botanists. In 1816 appeared the British Jungermanniae, his first scientific work, which was succeeded by a new edition of William Curtis's Flora. Londinensis, for which he wrote the descriptions (1S17- 1828); by a description of the Plantae cryptogamicae of A. von Humboldt and A. Bonpland; by the Muscologia Brilannica, a very complete account of the

mosses of Great Britain and Ireland, prepared in conjunction with Dr T. Taylor (1818); and by his Musci exotici (2 vols., 1818-1820), devoted to new foreign mosses and other cryptogamic plants. In 1820 he accepted the regius professorship of botany in Glasgow University where he soon became popular as a lecturer, his style being both clear and ready. The following year he brought out the Flora Scotica, in which the natural method of arrangement of British plants was given with the artificial. Subsequently he pre- pared or edited many works, the more important being the following: —

Botanical Illustrations (1822) ; Exotic Flora, indicating such of the specimens as are deserving cultivation (3 vols., 1822-1827) ; Account of Sabine's Arctic Plants (1824) ; Catalogue of Plants in the Glasgow Botanic Garden (1825); the Botany of Parry's Third Voyage (1826); The Botanical Magazine (38 vols., 1827-1865); Icones Filicum, in concert with Dr R. K. Greville (2 vols., 1829-1831); British Flora, of which several editions appeared, undertaken with Dr G. A. W. Arnott, &c. (1830); British Flora Cryptogamia (1833); Characters of Genera from the British Flora (1830); Flora Boreali- Americana (2 vols., 1840), being the botany of British North America collected in Sir J. Franklin's voyage; The Journal of Botany (4 vols., 1830-1842) ; Companion to the Botanical Magazine (2 vols., 1 835-1 836); Icones planlarum (10 vols., 1837-1854); the Botany of Beechey's Voyage to the Pacific and Behring's Straits (with Dr Arnott, 1841); the Genera Filicum (1842), from the original coloured drawings of F. Bauer, with additions and descriptive letterpress ; The London Journal of Botany (7 vols., 1842-1848) ; Notes on the Botany of the Antarctic Voyage of the Erebus and Terror (1843); Species filicum (5 vols., 1846-1864) the standard work on this subject; A Century of Orchideae (1846) Journal of Botany and Kew Garden Miscellany (9 vols., 1849-1857) Niger Flora (1849); Victoria Regia (1851); Museums of Economic Botany at Kew (1855); Filices exoticae (1857-1859); The British Ferns (1861-1862); A Century of Ferns (1854); A Second Century of Ferns (1 860-1 861).

It was mainly by Hooker's exertions that botanists wel« appointed to the government expeditions. While his works were in progress his herbarium received large and valuable additions from all parts of the globe, and his position as a botanist was thus vastly improved. He was made a knight of Hanover in 1836 and in 1841 he was appointed director of the Royal Botanical Gardens at Kew, on the resignation of W. T. Aiton. Under his direction the gardens expanded from 11 to 75 acres, with an arboretum of 270 acres, many new glass-houses were erected, and a museum of economic botany was established. He was engaged on the Synopsis filicum with J. G. Baker

when he was attacked by a throat disease then epidemic at Kew, where he died on the 12th of August 1865.

HOOLE, JOHN (1727-1803). English translator and dramatist, son of a watchmaker and machinist, Samuel Hoole, was born at Moorfields, London, in December 1727. He was educated at a private school at Hoddesdon, Hertfordshire, kept by James Bennet, who edited Ascham's English works. At the age of seventeen he became a clerk in the accountants' department of the East India House, and before 1767 became one of the auditors of Indian accounts. His leisure hours he devoted to the study of Latin and especially Italian, and began writing translations of the chief works of the Italian poets. He pub- lished translations of the Jerusalem Delivered of Tasso in T763, the Orlando Fitrioso of Ariosto in 1773-1783, the Dramas of Metastasio in 1767, and Rinaldo, an early work of Tasso, in 17Q2. Among his plays are: Cyrus (T768), Timanthcs (1770) and Cleonice, Princess of Bithynia (1775), none of which achieved success. The verses of Hoole were praised by Johnson, with whom he was on terms of intimacy, but. though correct, smooth and flowing, they cannot be commended for any other merit. His translation of the Orlando Furioso was superseded by the version (1823-1831) of W. S. Rose. Hoole was also the friend of the Quaker poet John Scott of Amwell (1 730-1 783), whose life he wrote; it was prefixed to Scott's Critical Essays (1785). In 1773 he was promoted to be chief auditor of Indian accounts, an office which he resigned in 1785. In 1786 he retired to the parsonage of Abinger, Surrey; and afterwards lived at Tenterden, Kent, dying at Dorking on the 2nd of April 1803.

See Anecdotes of the Life of the late Mr John Hoole, by his surviving brother, Samuel Hoole (London, 1803). Some of his plays are re- printed in J. Bell's British Theatre (1797).

HOOLIGAN, the generally accepted modern term for a young street ruffian or rowdy. It seems to have been first applied to the young street ruffians of the South-East of London about 1890, but though popular in the district, did not attract general attention till later, when authentic information of its origin was lost, but it appears that the most probable source was a comic song which was popular in the lower-class music-hall in the late 'eighties or early 'nineties, which described the doings of a rowdy family named Hooligan (i.e. Irish Houlihan). A comic character with the same name also appears to have been the central figure in a series of adventures running through an obscure English comic paper of about the same date, and also

in a similar New York paper, where his confrere in the adventures is a German named Schneider (see Notes and Queries, 9th series, vol. ii. pp. 227 and 316, 1898, and 10th series, vol. vii. p. 115. 1901). In other countries the " hooligan " finds his counter- part. The Parisian Apache, so self-styled after the North American Indian tribe is a much more dangerous character; mere rowdyism, the characteristic of the English "hooligan," is replaced by murder, robbery and outrage. An equally dangerous class of young street ruffian is the " hoodlum " of the United States of America; this term arose in San Francisco in 1870, and thence spread. Many fanciful origins of the name have been given, for some of which see Manchester (N.H.) Notes and Queries, September 1883 (cited in the New English Dictionary). The " plug-ugly " of Baltimore is another name for the same class. More familiar is the Australian " larrikin," which apparently came into use about 1870 in Melbourne. The story that the word represents an Irish policeman's pro- nunciation of " larking " is a mere invention. It is probably only an adaptation of the Irish " Larry," short for Lawrence. Others suggest that it is a corruption of the slang Leary Kinclien, i.e. knowing, wide-awake child.

HOOPER, JOHN (d. 1555), bishop of Gloucester and Worcester and martyr, was born in Somerset about the end of the 15th century and graduated B.A. at Oxford in 1519. He is said to have then entered the Cistercian monastery at Gloucester; but in 1538 a John Hooper appears among the names of the Biack friars at Gloucester and also among the White friars at Bristol who surrendered their houses to the king. A John Hooper was likewise canon of Wormesley priory in Herefordshire;

but identification of any of these with the future bishop is doubt- ful. -The Greyfriars' Chronicle says that Hooper was " sometime a white monk "; and in the sentence pronounced against him by Gardiner he is described as " olim monachus de Cliva Ordinis Cislcrciensis," i.e. of the Cistercian house at Cleeve in Somerset. On the other hand, at his deprivation he was not accused, like the other married bishops who had been monks or friars, of infidelity to the vow of chastity; and his own letters to Bullinger are curiously reticent on this part of his history. He there speaks of himself as being the only son and heir of his father and as fearing to be deprived of his inheritance if he adopted the reformed religion. Before 1546 he had secured employment in the household of Sir Thomas Arundell, a man of influential connexions. Hooper speaks of himself at this period as being " a courtier and living too much of a court life in the palace of our king." But he chanced upon some of Zwingli's works and Bullinger's commentaries on St Paul's epistles; and after some molestation in England and some correspondence with Bullinger on the lawfulness of complying against his conscience with the established religion, he determined to secure what property he could and take refuge on the continent. He had an adventurous

journey, being twice imprisoned, driven about for three months on the sea, and reaching Strassburg in the midst of the Schmalkaldic war. There he married Anne de Tserclaes, and later on he proceeded by way of Basle to Zurich, where his Zwinglian convictions were confirmed by constant intercourse with Zwingli's successor, Bullinger.

It was not until May 1549, after he had published various works at Zurich, that Hooper again arrived in England. He at once became the principal champion of Swiss Protestantism against the Lutherans as well as the Catholics, and was appointed chaplain to Protector Somerset. Somerset's fall in the following October endangered Hooper's position, and for a time he was in hourly dread of imprisonment and martyrdom, more especially as he had taken a prominent part against Gardiner- and Bonner, whose restoration to their sees was now anticipated. Warwick, afterwards duke of Northumberland, however, overcame the reactionaries in the Council, and early in r55o the Reformation resumed its course. Hooper became Warwick's chaplain, and after a course of Lent lectures before the king he was offered the bishopric of Gloucester. This led to a prolonged contro- versy; Hooper had already denounced the " Aaronic vestments " and the oath by the saints. prescribed in the new Ordinal; and he refused to be consecrated according to its rites. Cranmer, Ridley, Bucer and others urged him to submit in vain; confine- ment to his house by order of the Council proved equally in- effectual; and it was not until he had spent some weeks in the Fleet prison that the " father of nonconformity " consented to conform, and Hooper submitted to consecration with the legal ceremonies (March 8, 1551).

Once seated in his bishopric Hooper set about his episcopal duties with exemplary vigour. His visitation of his diocese (printed in English Hist. Rev. Jan. 1904, pp. 98-121) revealed a condition of almost incredible ignorance among his clergy. Fewer than half could say the Ten Commandments; some could not even repeat the Lord's Prayer in English. Hooper did his best in the time at his disposal; but in less than a year the bishopric of Gloucester was reduced to an archdeaconry and added to Worcester, of which Hooper was made bishop in succes- sion to Nicholas Heath (q.v.). He was opposed to Northumber- land's plot for the exclusion of Mary from the throne; but this did not save him from speedy imprisonment. He was sent to the Fleet on the 1st of September 1553 on a doubtful charge of debt to the queen ; but the real cause was his stanclmess to a re- ligion which was still by law established. Edward VI. 's legislation was, however, repealed in the following month, and in March 1354 Hooper was deprived of his bishopric as a married man. There was still no statute by which he could be condemned to the stake, but Hooper was kept in prison; and the revival of the heresy acts in December 1534 was swiftly followed by execution. On the 29th of January 1355, Hooper, Rogers,

Rowland Taylor and others were condemned by Gardiner and

degraded by Bonner. Hooper was sent down to suffer at Gloucester, where he was burnt on the 9th of February, meeting his fate with steadfast courage and unshaken conviction.

Hooper was the first of the bishops to suffer because his Zwinglian views placed him further beyond the pale than Cranmer, Ridley and Latimer. He represented the extreme reforming party in England. While he expressed dissatisfaction with some of Calvin's earlier writings, he approved of the Con- sensus Tignrinus negotiated in 1549 between the Zwinglians and Calvinists of Switzerland; and it was this form of religion that he laboured to spread in England against the wishes of Cranmer, Ridley, Bucer, Peter Martyr and other more con- servative theologians. He would have reduced episcopacy to narrow limits; and his views had considerable influence on the Puritans of Elizabeth's reign, when many editions of Hooper's various works were published.

Two volumes of Hooper's writings are included in the Parker Society's publications and another edition appeared at Oxford in 1855. See also Gough's General Index to Parker Soc. Publ. ; Strype's Works (General Index) ; Foxe's Acts and Monuments, ed. Townsend; Acts of the Privy Council; Cal. State Papers, " Domestic" Series; Nichols's Lit. Remains of Edward VI.; Burnet, Collier, Dixon, Froude and Gairdner's histories; Pollard's Cranmer; Diet. Nat. Biogr. (A. F. P.)

HOOPOE (Fr. Huppe, Lat. Upupa, Gr. eiroˆ— all names bestowed apparently from its cry), a bird long celebrated in literature, and conspicuous by its variegated plumage and its large erectile crest, 1 the Upupa epops of naturalists, which is the type of the very peculiar family Upupidae, placed by Huxley in his group Coccygomorphae, but considered by Dr Murie (Ibis, 1873, p. 208) to deserve separate rank as Epopomorphae. This species has an exceedingly wide range in the Old World, being a regular summer-visitant to the whole of Europe, in some parts of which it is abundant, as well as to Siberia, mostly retiring

Hoopoe.

southwards in autumn to winter in equatorial Africa and India, though it would seem to be resident throughout the year in north-eastern Africa and in China. Its power of wing ordinarily seems to be feeble; but it is capable of very extended flight, as is testified by its wandering habits (for it

occasionally makes its appearance in places very far removed from its usual haunts), and also by the fact that when pursued by a falcon it will rapidly mount to an extreme height and frequently effect its escape from the enemy. About the size of a thrush, with a long, pointed and slightly arched bill, its head and neck are of a golden-buff — the former adorned by the crest already mentioned, which begins to rise from the forehead and consists of broad feathers, gradually increasing in length, tipped with black and having a subterminal bar of yellowish-white. The upper part of the back is of a vinous-

1 Hence the secondary meaning of the French word huppe — a crest or tuft (cf. Littre, Dict.francais, i. 2067.

grey, and the scapulars and flight-feathers are black, broadly barred with white tinged in the former with buff. The tail is black with a white chevron, marking off about the distal third part of its length. The legs and feet are as well adapted for running or walking as for perching, and the scutellations are continued round the whole of the tarsi. Chiefly on account of this character, which is also possessed by the larks, Sundevall (Tenlamen, pp. 53-55) united the Upupidae and Alaudidae in the same " cohors " Holaspideae. Comparative anatomy, how- ever, forbids its being taken to signify any real affinity between these groups, and the resemblance on this point, which is by no means so striking as that displayed by the form of the bill and the coloration in certain larks (of the genus Cerlhilauda, for instance) , must be ascribed to analogy merely.

Pleasing as is the appearance of the hoopoe as it fearlessly parades its showy plumage, some of its habits are much the reverse. All observers agree in stating that it delights to find its food among filth of the most abominable description, and this especially in its winter-quarters. But where it breeds, its nest, usually in the hole of a tree or of a wall, is not only partly com- posed of the foulest material, but its condition becomes worse as incubation proceeds, for the hen scarcely ever leaves her eggs, being assiduously fed by the cock as she sits; and when the young are hatched, their faeces are not removed by their parents, 2 as is the case with most birds, but are discharged in the immediate neighbourhood of the nest, the unsanitary condition of which can readily be imagined. Worms, grubs, and insects generally form the hoopoes' food, and upon it they get so fat in autumn that they are esteemed a delicate morsel in some of the countries of southern Europe, and especially by the Christian population of Constantinople. 3

Not a year passes but the hoopoe makes its appearance in some part or other of the British Islands, most often in spring, and if unmolested would doubtless stop to breed in them, and a few instances are known in which it

has done so. But its remarkable plumage always attracts attention, and it is generally shot down so soon as it is seen, and before it has time to begin a nest. Eight or nine so-called species of the genus have been described, but of them the existence of five only has been recog- nized by Sharpe and Dresser (Birds of Europe, pt. vii.). Besides the Upupa epops above treated, these are U. indica, resident in India and Ceylon; U. longirostris, which seems to be the form of the Indo-Chinese countries; U. marginata, peculiar to Mada- gascar; and U. africana or U. minor of some writers, which inhabits South Africa to the Zambesi on the east and Benguela on the west coast. In habits and appearance they all resemble the best-known and most widely-spread species. 4 (A. N.)

HOORN, a seaport in the province of North Holland, Hollandˆ on a bay of the Zuider Zee called the Hoornerhop, and a junction station 235 m. by rail N. by E. of Amsterdam, on the railway to Enkhuizen, with which it is also connected by steam tramway. Pop. (1900) 10,647. Hoorn is distinguished by its old-world air and the beauty and interest of its numerous gabled houses of the 16th and 17th centuries. Many of these are decorated with inscriptions and bas-reliefs, some of which commemorate the battle on the Zuider Zee in 1573, in which the Beggars defeated the Spaniards under Count Bossu. Walks and gardens now surround the town in the place of the old city walls, but a few towers and gateways adorned with various old coats of arms are still standing. The fine Gothic bastion tower overlooking the harbour was built in 1532; the East gate not later than 1578. Among the public buildings of special interest are the picturesque St John's hospital (1563), now used for military*

2 This indeed is denied by Naumann, but by him alone; and the statement in the text is confirmed by many eye-witnesses.

3 Under the name of Dukipath, in the authorized version of the Bible translated " lapwing " (Lev. xi. 19, Deut. xiv. 18), the hoopoe was accounted unclean by the Jewish law. Arabs have a great reverence for the bird, imparting to it marvellous medicinal and other qualities, and making use of its head in all their charms (cf . Tristram, Nat. Hist, of the Bible, pp. 208, 209).

1 The genera Rhinopomastus and Irrisor are generally placed in the Family Upupidae, but Dr Murie, after an exhaustive examination of their osteology, regards them as forming a group of equal value.

purposes; the old mint; the hospital for aged men and women (beginning of 17th century); the weigh-house (1609); the town hall, in which the states of West Friesland formerly met; and the old court-house, which dates from the beginning of the 17th century, though parts of it are older, containing a modern museum and some early portraits. There are also various charitable and educational institutions, Protestant and Roman Catholic churches and a synagogue. The extensive foreign commerce which Hoorn carried on in the 16th and 17th centuries has almost entirely vanished, but there is still a considerable trade with other parts of the Netherlands, especially in cheese and cattle. The chief industries include gold and silver work, and there are also tobacco factories, saw-mills and some small boat-building yards, a considerable number of vessels being engaged in the Zuider Zee fisheries.

Hoorn, latinized as Horna or Hornum, has existed at least from the first part of the 14th century, as it is mentioned in a document of the year 1311, five years earlier than the date usually assigned for its foundation. In 1356 it received municipal privileges from Count William V. of Holland, and in 1426 it was surrounded with walls. It was at Hoorn in 1416 that the first great net was made for the herring fishery, an industry which long proved an abundant source of wealth to the town. During the 15th century Hoorn shared in the troubles occasioned by the different contending factions; in 1569 the Spanish forces entered the town; but in 1572 it cast in its lot with the states of the Netherlands. In the 16th century it was a commercial centre, important for its trade, fisheries and breweries. A company of commerce and navigation was formed at Hoorn in 1720, and the admiralty offices and storehouses remained here until their removal to Medemblik in 1795. The English under Sir Ralph Abercromby took possession of the town in 1799, and in 181 1 it suffered severely from the French. Among the celebrities of Hoorn are William Schouten, who discovered in 1616 the passage round Cape Horn, or Hoorn, as he named it in honour of his birthplace; Abel Janszoon Tasman, whose fame is associated with Tasmania; and Jan Pietersz Coen, governor- general of the Dutch East Indies.

HOOSICK FALLS, a village of Rensselaer county, New York, U.S.A., in the township of Hoosick, 27 m. N.E. of Troy, on the Hoosick river. Pop. of the village (1890) 7014; (1900) 5671, of whom 1092 were foreign-born; (1905) 5251; (1910) 5532; of the township (1900) 8631; (1910) 8315. Hoosick Falls is served by the Boston & Maine Railroad, and is connected by electric railway with Bennington, Vermont, about 8 m. E. The falls of the Hoosick river furnish water-power for the manufacture of agricultural machinery by the Walter A. Wood Mowing and Reaping Machine Co., which dates from 1866, the business having been started in 1852 by Walter Abbott Wood (1815-1892), who was a Republican representative

in Congress in 1879-1883. Other manufactures are knit goods, shirts and collars and paper- making machinery. Hoosick Falls was settled about 1688 by Dutch settlers — settlers from Connecticut and Massachusetts came after 1763 — and it was first incorporated in 1827. Three miles N.E. of the village, at Walloomsac, in the township of Hoosick, the battle of Bennington was fought, on the 16th of August 1777.

HOP (Ger. Hopfen, Fr. houblon), Humulus Lupulus, L., an herbaceous twining plant, belonging to the natural order Can- nabinaceae, which is by some botanists included in the larger group called Urticaceae by Endlicher. It is of common occur- rence in hedges and thickets in the southern counties of England, but is believed not to be native in Scotland. On the European continent it is distributed from Greece to Scandinavia, and extends through the Caucasus and Central Asia to the Altai Mountains. It is common, but doubtfully indigenous, in the northern and western states of North America, and has been introduced into Brazil, Australia and the Himalayas.

It is a perennial plant, producing annually several long twining roughish striated stems, which twist from left to right, are often 15 to 20 ft. long and climb freely over hedges and bushes. The roughness of stem and leaves is due to lines of

strong hooked hairs, which help the plant to cling to its support. The leaves are stalked, opposite, 3-5 lobed, and coarsely serrate, and bear a general resemblance to those of the vine, but are, as well as the whole plant, rough to the touch; the upper leaves are sometimes scarcely divided, or quite entire. The stipules are between the leaf-stalks, each consisting of two lateral ones united, or rarely with the tips free. The male and female flowers are produced on distinct plants. The male inflorescence (fig. 1, A) forms a panicle; the flowers consist of a small greenish five-parted perianth (a) enclosing five stamens, whose anthers (b) open by terminal slits. The female inflorescence (fig. 1, B) is less con- spicuous in the young state. The catkin or strobile consists of a number of small acute bracts, with two sessile ovaries at their base, each subtended by a rounded bractlet ©. Both the bracts and bractlets enlarge greatly during the development of the ovary, and form, when fully grown, the membranous scales of the strobile (fig. 2, a); they are known as " petals " by hop-growers. The bracts can then only be distinguished from the bractlets by being rather more acute and more strongly veined. The

Fig. 1. — Male (A) and Female (B) Inflorescence of the Hop.

*perianth (fig. 1, d) is short, cup-shaped, undivided and closely applied to the ovary, which it ultimately encloses. In the young strobile the two purp^*

hairy styles (e) of each ovary project beyond the bracts. The ovary contains a single ovule (fig. 1. /) which becomes in the fruit an exalbuminous seed, containing a spirally-coiled embryo (fig. 2, b). The light dusty pollen is carried by the wind from the male to the female flowers.

The ovary and the base of the bracts are covered with a yellowish powder, consisting of minute sessile grains, called lupulin or lupulinic glands. These glands (fig. 2, c) are from t$tt t° ttit m – m diameter, like flattened subovate little saucers-in shape, and attached to a short pedicel. The upper or hemispheri- cal portion bears a delicate continuous membrane, the cuticle, which becomes raised by the secretion beneath it of the yellowish lupulin. The stalk is not perceptible in the gland as found in commerce. When fresh the gland is seen to be filled with a yellowish or dark brown liquid; this on drying contracts in bulk and forms a central mass. It is to these lupulinic glands that the medicinal properties of the hop are chiefly due. By careful sifting about 1 oz. may be obtained from 1 lb of hops, but the East Kent variety is said to yield more than the Sussex hops.*

In hop gardens a few male plants, usually three or four to an acre, are sometimes planted, that number being deemed sufficient to fertilize the female flowers. The blossoms are produced in August, and the strobiles are fit for gathering from the beginning of September to the middle of October, according to the weather.

The cultivation of hops for use in the manufacture of beer dates from an early period. In the 8th and 9th centuries hop gardens, called " humularia " or " humuleta," existed in France and Germany. Until the 16th century, however, hops appear to have been grown in a very fitful manner, and to a limited extent, generally only for private consumption; but after the beginning of the 17th century the cultivation increased rapidly. The plant was introduced into England from Flanders in 1525; and in America its cultivation was encouraged by legislative enactments in 1657. Formerly several plants were used as well as hops to season ale, hence the name " alehoof " for Nepeta Glcchoma, and " alecost " for Balsamita vulgaris. The sweet gale, Myrica Gale, and the sage, Salvia officinalis,

Fig. 2. — Fruit of Hop.

were also similarly employed. Various Aop substitutes, in the form of powder, have been offered in commerce of late years, most of which appear

to have quassia as a chief ingredient. The young tender tops of the hop are in Belgium cut off in spring and eaten like asparagus, and are forced from December to February.

Medical Use. — The principal constituents of the strobiles are lupulin, one of the few liquid alkaloids; lupulinic acid, a bitter crystalline body, soluble in ether, which is without any other phar- macological action than that common to bitter substances; Valerol, a volatile oil which in old hops undergoes a change to the malodorous body valerianic acid; resin; trimethylamine; a peculiar modifica- 'tion of tannin known as humuiotannic acid; and a sesqui-terpene. The British pharmacopoeia contains two preparations of the strobiles, — an infusion (dose, 1-2 oz.) and a tincture (dose, l-i drachm). The glands obtained from the strobiles are known in pharmacy as lupulin, a name v/hich tends to confusion with that of the alkaloid. They occur in commerce as a bright yellow-brown powder, seen under a lens to consist of minute glandular particles. The dose of this so- called lupulin is 2-5 grains. From it there is prepared the Tinctura Lupulinae of the United States pharmacopoeia, which is given in doses of 10-60 minims. Furthermore, there are prepared hop pillows,

designed to procure sleep; but these act, when at all, mainly by suggestion. The pharmacological action of hops is determined first by the volatile oil they contain, which has the actions of its class. Similarly the lupulinic acid may act as a bitter tonic. The prepara- tions of hops, when taken internally, are frequently hypnotic, though unfortunately different specimens vary considerably in composition, none of the preparations being standardized. It is by no means certain whether the hypnotic action of hops is due to the alkaloid lupuliTi or possibly to the volatile oil which they contain. Medical practice, however, is acquainted with many more trustworthy and equally safe hypnotics. The bitter acid of hops may endow beer containing it with a certain value in cases of impaired gastric digestion, and to the hypnotic principle of hops may partly be ascribed — as well as to the alcohol — the soporific action of beer in the case of some individuals.

Hop Production in England x

The cultivation of hops in the British Isles is restricted to England, where it is practically confined to half-a-dozen counties — four in the south-eastern and two in the west-midland districts. In 1901 the English crop was reported by the Board of Agri- culture to occupy 51,127 acres. The official returns as to acreage do not extend back beyond 1868, in which year the total area was reported to be 64,488 acres. The largest area recorded since then was 71,789 acres in 1878; the smallest was 44,938 acres in 1907. The extent to which the areas of hops in the chief hop-growing counties

vary from year to year is sufficiently indicated in Table I., which shows the annual acreages over a period of thirteen years, 1895 to iQ°7- The proportions in which the acres of hops are distributed amongst the counties concerned vary but little year by year, and as a rule over 60% belongs to Kent.

Table I.— Hop Areas of England 189$ to 1907. Acres.

1895

Kent.

Hereford.

Sussex.

Worcester.

Hants.

Surrey.

35,oi8

7553

7489

4024

2875

1783

1896

33,3°°

6895

59o8

3800

2494

1623

1897

31,661

6542

5174

3591

2306

1416

1898

30,941

6651

4829

3567

2263

1313

1899

31,988

7227

4949

3788

2319

1388

1900

31,514

7287

4823

3964

2231

1300

1 90 1

31,242

7497

4.800

4029

2133

1232

1902

29,649

6915

4541

3779

2003

969

1903

29,933

6851

4454

3697

1920

901

1904

29,841

6767

4474

3752

1900

877

1905

30,655

6851

4647

3807

1978

843

1906

29,296

6481

4379

3672

1939

777

1907

28,169

6i43

4243

3622

1842

744

Less than 200 acres in all are annually grown in the other hop- growing counties of England, these being Shropshire, Gloucester- shire and Suffolk.

The average yield per acre in cwt. in the six counties during the decade 1897 to 1906 was as follows: —

Table II.

Kent.

Hereford.

Sussex.

Worcester.

Hants.

Surrey.

9-31

7-14

9-41

779

8-78

7-23

Table III. shows the average acreage, yield and total home produce of England during the decades 1888-1897 and 1898-

1907.

Table III.

Periods.

Average Annual Acreage.

Average Annual Yield per acre

(cwt.).

Average Annual Home Produce.,

(cwt,).

1888-1897 1898-1907

56,370 48,841

776 8-84

438,215 434,567

The wide fluctuations in the home production of hops are worthy of note, as they exercise a powerful influence upon market prices. The largest crop between 1885, the first year in which figures relating to production were collected, and 1907 was

1 See Report from the Select Committee on the Hop Industry (London, 1908).

that of 776,144 cwt. in 1886, and the smallest that of 281,291 cwt. in 1888, the former being more than 2\ times the size of the latter. The crop of 1899, estimated at 661,373 cwt., was so large that prices receded to an extent such as to leave no margin of profit to the great body of growers, whilst some planters were able to market the crop only at a loss. The calculated annual average yields peracre over the years 1885 to 1907 ranged between 12-76 cwt. in 1899 and 4-81 cwt. in 1888. No other staple crop of British agriculture undergoes such wide fluctuations in yield as are here indicated, the size of the crop produced bearing no relation to the acreage under cultivation. For example, the 71.327 acres in 1885 produced only 509,170 cwt., whereas the 51 843 acres in 1899 produced 661,373 cwt. — 19,484 acres less under crop yielded 152,203 cwt. more produce.

Comparing the quantities of home-grown hops with those of imported hops,

of the total available for consumption about 70 % on the average is home produce and about 30% is imported produce. The imports, however, do not vary so much as the home .produce. Table IV. shows the average quantity of imports to and exports (home-grown) from Great Britain during the decades 1877-1886, 1887-1896 and 1897-1906.

Table IV.

Periods.

Annual Average Imports (cwt.).

Annual Average Exports (cwt.).

1 877-1 886 1 887-1 896 1 897-1906

215,219 194,966 186,362

10,805

9.437 14,808

The highest and lowest imports were 266,952 cwt. in 1885 and 145.122 cwt. in 1887, the latter in the year following the biggest home-grown crop on record. On a series of years the largest proportion of imports is from the United States.

During the twenty-five years 1881-1905 the annual values of the hops imported into England fluctuated between the wide limits of £2,962,631 in 18S2 and £427,753 in 1887. In five other years besides 1882 the value exceeded a million sterling. The annual average value over the whole period was £921,000, whilst the annual average import was 194,000 cwt., consequently the average value per cwt. was nearly £4, 15s., which is approxi- mately the same as that of the exported product. The quantities and values of the imported hops that are again exported are almost insignificant.

Hop Production in the United States

The distribution of the area of hop-cultivation in the United States showed great changes during the last decades of the 19th and the first decade of the 20th century. During the earlier portion of that period New York was the chief hop-growing state of the Union, but toward the end of it a great extension of hop-growing took place on the Pacific coast (in the states of Oregon, California and Washington), where the richness of the soil and mildness of the climate are favourable to the bines.

The average annual produce of hops in the United States from 1900 to 1906 was 423,471 cwt.; of this quantity 80 % was raised in the three states of the Pacific coast, where the yield per acre is much larger than in New York. In the latter state the yield does not appear to exceed 5 or 6 cwt. per acre, whereas in Oregon it is 9 or 10 cwt., and in Washington and California from 12 to 14 cwt. The average annual export (chiefly to Great Britain) in the years from 1899 to 1905 was 108,400 cwt.; the average import (chiefly from Germany) is about 50,000 cwt.

Hop Cultivation

As the county of Kent has always taken the lead in hop- growing in England, and as it includes about two-thirds of the hop acreage of the British Isles, the recent developments in hop cultivation cannot be better studied than in that county. They were well summarized by Mr Charles Whitehead in his sketch of the agriculture of Kent, 1 wherein he states that the hop grounds or hop gardens, as they are called in Kent — of 1 Jour. Roy. Agric. Soc 1899.

poor character and least suitable for hop production have been gradually grubbed since 1894, on account of large crops, the importation of hops and low prices. At the beginning of the 19th century there were 290 parishes in Kent in which hops were cultivated. A century later, out of the 413 parishes in the county, as many as 331 included hop plantations. The hops grown in Kent are classified in the markets as " East Kents," " Bastard East Kents," " Mid Kents " and " Wealds," according to the district of the county in which they are produced. The relative values of these four divisions follow in the same order, East Kents making the highest and Wealds the lowest rates. These divisions agree in the main with those defined by geo- logical formations. Thus, " East Kents " are grown upon the Chalk, and especially on the outcrop of the soils of the London Tertiaries upon the Chalk. " Bastard East Kents " are produced on alluvial soil and soils formed by admixtures of loam, clay- loams, chalk, marl and clay from the Gault, Greensand and Chalk formations. " Mid Kents " are derived principally from the Greensand soils and outcrops of the London Tertiaries in the upper part of the district. " Wealds " come from soils on the Weald Clay, Hastings Sand and Tunbridge Wells Sand. As each " pocket " of hops must be marked with the owner's name and the parish in which they were grown, buyers of hops can, without much trouble, ascertain from which of the four divisions hops come, especially if they have the map of the hop-growing parishes of England, which gives the name of each parish. There has been a considerable rearrangement of the hop plantations in Kent within recent years. Common varieties as Colegate's, Jones's, Grapes and Prolifics have been grubbed, and Goldings, Bramlings and other choice kinds planted in their places. The variety known as Fuggle's, a heavy-cropping though slightly coarse hop, has been much planted in the Weald of Kent, and in parts of Mid Kent where the soil is suitable. In very old hop gardens, where there has been no change of plant for fifty or even one hundred years in some instances, except from the gradual process of filling up the places of plants that have died, there has been replanting with better varieties and varieties ripening in more convenient succession; and, generally speaking, the plantations have been levelled up in this respect to suit the demand for bright hops of fine quality. A recent classification 2 of the varieties of English hops arranges them in

three groups: (1) early varieties (e.g. Prolific, Bramling, Amos's Early Bird); (2) mid-season or main-crop varieties (e.g. Farnham Whitebine, Fuggle's, Old Jones's, Golding) ; (3) late varieties (e.g. Grapes, Colgate's).

The cost of cultivating and preparing the produce of an acre of hop land tends to increase, on account of the advancing rates of wages, the intense cultivation more and more essential, and the necessity of freeing the plants from the persistent attacks of insects and fungi. In 1893 Mr Whitehead estimated the average annual cost of an acre of hop land to be £35, 10s., the following being the items: —

Manure (winter and summer)

Digging .

Dressing (or cutting)

Poling, tying, earthing, ladder-tying, stringing,

lewing

Shimming, nidgeting, digging round and hoeing

hills . ' . .

Stacking, stripping, making bines, &c.

Annual renewal of poles

Expense of picking, drying, packing, carriage,

sampling, selling, &c., on average crop of, say,

7 cwt. per acre

Rent, rates, taxes, repairs of oast and tacks, interest

on capita!

Sulphuring

Washing (often two, three or four times) . .

Total

Seven years later the average cost per acre in Kent quite £'37-

2 T. Penival, "The Hop and its English Varieties,' .1 «/•/<:. -Soc, 1 90 1.

£6 o

o

17 10

6

1

2

£35

10

had risen to

Jour. Roy.

68o

HOP

The hops in Kent are usually planted in October or November, the plants being 6 ft. apart each way, thus giving 1210 hills or plant-centres per acre. Some planters still grow potatoes or mangels between the rows the first year, as the plants do not bear much until the second year: but this is considered to be a mistake, as it encourages wire-worm and exhausts the ground. Many planters pole hop plants the first year with a single short pole, and stretch coco-nut-fibre string from pole to pole, and grow many hops in the first season. Much of the hop land is ploughed between the rows, as labour is scarce, and the spaces between are dug afterwards. It is far better to dig hop land if possible, the tool used being the Kent spud. The cost of digging an acre ranges from 18s. to 21s. Hop land is ploughed or dug between November and March. After this the plants are " dressed," which means that all the old bine ends are cut off with a sharp curved hop-knife, and the plant centres kept level with the eround.

Manuring. — Manure is applied in the winter, and dug or ploughed in. London manure from stables is used to an enormous extent. It comes by barge or rail, and is brought from the wharves and stations by traction engines; it costs from 7s. 6d. to 9s. per load. Rags, fur waste, sprats, wool waste and shoddy are also put on in the winter. In the summer, rape dust, guano, nitrate of soda and various patent hop manures are chopped in with the Canter- bury hoe. Fish guano or desiccated fish is largely used; it is very

stimulating and more lasting than some of the other forcing manures.

The recent investigations into the subject of hop-manuring made by Dr Bernard Dyer and Mr F. W. E. Shrivell, at Golden Green, near Tonbridge, Kent, are of interest. In the 1901 report l it was stated that the object in view was to ascertain how far nitrate of soda, in the presence of an abundant supply of phosphates and potash, is capable of being advantageously used as a source of nitrogenous food for hops. An idea long persisted among hop-growers that nitrate of soda was an unsafe manure for hops, being likely to produce rank growth of bine at the expense of quality and even quantity of hops. During recent years, however, owing very largely tp the results of

Weight of Kiln-dried Fuggle's Hops per Acre.

Average

Plot.

Annual Manuring per Acre.

1896

1897

1898

1899

1900

of 5 Years.

Cwt.

Cwt.

Cwt.

Cwt.

Cwt.

Cwt.

A

Phosphates and potash .

*13**

7i

84

204

8

ni

B

Phosphates, potash and

2 cwt. nitrate of soda .

i6§

Qt

1 o4

22i

Q?

*13**

C

Phosphates, potash and

4 cwt. nitrate of soda .

l6i

12

*12**

2 3

11

15

D

Phosphates, potash and

6 cwt. nitrate of soda .

*IS**

13

r 3

22 J

io§

*14**

E

Phosphates, potash and

8 cwt. nitrate of soda .

15

M+

154

23i

11

15J

F

Phosphates, potash and

10 cwt. nitrate of soda

15

!3

15

24J

io|

15!

X

30 loads (about 15 tons)

London dung .

13

8

*9**

24J

10J

I3i

In only one year did the very large dressing of 10 cwt. of nitrate of soda per acre afford any better result than was produced by the less heavy dressing of 8 cwt. per acre, and this was in 1899, a "season of such abundance and such low prices that it may be regarded as an abnormal season. If the effect of this one season on the average be eliminated, the best results, as regards quantity, were obtained on plot E, receiving 8 cwt. of nitrate of soda per acre. But plot C, with 4 cwt. only of nitrate of soda per acre, has been on the average not more than J cwt. per acre behind plot E.

Valuations of the hops made by merchants and factors show that, on the whole, the market quality of the produce is very little affected by manuring. Moreover, chemical investigation of the hops appears to indicate that the brewing quality is not in any constant or definite way influenced by the manuring, except where the quantity of nitrate of soda has amounted to the large dressing of 8 cwt. or more per acre, a quantity which in some seasons would seem to have been pre- judicial, although in one season it happened that the highest brewing value appertained to a sample grown with as much as 10 cwt. per acre.

The results of modern investigation show that it is very largely to the

presence and proportion of soft resin that hops owe their preservative value, although the quality of hops is by no means wholly dependent on this one feature. The resin percentages on the samples grown on the several plots in 1898, 1899 and 1900 were the following : —

Plot.

Annual Manuring per Acre.

1898

1899

1900

Total Resin.

Soft Resin.

Total Resin.

Soft Resin.

Total Resin.

Soft Resin.

A B C D E F X

Phosphates and potash

Phosphates, potash and 2 cwt. nitrate of soda Phosphates, potash and 4 cwt. nitrate of soda Phosphates, potash and 6 cwt. nitrate of soda Phosphates, potash and 8 cwt. nitrate of soda Phosphates, potash and 10 cwt. nitrate of soda 30 loads (about 15 tons) London dung

Per Cent.

14-15 14-30 14-06

13-57 14-11

12-21

13-93

Per Cent.

9-21 9-20

9-04

8-6o

8-85 7-91 8-66

Per Cent.

15-07 16-59

15-87 14-90 14-49

15-47 14-92

Per Cent. 8-6o

8-83 9-27 8-70 8-96 9.41

8-8o

Per Cent.

H-53

1509 14-46 13-46 13-30 12-77 14-78

Per Cent.

8-90

8-51

8-i6

7-62 7-18 6-77 9-07

these experiments, and of corresponding experiments based upon these, which have been carried out abroad, hop farmers have much more freely availed themselves of the aid of this useful manure ; and there is little doubt that the distrust of nitrate of soda as a hop manure which has existed in the past has been largely due to the fact that nitrate of soda, like many other nitrogenous manures, has often been misused (1) by being applied without a sufficient quantity of phosphates and potash, or (2) by being applied too abundantly, or (3) by being applied too late in the season, with the result of unduly delaying the ripening period. On most of

the experimental plots nitrate of soda (in conjunction with phosphates and potash) has been used as the sole source of nitrogen; but it is, of course, not be to supposed that any hop-grower would use year after year, as is the case on some of the plots, nothing but phosphates, potash and nitrate of soda. Miscellaneous feeding is probably good for plants as well as for animals, and there is a large variety of nitrogenous manures at the disposal of the hop-farmer, to say nothing of what, in its place, is one of the most valuable of all manures, namely, home-made dung. These experiments were begun in 1894 with a new garden of young Fuggle's hops. A series of experimental plots was marked out, each plot being one-sixth of an acre in area. The plots run parallel with one another, there being four rows of hills in each. The climate of the district is very dry.

The table given above shows the annual yield of hops per acre on each plot, and also the average for each plot over the five years

1896-1900.

^"ears' Experiments on Hop Manuring (London. 1901).

The general results seem to show that the purchase of town dung for hops is not economical, unless under specially favourable terms as to cost of conveyance, and that it should certainly not be relied upon as a sufficient manure. Home-made dung is in quite a different position, as not only is it richer, but it costs nothing for railway carriage. As a source of nitrogenous manure, purchased dung is on the whole too expensive. There is a large variety of other nitrogen- ous manures in the market besides nitrate of soda, such, for instance as Peruvian and Damaraland guano, sulphate of ammonia, fish guano, dried blood, rape dust, furriers' refuse, horn shavings, hoof parings, wool dust, shoddy, &c. All of these may in turn be used for helping to maintain a stock of nitrogen in the soil ; and the degree to which manures of this kind have been recently applied in any hop garden will influence the grower in deciding as to the quantity of nitrate of soda he should use in conjunction with them, and also to some extent in fixing the date of its application.

Dressings of 8 or 10 cwt. of nitrate of soda per acre, such as are applied annually to plots E and F, would be larger than would be put on where the land has been already dressed with dung or with other nitrogenous manures; and even, in the circumstances under notice, although these plots have on the average beaten the others in weight, the hops in some seasons have been distinctly coarser than those more moderately manured — though in the dry season of 1899 the most heavily dressed plot gave actually the best quality as well as the greatest quantity of produce.

With regard to the application of nitrate of soda in case the season should turn out to be wet, present experience indicates that, on a ■soil otherwise iiberally manured, 4 cwt. of nitrate of soda per acre

applied not too late, would be a thoroughly safe dressing. In the case of neither dung nor any other nitrogenous fertilizers having been recently applied, there seems no reason for supposing that, even in a wet season, 6 cwt. of nitrate of soda per acre applied early would be otherwise than a safe dressing, considering both quantity and quality of produce. In conjunction with dung, or with the early use of other nitrogenous manures, such as fish, guano, rape dust, &c. it would probably be wise not to exceed 4 cwt. of nitrate of soda per acre.

As to the date of application, April or May is the latest time at which nitrate of soda should, in most circumstances, be applied, and probably April is preferable to May. The quantity used should be applied in separate dressings of not more than 2 cwt. per acre each, put on at intervals of a month. Where the quantity of nitrate of soda used is large, and constitutes the whole of the nitrogenous manure employed, the first dressing may, on fairly deep and retentive soils, be given as early as January ; or, if the quantity used is smaller, say in February; while February will, in most cases, probably be early enough for the first dressing in the case of lighter soils. The condition of the soil and the degree and distribution of rainfall during both the previous autumn and the winter, as well as in the spring itself, produce such varying conditions that it is almost impossible to frame general rules.

The commonly accepted notion that nitrate of soda is a manure which should be reserved for use during the later period of the growth of the bine appears to be erroneous. The summer months, when the growth of the bine is most active, are the months in which natural nitrification is going on in the soil, converting soil nitrogen and the nitrogen of dung, guano, fish, rape dust, shoddy or other fertilizers into nitrates, and placing this nitrogen at the disposal of the plants; and it appears reasonable, therefore, to suppose that nitrate of soda will be most useful to the hops at the earlier stages of their growth, before the products of that nitrification become abundant. This would especially be so in a season immediately following a wet autumn and winter, which have the effect of washing away into the drains the residual nitrates not utilized by the previous crop.

The necessity, whether dung is used or not, and whatever form of

nitrogenous manure is employed, of also supplying the hops with an abundance of phosphates, cannot be too strongly urged. The use of phosphates for hops was long neglected by hop-planters, and even now there are many growers who do not realize the full importance of heavy phosphatic manuring. On soils containing an abundance of lime no better or cheaper phosphatic manure can be used than ordinary superphosphate, of which as much as 10 cwt. per acre may be applied without the slightest fear of harm. But if the soil is not de- cidedly calcareous — that is to say, if it does not effervesce when it is stirred up with some diluted hydrochloric (muriatic) acid — bone dust, phosphatic guano or basic slag should be used as a source of phos- phates, at the rate of not less than 10 cwt. per acre. On medium soils, which, without being distinctly calcareous, nevertheless contain a just appreciable quantity of carbonate of lime, it is probably a good plan to use the latter 'class of manures, alternately with super- phosphate, year and year about ; but it is wise policy to use phos- phates tn some form or other every year in every hop garden. They are inexpensive, and without them neither dung, nitrate of soda, ammonia salts nor organic manures can be expected to produce both a full vigorous growth of bine and at the same time a well-matured crop of full-weighted, well-conditioned hops.

The use of potash salts, on most soils, is probably not needed when good dung is freely used ; but where this is not the case it is safer in most seasons and on most soils to give a dressing of potash salts. On some soils their aid should on no account be dispensed with.

Experiments in hop-manuring have also been conducted in con- nexion with the South-Eastern Agricultural College, Wye, Kent. The main results have been to demonstrate the necessity of a liberal supply of phosphates, if the full benefit is to be reaped from applica- tions of nitrogenous manure.

Tying, Poling and Picking.— Tying the bines to the poles or Strings is essentially women's work. It was formerly always piecework, each woman taking so many acres to tie, but it is found better to pay the women is. 8d. to 2s. per day, that they may all work together, and tie the plants in those grounds where they want tying at once. The new modes of poling and training hop plants have also altered the conditions of tying.

Many improvements have been made in the methods of poling and training hops. Formerly two or three poles were placed to each hop-hill or plant-centre in the spring, and removed in the winter, and this was the only mode of training. Recently systems of training on wires and strings fastened to permanent upright poles have been introduced. One arrangement of wires and strings much adopted consists of stout posts set at the end of every row of hop-hills and fastened with stays to keep them in place. At intervals in

each row a thick pole is fixed. From post to post in the rows a wire is stretched at a height of 5 ft. from the ground, another about 6 ft. from the ground, and another

along the tops of the posts, so that there are three wires. Hooks are clipped on these wires at regular intervals, and coco-nut- fibre strings are threaded on them and fastened from wire to wire, and from post to post, to receive the hop bines. The string is threaded on the hooks continuously, and is put on those of the top wire with a machine called a stringer. There are several methods of training hops with posts or stout poles, wire and string, whose first cost varies from £20 to £40 per acre. The system is cheaper in the long run than that of taking down the poles every year, and the wind does not blow down the poles or injure the hops by banging the poles together. In another method, extensively made use of in Kent and Sussex, stout posts are placed at the ends of each row of plants, and, at intervals where requisite, wires are fastened from top to top only of these posts, whilst coco-nut-fibre strings are fixed by pegs to the ground, close to each hop-stock, whence they radiate upwards for attachment to the wires stretching between the tops of the posts. This method is more simple and less expensive than the system first described, its cost being from £24 to £28 per acre. In this case the plants require to be well " lewed," or sheltered, as the strings being so light are blown about by the wind. These methods are being largely adopted, and, together with the practice of putting coco-nut-fibre strings from pole to pole in grounds poled in the old-fashioned manner, are important improvements in hop culture, which have tended to increase the production of hops. Where the old system of poling with two or three poles is still adhered to they are always creosoted, most growers having tanks for the purpose; and, in the new methods of poling, the posts and poles are creosoted, dipped or kyanized.

At Wye College, Kent, different systems of planting and training have been tried, the alleys varying in width from 10 ft. down to 5 ft., and the distance between the hills varying quite as widely, so that the number of hills to the acre has ranged from 1 2 10 down to 660. The biggest crop was secured on the plot where hills were 8 ft. apart each way. As a rule, indeed, a wide alley and abundant space between the plants, thus allowing the hops plenty of air and light, produced the best results, besides effecting some saving in the cost of cultivation, as there were only 660 or 680 hills per acre. Of the various methods of training, the umbrella system gave the biggest crop in each of the three years,i8oo, i 00 o, 1901; and it seemed to be the best method, except in seasons when washing was required early, in which case the plants were not so readily cleared of vermin.

Much attention is required to keep the bines in their places on the poles, strings or wire, during the summer. This gives employment to many women,

for whose service in this and fruit- picking there is considerable demand, and a woman has no trouble in earning from is. 6d. to is. iod. per day from April till September at pleasant and not very arduous labour. The hop-picking follows, and at this women sometimes get 4s. and even 5s. per day. This is the real Kent harvest, which formerly lasted a month or five weeks. Now it rarely extends beyond eighteen days, as it is important to secure the hops before the weather and the aphides, which almost invariably swarm within the bracts of the cones, discolour them and spoil their sale, as brewers insist upon having bright, " coloury " hops. Picking is better done than was formerly the case. The hops are picked more singly, and with comparatively few leaves, and the pickers are of a somewhat better type than the rough hordes who formerly went into Kent for "hopping." Kent planters engage their pickers beforehand, and write to them, arranging the numbers required and the date of picking Many families go into Kent for pea-and fruit-picking and remain for hop-picking. Without this great immigration of persons, variously estimated at between 45,000 and 65,000, the crops of hops could not be picked; and fruit-farmers also would be unable to get their soft fruit gathered in time without the help of immigrant hands. The fruit-growers and hop-planters of Kent have greatly improved the accommodation for these immigrants.*

Concerning the general question as to the advisability or otherwise of cutting the hop bine at the time of picking, A.D.

Hall has ascertained experimentally that if the bine is cut close to the ground at a time when the whole plant is unripe there are removed in the bine and leaves considerable quantities of nitrogen, potash and phosphoric acid which would have returned to the roots if the bine had not been cut until ripe. The plant, therefore, would retain a substantial store of these constituents for the following year's growth if the bine were left. Chemical analyses have shown that about 30 lb of nitrogen per acre may be saved by allowing the bines to remain uncut, this representing practically one-third of the total amount of nitrogen in the hops, leaf and bine together. There are also from 25 lb to 30 lb of potash in the growth, of which nine-tenths would return to the roots, with about half the phosphoric acid and a very small proportion of the lime. It has been demon- strated that by the practice of cutting the bines when the hops are picked the succeeding crop is lessened to the extent of about one-tenth. As to stripping off the leaves and lower branches of the plant, it was found that this operation once reduced the crop 10 % and once 20 %, but that in the year 1890 it did not affect the crop at all. The inference appears to be that when there is a good crop

it is not reduced by stripping, but that when there is less vigour in the plant it suffers the more. Hence, it would seem advisable to study the plant itself in connexion with this matter, and to strip a little later, or somewhat less, than usual when the bine is not healthy.

Drying. — After being picked, the hops are taken in pokes — long sacks holding ten bushels — to the oasts to be dried. The oasts are circular or square kilns, 01 groups of kilns, wherein the green hops are laid upon floors covered with horsehair, under which are enclosed or open stoves or furnaces. The heat from these is evenly distributed among the hops above by draughts below and round them. This is the usual simple arrangement, but patent processes are adopted here and there, though they are by no means general. The hops are from nine to ten hours drying, after which they are taken off the kiln and allowed to cool somewhat, and are then packed tightly into " pockets " 6 ft. long and 2 ft. wide, weighing ij cwt., by means of a hop-pressing machine, which has cogs and wheels worked by hand. Of late years more care has been bestowed by some of the leading growers upon the drying of hops, so as to preserve their qualities and volatile essences, and to meet the altered requirements of brewers, who must have bright, well-managed hops for the production of light clear beers for quick draught. The use, for example, of exhaust fans, recently introduced, greatly facilitates drying by drawing a large volume of air through the hops; and as the temperature may at the same time be kept low, the risk of getting over- fired samples is considerably reduced, though not entirely ob- viated. The adoption of the roller floor is another great advance in the process of hop-drying, for this, used in conjunction with a raised platform for the men to stand on when turning, pre- vents any damage from the feet of the workmen, and reduces the loss of resin to a minimum. The best results are obtained when exhaust fans and the roller floor are associated together. In such cases the roller floor, which empties its load automati- cally, pours the hop cones into the receiving sheets in usually as whole and unbroken a condition as that in which they went on to the kiln.

Pests of the Hop Crop. — In recent years the difficulties attendant upon hop cultivation have been aggravated, and the expenses in- creased, by regularly recurring attacks of aphis blight — due to the insect Aphis (Phorodon) hamuli — which render it necessary to spray or syringe every hop plant, every branch and leaf, with insecticidal solutions three or four times, and sometimes more often, in each season. Quassia and soft-soap solutions are usually employed ; they contain from 4 fb to 8 lb of soft soap, and the extract of from 8 lb to 10 ft) of quassia chips to 100 gallons of water. The soft soap serves as a vehicle to retain the bitterness of the quassia upon the bines and leaves, making them repulsive to the aphides, which are thus starved out. Another pest, the red spider, Tetranychus

telarius — really one of the " spinning mites " — is most destructive in very hot summers. Congregating on the under surfaces of the leaves, the red spiders exhaust the sap and cause the leaves to fall, producing the effect known in Germany as " fire-blast." The hop-wash of soft soap and quassia, so effective against aphis attack, is of little avail

in the case of red spider. Some success, however, has attended the use of a solution containing 8 lb to 10 lb of soft soap to 100 gallons of water, with three pints of paraffin added. It is necessary to apply the washes with great force, in order to break through the webs with which the spiders protect themselves. Hop-washing is done by means of large garden engines worked by hand, but more frequently with horse engines. Resort is sometimes had to steam engines, which force the spraying solution along pipes laid between the rows of hops.

Mould or mildew is frequently the source of much loss to hop- planters. It is due to the action of the fungus Podosphaera castagnei, and the mischief is more especially that done to the cones. The only trustworthy remedy is sulphur, employed usually in the form of flowers of sulphur, from 40 lb to 60 lb per acre being applied at each sulphuring. The powder is distributed by means of a machine drawn by a horse between the rows. The sulphur is fed from a hopper into a blast-pipe, whence it is driven by a fan actuated by the travelling wheels, and falls as a dense, wide-spreading cloud upon the hop-bines. The first sulphuring takes place when the plants are fairly up the poles, and is repeated three or four weeks later; and even again if indications of mildew are present. It may be added that sulphur is also successfully employed in the form of an alka- line sulphide, such as solution of " liver of sulphur," a variety of potassium sulphide. (W. Fr.)

HOPE, ANTHONY, the pen-name of Anthony Hope Hawkins (1863-), British novelist, who was born on the oth of February 1863, the second son of the Rev. E. C. Hawkins, Vicar of St Bride's, Fleet Street, London. He was educated at Marlborough and Balliol College, Oxford, where he was president of the Union Society, and graduated with first classes in Modera- tions and Final Schools. He was called to the bar at the Middle Temple in 1877. He soon began contributing stories and sketches to the St James's Gazette, and in 1890 published his first novel, A Man of Mark. This was followed by Father Stafford (1891), Mr Witt's Widow (1892), Change of Air and Sport Royal and Other Stories (1893). By this time he had attracted by his vivacious talent the attention of editors and readers; but it was not till the following year that he attained a great popular success with the publication (May 1894) of The Prisoner of Zenda. This was followed a few weeks later by The Dolly Dia- logues (previously published in separate instalments in the Westminster Gazette). Both books became parents of a numerous progeny. The Prisoner of Zenda, owing something to the Prince

Otto of R. L. Stevenson, established a fashion for what was christened, after its fictitious locality, " Ruritanian romance "; while the Dolly Dialogues, inspired possibly by " Gyp " and other French dialogue writers, was the forerunner of a whole school of epigrammatic drawing-room comedy. The Prisoner of Zenda, with Mr Alexander as " Rupert Rassendyll," enjoyed a further success in a dramatized form at the St James's Theatre, which did still more to popularize the author's fame. In 1894 also appeared The God in the Car, a novel suggested by the ambiguous influence on English society of Cecil Rhodes's career; and Half a Hero, a complementary study of Australian politics. The same year saw further the publication of The Indiscretion of the Duchess, in the style of the Dolly Dialogues, and of another collection of stories named (after the first) The Secret of Wardale Court. In 1895 Mr Hawkins published Count Antonio, and contributed to Dialogues of the Day, edited by Mr Oswald Craw- furd. Comedies of Courtship and The Heart of the Princess Osra followed in 1896; Phroso in 1897; Simon Dale and Rupert of Hentzau (sequel of the Prisoner of Zenda) 1898; and The King's Mirror, a Ruritanian romance with an infusion of serious psychological interest, 1899. The author was advancing from his light comedy and gallant romantic inventions to the graver kind of fiction of which The God in the Car had been an earlier essay. Quisante, published in 1900, was a study of English society face to face with a political genius of an alien type. Tristram of Blent (1901) embodied an ethical study of family pride. The Intrusions of Peggy reflected the effects on society of recent financial fashions. In 1904 he published Double Harness, and in 1905 A Servant of the Public, two novels of modern society, containing somewhat cynical pictures of the condition of marriage. With increasing gravity the novelist sacrificed some of the charm of his earlier irresponsible gaiety and buoyancy; but his art retained its wit and urbanity while

it gained in grip of the social conditions of contemporary life. He wrote two plays. The Adventure of Lady Ursula (1898) and Pilkcrton's Peerage (1902), and his later novels include The Great Miss Driver (1908) and Second String (1909). Mr Hawkins's attractive and cultured style and command of plot give him a high place among the modern writers of English fiction. In 1903 he married Miss Elizabeth Somerville Sheldon of New York.

HOPE, THOMAS (c. 1770-1831), English art-collector, and author of Anastasius, born in London about 1770, was the eldest son of John Hope of Amsterdam, and was descended from a branch of an old Scottish family

who for several generations were extensive merchants in London and Amsterdam. About t he age of eighteen he started on a tour through various parts of Europe, Asia and Africa, where he interested himself especi- ally in architecture and sculpture, making a large collection of Ihe principal objects which attracted his attention. On his return to London about 1796 he purchased a house in Duchess Street, Cavendish Square, which he fitted up in a very elaborate st vie, from drawings made by himself. In 1807 he published sketches of his furniture, accompanied by letterpress, in a folio volume, entitled Household Furniture and Interior Decoration, which had considerable influence in effecting a change in the upholstery and interior decoration of houses, notwithstanding that Byron had referred scornfully to him as " House-furnisher withal, one Thomas hight." Hope's furniture designs were in that pseudo-classical manner which is generally called " English Empire." It was sometimes extravagant, and often heavy, but was much more restrained than the wilder and later flights of Sheraton in this style. At the best, however, it was a not very inspiring mixture of Egyptian and Roman motives. In 1809 he published the Costumes of the Ancients, and in 18 12 Designs of Modern Costumes, works which display, a large amount of antiquarian research. He was also, as his father had been — the elder Hope's country house near Haarlem was crowded with fine pictures — a munificent patron of the highest forms of art, and both at his London house and his country seat at Deepdene near Dorking he formed large collections of paintings, sculpture and antiques. Deepdene in his day became a famous resort of men of letters as well as of people of fashion, and among the luxuries suggested by his fine taste was a miniature library in several languages in each bedroom. Thorvaldsen, the Danish sculptor, was indebted to him for the early recognition of his talents, and he also gave frequent employment to Chantrey and Flaxman — it was to his order that the latter illustrated Dante. In t8iq he published anonymously his novel Anastasius, or Memoirs of a Modern Greek, written at the close of the iSth century, a work which, chiefly on account of the novel character of its subject, caused a great sensation. It was at first generally attributed to Lord Byron, who told Lady Blessington that he wept bitterly on reading it because he had not written it and Hope had. But, though remarkable for the acquaintance it displays with Eastern life, and distinguished by considerable imaginative vigour and much graphic and picturesque descrip- tion, its paradoxes are not so striking as those of Lord Byron; and. notwithstanding some eloquent and forcible passages, the only reason which warranted its ascription to him was the general type of character to which its hero belonged. Hope died on the 3rd of February 1831. He was the author of two works published posthumously — the Origin and Prospects of Man (1831). in which his speculations diverged widely from the usual orthodox opinions, and an Historical Essay on Archi- tecture (1835), an elaborate description of the architecture of the middle ages,

illustrated by drawings made by himself in Italy and Germany. He is commonly known in literature as " Anastasius " Hope. He married (1806) Louisa de la Poer Beresford, daughter of Lord Dccies, archbishop of Tuatn.

HOPEDALE, a township of Worcester county, Massachusetts, U.S.A.; pop. (1905; state census) 2048; (1910) 2188. It is served by the Milford & Uxbridge (electric) street railway, and (for freight) by the Grafton &: Upton railway. The town lies in the " dale "' between Milford and Mendon, and is cut from i.\V. to S.E. by the Mill river, which furnishes good water

power at its falls. The principal manufactures are textiles, boots and shoes, and, of most importance, cotton machinery. The great cotton machinery factories here are owned by the Draper Company. Hopedale has a public park on the site of the Ballou homestead, with a bronze statue of Adin Ballou; a memorial church erected by George A. and Eben S. Draper; the Bancroft Memorial Library, given by Joseph B. Bancroft in memory of his wife; and a marble drinking fountain with statuary by Waldo Story, the gift of Susan Preston Draper, General W. F. Draper's wife. The village is remarkable for the comfortable cottages of the workers.

The history of Hopedale centres round the Rev. Adin Ballou (1803-1890), a distant relative of Hosea Ballou; 1 he left, in succession, the ministry of the Christian Connexion (1823) and that of the Universalist Church (1831), because of his restorationist views. In 183 1 he became pastor of an independent church in Mendon. An ardent exponent of temperance, the anti-slavery movement, woman's rights, the peace cause and Christian non-resistance (even through the Civil War), and of " Practical Christian Socialism," it was in the interests of the last cause that he founded Hopedale, or "Fraternal Community No. 1," in Milford, in April 1842, the first compact of the com- munity having been drawn up in January 1841. Thirty persons joined with him, and lived in a single house on a poor farm of 258 acres, purchased in June T841. Ballou was for several years the president of the community, which was run on the plan that all should have an equal voice as to the use of property, in spite of the fact that there was individual holding of property. The community, however, owned the instruments of production, with the single exception of the important patent rights held by Ebenezer D. Draper. The result was bickerings between those who were joint stockholders and those whose only profit came from their manual labour. In a short time the control of the community came into the hands of its richest members, E. D. Draper and his brother, George Draper (1817-1887), who owned three-fourths of the joint stock. In 1856 there was a total deficit of about $12,000. The Draper brothers bought up the joint stock of the community at par and paid its debts, and the com- munity soon ceased to exist save as a religious society. After George Draper's death the control of the mills passed to his sons.. These included

General William Franklin Draper (1842-1910), a Republican representative in Congress in 1892-1897 and U.S. ambassador to Italy in 1897-1900, and Eben Sumner Draper (b. 1858), lieutenant-governor of Massachusetts in 1906-1908 and governor in 1909-1911. In 1867 the community was merged with Hopedale parish, a Unitarian organization. Hopedale was separated from Milford and incorporated as a township in 1886. See Adin Ballou's History of Milford (Boston, 1882), his History of the Hopedale Community, edited by William S. Hcywood (Lowell, 1897), his Biography by the same editor (Lowell, 1896) and his Practical and Christian Socialism (Hopedale, 1854) ; George L. Carey, " Adin Ballou and the Hopedale Community " (in the New World, vol. vii., 1898); Lewis G. Wilson, " Hopedale and Its Founder " (in The New England Magazine, vol. '%., 1891) ; and William F. Draper, Recollections of a Varied Career (Boston, 1908).

*HOPE-SCOTT, JAMES ROBERT (1812-1873), English barrister and Tractarian, was born on the 15th of July 1812, at Great Marlow, Berkshire, the third son of Sir Alexander Hope, and grandson of the second earl of Hopetoun. He was educated at Eton and Oxford, where he was a contemporary and friend of Gladstone and J. H. Newman, and in 1838 was called to the bar. Between 1840 and 1843 he helped to found Trinity College, Glenalmond. He was one of the leaders of the Tractarian movement and entirely in Newman's confidence. In*i85i he was received with Manning into the Roman Catholic church. At this time he was making a very large income at the Parliamentary bar. He only commenced serious practice in this branch of his profession in 1843, but by the end of 1845 he stood at the head of it and in 1849 was made a Queen's Counsel. In 1847 he married Miss Lockhart, granddaughter of Sir Walter Scott, and on her coming into possession of Abbotsford six years later,*

1 Adin Ballou wrote An Elaborate History and Genealogy of. the Batlous in America (Providence, R.I., 1888).

assumed the surname of Hope-Scott. He retired from the bar in 1870 and died on the 29th of April 1873.

HOPFEN, HANS VON (1835-1904), German poet and novelist, was born on the 3rd of January 1835, at Munich. He studied law, and in 1858, having shown marked poetical promise, he was received into the circle of young poets whom King Maxi- milian II. had gathered round him, and thereafter devoted himself to literature. In 1862 he made his debut as an

author, with Lieder und Balladen, which were published in the Milnchener Dichterbuch, edited by E. Geibel. After travelling in Italy (1862), France (1863) and Austria (1864), he was appointed, in 1865, general secretary of the " Schillerstiftung," and in this capacity settled at Vienna. The following year, however, he removed to Berlin, in a suburb of which, Lichterfelde, he died on the 19th of November 1904. Of Hopfen's lyric poems, Gedichte (4th ed., Berlin, 1883), many are of considerable talent and originality; but it is as a novelist that he is best known. The novels Pere- grelta (1864); Verdorben zu Paris (1868, new ed. 1892); Arge Sitlen (1869); Der graue Freund (1874, 2nd ed., 1876); and Verfehlte Liebe (1876, 2nd ed., 1879) are attractive, while of his shorter stories Tiroler Geschichten (1884-1885) command most favour.

An autobiographical sketch of Hopfen is contained in K. E. Franzos, Geschichte des Erstlingswerkes (1904).

HOPI, or Moki (Moquis), a tribe of North American Indians of Shoshonean stock. They are Pueblo or town-building Indians and occupy seven villages on three lofty plateaus of northern Arizona. The first accounts of them date from the expedition of Francisco Vasquez de Coronado in 1540. With the town- building Indians of New Mexico they were then subdued. They shared in the successful revolt of 1542, but again suffered defeat in 1586. In 1680, however, they made a successful revolt against the Spaniards. They weave very fine blankets, make baskets and are expert potters and wood-carvers. Their houses are built of stone set in mortar. Their ceremonies are of an elaborate nature, and in the famous " snake-dance " the performers carry live rattlesnakes in their mouths. They number some 1600. (See also Pueblo Indians.)

For Hopi festivals, see 21st Ann. Report Bureau of Amer. Ethnology

(1899- 1 900).

HOPKEN, ANDERS JOHAN, Count von (1712-1789), Swedish statesman, was the son of Daniel Niklas Hopken, one of Arvid Horn's most determined opponents and a founder of the Hat party. When in 1 738 the Hats came into power the younger Hopken obtained a seat in the secret committee of the diet, and during the Finnish war of 1741-42 was one of the two com- missioners appointed to negotiate with Russia. During the diet of 1 746-1 747 Hopken's influence was of the greatest import- ance. It was chiefly through his efforts that the estates issued a " national declaration " protesting against the arrogant attitude of the Russian ambassador, who attempted to dominate the crown prince Adolphus Frederick and the government. This spirited policy restored the waning prestige of the Hat party and firmly established their anti-Muscovite system. In 1746 Hopken

was created a senator. In 1751 he succeeded Gustaf Tessin as prime minister, and controlled the foreign policy of Sweden for the next nine years. On the outbreak of the Seven Years' War, he contracted an armed neutrality treaty with Denmark (1756); but in the ..following year acceded to the league against Frederick II. of Prussia. During the crisis of 1 760-1 762, when the Hats were at last compelled to give an account of their stewardship, Hopken was sacrificed to party exigencies and retired from the senate as well as from the premier- ship. On the 22nd of June 1762, however, he was created a count. After the revolution of 1772 he re-entered the senate at the particular request of Gustavus III., but no longer exercised any political influence. His caustic criticism of many of the royal measures, moreover, gave great offence, and in 1780 he retired into private life. Hopken was a distinguished author. The noble style of his biographies and orations has earned for him the title of, the Swedish Tacitus. He helped to found the Vclenskaps Akademi, and when Gustavus III. in 1786

established the Swedish Academy, he gave Hopken the first place in it.

See L. G. de Geer, Minne af Grefve A. J. von Hopken (Stockholm, 1882); Carl Silfverstolpe, Grefve Hopkens Skrifter (Stockholm, 1 890-1 893). (R. N. B.)

HOPKINS, EDWARD WASHBURN (1857-), American Sanskrit scholar, was born in Northampton, Massachusetts, on the 8th of September 1857. He graduated at Columbia University in 1878, studied at Leipzig, where he received the degree of Ph.D. in 1881, was an instructor at Columbia in 1881- 1885, and professor at Bryn Mawr in 1885-1895, and became professor of Sanskrit and comparative philology in Yale Uni- versity in 1895. He became secretary of the American Oriental Society and editor of its Journal, to which he contributed many valuable papers, especially on numerical and temporal categories in early Sanskrit literature. He wrote Caste in Ancient India (1881); Manu's Lawbook (1884); Religions of India (1895); The Great Epic of India (1901); and India Old and New

(1901).

HOPKINS', ESEK (1718-1802), the first admiral of the United States navy, was born at Scituate, Rhode Island, in 1718. He belonged to one of the most prominent Puritan families of New England. At the age of twenty he went to sea, and rapidly came to the front as a good sailor and skilful trader. Marrying, three years later, into a prosperous family of Newport, and thus increasing his influence in Rhode Island, he became commodore of a fleet of seventeen merchantmen, the movements of which he directed with skill and energy. In war as well as peace, Hopkins was establishing his reputation as one of the leading colonial seamen, for as captain of a

privateer he made more than one brilliant and successful venture during the Seven Years' War. In the interval between voyages, moreover, he was engaged in Rhode Island politics, and rendered efficient support to his brother Stephen against the Ward faction. At the outbreak of the War of Independence, Hopkins was appointed brigadier-general by Rhode Island, was commissioned, December 1775, by the Continental Congress, commander-in-chief of the navy, and in January 1776 hoisted his flag as admiral of the eight converted merchantmen which then constituted the navy of the United States. His first cruise resulted in a great acquisition of material of war and an indecisive fight with H.M.S. " Glasgow." At first this created great enthusiasm, but criticism soon made itself heard. Hopkins and two of his captains were tried for breach of orders, and, though ably defended by John Adams, were censured by Congress. The commands, nevertheless, were not interfered with, and a prize was soon afterwards named after the admiral by their orders. But the difficulties and mutual distrust continually increased, and in 1777 Congress summarily dismissed Hopkins from his command, on the complaint of some of his officers. Before the order arrived, the admiral had detected the conspiracy against him, and had had the ringleaders tried and degraded by court-martial. But the Congress followed up its order by dismissing him from the navy. For the rest of his life he lived in Rhode Island, playing a prominent part in state politics, and he died at Providence in 1802.

See Edward Field, Life of Esek Hopkins (Providence, 1898) ; also an article by R. Grieve in the New England Magazine of November

1897-

HOPKINS, MARK (1802-1887), American educationist, great-nephew of the theologian Samuel Hopkins, was born in Stockbridge, Massachusetts, on the 4th of February 1802. He graduated in 1824 at Williams College, where he was a tutor in 1825-1827, and where in 1830, after having graduated in the previous year at the Berkshire Medical College at Pittsfield, he became professor of Moral Philosophy and Rhetoric. In 1833 he was licensed to preach in Congregational churches. He was president of Williams College from 1836 until 1872. He was one of the ablest and most successful of the old type of college president. His volume of lectures on Evidences of Christianity (1846) was long a favourite text-book. Of his other writings, the chief were Lectures on Moral Science (1862), The Law of Love and Love as a Law (1869), An Outline Study of Man

(1873), The Scriptural Idea of Man (1883), and Teachings and Counsels (1884). Dr Hopkins took a lifelong interest in Christian missions, and from 1857 until his death was president of the American Board of Commissioners for Foreign Missions (the American Congregational Mission Board). He died at Williams- town, on the 17th of June 1887. His son, Henry Hopkins (183 7- 1 908), was also from 1903 till his death president of Williams College.

See Franklin Carter's Mark Hopkins (Boston, 1892), in the " American Religious Leaders " scries, and Leverett W. Spring's Mark Hopkins, Teacher (New York, 1888), being No. 4, vol. i., of the " Monographs of the Industrial Educational Association."

MarkHopkins's brother,ALBERTHoPKiNs(i8o7-i872),was long associated with him at Williams College, where he graduated in 1826 and was successively a tutor (1827-1829), professor of mathematics and natural philosophy (1829-1838), professor of natural philosophy and astronomy (1838-1868) and professor of astronomy (1868-1872). In 1835 he organized and conducted a Natural History Expedition to Nova Scotia, said to have been the first expedition of the kind sent out from any American college, and in 1837, at his suggestion and under his direction, was built at Williams College an astronomical observatory, said to have been the first in the United States built at a college exclusively for purposes of instruction. He died at Williams- town on the 24th of May 1872.

See Albert C. Sewall's Life of Professor Albert Hopkins (1879).

HOPKINS, SAMUEL (1721-1803), American theologian, from whom the Hopkinsian theology takes its name, was born at Waterbury, Connecticut, on the 17th of September .1721. He graduated at Yale College in 1741; studied divinity at Northampton, Massachusetts, with Jonathan Edwards; was licensed to preach in 1742, and in December 1743 was ordained pastor of the church in the North Parish of Sheffield, or Housa- tonick (now Great Barrington), Massachusetts, at that time a small settlement of only thirty families. There he laboured — – preaching, studying and writing — until 1769, for part of the time (1 751—1758) in intimate association with his old teacher, Edwards, whose call to Stockbridge he had been instrumental in procuring. His theological views having met with much opposition, however, he was finally dismissed from the pastorate on the pretext of want of funds for his support. From April 1770 until his death on the 20th of December 1803, he was the pastor of the First Church in Newport, Rhode Island, though during 17 76-1 780, while Newport was occupied by the British, he preached at Newburyport, Mass., and at Canterbury and Stamford, Conn. In 1799 he had an attack of paralysis, from which he never wholly recovered. Hopkins's theological views have

had a powerful influence in America. Personally he was remarkable for force and energy of character, and for the utter fearlessness with which he followed premises to their conclusions. In vigour of intellect and in strength and purity of moral tone he was hardly inferior to Edwards himself. Though he was originally a slave-holder, to him belongs the honour of having been the first among the Congregational ministers of New England to denounce slavery both by voice and pen; and to his persistent though bitterly opposed efforts are probably chiefly to be attributed the law of 1774, which forbade the importation of negro slaves into Rhode Island, as also that of 1784, which declared that all children of slaves born in Rhode Island after the following March should be free. His training school for negro missionaries to Africa was broken up by the confusion of the American War of Independence. Among his publications are a valuable Life and Character of Jonathan Edwards (1799), and numerous pamphlets, addresses and sermons, including A Dialogue concerning the Slavery of the Africans, showing it to be the Duty and Interest of the American States to emancipate all their African Slaves (1776), and A Discourse upon the Slave Trade and the History of the Africans (1793). His distinctive theological tenets are to be found in his important work, A System of Doctrines Contained in Divine Revelation, Explained and Defended (1793), which has had an influence hardly inferior to that exercised by the writings of Edwards himself. They may

be summed up as follows: God so rules the universe as to pro- duce its highest happiness, considered as a whole. Since God's sovereignty is absolute, sin must be, by divine permission, a means by which this happiness of the whole is secured, though that this is its consequence, renders it no less heinous in the sinner. Virtue consists in preference for the good of the whole to any private advantage; hence the really virtuous man must willingly accept any disposition of himself that God may deem wise — a doctrine often called " willingness to be damned." All have natural power to choose the right, and are therefore re- sponsible for their acts; but all men lack inclination to choose the right unless the existing " bias " of their wills is transformed by the power of God from self-seeking into an effective inclination towards virtue. Hence preaching should demand instant sub- mission to God and disinterested goodwill, and should teach the worthlessness of all religious acts or dispositions which are less than these, while recognizing that God can grant or withhold the regenerative change at his pleasure.

The best edition of Hopkins's Works is that published in three volumes at Boston in 1852, containing an excellent biographical sketch by Professor Edwards A. Park. In 1854 was published separately Hopkins's Treatise on the Millennium, which originally appeared in his System of Doctrines and in which he deduced from prophecies in Daniel and Revelation that the

millennium would come " not far from the end of the twentieth century." See also Stephen West's Sketches of the Life of the Late Reverend Samuel Hopkins (Hartford, Conn., 1805), Franklin B. Dexter's Biographical Sketches of the Graduates of Yale College and Williston Walker's Ten New England Leaders (New York, 1901). (W. Wr.)

HOPKINS, WILLIAM (1793-1866), English mathematician and geologist, was born at Kingston-on-Soar, in Nottingham- shire, on the 2nd of February 1793. In his youth he learned practical agriculture in Norfolk and afterwards took an extensive farm in Suffolk. In this he was unsuccessful. At the age of thirty he entered St Peter's College, Cambridge, taking his degree of B.A. in 1827 as seventh wrangler and M.A. in 1830. In 1833 he published Elements of Trigonometry. He was dis- tinguished for his mathematical knowledge, and became emi- nently successful as a private tutor, many of his pupils attaining high distinction. About 1833, through meeting Sedgwick at Barmouth and joining him in several excursions, he became intensely interested in geology. Thereafter, in papers published by the Cambridge Philosophical Society and the Geological Society of London, he entered largely into mathematical in- quiries connected with geology, dealing with the effects which an elevatory force acting from below would produce on a portion of the earth's crust, in fissures, faults, &c. In this way he dis- cussed the elevation and denudation of the Lake district, the Wealden area, and the Bas Boulonnais. He wrote also on the motion of glaciers and the transport of erratic blocks. So ably had he grappled with many difficult problems that in 1850 the Wollaston medal was awarded to him by the Geological Society of London; and in the following year he was elected president. In his second address (1853) he criticized Elie de Beaumont's theory of the elevation of mountain-chains and showed the imperfect evidence on which it rested. He brought before the Geological Society in 1851 an important paper On the Causes which may have produced changes in the Earth's superficial Tempera- ture. He was president of the British Association for 1853. His later researches included observations on the conductivity of various substances for heat, and on the effect of pressure on the temperature of fusion of different bodies. He died at Cambridge on the 13th of October 1866.

Obituary by W. W. Smyth, in Quart. Journ. Geol. Soc. (1867), p. xxix.

HOPKINSON, FRANCIS (1737-1791), American author and statesman, one of the signers of the Declaration of Independence, was born in Philadelphia, Pennsylvania, on the 2nd of October 1737. He was a son of Thomas Hopkinson (1709-1751), a prominent lawyer of Philadelphia, one of the first trustees of the College of Philadelphia, now the University of Pennsylvania, and first president of the American Philosophical Society. Francis was the first student to enter the College of Philadelphia.

from which he received his bachelor's degree in 1757 and his master's degree in 1760. He then studied law in the office in Philadelphia of Benjamin Chew, and was admitted to the bar in 1 761. Removing after 1768 to Bordentown, New Jersey, he became a member of the council of that colony in 1774. On the approach of the War of Independence he identified himself with the patriot or whig element in the colony, and in 1776 and 1777 he was a delegate to the Continental Congress. He served on the committee appointed to frame the Articles of Confederation, executed, with John Nixon (1733-1808) and John Wharton, the "business of the navy" under the direction cf the marine committee, and acted for a time as treasurer of the Continental loan office. From 1779 to 1789 he was judge of the court of admiralty in Pennsylvania, and from 1790 until his death was United States district judge for that state. He was famous for his versatility, and besides being a distinguished lawyer, jurist and political leader, was " a mathematician, a chemist, a physicist, a mechanician, an inventor, a musician and a composer of music, a man of literary knowledge and practice, a writer of airy and dainty songs, a clever artist with pencil and brush and a humorist of unmistakeable power " (Tyler, Literary History of the American Revolution). It is as a writer, however, that he will be remembered. He ranks as one of the three leading satirists on the patriot side during the War of Independence. His ballad, The Battle of the Kegs (1778), was long exceedingly popular. To alarm the British force at Philadelphia the Americans floated kegs charged with gun- powder down the Delaware river towards that city, and the British, alarmed for the safety of their shipping, fired with cannon and small arms at everything they saw floating in the river. Hopkinson's ballad is an imaginative expansion of the actual facts. To the cause of the revolution this ballad,, says Professor Tyler, " was perhaps worth as much just then as the winning of a considerable battle." Hopkinson's principal writings are The Pretty Story (1774), A Prophecy (1776) and The Political Catechism (1777). Among his songs may be mentioned The Treaty and The New Roof, a Song for Federal Mechanics; and the best known of his satirical pieces are Typographical Method of conducting a Quarrel, Essay on White Washing and Modern Learning. His Miscellaneous Essays and Occasional Writings were published at Philadelphia in 3 vols., 1792.

His son, Joseph Hopkinson (1770-1842), graduated at the University of Pennsylvania in 1786, studied law, and was a Federalist member of the national House of Representatives in 1815-1819, Federal judge of the Eastern District of Pennsylvania from 1828 until his death, and a member of the state con- stitutional convention of 1837. He is better known,

however, as the author of the patriotic anthem " Hail Columbia " (1798).

HOPKINSON, JOHN (1 849-1 898), English engineer and physicist, was born in Manchester on the 27th of July 1849. Before he was sixteen he attended lectures at Owens College, «nd at eighteen he gained a mathematical scholarship at Trinity College, Cambridge, where he graduated in 1871 as senior wrangler and first Smith's prizeman, having previously taken the degree of D.Sc. at London University and won a Whitworth scholar- ship. Although elected a fellow and tutor of his college, he stayed up at Cambridge only for a very short time, preferring to learn practical engineering as a pupil in the works in which his father was a partner. But there his stay was equally short, for in 1872 he undertook the duties of engineering manager in the glass manufactories of Messrs Chance Brothers and Company at Birmingham. Six years later he removed to London, and while continuing to act as scientific adviser to Messrs Chance, established a most successful practice as a consulting engineer. His work was mainly, though not exclusively, electrical, and his services were in great demand as an expert witness in patent cases. In 1890 he was appointed director of the Siemens labora- tory at King's College, London, with the title of professor of electrical engineering. His death occurred prematurely on the 27th of August 1898, when he was killed, together with one son and two daughters, by an accident the nature of which was never precisely ascertained, while climbing the Petite Dent

de Yeisivi, above Evolena. Dr Hopkinson presented a rare combination of practical with theoretical ability, and his achieve- ments in pure scientific research are not less intrinsically notable than the skill with which he applied their results to the solution of concrete engineering problems. His original work is contained in more than sixty papers, all written with a complete mastery both of style and of subject-matter. His name is best known in connexion with electricity and magnetism. On the one hand he worked out the general theory of the magnetic circuit in the dynamo (in conjunction with his brother Edward), and the theory of alternating currents, and conducted a long series of observations on the phenomena attending magnetization in iron, nickel and the curious alloys of the two which can exist both in a magnetic and non-magnetic state at the same tempera- ture. On the other hand, by the application of the principles he thus elucidated he furthered to an immense extent the em- ployment of electricity for the purposes of daily life. As regards the generation of electric energy, by pointing out defects of design in the dynamo as it existed about 1878, and showing how important improvements were to be effected in its con- struction, he was largely instrumental in converting it from a clumsy and wasteful appliance into one of the most efficient known to the engineer. Again, as regards the distribution of the current, he took a leading part in the development of the three-wire system and the closed-

circuit transformer, while electric traction had to thank him for the series-parallel method of working motors. During his residence in Birmingham, Messrs Chance being makers of glass for use in lighthouse lamps, his attention was naturally turned to problems of lighthouse illumination, and he was able to devise improvements in both the catoptric and dioptric methods for concentrating and directing the beam. He was a strong advocate of the group- flashing system as a means of differentiating lights, and in- vented an arrangement for carrying it into effect optically, his plan being first adopted for the catoptric light of the Royal Sovereign lightship, in the English Channel off Beachy Head. Moreover, bis association with glass manufacture led him to study the refractive indices of different kinds of glass ; he further undertook abstruse researches on electrostatic capacity, the phenomena of the residual charge, and other problems arising out of Clerk Maxwell's electro-magnetic theory.

His original papers were collected and published, with a memoir by his son, in 1901.

HOPKINSVILLE, a city and the county-seat of Christian county, Kentucky, U.S.A., about 150 m. S.W. of Louisville. Pop. (1890) 5833; (1900) 7280 (3243 negroes); (1910) 9419. The city is served by the Illinois Central and the Louisville & Nashville railways. It is the seat of Bethel Female College (Baptist, founded 1854), of South Kentucky College (Christian; co-educational; chartered 1849) and of the Western Kentucky Asylum for the Insane. The city's chief interest is in the tobacco industry; it has also considerable trade in other agricultural products and in coal; and its manufactures include carriages and wagons, bricks, lime, flour and dressed lumber. When Christian county was formed from Logan county in 1797, Hopkinsville, formerly called Elizabethtown, became the county- seat, and was renamed in honour of Samuel Hopkins (c. 1750- 1819), an officer of the Continental Army in the War of Inde- pendence, a pioneer settler in Kentucky, and a representative in Congress from Kentucky in 1813-1815. In 1798 Hopkinsville was incorporated.

HOPPNER, JOHN (1758-1810), English portrait-painter, was,, born, it is said, on the 4th of April 1758 at Whitechapel. His father was of German extraction, and his mother was one of the German attendants at the royal palace. Hoppner was consequently brought early under the notice and received the patronage of George III., whose regard for him gave rise to unfounded scandal. As a boy he was a chorister at the royal chapel, but showing strong inclination for art, he in 1775 entered as a student at the Royal Academy. In 1778 he took a silver medal for drawing from the life, and in 1782 the Academy's highest award, the gold medal for historical painting, his subject

being King Lear. He first exhibited at the Royal Academy in 1780. His earliest love was for landscape, but necessity obliged him to turn to the more lucrative business of portrait- painting. At once successful, he had, throughout life, the most fashionable and wealthy sitters, and was the greatest rival of the growing attraction of Lawrence. Ideal subjects were very rarely attempted by Hoppner, though a " Sleeping Venus," " Belisarius," " Jupiter and Io." a " Bacchante " and " Cupid and Psyche " are mentioned among his works. The prince of Wales especially patronized him, and many of his finest portraits are in the state apartments at St James's Palace, the best perhaps being those of the prince, the duke and duchess of York, of Lord Rodney and of Lord Nelson. Among his other sitters were Sir Walter Scott, Wellington, Frerc and Sir George Beaumont. Competent judges have deemed his most successful works to be his portraits of women and children. A Series of Portraits of Ladies was published by him in 1803, and a volume of translations of Eastern tales into English verse in 1805. The verse is of but mediocre quality. In his later years Hoppner suffered from a chronic disease of the liver; he died on the 23rd of January 1810. He was con- fessedly an imitator of Reynolds. When first painted, his works were much admired for the brilliancy and harmony of their colouring, but the injury due to destructive mediums and lapse of time which many of them suffered caused a great depreciation in his reputation. The appearance, however, of some of his pictures in good condition has shown that his fame as a brilliant colourist was well founded. His drawing is faulty, but his touch has qualities of breadth and freedom that give to his paintings a faint reflection of the charm of Reynolds. Hoppner was a man of great social power, and had the knowledge and accomplishments of a man of the world.

The best account of Hoppner's life and paintings is the exhaustive work by William McKay and W. Roberts (1909).

HOP-SCOTCH (" scotch," to score), an old English children's game in which a small object, like a flat stone, is kicked by the player, while hopping, from one division to another of an oblong space marked upon the ground and divided into a number of divisions, usually 10 or 12. These divisions are numbered, and the stone must rest successively in each. Should it rest upon a line or go out of the division aimed for, the player loses. In order to win a player must drive the stone into each division and back to the starting-point.

HOPTON, RALPH HOPTON, Baron (1598-1652), Royalist commander in

the English Civil War, was the son of Robert Hopton of Witham, Somerset. He appears to have been educated at Lincoln College, Oxford, and to have served in the army of the Elector Palatine in the early campaigns of the Thirty Years' War, and in 1624 he was lieutenant-colonel of a regiment raised in England to serve in Mansfeld's army. Charles I., at his coronation, made Hopton a Knight of the Bath. In the political troubles which preceded the outbreak of the Civil War, Hopton, as member of parliament successively for Bath, Somerset and Wells, at first opposed the royal policy, but after Strafford's attainder (for which he voted) he gradually became an ardent supporter of Charles, and at the beginning of the Creat Rebellion (q.v.) he was made lieutenant-general under the marquess of Hertford in the west. His first achievement was the rallying of Cornwall to the royal cause, his next to carry the war from that county into Devonshire. In May 1643 he won the brilliant victory of Stratton, in June he overran Devonshire, and on the 5th of July he inflicted a severe defeat on Sir William Waller at Lansdown. In the last action he was severely wounded by the explosion of a powder-wagon and he was soon after shut up in Devizes by Waller, where he defended himself until relieved by the victory of Roundway Down on the 13th of July. He was soon afterwards created Baron Hopton of Stratton. But his successes in the west were cut short by the defeat of Cheriton or Alrestord in March 1644. After this he served in the western campaign under Charles's own com- mand, and towards the end of the war, after Lord Goring had left England, he succeeded to the command of the royal army, which his predecessor had allowed to waste away in indiscipline.

It was no longer possible to stem the tide of the parliament's victory, and Hopton, defeated in his last stand at Torrington on the 1 6th of February 1646, surrendered to Fairfax. Sub- sequently he accompanied the prince of Wales in his attempts to prolong the war in the Scilly and Channel Islands. But his downright loyalty was incompatible with the spirit of con- cession and compromise which prevailed in the prince's council in 1649-1650, and he withdrew from active participation in the cause of royalism. He died, still in exile, at Bruges in September 1652. The peerage became extinct at his death. The king, Prince Charles and the governing circle appreciated the merits of their faithful lieutenant less than did his enemies Waller and Fairfax, the former of whom wrote, " hostility itself cannot violate my friendship to your person," while the latter spoke of him as " one whom we honour and esteem above any other of your party."

HOR, MOUNT (nn), the scene in the Bible of Aaron's death, situated " in the edge of the land of Edom " (Num. xxxiii. 37). Since the time of Josephus it has been identified with the Jebd Ncbi Harun (" Mountain of the Prophet Aaron "), a twin-peaked mountain 4780 ft. above the sea-level (6072 ft. above the Dead Sea) in the Edomite Mountains on the east side

of the Jordan- Arabah valley. On the summit is a shrine said to cover the grave of Aaron. Some modern investigators dissent from this identification: H. Clay Trumbull prefers the Jebel Madara, a peak north-west of 'Ain Kadis. Another Mount Hor is men- tioned in Num. xxxiv. 7, 8, as on the northern boundary of the prospective conquests of the Israelites. It is perhaps to be identified with Hermon. It has been doubtfully suggested that for Hor we should here read Hadrach, the name of a northern country near Damascus, mentioned only once in the Bible (Zech.ix. 1). (R. A. S. M.)

HORACE [Quintus Horatius Flaccus] (65-8 B.C.), the famous Roman poet, was born on the 8th of December 65 B.C. at Venusia, on the borders of Lucania and Apulia (Sat. ii. 1. 34). The town, originally a colony of veterans, appears to have long maintained its military traditions, and Horace was early imbued with a profound respect for the indomitable valour and industry of the Italian soldier. It would seem, however, that the poet was not brought up in the town itself, at least he did not attend the town school (Sat. i. 6. 72) and was much in the neighbouring country, of which, though he was but a child when he left it, he retained always a vivid and affectionate memory. The mountains near' and far, the little villages on the hillsides, the woods, the roaring Aufidus, the mossy spring of Bandusia, after which he named another spring on his Sabine farm — these scenes were always dear to him and are frequently mentioned in his poetry (e.g. Carm. iii. 4 and 30, iv. q). We may thus trace some of the germs of his poetical inspiration, as well as of his moral sympathies, to the early years which he spent near Venusia. But the most important moral influence of his youth was the training and example of his father, of whose worth, affectionate solicitude and homely wisdom Horace has given a most pleasing and life-like picture (Sat. i. 6. 70, &c). He was a freedman by position; and it is supposed that he had been originally a slave of the town of Venusia, and on his emancipation had received the gentile name of Horatius from the Horatian tribe in which the inhabitants of Venusia were enrolled. After his emancipation he acquired by the occupation of " coactor " (a collector of the payments made at public auctions, or, according to another interpretation, a collector of taxes) sufficient means to enable him to buy a small farm, to make sufficient provision for the future of his son (Sat. i. 4. 108), and to take him to Rome to give him the advantage of the best education there. .To his care Horace attributes, not only the intellectual training which enabled him in later life to take his place among the best men of Rome, -but also his immunity from the baser forms of moral evil (Sat. i. 6. 68. &c). To his practical teaching he attributes also his tendency to moralize and to observe character (Sat. i. 4. 105, &c.) — the tendency which enabled him to become the most truthful painter of social life and manners which the ancient world produced.

In one of his latest writings {Episl. ii. 2. 42, &c.) Horace gives a further account of his education; but we hear no more of his father, nor is there any allusion in his writings to the existence of any other member of his family or any other relative. After the ordinary grammatical and literary training at Rome, he went (45 B.C.) to Athens, the most famous school of philosophy, as Rhodes was of oratory; and he describes himself while there as " searching after truth among the groves of Academus " as well as advancing in literary accomplishment. His pleasant residence there was interrupted by the breaking out of the civil war. Following the example of his young associates, he attached himself to the cause of Brutus, whom he seems to have accom- panied to Asia, probably as a member of his staff; and he served at the battle of Philippi in the post of military tribune. He shared in the rout which followed the battle, and henceforth, though he was not less firm in his conviction that some causes were worth fighting for and dying for, he had but a poor opinion of his own soldierly qualities.

He returned to Rome shortly after the battle, stripped of his property, which formed part of the land confiscated for the benefit of the soldiers of Octavianus and Antony. It may have been at this time that he encountered the danger of shipwreck, which he mentions among the perils from which his life had been protected by supernatural aid (Carm. iii. 4. 28). He procured in some way the post of a clerkship in the quaestor's office, and about three years after the battle of Philippi, he was introduced by Virgil and Varius to Maecenas. This was the turning-point of his fortunes. He owed his friendship with the greatest of literary patrons to his personal merits rather than to his poetic fame; for he was on intimate terms with Maecenas before the first book of the Satires (his first published work) appeared. He tells us in one of his Satires (i. 10. 31) that his earliest ambition was to write Greek verses. In giving this direction to his ambition, he was probably influenced by his admiration of the old iambic and lyrical poets whom he has made the models of his own Epodes and Odes. His common sense as well as his national feeling fortunately saved him from becoming a second- rate Greek versifier in an age when poetic inspiration had passed from Greece to Italy, and the living language of Rome was a more fitting vehicle for the new feelings and interests of men than the echoes of the old Ionian or Aeolian melodies. His earliest Latin compositions were, as he tells us, written under the instigation of poverty; and they alone betray any trace of the bitterness of spirit which the defeat of his hopes and the hardships which he had to encounter on his first return to Rome may have temporarily produced on him. Some of the Epodes, of the nature of personal and licentious lampoons, and the second Satire of

book i., in which there is some trace of an angry republi- can feeling, belong to these early compositions. But by the time the first book of Satires was completed and published (35 B.C.) his temper had recovered its natural serenity, and, though he had not yet attained to the height of his fortunes, his personal position was one of comfort and security, and his intimate relation with the leading men in literature and social rank was firmly established.

About a year after the publication of this first book of Satires Maecenas presented him with a farm among the Sabine hills, near the modern Tivoli. This secured him pecuniary independ- ence; it satisfied the love of nature which had been implanted in him during the early years spent on the Venusian farm; and it afforded him a welcome escape from the distractions of city life and the dangers of a Roman autumn. Many passages in the Satires, Odes and Epistles express the happiness and pride with which the thought of his own valley filled him, and the interest which he took in the simple and homely ways of his country neighbours. The inspiration of the Satires came from the heart of Rome; the feeling of many of the Odes comffi direct from the Sabine hills; and even the meditative spirit of the later Epistles tells of the leisure and peace of quiet days spent among books, or in the open air, at a distance from " the smoke, wealth and tumult " of the great metropolis. The second book of Satires was published in 29 B.C.; the

Epodes (spoken of by himself as iambi) apparently about a year earlier, though many of them are, as regprds the date of their composition, to be ranked among the earliest extant writings of Horace. In one of his 'Epistles (i. 19. 25) he rests his first claim to originality on his having introduced into Latium the metres and spirit of Archilochus of Paros. He may have natural- ized some special form of metre employed by that poet, and it may be (as Th. Pliisz has suggested) that we should see in the Epodes a tone of mockery and parody. But his personal lampoons are the least successful of his works; while those Epodes which treat of other subjects in a poetical spirit are inferior in metrical effect, and in truth and freshness of feeling, both to the lighter lyrics of Catullus and to his own later and more carefully meditated Odes. The Epodes, if they are serious at all, are chiefly interesting as a record of the personal feelings of Horace during the years which immediately followed his return to Rome, and as a prelude to the higher art and inspiration of the first three books of the Odes, which were published together about the end of 24 or the beginning of 23 B.C. 1 The composition of these Odes extended over several years, but all the most important among them belong to the years between the battle of Actium and 24 B.C. His lyrical poetry is thus, not, like that of Catullus, the ardent utterance of his youth, but the mature and finished workmanship of his manhood. The state of public affairs was more favourable than it had been

since the outbreak of the civil war between Caesar and Pompey for the appearance of lyrical poetry. Peace, order and national unity had been secured by the triumph of Augustus, and the enthusiasm in favour of the new government had not yet been chilled by experience of its repressing influence. The poet's circumstances were, at the same time, most favourable for the exercise of his lyrical gift during these years. He lived partly at Rome, partly at his Sabine farm, varying his residence occasionally by visits to Tibur, Praeneste or Baiae. His intimacy with Maecenas was strengthened and he had become the familiar friend of the great minister. He was treated with distinction by Augustus, and by the foremost men in Roman society. He complains occasionally that the pleasures of his youth are passing from him, but he does so in the spirit of a temperate Epicurean, who found new enjoyments in life as the zest for the old enjoyments decayed, and who considered the wisdom and meditative spirit — " the philosophic mind that years had brought " — an ample compensa- tion for the extinct fires of his youth.

About four years after the publication of the three books of Odes, the first book of the Epistles appeared, introduced, as his Epodes, Satires and Odes had been, by a special address to Maecenas. From these Epistles, as compared with the Satires, we gather that he had gradually adopted a more retired and meditative life, and had become fonder of the country and of study, and that, while owing allegiance to no school or sect of philosophy, he was framing for himself a scheme of life, was endeavouring to conform to it, and was bent on inculcating it on others. He maintained his old friendships, and continued to form new intimacies, especially with younger men engaged in public affairs or animated by literary ambition. After the death of Virgil he was recognized as pre-eminently the greatest living poet, and was accordingly called upon by Augustus to compose the sacred hymn for the celebration of the secular games in 17 B.C. About four years later he published the fourth book of Odes (about 13 B.C.) having been called upon to do so by the emperor, in order that the victories of his stepsons Drusus and Tiberius over the Rhaeti and Vindelici might "be worthily celebrated. He lived about five years longer, and during these years published the second book of Epistles, and the Epistle to the Pisos, more generally known as the " Ars poetica." These later Epistles are mainly devoted to literary criticism, with the especial object of vindicating the poetic claims of his own age over those of the age of Ennius and the other early

1 The date is determined by the poem on the death of Quintilius Varus (who died 24 B.C.), and by the reference in Ode i. 12 to the young Marcellus (died in autumn 23 B.C.) as still alive. Cf. Wickham's Introduction to the Odes..

poets of Rome. He might have been expected, as a great critic and lawgiver on literature, to have exercised a beneficial influence on the future poetry of his country, and to have applied as much wisdom to the theory of his own art as to that of a right life. But his critical Epistles are chiefly devoted to a controversial attack on the older writers and to the exposition of the laws of dramatic poetry, on which his own powers had never been exercised, and for which either the genius or circumstances of the Romans were unsuited. The same subordination of imagination and enthusiasm to good sense and sober judgment characterizes his opinions on poetry as on morals.

He died somewhat suddenly on the 17 th of November of the year 8 B.C. He left Augustus to see after his affairs, and was buried on the Esquiline Hill, near Maecenas.

Horace is one of the few writers, ancient or modern, who have written a great deal about themselves without laying themselves open to the charge of weakness or egotism. His chief claim to literary originality is not that on which he himself rested his hopes of immortality — that of being the first to adapt certain lyrical metres to the Latin tongue — but rather that of being the first of those whose works have reached us who establishes a personal relation with his reader, speaks to him as a familiar friend, gives him good advice, tells him the story of his life, and shares with him his private tastes and pleasures — and all this without any loss of self-respect, any want of modesty or breach of good manners, and in a style so lively and natural that each new generation of readers might fancy that he was addressing them personally and speaking to them on subjects of every day modern interest. In his self-portraiture, far from wishing to make himself out better or greater than he was, he seems to write under the influence of an ironical restraint which checks him in the utterance of his highest moral teaching and of his poetical enthusiasm. He affords us some indications of his personal appearance, as where he speaks of the "nigros angusta fronte capillos " of his youth, and describes himself after he had completed his forty-fourth December as of small stature, prematurely grey and fond of basking in the sun {Epist. i. 20. 24).

In his later years his health became weaker or more uncertain, and this caused a considerable change in his habits, tastes and places of residence. It inclined him more to a life of retirement and simplicity, and also it stimulated his tendency to self- introspection and self-culture. In his more vigorous years, when he lived much in Roman society, he claims to have

acted in all his relations to others in accordance with the standard recognized among men of honour in every age, to have been charitably indulgent to the weakness of his friends, and to have been exempt from petty jealousies and the spirit of detraction. If ever he deviates from his ordinary vein of irony and quiet sense into earnest indignation, it is in denouncing conduct involving treachery or malice in the relations of friends (Sat. i. 4. 81, &c).

He claims to be and evidently aims at being independent of fortune, superior to luxury, exempt both from the sordid cares of avarice and the coarser forms of profligacy. At the same time he makes a frank confession of indolence and of occasional failure in the pursuit of his ideal self-mastery. He admits his irascibility, his love of pleasure, his sensitiveness to opinion, and some touch of vanity or at least of gratified ambition arising out of the favour which through all his life he had enjoyed from those much above him in social station (Epist. i. 20. 23). Yet there appears no trace of any unworthy deference in Horace's feelings towards the great. Even towards Augustus he maintained his attitude of independence, by declining the office of private secretary which the emperor wished to force upon him; and he did so with such tact as neither to give offence nor to forfeit the regard of his superior. His feeling towards Maecenas is more like that of Pope towards Bolingbroke than that which a client in ancient or modern times entertains towards his patron. He felt pride in his protec- tion and in the intellectual sympathy which united him with one whose personal qualities had enabled him to play so prominent

and beneficent a part in public affairs. Their friendship was slowly formed, but when once established continued unshaken through their lives.

There is indeed nothing more remarkable in Plorace than the independence, or rather the self-dependence, of his character. The enjoyment which he drew from his Sabine farm consisted partly in the refreshment to his spirit from the familiar beauty of the place, partly in the " otia Uberrima " from the. claims of business and society which it afforded him. His love poems, when compared with those of Catullus, Tibullus and Propertius, show that he never, . in his mature years at least, allowed his peace of mind to be at the mercy of any one. They are the expressions of a fine and subtle and often a humorous observation rather than of ardent feeling. There is perhaps a touch of pathos in his reference in the Odes to the early death of Cinara, but the epithet he applies to her in the Epistles,

"Quem scis immunem Cinarae placuisse rapaci,"

shows that the pain of thinking of her could not have been very heartfelt. Even when the Odes addressed to real or imaginary beauties are most

genuine in feeling, they are more the artistic rekindling of extinct fires than the utterance of recent passion. In his friendships he had not the self - forgetful devotion which is the most attractive side of the character of Catullus; but he studied how to gain and keep the regard of those whose society he valued, and he repaid this regard by a fine courtesy and by a delicate appreciation of their higher gifts and qualities, whether proved in literature, or war, or affairs of state or the ordinary dealings of men. He enjoyed the great world, and it treated him well; but he resolutely maintained his personal independence and the equipoise of his feelings and judgment. If it is thought that in attributing a divine function to Augustus he has gone beyond the bounds of a sincere and temperate admiration, a comparison of the Odes in which this occurs with the first Epistle of the second book shows that he certainly recognized in the emperor a great and successful administrator and that his language is to be regarded rather as the artistic expression of the prevailing national sentiment than as the tribute of an insincere adulation.

The aim of Horace's philosophy was to " be master of oneself," to retain the " mens aequa " in all circumstances, to use the gifts of fortune while they remained, and to be prepared to part with them with equanimity; to make the most of life, and to contemplate its inevitable end without anxiety. Self-reliance and resignation are the lessons which he constantly inculcates. His philosophy is thus a mode of practical Epicureanism combined with other elements which have more affinity with Stoicism. In his early life he professed his adherence to the former system, and several expressions in his first published work show the influences of the study of Lucretius. At the time when the first book of the Epistles was published he professes to assume the position of an eclectic rather than that of an adherent of either school (Epist. i. 1. 13-19). We note in the passage here referred to, as in other passages, that he mentions Aristippus of Cyrene, rather than Epicurus himself, as the master under whose influence he from time to time insensibly lapsed. Yet the dominant tone of his teaching is that of a refined Epicureanism, not so elevated or purely contemplative as that preached by Lucretius, but yet more within the reach of a society which, though luxurious and pleasure-loving, had not yet become thoroughly frivolous and enervated. His advice is to subdue all violent emotion of fear or desire; to estimate all things calmly — "nil admirari";. to choose the mean between a high and low estate; and to find one's happiness in plain living rather than in luxurious indulgence. Still there was in Horace a robuster fibre, inherited from the old Italian race, which moved him to value the dignity and nobleness of life more highly than its ease and enjoyment. In some of the stronger utterances of his Odes, where he expresses sympathy with the manlier qualities of character, we recognize the resistent attitude of Stoicism rather than the passive acquiesc ence of

Epicureanism. The concluding stanzas of the address to Lollius (Ode iv. 9) exhibit the Epicurean and Stoical view of life so combined as to be more worthy of human dignity than

the genial worldly wisdom of the former school, more in har- mony with human experience than the formal precepts of the latter.

It is interesting to trace the growth of Horace in elevation of sentiment and serious conviction from his first ridicule of the paradoxes of Stoicism in the two books of the Satires to the appeal which he makes in some of the Odes of the third book to the strongest Roman instincts of fortitude and self-sacrifice. A similar modification of his religious and political attitude may be noticed between his early declaration of Epicurean unbelief and the sympathy which he shows with the religious reaction fostered by Augustus; and again between the Epicurean indifference to national affairs and the strong support which he gives to the national policy of the emperor in the first six Odes of the third book, and in the fifth and fifteenth of the fourth book. In his whole religious attitude he seems to stand midway between the consistent denial of Lucretius and Virgil's pious endeavour to reconcile ancient faith with the conclusions of philosophy. His introduction into some of his Odes of the gods of mythology must be regarded as merely artistic or symbolical. Yet in some cases we recognize the expression of a natural piety, thankful for the blessing bestowed on purity and simplicity of life, and acknowledging a higher and more majestic law governing nations through their voluntary obedience. On the other hand, his allusions to a future life, as in the " domus exilis Plutonia," and the " furvae regna Proserpinae," are shadowy and artificial. The image of death is constantly obtruded in his poems to enhance the sense of present enjoyment. In the true spirit of paganism he associates all thoughts of love and wine, of the meeting of friends, or of the changes of the seasons with the recollection of the transitoriness of our pleasures— " Nos, ubi decidimus Quo pius Aeneas, quo dives Tullus et Ancus, Pulvis et umbra sumus." Horace is so much of a moralist in all his writings that, in order to enter into the spirit both of his familiar and of his lyrical poetry, it is essential to realize what were his views of life and the influences under which they were formed. He is, though in a different sense from Lucretius, eminently a philosophical and reflective poet. He is also, like all the other poets of the Augustan age, a poet in whose com- position culture and criticism were as conspicuous elements as spontaneous inspiration. In the judgment he passes on the older poetry of Rome and on that of his contemporaries, he seems to attach more importance to the critical and artistic than to the creative and inventive

functions of genius. It is on the labour and judgment with which he has cultivated his gift that he rests his hopes of fame. The whole poetry of the Augustan age was based on the works of older poets, Roman as well as Greek. Its aim was to perfect the more immature workmanship of the former, and to adapt the forms, manners and metres of the latter to subjects of immediate and national interest. As Virgil performed for his generation the same kind of office which Ennius performed for an older generation, so Horace in his Satires, and to a more limited extent in his Epistles, brought to perfection for the amusement and instruction of his contemporaries the rude but vigorous designs of Lucilius.

It was the example of Lucilius which induced Horace to commit all his private thoughts, feelings and experience " to his books as to trusty companions," and also to comment freely on the characters and lives of other men. Many of the subjects of particular satires of Horace were immediately suggested by those treated by Lucilius. Thus the " Journey to Brundusium " (Sat. i. 5) reproduced the outlines of Lucilius's " Journey to the Sicilian Straits." The dis- course of Ofella on luxury (Sat. ii. 2) was founded on a similar dis- course of Laelius on gluttony, and the " Banquet of Nasidienus " (Sat. ii. 8) may have been suggested by the description by the older poet of a rustic entertainment. There was more of moral censure and personal aggressiveness in the satire of the older poet. The ironical temper of Horace induced him to treat the follies of society in the spirit of a humorist and man of the world, rather than to assail vice with the severity of a censor; and the greater urbanity of his age or of his disposition restrained in him the direct personality of satire. The names introduced by him to mark types of character such as Nomentanus, Maenius, Pantolabus, &c, are reproduced from the writings of the older poet. Horace also followed Lucilius in the variety of forms which his satire assumes, and especially in the frequent adoption of the form of dialogue, derived from the " dramatic medley " which was the original character of the Roman Satura. This form suited the spirit in which Horace regarded the world, and also the dramatic quality of his genius, just as the direct denunciation and elaborate painting of character suited the " saeva indignatio " and the oratorical genius of Juvenal. Horace's satire is accordingly to a great extent a reproduction in

form, manner, substance and tone of the satire of Lucilius; or rather it is a casting in the mould of Lucilius of his own observation and experience. But a comparison of the fragments of Lucilius with the finished compositions of Horace brings out in the strongest light the artistic originality and skill of the latter poet in his management of metre and style. Nothing can be rougher and harsher than the hexameters of Lucilius, or cruder than his expression. In his management of the more natural trochaic metre, he has shown much greater ease and simplicity. It is one great triumph of Horace's

genius that he was the first and indeed the only Latin writer who could bend the stately hexameter to the uses of natural and easy, and at the same time terse and happy, conversational style. Catullus, in his hendecasyllabics, had shown the vivacity with which that light and graceful metre could be employed in telling some short story or describing some trivial situation dramatically. But no one before Horace had succeeded in applying the metre of heroic verse to the uses of common life. But he had one great native model in the mastery of a terse, refined, ironical and natural conversational style, Terence; and the Satires show, not only in allusions to incidents and personages, but in many happy turns of expression very frequent traces of Horace's familiarity with the works of the Roman Menander. The Epistles are more original in form, more philosophic in spirit, more finished and charming in style than the Satires. The form of composition may have been suggested by that of some of the satires of Lucilius, which were composed as letters to his personal friends. But letter-writing in prose, and occasionally also in verse, had been common among the Romans from the time of the siege of Corinth ; and a practice originating in the wants and covenience of friends temporarily separated from one another by the public service was ultimately cultivated as a literary accomplishment. It was a happy idea of Horace to adopt this form for his didactic writings on life and literature. It suited him as an eclectic and not a systematic thinker, and as a friendly counsellor rather than a formal teacher of his age. It suited his circumstances in the latter years of his life, when his tastes inclined him more to retirement and study, while he yet wished to retain his hold on society and to extend his relations with younger men who were rising into eminence. It suited the class who cared for literature — a limited circle of educated men, intimate with one another, and sharing the same tastes and pursuits. While giving expression to lessons applicable to all men, he in this way seems to address each reader individually, with the urbanity of a friend rather than the solemnity of a preacher. In spirit the Epistles are more ethical and meditative than the Satires. Like the Odes they exhibit the twofold aspects of his philosophy, that of temperate Epicurean- ism and that of more serious and elevated conviction. In the actual maxims which he lays down, in his apparent belief in the efficacy of addressing philosophical texts to the mind, he exemplifies the trite- ness and limitation of all Roman thought. But the spirit and senti- ment of his practical philosophy is quite genuine and original. The individuality of the great Roman moralists, such as Lucretius and Horace, appears not in any difference in the results at which they have arrived, but in the difference of spirit with which they regard the spectacle of human life. In reading Lucretius we are impressed by his earnestness, his pathos, his elevation of feeling; in Horace we are charmed by the serenity of his temper and the flavour of a delicate and subtle wisdom. We note also in the Epistles the presence of a more philosophic spirit, not only in the

expression of his personal convictions and aims, but also in his comments on society. In the Satires he paints the outward effects of the passions of the age. He shows us prominent types of character — the miser, the parasite, the legacy-hunter, the parvenu, &c, but he does not try to trace these different manifestations of life to their source. In the Epistles he finds the secret spring of the social vices of the age in the desire, as marked in other times as in those of Horace, to become rich too fast, and in the tendency to value men according to their wealth, and to sacrifice the ends of life to a superfluous care for the means of living. The cause of all this aimless restlessness and unreasonable desire is summed up in the words " Strenua nos exercet inertia."

In his Satires and Epistles Horace shows himself a genuine moralist, a subtle observer and true painter of life, and an admirable writer. But for both of these works he himself disclaims the title of poetry. He rests his claims as a poet on his Odes. They reveal an entirely different aspect of his genius, his spirit and his culture. He is one among the few great writers of the world who have attained high excellence in two widely separated provinces of literature. Through all his life he was probably conscious of the " ingeni benigna vena," which in his youth made him the sympathetic student and imitator of the older lyrical poetry of Greece, and directed his latest efforts to poetic criticism. But it was in the years that intervened between the publication of his Satires and Epistles that his lyrical genius asserted itself as his predominant faculty. At that time he had outlived the coarser pleasures and risen bove the harassing cares of his earlier career; a fresh source of happiness and inspiration had been opened up to him in his beautiful Sabine retreat ; he had become not only reconciled to the rule of Augustus, but a thoroughly convinced and, so far as his temperament admitted to enthusiasm, an enthusiastic believer in its beneficence. But it was only after much labour that his original vein of genius obtained a free and abundant outlet. He lays no claim to the " profuse strains of un- 1 premeditated art," with which other great lyrical poets of ancient

and modern times have charmed the world. His first efforts were apparently imitative, and were direcfed to the attainment of perfect mastery over form, metre and rhythm. The first nine Odes of the first book are experiments in different kinds of metre. They and all the other metres employed by him are based on those employed by the older poets of Greece; — Alcaeus, Sappho, Archilochus, Alcman, &c. He has built the structure of his lighter Odes also on their model, while in some of those in which the matter is more weighty, as in that in which he calls on Calliope " to dictate

a long continuous strain," he has endeavoured to reproduce something of the intricate movement, the abrupt transitions, the interpenetration of narrative and reflection, which characterize the art of Pindar. He frequently reproduces the language and some of the thoughts of his masters, but he gives them new application, or stamps them with the impress of his own experience. He brought the metres which he has employed to such perfection that the art perished with him. A great proof of his mastery over rhythm is the skill with which he has varied his metres according to the sentiment which he wishes to express. Thus his great metre, the Alcaic, has a character of stateliness and majesty in addition to the energy and impetus originally imparted to it by Alcaeus. The Sapphic metre he employs with a peculiar lightness and vivacity which harmonize admirably with his gayer moods

Again in regard to his diction, if Horace has learned his subtlety and moderation from his Greek masters, he has tempered those qualities with the masculine characteristics of his race. No writer is more Roman in the stateliness and dignity, the terseness, occasionally even in the sobriety and bare literalness, of his diction.

While it is mainly owing to the extreme care which Horace gave to form, rhythm and diction that his own prophecy " Usque ego postera Crescam laude recens " has been so amply fulfilled, yet no greater injustice could be done to him than to rank him either as poet or critic with those who consider form everything in literature. With Horace the mastery over the vehicle of expression was merely an essential preliminary to making a worthy and serious use of that vehicle. The poet, from Horace's point of view, was intended not merely to give refined pleasure to a few, but above all things, to be " utilis urbi." Yet he is saved, in his practice, from the abuse of this theory by his admirable sense, his ironical humour, his intolerance of pretension and pedantry. Opinions will differ as to whether he or Catullus is to be regarded as t he greater lyrical poet. Those who assign the palm to Horace will do so, certainly not because they recognize in him richer or equally rich gifts of feeling, conception and expression, but because the subjects to which his art has been devoted have a fuller, more varied, more mature and permanent interest for the world.

Authorities. — For the life of Horace the chief authorities are his own works and a short ancient biography which is attributed to Suetonius. The apparatus criticus is most fully described in O. Keller's preface to vol. i. of the 2nd ed. (1899) of Keller and Holder's recension of Horace's works. This edition also gives by far the largest collection of variants and emendations to the text and of the testi- monia of ancient writers.

What might have proved the most important manuscript of Horace, the so-

called vetustissimus Blandinius, is now lost, and we know it only from the account of J. Cruquius who saw it in 1565. The relations of the extant MSS. to each other and the presumed archetype present an intricate problem; and Keller's solution has not proved generally acceptable. See a resume of the controversy llorazkritik seit 1880 by J. Bick (Leipzig, 1906) and F. Vollmer in Philohgus. Supp. x. 2, pp. 261-322. Many MSS. of Horace contain ancient scholia which are copied or taken with abridgment from the commentaries of Porphyrio, who lived about a.d. 200, and Helenius Aero, a still earlier grammarian. These scholia also have been collected and edited — the Porphyrio scholia by A. Holder (1902) and the " Acronian " (or pseudo-Acronian) by O. Keller (1902-1904). R. Bentley's epoch-making edition (1 711) has been reprinted with an index by Zangemcister (1869). Of the modern commentaries the most useful are those of J. C. Orelli (4th ed., revised by O. Hirsch- feldcr and J. Mewes, 1886-1890, with index verborum) , and of A. Kiessling (revised by R. Heinze, Odes, 1901, 1908, Satires, 1906, Epistles, 1898). The best complete English commentary is that of E. C. Wickham (2 vols., 1874-1896). Other editions with English notes are those of T. E. Page (Odes, 1883), A. Palmer (Satires, 1883), A. S. Wilkins {Epistles, 1885), J. Gow (Odes and Epodes, 1896, Satires, i., 1901). P. Shorey (Odes and Epodes, 1898, Boston, U.S.A.). L. Muller's elaborate edition of the Odes and Epodes was published posthumously (1900). Of the critical editions Keller and Holder's still holds the field: to this Keller's Epilegomena zu Horaz (1879) is a necessary adjunct. F. Vollmer's text (1907) uses Keller's materials on a new principle. Of illustrated editions H. H. Milman's (1867) and C. W. King's (1869, with text revised by H. A. J. Munro) deserve mention. The best verse translation is that of]. Conington lately reprinted with the Latin text from the recension in Postgate's new Corpus poetarum. For further information see Teuffel's Gesc.hich.te der romischen Litleratur (Eng. trans, by G. C. Warr), §§234-240, and M. Schanz's excellent account in his Geschichte der romischen Littcratur, vol. ii. §§ 251-266. (W. Y. S. ; J. G.)*

HORAE (Lat. hora, hour), the Hours, in Greek mythology 'Open, originally the personification of a series of natural pheno- mena. In the Iliad (v. 749) they are the custodians of the gates of Olympus, which they open or shut by scattering or condensing the clouds; that is, they are weather goddesses, who send down or withhold the fertilizing dews and rain. In the Odyssey, where they are represented as bringing round the seasons in regular order, they are an abstraction rather than a concrete personification. The brief notice in Hesiod (Theog. 901), where they are called the children of Zeus and Themis, whe superintend the operations of agriculture, indicates by the names assigned to them (Eunomia, Dike, Eirene, i.e. Good Order, Justice, Peace) the extension of their functions as goddesses of order from nature to

the events of human life, and at the same time invests them with moral attributes. Like the Moerae (Fates), they regulate the destinies of. man, watch over the newly born, secure good laws and the administration of justice. The selection of three as their number has been supposed to refer to the most ancient division of the year into spring, summer and winter, but it is probably only another instance of the Greek liking for that particular number or its multiples in such connexions (three Moerae, Charites, Gorgons, nine Muses). Order and regularity being indispensable conditions of beauty, it was easy to conceive of the Horae as the goddesses of youthful bloom and grace, inseparably associated with the idea of spring- time. As such they are companions of the Nymphs and Graces, with whom they are often confounded, and of other superior deities connected with the spring growth of vegetation (Demeter, Dionysus). At Athens they were two (or three) in number: Thallo and Carpo, the goddesses of the flowers of spring and of the fruits of summer, to whom Auxo, the goddess of the growth of plants, may be added, although some authorities make her only one of the Graces. In honour of the Horae a yearly festival (Horaea) was celebrated, at which protection was sought against the scorching heat and drought, and offerings were made of boiled meat as less insipid and more nutritious than roast. In later mythology, under Alexandrian influence, the Horae become the four seasons, daughters of Helios and Selene, each represented with the conventional attributes. Subsequently, when the day was divided into twelve equal parts, each of them took the name of Hora. Ovid (Melam. ii. 26) describes them as placed at equal intervals on the throne of Phoebus, with whom are also associated the four seasons. Nonnus (5th century a.d.) in the Dionysiaca also unites the twelve Horae as representing the day and the four Horae as the seasons in the palace of Helios. See C. Lehrs, Populate Altfsatze (1856) ; J. H. Krause, Die Musen, Grazien, Horen, und Nymphen (1871); and the articles in Daremberg and Saglio's Dictionnaire des antiquites, J. A. Hild; and in Roscher's Lexikon der Mythologie, W. Rapp.

HORAPOLLON, of Phaenebythis in the nome of Panopolis in Egypt, Greek grammarian, flourished in the 4th century a.d. during the reign of Theodosius I. According to Suidas, he wrote commentaries on Sophocles, Alcaeus and Homer, and a work (TefxtviKa) on places consecrated to the gods. Photius (cod. 279), who calls him a dramatist as well as a grammarian, ascribes to him a history of the foundation and antiquities of Alexandria (unless this is by an Egyptian of the same name, who lived in the reign of Zeno, 474-491). Under the name of Horapollon two books on Hieroglyphics are extant, which profess to be a translation from an Egyptian original into Greek by a certain Philippus, of whom nothing is known. The inferior Greek of the translation, and the character of the additions "in. the second book point to its being of late date; some have

even assigned it to the 15th century. Though a very large proportion of the statements seem absurd and cannot be accounted for by anything known in the latest and most fanciful usage, yet there is ample evidence in both the books, in individual cases, that the tradition of the values of the hieroglyphic signs was not yet extinct in the days of their author.

Bibliography. — Editions by C. Leemans (1835) and A. T. Cory (1840) with English translation and notes; see also G. Rathgeber in Ersch and Gruber's Allgemeine Encyclopadie; H. Schafer, Zeitschrifi fiir dgyptische Sprache (1905), p. 72.

HORATII and CURIATII, in Roman legend, two sets of three brothers born at one birth on the same day — the former Roman, the latter Alban — the mothers being twin sisters. During the war between Rome and Alba Longa it was agreed that the issue should depend on a combat between the two families. Two of the Horatii were soon slain; the third brother feigned flight, and when the Curiatii, who were all wounded, pursued him without concert he slew them one by one. When he entered Rome in triumph, his sister recognized a cloak which he was wearing as a trophy as one she had herself made for her lover, one of the Curiatii. She thereupon invoked a curse upon her brother, who slew her on the spot. Horatius was condemned to be scourged to death, but on his appealing to the people his life was spared (Livy i. 25, 26; Dion. Halic. iii. 13-22). Monuments of the tragic story were shown by the Romans in the time of Livy (the altar of Janus Curiatius near the sororium tigillum, the " sister's beam," or yoke under which Horatius had to pass; and the altar of Juno Sororia). The legend was probably invented to account for the origin of the proiocatio (right of appeal to the people), while at the same time it points to the close connexion and final struggle for supremacy between the older city on the mountain and the younger city on the plain. Their relationship and origin from three tribes are symbolically represented by the twin sisters and the two sets of three brothers.

For a critical examination of the story, see Schwegler, Romische Geschichte, bk. xii. 11. 14; Sir G. Cornewall Lewis, Credibility of Early Roman History, ch. xi. 15; W. Ihne, Hist, of Rome, i. ; E. Pais, Storia di Roma, i. ch. 3 (1898), and Ancient Legends of Roman History (Eng. trans., 1906), where the story is connected with the ceremonies performed in honour of Jupiter Tigillus and Juno Sororia; C. Pascal, Fatti e legende di Roma antica (Florence, 1903); O. Gilbert. Geschichte und Topographie der Stadt Rom im Altertum

(1883-1885).

HORATIUS COCLES, a legendary hero of ancient Rome. With two companions he defended the Sublician bridge against Lars Porsena and the whole army of the Etruscans, while the Romans cut down the bridge behind. Then Horatius threw himself into the Tiber and swam in safety to the shore. A statue was erected in his honour in the temple of Vulcan, and he received as much land as he could plough round in a single day. According to another version, Horatius alone defended the bridge, and was drowned in the Tiber.

There is an obvious resemblance between the legend of Horatius Codes and that of the Horatii and Curiatii. In both cases three Romans come forward as the champions of Rome at a critical moment of her fortunes, and only one successfully holds his ground. In the one case, the locality is the land frontier, in the other, the boundary stream of Roman territory. E. Pais finds the origin of the story in the worship of Vulcan, and identifies Codes (the " one-eyed ") with one of the Cyclopes, who in mythology were connected with Hephaestus, and later with Vulcan. He concludes that the supposed statue of Codes was really that of Vulcan, who, as one of the most ancient Roman divinities and, in fact, the protecting deity of the state, would naturally be confounded with the hero who saved it by holding the bridge against the invaders. He suggests that the legend arose from some religious ceremony, possibly the practice of throwing the stuffed figures called Argei into the Tiber from the Pons Sublicius on the ides of May. The conspicuous part played in Roman history by members of the Horatian family, who were connected with the worship of Jupiter Vulcanus, will explain the attribution of the name Horatius to Vulcan-Cocles.

See Livy ii. 10; Dion. Halic. v. 23-25; Polybius vi. 55; Plutarch, Poplicola, 16. For a critical examination of the legend, see Schwegler, Romische Geschichte, bk. xxi. 18; W. Ihne, History of Rome, i. ; E. Pais, Storia di Roma, i. ch. 4 (1898), and Ancient Legends of Roman History (Eng. trans., 1906).

HORDE, a manufacturing town of Germany, in the Prussian province of Westphalia, is 2 m. S.E. from Dortmund on the railway to Soest. Pop. (1905) 28,461. It has a Roman Catholic and an Evangelical church, a synagogue and an old castle dating from about 1300. There are large smelting- works, foundries,

puddling-works, rolling-mills and manufactures of iron and plated wares. In the neighbourhood there are large iron and coal mines. A tramway connects the town with Dortmund.

HOREB, the ancient seat of Yahweh, the tribal god of the Kenites, adopted by His covenant by Israel. This is the name preferred by the Elohistic writer (E) whose work is interwoven into the Old Testament narrative, and he is followed by the Deuteronomist school (D). The Yahwistic writer (J), on the other hand, prefers to call the mountain Sinai (q.v.), and so do the priestly writers (P). This latter form became the more usual. There is no ground for distinguishing between Horeb as the range and Sinai as the single mountain, or between Horeb and Sinai as respectively the N. and S. parts of the range.

HOREHOUND (0. Eng. harhune, Ger. Andorn, Fr. marrube). Common or white horehound, Marrubium vulgare, of the natural order Labiatae, is a perennial herb with a short stout rootstock, and thick stems, about 1 ft. in height, which, as well as their numerous branches, are coated with a white or hoary felt — whence the popular name of the plant. The leaves have long petioles, and are roundish or rhombic-ovate, with a bluntly toothed margin, much wrinkled, white and woolly below and pale green and downy above; the flowers are sessile, in dense whorls or clusters, small and dull-white, with a 10-toothed calyx and the upper lobe of the corolla long and bifid. The plant occurs in Europe, North Africa and West Asia to North-West India, and has been naturalized in parts of America. In Britain, where it is found generally on sandy or dry chalky ground, it is far from common. White horehound contains a volatile oil, resin, a crystallizable bitter principle termed inarrubiin and other substances, and has a net un-pleasant aromatic odour, and a persistent bitter taste. For- merly it was official in British

pharmacopoeias; and the infusion, syrup or confection of horehound has long been in popular repute for the treatment of a host of dissimilar affections. Black horehound, Ballota nigra, is a hairy perennial herb, belonging to the same order, of foetid odour, is 2 to 3 ft. in height, and has stalked, roundish- ovate, toothed leaves and numerous flowers, in dense axillary clusters, with a green or purplish calyx, and a pale red-purple corolla. It occurs in Europe, North Africa and West Asia, and in Britain south of the Forth and Clyde, and has been introduced into North America.

HORGEN, a small town in the Swiss canton of Zurich, situated on the left or west shore of the Lake of Zurich, and by rail io| m. S.E. of the town of Zurich. Pop. (1900) 6883, mostly German-speaking and Protestants. It possesses many industrial establishments of various kinds, and is a centre of the Zurich silk manufacture. It came in 1406 into the possession of Zurich, with which it communicates by means of steamers on the lake, as well as by rail.

HORIZON (Gr. opifav, dividing), the apparent circle around which the sky

and earth seem to meet. At sea this circle is well defined, the line being called the sea horizon, which divides the visible surface of the ocean from the sky. In astronomy the horizon is that great circle of the sphere the plane of which is at right angles to the direction of the plumb line. Sometimes a distinction is made between the rational and the apparent horizon, the former being the horizon as determined by a plane through the centre of the earth, parallel to that through the station of an observer. But on the celestial sphere the great circles of these two planes are coincident, so that this distinction is not necessary (see Astronomy: Spherical). The Dip of the horizon at sea is the angular depression of the apparent sea

horizon, or circle bounding the visible ocean, below the apparent celestial horizon as above defined. It is due to the rotundity of the earth, and the height of the observer's eye above the water. The dip of the horizon and its distance in sea-miles when the height of the observer's eye above the sea-level is Ji feet, are approximately given by the formulae: Dip = o'-97 -4h; Distance = i"'-i7 -Jh. The difference between the coefficients 0-97 and 1-17 arises from the refraction of the ray, but for which they would be equal.

HORMAYR, JOSEPH, Baron von (1782-1848), German statesman and historian, was born at Innsbruck on the 20th of January 1782. After studying law in his native town, and attaining the rank of captain in the Tirolese Landwehr, the young man, who had the advantage of being the grandson of Joseph von Hormayr (1705-17 78), chancellor of Tirol, obtained a post in the foreign office at Vienna (1801), from which he rose in 1803 to be court secretary and, being a near friend of the Archduke John, director of the secret archives of the state and court for thirteen months. In 1803 he married Therese Anderler von Hohenwald. During the insurrection of 1809, by which the Tirolese sought to throw off the Bavarian supremacy con- firmed by the treaty of Pressburg, Hormayr was the mainstay of the Austrian party, and assumed the administration of everything (especially the composition of proclamations and pamphlets) ; but, returning home without the prestige of success, he fell, in spite of the help of the Archduke John, into disfavour both with the emperor Francis I. and with Prince Metternich, and at length, when in 1813 he tried to stir up a new insurrection in Tirol, he was arrested and imprisoned at Munkatt. In 1816 some amends were made to him by his appointment as imperial historiographer; but so little was he satisfied with the general policy and

conduct of the Austrian court that in 1828 he accepted an invitation of King Louis I. to the Bavarian capital, where he became ministerial councillor in the department of foreign affairs. In 1832 he was appointed Bavarian minister-resident at Hanover, and from 1837 to 1846 he held the same position at Bremen. Together with Count Johann Friedrich von der Decken (1769- 1840) he founded the Historical Society of Lower Saxony (Historischer Verein fur Niedersachsen). The last two years of his life were spent at Munich as superintendent of the national archives. He died on the 5th of October 1848.

Hormayr's literary activity was closely conditioned by the circumstances of his political career and by the fact that Johannes von Mtiller (d. 1611) was his teacher: while his access to original documents gave value to his treatment of the past, his record or criticism of contemporary events received authority and interest from his personal experience. But his history of the Tirolese rebellion is far from being impartial; for he always liked to put himself into the first place, and the merits of Andreas Hofer and of other leaders are not sufficiently acknowledged. In his later writings he appears as a keen opponent of the policy of the court of Vienna.

The following are among Hormayr's more important works: Geschichte des Graf en von Andechs (1796); Lexikon fiir Reisenden in Tirol (1796) ; Kritisch-diplomatische Beitrdge zur Geschichte Tirols im Mittelalter (2 vols., Innsbruck, 1802-1803, newed., 1805); Gesch. der gefurst. Grafschaft Tirol (2 vols., Tubingen, 1806-1808); Oster- reichischer Plutarch, 20 vols., collection of portraits and biographies of the most celebrated administrators, commanders and statesmen of Austria (Vienna. 1807); an edition of Beauchamp's Histoire de la guerre en Vendee (1809); Geschichte Hofers (1817, 2nd ed., 2 vols., 1845) and other pamphlets; Archiv fiir Gesch., Stat., Lit. und Kunst (20 vols., 1809-1828); Allgemeine Geschichte der neuesten Zeit vom Tod Friedrichs des Grossen bis zum zweilen Pariser Frieden (3 vols., Vienna, 1814-1819, 2nd ed., 1891); Wien, seine Gesch. und Denkwiirdigkeiten (5 vols., Vienna, 1823-1824); together with Fragmente uber Deutschland, in Sondetheil Bayerns Welthandel; Lebensbilder aus dem Befreiungskriege (3 vols., Jena, 1841-1844, 2nd cd., 1845) ; Die goldene Chronik von Iiohenschwangau (Munich, 1842) ; Anemonen atis dem Tagebuch eines alien Pilgersmanns (4 vols., Jena, 1845-1847). Together with Mednyanski (1784-1844) he founded the Taschenbuch fiir die vaterldnd. Gesch. (Vienna, 1811-1848).

See T. H. Merdau, Biographische, Ziige aus dem Leben deutscher Manner (Leipzig, 1815); Graffer, Osterreichische National-Encyclo- pddie, ii. (1835); Taschenbuch fur vaterlandische Geschichte (1836 and 1847); Neuer Nekrolog der Deutschen (1848); Blatter fiir literarische

Unterhaltung (1849); Wurzbach, Osterreichisches biographisches Lexikon, ix. (1863); K. Th. von Heigel in the Allgemeine deutsche Biographic (1881) and F. X. Wegele, Geschichte der deutschen Historio- graphie (Munich and Leipzig, 1885); F. v. Krones, Aus Osterreichs stillen und bewegten Jahren 1810-181$; Biographie und Brief e an Erzhz. Johann (Innsbruck, 1892) ; Hirn, Tiroler Auf stand (1909). (J. Hn.)

HORMISDAS, pope from 514 to 523 in succession to Symmachus, was a native of Campania. He is known as having succeeded in obtaining the reunion of the Eastern and Western Churches, which had been separated since the excommunication of Acacius in 484. After two unsuccessful attempts under the emperor Anastasius I., Hormisdas had no difficulty in coming to an understanding in 518 with his successor Justin. Legates were despatched to Constantinople; the memorial of the schismatic patriarchs was condemned; and union was resumed with the Holy See.

Details of this transaction have come down to us in the Collectio Avellana (Corpus script, eccl. Vindobon., vol. xxv., Nos. 105-203; cf. Andreas Thiel, Epp. Rom. Pont. i. 741 seq.).

HORMIZD, or Hormizdas, the name of five kings of the Sassanid dynasty (see Persia: Ancient History). The name is another form of Ahuramazda or Ormuzd (Ormazd), which under the Sassanids became a common personal name and was borne not only by many generals and officials of their time (it therefore occurs very often on Persian seals), but even by the pope of Rome noticed above. It is strictly an abbreviation of Hormuzd-dad, " given by Ormuzd," which form is preserved by Agathias iv. 24-25 as name of King Hormizd I. and II. ('OpMicScmjs).

1. Hormizd I. (272-273) was the son of Shapur I., under whom he was governor of Khorasan, and appears in his wars against Rome (Trebellius Pollio, Trig. Tyr. 2, where Noldeke has corrected the name Odomastes into Oromastes, i.e. Hormizd). In the Persian tradition of the history of Ardashir I., preserved in a Pahlavi text (Noldeke, Geschichte des Artachsir I. Pdpakdn), he is made the son of a daughter of Mithrak, a Persian dynast, whose family Ardashir had extirpated because the magians had predicted that from his blood would come the restorer of the empire of Iran. Only this daughter is preserved by a peasant; Shapur sees her and makes her his wife, and her son Hormizd is afterwards recognized and acknowledged by Ardashir. In this legend, which has been partially preserved also in Tabari, the great conquests of. Shapur are transferred to Hormizd. In reality he reigned only one year and ten days.

2. Hormizd II., son of Narseh, reigned for seven years five months, 302-309. Of his reign nothing is known. After his death his son Adarnases

was killed by the grandees after a very short reign, as he showed a cruel disposition; another son, Hormizd, was kept a prisoner, and the throne reserved for the child with which a concubine of Hormizd II. was pregnant and which received the name Shapur II. Hormizd escaped from prison by the help of his wife in 323, and found refuge at the court of Constantine the Great (Zosim. ii. 27; John of Antioch, fr. 178; Zonar. 13-5). In 363 Hormizd served in the army of Julian against Persia; his son, with the same name, became consul in 366 (Ammian. Marc. 26. 8. 12).

3. Hormizd III., son of Yazdegerd I., succeeded his father in 457. He had continually to fight with his brothers and with the Ephthalites in Bactria, and was killed by Peroz in 459.

4. Hormizd IV., son of Chosroes I., reigned 578-590. He seems to have been imperious and violent, but not without some kindness of heart. Some very characteristic stories are toW of him by Tabari (Noldeke, Geschichte d. Perser und Araber unter den Sasaniden, 264 fL). His father's sympathies had been with the nobles and the priests. Hormizd protected the common people and introduced a severe discipline in his army and court. When the priests demanded a persecution of the Christians, he declined on the ground that the throne and the government could only be safe if it gained the goodwill of both concurring religions. The consequence was that he raised a strong opposi- tion in the ruling classes, which led to many executions and

I confiscations. When he came to the throne he killed his brothers,

according to the oriental fashion. From his father he had inherited a war against the Byzantine empire and against the Turks in the east, and negotiations of peace had just begun with the emperor Tiberius, but Hormizd haughtily declined to cede anything of the conquests of his father. Therefore the accounts given of him by the Byzantine authors, Theophylact, Simocatta (iii. 16 ff.), Menander Protector and John of Ephesus (vi. 22), who give a full account of these negotiations, are far from favourable. In 588 his general, Bahram Chobin, defeated the Turks, but in the next year was beaten by the Romans; and when the king superseded him he rebelled with his army. This was the signal for a general insurrection. The magnates deposed and blinded Hormizd and proclaimed his son Chosroes II. king. In the war which now followed between Bahram Chobin and Chosroes II. Hormizd was killed by some partisans of his son (590).

5. Hormizd V. was one of the many pretenders who rose after the murder of Chosroes II. (628). He maintained himself about two years (631, 632) in the district of Nisibis. (Ed. M.)

HORMUZ (Hurmuz, Ormuz, Ormus), a famous city on the shores of the Persian Gulf, which occupied more than one position in the course of history, and has now long practically ceased to exist. The earliest mention of the name occurs in the voyage of Nearchus (325 B.C.). When that admiral beached his fleet at the mouth of the river Anamis on the shore of Harmozia, a coast district of Carmania, he found the country to be kindly, rich in every product except the olive. The Anamis appears to be the river now known as the Minab, discharging into the Persian Gulf near the entrance of the latter. The name Hormuz is derived by some from that of the Persian god Hormuzd (Ormazd), but it is more likely that the original etymology was connected with khurma, " a date "; for the meaning of Moghistan the modern name of the territory Harmozia is " the region of date-palms." The foundation of the city of Hormuz in this territory is ascribed by one Persian writer to the Sassanian Ardashir Babegan (c. 230 a.d.). But it must have existed at an earlier date, for Ptolemy takes note of "Ap/tovfa ir6X« (vi. 8).

Hormuz is mentioned by Idrisi, who wrote c. 11 50, under the title of Hormuz-al-sahillah, "Hormuz of the shore" (to distinguish it from inland cities of the same name then existing), as a large and well-built city, the chief mart of Kirman. Siraf and Kish (Kais), farther up the gulf, had preceded it as ports of Irade with India, but in the 13th century Hormuz had become the chief seat of this traffic. It was at this time the seat also of a petty dynasty of kings, of which there is a history by one of their number (Turan Shah); an abstract of it is given by the Jesuit Teixeira. According to this history the founder of the dynasty was Shah Mohammed Dirhem-Kub (" the Drachma- coiner "), an Arab chief who crossed the gulf and established himself here. The date is not given, but it must have been before 1100 a.d., as Ruknuddin Mahmud, who succeeded in 1246, was the twelfth of the line. These princes appear to have been at times in dependence necessarily on the atabegs of Fars and on the princes of Kirman. About the year 1300 Hormuz was so severely and repeatedly harassed by raids of Tatar horsemen that the king and his people abandoned their city on the mainland and transferred themselves to the island of Jerun (Organa of Nearchus), about 12 m. westward and 4 m. from the nearest shore.

The site of the continental or ancient Hormuz was first traced in modern times by Colonel (Sir Lewis) Pelly when resident at Bushire. It stands in the present district of Minab, several miles from the sea, and on a creek which communicates with the Minab river, but is partially silted up and not now

accessible for vessels. There remain traces of a long wharf and extensive ruins. The new city occupied a triangular plain forming the northern part of the island, the southern wall, as its remains still show, being about 2 m. in extent from east to west. A suburb with a wharf or pier, called Turan Bagh (garden of Turan) after one of the kings, a name now corrupted to Trumpak, stood about 3 m. from the town to the south-east.

Odoric gives the earliest notice we have of the new city (c. 1320). He calls it Ormes, a city strongly fortified and abound- ing in cosily wares, situated on an island 5 m. distant from the main, having no trees and no fresh water, unhealthy and (as all evidence confirms) incredibly hot. Some years later it was visited more than once by Ibn Batuta, who seems to speak ot the old city as likewise still standing. The new Hormuz, called also Jerun {i.e. still retaining the original name of the island), was a great and fine city rising out of the sea, and serving as a mart for all the products of India, which were distributed hence over all Persia. The hills on the island were of rock-salt, from which vases and pedestals for lamps were carved. Near the gate of the chief mosque stood an enormous skull, apparently that of a sperm-whale. The king at this time was Kutbuddin Tahamtan, and the traveller gives a curious description of him, seated on the throne, in patched and dirty raiment, holding a rosary of enormous pearls, procured from the Bahrein fisheries, which at one time or another belonged, with other islands in the gulf and on the Oman shores from Ras-el-had (C. Rosalgat of the Portuguese) on the ocean round to. Julfar on the gulf, to the princes of Hormuz. Abdurazzak, the envoy of Shah Rukh on his way to the Hindu court of Vijayanagar, was in Hormuz in 1442, and speaks of it as a mart which had no equal, frequented by the merchants of all the countries of Asia, among which he enumerates China, Java, Bengal, Tenasserim, Shahr-I-nao {i.e. Siam) and the Maldives. Nikitiu, the Russian (c. 1470), gives a similar account; he calls it " a vast emporium of all the world."

In September 1507 the king of Hormuz, after for some time hearing of the terrible foe who was carrying fire and sword along the shores of Arabia, saw the squadron of Alphonso d' Albuquerque appear before his city, an appearance speedily followed by extravagant demands, by refusal of these from the ministers of the young king, and by deeds of matchless daring and cruelty on the part of the Portuguese, which speedily broke down resistance. The king acknowledged himself tributary to Portugal, and gave leave to the Portuguese to build a castle, which was at once commenced on the northern part of the island, commanding the city and the anchorage on both sides. But the mutinous conduct and desertion of several of Albuquerque's captains compelled him suddenly to abandon the enterprise; and it was not till 1 5 14, after the great leader had captured Goa and Malacca, and had for five years been viceroy, that he returned to Hormuz

{at Ormuz, as the Portuguese called it), and without encountering resistance to a name now so terrible, laid his grasp again on the island and completed his castle. For more than a century Hormuz remained practically in the dominions of Portugal, though the hereditary prince, paying from his revenues a tribute to Portugal (in lieu of which eventually the latter took the whole of the customs collections), continued to be the instrument of government. The position of things during the Portuguese rule may be understood from the description of Cesare de' Federici, a Venetian merchant who was at Hormuz about 1565. After speaking of the great trade in spices, drugs, silk and silk stuffs, and pearls of Bahrein, and in horses for export to India, he says the king was a Moor {i.e. Mahommedan), chosen by and subordinate to the Portuguese. " At the election of the king I was there and saw the ceremonies that they use . . . The old king being dead, the captain of the Portugals chooseth another of the blood-royal, and makes this election in the castle with great ceremony. And when he is elected the captain sweareth him to be true … to the K. of Portugal as his lord and governor, and then he giveth him the sceptre regal. After this . . . with great pomp … he is brought into the royal palace in the city. The king keeps a good train and hath sufficient revenues, . . . because the captain of the castle doth maintain and defend his right … he is honoured as a king, yet he cannot ride abroad with his train, without the consent of the captain first had " (in Hakluyt). 1

1 In Barros, Dec. II. book x. c. 7, there is a curious detail of the revenue and expenditure of the kingdom of Ormuz, which would I seem to exhibit the former as not more than £100,000.

The rise of the English trade and factories in the Indian seas in the beginning of the 1 7 th century led to constant jealousies and broils with the Portuguese, and the successful efforts of the English company to open traffic with Persia especially embittered their rivals, to whom the possession of Hormuz had long given a monopoly of that trade. The officers of Shah Abbas, who looked with a covetous and resentful eye on the Portuguese occupation of such a position, were strongly desirous of the aid of English ships in attacking Hormuz. During 1620 and 1621 the ships of Portugal and of the English company had more than once come to action in the Indian seas, and in November of the latter year the council at Sural had resolved on what was practically maritime war with the Portuguese flag. There was hardly a step between this and the decision come to in the following month to join with " the duke of Shiraz " (Imam Kull Khan, the governor of Fars) in the desired expedition against Horrhuz. There was

some pretext of being forced into the alliance by a Persian threat to lay embargo on the English goods at Jashk; but this seems to have been only brought forward by the English agents when, at a later date, their proceedings were called in question. The English crews were at first unwilling to take part in what they justly said was " no merchandizing business, nor were they engaged for the like," but they were persuaded, and five English vessels aided, first, in the attack of Kishm, where (at the east end of the large island so called) the Portuguese had lately built a fort, 1 and afterwards in that of Hormuz itself. The latter siege was opened on the 18th of February 1622, and continued to the 1st of May, when the Portuguese, after a gallant defence of ten weeks, surrendered. It is to be recollected that Portugal was at this time subject to the crown of Spain, with which England was at peace; indeed, it was but a year later that the prince of Wales went on his wooing adventure to the Spanish court. The irritation there was naturally great, though it is surprising how little came of it. The company were supposed (apparently without foundation) to have profited largely by the Hormuz booty; and both the duke of Buckingham and the king claimed to be " sweetened," as the record phrases it, from this supposed treasure. The former certainly received a large bribe (£10,000) . The conclusion of the transaction with the king was formerly considered doubtful; but entries in the calendar of East India papers seem to show that James received an equal sum. 2

Hormuz never recovered from this blow. The Persians transferred their establishments to Gombroon on the mainland, about 12 m. to the north-west, which the king had lately set up as a royal port under the name of Bander Abbasi. The English stipulations for aid had embraced an equal division of the customs duties. This division was apparently recognized by the Persians as applying to the new Bander, and, though the trade with Persia was constantly decaying and precarious, the company held to their factory at Gombroon for the sake of this claim to revenue, which of course was most irregularly paid. In 1683- 1684 the amount of debt due to the company in Persia, including their proportion of customs duties, was reckoned at a million sterling. As late as 1690-1691 their right seems to have been admitted, and a payment of 3495 sequins was received by them on this account. The factory at Gombroon lingered on till 1759, when it was seized by two French ships of war under Comte d'Estaing. It was re-established, but at the time of Niebuhr's visit to the gulf a few years later no European remained. Niebuhr mentions that in his time (c. 1765) Mulla 'Ali Shah, formerly admiral of Nadir Shah, was established on the island of Hormuz and part of Kishm as an independent chief.

See also Barros, Asia; Commentaries of Albuquerque, trans, by Birch (Hak. Society) ; Relaciones de Pedro Teixeira (Antwerp, 1610) ; Narratives in Hakluyt's Collection (reprint in 1809, vol. ii.) and in

Purchas's Pilgrims, vol. ii. ; Pietro della Valle, Persia, lett. xii.- xvii. ; Calendar of E. I. Papers, by Sainsbury, vol. iii. ; Ritter, Erdkunde, xii.; Jour. Roy. Geog. Soc, Kempthorne in vol. v., White-

1 The attack on Kishm was notable in that one of the two English- men killed there was the great navigator Baffin.

2 Colonial Series, E. Indies, by Sainsbury, vol. iii. passim, especi- ally see pp. 296 and 329.

locke in vol. viii., Pelly in vol. xxxiv. ; Fraser, Narrative of a Journey into Khorasan (1825); Constable and Stift'e, Persian Gulf Pilot (1864); Bruce, Annals of the E. I. Company, &c. (1810). (H. Y.)

The island has a circumference of 16 m. and its longest axis measures 4ˆ m. The village is in 27 6′ N., 56° 29′ E. The Portuguese fort still stands, but is sadly out of repair and much of its western wall has been undermined and washed away by the action of the sea. It is a bastioned fort with orillons and loopholed casemates under the ramparts and was separated from the town by a deep moat, now silted up, cut E.-W. across the isthmus and crossed by a bridge. It has three cisterns for collecting rainwater; two are 17-18 ft. deep, have a capacity of about 60,060 gallons and are covered by arched roofs supported on six stone pillars. The third cistern is smaller and has no roof. Five rusty old iron guns are lying prone on the roof; six others on the strand before the village are used for fastening boats, another serves as a socket for a flagstaff before the repre- sentative of the government. The island is under the jurisdiction of the governor of the Persian Gulf ports who resides a,t Bushire. Of the old city hardly anything stands except a minaret, 70 ft. high, with a winding staircase inside and much worn away at the base, part of a former mosque used by the Portuguese as a lighthouse, but the traces of buildings, massive foundations constructed of stone quarried in the hills on the island, of many cisterns (some say 300), &c, are numerous and extensive. The modern settlement, situated south of the fort on the eastern shore, has a population of about 1000 during the cool season, but less in the hot season, when many people go over to Minab on the mainland to the east. Most of the people live in huts constructed of the branches and leaves of the date palm. They own about sixty small sailing vessels trading to Muscat and other ports and also do some pearl-fishing. At Turan Bagh on the east coast 4j m. S.E. of the fort are some considerable ruins, irrigation canals, an extensive burial ground and some huts occupied by a few families who cultivate a small garden on a terrace supported by old retaining walls. On a hill near the shore if m. S.E. of the fort is the ruin of a small chapel called " Santa Lucia" on an old map in Astley's Collection of Voyages, and on the summit of a salt hill 15 m. south of the fort are the remains of another

chapel called " N.S. de la Pena " on the same map, and a " Monastery " in a sketch of Hormuz made by David Davies, a mate on board the East India Company's ship " Discovery " in 1627. With the exception of the northern part, where the old city stood, and the little patch at Turan Bagh, the island is covered with reddish brown hills with sharp serrated ridges composed of gypsum, rock-salt and clay. These hills, which do not exceed 300 ft. in height, are broken through in four places by conical, whitish peaks of volcanic rocks (green- stone, trachyte) ; the highest of these peaks with an altitude of 690 ft. is situated almost in the centre of the island.

The island has extensive beds of red ochre in which nodules of very pure hematite are often found. The ochre, here called gilek, has been an important article of export for centuries' and great quantities of it are exported at the present time to England (in 1906-1907, 10,000 tons; local price 27s. the ton). The climate of Hormuz, although hot, is, according to medical experts, the best in the Persian Gulf. Rain falls in January, February and March, and the annual rainfall is said to be about the same as that of Bushire, 12 to 13 in.

Capt. A. W. Stiffe in Geogr. Mag. (April 1874) ; William Foster in Geogr. Journal (Aug. 1894); writer's notes taken on island. (A.H.-S^).

HORN, ARVID BERNHARD, Count (1664-1742), Swedish statesman, was born at Vuorentaka in Finland on the 6th of April 1664, of a noble but indigent family. After completing his studies at Abo, he entered the army and served for several years in the Netherlands, in Hungary under Prince Eugene, and in Flanders under Waldeck (1690-1695). He stood high

3 " Reddle or Red Ochre from the Forest of Dean in Gloucester- shire is very little inferior to the Sort brought from the Island of Ormuz in the Persian Gulph and so much valued and used by our Painters under the name of Indian Red " (Sir John Hill, Theo- phrastus's History of Stones, London, 1774).

in the favour of the young Charles XII. and was one of his fore- most generals in the earlier part of the great Northern War. In 1704 he was entrusted with his first diplomatic mission, the deposition of Augustus II. of Poland and the election of Stanislaus I., a mission which he accomplished with distinguished ability but absolute unscrupulousness. Shortly afterwards he was besieged by Augustus in Warsaw and compelled to surrender. In 1705 he was made a senator, in 1706 a count and in 1707 governor of

Charles XII. 's nephew, the young duke Charles Frederick of Holstein-Gottorp. In 1710 he succeeded Nils Gyldenstolpe as prime minister. Transferred to the central point of the administration, he had ample opportunity of regarding with other eyes the situation of the kingdom, and in consequence of his remonstrances he fell rapidly in the favour of Charles XII. Both in 1710 and 1713 Horn was in favour of summoning the estates, but when in 17 14 the diet adopted an anti-monarchical attitude, he gravely warned and ultimately dissolved it. In Charles XII. 's later years Horn had little to do with the administration. After the death of Charles XII. (1718) it was Horn who persuaded the princess Ulrica Leonora to relinquish her hereditary claims and submit to be elected queen of Sweden. He protested against the queen's autocratic behaviour, and resigned both the premiership and his senatorship. He was elected landtmarskalk at the diet of 1720,'and contributed, on the resignation of Ulrica Leonora, to the election of Frederick of Hesse as king of Sweden, whose first act was to restore to him the office of prime minister. For the next eighteen years he so absolutely controlled both the foreign and the domestic affairs of Sweden that the period between 1720 and 1738 has well been called the Horn period. His services to his country were indeed inestimable. His strong hand kept the inevitable strife of the parliamentary factions within due limits, and it was entirely owing to his provident care that Sweden so rapidly recovered from the wretched condition in which the wars of Charles XII. had plunged her. In his foreign policy Horn was extremely wary and cautious, yet without compromising either the independence or the self-respect of his country. He was, however, the promoter of a new principle of administration which in later days proved very dangerous to Sweden under ministers less capable than he was. This was to increase the influence of the diet and its secret committees in the solution of purely diplomatic questions, which should have been left entirely to the executive, thus weakening the central government and at the same time facilitat- ing the interference of foreign Powers in Sweden's domestic affairs. Not till 1731 was there any appearance of opposition in the diet to Horn's "system"; but Horn, piqued by the growing coolness of the king, the same year offered his resignation, which was not accepted. In 1734, however, the opposition was bold enough to denounce his neutrality on the occasion of the war of the Polish Succession, when Stanislaus I. again appeared upon the scene as a candidate for the Polish throne; but Horn was still strong enough to prevent a rupture with Russia. Hence- forth he was bitterly but unjustly accused of want of patriotism, and in 1738 was compelled at last to retire before the impetuous onslaught of the triumphant young Hat party. For the rest of his life he lived in retirement at his estate at Ekebyholm, where he died on the 17th of April 1742. Horn in many respects greatly resembled his contemporary Walpole. The peculiar situation of Sweden, and the circumstances of his time, made his policy necessarily opportunist, but it

was an opportunism based on excellent common sense.

See V. E. Svedelius, Amid Bernard Horn (Stockholm, 1879) ; R. N. Bain, Gustavus III., vol. i. (London, 1894), and Charles XII. (1895); C. F. Horn, A. B. Horn:hans lefnad (Stockholm, 1852). (R. N. B.)

HORN, PHILIP DE MONTMORENCY, Count of (1518-1568), a man of illustrious descent and great possessions in the Nether- lands, became in succession under Charles V. and Philip II. stadtholder of Gelderland, admiral of Flanders and knight of the Golden Fleece. In 1559 he commanded the stately fleet which conveyed Philip II. from the Netherlands to Spain, and he remained at the Spanish court till 1563. On his return he placed himself with the prince of Orange and Count Egmont

at the head of the party which opposed the policy of Cardinal Granvella. When Granvella retired the three great nobles continued to resist the introduction of the Spanish Inquisition and of Spanish despotic rule into the Netherlands. But though Philip appeared for a time to give way, he had made up his mind to visit the opponents of his policy with ruthless punishment. The regent, Margaret, duchess of Parma, was replaced by the duke of Alva, who entered the Netherlands at the head of a veteran army and at once began to crush all opposition with a merciless hand. Orange fled from the country, but Egmont and Horn, despite his warning, decided to remain and face the storm. They were both seized, tried and condemned as traitors, and were executed on the 5th of June 1568 in the great square before the town hall at Brussels.

See biographical notices in A. J. van der Aa, Biographisch Woorden- boek der Nederlanden (Haarlem, 1851-1879); J. Kok, Vaderlandsch Woordenboek (Amsterdam, 1 785-1 799); also bibliography to chaps. vi. vii. and xix. in Cambridge Modern History, vol. iii. pp. 798-809

(1904).

HORN, English hero of romance. King Horn is a heroic poem or gest of 1546 lines dating from the 13th century. Murry (cr Allof), king of Sudenne 1 (Surrey and Sussex?) is slain by Saracen pirates who turn his son Horn adrift with twelve other children. The boat drifts to Westernesse 2 (Cornwall?), where the children are received by King Aylmer (Aethelmaer). Presently Horn is denounced by one of his companions as the lover of the king's daughter Rymenhild (Rimel) and is banished, taking with him a ring, the gift of his bride and a talisman against danger. In Ireland, under the name of Godmod, he serves for seven years, and slays in battle the Saracens who had killed his father. Learning that Rymenhild is to be married against her will to King Mody, he returns to Westernesse

disguised as a palmer, and makes himself known to the bride by dropping the ring into the cup she offers him, with the words " Drink to Horn of Horn." He then reconquers his father's kingdom and marries Rymenhild.

The other versions of the story, which are founded on a common tradition, but are not immediately dependent on one another, are : (1) the longer French romance of Horn et Rimenhild by "mestre Thomas," describing more complex social conditions than those of the English poem; (2) a slightly shorter Middle English poem, Horn Childe and Maiden Rimnild; (3) the Scottish ballad of " Hind Horn; " (4) a prose romance founded on the French Horn, entitled Pontus et Sidoine (Lyons, 1480, Eng. trans, pr. by Wynkyn de Worde, 151 1 ; German trans. Augsburg, 1483).

There is a marked resemblance between the story of Horn and the legend of Havelok the Dane, and it is interesting to note how closely Richard of Ely followed the Horn tradition in the 12th century De gestis Herewardi Saxonis. Hereward also loves an Irish princess, flees to Ireland, and returns in time for the bridal feast, where he is presented with a cup by the princess. The orphaned prince who recovers his father's kingdom and avenges his murder, and the maid or wife who waits years for an absent lover or husband, and is rescued on the eve of a forced marriage, are common characters in romance. The second of these motives, with almost identical incidents, occurs in the legend of Henry the Lion, duke of Brunswick; it is the subject of ballads in Swedish, Danish, German, Bohemian, &c, and of a Historia by Hans Sachs, though some magic elements are added; it also occurs in the ballad of Der edle Moringer (14th century), well known in Sir Walter Scott's translation; in the story of Torello in the Decameron of Boccaccio (10th day, 9th tale); and with some variation in the Russian tale of Dobrynya and Nastasya.

King Horn was re-edited for the Early English Text Soc. by G. H. McKnight in 1901 ; Horn et Rimenhild was edited with the English versions for the Bannatyne Club by F. Michel (Paris, 1845) ; Horn Childe and Maiden Rimnild in J. Ritson's Metrical Romances, vol. iii.; and " Hind Horn " in F. J. Child's English and Scottish

1 There was a barrow in the Isle of Purbeck, Dorsetshire, called Hornesbeorh ; and there are other indications which point to a possible connexion between Horn and Dorset (see H. L. Ward, Cat. of Romances, i. 451).

2 Sudenne and Westernesse are tentatively identified also with Isle of Man and Wirral {Cambridge Hist, of Eng Lit., i. 304).

Popular Ballads (vol. i., 1882), with an introductory note on similar legends. See also H. L. Ward, Catalogue of Romances, vol. i., where the relation between Havelok and Horn is discussed; Hist. Utt. de la France (vol. xxii., 1852); W. Soderhjelm, Sur I'idenlite du Thomas auteur de Tristan et du Thomas auteur de Horn {Romania, xv., 1886) ; T. Wissmann, " King Horn " (1876) and " Das Lied von King Horn " (188O in Nos. 16 and 45 of Quellen und Forschungen zur Spr. und Ci'iturgesch. d. german. Volker (Strassburg and London); Reinfrid von Braunschweig, a version of the legend of Henry the Lion, edited by K. Bartsch (Stuttgart, 1871); and a further bibliography in O. Hartenstein, Studien zur Hornsage (Heidelberg, 1902).

HORN (a common Teutonic word, cognate with Lat. cornu; cf. Gr. Kepas). The weapons which project from the heads of various species of animals, constituting what are known as horns, embrace substances which are, in their anatomical structure and chemical composition, quite distinct from each other; and although in commerce also they are known indiscriminately as horn, their uses are altogether dissimilar. These differences in structure and properties were thus indicated by Sir R. Owen: — " The weapons to which the term horn is properly or technically applied consist of very different substances, and belong to two organic systems, as distinct from each other as both are from the teeth. Thus the horns of deer consist of bone, and are processes of the frontal bone; those of the giraffe are independent bones or ' epiphyses ' covered by hairy skin; those of oxen, sheep and antelopes are ' apophyses ' of the frontal bone, covered by the corium and by a sheath of true horny material; those of the prong-horned antelope consist at their basis of bony processes covered by hairy skin, and are covered by horny sheaths in the rest of their extent. They thus combine the character of those of the giraffe and ordinary antelope, together with the expanded and branched form of the antlers of deer. Only the horns of the rhinoceros are composed wholly of horny matter, and this is disposed in longitudinal fibres, so that the horns seem rather to consist of coarse bristles compactly matted together in the form of a more or less elongated sub-compressed cone." True horny matter is really a modified form of epidermic tissue, and consists of the albuminoid " keratin." It forms, not only the horns of the ox tribe, but also the hoofs, claws or nails of animals generally, the carapace of the tortoises and the armadilloes, the scales of the pangolin, porcupine quills, and birds' feathers, &c.

Horn is employed in the manufacture of combs, buttons, the handles of walking-sticks, umbrellas, and knives, drinking-cups, spoons of various kinds, snuff-boxes, &c. In former times it was applied to several uses for which it is no longer required, although such applications have left their

traces in the language. Thus the musical instruments and fog signals known as horns indicate their descent from earlier and simpler forms of apparatus made from horn. In the same way powder-horns were spoken of long after they ceased to be made of that substance; to a small extent lanterns still continue to be "glazed" with thin trans- parent plates of horn.

HORN (Lat. cornu; corresponding terms being Fr. cor, trompe; Ger. Horn; Ital. como), a class of wind instruments primarily derived from natural animal horns (see above), and having the common characteristics of a conical bore and the absence of lateral holes. The word " horn " when used by modern English musicians always refers to the French horn.

Modern horns may be divided into three classes: (1) the short horns with wide bore, such as the bugles (q.v.) and the post-horn. (2) The saxhorns (q.v.), a family of hybrid instru- ments designed by Adolphe Sax, and resulting from the adapta- tion of valves and of a cup-shaped mouthpiece to instruments of the calibre of the bugle. The Flugelhorn family is the German equivalent of the saxhorns. The natural scale of instiuments of this class comprises the harmonics from the second to the eighth only. (3) The French horn (Fr. cor de chasse or trompe de chasse, cor a pistons; Ger. Waldhorn, Ventilhorn; Ital. como or como di caccia), one of the most valuable and diffi- cult wind instruments of the orchestra, having a very slender conical tube wound round in coils upon itself. It consists of four principal parts — the body, the crooks, the slide and the mouthpiece.

(a) The body is the main tube, having a bore of the form known as trunco-conical, measuring approximately 7 ft. 4 in. in length, in which the increase in the diameter of the bore is very gradual in proportion to the length, the cone becoming accentuated only near the bell. In the valve horn the bore is only theoretically conical, the extra lengths of tubing attached to the valves being practically cylindrical. The body is coiled spirally, and has at one end a wide-mouthed bell from 11 to 12 in. in diameter having a parabolic curve, and at the other a conical ferrule into which fit the crooks.

(£>) The crooks (Fr. corps or tons de rechange; Ger. Krummbogen, Stimmbogen, Einsetzbogen) are interchangeable, spiral tubes, tapering to a diameter of a quarter of an inch at the mouthpiece end and vary- ing in length from 16 in. for the Bb alto crook to 125 in. for the Bl> basso. Each crook is named according to the fundamental tone which it produces on being added to the body. By lengthening the tube at will the crook lowers the pitch of the instrument, and conse- quently changes the key in which it stands. Although the harmonic series remains the same for all the crooks, the actual sounds produced by overblowing are lower, the tube being longer, and they now belong to the key of the crook. The principle of the crook was known early in the 17th century; it had been applied to the

trumpet, trombone and Jagertrummet 1 before being adapted to the horn. Crooks are merely transposing agents; they are powerless to fill up the gaps in the scale of the horn in order to make it a chromatic or even a diatonic instrument, for they require time for adjustment. The principle of the crook doubtless suggested to Stolzel the system of valves, which is but an instantaneous application of the general principle to the individual notes of the harmonic series, each of which is thereby lowered a semitone, a tone or a tone and a half, as long as the valve remains in operation. The body of the horn without crooks is of the length to produce 8 ft. C, and forms the standard, being known as the alto horn in C, which is the highest key in which the horn is pitched. The notes are sounded as written.

(c) The mouthpiece of the horn differs substantially from that of the trumpet, 2 There is, strictly speaking, no cup, the inside of the mouthpiece being, like the bore of the instrument itself, in the form of a truncated cone or funnel. Like the other parts of this difficult and complex instrument, the proportions of the mouthpiece must bear a certain undefined relation to the length and diameter of the column of air. The choice of a suitable mouthpiece is in fact a test of skill ; the shape of the lip of the performer and the more special use he may wish to make of either the higher or the lower harmonics have to be taken into consideration. In orchestral music the part for first horns naturally calls for the use of the higher harmonics, which are more easily obtained by means of a somewhat smaller and shallower mouthpiece 3 than that used upon the second horn : which is called upon to dwell more on the lower harmonics.

(d) The tuning slides (Fr. coulisses; Ger. Stimmbogen) consist of a pair of sliding U" sna P e d tubes fitting tightly into each other, by means of which the instrument can be brought strictly into tune, and which also act as compensators with the crooks. On these tuning slides, placed across the ring formed by the coils of the valve-horn, are fixed the pistons with their extra lengths of tubing ; as the con- nexion of the pistons with the body of the horn is made through the slides, the value of the latter as compensators will be readily under- stood. Those accustomed to deal with instruments having fixed notes, such as the piano and harp, hardly realize the extreme diffi- culties which confront both maker and performer in intricate wind instruments such as the horn, on which no sounds can be produced without conscious adjustment of lips and breath, and but few without the additional use of some such contrivance as slide, crook, piston or of the hand in the bell, in the case of the natural or hand horn.

The production of sound in wind instruments has a fourfold object: (1) pitch; (2) range or scale of available notes; (3) quality of tone or timbre; (4) dynamic variation, or crescendo and diminuendo. The pitch of the horn, as of other wind instruments, depends almost exclusively on the

length of the air-column set in vibration, and remains practically uninfluenced by the diameter of the bore. In the case of conical tubes in which the difference in diameter at the two extremities, mouthpiece and bell, is very great, as in the horn, the pitch of the tube will be slightly higher than its theo- retical length would warrant. 4 When, for instance, three tubˆg of the same length are sounded — No. 1, conical diverging; No. 2,

1 See Michael Praetorius, De organographia (Wolfenbiittel, 1618), tab. viii., where crooks for lowering the key by one tone on trumpet and trombone are pictured.

2 See Victor Mahillon, Les Elements d'acoustique musicale et instru- mentale (Brussels, 1874), PP- 96, 97, &c. ; Friedrich Zamminer, Die Musik und die musikalischen Instrumente (Giessen, 1855), p. 310, where diagrams of the mouthpieces are given.

3 See Joseph Frohlich, Vollstdndige theoretisch-praklische Musik- schule (Bonn, 1811), iii. 7, where diagrams of the two mouth- pieces for first and second horn are given.

4 See Gottfried Weber, " Zur Akustik der Blasinstrumente," in AUgemeine m-usikalischc Zeitung (Leipzig, 1816), p. 38.

conical converging in the direction from mouthpiece to bell; No. 3, cylindrical — No. i gives a fundamental tone somewhat higher, No. 2 somewhat lower, than No. 3. Victor Mahillon 1 adds that the rate of vibration in such conical tubes as the horn is slightly less than the rate of vibration in ambient air; therefore, as the rate of vibration (i.e. the number of vibrations per second) varies in the inverse ratio with the length of the tube, it follows that the practical length of the horn is slightly less than the theoretical, the difference for the horn in Bl> normal pitch amounting to 13-9 cm. (approximately 55 in.).

The tube of the horn behaves as an open pipe. E. F. F. Chladni 2 states that the mouthpiece end is to be considered as open in all wind instruments (excepting reed instruments), even when, as in horns and trumpets, it would seem to be closed by the lips. Victor Mahillon, although apparently holding the opposite view, and considering as closed the tubes of all wind instruments played by means of reeds, whether single or double, or by the lips acting as reeds, gives a new and practical explana- tion of the

phenomenon. 3 The result is the same in both cases, for the closed pipe of trunco-conical bore, whose diameter at the bell is at least four times greater than the diameter at the mouthpiece, behaves in the same manner, when set in vibration by a reed, as an open pipe, and gives the consecutive scale of harmonics. 4

In order to produce sound from the horn, the performer, stretching his lips across the funnel-shaped mouthpiece from rim to rim, blows into the cavity. The lips, vibrating as the breath passes through the aperture between them, communicate pulsations or series of inter- mittent shocks to the thin stream of air, known as the exciting current, which, issuing from them, strikes the column of air in the tube, already in a state of stationary vibration. 6 The effect of this series of shocks, without which there can be no sound, upon the column of air confined within the walls of the tube is to produce sound-waves, travelling longitudinally through the tube. Each sound-wave consists of two half-lengths, one in which the air has been compressed or condensed by the impulse or push, the second in which, the push being spent, the air again dilates or becomes rare- fied. In an open pipe, the wave-length is theoretically equal to the length of the tube. The pitch of the note depends on the frequency per second with which each vibration or complete sound-wave reaches the drum of the ear. The longer the wave the lower the frequency. The velocity of the wave is independent of its length, being solely conditioned by the rate of vibration of the particles composing the conveying medium : while one individual particle performs one complete vibration, the wave advances one wave- length. 6 The rate of particle vibration or frequency is therefore inversely proportional to the corresponding wave-length. 7 Sound- waves generated by the same exciting current travel with the same velocity whatever their length, the difference being the frequency number and therefore the pitch of the note. As long as the per- former blows with normal force, the same length of tube produces the same wave-length and therefore the same frequency and pitch. By " blowing with normal force " is understood the proper relative proportions to be maintained between the wind-pressure and the lip-tension — a ratio which is found instinctively by the performer but was only suspected by the older writers. 8 If the shocks or vibrations initiated by the lips through the medium of the exciting current be sharper owing to the increased tension of the lips, and at the same time succeed each other with greater velocity, the wave- length breaks up, and two, three or more proportionally shorter

1 Les Instruments de musique au musee du Conservatoire royal de musique de Bruxelles, " Instruments a vent," ii.," Le Cor, son histoire, sa theorie, sa construction " (Brussels and London, 1907), p. 28.

2 Die Akustik (Leipzig, 1802), p. 86, § 72.

1 Op. cit. p. 13, § 20, and p. 15, §§ 24 and 25. This apparent discrepancy between an early and a modern authority on the acoustics of wind instruments is easily explained. Chladni, when speaking of open and closed pipes, refers to the standard cylindrical and rect- angular organ-pipes. Mahillon, on the other hand, draws a distinc- tion in favour of the conical pipe, demonstrating in a practical manner how, given a certain calibre, the conical pipe must overblow the harmonics of the open pipe, whatever the method of producing the sound.

4 See Gottfried Weber, loc. cit.

6 See Ernst Heinrich and Wilhelm Weber, Wellenlehre (Leipzig, 1825), p. 519, § 281, and A Text-Book of Physics, part, ii., " Sound, by J. H. Poynting and J. J. Thomson (London, 1906), pp. I04 and 105.

6 See Sedley Taylor, Sound and Music (1896), p. 21.

7 Id. pp. 23-25.

8 See Gottfried Weber, op. cit., pp. 39-41. and F.rnsl II. and Wilhelm Weber, op. cit. p. 522, end of § 285.

complete waves form instead of one, and traverse the pipe within the same space of time, producing sounds proportionally higher by an octave, a twelfth, &c, according to the character of the initiatory disturbance. We may therefore add this proposition: the rate of vibration of a tube varies as the number of segments into which the vibrating column of air within it is divided. In order to obtain the fundamental, the performer's lips must be loose and the

It is often stated that the harmonics are obtained by increasing the tension of the lips and a crescendo by increasing the pressure of the breath. 9 Victor Mahillon 10 accounts for the harmonics by increased wind-pressure only. It is evident that the greater the tension of the lips, the greater the force of wind required to set them vibrating; therefore the force and velocity of the air must vary with the tension of the lips in order to produce a steady or musical sound. D. J. Blaikley considers that the ratio of increase in lips and breath follows that of the harmonic series. The tension of the lips has the effect of reducing the width of the slit or aperture between them and the width of the exciting current. While increasing its density the energy of the wind must, therefore, either expend itself in increasing the rate of vibration, or frequency of the pulses, which influences the pitch of the note; or else in increasing the extent of excursion or amplitude of the vibrations, which influences the dynamic force of the sound or loudness. 11 If the aperture be narrowed without pro- viding a

proportional increase of wind-pressure, the harmonic over- tone may be heard, but either the intonation will suffer or the in- tensity of the tone will be reduced, because the force required to set the tenser membrane in vibration is insufficient to give the vibrations the requisite amplitude as well as the frequency. If the force ex- pended be excessive, i.e. more than the maximum required to ensure the increased frequency proportional to the increased tension, the superfluous energy must expend itself in increasing the amplitude of the vibrations so that a note of a greater degree of loudness as well as of higher pitch will be produced. The converse is equally true ; the lower the pitch of the note the slower the pulses or vibrations and therefore the looser the lip and the gentler the force of current required to set them vibrating. To draw a parallel from organ-

Eipes : as long as even wind-pressure is maintained, the mouthpiece eing fixed proportional to the length of tube, the pipe gives out one note of unvarying dynamic intensity; increase the pressure of the wind and harmonics are heard, but it is impossible to obtain a crescendo unless the mouthpiece be dispensed with and a free reed (q.v.) adapted.

Reference has already been made above to the difficulty of obtain- ing the fundamental on tubes of great length and narrow bore like the horn. The useful compass of the horn, therefore, begins with the note that an open pipe half its length would give; the Germans term instruments of such small calibre half instruments, and those of wide calibre, such as bugles and tubas, whole instruments, 12 since in them the whole of the length of the tube is available in practice.

The harmonic series of the horn, or the open notes obtainable without using valves or crooks, is written as for the alto horn in C of 8 ft. tone, which forms the standard of notation. Notes written in the bass cief are generally, for some unexplained reason, placed an octave lower than the real sounds.

Written and sounded. Written. Sounded. _ ^ ^tl^JO^- £:

£

56 7 S 9 10 11 12 13 14 15 16

Very difficult.

9 See A. Ganot, Elementary Treatise on Physics, translated By E. Atkinson (16th ed., London, 1902), p. 266, § 282, " In the horn different notes are produced by altering the distance of the lips." Such a vague and misleading statement is worse than useless. See also Poynting and Thomson, op. cit. p. 113.

u "LeCor," p. 22; p. 11, § 18; pp. 6 and 7, § 8.

11 The phraseology alone is here borrowed from Sedley Taylor, (op. cit. p. 55), who does not enter into the practical application of the theory he expounds so clearly.

12 See Dr Emil Schafhautl's article on musical instruments, § iv. of Bericht der Beurtheilungs Commission bei der Allg. Deutschen Industrie Aitsstellung, 1854 (Munich, 1855), pp. 169-170; alsc F. Zamrnincr, j>p. cit.

HORN

All the crooks, a list of the principal of which is appended, therefore necessarily give real sounds lower than the above series according to their individual length.

699

French horns are made with either two or three valves. To the first valve is attached sufficient length of tubing to lower the pitch of the instrument a tone, so that any note played upon the horn in F

Table of Principal Crooks now in Use. 1

Key of Crook.

Bb alto

All

A!>

El.

C basso

Bi> basso

Actual Sounds of Range of Useful Harmonics.

23 456789 10

234 5678910 234 56789 10

234 5 6 7 8 9 10 11 12

2 3 4 5 6 7 8 9 10 11 12 13 14 is 16 2 3 4 5 6 7 8 9 10 ii 12 13 14 15 16

2 3 4 5 6 7 8 9 10 11 X2 13 14 ×5 16

■=f

=E

j^^mm^

2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

3 4 5 6 7 8 9 10 11 12 13 14 15 16

34567

9 10 11 12 13 14 15 16

2nd to 10th

2nd to 10th

2nd to 10th

2nd to 12th

2nd to 1 6th

2nd to 1 6th

2nd to 16th

2nd to 16th

3rd to 16th

3rd to 16th

Length of

Crook in

Inches.

16 22$

36f

52i

61

70}

80

IOI

125

Transposes to

major 2nd lower minor 3rd „

major L ‘ 3rd „ perfect 4th „ perfect 5th „ minor 6th „ major 6th ; „

minor 7th „ major 9th “„

The practical aggregate compass of the natural horns from Bb basso at the service of composers therefore ranges (actual sounds)

from g?

— T

or with 3 from

valves

r

\»-

By means of hand-stopping, i.e. the practice of thrusting the hand into the bell in order to lower the sound by a tone or a semitone, or by the adaptation of valves to the horn, this compass may be rendered chromatic almost throughout the range.

The principle of the valve as applied to wind instruments differs entirely from that of keys. The latter necessitate ‘lateral holes bored through the tube, and when the keys are raised the vibrating column of air within the tube and the ambient air without are set in com- munication, with the result that the vibrating column is shortened and the pitch of the note raised. The valve system consists of valves or pistons attached to additional lengths of tubing, the effect of which is invariably to lower the pitch, except

in the case of valve systems specified as " ascending " tried by John Shaw and Adolphe Sax. Insuperable practical difficulties led to the abandonment of these systems, which in any case were the exception and not the rule. The valves, placed upon the U-shaped slides in the centre of the horn, are worked by means of pistons or levers, opening or closing the wind- ways at will, so that when they are in operation the vibrating column of air no longer takes its normal course along the main tube and directly through the slides, but makes a detour through the extra length of tubing before completing its course. Thus the valves, unlike the keys, do not open any communication with the ambient air Even authoritative writers 2 have confused the two principles, believing them to be one a nd the same.

1 The measurements are for the high philharmonic pitch a' = 452-4. V. Mahillon, " Le cor " (p. 32), gives a table of the lengths of crooks in metres.*

- *Robert Eitner, editor of the Monatskefte fur Musikwissenschaft, published therein an article in 1881, p. 41 seq., " Wer hat die Ventil-*

while the first valve is depressed takes effect a tone lower, or as though the horn were in E\>. The second valve opens a passage into a shorter length of tubing sufficient to lower the pitch of the instru- ment a semitone, as though the instrument were for the time being in E. The third valve similarly lowers the pitch a tone and a half. It will thus be seen that the principle applied in the crook and the valve is in the main the same, but the practical value of the valve is immeasurably superior. Thanks to the valve system the performer is able to have the extra lengths of tubing necessary to give the horn a chromatic compass permanently incorporated with the instrument, and at will to connect one or a combination of these lengths with the main tube of the instrument during any interval of time, however short. The three devices, crooks, valves and slides, are in fact all based upon the same principle, that of providing additional length of tubing in order to deepen the pitch of the whole instrument at will and to transpose it into a different key. Valves and slides, being instantaneous in operation, give to the instrument a chromatic compass, whereas crooks merely enable the performer to play in many keys upon one instrument instead of requiring a different instrument for each key. The slide is the oldest of these devices, and probably suggested the crook as a substitute on instruments of comcalbore such as the horn.

The invention of the valve, although a substantial improvement,

trompete erfunden," in which, after referring to the Klappenwald- horn and Trompete (keyed horn and trumpet) made by Weidinger and played in public in 1802 and 1813 respectively, he goes on to state that Schilling in his Lexicon makes the comical mistake of looking upon the Klappentrompete (keyed trumpet) and Ventti- Irompete (valve trumpet) as different instruments. He accordingly sets matters right, as he thinks, by according to Weidinger the honour of the invention of valves, hitherto wrongfully attributed to Stolzel; and in the Quellenlexikon (1904) he leaves out Stolzel's name, and names Weidinger as the inventor of the Klappen or Ventil, referring readers for further particulars to his article, just quoted, in the Monatshefte.

was found to fall short of perfection in its operation on the tubes of wind instruments so soon as the possibility of using the. three valves in combination to produce six different positions or series of harmonics was realized, and for the following reason. In order to deepen the pitch one tone by means of valve I, a length of tubing exactly proportional to the length of the main tube must be thrown into communication with the latter. If, in addition to valve I, valve 3 be depressed, a further drop in pitch of if tone should be effected ; but as the length of tubing added by depressing valve 3 is calculated in proportion to the main tube, and the latter has already been lengthened by depressing valve 1, therefore the addi- tional length supplied by opening valve 3 is now too short to produce a drop of a minor third strictly in tune, and all notes played while valves 1 and 3 are depressed will be too sharp. Means of compensat- ing slight errors in intonation are provided in the U-shaped slides mentioned above.

The timbre of the natural horn is mellow, sonorous and rich in harmonics; it is quite distinctive and bears but little resemblance to that of the other members of the brass wind. In listening to its sustained notes one receives the impression of the tone being breathed out as by a voice, whereas the trumpet and trombone produce the effect of a rapid series of concussions, and in the tuba and cornet the concussions, although still striking, are softened as by padding. The timbre of the hand-stopped notes is veiled and suggestive of mystery ; so characteristic is the timbre that passages in the Rhein- gold heard when the magic power of the Tarnhelm reveals itself sound meaningless if the weird chords are played by means of the valves instead of by hand-stopping. The timbre of the piston notes is more resonant than that of the open noˆ-es, partaking a little of the character of the trombone, which is probably due to the fact that the strictly conical bore of the natural horn has been replaced by a mixed cylindrical and

conical as ii. trumpet and trombone.

The form of the mouthpiece (q.v.) at the point where it joins the main bore of the tube must also exercise a certain influence on the form of vibration, which it helps to modify in conjunction with the conformation of each individual horn-player's lip. In the horn the cup of the mouthpiece is shaped like a funnel, the bore converging insensibly into the narrow end of the main conical bore without break or sharp edges as in the mouthpieces, more properly known as cup-shaped, of trumpet and bombardon.

The brilliant sonorousness and roundness of the timbre of the horn are due to the strength and predominance of the partial tones up to the 7th or 8th. The prevalence of the higher harmonics from the 10th to the 16th, in which the partial tones lie very close together, determines the harsh quality of the trumpet timbre, which may be easily imitated on the horn by forcing the sound production and using a trumpet mouthpiece, and by raising the bell, an effect which is indicated by composers by the words " Raise the Bells." l

The origin of the horn must be sought in remote prehistoric times, when, by breaking off the tip of a short animal horn, one or at best two notes, powerful, rough, unsteady, only barely approximating to definite musical sounds, were obtained. This was undoubtedly the archetype of the modern families of brass wind instruments, and from it evolved the trumpet, the bugle and the tuba no less than the horn. The common characteristics which link together these widely different modern families of instruments are: (1) the more or less pronounced conical bore, and (2) the property possessed in a greater or lesser degree of producing the natural sounds by what has been termed overblowing the harmonic overtones. If we follow the evolution of the animal horn throughout the centuries, the ultimate development leads us not to the French horn but to the bugle and tuba.

Before civilization had dawned in classic Greece, Egypt, Assyria and the Semitic races were using wind instruments of wood and metal which had left the primitive ram or bugle horn far behind. Even in northern Europe, during the Bronze age (c. 1000 B.C.), prehistoric man had evolved for himself the prototype of the Roman cornu, a bronze horn of wide conical bore, bent in the shape of a G. One of these instruments, known among the modern Scandinavian races as luurs or lurs, found in the peat beds of Denmark and now preserved in the Museum of Northern Antiquities in Copenhagen, has a length of 1-91 m. (about 6 ft. 4 in.). The U-shaped mouthpiece joint is neatly joined to the remainder of the crescent-tube by means of a bronze ring; the bell, which must have rested on the shoulder, consists merely of a flat rim set round the end of the tube. There is therefore no graceful curve in the bell as in the French horn. An exact facsimile of this prehistoric horn has been made by Victor Mahillon of

Brussels, who finds that it was in the key of E[> and easily produces the first eight harmonics of that key. It stands, therefore,

1 See Hector Berlioz, A Treatise on Modern Instrumentation and Orchestration, translated by Mary Cowden Clarke, new edition re- vised by Joseph Bennett (18ˆ2), p. 141.

an octave higher than the modern horn in Eb (which measures some 13 ft.), but on the lur the fundamental Et> can be reached owing to the wider calibre of the bore. 2

Among the Romans the wind instruments derived from the horn were well represented, and included well-developed types which do not differ materially from the natural instruments of modern times. The buccina developed directly into the trumpet and trombone during the middle ages, losing no characteristic of importance but the bent form, which was perforce abandoned when the art of bending hollow tubes was lost after the fall of the Roman Empire. The name clung through all the changes in form and locality to the one type, and still remains at the present day in the German Posaune (trom- bone). There were four instruments known by the name of cornu among the Romans: (1) the short animal horn used by shepherds; (2) the longer, semicircular horn, used for signals; and (3) the still longer cornu, bent and carried like the buccina, which had the wide bore of the modern tuba. But whereas on the buccina the higher harmonics were easily obtained, on the cornu the natural scale con- sisted of the first eight harmonics only. The cornu, although shorter than the buccina, had a deeper pitch and more sonorous tone, for, owing to the wider calibre of the bore, the fundamental was easily reached. In the reliefs on Trajan's Column, where the two instru- ments may be compared, the wider curve of the buccina forms a ready means of identification. In addition to these was (4) the small instrument like the medieval hunting-horn or post-horn, with the single spiral turn similar to one which figures as service badge in many British infantry regiments, 3 such as the first battalion of the King's Own Light Infantry. A terra-cotta model, slightly broken, but with the spiral intact, was excavated at Ventoux in France and is at present preserved in the department of Greek and Roman antiquities at the British Museum, having been acquired from the collection of M. Morel.

The lituus, or cavalry trumpet of the Romans, consisted of a cylindrical tube, to which was attached a bent horn or conical bell, the whole in the shape of a J. The long, straight Roman tuba was similar to the large, bent cornu so far as bore and capabilities were concerned, but more unwieldy. All these wind instruments seem to have been used during the classic Greek and Roman periods merely to sound fanfares, and therefore, in spite of the high degree of perfection to which they attained as instruments, they

scarcely possess any claim to be considered within the domain of music. They were signalling instruments, mainly used in war, in hunting and in state or civic ceremonial. Vegetius (a.d. 386) describes these instruments, and gives detailed instructions for the special traditional uses of tuba, buccina and cornu in the military camp: " Semivocalia sunt, quae per tubam, aut cornua, aut buccinam dantur. Tuba quae directa est appellatur buccina, quae in semet ipsam aereo circulo flectitur. Cornu quod ex uris agrestibus, argento nexum, temperatum arte, et spiritu, quem canentis flatus emiftit auditur. 4 It will be seen that Vegetius demands a skilled horn-player. These service instruments may all be identified in the celebrated bas-reliefs of Trajan's Column 6 (fig. 1) and of the Triumphal arch of Augustus at Susa. 6

Interesting evidence of a collegium cornicinum (gild of horn- players) is furnished by an altar stone in the Roman catacombs, erected to the memory of one " M. Julius victor ex Collegio Liticinum Cornicinum," on which are carved a lituus, a cornu and a pan's pipe, the cornu being similar to those On Trajan's Column.

All three Roman instruments, the tuba, the buccina and the cornu, had well-formed mouthpieces, differing but little from the modern cup-shaped form in use on the trumpet, the trombone, the tubas, &c. 7 It would seem that even the short horn in the 4th

2 See Victor Mahillon, Catal. descriptif des instruments de musique, &c, vol. ii. p. 388, No. 1156, where an illustration is given. See also Dr August Hammerich (French translation by E. Beauvais), " tjber altnordische Luren " in Vierteljdhrschrift fur Musik-Wissenschaft x. (1894).

3 See Major J. H. L. Archer, The British Army Records (London, 1888), pp. 402, &c. _

4 De re militari, iii. 5 (Basel, 1532). The successive editions and translations of this classic, both manuscript and printed, throughout the middle ages afford useful evidence of the evolution of these three wind instruments.

6 See Wilhelm Froehner, La Colonne Trajane d'aprhs le sur- moulage execute d, Rome en 1861-1862 (Paris, 1872-1874). On'pi. 51 is a cornu framing the head of a cornicen or horn-player. See also the fine plates in Conrad Cichorius, Die Reliefs der Traiansdule (Berlin, 1896, &c).

6 Ermanno Ferrero, L' 'Arc d'Auguste a Suse (Segusio, 9-8 B.C.) (Turin, 1901).

7 See the mouthpiece on the Pompeian buccinas preserved in the museum

at Naples, reproduced in the article Buccina. The museums of the conservatoires of Paris and Brussels and the Collection Kraus in Florence possess facsimiles of these instruments; see Victor Mahillon, Catalogue, vol. ii. p. 30. Cf. also the pair of bronze Etruscan cornua, No. 2734 in the department of Greek and Roman antiquities at the British Museum, which possess well-preserved cup-shaped mouthpieces.

century was provided with a mouthpiece, 1 judging from a carved specimen on an ivory capsa or pyxis dating from the period im- mediately preceding the fall of the Roman Empire, preserved among the precious relics at Xanten.

After the fall of the Roman Empire, when instrumental music had fallen into disrepute and had been placed under a ban by the church,

huntsmen. The hunting-horn was generally represented as small in the hunting scenes which abound in illuminated MSS. and early printed books; it was crescent-shaped and was worn slung by a leather strap over one shoulder and resting on the opposite hip. When played it was held with the wide end curving upwards in front of the huntsman's head. A kind of tablature for the horn was in use in France in the 14th century; an example of it is here reproduced (fig 2) from a 14th-century French MS. treatise on venery. 4 Only one note is indicated, the various calls and signals being based chiefly on rhythm, and the notes being left to the taste and skill of the huntsman. The inter- pretation 5 of the Cornure de chasse de vette seen in the figure is as follows:

First line- «« • «««««««

Second line — Third line =

H I H

From Conrad Cichorius, Die Reliejs der Traiattsaule, by permission of Georg Reimer.

Fig. 1. — Roman Cornua and Buccina.

the art of playing upon such highly-developed instruments gradually died out in western Europe. With the disappearance of thecivilizа- tion and culture of the Romans, the skilled crafts also gradually vanished, and the art of making metal pipes of delicate calibre and of bending them was

completely forgotten, and had to be reacquired step by step during the middle ages from the more enlightened East. The names of the instruments and representations of them survived in MSS. and monuments of art, and as long as the West was content to turn to late Roman and Romano-Christian art for its models, no difficulties were created for the future archaeologist. By the time the Western races had begun to express themselves and to develop their own characteristics, in the nth century, the arts of Persia, Arabia and the Byzantine Empire had laid their mark upon the West, and confusion of models, and more especially of names, ensued. The greatest confusion of all was created by the numerous translations and glosses of the Bible and by the attempts of minia- turists to illustrate the principal scenes. In Revelation, for instance (ch. viii.), the seven angels with their trumpets are diversely repre- sented with long tubas, with curved horns of various lengths, and with the buisine, busaun or posaune, the descendant of the buccina. We know from the colouring used in illuminated MSS., gold and pale blue, that horns were made of metal early in the middle ages. The metal was not cast in moulds but hammered into shape. Viollet-le-Duc 2 reproduces a miniature from a MS. of the end of the 13th century (Paris, Bibliotheque du corps legislatif) , in which two metal-workers are shown hammering two large horns.

The early medieval horns had no mouthpieces, the narrow end being merely finished with a rim on which the lips rested. The tone

suffered in conse- quence, being un- certain, rough and tremulous, where fore it was indic- ated by the neume known as quilisma : " Est vox tremula; sicut est sonus flatus tubae vel cornu et designatur per neumam, quae vocatur quilisma." 3 During the middle ages the bugle-horn or bull's horn was exten- sively used as a signal " instrument

In the first poem is given a list of these signs with the names by which they were known in venery.

In the 16th century in England the hunting-horn sometimes had a spiral turn in the centre, half-way between mduthpiece and beli end; the extra length was apparently added solely jn order to lower the pitch, the higher harmonics not being used for the hunting calls. In George Turbevile's Noble Arte of Venerie (1576, facsimile reprint, Oxford, 1908) the " measures of blowing according to the order which is observed at these dayes in this Realme of Englande " are given for the horn in D. One of these, given in fig. 3, is the English 16th-century hunting call, corresponding to the 14th-century French Cornure de chasse de veue given above.

*SBQmtQr (ftmrftotli Intake dtoimt. HDlfo butt nitron**

r«‘IMU«IHMl«imi»ritirin»T»ii

L.‘fTjY ‘H iffTTf » TTTl , i flTf i ffT r

-Kimiirr«mMiJiaKiriMrir»riiKi»i

Fig. 2. — Medieval Hunting-Hcrn with the Tablature in use in the 14th Century, on land and sea (see Bugle), by the night-watchmen in cities in the watch tower of the feudal castle and by foresters and

1 See Bock, ” Gebrauch der Horner im Mittelalter,” in Gustav Heider’s Mittelalterliche Kunstdenkmaler Osterreichs (Stuttgart, 1858-

1860).

2 Dictionnaire raisonne du mobilier francais (Paris, 1889), ii. p. 246.

3 Engelbertus Admontensis in De Musica Scriptores, by Martin Gerbert, Bd. ii. lib. ii. cap. 29; and Edward Buhle, Die Musika- lischen Instrumente in den Miniaturen des friihen Mittelalter s, pt. i., ” Die Blasinstrumente ” (Leipzig, 1903), p. 16.

From Turbevile’s Noble Arte of Venerie (1576), by permission of the Clarendon Press. Fig. 3. — Hunting Call.

The hunting-horn, whether in its simplest form or with the one spiral, was held with the bell upwards on a level with the hunts- man’s head or just above it. 6

A horn of the same fine calibre as the French horn, 3 or 4 ft. in length, slightly bent to take the curve of the body, was in use in Italy, it would seem, in the 15th century. 7 It was held slanting , across the body with the bell already slightly parabolic, at arm’s length to the left side.

The hunting- and post-horns were favourite emblems on medieval coats of arms, more especially in Germany 8 and Bohemia.

It is necessary at this point to draw attention to the fact that the French horn is a hybrid having affinities with both trumpet and primitive animal horn, or with buccina and cornu, and that both types, although frequently misnamed and confused by medieval writers and miniaturists.subsisted side by side.evolving independently until they merged in the so-called French horn. Both buccina and cornu after the fall of the Roman Empire, while Western arts and

4 Le Tresor de venerie par Hardouin, seigneur de Fontaines-Guerin (edited

by H. Michelant, Metz, 1856) ; the first part was edited by Jerome Pichon (Paris, 1855), with an historical introduction by Bottde de Toulmon.

6 As worked out by Edward Buhle, op. cit., p. 23.

6 See Turbevile, op. cit., also I. du Fouilloux, La Venerie (Paris, 1628), p. 70; cf. also editions of 1650 and of 1562, where the horn is called trompe, used with the verb corner; Juliana Bernes, Moke of St Albans (1496), the frontispiece of which is a hunting scene showing a horn of very wide bore, without bell. Only half the instrument is visible.

7 See " Reliure italienne du xv 6 siecle en argent nielle. Collection du Baron Nathaniel de Rothschild, Vienne," mpazette archeologique (Paris, 1880), xiii. p. 295, pi. 38, where other instruments are also represented.

8 See Jost Amman, Wappen und Stammbuch (1589). A reprint in facsimile has been published by Georg Hirth as vol. iii. of Liebhaber Bibliothek (Munich, 1881). See arms of Sultzberger aus Tirol (p. 52), " Ein Jagerhornlin," and of the Herzog von Wittenberg; cf. the latter with the arms of Wurthemberch in pi. xxii. vol. ii. of Gelre's Wappenboek ou armorial de 1334 ct 1372 (miniatures of coats of arms in facsimile), edited by Victor Bouton (Paris, 1883).

crafts were in their infancy, were made straight, being then known as the busine or straight trumpet (busaun or posaun in Germany), and the long horn, Herhorn, slightly curved. 1

From two medieval representations of instruments like the Roman cornu one might be led to conclude that the instrument had been revived and was in use from the 14th century. A wooden bas-relief on the under part of the seats of the choir of Worcester cathedral, 2 said to date from the 14th century, shows a musician in a robe with long sleeves of fur playing the horn (fig. 4). The tube

winds from the mouth in a circle reaching to his waist, passes under the right arm across the shoulders with the bell stretch- ing out horizontally over his left shoulder. The tube, of strictly conical bore, is made in three pieces, the joints being strength- ened by means of Fig. 4. — Medieval Fig. 5. — Medieval two rings. The other Circular Horn. Circular Horn, 1589. example is German,

and figures in the arms of the city of Frankfort-on-Main. 3 Here in the two

opposite corners are two cherubs playing immense cornua. The bore of the instruments (fig. 5) is of a calibre suggestive of the contrabass tuba; the circle formed is of a diameter sufficiently large to accommodate the youthful performer in a sitting posture; the bell is the fore- runner of that of the modern saxophone, shaped like a gloxinea; the mouthpiece is cup-shaped. It is possible, of course, that these two examples are attempts to reproduce the classic instrument, but the figures of the musicians and the feeling of the whole scheme of ornamentation seem to render such an explanation improbable. Moreover, Sebastian Virdung, 4 writing on musical instruments at the beginning of the 16th century, gives a drawing of a cornu coiled round tightly, the tubing being probably soldered together at certain points. Virdung calls this instrument a Jegerhorn, and the short hunting-horn Acherhorn (Ackerhorn — the synonym of the modern Waldhorn). The scale of the former could have con- sisted only of the first eight harmonics, including the fundamental, which would be easily obtained on an instrument of such a large calibre. Mersenne, 6 a century and a quarter later, gives a drawing of the same kind of horn among his cors de chasse, but does not in his description display his customary intimate knowledge of his subject; it may be that he was dealing at second-hand with an instrument of which he had had little practical experience. Praetorius 6 gives as Jagerhorn only the simple forms of crescent- shaped horns with a single spiral; the spirally-wound horn of Virdung is replaced by a new instrument — the Jdgertrummet (hunts- man's trumpet) — of the same form, but less cumbersome, of cylindri- cal bore excepting at the bell end and having a crook inserted between the mouthpiece and the main coils. The tube, which could not have been less than 8 ft. long, produced the harmonic series of the cavalry trumpet from the 3rd to the 12th. The restrictions placed upon the use of the cavalry trumpet would have rendered it unavailable for use in the hunting-field, but the snake-shaped model, as Praetorius describes it, was a decided improvement on the horn, although inferior in resonance to the cavalry model. Here then are the materials for the fusion of the trumpet and hunting- horn into the natural or hand-horn of the 17th and 18th centuries. There is evidence, however, that a century earlier, i.e. at the end of the 15th century, the art of bending a brass tube of the delicate proportions of the French horn, which is still a test of fine work- manship, had been successfully practised. In an illustrated edition of Virgil's works published in Strassburg in 1502 and emanating from Grüninger's office, Brant being responsible for the illustrations, the lines (Aen. viii. 1-2) " Ut belli signum Laurenti Turnus ab arce Extulit: et rauco strepuerunt cornua cantu " are illustrated by two soldiers, one with the sackbut (posaune, the descendant of the buccina), the other with a horn wound spirally round his body in three coils, which appear to have a conical bore from the funnel- shaped mouthpiece to the bell which extends at the back of the head

1 For illustrations see autotype facsimile of Utrecht Psalter, 9th century; British Museum, Add. MS. 10,546, Ps. 150,9th century ; Add. MS. 24, 199, 10th century; Eadwine Psalter, Trin. Coll. Camb., nth century, and Cotton MS., Nero, D.IV., 8th century ; also Edward Buhle, op. cit., pi. ii. and pp. 12-24.

-See John Carter, Specimens of Ancient Sculpture and Paintings (London, 1780-1794), i. p. 53 (plates unnumbered) ; also reproduced in H. Lavoix, Histoire de la musique (Paris, 1884).

3 See Jost Amman, op. cit.

4 Musica getutscht und ausgezogen (Basel, 151 1), p. 30. The names are not given under the drawings, but the above is the order in which they occur, which is probably reversed.

b Harmonie universelle (Paris, 1636)' p. 245.

6 Syntagma Musicum (Wolfenbuttel, 1618), pi. vii. No. n, p. 39.

horizontally over the left shoulder (fig. 6). There is ample room for the performer's head and shoulders to pass through the circle: the length of the tube could not therefore have been much less than 16 ft. long, equivalent to the horn in C or Bb basso. In the same book (pi. ccci.) is another horn, smaller, differing slightly in the disposition of the coils and held like the modern horn in front.

These horns were not used for hunting but for war in conjunction with the draw-trumpet. Brant could not have imagined these instru- ments, and must have seen the originals or at least drawings of them; the instruments prob- ably emanated from the famed workshops of Nuremberg, being intended mainly for use in Italy, and had not been generally adopted in Germany. The significance of these drawings of natural horns in a German work of the dawn of the 16th century will not be lost. It dis- poses once and for all of the oft-repeated fable ;that the hunting-horn first assumed its present ;form in France about 1680, a statement ac- cepted without question by authorities of all countries, but without reference to any piece 'justificative other than the story of the Bohemian Fig. 6. — Spirally I Count Sporken first quoted by Gerber, ' and Coiled Horn from repeated in most musical works without the Virgil's Work- context. The account which gave rise to (1502), folio cccviii. this statement had been published in 1782 versa. in a book by Faustinus Prochaska: 8 " Vix Parisiis inflandi cornua venatoria inventa ars quum delectatus suavitate cantus duos ex hominibus sibi obnoxiis ea instituendos curavit. Id principium apud nos artis, qua hodie Bohemi excellere putantur." In a preceding passage after

the count's name, Franz Anton, Graf von SpSrken, are the words " anno saeculi superioris octogesimo quum iter in externas provincias suscepisset," &c. There is no reference here to the invention of the horn in Paris or to the folding of the tube spirally, but only to the manner of eliciting sound from the instrument. Count Sporken, accustomed to the medieval hunting fanfares in which the tone of the horn approxi- mated to the blare of the trumpet, was merely struck by the musical quality of the true horn tone elicited in Paris, and gave France the credit of the so-called invention, which probably more properly belonged to Italy. The account published by Prochaska a hundred years after, without reference to the source from which it was obtained, finds no corroboration from French sources. Had the French really made any substantial improvement in the hunting- horn at the end of the 17th century, transforming it from the primi- tive instrument into an orchestral instrument, it would only be reasonable to expect to find some evidence of this, considering the importance attached to the art of music at the court of Louis XIV., whose musical establishments, la Chapelle Musique, 9 la Musique de la Chambre du Roi and la Musique de la Grande Ecurie, included the most brilliant French artists. One would expect to find horns of that period by French makers among the relics of musical instruments in the museums of Europe. This does not seem to be the case. Moreover, in Diderot and d'Alembert's Encyclopedic (1767) the information given under the heading trompe ou cor de chasse grand et petit is very vague, and contains no hint of any special merit due to France for any improvement in construction. Among the plates (vol. v., pi. vii.) is given an illustration of a horn very similar to the instruments made in England and Germany nearly a century earlier, but with a funnel-shaped mouthpiece. Dr Julius Ruhlmann states that there are two horns by Raoux, bearing the date 1703," in the Bavarian National Museum in Munich, 11 but although fine examples, one in silver, the other in brass (fig. 6) by Raoux, thev turn out on inquiry 12 to bear no date whatever. Rilhlmann's statement in the same article, that in the arms of the family of Wartenberg-Kolb (now extinct), which goes back to 1169, there is a hunting-horn coiled round in a complete circle is also misleading.

7 liistorisch.biographisch.es Lexicon der Tonkiinslter (Leipzig 1700 1792 and 1812-1814).

8 De saecularibus Liberalium Artium in Bohemia et Moravia fatis commentarius (Prague, 1784), p. 401.

9 See Ernest Thoinan, Les Origines de la chapelle musique des souverains de France (Paris', 1864); F. J. Fetis, " Recherches sur la musique des rois de France, et de quelques princes depuis Philippe le Bel jusqu'a la fin du regne de Louis XIV.," Revue musicale (Paris 1832), xii. pp. 193, 217, 233, 241, 257; Castil-Blaze, La Chapelle musique des rois de France

(Paris, 1882); Michel Brenet, " Deux comptes de la chapelle musique des rois de France," Intern. Mus. Ges., Smbd. vi., i. pp. 1-32; J. Ecorcheville, " Quelques documents sur la musique de la grande ecurie du roi," Intern. Mus. Ges., Smbd. ii. 4 (Leipzig, 1901), pp. 608-642.

10 Neue Zeitschrifl f. Musik (Leipzig, 1870), p. 309.

11 See Die Sammlung der Musikinslrumente des baierischen Nat. Museum by K. A. Bierdimpfl (Munich, 1883), Nos. 105 and 106.

12 Communication from Dr Georg Hagen, assistant director.

HORN

7«3

From a Photo by K. Teufel. Fig. 7. — Early Raoux Horn (Munich).

The horn (a post-horn) did not appear in the arms of the family in question until 1699, when the first peer Casimir Johann Friedrich was created hereditary Post-Master. The influence of such erroneous statements in the work of noted writers is far-reaching. Inquiries

at the department of National Archives in Paris concerning Raoux, the founder of the after- wards famous firm of horn-makers whose model with pistons is used in the British military bands and at Kneller Hall, proved fruitless. Fetis states that he worked during the second half of the 1 8th century. Albert Chouquet l states that he has seen a trumpet by Raoux, " seul ordinaire du Roy, Place du Louvre" dated 1695. The inscrip- tions on the horns in ques- tion are: For No. 105, a silver horn of the simplest form of construction in D, " Fait a Paris par Raoux " ; for No. 106, a brass horn engraved with a crown on an ermine mantle with the initials C. A. (Carl Albert), " Fait a Paris par Raoux, seul ordinaire du Roy, Place du Louvre." Both horns measure across the coils 56 cm. and across the bell 275. They are practically the same as the cors de chasse now in use in French and Belgian military bands, the large diameter of the coil enabling the performer to carry it over his shoulder. The orchestral horn was given a narrower diameter in order to facilitate its being held in front of the performer in a convenient position for stopping the bell with the right hand. No. 107 in the same collection, a horn of German construction, bears the inscription " Macht Jacob Schmid in Niirnberg " and the trademark " J. S. ' with a bird. A horn in E> of French make, having fleur-de-lys stamped on the rim of the bell, and measuring only 15 in. across the coils to the exterior edge of the bell — therefore a very small horn — is preserved in the Grand Ducal Museum at Darmstadt. 2 A horn in F# (probably F in modern high pitch), having the rim ornamented as above and the

inscription " Fait a Paris, Carlin, ordinaire du Roy," readily gives the harmonics from the 3rd to the 12th. 3 The extreme width is 20 in. 4 Carlin, who lived at rue Croix des Petits Champs, died about 1780. The earliest dated horn extant is believed to be the one preserved in the Hohenzollern Museum in Sigmaringcn, " Machts Wilhelm Haas, Niirnberg, 1688." b Another early German horn engraved " Machts Heinr. Rich. Pfeiffer in Leipzig, 1697," 6 formerly in Paul de Wit's museum in Leipzig and now transferred with the rest of the collection to Cologne, is of similar construction.

The horn must have been well known at this time in England, for there are 17th-century horns of English manufacture still extant, one, for instance, in the collection of the Rev. F. W. Galpin by William Bull, dated 1699. 7 In 1701 Clagget 8 invented a contrivance by means of which two horns in different keys could be coupled and played by means of one mouthpiece, a valve or key opening the passage into the airways of one or the other of these horns at the will of the performer. Another horn of English manufacture about 1700 was exhibited at the South Kensington Museum in 1872, bearing No. 337 in the catalogue, in which unfortunately no details are given. Enough examples have been quoted to show that, judging from the specimens extant, Germany was not behind France, if not actually ahead, in the manufacture of early natural horns. Data are wanting concerning the instruments of Italy;

they would probably prove to be the earliest of all, and as brass wind instruments are perishable are perhaps for that very reason unrepresented at the present day.

The horn at the present stage in its evolution was also well represented among the illustrations of the musical literature in Germany 9 during the first half of the 18th century, and references to it are frequent.

The earliest orchestral music for the horn occurs in the operas of Cavalli and Cesti, leaders of the Venetian Opera in the 17th century. Already in 1639 Cavalli in his opera Le Nozze „ .

de Tito e Pelei (act i. sc. 1) introduced a short scena, asc '

" Chiamata alia Caccia " I0 in C major for four horns on a basso continuo. An examination of the scoring in C clefs on the first, second, third and fourth lines shows, by the use of the note

'—ˆi – = (gf ~~ m .: – in the bass part and in the second tenor of

1 See Musee du Conservatoire National de Musique. Catalogue des instruments de musique (Paris, 1884), p. 147.

- See Captain C. R. Day, Descriptive Catalogue of the Musical Instruments exhibited at the Military Exhibition (London, 1890), p. 147, No. 307.

3 See V. Mahillon, Catal. vol. i. No. 468.

4 See Captain C. R. Day, Catal. No. 309, p. 148.

'" For an illustration see Catalogue of the Special Exhibition of Ancient Musical Instruments at South Kensington Museum t8?2 (London, 1873), p. 25, No. 332.

c See Katalog des musikhtstorischeii Museums von Paid de Wit (Leipzig, 1904), p. 142, No. 564, where it is classified as a Jagertrom- pete alter Praetorius; it has a trumpet mouthpiece.

7 For an illustration see F. J. Crowest, English Music, p. 449, No. 12.

8 See Ignatz and Anton Bock in Baierisches M us ik- Lex-ikon by Felix J. Lipowski (Munich, 181 1), p. 26, note.

Eh ■—£■- the 5th harmonic of the series, that the funda- mental could have been no other than the 16-ft. C; the highest

note in the treble part is

, the 1 2th harmonic of the 8-ft.

alto horn in C, now obsolete. It is clear therefore that horns with tubing respectively 8 ft. and 16 ft. long, which must have been disposed in coils as in the present day, were in use in Italy before the middle of the 17th century, fifty years before the date of their reputed invention in Paris.

In the same opera, act i. sc. 4, " Coro di Cavalieri " is a stirring call to arms of elemental grandeur, in which occur the words: " all' armi, 6 la guerrieri corni e tamburi e trombe, ogni campo ogni canto, armi nmbombe." There are above the voice parts four staves with treble and C clef signatures above the bass, and, al- though no instruments are indicated, the music written thereon, which alternates with the voices but does not accompany them, can have been intended for no instruments but trumpets and horns, thus carrying out the indications in the text. The horn is here once again put to the same use as the Roman cornu, and associated in like manner with the descendant of the buccina in a call to arms. It may

be purely a coincidence that the early illustration of a horn with the tubing wound in coils round the body in the Strassburg Virgil mentioned above was put to the same use and associated with the same instrument.

Cesti's operas likewise contain many passages evidently intended for the horn, although the instruments are not specified in the score, which was nothing unusual at the time. Lulli composed the incidental music for a ballet, La Princesse d'Elide, which formed part of Moliere's divertissement, " Les plaisirs de l'ile enchantee," written for a great festival at Versailles on the 7th of May 1664. A copy of the music for this ballet, made about 1680, is preserved in the library of the Fitzwilliam Museum, Cambridge. The music contains a piece entitled " Les violons et les cors de chasse," written in the same style as Cavalli's scena; there are but two staves, and on both the music is characteristic of the horn, with which the

violins would play in unison. The piece finishes on Bb

and to play this note as the second of the harmonic series, the fundamental not being obtainable, the tube of the horn must have been over 17 ft. long. Among Philidpr's copies of Lulli's ballets preserved in the library of the Paris Conservatoire of Music (vol. xlvii., p. 61) is a more complete copy of the above. The second number is an " Air des valets de chiens et des chasseurs avec les cors de chasse," which is substantially the same as the one in the Fitzwilliam Museum, but set for five horns in Bb. Here again the use of D, the fifth note of the harmonic series, indicates that the

fundamental was

a tone lower than the C horn

scored for by Cavalli, and known as B? basso. Victor Mahillon 11 considers that the music reveals the fact that it was written for horns in Bt>, 35 degrees (chromatic semitones) above 32-ft. C, or

(B-frj '~ having a wave-length of 1-475 m – To this statement

it is not possible to subscribe. The quintette required four horns in Bi> over 8 ft. long and one Bb basso about 17 ft. long. It is ofrwjous that the present custom of placing the bass notes of the horn on the

9 See, for instance, frontispiece of Walther's Musikalisches Lexikon (Leipzig, 1732); J. F. B. C. Majer's Musik-Saal (Nuremberg, 1741, 2nd ed.), p. 54; Joh. Christ. Kolb, Pinacotheca Davidica (Augsburg, 1 7 1 1) ; Ps. xci. ; ' Componimenti Musicali per il cembalo Dr Theofilo Muffat, organista di sua Sacra Maesta Carlo VI. Imp." (1690), title-page in Denkmdler d. Tonkunst in Oesterreich, Bd. iii.*

10 See Hugo Goldschmidt, " Das Orchester der italienischen Oper im 17 Jahrhundcrt," Intern. Mus. Ges., Srrfbd. ii. I, p. 73.

" See " Le Cor," pp. 23 and 24, and Dictionnaire de Vacad. des beaux arts, vol. iv., art. ' Cor."

F clef an octave too low, as is now customary, had not yet been adopted, for in that case the bass horn would in several bars be playing above the tenor.

In 1647 Cardinal Mazarin, wishing to create in France a taste for Italian opera, had procured from Italy an orchestra, singers and mise-en-scene. That he was not entirely successful in making Paris appreciate Italian music is beside the mark; he developed instead a demand for French opera, to which Lulli proved equal. The great similarity in the style of the horn scene by Cavalli and Lulli may perhaps provide a clue to the mysterious and sudden apparition of the natural horn in France, where nothing was known of the hybrid instrument thirty years before, when Mersenne 1 wrote his careful treatise on musical instruments.

The orchestral horn had been introduced from Italy. It is not difficult to understand how the horn came to be called the French horn in England; the term only appears after Gerber and other writers had repeated the story of Count Sporken introducing the musical horn into Bohemia. 2 By this time the firm of Raoux, established in Paris a hundred years, had won for itself full recog- nition of its high standard of workmanship in the making of horns. This use of the horn by Lulli in the one ballet seems to be an isolated instance; no other has yet been quoted. The introduction of the natural horn into the orchestra of the French opera did not occur until much later in 1735 in Andre Campra's Achille ei Deidamie, and then only in a fanfare. In the meantime the horn had already won a place in most of the rising opera houses and ducal orchestras 3 of Germany, and had been introduced by Handel into the orchestra in London in his Water-music composed in honour of George I.

Although the Italians were undoubtedly the first to introduce the horn into the orchestra, it figured at first only as the characteristic instrument of the chase, suggesting and accompanying hunting scenes or calls to arms. For a more independent use of the horn in the orchestra we must turn to Germany. Reinhard Reiser, the founder of German opera, at the end of the 17th century in Hamburg, introduced two horns in C into the opening

chorus of his opera Octavia in 1705, where the horns are added to the string quartette and the oboes; they play again in act i. sc. 3, and in act ii. sc. 6 and 9. The compass used by the composer for. the horns in C alto is the following: —

=1=

3=-

£§=£

m m

?-.

4 5 6 8 9 10 11 12 13 14 16

Wilhelm Kleefeld draws attention to the characterization, which differed in the three acts. In Henrico (1711), in Diana (1712) and in L'Inganno Fedele (1714) F horns were used. This called forth from Mattheson 4 his much-quoted eulogium, the earliest description of the orchestral horn: " Die lieblich pompeusen Waldhorner sind bei itziger Zeit sehr en vogue kommen, weil sie theils nicht so rude von Natur sind als die Trompeten, teils auch weil sie mit mehr Facilite konnen tractiret werden. Die brauchbarsten haben F und mit den Trompeten aus dem C gleichen Ambitum. Sie klingen auch dicker und fi'illen besser aus als die iibertaubende und schrey- ende Clarinen, weil sie um eine ganze quinte tiefer stehen."

Lotti in his Giove in Argo, given in Dresden, 1717, scored for two horns in C, writing for them soli in the aria for tenor 5 (act iii. sc. 1). Examples of C. H. Graun's 6 scoring for horns in F and G respectively in Polydorus (1708-1729) and in. Iphigenia (i73l)_show the complete emancipation of the instrument from its original limitations; it serves not only as melody instrument but also to enrich the harmony and emphasize the rhythm. A comparison of the early scores of Cavalli and Lulli with those of Handel's Wasser- fahrtmusik 1 (17 17) and of Radamisto, performed in London in 1720,

1 Mcrsenne's drawings of cors de chasse are very crude; they have no bell and are all of the large calibre suggestive of the primitive animal horn. He mentions nevertheless that they were not only used for signals and fanfares but also for little concerted pieces in four parts for horns alone, or with oboes, at the conclusion of the hunt.

- See William Tans'ur Senior, The Elements of Mustek (London, 1772); Br. V. Dictionary under "Horn." Also Scale of Horn in the hand of Samuel

Weslev; in Add. MS. 3501 1, fol. 166, Brit. Mus.

3 A horn-player, Johann Theodor Zeddelmayer, was engaged in 1706 at the Saxon court at Weissenfels; see Neue-Milteilungen aus dem Gebiete histor. antiqu. Forschungen, Bd. xv. (2) (Haile, 1882), p. 503; also Wilhelm Kleefeld, " Das Orchester der Ham- burger Oper, 1678-1738," Intern. Mus. Ges., Smbd. i. 2, p. 280, where the appearance of the horn in the orchestras of Germany is traced.

4 Das neu-eroffnete Orchester, i. 267.

6 Sec Moritz Furstenau, Zur Geschichte der Musik und des Theaters zu Dresden (Dresden, 1861-1862), vol. ii. p. 60.

6 See " Carl Heinrich GraUn als Opernkomponist," by Albert Mayer-Reinach, Intern^ Mus. Ges., Smbd. i. 3 (Leipzig, 1900), pp. 516-517 and 523-524, where musical examples are given.

; Cf. Chrysander, Ilaendel, ii. 146.

shows the rapid progress made by the horn, even at a time when its technique was still necessarily imperfect.

While Bach was conductor of the prince of Anhalt-Cothen's orchestra (1717-1723), it is probable that horns in several keys were used. In Dresden two Bohemian horn-players, Johann Adalbert Fischer and Franz Adam Samm, were added to the court orchestra in 171 1. 8 In Vienna the addition is stated to have taken place in 1712 at the opera. 9 It is probable that as in Paris so in Vienna there were solitary instances in which the horn was heard in opera without attracting the attention of musicians long before 1712, for instance in Cesti's // Porno d'Oro, printed in Vienna in 1667 and 1668 and performed for the wedding ceremonies of Kaiser Leopold, and Margareta, infanta of Spain. A horn in E (former F pitch) in the museum of the Brussels conservatoire bears the in- scription " Machts Michael Leicham Schneider in Wien, 1713." 10 Ftirstenau 11 gives a further list of operas in Vienna during the first two decades of the 18th century.

It will be well before the next stage in the evolution is approached to consider the. compass of the natural horn. The pedal octave from the fundamental to the 2nd harmonic was altogether wanting; the next octave contained only the 2nd and 3rd harmonics or the octave and its fifth; in the third octave, the 8ve, its major 3rd, 5th and minor 7th ; in the fourth octave, a diatonic scale with a few accidentals was possible. It will be seen that the compass was very limited on any individual horn, but by grouping horns in different keys, or by changing the crooks, command was gained by

the composer over a larger number of open notes.

An important period in the development of the horn has now been reached. Anton Joseph Hampel is generally credited 12 with the innovation of adapting the crooks to the middle of the body of the horn instead of near the mouthpiece, which greatly improved the quality of the notes obtained by means of the crooks. The crooks fitted into the two branches of U-shaped tubes, thus forming slides which acted as compensators. Hampel's Inventionshorn, as it is called in Germany (Fr. cor harmonique), is said to date from 1 753 1 13 the first instrument having been made for him by Johann Werner, a brass instrument-maker of Dresden. The same invention is also attributed to Haltenhof of Hanau. 14 Others again mention Michael Wogel 16 of Carlsruhe and Rastadt, probably confusing his adaptation of the Invention or Maschine, as the slide contrivance was called in Germany, to the trumpet in 1780. The Inventions- horn, although embodying an important principle which has also found its application in all brass wind instruments with valves as a means of correcting defective intonation, did not add to the compass of the horn. At some date before 1762 it would seem that Hampel 16 also discovered the principle on which hand-stopping is founded.

By hand-stopping (Fr. sons bouches, Ger. gestopfte Tone) is under- stood the practice of inserting the hand with palm outstretched and

8 See Moritz Furstenau, op. cit. ii. 58.

9 See Ludwig von Kochel, Die kaiserliche Hofkappelle in Wien (Vienna, 1869), p. 80.

10 See Victor Mahillon, Catalogue descriptif, vol. ii. No. 1160, p. 389. u Op. cit. ii. 60.

12 The Department of State Archives for Saxony in Dresden possesses no documents which can throw any light upon this point, but, through the courtesy of the director, the following facts have been communicated. Two documents concerning Anton Joseph Hampel are extant: (1) An application by his son, Johann Michael Hampel, to the elector Friedrich August III. of Saxony, dated Dresden, April 3, 1 771, in which he prays that the post of his father as horn-player in the court orchestra — in which he had already served as deputy for his invalid father — may be awarded to him. (2) A petition from the widow, Aloisia Ludevica Hampelin, to the elector, bearing the same date (April 3, 1771), wherein she announces the death of her husband on the 30th of March 1771, who had been in the service of the house of Saxony thirty-four years as horn- player, and prays for the grant of a monthly pension for herself and her three delicate

daughters, as she finds herself in the most un- fortunate circumstances. There is no allusion in either letter to any musical merit of the deceased.

13 There is an instrument of this early type, supposed to date from the middle of the 18th century', in Paul de Wit's fine collection of musical instruments formerly in Leipzig and now transferred to Cologne; see Katalog, No. 645, p. 148.

14 See Dictionnaire de I'acad. des beaux arts, vol. iv. (Paris), article " Cor."

15 See Dr Gustav Schilling, Universal LexikOn der Tonkunst (Stuttgart, 1840), Bd. vi., " Trompete " ; also Capt. C. R. Day, pp. 139 and 151, where the term Invention is quite misunderstood and misapplied. See Gottfried Weber in Caecilia (Mainz, 1835), Bd. xvii.

16 Gerber in the first edition of his Lexikon does not mention Hampel or award him a separate biographical article; we may therefore conclude that he was not personally acquainted with him, although Hampel was still a member of the electoral orchestra in Dresden during Gerber's short career in Leipzig. In the edition of 1812 Gerber renders him full justice.

fingers drawn together, forming a long, shallow cup, into the bell of the horn ; the effect is similar to that produced in wood wind instruments, termed d'amore, by the pear-shaped bell with a narrow opening, i.e. a veiled mysterious quality, and, according to the arrangement of the hand and fingers (which cannot be taught theoretically, being inter-dependent on other acoustic conditions), a drop in pitch which enables the performer merely to correct the faulty intonation of difficult harmonics or to lower the pitch exactly a semitone or even a full tone by inserting the hand well up the bore of the bell. J. Frohlich 1 gives drawings of the two principal positions of the hand in the horn. The same phenomenon may be observed in the flute by closing all the holes, so that the fundamental note of the pipe speaks, and then gradually bringing the palm of the hand nearer the open end of the flute. As a probable explanation may be offered the following suggestion. The partial closing of the opening of the bell removes the boundary of ambient air, which determines the ventral segment of the half wave-length some distance beyond the normal length; this boundary always lies beyond the end of fhe tube, thus accounting for the discrepancy between the theoretical length of the air-column and the practical length actually given to the tube. 2 Hampel is also said to have been the first to

apply the sordini 3 (Fr. sourdine) or mute, already in use in the 17th century for the trumpet, 4 to the horn. The original mute did not affect the pitch of the instrument, but only the tone, and when properly constructed may be used with the valve horn to produce the mysterious veiled quality of the hand-stopped notes. No satisfactory scientific explanation of the modifications in the pitch effected by the partial obstruction of the bell, whether by the hand or by means of certain mechanical devices, has as yet been offered. D. J. Blaikley suggests that in cases when the effect of hand-stopping appears to be to raise the pitch of the notes of the harmonic series, the real result of any contraction of the bell mouth (as by the insertion of the hand) is always a flattening of pitch accompanied by the introduction of a distorted or inharmonic scale, of such a character that for instance, the c, d, e, or 8th, 9th and 10th notes of the original harmonic scale become not the c# d# «# of a fundamental raised a semitone, but Dt>, E \>, and / due to the 9th, 10th and nth notes of a disturbed or distorted scale having a fundamental lower than that of the normal horn.

With regard to the discovery of this method of obtaining a chromatic compass for the horn, which rendered the instrument very popular with composers, instrumentalists and the public, and procured for it a generally accredited position in the orchestra, the following is the sum of evidence at present available. In the Kgl. offentliche Bibliothek, Dresden, is preserved, amongst the musical MSS., an autograph volume of 152 pages, entitled Lection pro Cornui, bearing the signature A. J. H[ampel], the name being filled in in pencil by a different hand. There is no introduction, no letter-press of any description belonging to the MS. method for the horn, nor is any book or pamphlet explaining the Inventionshorn or the method of hand-stopping by Hampel extant or known to have existed. He has apparently left no record of his accomplishment. A few typical extracts copied and selected from the original MS., courteously communicated by the director of the Royal Library, Hofrath, P. E. Richter (a practical musician and performer on horn and trumpet), do not prove conclusively that they were intended to be played on hand-stopped horns, with the exception, perhaps,

*- r ■ ; > ; fi i i 1 i -^ – *■! 1 i*

*it**

133, No. 21.

133, No. 22. of the A, 13th harmonic from C, which could not easily be obtained except by hand-stopping on the hand-horn. On the blank sheet preceding the exercises is an inscription in the hand of Moritz Furstenau, former custodian of the Royal Private Musical Collection (incorporated

with the public library in 1896): "Anton Joseph Hampel, by whom these exercises for the horn were written, was a celebrated horn-player, a member of the Orchestra of the Electoral Prince of Saxony. He invented the so-called Inventionshorn. Cf. Neues biog.-hist. Lexicon der Tonkilnstler by Gerber, pt. i. col. 493; also Zur Gesch. der Musik u. des Theaters am Hofe zu Dresden, by M. Furstenau, Bd. ii." It will be seen that Furstenau gives Gerber as his authority for the attribution of the invention to Hampel, although he searched the archives, to which he had free access, for material for his book.

1 Vollstdndige theoretisch-praktische Musikschule (Bonn, 181 1), pt. iii. p. 7.

2 See Victor Mahillon, " Le Cor," p. 28; Chladni, op. cit. p. 87.

3 See Frohlich, op. cit. 7; and Gerber, Lexikon (ed. 1812), p. 493; " Le Cor," pp. 34 and 53.

4 See Praetorius and Mersenne, op. cit. ; . the latter gives an illustration of the trumpet mute.

XIII. 23

The first possessor of the MS., Franz Schubert (1768-1824), musical director of the Italian opera in Dresden, wrote the following note in pencil on the last page of the cover: " Franz Schubert. The complete school of horn-playing by the Kgl. Polnischen u. Kursachs. Cammermusicus Anton Joseph Hampel, a celebrated virtuoso, invented by himself in 1762. Judging from the standard of modern technique, there are many passages in the " Lection " which could not be played without artificially humouring the pro- duction of harmonics with the lips, and it is an open question to what extent this method of correcting intonation and of altering the pitch was practised in the 18th century. When, therefore, Franz Schubert states that the method was invented by Hampel, we may take this as indirectly confirming Gerber's statements. Further confirmation is obtained from the text of a work on the horn written by Heinrich Domnich 6 (b. 1760), the son of a celebrated horn-player of Wurtzburg contemporary with Hampel. Domnich junior settled eventually in Paris, where he was appointed first professor of the horn at the Conservatoire. According to him the mute (sourdine) of metal, wood or cardboard in the form of a hollow cone, having a hole in the base, was used to soften the tone of the horn without altering the pitch. But Hampel, substituting for this the pad of cotton wool used for a similar purpose with the oboe, found with surprise that its effect in the bell of the horn was to raise the pitch a semitone (see D. J. Blaikley's explanation above). By this means, says Domnich, a diatonic and

chromatic scale was obtained. Later Hampel substituted the hand for the pad. Domnich duly ascribes to Hampel the credit of the Inventionshorn, but erroneously states that it was Haltenhoff of Hanau who made the first instrument. Domnich further explains that Hampel, who had not practised the bouche notes in his youth, only made use of them in slow music, and that the credit of making practical use of the discovery was due to his pupil Giovanni Punto (Joh. Sticli) the celebrated horn virtuoso, who was a friend of Domnich's.

It may be well to draw attention to the fact that hand-stopping was not possible so. long as the tube of horn was folded in a circle wide enough to be worn round the body. The reduction of the diameter of the orchestral horn in order to allow the performer to hold the instrument in front of him, thus bringing the bell in front of the right arm in a convenient position for hand-stopping, must have preceded the discovery of hand-stopping. In the absence of contrary evidence we may suppose that the change was effected for the more convenient arrangement and manipulation of the slides or Inventions. So radical a change in the compass of the f\orn could not occur and be adopted generally without leaving its mark on the horn music of the period; this change does not occur, as far as we know, before the last decades of the 18th century. The rapid acceptance in other countries of Hampel's discovery of hand-stopping is evidenced by a passage from a little English work on music, published in London in 1772 but bearing at the end of the preface the date June 1766: 8 " Some eminent Proficients have been so dexterous as very nearly to perform all the defective notes of the scale on the Horn by management of Breath and by a little stopping the bell with their hands."

Hampel's success gave a general impetus to the inventive faculty of musical instrument makers in Europe. At first the result was negative. Kolbel's attempt must, however, be mentioned, if only to correct a misconception. Kolbel, a Bohemian horn virtuoso at the imperial Russian court from 1754, spent many years in vain endeavours to improve his instrument. At last, in 1760, he applied keys to the horn or the bugle, calling it Klappenhorn (the bugle is known in Germany as Signal or Buglehorn). Kolbel's experiment did not become widely known or adopted during his lifetime, but Anton Weidinger, court trumpeter at Vienna, made a keyed trumpet 7 in 1 80 1, which attracted attention in musical circles and gave a fresh impetus in experimenting with keys upon brass instruments. In 1 8 13 Joseph Weidinger, the twelve-year-old son of the above, gave a concert in Vienna on the Klappenwaldhorn 8 (or keyed French horn), about which little seems to be known. Victor Mahillon 9 describes such an instrument, but ascribes the invention to Kolbel ; there was but one key placed on the bell, which on being opened had the effect of raising the pitch of the instrument a whole tone. By alternately using the harmonic open notes on the normal

length of the tube, and then by the action of the key shortening the air column, the following diatonic scale was obtained in the third octave :

key 8

- *Methode de premier et de second cor (Paris, c. 1807). The passage in question was discovered and courteously communicated by Hofrat P. E. Richter of the Royal Library, Dresden. There is no copy of Domnich's work in the British Museum.*

• See William Tans'ur Senior, op. et he. cit.

7 See Allgemeine musikalische Zeitung (Leipzig), Nov. 1802, p, 158, and Jan. 1803, p. 245; and E. Hanslick, Geschichte des Con- certwesens in Wien (Vienna, 1869), p. 119.

8 See Allgem. mus. Ztg., 1815, p. 844. » " Le Cor," pp. 34-35.

In 181a Dikhuth, 1 horn-player in the orchestra of the grand-duke of Baden at Mannheim, constructed a horn in which a slide on the

principle of that of the trom- bone was intended to replace hand-stopping and to lower the pitch at will a semitone.

The most felicitous, far- reaching and important of all improvements was the inven- tion of valves (q.v.), pistons or cylinders (the principle of which has already been ex- plained), by Heinrich Stolzel, 8 who applied them first of ail to the horn, the trumpet and the trombone, 8 thus endowing the brass wind with a chromatic compass obtained with perfect ease throughout the compass. The inherent defect of valve instruments already explained, which causes faulty intonation need- ing correction when the pis- tons are used in combination, has now been practically overcome. The numerous FlG. 8. — Modern Horn (Boosey& Co.) attempts to solve the diffi- culty, made with varying suc- cess by makers of brass instruments, are described under Valve, Bombardon and Cornet. 4 (K. S.)

HORNBEAM (Carpinus betulus), a member of a small genus of trees of the natural order Corylaceae. The Latin name Carpinus has been thought to be derived from the Celtic car, wood, and pin or pen, head, the wood of hornbeams having been used for yokes of cattle (see Loudon, Ency. of PI.

p. 792, new ed. 1855, and Littre, Diet. ii. 556)- The common hornbeam, or yoke-elm, Carpinus betulus (Ger. Hornbaum and Hornbuche, Fr. charme), is indigenous in the temperate parts of western Asia and of Asia Minor, and in Europe, where it ranges as high as 55° and 56° N. lat. It is common in woods and hedges in parts of Wales and of the south of England. The trunk is usually flattened, and twisted as though composed of several stems united; the bark is smooth and light grey; and the leaves are in two rows, 2 to 3 in. long, elliptic-ovate, doubly toothed, pointed, numerously ribbed, hairy below and opaque, and not glossy as in the beech, have short stalks and when young are plaited. The stipules of the leaves act as protecting scale-leaves in the winter-bud and fall when the bud opens in spring. The flowers appear with the leaves in April and May. The male catkins are about ij in. long, and have pale-yellow anthers, bearing tufts of hairs at the apex; the female attain a length in the fruiting stage of 2 to 4 in., with bracts 1 to 15 in. long. The green and angular fruit or " nut " ripens in October; it is about \ in. in length, is in shape like a small chestnut, and is enclosed in leafy, 3-lobed bracts. The hornbeam thrives well on stiff, clayey, moist soils, into which its roots penetrate deeply; on chalk or gravel it does not flourish. Raised from seed it may become a tree 40 to as much as 70 ft. in height, greatly resembling the beech, except 1 See the description of the instrument and of other attempts to obtain the same result by Gottfried Weber, " Wichtige Ver- besserung des Horns " in Allg. musik. Ztg. (Leipzig, 1812), pp. 758, &C; also 1815, pp. 637 and 638 (the regent or keyed bugle).

5 See Allg. musik. Ztg., 1815, May, p. 309, the first announcement of the invention in a paragraph by Captain G. B. Bierey.

'Ibid., 1817, p. 814, by F. Schneider, and Dec. p. 558; 1818, p. 531. An announcement of the invention and of a patent granted for the same for ten years, in which Bliimel is for the first time associated with Stolzel as co-inventor. See also Caecilia (Mainz, 1835), Bd. xvii. pp. 73 seq., with illustrations, an excellent article by Gottfried Weber on the valve horn and valve trumpet.

4 For a very complete exposition of the operation of valves in the horn, and of the mathematical proportions to be observed in construction, see Victor Mahillon's " Le Cor," also the article by Gottfried Weber in Caecilia (1835), to which reference was made above. A list qf horn-players of note during the 1 8th century is given by C. Gottlieb Murr in Journal/. Kunstgeschichte (Nuremberg, 1776), vol. ii. p. 27. See also a good description of the style of playing of the virtuoso J. Nisle in 1767 in Schubart, Aesthetik d. Tonkunst, p. 161, and Leben u. Gesinnungen (1791), Bd. ii. p. 92; or in L. Schiedermair, " Die Blutezeit d. Ottingen-Wallensteinschen Hofkapelle," Intern. Mus. Ges. Smbd. ix. (1), 1907, pp.

in its rounder and closer head. It is, however, rarely grown as a timber-tree, its chief employment being for hedges. " In the single row," says Evelyn (Sylva, p. 29, 1664), " it makes the noblest and the stateliest hedges for long Walks in Gardens or Parks, of any Tree whatsoever whose leaves are deciduous." As it bears clipping well, if was formerly much used in geometric gardening. The branches should not be lopped in spring, on account of their tendency to bleed at that season. The wood of the hornbeam is white and close-grained, and polishes ill, is of considerable tenacity and little flexibility, and is extremely tough and hard to work — whence, according to Gerard, the name of the tree. It has been found to lose about 8% of its weight by drying. As a fuel it is excellent; and its charcoal is much esteemed for making gunpowder. The inner part of the bark of the hornbeam is stated by Linnaeus to afford a yellow dye. In France the leaves serve as fodder. The tree is a favourite with hares and rabbits, and the seedlings are apt to be destroyed by mice. Pliny (Nat. Hist. xxvi. 26), who describes its wood as red and easily split, classes the hornbeam with maples.

The American hornbeam, blue or water beech, is Carpinus americana (also known as C. caroliniana); the common hop- hornbeam, a native of the south of Europe, is a member of a closely allied genus, Ostrya vulgaris, the allied American species, O. virginiana, is also known as iron wood from its very hard, tight, close-grained wood.

HORNBILL, the English name long generally given to all the birds of the family Bucerolidae of modern ornithologists, from the extraordinary horn-like excrescence (cpithema) developed on the bill of most of the species, though to which of them it was first applied seems doubtful. Among classical authors Pliny had heard of such animals, and mentions them (Hist. Nat. lib. x. cap. lxx.) under the name of Tragopan; but he deemed their existence fabulous, comparing them with Pegasi and Gry phones — in the words of Holland, his translator (vol. i. p. 296) — " I thinke the same of the Tragopanades, which many men affirme to bee greater than the ˆEgle; having crooked homes like a Ram on either side of the head, of the colour of yron, and the head onely red." Yet this is but an exaggerated description of some of the species with which doubtless his informants had an imperfect acquaintance. Medieval writers found Pliny's bird to be ho fable, for specimens of the beak of one species or another seem occasionally to have been brought to Europe, where they were preserved in the cabinets of the curious, and thus Aldrovandus was able to describe pretty fairly and to figure (Orniihologia, lib. xii. cap. xx. tab. x. fig. 7) one of them under the name of " Rhinoceros Avis," though the rest of the bird was wholly unknown to him. When the explora- tion of the East Indies had

extended farther, more examples reached Europe, and the " Corvus Indicus cornutus " of Bontius became fully recognized by Willughby and Ray, under the title of the " Horned Indian Raven or Topau called the Rhinocerot Bird." Since the time of those excellent ornithologists our knowledge of the hornbills .has been steadily increasing, but up to the third quarter of the 19th century there was a great lack of precise information, and the publication of D. G. Elliot's " Monograph of the Bucerotidae," then supplied a great want. He divides the family into two sections, the Bucerotinae and the Bucominae. The former group contains most of the species, which are divided into many genera. Of these, the most remarkable is Rhinoplax, which seems properly to contain but one species, the Buceros vigil, B. scutatus or B. geleatus of authors, commonly known as the helmet-hornbill, a native of Sumatta and Borneo. This is easily distinguished by having the front of its nearly vertical and slightly convex epithema composed of a solid mass of horn 6 instead of a thin coating of the light

6 Apparently correlated with this structure is the curious thicken- ing of the " prosencephalic median septum " of the cranium as also of that which divides the " prosencephalic " from the " mesencephalic chamber," noticed by Sir R. Owen {Cat. Osteol. Ser. Mus. Roy. Coll. Surg. England, i. 287) ; while the solid horny mass is further strength- ened by a backing of bony props, directed forwards and meeting its base at right angles. This last singular arrangement is not perceptible in the skull of any other species examined by the present writer.

HORNBLENDE

?o?

and cellular structure found in the others. So dense and hard is this portion of the " helmet " that Chinese and Malay artists carve figures on its surface, or cut it transversely into plates, which from their agreeable colouring, bright yellow with a scarlet rim, are worn as brooches or other ornaments. This bird, which is larger than a raven, is also remarkable for its long graduated tail, having the middle two feathers nearly twice the length of the rest. Nothing is known of its habits. Its head was figured by George Edwards in the 18th century, but little else had been seen of it until 1801, when John Latham described the plumage from a specimen in the British Museum, and the first figure of the whole bird, from an example in the Museum at Calcutta, was published by General Hardwicke in 1823 (Trans. Linn. Society, xiv. pi. 23). Yet more than twenty years elapsed before French naturalists became acquainted with it.*

In the Bucorvinae we have only the genus Bucorvus, or Bucorax as some

call it, confined to Africa, and containing at

Great Indian Hornbill (B. bicornis). (After TickeU's drawing in the Zoological Society's library.)

least two and perhaps more species, distinguishable by their longer legs and shorter toes, the ground-hornbills of English writers, in contrast to the Bucerotinae which are chiefly arboreal in their habits, and when not flying move by short leaps or hops, while the members of this group walk and run with facility. From the days of James Bruce at least there are few African 1 ravellers who have not met with and in their narratives more or less fully described one or other of these birds, whose large size and fearless habits render them conspicuous objects.

As a whole the hornbills, of which more than 50 species have been described, form a very natural and in some respects an isolated group, placed by Huxley among his Coccygomorphae. It has been suggested that they have some affinity with the hoopoes (Upupidae), and this view is now generally accepted. Their supposed alliance to the toucans (Rhampkastidae) rests only on the apparent similarity presented by the enormous beak, and is contradicted by important structural characters. In many of their habits, so far as these are known, all hornbills seem to be much alike, and though the modification in the form of the beak, and the presence or absence of the extraordinary

excrescence, 1 whence their flariie is derived, causes great diversity of aspect among them, the possession of prominent eyelashes (not a common feature in birds) produces a uniformity of expres- sion which makes it impossible to mistake any member of the family. Hornbills are social birds, keeping in companies, not to say flocks, and living chiefly on fruits and seeds; but the bigger species also capture and devour a large number of snakes, while the smaller are great destroyers of insects. The older writers say that they eat carrion, but further evidence to that effect is required before the statement can be believed. Almost every morsel of food that is picked up is tossed into the air, and then caught in the bill before it is swallowed. They breed in holes of trees, laying large white eggs, and when the hen begins to sit the cock plasters up the entrance with mud or clay, leaving only a small window through which she receives the food he brings her during her incarceration.

This remarkable habit, almost simultaneously noticed by Dr Mason in Burma, S. R. Tickell in India, and Livingstone in Africa, and since confirmed by other observers, especially A. R. Wallace 2 in the Malay Archipelago, has been connected by A. D. Bartlett (Proc. Zool. Society, 1869, p. 142) with a peculiarity as remarkable, which he was the first to

notice. This is the fact that hornbills at intervals of time, whethef periodical or irregular is not yet known, cast the epithelial layer of their gizzard, that layer being formed by a secretion derived from the glands of the proventriculus or some other upper part of the alimentary canal. The epithelium is ejected in the form of a sack or bag, the mouth of which is closely folded, and is filled with the fruit that the bird has been eating. The announcement of a circumstance so extraordinary naturally caused some hesitation in its acceptance, but the essential truth of Bartlett's observations was abundantly confirmed by Sir W. H. Flower and especially by Dr J. Murie. These castings form the hen bird's food during her confinement. (A. N.)

HORNBLENDE, an important member of the amphibole group of rock-forming minerals. The name is an old one of German origin, and was used for any dark-coloured prismatic crystals from which metals could not be extracted. It is now applied to the dark-coloured aluminous members of the mono- clinic amphiboles, occupying in this group the same position that augite occupies in the pyroxene group. The monoclinic crystals are prismatic in habit with a six-sided cross-section; the angle between the prism- faces (M), parallel to which there are perfect cleavages, is 55 49'. The colour (green, brown or black) and the specific gravity (3 -0-3 3) vary with the amount of iron present. The pleo chroism is always strong, and the angle of optical extinction on the plane of symmetry (x in the figure) varies from o° to 37°. The chemical composition is expressed by mix- tures in varying proportions of the molecules Ca(Mg,Fe) 3 (Si0 3)4, (Mg,Fe) (Al,Fe) 2 Si0 6 and NaAl(Si0 3)2. Numerous varieties have been distinguished by special names: edenite, from Edenville in New York, is a pale-coloured aluminous amphibole containing little iron; pargasite, from Pargas near Abo in Finland, a green or bluish-green variety; common hornblende includes the greenish-black and black kinds containing more iron. The dark-coloured porphyritic crystals of basalts are known as basaltic hornblende. • – s

Hornblende occurs as an essential constituent of many kinds

1 Buffon, as was his manner, enlarges on the cruel injustice done to these birds by Nature in encumbering them with this deformity, which he declares must hinder them from getting their food with ease. The only corroboration his perverted view receives is afforded by the observed fact that hornbills, in captivity at any rate, never have any fat about them.

2 In The Malay Archipelago (i. 213), Wallace describes a nestling hornbill (£. bicornis) which he obtained as " a most curious object^ as large as a pigeon, but without a particle of plumage on any part of it. It was exceedingly plump and soft, and with a semi-transparent skin, so that it,

looked more like a bag of jelly, with head and feet stuck on, than like a real bird. ‘

/fT

***/*

I

t

r

-‘

N

M

a

.

I

3

1

/ ‘ ” 1

•.».”***

“J

/

of igneous rocks, such as hornblende-granite, syenite, diorite, hornblende-andesite, basalt, &c; and in many crystalline schists, for example, amphibolite and hornblende-schist which are composed almost entirely of this mineral. Well-crystallized specimens are met with at many localities, for example: brilliant black crystals (syntagmatite) with augite and mica in the sanidine bombs of Monte Somma, Vesuvius; large crystals at Arendal in Norway, and at several places in the state of New York; isolated crystals

from the basalts of Bohemia. (L.J. S.)

HORN-BOOK, a name originally applied to a sheet containing the letters of the alphabet, which formed a primer for the use of children. It was mounted on wood and protected with transparent horn. Sometimes the leaf was simply pasted against the slice of horn. The wooden frame had a handle, and it was usually hung at the child's girdle. The sheet, which in ancient times was of vellum and latterly of paper, contained first a large cross — the criss-crosse — from which the horn-book was called the Christ Cross Row, or criss-cross-row. The alphabet in large and small letters followed. The vowels then formed a line, and their combinations with the consonants were given in a tabular form. The usual exorcism—" in the name of the Father and of the Sonne and of the Holy Ghost, Amen " — followed, then the Lord's Prayer, the whole concluding with the Roman numerals. The horn-book is mentioned in Shakespeare's Love's Labour's Lost, v. i, where the ba, the a, e, i, o, u, and the horn, are alluded to by Moth. It is also described by Ben Jonson —

" The letters may be read, through the horn, That make the story perfect."

HORNBY, SIR GEOFFREY THOMAS PHIPPS (1825-1895), British admiral of the fleet, son of Admiral Sir Phipps Hornby, the first cousin and brother-in-law of the 13th earl of Derby, by a daughter of Lieut .-General Burgoyne, commonly distinguished as " Saratoga " Burgoyne, was born on the 20th of February 1825. At the age of twelve he was sent to sea in the flagship of Sit Robert Stopford, with whom he saw the capture of Acre in November 1840. He afterwards served in the flagship of Rear-Admiral Josceline Percy at the Cape of Good Hope, was flag-lieutenant to his father in the Pacific, and came home as a commander. When the Derby ministry fell in December

1852 young Hornby was promoted to be captain. Early in

1853 he married, and as the Derby connexion put him out of favour with the Aberdeen ministry, and especially with Sir James Graham, the first lord of the Admiralty, he settled down in Sussex as manager of his father's property. He had no appointment in the navy till 1858, when he was sent out to China to take command of the " Tribune " frigate and convey a body of marines to Vancouver Island, where the dispute with the United States about the island of San Juan was threatening to become very bitter. As senior naval officer there Hornby's moderation, temper and tact did much to smooth over matters, and a temporary arrangement for joint occupation of the island was concluded. He afterwards commanded the " Neptune " in the Mediterranean under Sir William Fanshawe Martin, was flag-captain to Rear-Admiral Dacres in the Channel, was com- modore of

the squadron on the west coast of Africa, and, being promoted to rear-admiral in January 1869, commanded the training squadron for a couple of years. He then commanded the Channel Fleet, and was for two years a junior lord of the Admiralty. It was early in 1877 that he went out as commander- in-chief in the Mediterraean, where his skill in manoeuvring the fleet, his power as a disciplinarian, and the tact and deter- mination with which he conducted the foreign relations at the time of the Russian advance on Constantinople, won for him the K.C.B. He returned home in 1880 with the character of being perhaps the most able commander on the active list of the navy. His later appointments were to the Royal Naval College as president, and afterwards to Portsrhouth as commander- in-chief. On hauling down hi flag he was appointed G.C.B., and in May 1888 was promoted to be admiral of the fleet. From 1886 he was principal naval aide-de-camp to Queen Victoria, and in that capacity, and as an admiral of the fleet, was appointed*

on the staff of the German emperor during his visits to England in 1889 and 1890. He died, after a short illness, on the 3rd of March 1895. By his wife, who predeceased him, he left several children, daughters and sons, one of whom, a major in the artillery, won the Victoria Cross in South Africa in 1900. His life was written by his daughter, Mrs Fred. Egerton, (1896). HORNCASTLE, a market-town in the S. Lindsey or Horncastle parliamentary division of Lincolnshire, England, at the foot of a line of low hills called the Wolds, at the confluence of the Bain and Waring streams; the terminus of a branch line of the Great Northern railway, 130 m. N. from London. Pop. of urban district (1901) 4038. The church of St Mary is principally Decorated and Perpendicular, with some Early English remains and an embattled western tower. Queen Elizabeth's grammar school was founded in 1562. Other buildings are an exchange, a court-house and a dispensary founded in 1789. The prosperity of the town is chiefly dependent on agriculture and its well-known horse fairs. Brewing and malting are carried on, and there is some trade in coal and iron.

Remains have been found here which may indicate the exist- ence of a Roman village. The manor of Horncastle (Hornecastre) belonged to Queen Edith in Saxon times and was royal demesne in 1086 and the head of a large soke. In the reign of Stephen it apparently belonged to Alice de Cundi, a partisan of the empress Maud, and passing to the crown on her death it was granted by Henry III. to Gerbald de Escald, from whom it descended to Ralph de Rhodes, who sold it to Walter Mauclerc, bishop of Carlisle in 1230. The see of Carlisle retained it till the reign of Edward VI. when it was granted to Edward, Lord Clinton, but was recovered in the following reign. In 1230 Henry III. directed the men of Horncastle to render a reasonable aid to the bishop, who obtained the right to try felons, hold a court leet and have free warren. An inquisition of 1275 shows that the

bishop had then, besides the return of writs, the assize of bread and ale and waifs and strays in the soke. Horncastle was a centre of the Lincolnshire rebellion of 1536. Royalist troops occupied the town in 1643, and were pursued through its streets after the battle fought at Winceby. It was never a municipal or parliamentary borough, but during the middle ages it was frequently the residence of the bishops of Carlisle. Its prosperity has always depended largely on its fairs, the great horse fair described by George Borrow in Romany Rye being granted to the bishop in 1230 for the octave of St Lawrence, together with the fair on the feast of St Barnabas. The three other fairs are apparently of later date.

See George Weir, Historical and Descriptive Sketches of the Town and Soke of Horncastle in the County of Lincoln and of Several Places adjacent (London, 1820).

HORN DANCE, a medieval dance, still celebrated during the September " wakes " at Abbots Bromley, a village on the borders of Need wood Forest, Staffordshire. Six or seven men, each wearing a deer's skull with antlers, dance through the streets, pursued by a comrade who bestrides a mimic horse, and whips the dancers to keep them on the move. The horn-dance usually takes place on the Monday after Wakes Sunday, which is the Sunday next after the 4th of September. Originally the dance took place on a Sunday.

See Strand Magazine for November 1896; also Folk-lore, vol. vii. (1896), p. 381.

HORNE, GEORGE (1730-1792), English divine, was born on the 1st of November 1730, at Otham near Maidstone, and received his education at Maidstone school and University College, Oxford. In 1749 he became a fellow of Magdalen, of which college he was elected president in 1768. As a preacher he early attained great popularity, and was, albeit unjustly, accused of Methodism. His reputation was helped by several clever if somewhat wrong-headed publications, including a satirical pamphlet entitled The Theology and Philosophy of Cicero's Somniwm Scipionis (17 51), a defence of the Hut chin— sonians in A Fair, Candid and Impartial State of the Case between Sir Isaac Newton and Mr Hutchinson (1753), and critiques upon William Law (1758) and Benjamin Kennicott (1760). In 1 771 he published his well-known Commentary on the Psalms.

a series of expositions based on the Messianic idea. In 1776 he was chosen

vice-chancellor of his university; in 1781 he was made dean of Canterbury, and in 1790 was raised to the see of Norwich. He diedat Bath on the 17th of January 1792.

His collected Works were published with a Memoir by William Jones in 1799.

HORNE, RICHARD HENRY, or HENGIST (1803-1884), English poet and critic, was born in London on New Year's Day 1803. He was intended for the army, and entered at Sandhurst, but receiving no commission, he left his country and joined the Mexican navy. He served in the war against Spain, and underwent many adventures. Returning to England, he became a journalist, and in 1836-1837 edited The Monthly Repository. In 1837 he published two tragedies, Cosmo de Medici and The Death of Marlowe, and in 1841 a History of Napoleon. The book, however, by which he lives is his epic of Orion, which appeared in 1843. It was published originally at a farthing, was widely read, and passed through many editions. In the next year he set forth a volume of critical essays called .4 New Spirit of the Age, in which he was assisted by Elizabeth Barrett (Mrs Browning), with whom, from 1839 to her marriage in 1846, he conducted a voluminous correspondence. In 1852 he went to Australia in company with William Howitt, and did not return to England until 1869. He received a Civil List pension in 1874, and died at Margate on the 13th of March 1884. Home possessed extraordinary versatility, but, except in the case of Orion, he never attained to a very high degree of distinc- tion. That poem, indeed, has much of the quality of fine poetry; it is earnest, vivid and alive with spirit. But Home early drove his talent too hard, and continued to write when he had little left to say. In criticism he had insight and quickness. He was one of the first to appreciate Keats and Tennyson, and he gave valuable encouragement to Mrs Browning when she was still Miss Elizabeth Barrett.

HORNE, THOMAS HARTWELL (1 780-1862), English theo- logian and bibliographer, was born in London on the 20th of October 17S0, and was educated at Christ's Hospital, with S. T. Coleridge as an elder contemporary. On leaving school he became clerk to a barrister, but showed a keen taste for author- ship. As early as 1800 he published A Brief View of the Necessity and Truth of the Christian Revelation, which was followed by several minor works on very varied subjects. In 1814, having been appointed librarian of the Surrey Institution, he issued his Introduction to the Study of Bibliography. This was followed in 1818 by his long matured work, the Introduction to the Critical Study of the Holy Scriptures, which rapidly attained popularity, and secured for its author widespread fame and an honorary M.A. degree from Aberdeen. In 1819 he received ordination from William Howley, bishop of London, and after

holding two smaller livings was appointed rector of the united parishes of St Edmund the King and Martyr, and St Nicolas Aeons in London. On the breaking up of the Surrey Institution in 1823, he was appointed (1824) senior assistant librarian in the depart- ment of printed books in the British Museum. After the project of making a classified catalogue had been abandoned, he took part in the preparation of the .alphabetical one, and his connexion with the museum continued until within a few months of his death on the 27th of January 1862.

Home's works exceed forty in number. The Introduction, edited by John Ayre and S. P. Tregelles, reached a 12th edition in 1869; but, owing to subsequent advances in biblical scholarship, it fell into disuse.

HORNELL, a city of Steuben county, New York, U.S.A., on the Canisteo river, 90 m. S.E. of Buffalo. Pop. (1890) 10,996; (1900) 11,918, of whom 1230 were foreign-born; (1910 census) 13,617. Hornell is served by the Erie and the Pittsburg, Shawmut & Northern railways; the latter connects at Wayland (20 m. distant by rail) with the Delaware, Lackawanna & Western railroad. In the city are St Ann's Academy, the St James Mercy Hospital, the Steuben Sanitarium, a public library, and a county court-house — terms of the county court being held here as well as in Bath (pop. in 1903, 3695), the county-seat, and in Corning. Hornell has extensive car shops of the Eric railroad,

and among its manufactures are silk goods (silk gloves being a specially important product), sash, doors and blinds, leather, furniture, shoes, white-goods, wire-fences, foundry and machine shop products, electric motors, and brick and tile. The value of the factory product in 1905 was $3,162,677, an increase of 30-1% since 1900. The first settlement here was made in 1790, within the district of Erwin (then in Ontario county); after 1 796 it was a part of Canisteo township, and the settlement itself was known as Upper Canisteo until 1820, when a new township was formed and named Hornellsville in honour of Judge George Hornell (d. 1813). The village of Hornellsville was incorporated in 1852, and in 1888 was chartered as a city; and by act of the state legislature the name was changed to Hornell in 1906.

See G. H. McMaster, History of the Settlement of Steuben County (Bath, New York, 1849).

HORNEMANN, FREDERICK _(fi. 1 796-1800), German traveller in Africa, was born at Hildesheim. He was a young man when, early in 1796, he offered his services to the African Association of London as an explorer in Africa. By the association he was sent to Gottingen University to study Arabic and otherwise prepare for an expedition into the unknown regions

of North Africa from the east. In September 1797 he arrived in Egypt, where he continued his studies. On the invasion of the country by the French he was confined in the citadel of Cairo, to preserve him from the fanaticism of the populace. Liberated by the French, he received the patronage of Bonaparte. On the 5th of September 1798 he joined a caravan returning to the Maghrib from Mecca, attaching himself to a party of Fezzan merchants who accompanied the pilgrims. As an avowed Christian would not have been permitted to join the caravan Hornemann assumed the character of a young mameluke trading to Fezzan. He then spoke, but indifferently, both Arabic and Turkish, and he was accompanied as servant and interpreter by Joseph Freudenburg, a German convert to Islam, who had thrice made the pilgrimage to Mecca. Travelling by way of the oases of Siwa and Aujila, a " black rocky desert " was traversed to Temissa in Fezzan. Murzuk was reached on the 17th of November 1798. Here Hornemann lived till June 1799, going thence to the city of Tripoli, whence in August of the same year he despatched his journals to London. He then returned to Murzuk. Nothing further is known with certainty concerning him or his companion. In Murzuk Hornemann had collected a great deal of trustworthy information concerning the peoples and countries of the western Sahara and central Sudan, and when he left Tripoli it was his intention to go direct to the Hausa country, which region he was the first European definitely to locate. " If I do not perish in my undertaking," he wrote in his journal, " I hope in five years I shall be able to make the Society better acquainted with the people of whom I have given this short description." The British consul at Tripoli heard from a source believed to be trustworthy that about June 1803 Jusef (Hornemann's Mahom- medan name) was at Casna, i.e. Katsena, in Northern Nigeria, " in good health and highly respected as a marabout." A report reached Murzuk in 1819 that the traveller had gone to " Noofy " (Nupe), and had died there. Hornemann was the first European in modern times to traverse the north-eastern Sahara, and up to 1910 no other explorer bad followed his route across the Jebel-es- Suda from Aujila to Temissa.

The original text of Hornemann's journal, which was written in German, was printed at Weimar in 1801; an English translation, Travels from Cairo to Mourzouk, &c, with maps and dissertations by Major James Rennell, appeared in London in 1802. A French translation of the English work, made by order of the First ConsuV and augmented with notes and a memoir on the Egyptian oases by L. Langles, was published in Paris in the following year. The French version is the most valuable of the three. Consult also the Proceedings of the African Association (18 10), and the Geog. Jnl. Nov. 1906.

HORNER, FRANCIS (1778-1817), British economist, was born at Edinburgh on the 12th of August 1778. After passing through the usual

courses at the high school and university of his native city, he devoted five years, the first two in England, to comprehensive but desultory sfudy, and in 1800 was called to the Scottish bar. Desirous, however, of a wider sphere, Horner removed to London in 1802, and occupied the interval

that elapsed before his admission to the English bar in 1807 with researches in law, philosophy and political economy. In February 1806 he became one of the commissioners for adjusting the claims against the nawab of Arcot, and in November entered parliament as member for St Ives. Next year he sat for Wendover, and in 181 2 for St Mawes, in the patronage of the marquis of Buckingham. In 1811, when Lord Grenville was organizing a prospective ministry, Horner had the offer, which he refused, of a treasury secretaryship. He had resolved not to accept office till he could afford to live out of office; and his professional income, on which he depended, was at no time proportionate to his abilities. His labours at last began to tell upon a constitution never robust, and in October 1816 his physicians ordered him to Italy, where, however, he sank under his malady. He died at Pisa, on the 8th of February 1817. He was buried at Leghorn, and a marble statue by Chantrey was erected to his memory in Westminster Abbey.

Without the advantages of rank, or wealth, or even of genius, Francis Horner rose to a high position of public influence and private esteem. His special field was political economy. Master of that subject, and exercising a sort of moral as well as intellectual influence over the House of Commons he, by his nervous and earnest rather than eloquent style of speaking, could fix its attention for hours on such dry topics as finance, and coinage, and currency. As chairman of the parliamentary committee for investigating the depreciation of bank-notes, for which he moved in 1810, he extended and confirmed his fame as a political economist by his share in the famous Bullion Report. It was chiefly through his efforts that the paper-issue of the English banks was checked, and gold and silver reinstated in their true position as circulating media; and his views on free trade and commerce have been generally accepted at their really high value. Horner was one of the promoters of the Edinburgh Review in 1802. His articles in the early numbers of that publication, chiefly on political economy, form his only literary legacy.

See Memoirs and Correspondence of Francis Horner, M.P., pub- lished by

his brother (see below) in 1843. Also the Edinburgh and Quarterly Reviews for the same year; and Blackwood's Magazine, vol. i.

HORNER, LEONARD (1785-1864), Scottish geologist, brother of Francis Horner (above), was born in Edinburgh on the 17th of January 1785. His father, John Horner, was a linen merchant in Edinburgh, and Leonard, the third and youngest son, entered the university of Edinburgh in 1799. There in the course of the next four years he studied chemistry and mineralogy, and gained a love of geology from Playfair's Illustrations of the Hultonian Theory. At the age of nineteen he became a partner in a branch of his father's business, and went to London. In 1808 he joined the newly formed Geological Society and two years later was elected one of the secretaries. Throughout his long life he was ardently devoted to the welfare of the society; he was elected president in 1846 and again in i860. In 181 1 he read his first paper " On the Mineralogy of the Malvern Hills " {Trans. Geol. Soc. vol. i.) and subsequently communicated other papers on the " Brine-springs at Droitwich," and the " Geology of the S.W. part of Somersetshire." He was elected F.R.S. in 1813. In 1815 he returned to Edinburgh to take personal superintendence of his business, and while there (1821) he was instrumental in founding the Edinburgh School of Arts for the instruction of mechanics, and he was one of the founders of the Edinburgh Academy. In 1827 he was invited to London to become warden of the London University, an office which he held for four years; he then resided at Bonn for two years and pursued the study of minerals and rocks, communicating to the Geological Society on his return a paper on the " Geology of the Environs of Bonn," and another " On the Quantity of Solid Matter suspended in the Water of the Rhine." In 1833 he was appointed one of the commissioners to inquire into the employ- ment of children in the factories of Great Britain, and he was subsequently selected as one of the inspectors. In later years he devoted much attention to the geological history of the

alluvial lands of Egypt; and in 1843. he published his Life o" his brother Francis. He died in London on the 5th of March

1864.

See Memoir of Leonard Horner, by Katherine M. Lyell (1890) (privately printed).

HORNES, MORITZ (18:5-1868), Austrian palaeontologist, was born in Vienna on the 14th of July 181 5. He was educated in the university and graduated Ph.D. He then became assistant in the Vienna mineralogical museum. He was distinguished for his researches on the Tertiary mollusca of the Vienna Basin, and on the Triassic mollusca of Alpine regions. Most

of his memoirs were published in the Jahrbuch der K. K. geol. Reichsanstalt. In 1864 he introduced the term Neogene to include Miocene and Pliocene, as these formations are not always to be clearly separated: the fauna of the lower division being subtropical and gradually giving place in the upper division to Mediterranean forms. He died in Vienna on the 4th of November 1868. His son Dr Rudolf Homes (b. 1850), professor of geology and palaeontology in the university of Graz, has also carried on researches among the Tertiary mollusca, and is author of Elemente der Palaeontologie (1884).

HORNFELS (a German word meaning hornstone), the group designation for a series of rocks which have been baked and indurated by the heat of intrusive granitic masses and have been rendered massive, hard, splintery, and in some cases exceedingly tough and durable. Most hornf elses are fine-grained, and while the original rocks (such as sandstone, shale and slate, limestone and diabase) may have been more or less fissile owing to the presence of bedding or cleavage planes, this structure is effaced or rendered inoperative in the hornfels. Though they may show banding, due to bedding, &c, they break across this as readily as along it; in fact they tend to separate into cubical fragments rather than into thin plates. The commonest hornfelses (the " biotite hornfelses ") are dark-brown to black with a somewhat velvety lustre owing to the abundance of small crystals of shining black mica. The " lime hornfelses " are often while, yellow, pale-green, brown and other colours. Green and dark- green are the prevalent tints of the hornfelses produced by the alteration of igneous rocks. Although for the most part the constituent grains are too small to be determined by the unaided eye, there are often larger crystals of garnet or andalusitc scattered through the fine matrix, and these may become very prominent on the weathered faces of the rock.

The structure of the hornfelses is very characteristic. Very rarely do any of the minerals show crystalline form, but the small grains fit closely together like the fragments of a mosaic; they are usually of nearly equal dimensions and from the resem- blance to rough pavement work this has been called' pflaster structure or pavement structure. Each mineral may also enclose particles of the others; in the quartz, for example, small crystals of graphite, biotite, iron oxides, sillimanite or felspar may appear in great numbers. Often the whole of the grains are rendered semi-opaque in this way. The minutest crystals may show traces of crystalline outlines; undoubtedly they are of new formation and have originated in situ. This leads us to believe that the whole rock has been recrystallized at a high temperature and in the solid state, so that there was little freedom for the mineral molecules to build up well- individualized crystals. The regeneration of the rock has been sufficient to efface most of the original structures and to replace the former minerals more or less completely by

new ones. But crystallization has been hampered by the solid condition of the mass and the new minerals are formless and have been unable to reject impurities, but have grown around them.

Slates, shales and clays yield biotite hornfelses in which the most conspicuous mineral is black mica, in small scales which under the microscope are transparent and have a dark reddish- brown colour and strong dichroism. There is also quartz, and often a considerable amount of felspar, while graphite, tourmaline and iron oxides frequently occur in lesser quantity. In these biotite hornfelses the minerals, which consist of aluminium silicates, arc commonly found; they are usually andalusite and

sillimanite, but kyanite appears also in hornfelses, especially in those which have a schistose character. The andalusite may he pink and is then often pleochroic in thin sections, or it may be white with the cross-shaped dark enclosures of the matrix which are characteristic of chiastolite. Sillimanite usually forms exceedingly minute needles embedded in quartz. In the rocks of this group cordierite also occurs, not rarely, and may have the outlines of imperfect hexagonal prisms which are divided up into six sectors when seen in polarized light. In biotite hornfelses a faint striping may indicate the original bedding of the unaltered rock and corresponds to small changes in the nature of the sediment deposited. More commonly there is a distinct spotting, visible on the surfaces of the hand specimens.. The spots are round or elliptical, and may be paler or darker 1 han the rest of the rock. In some cases they are rich in graphite or carbonaceous matters; in others they are full of brown mica; some spots consist of rather coarser grains of quartz than occur in the matrix. The frequency with which this feature reappears in the less altered slates and hornfelses is rather remarkable, especially as it seems certain that the spots are not always of the same nature or origin. ” Tourmaline hornfelses ” are found sometimes near the margins of tourmaline granites; they are black with small needles of schorl which under the microscope are dark brown and richly pleochroic. As the tourmaline con- tains boron there must have been some permeation of vapours from the granite into the sediments. Rocks of this group are often seen in the Cornish tin-mining districts, especially near the lodes.

A second great group of hornfelses are the calc-silicate-horn- felses which arise from the thermal alteration of impure lime- stones. The purer beds recrystallize as marbles, but where there has been originally an admixture

of sand or clay lime-bearing silicates are formed, such as diopside, epidote, garnet, sphene, vesuvianite, scapolite; with these phlogopite, various felspars, pyrites, quartz and actinolite often occur. These rocks are fine-grained, and though often banded are tough and much harder than the original limestones. They are excessively variable in their mineralogical composition, and very often alternate in thin seams with biotite hornfels and indurated quartzites. When perfused with boric and fluoric vapours from the granite they may contain much axinite, fluorite and datolite, but the aluminous silicates (andalusite, &c.) are absent from these rocks. From diabases, basalts, andesites and other igneous rocks a third type of hornfels is produced. They consist essentially of felspar with hornblende (generally of brown colour) and pale pyroxene. Sphene, biotite and iron oxides are the other common constituents, but these rocks show much variety of composition and structure. Where the original mass was decom- posed and contained calcite, zeolites, chlorite and other secondary minerals either in veins or in cavities, there are usually rounded areas or irregular streaks containing a suite of new minerals, which may resemble those of the calc silicate hornfelses above described. The original porphyritic, fluidal, vesicular or frag- ment al structures of the igneous rock are clearly visible in the less advanced stages of hornfelsing, but become less evident as the alteration progresses.

In some districts hornfelsed rocks occur which have acquired a schistose structure through shearing, and these form transitions to schists and gneisses which contain the same minerals as the hornfelses, but have a schistose instead of a hornfels structure. Among these may be mentioned cordierite and sillimanite gneisses, andalusite and kyanite mica schists, and those schistose calc silicate rocks which are known as cipolins. That these are sediments which have undergone thermal alteration is generally admitted, but the exact conditions under which they were formed is not always clear. The essential features of hornfelsing are ascribed to the action of heat, pressure and permeating vapours, regenerating a rock mass without the production of fusion (at least on a large scale). It has been argued, however, that often there is extensive chemical change owing to the introduction of matter from the granite into the rocks surrounding it. The formation of new felsr>ar in the hornfelses is pointed out as

evidence of this. While this "felspathization" may have occurred in a few localities, it seems conspicuously absent from others. Most authorities at the present time regard the changes as being purely of a physical and not of a chemical nature. (J. S. F.)

HOBNING, LETTERS OF, a term in Scots law. Originally in Scotland imprisonment for debt was enforceable only in certain cases, but a custom gradually grew up of taking the debtor's oath to pay. If the debtor broke his

oath, he became liable to the discipline of the Church. The civil power, further, stepped in to aid the ecclesiastical, and denounced him as a rebel, imprisoning his person and confiscating his goods. The method declaring a person a rebel was by giving three blasts on a horn and publicly proclaiming the fact; hence the expres- sion, "put to the horn." The subsequent process, the warrant directing a messenger-at-arms to charge the debtor to pay or perform in terms of the letters, was called " letters of horning." This system of execution, was simplified by an act of 1837 (Personal Diligence Act), and execution is now usually by diligence (see Execution).

HORNPIPE, originally the name of an instrument no longer in existence, and now the name of an English national dance. The sailors' hornpipe, although the most common, is by no means the only form of the dance, for there is a pretty tune known as the " College Hornpipe," and other specimens of a similar kind might be cited. The composition of hornpipes flourished chiefly in the 18th century, and even Handel did not disdain to use the characteristic rhythm. The hornpipe may be written in f or in common time, and is always of a lively nature.

HORNSEY, a municipal borough in the Hornsey parliamentary division of Middlesex, England, suburban to London, 6 m. N. of St Paul's Cathedral, on the Great Northern railway. Pop. (1891) 44,523; (1901) 72,056. It is chiefly occupied by small residences of the working classes. The manor, called in the 13th century Haringee (a name which survives as Harringay), belonged from an early date to the see of London, the bishops having a seat here. In 1387 the duke of Gloucester, uncle of Richard II., assembled in Hornsey Park the forces by the display of which he compelled the king to dismiss his minister de la Pole, earl of Suffolk; and in 1483 the park was the scene of the ceremonious reception of Edward V., under the charge of Richard, duke of Gloucester, by Edmund Shaw, lord mayor of London. The parish church of St Mary, Hornsey, retains its Perpendicular tower {c. 1500) and a number of interesting monuments. Finsbury Park, of 120 acres, and other smaller public grounds, are within the borough. Hornsey was incorpor- ated in 1903 under a mayor, 10 aldermen and 30 councillors. Area, 2875 acres.

HOROWITZ, ISAIAH (c. 1555-c. 1630), Jewish rabbi and mystic, was born at Prague, and died at Safed, then the home of Jewish Kabbala. His largest work is called Shelah (abbrevi- ated from the initials of the full title Skene luhoth ha-berit, " Two Tables of the Covenant "). This is a compilation of ritual, ethics and mysticism, and had a profound influence on Jewish life. It has been often reprinted, especially in an abbreviated form.

For an account of the Jewish mystics at Safed see S. Schecter, Studies in Judaism, series ii. (1908).

HORREUM, the Latin word for a magazine or storehouse for the storage of grain and other produce of the earth, and occasion- ally for that of agricultural implements. The storehouses" of Rome were of the most extensive character, there being no fewer than 290 public horrea at the time of Constantine. They were used for the storage of food and merchandize of all kinds, being part of the great Roman system of providing food for the population, and they were supplied constantly with corn and other provisions from Africa, Spain and elsewhere.

HORROCKS, JEREMIAH (1619-1641), English astronomer, was born in 1619 at Toxteth Park, near Liverpool. His family was poor, and the register of Emmanuel College, Cambridge, testifies to his entry as sizar on the 18th of May 1632. Isolated in his scientific tastes, and painfully straitened in means, he

pursued amid innumerable difficulties his purpose of self-educa- tion. His university career lasted three years, and on its termination he became a tutor at Toxteth, devoting to astrono- mical observations his brief intervals of leisure. In 1636 he met with a congenial spirit in William Crabtree, a draper of Broughton, near Manchester; and encouraged by his advice he exchanged the guidance of Philipp von Lansberg, a pretentious but in- accurate Belgian astronomer, for that of Kepler. He now set himself to the revision of the Rudolphine Tables (published by Kepler in 1627), and in the progress of his task became convinced that a transit of Venus overlooked by Kepler would nevertheless occur on the 24th of November (O.S.) 1639. He was at this time curate of Hoole, near Preston, having recently taken orders in the Church of England, although, according to the received accounts, he had not attained the canonical age. The 24th of November falling on a Sunday, his clerical duties threatened fatally to clash with his astronomical observations; he was, however, released just in time to witness the punctual verification of his forecast, and carefully noted the progress of the phenomenon during half an hour before sunset (3-15 to 3-45). This transit of Venus is remarkable as the first ever observed, that of 1631 predicted by Kepler having been invisible in western Europe. Notwithstanding the rude character of the apparatus at his disposal, Horrocks was enabled by his observation of it to introduce some important corrections into the elements of the planet's orbit, and to reduce to its exact value the received estimate of its apparent diameter.

After a year spent at Hoole, he returned to Toxteth, and there, on the eve of a long-promised visit to his friend Crabtree, he died, on the 3rd of January 1641, when only in his twenty- second year. To the inventive activity of the discoverer he had already united the patient skill of the observer and the practical sagacity of the experimentalist. Before he was twenty he had afforded a specimen of his powers by an important contribution to the lunar theory. He first brought the revolutions of our satellite within the domain of Kepler's laws, pointing out that her apparent irregularities could be completely accounted for by supposing her to move in an ellipse with a variable eccen- tricity and directly rotatory major axis, of which the earth occupied one focus. These precise conditions were afterwards demonstrated by Newton to follow necessarily from the law of gravitation.

In his speculations as to the physical cause of the celestial motions, his mind, though not wholly emancipated from the tyranny of gratuitous assumptions, was working steadily towards the light. He clearly perceived the significant analogy between terrestrial gravity and the force exerted in the solar system, and by the ingenious device of a circular pendulum illustrated the composite character of the planetary movements. He also reduced the solar parallax to 14″ (less than a quarter of Kepler's estimate), corrected the sun's semi-diameter to 15′ 45", recom- mended decimal notation, and was the first to make tidal observations.

Only a remnant of the papers left by Horrocks was preserved by the care of William Crabtree. After his death (which occurred soon after that of his friend) these were purchased by Dr Worthington, of Cambridge; and from his hands the treatise Venus in sole visa passed into those of Hevelius, and was published by him in 1662 with his own observations on a transit of Mercury. The remaining fragments were, under the directions of the Royal Society, reduced by Dr Wallis to a compact form, with the heading Astronomia Kepleriana defensa et promota, and published with numerous extracts from the letters of Horrocks to Crabtree, and a sketch of the author's life, in a volume entitled Jeremiae Horroccii opera posthuma (London, 1672). A memoir of his life by the Rev. Arundell Blount Whatton, prefixed to a translation of the Venus in sole visa, appeared at London in 1859.

For additional particulars, see J. E. Bailey's Palatine Note-Book, ii. 253, iii. 17; Bailey's "Writings of Horrocks and Crabtree" (from Notes and Queries, Dec. 2, 1882) ; Notes and Queries, 3rd series, vol. v., 5th series, vols, ii., iv. ; Martin's Biographia philosophica, p. 271 {1764); R. Brickel, Transits of Venus, 1639- 1874 (Preston, 1874); Astronomical Register, xii. 293; Hevelii, Mercurius in sole visus, pp. 1 16-140; S. Rigaud's Correspondence of Scientific Men; Th. Birch, History of the Royal Society,

i. 386, 395. 47°; Sir E. Sherburne's Sphere of M. Manilius, p. 92 (1675);

Sir J. A. Picton's Memorials of Liverpool, ii. 561; M. Gregson's Fragments relative to the Duchy of Lancaster, p. 166 (1817); Liverpool Repository, i. 570 (1826); Phil. Trans. Abridged, ii. 12 (1809); C. Hutton's Phil, and Math. Dictionary (1815); Penny Cyclopaedia (De Morgan); Nature, viii. 117, 137; J. B. J. Delambre, Hist, de Vastronomie moderne, ii. 495; Hist, de Vastronomie au XVIII" siecle, pp. 28, 61, 74; W. Whewell, Hist, of the Inductive Sciences, i. 331 ; R. Grant, Hist, of Physical Astronomy, pp. 420, 545; J. Madler, Geschichte der Himmelskunde, i. 275; M. Marie, Hist, des Sciences, iv. 168, vi. 90; J. C. Houzeau, Bibl. Astr. ii. 167. (A. M. C.)

HORROCKS, JOHN (1768-1804), British cotton manufacturer, was born at Edgeworth, near Bolton, in 1768. His father was the owner of a small quarry, and John Horrocks spent his early days in dressing and polishing millstones. The Lancashire 'cotton industry was then in its infancy, but Horrocks was greatly impressed with its future possibilities, and he managed to obtain a few spinning-frames which he erected in a corner of his father's offices. For a time he combined cotton-spinning on a very small scale with stone-working, but finally devoted himself entirely to cotton-spinning, working the frames with his own hands, and travelling through the Lancashire manufactur- ing districts to sell the yarn. His goods obtained a reputation for quality, and his customers increased so rapidly that in 1791 he removed to Preston, where he began to manufacture cotton shfrtings and long-cloths in addition to spinning the cotton yarn. By taking full advantage of the machinery invented for manu- facturing textiles, and by rigidly maintaining the quality of his goods, Horrocks rapidly developed his business, and with the aid of the capital of a local banker, whom he took into partnership, erected within a year of his arrival in Preston his first large mill, securing shortly afterwards from the East India Company a monopoly of the manufacture of cottons and muslins for the Indian market. The demand for Horrocks's goods continued to increase, and to cope with the additional work he took first an elder brother and in 1801 a Mr Whitehead and a Mr 'Miller into partnership, the title of the firm being altered to Horrockses, Miller & Co. In 1802 he entered parliament as tory member for Preston. He died in London in 1804 of brain-fever resulting from over-work.

HORSE (a word common to Teutonic languages in such forms as hors, hros, ros; cf. the Ger. ross), a name properly restricted to the domesticated horse (Equus caballus) and its wild or half- wild representatives, but in a zoological sense used as a general term for all the members of the family Equidae.

Species

The distinctive characteristics of the family, and its position in the zoological system, are given in the articles Equidae and Perissodactyla. Here attention is concentrated on the lead- ing features of the horse as contrasted with the other members of the same family, and subsequently on the anatomical structure of the former animal. The evolution of the existing representa- tives of the family from primitive extinct animals is summarized in the article Equidae.

Horse, Wild Horse, Pony. — The horse {Equus caballus) is distinguished from the others by the long hairs of the tail being more abundant and growing quite or nearly from the base as well as the end and sides, and also by possessing a small bare callosity on the inner side of the hind leg, just below the " hock " or heel joint, in addition to the one on the inner side of the fore-arm above the carpus or " knee," common to all the genus. The mane is also longer and more flowing, and the ears are shorterˆ the limbs longer, and the head smaller.

Though existing horses are usually not marked in any definite manner, or only irregularly dappled, or spotted with light surrounded by a darker ring, many examples are met with showing a dark median dorsal streak like that found in all the other members of the genus, and even with dark stripes on the shoulders and legs.

Two distinct types of horse, in many instances largely modified by interbreeding, appear to exist. (1) The northern, or dun type, represented by the dun ponies of Norway {Equus caballus typicus), the closely allied Celtic pony {E. c.celticus) of Iceland, the

Hebrides, &c, and the wild pony of Mongolia (E. c. przewalskii) , with which the now extinct tarpan of the Russian steppes appears to have been identical. The prevalent colour is yellow- dun, with dark brown or black mane, tail and legs; in the wild forms the muzzle is often white and the root of the tail short- haired; while the head is relatively large and heavy. No depression exists in the skull in front of the eye. Most of the ordinary horses of N.W. Europe are descended from the dun type, with more or less admixture of Barb blood. (2) The southern, or Barb type, represented by Barbs, Arabs, thorough- breds, &c. (E. c. asiaticus or libycus), in which the typical colour is bay with black " points " and often a white star on the forehead, and the mane and tail are long and full. The skull generally

shows a slight depression in front of the socket of the eye, which, although now serving as the attachment for the muscle running to the nostril, may represent the face-gland of the extinct Hipparion. Many of the dark-coloured horses of Europe have Barb or Arab blood in their veins, this being markedly the case with the Old English black or Shire horse, the skull of which shows a distinct depression in front of the eye-socket. This depression is still more marked in the extinct Indian E. sivalensis, which may have been the ancestral form.

In Europe wild horses were abundant in the prehistoric Neolithic or polished-stone period. Judging from the quantity of their remains found associated with those of the men of that time, the chase of these animals must have been among man's chief occupations, and horses must have furnished him with one of his most important food-supplies. The characters of the bones preserved, and certain rude but graphic representations carved on bones or reindeers' antlers, enable us to know that they were rather small in size and heavy in build, with large heads and rough shaggy manes and tails, much like, in fact, the recently extinct tarpans or wild horses of the steppes of the south of Russia, and the still-surviving Mongolian wild pony or " Przewalski's horse." These horses were domesticated by the inhabitants of Europe before the dawn of history. Horses are now diffused by the agency of man throughout almost the whole of the inhabited parts of the globe, and the great modifica- tions they have undergone in consequence of domestication, crossing, and selective breeding are well exemplified by comparing such extreme forms as the Shetland pony, dwarfed by uncongenial climate, the thoroughbred racer, and the London dray-horse. In Australia, as in America, horses imported by European settlers have escaped into unreclaimed lands and multiplied to a prodigious extent, roaming in vast herds over the wide and uncultivated plains.

Ass, Zebra, Quagga. — The next group is formed by the Asiatic wild asses, or kiangs and onagers, as they might well be called, in order to distinguish them from the wild asses of Africa. These asses have moderate ears, the tail rather long, and the back-stripe dark brown and running from head to tail. On the neck and withers this stripe is formed by the mane. There are two species of Asiatic wild ass, with several varieties. The first and largest has two races, the chigetai (Equus hemionus) of Mongolia, and the kiang (E. h. kiang) of Tibet, which is a redder animal. The onager (E. onager), of which there are several races, is smaller, with a broader dorsal stripe, bordered with white; the colour varying from sandy to greyish. This species ranges from Baluchistan and N.W. India to Persia, Syria and Arabia. These asses inhabit desert plains or open table-land; the kiang dwelling at elevations of about 14,000 ft. They are generally found in herds of from twenty to forty, although occasionally in larger numbers. All are fleet, and traverse rough ground with speed. On the lowlands they feed on dry

grasses, and in Tibet on small woody plants. In India and Persia they are difficult to approach, although this is not the case in Tibet. Their sandy or chestnut colouring assimilates them to the horse, and separates them widely from the African wild asses, which are grey. The kiang has also larger and more horse-like hoofs, and the tail is haired higher up, thus approximating to Equus caballus przewalskii.

Among the striped species, or zebras and quaggas of Africa,

the large Grevy's zebra {Equus grevyi) of Somaliland and Abyssinia stands apart from the rest by the number and narrow- ness of its stripes, which have an altogether peculiar arrangement on the hind-quarters, the small size of the callosities on the fore-legs, the mane extending on to the withers and enormous rounded ears, thickly haired internally. The large size of the ears and the narrow stripes are in some degree at any rate adaptations to a life on scrub-clad plains.

Next comes the closely allied species with small pointed ears, of which the true quagga (E. quagga.) of South Africa is now extinct. This animal has the dark stripes limited to the head, neck and shoulders, upon a brown ground. In the typical form, now also extinct, of the bonte-quagga, dauw, or Burchell's zebra (E. burchelli), the ground-colour is white, and the stripes cover the body and upper part of the limbs. This was the commonest species in the great plains of South Africa, where it roamed in large herds, often in company with, the quagga and numerous antelopes. The species ranges from the Orange river to the confines of Abyssinia, but its more northern representatives show a gradual increase in the striping of the legs, culminating in the north-east African E. burchelli grand, in which the stripes extend to the hoofs. The markings, too, are alternately black and white, in place of brown and creamy, with intermediate " shadow stripes," as in the southern races.

Lastly, there is the true or mountain zebra (E. zebra) , typically from the mountain ranges of Cape Colony, where it is now specially protected, but represented by E. zebra penricei in south-west Africa. In its relatively long ears and general build it approaches the African wild asses, from which it chiefly differs by the striping (which is markedly different from that of the quagga-group) and the reversal of the direction of the hairs along the spine.

The African wild ass (E. asinus) is the parent of the domesti- cated breed, and is a long-eared grey animal, with no forelock, and either a shoulder-stripe or dark barrings on the legs. There are two races, of which the Nubian E. a. africanus is the smaller, and has a continuous dorsal stripe and a shoulder-stripe but no bars on the legs. The Somali race (E. a somaliensis) , on the other hand, is a larger and greyer animal, with an

interrupted dorsal and no shoulder-stripe, but distinct leg-barrings.

Hybrids. — There are thus eight modifications of the horse-type at present existing, sufficiently distinct to be reckoned as species by most zoologists, and easily recognizable by their external characters. They are, however, all so closely allied that each will, at least in a state of domestication or captivity, breed with any of the others. Cases of fertile union are recorded between the horse and the quagga, the horse and the bonte-quagga or Burchell's zebra, the horse and the onager and kiang or Asiatic wild asses, the common ass and the zebra, the ass and bonte- quagga, the ass and the onager, the onager and the zebra, and the onager and the bonte-quagga. The two species which are farthest removed in structure, the horse and the ass, produce, as is well known, hybrids or mules, which in certain qualities useful to man excel both their progenitors, and in some countries and for certain kinds of work are in greater requisition than either. Although occasional more or less doubtful instances have been recorded of female mules breeding with the males of one or other of the pure species, it is more than doubtful if any case has occurred of their breeding inter sc, although the opportunities of doing so must have been great, as mules have been reared in immense numbers for at least several thousands of years. We may therefore consider it settled that the different species of- the group are now in that degree of physiological differentiation which enables them to produce offspring with each other, but does not permit of the progeny continuing the race, at all events unless reinforced by the aid of one of the pure forms.

The several members of, the group show mental differences quite as striking as those exhibited by their external form, and more than perhaps might be expected from the similarity of their brains. The patience of the ass, the high spirit of the horse, the obstinacy of the mule, have long been proverbial. It is very remarkable that, out of so many species, two only should have

shown any aptitude for domestication, and that these should have been from time immemorial the universal and most useful companions and servants of man, while all the others remain in their native freedom to this day. It is, however, still a question whether this really arises from a different mental constitution causing a natural capacity for entering into relations with man, or whether it may not be owing to their having been

brought gradually into this condition by long-continued and persevering efforts when the need of their services was felt. It is possible that one reason why most of the attempts to add new species to the list of our domestic animals in modern times have ended in failure is that it does not answer to do so in cases in which existing species supply all the principal purposes to which the new ones might be put. It can hardly be expected that zebras and bonte- quuggas fresh from their native mountains and plains can be brought into competition as beasts of burden and draught with horses and asses, whose useful qualities have been augmented by the training of thousands of generations of progenitors.

Not infrequently instances occur of domestic horses being produced with a small additional toe with complete hoof, usually on the inside of the principal toe, and, though far more rarely, three or more toes may be present. These malformations are often cited as instances of reversion to the condition of some of the earlier forms of equine animals previously mentioned. In some instances, however, the feet of such polydactyle horses bear little resemblance to those of the extinct Hipparion or Anchitherium, but look rather as if due to that tendency to reduplication of parts which occurs so frequently as a monstrous condition, especially among domesticated animals, and which, whatever its origin, certainly cannot in many instances, as the cases of entire limbs superadded, or of six digits in man, be attributed to reversion.

Anatomy

The anatomical structure of the horse has been described in detail in several works mentioned in the bibliography at the end of this section, though these have generally been written from the point of view of the veterinarian rather than of the comparative anatomist. The limits of the present article will only admit of the most salient points being indicated, particularly those in which the horse differs from other Ungulata. Unless otherwise specified, it must be understood that all that is staled here, although mostly derived from observation upon the horse, applies equally well to the other existing members of the group.

Skeleton. — The skull as a whole is greatly elongated, chiefly in consequence of the immense size of the face as compared with the hinder or true cranial portion. The basal line of the cranium from the lower border of the foramen magnum to the incisor border of the palate is nearly straight. The orbit, of nearly circular form, though

small in proportion to the size of the whole skull, is distinctly marked, being completely surrounded by a strong ring of bone with prominent edges. Behind it, and freely communicating with it beneath the osseous bridge (the post-orbital process of the frontal) forming the boundary between them, is the small temporal fossa occupying the whole of the side of the cranium proper, and in front is the great flattened expanse of the " cheek," formed chiefly by the maxilla, giving support to the long row of cheek-teeth, and having a prominent ridge running forward from below the orbit for the attachment of the masseter muscle. The lachrymal occupies a considerable space on the Hat surface of the cheek in front of the orbit, and below it the jugal does the same. The latter sends a horizontal or slightly ascending process backwards below the orbit to join the under surface of the zygomatic process of the squamosal, which is remarkably large, and instead of ending as usual behind the orbit, runs forwards to join the greatly developed post-orbital process of the frontal, and even torms part of the posterior and inferior boundary of the orbit, an arrangement not met with in other mammals. The closure of the orbit behind distinguishes the skull of the horse from that of its allies the rhinoceros and tapir, and also from all of the perissodactyles of the Eocene period. In front of the brain cavity, the great tubular nasal cavities are provided with well-developed turbinal bones, and are roofed over by large nasals, broad behind, and ending in front in a narrow- decutved point. The opening of the anterior nostrils

is prolonged backwards on each side of the face between the nasals

and the elongated slender premaxillae. The latter expand in front,

and are curved downwards to form (he semicircular alveolar border

which supports the large incisor teeth. The palate is narrow in the

interval between the iiicL-or and molar teeth, in which are situated

the large anterior palatine foramina. Between the molar teeth it is broader, and it ends posteriorly in a rounded excavated border opposite the hinder border of the penultimate molar tooth. It is mainly formed by the maxillae, as the palatines are very narrow. The pterygoids are delicate slender slips of bone attached to the hinder border of the palatines, and supported externally by, and generally welded with, the rough pterygoid plates of the alisphenoid, with no pterygoid fossa between. They slope obliquely forwards, and end in curved, compressed, hamular processes. There is a distinct alisphenoid canal for the passage of the internal maxillary artery. The base of the cranium is long and narrow ; the alisphenoid is very obliquely perforated by the foramen rotundum, but the foramen ovale is confluent with the large foramen lacerum medium behind. The glenoid surface for the articulation of the mandible is greatly extended transversely, concave ‘ from side to side, convex from before backwards in front, and hollow behind, and is bounded posteriorly at its inner part by a prominent post-glenoid process. The squamosal enters considerably into the formation of the temporal fossa, and, besides sending the zygomatic process forwards, it sends down behind the meatus auditorius a post-tympanic process which aids to hold in place the otherwise loose tympano-periotic bone. Behind this the exoecipital gives off a long paroccipital process.

s 1f~. Pa*

*EM**

Fig. i. — Side view of Skull of Horse, with the bone removed so as to expose the whole of the teeth. PMx, Premaxilia. c, The canine tooth.

Mx, Maxilla. pm l , The situation of the rudi-

Na, Nasal bone. mentary first premolar,

Ma, Jugal or malar bone. which has been lost in

L, Lacrymal bone. the lower, but is present

Fr, Frontal bone. in the upper jaw.

Sq, Squamosal bone. pm 2 , pm 3 , and pm 4 , The three

Pa, Parietal bone. fully developed prc-

oc, Occipital condyle. molar teeth.

pp, Paroccipital process. m 1 , m 2 , and m 3 , The three true

**', i 2 , andi 3 , The three incisor teeth. molar teeth.*

The periotic and tympanic are welded together, but not with the squamosal. The former has a wide but shallow floccular fossa on its inner side, and sends backwards a considerable " pars mastoidea," which appears on the outer surface of the skull between the post- tympanic process of the squamosal and the exoecipital. The tympanic forms a tubular meatus auditorius externus directed out- wards and slightly backwards. It is not dilated into a distinct bulla, but ends in front in a pointed rod-like process. It completely embraces the truncated cylindrical tympanohyal, which is of great size, corresponding with the large development of the whole anterior arch of the hyoid. This consists mainly of a long and compressed stylohyal, expanded at the upper end, where it sends off a triangular posterior process. The basi-hyal is remarkable for the long, median, pointed, compressed " glossohyal " process, which it sends forward from its anterior border into the base of the tongue. A similar but – less developed process is found in the rhinoceros and tapir. The lower jaw is large, especially the region of the angle, which is ex- panded and flattened, giving, great surface for the attachment of the masseter muscle. The condyle is greatly_ elevated above the alveolar border; its articular surface is very wide transversely, and narrow and convex from before backwards. The coronoid process is slender, straight, and inclined backwards. The horizontal ramus, long, straight, and compressed, gradually narrows towards the sym- physis, where it expands laterally to form with the ankylosed opposite ramus the wide, semicircular, shallow alveolar border for the incisor teeth.

The vertebral column consists of seven cervical, eighteen dorsal, six lumbar, five sacral, and fifteen to eighteen caudal vertebrae

There may be nineteen rib-bearing vertebrae, in which case five only will be

reckoned as belonging to the lumbar series. The odontoid process of the axis is wide, flat, and hollowed above, as in the ruminants. The bodies of the cervical vertebrae are elongated, strongly keeled, and markedly opisthocoelous, or concave behind and convex in front. The neural laminae are broad, the spines almost obsolete, except in the seventh, and the transverse processes not largely developed. In the trunk vertebrae the opisthocoelous character of the centrum gradually diminishes. The spinous pro- cesses of the anterior thoracic region are high and compressed. To these is attached the powerful elastic ligament (ligamentum nuchae, or " paxwax ") which, passing forwards in the middle line of the neck above the neural arches of the cervical vertebrae — to which it is also connected — is attached to the occiput and supports the weight of the head. The transverse processes of the lumbar vertebrae are long, flattened, and project horizontally outwards or slightly forward from the arch. The metapophyses are moderately developed, and there are no anapophyses. The caudal vertebrae, except those quite at the base, are slender and cylindrical, without processes and without chevron bones beneath. The ribs are eighteen or nineteen in number on each side, flattened, and united to the sternum by short, stout, tolerably well ossified sternal ribs. The sternum con- sists of six pieces; the anterior or presternum is compressed and projects forwards like the prow of a boat. The segments which follow gradually widen, and the hinder part of the sternum is broad and flat.

As in all other ungulates, there are no clavicles. The scapula is long and slender, the supra-scapular border being rounded, and slowly and imperfectly ossified. The spine is very slightly developed ; rather above the middle its edge is thickened and somewhat turned backwards, but it gradually subsides at the lower extremity without forming any acromial process. The coracoid is a prominent rounded nodule. The humerus is stout and rather short. The ulna is rudi- mentary, being represented by little more than the olecranon. The shaft gradually tapers below and is firmly welded to the radius. The latter bone is of nearly equal width throughout. The three bones of the first row of the carpus (scaphoid, lunar and cuneiform) are subequal in size. The second row consists of a broad and flat magnum, supporting the great third metacarpal, having to its radial side the trapezoid, and to its ulnar side the unciform, which are both small, and articulate inferiorally with the rudimentary second and fourth metacarpals. The pisiform is large and prominent, flattened and curved; it articulates partly with the cuneiform and partly with the lower end of the radius. The large metacarpal is called in veterinary anatomy "cannon bone"; the small lateral metacarpals, which gradually taper towards their lower extremities, and lie in close contact with the large one, are called " splint bones." The single digit consists of a moderate-sized proximal (os suffraginis, or large pastern), a short middle (os coronae, or small

pastern), and a wide, semi-lunar, ungual phalanx (os pedis, or coffin bone). There is a pair of large nodular sesamoids behind the metacarpophalangeal articulation, and a single large transversely-extended sesamoid behind the joint between the second and third phalanx, called the " navicular bone."

The carpal joint, corresponding to the wrist of man, is commonly called the " knee " of the horse, the joint between the metacarpal and the first phalanx the " fetlock,' that between the first and second phalanges the " pastern," and that between the second and third phalanges the " coffin joint."

In the hinder limb the femur is marked, as in other perissodactyles, by the presence of a " third trochanter," a flattened process, curving forwards and arising from the outer side of the bone, about one-third of the distance from the upper end. The fibula is reduced to a mere rod-like rudiment of the upper end. The lower part is absent or completely fused with the tibia. The calcaneum has a long and compressed calcaneal process. The astragalus has a large flat articular surface in front for the navicular, and a small one for the cuboid. The navicular and the external cuneiform bones are broad and flat. The cuboid is small, and the internal and middle cuneiform bones are small and united together. The metapodals and phalanges resemble very closely those of the fore limb, but the principal metatarsal is more laterally compressed at its upper end than is the corresponding metacarpal. The joint between the femur and tibia, corresponding to the knee of man, is called the " stifle-joint "; that between the tibia and tarsus, corresponding to the ankle of man, the " hock." The bones and joints of the foot have the same names as in the fore limb. The horse is eminently " digitigrade," standing on the extremity of the single digit of each foot, which is kept habitu- ally in a position approaching to vertical.

The muscles of the limbs are modified from those of the ordinary mammalian type in accordance with the reduced condition of the bones and the simple requirements of flexion and extension of the joints, no such actions as pronation and supination, or opposition of digits, being possible or needed. The muscles therefore which per- form these functions in other quadrupeds are absent or rudimentary. Below the carpal and tarsal joints, the fore and hind limbs corre- spond almost exactly in structure as well as function. On the anterior or extensor surface of the limb a powerful tendon (7 in fig. 2), that of the anterior extensor of the phalanges (corresponding to the extensor communis digitorum of the arm and extensor longus digitorum

of the foot of man) passes down over the metacarpal bone and phalanges, to be inserted mainly into the upper edge of the anterior surface of the last

phalanx or pedal bone. There is also a much smaller second extensor on the outer side of this in each limb, the lateral extensor of the phalanges. In the fore-leg the tendon of this muscle (which corresponds with the extensor minimi digiti of man) receives a slip from that of the principal extensor, and is inserted into the first phalanx. In the hind-leg (where it is the homologue apparently of the peroneus brevis of man) the tendon becomes blended with that of the large extensor.

A strong ligamentous band behind the metapodium, arising from near the upper extremity of its posterior surface, divides into two at its lower end, and each division, being first connected with one of the paired upper sesamoid bones, passes by the side of the first phalanx to join the extensor tendon of the phalanges. This is called in veterinary anatomy the " suspensory ligament of the sesamoids," or of the " fetlock " (10 in fig. 2); but its attachments and relations, as well as the occasional presence of muscular fibres in its substance, show that it is the homologue of the interosseous muscles of other mammals, modified in structure and function, to

Fig. 2. — Section of Foot of Horse.

1, Metacarpal bone.

2, First phalanx (os suffraginis).

3, Second phalanx (os coronae).

4, Third or ungual phalanx (os

pedis, or coffin bone).

5, One of the upper sesamoid

bones.

6, Lower sesamoid or navicular

bone.

7, Tendon of anterior extensor

of the phalanges.

8, Tendon of superficial flexor

(fl. perforatus).

9, Tendon of deep flexor (fl.

perforans).

10, Suspensory ligament of fet- lock.

Inferior or short sesamoid ligament.

Derma or skin of the foot, covered with hair, and continued into

The coronary cushion,

The podophyllous or laminar membrane, and

The keratogenous membrane of the sole.

Plantar cushion.

Hoof.

Fatty cushion of fetlock.

11,

12,

13.

H.

15-

16,

17. 18,

suit the requirements of the horse's foot. Behind or superficial to this are placed the two strong tendons of the flexor muscles, the most superficial, or flexor perforatus (8) dividing to allow the other to pass through, and then inserted into the middle phalanx. The flexor perforans (9) is as usual inserted into the terminal phalange. In the fore-leg these muscles correspond with those similarly named in man. In the hind-leg, the perforated tendon is a continuation of that of the plantaris, passing pulley-wise over the tuberosity of the calcaneum. The perforating tendon is derived from the muscle corresponding with the long flexor of man, and the smaller tendon of the oblique flexor (tibialis portions of man) is united with it.

The hoof of the horse corresponds to the nail or claw of other mammals, but is so constructed as to form a complete and solid case to the expanded termination of the toe, giving a firm basis of support formed of a non-sensitive substance, which is continually renewed by the addition of material from within, as its surface wears away by friction. The terminal phalange of the toe is greatly enlarged and modified in form to support this hoof, and the size of the internal framework of the foot is increased by a pair of latereˆ fibro-cartilaginous masses attached on each side to the hinder edges of the bone, and by a fibro-cellular and fatty plantar cushion in the median part. These structures are all enclosed in the middle sub-corneous integument, a continuation of the ordinary skin of the limb, but extremely vascular, and having its superficial extent greatly increased by being developed into papillae or laminae. From this the horny material which constitutes the hoof is exuded. A thickened ring encircling the upper part, called coronary cushion (13) and the sole (15), are covered with numerous thickly-sec

papillae or villi, and take the greatest share in the formation of the hoof; the intermediate part constituting the front and side of the foot (14), corresponding with the wall of the hoof, is covered with parallel, fine longitudinal laminae, which fit into corresponding depressions in the inner side of the horny hoof.

The horny hoof is divided into a wall or crust consisting of the front and sides, the flattened or concave sole, and the frog, a triangular median prominence, notched posteriorly, with the apex turned forwards, situated in the hinder part of the sole. It is formed of pavement epithelial cells, mainly grouped in a concentric manner around the vascular papillae of the subcorneous integument, so that a section near the base of the hoof, cut transversely to the long axis of these pafjillae, shows a number of small circular or oval orifices, with cells arranged concentrically round them. The nearer the surface of the hoof, or farther removed from the seat of growth, the more indistinct the structure becomes.

Small round or oval plates of horny epithelium called ” chestnuts,” callosities growing like the hoof from enlarged papillae of the skin, are found on the inner face of the fore-arm, above the carpal joint in all species

of Equidae, and in the horse (22. caballus) similar structures occur near the upper extremity of the inner face of the metatarsus. They are evidently rudimentary structures which it is suggested may represent glands (Lydekker, Proc. Zool. Soc. London, 1903, vol. i.).

Dentition. — The dentition of the horse, when all the teeth are in place, is expressed by the formula i. f, c. \, p. J, m. §=44. The incisors of each jaw are placed in close contact, forming a semi- circle. The crowns are broad, somewhat awl-shaped, and of nearly equal size. They have all the great peculiarity, not found in the teeth of any other mammal, and only in the Equidae of comparatively recent geological periods (see also Palaeontology), of an involution of the external surface of the tooth (see fig. 3), by which what should

properly be the apex is carried deeply into the interior of the crown, forming a pit, the bottom of which becomes partially filled with cement. As the tooth wears, the surface, besides the external enamel layer as in an ordinary simple tooth, shows in addition a second inner ring of the same hard substance sur- rounding the pit, which adds greatly to the efficiency of the tooth as an organ for biting tough, fibrous substances. This pit, generally filled in the living animal with particles of food, is .,.,,_ _ conspicuous from its

Fig. 3 — Longitudinal and transverse Section dark colour, and con- of Upper Incisor of Horse. stitutes the " mark "

p, Pulp cavity. by which the age of

d, Dentine or ivory. the horse is judged,

e, Enamel. as j n consequence of c, Outer layer of cementum or crusta petrosa. jt s on ly extending to c', Inner layer of cementum, lining a, the pit a certain depth in

or cavity of the crown of the tooth. t h e crown it becomes obliterated as the latter wears away, and then the tooth assumes the character of that of an ordinary incisor, consisting only of a core of dentine, surrounded by the external enamel layer. It is not quite so deep in the lower as in the upper teeth. The canines are either rudimentary or absent in the female. In the male they are compressed, pointed, and smaller than the incisors, from which they are separated by a slight interval. The teeth of the cheek series are all in contact with each other, but separated from the canines by a considerable toothless space. The anterior premolars are quite rudimentary, sometimes not developed at all, and generally fall by the time the animal attains maturity, so that there are but six functional cheek teeth, — three

that have predecessors in the milk-dentition, and hence are considered as premolars, and three molars, but otherwise, except the first and last of the series, not distinguishable in form or structure. These teeth in both upper and lower jaws are extremely long-crowned or hypso- dont, successive portions being pushed out as the surface wears away, a process which continues until the animal becomes advanced in age. The enamelled surface is infolded in a complex manner (a modification of that found in other perissodactyles), the folds ex- tending quite to the base of the crown, and the interstices being filled and the surface covered with a considerable mass of cement, which binds together and strengthens the whole tooth. As the teeth wear, the folded enamel, being harder than the other constituents, the dentine and cement, forms projecting ridges on the surface

arranged in a definite pattern, which give it great efficiency as a grinding instrument (see fig. 2, in article Equidae). The free surfaces of the upper teeth are quadrate, except the first and last, which are nearly triangular. The lower teeth are much narrower than the upper.

The milk-dentition consists of i. |, c. £, m. 1 = 24, — the canines and first or rudimentary premolars having apparently no prede- cessors. In form and structure the milk-teeth much resemble the permanent ones, having the same characteristic enamel-foldings. Their eruption commences a few days after birth, and is complete before the end of the first year, the upper teeth usually appearing somewhat earlier than the lower. The first teeth which appear are the first and second milk-molars (about five days), then the central incisor (from seven to ten days) ; this is followed by the second incisor (at one month), then the third molar, and finally the third incisor. Of the permanent teeth the first molar appears a little after the end of the first year, followed by the second molar before the end of the second year. At about two and a half years the first premolar replaces its predecessor. Between two and a half and three years the first incisor appears. At three years the second and third premolars, and the third molar have appeared, at from three and a half to four years the second incisor, at four to four and a half years the canine, and, finally, at five years, the third incisor, completing the permanent dentition. Up to this period the age of the horse is clearly shown by the condition of dentition, and for some time longer indications can be obtained from the wear of the incisors, though this depends to a certain extent upon the hardness of the food or other circumstances. As a general rule, the depression caused by the infolding of the surface of the incisor (the " mark ") is obliterated in the first or central incisor at six years, in the second at seven years, and in the third at eight years. In the upper teeth, as the depressions are deeper, this obliteration does not take place until about two years later. After this period no certain indications can be obtained of the age of the horse from the teeth.

Digtstive Organs. — The lips are flexible and prehensile; and the membrane that lines them and the cheeks smooth. The palate is long and narrow; its mucous surface has seventeen pairs of not very sharply defined oblique ridges, extending as far back as the last molar tooth, beyond which the velum palati extends for about 3 in., having a soft corrugated surface, and ending posteriorly in an arched border without a uvula. This embraces the base of the epiglottis, and, except while swallowing food, shuts off all communication between the cavity of the mouth and the pharynx, respiration being, under ordinary circumstances, exclusively through the nostrils. Between the mucous membrane and the bone of the hard palate is a dense vascular and nervous plexus. The membrane lining the jaws is soft and corrugated. An elongated raised glandular mass, 3 in. long and I in. from above downwards, extending backwards from the root of the tongue along the side of the jaws, with openings on the surface leading into crypts with glandular walls, represents the tonsil. The tongue, corresponding to the form of the mouth, is long and narrow. It consists of a compressed intermolar portion with a flat upper surface, broad behind and becoming narrower in front, and of a depressed anterior part rather shorter than the former, which is narrow behind and widens towards the evenly rounded apex. The dorsal surface generally is soft and smooth. There are two large circumvallate papillae near the base, rather irregular in form, about a quarter of an inch in diameter and half an inch apart. The conical papillae are small and close set, though longer and more filamentous on the intermolar portion. There are no fungiform papillae on the dorsum, but a few inconspicuous ones scattered along the sides of the organ.

Of the salivary glands the parotid is by far the largest, elongated in the vertical direction, and narrower in the middle than at either end. Its upper extremity embraces the lower surface of the cartila- ginous ear-conch; its lower end reaches the level of the inferior margin of the mandible, along the posterior margin of which it is placed. Its duct leaves the inferior anterior angle, at first descends a little, and runs forward under cover of the rounded inferior border of the lower jaw, then curves up along the anterior margin of the masseter muscle, becoming superficial, pierces the buccinator, and enters the mouth by a simple aperture opposite the middle of the crown of the third premolar tooth. It is not quite so thick as a goose-quill when distended, and nearly a foot in length.

The submaxillary gland is of very similar texture to the last, but much smaller; it is placed deeper, and lies with its main axis" horizontal. It is elongated and slender, and flattened from within outwards. Its posterior end rests against the anterior surface of the transverse process of the atlas, from which it extends forwards and downwards, slightly curved, to beneath the ramus of the jaw. The duct which runs along its upper and internal border passes forwards in the usual course, lying in the inner side of the

sublingual gland, to open on the outer surface of a distinct papilla, situated on the floor of the mouth, half an inch from the middle line, and midway between the lower incisor teeth and the attachment of the fraenum linguae. The sublingual is represented by a mass of glands lying just beneath the mucous membrane of the floor of the mouth on the side of the tongue, causing a distinct ridge, extending from the fraenum backwards, the numerous ducts opening separately along the summit of the ridge. The buccal glands are arranged in two

rows parallel with the molar teeth. The upper ones are the largest, and are continuous anteriorly with the labial glands, the ducts of which open on the raucous membrane of the upper lip.

The stomach of the horse is simple in its external form, with a largely developed right cul de sac, and is a good deal curved on itself, so that the cardiac and pyloric orifices are brought near together. The antrum fyloricum is small and not very distinctly marked. The interior is divided by the character 01 the lining membrane into two distinct portions, right and left. Over the latter the dense white smooth epithelial lining of the oesophagus is continued, terminating abruptly by a raised crenulated border. Over the right part the mucous membrane has a greyish-red colour and a velvety appearance, and contains numerous peptic glands, which are wanting in the cardiac portion. The oesophageal orifice is small, and guarded by a strong crescentic or horseshoe-like band of muscular fibres, supposed to be the cause of the difficulty of vomiting in the horse. The small intestine is of great length (80 to 90 ft.), its mucous membrane being covered with numerous fine villi. The caecum is of conical form, about 2 ft. long and nearly a foot in diameter; its walls are sacculated, especially near the base, having four longitudinal muscular bands; and its capacity is about twice that of the stomach. It lies with its base near the lower part of the abdomen, and its apex directed towards the thorax. The colon is about one-third the length of the small intestine, and very capacious in the greater part of its course. As usual it may be divided into an ascending, transverse, and descending portion; but the middle or transverse portion is folded into a great loop, which descends as low as the pubis; so that the colon forms altogether four folds, generally parallel to the long axis of the body. The descending colon is much narrower than the rest, and not sacculated, and, being considerably longer than the distance it has to traverse, is thrown into numerous folds.

The liver is tolerably symmetrical in general arrangement, being divided nearly equally into segments by a well-marked umbilical fissure. Each segment is again divided by lateral fissures, which do not extend quite to the posterior border of the organ; of the central lobes thus cut off, the right is rather the larger, and has twq fissures in its free border dividing it into lobules. The extent of these varies, however, in different individuals. The two lateral lobes are subtriangular in form. The Spigelian lobe is represented by a flat surface between the postal fissure and the posterior border, not distinctly marked off from the left lateral by a fissure of the ductus venosus, as this vessel is buried deep in the hepatic substance, but the caudate lobe is distinct and tongue-shaped, its free apex reaching nearly to the border of the right lateral lobe. There is no gall- bladder, and the biliary duct enters the duodenum about 6 in. from the pylorus. The pancreas has two lobes or branches, a long one passing to the left and reaching the spleen, and a shorter right lobe. The principal duct enters the duodenum with the bile- duct, and there is often a second small duct opening separately.

Circulatory and Respiratory Organs.— The heart has the form of a rather elongated and pointed cone. There is one anterior vena cava, formed by the union of the two jugular and two axillary veins. The aorta gives off a large branch (the anterior aorta) very near its origin, from which arise — first, the left axillary, and afterwards the right axillary and the two carotid arteries.

Under ordinary circumstances the horse breathes entirely by the nasal passages, the communication between the larynx and the mouth being closed by the velum palati. The nostrils are placed laterally, near the termination of the muzzle, and are large and dilatable, being bordered by cartilages upon which several muscles act. Immediately within the opening of the nostril, the respiratory canal sends off on its upper and outer side a blind pouch (" false nostril ") of conical form, and curved, 2 to 3 in. in depth, lying in the notch formed between the nasal and premaxillary bones. It is lined by mucous membrane continuous with that of the nasal passage ; its use is not apparent. It is longer in the ass than in the horse. Here may be mentioned the guttural pouches, large air- sacs from the Eustachian tubes, and lying behind the upper part of the pharynx, the function of which is also not understood. The larynx has the lateral sacculi well developed, though entirely con- cealed within the alae of the thyroid cartilage. The trachea divides into two bronchi.

Nervous System. — The brain differs little, except in details of arrangement of convolutions, frem that of other ungulates. The hemispheres are rather elongated and subcylindrical, the olfactory !obes are large and project freely in front of the hemispheres, and the greater part of the cerebellum is

uncovered. The eye is provided with a nictitating membrane or third eyelid, at the base of which open the ducts of the Harderian gland.

Reproductive System. — The testes are situated in a distinct sessile or slightly pedunculated scrotum, into which they descend from the sixth to the tenth month after birth. The accessory generative glands are the two vesiculae seminales, with the median third vesicle, or uterus masculinus, lying between them, the single bilobed prostate, and a pair of globular Cowper's glands. The penis is very large, cylindrical, with a truncated, expanded, flattened termination. When in a state of repose it is retracted, by a muscle arising from the sacrum, within the prepuce, a cutaneous fold attached below the symphysis pubis.

The uterus is bicornuate. The vagina is often partially divided by a membraneous septum or hymen. The teats are two, inguinally placed. The surface of the chorion is covered evenly with minute villi, constituting a diffuse non-deciduate placenta. The period of gestation is eleven months.

Authorities. — R. I. Pocock, " The Species and Subspecies of Zebras," Ann. M%g. Nat. Hist. ser. 6, vol. xx., 1897, and "A New Arrangement of the Existing Species of Equidae," Op. cit. ser. 7, vol. x., 1902; R. Lydekker, "Notes on the specimens of Wild Asses in English Collections," Novitates Zoologicae, vol. xi., 1904; B. Salensky, "On Equus przewalskii," Mem. Acad. St Petersburg, 1902; M. S. Arloing, "Organisation du pied chez le cheval," Ann. Sci. Nat., 1867, viii. 55-81; H. Burmeister, Los caballos fosiles de la Pampa Argentina (Buenos Aires, 1875) '< Chauveau and Arloing, Traiti d'anatomie comparee des animaux domestiques (Paris, 1871), and English edition by G. Fleming (1873); A. Ecker, " Das Europaische Wildpferd und dessen Beziehungen zum domesticirten Pferd," Globus, Bd. xxxiv. (Brunswick, 1878); Major Forsyth, " Beitrage zur Geschichte der fossilen Pferde besonders Italiens," Abh. Schiv. Pal. Ges. iv. 1-16, pt. iv. ; George, "Etudes zool. sur les Hemiones et quelques autres espˆceschevalines," Ann. Sci. Nat., 1869, xii. 5; E. F. Gurlt, Anatomische Abbildungen der Haussdu- gethiere (1824), and Hand, der vergleick. Anat. der Haussdugethiere (2 vols., 1822); Huet, " Croisement des diverses especes du genre cheval," Nouv. Archives du Museum, and ser., torn. ii. p. 46, 1879; Leisering, Atlas der Anatomie des Pferdes (Leipzig, 1861); O. C. Marsh, " Notice of New Equine Mammals from the Tertiary Forma- tion," Am. Journ. of Science and Arts, vol. vii., March 1874; Id., " Fossil Horses in America," Amer. Naturalist, vol. viii., May 1874; Id., " Polydactyle Horses," Am. Journ. Sci. and Arts, vol. xvii., June 1879; Franz Muller, Lehrbuck der Anatomie des Pferdes (Vienna, 1853); R. Owen, " Equine Remains in Cavern of Bruni- quel," Phil. Trans, vol. clix., 1870, p. 535; W. Percivall, The Anatomy of the Horse (1832); G. Stubbs, Anatomy of the Horse (1766); W. H. Flower, The Horse (London, 1891); Ridgeway,

Origin of the Thoroughbred Horse (1905). (W. H. F; R. L.)*

History From the evidence of philology it appears that the horse was already known to the Aryans before the period of their dispersion. 1 The first mention of the British horse occurs in the well-known passages in Caesar (B.G. iv. 24. 33, v. 15. 16; cf. Pomp. Mela iii. 6), in which he mentions the native " essedarii " and the skill with which they handled their war chariots. We are left quite in the dark as to the character of the animal thus employed; but there would appear to be much probability in the surmise of W. Youatt, who conjectures the horse to have been, " then as ever, the creature of the country in which he lived. With short 1 Compare Sans, acva, Zendish and Old Persian acpa, Lithuanian aszva (mare), Prussian asvinan (mare's milk), O.H. Ger. ehu, A.S. eoh, I eel. tor, Gothic aihos, aihous (?), Old Irish ech, Old Cambrian and Gaelic ep (as in Epona, the horse goddess), Lat. equus, Gr. tiriros or ikkos. The word seems, however, to have disappeared from the Slavonic languages. The root is probably ak, with the idea of sharpness or swiftness (fopos, ojkvs, acus, ocior). See Pott, Etym. Forsch. ii. 256, and Hehn, Kultur- pflanzen u. Hauslhiere in ihrem Uebergang aus Asien nach Griechenland u. Italien sowie in das iibrige Europa (3rd ed., 1877), p. 38. The last-named author, who points out the absence of the horse from- the Egyptian monuments prior to the beginning of the 18th century B.C., and the fact that the earliest references to this animal in Hebrew literature (Judges v. 22, 28; cf. Josh, xi. 4) do not carry us any farther back, is of opinion that the Semitic peoples as a whole were indebted for the horse to the lands of Iran. He also shows that literature affords no trace of the horse as indigenous to Arabia prior to about the beginning of the 5th century A.D., although references abound in the pre-Islamitic poetry. Horses were not numerous even in Mahomet's time (Sprenger, Leb. Moh. iii. 139, 140). Compare Ignazio Guidi's paper " Delia sede primitiva dei popoli Semitici ' in the Transactions of the Accademia dei Lincei (1878-1879). Professor W. Ridgeway, in his Origin and Influence of the Thoroughbred Horse (1905), reinvestigated the historical mystery as to the Arab breed, and its connexion with the English thoroughbred stock, but his conclusions have been hotly controverted; archaeology and biology are in fact still in the dSrk on the subject, but see the section on " Species " above. According to Ridgeway, the original source of the finest equine blood is Africa, still the home of the largest variety of wild Equidae; he concludes that thence it passed into Europe at an early time, to be blended with that of the indigenous Celtic species, and thence into western Asia into the veins of an indigenous Mongolian species, still represented by " Przewalski's horse"; not till a comparatively late period did it reach Arabia, though the " Arab " now represents the purest form of the Libyan blood., , The controversy depends upon the considera- tion of a wealth of detail, which should be

studied in Ridgeway's book; but zoological authorities are sceptical as to the suggested species, Equus caballus libycus.

fare, and exposed to the rigour of the seasons, he was probably the little hardy thing we yet see him; but in the marshes of the Nen and the Witham, and on the borders of the Tees and the Clyde, there would be as much proportionate development of frame and strength as we find at the present day." After the occupation of the country by the Romans, it appears that the horses of their cavalry were crossed with the native mares, and thus there was infused into the breed new blood, consisting probably of strains from every quarter from which Roman remounts were procured. As to the effect of this cross we are not, however, in a position to judge. We are also quite uncertain as to the extent to which the Jutes and Saxons may in their turn have again introduced a new breed of horses into England; and even to the close of the Anglo-Saxon period of English history allusions to the horse are still very infrequent. The horsthegn we know, however, was from an early period a high court official; and from such a law as that of Athelstan pro- hibiting the exportation of horses except as presents, it may be inferred that the English breed was not only much valued at home but also in great request abroad. 1

The period of the Norman Conquest marks an important stage in the history of the British horse. William the Conqueror's own horse was of the Spanish breed, and others of the same kind were introduced by the barons on their estates. But the Norman horses included many varieties, and there is no doubt that to the Conquest the inhabitants of Britain were indebted for a decided improvement in the native horse, as well as for the introduction of several varieties previously unknown. According to Giraldus Cambrensis, Roger de Bellesme, a follower of William I., after- wards created earl of Shrewsbury, imported some stallions from Spain into England; their produce was celebrated by Drayton the poet. It is curious to notice that agriculture seems to be the last use to which the horse has been put. The earliest suggestion that horses were used in agriculture is derived from a piece of the Bayeux tapestry, where a horse is represented as drawing a harrow. This, however, must have been an exceptional case, for we know that oxen were used until a comparatively late time, and that in Wales a law existed forbidding horses to be used for ploughing.

In 1121 two Eastern horses are said to have been imported, — one of them

remaining in England, and the other being sent as a present by King Alexander I. to the church of St Andrews, in Scotland. It has been alleged that these horses were Barbs from Morocco, but a still more likely theory is that they existed only in name, and never reached either England or Scotland. The crusades were probably the means of introducing fresh strains of blood into England, and of giving opportunity for fresh crossings. The Spanish jennet was brought over about 1 182. King John gave great encouragement to horse-breeding: one of his earliest efforts was to import a hundred Flemish stallions, and, having thus paved the way for improving the breed of agricultural horses, he set about acquiring a valuable stud for his own use.

Edward III. was likewise an admirer of the horse; he procured fifty Spanish horses, probably jennets. At this time there was evidently a tendency to breed a somewhat lighter and speedier horse; but, while the introduction of a more active animal would soon have led to the displacement of the ponderous but powerful cavalry horse then in use, the substituted variety would have been unable to carry the weight of armour with which horse and rider were alike protected; and so in the end the old breed was kept up for a time. With the object of pre- serving to England whatever advantages might accrue from her care and skill in breeding an improved stamp of horses, Edward III. forbade their exportation; they consequently improved so rapidly in value that Richard II. compelled dealers to limit their prices to a fixed maximum. In the ninth year of his reign, Edward received from the king of Navarre a present

1 Some fragments of legislation relating to the horse about this period may be gleaned from Ancient Laws and Institutes of England (fol., London, l840\ and Ancient Laws and Institutes of Wales (foL, London, 1841).

of two running horses, supposed to have been valuable. The wars of 1346 checked the improvement of horses, and undid much of what had been previously accomplished, for we read that the cavalry taken into France by Edward III. were but in- differently mounted, and that in consequence he had to purchase large numbers of foreign horses from Hainault and elsewhere for remounts. The reign of Richard III. does not seem to have been remarkable for the furtherance of horse-breeding; but it was then that post-horses and stages were introduced.

Our information on the whole subject is but scanty down to the reign of Henry VII. , who continued the enactment against the exportation of stallions, but relaxed it in the case of mares above two years old. His object was to retain the best horses in the country, and to keep the price of them down by limiting the demand and encouraging the supply. In his reign gelding is believed to have had its origin, on account of numerous herds of

horses belonging to different proprietors grazing together, especially in time of harvest. Henry VIII. was particularly careful that horse-breeding should be conducted on right prin ciples, and his enactments, if somewhat arbitrary, were singularly to the point. In the thirty-second year of this reign, the " Dill for the breed of horses " was passed, the preamble of whicn runs thus: — " Forasmuch as the generation and breed of good and strong horses within this realm extendeth not onlv to a great help and defence of the same, but also is a great commodity and profit to the inhabitants thereof, which is now much decayed and diminished, by reason that, in forests, chases, moors and waste grounds within this realm, little storied horses and nags of small stature and of little value be not only suffered to pasture thereupon, but also to cover mares feeding there, whereof cometh in manner no profit or commodity." Section 2 of the act provides that no entire horse being above the age of two years, and not being of the bright of 15 " handfulls," shall be put to graze on any common or waste land in certain counties; any one was to be at liberty to seize a horse of unlawful height, and those whosˆ duty it was to measure horses, but who refused to do so, were to be fined 40s. By section 6 all forests, chases, commons, &c, were to be " driven " within fifteen days of Michaelmas day, and all horses, mares and colts not giving promise of growing into serviceable animals, or of producing them, were to be killed. The aim of the act was to prevent breeding from animals not calculated to produce the class of horse suited to the needs of the country. By another act (27 Henry VIII. chapter 6), after stating that the " breed of good strong horses " was likely to diminish, it was ordered that the owners of all parks and enclosed, grounds of the extent of one mile should keep two mares 13 hands high for breeding purposes, or, if the extent of the ground was 4 m., four mares. The statute was not to extend to the counties of Westmorland, Cumberland, Northumberland or the bishopric of Durham. Henry took great pains to improve the royal stud: according to Sir Thomas Chaloner — a writer in the reign of Elizabeth — he imported horses from Turkey, Naples and Spain.

Queen Elizabeth is reputed to have been an accomplished horsewoman, and to have indulged in riding late in life. In the first year of her reign she revived an act passed by Henry VIII. making it felony " to sell, exchange or deliver within Scotland, or to the use of any Scottishman, any horse " ; this, however, was very naturally repealed by James I. Carriages were soon after introduced, and the use of them Speedily became so fashion- able that a bill was brought in " to restrain the excessive and superfluous use of coaches." Prior to the introduction of carriages horseback was the means of locomotion, and Queen Elizabeth rode in state to St Paul's on a pillion; but even after carriages were used, horseback was held to be more dignified, for James I. and his judges rode on horseback to Westminster Hall. One

advantage of the introduction of carriages was that it created a demand for a lighter and quicker sort of horse, instead of the ponderous animal which, despite all attempts to banish him, was still the horse of England — the age of chivalry having been the first epoch of the British horse.

Gunpowder, too, was invented; and now that the weight

of the cavalry soidier was dimink jd by the substitution of lighter armour, a quicker and better bred horse was thought desirable for military service. The introduction of carriages and the invention of gunpowder thus opened out a new industry in breeding; and a decided change was gradually creeping on by the time that James I. came to the throne (1603), which commences the second epoch. James was a thorough sportsman, and his taste for racing, in which he freely indulged, caused him to think but little of the speed of even the best English horses. With the laudable motive, therefore, of effecting improve- ment in horses, he gave the then large sum of 500 guineas for an Arab stallion which had been procured from Constantinople by a Mr Markham, since known as the " Markham Arabian." This is the first authentic account we have of the importation of Arab blood, and the Stud-Book says he was the first of that breed ever seen in England. The people having to do with horses at that time were as conservative in their notions as most of the grooms are now, and the " Markham Arabian " was not at all approved of. The duke of Newcastle, in his treatise on horsemanship, said that he had seen the above Arabian, and described him as a small bay horse and not of very excellent shape. In this instance, however, prejudice (and it is difficult to believe that it was anything else) was right, for King James's first venture does not appear to have been a success either as a race-horse or as a sire, and thus Arabian blood was brought into disrepute. The king, however, resolved to give Eastern blood another trial, and bought a horse known as Place's White Turk from a Mr Place, who subsequently held some office in connexion with the stable under Cromwell. Charles I. followed in thefootstepsof James, and lent such patronage to the breeding of a better kind of horse that a memorial was presented to him, asking that some measures might be taken to prevent the old stamp of horse " fit for the defence of the country" from dying out.

We now come to a very important period in the history of the British horse, for Charles II. warmly espoused the introduc- tion of Eastern blood into

England. He sent his master of the horse abroad to purchase a number of foreign horses and mares for breeding, and the mares brought over by him (as also many of their produce) were called "royal mares"; they form a conspicuous feature in the annals of breeding. The Stud-Book shows of what breed the royal mares really were: one of them, the dam of Dodsworth (who, though foaled in England, was a natural Barb), was a Barb mare; she was sold by the stud-master, after Charles II. 's death, for forty guineas, at twenty years old, when in foal by the Helmsley Turk.

James II. was a good horseman, and had circumstances been more propitious he might have left his mark in the sporting annals of the country. In his reign, according to the Stud-Book, the Stradling or Lister Turk was brought into England by the duke of Berwick from the siege of Buda.

The reign of William III. is noteworthy as the era in which, among other importations, there appeared the first of three Eastern horses to which the modern thoroughbred race-horse traces back as the founders of his lineage. This was the Byerly Turk, of whom nothing more is known than that — to use the words of the first volume of the Stud-Book — he was Captain Byerly's charger in Ireland in King William's wars. The second of the three horses above alluded to was the Darley Arabian, who was a genuine Arab, and was imported from Aleppo by a brother of Mr Darley of Aldby Park, Yorkshire, about the end of the reign of William III. or the beginning of that of Anne. The third horse of the famous trio, the Godolphin Arabian or Barb, brought to England about five-and-twenty years after the Darley Arabian, will be more particularly referred to further on. All the horses now on the turf or at the stud trace their ancestry in the direct male line to one or other of these three — the Byerly Turk, the Darley Arabian, and the Godolphin Arabian or Barb. In the female line their pedigrees can be traced to other sources, but for all practical purposes it suffices to regard one or other of these three animals as the ultima Thule of racing pedigree. Of course there is a large interfusion of the blood of

each of the trio through the dams of horses of the present day; indeed, it is impossible to find an English race-horse which does not combine the blood of all three.

The Race-horse.— The third and last epoch of the British horse, viz. that of the thoroughbred racer, may be taken to date from the beginning of the 18th century. By thoroughbred is meant a horse or mare whose pedigree is registered in the Stud Book kept by Messrs Weatherby, the official agents of the Jockey Club — originally termed the keepers of the match-book — as well as publishers of the Racing Calendar. The first attempt to evolve order out of the chaos which had long reigned supreme was made in 1791, for we find in the preface of the first volume of the Stud-Book, published in

1808, that " with a view to correct the then increasing evil of false and inaccurate pedigrees, the author was in the year 1791 prevailed upon to publish an Intro- duction to a General Stud-Book, consisting of a small collection of pedigrees which he had extracted from racing calendars and sale papers and arranged on a new plan." It will be seen that the compiler of the volume on which so much depends had to go back fully a century, with little else to guide him but odds and ends in the way of publications and tradition. Mistakes under such circumstances are pardonable. The Stud-Book then (vol. i.), which is the oldest authority we have, contains the names and in most cases the pedigrees, obscure though they may be, of a very large number of horses and mares of note from the earliest accounts, but with two exceptions no dates prior to the 18th century ˆare specified in it. These exceptions are the Byerly Turk, who was "Captain Byerly's charger in Ireland in King William's wars (1689, &c.),"and ahorse called Counsellor, bred by Mr Egerton in 1694, by Lord D'Arcy's Counsellor by Lord Lonsdale's Counsellor by the Shaftesbury Turk out of sister to Spanker — all the dams in Counsellor's pedigree tracing back to Eastern mares. There is not the least doubt that many of the animals named in the Stud-Book were foaled much earlier than the above dates, but we have no particulars as to time; and after all it is not of much consequence.

The Stud-Book goes on to say of the Byerly Turk that he did not cover many bred mares, but was the sire of the duke of Devonshire's Basto, Halloway's Jigg, and others. Jigg, or Jig, is a very important factor, as will be seen hereafter. The Stud- Book, although silent as to the date of his birth, says he was a common country stallion in Lincolnshire until Partner was six years old — arid we know from the same authority that Partner was foaled in 17 18; we may therefore conclude that Jigg was a later foal than Basto, who, according to Whyte's History of the Turf, was a brown horse foaled in 1703.

The reign of Queen Anne, however (1702-1714), is that which will ever be inseparably connected with the thoroughbred race-horse on account of the fame during that period of the Darley Arabian, a bay stallion, from whom our very best horses are descended. According to the Stud-Book, " Darley 's Arabian was brought over by a brother of Mr Darley of Yorkshire, who, being an agent in merchandise abroad, became member of a hunting club, by which means he acquired interest to procure this horse." The Stud-Book is silent, and other authorities differ, as to the date of the importation of this celebrated Arab, some saying he came over in the year 1700, others that he arrived somewhat later; but we know from the Stud-Book that Manica (foaled in 1707), Aleppo (1711), Almanzor (1713), and Flying Childers (1715) were got by him, as also was Bartlett's Childers, a younger brother of Flying Childers. It is generally believed that he was imported in Anne's reign, but the exact date is immaterial, for, assuming that he was

brought over as early as 1700 from Aleppo, he could scarcely have had a foal living before 1701, the first year of the 18th century. The Darley Arabian did much to remove the prejudice against Eastern blood which had been instilled into the public mind by the duke of Newcastle's denunciation of the Markham Arabian. Prince George of Denmark, consort of Queen Anne, was himself a large horse-owner; and it was in a great measure owing to his intervention that so many valuable stallions were imported during her reign.

J20

HORSE

At this period we find, among a mass of horses and mares in the Stud-Book without any dates against their names, many animals of note with the earliest chronology extant, from Grey Ramsden (1704) and Bay Bolton (1705) down to a mare who exercised a most important influence on the English blood-horse. This was Roxana (17 18) by the Bald Galloway, her dam sister to Chanter by the Akaster Turk, from a daughter of Leedes's Arabian and a mare by Spanker. Roxana threw in 1732 the bay colt Lath by the Godolphin Arabian, the sorrel colt Round- head by Childers in 1733, and the bay colt Cade by the Godolphin Arabian in 1734, in which year she died within a fortnight after foaling, the produce— Cade— being reared on cow's milk. The Godolphin Barb or Arabian, as he was commonly called, was a brown bay about 15 hands in stature, with an unnaturally high crest, and with some white on his off hind heel. He is said to have been imported into England from France by Mr Coke, where, as the editor of the Slud-Book was informed by a French gentlemen, he was so little thought of that he had actually drawn a cart in the streets of Paris. Mr Coke gave him to a Mr. Williams, who in his turn presented him to the earl of Godolphin. Although called an Arabian, there is little doubt he was a Barb pure and simple. In 1 73 1 , being then the property of Mr. Coke, he was teazer to Hobgoblin, and on the latter refusing his services to Roxana, the mare was put to the Godolphin, and the produce was Lath (1732), the first of his get, and the most celebrated race-horse of his day after Flying Childers. He was also the sire of Cade, own brother to Lath, and of Regulus the maternal giandsire of Eclipse. He died at Gogmagog in Cambridgeshire, in the possession of Lord Godolphin, in 1753, being then, as is supposed, in his twenty- ninth year. He is believed to have been foaled in Barbary about 1724, and to have been imported during the reign of George II.

In regard to the mares generally, we have a record of the royal mares already alluded to, and likewise of three Turk mares brought over from the siege of Vienna in 1684, as well as of other importations; but it is

unquestionable that there was a very large number of native mares in England, improved probably from time to time by racing, however much they may have been crossed at various periods with foreign horses, and that from this original stock were to some extent derived the size and stride which characterized the English race-horse, while his powers of endurance and elegant shape were no doubt inherited from the Eastern horses, most of which were of a low stature, 14 hands or thereabouts. It is only necessary to trace carefully back the pedigree of most of the famous horses of early times to discover faults on the side of the dam— that is to say, the expression " dam's pedigree unknown," which evidently means of original or native blood. Whatever therefore may be owing to Eastern blood, of which from the middle of the 17th to the beginning of the 18th century a complete wave swept over the British Isles, some credit is unquestionably due to the native mares (which Blaine says were mostly Cleveland bays) upon which the Arabian, Barb, or Turk blood was grafted, and which laid the foundation of the modern thoroughbred. Other nations may have furnished the blood, but England has made the race-horse.

Without prosecuting this subject further, it may be enough here to follow out the lines of the Darley Arabian, the Byerly Turk, and the Godolphin Arabian or Barb, the main ancestors of the British thoroughbred of the 18th and 19th centuries, through several famous race-horses, each and all brilliant winners,— Flying Childers, Eclipse, Herod and Matchem — to whom it is considered sufficient to look as the great progenitors of the race-horse of to-day.

1. The Darley Arabian's line is represented in a twofold degree- first, through his son Flying Childers, his grandsons Blaze and Snip, and his great-grandson Snap, and, secondly, through his other son Bartlett's Childere and his great-great-grandson Eclipse. Flying or Devonshire Childers, so called to distinguish him from other horses of the same name, was a bay horse of entirely Eastern blood, with a blaze in his face and four white feet, foaled in 1715. He was bred by Mr Leonard Childers of Carr House near Doncaster,

[HISTORY

and was purchased when young by the duke of Devonshire He was got by the Darley Arabian from Betty Leedes, by Careless from sister to Leedes, by Leedes's Arabian from a mare by Spanker out of a Barb mare, who was Spanker's own mother. Spanker himself Wa ?%Pn r , c ys Yellow Turk from a daughter of the Morocco Barb and Old Bald Peg, by an Arab horse from a Barb mare. Careless was by Spanker from a Barb mare, so that Childers's dam was closely in-bred to Spanker. Flying Childers— the wonder of his time- was never beaten, and died in the duke of Devonshire's

stud in 1741, aged twenty-six years. He was the sire of, among other

M Se , S 'c. e / I733) and Sni P (x 73°). Snip too had a celebrated son called Snap (1750), and it is chiefly in the female line through the mares by these horses, of which there are fully thirty in the Stud- Hook, that the blood of Flying Childers is handed down to us

The other representative line of the Darley Arabian is through Harriett s Childers, also bred by Mr Leonard Childers, and sold to

11 1 f a .ˆ lett of Masham, in Yorkshire. He was for several years called Young Childers,— it being generally supposed that he was a younger brother of his Flying namesake, but his date of birth is not on record,— and subsequently Bartlett's Childers. This horse, who was never trained, was the sire of Squirt (1732), whose son Marske (1750) begat Eclipse and Young Marske (1762), sire of Shuttle (1793) This at least is the generally accepted theory, although Eclipse's dam is said to have been covered by Shakespeare as well as by Marske. Shakespeare was the son of Hobgoblin by Aleppo and consequently the male line of the Darley Arabian would come through these horses instead of through Bartlett's Childers, Squirt and Marske ; the Slud-Book, however, says that Marske was the sire of Eclipse. This last-named celebrated horse— perhaps the most celebrated in the annals of the turf— was foaled on the 1st of April 1764 the day on which a remarkable eclipse of the sun occurred and he was named after it. He was bred by the duke of Cumberland after whose decease he was purchased by a Mr Wildman, and subse- quently sold to Mr D. O'Kelly, with whom he will ever be identified His dam Spiletta was by Regulus, son of the Godolphin Barb, from Mother Western, by a son of Snake from a mare by Old Montague out of a mare by Hautboy, from a daughter of Brimmer and a mare whose pedigree was unknown. In Eclipse's pedigree there are up- wards of a dozen mares whose pedigrees are not known, but who are supposed to be of native blood. Eclipse was a chestnut horse with a white blaze down his face; his off hind leg was white from the hock downwards, and he had black spots upon his rump— this peculiarity coming down to the present day in direct male descent. His racing career commenced at five years of age, viz. on the 3rd May 1769, at Epsom, and terminated on the 4th October 1770, at Newmarket. He ran or walked over for eighteen races, and was never beaten. It was in his first race that Mr O'Kelly took the odds to a large amount before the start for the second heat, that he would place the horses. When called upon to declare, he uttered the exclamation, which the event justified, " Eclipse first, and the rest nowhere."

Eclipse commenced his stud career in 1771, and had an enormous number of foals, of which four only in the direct male line have come down to us,

*viz. Potoooooooo, or, as he is commonly called, Pot-8-os (1773), his most celebrated son, King Fergus (1775), loe Andrews (1778), and Mercury (1778), though several others are represented in the female line. Pot-8-os was the sire of Waxy (1790) out of Maria (1777) by Herod out of Lisette (1772) by Snap. Waxy, who has been not inaptly termed the ace of trumps in the Mud-Book, begat Whalebone (1807), Web (1808), Woful (1809), Wire (181 1), Whisker (1812), and Waxy Pope (1806), all but the / 'oof ? g °t U * ? f „ Penel °Pe (1798) by Trumpator (1782) from Prunella (1788) by Highflyer out of Promise by Snap, while Waxy Pope was out of Prunella, dam of Parasol (1800) by Pot-8-os. Trumpator was a son of Conductor, who was by Matchem out of a mare by Snap.*

Whalebone's best sons were Camel (1822) and Sir Hercules (1826). Camel was the sire of Defence (1824) and Touchstone (1831), while Sir Hercules was the sire of Birdcatcher (1833) and Faugh-a-Ballagh (1841), own brothers, and of Gemma di Vergy (1854). Touchstone was the sire of Newminster (1848), who begat Lord Clifden, Adven- turer, and the Hermit, as well as of Orlando (1841), sire of Tedding- ton (1848). Whalebone's blood also descends through Waverley (1817) and his son the Saddler (1828), while Whisker is represented by the Colonel (1825) and by Economist (1825) and his son Harkaway (1 834) , sire of King Tom (1 85 1) . Birdcatcher begat , besides Saunt(Tr«r (1854), the Baron (1842), sire of Stockwell (1849) and of Rataplan (1850). Stockwell, who was a chestnut with black spots, was the sire of Blair Athol (1861), a chestnut, and also of Doncaster (1870), another chestnut, but with the characteristic black spots of his grandsire; and Doncaster was the sire of the chestnut Bend Or

(1877)-

• To r t n rn to Ecli P se ' s otner s0 "s- King Fergus (1775) was the sire of Bemngbrough (1791), whose son was Orville (1799), whence comes some of the stoutest blood on the turf, including Emilius (1820) and his son Priam (1827), Plenipotentiary (1831), Muley (1810), Chesterfield (1834), and the Hero (1843). Joe Andrews (1778) was the sire of Dick Andrews (1797), and from him descend lramp (1810), Lottery (1820), Liverpool (1828), Sheet Anchor (1832), Lanercost (1835), W.eatherbit (1842). Beadsman (1855), and

Blue Gown (1865). Mercury was sire of Gohanna (1790), who was foaled in the same year as Waxy, and the two, who were both grandsons of Eclipse and' both out of Herod mares, had several contests, Waxy generally getting the better of his cousin. Gohanna's descendants come down through Golumpus (1802), Catton (1809), Mulatto (1823), Royal Oak (1823), and Slane (1833).

2. The Byerly Turk's line is represented by Herod, the Turk being the sire of Jigg, who was the sire of Partner (1718), whose son Tartar (1743) begat King Herod, or Herod as he was commonly called, foaled in 1758. Herod's dam was Cypron (1750) by Blaze (1733), son of Flying Childers. Cypron's dam was Selima by Bethel's Arabian from a mare by Graham's Champion from a daughter of the Darley Arabian and a mare who claims Merlin for her sire, but whose mother's pedigree is unknown. In Herod's pedigree there are fully a dozen dams whose pedigree is unknown. Herod was a bay horse about 15 hands 3 inches high, possessed both of substance and length, — those grand requisites in a race-horse, — combined with uncommon power and stamina or lasting qualities. He was bred by William, duke of Cumberland, uncle of King George III. He commenced his racing career in October 1763, when he was five years old, and ended it on the 16th of May 1767. He ran ten times, winning six and losing four races. He died in 1780, and among other progeny left two famous sons, Woodpecker (1773), whose dam was Miss Ramsden (1760) by Cade, son of the Godolphin Barb, but descended also on the dam's side from the Darley Arabian and the Byerly Turk, and Highflyer (1774), whose dam was Rachel (1763) by Blank, son of the Godolphin Barb from a daughter of Regulus, also son of the Godolphin. These two horses have trans- mitted Herod's qualities down to the present day in the direct male line, although in the female line he is represented through some of his other sons and his daughters as well. Woodpecker was the sire of Buzzard (1787), who in his turn became the father of three celebrated sons, Castrel (1801), Selim (1802), and Rubens (1803), all three chestnuts, and all out of an Alexander mare (1790), who thereby became famous. This mare was by Eclipse's son Alexander (1782) out of a mare by Highflyer (son of Herod) out of a daughter of Alfred, by Matchem out of a daughter of Snap. Bustard (1813), whose dam was a daughter of Shuttle, and his son Heron (1833), Sultan (1816) and his sons Glencoc (1831) and Bay Middleton (1833) and Middleton's sons Cowl (1842) and the Flying Dutchman (1846), Pantaloon (1824) and his son Windhound (1847), Langar (1817) and his son Epirus (1834) and grandson Pyrrhus the First (1843), are representatives of Castrel and Selim.

Highflyer is represented through his greatly esteemed son Sir Peter Teazle, commonly called Sir Peter (1784), whose dam was Papillon by Snap. Sir Peter had five sons at the stud, Walton (1790), Stamford (1794), and Sir

Paul (1802) being the chief. Paulowitz (1813), Cain (1822), Ion (1835), Wild Dayrell (1852), and his son Buccaneer (1857) bring down Sir Paul's blood; whilst Walton is represented through Phantom (1806), Partisan (1811) and his sons Glaucus (1829) and Venison (1833) and Gladiator (1833), Venison's sons Alarm (1842) and Kingston (1849), Gladiator's son Sweetmeat (1842), Sweetmeat's sons Macaroni (i860) and Parmesan (1857), and Parmesan's sons Favonius (1868) and Cremorne (1869). It may be added that in the first volume of the Stud-Book there are nearly a hundred Herod and Highflyer mares registered.

3. The Godolphin Barb is represented by Matchem, as the former was the sire of Cade (1734), and Cade begat Matchem, who was foaled in 1748. He was thus ten years the senior of Herod, repre- senting the Byerly Turk, and sixteen years before Eclipse, though long subsequent to Flying Childers, who represent the Darley Arabian. Matchem was a brown bay horse with some white on his off hind heel, about 15 hands high, bred by Sir John Holme of Carlisle, and sold to Mr W. Fenwick of Bywell, Northumberland. His dam was sister to Miss Partner (1735) by Partner out of Brown Farewell by Makeless (son of the Oglethorpe Arabian) from a daughter of Brimmer out of Trumpet's dam, by Place's White Turk from a daughter of the Barb Dodsworth and a Layton Barb mare; while Brimmer was by D'Arcy's Yellow Turk from a royal mare. Matchem commenced his racing career on the 2nd of August 1753, and terminated it on 1st September 1758. Out of thirteen engage- ments he won eleven and lost two. He died in 1781, aged thirty- three years. His best son was Conductor (1767) out of a mare by Snap; Conductor was the sire of Trumpator (1782), whose two sons, Sorcerer (1790) and Paynator (1791), transmit the blood of the Godolphin down to modern times. Sorcerer was the sire of Sooth- sayer (1808), Comus (1809), and Smolensko (1810). Comus was the sire of Humphrey Clinker (1822), whose son was Melbourne (1834), sire of West Australian (1850) and of many valuable mares, including Canezou (1845) and Blink Bonny (1854), dam of Blair Athol. Paynator was the sire of Dr Syntax (181 1), who had a celebrated daughter called Beeswing (1833), dam of Newminster by Touchstone.

The gems of the three lines may be briefly enumerated thus: (1) of the Darley Arab's line — Snap, Shuttle, Waxy, and Orville— the stoutest blood on the turf; (2) of the Byerly Turk's line — Buzzard and Sir Peter — speedy blood, the latter the stouter of the two; (3) of the Godolphin Barb's line — Sorcerer — often producing large-sized animals, but showing a tendency to die out, and becoming rare.

On the principle that as a rule like begets like, it has been the practice to select as sires the best public performers on the turf, and of two horses of like blood it is sound sense to choose the better as against the inferior

public performer. But there can be little doubt that the mating of mares with horses has been often pursued on a haphazard plan, or on no system at all; to this the Stud-Book testifies too plainly. In the article Horse-Racing mention is made of some of the great horses of recent years; but the following list of the principal sires of earlier days indicates also how their progeny found a place among the winners of the three great races, the Derby (D), Oaks (O), and St Leger (L) : — Eclipse: Young Eclipse (D), Saltram (D), Sergeant (D), Annette

(0).

Herod: Bridget (O), Faith (O), Maid of the Oaks (O), Phenomenon

(L). Matchem: Teetotum (O), Hollandaise (L).

Florizel (son of Herod) : Diomed (D), Eager (D), Tartar (L), Ninety- three (L). Highflyer: Noble (D), Sir Peter Teazle (D), Skyscraper (D), Violante

(O), Omphale (L), Cowslip (L), Spadille (L), Young Flora (L).

Pot-8-os: Waxy (D), Champion (D, L), Tyrant (D), Nightshade (O).

Sir Peter (D) : Sir Harry (D), Archduke (D), Ditto (D), Paris (D),

Hermione (O), Parasite (O), Ambrosio (L), Fyldener (L),

Paulina (L), Petronius (Lj.

Waxy (D): Pope (D), Whalebone (D), Blucher (D), Whisker (D),

Music (O), Minuet (O), Corinne (O). Whalebone (D): Moses (D), Lapdog (D), Spaniel (D), Caroline (O). Woful: Augusta (O), Zinc (O), Theodore (L). Whisker (D) : Memnon (L), The Colonel (L). Phantom: Cedric (D), Middleton (D), Cobweb (O). Orville (L) : Octavius (D), Emilius (D), Ebor (L). Tramp: St Giles (D), Dangerous (D), Barefoot (L). Emilius (D): Priam (D), Plenipotentiary (D), Oxygen (O), Mango

(L). Priam (D): Miss Seltz (O), Industry (O), Crucifix (O). Sir Hercules: Coronation (D), Faugh-a-Ballagh (L), Birdcatcher (L). Touchstone (L): Cotherstone (D), Orlando (D), Surplice (D, L),

Mendicant (O), Blue Bonnet (L), Newminster (L). Birdcatcher (L) : Daniel O'Rourke (D), Songstress (0), Knight of

St George (L), Warlock (L), The Baron (L). The Baron (L) : Stockwell (L). Melbourne: West Australian (D, L), Blink Bonny (D, O), Sir Tatton

Sykes (L). Newminster (L) : Musjid (D), Hermit (D), Lord Clifden (L). Sweetmeat: Macaroni (D), Mincemeat (O), Mincepie (O). Stockwell (L) : Blair Athol (D, L), Lord Lyon (D, L), Doncaster (D), Regalia (O), St Albans (L), Caller Ou (L), The Marquis (L), Achievement (L). King Tom: Kingcraft (D), Tormentor (O), Hippia (O), Hannah

(O, L). Rataplan (son of the Baron) : Kettledrum (D). Monarque: Gladiateur (D, L).

Parmesan (son of Sweetmeat): Favonius (D), Cremorne (D). Buccaneer: Kisber (D), Formosa (O, L), Brigantine (O). Lord Clifden (L) : Jannette (O, L), Hawthornden (L), Wenlock (L),

Petrarch (L). Adventurer: Pretender (D), Apology (O, L), Wheel of Fortune (O). Blair Athol (D, L) : Silvio (D, L), Craig Millar (L).

In regard to mares it has very frequently turned out that animals which were brilliant public performers have been far less successful as dams than others which were comparatively valueless as runners. Beeswing, a brilliant public performer, gave birth to a good horse in Newminster; the same may be said of Alice Hawthorn, dam of Thormanby, of Canezou, dam of Fazzoletto, of Crucifix, dam of Surplice, and of Blink Bonny, dam of Blair Athol; but many of the greatest winners have dropped nothing worth training. On the other hand, there are mares of little or no value as racers who have become the mothers of some of the most celebrated horses on the turf ; among, them we may cite Queen Mary, Pocahontas and Paradigm. Queen Mary, who was by Gladiator out of a daughter of Plenipotentiary and Myrrha by Whalebone, when mated with Melbourne pro- duced Blink Bonny (winner of the Derby and Oaks); when mated with Mango and Lanercost she produced Haricot, dam of Caller Ou (winner of the St Leger). Pocahontas, perhaps the most remarkable mare in the Stud-Book, never won a race on the turf, but threw Stockwell and Rataplan to the Baron, son of Birdcatcher, King Tom to Harkaway, Knight of St Patrick to Knight of St George, and Knight of Kars to Nutwith — all these horses being 16 hands high and upwards, while Pocahontas was

a long low mare of about 15 hands or a trifle more. She also gave birth to Ayacanora by Birdcatcher, and to Araucaria by Ambrose, both very valuable brood mares, Araucaria being the dam of Chamant by Mortemer, and of Rayon d'Or by Flageolet, son of Plutus by Touchstone. Paradigm

again produced, among several winners of more or less celebrity, Lord Lyon (winner of the Two Thousand Guineas, Derby and St Leger) and Achievement (winner of the St Leger), both being by Stockwell. Another famous mare was Manganese (1853) by Birdcatcher from Moon- beam by Tomboy from Lunatic by the Prime Minister from Maniac by Shuttle. Manganese when mated with Rataplan threw Mandragora, dam of Apology, winner of the Oaks and St Leger, whose sire was Adventurer, son of Newminster. She also threw Mineral, who, when mated with Lord Clifden, pro- duced Wenlock, winner of the St Leger, and after being sold to go to Hungary, was there mated with Buccaneer, the produce being Kisber, winner of the Derby.

We append the pedigree of Blair Athol, winner of the Derby and St Leger in 1864, who, when subsequently sold by auction, fetched the then unprecedented sum of 12,000 guineas, as it contains, not only Stockwell (the emperor of stallions, as he has been termed), but Blink Bonny and Eleanor — in which latter animal are combined the blood of Eclipse, Herod, Matchem and Snap, — the mares that won the Derby in 1801 and 1857 respec- tively, as well as those queens of the stud, Eleanor's great-granddaughter Pocahontas and Blink Bonny's dam Queen Mary. Both Eleanor and Blink Bonny won the Oaks as well as the Derby.

The Baront r (1842)

Stockwell X

0849)

Birdcalchert(i83.})J

'Sir Hercules

(1826)

Blair Athol (i860*

Pocahontas

('837)

Echidna (1838)

'Glencoe (1831)

LMarpessa (1830)

LOuiccioli (1823)

f Economist (1825)

..Miss Pratt (1823)

f Sultan (1816)

f Tramp (1810) Trampoline (I S2 S)ˆ Web(igog)

r Muley (1810)

U'larc (1824)

f Comus (i8oy)

("Humphrey Clinker

(1822)

[ciinkerina (1812)

*Blink Bonny**

(1854)

Melbourne

(1834)

f Cervantes (1806)

L Daughter of (1825)-;

Daughter of

. (1818)

'Gladiatc (1833)

Queen Mary –

(1843)

f Partisan (i8it)

[Pauline (1826)

*f Plenipotentiary**

(1831)

Myrrha (1830)

- *Winner of the Derby.*

Winner of the Oaks.

The shape of a race-horse is of considerable importance, although it is said with some degree of truth that they win in

all shapes. There are the neat and elegant animals, like the descendants of Saunterer and Sweetmeat; the large-framed, plain-looking, and heavy-headed Melbournes, often with lop ears; the descendants of Birdcatcher, full of quality, and of more than average stature, though sometimes disfigured with curby hocks; and the medium-sized but withal speedy descend- ants of Touchstone, though in some cases characterized by somewhat loaded shoulders. In height it will be found that the most successful racers average from 15 to 16 J hands, the former being considered somewhat small, while the latter is unquestion- ably very large; the mean may be taken as between \%\ and 16 hands (the hand = 4 in.). The head should be light and lean, and well set on; the ears small and pricked, but not too short; the eyes full; the forehead broad and flat; the nostrils large and dilating; the muzzle fine; the neck moderate in length, wide, muscular, and yet light; the throat clean; the windpipe spacious and loosely attached to the neck; the crest thin, not coarse and arched. The withers may be moderately high and thin; the chest well developed, but not too wide or deep; the shoulder should lie well on the chest, and be oblique and well covered with muscle, so as to reduce concussion in galloping; the upper and lower arms should be long and muscular; the knees broad and strong; legs short, flat and broad; fetlock joints large; pasterns strong and of moderate length; the feet should be moderately large, with the heels open and frogs sound —with no signs of contraction. The body or barrel should be moderately deep, long and straight, the length being really in the shoulders and in the quarters; the back should be strong

and muscular, with the shoulders and loins running well in at each end; the loins them- selves should have great breadth and substance, this being a vital neces- sity for weight- carrying and pro- pelling p ower uphill. The hips should be long and wide, with the stifle and thigh strong, long and propor- tionately de- veloped, and the hind quarters well let down. The hock should have plenty of bone, and be strongly affixed to the leg, and show no signs of curb; the bones below the hock should be flat, and free from adhe- sions; the liga- ments and tendons well developed, and standing out from the bone; the joints well formed and wide, yet without undue

enlarge- ment; the pasterns and feet similar to those of the fore- hand. The tail should be high set on, the croup being continued in a straight line to the tail, and not falling away and drooping

J" Whalebone (1807) I Peri (1822) f Bob Booty (1804) ■>- Flight (1809) ("Whisker* (1812) I Floranthe (1818) fBlacklock (1814) LCadabout (1812) Selim (1802) Bacchante (1809)*

*fOrvillet (1799) l.Eleanor*t (1798) j Marmion (1806) iHarpalice (1814) f Sorcerer (1796) I Houghton Lass (1801) [Clinker (1805) lPewet(i786) j" Don Quixote (1784) I Evelina (179O j Golumpus (1802) Inaughter of (1810) j" Walton (1799) I Parasol (1800) ("Moses* (z8i 9) I Quadrille (181s) fEmilius*(i82o) "-Harriett (1819) f Whalebone* (1807) I Gift (1818)*

(Waxy (1700)*

I Penelope (1798)

5 Wanderer (1790)

) Thalestris (1809)

i Chanticleer (1787)

(Ierne (1790)

5 Escape (1802)

1. Young Heroine

i Waxy (1790)*

(Penelope (1798)

(Octavian (1807)

r Caprice (1797)

(Whitelock (1803)

/ Coriander mare (1799)

5 Orvillet (1709)

(Minstrel (1803)

(Buzzard (1787)

I Alexander mare (1700)

j Williamson's Ditto (1800)

Sister to Calomel (1791)

Dick Andrews (1797)

Gohanna mare

Waxy (:79o)*

Penelope (1798)

Beningbrough (1791)

Evelina (1791) f Whiskey (1789) I Young Giantess (1790) (Whiskey O789) (Young Noisette (1789) <, Gohanna (1 790) (Amazon (1799)

j Trumpator (1782) '

I Young Giantess (1790)

' Sir Peter (1784) Alexina (1788) Sir Peter* (1784) Hyale (1797) Tandem (1773) Termagant Eclipse (1764) Grecian Princess (1770)*

. Highflyer (1774) ˆ Termagant

(Gohanna (1790) } Catherine (1795)

5 Paynator (1791)

) Sister to Zodiac

(Sir Peter (1784)*

I Arethusa (1792)

(Pot-8-os (1773)

) Prunella (1788)

\ Whalebone by Waxy* (1807)*

7 Gohanna mare

5 Selim (1802)

(Canary Bird (1806)

(Orviilet (1799)

. Emily (1810)

(Pericles (1809)

\ Selim mare (1812)

j Waxy (1790)*

? Penelope (1798)

S Young Gohanna (1810)

(Sister to Grazier by Sir Peter (1808) J Winner of the St Leger.*

HORSE

z o

J J

<

J O

Z

g

j

<

! z

z o

5

in

Pi O

ffi

O

cJ O

w

H Pi B

O

£

w ►J

w

J

‘J

— ~ w#

Plate II.

r

HORSE

z o

Y,

o

a z

H W

z

o

> z

o

q

o

z

o

o

— . .

l – •-■’■

BREEDS]

HORSE

723

to a low-set tail. Fine action is the best criterion of every- thing fitting properly, and all a horse's points ought to harmonize or be in proportion to one another, no one point being more prominent than another, such as good shoulders, fine loins or excellent quarters. If the observer is struck with the remarkable prominence of any one feature, it is probable that the remaining parts are deficient. A well-made horse wants dissecting in detail, and then if a good judge can discover no fault with any part, but finds each of good propor- tions, and the whole to harmonize without defect, deformity or deficiency, he has before him a well-shaped horse; and of two equally well-made and equitably proportioned horses the best bred one will be the best. As regards hue, the favourite colour of the ancients, according to Xenophon, was bay, and for a long time it was the fashionable colour in England; but for some time chestnut thoroughbreds have been the most conspicuous figure on English race-courses, so far as the more important events are concerned. Eclipse was a chestnut; Castrel, Selim and Rubens were chestnuts; so also were Glencoe and Pantaloon, of whom the latter had black spots on his hind quarters like Eclipse; and also Stockwell and Doncaster. Birdcatcher was a chestnut, so also were Stockwell and his brother Rataplan, Manganese, Mandragora, Thormanby, Kettledrum, St Albans, Blair Athol, Regalia, Formosa, Hermit, Marie Stuart, Doncaster, George Frederick, Apology, Craig Millar, Prince Charlie, Rayon d'Or and Bend Or. The dark browns or black browns, such as the Sweetmeat tribe, are not so common as the bays, and black or grey horses are almost as unusual as roans. The skin and hair of the throughbred are finer, and the veins which underlie the skin are larger and more prominent than in other horses. The mane and tail should be silky and devoid of curl, which is a sign of impurity.

Whether the race-horse of to-day is as good as the stock to which he traces back has often been disputed, chiefly no doubt because he is brought to more early maturity, commencing to win races at two years instead of at five years of age, as in the days of Childers and Eclipse; but the highest authorities, and none more emphatically than the late Admiral Rous, have insisted that he can not only stay quite as long as his ancestors, but also go a good deal faster. In size and shape the modern race-horse is unquestionably superior, being oh an average fully a hand higher than the Eastern horses from which he is descended ; and in elegance of shape and beauty of outline he has certainly never been surpassed. That experiments, founded on the study of his nature and properties, which have from time to time been made to improve the breed, and bring the different varieties to the perfection in which we now find them, have succeeded, is best confirmed by the high estimation in which the horses of Great Britain are held in all parts of the civilized world; and it is not too much to assert that, although the cold, humid and variable nature of their climate is by no

means favourable to the production of these animals in their very best form, English- men have by great care, and by sedulous attention to breeding, high feeding and good grooming, with consequent development of muscle, brought them to the highest state of perfection of which their nature is capable. (E. D. B.)

Breeds of Horses

The British breeds of light horses include the Thoroughbred, the Yorkshire Coach-horse, the Cleveland Bay, the Hackney and the Pony; of heavy horses, the Shire, the Clydesdale and the Suffolk.

The Thoroughbred is probably the oldest of the breeds, and it is known as the " blood-horse " on account of the length of time through which its purity of descent can be traced. The frame is light, slender and graceful. The points of chief import- ance are a fine, clean, lean head, set on free from collar heaviness; a long and strongly muscular neck, shoulders oblique and covered with muscle; high, long withers, chest of good depth and narrow but not extremely so; body round in type; back rib well down; depth at withers a little under half the height; length equal to the height at withers and croup; loins level and muscular;

croup long, rather level; tail set on high and carried gracefully; the hind quarters long, strongly developed, and full of muscle and driving power; the limbs clean-cut and sinewy, possessing abundance of good bone, especially desired in the cannons, which are short, broad and flat; comparatively little space between the fore legs; pastern joints smooth and true; pasterns strong, clean and springy, sloping when at rest at an angle of 45°; feet medium size, wide and high at the heels, concave below and set on straight. The action in trotting is generally low, but the bending of the knee and the flexing of the hock is smooth, free and true. The thoroughbred is apt to be nervous and excitable, and impatient of common work, but its speed, resolution and endurance, as tested on the race-course, are'beyond praise.

Many of the best hunters in the United Kingdom are thorough- breds, but of the substantial weight-carrying type. The Hunters Improvement Society, established in 1885, did not restrict entries to the Hunters' Stud-Book to entirely dean-bred animals, but admitted those with breeding enough to pass strict inspec- tion. This society acts in consort with two other powerful organizations (the Royal Commission on Horse-breeding, which began its work in 1888, and the Brood Mare Society, established in 1903), with the desirable object of improving the standard of light horse breeding. The initial efforts began by securing the services of thoroughbred stallions for specified districts, by offering a limited number of " Queen's Premiums," of £200 each, to selected animals of four years old and upwards. Since the

formation of the Brood Mare Society mares have come within the sphere of influence of the three bodies, and well-conceived inducements are offered to breeders to retain their young mares at home. The efforts have met with gratifying success, and they were much needed, for while in 1904 the Dutch government took away 350 of the best young Irish mares, Great Britain was paying the foreigner over £2,000,000 a year for horses which the old system of management did not supply at home. The Royal Dublin Society also keeps a Register of Thoroughbred Stallions under the horse-breeding scheme of 1892, which, like the British efforts, is now bearing fruit.

The Yorkshire Coach-horse is extensively bred in the North and East Ridings of Yorkshire, and the thoroughbred has taken a share in its development. The colour is usually bay, with black or brown points. A fine head, sloping shoulders, strong loins, lengthy quarters, high-stepping action, flat bone and sound feet are characteristic. The height varies from 16 hands to 16 hands 2 in.

The Cleveland Bay is an ancestor of the Yorkshire Coach-horse and is bred in parts of Yorkshire, Durham and Northumberland. He is adapted alike for the plough, for heavy draught, and for slow saddle work. Some specimens make imposing-looking carriage horses, but they have low action and are lacking in quality. The colour is light or dark bay, with black legs. Though rather coarse-headed, the Cleveland Bay has a well-set shoulder and neck, a deep chest and round barrel. The height is from 16 to 17 hands.

The Hackney has come prominently to the front in recent years. The term Nag, applied to the active riding or trotting horse, is derived from the A.S. hnegan, to neigh. The Normans brought with them their own word haquenie, or hacqucne'e, a French derivative from the Latin equus, a horse, whence the name hackney. Both nag and hackney continue to be used as synonymous terms. Frequent mention is made of hackneys and trotters in old farm accounts of the 14th century. The first noteworthy trotting hackney stallion, of the modern type, was a horse foaled about 1755, and known as the Schales, Shields or Shales horse, and most of the recognized hackneys of to-day trace back to him. The breeding of hackneys is extensively pursued in the counties of Norfolk, Cambridge, Huntingdon, Lincoln and York, and in the showyard competi- tions a keen but friendly rivalry is usually to be noticed between the hackney-breeding farmers of Norfolk and Yorkshire. The high hackney action is uncomfortable in a riding horse. Excel- lent results have sometimes followed the use of hackney sires upon half-bred mares, i.e. by thoroughbred stallions and trotting

mares, but it is not always so. As regards the movement, or " action," of the hackney, he should go light in hand, and the knee should be well elevated and advanced during the trot, and, before the foot is put down, the leg should be well extended. The hackn«y should also possess good hock action, as distin- guished from mere fetlock action, the propelling power depending upon the efficiency of the former. The hackney type of the day is " a powerfully built, short-legged, big horse, with an intelligent head, neat neck, strong, level back, powerful loins, and as perfect shoulders as can be obtained, good feet, flat-boned legs, and a height of from 15 hands 2 in. to 15 hands 3j in. Carriage-horses hackney-bred have been produced over 17 hands high.

The Pony differs essentially from the hackney in height, the former not exceeding 14 hands. There is one exception, which is made clear in the following extract from Sir Walter Gilbey's Ponies Past and Present (1900): —

Before the establishment of the Hackney Horse Society in 1883 the dividing line between the horse and the pony in England was vague and undefined. It was then found necessary to distinguish clearly between horses and ponies, and, accordingly, all animals measuring 14 hands or under were designated " ponies," and re- gistered in a separate part of the (Hackney) Stud-Book. This record of height, with other particulars as to breeding, &c, serves to direct breeders in their choice of sires and dams. The standard of height established by the Hackney Horse Society was accepted and officially recognized by the Royal Agricultural Society in 1889, when the prize-list for the Windsor show contained pony classes for animals not exceeding 14 hands. The altered polo-rule, which fixes the limit of height at 14 hands 2 in., may be productive of some little confusion; but for all other purposes 14 hands is the recognized maximum height of a pony. Prior to 1883 small horses were called indifferently Galloways, hobbies, cobs or ponies, irrespective of their height.

Native ponies include those variously known as Welsh, New Forest, Exmoor, Dartmoor, Cumberland and Westmorland, Fell, Highland, Highland Garron, Celtic, Shetland and Conne- mara. Ponies range in height from 14 hands down to 8 hands, Shetland ponies eligible for the Stud-Book not exceeding the latter. As in the case of the hackney, so with the pony, thoroughbred blood has been used, and with good results, except in the case of those animals which have to remain to breed in their native haunts on the hills and moorlands. There the only possible way of

improvement is by selecting the best native specimens, especially the sires, to breed from. The thin-skinned progeny of thoroughbred or Arab stock is too delicate to live unless when hand-fed — and hand-feeding is not according to custom. Excellent polo ponies are bred as first or second crosses by thoroughbred stallions on the mares of nearly all the varieties of ponies named. The defective formation of the pony, the perpendicular shoulder and the drooping hind quarters, are modified; but neither the latter, nor bent 'hocks, which place the hind legs under the body as in the zebra, are objected to, as the conformation is favourable to rapid turning. One object of the pony breeder, while maintaining hardiness of constitution, is to control size — to compress the most valuable qualities into small compass. He endeavours to breed an animal possessing a small head, good shoulders, true action and perfect manners. A combination of the best points of the hunter with the style and finish of the hackney produces a class of weight- carrying pony which is always saleable.

The Shire horse owes its happily-chosen name to Arthur Young's remarks, in the description of his agricultural tours during the closing years of the 18th century, concerning the large Old English Black Horse, " the produce principally of the Shire counties in the heart of England." Long previous to this, however, the word Shire, in connexion with horses, was used in the statutes of Henry VIII. Under the various names of the War Horse, the Great Horse, the Old English Black Horse and the Shire Horse, the breed has for centuries been cultivated in the rich fen-lands of Lincolnshire and Cambridgeshire, and in many counties to the west. The Shire is the largest of draught horses, the stallion commonly attaining a height of 17 to 17-3 hands. Though the black colour is still frequently met with, bay and brown are more usually seen. With their immense size and weight — 1800 lb to 2200 lb — the Shires combine great strength, and they are withal docile and intelligent. They stand on short stout legs, with a plentiful covering—sometimes too abundant — of long hair extending

chiefly down the back but also round the front of the limbs from knees and hocks, and when in full feather obscuring nearly the whole of the hoofs. The head is a good size, and broad between the eyes; the neck fairly long, with the crest well arched on to the shoulders, which are deep and strong, and moderately oblique. The chest is wide, full and deep, the back short and straight, the ribs are round and deep, the hind quarters long, level and well let down into the muscular thighs. The cannon-bones should be flat, heavy and clean, and the feet wide, tough, and prominent at the heels. A good type of Shire horse combines symmetrical outlines and bold, free action. There is a good and remunerative demand for Shire geldings for use as draught horses in towns.

The Clydesdale, the Scottish breed named from the valley of the Clyde, is not quite so large as the Shire, the average height of stallions being about 16 hands 2 in. The popular colour is bay, particularly if of a dark shade, or dappled. Black is not uncommon, but grey is not encouraged. White markings on one or more of the legs, with a white star or stripe on the face, are characteristic. The long hair on the legs is not so abundant as in the Shires, and it is finer in texture. It is regarded as an indication of good bone. The bones of the legs should be short, flat, clean and hard; the feet large, with hoofs deep and concave below. With its symmetry, activity, strength and endurance the Clydesdale is easily broken to harness, and makes an excellent draught horse. This breed is growing rapidly in favour in Canada, but in the United States the Percheron, with its round bone and short pasterns, holds the field. A blend of the Shire and Clydesdale strains of the British rough-legged draught horse (virtually sections of the same breed) is a better animal than either of the parents. It is an improvement upon the Shire due to the quality contributed by the Clydesdale, and it surpasses the Clydesdale in strength and substance, as a result of the Shire connexion. To secure success the two Stud-Books will require to be opened to animals eligible to be entered in either record. The blend is being established in U.S.A. as a National breed.

The Suffolk is a horse quite distinct from the Shire and the Clydesdale. Its body looks too heavy for its limbs, which are free from the " feather " so much admired in the two other heavy breeds; it possesses a characteristic chestnut colour. How long the Suffolks have been associated with the county after which they are named is unknown, but they are mentioned in 1 586 in Camden's Britannia. With an average height of about 16 hands they often have a weight of as much as 2000 lb., and this may explain the appearance which has given rise to the name of the Suffolk Punch, by which the breed is known. The Suffolk is a resolute and unwearying worker, and is richly endowed with many of the best qualities of a horse. The Suffolk Stud-Book and History of the Breed, published in 1880, is the most exhaustive record of its kind in England. (W. Fr.; R. W.)

Management

Breeding. — Animals to breed from should be of good blood, sound and compactly built, with good pluck and free from nervous excitability and vicious tendency. A mare used to be put to the horse at three years old, but latterly two has become the common age. Young sires begin to serve in moderation at two. May is considered the best month for a mare to foal, .as there is abundance of natural food and the weather is mild enough for the mare to lie out. Show specimens generally profit by being born earlier. The period of gestation in the mare is about eleven months. No nursing mare should go to work, if this can possibly be avoided. A brood mare requires plenty of exercise at a slow pace and may work, except between shafts or on a road, till the day of foaling.

To avoid colic an animal has to be gradually prepared by giving small quantities of green food for a few days before going to grass. Shelter against severe storms is needed. Succulent food encourages the flow of milk, and the success of the foal

greatly depends on its milk supply. Mares most readily conceive when served at the " foal heat " eleven days after foaling. A mature stallion can serve from eighty to one hundred mares per annum.

Foals are weaned when five or six months old, often in October, and require to be housed to save the foal-flesh, and liberally but not overfed; but from the time they are a month old they require to be " gentled " by handling and kindly treatment, and the elementary training of leading from time to time by a halter adjusted permanently to the head. When they are hand- reared on cow's milk foals require firm treatment and must have no fooling to teach them tricks. Young horses that are too highly fed are apt to become w.eak-limbed and top-heavy.

Breaking. — Systematic breaking begins at about the age of two years, and the method of subduing a colt by " galvayning " is as good as any. It is a more humane system than " rareying," which overcame by exhaustion under circumstances which were not fruitful of permanent results. Galvayning is accomplished by bending the horse's neck round at an angle of thirty-five to forty degrees and tieing the halter to the tail, so that when he attempts to walk forward he holds himself and turns " round and round, almost upon his own ground." The more strenuous his resistance the sooner he yields to the inevitable force applied by himself. A wooden pole, the "

third hand," is then gently applied to all parts of the body until kicking or any form of resistance ceases. " Bitting " or " mouthing," or the familiarizing of an animal to the bit in his mouth, and to answer to the rein without bending his neck, is still a necessity with the galvayning method of breaking. Experience can only be gained by a horse continuing during a considerable time to practise what he has been taught.

Three main characteristics of a successful horse-breaker are firmness, good temper and incessant vigilance. Carelessness in trusting too much to a young colt that begins its training by being docile is a fruitful source of untrustworthy habits which need never have developed. Driving with long reins in the field should precede the fastening of ropes to the collar, as it accustoms the animal to the pressure on the shoulders of the draught, later to be experienced in the yoke. If a young horse be well handled and accustomed to the dummy jockey, mounting it is not attended with much risk of resistance, although this should invariably be anticipated. An animal ought to be in good con- dition when being broken in, else it is liable to break out in. unpleasant ways when it becomes high-spirited as a result of improved condition. It should be well but not overfed, and while young not overworked, as an overtired animal is liable to refuse to pull, and thus contract a bad habit. Most bad habits and stable tricks are the result of defective management and avoidable accidents.

Feeding. — Horses have small stomachs relatively to ruminating animals, and require small quantities of food frequently. While grazing they feed almost continually, preferring short pasture. No stable food for quick work surpasses a superior sample of fine-hulled whole oats like " Garton's Abundance " (120 ft) per week), and Timothy hay harvested in dry weather. The un- bruised oats develop a spirit and courage in either a saddle or harness horse that no other food can. A double handful of clean chaff, or of bran mixed with the oats in the manger, prevents a greedy horse from swallowing a considerable proportion whole. Unchewed oats pass out in the faeces uninjured, so that they are capable of germination, and are of less than no value to a horse. Horses doing slow or other than " upper ten " work may have oats crushed, not ground, and a variety of additions made to the oats which are usually the basis of the feed — for example, a few old crushed beans, a little linseed meal, ground linseed cake or about a wine-glassful of unboiled linseed oil. Indian pulses are to be avoided on account of the danger of Lathyrus poisoning. A seasoning of ground fenugreek or spice is sometimes given to shy feeders to encourage them to eat. A little sugar or molascuit added to the food will sometimes serve the same purpose. Newly crushed barley or cracked maize, even in considerable proportion to the rest of the food, gives good

results with draught, coach, 'bus and light harness horses gener- ally.

Boiled food of any kind is unnatural to a horse, and is risky to give, being liable to produce colic, especially if the animal bolts its food when hungry, although it generally pro- duces a glossy coat. Too much linseed, often used in preparing horses for market, gives a similar appearance, but is liable to induce fatty degeneration of the liver; given in moderation it regulates the bowels and stimulates the more perfect digestion of other foods. In England red-clover hay, or, better still, crimson-clover or lucerne hay, is liberally fed to farm horses with about 10 lb per day of oats, while they usually run in open yards with shelter sheds. Bean straw is sometimes given as part of the roughage in Scotland, but not in England. In England hunters and carriage horses are generally fed on natural hay, in Scotland on Timothy, largely imported from Canada, or ryegrass hay that has not been grown with nitrate of soda. Heavily nitrated hay is reputed to produce excessive urination and irritation of the bladder. Pease straw, if not sandy, and good bright oat straw are good fodder for horses; but with barley and wheat straw, in the case of a horse, more energy is consumed during its passage through the alimentary canal than the digested straw yields. Three or four Swedish turnips or an equivalent of carrots is an excellent cooling food for a horse at hard work. The greater number of horses in the country should have green forage given them during summer, when the work they do will permit of it, as it is their natural food, and they thrive better on it than on any dry food.

When a horse has been overstrained by work the best remedy is a long rest at pasture, and, if it be lame or weak in the limbs, the winter season is most conducive to recovery. The horse becomes low in condition and moves about quietly, and the frost tends to brace up the limbs. In autumn all horses that have been grazing should be dosed with some vermifuge to destroy the worms that are invariably present, and thus prevent colic or an unthrifty or anaemic state. On a long journey a horse should have occasional short drinks, and near the end a long drink with a slower rate of progression with the object of cooling off. In the stable a horse should always be provided with rock salt, and water to drink at will by means of some such stall fixture as the Mundt hygienic water-supply fittings. Overhead hay-racks are unnatural and are liable to drop seeds into a

horse's eye.

Literature. — For riding, &c. see Riding, Driving, Horseman- ship, and Horse-Racing. For diseases of the horse see Veterinary Science. The literature about the horse and its history and uses is voluminous, and is collected up to 1887 in Huth's Works on Horses, &c, a bibliographical record of hippology. See also, besides the works already mentioned, various books by Capt. M. Horace Hayes, Points of the Horse (1893, 2nd ed., 1897); Stable Manage- ment and Exercise (1900); Illustrated Horse-

breaking (1889, 2nd ed., 1896); and The Horsewoman (1893) (with Mrs Hayes); E. L. Anderson, Modern Horsemanship (1884); W. Day, The Horse: How to Breed and Rear Him (1888); W. Ridgeway, Origin and Influence of the Thoroughbred Horse (1905); Major-General Tweedie, The Arab Horse (1894); J. Wortley Axe, The Horse; its Treatment in Health and Disease (1906) ; R. Wallace, Farm Live Stock of Great Britain (1885, 4th ed., 1907); Sydney Galvayne, The Twentieth Century Book of the Horse (1905) ; C. Bruce Low, Breeding Race- horses by the Figure System (1895); J. H. Wallace, The Horse of America in his Derivation, &c. (1897); Weatherly's Celebrated Race- horses (1887); Ruff's Guide to the Turf '; T. A. Cook, History of the English Turf (1903) ; The General Stud-Book (issued quinquennially) ; and the Stud-Books of the various breed societies. (R. W.)

HORSE LATITUDES, the belts of calms and variable breezes at the polar edge of the N.E. and S.E. trades. According to the New English Dictionary two explanations have been given of the origin of the name: one that the calm kills horses on a sailing ship, the other that the name signifies the unruly and boisterous nature of these winds compared with the pleasant trades. The name is commonly applied to the permanent belt of high atmospheric pressure which encircles the globe in 30° to 35 from the equator.

HORSE-MACKEREL, the name applied to a genus of fishes {Caranx) found in abundance in almost all temperate and especially in tropical seas. The designation " cavalli," given to them by the early Portuguese navigators, and often met with

in the accounts of the adventures of the buccaneers, is still in frequent use among the sailors of all nations. Some ninety different kinds are known — the majority being wholesome food, and some of the species attaining a length of 3 ft. and more. The fish to which the name horse-mackerel is applied in Great Britain is Caranx trachurus, distinguished by having the lateral line in its whole length armed with large but narrow bony plates. Horse-mackerel are found singly on the coast all the year round, but sometimes they congregate in shoals of many thousands. Although well-flavoured, they are much more frequently used for bait than for food. This species has a most extraordinary range, being found almost everywhere within the temperate and tropical zones of the northern and southern hemispheres.

HORSEMANSHIP, the art of managing the horse from his back and controlling his paces and the direction and speed of his movement. The ordinary procedure is dealt with in the articles on Riding and cognate subjects (see also Horse : section Management). A special kind of skill is, however, needed in breaking, training, bitting and schooling horses for a game like polo, or for the evolutions of what is known as the haute tcole. It is with the latter, or " school " riding, that we deal here. The middle ages had seen chivalry developed into a social distinction, and horsemanship into a form of knightly prowess. The Re- naissance introduced the cultivation of horsemanship as an art, with regular conditions and rules, instead of merely its skilful practice for utility and exercise. In Italy in the 16th century schools of horsemanship were established at Naples, Rome and other chief cities; thither flocked the nobility of France, Spain and Germany; and Henry VIII. of England and other monarchs of his time had Italians for their masters of the horse. The academy of Pignatelli at Naples was the most famous of the schools in the middle of the 16th century, but a score of other less renowned masters devoted themselves to teaching the riders and training the horses. Trappings of all sorts multiplied; the prescribed tricks, feats and postures involved considerable dexterity; they were fatiguing to both man and beast, and were really useless except for show. This elaborate art, en- thusiastically followed among the Romance nations, was the parent of later developments of the haute ecole, and of the circus- performances of modern days. In England, however, the continental style did not find favour for long. The duke of Newcastle's Methode nouvelle de dresser les chevaux (1648) was the leading text-book of the day, and in 1761 the earl of Pem- broke published his Manual of Cavalry Horsemanship. In France a simplification was introduced in the early part of the 18th century by La Gueriniere (Ecole de cavalerie) and others. The French military school thus became the model for Europe, though the English style remained in opposition, forming a sort of compromise with the ordinary method of riding across country. In more modern times France again came to the front in regard to the haute Scole, through the innovations of the vicomte d'Aure (1798-1863) and Francois Baucher (1796-1873). Baucher was a circus-rider who became the greatest master of his art, and who had an elaborate theory of the principles in- volved in training a horse. His system was carried on, with modifications, by masters and theorists like Captain Raabe, M. Barroil and M. Fillis. In more recent times the style of the haute ecole has also been cultivated by various masters in the United States, such as H. L. de Bussigny at Boston.

See d'Aure, Traite d'equitation (1847); Hundersdorf, Equitation allemande (Bruxelles, 1843); Baucher, Passe-temps equestres (1840), Methode d'equitation (1867) ; Raabe, Methode de haute ecole d' Equitation (1863); Barroil, Art equestre; Fillis, Principes de dressage; Hayes, Riling on the flat,

&c. (1882).

HORSENS, a market town of Denmark, at the head of Horsens Fjord, on the east side of Jutland, 32 m. by rail S.W. of Aarhus, in the ami (county) of that name. Pop. (1001) 22,243. It is the junction of branch railways to Bryrup and to Torring inland, and to Juelsminde on the coast. The exports are chiefly bacon and butter; the imports, iron, yarn, coal and timber. The town is ancient; there is a disused convent church with tombs of the 17th century, and the Vor-Frelsers-Kirke has a carved pulpit of the same period. Horsens is the birthplace of the

navigator Vitus Bering or Behring (1680), the Arctic explorer. To the north lies the picturesque lake district between Skander- borg and Silkeborg (see Aarhus)

HORSE-POWER. The device, frequently seen in farmyards, by which the power of a horse is utilized to drive threshing or other machinery, is sometimes described as a "horse-power," but this term usually denotes the unit in which the performance of steam and other engines is expressed, and which is defined as the rate at which work is done when 33,000 lb are raised one foot in one minute. This value was adopted by James Watt as the result of experiments with strong dray-horses, but, as he was aware, it is in excess of what can be done by an average horse over a full day's work. It is equal to 746 watts. On the metric system it is reckoned as 4500 kilogram-metres a minute, and the PYench cheval-vapeur is thus equal to 32,549 foot-pounds a minute, or 0-9863 of an English horse-power, or 736 watts. The " nominal horse-power " by which engines are sometimes rated is an arbitrary and obsolescent term of indefinite significance. An ordinary formula for obtaining it is t-ˆtD 2 ˆ S for high- pressure engines, and •j'ijD 2 ˆ' S for condensing engines, where D is the diameter of the piston in inches and S the length of the stroke in feet, though varying numbers are used for the divisor. The " indicated horse-power " of a reciprocating engine is given by ASPN/ 33,000, where A is the area of the piston in square inches, S the length of the stroke in feet, P the mean pressure on the piston in lb per sq. in., and N the number of effective strokes per minute, namely, one for each revolution of the crank shaft if the engine is single-acting, but twice as many if it is double-acting. The mean pressure P is ascertained from the diagram or " card " given by an indicator (see Steam- Engine). In turbine engines this method is inapplicable. A statement of indicated horse-power supplies a measure of the force acting in the cylinder of an engine, but the power available for doing external work off the crank-shaft is less than this by the amount absorbed in driving the engine itself. The useful residue, known as the " actual," " effective " or " brake " horse-power, can be directly measured by a dynamometer {q.v.) ; it amounts to about 80% of the indicated horse-

power for good condensing engines and about 85% for non-condensing engines, or perhaps a little more when the engines are of the largest sizes. When turbines, as often happens in land practice, are directly coupled to electrical generators, their horse-power can be deduced from the electrical output. When they are used for the propulsion of ships recourse is had to " torsion meters " which measure the amount of twist undergone by the propeller shafts while transmitting power. Two points are selected on the surface of the shaft at different positions along it, and the relative displacement which occurs between them round the shaft when power is being transmitted is determined either by electrical means, as in the Denny-Johnson torsion-meter, or optically, as in the Hopkinson-Thring and Bevis-Gibson instruments. The twist or surface-shear being proportional to the torque, the horse-power can be calculated if the modulus of rigidity of the steel employed is known or if the amount of twist correspond- ing to a given power has previously been ascertained by direct experiment on the shaft before it has been put in place.

HORSE-RACING. Probably the earliest instance of the use of horses in racing recorded in literature occurs in II. xxiii. 212-650, where the various incidents of the chariot-race at the funeral games held in honour of Patroclus are detailed with much vividness. According to the ancient authorities the four-horse chariot-race was introduced into the Olympic games as early as the 23rd Olympiad; to this the race with mounted horses was added in the 33rd; while other variations (such as two-horse chariot-races, mule races, loose-horse races, special races for under-aged horses) were admitted at a still later period. Of the training and management of the Olympic race-horse we are left in ignorance; but it is known that the equestrian candidates were required to enter their names and send their horses to Elis at least thirty days before the celebration of the games commenced, and that the charioteers and riders, whether owners or proxies, went through a prescribed course of exercise

during the intervening month. At all the other national games of Greece (Pythian, Isthmian, Nemean), as well as at many of the local festivals (the Athenian Olympia and Panathenaea), similar contests had a prominent place. Some indication of the extent to which the passion for horse-racing was indulged in at Athens, for example, about the time of Aristophanes may be obtained from the scene with which The Clouds opens; while it is a significant fact that the Boeotians termed one of the months of their year,

corresponding to the Athenian Hecatom- baeon, Hippodromius (”’ Horse-race month “; see Plutarch, Cam. 15). For the chariot-races and horse-races of the Greeks and Romans, see Circus and Games.

Great Britain

There is no direct historical evidence to show that the ancient Britons addicted themselves to any form of this amusement; but there are indications that among some at least of the Germanic tribes, from a very early period, horse-racing was an accompani- ment of their religious cultus. There can be no doubt that the Romans encouraged the pursuit in Britain, if they did not intro- duce it; traces of race-courses belonging to the period of their occupation have been frequently discovered. The influence of the Christian Church was everywhere at first strongly against the practice. The opinion of Augustine and other fathers of the church with regard to attendance at the spectacles, whether of theatre or of circus, is well known; those who performed in them were rigidly excluded from church fellowship, and some- times even those who merely frequented them. Thus the first council of Aries, in its fourth canon, declared that those members of the church who drove chariots at the public games should, so long as they continued in that employment, be denied com- munion. (Compare the rule in the Ap. Const, viii. 32 ; ap. Bingham. A nt. Chr. Church, xvi. 4, 10.) In many cases, however, the weight of ecclesiastical authority proved insufficient to cope with the force of old custom, or with the fascination of a sport the unchristian character of which was not very easily demon-strable; and ultimately in Germany and elsewhere the old local races appear to have been admitted to a recognized place among the ceremonies peculiar to certain Christian festivals.

The first distinct indication which contemporary history affords of horse-racing as a sport occurs in the Description of the City of London of William Fitzstephen (c. 1174). He says that in a certain ” plane field without one of the gates (quidam planus campus re et nomine — Smithfield, quasi Smoothfield) every Friday, unless it be one of the more solemn festivals, is a noted show of well-bred (nobilium) horses exposed for sale. The earls, barons and knights who are resident in the city, as well as a multitude of citizens, flock thither either to look on or buy.” After describing the different varieties of horses brought into the market, especially the more valuable chargers tdextrarios preciosos). he says: ” When a race is to be run by such horses as these, and perhaps by others which, in like manner, according to their breed are strong for carriage and vigorous for the course, the people raise a shout and order the common horses to be withdrawn to another part of the field. The jockeys, who are boys expert in the management of horses, which they regulate by means of curb bridles, sometimes by threes and sometimes by twos, as the match is made, prepare

themselves for the con- test. Their chief aim is to prevent a competitor from getting before them. The horses too, after their manner, are eager for the race: their limbs tremble, and impatient of delay they cannot stand still; upon the signal being given they stretch out their limbs, hurry on the course, and are borne along with un- remitting speed. The riders, inspired with the love of praise and the hope of victory, clap spurs to their flying horses, lashing them with whips, and inciting them by their shouts " (see Stow's Translation).

In the reign of Richard I. knights rode at Whitsuntide on steeds and palfreys over a three-mile course for " forty pounds of ready gold," according to the old romance of Sir Bevys of Hampton. The feats of the tilt-yard, however, seem to have surpassed horse-racing in popular estimation at the period of the

crusades. That the sport was to some extent indulged in by King John is quite possible, as running horses are frequently mentioned in the register of royal expenditure; and we know that Edward III. had a number of running horses, but it is prob- able they were chiefly used for field sports.

An evidence of the growing favour in which horse-racing was held as a popular amusement is furnished by the fact that public races were established at Chester in 1512. Randle Holme of that city tells us that towards the latter part of Henry VIII.'s reign, on Shrove Tuesday, the company of saddlers of Chester presented to " the drapers a wooden ball embellished with flowers, and placed upon the point of a lance. This ceremony was performed in the presence of the mayor at the cross of the Roody or Roodee, an open place near the city; but this year (1540) the ball was changed into a silver bell, valued at three shillings and sixpence or more, to be given to him who shall run best and furthest on horseback before them on the same day, Shrove Tuesday; these bells were denominated St George's bells." In the reign of Elizabeth there is evidence from the poems of Bishop Hall (1597) that racing was in vogue, though apparently not patronized by the queen, or it would no doubt have formed part of the pastimes at Kenilworth; indeed, it seems then to have gone much out of fashion.

The accession of the Stuarts opened up an era of prosperity for the sport, for James I., who, according to Youatt, had encouraged if not established horse-racing in Scotland, greatly patronized it in England when he came to the throne. Not only did he run races at Croydon and Enfield, but he endeavoured to improve the breed of horses by the purchase for a high figure of the Arab stallion known as Markham's Arabian, which little horse, however, was beaten in every race he ran.

In 1607, according to Camden's Britannia, races were run near York, the prize being a little golden bell. Camden also mentions as the prize for running horses in Gatherley Forest a little golden ball, which was apparently anterior to the bell. In 1609 Mr Robert Ambrye, sometime sheriff of the city of Chester, caused three silver bells to be made of good value, which bells he appointed to be run for with horses on St George's day upon the Roodee, the first horse to have the best bell and the money put in by the horses that ran — in other words, a sweepstake — the bells to be returned that day twelvemonth as challenge cups are now; towards the expenses he had an allowance from the city. In 1613 subscription purses are first mentioned. Nicholls, in his Progress of James I., makes mention of racing in the years 161 7 and 1 619. Challenge bells appear to have continued to be the prizes at Chester, according to Randle Holme the younger, and Ormerod's History of Chester, until 1623 or 1624, when Mr John Brereton, mayor of Chester, altered the course and caused the horses to run five times round the Roodee, the bell to be of good value, £8 or £10, and to be a free bell to be held for ever — in other words, a presentation and not a challenge prize.

During James's reign public race meetings were established at Gatherley or Garterley, near Richmond in Yorkshire, at Croydon in Surrey, and at Enfield Chase, the last two being patronized by the king, who not only had races at Epsom during his residence at Nonsuch, but also built a house at Newmarket for the purpose of enjoying hunting, and no doubt racing too, as we find a note of there having been horse-races at this place as early as 1605. Races are also recorded as having taken place at Linton near Cambridge, but they were probably merely casual meetings. The prizes were for the most part silver or gold bells, whence the phrase " bearing away the bell." The turf indeed appears ' to have attracted a great deal of notice, and the systematic preparation of running horses was studied, attention being paid to their feeding and training, to the instruction of jockeys— although private matches between gentlemen who rode their own horses were very common, — and to the adjustment of weights, which were usually about 10 stone. The sport also seems to have taken firm hold of the people, and to have become very popular.

The reign of Charles I., which commenced in 1625, saw still more marked strides made, for the king not only patronized th«

racing at Newmarket, which we know was current in 1640, but thoroughly established it there, and built a stand house in 1667, since which year the races have been annual. Mention is likewise made in the comedy of the Merry Beggars, played in 1641, of races, both horse and foot, in Hyde Park, which were patronized by Charles I., who gave a silver cup, value 100 guineas, to be run for instead of bells. Butcher, in his survey of the town of Stamford (1646), also says that a race was annually run in that town for a silver and gilt cup and cover, of the value of £7 or £8, provided by the care of the aldermen for the time being out of the interest of a stock formerly made by the nobility and gentry of the neighbourhood.

In 1648 Clarendon tells us that a meeting of Royalists was held at Banstead Downs, as Epsom Downs were then called, " under the pretence of a horse-race," so that horse-racing at Epsom was not unknown early in the 17th century; Pepys, too, in his Diary of 1663, mentions his having intended to go to Banstead Downs to see a famous horse-race. Cromwell is said to have kept running horses in the year 1653, but in 1654 he appears to have gone so far as to forbid racing for six and eight months respectively. After the Reformation in 1660, a new impetus was given to horse-racing, which had languished during the civil wars, and the races at Newmarket, which had been suspended, were restored and attended by the king; and as an additional spur to emulation, according to Youatt, royal plates were given at each of the principal courses, and royal mares, as they Were called, were imported from abroad. Charles II. rebuilt the house originally erected at Newmarket by James I., which had fallen into decay. The Round course was made in 1666, and racing at the headquarters of the turf was regulated in the most systematic way, as to the course, weights and other conditions. Charles II. was the first monarch who entered and ran horses in his own name; and, besides being a frequent visitor at the races on Newmarket Heath, and on Burford Downs, near Stockbridge, where the Bibury Club meeting was held, he established races at Datchet. In the reign of James II. nothing specially noteworthy occurred, but William III. con- tinued former crown donations and even added to them.

Anne was much devoted to horse-racing, and not only gave royal plates to be competed for, but ran horses for them in her own name. In 1703 Doncaster races were established, when 4 guineas a year were voted by the corporation towards a plate, and in 17 16 the Town Plate was established by the same authority to be run on Doncaster Moor. Nearly a century, however, elapsed before the St Leger was instituted. Matches at New-market had become common, for we find that Basto, one of the earliest race-horses of whom we have any authentic account, won several matches there in 1708 and 1709. In the latter year, according to Camden, York races were established, the course at first being on Clifton Ings, but it was subsequently removed to Knavesmire, on which the races are now run. In 1

7 10 the first gold cup said to have been given by the queen, of 60 guineas value, was run for by six-year-old horses carrying 12 stone each, the best of three 4-mile heats, and was won by Bay Bolton. In 1711 it was increased to 100 guineas. In 171 2 Queen Anne's gelding Pepper ran for the Royal Cup of £100 at York, and her Mustard, a nutmeg-grey horse, ran for the same prize in 1713. Again in 1714 her Majesty's bay horse Star won a sweepstake of 10 guineas added to a plate of £40 at the same place, in four heats, carrying n stone. In 1716 the Ladies' Plate at York for five-year-olds was won by Aleppo, son of the Darley Arabian. Racing and match-making continued to be a regular sport at Newmarket, and at York and Hambleton, and we also find a record of a race at Lincoln in August 171 7 for a silver tea-board, won by Brocklesby Betty, as was the Queen's Plate at Black Hambleton in the year before.

Between 1714 and 1720 there were races at Pontefract in Yorkshire for plates or money. The best of two out of three heats was to be the winner, provided the said horse was not distanced in the third heat — the distance post being 1 furlong from the winning post; and this appears to have been a usual condition. In or about the year 1721 Flying Childers is said to

have run a trial against Almanzor and Brown Betty over the Round course at Newmarket (3 m. 4 f. 93 y.) in 6 m. 40 s., and another trial over the Beacon course (4 m. 1 f. 138 y.) in 7 m. 30 s. — which is fast even for a six-year old; but it is just possible that in those days the art of time-taking was anything but perfect. In 1 721 George I. gave 100 guineas in specie in lieu of the gold cup at York presented by Anne, and the king's or queen's plates have been given in cash ever since. In 1725 a ladies' plate was run for on the 14th of September by female riders on Ripon Heath in Yorkshire. In 1 7 2 7 Mr John Cheney established the Racing Calendar — an historical list of all the horse matches run, and of all plates and prizes run for in England and Wales of the value of £10 or upwards in 1727, &c. No systematic records had till then been preserved of the running of the race- horses of the day, and it is only through the performances of certain celebrated horses and mares that we have any informa- tion of what actually took place, and even that is more or less of a fragmentary kind. At this time racing was thoroughly established as a national and popular sport, for there were upwards of a hundred meetings in England and Wales; but the plates or sweepstakes run for were for the most part of small value, as £10, £20, £30, £40, and sometimes £50. In 1727, according to Whyte, there were only a dozen royal plates run for in England: one at Newmarket in April for six-year-old horses at 12 stone each, in heats over the Round course — first called the King's Plate course; one for five-year-old mares at 10 stone each, in one heat, and another in October for six-year-old horses at 12 stone, in heats over the same course; one at York (which commenced in 1711) for six-year-old horses, 12 stone each, 4-m. heats; one at Black

Hambleton, Yorkshire (of which no regular account was kept until 171 5), for five-year-old mares, 10 stone, 4 m.; one at each of the following places, Nottingham, Lincoln, Guildford, Winchester, Salisbury and Lewes, for six-year-old horses, 12 stone each, 4-m. heats; and one at Ipswich for five-year-old horses-, 10 stone each. A royal plate was also run for at Edinburgh in 1728 or 1729, and one at the Curragh of Kildare in 1741.

In 1739 an act was passed to prevent racing by ponies and weak horses, 13 Geo. II. cap. 10, which also prohibited prizes or plates of less value than £50. At this period the best horses seldom ran more than five or six times, and some not so often, there being scarcely any plates of note except royal ones, and very few sweepstakes or matches of value except at Newmarket until after 1750; moreover, as the races were run in heats, best three out of four, over a course of several miles in length, the task set the horses before winning a plate was very severe, and by no means commensurate with the value of the prize. In 1 751 the great subscription races commenced at York, the city also giving £50 added money to each day's racing. At New-market there were only two meetings, one in April and the other in October, but in 1753 a second spring meeting was established, and in that year the Jockey Club, which was founded in 1750, established the present racing ground. In 1762 a second October meeting was added, in 1765 the July meeting, in 1770 the Houghton meeting, and in 1771 the Craven meeting. In 1766 Tattersall's was established at Hyde Park Corner by Richard Tattersall for the sale of horses; it remained the great emporium of horses, and the rendezvous for betting on horse races, until 1865, when, the lease of the premises at the Corner having run out, it was removed to Knightsbridge.

We now come to a very important period — that at which the great three-year-old races were instituted.

The St Leger was established in 1776 by Colonel St Leger, who resided at Parkhill, near Doncaster. On the 24th of September, during the Doncaster races, which took place annually in the autumn, at his suggestion a sweepstake of teger. 25 guineas each for three-year-old colts and fillies was run over a 2-m. course; there were six competitors, the property of as many subscribers, — a very small beginning, it must be owned. The race was won by a filly by Sampson, belonging to Lord Rockingham, which was afterwards named Allabaculia. In the following year the same stake had twelve

subscribers and ten starters, and was won by Mr Sotheron's Bourbon. It was not, however, until the succeeding year, 1778, that it was named the St Leger, in compliment to the founder, at the suggestion of the marquis of Rockingham. The stakes were increased in 1832 to 50 sovs. each, and the weights have been raised from time to time to keep pace with modern requirements. The Doncaster Cup, a weight for age race for three- year-olds and upwards, was established in 1801. The course is nearly flat, of an oval or kite shape, about if m. round the town-moor.

The Epsom Derby and Oaks were established in 1779 and 1780, the Oaks in the former and the Derby in the latter year. It is true that in 1730 Epsom races became annual, but and Oaks tne P r ' zes were nothing more than the usual plates run for in heats, the money required being raised by voluntary subscriptions, as well by the owners of booths on the downs as by the parties more immediately interested, whence arose the custom of charges being made by the lord of the manor for permission to erect booths, &c. during the race- meetings. On the 14th of May 1779 the twelfth earl of Derby originated the Oaks stakes (named after his seat or hunting-box " The Oaks " at Woodmansterne), a sweepstake for three-year- old fillies run on a course i| m. long. The race was won by Lord Derby's bay filly Bridget, bred by himself — her sire being Herod and her dam Jemima. In the following year the earl established a sweepstake of 50 sovs. each, half forfeit, for three-year-old colts. This, the first Derby, was won by Sir C. Bunbury's chestnut colt Diomed by Florizel, son of Herod, who beat eight opponents, including the duke of Bolton's Bay Bolton and Lord Grosvenor's Diadem. These two races have since been run for regularly every year, the Derby, which before 1839 was run on the Thursday, now taking place on the Wednes- day, and the Oaks on the Friday, in the same week at the end of May.

Ascot races, which are held on Ascot Heath, were established by the duke of Cumberland, uncle of George III., and are patronized by royalty in state or semi-state. They are mentioned in the first Racing Calendar, published in 1727, but the races were for the most part plates and other prizes of small importance, though a royal plate for hunters appears to have been given in 1 785. The Gold Cup was first given in 1807, and has been regularly competed for ever since, though from 1845 to 1853 inclusive it went by the designation of the Emperor's Elate, the prize being offered by the emperor of Russia. In 1854. during the Crimean War, the cup was again called the Ascot Gold Cup, and was given from the race fund. The Queen's Vase was first given in 1838, and the Royal Hunt Cup in 1843, while in 1865 a new long-distance race for four-year-olds and upwards was established, and named the Alexandra Plate, after the Princess of Wales.

Goodwood races were established by the duke of Richmond on the downs at the northern edge of Goodwood Park in 1802, upon the earl of Egremont discontinuing races in his park at Petworth. The races take place at the end of July, on the close of the London season. The Goodwood Cup, the chief prize of the meeting, was first given in 181 2; but from 181 5 to 1824 inclusive there was no race for it, with the single exception of 1816.

During the latter half of the 18th century horse-racing de- clined very much in England, and numbers of meetings were discontinued, the wars which took place necessarily T.Y" _, causing the change. From the beginning of the 19th

Thousand, " , . „ . , f . r 1,

£,_.. century, and especially after the conclusion 01 the

French war in 1815, racing rapidly revived, and many

new meetings were cither founded or renewed after a period of

suspension, and new races were from time to time established.

Among others the Two Thousand Guineas at Newmarket for

three-year-old colts and fillies, and the One Thousand Guineas

for fillies, were established in 1809 and 1814 respectively, the

Goodwood Stakes in 1823, the Chester Cup and Brighton Stakes

in 1824, the Liverpool Summer Cup in 1828, the Northumberland

Plate in 1833, the Manchester Cup in 1834, the Ascot Stakes

Ascot Races.

Goodwood.

and the Cesarewitch and Cambridgeshire Handicaps at New- market in 1839, the Stewards' and Chesterfield Cups at Goodwood in 1840, the Great Ebor Handicap at York in 1843, and, to omit others, the City and Suburban Handicap at Epsom in 1851, and the Lincoln Handicap in 1853.

Two-year-old racing was established very shortly after the great three-year-old races, and on a similar footing, that is to say, the competitors carried the same weights, with the exception of a slight allowance for sex, — the July Stakes at the Newmarket Midsummer Meeting having been founded as

early as 1 786. The Woodcote Stakes at Epsom succeeded in 1807, the Champagne Stakes at Doncaster in 1823, the Criterion Stakes at the Houghton Meeting in 1829, the Chesterfield Stakes at the Newmarket July meeting in 1834, the New Stakes at Ascot in 1843, the Middle Park Plate (or two-year-old Derby, as it is sometimes called) at the Newmarket Second October Meeting in 1866, the Dewhurst Plate at the Houghton Meeting in 1875, and the Rich- mond Stakes at Goodwood in 1877. (E. D. B.)

Present Conditions. — Horse-racing, usually described as " the national sport," has greatly advanced in general popularity in the British Isles. There is no doubt that the best specimens of the English thoroughbred horse are the & ass,c finest animals of their kind in existence; the value of an England. infusion of the blood for chargers, hunters, hacks, and other varieties is scarcely to be overestimated ; and the only way of ascertaining what animals may be most judiciously employed for breeding purposes is to submit them to the tests of preparation for and performance on the turf. Racing is therefore a practical necessity. On some accepted authority, the origin of which is not to be traced, five races run each season by three-year-olds are distinguished as " classic." Of these the chief, by universal consent, is the Derby, which takes place at Epsom during the week which includes the 3 1st May. The Epsom course, on which the Derby has been run since its origin in 1780, is by no means a good one, in consequence of the abrupt turn at Tattenham Corner; and the severe descent after this turn is made is also held to be a disadvantage, though a really good horse should be able to act on ascents, descents and level ground with equal relative facility. In many respects the St Leger, run at Don- caster about the middle of September, is a better test, as here colts and fillies meet when both are presumably able to do themselves the fullest justice. September, indeed, has been called " the Mares' Month," for though fillies are eligible to run in the Derby, they are very frequently out of sorts and always more or less uncertain in their performances during the summer — only four have been successful in 129 contests for the stake — whereas in the autumn their numerous victories in the St Leger prove them to be at their best. It was the recognition of this fact which induced an alteration of the weights in the year 1882, previously to which fillies had carried 5 lb less than colts; the weights, formerly 8 st. 10 lb and 8 st. 5 lb, are now 9 st. and 8 st. 1 ilb. The Doncaster course is superior for racing purposes to that at Epsom, where the Oaks, another of the " classic races," is run on the Friday following the Derby; the other two contests which come into this category being the Two Thousand Guineas for colts and fillies, and the One Thousand Guineas for fillies only. These races take place at Newmarket during the First Spring Meeting, the former always on a Wednesday, the latter on Friday. The expression " a Derby horse " is common, but has no

precise significance, as the three- year-olds vary much in capacity from year to year. It is generally understood, for instance, that Ormonde, who won the Derby in 1886, must have been at least 21 lb superior to Sir Visto or Jeddah, who were successful in 1895 and 1898. By their ability to carry weight the value of horses is estimated on the turf. Thus one horse who beats another by a length over a distance of a mile would be described as a 5-Ib better animal.

The term ” handicap horse ” once had an adverse significance which it does not now possess. In handicaps horses carry weight according to their presumed capacity, as calculated by handicappers who are licensed by the Jockey Club and

employed by the directors of different meetings. The idea of a handicap is to afford chances of success to animals who would

have no prospect of winning if they met their rivals on Horses” ec l ua l terms; but of late years the value of handicaps*

has been so greatly increased that few owners resist the temptation of taking part in them. Horses nowadays who do not run in this kind of contest are very rare, though a few, such as Ormonde, Isinglass, and Persimmon, never condescended to this class of sport. The duke of Westminster did not hesitate to put his Derby winner Bend Or into some of the chief handicaps; and it is, of course, a great test of merit when horses carrying heavy weights show marked superiority in these contests to rivals of good reputation more lightly burdened. St Gatien, who dead-heated with Harvester in the Derby of 1884; Robert the Devil, who won the St Leger in 1880 and on several occasions beat the Derby winner Bend Or; and La Fleche, who won the Oaks and the St Leger in 1892, added to the esteem in which they were held by their successes under heavy weights, the colts in the Cesarewitch, the filly in the Cambridgeshire. Of the chief handi- caps of the year, special mention may be made of the City and Suburban, run at the Epsom Spring Meeting over ij m.; the Kempton Park Jubilee, over 1 m.; the Ascot Stakes, 2 m., and the Royal Hunt Cup, 1 m.; the Stewards’ Cup at Goodwood, six furlongs; the Cesarewitch Stakes and the Cambridgeshire Stakes at Newmarket, the former 21 m., the latter now a mile and a furlong — till lately it was ” a mile and a distance ” — ” a distance ” on the Turf being a fixed limit of 240 yds. The cups at Manchester, Newbury,

and Liverpool are also handicaps of some note, though it may be remarked that the expression " a cup horse " is understood to imply an animal capable of distinguish- ing himself over a long distance at even weights against the best opponents. There are many other valuable stakes of almost equal importance, diminishing to what are known as " selling handicaps," the winners of which are always put up for sale by auction immediately after the race, in the lowest class of them the condition being that the winner is to be offered for £50. No stake of less than £100 can be run for under Jockey Club rules, which govern all reputable flat racing in England, nor is any horse ever entered to be sold for less than £50. As horses mature they are naturally able to carry heavier weights.

Scale of Weight for Age.

The following scale of weight for age is published under the sanc- tion of the Stewards of the Jockey Club as a guide to managers

£10,000 Races.

Age.

Vlar. and April.

May.

June.

July.

Aug.

Sept.

Dct. and Nov.

Five Furlongs —

St. lb

st. lb

St. ft

st. lb

st. lb

St.

ft

St. ft

Two years ….

6

6 2

6 7

6 9

7

7

4

7 7

Three years

8 2

8 3

8 5

8 7

8 9

8

10

8 11

Four years ….

9

9

9

9

9

9

9

Five, six and aged

9 1

9

9

9

9

9

9

Six Furlongs —

Two years ….

6

6 4

6 7

6 11

7

7

5

7 7

Three years

8 4

8 6

8 8

8 10

8 12

9

9 2

Four years ….

9 7

9 7

9 7

9 7

9 7

9

7

9 7

Five, six and aged

9 9

9 8

9 7

9 7

9 7

9

7

9 7

One Mile —

Two years ….

6

5

6 7

Three years

7 9

7 11

7 13

8”2

s” 4

8

5

8 6

Four years ….

9

9

9

9

9

9

9

Five, six and aged

One Mile and a Half —

9 4

9 3

9 2

9

9

9

9

Two years ….

6

6 4

Three years

7 7

7 9

7 11

7 13

8 1

8

3

8 5

Four years ….

9

9

9

9

9

9

9

Five, six and aged

9 5

9 4

9 3

9 2

9 1

9

9

Two Miles —

Two years ….

6

6 2

Three years . .

7”8

7 11

7 12

8

«“3

8

4

8 5

Four years ….

9 4

9 4

9 4

9 4

9 4

9

4

9 4

Five, six and aged

9 10

9 9

9 .8

9 7

9 &

9

5

9 4

Three Miles —

Three years

7 1

7 4

7 5

7 7

7 9

7

ii

7 13

Four years ….

9

9

9

9

9

9

9

Five years ….

9 8

9 7

9 6

9 5

9 5

9

4

9 3

Six and aged

9 10

of race meetings, but is not intended to be imperative, especially as regards the weights of two- and three-year olds relatively to the old horses in selling races early in the year. It is founded on the scale published by Admiral Rous, and revised by him in 1873, but has been modified in accordance with suggestions from the principal trainers and practical authorities.

In the year 1884 the managers of Sandown Park formulated the scheme of a race for a prize of £10,000, to be called the Eclipse Stakes, and to be run over a distance of i{ m. In order to secure a large entry, horses were to be nominated soon after their birth; owners who per- ceived the hopelessness of their nominations could withdraw at stated intervals by the payment of increasing forfeits; if their animals finally went to the post a stake amounting in all to £115 would have to be paid for them; and thus it will be seen that owners were really running for their own money, though if there were an insufficient number of entries the funds of the club might be taxed to supply the deficiency. The scheme was found to be attractive, and the example was followed at Leicester and at Manchester, at both of which places, however, it lapsed. At Newmarket, under the immediate auspices of the Jockey Club, the £10,000 races succeeded, and there were two of them each year. The Princess of Wales's Stakes was run for the first time in 1894 at the First July Meeting, and the Jockey Club Stakes at the First October. The former has, however, now been reduced to £2000 added to a sweepstake of £30 each with a minor forfeit. In the year 1900 a fourth race of similar character, the Century Stakes, was originated at Sandown, but the experiment proved a failure, and the contest was discontinued.

The age of the thoroughbred horse is always dated from the 1st January. Foals are generally born in February, March or April, though not a few good horses have been born in May; they become yearlings, therefore, on the 1st uˆ aces ' January following, two-year-olds twelve months later, and many of them begin to race in the following March, for flat racing always starts during the week which contains the 25th, except when Easter falls

unusually early. In France no two- year-olds run until the 1st August, and discussion is frequently raised as to the respective wisdom of the English and French systems. It happens, however, that some young horses " come to hand " soon, and deteriorate with equal rapidity. They are, in fact, able to win races at the beginning of the season, and fail to hold their own later in the year against bigger and more powerful animals of their own age who have taken longer to mature; so that there is some argument in favour of the earlier date. The first noteworthy two-year-old race is the Brocklesby Stakes, run at Lincoln during the first week of the season. Sometimes the winner of the Brocklesby is really a good animal, as was the case with The Bard in 1885 and Donovan in 1888, but as a general rule when the autumn comes he is found to be far inferior to the winners of subsequent two-year- old races of good class. It is seldom that a first-class two-year-old appears before the Ascot Meeting about the middle of June, though horses of character some- times run for the Woodcote Stakes at Epsom and in other contests elsewhere. The names of many of the most famous horses on the turf are found in the list of winners of the New Stakes at Ascot, which was first run in 1843 and maintains its character. In 1890 the Coventry Stakes was originated, and is regarded as a race of practically equal importance. The July Stakes at Newmarket is the oldest of existing two-year-old races, having been first run in 1786. The list of winners is a brilliant one. The Chesterfield Stakes ranks with it. The best two-year-olds are usually seen out at Goodwood, and as a general rule those that have chiefly distinguished themselves during the year, and are to make names for themselves later in life, are found contesting the Middle Park Plate at the Newmarket Second October Meeting and the Dewhurst Plate at the Newmarket Houghton. The Middle Park Plate is generally worth over £2000, the

other races named are -between £1000 and £2000 in value; but these are not the richest two-year-old prizes of the year, the value of the National Breeders' Produce Stakes at Sandown, run on the day following the Eclipse, being between £4000 and £5000, and the Imperial Stakes at Kempton Park falling not very far short of £3000. As a rule, a colt who has been specially successful as a two-year-old maintains his capacity later in life, unless it be found that he cannot " stay " — that is to say, is unable to maintain his best speed over more than five or six furlongs; but it is frequently the case that fillies who have won good races as two-year-olds entirely lose their form and meet with little or no success afterwards.

*Newmarket is called with reason ” the headquarters of the Turf.” There are about forty training establishments in the town, each trainer being in charge of an average of in””*e< thirty to forty horses, irrespective of mares, foals and yearlings. During the year eight race meetings are held on the Heath: the Craven; the First and Second Spring; the First and Second October — the First October usually occurring at the end of September; and the Houghton. These are contested on "the Flat," the course which includes the Rowley Mile. It is said that the Rowley Mile is so called from the fact of its having been a favourite race-ground with Charles II. The First and Second July Meetings take place on another course, known as •' Behind the Ditch," the Ditch being the huge embankment which runs through several counties and has existed from time immemorial. The Craven Stakes for three-year-olds is an event of some importance at the first meeting of the year. It used to finish on an ascent at what is called the " Top of the Town," a course over which the handicap for the Cambridgeshire was run. This course has now been abandoned and the stand pulled down. At the First Spring Meeting the Two Thousand Guineas and the One Thousand Guineas occur, as already stated, but the names do not represent the values of the stakes, which are, in fact, usually worth close on £5000 each. The July Stakes and the Princess of Wales' Stakes are run at the First July Meeting. The Jockey Club Stakes is the leading event of the First October; the Cesarewitch and the Middle Park Plates follow in the Second October; the Criterion Stakes, another of the few races that once finished at the " Top of the Town," the Cambridgeshire and the Dewhurst Plate take place at the Houghton Meeting. The majority of races finish at the Rowley Mile post; but there are three other winning-posts along the Rowley Mile. " Behind the Ditch " races finish at two different posts, one of which enables horses to avoid the necessity of gallop- ing up the severe ascent of the " Bunbury Mile." Although, as a rule, there is no better racing to be seen than the best events at Newmarket, the programmes are often spun out by Ascot and se u; n g pi a tes and paltry handicaps, and a high level is meetings, nowhere so consistently maintained as at Ascot. The Ascot meeting is distinguished by the entire absence of selling plates, and much more "added money" is given than on any other course. Added money is the sum sup- plied by the directors of a race meeting, derived by them from the amounts paid for entrances to stands and enclosures; for in many races — the Ten Thousand prizes, for instance — owners run mainly or entirely for money which they have themselves provided. The Ascot Cup is generally spoken of as a race success in which sets the sea! to the fame of a good horse. It is a prize of the highest distinction, and of late years has been of considerable value, the winner in 1000 having gained for his owner £3430. That the number of runners for this race should be invariably small — the average for many years past has been about six — is not a matter of surprise to those who are familiar with*

the Turf. There are very few horses possessing sufficient speed and staying power to make it worth the while of their owners to submit them to the exceedingly severe test of a preparation for this race, which is run over 2j m. of ground at a time of year when the turf is almost always extremely hard everywhere, and harder at Ascot than almost anywhere else. There is no course on which more good horses have hopelessly broken down. All the prizes

are handsome, and success at Ascot confers much prestige, for the reason that the majority of horses that run are good ones; but annually there is a list of victims that never recover from the effects of galloping on this ground. Goodwood also attracts horses of high character, though some unimportant races fill out the programme. Formerly there were many meetings around London, which fell into disrepute in consequence of the manner in which they were conducted. These have been replaced by well-managed gatherings in enclosed parks, and here the value of the prizes is often so high that the best horses in training are attracted. These meetings include Sandown, Kempton, Gatwick, Lingfield, Newbury and Hurst Park. Liver- pool, Manchester, Birmingham, Brighton,York and various other towns have race meetings twice or oftener in the course of each year. At the various fixtures over half a million of money is annually given in stakes. The largest sum ever won by a horse was the £57,185 gained by Isinglass in 1892-1895. Donovan follows with £54,935. In all probability these large totals would have been considerably exceeded had not Flying Fox — who had won in his first two seasons £40,090 — been disqualified by the death of his owner, the duke of Westminster, as this colt was engaged in the four £10,000 races of 1900, in which to all appear- ance he could not have been beaten, so much was he superior to his contemporaries. The death of an owner of horses dis- qualifies the animals he has entered — a necessary regulation, as otherwise an heir might be burdened with a stable of horses the possession of which would entail heavy expense and serious responsibility on a person who perhaps had no knowledge of or taste for racing.

The value of an unquestionably good horse is enormous. It has been seen what handsome prizes are offered for competition, and when withdrawn from the Turf the horse may secure a large income to his owner at the stud. A horses" stallion's fee of 600 guineas (as in the case of St Simon) should mean well over £20,000 a year; and fees of 100 guineas and more are common. Proved merit on the Turf is considered essential in a sire, though there have been instances of horses, unsuccessful during their racing career, who have distinguished themselves at the stud: Wisdom, sire of the Derby winner Sir Hugo, and several notable examples might be cited. Mares are much more uncertain in this respect. On the whole, the famous mares that have won the Oaks, the St Leger and other leading races, have been apt to

fail in the paddocks; but there is always a hope of success with them, and the large sum of 12,600 guineas was paid for La Fleche when she had ceased from active service on the Turf. For None-the- Wiser 7200 guineas was given; and 4600 guineas for Wedlock when well advanced in years, on the strength of her having been the dam of a good horse called Best Man. Well-bred mares that have shown no capacity for racing are, however, frequently the dams of good winners. Breeding is a lottery. An Australian enthusiast some years since published a book the object of which was to enable breeders to produce good horses by a species of mathe- matical calculation; but the fallacy of the " Figure System" was at once proved by the simple circumstance that in very many cases the own brothers and sisters of good winners, whose breeding conformed entirely to the system, proved to be utterly worthless for racing purposes. It is a fact difficult of explanation that the majority of famous winners have been privately bred by their owners. Many persons breed for sale, in some cases sparing no expense or trouble in the endeavour to secure good results, and yearlings sold by auction have fetched prices, of from 10,000 guineas (paid for Sceptre, a daughter of Persimmon and Ornament, in 1900) downwards; sums of over 1000 guineas being frequently given. That so large a proportion of high- priced yearlings should turn out failures is not at all a matter for surprise, considering the uncertainties of the Turf, but it by no means follows that a high-priced yearling is necessarily an expensive animal; 5500 guineas was, for instance, given for La Fleche, who won for her owner £34,585 in stakes, and, as already observed, was subsequently sold for 12,600 guineas. The principal yearling sales take place during the July meeting

guineas

at Newmarket and the Doncaster meeting in September. There are also sales at Ascot and elsewhere. The Royal Stud at Bushey Park, where Memoir, La Fleche, Best Man and other good animals were bred, has now been abandoned.

In many cases trainers have graduated from jockeys. The usual charge to an owner is 50s. a week per horse, but, as regards the cost of a horse in training, to this there are various additions irrespective of entrances to races, forfeits, travelling, jockey's fees, &c. The recognized sum paid to a jockey is 3 guineas for a losing mount, 5 for winning. In many cases special terms are made; the principal owners usually have a claim on a rider's services, and for this call as much as £5000 per annum, exclusive of the usual riding fees, has been given.

From time immemorial until within a very recent period jockeys rode in much the same style, though, of course, with varying degrees of skill. Many hundreds of boys exercise daily at Newmarket and other training grounds, all of them necessarily having a firm seat in the saddle, for the thoroughbred horse is, as a rule, high-ceuraged and apt to play violent tricks; but though most of these lads find chances to distinguish themselves in trials and races for apprentices, probably not 5 % grow into professional jockeys, increasing weight keeping many from the business, as a jockey has few chances unless he can ride well under 9 stone. Knowledge of pace is a rare gift or acquisition which is essential to successful jockeyship. The rider must also be quick to perceive how his own horse is going — -what he has " left in him "; he must understand at a glance which of his rivals are beaten and which are still likely to be dangerous; must know when the moment comes for the supreme effort to be made, and how to balance and prepare the horse for that critical struggle. At the beginning of the race the jockey used to stand in his stirrups, with the idea of removing weight from the horse's back and preserving perfect steadiness; towards the end of the race, if it were necessary to drive the animal home, he sat down " to finish."

This method used to be adopted in all countries, but recently a new system came into practice in America. Instead of putting the saddle in the middle of the horse's back, where it had always been placed previously, it was shifted forward on to the animal's withers. The jockey rode with very short stirrups, leaning forward over the neck and grasping the reins within a few inches of the horse's mouth. The appearance of this was un- gainly in the extreme and an entire departure from ancient ways (though Fordham and a few other riders of great reputation had always sat much more forward than their contemporaries), but it was found to be remarkably effective. From the position thus adopted there was less resistance to the wind, and though the saving in this respect was largely exaggerated, in racing, where success or failure is frequently a matter of a very few inches, every little that helps is to be considered. The value of the discovery lay almost entirely in the fact that the horse carries weight better — and is therefore able to stride out more freely — ■ when it is placed well forward on his shoulders. With char- acteristic conservatism the English were slow to accept the new

plan. Several American jockeys, however, came to England. In all the main attributes of horsemanship there was no reason to believe that they were in the least superior to English jockeys, but their constant successes required explanation, and the only way to account for them appeared to be that horses derived a marked advantage from the new system of saddling. A number of English riders followed the American lead, and those who did so met with an unusual degree of success. Race-riding, in- deed, was in a very great measure revolutionized in the closing years of the 19th century.

Of late years American horses — bred, it must always be remembered, from stock imported from England — have won many races in England. Australian horses have also been sent to the mother country, with results re- munerative to their owners, and the intermixture of blood which will necessarily result should have beneficial con- sequences. French horses — i.e. horses bred in France from

immediate or from more or less remote English parentage- have also on various occasions distinguished themselves on" English racecourses. That coveted trophy, the Ascot Cup, was won by a French horse, Elf II., in 1898, it having fallen also to the French-bred Verneuil in 1878, to Boiard in 1874, to Henry in 1872 and to Mortemer in 187 1. In the Cesarewitch Plaisanterie (3 yrs., 7 st. 81b) and Tenebreuse (4 yrs., 8 st. 12 ib) were suc- cessful in 1885 and 1888; and Plaisanterie also carried off the Cambridgeshire as a three-year-old with the heavy weight of 8 st. 12 lb in a field of 27 runners. In most respects racing in France is conducted with praiseworthy discrimination. There are scarcely any of the five- and six-furlong scrambles for horses over two years old which are such common features of English programmes.

That the horses who have covered various distances in the shortest times on record must have been exceptionally speedy animals is obvious. The times of races, however, Time.

frequently form a most deceptive basis in any attempt to gauge the relative capacity of horses. A good animal will often win a race in bad time, for the reason that his opponents are unable to make him exert himself to the utmost. Not seldom a race is described as having been " won in a canter," and this necessarily signifies that if the winner had been harder pressed he would have completed the course more quickly. The following figures show the shortest times that had been occupied in winning over various distances up to the spring of 1910: —

Foreign horses.

Five furlongs

Six furlongs Seven furlongs

Mile

Mile and a quarter Mile and a half Mile and three quarters Two miles …. Two miles and a half Three miles

Mirida (2 years), Epsom, 1905 Le Buff (aged), Epsom, 1903 Master Willie (aged), Epsom, 1903 Master Willie (5 years), Epsom, 1901 Vav (4 years), Epsom, 1907 Caiman (4 years), Lingfield, 1900 Housewife (3 years), Brighton, 1904 Zinfandel (3 years), Manchester, 1903 Golden Measure (4 years), York, 1906 Pradella (aged), Ascot, 1906 Bachelor's Button, Ascot, 1906 Corrie Roy, Ascot, 1884

o 56!

7!

20g

*33**

if

284

57f i9|

23 k

9

It may be noted that, as compared with similar records in 1901, only three of these latter held good in 1910, i.e. the mile, the six fur- longs and the three miles. The fastest times over a mile and a half (the Derby and Oaks distance) up to 1901 may be repeated here as of some interest: Avidity, 2 mm. 30 sees., in September 1901 at Doncaster; Santoi, 2 min. 31 sees., in May 1901 at Hurst Park; King's Courier, 2 min. 31 sees., in 1900 at Hurst Park; Landrail, 2 min. 34 sees., in September 1899 at Doncaster; Carbiston, 2 min. 37§ sees., in August 1899 at York; Bend Or, 2 min. 40 sees., in 1881 at Epsom (gold cup): Volodyovski won the Derby in 1901, and Memoir the Oaks in 1890, in 2 min. 40* sees.*

As regards time in famous races, Ormonde, perhaps the best horse of the 19th century — one, at any rate, that can scarcely have had a superior — occupied 2 minutes 45ˆ seconds in winning the Derby; and Lonely, one of the worst mares that have won the Oaks, galloped the same mile and a half

in 2 seconds less. Ormonde's St Leger time was 3 m. 2if s., and Sir Visto, one of the poorest specimens of a winner of the great Doncaster race, took 3 m. 18 f s. The regulation of the weight to'be carried serves to " bring the horses together," as the popular sporting phrase runs — that is to say, it equalizes their chances of winning; hence handicaps, the carrying of penalties by winners of previous races, and the granting of " maiden allowances." A horse that has never won a race, and is therefore known as a " maiden," often has an allowance of as much as 7 ft made in its favour.

Sport is carried on under the auspices of the Jockey Club, a self- elected body of the highest standing, whose powers are absolute and whose sway is judicious and beneficent. Three stewards, one of whom retires each year, when a c/u ^_ oc ey successor is nominated, govern the active — and ex-tremely arduous — work of the club. They grant licences to trainers and jockeys and all officials, and supervise the whole business of racing. The stewards of the Jockey Club are ex officio stewards of Ascot, Epsom, Goodwood and

Doncaster. All other meetings are controlled by stewards, usually well-known patrons of the Turf invited to act by the projectors of the fixture, who settle disputed points, hear and adjudicate on objections, &c, and, if special difficulties arise, report to the stewards of the Jockey Club, whose decision is final.

Steeplechasing has altered entirely since the first introduction of this essentially British sport. In early days men were

accustomed to match their hunters against each other chasing. anc ^ "de across country to a fixed point near to some

steeple which guided them on their way; and this is no doubt, in several respects, a class of sport superior to that now practised under the name of steeplechasing; for it tested the capacity of the horse to jump fences of all descriptions, and provided the rider with opportunities of showing his readiness and skill in picking the best line of country. But racing of this kind afforded spectators a very small chance of watching the struggle ; and made-up steeplechase courses, the whole circuit of which could be viewed from the enclosures, came into existence. The steeplechase horse has also changed. The speed of the thoroughbred is so much greater than that of all other breeds that if one were in the field, if he only stood up and could

jump a little, his success was certain; consequently, except in " point- to-point " races, organized by various hunts, where a qualifica- tion is that all starters must have been regularly ridden with hounds, few other than thoroughbred horses are nowadays ever found in races run under the rules of the National Hunt Committee, the body which governs the sport of steeplechasing. A considerable proportion of existing steeplechase horses have done duty on the flat. Members of certain equine families display a special aptitude for jumping; thus the descendants of Hermit, who won the Derby in 1867, are very frequently successful in steeplechases — Hermit's son Ascetic, the sire of Cloister, Hidden Mystery and other good winners, is a notable case in point. The sons and daughters of Timothy and of several other Hermit horses often jump well. When a flat-race horse appears to have comparatively poor prospects of winning under Jockey Club rules, he is frequently, if he " looks like jumping," schooled for steeplechasing, generally in the first place over hurdles, and subsequently over what is technically called " a country," beginning with small fences, over which he canters, led by some steady animal who is to be depended on to show the way. A great many steeplechase horses also come from Ireland. They are usually recognizable as thoroughbred, though it is possible that in some cases the name of an ancestor may be missing from the Stud Book. Irish horse-masters are for the most part particu- larly skilful in schooling jumpers, and the grass and climate of Ireland appear to "have beneficial effects on young stock; but, as a rule, the imported Irish horse improves consider- ably in an English training-stable, where he is better fed and groomed than in most Irish establishments. All steeple- chase courses must at the present time contain certain regula- tion jumps, the nature of which is specified in the National Hunt rules: —

44. In all steeplechase courses there shall be at least twelve fences (exclusive of hurdles) in the first 2 m., and at least six fences in each succeeding m. There shall be a water jump at least 12 ft. wide and 2 ft. deep, to be left open, or guarded only by a perpendi- cular fence not exceeding 2 ft. in height. There shall be in each m. at least one ditch 6 ft. wide and 3 ft. deep on the taking-off side of the fence, which ditch may be guarded by a single rail, or left open, and which fence must be 4 ft. 6 in. in height, and, if of dead brush- wood or gorse, 2 ft. in width.

45. In all hurdle-race courses there shall be not less than eight flights of hurdles in the first 2 m., with an additional flight of hurdles for every quarter of a m. or part of one beyond that distance, the height of the hurdles being not less than 3 ft. 6 in. from the bottom bar to the top bar.

Natural fences would no doubt be desirable if they could be utilized; but it is obvious that fences must be made up, because when the same hedge is jumped frequently, and for the most part in the same place — as it is the

object of riders to go the shortest way round — gaps would necessarily be made. The use of

these made courses naturally renders the sport somewhat artificial, but under existing conditions this is unavoidable; and as a matter of fact, by reason of the conformation of the ground, the arrangement and make of the fences, courses do vary in no small degree. The steeplechase horse differs from the hunter in his method of jumping. In riding to hounds a man usually steadies his horse at a fence, and in almost every case the animal " dwells " more or less after the leap. In a steeple- chase, where speed is everything, horses must be taught to dash resolutely at their jumps without hesitation, and to get away with no pause on the other side; as a rule, therefore, an old steeplechase horse who is employed as a hunter is rarely a pleasant mount for any but a bold rider. It has been remarked that steeplechase horses are usually in the first place schooled over hurdles, and many animals remain hurdle racers till the end. More speed is required for hurdles than for a steeplechase course, and there is more money to be won over hurdles than over " a country." No hurdle race is worth so much as the Grand National or the Lancashire Handicap Steeplechase, the two richest prizes now offered; but, with the exception of these, hurdle-race stakes are as a rule of greater value. Except as a spectacle, there is little to be said in defence of this mongrel business, which is neither one thing nor the other; but hurdle races are popular and are therefore likely to continue. A few years ago an attempt was made to discriminate between what were called " hunters " and handicap steeplechase horses, and certain races were only open to the former class. It proved, however, to be a distinction without a difference; thoroughbred horses crept into the ranks of the so-called hunters, and when nominal hunters began to be entered for, and in some cases to win, the Grand National and other important steeplechases, for which they could be nominated by abandoning their qualifica- tion of hunter, the meaningless title was relinquished. Still more absurd were the hunters' flat races of a former day. In order to compete in these the rule was that an owner must produce a certificate from a master of hounds to the effect that his horse had been hunted. Thoroughbreds who lacked speed to win under Jockey Club rules used to be ridden to a meet, perhaps cantered across a field or two, and were then supposed to have become hunters. Animals who were genuinely and regularly utilized for the pursuit of foxes had of course no chance against these race-horses in shallow disguise. What are called National Hunt flat races still exist, the qualification being that a horse must have been placed first, second or third in a steeplechase in Great Britain or Ireland, after having jumped all the fences and completed the whole distance of the race to the satisfac- tion of at least two of the stewards, to whom previous notice must have been given in writing. There are no handicaps for such animals, and none is allowed

to carry less than 11 stone. No race under National Hunt rules can be of a shorter distance than 2 m., except for three-year-olds, who sometimes run a mile and a half over hurdles; and the lowest weight carried can never be less than 10 stone except in a handicap steeplechase of 3! m. or upwards, when it may be 9 st. 7ft.

Horses are ridden in these races either by gentlemen, or qualified riders or jockeys. The first of these classes comprises officers on full pay in the army or navy, persons holding com- missions under the Crown, bearing titles either in their own right or by courtesy, or members of certain social and racing clubs. Qualified riders may be farmers holding at least a hundred acres of land, their sons if following the same occupation, and persons elected by members of the National Hunt Com- mittee, a proviso being that they must never have ridden for hire; but it is feared that this rule is in not a few cases evaded. Professional jockeys are paid £5 for each mount or £10 if they win. The sport is governed by the National Hunt Committee, a body which receives delegated powers from the Jockey Club, and six stewards are elected every year to supervise the business of the various meetings. Steeplechases and hurdle races are either handicaps or weight-for-age races according to the following scale: —

1UNITEP STATES

For Steeplechases of J miles and upwards. From the 1st of January to the 30th of June, both inclusive:— 4 vrs. 5 yrs. 6 and aged

10 st. 3 ft 11 st. 8 lb 12 St. 3 lb

From the 1st of July to the 3 1st of December, both inclusive: — 4 yrs. 5 yrs. 6 and aged

II st. II st. 12 lb 12 st. 3 lb

For Steeplechases of less than 3 miles. From the 1st of January to the 30th of June, both inclusive: — 4 yrs. 5 yrs. 6 and aged

10 st. 10 lb 11 st. 10 lb ■ 12 st. 3 lb From the 1st of July to the 31st of December, both inclusive: —

4 yrs. 5 yrs. 6 and aged

11 st. 6 lb 12 st. 12 st. 3 lb

For Hurdle Races. From the 1st of January to the 31st of August, inclusive: — 4 yrs. 5 yrs. 6 and aged

11 st. 6 lb 11 st. 10 lb 12 st. o lb

From the 1st of September to the 31st of December, inclusive: — 3 yrs. 4 yrs. 5, 6, and aged

lost. 7ft 11 st. 12 lb 12 st. 3 lb

The great test of merit in a steeplechase horse is success in the Grand National, which is always run at Liverpool during the

first week of the flat-racing season. The course is Nation". ˆ m '> an ˆ includes thirty jumps, the fences being for*

the most part larger than are found elsewhere.' The average time occupied is well under ten minutes. The stake has varied in value since the race was originated in 1839; it now amounts to close on £2500. Only a very small percentage of steeplechase horses possess the speed and staying power to give them a chance in this race, and the number of entries year by year falls considerably short of a hundred, the prospects of many of these usually appearing hopeless to all but unduly sanguine owners. The average number of starters during the period 1860-1901 was rather over twenty. As many as thirty-two competed in 1909, when the French-bred Latteur III. won; in 1883, when Zoedone, ridden by her owner, Count Kinsky,was successful, only ten went to the post. Mishaps are almost invariably numerous; in most years about one-third complete the course. So severe is the task that for a long time many good judges of steeplechasing believed that no horse with more than 12 stone on his back could possibly win. In 1893, however, Cloister won in a canter by forty lengths carrying 12 st. 7 lb, and with the same weight Manifesto also won in 1899. The race which most nearly approaches the Grand National in importance is the Lancashire Handicap Steeplechase, run at Manchester over 3! m. early in April. The stake is worth about £1750. An interesting steeplechase called the Grand Sefton takes place at Liverpool about the middle of November; the distance is 3 m. During the winter, and extending into the spring, steeplechasing and hurdle racing are carried on at Sandown, Kempton, Gatwick, Lingfield. Newbury and Hurst Park; at Ludlow, Newmarket, Aldershot, Birmingham, Manchester, Windsor and other places. A race called the National Hunt Steeplechase, under the immedi- ate patronage of the National Hunt Committee, is run annually over a 4-mile course, the stake being £1000. Managers of various courses bid for the privilege of having the race on their ground, and it is therefore found in different localities. A con- dition is that no horse who has ever won a race can compete; and, as few owners are

willing to keep their animals with a view to success in this event, the field consists either of unknown horses or of those that have been beaten.

Australia

Racing in Australia has its headquarters at Sydney, under the government of the Australian Jockey Club, the principal course being at Ranwick; and at Melbourne, where the Victoria Jockey Club is supreme, the principal course being at Flemington. In New Zealand sport is carried on under the authority of delegates from the chief racing clubs, who meet in conference. There is a Sydney Derby and a Victoria Derby, and a notable event at Flemington is the Champion Race, weight-for-age, for three-year-olds and upwards, which usually attracts the best horses in training, as the fee at which a sire stands depends in a great measure on hi.s success in this contest. This race is over a distance of 3 m., and to ensure a good pace there is a regulation that the time in which it is run must not exceed 5 minutes 40 seconds, though the stewards have power to

extend this in case the ground should be made exceptionally heavy by rainy weather, The Melbourne Cup is regarded as one of the most important races in the state. This is a handicap, and in com- parison with English races may perhaps be ranked with the Cesare- witch. The birth of horses dates from the 1st of August, which corresponds as nearly as possible to the 1st of February in England, so that the Australian horses are practically seven months younger than the English — a matter of some importance in the case of those sent to run in England. There are few races which close long before the date of decision, and practically all the good animals run in handicaps. The five- and six-furlong races for other than two-year- olds, so common in Great Britain, are extremely rare; and it is asserted by colonial sportsmen that their horses stay better than those bred in England, a circumstance which is largely attributed to the fact that mares and foals have much more liberty and exercise than is the case in the mother country.

United States

Horse-racing was indulged in to a limited extent in Maryland and Virginia as early as the middle of the 17 th century, particu- larly in the latter colony. Most of the inhabitants of both were either from the British Isles or were descended from parents who had immigrated from them, and they inherited a taste for the sport. The animals used for this purpose, however, were not highly prized at the time, and the pedigree of not even one of them has been preserved. A horse called Bully Rock by the Darley Arabian out of a mare by the Byerly Turk, granddam by the Lister Turk, great-granddam a royal mare, foaled 17 18, is the first recorded importation of

a thoroughbred horse into America. He was imported into Virginia in 1730. In 1723 the duke of Bolton bred a mare named Bonny Lass by his celebrated horse Bay Bolton out of a daughter of the Darley Arabian. She became celebrated in England as a brood mare, and was the first thoroughbred mare, according to the records, that was carried to America. This is supposed to have been in or after 1740, as the Stud- Book shows she produced in England after 1739 a filly by Lord Lonsdale's Arabian, and subsequently became familiar to the public as the granddam of Zamora. The im- portations increased very rapidly from this period, and many valuable shipments were made before the war which resulted in a separation of the colonies from the mother country. This acquisition of thoroughbred stock increased the number and value of racing prizes, and extended the area of operations into the Carolinas in the South, and New Jersey and New York in the North. The first race run in South Carolina was in February 1734 for £20. It took place over " the Green," on Charleston Neck. This shows that the earlier races in America were actually on the turf, as they have always been in England. The next year a Jockey Club was organized at Charleston (1735), and a course was prepared, such as those which came later into general use throughout the states, the turf being removed and the ground made as level as possible.

After 1776, when the United States declared their independence of Great Britain, the importation of thoroughbred horses from England became quite common, and selections were made from the best stocks in the United Kingdom. This continued and even increased as the country became developed, down to 1840, The following Derby winners were among those carried into the states: Diomed, who won the first Derby in 1780; Saltram, winner in 1783; John Bull, winner in 1792; Spread Eagle, winner in 1795; Sir Harry, winner in 1798; Archduke, winner in 1799; and Priam, who won in 1830. The most important and valuable importations, however, proved to be Jolly Roger, Fearnought, Medley, Traveller, Diomed, Glencoe, Leviathan, Tranby, Lexington, Margrave, Yorkshire Buzzard, Albion and Leamington. The best results were obtained from Diomed and Glencoe. Diomed sired one horse, Sir Archy, who founded a family to which nearly all the blood horses of America trace back. He was foaled in 1805, in Virginia, and became celebrated as a sire. The superiority of his progeny was so generally con- ceded that they were greatly sought after. From this period, too, the number and value of races increased; still they were com- paratively few in number, and could not compare in value with those of Great Britain. Up to i860 the value of racing prizes was quite inadequate to develop large breeding establishments,

or to sustain extensive training stables. Then the civil war between the North and the South broke out, which raged for four years. Breeding establishments were broken up during that time; the horses were taken by the armies for cavalry purposes, for which service they were highly prized; and racing was completely paralysed. It took some time to regain its strength; but an era of prosperity set in about 1870, and since then the progress in interest has been continuous.

In the United States interest in trotting races more than rivals that felt fn the contests of thoroughbred horses. This interest dates back to the importation to Philadelphia from England, in 1788, of the thoroughbred horse Messenger, a grey stallion, by Mambrino. 1st dam by Turf, 2nd dam by Regulus, 3rd dam by Starling, 4th dam by Fox, 5th dam Gipsey, by Bay Bolton, 6th dam by duke of Newcastle's Turk, 7th dam by Byerly Turk, 8th dam by Taffolet Barb, 9th dam by Place's White Turk. He was eight years old when imported to the United States. He was at the stud for twenty years, in the vicinity of Phila- delphia and New York, serving a number of thoroughbred mares, but a far greater number of cold-blooded mares, and in the progeny of the latter the trotting instinct was almost invariably developed, while his thoroughbred sons, who became scattered over the country, were also noted for transmitting the trotting instinct. The first public trotting race of which there is any account in the United States was in 1818, when the grey gelding Boston Blue was matched to trot a mile in 3 minutes, a feat deemed impossible; but he won, though the time of his perform- ance has not been preserved. From about that date interest in this gait began to increase; breeders of trotters sprang up, and horses were trained for trotting contests. The problem of breeding trotters has been necessarily found to be a much more complex one than that of breeding the thoroughbred, as in the latter case pure blood lines of long recognized value could be relied upon, while in the former the best results were constantly being obtained from most unexpected sources. Among the leading families came to be the Hambletonian, of which the modern head was Rysdyk's Hambletonian, a bay horse foaled in 1849, got by Abdallah (traced to imp. Messenger on the side of both sire and dam) out of the Charles Kent mare, by imp. (i.e. imported) Bellfounder, with two crosses to imp. Messenger on her dam's side; the Mambrinos, whose modern head was Mambrino Chief, foaled 1844, by Mambrino Paymaster, a grandson of imp. Messenger; the Bashaws, founded by Young Bashaw, foaled 1822, by Grand Bashaw, an Arabian horse, dam Pearl, by First Consul; the Clays, springing from Henry Clay, a grandson of Young Bashaw through Andrew Jackson; the Stars, springing from Stockholm's American Star, by Duroc, son of imp. Diomed; the Morgans, whose founder was Justin Morgan, foaled 1793, by a horse called True Briton, or Beautiful Bay, who was probably thoroughbred; the

Black Hawks, a branch of the Morgan family; the Blue Bulls, descended from Doyle's Blue Bull, foaled 1855, a pacer, sired by a pacer of the same name, dam by Blacknose, son of Medoc; the Canadians, whose best representatives were St Lawrence and pacing Pilot, horses of unknown pedigree; the Gold Dusts, another branch of the Morgan family; and the Royal Georges, springing from Tippoo, a horse who was probably by Ogden's Messenger, son of imp. Messenger. But trotters of great speed have been pro- duced which do not trace to any of the sources mentioned. Very large prices are paid. Steinway, a three-year-old colt, was sold in 1879, to go to California, for $13,000; and in 1878 $21,000 was paid for the four-year-old filly Maud S., after she had trotted a mile in public in 2 m. 17IS. Much larger sums have been paid, however, for matured trotters, such as $40,000 for the stallion Smuggler, $38,000 for Pocahontas, $35,000 for Dexter, $36,000 for Rarus, and long prices for many others; St Julien, the trotter with the fastest record at the close of 1879, was held at $50,000, while Rysdyk's Hambletonian, Messenger Duroc and Volunteer were valued, in their prime, at $100,000 each.

Compared with the early days of American trotting, the advance has been rapid and the changes marked. After the performance of Boston Blue, mentioned above, more attention

was paid to the gait, but for a long time the races were generally under saddle, and at long distances, 3 m. being rather the favourite. The best of the old time trotters were Edwin Forrest, who trotted a mile in 2 m. 315 s. in 1834; Dutchman, who did 3 m. under saddle in 7 m. 325 s.; Ripton; Lady Suffolk, who trotted a mile in 2 m. 265 s. in 1843, and headed the list of performers; Mac, Tacony, &c. After 1850, however, the taste of the people settled upon the style of race called " mile heats, best three out of five, in harness " as the favourite. By " in harness " is meant that the horse draws a sulky, a light two-wheeled vehicle in which the driver sits close to the horse, with his legs on each side of his flanks. These sulkies often weigh less than 40 lb. The driver is required to weigh, with the blanket on which he sits, 150 lb, while for saddle races the regulation weight is 145 lb, or 10 st. 5 lb. Each heat of a mile is a separate race; 20 minutes is allowed between heats; and the horse that first places three heats to his credit wins the race. There are various penalties imposed upon a horse that breaks into a run in a trotting race. The driver is required to pull him to a trot as quickly as possible; if the horse gains by running, the judges set him back at the finish twice the distance he has gained, in their estimation, by running; and for repeated " breaks " they can declare him distanced. The first-class tracks are of oval shape, with long stretches and easy curves, measuring 1 m. at 3 ft. distance from the " pole," as the inner railing of the track is called. The time in which the leading horse trots each heat is accurately kept, placed on a blackboard in front of the judges' stand for the

information of the public, and also placed in the book of the course. The fastest time that any trotter has is thus entered as his " record." This is one of the distinctive features of trotting in America.

Prior to 1866 purses for trotters were small; match races were more in vogue, and the trotting turf was in bad odour. In that year an association was formed at Buffalo, N.Y., which in- augurated its efforts by offering the then unprecedented sum of $10,500 for a trotting meeting of four days' duration. The experiment was successful; other cities followed the example of Buffalo; larger and larger purses were given; and at Buffalo in 1872 the prizes amounted to $70,000. Since then the amount offered in the United States and Canada, during a single year, has reached $1,500,000. Individual trotters, in the course of a long turf career, earn enormous amounts. A remarkable instance of this was the mare Goldsmith Maid, by Alexander's Abdallah (a son of Rysdyk's Hambletonian), out of an Abdallah mare. She began trotting in 1866, and left the turf in 1878, when twenty- one years old, and her winnings amounted to over $200,000.

In 1869 the National Trotting Association was formed, under which an elaborate code of rules has been published.

In trotting races, it will be noted, the time test is supreme, differing from running races, in which time is of comparatively little consequence. The animal which has the fastest record for

1 mile in harness is, until deposed, the king or queen of the trotting turf. Lady Suffolk, with her record of 2 m. 265 s., in 1843, held this honour until 1853, when Tacony trotted in 2 m. 25J s. under saddle; Flora Temple wrested it from him in 1856 by trotting in

2 m. 24! s. in harness. This latter mare, in 1859, trotted a mile in 2 m. 19J s., a feat which the best horsemen thought would never be repeated, but since that time forty-two trotters have beaten 2 m. 20 s. Dexter's record was 2 m. 175 s. in 1867, and Goldsmith Maid's in 1871 was 2 m. 17 s., which she reduced, by successive efforts, to 2 m. i6f s., 2 m. 16 s., 2 m. 15 s., 2 m. 14J s., and finally, in 1874, to 2 m. 14 s. In 1878 Rarus trotted a- mile in 2 m. 13J s., and in October 1879 the bay gelding St Julien, by Volunteer, son of Rysdyk's Hambletonian, dam by Henry Clay, trotted a mile in California in 2 m. 1 2J s. Other notable performances reducing the record were Maud S. in 1881, 2 m. 10J s.; Maud S. in 1885, 2 m. 8f s.; Sunol in 1891, 2 m. 8| s.; Nancy Hanks in 1892, 2 m. 4 s.; Alix in 1894, 2 m. 3! s.; Cresceus in 1901, 2 m. 2\ s.; Lou Dillon in 1905, 1 m. 585 s. Im- proved times have doubtless been the result of improved methods, as well as of care in the breeding of the trotter. Some very severe training rules used to be sedulously observed; about 1870, for

instance, a horse never had water the night before a race, and the system generally appears to have overtaxed the animal's strength. A prominent consideration in trotting races is the adjustment of toe-weights, which are fastened on to the horses' feet to equalize their action, and it is found that horses improve their time to the extent of several seconds when properly shod.

Pacing races are also frequent in the United States. In trotting the action may be described as diagonal; the pacer moves both legs on the same side at the same time, and both feet stride as one. A similar " gait," to employ the American term, was called in England some centuries ago an " amble." The pacer moves more easily and with apparently less exertion than the trotter, and the mile record (made by Prince Alert in 1903) stands at 1 m. 57 s.

Owing to the vast size of the country there are various centres of sport, which can be classified with reasonable accuracy as follows: the Eastern States, dominated by the Jockey Club, founded in New York in 1894, and recognized by a state law in 1895; the Middle Western States, under the control of the Western Jockey Club, whose headquarters are in Chicago; the Pacific Coast, with San Francisco for its centre; and the Southern and South- Western States, with Louisville as the most important centre. The passage of the racing law in New York State marked the opening of a new era. Supreme even over the Jockey Club is a State Racing Commission of three, appointed by the governor of the state. While the Jockey Club is only recognized by law in its native state, it has assumed and maintains control of all racing on the eastern seaboard, within certain lines of latitude and longitude, extending as far north as the Canadian border and south to Georgia. There is small question that other states, both east and west, will follow suit and enact similar laws. The Western Jockey Club, though not recognized by law, controls practically all the racing through the middle west, south-west and south; but the racing associations of the Pacific Coast have maintained a position of independence.

What New York is to the east, Chicago is to the middle west, and a very large proportion of American racing is conducted close to these centres. In New York State the Coney Island Jockey Club, at Sheepshead Bay; the Brooklyn Jockey Club, at Gravesend; the Westchester Racing Association, at Morris Park; the Brighton Beach Racing Association, at Brighton Beach;

the Queen's County Jockey Club, at Aqueduct; and the Saratoga Racing Association, at Saratoga, are the leading organizations; and all these race-courses, with the exception of Saratoga, are within a radius of 20 miles of the city. The Empire City Jockey Club, near Yonkers, and another club with headquarters near Jamaica, Long Island, have also become prominent institutions. The Washington Park Club, at Chicago, is the leading Turf body of the west, and the only one on an equal footing with the prominent associations of New York State. With this single exception the most important and valu- able stakes of the American Turf are given in the east; and so great has the prosperity of the Turf been since the Jockey Club came into existence that the list of rich prizes is growing at a surprising rate. In this respect the principal fault is the undue encouragement given to the racing of two-year-olds. At the winter meetings held at New Orleans and San Francisco, two-year-olds are raced from the very beginning of the year; and under the rules of the Jockey Club of New York they run as early as March. The Westchester Racing Association, with which are closely identified some of the principal members of the Jockey Club, gives valuable two-year-old stakes in May. The Futurity Stakes, the richest event of the year — on one occasion it reached a value of $67,675 — is for two-year-olds, and is run at Sheepshead Bay in the autumn. The institution of races, either absolutely or practically at weight-for-age, and over long courses, has engaged much attention. The Coney Island Jockey Club has the leading three-year-old stake in the Lawrence Realization, over 1 mile 5 furlongs, with an average value of about $30,000. The Westchester Racing Association's two principal three-year-old stakes, the Withers,

over a mile, run in May, and the Belmont, 1 mile and 3 furlongs, run later in the same month, are of less value, but are much older-established and have a species of " classic " prestige, dating from the old Jerome Park race-course in the 'sixties. The Coney Island Jockey Club's Century and the Annual Champion Stakes, both for three-year-olds and upwards, over a mile and a half and two miles and a quarter respectively, are fair specimens of the races the associations have founded. At Saratoga a stake of $50,000 for three-year-olds and upwards, distance a mile and a quarter, was opened, and run for first in 1904. The hope is to wean owners from the practice of overtaxing their two-year-olds, which has resulted practically in a positive dearth, almost a total absence, of good four-year-olds and upwards of late years. Handicaps play a more important part than in England. The principal events of this character, such as the Brooklyn Handicap at Gravesend and the Suburban at Sheepshead Bay, have for years drawn the largest attendances of the racing season.

Practically all flat racing in the United States is held on " dirt-tracks," i.e. courses with soil specially prepared for racing, instead of turf courses. At Sheepshead Bay there is a turf course, but it is only used for a minority of

races. Dirt- tracks, which are, like many other things in American racing, a legacy from the once hugely popular harness-racing, are conducive to great speed, but are costly in the extreme strain on horses' legs. Steeplechases are run on turf. This branch of the sport in the east is now flourishing under the administra- tion of the National Steeplechase and Hunt Association, a sister body of the Jockey Club. Comparatively few races are, however, run under these rules, as the weather conditions render it im- possible to have a separate season for cross-country sport and steeplechases, and hurdle races are incorporated in programmes of flat racing held through the spring, summer and autumn, though the ground is frequently so hard as to be unsafe. Since the National Steeplechase and Hunt Association assumed control, regulation courses, practically similar in every respect to those used in England, have been insisted upon in the east, the " open ditch " figuring under the name of the " Liverpool." In the west and south there is not the same uniformity, and so far the sport has not flourished.

France Racing in France as conducted on modern lines may be said to date from the year 1833, when the French Stud-Book was originated, and a body formed, somewhat after the model of the English Jockey Club, under the title of the Societe d'En- couragement pour l'Amelioration des Races de Chevaux en France. Races took place in the Champs de Mars, and an unsuccessful attempt was made in 1834 to arrange for a course, or " hippodrome," as it is termed in France, at Maisons Laffitte. Chantilly was, however, fixed upon as the principal racing centre; on the 22nd April 1836 the first meeting was held there, with five races on the card, the principal being the Prix d'Orleans, a stake of 3500 francs, named after the due d'Orleans, one of the chief promoters of the fixture. Next day the first race for the Prix du Jockey Club was run, and won by Frank, the property of Lord Henry Seymour, who was at the time taking a very active part in French sport. The Prix du Jockey Club was then worth 5000 francs; the value has since increased to 200,000 francs. This race occupies in France the place of the English Derby. The Prix de Diane, which corresponds to the English Oaks, was first run in 1843. Chantilly still continues an important centre of the French Turf, and a great many horses are trained in the district. Attempts had been made to popularize racing at Longchamps prior to the year 1856, when the Societe d' En- couragement obtained a lease, erected stands, laid out the course, and held their first meeting on the 27th August 1857. Next season two meetings were held, one of four days in the spring and another of three in the autumn; at the present time the sport is vigorously carried on from March to the end of October, except during a summer recess. In 1857 meetings under the auspices of the Societe d'Encouraee.ment began to

take place at Amiens, Caen, Nantes, Versailles, Moulins and other towns; and there were stakes for two-year-olds in the spring, though of late years the appearance of the young horses has been postponed to the ist of August. Progress was rapid, and in 1863 two important events were contested for the first time, the Prix du Prince Imperial, which was designed to balance the English St Leger, but for obvious reasons faded out of the programme, and the Grand Prix de Paris, an international race for three-year-olds, run at Longchamps over a distance of 1 mile 7 furlongs, and now the most valuable stake in Europe. In 1909 the prize was £14,071. The first Grand Prix fell to an English horse. Mr Savile's The Ranger; two years later it was won by Gladiateur, winner of the English Derby and the property of the comte de Lagrange, who raced equally in France and in England; the duke of Beaufort's Ceylon was successful in 1866, and the marquis of Hastings' Earl in 1868. Mr Savile's Cremorne followed up his Derby victory by a victory at Longchamps in 1872, as did Mr Baltazzi's Kisber four years later. English horses were also victorious in 1874 (Mr W. R. Marshall's Trent), in 1878 (Prince Soltykoff's Thurio), in 1880 (Mr C. Brewer's Robert the Devil), in 1881 (Mr Keene's Foxhall, who, however, should rather rank as an American horse), in 1882 (Mr Rymill's Bruce), in 1885 (Mr Cloete's Paradox), in 1886 (Mr Vyner's Minting) ; and in 1906 Major Eustace Loder's Derby winner Spearmint. During the first 23 years of the Grand Prix (owing to the war the race did not take place in 187 1) the stake fell to English horses — if Kisber and Foxhall be included — on twelve occasions, and generally to English jockeys. In recent years, however, French owners have held their own. In not a few respects racing is managed more judiciously than in England. The courses, for one thing, are better tended and maintained. The five- and six-furlong races for others than two-year-olds, which are so common at English meetings, are comparatively rare in France, and the value of the prizes in an average day's racing is considerably higher across the Channel than in England. A very large percentage of trainers and jockeys are English, and the former are, as a rule, quite as expert as at Newmarket and elsewhere. Transatlantic methods have been introduced by American jockeys since 1899. From the middle of February until the middle of 'December a race meeting within easy reach of Paris takes place almost every day, except during August, when the sport is carried on in the provinces, notably at Deauville. Near Paris, the chief centre after Longchamps is Maisons Laffitte. At Longchamps, early in October, a race called the Prix du Conseil Municipal, worth £4000, for three-year-olds and upwards, over a mile and a half, was organized in 1893, and has usually attracted English hcrses, Mr Wallace Johnstone's Best Man having been successful in 1894, and Mr Sullivan's Winkfield's Pride the following year. Except when the Whip is

challenged for and the challenge decided over the Beacon Course at Newmarket, no race is run in England over a longer distance than two miles and 6 furlongs; but in France the Prix Gladiateur, of £1200 and a work of art value £100, 3 miles 7 furlongs, creates considerable interest at Longchamps in the autumn.

The first recognized steeplechase in France took place at Croix de Bcrny, and was won by the comte de Vaublanc's May-fly, all the horses at that time being ridden chasing. by gentlemen. Sport does not seem to have been carried on with much spirit, for it is said that the death of an animal called Barcha, in 1839, nearly led to the abandonment of the meeting; and it was not till 1863, when the Societe des Steeplechases de France was founded, that the business was resolutely taken in hand. Gravelle and Vincennes were the principal centres until 1873, when the Societe obtained possession of the ground at Auteuil, where the excellent course now in use was laid out. In 1874 twelve days' racing took place here, the card each day including three steeplechases and a hurdle race, the " hurdles," however, being small fences, as they are at present. The Grand Steeplechase d'Auteuil was then for a stake of 30,000 francs, at the time the most valuable offered in any country; but, as in racing xm. 24

on the flat, the stakes have enormously increased in value, and in 1901 the Paris Grand Steeplechase, as the chief event is now called, credited the winner with £6020, the hurdle race being worth rather more than half as much. In England there is scarcely any steeplechasing between March and November, except at hunt meetings, but in Paris cross-country sport is pursued almost all through the year, the chief races at Auteuil taking place in June, about the time of the Grand Prix, which is usually run for between the English Epsom and Ascot meetings. The Auteuil course is laid out in the shape of the figure 8, with varied fences, several of which really test a horse's jumping capacity; and variety is further obtained by starting the fields in different places and traversing the course in different ways. St Ouen, a meeting within half an hour's drive of the Louvre, is entirely devoted to steeplechasing; and jumping is also carried on at Vincennes, Colombes, Enghien, and elsewhere near Paris, as also at Nice in the winter, at Dieppe and other places in August. As a rule, the stakes run for, especially at Auteuil, are very much larger than in England. There are none of the clubs and special enclosures such as at Sandown, Kempton, Hurst, Lingfield, Gatwick, &c, though portions of the stand are set apart for privileged persons. A fee of 20 francs is charged for admission to the chief French race-courses, with half as much for a lady's voucher, and the tickets give access everywhere but to the very few reserved portions. At Vincennes, St Cloud, and some other courses trotting races are also contested.

Other Countries. — Racing in Germany is mainly conducted under the

authority of the Union Club of Berlin, the principal course being the Hoppegarten. Two-year-olds do not run until the 1st of June, except in Saxony, where they appear a month earlier. During the month of August there are several days' racing at Baden-Baden, steeplechases as well as flat races being run. Some of the more valuable stakes are usually contested by a proportion of horses from France and other countries, a few being occasionally sent from England. For years past blood-stock has been imported from England. In Austria the two centres of racing are Vienna and Budapest, each of which has its Jockey Club. Racing in Belgium derives no little support from the contiguity of the country to France. The headquarters of the Belgium Jockey Club are in the Bois de la Cambre at Boisfort, and meetings are held at Ostend, Antwerp, Spa, Bruges and elsewhere. Steeplechases take place at Groenenval and on other Belgian courses, but are not of high class. Racing has not reached a great degree of excellence in Italy, though attempts have been made to improve competitors by the purchase of Melton, who won the Derby of 1885, and of other notable animals. Meetings take place at Florence, Padua, Bologna and other places, but the stakes are usually small. (A. E. T. W.)

HORSERADISH (Ger. Meerrettig ; Fr. raifort = racine forte, cran de Bretagne ; Swed. Peppar-rot ; Russ. chren), known botanically as Cochlearia Armor acta, a perennial plant of the natural order Cruciferae, having a stout cylindrical rootstock from the crown of which spring large radical leaves on long stalks, 4 to 6 in. broad, and about a foot in length with a deeply crenate margin, and coarsely veined; the stem-leaves are short- stalked or sessile, elongated and tapering to their attachment, the lower ones often deeply toothed. The flowers, which appear in May and June, are f in. in width, in flat-topped panicles, with purplish sepals and white petals; the fruit is a small silicula, which does not ripen in the climate of England. The horse- radish is indigenous to eastern Europe. Into western Europe and Great Britain, where it is to be met with on waste ground, it was probably introduced. It was wild in various parts of England in Gerard's time.

The root, the armoraciae radix of pharmacy, is | to 2 m. or more in diameter, and commonly 1 ft., sometimes 3 ft. in length; the upper part is enlarged into a crown, which is annu lated with the scars of fallen leaves; and from the numerous irregular lateral branches are produced vertical stolons, and also adventitious buds, which latter render the plant very difficult of extirpation. From the root of Aconite (q.v.), which has occasionally been mistaken for it, horseradish root differs in being more or less cylindrical from a little below the crown, and in its pale yellowish (or brownish) white hue externally, acrid and penetrating odour when scraped or bruised, and

pungent and either sweetish or bitter taste. Under the influence of a ferment which it contains, the fresh root yields on distillation with water about -05 % of a volatile oil, butyl sulphocyanide, C4H9CNS. After drying, the root has been found to afford 1 1 ■ 1 5 % of ash. Horseradish root is an ingredient in the spirilus armoraciae compositus (dose 1-2 drachms) of the British Pharma- copoeia. It is an agreeable flavouring agent. In common with other species of Cochlearia, the horseradish was formerly in high repute as an antiscorbutic. The root was, as well as the leaves, taken with food by the Germans in the middle ages, whence the old French name for it, moutarde des Allemands; and Coles, writing in 1657, mentions its use with meat in England, where it is still chiefly employed as a condiment with beef.

For the successful cultivation of the horseradish, a light and friable damp soil is the most suitable; this having been trenched 3 ft. deep in autumn, and the surface turned down with a liberal supply of farm-yard manure, a second dressing of decomposed manure should in the ensuing spring be dug in 2 ft. deep, and pieces of the root 6 in. in length may then be planted a foot apart in narrow trenches. During summer the ground requires to be kept free of weeds; and the application of liquid manure twice or thrice in sufficient quantity to reach the lowest roots is an advantage. When dug the root may be long preserved in good condition by placing it in sand.

See Gerard, Herball, p. 240, ed. Johnson (1636) ; Fliickiger and Hanbury, Pharmacographia, p. 71 (2nd ed., 1879); Bentley and Trimen, Med. PL, i. 21 (1880).

HORSE-SHOES. The horny casing of the foot of the horse and other Solidungulates, while quite sufficient to protect the extremity of the limb under natural conditions, is found to wear away and break, especially in moist climates, when the animal is subjected to hard work of any kind. This, however, can be obviated by the simple device of attaching to the hoof a rim of iron, adjusted to the shape of the hoof. The animal itself has been in a very marked manner modified by shoeing, for without this we could have had neither the fleet racers nor the heavy and powerful cart-horses of the present day. Though the ancients were sufficiently impressed by the damage done to horses' hoofs to devise certain forms of covering for them (in the shape of socks or sandals), the practice of nailing iron plates or rim-shoes to the hoof does not appear to have been introduced earlier

than the 2nd century b.c, and was not commonly known till the close of the 5th century a.d., or in regular use till the middle ages. The evidence for the earlier date depends on the doubtful interpretations of designs on coins, &c. As time went on, how- ever, the profession of the farrier and the art of the shoesmith gradually grew in importance. It was only in the 19th century that horse-shoeing was introduced in Japan, where the former practice was to attach to the horse's feet slippers of straw, which were renewed when necessary, a custom which may indicate the usage of early peoples. In modern times much attention has been devoted to horse-shoeing by veterinary science, with the result of showing that methods formerly adopted caused cruel injury to horses and serious loss to their owners. The evils resulted from (1) paring the sole and frog; (2) applying shoes too heavy and of faulty shape; (3) employing too many and too large nails; (4) applying shoes too small and removing the wall of the hoof to make the feet fit the shoes, and

(5) rasping the front of the hoof. In rural districts, where the art of the farrier is combined with general blacksmith work, too little attention is apt to be given to considerations which have an important bearing on the comfort, usefulness and life of the horse. According to modern principles (1) shoes should be as light as compatible with the wear demanded of them; (2) the ground face of the shoe should be concave, and the face applied to the foot plain; (3) heavy draught horses alone should have toe and heel calks on their shoes to increase foothold; (4) the excess growth of the wall or outer portion of horny matter should only be re- moved in re-shoeing, care being taken to keep both sides of the hoof of equal height; (5) the shoe should fit accurately to the circumference of the hoof, and project slightly beyond the heel;

(6) the shoes should be fixed with as few nails as possible, six or

seven in fore-shoes and eight in hind-shoes, and (7) the nails should take a short thick hold of the wall, so that old nail-holes may be removed with the natural growth and paring of the horny matter. Horse-shoes and nails are now made with great economy by machinery, and special forms of shoe or plate are made for race-horses and trotters, or to suit abnormalities of the hoof.

HORSETAIL {Equisetum), the sole genus of the botanical natural order Equisetaceae, consisting of a group of vascular cryptogamous plants (see Pteridophyta) remarkable for the Vegetative structure which resembles in general appearance the genera of flowering plants Casuarina and Ephedra. They are herbaceous plants growing from an underground much-

From Slrasburger's Lehrbuch tier Botanik, by permission of Gustav Fischer.

Equisetum arvense. A, Fertile shoot, springing B, C, Sporophylls bearing sporangia, from the rhizome, which which in C have opened,

also bears tubers; the D, Spore showing the two spiral vegetative shoots have bands of the perinium.

not yet unfolded. E, Dry spores showing the ex-

F, Sterile vegetative shoot. panded spiral bands.

(.4, F, reduced. B, C, D, E, enlarged.)

branched rootstock from which spring slender aerial shoots which are green, ribbed, and bear at each node a whorl of leaves reduced to a toothed sheath. From the nodes spring whorls of similar but more slender branches. Some shoots are sterile while others are fertile, bearing at the apex the so-called fructifica- tion — a dense oval, oblong conical or cylindrical spike, consisting of a number of shortly-stalked peltate scales, each of which has attached to its under surface a circle of spore-cases {sporangia)

which open by a longitudinal slit on their inner side. The spores differ from those of ferns in their outer coat (exospore) being split up into four club-shaped hygroscopic threads (elaters) which are curled when moist, but become straightened when dry. In most species the fertile and sterile shoots are alike, both being green and leaf-bearing, but in a few species the fertile are more or less different, e.g. in E. arvense the fertile shoots appear first, in the spring, and are unbranched and not green. Any portion of the underground rhizome when broken off is capable of producing a new plant; hence the difficulty of eradicating them when once established. There are 24 known species of the genus which is universally distributed.

The corn horsetail E. arvense. one of the commonest species, is a troublesome weed in clayey cornfields (see fig.). The fructification appears in March and April, terminating in short unbranched stems. It is said to produce diarrhoea in such cattle as eat it. The bog horsetail, E. palustre, is said to possess similar properties. It grows in marshes, ditches, pools and drains in meadows, and sometimes obstructs the flow of water with its dense matted roots. The fructification in this species is cylindrical, and in that of E. limosum, which grows in similar situations, it is ovate in outline. The largest British species, E. maximum, grows in wet sandy declivities by railway embankments or streams, &c, and is remarkable for its beauty, due

to the abund- ance of its elegant branches and the alternately green and white appearance of the stem. In this species the fructification is conical or lanceolate, and is found in April on short, stout, un- branched stems which have large loose sheaths. Horses appear to be fond of this species, and in Sweden it is stored for use as winter fodder. E. hyemale, commonly known as the Dutch rush, is much more abundant in Holland than in Britain; it is used for polishing purposes. E. variegatum grows on wet sandy ground, and serves by means of its fibrous roots to bind the sand together. The horsetails are remarkable for the large quantity of silica they contain in the cuticle (hence their value in polishing), which often amounts to half the weight of the ash yielded by burning them; the roots contain a quantity of starch.

HORSHAM, a market town in the Horsham parliamentary division of Sussex, England, 38 m. S. by W. from London by the London, Brighton and South Coast railway. Pop. of urban district (1901) 9446. It is pleasantly situated in the midst of a fertile country near the source of the Arun. A picturesque avenue leads to the church of St Mary, principally Early English and Perpendicular, with remains of Norman work, having a lofty tower surmounted by a spire, and containing several fine monuments, tombs and brasses. Other buildings include the grammar school, founded in 1532 and rebuilt in 1893, a town hall and corn exchange, erected in 1866 in Italian style, with an assembly room. In the vicinity are several fine mansions. The buildings of Christ's Hospital (q.v.) at West Horsham were opened in 1902, the school being removed hither from London. The town has industries of tanning, founding, carriage-building and Hour-milling.

Some neolithic remains have been found at Horsham. The town is not mentioned in Domesday Book, but the Rape of Bramber, in which it lies, belonged at that time to William de Braose. His descendants held the borough and the manor of Horsham, and through them they passed to the family of Mowbray, afterwards dukes of Norfolk. There are traces of burgage tenure at Horsham in 12 10, and it was called a borough in 1236. It has no charter of incorporation. Horsham sent two representatives to parliament from 1295 until 1832, when the number was reduced to one. In 1885 it was dis- franchised. In 1233 Henry III. granted William de Braose a yearly three-days' fair at his manor of Horsham. In the reign of Edward I. William de Braose claimed to have a free market on Wednesdays and Saturdays. Fairs are held on the 5th of April, 18th of July, 17th of November and 27th of November. Market days are Monday and Wednesday. " Glovers " of Horsham are mentioned in a patent roll of 1485, and a brewery existed here in the time of Queen Anne.

HORSLEY, JOHN (c. 1685-1732), British archaeologist. John Hodgson (1779-1845), the historian of Northumberland, in a short memoir published in 1831, held that he was born in 1685, at Pinkie House, in the

parish of Inveresk, Midlothian, and that his father was a Northumberland Nonconformist, who had migrated to Scotland, but returned to England soon after the Revolution of 1688. J. H. Hinde, in the Archaeologia Aeliana (Feb. 1865), held that he was a native of Newcastle-on-Tyne, the son of Charles Horsley, a member of the Tailors' Company of that town. He was educated at Newcastle, and at Edinburgh University, where he graduated M.A. on the 29th of April 1701. There is evidence that he " was settled in Morpeth as a Presby- terian minister as early as 1709." Hodgson, however, thought that up to 1721, at which time he was residing at Widdrington, " he had not received ordination, but preached as a licentiate." Even if he was ordained then, his stay at the latter place was probably prolonged beyond that date; for he communicated to the Philosophical Transactions (xxxii. 328) notes on the rainfall there in the years 1722 and 1723. Hinde shows that during these years " he certainly followed r secular employment as agent to the York Buildings Company, who had contracted to purchase and were then in possession of the Widdrington estates." At Morpeth Horsley opened a private school. Re- spect for his character and abilities attracted pupils irrespective of religious connexion, among them Newton Ogle, afterwards dean of Westminster. He gave lectures on mechanics and hydrostatics in Morpeth, Alnwick and Newcastle, and was elected F.R.S. on the 23rd of April 1730. It is as an archae- ologist that Horsley is now known. His great work, Britannia Romana, or the Roman Antiquities of Britain (London, 1732), one of the scarcest and most valuable of its class, contains the result of patient labour. There is in the British Museum a copy with notes by John Ward (c. 1679-1758), biographer of the Gresham professors. Horsley died of apoplexy on the 12 th of January 1732, on the eve of the publication of the Britannia Romana. He also published two sermons and a handbook to his lectures on mechanics, &c, and projected a history of Northumberland and Durham, collections for which were found among his papers.

J. P. Wood (d. 1838) (Parish of Cramond, 1794, and Anecdotes of Bowyer, 1782, p. 371) says that his wife was a daughter of William Hamilton, D.D., minister of Cramond, afterwards professor of divinity in Edinburgh University, but probably the John Horsley in question was another, the father of Samuel Horsley {q.v.).

HORSLEY, JOHN CALLCOTT (1817-1903), English painter, son of William Horsley, the musician, and grand-nephew of Sir Augustus Callcott, was born in London, on the 29th of January 18 1 7. He studied painting in the Academy schools, and in 1836 exhibited " The Pride of the Village " (Vernon Gallery) at the Royal Academy. This was followed by numerous genre pictures at subsequent exhibitions up to 1893, the best known of these being " Malvolio," " L'Allegro and il Penseroso " (painted for the Prince Consort), " Le Jour des Morts," "A Scene from Don Quixote," &c.

In 1843 his cartoon of " St Augustine Preaching " won a prize in the Westminster Hall competition, and in 1844 he was selected as oneof thesix painters commissioned to execute frescoes for the Houses of Parliament, his " Religion " (1845) being put in the House of Lords; he also painted the " Henry V. assuming the Crown " and " Satan surprised at the Ear of Eve." In 1864 he became R.A., and in 1882 was elected treasurer, a post which he held till 1897, when he resigned and became a " retired Academician." Mr Horsley had much to do with organizing the winter exhibitions of " Old Masters " at Burlington House after 1870. When, during the 'eighties, the example of the French Salon began to affect the Academy exhibitors, and paintings of the nude became the fashion, he protested against the innovation, and his attitude caused Punch to give him the punning sobriquet of " Mr J. C (lothes) Horsley." He died on the 18th of October 1903. His son, Sir Victor Horsley (b. 1857), became famous as a surgeon and neuropatho- logist, and a prominent supporter of the cause of experimental, research.

HORSLEY, SAMUEL (1733-1806), English divine, was born in London on the 15th of September 1733. Entering Trinity College, Cambridge, he became LL.B. in 1758 without graduating in arts, and in the following year succeeded his father in the living of Newington Butts in Surrey. Horsley was elected a Fellow of the Royal Society in 1767; and secretary in 1773, but, in consequence of a difference with the president (Sir Joseph Banks) he withdrew in 1784. In 1768 he attended the eldest son of the 4th earl of Aylesford to Oxford as private tutor; and, after receiving through the earl and Bishop Lowth various minor preferments, which by dispensations he combined with his first living, he was installed in 1781 as archdeacon of St Albans. Horsley now entered in earnest upon his famous controversy with Joseph Priestley, who denied that the early Christians held the doctrine of the Trinity. In this controversy, conducted on both sides in the fiercest polemical spirit, Horsley showed the superior learning and ability. His aim was to lessen the influence which the prestige of Priestley's name gave to his views, by indicating inaccuracies in his scholarship and undue haste in his conclusions. For the energy displayed in the contest Horsley was rewarded by Lord Chancellor Thurlow with a prebendal stall at Gloucester; and in 1788 the same patron procured his promotion to the see of St David's. As a bishop, Horsley was energetic both in his diocese, where he strove to better the position of his clergy, and in parliament. The efficient support which he afforded the government was ac- knowledged by his successive translations to Rochester in 1793, and to St Asaph in 1802. With the bishopric of Rochester he held the deanery of ' Westminster. He

died at Brighton on the 4th of October 1806.

Besides the controversial Tracts, which appeared in I 783-1 784- 1786, and were republished in 1789 and 1812, Horsley's more im- portant works are: — Apollonii Pergaei inclinationum libri duo (1770); Remarks on the Observations . , .for determining the accelera- tion of the Pendulum in Lai. 70° 51′ (1774); Isaaci Newtoni Opera quae extant Omnia, with a commentary (5 vols. 4to, 1779-1785); On the Prosodies of the Greek and Latin Languages (1796); Dis- quisitions on Isaiah xviii. (1796); Hosea, translated… with Notes (1801); Elementary Treatises on … Mathematics (1801); Euclidis elementorum libri prior es XII. (1802); Euclidis datorum liber (1803) ; Virgil's Two Seasons of Honey, &c. (1805); and papers in the Philosophical Transactions from 1767 to 1776. After his death there appeared — Sermons (1810-1812); Speeches in Parlia- ment (1813); Book of Psalms, translated with Notes (1815); Biblical Criticism (1820) ; Collected Theological Works (6 vols. 8vo, 1845).

HORSLEY, WILLIAM (1774-1858), English musician, was born on the 15th of November 1774. He became in 1790 the pupil of Theodore Smith, an indifferent musician of the time, who, however, taught him sufficient to obtain in 1794 the position of organist at Ely Chapel, Holborn. This post he resigned in 1798, to become organist at the Asylum for Female Orphans, as assistant to Dr Callcott, with whom he had long been on terms of personal and artistic intimacy, and whose eldest daughter he married. In 1802 he became his friend's successor upon the latter's resignation. Besides holding this appointment he became in 1812 organist of Belgrave Chapel, Halkin Street, and in 1838 of the Charter House. He died on the 12th of June 1858. Horsley's compositions are numerous, and include amongst other instrumental pieces three symphonies for full orchestra. Infinitely more important are his glees, of which he published five books (1801-1807) besides contributing many detached glees and part songs to various collections. His glees, " By Celia's arbour," " O nightingale," " Now the storm begins to lower," and others, are amongst the finest specimens of this peculiarly English class of compositions. Horsley's son Charles Edward (1822-1876), also enjoyed a certain reputa- tion as a musician. He studied in Germany under Hauptmann and Mendelssohn, and on his return to England composed several oratorios and other pieces, none of which had permanent success. In 1868 he emigrated to Australia, and in 1872 went to America; he died in New York.

HORSMAN, EDWARD (1807-1876), English politician, was the son of a well-to-do gentleman of Stirling, and connected on the mother's side with the earls of Stair. He was educated

at Rugby and Cambridge, and was called to the Scotch bar in 1832, but

then took to politics. He was elected to parliament as a Liberal for Cockermouth in 1836, and represented that constituency till 1852, when he was defeated; in 1853 he was returned for Stroud, and sat there till 1868; and from 1869 till he died he was member for Liskeard. He was a junior lord of the treasury in Lord Melbourne's administration for a few months during 1841, and became prominent for attacking Lord John Russell's ecclesiastical policy in 1847 and subsequent years. In 1855, under Lord Palmerston, he was made chief secretary for Ireland, but resigned in 1857. He gradually took up a position as an independent Liberal, and was well known for his attacks on the Church, and his exposures of various " jobs." But his name is principally connected with his influence over Robert Lowe (Lord Sherbrooke) in 1866 at the time of Mr Gladstone's Reform Bill, to which he and Lowe were hostile; and it was in describing the Lowe-Horsman combination that John Bright spoke of the " Cave of Adullam." Horsman died at Biarritz on the 30th of November 1876.

HORST, the term used in physical geography and geology for a block of the earth's crust that has remained stationary while the land has sunk on either side of it, or has been crushed in a mountain range against it. The Vosges and Black Forest are examples of the former, the Table, Jura and the D61e of the latter result. The word is also applied to those larger areas, such as the Russian plain, Arabia, India and Central South Africa, where the continent remains stable, with horizontal table-land stratification, in distinction to folded regions such as the Eurasian chains.

HORT, PENTON JOHN ANTHONY (1828-1892), English theologian, was born in Dublin on the 23rd of April 1828, the great-grandson of Josiah Hort, archbishop of Tuam in the 18th century. In 1846 he passed from Rugby to Trinity College, Cambridge, where he was the contemporary of E. W. Benson, B. F. Westcott and J. B. Lightfoot. The four men became lifelong friends and fellow- workers. In 1850 Hort took his degree, being third in the classical tripos, and in 1852 he became fellow of his college. In 1854, in conjunction with J. E. B. Mayor and Lightfoot, he established the Journal of Classical

and Sacred Philology, and plunged eagerly into theological and patristic study. He had been brought up in the strictest principles of the Evangelical school, but at Rugby he fell under the influence of Arnold and Tait, and his acquaintance with Maurice and Kingsley finally gave his opinions a direction towards Liberalism. In 1857 he married, and accepted the college living of St Ippolyts, near Hitchin, in Hertfordshire, where he remained for fifteen years. During his residence there he took some part in the discussions on university reform, continued his studies, and wrote essays for various periodicals. In 1870 he was appointed a member of the committee for revising the translation of the New Testament, and in 187 1 he delivered the Hulsean lectures before the university. Their title was The Way, the Truth, and the Life, but they were not prepared for publication until many years after their delivery. In 1872 he accepted a fellowship and lectureship at Emmanuel College; in 1878 he was made Hulsean professor of divinity, and in 1887 Lady Margaret reader in divinity. In the meantime he had published, with his friend Westcott, an edition of the text of. the New Testament. The Revision Committee had very largely accepted this text, even before its publication, as a basis for their translation of the New Testament. The wosk on its appearance created an immense sensation among scholars, and was vehemently attacked in many quarters, but on the

whole it was received as being much the nearest approximation yet made to the original text of the New Testament (see Bible: New Testament, " Textual Criticism "). The introduction was the work of Hort, and its depth and fulness convinced all who read it that they were under the guidance of a master. Hort died on the 30th of November 1892, worn out by intense mental labour. Next to his Greek Testament his best-known work is The Christian Ecclesia (1897). Other publications are: Judaistic Christianity (1894); Village Sermons (two series); Cambridge

and other Sermons; Prolegomena to . . . Romans and Ephesians (1895); The Ante-Nicene Fathers (1895); and two Dissertations, on the reading fwvoyevrjs debs in John i. 18, and on The Con- stantino politan and other Eastern Creeds in the Fourth Century. All are models of exact scholarship and skilful use of materials.

His Life and Letters was edited by his son, Sir Arthur Hort, Bart. (1896).

HORTA, the capital of an administrative district comprising the islands of Pico, Fayal, Flores and Corvo, in the Portuguese archipelago of the Azores. Pop. (1900) 6574. Horta is a seaport on the south-east coast of Fayal. It is defended by two castles and a wall, but these fortifications are obsolete. The harbour, a bay 2 m. long and nearly 1 m. broad, affords good anchorage in 5 to 20 fathoms of water, but is dangerous in south-westerly and south-easterly winds. It is the head- quarters of profitable whale, tunny, bonito and mullet fisheries. Its exports include sperm-oil, fruit, wine and grain. Between 1897 and 1904 the port annually accommodated about 140 vessels of 220,000 tons, mostly of British or Portuguese nationality.

HORTEN, a seaport of Norway, in Jarlsberg-Laurvik ami (county), beautifully situated on the west bank of the Chris- tiania Fjord, opposite Moss, 38 m. by water and 66 by rail S. of Christiania. Pop. (1900) 8460.

It is practically united with Karl-Johansvaern, which is defended by strong fortifications, is the headquarters of the Norwegian fleet, and possesses an arsenal and shipbuilding yards. There are also an observatory and a nautical museum.

HORTENSIUS, QUINTUS (114-50 B.C.), surnamed Hortalus, Roman orator and advocate. At the age of nineteen he made his first speech at the bar, and shortly afterwards successfully defended Nicomedes III. of Bithynia, one of Rome's dependants in the East, who had been deprived of his throne by his brother. From that time his reputation as an advocate was established. As the son-in-law of Q. Lutatius Catulus he was attached to the aristocratic party. During Sulla's ascendancy the courts of law were under the control of the senate, the judges being themselves senators. To this circumstance perhaps, as well as to his own merits, Hortensius may have been indebted for much of his success. Many of his clients were the governors of provinces which they were accused of having plundered. Such men were sure to find themselves brought before a friendly, not to say a corrupt, tribunal, and Hortensius, according to Cicero (Div. in Caecil. 7), was not ashamed to avail himself of this advantage. Having served during two campaigns (90-89) in the Social War, he became quaestor in 81, aedile in 75, praetor in 72, and consul in 69. In the year before his consulship he came into collision with Cicero in the case of Verres, and from that time his supremacy at the bar was lost. After 63 Cicero was himself drawn towards the party to which Hortensius belonged. Consequently, in political cases, the two men were often engaged on the same side {e.g. in defence of Rabirius, Murena, Publius Cornelius Sulla, and Milo). After Pompey's return from the East in 61, Hortensius withdrew from public life and devoted himself to his profession. In 50, the year of his death, he successfully defended Appius Claudius Pulcher when accused of treason and corrupt practices by P. Cornelius Dolabella, afterwards Cicero's son-in-law.

Hortensius's speeches are not extant. His oratory, according to Cicero, was of the Asiatic style, a florid rhetoric, better to hear than to read. He had a wonderfully tenacious memory (Cicero, Brutus, 88, 95), and could retain every single point in his opponent's argument. His action was highly artificial, and his manner of folding his toga was noted by tragic actors of the day (Macrobius, Sat. iii. 13. 4). He also possessed a fine musical voice, which he could skilfully command. The vast wealth he had accumulated he spent on splendid villas, parks, fish-ponds and costly entertainments. He was the first to introduce peacocks as a table delicacy at Rome. He was a great buyer of wine, pictures and works of art. He wrote a treatise on general questions of oratory, erotic poems (Ovid, Tristia, ii. 441), and an Annates, which gained him considerable reputation as an historian (Veil. Pat. ii. 16. 3).

His daughter Hortensia was also a successful orator. In 42 she spoke against the imposition of a special tax on wealthy- Roman matrons with such success that part of it was remitted (Quint. Instit. i. 1. 6; Val. Max. viii. 3. 3).

In addition to Cicero {passim), see Dio Cassius xxxviii. 16, xxxix. 37; Pliny, Nat. Hist. ix. 81, x. 23, xiv. 17, xxxv. 40; Varro, R.R. iii. 13. 17.

HORTENSIUS, QUINTUS, dictator of Rome 286 B.C. When the people, pressed by their patrician creditors, " seceded " to the Janiculum, he was commissioned to put an end to the strife. He passed a law whereby the resolutions of the multitude {plebiscita) were made binding on all the citizens, without the approval of the senate being necessary. This was not a mere re-enactment of previous laws. Another lav/, passed about the same time, which declared the nundinae (market days) to be dies fasti (days on which legal business might be transacted), is also attributed to him. He is said to have died while still dictator.

Aulus Gellius xv. 27; Pliny, Nat. Hist. xvi. 15; Macrobius, Saturnalia i. 16; Livy, Epit. ii.

HORTICULTURE (Lat. hortus, a garden), the art and science of the cultivation of garden plants, whether for utilitarian or for decorative purposes. The subject naturally divides itself into two sections, which we here propose to treat separately, commencing with the science, and passing on to the practice of the cultivation of flowers, fruits and vegetables as applicable to the home garden. The point of view taken is necessarily, as a rule, that of a British gardener.

Part I.— Principles or Science or Horticulture

Horticulture, apart from the mechanical details connected with the maintenance of a garden and its appurtenances, may be considered as the application of the principles of plant physio- logy to the cultivation of plants from all parts of the globe, and from various altitudes, soils and situations. The lessons derived from the abstract principles enunciated by the physio- logist, the chemist and the physicist require, however, to be modified to suit the special circumstances of plants under cultiva- tion. The necessity for this modification arises from the fact that such plants are subjected to conditions more or less un- natural to them, and that they are grown for special purposes which are at variance, in degree at any rate, with their natural requirements.

The life of the plant (see Plants) makes itself manifest in the processes of growth, development and reproduction. By growth is here meant mere

increase in bulk, and by develop- ment the series of gradual modifications by which a plant, originally simple in its structure and conformation, becomes eventually complicated, and endowed with distinct parts or organs. The reproduction of the higher plants takes place either asexually by the formation of buds or organs answering thereto, or sexually by the production of an embryo plant within the seed. The conditions requisite for the growth, development and reproduction of plants are, in general terms, exposure, at the proper time, to suitable amounts of light, heat and moisture, and a due supply of appropriate food. The various amounts of these needed in different cases have to be adjusted by the gardener, according to the nature of the plant, its " habit" or general mode of growth in its native country, and the influence to which it is there subjected, as also in accord- ance with the purposes for which it is to be cultivated, &c. It is but rarely that direct information on all these points can be obtained; but inference from previous experience, especially with regard to allied forms, will go far to supply such deficiencies. Moreover, it must be remembered that the conditions most favourable to plants are not always those to which they are subjected in nature, for, owing to the competition of other forms in the struggle for existence, liability to injury from insects, and other adverse circumstances, plants may actually be excluded from the localities best suited for their development. The gardener therefore may, and does, by modifying, improve upon the conditions under which a plant naturally exists. Thus it frequently happens that in our gardens flowers have a beauty

and a fragrance, and fruits a size and savour denied to them in their native haunts. It behooves the judicious gardener, then, not to be too slavish in his attempts to imitate natural conditions, and to bear in mind that such attempts sometimes end in failure. The most successful gardening is that which turns to the best account the plastic organization of the plant, and enables it to develop and multiply as perfectly as possible. Experience, coupled with observation and reflection, as well as the more indirect teachings of tradition, are therefore of primary importance to the practical gardener.

We propose here to notice briefly the several parts of a flower- ing plant, and to point out the rationale of the cultural procedures connected with them (see the references to separate articles at the end of article on Botany).

The Root. — The root, though not precluded from access of air, is not directly dependent for its growth on the agency of light. The efficiency of drainage, digging, hoeing and like operations is accounted for by the manner in which they promote aeration of the soil, raise its temperature and remove its stagnant water. Owing to their growth in length at, or rather in the immediate vicinity of, their tips, roots are enabled to traverse long distances by surmount- ing some obstacles, penetrating others, and insinuating themselves into narrow crevices. As they have no power of absorbing solid materials, their food must be of a liquid or gaseous character. It is taken up from the interstices between the particles of soil exclusively by the finest subdivisions of the fibrils, and in many cases by the extremely delicate thread-like cells which project from them and which are known as root-hairs. The importance of the root-fibres, or " feeding roots " justifies the care which is taken by every good gardener to secure their fullest development, andto prevent as far as possible any injury to them in digging, potting and transplanting, such operations being therefore least prejudicial at seasons when the plant is in a state of comparative rest.

Root-Pruning and Lifting. — In apparent disregard of the general rule just enunciated is the practice of root-pruning fruit trees, when, from the formation of wood being more active than that of fruit, they bear badly. The contrariety is more apparent than real, as the operation consists in the removal of the coarser roots, a process which results in the development of a mass of fine feeding roots. Moreover, there is a generally recognised quasi-antagonism between the vegetative and reproductive processes, so that, other things being equal, anything that checks the one helps forward the other.

Watering. — So far as practical gardening is concerned, feeding by the roots after they have been placed in suitable soil is confined principally to the administration of water and, under certain cir- cumstances, of liquid or chemical manure; and no operations demand more judicious management. The amount of water re- quired, and the times when it should be applied, vary greatly according to the kind of plant and the object for which it is grown, the season, the supply of heat and light, and numerous other con- ditions, the influence of which is to be learnt by experience only. The same may be said with respect to the application of manures. The watering of pot-plants requires especial care. Water should as a rule be used at a temperature not lower than that of the sur- rounding atmosphere, and preferably after exposure for some time to the air.

Bottom-Heat. — The " optimum " temperature, or that best suited to promote the general activity of roots, and indeed of all vegetable organs, necessarily varies very much with the nature of the plant, and the circumstances in which it is placed, and is ascertained by practical

experience. Artificial heat applied to the roots, called by gardeners " bottom-heat," is supplied by fermenting materials such as stable manure, leaves, &c, or by hot-water pipes. _ In winter the temperature of the soil, out of doors, beyond a certain depth is usually higher than that of the atmosphere, so that the roots are in a warmer and more uniform medium than are the upper parts of the plant. Often the escape of heat from the soil is prevented by " mulching," i.e. by depositing on it a layer of litter, straw, dead leaves and the like.

The Stem and its subdivisions or branches raise to the light and air the leaves and flowers, serve as channels for the passage to them of fluids from the roots, and act as reservoirs for nutritive substances. Their functions in annual, biennial and herbaceous perennial plants cease after the ripening of the seed, whilst in plants of longer duration layer after layer of strong woody tissue is formed, which enables them to bear the strains which the weight of foliage and the exposure to wind entail. The gardener aims usually at producing stout, robust, short-jointed stems, instead of long lanky growths defective in woody tissue. To secure these conditions free exposure to light and air is requisite; but in the case of coppices and woods, or where long straight spars are needed by the forester, plants are allowed to grow thickly so as to ensure development in an upward rather than in a lateral direction. This and like matters will, how- ever, be more fitly considered in dealing hereafter with the buds and their treatment.

Leaves. — The work of the leaves may briefly be stated to consist of the processes of nutrition, respiration and transpiration. Nutri- tion (assimilation) by the leaves includes the inhalation of air, and the interaction under the influence of light and in the presence of chlorophyll of the carbon dioxide of the air with the water received from the root, to form carbonaceous food. Respiration in plants, as in other organisms, is a process that goes on by night as well as by day and consists in plants in the breaking up of the complex carbonaceous substances formed by assimilation into less complex and more transportable substances. This process, which is as yet imperfectly understood, is attended by the consumption of oxygen, the liberation of energy in the form of heat, and the ex- halation of carbon dioxide and water vapour. Transpiration is loss of water by the plant by evaporation, chiefly from the minute pores or stomata on the leaves. In xerophytic plants {e.g. cacti, euphorbias, &c.) from hot, dry and almost waterless regions where evaporation would be excessive, the leaf surface, and consequently the number of stomata, are reduced to a minimum, as it would be fatal to such plants to exhale vapour as freely in those regions as the broad-leaved plants that grow in places where there is abundance of moisture. Although transpiration is a necessary accompaniment of nutrition, it may easily become excessive, especially where the plant cannot readily recoup itself. In these

circumstances " syringing " and " damping down " are of value in cooling the temperature of the air in hothouses and greenhouses and increasing its humidity, thereby checking excessive transpiration. Shading the glass with canvas or washes during the summer months has the same object in view. Syringing is also beneficial in washing away dirt and insects.

Buds. — The recognition of the various forms of buds and their modes of disposition in different plants is a matter of the first consequence in the operations of pruning and training. Flower- buds are produced either on the old wood, i.e. the shoots of the past year's growth, or on a shoot of the present year. The peach, horse-chestnut, lilac, morello cherry, black currant, rhododendron and many other trees and shrubs develop flower-buds for the next season speedily after blossoming, and these may be stimulated into premature growth. The peculiar short, stunted branches or " spurs " which bear the flower-buds of the pear, apple, plum, sweet cherry, red currant, laburnum, &c, deserve special attention. In the rose, passion-flower, clematis, honeysuckle, &c, in' which the flower- buds are developed at the ends of the young shoot of the year, we have examples of plants destitute of flower-buds during the winter.

Propagation by Buds. — The detached leaf buds (gemmae or bulbils, of some plants are capable under favourable conditions of forming new plants. The edges of the leaves of Bryophyllum calycinum and of Cardamine pratensis, and the growths in the axils of the leaves of Lilium bulbiferum, as well as the fronds of certain ferns (e.g. Asplenium bulbiferum), produce buds of this character. It is a matter of familiar observation that the ends of the shoots of brambles take root when bent down to the ground. In some in stances buds form on the roots, and may be used for purposes of propagation, as in the Japan quince, the globe thistle, the sea holly, some sea lavenders, Bocconia, Acanthus, &c. Of the tendency in buds to assume an independent existence gardeners avail themselves in the operations of striking " cuttings," and making " layers " and " pipings," as also in budding and grafting. In taking a slip or cutting the gardener removes from the parent plant a shoot having one or more buds or " eyes," in the case of the vine one only, and places it in a moist and sufficiently warm situation, where, as previously mentioned, undue evaporation from the surface is pre- vented. For some cuttings, pots filled with light soil, with the protection of the propagating-house and of bell-glasses, are requisite ; but for many of our hardy deciduous trees and shrubs no such precautions are necessary, and the insertion of a short shoot about half its length into moist and gritty ground at the proper season suffices to ensure its growth. In the case of the more delicate plants, the formation of roots is preceded by the production from the cambium of the cuttings of a succulent mass of tissue, the callus. It is important in some cases, e.g. zonal pelargoniums, fuchsias, shrubby calceolarias, dahlias, carnations, &c, to retain on the

cutting some of its leaves, so as to supply the requisite food for storage in the callus, fn other cases, where the buds themselves contain a sufficiency of nutritive matter for the young growths, the retention of leaves is not necessary. The most successful mode of forming roots is to place the cuttings in a mild bottom-heat, which expedites their growth, even in the case of many hardy plants whose cuttings strike roots in the open soil. With some hard-wooded trees, as the common white-thorn, roots cannot be obtained without bottom-heat. It is a general rule throughout plant culture that the activity of the roots shall be in advance of that of the leaves. Cuttings of deciduous trees and shrubs succeed best if planted early in autumn while the soil still retains the solar heat absorbed during summer. For evergreens August or September, and foi greenhouse and stove-plants the spring and summer months, are the times most suitable for propagation by cuttings.

Layering consists simply in bending down a branch and keeping it in contact with or buried to a small depth in the soil until roots are formed; the connexion with the parent plant may then be

severed. Many plants can be far more easily propagated thus than t>y cuttings.

Grafting or " working " consists in the transfer of a branch, the " graft " or " scion," from one plant to another, which latter is termed the " stock." The operation must be so performed that the growing tissues, or cambium-layer of the scion, may fit accurately to the corresponding layer of the stock. In budding, as with roses and peaches, a single bud only is implanted. Inarching is essentially the promotion of the union of a shoot of one plant to that of another of the same or allied species or variety. The outer .bark of each being removed, the two shoots are kept in contact by ligature until union is established, when the scion is completely severed from its original attachments. This operation is varied in detail according to the kind of plant to be propagated, but it is essential in all cases that the affinity between the two plants be near, that the union be neatly effected, and that the ratio as well as the season of growth of stock and scion be similar.

The selection of suitable stocks is a matter still requiring much scientific experiment. The object of grafting is to expedite and increase the formation of flowers and fruit. Strong-growing pears, for instance, are grafted on the quince stock in order to restrict their tendency to form " gross " shoots and a superabundance of wood in place of flowers and fruit. Apples, for the same reason, are " worked " on the " paradise " or " doucin " stocks, which from their influence on the scion are known as dwarfing stocks. Scions from a tree which is weakly, or liable to injury by frosts, are strengthened by engrafting on robust stocks. Lindley has pointed out that, while in Persia, its native country, the peach is probably best grafted on the peach, or on its wild type the almond, in England, where the summer temperature of the soil is much lower than that of Persia, it might be expected, as experience has proved, to be most successful on stocks of the native plum.

The soil in which the stock grows is a point demanding attention. From a careful series of experiments made in the Horticultural Society's Garden at Chiswick, it was found that where the soil is loamy, or light and slightly enriched with decayed vegetable matter, the apple succeeds best on the doucin stock, and the pear on the quince; and where it is chalky it is preferable to graft the apple on the crab, and the pear on the wild pear. For the plum on loamy soils the plum, and on chalky and light soils the almond, are the most desirable stocks, and for the cherry on loamy or light rich soils the wild cherry, and on chalk the " mahaleb " stock.

The form and especially the quality of fruit is more or less affected by the

stock upon which it is grown. The Stanwick nectarine, so apt to crack and not to ripen when worked in the ordinary way, is said to be cured of these propensities by being first budded close to the ground, on a very strong-growing Magnum Bonum plum, worked on a Brussels stock, and by then budding the nectarine on the Magnum Bonum about a foot from the ground. The fruit of the pear is of a higher colour and smaller on the quince stock than on the wild pear ; still more so on the medlar. On the mountain ash the pear becomes earlier.

The effects produced by stock on scion, and more particularly by scion on stock, are as a rule with difficulty appreciable. Never- theless, in exceptional cases modified growths, termed " graft- hybrids," have been obtained which have been attributed to the commingling of the characteristics of stock and scion (see Hybridism). Of these the most remarkable example is Cytisus Adami, a tree which year after year produces some shoots, foliage and flowers like those of the common laburnum, others like those of the very different looking dwarf shrub C. purpureus, and others again inter- mediate between these. We may hence infer that C. purpureus was grafted or budded on the common laburnum, and that the intermediate forms are the result of graft-hybridization. Numerous similar facts have been recorded. Among gardeners the general opinion is against the possibility of graft-hybridization. The wonder, however, seems to be that it does not occur more frequently, seeing that fluids must pass from stock to scion, and matter elaborated in the leaves of the scion must certainly to some extent enter the stock. It is clear, nevertheless, from examination that as a rule t he wood of the stock and the wood of the scion retain their external characters year by year without change. Still, as in the laburnum just mentioned, in the variegated jasmine and in Abutilon Darwinii, in the copper beech and in the horse-chestnut, the influence of a variegated scion has occasionally shown itself in the production from the stock of variegated shoots. At a meeting of the Scottish Horticultural Association (see Gard. Chron., Jan. 10, 1880, figs. 12-14) specimens of a small roundish pear, the " Aston Town," and of the elongated kind known as " Beurre Clairgeau," were exhibited. I »o more dissimilar pears hardly exist. The result of working the Beurre Clairgeau upon the Aston Town was the production of fruits precisely intermediate in size, form, colour, speckling of rind and other characteristics. Similar, though less marked, intermediate characters were obvious in the foliage and flowers.

Double grafting (French, greffe sur greffe) is sufficiently explained by its name. By means of it a variety may often be propagated, or its fruit improved in a way not found practicable under ordinary circumstances. For its successful prosecution prolonged experiments in different localities and in gardens devoted to the purpose arc requisite.

Planting. — By removal from one place to another the growth of every plant receives a check. How this check can be obviated or reduced, with regard to the season, the state of atmosphere, and the condition and circumstances of the plant generally, is a matter to be considered by the practical gardener.

As to season, it is now admitted with respect to deciduous trees and shrubs that the earlier in autumn planting is performed the better; although some extend it from the period when the leaves fall to the first part of spring, before the sap begins to move. If feasible, the operation should be completed by the end of November, whilst the soil is still warm with the heat absorbed during summer. Attention to this rule is specially important in the case of rare and delicate plants. Early autumn planting enables wounded parts of roots to be healed over, and to form fibrils, which will be ready in spring, when it is most required, to collect food for the plant. Planting late in spring should, as far as possible, be avoided, for the buds then begin to awaken into active life, and the draught upon the roots becomes great. It has been supposed that because the surface of the young leaves is small transpiration is correspond- ingly feeble; but it must be remembered, not only that their newly- formed tissue is unable without an abundant supply of sap from the roots to resist the excessive drying action of the atmosphere, but that, in spring, the lowness of the temperature at that season in Great Britain prevents the free circulation of the sap. The com- parative dryness of the atmosphere in spring also causes a greater amount of transpiration then than in autumn and winter. Another fact in favour of autumnal planting is the production of roots in winter.

The best way of performing transplantation depends greatly on the size of the trees, the soil in which they grow, and the mechanical appliances made use of in lifting and transporting them. The smaller the tree the more successfully can it be removed. The more argillaceous and the less siliceous the soil the more readily can balls of earth be retained about the roots. All planters lay great stress on the preservation of the fibrils; the point principally disputed is to what extent they can with safety be allowed to be cut off in transplantation. Trees and shrubs in thick plantations, or in sheltered warm places, are ill fitted for planting in bleak and cold situations. During their removal it is important that the roots be covered, if only to prevent desiccation by the air. Damp days are therefore the best for the operation; the dryest months are the most unfavourable. Though success in transplanting depends much on the humidity of the atmosphere, the most important requisite is warmth in the soil; humidity can be supplied artificially, but heat cannot.

Pruning, or the removal of superfluous growths, is practised in order to equalize the development of the different parts of trees, or to promote it in

particular directions so as to secure a certain form, and, by checking undue luxuriance, to promote enhanced fertility. In the rose-bush, for instance, in which, as we have seen, the flower-buds are formed on the new wood of the year, pruning causes the old wood to " break," i.e. to put forth a number of new buds, some of which will produce flowers at their extremities. The manner and the time in which pruning should be accomplished, and its extent, vary with the plant, the objects of the operation, i.e. whether for the production of timber or fruit, the season and various other circumstances. So much judgment and experience does the operation call for that it is a truism to say that bad pruning is worse than none. The removal of weakly, sickly, overcrowded and gross infertile shoots is usually, however, a matter about which there can be few mistakes when once the habit of growth and the form and arrangement of the buds are known. Winter pruning is effected when the tree is comparatively at rest, and is therefore less liable to " bleeding " or outpouring of sap. Summer pruning or pinching off the tips of such of the younger shoots as are not required for the extension of the tree, when not carried to too great an extent, is preferable to the coarser more reckless style of pruning. The injury inflicted is less and not so concentrated; the wounds are smaller, and have time to heal before winter sets in. The effects of badly-executed pruning, or rather hacking, are most noticeable in the case of forest trees, the mutilation of which often results in rotting, canker and other diseases. Judicious and timely thinning so as to allow the trees room to grow, and to give them sufficiency of light and air, will generally obviate the need of the pruning-saw, except to a relatively small extent.

Training is a procedure adopted when it is required to grow plants in a limited area, or in a particular shape, as in the case of many plants of trailing habit. Judicious training also may be of import- ance as encouraging the formation of flowers and fruit. Growth in length is mainly in a vertical direction, or at least at the ends of the shoots; and this should be encouraged, in the case of a timber tree, or of a climbing plant which it is desired should cover a wall quickly; but where flowere or fruit are specially desired, then, when the wood required is formed, the lateral shoots may often be trained more or less downward to induce fertility. The refinements of training, as of pruning, may, however, be carried too far; and not unfrcqucntly the symmetrically trained trees of the French excite admiration in every respect save fertility.

Spflrt.t or Bvd Variations. — Here we may conveniently mention certain variations from the normal condition in the size, form or

disposition of buds or shoots on a given plant. An inferior variety of pear, for instance, may suddenly produce a shoot bearing fruit of superior quality; a beech tree, without obvious cause, a shoot with finely divided foliage; or a camellia an unwontedly fine flower. When removed from the plant and treated as cuttings or grafts, such sports may be perpetuated. Many garden varieties of flowers and fruits have thus originated. The cause of their production is very obscure.

Formation of Flowers.— Flowers, whether for their own sake or as the necessary precursors of the fruit and seed, are objects of the greatest concern to the gardener. As a rule they are not formed until the plant has arrived at a certain degree of vigour, or until a sufficient supply of nourishment has been stored in the tissues of the plant. The reproductive process of which the formation of the flower is the first stage being an exhaustive one, it is necessary that the plant, as gardeners say, should get " established " before it flowers. Moreover, although the green portions of the flower do indeed perform the same office as the leaves, the more highly coloured and more specialized portions, which are further removed from the typical leaf-form, do not carry on those processes for which the presence of chlorophyll is essential ; and the floral organs may, therefore, in a rough sense, be said to be parasitic upon the green parts. A check or arrest of growth in the vegetative organs seems to be a necessary preliminary to the development of the flower.

A diminished supply of water at the root is requisite, so as to check energy of growth, or rather to divert it from leaf-making. Partial starvation will sometimes effect this; hence the grafting of free- growing fruit trees upon dwarfing stocks, as before alluded to, and also the " ringing " or girdling of fruit trees, i.e. the removal from the branch of a ring of bark, or the application of a tight cincture, in consequence of which the growth of the fruits above the wound or the obstruction is enhanced. On the same principle the use of small pots to confine the roots, root-pruning and lift- ing the roots, and exposing them to the sun, as is done in the case of the vine in some countries, are resorted to. A higher temperature, especially with deficiency of moisture, will tend to throw a plant into a flowering condition. This is exemplified by the fact that the temperature of the climate of Great Britain is too low for the flowering, though sufficiently high for the growth of many plants. Thus the Jerusalem artichoke, though able to produce stems and tubers abundantly, only flowers in exceptionally hot seasons.

Forcing. — The operation of forcing is based upon the facts just mentioned. By subjecting a plant to a gradually increasing tempera- ture, and

supplying water in proportion, its growth may be ac- celerated ; its season of development may be, as it were, anticipated ; it is roused from a dormant to an active state. Forcing therefore demands the most careful adjustment of temperature and supplies of moisture and light.

Deficiency of light is less injurious than might at first be expected, because the plant to be forced has stored iip in its tissues, and available for use, a reserve stock of material formed through the agency of light in former seasons. The intensity of the colour of flowers and the richness of flavour of fruit are, however, deficient where there is feebleness of light. Recent experiments show that the influence of electric light on chlorophyll is similar to that of sunlight, and that deficiencies of natural light may to some extent be made good by its use. The employment of that light for forcing purposes would seem to be in part a question of expense. The advantage hitherto obtained from its use has consisted in the rapidity with which flowers have been formed and fruits ripened under its influence, circumstances which go towards compensating lor the extra cost of production.

Retardation. — The art of retarding the period of flowering in certain plants consists, in principle, in the artificial application of cold temperatures whereby the resting condition induced by low winter temperature is prolonged. For commercial purposes, crowns of lily of the valley, tulip and other bulbs, and such deciduous woody plants as lilac and deciduous species of rhododendron, while in a state of rest, are packed in wet moss and introduced into cold- storage chambers, where they may be kept in a state of quiescence, it desired, throughout the following summer. The temperature of the cold chamber is varied from the freezing-point of water, to a few degrees lower, according to the needs of the plants under treat- ment. When required for use they are removed to cool sheds to thaw, and are then gradually inured to higher temperatures. The chief advantages of retarded plants are: — (a) they may be flowered almost at will; (b) they are readily induced to flower at those times when unretarded plants refuse to respond to forcing. Cold- storage chambers form a part of the equipment of most of the leading establishments where flowers are grown for market.

Double Flowers.— The taste of the day demands that " double flowers " should be largely grown. Though in many instances, as in hyacinths, they are less beautiful than single ones, they always present the advantage of being less evanescent. Under the vague term " double " many very different morphological changes are included. The flower of a double dahlia, e.g. offers a totally different condition of structure from that of a rose or a hyacinth. The double poinsettia, again, owes its so-called double condition merely to the increased number of its scarlet involucral leaves, which are not parts of the flower at all. It is reasonable, therefore, to infer that

the causes leading to the production of double flowers are varied. A good deal of difference of opinion exists as to whether they are the result of arrested growth or of exuberant development, and accordingly whether restricted food or abundant supplies of nourish- ment are the more necessary for their production. It must suffice here to say that double flowers are most commonly the result of the substitution of brightly-coloured petals for stamens or pistils or both, and that a perfectly double flower where all the stamens and pistils are thus metamorphosed is necessarily barren. Such a plant must needs be propagated by cuttings. It rarely happens, however, that the change is quite complete throughout the flower, and so a few seeds may be formed, some of which may be expected to reproduce the double-blossomed plants. By continuous selection of seed from the best varieties, and " roguing " or eliminating plants of the ordinary type, a " strain " or race of double flowers is gradually produced.
•

Formation of Seed — Fertilization. — In fertilization — the influence in flowering plants of the male-cell in the pollen tube upon the egg- cell in the ovule (see Botany) — there are many circumstances of importance horticulturally, to which, therefore, brief reference must be made. Flowers, generally speaking, are either self-fertilized, cross-fertilized or hybridized. Self-fertilization occurs when the pollen of a given flower affects the egg-cell of 'the same individual flower. Cross-fertilization varies both in manner and degree. In the simplest instances the pollen of one flower fertilizes the ovules of another on the same plant, owing to the stamens arriving at maturity in any one flower earlier or later than the pistils.

Cross-fertilization must of necessity occur when the flowers are structurally unisexual, as in the hazel, in which the male and female flowers are monoecious, or separate on the same plant, and in the willow, in which they are dioecious, or on different plants. A conspicuous example of a dioecious plant is the common aucuba, of which for years only the female plant was known in Britain. When, through the introduction of the male plant from Japan, its fertiliza- tion was rendered possible, ripe berries, before unknown, became common ornaments of the shrub.

The conveyance of pollen from one flower to another in cross- fertilization is effected naturally by the wind, or by the agency of insects and other creatures. Flowers that require the aid of insects usually offer some attraction to their visitors in the shape of bright colour, fragrance or sweet juices. The colour and markings of a flower often serve to guide the insects to the honey, in the obtaining of which they are compelled either to remove or to deposit pollen. The reciprocal adaptations of insects and flowers demand attentive observation on the part of the gardener concerned with the growing of grapes, cucumbers, melons and strawberries, or with the

raising of new and improved varieties of plants. In wind-fertilized plants the flowers are comparatively inconspicuous and devoid of much attraction for insects; and their pollen is smoother and smaller, and better adapted for transport by the wind, than that of insect- fertilized plants, the roughness of which adapts it for attachment to the bodies of insects.

It is very probable that the same flower at certain times and seasons is self-fertilizing, and at others not so. The defects which cause gardeners to speak of certain vines as " shy setters," and of certain strawberries as " blind," may be due either to unsuitable conditions of external temperature, or to the non-accomplishment, from some cause or other, of cross-fertilization. In a vinery, tomato- house or a peach-house it is often good practice at the time of flowering to tap the branches smartly with a stick so as to ensure the dispersal of the pollen. Sometimes more delicate and direct manipulation is required, and the gardener has himself to convey the pollen from one flower to another, for which purpose a small camel's-hair pencil is generally suitable. The degree of fertility varies greatly according to external conditions, the structural and functional arrangements just alluded to, and other causes which may roughly be called constitutional. Thus, it often happens that an apparently very slight change in climate alters the degree of fertility. In a particular country or at certain seasons one flower will be self-sterile or nearly so, and another just the opposite.

Hybridization. — Some of the most interesting results and many of the gardener's greatest triumphs have been obtained by hybridiza- tion, i.e. the crossing of two individuals not of the same but of two distinct species of plants, as, for instance, two species of rhododendron or two species of orchid (see Hybridism). It is obvious that hybridization differs more in degree than in kind froni cross-fertilization. The occurrence of hybrids in nature explains the difficulty experienced by botanists in deciding on what is a species, and the widely different limitations of the term adopted by different observers in the case of willows, roses, brambles, &c. The artificial process is practically the same in hybridization as in cross-fertiliza- tion, but usually requires more care. To prevent self-fertilization, or the- access of insects, it is advisable to remove the stamens and even the corolla from the flower to be impregnated, as its own pollen or that of a flower of the same species is often found to be " pre- potent." There are, however, cases, e.g. some passion-flowers and rhododendrons, in which a flower is more or less sterile with its own, but fertile with foreign pollen, even when this is from a distinct species. It is a singular circumstance that reciprocal crosses arc not always or even often possible; thus, one rhododendron may

afford pollen perfectly potent on the stigma of another kind, by the pollen of which latter its own stigma is unaffected.

The object of the hybridizer is to obtain varieties exhibiting improvements in hardihood, vigour, size, shape, colour, fruitfulness, resistance to disease or other attributes. His success depends not alone on skill and judgment, for some seasons, or days even, are found more propitious than others. Although promiscuous and hap-hazard procedures no doubt meet with a measure of success, the best results are those which are attained by systematic work with a definite aim.

Hybrids are sometimes less fertile than pure-bred species, and are occasionally quite sterile. Some hybrids, however, are as fertile as pure-bred plants. Hybrid plants may be again crossed, or even re-hybridized, so as to produce a progeny of very mixed parentage. This is the case with many of our roses, dahlias, begonias, pelargoniums, orchids and other long or widely cultivated garden plants.

Reversion. — In modified forms of plants there is frequently a tendency to " sport " or revert to parental or ancestral charac- teristics. So markedly is this the case with hybrids that in a few generations all traces of a hybrid origin may disappear. The dissociation of the hybrid element in a plant must be obviated by careful selection. The researches of Gregor Johann Mendel (1822- 1884), abbot of the Augustinian monastery at Briinn, in connexion with peas and other plants, apparently indicate that there is a definite natural law at work in the production of hybrids. Having crossed yellow and green seeded peas both ways, he found that the progeny resulted in all yellow coloured seeds. These gave rise in due course to a second generation in which there were three yellows to one green. In the third generation the yellows from the second generation gave the proportion of one pure yellow, two impure yellows, and one green ; while the green seed of the second generation threw only green seeds in the third, fourth and fifth generations. The pure yellow in the third generation also threw pure yellows in the fourth and fifth and succeeding generations. The impure yellows, however, in the next generation gave rise to one pure yellow, one pure green, to two impure yellows, and so on from generation to genera- tion. Accordingly as the green or the yellow predominated in the progeny it was termed " dominant," while the colour that dis- appeared was called " recessive." It happened, however, that a recessive colour in one generation becomes the dominant in a suc- ceeding one.

Germination. — The length of the period during which seeds remain dormant after their formation is very variable. The con- ditions for germination are much the same as for growth in general. Access to light is not required, because the seed contains a sufficiency of stored-up food. The temperature necessary varies according to the nature and source of the seed. Some seeds require prolonged immersion in water to soften their shells; others are of so delicate a texture that they would dry up and perish if not kept constantly in a moist atmosphere. Seeds buried too deeply receive a deficient supply of air. As a rule, seeds require to be sown more deeply in proportion to their size and the lightness of the soil.

The time required for germination in the most favourable cir- cumstances varies very greatly, even in the same species, and in seeds taken from one pod. Thus the seeds of Primula japonica, though sown under precisely similar conditions, yet come up at very irregular intervals of time. Germination is often slower where there is a store of available food in the perisperm, or in the endo- sperm, or in the embryo itself, than where this is scanty or wanting. In the latter case the seedling has early to shift for itself, and to form roots and leaves for the supply of its needs.

Selection. — Supposing seedlings to have been developed, it is found that a large number of them present considerable variations, some being especially robust, others peculiar in size or form. Those most suitable for the purpose of the gardener are carefully selected for propagation, while others not so desirable are destroyed; and thus after a few generations a fixed variety, race or strain superior to the original form is obtained. Many garden plants have originated solely by selection ; and much has been done to improve our breeds of vegetables, flowers and fruit by systematic selection.

Large and well-formed seeds are to be preferred for harvesting. The seeds should be kept in sacks or bags in a dry place, and if from plants which are rare, or liable to lose their vitality, they are ad- vantageously packed for transmission to a distance in hermetically sealed bottles or jars filled with earth or moss, without the addition of moisture.

It will have been gathered from what has been said that seeds cannot always be depended on to reproduce exactly the character- istics of the plant which yielded them; for instance, seeds of the greengage plum or of the Ribston pippin will produce a plum or an apple, but not these particular varieties, to perpetuate which grafts or buds must be employed. (M. T. M.; W. R. W.)

Part II. — The Practice of Horticulture

The details of horticultural practice naturally range under the three heads

of flowers, fruits and vegetables (see also Fruit and Flower Farming). There are, however, certain general

aspects of the subject which will be more conveniently noticed apart, since they apply alike to each department. We shall therefore first treat of these under four headings: formation and preparation of the garden, garden structures and edifices, garden materials and appliances, and garden operations.

I. Formation and Preparation of the Garden.

Site. — The site chosen for the mansion will more or less determine that of the garden, the pleasure grounds and flower garden being placed so as to surround or lie contiguous to it, while the fruit and vegetable gardens, either together or separate, should be placed on one side or in the rear, according to fitness as regards the nature of the soil and subsoil,, the slope of the surface or the general features of the park scenery. In the case of villa gardens there is usually little choice: the land to be occupied is cut up into plots, usually rectangular, and of greater or less breadth, and in laying out these plots there is generally a smaller space left in the front of the villa residence and a larger one behind, the front plot being usually devoted to approaches, shrubbery and plantations, flower beds being added if space permits, while the back or more private plot has a piece of lawn grass with flower beds next the house, and a space for vegetables and fruit trees at the far end, this latter being shut off from the lawn by an intervening screen of ever- greens or other plants. Between these two classes of gardens there are many gradations, but our remarks will chiefly apply to those of larger extent.

The almost universal practice is to have the fruit and vegetable gardens combined; and the flower garden may sometimes be conveniently placed in juxtaposition with them. When the fruit and vegetable gardens are combined, the smaller and choicer fruit trees only should be admitted, such larger-growing hardy fruits as apples, pears, plums, cherries, &c, being relegated to the orchard.

Ground possessing a gentle inclination towards the south is desirable for a garden. On such a slope effectual draining is easily accomplished, and the greatest possible benefit is derived from the sun's rays. It is well also to have an open exposure towards the east and west, so that the garden may enjoy the full benefit of the morning and evening sun, especially the latter; but shelter is desirable on the north and north-east, or in any direction in which the particular locality may happen to be exposed. In some places the south-western gales are so severe that a belt of trees is useful as a break wind and shelter. Soil and Subsoil. — A hazel-coloured loam, moderately

light in texture, is well adapted for most garden crops, whether of fruits or vegetables, especially a good warm deep loam resting upon chalk; and if such a soil occurs naturally in the selected site, but little will be required in the way of preparation. If the soil is not moderately good and of fair depth, it is not so favourable for gardening purposes. Wherever the soil is not quite suitable, but is capable of being made so, it is best to remedy the defect at the outset by trenching it all over to a depth of 2 or 3 ft., incorporating plenty of manure with it. A heavy soil, although at first requiring more labour, generally gives far better results when worked than a light soil. The latter is not sufficiently retentive of moisture and gets too hot in summer and requires large quantities of organic manures to keep it in good condition. It is advantageous to possess a variety of soils; and if the garden be on a slope it will often be practicable to render the upper part light and dry, while the lower remains of a heavier and damper nature.

Natural soils consist of substances derived from the decom- position of various kinds of rocks, the bulk consisting of clay, silica and lime, in various proportions. As regards pre- paration, draining is of course of the utmost importance. The ground should also be trenched to the depth of 3 ft. at least, and the deeper the better so as to bring up the subsoil— whether it be clay, sand, gravel, marl, &c. — for exposure to the weather and thus convert it from a sterile mass into a living soil teeming with bacteria. In this operation all stones larger than a man's fist must be taken out, and all roots of trees and of

perennial weeds carefully cleared away. When the whole ground has been thus treated, a moderate liming will, in general, be useful, especially on heavy clay soils. After this, supposing the work to have occupied most of the summer, the whole may be laid up in ridges, to expose as great a surface as possible to the action of the winter's frost.

Argillaceous or clay soils are those which contain a large per- centage (45-50) of clay, and a small percentage (5 or less) of lime. These are unfitted for garden purposes until improved by draining, liming, trenching and the addition of porous materials, such as ashes, burnt ballast or sand, but when thoroughly improved they are very fertile and less liable to become exhausted than most other soils. Loamy soils contain a considerable quantity (30-45 %) of clay, and smaller quantities of lime, humus and sand. Such soils properly drained and prepared are very

suitable for orchards, and when the proportion of clay is smaller (20-30 %) they form excellent garden soils, in which the better sort of fruit trees luxuriate. Marly soils are those which contain a considerable percentage (10-20) of lime, and are called clay marls, loamy marls and sandy marls, according as these several ingredients preponderate. The clay marls are, like clay soils, too stiff for garden purposes until well worked and heavily manured ; but loamy marls are fertile and well suited to fruit trees, and sandy marls are adapted for producing early crops. Calcareous soils, which may also be heavy, intermediate or light, are those which contain more than 20 % of lime, their fertility depending on the proportions of clay and sand which enter into their composition ; they are generally cold and wet. Vegetable soils or moulds, or humus soils, contain a considerable percentage (more than 5) of humus, and embrace both the rich productive garden moulds and those known as peaty soils.

The nature of the subsoil is of scarcely less importance than that of the surface soil. Many gardeners are still afraid to dis- turb an unsuitable subsoil, but experienced growers have proved that by bringing it up to the surface and placing plenty of manure in the bottoms of the various trenches, the very best results are attained in the course of a season or so. An uneven subsoil, especially if retentive, is most undesirable, as water is apt to collect in the hollows, and thus affect the upper soil. The remedy is to make the plane of its surface agree with that of the ground. When there is a hard pan this should be broken up with the spade or the fork, and have plenty of manure mixed with it. When there is an injurious preponderance of metallic oxides or other deleterious substances, the roots of trees would be affected by them, and they must therefore be removed. When the subsoil is too compact to be pervious to water, effectual drainage must be resorted to; when it is very loose, so that it drains away the fertile ingredients of the soil as well as those which are artificially supplied, the compactness of the stratum should be increased by the addition of clay, marl or loam. The best of all subsoils is a dry bed of clay overlying sandstone.

Plan. — In laying out the garden, the plan should be prepared in minute detail before commencing operations. The form of the kitchen and fruit garden should be square or oblong, rather than curvilinear, since the working and cropping of the ground can thus be more easily carried out. The whole should be compactly arranged, so as to facilitate working, and to afford convenient access for the carting of the heavy materials. This access is especially desirable as regards the store-yards and framing ground, where fermenting manures and tree leaves for making up hot beds, coals or wood for fuel and ingredients for composts, together with flower-pots and the many necessaries of garden culture, have to be accom- modated. In the case of villas or picturesque residences, gardens of irregular form may be permitted; when adapted to the conditions of the

locality, they associate better with surrounding objects, but in such gardens wall space is usually limited.

The distribution of paths must be governed by circumstances. Generally speaking, the main paths for cartage should be 8 ft. wide, made up of o in. hard core covered by 4 in. of gravel or ash, with a gentle rise to centre to throw off surface water. The smaller paths, not intended for cartage, should be 4 ft. to 6 ft. wide, according to circumstances, made up of 6 in. hard core and 3 in. of gravel or ash, and should be slightly raised at centre. A considerable portion of the north wall is usually covered

in front with the glazed structures called forcing-houses, and to these the houses for ornamental plants are sometimes attached; but a more appropriate site for the latter is the flower garden, when that forms a separate department. It is well, however, that everything connected with the forcing of fruits or flowers should be concentrated in one place. The frame ground, in- cluding melon and pine pits, should occupy some well-sheltered spot in the slips, or on one side of the garden, and adjoining to this may be found a suitable site for the compost ground, in which the various kinds of soils are kept in store, and in which also composts may be prepared.

As walls afford valuable space for the growth of the choicer kinds of hardy fruits, the direction in which they are built is of considerable importance. In the warmer parts of the country the wall on the north side of the garden should be so placed as to face the sun at about an hour before noon, or a little to the east of south; in less favoured localities it should be made to face direct south, and in still more unfavourable districts it should face the sun an hour after noon, or a little west of south. The east and west walls should run parallel to each other, and at right angles to that on the north side, in all the most favoured localities; but in colder or later ones, though parallel, they should be so far removed from a right angle as to get the sun by eleven o'clock. On the whole, the form of a parallelogram with its longest sides in the proportion of about, five to three of the shorter, and running east and west, may be considered the best form, since it affords a greater extent of south wall than any other.

Fig. 1 represents a garden of one acre and admits of nearly double the number of trees on the south aspect as compared with the east and west ; it allows a greater number of espalier or pyramid trees to face the south ; and it admits of being divided into equal principal compartments, each of which forms nearly a sq uare. The size of course can be increased to any requisite extent. That of the royal gardens at Frog- more, 760 ft. from east to west and 440 ft. from north to south, is nearly of the same proportions.

The spaces between the walls and the outer fence are called " slips." A

considerable extent is sometimes thus enclosed, p. and utilized for the

1. — Plan of Garden an acre in area.

growth of such vegetables as potatoes, winter greens and sea- kale, for the small bush fruits, and for strawberries. The slips are also convenient as affording a variety of aspects, and thus helping to prolong the season of particular vegetable crops.

Shelter. — A screen of some kind to temper the fury of the blast is absolutely necessary. If the situation is not naturally well sheltered, the defect may be remedied by masses of forest trees disposed at a considerable distance so as not to shade the walls or fruit trees. They should not be nearer than, say, 50 yds., and may vary from that to 100 or 150 yds. distance according to circumstances, regard being had especially to peculiarities occasioned by the configuration of the country, as for instance to aerial currents from adjacent eminences. Care should be taken, however, not to hem in the garden by crowded plantations, shelter from the prevailing strong winds being all that is required, while the more open it is in other directions the better. The trees employed for screens should include both those of deciduous and of evergreen habit, and should suit the peculiarities of local soil and climate. Of deciduous trees the sycamore, wych-elm, horse-chestnut, beech, lime, plane and poplar may be used, — the abele or white poplar, Populus alba, being one of the most rapid-growing of all trees, and, like other poplars, well suited for nursing other choicer subjects; while of evergreens, the holm oak, holly, laurel (both common and Portugal), and such conifers as the Scotch, Weymouth and Austrian pines, with spruce and*

silver firs and yews, are suitable. The conifers make the most effective screens.

Extensive gardens in exposed situations are often divided into compartments by hedges, so disposed as to break the force of high winds. Where these are required to be narrow as well as lofty, holly, yew or beech is to be preferred; but, if there is sufficient space, the beautiful laurel and the bay may be employed where they will thrive. Smaller hedges may be formed of evergreen privet or of tree-box. These subordinate divisions furnish, not only shelter but also shade, which, at certain seasons, is

peculiarly valuable.

Belts of shrubbery may be placed round the slips outside the walls; and these may in many cases, or in certain parts, be of sufficient breadth to furnish pleasant retired promenades, at the same time that they serve to mask the formality of the walled gardens, and are made to harmonize with the picturesque scenery of the pleasure ground.

Water Supply. — Although water is one of the most important elements in plant life, we do not find one garden in twenty where even ordinary precautions have been taken to secure a competent supply. Rain-water is the best, next to that river or pond water, and last of all that from springs; but a chemical analysis should be made of the last before introducing it, as some spring waters contain mineral ingredients injurious to vegetation. Iron pipes are the best conductors; they should lead to a capacious open reservoir placed outside the garden, and at the highest convenient level, in order to secure sufficient pressure for effective distribution, and so that the wall trees also may be effectually washed. Stand-pipes should be placed at intervals beside the walks and in other convenient places, from which water may at all times be drawn; and to which a garden hose can be attached, so as to permit of the whole garden being readily watered. The mains should be placed under the walks for safety, and also that they may be easily reached when repairs are required. Pipes should also be laid having a connexion with all the various greenhouses and forcing-houses, each of which should be pro- vided with a cistern for aerating the daily supplies. In fact, every part of the garden, including the working sheds and offices, should have water supplied without stint.

Fence. — Gardens of large extent should be encircled by an outer boundary, which is often formed by a sunk wall or ha-ha surrounded by an invisible wire fence to exclude ground game, or consists of a hedge with low wire fence on its inner side. Occasionally this sunk wall is placed on the exterior of the screen plantations, and walks lead through the trees, so that views are obtained of the adjacent country. Although the interior garden receives its form from the walls, the ring fence and plantations may be adapted to the shape and surface of the ground. In smaller country gardens the enclosure or outer fence is often a hedge, and there is possibly no space enclosed by walls, but some divisional wall having a suitable aspect is utilized for the growth of peaches, apricots, &c, and the hedge merely separates the garden from a paddock used for grazing. The still smaller gardens of villas are generally bounded by a wall or wood fence, the inner side of which is appropriated to fruit trees. For the latter walls are much more convenient and suitable than a boarded fence, but in general these are too low to be of much value as aids to cultivation, and they are best covered with bush fruits or with ornamental plants of limited growth.

Walks. — The best material for the construction of garden walks is good binding gravel. The ground should be excavated to the depth of a foot or more — the bottom being made firm and slightly concave, so that it may slope to the centre, where a drain should be introduced; or the bottom may be made convex and the water allowed to drain away at the sides. The bottom 9 in. should be filled in compactly with hard, coarse materials, such as stones, brickbats, clinkers, burned clay, &c, on which should be laid 2 or 3 in. of coarse gravel, and then r or 2 in. of firm binding gravel on the surface. The surface of the walks should be kept well rolled, for nothing contributes more to their elegance and durability.

All the principal lines of walk should be broad enough to allow

at least three persons to walk abreast; the others may be narrower, but a multitude of narrow walks has a puny effect. Much of the neatness of walks depends upon the material of which they are made. Gravel from an inland pit is to be pre- ferred; though occasionally very excellent varieties are found upon the sea-coast. Gravel walks must be kept free from weeds, either by hand weeding, or by the use of one of the many weed killers now on the market. In some parts of the country the available material does not bind to form a close, even surface, and such walks are kept clean by hoeing.

Grass walks were common in English gardens during the pre- valence of the Dutch taste, but, owing to the frequent humidity of the climate, they have in a great measure been discarded. Grass walks are made in the same way as grass lawns. When the space to be thus occupied is prepared, a thin layer of sand or poor earth is laid upon the surface and over this a similar layer of good soil. This arrangement is adopted in order to prevent excessive luxuriance in the grass. In many modern gardens pathways made of old paving stones lead from the house to different parts. They give an old-fashioned and restful appear- ance to a garden, and in the interstices charming little plants like thyme, Ionopsidium acaule, &c, are allowed to grow.

Edgings. — Walks are separated from the adjoining beds and borders in a variety of ways. If a living edging is adopted, by far the best is afforded by the dwarf box planted closely in line. It is of extremely neat growth, and when annually clipped will remain in good order for many years. Very good edgings, but of a less durable character, are formed by thrift (Armeria vulgaris), double daisy (Belhs perennis), gentianella (Gentiana acaulis) and London pride (Saxifraga umbrosa), Cerastium tomentosum, Stachys lavata and the beautiful ever- green Veronica rupestris with sheets of bright blue flowers close to the ground, or by some of the finer grasses very carefully selected, such as the sheep's fescue (Festuca ovina) or its

glaucous-leaved variety. Indeed, any low-growing herbaceous plant, susceptible of minute division, is suitable for an edging. Amongst shrubby plants suitable for edgings are the evergreen candytuft (Iberis sempervirens) , Euonymus radicans variegata, ivy, and Euonymus. microphyllus — a charming little evergreen with small serrated leaves. Edgings may also be formed of narrow slips of sandstone flag, slate, tiles or bricks. One advantage of using edgings of this kind, especially in kitchen gardens, is that they do not harbour slugs and similar vermin, which all live edgings do, and often to a serious extent, if they are left to grow large. In shrubberies and large flower-plots, verges of grass-turf, from 1 to 3 ft. in breadth, according to the size of the border and width of the walk, make a very handsome edging, but they should not be allowed to rise more than an inch and a half above the gravel, the grass being kept short by repeated mowings, and the edges kept trim and well-defined by frequently clipping with shears and cutting once or twice a year with an edging iron.

II. Garden Structures.

Walls. — The position to be given to the garden walls has been already referred to. The shelter afforded by a wall, and the increased temperature secured by its presence, are indispensable in the climate of Great Britain, for the production of all the finer kinds of outdoor fruits; and hence the inner side of a north wall, having a southern aspect, is appropriated to the more tender kinds. It is, indeed, estimated that such positions enjoy an increased temperature equal to 7° of latitude — that is to say, the mean temperature within a few inches of the wall is equal to the mean temperature of the open plain 7 farther south. The eastern and western aspects are set apart for fruits of a somewhat hardier character.

Where the inclination of the ground is considerable, and the presence of high walls would be objectionable, the latter may be replaced by sunk walls. These should not rise more than 3 ft. above the level of the ground behind them. As dryness is favourable to an increase of heat, such walls should be either built hollow or packed behind to the thickness of 3 or 4 ft.

with rubble stones, flints, brickbats or similar material, thoroughly drained at bottom. For mere purposes of shelter a height of 6 or 7 ft. will generally be sufficient for the walls of a garden, but for the training of fruit trees it is found that an average height of 12 ft. is more suitable. In gardens of large

size the northern or principal wall may be 14 ft., and the side walls 1 2 ft. in height; while smaller areas of an acre or so should have the principal walls 12 and the side walls 10 ft. in height. As brick is more easily built hollow than stone, it is to be preferred for garden walls. A 14-in. hollow wall will take in its construction 12,800 bricks, while a solid 9-in. one, with piers, will take 11,000; but the hollow wall, while thus only a little more costly, will be greatly superior, being drier and warmer, as well as more substantial. Bricks cannot be too well burnt for garden walls; the harder they are the less moisture will they absorb. Many excellent walls are built of stone. The best is dark-coloured whinstone, because it absorbs very little moistuie, or in Scotland Caithness pavement 4 in. thick. The stones can be cut (in the quarries) to any required length, and built in regular courses. Stone walls should always be built with thin courses for convenience of training over their surface. Concrete walls, properly coped and provided with a trellis, may in some places be cheapest, and they are very durable. Common rubble walls are the worst of all. Trie coping of garden walls is important, both for the preserva- tion of the walls and for throwing the rain-water off their surfaces. It should not project less than from 2 to 2j in., but in wet districts may be extended to 6 in. Stone copings are best, but they are costly, and Portland cement is sometimes sub- stituted. Temporary copings of wood, which may be fixed by means of permanent iron brackets just below the stone coping, are extremely useful in spring for the protection of the blossoms of fruit trees. They should be 9 in. or 1 ft. wide, and should be put on during spring before the blossom buds begin to expand; they should have attached to them scrim cloth (a sort of thin canvas), which admits light pretty freely, yet is sufficient to ward off ordinary frosts; this canvas is to be let down towards evening and drawn up again in the morning. These copings should be removed when they are of no further utility as pro- tectors, so that the foliage may have the- full benefit of rain and dew. Any contrivance that serves to interrupt radiation, though it may not keep the temperature much above freezing, will be found sufficient. Standard fruit trees must be left to take their chance; and, indeed from the lateness of their flower- ing, they are generally more injured by blight, and by drenching rains, which wash away the pollen of the flowers, than by the direct effects of cold.

Espalier Rails. — Subsidiary to walls as a means of training fruit trees, espalier rails were formerly much employed, and are still used in many gardens. In their simplest form, they are merely a row of slender stakes of larch or other wood driven into the ground, and connected by a slight rod or fillet at top. The use of iron rails has now been almost wholly discontinued on account of metallic substances acting as powerful conductors of both heat and cold in equal extremes. Standards from which galvanized wire is tightly strained from one end to the other are preferable

and very convenient. Trees trained to them are easily got at for all cultural operations, space is saved, and the fruit, while freely exposed to sun and air, is tolerably secure against wind. They form, moreover, neat enclosures for the vegetable quarters, and, provided excess of growth from the centre is successfully grappled with, they are productive in soils and situations which are suitable.

Plant Houses. — These include all those structures which are more intimately associated with the growth of ornamental plants and flowers, and comprise conservatory, plant stove, greenhouse and the subsidiary pits and frames. They should be so erected as to present the smallest extent of opaque surface consistent with stability. With this object in view, the early improvers of hot-house architecture substituted metal for wood in the construction of the roofs, and for the most part dispensed with back walls; but the conducting power of the metal caused a great irregularity of temperature, which it was found difficult

to control; and, notwithstanding the elegance of metallic houses, this circumstance, together with their greater cost, has induced most recent authorities to give the preference to wood. The combination of the two, however, shows clearly that, without much variation of heat or loss of h'ght, any extent of space may be covered, and houses of any altitude constructed.

The earliest notice we have of such structures is given in the Latin writers of the 1st century (Mart. Epigr. viii. 14 and 68) ; the 'ASowUios KrjTToi, to which allusion is made by various Greek authors, have no claim to be mentioned in this connexion. Columella (xi. 3, 51, 52) and Pliny (H.N. xix. 23) both refer to their use in Italy for the cultivation of the rarer and more delicate sorts of plants and trees. Seneca has given us a description of the application of hot water for securing the necessary temperature. The botanist Jungermann had plant houses at Altdorf in Switzerland; those of Loader, a London merchant, and the conservatory in the Apothe- caries' Botanic Garden at Chelsea, were among the first structures of the kind erected in British gardens. These were, however, ill adapted for the growth of plants, as they consisted of little else than a huge chamber of masonry, having large windows in front, with the roof invariably opaque. The next step was taken when it became fashionable to have conservatories attached to mansions, instead of having them in the pleasure grounds. This arrangement brought them within the province of architects, and for nearly a century utility and fitness for the cultivation of plants were sacrificed, as still is often the case, to the unity of architectural expression between the conservatory and the mansion.

Plant houses must be as far as possible impervious to wet and cold air from

the exterior, provision at the same time being

Fig. 2. — Lean-to Plant House.

made for ventilation, while the escape of warm air from the interior must also be under control. The most important part of the enclosing material is necessarily glass. But as the rays of light, even in passing through transparent glass, lose much of their energy, which is further weakened in proportion to the distance it has to travel, the nearer the plant can be placed to the glass the more perfectly will its functions be performed; hence the importance of constructing the roofs at such an angle as will admit the most light, especially sunlight, at the time it is most required. Plants in glass houses require for their fullest develop- ment more solar light probably than even our best hot-houses transmit — certainly much more than is transmitted through the roofs of houses as generally constructed.

Plant houses constructed of the best Baltic pine timber are very durable, but the whole of the parts should be kept as light as possible. In many houses, especially those where ornament is of no consequence, the rafters are now omitted, or only used at wide intervals, somewhat stouter sash-bars being adopted, and stout panes of glass (usually called 21-oz.) 12 to 18 in. wide, made use of. Such houses are very light; being also very close, they require careful ventilation. The glass roof is commonly designed so as to form a uniform plane or slope from back to front in lean-to houses (fig. 2), and from centre to sides in span-roofed houses. To secure the greatest possible influx of light, some horticulturists recommend curvilinear roofs; but the superiority of these is largely due to the absence of rafters, which may also be dis- pensed with in plain roofs. They are very expensive to build and maintain. Span and ridge-and-furrow roofs, the forms now mostly preferred, are exceedingly well adapted for the admission of light, especially when they are glazed to within a few inches

of the ground. They can be made, too, to cover in any extent of area without sustaining walls. Indeed, it has been proposed to support such roofs to a great extent upon suspension principles, the internal columns of support being utilized for conducting the rain-water off the roof to underground drains or reservoirs. The lean-to is the least desirable form, since it scarcely admits of elegance of design, but it is necessarily adopted in many cases.

In glazing, the greater the surface of glass, and the less space occupied by rafters and astragals as well as overlaps, the greater the admission of light. Some prefer that the sash-bars should be grooved instead of rebated, and this plan exposes less putty to the action of the weather. The simple bedding of the glass, without the use of over putty, seems to be widely approved; but the glass may be fixed in a variety of other ways, some of which are patented.

The Conservatory is often built in connexion with the mansion, so as to be entered from the drawing-room or boudoir. But when so situated it is apt to suffer from the shade of the building, and is objectionable on account of admitting damp to the drawing-room. Where circumstances will admit, it is better to place it at some distance from the house, and to form a connexion by means of a glass corridor. In order that the conservatory may be kept gay with flowers, there should be a subsidiary structure to receive the plants as they go out of bloom. The conservatory may also with great propriety be placed in the flower garden, where it may occupy an elevated terrace, and form the termination of one of the more im- portant walks.

Great variety of design is admissible in the conservatory, but it ought always to be adapted to the style of the mansion of which it is a prominent appendage. Some very pleasing examples are to be met with which have the form of a parallelogram with a lightly- rounded roof; others of appropriate character are square or nearly so, with a ridge-and-furrow roof. Whatever the form, there must be light in abundance; and the shade both of buildings and of trees must be avoided. A southern aspect, or one varying to south-east or south-west, is preferable; if these aspects cannot be secured, the plants selected must be adapted to the position. The central part of the house may be devoted to permanent plants; the side stages and open spaces in the permanent beds should be reserved for the temporary plants.

The Greenhouse is a structure designed for the growth of such exotic plants as require to be kept during winter in a temperature considerably above the freezing-point. The best form is the span- roofed, a single span being better even than a series of spans such as form the ridge-and-furrow roof. For plant culture, houses at a comparatively low pitch are better than higher ones where the plants have to stand at a greater distance from the glass, and therefore in greater gloom. Fig. 3 represents a convenient form of greenhouse.

It is 20 ft. wide and 12 ft. high, and may be of any convenient length. The side walls are surmounted by short upright sashes which open outwards by ma- chinery a, and the roof is provided with sliding upper sashes for top ventilation. The upper sashes may also be made to lift, and are in many respects more con- venient to operate. In the centre is a two-tier stage 6 ft.

wide, for plants, with a pathway on each side 3 ft. wide, and a side stage 4 ft. wide, the side stages being flat, and the centre stage having the middle portion one-third of the width elevated 1 ft. above the rest so as to lift up the middle row of plants nearer the light. Span-roofed houses of this character should run north and south so as to secure an equalization of light, and should be warmed by two flow, and one or two return 4-in. hot-water pipes, carried under the side stages along each side and across each end. Where it is desired to cultivate a large number of plants, it is much better to increase the number of such houses than to provide larger structures. The smaller houses are far better for cultural purposes, while the plants can be classified, and the little details of management more conveniently attended to. Pelargoniums, cinerarias, calceolarias, cyclamens, camellias, heaths, roses and other- specialities might thus have to themselves either a whole house or part of a house, the con- ditions of which could then be more accurately fitted to the wants of the inmates.

The lean-to house is in most respects inferior to the span-roofed;

Fig. 3. — Section of Greenhouse.

Fig. 4. — Section of Plant Stove.

one of the latter could be converted into two of the former of opposite aspects by a divisional wall along the centre. Except where space does not permit a span-roofed building to be introduced, a lean-to is not to be recommended ; but a house of this class may often be greatly improved by adopting a half-span or hipped roof- — that is, one with a short slope behind and a longer in front.

Where the cultivation of large specimens has to be carried on, a span-roofed house of greater height and larger dimensions may sometimes prove useful; but space for this class of plants may generally be secured in a house of the smaller elevation, simply by lowering or removing altogether the staging erected for smaller plants, and allowing the larger ones to stand on or nearer the floor. The Plant Stove differs in no respect from the greenhouse except in having a greater extent of hot-water pipes for the purpose of securing a greater degree of heat, although, as the plants in stove houses often attain a larger size, and many of them require a bed of coco-nut fibre, tan or leaf mould to supply them with bottom heat, a somewhat greater elevation may perhaps be occasionally required in some of the houses. For the smaller plants, and for all choicer sub- jects, the smaller size of house already recom- mended for greenhouses, namely 20 ft. wide and L 12 ft. high, with a side table of 4 ft. on each side, a pathway of 3 ft. and a central stage on two levels

of 6 ft. wide, will be preferable, because more easily managed as to the supply of heat and moisture. It will be seen (fig. 4) that along the ridge of the roof a raised portion or lantern light b, b is introduced, which permits of the fixing of two continuous ventilators, one along each side, for the egress of heated and foul air, openings a, a being also provided in the side walls opposite the hot-water pipes for the admission of pure cold air. This type of house is also very suitable for greenhouse plants, but would not need so much heating apparatus. Three or four rows of flow and return pipes respectively will be re- quired on each side, according to the heat proposed to be maintained. In their interior fittings plant stoves require more care than green- houses, which are much drier, and in which consequently the staging does not so soon decay. In stoves the stages should be of slate or stone where practicable, and the supports of iron. These should be covered with a layer of 2 or 3 in. of some coarse gritty material, such as pounded spar, or the shell sand obtained on the sea -coast, on which the pots are to stand ; its use is to absorb moisture and gradually give it out for the benefit of the plants. The pathways should be paved with tiles, brick or stone, or made of concrete and cement, and the surface should be gently rounded so that the water required for evaporation may drain to the sides while the centre is sufficiently dry to walk upon ; they should also have brick or stone edgings to prevent the water so applied soaking away at the sides and thus being wasted.

Fruit Houses. — The principal of these are the vinery, peach house, cucumber and melon house and orchard house. These,

or a portion of them, especially the vineries and peacheries, are frequently brought

together into a range along the principal interior or south wall of the garden, where they are well exposed to sun and light, an ornamental plant house being some-

Fig. 5. — Lean-to Vinery.

times introduced into the centre of the range in order to give effect to the outline of the buildings. When thus associated, the houses are usually of the lean-to class, which have the

advantage of being more easily warmed and kept warm than buildings

having glass on both sides, a matter of great im- portance for forcing purposes.

The Vinery is a house devoted to the culture of the grape-vine, which is by far the most important exotic fruit cultivated in English gardens. When forming part of a range a vinery would in most cases be a lean-to structure, with a sharp pitch (45 -50) if intended for early forcing, and a natter roof (40) with longer rafters if designed for the main and late crops. (1) The lean-to (fig. 5) is the simplest form, often erected against some existing wall, and the best for early forcing, being warmer on account of the shelter afforded by the back wall. In this house the principal part of the roof is a fixture, ventila- tion being provided for by small lifting sashes against the back wall, and by the upright front sashes being hung on a pivot so as to swing

outwards on the lower side. The necessary heat is pro- vided by four 4-in. hot-water pipes, which would perhaps be best placed if all laid side by side, while the vines are planted in front and trained upwards under the roof. A second set of vines may be planted against the back wall, and will thrive there until the shade of the roof becomes too dense. (2) The hip-roofed or three- quarter span (fig. 6) is a combination of the lean-to and the span-roofed, uniting to a great degree the ad- vantages of both, being warmer than the span and lighter than the lean-to. The heating and ventilating arrangements arc much the same as in the lean-to, only the top sashes which open are on the back slope, and therefore do not interfere so much with the vines on the front slope. In both this and the lean-to the aspect should be as nearly due south as possible. Houses of this form are excellent for general purposes, and they are well adapted both for muscats, which require a high temperature, and for late-keeping grapes. (3) The span-roofed (fig. 7), the most elegant and ornamental form, is especially adapted for isolated positions; indeed, no other form affords so much roof space for the development of the vines. The amount of light admitted being very great, these houses answer well for general purposes and for the main crop. The large amount of glass or cooling surface, however, makes it more difficult to keep up a high and regular temperature in them, and from this cause they are not so well adapted for very early or very late crops. They are best, nevertheless, when grapes and ornamental plants are grown in the same house, except, indeed, in very wet and cold districts, where, in consequence of its greater warmth, the lean-to is to be preferred.

Fig. 6. — Hip-Roofed Vinery .

Fig. 7. — Span-Roofed Vinery.

on piers and arches to allow the roots to pass outwards into a prepared

border, the trees being planted just within the house. Abundant means of ventilation should be provided.

For more general purposes the house represented in fig. 8 will be found more useful. One set of trees is planted near the front, anc' trained to an arched trellis b. Another set is planted at the back, and trained on a trellis c, which is nearly upright, and leans against the back wall; or the back wall itself may be used for training. There are no upright front sashes, but to facilitate ventilation there are ventilators d in the front wall, and the upper roof sashes arc made to move -up

This type of house, cheaply constructed, is in general use for raising grapes for market.

The Peach House is a structure in which the ripening of the fruit is accelerated by the judicious employment of artificial heat. For early forcing, as in vineries, the lean-to form is to be preferred, and the house may have a tolerably sharp pitch. A width of 7 or 8 ft., with the glass slope continued down to within a foot or two of the ground, and without any upright front sashes, will be suitable for such a house, which may also be conveniently divided into com- partments of from 30 to 50 ft. in length according to the extent of the building, small houses being preferable to larger ones. As a very high temperature is not required, two or three pipes running the whole length of the house will suffice. The front wall should be built

Fig. 8. — Peach House.

and down for the same object. Two or three hot-water pipes are placed near the front wall. The back wall is usually planted with dwarf and standard trees alternately, the latter being temporary, and intended to furnish the upper part of the trellis, while the per- manent dwarfs arc gradually filling up the trellis from below. In any case the front trellis should stop conveniently short of the top of the sashes if there are trees against the back wall, in order to admit light to them. They would also be better carried up nearly parallel to the roof, and at about 1 ft. distant from it, supposing there were no trees at the back.

A span-roofed house, being lighter than a lean-to, would be so much the better for peach culture, especially for the crop grown just

Fig. 9. — Forcing House.

in anticipation of those from the open walls since a high temperature. is not required. A low span, with dwarf side walls, and a lantern ventilator along the ridge, the height in the centre being 9 ft., would be very well adapted

for the purpose. The trees should be planted inside and trained up towards the ridge on a trellis about a foot from the glass, the walls being arched to permit the egress of the roots. A trellis path should run along the centre, and movable pieces of trellis should be provided to prevent trampling on the soil while dressing and tying in the young wood.

The Forcing House. — Whenever continuous supplies of cucumbers, melons and tomatoes are required, it is most convenient to grow them in properlv constructed forcing houses. Span-roofed houses (fig. 9) arc probably the most useful for the purpose. They are usually

12 to 14 ft. wide, by 10 to 12 ft. high, and of any convenient length. Heating is effected by means of hot-water pipes below the beds, and against the side ventilators. The walls bordering the central paths are arched or clotted to admit heat from the chambers below the beds. Side pipes are occasionally dispensed with, heat being obtained by means of slots at the back of the beds, communicating with the chambers. The beds are also of use for plunging pot plants. Ventila- tion is provided at sides and top.

Pits and frames of various kinds are frequently used for the culti- vation of cucumbers and melons, as well as hot beds covered by ordinary garden frames. In these cases the first supply of heat is derived from the hot bed made up within the pit. When the heat of the original bed subsides, linings of fermenting dung must be added, and these must be kept active by occasional turnings and the addition of fresh material as often as required. It is better, however, to effect both top and bottom heating by hot-water pipes.

Orchard Houses are span-roofed or lean-to structures, in which various fruits are cultivated without the aid of artificial heat. Peaches, nectarines, apricots, cherries and the more tender varieties of plums and pears succeed well in houses of this kind. The types of houses in general use are substantially as shown in fig. 7, for span- roofed, and as fig. 5, for lean-to; in each case without the heating apparatus. The orchard house is among the most generally useful of all garden structures. These houses require careful management in early summer so as to induce the more delicate varieties of peaches and nectarines to complete and ripen their growth before cold, sunless weather sets in.

In commercial establishments where utility is of more importance than

ornament, the glass houses and hot water apparatus are not of so elaborate a type as indicated in the foregoing remarks, and in many cases excellent produce is grown in structures more or less dilapidated. In some places movable greenhouses have been erected for market purposes, so that the soil may be exposed to the sweeten- ing effect of the weather, when the glass roof is moved to an adjoining patch.

Pits and Frames. — These are used both for the summer growth and winter protection of various kinds of ornamental plants, for the growth of such fruits as cucumbers, melons and strawberries, and for the forcing of vegetables. When heat is required, it is sometimes supplied .by means of fermenting dung, or dung and leaves, or tanner's bark, but it is much more econ- omically provided by hot-water pipes. Pits of many different forms have been designed, but it may be sufficient here to describe one or two which can be recommended for general purposes.

An excellent pit for wintering bedding-out plants or young green- house stock is shown at fig. 10. It is built upon the pigeon-hole

principle as high as the ground level o, a, and above that in 9-in. brickwork. At a dis- tance of 9 in. retaining walls b, b are built up to the ground level, and the spaces be- tween the two are covered by thick sr\^ boarding, which is to 1 be shut down as shown at c in cold weather to exclude frost, and opened as shown at d in mild weather to promote The height of the pit of the plants; and, to

Fig. 10. — Ventilated Plant Pit.

a free circulation of air through the pit. might be reduced according to the size

secure the interior against frost, flow and return hot-water pipe e should pass along beneath the staging, which should be a strong wooden trellis supported by projections in the brickwork. The water which drains from the plants or is spilt in watering would fall on the bottom, which should be made porous to carry it away. For many plants this under current of ventilation would be exceedingly beneficial, especially when cold winds prevented the sashes from being opened. A pit of this character may be sunk into the ground deeper than is indicated in the figure if the subsoil is dry and gravelly, but in the case of a damp subsoil it should rather be more elevated, as the soil could easily be sloped up to meet the retaining wall.

Frames. — Frames (fig. n) should be made of the best red deal, 1 J in. thick. A convenient size is 6 ft. wide, 24 in. high at the back and 15 in front; and they are usually 12 ft. long, which makes three lights and

sashes, though they can be made with two lights or one light for particular purposes. Indeed, a one-light frame is often found very convenient for many purposes. The lights should be 2 in. thick, and glazed with 21 oz. sheet glass, in broad panes four or five to the breadth of a light, and of a length which will work in conveniently and economically, very long panes being undesirable

from the havoc caused by accidents, and very short ones being objectionable as multiplying the chances of drip, and the exclusion of light by the numerous lappings; panes about 12 in. long are of convenient size for garden lights of this character. In all gardens

Fig. 11. — Hot-Bed Three-Light Frame.

the frames and lights should be of one size so as to be interchangeable, and a good supply of extra lights (sashes) may always be turned to good account for various purposes. .

Span-roof garden frame (fig. 12) may under some circumstances be useful as a substitute for the three-light frame. It is adapted for storing plants in winter, for nursing small plants in summer and for the culture of melons and other crops requiring glass shelter. These frames are made II in. high in front, 22 at the back and 32 at the

Fig. 12. — Span-Roof Frame.

ridge, with ends of I |-in. red deal ; the sashes, which are 2 in. thick, open by gearing, the front and back separately. The lights are hinged so that they can be turned completely back when necessary. This more direct and ready access to the plants within is one of the principal recommendations of this form of pit.

Mushroom House. — Mushrooms may be grown in sheds and cellars, or even in protected ridges in the open ground, but a special structure is usually devoted to them. A lean-to against the north side of the garden wall will be found suitable for the purpose, though a span-roofed form may also be adopted, especially if the building stands apart.

The internal arrangement of a lean-to mushroom house is shown in fig. 13. The length may vary from 30 ft. to 60 ft.; a convenient width is 10 ft., which admits of a 3I ft. central path, and beds 3 ft. wide on each side. The shelves should be of slate a, a, supported by iron uprights 0, 6, each half having a front ledge of bricks set on edge in cement c, c. The slabs of slate forming the shelves should not be too closely > fitted, as a small interval will prevent the accumu- lation of moisture at the bottom of the bed. They may be supported by iron standards or brick piers, back and front, bearing

up a flat bar of iron on which the slates may rest ; the use of the bar will give wider intervals between the supports, which will be found con- venient for filling and emptying the beds. The roof may be tiled or slated; but, to prevent s.| the injurious influence of hot sun, there should be an inner roof or ceil- ing d, the space between which and the outer roof e should be packed with sawdust. A hot-water pipe / should run along both sides of the pathway, close to the front ledge of the lowest beds. The different shelves can be planted in succession ; and the lower ones, especially those on the floor level, as being most convenient, can be utilized for forcing sea-kale and rhubarb.

The Fruit Room. — This important store should be dark, moderately dry, with a steady, moderately cool atmosphere.

Fig. 13. — Lean-to Mushroom House.

and with the means of giving sufficient ventilation to keep the air sweet. It should also be sufficiently commodious to permit of the fruit being arranged in single layers on the shelves or trays. A type of building which is becoming increasingly popular for this purpose, and which is in many respects superior to the older, and often more expensive structures, is built of wood, with or without brick foundations, and is thickly thatched with reeds or other non-conducting material externally — on walls and roof — while the interior is matchboarded. Ventilation is afforded at the ends, usually by tilting laths, operated by a cord. Two doors are provided at one end — an inner, and an outer — the inner being glazed at the top to admit light. They are generally span- roofed, about 6 ft. high at the eaves, and 8 or io ft. high at the ridge, according to width.

The length and breadth of these stores should be governed by the amount and character of the storage accommodation to be provided. If intended for storage only, a width of 9 ft. 6 in. would suffice, but if intended to combine display with storage, the internal diameter should be about 13 ft. In the former type, the walls are fitted with four rows of shelves, about 3 ft. wide, and about 1 ft. 6 in. apart. The shelves are of deal strips, 2 or 3 in. wide, laid about 1 in. apart for ventilation. These are being superseded, however, by sliding-out trays of convenient lengths and about 9 in. deep, working on fixed framework. By this means the storage accommodation is nearly doubled and the fruit is more easily manipulated. The central gangway is

about 3 ft. 6 in. wide. In the latter a central exhibition bench about 3 ft. wide and of convenient height is provided. Gang- ways 2 j ft. wide flank this, while the shelves or drawers with which the walls are fitted are about 2\ ft. wide.

Care of the Fruit Room. — This consists mainly in the storing only of such fruits as are dry and in proper condition; in judicious ventilation, especially in the presence of large quantities of newly- gathered fruit; in the prompt removal of all decaying fruit; and in the exclusion of vermin. It is also advisable to wash all woodwork and gangways annually with a weak solution of formalin, or other inodorous germicide.

Healing Apparatus. — Plant houses were formerly heated in a variety of w^ays — by fermenting organic matter, such as dung, by smoke flues, by steam and by hot water circulating in iron pipes. The last-named method has proved so satisfactory in practice that it is now in general use for all ordinary purposes. The water is heated by a furnace, and is conveyed from the boiler into the houses by a main or " flow " pipe, connected by means of syphon branches with as many pipes as it is intended to serve. When cooled it is returned to the boiler by another main or " return " pipe. Heat is regulated in the structures by means of valves on the various branch pipes. The flow pipe is attached to the boiler at its highest point, to take the heated water as it ascends. The return pipe is connected with the boiler at or near its lowest point. The highest points of the pipes are fitted with small taps, for the removal of air, which would retard circulation if allowed to remain. Heating by hot water may be 1 said to depend, in part, on the influence of gravity on water being to some extent overcome by heating in a boiler. It ascends the flow pipe by convection, where its onward journey would speedily end if it were not for the driving force of other molecules of water following, and the suction set up by the gravitation into the boiler of the cooled water by the return pipe. The power of water to conduct heat is very low. The conducting power of the iron in which it is conveyed is high. It is, however, prob- able that conduction is to some extent a factor in the process.

Pipes. — It is a mistake to stint the quantity of piping, since it is far more economical and better for the plants to have a larger surface heated moderately than a smaller surface heated excessively. In view of the fact that air expands, becomes lighter and rises, under the influence of heat, the pipes should be set near the floor. If intended to raise the temperature of the structure, they should be set on iron or brick supports just clear of walls, earth or other heat- absorbing bodies. Those intended to provide bottom heat, however, are set in (

used, the 4 in. size being the most convenient for general purposes.

The joints are packed or caulked with tow, smeared with a mixture of white and red lead. Flanged joints are made to bolt together on washers of vulcanized rubber.

Boilers. — There are numerous types of boilers in use, illustrative)f efforts to secure as much exposure as possible to the action of the flames. The water-tube type, with multiple waterways, consists of a number of separate tubes joined together in various ways. Some of these are built in the form of a blunt cone, and are known as conical tubular boilers. Others are built with the tubes arranged horizont- ally, and are known as horizontal tubular boilers. The majority of the latter are more or less saddle-shaped. Boilers with a single waterway are of three principal types, the Cornish, the saddle and the Conical. The Cornish is cylindrical with the furnace occupying about half the length of the cylinder. The saddle is so named from its supposed resemblance to a saddle. It is set to span the furnace, additional exposure to heat being secured in a variety of ways by flues. Exposure in the conical boiler is direct on its inner surface, and is supplemented by flues. Tubular boilers, especially the horizontal types, are very powerful and economical. The Cornish type is a rather slow and steady boiler, and is much used for pro- viding heat for large areas. The saddle boiler is very commonly employed to provide heat for moderately sized and small areas. Both are powerful and economical. Conical boilers are more ex- pensive to set by reason of their shape, and are not so convenient to manipulate as the horizontal kinds. All the above types require a setting of masonry. Portable boilers are convenient for heating small areas, and are less expensive to instal than those described above. They are less economical, however, owing to loss of heat from their exposed surfaces. What are called sectional boilers as used in America and on the Continent are being introduced to British gardens. Portions can be added or taken away according to the amount of heating surface required.

Water Supply. — Wastage of water in the boilers should be made good automatically from a cistern controlled by means of a ball-cock. It should be placed as high above the boiler as practicable. The feed should connect with the return pipe near the point at which it enters the boiler.

Stokeholds. — These have usually to be excavated to admit of the boilers being set below the level of the pipes they are intended to serve. In consequence of their depth, the draining of stokeholds often presents difficulties. Care should be taken to allow sufficient room to properly manipulate the fires and to store fuel. It is important that the ventilation

should be as efficient as practicable, especially where coke fuel is to be used.

Stoking. — The management of the furnaces is relatively easy, and consists in adapting the volume and intensity of the fires to particular needs. It involves the keeping clean of flues, ashpits and especially the fires themselves. Where coke or ordinary hard coal are used, the removal of clinkers should be done systematically, and the fires stirred. Anthracite coal fires should not be stirred more than is absolutely necessary, and should not be fed in driblets. They require more draught than coke fires, but care must be taken not to give too much, as excessive heat is likely to melt or soften the fire-bars. Draught is regulated in the ashpit by opening or closing the bottom door of the furnace and by the damper on the smoke shaft. The latter must be of a fairly good height, according to circumstances, to secure a good draught.

Solar Heat. — The importance of sun heat to the general well-being of plant life, its influence on the production of flowers and the ripening of edible fruits, has long been appreciated in horticulture. The practice of " closing up " early in the afternoon, i.e. the closing of ventilators (accompanied by syringing and damping of surfaces to produce a humid atmosphere) has for its object the conservation of as much solar heat as practicable.

Ventilation. — This consists in the admission of air for the purpose of preventing stagnation of the atmosphere and for the regulation of temperature. Means of affording ventilation in all plant houses should be provided in at least two places — as near the floor as practicable, and at the top. Mechanical contrivances whereby whole sets of ventilators may be operated simultaneously are now in common use, and are much more convenient and economical than the older method of working each ventilator separately. Efficient ventilating can only be effected by the exercise of common sense and vigilance, and care must be taken to avoid cold draughts through the houses.

III. Garden Materials and Appliances.

Soils and Composts. — The principal soils used in gardens, either alone, or mixed to form what are called composts, are — loam, sand, peat, leaf-mould and various mixtures and com- binations of these made up to suit the different subjects under cultivation.

Loam is the staple soil for the gardener; it is not only used extensively in the pure and simple state, but enters into most of the composts prepared specially for his plants. For garden purposes loam should be rather

unctuous or soapy to the touch when moderately dry, not too clinging nor adhesive, and should readily crumble when a compressed handful is thrown on the ground. If it clings together closely it is too heavy and requires amelioration by the admixture of gritty material; if it has little or no cohesion when squeezed tightly in the hand, it is

too light, and needs to be improved by the addition of heavier or clayey material. Sound friable loam cut one sod deep from the surface of a pasture, and stacked up for twelve months in a heap or ridge, is invaluable to the gardener. When employed for making vine borders, loam of a somewhat heavier nature can be used with advantage, on account of the porous materials which should accompany it. For stone fruits a calcareous loam is best; indeed, for these subjects a rich calcareous loam used in a pure and simple state cannot be surpassed. Somewhat heavy loams are best for potting pine apples, for melons and strawberries, fruit trees in pots, &c, and may be used with the addition of manures only; but for ornamental plants a loam of a somewhat freer texture is preferable and more pleasant to work. Loam which contains much red matter (iron) should be avoided.

Sand is by itself of little value except for striking cuttings, for which purpose fine clean sharp silver sand is the best; and a somewhat coarser kind, if it is gritty, is to be preferred to the comminuted sands which contain a large proportion of earthy matter. River sand and the sharp grit washed up sometimes by the road side are excellent materials for laying around choice bulbs at planting time to prevent contact with earth which is perhaps manure-tainted. Sea sand may be advantageously used both for propagating purposes and for mixing in composts. For the growth of pot plants sand is an essential part of most composts, in order to give them the needful porosity to carry off all excess of moisture from the roots. If the finer earthy sands only are obtainable, they must be rendered sharper by washing away the earthy particles. Washed sand is best for all plants like heaths, which need a pure and lasting peaty compost.

Peat soil is largely employed for the culture of such plants as rhododendrons, azaleas, heaths, &c. In districts where heather and gritty soil predominate, the peat soil is poor and unprofitable, but selections from both the heathy and the richer peat soils, collected with judgment, and stored in a dry part of the compost yard, are essential ingredients in the cultiva- tion of many choice pot plants, such as the Cape heaths and many

of the Australian plants. Many monocotyledons do well in peat, even if they do not absolutely require it.

Leaf-mould is eminently suited for the growth of many free- growing plants, especially when it has been mixed with stable manure and has been subjected to fermentation for the forma- tion of hot beds. It any state most plants feed greedily upon it, and when pure or free from decaying wood or sticks it is a very safe ingredient in composts; but it is so liable to generate fungus, and the mycelium or spawn of certain fungi is so injurious to the roots of trees, attacking them if at all sickly or weakened by drought, that many cultivators prefer not to mix leaf-mould with the soil used for permanent plants, as peaches or choice ornamental trees. For quick growing plants, however, as for example most annuals cultivated in pots, such as balsams, cockscombs, globe-amaranths and the like, for cucumbers, and for young soft-wooded plants generally, it is exceedingly useful, both by preventing the consolidation of the soil and as a manure. The accumulations of light earth formed on the surface in woods where the leaves fall and decay annually are leaf-mould of the finest quality. Leaves collected in the autumn and stored in pits or heaps, and covered with a layer of soil, make beautiful leaf-mould at the end of about twelve months, if frequently drenched with water or rain during this period.

Composts are mixtures of the foregoing ingredients in varying proportions, and in combination with manures if necessary, so as to suit particular plants or classes of plants. The chief point to be borne in mind in making these mixtures is not . to combine in the same compost any bodies that are antagonistic in their nature, as for example lime and ammonia. In making up composts for pot plants, the fibrous portion should not be removed by sifting, except for small-sized pots, but the turfy portions should be broken up by hand and distributed in smaller or larger lumps throughout the mass. When sifting is had recourse to, the fibrous matter should be rubbed through I he

meshes of the sieve along with the earthy particles. Before being used the turfy ingredients of composts should lie together in a heap only long enough for the roots of the herbage to die, not to decompose.

Manures (see Manure). — These are of two classes, organic and inorganic — the former being of animal and vegetable, the latter of mineral origin. The following are organic manures :

Farm-yard manure consists of the mixed dung of horses and cattle thrown together, and more or less soaked with liquid drainings of the stable or byre. It is no doubt the finest stimulant for the growth of plants, and that most adapted to restore the fertile elements which the plants have

abstracted from exhausted soils. This manure is best fitted for garden use when in a moderately fermented state.

Horse dung is generally the principal ingredient in all hot bed manure; and, in its partially decomposed state, as afforded by ex- hausted hot beds, it is well adapted for garden use. It is most beneficial on cold stiff soils. It should not be allowed to lie too long unmoved when fresh, as it will then heat violently, and the ammonia is thus driven off. To avoid this, it should be turned over two or three times if practicable, and well moistened — preferably with farm-yard drainings.

Cow dung is less fertilizing than horse dung, but being slower in its action it is more durable; it is also cooler, and therefore better for hot dry sandy soils. Thoroughly decayed, it is one of the best of all manures for mixing in composts for florists' flowers and other choice plants.

Pig dung is very powerful, containing more nitrogen than horse dung; it is therefore desirable that it should undergo moderate fermentation, which will be secured by mixing it with litter and a portion of earth. When weeds are thrown to the pigs, this fermenta- tion becomes specially desirable to kill their seeds.

Night-soil is an excellent manure for all bulky crops, but requires to be mixed with earth or peat, or coal-ashes, so as both to deodorize it and to ensure its being equally distributed. Quicklime should not be used, as it dispels the greater part of the ammonia. When prepared by drying and mixing with various substances, night-soil is sold as desiccated night-soil or native guano, the value of which depends upon the materials used for admixture.

Malt-dust is an active manure frequently used as a top-dressing, especially for fruit trees in pots. It is rapid in its action, but its effects are not very permanent. Rape dust is somewhat similar in its character and action.

Bones are employed as a manure with decided advantage both to vegetable crops and to fruit trees, as well as to flowers. For turnips bone manure is invaluable. The effects of bones are no doubt mainly due to the phosphates they contain, and they are most effectual on dry soils. They are most quickly available when dis- solved in sulphuric acid.

Guano is a valuable manure now much employed, and may be applied to almost every kind of crop with decided advantage. It should be mixed with six or eight times its weight of loam or ashes, charred peat, charcoal-dust or some earthy matter, before it is applied to the soil, as from its causticity it is otherwise not unlikely to kill or injure the plants to which it is

administered. Peruvian guano is obtained from the excreta of South American sea-birds, and fish guano from the waste of fish. Both are remarkable for the quantity of nitrates and phosphates they contain.

Pigeon dung approaches guano in its power as manure. It should be laid up in ridges of good loamy soil in alternate layers to form a compost, which becomes a valuable stimulant for any very choice subjects if cautiously used. The dung of the domestic fowl is very similar in character.

Horn, hoof-parings, woollen rags, fish, blubber and blood, alter treat- ment with sulphuric acid, are all good manures, and should be utilized if readily obtainable.

Liquid manure, consisting of the drainings of dung-heaps, stables, cowsheds, &c, or of urine collected from dwelling houses or other sources, is a most valuable and powerful stimulant, and can be readily applied to the roots of growing plants. The urine should be allowed to putrefy, as in its decomposition a large amount of ammonia is formed, which should then be fixed by sulphuric acid or gypsum ; or it may be applied to the growing crops after being freely diluted with water or absorbed in a compost heap. Liquid manures can be readily made from most of the solid manures when required, simply by admixture with water. When thus artificially compounded? unless for immediate use, they should be made strong for con- venience of storage, and applied as required much diluted. The following are inorganic manures:

Ammonia is the most powerful and one of the most important of the constituents of manures generally, since it is the chief source whence plants derive their nitrogen. It is largely supplied in all the most fertilizing of organic manures, but when required in the in- organic state must be obtained from some of the salts of ammonia, as the sulphate, the muriate or the phosphate, all of which, being extremely energetic, require to be used with great caution. These salts of ammonia may be used at the rate of from 2 to 3 cwt. per acre as a top-dressing in moist weather. When dissolved in water they

form active liquid manures. The most commonly used nitrogenous manures are nitrate of soda, nitrate of potash and sulphate of,, ammonia, the prices of which are constantly fluctuating.

Potash and soda are also valuable inorganic manures in the form of carbonates, sulphates, silicates and phosphates, but the most valuable is the nitrate of potash. The price, however, is generally so high that its use is practically nil, except in small doses as a liquid manure for choice pot plants. Cheaper substitutes, however, are now found in sulphate of potash, and muriate of potash and kainit. The two last-named must not be applied direct to growing crops, but to the soil some weeks in advance of sowing or cropping. The manures of this class are of course of value only in cases where the soil is naturally deficient in them. On this account the salts of soda are of less importance than those of potash. The value of wood ashes as a manure very much depends upon the carbonate and other salts of potash which they contain.

Phosphoric acid, in the form of phosphates, is a most valuable plant food, and is absorbed by most plants in fairly large quantities from the soil. It induces the earlier production of flowers and fruits. In a natural state it is obtained from bones, guano and wood ashes ; and in an artificial condition from basic slag or Thomas's phosphate, coprolites and superphosphate of lime.

Lime in the caustic state is beneficially applied to soils which contain an excess of inert vegetable matter, and hence may be used for the improvement of old garden soils saturated with humus, or of peaty soils not thoroughly reclaimed. It does not supply the place of organic manures, but only renders that which is pfesent available for the nourishment of the plants. It also improves the texture of clay soils.

Gypsum, or sulphate of lime, applied as a top-dressing at the rate of 2 to 3 cwt. per acre, has been found to yield good results, especially on light soils. It is also employed in the case of liquid manures to fix the ammonia.

Gas lime, after it has been exposed to the air for a few months is an excellent manure on heavy soils. In a fresh state it is poisonous and fatal to vegetation, and is often used for this reason to dress land infested with wireworms, grubs, club-root fungus, &c.

Burnt clay has a very beneficial effect on clay land by improving its texture and rendering soluble the alkaline substances it contains. The clay should be only slightly burnt, so as to make it crumble down readily; in fact, the fire should not be allowed to break through, but should be constantly repressed by the addition of material. The burning should be effected when the soil is dry.

Vegetable refuse of all kinds, when smother-burned in a similar way, becomes a valuable mechanical improver of the soil; but the preferable

course is to decompose it in a heap with quicklime and layers of earth, converting it into leaf-mould. Potato haulms, and club-rooted cabbage crops should, however, never be mixed with ordinary clean vegetable refuse, as they would be most likely to perpetuate the terrible diseases to - which they are subject. The refuse of such plants should be burned as early as possible. The ash may be used as manure.

Soot forms a good top-dressing ; it consists principally of charcoal, but contains ammonia and a smaller proportion of phosphates and potash, whence its value as a manure is derived. It should be kept dry until required for use. It may also be used beneficially in pre- venting the attacks of insects, such as the onion gnat and turnip fly, by dusting the plants or dressing the ground with it.

Common salt acts as a manure when used in moderate quantities, but in strong doses is injurious to vegetation. It suits many of the esculent crops, as onions, beans, cabbages, carrots, beet-root, asparagus, &c. ; the quantity applied varies from 5 to io bushels per acre. It is used as a top-dressing sown by the hand. Hyacinths and other bulbs derive benefit from slight doses, while to asparagus as much as 20 lb to the rood has been used with beneficial effect. At the rate of from 6 to io bushels to the acre it may be used on garden lawns to prevent worm casts. For the destruction of weeds on gravel walks or in paved yards a strong dose of salt, applied either dry or in a very strong solution, is found very effective, especially a hot solution, but after a time much of it becomes washed down, and the residue acts as a manure; its continued application is undesirable, as gravel so treated becomes pasty.

Garden Tools, 6>c. — Most of these are so well known that we shall not discuss them here. They are, moreover, illustrated and described in the catalogues of most nurserymen and dealers in horticultural sundries.

Tallies or Labels. — The importance of properly labelling plants can hardly be over-estimated. For ordinary purposes labels of wood of various sizes (sold in bundles) are the most convenient. These should be wiped with a little white paint or linseed oil, and written with a soft lead pencil before the surface becomes dry. Copying-ink pencils should not be used, as water will wash away the writing. For permanent plants, as trees, roses, &c, metallic labels with raised type are procurable from dealers, and are neat, durable and convenient. Permanent labels may also be made from sheet lead, the names being punched in by means

of steel type. For stove and greenhouse plants, orchids, ferns, &c, labels made of xylonite, zinc and other materials are also used.

IV. Garden Operations.

Propagation. — The increase of plants, so far as the production of new individuals of particular kinds is concerned, is one of the most important and constantly recurring of gardening opera- tions. In effecting this, various processes are adopted, whicfi will now be described.

I. By Seeds. — This may be called the natural means of increas- ing the number of any particular kind of plant, but it is to be re- membered that we do not by that means secure an exact reproduction of the parent, especially in the case of plants raised or evolved in the course of generations by hybridization and selection. Wc may get a progeny very closely resembling it, yet each plant possessing a distinct individuality of its own ; or we may get a pro t eny very unlike the parent, or a mixed progeny showing various degrees of divergence. Many seeds will grow freely if sown in a partially ripened state ; but as a general rule seeds have to be kept for some weeks or months in store, and hence they should be thoroughly ripened before being gathered. They should be sown in fine rich soil, and such as will not readily get consolidated. In the case of outdoor crops, if the soil is inclined to be heavy, it is a good plan to cover all the smaller seeds with a light compost. Very small seeds should only have a sprinkling of light earth or of sand, and sometimes only a thin layer of soft moss to exclude light and preserve an equable degree of moisture. Somewhat larger seeds sown indoors may be covered to the depth of one-eighth oi one-fourth of an inch, according to their size. Outdoor crops require to be sown, the smaller seeds from J to I in., and the larger ones from 2 to 4 in. under the surface, the covering of the smaller ones especially being light and open. Many seeds grow well when raked in; that is, the surface on which they are scattered is raked backwards and forwards until most of them are covered. Whatever the seeds, the ground should be made tolerably firm both beneath and above them; this may be done by treading in the case of most kitchen garden crops, which are also better sown in drills, this admitting the more readily of the ground being kept clear from weeds by hoeing. All seeds require a certain degree of heat to induce germination. For tropical plants the heat of a propagating house— 75° to 8o p , with a bottom heat of 8o° to 90° — is desirable, and in many cases absolutely necessary; for others, such as half-hardy annuals, a mild hot bed, or a temperate pit ranging from 60° to 70°, is convenient ; while of course all outdoor crops have to submit to the natural temperature of the season. It is very important that seeds should be sown when the ground is in a good working condition, and not clammy with moisture.

2. By Offsets. — This mode of increase applies specially to bulbous plants, such as the lily and hyacinth, which produce little bulbs on the exterior round their base. Most bulbs do so naturally to a limited but variable

extent ; when more rapid increase is wanted the heart is destroyed, and this induces the formation of a larger number of offsets. The stem bulbs of lilies are similar in character to the offsets from the parent bulb. The same mode of increase occurs in the gladiolus and crocus, but their bulb-like permanent parts are called corms, not bulbs. After they have ripened in connexion with the parent bulb, the offsets are taken off, stored in appropriate places, and at the proper season planted out in nursery beds.

3. By Tubers. — The tuber is a fleshy underground stem, furnished with eyes which are either visible, as in the potato and in some familiar kinds of Tropaeolum (T. tuberosum) and of Oxalis (0. crenata), or latent, as in the Chinese yam (Dioscorea Batatas). When used for propagation, the tubers are cut up into what are called " sets," every portion having an eye attached being capable of forming an independent plant. The cut portions of bulky sets should be suffered to lie a short time before being planted, in order to dry the surface and prevent rotting; this should not, however, be done with such tropical subjects as caladiums, the tubers of which are often cut up into very small fragments for propagation, and of course require to be manipulated in a properly heated propagating pit. No eyes are visible in the Chinese yam, but slices of the long club-shaped tubers will push out young snoots and form independent plants, if planted with ordinary care.

4. By Division. — Division, or partition, is usually resorted to in the case of tufted growing plants, chiefly perennial herbs; they may be evergreen, as chamomile or thrift, or when dormant may consist only of underground crowns, as larkspur or lily-of-the- valley; but in either case the old tufted plant being dug up may be divided into separate pieces, each furnished with roots, and, when replanted, generally starting on its own account without much check. Suffruticose plants and even small shrubs may be propagated in this way, by first planting them deeper than they are ordinarily grown, and then after the lapse of a year, which time they require to get rooted, taking them up again and dividing them into parts or separate plants. Box-edging and southernwood are examples. The same ends may sometimes be effected hy merely working fine

soil in amongst the base of the stems, and giving them time to throw out roots before parting them.

5. By Suckers. — Root suckers are young shoots from the roots of plants,

chiefly woody plants, as may often be seen in the case of the elm and the plum. The shoots when used for propagation must be transplanted with all the roots attached to them, care being taken not to injure the parent plant. If they spring from a thick root it is not to be wantonly severed, but the soil should be removed and the sucker taken off by cutting away a clean slice of the root, which will then heal and sustain no harm. Stem suckers are such as proceed from the base of the stem, as is often seen in the case of the currant and lilac. They should be removed in any case; when required for propagation they should be taken with all the roots attached to them, and they should be as thoroughly disbudded below ground as possible, or they are liable to continue the habit of suckering. In this case, too, the soil should be carefully opened and the shoots re- moved with a suckering iron, a sharp concave implement with long iron handle (fig. 14). When the number of roots is limited, the tops

Fig. 14. — Suckering Iron.

should be shortened, and some care in watering and mulching should be bestowed on the plant if it is of value.

6. By Runners. — The young string-like shoots produced by the strawberry are a well-known example of runners. The process of rooting these runners should be facilitated by fixing them close down to the soil, which is done by small wooden hooked pegs or by stones; hair-pins, short lengths of bent wire, &c, may also be used. After the roots are formed, the strings are cut through, and the runners become independent plants.

7. By Proliferous Buds. — Not unlike the runner, though growing in a very different way, are the bud-plants formed on the fronds of several kinds of ferns belonging to the genera Asplenium, Woodwardia, Polystiehum, Lastrea, Adiantum, Cystopteris, &c. In some of these (Adiantum candatum, Polystiehum lepidocaulon) the rachis of the frond is lengthened out much like the string of the strawberry runner, and bears a plant at its apex. In others (Polystiehum angulare proliferum) the stipes below and the rachis amongst the pinnae develop buds, which are often numerous and crowded. In others again (Woodwardia orientalis, Asplenium bulbiferum), buds are numerously produced on the upper surface of the fronds. These will develop on the plant if allowed to remain. For propagation the buibiferous portion is pegged down on the surface of a pot of suitable soil; if kept close in a moist atmosphere, the little buds will soon strike root and form independent plants. In Cystopteris the buds are deciduous, falling off as the fronds acquire maturity, but, if collected and pressed into the surface of a pot of soil and kept close, they will grow up into young plants the following season. In some genera of flowering plants, and notably in Bryophyllum, little plants form on various parts of the leaves. In some Monocotyledons,

ordin- arily in Chlorophytum, and exceptionally in Phalaenopsis and others, new plants arise on the flower stems.

8. By Layers. — Layering consists in preparing the branch of a plant while still attached to the parent, bending it so that the part operated on is brought under ground, and then fixing it there by means of a forked peg. Some plants root so freely that they need only pegging down ; but in most cases the arrest of the returning sap to form a callus, and ultimately young roots, must be brought about artificially, either by twisting the branch, by splitting, it, by girding

Fig. 15. — Propagation by Layers — a, tonguing; b, ringing.

it closely with wire, by taking off a ring of bark, or by " tonguing." In tonguing the leaves are cut off the portion which has to be brought unde.' ground, and a tongue or slit is then cut from below upwards close beyond a joint, of such length that, when the cut part of the layer is pegged an inch or two (or in larger woody subjects 3 or 4 in.) below the surface, the elevation of the point of the shoot to an upright position may open the incision, and thus set it free, so that it may

be surrounded by earth to induce it to form roots. The whole branch, except a few buds at the extremity, is covered with soil. The best seasons for these operations are early spring and mid- summer, that is, before the sap begins to flow, and after the first flush of growth has passed off. One whole summer, sometimes two, must elapse before the layers will be fully rooted in the case of woody plants; but such plants as carnations and picotees, which are usually propagated in this way, in favourable seasons take only a few weeks to root, as they are layered towards, the end of the bloom- ing season in July, and are taken off and planted separately early in the autumn. Fig. 15 shows a woody plant with one layer prepared by tonguing and another by ringing.

In general, each shoot makes one layer, but in plants like the Wistaria or Clematis, which make long shoots, what is called serpent- ine layering may be adopted ; that is, the shoot is taken alternately below and above the surface, as frequently as its length permits. There must, however, be a joint at the underground part where it is to be tongued and pegged, and at least one sound bud in each ex- posed part, from which a shoot may be developed to form the top of the young plant.

9. By Circumposition. — When a plant is too high or its habit does not conveniently admit of its being layered, it may often be increased by what is called circumposition, the soil being carried up to the branch operated on. The branch is to be prepared by ringing or notching or wiring as in

layering, and a temporary stand made to support the vessel which is to contain the soil. The vessel may be a flower-pot sawn in two, so that the halves may be bound together when used, or it may be a flower-pot or box with a side slit which will admit the shoot; this vessel is to be filled compactly with suit- able porous earth, the opening at the slit being stopped by pieces of slate or tile. The earth must be kept moist, which is perhaps best done by a thick mulching of moss, the moss being also bound closely over the openings in the vessel, and all being kept damp by frequent syringings. Gardeners often dispense with the pot, using sphagnum moss and leaf-mould only when propagating indiarubber plants, perpetual carnations, dracaenas, &c.

10. By Grafts. — Grafting is so extensively resorted to that it is im- possible here to notice all its phases. It is perhaps of most import- ance as the principal means of propagating our hardy kinds of fruit, especially the apple and the pear; but the process is the same with most other fruits and ornamental hardy trees and shrubs that are thus propagated. The stocks are commonly divided into two classes: — (1) free stocks, which consist of seedling plants, chiefly of the same genus or species as the trees from which the scions are taken; and (2) dwarfing stocks, which are of more diminutive growth, either varieties of the same species or species of the same or some allied genus as the scion, which have a tendency to lessen the expansion of the engrafted tree. The French Paradise is the best dwarfing stock for apples, and the quince for pears. In determining the choice of stocks, the nature of the soil in which the grafted trees are to grow should have full weight. In a soil, for example, naturally moist, it is proper to graft pears on the quince, because this plant not only thrives in such a soil, but serves to check the luxuriance thereby produced. The scions should always be ripened portions of the wood of the preceding year, selected from healthy parents; in the case of shy-bearing kinds, it is better to obtain them from the fruitful branches. The scions should be taken off some weeks before they are wanted, and half-buried in the earth, since the stock at the time of grafting should in point of vegetation be somewhat in advance of the graft. During winter, grafts may be conveyed long distances, if carefully packed. If they have been six weeks or two months separated from the parent plant, they should be grafted low on the stock, and the earth should be ridged up round them, leaving only one bud of the scion exposed above ground. The best season for grafting apples and similar hardy subjects in the open air is in March and April ; but it may be commenced as soon as the sap in the stock is fairly in motion.

Whip-grafting or Tongue-grafting (fig. 16) is the most usual mode of performing the operation when there is no great difference in thickness between the stock and scion. The stock is headed off by an oblique transverse cut as shown at a, a slice is then pared off the side as at b, and

on the face of this a tongue or notch is made, the cut being in a downward direction ; the scion c is pared off in a similar way by a single clean sharp cut, and this is notched ortongued in the opposite direction as the figure indicates; the two are then fitted together as shown at d, so that the inner bark of each may come in contact at least on one side, and then tied round with damp soft bast as at e; next some grafting clay is taken on the forefinger and pushed down on each side so as to fill out the space between the top of the stock and the graft, and a portion is also rubbed over the ligatures on the side where the graft is placed, a handful of the clay is then taken, flattened out, and rolled closely round the whole point of junction, being finished off to a tapering form both above and below, as shown by the dotted line /. To do this deftly, the hands should be plunged from time to time in dry ashes, to prevent the clay from sticking to them. Various kinds of grafting wax are now obtainable, and are a great improvement upon the clay process. Some cold mastics become very pliable with the warmth of the hands. They are best applied with a piece of flat wood ; or very liquid waxes may be applied with a brush.*

deft-grafting (fig. 17) is another method in common use. The stock a is cleft down from the horizontal cut d (but not nearly so

Fig. 16. — Whip-grafting or Tongue-grafting.

much as the sketch would indicate), and the scion, when cut to a thin wedge form, as shown at c and e, is inserted into the cleft; the whole is then bound up and clayed as in the former case. This is not so good a plan as whip-grafting; it is improved by sloping the stock on one side to the size of the graft.

Crown-grafting or Rind-grafting (fig. 18) is preferable to cleft- grafting, inasmuch as it leaves no open spaces in the wood. The stock b is cut off horizontally or nearly so in January or February. At grafting time a slit is cut in the bark/,/, a wedge-shaped piece of

Fig. 17.— Cleft-Grafting.

Fig.

Crown-Grafting.

iron or a small chisel being inserted to raise the bark; the scion ~is then cut to the same wedge-shaped form g, h, and inserted in the space opened for it between the alburnum and the bark, after which it is tied down and clayed or waxed over in the manner already described. Side-grafting is performed like whip-grafting, the graft being inserted on the side of a branch and not at the cut end of the stock. It may be practised for the purpose of changing a part of the tree, and is sometimes very useful for filling out vacant spaces, in trained trees especially.

Inarching is another form of side-grafting. Here the graft is fixed to the side of the stock, which is planted or potted close to the plant to be worked. The branches are applied to the stock while yet attached to the parent tree, and remain so until united. In the case of trained trees, a young shoot is sometimes inarched to its parent stem to supply a branch where one has not been developed in the ordinary way.

For the propagation by grafts of stove and greenhouse plants the process adopted is whip-grafting or a modification of it. The parts are, however, sometimes so small that the tongue of the graft is dispensed with, and the two stems simply pared smooth and bound together. In this way hardy rhododendrons of choice sorts, green- house azaleas, the variaaes of the orange family, camellias, roses, rare conifers, clematises and numerous other plants are increased. Raffia — which has taken the place of bast — is generally used for tying, and grafting wax is only used occasionally with such plants under glass. All grafting of this kind is done in the propagating house, at any season when grafts are obtainable in a fit state — the plants when operated on being placed in .close frames warmed to a suitable temperature. Roses and clematis, however, are generally grafted from January to March and April.

Root-grafting is sometimes resorted to where extensive increase is an object, or where stem-grafting or other means of propagation are not available. In this case the scion is grafted directly on to a portion of the root of some appropriate stock, both graft and stock

being usually very small; the grafted root is then potted so as to cover the point of junction with the soil, and is plunged in the bed of the propagating house, where it gets the slight stimulus of a gentle bottom heat. Dahlias (fig. 19), paeonies, and Wistarias maybe

Fig. 19. — Root-grafting of Dahlia.

Fig. 20. — Root-grafting of Woody Plant.

grafted by inserting young shoots into the neck of one of the fleshy roots of

each kind respectively — the best method of doing so being to cut a triangular section near the upper end of the root, just large enough to admit the young shoot when slightly pared away on two sides to give it a similar form. In the case of large woody plants thus worked (fig. 20) the grafted roots, after the operation is completed, are planted in nursery beds, so that the upper buds only are exposed to the atmosphere, as shown in the figure.

1 1 . By Buds. — Budding is the inserting of a bud of a choice variety cut with a portion of bark into the bark of the stock of an inferior nature where it is bound gently but firmly. Stone fruits, such as peaches, apricots, plums, cherries, &c, are usually propagated in this way, as well as roses and many other plants. In the propagating house budding may be done at any season when the sap is in motion; but for fruit trees, roses, &c, in the open air, it is usually done in j uly or August, when the buds destined for the following year are com- pletely formed in the axils of the leaves, and when the bark separates freely from the wood it covers. Those buds are to be preferred, as being best ripened, which occur on the middle portion of a young shoot, and which are quite dormant at the time.

The simplest and most generally practised form of budding is that called shield-budding or T -budding (fig. 21). The operator should be

Fig. 21. — Shield-budding.

provided with a sharp budding knife having a thin ivory or bone handle, for raising the bark of the stock. A horizontal incision is made in the bark quite down to the wood, and from this a perpen- dicular slit is drawn upwards to the extent of perhaps an inch, so that the slit has a resemblance to the letter T, as at a. A bud is then cut by a clean incision from Ae tree intended to be propagated, having a portion of the wood attached to it, and so that the whole may be about I in. long, as at d. The bit of wood e must be gently withdrawn, care being taken that the bud adheres wholly to the bark or shield,

as it is called, of which / is a side view. The bark on each side of the perpendicular slit being then cautiously opened, as at b, with the handle of the knife, the bud and shield are inserted as shown at c. The upper tip of the shield is cut off horizontally, and brought to fit the bark of the stock at the transverse incision. Slight ties of soft cotton wool or worsted, or moist raffia, are then applied. In about a month or six weeks the ligatures may be

removed or slit with the knife to allow for the swelling stem, when, if the operation has been successful, the bud will be fresh and full, and the shield firmly united to the wood. In the following spring a strong shoot will be thrown out, and to prevent its being blown out by the wind, must be fastened to a stake, or to the lower portion of the old stock which has been left for the purpose.

To be successful the operation should be performed with a quick and light hand, so that no part of the delicate tissues be injured, as would happen if they were left for a time exposed, or if the bud were forced in like a wedge. The union is effected as in grafting, by means of the organizable sap or cambium, and the less this is disturbed until the inner bark of the shield is pressed and fixed against it the better. Trees to be grown in the form of a bush are usually budded low down on the stem of the stock as near the root as possible to obviate the development of wild suckers later on. Standard trees, however, are budded on a sturdy young shoot close to the top. In either case the stocks should have been carefully planted at least the previous November when the work is to be done in the open air the following July or August.

12. By Branch Cuttings. — Propagation by cuttings is the mode of increase most commonly adopted, next to that by seeds. It is effected by taking a portion from a branch or shoot of the plant, and placing it in the soil. There are great differences to be observed in the selection and treatment of cuttings. Sometimes soft green leafy shoots, as in Verbena (fig. 22, a), are used ; sometimes the shoots

Fig. 22. — Propagation by Cuttings.

must be half-ripened, and sometimes fully matured. So of the mode of preparation; some will root if cut off or broken off at any point and thrust into wet earth or sand in a warm place (fig. 22, a) ; others require to be cut with the utmost care just below a joint or leaf-base, and by a keen blade so as to sever the tissues without tearing or bruising; and others again after being cut across may be split up for a short distance, but there seems to be no particular virtue in this. It is usual and in most cases necessary to cut away the lower portion of a cutting up to just below the node or joint (fig. 22, b, d, e). The internodal parts will not often divide so as to form separate individual plants; sometimes, however, this happens; it is said that the smallest piece of Torenia asiatica, for instance, will grow. Then as to position, certain cuttings grow readily enough if planted outdoors in the open soil, some preferring shade, others sunshine, while less hardy subjects must be covered with a bell-glass, or must be in a close atmosphere with bottom heat, or must have the aid of pure silver sand to facilitate their rooting (fig. 22, c). Cuttings should in all cases be taken from healthy

plants, and from shoots of a moderate degree of vigour. It is also important to select leafy growths, and not such as will at'once run up to flower. Young shoots which have become moderately firm generally make the best cuttings, but some- times the very softest shoots strike more readily. For all indoor plants in a growing state spring is a good time for taking cuttings, but at any time during the summer months is also favourable if cuttings are obtainable.

Cuttings of deciduous plants should be taken off after the fall of the leaf. These cuttings should be about 6 in. to I ft. in length, and should be planted at once in the ground so as to leave only the top with the two or three preserved buds exposed. If a clean stem, however, is desired, a longer portion may be left uncovered. Goose- berries, currants, roses and many hardy deciduous trees and shrubs are easily propagated in this way if the cuttings are inserted in well- drained soil about the end of October or early in November.

Cuttings of growing plants are prepared by removing with a sharp knife, and moderately close, the few leaves which would otherwise be buried in the soil; they are then cut clean across just below a joint; the fewer the leaves thus removed, however, the better,

Fig. 23. — Leaf Cuttings.

as if kept from being exhausted they help to supply the elaborated sap out of which the roots are formed. Free-rooting subjects strike in any lightish sandy mixture; but difficult subjects should have thoroughly well-drained pots, a portion of the soil proper for the particular plants made very sandy, and a surfacing of clean sharp silver sand about as deep as the length of the cutting.

Such difficult plants as heaths are reared in silver sand, a stratum of which is placed over the sandy peat soil in a specially prepared cutting pot, and thus the cuttings, though rooting in the sand under a bell-glass, find at once on the emis- sion of roots con- genial soil for them to grow in (fig. 22, c).

Hardy plants, such as pinks, pansies, &c, are propagated by cuttings planted during early sum- mer in light rich soil. The cuttings of pinks are called pipings (fig. 22, d), and are planted about June, while pansies may be renewed in this way both in spring and in autumn.

13. By Leaf Cuttings. — Many plants may be pro- pagated by plant- ing their leaves or portions of the leaves as cuttings, as, for example, the Gloxinia (fig. 23, a) and Gesnera, the succulent Sempervivum, Echeveria, Pachyphytum and their allies, and such hard-leaved plants as Theophrasta

(fig. 23, b). The leaves are best taken off with the base whole, and should be planted in well-drained sandy soil; in due time they form roots, and ultimately from some latent bud a little shoot which forms the young plant. The treatment is precisely like that of branch cuttings. Gloxinias, begonias, &c, grow readily from fragments of the leaves cut clean through the thick veins and ribs, and planted edgewise like cuttings. This class of subjects may also be fixed flat on the surface of the cutting pot, by means of little pegs or hooks, the

main ribs being cut across at in- tervals, and from these points roots, and eventually young tubers, will be " produced (fig. 24). / -ˆN

*14. By Root Cuttings. — Some\~~ plants which are not easily increased * *" by other means propagate readily from root cuttings. Amongst the indoor plants which may be so treated, Bouvardia, Pelargonium, Aralia and Wigandia may be men- tioned. The modus operandi is to Fig. 24. — Leaf-Propagation of turn the plant out of its pot, Begonia.*

shake away the soil so as to free

the roots, and then select as many pieces of the stouter roots as may be required. These are cut up into half-inch lengths (more or less), and inserted in light sandy soil round the margin of a cutting pot, so that the upper end of the root cutting may be level with the soil or only just covered by it. The pots should be watered so as to settle the soil, and be placed in the close atmosphere of the propagating pit or frame, where they will need scarcely any water until the buds are seen pushing through the surface.

There are various herbaceous plants which may be similarly treated, such as sea-kale and horseradish, and, among ornamental plants, the beautiful autumn-blooming Anemone japonica, Bocconia cordata, Dictamnus Fraxinella — the burning bush ; the sea hollies (Eryngium), the globe thistle {Echinops ritro), the Oriental poppy (Papaver orientate) , the sea lavender (Statice latifolia) , Senecio pulcher, &c. The sea-kale and horseradish require to be treated in the open garden, where the cut portions should be planted in lines in well- worked soil; but the roots of the others should be planted in pots and kept in a close frame with a little warmth till the young shoots have started.

Various hardy ornamental trees are also increased in this way, as the quince, elm, robinia and mulberry, and the rose amongst shrubs. The most important use to which this mode of propagation is put is, however, the increase of roses, and of the various plums used as stocks for working the choicer stone fruits. The method in the latter case is to select roots averaging the thickness of the little finger, to cut these into lengths of about

3 or 4 in., and to plant them

in lines just beneath the surface in nursery beds. The root cuttings of rose-stocks are prepared and treated in a similar way.

15. By Cuttings of Single Eyes. — This mode of propagation is by cutting the ripened young branches into short lengths, each con- taining one well-matured bud or eye, with a short portion of the

stem above and below. It is a common mode of propagating vines, the eyes being in this case cut from the ripened leafless wood. The eyes (fig. 25, a) are planted just below the surface in pots of light soil, which are placed in a hot bed or propagating pit, and in due time each pushes up a young shoot which forms the future stem, while from about its base the young roots are produced (fig. 25, b) which convert it into an independent plant. In the case of plants with persistent leaves, the stem may be cut through just above and below the bud, retaining the leaf which is left on the cutting, the old wood and eye being placed beneath the soil and the leaf left ex- posed. In this way the india-rubber tree {Ficus elastica), for example, and many other tender plants may be increased with the aid of a brisk bottom heat. Many of

-Cutting of Single Eye.

Fig. 25

uotiom neat, many 01 the free-growing soft-wooded plants may also be grown from cut- tings of single joints of the young wood, where rapid increase is desired; and in the case of opposite-leaved plants two cuttings may .often be made from one joint by splitting the stem longi- tudinally, each cutting consisting of a leaf and a perfect bud attached to half the thickness of the stem.

Planting and Transplanting. — In preparing a fruit tree for transplantation, the first thing to be done is to open a trench round it at a distance of from 3 to 4 ft., according to size. The trench should be opened to about two spades' depth, and any- coarse roots which may extend thus far from the trunk may be cut clean off with a sharp knife. The soil between the trench and the stem is to be reduced as far as may seem necessary or practicable by means of a digging fork, the roots as soon as they are liberated being

fixed on one side and carefully preserved. By working in this way all round the ball, the best roots will be got out and preserved, and the ball lightened of all superfluous soil. The tree will then be ready to lift if carefully prized up from beneath the ball, and if it does not lift readily, it will probably be found that a root has struck downwards, which will have to be sought out and cut through. Whenever practicable, it is best to secure a ball of earth round the roots. On the tree being lifted from its hole the roots should be examined, and all which have been severed roughly with the spade should have the ends cut smooth with the knife to facilitate the emission of fibres. The tree can then be transported to its new position. The hole for its reception should be of sufficient depth to allow the base of the ball of earth, or of the roots, to stand so that the point whence the uppermost roots spring from the stem may be 2 or 3 in. below the general surface level. Then the bottom being regulated so as to leave the soil rather highest in the centre, the plant is to be set in the hole in the position desired, and steadied there by hand. Next the roots from the lower portion of the ball are to be sought out and laid outwards in lines radiating from the stem, being distributed equally on all sides as nearly as this can be done; some fine and suitable good earth should be thrown amongst the roots as they are thus being placed, and worked in well up to the base of the ball. The soil covering the roots may be gently pressed down, but the tree should not be pulled up and down, as is sometimes done, to settle the soil. This done

another set of roots higher up the ball must be laid out in the same way, and again another, until the whole of the roots, thus carefully laid, are embedded as firmly as may be in the soil, which may now receive another gentle treading. The stem should next be supported permanently, either by one stake or by three, according to its size. The excavation will now be filled up about two-thirds perhaps; and if so the tree may have a thorough good watering, sufficient to settle the soil closely about its roots. After twenty-four hours the hole may be levelled in, with moderate treading, if the water has soaked well in, the surface being left level and not sloping upwards towards the stem of the tree. In transplanting trees of the ornamental class, less need be attempted in respect to providing new soil, although the soil should be made as congenial as practicable. Generally speaking, fruit trees are best transplanted when three or four years of age in which time they will have acquired the shape given by the nurseryman, who generally transplants his stock each autumn to produce large masses of root fibres. Nowadays, however, quite large trees, chiefly of an ornamental character, and perhaps weighing several tons, are lifted with a large ball of soil attached to the roots, by means of a special tree-lifting machine, and are readily transferred from one part of the garden to another, or even for a distance of several miles, without serious injury. The best season for transplanting deciduous trees is during the early autumn

months. As regards evergreens opinions are divided, some preferring August and September, others April or May. They can be successfully planted at either period, but for subjects which are at all difficult to remove the spring months are to be preferred.

In transplanting smaller subjects, such as plants for the flower garden, much less effort is required. The plant must be lifted with as little injury to its rootlets as possible, and carefully set into the hole, the soil being filled in round it, and carefully pressed close by the hand. For moving small plants the garden trowel is a very convenient tool, but we are inclined to give the preference to the hand-fork. For larger masses, such as strong- growing herbaceous plants, a spade or digging-fork will be requisite and the soil may be trodden down with the feet.

When seedlings of vigorous plants have to be " pricked out," a dibble or dibber is the best implement to be used. The ground being prepared and, if necessary, enriched, and the surface made fine and smooth, a hole is made with the dibble deep enough and large enough to receive the roots of the seedling plants without doubling them up, and the hole is filled in by working the soil close to the plant with the point of the dibble. The pricking out of seedlings in pots in the propagating pit is effected in a similar way. The plants, indeed, often require to be removed and set from I in. to 1 in. apart before they have become sufficiently developed to admit of being handled with any degree of facility, and for these a pointed stickof convenient size is used as a dibble! In delicate cases, such as seedling gloxinias and begonias, it is best to lift the little seedling on the end of a flatfish pointed stick, often cleft at the apex, pressing this into the new soil where the plant is to be placed, and liberating it and closing the earth about it by the aid of a similar stick held in the other hand.

Potting and Repotting—Garden pots are made with a com- paratively large hole in the bottom, and those of the largest size have also holes at the side near the bottom; these openings are to prevent the soil becoming satu- rated or soured with superabundant water. To prepare the pot for the plant, a broadish piece of potsherd, called a " crock," is placed over the large hole, and if there be side holes they also are covered. The bottom crock is made from a piece of a broken garden pot, and is laid with the con-

vex side upwards; then comes a layer ,-. „ <•<;• t r>*

c ■ 1 . r , . riG. 26. — section of Pot

of irregular pieces of crock of various showing Crocks.

sizes, about 1 in. deep in a 5-in. pot,

2 in. in an 11-in. or 12-in. pot, &c. The mode of crocking a pot is shown in fig. 26. A few of the coarser lumps from the outer

edge of the heap of potting soil are spread over the crocks. The same end, that of keeping the finer particles of the soil from mixing with the drainage crocks, may be attained by shaking in a little clean moss. A handful or two of the soil is then put in, and on this the plant with its roots spread out is to be set, a trifle higher than the plant should stand in the pot when finished off; more soil is to be added, and the whole pressed firmly with the fingers, the base of the stem being just below the pot-rim, and the surface being smoothed off so as to slope a little outwards. When finished off, the pots should be watered well, to settle the soil; but they should stand till the water has well drained away, since, if they are moved about while the fresh soil is very wet, there will be a risk of its becoming puddled or too much con- solidated. Larger plants do not need quite such delicate treat- ment, but care should be taken not to handle the roots roughly. The soil for these may be somewhat coarser, and the amount of drainage material more ample. Larger bodies of soil also require to be more thoroughly consolidated before watering; otherwise they would settle down so as to leave an unsightly void at the pot-rim.

Some plants, especially when potted temporarily, may be dealt with in a simpler way. A single crock may be used in some cases, and in others no crock at all, but a handful of half-decayed leaves or half-decayed dung thrown into the bottom of the pot. This mode of potting does well for bulbs, such as hyacinths, which are either thrown away or planted out when the bloom is over. The bedding plants generally may be potted in this way, the advantage being that at planting-out time there is less risk of disturbing the roots than if there were potsherds to remove. Plants of this character should be potted a little less firmly than specimens which are likely to stand long in the pot, and indeed the soil should be made comparatively light by the intermixture of leaf-mould or some equivalent, in order that the roots may run freely and quickly into it.

For epiphytal plants like orchids the – most thorough drainage must be secured by the abundant use of potsherds, small pots being sometimes inserted inside the larger ones, or by planting in shallow pots or pans, so that there shall be no large mass of soil to get consolidated. For most of these the lightest spongy but sweet turfy peat must be used, this being

packed lightly about the roots, and built up above the pot-rim, or in some cases freely mixed before use with chopped sphagnum moss and small pieces of broken pots or nodules of charcoal. The plants under these conditions often require to be supported by wooden pegs or sticks. Some of the species grow better when altogether taken out of the soil and fixed to blocks of wood, but in this case they require a little coaxing with moss about the roots until they get estab- lished. In other cases they are planted in open baskets of wood or wire, using the porous peat and sphagnum compost. Both blocks and baskets are usually suspended from the roof of the house, hanging free, so that no accumulation of water is possible. These conditions of orchid-growing have undergone great changes of late years, and the plants are grown much as other stove and greenhouse plants in ordinary pots with composts not only of peat but of leaf-mould, and fibres from osmunda and polypodium ferns.

When repotting is adopted as a temporary expedient, as in the case of bedding-out plants which it is required to push for- ward as much as possible, it will suffice if provision is made to prevent the drainage hole from getting blocked, and a rich light compost is provided for the encouragement of the roots. When, however, a hard-wooded plant has to be repotted, the case is different; it may stand without further potting for one year or two years or more, and therefore much more care is necessary. The old ball of earth must be freed from all or most of the old crocks without doing injury to the roots, and the sharp edge of the upper surface gently rubbed off. If there be any sour or sodden or effete soil into which the roots have, not run, this should be carefully picked out with a pointed stick. The ball is to be set on the new soil just high enough that when finished the base of the stem may be somewhat below the pot-rim, and the space between the old ball and the sides of the pot is to

be filled in gradually with the prepared compost, which is. from time to time to be pressed down with a blunt-ended flat piece of wood called a potting-stick, so as to render the new soil as solid as the old. The object of this is to prevent the plant from starving by the water applied all running off by way of the new soil, and not penetrating the original ball of earth. When this amount of pressure is necessary, especially in the case of loamy composts, the soil itself should be rather inclined to dryness, and should in no case be sufficiently moist to knead together into a pasty mass. In ordinary cases the potting soil should be just so far removed from dryness that when a handful is gently pressed it may hang together, but may lose its cohesion when dropped When plants are required to stand in ornamental china pots or vases, it is better, both for the plants and for avoiding risk of breakage, to grow them in ordinary garden pots of a size that will drop into the more valuable vessels. Slate pots or tubs, usually square, are sometimes adopted, and are durable and otherwise unobjectionable, only, their sides*

being less porous, the earth does not dry so rapidly, and some modification of treatment as to watering is necessary. For large conservatory specimens wooden tubs, round or square, are frequently used; these should be coated with pitch inside to render them more durable.

Various other contrivances take the place of garden pots for special purposes. Thus shallow square or oblong wooden boxes, made of light, inexpensive wood, are very useful for seed- sowing, for pricking out seedlings, or for planting cuttings. When the disturbance of the roots incidental to all transplanting is sought to be avoided, the seed or plant is started in some cases in squares of turf (used grassy-side downwards), which can when ready be transferred to the place the plant is to occupy. Cucumber and melon plants and vines reared from eyes are some- times started in this way, both for the reason above mentioned and because it prevents the curling of the roots apt to take place in plants raised in pots. Strips of turf are sometimes used for the rearing of early peas, which are sown in a Warmish house or frame, and gradually hardened so as to bear exposure before removal to the open air.

Watering. — The guiding principle in watering plants is to do it thoroughly when it is required, and to abstain from giving a second supply till the first has been taken up.

When watering becomes necessary for kitchen-garden crops, the hose should be laid on and the lines of esculents allowed to drink their fill, if fresh succulent vegetables are desired. So also, if well-swelled and luscious fruits, such as strawberries, are required, there must be no parching at the roots. This applies even more strongly to conservatory borders and to forcing- houses than to the outside fruit-tree borders, because from these the natural rain supply is in most cases more distinctly cut off. In the case of forcing-houses, the water should be heated before being applied to the borders containing the roots of the trees.

In the watering of pot plants the utmost care is requisite if the plant be a shy-growing or valuable one, and yet it is almost impossible to give any intelligible instruction for performing the operation. The roots should never be suffered either to get thoroughly dry or to get sodden with excess of water. An adept will know by the ring of the pot on striking it with his knuckles whether water is wanted or not, according as it rings 1 loud and clear or dull and heavy. With very choice subjects watering may be necessary two or three times a day in drying summer weather. It is a wrong though common practice to press the surface of the soil in the pot in order to feel if it is moist enough, as this soon consolidates it, and prevents it from getting the full benefit of aeration.

*In all heated houses the water used should be warmed at least up to the temperature of the atmosphere, so as to avoid chilling the roots. This is also necessary in the case of water used for syringing the plants, which should be done two or three times a day in all stoves and forcing-houses, especially during the period when the young growth is being developed. The damping of all absorbent surfaces, such as the floors or bare walls, &c, is frequently necessary several times a day in the growing season, so as to keep up a humid atmosp*here; hence*

the advantage of laying the floors a little rounded, as then the water draws off to the sides against the kerbstone, while the centre remains dry for promenaders.

In cooler structures it becomes necessary in the dull season of the year to prevent the slopping of water over the plants or on the floor, as this tends to cause " damping off," — the stems assuming a state of mildewy decay, which not infrequently, if it once attacks a plant, will destroy it piece by piece. For the same reason cleanliness and free ventilation under favourable weather conditions are of great importance.

Pruning. — Pruning is a very important operation in the fruit garden, its object being twofold — (1) to give form to the tree, and (2) to induce the free production of flower buds as the precursors of a plentiful crop of fruit. To form a standard tree, either the stock is allowed to grow up with a straight stem, by cutting away all side branches up to the height required, say about 6 ft., the scion or bud being worked at that point, and the head developed therefrom; or the stock is worked close to the ground, and the young shoot obtained therefrom is allowed to grow up in the same way, being pruned in its progress to keep it single and straight, and the top being cut off when the desired height is reached, so as to cause the growth of lateral shoots. If these are three or four in number, and fairly balanced as to strength and position, little pruning will be required. The tips of unripened wood should be cut back about one-third their length at an outwardly placed bud, and the chief pruning thereafter required will be to cut away inwardly directed shoots which cross or crowd each other and tend to confuse the centre of the tree. Bushy heads should be thinned out, and those that are too large cut back so as to remodel them. If the shoots produced are not sufficient in number, or are badly placed, or very unequal in vigour, the head should be cut back moderately close, leaving a few

inches only of the young shoots, which should be pruned back to buds so placed as to furnish shoots in the positions desired. When worked at the top of a stem formed of the stock, the growth from the graft or bud must be pruned in a similar way. Three or four leading shoots should be selected to pass ere long into boughs and form a well-balanced framework for the tree; these boughs, however, will soon grow beyond any artificial system the pruner may adopt.

To form a dwarf or bush fruit tree the stock must be worked near the ground, and the young shoot produced from the scion or bud must be cut back to whatever height it is desired the dwarf stem should be, say 15 to 2 ft. The young shoots produced from the portion of the new wood retained are to form the framework of the bush tree, and must be dealt with as in the case of standard trees. The growth of inwardly directed shoots

excellent work, TraitS de la taille des arbres fruitiers, will give a good idea how these dwarf trees are to be manipulated, a showing the first year's development from the maiden tree after being headed back, and b the form assumed a year or two later. In forming a pyramidal tree, the lateral growths, instead of being removed, as in the standard tree, are encouraged to the utmost; and in order to strengthen them the upper part of the leading shoot is removed annually, the side branches being also shortened somewhat as the tree advances in size. In fig. 28, reduced from M. Hardy's work, a shows a young

Dwarf-Tree Pruning.

is to be prevented, and the centre kept open, the tree assuming a cup-shaped outline. Fig. 27, reduced from M. Hardy's

Fig. 28. — Pyramid Pruning.

tree with its second year's growth, the upright shoot of the maiden tree having been moderately headed back, being left longer if the buds near the base promise to break freely, or cut shorter if they are weak and wanting in vigour. The winter pruning, carried out with the view to shape the tree into a well-grown pyramid, would be effected at the places marked by a cross line. The lowest branch would have four buds retained, the end one being on the lower side of the branch. The two next would be cut to three buds, which here also are fortunately so situated that the one to be left is on the lower side of the branches. The fourth is not cut at all owing to its shortness and weakness, its terminal bud being allowed to grow to draw strength into it. The fifth is an example where the bud to which the shoot should be cut back is badly placed; a shoot resulting from a bud left on the upper side is apt instead of growing outwards to grow erect, and lead to

confusion in the form of the tree; to avoid this it is tied down in its proper place during the summer by a small twig. The upper shoots are cut closer in. Near the base of the stem are two prominent buds, which would produce two vigorous shoots, but these would be too near the ground, and the buds should therefore be suppressed; but, to strengthen the lower part, the weaker buds just above and below the lowest branch should be forced into growth, by making a transverse incision close above each. Fig. 28, 6, shows what a similar tree would be at the end of the third year's growth.

In order to bring a young tree into the cordon shape, all its side branches are shortened back, either to form permanent spurs, as in the case of pears, or to yield annual young shoots, as in peaches and nectarines. The single-stemmed cordon may be trained horizontally, obliquely at any required angle, or vertically if required, the first two arrangements being preferable. If a double cordon is required, the original young stem must be headed back, and the two best shoots produced must be selected, trained right and left, and treated as for the single cordon.

The forms chiefly adopted for trees trained to walls and espalier rails are the fan-shaped, the half-fan and the horizontal, with their various modifications.

The maiden tree is headed down, and two shoots led away right and left. Two laterals should be allowed to grow from the upper side of them, one from near the base, the other from near the middle, all others being pinched out beyond the second or third leaf during summer, but cut away to the last bud in winter. The tree will thus consist of six shoots, probably 3 ft. to 4 ft. long, which are not to be pruned unless they are unequal in strength, a defect which is rather to be remedied by summer pinching than by winter pruning. The second year three young shoots are to be left on each of the six, one close to the base, one about the middle, and one at the point, the rest being rubbed off. These three shoots will produce laterals, of which one or two may be selected and laid in; and thus a number of moder- ately strong fertile shoots will be obtained, and at the end of the season a comparatively large tree will be the result.

The method of pruning formerly adopted for the formation of a fan-shaped tree was to head down the maiden plant to about two eyes, so placed as to yield a young shoot on each side (fig. 29), the supernumerary shoots being rubbed off while quite young, and the reserved shoots trained against the wall

Fig. 29. — Pruning for Fan- shaped Tree.

Fig. 30. — The same — third year.

during the summer so as to get them well matured. The next year they were cut back again; often nearly to the base, in order that the lower pair of these shoots might each produce two well-placed young shoots, and the upper pair three young shoots. The tree would thus consist of ten shoots, to be laid out at regular distances, and then if closely cut the frame-work of the tree would be as in fig. 30. These main shoots were not again to be shortened back, but from each of them three young shoots were to be selected and trained in two, on the upper side, one near the base, and the other halfway up, and one on the lower side placed about midway between these two; these with the leading shoot, which was also to be nailed in, made four branches of the current year from each of the ten main branches, and the form of the tree would therefore be that of fig. 31. The

other young shoots produced were pinched off while quite young, to throw all the strength of the tree into those which were to form its basis, and to secure abundant light and air. In after years the leading shoot was not to be cut back, but all the lateral shoots were to be shortened, and from these year by year other shoots were to be selected to fill up the area occupied by the tree.

Fig. 31. — The same — fourth year.

In pruning for a horizontal tree the young maiden tree has to be headed back nearly to its base, and from the young shoots three are to be selected, the two best-placed lower ones to form an opposite or nearly opposite pair of main branches, and the best-placed upper one to continue the erect stem (fig. 32). This upper shoot is at the next winter pruning to be cut down to within about a foot of the point whence it sprung, and its buds rubbed off except the upper one for a leader, and one on each side just below it to furnish another pair of side shoots; these being trained in position, the tree would appear as in fig. ˆ~

Fig. 32. — Pruning for Horizontally trained Tree.

Fig. 33. — The sameˆ— third year.

The same course is to be followed annually till the space is filled. Sometimes in very favourable soils and with vigorous trees two pairs of branches may be obtained in one season by summer- stopping the erect shoots and selecting others from the young growths thus induced, but more

commonly the trees have to be built up by forming one pair of branches annually. The shoots are not at first lowered to the horizontal line, but are brought down gradually and tied to thin stakes; and while the tree is being formed weak shoots may be allowed to grow in a more erect position than it is ultimately intended they should occupy. Thus in four or five years the tree will have

Fig. 34. — The same — fifth year.

acquired something of the character of fig. 34, and will go on thus increasing until the space is filled.

The half -fan is a combination of the two forms, but as regards pruning does not materially differ from the horizontal, as two opposite side branches are produced in succession upwards till the space is filled, only they are not taken out so abruptly, but are allowed to rise at an acute angle and then to curve' into the horizontal line.

In all the various forms of cordons, in horizontal training, and in fan and half-fan training, the pruning of the main branches wlien the form of the tree is worked out will vary in accordance with the kind of fruit under treatment. Thus in the peach, nectarine, apricot, plum and cherry, which are commonly trained fan-fashion, the first three (and also the morello cherry if grown) will have to be pruned so as to keep a succession of young annual shoots, these being their fruit-bearing wood. The others are generally pruned so as to combine a moderate supply of young wood with a greater or less number of fruit spurs. In the pear and apple the fruit is borne principally on spurs, and hence what is known as spur-pruning has to be adopted, the young shoots being all cut back nearly to their base, so as to cause fruit buds to evolve from the remaining eyes or buds. Cordons of apples and pears have to be similarly treated, but cordons of peaches and nectarines are pruned so as to provide the necessary annual succession of young bearing wood.

Fruit trees trained as espaliers, fans or cordons against walls, trellises or fences, are not only pruned carefully in the winter but must be also pruned during the early summer months. Many of the smaller, useless shoots are rubbed out altogether; the best are allowed to grow perhaps a foot or more in length, and then either have the tips pinched out with the finger and thumb, or the ends may be cracked or broken, and allowed to hang down,

but are not detached completely. This is called summer pruning, and is an important operation requiring knowledge on the part of the gardener to perform properly. Shoots of peaches, nectarines and morello cherries are "laid in," that is, placed in between fruiting shoots where there is the space to be ripened for next year's crop.

Summer Pruning should be performed while the shoots are yet young and succulent, so that they may in most cases be nipped off with the thumb-nail. It is very necessary in the case of trees trained to a flat surface, as a wall or espalier rail, to prevent undue crowding. In some cases , as, for example, with peaches, the superfluous shoots are wholly removed, and certain selected shoots reserved to supply bearing wood for next year. In others, as pears, the tops of the young shoots are removed, leaving three or four leaves and their buds at the base, to be de- veloped into fruit buds by the additional nourishment thus thrown into them (fig. 35, a). One or two may push out a late summer growth, b; this will serve as a

vent for the vigour Fig. 35.— Summer Pruning for Spurs. of the tre6j and

if the lowermost only go to the formation of a fruit spur, the object will have been gained. They are cut to the last dormant bud in winter.

But summer pruning has been much extended since the introduction of restricted growth and the use of dwarfing stocks. Orchard-house trees, and also pyramidal and bush trees of apples, pears and plums, are mainly fashioned by summer pruning; in fact, the less the knife is used upon them, except in the necessary cutting of the roots in potted trees, the better. In the case of orchard-house plants no shoots are suffered to lengthen out, except as occasionally wanted to fill up a gap in the outline of the tree. On the contrary, the tops of all young shoots are pinched off when some three or four leaves are formed, and this is done again and again throughout the season. When this pruning is just brought to a balance with the vigour of the roots, the consequence is that fruit buds are formed all over the tree, instead of a thicket of sterile and useless wood. Pyramidal and bush trees out of doors are, of course, suffered to become somewhat larger, and sufficient wood must be allowed to grow to give them the form desired; but after the first year or two, when the framework is laid out, they are permitted to extend very slowly, and never to any great extent, while the young growths are continually nipped off, so as to clothe the branches with fruit buds as closely placed as will permit of their healthy development.

The nature of the cut itself in pruning is of more consequence, especially in the case of fruit trees, than at first sight may appear. The branches should be separated by a clean cut at an angle of about 45 , just at the back of a bud, the cut entering on a level with the base of the bud and passing out on

a level with its top (fig. 36, a), for when cut in this way the wound becomes rapidly covered with new wood, as soon as growth recommences, whereas if the cut is too close the bud is starved, or if less close an ugly and awkward snag is left. Fig 36, b and c, are examples of the former, and d, e, f of the latter. In fact there is only one right way to cut a shoot and that is as shown at a.

The Pruning of flowering plants is generally a much lighter 'matter than the pruning of fruit trees. If a young seedling or cutting of any soft-wooded plant is to be bushy, it must have

its top nipped out toy the thumb-nail or pruning-scissors at a very early stage, and this stopping must be repeated frequently. If what is called a well-furnished plant is required, an average of from 2 to 3 in. is all the extension that must be permitted —

Fig. 36. — Cuts — Good and Bad. ■

sometimes scarcely so much — before the top is nipped out; and this must be continued until the desired size is attained, whether that be large or small. Then generally the plant is allowed to grow away till bloom or blooming shoots are developed. To form a pyramidal plant, which is a very elegant and useful shape to give to a decorative pot plant, the main stem should be encouraged to grow upright, for a length perhaps of 6 or 8 in. before it is topped; this induces the formation of laterals, and favours their development. The best-placed upper young shoot is selected and trained upright to a slender stake, and this also is topped when it has advanced 6 or 8 in. further, in order to induce the laterals on the second portion to push freely. This process is continued till the required size is gained. With all the difficult and slow-growing plants of the hard- wooded section, all the pruning must be done in this gradual way in the young wood as the plant progresses.

Some plants, like pelargoniums, can only be kept handsomely formed and well furnished by cutting them down severely every season, after the blooming is over. The plants should be prepared for this by keeping them rather dry at the root, and after cutting they must stand with little or no water till the stems heal over, and produce young shoots, or " break," as it is technically termed. The appearance of a specimen pelargonium properly pruned is shown in fig. 37, in which a shows a young plant, the head of which has been taken off to form a cutting, and whose buds are ready to break into young shoots. Three shoots will be produced, and these, after growing from 4 to 6 in. in length,

should be stopped by pinching out the point, this giving rise to lateral

shoots. These will blossom in due course, and, after being ripened thoroughly by full exposure to the sun, should be cut back as shown at b. This is the proper foundation for a good specimen, and illustrates how all such subjects should be pruned to keep them stocky and presentable in form.

Root-pruning\smost commonly practised in fruit-tree cultiva- tion. It is often resorted to as a means of restoring fertility in plants which have become over rank from an excess of nourishment in the soil, or sterile from want of it. The effect of root-pruning in the first case is to reduce the supply of crude sap to the branches, and consequently to cause a check in their develop- ment. In the second case all roots that have struck downwards into a cold uncongenial subsoil must be pruned off if they cannot be turned in a lateral direction, and all the lateral ones that have become coarse and fibreless must also be shortened back by means of a clean cut with a sharp knife, while a compost of rich loamy soil with a little bone-meal, and leaf-mould or old manure, should be filled into the trenches from which the old sterile soil has been taken. The operation is best performed early in autumn, and mav be safely resorted to in the case of fruit trees

Fig. 37

of moderate age, and even of old trees if due care be exercised. In transplanting trees all the roots which may have become bruised or broken in the process of lifting should be cut clean away behind the broken part, as they then more readily strike out new roots from the cut parts. In all these cases the cut should be a clean sloping one, and made in an upward and out- ward direction.

The root-pruning of pot-plants is necessary in the case of many soft-wooded subjects which are grown on year after year — pelargoniums and fuchsias, for example. After the close pruning of the branches to which they are annually subjected, and when the young shoots have shot forth an inch or two in length, they are turned out of their pots and have the old soil shaken away from their roots, the longest of which, to the extent of about half the existing quantity, are then cut clean away, and the plants repotted into small pots. This permits the growing plant to be fed with rich fresh soil, without having been necessarily trans- ferred to pots of unwieldy size by the time the flowering stage is reached.

Ringing. — One of the expedients for inducing a state of fruit- fulness in trees is the ringing of the branches or stem, that is, removing a narrow annular portion of the bark, by which means, it is said, the trees are not only rendered productive, but the quality of the fruit is at the same time improved. The advantage depends on the obstruction given to the descent of the. sap. The ring should be cut out in spring, and be of such a width that the bark may remain separated for the season. A tight ligature of twine or wire answers the same end. The advantages of the operation may generally be gained by judicious root pruning, and it is not at all adapted for the various stone fruits.

Training. — What is called training is the guiding of the branches of a tree or plant in certain positions which they would not naturally assume, the object being partly to secure their full exposure to light, and partly to regulate the flow and dis- tribution of the sap. To secure the former object, the branches must be so fixed as to shade each other as little as possible; and

to realize the second, the branches must have given to them an upward or downward direction, as they may require to be encouraged or repressed. Something of the same vegetative vigour which is given to a plant or tree by hard pruning is afforded by training in an upward direction so as to promote the flow of the sap; while the repression effected by summer pruning is supplemented by downward training, which acts as a check. One main object is the preservation of equilibrium in the growth of the several parts of the tree; and for this various minor details deserve attention. Thus a shoot will grow more vigorously whilst waving in the air than when nailed close to the wall; consequently a weak shoot should be left free, whilst its stronger antagonist should be restrained; and a luxuriant shoot may be retarded for some time by having its tender extremity pinched off to allow a weaker shoot to overtake it.

By the prudent use of the knife, fruit trees may be readily trained into the forms indicated below, which are amongst the best out of the many which have been devised.

The training of standard and bush trees in the open ground has been already referred to under the section Pruning. When the growth of pyramids is completed, the outline is something like that of fig. 39, and very pretty trees are thus formed. It is better, however, especially if the tendency to bear fruit is rather slack, to adopt what the French call en quenouille training

Fig. 38.

-Diagram illustrating Branch Distribution.

(fig. 40), which consists in tying or weighting the tips of the branches so as to give them all a downward curve. Pear trees

Fig. 39. — Pyramidal Training. Fig. 40. — Training en quenouille.

worked on the quince stock, and trained en quenouille, are generally very fertile.

Wall trees, it must be evident, are placed in a very unnatural and constrained position, and would in fact soon be reduced to a state of utter confusion if allowed to grow unrestricted; hence the following modes of training have been adopted.

Horizontal Training (fig. 41) has long been a favourite form in England. There is one principal ascending stem, from which

Fig. 41. — Horizontal Training.

the branches depart at right angles, at intervals oi about a foot. Horizontal training is best adapted to the apple and the pear; and for the more twiggy growing slender varieties, the forms shown in fig. 42 have been recommended. In these the horizontal branches are placed wider, 18 to 20 in. apart, and the smaller shoots are trained between them, either on both sides, as at a, or deflexed from the lower side, as at b. The latter is an excellent method of reclaiming neglected trees. Every alternate

nrmrrm

rvrnrm' mm

1 i

rrrrrnrwi

*rrrnrTTT^*

Fig. 42. — Forms of Horizontal Training.

branch should be taken away, and the spurs cut off, after which the young shoots are trained in, and soon produce good fruit.

In Fan Training (fig. 43) there is no leading stem, but the branches spring from the base and are arranged somewhat like the ribs of a fan. This mode of training is commonly adopted for the peach, nectarine, apricot and morello cherry, to which

it is best adapted. Though sometimes adopted, it is not so well suited as the horizontal form for apples and pears, because, when the branches reach the top of the wall, where they must

^^.SJ'V'^S—

Fig. 43. — Fan Training.

be cut short, a hedge of young shoots is inevitable. A modifica- tion of the fan shape (fig. 44) is sometimes adopted for stone fruits, such as the plum and apricot. In this the object is to establish a number of mother branches, and on these to form a series of subordinate members, chiefly composed of bearing wood. The mother branches or limbs should not be numerous, but well marked, equal in strength and regularly disposed. The

*^

Fig. 44. — Modified Fan Training.

side branches should be pretty abundant, short and not so vigorous as to rival the leading members.

The Half-fan mode of training, which is intermediate between horizontal and fan training, is most nearly allied to the former, but the branches leave the stem at an acute angle, a disposition supposed to favour the more equal distribution of the sap. Some- times, as in fig. 45, two vertical stems are adopted, but there is no particular advantage in this, and a single-stemmed tree is more manageable. The half-fan form is well adapted for such fruits

between the wire and the wood, however, and so preventing them from coming in contact, there is no danger. If they are adopted, the wires should be a few inches away from the wall, to allow free circulation of air between it and the tree, and thus avoid the scorching or burning of leaves and fruits during the summer months in very hot places. Care should be taken that the ties or fastenings do not eventually cut into the bark as the branches swell with increased age. When shreds and nails are used, short thick wire nails and " medicated shreds " are the best; the ordinary cast iron wall nails being much too brittle and difficult to drive into the wall. It must be remembered that nails spoil a wall sooner or later, whereas a wire trellis is not only much neater, but enables the gardener to tie his trees up much

more quickly.

For tying plants to trellises and stakes soft tarred string or raffia (the fibre from the Raphia palm of Madagascar) is used.

In training greenhouse plants the young branches should be drawn outwards by means of ties fastened to a string or wire

Fig. 45.— Half-Fan Training.

as the plum and the cherry; and, indeed, for fruits of vigorous habit, it seems to combine the advantages of both the foregoing. Trees must be fixed to the walls and buildings against which they are trained by means of nails and shreds (neat medicated strips are now sold for this purpose), or in cases where it is desired to preserve the wail surface intact, by permanent nails or studs driven in in regular order. Sometimes the walls are furnished with galvanized wires, but this has been objected to as causing cankering of the shoots, for which, however, painting is recommended as a remedy. By crossing the tying material

Fig. 46. — Clematis trained on Balloon-Shaped Trellis.

under the pot-rim; the centre then fills up, and slender stakes are used as required; but the fewer these are in number the better. Climbers are trained from the bottom around or across trellises, of which the cylindrical or the balloon-shaped, or sometimes the flat oval or circular, are the best forms. The size should be adapted to the habit of the plant, which should cover the whole by the time flowers are produced. Bast fibre and raffia fibre are to be preferred for light subjects of this character, as they can be split to any degree of fineness. Very durable trellises for greenhouse climbers are made of slender round iron rods for standards, having a series of hooks on the inner edge, into which rings of similar metal are "dropped; the rings may be graduated so as to form a broad open top, or may be all of the same size, when the trellis will assume the cylindrical form. Fig. 46 shows a pot specimen of clematis trained over a balloon- shaped trellis.

The training of certain bedding plants over the surface of the soil is done by small pegs of birch wood or bracken, by loops of wire or cheap hair-pins, or sometimes by loops of raffia having the ends fixed in the soil by the aid of the dibble. The object is to fill up the blank space as quickly and as evenly as possible.

Forcing is the accelerating, by special treatment, of the growth of certain plants, which are required to be had in leaf, in flower or in fruit before their natural season, — as, for instance, the leaves of mint at Eastertide or the leafstalks of sea-kale and rhubarb

at Christmas, the flowers of summer in the depth of winter, or some of the choicest fruits perfected so much before their normal period as to complete, with the retarded crops of winter, the circle of the seasons.

In the management of artificial heat for this purpose, a considerable degree of caution is required. The first stages of forcing should, of course, be very gentle, so that the whole growth of the plants may advance in harmony. The immediate application of a very hot atmosphere would unduly force the tops, while the roots remained partially or wholly inactive; and a strong bottom heat, if it did not cause injury by its excess, would probably result in abortive growth.

Any sudden decrease of warmth would be very prejudicial to the progress of vegetation through the successive stages of foliation, inflorescence and fructification. But it is not necessary that one unvarying range of temperature should be kept up at whatever pains or risk. Indeed, in very severe weather it is found better to drop a little from the maximum temperature by fire heat, and the loss so occasioned may be made good by a little extra heat applied when the weather is more genial. Night temperatures also should always be allowed to drop somewhat, the heat being increased again in the morning. In other words, the artificial temperature should increase by day and decrease by night, should rise in summer and fall in winter, should, in short, imitate as nearly as possible the varying influence of the sun.

For the growth of flowers generally, and for that of all fruits, every ray of light to be obtained in the dull winter season is required, and therefore every possible care should be taken to keep the glass clean. A moist genial atmosphere too is essential, a point requiring unremitting attention on account of the necessity of keeping up strong fires. With moisture as with heat, the cultivator must hold his hand somewhat in very severe or very dull weather; but while heat must not drop so as to chill the progressing vegetation, so neither must the lack of moisture parch the plants so as to check their growth.

There are some few subjects which when forced do not require a light house. Thus amongst flowers the white blossoms of the lilac, so much prized during winter, are produced by forcing purple-flowered plants in darkness. Rhubarb and sea-kale among esculents both need to be forced in

darkness to keep them crisp and tender, and mushrooms also are always grown in dark structures. In fact, a roomy mushroom house is one of the most convenient of all places for forcing the vegetables just referred to. The lilac would be better placed in a dark shed heated to about 70 or 80°, in which some dung and leaves could be allowed to lie and ferment, giving off both a genial heat and moisture.

One of the most important preliminaries to successful forcing is the securing to the plants a previous state of rest. The thorough ripening of the preceding season's wood in fruit trees and flowering plants, and of the crown in perennial herbs like strawberries, and the cessation of all active growth before the time they are to start into a new growth, are of paramount importance. The ripening process must be brought about by free exposure to light , and by the application of a little extra heat with dryness, if the season should be unfavourable; and both roots and tops must submit to a limitation of their water supply. When the ripening is perfected, the resting process must be aided by keeping the temperature in which they await the forcing process as low as each particular subject can bear. (See Retardation above.)

V. Flowers.

Flower Garden and Pleasure Grounds. — Wherever there is a flower garden of considerable magnitude, and in a separate situation, it should be constructed on principles of its own. The great object must be to exhibit to advantage the graceful forms and glorious hues of flowering plants and shrubs. Two varieties of flower gardens have chiefly prevailed in Britain. In one the ground is turf, out of which flower-beds, of varied patterns, are cut; in the other the flower-beds are separated

by gravel walks, without the introduction of grass. When the flower garden is to be seen from the windows, or any other elevated point of view, the former is to be preferred; but where the surface is irregular, and the situation more remote, and especially where the beauty of flowers is mainly looked to, the choice should probably fall on the latter.

The flower garden may include several different compartments. Thus, for example, there is the " Rock Garden," which should consist of variously grouped masses of large stones, those which are remarkable for being figured by water-wearing, or containing petrifactions or impressions, or showing something of natural stratification, being generally preferred. In the cavities between the stones, filled with earth, alpine or trailing plants are inserted, and also some of the choicest flowers. In proper situations, a small pool of water may be introduced for the culture of aquatic plants. In these days the rock-garden is a most important feature, and it requires a

good deal of care and skill to arrange the boulders, walks, pools or streams in natural and artistic fashion. The selection of suitable alpines, perennials and shrubs and trees also necessitates considerable knowledge on the part of the gardener. A separate compartment laid out on some regular plan is often set apart for roses, under the name of the " Rosery." A moist or rather a shady border, or a section of the pleasure ground supplied with bog earth, may be devoted to what is called the " American Garden," which, as it includes the gorgeous rhododendrons and azaleas, forms one of the grandest features of the establishment during the early summer, while if properly selected the plants are effective as a garden of evergreens at all seasons. The number of variegated and various-coloured hardy shrubs is now so great that a most pleasant plot for a " Winter Garden " may be arrayed with plants of this class, with which may be associated hardy subjects which flower during that season or very early spring, as the Christmas rose, and amongst bulbs the crocus and snowdrop. Later the spring garden department is a scene of great attraction; and some of the gardens of this character, as those of Cliveden and Belvoir, are among the most fascinating examples of horti- cultural art. The old-fashioned stereotyped flower garden that one met with almost everywhere is rapidly becoming a thing of the past, and grounds are now laid out more in accord- ance with their natural disposition, their climatic conditions and their suitability for certain kinds of plants. Besides the features already mentioned there are now bamboo gardens, Japanese gardens, water gardens and wall gardens, each placed in the most suitable position and displaying its own special features.

Lawns. — In the formation of lawns the ground must be regularly broken up so that it may settle down evenly, any deep excavations that may have to be filled in being very carefully rammed down to prevent subsequent settlement. The ground must also be thoroughly cleared of the roots of all coarse, perennial weeds, and be worked to a fine tilth ready for turfing or sow- ing. The more expeditious method is of course to lay down turf, which should be free from weeds, and is cut usually in strips of 1 ft. wide, 3 ft. long, and about 1 in. in thickness. This must be laid very evenly and compactly, and should then be beaten down firmly with the implement called a turf-beater (fig. 47). When there is a large space to cover, it is much the cheaper plan to sow the lawn 47-

with grass-seeds, and equally effective, though the sward takes much longer to thicken. It is of the utmost importance that a good selection of grasses be made, and that pure seeds should be obtained (see Grass and Grassland). The follow- ing sorts can be recommended, the quantities given being those for sowing an acre of ground: —

Turf Beater.

61b

lb lb lb 3 H> 3 lb 2 lb 6 lb

Cynosurus crista! us — Crested Dog's-tail

Festuca duriuscula — Hard Fescue ….

Festuca ovina — Sheep's Fescue

Lotium perenne tenue

Poa nemoralis sempervirens — Evergreen Meadow-grass Poa trivialis — Trivial Meadow-grass …. Trisetum flavescens — Yellow Oat-grass Trifclium repens — Dutch Clover ….

The seeds should be thoroughly mixed, and very evenly sown, after which the surface should be raked over to bury them, and then rolled down while dry so as to finish it off smooth and level. When thus sown, lawns require to be promptly weeded. During the growing season established lawns should be mown at least once a week. They should be occasionally rolled, and towards autumn they require frequent sweepings to remove worm-casts. Hardy Annuals. — Annual plants are those which grow up from seed, flower, ripen seed, and die in the course of one season — one year. They are useful in the mixed garden, for though in some cases they are of short duration, many of them are possessed of much beauty of hue and elegance of form. Annuals may be divided into three classes: the hardy, which are sown at once in the ground they are to occupy; the half-hardy, which succeed best when aided at first by a slight hot bed, and then transplanted into the open air; and the tender, which are kept in pots, and treated as greenhouse or stove plants, to which departments they properly belong. Some of the more popular annuals, hardy and half-hardy, have been very much varied as regards habit and the colour of the flowers, and purchases may be made in the seed shops of such things as China asters, stocks, Chinese and Indian pinks, larkspurs, phloxes and others, amongst which some of the most beautiful of the summer flowers may be found.

The hardy annuals may be sown in the open ground during the latter part of March or beginning of April, as the season may determine, for the weather should be dry and open, and the soil in a free-working condition

before sowing is attempted. In favourable situations and seasons some of the very hardiest, as Silene pendula, Saponaria, Nemophila, Gilia, &c, may be sown in September of October, and transplanted to the beds or borders for very early spring flowering. Those sown in spring begin to flower about June. The plants, if left to flower where they are sown, should be thinned out while young, to give them space for proper development. \f. is from having ample room that pricked out transplanted seedlings often make the finest plants. The soil should be rich and light.

The half-hardy series are best sown in pots or pans under glass in mild' heat, in order to accelerate germination. Those of them which are in danger of becoming leggy should be speedily removed to a cooler frame and placed near the glass, the young plants being pricked off into fresh soil, in other pots or pans or boxes, as may seem best in each case. All the plants must be hardened off gradually during the month of April, and may generally be planted out some time in May, earlier or later according to the season.

The class of tender annuals, being chiefly grown for greenhouse decoration, should be treated much the same as soft-wooded plants, being sown in spring, and grown on rapidly in brisk heat, near the glass, and finally hardened off to stand in the greenhouse when in flower.

We add a select list of some of the more distinct annuals desirable for general cultivation as decorative plants for the open air: —

Acroclinium roseum: half-hardy, I ft., rose-pink or white; ever- lasting.

Agrostis pulchella: hardy, 6 in. ; a most graceful grass for bouquets.

Amberboa moschata atropurpurea (Sweet Sultan): hardy, \ ft., purple; musk-scented.

Antirrhinum majus (Snapdragon): hardy, 6 in. to 2 ft., white, yellow and red. This plant is perennial, but is best treated as an annual.

Arnebia cornuta: hardy, ij to 2 ft. yellow.

Bartonia aurea: hardy, 2 ft., golden yellow; showy and free.

Brachycome iberidifolia : half-hardy, I ft., blue or white with dark disk.

Calendula officinalis Meteor: hardy, I ft., orange striped with yellow.

Calliopsis or Coreopsis bicolor (tincloria) : hardy, 2 to 3 ft., yellow and chestnut-brown.

Calliopsis or Coreopsis Drummondii: hardy, 1 to 2 ft., golden yellow with red disk.

Callistephus hortensis or chinensis (the China aster) : half-hardy, 6 in. to 1 J ft.; there arc several groups of various colours. The species itself is a very handsome plant.

Campanula Loreyi: hardy, 1 j ft., purplish-lilac or white.

Campanula macrostyla : hardy, I to 2 ft., purple, beautifully veined.

Carnations, Marguerite: half-hardy, 9 to 12 in., colours various.

Centaurea Cyanus: hardy, 3 ft., blue, purple, pink or white; showy.

Centranthus macrosiphon: hardy, ij to 2 ft., rosy-carmine.

Centranthus ruber (known as Pretty Betsy and Red Valerian) : hardy, 2 to 3 ft., red.

Chrysanthemum carinatum: a charming half-hardy annual, 2 tc 3 ft. high, with several varieties, of which C. Burridgeanum with zones of white, crimson and yellow is best.

C. coronarium, a yellow-flowered species requires similar treatment, Clarkia pulchella: hardy, l| ft., rosy-purple; some varieties very handsome.

Collinsia bicolor: hardy, ij ft., white and purple; pretty. Collinsia vema: hardy, I ft., white and azure; sow as soon as ripe.

Convolvulus tricolor atroviolacea: hardy, 1 ft., white, blue and yellow. This is the Convolvulus minor of gardens.

Cosmos bipinnatus: half-hardy, 3 ft., rose, purple, white; requires sunny spots.

Dianthus chinensis (Indian pink) : half-hardy, 6 in. to I ft., various shades of red and white.

Delphinium Ajacis and Delphinium Consolida (Larkspurs) : hardy, 3 ft., various colours.

Erysimum Peroffskianum: hardy, 2 ft., deep orange; in erect racemes.

Eschscholtzia calif ornica: hardy, ij ft., yellow with saffron eye. Eschscholtzia crocea flore-pleno: hardy, l-| ft.,, orange yellow; double.

Eutoca viscida: hardy, 2 ft., bright blue, with white hairy centre. Gaillardia Drummondii {picta) : half-hardy, I J ft., crimson, yellow margin.

Gilia achilleaefolia: hardy, 2 ft., deep blue; in large globose heads Godetia Lindleyana: hardy, 2 to 3 ft., rose-purple, with crimson spots.

Godetia Whitneyi: hardy, 1 ft., rosy-red, with crimson spots. The variety Lady Albemarle is wholly crimson, and very handsome.

Gypsophila elegans: hardy, I J ft., pale rose; branched very gracefully.

Helianthus cucumerifolius : hardy, 3 to 4 ft., golden yellow, black disk ; branching, free and bold without coarseness.

Helichrysum bracteatum : half-hardy, 2 ft. ; the incurved crimson, rose and other forms very handsome.

Hibiscus Trionum (africanus): hardy, \ ft., cream colour, dark purple centre.

Iberis umbellata (Candytuft): hardy, 1 ft., white, rose, purple, crimson. Some new dwarf white and flesh-coloured varieties are very handsome.

Kaulfussia amelloides: hardy, 1 ft., blue or rose; the var. kermesina is deep crimson.

Kochia scoparia (Belvedere or lawn cypress) : hardy, graceful green foliage, turning purple in autumn.

Koniga maritima (Sweet Alyssum): hardy, 1 ft., white; fragrant, compact.

Lathyrus odoratus (Sweet Pea) : hardy ; there are two races, dwarf and tall, the latter — far and away the most beautiful — requires support ; various colours ; numerous immensely popular forms.

Lavatera trimestris: hardy, 3 ft., pale-rose, showy malvaceous flowers.

Leptosiphon densiflorus: hardy in light soil, 1 ft., purplish or rosy-lilac.

Leptosiphon roseus: hardy in light soil, 6 in., delicate rose; fine in masses.

Linaria bipartita splendida: hardy, I ft., deep purple. Linum grandiflorum : hardy, 1 ft., splendid crimson; var. roseum is pink.

Lupinus luteus: hardy, 2 ft., bright yellow, fragrant. Lupinus mutabilis Cruickshanksii : hardy, 4 ft., blue and yellow; changeable.

Lupinus nanus: hardy, 1 ft., bluish-purple; abundant flowering. Lychnis Coeli-rosa: hardy, ij ft., rosy-purple, with pale centre; pretty.

Lychnis oculata cardinalis: hardy, if ft., rosy-crimson; very brilliant.

Malcolmia maritima (Virginian Stock): hardy, 6 in., lilac, rose or white.

Malope trifida: hardy, 3 ft., rich glossy purplish-crimson; showy. M. grandiflora is a finer plant in every way.

Matthiola annua (Ten- week Stock and its variety, the intermediate stock) : half-hardy, 1 to 2 ft., white, rose and red.

Matthiola graeca (Wallflower-lvd. Stock): hardy, 1 ft., various as in Stock.

Mesembryanthemum tricolor: half-hardy, 3 in., pink and crimson, with dark centre.

Mimulus cupreus: half-hardy, 6 in., coppery red, varying con- siderably .

Mimulus luteus tigrinus: half-hardy, I ft., yellow spotted with red ; var. duplex has hose-in-hose flowers.

Mirabilis Jalapa: half-hardy, 3 ft., various colours; flowers evening-scented.

Nemesia floribunda: hardy, 1 ft., white and yellow; pretty and compact.

Nemophila insignis: hardy, 6 in., azure blue, with white centre. Nemophila maculata: hardy, 6 in., white, with violet spots at. the edge.

Nicotiana ajfmis: half-hardy, 2 to 3 ft., white.

FLOWERS]

HORTICULTURE

767

Nicotiana Sanderae: half-hardy, 2 to 3 ft., white, crimson, scarlet, &c.

Nigella hispanica: hardy, Ij ft., pale blue, white or dark purple. Oenothera odorata: hardy, 2 to 3 ft., yellow; fragrant. Omphalodes linifolia (Venus's Navelwort) : hardy, 1 ft., white. Papaver Rhoeas flore-pleno: hardy, 2 ft., scarlet and other colours; showy.

Papaver somniferum flore-pleno: hardy, 3 ft., white, lilac, rose, &c. ; petals

sometimes fringed.

Petunia violacea hybrida: half-hardy, ij ft., various colours; sow in heat.

Pharbitis hispida: hardy, 6 ft., various; the many-coloured twining Convolvulus major.

Phlox Drummondii: half-hardy, 1 ft., various colours. Platystemon calif ornicus : hardy, I ft., sulphur yellow; neat and distinct.

Portulaca splendens: half-hardy, 6 in., crimson, rose, yellow, white, &c, single and double; splendid prostrate plants for sunny rockwork. Pyrethrum Parthenium aureum: half-hardy, 1 ft.; grown for its golden foliage, and much used for bedding.

Reseda odorata (Mignonette) : hardy, 1 ft., greenish, but exquisitely fragrant; there are some choice new sorts.

Rhodanthe maculata: half-hardy, I i ft., rosy-pink or white; larger flower-heads than the next.

Rhodanthe Manglesii: half-hardy, I ft., rosy-pink; a drooping everlasting.

Salpiglossis sinuata: half-hardy, 2 to 3 ft., yellow, purple, crimson, &c. ; much varied and beautifully veined.

Sanvitalia procumbens flore-pleno: half-hardy, 6 in., golden yellow; procumbent.

Saponaria calabrica: hardy, 6 to 8 in., bright rase pink or white; continuous blooming, compact-growing. »

Scabiosa atropurpurea: hardy, 1 to 2 ft., rose, white, lilac, crimson, &c.

Schizanthus pinnatus: hardy, 1 to 2 ft., purple-lilac, prettily blotched; curiously lobed flowers.

Sckizopetalon Walkeri: hardy, I ft., white, sweet-scented at night; curiously fringed petals.

Senecio elegans: half-hardy, l| ft., white, rose or purple; the various double forms are showy.

Silene pendula: hardy, 1 ft., bright rose pink; very showy in masses; var. compacta forms close dense tufts.

Silene Pseudo-Atocion: hardy, I ft., rose pink; free-flowering. Specularia

Speculum: hardy, 6 in., reddish- violet ; free-flowering. Sphenogyne speciosa: half-hardy, 1 ft., orange-yellow, with black ring around the disk.

Statice Bonduelli (Sea Lavender): half-hardy, 1$ ft., yellow. 5. Limonum: bluish purple. 5. sinuata: white, blue, yellow. 5. Suieorowi: lilac.

Tagetes signata: half-hardy, l| ft., golden yellow; continuous blooming, with elegant foliage. The French and African marigolds, favourites of some, are allied to this.

Tropaeolum aduncum (Canary creeper): half-hardy, 10 ft., yellow, fringed; an elegant climber.

Tropaeolum majus (the nasturtium of gardens) : hardy. There are two races, dwarf and tall, various shades of red and yellow.

Waitzia aurea: half-hardy, l\ ft., golden yellow; • a showy everlasting.

Xeranthemum annuum flore-pleno: hardy, 2 ft., lilac-purple; floriferous.

Zinnia elegans: half-hardy, I to 2 ft., various colours. Hardy Biennials. — Biennials live through one winter period. They require to be sown in the summer months, about June or July, in order to get established before winter; they should be pricked out as soon as large enough, and should have ample space so as to become hardy and stocky. They should be planted in good soil, but not of too stimulating a character. Those that are perfectly hardy are best planted where they are to flower in good time during autumn. This transplanting acts as a kind of check, which is rather beneficial than otherwise. Of those that are liable to suffer injury in winter, as the Brompton and Queen Stocks, a portion should be potted and wintered in cold frames ventilated as freely as the weather will permit.

The number of biennials is not large, but a few very desirable garden plants, such as the following, occur amongst them: —

Agrostemma coronaria (Rose Campion): hardy, ij ft., bright rose-purple or rose and white.

Beta Cicla variegata: hardy, 2 ft., beautifully coloured leaves and midribs, crimson, golden, &c.

Campanula Medium (Canterbury Bell) : hardy, 2 ft., blue, white, rose, &c. The double- flowered varieties of various colours are very handsome.

Campanula Medium calycanthema: hardy, 2 ft., blue or white; hose-in-hose flowered.

Catananche coerulea: hardy, 2 to 3 ft., blue or white. Celsia cretica: hardy. 4 to 5 ft., yellow, with two dark spots near centre; in spikes.

Cheiranthus Cheiri (Wallflower): hardy, 1} to 2 ft., red, purple, yellow, &c. ; really a perennial but better as a biennial.

Coreopsis grandiflora: hardy, 2 to 3 ft., bright yellow; the finest member of the genus.

Dianthus barbatus (Sweet William): hardy, 1 to ij ft., crimson, purple, white or parti-coloured.

Dianthus chinensis (Indian Pink): half-hardy, 1 ft., various;

flower earlier if treated as biennials; must be protected from frost.

Digitalis purpurea (Foxglove) : hardy, 3 to 5 ft., rosy-purple or

white; beautifully spotted; the variety called gloxinioides has

regular, erect flowers.

Echium pomponium: hardy, 4 ft., rosy-pink.

Hedysarum coronarium (French Honeysuckle) : hardy, 2 to 3 ft., 6carlet or white ; fragrant.

Hesperis tristis (Night-scented Rocket) : hardy, 3 ft., dull purplish; fragrant at night.

Lunaria biennis (Honesty): hardy, 2 to 3 ft., purple; the silvery dissepiment attractive among everlastings.

Matthiola incana (two groups, the Brompton and the Queen stocks) : hardy, 2 to 2\ ft., white, red and purple.

Meconopsis. Charming members of the poppy family, of which M. aculeata, purple; M. grandis, purple; M. heterophylla, coppery- orange; M. nepalensis, golden yellow; M. integrifolia, yellow; M. simplicifolia, violet purple, are grown with care in sheltered spots, and in rich, very gritty soil.

Michauxia campanuloides, a remarkable bell flower, 3 to 8 ft. high, white tinged purple. Requires rich loam in warm sheltered spots.

Oenothera biennis and O. Lamarckiana (Evening primrose) : hardy, 5 ft., bright yellow; large.

Scabiosa caucasica: hardy, 3 ft., blue, white.

Silene compacta: half-hardy, 3 to 6 inches, bright pink; clustered as in S. Armeria.

Verbascum Blattaria: hardy, 3 to 4 ft., yellowish, with purple hairs on the filaments ; in tall spikes.

Hardy Herbaceous Perennials. — This term includes not only those fibrous-rooted plants of herbaceous habit which spring up from the root year after year, but also those old-fashioned subjects known as florists' flowers, and the hardy bulbs. Some of the most beautiful of hardy flowering plants belong to this class. When the length of the flowering season is considered, it will be obvious that it is im- possible to keep up the show of a single border or plot for six months together, since plants, as they are commonly arranged, come dropping into and out of flower one after another; and even where a certain number are in bloom at the same time, they necessarily stand apart, and so the effects of contrast, which can be perceived only among adjacent objects, are lost. To obviate this defect, it has been recom- mended that ornamental plants should be formed into four or five separate suites of flowering, to be distributed over the garden. Not to mention the more vernal flowers, the first might contain the flora of May; the second that of June; the third that of July; and the fourth that of August and the following months. These com- partments should be so intermingled that no particular class may be entirely absent from any one quarter of the garden.

Before beginning to plant, it would be well to construct tables or lists of the plants, specifying their respective times of flowering, colours and heights. To diversify properly and mingle well together the reds, whites, purples, yellows and blues, with all their intervening shades, requires considerable taste and powers of combination; and ascertained failures may be rectified at the proper time the next season. The one great object aimed at should be to present an agreeable contrast — a floral picture; and, as at particular seasons a monotony of tint prevails, it is useful at such times to be in possession of some strong glaring colours. White, for instance, should be much employed in July, to break the duller blues and purples which then preponderate. Orange, too, is very effective at this season. On the other hand, yellows are superabundant in autumn, and therefore reds and blues should then be sought for. The flower-gardener should have a small nursery, or reserve garden, for the propagation of the finer plants, to be transferred into the borders as often as is required. As a rule, all the fibrous-rooted herbaceous plants flourish in good soil which has been fairly enriched with manure, that of a loamy character being the most suitable. Many of them also grow satis- factorily in a peaty soil if well worked, especially if they have a cool moist subsoil. Pentstemons and phloxes, amongst others, succeed well in soil of this character, but the surface must be well drained ; the former are rather apt to perish in winter in loamy soil, if at all close and heavy. The herbaceous border should be a distinct compartment varying from 6 to 10 ft. in width, and perhaps backed up by evergreens under certain conditions. Such a border will take in about four lines >»f plants, the tallest being placed in groups at the back and in the centre, and the others graduated in height down to the front. In the front row patches of the white arabis, the yellow alyssum, white, yellow, blue, or purple violas, and the purple aubrietia, recurring at intervals of 5 or 6 yards on a border of considerable length, carry the eye forwards and give a balanced kind of finish to the whole. The same might be done with dianthuses or the larger narcissi in the second row, with paeonies, columbines and phloxes in the third, and with delphiniums, aconitums and some of the taller yellow composites as helianthus and rudbeckia at the back. Spring and autumn flowers, as well as those blooming in summer, should be regularly distributed throughout the border, which will then at no season be devoid of interest in any part. Many of the little alpines may be brought into

the front line planted between suitable pieces of stone, or they may be relegated to a particular spot, and placed on an artificial rockery. Most of the hardy bulbs will do well enough in the border, care being taken not to disturb them while leafless and dormant.

Some deep-rooting perennials do not spread much at the surface, and only require refreshing from time to time by top-dressings. Others, as the asters, spread rapidly; those possessing this habit should be taken up every second or third year, and, a nice patch being selected for replanting from the outer portions, the rest may be either thrown aside, or reserved for increase; the portion selected for replanting should be returned to its place, the ground having mean- while been well broken up. Some plants are apt to decay at the base, frequently from exposure caused by the lifting process going on during their growth ; these should be taken up annually in early autumn, the soil refreshed, and the plants returned to their places, care being taken to plant them sufficiently deep.

Only a section of some of the best of the decorative hardy per- ennials can be noted, before we pass on to those popular subjects of this class which have been directly influenced by the hybridizer and improver. Many more might be added to the subjoined list : —

Acaena.— Neat trailing plants adapted for rockwork, thriving in sandy soil. A. microphylla and A. myriophylla have pretty spiny heads of flowers.

Acanlholimon.— Pretty dwarf tufted plants, with needle-shaped leaves, adapted for rockwork. A. glumaceum and A. venustum bear bright pink flowers in July and August. Light sandy loam.

Acanthus. — Bold handsome plants, with stately spikes, 2 to 3 ft. high, of flowers with spiny bracts. A. mollis, A. latifolius, and A. longifolius are broad-leaved sorts; A. spinosus and A. spinosissimus have narrower spiny toothed leaves.

Achillea. — Handsome composite plants, the stronger ones of easy culture in common soil. A. Eupatorium and filipendula, 3 to 4 ft., have showy yellow corymbose flowers; A. rosea, 2 ft., rosy-crimson; and A. Ptarmica flore-pleno, 2 ft., double white flowers. Others suitable for front lines or rockwork are A. tomentosa, 9 in., bright yellow; A. aegyptiaca, 1 ft., silvery leaves and yellow flowers; A. umbellata, 8 in., silvery leaves and white flowers; and A. Claven- nae, 6 in., with silvery leaves and pure white flowers.

Aconitum. — Handsome border plants, the tall stems crowned by racemes of showy hooded flowers. A. Camarum, 3 to 4 ft., has deep purple flowers

in August; A. sinense, 1} to 2 ft., has large dark purple flowers in September; A. variegatum, 3 ft., has the flowers white edged with blue; A. autumnale, 3 ft., has pale blue flowers; A. Anthora, I to 2 ft., yellow; and A. japonicum, 2| ft., deep blue flowers, produced in September and October. A. Wilsoni, a new species from China, 6 ft high, with bluish-purple flowers.

Adenophora. — Bell-shaped flowers. A. stylosa, 2 ft., pale blue,

elegant; A. denliculata, I J ft., dark blue; and in A. liliifolia, l£ ft.,

pale blue, sweet-scented — all blooming during summer. Light soil.

Adonis.— A. vernalis, 1 ft., has large bright yellow stellate flowers

in April. Deep light soil. A. amurensis is a fine Chinese species.

Ajuga. — Free growing, dwarf and showy. A. reptans, 8 in., has creeping runners, which A. genevensis has not; both bear handsome spikes of blue labiate flowers. Ordinary soil.

Allium. — Hardy bulbs of the garlic family, some species of which are ornamental; the inflorescence is umbellate. In A. azureum, I to 2 ft., the flowers are deep-blue; in A. Moly, I ft., golden yellow; in A. neapolitanum, ii ft., white, very handsome; in A. triquetrum, 8 in., white with green central stripes; in A. pedemontanum, 9 in., reddish-violet, very beautiful, the umbels nodding.

Alstroemeria. — Beautiful plants with fleshy tuberous roots, which are the better if not often disturbed. A. aurantiaca, 2 to 3 ft., orange streaked with red, in July and August; A. chilensis, 2 to 3 ft., blood-red, streaked with yellow, affording many varieties. Deep sandy loam or peat. Should be planted at least 6 or 8 in. deep.

Althaea rosea. — The hollyhock is a noble perennial, 6 to 15 ft. high, with flowers of every colour except blue. Requires rich loamy soil and plenty of space.

Alyssum. — Showy rockwork or front row border plants of easy culture in any light soil; the plants should be frequently renewed from cuttings. A. saxatile, with greyish leaves, and deep yellow flowers, produced in April and May, and the dwarf er A. montanum are useful.

Amaryllis. — Noble half-hardy bulbs, for planting near the front wall of a hothouse or greenhouse ; the soil must be deep, rich and well drained. A. Belladonna, the Belladonna Lily, 3 ft., has large funnel-shaped flowers in

September, of a delicate rose colour. The variety A . blanda has paler flowers, almost white.

Anchusa. — Pretty boraginaceous herbs, easily grown. A. italica, 3 to 4 ft., has blue star-like flowers. A. sempervirens , ij ft., rich blue, is well suited for rough borders.

Androsace. — Pretty dwarf rock plants, requiring rather careful management and a gritty soil. A. Vitaliana, yellow; A. Wulfeniana, purplish-crimson; .4. villosa, white or pale rose; A. lactea, white with yellow eye; A. lanuginosa, delicate rose;. and A. Chamatjasme, delicate rose, are some of the best.

Anemone. — The Japanese kinds, A. japonica, flowers white and purple, are very easily grown and are particularly fine in autumn. The scarlet A. fulgens, and A. coronaria, the poppy anemone, are useful for the front, or in nooks in the rockery; while the common

hepatica (A . hepatiea) with its bright blue flowers should also have a place.

Antennaria. — Composite plants, with everlasting flowers. A. margaritacea, if to 2 ft., has white woolly stems and leaves, and white flower-heads.

Anthericum. — Charming border flowers. A. Liliastrum, St Bruno's Lily, I J ft., bears pretty white sweet-scented flowers in May; A. Hookeri (Chrysobactron), 2 ft., with long racemes of bright golden yellow flowers, requires cool peaty soil.

Aquilegia. — The Columbine family, consisting of beautiful border flowers in great variety, ranging from I to 2 or 3 ft. in height. Besides the common purple A. vulgaris with its numerous varieties, double and single, there are of choice sorts A . alpina and A . pyrenaica, blue ; A. glandulosa, A. jucunda, and A. coerulea, blue and white; A. leptoc ""w, blue and yellow; A. canadensis, A. Skinneri, and A. truncata {calif ornica) , scarlet and yellow; A. chrysantha, yellow; and A. fragrans, white or flesh-colour, very fragrant. Light rich garden soil.

Arabis. — Dwarf close-growing evergreen cruciferous plants, adapted for rockwork and the front part of the flower border, and of the easiest culture. A . albida forms a conspicuous mass of greyish leaves and white blossoms. There is also a charming double variety. A. lucida, which is also white-flowered, bears its bright grcn leaves in rosettes, and has a variety with prettily gold-margined leaves.

Arenaria. — Evergreen rock plants of easy culture. A. graminifoliu, and A. laricifolia are tufted, with grajsy foliage and white flowers, while A. balearica, a creeping rock plant, has tiny leaves and solitary white flowers.

Armeria. — The Thrift or Sea-Pink, of which the common form A. maritima is sometimes planted as an edging for garden walks; there are three varieties, the common pale pink, the deep rose, and the white, the last two being the most desirable. A. cephalotes, ij ft., is a larger plant, with tufts of linear lance -shaped leaves, and abundant globular heads of deep rose flowers, in June and July.

Asclepias. — A. tuberosa is a handsome fleshy-rooted plant, very impatient of being disturbed, and preferring good peat soil; it grows I to 1 J ft. high, and bears corymbs of deep yellow and orange flowers in September. A. incarnata, 2 to 4 ft., produces deep rose sweet-scented flowers towards the end of summer.

Asp'erula odorata. — The woodruff, a charming white-flowered plant with leaves in circles. Well adapted for carpeting the border or rockery.

Asphodelus. — Handsome liliaceous plants, with fleshy roots, erect stems, and showy flowers, thriving in any good garden soil. A. albus, 4 ft., A-aestivus, 4 ft., and A. ramosus, 4 ft., have all long tapering keeled leaves, and simple or branched spikes of white flowers; A. luteus, 2 ft., has awl-shaped leaves and dense spikes of fragrant yellow flowers; A. capillaris is similar to A. luteus, but more slender and elegant.

Aster. — A very large family of autumn-blooming composites, in- cluding some ornamental species, all of the easiest culture. Of these, A. alpinus, 1 ft., and A. Amellus, ij ft., with its var. bessara- bicus, have broadish blunt leaves, and large starry bluish flowers;

A. longifolius formosus, 2 ft., bright rosy lilac; A. elegans, 3 to 5 ft., small pale purple or whitish; A. laxus, 2 ft., purplish-blue; A. pendulus, 2J ft., white, changing to rose; A. pyrenaeus, 2 to 3 ft., lilac-blue; A. turbinellus, 2 to 3 ft., mauve-coloured, are showy border plants; and A. Novae Angliae, 5 to 6 ft., rosy- violet; A. cyaneus, 5 ft., blue-lilac; and A. grandiflorus, 3 ft., violet, are especially useful from their late-flowering habit.

Astilbe. — A. japonica, 1 to ij ft., better known as Hoteia japonica or Spiraea japonica, thrives in peaty or sandy soil ; its glossy tripinnate leaves, and feathery panicles of white flowers early in summer, are very attractive. It proves to be a fine decorative pot- plant, and invaluable for forcing during the spring.

Astragalus. — Showy pea flowered plants, the smaller species adapted for rockwork; sandy soil. A. dasy glottis, 6 in., has bluish purple flowers in August and September; and A. monspessulanus, 8 in., crimson-purple in July; while A. hypoglottis, 6 in., produces in summer compact heads of pretty flowers, which are either purple or white. There are many very ornamental kinds.

Aubrietia. — Beautiful dwarf spring-blooming rock plants, forming oarpety tufts of flowers of simple cruciferous form. A. delioidea is of a deep lilac-blue; A. Campbelliae is more compact and rather darker, approaching to purple; A. grandiflora and graeca are rather larger, but of a lighter hue. Light sandy soil.

Bambusa. — The bamboo family are elegant arborescent grasses (see Bamboo).

Baptisia. — Stoutish erect-growing, 2 to 3 ft., with smooth foliage and spikes of pea-like flowers. B. australis is_ purplish-blue,

B. alba, white, B. exaltata, deep blue; all flowering in the summer months.

BeUis.—B. perennis flore-pleno, the Double Daisy, consists of dwarf showy plants 3 to 4 in. high, flowering freely in spring if grown in rich light soil, and frequently divided and transplanted. The white and pink forms, with the white and red quilled, and the varie- gated-leaved aucubaefolia, are some of the best.

Bocconia. — Stately poppyworts, 6 to 8 ft. B. cordata has heart- shaped lobed leaves, and large panicles of small flesh-coloured flowers. Sometimes called Macteaya. Deep sandy loam.

Brodiaea. — Pretty bulbous plants. B. grand.ifi.ora, 1 ft., has large bluish-purple flowers; B. coccinea, 2 to 3 ft., has tubular campanulate nodding flowers of a rich crimson with green tips. Sandy loam.

Bulbocodium. — -Pretty spring-flowering crocus-like bulbs. B. vernum, 4 to 6 in. high, purplish-lilac, blooms in March. Good garden soil.

Buphthalmum. — -Robust composite herbs with striking foliage, for the back of herbaceous or shrubbery borders. B. cordifolium, 4 ft., has large

cordate leaves, and heads of rich orange flowers in cymose panicles in July. Also called Telekia speciosa.

Calandrinia. — Showy dwarf plants for sunny rockwork, in light sandy soil. C. umbellata, 3 to 4 in., much branched, with narrow hairy leaves, and corymbs of magenta-crimson flowers in the summer months.

Calochortus. — Beautiful bulbous plants, called mariposa lilies, requiring warm sheltered spots in rich gritty and well-drained soil. There are several species known, the best being albus, elegans, luteus, Plummerae, splendens, Purdyi, venustus and Weedi.

Caltha. — Showy marsh plants, adapted for the margins of lakes, streamlets or artificial bogs. C. palustris flore-pleno, \ it., has double brilliant yellow flowers in May.

Calystegia. — Twining plants with running perennial roots. C. pubescens flore-pleno, 8 to 10 ft., has showy double-pink convolvuloid flowers in July; C. dahurica is a handsome single-flowered summer- blooming kind, with rosy-coloured flowers.

Camassia esculenta. — A beautiful bulbous plant 2 to 3 ft. high with large pale blue flowers. Also a white variety.

Campanula. — Beautiful, as well as varied in habit and character. They are called bell-flowers. C. pulla, 6 in., purplish, nodding, on slender erect stalks; C. turbinata, 9 in., purple, broad-belled; C. carpatica, 1 ft., blue, broad-belled; C. nobilis, i| ft., long-belled, whitish or tinted with chocolate; C. persicifolia, 2 ft., a fine border plant, single or double, white or purple, blooming in July; and C. pyramldalis, 6 ft., blue or white, in tall branching spikes, are good and diverse. There are many other fine sorts.

Centaurea. — Bold-habited composites of showy character; com- mon soil. C. babylonica, 5 to 7 ft., has winged stems, silvery leaves, and yellow flower-heads from June to September; C. montana, 3 ft., deep bright blue or white.

Centranthus. — Showy free-flowering plants, for rockwork, banks, or stony soil. C. ruber, 2 ft., branches and blooms freely all summer, and varies with rosy, or crimson, or white flowers. It clothes the chalk cuttings on some English railways with a sheet of colour in the blooming season.

Cheiranthus. — Pretty rock plants, for light stony soils. C. alpinus, 6 in., grows in dense tufts, and bears sulphur-yellow flowers in May. C. ochroleucus is similar in character.

Chionodoxa. — Charming dwarf hardy bulbous plants of the liliaceous order, blooming in the early spring in company with Scilla sibirica, and of equally easy cultivation. C. Luciliae, 6 in., has star- shaped flowers of a brilliant blue with a white centre. C. gigantea is the finest of the few known species. It blooms from February to April.

Chrysanthemum. — Apart from the florist's varieties of C. indicum there are a few fine natural species. One of the best for the flower border is C. maximum and its varieties — all with beautiful white flowers having yellow centres. C. latifolium is also a fine species.

Colchicum. — Showy autumn-blooming bulbs (corms), with crocus- like flowers, all rosy-purple or white. C. speciosum, C. autumnale, single and double, C. byzantinum, and C. variegatum are all worth growing.

Convallaria. — C. majalis, the lily of the valley, a well-known sweet-scented favourite spring flower, growing freely in rich garden soil; its spikes, 6 to 9 in. high, of pretty white fragrant bells, are produced in May and June. Requires shady places, and plenty of old manure each autumn.

Coreopsis. — Effective composite plants, thriving in good garden soil. C. auriculata, 2 to 3 ft., has yellow and brown flowers in July and August; C. lanceolata, 2 to 3 ft., bright yellow, in August; next to the biennial C. grandiflora it is the best garden plant.

Corydalis. — Interesting and elegant plants, mostly tuberous, growing in good garden soil. C. bracleata, 9 in., has sulphur-coloured flowers in April, and C. nobilis, 1 ft., rich yellow, in May; C. solida, with purplish, and C. tuberosa, with white flowers, are pretty spring- flowering plants, 4 to 6 in. high. C. thalictrifolia, 1 ft., yellow, May to October.

Cyclamen.— Charming tuberous-rooted plants of dwarf habit, suitable for sheltered rockeries, and growing in light gritty soil. C. europaeum, reddish-purple, flowers in summer, and C. hederae- folium in autumn.

Cypripedium. — Beautiful terrestrial orchids, requiring to be planted in peat soil, in a cool and rather shady situation. C. specta- bile, Ij to 2 ft., white and rose colour, in June, is a lovely species, as is C. Calceolus, 1 ft., yellow and brown, in May; all are full of interest and beauty.

Delphinium. — The Larkspur imily, tall showy plants, with spikes of blue flowers in July. Distil :t sorts are D. grandiflorum and D. grandiflorum flore-pleno, 2 to 3 ft., of the richest dazzling blue, flowering on till September; D. chinense, 2 ft., blue, and its double- flowered variety, are good, as is D. Barlowi, 3 ft., a brilliant double xm. 25

blue-purple. D. nudicaule, 2 ft., orange-scarlet, very showy, is best treated as a biennial, its brilliant flowers being produced freely in the second year from the seed.

Dianthus. — -Chiefly rock plants with handsome and fragrant flowers, the smaller sorts growing in light sandy soil, and the larger border plants in rich garden earth. Of the dwarfer sorts for rock gardens, D. alpinus, D. caesius, D. deltoides, D. dentosus, D. neglectus, D. petraeus, and D. glacialis are good examples; while for borders or larger rockwork D. plumarius, D. superbus, D. Fischeri, D. cruentus, and the clove section of D. Caryophyllus are most desirable.

Dicentra. — Very elegant plants, of easy growth in good soil. D. spectabilis, 2 to 3 ft., has paeony-like foliage, and gracefully drooping spikes of heart-shaped pink flowers, about May, but it should have a sheltered place, as it suffers from spring frosts and winds; D.formosa and D. eximia, I ft., are also pretty rosy-flowered species.

Dictamnus. — D. Fraxinella is a very characteristic and attractive plant, 2 to 3 ft., with bold pinnate leaves, and tall racemes of irre- gular-shaped purple or white flowers. It is everywhere glandular, and strongly scented.

Digitalis. — Stately erect-growing plants, with long racemes of pouch-shaped drooping flowers. The native D. purpurea, or fox- glove, 3 to 5 ft., with its dense racemes of purple flowers, spotted inside, is very showy, but is surpassed by the garden varieties that have been raised. It is really a biennial, but grows itself so freely as to become perennial in the garden. An erect flowered form is called gloxinioides. The yellow-flowered D. lutea and D. grandiflora are less showy. Good garden soil, and frequent renewal from seeds.

Doronicum. — Showy composites of free growth in ordinary soil. D. caucasicum and D. austriacum, 1 to I J ft., both yellow-flowered, bloom in spring and early summer. D. plantagineum excelsum, 3 to 5 ft. high, is the best garden plant.

Draba. — Good rockwork cruciferous plants. D. alpina, D. aizoides, D. ciliaris, D. Aizoon, and D. cuspidata bear yellow flowers in early spring; D. cinerea and D. ciliata have white flowers. Gritty well- drained soil.

Dracocephalum. — Handsome labiate plants, requiring a warm and well-drained soil. D. argunense, 15 ft., D. austriacum, I ft.,

D. grandiflorum, I ft., and D. Ruyschianum, ij ft., with its var. japonicum, all produce showy blue flowers during the summer months.

Echinacea. — Stout growing showy composites for late summer and autumn flowering, requiring rich deep soil, and not to be often dis- turbed. E. angustifolia, 3 to 4 ft., light purplish-rose, and E. inter- media, 3 to 4 ft., reddish-purple, are desirable kinds. E. purpurea (often called Rudbeckia) is the showiest species. Height 3 to 4 ft., with rosy-purple flowers.

Eomecon chionanthus. — A lovely poppywort about 1 ft. high, with pure white flowers 2 to 3 in. across. Root-stocks thick, creeping.

Epimedium. — Pretty plants, growing about 1 ft. high, with elegant foliage, and curious flowers. E. macranthum, white flowers, and E. rubrum, red, are distinctly spurred; E. pinnatum and E. Perralderianum, yellow, less so. They bloom in spring, and prefer a shady situation and a peaty soil.

Eranthis hyemalis. — A charming tuberous rooted plant, called winter aconite. Flowers bright yellow, January to March, close to the ground.

Eremurus. — Noble plants with thick rootstocks, large sword-like leaves, and spikes of flowers from 3 to 10 ft. high. They require warm sunny spots and rich gritty soil. The best kinds are robustus, pink, 6 to 10 ft.; himalaicus, 4 to 8 ft., white; Ailchisoni, 3 to 5 ft., red; Bungei, 2 to 3 ft., yellow; and aurantiacus, 2 to 3 ft., orange- yellow. There are now several hybrid forms.

Erigeron. — Composite plants, variable in character. E. purpureus, 1 1 ft., with pink flower-heads, having narrow twisted ray-florets;

E. Roylei, I ft., dark blue; and E. pulchellus, 1 ft., rich orange, flowering during the summer, are among the best kinds. Good ordinary garden soil.

Erinus. — E. alpinus is a beautiful little alpine for rockwork, 3 to 6 in., of tufted habit, with small-toothed leaves, and heads of pinkish-purple or, in a variety, white flowers, early in summer. Sandy well-drained soil.

Erodium. — Handsome dwarf tufted plants. E. Manescavi, 1 to l| ft., has large purplish-red flowers in summer; E. Reichardi, a minute stemless plant, has small heart-shaped leaves in rosette-like tufts, and white flowers striped with pink, produced successively.. Light soil.

Eryngium. — Very remarkable plants of the umbelliferous orejer, mostly of an attractive character. E. amethystinum, 2 ft., has the upper part of the stem, the bracts, and heads. of flowers all of an amethystine blue. Some of more recent introduction have the aspect of the pine-apple, such as E. bromeliae folium, E. pandanifolium, and E. eburneum. Deep light soil.

Erythronium. — E. dens-canis, the Dog's Tooth Violet, is a pretty dwarf

bulbous plant with spotted leaves, and rosy or white flowers produced in spring, and having reflexed petals. Mixed peaty and loamy soil, deep and cool. Several charming American species are now in cultivation.

Euphorbia. — Plants whose beauty resides in the bracts or floral I leaves which surround the inconspicuous flowers. E. aleppica, 2 ft..

and E. Characias, 2 to 3 ft., with green bracts, are fine plants for rockwork or sheltered corners.

Ferula. — Gigantic umbelliferous plants, with magnificent foliage, adapted for shrubbery borders or open spots on lawns. They have thick fleshy roots, deeply penetrating, and therefore requiring deep soil, which should be of a light or sandy character. F. communis,

F. glauca, and F. tingitana, the last with glossy lozenge-shaped leaflets, grow 8 to 10 ft. high; F. Ferulago, with more finely cut leaves, grows 5 to 6 ft. high. They flower in early spring, and all have a fine appearance when in bloom, on account of their large showy umbels of yellow flowers.

Fritillaria. — A large genus of liliaceous bulbs, the best known of which is the crown imperial (F. imperialis) and the snake's head (F. Meleagris). There are many charming species grown, such as aurea, pudica, recurva, sewerzowi, askabadensis, &c.

Funkia. — Pretty liliaceous plants, with simple conspicuously longitudinal-ribbed leaves, the racemose flowers funnel-shaped and deflexed. F. Sieboldiana, I ft., has lilac flowers; F. grandiflora, 18 in., is white and fragrant; F. coerulea, 18 in., is violet-blue; F. albo-marginata, 1 5 in., has the leaves edged with white, and the flowers lilac. Rich garden soil.

Gaillardia. — Showy composite plants, thriving in good garden soil.

G. aristata, 2 ft., has large yellow flower-heads, 2 or 3 in. across, in summer; G. Baeselari and G. Loiselii have the lower part of the ray- florets red, the upper part yellow.

Galanthus. — The Snowdrop. Early spring-flowering amaryllidace- ous

bulbs, with pretty drooping flowers, snow-white, having the tips of the enclosed petals green. The common sort is G. nivalis, which blossoms on the first break of the winter frosts; G. Imperoti, G. Elwesi and G. plicatus have larger flowers.

Galax aphylla. — A neat little rock plant, 6 to 8 in. high, with pretty round leaves and white flowers. Requires moist peaty soil.

Galega officinalis. — A strong-growing leguminous plant, 2 to 5 ft. high, with pinnate leaves, and masses of pinkish purple pea-like flowers. Also a white variety. Grows anywhere.

Galtonia candicans.—A fine bulbous plant, 3 to 4 ft. high, with drooping white flowers.

Gaura. — G. Lindheimeri, 3 to 5 ft., is much branched, with elegant white and red flowers of the onagraceous type, in long slender ramose spikes during the late summer and autumn months. Light garden soil; not long-lived.

Gentiana. — Beautiful tufted erect-stemmed plants preferring a strong rich loamy soil. G. acaulis, known as the Gentianella, forms a close carpet of shining leaves, and in summer bears large erect tubular deep blue flowers. G. Andrewsii, 1 ft., has, during summer, large deep blue flowers in clusters, the corollas closed at the mouth ; G. asclepiadea, 18 in., purplish-blue, flowers in July.

Geranium. — Showy border flowers, mostly growing to a height of 1 § or 2 ft., having deeply cut leaves, and abundant saucer- shaped blossoms of considerable size. G. ibericum, platypetalum, armenum and Endressi are desirable purple- and rose-flowered sorts ; G. sanguineum, a tufted grower, has the flowers a deep rose colour; and the double-flowered white and blue forms of G. pratense and G. sylvaticum make pretty summer flowers. Good garden soil.

Gerbera. — A South African genus of composites requiring very warm sunny spots and rich gritty soil. G. Jamesoni, with large scarlet marguerite-like flowers, and G. viridiflora, with white flowers tinged with lilac, are best known. Numerous hybrids have been raised, varying in colour from creamy white to salmon, pink, yellow, red and orange.

Geum. — Pretty rosaceous plants. The single and double flowered forms of G. chiloense and its varieties grandiflorum and miniatum, 2 ft., with brilliant scarlet flowers; G. coccineum, 6 to 12 in., scarlet, and G. montana, 9 in., yellow, are among the best sorts. Good garden soil.

Gillenia trifoliata. — A pretty rosaceous plant about 2 ft. high. Flowers white in graceful panicles; flourishes in a mixture of sandy peat and loam.

Gunnera. — Remarkable rhubarb-like plants with huge lobed leaves, often 6 ft. across. They should be grown near water as they like much moisture, and a good loamy soil. G. manicata and G. scabra are the two kinds grown.

Gynerium. — The Pampas-Grass, a noble species, introduced from Buenos Aires; it forms huge tussocks, 4 or 5 ft. high, above which towards autumn rise the bold dense silvery plumes of the inflorescence. It does best in sheltered nooks.

Gypsophila. — Interesting caryophyllaceous plants, thriving in dryish situations. G. paniculate, 2 ft., from Siberia, forms a dense semi-globular mass of small white flowers from July onwards till autumn, and is very useful for cutting.

Haberlea rhodopensis. — A pretty rock plant with dense tufts of leaves and bluish-lilac flowers. It likes fibrous peat in fissures of the rocks.

Helenium. — Showy composites of free growth in lightish soil. H. autumnale, 4 ft., bears a profusion of yellow-rayed flower-heads in August and September.

Helianthemum. — Dwarf subshrubby plants well suited for rockwork, and called Sun-Roses from their blossoms resembling small wild roses and their thriving best in sunny spots. Some of the hand- somest are H. roseum, mutabile, cupreum and rhodanthum, with red

flowers ; H. vulgare flore-pleno, grandiflorum and stramineum, with yellow flowers; and H. macranthum and papyraceum, with the flowers white.

Helianthus. — The Sunflower genus, of which there are several ornamental kinds. H. multiflorus, 4 ft., and its double-flowered varieties, bear showy golden yellow flower-heads in profusion, and are well adapted for shrubbery borders; H. orgyalis, 8 ft., has droop- ing willow-like leaves. Many other showy species.

Helichrysum. — Composite plants, with the flower-heads of the scarious character known as Everlastings. H. arenarium, 6 to 8 in., is a pretty species, of dwarf spreading habit, with woolly leaves and corymbs of golden yellow flowers, about July.

Helleborus. — Charming very early blooming dwarf ranunculaceous herbs. H. niger or Christmas Rose, the finest variety of which is called maximus,

has white showy saucer-shaped flowers; H. orien- talis, 1 ft., rose-coloured; H. atrorubens, 1 ft., purplish-red; and H. colchicus, 1 ft., deep purple. Deep rich loam.

Hemerocallis. — The name of the day lilies of which H. fulva, H. disticha, H. flava, H. Dumortieri and H. aurantiaca major are the most. showy, all wkh yellow or orange flowers. They flourish in any garden soil.

Hepatica. — Charming little tufted plants requiring good loamy soil, and sometimes included with Anemone. H. triloba, 4 in., has three-lobed leaves, and a profusion of small white, blue, or pink single or double flowers, from February onwards; H. angulosa, from Transylvania, 6 to 8 in., is a larger plant, with sky-blue flowers. Hesperis. — H. matronalis, I to 2 ft., is the old garden Rocket, of which some double forms with white and purplish blossoms are amongst the choicest of border flowers. They require a rich loamy soil, not too dry, and should be divided and transplanted into fresh soil annually or every second year, in the early autumn season.

Heuchera. — //. sanguinea and its varieties are charming and brilliant border plants with scarlet flowers in long racemes. Rich and well-drained soil.

Hibis.cus. — Showy malvaceous plants. H. Moscheutos, rose- coloured, and H. palustris, purple, both North American herbs, 3 to 5 ft. high, are suitable for moist borders or for boggy places near the margin of lakes.

Iberis. — The Candytuft, of which several dwarf spreading sub- shrubby species are amongst the best of rock plants, clothing the surface with tufts of green shoots, and flowering in masses during May and June. The best are /. saxatilis, 6 to 10 in. ; /. sempervirens, 12 to 15 in.; and I. Pruitii (variously called coriacea, carnosa, correaefolia), 12 in.

Incarvillea. — I. Delavayi is the best species for the open air. It grows 2 ft. high and has large tubular rosy carmine blossoms. It likes rich sandy loam and sunny spots.

Lathyrus. — Handsome climbing herbs, increased by' seeds or division. L. grandiflorus, 3 ft., has large rose-coloured flowers with purplish-crimson wings, in June; L. latifolius, the everlasting pea, 6 ft., has bright rosy flowers in the late summer and autumn; the vars. albus, white, and superbus, deep rose, are distinct. Ordinary garden soil.

Lavatera. — L. thuringiaca-, 4 ft., is a fine erect-growing malvaceous plant, producing rosy-pink blossoms freely, about August and September. Good garden soil.

Leucojum. — Snowflake. Pretty early-blooming bulbs, quite hardy. L. vernum, 6 in., blooms shortly after the snowdrop, and should have a light rich soil and sheltered position; L. carpaticum, flowers about a month later; L. pulchellum, if ft., blooms in April and May; and L. aestivum, 2 ft., in May. All have white pendant flowers, tipped with green.

Liatris. — Pretty composites with the flower-heads collected into spikes. L. pumila, I ft., L. squarrosa, 2 to 3 ft., L. spicata, 3 to 4 ft., L. pyenostachya, 3 to 4 ft., all have rosy-purplish flowers. Deep, cool, and moist soil. Lilium. — See Lily.

Linaria. — Toadflax. Pretty scrophulariads, of which L. alpina, 3 to 6 in., with bluish-violet flowers having a brilliant orange spot, is suitable for rockwork; L. dalmatica, 4 ft., and L. genistifolia, 3 ft., both yellow-flowered, are good border plants; L. vulgaris, the common British toad-flax, and its regular peloriate form, are very handsome and free flowering during the summer months.

Linum. — Flax. L. alpinum, 6 in., large, dark blue; L. narbon- nense, l\ ft., large, blue; L. perenne, l| ft., cobalt blue; and L. arboreum (flavum), 1 ft., yellow, are all pretty. The last is liable to suffer from damp during winter, and some spare plants should be wintered in a frame. It is really shrubby in character.

Lithospermum. — L. prostratum, 3 in., is a trailing evergreen herb, with narrow hairy leaves, and paniculate brilliant blue flowers in May and June. Well adapted for rockwork or banks of sandy soil.

Lupinus. — Showy erect-growing plants with papilionaceous; flowers, thriving in good deep garden soil. L. polyphyllus, 3 ft., forms noble tufts of palmate leaves, and long spikes of bluish- purple or white flowers in June and July ; L. arboreus is subshrubby, and has yellow flowers.

Lychnis. — Brilliant erect-growing caryophyllaceous plants, thriv- ing best in beds of peat earth or of deep sandy loam. L. chalcedonica, 3 ft., has dense heads of bright scarlet flowers, both single and double, in June and July; L. fulgens, 1 ft., vermilion; L. Haageana,

1 j ft., scarlet; and L. grandiflora, 1 to 2 ft., with clusters of scarlet, crimson, pink and white flowers. All large-flowered and showy, but require

a little protection in winter.

Lysimachia. — The best known is the Creeping Jenny, L. Num- mularis, much used for trailing over rockeries and window boxes, with bright yellow flowers. The variety aurea with golden leaves is also popular. Other species that grow from 2 to 3 ft. high, and are good border plants, are L. clethroides, with white spikes of flowers; L. vulgaris, L. thyrsiflora, L. ciliata, L. verticittata and L. punctata, all yellow.

Malva. — M. moschata, 2 ft., with a profusion of pale pink or white flowers, and musky deeply cut leaves, though a British plant, is worth introducing to the flower borders when the soil is light and free.

Meconopsis. — The Welsh poppy, M. cambrica, 1 to 2 ft. high, yellow, and M. Wallichi, from the Himalayas, 4 to 6 ft. high with pale blue flowers, are the best known perennials of the genus. The last-named, however, is best raised from seeds every year, and treated like the biennial kinds.

Mertensia. — M. virginica, 1 to 15 ft., azure blue, shows flowers in drooping panicles in May and June. It does best in shady peat borders.

Mimulus. — Monkey-flower. Free-blooming, showy scrophulari- aceous plants, thriving best in moist situations. M. cardinalis,

2 to 3 ft., has scarlet flowers, with the limb segments reflexed; M. luteus and its many garden forms, I to ij ft., are variously coloured and often richly spotted; and M. cupreus, 8 to 10 in., is bright coppery-red. M. moschatus is the Musk-plant, of which the variety Harrisoni is a greatly improved form, with much larger yellow flowers.

Afonarda.— Handsome labiate plants, flowering towards autumn, and preferring a cool soil and partially shaded situation. M. didyma, 2 ft., scarlet or white; M. fistulosa, 3 ft., purple; and M. purpurea, 2 ft., deep purple, are good border flowers.

Muscari. — Pretty dwarf spring-flowering bulbs. M. botryoides (Grape Hyacinth), 6 in., blue or white, is the handsomest; M. moschatum (Musk Hyacinth), 10 in., has peculiar livid greenish- yellow flowers and a strong musky odour; M. monstrosum (Feather Hyacinth) bears sterile flowers broken up into a feather-like mass. Good garden soil.

Myosotidium nobile. — A remarkable plant, i| to 2 ft. high, with large blue forget-me-not-like flowers. Requires gritty peat soil and cool situations, but must be protected from frost in winter.

Myosotis. — Forget-me-not. Lovely boraginaceous plants. M. dissitiflora, 6

to 8 in., with large, handsome and abundant sky-blue flowers, is the best and earliest, flowering from February onwards; it does well in light cool soils, preferring peaty ones, and should be renewed annually from seeds or cuttings. M. rupicola, 2 to 3 in., intense blue, is a fine rock plant, preferring shady situations and gritty soil; M. sylvatica, 1 ft., blue, pink or white, used for spring bedding, should be sown annually in August.

Narcissus. — See Narcissus.

Nepeta. — N. Mussinii, I ft., is a compactly spreading greyish- leaved labiate, with lavender-blue flowers, and is sometimes used for bedding or for marginal lines in large compound beds.

Nierembergia. — N. rivularis, 4 in., from La Plata, has slender, creeping, rooting stems, bearing stalked ovate leaves, and large funnel-shaped white flowers, with a remarkably long slender tube; especially adapted for rockwork, requiring moist sandy loam.

Nymphaea. — See Water-Lily.

Oenothera. — The genus of the Evening Primrose, consisting of showy species, all of which grow and blossom freely in rich deep soils. Oe. missouriensis (macrocarpa), 6 to 12 in., has stout trailing branches, lance-shaped leaves and large yellow blossoms; Oe. taraxacifolia, 6 to 12 in., has a stout crown from which the trailing branches spring out, and these bear very large white flowers, changing to delicate rose; this perishes in cold soils, and should therefore be raised from seed annually. Of erect habit are Oe. speciosa, I to 2 ft., with large white flowers; Oe. fruticosa, 2 to 3 ft., with abundant yellow flowers; and Oe. serotina, 2 ft., also bright yellow.

Omphalodes. — Elegant dwarf boraginaceous plants. O. verna, 4 to 6 in., a creeping, shade-loving plant, has bright blue flowers in the very early spring; O. Luciliae, 6 in., has much larger lilac-blue flowers, and is an exquisite rock plant for warm, sheltered spots. Light sandy soil.

Onosma. — 0. taurica, 6 to 8 in., is a charming boraginaceous plant from the Caucasus, producing hispid leaves and cymose heads of drooping, tubular, yellow flowers. It is of evergreen habit, and requires a warm position on the rockwork and well-drained sandy soil ; or a duplicate should be sheltered during winter in a cold, dry frame.

Ornithogalum. — The Star of Bethlehem. 0. arabicum can only be grown in the warmest parts of the kingdom, and then requires protection in winter. Other species, all bulbous, are 0. nutans, 0. pyramidale, 0. pyrenaicum, and the common Star of Bethlehem, 0. umbellatum; all are easily grown, and have white flowers.

Ostrmuskya magnifica. — A magnificent bellflower from Bokhara,

4 to 5 ft. high, and white flowers tinted and veined with lilac, 3 to

5 in. across. Requires rich, gritty loam of good depth, as it produces tuberous roots 1 to 2 ft. long.

Ourisia. — Handsome scrophulariaceous plants, from Chile, thriving in moist, well-drained peaty soil, and in moderate shade. O. coccinea, l ft., has erect racemes of pendent crimson flowers.

Papaver. — The Poppy. Very showy plants, often of strong growth, and of easy culture in ordinary garden soil. P. orientate, 3 ft., has crimson-scarlet flowers, 6 in. across, and the variety bractealum closely resembles it, but has leafy bracts just beneath the blossom. P. alpinum, 6 in., white with yellow centre; P. nudicaule, 1 ft., yellow, scented, and P. pilosum, I to 2 ft., deep orange, are orna- mental smaller kinds.

Pentstemon. — The popular garden varieties have sprung from P. Hartwegii and P. Cobaea. Other distinct kinds are P. campanulatus , lj ft., pale ro.se, of bushy habit; P. humilis, 9 in., bright blue; P. speciosus, cyananthus and J affray anus, 2 to 3 ft., all bright blue; P. barbatus, 3 to 4 ft., scarlet, in long terminal panicles; P. Murray- anus, 6 ft., with scarlet flowers and connate leaves; and P. Palmeri, 3 to 4 ft., with large, wide-tubed, rose-coloured flowers.

Petasites. — P. fragrans, the Winter Heliotrope, though of weedy habit, with ample cordate coltsfoot-like leaves, yields in January and February its abundant spikes, about 1 ft. high, of greyish flowers scented like heliotrope; it should have a corner to itself.

Phlomis. — Bold and showy labiates, growing in ordinary soil. P. Russelliana (lunariaefolia) , 4 ft., yellow, and P. tuberosa, 3 ft., purplish-rose, both with downy hoary leaves, come in well in broad flower borders.

Phygelius.—P. capensis from South Africa is hardy south of the Thames and in favoured localities. Flowers tubular scarlet, on branching stems, 2 to 3 ft. high. Requires light, rich soil.

Physalis. — P. Alkekengi from South Europe has long been known in gardens for its bright orange-red globular calyxes. It has been surpassed by the much larger and finer P. Francheti from Japan ; the brilliant calyxes are often 3 in. in diameter in autumn. Grows in any garden soil.

Physostegia. — Tall, autumn-blooming labiates, of easy growth in ordinary garden soils. P. imbricata, 5 to 6 ft., has pale purple flowers in closely

imbricated spikes.

Phytolacca. — Ornamental strong-growing perennials requiring much space. P. acinosa, from the Himalayas, 3 to 4 ft., with whitish flowers in erect spikes. P. decandra, the North American Poke Weed or Red Ink plant, grows 5 to 10 ft. high, has fleshy poisonous roots, erect purple stems and white flowers. P. icosandra, from Mexico, 2 to 3 ft., pinky white. The foliage in all cases is handsome. Ordinary garden soil.

Platycodon. — P. grandiflorum, 6 to 24 in. high, is a fine Chinese perennial with flattish, bell-shaped flowers, 2 to 3 in. across, and purple in colours The variety Mariesi (or pumilum) is dwarf, with larger, deeper-coloured flowers. Requires rich sandy loam.

Podophyllum. — Ornamental herbs with- large lobed leaves. P. Emodi, 6 to 12 in. high, from the Himalayas, has large white or pale- rose flowers, and in autumn bright red, hen's-egg-like fruits. P. peltatum, the North American mandrake, has large umbrella-like leaves and white flowers; P. pleianthum, from China, purple. They all require moist, peaty soil in warm, sheltered nooks.

Polemonium. — Pretty border flowers. P. coeruleum (Jacob's Ladder), 2 ft., has elegant pinnate leaves, and long panicles of blue rotate flowers. The variety called variegatum has very elegantly marked leaves, and is sometimes used as a margin or otherwise in bedding arrangements. Good garden soil.

Polygonatum. — Elegant liliaceous plants, with rhizomatous stems. P. multiflorum (Solomon's Seal), 2 to 3 ft., with arching stems, and drooping white flowers from the leaf axils, is a handsome border plant, doing especially well in partial shade amongst shrubs, and also well adapted for pot culture for early forcing. Good garden soil.

Polygonum. — A large family, varying much in character, often weedy, but of easy culture in ordinary soil. P. vacciniifolium, 6 to 10 in., is a pretty prostrate subshrubby species, with handsome rose-pink flowers, suitable for rockwork, and prefers boggy soil ; P. affine (Brunonis), 1 ft., deep rose, is a showy border plant, flowering in the late summer; P. cuspidatum, 8 to 10 ft., is a grand object for planting where a screen is desired, as it suckers abundantly, and its tall spotted stems and handsome cordate leaves have quite a noble appearance. Other fine species are P. baldschuanium, a climber, P. sphaerostachyum, P. lanigerum, P. polystachyum and P. sachali- nense, all bold and handsome.

Potentilla. — The double varieties are fine garden plants obtained from P.

argyrophylla atrosanguinea and P. nepalensis. The colours include golden-yellow, red, orange-yellow, crimson, maroon ~and intermediate shades. They all flourish in rich sandy soil.

Primula. — Beautiful and popular spring flowers, of which many forms are highly esteemed in most 'gardens. P. vulgaris, 6 in., affords numerous handsome single- and double-flowered varieties, with various-coloured flowers for the spring flower-beds and borders. Besides this, P. Sieboldii (cortusoides amoena), 1 ft., originally deep rose with white eye, but now including many varieties of colour, such as white, pink, lilac and purple; P. japonica, 1 to 2 ft., crimson-rose; P. denticulata, 1 ft., bright bluish-lilac, with its allies P. erosa and P. purpurea, all best grown in a cold frame; P. viscosa, 6 in., purple, and its white variety nivalis, with P. pede- I montana and P. spectabilis, 6 in., both purple; and the charming

little Indian P. rosea, 3 to 6 in., bright cherry-rose colour, are but a few of the many beautiful kinds in cultivation.

Pulmonaria. — Handsome dwarf, boraginaceous plants, requiring good deep garden soil. P. officinalis, I ft., has prettily mottled leaves and blue flowers; P. sibirica is similar in character, but has broader leaves more distinctly mottled with white.

Pyrethrum. — Composite plants of various character, but of easy culture. P. Parthenium eximium, 2 ft., is a handsome double white form of ornamental character for the mixed border; P. uliginosum,

5 to 6 ft., has fine large, white, radiate flowers in October; P. Tchihatchewii, a close-growing, dense evergreen, creeping species, with long-stalked, white flower-heads, is adapted for covering slopes in lieu of turf, and for rockwork.

Ramondia. — R. pyrenaica, 3 to 6 in., is a pretty dwarf plant, requiring a warm position on the rockwork and a moist, peaty soil more or less gritty; it has rosettes of ovate spreading root-leaves, and large purple, yellow-centred, rotate flowers, solitary, or two to three together, on naked stalks.

Ranunculus. — The florists' ranunculus is a cultivated form of R. asiaticus (see Ranunculus). R. amplexicaulis, 1 ft., white; R. aconilifolius, I to 2 ft., white, with its double variety R. aconiti- folius flore-pleno (Fair Maids of

France) ; and R. acns flore-pleno (Bachelor's Buttons), 2 ft., golden yellow, are pretty. Of dwarfer interesting plants there are R. alpestris, 4 in., white; R. gramineus,

6 to 10 in., yellow; R. parnassifolius, 6 in., white; and R. rutae- folius, 4 to 6 in., white with orange centre.

Rodgersia. — Handsome herbs of the saxifrage family. R. podo- phylla with large bronzy-green leaves cut into 5 large lobes, and tall branching spikes 3 to 4 ft. high — the whole plant resembling one of the large meadow sweets. R. aesculifolia, yellowish- white ; R. Henrici, deep purple; R. pinnata, fleshy pink; and R. sambucifolia, white, are recently introduced species from China. They require rich sandy peat and warm sheltered spots.

Romneya. — R. Coulteri, a fine Californian plant, with large white flowers on shoots often as high as 7 ft.; R. trichocalyx is similar. Both require very warm, sunny spots and rich, sandy soil, and should not be disturbed often.

Rudbeckia. — Bold-habited composite plants, well suited for shrubbery borders, and thriving in light loamy soil. The flower- heads have a dark-coloured elevated disk. R. Drummondii, 2 to 3 ft., with the ray-florets reflexed, yellow at the tip and purplish- brown towards the base; R. fulgida, 2 ft. golden-yellow with dark chocolate disk, the flower-heads 2 to 3 in. across; and R. speciosa,

2 to 3 ft., orange-yellow with blackish-purple disk, the flower-heads

3 to 4 in. across, are showy plants. Sagittaria. — Graceful water or marsh plants with hastate leaves,

and tuberous, running and fibrous roots. S. japonica plena; S. lancifolia, S. macrophylla and 5. sagittifolia, are among the best kinds, all with white flowers.

Salvia. — The Sage, a large genus of labiates, often very handsome, but sometimes too tender for English winters. S. Sclarea, 5 to 6 ft., is a very striking plant little more than a biennial, with branched panicles of bluish flowers issuing from rosy-coloured bracts; S. patens, 2 ft., which is intense azure, has tuberous roots, and may be taken up, stored away and replanted in spring like a dahlia. S. pratensis, 2 ft., blue, a showy native species, is quite hardy; the variety lupinoides has the centre of the lower lip white.

Saxifraga. — A very large genus of rock and border plants of easy culture. The Megasea group, to which 5. ligulala, S. cordifolia and S. crassifolia belong, are early-flowering kinds of great beauty, with fleshy leaves and

large cymose clusters of flowers of various shades of rose, red and purple. Another very distinct group with siivery foliage — the crustaceous group — contains some of our choicest Alpines. Of these 5. caesia, S. calyciflma, S. Cotyledon are among the best known. Some of the species look more like lichens than flowering plants. The green moss-like saxifrages are also a very distinct group, with dense tufted leaves which appear greener in winter than in summer. The flowers are borne on erect branching stems and are chiefly white in colour. Saxifraga umbrosa (London Pride) and 5. Geum belong to still another group, and are valuable alike on border and rockery. 5. peltata is unique owing to its large peltate leaves, often 1 ft. to 18 in. across, with stalks I to 2 ft. long. Flowers in April, white or pinkish. Likes plenty of water and a moist peaty soil or marshy place. 5. sarmentosa, the well-known " mother of thousands," is often grown as a pot plant in cottagers' windows.

Scilla. — Beautiful dwarf bulbous plants, thriving in well-worked sandy loam, or sandy peat. S. bifolia, 3 in., and 5. sibirica, 4 in., both intense blue, are among the most charming of early spring flowers; S. patula, 6 to 8 in., and S. campanulata, 1 ft., with tubular greyish-blue flowers, freely produced, are fine border plants, as is the later-blooming 5. peruviana, 6 to 8 in., dark blue or white.

Sedum. — Pretty succulent plants of easy growth, and mostly suitable for rockwork. They are numerous, varied in the colour of both leaves and foliage, and mostly of compact tufted growth. 5. spectabile, 1 to I J ft., pink, in great cymose heads, is a fine plant for the borders, and worthy also of pot-culture for greenhouse decoration. Mention may also be made of the common S. acre (Stonecrop), 3 in., yellow, and its variety with yellow-tipped leaves. Sempervivum. — House-Leek. Neat-growing, succulent plants,

forming rosettes of fleshy leaves close to the ground, and rapidly increasing by runner-like offsets; they are well adapted for rock- work, and do best in sandy soil. The flowers are stellate, cymose, on stems rising from the heart of the leafy rosettes. S. arachnoideum, purplish, 5. arenarium, yellow, S. globiferum and S. Laggeri, rose, grow when in flower 3 to 6 in. high ; S. calcareum, rose colour, and S. Boulignianum, pale rose, both have glaucous leaves tipped with purple; S. Heuffelii, yellow, with deep chocolate leaves, and S. Wulfeni, sulphur-yellow, are from 8 to 12 in. high.

Senecio. — A large genus with comparatively few good garden plants. Large and coarse-growing kinds like 5. Doria, S. macro- phyllus and S. sarracenicus are good for rough places; all yellow- flowered. S. pulcher is a charming plant, 2 to 3 ft. high, with rosy- purple flower-heads, having a bright orange centre. It likes a warm corner and moist soil. 5. clivorum,

from China, has large roundish leaves and orange-yellow flowers. It flourishes near water and in damp places.

Shortia. — 5. galacifolia, a beautiful tufted plant 2 to 3 in. high, with roundish crenate leaves, on long stalks, and white funnel- shaped flowers inMarch and April. .S. unifiora from Japan is closely related. The leaves of both assume rich purple-red tints in autumn. Warm sunny situations and rich sandy loam and peat are required. Silene. — Pretty caryophyllaceous plants, preferring sandy loam, and well adapted for rockwork. 5. alpestris, 6 in., white, and 5. ■quadridentata, 4 in., white, are beautiful tufted plants for rockwork or the front parts of borders; 5. maritima flore-pleno, 6 in., white, 5. Elizabethae, 4 in., bright rose, and S. Schafta, 6 in., purplish-rose, are also good kinds.

Sisyrinchium. — Pretty dwarf iridaceous plants, thriving in peaty soil. 5. grandiflorum, 10 in., deep purple or white, blooms about April, and is a fine plant for pot-culture in cold frames.

Sparaxis. — Graceful bulbous plants from South Africa. 5. grandi- flora, with deep violet-purple, and 5. tricolor, with rich orange-red, flowers are best known. S. pulcherrima, a lovely species, 3 to 6 ft. high, with drooping blood-red blossoms, is now referred to the genus Dierama. A warm, light, but rich soil in sheltered spots required.

Spiraea.— Vigorous growing plants of great beauty, preferring good, deep, rather moist soil; the flowers small but very abundant, in large corymbose or spicate panicles. S. Aruncus, 4 ft., white; 5. astilbioides , 2 ft., white; S. Filipendula, i| ft., and S. Uimaria, 3 ft., both white; 5. palmata, 2 ft., rosy-crimson; and S. venusta, 3 ft., carmine rose, are some of the best.

Statice. — Pretty plants with broad, radical leaves, and a much- branched inflorescence of numerous small flowers. S. latifolia, 2 ft., greyish-blue; 5. talarica, I ft., la vender- pink ; 5. speciosa, ij ft., rose colour; and S. eximia, ij ft., rosy-lilac — are good border plants. 5. bellidifolia, 9 in., lavender; S. emarginata, 6 in., purple; S. globulariaefolia, 9 in., white; and S. nana, 4 in. — are good sorts for the rockery.

Stenactis. — S. speciosa, 1 to 2 ft., is a showy composite, of easy culture in good garden soil; it produces large corymbs of flower- heads, with numerous narrow blue ray-florets surrounding the yellow disk. Now more generally known as Erigeron.

Stipa. — 5. pennata (Feather Grass), ij ft., is a very graceful- habited grass, with stiff slender erect leaves, and long feathery awns to the seeds.

Stokesia. — 5. cyanea, 2 ft., is a grand, autumn-flowering, composite

plant, with blue flower-heads, 4 in. across. Sandy loam and warm situation.

Symphytum. — Rather coarse-growing but showy boraginaceous plants, succeeding in ordinary soil. 5. caucasicum, 2 ft., with blue flowers changing to red, is one of the finer kinds for early summer blooming.

Thalictrum. — Free-growing but rather weedy ranunculaceous plants, in many cases having elegantly cut foliage. T. aquilegifolium, 2 ft., purplish from the conspicuous stamens, the leaves glaucous, is a good border plant ; and T. minus has foliage somewhat re- sembling that of the Maidenhair fern. Ordinary garden soil.

Tiarella. — T. cordifolia, the foam flower, is very ornamental in border or rockery. Leaves heart-shaped lobed and toothed; flowers white starry; ordinary garden soil.

Tigridia. — Lovely bulbous plants called tiger flowers, useful in the warmest parts of the kingdom for the border in rich but gritty soil. T. Pavonia, the peacock tiger flower, from Mexico, grows 1 to 2 ft. high, with plaited sword-like leaves, and large flowers about 6 in. across, having zones of violet and yellow blotched with purple and tipped with scarlet. There are many varieties, all charming. –

Trillium. — T. grandiflorum, the wood-lily of North America, is" the finest. It has large white flowers and grows freely in peaty soil in shady borders. There are several other species, some with purplish flowers.

Tritonia. — A genus of South African plants with fibrous-coated corms or solid bulbs, often known as montbretas. T. crocata, 2 ft., orange-yellow, T. crocosmiaeflora, 2 to 2\ ft., orange-scarlet, and T. Pottsi, 3 to 4 ft., bright yellow, are the best-known varieties, of which there are many subsidiary ones, some being very large and free in flowering. A rich, gritty soil, and warm, sunny situations are best for these plants.

Triteleia. — Charming spring-flowering bulbs, thriving in any good sandy soil. T. Murrayana, 8 in., lavender-blue, and T. unifiora,

6 in., white, are both pretty plants of the easiest culture, either for borders or rockeries.

Tritoma. — Splendid stoutish-growing plants of noble aspect, familiarly known as the Poker plant, from their erect, rigid spikes of flame-coloured flowers; sometimes called Kniphofia. T. Uvaria, 3 to 4 ft., bright orange-red, passing to yellow in the lower flowers, is a fine autumnal decorative plant. They should be protected from frosts by a covering of ashes over the crown during winter.

Trollius. — Showy ranunculaceous plants, of free growth, flowering about May and June. T. europaeus, 18 in., lemon globular; T. asiaticus, 2 ft., deep yellow; and T. napettifolius, 2 to 2§ ft., golden yellow, are all fine showy kinds. Rich and rather moist soil.

Tulipa. — Splendid dwarfish bulbs, thriving in deep, sandy, well- enriched garden soil, and increased by offsets. They bloom during the spring and early summer months. T. Gesneriana, the parent of the florists' tulip, 12 to 18 in., crimson and other colours; T. Eichleri, I ft., crimson with dark spot; T. Greigi, I ft., orange with dark spot edged with yellow, and having dark spotted leaves; T. oculus solis, I ft., scarlet with black centre; and T. sylvestris, 12 to 18 in., bright yellow, are showy kinds.

Veratrum. — Distinct liliaceous plants with bold ornamental leaves regularly folded and plaited. V. album, 3 to 5 ft., has whitish blossoms in dense panicles, I to 2 ft. long. V. nigrum, 2 to 3 ft., has blackish-purple flowers, also V. Maacki, 2 ft. Rich sandy loam and peat.

Verbascum. — Showy border flowers of erect spire-like habit, of the easiest culture. V. Chaixii, 4 to 5 ft., yellow, in large pyramidal panicles; V. phoeniceum, 3 ft., rich purple or white; and V. for- ntosum, 6 ft., golden yellow in dense panicles, are desirable species.

Veronica. — The Speedwell family, containing many ornamental members; all the hardy species are of the easiest cultivation in ordinary garden soil. The rotate flowers are in close, erect spikes, sometimes branched. V. crassifolia, 2 ft., dark blue; V. incarnata, 1 5 ft., flesh-colour; V. corymbosa, i\ ft., pale blue in corymbosely- arranged racemes; V. gentianoides, 2 ft., grey with blue streaks; V. spicala, blue, and its charming white variety alba; and V. virginica, 5 ft., white, are distinct.

Vinca. — Periwinkle. Pretty rock plants, growing freely in ordinary soil. V. herbacea, of creeping habit, with purplish-blue flowers; V. minor, of trailing habit, blue; and V. major, I to 2 ft. high, also trailing, are suitable for the rock garden. The last two are ever- green, and afford varieties which differ in the colour of their flowers, while some are single and others double.

Viola. — Violet. Charming dwarf plants, mostly evergreen and of tufted

habit, requiring well-worked rich sandy soil. V. calcarata, 6 in., light blue; V. cornuta, 6 to 8 in., blue; V. lutea, 4 in., yellow; V. altaica, 6 in., yellow or violet with yellow eye; V. palmaensis, 6 to 8 in., lavender-blue; V. pedata, 6 in., pale blue; and V. odorata, the Sweet Violet, in its many single and double flowered varieties, are all desirable.

Yucca. — Noble subarborescent liliaceous plants, which should be grown in every garden. They do well in light, well-drained soils, and have a close family resemblance, the inflorescence being a panicle of white, drooping, tulip-shaped flowers, and the foliage rosulate, sword-shaped and spear-pointed. Of the more shrubby- habited sorts Y. gloriosa, recurvifolia and Treculeana are good and distinct ; and of the dwarfer and more herbaceous sorts Y. fila- mentosa, flaccida and angustifolia are distinct and interesting kinds, the first two flowering annually.

The taste for cultivation of the class of plants, of which the fore- going list embraces some of the more prominent members, is on the increase, and gardens will benefit by its extension.

Hardy Trees and Shrubs. — Much of the beauty of the pleasure garden depends upon the proper selection and disposition of orna- mental trees and shrubs. We can only afford space here for lists of some of the better and more useful and ornamental trees and shrubs, old and new.

*The following list, which is not exhaustive, furnishes material from which a selection may be made to suit various soils and situa- tions. The shrubs marked * are climbers.*

Hardy Acer — Maple. Aesculus — Horse-Chestnut. Ailantus — Tree of Heaven. Alnus — Alder. Amygdalus — Almond. Betula — Birch. Carpinus — Hornbeam. Carya — Hickory. Castanea — Sweet Chestnut. Catalpa.

Celtis — Nettle Tree. Cercis — Judas Tree. Cotoneaster (some species). Crataegu s — Thorn . Davidia. Diospyros. Fagus — Beech.

Deciduous Trees.

Fraxinus — Ash. Ginkgo — Maidenhair Tree. Gleditschia — Honey Locust. Gymnocladus — Kentucky Coffee

Tree. Juglans — Walnut. Kolreuteria. Laburnum. Larix — Larch. Liriodendron — Tulip-tree. Magnolia. Morus— M ulberry. Negundo — Box-Elder. Ostrya — Hop Hornbeam. Paulownia. Planera.

Platanus — Plane.

Populus — Poplar.

Prunus (Plums, Cherries, &c).

Ptelea — Hop Tree.

Pyrus — Pear, &c.

Quercus — Oak.

Rhus — Sumach.

Robinia— Locust Tree.

Salix — Willow.

Sophora.

Taxodium — Deciduous Cypress,

Tilia — Lime.

Ulmus — Elm.

VirgUia.

Xanthoceras.

Hardy Abies — Silver Fir. Araucaria — Chili Pine. Arbutus — Strawberry Tree. Biota — Arbor Vitae. Buxus — Box. Cedrus — Cedar. Cephalotaxus.

Cryptomeria — Japan Cedar. Cupressus — Cypress. Ilex— Holly. Tuniperus — Juniper. Laurus — Bay Laurel.

Evergreen Trees.

Libocedrus.

Magnolia grandiflora.

Picea — Spruce Fir.

Pinus — Pine.

Quercus Ilex — Holm-Oak.

Retinospora.

Sciadopitys — Umbrella Pine.

Sequoia (Wellingtonia).

Taxus — Yew.

Thuiopsis.

Thuya — Arbor Vitae.

Tsuga.

Hardy Deciduous Shrubs.

Abelia.

Acer — Maple.

Amelanchier.

*Ampelopsis.**

Amygdalopsis.

Aralia.

*Aristolochia.**

Berberis — Berberry.

Bignonia — Trumpet Flower.*

Buddleia.

Calophaca.

Calycanthus — Carolina Allspice.

Caragana.

Chimonanthus.

*Clematis. **

Colutea— Bladder Senna.

Cornus — Dogwood.

Cotoneaster (some species).

Crataegus — Thorn.

Cydonia— Japan Quince.

Cytisus — Broom, &c.

Daphne.

Deutzia.

Edwardsia.

Euonymus europaeus — Spindle

Tree. Forsythia. Fremontia.

Genista.

Halesia — Snowdrop Tree.

Hamamelis— Wych Hazel.

Hibiscus — Althaea frutex, &c.

Hippophae — Sea Buckthorn.

Hypericum — St John's Wort.

Jasminum — Jasmine.*

Kerria.

*Lonicera * — Honeysuckle.*

*Lycium. **

Magnolia.

Menispermum — Moonseed.*

*Periploca.**

Philadelphus — Mock Orange.

Rhus — Wig Tree, &c.

Ribes — Flowering Currant.

Robinia — Rose Acacia, &c.

Rosa — Rose.

Rubus — Bramble.*

Spartium — Spanish Broom.

Spiraea.

Staphylaea — Bladder- Nut.

Symphoricarpus — Snowberry.

Syringa — Lilac.

Tamarix — Tamarisk.

Viburnum — Guelder Rose, &c.

Vitis — Vine.*

Weigela.

Hardy Evergreen Shrubs.

*Akebia.**

Arbutus.

Aucuba — Japan Laurel.

Azara.

Bambusa — Bamboo.

*Berberidopsis. **

Berberis — Berberry.

Buddleia.

Bupleurum.

Buxus — Box.

Ceanothus.

Cerasus — Cherry-Laurel, &c.

Cistus-Sun-Rose.

Cotoneaster.

Crataegus Pyracantha — Fire

Thorn. Daphne. Desfontainea. Elaeagnus — Oleaster. Erica — Heath. Escallonia. Euonymus. Fabiana. Fatsia (Aralia). Garrya.

Griselinia.

Hedera — Ivy.*

Hypericum— St John's Wort.

Ilex— Holly.

*Jasminum * — Jasmine.*

*Kadsura. **

*Lardizabala.**

Laurus — Sweet Bay.

Ligustrum — Privet.

*Lonicera * — Honeysuckle.*

Osmanthus.

Pernettya.

Phillyrea.

Photinia.

Rhamnus Alaternus.

Rhododendron — Rose- Bay.

Rosa — Rose.*

Ruscus.

Skimmia.

Smilax. *

Stauntonia. *

Ulex — Furze.

ViDurnum — Laurustinus.

Vinca — Periwinkle.

Yucca — Adam's Needle.

Bedding Plants. — This term is chiefly applied to those summer- flowering plants, such as ivy-leaved and zonal pelargoniums, petunias, dwarf lobelias, verbenas, &c, which are employed in masses for filling the beds of a geometrical parterre. Of late years, however, more attention has been bestowed on arrangements of brilliant flowering plants with those of fine foliage, and the massing also of hardy early-blooming plants in parterre fashion has been very greatly extended. Bedding plants thrive best in a light loam, liberally manured with thoroughly rotten dung from an old hotbed or thoroughly decomposed cow droppings and leaf-mould.

Spring Bedding. — For this description of bedding, hardy plants only must be used ; but even then the choice is tolerably extensive. Kor example, there are the Alyssums, of which A. saxalile and A. gemonense are in cultivation; Antennaria tomentosa; the double white Arabis albida; Aubrietias, of which the best sorts are A. Campbelliae and A. grandiflora; the double Bellis perennis or Daisy; the Wallflowers, including Cheiranthus Cheiri (the Common Wall- flower), C. alpina and C. Marshallii; Hepaticas, the principal of which are the varieties of H. triloba, and the blue H. angulosa; I beris or Candytuft; Lithospermumfruticosum; Myosotis or Forget- me-not, including M. alpestris, M. dissitiflora, M. azorica and M. sylvestris; Phloxes, like P. subulata, with its varieties setacea, Nelsoni, nivalis; the single-flowered varieties of the Primrose, Primula vulgaris; the Polyanthuses; Pyrethrum Parthenium aureum, called Golden Feather; Sempervivum calcareum; the pink- flowered Silene pendula; self-coloured varieties of the Pansy, V. tricolor, and of V. lutea and V. cornuta, as well as some recent hybrids. Besides these there are the various spring-flowering

bulbs, such as the varieties of Hyacinthus, Tulipa, Narcissus, Fritillaria, Muscari or Grape Hyacinth, Crocus, Scilla, Chionodoxa and Galanthus or Snowdrop.

Summer Bedding. — There is great variety amongst the plants which are used for bedding-out in the garden during the summer months, but we can note only some of the most important of them. Amongst them are the Ageratums, the old tall-growing sorts of which have been superseded by dwarfer blue and white flowered varieties; Alternantheras, the principal of which are A. amoena, amoena spectabilis, magnifica, paronychioides major awea and amabilis; Alyssum maritimum variegatum; some of the dwarf varieties of Antirrhinum majus; Arundo Donax variegata; Begonias; Calceolarias; Cannas; Centaurea ragusina; Clematises, of which the hybrids of the Jackmanni type are best; Dahlia variabilis, and the single-flowered forms of D. coccinea; Echeverias, of which E. secunda and E. metallica are much employed; Gazanias; Heliotropes; Iresines; Lantanas; Lobelias; Mesembryanthemum cordifolium variegatum; Pelargoniums, of which the various classes of zonal or bedding varieties are unapproachable for effect and general utility; Petunias; Phloxes; Polemonium coeruleum variegatum; Pyrethrum Parthenium aureum, the well-known Golden Feather, especially useful as an edging to define the outline of beds upon grass; Tropaeolums, especially some of the varieties of T. Lob- bianum; and Verbenas, the offspring of Tiveedieana, chamaedrifolia and others. Few bulbs come into the summer flower gardens, but amongst those which should always be well represented are the Gladiolus, the Lilium, the Tigridia and the Montbretia.

Subtropical Bedding. — Foliage and the less common flowering plants may be used either in masses of one kind, or in groups ar- ranged for contrast, or as the centres of groups of less imposing or of dwarfer-flowering subjects; or they may be planted as single specimens in appropriate open spaces, in recesses, or as distant striking objects terminating a vista.

Carpet Bedding consists in covering the surface of a bed, or a series of beds forming a design, with close, low-growing plants, in which certain figures are brought out by means of plants of a different habit or having different coloured leaves. Sometimes, in addition to the carpet or ground colour, individual plants of larger size and handsome appearance are dotted symmetrically over the beds, an arrangement which is very telling. Some of the best plants for carpeting the surface of the beds are: Antennaria tomentosa and Leucophytum Browni, white; Sedum acre, dasyphyllum, corsicum and glaucum, grey; and Sedum Lydium, Mentha Pulegium gibral- tarica, Sagina subulata and Herniaria glabra, green. The Alternan- theras, Amaranthuses, Iresines and Coleus Verschaffelti furnish high and warm colours; while Pyrethrum Parthenium aureum yields greenish-yellow; Thymus citriodorus aureus, yellowish; Mesem- bryanthemum cordifolium

variegatum, creamy yellow; Centaureas and others, white; Lobelia Erinus, blue; and the succulent Eche- verias and Sempervivums, glaucous rosettes, which last add much to the general effect. In connexion with the various designs such fine plants as Agave americana, Dracaena indivisa are often used as centre-pieces.

Greenhouse Plants. — These are plants requiring the shelter of a glass house, provided with a moderate degree of heat, of which 45° Fahr. may be taken as the minimum in winter. The house should be opened for ventilation in all mild weather in winter, and daily throughout the rest of the year. The following is a select list of genera of miscellaneous clecorative plants (orchids, palms and ferns excluded; climbers are denoted by; bulbous and tuberous plants by t) :*

Abutilon

Acacia

Agapanthus

Agathaea

Agave

Alonsoa

Aloysia

Amaryllisf

Ardisia

Asparagus

Aspidistra Brugmansia

Asystasia (Mackaya) Calceolaria

Azalea

Bauera

Begonia f

Blandfordia

*Bomarea**

Boronia

*Bougainvillea**

Bouvardia

Camellia

Campanula

Canna

Celosia

*Cestrum**

*Chorizema**

Chrysanthemum

Cineraria

Clianthus Ficus

Clivia Fuchsia

*Cobaea** *Grevillea*

Coleus Haemanthusf

Coprosma Heliotropium

Cordyline Hibiscus

*Correa Hoya**

Cuphea Hydrangea

Cyclament Impatiens

*Cyperus Jasminum**

Cytisus . Justicia Darwinia (Genetyllis) Kalosanthes

Diosma Lachenaliaf

Dracaena Lantana

Eccremocarpus Lapageria**

Epacris Liliumf

*Epiphyllum Lophospermum**

*Erica Mandevillea**

*Eriostemon Manettia**

*Erythrina Mutisia**

*Eucalyptus Myrsiphyllum**

Eupatorium Maurandya Eurya*

*Stove Plants. — For the successful culture of stove plants two houses at least, wherein different temperatures can be maintained, should be devoted to their growth. The minimum temperature during winter should range at night from about 55 ° in the cooler to 65 in the warmer house, and from 65 to 75 by day, allowing a few degrees further rise by sun heat. In summer the temperature may range 10° higher by artificial heat, night and day, and will often by sun heat run up to 90° or even 95 , beyond which it should be kept down by ventilation and frequent syringing and damping down of the pathways. During the growing period the atmosphere must be kept moist by damping the walls and pathways, and by syringing the plants according to their needs; when growth is completed less moisture will be necessary. Watering, which, except during the resting period, should generally be copious, is best done in the forenoon ; while syringing should be done early in the morning before the sun becomes too powerful, and late in the afternoon to admit of the foliage drying moderately before night. The following is a select list of genera of stove plants (climbers are denoted by *, bulbous and tuberous plants by f) :*

Nerinef

Nerium

Pelargonium

Petunia

Pimelia

*Plumbago**

Polianthesf

Primula

Rhododendron

Richardia (Calla)f

Salvia

Sarracenia

Solanum

Sparmannia

Statice

Strelitzia

Streptocarpus

Swainsonia

*Tacsonia**

Tecoma

Tradescantia

Vallotaf

Acalypha

Achimenesf

Aeschynanthus

*Allamanda**

Alocasiaf

Amaryllisf

Anthurium

Aphelandra

Aralia

Ardisia

Arisaemat

*Aristolochia**

Ataccia

Begonia

Bertolonia

*Bignonia**

Bromeliads

Cactus

Caladiumf

Calathea

Centropogon

*Cissus**

*Clerodendron**

Crinumf

Codiaeum (Croton)

Cyanophyllum

(Miconia) Cycas

Dieffenbachia Dipladenia Dracaena Eranthemum Eucharisf Euphorbia Ficus Franciscea Gardenia Gesnera Gloriosa* Gloxinia! Helieoniaf Hoffmannia Ipomaea* Ixora Jacobinia Jasminum* Luculia Maranta Medinilla Meyenia*

Musa

Nelumbiumf

Nepenthes

Nymphaeaf

*Oxera**

Pancratium f

Pandanus

*Passiflora**

Pavetta

*Petraea**

*Pleroma**

Poinsettia

Rondeletia

Sanchezia

*Schubertia**

Scutellaria

Stephanotis

Tabernaemontana

Terminalia

Thunbergia

Torenia

Thyrsacanthus

Tydaea

Yinca

Orchids. — For the successful cultivation of a mixed collection of tropical orchids, it is necessary that two or three houses, in which different temperatures can be maintained, should be provided. The greater number of them are epiphytes or plants that grow on others without absorbing nourishment from them, and heat and moisture afford all or nearly all the nourishment they require. At one time it was thought the plants themselves were better for being associated with such objects as ferns and palms, but they are best grown by themselves.

The East Indian orchid house takes in those species which are found in the warm parts of the eastern hemisphere, as well as those from the hottest parts of the western, and its temperature should range from about 70° to 80° during the summer or growing season and from 65 ° to 70 during winter. The Mexican or Brazilian orchid house accommodates the plants from the warm parts of South America, and its temperature should range from about 65 to 75° during summer and from 60° to 65 in winter. A structure called the cool orchid house is set apart for the accommodation of the many lovely mountain species from South America and India, such as odontoglossums, masdevallias, &c, and in this the more uniform the temperature can be kept the better, that in summer varying between

60° and 65 , and in winter from 45 to 6o°. A genial moist at- mosphere must be kept up in the hottest houses during the growing season, with a free circulation of air admitted very cautiously by well-guarded ventilators. In winter, when the plants are at rest, little water will be necessary; but in the case of those plants which have no fleshy pseudobulbs to fall back upon for sustenance, they must not be suffered to become so dry as to cause the leaves to shrivel. In the Mexican house the plants will generally be able to withstand greater drought occasionally, being greatly assisted by their thick pseudobulbs. In the cool or odontoglossum house a considerable degree of moisture must be maintained at all times, for in these the plants keep growing more or less continuously.

*For potting or basketing purposes, or for plants requiring block- culture, the materials used are light fibrous peat, special leaf-mould, osmunda or polypodium fibre and living sphagnum moss, which supply free drainage for the copious supply of water required. Good turfy loam is also used for some, such as cypripediums and calanlh.es. Indeed the composts now used are varied considerably according to the particular group of orchids. The water should, however, be so used as not to run down into the sheathing bases of the leaves. While in flower, orchids may with advantage be re- moved to a drier and cooler situation, and may be utilized in the drawing-room or boudoir. Of late years not only have many fine hybrids been raised artificially between various species, but some remarkable bigeneric hybrids (between what are considered two distinct genera) have also been produced (indicated in the list below by *). To keep a valuable collection of orchids in good condition requires the services of an expert orchid grower. The following is a select list of genera in cultivation : —* ■ *Acineta Cymbidium*

Peristeria

Ada Cypripedium Pescatorea

Aerides Cyrtopodium Phajus

*Angraecum Dendrobium Phaio-calanthe**

Anguloa Diacrium Phalaenopsis

Anoectochilus Disa Pilumna

Ansellia Epidendrum Platyclinis

Arachnanthe Eulophia Pleione

Arpophyllum Eulophiella Pleurothallis

Barkeria Galeandra Polystachya

Batemannia Gongora Promenaea

Bifrenaria Grammatophyllum Renanthera

Brassavola Habenaria Restrepia

Brassia Houlletia Rodriguezia

Brasso-Cattleya Ionopsis Saccolabium*

Broughtonia Ipsea Schomburgkia

Bulbophyllum Laelia Scuticaria

Burlingtonia Laelio-Cattleya Sobralia*

*Calanthe Leptotes Sophro-cattleya**

Catasetum Lissochilus Sophronitis

Cattleya Lycaste Spathoglottis

Chysis Masdevallia Stanhopea

Cirrhopetalum Miltonia Thunia

Cochlioda Mormodes Trichopilia

Coelia Odontoglossum Trichosma

Coelogyne Odontioda Vanda*

*Comparettia Oncidium Zygo-colax**

Cycnoches Pachystoma Zygopetalum

Palms. — These form charming table and drawing-room plants when quite young. When more fully developed, and long before their full growth is attained, they are among the most decorative plants known for the conservatory and for subtropical gardening. They are easily cultivated, but should not be allowed to become dry. The soil should consist of about 3 parts turfy loam, I part leaf mould, I part coarse silver sand, with enough chemical or other manure added to render the whole moderately rich. The older plants will occasionally require the roots pruned in order to keep them in as small pots as possible without being starved. This should be done early in the spring, and the plants heavily shaded until feeding roots are again produced. It is of advantage to afford stove culture while the plants are quite young. A little later most of the genera succeed well under moderately cool conditions.

The following genera are among those most commonly cultivated :

Acanthophoenix

Acanthorhiza

Areca

Bactris

Brahea

Calamus

Caryota

Ceroxylon

Chamaedorea

Chamaerops

Cocos

Corypha

Geonoma

Hyophorbe

Kentia

Latania

Livistonia

Martinezia

Oreodoxa

Phoenix

Pritchardia

Rhapis

Sabal

Stevensonia

Thrinax

Ferns. — -These popular plants are usually increased by means of their spores, the " dust " produced on the back of their fronds. The spores should be sown in well-drained pots or seed pans on the surface of a mixture of fibrous sifted peat and small broken crocks or sandstone; this soil should be firmly pressed and well-watered, and the spores scattered over it, and at once covered with propagating glasses or pieces of sheet glass, to prevent water or dry air getting

to the surface. The pots should be placed in pans full of water, which they will absorb as required. A shady place is desirable, with temperature of 50 to 55 by night and 65° to 70° by day, or they may be set on a shelf in an ordinary propagating pit. The spores may be sown as soon as ripe, and when the young plants can be handled, or rather can be lifted with the end of a pointed flat stick, they should be pricked out into well-drained pots or pans filled with similar soil and should be kept moist and shady. As they become large enough, pot them singly in 3-in. pots, and when the pots are fairly filled with roots shift on into larger ones.

The best time for a general repotting of ferns is in spring, just before growth commences. Those with creeping rhizomes can be propagated by dividing these into well-rooted portions, and, if a number of crowns is formed, they can be divided at that season. In most cases this can be performed with little risk, but the glei- chenias, for example, must only be cut into large portions, as small divisions of the rhizomes are almost certain to die; in such cases, however, the points of the rhizomes can be led over and layered into small pots, several in succession, and allowed to remain unsevered from the parent plant until they become well-rooted. In potting the well-established plants, and all those of considerable size, the soil should be used in a rough turfy state, not sifted but broken, and one-sixth of broken crocks or charcoal and as much sand as will insure free percolation should be mixed with it.

The stove ferns require a day temperature of 65 to 75 , but do not thrive in an excessively high or close dry atmosphere. They require only such shade as will shut out the direct rays of the sun, and, though abundant moisture

must be supplied, the atmosphere should not be overloaded with it. Ferns should not be allowed to become quite dry at the root, and the water used should always be at or near the temperature of the house in which the plants are growing. Some ferns, as the different kinds of Gymnogramme and Cheilanthes, prefer a drier atmosphere than others, and the former do not well bear a lower winter temperature than about 6o° by night. Most other stove ferns, if dormant, will bear a temperature as low as 55 by night and 60° by day from November to February. About the end of the latter month the whole collection should be turned out of the pots, and redrained or repotted into larger pots as required. This should take place before growth has commenced. Towards the end of March the night temperature may be raised to 6o°, and the day temperature to 70 or 75 , the plants being shaded in bright weather. Such ferns as Gymnogrammesˆ which have their surface covered with golden or silver powder, and certain species of scaly-surfaced Cheilanthes and Nothochlaena, as they cannot bear to have their fronds wetted, should never be syringed ; but most other ferns may have a moderate sprinkling occasionally (not necessarily daily), and as the season advances, sufficient air and light must be admitted to solidify the tissues.

Hardy British ferns belonging to such genera as Aspleriium, Nephrodium, Aspidium, Scolopendrium, have become fairly popular of late years, and many charming varieties are now used in borders and rockeries. Spores may be sown as above described, but in a much lower temperature.

The following is a select list of genera : —

Acrostichum Davallia Osmunda

Actiniopteris Dicksonia Onoclea

Adiantum Gleichenia Phlebodium

Alsophila Gymnogramme Platycerium

Aspidium Hymenophyllum Polypodium

Asplenium Lastrea Pteris

Blechnum Lomaria Scolopendrium

Cheilanthes Lygodium Todea

Cibotium Nephrodium Trichomanes

Cyathea Nephrolepis Woodwardia

VI. Fruits.

Fruit-Tree Borders. — No pains should be spared, in the pre- paration of fruit-tree borders, to secure their thorough drainage. In case of adhesive clayey subsoil this can generally be secured by placing over the sloping bottom a good layer of coarse rubbly material, communicating with a drain in front to carry off the water, while earthenware drain tubes may be laid beneath the rubble from 8 to 10 ft. apart, so as to form air drains,-and provided with openings both at the side of the walk and aTso near the base of the wall. Over this rubbly matter, rough turfy soil, grass-side downwards, should be laid, and on this the good prepared soil in which the trees are to be planted.

The borders should consist of 3 parts rich turfy loam, the top spit of a pasture, and 1 part light gritty earth, such as road-grit, with a small portion (one-sixth) of fine brick rubbish. They should not be less than 12 ft. in breadth, and may vary up to 15 or 18 ft., with a fall from the wall of about 1 in. in 3 ft. The border itself should be raised a foot or more above the general level. The bottom of the border as well as that

of the drain must be kept lower than the general level of the subsoil, else the soakage will gather in all the little depressions of its surface. Fruit-tree borders should not be at all cropped with culinary vegetables, or very slightly so, as the process of digging destroys the roots of the trees, and drives them from near the surface, where they ought to be.

Shallow planting, whether of wall trees or standards, is gener- ally to be preferred, a covering of a few inches of soil being sufficient for the roots, but a surface of at least equal size to the surface of the hole should be covered with dung or litter so as to restrain evaporation and preserve moisture. In the case of wall trees, a space of 5 or 6 in. is usually left between the stem at the insertion of the roots and the wall, to allow for increase of girth. Young standard trees should be tied to stakes so as to prevent their roots being ruptured by the wind- waving of the stems and to keep them erect. The best time for planting fruit trees in the open air is from the end of September till the end of November in open weather.

In the selection and distribution of fruit trees regard must of course be had to local situation and climate. The best walls having a south or south-east aspect are devoted to the peach, nectarine, apricot, dessert pears, plums

and early cherries. Cherries and the generality of plums succeed very well either on an east or a west aspect. Morello cherries, apples and stewing pears succeed well on a north wall. In Scotland the mulberry requires the protection of a wall, and several of the finer apples and pears do not arrive at perfection without this help and a tolerably good aspect. The wall-trees intended to be permanent are called dwarfs, from their branches springing from near the ground. Between these, trees with tall stems, called riders, are planted as temporary occupants of the upper part of the wall. The riders should have been trained in the nursery into good-sized trees, in order that when planted out they may come into bearing as speedily as possible.

Standard Fruit Trees should not be planted, if it can be avoided, in the borders of the kitchen garden, but in the outer slips, where they either may be allowed to attain their full size or may be kept dwarfed. Each sort of fruit should be planted by itself, for the sake of orderly arrangement, and in order to facilitate protection when necessary by a covering of nets. Their produce is often superior in flavour to that of the same kind of fruit grown on walls.

Orchard-house Trees. — Peaches, nectarines, apricots, figs and dessert plums, cherries, apples and pears are commonly cultivated in the orchard-house. Peaches and nectarines are generally planted out, while the rest are more commonly culti- vated in pots. This allows of the hardier pot plants being re- moved out of doors while those planted out are in need of the room. The pot plants are overhauled in the autumn, the roots pruned, a layer being cut off to allow new soil to be introduced. Surface dressing and feeding by liquid manure should also be afforded these plants while the fruit is swelling. Every effort should be made to complete the growth of peaches and nectarines while the sun is sufficiently strong to ripen them. Tomatoes are frequently employed to fill gaps in the orchard-house. Should it be provided with a central path, requiring shade, Hambro and Sweet-water grapes serve the purpose well, and in favourable seasons afford excellent crops of fruit.

VII. Vegetables.

Under this head are included those esculents which are largely eaten as " vegetables " or as " salads." The more important are treated under their individual headings (see Artichoke, Asparagus, Bean, &c. &c). The culinary herbs used for flavouring and garnishing are for the most part dwarf perennial plants requiring to be grown on a rich soil in an open sunny aspect, or annuals for which a warm sheltered border is the most suitable place; and they may therefore be conveniently grown together in the same compartment — a herb garden. The perennials should be

transplanted either every year or every second year. For winter use the tops of the most useful kinds of herbs should be cut when in flower or full leaf and quite

dry, and spread out in an airy but shady place so as to part slowly with the moisture they contain and at the same time retain their aromatic properties. When quite dry they should be put into dry wide-mouthed bottles and kept closely corked. In this way such herbs as basil, marjoram, mint, sage, savory, thyme, balm, chamomile, horehound, hyssop and rue, as well as parsley, may be had throughout the season with almost the full flavour of the fresh herb.

Intensive Cultivation. — This name has been applied to the method of forcing early vegetables and salads during the winter and spring months in the market gardens in the neighbourhood of Paris. The system is now popularly known in England as " French gardening." Although a few assert that it is an old English one that has been discarded in favour of superior methods, there seems to be little or no evidence in support of this contention. The system itself has been practised for about 300 years in the " marais " gardens round Paris. At one time these gardens were in the centre of the city itself, but owing to modern improvements they have been gradually pushed out beyond the city boundaries farther and farther. Most of these gardens are small — not more than a couple of acres in extent, and the rent paid by the maratcher, or market gardener, is very high — as much as £30 to £40 per acre.

The French maratcher does not use hot-water apparatus for forcing his plants into early growth. He relies mainly upon the best stable manure, a few shallow frames about 4! ft. wide covered with lights, and a number of large bell glasses or " cloches." The work is carried on from October till the end of March and April, after which, with the exception of melons, the cultures are carried on in the open air.

The chief crops grown for early supplies, or " primeurs " as they are called, are special varieties of cos and cabbage lettuces, short carrots, radishes, turnips, cauliflowers, endives, spinach, onions, corn salad and celery. To these is added a very important crop of melons, a special large-fruited variety known as the Prescott Canteloup being the most favoured.

It is astonishing how much produce is taken off one of these small intensive gardens during the year, and especially during the worst months when prices usually run fairly high. The fact that rents are so heavy around Paris is in itself an indication of the money that is realized by the growers not only in the Paris markets, but also in Covent Garden.

During the winter season narrow beds are made up of manure, either quite fresh or mixed with old manure, according to the amount of heat required. These beds are covered with a few inches of the fine old mould obtained from the decayed manure of previous years. In the early stages seeds of carrots and radishes are sown simultaneously on the same beds, and over them young lettuces that have been raised in advance are planted. In this way three crops are actually on the same beds at the same time. Owing, however, to the difference in their vegetative growth, they mature one after the other instead of simultaneously. Thus with the genial warmth and moisture of the hotbeds, all crops grow rapidly, but the radishes mature first, then the lettuces are taken off in due course, thus leaving the beds to finish up with the carrots by themselves. Later on in the season, perhaps small cauliflowers will be planted along the margins of the beds where the carrots are growing, and will be developing into larger plants requiring more space by the time all the carrots have been picked and marketed. So on throughout the year with other crops, this system of intercropping or overlapping of one crop with another is carried out in a most ingenious manner, not only under glass lights, but also in the open air. Spinach, corn salad, radishes and carrots are the favourite crops for sowing between others such as lettuces and cauli- flowers.

Although enormous quantities of water are required during the summer season, great care must be exercised in applying water to the winter crops. When severe frost prevails the lights or cloches are rarely taken off except to gather mature specimens; and no water is given directly overhead to the plants for fear of chilling them and checking growth. They must secure their

supply of moisture from the rain that falls on the glass, and flows into the narrow pathways from 9 in. to 1 2 in. wide between each range of frames. As the beds are only about 4! ft. wide, the water from the pathways is soaked up on each side by capillary attraction, and in this way the roots secure a sufficient supply.

Besides an abundance of water in summer there must also be an enormous quantity of good stable manure available during the winter months. This is necessary not only to make up the required hotbeds in the first place, but also to fill in the path- ways between the frames, wherever it is considered advisable to maintain the heat within the frames at a certain point. As it is

impossible to use an ordinary wheelbarrow in these narrow pathways, the workman carries a specially made wicker basket called a " hotte " on his shoulders by means of two straps. In this way large quantities of manure are easily transported to any required spot, and although the work looks hard to an English gardener, the Frenchman says he can carry more manure with less fatigue in half a day than an Englishman can transport in a day with a wheelbarrow.

This is merely an outline of the system, which is now being taken up in various parts of the United Kingdom, but not too rapidly. The initial expenses for frames, lights, cloches, mats and water-supply are in many cases prohibitive to men with the necessary gardening experience, while on the other hand those who have the capital lack the practical knowledge so essential to success.

For full details of this system see French Market-Gardening, with details of Intensive Cultivation, by John Weathers (London, 1909).

VIII. — Calendar of Garden Operations (A) for Great Britain. January

Kitchen Garden. — Wheel out manure and composts during frosty weather; trench vacant ground not turned up roughly in autumn. Sow early peas in a cold frame for transplanting. Sow also first-crop peas, early in the month, and William I. towards the end; Early Seville and Early Longpod beans; and short-topped radish in two or three sowings, at a week's interval, all on a warm border; also Hardy Green and Brown cos lettuce in a frame or on south border. Plant shallots and Ashleaf potatoes on a warm border. Protect broccoli as it becomes fit for use, or remove to a dry shed or cellar ; lettuces and endive, which are best planted in frames; and parsley in frames so as to be accessible.

Fruit Garden— Plant fruit trees in open weather, if not done in autumn, which is the proper season, mulching over the roots to protect them from frost, and from drought which may occur in spring. Prune fruit trees in mild weather or in moderate frosts, nailing only in fine weather. Wash trees infested with insects with one of the many insecticides now obtainable. Take off grafts, and lay them aside in moist earth in a shady place.

Forcing. — Prepare manure for making up hotbeds for early cucumbers and melons, where pits heated with hot water are not in use; also for Ashleaf potatoes. Sow also in heat mustard and cress for salads, onions for salads; tomatoes, celery to be pricked out for an early crop; and Early Horn carrot and kidney-beans on slight hotbeds. Force asparagus, sea-kale and rhubarb, in hotbeds, in pits, in the mushroom-house or in the open

garden by the use of covers surrounded with warm litter; for cucumbers a top heat of 70°; for vines in leaf and flower a temperature ranging from 65 ° to 70 . Keep forced strawberries with swelling fruit well watered. Plant vine eyes for propagation in a brisk heat.

Plant Houses. — Give abundance of air to the greenhouse, con- servatory and alpine frame in mild weather, but use little water. A supply of roses, kalmias, rhododendrons, &c, and of hardy flowers and bulbs, as lily of the valley, hyacinths, tulips, daffodils, &c, should be kept up by forcing.

Flower Garden.— Plant out tubers and bulbs of border flowers, where neglected in autumn, deferring the finer florists' flowers till next month. Transplant herbaceous plants in light soils, if not done in autumn; also deciduous trees, shrubs and hedges. Lay edgings in fine weather. Sow mignonette, stocks, &c, in pots; sow sweet peas and a few hardy annuals on a warm border. Give auriculas and carnations abundance of air, but keep the roots rather dry to prevent damping off.

February Kitchen Garden. — Sow successional crops of Early Seville beans, and William I., American Wonder or other peas in the beginning and end of the month ; early cabbages to follow the last sowing in August ; red cabbages and savoys towards the end. Sow also Early Horn carrot; Early Purple-top Munich turnip; onions for a full crop in light soils, with a few leeks and some parsley. Sow lettuce

for succession, with radishes and Round-leaved spinach, twice in the course of the month; and small salads every fortnight. Plant Jerusalem artichokes, shallots, garlic, horse-radish and early potatoes. Transplant to the bottom of a south wall a portion of the peas sown in pots in frames in November and January for the first crop. Sow Brussels sprouts in gentle heat for an early crop.

Fruit Garden. — Prune apricots, peaches, nectarines and plums, before the buds are much swelled; finish pruning apples, pears, cherries, gooseberries, currants and raspberries, before the end of the month ; also the dressing of vines. Keep the fruit-room free from spoiled fruit, and shut it close. Cut down the double-bearing raspberries to secure strong autumn-fruiting shoots. Head back stocks preparatory to grafting.

Forcing. — Sow melons and cucumbers on hotbeds and in pits. Sow carrots, turnips, early celery, also aubergines or egg-plants, capsicums, tomatoes and successional crops of kidney-beans; cauliflower and Brussels sprouts, in gentle heat, to be afterwards planted out. Plant early potatoes on slight hotbeds. Continue the forcing of asparagus, rhubarb and sea-kale. Commence or continue the forcing of the various choice fruits, as vines,

peaches, figs, cherries, strawberries, &c. Pot roots of mint and place in heat to produce sprigs for mint sauce. Be careful to protect the stems of vines that are outside the forcing-houses.

Plant Houses. — Let the greenhouse and conservatory have plenty of air in mild weather. Pot and start tuberous-rooted begonias and gloxinias. Pot young plants of Hippeastrum, and start the established ones. Propagate chrysanthemums in cool-house or vinery under hand lights or frames. Put plants of fuchsias, petunias, verbenas, heliotropes, salvias and other soft-wooded subjects, into a propagating house to obtain cuttings, &c, for the flower garden. Sow stocks, dahlias and a few tender and half-hardy annuals, on a slight hotbed, or in pots. Propagate old roots of dahlias by cuttings of the young shoots in a hotbed. Sow petunias in heat, and prick out and harden for bedding out; also gloxinias to be grown on in heat till the flowering season.

Flower Garden. — In dry open weather plant dried roots, including most of the finer florists' flowers; continue the transplanting of hardy biennial flowers and herbaceous plants. Sow in the last week mignonette, and hardy annuals, in a warm border, for subse- quent transplanting.

March

Kitchen Garden. — Sow main crops of wrinkled marrow peas; Longpod and Windsor beans; cabbage, onions, leeks, Early Horn carrots, parsnips, salsafy, scorzonera, Brussels sprouts, borecoles, lettuces and spinach. In the beginning and also at the end of the month sow Early Strap-leaf and Early Snowball turnips and savoys. In the last fortnight sow asparagus, cauliflower and the various sweet and savoury herbs; also sea-kale, radishes, celery, celeriac and parsley. Small salads should be sown every ten days. Make up beds for mushrooms with well-prepared dung towards the end of the month. Plant early potatoes in the first week, and a main crop during the last fortnight. Sea-kale, asparagus and peas raised in frames may now be planted ; also garlic and shallots. Full crops of cabbages should be planted out; also cauliflowers under hand- glasses. Propagate by slips, or by earthing up the old stems, the various pot-herbs.

Fruit Garden. — Finish the pruning of fruit trees before the middle of the month. Protect those coming into blossom. Begin grafting in the third week; dig and dress between the rows of gooseberries, currants and other fruit trees, if not already done. Kill wasps assiduously as soon as they appear.

Forcing.— Continue the forcing of melons, cucumbers, tomatoes and the various fruits. In the vinery and peach-house, attend to the keeping down of insects by syringing; and promote the growth of the young shoots, by

damping the walls and paths morning and evening. Sow capsicum and tomato; also in slight heat such tender herbs as basil and marjoram.

Plant Houses. — More water may be given than formerly. Sow seeds of greenhouse and hothouse plants; also the different sorts of tender annuals; pot off those sown last month; sow cineraria for the earliest bloom ; also Chinese primulas. Shift heaths and other hard- wooded subjects and stove-plants; plant tuberoses in pots for forcing. Begin to propagate greenhouse plants by cuttings; also coleuses by cuttings in heat, potting them off as soon as rooted.

Flower^ Garden and Shrubbery. — In the last week, sow hardy annuals in the borders, with biennials that flower the first season, as also perennials. Plant anemone and ranunculus feats and the corms of gladiolus. Transplant from the nursery to their final sites annuals sown in autumn, with biennials and herbaceous plants. Propagate perennials from root-slips and offsets. Continue to propagate the finer sorts of dahlias, both by cuttings and by division of the roots. Finish the pruning of all deciduous trees and hedges as soon as possible. Attend to the dressing of shrubberies; Fay turf-edgings, and regulate the surface of gravel walks.

April Kitchen Garden. — Sow asparagus, sea-kale, Turnip-rooted beet, salsafy, scorzonera, skirret, carrots and onions on heavy soils; also marrow peas, Longpod and Windsor beans, turnips, spinach, celery,

cabbage, savoys and Brussels sprouts for succession. Sow broccoli and kidney-beans both in the second and in the last week, and lettuces and small salads twice or thrice during the month ; sow all herbs, if not done last month. Sow vegetable marrow. Plant cauliflower, cabbages, sea-kale, lettuce; and finish the planting of the main crops of potatoes; divide and replant globe-artichokes. Propagate all sorts of pot-herbs, and attend to the hoeing and thinning of spinach, onions, turnips, carrots, beet, &c. Earth up cabbages, cauliflower, peas, beans and early potatoes. Stake up peas; blanch sea-kale and rhubarb in the open air by covering with straw or leaves.

Fruit Garden. — If vines have been neglected to be pruned, rub off the buds that are not wanted ; this is safer than pruning now. Protect the finer sorts of fruit trees on the walls. The hardier orchard-house fruits should now be moved outdoors under temporary awnings, to give the choicer fruits more space, — the roots being protected by plunging the pots. Mulch all newly-

planted fruit trees, watering abundantly in dry weather.

Forcing. — Continue the preparation of succession beds and pits for cucumbers and melons. Sow; pot tomatoes and capsicums for succession. Pollinate tomatoes by hand to ensure early fruit on plants intended for outdoor culture. In the forcing-houses, from the variable state of the weather, considerable vigilance is required in giving air. Keep down red spider (Acarus) in the more advanced houses by frequent syringings and a well-moistened atmosphere. Continue the usual operations of disbudding and thinning of fruit, and take care to keep up the proper temperatures.

Plant Houses. — Still sow tender annuals if required ; also cinerarias and primulas. Proceed with all necessary shiftings. Propagate rare and fine plants by cuttings or grafting; increase bouvardias by cuttings, and grow on for winter flowering. Pot off tender annuals, and cuttings of half-hardy greenhouse plants put in during February to get them well established for use in the flower garden. Transfer chrysanthemums to sheltered positions out of doors, and provide means of protecting them from frost and cutting winds.

Flower Garden and Shrubbery. — Sow main or successional crops of annuals of all sorts — half-hardy annuals in warm borders, or on slight hotbeds. Biennials and perennials should be sown before the middle of the month. Plant out gladioli, if not done, tigridias and fine stocks. Finish the transplanting of herbaceous plants by the end of the first week. Cuttings of border chrysanthemums may now be dibbled in a warm spot out of doors. Protect stage auriculas and hyacinths from extremes of every description of weather; and tulips from hoar-frosts and heavy rains. Plant out tender deciduous trees and shrubs raised in pots; plant out tea-roses, mulching the roots. Remove part of the coverings of all tender shrubs and plants in the first week, and the remainder at the end of the month. Form and repair lawns and grass walks by laying turf and sowing perennial grass-seeds; mow the lawns frequently; plant evergreens.

May Kitchen Garden. — Sow- main crop of beet in the first week, small salads every week, radishes and lettuces thrice, spinach once a fortnight, carrots and onions for late drawing, kidney-beans in the first week and together with scarlet runners in the last fortnight; endive for an early crop; also peas and Longpod and Windsor beans, cauliflowers, Early York or Little Pixie cabbages, Brussels sprouts, borecole, broccoli, savoys and kale for late crops. Sow- vegetable marrows and hardy cucumbers on a warm border in the last week; sow cardoons in trenches, or (in the north) in pots under glass shelter; sow chicory for salading. Continue hoeing and earthing up the several crops.

Fruit Garden. — Disbud peaches, nectarines and other early trees against the walls; also attend to the thinning of fruit. Give occasional washings with the engine to keep down insects. Pick caterpillars from gooseberries and wall trees on their first appearance. Remove from raspberries and strawberries all suckers and runners that arc not wanted.

Forcing. — Plant melons and cucumbers on the hotbeds prepared for vegetables in February, and now free. Plant out vegetable marrows and pumpkins on dung-ridges, under hand-glasses. Sow late crops of cucumbers and melons.

Plant Houses. — Turn out hardy plants about the middle, and the more tender at the latter end of the month. Sow tender annuals for succession, potting and shifting those sown at an earlier period ; sow cinerarias for succession; and a few hardy annuals and ten- week stock, &c, for late crops. Pot off all rooted cuttings. Put in cuttings of the different desirable species which are now fit for that purpose. Plant out in rich soil Richardias, to be potted up in autumn for flowering. Bedding plants should be placed to harden in sheltered positions out of doors towards end of month. Towards the end of the month many of the main stock of chrysanthemums will be ready for the final potting.

Flower Garden. — Sow annuals for succession in the last week, also biennials and perennials in the nursery compartment, for planting out next year. Propagate plants of which more stock is required either by cuttings or by dividing the roots. Plant out, during the last week, dahlias, hardy pelargoniums, stocks and calceolarias, protecting the dahlias from slight frosts. By the end of the month, masses of the following plants may be formed with

safety in warm localities :— pelargonium, heliotropium, fuchsia, petunia, nierembergia, salvia, verbena, bouvardia and lobelia. Protect tulips, ranunculuses and anemones from the mid-day sun, and from rains and winds. Remove the coverings from all tender plants in the open air.

Shrubbery. — Transplant all kinds of evergreens, this month and September being the proper seasons. The rarer conifers should be planted now and in June, after they have commenced to grow. Proceed with the laying down of lawns and gravel-walks, and keep the former regularly mown.

June Kitchen Garden. — Sow kidney-beans for succession; also the wrinkled marrow peas and Seville Longpod and Windsor beans for late

crops. Sow salading every ten days; also carrots, onions and radishes for drawing young; and chicory for salads; sow endive for a full crop. In the first week sow Early Munich and Golden Ball turnips for succession, and in the third week for a full autumn crop. Sow scarlet and white runner beans for a late crop, and cabbages for coleworts. Make up successional mushroom beds early in the month. Plant full crops of broccoli, Brussels sprouts, savoys, kales, leeks and early celery, with successional crops of cabbage and cauliflower. In the first fortnight of the month, plant hardy cucumbers for pickling, in a warm border, placing hand- glasses over them towards the end of the month. Plant out capsi- cums and tomatoes in sunny positions, and stake and tie securely. Pull and store winter onions, if ripe.

Fruit Garden. — Train and prune the summer shoots of wall and trellis and other trained trees. Mulch and water fruit trees and strawberries in dry weather, desisting when the fruit begins to ripen. Net over cherry-trees. Destroy aphides and other insects by syringing with tobacco water, or by fumigating, or by dusting with tobacco powder.

Forcing. — Proceed with planting melons, cucumbers and toma- toes. Keep up the necessary temperatures for the ripening of the various fruits. Ventilation will still require constant care. Tomatoes will now be fruiting freely; thin out judiciously, avoiding excessive pruning at one time. Attend to the gathering of fruit as it ripens.

Plant Houses. — These will now be occupied with tender green- house plants and annuals, and the more hardy plants from the stove. Shift, repot and propagate all plants that are desirable. Sow fragrant or showy annuals to flower in pots during winter; and grow on a set of decorative plants for the same object. Continue the final potting of chrysanthemums as the plants become ready.

Flower Garden. — Plant out dahlias and other tender subjects, if risk of frost is past. Take up bulbs and tuberous roots and dry them in the shade before removing them to the store-room. Fill up with annuals and greenhouse plants those beds from which the bulbs and roots have been raised. After this season, keep always a reserve of annuals in pots, or planted on beds of thin layers of fibrous matter, so as to be readily transplanted. Layer carnations and pipe pinks in the end of the month. Keep the lawns closely mown.

July

Kitchen Garden. — Watering will be necessary in each department, if the weather is hot and dry. In the first week, sow peas for the last crop of the season; also Longpod beans and French beans. In the last week, sow red

globe or Chirk Castle turnip for a full winter crop, spinach for an early winter supply and Enfield Market cabbage for early summer use. Sow endive, for autumn and winter use, in the beginning and end of the month; also successional crops of lettuce and small salads. Make up successional mushroom beds. Plant full crops of celery, celeriac, endive about the middle and end of the month ; late crops of broccoli, cauliflower and coleworts in the last week. Gather and dry herbs; also propagate these by slips and cuttings.

Fruit Garden. — Continue the pruning and training of wall and espalier trees, and the destruction of noxious insects. Pot straw- berries for forcing next winter, and make new beds out of doors as soon as well-rooted runners can be obtained. Propagate the different sorts of stone fruit trees by budding on other trees or on prepared stocks. Gather fruits of all kinds as they ripen.

Forcing. — Prune melons and cucumbers, giving air and water and maintaining heat, &c. Continue the routine treatment in the tomato-houses. Feed the plants artificially as soon as good crops are set; do not wait for signs of distress. The forcing-houses ought to have abundance of fresh air and moisture where required, along with the necessary heat.

Plant Houses. — Ventilation will be necessary to keep down ex- cessive heat; and attention must be paid to potting, shifting and putting in cuttings, and giving abundance of water to the potted plants, both indoors and out. Sow seed of herbaceous calceolarias; shift heaths, if they require it; cut down pelargoniums past flower- ing, and plant the cuttings.

Flower Garden and Shrubbery. — Take up the remaining tuberous roots, such as anemones, ranunculuses, &c, by the end of the first week; fill up their places, and any vacancies that may have oc- curred, with annuals or bedding plants from the reserve ground.

Repot auriculas, and sow auricula seed in boxes under glass. Pro- pagate herbaceous and other plants that have gone out of flower, by means of cuttings and slips, especially those required for spring bedding; propagate also the various summer bedding plants in- creased by cuttings. Increase roses and American shrubs, by layer- ing, budding or cuttings, and go on with the layering of carnations and picotees. Stake and tie up dahlias and strong herbaceous plants.

August

Kitchen Garden. — Sow winter and spring spinach in the beginning and about the end of the month; parsley and winter onions, for a full crop, in the first week; cabbages about the middle of the month, for planting out in spring; cauliflower in the first half (Scotland) and in the second half (England) of the month; Hardy Hammersmith and Brown Cos lettuce in the first and last week; small salads occasionally ; and Black Spanish radish, for winter crops. Plant out kales and broccoli for late crops; plant celery (earthing up the advancing crops as required), endive for succession, and a few coleworts. Take up shallots, garlic, &c.

Fruit Garden. — Proceed in training and regulating the summer shoots of all fruit trees as directed for the last three months. Net up, in dry weather, gooseberry and currant bushes, to preserve the fruit till late in the autumn. Make new strawberry beds if required. Preserve the ripening fruits on the wall and other trees from in- sects, and destroy wasp nests. Gather fruits as they ripen.

Forcing. — The routine of cultivation in hotbeds and pits may be continued. Sow tomatoes and cucumbers for a winter crop. Make up mushroom beds. In the forcing-houses, where the crops are past, part of the sashes may be removed, so as to permit thorough ventila- tion.

Plant Houses. — Attend to the propagation of all sorts of green- house plants by cuttings, and to the replacing in the greenhouse and stoves the more tender species, by the end of the month in ordinary seasons, but in wet weather in the second week. Sow half-hardy annuals, as Nemophila, Collinsia, Schizanthus, Rhodanthe, &c, to flower during -winter.

Flower Garden and Shrubbery. — Sow in the second and the last week, on a warm border of a light sandy soil, with an east aspect, any free-flowering hardy annuals as Silene pendula, Nemophila, &c, for planting in spring; and auricula and primula seeds in pots and boxes. Propagate, all sorts of herbaceous plants by rooted slips or suckers; take off layers of carnations, picotees and pansies. Plant cuttings of bedding plants, and of bedding pelar- goniums in boxes for convenience of removal. Layer the tops of chrysanthemums, to obtain dwarf flowering plants. Transplant evergreens in moist weather, about the end of the month; and pro- pagate them by layers and cuttings. Pot Neapolitan violets for forcing ; or plant out on a mild hotbed. Clip box edgings.

September

Kitchen Garden. — Sow small salading for late crops; and lettuce and

spinach, if not done last month, for spring crops. Plant endive and lettuce at the foot of a south wall to stand the winter; plant out cabbages from the chief autumn sowing. Plant cauliflowers on a warm border in spaces such as can be protected by hand-lights. Thin the winter spinach, when large enough, that it may have space to grow. If broccoli be too rank or tall to withstand the winter, lift and lay nearly up to the neck in the earth, the heads sloping towards the north. Lift onions, and lay them out to ripen on a dry border or gravel-walk. Lift potatoes and store them.

Fruit Garden. — Finish the summer pruning and training. Where the walls are heated, assist the maturing of peaches and nectarines, and the ripening of the young wood for next year, by fires during the day. Gather and lay up in the fruit-room with care the autumnal sorts of apples and pears. Prepare borders and stations for fruit trees during dry weather. Plant strawberries for a main crop. Repot orchard-house trees, disrooting if necessary.

Forcing. — Take care that late melons, cucumbers and tomatoes be not injured by getting too much water and too little air. Sow a few kidney beans for an early forced crop. Expel damp, and assist the ripening of late grapes and peaches with fires during the day. Prune early vines and peaches.

Plant Houses. — The various pot plants should now be put in their winter quarters. Keep up moderate temperatures in the stove, and merely repel frosts in the greenhouse, guarding against damp, by ventilation and by the cautious use of water. Pot hyacinths, tulips and other bulbs for forcing; and propagate half-hardy plants by cuttings. Begin the housing of the main stock of chrys- anthemums.

Flower Garden, &c. — Sow in the beginning of this month all half- hardy annuals required for early flowering; also mignonette in pots, thinning the plants at an early stage; the different species of primula; and the seeds of such plants as, if sown in spring, seldom come up the same season, but if sown in September and October, vegetate readily the succeeding spring. Put in cuttings of bedding pelar- goniums in boxes, which may stand outdoors exposed to the sun, but should be sheltered from excessive rains. Continue the propagation of herbaceous plants, taking off the layers of carnations, picotees,

pansies and chrysanthemums, by the end of the month; choice carnations and picotees may be potted and wintered in cold frames if the season is wet and ungenial. Plant evergreens; lay and put in cuttings of most of the hard-wooded sorts of shrubby plants

October

Kitchen Garden. — Sow small salading and radishes in the first week, and lettuces in frames on a shallow hotbed for planting out in spring. If the winter prove mild they will be somewhat earlier than those sown next month or in January. Plant parsley in pots or boxes to protect under glass in case very severe weather occurs. Plant cabbages in beds or close rows till wanted in spring; and cauliflowers in the last week, to receive the protection of frames, or a sheltered situation. Store potatoes, beet, salsafy, scorzonera, skirret, carrots and parsnips, by the end of the month. Band and earth up cardoons.

Fruit Garden. — Such fruit trees as have dropped their leaves may be transplanted; this is the best season for transplanting (though with care it may be done earlier), whether the leaves have fallen or not. Protect fig-trees, if the weather proves frosty, as soon as they have cast their leaves. Plant out raspberries. The orchard-house trees should be got under glass before the end of the month. Gather and store all sorts of apples and pears, the longest-keeping sorts not before the end of the month, if the weather be mild.

Forcing. — Maintain the heat in hotbeds and pits by means of fresh dung linings. Give abundance of air in mild bright weather. Dress vines and peaches. Clean and repair the forcing-houses, and overhaul the heating apparatus to see it is in good working con- dition. Plant chicory in boxes or on hotbeds for blanching. Sow kidney beans. Make up successiona! winter mushroom beds.

Plant Houses. — Replace all sorts of greenhouse plants. Fill the pits with pots of stocks, mignonette and hardy annuals for planting out in spring, along with many of the hardy sorts of greenhouse plants; the whole ought to be thoroughly ventilated, except in frosty weather. From this time till spring keep succulent plants almost without water. Begin to force roses, hyacinths and a few other bulbs, for winter and early spring decoration. Plant hyacinths in glasses for windows. The last of the pot chrysanthemums should be housed by the end of the first week.

Flower Garden. — Sow a few pots of hardy annuals in a frame, or on a sheltered border, for successional spring use if required. Plant the greater part of the common border bulbs, as hyacinths, narcissi, crocuses and early tulips, about the end of the month, with a few anemones for early flowering. Transplant strong plants of biennials and perennials to their final situations ; also the select plants used for spring bedding. Protect alpine plants, stage auriculas, and choice carnations and picotees with glass frames; and tea roses and other tender plants with bracken or other

protective material. Take up, dry and store dahlias and all tender tubers at the end of the month ; pot lobelias and similar half-hardy plants from the open borders. Transplant all sorts of hardy evergreens and shrubs, especially in dry soils, giving abundance of water. Put in cuttings of all sorts of ever- greens, &c. Plant out the hardier sorts of roses.

November

Kitchen Garden. — -Trench up all vacant ground as soon as cleared of its crops, leaving the surface as rough as possible. Sow early peas and Early Dwarf Prolific beans in the second week, for an early crop; also in frames for transplanting. Protect endive, celery, artichoke and sea-kale with stable-litter or fern, or by planting the former in frames; take up late cauliflower, early broccoli and lettuces, and place them in sheltered pits or lay them in an open shed; earth up celery ; manure and dress up asparagus beds.

Fruit Garden. — Plant all sorts of fruit trees in fine weather — the earlier in the month the better. Protect fig-trees. Commence pruning and nailing. Gather and store the latest apples and pears. Examine the fruit-room and remove all decayed fruit.

Forcing. — Keep up the requisite degree of heat in hotbeds and pits. Cucumbers and tomatoes will require more than ordinary attention. Force asparagus, rhubarb and sea-kale, in the mushroom- hous'e, in pits, or in the open border under boxes or cases surrounded and covered by well-fermented stable dung and leaves. Sow Early Horn carrot; also kidney beans and radishes, on hotbeds. In the forcing-houses prune and train the trees; fork over and dress the borders of such houses as have not been already done.

Plant Houses. — The directions for the greenhouse and conservatory in January apply also to this month generally. Continue the fofeipg of roses, hyacinths; &c. Houses containing large-flowered Japanese chrysanthemums will require to be kept dry, airy and moderately warm to prevent " damping-off " of petals.

Flower Garden, &c. — Plant dried tubers of border flowers, but the finer sorts had better be deferred till spring. Plant tulips in the early part of the month. Put in cuttings of bedding calceolarias, choosing the shoots that will not run up to flower. Protect such half-hardy plants as are not already sheltered. Plant deciduous trees and shrubs so long as the weather continues favourable, and before the soil has parted with the solar heat absorbed during summer. Dig and dress such flower borders and shrubberies as may now be cleared of annuals and the stems of herbaceous plants.

December

Kitchen Garden. — Collect and smother-burn all vegetable refuse, and apply it as a dressing to the ground. Sow a few peas and beans, in case of accident to those sown in November, drawing up the soil towards the stems of those which are above ground as a protection ; earth up celery; blanch endive with flower-pots; sow radishes in a very sheltered place. Attend to trenching and digging in dry weather.

Fruit Garden. — Plant all sorts of fruit trees in mild weather. Proceed with pruning and nailing wall-trees. Examine the fruit- room every week, removing promptly all decaying fruit.

Forcing. — The same degree of attention to hotbeds aad pits will be necessary as in the last month. Continue the forcing of asparagus, rhubarb and sea-kale, in pits and in the mushroom-house. Proceed with the usual routine of culture commenced last month. Make the necessary preparations to begin forcing early or succession crops by the last week of this or the first of next month.

Plant Houses, Frames, &c. — Carnations and picotees in pots must be kept rather dry to prevent damping off. Heaths and Australian plants must be very sparingly watered, and kept with only fire heat enough to repel frost. Cut down plants of chrysanthemums, which should be placed in a cool pit, near the glass, in order to afford hard sturdy cuttings in February. Shy plants should be given gentle bottom heat to induce growth, which should be gently hardened by exposure under cooler conditions.

Flower Garden, fife— Plant shrubs in open weather. Prune shrubs. Sweep and roll the lawns, and put in repair the gravel-walks, keeping the surface frequently rolled. (J. Ws. ; W. R. W.)

(B) For the United States (chiefly for the latitude of New York).

January

Flower Garden and Greenhouse. — Little is to be done in either. In the greenhouse care must be used to protect against frost. Venti- late but little, and with care; raise the ventilating sash only high enough to let the heated air from the greenhouse drive back the outer air so as not to chill the

plants. To destroy the red spider, syringe the plants copiously at night, and splash the paths with water. The aphis, or " green fly," must also be destroyed; tobacco may be used. Various new preparations are coming on the market for the destruction of greenhouse pests. Several new effective preparations of tobacco have been brought into use. The white-fly is now a common pest in greenhouses, the nymphs being greenish scale-like objects on the under sides of the leaves, and adults very small white flies. The remedy is to spray with kerosene emulsion or whale-oil soap; or if on cucumbers or tomatoes, it is best to fumigate with hydrocyanic acid gas, using one ounce of potassium cyanide to each 1000 cubic ft. of space. (This material is very poisonous.) Many greenhouse insects can be kept more or less in check by careful and effective hosing of the plants at proper times. At this season roses, grape vines and other plants are often affected by mildew ; an effectual remedy is to paint the hot- water pipes with a mixture of sulphur and lime, put on as thick as ordinary white- wash, once each week until it is checked; but care must be taken not to apply it on any surface at a higher temperature than 212°. Hyacinths and other bulbs that have been kept in a cellar or other dark cool place may now be brought into the light of the greenhouse or sitting-room, provided they have filled the pots with roots. If they are not well rooted, leave them until they are, or select such of them as are best, leaving the others. In the outside flower garden little can be done except that shrubs may be pruned, or new work, such as making walks or grading, performed, if weather permits. See that the ornamental plants and trees are not injured by heavy weights of ice or snow.

Fruit Garden. — Pruning, staking up or mulching can be done if the weather is such that the workmen can stand out. In all warm or comfortable days the fruit trees may be pruned.

Grapery. — Graperies used for the forcing of foreign grapes may be started, beginning at a temperature of 50 at night, with io° or 15° higher during the day. The borders must be covered sufficiently deep with leaves or manure to prevent the soil from freezing, as it would be destruction to the vines to start the shoots if the roots were frozen ; hence, when forcing is begun in January, the covering should be put on in November, before severe frosts begin.

Vegetable Garden. — But little can be done in the northern states except to prepare manure, and get sashes, tools, &c, in working order; but in sections of the country where there is little or no frost the hardier kinds of seeds and plants may be sown and planted, such as asparagus, cabbage, cauliflower, carrot, leek, lettuce, onion, par- snip, peas, spinach, turnip, &c. In any section where these seeds can be sown in open ground, it is an indication that hotbeds may be started for the sowing of such tender vegetables as

tomatoes, egg and pepper plants, &c. ; though, unless in the extreme southern states, hotbeds should not be started before the beginning or middle of February. Make orders for the spring seeds. .

February

Flower Garden and Greenhouse. — The directions for January will in the main apply to this month, except that now some of the hardier

annuals may be sown in hotbed or greenhouse, and also the propaga- tion of plants by cuttings may be done rather better now than in January, as the greater amount of light gives more vitality to the cutting.

Fruit Garden. — But little can be done in most of the northern states as yet, and in sections where there is no frost in the ground it is likely to be too wet to work; but in many southern states this will be the best month for planting fruit trees and plants of all kinds, particularly strawberries, raspberries, blackberries, pear and apple trees, while grape vines will do, though they will also do well quite a month later. Continue the pruning. Fruit trees for spring planting should be ordered, if not already done.

Grapery. — The graperies started last month at 50° at night may now be increased to 6o°, with a correspondingly higher day tempera- ture. Great care must be taken to syringe the leaves thoroughly at least once a day, and to deluge the paths with water, so as to produce a moist atmosphere. Paint the hot-water pipes with sulphur mixture, as recommended in January.

Vegetable Garden. — Leaves from the woods, house manure or refuse hops from breweries may be got together towards the latter part of this month, and mixed and turned to get " sweetened " preparatory to forming hotbeds. Cabbage, lettuce and cauliflower seeds, if sown early this month in hotbed or greenhouse, will make fine plants if transplanted into hotbed in March. This is preferable to the use of fall-sown plants. Manure that is to be used for the crop should be broken up as fine as possible, for the more completely manure of any kind can be mixed with the soil the better the crop will be, and, of course, if it is dug or ploughed in in large unbroken lumps it cannot be properly commingled.

March

Flower Garden and Greenhouse. — The long days and bright sun- shine will now begin to tell on the plants under glass. Examine all plants that are vigorous and healthy; if the roots have matted the " ball " of earth they must be shifted into a larger-sized pot. Plants from cuttings struck last month may now be shifted, and the propa- gation of all plants that are

likely to be wanted should be continued. Hardier kinds of annuals may be sown; it is best done in shallow boxes, say 2 in. deep.

Lawns can be raked off and mulched with short manure, or rich garden earth where manure cannot be obtained. Flower-beds on light soils may be dug up so as to forward the work of the coming busy spring season. Lawns may be benefited by a gjood dressing, in addition to the manure, of some reliable commercial fertilizer. If the lawn is thin in spots, these places may be raked over heavily and new grass seed sown.

Fruit Garden. — In many sections, planting may now be done with safety, provided the soil is light and dry, but not otherwise. Although a tree or plant will receive no injury when its roots are undisturbed in the soil should a frost come after planting, the same amount of freezing will, and very often does, greatly injure the plant if the roots are exposed.

Grapery. — The grapery started in January will have set its fruit, which should be thinned by one-third. The temperature may now be further advanced to 70° at night, with 15° higher in the daytime. The same precautions must be used against mildew and insects as given in January. Graperies wanted for succession may be started in February or this month.

Vegetable Garden. — This is a busy month. In localities where the frost is out of the ground, if it is not wet, seeds of the hardier vegetables can be sown. The list of seeds given for the southern states in January may now be used at the north, while for most of the southern states tender vegetables, such as egg plant, okra, sweet potatoes, melon, squash, potatoes, tomatoes, &c, may be sown and planted. Hotbeds must now be all started. In March flower seeds and vegetable seeds may be sown in boxes or flats in the greenhouse, or in residence windows, or near the kitchen stove. Unless one has space under glass, or in hotbeds, in which the plants may be transplanted before they are set in the open ground, it is well not to start the seeds too early, inasmuch as the plants are likely to become too large or to be pot-bound, or to become drawn.

April

Flower Garden and Greenhouse. — Window and greenhouse plants require more water and ventilation. Due attention must be paid to shifting well-rooted plants into larger pots; and, if space is desired,, many kinds of hardier plants can be safely put out in cold frames. Towards the end of the month it may be necessary slightly to shade the glass of the greenhouse. All herbaceous plants and hardy shrubs may be planted in the garden. The covering of leaves or litter should be taken off bulbs and tender plants that were covered up for winter, so that the beds can be lightly forked and

raked. Sow tender annual flower seeds in boxes inside.

Fruit Garden. — Strawberries that have been covered up with straw or leaves should be relieved around the plants, leaving the covering between them. Special care must be exercised that the mulch be not left on toojong; the plants should not become whitened or " drawn." Raspberries, grape vines, &c, that have been laid down may now be uncovered and tied up to stakes or trellises, and all new

plantations of these and other fruits may now be made. Fruit trees may be grafted.

Vegetable Garden. — Asparagus, rhubarb, spinach, &c, should be uncovered, and the beds hoed or dug lightly. Hardier sorts of vegetable seeds and plants, such as beets, cabbage, cauliflower, celery, lettuce, onions, parsley, parsnips, peas, potatoes, radishes, spinach, turnip, &c, should all be sown or planted by the middle of the month if the soil is dry and warm, and in all cases, where practic- able, before the end of the month. It is essential, in sowing seeds now, that they be well firmed in the soil. Any who expect to get early cabbage, cauliflower, lettuce or radishes, while planting or sowing is delayed until the time of sowing tomato and egg plant in May, are sure to be disappointed of a full crop. Frequent rotation of crops should be practised in the vegetable garden, in order to head off insects and diseases; and also to make the best use of the land. Every three or four years the vegetable garden should be laid out in some new place; but if this cannot be done, the crops should be rotated on different parts of the old garden.

May

Flower Garden and Greenhouse. — Window and greenhouse plants should be in their finest bloom. Firing may be entirely dispensed with, though care must still be exercised in ventilating. If weather is eold and backward, however, and in very northern regions, care must be taken not to stop firing too soon, or the plants will mildew and become stunted. Every precaution must be used to keep the air moist. " Moss culture " may be tried, the common sphagnum or moss of the swamps, mixed with one-twentieth of its bulk of bone- dust, being laid as a mulch on the top of the earth of the flower-pots; its effect is to shield the pots from the gun, and at the same time stimulate the roots to come to the surface. By the end of the month all

of the plants that are wanted for the summer decoration of the flower border may be planted out, first loosening a little the ball of earth at the roots. If the weather is dry, water freely after planting. When the greenhouse is not to be used during the summer months, camellias, azaleas and plants of that character should be set out of doors under partial shade; but most of the other plants usually grown in the conservatory or window garden in winter may be set in the open border. Flower-beds should be kept well hoed and raked, to prevent the growth of weeds next month.

Pelargoniums, pinks, monthly roses and all the half-hardy kinds of flowering plants should be planted early, but coleus, heliotrope and the more tender plants should be delayed until the end of the month. Annuals that have been sown in the greenhouse or hotbed may be planted out, and seeds of such sorts as mignonette, sweet alyssum, Phlox Drummondii, portulaca, &c, may be sown in the beds or borders. The china aster is now one of the most popular of summer and fall plants. The seed may be sown in the north as late as the middle of May, or even the first of June, with good results for fall blooming. If the plants are started early in the greenhouse, they are likely to spend themselves before fall, and therefore a later sowing should be provided.

Lawns should be mown, and the edgings trimmed. Fruit Garden. — The hay or leaf mulching on the strawberry beds should be removed and the ground deeply hoed (if not removed in April in the more forward places), after which it may be placed on again to keep the fruit clean and the ground from drying. Where it has not been convenient before, most of the smaller fruits may yet be planted during the first part of the month. Tobacco dust will dislodge most of the numerous kinds of slugs, caterpillars or worms that make their appearance on the young shoots of vines or trees. Fruit trees may be planted this month, if they were not planted in March or April. If they have been kept fresh and dormant, they should still be in good condition. The broken roots should be cut back to fresh wood, and the cops should be headed back in proportion. Vegetable Garden. — Attention should be given to new sowings and plantings for succession. Crops sown last month will have to be thinned out if large enough. Hoe deeply all transplanted crops, such as cabbage, cauliflower, lettuce, &c. Tender vegetables, such as tomatoes, egg and pepper plants, sweet potatoes, &c, can be planted out. Seeds of Lima beans, sweet corn, melon, okra, cucumbers, &c, should be sown; and sow for succession peas, spinach, lettuce, beans, radishes, &c, every ten days.

June

Flower Garden and Greenhouse. — Tropical plants can now be used to fill up the greenhouse during the summer months. It should be well shaded,

and fine specimens of fancy caladiums, dracaenas, coleus, crotons, palms, ferns and such plants as are grown for the beauty of their foliage, will make a very attractive show. If these cannot be had, common geraniums may be used. The " moss culture " will be found particularly valuable for these plants. Hya- cinths, tulips and other spring bulbs may be dug up, dried and placed away for next fall's planting, and their places filled with bedding plants, such as coleus, achyranthes, pelargoniums, and the various white and coloured leaf plants. It will be necessary to mow the lawn once a week, and sometimes oftener.

Fruit Garden.— The small fruits should be mulched about the roots, if this has not yet been done. If the fruit garden is large enough to

admit of horse culture, it is best to keep the bush-fruits well cultivated during the season; this tillage conserves the moisture and helps to make a full and plump crop of berries. In small areas the mulching system is sometimes preferable.

Vegetable Garden. — Beets, beans, carrots, corn, cucumbers, lettuce, peas and radishes may be sown for succession. This is usually a busy month, as many crops have to be gathered, and, if hoeing is not promptly seen to, weeds are certain to give great trouble. Tomatoes should be tied up to trellises or stakes if fine-flavoured and handsome fruit is desired, for if left to ripen on the ground they are apt to have a gross earthy flavour.

July

Flower Garden and Greenhouse. — Watering, ventilating and fumi- gating (or the use of tobacco in other forms for destruction of aphides) must be attended to. The atmosphere of the greenhouse must be kept moist. Watch the plants that have been plunged out of doors, and see if any require repotting. All plants that require staking, such as dahlias, roses, gladioli and many herbaceous plants, should now be looked to. Carnations and other plants that are throwing up flower stems, if wanted to flower in winter, should be cut back, that is, the flower stems should be cut off to say 5 in. from the ground.

Fruit Garden. — If grape vines show any signs of mildew, dust them over with dry sulphur, selecting a still warm day. The fruit having now been gathered from strawberry plants, if new beds are to be formed, the system of layering the plants in small pots is the best. In general, field strawberries are not grown from potted layers, but from good strong layers that strike naturally in the field. In the north, spring planting of strawberries is generally advised for market conditions; although planting in early fall or late summer is successful when the ground is well prepared and when it

does not suffer from drought. Where apples, pears, peaches, grapes, &c, have set fruit thickly, thin out at least one-half to two-thirds of the young fruit.

Vegetable Garden.— The first ten days of this month will yet be time enough to sow sweet corn, beets, lettuce, beans, cucumbers and ruta-baga turnips. Such vegetables as cabbage, cauliflower, celery, &c, wanted for fall or winter use, are best planted this month, though in some sections they will do later. Keep sweet potatoes hoed to prevent the vines rooting at the joints.

August Flower Garden and Greenhouse. — But little deviation is required in these departments from the instructions for July. See that sufficient water is applied ; the walks may be wet in the houses.

Fruit Garden. — Strawberries that have fruited will now be making " runners," or young plants. These should be kept cut off close to the old plant, so that the full force of the root is expended in making the " crowns " or fruit buds for next season's crop. If plants are re- quired for new beds, only the required number should be allowed to grow, and these may be layered in pots as recommended in July. The old stems of raspberries and blackberries that have borne fruit should be cut away, and the young shoots thinned to three or four canes to each hill or plant. If tied to stakes and topped when 4 or 5 ft. high, they will form three or four branches on a cane, and will make stronger fruiting plants for next year.

Vegetable Garden. — Hoe deeply such crops as cabbage, cauliflower and celery. The earthing up of celery this month is not to be recommended, unless a little very early supply is wanted. Onions in many sections can be harvested. The proper condition is when the tops are turning yellow and falling down. They are dried best by placing them in a dry shed in thin layers. Sow spinach for fall use, but not yet for the winter crop. Red top, white globe, and yellow Aberdeen turnips should now be sown; ruta-baga turnips sown last month will need thinning, and in extreme southern states they may yet be sown.

September Flower Garden and Greenhouse. — The flower-beds in the lawn should be at their best. If planted in " ribbon lines " or " massing," strict attention must be given to pinching off the tops, so that the lines or masses will present an even surface. Tender plants will require to be put in the greenhouse or housed in some way towards the end of this month; but be careful to keep them as cool as possible during the day. Cuttings of bedding plants may now be made freely if wanted for next season, as young cuttings rooted in the fall make better plants for next spring's use than old plants, in the case of such soft-wooded plants as pelargoniums, fuchsias, verbenas, heliotropes, &c. ; with roses and plants of a woody nature,

however, the old plants usually do best. Dutch bulbs, such as hyacinths, tulips, crocus, &c, and most of the varieties of lilies, may be planted. Violets that are wanted for winter flowering will now be growing freely, and the runners should be trimmed off. Sow seeds of sweet alyssum, candytuft, daisies, mignonette, pansies, &c. Visit the roadsides and woods for interesting plants to put in the hardy borders.

Fruit Garden. — Strawberry plants that have been layered in pots may yet be planted, or in southern districts the ordinary ground layers may be planted. The sooner in the month both are planted the better crop thev will give next season; and, as these plants soon

make runners, it will be necessary to trim them off. Attend to rasp- berries and blackberries as advised lor last month, if they have not already been attended to. All fruit trees should be gone over for borers before cold weather sets in ; they also should have been gone over for the same purpose in May and June.

Vegetable Garden. — If cabbage, cauliflower and lettuce are wanted to plant in cold frames, the seed should be sown from about the 10th to the 20th of this month; but judgment should be exercised, for, if sown too early, cabbage and cauliflower are apt to run to seed. The best date for latitude of New York is September 15th. The main crop of spinach or sprouts that is wanted for winter or spring use should be sown about the same date. The earth should be drawn up to celery with a hoe preparatory to earthing up with a spade. Onions that were not harvested and dried last month must now be attended to. Turnips of the early or flat sorts may yet be sown the first week of this month in the northern states, and in the south from two to four weeks later.

October

Flower Garden and Greenhouse. — In northern sections of the United States, tender plants that are still outside should be got under cover as early as possible. Delay using fire heat as long as possible, unless the nights become so cold as to chill the plants inside the house. Roses, carnations, camellias, azaleas, pelargoniums and the hardier sorts of plants will do better if placed in a cold frame or pit until the middle of November than they would in an ordinary greenhouse. Look out for insects. Fall bulbs of all kinds may be planted. Take up summer-flowering bulbs and tubers, such as dahlias, tuberoses, gladioli, cannas, caladiums, tigridias, and dry them

off thoroughly, stowing them away afterwards in some place free from frost and moisture during the winter. Before winter sets in see that the lawn is freely top-dressed. Be careful not to mow the grass too short in fall.

Fruit Garden. — Strawberries that have been grown from pot-grown layers may yet be planted in southern states; keep the runners trimmed off. Fruit trees and shrubs may be set out ; but, if planting is deferred to the last of the month, the ground around the roots should be mulched to the thickness of 3 or 4 in. with straw, leaves or rough manure, as a protection against frost. The fruit garden must be protected from the ravages of mice in winter. Mice will nest about the plants if there is straw or other litter around them. Before winter, all tall grass and loose litter should be taken away ; if this is not done, then the first snow should be tramped heavily around the plants, in order to destroy any nesting-places.

Vegetable Garden. — Celery will now be in full growth, and will require close attention to earthing up, and during the last part of the month the first lot may be stored away in trenches for winter. All vegetable roots not designed to be left in the ground during the winter should be dug up, such as beets, carrots, parsnips, sweet potatoes, &c. The cabbage, cauliflower and lettuce plants grown from seed sown last month should be pricked out in cold frames. If lettuce is wanted for winter use, it may now be planted in the green- house or cold frame, and will be ready for use about Christmas. If asparagus or rhubarb is wanted for winter use, it should be taken up and stowed away in pit, frame, shed or cellar for a month or two. It may then be taken into the greenhouse and packed closely together under the stage, and will be fit for use from January to March, according to the temperature of the house. Vegetable gardens often become infested with diseases that are carried over from year to year in the old plants and litter; this is specially true of water-melons and of some diseases of tomatoes. It is well, there- fore, to burn the tops of the plants in the fall, rather than to plough them under or to throw them on the compost heap.

November Flower Garden and Greenhouse. — Plants intended to be grown inside should now all be indoors. Keep a sharp look-out for cold snaps, as they come very unexpectedly in November, and many plants are lost thereby. In cases where it is not convenient to use fire heat, 5° to 10° of cold can be resisted by covering the plants over with paper, and by using this before frost has struck the plants valuable collections may be saved. When fire heat is freely used, be careful to keep up the proper amount of moisture by sprinkling the paths with water. Little can be done in the flower garden, except to clean off all dead stalks, and straw up tender roses, vines, &c, and, wherever there is time, to dig up and rake the borders, as it will greatly facilitate spring work. Cover up all beds in which there are hyacinths, tulips and other bulbs with a litter of leaves or straw to the

depth of 2 or 3 in. If short, thoroughly-decayed manure can be spared, a good sprinkling spread over the lawn will help it to a finer growth next spring.

Fruit Garden. — Strawberry beds should be covered (in cold sections) with hay, straw or leaf mulching, to a depth not exceeding 2 in. Fruit trees and grape vines generally should be pruned ; and, if the wood of the vine is wanted for cuttings, or scions of fruit trees for grafts, they should be tied in small bundles and buried in the ground until spring. They may be taken in December or January if pre- ferred.

Vegetable Garden. — Celery that is to be stored for winter use should

[CALENDAR (UNITED STATES)

be put away before the end of the month in all sections north of Virginia; south of that it may be left in most places where grown throughout the winter if well covered up. The stalks of the asparagus bed should be cut off, and burned if there are berries on them, as the seeds scattered in the soil sometimes produce troublesome weeds. Mulch the beds with 2 or 3 in. of rough manure. All vegetable roots that are yet in the ground, and not designed to be left there over winter, must be dug up in this latitude before the middle of the month or they may be frozen in. Cover up onions, spinach, sprouts, cabbage or lettuce plants with a covering of 2 or 3 in of leaves, hay, or straw, to protect them during the winter. Cabbages that have headed may usually be preserved against injury by frost until the middle of next month, by simply pulling them up and packing them closely in a dry spot in the open field with the heads down and roots up. On approach of cold weather in December they should be covered up with leaves as high as the tops of the roots, or, if the soil is light, it may be thrown over them, if leaves are not convenient. Cabbages will keep this way until March if the covering has not been put on too early. Plough all empty ground if practicable, and, whenever time will permit, do trenching and subsoiling. Cabbage, cauli- flower and lettuce plants that are in frames should be regularly ventilated by lifting the sash on warm days, and on the approach of very cold weather they should be covered with straw mats or shutters. In the colder latitudes, and even in the middle states, it is absolutely necessary to protect cauliflower in this way, as it is much more tender than cabbage and lettuce plants.

December

Flower Garden and Greenhouse. — Close attention must be paid to protecting all tender plants, for it is not uncommon to have the care of a whole year spoiled by one night's neglect. Vigilance and extra hot fires will

have to be kept up when the thermometer falls to 34 ° or 35 in the parlour or conservatory. It is well to set the plants under the benches or on the walks of the greenhouses; if they are in. the parlour move them away from the cold point and protect them with paper; this will usually save them even if the thermometer falls to 24° or 26 . Another plan in the greenhouse is to dash water on the pipes or flues, which causes steam to rise to the glass and freeze there, stopping up all the Crevices. With plants outside that require strawing up or to be mulched, this will have now to be finished.

Fruit Garden. — In sections where it is an advantage to protect grape vines, raspberries, &c.,from severe frost, these should be laid down as close to the ground as possible, and covered with leaves, straw or hay, or with a few inches of soil. Grapes may be pruned. Fruit trees may be pruned from now till March in the north.

Vegetable Garden. — Celery in trenches should receive the final covering for the winter, which is best done by leaves or light stable litter; in the latitude of New York it should not be less than 12 "in. thick. Potatoes, beets, turnips or other roots in pits, the spinach crop in the ground, or any other article in need of protection, should be attended to before the end of the month ; manure and compost heaps should be forwarded as rapidly as possible, and turned and mixed so as to be in proper condition for spring. Remove the snow that accumulates on cold frames or other glass structures, particu- larly if the soil which the glass covers was not frozen before the snow fell ; it may remain on the sashes longer if the plants are frozen in, since they are dormant, and would not be injured if deprived of light for eight or ten days. If roots have been placed in cellars, attention must be given to ventilation, which can be done by making a wooden box, say 6 by 8 in., to run from the ceiling of the cellar to the eaves of the building above. (L. H. B. ; P. H.)

Bibliography of Modern Works on Horticulture. — W. Robinson, Alpine Flowers; Lord Redesdate (A. B. Freeman Mitford), The Bamboo Garden; J. Weathers, Bulbous Plants (33 col. plates) ; H. H. Cousins, Chemistry of the Garden; W. Watson, Cactus Culture for Amateurs; R. P. Brotherston and M. R. Smith, Book of the Carnation; J. Weathers, Cottage and Allotment Gardening; J. Veitch and Sons, Manual of Coniferae; W. Wells, Culture of the Chrysanthe- mum; Rev. S. E. Bourne, Book of the Daffodil; Geo. Nicholson, Dictionary of Gardening (5 vols.) ; W. Robinson, The English Flower Garden; Geo. Schneider, Book of Choice Ferns (3 vols.); W. Robin- son, Flora and Sylva (3 vols. ; col. plates by the late H. G. Moon) ; J. Weathers, Flowering Trees and Shrubs (33 col. plates) ; J. Weathers, French Market-Gardening .and Intensive Cultivation; T. Smith, French Gardening; Geo. Bunyard and O. Thomas, The Fruity Garden; Josh. Brace, Fruit' Trees in Pots; Dr R. Hogg, The Fruit Manual; M. C. Cooke, Fungoid

Pests of Cultivated Plants; Thos. H. Mawson, The Art and Craft of Garden-Making; J. Weathers, A Practical Guide to Garden Plants; W. Watson, The Gardeners' Assistant; C. H. Wright and D. Dewar, The Gardeners' Dictionary; J. Weathers, Garden Flowers for Town and Country (33 col. plates) ; Chas. Baltet, The Art of Grafting and Budding; W. Thomson, The Grape Vine; Thos. Baines, Greenhouse and Stove Plants; R. Irwin Lynch, The Book of the Iris; G. Jekyll, Lilies for English Gardens; E. A. Ormerod, Manual of Injurious Insects; Dr A. B. Griffiths, Manures for Fruit and other Trees; F. W. Burbridge and J. G. Baker, The Narcissus (48 col. plates) ; H. A. Burberry, The Orchid Culti- vator's Handbook; B. S. Williams, The Orchid Grower's Manual:

HORTON, C— HOSE

■J- Y e ' tch & S° ns . Manual of Orchidaceous Plants; Dr Paul Sorauer and F. E. Weiss, Physiology of Plants; W. Watson, Orchids, their Culture and Management; G. Massee, Plant Diseases; Rev. A Foster-Melhar, Book of the Rose; Wm. Paul, The Rose Garden (20 col. plates); G. Jekyll and E. Mawley, Roses for English Gardens; d VVe ^ thers ' Roses for Garden and Greenhouse (33 col. plates); Nat Rose Society, Handbook on Pruning Roses; Rev. J. H. Pemberton Roses, their History, Development and Culture ; Very Rev Dean Hole' A Book about Roses; J. Hoffmann, The Amateur Gardener's Rose Book (20 col. plates; translated from the German); A. Gaut Seaside Planting of Trees and Shrubs; E. Beckett, Book of the Strawberry; W. Iggulden, The Tomato; J. Weathers, Trees and .\hrubs for English and Irish Gardens (33 col. plates) ; Vilmorin et C ie., The Vegetable Garden (Eng. ed. by W. Robinson) ; A. F. Barron V tries and Vine Culture; G. Jekyll, Wall and Water Gardens W Robinson, The Wild Garden; L. H. Bailev, Practical Garden Book (\ew York, 1908). ' (j. Ws. ; W. R. W.)

HORTON, CHRISTIANA (c. 1696-c. 1756), English actress, first appeared in London as Melinda in The Recruiting Officer in 1714 at Drury Lane. Here she remained twenty years, followed by fifteen at Covent Garden. At both houses during this long career she played all the leading tragedy and comedy parts, and Barton Booth (who " discovered " her) said she was the best successor of Mrs. Oldfield. She was the original Mariana in Fielding's Miser (1733).

HORTON, ROBERT FORMAN (i8 5S –), British Noncon- formist divine, was born in London on the 1 8th of September 1855. He was educated at Shrewsbury school and New College, Oxford, where he took first classes in classics. He was president of the Oxford Union in 1877. He became a fellow of his college in 1879, and lectured on history for four years. In 1880 he accepted an influential invitation to become pastor of the Lynd-

hurst Road Congregational church, Hampstead, and sub- sequently took a very prominent part in church and denomina- tional work generally. He delivered the Lyman Beecher lectures at Yale in 1S93; in 1898 he was chairman of the London Congregational Union; and in 1903 of the Congregational Union of England and Wales. In 1909 he took a prominent part in the 75th anniversary celebration of Hartford Theological Seminary. His numerous publications include books on theological, critical, historical, biographical and devotional subjects.

HORTON, SAMUEL DANA (1844-1895), American writer on bimetallism, was born in Pomeroy, Ohio, on the 16th of January 1844. He graduated at Harvard in 1864, and at the Harvard Law School in 1868, studied Roman law in Berlin in 1869, and in 1871 was admitted to the Ohio bar. He practised law in Cincinnati, and then in Pomeroy until 1885, when he gave up law for the advancement of bimetallism. His attention had been turned to monetary questions by the "greenback cam- paign " of 1875 in Ohio, in which, as in former campaigns, he had spoken, particularly effectively in German, for the Republican party. He was secretary of the American delegation to the Monetary Conference which met in Paris in 1878, and edited the report of the delegation. To the conference of 1881 he was a delegate, and thereafter he spent much of his time in Europe, whither he was sent by President Harrison in 1889 as special commissioner to promote the international restoration of silver. He died in Washington, D.C., on the 23rd of February 1895. Horton's principal works were The Silver Pound (1887) and Silver in Europe (1890), a volume of essays.

HORUS (Egyptian Hor), the name of an Egyptian god, if not of several distinct gods. To all forms of Horus the falcon was sacred; the name Hor, written with a standing figure of that

bird ' JSˆ is connected with a roo t signifying "upper," and probably means " the high-flyer." The tame sacred falcon on

its perch Jiˆ is the commonest symbol of divinity in early

hieroglyphic writing; the commonest title of the king in the earliest dynasties, and his first title later, was that which named him Horus. Hawk gods were the presiding deities of Poi (Pe) and Nekhen, which had been the royal quarters in the capitals of the two primeval kingdoms of Upper and Lower Egypt, at Buto and opposite El Kab. A principal festival in very early times

was the " worship of Horus," and the kings of the prehistoric dynasties

were afterwards called " the worshippers of Horus." The Northern Kingdom in particular was under the patronage of Horus. He was a solar divinity, but appears very early in the Osiris cycle of deities, a son of Isis and probably of Osiris, and opponent of Seth. On monuments of the Middle Kingdom or somewhat later we find besides Hor the following special forms: Har-behtet, i.e. Hor of Beht, the winged solar disk, god of Edfu (Apollinopolis Magna); Har-khentekthai, god of Athribis; Har-mesen (whose principal sacred animal was a lion), god of the Sethroite (?) nome; Har-khentemna, i.e. the blind (?) Horus (with a shrew-mouse) at Letopolis; Har-mert (" of two eyes ") at Pharbaethus; Har-akht, Ra-har-akht, or Har-m-akhi (Haniakhis, " Hor of the horizon "), the sun-god of Heliopolis.

As a sun-god Horus not only worsted the hostile darkness and avenged his father, but also daily renewed himself. He was thus identical with his own father from one point of view. In the mythology, especially that of the New Kingdom, or of quite late times, we find the following standing epithets applied to more or less distinct forms or phases: Harendotes (Har-ent-yotf) , i.e. "Hor, avenger of his father (Osiris)"; Harpokhrates (Har-p-khrat), i.e. " H5r the child," with finger in mouth, sometimes seated on a lotus-flower; Harsiesis (Har-si-Esi) , i.e.. " Hor, son of Isis," as a child; Har-en-khebi, " Hor in Chemmis," a child nursed by Isis in the papyrus marshes; Haroeris (Har-uer), i.e. " the elder Hor," at Ombos, &c, human- headed or falcon-headed; Harsemteus (Har-sem-teu), i.e. " Hor, uniter of the two lands," and others. ˆ In the judgment scene Horus introduces the deceased to Osiris. To the Greeks Horus was equivalent to Apollo, but in the name of Hermopolis Parva (see Damanhur), which must have been among the first of the Egyptian cities to be known to them, he was apparently identified with Hermes. Although the falcon was the bird most properly sacred to Horus, not only its varieties, but also the sparrow-hawk, kestrel and other small hawks were mummified in his honour in late times.

See Egypt: section Religion; Meyer, art. " Horos " in Roscher, Lexicon der Griech. und Rom. Mythologie. (F. Ll. G.)

HORWICH, an urban district in the Westhoughton parlia- mentary division of Lancashire, England, 4 m. W.N.W. of Bolton, on the Lancashire and Yorkshire railway. Pop. (1901) 15,084. It lies beneath the considerable elevation of Rivington Pike, where formerly was a great forest. It has extensive locomotive works, and there are large stone quarries in the district. Bleaching and cotton-spinning and the manufacture of fire-bricks and tiles are carried on.

HOSANNA, the cry of praise or adoration shouted in recogni- tion of the Messiahship of Jesus on his entry into Jerusalem (Matt. xxi. 9, 15; Mark xi. 9 sq.; John xii. 13), and since used in the Christian Church. It is also a

Jewish liturgical term, and was applied specifically to the " hosanna " branches carried in procession in the Feast of Booths or Tabernacles, the seventh day of which was called the Hosanna-day (so also in Syrian usage; cf. " Palm " Sunday). This festival (for which see Lev. xxiii. 39 sqq.; 2 Mace. x. 7; Jos. Ant. xii. 10. 4, xiii. 13. 15; and the Talmudic tractate Sukkah) already suggested a Dionysiac celebration to Plutarch (Symp. iv. 6), and was associated with a ceremonial drawing of water which, it was believed, secured fertilizing rains in the following year; the penalty for abstinence was drought (cf. Zech. xiv. 16 seq.). The evidence (see further Ency. Bib. cols. 3354, 4880 seq.; I. Levy, Rev. des Et. juive$ < 1901, pp. 192 sqq.) points to rites of nature-worship, and it is possible that in these the term Hosanna had some other application.

The old interpretation "save, now!" which may be a popular etymology, is based on Ps. cxviii. 25 (Heb. hdshi'ah-nna), but this does not explain the occurrence of the word in the Gospels, a compli- cated problem, on which see the articles of J. H. Thayer in Hastings's Diet. Bib., and more especially T. K. Cheyne, Ency. Bib. s.v.

HOSE (a word common to many Teutonic languages; cf. Dutch, hoos, stocking, Ger. Hose, breeches, tights; the ultimate origin is unknown), the name of an article of dress,

7H

HOSEA

used as a covering for the leg and foot. The word has been used for various forms of a long stocking covering both the foot and leg (see Hosiery), and this is the usual modern sense. But it also formerly meant a kind of gaiter covering the leg from the knee to the ankle only, of the long tight covering for the whole of the lower limbs, and later of the short puffed or slashed breeches worn with the doublet— at this period, from the early part of the 16th century onwards, comes the distinction between the " hose " or " trunk hose " and the stocking (see Costume). The term is applied to certain objects resembling such a covering, as in its application to flexible rubber or canvas piping used for conveying water (see Hosepipe), and in botany, to the " sheath " covering, e.g. the ear of corn. The term " hose-in- hose " is thus used in botany for a flower in which the corolla has become doubled, as though a second were inserted in the throat of the first; it occurs sometimes in the primrose.

HOSEA, the son of Been, the first in order of the minor prophets of the Old Testament. The name Hosea (srtn, LXX. 'fiorje, Vulg. Osee, and so the English version in Rom. ix. 25) ought rather to be written Hoshea, and is

identical with that borne by the last king of Ephraim, and by Joshua in Num. xiii. 16, Deut. xxxii. 44. Of the life of Hosea 1 we know nothing beyond what can be gathered from his prophecies. That he was a citizen of the northern kingdom appears from the whole tenor of the book, but most expressly from i. 2, where " the land," the prophet's land, is the realm of Israel, and vii. 5, where " our king " is the king of Samaria. The date at which Hosea flourished is given in the title, i. 1, by the reigning kings of Judah and Israel. He prophesied (1) in the days of Uzziah, Jotham, Ahaz and Hezekiah, kings of Judah; (2) in the days of Jeroboam the son of Joash, king of Israel. The dates in- dicated by the title, which may be regarded as editorial, are, for the four kings of the southern kingdom, 789-740, 730-734, 733-721 and 720-693 B.C. respectively; and, for Jeroboam II., 782-743 (cf. Ency. Bib. col. 797-798). The book itself, however, plainly belongs to the period prior to 734 B.C. since, in that year, (a) the Syro-Ephraimitic war began, to which there is here no reference, nor is Assyria yet the open foe it then became; (b) Gilead became Tiglaih-Pileser's (2 Kings xv. 29), whereas it is here described as still part of the territory of Israel (vi. 8; xii. 1 1 ; cf. the included place-names of v. 1). On the other hand, the prophet connects with the birth of his eldest child the approaching fall of the house of Jehu (i. 4), thus anticipating the death of Jeroboam II. in 743, and the period of anarchy which followed (2 Kings xv.). Thus the prophetic work of Hosea may be dated, with practical certainty, as beginning from some point previous to 743 and extending not later than 734. 2 This is corroborated by the general character of the book. Of its two parts, i.-iii. reflects the wealth and prosperity of the reign of Jeroboam II. , whilst iv.xiv. contains frequent refer ences to the social disorder and anarchy of the subsequent years.

1 Traditions about Hosea. — Beerl, the prophet's father, is identified by the Rabbins with Beerah (1 Chron. v. 6), a Reubenite prince carried captive by Tiglath-Pileser. This view is already expressed by Jerome, Quaest. in Paralip., and doubtless underlies the state- ment of the Targum to Chronicles that Beerah was a prophet. For it is a Jewish maxim that when a prophet's father is named, he, too, was a prophet, and accordingly a tradition of R. Simon makes Isa. viii. 19, 20 a prophecy of Beerl (Kimchi in loc. ; Leviticus Rabba, par. 15). According to the usual Christian tradition, how- ever, Hosea was of the tribe of Issachar, and from an unknown town, Belemoth or Belemon (pseudo-Epiphanius, pseudo-Dorotheus, Ephraem Syr. ii. 234; Chron. Pasch., Bonn ed., i. 276). As the tradition adds that he died there, and was buried in peace, the source of the story lies probably in some holy place shown as his grave. There are other traditions as to the burial-place of Hosea. A Jewish legend in the Shalshelet haqqabala (Carpzov, Introd., pt. iii. ch. vii. § 3) tells that he died in captivity at Babylon, and was carried to Upper Galilee, and buried

at nsx, that is, Safed (Neubauer, Ceog. du Talmud, p. 227) ; and the Arabs show the grave of Nebi 'Osha, east of the Jordan, near Es-Salt (Baedeker's Palestine, p. 337; Burckhardt's Syria, p. 353).

- The supposed reference of viii. 9-10 to the tribute paid by Menahem to Tiglath-Pileser (2 Kings xv. 19), and dated, on the monuments, 738 B.C., depends on a corrupt text: read v. 10 with Septuagint.

The first part of Hosea's prophetic work, corresponding to chs. i.-iii., lay in the years of external prosperity immediately preceding the catastrophe of the house of Jehu in or near the year 743. The second part of the book is a summary of prophetic teaching during the subsequent troublous reign of Menahem, and, perhaps, that of his successor, Pekahiah, and must have been completed before 734 B.C. Apart from the narrative in chs. i.iii., to which we shall presently recur, the book throws little or no light on the details of Hosea's life. It appears from ix. 7, 8, that his prophetic work was greatly embarrassed by opposition: " As for the prophet, a fowler's snare is in all his ways, and enmity in the house of his God." The enmity which had its centre in the sanctuary probably proceeded from the priests (comp. Amos vii.), against whose profligacy and pro fanation of their office our prophet frequently declaims — perhaps also from the degenerate prophetic gilds which had their seats in the holy cities of the northern kingdom, and with whom Hosea's elder contemporary Amos so indignantly refuses to be identified (Amos vii. 14). In ch. iv. 5 Hosea seems to comprise priests and prophets in one condemnation, thus placing himself in direct antagonism to all the leaders of the religious life of his nation. He is not less antagonistic to the kings and princes of his day (vii. 3-7, viii. 4, viii. 10 Septuagint, x. 7-15, xiii. ii). 3 In view of the familiarity shown with the intrigues of rulers and the doings of priests, it has been conjectured that Hosea held a prominent position, or even (by Duhm) that he was himself a priest (Marti, p. 2).

The most interesting problem of Hosea's history lies in the interpretation of the story of his married life (chs. i.-iii.). We read in these chapters that God's revelation to Hosea began when in accordance with a divine command he married a profligate wife, Gomer, the daughter of Diblaim. Three children were born in this marriage and received symbolical names, illustrative of the divine purpose towards Israel, which are expounded in ch. i. In ch. ii. the faithlessness of Israel to Jehovah (Yahweh), the long-suffering of God, the moral discipline of sorrow and tribulation by which He will yet bring back His erring people and betroth it to Himself for ever in righteousness, love and truth, are depicted under the figure of the relation of a husband to an erring spouse. The suggestion of this allegory lies in the prophet's marriage with Gomer, but the details are worked out quite independently, and under a rich multiplicity of figures derived from

other sources. In the third chapter we return to the personal experience of the prophet. His faithless wife had at length left him and fallen, under circumstances which are not detailed, into a state of misery, from which Hosea, still following her with tender affection, and encouraged by a divine command, brought her back and restored her to his house, where he kept her in seclusion, and patiently watched over her for many days, yet not readmitting her to the privileges of a wife.

In these experiences the prophet again recognizes a parallel to Yahweh's long-suffering love to Israel, and the discipline by which the people shall be brought back to God through a period in which all their political and religious institutions are overthrown. Throughout these chapters personal narrative and prophetic allegory are interwoven with a rapidity of transition very puzzling to the modern reader; but an unbiassed exegesis can hardly fail to acknowledge that chs. i. and iii. narrate an actual passage in the prophet's life. The names of the three children are symbolical, but Isaiah in like manner gave symbolical names to his sons, embodying prominent points

3 Some scholars hold that his attack is directed against the very principle of monarchy (Nowack, p. 8; Smend, p. 209: " Hosea rejects the kingship in itself"; Wellhausen, p. 125: "The making of kings in Israel is for him, together with the heathen cultus, the fundamental evil "). This view depends on a disputed interpreta- tion of the reference to Gibeah (x. 9; cf. ix. 9); and on the words: " I give thee kings in mine anger, and I take them away in my wrath " (xiii. 11), which may refer to the rise and fall of contem- porary kings (cf. Marti, ad loc). In any case, as Wellhausen himself says (p. 132) : " He does not start from a dogmatic theory, but simply from historical experience."

in his prophetic teaching (Shear-jashub, Isa. vii. 3, comp. x. 21; Maher-shalal-hash-baz, viii. 3). And the name of Gomer bath Diblaim is certainly that of an actual person, upon which all the allegorists, from the Targum, Jerome and Ephraem Syrus downwards, have spent their arts in vain, whereas the true sym- bolical names in the book are perfectly easy of interpretation. 1 That the ancient interpreters take the whole narrative as a mere parable is no more than an application of their standing rule that everything in the Biblical history is allegorical which in its literal sense appears offensive to propriety (comp. Jerome's proem to the book). But the supposed offence to propriety seems to rest on mistaken exegesis and too narrow a conception of the way in which the Divine word was

communicated to the prophets. 2 There is no reason to suppose that Hosea knowingly married a woman of profligate character. The point of the allegory in i. 2 is plainly infidelity after marriage as a parallel to Israel's departure from the covenant God, and a profligate wife (d';i:i wk) is not the same thing with an open prostitute (■■"")• The marriage was marred by Gomer's infidelity; and the struggle of Hosea's affection for his wife with this great unhappiness — a struggle inconceivable unless his first love had been pure and full of trust in the purity of its object — furnished him with a new insight into Yahweh's dealings with Israel. Then he recognized that the great calamity of his life was God's own ordinance and appointed means to communicate to him a deep prophetic lesson. The recognition of a divine command after the fact has its parallel, as Wellhausen observes, in Jer. xxxii. 8.

It was in the experiences of his married life, and in the spiritual lessons opened to him through these, that Hosea first heard the revealing voice of Yahweh (i. 2).' Like Amos (Amos iii. 8), he was called to speak for God by an inward constraining voice,

*1 Theodorus Mops, remarks very justly, Kal-ro ovoiia xaJ tAp xorepa X*7ei, us jii) TXdayia ipi\6v ti SokoLtj t6 Xtybpevov, itrropla 5i dAij#i)s tw jrpcry/iaTtoi/.*

2 This explanation of the narrative, which is essentially Ewald's, is now generally accepted. It has the great advantage of supplying a psychological key to the conception of Israel or the land of Israel (i. 2) as the spouse of Yahweh, which dominates these chapters, but in the later part of the book gives way to the personification of the nation as God's son. This conception has, indeed, formal points of contact with notions previously current, and even with the ideas of Semitic heathenism. On the one hand, it is a standing Hebrew usage to represent the land as mother of its people, while the repre- sentation of worshippers as children of their god is found in Num. xxi. 29, where the Moabites are called children of Chemosh, and is early and widespread throughout the Semitic field (cf. Trans. Bib. Arch. vi. 438; Jour, of Phil. ix. 82). The combination of these two notions gives at once the conception of the national deity as husband of the land. On the other hand, the designation of Yahweh as Baal, which, in accordance with the antique view of marriage, means husband as well as lord and owner, was current among the Israelites in early times, perhaps, indeed, down to Hosea's age (ii. 16). Now it is highly probable that among the idolatrous Israelites the idea of a marriage between the deity and individual worshippers was actually current and connected with the immorality which Hosea often condemns in the worship of the local Baalim whom the ignorant people identified with Yahweh. For we have a Punic woman's name, VynneHN, " the betrothed of Baal " (Euting, Punische Steine, pp. 9,

15), and a similar conception existed among the Babylonians (Herod, i. 181, 182). But Hosea takes the idea of Yahweh as husband, and gives it an altogether different turn, filling it with a new and profound meaning, based on the psychical experiences of a deep human affection in contest with outraged honour and the wilful self-degradation of a spouse. It can hardly be supposed that all that lies in these chapters is an abstract study in the psychology of the emotions. It is actual human experience that gives Hosea the key to divine truth.

3 Davidson (D.B. ii. 422) remarks that " it was not his mis- fortunes that gave Hosea his prophetic word. Israel's apostasy was plain to him, and he foreshadowed her doom in Jezreel, the name of his first child, before any misfortunes overtook him. At most, his misfortunes may at a later time have given a complexion to his prophetic thoughts." Wellhausen (p. 108) objects to the emergence of the call from the experience, on the ground that the name given to the first child gives no indication that Hosea had yet reached his specific message, the infidelity of. his wife and of Israel, though it shows him already as a prophet. Marti (p. 15) agrees with Davidson in making the order (a) call, (6) marriage and birth of three children, (c) comprehension of the significance of the marriage for himself and for Israel. The statement made above must be interpreted of Hosea's specific message from Yahweh, as recorded in his book.

and there is no reason to think that he had any connexion with the recognized prophetic societies, or ever received such outward adoption to office as was given to Elisha. His position in Israel was one of tragic isolation. Amos, when he had discharged his mission at Bethel, could return to his home and to his friends; Hosea was a stranger among his own people, and his home was full of sorrow and shame. Isaiah in the gloomiest days of Judah's declensions had faithful disciples about him, and knew that there was a believing remnant in the land. Hosea knows no such remnant, and there is not a line in his prophecy from which we can conclude that his words ever found an obedient ear.

As already stated, this prophecy falls into two clearly dis- tinguished sections, 4 the former (i.-iii.), already dealt with, accounting for the general standpoint of the latter (iv.-xiv.). It is not possible to make any convincing subdivisions of this latter section (cf. G. A. Smith, i. p. 223) which is best regarded as a series of separate discourses on certain recurrent topics, viz. (a) the cultus, (b) the social disorder and immorality, (c) political tendencies (alliance with either Assyria or Egypt sought). 5 In regard to each of these topics, the attitude of the prophet involves the discernment of present guilt, and the assertion of future punishment. For him the present condition of the people contained no germ or pledge of future amendment, and he describes the impending judgment, not as a

sifting process (Amos ix. 9, 10) in which the wicked perish and the righteous remain, but as the total wreck of the nation which has wholly turned aside from its God. In truth, while the idolatrous feasts of Ephraim still ran their joyous round, while the careless people crowded to the high places, and there in unbridled and licentious mirth flattered themselves that their many sacrifices ensured the help of their God against all calamity, the nation was already in the last stage of internal dissolution. To the prophet's eye there was " no truth, nor mercy, nor knowledge of God in the land—nought but swearing, and lying, and killing, and stealing and adultery; they break out, and blood toucheth blood " (iv. 1, 2). The root of this corruption lay in total ignorance of Yahweh, whose precepts were no longer taught by the priests, while in the national calf-worship, and in the local high places, this worship was confounded with the service of the Canaanite Baalim. Thus the whole religious constitution of Israel was undermined. And the political state of the realm was in Hosea's eyes not more hopeful. The dynasty of Jehu, still great and powerful when the prophet's labours began, is itself an incorpora- tion of national sin. Founded on the bloodshed of Jezreel, it must fall by God's vengeance, and the state shall fall with it (i. 4, iii. 4). This sentence stands at the head of Hosea's pre-dictions, and throughout the book the civil constitution of Ephraim is represented as equally lawless and godless with the corrupt religious establishment. The anarchy that followed on the murder of Zachariah appears to the prophet as the natural decadence of a realm not founded on divine ordinance. The nation had rejected Yahweh, the only helper. And now the avenging Assyrian 6 is at hand. Samaria's king shall pass away as foam on the water. Fortress and city shall fall before the ruthless invader, who spares neither age nor sex, and thistles shall cover the desolate altars of Ephraim.

In our present book of Hosea, this condemnatory judgment on contemporary Israel culminates in a chapter of appeal for penitence, with promise of divine forgiveness. The question of the authenticity of this and of other " restoration" passages 7 forms the chief problem

4 Marti disregards this generally accepted division, argutng that (a) i.-iii. was not written earlier than iv.-xiv., (6) iii. is not Hoseanic, (c) ii. is much more akin to iv.-xiv. than to i.-iii. (Comm. p. 1 ; cf. Enc. Bib. 2123 n. s). He holds that another wife, not Gomer, is intended in iii., which is an allegory referring to Israel, as Gomer referred to J udah. His arguments are not convincing. 1

6 So, practically, Davidson, D.B. ii. p. 423 seq., where the detailed references will be found.

6 This is too definite for the data; cf. Davidson, I.e. " Hosea has

no clear idea of the instrument or means of Israel's destruction.

It is ' the sword ' (vii. 16, xi. 6), the ' enemy ' (viii. 3, v. 8-9);

or it is natural, internal decay (vii. 8-9, ix. 16), the moth and

I rottenness (v. 12)."

' ' e.g. i. 10-ii. 1, ii. 14

14 f., iii. 5, v. 15-vi. 3, xi. io-II.

for literary criticism presented by the book. 1 Amongst the more recent commentators, Davidson, G. A. Smith and Nowack regard Hosea xiv. as written by the prophet, though the second admits its chronological misplacement and the third its later expansion. On the other hand, it is altogether rejected by Cheyne, Wellhausen, Marti and Harper. These claim that the passage reflects the later standpoint of completed punishment, and is therefore inconsistent in the prophet who anticipates that punishment. But the case is different from that of the epilogue to Amos, since Hosea's personal experience covers forgiveness as well as discipline (Marti consistently, though without ground, rejects this experience also). There seems, therefore, to be no sufficient evidence for denying thoughts of restoration to Hosea, whilst it is highly probable that such passages would be amplified in a later age. Indeed, the importance of these passages for the interpretation of Hosea is apt to be overrated, for, as one of those rejecting them remarks, though Hosea " promised nothing,' yet he " contributed a conception of Yahweh which made such a future not only possible but even probable " (Harper, p. cliii.). We may therefore read the closing chapter as, at least, the explicit statement of a hope implicit in Hosea's teaching.

Hosea could discern no faithful remnant in Ephraim, yet Ephraim in all his corruption is the son of Yahweh, a child nurtured with tender love, a chosen people, whose past history declares in every episode the watchful and patient affection of his father. And that father is God and not man, the Holy One who will not and cannot sacrifice His love even to the justest indignation (chap. xi.). To the prophet who knows this love of Yahweh, who has learned to understand it in the like experience of his own life, the very ruin of the state of Israel is a step in the loving guidance which makes the valley of trouble a do.or of hope (ii. 15), and the wilderness of tribulation as full of promise as the desert road from Egypt to Canaan was to Israel of old. Of the manner of Israel's repentance and conversion Hosea

presents no clear image — nay, it is plain that on this point he had nothing to tell. The certainty that the people wiH at length return and seek Yahweh their God rests, not on any germ of better things in Israel, but on the invincible supremacy of Yahweh's love. And so the two sides of his prophetic declaration, the passionate denunciation of Israel's sin and folly, and the not less passionate tenderness with which he describes the final victory of divine love, are united by no logical bond. The unity is one of feeling only, and the sob of anguish in which many of his appeals to a heedless people seem to end turns once and again with sudden revulsion into the clear accents of evangelical promise, which in the closing chapter swell forth in pure and strong cadence out of a heart that has found its rest with God from all the troubles of a stormy life.

The strongly emotional temperament of Hosea suggests com- parison with that of Jeremiah, who like himself is the prophet of the decline and fall of a kingdom. The subsequent influence of Hosea on the literature of the Old and New Testaments is very marked. Not only is it seen in the conception of the relation between God and His people as a marriage, which he makes current coin (cf. Marti, p. 15), but still more in the fact that his conception of the divine character becomes the inspiration of the book of Deuteronomy and so of the whole canon of Scripture. " In a special degree, the author of Deuteronomy is the spiritual heir of Hosea." 2

Recent Literature (where references to older works will be found): Cheyne, "Hosea" in Cambridge Bible (1884); W. R. Smith, The Prophets of Israel, 2 with Cheyne's introduction (1895); G, A. Smith, " The Book of the Twelve," i., in The Expositor' s Bible (1896); Nowack, Die Kleinen Propheten (1897); Wellhausen, Die Kleinen Propheten 3 (1898); Smend, Alttest. Religionsgeschichte,' 1 pp. 204 f. (1899); Davidson, art. " Hosea " in Hastings' Dictionary of the Bible, ii. pp. 419 f. (1900); Marti, art. "Hosea" in Ency.

1 Apart from glosses and minor alterations, the only other critical problem of importance is that of the references to Judah scattered throughout the book (i. 7, iv. 15, v. 5, v. 10 f., vi. 4, II, viii. 14, x. 11, xi. 12). There is no inherent improbability in some mention -of the sister kingdom; but some of the actual references do suggest interpolation, especially i. 7, where the deliverance of Judah from Sennacherib in 701 B.C. seems intended. Each case, as Wellhausen implies, is to be considered oh its merits. On these and other suspected passages, cf. Cheyne, Intro, to W. R. Smith's Prophets of Israel, pp. xvh.-xxii. ; Marti, p. 8; Harper, p. clix.

8 Driver, Deuteronomy, p. xxvii.

Biblica,u. c. 2119 (1901) (a revision of the original article by W. R.

Smith, in the Ency. Britannica, partially reproduced above); Marti, Dodekapropheton (1903); W. R. Harper, "Amos and Hosea" in Inter. Critical Commentary (1905) (with copious bibliography).

(W. R. S.;H. W. R.)*

HOSE-PIPE, or simply " hose," the name given to flexible piping by means of which water may be conveyed from one place to another. One end of the pipe is connected to the source of the water, while the other end is free, so that the direction of the stream of water which issues from the pipe may be changed at will. The method of manufacture and the strength of the materials used depend naturally upon the particular use to which the finished article is to be put Simple garden hose is often made of india-rubber or composition, but the hose intended for fire brigade and similar important purposes must be of a much more substantial material. The most satisfactory material is the best long flax, although cotton is also extensively used for many types of this fabric.

The flax fibre, after having been carefully spun into yarn, is boiled twice and then beetled; these two processes remove all injurious matter, and make the yarn soft and lustrous. The yarn is then wound on to large bobbins, and made into a chain ; the number of threads in the chain depends upon the size of the hose, which may be anything from half an inch to 15 in. or even more in diameter. When the chain is warped, it is beamed upon the weaver's beam, and the ends — either double or triple- are drawn through the leaves of the cambs of heddles, passed through the reed and finally tied to the cloth beam. The prepara- tion of the warp for any kind of loom varies very little, but the weaving may vary greatly. In ail cases the hose fabric is essentially circular, although it appears quite flat during the weaving operation.

There are very few hand-made fabrics which can compete with the machine-made article, but the very best type of hose- pipe is certainly one of the former class. The cloth can be made much more cheaply in the power-loom than in the hand-loom, but, up to the present, no power-loom has been made which can weave as substantial a cloth as the hand-loom product; the weak part in all hose-pipes is where the weft passes round the sides from top to bottom of the fabric or vice versa, that is, the side corre- sponding to the selvages in an ordinary cloth; the hand-loom weaver can draw the weft tighter than is possible in the power- loom, hence the threads at the sides can be brought close to- gether, and by this means the fabric is made almost, but not quite, as perfect here as in other parts. It is essential that the warp threads be held tightly in the loom, and to secure this, they pass alternately over and under three or four back rests before reaching the heddles or cambs, which are almost invariably made of wire. Although the

warp yarn is made very soft and pliable by boiling and beetling, the weaver always tallows it in order to make it work more easily.

The commonest type of hose-pipe is made on the double-plain principle of weaving, the cloth being perfectly plain but woven in such a manner that the pipe is without seams of any kind. Fig. 1 is a design showing two repeats or eight shots in the way of the weft, and six repeats or twenty-four- threads in the way of the warp, consequently the weave is complete on four threads, or leaves, and four picks. Fig. 2 illustrates the method of interlacing the threads

Fig. 1.

Fig. 2.

and the picks : this figure shows that twenty-three threads only are used, the first thread — shown shaded in fig. I — having been left out. It is necessary to use a number of threads which is either one less or one more than some multiple of four — the number of threads in the unit weave. The sectional view (fig. 2), although indicating the crossings of. the warp and the weft, is quite different from an actual section through the threads: the warp is almost invariably two of three ply, and in addition two or more of these twisted threads pass through the same heddle-eye in the camb; moreover, they are set very closety together — so closely, indeed, that the threads entirely conceal the weft; it is, therefore, impossible to give a correct

Fig. 3. — Section through the Warp.

sectional view with satisfactory clearness, as the threads are so very rank, but fig. 3 gives some idea of the structure of the fabric. This view shows ninety-nine threads and one complete round of weft ; this round is, of course, equal to two picks or shots — one pick for fhc top part of the cloth and one for the bottom part. A com- parison of this figure with fig. 2 will, perhaps, make the description clearer. The weft in fig. 3 is thinner than the warp, but, in practice, it is always much thicker, and may consist of from two to seventy threads twisted p together.

Hose-pipes are also woven with the three-leaf twill on both sides, and occasionally with the four-leaf twill. These pipes, woven with the twill weaves, are usually lined with a pure rubber tube which is fixed to the inside of the cloth by another layer of rubber after the cloth leaves the

loom. Such pipes have usually, but not invariably, a smoother inner surface than those which are unlined, hence, when they are used, less friction is presented to the flow of water, and there is less ten- dency for the pipe to leak. They are, therefore, suitable for hotels, public buildings and similar places where their temporary use will not result in undue damage to articles of furniture, carpets and general decoration.

The greatest care must be observed in the weaving of these fabrics, the slightest flaw in the structure rendering the article practically useless. After the cloth has been woven, it is carefully examined, and then steeped in a chemical solution which acts as an antiseptic. The cloth is thus effectively preserved from mildew, and is, in addition, made more pliable. Finally the hose-pipe is dried artificially, and then fitted with the necessary couplings and nozzles. For a more detailed description of circular weaving see Woodhouse and Milne, Textile Design: Pure and Applied. (T. Wo.)

HOSHANGABAD, a town and district of British India, in the Nerbudda division of the Central Provinces. The town stands on the left bank of the Nerbudda, 1009 ft. above the sea, and has a railway station. Pop. (1901), 14,940. It is supposed to have been founded by Hoshang Shah, the second of the Ghori kings of Mahva, in the 15th century; but it remained an insignificant place till the Bhopal conquest about 1720, when a massive stone fort was constructed, with its base on the river, commanding the Bhopal road. It sustained several sieges during the 1 8th century, and passed alternately into the hands of the Bhopal and Nagpur rulers. Since 1818 it has been the residence of the chief British officials in charge of the district. It has a government high school, and agricultural school and a brass-working industry.

The District of Hoshangabad has an area of 3676 sq. m. Pop. (1901). 449,165, showing a decrease of 10% in the decade, due to famine. It may be described as a valley of varying breadth, extending for 150 m. between the Nerbudda river and the Satpura mountains. The soil consists chiefly of black basaltic alluvium, often more than 20 ft. deep; but along the banks of the Nerbudda the fertility of the land compensates for the tameness of the scenery. Towards the west, low stony hills and broken ridges cut up the level ground, while the Vindhyas and the Satpuras throw out jutting spurs and ranges. In this wilder country considerable regions are covered with jungle. On the south the lofty range which shuts in the valley is remarkable in mountain scenery, surpassing in its picturesque irregularity the Vindhyan chain in the north. Many streams take their rise amid its precipices, then, winding through deep glens, flow across the plain between sandy banks covered with low jungle till they swell the waters of the Nerbudda. None is of any impor- tance except the Tawa, which is interesting to the geologist on account of the many minerals to be found along its course. The

boundary rivers, the Nerbudda and Tapti, are the only con- siderable waters in Hoshangabad. The principal crops are wheat, millets and oil-seeds. The district is traversed through- out its length by the Great Indian Peninsula railway.

HOSHEA (Heb. for " deliverance "), the last king of Israel, in the Bible. The attempt of his predecessor Pekah to take Jerusalem with the help of his ally Rasun (Rezin) of Damascus was frustrated by the intervention of Tiglath-Pileser IV. (see Ahaz), who attacked Gilead, Galilee and the north frontier,

and carried off some of its population (cp. 1 Chron. v. 26). Pekah's resistance to Assyria led to a conspiracy in which he lost his life, and Hoshea the son of Elah became king (2 Kings xv. 27-30). The Assyrian king held him as his vassal (and indeed claims to have set him on the throne) , and exacted from him a yearly tribute. Meanwhile, Damascus was besieged (733-732 B.C.), Rasun was slain and the inhabitants deported (2 Kings xvi. 9; LXX. omits " to Kir," but see Amos i. 5). The impending fate of Damascus is illustrated by Isaiah (vii. 16, viii. 4, xvii. 1-11), who also gives a vivid description of the impression left by the Assyrian army (v. 26-30). After the death of Tiglath-Pileser, Israel regained confidence (Isa. ix. 8-x. 4) and took steps to recover its independence. Its policy vacillated — " like a silly dove " (Hos. vii. 11), and at length negotiations were opened with Mizraim. The annual payment of tribute ceased and Shalmaneser IV. (who began to reign in 727 B.C.) at once laid siege to Samaria, which fell at the end of three years (722-721 B.C.). The achievement is claimed by his successor Sargon. Hoshea was. killed, the land was again partly depopu- lated and a governor appointed (2 Kings xviii. 9-12; cp. xvii. 1 sqq.). For other allusions to this period see Hosea, Isaiah.

2 Kings xvii. 3 and 5 imply two attacks by Shalmaneser : in the first of which Hoshea was imprisoned and perhaps blinded (Cheyne, emending, " shut him up " in v. 4), although in v. 6 he is still reigning; see on this Winckler, Keilinschr. u. Alte Test. 3 p. 268; Burney, Kings, p. 328 seq. ; Skinner, Kings, p. 372 seq. The chronological notes, moreover, are extremely confused; contrast xv. 30 with xvii. 1. The usual identification of So (or Seve), king of Mizraim, with Shabaka of Egypt is difficult, partly on chronological grounds (which Petrie, History of Egypt, pp. 277, 281 sqq. does not remove), and partly because the Ethiopian dominion in Egypt appears to be still weak and divided. The Assyrian records name a certain Sibi as officer, and also Piru (Pharaoh!) as king of Musri, and it is doubtful whether Hoshea's ally was a petty prince of Egypt or of a N. Arabian district (see Mizraim). If the latter, Hoshea's policy becomes- more intelligible; see Whitehouse, Isaiah, p. 17 seq.; Jews: History; Philistines.

On the depopulation of Samaria and the introduction of colonists, see Winckler's objections, Alttest. Untersuch. pp. 95-107, with Burney's criticisms, Kings, p. 334 seq. (S. A. C.) ;

HOSHIARPUR, a town of British India, in the Jullundur division of the Punjab. Pop. (1901), 17,549. It was founded, according to tradition, about the early part of the 14th century < In 1809 it was occupied by Ranjit Singh. The maharaja and his successors maintained a considerable cantonment 1 m. S.E. of the town, and the British government kept it up for several years after the annexation of the Punjab in 1849. There are manufactures of cotton goods, inlaid woodwork, lacquered ware, shoes and copper vessels.

The District of Hoshiarpur comprises an area of 2244 sq. m.; pop. (1901) 989,782, showing a decrease of 2% in the decade, compared with an increase of 12% during the previous decade. It falls into two nearly equal portions of hill and plain country. Its eastern face consists of the westward slope of the Solar Singhi Hills; parallel with that ridge, a line of lower heights belonging to the Siwalik range traverses the district from south to north, while between the two chains stretches a valley of uneven width, known as the Jaswan Dun. Its upper portion is crossed by the Sohan torrent, while the Sutlej sweeps into its lower end through a break in the hills, and flows in a southerly direction till it turns the flank of the central range, and debouches westwards upon the plains. This western plain consists of alluvial formation, with a general westerly slope owing to the deposit of silt from the mountain torrents in the sub-montane tract. The Beas has a fringe of lowland, open to moderate but not excessive inundations, and considered very fertile. A considerable area is covered by government woodlands, under the care of the forest department. Rice is largely grown, in the marshy flats along the banks of the Beas. Several religious fairs are held, at Anandpur, Mukerian and Chintpurni, all of which attract an enormous concourse of people. The district, owing to its proximity to the hills, possesses a comparatively cool and humid climate. Cotton fabrics are manufactured, and sugar, rice and other grains, tobacco and indigo are among the exports.

The country around Hoshiarpur formed part of the old Hindu kingdom of Katoch in Jullundur. The state was eventually broken up, and the present district was divided between the rajas of Ditarpur and Jaswan. They retained undisturbed possession of their territories until 1759, when the rising Sikh chieftains commenced a series of encroachments upon the hill

tracts. In 181 5 the aggressive maharaja, Ranjit Singh, forced the ruler of Jaswan to resign his territories in exchange for an estate on feudal tenure; three years later the raja of Ditarpur met with similar treatment. By the close of the year 1818 the whole country from the Sutlej to the Beas had come under the government of Lahore, and after the first Sikh war in 1846 passed to the British government. The deposed rajas of Ditarpur and Jaswan received cash pensions from the new rulers, but expressed bitter disappointment at not being restored to their former sovereign position. Accordingly the outbreak of the second Sikh war, in 1848 found the disaffected chieftains ready for rebellion. They organized a revolt, but the two rajas and the other ringleaders were captured, and their estates confiscated.

HOSIERY, a term used to designate all manufactured textile fabrics which in their process of manufacture have been built on the principle of looping or loop structure. The origin of the term is obvious, being derived from " hose " or stocking, this being one of the earliest garments made by the process of knitting (q.v.). While it still forms one of the staples of the trade, it is only one of a very numerous and diversified range of applications of the entire industry. The elastic structure of knitting makes it very adaptable for all kinds of body or underwear. There is scarcely a single textile article manufactured but can be reproduced on the knitting or loop structure principle. The art of knitting is of very modern origin as compared with that of weaving. No certain allusion to the art occurˆ before the beginning of the 15th century. In an act of parliament of Henry VII. (1488) knitted woollen caps are mentioned. It is supposed that the art was first practised in Scotland, and thence carried into England, and that caps were made by knitting for some period before the more difficult feat of stocking-making was attempted. In an act of Edward VI. (1553) " knitte hose, knitte peticotes, knitte gloves and knitte sleeves " are enumer- ated, and the trade of hosiers, among others, included in an act dated 1563. Spanish silk stockings were worn on rare occasions by Henry VIII., and the same much-prized articles are also mentioned in connexion with the wardrobe of Edward VI.

Knitting, or loop formation by mechanical means, is divided into two distinct principles — frame-work knitting and warp knitting. Both principles may be employed in the formation of a large variety of plain and fancy stitches or a combination of the two.

Frame-work Knitting in its simplest form consists of rows of loops supporting each other — built from one continuous thread of yarn and running from one side of the fabric to the other and back

Fig. 1. — The Stitch or Loop Structure of Plain Knitting (back of fabric).

Fig. 2 — A Single Thread formed into a Chain of Crocket Work, showing the Loop Structure of the plain Warp-knitted Fabric. It is built up as shown in the diagram by a number of threads running up the fabric.

frame-work knitting. For this reason it is largely used in the shawl,

glove and fancy hosiery industries.

Machinery. — In hand knitting the implements employed (a few

needles or wires) are very simple and inexpensive. In the manu- facturing industry

the most complex

and ingenious

machinery is used.

In 1589 the Rev.

William Lee, a

graduate of St

John's College,

Cambridge, while

acting as curate (or

vicar) of Calverton,

Nottinghamshire,

introduced his

stocking-frame.

This machine was

the first mechanical

means employed to

produce a looped or

knitted fabric. This

frame or machine of

Lee's was the origin

of all the hosiery

and lace machines

at present in use.

One of the most

remarkable points

about his invention

was its complete- ness and adapt- ability for the work

for which its inven- tor intended it. The

main principles of

Lee's frame are em- bodied in most of the rotary or power frames of the present day.

Fig. 3 shows a hand frame of the present day.

In hand knitting an indefinite number of loops are skewered on

a wire or pin, but, in Lee's frame, an individual hooked or bearded

needle is employed for the support and formation of each loop in

the breadth of the fabric. This needle consists of a shank with a

terminal spring-pointed hook (or beard), the point of which can be pressed at will into a groove or eye in the shank. For method by which the loops are formed on the needles of the frame see fig. 4. This shows a few of Lee's hooked or bearded needles having the old loops or work hanging round the needle shanks. The thread of yarn which is to form the new row of loops is laid over the needle shanks and waved or looped between each pair of needles. This waving or looping ensures sufficient yarn being drawn and loops of a uniform size being made, so that a regular and level fabric will be produced. The looping or waving is obtained by having thin plates of shaped metal, called sinkers, which have a nose-shaped point and hang

between the needles. When looping they have an individual movement down- wards between the needles, and as they fall the nose- shaped point car- ries the yarn down, thus forming the new loop (fig. 5). The size of the loop is regulated by the distance the sinker is allowed to fall. After the thread of yarn has been

Fig. 3. — Hand Stocking Frame.

Fig. 4. The leads into which the needles (B) are

(fig. 1). It is on this principle of stitch that the greatest amount of hosiery is built (hose, shirts, pants).

Warp Knitting in its simplest form consists of rows of loops, but the number of threads employed are equal to the number of loops in the width of the fabric. Thus it will be seen that the threads run lengthwise of the fabric (fig. 2). This principle gives greater scope for reproducing designs in openwork and colour than that of

looped between ca ?V ~, , , , ,

the needle shanks D ‘ The old loops or work ‘ by the sinkers the C ‘ Tne new loops forme d and brought under loops are brought the beards.

forward under the needle beards or hooks. A presser bar is now brought down to close or press all the points of the needle beards into the eye in the shank. Thus all the hook ends of the needles are temporarily closed, with the newly formed loops under them. While in this position, the old loops hanging round the shank are brought forward and landed on to the top of the needle beard and off the needle altogether, being thus left hanging round, or supported by the loops newly formed. The needle beards are now released, and the loops drawn back along the shanks to be in position for next new course of loops. The foregoing is only an outline of how the loops are formed on the needles. It is not necessary here to enter into a description of the complex mechanical movements of Lee’s stocking-frame. The first fabric made by Lee was of a

fiat, even-selvedged nature, so that garments had to be cut to shape from the fabric. He soon learned to fashion or shape the garment at will, during the process of making, by transferring loops

^

Formation of a Loop on a Hand Frame.

1, Bearded needle cast in the lead. A, Lead; B, Shank; C, Eye;

D, Beard.

2, The thread is laid over the needles and formed into loops between

the needles by means of the sinkers, those new-formed loops being brought under the needle beards (as at 3).

4, The beards pressed or closed to allow the old loops to be passed

on to the top.

5, The old loops knocked off the needles and left hanging round the

newly formed loops.

at the edges, inwards to narrow, or outwards to widen. This process at the present day is known as fashioning, and all garments of the best make are shaped or fashioned in this manner. After Lee had

practised his new art for a few years at Calverton he removed to London, but on his receiving no help or encouragement from Queen Elizabeth or her successor, King James, he was induced to cross over to France with his frames. There he built up a flourishing industry at Rouen, under the patronage of the French king, Henry IV. Through the murder of this monarch he lost his patronage and died of want about the year 1610. He was buried in an unknown grave in Paris.

A number of improvements had been made on Lee's frame during the 1 8th century. The one of greatest importance was the rib machine invented by Jedediah Strutt of Belper in 1758. It was not what could be actually termed an improvement on Lee's frame, but an addition to it. Lee's frame was not altered in any way, Strutt's machine being added to it, and the two being worked in conjunction produced a fabric of a more elastic nature and alike on both sides (fig. 6). Strutt's machine consisted of a set of needles placed at right angles to and between Lee's plain needles, with the result that, when knitting, the frame needles drew their loops to one side and the machine needles their loops to the opposite side of the fabric. The first offshoot from frame-work knitting was the invention of the hand warp loom in 1775. It was improved by the addition of the Dawson wheel by William Dawson in 1791. This machine is the origin of the various complex machines now working on this principle. Some of these have Jacquard mechanism attached, and nearly all of them are driven by motive

power. About the middle of the 19th century close on 50,000 of Lee's hand frames were in use, finding employment for nearly 100,000 persons. Many attempts had been made previously to transform Lee's frame into a power or rotary frame. One of the first and most successful was that invented by Luke Barton in 1857. This frame was fitted with self-acting mechanism for fashioning, and was practically Lee's frame having rotary shafts with cams added to give the various movements, this type of frame being known as straight bar rotary frames. In 1864 William Cotton of Loughborough altered this frame by reversing the positions of the needles and sinkers. Although made by various builders it is still known as the " Cotton Patent Rotary Frame " (fig. 7). Since 1 864 a great number of important improvements and additions have been made to this frame. Single frames are built which will turn off one dozen pairs of hose at once, with the attention of one person. One of the most important inventions in connexion with the hosiery trade was the latch, tumbler, or self-acting needle invented by Matthew Townsend and David Moulding of Leicester in 1858. Previous to this Lee's type of needle was the only one in use. This latch- needle (fig. 8) consists of a stem having a butt at lower end by which it receives its knitting action from cams,

Fig. 6.— A \ Rib

Stitch.

Fig. 7. — Eight at once, 130 gauge, full-fashioned, seamless bosom, sloped shoulder underwear frame, Cotton's patents. (William Cotton, Ltd., Loughborough.)

the upper end being turned into a hook. Near the hook end and attached to the stem by a pin is the spoon-shaped latch, which closes over the hook as required. Machines fitted with latch- needles have grooves in which the stem of the needle works. Cams,

which act on the needle butts, give the needles their individual knit- ting action in rota- tion. This needle is self-acting, in that it is made to draw its own loop, sinkers being dis- pensed with.

Fig. 9 shows the looping action of this needle. The needles when not knitting have a Fig. 8. — Various Shapes of the Latch Needle, loop round their

shank, thus hold- ing the latch open. When about to knit, they are raised

individually and in rotation (by the cams acting on the needle butts) to receive the new loop of yarn.

Down till almost the middle of the 19th century only a flat web could be knitted in the machines in use, and for the finishing of stockings, &c, it was necessary to seam up the selvedges of web shaped on the frame (fashioned work), or to cut and seam them from even web (cut work). The introduction of any device by which seamless garments could be fabricated was obviously a great desideratum, and it is a singular fact that a machine capable of doing this was patented in 1816 by Sir Marc I. Brunei. This frame was the origin of the French-German loop-wheel circular frame of the present day. Brunei's frame was greatly improved by Peter Claussen of Brussels and was shown at an exhibition in Nottingham in 1845. This frame had horizontal placed needles fixed on a rotating rim. A few years later Moses Mellor of Nottingham tra-nsformed this type of frame by altering the position of the needles to perpendicular. This is now known as the English loop-wheel circular frame. After the invention of the latch-needle there was a revolution in the hosiery machine-building industry, new types of machines being

invented, fitted to work with latch- needles. Among Others there was the latch-needle circular frame, invented by Thomas Thompson, which was the origin of the English latch- needle circular frame, 1 a frame largely used for the production of wide circular fabric.

A circular knitting machine of American origin is the type of machine on which is produced the seam- less hosiery of to-day. Like the sewing machine it is largely used in the home as well as in the factory. From this machine all the circular automatic power machines for making plain and rib seamless hose and half hose have been developed. The " flat " or " lamb " type of machine, an American invention, was introduced by J. W. Lamb in 1863. This machine has two needle beds or rows of needles sloping at an angle of nearly 90 °.

A great many varieties of this type of machine have been invented for the production of all kinds of plain and fancy hosiery. It is built in small sizes to be wrought by hand or in large power machines. A large variety of sewing, seaming and linking machines are em- ployed in the hosiery industry for the purpose of putting together or joining all kinds of hosiery and knitted goods. These machines have almost entirely superseded the sewing or joining of the gar- ments by hand.

The principle centres in Great Britain of the hosiery industry are Leicester and Nottingham and the surrounding districts. It is also an industry of some extent in the south of Scotland. (T. B.)*

HOSIUS, or Osius (c. 257-359), bishop of Cordova, was born about a.d. 257, probably at Cordova, although from a passage in Zosimus it has sometimes been conjectured that he was believed by that writer to be a native of Egypt. Elected to the see of Cordova before the end of the 3rd century, he narrowly escaped martyrdom in the persecution of Maximian (303-305). In 305 or 306 he attended the council of Illiberis or Elvira (his

Fig. 9.-

-Individual Action of the Latch Needle.

name appearing second in the list of those present), and upheld its severe canons concerning such points of discipline as the treatment of the lapsed and clerical marriages. In 3 13 he appears at the court of Constantine, being expressly mentioned by name in a constitution directed by the emperor to Caecilianus of Carthage in that year. In 323 he was the bearer and possibly the writer of Constantine's letter to Bishop Alexander of Alexandria and Arius his deacon, bidding them cease disturbing the peace of the church; and, on the failure of the negotiations in Egypt, it was doubtless with the active concurrence of Hosius that the council of Nicaea was convened in 325. He certainly took part in its proceedings, and was one of the large number of " confessors " present; that he presided is a very doubtful assertion, as also that he was the principal author of the Nicene Creed. Still he powerfully influenced the judgment of the emperor in favour of the orthodox party. After a period of quiet life in his own diocese, Hosius presided in 343 at the fruitless synod of Sardica, which showed itself so hostile to Arianism; and afterwards he spoke and wrote in favour of Athanasius in such a way as to bring upon himself a sentence of banishment to Sirmium (355). From his exile he wrote to Constantius II. his only extant composition, a letter not unjustly characterized by the great French historian Sebastian Tillemont as displaying gravity, dignity, gentleness, wisdom, generosity and in fact all the qualities of a great soul and a great bishop. Subjected to continual pressure the old man, who was near his hundredth year, was weak enough to sign the formula adopted by the second synod of Sirmium in 357, which involved communion with the Arians but not the condemnation of Athanasius. He was then permitted to return to his diocese, where he died in 359. See S. Tillemont, Memoires, vii. 300-321 (1700); Hefele, Con- ciliengeschichte, vol. i.; H. M. Gwatkin, Studies of Arianism (Cambridge, 1882, 2nd ed., 1900); A. W. W. Dale, The Synod of Elvira (London, 1882) ; and article s.v. in Herzog-Hauck, Real- encyklopadie (3rd ed., 1900), with bibliography.

HOSIUS, STANISLAUS (1504-1579), Polish cardinal, was born in Cracow on the 5th of May 1504. He studied law at Padua and Bologna, and entering the church became in 1549 bishop of Kulm, in 1551 bishop of

Ermland, and in 1561 cardinal. Hosius had Jesuit sympathies and actively opposed the Pro- testant reformation, going so far as to desire a repetition of the St Bartholomew massacre in Poland, Apart from its being " the property of the Roman Church," he regarded the Bible as having no more worth than the fables of Aesop. Hosius was not distinguished as a theologian, though he drew up the Confessio fidei Christiana catholica adopted by the synod of Piotrkow in 1557. He was, however, supreme as a diplomatist and administrator. Besides carrying through many difficult negotiations, he founded the lyceum of Braunsberg, which became the centre of the Roman Catholic mission among Protestants. He died at Capranica near, Rome on the 5th of August 1579.

A collected edition of his works was published at Cologne in 1584. Life by A. Eichhorn (Mainz, 1854), 2 vols.

HOSKINS, JOHN (d. 1664), English miniature painter, the uncle of Samuel Cooper, who received his artistic education in Hoskins's house. His finest miniatures are at Ham House, Montagu House, Windsor Castle, Amsterdam and in the Pierpont Morgan collection. Vertue stated that Hoskins had a son, and Redgrave added that the son painted a portrait of James II. in 1686 and was paid £10, 5s. for it, a statement for which there must have been some evidence, although it is hot supported by any reference in the State Papers. Some contemporary inscriptions on the miniatures at Ham House record them as the work of "Old Hoskins," but the fact of the existence of a younger artist of the same name is settled by a miniature in the Pierpont Morgan collection, signed by Hoskins, and bearing an authentic engraved inscription on its contemporary frame to the effect that it represents the duke of Berwick at the age of twenty-nine in 1700. The elder Hoskins was buried on the 22nd of February 1664, in St Paul's, Covent Garden, and as there is no doubt of the authenticity of this miniature or of

the signature upon it, it is evident that he had a son who survived him thirty-six years and whose monogram we find upon this portrait. The frame of it has also the royal coat of arms de- bruised, the batons of a marshal of France, the collar of the Golden Fleece and the ducal coronet. (G. C. W.)

HOSMER, HARRIET GOODHUE (1830-1908), American sculptor, was born at Watertown, Massachussetts, on the 9th of October 1830. She early showed marked aptitude for model- ling, and studied anatomy with her father, a physician, and afterwards at the St Louis Medical College. She

then studied in Boston until 1852, when, with her friend Charlotte Cushman, she went to Rome, where from 1853 to i860 she was the pupil of the English sculptor John Gibson. She lived in Rome until a few years before her death. There she was associated with Nathaniel Hawthorne, Thorwaldsen, Flaxman, Thackeray, George Eliot and George Sand; and she was frequently the guest of the Brownings at Casa Guidi, in Florence. Among her works are " Daphne " and " Medusa," ideal heads (1853); " Puck " (1855), a spirited and graceful conception which she copied for the prince of Wales, the duke of Hamilton and others; "Oenone " (1855), her first life-sized figure, now in the St Louis Museum of Fine Arts; " Beatrice Cenci " (1857), for the Mercantile Library of St Louis; " Zenobia, Queen of Palmyra, in Chains " (1859), now in the Metropolitan Museum of Art, New York City; " A Sleeping Faun" (1867); "A Waking Faun"; a bronze statue of Thomas H. Benton (1868) for Lafayette Park, St Louis; bronze gates for the earl of Brownlow's art gallery at Ashridge Hall; a Siren fountain for Lady Marian Alford; a fountain for Central Park, New York City; a monument to Abraham Lincoln; .and, for the Columbian Exposition, Chicago, 1893, statues of the queen of Naples as the " heroine of Gaeta," and of Queen Isabella of Spain. Miss Hosmer died at Watertown, Mass., on the 21st of February 1908.

HOSPICE (Lat. hospitium, entertainment, hospitality, inn, hospes, host), the name usually given to the homes of rest and refuge kept by religious houses for pilgrims and guests. The most famous hospices are those of the Great and Little St Bernard Passes in the Alps.

HOSPITAL (Lat. hospitalis, the adjective of hospes, host or guest), a term now in general use for institutions in which medical treatment is given to the sick or injured. The place where a guest was received was in Lat. hospitium (Fr. hospice), but the terms hospitalis (sc. domus), hospitale (sc. cubiculum) and haspitalia (sc. cubicula) came into use in the same sense. Hence were derived on the one hand the Fr. hospital, hopilal, applied to establishments for temporary occupation by the sick for the purpose of medical treatment, and hospice to places for permanent occupation by the poor, infirm, incurable or insane; on the other, the form hotel, which became restricted (except in the case of ho/el-Dieu) to private or public dwelling-houses for ordinary occupation. In English, while " hostel " retained the earlier sense and " hotel " has become confined to that of a superior inn (q.v.), ." hospital " was used both in the sense of a permanent retreat for the poor infirm or for the insane, and also for a regular institution for the temporary reception of sick cases; but modern usage has gradually restricted it mainly to the latter, other words, such as almshouse and asylum, being preferred in the former cases.

The Origin of Hospitals. — In spite of contrary opinions the germ of the

hospital system may be seen in pre-Christian times (see Charity and Charities). Pinel goes so far as to declare that there were asylums distinctly set apart for the insane in the temples of Saturn in ancient Egypt. But this is probably an exaggeration, the real historical facts pointing to the existence of medical schools in connexion with the temples generally, to the knowledge that the priests possessed what medical science existed, and finally to the rite of " Incubation," which involved the visit of sick persons to the temple, in the shade of which they slept, that the god might inform them by dreams of the treat- ment they ought to follow. The temples of Saturn are known to have existed some 4000 years before Christ; and that those temples were medical schools in their earliest form is beyond

question. The reason why no records of these temples have survived is due to the fact that they were destroyed in a religious revolution which swept away the very name of Saturn from the monuments in the country. Professor Georg Ebers of Leipzig, whose possession of that important handbook of Egyptian medicine called the Papyrus Ebers constitutes him an authority, says the Heliopolis certainly had a clinic united to the temple. The temples of Dendera, Thebes and Memphis, are other ex- amples. Those early medical works, the Books of Hermes, were preserved in the shrines. Patients coming to them paid con- tributions to the priests. The most famous temples in Greece for the cure of disease were those of Aesculapius at Cos and Trikka, while others at Rhodes, Cnidus, Pergamum and Epidaurus were less known but frequented. Thus it is clear that both in Egypt and in Greece the custom of laying the sick in the precincts of the temples was a national practice.

Alexandria again was a famous medical centre. Before describing the European growth of the hospital system in modern times, to which its development in the Roman Empire is the natural introduction, it will be well to dispose very briefly of the facts relating to the hospital system in the East. Harun al-Rashid (a.d. 763-809) attached a college to every mosque, and to that again a hospital. He placed at Bagdad an asylum for the insane open to all believers; and there was a large number of public infirmaries for the sick without payment in that city. Benjamin, the Jewish traveller, notes an efficient scheme for the reception of the sick in a.d. 1173, which had long been in existence. The Buddhists no less than the Mahommedanshad their hospitals, and as early as 260 B.C. the emperor Asoka founded the many hospitals of which Hindustan could then boast. The one at Surat, made famous by travellers, and considered to have been built under the emperor's second edict, is still in existence. These hospitals contained provision so extensive as to be quite comparable to modern institutions. In China the only records that remain are those of books of very early date dealing with the theory of medicine. To return to India, the hospitals of Asoka were swept away by a revival of Brahmanism, and a practical

hiatus exists between the hospitals he introduced and those that were refounded by the British ascendancy. Hadrian's reign contains the first notice of a military hospital in Rome. At the beginning of the Christian era we hear of the existence of open surgeries (of various price and reputation), the specialization of the medical profession, and the presence of women practitioners, often as obstetricians. Iatria, or tabernae-medicae, are described by Galen and Placetus: many towns built them at their own cost. These iatria attended almost entirely to out-patients, and the system of medicine fostered by them continued without much development down to the middle of the 18th century. It is to be rioted that these out-patients paid reasonable fees. In Christian days no estab- lishments were founded for the relief of the sick till the time of Constantine. A law of Justinian referring to various institutions connected with the church mentions among them the Nosocomia, which correspond to our idea of hospitals. In a.d. 370 Basil had one built for lepers at Caesarea. St Chrysostom founded a hospital at Constantinople. At Alexandria an order of 600 Parabolani attended to the sick, being chosen for the purpose for their experience by the prelate of the city (a.d. 416). Fabiola, a rich Roman lady, founded the first hospital at Rome possessed of a convalescent home in the country. She even became a nurse herself. St Augustine founded one at his see of Hippo. These Nosocomia fell indeed almost entirely into the hands of the church, which supported them by its revenues when necessary and controlled their administration. Salerno became famous as a school of medicine; its rosiest days were between a.d. iooo and 1050. Frederick II. prescribed the course for students there, and founded a rival school at Naples. At this period the con- nexion between monasteries and hospitals becomes a marked one. The crusaders also created another bond between the church and hospital development, as the route they traversed was marked by such foundations. Lepers were some of the earliest patients for whom a specialized treatment was recognized,

and in 1118 a leprosarium was built in London for isolation purposes. Russia seems the one country where the intercon- nexion of hospital and monastery was not to be observed. After the period already reached, the 13th century, hospitals became common enough to demand individual or at any rate national treatment.

History of the Hospital Movement. — We have now to consider the principles upon which the provision of the best form of medical care in hospitals can be secured for all classes of people. Though hospitals cannot be claimed as a direct result of Chris- tianity, no doubt it softened the

relations between men, and gradually tended to instil humanitarian views and to make them popular with the civilized peoples of the world. These principles, as civilization grew, education improved, and the tastes and requirements of the common people were developed, made men and women of many races realize that the treatment of disease in buildings set apart exclusively for the care of the sick was, in fact, a necessity in urban districts. The establishment of a hospital freed the streets of the abuses attendant upon beggars and other poor creatures, who made their ailments the chief ground of appeal for alms. As the knowledge of hygiene and of the doctrine of cleanliness and purity in regard not only to dwellings and towns, but also in relation to food of all descrip- tions, including water, became known and appreciated, hospitals were found to be of even greater importance, if that is possible, to the healthy in crowded communities, than to the sick. It took many centuries before sound hygiene really began to occupy the position of importance which it is now known to possess, not only in regard to the treatment and cure of disease, but to its prevention and eradication. So the history of the world shows, that, whereas a few of the larger towns in most countries contained hospitals of sorts, up to and including the middle ages, it was not until the commencement of the 18th century that inhabitants of important but relatively small towns of from 50,000 to 100,000 inhabitants began to provide themselves with a hospital for the care of the sick. Thus, twenty-three of the principal English counties appear to have had no general hospital prior to 17 10, while London itself at that date, so far as the relief of the sick was concerned, was mainly, if not entirely, dependent upon St Bartholomew's and St Thomas's Hospitals. These facts are interesting to note, because we are enabled from them to deduce from recent events that hospital buildings in the past, though the planning of most of them was faulty to begin with and became more and more faulty as extensions were added to the original buildings, did in fact suffice to satisfy the requirements of the medical profession for nearly two centuries. In other words, under the old condition of affairs the life of a building devoted to the care of the sick might be considered as at least 150 years. To-day, under the conditions which modern science impose upon the management, probably few hospital buildings are likely to be regarded as efficient for the purpose of treating the sick for more than from 30 to 50 years.

The foregoing statement is based upon the history of British hospitals of importance throughout the country, but the same remark will apply in practice to hospital buildings almost everywhere throughout the world. In truth, hospitals have been more developed and improved in Great Britain than in other countries, though, since the last quarter of the 19th century, German scientists especially have added much to the efficiency of the accommodation for the sick, not only at hospitals but in private clinics, and

many German ideas have been accepted and copied by other countries. In Great Britain hospitals for the treatment of general and special diseases are mainly main- tained upon what is known as the voluntary system. On the European continent, hospitals as a rule are maintained by the state or municipalities, and this system is so fully developed in Sweden and elsewhere that a sound economical principle has been embroidered upon the hospital system, to the great physical and moral advantage of all classes of the community. The system referred to confers great benefits upon inhabitants in large towns by bringing the poor-law and voluntary institutions into more

intimate association, although they may be managed by separate governing bodies. The plan pursued is to demand payment from all patients who are admitted to the hospital under a scale of charges divided into three or four grades. The first grade pays a substantial sum and obtains anything or everything the patient may care to have or to pay for, subject to the control of the medical attendant. The second pays much less, but a remunerative rate, for all they receive at the hospital; and the third and fourth classes are very poor people or paupers, who are paid for on a graduated scale by the poor-law authorities, or the communal government, or the municipality. Under this system well-to-do thrifty artisans and improvident paupers are all treated by one staff, controlled by one administration, and are located in immediate proximity to each other though in separate pavilions. We have no doubt, as the result of many years' investigation and an accurate knowledge of the working of the system, that this is the true principle to enforce in providing adequate medical relief for large urban populations everywhere throughout the world. It should be accompanied by a system of government insurance, whereby all classes who desire to be thrifty may pay a small annual premium in the days of health, and secure adequate hospital treatment and care when ill. Provided that pay wings were added to the existing voluntary and municipal hospitals, it should be found that the relatively small annual premium of £3 per annum should enable the policyholders to defray the cost of medical treatment in a pay ward or at a consultation department of a great hospital as a matter of business. In the United States of America most large towns have great hospitals, usually known as city hospitals, administered and mainly supported by the municipality. Many such institutions have pay wards, but nowhere, so far as we have been able to discover, has the system of medical relief in its entirety been organized as yet upon the business system we have just referred to.

As to the relative merits and demerits of the systems of government of municipal hospitals and voluntary hospitals a few words may be useful. There can be no doubt that the voluntary hospital in Great Britain has had a remarkable effect for good upon all classes in the making of modern

England. The management of these institutions is frequently representative of all classes of the people, while the voluntary system, as the Hospital Sunday collections all over the country, and all over the English-speaking world, prove, has united all creeds in the good work of caring and providing for the sick and injured members of each community. Again the voluntary system makes for efficiency in the administration of all hospitals. Each voluntary hospital is dependent upon its popularity and efficiency, in large measure, for the financial support it receives. In this way an ill-managed voluntary hospital, or one which has ceased to fulfil any useful public purpose, is sure to disappear in due course under the voluntary system. Voluntary hospitals are always open to, as well as supported by, the public, and, owing largely to the example so prominently set by King Edward VII. and members of the royal family, more people every year devote some time in some way to the cause of the hospitals. Attached to the voluntary hospitals are the principal medical and nursing schools upon which the public depend for the supply of doctors and nurses. The education of students and nurses in a clinical hospital makes that hospital the most desirable place for every- body when they are really ill. In such a hospital no patient can be overlooked, no wrong or imperfect diagnosis can long remain undiscovered and unrectified, and nowhere else have the patients so continuous a guarantee that the treatment they receive will be of the best, while the provision made for their comfort and welfare, owing to the unceasing and ever varying quality of the criticism to which the work of everybody, from the senior physician to the humblest official, is subjected in a clinical hospital, is unequalled anywhere else. At a great voluntary hospital, not only do hundreds of medical students and nurses work in the wards, but thousands of people, in the persons of the patients' friends, and those members of the public who take an interest in hospitals, pass through the wards in the

course of every year. Again, each voluntary hospital has to live by competition, a fact which guarantees that everything in the way of new treatment and scientific development shall in due course find its proper place within the walls of such an establish- ment. Open as they are to the full inspection of everybody whose knowledge and presence can promote efficiency, the voluntary hospitals have shown, especially since the last quarter of the 19th century, a continuous development and improve- ment. Here the patients are treated with invariable kindness and consideration, as human beings rather than cases, to the great benefit of the whole human family as represented by the officials, the patients and the students, with their relations and friends, the honorary medical officers, hundreds of

medical practitioners and nurses, who receive their medical training in the hospitals, and the ever-increasing number of governors and supporters by whose contributions voluntary hospitals live. The great missionary and social value of the voluntary hospitals to the whole community cannot be questioned, and they have been of inestimable value to the churches by inculcating the higher principles of humanity, while removing the many acerbities which might otherwise prevail between rich and poor in large cities.

The voluntary hospitals are attended, however, by certain dis- advantages which do not attach to municipal institutions. A municipality which undertakes the provision of hospitals for the entire community is largely able to plan out the urban area, and to provide that each hospital site selected shall not only be suitable for the purpose, but that it shall be so chosen as to contribute to make the whole system of hospital provision easily accessible to all classes who may require its aid. The voluntary hospitals, on the contrary, have grown up without any com- prehensive plan of the districts or any real regard to the con- venience or necessities of their poorer inhabitants. Voluntary hospital sites were almost invariably selected to suit the con- venience of the honorary medical staff and the general con- venience of the hospital economy rather than to save the patients and their friends long journeys in search of medical aid. The best of the municipal systems too enables economy to be en- forced in the administration by a plan which provides a central office in every town where the number of vacant beds in each hospital is known, so that the average of occupied beds in all the hospitals can be well maintained from an economical point of view. This speedy and ready inter-communication between all hospitals in a great city, which might perfectly well be secured under the voluntary system if the managers could only be brought into active co-operation, prevents delay in the admission of urgent cases, promotes the absence of waste by keeping the average of beds occupied in each establishment high and uniform, and has often proved a real gain to the poor by the diminution in cost to the patients and their friends, who under the best municipal systems can find a hospital within reasonable distance of their home in a large city wherever it may be placed. Another advantage of the municipal system should be that central control makes for economical administration. Unfortunately a close study of this question tends to prove that municipal hospitals for the most part have resulted in a dead monotony of relative inefficiency, often entailing great extravagance in buildings, and accompanied by much waste in many directions. Existing municipal hospital systems are attended by several grave disadvantages. The administration shows a tendency to lag and grow sleepy and inert. The absence of competition, and the freedom from continuous publicity and criticism such as the voluntary hospitals enjoy, make for inefficiency and

indifferent work. Rate-supported hospitals, as a rule, are administered by permanent officials who reside in houses usually situated on the hospital sites, and who are paid salaries which attract the younger men, who, once appointed, tend to continue in office for a long period of years. This fixture of tenure is apt to cause a decline in the general interest in the work of the municipal hospital, due mainly to the absence of a continuous criticism from outside, and so the average of efficiency, both in regard to treatment and other important matters, may become lower

and lower. Those who have habitually inspected great rate- supported hospitals must have met instances over and over again where a gentleman who has held office for twenty or thirty years has frankly stated that his income is fixed, that his habits have become crystallized, that he finds the work terribly monoton- ous, and yet, as he hopes ultimately to retire upon a pension, he has felt there was no course open to him but to continue in office, even though he may feel conscientiously that a change would be good for the patients, for the hospital and for himself. Under the voluntary system evils of this kind are seldom or never met with, nor have these latter establishments, within living memory, ever been so conducted as to exhibit the grave scandals which have marred the administration of rate-supported hospitals not only in Great Britain but in other parts of the world. We believe that the more thoroughly the advantages and disadvantages of rate-supported and voluntary hospitals for the care of the sick are weighed and considered, and the more accurate and full the knowledge which is added to the judgment upon which a decision can be based, the more certain will it be that every capable administrator will come to the conclusion that on the whole it is good for the sick and for the whole com- munity that these establishments should, at any rate in Great Britain, be maintained upon the voluntary system. Of course it is essential to have rate-supported hospitals where cases of infectious disease and the poorest of the people who are dependent largely upon the poor-law for their maintenance can be cared for. It is satisfactory to be able to state that of late years the admini- stration of both these types of rate-supported hospitals has greatly improved. The added importance now given all over the country to medical officers of health, and the disposition exhibited, both by parliament and government departments, to make the position of these officers more important and valuable than ever before, have tended largely to improve the administrative efficiency of hospitals for infectious diseases. No doubt the whole community would benefit if residents in every part of the country could be moved to take a personal interest in the infectious hospital in their immediate neighbourhood. Amongst the smaller of these establishments there has been so marked an inefficiency at times as to cause much avoidable suffering. The existence of such inefficiency casts a grave reflection upon the local authorities and others who are re- sponsible for

the evils which undoubtedly exist in various places at the present time. Unfortunately knowledge has not yet sufficiently spread to enable the public to overcome its fear and dread of infectious maladies. It is therefore very difficult to induce people to take an active interest in one of these hospitals, but we look forward to the time when, owing to the activity of the medical officers of health who have immediate charge of buildings of this kind, this difficulty may be overcome, when the avoidable dangers and risks and the appalling discomfort which a poor sufferer from a severe infectious disease in a rural district may suddenly have to encounter under existing circumstances, would be rendered impossible.

The poor-law infirmary in large cities, so far as the buildings and equipment are concerned, very often leaves little to desire. Poor-law infirmaries lack, however, the stimulus and the checks and advantages which impartial criticism continuously applied brings to a great voluntary hospital. Such disadvantages might be entirely removed if parliament would decide to throw open every poor-law infirmary for clinical purposes, and to have con- nected with each such establishment a responsible visiting medical staff, consisting of the best qualified men to be fou"hd in the community which each hospital serves. The old prejudice against hospital treatment has disappeared, for the least in- telligent members of the population now understand that, when a citizen is sick, there is no place so good as the wards of a well- administered hospital. Looking at the question of hospital provision in Great Britain, and indeed in all countries at the present time, it may be said, that there is everywhere evidence of improvement and development upon the right lines, so that never before in the history of the world has the lot of the sick t man or woman been so relatively fortunate and safe as it is in

the present day. Probably it is not too much to say that to-day hospitals occupy the most important position in the social economy of nations.

Classification of Hospitals. — Having dealt with hospitals as a whole it may be well very briefly to classify them in groups, and explain as tersely as possible what they represent and how far it may be desirable to eliminate by consolidation or to increase by disintegration the number of special hospitals.

General Hospitals. — These establishments consist of two kinds, (a) clinical and (&) non-clinical, each of which, under the modern system, should include every department of medicine and surgery, and every

appliance and means for the alleviation of suffering, the healing of wounds, the reduction of fractures, the removal of mal-formations and foreign growths, the surgical restoration of damaged and diseased organs and bones, and everything of every kind which experience and knowledge prove to be necessary to the rapid cure of disease. The clinical hospital means an institution to which a medical school is attached, where technical instruction is given by able and qualified teachers to medical students and others. A non-clinical hospital is one which is not attached to a medical school, and where no medical instruction is organized.

Special Hospitals. — Up to about 1840 the general hospital was, speaking generally, the only hospital in existence. Twenty years later, as the population increased and medical science became more and more active, some of the more ardent members of the medical profession, especially amongst the younger men, pressed continuously for opportunities to develop the methods of treatment in regard to special diseases for which neither accom- modation nor appliances were at that time forthcoming in general hospitals. In a few cases, where the managers of the great general hospitals were men of action and initiative special departments were introduced, and an attempt was made to make them efficient. The conservative spirit which, on .the whole, represents the British character for the most part, resulted, however, in a steady resistance being offered by the older members of the medical staffs and existing committees to the advocates of special departments. In the result, especially as such special departments as there were in connexion with general hospitals were too often starved for want of means and men for their development and improvement, the younger spirits called their friends together and ‘ began to start special hospitals. To-day every really efficient clinical general hospital has within its walls special departments of almost every description, which have been made as efficient and up-to-date as money and knowledge can make them. Unfortunately the causes already referred to led to the establishment of hundreds of the smaller special hospitals, many of which were started in unsuitable buildings, and some of which have ever since maintained a struggling existence. Others, on the contrary, through the energy of their original promoters and the excellence of the work they have done, have obtained a position of authority and reputation which has had a very important bearing for good upon the development of medical science in the treatment of disease. If the world had to-day to organize the very best system of hospital accommodation which could be evolved, there is no doubt that few or none of the special hospitals would find any place in that system. As matters stand, however, the special hospital has had to be accepted, and nothing which King Edward’s Hospital Fund has done in London has met with greater popularity and professional approval than the labours which its council have undertaken in promoting the amalgama- tion of the smaller

special hospitals of certain kinds, so as to secure the provision of one really efficient special hospital for each speciality. No doubt this policy of amalgamation will be steadily pursued, and in the course of years every great city will gradually reorganize its hospital methods so as to secure that, whether the patients are treated in a general hospital or in a special hospital, the average efficiency in every institution shall be as high and as good as possible.

VVe will take now the special hospitals in detail. ‘ Cancer Hospitals. — The justification for efficient cancer hospitals must be found in the circumstance that most scientific men of

experience believe that, if adequate resources were placed at the disposal of the medical profession, the origin of cancer might be discovered, and so the human race would be freed from one of the most awful diseases which affect humanity. Pending such a dis- covery the experience of the cancer department connected with the Middlesex Hospital in London proves to demonstration that the provision of adequate and special accommodation for the exclusive treatment of cases of cancer is not only desirable but necessary on humanitarian grounds alone.

Hospitals for Consumption. — For many years it was held that this group of hospitals was not a necessity, and the patients were treated in the ordinary medical wards of the general hospitals. Since the contagious character of tuberculosis became known, and improved methods of treatment have been developed, every one agrees that this type of special hospital is desirable, though it is believed by the more advanced school of scientists that before long it may be happily rendered obsolete owing to the discovery of methods of treatment which will stay the disease at its commencement and restore the patient to health.

Children’s Hospitals. — -These hospitals were very much opposed at the outset. There can be no doubt that the children’s ward or wards in a big voluntary hospital is a most valuable asset to the managers, so long as the children are treated in separate wards. There is no reason of course why a hospital should confine its work to the treatment of children, exclusively. Still this special hospital is popular with the public ; it has led to many discoveries and developments in the treatment of children’s diseases ; on the whole the administration of these establishments has been good; and we believe they will continue to flourish, however many children’s wards may be provided in general hospitals. Children’s hospitals with country branches for the treatment of chronic ailments, such as hip disease, are a valuable addition to the relief of suffering in cities.

Cottage Hospitals. — These hospitals, established originally in 1859 by Mr

Albert Napper at Cranleigh, Surrey, have fulfilled a most useful function. Many of them are very efficient both in regard to equipment and treatment. They have become essential to the well-being and adequate medical care of rural populations, as they attract to the country some of the best members of the pro- fession, who are able, with the aid of the cottage hospital, to keep themselves efficient and up-to-date, so that all classes of the com- munity are benefited in this way by this type of hospital.

Ear, Throat and Nose Hospitals. — The history of this type of hospital bears out in every particular the reason we have given above for the establishment of special hospitals in the first instance. There can be no doubt that the best conducted throat hospitals have been beneficial to the poorer inhabitants of great cities.

Fever Hospitals. — Incidentally we have dealt with these institu- tions, which are usually supported out of the rates and administered by the medical officers of health, who are paid by the county or municipal authorities.

Maternity and Lying-in Hospitals. — This is one of the oldest types of special hospitals, and has done a great deal of good in its time. Owing to modern methods of treatment and hygienic de- velopments the maternity hospital never occupied a stronger position than it does to-day.

Mental Hospitals. — In Great Britain the insane are provided for in asylums (see Insanity, ad fin.) , though such establishments, if properly conducted, are essentially hospitals. Scientific and public opinion tend towards the establishment of mental hospitals to which all acute cases of mental disease should be first relegated for treatment and diagnosis before they are consigned to a permanent lunatic hospital. Too little attention on an organized plan has been given to the continuous study of mental disease in its clinical and pathological aspects. It is probable, therefore, that the advent of the mental hospital may lead to important developments in treatment in many ways.

Ophthalmic Hospitals. — Of all special hospitals this is one which would probably be the least necessary, providing general hospitals everywhere were properly equipped and organized. No special hospital has probably been so abused in the material sense by the free relief of patients who could well afford to pay for their treatment at the ophthalmic hospital. Several of the existing ophthalmic hospitals have entailed an enormous expenditure, and their modern equipment is wonderfully efficient.

Orthopaedic Hospitals, — It is very doubtful whether this type o£ hospital is really desirable or necessary. Its necessity may be advocated on the

ground that orthopaedic cases may require pro- longed treatment, and that the pressure upon the beds of general hospitals by acute cases is nowadays so great as to render the orthopaedic hospital more necessary than ever before.

Paralysis and Epileptic Hospitals. — Seeing that the percentage of those who are at present attacked by paralysis and nervous disease shows a continued tendency to increase under modern conditions of life in large cities, hospitals of this type are necessary, and London at any rate, like most foreign towns of importance, possesses, , at present, far too little accommodation for this class of case.

Skin and Phota-Therapy. — Up to the end of the 19th century hospitals for diseases of the skin were a constant cause of scandal and criticism. The introduction of modern methods of treatment by

light and electricity, including photo-therapy, has given an im- portance to this department and treatment which it did not previ- ously possess. We are of opinion that, on the whole, it is better and more economical to treat these cases in properly equipped depart- ments of general hospitals than in separate institutions.

Women's Hospitals. — These hospitals are not absolutely necessary, but considering their popularity with the women themselves, and that several of them have done excellent work, remembering too that women constitute the majority of the population, there seems to be some reason for their continuance.

The Evolution of the Modern Hospital. — The evolution of the modern hospital affords one of the most marvellous evidences of the advance of scientific and humanitarian principles which the world has ever seen. At the outset hospitals were probably founded by the healthy more for their own comfort than out of any regard for the sick. Nowadays the healthy, whilst they realize that the more efficient they can make the hospital, the more certain, in the human sense, is their own chance of prolonged life and health, are, as the progress of the League of Mercy has shown in recent years, genuinely anxious for the most part to do something as individuals in the days of health in the cause of the sick. Formerly the hospital was merely a building or buildings, very often unsuitable for the purposes to which it was put, where sick and injured people were retained and more frequently than not died. In other words the hygienic condition, the

methods of treatment and the hospital atmosphere were all so relatively unsatisfactory as to yield a mortality in serious cases of 40%. Nowadays, despite, or possibly because of, the fact that operative interference is the rule rather than the exception in the treatment of hospital patients, and in consequence of ihe introduction of antiseptic and aseptic methods, the mortality in hospitals is, in all the circumstances, relatively less, and probably materially less, than it is even amongst patients who are attended in their own homes. Originally hospitals were unsystematic, crowded, ill-organized necessities, which wise people refused to enter, if they had any voice in the matter. At the present time in all large cities, and in crowded communities in civilized countries, great hospitals have been erected upon extensive sites which are so planned as to con- stitute in fact a village with many hundreds of inhabitants. This type of modern hospital has common characteristics. A multitude of separate buildings are dotted over the site, which may cover 20 acres or upwards. In one such in- stitution, within an area of 20 acres, there are 6 m. of drains, 29 m. of water and steam pipes, 3 m. of roof gutters, 42 m. of electric wires, and 42 separate buildings, which to all intents and purposes constitute a series of distinct, isolated hospitals, in no case containing more than forty-six patients. On the continent of Europe buildings of this class are usually of one storey; in the United States, owing to the difficulty of obtaining suitable sites and for reasons of economy, some competent authorities strenuously advocate high buildings with many storeys for town hospitals. In England the majority have two to three storeys each, the ward unit containing a ward for twenty beds and two isolation wards for one and two beds respectively. The two storeys in modern fever hospitals, however, are absolutely distinct — that is, there is no internal staircase going from one ward to the others, for each is entered separately from the outside. This system carries to its extreme limits the principle of separating the patients as much as possible into small groups; the acute cases are usually treated in the upper ward, and as they become convalescent are removed downstairs. In this way the necessity for an entirely separate convalescent block is done away with and the patients are kept under the same charge nurse, an arrangement which promotes necessary discipline. The unit of these hospitals is the pavilion, not the ward, and consists of an acute ward, a convalescent ward, separation wards, nurses' duty rooms, store-rooms for linen, an open-air balcony upstairs into which beds can be wheeled in suitable weather, and a large airing-ground for convalescent patients directly accessible from the downstairs ward. Each of the pavilions is raised above the ground level, so that air

can circulate freely underneath. The wall, floor and air spaces in the scarlet fever wards of one of these hospitals are respectively 12 ft., 156 ft. and 2028 ft. per bed; and in the enteric and diphtheria wards they have

been increased to 15 ft., 195 ft. and 2535 ft. respectively. The provision of so large a floor and linear space, especially in the diphtheria wards, is an ex- periment the effect of which will be watched with considerable interest. A building of this type is a splendid example of the separate pavilion hospital, and is doing great service in the treatment of fevers wherever it has been introduced. Some idea of a hospital village, some of the wards of which we have been describing, may be gathered from the circumstances that it costs from £300,000 to £400,000, that it usually contains from 500 to 700 beds, and that the staff numbers from 350 to 500 persons. The medical superintendent lives in a separate house of his own. The nurses are provided with a home, conˆ sisting of several blocks of buildings under the control of the matron; the charge nurses usually occupy the main block; where the dining and general sitting-rooms are placed; the day assistant-nurses another block; and lastly, by a most excellent arrangement, the night nurses, 80 to r2o in number, have one whole block entirely given up to their use. The female servants have a second home under the control of the house- keeper, and the male servants occupy a third home under the supervision of the steward. The two main ideas aimed at are to disconnect the houses occupied by the staff from the infected area, and to place the members of each division of the staff together, but in separate buildings, under their respective heads. These objects are highly to be commended,as they have important bearings upon the well-being and discipline of the whole establish- ment and constitute a lesson for all who have to do with buildings where a great number of people are constantly employed.

The Hospital City. — We have shown that the modern hospital where an adequate site is available under the most favourable conditions has developed into a hospital village. No one who is familiar with the existing disadvantages of many of the sites and their surroundings of town hospitals in many a large city can have any doubt that, if the well-being of the patients and the good of the whole community, combined with economical and administrative reasons, together with the provision of an adequate system for the instruction and training of medical students and nurses, are to be the first considerations with those responsible for the hospitals of the future, the time will come, and is probably not far distant, when each great urban community will provide for the whole of its sick by removing them to a hospital city, which will be situated upon a specially selected and most salubrious site some distance from the town itself. The atmosphere of a great city grows less and less suitable to the rapid and complete recovery of patients who may undergo the major operations or be suffering from the severe and acute forms of disease. Asepsis, it is true, has reduced the average residence in hospital from about 35 to less than 20 days. It has thereby added quite one million working days each year to the earning power of the artisan classes in London alone. Medical opinion is more and

more favouring the provision of convalescent and suburban hospitals, to which patients suffering from open wounds may be removed from the city hospitals. This course, which entails much additional expenditure, is advocated to overcome the difficulty arising from the fact that, in operation and other cases, the patients cease to continue to make rapid progress towards recovery after the seventh or ninth day's residence in a city hospital. A change of~such cases to the country restores the balance and completes the recovery with a rapidity often remarkable.

Thinking out the problem here presented in all its bearings, realizing the great and ever-increasing cost of sites for hospitals in great cities, the heavy consequential taxes and charges which they have to meet there, and all the attendant disadvantages and drawbacks, the present writer has ventured upon an antici- pation which he hopes may prove intelligent and well-founded. Nearly every difficulty in regard to the cost of hospitals and in respect to all the many problems presented by securing

the material required, under present systems, for the efficient training of students and nurses, would be removed by the erection of the Hospital City, which, he foresees, must ultimately be recognized by intelligent communities throughout the civilized world. Why should we not have, on a carefully selected site well away from the contaminations of the town, and adequately provided with every requisite demanded from the site of the most perfect modern hospital which the mind of man can conceive, a "Hospital City"? Here would be con- centrated all the means for relieving and treating every form of disease to the abiding comfort of all responsible for their adequacy and success. At the present time all the traffic and all the citizens give way to fire engines and the ambulance in the public streets. Necessarily the means of transit to and from the " Hospital City," and its rapidity, would be the most perfect in the world. So the members of the medical staff, the friends of the patients, and all who had business in the " Hospital Cityr" would find it easier and less exacting in time and energy to be attached to one of the hospitals located therein than to one situated in the centre of a big population in a crowded town. To meet the urgent and accident cases a few receiving houses, or outpost relief stations, with a couple of wards, would be situated in various quarters of the working city, where patients could be temporarily treated, and whence they could be removed to the " Hospital City " by an efficient motor ambulance service. The writer can see such a " Hospital City" established, can realize the comfort it will prove in practice to the medical pro- fession, to the patients' friends, to those who have to manage the hospitals and train the medical

and nursing students, and indeed to all who may go there as well as to the whole community. The initial cost of hospital buildings should be reduced at once to a quarter or less of the present outlay. They could then be built of the cheapest but most suitable material, which would have many advantages, whilst the actual money forth- coming from the realization and sale of the existing hospital sites in many cities would, in all probability, produce a sum which in the whole might prove adequate, or nearly adequate, or even in some cases more than adequate, to defray the entire cost of building the " Hospital City " and of equipping it too. The cost of administration and working must be everywhere reduced to a minimum. The hygienic completeness of the whole city, its buildings and appliances, must expedite recovery to the maximum extent. In all probability the removal of the sick from contact with the healthy would tend in practice so to increase the healthiness of the town population, i.e. of the workers of the city proper, as to free them from some of the most burdensome trials which now cripple their resources and diminish materially the happiness of their lives. Probably the United States (where a city has sometimes sprung up in twelve months) may be the home where this idea may first find its realization in accomplished fact. The writer may never live to see such a city in actual working or in its entirety, but he makes bold to believe its adoption will one day solve the more difficult of the problems involved in providing ade- quately for the sick in crowded communities. He has formulated the idea because it seems desirable to encourage discussion as to the best method of checking the growing tendency to make hospital buildings everywhere too costly. If the idea of the " Hospital City " commends itself to the profession and the public, the practice of treating all the hospital accommodation in each city as a whole will gradually increase and spread, until most of the present pressing difficulties may disappear altogether. That is a consummation devoutly to be wished. The Problem of Hospital Administration. — A study of the hospital problem in various countries, and especially in different portions of the English-speaking world, convinces the writer that, apart from local differences, the features presented are everywhere practically identical. A number of hospitals under independent administration, dependent in whole or in part on voluntary contributions, administered under different regula- tions originally representing the idiosyncracies of individual managers for the time being, without any standard of efficiency

or any system of co-operation, which would bring the whole of the medical establishments of each or all of the great cities of the world under one administration which the combined wisdom and experience of hospital managers as a whole might agree to be the best, must mean in practice a material gain in every way to each and all of the hospitals and their supporters on economical, scientific and other grounds. Such an absence of

system throughout the world has everywhere led to overlapping, to the perpetuation of many abuses, to the admission of an increasing number of patients whose social position does not entitle them to claim free medical relief at all, and, often too, to the admission of patients belonging to a humbler grade of society who are already provided for by the rates in institutions which they do not care to enter and who find their way to the wards of hospitals which were established to provide for patients of an entirely different social grade. These evils have continued to grow and increase almost everywhere, despite many and varied attempts to grapple with and remove them. Amongst these attempts we may mention the assembling of hospital conferences, the establishment of special funds and committees, and the holding of inquiries of various kinds in London and other British cities and also in the United States. The most remarkable proof of the impossibility of inducing those re- sponsible to act together and enforce the necessary reforms is afforded by the historical fact that the famous Commission on Hospital Abuse, known as Sir William Fergusson's Commission, in 187 1, after an exhaustive inquiry, made the following recom- mendations: (1) to improve the administration of poor-law medical relief; (2) to place all free dispensaries under the control of the poor-law authorities; (3) to establish an adequate system of provident dispensaries; (4) to curtail the unrestricted system of gratuitous relief, partly by the selection of cases possessing special clinical interest and partly by the exclusion of those who on social grounds are not entitled to gratuitous medical advice; (5) the payment of the medical staff engaged in both in- and out-patient work, and the payment of fees by patients in the pay wards and in the consultation departments of the voluntary hospitals. Other commissions have since been appointed, have reported, and have disappeared, with the result that nothing practical had been done up to 1910 in the way of reform. Yet it is an undoubted fact that, if the foregoing re- commendations of Sir William Fergusson's Commission had been carried out in their entirety at the time they were made, practically all the abuses from which British hospitals afterwards suffered would have been removed, and the charitable public might have been saved several millions of pounds sterling. It may be well, therefore, briefly to indicate exactly what these changes amount to, and how they can be made effective at any time by those responsible for the working of a hospital. There is no doubt that all the facts available tend to prove that the voluntary hospitals are used to an increasing extent by persons able to make payment or partial payment for the treatment which they receive. The evidence and statistics demonstrating these facts may be readily gathered from a study of the Report (1909) and Evidence of the Royal Commission on the Poor Laws and Relief of Distress (Lord George Hamilton's Commission) and in the authorities mentioned at the end of this article. The underlying cause of the abuse was that no means existed whereby persons of moderate income

could obtain efficient treatment and hospital care when ill at a rate which they could afford to pay. The system, or want of system, whereby medical relief is granted to practically all applicants by the voluntary hospitals grew up without any combined attempt to organize it efficiently or to check abuses. Such a system rests upon a wrong basis, and the best interests of every class of the population demand its abolition in favour of one which shall afford the maximum of justice (1) to the poor, (2) to those who can afford to pay in part or in whole the cost of their medical treatment and care at a hospital, (3) to the medical profession, (4) to the subscribers and supporters of voluntary hospitals, whose gifts should be strictly applied to the purposes they were intended to serve, and (5) to the ratepayers, who are entitled to a guarantee that the

maximum efficiency is secured by the poor-law system of medical relief. The remedy is very simple and easy of application. Every voluntary hospital, while admitting all accidents and urgent cases needing immediate attention, should institute a system whereby each applicant would be asked to prove that he or she was a fit object of charity. The only real attempt at reform, up to 1909, was the appointment by many of the larger hospitals of almoners to ascertain whether certain selected patients were in a position to pay or not. By putting the burden of proof of eligibility to receive free medical relief upon the patients and their friends, all abuse of every kind must speedily cease. There would be no hardship entailed upon the patients by such a system, as experience has proved, but, to make it effective, the system of providing for in- and out-patients in Great Britain requires radical change, for, in existing circumstance, if a voluntary hospital attempted to enforce this simple method, it would be met with the difficulty that, where it was found that a patient or his friends could pay at any rate something, no department connected with British hospitals existed — as is the case in regard to hospitals in the United States — enabling such in-patients to be transferred to accommodation provided in paying wards. In the same way, directly the out-patients were dealt with under such a system, it would be made apparent, where a case could be properly treated under the poor law, that no plan of co-operation to secure this was organized under existing conditions. If the patient, being of a better class, were suffering from a minor ailment, and could be properly dealt with at a provident dispensary, the fees of which he could easily pay, the same absence of co-operation must make it practically impossible readily to enforce the system. When, again, an out- patient of the better class was entitled, from the severity of his ailment, to receive the advantages of a consultation by the medical staff, no method existed whereby this aid could

be rendered to him, and his transfer afterwards to the care of a medical practitioner attached to some provident dispensary, or resident near the patient's home, could be properly carried out. It follows that adequate reform required that methods should be adopted with a view to some part or all the cost of treatment being provided by the patient or his friends through an entire reorganization of the system of medical relief not only at the voluntary hospitals, but under the poor-law system. The reforms required in regard to voluntary hospitals are that every large hospital shall have connected with the in-patient depart- ment, in separate buildings, but under the administration of the managers, pay wards for the reception of those patients who are able to pay some part or all of the cost of treatment; that, as regards out-patients, the existing out-patient department should be abolished; that in substitution for it each hospital should have a casualty department and a department for consultation. In the casualty department every applicant should be seen once, and be there disposed of by being handed on to the consultation department; if his case was sufficiently important, he should then be transferred to some provident or poor-law dispensary, or be referred to a private medical attendant. It would no doubt take time to overcome the in- cidental difficulties which would necessarily arise in effecting so radical a reform as is here contemplated, but if all voluntary hospitals adopted the same system, and were to be brought into active co-operation with provident dispensaries and poor-law dispensaries and private medical practitioners, the new system might be successfully introduced and made effective within twelve months, and probably within six months, from the date of its commencement. This opinion is based upon the assump- tion that the provident dispensaries would be standardized, and that every one of them would be brought up to a state of the highest efficiency. In the town of Northampton the Royal Victoria Dispensary has been worked with the maximum of success, so far as the patients and the medical practitioners are concerned. In London and in other large towns like Manchester and elsewhere the provident dispensary has not succeeded as it has done in Northampton, because so many members of the medical profession are not alive to the importance of making

it their first business to provide that every patient connected with the provident dispensary who attends at the surgery of a private medical practitioner shall receive at least equal attention and accommodation to that afforded to every other private patient, whatever the fee he may pay. In the same way, poor- law dispensaries must be radically reformed. Everything which tends to excite a feeling of shame on the part of the patient attending the poor-law dispensary, such as the printing of the word " pauper " at the beginning of the space on which the patient's name is entered, must be abolished, and the class of medical service and all the arrangements for the treatment of the patients, however poor, at the poor-

law dispensary, must be made at least as efficient as those provided by voluntary hospitals. There undoubtedly is considerable overlapping between the voluntary hospitals and the poor law in Great Britain. The Royal Commission on the Poor Laws and Relief of Distress (1909) deals with this point with a view to set up a standard of medical relief to be granted by each class and type of hospitals, provides for adequate co-operation between all classes of institutions; and these reforms may be commended. It is too often forgotten that the function of the poor law is the relief of destitution, while it should be the object and duty of each voluntary hospital and indeed of all hospitals other than poor-law institutions to apply their resources entirely to the prevention of destitution, by stepping in to grant free medical relief to the provident and thrifty when, through no fault of their own, they meet with an accident or are overtaken by disease. An adequate system of co-operation would preserve the privilege of the voluntary hospitals, which save such patients from the necessity of requiring the relief which it is the object of the poor law to supply.

We have dealt with the relative advantages and disadvan- tages of rate-supported hospitals and voluntary hospitals. We should regard the establishment of a complete state-provided or rate-provided system of gratuitous medical relief, either for in- door patients or for out-door patients, or for both, as a grave evil. Such a system must eventually lead to the extinction of voluntary hospitals. If this disaster ever happens, it must result in the gravest evils, for it could not fail to injure the morale of all classes and tend to harden unnecessarily the relations between the rich and poor, who, under the voluntary system, have come to share each other's sufferings and to be animated by respect and confidence towards each other.

Hospital Construction. Locality and Site. — Hospitals are required for the use of the community in a certain locality, and to be of use they must be within reach of the centre of population. Formerly the greater difficulty of locomotion made it necessary that they should be actually in the midst of towns and cities, and to some extent this continues to prevail. It is now proved to demonstration that this is not the best plan. Fresh and pure air being a prime necessity, as well as a considerable amount of space of actual area in proportion to population, it would certainly be better to place hospitals as much in the outskirts as is consistent with considerations of usefulness and convenience. In short, the best site would be open fields; but if that be impracticable, a large space, "a sanitary zone " as it is called by Toilet, should be kept permanently free between them and surrounding buildings, certainly never less than double the height of the highest building. In the selection of a site various factors must be taken into consideration. If the hospital is to be used as the clinical school of a university or medical college, then the most suitable ground available within easy reach of the

university or college must be secured. If, on the other hand, the hospital is not to be used as a teaching school, a site more in the country should be favoured. In any case ample ground must be purchased to permit of the wards receiving the maximum of sun- light, an abundant supply of fresh air, and leave room for possible future extensions. The site should be self-contained; it should fee in such a position as to prevent the hospital being shadowed by other buildings in the neighbourhood, and, unless the site is along- side a public park, it should be entirely surrounded by streets of from 40 to 60 ft. in width. It is also necessary to secure that ade- quate water mains serve the site, and that the system of sewers be ample for all sewage purposes.

The difference between the expense of purchase of land in a town and in the environs is generally considerable, and this is therefore an additional reason for choosing a suburban locality. Even with existing hospitals it would be in most cases pecuniarily advantageous to dispose of the present building and site and retain only a receiving house in the town. St Thomas's in London, the Hdtel-Dieu in Paris

and the Royal Infirmary in ; Manchester, are all good examples where this might have been carried out. In none7 however, has this been done; these hospitals have been rebuilt, at enormous outlay, in the cities as before, although not exactly in the same locality.

As regards the actual site itself, where circumstances admit of choice, a dry gravelly or sandy soil should be selected, in a position where the ground water is low and but little subject to fluctuations of level, and where the means of drainage are capable of being effectually carried out. There should also be a cheerful sunny aspect and some protection from the coldest winds.

Form of Building. — A form of building must be selected which answers the following conditions: (a) the freest possible circulation of air round each ward, with no cul-de-sac or enclosed spaces where air can stagnate; (b) free play of sunlight upon each ward during some portion at least of the day ; (c) the possibility of isolating any ward, or group of wards, effectually, in case of infectious disease breaking out; (d) the possibility of ventilating every ward inde- pendently of any other part of the establishment. Those conditions can only be fulfilled by one system, viz. a congeries of houses Or pavilions, more or less connected with each other by covered ways, so as to facilitate convenient and economical administration.

The older plans of huge blocks of buildings, arranged in squares or rectangles, enclosing spaces without free circulation , of air, are obviously objectionable. Even when arranged in single lines or crosses they are not desirable, as the wards either communicate with each other or with common passages or corridors, rendering separation impossible. On this point it may be remarked that some of the buildings of the l8th century were more wisely con- structed than many of those in the first half of the igth century, and that the older buildings have been from time to time spoilt by ignorant additions made in later times.

. The question next arises, is it better to have pavilions of two or more storeys "high, or to have single-storeyed huts or cottages scattered more widely? For the treatment of tuberculosis there can be no doubt that, for hygienic reasons, the chdlet or single- patient hut is the best for the patients in the acute stages; for economical reasons the chalet has not been heretofore as popular as it deserves to be, but if the welfare of the patient is to be the first consideration there is no doubt that the chalet will ultimately prevail. It has the merit of being easily adapted to villages and houses where there is a garden, and in this way poor families may readily isolate and treat a member affected by tuberculosis at a cost within their means. For hospital purposes, so long as the system of placing hospital buildings in densely crowded areas prevails, many-storeyed buildings for hospital purposes are likely to continue. Should the proposal to institute a Hospital City ultimately prevail, then it is probable that the majority of the pavilions will be single-storeyed. Still some hospital authorities prefer the multiple-storeyed system for administrative reasons, contending that single-storeyed pavilions have no special advantages over two or three-storeyed buildings, whereas the difficulties in administration and service of a hospital building on the single-storey principle outweigh any argument against the two- or three-storey building, if it is properly designed and constructed. We hope that the time is approaching when architects and those members of the public who have to provide the money for hospital buildings will insist upon the erection of simple structures, costing little, so that the whole cost of hospital buildings may be, as it ought to be, reduced by at least half when compared with the expenditure of the past.

The pavilions may be arranged in various ways; they may be joined at one end by a corridor, or may be divided by a central corridor at right angles to them. In fact, the plan is very elastic, and adapts itself to almost any circumstances. A certain distance, not less than twice the height of the pavilions, ought to be pre- served between them. By this means free circulation of air and plenty of light are secured, whilst separation or isolation may be at once accomplished if required.

Foundations , Building Materials, Sfc. — rlt is of the first consequence that

a hospital should be dry; therefore the foundation and walls ought to be constructed so as to prevent the inroads of damp. An impervious foundation has the further advantage of preventing emanations from the soil rising up in consequence of the suction force produced by the higher temperature of the internal atmosphere of the building itself. There should be free ventilation in the base- ment, and the raising of the whole on arches is a good plan, now generally carried out in hot climates. If the pavilions are two or more storeys high, it is advisable to use fire-proof material as much as possible, but single-storeyed huts may be of wood. In any case effectual means of excluding damp must be employed. The in- teriors of wards ought to be rendered as non-absorbent as possible, by being covered with impervious coatings, such as glazed tiles (Parian, though much used, is apt to crack), silicate paint, which is preferable to tiles, or the like. The ceilings ought to be treated in the same way as the walls. There must be a concrete floor between each flat, experience showing that if a teak floor is laid hard on the concrete a very noisy floor is the result, but if the teak is laid on strips of wood, leaving a small space between the concrete and the floor, a more silent floor is obtained. For the floors themselves various materials have been suggested : in France there is a pre- ference for flags (dalles), but in England wood is more liked; and

indeed hard well-fitting wood, such as teak, oak or American willovy, leaves nothing to be desired. The surface should be waxed and polished or varnished. Even deal floors can be rendered non- absorbent by waxing, by impregnating them with solid paraffin as recommended by Dr Langstaff.

Shape and Arrangement of Wards. — It is now generally agreed that wards should have windows on at least two opposite sides. Three main shapes have been proposed: (a) long wards with windows down each side, and (generally) one at the farther end with balcony ; 26 ft. is a good width for a ward of twelve or fourteen beds, but for larger wards of more than fourteen beds the width should be not less than 28 ft.; (b) wards nearly square, with windows on three sides; and © circular wards with windows all round. The first (a) is the form usually adopted in pavilions ; (b) is recommended by Dr C. F. Folsom {Plans for the Johns Hopkins Hospital) ; and © has been • suggested by Mr John Marshall, F.R.S. (Nat. Assoc, for Promotion of Social Science, 1878). Of these (b) seems the least to be com- mended, and ©, now comparatively common, has distinct ad- vantages in an administrative sense, when the wards are constructed as to floor space so as to allow the same proportion of superficial space per bed in a circular ward to that which is contained in a rectangular ward, as, is the case at the Great Northern Central Hospital, London. Some authorities object to a chimney-stack up the centre of the circular ward, urging that it prevents the nurses from having complete supervision over all the beds. In practice this objection seems to us to have little force, and it can be avoided

by placing the fireplaces at the side of the circular ward, if desirable, though this adds somewhat to the cost of building.

Each bed should be a little distance, say from 8 in. to I ft. from the wall, and each bed may be reckoned as 6 j ft. long ; this gives 7§ ft. on each side. Between the ends of the beds about 10 ft. space is necessary, so that 25 or 26 ft. of total breadth may be taken as a favourable width. The wards of the Herbert Hospital are 26 ft.; but some exceed this, as, for instance, St Thomas's, London, and the New Royal infirmary, Edinburgh, 28; new Hotel Dieu, 29; and Lari- boisiere, 30. There seems no necessity for exceeding 26 for a ward of twelve or fourteen beds, but if the breadth be greater there ought to be more window space — the great difficulty being to get a wide space thoroughly ventilated. There ought to be only two rows of beds, one down each wall, with a window on each side of each bed. For ventilation two things are required — sufficient space and sufficiently frequent change or renewal of air. As regards space, this must be considered with reference both to total space and to lateral or floor space. Unless a minimum of floor space be laid down, we shall always be in danger of overcrowding, for cubic space may be supplied vertically with little or no advantage to the occupier. If we allow a minimum distance of 4 ft. between the beds and 10 ft. between the ends of the beds, this gives 100 sq. ft. of space per bed; less than this is undesirable. In severe surgical cases, fever cases and the like, a much larger space is required; and in the Edinburgh Infirmary 150 sq. ft. is allowed. Cubic space must be regulated by the means of ventilation; we can rarely change the air oftener than three times in an hour, and therefore the space ought to be at least one-third of the hourly supply. This ought not to be less than 4000 cubic ft. per bed, even in ordinary cases of sickness — and the third of that is 1333 cubic ft. of space. With 100 sq. ft. of floor space a ward of 13ˆ ft. high would supply this amount, and there is but little to be gained by raising the ceiling higher, — indeed 12 ft. is practically enough. The experiments of Drs Cowles and Wood of Boston (see Report of State Board of Health of Massachusetts for i8/q) show that above 12 ft. there is little or no movement in the air except towards the outlet ventilator; the space above is there- fore of little value as ventilation space. Authorities nowadays, however, fix 10 ft. 6 in. as the maximum, and any height above this may be disregarded for purposes of ventilation. Additional height adds also to the cost of construction, increases the expense of warm- ing, makes cleaning more difficult, and to some extent hampers ventilation. Whatever be the height of wards, the windows must reach to the ceiling, or there must be ventilators in the ceiling or at the top of the side walls. If this be not arranged for, a mass of foul air is apt to stagnate near the ceiling, and sooner or later to be driven down upon the inmates. The reasons for a large and constant renewal of air are, of course, the immediate removal and

dilution of the organic matter given off by the inmates; as this is greater in quantity and more offensive and dangerous in sickness than in health, the change of air in the former case must be greater than in the latter. Hence in serious cases an amount of air practically unlimited is desirable — the aim of true ventilation being to approach as near as possible to the condition of pure external air. Without going too much into details, a few general rules may be laid down. (1) Fresh air ought, if possible, to be brought in at the lowest part of the ward, warmed if necessary; (2) foul air ought to be taken out at the highest part of the ward; (3) fresh air should reach each patient without passing over the bed of any other; (4) the vitiated air should be removed from each patient without passing over the bed of any other; (5) 4000 cubic ft. of fresh air per head per hour should be the minimum in ordinary cases of sickness, to be increased without limit in severer cases; (6) the air should move in no part of a ward at a greater rate than i| ft. per second, except at the point of entry, where it should not exceed 5 ft. per second, and at the

outlet, where the rate may be somewhat higher; about 64 sq. in. of inlet and outlet sectional area ought to be supplied per head as a minimum; (7) every opportunity ought to be taken of freely flushing the wards with air, by means of open windows, when this can be done with safety.

Warming is a question of great importance in most climates, especially in such a climate as that of Great Britain, where every system of ventilation must involve either the warming of some portion of the incoming air, or the contriving its delivery without too great lowering of temperature; at the same time it cannot be too strongly insisted upon that the tendency is too much in the direction of allowing warmth to supersede freshness of air. There are very few cases of disease (if any) that are not more injured by foul air than by low temperature; and in the zymotic diseases, such as typhus, enteric fever, smallpox, &c, satisfactory results have been obtained even in winter weather by almost open-air treatment. At the same time a reasonable warmth is desirable on all grounds if it can be obtained without sacrificing purity of atmo- sphere. For all practical purposes 6o° to 63 ° F. is quite sufficient, and surgical and lying-in cases do well in lower temperatures. Various plans of warming have been recommended, but probably a combination is the best. It is inadvisable to do away altogether with radiant heat, although it is not always possible to supply sufficient warmth with open-air fire-places alone. A portion of the air may be warmed by being passed over a heating apparatus before it enters the ward, by having an air-chamber round the fire-place or stove, or by the use of

radiators in the ward itself. In each case, however, the air must be supplied independently to each ward, so that no general system of air supply is applicable.

The lighting of the ward at night will be most conveniently done by means of electricity in the form of a lamp for each bed, where gas is used each jet should have a special ventilator to carry off com- bustion products, as in the Edinburgh Infirmary.

The Furniture of Wards should be simple, clean and non- absorbent; the bedsteads of iron, mattresses hair, laid on spring bottoms without sacking. No curtains should be permitted.

The water-supply ought to be on the constant system, and plenti- ful ; 50 gallons per head per diem may be taken as a fair minimum estimate. ..

The closets ought to be of the simplest construction, the pans of earthenware all in one piece, the flushing arrangements simple but perfect, and the supply of water ample. Each ward should have its own closets, lavatories, &c, built in small annexes, with a cross- ventilated vestibule separating them from the ward. All the pipes should be disconnected from the drains, the closets by intercepting traps, the sink and waste pipes by being made to pour their contents over trapped gratings. The soil pipes should be ventilated, and placed outside the walls, protected as may be necessary from frost. Each ward should have a movable bath, which can be wheeled to the patient's bedside.

Each ward should have attached to it a small kitchen for any special cooking that may be required, a room for the physician or surgeon, and generally a room with one or two separate beds. No cooking should be done in the wards, nor ought washing, airing or drying of linen to be allowed there.

Hospital Economics. — There is no doubt that the voluntary system of hospital government is far more economical than any system of state or rate-supported hospitals. That the present condition of the voluntary hospitals in regard to economy is all that can be wished is not, of course, true. Still, resting as this system does upon the goodwill of the public for its continuance and maintenance, it is satisfactory to note that there is a continuous improvement in system and method, which makes for economy. It has taken many years to perfect and enforce the uniform system of hospital accounts, but this system with the co-operation of the great funds has produced economical results of the first importance. This system originated at the Queen's Hospital, Birmingham, in 1869, and was devised by an eminent Birmingham accountant, William Laundy, and Sir Henry

Burdett. It proved so fruitful in practice that six years later it was introduced at the " Dreadnought " Seamen's Hospital, the first London hospital to use it, and was then adopted spontaneously by a few of the best-administered hospitals where the managers were keen in enforcing economy. In 1891, in order to secure for comparative purposes an identical classification of the items and charges included in the system, a glossary or index of classification was prepared and published in the Hospital Annual of that year. This index enabled the same classification of the many items included in the expenditure of a great institution to be adopted generally. In the same year a committee of hospital secretaries, at the instigation of the Metropolitan Hospital Sunday Fund, revised and elaborated the index of classification, and the new index was adopted by a general meeting of hospital secretaries in January 1892. The Council of the Metropolitan Hospital Sunday Fund approved it, and the Uniform System of Accounts was for- mulated by that body for the use of the metropolitan hospitals. In 1906 the whole of this system was inquired into on behalf of the King's Fund by Mr John G. Griffiths, F.C.A., when a committee of hospital secretaries and representatives of the King's Fund prepared a further revision of the system. This was completed in the course of the year and adopted by the King's, the Hospital Sunday and the

Hospital Saturday Funds. The publication of a book by Sir Henry Burdett led to the adoption of the system in several of the British Colonies, and as a result of the action taken in the British Empire the Uniform System of Accounts has recently been set up and adopted by the principal hospitals of the United States of America. The prince of Wales (George V.) testified to the value of this system in enforcing control over expenditure, and Sir Henry Burdett adapted it for the use of the authorities of all charities of every class. It is probable that no single reform has had a greater influence for good upon the administration of charitable institutions than the evolution and enforcement of the uniform system of accounts.

Nursing. — -The arrangements for nursing the sick have ■ greatly improved in recent times, although controversy still goes on as to the best method of carrying it out. In arranging for the nursing in a hospital both efficiency and economy have to be considered. No ward in a general hospital for acute cases should contain more than 24 beds. In hospitals with clinical schools the proportion of nurses to patients should be about one nurse to every three patients, and if possible every ward should have a probationer on duty at night, in addition to the night nurse. In all well-conducted hospitals it is, now arranged that the nurses on night duty have a hot meal served in the general dining-room during the night, and this is only possible where a nurse and a probationer are allowed for each ward. The nurses' quarters should be separate from the hospital proper, and connected by a conservatory or covered way. Each nurse should have a

separate bedroom, measuring not less than 12 ft. long, 9 ft, broad and 10 ft. high. A bath should be allowed for every eight looms, and the water-closets and sinks should, if possible, be in sanitary towers cut off from the main block of buildings.

Circumstances must to a large extent determine the arrangement, but it seems desirable on the whole that the work of a nurse should be confined to a single ward at a time if possible. The duties of nurses ought also to be distinctly confined to attendance on the sick, and no menial work, such as scrubbing floors and the like, should be demanded of them ; a proper staff of servants ought to be em- ployed for such purposes. It is also desirable that a separate pavilion for lodging the nurses should be set .apart, and that fair and reasonable time for rest and recreation should be allowed. Some discussion has taken place as to the advisability of placing the nursing of a hospital in the hands of a sisterhood or a separate corporation. It will, however, be admitted that the best plan is for the nursing staff of each hospital to be special and under one head within the establishment itself, even though it may be con- nected with some main institution outside. The nursing must, of course, be carried on in aacordance with the directions and treatment of the physicians and surgeons.

General. — The kitchen, laundry, dispensary and other offices must be in a separate pavilion or pavilions, away from the wards, but within convenient access. A separate pavilion for isolation of infectious cases is desirable. This may be a wooden hut, or in some cases even' a tent; either is probably preferable to a per- manent block o f buildings. A disinfecting chamber ought to be provided where heat can be applied to clothes and bedding, for the destruction both of vermin and of the germs of disease. It is ad- visable to expose all bedding and clothing to its influence after each occasion of wear. Although this may entail additional expense from the deterioration of fabric, it is worth the outlay to secure immunity from disease. This plan is rigidly followed at the Royal South Hants Infirmary at Southampton. It is of great importance that the wards should be periodically emptied and kept unoccupied for not less than one month in each year, and longer if possible. During such period thorough cleansing and flushing with air could be carried out, so as to prevent any continuous deposit of organic matter.

Gale House or Admission Block. — If the efficiency of a hospital and the regular and smooth working of its departments are to be secured, the proper management and control of the admission department is of the greatest importance. When one considers for a moment the number of applicants of all ages in various stages of disease, and the number of accident cases of every degree of severity who present themselves every day seeking admission, it will be evident that the most careful supervision must be exercised on the very threshold. It is essential that every precaution be

taken against the admission of an unsuitable case, or the refusal, without careful examination, of any patient seeking admission. It is only necessary to instance the case of a patient with delirium tremens being adr mitted to a general ward at a late hour, or a case of infectious disease admitted through an overlook, or a case refused admission and expiring on the way home, in order to illustrate the danger and trouble which might arise should the supervision exercised over this department not be systematic, stringent and thorough.

To secure this proper control it is necessary that the admission department should be designed on a definite plan suitable for the purposes in view. It is not sufficient to utilize any available rooms, say, in the basement of the building, where patients may be casually interviewed by a house surgeon or physician. This department should be as carefully designed and equipped as any other depart- ment of the hospital.

Within recent years much more attention has been devoted to the details of construction than was formerly considered necessary,

but even in the best type of hospital there is still much to be desired in this respect. It is essential for an architect in designing any building to have before him an accurate idea of all the requirements, and the use to which each foot of space is to be put; for unless he is furnished with this information it is not possible for him to design his building so as to give effect to all the details which are so neces- sary. The following is an endeavour in a general way to enumerate the various points which an architect should have before him in designing the admission department of a general hospital : —

The admission department should be conveniently placed on the ground floor of the hospital — or it may be a detached building — with a large court where ambulance wagons or other vehicles may easily pass each other on approaching or retiring from the institu- tion. The entrance to the admission department for patients should, if possible, be entirely separate and distinct from that for the staff and students. An additional entrance should be provided for patients' friends on visiting days, in order that they may be able to enter the hospital without passing through the patients' entrance, or coming into contact with an accident case or other patient seeking admission. The main entrance door should be protected by a covered porch so that patients may be removed from the ambulance or cab to the examination room without being exposed to the weather or the gaze

of inquisitive onlookers. This door should be sufficiently wide to allow two hand ambulances or barrows to pass should they require to be brought out to the ambulance or cab, and to facilitate this the floor of the entrance hall should be as nearly as possible on a level with that of the outside porch. Adjoining the entrance vestibule, lavatory accommodation should be provided for males and females who may accompany the patient. Lavatory accommodation should also be provided for porters on duty, and all lavatories should have a cut-off ventilating passage.

A recess to store ambulance barrows should adjoin the entrance, and this recess must be in proportion to the size of the hospital, in order that a hand ambulance may always be available when an accident or urgent case arrives. The vestibule should lead into a large waiting-hall with an inquiry office at its entrance, provided with a telephone exchange, private exchange box, also letter and parcel racks. If possible a window of the inquiry office should command a view of the main entrance. A room should be provided for the medical officer on duty, so that a medical officer may be always at hand and that no delay will occur in attending to a patient on arrival.

Leading off from this waiting-hall, well-lit examination rooms should be available for the thorough examination of patients, both male and female, the number of rooms, of course, varying with the size of the hospital and the amount of work to be done. Each of these rooms should be fitted with a wash-hand basin and sink, and a plentiful supply of hot and cold water.

Two rooms, with recovery rooms adjoining, should be fitted up as small operating-rooms for the treatment of minor casualties. A special room should also be furnished with an X-ray outfit, and arrangements should be made whereby this room can be readily darkened so that suspected fractures, &c, may be examined with the fluorescent screen.

Adjoining the admission department two small wards should be provided for the accommodation of drunk or noisy cases unfit to be placed in the general wards. To these " emergency wards " must be attached the usual bathroom and lavatory accommodation, nurses' room, ward kitchen and urine-test room or small lavatory. These wards should have double windows in order to prevent noise being heard outside if the wards are near other buildings.

The interior walls of the admission department should, as far as possible, have a smooth and impervious surface, in order that they may be easily cleaned. All angles should be avoided and all corners rounded. Although glazed tiles are open to the criticism that they have numerous joints, they probably make the most suitable wall yet devised, as they can be easily washed down at very small cost. The corridors and waiting-hall should be

tiled to a height of 6 ft. 6 in., and the upper walls covered with Parian or Kean's cement, and be treated with three coats of flat paint and two coats of enamel, or, what is equally suitable and less costly, enamellette. The floors of the passages and corridors throughout the department should be covered with terrazzo, which is a mixture of Portland cement and marble chips. A margin of I ft. round the rooms should be treated in this way, and the terrazzo carried up this same distance on the wall to join the tiles. The remainder of the floors should be covered with hard wood, such as American maple or teak. As these floors require to be frequently washed, oak is not so suitable. Oak very soon becomes destroyed with water; .the same trouble is experienced with pitch pine. The doors should also be made of a hard wood,

preferably teak, and have no mouldings or grooves where dust can lodge. They should be wide enough to admit an ambulance barrow or bed with ease. In no case should the doors of an examination room be less than 3 ft. 6 in. in width.

As an aid to a complete understanding of the varied work which has to be provided for, and the most effective method of carrying it out, the accompanying plans are given of an admission block de- signed to embody the ˆ XJBW/ " main principles which

govern the construction of such a department.

All accidents and patients seeking admis- sion to this hospital enter through the central gate- way, and on the left is shown the porters' room, where a porter is always in readiness to attend to any applicant. This room has suitable ac- commodation for parcels, letters, telephones, &c, and adjoining it is a small lavatory for the use of porters. At the side of the porters' room

Plans of Ground Floor and Basement of a Hospital.

is the entrance to the central waiting-hall, which is lit from the roof. On one side of this hall are examination and dressing-rooms for males, with lavatory accommodation ; and on the other side similar provision for females, with the addition of a nurses' duty room. At the end of the central hail are two operating theatres, with recovery room adjoining each; one theatre for males, and the other for females. Between these theatres are rooms for sterilizers and dressings. An X-ray examination room is provided beyond the male examination room on the right of the hall. In the basement, under the entrance-hall and operating theatres are two bathrooms for males and two for females, with W.C.'s for each. The remainder of the basement is used as a store for patients' clothes, and a hot- air chamber is provided for purposes of disinfection. The basement can

be reached by a lift or by a wide staircase which is situated at the end of the waiting-hall.

In the above plan provision is made for a sitting-room for the medical officer on duty. This is a new and essential feature in the admission block unit of all hospitals in large cities, for it should secure that no patient is kept waiting for many minutes before being seen. One of the blots on the management of many hospitals is that regrettable delays often take place, and much dissatisfaction and avoidable suffering may arise from this difficulty in the ad- ministration of a general hospital. We have given this plan of a model gatehouse or admission block for a modern general hospitaL because the block as it stands contains all the elements necessary for a receiving-house block in cities in connexion with a great Hospital city situated outside its area, in fulfilment of the suggestion for a Hospital city made above. Apart from its interest as a new feature which all new hospitals should adopt, the gatehouse or admission block has an importance in the wider sense, that it may come to form the key to the solution of the problem of how best to provide hospital accommodation for the poor in great cities under the best hygienic conditions, while protecting them from the misery and danger of prolonged delay in first treatment, especially in con- nexion with accidents and other cases of urgency.

Bibliography. — Sir H. Burdett, Cottage Hospitals, General, Fever and Convalescent, their Construction, Management and Work (London, 1877, 1880 and 1896); Toilet, Les Edifices hospitaliers depuis leur

origine jusqu'a nos jours (Paris, 1892); Sir H. Burdett, Hospitals and Asylums of the World, with large portfolio of plans to a uniform scale (London, 1893) (a supplement is published every year bringing the information up to date, entitled Burdett' s Hospitals and Charities) ; J. S. Billings, The Principles of Ventilation, Heating and their Practical Application (New York, 1893) ; Galton, Healthy Hospitals (London, ! 893); Toilet, Les Hopitaux au XIX' siecle (Paris, 1894); Billings and Hurd, Suggestions to Hospital and Asylum Visitors (Philadelphia 1895); Oswald Kuhn, "Hospitals," Handbuch der Architektur, 4th part, 5th half-volume, part i. (Stuttgart, 1897); Plans for the Johns Hopkins Hospital (Baltimore, 1875); Report of State Board of Health for Massachusetts for 1879. (H. Bt.)

HOSPITIUM (Gr. ţevia, irpoˆtvia), "hospitality," among the Greeks and Romans, was of a twofold character : (1) private ; (2) public.

(1) In Homeric times all strangers without exception were regarded as being under the protection of Zeus Xenios, the god of strangers and suppliants. It is doubtful whether, as is commonly assumed, they were considered as ipso facto enemies; they were rather guests. Immediately on his arrival, the stranger was clothed and entertained, and no inquiry was made as to his name or antecedents until the duties of hospitality had been fulfilled. When the guest parted from his host he was often presented with gifts (&via), and sometimes a die (ao-TpayaXos) was broken between them. Each then took a part, a family connexion was established, and the broken die served as a symbol of recognition; thus the members of each family found in the other hosts and protectors in case of need. Violation of the duties of hospitality was likely to provoke the wrath of the gods; but it does not appear that any- thing beyond this religious sanction existed to guard the rights of a traveller. Similar customs seem to have existed among the Italian races. Amongst the Romans, private hospit- ality, which had existed from the earliest times, was more accurately and legally defined than amongst the Greeks, the tie between host and guest being almost as strong as that between patron and client. It was of the nature of a contract, entered into by mutual promise, the clasping of hands, and exchange of an agreement in writing (tabula hospitalis) or of a token (tessera or symbolum), and was rendered hereditary by the division of the tessera. The advantages thus obtained by the guest were, the right of hospitality when travelling and, above all, the protection of his host (representing him as his patron) in a court of law. The contract was sacred and inviolable, undertaken in the name of Jupiter Hospitalis, and could only be dissolved by a formal act.

(2) This private connexion developed into a custom according to which a state appointed one of the citizens of a foreign state as its representative (irp6£evos) to protect any of its citizens travelling or resident in his country. Sometimes an individual came forward voluntarily to perform these duties on behalf of another state (e9e\oirp6ˆvos). The proxenus is generally compared to the modern consul or minister resident. His duties were to afford hospitality to strangers from the state whose proxenus he was, to introduce its ambassadors, to procure them admission to the assembly and seats in the theatre, and in general to look after the commercial and political interests of the state by which he had been appointed to his office. Many cases occur where such an office was hereditary; thus the family of Callias at Athens were proxeni of the Spartans. We find the office mentioned in a Corcyraean inscription dating probably from the 7th century B.C., and it continued to grow more important and frequent throughout Greek history. There is no proof that any direct emolument was ever attached to the office, while the expense and trouble entailed by it must often have been very great. Probably the

honours which it brought with it were sufficient recompense. These consisted partly in the general respect and esteem paid to a proxenus, and partly in many more substantial honours conferred by special decree of the state whose representative he was, such as freedom from taxation and public burdens, the right of acquiring property in Attica, admission to the senate and popular assemblies, and perhaps even full citizenship. Public hospitium seems also to have existed among the Italian races; but the

circumstances of their history prevented it from becoming so important as in Greece. Cases, however, occur of the establish- ment of public hospitality between two cities (Rome and Caere, Livy v. s°), and of towns entering into a position of clientship to some distinguished Roman, who then became patronus of such a town. Foreigners were frequently granted the right of public hospitality by the senate down to the end of the re- public. The public hospes had a right to entertainment at the public expense, admission to sacrifices and games, the right of buying and selling on his own account, and of bringing an action at law without the intervention of a Roman patron.

A full bibliography of the subject will be found in the article in Daremberg and Saglio, Dictionnaire des antiquites, to which may be added R. von Jhering, Die Gastfreundschaft im Altertum (1887); see also Smith's Dictionary of Greek and Roman Antiquities (3rd ed.,

1890).

HOSPODAR, a term of Slavonic origin, meaning " lord " (Russ. gospodar). It is a derivative of gospod, "lord," and is akin to gosudar, which primarily means " sovereign," and is now also used in Russia as a polite form of address, equivalent to " sir." The pronunciation as hospodar of a word written gospodar in all but one of the Slavonic languages which retain the Cyrillic alphabet is not, as is sometimes alleged, due to the influence of Little Russian, but to that of Church Slavonic. In both of these g is frequently pronounced h. In Little Russian the title hospodar is specially applied to the master of a house or the head of a family. The rulers of Walachia and Moldavia were styled hospodars from the 15th century to 1866. At the end of this period, as the title had been held by many vassals of Turkey, its retention was considered inconsistent with the growth of Rumanian independence. It was therefore discarded in favour of domn (dominus, "lord"), which continued to be the official princely title up to the proclamation of a Rumanian kingdom in 1881.

HOST. (1) (Through the O. Fr. oste or hoste, modern hdte, from Lat. hospes, a guest or host; hospes being probably from an original hostipes, one who feeds a stranger or enemy, from hostis and the root of pascere),

one who receives another into his house and provides him with lodging and entertainment, especially one who does this in return for payment. The word is thus transferred, in biology, to an animal or plant upon which a parasite lives. (2) (From Lat. hostis, a stranger or enemy; in Med. Latin a military expedition), a very large gathering of men, armed for war, an army, and so used generally of any multitude. In biblical use the word is applied to the company of angels in heaven; or to the sun, moon and stars, the " hosts of heaven," and also to translate "Jehovah Sabaoth," the Lord God of hosts, the lord of the armies of Israel or of the hosts of heaven. (3) (From Lat. hostia, a victim or sacrifice), the sacrifice of Christ's body and blood in the Eucharist, more particularly the consecrated wafer used in the service of the mass in the Roman Church (see Eucharist).

HOSTAGE (through Fr. ostage, modern otage, from Late Lat. obsidaticum, the state of being an obses or hostage; Med. Lat. ostaticum, ostagium), a person handed over by one of two belligerent parties to the other or seized as security for the carrying out of an agreement, or as a preventive measure against certain acts of war. The practice of taking hostages is very ancient, and has been used constantly in negotiations with conquered nations, and in cases such as surrenders, armistices and the like, where the two belligerents depended for its proper carrying out on each other's good faith. The Romans were accustomed to take the sons of tributary princes and educate them at Rome, thus holding a security for the continued loyalty of the conquered nation and also instilling a possible future ruler with ideas of Roman civilization. This practice was also adopted in the early period of the British occupation of India, and by France in her relations with the Arab tribes in North Africa. 1 The position of a hostage was that of a prisoner of war,

1 The sultan of Bagiemi, in Central Africa, in 1906 sent his nephew to undergo military training with a squadron of Spahis, and at the same time to serve as a guarantee of his fidelity to the French (Bulletin du Comite de I'Afrique francaise, Oct. 1906).

to be retained till the negotiations or treaty obligations were carried out, and liable to punishment (in ancient times), and even to death, in case of treachery or refusal to fulfil the promises made. The practice of taking hostages as security for the carrying out of a treaty between civilized states is now obsolete. The last occasion was at the treaty of Aix-la-Chapelle in

1748, when two British peers, Henry Bowes Howard, nth earl of Suffolk, and Charles, 9th Baron Cathcart, were sent to France as hostages for the restitution of Cape Breton to France.

In modern times the practice may be said to be confined to two occasions: (1) to secure the payment of enforced con- tributions or requisitions in an occupied territory and the obedience to regulations the occupying army may think fit to issue; (2) as a precautionary measure, to prevent illegitimate acts of war or violence by persons not members of the recognized military forces of the enemy. During the Franco-Prussian War of 1870, the Germans took as hostages the prominent people or officials from towns or districts when making requisitions and also when foraging, and it was a general practice for the mayor and adjoint of a town which failed to pay a fine imposed upon it to be seized as " hostages " and retained till the money was paid. The last case where " hostages " have been taken in modern warfare has been the subject of much discussion. In 1870 the Germans found it necessary to take special measures to put a stop to train- wrecking by parties in occupied territory not belonging to the recognized armed forces of the enemy, an illegitimate act of war. Prominent citizens were placed on the engine of the train " so that it might be understood that in every accident caused by the hostility of the inhabitants their com- patriots will be the first to suffer." The measure seems to have been effective. In 1900 during the Boer War, by a proclamation issued at Pretoria (June 19th), Lord Roberts adopted the plan for a similar reason, but shortly afterwards (July 29) it was abandoned (see The Times' History of the War in S. Africa, iv. 402). The Germans also, between the surrender of a town and its final occupation, took " hostages " as security against outbreaks of violence by the inhabitants. Most writers on international law have regarded this method of preventing such acts of hostility as unjustifiable, on the ground that the persons taken as hostages are not the persons responsible for the act; 1 that, as by the usage of war hostages are to be treated strictly as prisoners of war, such an exposure to danger is transgressing the rights of a belligerent; and as useless, for the mere temporary removal of important citizens till the end of a war cannot be a deterrent unless their mere removal deprives the combatants of persons necessary to the continuance of the acts aimed at (see W. E. Hall, International Law, 1904, pp. 418, 475). On the other hand it has been urged (L. Oppenheim, International Law, 1905, vol. ii., " War and Neutrality," pp. 271-273) that the acts, the prevention of which is aimed at, are not legitimate acts on the part of the armed forces of the enemy, but illegitimate acts by private persons, who, if caught, could be quite lawfully punished, and that a precautionary and preventive measure is more reasonable than " reprisals." It may be noticed, however, that the hostages would suffer should the acts aimed at be

performed by the authorized belligerent forces of the enemy. In France, after the revolution of Prairial (June 18, 1799), the so-called " law of hostages " was passed, to meet the insurrec- tion in La Vendee. Relatives of emigres were taken from dis- turbed districts and imprisoned, and were liable to execution at any attempt to escape. Sequestration of their property and deportation from France followed on the murder of a republican, four to every such murder, with heavy fines on the whole body of hostages. The law only resulted in an increase in the insurrection. Napoleon in 1796 had used similar measures to deal with the insurrection in Lombardy (Correspondance de Napoleon I. i. 323, 327, quoted in Hall, International Law).

1 Article 50 of the Hague War Regulations lays it down that " no general penalty, pecuniary or otherwise, can be inflicted on the population on account of the acts of individuals for which it cannot be regarded as collectively responsible." The regulations, however, do not allude to the practice of taking hostage.

In May 187.1, at the close of the Paris Commune, took place the massacre of the so-called hostages. Strictly they were not " hostages," for they had not been handed over or seized as security for the performance of any undertaking or as a preventive measure, but merely in retaliation for the death of their leaders E. V. Duval and Gustave Flourens. It was an act of maniacal despair, on the defeat at Mont Valerien on the 4th of April and the entry of the army into Paris on the 21st of May. Among the many victims who were shot in batches the most noticeable were Monsignor Darboy, archbishop of Paris, the Abbe Deguery, cure of the Madeleine, and the president of the Court of Cassation, Louis Bernard Bonjean.

HOSTE, SIR WILLIAM (1780-1828), British naval captain, was the son of Dixon Hoste, rector of Godwick and Tittleshill in Norfolk. He was born on the 26th of August 1780 at Ingolds- thorpe, and entered the navy in April 1793, under the special care of Nelson, who had a lively affection for him. He became lieutenant in 1798, and was appointed commander of the " Mutine "brig after the battle of the Nile, at which he was present as lieutenant of the " Theseus." In 1802 he was promoted post captain by Lord St Vincent. During all his active career, he was employed in the Mediterranean and the Adriatic. From 1808 to 1814 he held the command of a detached force of frigates, and was engaged in operations against the French who held Dalmatia at the time, and in watching, or, when they came out, fighting, the ships of the squadron formed at Venice by Napoleon's orders. The work was admirably done, and was also lucrative; and Hoste, although he occasionally complained that his exertions did not put much money in his pocket, made a fortune of at least £60,000 by the capture of Italian and Dalmatian merchant ships. He also made many

successful attacks on the French military posts on shore. His most brilliant feat was performed on the 13th of March 1811. A Franco-Venetian squadron of six frigates and five small vessels, under the command of a French officer named Dubourdieu, assailed Hoste's small force of four frigates near the island of Lissa. The French officer imitated Nelson's attack at Trafalgar by sailing down on the English line from windward with his ships in two lines. But the rapid manoeuvring and gunnery of Hoste's squadron proved how little virtue there is in any formation in itself. Dubourdieu was killed, one of the French frigates was driven on shore, and two of the Venetians were taken. After the action, which attracted a great deal of attention, Hoste returned to England, but in 1812 he was back on his station, where he remained till the end of the war. During the peace he did not again go to sea, and he died on the 6th of December 1828. He married Lady Harriet Walpole in April 1817, and left three sons and three daughters.

In 1833 his widow published his Memoirs and Letters. See also Marshall, Roy. Nav. Biog. vol. iii., and James, Naval History.

HOSTEL, the old name for an inn (see Hospital, ad init.); also employed at Oxford and Cambridge to designate the lodgings which were in ancient times occupied by students of the university and to a certain extent regulated by the authorities. In some English public schools what is known as the " hostel " system provides for an organization of the lodging accommodation under separate masterships.*

HOSTIUS, Roman epic poet, probably flourished in the 2nd century B.C. He was the author of a Bellum Histricum in at least seven books, of which only a few fragments remain. The poem is probably intended to celebrate the victory gained in 129 by Gaius Sempronius Tuditanus (consul and himself an annalist) over the Illyrian Iapydes (Appian, Illyrica, 10; Livy, epit. 59). Hostius is supposed by some to be the " doctus avus " alluded to in Propertius (iv. 20. 8), the real name of Propertius's Cynthia, according to Apuleius {Apologia x.) and the scholiast on Juvenal (vi. 7), being Hostia (perhaps Roscia).

Fragments in E. Bahrens, Fragmenta poetarum Romanorum (1884) ; A. Weichert, Poetarum Latinorum reliquiae (1830).

HOSUR, a town of British India, in the Salem district of Madras, 24 m. E. of Bangalore. Pop. (1901) 6695. It contains an old fort, frequently mentioned in the history of the Mysore wars, and a fine castellated mansion built by a former collector.

Close by is the remount depot, established in 1828, where Australian horses are acclimatized and trained for artillery and cavalry use in southern India.

HOTCH-POT, or Hotch-potch (from Fr. hocher, to shake; used as early as 1292 as a law term, and from the 15th century in cookery for a sort of broth with many ingredients, and so used figuratively for any heterogeneous mixture), in English law, the name given to a rule of equity whereby a person, interested along with others in a common fund, and having already received something in the same interest, is required to surrender what has been so acquired into the common fund, on pain of being excluded from the distribution. " It seemeth," says Littleton, " that this word hotch-pot is in English a pudding; for in a pudding is not commonly put one thing alone, but one thing with other things together." The following is an old example given in Coke on Littleton: " If a man seized of 30 acres of land in fee hath issue only two daughters, and he gives with one of them 10 acres in marriage to the man that marries her, and dies seized of the other 20; now she that is thus married, to gain her share of the rest of the land, must put her part given in marriage into hotch-pot; i.e. she must refuse to take the profits thereof, and cause her land to be so mingled with the other that an equal division of the whole may be made between her and her sister, as if none had been given to her; and thus for her 10 acres she shall have 15, or otherwise the sister will have the 20." In the common law this seems to have been the only instance in which the rule was applied, and the reason assigned for it is that, inasmuch as daughters succeeding to lands take together as coparceners and not by primogeniture, the policy of the law is that the land in such cases should be equally divided. The law of hotch-pot applies only to lands descending in fee-simple. The same principle is noticed by Blackstone as applying in- the customs of York and London to personal property. It is also expressly enacted in the Statute of Dis- tributions (§ 5) that no child of the intestate, except his heir-at- law, who shall have any estate in land by the settlement of the intestate, or who shall be advanced by the intestate in his lifetime by pecuniary portion equal to the distributive shares of the other children, shall participate with them in the surplus; but if the estate so given to such child by way of advancement be not equivalent to their shares, then such part of the surplus as will make it equal shall be allotted to him. It has been decided that this provision applies only to advancements by fathers, on the ground that the rule was founded on the custom of London, which never affected a widow's personal estate. The heir-at-law is not required to bring any land which he has by descent or otherwise from the deceased into hotch-pot, but advancements made to him out of the personal property must be brought in. The same principle is to be found in

the collatio bonorum of the Roman law: emancipated children, in order to share the inheritance of their father with the children unemancipated, were required to bring their property into the common fund. It is also found in the law of Scotland.

HOTEL-DE-VILLE, the town hall of every French munici- pality. The most ancient example still in perfect preservation is that at St-Antonin (Tarn-et-Garonne) dating from the middle of the 1 2th century. Other fine town halls are those of Com- piegne, Orleans, Saumur, Beaugency and St Quentin. The Hotel de Ville in Paris built in the 16th century was burnt by the Commune in 1871 and has since been rebuilt on an extended site, the central portion of the main front being a reproduction of the old design. There is only one town hall in a French town, those erected for the mayors of the different arrondissements in Paris being called mairies.

HOTEL-DIEU, the name given to the principal hospital in any French town. The Hotel-Dieu in Paris was founded in the year a.d. 660, has been extended at various times, and was entirely rebuilt between 1868-1878. One of the most ancient in France is at Angers, dating from 1153. The Hotel-Dieu of Beaune (Cote-d'Or), founded 1443, is one of the most interesting, as it retains the picturesque disposition of its courtyard, with covered galleries on two storeys and large dormer windows;

and the great hall of the Hotel-Dieu at Tonnerre, Yonne (1338), nearly 60 ft. wide and over 300 ft. long, is still preserved as part of the chief hospital of the town.

HOTHAM, SIR JOHN (d. 1645), English parliamentarian, belonged to a Yorkshire family, and fought on the continent of Europe during the early part of the Thirty Years' War. In 1622 he was made a baronet, and he was member of parliament for Beverley in the five parliaments between 1625 and 1640, being sheriff of Yorkshire in 1635. In 1639 he was deprived by the king of his office of governor of Hull, and joining the parliamentary party refused to pay ship-money. In January 1642 Hotham was ordered by the parliament to seize Hull, where there was a large store of munitions of war; this was at once carried out by his son John. Hotham took command of Hull and in April 1642 refused to admit Charles I. to the town. Later he promised his prisoner, Lord Digby, that he would surrender it to the king, but when Charles appeared again he refused a second time and drove away the besiegers. Meanwhile the younger Hotham was taking an active part in the Civil War in Yorkshire and Lincolnshire, but was soon at variance with other parliamentary leaders, especially with the Fairfaxes, and complaints about his conduct and that of his troops were made by Cromwell and by Colonel Hutchinson. Soon both the Hothams were corresponding with the earl of Newcastle, and the younger one was probably ready to betray Hull;

these proceedings became known to the parliament, and in June 1643 father and son were captured and taken to London. After a long delay they were tried by court-martial, were found guilty and were sentenced to death. The younger Hotham was beheaded on the 2nd of January 1645, and in spite of efforts made by the House of Lords and the Presbyterians to save him, the elder suffered the same fate on the following day. Sir John Hotham had two other sons who were persons of some note: Charles Hotham (i6i5-<;. 1672), rector of Wigan, a Cambridge scholar and author of Ad phttosophiam Teutonicam Manuductio (1648); and Durant Hotham (1617-1691), who wrote a Life of Jacob Boehme (1654).

HOTHAM, WILLIAM HOTHAM, ist Baron (1736-1813), British Admiral, son of Sir Beaumont Hotham (d. 1771), a lineal descendant of the above Sir John Hotham, was educated at Westminster School and at the Royal Naval Academy, Portsmouth. He entered the navy in 1 751, and spent most of his midshipman's time in American waters. In 1755 he became lieutenant in Sir Edward Hawke's flagship the " St George," and he soon received a small command, which led gradually to higher posts. In the " Syren " (20) he fought a sharp action with the French " Telemaque " of superior force, and in the " Fortune " sloop he carried, by boarding, a 26-gun privateer. For this service he was rewarded with a more powerful ship, and from 1757 onwards commanded various frigates. In 1759 his ship the " Melampe," with H.M.S. " Southampton," fought a spirited action with two hostile frigates of similar force, one of which became their prize. The " Melampe " was attached to Keppel's squadron in 1761, but was in the main employed in detached duty and made many captures. In 1776, as a commodore, Hotham served in North American waters, and he had a great share in the brilliant action in the Cul de Sac of St Lucia (Dec. 15th, 1778). Here he continued till the spring of 1781, when he was sent home in charge of a large convoy of merchantmen. Off Scilly Hotham fell in with a powerful French squadron, against which he could effect nothing, and many of the merchant- men went to France as prizes. In 1782 Commodore Hothlim was with Howe at the relief of Gibraltar, and at the time of the Spanish armament of 1790 he flew his flag as rear-admiral of the red. Some time later he was made vice-admiral. As Hood's second-in-command in the Mediterranean he was engaged against the French Revolutionary navy, and when his chief retired to England the command devolved upon him. On March 1 2th, 1794 he fought an indecisive fleet action, in which the brunt of the fighting was borne by Captain Horatio Nelson, and some months later, now a full admiral, he again engaged, this time under conditions which might have permitted a decisive victory;

of this affair Nelson wrote home that it was a " miserable action." A little later he returned to England, and in 1797 he was made a peer of Ireland under the title of Baron Hotham of South Dalton, near Hull. He died in 1813. Hotham lacked the fiery energy and genius of a Nelson or a Jervis, but in subordinate positions he was a brave and capable officer.

As Hotham died unmarried his barony passed to his brother, Sir Beaumont Hotham (1737-1814), who became 2nd Baron Hotham in May 1813. Beaumont, who was a baron of the exchequer for thirty years, died on the 4th of March 18 14, and was succeeded as 3rd baron by his grandson Beaumont Hotham (1794-1870), who was present at the battle of Waterloo, being afterwards a member of parliament for forty-eight years. He died unmarried in December 1870 and was succeeded by his nephew, Charles (1836-1872), and then by another nephew, John (1838- 1907). In 1907 his cousin Frederick William (b. 1863) became the 6th baron.

Other distinguished members of this family were the 2nd baron's son, Sir Henry Hotham (177 7-1833), a vice-admiral, who saw a great deal of service during the Napoleonic wars; and Sir William Hotham (1772-1848), a nephew of the 1st baron, who served with Duncan in 1797 off Camperdown and elsewhere.

See Charnock, Biographia navalis, vi. 236.

HOTHO, HEINRICH GUSTAV (1802-1873), German historian of art, was born at Berlin in 1802, and died in his native city on Christmas day 1873. During boyhood he was affected for two years with blindness consequent on an attack of measles. But recovering his sight he studied so hard as to take his degree at Berlin in 1826. A year of travel spent in visiting Paris, London and the Low Countries determined his vocation. He came home delighted with the treasures which he had seen, worked labori- ously for a higher examination and passed as " docent " in aesthetics and art history. In 1829 he was made professor at the university of Berlin. In 1833 G. F. Waagen accepted him as assistant in the museum of the Prussian capital; and in 1858 he was promoted to the directorship of the print-room. During a long and busy life, in which his time was divided between literature and official duties, Hotho's ambition had always been to master the history of the schools of Germany and the Nether- lands. Accordingly what he published was generally confined to those countries. In 1842-1843 he gave to the world his account of German and Flemish painting. From 1833 to 1858 he revised and published anew a part of this work, which he called " The school of Hubert van Eyck, with his German precursors and contemporaries." His attempt later on to write a history of Christian painting overtasked his strength, and remained unfinished. Hotho is important in the history of aesthetics as having developed Hegel's theories;

but he was deficient in knowledge of Italian painting.

HOTI-MARDAN, or Mardan, a frontier cantonment of British India in the Peshawar district of the North-West Frontier Province, situated 15 m. N. of Nowshera. Pop. (1901) 3572. It is notable as the permanent headquarters of the famous corps of Guides, and also contains a cavalry brigade belonging to the 1st division of the northern army.

HOTHAN, FRANCOIS (1524-1590), French publicist, eldest son of Pierre Hotman, was born on the 23rd of August 1524, at Paris, his family being of Silesian origin. His name is latin- ized by himself Hotomanus, by others Hotomannus and Hotto- mannus. His father, a zealous Catholic, and a counsellor of the parlement of Paris, destined him for the law, and sent him at the age of fifteen to the university of Orleans. He obtained his doctorate in three years, and became a pleader at Paris. The arts of the barrister were not to his taste; he turned to the study of jurisprudence and literature, and in 1546 was appointed lecturer in Roman Law at the university of Paris. The fortitude of Anne Dubourg under torture gained his adhesion to the cause of Reform. Giving up a career on which he had entered with high repute, he went in 1547 to Lyons, and thence to Geneva and to Lausanne, where, on the recommendation of Calvin, he was appointed professor of belles-lettres and history, and married Claudine Aubelin, a refugee from Orleans. On the

invitation of the magistracy, he lectured at Strassburg on law in 1555, and became professor in 1556, superseding Francois Baudouin, who had been his colleague in Paris. His fame was such that overtures were made to him by the courts of Prussia and Hesse, and by Elizabeth of England. Twice he visited Germany, in 1556 accompanying Calvin to the Diet at Frankfort. He was entrusted with confidential missions from the Huguenot leaders to German potentates, carrying at one time credentials from Catherine de Medici. In 1560 he was one of the principal instigators of the conspiracy of Amboise; in September of that year he was with Antoine of Navarre at Nerac. In 1562 he attached himself to Conde. In 1564 he became professor of civil law at Valence, retrieving by his success the reputation of its university. In 1567 he succeeded Cujas in the chair of juris- prudence at Bourges. Five months later his house and library were wrecked by a Catholic mob; he fled by Orleans to Paris, where L'Hopital made him historiographer to the king. As agent for the Huguenots, he was sent to Blois to negotiate the peace of 1568. He returned to Bourges, only to be again driven away by the outbreak of hostilities. At Sancerre, during its siege, he composed his Consolatio (published in 1593). The peace of 1570 restored him to Bourges, whence a third time he fled, in con- sequence of the St Bartholomew massacre (1572). In 1573, after publishing his Franco-Gallia, he left France for ever with his family, and became

professor of Roman law at Geneva. On the approach of the duke of Savoy he removed to Basel in 1579. In 1580 he was appointed councillor of state to Henry of Navarre. The plague sent him in 1582 to Montbeliard; here he lost his wife. Returning to Geneva in 1584 he developed a kind of scientific turn, dabbling in alchemy and the research for the philosopher's stone. In 1589 he made his final retirement to Basel, where he died on the 12th of February 1590, leaving two sons and four daughters; he was buried in the cathedral.

Hotman was a man of pure life, real piety (as his Consolatio shows) and warm domestic virtues. His constant removals were inspired less by fear for himself than by care f or his family, and by a temperament averse to the conditions of warfare, and a constitutional desire for peace. He did much for 16th-century jurisprudence, having a critical knowledge of Roman sources, and a fine Latin style. He broached the idea of a national code of French law. His works were very numerous, beginning with his De gradibus cognationis (1546), and including a treatise on the Eucharist (1566); a treatise (Anti-Tribonien, 1567) to show that French law could not be based on Justinian; a life of Coligny (1575); a polemic (Brutum fulmen, 1585) directed against a bull of Sixtus V., with many other works oh law, history, politics and classical learning. His most important work, the Franco-Gallia (1573), was in advance of his age, and found favour neither with Catholics nor with Huguenots in its day; yet its vogue has been compared to that obtained later by Rousseau's Contrat Social. It presented an ideal of Protestant statesmanship, pleading for a representative government and an elective monarchy. It served the purpose of the Jesuits in their pamphlet war against Henry IV.

See Bayle, Dictionnaire ; R. Dareste, Essai sur F. Hotman (1850); E. Gregoire, in Nouvelle Biog. generate (1858). (A. Go.)*

HOT SPRINGS, a city of Arkansas, U.S.A., the county-seat of Garland county, at the easterly base of the Ozark mountains, 55 m. by rail W.S.W. of Little Rock. Pop. (1880) 3554; (1890) 8086; (1900) 9973, of whom 3102 were of negro descent and 561 were foreign-born; (1910 census) 14,434. The transient, population numbers more than 100,000 annually. Hot Springs is served by the Chicago, Rock Island & Pacific, the Little Rock & Hot Springs Western, and the St Louis, Iron Mountain & Southern railways. The city lies partly in several mountain ravines and partly on a plateau. A creek, flowing through the valley but walled over, empties into the Ouachita river several miles from Hot Springs. The elevation of the surrounding hills is about 1200 ft. above the sea and 600 above the surrounding country. The scenery is beautiful, and there is a remarkable view from a steel tower observatory, 150 ft. high, on the top of Hot Springs mountain. The climate is delightful. The

average rainfall lor the year is about 55 in. The springs are about forty-four in number, rising within an area of 3 acres on the slope of Hot Springs mountain. They are all included within a reservation held by the United States government, which (since 1903) exercises complete jurisdiction. The daily flow from the springs used is more than 800,000 gallons. Their temperature varies from 05° to 147 F. The waters are tasteless and inodorous, and contain calcium and magnesium bicarbonates, combinations of hydrogen and silicon, and of iodides, bromides and lithium. The national government maintains at Hot Springs an army and navy hospital, and a bath-house open gratuitously to indigent bathers. The business of Hot Springs consists mainly in caring for its visitors. Fruit-raising and small gardening characterize its environs. There are sulphur, lithia and other springs near the city, and an ostrich farm and an alligator farm in the suburbs. The finest of the novaculite rocks of central Arkansas are quarried near the city. The total value of its factory product in 1905 was $597,029, an increase of 213-1% since 1900.

The Springs were first used by the itinerant trappers. They were visited about 1800 by French hunters; and by members of the Lewis and Clark party in 1804 under instructions from President Thomas Jefferson. The permanent occupation of the town site dates only from 1828, though as early as 1807 a temporary settlement was made. In 1876 Hot Springs was incorporated as a town, and in 1879 it was chartered as a city. In 1832 Congress created a reservation, but the right of the government as against private claimants was definitely settled only in 1876, by a decision of the United States Supreme Court. The city was almost destroyed by fire in 1878, and was greatly improved in the rebuilding.

HOT SPRINGS, a hamlet and health-resort in Cedar Creek District, Bath county, Virginia, U.S.A., 25 m. by rail (a branch of the Chesapeake & Ohio railway) N. by E. of Covington and near the N.W. border of the state. It lies in a narrow valley, about 2200-2500 ft. above the sea, with rugged mountains on either side. Pop. of the district (1900) 1761; (1910) 2472. The mean summer temperature is only 69° F., and the summer nights are always cool. There is a good golf-course. Mineral waters (with magnesia, soda-lithia and alum) issue from several springs, some at a temperature as high as 106° F., and are used both for drinking and for bathing. The Warm Sulphur Springs (about 98 F.) are 5 m. N.; Healing Springs (85° F.) are 2j m. S. of Hot Springs; and a few miles to the S.E., in Rockbridge county, are Rockbridge and Jordan Alum Springs.

HOTTENTOTS, an African people of western Cape Colony and the adjoining German territory, formerly widely spread through- out South Africa. The name is that given them by the early Dutch settlers at the Cape, being a Dutch word of an onomatopoeic kind to express stammering, in reference to the staccato pro- nunciation and clicks of the native language. Some early writers termed them Hodmadods or Hodmandods, and others Hot-nots and Ottentots — all corruptions of the same word. Their name for themselves was Khoi-Khoin (men of men), or Quae Quae, Kwekhena, t'Kuhkeub, the forms varying according to the several dialects. Early authorities believed them to be totally distinct from all other African races. The researches of Gustav Fritsch, Dr E. T. Hamy, F. Shrubsall and others have demon- strated, however, that they are not so much a distinct or inde- pendent variety of mankind as the result of a very old cross between two other varieties — the Bantu Negro (containing a distinct Hamitic element) and the Bushman. Hamy calls them simply " Bushman-Bantu half-breeds," the Bushman element being seen in the leathery colour, compared to that of the " sere and yellow leaf " ; in the remarkably prominent cheek-bones and pointed chin, giving the face a peculiarly triangular shape; and lastly, in such highly specialized characters as the tablier and the steatopygia of the women. The cranial capacity is also nearly the same (1331 c.c. in the Bushman, 1365 c.c. in the Hottentot), and on these anatomical grounds Shrubsall concludes that the two are essentially one race, allowing for the undeniable strain of Bantu blood in the Hottentot. This view is further

strengthened by the vast range in prehistoric times of the Hottentot variety, which, since the time of Martin H.K. Lichten- stein (1800- 1 804), was known to have comprised the whole of Africa south of the Zambezi, and has since been extended as far north as the equatorial lake region.

Fritsch divides the Hottentots into three bodies; the Cape Hottentots, from the Cape peninsula eastward to Kaffraria, the Koranna, chiefly on the right bank of the Orange river, but also found on the Harts and the Vaal, and the Namaqua in the western portion of South Africa. Of these all save the last mentioned have ceased to exist in any racial purity. The name which the Namaqua give to themselves is Khoi-Khoin, and this name must be distinguished from that of the Berg-Damara or Hau-Khoin, since the latter are physically of Bantu origin though they have borrowed their speech from the Hottentots. While the Namaqua preserve the racial type and speech, the other so-called Hottentots are more or less Hottentot-Dutch or Hottentot-Bantu half-breeds, mainly of debased Dutch speech, although the Koranna still here and there speak a moribund Hottentot jargon flooded with Dutch and English words and expressions. When the Cape Colony became a part of the British empire the protection given to the natives arrested the process of extermination with which the Hottentots were then threatened, but it did not promote racial purity. Sir John Barrow, describing the condition of the

Hottentots in 1798, estimated their number at about 15,000 souls. In 1806 the official return gave a Hottentot population of 9784 males and 10,642 females. In 1824 they had increased to 31,000. At the census of 1865 they numbered 81,589, but by this time the official classification " Hottentot " signified little more than a half-breed. The returns for 1904 showed a " Hottentot " population of 85,892. Very few of these were pure-bred Hotten- tots, while the official estimate of those in which Hottentot blood was strongly marked was 56,000.

Customs and Culture. — The primitive character of the race having greatly changed, the best information as to their original manners and customs is therefore to be found in the older writers. All these agree in describing the Hottentots as a gentle and friendly people. They held in contempt the man who could eat, drink or smoke alone. They were hospitable to strangers, even to the point of impoverishing themselves. Although mentally and physically indolent, they were active in the care of their cattle and, within certain limits, clever hunters. They were of a medium height, the females rather smaller than the men, slender but well proportioned, with small hands and feet. Their skin was of a leathery brown colour; their face oval, with prominent cheekbones; eyes dark brown or black and wide apart; nose broad and thick and flat at the root; chin pointed and mouth large, with thick turned-out lips. Their woolly hair grew in short thick curly tufts and the beard was very scanty. Amongst the women abnormal developments of fat were somewhat common; and cases occurred of extraordinary elongation of the labia minora and of the praeputium clitoridis. 1

Their dress was a skin cloak (kaross) worn across the shoulders and a smaller one across the loins. They wore these cloaks all the year round, turning the hairy side inward in winter and outward in summer; they slept in them at night, and when they died they were buried in them. They had suspended around their necks little bags or pouches, containing their knives, their pipes and tobacco or dakka (Cannabis, or hemp), and an amulet of burnt wood. On their arms were rings of ivory. Sometimes they wore sandals and carried a jackal's tail fastened on a stick, which served as handkerchief and fan. The women wore, besides the kaross, a little apron to which were hung their ornaments; and underneath this one or two fringed girdles; and a skin cap. Both sexes Smeared themselves and even their dress with an ointment made of soot, butter or fat, and the powdered leaves of a shrub called by them bucchu (Diosma crenata).

Their villages were usually on meadow grounds. They neyer entirely exhausted the grass but kept moving from one pasture t» another. The huts were in circles, the area of which varied with the pastoral wealth of the community. In the centre of the huts a hole served for a fire-place, and at each side of this small excavations an inch or two deep were made in the

ground in which both sexes, rolled up in their karosses, slept. A few earthen vessels, well-made bowls of wood, tortoise shells for spoons and dishes, calabashes, bamboos and skins for holding milk and butter, and mats of rushes interwoven with bast, were all their furniture. Their weapons were primarily bows and arrows, but they also possessed assegais, 1 See paper by Messrs Flower and Murie in Journ. Comp. Anat. and Physiology (1867); and Fritsch, Die Eingebomen Siid-Afrikas (Breslau, 1873).

and knob-kerries. To women much respect was shown; the most sacred oath a Hottentot could take was to swear by his sister or mother; yet the females ate apart from the men and did all the work of the kraal with the exception of the tending of cattle and of the curing of the hides ; the men, however, assisted in the erection of the framework of the huts. The usual food of the Hottentots was milk, the flesh of the buffalo, hippopotamus, antelope or other game, and edible roots and bulbs or wild fruits. On the coast fish captured by hooks and lines or spears were also eaten. Cows' milk was commonly drunk by both sexes, but ewes' milk only by the women, and when cows' milk was scarce the women were obliged to keep to ewes' milk or water. Milk was drunk fresh, and not allowed to turn sour as among the Bantu. Meats were eaten either roasted or boiled, but for the most part half raw, without salt, spices or bread. From some meats they carefully abstained, such as swine's flesh. Hares and rabbits were forbidden to the men, but not to the women ; the pure blood of beasts and the flesh of the mole were forbidden to the women, but not to the men.

In occupation they were essentially cattle-breeders, and showed great skill in this pursuit, especially the Namaqua, who were capable of training the horns of their cattle so that they grew in spirals. Their social pleasures consisted in feasting, smoking, dancing and singing. Dances were held every first quarter of the moon and lasted all night, often for eight days in succession. Every signal event of life, and every change of abode and condition was celebrated with a feast. On the formation of a new kraal an arbour was con- structed in the centre, and the women and children adorned and perfumed it with flowers and branches of trees and odoriferous herbs. The fattened ox was killed and cooked, and the men ate of it in the arbour, while the women sitting apart regaled themselves with broth. Upon such occasions the only intoxicant was tobacco or dakka.

Circumcision, which is common to the Kaffir tribes, was unknown to the Hottentots, but when a youth entered upon manhood a ceremony was performed. One of the elders, using a knife of quartz, made incisions in the

young man's body, afterwards besprinkling them with urine. When a man killed his first elephant, hippopota- mus or rhinoceros, similar marks were made on his body, and were regarded as insignia of honour. Finger mutilation was common, especially among women; this consisted in the removal of one or two joints of the little finger, and, sometimes, the first joint of the next. The reason for this is doubtful; it may have been a sign of mourning, or, especially in the case of children, it may have been regarded as magically protective. Marriages were by arrangement between the man and the girl's parents, the consent of the girl herself being a matter of little consideration. If accepted, the suitor, accompanied by all his kindred, drove two or three fat oxen to the house of his bride. There her relations welcomed the visitors; the oxen were slain, and the bridal feast took place. The nuptial ceremony was concluded by an elder besprinkling the happy pair. Among the southern Hottentots these ancient usages have ceased; but they are continued among some tribes north of the Orange river. Polygamy was allowed: divorce was common. Family names were perpetuated in a peculiar manner — the sons took the family name of the mother, the daughters that of the father. The children were very respectful to their parents, by whom they were kindly and affectionately treated. Yet the aged father or mother was sometimes put in the bush and left to die. Namaqua says this was done by very poor people if they had no food for their parents. But even when there was food enough, aged persons, especially women, who were believed to be possessed of the evil spirit, were so treated.

The Hottentots had few musical instruments. One named the " gorah " was formed by stretching a piece of the twisted entrails of a sheep from end to end of a thin hollow stick about 3 ft. in length in the manner of a bow and string. At one end there was a piece of quill fixed into the stick, to which the mouth of the player was applied. The " rommel-pot " was a kind of drum shaped like a bowl and containing water to keep the membrane moist. Reeds several feet long were used as flutes.

Government and Laws. — The system of government was patriarchal. Each tribe had its hereditary " khu-khoi " or " gao-ao " or chief, and each kraal its captain. These met in council whenever any great matters had to be decided. The post was honorary, and the coun- cillors were held in great reverence, and were installed in office with solemnities and feasting. In certain tribes the hind part of every bullock slaughtered was sent to the chief, and this he dis- tributed among the males of the village. He also collected sufficient milk at the door of his hut to deal out amongst the poor. A part of every animal taken in hunting was exacted by the chief, even though it was in a state of putrefaction when brought to him. The captains, assisted by the men of each kraal, settled disputes regarding property and tried criminals. A murderer was beaten or stoned to death; but if one

escaped and was at large for a whole year, he was allowed to go unpunished. Adultery seldom occurred ; if any one found parties in the act and killed them he was no murderer, but on the contrary received praise for his deed. Women found offending were burnt. Theft, especially cattle-stealing, was severely punished. The thief was bound hand and foot, and left on the ground without food for a long time; then, if his offence was slight, he received some blows with a stick, but if the case was

an aggravated one, he was severely beaten, and then unloosed and banished from the kraal. The family of even the worst crimina) suffered nothing on his account in reputation, privilege or property. The duel was an institution. If any one was insulted he challenged his enemy by offering him a handful of earth. If the latter seized the hand and the dust fell to the ground, the challenge was accepted. If it was not accepted, the challenger threw the dust in his foe's face. The duel took place by kicking, with clubs, or with the spear and shield.

Religious Ideas. — The religious ideas of the Hottentots were very obscure. Francois le Vaillant says they had " neither priests nor temples, nor idols, nor ceremonials, nor any traces of the notion of a deity." Other authorities state that they believed in a benevolent deity or " Great Captain," whom they named Tik-guoa [Tsu-goab). There were other " captains " of less power, and a black captain named Gauna, the spirit of evil. The moon was a secondary divinity, supposed to govern the weather; and its appearance each month was hailed with dancing and singing. 1 George Schmidt, the first missionary to the Hottentots, says they also celebrated the annual appearance of the Pleiades above the eastern horizon. As soon as the constellation appeared, all the mothers ascended the nearest hill, carrying their babies, whom they taught to stretch their arms towards the friendly stars. Some of the tribes are said to worship a being whom they name Tusib, the rain god. An old Namaqua was once heard to say " The stars are the souls of the deceased,' and a Hottentot form of imprecation is " Thou happy one, may misfortune fall on thee from the star of my grandfather."

Such as it was, the Hottentot religion was largely ancestor- worship. Their deified hero was named Heitsi-Eibib; and of him endless stories are told. The one most generally accepted is that he was a notable warrior of great physical strength, who once ruled the Khoi-Khoin, and that in a desperate struggle with one of his enemies, whom he finally overcame, he received a wound in the knee, from which event he got the name of " Wounded knee." He had extra- ordinary powers during life, and after death he continued to be invoked as one who could still relieve and protect. According to the tradition preserved among the Namaqua, Heitsi-Eibib came from the east. Therefore they make the doors of their huts towards the east, and those

who possess waggons and carts put their vehicles alongside the mat-house with the front turned towards the east. All the graves are in true west-easterly direction, so that the face of the deceased looks towards the east. The spirit of Heitsi-Eibib is supposed to exist in the old burial places, and, whenever a heathen Hottentot passes them, he throws stones on the spot as an offering, at the same time invoking the spirit's blessing and protection, Johann Georg von Hahn asserts that there are many proofs which justify the conclusion that Heitsi-Eibib and Tsu-goab (the supreme being) were identical. Both were benevolent. Both were believed to have died and risen again. They killed the bad beings and restored peace on earth ; they promised men immortality, understood the secrets of nature, and could foretell the future. 2

Various ceremonies were practised to ward off the evil influence of ghosts and spectres, and charms were freely employed. If a Khoi- Khoi went out hunting his wife kindled a fire, and assiduously watched by it to keep it alive ; if the fire should be extinguished her husband would not be lucky. If she did not make a fire, she went to the water and kept on throwing it about on the ground, believing that thereby her husband would be successful in getting game. Charms, consisting of bones, burnt wood, and roots of particular shrubs cut into small pieces, were generally worn round the neck. There was also a belief that in every fountain there was a snake, and that as long as the snake remained there water would continue to flow, but that if the snake was killed or left the fountain it would cease. Offerings were sometimes made to the spirit of the fountain. In common with the Bushmen, the Hottentots venerated the mantis fausta, a local variety of the insect known as " the praying mantis " (mantis religiosa). P. Kolbe saw sacrifices made in its honour when it appeared inside a kraal; to kill it was strictly forbidden. The Hottentots had great faith in witch-doctors, or sorcerers. When called to a sick-bed these ordered the patient to lie on his back, and then pinched, cuffed, and beat him all over until they expelled the illness. After that they produced a bone, small snake, frog or other object which they pretended to have extracted from the patient's body. If the treatment did not succeed, the person was declared incurably bewitched. If death occurred, the corpse was interred on the day of decease. It was wrapt in skins, and placed in the ground in the same position it once occupied hVthe mother's womb. Death was generally regarded in a very stoical manner.

Language. — The existence of a fundamental connexion between the language of the Hottentot and that of the Bushman was

1 An interesting notice of this form of worship occurs in the journal of an expedition which the Dutch governor, Ryk van Tulbagh, sent to the Great Namaqua in 1752, which reached as far as the Kamob or Lion river

(about 27 S. lat.).

2 On the religion and antiquities see Theophilus Hahn's papers, " Graves of the Heitsi-Eibib," in Cape Monthly Magazine (1879). and " Der hottentottische Zai-goab und der griechisch? Zeus," in Zeitschr. fur Geogr. (Berlin, 1870).

suggested by Dr Bleek and is supported by further evidence ad- vanced by Bertin.

The Hottentot language was regarded by the early travellers and colonists as an uncouth and barbarous tongue. The Portuguese called the native manner of speaking stammering; and the Dutch compared it to the " gobbling of a turkey-cock." These phonetic characteristics arose from the common use of " clicks," — sounds produced by applying the tongue to the teeth or to various parts of the gums or roof of the mouth, and suddenly jerking it back. Three-fourths of the syllabic elements of the language begin with these clicks, and combined with them are several hard and deep gutturals and nasal accompaniments. The difficulty a European has in acquiring an accurate pronunciation is not so much in pro- ducing the clicking sound singly as in following it immediately with another letter or syllable. The four recognized clicks, with the symbols generally adopted to denote them, are as follows: dental = | ; palatal = #; lateral = II ; cerebral = !. According to Tindall, one of "the best grammarians of the language, the dental click (similar to a sound of surprise or indignation) is produced by pressing the top of the tongue against the upper front teeth, and then suddenly and forcibly withdrawing it. The palatal click (like the crack of a whip) is produced by pressing the tongue with as flat a surface as possible against the termination of the palate at the gums, so that the top of the tongue touches the upper front teeth and the back of the tongue lies towards the palate, and then forcibly withdrawing the tongue. The cerebral click (compared to the popping of the cork of a bottle of champagne) is produced by curling up the tip of the tongue against the roof of the palate, and withdrawing it suddenly and forcibly. The lateral click (similar to the sound used in stimulating a horse to action) is articulated by covering with the tongue the whole of the palate and producing the sound as far back as possible; Europeans imitate it by placing the tongue against the side teeth and then withdrawing it. The easiest Hottentot clicks, the dental and cerebral, have been adopted by the Kaffirs; and it is a striking circumstance, in evidence of the past Hottentot influence upon the Kaffir languages, that the clicking decreases amongst these tribes almost in

proportion to their distance from the former Hottentot domain.

The language in its grammatical structure is beautiful and regular. Dr Bleek describes it as having the distinctive features of the suffix- pronominal order or higher form of languages, in which the pronouns are identical with and borrowed from the derivative suffixes of the nouns. The words are mostly monosyllables, always ending, with two exceptions, in a vowel or nasal sound. Among the consonants neither /, nor/ nor v is found. There are two g's, g hard and g guttural, and a deeper guttural kh. Diphthongs abound. There is no article, but the definite or indefinite sense of a noun is determined by the gender. In the fullest known dialect (that spoken by the Namaqua) nouns are formed with eight different suffixes, which in nouns desig- nating persons distinguish masc. sing. (-6), masc. plur. {-ku), masc. dual (kha), fem. sing, (s), fem. plur. {-ti), com. sing, (-i), com. plur. (-«), com. dual (-ra). The adjective is either prefixed to a noun or referred to it by a suffixed pronoun. This grammatical division of the nouns according to gender led to the classification of the language as " se-denoting," thus suggesting its relationship, in original structure, with the Galla and others.*

There are four dialectical varieties of the language, each with well-marked characteristics: the Kama dialect, spoken by the Namaqua as well as by the Hau-Khoin or Hill Damara; the Kora dialect, spoken by the Koranna, or Koraqua, dwelling about the middle and upper part of the Orange, Vaal and Modder rivers; the Eastern dialect, spoken by the Gona or Gonaqua on the borders of Kaffirland ; and the Cape dialect, now no longer spoken but preserved in the records of early voyagers and settlers. Of the Nama dialect there are three grammars: Wallmann's (1857) and Hahn's in German, and Tindall's (187 1) in English, the last being the best; and the four Gospels, with a large amount of missionary literature, have been published in it.

The vocabulary is not limited merely to the expression of the rude conceptions that are characteristic of primitive races. It possesses such words as koi, human being ; khoi-si, kindly or friendly ; koi-si-b, philanthropist; khoi-si-s, humanity; # ei, to think; % ei-s, thought; amo, eternal; amo-si-b, eternity; tsa, to feel; tsa-b, feeling, sentiment; tsa-kha, to condole; ama, true; ama-b, the truth ; anu, sacred ; anu-si-b, holiness ; esa, pretty ; anu-xa, full of beauty.

Literature and History. — Much traditionary literature — fables, myths and legends — existed amongst the Hottentots, — a fact first made known by Sir James Alexander, who in his journeyings through Great Namaqualand in 1835 jotted down the stories told him around the camp fire by his Hottentot followers. These Hottentot tales generally have much of the character of fables; some are in many points identical with northern nursery tales, and suggestive of European origin or of contact with the

white man; but the majority bear evidence of being true native products. Bleek's Reynard the Fox in South Africa (1864) contains a translation of a legend written down from the lips of the Namaqua by the Rev. G. Kronlein, which is regarded as an excellent specimen of the national style. Another legend relating to the moon and the hare conveys the idea of an early conception of the hope of immortality.

It is found in various versions, and, like many other stories, occurs in Bushman as well as in Hottentot mythology.

The earliest accounts of the Hottentots occur in the narratives of Vasco da Gama's first voyage to India round the Cape in 1497-1498. In 1510 the Portuguese viceroy, Francisco d'Almeida, count of Abrantes, met his death in a dispute with the natives. Till the 17th century they were believed to be cannibals, but with the occupation of the Cape by the Dutch, in 1652, more accurate knowledge was obtained. A century of Dutch rule resulted in the Hottentots becoming a nation of slaves and in serious danger of extermination, and thus the arrival of the English in 1795 was welcomed by them. In 1828 an ordinance was passed declaring " all Hottentots and other free persons of colour " entitled to all and every right to which any other British subjects were entitled. (See Cape Colony: History; and South Africa.)

Bibliography. — A. de Quatrefages, Les Pygmees (1887); G. W. Stow, The Native Races of South Africa (1905); E. T. Hamy, "Les Races negres," in L' Anthropologic (1897), pp. 257 et sqq.; F. Shrubsall, " Crania of African Bush Races," in Jour. Anthrop. Inst, (November 1897); W. H. J. Bleek, A Comparative Grammar of South African Languages (1862); and " Die Hottentotten Stamme, in Petermanns Mil. (1858), pp. 49 et sqq.; G. Fritsch, Die Einge- bornen Sud-Afrikas (1872), and " Schilderungen der Hottentotten," in Globus (1875), PP- 374 et sqq.; G. Bertin, " The Bushmen and their Language," in Jour. R. Asiat. Soc. xviii., part i., and reprint; P. Kolbe or Kolben, Present State of the Cape of Good Hope; Sir John Barrow, Travels in South Africa (1801-1804).

HOTTINGER, JOHANN HEINRICH (1620-1667), Swiss philo- logist and theologian, was born at Zurich on the 10th of March 1620. He studied at Geneva, Groningen and Leiden, and after visiting France and England was in 1642 appointed professor of church history in his native town. The chair of Hebrew at the Carolinum was added in 1643, and in 1653 he was ap- pointed professor ordinarius of logic, rhetoric and theology. He gained such a reputation as an Oriental scholar that the elector palatine in 1655 appointed him professor of Oriental languages and biblical criticism at Heidelberg. In 1661, however, he returned to Zurich, where in 1662 he was chosen principal of . the university. In 1667 he accepted an invitation

to succeed Johann Hoornbeck (161 7-1 666) as professor in the university of Leiden, but he was drowned with three of his children by the upsetting of a boat while crossing the river Limmat. His chief works are Historia ecclesiaslica Nov. Test. (1651-1667); Thesaurus philologicus seu clavis scripturae (1649; 3 f d ed. 1698); Etymo- logicon orientaie, sive lexicon harmonicum heptaglotton (1661). He also wrote a Hebrew and an Aramaic grammar.

His son, Johann Jakob Hottinger (1652-1735), who became professor of theology at Zurich in 1698, was the author of a work against Roman Catholicism, Helvetische Kirchengeschichte (4 vols., 1698-1729); and his grandson, Johann Heineich Hottinger (1681-1750), who in 1 72 1 was appointed professor of theology at Heidelberg, wrote a work on dogmatics, Typus doctrinae christianae (1714).

HOUBRAKEN, JACOBUS (1698-1780), Dutch engraver, was born at Dort, on the 25th of December 1698. All that his father, Arnold Houbraken (1660-17 19), bequeathed to him was a fine constitution and a pure love for work. In 1707 he came to reside at Amsterdam, where for years he had to struggle incessantly against difficulties. He commenced the art of engraving by studying the works of Cornells Cort, Suyderhoef, Edelinck and the Visschers. He devoted himself almost entirely to portraiture. Among his best works are scenes from the comedy of De Ontdekte Schijndeugd, executed in his eightieth year, after Cornelis Troost, who was called by his countrymen the Dutch Hogarth. He died on the 14th of November 1780.

See A. Ver Hull, Jacobus Houbraken et son auvre (Arnhem, 1875), where 120 engraved works are fully described.

HOUDENC (or Houdan), RAOUL DE, 12th-century French trouvere, takes his name from his native place, generally identified with Houdain (Artois), though there are twelve places bearing the name in one or other of its numerous variants. It has been suggested that he was a monk, but from the scattered hints in his writings it seems more probable that he followed the trade of jongleur and recited his chansons, with small success apparently, in the houses of the great. He was well acquainted with Paris, and probably spent a great part of his life there. His undoubted works are: Le Songe d'enfer, La Vote de paradis, Le Roman des eles (pr. by A. Scheler in Trouveres beiges, New

Series, 1897) and the romance of Meraugis de Portlesguez, edited by M. Michelant (1869) an d by Dr M. Friedwagner (Halle, 1897). Houdenc was an imitator of Chretien de Troyes; and Huon de Meri, in his Tournoi de V antichrist (1226) praises him with Chretien in words that seem to imply that both were dead. Meraugis de Portlesguez, the hero of which perhaps derives his name from Lesguez, the port of Saint Brieuc in Brittany, is a roman d'aventures loosely attached to the Arthurian cycle.

See Gaston Paris in Hist. litt. de la France, xxx. 220-237 ; W. Zingerle, Uber Raoul de Houdenc und seine Werke (Erlangen, 1880); and O. Boerner, Raoul de Houdenc. Eine stilistische Unter- suchung (1885).

HOUDETOT, a French noble family, taking its name from the lordship of Houdetot, between Arques and St Valery. Louis de Houdetot went with Robert, duke of Normandy, to Palestine in 1034, and the various branches

of the family trace descent from Richard I. de Houdetot (fl. 1229), who married Marie de Montfort. Charles Louis de Houdetot received a marquisate in 1722, and on his son Claude Constance Cesar, lieutenant-general in the French army, was conferred the hereditary title of count in 1753. His wife (see below) was the Madame de Houdetot of Rousseau's Confessions. Their son Cesar Louis Marie Francois Ange, comte de Houdetot (1 749-1825), was governor of Martinique (1803-1809) and lieutenant-general (1814) under the Empire. His son Frederic Christophe, comte de Houdetot (1778-1859), was director-general of indirect imposts in Prussia after Jena, and prefect of Brussels in 1813. He acquiesced in the Restoration, but had to resign from the service after the Hundred Days. He became a peer of France in 1819, and under the Second Empire he was returned by the department of Calvados to the Corps Legislatif. His half-brother, Charles lle-de-France, comte de Houdetot (1789-1866), was wounded at Trafalgar and transferred to the army, in which he served through the Napoleonic wars. He retired at the Restora- tion, but returned to the service in 1823, and in 1826 became aide-de-camp to the duke of Orleans, becoming lieutenant-general in 1842. He sat in the Chamber of Deputies from 1837 to 1848, when he followed Louis Philippe into exile. A third brother, Cesar Francois Adolphe, comte de Houdetot (1799-1869), was a well-known writer on military and other subjects.

HOUDETOT, ELISABETH FRANCOISE SOPHIE DE LA LIVE DE BELLEGARDE, Comtesse de (1730-1813), was born in 1730. She married the comte de Houdetot (see above) in 1748. In 1753 she formed with the marquis de Saint Lambert (q.v.) a connexion which lasted till his death. Mme de Houdetot has been made famous by the chapter in Rousseau's Confessions in which he describes his unreciprocated passion for her. When questioned on the subject she replied that he had much ex- aggerated. A view differing considerably from Rousseau's is to be found in the Memoires of Mme d'Epinay, Mme de Houdetot's sister-in-law.

For a discussion of her relations with Rousseau see Saint-Marc- Girardin in the Revue des deux mondes (September 1853).

HOUDON, JEAN ANTOINE (1740-1828), French sculptor, was born at Versailles on the 18th of March 1740. At the age of twelve he entered the Ecole royale de Sculpture, and at twenty, having learnt all that he could from Michel Ange Slodtz and Pigalle, he carried off the prix de Rome and left France for Italy, where he spent the next ten years of his life. His brilliant talent, which seems to have been formed by the influence of that world of statues with which Louis XIV. peopled the gardens of Versailles rather than by the lessons of his masters, delighted Pope Clement XIV., who, on seeing the St Bruno executed by Houdon for the church of St Maria degli Angeli, said " he would speak, were it not that the rules of his

order impose silence." In Italy Houdon had lived in the presence of that second Renaissance with which the name of Winckelmann is associated, and the direct and simple treatment of the Morpheus which he sent to the Salon of 1771 bore witness to its influence. This work procured him his " agregation " to the Academy of Painting and Sculpture, of which he was made a full member in 1775. Between these dates Houdon had not been idle; busts of

Catharine II., Diderot and Prince Galitzin were remarked at the Salon of 1773, and at that of 1775 he produced, not only his Morpheus in marble, but busts of Turgot, Gluck (in which the marks of small-pox in the face were reproduced with striking effect) and Sophie Arnould as Iphigeneia (now in the Wallace Collection, London), together with his well-known marble relief, " Grive suspendue par les pattes." He took also an active part in the teaching of the academy, and executed for the instruction of his pupils the celebrated Ecorche still in use. To every Salon Houdon was a chief contributor; most of the leading men of the day were his sitters; his busts of d'Alembert, Prince Henry of Prussia, Gerbier, Buffon (for Catharine of Russia) and Mira- beau are remarkable portraits; and in 1778, when the news of Rousseau's death reached him, Houdon started at once for Ermenonville, and there took a cast of the dead man's face, from which he produced the grand and life-like head now in the Louvre. Ini779his bust of Moliere, at the Theatre Francais, won universal praise, and the celebrated draped statue of Voltaire, in the vestibule of the same theatre, was exhibited at the Salon of 1781, to which Houdon also sent a statue of Marshal de Tourville, com- missioned by the king, and the Diana executed for Catharine II. This work was refused; the jury alleged that a statue of Diana demanded drapery; without drapery, they said, the goddess became a " suivante de Venus," and not even the proud and frank chastity of the attitude and expression could save the Diana of Houdon (a bronze reproduction of which is in the Louvre) from insult. Three years later he went to America, there to carry outastatueof Washington . With Franklin , whose bust he had recently executed, Houdon left France in 1785, and, staying some time with Washington at Mount Vernon, he modelled the bust, with which he decided to go back to Paris, there to complete the statue destined for the capitol of the State of Virginia. After his return to his native country Houdon executed for the king of Prussia, as a companion to a statue of Summer, La Frileuse, a naif embodiment of shivering cold, which is one of his best as well as one of his best-known works. The Revolution interrupted the busy flow of commissions, and Houdon took up a half-forgotten project for a statue of St Scholastica. He was immediately denounced to the convention, and his life was only saved by his instant and ingenious adapta- tion of St Scholastica into an embodiment of Philosophy. Under Napoleon, of whom in 1806 he made a

nude statue now at Dijon, Houdon received little employment; he was, however, com- missioned to execute the colossal reliefs intended for the decora- tion of the column of the " Grand Army " at Boulogne (which ultimately found a different destination); he also produced a statue of Cicero for the senate, and various busts, amongst which may be cited those of Marshal Ney, of Josephine and of Napoleon himself, by whom Houdon was rewarded with the legion of honour. He died at Paris on the 16th of July 1828.

See memoir by Emile D£lerot and Arsene Legrelle in Mimoires de la societe des sciences morales . . . de Seine-et-Oise, iv. 49 et seq. (1857); Anatole de Montaiglon and Georges Duplessis in Revue universelle des arts, i. and ii. (1855-1856); Hermann Dierks, Houdons Leben und Werke (Gotha, 1887); Albert Terrade, Autour de la statue de Jean Houdon (Versailles, 1892); P. E. Man- geant, Sur une statuette de Voltaire par J. Houdon (Paris, 1896).

HOUFFALIZE, a small town occupying an elevated position (nearly 1100 ft.) in the extreme south-east of the province of Luxemburg, Belgium, much visited during the summer on account of its fine bracing air. There are the ruins of an old castle, and some remains of the still older abbey of Val Ste Catherine. The parish church dates from the 13th or 14th century. It contains two old black marble tombs to Thierry of Houffalize and Henri his son, the latter killed at Woeringen in 1288. Houffalize is on the eastern Ourthe, and is connected by a steam tramway with Bourcy on the line from Libramont to Bastogne, Spa and Liege. Pop. (1904) i486.*

HOUGHTON, RICHARD MONCKTON MILNES, ist Baron (1809-1885), English poet and man of letters, son of Robert Pemberton Milnes, of Fryston Hall, Yorkshire, and the Hon. Henrietta Monckton, daughter of the fourth Lord Galway, was born in London on the 19th of June 1809. He was educated

privately, and entered Trinity College, Cambridge, in 1827. There he was at once drawn into a literary set, and became a member of the famous " Apostles " Club, which then included Tennyson, Hallam, Trench, J. W. Blakesley, afterwards dean of Lincoln, and others. After taking his degree, Milnes travelled abroad, spending some time at Bonn University. Thence he went to Italy and Greece, and published in 1834 a volume of Memorials of a Tour in some Parts of Greece, describing his experiences. He returned to London in 1837, and was in that year elected to Parliament as member for

Pontefract. His parliamentary career was marked by much strenuous activity. He interested himself particularly in the question of copyright and the conditions of reformatory schools. He left Peel's party over the Corn Law controversy, and was afterwards identified in politics with Palmerston, at whose instance he was made a peer in 1863. His literary career was industrious and cultured, without being exceptionally distinguished. Church matters had always a claim upon him: he wrote a striking tract in 1841, which was praised by Newman; and took part in the discussion about " Essays and Reviews," defending the tractarian position in One Tract More (1841). He published two volumes of verse in 1838, Memorials of Residence upon the Continent and Poems of Many Years, Poetry for the People in 1840 and Palm Leaves in 1844. He also wrote a Life and Letters of Keats in 1848, the material for which was largely provided by the poet's friend, Charles Armitage Brown. Milnes also contributed largely to the reviews. His poetry is meditative and delicate; some of his ballads were among the most popular of their day, and all his work was marked by refinement. But his chief distinctions were his keen sense of literary meritin others, and the judgment and magnanimity with which he fostered it. He was surrounded by the most brilliant men of his time, many of whom he had been the first to acclaim. His chief title to remembrance rests on the part he played, as a man of influence in society and in moulding public opinion on literary matters, in connexion with his large circle of talented friends. He secured a pension for Tennyson, helped to make Emerson known in Great Britain, and was one of the earliest champions of Swinburne. He helped David Gray and wrote a preface for The Luggie. He was, in the old sense of the word, a patron of letters, and one who never abused the privileges of his position. Milnes married in 1851 the Hon. Annabel Crewe (d. 1874). He died at Vichy on the nth of August 1885, and was buried at Fryston. His son, the second Baron Houghton, was created Earl of Crewe (q.v.) in

1895.

See The Life, Letters and Friendships of Richard Monckton Milnes, first Lord Houghton (1890), by Sir T. Wemyss Reid.

HOUGHTON-LE-SPRING, an urban district in the Houghton- le-Spring parliamentary division of Durham, England, 6 m. N.E. of the city of Durham. Pop. (1901) 7858. It is well situated at the head of a small valley branching from that of the Wear. St Michael's church is a cruciform Early English and Decorated building, with a picturesque embattled rectory adjoining. Bernard Gilpin, " the Apostle of the North," was rector of this parish from 1556 to 1583, and the founder of the grammar school. The principal public buildings are a town hall, market house and church institute. Houghton Hall is a fine mansion of the late 16th century. In the

orchard stands a tomb, that of the puritan Sir Robert Hutton (d. 1680), of whom a curious tradition states that he desired burial beside his war-horse, the body of which was denied interment in consecrated ground. The main road from Durham to Sunderland here passes through a remark- able cutting in the limestone 80 ft. deep. The district affords frequent evidence of ice activity in the glacial period. The town is the centre of a large system of electric tramways. The population is mainly dependent on the neighbouring collieries, but limestone quarrying is carried on to some extent.

HOUND, a dog, now used, except in poetry, only of dogs of the chase, and particularly of the breed used in hunting the fox, the " hound " par excellence. Other breeds have a defining word prefixed, e.g. boar-hound, stag-hound, &c. (see Dog). The O, Eng. hund is the common Teutonic name for the animal,

cf. Du. hond, Ger. Hund, &c, and is cognate with Sansk. cvan, Gr. Kvwv, Lat. canis, Ir. and Gael. cu.

HOUNSLOW, a town in the Brentford parliamentary division of Middlesex, England, 125 m. W. by S. of St Paul's Cathedral, London, on the District and London & South Western railways. Pop. (1901) 11,377. It has grown into an extensive residential suDurb of London. Its situation at the junction of two great roads from the west of England made it an important coaching station, and some 500 coaches formerly passed through it daily, A priory of friars of the Holy Trinity was founded at Hounslow in 1296, and existed till the dissolution of the monasteries. The priory chapel was used as a church till 1830, after which its place was taken by the existing church of the Holy Trinity (1835). Hounslow Heath, west of the town, had, according to the survey of 1546, an area of 4293 acres. It was the site of Roman and British camps, and in the wars of the 17th century was the scene of several important military rendezvous. It was a favourite resort of highwaymen, whose bodies were exposed on gibbets along the road. In 1784 the base-line of the first trigonometrical survey in England was laid down on the heath. In 1793 large cavalry barracks were erected upon it, and it is also the site of extensive powder mills. It began to be enclosed towards the end of the reign of George III. In Osterley Park, N.E. of Hounslow, Sir Thomas Gresham built a mansion in 1577, and this was rebuilt with great magnificence by Francis and Robert Child c. 1770. Hounslow is divided between the parishes of Heston and Isleworth. Pop. of urban district of Heston and Isleworth (1901) 30,863.

HOUR, the twenty-fourth part of a civil day, the twelfth part of a natural day or night, a space of time of sixty minutes' duration. The word is derived through the O. Fr. ure, ore, houre, mod. heure, from Lat. hora, Gr.

&pa, season, time of day, hour (see Calendar).

HOUR ANGLE,' the angular distance of a heavenly body from the meridian, as measured around the celestial pole. It is equal to the angle at the pole between the hour circle through the body and the meridian, but is usually expressed in time.

HOUR-GLASS, a device for measuring intervals of time, also known as sand-glass, and as log-glass when used in conjunction with the common log for ascertaining the speed of a ship. It consists of two pear-shaped bulbs of glass, united at their apices and having a minute passage formed between them. A quantity of sand (or occasionally of mercury) is enclosed in the bulbs, and the size of the passage is so proportioned that this sand will completely run through from one bulb to another in the time it is desired to measure — e.g. an hour or a minute. Instruments of this kind, which have no great pretensions to accuracy, were formerly common in churches. In the English House of Commons, as a preliminary to a division, a two-minute sand-glass is still turned, and while the sand is running the " division bells " are set in motion in every part of the building, to give members notice that a division is at hand.

HOURI, the term for a beautiful virgin who awaits the devout Mahommedan in Paradise. The word is the French representative of the Pers. hurt, Arab, hawra', a black-eyed virgin, from hawira, to be black-eyed, like a gazelle.

HOURS, CANONICAL, certain portions of the day set apart by rule (canon) of the church for prayer and devotion. The Jewish custom of praying three times a day, i.e. at the third, sixth and ninth hours, was perpetuated in the early Christian Church (Acts ii. 15, hi. 1, x. 9), and to these were added midnight (when Paul and Silas sang in prison), and the beginning of day andt>f night. Ambrose, Augustine and Hilary commended the example of the psalmist who gave praise " seven times a day " (Ps. cxix. 164). The seventh (Compline, Completorium) was added by Benedict. These hours were adopted especially in the monasteries as a part of the canonical life, and spread thence to the cathedral and collegiate chapters.

Since the 6th century the number and order of the hours have been fixed thus: matins, lauds, prime, terce, sext, none, vespers, compline.

Matins theoretically belongs to midnight, but in Italy it is

said about 7 01 8 a.m. and in France often on the preceding evening in accordance with the statement " evening and morning were one day." At matins is said the Venite (Ps. xcv.) and a hymn, followed by a Nocturna or night-watch (on Sundays three) which consists of twelve psalms. After the nocturna comes a lesson divided into three parts, one biblical and two patristic, and finally the Te Deum.

Lauds is proper to sunrise, but is mostly grouped with matins. It consists of four psalms, a canticle, psalms 148-150, a hymn, the Benedictus (Luke i. 68-79) and prayers.

Prime (6 am.), Terce (9 a.m.), Sext (noon) and None (3 p.m.) are called the Little Day Hours, are often said together, and are alike in character, consisting of a hymn and some sections of Ps. cxix., followed by a prayer. On Sundays the Athanasian Creed is said at prime.

Vespers or Evensong consists of five varying psalms, a hymn, the Magnificat (Luke i. 46-55) and prayers. It belongs theoretic- ally to sunset.

Compline, technically 9 p.m., but usually combined with vespers, is a prayer for protection during the darkness. It con- sists of the general confession, four fixed psalms, a hymn, the Nunc dimittis (Luke ii. 29-32), prayers and a Commemoration of the Virgin.

The term " canonical hours " is also used of the time during which English marriages may be solemnized without special licence, i.e. between 8 a.m. and 3 p!m.

HOUSE (0. Eng. hies, a word common to Teutonic languages, cf. Dut. huis, Ger. Haus; in Gothic it is only found in gudhus, a temple; it may be ultimately connected with the root of " hide," conceal), the dwelling-place of a human being (treated, from the architectural point of view, below), or, in a transferred sense, of an animal, particularly of one whose abode, like that of the beaver, is built by the animal ; tself, or, like that of the snail, resembles in some fancied way a human' dwelling. Apart from the numerous compound uses of the word, denoting the purpose for which a building is employed, such as custom-house, lighthouse, bakehouse, greenhouse and the like, there may be mentioned the particular applications to a chamber of a legislative body, the Houses of Parliament, House of Representatives, &c; to the upper and lower assemblies of convocation; and to the colleges at a university; the heads of these foundations, known particularly as master, principal, president, provost, rector, &c, are collectively called heads of houses. At English public schools a " house " is the usual unit of the organization. In the " houses " the boys sleep, have their " studies " and their meals, if the school is arranged on the

" boarding-house " system. The houses have their representative teams in the school games, but have no place in the educational class-system of the school. It may be noticed that in Scotland the words " house " and " tenement " are used in a way distinct from the English use, " tenement " being applied to the large block containing " houses," portions, i.e., occupied by separate families. " The House " is the name colloquially given to such different institu- tions as the London Stock Exchange, the House of Commons or Lords and to a workhouse.

In the transferred sense, " house " is used of a family, genea- logically considered, and of the audience at a public meeting, or entertainment, especially of a theatre. A " house-physician " and " house-surgeon " is a member of the resident medical staff of a hospital. In astrology the twelve divisions into which the heavens are divided, and through which the planets pass, are known as houses, the first being called the " house of life." The word " house," " housing," used of the trappings of a horse, especially of a covering for the back and flanks, attached to the saddle, is of quite distinct origin. In medieval Latin it appears as hucia, houssia and housia (see Ducange, Glossarium. s.v. housia), and comes into English from the 0. Fr. huche, modern hoi(sse. It has been supposed to have been adopted, at the time of the crusades, from the Arabic yushiah, a covering.

Architecturally considered, the term " house " is given to a building erected for habitation, in contradistinction to one built for secular or ecclesiastical purposes. The term extends, there-

fore, to a dwelling of any size, from a single-room building to one containing as many rooms as a palace; thus in London some of the largest dwellings are those inhabited by royalty, such as Marlborough House, or others by men of rank, such as Devon- shire House, Bridgewater House, Spencer House, &c. ; and even those which, formerly built as habitations, have subsequently been devoted to other purposes, such as Somerset House and Burlington House, retain the term. In Paris the larger houses thus named would be called hotel.

So far as the history of domestic architecture is concerned, the earliest houses of which remains have been found are those of the village of Kahun in Egypt, which were built for the workmen employed in the building of the pyramid at Illahun, and deserted on its completion. They varied in size from the habitations of the chief inspectors to the single room of the ordinary labourer, and were built in unburnt brick with open courts in the larger examples, to give light and air to the rooms round. The models found in 1907 at Deir-Rifa opposite Assiut in Upper Egypt, by Flinders Petrie, and assumed by him to be those of " soul- houses," suggest that the early type of building consisted of a hut, to which later a porch or lean-to, with two

poles in front, has been added; subsequently, columns replaced the poles, and a flat roof with parapet, suggesting the primitive forms of the Egyptian temple.

The only remains of early houses found in Mesopotamia are those within the precincts of the Temple of Bel, at Nippur, occupied by the king; but beyond the fact that the walls were built in unburnt brick and were sometimes of great thickness, nothing is known.

The houses in Crete would seem to have been small in area, but this was compensated for in height, as the small plaques found in the palace at Cnossus show houses in two or three storeys, with gable roofs and windows subdivided by mullions and transomes, corresponding with those of the 15th to 17th centuries in England. The stone staircase in the palace rising through two storeys shows that even at this early period the houses in towns had floors superposed one above the other; to a certain extent the same extension existed in the later Greek houses found in Delos, in two of which there was clear evidence of wooden staircases leading within to the roof or to an upper storey. The largest series hitherto discovered is that at Priene in Asia Minor, where the remains of some thirty examples were found, varying in dimensions, but all based on the same plan; this consisted of an entrance passage leading to an open court, on the north side of which, and therefore facing south, was an open portico, corresponding to the prostas in Vitruvius (vi. 7), and in the rear two large rooms, one of which might be the oecus or sitting-room, and the other the thalamos or chief bedroom. Other rooms round the court were the triclinium, or dining room, and cubicula or bedchambers. The largest of these houses occupied an area measuring 75X30 ft. Those found in Delos, though fewer in number, are of much greater importance, the house in the street of the theatre having twelve rooms ■ exclusive of the entrance passage and the great central court, surrounded on all four sides by a peristyle; in this house the oecus measured 26X18 ft. In a second example the prostas consisted of a long gallery, the whole width of the site, which was lighted by windows at each end, the sills of which were raised & ft. or 9 ft. from the floor.

The remains of the houses found in the Peiraeus are of the same simple plan as those at Priene, and suggest that the Greek house was considered to be the private residence only for the members of the family, and without any provision for entertaining guests as in Rome and Pompeii. From the descriptions given by Vitruvius (ii. 8) it may be gathered that in his time many of the houses in Rome were built in unburnt brick, the walls of which, if properly protected at the top with a course of burnt brick projecting over the face of the brickwork, and coated inside and outside with stucco, were considered to be more lasting than those built in soft

stone. Vitruvius refers also to Greek houses thus built, and states that in the house of Mausolus, at Halicarnassus, the walls were of unburnt brick, and the

HOUSE

Plate I.

Fig. 4. -MUSICIAN'S HOUSE, REIMS.

Photo, F. Frith & Co.

Fig. 5.— JEW'S HOUSE, LINCOLN.

Plate II.

HOUSE

FlG. 8.— HALF-TIMBERED HOUSE AT HILDESHE1M.

Fkoto. /<'. I'rith &= Co.

Fig. 9— HOUSE OF JOHN HARVARD'S MOTHER, STKATFORD-ON - AVON.

HOUSE

8 ii

plastering with which they were covered was so polished that they sparkled like glass. In Rome, however, he points out, such walls ought to be forbidden, as they are not fit to carry an upper storey, unless they are of great thickness, and as upper storeys become necessary in a crowded city such walls would occupy too much space. The houses in Pompeii (q.v.) were built in rubble masonry with clay mortar, and their walls were protected at the top by burnt brick courses and their faces with stucco; they were, however, of a second- or third-rate class j :ompared with those in Rome, the magnificence of which is j attested in the descriptions given by various writers and sub- stantiated by the remains occasionally found in excavations. Vitruvius refers to upper storeys, which were necessary in | consequence of the limited area in Rome, and representations in mosaic floors and in bas-relief sculpture have been found on which two or three storeys are indicated. The plans of many Roman houses are shown on the Marble Plan, and they resemble those of Pompeii, but it is probable that the principal reception rooms were on an upper storey, long since destroyed. The house of Livia on the Palatine Hill was in two storeys, and the decora-

tion was of a much finer character than those of Pompeii; this house and the House of the Vestals might be taken as representa- tive of the Roman house in Rome itself. In those built in colder climates, as in England and Germany, account has to be taken of the special provision required for warming the rooms by hypocausts, of which numerous examples have been found, with rich mosaic floors over them.

Of the houses in succeeding centuries, those found in the cities of central Syria, described in the article Architecture, are wonderfully perfect, in consequence of their desertion at the time of the Mahommedan invasion in the 7th century. Very little is known of the houses in Europe during the dark ages, owing to the fact that they were generally built in wood, with thatched roofs. The only examples in stone which have been preserved are those in the island of Skellig Michael, Kerry, which were constructed like the beehive tombs at Mycenae with stone courses overlapping inside until they closed in at the top. These houses or cells were rectangular inside and round or oval outside, with a small low door at one end, and an opening above to let the smoke out.

The houses, even in large towns like London, were built mainly in wood, in some cases down to the 17th century; in the country, the smaller houses were constructed with trunks of trees in pairs, one end of the trunk being sunk in the ground, the other bent over and secured by a ridge piece, thus forming a pointed arch, the opening of which was about 11 ft. The pairs were fixed 16 ft. apart, and the space included constituted a bay, any requisite increase in the size of the house being made by doubling or trebling the bays. The roofs were thatched with straw on battens, and sometimes with a collar beam carrying a floor, which constituted an upper storey. The end walls were closed with wooden studs and wattle-and-dab filling. The pairs of trees were known as forks or crucks. Vitruvius (ii. 1) suggests a similar kind of building in ancient times, except that the interlaced twigs were covered with clay, so as to carry off the rain. In Yorkshire there was another type of house, known as a coit, which was a dwelling-house and barn (shippon) united; the latter contained the cow-stalls with loft above, and the former was in two storeys, with a ladder inside the room leading to the upper floor. 1

Passing now to structures of a less ephemeral character, the earliest houses of which there still remain substantial relics are those built in stone (see Manor House). The Jew's House at Lincoln, 12th century, is one of the best-known examples, and still preserves its street front in stone, with rich entrance door- way and first-floor windows lighting the principal room, which seems invariably in those early houses to have been on the first floor, the ground floor being used for service and stores (see Plate I. fig. 5). To the 13th century belongs the old Rec- tory House at West Dean, Sussex,

and to the 14th century the

1 A complece description of these houses will be found in The Evolution of the English House, by S. O. Addy.

Parsonage House at Market Deeping, Lincolnshire. The principal examples of the domestic architecture of this early period in the country are castles, manor houses and farm buildings, as town houses occupied sites too valuable to be left untouched; this, however, is not the case in France, and particularly in the south, where streets of early houses are still to be found in good preservation, such as those at Cluny (fig. 1) and Cordes (Tarn), and others at Montferrand, Cahors, Figeac, Angers, Provins, Sarlat (fig. 2), St Emilion, Perigueux, Soissons and Beauvais, dating from the 12th to the 14th centuries. One of the most remarkable examples is the Musician's House at Reims (see Plate I., fig. 4), with large windows on the first floor, between which are niches with life-size figures of musicians seated in them. Generally speaking, the ground storeys of these houses, which in many cases were occupied by shops, have been trans- formed, but occasionally the old shop fronts remain, as in Dinan, Morlaix and other old towns in Brittany. Houses of the first Renaissance of great beauty exist in Orleans, such as the house of Agnes Sorel; and the example in the Market Place illustrated in fig. 3 ; in Tours, Tristan's house in brick with stone

Fig. 1. — Houses at Cluny.

quoins and dressings to windows; in Rouen, Caen, Bayeux, Toulouse, Dijon and, in fact, in almost every town throughout France. Of houses of large dimensions, which in France are termed hotels, there are also many other fine examples, the best known of which are the hotel de Jacques Cceur (see Plate II., fig. 7), at Bourges, and the h6tel de Cluny at Paris (see Plate I., fig. 6). In the 15th and 16th centuries in France, owing to the value of the sites in towns, the houses rose to many storeys, the upper of which were built in half-timber, sometimes projecting on corbels and richly carved; of these numerous examples exist at Rouen, Beauvais, Bayeux and other towns in Normandy and Brittany. Of such structures in English towns (see Plate II. fig. 9) there are still preserved some examples in York, Southampton, Chester, Shrewsbury, Stratford-on- Avon, and many smaller towns; the greatest development in half-timber houses in England is that which is found more particularly throughout Kent, Sussex and Surrey, in houses oi modest dimensions, generally consisting of ground and first floor only, with sometimes additional rooms in the roof; in these the upper storey invariably projects in front of the lower, giving increased dimensions to the rooms in the former, but adopted in order to protect the walls of the ground storey from rain, which in the upper storey was effected by the projecting eaves of the roof. In the north and west of England, where stone could be

obtained at less cost than brick, and in the east of England, where brick, often imported from the Low Countries, was largely employed, the ordinary houses were built in those materials,

and in consequence of their excellent construction many houses of the 1 6th and 1 7th centuries have remained in good preservation down to the present day; they are found in the Cotswolds generally, and (among small towns) at Broadway in Worcester- shire and (of brick) throughout Essex and Suffolk. Among the larger half-timber houses built in the 15th and 16th centuries, mention may be made of Bramhall Hall, near Manchester; Speke Hall, near Liverpool (see Plate III., fig. 10); The Oaks; West Bromwich; and Moreton Old Hall, Cheshire, one of the most elaborate of the series (see Plate III., fig. 11).

On the borders of the Rhine, as at Bacharach and Rhense, and throughout Germany, half-timber houses of the most

Fig. 2. — House at Sarlat.

picturesque character are found in every town, large and small, those of Hildesheim (see Plate II., fig. 8) dating from the 15th and 1 6th centuries, and in some cases rising to a great height with four or five storeys, not including those in the lofty roofs. Houses in stone from the 12th to the 16th century are found in Cologne, Metz, Trier, Hanover and Munster in Westphalia, where again there are whole streets remaining; and in brick at Rostock, Stralsund, Lubeck, Greifswald and Dantzig, forming a very remarkable series of 15th and 16th-century work.

Of half-timber work in Italy there are no examples, but sometimes (as at Bologna) the rooms of the upper floors are carried on arcades, and sometimes on corbels, as the casa dei Carracci in the same town. The principal feature of the Italian house is the courtyard in the rear, with arcades on one or more sides, the front in stone or brick, or both combined, being of the greatest simplicity (examples in San Gimignano and Pisa). At Viterbo are small houses in stone, two of which have external stone staircases of fine design, and the few windows on the ground floe r suggest that the rooms there were used only for stores.

Houses with external staircases, but without any architectural pretensions, are found throughout the Balkan provinces.

The introduction of the purer Italian style into England in the 17th century created a great change in domestic architecture. Instead of the projecting wings and otherwise picturesque contour of the earlier work the houses were made square or rectangular on plan, in two or three storeys, crowned with a modillion cornice carrying a roof of red tiles; the only embellishments of the main front were the projecting courses of stone on the quoins and architraves round the windows, and flat pilasters carrying a hood or pediment flanking the entrance doorway. In the larger mansions more thought was bestowed

Fig. 3. — Detail of house at Orleans.

on the introduction of porticoes (scarcely necessary in the English climate), with sometimes great flights of steps up to the principal floor, which was raised abcve a basement with cold and dark passages; a great saloon in the centre of the block, lighted from above, took the place of the great entrance hall of the Tudor period, and the rooms frequently led one out of the other, without an independent entrance door. On the other hand, in the ordinary houses, the deficiency in external ornament was amply made up for by the comfort in the interior and the decoration of the staircase and other rooms. Towards the close of the century the square mullioned and transomed windows, with opening casements, gave way to sash windows, introduced from Holland, and these with moulded and stout sash-bars gave a certain character to the outside of the houses, which are valued now for their quiet unpretentious character and excellent con- struction. In the closes of many English cathedrals, on the outskirts of London, and in some of the older squares, as Lincoln's Inn Fields and Queen Square, are examples of this style of house. The substitution of thin sash-bars in the 19th century,

HOUSE

Plate III.

•■■j >

y,yh i xv./

I if' ! 'i iT t —Ji'TTO?iP^- \ I

*I * !: '*

Fig. ii.— MORETON OLD HALL, NEAR CONGLETON, CHESHIRE.

Plate IV.

HOUSE

From Garner and St rat ton, Domestic Architecture oj England during the Tudor Period, icjio- By permission of B. T. Balsford.

Fig. 12— SOUTH COURT OF SUTTON PLACE, SURREY, 1525.

From Gofch, Architecture of the Renaissance in England, 1894. By permission of B. T. Balsford,

Fig. 13— MOYNS PARK, ESSEX, 15

and their omission occasionally, in favour of plate-glass, deprived the house-front of one of its chief attractions; but the old English casements and oriels or bow-windows have been again introduced, and a return has been made to the style which prevailed in the beginning of the 18th century, commonly known as that of Queen Anne.

Perhaps in one respect the greatest change which has been made in the English house is the adoption of "flats"; com- menced some time in the 'fifties in Ashley Gardens, Westminster, they have spread throughout London. In consequence of the great value of the sites on which they are sometimes built, to which must be added the cost of the houses pulled down to make way for them, the question of expense in material and rich decoration has not always been worth considering, so that frontages in stone, with the classic orders brought in with many varieties of design, have given the character of a palace to a structure in which none of the rooms exceeds the modest height of 10 ft. The increasing demand for these, however, shows that they meet, so far as their accommodation and comfort are concerned, the wants and tastes of the upper and middle classes. In some of the London streets, where shops occupy the ground floor, a far finer type of house has been erected than that which could have been afforded for the shopkeeper's residence above, as in old times, so that London promises in time to become a city of palaces. The same change in the aspects of its streets has long been evident in Paris, but there is one feature in the latter city which has never yet found its way into London, much to the surprise of French visitors, viz. the porte-cochere, through which the occupants of the house can in wet weather drive and be landed in a covered hall or vestibule. This requires, of course, a small court at the back, so small that one wonders sometimes how it is possible for the carriage to turn round in it. The porte-cochere also, from its dimensions, is a feature of more importance than the ordinary street doorway, even when a portico of some kind is added; on the other hand, the strict regulations in

Paris as regards the projection of cornices and other decorative accessories gives to the stranger the appearance of monotony in their design, which certainly cannot be said of the houses in flats lately built in London. Within recent years an old English feature, known as the bow-window, has been introduced into Paris, the primary object of which does not seem yet to have been thoroughly understood by the French architect. An English bow-window, by its slight projection in front of the main wall, increases greatly the amount of light entering the room, and it is generally placed between solid piers of stone or brick. The French architects, however, project their piers on immense corbels, and then sink their windows 1 with deep external reveals, so that no benefit accrues to the room, so far as the increased light is concerned. In Paris, since 1900, there has been a tendency to introduce a style of design in French houses which is known as " l'art nouveau," a style which commenced in furniture as a reaction against the revival of the Empire and Louis XIV. and XVI. periods, and was then extended to house fronts; this style has unfortunately spread through the various towns in France and apparently to Germany, again as a reaction against the formal classic style of the latter half of the 19th century. It is probable that in Italy and -Spain " l'art nouveau " may meet with the same success, and for the same reasons, so that in the latter country it wiJJ be a revival, with modifications, of the well-known Churrigueresque style, the most debased Rococo style which has ever existed. In England it has never met with any response. (R. P. S.)

HOUSEHOLD, ROYAL. In all the medieval monarchies of western Europe the general system of government sprang from, and centred in, the royal household. The sovereign's domestics were his officers of state, and the leading dignitaries of the palace were the principal administrators of the kingdom. The royal household itself had, in its turn, grown out of an earlier and more primitive institution. It took its rise in the comitatus described by Tacitus, the chosen band of comites or companions who, when the Roman historian wrote, constituted the personal following, in peace as well as in war, of the Teutonic chieftain. In

England before the Conquest the comitatus had developed or degenerated into the thegnhood, and among the most eminent and powerful of the king's thegns were his dishthegn, his bowerthegn, and his horsethegn or staller. In Normandy at the time of the Conquest a similar arrangement, imitated from the French court, had long been established, and the Norman dukes, like their overlords the kings of France, had their seneschal or steward, their chamberlain and their constable. After the Conquest the ducal household of Normandy was reproduced in the royal household of England; and since, in obedience to the spirit of feudalism, the great offices of the first had been made hereditary, the great offices of the second were made hereditary also, and were thenceforth held by the grantees and their

descendants as grand-serjeanties of the crown. The con- sequence was that they passed out of immediate relation to the practical conduct of affairs either in both state and court or in the one or the other of them. The steward and chamberlain of England were superseded in their political functions by the justiciar and treasurer of England, and in their domestic functions by the steward and chamberlain of the household. The marshal, of England took the place of the constable of England in the royal palace, and was associated with him in the command of the royal armies. In due course, however, the marshalship as well as the constableship became hereditary, and, although the constable and marshal of England retained their military authority until a comparatively late period, the duties they had successively performed about the palace had been long before transferred to the master of the horse. In these circumstances the holders of the original great offices of state and the household ceased to attend the court except on occasions of extraordinary ceremony, and their representatives either by inheritance or by special appointment have ever since continued to appear at coronations and some other public solemnities, such as the opening of the parliament or trials by the House of Lords. 1

The materials available for a history of the English royal household are somewhat scanty and obscure. The earliest record relating to it is of the reign of Henry II. and is contained in the Black Book of the Exchequer. It enumerates the various inmates of the king's palace and the daily allowances made to them at the period at which it was compiled. Hence it affords valuable evidence of the antiquity and relative importance of the court offices to which it refers, notwithstanding that it is silent as to the functions and formal subordination of the persons who filled them. 2 In addition to this record we have a series of far later, but for the most part equally meagre, documents bearing more or less directly on the constitution of the royal household, and extending, with long intervals, from the reign of Edward III. to the reign of William and Mary. 3 Among them, however, are what are known as the Black Book of the Household and the Statutes of Eltham, the first compiled in the reign of Edward IV. and the second in the reign of Henry VIII., from which a good deal of detailed information may be gathered concerning the arrangements of the court in the 15th and 16th centuries. The Statutes of Eltham were meant for the practical guidance merely of those who were responsible for the good order and the sufficient supply of the sovereign's household at the time they were issued.

1 The great officers of state and the household whom we have particularly mentioned do not of course exhaust the catalogue of them. We have named those only whose representatives are still dignitaries of the court and functionaries of the palace. If the reader consults Hallam {Middle Ages, i. 181 seq.), Freeman {Norman Conquest, i. 91 seq., and v. 426 seq.) and Stubbs {Const. Hist. i. 343, seq.), he will be able himself to fill in the

*details of the outline *»e have given above.*

2 The record in question is entitled Constitulio Dontus Regis de Procurationibus , and is printed by Hearne {Liber Niger Scaccarii, i. 341 sq.). It is analysed by Stubbs {Const. Hist. vol. i. note 2,

P- 345)-

8 A Collection of Ordinances and Regulations for the Government of the Royal Household, made in Divers Reims from King Edward III. to King William and Queen Mary, printed for the Society of Antiquaries, (London, 1790). See also Pegge's Curialia, published partly before and partly after this volume; and Carlisle's Gentlemen of the Privy Chamber, published in 1829. Pegge and Carlisle, however, deal with small and insignificant portions of the royal establishment.

But the Black Book of the Household, besides being a sort of treatise on princely magnificence generally, professes to be based on the regulations established for the governance of the court by Edward III., who, it affirms, was " the first setter of certeynties among his domesticall meyne, upon a grounded rule " and whose palace it describes as " the house of very policie and flowre of England "; and it may therefore possibly, and even probably, take us back to a period much more remote than that at which it was actually put together. 1 Various orders, returns and accounts of the reigns of Elizabeth, James I., Charles I., Charles II., and William and Mary throw considerable light on the organization of particular sections of the royal household in times nearer to our own. 2 Moreover, there were several parlia- mentary inquiries into the expenses of the royal household in connexion with the settlement or reform of the civil list during the reigns of George III., George IV. and William IV. 3 But they add little or nothing to our knowledge of the subject in what was then its historical as distinguished from its contemporary aspects. So much, indeed, is this the case that, on the accession , of Queen Victoria, Chamberlayne's Present State of England, which contains a catalogue of the officials at the court of Queen Anne, was described by Lord Melbourne the prime minister as the " only authority " which the advisers of the crown could find for their assistance in determining the appropriate constitution and dimensions of the domestic establishment of a queen regnant. 4

In its main outlines the existing organization of the royal household is essentially the same as it was under the Tudors or the Plantagenets. It is

now, as it was then, divided into three principal departments, at the head of which are severally the lord steward, the lord chamberlain and the master of the horse, and the respective provinces of which may be generally described as " below stairs," " above stairs " and " out of doors." The duties of these officials, and the various officers under their charge are dealt with in the articles under those headings. When the reigning sovereign is a queen, the royal household is in some other respects rather differently arranged from that of a king and a queen consort. When there is a king and a queen consort there is a separate establishment " above stairs " and " out of doors " for the queen consort. She has a lord chamberlain's department of her own, and all the ladies of the court from the mistress of the robes to the maids of honour are in her service. At the com- mencement of the reign of Queen Victoria the two establishments were combined, and on the whole considerably reduced. On the accession of Edward VII. the civil list was again reconstituted; and while the household of the king and his consort became larger than during the previous reign, there was a tendency towards increased efficiency by abolishing certain offices which were either redundant or unnecessary.

The royal households of such of the continental monarchies of Europe as have had a continuous history from medieval times resemble in general outlines that described above. There are,

1 Liber niger domus Regis Edward IV. and Ordinances for the Household made at Eltham in the seventeenth year of King Henry VIII., a.D. 1526, are the titles of these two documents. The earlier documents printed in the same collection are Household of King Edward III. in Peace and War from the eighteenth to the twenty-first year of his reign; Ordinances of the Household of King Henry IV. in the thirty-third year of his reign, AD. 1455, and Articles ordained by King Henry VII. for the Regulation of his Household, A .D. 1494.

z The Book of the Household of Queen Elizabeth as it was ordained in the forty-third year of her Reign delivered to our Sovereign Lord King James, &c, is simply a list of officers' names and allowances. It seems to have been drawn up under the curious circumstances referred to in Archaeologia (xii. 80-85). F°r the rest of these documents see Ordinances and Regulations, &c, pp. 299, 340, 347, 352, 368 and 380.

1 Burke's celebrated Act " for enabling His Majesty to discharge the debt contracted upon the civil list, and for preventing the same from being in arrear for the future, &c," 22 Geo. III. c. 82, was passed in 1782. But it was foreshadowed in his great speech on ' Economical Reform " delivered two years before. Since the beginning of the 19th century select committees of the House of Commons have reported on the civil list and royal

household in 1803, 1804, 1815, 1831 and 1901.

4 Torrens's Memoirs of William, second Viscount Melbourne, "■ 303-

common to many, certain great offices, which have become, in course of time, merely titular and sometimes hereditary. In most cases, as the name of the office would suggest, they were held by those who discharged personal functions about the sovereign. Gradually, in ways or for reasons which might vary in each individual case, the office alone survived, the duties either ceasing to be necessary, or being transferred to officers of less exalted station and permanently attached to the sovereign's household. For example, in Prussia, there are certain great titular officers, such as the Oberstmarschall (great chamberlain) ; the Oberstjagermeister (grand master of the hunt); the Oberst- schenk (grand cup-bearer) and the Obersttruchsess (grand carver), while, at the same time, there are also departments which correspond, to a great extent — both as to offices and their duties — to those of the household of the English sovereigns. This is a feature which must necessarily be reproduced in any monarchical country, whatever the date of its foundation, to a more or less limited extent, and varying in its constitution with the needs or customs of the particular countries.

See also Lord Steward; Lord Chamberlain; Master of the Horse; Privy Purse; and Civil List.

HOUSEL, the English name, until the time of the Reformation, for the Eucharist. The word in O. Eng. was huscl. Its proper meaning is " sacrifice," and thus the word hunsl appears in TJlfilas' Gothic version of Matt. ix. 13, " I will have mercy and not sacrifice." The ultimate- origin is doubtful. The New English Dictionary connects it with a Teutonic stem meaning "holy"; from which is derived the Lithuanian szwentas, and Lettish swils. Skeat refers it to a root meaning " to kill," which may connect it with Gr. Kaivav.

HOUSELEEK, Sempervivum, a genus of ornamental evergreen plants belonging to the natural order Crassulaceae. About 30 species are known in gardens, some of which are hardy perennial herbs, and grow well in dry or rocky situations; the others are evergreen shrubs or undershrubs, fit only for cultivation in the greenhouse or conservatory. The genus Sempervivum is distinguished from the nearly allied Sedum by having more than five (about 12) petals, and by the glands at the base of the ovary being laciniated if present. The common houseleek, S. tectorum (Ger. Hauswurzel, Fr. joubarbe), is often met with in Britain on roofs of outhouses and wall-tops, but is not a native. Originally it was indigenous in the Alps, but it is now widely dispersed in Europe, and has been introduced

into America. The leaves are thick, fleshy and succulent, and are arranged in the form of a rosette lying close to the soil. The plant pro- pagates itself by offsets on all sides, so that it forms after a time a dense cushion or aggregation of rosettes. The flowering stem, which is of rather rare occurrence, is about 1 ft. high, reddish, cylindrical and succulent, and ends in a level-topped cyme, re- flexed at the circumference, of reddish flowers, which bloom from June to September. The houseleek has been known variously as the houselick, homewort or great houseleek. Sedum acre (stone-crop) is styled the little houseleek. In Germany it is sometimes called Donnerkraut, from being supposed to protect the house on which it grows from thunder. The leaves are said to contain malic acid in considerable quantity, and have been eaten as salad, like Porttdaca. S. glutinosum and 5. balsamiferum, natives respectively of Madeira and the Canary Islands, contain a very viscous substance in large quantity, and are used for the preparation of bird-lime; fishermen in Madeira, after dipping their nets in an alkaline solution, rub them with this substance, rendering them as tough as leather. S. montanum, indigenous in Central Europe, according to Gmelin, causes violent purging; 5. arboreum, rd jue-ya adfaov of Dioscorides, is employed in Cyprus, the East, and northern Africa as an external remedy for malignant ulcers, inflammations and burns, and internally for mucous discharges.

HOUSING. The housing of the poorer classes has become a pressing problem in all populous Western countries, and has engaged, in a varying but constantly increasing measure, the attention of legislative and administrative bodies and of phil- anthropic individuals and societies. The general interest was

HOUSE

Plate V.

ac.irtney, Later Renaissance Architecture in England, iooi. By permission of

Fig. 14.— HAM HOUSE, PETERSHAM, 1610.

From Gotch, ,1 rck,tecl„re oj the Remittance in England, ,854. By permission of B. T. Balsfonl.

xiii. s.4. Fig. 15.— BRAMSHILL, HAMPSHIRE, 1612.

Plate VI.

HOUSE

i Bdcher and Macartney, Later Renaissance Architecture in England, 1901.

By permission of B. T. Batsford.

Fig. 16— THE EARL OF BURLINGTON'S VILLA, CIIISWICK. EIGHTEENTH CENTURY.

HOUSES IN CAVENDISH SQUARE, LONDON. EIGHTEENTH CENTURY.

signalized by an International Congress held in London in 1907. The recognition of the problem is due in the first instance to the science of public health, the rise of which dates from the second quarter of the 19th century; and in the second instance to the growth of urban populations consequent on the development of manufacturing industries and of trading and transporting agencies, both of which tend to mass increasing numbers of people in convenient centres. To have a clear view of the subject it is necessary to distinguish these factors and their respective influence upon the problem. Urban congestion is quite secondary, and only important because and so far as it has a prejudicial effect upon health and strength. Further, the requirements on the scientific side, made on behalf of public health, are of very much wider application and more expansive than those which arise from the mere growth of urban population. That is obvious at once from the fact that they extend to rural housing, which has indeed become a prominent feature of the question in recent years. To ascribe the housing problem to the " factory system," as some writers have done, is to put forward an in- adequate and misleading view of it. It is, in fact, particularly acute in some places totally devoid of factories and least acute in some purely factory towns. If the factory system were abolished with all its effects the housing question would remain. But there is a more important distinction than extent of applica- tion. The requirements of public health are indeterminate and interminable; knowledge increases, or rather changes, and the standard constantly rises. It is the changing standard which gives most trouble; housing at one period thought good enough is presently condemned. Fifty years ago no house existed which would satisfy modern sanitary standards, and the mansions of the great were in some respects inferior to the worst .quarters to-day. And to this process there is no end. It is quite con- ceivable that urban congestion might cease to be a difficulty at all. That actually happens in particular towns where the population is stationary or diminishing. One whole nation (France) has already reached that point, and others are moving towards it at varying rates. But even where the supply of houses exceeds the demand and many stand empty, the housing problem remains; condemnation of existing accommodation continues and the effort to provide superior houses

goes on. In other words, there are two main aspects of the housing question, quality and quantity; they touch at various points and interact, but they are essentially distinct. The problem of quantity may be " solved," that of quality has no finality.

The importance attached to housing is much enhanced by the general tendency to lay stress on the material conditions of life, which characterizes the present age. Among material conditions environment takes a leading place, largely under the influence of the theory of evolution in a popular and probably erroneous form; and among the factors of environment the home assumes a more and more prominent position. There is reason in this, for whatever other provision be made for work or recreation the home is after all the place where people spend most of their time. Life begins there and generally ends there. At the beginning of life the whole time is spent there and home conditions are of paramount importance to the young, whose physical welfare has become the object of increasing care. But the usual tendency to run to extremes has asserted itself. It may be admitted that it is extremely difficult to raise the character and condition of those who live in thoroughly bad home surroundings, and that an indispensable or preliminary step is to improve the dwelling. But if in pursuit of this object other considerations are lost sight of, the result is failure. Bad housing is intimately connected with poverty; it is, indeed, largely a question of poverty now that the difference between good and bad housing is understood and the effects of the latter are recognized. The poorest people live under the worst housing conditions because they are the cheapest; the economic factor governs the situation. Poverty again is associated with bad habits, with dirt, waste, idleness and vice, both as cause and as effect. These factors cannot be separated in real life; they act and react upon each other in such a way that it is impossible

to disentangle their respective shares in producing physical and moral evils. To lay all responsibility upon the structural environment is an error constantly exposed by experience.

Defective quality embraces some or all of the fqllowing conditions — darkness, bad air, damp, dirt and dilapidation. Particular insanitary conditions independent of the structure are often associated; namely defects of water-supply, drainage, excrement and house refuse removal, back-yards and surround- ing ground; they contribute to dirt, damp and bad air. De- fective quantity produces high rents and overcrowding, both of which have a prejudicial effect upon health; the one by diminish- ing expenditure on other necessaries, the other by fouling the atmosphere and promoting the spread of infectious illness. The physical effects of these conditions have been demon- strated by comparative statistics of mortality general and special; among the latter particular stress is laid on the mortality of infants,

that from consumption and from " zymotic " diseases. The statistical evidence has been especially directed to the effects of overcrowding, which can be stated with greater pre- cision than other insanitary conditions. It generally takes the form of comparing the death-rates of different areas having widely contrasted densities of population or proportions of persons to a given space. It is not necessary to quote any of these figures, which have been produced in great abundance. They broadly establish a connexion between density and mortality; but the inference that the connexion can be reduced to a precise numerical statement and that the difference of mortality shown is all due to overcrowding or other housing conditions is highly fallacious. Many other factors ought to be taken into account, such as the age-distribution of the population, the birth-rate, the occupations, means, character and habits of the people, the geographical situation, the number of public institutions, hospitals, workhouses, asylums and so forth. The fallacious use of vital statistics for the purpose of proving some particular point has become so common that it is necessary to enter a warning against them; the subject of housing is a popular field for the exercise of that art, though there is no need of it.

The actual state of housing in different countries arid localities, the efforts made to deal with it by various agencies, the sub- sidiary points which arise in connexion with it and the results attained — all these heads embrace such a vast mass of facts that any attempt to treat them fully in detail would run to inordinate length. It must suffice to review the more salient points; and the most convenient way of doing so is to deal first with Great Britain, which has led the way historically in extent of need, in its recognition and in efforts to meet it, adding some notes upon other countries, in which the question is of more recent date and for which less information is available.

The United Kingdom The importance of housing and the need of improvement had by 1909 received public recognition in England for nearly 70 years, a period coinciding almost exactly with the systematic study of sanitation or public health. The active movement definitely began about 1841 with voluntary effort in which Lord Shaftesbury was the most prominent and active figure. The motive was philanthropic and the object was to improve the condition of the working classes. It took the form of societies; one was the " Metropolitan Association for Improving the Dwellings of the Industrial Classes," incorporated in 1845 but founded in 1841; another was the "Society for Improv- ing the Condition of the Labouring Classes," originally the " Labourers' Friend Society," of which the Prince Consort became president. That fact and the statement of the Society concerning improved housing that " the moral were almost equal to the physical benefits," sufficiently prove that public interest in the subject and a grasp of its significance already existed at that date. Legislation

followed not long after and has continued at intervals ever since.

Legislation. — Twenty-eight Housing and Health Acts, passed between 1851 and 1903, arc enumerated by Mr Dewsnup, whose monograph on The Housing Problem in England is the fullest account

of the subject published. The first was the Shaftesbury Act of 1851 for the establishment of lodging-houses for the working classes; the last was the Housing of the Working Classes Act of 1903. The Shaftesbury Act had in view the provision by local authorities of good lodging-houses for the better class of artisans, and particularly of single persons, male and female, though families were also con- templated. It was accompanied in the same year by another act, not included in the list of twenty-eight, for the regulation and control of common lodging-houses, from which Mr Dewsnup reasonably infers that the object of Lord Shaftesbury, who inspired both acts, was the separation of the casual and disorderly class frequenting common lodging-houses from the more regularly employed and respectable workers who were sometimes driven to use them for lack of other accommodation. ' At any rate this early legislation embodied the principle of differential treatment and showed a grasp of the problem not always visible in later procedure. The most important of the subsequent acts were those of 1855 and 1866, both intended to encourage private enterprise in the provision of working- class dwellings; the Torrens Act of 1868 (Artisans' and Labourers' Dwellings Act) for the improvement or demolition of existing buildings; the Cross Act of 1875 (Artisans' and Labourers' Dwellings Improvement Act), for extending that process to larger areas; the Public Health Act of 1875; the Housing of the Working Classes Act of 1885 following the report of the Royal Commission on the Housing of the Working Classes, of which King Edward, then prince of Wales, was a member; the Housing of the Working Classes Act of 1890; the Public Health (London) Act of 1891. The acts of 1875 (Public Health), of 1890 and of 1891 are still in force. The story of this half-century of legislation (which also includes a number of Scotch and Irish acts, local private acts and others bearing on the question) is one of tentative efforts first in one direction then in another, of laws passed, amended, extended, consolidated, super- seded. Many of the enactments, originally of limited application, were subsequently extended, and the principal laws now in force apply to the whole of the United Kingdom. Two main objects can be distinguished — (1) the treatment of existing dwellings by de- molition or improvement; (2) the construction of new ones. The second head is further subdivided into (a) municipal action, (6) private action. These objects have

*been alternately promoted by legislative measures conceived and carried out on no systematic plan, but gradually and continuously developed into an effective body of law, particularly with regard to the means of dealing with existing insanitary dwellings. The advancing requirements of public health are clearly traceable in the series of enactments directed to that end. The Nuisances Removal Act of 1855 took cognizance of premises in such a state as to be " a nuisance or injurious to health," and made provision for obtaining an order to prohibit the use of such premises for human habitation. In the same act over- crowding obtained statutory recognition as a condition dangerous or prejudicial to health, and provision was made for compelling its abatement. The campaign against bad housing conditions thus inaugurated by the legislature was extended by subsequent acts in i860, 1866 and 1868, culminating in the Cross Act of 1875 for the demolition (and reconstruction) of large insanitary areas and the extremely important Public Health Act of the same year. The constructive policy, begun still earlier in 1851 by Lord Shaftesbury's Act, was concurrently pursued, and for some years more actively than the destructive; but after 1866 the latter became more pro- minent, and though the other was not lost sight of it fell into the background until revived by the Royal Commission of 1885 and the housing legislation which followed, particularly the Housing of the Working Classes Act of 1890, amending and consolidating previous acts. *

The laws in operation at the beginning of 1909 were the Public Health Acts of 1875 and 1891 (London), as amended by subsequent minor measures, and the Housing of the Working Classes Act of 1890, amended in 1894, 1900 and 1903. The Public Health Acts place upon the local sanitary authority the obligation of securing, under by-laws, the proper construction, draining and cleaning of streets, removal of house refuse and building of houses, including structural details for the prevention of damp and decay, the provision of sanitary conveniences and an adequate water-supply; also of inquiring into and removing nuisances, which include any premises in such a condition as to be a nuisance or injurious to health and any house so over- crowded as to be dangerous or injurious to health. For the purpose of carrying out these duties the local authority has the power of inspection, of declaring a building unfit for human habitation and of closing it by order. The Housing Acts give more extended power to the local authority to demolish in- sanitary dwellings and clear whole areas' or " slums," and also to construct dwellings for the working classes with or without such clearance; they also retain the older provisions for encourag- ing private enterprise in the erection of superior dwellings for

the working classes. The procedure for dealing with insanitary property under these Acts is too intricate to be stated in detail; but, briefly, there are two ways of proceeding. In the first the local authority, on receiving formal

complaint of an unhealthy area, cause an inspection to be made by their medical officer, and if the report in their opinion justifies action, they may prepare an " improvement scheme," which is submitted to the Local Government Board. The Board holds an inquiry, and, if satisfied, issues a provisional order, which has to be confirmed by a special act of parliament, under which the local authority can proceed to demolish the houses concerned after paying compensation to the owners. This procedure, which is authorized by part i. of the act of 1890, is obviously both cumbrous and costly. The second way, provided for by part ii. of the act, is much simpler and less ambitious; it only applies to single houses or groups of houses. The medical officer in the course of his duty reports to the local authority any houses which are in his opinion unfit for human habitation; the local authority can then make an order to serve notices on the owners to repair the houses at their own expense. Failing compliance on the part of the owners, an order for closing the houses can be obtained; and if nothing is done at the end of three months an order for demolition can be made. Buildings injurious by reason of their obstructive character (e.g. houses built back to back so as to be without through ventilation and commonly called " back-to- back " houses) can be dealt with in a similar manner. Small areas containing groups of objectionable houses of either kind may be made the subject of an improvement scheme, as above. Where areas are dealt with under improvement schemes there is a certain obligation to re-house the persons displaced. Building schemes .are provided for under part iii. of the act. Land may be compulsorily purchased for the purpose and the money required may be raised by loans under certain conditions. The provisions thus summarized were considerably modified by the " Housing, Town Planning, &c, Act," passed at the end of 1909. It rendered obligatory the adoption (previously permissive) of the housing provisions (part iii.) of the act of 1890 by local authorities, simplified the procedure for the compulsory purchase of land required for the purpose and extended the facilities for obtaining loans. It further gave power to the Local Government Board to compel local authorities to put in force the act of 1890 in regard both to existing insanitary housing and the provision of new housing. Power was also given to county councils to act in default of rural district councils in regard to new housing. The procedure for dealing with insanitary houses by closing and demolition under part ii. (see above) was rendered more stringent. The general intention of the new act was partly to facilitate the administration of the previous one by local authorities and partly to provide means of compelling supine authorities to take action. Its town-planning provisions are noted below.

Effects of Legislation. — The efficacy of 1 aws depends very largely on their administration; and when they are permissive and dependent on the energy and discretion of local bodies their administration varies greatly in

different localities. That has been the case with the British housing and health laws, and is one cause of dissatisfaction with them. But in the aggregate they have effected very great improvement. Public action has chiefly taken effect in sanitary reform, which includes the removal of the worst housing, through demolition or alteration, and general sanitary improvements of various kinds. ‘ In some large towns the worst parts have been transformed, masses of old, narrow, crowded, dilapidated and filthy streets and courts have been swept away at one blow or by degrees; other parts have been reconstructed or improved. The extent to which this has been accomplished is not generally recognized. It is not easily demonstrated, and to realize it local knowledge, observation and memory are needed. The details of the story are hidden away in local annals and official reports; and writers on the subject are usually more concerned with what has not than with what has been done. Both the Public Health and the Housing Acts have had a share in the improvement effected.

The operation of the former is slow and gradual, but it is continu- ous and far more general than that of the latter. It embraces many details which are not usually taken into account in discuss- ing housing, but which have as much bearing on the healthiness of the home as the structure itself. The Public Health Acts have further had a certain preventive influence in laying down a standard for the erection of new houses by the ordinary commercial agencies. Such houses are not ideal, because the commercial builder studies economy and the question of rent; but the standard has risen, and building plans involving in- sufficient light and air, such as once were general, have now for several years been forbidden almost everywhere. Super- vision of commercial building is, in fact, vastly more important than the erection of dwellings by public or philanthropic agencies, because it affects a vastly larger proportion of the population. The influence of the Public Health Acts in improving the condi- tions of home life cannot be estimated or summarized, but it is reflected in the general death-rate, which fell steadily in the United Kingdom from 21-1 per 1000 in 1878 to 15-4 per 1000 in 1907.

Insanitary Areas. — The operation of the Housing Acts is more susceptible of being stated in figures, though no fully com- prehensive information is available. The original Shaftesbury Act of 1851 for erecting municipal lodging-houses appears to have been practically inoperative and little or nothing was done for a good many years. In 1864, however, Liverpool obtained a private act and entered on the policy of improvement by the demolition of insanitary dwellings on a considerable scale, following it up

in 1869 by re-housing. In 1866 Glasgow, also under a private act, created an Improvement Trust, administered by the city council, and em- barked on a large scheme of improvement. These seem to have been the earliest examples. The Torrens Act of 1868, which embodied the improvement policy, did not produce much effect. According to a parliamentary return, during the years 1 883-1 888, proceedings were only taken under this act in respect of about 2000 houses in London and four provincial towns. More advantage was taken of the Cross Act of 1875, which was intended to promote large im- provement schemes. Between 1875 and 1885 23 schemes involving a total area of 51 acres and a population of about 30,000 were undertaken, in London; and II schemes in provincial towns. By far the most important of these, and the largest single scheme ever undertaken, was one carried out in Birmingham. It affected an area of 93 acres and involved a net cost of £550,000. Altogether between £4,000,000 and £5,000,000 were raised for improvement schemes under those acts. After the Housing Act of 1890 the clearance policy was continued in London and extended in the provinces. During the period 1891-1905 loans to the amount of about £2,300,000 were raised for improvement schemes by 28 provincial towns in England and Wales. The largest of these were Leeds (£923,000), Manchester (£285,000), Liverpool (£178,000), Sheffield (£131,000), Brighton (£112,000). The Leeds scheme affected an area of 75 acres, which was cleared at a cost of £500,000. In London the area cleared was raised to a total of 104 acres; the gross cost, down to March 31, 1908, was £3,417,337, the net cost £2,434,096, and the number of persons displaced 48,525. Glasgow has under its Improvement Trust cleared an area of 88 acres with a population of 51,000. At the same time the policy of dealing with houses unfit for habitation singly or in small groups by com- pelling owners to improve them has been pursued by a certain number of local authorities. In the six years 1899-1904 action was taken each year on the average in respect of about 5000 houses bv some 400 local authorities large and small outside London. Representations were made against 33,746 houses, 17,210 were rendered fit for habitation, closing orders were obtained against 4220 and demolition orders against 748. These figures do not in- clude cases in which action was taken under local acts and Public Health Acts. In Manchester, between 1885 and 1905, nearly 10,000 " back-to-back " houses were closed and about half of them re- opened after reconstruction. Hull, an old seaport town with a great deal of extremely bad housing, has made very effective use of the method of gradual improvement and has transformed its worst areas without appearing in any list of improvement schemes. In recent years this procedure has been systematically taken up in Birmingham and other places, and has been strongly advocated by Mr J. S. Nettlefold (Practical Housing) in preference to large im- provement schemes on account of the excessive expense involved by the latter in buying up insanitary areas. In

the six years 1902- 1907 Birmingham dealt with 41 1 1 houses represented as unfit for habitation; 1780 were thoroughly repaired, 1005 were demolished; the rest were under notice or in course of repair at the end of the period. Among other towns which have adopted this policy are Liverpool, Cardiff, York, Warrington and two London boroughs.

Building. — On the constructive side the operation of the Housing Acts has been less extensive and much less general. In London

alone has the erection of working-class dwellings by municipal action and organized private enterprise assumed large proportions. Philanthropic societies were first in the field and date from a period anterior to legislation, which however, stimulated their activity for many years by affording facilities. Fourteen organizations were in operation in London prior to 1890 and some of them on a large scale; others have since been formed. The earliest was the Metropolitan Association for Improving the Dwellings of the Industrial Classes, whose operations date from 1847; it has built 1441 tenements containing 5105 rooms. The largest of these enterprises are the Improved Industrial Dwellings Company (1864), which has built 5421 tenements containing 19,945 rooms; the Peabody Fund (1864) with 5469 tenements containing 12,328 rooms; the Artisans', Labourers' and General Dwellings Company (1867), with 1467 tenements containing 3495 rooms, and 6195 cottage dwellings; the East-End Dwellings Company (1885) with 2096 tenements containing 4276 rooms; the Guinness Trust (1889) with 2574 tenements containing 5338 rooms. The Artisans' Dwellings Com- pany alone has housed upwards of 50,000 persons. In addition to these there are the Rowton Houses (1892), which are hotels for working men, six in number, accommodating 5162 persons. So far as can be estimated, private enterprise has housed some 150,000 persons in improved dwellings in London on a commercial basis. The early activity of the building companies was largely due to the policy of the Metropolitan Board of Works, which adopted extensive improvement schemes and sold the cleared sites to the companies, who carried out the re-housing obligations imposed by the law. Since the London County Council, which replaced the Board of Works in 1889, adopted the policy of undertaking its own re-housing, their activity has greatly diminished. The buildings erected by them are nearly all in the form of blocks of tenements; the Artisans Dwellings Company, which has built small houses and shops in outlying parts of London, is an exception. The tenement blocks are scattered about London in many quarters. For instance the Pea- body Fund has 18 sets of dwellings in different situations, the Metropolitan Association has 14; the Artisans' Dwellings Company has 10; the Guinness Trust has 8. In 1909 an important addition to the list of philanthropic enterprises in London was put in hand under the will of Mr W. R. Sutton, who left nearly £2,000,000 for the purpose of providing improved working-class dwellings.

The erection of tenement blocks containing accommodation for 300 families was begun on a site in the City Road. In only a few pro- vincial towns has private enterprise contributed to improved housing in a similar manner and that not upon a large scale ; among them are Newcastle, Leeds, Hull, Salford and Dublin.

Municipal Building has been more generally adopted. The following details are taken from Mr W. Thompson's Housing up to Date, which gives comprehensive information down to the end of 1906. The number of local authorities which had then availed themselves of part iii. of the Housing Act of 1890, which provides for the erection of working-class dwellings, was 142. They were the London County Council, 12 Metropolitan Boroughs, 69 County Boroughs and Town Councils, 49 Urban District Councils and 12 Rural District Councils. The dwellings erected are classified as lodging-houses, block dwellings, tenement houses, cottage flats and cottages. Lodging-houses have been built by 12 towns, of which 8 are in England, 3 in Scotland (Glasgow, Aberdeen and Leith) and 1 in Ireland (Belfast). The total number of beds provided was 6218, of which Glasgow accounts for 2414, London for 1846, Man- chester "and Salford together for 648. Four other towns have built or are building municipal lodging-houses for which no details are available. The other municipal dwellings erected are summarized as follows: —

Kind of Dwelling.

No. of Dwellings.

No. of Rooms. '

Blocks

Tenement Houses Cottage flats . Cottages ….

12,165

2,507 2,004

3.830

27.523 6,068

5-747 17,611

Total ….

20,506

56,949

It appears from these figures that municipal building has provided for a smaller number of persons in the whole of the United Kingdom than private enterprise in London alone. The principal towns which have erected dwellings in blocks are London (7786), Glasgow" (2300), Edinburgh (596), Liverpool (501), Dublin (460) and Man- chester (420). The great majority of such dwellings contain either two or three rooms. Tenement houses have been built in Liverpool (1424), Manchester (308), Sheffield (192), Aberdeen (128), and in seven other towns on a small scale. Such tenements are generally somewhat larger than those built in blocks; the proportion of three- and four-roomed dwellings is higher and only a small number consist of a single room. Cottage flats have been built in Dublin (528), West Ham (401), Battersea (320), Plymouth (238), East Ham (212), andon a small scale in Liverpool, Birmingham, Newcastle and seven other places. The majority of the cottage flats contain three or more rooms, a considerable proportion have four rooms. Cottages

have been built in 67 places, chiefly small towns and suburban districts. Of the large towns which have adopted this class of dwellings Salford stands first with 633 cottages; three London boroughs, all on the south side of the Thames, have built 234; Manchester has 228, Sheffield 173, Huddersfield 157, Birmingham 103. The number of rooms in municipal cottages ranges from three to eight, but the great majority of these dwellings have four or five rooms.

Some further details of municipal housing in particular towns are of interest. In London, the work of the London County Council down to March 31, 1908, not including three lodging-homes containing 1845 cubicles, is given in the official volume of London Statistics, published by the Council, as follows: —

Buildings Erected and in Course of Erection.

No. of Dwellings.

No. of Rooms.

Cost of Land and Building.

No. of Persons . in Occupation.

8.373

22,939

£2,438,263

26,687

With regard to the cost, it is to be noted that the actual cost of the land purchased for improvement schemes was very much greater than that stated, having been written down to an arbitrary figure called " housing valuation." The financial accounts of L.C.C. dwellings for the year ending March 31 , 1908, are thus summarized : —

> London County Council Dwellings, Accounts 1907-1908.

Gross Rental.

Deductions for Empties, &c.

Net Receipts.

Expenditure including Interest.

Net Returns.

£180,169

£i9,455

£160,714

£157.141

£3.573

It appears from this that if the actual commercial cost of the land were taken the housing of the Council would be run at a considerable annual loss. The occupations of the tenants are stated in the following proportions: labourers 789, clerks 312, policemen 251, shop assistants 202, warehousemen 183, printers 182, charwomen 182, tailors 155, cabinetmakers 1 46, canvassers 122, cigarette makers 118, widows 116, tram drivers no, postmen 107, packers 97, engineers 87, dressmakers 41, coachmen 31, motormen 26, milliners 19. These proportional figures show that though a considerable number of labourers have been housed, the great majority of the occupants of London municipal dwellings are of a superior class. The mean weekly rent in London County Council dwellings

is 2s. iojd. per room against 2s. 4d. in dwellings erected by other agencies. The most important feature of the County Council's policy in recent years has been the acquisition of suburban sites for the erection of cottages. There are four such sites, two on the south, one on the north and one on the west side of London; the total area is 349 acres, and the total accommodation contemplated is for 66,000 persons at an estimated cost of £3,105,840; the present accommodation is for about 8000. In addition to the housing provided by the County Council, fourteen London Borough Councils and the City Corporation had at the beginning of 1909 erected or adapted 3136 dwellings containing 7999 rooms.

In Liverpool, down to 1907, about £920,000 had been spent in clearing insanitary areas and building new dwellings; the de- molition of about 8000 houses and purchase of land cost about £500,000; and the erection of 2046 dwellings, containing 4961 rooms, cost about £350,000. The size of the dwellings and the number of each class are: I room, 193; 2 rooms, 965; 3 rooms, 719; 4 rooms, 167. The great majority are in tenement houses of three storeys. The mean weekly rent is is. 6|d. per room, but a large number are let at less. The net return on the total outlay is just over 1 , on the building outlay it is 2|. The principal classes of persons occupying the dwellings are labourers 675, carters 120, charwomen 103, firemen 93, porters 80, hawkers 64, sailors 45, scavengers 40. These all belong to the poorest classes, living by casual or irregular work. Liverpool has, in fact, succeeded more than any other town in providing municipal dwellings in which the really poor can afford to live.

In Manchester 956 dwellings have been built at a total cost for building and improvement of £451,932; of the whole number 420 are in blocks, 308 in tenement nouses and 228 in cottages. The rents are much higher than in Liverpool; in the tenement houses the mean weekly rent is about 6d. per room more than in Liverpool. The gross profit on the block dwellings is i\ % on the capital outlay, on the tenement houses 3%, on the cottages 2§ %. "The total loss during the last seven to ten years, including loan charges, has amounted to about £54,240 " (Thompson).

In Glasgow the corporation has built under improvement schemes '2280 new dwellings containing 4013 rooms and 241 shops. The dwellings, which are all in blocks and centrally situated, are occupied chiefly by artisans; only 28% have been reserved for the poorest class of tenants. The total amount taken from the rates on this account in 30 years is £600,000. Dwellings valued at £400,000 for

building and £300,000 for land give a net return of 3-06% on out- lay; dwellings valued at £280,000 for land and building return 3-03% on outlay; leaving the sinking fund charges to be defrayed out of rates.

In Edinburgh insanitary areas have been bought for £107,023 and new dwellings containing 1032 rooms have been built for £87,970. Nearly all the dwellings are of one or two rooms only. The rents charged average about 2s. a week per room; actual rents received average is. 4d. per room and they have to be subsidized out of the rates to the extent of 2s. 3d. per room to meet the cost of site.

In Dublin provision has been or was in 1909 shortly to be made for housing 5394 families or 19,000 persons; of which 1041 families, or about one-fifth, are housed by the Corporation, the rest by companies and private persons. Altogether it was estimated that £500,000 would be spent under the act of 1890. Fifteen streets, containing 1665 houses, have been declared unhealthy areas by the medical officer, and between 1879 and 1909 more than 3000 houses were closed as unfit for habitation.

Co-operative Building. — Municipal and philanthropic housing by no means exhaust the efforts that have been made to provide working- class dwellings outside the ordinary building market. Their special function has been to substitute better dwellings for pre-existing bad ones, which is the most costly and difficult, as well as the most urgent, part of the problem in old towns. But in the provision of new dwellings alone they have been far surpassed by organized self- help in different forms. Down to 1906 there had been built 46,707 houses by 413 co-operative societies at a cost of nearly £10,000,000. They are most numerous in the manufacturing towns and particu- larly in the north-western district of England. Of the whole number 8530 were owned by the societies which built them; 5577 had been sold to members, and 32,600 had been built by members on money lent by the societies. These figures do not include the particular form of co-operative building known as cc-partnership housing, which will be mentioned later on, or the operations of the so-called building societies, which are really companies lending money to persons on mortgage for the purpose of building. The difference between them and the co-operative societies which do the same thing is that the latter retain the element of co-operation by lending only to their own members, whereas the building societies deal in the open market. Their operations are on an immense scale; at the end of 1908 the invested funds of the registered build- ing societies exceeded £72,000,000. An agency working on this scale, which far exceeds the operations of all the others put together, is obviously an important factor in housing. The number of houses built must help to relieve congestion, and since they are built to suit the owners or tenants they cannot be of the worst class. They also represent a form of thrift, and deserve notice on that account.

The Small Dwellings Acquisition Act of 1899, which has not previously been mentioned, was intended to facilitate the building or purchase of small

houses by their tenants by means of loans advanced by local authorities. Down to 1906 about £82,000 had been so advanced by 5 county boroughs, 17 urban councils and I rural district council.

Housing by Employers. — No comprehensive information is avail- able on this head, but it has not been an important factor in towns, being chiefly confined to agricultural, mining and suburban manu- facturing districts. The former two belong to the subject of Rural Housing, which is separately discussed below; the third has an interest of its own on account of its connexion with " model, settle- ments." The building of houses for their workpeople by industrial employers has never been widely adopted in this country, but it has attracted considerable attention at two different periods. Sir Titus Salt was a pioneer in this direction, when he built his woollen mills at Saltaire, on the outskirts of Bradford, and housed his work- people on the spot. That plan was maintained by his successors, who still own some 900 excellent and cheap cottages, and was adopted by a few other manufacturers in the same neighbourhood. Saltaire was a model settlement with many institutions for the benefit of the mill-hands, and as such it attracted much attention; but the example was not generally followed, and the interest lapsed. Recently it has been revived by the model settlements at Port Sunlight, near Liverpool, started about 1888, Bournville near Birmingham (1895), and Earswick, near York (1904), which are of a much more elaborate character. Elsewhere, employers setting down works in some new locality where no provision existed, have had to build houses for their workmen ; but they have done so in a plain way, and this sort of housing has not assumed large proportions-.

Conditions in 1909. — It has been said above that great improve- ments have been effected, and of that there is no doubt at all. Both quantity and quality are more satisfactory than they were, though both are still defective. The conditions vary greatly in different places, and no general indictment can be sustained. The common practice of citing some exceptionally bad cases, and by tacit inference generalizing from them to the whole country, is in nothing more misleading than in the matter of housing. Local differences are due to several causes — age,

population, occupations and means of the people, public opinioD and municipal energy. The first three chiefly determine the difficulty and extent of the problem, the last two irfluence its treatment. The difficulty is greatest in towns which are old, have large populations and a high percentage of poor. Such pre-eminently are the large seaports, where much casual labour

is employed. London, Liverpool, Glasgow, the Tyne, Hull, Sunderland are examples. Old inland towns having a large trading as well as an industrial element present the same features. Such are Manchester, Birmingham, Leeds, Sheffield and Bradford. In all these, and some others like them, the past has left a heavy legacy of bad housing by malconstructioc and dilapidation, which has been increased by growth of population and over-crowding. They have attacked it with varying degrees of energy according to the prevalent local spirit and with varying results.

Overcrowding. — The one condition which permits of precise and comprehensive statement is overcrowding. A standard has been officially adopted in England based on the number of persons to a room in each dwelling; and the facts in relation to this standard are embodied in the census returns. It is a much better criterion than that of " density " or number of persons per acre, which is very deceptive; for an apparently low density may conceal much overcrowding within walls and an apparently high one may be comparatively guiltless. The room-density is the important thing in actual life. Some light is also thrown on this question by the number of rooms contained in each dwelling, and that is also given in the census. The standard of overcrowding is more than two persons to a room. In 1901 there were in England and Wales 2,667,506 persons or 82% of the population living in a state of overcrowding according to this definition. Their distribution is extremely irregular and capricious. In rural districts the proportion was only 5-8%, in urban districts 8-9%; but these summary figures give no idea of the actual state of things in different localities. In both rural districts and in towns the proportion of overcrowding varies in different localities from less than 1 % to over 30% of the population. The towns are the most im- portant and we shall confine attention chiefly to them. A list of 84 having a population of 50,000 and upwards, exclusive of London, is given by Mr Dewsnup. The overcrowding ranges from 34-54% in Gateshead and 32-42% in South Shields to 0-97% in Northampton and 0-62% in Bournemouth. Of the whole number exactly one-half have less than 5%; 15 have less than 2% and 22 have 10% or more. Neither size nor character has much to do with the variation. Bournemouth, at the bottom of the list with 0-62%, is a residential place and health resort with a population of about 50,000; so is Tynemouth, which is nearly at the top, with 30- 7 1 . The two largest towns, Liverpool and Manchester, are 26th and 32nd on the list, with only 7-94 and 6-28% respectively, or considerably less than the average; and on the other hand none of the first 17 towns with the highest proportion of overcrowding are of the largest size. Again, with regard to character, Leicester and Northampton, which are almost at the bottom of the list, with 1-04% and 0-97% respec- tively, are both purely industrial towns. The most striking facts are that the six towns, which alone have more than 20% of overcrowding, namely

Gateshead (34-5), South Shields (32-4), Tynemouth (30-7), Newcastle (30-4), Sunderland (30-10), Plymouth (20-1) are all old seaports, that four of them at the head of the list are on the Tyne and the fifth on the Wear. This points strongly to special local conditions and it is borne out by the facts with regard to rural districts. Northumberland and Durham show a great excess of overcrowding over other counties; and some of their rural districts even surpass any of the towns. The highest of all is the district of Tynemouth, with 38-18% of overcrowding. The explanation lies in a special combination of large families and small houses prevalent in this area. All the rural districts are seats of coal-mining, and miners are the most prolific section of the population. They also live in small houses of a traditional and antiquated character, often of one storey only or built back to back. Many are built by colliery

proprietors. Large families and small houses also prevail in the towns. Some of them contain coal-pits and the rest of their industrial population is engaged chiefly in engineering and shipbuilding works, occupations also usually associated with a high birth-rate. The men live as near their work as possible and the practice of living in flats or occupying part of a house prevails extensively.

In London the number of persons living in overcrowded conditions in 1901 was 726,096 or 16-0% of the population. The proportion varied from 2-6% in Lewisham to 35-2% in Finsbury, but in 23 out of the 29 boroughs into which the county is divided it exceeded the urban mean for the whole country, and in 9 boroughs having an aggregate population of 1,430,000 it was more than double the mean. Conditions in London are evidently untypical of English towns.

In the light of the census figures it is clear that no large proportion of the English industrial population is living under conditions of serious overcrowding, outside the special districts mentioned and that the expression " house famine " cannot be properly applied to England or English towns in general. In the House of Commons, on the 16th of August 1909, the president of the Local Government Board, Mr John Burns, gave a list of the number of unoccupied houses and tenements in each of the London boroughs and in the eight largest provincial towns, including Glasgow; the total was 104,107. By a further analysis of the census returns Mr Dewsnup shows that a great deal of the overcrowding is of a comparatively mild character and that it is due to a relatively small excess of population. Bradford, for instance, is credited with 40,896 overcrowded persons, representing the high percentage of 14-61 of the population; but in the case of nearly 20,000 the excess over the standard is very slight, and the proportion of gross overcrowding comes down to 7-55%. Moreover, this serious overcrowding is produced by no more than 2-79 of the population,

so that its cure presents no insuperable difficulty. The argument is confirmed by the very substantial diminution which actually took place betweeen 1891 and 1901. The facts are so striking that they deserve to be presented in tabular form: —

Percentage of Population Overcrowded.

1891

1901

England and Wales.

11-23

8-20

Gateshead ….

40-78

34-54

Newcastle

35-o8

3°-47

Sunderland .

32-85

30-10

Plymouth

26-27

20-19

Halifax .

21-31

14-49

Bradford .

20-61

14-61

Huddersfield .

19-89

12-88

London .

19-70

16-01

Leeds .

16-46

10-08

St Helens.

15-72

10-86

Birmingham

14-27

10-32

Burnley .

12-74

7-14

Sheffield .

11-58

9-50

Bolton .

11-22

6-50

Liverpool .

10-96

7-94

Oldham .

10-13

7-42

Salford

9-39

7-54

West Ham

9-34

9.27

Wolverhampt

on

9-31

4-67

Swansea .

9-25

5-57

Stockport

8-50

4.98

Manchester

8-25

6-28

Bristol .

8-03

3-55

Hull . .

7-86

6-12

Blackburn

7-°5

3-92

Birkenhead

6- 80

5-02

Norwich .

4-91

3-34

Brighton .

4-56

3-07

Cardiff

4-31

2-92

Preston

4-13

2-64

Nottingham'

3-62

3-65

Croydon .

2-76

2-74

Derby .

2-69

i-i8

Leicester .

2-22

1 04

Portsmouth

i-74

119

820

HOUSING

To what is this remarkable movement due ? It is far too general to be attributed to the operation of the Housing Acts; j for, though they have helped in some cases, a great diminution has occurred in many places in which no use has been made of them. Towns of all kinds and in all parts of the country exhibit the same movement in some degree; those which had little and those which had much overcrowding, the worst and the best. In London the precentage fell by 3-7, and the number of persons overcrowded was reduced by 103,669 in spite of an increase of population of 324,798.

In Gateshead a fall of 6-2%, in Newcastle one of 4-6% took place; while at the other end of the scale Leicester and Derby reduced their already very low proportions by more than one-half. Nottingham is the only exception in the whole list. And in 28 out of the 35 towns the decrease of overcrowding was absolute as well as relative in spite of a large increase of population. London has been cited. The other large towns may be tabulated with it, thus: —

Town.

Increase of Population.

Decrease of

Overcrowded

Persons.

London Liverpool . Manchester Birmingham . Leeds …. Sheffield . . . Bristol Bradford

324,898 166,978

38,504 44,091

61,463

56,55o

107,367

63,406

103,669

2,381

7.545

14,290

17.252 1,388 6,105 3.696

The very divergencies make the uniform diminution of over- crowding the more remarkable. The large increase of population in Liverpool and Bristol no doubt means extension of boundaries, which might have the effect of reducing the proportions of over- crowding, but it cannot account for the

actual decrease of overcrowded persons. The change seems to be due to three factors all of which have been in general operation though in varying degrees. They are (1) the centrifugal movement pro- moted by improved locomotive facilities, (2) the declining birth-rate, (3) public health administration. (1) The first is the most important and the chief element has been tramways, of which a great extension accompanied by electrification took place in the decade. Thus the process of urbanization has been modified by one of suburbanization. Bristol is a prominent case; its overcrowding has been reduced by more than one-half without any large, and costly municipal interference, mainly through the operation of ordinary economic forces. Tramways have made the outskirts accessible and builders have utilized the opportunity. They have built good houses, too, under supervision, and Bristol, though an old seaport and industrial town with much poverty, has the lowest general death-rate and the lowest infantile death-rate of all the great towns. (2) The birth-rate and the size of families are conditions which affect overcrowding in a very marked degree, though no attention is paid to them in that connexion. The case of the mining districts and the towns on the Tyne has been mentioned above; the same thing is seen in London, where all the most overcrowded dis- tricts (Finsbury, Stepney, Shoreditch and Bethnal Green) have high birth-rates, ranging from 31-3 to 36-4 per 1000 in 1902-1906. The necessity imposed on poor parents of putting several children into a cheap and therefore small dwelling accounts for a large proportion of overcrowding, which automatically diminishes with a falling birth-rate. The ultimate advantage of this method of reducing overcrowding is a question on which opinions may differ, but there is no doubt about the fact. (3) Public health administration is the third general cause; it attracts no notice and works very gradually, but it does work. The last annual report (for 1907) of the medical officer to the London County Council says of overcrowding: ‘ There is reason for thinking that in recent years greater

attention has been paid by sanitary authorities to the abatement of the nuisance, and Dr Newman states that in Finsbury there has been an enormous reduction in overcrowding, the reduction having been effected mainly in the years 1901-1905.” The medical officers of the metropolitan boroughs reported in 1907 2613 dwellings overcrowded in 23 boroughs and 3216 such dwellings remedied in 27 boroughs. It should not be forgotten that a good deal of overcrowding is voluntary. Families which have not enough room for their own members nevertheless take in lodgers; and in some places, of which London is the most conspicuous but not the only example, foreigners herd together thickly in a very small space.

The improvement shown by the statistics of overcrowding is confirmed by those relating to the size of dwellings. Between 1 89 1 and 1 90 1 the percentage of the population living in very small dwellings appreciably

diminished thus — in 1 -roomed dwellings, from 2-2 to i-6%; in 2-roomed dwellings, from 8-3 to 6-6%; in 3-roomed dwellings, from ii-i to 9-8%; while the proportion living in dwellings of 5 rooms and upwards increased from 54-9 to 6o-i%. This again is referable to the suburban movement and a higher standard of requirements. Six-roomed houses with a bathroom tend to replace the old four-roomed type. The general report accompanying the census says: " However the tenement figures for England and Wales are compared it is impossible to avoid the conclusion that the comparison affords satisfactory evidence of distinct improvement in the housing of the people during the ten years 1891-1901." In short, the problem of quantity is only acute in a few places and steadily becoming less so.

The foregoing facts apply only to England and Wales. In Scotland the state of things is much less satisfactory. No statistics of over- crowding are available, but the following comparative table shows how different the housing conditions are in the two countries: —

Size of Dwellings, England and Scotland, 1901.

Dwelling.

Percentage of Population.

England.

Scotland.

2 rooms ….

3 rooms ….

4 rooms ….

5 rooms and over .

16

6-6

9-8

21-9

6o-i

ii-i

39-5

19-9

9-1

20-4

Over 50 % of the population of Scotland live in tenements of one or two rooms; only 8-2 % in England. A comparison of the largest towns in the two countries gives the following result : —

Percentage of Population.

Scotland.

England.

Town.

1 Room.

2 Rooms.

Town.

1 Room.

2 Rooms.

Glasgow .

Edinburgh

Dundee .

Aberdeen

Paisley

Greenock

Kilmarnock

16-2 8-9

n-3

6-1

13-5

u-3

18-9

38-9 32-4 51-7 33-2 49-9 47-6 43-3

London .

Liverpool

Manchester

Birmingham

Leeds

Sheffield .

Bristol

6-7 2-7 0-8

o-3

0-4 0-4 16

15-5 5-9 4-01

2-4 9-5 4-0

57

Mean .

..... , , ,

12-7

42-4

Mean .

1-8

6-7.

The conditions in Scottish towns where very tall tenement houses are common, resemble those in other countries, in which overcrowd- ing is far greater than in England. All these matters are comparative, and the superiority of conditions in England ought to be recognized. Yet, in Scotland, too, great improvements have been effected. In 1861 there were 25,959 houses without windows; in 1901 only 130. These facts throw light on the long standing of the housing question, the change of standard and the improvement effected.

In Ireland there is more overcrowding than in England, though probably less 1 lan in Scotland, with the possible exception of Dublin, which has a larger proportion of one-roomed dwellings than any Scottish town, namely, 24-7 %. The percentage of population living in overcrowded conditions in the principal towns is — Dublin 40-6, Limerick 31-7, Cork 23-4, Waterford 20-6, Londonderry 167, Belfast 8-2.

HOUSING

821

Sanitary Conditions. — With regard to the quality of existing housing reference has already been made to the effect of the Public Health Acts and the general improvement in sanitation. The only numerical measure is afforded by the death-rates, which have fallen in England from 20-9 per 1000 in 1871-1875 to 15-4 per 1000 in 1 903-1907 and in the United Kingdom from 21-3 to 15-7 per 1000 in the same period. The condition of the dwelling must be credited with a considerable share in this fall. There have, in fact, been great changes and all in the direction of improvement. The rise and development of sanitation, of house and main drainage and sewage disposal, the purification of water and provision of a constant service in the house, the removal of refuse, the segregation of infectious illness, sanitary inspection — all these, apart from the demolition of the worst housing and the provision of better, have raised the general healthiness of the dwellings of the people. In face of these facts and of the vital statistics, to say that the people are physically deteriorating through the influence of bad housing is to talk obvious nonsense, for all conditions have been improving for more than a generation. If physical deterioration is going on, of which there is no proof, either it is not caused by bad housing or there is less than there was. Deterioration may be caused by the continued process of urbanization and the congregating of an ever larger proportion of the population in towns; but that is a different question. If the town has any injurious influence it is not due to the sanitary condition of the houses, which is in general superior to that of houses in the country, but

to the habits and occupations of the people or to the atmosphere and the mere aggregation. But much misapprehension prevails with regard to towns. The most distinctive and the most valuable feature of English housing is the general predominance of the small house or cottage occupied by a single family. Only in London and a few other towns do blocks of large tenement houses of the continental type exist, and even there they are comparatively few. In England and Wales 84% of the population live in dwellings of 4 rooms and upwards, which means broadly separate houses. Now the prevalence of small houses involves spreading out and the covering of much ground with many little streets, which produce a monotonous effect; a smoky atmosphere makes them grimy and dull skies contribute to the general dinginess. The whole presents to the eye a vast area of dreary meanness and monotony. Thus the best feature of English national housing turns to its apparent disadvantage and the impression is gained by superficial observers that the bulk of our working-class populations lives in " slums." The word " slum " has no precise meaning, but if it implies serious sanitary defects it is not applic- able to most of our town housing. There are real slums still, but the bulk of the working class population do not live in them; they live in small houses, often of a mean and dingy exterior but in essential respects more sanitary than the large and often hand- some blocks to be seen in foreign towns, which are not put down as slums because they do not look dirty. A smoky atmosphere is injurious to health, but it must be distinguished from defects of housing. Ideal houses in a smoky place soon look bad ; inferior ones in a clean air look brighter and deceive the eye. The worst of the old housing has disappeared; the filthy, dilapidated, air- less and sunless rookeries — the real slums — and the underground dwellings have been swept away in most cases, and what remains of them is not so bad as what has gone. But reform has been very regularly applied. Some towns have done much, others little. The large towns, in which the evil was most intense and most conspicuous in bulk, have as a class done far more than smaller ones in which the need perhaps was less great, but in which also a less healthy public spirit prevailed. The worst housing conditions to-day are probably to be found in old towns of small and medium size, in which the ratepayers have a great disinclination to spend money on anything, and the control of local affairs is apt to be in the hands of the owners of the most insanitary property. Nor is this state of things altogether con- fined to old places. Some of recent growth have been allowed, for the same reason, to spring up and develop without any regard to sanitary principles or the requirements of public health.

There is therefore abundant scope for further reform and in not a few cases urgent need of it. On the other hand, we have a number of towns, particularly manufacturing towns, both large and small in the midlands and the north of England, which have already reached a good general

standard of housing in all essential requirements, and only need the regular and steady exercise of vigilance by the public health service to remove such defects as still remain or may reveal themselves with the lapse of time.

Rents. — Rent is a matter of great importance from every point of view, and that is now being realized. A quantity of official information on the subject has been collected and made available by an elaborate inquiry ordered by the Board of Trade in 1905 and published in 1908 (Cd. 3864). It relates to working class dwellings in the principal industrial towns in the United Kingdom, 94 in all : namely, 77 in England and Wales, II in Scotland and 6 in Ireland. The following tables give in a condensed form the chief statistical results obtained in October 1905:—

Predominant Range of Weekly Rents.

England and Wales.

Scotland.

Ireland.

London.

Provincial

towns.

One room . Two rooms Three ,, Four ,, Five , , Six

4/6 to 7/6 6/- to 9/- 7/6 to 10/6 9/- to 13/- 10/6 to 15/6

3,1- to 3/6 3/9 to 4/6 4/6 to 5/6 5/6 to 6/6 6/6 to 7/9

2/- to 2/6 3/10 to 4/3 5/2 to 6/5

1/6 to 2/6 2/6 to 3/6 4/- to 5/- 5/6 to 6/9

Rents are lowest in Ireland and next lowest in English provincial towns, considerably higher in Scotland and highest of all in London, for which further special details are given. It is divided into three zones (1) central, (2) middle, (3) outer, which have the following mean weekly rents: —

London Mean Weekly Rents.

One room. Two rooms Three ,, . Four ,, . Five ,, . Six „ .

Zone.

Central.

4/6

7/- 8/9

Middle.

Outer.

3/9

61-

7/6

6/6

9/-

7/9

“/-

9/6

13/-

11/

In central London — which extends to Stepney in the East, Lambeth in the South, Islington in the North, and includes Westminster, Holborn, Finsbury, Marylebone, Shoreditch, most of Bethnal Green, Southwark and Bermondsey — the rent of a single room may be as high as 6s. or even 6s. 6d. (Holborn) a week. It is here that overcrowding is greatest, and block-tenements, philanthropic and municipal, most numerous. The rentals of the block dwellings have not been taken into account in the foregoing official statistics; they range as follows: 1 room, 2s. 6d. to 5s.; 2 rooms, 5s. to 8s.; three rooms, 6s. 6d. to lis. The lowest rent for which a single room can be obtained in this area is 2s. 6d. a week. In no English town are rents nearly so high as in London. If 100 is teken as the index number for rent in London the nearest towns to it (Croydon and Plymouth) only reach 81, and one town on the list (Macclesfield) is as low as 32. The index number of twenty-one towns out of the whole is 50 or under, and these include a number of important industrial centres— Hull, Leicester, Blackburn, Northampton, Warrington, Coventry, Crewe and others. The index numbers of the great towns are: Liverpool 65, Manchester and Salford 62,

Birmingham 59, Leeds 56, Sheffield 55, Bristol 53, Bradford 59, Hull 48; that is to say the level of rents in these towns is little more than half that in London. This is one more proof of the un- typical character of London, and of the fallacy of generalizing from it to the rest of the country. Even in the overcrowded towns an Tyneside rents do not run to three-fourths of the London level. When the towns are divided into geographical groups the index numbers run thus: London 100, Northern Counties 62, Yorkshire 56, Lancashire and Cheshire 54, Midlands 51, Eastern Counties 50, Southern Counties 61, Wales and Monmouth 60. Rents are always highest in capitals, and Edinburgh complies with the rule; but it is very slightly in advance of Glasgow, and in Scotland generally the range is much smaller than in England. Dublin, on the other hand, is differentiated from the other Irish towns as widely as London from English ones. ,

A general and progressive rise in rents has been taking place tor many years. The following index numbers for the great towns are

given in the second series of memoranda published by the Board of Trade in 1904 (Cd. 1761):—

Relative Working- Class Rents.

1880 . .

. . 86-6

1895 • •

■ • *96-3*

1885 . .

. 90-1

1900 .

. IOO-0

1890 .

■ • *89-9*

The tendency to rise is attributable to increased cost of labour, due to

higher wages and less work, increased cost of materials and higher rates. Weekly working-class rents generally include rates which are paid by the landlord. Housing reform has contributed to the rise, both directly and through the rates, on which it has thrown a heavy burden in various ways. When slums are cleared away and replaced by superior dwellings the new rents are generally higher than the old and this fact has proved a great difficulty. Most of the improved housing is beyond the means of those who need it most, and they seek other quarters resembling the old ones as nearly as possible. The example of Liverpool, which has the largest proportion of casual and ill-paid labour of all the great towns, and has been the most successful in providing new dwellings of a fair quality, centrally situated and not in blocks, at really low rates, shows that the problem is not insoluble; but as a rule too little attention is paid to the question of rent in housing reform, especially in building undertaken by municipalities. It is not ignored, but the importance attached to it by the poor is not realized. To them it is the first consideration after four walls, a roof and a fire-place; and 6d. a week makes a vast difference in their calculations. Reform which aims at raising the lowest classes of tenants by improving their dwellings defeats itself when it drives them away.

Rural Housing. — Little has hitherto been said about rural housing. It is of less importance than urban housing because it concerns a much smaller proportion of the population, and because in rural life the influence of inferior housing on health is offset by other conditions; but it has recently attracted much attention and was made the subject of inquiry by a Select Com- mittee of the House of Commons in 1906. The report laid stress chiefly on the inaction of local rural authorities under the Public Health and Housing Acts, and on various obstacles in the way of improving existing houses and of providing more and better ones at rents which agricultural labourers can afford to pay. The available facts with regard to rural housing are scrappy and unsatisfactory. The word " rural " has no precise meaning and it includes several very different sections of the population; for instance, the inhabitants of suburbs, mining villages and mill villages as well as the real agricultural population. Complaint is made of both the quantity and the quality of rural housing. With regard to quantity it is said that in spite of migration to the towns there is a dearth of cottages through dilapidation and demolition without rebuilding. That may happen in particular localities, but there is no evidence to support a general allegation. Inquiries issued by the Board of Trade to agricultural corre- spondents brought the following replies: insufficient 56, sufficient in, more than sufficient 32. Similar inquiries of land agents and owners resulted thus: insufficient 9, sufficient 11, more than sufficient 4, variable 6. From which it appears that insufficiency exists but is not general. The official evidence with regard to overcrowding is that it is much less acute than in

the towns. The proportion of the rural population in England living in overcrowded conditions in 1901 was 5-8%; if the rural mining districts, the exceptional overcrowding of which has been noted above, be eliminated, the rest cannot be very bad. Moreover, the percentage has appreciably diminished; in 1891 it was 846. The complaint of bad quality is better founded. Some landowners take great pride in the state of their property, and excellent cottages may be found in model villages and elsewhere in many parts of the country; but much rural housing is of an extremely insanitary character. A good deal of evidence on this head has of late years been published in the reports of medical inspectors to the Local Government Board. And local authorities are very reluctant to set the law in motion against insanitary dwellings. On the other hand, they have in some cases hindered and prevented building by too rigid insistence on by-laws, framed with a view to urban housing and quite unsuited to rural conditions. A few rural authorities have taken action with regard to building schemes under Part III. of the Housing Act. A list of 31 in 17 counties is given in " Housing up to Date "; 13 applications were refused and 13 granted by the respective county

councils and others were dropped. Details are given by the same authority of 54 houses built by 17 rural district councils. Public action may thus be said to amount to nothing at all. Landowners, however, have borrowed under the Improvements of Lands Acts upwards of £1,250,000 for building labourers' cottages; and this is probably only a fraction of the amount spent privately.

In Ireland a special condition of affairs exists. A series of about a dozen acts, dating from 1881 and culminating in the Labourers (Ireland) Act of 1906, have been passed for promoting the provision of labourers' cottages; and under them 20,634 cottages had been built and some thousands more authorized previous to the act of 1906, which extended the pre-existing facilities. The principle is that of the English Housing Acts applied to rural districts, but the procedure is simpler and quicker. The law provides that a representation may be made to the local authority by three ratepayers or resident labourers that " the existing house accommodation for agricultural labourers and their families is deficient having regard to the ordinary requirements of the district, or is unfit for human habitation owing to dilapidation, want of air, light, ventilation or other convenience or to any other sanitary defects," whereupon the local authority shall make an improvement scheme. It may also initiate a scheme without representation, or the Local Government Board may do so in default of the local authority. The scheme is published, an inquiry held, notice given and an order made with very much less delay and expense than under the English law. Land is purchased by agreement, or com- pulsorily and the money for land and building raised by loan. Loans amounting to about 3! millions sterling had

been raised down to 1906. The great majority of the cottages built are in Munster and Leinster. They must have at least 2 bedrooms and a kitchen, and the habitable rooms must be 8 ft. high. One of the most remarkable features is the low cost— about £150 — at which these cottages have been built, including land and the expenses of procedure.

Recent Developments. — It is clear from a general review of the subject that the problem of housing the working classes in a satisfactory manner has proved more complex than was at one time realized. Experience has falsified hopes and led to a change of attitude. It is seen that there are limits to drastic interference with the normal play of economic forces and to municipal action on a large and ambitious scale. A reaction has set in against it. At the same time the problem is being attacked on other sides and from new points of departure. The tendency now is towards the more effectual application of gradual methods of improvement, the utilization of other means and the exercise of prevention in preference to cure. Under each of these heads certain movements may be noted.

The most troublesome problem is the treatment of existing bad housing. In regard to this the policy of large improvement schemes under which extensive areas are bought up and demolished has had. its day, and is not likely to be revived to any considerable extent. That is not only because it is extremely costly but also because it has in the main done its work. It has done what could not have been done otherwise, and has swept away the worst of the old housing en masse. To call it a failure because it is costly and of limited application would be as great a mistake as to regard it as a panacea. The procedure which seems to be coming into favour in place of it is that adopted in Birming- ham and advocated by Mr J. S. Nettlefold (Practical Housing) coupled with a more general and effective ‘ use of the Public Health Acts. The principle is improvement in detail effected by pressure brought to bear on owners by public authority. The embodiment of this principle forms an important part of the Housing and Town Planning Bill introduced by the Local Government Board in 1908, which contained clauses empowering the central authority to compel apathetic local authorities to do their duty in regard to the closing of unfit houses, and authorizing local authorities both to issue closing orders and to serve notices on landlords requiring them ” to execute such works as the local authority may specify as being necessary to

make the house in all respects reasonably fit for human habita- ; tion.”

Among the other and less direct means to which attention is being turned is the policy of getting people away from the towns. The effect of improved travelling facilities in reducing urban overcrowding has been noted above. That object was not specifically contemplated in the building and electrification of tramways, and in the development of other means of cheap local travel, but the beneficial effect has caused them to be recognized as an important factor in relation to housing and to be more systematically applied in that connexion. A newer departure, however, is to encourage migration not to the outskirts of towns but altogether into the country by facilitating the acquisition of small holdings of land. This has been done by private landowners in an experimental way for some years, and in 1907 the policy was embodied in the Small Holdings Act, which gives county and borough councils power to purchase or hire land compulsorily and let it in holdings of not more than 50 acres or £50 annual value. Failing action on their part the Board of Agriculture may frame schemes. Power is also conferred on the Board and on County Councils to establish co-operative agricultural societies and credit banks. These measures have been adopted from foreign countries, and particularly from Denmark and Germany. A very large number of applications for holdings have been made under this act, but it is too early to state the effects. They will depend on the success of tenants in earning a livelihood by agricultural produce.

Another new and quite different departure is the attempt to establish a novel kind of town, called a " Garden City," which shall combine the advantages of the town and the country. The principal points are the choice of a site, which must be sufficiently convenient to enable industries to be carried on, yet with rural surroundings, the laying out of the ground in such a way as to ensure plenty of open space and variety, the insistence on building of a certain standard and the limitation of size. One has been established at Letchworth in Hertfordshire, 34 m. from London, and so far seems to be prospering. It consists of an area of 3800 acres, bought from the previous owners by a company registered in 1903 and entitled First Garden City Ltd., with a capital of £300,000 in £5 shares. The interest is limited to a dividend of 5%, all further profits to be devoted to the benefit of the town. The estate is divided into a central urban area of 1200 and a surrounding agricultural belt of 2600 acres. The town is planned for an eventual population of 30,000 and at present (1909) has about $000. Some London printing works and other small industrial establishments have been planted there, and a number of model cottages have been built. In this connexion another recent novelty has appeared in the shape of an exhibition of cottages. The idea, originated by Mr St Loe Strachey, was to encourage the art of designing and building cheap but good and convenient cottages, especially for the country. Two exhibitions have been held at

Letchworth in 1905 and 1907, and others at Sheffield (1907) and Newcastle (1908). The two latter were held on municipal land, and it is proposed by the National Housing Reform Council to hold one every year.

The " Garden City " has led to the " Garden Suburb," an adaptation of the same idea to suburban areas. One was opened near Hampstead Heath in 1907: it consists of 240 acres, of which 72 have been reserved for working-class cottages with gardens. These developments, with which may be associated the model industrial villages, mentioned above, at Bournville, Port Sunlight and Earswick, represent an aspiration towards a higher standard of housing for families belonging to the upper ranks of the working classes; and the same movement is demonstrated in a still more interesting fashion by a particular form of co-operative activity known as Co-partnership Housing. The first complete example of this method of organization was the Ealing Tenants Limited, a society registered under the Industrial and Provident Societies Act in 1901, though the Tenant Co-operators Limited, formed in 1888, was a precursor on very nearly the same lines. The essential principle is self-help

applied by combination to the provision of superior homes, and the chief material feature is the building of houses which are not only of good design and workmanship, but disposed on a systematic plan so as to utilize the ground to the best advantage. Land is bought and houses are built with combined capital to which ep.ch tenant contributes a substantial share; the houses are let at rents which will return 5% on share capital and 4% on loan capital after defraying all expenses, and the surplus profits are divided among the tenant members in proportion to the rents paid by them. Each tenant's share of profits is credited to him in shares until his share capital equals the value of the house he occupies, after which it is paid in cash. There is thus common ownership of the whole group, which forms a little community. This system has caught on in a remarkable way and has spread with great rapidity. In 1905 a central organizing body was formed called the Co-partnership Housing Council, for the purpose of promoting the formation of societies and assisting them with advice; it is supported by voluntary contributions. In 1909 twelve societies, including the original Tenant Co-operators,, had been formed with a total investment of £536,300. They are situated at Ealing, Letchworth, Seven- oaks, Leicester, Manchester, Hampstead (two), Harborne near Birmingham, Fallings Park, Stoke-on-Trent, Wayford and Derwentwater. The rapidity with which the movement has developed and spread since the establishment of the Co-partner- ship Housing Council indicates great vitality, and since it is based on thoroughly sound lines it has probably a large future. It is the most interesting and in many respects the best of all recent developments. The Report of the Select Committee on Rural Housing mentioned above suggested that a Co-partner- ship Housing Society should be formed in

every county in England.

All the enterprises just described have one feature in common, namely, the laying out of sites on a plan which takes cognizance of the future, secures a due proportion of open space, variety in the arrangement of streets and the most advantageous disposition of the houses and other buildings. They go beyond sanitary requirements and take account of higher needs. They have lent force to the advocacy of municipal " town-planning," as practised by several towns in Germany; and provision was made for this procedure in the Housing and Town Planning Act of 1909. The act contains clauses giving local authorities power to prepare plans with reference to any land which appears likely to be used for building purposes within or near their own boundaries; and also to purchase land comprised in a town- planning scheme and either build on it themselves or let plots for building in accordance with the plan. The chief object is to safeguard the future, prevent the repetition of past defects and encourage a higher standard of housing.

These new developments represent an upward movement at the higher end of the scale. They cater for the superior ranks of working classes, those who attach some importance to the aesthetic and moral influence of pleasant and wholesome surroundings, and are willing to sacrifice immediate gratifications to a higher end. They embody an aspiration, set an example and exercise an educative influence. But they have nothing to do with the housing of the really poor, which is the great difficulty; and their very attractiveness seems in some danger of drawing attention from it. Garden cities and suburbs will never house the poor or even the bulk of our working class population, and it would be a pity if the somewhat sentimental popularity of romantic schemes led to a distaste for the plodding effort which alone can effect a real cure of deep-seated social evils of long standing. All the new schemes and legislative proposals leave untouched the greatest difficulty of all, which lies not in the dwelling but in the tenant. It is comparatively easy to afford better opportunities to those who are willing to take advantage of them, but how to raise those who are not ? The lesson taught by Miss Octavia Hill's classical experiment is, if not forgotten, certainly neglected in the presence of more showy efforts. Or perhaps it would be more true to say that half of it is neglected. Miss Hill was one of the pioneers in the comparatively modest

method of improving and reconstructing bad houses, which, as we have noted, is now being more generally recognized and pursued; but that was

only half her work. She improved bad dwellings and made them decent, but she also managed them on business lines, by a system of inspection and rent collection which combined a judicious discipline with the stimulus of reward. This was done by means of personal service, which is the secret of all really effective work among the poor. Her words written years ago remain true to-day: " The people's homes are bad partly because they are badly built and arranged; they are tenfold worse because the tenants' habits and lives are what they are. Transplant them to-morrow to healthy and com- modious homes and they will pollute and destroy them."

The following is a list of the principal associations formed for the promotion of housing reform : Mansion House Council on the Dwell- ings of the Poor, Rural Housing and Sanitation Association, Work- men's National Housing Council, National Housing Reform Council, Co-partnership Tenants Housing Council. They are all of recent date, except the first. There are also local associations at Liverpool, Oldham, Rochdale, York, Plymouth, and elsewhere.

Other Countries

At the International Housing Congress organized by the National Housing Reform Council and held in London in 1907 representatives were present from a number of foreign countries and a good deal of information was collected and published in the report of the Congress. Further detailed data have been supplied by foreign correspondents to Mr W. Thompson and published in Housing up to Dale. The more important facts relating to the principal industrial countries are here condensed from this and other sources of information.

Austria. — An act for encouraging the building of cheap working- class dwellings was passed in 1902 ; it provides for exemption from taxes for 24 years of working-class dwellings which fulfil certain conditions including sanitary requirements, a minimum area per room, minimum height, minimum door and window spaces, thickness of walls, a maximum number of inhabitants (one to 4 sq. metres in sleeping rooms), prohibition of lodgers, fixed rent and maximum profit. The municipalities are the authority for administering sanitary and housing laws; they have no power of compulsory purchase of land without a special law. There is excessive overcrowding in the large towns ; in Vienna (1900) 43 % of the population live in dwellings of I room or 1 room and a kitchen; in 60 provincial towns the pro- portion is 63 %. Overcrowding is reckoned at more than 5 persons to a room and more than 9 to two rooms; the proportion of over- crowded on this basis is nearly one-fifth in Vienna and one-fourth in the provincial towns (Thompson).

Belgium. — An act was passed in 1889 instituting Comiies de Patronage; since then other Acts relating to loan societies, and to inheritance and succession in the case of small properties. Comites de Patronage are semi-official bodies, but without legal power, whose function it is to study the subject of housing, to report to local authorities on existing conditions, to advise, to collect funds and promote the provision of good houses by any means in their power. They influence public opinion and stimulate the activity of local authorities which have the power to compel improvements and close dwellings unfit for habitation; they have led to the formation of numerous societies for erecting working-class dwellings. The latter are encouraged by the law in various ways;. they are exempt from the payment of some government duties and partly exempt from others. Working men buying or building houses liable to registration fees up to from 72 to 171 francs are exempted from personal, pro- vincial and communal taxes. The National Savings Bank of Belgium is empowered to lend money to working men for buying or building houses and to insure the lives of those doing so, to preserve the home for the family. In 1904 the number of workmen's homes exempted from taxation was 164,387, and the amount of taxation remitted considerably exceeded 3 million francs; workmen had acquired lands and houses valued at nearly £4,000,000; there were 161 societies for building working-class dwellings; 30,000 workmen representing a population of 150,000 had become owners of property ; and 70,000 representing a population of 350,000 had availed them- selves of the law in obtaining exemptions and loans (O. Velghe). The foregoing results effected in 15 years are remarkable and indicate a great capacity for self-help on the part of Belgian workmen with suitable and well-considered assistance. But this movement, in common with those of a similar character in other countries, does not touch the problem of housing the very poor. No statistics of over- crowding are available, but the average number of persons to a dwelling is over 5 for the whole country and nearly 9 in Brussels. The communal administrations are the authorities for health and housing; they have power to abate nuisances but not to compel landowners to sell land for building, though they have the right to dispossession for " public, purposes." No town has constructed

quarters devoted entirely to working-class dwellings and only _one commune (St Giles) has built any. In towns the height of buildings is regulated by the width of streets; generally it is the width 'plus 6 metres. The height of rooms and thickness of walls are prescribed by local regulations but not the area of rooms. The housing difficulty has been lessened in a notable degree by cheap transport facilities, including railroads, light railroads and tramways ; a large proportion of the workpeople travel long distances to and from work. One- quarter travel on the State railways alone; fares are is. 6d. a week for a daily double journey

of 20 m., 2s. for 44 m. and 2s. 6d. for 66 m. The area of the labour market of Liege extends nearly to Ostend and out of 5830 workmen travelling over 1000 live more than 50 kilometres from Liege. Some journeys last 3 hours.

France. — The question of housing was publicly raised in France quite as early as in England on grounds of public health in con-‘ nexion with the first visitation of cholera, and building societies were formed as early as 1 851, but little was done until after 1889, when the Societe Frangaise des Habitations a Bolt MarcM was fouhded under the inspiration of M. Siegfried. This led to the formation of several societies, which increased rapidly after the passage of la lot Siegfried in 1894, for promoting the provision of working-class dwellings. In 1902 a Public Health Act and in I906 a Housing of the Working Classes Act were passed, and these three enactments with regulations made in 1907 govern the procedure. The act of 1906 embodies the Belgian system of Comites de Patronage, of which at least one was to be established in each department with grants In aid, and ex- emptions from certain taxes of working-class dwellings fulfilling specified conditions as to sanitation and rent. The law promotes the formation of Housing Societies by granting various facilities for, the investment of money in building by public bodies and benevolent institutions by taking shares or by loans. Down to the ettd of 1906 there had been lent for this purpose £233,000 by savings banks, £258,000 by the Caisse des D6p6ts> and £14,060 by charitable in- stitutions. The law does not authorize municipalities to build houses and none of the communes have acquired iand for this pur- pose. Under the Public Health Act of 1902 towns can purchase land compulsortly in Connexion with Unhealthy areas. The Public Health and Housing Acts ate administered by the local authority, which makes regulations for building and for laying out building land. A minimum height of 2-6 metres and a minimum cubical content of 25 cubic metres are prescribed for rooms; there are no regulations for thickness of walls. Housing societies are under the Ministry of Works and a Superior Housing Council, which is a central advisory body. These societies are now numerous; there are 46 in Paris alone, but their operations ate not on a large scale. One of them deserves special notice on account of its special object. It is called the Sociitti de logements pour families nombreuses and it builds special flats called mqisons des enfants which are let at low rents only to persons With large families. In 1907 it had housed 168 families, averaging 6-8 persons, in two blocks at Belleville and Montmartre. The great defect in France is the large quantity of old, bad, insanitary housing. Real slums exist in all the old towns and in some of them, such as Marseilles and Lyons, on an extensive scale. Very little has hitherto been done to grapple with this difficulty. The standard of sanitation is altogether lower in France than in England, as is shown by the

death-rates, and this holds good of the housing. But conditions vary widely in different parts of the country. They are better, generally speaking, in the industrial towns of the north, which are largely Flemish and distinguished by the prevalence of small houses after the English fashion, than in the central or southern districts where tall old tenement houses of six and seven storeys abound. There are no statistics and no standard of overcrowding; but the careful inquiry carried out by the Board of Trade and published in 1909 shows the extraordinary prevalence of tenements consisting of 1 , 2 or 3 rooms. In 16 towns for which information was obtained the average proportion of dwellings containing less than 4_ rooms was 75 % of the whole ; in some it was as high as 89 % and in none lower than 61 %. In 8 towns, including Paris, the number of one- roomed dwellings was more than a quarter of the whole, and in two towns (Brest and Fougeres) it was more than half. Some correspond- ing statistics for English and German towns are given below in the section on Germany. According to the same report, the general accuracy of which has been confirmed by personal inquiries, made in 1909 by the writer in a number of towns, rents are decidedly lower in France. If the London level be taken as 100 that of Paris is only 78 and the other French towns are considerably lower, 21 out of 29 being less than half the London standard. A general com-, parison between a number of English and French towns shows the average level of French rents to be less than three-fourths of English ones. A noticeable feature of housing in France is the large number cf dwellings built by employers in recent years. The mining com- panies, particularly in the Pas de Calais, have built whole groups of villages; the railway companies and various manufacturers have also done a great deal, chiefly in rural areas. Among the manu- facturers MM. Schneider at Le Creusot and the textile mill-owners in the Vosges are noticeable. The houses provided are of a charming type, white with red roofs; the rooms are of good size, the rents low, and a large garden is usually attached to every house.

Germany.— In no country is the problem of housing more acute

than in Germany, where the increase of population, the growth of manufacturing industry and the urbanization of the people have proceeded at an exceptionally rapid pace in recent years and have combined with increasing wealth and a rising standard of living to force the question into prominence. Up to 1909 no uniform legisla- tion for the empire had been framed and no central authority existed for dealing with housing; but the several states have their own public health and housing laws, and great activity has been developed in various directions. The most general

difficulty is deficiency of quantity consequent on the rapid change in the dis- tribution of the population. The proportion of the whole population living in the great towns increased from 7-2% to 16-2%, or more than doubled between 1890 and 1900; in England it only increased by about one-tenth. Slums are a much less conspicuous feature than in England because of the comparatively recent development of German towns, but where old quarters exist on a large scale, as in Hamburg, the conditions are quite as bad as anything in English towns, and call for similar measures. Public sanitation in Germany is still as a whole less advanced than in England ; but in some cases it is superior and in general it is coming up rapidly; the administration of sanitary laws, as of others, is more effective and uniform, and less subject to evasion. This also contributes to the comparative absence of slums. And there is a third factor which has perhaps the greatest influence of all, and that is the superior manner in which German homes are kept. But the pressure of inadequate quantity is urgent; it has caused high rents, over- crowding, and the development of large barrack or block dwellings which are becoming the prevailing type. At the same time it has led to many and varied efforts to meet the difficulty. Isolated attempts go back to an early date. For instance a building society was formed in Berlin in 1849, Alfred Krupp began to build his " colonies " at Essen in 1863, Barmen started a society in 1871 and there were other cases; but general attention seems first to have been drawn to the subject by the reforming efforts of Pastor Bodel- schwingh at Bielefeld about 1884 in connexion with his Arbeiterheim. In short housing reform in Germany is really a matter of the last 20 years. The first efficient by-laws for regulating building in Berlin were not adopted till 1887; the previous regulations dating from 1853 permitted many abuses and under them a great deal of bad housing was constructed, especially after the establishment of the empire and the beginning of the great development of the capital.

The worst feature is the general prevalence of dwellings con- taining a very small number of rooms — from I to 3 — and consequent overcrowding. The following figures are extracted from the Report to the Board of Trade on Rents, Housing, &c, in Germany (1908, Cd. 4032). They indicate the proportion of dwellings containing 1 . 2 or 3 rooms, or (in a few cases) the proportion of the population living in such dwellings. The towns are those for which the in- formation is given. They are not selected as particularly bad specimens but as representative, and they include most of the capitals and chief industrial centres. The figures relate to the year 19W, except in a few cases, in which they are taken from a municipal house census in 1905.

Percentage of Dwellings or Population living in Dwellings containing

Total under

Town.

1 Room.

2 Rooms.

3 Rooms.

4 Rooms.

Berlin

8-o

37-2

30-6

75-8

Aachen

13-7

32-0

21-9

67-6

Barmen (pop.)

1-5

24-3

28-8

54-6

Biemen

3-8(?)

26-8

26- 1

56-7 (?)

Breslau (pop.)

3-9

46-0

24-4

74-3

Chemnitz (pop.)

'•7

34-8

29-9

66-4

Dantzig .

3-3

45-o

29-9

78-2

Dortmund

4-7

45-5

30-0

80-2

Dresden .

o-8

3-5

27-8

32-1

Dtisseldorf

5-0

26-4

22-7

54-1

Klberfeld

8-4(?)

36-9

21-7

67-0 (?)

Essen

29

35-4

30-0

68-3

Hamburg.

J-O

3‘9

24-7

29-6

\ *Konigshutte(pop.)*

IO-0

60-4

16-8

87-2

Leipzig (pop.)

0-4

i-7

14-5

16-6

Mannheim

31

22-1

40-4

65-6

1 Munich (pop.)

4-6

2 4 -I

28-4

57-1

Plauen (pop.)

i-3

14-2

21-8

36-3

percentages for working-class quarters are — I room 21-0, 2 rooms 51-8, 3 rooms26-9; total under 4 rooms 98-7. Konigshutte, the chief coal and iron centre in Silesia and a purely working-class town, shows the same state of things; 60% of the whole population live in dwellings of 2 rooms and 87% in less than four. It is interesting to compare English towns. The proportion of dwellings containing less than 4 rooms in London was (1901) 52-2%, in Berlin 75-8%; the proportion of the population living in such dwellings was — London 38-7%, Berlin 71-5%. Not only is the proportion of small dwellings very much higher in Berlin but the proportion of the population living in them shows a far greater discrepancy. This indicates a much higher degree of overcrowding. The only point in which Berlin has the advantage is the smaller number of single- room dwellings. The proportions are London 14-7%, Berlin 8-0%. But it is to be observed that overcrowding is not so common in I -room dwellings, which are often occupied by a single person, as in those with 2 or 3 rooms, which are occupied by families, though probably the most extreme cases of overcrowding occur in particular 1 -room dwellings. In the English county boroughs the proportion of dwellings with less than 4 rooms was 24-0 , in other urban districts I7‘4, and in all urban areas including London 26-4. When all allowance is made for minor errors and discrepancies it may be broadly concluded that the proportion of small dwellings containing less than 4 rooms is at least twice as great in German as in English towns, and that the conditions as to accommodation which in England prevail only in London are general in urban Germany. As a set-off German rooms are

generally larger than English ones and in block dwellings there is often a little ante-room or landing which does not count but really increases the space.

The German census does not take cognisance of overcrowding and there is no general official standard ; but some towns have adopted a standard of their own, namely, six or more persons to 1 room and ten or more to 2 rooms. In Breslau, which is one of the worst towns, 17-5% of the population (53,000) of the "city" or inner ring were overcrowded on this basis in 1900. In Barmen, which is not one of the worst, 20 % of the 2-roomed and 17 % of the 3-roomed dwellings (together housing more than half the population) were overcrowded according to the English standard. Overcrowding and other bad conditions are worst in the basement or cellar dwell- ings, of which some towns have a very large number. In Breslau 15,000 persons were living in 3853 such dwellings in 1900; in Berlin 91,426 persons were living in 24,088 basements. Some of these are free from objection, but 11,147, housing 38,663 persons, were situated in back buildings and unfit for habitation on account of darkness, damp, dilapidation and the like. " Back " houses are a feature of old towns; they are houses which do not give on the street but lie behind and are approached by a passage ; they are what we call courts and quite as insanitary as anything of the kind in English towns.

With regard to rents the Board of Trade (London) Report gives the following figures for Berlin and a number of other towns: —

The figures must be read with a certain amount of caution, as they are not in every case compiled on a precisely uniform method with regard to inclusion of kitchens and attics. For this reason the position of Bremen and Elberfeld is probably more unfavourable than it ought to be. But broadly the table shows that in most of the large towns in Germany more than "half, and in some cases more than three-quarters of the dwellings have less than 4 rooms. Leipzig is the most striking exception. If working-class quarters alone are taken it is found that dwellings of more than 3 rooms are so few as to be negligible. In Stuttgart, where housing is very dear, the

No. of Rooms per Dwelling.

Predominant Range of Weekly Rents.

Berlin.

Other Towns.

2 rooms .

3 rooms .

4 rooms .

5/-to6/- 7/- to 9/3

2/8 to 3/6 3/6 to 4/9 4/3 to 6/-

Rents are higher in Berlin than in any other town, though Stuttgart comes very near it. The following table of index numbers shows the relations of 32 towns to Berlin : —

Town.

Index

Number.

Town.

Index Number.

Berlin ….

100

Nuremberg

53

Stuttgart

97

Aachen

53

Dtisseldorf .

79

Crefeld. . . .

52

Dortmund .

68

Bremen

52

Anchaffenburg

67

Plauen

52

Hamburg

66

Leipzig

51

Mannheim .

64

Dantzig . .

49 –

Konigsberg

62

Mtilhausen

48

Munich ….

63

Konigshtitte .

47

Essen . . ...

62

Stettin

46

Solingen

61

Magdeburg

43

Bochum

57

Chemnitz .

40

Elberfeld . . .

57

Zwickau

38

Barmen

57

Brunswick

37

Remscheid .

56

Stassfurt

33

Breslau

56

Oschersleben .

28

Dresden . .

54

Comparing rents in Germany and England, the Board of Trade Report gives the following table, to which the corresponding ratio of French towns lias been added.

8a6

HQU&INQ

-■ ■ ■ — ■ ~ — No. of Rooms.

Predominant Weekly Rents.

Ratio of

German to

English (loo)

Ratio, of

French to

English (ioo)

England.

Germany.

2 rooms

3 rooms

4 rooms . . .

3/- to 3/6 3/9 to 4/6 4/6 to 5/6

2/8 to 3/6 3/6 to 4/9

4/3 to 6/-

95

100 102

79 86 78

If the mean of the English and German figures be taken it shows a very slight difference in favour of Germany ; the mean weekly rent per room being is. 5d. in England and is. 4Jd. in Germany. But in England rent usually includes local taxation (rates) whereas in Germany it does not ; if this be added German rents are to English as 123 to 100, or nearly one-fourth more.

The statistics given above indicate a wide range of variation in the conditions prevailing in different towns in Germany; and that holds good with regard to improvements. The administration of the laws relating to public health and housing is in the hands of the local authorities. The public health service is generally efficient and sometimes very good. Increasing attention has been paid in recent years to the sanitary inspection of houses and in some towns it is now thorough and systematic, but active efforts to deal with old and insanitary quarters en masse are isolated and exceptional. Hamburg is an instance; scared by the visitation of cholera in 1892 the authorities put in hand an extensive improvement scheme on the English plan at a cost of half a million sterling. But demolition is exceptional ; slums are usually subjected to supervision and are not allowed to be in a state of dilapidation, and sometimes, as at Mannheim, notices are served to abate overcrowding. In Munich a policy of gradually buying up insanitary houses has been adopted. But improvement has principally been promoted by new building and the reduction of the population in old insanitary quarters, to which cheap locomotive facilities have greatly contributed. The great bulk of urban Germany is new, and the most valuable con- tribution made by it to the housing question is the more effective control of new building and particularly the principle of town-planning, coupled with the purchase of neighbouring ground with a view to future extension. This policy is comparatively recent and still very partially applied, but it is now rapidly extending, A

feneral act providing for the planning of streets was passed in 'russia in 1875 and still forms the basis of building legislation; but as noted above no effective by-laws were adopted even in Berlin until after 1887, and consequently a very faulty style of building was adopted, especially in large blocks which conceal grave defects behind an imposing exterior. The Saxon towns have been con- spicuously successful in regard to housing. Leipzig

stands alone among German towns in having 83-4 % of its population living in dwellings of 4 rooms and upwards. Yet it is a great commercial city, the fifth in the empire, with a population of upwards of half a million. It also comes low on the rent table, having an index number little more than half that of Berlin. All the Saxon towns are low, Chemnitz and Zwickau particularly so, and the position of Dresden, being a capital, is remarkable. More than two-thirds of the popula- tion live in dwellings of 4 rooms or more, and the rent index number is only 54. In Saxony a general Building Act, especially providing for town planning, was passed in 1900; and the Grand Duchy of Hesse, which alone among the German states has a government Housing Department, adopted a Housing of the Working Classes Act in 1902. Other states have followed or are following and the air is full of movement. The distinctive features of urban housing reform in Germany are (1) the systematic planning of extensions, (2) purchase of ground by municipalities, (3) letting or sale of muni- cipal land for building under prescribed conditions. Many of the freat towns, including Berlin, Munich, Dresden, Leipzig, Cologne, rankfort and Diisseldorf, are owners of land to a variable but sometimes large extent. This policy seems to have been originally adopted on economic grounds and those municipalities which bought or otherwise came into possession of town land at an early date derive a substantial revenue from it now, besides being in a position to promote housing improvement. There is comparatively little municipal building, and that as a rule only or principally for muni- cipal servants, as at Diisseldorf, Mannheim and Nuremberg; but there seems to be a tendency to venture further in this direction and some towns have built houses for letting. The municipalities generally sell or let their land, and the building agencies which enjoy most official favour are the societies " of public utility "; they are encouraged in every way and have greatly developed, particularly in the Rhine province. Some are co-operative, others semi-philan- thropic in that they aim at building good houses and limit their profits. In 1901 the Prussian Government issued an order urging municipalities to support these societies by remitting the cost of constructing streets and sewers, placing the assistance of building officials at their disposal, taking their shares, lending them money and becoming security for them. A great deal of public money has been advanced to building societies, and one very important source of supply has been developed, since the Old Age and In- firmity Insurance Act of 1889, in the National Insurance Funds which invest their surplus capital in this way. Down to 1906 the Boards of Insurance had lent £8,650,000 to societies for building;

the Imperial Government had lent £,1,250,000, the Prussian Government £1 ,825,000, and the other states further large sums in addition to the municipalities, Money lent by the state is usually limited to build- ing

houses for state employees and Insurance Boards lend on condition that the houses are let to persons who come under the insurance laws. The development of building societies has been promoted by the formation of general building associations of which the earliest was established in Diisseldorf in 1897 for the Rhine provinces; under its influence one-fifth of the new housing provided in 1901 was erected by the societies. The example was followed at Frankfort, Miinster and Wiesba,den. Housing by employers has also been carried out on a large scale in Germany. States and municipalities have to some extent built houses as employers, the former chiefly for railwaymen, besides lending money to societies for the purpose; but most housing of this kind has been done by private, employers. Krupps, who had built 4274 dwellings housing nearly 27,000 persons down to 1901, are the most famous example; but, they are only one among many. In Rhineland and Westphalia employers had in 1902 provided 22,269 houses containing 62,539 dwellings at a cost of £10,500,000 ; more than half the families so housed belonged to the mining industry, the rest to various manu- factures. These two provinces, in which industrial development has been extremely rapid, are exceptional ; but housing by em- ployers is not confined to them. At Mannheim for instance over 1000 working-class households have been so provided. At Nurem- berg the Siemens Schuckert Company have encouraged an.interesting system of collective building among their employees, by which 722 dwellings have been provided.

Holland. — In 1901 a Public Health and a Housing Act were passed, and these two embody most of the features of housing reform adopted in other countries. The first provides for a general sanitary service under the Ministry of the Interior. The second ordains that local authorities shall frame by-laws for building and for the main- tenance and proper use of dwellings ; that they shall inspect existing dwellings, order improvements or repairs or demolition; empowers them to take land compulsorily for the purposes of the act, to prohibit building or rebuilding on sites reserved for public purposes and to make grants or loans to societies or companies operating exclusively for the improvement of working-class dwellings. If they fail to make by-laws the provincial authorities may take action. Land buying with a view to extensions has been adopted by a number of municipalities including Amsterdam, Rotterdam, Utrecht and other important towns, and the practice is increasing. Amsterdam has also begun the systematic planning of extensions. There has been a little municipal building in some small places, but it is on an insignificant scale ; the tendency is rather to favour societies of public utility as in France, Germany and Belgium. The new laws are too recent to have had much effect and housing reform is as yet in an early stage. Rents are high in the large towns, namely, I room is. 8d. to 3s.; 2 rooms 2s. 6d. to 5s.; 3 rooms

3s. 6d. to 6s; 4 rooms 4s. 2d. to 7s.

Italy. — A Housing of the Working Classes Act was passed in 1903, to promote the improvement and provision of workmen's dwellings. Municipalities have the power to purchase land com- pulsorily for housing purposes and also to build workmen's dwellings. A few towns, of which Milan is one, have done so. There are building regulations relating to the area and height of rooms and the thickness of walls. The antiquity of the Italian towns and the great quantity of old and insanitary building make housing improvement a very difficult matter. La Societa Umanitaria, a benevolent trust founded by Prosper Loria of Milan in 1902, has taken up this subject among others and has built two model tenements, housing 2000 persons.

United States.— Interest in the housing question in the United States is confined to a few of the largest cities and can only be said to be acute in New York, though there have been investigations by commissions elsewhere and Miss Octavia Hill's work in London has found admirers and imitators in Philadelphia and Boston as well as in New York. The evils of housing in New York have been the subject of much sensational writing which has elevated them to the position of a world-wide scandal. It is not necessary to accept all the allegations made in order to see that several circumstances have combined to produce an exceptional state of things in this great city. The limited spaceˆthe island or peninsula of Manhattan — in which central New York is built has compelled the erection of large tene- ment blocks, otherwise rare in American towns ; the incessant inrush: of immigrants from the poorest parts of Europe has filled these tenements with immense numbers of persons of many nationalities accustomed to a low standard of living; the generally backward state of public sanitation in America, and the absence or evasion of regulations and supervision, have permitted the erection of bad dwellings, their deterioration into worse, and their misuse by ex- cessive overcrowding. Other large cities in'which bad housing con- ditions are known to exist are Chicago, Philadelphia, Boston, Balti- more, Cincinnati, Pittsburg, Jersey City. There are doubtless many others, but bad housing conditions are not so general in the United States as in Europe. Outside the very large cities there is more space, more light and air, less crowding together, less darkness, dirt and dilapidation. Large housas, oocupied by two or perhaps three

families, are common, but they have'more room space than is usual in Europe. The 18th annual report (1903) of the Commissioner of Labour

gives the result of a special inquiry embracing 23,447 families distributed in 33 states. The average number of rooms was 4-95 per family and 1-04 per individual. It is a fair inference that overcrowding is confined to a comparatively small number of exceptional places. A large number of the schedules were furnished by the eminently urbanized and manufacturing states of New York, Pennsylvania, Massachusetts, Ohio and Illinois; and in all these the average number of rooms to a family exceeded 4, ranging from 4-2 in Ohio to 5-5 in Massachusetts. The condition of homes as to sanitation and cleanliness was statistically stated thus : Sanitary condition — good 61-46 %, fair 32-59 %, bad 5-95 %; Cleanliness — good 79-63 , fair 14-66 _, bad 5-71 %. Other special inquiries have been carried out in particular towns. In 1891-1892 the tenements in Boston were investigated for the Massachusetts Labour Bureau, which found 3657 sleeping rooms without outside windows and about 8 % of the population living in conditions objectionable from one cause or another. In 1892 Congress authorized a special inquiry into the slum population of New York, Chicago, Philadelphia and Baltimore, the results of which were published in the seventh special report (1894) of the United States Commissioner of Labour. It was estimated that the total " slum population " (presumably those living in unhealthy con- ditions) was — New York 360,000, Chicago 162,000, Philadelphia 35,000, Baltimore 25,000. In Baltimore 530 families, consisting of 1648 persons, were living in single rooms with an average of 3-15 persons to a room; in Philadelphia 401 families were so living with an average of 3-11 persons to a room. The proportion of i-room dwellings was less in New York and Chicago. In New York 44ˆ55 % or nearly half the families investigated were found living in 2-roomed dwellings, in Baltimore 27-88 %, in Philadelphia 19-41 % and in Chicago 19-14 %. These figures conclusively prove that European conditions reproduce themselves in American cities. Poverty was not the cause, as the average earnings per family ranged from £3, 4s. a week in Baltimore to £4, 6s. a week in Chicago. Another official investigation in New York was carried out in 1895 by the Tenement House Commission appointed by the State of New York. It reported " many houses in the city in an insanitary con- dition which absolutely unfits them for habitation." Further details have been compiled from the census by the New York Federation of Churches, chiefly relating to density of population in the city. In 1900, out of a total of nearly 250,000 dwellings, 95,433 (38-2 %) contained from 2 to 6 persons, 60,672 (24-2 %) from 7 to 10 persons and 89,654 (35-9 %) 11 persons or more. The density of population for the whole city as now constituted was 19 persons to the acre, in Manhattan 149; in the south-eastern district of Manhattan 382 and in one ward 735. Between 1900 and 1905 the density increased in every district, and in the latter year there were 1 2 blocks with from 1000 to 1400 persons to the acre. The number of persons to the acre in London (1901) is 6o-6; in the most

densely populated borough 1 82, and in the most densely populated district (a very small one) 396. This will give a measure of comparison. The large tenement blocks in New York have been constructed with far less regard to health than those in Berlin, and reproduce in an aggravated form the same evil of insufficient light and air. In place of the inadequate courts round which many are built in Berlin, the New York tenements have merely narrow air shafts. In 1904 there were reported to be 362,000 dark interior rooms, that is with no outside windows.

If American cities have nothing to learn from other countries in regard to bad housing, they have nothing to teach in the way of reform. They are following Europe slowly and a long distance behind. There is no serious attempt to deal with insanitary areas as they have been dealt with in England, or to prevent the creation of new ones by regulation and planning of extensions as in Germany, or to promote the provision of superior houses by organized public effort as in several countries. A little has been done in New York to improve the worst housing. A Tenement House Act was passed after the report of the Commission of 1 895 and a Department formed to give effect to it. Some cleansing and repairing and insertion of windows is carried out every year, but more attention seems to be paid to fire escapes. Societies for providing improved dwellings exist in New York, Boston, Chicago and Philadelphia. The oldest is one formed in Boston in 1871, called the Co-operative Building Company; it was followed in 1876 by an Improved Dwellings Company in Brooklyn, and in 1879 by a similar society in Manhattan, and in 1885 by another in Boston. The largest concern of the kind is the City and Suburban Houses Company in New York, formed in 1896 under the guidance of Dr E. R. L. Gould; it has built four groups of tenements housing 1238 families in the city and 112 houses on a suburban estate at Brooklyn ; in all it has housed some 6000 persons. More recently Mr Henry Phipps has given £200,000 for the provision of model dwellings in New York, and a building has been erected on the plan of the Maison des Enfants in Paris. In Chicago the City Houses Association works at housing reforms in various ways. There are some other institutions of a like kind, but the aggregate results are inconsiderable. Two other building agencies have'done far more in the United States than philanthropic societies; these are the building and loan associations and private

employers. The former are co-operative provident societies ; they are widely diffused throughout the United States and their operations are on a very large scale. They date from 1831, when the Oxford Provident Building Association was formed at Frankfort, near Philadelphia. Pennsylvania has still the largest number of associa- tions, but from 1843 onwards the movement spread rapidly and continuously in other states. The high-water mark appears to have been reached in 1897, when the total assets of the

associations amounted to about £133,000,000. In 1905 there were 5326 associa- tions with an aggregate membership of 1,686,611 and assets of about £130,000,000. The states of Pennsylvania and Ohio head the list, but the movement is very strong in many others. It accounts for the comparatively large number of houses owned by working- class families in the United States. With regard to housing by employers, no comprehensive information is available, but the total amount is certainly considerable though probably not so large as in Germany or in Fiance. Some of the better-known instances are the Pelzer Manufacturing Company at Pelzer in South Carolina, which has built about 1000 dwellings; the Maryland Steel Company at Sparrows Point, Maryland, 800 dwellings; Ludlow Manufacturing Associates at Ludlow, Mass., 500 dwellings; Whitin Machine Works at Whitinsville, Mass., 600 dwellings; Westinghouse Air Brake Co. at Wilmerding, Penn., 360 dwellings; Draper Co., Hope- dale, Mass., 250 dwellings. These are all more or less " model " settlements, not in cities, but in outlying or country places, where works have been established, and that is generally true of housing by employers in the United States, whereas in Germany much has been provided by them in the large towns. Rents are very much higher in American cities than in European towns of comparable size and character.

Authorities. — Board of Trade Reports — " Cost of Living of the Working Classes (England) " (1908) ; " Cost of Living in German Towns " (1908); " Cost of Living in French Towns" (1909). Pro- ceedings of International Housing Congress (London, 1907).; The New Encyclopaedia of Social Reform ; E. R. Dewsnup, The Housing Problem in England; T. C. Horsfall, The Example of Germany; J. S. Nettlefold, Practical Housing Reform; A. Shadwell, Industrial Efficiency, ch. xi. on "Housing"; W. Thompson, The Housing Handbook, Housing up to Date. (A. Sl.)

HOUSMAN, LAURENCE (1867-), English writer and artist, was Lorn on the 18th of June 1867. Having studied at South Kensington, he first made a reputation as a book- illustrator. Some of his best pictorial work may be seen in the editions of Meredith's Jump to Glory Jane (1892), the Weird Tales of Jonas Lie (1892), Jane Barlow's Land of Elfintoun (1894), Christina Rossetti's Goblin Market (1893), Werewolf (1896), by his sister, Miss Clemence Housman, Shelley's Sensitive Plant (1898), and his own Farm in Fairyland (1894). His designs were engraved on wood by Miss Housman. His volumes of verse include Green Arras (1896), Rue (1899), Spikenard (1898) and Mendicant Rhymes (1906); and the mysticism which characterizes the devotional poems in Spikenard recurs in his half-allegorical tales, All Fellows (1896), The Blue Moon (1904) and The Cloak of Friendship (1906). His nativity play, Bethlehem, was presented in the Great Hall of London University at South Kensington for a week in December 1902. In 1900 he published anonymously An Englishwoman's

Love Letters, which created a temporary sensation; and he followed this essay in popular fiction by the novels A Modern Antaeus (1901) and Sabrina Warham (1904). On the 23rd of December 1904 his fantastic play Prunella, written in collaboration with Mr Granville Barker, was produced at the Court Theatre.

His brother, Alfred Edward Housman (b. 1859), an accom- plished scholar, professor of Latin at University College, London, is known as a poet by his striking lyrical series, A Shropshire Lad (1896).

HOUSSAYE, ARSENE (1815-1896), French novelist, poet and man of letters, was born at Bruyeres (Aisne), near LaoA, on the 28th of March 1815. His real surname was Housset. In 1832 he found his way to Paris, and in 1836 he published two novels, La Couronne de bluets and La Picheresse. He had many friends in Paris, among them Jules Janin and Theophile ' Gautier, and he wrote in collaboration with Jules Sandeau. He produced art criticism in L'Histoire de la peinture ftamande et hollandaise (1846); semi-historical sketches in Mile de la V oilier e et Mme de Montespan (i860) and Galerie de portraits du XVII" Steele (1844); literary criticism in Le Rot Voltaire (1858) and his famous satirical Histoire du quarante et uniime fauteuil de I'acadimie francaise (1855); drama in his Comediennes (1857); poetry in his Symphonic des vingt ans (1867), Cent et un sonneti

(1873), &c; and novels, Les Filles d' &ve (1852) and many others. In 1849, through the influence of Rachel, he was entrusted with the administration of the Theatre Francais, a position he filled with unfailing tact and success until 1859, when he was made inspector-general of works of art. He died on the 26th of February 1896.

His Confessions, souvenir; d'un demi-siecle appeared in 1885- 1891. See also J. Lemaitre, Arsene Houssaye (1897), with a biblio- graphy.

His son, Henry Hou&saye (1848-), the historian, was born in Paris. His early writings were devoted to classical antiquity, studied not only in books but on the actual Greek sites which he visited in 1868. He published successively Histoire d'Apelles (1867), a study on Greek art; L'ArmSe dans la Grece antique (1867); Histoire d'Alcibiade et de la republique athenicnne depuis la mort de PSricles jusqu'd I'avenement des trente tyrans (1873); Papers on Le N ombre des citoyens d'Alhenes au V' me siecle avant Fere chretienne (1882); La Loi agraire a Sparte (1884); Le Premier

Siege de Paris en 52 av. J.-C. (1876); and two volumes of miscellanies, Athenes, Rome, Paris, Vhisioire et les moeurs (1879), and Aspasie, Cleopatre, Theodora (6th ed. 1889). The military history of Napoleon I. then attracted him. His first volume on this subject, called 1814 (1888), went through no fewer than forty-six editions. It was followed by 1815, the first part of which comprises the first Restoration, the return from Elba and the Hundred Days (1893); the second part, Waterloo (1899); and the third part, the second abdication and the White Terror (1905). He was elected a member of the French Academy in 1895.

HOUSTON, SAM, or Samuel (1793-1863), American general and statesman, of Scotch-Irish descent, was born near Lexington, Virginia, on the 2nd of March 1793. His father, who had fought in the War of Independence, died in 1806, and soon afterward Samuel removed with his mother to the frontier in Blount county, Tennessee. When he was about fifteen his elder brothers obtained for him a place as clerk in a trader's store, but he ran away and lived with the Cherokee Indians of East Tennessee for nearly three years. On his return he opened a country school, and later attended a session or two of the Academy at Maryville. During theWarof 1812 he served under Andrew Jackson against the Creek Indians, and his bravery at the battle of Tohopeka, in which he was disabled by several wounds, won promotion to a lieutenancy. In 1817 he was appointed sub-agent in managing the business relating to the removal of the Cherokees from East Tennessee to a reservation in what is now Arkansas, but he was offended at a rebuke from John C. Calhoun, then secretary of war, for appearing before him in Indian garments, as well as at an inquiry into charges affecting his official integrity, and he resigned in 1818. He entered a law office in Nashville, and was admitted to the bar, and was soon elected a district attorney. From 1823 to 1827 Houston represented the ninth district of Tennessee in Congress, and in 1827 was elected governor of the state by the Jackson Democrats. He married Eliza Allen in January 1829; his wife left him three months later, and he resigned his office of governor, again t,ook up his residence among the Cherokees, who were at this time about to remove to Indian Territory, and was formally adopted a member of their nation.

In 1830 and again in 1832 he visited Washington to expose the frauds practised upon the Cherokees by government agents, and attracted national attention by an encounter on the 13th of April 1832 with William Stanberry, a Congressman from Ohio, who intimated that Houston himself was seeking to defraud them. Commissioned by President Jackson, Houston went to Texas in December 1832 to negotiate treaties with the Indian tribes there for the protection of American traders on the border. He decided to remain in Texas, and was. elected a delegate to the constitutional convention which met at San Felipe on the 1st of April 1833 to draw up a

memorial to the Mexican Congress asking for the separation of Texas from Coahuila, in which the anti-American party was in control, as well as to frame a con- stitution for the commonwealth as a new member of the Mexican

Republic, and he served as chairman of the drafting committee, and took a prominent part in the preparations for war when next year the petition was refused. In October 1835, soon after the outbreak of the War for Texan Independence, the committees of the township of Nacogdoches chose Houston as commander- in-chief of the forces in eastern Texas, and after the San Felipe convention in November he was chosen commander-in-chiei of the Texan army. On the 21st of April 1836, while in com- mand of 743 raw troops, he met on the bank of the San Jacinto about 1600 Mexican veterans led by Santa Anna and completely routed them; on the next day Santa Anna was taken prisoner.

Texan independence was won by this victory (although the Mex- ican government repudiated t he treaty negotiated by Santa Anna) , and Houston was elected president of Texas (1st of September") and was inaugurated on the 22nd of October. His term expired in December 1838; he was elected again in 1841 and served until 1844. During his first term a newly founded city was named in his honour and this was the seat of government in 1837-39 and in 1842-45. Texas having been admitted as a state of the American Union in 1845, Houston was elected one of its first two United States senators. He served as a stalwart Union Democrat from March 1846 until 1859; he opposed the Kansas-Nebraska bill in an able speech (3rd March 1854), and spoke frequently in defence of the rights of the Indians. In 1859 he was elected governor of Texas and tried to prevent the secession of his state; upon his refusal, in March 1861, to swear allegiance to "the Confederacy he was declared deposed. He died at Huntsville, Texas, on the 26th of July 1863. Houston was an able soldier, wary, intrepid and resolute; and was a legislator of rare fore- sight, cool discrimination and fearless candour.

See A. M. Williams, Sam Houston and the War of Independence in Texas (Boston, 1893); Henry Bruce, Life of General Houston (New York, 1891); and W. C. Crane, Life and Select Literary Re- mains of Sam Houston (Philadelphia, 1884).

HOUSTON, a city and the county-seat of Harris county, Texas, U.S.A., at the head of deep-sea navigation on Buffalo Bayou, a tributary of Galveston Bay, 50 m. N.W. of Galveston, and about 325 m. W. of New Orleans. Pop. (1880) 16,513; (1890) 2 7>557; (1900) 44,633, of whom 4415 were foreign-born and 14,608 were negroes; (1910 census) 78,800. The land area in 1906 was 16-02 sq. m.; in 1908, about 20 sq. m. It is served by

the Galveston, Harrisburg & San Antonio (Southern Pacific), the Galveston, Houston & Henderson, the Gulf, Colorado & Santa Fe, the Houston & Texas Central (Southern Pacific), the Houston, East & West Texas, the International & Great Northern, the Missouri, Kansas & Texas, the San Antonio & Aransas Pass, the Trinity & Brazos Valley, the St Louis, Browns- ville & Mexico, the Texas & New Orleans, and the Houston Belt & Terminal railways, several of which have their headquarters at Houston. The Federal government has greatly improved the natural channel from the city to the Gulf of Mexico, straighten- ing, widening and deepening it to a depth of 25 ft. for the entire distance from the Galveston jetties to the Houston turning basin — where the municipality has constructed free municipal wharves. The city occupies an unusually fine site on both sides of the Buffalo Bayou. Among the principal buildings are a Carnegie library, the Houston Lyceum, the Federal building, the Masonic temple, the city high school, the city hall and market house, the Harris County Court House, the Cotton Exchange, and the First and Commercial National banks. Houston is the seat of the Texas Dental College, of St Thomas College (1903), and of the Houston, Annunciation and St Agnes academies; and the will (1901) of William Marsh Rice provided an endowment (valued in 1908 at about $7,000,000) for the William M. Rice Institute for the Advancement of Literature, Science and Art, of which Dr Edgar Odell Lovett, formerly professor of mathematics (1900- 1905) and of astronomy (1905- 1908) in Princeton University, was made president in 1908. The city is the most important railway and shipping centre of South Texas, and has a large trade in cotton (the receipts for the year ending Aug. 31, 1907 being 2,967,535 bales), cotton-seed

oil, sugar, rice, 1 lumber and citrus fruits. Houston is important also as a manufacturing centre, its factory product being valued at $13,564,010 in 1905, an increase of 81% over the factory product in 1900. There are extensive railway car-shops, cotton- seed oil, petroleum and sugar refineries, cotton gins and com- presses, steel rolling mills, car-wheel factories, boiler, pump and engine works, flour mills, rice mills and a rice elevator, breweries, planing and saw-mills, pencil factories, and brick and tile factories. Its proximity to the Texas oil fields gives the city a cheap factory fuel. The assessed valuation of taxable property in the city increased from $27,480,898 in 1900 to $51,513,615 in 1908. The No-Tsu Oh Carnival week each November is a distinctive feature of the city. Houston, like Galveston, adopted in 1905 a very successful system of municipal government by commission, a commission of five (one of whom acts as mayor) being elected biennially and having both executive and

legislative powers. The waterworks are owned and operated by the municipality, which greatly improved them from the city's surplus under the first two years of government by commission. In 1908 extensive improvements in paving, drainage and sewerage were under- taken by the city. The payment of an annual poll-tax of $2-50 is a prerequisite to voting. Houston was settled and laid out in 1836, and was named in honour of General Sam Houston, whose home in Caroline Street was standing in 1908. In 1837-1839 and in 1842-1845 Houston was the capital of the Republic of Texas. About 15 m. E.S.E. of the city is the battleground of San Jacinto, which was bought by the state in 1906 for a public memorial park.

HOUWALD, CHRISTOPH ERNST, Freiherr von (1778- 1845), German dramatist and author, was born at Straupitz in Lower Lusatia, a son of the president of the district court of justice, on the 28th of November 1778. He studied law at the university of Halle, and on completion of his academic studies returned home, married, and managed the family estates. In 1S16 he afforded a home to his friend K. W. S. Contessa (1777- 1825), himself a poet, who had met with serious reverses of fortune; Contessa lived with Houwald, assisting and stimulating him in his literary work, for eight years. In 1821 Houwald was unanimously elected syndic for Lower Lusatia, an office which placed him at the head of the administration of the province. He died at Neuhaus, near Liibben, on the 28th of January 1845. Houwald is remembered as the author of several so-called " Fate tragedies " (see German Literature), of which the best known are Das Bild, Der Leuchtttcrm, Die Heimkehr, Fluch und Segen (all published in 1821). They have, however, small literary value, and Houwald is seen to better advantage in his narratives and books for juvenile readers, such as Romantische Akkorde (publ. by W. Contessa, Berlin, 1817); Buck fiir Kinder gebildeter Stande (1819-1824); and Jakob Thau, der Ilofnarr (1821). Houwald's collected works, Siimtliche Werke, were published in five volumes (Leipzig, 1851 ; 2nd ed., 1858-1859). See J. Minor, Die Schicksalstragodie in ihren Hauplvertretern (Frankfurt, 1883), and Das Schicksalsdrama in Kiirschner's Deutsche Nationalliteratur , vol. cli. (Stuttgart, 1884) ; (). Schmidtborn, C. E von Houwald als Dramatiker (1909).

HOVA, the name originally applied to the middle-class Malayo- Indonesian natives of Madagascar (q.v.), as distinct from the noble class Andriana and the slave class Andevo. Hdva has now come to mean the most numerous and powerful of the tribes which form the native population of Madagascar. The Hova, who occupy the province of Imerina, the central plateau of the island, are of Malayo-Indonesian origin. The period at which the Hova arrived in Madagascar is still a subject of dispute. Some think that the immigration took place in very early times, before Hinduism

reached the Malay Archipelago, since no trace of Sanskrit is found in Malagasy. Others believe that the Hova did not reach the island until the 12th or 13th century. At the French conquest of Madagascar (1895). the Hova were the most powerful and, politically, the dominant people; but were far from having subjected the whole of the island to their rule. The Hova are short and slim, with a complexion of a yellowish olive, many being fairer than the average of southern Europeans. Their hair is long, black and smooth but coarse. Their heads

1 Much rice is cultivated in the vicinity of Houston by Japanese farmers.

are round, with flat straight foreheads, flat faces, prominent cheekbones, small straight noses, fairly wide nostrils, and small black and slightly oblique eyes. The physical contrast to the negro is usually very obvious, but, especially among the lower classes, there is a tendency to thick lips, kinky hair and dark skin. In many of their customs, such as taboo, infanticide, marriage and funeral rites, they show their Indonesian origin. Most of them now profess Christianity.

HOVE, a municipal borough of Sussex, England, adjoining the watering-place of Brighton on the west, on the London, Brighton, & South Coast railway. Pop. (1901) 36,535. The great sea- wall of Brighton continues along the front at Hove, forming a pleasant promenade. Here is the Sussex county cricket ground. The municipal borough, incorporated in 1898, includes the parishes of Hove and Aldrington, of which the first is within the parliamentary borough of Brighton, but the second is in the Lewes division of the county. The corporation consists of a mayor, 10 aldermen and 30 councillors. Area, 1521 acres.

HOVENDEN, THOMAS (1840-1895), American artist, was born in Dunmanway, Co. Cork, Ireland, on the 28th of December 1840. He was a pupil of the South Kensington Art Schools and those of the National Academy of Design, New York, whither he had removed in 1863. Subsequently he went to Paris and studied in the Ecole des Beaux Arts under Cabanel, but passed most of his time with the American colony in Brittany, at Pont-Aven, where he painted many pictures of the peasantry. Returning to America in 1880, he became an academician in 1882, and attracted attention by an important canvas of " The Last Moments of John Brown " (now in the Metropolitan Museum of Art). His " Breaking Home Ties," a picture of American farm life, was engraved with considerable popular success. Hovenden was mortally injured in a heroic effort to save a child from a railroad train in the station at Germantown, near Philadelphia, and died at Norristown, Pennsylvania, on the 14th of August 1895. Among his principal works are: — " News from the Conscript " (1877), " Loyalist Peasant Soldier of La Vendee" (1879). "A Breton

Interior," " Image Seller " and " Jerusalem the Golden " (in the Metropolitan Museum of Art). HOW, WILLIAM WALSHAM (1823-1897), English divine, son of a Shrewsbury solicitor, was born on the 13th of December 1823, and was educated at Shrewsbury school and Wadham College, Oxford. He was ordained in 1846, and for upwards of thirty years was actively engaged in parish work at Whittington in Shropshire and Oswestry (rural dean, i860). He refused preferment on several occasions, but his energy and success made him well known, and in 1879 he became a suffragan bishop in London, under the title of bishop of Bedford, his province being the East End. There he became the inspiring influence of a revival of church work. He founded the East London Church Fund, and enlisted a large band of enthusiastic helpers, his popularity among all classes being immenst. He was particularly fond of children, and was commonly called " the children's bishop." In 1888 he was made bishop of Wakefield, and in the north of England he continued to do valuable work. His sermons were straightforward, earnest and attractive; and besides publishing several volumes of these, he wrote a good deal of verse, including such well-known hymns as " Who is this so weak and helpless," " Lord, Thy children guide and keep." In 1863-1868 he brought out a Commentary on the Four Gospels; and he also wrote a Manual for the Holy Communion. In the movement for infusing new spiritual life into the church services, especially among the poor, How was a great force. He died on the 10th of August 1897. He was much helped in his earlier work by his wife. Frances A. Douglas (d. 1887). See his Life by his son, F. D. How (1898).

HOWARD (Family). Among English families, the house of Howard has long held the first place. Its head, the duke of Norfolk, is the first of the dukes and the hereditary earl marshal of England, while the earls of Suffolk, Carlisle and Effingham and the Lord Howard of Glossop represent in the peerage its younger lines.

Its founder was a Norfolk lawyer, William Howard orHaward,

who was summoned to parliament as a justice in 1295, being appointed a justice of the common pleas in 1297. Over the parentage of this man genealogists have disputed for centuries. The pedigree-makers have hailed him in turn as the descendant of a Norman " Auber, earl of Passy " and as the heir of Here- ward, " the last of the English." But out of the copies of Norfolk deeds and records collected for Thomas, earl of Arundel, in the early part of the 17th century, it seems clear enough that he sprang from a

Norfolk family, several of whose members held lands at Wiggenhall near Lynn. These notes from deeds, evidently collected by an honest inquirer, make no extravagant claims of ancient ancestry or illustrious origin for the Howards, although the facts contained in them were recklessly manipulated by subservient genealogists. Doubtless the judge was the son of John Howard of Wiggenhall, living about 1260, whose widow Lucy, called by the genealogists the daughter of John Germund, was probably the wife of John Germund by her second marriage. William Howard was employed as counsel by the corporation of Lynn, and it is worthy of note that the " crosslets fitchy " in his shield of arms suggest the cross with which the dragon was discomfited by St Margaret, the patroness of Lynn. Prospering by the law, William Howard of Wiggenhall rose to knight's rank and acquired by purchase Grancourt's manor in East Winch, near Lynn, where he had his seat in a moated house whose ruins remain. He was probably dead and buried in his chapel at East Winch before November 27, 1308, the date of the patent by which Henry Scrope succeeded him as a commissioner of trailbaston. His two wives, Alice Ufford and Alice Fitton — heir of Fitton's manor in Wiggenhall — were both daughters of knightly houses. Before his death his eldest son, John Howard, was a knight and already advanced by his marriage with Joan of Cornwall, one of the bastard line founded by Richard of Cornwall, king of the Romans.

Sir John Howard served in Edward II. 's wars in Scotland and Gascony, was sheriff of Norfolk and Suffolk and governor of Norwich Castle. When he died in 133 1 he was seised of many Norfolk manors. His son and heir, another Sir John, admiral of the king's navy in the north, was a banneret who displayed his banner in the army that laid siege to Calais. By the admiral's "wife Alice, sister and heir of Sir Robert de Boys, the Howards had the Boys manor of Fersfield, near Diss, which is still among the possessions of the dukes of Norfolk. His son Sir Robert Howard, who had married a daughter of Sir Robert Scales (Lord Scales) , died in 1388. From Sir John Howard, the only son of Sir Robert, two branches of the house of Howard spring. The elder line was soon extinct. By his first wife, Margaret, daughter and heir of Sir John Plays, Sir John Howard had a son who died before him, leaving a daughter through whom descended to her issue, the Veres, earls of Oxford, the ancient Norfolk estates of the Howards at East Winch and elsewhere, with the lands of the houses of Scales, Plays and Walton, brought in by the brides of her fore- fathers. After the death of Margaret Plays, her widower found, with the peculiar instinct of his race, a second well-endowed wife. By her, the heir of the Tendrings of Tendring, he had a second son, Sir Robert Howard, a knight who fought under Henry V. in France, and died, like his half-brother, before the old knight's career ended in 1436.

It is to the marriage of this young knight that the house of Howard owes

the tragedy of its greatness. He was a younger son, although he had some of his mother's inheritance. Had he married the landless daughter of a neighbour he might have been the ancestor of a line of Essex squires, whose careers would have had the parish topographer for chronicler. But his bride was Margaret Mowbray, daughter of the banished duke of Norfolk. Although this was a noble alliance, it is probable that the lady had no great portion. The head of her elder brother, the boy earl marshal, had been stricken off in the cornfield under the walls of York, but her younger brother's right to his father's dukedom was allowed by parliament in 1425.

Sir John Howard, only son of the match between Howard and Mowbray, took service with his cousin the third duke of Norfolk, who had him returned as knight of the shire for Norfolk,

where, according to the Pasion Letters, this Howard of the Essex branch was regarded by the gentry as a strange man. He followed the White Rose and was knighted at the crowning of King Edward IV., who pricked him for sheriff of Norfolk and Suffolk. In the duke's quarrel he brawled with the Pastons, his wife boasting that, should her husband's men meet with John Paston " there should go no penny for his life." " And Howard," writes Clement Paston, " hath with the king a great fellowship." Offices and lands came to John Howard by reason of that fellowship. Henry VI., when restored, summoned him to parliament in 1470 as Lord Howard, a summons which may have been meant to lure him to London into Warwick's power, but he proclaimed the Yorkist sovereign on his return and fought at Barnet and Tewkesbury. When peace was made, Edward summoned him again as a baron and gave him the Garter and the treasurership of his household. After Edward's burial, at which he bore the king's banner, Howard, an enemy of the Wydviles, linked his fortunes with those of the duke of Gloucester. At this time came his sudden lifting to the highest rank in the peerage. The last of the dukes of Norfolk had left a child heir, Anne Mowbray, married to the infant duke of York, the younger of the princes doomed by Richard in the Tower. By the death of this little girl, John Howard became one of the coheirs of her illustrious house, which was now represented by the issue of Margaret Mowbray, his mother, and of her sister Isabel, who had married James, Lord Berkeley. A lion's share of the Mowbray estates, swollen by the great alliances of the house, heir of Breouse and Segrave, and, through Segrave, of Thomas of Brotherton, son of Edward I., fell to Howard, who, by a patent of June 28, 1483, was created duke of Norfolk and earl marshal of England with a remainder to the heirs male of his body. On the same day the lord Berkeley, the other coheir, was made earl of Nottingham. High steward at Richard's crowning, the duke bore the crown and rode as marshal into Westminster Hall. For the rest of his life he was Richard's man, and though warned by the famous couplet that " Dykon his master " was bought and sold, " Jack of Norfolk "

led the archer vanguard at Bosworth and died in the fight, from which his son the earl of Surrey was carried away a wounded prisoner. An attainder by the first parliament of Henry VII. extinguished the honours of the father with those of the son, who had been created an earl when the lord Howard was raised to the dukedom. Their estates were forfeit.

Thomas Howard, a politic mind, loyal to the powers that be, was released from the Tower of London in 1489, his earldom of Surrey and his Garter restored. Accepting the position in which the Tudor king would have his great nobles, he became the faithful soldier, diplomatist and official of the new power. In his seventieth year, as lieutenant-general of the North, he led the English host on the great day of Flodden, earning a paterit of the dukedom of Norfolk, dated 1 February 1513/4, and that strange patent which granted to him and his heirs that they should bear in the midst of the silver bend of their Howard shield a demi-lion stricken in the mouth with an arrow, in the right colours of the arms of the king of Scotland. This augmentation has been interpreted as a golden scocheon with the demi-lion within the Scottish tressure. Thus charged on the silver bend, it makes bad armory and it is worthy of note that, although the grant of it is clearly to the duke and his heirs in fee simple, Howards of all branches descending from the duke bear it in their shields, even though all right to it has long passed from the house to the duke's heirs general, the Stourtons and Petres.

The victor of Flodden is the common ancestor of all living Howards that can show a descent from the main stock. The second duke, twice married, was father of at least eleven sons and six daughters, the sons including Edward the lord high admiral, killed in boarding Pregent's galleys at Brest, Edmund the knight marshal of the army at Flodden, and William the first Lord Howard of Effingham. The eldest son, Thomas, succeeded as the third duke of his name, although the second under the patent of 1514. He had fought as captain of the

vanguard at Flodden and after the victory was created earl of Surrey. When Richard III. was allying himself with the Howards, Thomas Howard, a boy of eleven, had been betrothed to Anne, daughter of the late King Edward IV., and Henry VII. allowed the marriage with his queen's sister to take place in 1495. This royal bride died of consumption, leaving no living child, and her husband took in 1513, as his second wife, Elizabeth Stafford, daughter of that duke of Buckingham upon whom the old duke of Norfolk, the tears upon his cheeks, was forced to pass sentence of death.

Succeeding his father in 1524, Norfolk was created earl marshal in 1533. An unsuccessful diplomatist, his chief services in arms were the butchery in the north after the Pilgrimage of Grace and the raid into Scotland which ended with the rout of Solway Moss. He left his wife for a mistress, Elizabeth Holland, was in discord with his family, and lived to see his two nieces, Anne Boleyn and Catherine Howard, and his son Surrey, the fiery-tempered poet, go in turn to the block. He himself was attainted and was lying a prisoner in the Tower, doomed to die in the morning, on the night of the death of Henry VIII. He was not released until the accession of Mary, parliament restoring his dukedom on his petition for reversal of the attainder. His grandson Thomas succeeded him in 1554, and in 1556 made the second of those marraiges which have given the Howards their high place among the English nobility. The bride was Mary, sole heir in her issue of her father Henry, the last of the Fitzalan earls of Arundel. Her father's line and the royal Stewards of Scotland sprang from one forefather, Alan, son of Flaald the Breton. The Mowbray match had already brought to the Howards the representation of an elder line of the Fitzalan earls, who sat in the seats of their ancestors, the Aubignys and Warennes, great earls near akin to their sovereigns. And now the younger line, earls of Arundel and Lords Mautravers, were also to have a Howard to represent them. From this time the spreading genealogy of the Howards drew its origins from most of the illustrious names of the houses founded after the Norman Conquest.

The young duchess died in her seventeenth year after giving birth to a son, and the duke took a second wife from a humble stock, newly enriched and honoured, the daughter of Henry VIII. 's subservient chancellor, the Lord Audley of Walden. Within ten years he married a third time, the lady being Elizabeth Leybourne, the widow of Lord Dacre of Gilsland. She survived her marriage but a few months and her husband then obtained the wardship of her Dacre offspring, a son who died young, and three daughters whom the duke, with the true Howard eye for a rich inheritance, gave as brides to three of his sons. After three such good fortunes by marriage Norfolk in his folly looked for a crown with a fourth match, listening to the laird of Lethington when he set forth the scheme by which the duke was to marry a restored queen of Scots and rule Scotland with her who should be recognized as Elizabeth's successor. Ten months in the Tower under strong suspicion would have warned another man, but Norfolk was unstable and false. After promising fidelity and the abandonment of the Scots marriage scheme, Cecil took him corresponding with Mary and tampering with the Ridolfi plot. He died on Tower Hill in 1572 for an example to the disloyal counties, protesting innocence and repentance, warning his children in a last letter to discredit all " false bruits " that he was a papist .

By his attainder the Norfolk titles were once more forfeited. But Philip Howard, the son and heir, succeeded to the ancient earldom of Arundel in 1580, on the death of his maternal grand- father, while the Lord Lumley, his uncle by marriage, surrendered to him his life interest in the castle and honour of Arundel. The next year an act of parliament restored the earl in blood. After a profligate youth at court, he followed his wife in pro- fessing the Roman faith, and in 1585 made an attempt to leave England to seek safety from the penal laws, But his ship was boarded in the Channel and the earl, condemned by the Star Chamber to a heavy fine and to imprisonment during the queen's pleasure, suffered a harsh captivity in the Tower. After the defeat of the Armada he had been condemned to death on a*

charge of high treason, founded on the tale drawn by torture from a priest, that Arundel had urged him to say a mass for the success of the Spaniards. But he was allowed to linger in his prison until 1595 when he died, the sight of his wife and children being cruelly refused to the dying man. Thus it befell that, of the chiefs of the Howards born since the great Mowbray alliance, two had died by the axe and one in the prison from which a fourth had hardly escaped. A fifth had fallen in a lost battle, and only one had died in peace in his own house.

The ill fate of the Howards seemed to be appeased by the death of Philip, earl of Arundel. Tudor policy did its work well, and noblemen, however illustrious their pedigrees, could no longer be counted as menaces by the Crown, which was, indeed, finding another rival to its power. In the first year of James I., Thomas, the young son of Earl Philip, was restored in blood and given the titles of Arundel and Surrey. But the lands belonging to these titles remained with the Crown and he had to repair his fortunes by one of those marriages which never failed his house, his wife being Alathea Talbot, who was at last the heir of Gilbert, earl of Shrewsbury. To the grief of his mother he left the Roman church. A knight of the Garter, he was in 162 1 created earl marshal for life, and revived the jurisdiction belonging to the office. An act of 1627, one of several such aimed at aggrandizing families by diverting the descent of dignities in fee from heirs general, entailed the earldom and castle of Arundel upon Thomas, earl of Arundel and Surrey and the heirs male of his body " and for default of such issue, to the heirs of his body." His pride and austerity made him unpopular at court and he left the country in 1642, settling at last in Padua, where he died in 1646, impoverished by the sequestrations of the parliament, whose forces had taken and retaken his castle of Arundel. In answer to his petition for the dukedom, the king had, on the 6th of June 1644, given him a patent of the earldom of Norfolk, in order, as it would seem, to flatter him by suggesting that the title of Norfolk would at least be refused to any other family. He is celebrated as a collector of paintings, books, gems and

sculptures, his " Arundel marbles " being given by his grandson in 1667 to the University of Oxford. The dukedom for which Arundel had petitioned Charles I. in vain was restored by act of the first parliament of Charles II. to his grandson Thomas, a lunatic living at Padua, on whose death in 1677 it passed to this Thomas's brother, Henry Frederick, who had been created earl of Norwich and hereditary earl marshal of England in 1672. In 1777 Edward, the ninth of the Howard dukes, died childless in his ninety-second year. With him ended the earldom of Norwich, while the representation of the Mowbrays and Segraves passed to his nieces, the Ladies Stourton and Petre, the abeyance of the two baronies being determined in 1878 in favour of Lord Stourton. Under the act of 1627 the earldom of Arundel and the castle passed with the dukedom to a second cousin, Charles Howard of Greystock (d. 1786), an eccentric recluse. At his death in 1786 he was succeeded by his son Charles, the notorious " Jockey of Norfolk," the big, coarse, generous, slovenly, hard-drinking Whig of whom all the memoir-writers of his. age have their anecdotes. He conformed to the Church of England and spent a vast sum in restoring Arundel Castle. ; A third cousin succeeded him in 181 5, Bernard Edward Howard, who, although a Roman Catholic, was enabled, by the act of 1824, to act as carl marshal. This was the grandfather of the fifteenth duke, earl of Arundel, Surrey and Norfolk, and hereditary earl marshal of England.

The eldest of the cadet branches of the ducal house has its origin in William (c. 1510-1573), eldest son of the victor of Flodden by his second marriage. He survived the reign of Henry VIII., that perilous age for the Howards, with no worse misadventure than the conviction of himself and his wife of misprision of treason in concealing the offences of his niece, Queen Catherine. But both were pardoned. In r 553 he had the office of lord admiral of England, and in the next year the Garter. For his services against Sir Thomas Wyat he was created (March 11, 1553/4) Lord Howard of Effingham, the title being taken from a Surrey manor granted him by Edward VI. Queen Elizabeth continued his employment in diplomacy, and had he been richer he might have had an earldom. His eldest son Charles (1536-162ˆ), lord admiral of England in 1585, sailed as*

commander in chief against the Spanish Armada, and, although giving due weight to the counsel of Drake and his other officers, showed himself a leader as prudent as courageous. He was created earl of Nottingham in 1596 and died in 1624. The legend that the admiral was a Roman

Catholic has no authority. Two of his sons succeeded in turn to the earldom of Nottingham, extinct on the death of Charles, the third earl in 1681. Sir William Howard of Lingfield, younger brother of the great admiral, carried on the Effingham line, his great-grandson succeeding to the barony on the extinction of the earldom. Francis, seventh Lord Howard of Effingham, was created earl of Effingham in 1 731, a title extinct in 1 816 with the fourth earl, but revived again in 1837 for the eleventh baron, who had served as a general officer in the Peninsular cam- paign, the great-grandfather of the present peer.

A patent of 1604 created Henry Howard (1540-1614), younger son of Surrey the poet, earl of Northampton, a peerage which ended with the death of this, the most unprincipled of his house.

Thomas, son of the fourth duke of Norfolk's marriage with the daughter and heir of Thomas, Lord Audley of Walden, founded the line of the present earls of Suffolk and Berkshire and of the extinct Lords Howard of Escrick. His barony of Howard of Walden has descended to his heirs general. Lord William Howard (1563-1640), the " belted Will " of Scott's Lay and the " bauld Willie " of more authentic legend, was another of the sons of the fourth duke and Margaret Audley. Married in 1577 to one of the three co-heirs of the Lord Dacre of Gilsland he suffered under Elizabeth more than one imprisonment with his brother the unfortunate earl of Arundel. But in 1603 he was able, on the partition of the Dacre lands, to make his home at Naworth Castle, where he lived, a border patriarch, cultivating his estates and serving as a commissioner of the borders. His great-grandson Charles Howard, although fledged in a nest of cavaliers, changed sides and fought at Worcester for the parliament. The Protector summoned him in 1657 to his House of Lords, but he was imprisoned in 1659 on suspicion of a share in Booth's insur- rection and, after the Restoration, was created, in 1661, earl of Carlisle, Viscount Morpeth and Lord Dacre of Gilsland, titles which are still held by his descendants. From Sir Francis Howard, a cavalier colonel and a younger son of " bauld Willie," come the Howards of Corby Castle in Cumberland, a branch without a here- ditary title.

William Howard, Viscount Stafford, was the fifth son of Thomas, earl of Arundel, and grandson of Philip the prisoner. Marrying the sister and heir of the fifth Lord Stafford, who died in 1637, he and his wife were created Baron and Baroness Stafford by a patent of 1640, with remainder, in default of heirs male, to heirs female. A giant of the precedence enjoyed by the bride's father being held illegal, her husband was in the same year created Viscount Stafford. Roger Stafford, the impoverished heir male of the ancient Staff ords", had been forced to surrender his barony to the king by a deed dated in the preceding year, a piece of injustice which is in the

teeth of all modern conceptions of peerage law. The Viscount Stafford was one of ttie " five Popish lords " committed to the Tower in 1678 as a result of the slanders of Titus Oates and he died by the axe in 1680 upon testimony which, as the diarist Evelyn protested, "should not be taken against the life of a dog." But three earls of his own house — Carlisle, Suffolk and Berkshire — and the Lord Howard of Escrick, an ex-trooper of Cromwell's guard and an anabaptist sectary, gave their votes against him, his nephew Mowbray being the only peer of his name in the minority for acquittal. In 1688 his widow was created countess of Stafford for life, and his eldest son, Henry, had the earldom of Stafford, with special remainder to his brothers. This earldom ended in 1762, but the attainder was reversed by an act of 1824 and in the following year Sir George Jrrningham, the heir general, established his claim to the Stafford barony of 1640.

Authorities. — State papers;- patent, close and plea rolls. Tierney, History of Arundel; G. E. C, Complete Peerage; J. H. Round, Peerage Studies; Howard of Corby, Memorials of the Family of Howard; Brenan and Statham, House of Howard; Howard, Historical Anecdotes of the Howard Family; Morant, Essex; Blome- field, Norfolk. (0. Ba.)

HOWARD, CATHERINE (d. 1542), the fifth queen of Henry VIII.. was a daughter of Lord Edmund Howard and a grand- daughter of Thomas Howard, 2nd duke of Norfolk (d. 1524). Her father was very poor, and Catherine lived mainly with Agnes, widow of the 2nd duke of Norfolk, meeting the king at the house of Stephen Gardiner, bishop of Winchester. Henry was evidently charmed by her; the Roman Catholic party, who disliked the marriage with Anne of Cleves, encouraged his attentions; and after Anne's divorce he was privately married to Catherine at Oatlands in July 1540. Soon afterwards she was publicly acknowledged as queen. Before her marriage Catherine had had several lovers, among them being a musician, Henry Mannock, or Manox; her cousin, Thomas Culpepper; iind Francis Dereham, to whom she had certainly been betrothed.

After becoming queen she occasionally met Dereham and Culpepper, and in November 1 541 Archbishop Cranmer informed Henry that his queen's past life had not been stainless. Cranmer had obtained his knowledge indirectly from an old servant of the duchess of Norfolk. Dereham confessed to his relations with Catherine, and after some denials the queen herself admitted that this was true; but denied that she had ever been betrothed to Dereham, or that she had misconducted herself since her marriage. Dereham and Culpepper were executed in December 1541 and their accomplices were punished, but Catherine was released from prison. Some fresh information, however, very soon came to light showing that she had been unchaste since her marriage; a bill of attainder was passed through parliament, and on the 13th of February 1542 the queen was

beheaded. See A. Strickland, Lives of the Queens of England (vol. iii. 1877). HOWARD, JOHN (1726-1790), English philanthropist and prison reformer, was born at Hackney, probably on the 2nd of September 1726. His childhood was passed at Cardington, near Bedford, where his father, a retired merchant of independent means, had a small estate. He was apprenticed to a firm of grocers in the city of London, but on the death of his father in 1742, by which he inherited considerable property, he bought up his indenture, and devoted more than a year to foreign travel. Never constitutionally strong, he became, on his return to England, a confirmed invalid. Having been nursed through an acute illness by an attentive landlady, a widow of some fifty- three years of age, Howard, in return for her kindness, offered her marriage and they were united in 1752. Becoming a widower in less than three years, he determined to go abroad again, Portugal being his destination. The ship, however, in which he sailed was taken by a French privateer, the crew and passengers being carried to Brest, where they were treated with great severity. Howard was permitted to return to England on parole to negotiate an exchange, which he accomplished, as well as successfully representing the case of his fellow-captives. He now settled down on his Cardington property, interesting himself in meteorological observations. He was admitted a member of the Royal Society in 1756. In 1758 he married Henrietta, daughter of Edward Leeds, of Croxton, Cambridge- shire. He continued to lead a secluded life at Cardington and at Watcombe, Hampshire, busying himself in the construction of model cottages and the erection of schools. In 1765 his second wife died after giving birth to a son. In the following year Howard went for a prolonged foreign tour, from which he returned in 1770.

In 1773 the characteristic work of his life may be said to have begun by his acceptance of the office of high sheriff of Bedford. When the assizes were held he did not content himself with sitting out the trials in open court, his inquisitiveness and his benevolence alike impelled him to visit the gaol. Howard found it, like all the prisons of the time, wretchedly defective in its arrangements; but what chiefly shocked him was the circum- stance that neither the gaoler nor his subordinates were salaried officers, but were dependent for their livelihood on fees from the prisoners. He found that some whom the juries had declared not guilty, others in whom the grand jury had net found even such appearance of guilt as would warrant a trial, others whose prosecutors had failed to appear, were frequently detained in prison for months after they had ceased to be in the position of accused parties, until they should have paid the fees of gaol delivery (see Introduction to The State of the Prisons of England and Wales). His prompt application to the justices of "the county for a salary to the gaoler in lieu of his fees was met by a demand for a precedent in charging the county with an expense. This he undertook to find if such a thing existed. He went

accordingly from county to county, and though he could find no precedent for charging the county with the wages of its servants he did find so many abuses in prison management that he determined to devote himself to their reform.

In 1774 he gave evidence before a committee of the House of Commons, and received the thanks of the house for " the humanity and zeal which have led him to visit the several gaols

of this kingdom, and to communicate to the House the interesting observations which he has made on that subject." Almost immediately an act was passed which provided for the liberation, free of all charges, of every prisoner against whom the grand jury failed to find a true bill, giving the gaoler a sum from the county rate in lieu of the abolished fees. Tnis was followed in June by another requiring justices of the peace to see that the walls and ceilings of all prisons within their jurisdiction were scraped and whitewashed once a year at least; that the rooms were regularly cleaned and ventilated; that infirmaries were provided for the sick, and proper care taken to get them medical advice; that the naked should be clothed; that underground dungeons should be used as little as could be; and generally that such courses should be taken as would tend to restore and preserve the health of the prisoners. It was highly characteristic of the man that, having caused the provisions of the new legisla- tion to be printed at his own private cost in large type, he sent a copy to every gaoler and warder in the kingdom, that no one should be able to plead ignorance of the law if detected in the violation of its provisions. He then set out upon a new tour of inspection, from which, however, he was brought home by the approach of a general election in September 1774. Standing as one of the anti-ministerial candidates for Bedford, he was returned by a narrow majority but was unseated after a scrutiny.

After a tour in Scotland and Ireland, he set out in April 1775 upon an extended tour through France, the Low Countries and Germany. At Paris he was at first denied access to the prisons; but, by recourse to an old and almost obsolete law of 1717, according to which any person wishing to distribute alms to the prisoners was to be admitted, he succeeded in inspecting the Bicetre, the Force l'Eveque and most of the other places of confinement, the only important exception being the Bastille. Even in that case he succeeded in obtaining possession of a suppressed pamphlet, which he afterwards translated and published in English, to the unconcealed chagrin of the French authorities. At Ghent he examined with special

interest the great Maison de Force, then recently erected, with its distinctive features — useful labour, in the profits of which the prisoners had a share, and complete separation of the inmates by night. At Amsterdam, as in Holland generally, he was much struck with the comparative absence of crime, a phenomenon which he attributed to the industrial and reformatory treatment there adopted. In Germany he found little that was useful and much that was repulsive; in Hanover and Osnabriick, under the rule of a British sovereign, he even found traces of torture. After a short tour in England (Nov. 1775 to May 1776), he again went abroad, extending his tour to several of the Swiss cantons. In 1777 appeared The State of the Prisons in England and Wales, with Preliminary Observations, and an Account of some Foreign Prisons. One of the immediate results was the drafting a bill for the establishment of penitentiary houses, where by means of solitary imprisonment, accompanied by well-regulated labour and religious instruction, the object of reforming the criminal and inuring him to habits of industry might be pursued. New buildings were manifestly necessary; and Howard volun- teered to go abroad again and collect plans. He first went to Amsterdam (April 1778), and carefully examined the " spin- houses " and " rasp-houses" 1 for which that city was famous; next he traversed Prussia, Saxony, Bohemia, Austria and Italy, everywhere inspecting prisons, hospitals and workhouses, and carefully recording the merits and defects of each. The informa- tion he thus obtained having been placed at the service of parliament, a bill was passed for building two penitentiary houses, and Howard was appointed first supervisor, but he resigned the post before anything practical had been achieved. In 1780 he had published a quarto volume as an appendix (the first) to his State of Prisons ; about the same time also he caused to be printed his translation of the suppressed French

1 The spinhouses were for women prisoners, who were set to spinning or other useful work; in the rasp-houses, the prisoners were employed in rasping wood.

pamphlet on the Bastille; but on obtaining release from his employments at home his passion for accumulating statistics urged him to new and more extended continental tours, as far as to Denmark, Sweden and Russia in 1781, and to Spain and Portugal in 1783. The results of these journeys were embodied in 1784 in a second appendix, with the publication of which his direct labours in connexion with the subject of prison reform may be said to have ceased.

The five remaining years of his life were chiefly devoted to researches on the means for prevention of the plague, and for guarding against the

propagation of contagious distempers in general. After an extended tour on the continent his researches seemed to be complete; and with a great accumulation of papers and memoranda, he was preparing to return homewards from Constantinople by Vienna, when it occurred to his scrupulous mind that he still lacked any personal experience of quarantine discipline. He returned to Smyrna, and, deliberately choosing a foul ship, took a passage to Venice. A protracted voyage of sixty days, during which an attack by pirates gave Howard an opportunity of manifesting his personal bravery, was followed by' a weary term of confinement which enabled him to gain the experience he had desired. While imprisoned in the Venetian lazaretto he received the information that his only son, a youth of twenty-two years of age, had lost his reason and had been put under restraint. Returning hastily by Trieste and Vienna (where he had a long and singular interview with the emperor Joseph II.), he reached England in February 1787. His first care related to his domestic concerns; he then set out upon another journey of inspection of the prisons of the United Kingdom, at the same time busying himself in preparing for the press the results of his recent tour. The somewhat rambling work containing them was published in 1798 at Warrington, under the title An Account of the Principal Lazarettos in Europe : with various Papers, relative to the Plague, together with further Observations on some Foreign Prisons and Hospitals, and addi- tional Remarks on the present State of those in Great Britain and Ireland.

In July 1789 he embarked on what proved to be his last journey. Travelling overland to St Petersburg and Moscow, and so southwards, and visiting the principal military hospitals that lay on his route, he reached Kherson in November. In the hospitals of this place and of the immediate neighbourhood he found more than enough to occupy his attention while he awaited the means of transit to Constantinople. Towards the end of the year his medical advice was asked in the case of a young lady who was suffering under the camp fever then prevalent, and in attending her he himself took the disease, which terminated fatally on the 20th of January 1790. He was buried near the village of Dauphigny on the road to St Nicholas. There is a, statue by Bacon to his memory in St Paul's, London, and one at Bedford by A. Gilbert. In personal appearance Howard is described as having been short, thin and sallow — unpre- possessing apart from the attraction of a penetrating eye and a benevolent smile.

Authorities. — Anecdotes of the Life and Character of John Howard, written by a Gentleman (1790); Aikin, View of the Character and Public Services of the late John Howard. (1792); Memoirs by T. Baldwin Brown (1818); T. Taylor (1836), Hepworth Dixon (1849), J. Field (1850), and J. Stoughton, Howard the Philanthropist (1884).

HOWARD, OLIVER OTIS (1830-1909), American soldier, was born in Leeds, Maine, on the 8th of November 1830. He gradu- ated at Bowdoin College in 1850, and at the U.S. Military Academy in 1854. In 1857 he served in Florida against the Seminole Indians, and from 1857 to 1861 he was assistant professor of mathematics at West Point. At the beginning of the Civil War he resigned to become colonel of the 3rd Maine volun- teer regiment, and at the first battle of Bull Run was in command of a brigade. In September he was promoted brigadier-general of volunteers. He served in the Peninsular Campaign, and at the battle of Seven Pines (Fair Oaks) he was twice wounded, losing his right arm. On his return to active service in August 1862 he took part in the Virginian campaigns of 1862-63; at

Antietam he succeeded Sedgwick in command of a division, and he became major-general of volunteers in March 1863. In the campaign of Chancellorsville (see Wilderness) he commanded the XI. corps, which was routed by "Stonewall" Jackson, and in the first day's battle at Gettysburg he was for some hours (succeeding Doubleday after Reynolds's death) in command of the Union troops. The XI. corps was transferred to Tennessee after Rosecrans's defeat at Chickamauga, and formed part of Hooker's command in the great victory of Chattanooga. When Sherman prepared to invade Georgia in the spring of 1864 the XI. corps was merged with the XII. into the new XX., commanded by Hooker, and Howard was then placed in command of the new IV. corps, which he led in all the actions of the Atlanta campaign, receiving another wound at Pickett's Mills. On the death in action of General M'Pherson, Howard, in July 1864, was selected to com- mand the Army of the Tennessee. In this position he took part in the " March to the Sea " and the Carolinas campaign. In March 1865 he was breveted major-general U.S.A. " for gallant and meritorious service in the battle of Ezra Church and during the campaign against Atlanta," and in 1893 received a Con- gressional medal of honour for bravery at Fair Oaks. After the peace he served as commissioner of the Bureau of Refugees, Freedmen and Abandoned Lands from 1865 until 1874; in 1872 he was special commissioner to the hostile Apaches of New Mexico and Arizona; in 1874-18ˆ81 was in command of the Department of the Columbia and conducted the campaign against Chief Joseph in 1877 and that against the Bannocks and Piutes in 1878. In 1881-1882 he was superintendent of West Point; and in 1882-1886 he commanded the Department of the Platte, in 1886-1888 the Department of the Pacific, and in 1888-1894 the Department of the East. In 1886 he was pro- moted major-general and in

1894 he retired. He died at Burlington, Vermont, on the 26th of October 1009.

Howard was deeply interested hi the welfare of the negroes; and the establishment by the U.S. Government in 1867 of Howard University, at Washington, especially for their education, was largely due to him; it was named in his honour, and from 1869 to 1873 he presided over it. In 1895 he founded for the education of the " mountain whites " the Lincoln Memorial University at Cumberland Gap, Tenn. (see Cumberland Mountains), and became president of its board. He held honorary degrees of various universities, and was a chevalier of the Legion of Honour. He wrote, amongst other works, Donald's Schooldays (1877); Chief Joseph (1881); a life of General Zachary Taylor (1892) in the " Great Commanders " series; Isabella of Castile (1894); Fighting for Humanity (1898); Henry in the War (1898); papers in the "Battles and Leaders " collection oh the Atlanta campaign; My Life and Experience among our Hostile Indians (1007); and Autobio- graphy of O. O. Howard (2 vols., New York, 1907).

HOWARD, SIR ROBERT (1626-1698), English dramatist, sixth son of Thomas Howard, 1st earl of Berkshire, was born in 1626. He was knighted at the second battle of Newbury (1644) for his signal courage on the Royalist side. Imprisoned in Windsor Castle under the Commonwealth, his loyalty was rewarded at the Restoration, and he eventually became auditor of the exchequer. His best play is a comedy, The Committee, or the Faithful Irishman (1663; printed 1665), which kept the stage, long after its interest as a political satire was exhausted, for the character of Teague, said to have been drawn from one of his own servants. He was an early patron of Dryden, who married his sister, Lady Elizabeth Howard, and in the Indian Queen, a tragedy in heroic verse (1664; pr. 1665) Howard had assistance from Dryden, although the fact was not made public until the production of Dryden's Indian Emperor. The magnificence of the spectacle, and the novelty of' the cbstume of feathers, pre- sented by Mrs. Aphra Behn, that was' worn by Zempoalla, the Indian queen, made a great sensation. The scenery and acces- sories were unusually brilliant, the richest ever seen in England, according to Evelyn. In 1665 Howard published Foure New Plays, in the preface to which he opposed the view maintained by Dryden in the dedicatory epistle to The Rival Ladies, that

rhyme was better suited to the heroic tragedy than blank verse. Howard made an exception in favour of the rhyme of Lord Orrery, but by his silence concerning Dryden implicated him in the general censure. Dryden answered by placing Howard's sentiments in the mouth of Crites in his own Essay on Dramatic Poesy (1668). The controversy did not end here, but Dryden completely worsted his adversary in the 1668 edition of The Indian

Emperor. Howard died on the 3rd of September 1698.

His brother, James Howard, wrote two comedies, All Mistaken, or the Mad Couple, a comedy (1667; pr. 1672), and The English Mounsieur (1666; pr. 1674), the success of which seems to have been partly due to the acting of Nell Gwynn.

HOWARD, LORD WILLIAM (1563-1640), known as "Belted or Bauld (bold) Will," 3rd son of Thomas Howard, 4th duke of Norfolk (executed in 1572), and of his second wife Margaret, daughter of Lord Audley, was born at Audley End in Essex on the 19th of December 1563. He married on the 28th of October 1577 Elizabeth, daughter of Thomas, Lord Dacre, and proceeded subsequently to the University of Cambridge. Being suspected of treasonable intentions together with his elder brother, Philip, earl of Arundel, he was imprisoned in 1583, 1585 and 1589. He joined the church of Rome in 1584, both brothers being dispossessed by the queen of a portion of their Dacre estates, which were, however, restored in 1601 for a pay- ment of £10,000. Howard then took up his residence with his children and grandchildren at Naworth Castle in Cumberland, restored the castle, improved the estate and established order in that part of the country. In 1603, on the accession of James, he had been restored in blood. In 161 8 he was made one of the commissioners for the border, and performed great services in upholding the law and suppressing marauders. Lord William was a learned and accomplished scholar, praised by Camden, to whom he sent inscriptions and drawings from relics collected by him from the Roman wall, as " a singular lover of valuable antiquity and learned withal." He collected a valuable library, of which most of the printed works remain still at Naworth, though the MSS. have been dispersed, a portion being now in the Arundel MSS. in the Royal College of Arms; he corresponded with Ussher and was intimate with Camden, Spelman, and Cotton, whose eldest son married his daughter. He published in 1592 an edition of Florence of Worcester's Chronicon ex Chronicis, dedicated to Lord Burghley, and drew up a genealogy of his family, now among the duke of Norfolk's MSS. at Norfolk House. He died in October 1640 at Greystock, to which place he had been removed when failing in health to escape the Scots who were threatening an advance on Naworth. He had a large family of children, of whom Philip, his heir, was the grandfather of Charles, 1st earl of Carlisle, and Francis was the ancestor of the Howards of Corby.

HOWARD OF EFFINGHAM, WILLIAM HOWARD, 1st Baron (c. 15 10-1573), English lord high admiral, was the son of the 2nd duke of Norfolk. He was popular with Henry VIII., and at Anne Boleyn's coronation was deputy earl marshal; and he was sent on missions to Scotland and France; but in 1 541 he was charged with abetting his

relative Queen Catherine Howard, and was convicted of misprision of treason, but pardoned. In 1552 he was made governor of Calais, and in 1553 lord high admiral, being created Baron Howard of Effingham in 1554 for his defence of London in Sir Thomas Wyat's rebellion against Queen Mary. He befriended the princess Elizabeth, but his popularity with the navy saved him from Mary's resentment; and when Elizabeth beeame queen he had great influence with-, her and filled several important posts. His son, the second baron; who is famous in English naval history, was created earl of Nottingham (q.v.); and from a younger son the later earls of Effingham were descended. William's descendant, Francis (d. 1695), inherited the barony of Howard of Effingham on the death of his cousin, Charles, in 1681; and Francis's son, Francis (1683-1743), was created earl of Effingham in 1731. This earldom became extinct on the death of Richard, the fourth holder, in

18 16; but it was created again in 1837 in favour of Kenneth Alexander(1 767-1 845} , another of William Howard's descendants,

KtSQWE, BLIASˆHQWE, JOSEPH

s 35

who had succeeded to the barony of Howard of Effingham in

1816.

HOWE, ELIAS (1819-1867), American sewing-machine inventor, was born in Spencer, Massachusetts, on the 9th of July 1819. His early years were spent on his father's farm. In 1835 he entered the factory of a manufacturer of cotton-machinery at Lowell, Massachusetts, where he learned the machinist's trade. Subsequently, while employed in a machine shop at Cambridge, Mass., he conceived the idea of a sewing machine, and for five years spent all his spare time in its development. In September 1846 a patent for a practical sewing machine was granted to him; and Howe spent the following two years (1847-1849) in London, employed by William Thomas, a corset manufacturer, to whom he had sold the English rights for £250. Years of disappointment and discouragement followed before he was successful in introducing his invention, and several imitations which infringed his patent, particularly that of Isaac Merritt Singer (1811-1875), had already been successfully introduced and were widely used. His rights were established after much litigation in 1854, and by the date of expiration of his patent (1867) he had realized something over $2,000,000 out of his invention. He died in Brooklyn, New York, on the 3rd of October 1867.

See History of the Sewing Machine and of Elias Howe, Jr., the Inventor (Detroit, 1867); P. G. Hubert, Jr., Inventors, in " Men of Achievement " series (New York, 1893).

HOWE, JOHN (1630-1706), English Puritan divine, was born on the 17th of May 1630 at Loughborough, Leicestershire, where his father was vicar. On the 19th of May 1647 he entered Christ's College, Cambridge, as a sizar, and in the following year took his degree of B.A. During his residence at the univer- sity he made the acquaintance of Ralph Cudworth,; Henry More and John Smith, from intercourse with whom, as well as from direct acquaintance with the Dialogues themselves, his mind received that " Platonic tinge " so perceptible in his writings. Immediately after graduation at Cambridge, he migrated to Oxford, where he became fellow and chaplain of Magdalen College, proceeding M.A. in 1652. He was then ordained by Charles Herle (1598-1659), the Puritan rector of Winwick, and in 1654 went as perpetual curate to Great Torring- ton in Devon, where he preached the discourses which later took shape in his treatises on The Blessedness of the Righteous and on Delighting in God. In the beginning of 1657 a journey to London accidentally brought Howe under the notice of Cromwell, who made him his domestic chaplain. In this position his conduct was such as to win the praise of even the bitterest enemies of his party. Without overlooking his fellow-Puritans, he was always ready to help pious and learned men of other schools. Seth Ward (afterwards bishop of Exeter) and Thomas Fuller were among those who profited by Howe's kindness, and were not ashamed subsequently to express their gratitude for it. On the resignation of Richard Cromwell, Howe returned to Great Torrington, to leave it again in 1662 on the passing of the Act of Uniformity. For several years he led a wandering and uncertain life, preaching in secret as occasion offered to handfuls of trusted hearers. Being in straits he published in 1668 The Blessedness of the Righteous ; the reputation which he thus acquired procured him an invitation from Lord Massereene, of Antrim Castle, Ireland, with whom he lived for five or six years as domestic chaplain, frequently preaching in public, with the approval of the bishop of the diocese. Here too he produced the most eloquent of his shorter treatises, The Vanity of Man as Mortal, and On Delighting in God, and planned his best work, The Living Temple. In the beginning of 1676 he accepted an invitation to become joint-pastor of a non- conformist congregation at Haberdashers' Hall, London; and in the same year he published the first part of The Living Temple entitled Concerning God's Existence and his Conversableness with Man: Against Atheism or the Epicurean Deism. In 1677 appeared his tractate On the Reconcileableness of God's Prescience of the Sins of Men with the Wisdom and Sincerity of His Counsels, Exhortations and whatsoever means He uses to prevent them,

which was attacked from various quarters, and had Andrew Marvell for one of its defenders. On Thoughtfulness for the Morrow followed in 1681; Self- Dedication and Union among Protestants in 1682, and The Redeemer's Tears wept over Lost Souls in 1684.

For five years after his settlement in London Howe enjoyed comparative freedom, and was on not unfriendly terms with many eminent Anglicans, such as Stillingfleet, Tillotson, John Sharp and Richard Kidder; but the greater severity which began to be exercised towards nonconformists in 1681 so inter- fered with his liberty that in 1685 he gladly accepted the invita- tion of Philip, Lord Wharton, to travel abroad with him. In 1686 he determined to settle for a time at Utrecht, where he officiated in the English chapel. Among his friends there was Gilbert Burnet, by whose influence he. obtained several con- fidential interviews with William of Orange. In 1687 Howe availed himself of the declaration for liberty of conscience to return to England, and in the following year he headed the deputation of nonconformist ministers who went to congratulate William on his accession to the English throne. The remainder of his life was uneventful. His influence was always on the side of mutual forbearance, between conformists and dissenters in 1689, and between Congregationalists and Presbyterians in 1690. In 1693 he published three discourses On the Carnality of Religious Contention., suggested by the disputes that became rife among nonconformists as soon as liberty of doctrine and worship had been granted. In 1694 and 1695 he published various treatises on the subject of the Trinity, the principal being A Calm and Solemn Inquiry concerning the Possibility of a Trinity in the Godhead. The second part of The Living Temple, entitled Animadversions on Spinosa and a French Writer pretending to confute him, with a recapitulation of the former part and an account of the destitution and restitution of God's Temple among Men, appeared in 1 702. In 1 701 he had some controversy with Daniel Defoe on the question of occasional conformity. In 1705 he published a discourse On Patience in the Expectation of Future Blessedness, but his health had begun to fail, and he died in London on the 2nd of April 1706. Richard Cromwell visited him in his last illness.

Though excelled by Baxter as a pulpit orator, and by Owen in exegetical ingenuity and in almost every department of theological learning, Howe compares favourably with either as a sagacious and profound thinker, while he was much more successful in combining religious earnestness and fervour of conviction with large-hearted tolerance and cultured breadth of view. He was a man of high principle and fine presence, and it was said of him " that he never made an enemy and never lost a friend."

The works published in his lifetime, including a number of sermons, were collected into 2 vols. fol. in 1724, and again reprinted in 3 vols. 8vo. in

1848. A complete edition of the Whole Works, including much posthumous and additional matter, appeared with a memoir in 8 vols, in 1822; this was reprinted in 1 vol. in 1838 and in 6 vols, in 1862-1863. E. Calamy's Life (1724) forms the basis of The Life and Character of Howe, with an Analysis of his Writings, by Henry Rogers (1836, new ed. 1863). See also a sketch by R. F. Horton (1896).

HOWE, JOSEPH (1804-1873), Canadian statesman, was born at Halifax, Nova Scotia, on the 13th of December 1804, the son of John Howe (1752-1835), a United Empire Loyalist who. was for many years king's printer and postmaster-general for the Maritime Provinces and the Bermudas. He received little regular education, and at the age of 13 entered his father's office. In 1827 he started the Acadian, a weekly non-political journal, but soon sold it, and in 1828 purchased the Nova Scotian, which later became amalgamated with the Morning Chronicle. From this date he devoted increasing attention to political affairs, and in 1835 was prosecuted for libelling the magistrates of Halifax. Being unable to find a lawyer willing to undertake his case, he pleaded it himself, and won his acquittal by a speech of over six hours, which secured for Nova Scotia the freedom of the press and for himself the reputation of an orator. In 1836 he was elected member for Halifax in the provincial assembly, and during the next twelve years devoted himself to attaining

responsible government for Nova Scotia. This brought him into fierce conflict with the reigning oligarchy and with the lieutenant- governor, Lord Falkland (1803-1884), whom he forced to resign. Largely owing to Howe's statesmanship responsible government was finally conceded in 1848 by the imperial authorities, and was thus gained without the bloodshed and confusion which marked its acquisition in Ontario and Quebec. In 1850 he was appointed a delegate to England on behalf of the Intercolonial railway, for which he obtained a large imperial guarantee. In 1854 he resigned from the cabinet, and was appointed chief commissioner of railways. In 1855 he was sent by the imperial government to the United States in connexion with the Foreign Enlistment Act, to raise soldiers for the war in the Crimea. Through the rashness of others he got into difficulties, and was attacked in the British House of Commons by Mr Gladstone, whom he compelled to apologize.

In 1855 he was defeated by Mr (afterwards Sir Charles) Tupper, but was elected by acclamation in the next year in Hants county, and was from i860 to 1863 premier of Nova Scotia. In the latter years he was appointed

by the imperial government fishery commissioner to the United States, and thus took no part in the negotiations for confederation. Though his eloquence had done more than anything else to make practicable a union of the British North American provinces, he opposed confederation, largely owing to wounded vanity; but on finding it impossible to obtain from the imperial authorities the repeal of the British North America Act, he refused to join his associates in the extreme measures which were advocated, and on the promise from the Canadian government of better financial terms to his native province, entered (on the 30th of January i860) the cabinet of Sir John Macdonald as president of the council. This brought upon him a storm of obloquy, under which his health gradually gave way. In May 1873 he was appointed lieutenant-governor of Nova Scotia, but died suddenly on the 1st of June of the same year.

Howe's eloquence, and still more his unfailing wit and high spirits, made him for many years the idol of his province. He is the finest orator whom Canada has produced, and also wrote poetry, which shows in places high merit. Many of his sayings are still current in Nova Scotia. In 1904 a statue in his honour was erected in Halifax.

His Letters and Speeches were published in 1858 in Boston, Mass., in 2 vols., edited nominally by William Annand, really by himself. See also Public Letters and Speeches of Joseph Howe (Halifax, 1909). The Life and Times by G. E. Fenety (1896) is poor. The Life by the Hon. James W. Longley (Toronto, 1904) is dispassionate, but otherwise mediocre. Joseph Howe, by George Monro Grant (reprinted Halifax, 1904), is a brilliant sketch. (W. L. G.)

HOWE, JULIA WARD (1819-1910), American author and

reformer, was born in New York City on the 27th of May 1819.

Her father, Samuel Ward, was a banker; her mother, Julia

Rush [Cutler] (1 796-1824), a poet of some ability. When only

sixteen years old she had begun to contribute poems to New

York periodicals. In 1843 she married Dr Samuel Gridley

Howe (q.v.), with whom she spent the next year in England,

France, Germany and Italy. She assisted Dr Howe in editing

the Commonwealth in 1851-1853. The results of her study of

German philosophy were seen in philosophical essays; in lectures on " Doubt and Belief," " The Duality of Character," &c, delivered in 1860-1861 in her home in Boston, and later in Washington; and in addresses before the Boston Radical Club and the Concord school of philosophy. Samuel Longfellow, his brother Henry, Wendell Phillips, W.-L. Garrison, Charles Sumner, Theodore Parker and James Freeman Clarke were among her friends; she advocated abolition, and preached occasionally from Unitarian pulpits. She was one of the organizers of the American Woman-Suffrage Association and of the Association for the Advancement of Women (1869), and in 1870 became one of the editors of the Woman's Journal, and in 1872 president of the New England Women's Club. In the same year she was a delegate to the Prison Reform Congress in London, and founded there the Woman's Peace Association, one of the many ways in which she expressed her opposition to war. She wrote The World's Own (unsuccessfully played at Wallack's, New York, in 1855, published 1857), and in 1858, for Edwin Booth, Hippolytus, never acted or published. Her lyric poetry, thanks to her temperament, and possibly to her musical training, was her highest literary form: she published Passion Flowers (anonymously, 1854), Words for the Hour (1856), Later Lyrics (1866), and From Sunset Ridge : Poems Old and New (1898); her most popular poem is The Battle Hymn of the Republic, written to the old folk-tune associated with the song of " John Brown's Body," when Mrs Howe was at the front in 1861, and published (Feb. 1862) in the Atlantic Monthly, to which she frequently contributed. She edited Sex and Education (1874), an answer to Sex in Education (1873) by Edward Ham- mond Clarke (1820-1877); and wrote several books of travel, Modern Society (1880) and Is Polite Society Polite ? (1895), collections of addresses, each taking its title from a lecture criticizing the shallowness and falseness of society, the power of money, &c, A

Memoir of Dr Samuel G. Howe (1876), Life of Margaret Fuller (1883), in the " Famous Women " series. Sketches of Representative Women of New England (1905) and her own Reminiscences (Boston, 1899). Her children were: Julia Romana Anagnos (1844-1886), who, like her mother, wrote verse and studied philosophy, and who taught in the Perkins Institution, in the charge of which her husband, Michael Anagnos (183 7-1 906), whose family name had been Anagnostopoulos, succeeded her father; Henry Marion Howe (b. 1848), the eminent metallurgist, and professor in Columbia University; Laura Elizabeth Richards (b. 1850), and Maud Howe Elliott (b. 1855), wife of John Elliott, the painter of a fine ceiling in the Boston library, — both these daughters being contributors to literature. Mrs Howe died on the 17th of October 1910.

HOWE, RICHARD HOWE, Earl (17 26-1 799), British admiral, was born in London on the 8th of March 1726. He was the second son of Emmanuel Scrope Howe, 2nd Viscount Howe, who died governor of Barbadoes in March 1735, and of Mary Sophia Charlotte, a daughter of the baroness Kilmansegge, afterwards countess of Darlington, the mistress of George I.— a relationship which does much to explain his early rise in the navy. Richard Howe entered the navy in the " Severn," one of the squadron sent into the south seas with Anson in 1740. The " Severn " failed to round the Horn and returned home. Howe next served in the West Indies in the " Burford," and was present in her when she was very severely damaged in the unsuccessful attack on La Guayra on the 18th of February 1742. He was made acting-lieutenant in the West Indies in the same year, and the rank was confirmed in 1 744. During the Jacobite rising of 1745 he commanded the "Baltimore" sloop in the North Sea, and was dangerously wounded in the head while co-operating with a frigate in an engagement with two strong French privateers. In 1746 he became post-captain, and com- manded the " Triton " (24) in the West Indies. As captain of the " Cornwall " (80), the flagship of Sir Charles Knowles, he was in the battle with the Spaniards off Havana on the 2nd of October 1 748. While the peace between the War of the Austrian Succession and the Seven Years' War lasted, Howe held com- mands at home and on the west coast of Africa. In 1755 he went with Boscawen to North America as captain of the " Dun- kirk " (60), and his seizure of the French " Alcide " (64) was the first shot fired in the war. From this date till the peace of 1763 he served in the Channel in various more or less futile expeditions against the coast of France, with a steady increase of reputation as a firm and skilful officer. On the 20th of November 1759"" he led Hawke's fleet as captain of the " Magnanime " (64) in the magnificent victory of Quiberon.

By the death of his elder brother, killed near Ticonderoga on the 6th of July 1758, he became Viscount Howe-ˆan Irish peerage. In 1762 he was elected M.P. for Dartmouth, and held the seat till he received a title of

Great Britain. During 1763 and 1765 he was a member of the Admiralty board, and from 1765 to 1 7 70 was treasurer of the navy. In that year he was promoted rear-admiral, and in 1775 vice-admiral. In 1776 he was appointed to the command of the North American station. The rebellion

of the colonies was making rapid progress, and Howe was known to be in sympathy with the colonists. He had sought the acquaintance of Benjamin Franklin, who was a friend of his sister Miss Howe, a clever eccentric woman well known in London society, and had already tried to act as a peacemaker. It was doubtless because of his known sentiments that he was selected to command in America, and was joined in commission with his brother Sir William Howe, the general at the head of the land forces, to make a conciliatory arrangement. A committee appointed by the Continental Congress conferred with the Howes in September 1776 but nothing was accomplished. The appoint- ment of a new peace commission in 1778 offended the admiral deeply, and he sent in a resignation of his command. It was reluctantly accepted by Lord Sandwich, then First Lord, but before it could take effect France declared war, and a powerful French squadron was sent to America under the count d'Estaing. Being greatly outnumbered, Howe had to stand on the defensive, but he baffled the French admiral at Sandy Hook, and defeated his attempt to take Newport in Rhode Island by a fine combina- tion of caution and calculated daring. On the arrival of Admiral John Byron from England with reinforcements, Howe left the station in September. Until the fall of Lord North's ministry in 1782 he refused to serve, assigning as his reason that he could not trust Lord Sandwich. He considered that he had not been properly supported in America, and was embittered both by the supersession of himself and his brother as peace commis- sioners, and by attacks made on him by the ministerial writers in the press.

On the change of ministry in March 1782 he was selected to command in the Channel, and in the autumn of that year, September, October and November, he carried out the final relief of Gibraltar. It was a difficult operation, for t

Lord Howe married, on the 10th of March 1758, Mary Hartop, the daughter of Colonel Chiverton Hartop of Welby in Leicester- shire, and had issue two daughters. His Irish title descended to his brother William, the general, who died childless in 1814. The earldom, and the viscounty of the United Kingdom, being

limited to heirs male, became extinct, but the barony, being to heirs general, passed to his daughter, Sophia Charlotte (1 762-1835), who married the Hon. Penn Assheton Curzon. Their son, Richard William Curzon (1796-1870), who succeeded his paternal grandfather as Viscount

Curzon in 1820, was created Earl Howe in 1821; he was succeeded by his son, George Augustus (1821-1876), and then by another son, Richard William (1822-1900), whose son Richard George Penn Curzon-Howe (b. 1861) became 4th Earl Howe in 1900.

The standard Life is by Sir John Barrow (1838). Interesting reminiscences will be found in the Life of Codrington, by Lady Bourchier. Accounts of his professional services are in Charnock's Biographia Navalis, v. 457, and in Rail s Naval Biographies, i. 83. See also Beatson's Naval and Military Annals, James's Naval History, and Chevalier's Histoire de la Marine francaise, vols. i. and ii. (D. H.)

HOWE, SAMUEL GRIDLEY (1801-1876), American philan- thropist, was born at Boston, Massachusetts, on the 10th of November 1801. His father, Joseph N. Howe, was a ship-owner and cordage manufacturer; and his mother, Patty Gridley, was one of the most beautiful women of her day. Young Howe was educated at Boston and at Brown University, Providence, and in 182 1 began to study medicine in Boston. But fired by enthusiasm for the Greek revolution and by Byron's example, he was no sooner qualified and admitted to practice than he abandoned these prospects and took ship for Greece, where he joined the army and spent six years of hardship amid scenes of warfare. Then, to raise funds for the cause, he returned to America; his fervid appeals enabled him to collect about $60,000, which he spent on provisions and clothing, and he established a relief depot near Aegina, where he started works for the refugees, the existing quay, or American Mole, being built in this way. He formed another colony of exiles on the Isthmus of Corinth. He wrote a History of the Greek Revolution, which was published' in 1828, and in 1831 he returned to America. Here a new object of interest engaged him. Through his friend Dr John D. Fisher (d. 1850), a Boston physician who had started a movement there as early as 1826 for establishing a school for the blind, he had learnt of the similar school founded in Paris by Valentin Haiiy, and it was proposed to Howe by a committee organized by Fisher that he should direct the establishment of a " New England Asylum for the Blind " at Boston. He took up the project with characteristic ardour, and set out at once for Europe to investigate the problem. There he was temporarily diverted from his task by becoming mixed up with the Polish revolt, and, in pursuit of a mission to carry American contributions across the Prussian frontier, he was arrested and imprisoned at Berlin, but was at last released through the intervention of the American minister at Paris. Returning to Boston in July 1832, he began receiving a few blind children at his father's house in Pleasant Street, and thus sowed the seed which grew into the famous Perkins Institution. In January 1833 the funds available were all spent, but so much progress had been shown that the legislature voted $6000, later increased to $30,000 a year, to the institution on condition

that it should educate gratuitously twenty poor blind from the state; money was also contributed from Salem, and from Boston, and Colonel Thomas H. Perkins, a prominent Bostonian, presented his mansion and grounds in Pearl Street for the school to be held there in perpetuity. This building being later found unsuitable, Colonel Perkins consented to its sale, and in 1839 the institution was moved to South Boston, to a large building which had previously been an hotel. It was henceforth known as the " Perkins Institutfba and Massachusetts Asylum (or, since 1877, School) for the Blind." Howe was director, and the life and soul of the school; he opened a printing-office and organized a fund for printing for the blind — the first done in America; and he was unwearied in calling public attention to the work. The Institution, through him, became one of the intellectual centres of American phil- anthropy, and by degrees obtained more and more financial support. In 1837 Dr Howe went still further and brought the famous blind deaf-mute, Laura Bridgman (q.v.) to the school.

It must suffice here to chronicle the remaining more important facts in Dr Howe's life, outside his regular work. In 1843 he married Julia Ward (see above), daughter of a New York banker, and they made a prolonged European trip, on which Dr Howe spent much time in visiting those public institutions which carried out the objects specially interesting to him. In Rome, in 1844, his eldest daughter, Julia Romana (afterwards the wife of Michael Anagnos, Dr Howe's assistant and successor), was born, and in September the travellers returned to America, and Dr Howe resumed his activities. In 1846 he became interested in the condition and treatment of idiots, and particularly in the experiments of Dr Guggenbuhl on the cretins of Switzerland. He became chairman of a state commission of inquiry into the number and condition of idiots in Massachusetts, and the report of this commission, presented in 1848, caused a profound sensa- tion. An appropriation of $2500 per annum was made for training ten idiot children under Dr Howe's supervision, and by degrees the value of his School for Idiotic and Feeble-minded Youths, which, starting in South Boston, was in 1890 removed to Waltham, was generally appreciated. It was the first of its kind in the United States. An enthusiastic humanitarian on all subjects, Dr Howe was an ardent abolitionist and a member of the Free Soil party, and had played a leading part at Boston in the movements which culminated in the Civil War. When it broke out he was an active member of the sanitary commission. In 1871 he was sent to Santo Domingo as a member of the commission appointed by President Grant to examine the condition of the island, the government of which desired annexa- tion; and when that scheme was defeated through Sumner's opposition he returned

(1872) as the representative of the Samana Bay Company, which proposed to take a lease of the Samana peninsula; but though in 1874 he revisited the island, it was only to see the flag of the company hauled down. His health was then breaking and began soon after to fail rapidly, and on the 9th of January 1876 he died at Boston. The governor of the state sent a special message of grief to the legislature on his death, eulogies were delivered in the two houses, and a public memorial service was held, at which Dr O. W. Holmes read a poem. Whittier had in his lifetime commemorated him in his poem " The Hero," in which he called him " the Cadmus of the blind "; and in 1901 a centennial celebration of his birth was held at Boston, at which, among other notable tributes, Senator Hoar spoke of Howe as " one of the great figures of American history."

A Memoir of Dr Howe by his wife appeared in 1876. See also the Letters and Journals of S. G. Howe, edited bv Laura E. Richards (1910). (H. Ch.)

HOWE, WILLIAM HOWE, 5™ Viscount (1729-1814), British general, was the younger brother of George Augustus, 3rd viscount, killed in the Ticonderoga expedition of 1758, and of Richard, 4th viscount and afterwards Earl Howe, the admiral. He entered the cavalry in 1746, becoming lieutenant a year later. On the disbanding of his regiment in 1749 he was made captain- lieutenant and shortly afterwards captain in Lord Bury's (20th) regiment, in which Wolfe was then a field officer. Howe became major in 1756 and lieutenant-colonel in 1757 of the 58th (now Northampton) regiment, which he commanded at the capture of Louisburg. In Wolfe's expedition to Quebec he distinguished himself greatly at the head of a composite light battalion. He led the advanced party in the landing at Wolfe's Cove and took part in the battle of the Plains of Abraham which followed. He commanded his own regiment in the defence of Quebec in 1 7 59- 1760, led a brigade in the advance on Montreal and took part on his return to Europe in the siege of Belleisle (1761). He was adjutant-general of the force which besieged and took Havana in 1762, and at the close of the war had acquired the reputation of being one of the most brilliant of the junior officers of the army. He was made colonel of the 46th foot in 1764 and lieutenant- governor of the Isle of Wight four years later. From 1 7 58 to 1 780 he was M.P. for Nottingham. In 1772 he became major-general, and in 1774 he was entrusted with the training of light infantry companies on a new system, the training-ground being Salisbury Plain.

Shortly after this he was sent out to North America. He did not agree with the policy of the government towards the colonists, and regretted in particular that he was sent to Boston, where the memory of his eldest brother was still cherished by the inhabitants, and General Gage, in whom he had no confidence, commanded in chief. He was the senior officer after Gage, and led the troops actively engaged in the storming of Bunker Hill,

he himself being in the thickest of the fighting. In the same year Howe was made a K.B. and a lieutenant-general, and appointed, with the local rank of general, to the chief command in the seat of war. For the events of his command see American War of Inde- pendence. He retained it until May 1778 — on the whole with success. The cause of his resignation was his feeling that the home government had not afforded the proper support, and after his return to England, he and his brother engaged in a heated but fruitless controversy with the ministers. Howe's own defence is embodied in Narrative of Sir William Howe before a Committee of the House of Commons (London, 1780). In 1782 Howe was made lieutenant-general of the ordnance; in 1790 he was placed in command of the forces organized for action against Spain, and in 1793 he was made a full general. He held various home commands in the early part of the French revolutionary war, in particular that of the eastern district at the critical moment when the French established their forces on the Dutch coast. When Earl Howe died in 1799, Sir William succeeded to the Irish viscounty. He had been made governor of Berwick-on- Tweed in 1795, and in 1805 he became governor of Plymouth, where he died on the 12th of July 1814. With his death the Irish peerage became extinct.

HOWEL DDA ("the Good ") (d. 950), prince of Deheubarth (South Central Wales) from before 915, and king of Wales from 943 to 950, was the grandson of Rhodri Mawr (the Great), who had united practically the whole of Wales under his supremacy. As Idwal Voel succeeded his father Anarawd, the elder son of Rhodri, as lord of Gwynedd in 915, so Howel at some time before that date succeeded Rhodri's younger son Cadell as prince of Deheubarth. Howel married Elen, daughter of the last king of Dyfed, and also added Kidweli and Gwyr to his dominions, while on the death of Idwal, who was slain by the English in 943, he took possession of Gwynedd. Both these princes had done homage to the English kings, Edward the Elder and Aethelstan, in 922 and 926, and we find that Howel attended the witans of the English kingdom and witnessed about ten charters between the years 931 and 949. He was secure, therefore, from attack on the eastern side of his kingdom, and it is not certain whether he was engaged in any of the battles recorded during these years in Wales, either in M6n 914, at Dinas Newydd 919 or at Brun 935. To the peaceful character of his reign is probably due the high place which he holds among the Welsh princes. From 943 to 950 Howel Dda was probably ruler of all Wales except Powys (apparently dependent on Mercia), Brecheiniog, Buallt, Gwent and Morgannwg. With Morgan Hen, king of Morgannwg, Howel had a dispute which was eventually settled in favour of the former at the court of the English king. Howel died in 950, and such unity as he had preserved at once disappeared in a war between his sons and those of Idwal Voel. The code of laws attributed to this prince is perhaps his chief

claim to fame. He is said to have summoned four men from each cantref in his dominions to the Ty Gwyn (perhaps Whitland in Caermarthen- shire) to codify existing custom. Three codes, accordingly called Venedotian,Demetian and Gwentian, are said to have been written down by Bleggwryd, archdeacon of Llandaff (see Welsh Laws% See Sir John Rhys and Brynmor-Jones, The Welsh People (London, 1900); and Aneurin Owen, Ancient Laws and Institutions of Wales (London, 1841).

HOWELL, JAMES (c. 1 594-1666), British author, who came of an old Welsh family, was born probably at Abernant, in Carmarthenshire, where his father was rector. From the free grammar school at Hereford he went to Jesus College, Oxford, and took his degree of B.A. in 1613. About 1616 he was steward in Sir Robert Mansell's glass-works in Broad Street, and was commissioned to go abroad to procure the services of expert

workmen. It was not till 1622 that he returned, having visited Holland, France, Spain and Italy. With the intention of utiliz- ing to better purpose his knowledge of continental languages and methods, he left the glass business and applied for a diplo- matic post. Failing to obtain this, he was for a short time tutor in a nobleman's family. At the close of 1622 he was sent on a special mission to Madrid to obtain redress for the seizure of an English vessel, but, owing to the presence at the Spanish court of Prince Charles and the duke of Buckingham to arrange a marriage between the prince and the infanta of Spain, the negotiations had to be broken off. He made many friends among the prince's retinue, and, after his return in 1624, applied for employment to the duke of Buckingham, but without success. In 1626 he became secretary to Lord Scrope, Lord President of the North at York, and retained the office under Scrope's successor, Thomas Wentworth. In 1627 he was elected M.P. for Richmond; in 1632 he was sent as secretary to the embassy of the earl of Leicester to Denmark; and in 1642 the king appointed him one of the clerks of the privy council. In 1643 he was committed to the Fleet prison by the parliament, accord- ing to his own account, on suspicion of royalist leanings, or, as Anthony a Wood says, for debt. Whatever the reason, he remained in prison until 1651. He had acquired considerable fame by his allegorical AevSp6\cryla: Dodona's Grove, or the Vocall Forest, published in 1640, and his Instructions for Forreine Travell (1642), which has been described as the first continental handbook; and now he was driven to maintain himself by his pen. He edited and supplemented (1650) Cotgrave's French and English dictionary, compiled Lexicon Tetraglotton, or an English, French, Italian and Spanish Dictionary (London, 1660), trans- lated various works from Italian and

Spanish, wrote a life of Louis XIII. and issued a number of political pamphlets, varying the point of view somewhat to suit the changes of the time. Among these tracts may be mentioned a rather malicious Perfect Description of the People and Country of Scotland, which was revived by John Wilkes and printed in the North Briton during the agitation directed against Lord Bute. In 1660 he asked for the place of clerk of the privy council; and, though this was not granted' him, the post of historiographer royal was created for him. In 1661 he applied for the office of tutor in foreign languages to the infanta Catherine of Braganza, and in 1662 published an English Grammar translated into Spanish. He was buried in the Temple Church on the 3rd of November 1666, having realized to the last his favourite motto, " Senesco non segnesco."

All Howell's writings are imbued with a certain simplicity and quaintness. His elaborate allegories are forgotten; his linguistic labours, of value in their time, are now superseded; but his Letters, the Epistolae Ho-elianae (four volumes issued in 1645, 1647, 1650 and 1655), are still models of their kind. Their dates are often fictitious, and they are, in nearly every case, evidently written for publication. Thackeray said that the Letters was one of his bedside books. He classes it with Montaigne and says he scarcely ever tired of " the artless prattle " of the " priggish little clerk of King Charles's council."

The Epistolae have been frequently edited, notably by J. Jacobs in 1890, with a commentary (1891), and Agnes Repplier (1907).

HOWELLS, WILLIAM DEAN (1837-), American novelist, was born at Martin's Ferry, Ohio, on the 1st of March 1837. His father, William Cooper Howells, a printer-journalist, moved in 1840 to Hamilton, Ohio, and here the boy's early life was spent successively as type-setter, reporter and editor in the offices of various newspapers. In the midst of routine work he contrived to familiarize himself with a wide range of authors in several modern tongues, and to drill himself thoroughly in the use of good English. In i860, as assistant editor of the leading Re- publican newspaper in Ohio, he wrote— in connexion with the Presidential contest — the campaign life of Lincoln; and in the same year he was appointed consul at Venice, where he remained till 1865. On his return to America he joined the staff of the Atlantic Monthly, and from 1872 to 1881 he was its editor-in-chief. Since 1885 he has lived in New York. For a time he

conducted for Harper's Magazine the department called " The Editor's Study," and in December 1900 he revived for the same periodical the department of " The Easy Chair," which had lapsed with the death of George William Curtis. Of Mr Howells's many novels, the following may be mentioned as specially noteworthy: Their Wedding Journey (1872); The

Lady of the Aroostook (1879); A Modern Instance (1882); The Rise of Silas Lapham (1885); The Minister's Charge (1886); A Hazard of New Fortunes (1889); The Quality of Mercy (1892); The Landlord at Lion's Head (1897). He also published Poems (1873 and 1886); Stops of Various Quills (1895), a book of verse; books of travel; several amusing farces; and volumes of essays and literary criticism, among others, Literary Friends and Acquaintance (1901), which contains much autobiographical matter, Literature and Life (1902), and English Films (1905).

Howells is by general consent the foremost representative of the realistic school of indigenous American fiction. From the outset his aim was to portray life with entire fidelity in all its commonplaceness, and yet to charm the reader into a liking for this commonplaceness and into reverence for what it conceals. Though in his earliest novels his method was not consistently realistic — he is at times almost as personal and as whimsical as Thackeray— yet his vivid impressionism and his choice of sub- jects, as well as an occasional explicit protest that " dulness is dear to him," already revealed unmistakably his realistic bias. In A Modern Instance (1882) he gained complete command of his method, and began a series of studies of American life that are remarkable for their loyalty to fact, their truth of tone, and their power to reveal, despite their strictly objective method, both the inner springs of American character and the sociological forces that are shaping American civilization. He refuses to over- sophisticate or to over-intellectualize his characters, and he is very sparing in his use of psychological analysis. He insists on seeing and portraying American life as it exists in and for itself, under its own skies and with its own atmosphere; he does not scrutinize it with foreign comparisons in mind, and thus try to find and to throw into relief unsuspected configurations of surface. He keeps his dialogue toned down to almost the pitch of everyday conversation, although he has shown in his comedy sketches how easy a master he is of adroit and witty talk.

See also J. M. Robertson, Essays towards a Critical Method (London, 1889); H. C. Vedder, American Writers (Boston, 1894).

HOWITT WILLIAM, (1792-1879), English author, was born on the 18th of December 1792 at Heanor, Derbyshire. His parents were Quakers, and he was educated at the Friends' public school at Ackworth, Yorkshire. In 1814 he published a poem on the " Influence of Nature and Poetry on National Spirit." He married, in 1821, Mary Botham (1799-1888), like himself a Quaker and a poet. William and Mary Howitt col- laborated throughout a long literary career, the first of their joint productions being The Forest Minstrels and other Poems (1821). In 1 83 1 William Howitt produced a work for which his habits of observation and his genuine love of nature peculiarly fitted him. It was a history of the changes in the face

of the out- side world in the different months of the year, and was entitled The Book of the Seasons, or the Calendar of Nature (183 1). His Popular History of Priestcraft (1833) won for him the favour of active Liberals and the office of alderman in Nottingham, where the Howitts had made their home. They removed in 1837 to Esher, and in 1840 they went to Heidelberg, primarily for. the education of their children, remaining in Germany for two ytSts. In 1 841 William Howitt produced, under the pseudonym of " Dr Cornelius," The Student Life of Germany, the first of a series of works on German social life and institutions. Mary Howitt devoted herself to Scandinavian literature, and between 1842 and 1863 she translated the novels of Frederika Bremer and many of the stories of Hans Andersen. With her husband she wrote in 1852 The Literature and Romance of Northern Europe. In June of that year William Howitt, with two of his sons, set sail for Australia, where he spent two years in the goldfields. The results of his travels appeared in A Boy's

Adventures in the Wilds of Australia (1854), Land, Labour and Gold; or, Two Years in Victoria (1855) and Tallangetta, the Squatter's Home (1857). On his return to England Hewitt had settled at Highgate and resumed his indefatigable book-making. From 1856 to 1862 he was engaged on CasselPs Illustrated History of England, and from 1861 to 1864 he and his wife worked at the Ruined Abbeys and Castles of Great Britain. The Howitts had left the Society of Friends in 1847, and became interested in spiritualism. In 1863 appeared The History of the Super-natural in all Ages and Nations, and in all Churches, Christian and Pagan, demonstrating a Universal Faith, by William Howitt. He added " his own conclusions from a practical examination of the higher phenomena through a course of seven years." From 1870 onwards Howitt "spent the summers in Tirol and the winters in Rome, where he died on the 3rd of March 1879. Mary Howitt was much affected by his death, and in 1882 she joined the Roman Catholic Church, towards which she had been gradually moving during her connexion with spiritualism. She died at Rome on the 30th of January 1888. The Howitts are remembered for their untiring efforts to provide wholesome and instructive literature. Their son, Alfred William Howitt, made himself a name by his explorations in Australia. Anna Mary Howitt married Alaric Alfred Watts, and was the author of Pioneers of the Spiritual Reformation (1883).

Mary Howitt's autobiography was edited by her daughter.Margaret Howitt, in 1889. William Howitt wrote some fifty books, and his wife's publications, inclusive of translations, number over a hundred.

HOWITZER (derived, through an earlier form howitz, and the Ger. Haubilz, from the Bohemian houfnice = catapult, from which come also, through the Ital. obiza or obice, the French forms obus = shell and obusier = howitzer), a form of mobile ordnance in use from the 1 6th century up to the present day. It is a short and therefore comparatively light gun, which fires a heavy projectile at low velocity. A high angle of elevation is always given and the angle of descent of the projectile is con- sequently steep (up to 70°). On this fact is based the tactical use of the modern howitzer. The field howitzer is of the greatest value for " searching " trenches, folds of ground, localities, &c, which are invulnerable to direct fire, while the more powerful siege howitzer has, since the introduction of modern artillery and, above all, of modern projectiles, taken the foremost place amongst the weapons used in siege warfare. See Artillery, Ordnance and Fortification and Siegecraft. HOWLER, a name applied to the members of a group of tropical American monkeys, now known scientifically as Alouata, although formerly designated Mycetes. These monkeys, which are of large size, with thick fur, sometimes red and sometimes black in colour, are characterized by the inflation of the hyoid- bone (which supports the roof of the tongue) into a large shell- like organ communicating with the wind-pipe, and giving the peculiar resonance to the voice from which they take their title. To allow space for the hyoid, the sides of the lower jaw are very deep and expanded. The muzzle is projecting, and the profile of the face slopes regularly baskwards from the muzzle to the crown. The long tail is highly prehensile, thickly furred, with the under surface of the extremity naked. Howlers dwell in large companies, and in the early morning, and again in the evening, make the woods resound with their cries, which are often con- tinued throughout the night. They feed on leaves, and are in the habit of sitting on the topmost branches of trees. When active, they progress in regular order, led by an old male. (R. L.)*

HOWRAH, a city and district of British India, in the Burdwan division of Bengal. The city is situated opposite Calcutta, with which it is connected by a floating bridge. The municipal area is about n sq. m.; pop. (1901) 157,594, showing an increase of 35 % in the decade. Since 1872 the population has almost doubled, owing to the great industrial development that has taken place. Howrah is the terminus of the East Indian railway, and also of the Bengal-Nagpur and East Coast lines. It is also the centre of two light railways which run to Amta and Sheakhala. Further, it is the headquarters of the jute-manu- facturing industry, with many steam mills, steam presses, also

cotton mills, oil mills, rope-works, iron-works and engineering works. Sibpur Engineering College lies on the outskirts of the town. There is a hospital, with a department for Europeans, and Howrah forms a suburban residence for many people who have their place of business in Calcutta.

The District of Howrah extends southwards down the right bank of the Hugh to the confluence of the river Damodar. For revenue purposes it is included within the district of Hugh Its area is 510 sq. m.; pop. (1901) 850,514, showing an increase of 1 1 % in the decade. In addition to the two steam tramways and the East Indian railway, the district is crossed by the high- level canal to Midnapore, which communicates with the Hugh at Ulubaria. The manufacturing industries of Howrah extend beyond the city into the district. One or two systems of draining low-lying lands are maintained by the government.

HOWSON, JOHN SAUL (1816-1885), English divine, was born at Giggleswick-in-Craven, Yorkshire, on the 5th of May 1816. After receiving his early education at Giggleswick school, ol which, his father was head-master, he went to Trinity College, Cambridge, and there became tutor successively to the marquis of Sligo and the marquis of Lome. In 1845 Howson, having taken orders, accepted the post of senior classical master at the Liver- pool College under his friend W. J. Conybeare, whom he succeeded as principal in 1849. This post he held until 1865, and it was largely due to his influence that a similar college for girls was established at Liverpool. In 1866 he left Liverpool for the vicarage of Wisbech, and in 1867 he was appointed dean of Chester Cathedral, where he gave himself vigorously to the work of restoring the crumbling fabric, collecting nearly £100,000 in five years for this purpose. His sympathies were with the evangelical party, and he stoutly opposed the " Eastward position," but he was by no means narrow. He did much to reintroduce the ministry of women as deaconesses. The building of the King's School for boys, and the Queen's School for girls (both in Chester), was due in a great measure to the active interest which he took in educational matters. He died at Bournemouth on the 15th of December 1885, and was buried in the cloister garth of Chester. Howson's chief literary production was The Life and Epistles of St Paul (1852) in which he collabor-

ated with Conybeare.

The book is still of interest, especially for its descriptive passages, which were mostly done by Howson; but later researches (such as those of Sir W. M. Ramsay) have made the geographical and histori- cal sections obsolete, and the same may be said of the treatment of the Pauline theology.

HOWTH [pronounced Hoth], a seaside town of Co. Dublin, Ireland, on the rocky hill of Howth, which forms the northern horn of Dublin Bay, 9 m. N.E. by N. of Dublin by the Great Northern railway. Pop. (1901) 1166. It is frequented by the residents of the capital as a watering-place. The artificial harbour was formed (1807-1832) between the mainland and the picturesque island of Ireland's Eye, and preceded Kingstown as the station

for the mail-packets from Great Britain, but was found after its construction to be liable to silt, and is now chiefly used by fishing-boats and yachts. The collegiate church, standing picturesquely on a cliff above the sea, was founded about 1235, and has a monastic building attached to it. The embattled castle contains the two-handed sword of Sir Almeric Tristram, the Anglo-Norman conqueror of the hill of Howth. and a portrait of Dean Swift holding one of the Drapier letters, with Wood, the coiner against whom he directed these attacks, prostrate before him. The view of Dublin Bay from the hill of – Howth is of great beauty. Howth is connected with the capital by electric tramway, besides the railway, and another tramway encircles the hill.

HOXTER, a town of Germany, in the Prussian province of Westphalia, prettily situated on the left bank of the Weser, and on the Prussian state railways Borssum-Soest and Scherfede- Holzminden, 32 m. N. of Cassel. Pop. (1905) 7699. It has a medieval town hall, and interesting houses with high gables and wood-carved facades of the 15th and 16th centuries. The most interesting of the churches is the Protestant church of St Kilian,

irith a pulpit dating from 1595 and a font dating from 163 1. There are a gymnasium, a school of architecture and a monu- ment to Hoffmann von Fallersleben in the town. The Weser is crossed here by a stone bridge about 500 ft. in length, erected in 1833. On the Brunsberg adjoining the town there is an old watch-tower, said to be the remains of a fortress built by Bruno, brother of Widukind. Near Hoxter is the castle, formerly the Benedictine monastery, of Corvey. The principal manufactures of the town are linen, cotton, cement and gutta-percha, and there is also a considerable shipping trade. Hoxter (Lat. Huxaria) in the time of Charlemagne was a villa regie, and was the scene of a battle between him and the Saxons. Under the protection of the monastery of Corvey it gradually increased in prosperity, and became the chief town of the principality of Corvey. Later it asserted its independence and joined the Hanseatic League. It suffered severely during the Thirty Years' War. After the peace of Westphalia in 1648 it was united to Brunswick; in 1802 it was transferred to Nassau; and in 1807 to the kingdom of Westphalia, after the dismemberment of which, in 1814, it came into the possession of Prussia.

See Kampschulte, Chrohik der Stadt Hoxter (Hoxter, 1872).

HOY (Norse Haey, " high island "), the second largest island of the Orkneys, county of Orkney, Scotland. Pop. (1901) 1216. It has an

extreme length from N.W.to S.E.of 13I m.,its greatest breadth from E. to W. is 8 m., and its area occupies 53 sq. m. It is situated 2 m. S.W. of Pomona, from which it is separated by Hoy Sound. As seen from the west it rises abruptly from the sea, presenting in this respect a marked contrast to the rest of the isles of the Orcadian group, which as a whole are low-lying. Its eastern and southern shores are indented by numerous bays, one of which, Long Hope, forms a natural harbour 4 m. long, with a breadth varying from j m. to more than 1 m., affording to any number of vessels a haven of refuge from the roughest weather of the Pentland Firth. Off the eastern coast lie the islands of Graemsay, Cava, Risa, Fara, Flotta and Switha, while the peninsula of South Walls, forming the southern side of the harbour of Long Hope, is an island in all but name. Red and yellow sandstone cliffs, sometimes over 1000 ft. in height, stretch for 10 to 12 m. on the Atlantic front. The detached pillar or stack called the Old Man of Hoy (450 ft.) is a well-known landmark to sailors. The only break in this remarkable run of rocky coast is at Rackwick in the bight below the head of Rora. In the interior, Ward Hill (1564 ft.) is the loftiest summit in either the Orkneys or Shetlands. In the valley between Ward Hill and the ridge of the Hamars to the south-east is situated the famous Dwarfie Stone, an enormous block of sandstone measuring 28 ft. long, from n ft. to 145 ft. broad, and 6| ft. high at one end and 2 ft. high at the other, in which two rooms have been artificially hollowed out, traditionally believed to be the bed-chambers of Trolld, the dwarf of the sagas, and his wife. A boulder lying at the narrow end was supposed to be used to close the entrance. The generally accepted theory is that it was a pagan altar which some hermit afterwards converted into a cell. Other hills in the island are the Cuilags (1420 ft.) and the Knap of Trewieglen (1308 ft.), besides several peaks exceeding 1000 ft. in height. Hoy is commonly approached from Stromness, there being piers at Linksness, the nearest point to Graemsay, and at Hackness, South Ness and North Bay, the last three all on the harbour of Long Hope.

HOYLAKE, a watering-place in the Wirral parliamentary division of Cheshire. England, 8 m. W. of Birkenhead, on the Wirral railway. With West Kirby to the south, at the mouth of the estuary of the Dee, it forms the urban district of Hoylake and West Kirby. Pop. (1901) 10,011. The well-known links of the Royal Liverpool Golf Club are at Hoylake. The town has a considerable population of fishermen.

HOYLAND NETHER, an urban district in the Hallamshire parliamentary division of the West Riding of Yorkshire, England, SJ m. S.S.E. of Barnsley, on the Midland railway. Collieries and brickworks employ the large industrial population. Pop.

(1901) 12,464.

HOYLE, EDMUND, or Edmond (1672-1769), the first system- atizer of the laws of whist, and author of a book on games, was born in 1672. His parentage and place of birth are unknown, and few details of his life are recorded. For some time he was resident in London, and partially supported himself by giving instruction in the game of whist. For the use of his pupils he drew up a Short Treatise on the game, which after circulating for some time in manuscript was printed by him and entered at Stationers' Hall in November 1742. The laws of Hoyle continued to be regarded as authoritative until 1864, since which time they have been gradually superseded by the new rules adopted by the Arlington and Portland clubs in that year (see Whist). He also published rules for various other games, and his book on games, which includes the Short Treatise, has passed into many editions. The weight of his authority is indicated by the phrase " according to Hoyle," which, doubtless first applied with reference to whist, has gained currency as a general proverb. Hoyle died in London on the 29th of August 1769.

HOZIER, PIERRE D\ Seigneur de la Garde (1592-1660), French genealogist, was born at Marseilles on the 10th of July 1592. In 1616 he entered upon some very extensive researches into the genealogy of the noble families of the kingdom, in which work he was aided by his prodigious memory for dates, names and family relationships, as well as by his profound knowledge of heraldry. In 1634 he was appointed historiographer and genealogist of France, and in 1641 juge d'armes of France, an officer corresponding nearly to the Garter king-of-arms in England. In 1643 he was employed to verify the claims to nobility of the pages and equerries of the king's household. He accumulated a large number of documents, but published comparatively little, his principal works being Recueil armorial des anciennes maisons de Bretagne (1638); Les noms, surnoms, qualitez, armes et blasons des chevaliers ct qfficiers de I'ordre du Saint-Esprit (1634); and the genealogies of the houses of La Rochefoucauld (1654), Bournonville (1657) and Amanze (1659). He was renowned as much for his uprightness as for his knowledge, no slight praise in a profession exposed to so many temptations to fraud. He died in Paris on the 1st of December 1660. At his death his collections comprised more than 150 volumes or portfolios of documents and papers relating to the genealogy of the principal families in France. Of his six sons, only two survived him. His eldest son, Louis Roger d'Hozier (1634-1708), succeeded him as juge d'armes, but became blind in 1675, and was obliged to surrender his office to his brother.

Charles Rene d'Hozier (1640-1732), younger son of Pierre, was the true continuator of his father. In addition to his commentary appended to Antoine Varillas's history of King Charles IX. (1686 ed.), he published Recherches sur la noblesse de Champagne (1673). On the promulgation in

1696 of an edict directing all who had armorial bearings to register them on payment of 20 livres, he was employed to collect the declara- tions returned in the various generalites, and established the Armorial general de France. This work, which contained not only the armorial bearings of noble families, but also of those commoners who were entitled to bear arms, is not complete, inasmuch as many refused to register their arms, either from vanity or from a desire to evade the fee.

The collection (now in the Bibliotheque Nationale) consists of 34 volumes of text and 35 of coloured armorial bearings, and in spite of its deficiencies is a useful store of information for the history of the old French families. It contains 60,000 names, grouped according to provinces and provincial subdivisions. The sections relating to Burgundy and Franche-Comt6 were published bv Henri Bouchot (1875-1876): those relating to the generality of Limoges, by Moreau de Pravieux (1895) ; and those for the election of Reims, by P. Gosset (1903).

In 1717, in consequence of a quarrel with his nephew Louis Pierre, son of Louis Roger, Charles sold his collection t© the king. It then comprised 160 portfolios of genealogical papers arranged alphabetically, 17s volumes of documents, and numerous printed books profusely annotated. In 1720 it was inventoried by P.deClairambault, who added a certain number of genealogies taken from the papers of F. R. de Gaignieres, increasing the

total to 217 boxes and portfolios. Thus originated the Cabinet des titres of the Bibliotheque Nationale. Charles subsequently became reconciled to his nephew, to whom he left all the papers he had accumulated from the date of the quarrel until his death, which occurred in Paris on the 13th of February 1732.

Louis Pierre d'Hozier (1685-1767), son of Louis Roger, succeeded his uncle Charles as juge d'artnes. He published the Armorial gintral, ou registre de la noblesse de France (10 vols., 1 738-1 768), which must not be confounded with the publication mentioned above, inasmuch as it related solely to noble families and was not an official collection. Complete copies of this work, which should contain six regislres, are comparatively rare. A seventh registre, forming vol. xi., prepared by Ambroise Louis Marie, nephew of Louis Pierre, was published in 1847 by comte Charles d'Hozier. Louis Pierre died on the 25th of September 1767. His eldest son, Antoine Marie d'Hozier de Serigny (1721-c. 1810), was his father's collaborator and con- tinuator; and his fourth son, Jean Francois Louis,

wrote an account of the knights of St Michael in the province of Poitou, which was published in 1806 by the vicomte P. de Chabot.

His nephew, Ambroise Louis Marie d'Hozier (1764-1846), was the last of thejuges d'armes of France. He held the position of president of the cour des comptes, aides et finances of Normandy, and was therefore generally known as President d'Hozier, to distinguish him from the other members of the family. After the Restoration he was employed to verify French armorial bearings for the conseil du sceau des titres. He died in obscurity. His collection, which was purchased in 1851 by the Bibliotheque Nationale, comprised 136 volumes, 165 portfolios of documents and 200 packets of extracts from title-deeds, known as the Carres d'Hozier.

Abraham Charles Auguste d'Hozier (1775-1846), who also belonged to his family, was implicated in the conspiracy of Georges Cadoudal, and was condemned to death, but Bona- parte spared his life. He did not, however, recover his liberty until after the fall of the emperor, and died at Versailles on the 24th of August 1846. (C. B.)*

HRABANUS MAURUS MAGNENT1US (c. 776-856), arch- bishop of Mainz, and one of the most prominent teachers and writers of the Carolingian age, was born of noble parents at Mainz. Less correct forms of his name are Rabanus and Rhabanus. The date of his birth is uncertain, but in 801 he received deacon's orders at Fulda, where he had been sent to school; in the follow- ing year, at the instance of Ratgar, his abbot, he went together with Haimon (afterwards of Halberstadt) to complete his studies at Tours under Alcuin, who in recognition of his diligence and purity gave him the surname of Maurus, after St Maur the favourite disciple of Benedict. Returning after the lapse of two years to Fulda, he was entrusted with the principal charge of the school, which under his direction rose into a state of great efficiency for that age, and sent forth such pupils at Walafrid Strabo, Servatus Lupus of Ferrieres and Otfrid of Weissenburg. At this period it is most probable that his Excerptio from the grammar of Priscian, long so popular as a text-book during the middle ages, was compiled. In 814 he was ordained a priest; but shortly afterwards, apparently on account of disagreement with Ratgar, he was compelled to withdraw for a time from Fulda. This " banishment " is understood to have occasioned the pilgrimage to Palestine to which he alludes in his commentary on Joshua. He returned to Fulda on the election of a new abbot (Eigil) in 817, upon whose death in 822 he himself became abbot. The duties of this office he discharged with efficiency and success until 842, when, in order to secure greater leisure for literature and for devotion, he resigned and retired to the neighbouring cloister of St Peter's. In 847 he was again constrained to enter public life by his election to succeed Otgar in the archbishopric of Mainz, which see he occupied for

upwards of eight years. The principal incidents of historical interest belonging to this period of his life were those which arose out of his relations to Gottschalk (q.v.); they may be regarded as thoroughly typical of that cruel intolerance which he shared with all his contempor- aries, and also of that ardent zeal which was peculiar to himself;

but they hardly do justice to the spirit of kindly benevolence which in less trying circumstances he was ever ready to display. He died at Winkel on the Rhine, on the 4th of February 856. He is frequently referred to as St Rabanus, but incorrectly.

His voluminous works, many of which remain unpublished, com- prise commentaries on a considerable number of the books both of canonical and of apocryphal Scripture (Genesis to Judges, Ruth, Kings, Chronicles, Judith, Esther, Canticles, Proverbs, Wisdom, Ecclesiasticus, Jeremiah, Lamentations, Ezekiel, Maccabees, Matthew, the Epistles of St Paul, including Hebrews) ; and various treatises relating to doctrinal and practical subjects, including more than one series of Homilies. Perhaps the most important is that De institutione clericorum, in three books, by which he did much to bring into prominence the views of Augustine and Gregory the Great as to the training which was requisite for a right discharge of the clerical function ; the most popular has been a comparatively worthless tract De laudibus sanctae cruets. Among the others may be mentioned the De universo libri xxii., sive etymologiarum opus, a kind of dictionary or encyclopaedia, designed as a help towards the historical and mystical interpretation of Scripture, the De sacris ordinibus, the De disciplina ecclesiastica and the Martyro- logium. All of them are characterized by erudition (he knew even some Greek and Hebrew) rather than by originality of thought. The poems are of singularly little interest or value, except as includ- ing one form of the " Veni Creator." In the annals of German philology a special interest attaches to the Glossaria Latino-Theodisca. A commentary, Super Porphyrium, printed by Cousin in 1836 among the Ouvrages inedits d'Abelard, and assigned both by that editor and by Haureau to Hrabanus Maurus, is now generally believed to have been the work of a disciple.

The first nominally complete edition of the works of Hrabanus Maurus was that of Colvener (Cologne, 6 vols, fol., 1627). The Opera omnia form vols, cvii.-cxii. of Migne's Patrologiae cursus computus. The De universo is the subject of Compendium der Naturwissenschaften an der Schule zu Fulda im IX. Jahrhundert (Berlin, 1880). Maurus is the subject ot monographs by Schwarz (De Rhabano Mauro primo Germaniae praeceptore, 181 1), Kunstmann (Historische Monographic iiber Hrabanus Magnentius Maurus, 1841), Spengler (Leben des heil. Rhabanus Maurus, 1856) and Kohler (Rhabanus Maurus u. die Schule zu Fulda, 1870). Lives by his disciple

Rudolphus and by Joannes Trithemius are printed in the Cologne edition of the Opera. See also Pertz, Monum. Germ. Hist. (i. and ii.) ; Bahr, Gesch. d. romischen Literalur im Karoling. Zeitalter (1840), and Hauck's article in the Herzog-Hauck Real- encyklopadie, ed. 3.

HR6LFR KRAKI, perhaps the most famous of the Danish kings of the heroic age. In Beowulf, where he is called Hroth- wulf, he is represented as reigning over Denmark in conjunction with his uncle Hrothgar, one of the three sons of an earlier king called Healfdene. In the Old Norse sagas Hrolfe is the son of Helgi (Halga), the son of Half dan (Healfdene). He is repre- sented as a wealthy and peace-loving monarch similar to Hrothgar in Beowulf, but the latter (Hroarr, or Roe) is quite overshadowed by his nephew in the Northern authorities. The chief incidents in Hrolfr's career are the visit which he paid to the Swedish king ASils (Beowulf's Eadgils), of which several different explanations are given, and the war, in which he eventually lost his life, against his brother-in-law HiorvarSr. The name Kraki (pole- ladder) is said to have been given to him on account of his great height by a young knight named Voggr, whom he handsomely rewarded and who eventually avenged his death on HiorvarSr. There is no reason to doubt that Hrolfr was an historical person and that he reigned in Denmark during the early years of the 6th century, but the statement found in all the sagas that he was the stepson of Aflils seems hardly compatible with the evidence of Beowulf, which is a much earlier authority.

See Saxo Grammaticus, Gesta Danorum, pp. 52-68, ed. A. Holder (Strassburg, 1886); and A. Olrik, Danmarks Hettedigtning (Copen- hagen, 1903).

HROSVITHA (frequently Roswitha, and properly Hrotsuit), early medieval dramatist and chronicler, occupies a very notable position in the history of modern European literature. Her endeavours formed part of the literary activity by which the age of the emperor Otto the Great sought to emulate that of Charles the Great. The famous nun of Gandersheim has occasionally been confounded with her namesake, a learned abbess of the same convent, who must have died at least half a century earlier. The younger Hrosvitha was born in all probability about the year 935; and, if the statement be correct that she sang the praises of the three Ottos, she must have lived to near the close of the

century. Some time before the year 059 she entered the Bene- dictine nunnery of Gandersheim, a foundation which was con- fined to ladies of

German birth, and was highly favoured by the Saxon dynasty. In 959 Gerberga, daughter of Duke Henry of Bavaria and niece of the emperor Otto I., was consecrated abbess of Gandersheim; and the earlier literary efforts of the youthful Hrosvitha (whose own connexion with the royal family appears to be an unauthenticated tradition) were encouraged by the still more youthful abbess, and by a nun of the name of Richarda.

The literary works of Hrosvitha, all of which were as a matter of course in Latin, divide themselves into three groups. Of these the first and least important comprises eight narrative religious poems, in leonine hexameters or distichs. Their subjects are the Nativity of the Virgin (from the apocryphal gospel of St James, the brother of our Lord), the Ascension and a series of legends of saints (Gandolph, Pelagius, Theophilus, Basil, Denis, Agnes). Like these narrative poems, the dramas to which above all Hrosvitha owes her fame seem to have been designed for reading aloud or recitation by sisters of the convent. For though there are indications that the idea of their representation was at least present to the mind of the authoress, the fact of such a representation appears to be an unwarrantable assumption. The comedies of Hrosvitha are six in number, being doubtless in this respect also intended to recall their nominal model, the comedies of Terence. They were devised on the simple principle that the world, the flesh and the devil should not have all the good plays to themselves. The experiment upon which the young Christian diamatist ventured was accordingly, although not absolutely novel, audacious enough. In form the dramas of " the strong voice of Gandersheim," as Hrosvitha (possibly alluding to a supposed etymology of her name) calls herself, are by no means Terentian. They are written in prose, with an element of something like rhythm, and an occasional admixture of rhyme. In their themes, and in the treatment of these, they are what they were intended to be, the direct opposites of the lightsome adapter of Menander. They are founded upon legends of the saints, selected with a view to a glorification of religion in its supremest efforts and most transcendental aspects. The emperor Constantine's daughter, for example, Constantia, gives her hand in marriage to Gallicanus, just before he starts on a Scythian campaign, though she has already taken a vow of perpetual maidenhood. In the hour of battle he is himself converted, and, having on his return like his virgin bride chosen the more blessed unmarried state, dies as a Christian martyr in exile. The three holy maidens, Agape, Chionia and Irene, are preserved by a humorous miracle from the evil designs of Dulcitius, to offer up their pure lives as a sacrifice under Diocletian's persecutions. Callimachus, who has Romeo-like carried his earthly passion for the saintly Drusiana into her tomb, and among its horrors has met with his own death, is by the mediation of St John raised with her from the dead to a Christian life. All these themes are treated with both spirit and skill, often with instinctive

knowledge of dramatic effect — often with genuine touches of pathos and undeniable felicities of expression. In Dulcitius there is also an element of comedy, or rather of farce. How far Hrosvitha's comedies were an isolated phenomenon of their age in Germany must remain undecided; in the general history of the drama they form the visible bridge between the few earlier attempts at utilizing the forms of the classical drama for Christian purposes and the miracle plays. They are in any case the productions of genius; nor has Hrosvitha missed the usual tribute of the supposition that Shakespeare has borrowed from her writings.

The third and last group of the writings of Hrosvitha is that of her versified historical chronicles. At the request of the abbess Gerberga, she composed her Carmen de gestis Oddonis, an epic attempting in some degree to follow the great Roman model. It was completed by the year 968, and presented by the authoress to both the old emperor and his son (then already crowned as) Otto II . This poem so closely adheres to the materials supplied to the authoress by members of the imperial family

that, notwithstanding its courtly omissions, it is regarded as an historical authority. Unfortunately only half of it remains; the part treating of the period from 953 to 962 is lost with the exception of a few fragments, and the period from 962 to 967 is summarized only. Subsequently, in a poem (of 837 hexameters) De primordiis et fundatoribus coenobii Ganders-heimensis, Hrosvitha narrated the beginnings of her own convent, and its history up to the year 919.

The Munich MS., which contains all the works enumerated above except the Chronicle of Gandersheim, was edited by the great Vienna humanist, Conrad Celtes, in 1501. The edition of Celtes was published at Nuremberg, with eight wood-cuts by Albrecht Diirer. It was re-edited by H. L. Schurzfleisch and published at Wittenberg in 1707. The comedies have been edited and translated into German by J. Bendixen (Liibeck, 1857), and into French by C. Magnin (Paris, 1845), whose introduction gives a full account of the authoress and her works. See also her Poesies latines, with a translation into French verse by V. R£tif de la Bretonne (Paris, 1854). A copious analysis of her plays will be found in Klein, Geschichte des Dramas, iii. 665-754. See also W. Creizenach, Geschichte des neueren Dramas, i. 17 sqq. (Halle, 1893), and A. W. Ward, History of English Dramatic Literature, i. 6 sqq. (Cambridge, 1899). Gustav Freytag wrote a dissertation, De Rosuitha poetria (Breslau, 1839), to qualify himself as an academical teacher, which, as he records (Erinnerungen aus meinem Leben, Leipzig, 1887, p. 1839), showed " how impossible it was to the German, a thousand years since, to compose dramatic- ally "; and at the beginning of Albert Cohn's Shakespeare in Ger- many (Berlin, 1 865) Shakespearean parallels are suggested to certain passages in Hrosvitha's

dramas. Her two chronicles in verse were edited by Z. H. Pertz in the Monumenta Germaniae, iv. 306-335 (Hanover, 1841). See also J. P. Migne, Patrologiae curs, compl. (Paris, 1853, vol. 137). The Carmen was included by Leibnitz in his Scriptores rer. Brunsvic. (Hanover, 1707-1711). For other early editions of these see A. Potthast, Bibliotheca historica medii aevi (supplement, Berlin, 1862-1868); and for an appreciation of them seeWattenbach, Geschichtsquellen, pp. 214-216, and Giesebrecht, Deutsche Kaiserzeit, i. 780, who mentions a German translation by Pfund (i860). There is a complete edition of the works of Hrosvitha by K. A. Barack (Ntlrnberg, 1858). J. Aschbach (1867) attempted to prove that Celtes had forged the productions which he published under the name of Hrosvitha, but he was refuted by R. Kopke (Berlin, 1869). Anatole France, La Vie litteraire (3 m,> serie, Paris, 1891), cited by Creienach, mentions a curious recent experiment, the performance of Hrosvitha's comedies in the Theatre des Marionettes at Paris. (A. W. W.)*

HStiAN TSANG (Hiouen Thsang, Hiwen T'Sang, YCan Tsang, Yuan-Chwang) , the most eminent representative of a remarkable and valuable branch of Chinese literature, consisting of the narratives of Chinese Buddhists who travelled to India, whilst their religion flourished there, with the view of visiting the sites consecrated by the history of Sakya Muni, of studying at the great convents which then existed in India, and of collecting books, relics and other sacred objects.

The importance of these writings as throwing light on the geo- graphy and history of India and adjoining countries, during a very dark period, is great, and they have been the subject of elaborate commentaries by modern students. Several Chinese memoirs of this kind appear to have perished; and especially to be regretted is a great collection of the works of travellers to India, religious and secular, in sixty books, with fortymoreof mapsand illustrations, pub- lished at the expense of the emperor Kao-Tsung of the T'ang dynasty, a.d. 666, with a preface from the imperial hand. We will mention the clerical travellers of this description who are known to us by name.

I. Shi-tao-'an (d. 385) wrote a work on his travels to the " western lands " (an expression applying often to India), which is supposed to be lost. 2. Fa-hien travelled to India in 399, and returned by sea in 414. His work, called Fo-Kwo-Ki, or Memoirs on the Buddha Realms, has been translated by Abel-R6musat and Landresse, and again into English by the Rev. S. Beale; Mr Laidlay of Calcutta also published a translation from the French, with in- teresting notes. 3. Hwai Seng and Sung-Yun, monks, travelled to India to collect books and reliques, 518-521. Their short narrative has been translated by Karl Fried. Neumann, and also by Mr Beale (along with Fa-hien). 4. Hsiian Tsang, the subject of this notice. In relation to his

travels there are two Chinese works, both of which have been translated with an immense appliance of labour and learning by M. Stanislas Julien, viz. (a) the Ta-V ang-Si-Yu-Ki, or Memoirs on Western Countries issued by the T'ang Dynasty, which was compiled under the traveller's own supervision, by order of the great emperor Tai-Tsung ; and (b) a Biography of Hsiian Tsang by two of his contemporaries. 5. The Itinerary of Fifty-six Religious Travellers, compiled and published under imperial authority, 730. 6. The Itinerary of Khi-Nie, who travelled (964-976) at the head of a large body of monks to collect books, &c. Neither of the last two has been translated.

8 + 4

HUAMBISAS— HUANCAVELICA

Hsiian Tsang was born in the district of Keu-Shi, near Honan- Fu, about 605, a period at which Buddhism appears to have had a powerful influence upon a large body of educated Chinese. From childhood grave and studious, he was taken in charge by an elder brother who had adopted the monastic life, in a convent at the royal city of Loyang in Honan. Hsiian Tsang soon followed his brother's example. For some years he travelled over China, teaching and learning, and eventually settled for a time at the capital Chang-gan (now Si-gan-fu in Shensi), where his fame for learning became great. The desire which he entertained to visit India, in order to penetrate all the doctrines of the Buddhist philosophy, and to perfect the collections of Indian books which existed in China, grew irresistible, and in August 629 he started upon his solitary journey, eluding with difficulty the strict prohibition which was in force against crossing the frontier.

The " master of the law," as his biographers call him, plunged alone into the terrible desert of the Gobi, then known as the Sha-mo or " Sand River," between Kwa-chow and Igu (now Hami or Kamil). At long intervals he found help from the small garrisons of the towers that dotted the desert track. Very striking is the description, like that given six centuries later by Marco Polo, of the quasi-supernatural horrors that beset the lonely traveller in the wilderness — the visions of armies and banners; and the manner in which they are dissipated singularly recalls passages in Bunyan's Pilgrim's Progress. After great suffering Hsiian Tsang reached Igu, the seat of a Turkish princi- pality, and pursued his way along the southern foot of the T'ian-shan, which he crossed by a glacier pass (vividly described) in the longitude of Lake Issyk-kul. In the valley of the Talas river he encounters the great khan of the Turks on a hunting party, — a rencontre which it is interesting to compare with the visit of Zemarchus to the great khan Dizabul, sixty years before, in the same region. Passing by the present Tashkend, and by Samarkand, then inhabited by fire worshippers, he

reached the basin of the Upper Oxus, which had recently been the seat of the powerful dominion of the Haiathelah, Ephthalites or White Huns, known in earlier days to the Greeks as Tochari, and to Hsiian Tsang (by the same name) as Tuholo or Tukhara. His account of the many small states into which the Tukhara empire had broken up is of great interest, as many of them are identical in name and topography with the high valley states and districts on the Upper Oxus, which are at this day the object of so much geographical and political interest.

Passing by Bamian, where he speaks of the great idols still so famous, he crosses Hindu-Kush, and descends the valley of the Kabul river to Nagarahara, the site of which, still known as Nagara, adjoining Jalalabad, has been explored by Mr W. Simpson. Travelling thence to Peshawar (Purushapura), the capital of Gandhara, he made a digression, through the now inaccessible valley of Swat and the Dard states, to the Upper Indus, returning to Peshawar, and then crossing the Indus (Sinht) into the decayed kingdom of Taxila (Ta-cha-si-lo, Takshasila), then subject to Kashmir. In the latter valley he spent two whole years (631-633) studying in the convents, and visiting the many monuments of his faith. In his further travels he visited Mathura (Mot'ulo, Muttra), whence he turned north to Thanesar and the upper Jumna and Ganges, returning south down the valley of the latter to Kanyakubja or Kanauj, then one of the great capitals of India. The pilgrim next entered on a circuit of the most famous sites of Buddhist and of ancient Indian history, such as Ajodhya, Prayaga (Allahabad), Kausambhi, Sravasti, Kapilavastu, the birth-place of Sakya, Kusinagara, his death-place, Pataliputra (Patna, the Palibothra of the Greeks), Gaya, Rajagriha and Nalanda, the most famous and learned monastery and college in India, adorned by the gifts of successive kings, of the splendour of which he gives a vivid description, and of which traces have recently been recovered. There he again spent nearly two years in mastering Sanskrit and the depths of Buddhist philosophy. Again, proceeding down the banks of the Ganges, he diverged eastward to Kamarupa (Assam), and then passed by the great ports of Tamralipti (Tamluk, the mis-

placed TamalUis of Ptolemy) , and through Orissa to Kanchipara (Conjeeveram), about 640. Thence he went northward across the Carnatic and Maharashtra to Barakacheva (Broach of our day, Barygaza of the Greeks) . After this he visited Malwa, Cutch, Surashtra (peninsular Gujarat, Syrastrene of the Greeks), Sind, Multan and Ghazni, whence he rejoined his former course in the basin of the Kabul river.

This time, however, he crosses Pamir, of which he gives a remarkable account, and passes by Kashgar, Khotan (Kustana), and the vicinity of Lop-nor across the desert to Kwa-chow, whence he had made his venturous

and lonely plunge into the waste fifteen years before. He carried with him great collections of books, precious images and reliques, and was received (April 645) with public and imperial enthusiasm. The emperor T'ai- Tsung desired him to commit his journey to writing, and also that he should abandon the eremitic rule and serve the state. This last he declined, and devoted himself to the compilation of his narrative and the translation of the books he had brought with him from India. The former was completed a.d. 648. In 664 Hsiian Tsang died in a convent at Chang-gan. Some things in the history of his last days, and in the indications of beatitude recorded, strongly recall the parallel history of the saints of the Roman calendar. But on the other hand we find the Chinese saint, on the approach of death, causing one of his disciples to frame a catalogue of his good works, of the books that he had translated or caused to be transcribed, of the sacred pictures executed at his cost, of the alms that he had given, of the living creatures that he had ransomed from death. " When Kia-shang had ended writing this list, the master ordered him to read it aloud. After hearing it the devotees clasped their hands, and showered their felicitations on him." Thus the " well-done, good and faithful " comes from the servant himself in self-applause.

The book of the biography, by the disciples Hwai-li and Yen-t'sung, as rendered with judicious omissions by Stan. Julien, is exceedingly interesting; its Chinese style receives high praise from the translator, who says he has often had to regret his inability to reproduce its grace, elegance and vivacity.

Authorities. — Fo-Koue-Ki, trad, du Chinois, par Abel-Remusat, revu et complete par Klaproth et Landresse (Paris, 1836) ; H. de la vie de Hiouen-Thsang, &c, trad, du Chinois par Stanislas Julien (Paris, 1853) ; Memoires sur les contrees occidentales . . . trad, du Chinois en Francais (par le meme) (2 vols., Paris, 1857-1858); Memoire analylique, &c, attached to the last work, by L. Vivien de St Martin; " Attempt to identify some of the Places mentioned in the Itinerary of Hiuan Thsang," by Major Win. Anderson, C.B., in Journ. As. Soc. Bengal, vol. xvi. pt. 2, p. 1 183 (the enunciation of a singularly perverse theory); " Verification of the Itinerary of Hwan Thsang, &c," by Captain Alex. Cunningham, Bengal Engineers, ibid, vol. xvii. pt. 1, p. 476; Travels of Fah-hian and Sung-Yan, Buddhist Pilgrims, &c. x by Sam. Beal (1869); The Ancient Geography of India, by Major-General Alex. Cunningham, R.E. (1871); " Notes on Hwen Thsang's Account of the Principalities of Tokharistan," by Colonel H. Yule, C.B., in Journ. Roy. As. Soc, new ser., vol. vi. p. 82; "On Hiouen Thsang's Journey from Patna to Ballabhi," by James Fergusson, D.C.L., ibid. p. 213. (H. Y. ; R. K. D.)

HUAMBISAS, a tribe of South American Indians on the upper Maranon

and Santiago rivers, Peru. In 1841 they drove all the civilized Indians from the neighbouring missions. In 1843 they killed all the inhabitants of the village of Santa Teresa, between the mouths of the Santiago and Morona. They are fair-skinned and bearded, sharing with the Jeveros a descent from the Spanish women captured by their Indian ancestors at the sack of Sevilla del Oro in 1 599.

HUANCAVELICA, a city of central Peru and capital of a department, 160 m. S.E. of Lima. The city stands in a deep ravine of the Andes at an elevation of about 12,400 ft. above the sea, the ravine having an average width of 1 m. Pop. (1906 estimate) 6000. The city is solidly and regularly built, the houses being of stone and the stream that flows through the town being spanned by several stone bridges. Near Huan cavelica is the famous quicksilver mine of Santa Barbara, with its subterranean church of San Rosario, hewn from the native cinnabar-bearing rock. Huancavelica was founded by Viceroy Francisco de Toledo in 1572 as a mining town, and mining continues to be the principal occupation of its inhabitants. The

department is traversed by the Cordillera Occidental, and is bounded N., E. and S. by Junin and Ayacucho. Pop. (1906 official estimate) 167,840; area, 9254 sq. m. The principal industry is mining for silver and quicksilver. The best-known silver mines are the Castrovirreyna.

HUANUCO, a city of central Peru, capital of a department, 170 m. N.N.E. of Lima in a beautiful valley on the left bank of the Huallaga river, nearly 6000 ft. above sea-level. Pop. (1906 estimate) about 6000. The town was founded in 1 539 by Gomez Alvarado. Huanuco is celebrated for its fruits and sweetmeats, the " chirimoya " (Anona chirimolia) of this region being the largest and most delicious of its kind. Mining is one of the city's industries. Huanuco was the scene of one of the bloodthirsty massacres of which the Chileans were guilty during their occupa- tion of Peruvian territory in 1881-1883. The department of Huanuco lies immediately N. of Junin, with Ancachs on the W. and San Martin and Loreto on the N. and E. Pop. (1906 estimate) 108,980; area, 14,028 sq. m. It lies wholly in the Cordillera region, and is traversed from S. to N. by the Marafion and Huallaga rivers.

HUARAZ, a city of northern Peru and capital of the department of Ancachs, on the left bank of the Huaraz, or Santa river, about 190 m. N.N.W. of Lima and 58 m. from the coast. Pop. (1876) 4851, (1906 estimate) 6000. Huaraz is situated in a narrow fertile valley of the Western

Cordillera, at a considerable eleva- tion above sea-level, and has a mild climate. A railway projected to connect Huaraz with the port of Chimbote, on the Bay of Chimbote, a few miles S. of the mouth of the Santa river, was completed from Chimbote to Suchiman (ˆ w.) in 1872, when work was suspended for want of money. In the valley of the Huaraz cattle are raised, and wheat, sugar and fruit, gold, silver, copper and coal are produced. Alfalfa is grown by stock-raisers, and the cattle raised here are among the best in the Peruvian market. In the vicinity of Huaraz are mcgalithic ruins similar to those of Tiahunaco and Cuzco, showing that the aboriginal empire preceding the Incas extended into northern Peru.

HUARTE DE SAN JUAN, or Huarte Y Navarro, Juan (c. 1 530-1 592), Spanish physician and psychologist, was born at Saint-Jean-Pied-de-Port (Lower Navarre) about 1530, was educated at the university of Huesca, where he graduated in medicine, and, though it appears doubtful whether he practised as a physician at Huesca, distinguished himself by his professional skill and heroic zeal during the plague which devastated Baeaa in 1566. He died in 1592. His Examen de ingenios para las ciencias (1575) won him a European reputation, and was trans- lated by Lessing. Though now superseded, Huarte's treatise is historically interesting as the first attempt to show the con- nexion between psychology and physiology, and its acute ingenuity is as remarkable as the boldness of its views.

HUASTECS, a tribe of North American Indians of Mayan stock, living to the north of Vera Cruz. They are of interest to the ethnologist as being so entirely detached from the other Mayan tribes of Central America. The theory is that the Mayas came from the north and that the Huastecs were left behind in the migration southward.

HUBER, FRANCOIS (1750-1831), Swiss naturalist, was born at Geneva on the 2nd of July 1750. He belonged to a family which had already made its mark in the literary and scientific world: his great-aunt, Marie Huber (1695-1753), was known as a voluminous writer on religious and theological subjects, and as the translator and epitomizer of the Spectator (Amsterdam, 3 vols., 1753); and his father Jean Huber (1721-1786), who had served for many years as a soldier, was a prominent member of the coterie at Ferney, distinguishing himself by his Observations sur le vol des oiseaux (Geneva, 1784). Francois Huber was only fifteen years old when he began to suffer from an affection of the eyes which gradually resulted in total blindness; but, with the aid of his wife, Marie Aimee Lullin, and of his servant, Francois Burnens, he was able to carry out investigations that laid the foundations of our scientific knowledge of the life history of the honey-bee. His Nouvelles Observations sur les abeilles was pub- lished at Geneva in 1702 (Eng, trans., 1806I. He assisted Jean

Senebier in his Mem. sur I'influence de Pair, b°c, dans la germina- tion (Geneva, 1800); and he also wrote " Mem. sur l'origine de la cire " (Bibliotheque brilanniqite, tome xxv.), a " Lettre a. M. Pictet sur certains dangers que courent les abeilles " (Bib. brit. xxvii), and "Nouvelles Observ. rel. au sphinx Atropos " (Bib. brit. xxvii). He died at Lausanne on the 22nd of December 1 83 1. De Candolle gave his name to a genus of Brazilian trees — Huberia laurina.

Pierre Huber (1 777-1840) followed in his father's footsteps. His best-known work is Recherches sur les moeurs des fourmis indigenes (Geneva and Paris, 1810; new ed., Geneva, 1861), and he also wrote various papers on entomological subjects.

Sec the account of Francois Huber, by De Candolle, in Bibl. universelle (1832); and the notice of Pierre in Bibl. univ. (1886); also Haag, La France protestante.

HUBER, JOHANN NEPOMUK (1830-1879), German philo- sophical and theological writer, a leader of the Old Catholics, was born at Munich on the 18th of August 1830. Originally destined for the priesthood, he early began the study of theology. By the writings of Spinoza and Oken, however, he was strongly drawn to philosophical pursuits, and it was in philosophy that he " habilitated " (1854) in the university of .his native place, where he ultimately became professor (extraordinarius, 1859; ordinarius, 1864). With Dollinger and others he attracted a large amount of public attention in 1869 by the challenge to the Ultramontane promoters of the Vatican council in the treatise Der Papst und das Koncil, which appeared under the pseudonym of " Janus," and also in 1870 by a series of letters (Romische Briefe, a redaction of secret reports sent from Rome during the sitting of the council), which were published over the pseudonym Quirinus in the Allgemeine Zeiiung. He died suddenly of heart disease at Munich on the 20th of March 1879.

Works. — The treatise JJber die Willensfreiheil (1858), followed in 1859 by Die Philosophic der Kirchenvdter, which was promptly placed upon the Index, and led to the prohibition of all Catholic students from attending his lectures; Johannes Scotus Erigena (1861); Die Idee der Unsterblichkeit (1864); Studien (1867); Der Proletarier; zur Orienlirung in der sozialen Frage (1865); Der Jesuitenorden nach seiner Verfassung und Doctrin, Wirksamkeit und Ceschichte (1873), also placed upon the Index; Der Pessimismus (1876); Die Forschung nach der Materie (1877); Zur Philosophie der Astronomie (1878); Das Geddchtnis (1878). He also published adverse criticisms of Darwin, Strauss, Hartmann and Hackel; pamphlets on Das Papsttum und der Staat (1870), and- on Die Frei- heiten der franzbsischen Kirche (1871); and a volume of Kleine Schriften (1871).

See E. Zirngiebl, Johannes Huber (1881); and M. Carriere in Allgemeine deutsche Biographie, xiii. (1881), and in Nord und Sud

(1879).

HUBER, LUDWIG FERDINAND (1764-1804), German author, was born in Paris on the 14th of September 1764, the son of Michael Huber (1727-1804), who did much to promote the study of German literature in France. In his infancy young Huber removed with his parents to Leipzig, where he was carefully instructed in modern languages and literature, and showed a particular inclination for those of France and England. In Leipzig he became intimate with Christian Gottfried -Korper, father of the poet; in Dresden Fluber became engaged to. Dora Stock, sister of Korner's betrothed, and associated with Schiller, who was one of Korner's stanchest friends. In 1787 be was appointed secretary to the Saxon legation in Mainz, where he remained until the French occupation of 1792. While here he interested himself for the welfare of the family of his friend Georg Forster, who, favouring republican views, had gone to Paris, leaving hˆ wife Therese Forster (1764-1829) and family in destitute circumstances. Huber, enamoured of the talented young wife, gave up his diplomatic post, broke off his engagement to Dora Stock, removed with the Forster family to Switzerland, and on the death of her husband in 1794 married Therese Forster. In 1798 Huber took over the editorship of the Allgemeine Zeitung in Stuttgart. The newspaper having been prohibited in Wurttem- berg, Huber continued its editorship in Ulm in 1803. He was created " counsellor of education " for the new Bavarian province of Swabia in the following year, but had hardly entered upon the functions of his new office when he died on the 24th of December 1804.

Huber was well versed in English literature, and in 1785 he published the drama Ethelwolf, with notes on Beaumont and Fletcher and the old English stage. He also wrote many dramas, comedies and tragedies, most of which are now forgotten, and among them only Das heimliche Gericht (1790, new ed. 1795) enjoyed any degree of popularity. As a critic he is seen to advantage in the Vermischte Schriften von dem Verfasser des heimlichen Gerichts (2 vols., 1793). As a publicist he made his name in the historical-political periodicals Friedensprdliminarien (1794-1796, 10 vols.) and Klio (1795-1798, 1819).

His collected works, Samtliche Werke seit dem Jahre 1802 (4 vols., 1 807-1 8 19), were published with a biography by his wife Therese Huber.

See L. Speidel and H. Wittmann, BUder aus der Schiller- Zeit (1884).

HUBERT (Hucbertus, Hugbertus), ST (d. 727), bishop of Liege, whose festival is celebrated , on the 3rd of November. The Bollandists have published seven different lives of the saint. The first is the only one of any value, and is the work of a contemporary. Unfortunately, it is very sparing of details. In it we see that Hubert in 708 succeeded Lambert in the see of Maestricht (Tongres), and that he erected a basilica to his memory. In 825 Hubert's remains were removed to a Bene- dictine cloister in the Ardennes, which thenceforth bore his name (St Hubert, province of Luxemburg, Belgium), and ulti- mately became a considerable resort of pilgrims. The later legends {Bibliolheca hagiographica latina, nos. 3994-4002) are devoid of authority. One of them relates, probably following the legend of St Eustace, the miracle of the conversion of St Hubert. This conversion, represented as having been brought about while he was hunting on Good Friday by a miraculous appearance of a stag bearing between his horns a cross or crucifix surrounded with rays of light, has frequently been made the subject of artistic treatment. He is the patron of hunters, and is also invoked in cases of hydrophobia. Several orders of knighthood have been under his protection; among these may be mentioned the Bavarian, the Bohemian and that of the electorate of Cologne.

See Acta Sanctorum, Novembris, i. 759-930; G. Kurth, Charles it I'abbaye de St Hubert en Ardenne (Brussels, 1903) ; Anna Jameson, Sacred and Legendary Art, i. 732-737 (London, 1896); Cahier, Caractirisliques des saints, pp. 183, 775, &c. (Paris, 1867). (H. De.)

HUBERTUSBURG, a chateau in the kingdom of Saxony, near the village of Wermsdorf and midway 6 m. between the towns Oschatz and Grimma. It was built in 1721-1724 by Frederick Augustus II., elector of Saxony, subsequently King Augustus III. of Poland, as a hunting box, and was often the scene of brilliant festivities. It is famous' for the peace signed here on the 1 5th of February 1763, which ended the Seven Years' War. After undergoing various vicissitudes, it now serves the purpose of a lunatic asylum and a training school for nursing sisters.

See Riemer, Das Schloss Hubertusburg, sonst undjetzt (Oschatz,

1881).

HUBLI, a town of British India, in the Dharwar district of Bombay, 15 m. S.E. of Dharwar town. Pop. (1901) 60,214. It is a railway junction on the Southern Mahratta system, where the lines to Bangalore and Bezwada branch off south and west. It is an important centre of trade and of cotton and silk weaving, and has two cotton mills and several factories for ginning

and pressing cotton. Hubli was in early times the seat of an English factory, which, with the rest of the town, was plundered in 1673 by Sivaji, the Mahratta leader.

HUBNER, EMIL (1834-1901), German classical scholar, son of the historical painter Julius Hiibner (1806-1882), was born at Diisseldorf on the 7th of July 1834. After studying at Berlin and Bonn, he travelled extensively with a view to antiquarian and epigraphical researches. The results of these travels were embodied in several important works: Inscriptiones Hispaniae Latinae (1869, supplement 1892), I.H. Christianae (1871, supple- ment 1900); Inscriptiones Britanniae Latinae (1873), I.E. Christianae (1876); La Arqueologia de Espana (1888); Monu- menta linguae Hibericae (1893). Hiibner was also the author of two books of the greatest utility to the classical student:

Grundriss zu Vorlesungen iiber die rbmische Liter aturgeschichtc (4th ed. 1878, edited, with large additions, by J. E. B. Mayor as Bibliographical Clue to Latin Literature, 1875), and Bibliographic der classischen Altertumswissenschaft (2nd ed., 1889); mention may also be made of Rbmische Epigraphik (2nd ed., 1892); Exempla Scripturae Epigraphicae Latinae (1885); and Rdmische Herrschaft in Westeuropa (1890). In 1870 Hiibner was appointed professor of Classical Philology in the university of Berlin, where he died on the 21st of February 1901.

HUBNER, JOSEPH ALEXANDER, Count (1811-1892ˆ Austrian diplomatist, was born in Vienna on the 26th of November 1811. His real name was Hafenbredl, which he after- wards changed to Hiibner. He began his public career in 1833 under Metternich, whose confidence he soon gained, and who sent him in 1837 as attache to Paris. In 184 1 he became secretary of embassy at Lisbon, and in 1844 Austrian consul-general at Leipzig. In 1848 he was sent to Milan to conduct the diplomatic correspondence of Archduke Rainer, viceroy of Lombardy. On the outbreak of the revolution he was seized as a hostage, and remained a prisoner for some months. Returning to Austria, he was entrusted with the compilation of the documents and pro- clamations relating to the abdication of the Emperor Ferdinand and the accession of Francis Joseph. His journal, an invaluable clue to the complicated intrigues of this period, was published in i89r in French and German, under the title of Une Annie de ma vie, 1848-1849. In March 1849 he was sent on a special mission to Paris, and later in the same year was appointed ambassador to France. To his influence was in large measure due the friendly attitude of Austria to the Allies in the Crimean War, at the close of which he represented Austria at the congress of Paris in 1856. He allowed himself, however, to be taken by surprise by Napoleon's intervention on behalf of Italian unity, of which the first public intimation was given by the French emperor's cold reception of

Hiibner on New Year's Day, 1859, with the famous words: " I regret that our relations with your Government are not so good as they have hitherto been," He did not return to Paris after the war, and after holding the ministry of police in the Goluchowski cabinet from August to October 1859, lived in retirement till 1865, when he became ambassador at Rome. Quitting this post in 1867, he undertook extensive travels, his descriptions of which appeared as Promenade autour du monde, 1871 (1873; English translation by Lady Herbert, 1874) and Through the British Empire (1886). Written in a bright and entertaining style, and characterized by shrewd observation, they achieved considerable popularity in their time. A more serious effort was his Sixte-Quint (1870, trans- lated into English by H. E. H. Jerningham under the title of The Life and Times of Sixtus the Fifth, 1872), an original contribu- tion to the history of the period, based on unpublished documents at the Vatican, Simancas and Venice. In 1879 he was made a life-member of the Austrian Upper House, where he sat as a Clerical and Conservative. He had received the rank of Baron (Freiherr) in 1854, and in 1888 was raised to the higher rank of Count (Graf). He died at Vienna on the 30th of July 1892. Though himself of middle-class origin, he was a profound admirer of the old aristocratic regime, and found his political ideals in his former chiefs, Metternich and Schwarzenberg. As the last survivor of the Metternich school, he became towards the close of his life more and more out of touch with the trend of modern politics, but remained a conspicuous figure in the Upper House and at the annual delegations. That he possessed the breadth- of mind to appreciate the working of a system at total variance with his own school of thought was shown by his grasp of British colonial questions. It is interesting, in view of subsequent events, to note his emphatic belief in the loyalty of the British colonies — a belief not shared at that time by many statesmen with far greater experience of democratic institutions.

See Sir Ernest Satow, An Austrian Diplomatist in the Fifties (1908).

HUC, EVARISTE REXHS (1813-1860), French missionary- traveller, was born at Toulouse, on the 1st of August 1813. In his twenty-fourth year he entered the congregation of the Lazarists at Paris, and shortly after receiving holy orders in

1839 went out to China. At Macao he spent some eighteen months in the Lazarist seminary, preparing himself for the regular work of a missionary. Having acquired some command of the Chinese tongue, and modified his personal appearance and dress in accordance with Chinese taste, he started

from Canton. He at first superintended a Christian mission in the southern provinces, and then passing to Peking, where he per- fected his knowledge of the language, eventually settled in the Valley of Black Waters or He Shuy, a little to the north of the capital, and just within the borders of Mongolia. There, beyond the Great Wall, a large but scattered population of native Christians had found a refuge from the persecutions of Kia- King, to be united half a century later in a vast but vague apostolic vicariate. The assiduity with which Hue devoted himself to the study of the dialects and customs of the Tatars, for whom at the cost of much labour he translated various religious works, was an admirable preparation for undertaking in 1844, at the instigation of the vicar apostolic of Mongolia, an expedition whose object was to dissipate the obscurity which hung over the country and habits of the Tibetans. September, of that year found the missionary at Dolon Nor occupied with the final arrangements for his journey, and shortly afterwards, accompanied by his fellow-Lazarist, Joseph Gabet, and a young Tibetan priest who had embraced Christianity, he set out. To escape attention the little party assumed the dress of lamas or priests. Crossing the Hwang-ho, they advanced into the terrible sandy tract known as the Ordos Desert. After suffering dreadfully from want of water and fuel they entered Kansu, having recrossed the flooded Hwang-ho, but it was not till January 1845 that they reached Tang-Kiul on the boundary. Rather than encounter alone the horrors of a four months' journey to Lhasa they resolved to wait for eight months till the arrival of a Tibetan embassy on its return from Peking. Under an intelligent teacher they meanwhile studied the Tibetan language and Buddhist literature, and during three months of their stay they resided in the famous Kunbum Lamasery, which was reported to accommodate 4000 persons. Towards the end of September they joined the returning embassy, which comprised 2000 men and 3700 animals. Crossing the deserts of Koko Nor, they passed the great lake of that name, with its island of contemplative lamas, and, following a difficult and tortuous track across snow-covered mountains, they at last entered Lhasa on the 29th of January 1846. Favourably received by the regent, they opened a little chapel, and were in a fair way to establish an important mission, when the Chinese ambassador interfered and had the two missionaries conveyed back to Canton, where they arrived in October of the same year. For nearly three years Hue remained at Canton, but Gabet, returning to Europe, proceeded thence to Rio de Janeiro, and died there shortly afterwards. Hue returned to Europe in shattered health in 1852, visiting India, Egypt and Palestine on his way, and, after a prolonged residence in Paris, died on the 31st of March i860.

His writings comprise, besides numerous letters and memoirs in the Annates de la propagation de la foi, the famous Souvenirs d'un voyage dans la Tarlarie, le Thibet, et la Chine pendant les annees 1844-1846 (2 vols.,

Paris, 1850; Eng. trans, by W. Hazlitt, 1851, abbreviated by M. Jones, London, 1867) ; its supplement, crowned by the Academy, entitled L'Empire chinois (2 vols., Paris, 1854; Eng. trans., London, 1859); and an elaborate historical work, he Chri stianisme en Chine, &c. (4 vols., Paris, 1857-1858; Eng. trans., London, 1857-1858). These works are written in a lucid, racy, picturesque style, which secured for them an unusual degree of popularity. The Souvenirs is a narrative of a remarkable feat of travel, and contains passages of so singular a character as in the absence of corroborative testimony to stir up a feeling of incredulity. That Hue was suspected unjustly was amply proved by later re- search. But he was by no means a practical geographer, and the record of his travels loses greatly in value from the want of precise scientific data.

See, for information specially relating to the whole subject, the Abbe Desgodin's Mission du Thibet de 1855 a 1870 (Verdun, 1872); and " Account of the Pundit's Journey in Great Tibet," in the Royal Geographical Society's Journal for 1877.

HUCBALD (Hugealdus, Hubaldus), Benedictine monk, and writer on music, was born at the monastery of Saint Amand

near Tournai, in or about 840, if we may believe the statement of his biographers to the effect that he died in 930, aged 90. He studied at the monastery, where his uncle Milo occupied an important position. Hucbald made rapid progress in the acquirement of various sciences and. arts, including that of music, and at an early age composed a hymn in honour of St Andrew, which met with such success as to excite the jealousy of his uncle. It is said that Hucbald in consequence was compelled to leave St Amand, and started an independent school of music and other arts at Nevers. In 86q, however, he was at St Germain d'Auxerre, bent upon completing his studies, and in 872 he was back again at St Amand as the successor in the headmasterghip of the convent school of his uncle, to whom he had been reconciled in the meantime. Between 883 and 900 Hucbald went on several missions of reforming and reconstructing various schools of music, including that of Rheims, but in the latter year he re-turned to St Amand, where he remained to the day of his death on the 25th of June 930, or, according to other chroniclers, on the 20th of June 932. The only work which can positively be ascribed to him is his Harmonica Institutio. The Musica Enchiriadis, published with other writings of minor importance in Gerbert's Scriplores de Musica, and containing a complete system of musical science as well as instructions regarding notation, has now been proved to have originated about half a century later than the death of the monk Hucbald, and to have been the work of an unknown writer belonging to the close of the 10th century and possibly also bearing the name of Hucbald. This work is celebrated chiefly for an essay on a new

form of notation described in the present day as Dasia Notation. The author of the Harmonica Institutio wrote numerous lives of the saints and a curious poem on bald men, dedicated to Charles the Bald.

Authorities. — Sir John Hawkins, General History of the Science and Practice of Music (i. 153).; Histoire litteraire de la France (vi. 216 et seq.); Coussemaker, Memoire sur Hucbald (Paris/ 1841); Hans Miiller, Hucbald's echte und unechte Schriften iiber Musik (Leipzig, 1884); Spitta, Die Musica Enchiriadis und seine Zeitalter (Viertel jahresschrift fur Musikwissenschaft, 1889, 5th year).

HU-CHOW-FU, a city of China, in the province of Cheh-Kiang (30° 48′ N., 120 3′ E.), a little S. of Tai-hu Lake, in the midst of the central silk district. According to Chinese authorities it is 6 m. in circumference, and contains about 100,000 families. A broad stream or canal crosses the city from south to north, and forms the principal highway for boat traffic. The main trade of the place is in raw silk, but some silk fabrics, such as flowered crape (chousha), are also manufactured. Silk is largely worn even by the lowest classes of the inhabitants.

HUCHOWN, " of the Awle Ryale " (fl. 14th century), Scottish poet, is referred to by Wyntoun in his Chronicle in these words: —

" Hucheon, bat cunnande was in littratur. He made a gret Gest of Arthure, And be Awntyr of Gawane, Pe Pistil als of Suet Susane. He was curyousse in his stille, Fayr of facunde and subtile, And ay to pleyssance hade delyte, Mad in metyr meit his dyte Litil or noucht neuir pe lesse Wauerande fra pe suythfastnes."

(Cott. MS. bk. v. 11, 4308-4318).

Much critical ingenuity has been spent in endeavouring to identify (a) the poet and (b) the works named in the foregoing passage. It has been assumed that " Huchown," or " Hucheorf/i, represents the " gude Sir Hew of Eglyntoun " named by Dunbar (q.v.) in his Lament for the Makaris (i.53). The only known Sir Hugh of Eglintoun of the century is frequently mentioned in the public records from the middle of the century onwards, as an auditor of accounts and as witness to. several charters. By 1360 he had married Dame Egidia, widow of Sir James Lindsay and half-sister of Robert the Steward. His public office and association \yith the Steward sorts well with the designation " of the Awle Ryakj" if that be interpreted as " Aula Regalis " or " Royal Palace." He appears to have died late in 1376 or early in 1377.

The first of the poems named above, the Gest of Arlkure 01 Gest Historyalle (ib. i. 4288) , has been identified by Dr Trautmann, " Anglia," Der Dichter Huchown (1877), with the alliterative Morte Arthure in the Thornton MS. at Lincoln, printed by the E.E.T.S. (ed. Brock, 1865). The problem of the second (The Awntyr of Gawane) is still in dispute. There are difficulties in the way of accepting the conjecture that the poem is the " Awn- tyres of Arthure at the Tern Wathelyne " (see S.T.S., Scottish Alliterative Poems, 1897, and Introduction, pp. 11 et seq.), and little direct evidence in favour of the view that the reference is to the greatest of middle English romances, Sir Gawain and the Grene Knight. The third may be safely accepted as the well-known Pistil [Epistle] of Swete Susan, printed by Laing (Select Remains, 1822) and by the S.T.S. (Scottish Alliterative Poems, U.S.).

See, in addition to the works named above, G. Neilson's Sir Hnv of Eglintoun and Huchown of the Awle Ryale (Glasgow, 1901), which contains a full record of references to the historical Sir Hew of Eglintoun; Huchown of the Awle Ryale, the Alliterative Poet (Glasgow, 1902) by the same; J. T. T. Brown's Huchown of the Awle Ryale and his Poems (Glasgow, 1902), in answer to the fore- going. See also the correspondence in the Athenaeum, 1900-1901, and the review of Mr Neilson's pamphlets, ib. (Nov. 22, 1902) ; and J. H. Millar's Literary History of Scotland (1903), pp. 8-14.

HUCHTENBURG, the name of two brothers who were Dutch painters in the second half of the 1 7th century. Both Were natives of Haarlem. Jacob, the elder, of whom very little is known, studied under Berghem, and went early to Italy, where he died young about 1667. His pictures are probably confounded with those of his brother. In Copenhagen, where alone they are catalogued, they illustrate the style of a Dutchman who transfers Berghem's cattle and flocks to Italian landscapes and market- places.

John van Huchtenburg (1646-1733), born at Haarlem it is said in 1646, was first taught by Thomas Wyk, and afterwards induced to visit the chief cities of Italy, where, penetrating as far as Rome, he met and dwelt with his brother Jacob. After the death of the latter he wandered homewards, taking Paris on his way, and served under Van der Meulen, then employed in illustrating for Louis XIV. the campaign of 1667-1668 in the Low Countries. In 1670 he settled at Haarlem, where he married, practised and kept a dealer's shop. His style had now merged into an imitation of Philip Wouvermans and Van der Meulen, which could not fail to produce pretty pictures of hunts and robber camps, the faculty of painting horses and men in action and varied dress being the chief point of attraction. Later

Huchtenburg ventured on cavalry skirmishes and engagements of regular troops generally, and these were admired by Prince Eugene and William III., who gave the painter sittings, and commissioned him to throw upon canvas the chief incidents of the battles they fought upon the continent of Europe. When he died at Amsterdam in 1733, Huchtenburg had done much by his pictures and prints to make Prince Eugene, King William and Marlborough popular. Though clever in depicting a melee or a skirmish of dragoons, he remained second to Philip Wouver- mans in accuracy of drawing, and inferior to Van der Meulen in the production of landscapes. But, nevertheless, he was a clever and spirited master, with great facility of hand and considerable natural powers of observation.

The earliest date on his pictures is 1674., when he executed the " Stag-Hunt " in the Museum of Berlin.and the " Fight with Robbers " in the Lichtenstein collection at Vienna. A " Skirmish at Fleurus " (1690) in the Brussels gallery seems but the precursor of larger and more powerful works, such as the " Siege of Namur " (1695) in the Belvedere at Vienna, where William III. is seen in the foreground accompanied by Max Emmanuel, the Bavarian elector. Three years before, Huchtenburg had had sittings from Prince Eugene (Hague museum) and William III. (Amsterdam Trippenhuis). After 1696 he regularly served as court painter to Prince Eugene, and we have at Turin (gallery) a series of eleven canvases all of the same size depicting the various battles of the great hero, commenc- ing with the fight of Zentha against the Turks in 1697, and con- cluding with the capture of Belgrade in 1717. Had the duke of Marlborough been fond of art he would doubtless have possessed many works of our artist. AH that remains at Blenheim, however, is a couple of sketches of battles, which' were probably sent to Churchill by his great contemporary. The pictures of Huchtenburg

are not very numerous now in public galleries. There is one in the National Gallery, London, another at the Louvre. But Copenhagen has four, Dresden six, Gotha two, and Munich has the well-known composition of " Tallart taken Prisoner at Blenheim in 1704."

HUCKABACK, 1 the name given to a type of cloth used for towels. For this purpose it has perhaps been more extensively used in the linen trade than any other weave. One of the chief merits of a towel is its capacity for absorbing moisture; plain and other flat-surfaced cloths do not perform this function satisfactorily, but cloths made with huckaback, as well as those made with the honeycomb and similar weaves, are particu- larly well adapted for this purpose. The body or foundation of the cloth is plain and therefore sound in struc- ture (see designs A and B in figure), but at fixed

intervals some of the warp threads float on the surface of the cloth, while at the same time a number of weft threads float on the back. Thus the cloth has a somewhat similar appearance on both sides. Weave A is the ordinary and most used huck or huckaback, while weave B, which is usually woven with double weft, is termed the Devon or medical huck. The cloths made by the use of these weaves were originally all linen, but are too often adulterated with inferior fibres.

HUCKLEBERRY, in botany, the popular name in the north- eastern United States of the genus Gaylussacia, small branching shrubs resembling in habit the English bilberry (Vaccinium), to which it is closely allied, and bearing a similar fruit. The common huckleberry of the northern states is G. resinosa; while G. brachycera and G. dumosa are known respectively as box and dwarf huckleberry. The name Gaylussacia com- memorates the famous French chemist Gay-Lussac.

HUCKNALL TORKARD, a town in the Rushcliffe parlia- mentary division of Nottinghamshire, England; 132 m. N.N.W. from London by the Great Central railway, served also by the Great Northern and Midland railways. Pop. (1901) i5, 2 5°- The church of St Mary Magdalene contains the tomb of Lord Byron. There are extensive collieries in the vicinity, and the town has tobacco and hosiery works. Small traces are found of Beauvale Abbey, a Carthusian foundation of the 14th century, in the hilly, wooded district W. of Hucknall; and 3 m. N. is Newstead Abbey, in a beautiful situation on the border of Sherwood Forest. This Augustinian foundation owed its origin to Henry II. It came into the hands of the Byron family in 1540, and the poet Byron resided in it at various times until 1818. There remain the Early English west front of the church, a Perpendicular cloister and the chapter-house; while in the mansion, wholly restored since Byron's time, and in the demesne, many relics of the poet are preserved. To the S. of Hucknall are traces of Gresley Castle, of the 14th century.

HUCKSTER, a dealer or retailer of goods in a small way. The word, in various forms, is common to many Teutonic languages. In Early English it is found as howkester, hokesler, huxter; in early modern Dutch as henker, and Medieval Low German as hoker; but the ultimate origin is unknown. Huckster apparently belongs to that series of words formed from a verb, — as brew, brewer; but the noun " huckster " is found in use before the verb to huck. Hawker and pedlar are nearly synonym- ous in meaning, but " huckster " may include a person in a small way of trade in a settled habitation, while a hawker or pedlar invariably travels from place to place offering his wares. In a contemptuous sense, huckster is used of any one who barters, or makes gain or profit in underhand or mean ways, or who over-reaches another, to get advantage for himself.

HUDDERSFIELD, a municipal, county and parliamentary borough in the West Riding of Yorkshire, England, 190 m. N.N.W. from London. Pop. (1901) 95,047. It is served by the Lancashire & Yorkshire and London & North Western

1 Skeat, Etym. Diet. (1898), says, " The word bears so remarkable resemblance to Low Ger. hukkebak, Ger. huckeback, pick-a-back, that it seems reasonable to suppose that it at first meant ' peddler & ware.' " The New English Dictionary does not consider that the connexion can at present be assumed.

railways, and has connexion with all the important railway systems of the West Riding, and with the extensive canal system of Lancashire and Yorkshire. It is well situated on a slope above the river Colne, a tributary of the Calder. It is built principally of stone, and contains several handsome streets with numerous great warehouses and business premises, many of which are of high architectural merit. Of the numerous churches and chapels all are modern, and some of considerable beauty. The parish church of St Peter, however, though rebuilt in 1837, occupies a site which is believed to have carried a church since the 1 ith century. The town hall (1880) and the corporation offices (1877) are handsome classic buildings; the Ramsden Estate buildings are a very fine block of the mixed Italian order. The market hall (1880) surmounted by a clock-tower is in geometrical Decorated style. The cloth-hall dates from 1784, when it was erected as a clothiers' emporium. It is no longer used for any such purpose, but serves as an exchange news-room. The Armoury, erected as a riding-school, was the headquarters of a volunteer corps, and is also used for concerts and public meetings The chief educational establishments are the Huddersfield College (1838), a higher-grade school, the technical school and several grammar-schools, of which Longwood school was founded in 1731. The Literary and Scientific Society possesses a museum. Of the numerous charitable institutions, the Infirmary, erected in 183 1, is housed in a building of the Doric order. The chief open spaces are Greenhead and Beaumont parks, the last named presented to the town by Mr H. F. Beaumont in 1880. There is a sulphurous spa in the district of Lockwood.

Huddersfield is the principal seat of the fancy woollen trade in England, and fancy goods in silk and cotton are also produced in great variety. Plain cloth and worsteds are also manufactured: There are silk and cotton spinning-mills, iron foundries and engineering works. Coal is abundant in the vicinity. The parliamentary borough returns one member. The county

borough was created in 1888. The municipal borough is under a mayor, 15 aldermen and 45 councillors. Area, 11,859 acres.

Huddersfield (Oderesfelte) only rose to importance after the introduction of the woollen trade in the 17th century. After the Conquest William I. granted the manor to Ilbert de Laci, of whom the Saxon tenant Godwin was holding as underlord at the time of the Domesday Survey. In Saxon times it had been worth 100s., but after being laid waste by the Normans was still of no value in 1086. From the Lacys the manor- passed to Thomas Plantagenet, duke of Lancaster, through his marriage with Alice de Lacy, and so came to the crown on the accession of Henry IV. In 1599 Queen Elizabeth sold it to William Ramsden, whose descendants still own it. Charles II. in 1670 granted to John Ramsden a market in Huddersfield every Wednesday with the toll and other profits belonging. By the beginning of the 18th century Huddersfield had become a " considerable town," chiefly owing to the manufacture of woollen kersies, and towards the end of the same century the trade was increased by two events — the opening of navigation on the Calder in 1780, and in 1784 that of the cloth-hall or piece-hall, built and given to the town by Sir John Ramsden, baronet. Since 1832 the burgesses have returned members to parliament. The town possesses no charter before 1868, when it was created a municipal borough.

HUDSON, GEORGE (1800-1871), English railway financier, known as the " railway king." was born in York in March 1800. Apprenticed to a firm of linendrapers in that city, he soon became a successful merchant, and in 1837 was elected lord mayor of York. Having inherited, in 1827, a sum of £30,000, he invested it in North Midland Railway shares, and was shortly afterwards appointed a director. In 1833 he had founded and for some time acted as manager of the York Banking Company. He had for long been impressed with the necessity of getting the railway to York, and he took an active part in securing the passing of the York and North Midland Bill, and was elected chairman of the new company — the line being opened in 1839. From this time he turned his undivided attention to the projec-

tion of railways. In 1841 he initiated the Newcastle and Darling- ton line. With George Stephenson he planned and carried out the extension of the Midland to Newcastle, and by 1844 had over a thousand miles of railway under his control. In this year the mania for railway speculation was at its height, and no man was more courted than the " railway king." All classes delighted to honour him, and, as if a colossal fortune were an insufficient reward for his public services, the richest men in England presented him with a tribute of £20,000. Deputy- lieutenant for Durham, and thrice lord mayor of York, he was returned in the Conservative interest for Sunderland

in 1845, the event being judged of such public interest that the news was conveyed to London by a special train, which travelled part of the way at the rate of 75 m. an hour. Full of rewards and honours, he was suddenly ruined by the disclosure of the Eastern Railway frauds. Sunderland clung to her generous representa- tive till 1859, but on the bursting of the bubble he had lost influence and fortune at a single stroke. His later life was chiefly spent on the continent, where he benefited little by a display of unabated energy and enterprise. Some friends gave him a small annuity a short time before his death, which took place in London, on the 14th of December 1871. His name has long been used to point the moral of vaulting ambition and unstable fortune. The " big swollen gambler," as Carlyle calls him in one of the Latter-Day Pamphlets, was savagely and excessively reprobated by the world which had blindly believed in his golden prophecies. He certainly ruined scrip-holders, and disturbed the great centres of industry; but he had an honest faith in his own schemes, and, while he beggared himself in their promotion, he succeeded in overcoming the powerful landed interest which delayed the adoption of railways in England long after the date of their regular introduction into America.

HUDSON, HENRY, English navigator and explorer. Nothing is known of his personal history excepting such as falls within the period of the four voyages on which his fame rests. The first of these voyages in quest of new trade and a short route to China by way of the North Pole, in accordance with the sug- gestion of Robert Thorne (d. 1527), was made for the Muscovy Company with ten men and a boy in 1607. Hudson first coasted the east side of Greenland, and being prevented from proceeding northwards by the great ice barrier which stretches thence to Spitzbergen sailed along it until he reached " Newland," as Spitz- bergen was then called, and followed its northern coast to beyond 8o° N. lat. On the homeward voyage he accidentally discovered an island in lat. 71 which he named Hudson's Touches, and which has since been identified with Jan Mayen Island. Molineux's chart, published by Hakluyt about 1600, was Hudson's blind guide in this voyage, and the polar map of 161 1 by Pontanus illustrates well what he attempted, and the valuable results both negative and positive which he reached. He in- vestigated the trade prospects at Bear Island, and recommended his patrons to seek higher game in Newland; hence he may be called the father of the English whale-fisheries at Spitzbergen.

Next year Hudson was again sent by the Muscovy Company to open a passage to China, this time by the north-east route between Spitzbergen and Novaya Zemlya, which had been attempted by his predecessors and especially by the Dutch navigator William Barents. This voyage lasted from the 22nd of April to the 26th of August 1608. He raked the Barents Sea in

vain between 75 30′ N.W. and 71° 15′ S.E. for an opening through the ice, and on the 6th of July, " voide of hope of ˆa north-east passage (except by the Waygats, for which I was not fitted to trie or prove)," he resolved to sail to the north-west, and if time and means permitted to run a hundred leagues up Lumley's Inlet (Frobisher Strait) or Davis's " overfall " (Hudson Strait). But his voyage being delayed by contrary winds he was finally compelled to return without accomplishing his wish. The failure of this second attempt satisfied the Muscovy Company, which thenceforward directed all its energies to the profitable Spitzbergen trade.

TTV'ards the end of 1608 Hudson " had a call " to Amsterdam,

where he saw the celebrated cosmographer the Rev; Peter Plancius and the cartographer Hondius, and after some delay, due to the rivalry which was exhibited in the attempt to secure his services, he undertook for the Dutch East India Company his important third voyage to find a passage to China either by the north-east or north-west route. With a mixed crew of eighteen or twenty men he left the Texel in the " Half-Moon " on the 6th of April, and by the 5th of May was in the Barents Sea, and soon afterwards among the ice near Novaya Zemlya, where he had been the year before. Some of his men becoming disheartened and mutinous (it is now supposed that he had arrived two or three months too early), he lost hope of effecting anything by that route, and submitted to his men, as alternative proposals, either to go to Lumley's Inlet and follow up Waymouth's light, or to make for North Virginia and seek the passage in about 40 lat., according to the letter and map sent him by his friend Captain

John Smith. The latter plan was adopted, and on the 14th of May Hudson set his face towards the Chesapeake and China. He touched at Stromo in the Faroe Islands for water, and on the 15th of June off Newfoundland the " Half- Moon " " spent overboard her foremast." This accident compelled him to put into the Kennebec river, where a mast was procured, and some communication and an unnecessary encounter with the Indians took place. Sailing again on the 26th of July, he began on the 28th of August the survey where Smith left off, at 37° 36′ according to his map, and coasted northwards. On the 3rd of September, in 40° 30', he entered the fine bay of New York, and after having gone 150 m. up the river which now bears his name to near the position of the present Albany, treating with the Indians, surveying the country, and trying the stream above tide-water, he became satisfied that this course did not lead to the South Sea or China, a conclusion in harmony with that of Champlain, who the same summer had been making his way south through Lake Champlain and Lake St Sacrement (now Lake George). The two explorers by opposite routes approached within 20 leagues of each other. On the 4th of October the " Half-Moon " weighed for the Texel, and on the 7th of November arrived at Dartmouth, where she was seized and detained by the English government, Hudson and the other Englishmen of the ship being commanded not to leave England, but rather to serve

their own country. The voyage had fallen short of Hudson's expectations, but it served many purposes perhaps as important to the world. Among other results it exploded Hakluyt's myth, which from the publication of Lok's map in 1582 to the 2nd charter of Virginia in May 1609 he had lost no opportunity of promulgating, that near 40 lat. there was a narrow isthmus, formed by the sea of Verrazano, like that of Tehuantepec or Panama.

Hudson's confidence in the existence of a North- West Passage had not been diminished by his three failures, and a new company was formed to support him in a fourth attempt, the principal promoters being Sir Thomas Smith (or Smythe), Sir Dudley Digges and John (afterwards Sir John) Wolstenholme. He determined this time to carry out his old plan of searching for a passage up Davis's " overfall " — so-called in allusion to the over- fall of the tide which Davis had observed rushing through the strait. Hudson sailed from London in the little ship " Discovery " of 55 tons, on the 17th of April 1610, and entered the strait which now bears his name about the middle of June. Sailing steadily westward he entered Hudson Bay on the 3rd of August, and passing southward spent the next three months examin- ing the eastern shore of the bay. On the 1st of November the " Discovery " went into winter quarters in the S.W. corner of James Bay, being frozen in a few days later, and during the long winter months which were passed there only a scanty supply of game was secured to eke out the ship's provisions. Discontent became rife, and on the ship breaking out, of the ice in ; the spring Hudson had a violent quarrel with a dissolute young fellow named Henry Greene, whom he had befriended by taking him on board, and who now retaliated by inciting the discontented part of the rrew to put Hudson and eight others (including the sick men) out of the ship. This happened on the

22nd of June 1 611. Robert Bylot was elected master and brought the ship back to England. During the voyage home Greene and several others were killed in a fight with the Eskimo, while others again died of starvation, and the feeble remnant which reached England in September were thrown into prison. No more tidings were ever received of the deserted men.

Although it is certain that the four great geographical land- marks which to-day serve to keep Hudson's memory alive, namely the Hudson Bay,

Strait, Territory and River, had repeatedly been visited and even drawn on maps and charts before he set out on his voyages, yet he deserves to take a very high rank among northern navigators for the mere extent of his discoveries and the success with which he pushed them beyond the limits of his predecessors. The rich fisheries of Spitzbergen and the fur industry of the Hudson Bay Territory were the immediate fruit of his labours.

See Henry Hudson, (he Navigator (Hakluyt Society, i860); and T. A. Janvier, Henry Hudson (1909). In 1909 a great celebration of the tercentenary was held in the United States.

HUDSON, JOHN (1662-1719), English classical scholar, was born at Wythop in Cumberland. He was educated at Oxford, where the remainder of his life was spent. In 1701 he was appointed Bodley's librarian, and in 171 1 principal of St Mary's Hall. His political views stood in the way of his preferment in the church and university. He died on the 26th of November 1719. As an editor and commentator he enjoyed a high reputation both at home and abroad. His works, chiefly editions of classical authors, include the following: Velleius Paterculus (1693); Thucydides (1696); Geographiae Veteris Scriptores Graeci minores (1698-17 12) containing the works and fragments of 21 aiithors and the learned, though diffuse, dissertations of H. Dodwell — a rare and valuable work, which in spite of its faulty text was not superseded until the appearance of C. W. Muller's edition in the Didot series: the editio princeps of Moeris, De Vocibus Atticis et Hellenicis (1712); Josephus (1720, published posthumously by his friend Anthony Hall, the anti- quary), a correct and beautifully printed edition, with variorum notes and translation.

See Wood, Athenae Oxonienses, iv. ; introduction to the edition of Josephus; W. Hutchinson, History of Cumberland (1794).

HUDSON, a city and the county-seat of Columbia county, New York, U.S.A., on the E. side of the Hudson river, about 114 m. N. of New York City and about 28 m. S. of Albany. Pop. (1890) 9970; (1900) 9528, of whom 1155 were foreign-born; (1910 census) 11,417. It is served by the Boston & Albany, the New York Central & Hudson River and the (electric) Albany & Hudson railways, by river steamboats, and by a steam ferry to Athens and Catskill across the river. The city is pictur- esquely situated on the slope of Prospect Hill; and Promenade Park, on a bluff above the steamboat landing, commands a fine view of the river and of the Catskill Mountains. Among the public buildings and institutions are a fine city hall, the Columbia County Court House, a public library, a Federal building, a State Training School for Girls, a State Firemen's Home, an Orphan Asylum, a Home for the Aged and a hospital. The city's manufactures include hosiery and knit goods, Portland cement (one of the largest

manufactories of that product in the United States being here), foundry and machine shop products, car wheels, ice tools and machinery, ale, beer, bricks and tiles and furniture. The value of the factory products in 1905 was $4,115,525, an increase of 58-1% over that in 1900. The municipality owns and operates the water-works. Hudson,' which was originally known as Claverack Landing, was for many years merely a landing with two rude wharfs and two small storehouses, to which farmers in the neighbourhood brought their produce for shipment on the river. Late in 1783 the place was settled by an association of merchants and fishermen from Rhode Island, Nantucket and Martha's Vineyard. The present name was adopted in 1784, and the city was chartered in 1785. For many years Hudson had a considerable foreign commerce and whaling interests, but these were practically destroyed by the war of 1S12.

HUDSON BAY (less often, but more correctly, Hudson's Bay), an inland sea in the N.E. of Canada, extending from 78 to 95 W. and from 51° to 70 N. On the east it is connected with the Atlantic Ocean by Hudson Strait, and on the north with the Arctic Ocean by Fox Channel and Fury and Hecla Strait. Its southern extremity between 5 5° and 51° N. is known as James Bay. It is 590 m. in width, and 1300 from S. to N., including James Bay (350 m.) and Fox Channel (350 m.). The customary use of the term includes James Bay, but not Fox Channel. The average depth of water is about 70 fathoms, deepening at the entrance of Hudson Strait to 100 fathoms. James Bay is much shallower, and unfit for shipping save for a central channel leading to the mouth of the Moose river. The centre and west of the main bay are absolutely free from shoals, rocks or islands, but down its east coast extend two lines of small islands, one close to shore, the other at 70 to 100 m. distance, and comprising a number of scattered groups (the Ottawa Islands, the Sleepers, the Belchers, &c),

Into Hudson and James Bays flow numerous important rivers, so much so that the water of the latter is rather brackish than salt. Beginning at the north-west, the chief of these are Churchill, Nelson (draining Lake Winnipeg, and the numerous inland rivers of which it is the basin), Hayes (the old boat route of the voyageurs to Winnipeg), Severn, Albany, Moose, Rupert river (draining Lake Mistassini), Nottaway, East Main, Great Whale and Little Whale.

Save for some high bluffs on the east and north-east, the shores of the bay are low. Around much of James Bay extend marshes and swampy ground. Geologically the greater part of the Hudson Bay district belongs to the

Laurentian system, though there are numerous outcrops of later formation; Cambro- Silurian on the south and west, and to the north of Cape Jones (the north-eastern extremity of James Bay) a narrow belt of Cambrian rocks, of which the islands are composed. Coal, plumbago, iron and other minerals have been found in various districts near the coast. The climate is harsh, though vegetables and certain root crops ripen in the open air as far north as Fort Churchill; cattle flourish, and are fed chiefly on the native grasses; spruce, balsam and poplar grow to a fair size as far as the northern limit of James Bay. Caribou, musk ox and other animals are still found in large numbers, and there is an abun- dance of feathered game — ducks, geese, loons and ptarmigan; hunting and fishing form the chief occupations of the Indians and Eskimo who live in scattered bands near the shore. The bay abounds with fish, of which the chief are cod, salmon, porpoise and whales. The last have long been pursued by American whalers, whose destructive methods have so greatly depleted the supply that the government of Canada is anxious to declare the bay a mare clausum.

Hudson Strait is about 450 m. long with an average breadth of 100 m., narrowing at one point to 45. Its shores are high and bold, rarely less in height than 1000 ft., save on the coast of Ungava Bay, a deep indentation on the south-east. No islands or rocks impede navigation. Its depth is from 100 to 200 fathoms. Owing to the violence of the tides, which rise to a height of 35 ft., it never absolutely freezes over.

After three centuries of exploration, the navigability of Hudson Bay and Strait remains a vexed question. To Canada it is one of great commercial interest, and numerous expeditions have been made and reports issued by the Geological Survey. From Winnipeg to Liverpool via Churchill is over 500 m. less than via Montreal, and from Edmonton to Liverpool almost 1000 m. less. Were navigation open for a sufficient time, such a route for the grain of the Canadian and American west would be of enormous advantage. But the inlet from the Arctic sends down masses of heavy ice, which drift about in the bay and the strait. Past the mouth of the strait flows a stream often over 100 m. wide, of berg and floe ice, carried by the Arctic current. Owing to the proximity of the Magnetic Pole (in Boothia) the compass often refuses to work. For sailing ships, such as the Hudson's Bay Company has long employed, the season for safe navigation is from the 15th of July to the 1st of October. In over 200 years very few serious accidents have occurred to the company's ships within these limits. It is claimed that specially built and protected steamers would be safe from the 15th of June till the 1st of November, and the problem may be solved by ice- breaking vessels of great power. The only good harbour available

is Fort Churchill, at the mouth of the Churchill river, which is large and easy of access. Moose Factory (at the foot of James Bay) and York Factory

(at the mouth of the Nelson) are mere roadsteads. Marble Island, south of Chesterfield Inlet, where the whalers winter, is too far north for regular shipping.

The Cabots entered the strait in 1498, and during the next century a series of Elizabethan mariners; but the bay was not explored until 1610, when Henry Hudson pushed through the ice and explored to the southern limit of James Bay.

See Lieutenant Gordon, R.N., Reports on the Hudson's Bay Expeditions (1884, 5, 6); William Ogilvie, Exploratory Survey to Hudson's Bay in 1890 (Ottawa, 1891); R. F. Stupart, The Naviga- tion of Hudson's Bay and Straits (Toronto, 1904).

HUDSON RIVER, the principal river of New York state, and one of the most important highways of commerce in the United States of America. It is not a river in the truest sense of the word, but a river valley into which the ocean water has been admitted by subsidence of the land, transforming a large part of the valley into an inlet, and thus opening it up to navigation.

The Hudson lies entirely in the state of New York, which it crosses in a nearly north-and-south direction near the eastern boundary of the state. The sources of the river are in the wildest part of the Adirondack Mountains, in Essex county, north- eastern New York. There are a number of small mountain streams which contribute to the headwater supply, any one of which might be considered the main stream; but assuming the highest collected and permanent body of water to be the true head, the source of the Hudson is Lake Tear-of-the-Clouds, which lies near Mount Marcy at an elevation of about 4322 ft. This small mountain stream flows irregularly southward with a fall of 64 ft. per mile in the upper 52 miles, then, from the mouth of North Creek to the mouth of the Sacondaga, at the rate of nearly 14 ft. per mile. In this part of its course the Hudson has many falls and rapids, and receives a number of mountain streams as tributaries, the largest being Indian river, Schroon river and Sacondaga river. Below the mouth T>f the Sacondaga the Hudson turns sharply and flows eastward for about 12 m., passing through the mountains, and leaping over several falls of great height and beauty. At Glens Falls there is a fall of about 50 ft.; and just below this, at Sandy Hill, the river again turns abruptly, and for the rest of its course to New York Bay flows almost due south. There are numerous falls and rapids between Glens Falls and Troy which are used as a source of power and are the seats of busy manufacturing plants. Several large tributaries join this part of the river, including Batten Kill, Fish Creek, Hoosic river and the Mohawk, which is the largest of all the tributaries to the Hudson, and contributes more water than the main river itself.

From Troy to the mouth of the Hudson the river is tidal, and from this point also the river is navigable, not because of the river water itself, but because of the low grade of the river bed by which the tide is able to back up the water sufficiently to float good-sized boats. From Albany, 6 m. below Troy, to the mouth of the Hudson, a distance of 145 m., there is a total fall of only 5 ft. It is this lower, tidal, navigable portion of the Hudson that is of so much importance and general interest. Numerous tributaries enter this part of the Hudson from both the east and the west, the largest and most important being the Wallkill which enters at Kingston. In general there is in this part of the river a broad upper valley with a much narrower gorge cut in its bottom, with its rock floor below sea level and drowned by the entrance of the sea. Although this is true in a general way, the character of the river Valley varies greatly in detail from point to point, under the influence of the geological structure of the enclosing rock walls.

Most of these variations may be included in a threefold division of the lower Hudson valley. The uppermost of these extends from the south-eastern base of the Adirondack Mountains to the northern portal of the Highlands in Dutchess and Ulster counties. This is a lowland region of ancient Paleozoic rocks. Into the upper portion of this section of the river the non-tidal Hudson is depositing its load of detritus, building a delta below Troy. This, shifted about by the currents, has interposed an obstacle to navigation which has called for extensive dredging and other work, for the purpose of maintaining; 9 navigable channel. The width of the tidal river

varies somewhat, being about 300 yds. at Albany and thence to the Highlands varying from 300 yds. to 900 yds.

The scenery in this part of the river, though not tame, is a little monotonous, the gently sloping hills, with the variegated colours of wood and cultivated land, and the occasional occurrence of a town or village being repeated without any marked feature to break their regularity. Thirty miles from Troy noble views begin to be obtained of the Catskill Mountains towering up behind the west bank, the nearest eminence at the distance of about 7 m. Along' the im- mediate banks of the river are great beds of clay which is extensively used in the manufacture of brick; and the brick-burning plants and huge ice houses are conspicuous features in the landscape. Although the river freezes in the winter, so that ice-boating is a favourite winter sport, the summer climate is warm enough for the cultivation of grapes and other fruits, which is aided to a con- siderable

extent by the influence of the large body of water en- closed between the valley walls, which tends to retard both early and late frosts, and thus to extend the growing season. In addition to smaller towns and villages, there are a number of larger towns and cities, including Hudson and Catskill, nearly opposite each other, and farther down Kingston and the thriving city of Poughkeepsie. Near the extreme end of this section of the Hudson lies the city of Newburgh, a short distance below which, at Cornwall Landing, the river enters the Highlands, the second division of the tidal part of the Hudson and far the grandest of all.

The river enters the northern portals of the Highlands between a series of hills whose frequently precipitous sides rise often abruptly from the water's edge. For about 16 m. the river is bordered by steeply rising hills, giving picturesque and striking views of great variety. These are due to the fact that the river here is crossing a belt of ancient crystalline rocks of moderately high relief, comparable in geological structure to the Adirondack region. The views in this part of the river, often compared with those along the Rhine, are of a character in some respects unparalleled, and at several points they have an impressiveness and surprising grandeur rarely equalled. About 10 m. after the Highlands are entered West Point is reached, a favourite landing-place of tourists and the seat of the United States Military Academy, from whose grounds fine views of the river may be had. This point is historically interesting as the seat of Fort Putnam, now in ruins, built during the American War of Independence, at which time a chain was stretched across the river to prevent the passage of British ships.

The third and lowest section of the tidal part of the Hudson extends from the lower end of the Highlands to New York Bay. This is a region of ancient and metamorphic Paleozoic rocks on the eastern side, and mainly Triassic rocks on the west. Because of their less resistance to denudation, these rocks have permitted a broadening of the valley in this part of the course. Just below Peekskill the river broadens out to form Haverstraw Bay, at the extremity of which is the headland of Croton Point. Below this is the wider expanse of Tappan Bay, which has a length of 12 m. and a breadth of from 4 to 5 m., while below this bay the river narrows to a breadth between I and 2 m. On Tappan Bay stands Tarry- town, famous both historically and from its connexion with Wash- ington Irving, whose cottage of Sunnyside is in the vicinity. At Piermont, where the bay ends, the range named the Palisades rises picturesquely from the water's edge to the height of between 300 and 500 ft., extending along the west bank for about 20 m., the opposite shore being level and dotted with hamlets, villages and towns. The Palisades are a lava rock of the variety called trap, which has been intruded as a sheet into the Triassic sandstones, and, on cooling, has developed the prismatic jointing which is so much more perfectly seen at Fingal's Cave in Scotland and Giant's Causeway in

Ireland. It is this imperfect hexagonal jointing that has given rise to the name " palisade," applied to the range whose face fronts the lower Hudson. At its mouth the Hudson both broadens and branches, forming a series of islands and an excellent harbour, rjwing to the fact that the sinking of the land here has permitted the sea to fill the valleys and even to flood low divides. A submerged valley, traceable over the continental shelf, south-east of New York, is commonly believed to represent an earlier course of the Hudson when the land stood 2000 or 3000 ft. higher than at present, and when the inner gorge above New York was being excavated.

Although the Hudson river has a total length of only about 300 m., and a drainage area of but 13,370 sq. m., it has been one of the most significant factors in the development of the United States. With an excellent harbour at its mouth, and navigable waters leading into a fertile interior for a distance of 150 m., it early invited exploration and settlement. Verrazano pro- ceeded a short distance up the Hudson in a boat in 1524; but the first to demonstrate its extent and importance was Henry Hudson, from whom it derives its name. He sailed above the mouth of the Mohawk in September 1609. The Dutch later explored and settled the valley and proceeded westward along

the Mohawk. The Dutch place-names of the region clearly show the significance of this early use of the Hudson highway. Later, in wars, and notably in the American War of Independence, and American War of 181 2, the valley became a region of great strategic importance. This was increased by the fact that from the Hudson near Sandy Hill there are two low gaps into the northern country, one along the valley occupied by Lake George, the other into the Lake Champlain valley. The divide between this part of the Hudson and Lake Champlain is only 147 ft. above sea level, and a depression of the land of only 200 ft. in the region between Albany and the St Lawrence river would convert the Hudson and Champlain valleys into a navigable strait having a depth sufficient for the largest vessels. Move- ments of armies across these gaps were noteworthy events in the wars between the United States and the French and British; but modern commerce has made far less significant use of this highway, mainly because the gaps lead to a region of little economic importance, and thence to the boundary line of a foreign country. Far more important has been the highway westward along the Mohawk, which has cut a gap across the mountains that has been the most useful of all the gaps through the Appalachians. It has been useful in exploration, in war and in commerce, the latter especially because it leads to the fertile interior and to the waterway of the Great Lakes. By the Erie canal the river is connected with Lake Erie, with a branch to Lake Ontario, and other branches to smaller lakes. The Champlain canal connects the Hudson with Lake Champlain. Although these canals are far less used than formerly, the Hudson is still a

busy highway for navigation. It is of interest to note that it was on the Hudson that Fulton, the inventor of steam navigation, made his first successful experiment; and that it was along this same highway, from Albany, that one of the first successful railways of the country was built. A railway line now runs parallel to each bank of the Hudson, the New York Central & Hudson River on the eastern side and the West Shore on the western side, each with connexions to the north, east and west, and each turning westward along the Mohawk to Buffalo. It is largely because of the importance of this highway of com- merce, by water and by rail, from the coast to the interior, that the greatest and densest population in the United States has gathered at the seaward end of the route in New York City, Jersey City, Hoboken and other places on and near New York Bay, making one of the leading industrial and commercial centres of the world.

For references to articles on the physiography of the Hudson river see R. S. Tarr, Physical Geography of New York State (New York; 1902), pp. 184-190. For Pleistocene conditions see J. B. Wood- worth, Ancient Water Levels of the Champlain and Hudson Valleys (Albany, 1905), N.Y. State Museum, Bulletin 84. For facts con- cerning water supply see Surface Water Supply of the Hudsonˆ Passaic, Raritan and Delaware River Drainages (1907), being U.S. Geological Survey, Water Supply Paper, No. 202. For relation between physiography and history see chapters in E. C. Semple's American History and its Geographic Conditions (Boston, 1903); A. P. Brigham, Geographic Influences in American History (Boston, 1903), and From Trail to Railway through the Appalachians (Boston, 1907). See also E. M. Bacon, The Hudson River (New York, 1902); W. E. Verplanck and M. W. Collyer, Sloops of the Hudson: Sketch of the Packet and Market Sloops of the Last Century (New York, 1908), D. L. Buckman, Old Steamboat Days on the Hudson River (New York, 1907), and Clifton Johnson, The Picturesque Hudson (New York, 1909). (R. S. T.)

HUDSON'S BAY COMPANY, or " the Governor and Company of Adventurers of England trading into Hudson's Bay,"_a corporation formed for the purpose of importing into Great Britain the furs and skins which it obtains, chiefly by barter, from the Indians of British North America. The trading stations of the Company are dotted over the immense region (excluding Canada proper and Alaska), which is bounded E. and W. by the Atlantic and Pacific Oceans, and N. and S. by the Arctic Ocean and the United States. From these various stations the furs are despatched in part to posts in Hudson Bay and the coast of Labrador for transportation to England by the Company's ships, and in part by steamboat or other conveyances to points on the railways from whence they can be conveyed to Montreal, St John,

N.B., or other Atlantic port, for shipment to London by Canadian Pacific Railway Company's mail ships, or other line of steamers, to be sold at auction.

In the year 1670 Charles II. granted a charter to Prince Rupert and seventeen other noblemen and gentlemen, incorporating them as the " Governor and Company of Adventurers of England trading into Hudson's Bay," and securing to them " the sole trade and commerce of all those seas, straits, bays, rivers, lakes, creeks and sounds, in whatsoever latitude they shall be, that lie within the entrance of the straits commonly called Hudson's Straits, together with all the lands and territories upon the countries, coasts and confines of the seas, bays, &c, aforesaid, that are not already actually possessed by or granted to any of our subjects, or possessed by the subjects of any other Christian prince or state." Besides the com- plete lordship and entire legislative, judicial and executive power within these vague limits (which the Company finally agreed to accept as meaning all lands watered by streams flowing into Hudson Bay), the corporation received also the right to " the whole and entire trade and traffic to and from all havens, bays, creeks, rivers, lakes and seas into which they shall find entrance or passage by water or land out of the territories, limits or places aforesaid." The first settlements in the country thus granted, which was to be known as Rupert's Land, were made on James Bay and at Churchill and Hayes rivers; but it was long before there was any advance into the interior, for in 1749, when an unsuccessful attempt was made in parliament to deprive the Company of its charter on the plea of " non-user," it had only some four or five forts on the coast, with about 120 regular employes. Although the commercial success of the enterprise was from the first immense, great losses, amounting before 1700 to £217,514, were inflicted on the Company by the French, who sent several military expeditions against the forts. After the cession of Canada to Great Britain in 1763, numbers of fur-traders spread over that country, and into the north-western parts of the continent, and began even to encroach on the Hudson's Bay Company's territories. These individual speculators finally combined into the North-West Fur Company of Montreal.

The fierce competition which at once sprang up between the companies was marked by features which sufficiently demon- strate the advantages of a monopoly in commercial dealings with savages, even although it is the manifest interest of the monopolists to retard the advance of civilization towards their hunting grounds. The Indians were demoralized, body and soul, by the abundance of ardent spirits with which the rival traders sought to attract them to themselves; the supply of furs threatened soon to be

exhausted by the indiscriminate slaughter, even during the breeding season, of both male and female animals; the worst passions of both whites and Indians were inflamed to their fiercest (see Red River Settlement). At last, in 1821, the companies, mutually exhausted, amalgamated, obtaining a licence to hold for 21 years the monopoly of trade in the vast regions lying to the west and north- west of the older company's grant. In 1838 the Hudson's Bay Company acquired the sole rights for itself, and obtained a new licence, also for 21 years. On the expiry of this it was not renewed, and since 1859 the district has been open to all.

The licences to trade did not of course affect the original possessions of the Company. Under the terms of the Deed of Surrender, dated November 19th, 1869, the Hudson's Bay Company surrendered " to the Queen's Most Gracious Majesty,' all the rights of Govern- ment, and other rights, privileges, liberties, franchises, powers and authorities, granted or purported to be granted to the said Govern- ment and Company by the said recited Letters Patent of His Late Majesty King Charles II.; and also all similar rights which may have been exercised or assumed by the said Governor and Company in any parts of British North America, not forming part of Rupert's Land or of Canada, or of British Columbia, and all the lands and territories within Rupert's Land (except and subject as in the said terms and conditions mentioned) granted or purported to be granted to the said Governor and Company by the said Letters Patent," subject to the terms and conditions set out in the Deed of Surrender, including the payment to the Company by the Canadian Government of a sum of £300,000 sterling on the transfer of Rupert's Land to the Dominion of Canada, the retention by the Company of its posts and stations, with a right of selection of a block of land adjoining each post in conformity with a schedule annexed to the Deed of Surrender; and the right to claim in any township or district within the Fertile Belt in which land is set out for settle- ment, grants of land not exceeding one-twentieth part of the land so set out. The boundaries of the Fertile Belt were in terms of the Deed of Surrender to be as follows:—" On the south by the United States' boundary; on the west by the Rocky Mountains; on the north by the northern branch of the Saskatchewan; on the east by Lake Winnipeg, the Lake of the Woods, and the waters connecting them," and " the Company was to be at liberty to carry on its trade without hindrance, in its corporate capacity; and no exceptional tax was to be placed on the Company's land, trade or servants, nor any import duty on goods introduced by them previous to the surrender."

An Order in Council was passed confirming the terms of the Deed of Surrender at the Court of Windsor, the 23rd of June 1870.

In 1872, in terms of the Dominion Lands Act of that year, it was mutually

agreed in regard to the one-twentieth of the lands in the Fertile Belt reserved to the Company under the terms of the Deed of Surrender that they should be taken as follows : —

" Whereas by article five of the terms and conditions in the Deed of Surrender from the Hudson's Bay Company to the Crown, the said Company is entitled to one-twentieth of the lands surveyed into Townships in a certain portion of the territory surrendered, described and designated as the Fertile Belt.

" And whereas by the terms of the said deed, the right to claim the said one-twentieth is extended over the period of fifty years, and it is provided that the lands comprising the same shall be determined by loS and whereas the said Company and the Govern- ment of the Dominion have mutually agreed that with a view to an equitable distribution throughout the territory described, of the said one-twentieth of the lands, and in order further to simplify the setting apart thereof, certain sections or parts of sections, alike in numbers and position in each township throughout the said Territory, shall, as the townships are surveyed, be set apart and designated to meet and cover such one-twentieth :

" And whereas it is found by computation that the said one- twentieth will be exactly met, by allotting in every fifth township two whole sections of 640 acres each, and in all other townships one section and three quarters of a section each, therefore —

"In every fifth Township in the said Territory; that is to say: in those townships numbered 5, 10, 15, 20, 25, 30, 35, 40, 45, 50 and so on in regular succession northerly from the International boundary, the whole of sections Nos. 8 and 26, and in each and every of the other townships the whole of section No. 8, and the south half and north-west quarter of section 26 (except in the cases hereinafter provided for) shall be known and designated as the lands of the said Company."

See G. Bryce, Remarkable History of the Hudson's Bay Company (London. 1900) ; and A. C. Laut, Conquest of the great Northwest; being the story of the adventurers of England known as Hudson's Bay Co. (New York, 1909).

HUE, a town of French Indo-China, capital of Annam, on the Hue river (Song-Huorig-Giang) about 8 m. from its mouth in the China Sea. Pop. about 42,000, of whom 240 are Europeans. The country immediately surrounding it is fiat, alluvial land, traversed by streams and canals and largely occupied by rice fields. Beyond the plain rises a circle of hills formed by spurs of the mountains of Annam. The official portion of the

town, fortified under French superintendence, lies on the left bank of the river within an enclosure over 7300 yds. square. It-contains the royal palace, the houses of the native ministers and officials, the arsenals, &c. The palace stands inside a separate enclosure. Once forbidden ground, it is to-day open to foreigners, and the citadel is occupied by French troops. The palace of the French resident-general and the European quarter, opposite the citadel on the right bank of the Hue, are connected wifh the citadel by an iron bridge. Important suburbs adjoin the official town, the villages of Dong-Bo, Bo-vinh, Gia-Ho, Kim-Long and Nam-Pho forming a sort of commercial belt around it. Glass- and ivory-working are carried on, but otherwise industry is of only local importance. Rice is imported by way of the river. A frequent service of steam launches connects the town with the ports of Thuan-an, at the mouth of the river, and Tourane, on the bay of that name. Tourane is also united to Hue by a railway opened in 1906. In the vicinity the chief objects of interest are the tombs of the dead kings of Annam.

HUE AND CRY, a phrase employed in English law to signify the old common law process of pursuing a criminal with born and voice. It was the duty of any person aggrieved, or discovering a felony, to raise the hue and cry, 1 and his neighbours were bound to turn out with him and assist in the discovery of the offender. In the case of a hue and cry, all those joining in the pursuit were justified in arresting the person pursued, even though it turned out that he was innocent. A swift fate awaited any one overtaken

1 The word " hue," which is now obsolete except in this phrase and in the " huers " on the Cornish coast who direct the pilchard- fishing from the cliffs, is generally connected with the Old French verb huer, to cry, shout, especially in war or the chase. It has been suggested that while " cry " represents the sound of the voices of the pursuers, " hue " applies to the sound of horns or other instru- ments used in the pursuit; and so Blackstone, Comment, iv. xxi. 293 (1809), " an hue and cry, hutesium et clamor, . . . with horn and voice." " Hue," appearance, colour, is in Old English hiew, hiw, cognate with Swedish hij, complexion, skin, and probably connected with Sanskrit chavii, skin, complexion, beauty.

by hue and cry, if he still had about him the signs of his guilt. If he resisted he could be cut down, while, if he submitted to capture, his fate was decided. Although brought before a court, he was not allowed to say anything in self-defence, nor was there any need for accusation, indictment or appeal. Although regulated from time to time by writs and statutes, the

process of hue and cry continued to retain its summary method of procedure, and proof was not required of a culprit's guilt, but merely that he had been taken red-handed by hue and cry. The various statutes relating to hue and cry were repealed in 1827 (7 and 8 Geo. IV. c. 27). The Sheriffs Act 1887, re- enacting 3 Edw. I. c. 9, provides that every person in a county must be ready and apparelled at the command of the sheriff and at the cry of the county to arrest a felon, and in default shall on conviction be liable to a fine.

" Hue and cry " has, from its original meaning, come to be applied to a proclamation for the capture of an offender or for the finding of stolen goods, and to an official publication, issued for the information of the authorities interested, in which particulars are given of offenders " wanted," offences committed, &c.

For the early history, see Pollock and Maitland, History of English Law, vol. ii. ; W. Stubbs, Select Charters.

HUEHUETANANGO (i.e. in the local Indian dialect, " City of the Ancients "), the capital of the department of Huehue- tanango, western Guatemala, 106 m. W.N.W. of Guatemala city, on the right bank and near the source of the river Salegua, a tributary of the Chiapas. Pop. (1905) about 12,000. Huehue- tanango was built near the site of the ancient Indian city of Zakuleu, now represented by some ruins on a neighbouring ridge surrounded by deep ravines. It is the principal t'own of a fertile upland region, which produces coffee, cocoa and many European and tropical fruits. Chiantla, a neighbouring town mainly inhabited by Indians, was long the headquarters of a successful Dominican mission; its convent, enriched by the gifts of pilgrims and the revenues of the silver mines owned by the monks, became one of the wealthiest foundations in Central America. It was secularized in 1873, and the mines have been abandoned.
HUELVA, a maritime province of south-western Spain, formed in 1833 of districts taken from Andalusia, and bounded on the N. by Badajoz, E. by Seville, S. by the Gulf of Cadiz and W. by Portugal. Pop. (1900) 260,880; area 3913 sq. m. With the exception of its south-eastern angle, where the province merges into the flat waste lands known as Las Marismas, at the mouth of the Guadalquivir, Huelva presents throughout its entire extent an agreeably varied surface. It is traversed in a south-westerly direction by the Sierra Morena, here known, in its main ridge, as the Sierra de Aracena. The principal streams are the navigable lower reaches of the Guadalquivir and Guadiana, which respectively form for some distance the south-eastern and south-western boundaries; the Odiel and the Tinto, which both fall into the Atlantic by navigable rias or estuaries; the Malagon, Chanza, Alcalaboza and Murtiga, which belong to the Guadiana system; and the Huelva, belonging to that of the Guadalquivir. Huelva has a mild and

equable climate, with abundant moisture and a fertile soil. Among the mountains there are many valuable woodlands, in which oaks, pines, beeches, cork-trees and chestnuts predominate, while the lowlands afford excellent pasturage. But agriculture and stock-breeding are here less important than in most Spanish provinces, although the exports comprise large quantities of fruit, oil and wine, besides cork and esparto grass. The head- quarters of the fishing trades, which include the drying and salting of fish, are at Huelva, the capital, and Ayamonte on the Guadiana. There are numerous brandy distilleries; and bricks, pottery, soap, candles and flour are also manufactured; but the great local industry is mining. In 1903 no fewer than 470 mines were at work; and their output, consisting chiefly of copper with smaller quantities of manganese and iron, exceeded £1,500,000 in value. The celebrated Rio Tinto copper mines, near the sources of the Tinto, were, like those of Tharsis, 30 m. N.N.W. of Huelva, exploited long before the Christian era, probably by

the Carthaginians, and certainly by the Romans. They are still among the most important copper mines in the world (see Rio Tinto) . • Saline and other mineral springs are common throughout the province. Huelva is the principal seaport, and is connected with Seville on the east and Merida on the north by direct railways; while a network of narrow-gauge railways gives access to the chief mining centres. The principal towns, besides Huelva (21,359) an d Ri° Tinto (11,603), which are described in separate articles, are Alosno (8187), Ayamonte (7530), Bollullos (7922), Moguer (8455), Nerva (7908) and Zalamea la Real (7335). The state and municipal roads are better engineered and maintained than those of the neighbouring provinces. See also Andalusia.

HUELVA (the ancient Onuba, Onoba, or Onuba Aestuaria), the capital of the Spanish province of Huelva, about 10 m. from the Atlantic Ocean, on the left bank of the river Odiel, and on the Seville-Huelva, Merida-Huelva and Rio Tinto- Huelva railways, the last-named being a narrow-gauge line. Pop. (1900) 21,357. Huelva is built on the western shore of a triangular peninsula formed by the estuaries of the Odiel and Tinto, which meet below the town. It is wholly modern in character and appearance, and owes its prosperity to an ever- increasing transit trade in copper and other ores, for which it is the port of shipment. After 1872, when the famous Rio Tinto copper mines were for the first time properly exploited, it progressed rapidly in size and wealth. Dredging operations removed a great part of the sandbanks lining the navigable main channel of the Odiel, and deepened the water over the bar at its mouth; new railways were opened, and port works were undertaken on a large scale, including the construction of extensive quays and two piers, and the installation of modern appliances for handling cargo. Many of these improvements were added after 1900. Besides exporting copper, manganese and other minerals, which in 1903

reached 2,750,000 tons, valued at more than £1,500,000, Huelva is the headquarters of profitable sardine, tunny and bonito fisheries, and of a trade in grain, grapes, olives and cork. The copper and cork industries are mainly in British hands, and the bulk of the imports, which consist chiefly of coal, iron and steel and machinery, comes from Great Britain. Foodstuffs and Australian hardwood are also imported.

Huelva was originally a Carthaginian trading-station, and afterwards a Roman colony; but it retains few memorials of its past, except the Roman aqueduct, repaired in modern times, and the colossal statue of Columbus. This was erected in 1892 to commemorate the fourth centenary of his voyage to the new world in 1492-1493, which began and ended in the village of San Palos de la Frontera on the Tinto. Columbus resided in the neighbouring monastery of Santa Maria la Rabida after his original plans for the voyage had been rejected by King John II. of Portugal in 1484. An exact reproduction of this monastery was erected in 1893 at the World's Fair, Chicago, U.S.A., and was afterwards converted into a sanatorium. Higher up the Tinto, above San Palos, is the town of Moguer (pop. 8455), which exports large quantities of oil and wine.

HUllRCAL OVERA, a town of south-eastern Spain, in the province of Almerla, on the Lorca-Baza railway, and between two branches of the river Almanzora. Pop. (1900) 15,763. Huercal Overa is the chief town of a thriving agricultural district, largely dependent for its prosperity on the lead mining carried on among the surrounding highlands.

HUESCA, a frontier province of northern Spain, formed in" 1833 of districts previously belonging to Aragon; and bounded on the N. by France, E. and S.E. by Lerida, S.W. and W. by Saragossa, and N.W. by Navarre. Pop. (1900) 244,867; area 5848 sq. m. The entire northern half of Huesca belongs to the mountain system of the Pyrenees, which here attain their greatest altitudes in Aneto, the highest point of the Maladetta ridge (11,168 ft.), and in Monte Perdido (10,997 ft.). The southern half forms part of the rugged and high-lying plateau of Aragon. Its only conspicuous range of hills is the Sierra de Alcubierre on the south-western border. The whole province is included in

the basin of the Ebro, and is drained by four of its principal tributaries — the Aragon in the north-west, the Gallego in the west, the Cinca in the centre, and the Noguera Ribagorzana along part of the eastern border. These rivers rise among the Pyrenees, and take a southerly course; the two

last-named unite with the Segre on their way to join the Ebro. The Cinca receives the combined waters of the Alcanadre and Isuela on the right and the Esera on the left.

The climate varies much according to the region; in the north, cold winds from the snow-capped Pyrenees prevail, while in the south, the warm summers are often unhealthy from the humidity of the atmosphere. Agriculture, the leading industry of Huesca, is facilitated by a fairly complete system of irrigation, by means of which much waste land has been reclaimed, although large tracts remain barren. There is good summer pasturage on the mountains, where cattle, sheep and swine are reared. The mountains are richly clothed with forests of pine, beech, oak and fir; and the southern regions, wherever cultivation is possible, produce abundant crops of wheat and other cereals, vines, mulberries and numerous other fruits and vegetables. The mineral resources include argentiferous lead, copper, iron and cobalt, with salt, lignite, limestone, millstone, gypsum, granite and slate. None of these, however, occurs in large quantities; and in 1903 only salt, lignite and fluor-spar were worked, while the total output was worth less than £1500. Mineral springs are numerous, and the mining industry was formerly much more important; but the difficulties of trans- port hinder the development of this and other resources. Trade is most active with France, whither are sent timber, millstones, cattle, leather, brandy and wine. Between 1882 and 1892 the wine trade throve greatly, owing to the demand for common red wines, suitable for blending with finer French vintages; but the exports subsequently declined, owing to the protective duties imposed by France. The manufactures, which are of little importance, include soap, spirits, leather, pottery and coarse cloth.

The Saragossa-Lerida-Barcelona railway traverses the pro- vince, and gives access, by two branch lines, to Jaca, by way of Huesca, the provincial capital, and to Barbastro. Up to the beginning of the 20th century this was the only railway com- pleted, although it was supplemented by many good roads. But by the Railway Convention of 1904, ratified by the Spanish government in 1906, France and Spain agreed jointly to construct a Transpyrenean line from Oloron, in the Basses Pyrenees, to Jaca. which should pass through the Port de Canfranc, and connect Saragossa with Pau. Apart from the episcopal cities of Huesca (pop. 1900, 12,626) and Jaca (4934), which are separately described, the only towns in the province with more than 5000 inhabitants are Barbastro (7033), an agricultural market, and Fraga (6899), an ancient residence of the kings of Aragon, with a fine 1 2th century parish church and a ruined Moorish citadel. Monzon, long celebrated as the meeting-place of the Aragonese and Catalonian parliaments, is a town on the lower Cinca, with the ruins of a Roman fortification, and of a 12th century castle, which was owned by the Knights Templar. (See also Aragon.) HUESCA (anc. Osca), the capital of

the Spanish province of Huesca, 35 m. N.N.E. of Saragossa, on the Tardienta-Huesca- Jaca railway. Pop. (1900), 12,626. Huesca occupies a height near the right bank of the river Isuela, overlooking a broad and fertile plain. It is a very ancient city and bears many traces of its antiquity. The streets in the older part are narrow and crooked, though clean, and many of the houses witness by their size and style to its former magnificence. It is an episcopal see and has an imposing Gothic cathedral, begun in 1400, finished in 1515, and enriched with fine carving. In the same plaza is the old palace of the kings of Aragon, formerly given up for the use of the now closed Sertoria (the university), so named in memory of a school for the sons of native chiefs, founded at Huesca by Sertorius in 77 B.C. (Plut. Sert. 15). Among the other prominent buildings are the interesting parish churches (San Pedro, San Martin and San Juan), the episcopal palace, and various bene- volent and religious foundations. Considerable attention is

paid to public education, and there are not only several good primary schools, but schools for teachers, an institute, an ecclesiastical seminary, an artistic and archaeological museum, and an economic society. Huesca manufactures cloth, pottery, bricks and leather; but its chief trade is in wine and agricultural produce. The development of these industries caused an increase in the population which, owing to emigration to France, had declined by nearly 2000 between 1887 and 1897.

Strabo (iii. 161, where some editors read Ileosca) describes Osca as a town of the Ilergetes, and the scene of Sertorius's death in 72 B.C.; while Pliny places the Oscenses in regio Vescilania. Plutarch (loc. cit.) calls it a large city. Julius Caesar names it Vencedora; and the name by which Augustus knew it, Urbs victrix Osca, was stamped on its coins, and is still preserved on its arms. In the 8th century a.d. it was captured by the Moors; but in 1096 Pedro I. of Aragon regained it, after winning the decisive battle of Alcoraz.

HUET, PIERRE DANIEL (1630-172 1), bishop of Avranches, French scholar, was born at Caen in 1630. He was educated at the Jesuit school of Caen, and also received lessons from the Protestant pastor, Samuel Bochart. At the age of twenty he was recognized as one of the most promising scholars of the time. He went in 1651 to Paris, where he formed a friendship with Gabriel Naude, conservator of the Mazarin library. In the following year Samuel Bochart, being invited by Queen Christina to her court at Stockholm, took his friend Huet with him. This journey, in which he saw Leiden, Amsterdam and Copen- hagen, as well as Stockholm, resulted chiefly in the discovery, in the Swedish royal library, of some fragments of Origen's Commentary on St Matthew, which gave Huet the idea of editing Origen, a task he completed in 1668. He eventually

quarrelled with his friend Bochart, who accused him of having suppressed a line in Origen in the Eucharistic controversy. In Paris he entered into close relations with Chapelain. During the famous dispute of Ancients and Moderns Huet took the side of the Ancients against Charles Perrault and Desmarets. Among his friends at this period were Conrart and Pellisson. His taste for mathematics led him to the study of astronomy. He next turned his attention to anatomy, and, being himself shortsighted, devoted his inquiries mainly to the question of vision and the formation of the eye. In this pursuit he made more than 800 dissections. He then learned all that was then to be learned in chemistry, and wrote a Latin poem on salt. All this time he was no mere book-worm or recluse, but was haunting the salons of Mile de Scudery and the studios of painters; nor did his scientific researches interfere with his classical studies, for during this time he was discussing with Bochart the origin of certain medals, and was learning Syriac and Arabic under the Jesuit Parvilliers. He also translated the pastorals of Longus, wrote a tale called Diane de Castro, and defended, in a treatise on the origin of romance, the reading of fiction. On being appointed assistant tutor to the Dauphin in 1670, he edited with the assistance of Anne Lefevre, afterwards Madame Dacier, the well-known edition of the Delphin Classics. This series was a comprehensive edition of the Latin classics in about sixty volumes, and each work was accompanied by a Latin commentary, ordo verborum, and verbal index. The original volumes have each an engraving of Arion and the Dolphin, and the appropriate inscription in usum serenissimi Delphini. Huet was admitted to the Academy in 1674. He issued one of his greatest works, the Demonstratio cvangelica, in 1679. He took holy orders in 1676, and two years later the king gave him the abbey of Aulnay, where he wrote his Questiones Aletuanae (Caen, 1690), his Censura philosophiae Cartesianae (Paris, 1689), his Nouveau memoir e pour servir d, I'histoire du CarUsianisme (1692), and his discussion with Boileau on the Sublime. In 1685 he was made bishop of Soissons, but after waiting for installation for four years he took the bishopric of Avranches instead. He exchanged the cares of his bishopric for what he thought would be the easier chair Of the Abbey of Fontenay, but there he was vexed with continual law- suits. At length he retired to the Jesuits' House in the Rue Saint Antoine at Paris, where he died in 1721. His great library

and manuscripts, after being bequeathed to the Jesuits, were bought by the king for the royal library.

In the Huetiana (1722) of the abb6 d'Olivet will be found material for

arriving at an idea of his prodigious labours, exact memory and wide scholarship. Another posthumous work was his Traite philo- sophique de la faiblesse de Vesprit humain (Amsterdam, 1723). His autobiography, found in his Commentarius de rebus ad eum pertinenti- bus (Paris, 1718), has been translated into French and into English.

See de Gournay, Huet, evQque d'Avranches, sa vie et ses ouvrages (Paris, 1854).

HUFELAND, CHRISTOPH WILHELM (1762-1836), German physician, was born at Langensalza on the 12th of August 1762. His early education was carried on at Weimar, where his father held the office of court physician to the grand duchess. In 1 780 he entered the university of Jena, and in the following year proceeded to Gottingen, where in 1783 he graduated in medicine. After assisting his father for some years at Weimar, he was called in 1793 to the chair of medicine at Jena, receiving at the same time the dignities of court physician and councillor at Weimar. In 1798 he was placed at the head of the medical college and generally of state medical affairs in Berlin. He filled the chair of pathology and therapeutics in the university of Berlin, founded in 1809, and in 18 10 became councillor of state. He died at Berlin on the 25th of August 1836. Huf eland is cele- brated as the most eminent practical physician of his time in Germany, and as the author of numerous works displaying extensive reading and cultivated and critical faculty.

The most widely known of his many writings is the treatise entitled Makrobiotik, oder die Kunst, das menschliche Leben zu verldngern (1796), which was translated into many languages. Of his practical works, the System of Practical Medicine {System der praktischen Heilkunde, 1818-1828) is the most elaborate. From •795 to 1835 he published a Journal der praktischen Arznei und Wundarzneikunde. His autobiography was published in 1863. There are sketches of his life and labours by Augustin and Stourdza (1837).

HUFELAND, GOTTLIEB (1 760-181 7), German economist and jurist, was born at Dantzig on the 19th of October 1760. He was educated at the gymnasium of his native town, and completed his university studies at Leipzig and Gottingen. He graduated at Jena, and in 1788 was there appointed to an extraordinary professorship. Five years later he was made ordinary professor. His lectures on natural law, in which he developed with great acuteness and skill the formal principles of the Kantian theory of legislation, attracted a large audience, and contributed to raise to its height the fame of the university of Jena, then unusually rich in able teachers. In 1803, after the secession of many of his colleagues from Jena, Hufeland accepted a call to Wiirzburg, from which, after but a brief tenure of a professorial chair, he proceeded to Landshut. From 1808 to 1 81 2 he acted as burgomaster in his native town of Dantzig. Returning to Landshut, he lived there till 1816, when he was invited to Halle, where he died on the 25th of February 181 7.

Hufeland 's works on the theory of legislation — Versuch iiber den Grundsatz Naturrechts (1785); Lehrbuch des Naturrechts (1.790); Institutional des gesammten positiven Rechts (1798); and Lehrbuch der

Geschichte und Encyclopddie alter in Deutschland geltenden positiven Rechte (1790), are distinguished by precision of statement and clear- ness of deduction. They form on the whole the best commentary upon Kant's Rechtslehre, the principles of which they carry out in detail, and apply to the discussion of positive laws. In political economy Hufeland's chief work is the Neue Grundlegung der Staats- ivirthschaftskunst (2 vols., 1807 and 1813), the second volume of which has the special title, Lehre vom Gelde und Geldumlaufe . The principles of this work are for the most part those of Adam Smith's Wealth of Nations, which were then beginning to be accepted and developed in Germany; but both in his treatment of fundamental notions, such as economic good and value, and in details, such as the theory of money, Hufeland's treatment has a certain originality. Two points in particular seem deserving of notice. Hufeland was the first among German economists to point out the profit of the entrepreneur as a distinct species of revenue with laws peculiar to itself. He also tends towards, though he does not explicitly state, the view that rent is a general term applicable to all payments resulting from differences of degree among productive forces of the same order. Thus the superior gain of a specially gifted workman or specially skilled employer is in time assimilated to the payment for a natural agency of more than the minimum efficiency.

See Roscher, Geschichte der Nationalbkonomik in Deutschland,

654 662.

HUG, JOHANN LEONHARD (1 765-1846), German Roman Catholic theologian, was born at Constance on the 1st of June 1765. In 1783 he entered the university of Freiburg, where he became a pupil in the seminary for the training of priests, and soon distinguished himself in classical and Oriental philology as well as in biblical exegesis and criticism. In 1787 he became superintendent of studies in the seminary, and held this appoint- ment until the breaking up of the establishment in 1790. In the following year he was called to the Freiburg chair of Oriental languages and Old Testament exegesis; to the duties of this post were added in 1793 those of the professorship of New Testament exegesis. Declining calls to Breslau, Tubingen, and thrice to Bonn, Hug continued at Freiburg for upwards of thirty years, taking an occasional literary tour to Munich, Paris or Italy. In 1827 he resigned some of his professorial work, but continued in active duty until in the autumn of 1845 he was seized with a painful illness, which proved fatal on the nth of March 1846.

Hug's earliest publication was the first instalment of his Einleitung; in it he argued with much acuteness against J. G. Eichhorn in favour of the " borrowing hypothesis " of the origin of the synoptical gospels, maintaining

the priority of Matthew, the present Greek text having been the original. His subsequent works were disserta- tions on the origin of alphabetical writing {Die Erfindung der Buch- stabenschrift, 1801), on the antiquity of the Codex Vaticanus (1810), and on ancient mythology (JJber den Mythos der alien V biker, 1812) ; a new interpretation of the Song of Solomon {Das hohe Lied in einer noch unversuchten Deutung, 1813), to the effect that the lover re- presents King Hezekiah, while by his beloved is intended the remnant left in Israel after the deportation of the ten tribes; and treatises on the indissoluble character of the matrimonial bond {De conjugii christiani vinculo indissolubili commentatio exegetica, 1816) and on the Alexandrian version of the Pentateuch (1818). His Einleitung in die Schriften des Neuen Testaments, undoubtedly his most im- portant work, was completed in 1 808 (fourth German edition, 1847; English translations by D. G. Wait, London, 1827, and by Fosdick, New York, 1836; French partial translation by J. E. Cellerier, Geneva, 1823). It is specially valuable in the portion relating to the history of the text (which up to the middle of the 3rd century he holds to have been current only in a common edition {noivi) ocdoins), of which recensions were afterwards made by Hesychius, an Egyptian bishop, by Lucian of Antioch, and by Origen) and in its discussion of the ancient versions. The author's intelligence and acuteness are more completely hampered by doctrinal presuppositions when he comes to treat questions relating to the history of the individual books of the New Testament canon. From 1839 to his death Hug was a regular and important contributor to the Freiburger Zeitschrift fur kathol. Theologie.

See A. Maier, Geddchtnisrede auf J. L. Hug (1847) ; K. Werner, Geschichte der kath. Theol. in Deutschland, 527-533 (:866).

HUGGINS, SIR WILLIAM (1824-1910), English astronomer,

was born in London on the 7th of February 1824, and was

educated first at the City of London School and then under

various private teachers. Having determined to apply himself

to the study of astronomy, he built in 1856 a private observatory

at Tulse Hill, in the south of London. At first he occupied

himself with ordinary routine work, but being far from satisfied

with the scope which this afforded, he seized eagerly upon the

opportunity for novel research, offered by Kirchhoff 's discoveries

in spectrum analysis. The chemical constitution of the stars was the problem to which he turned his attention, and his first results, obtained in conjunction with Professor W. A. Miller, were presented to the Royal Society in 1863, in a preliminary note on the " Lines of some of the fixed stars." His experiments, in the same year, on the photographic registration of stellar spectra, marked an innovation of a momentous character. But the wet collodion process was then the only one available, and its inconveniences were such as to preclude its extensive employment; the real triumphs of photographic astronomy began in 1875 with Huggins's adoption and adaptation of the gelatine dry plate. This enabled the observer to make exposures of any desired length, and, through the cumulative action of light on extremely sensitive surfaces, to obtain permanent accurate pictures of celestial objects so faint as to be completely invisible to the eye, even when aided by the most powerful telescopes. In the last quarter of the 19th century spectroscopy and photography together worked a revolution in observational astronomy, and in both branches Huggins acted as pioneer.

HUGH, ST— HUGH THE GREAT

»57

Many results of great importance are associated with his name. Thus in 1864 the spectroscope yielded him evidence that planetary and irregular nebulae consist of luminous gas — a conclusion tending to support the nebular hypothesis of the origin of stars and planets by condensation from glowing masses of fluid material. On the 18th of May 1866 he made the first spectro- scopic examination of a temporary star (Nova Coronae), and

found it to be enveloped in blazing hydrogen. In 1868 he proved incandescent carbon-vapours to be the main source of cometary light; and on the 23rd of April in the same year applied Doppler's principle to the detection and measurement of stellar velocities in the line of sight. Data of this kind, which are by other means inaccessible to the astronomer, are obviously indispensable to any adequate conception of the stellar system as a whole or in its parts. In solar physics Huggins suggested a spectroscopic method for viewing the red prominences in daylight; and his experiments went far towards settling a much-disputed question regarding the solar distribution of calcium. In the general solar spectrum this element is represented by a large number of lines, but in the spectrum of the prominences and chromosphere one pair only can be detected. This circumstance appeared so anomalous that seme astronomers doubted whether the surviving lines were really due to calcium; but Sir William and Lady Huggins (nee Margaret Lindsay Murray, who, after their marriage in 1875, actively assisted her husband) successfully demonstrated in the laboratory that •alcium vapour, if at a sufficiently low pressure, gives under the influence of the electric discharge precisely these lines and no others. The striking discovery was, in 1903, made by the same investigators that the spontaneous luminosity of radium gives a spectrum of a kind never before obtained without the aid of powerful excitation, electrical or thermal. It consists, that is to say, in a range of bright lines, the agreement of which with the negative pole bands of nitrogen, together with details of interest connected with its mode of production, was ascertained by a continuance of the research. Sir William Huggins, who was made K.C.B. in 1897, received the Order of Merit in 1902, and was awarded many honours, academic and other. He presided over the meeting of the British Association in 1891, and during the five years 1900-1905 acted as president of the Royal Society, from which he at different times received a Royal, a Copley and a Rumford medal. Four of his presidential addresses were republished in 1906, in an illustrated volume entitled The Royal Society. A list of his scientific papers is contained in chapter ii. of the magnificent Atlas of Representative Stellar Spectra, published in 1899, by Sir William and Lady Huggins conjointly, for which they were adjudged the Actonian prize of the Royal Institution. Sir William Huggins died on the 12th of May 1910.

See ch. i. of Atlas of Stellar Spectra, containing a history of the Tulse Hill observatory; Sir W. Muggins's personal retrospect in the Nineteenth Century for June 1897; "Scientific Worthies," with photogravure portrait (Nature); Astronomers of To-Day, by Hector Macpherson, junr. (1905) (portrait); Month. Notices Roy. Astr. Society, xxvii. 146 (C. Pritchard). (A. M. C.)

HUGH, ST. Sx Hugh of Avalon (c. 1 140-1200), bishop of Lincoln, who

must be distinguished from Hugh of Wells, and also from St Hugh of Lincoln (see below), was bom of a noble family at Avalon in Burgundy. At the age of eight he entered along with his widowed father the neighbouring priory of canons regular at Villard-Benoit, where he was ordained deacon at nineteen. Appointed not long after prior of a dependent cell, Hugh was attracted from that position by the holy reputation of the monks of the Grande Chartreuse, whose house he finally entered despite an oath to the contrary which he had given his superior. There he remained about ten years, receiving priest's orders, and rising to the important office of procurator, which brought him into contact with the outer world. The wide reputation for energy and tact which Hugh speedily attained penetrated to the ears of Henry II. of England, and induced that monarch to request the procurator's assistance in establish- ing at Witham in Somersetshire the first English Carthusian monastery. Hugh reluctantly consented to go to England,

where in a short time he succeeded in overcoming every obstacle, and in erecting and organizing the convent, of which he was appointed first prior. He speedily became prime favourite with Henry, who in 1186 procured his election to the see of Lincoln. He took little part in political matters, maintaining as one of his chief principles that a churchman should hold no secular office. A sturdy upholder of what he believed to be right, he let neither royal nor ecclesiastical influence interfere with his conduct, but fearlessly resisted whatever seemed to him an infringement of the rights of his church or diocese. But with all his bluff firmness Hugh had a calm judgment and a ready tact, which almost invariably left him a better friend than before of those whom he opposed; and the astute Henry, the impetuous Richard, and the cunning John, so different in other points, agreed in respecting the bishop of Lincoln. Hugh's manners were a little rigid and harsh; but, though an ascetic to himself, he was distinguished by a broad kindliness to others, so that even the Jews of Lincoln wept at his funeral. He had great skill in taming birds, and for some years had a pet swan, which occupies a prominent place in all histories and representations of the saint. In 1200 Bishop Hugh revisited his native country and his first convents, and on the return journey was seized with an illness, of which he died at London on the 16th of November 1200. He was canonized by Honorius III. on the 17th of February 1220. His feast day is kept on the 17 th of November in the Roman Church.

The chief life of St Hugh, the Magna vita S. Hugonis, probably written by Adam, afterwards abbot of Eynsham, the bishop's chaplain, was edited by J. F. Dimock in tier. Britan. med. aevi script, No. xxxvii. (London, 1864). MSS. of this are in the Bodleian Library (Digby, 165 of the 13th century) and in Paris (Bib:- Nat. 5575. Fonds Latin); the Paris MS. fortunately makes good the portions lacking in the Oxford one. Mr Dimock also edited

a Metrical Life of St Hugh of Avalon (London, i860), from two MSS. in the British Museum and the Bodleian Library. The best modern source for information as to St Hugh and his time is the Vie de St Hugues, eveque de Lincoln (1 140-1200) par un religieux.de la Grande Chartreuse (Montreuil, 1890), Eng. trans, edited by H. Thurston, S.J., with valuable appendices and notes (London, 1898). A com- plete bibliography is given in U. Chevalier, Bio-bibliographie (Paris, 1905, 2206-2207); see also A. Potthast, Bibliotheca med. OCT.,

1380.

Hugh of Wells, one of King John's officials and councillors, became bishop of Lincoln in 1209. He soon fell into disfavour with John, and the earlier years of his bishopric were mainly spent abroad, while the king seized the revenues of his see. However, he was one of John's supporters when Magna Carta was signed, and after the accession of Henry III. he was able to turn his attention to his episcopal duties. His chief work was the establishment of vicarages in his diocese, thus rendering the parish priest more independent of the monastic houses; this policy, and consequently Hugh himself, was heartily disliked by Matthew Paris and other monastic writers. The bishop, who did some building at Lincoln and also at Wells, died on the 7th of February 1235.

St Hugh of Lincoln, a native of Lincoln, was a child about ten years old when he was found dead on premises belonging to a Jew. It was said, and the story was generally believed, that the boy had been scourged and crucified in imitation of the death of Jesus Christ. Great and general indignation was aroused, and a number of Jews were hanged or punished in other ways. The incident is referred to by Chaucer in the Prioresses Tale and by Marlowe in the Jew of Malta.

HUGH, called The Great (d. 956), duke of the Franks and count of Paris, son of King Robert I. of France (d. 923) arid nephew of King Odo or Eudes (d. 898), was one of the founders of the power of the Capetian house in France. Hugh's first wife was Eadhild, a sister of the English king, iEthelstan. At the death of Raoul, duke of Burgundy, in 936, Hugh was in possession of nearly all the region between the Loire and the Seine, corresponding to the ancient Neustria, with the exception of the territory ceded to the Normans in 911. He took a very active part in bringing Louis IV. (d'Outremer) from England in 936, but in the same year Hugh married Hadwig, sister of the emperor Otto the Great, and soon quarrelled with Louis. Hugh

even paid homage to Otto, and supported him in his struggle against Louis. When Louis fell into the hands of the Normans in 945, he was handed over to Hugh, who released him in 946 only on condition that he should surrender the fortress of Laon. At the council of Ingelheim (948) Hugh was condemned, under pain of excommunication, to make reparation to Louis. It was not, however, until 950 that the powerful vassal became re- conciled with his suzerain and restored Laon. But new diffi- culties arose, and peace was not finally concluded until 953. On the death of Louis IV. Hugh was one of the first to recognize Lothair as his successor, and, at the intervention of Queen Gerberga, was instrumental in having him crowned. In recogni- tion of this service Hugh was invested by the new king with the duchies of Burgundy (his suzerainty over which had already been nominally recognized by Louis IV.) and Aquitaine. But his expedition in 955 to take possession of Aquitaine was unsuccess- ful. In the same year, however, Giselbert, duke of Burgundy, acknowledged himself his vassal and betrothed his daughter to Hugh's son Otto. At Giselbert's death (April 8, 956) Hugh became effective master of the duchy, but died soon afterwards, on the 16th or 17th of June 956.

HUGH CAPET (c. 938-996), king of France and founder of the Capetian dynasty, was the eldest son of Hugh the Great by his wife Hadwig. When his father died in 956 he succeeded to his numerous fiefs around Paris and Orleans, and thus becoming one of the most powerful of the feudatories of his cousin, the Frankish king Lothair, he was recognized somewhat reluctantly by that monarch as duke of the Franks. Many of the counts of northern France did homage to him as their overlord, and Richard I., duke of Normandy, was both his vassal and his brother-in-law. His authority extended over certain districts south of the Loire, and, owing to his interference, Lothair was obliged to recognize his brother Henry as duke of Burgundy. Hugh supported his royal suzerain when Lothair and the emperor Otto II. fought for the possession of Lorraine; but chagrined at the king's conduct in making peace in 980, he went to Rome to conclude ah alliance with Otto. Laying more stress upon independence than upon loyalty, Hugh appears to have acted in a haughty manner toward Lothair, and also towards his son and successor Louis V.; but neither king was strong enough to punish this powerful vassal, whose clerical supporters already harboured the thought of securing for him the Frankish crown. When Louis V. died without children in May 987, Hugh and the late king's uncle Charles, duke of Lower Lorraine, were candidates for the vacant throne, and in this contest the energy of Hugh's champions, Adalberon, arch- bishop of Reims, and Gerbert, afterwards Pope Sylvester II., prevailed. Declaring that the Frankish crown was an elective and not an hereditary dignity, Adalberon secured the election of his friend, and

crowned him, probably at Noyon, in July 987, The authority of the new king was quickly recognized in his kingdom, which covered the greater part of France north of the Loire with the exception of Brittany, and in a shadowy fashion he was acknowledged in Aquitaine; but he was compelled to purchase the allegiance of the great nobles by large grants of royal lands, and he was hardly more powerful as king than he had been as duke. Moreover, Charles of Lorraine was not prepared to bow before his successful rival, and before Hugh had secured the coronation of his son Robert as his colleague and successor in December 987, he had found allies and attacked the king. Hugh was worsted during the earlier part of this struggle, and was in serious straits, until he was saved by the wiles of his partisan Adalberon, bishop of Laon, who in 991 treacherously seized Charles and handed him over to the king. This capture virtually ended the war, but one of its side issues was a quarrel between Hugh and Pope John XV., who was supported by the empire, then under the rule of the empresses Adelaide and Theophano as regents for the young emperor Otto III. In 987 the king had appointed to the vacant archbishopric of Reims a certain Arnulf , who at once proved himself a traitor to Hugh and a friend to Charles of Lorraine. In June 991, at the instance of the king, the French bishops deposed Arnulf and elected Gerbert in his stead, a proceeding which was displeasing to the pope, who excom-

municated the new archbishop and his partisans. Hugh and his bishops remained firm, and the dispute was still in progress when the king died at Paris on the 24th of October 996.

Hugh was a devoted son of the church, to which, it is not too much to say, he owed his throne. As lay abbot of the abbeys of St Martin at Tours and of St Denis he was interested in clerical reform, was fond of participating in religious ceremonies, and had many friends among the clergy. His wife was Adelaide, daughter of William III., duke of Aquitaine, by whom he left a son, Robert, who succeeded him as king of France. The origin of Hugh's surname of Capet, which was also applied to his father, has been the subject of some discussion. It is derived undoubtedly from the Lat. capa, cappa, a cape, but whether Hugh received it from the cape which he wore as abbot of St Martin's, or from his youthful and playful habit of seizing caps, or from some othei cause, is uncertain.

See Richerus, Historiarum libri IV., edited by G. Waitz (Leipzig, 1877); F. Lot, Les Derniers Carolingiens (Paris, 1891), and £tudes sur le regne de Ungues Capet (Paris, 1900) ; G. Monod, " Les Sources du rfegne de Hugues Capet," in the Revue historique, tome xxviii. (Paris, 1891); P. Viollet, La Question de la legitimiti d, Vavenement h Hugues Capet (Paris, 1892); and E. Lavisse, Histoire de France, tome ii. (Paris, 1903-1905).

HUGH DE PUISET (c. 1125-1195), bishop of Durham, was the nephew of Stephen and Henry of Blois; the latter brought him to England and made him an archdeacon of the see of Winchester. Hugh afterwards became archdeacon and treasurer of York. In 1 1 53 he was chosen bishop of Durham, in spite of the opposi tion of the archbishop of York; but he only obtained consecration by making a personal visit to Rome. Hugh took little part in politics in the reign of Henry II., remaining in the north, immersed in the affairs of his see. He was, however, present with Roger, archbishop of York, at the coronation of young Henry (n 70), and was in consequence suspended by Alexander III. He remained neutral, as far as he could, in the quarrel between Henry and Becket, but he at least connived at the rebellion of n 73 and William the Lion's invasion of England in that year. After the failure of the rebellion the bishop was compelled to surrender Durham, Norham and Northallerton to the king. In 1179 he attended the Lateran Council at Rome, and in 1181 by the pope's order he laid Scotland under an interdict. In 1184 he took the cross. At the general sale of offices with which Richard began his reign (1189) Hugh bought the earldom of Northumberland. The archbishopric of York had been vacant since 1181. This vacancy increased Hugh's power vastly, and when the vacancy was filled by the appointment of Geoffrey he naturally raised objections. This quarrel with Geoffrey lasted till the end of his life. Hugh was nominated justiciar jointly with William Longchamp when Richard left the kingdom. But Longchamp soon deprived the bishop of his place (1191), even going so far as to imprison Hugh and make him surrender his castle, his earldom and hostages. Hugh's chief object in politics was to avoid ac- knowledging Geoffrey of York as his ecclesiastical superior, but this he was compelled to do in 1195. On Richard's return Hugh joined the king and tried to buy back his earldom. He seemed on the point of doing so when he died. Hugh was one of the most important men of his day, and left a mark upon the north of England which has never been effaced. Combining in his own hands the palatinate of Durham and the earldom of Northumberland, he held a position not much dissimilar tc that of the great German princes, a local sovereign in all but name.

See Kate Norgate's England under the Angevin Kings (1887); Stubbs's preface to Hoveden, iii. '«

HUGH OF ST CHER (c. 1200-1263), French cardinal and Biblical commentator, was born at St Cher, a suburb of Vienne, Dauphine, and while a student in Paris entered the Dominion convent of the Jacobins in 1225. He taught philosophy, theology and canon law. As provincial of his order, which office he held during most of the third decade of the century, he contributed largely to its prosperity, and won the confidence of the popes Gregory IX., Innocent IV. and Alexander IV., who charged him with several important missions. Created cardinal-priest fai 1244, he played an

important part in the council of Lyons in

1245, contributed to the institution of the Feast of Holy Sacra- ment, the reform of the Carmelites (1247), and the condemnations of the Introductorius in evangelium aeternum of Gherardino del JBorgo San Donnino (1255), and of William of St Amour's De periculis novissimorum temporum. He died at Orvieto on the 19th of March 1263. He directed the first revision of the texi of the Vulgate, begun in 1236 by the Dominicans; this first " correctorium," vigorously criticized by Roger Bacon, was revised in 1248 and in 1256, and forms the base of the celebrated Correctorium Bibliae Sorbonicum. With the aid of many of his order he edited the first concordance of the Bible (Concordantiae Sacrorum Bibliorum or Concordantiae S. Jacobi), but the assertion that we owe the present division of the chapters of the Vulgate to him is false.

Besides a commentary on the book of Sentences, he wrote the Postillae in sacram scripturam juxta quadruplicem sensum, litteralem, allegoricum, anagogicum et moralem, published frequently in the 15th and 16th centuries. His Sermones de tempore et Sanctis are apparently only extracts. His exegetical works were published at Venice in 1754 in 8 vols.

See, for sources, Quetif-Echard, Scriptores ordinis praedicatorum; Denifle, in Archiv fur Litteratur und Kirchengeschichte des Mittelalters, i. 49, ii. 171, iv. 263 and 471 ; L'Annee dominicaine, iii. (1886) 509 and 883; Chartularium universitatis Parisiensis, i. 158. (H. L.)

HUGH OF ST VICTOR (c. 1078-1141), mystic philosopher, was probably born at Hartingam, in Saxony. After spending some time in a house of canons regular at Hamersleben, in Saxony, where he completed his studies, he removed to the abbey of St Victor at Marseilles, and thence to the abbey of St Victor in Paris. Of this last house he rose to be canon, in n 25 scholasticus, and perhaps even prior, and it was there that he died on the nth of February 1141. His eloquence and his writings earned for him a renown and influence which far exceeded St Bernard's, and which held its ground until the advent of the Thomist philosophy. Hugh was more especially the initiator of a movement of ideas — the mysticism of the school of St Victor— which filled the whole of the second part of the 12th century. " The mysticism which he inaugurated," says Ch. V. Langlois, " is learned, unctuous, ornate, florid, a mysticism which never indulges in dangerous temerities; it is the orthodox mysticism of a subtle and prudent rhetorician." This tendency undoubtedly shows a marked reaction from the

contentious theology of Roscellinus and Abelard. For Hugh of St Victor dialectic was both insufficient and perilous. Yet he did not profess the haughty contempt for science and philosophy which his followers the Victorines expressed; he regarded knowledge, not as an end in itself, but as the vestibule of the mystic life. The reason, he thought, was but an aid to the understanding of the truths which faith reveals. The ascent towards God and the functions of the " threefold eye of the soul " — cogitatio, meditatio and contem- platio — were minutely taught by him in language which is at once precise and symbolical.

Manuscript copies of his works abound, and are to be found in almost every library which possesses a collection of ancient writings. The works themselves are very numerous and very diverse. The middle ages attributed to him sixty works, and the edition in Migne's Patr. Lat. vols, clxxy.-clxxvii. (Paris, 1854) contains no fewer than forty-seven treatises, commentaries and collections of sermons. Of that number, however, B. Haur6au (Les CEuvres de Ungues de St Victor _(1 st ed., Paris, 1859; 2nd ed., Paris, 1886) contests the authenticity of several, which he ascribes with some show of proba- bility to Hugh of Fouilloi, Robert Paululus or others. Among those works with which Hugh of St Victor may almost certainly be credited may be mentioned the celebrated De sacramentis christianae fidei ; the Didascalicon de studio legendi ; the treatises on mysticism entitled Soliloquium de arrha animae, De contemplatione et ejus operibus, Aureum de meditando opusculum, De area Noe morali, De area Noe mystica, De vanitate mundi, De arrha animae, De amore sponsi ad sponsam, &c. ; the introduction (Praenotatiunculae) to the study of the Scriptures; homilies on the book of Eccleslastes ; commentaries on other books of the Bible, e.g. the Pentateuch, Judges, Kings, Jeremiah, &c.

See B. Haureau, op. cit. and Notices et extraits des MSS. latins de la Bibliotheque Nationale, passim; De Wulf, Histoire de la philo- sophic tredievale (Louvain, 1900), pp. 220-221 ; article by H. Denifle in Archiv fiir Lileratur und Kirchengeschichte des Mittelalters, iii. 634-640 (1887) ; A. Mignon, Les Origines de la scholastique et Hugues de St Victor (Paris, 1895); J. Kilgenstein, Die Gotteslehre des Hugo von St Victor (1898). (P. A.)

HUGHES, DAVID EDWARD (1831-1900), Anglo-American electrician, was born on the 16th of May 183 1 in London, but the earlier part of his life was spent in America, whither his parents emigrated when he was about seven years old. In 1850 he became professor of music at the college of Bardstown, Kentucky, and soon afterwards his attainments in physical science procured his appointment as teacher of natural philosophy at the same place. His professorial career, however, was brief, for in 1854 he removed to Louisville to supervise the manufacture of the type-printing

telegraph instrument which he had been thinking out for some time, and which was destined to make both his name and his fortune. The patent for this machine was taken out in the United States in 1855, and its success was immediate. After seeing it well established on one side of the Atlantic, Hughes in 1857 brought it over to his native country, where, however, the telegraph companies did not receive it with any favour. Two or three years afterwards he introduced it to the notice of the French Government, who, after submitting it to severe tests, ultimately adopted it, and in the succeeding ten years it came into extensive use all over Europe, gaining for its inventor numerous honours and prizes. In the development of telephony also Hughes had an important share, and the telephone has attained its present perfection largely as a result of his investigations. The carbon transmitters which in various forms are in almost universal use are modifications of a simple device which he called a microphone, and which consists essentially of two pieces of carbon, in loose contact one with the other. The arrangement constitutes a variable electrical resistance of the most delicate character; if it is included in an electric circuit with a battery and subjected to the influence of sonorous vibra- tions, its resistance varies in such a way as to produce an un- dulatory current which affords an exact representation of the sound waves as to height, length and form. These results were published in 1878, but Hughes did much more work on the properties of such microphonic joints, of which he said nothing till many years afterwards. When towards the end of 1879 he found that they were also sensitive to " sudden electric impulses, whether given out to the atmosphere through the extra current from a coil or from a frictional machine," he in fact discovered the phenomena on which depends the action of the so-called " coherers " used in wireless telegraphy. But he went further and practised wireless telegraphy himself, surmising, moreover, that the agency he was employing consisted of true electric waves. Setting some source of the " sudden electric impulses " referred to above into operation in his house, he walked along the street carrying a telephone in circuit with a small battery and one of these microphonic joints, and found that the sounds remained audible in the telephone until he had traversed a distance of S°o yards. This experiment he showed to several English men of science, among others to Sir G. G. Stokes, to whom he broached the theory that the results were due to electric waves. That physicist, however, was not disposed to accept this explanation, considering that a sufficient one could be found in well-known electromagnetic induction effects, and Hughes was so discouraged at that high authority taking this view of the matter that he resolved to publish no account of his inquiry until further experiments had enabled him to prove the correctness of his own theory. These experiments were still in progress when H.R.Hertz settled the question by his researches on electric waves in 1887-1889. Hughes, who is also known for his invention of the induction balance and for his contributions to the theory of

magnetism, died in London on the 22nd of January 190©. As an investigator he was remarkable for the simplicity of the apparatus which served his purposes, domestic articles like jam-pots, pins, &c, forming a large part of the equipment of- his laboratory. His manner of life, too, was simple and frugal in the extreme. He amassed a large fortune, which, with the exception of some bequests to the Royal Society, the Paris Academy of Sciences, the Institution of Electrical Engineers, and the Paris Societe Internationale des Electriciens, for the establishment of scholarships and prizes in physical science, was left to four London hospitals, subject only to certain life annuities.

HUGHES, SIR EDWARD (c. 17 20-1 794), British admiral, entered the Royal Navy in 1735, and four years later was present at Porto Bello. In 1740 he became lieutenant, and in that rank served in the Cartagena expedition of 1741, and at the indecisive battle of Toulon (1744). In H.M.S. "Warwick" he was present at the action with the " Glorioso," but in default of proper support from the " Lark " (which was sailing in company with the "Warwick"), the combat ended with the enemy's escape. The commander of the " Lark " was subse- quently tried and condemned for his conduct, and Hughes received the vacant command. Captain Hughes was with Boscawen at Louisburg and with Saunders at Quebec. He was in continual employment during the peace, and as Commodore commanded in the East Indies from 1773 to 1777. It was not long before he returned to the East as a rear-admiral, with an overwhelming naval force. On his outward voyage he .retook Goree from the French, and he was called upon to conduct only minor operations for the next two years, as the enemy could not muster any force fit to meet the powerful squadron Hughes had brought from the Channel. In 1782 he stormed Trincomalee a few days before the squadron of Suffren arrived in the neighbourhood. For the next year these Indian waters were the scene of one of the most famous of naval cam- paigns. Suffren (q.v.) was perhaps the ablest sea-commander that France ever produced, but his subordinates were factious and unskilful; Hughes on the other hand, whose ability was that born of long experience rather than genius, was well supported. No fewer than five fiercely contested general actions were fought by two fleets, neither of them gaining a decisive advantage. In the end Hughes held his ground. After the peace he returned to England, and, though further promotions came to him, he never again hoisted his flag. He had accumulated considerable wealth during his Indian service, which for the most part he spent in unostentatious charity. He died at his seat of Lux- borough in Essex in 1794.

HUGHES, HUGH PRICE (184 7-1902), British Nonconformist divine, was born at Carmarthen on the 8th of February 1847, the son of a surgeon. He began to preach when he was fourteen, and in 1865 entered Richmond College to study for the Wesleyan Methodist ministry under the Rev. Alfred Barrett, one of whose daughters he married in 1873. He graduated at London University in 1869, the last year of his residence. He established in 1887 the West London Mission, holding popular services on Sunday in St James's Hall, Piccadilly, when he preached from time to time on the housing of the poor, sweating, gambling and other subjects of social interest. In connexion with this mission he founded a sisterhood to forward the social side of the work, which was presided over by Mrs Hughes. He had started in 1885 the Methodist Times, and rapidly made it a leading organ of Nonconformist opinion. He was a born fighter, and carried the fire and eloquence he showed on the platform and in the pulpit into journalism. He supported Mr W. T. Stead in 1885, a's he had earlier supported Mrs Josephine Butler in a similar cause; he attacked the trade in alcohol; was an anti-vivi- sectionist; he advocated arbitration; and his vehement attacks on Sir Charles Dilke and Charles Stewart Parnell originated the phrase the " Nonconformist conscience." He differed strongly, however, from a large section of Nonconformist opinion in his defence of the South African War. He was long regarded with some distrust by the more conservative section of his own church, but in 1898 he was made president of the Wesleyan Conference. He raised large sums for church work, amounting it is said to over a quarter of a million of money. His energies were largely devoted to co-operation among the various Nonconformist bodies, and he was one of the founders and most energetic members of the National Council of the Evangelical Free Churches. He had long been in failing health when he died suddenly in London on the 17th of November 1902.

See his Life (1904) by his daughter, Dorothea Price Hughes.

HUGHES, JOHN (1677-1720), English poet and miscellaneous writer, was born at Marlborough, Wiltshire, on the 29th of January 1677. His father was a clerk in a city office, and his

grandfather was ejected from the living of Marlborough in 1662 for his Nonconformist opinions. Hughes was educated at a dissenting academy in London, where Isaac Watts was among his fellow scholars. He became a clerk in the Ordnance Office, and served on several commissions for the purchase of land for the royal dockyards. In 1 7 1 7 Lord Chancellor Cowper made him secretary to the commissions of the peace in the court of chancery. He died on the night of the production of his most celebrated work, The Siege of Damascus, the 17th of February 1720.

His poems include occasional pieces in honour of William III., imitations of Horace, and a translation of the tenth book of the Pharsalia of Lucan. He was an amateur of the violin, and played in the concerts of Thomas Britton, the " musical small-coal man." He wrote some of the libretti of the cantatas (2 vols., 171 2) set to music by Dr John Christopher Pepusch. To these he prefixed an essay advocating the claims of English libretti, and insisting on the value of recitative. Others of his pieces were set to music by Ernest Galliard and by Handel. In the masque of Apollo and Daphne (17 16) he was associated with Pepusch, and in his opera of Calypso and Telemachus (1712) with John E. Galliard. He was a contributor to the Taller, the Spectator and the Guardian, and he collaborated with Sir Richard Blackmore in a series of essays entitled The Lay Monastery (1713-1714). He persuaded Joseph Addison to stage Cato. Addison had requested Hughes to write the last act, but eventually completed the play himself. He wrote a version of the Letters of Abelard and Heloise . . . (17 14) chiefly from the French translation printed at the Hague in 1693, which went through several editions, and is notable as the basis of Pope's " Eloisa to Abelard" (1717). He also made translations from Molierc, Fontenelle and the Abbe Vertot, and in 17 15 edited The Works of Edmund Spenser . . . (another edition, 1750). His last work, the tragedy of The Siege of Damascus, is his best. It remained on the list of acting plays for a long time, and is to be found in various collected editions of British drama.

His Poems on Several Occasions, with some Select Essays in Prose . . . were edited with a memoir in 1735, by William Duncombe, who had married his sister Elizabeth. See also Letters by several eminent persons (2 vols., 1772) and The Correspondence of John Hughes, Esq. . . . and Several of his Friends … (2 vols., 1773), with some additional poems. There is a long and eulogistic account of Hughes, with some letters, in the Biographia Britannica.

HUGHES, JOHN (1797-1864), American Roman Catholic divine, was born in Annaloghan, Co. Tyrone, Ireland, on the 24th of June 1797. In 181 7 he followed his father to Chambers- burg, Pennsylvania. He was ordained deacon in 1825 and priest in 1826; and as vicar in St Augustine's and other churches in Philadelphia he took a prominent part in the defence of ecclesiastical authority against the lay trustee system. In 1837 he was consecrated coadjutor to Bishop Dubois in New York. In the New York diocese, of which he was made admi- nistrator in 1839 and bishop in 1842, besides suppressing (1841) church control by lay trustees, he proved himself an active, almost pugnacious, leader. His unsuccessful attempt to build in Lafargeville, Jefferson county, a seminary of St Vincent de Paul, was followed by the transfer of the school to Fordham, where St John's College (now Fordham University) was estab- lished (1841), largely out of funds collected by him in Europe in 1839-1840. His demand for state

support for parochial schools was favoured by Governor Seward and was haff victorious: it was in this controversy that he was first accused of forming a Catholic party in politics. John McCloskey was consecrated his coadjutor in 1844; in 1847 the diocese of New York Was divided; and in 1850 Hughes was named the first archbishop of New York, with suffragan bishops of Boston, Hartford, Albany and Buffalo. In the meantime, during the " Native American " disturbances of 1844, he had been viciously attacked together with his Church; he kept his parishioners in check, but bade them protect their places of worship. His attitude was much the same at the time of the Anti-Popery outcry of the '•' Know- Nothings " in 1854. His early anti-slavery views had been made much less radical by his travels in the South and in the West Indies, but at the outbreak of the Civil War he was strongly

pro-Union, and: in 1861 he went to France to counteract the influence of the Slidell mission. He met with success not only in France, but at Rome and in Ireland, where, however, he made strong anti-English speeches. He died in New York City on the 3rd of January 1864. Hughes was a hard fighter and delighted in controversy. In 1826 he wrote An Answer to Nine Objections Made by an Anonymous Writer Against the Catholic Religion; he was engaged in a bitter debate with Dr John Breckenndge (Presbyterian), partly in letters published in 1833 and partly in a public discussion in Philadelphia in 1835, on the subject of civil and religious liberty as affected by the Roman Catholic and the Presbyterian " religions " ; in 1856, through his organ, the Metropolitan Record, he did his best to discredit any attempts by the Catholic press to forward either the move- ment to " Americanize " the Catholic Church or that to dis- seminate the principles of " Young Ireland."

His works were edited by Laurence Kehoe (2 vols., New York, 1 864-1 865). See John R. G. Hassard, Life of the Most Rev. John Hughes (New York, 1866); and Henry A. Brann, John Hughes (New York, 1894), a briefer sketch, in " The Makers of America " scries.

HUGHES, THOMAS, English dramatist, a native of Cheshire, entered Queens' College, Cambridge, in 1571. He graduated and became a fellow of his college in 1576, and was afterwards a member of Gray's Inn. He wrote The Misfortunes of Arthur. Uther Pendragon's son reduced into tragical notes by Thomas Hughes, which was performed at Greenwich in the Queen's presence on the 28th of February 1588. Nicholas Trotte provided the introduction, Francis Flower the choruses of Acts I. and II.,

William Fulbeck two speeches, while three other gentlemen of Gray's Inn, one of whom was Francis Bacon, undertook the care of the dumb show. The argument.of the play, based on a story of incest and crime, was borrowed, in accordance with Senecan tradition, from mythical history, and the treatment is in close accordance with the model. The ghost of Gorlois, who was slain by Uther Pendragon, opens the play with a speech that reproduces passages spoken by the ghost of Tantalus in the Thyestes; the tragic events are announced by a messenger, and the chorus comments on the course of the action. Dr W. J. Cunliffe has proved that Hughes's memory was saturated with Seneca, and that the play may be resolved into a patchwork of translations, with occasional original lines. Appendix II. to his exhaustive essay On the Influence of Seneca on Elizabethan Tragedy (1893) gives a long list of parallel passages.

The Misfortunes of Arthur was reprinted in J. P. Collier's supple- ment to Dodsley's Old Plays; and by Harvey Carson Grumline (Berlin, 1900), who points out that Hughes's source was Geoffrey of Monmouth's Historia Britonum, not the Morte D Arthur.

HUGHES, THOMAS (1822-1896), English lawyer and author, second son of John Hughes of Donnington Priory, editor of The Boscobel Tracts (1830), was born at Uffington, Berks, on the 20th of October 1822. In February 1834 he went to Rugby School, to be under Dr Arnold, a contemporary of his father at Oriel. He rose steadily to the sixth form, where he came into contact with the headmaster whom he afterwards idealized; but he excelled rather in sports than in scholarship, and his school career culminated in a cricket match at Lord's. In 1842 he proceeded to Oriel, Oxford, and graduated B.A. in 1845. He was called to the bar in 1848, became Q.C. in 1869, a bencher in 1870, and was appointed to a county court judgeship in the Chester district in July 1882. While at Lincoln's Inn he came under the dominat- ing influence of his life, that of Frederick Denison Maurice. In 1848 he joined the Christian Socialists, under Maurice's banner, among his closest allies being Charles Kingsley. In January 1854 he was one of the original promoters of the Working Men's College in Great Ormond Street, and whether he was speaking on sanitation, sparring or singing his favourite ditty of " Little Billee," his work there continued one of his chief interests to the end of his life. After Maurice's death he held the principalship of the college. His Manliness of Christ (1879) grew out of a Bible class which he held there. Hughes had been influenced mentally by Arnold, Carlyle, Thackeray, Lowell and Maurice, and had developed into a liberal churchman, extremely religious,

with strong socialistic leanings; but the substratum was still and ever the manly country squire of old-fashioned, sport-loving England. In

Parliament, where he sat for Lambeth (1865-1868), and for Frome (1868-1874), he reproduced some of the traits of Colonel Newcome. Hughes was an energetic supporter of the claims of the working classes, and introduced a trades union Bill which, however, only reached its second reading. Of Mr Gladstone's home rule policy he was an uncompromising opponent. Thrice he visited America and received a warm welcome, less as a propagandist of social reform than as a friend of Lowell and of the North, and an author. In 1879, in a sanguine humour worthy of Mark Tapley, he planned a co- operative settlement, " Rugby," in Tennessee, over which he lost money. In 1848 Hughes had married Frances, niece of Richard Ford, of Spanish Handbook fame. They settled in 1853 at Wimbledon, and there was written his famous story, Tom Brown's School-Days, " by an Old Boy " (dedicated to Mrs Arnold of Fox Howe), which came out in April 1857. It is probably impossible to depict the schoolboy in his natural state and in a realistic manner; it is extremely difficult to portray him at all in such a way as to interest the adult. Yet this last has certainly been achieved twice in English literature — by Dickens in Nicholas Nickleby, and by Hughes in Tom Brown. In both cases interest is concentrated upon the master, in the first a demon, in the second a demigod. Tom Brown did a great deal to fix the English concept of what a public school should be. Hughes also wrote The Scouring of the White Horse (1859), Tom Brown at Oxford (1861), Religio laid (1868), Life of Alfred the Great (1869) and the Memoir of a Brother. The brother was George Hughes, who was in the main the original " Tom Brown," just as Dean Stanley was in the main the original of " Arthur." Hughes died at Brighton, on 22nd March 1896. He was English of the English, a typical broad-churchman, full of " muscular Christianity," straightforward and unsuspicious to a fault, yet attaching a somewhat exorbitant value to " earnestness " — a favourite expression of Doctor Arnold. (T. Se.)

HUGLI, or Hooghly, the most westerly and commercially the most important channel by which the Ganges enters the Bay of Bengal. It takes its distinctive name near the town of Santipur, about 120 m. from the sea. The stream now known as the Hugli represents three western deltaic distributaries of the Ganges — viz. (1) the Bhagirathi, (2) the Jalangi and (3) part of the Matabhanga. The Bhagirathi and Jalangi unite at Nadia, above the point of their junction with the lower waters of the Matabhanga, which has taken the name of the Churni before the point of junction and thrown out new distributaries of its own. These three western distributaries are known as the Nadia rivers, and are important, not only as great highways for internal traffic, but also as the headwaters of the Hugli. Like other deltaic distributaries, they are subject to sudden changes in their channels, and to constant silting up. The supervising and keeping open of the Nadia rivers, therefore, forms one of the great tasks of fluvial

engineering in Bengal. Proceeding south from Santipur, with a twist to the east, the Hugli river divides Nadia from Hugli district, until it touches the district of the Twenty-Four Parganas. It then proceeds almost due south to Calcutta, next twists to the south-west and finally turns south, entering the Bay of Bengal in 21 41′ N., 88° E.

In the 40 miles of its course above Calcutta, the channels of the Hugli are under no supervision, and the result is that they have silted up and shifted to such an extent as to be no longer navigable for sea-going ships. Yet it was upon this upper section that all the famous ports of Bengal lay in olden times. From Calcutta to the sea (about 80 m.) the river is a record of engineering improvement and success. A minute supervision, with steady dredging and constant readjustment of buoys, now renders it a safe waterway to Calcutta for ships of the largest tonnage. Much attention has also been paid to the port of Calcutta (q.v.) .

The tide runs rapidly on the Hugli, and produces a remarkable example of the fluvial phenomenon known as a " bore." This con- sists of the head-wave of the advancing tide, hemmed in where the

estuary narrows suddenly into the river, and often exceeds 7 ft. in height. It is felt as high up as Calcutta, and frequently destroys small boats. The difference from the lowest point of low-water in the dry season to the highest point of high-water in the rains is reported to be 20 ft. 10 in. The greatest mean rise of tide, about 16 it., takes place in March, April or May — with a declining range during the rainy season to a mean of 10 ft., and a minimum during treshets of 3 ft. 6 in. 6

HUGLI, or Hooghly, a town and district of British India, in the Burdwan division of Bengal, taking their name from the river Hugh. The town, situated on the right bank of the Hugli, 24 m. above Calcutta by rail, forms one municipality with Chinsura, the old Dutch settlement, lower down the river. Pop. (1901) 29,383. It contains the Hooghly CoUege at Chinsura, a Mahommedan college, two high schools and a hospital with a Lady Dufferin branch for female patients. The principal building is a handsome imambara, or mosque, constructed out of funds which had accumulated from an endowment originally left for the purpose by a wealthy Shia gentleman, Mahommed Mohsin The town was founded by the Portuguese in 1537, on the decay of Satgaon, the royal port of Bengal. Upon establishing them- selves, they built a fort at a place called Gholghat (close to the present jail), vestiges of which are still visible in the bed of the river.

This fort gradually grew into the town and port of Hugli. The District comprises an area of 1101 sq. m. In 1001 the population was 1,049,282, showing an increase of 1% in the decade. It is flat, with a gradual ascent to the north and north- west. The scenery along the high-lying bank of the Hugli has a quiet beauty of its own, presenting the appearance of a connected series of orchards and gardens, interspersed with factories villages and temples. The principal rivers, besides the Hugli' are the Damodar and the Rupnarayan. As in other deltaic districts, the highest land lies nearest the rivers, and the lowest levels are found midway between two streams. There are in consequence considerable marshes both between the Hugli and the Damodar and between the latter river and the Rupnarayan. I he district is traversed by the main line of the East Indian railway, with a branch to the pilgrim resort of Tarakeswar, whence a steam tramway has been constructed for a further distance of 3 1 m. The Eden canal furnishes irrigation, and there are several embankments and drainage works. Silk and indigo are both decaying industries, but the manufacture of brass and bell-metal ware is actively carried on at several places. There are several jute mills, a large flour mill, bone-crushing mills and a brick and tile works.

From an historical point of view the district possesses as much interest as any in Bengal. In the early period of Mahommedan rule Satgaon was the seat of the governors of Lower Bengal and a mint town. It was also a place of great commercial importance. In consequence of the silting up of the Saraswati, the river on which Satgaon was situated, the town became inaccessible to large ships, and the Portuguese settled at Hugli. In 1632 the latter place, having been taken from the Portuguese by the Mahommedans, was made the royal port of Bengal; and all the public offices and records were withdrawn from Satgaon, which rapidly fell into decay. In 1640 the East India Company estab- lished a factory at Hugli, their first settlement in Lower Bengal. a u a cLspute havim ? taken place between the English factors and the nawab, the town was bombarded and burned to the ground. This was not the first time that Hugli had been the scene of a struggle deciding the fate of a European power in India In 1629 when held by the Portuguese, it was besieged for three months and a half by a large Mahommedan force sent by the emperor Shah Jahan. The place was carried by storm; more than 1000 Portuguese were killed, upwards of 4000 prisoners taken, and of 300 vessels only 3 escaped. But Hugli district possesses historical interest for other European nations besides England and Portugal. The Dutch established themselves at Uunsura in the 17th century, and held the place till 1825, when it was ceded to Great Britain in exchange for the island of Sumatra The Danes settled at Serampur in 1616, where they remained till 1845, when all Danish possessions in India were transferred to the East India Company. Chandernagore

became a French settlement in 1688. The English captured this town twice, but since 1816 it has remained in the possession of the French.

*(c!?cut?a, f^fr**™ 1, A Brief HisU>ry ° f the HoogUy District*

HUGO, GUSTAV VON (1764-1844), German jurist, was born at Lorrach in Baden, on the 23rd of November 1764. From the gymnasium at Carlsruhe he passed in 1782 to the university of Gottingen, where he studied law for three years. Having re- ceived the appointment of tutor to the prince of Anhalt-Dessau he took his doctor's degree at the university of Halle in 1788′ Recalled in this year to Gottingen as extraordinary professor of law, he became ordinary professor in 1 792. In the preface to his Beitrage.zur ziwlistischen Bucherkenntnis der letzten vierzie Jahre (1828-1829) he gives a sketch of the condition of the civil law teaching at Gottingen at that time. The Roman Canon and German elements of the existing law were, without criticism or differentiation, welded into an ostensible whole for practical needs with the result that it was difficult to say whether historical truth or practical ends were most prejudiced. One man handed on the inert mass to the next in the same condition as he had received it, new errors crept in, and even the best of teachers could not escape from the false method which had become traditional These were the evils which Hugo set himself to combat, and he became the founder of that historical school of jurisprudence which was, continued and further developed by Savigny His magna opera are the Lehrbuch eines zivilistischen Kursus (7 vols 1702-1821), in which his method is thoroughly worked out \ and the Zivilistisches Magazin (6 vols., 1790-1837) He died at Gottingen on the 15th of September 1844.

*ftSfl.^il'f.Sf ^ Eyssenhardt ' *". **»»«i «•*

HUGO, VICTOR MARIE (1802-1885), French poet, dramatist and romance-writer,,, youngest son of General J. L. S Hugo (1773-1828), a distinguished soldier in Napoleon's service was born at Besancon on the 26th of February 1802 The all but still-born child was only kept alive and reared by the indefatigable devotion of his mother Sophie Trebuchet (d 182 1) a royalist of La Vendee. Educated first in Spain and after- wards m France, the boy whose infancy had followed the fortunes of the. imperial camp grew up a royalist and a Catholic His first work m poetry and in fiction was devoted to the passionate proclamation of his faith in these principles.

The precocious eloquence and ardour of these early works made him famous before his time. The odes which he published at the age of twenty, admirable for their spontaneous fervour and fluency, might have been merely the work of a marvellous boy; the ballads which followed them two

years later revealed him as a great poet, a natural master of lyric and creative song In 1823, at the age of twenty-one, he married his cousin Adele Foucher (d. 1868). In the same year his first romance, Han dlslande was given to the press; his second, Bug-Jar gal appeared three years later. In 1827- he published the great dramatic poem of Cromwell, a masterpiece at all points except that of fitness for the modern stage. Two years afterwards he published Les Onentales, a volume of poems so various in style so noble m spirit, so perfect in workmanship, in music and in form, that they might alone suffice for the foundation of an immortal fame. In the course of nine years, from 1831 to 1840 he published Les Feuilles d'automne, Les Chants du crepuscule Les Voix tnttneures and Les Rayons et les ombres.

That their author was one of the greatest elegiac and lyrk poets ever born into the world, any one of these volumes would amply suffice to prove. That he was the greatest tragic and dramatic poet born since the age of Shakespeare, the appearance of Hernam m 1830 made evident for ever to all but the meanest and most perverse of dunces and malignants. The earlier and even greater tragedy of Marion de Lorme (1828) had been proscribed on the ground that it was impossible for royalty to tolerate the appearance of a play in which a king was repre- sented as the puppet of a minister. In all the noble and glorious life of the greatest poet of his time there is nothing on record

more chivalrous and characteristic than the fact that Victor Hugo refused to allow the play which had been prohibited by the government of Charles X. to be instantly produced under the government of his supersessor. Le Roi s'amuse (1832), the next play which Hugo gave to the stage, was prohibited by order of Louis Philippe after a tumultuous first night — to reappear fifty years later on the very same day of the same month, under the eyes of its author, with atoning acclamation from a wider audience than the first. Terror and pity had never found on the stage word or expression which so exactly realized the ideal aim of tragic poetry among the countrymen of Aeschylus and Sophocles since the time or since the passing of Shakespeare, of Marlowe and of Webster. The tragedy of Lucrece Borgia, coequal in beauty and power with its three precursors, followed next year in the humbler garb of prose; but the prose of Victor Hugo stands higher on the record of poetry than the verse of any lesser dramatist or poet. Marie Tudor (1833), his next play, was hardly more daring in its Shakespearean defiance of historic fact, and hardly more triumphant in its Shakespearean loyalty to the everlasting truth of human

character and passion. Angelo, Tyran de Padoue (1835), the last of the tragic triad to which their creator denied the transfiguration of tragic verse, is inferior to neither in power of imagination and of style, in skill of invention and construction, and in mastery over all natural and noble sources of pity and of terror. La Esmeralda, the libretto of an opera founded on his great tragic romance of Notre-Dame de Paris, is a miracle of lyric melody and of skilful adaptation. Ruy Bias (1838) was written in verse, and in such verse as none but he could write. In command and in expression of passion and of pathos, of noble and of evil nature, it equals any other work of this great dramatic poet; in the lifelike fusion of high comedy with deep tragedy it excels them all. Les Burgraves, a tragic poem of transcendent beauty in execution and imaginative audacity in conception, found so little favour on the stage that the author refused to submit his subsequent plays to the verdict of a public audience.

Victor Hugo's first mature work in prose fiction, Le Dernier Jour d'un condamne, has appeared thirteen years earlier (1829). As a tragic monodrama it is incomparable for sustained power and terrible beauty. The story of Claude Gueux, published five years later (1834), another fervent protest against the in- fliction of capital punishment, was followed by many other eloquent and passionate appeals to the same effect, written or spoken on various occasions which excited the pity or the indignation of the orator or the poet. In 183 1 appeared the greatest of all tragic or historic or romantic poems in the form of prose narrative, Norte-Dame de Paris. Three years after- wards the author published, under the title of Litterature et philosophie melees, a compilation or selection of notes and essays ranging and varying in date and in style from his earliest effusions of religious royalism to the magnificent essay on Mirabeau which represents at once the historical opinion and the critical capacity of Victor Hugo at the age of thirty-two. Next year he published Le Rhin, a series of letters from Germany, brilliant and vivid beyond all comparison, containing one of the most splendid stories for children ever written, and followed by a political supplement rather pathetically unprophetic in its predictions.

At the age of thirty-eight he honoured the French Academy by taking his place among its members; the speech delivered on the occasion was characteristically generous in its tribute to an undeserving memory, and significantly enthusiastic in its glorification of Napoleon. Idolatry of his father's hero and leader had now superseded the earlier superstition inculcated by his mother. In 1846 his first speech in the chamber of peers — Louis Philippe's House of Lords— was delivered on behalf of Poland; his second, on the subject of coast defence, is memor- able for the evidence it bears of careful research and practical suggestion. His pleading on behalf of the exiled family of Bonaparte induced Louis Philippe to cancel the sentence which excluded its members from France. After the fall and flight

of the house of Orleans, his parliamentary eloquence was never

less generous in aim and always as fervent in its constancy to patriotic and progressive principle. When the conspiring forces of clerical venality and political prostitution had placed a putative Bonaparte in power attained by perjury after perjury, and supported by massacre after massacre, Victor Hugo, in common with all honourable men who had ever taken part in political or public life under the government superseded by force of treason and murder, was driven from his country into an exile of well-nigh twenty years. Next year he published Napolion le petit; twenty-five years afterwards, Histoire d'un crime. In these two books his experience and his opinion of the tactics which founded the second French empire stand registered for all time. In the deathless volume of Chdtiments, which appeared in 1853, his indignation, his genius, and his faith found such utterance and such expression as must recall to the student alternately the lyric inspiration of Coleridge and Shelley, the prophetic inspiration of Dante and Isaiah, the satiric inspiration of Juvenal and Dryden. Three years after Les Chdtiments, &. book written in lightning, appeared Les Contemplations, a book written in sunlight and starlight. Of the six parts into which it is divided, the first translates into many- sided music the joys and sorrows, the thoughts and fancies, the studies and ardours and speculations of youth; the second, as full of light and colour, grows gradually deeper in tone of thought and music; the third is yet riper and more various in form of melody and in fervour of meditation; the fourth is the noblest of all tributes ever paid by song to sorrow — a series of poems consecrated to the memory of the poet's eldest daughter, who was drowned, together with her husband, by the upsetting of a boat off the coast of Normandy, a few months after their wedding-day, in 1843; the fifth and the sixth books, written during his first four years of exile (all but one noble poem which bears date nine years earlier than its epilogue or postscript) , contain mooe than a few poems unsurpassed and unsurpassable for depth and clarity and trenchancy of thought, for sublimity of inspiration, for intensity of faith, for loyalty in translation from nature, and for tenderness in devotion to truth; crowned and glorified and completed by their matchless dedication to the dead. Three years later again, in 1859, Victor Hugo gave to the world the first instalment of the greatest book published in the 19th century, La Legende des siecles. Opening with a vision of Eve in Paradise which eclipses Milton's in beauty no less than in sublimity — a dream of the mother of mankind at the hour when she knew the first sense of dawning motherhood, it closes with a vision of the trumpet to be sounded on the day of judgment which transcends the imagination of Dante by right of a realized idea which was utterly impossible of conception to a believer in Dante's creed: the idea of real and final equity; the concept of absolute and abstract righteousness.

Between this opening and this close the pageant of history and of legend, marshalled and vivified by the will and the hand of the poet, ranges through an infinite variety of action and passion, of light and darkness, of terror and pity, of lyric rapture and of tragic triumph.

After yet another three years' space the author of La Ligende des siecles reappeared as the author of Les Mistrables, the greatest epic and dramatic work of fiction ever created or conceived: the epic of a soul transfigured and redeemed, purified by heroism and glorified through suffering; the tragedy and the comedy of life at its darkest and its brightest, of humanity at its best and at its worst. Two years afterwards the greatest man born since the death of Shakespeare paid homage to the. greatest of his predecessors in a volume of magnificent and discursive eloquence which bore the title of William Shakespeare, and might, as its author admitted and suggested, more properly have been entitled A propos de Shakespeare. It was undertaken with the simple design of furnishing a preface to his younger son's translation of Shakespeare; a monument of perfect scholarship, of indefatigable devotion, and of literary genius, which eclipses even Urquhart's Rabelais — its only possible competitor; and to which the translator's father prefixed a brief and admirable note of introduction in the year after the

publication of the volume which had grown under his hand into the bulk and the magnificence of an epic poem in prose In the same year Les Chansons des rues el des bois gave evidence of new power and fresh variety in the exercise and display of an unequalled skill and a subtle simplicity of metre and of style employed on the everlasting theme of lyric and idyllic fancy, and touched now and then with a fire more sublime than that of youth and love. Next year the exile of Guernsey published his third great romance, Les Travailleurs de la mer, a work unsurpassed even among the works of its author for splendour of imagination and of style, for pathos and sublimity of truth. Three years afterwards the same theme was rehandled with no less magnificent mastery in L'Homme qui rit ; the theme of human heroism confronted with the superhuman tyranny of blind and unimaginable chance, overpowered and unbroken, defeated and invincible. Between the dates of these two great books appeared La Voix de Guernesey, a noble and terrible poem on the massacre of Mentana which branded and com- memorated for ever the papal and imperial infamy of the col- leagues in that crime. In 1872 Victor Hugo published in imperishable verse his record of the year which followed the collapse of the empire, L'Annee terrible. All the poet and all the man spoke out and stood

evident in the perfervid patriotism, the filial devotion, the fatherly tenderness, the indignation and the pity, which here find alternate expression in passionate and familiar and majestic song. In 1874 he published his last great romance, the tragic and historic poem in prose called Quatrevingt-treize; a work as rich in thought, in tenderness, in wisdom and in humour and in pathos, as ever was cast into the mould of poetry or of fiction.

The introduction to his first volume of Actes el paroles, ranging in date from 1841 io 1851, is dated in June 1875; it is one of his most earnest and most eloquent appeals to the conscience and intelligence of the student. The second volume eontains the record of his deeds and words during the years of his exile; like the first and the third, it is headed by a memorable preface, as well worth the reverent study of those who may dissent from some of the writer's views as of those who may assent to all. The third and fourth volumes preserve the register of his deeds and words from 1870 to 1885; they contain, among other things memorable, the nobly reticent and pathetic tribute to the memory of the two sons, Charles (1826-1871) and Francois (1828-1873), he had lost since their common return from exile. In 1877 appeared the second series of La Legende des siecles; and in the same year the author of that colossal work, treating no less of superhuman than of human things, gave us the loveliest and most various book of song on the loveliest and simplest of subjects ever given to man, L' Art d'etre grandpere. Next year he published Lc Pape, a vision of the spirit of Christ in appeal against the spirit of Christianity, his ideal follower confronted

and contrasted with his nominal vicar; next year again La Pitie supreme, a plea for charity towards tyrants who know not what they do, perverted by omnipotence and degraded by adoration; two years later Religions el religion, a poem which is at once a cry of faith and a protest against the creeds which deform and distort and leave it misshapen and envenomed and defiled; and in the same year L'Ane, a paean of satiric invective against the past follies of learned ignorance, and lyric rapture of confidence in the future wisdom and the final conscience of the world. These four great poems, one in sublimity of spirit and in supremacy of style, were succeeded next year by a fourfold gift of even greater price, Les Quatre Vents de l' esprit: the first book, that of satire, is as full of fiery truth and radiant reason as any of his previous work in that passionate and awful kind; the second or dramatic book is as full of fresh life and living nature, of tragic humour and of mortal pathos, as any other work of the one great modern dramatist's; the third or lyric book would suffice to reveal its author as incomparably and immeasurably the greatest poet of his age, and one great among the greatest of all time; the fourth or epic book is the sublimest and most terrible of historic poems — a visionary pageant of French history from the reign and the revelries of Henry IV.

to the reign and the execution of Louis XVI. Next year the great tragic poem of Torquemada came forth to bear witness that the hand which wrote Ruy Bias had lost nothing of its godlike power and its matchless cunning, if the author of Le Roi s'amuse had ceased to care much about coherence of

con- struction from the theatrical point of view as compared with the perfection of a tragedy designed for the devotion of students not unworthy or incapable of the study; that his command of pity and terror, his powers of intuition and invention, had never been more absolute and more sublime; and that his infinite and illimitable charity of imagination could transfigure even the most monstrous historic representative of Christian or Catholic diabolatry into the likeness of a terribly benevolent and a tragically magnificent monomaniac. Two years later Victor Hugo published the third and concluding series of La Legende des siecles.

On the 22nd of May 1885 Victor Hugo died. He was given a magnificent public funeral, and his remains were laid in the Pantheon. The first volume published of his posthumous works was the exquisite and splendid ThSdtre en liberie, a sequence if not a symphony of seven poems in dramatic form, tragic or comic or fanciful eclogues, incomparable with the work of any other man but the author of The Tempest and The Winter's Tale in combination and alternation of gayer and of graver harmonies. The unfinished poems, Dieu and La Fin de Satan, are full to overflowing of such magnificent work, such wise simplicity of noble thought, such heroic and pathetic imagination, such reverent and daring faith, as no other poet has ever cast into deathless words and set to deathless music. Les Jumeaux, an unfinished tragedy, would possibly have been the very greatest of his works if it had been completed on the same scale and on the same lines as it was begun and carried forward to the point at which it was cut short for ever. His reminiscences of " Things Seen" in the course of a strangely varied experience, and his notes of travel among the Alps and Pyrenees, in, the north of France and in Belgium, in the south of France and in Burgundy, are all recorded by such a pen and registered by such a memory as no other man ever had at the service of his impressions or his thoughts. Toute la lyre, his latest legacy to the world, would be enough, though no other evidence were left, to show that the author was one of the very greatest among poets and among men; unsurpassed in sublimity of spirit, in spontaneity of utterance, in variety of power, and in perfection of workmanship ; infinite and profound beyond all reach of praise at once in thought and in sympathy, in perception and in passion; master of all the simplest as of all the subtlest melodies or symphonies of song that ever found expression in a Border ballad or a Pythian ode. (A. C. S.)

Bibliography.— Victor Hugo's complete works were published in a definitive edition at Paris in 58 volumes (1885-1902). The critical literature which has grown up round his name is very ex- tensive, from the time of Sainte-Beuve onwards, and only a few of the more important books need here be mentioned for reference on biographical and other details: F. T. Marzials, Life of Hugo, with bibliography (1888); A. C. Swinburne, Study of Hugo (1886); E. Dupuy, Victor Hugo, I'homme et le poete

(1886); Paul de Saint Victor, Victor Hugo (1885); F. Brunetiere, Victor Hugo (1903); Jules Claretie, Victor Hugo, souvenirs intimes (1902). See also The Bookman for August 1904; Francis Gribble, "The Hugo Legend," an adverse view, in Fortnightly Review (February 1910) ; and the article French Literature.

HUGUENOTS, the name given from about the middle of the 1 6th century to the Protestants of France. It was formerly explained as coming from the German Eidgenossen, the designs.- tion of the people of Geneva at the time when they were admitted to the Swiss confederation. This explanation is now abandoned. The words Huguenot, Huguenote are old French words, common in 14th and 15th-century charters. As the Protestants called the Catholics papistes, so the Catholics called the Protestants huguenots. Henri Estienne, one of the great savants of his time, in the introduction to his Apologie d'Herodote (1566) gives a very clear explanation of the term huguenots. The Protestants at Tours, he says, used to assemble by night near the gate of King Hugo, whom the people regarded as a spirit. A monk, therefore,

in a sermon declared that the Lutherans ought to be called Huguenots as kinsmen of King Hugo, inasmuch as they would only go out at night as he did. This nickname became popular from 1560 onwards, and for a long time the French Protestants were always known by it.

France could not stand outside the religious movement of the 16th century. It is true that the French reform movement has often been regarded as an offshoot of Lutheranism; up to I he middle of the century its adherents were known as Lutherans. But it should not be forgotten that so early as 1512 Jacobus Faber {q.v.) of Etaples published his Santi Paidi Epislolac xiv. . . . cum commentariis, which enunciates the cardinal doctrine of reform, justification by faith, and that in 1523 appeared his French translation of the New Testament. The first Protestants were those who set the teachings of the Gospel against the doctrines of the Roman Church. As early as 1525 Jacques Pavannes, the hermit of Livry, and shortly afterwards Louis de Berquin. the first martyrs, were burned at the stake. But no persecution could stop the Reform movement, and on the walls of Paris and even at Amboise, on the very door of Francis I.'s bedroom, there were found placards condemning the mass (1534). On the 2qth of January 1535 an edict was published ordering the extermination of the heretics. From this edict dates the emigration of French Protestants, an emigration which did not cease till the middle of the 18th century. Three years later (1538) at

Strassburg the first French Protestant Church, com- posed of 1 500 refugees, was founded.

Of all these exiles the most famous was John Calvin {q.v.), the future leader of the movement, who fled to Basel, where he is said to have written the famous Instilutio christianae religionis, preceded by a letter to Francis I. in which he pleaded the cause of the reformers. The first Protestant community in France was that of Meaux (1546) organized on the lines of the church at Strassburg of which Calvin was pastor. The Catholic Florimond de Remond paid it the beautiful tribute of saying that it seemed as though " la chretiente fut revenue en elle a. sa primitive innocence."

Persecution, however, became more rigorous. The Vaudois of Cabrieres and Merindol had in 1545 been massacred by the orders of Jean de Maynier, baron d'Oppede, lieutenant-general of Provence, and at Paris was created a special court in the pariement. for the suppression of heretics, a court which became famous in history as the Chambre ardente (1549). In spite of persecution the churches became more numerous; the church at Paris was founded in 1556. They realized the necessity of uniting in defence of their rights and their liberty, and in 1558 at Poitiers it was decided that all the Protestant churches in France should formulate by common accord a confession of faith and an ecclesiastical discipline. The church at Paris was com- missioned to summon the first synod, which in spite of the danger of persecution met on the 25th of May 1559. The Synod of Paris derived its inspiration from the constitution introduced by Calvin at Geneva, which has since become the model for all the presbyterian churches. Ecclesiastical authority resides ulti- mately in the people, for the faithful select the elders who are charged with the general supervision of the church and the choice of pastors. The churches are independent units, and there can be no question of superiority among them; at the same time they have common interests and their unity must be maintained by an authority which is capable of protecting them. The association of several neighbouring churches forms a local council tcolloquc). Over these stands the provincial synod, on which each church is equally represented by lay delegates and pastors. Supreme authority resides in the National Synod composed of representatives, lay and ecclesiastic, elected by the provincial synods. The democratic character of this constitution of elders and synods is particularly remarkable in view of the early date at which it began to flourish. The striking individuality of the Huguenot character cannot be fully realized without a clear understanding of this powerful organization which contrived to reconcile individual liberty with a central authority.

The synod of 1550 was the beginning of a remarkable increase xin. 28

in the Reform movement; at that synod fifteen churches were represented,

two years later, in 1561, the number increased to 2150. The parlements were powerless before this increase; thousands left the Catholic Church, and when it was seen that execution and popular massacre provided no solution of the difficulty the struggle was carried into the arena of national politics. On the side of the reformers were ranged some among the noblest Frenchmen of the age, Coligny, La Noue, Duplessis Mornay, Jean Cousin, Ramus, Marot, Ambroise Pare, Olivier de Serres, Bernard Palissy, the Estiennes, Hotman, Jean de Serres, with the princess Renee of France, Jeanne d'Albret, Louise de Coligny. The policy which refused liberty of conscience to the reformers and thus plunged the country into the horrors of civil war came near to causing a national catastrophe. For more than fifty years the history of the Huguenots is that of France (1560- 1629). Francis II., who succeeded Henry II. at the age of sixteen, married Mary Stuart, and fell under the domination of the queen's uncles, the Guises, who were to lead the anti-Reform party. The Bourbons, the Montmorencies, the Chatillons, out of hostility to them, became the chiefs of the Huguenots.

The conspiracy of Amboise, formed with the object of kid- napping the king (March 1560), was discovered, and resulted in the death of the plotters; it was followed by the proclamation of the Edict of Romorantin which laid an interdict upon the Protestant religion. But the reformers had become so powerful that Coligny, who was to become their most famous leader, protested in their name against this violation of liberty of con- science. The Guise party caused the prince of Conde to be arrested and condemned to death, but the sentence was not carried into effect, and at this moment Catherine de' Medici became regent on the accession of Charles IX. She introduced Italian methods of government, alternating between concessions and vigorous persecution, both alike devoid of sincerity. For a moment, at the colloquy of Poissy (Oct. 1561), at which Roman Catholic and Protestant divines were assembled together and Theodore Beza played so important a part, it seemed as though a modus vivendi would be established. The attempt failed, but by the edict of January 1562, religious liberty was assured to the Huguenots, This, however, was merely the prelude to civil war, the signal for which was given by the Guises, who slaughtered a number of Huguenots assembled for worship in a barn at Vassy (March 1 , 1562). The duke of Guise, entering Paris in triumph, trans- ferred the court to Fontainebleau by a daring coup d'etat in defiance of the queen regent. It was then that Conde declared " qu'on ne pouvait plus rien esperer que de Dieu et ses armes," and with the Huguenot leaders signed at Orleans (April 11, 1562) the manifesto in which, having declared their loyalty to the crown, they stated that as good and loyal subjects they were driven to take up arms for liberty of conscience on behalf of the persecuted saints. The first civil war had already broken out; till the end of

the century the history of France is that of the struggle between the Huguenots upholding "The Cause" (La Cause) and the Roman Catholics fighting for the Holy League (La Sainte Ligue). The leading events only will be related here (see also France: History). The Huguenots lost the battle of Dreux (Dec. 19, 1562), the duke of Guise was assassinated by Poltrot de Mere (Feb. 18, 1563) and finally Conde signed the Edict of Amboise which put an end to this first war. But the League gradually extended its action and Catherine de' Medici entered into negotiations with Spain. The Huguenots, seeing their danger, renewed hostilities, but after their defeat at St Denis (Nov. 10, 1567) and the revolt of La Rochelle, peace was concluded "at Longjumeau (March 23, 1568). This truce lasted only a few months. Pope Pius V. did not cease to demand the extermination of the heretics, and the queen mother finally issued the edict of the 28th of September 1 568, which put the Huguenots outside the protection of the law. The Huguenots once more took up arms, but were defeated at Jarnac (March 13, 1569), and Conde was taken prisoner and assassinated by Montesquiou. But Jeanne d'Albret renewed the courage of the vanquished by pre- senting to them her son Henri de Bourbon, the future Henry IV. Coligny, whose heroic courage rose with adversity, collected the

remnants of the Protestant army and by a march as able as it was audacious moved on Paris, and the Peace of St Germain was signed on the 8th of August 1570.

For a moment it seemed reasonable to hope that the war was at an end. Coligny had said that he would prefer to be dragged through the streets of Paris than to recommence the fighting; Charles IX. had realized the nobility and the patriotism of the man who wished to drive the Spaniards from Flanders; Henri de Bourbon was to marry Marguerite of France. Peace seemed to be assured when on the night of the 24th of August, 1572, after a council at which Catherine de' Medici, Charles IX., the duke of Anjou and other leaders of the League assisted, there occurred the treacherous Massacre of St Bartholomew (q.v.) in which Coligny and all the leading Huguenots were slain. This date marks a disastrous epoch in the history of France, the long period of triumph of the Catholic reaction, during which the Huguenots had to fight for their very existence. The Paris massacre was repeated throughout France; few were those who were noble enough to decline to become the executioners of their friends, and the Protestants were slain in thousands. The survivors resolved upon a desperate

resistance. It was at this time that the Huguenots were driven to form a political party; otherwise they must, like the Protestants of Spain, have been exterminated. This party was formed at Milhau in 1573, definitely constituted at La Rochelle in 1588, and lasted until the peace of Alais in 1629. The delegates selected by the churches bound themselves to offer a united opposition to the violence of the enemies of God, the king and the state. It is a profound mistake to attribute to them, as their enemies have done, the intention of overthrowing the monarchy and sub- stituting a republic. They were royalists to the core, as is shown by the sacrifices they made for the sake of setting Henry IV. on the throne. It is true, however, that among themselves they formed a kind of republic which, according to the historian J. A. de Thou, had its own laws dealing with civil government, justice, war, commerce, finance. They had a president called the Protector of the Churches, an office held first by Conde and afterwards by the king of Navarre up to the day on which he became king of France as Henry IV. (1589). The fourth religious war, which had broken out immediately after the Massacre of St Bartholomew, was brought to an end by the pacification of Boulogne (July 16, 1573), which granted a general amnesty, but the obstinate intolerance of the League resulted in the creation of a Catholic party called " les Politiques " which refused to submit to their domination and offered aid to the Huguenots against the Guises. The recollections of the horrors of St Bartholomew's night had hastened the death of Charles IX., the last of the Valois; he had been succeeded by the most debauched and effeminate of monarchs, Henry III. Once more war broke out. Henry of Guise, " le Balafre," nephew of the cardinal of Lorraine, became chief of the League, while the duke of Anjou, the king's brother, made common cause with the Huguenots. The peace of Monsieur, signed on the 5th of May 1576, marked a new victory of liberty of conscience, but its effect was ephemeral; hostilities soon recommenced and lasted for many years, and only became fiercer when the duke of Anjou died on the 10th of June 1584.

The fact that on the death of Henry III. the crown would pass to Henry of Navarre, the Protector of the Churches, induced the Guise party to declare that they would never accept a heretical monarch, and, at the instigation of Henry of Guise, Cardinal de Bourbon was nominated by them to succeed. Henry of Navarre since 1575 leader of the Huguenots, had year by year seen his influence increase, and now, faced by the machina- tions of the Guises, who had made overtures to Spain, declared that his only object was to free the feeble Henry III. from their influence. On the 20th of October 1587 he won the battle of Coutras, but on the 28th the foreign Protestants who were coming to his aid were routed by Guise at Montargis. The new body, known as " the Sixteen of Paris," thereupon compelled Henry III. to sign the " Edict of Union " by which the cardinal of Bourbon was declared

heir presumptive. The

king could not, however, endure the humiliation of hearing Henry of Guise described as " king of Paris " and on the 23rd of December 1588 had him murdered together with the cardinal of Lorraine at the chateau of Blois. The League, now led by the duke of Mayenne, Guise's brother, declared war to the knife upon him and caused him to be excommunicated. In his isola- tion Henry III. threw himself into the arms of Henry of Navarre, who saved the royalist party by defeating Mayenne and escorted the king with his victorious army to St. Cloud, whence he proposed to enter Paris and destroy the League. But Henry III., on the 1st of August 1589, was assassinated by the monk Jacques Clement, on his deathbed appointing Henry of Navarre as his successor.

This only spurred the League to redoubled energy, and Mayenne proclaimed the cardinal of Bourbon king with the title of Charles X. But Henry IV., who had already promised to maintain the Roman Church, gained new adherents every day, defeated the Leaguers at Arques in 1589, utterly routed Mayenne at Ivry on the 14th of March 1590, and laid siege to Paris. Cardinal de Bourbon having died in the same year and France being in a state of anarchy, Philip II. of Spain, in concert with Pope Gregory XIV., who excommunicated Henry IV., supported the claims of the infanta Isabella. Mayenne, unable to continue the struggle without Spanish help, promised to assist him, but Henry neutralized this danger by declaring himself a Roman Catholic at St Denis (July 25, IS93), saying, " Paris after all is worth a mass, in spite of the advice and the prayers of my faithful Huguenots." " It is with anguish and grief," writes Beza, " that I think of the fall of this prince in whom so many hopes were placed." On the 22nd of March 1594 Henry entered Paris. The League was utterly defeated. Thus the Huguenots after forty years of strife obtained by their constancy the promulgation of the Edict of Nantes (April 13, 1598), the charter of religion and political freedom (see Nantes, Edict of).

The Protestants might reasonably hope that Henry IV., in spite of his abjuration of their faith, would remember the devoted support which they had given him, and that his authority would guarantee the observance of the provisions of the Edict. Unhappily twelve years afterwards, on the 14th of May 1610, Henry was assassinated by Ravaillac, leaving the great work incomplete. Once more France was to undergo the misery of civil war. During the minority of Louis XIII. power resided in the hands of counsellors who had not inherited the wisdom of Henry IV. and were only too ready to favour the Catholic party. The Huguenots, realizing that their existence was at stake, once more took up arms in defence of their liberty under the leadership of Henri de Rohan (q.v.). Their watchword had always been that, so long as the state was opposed to liberty of conscience, so long there

could be no end to religious and civil strife, that misfortune and disaster must attend an empire of which the sovereign identified himself with a single section of his people. Richelieu had entered the king's council on the 4th of May 1624; the destruction of the Huguenots was his policy and he pursued it to a triumphant conclusion. On the 28th of October 1628, La Rochelle, the last stronghold of the Huguenots, was obliged to surrender after a siege rendered famous for all time by the heroism of its defenders and of its mayor. The peace of Alais, which was signed on the 28th of June 1629, marks the end of the civil wars.

The Huguenots had ceased to exist as a political party and, in the assurance that liberty of conscience would be accordeS to them, showed themselves loyal subjects. On the death of Louis XIII., the declaration of the 8th of July 1643 had guaranteed to the Protestants "free and unrestricted exercise of their religion," thus confirming the Edict of Nantes. The synods of Charenton (1644) and Loudun (1659) asserted their absolute loyalty to Louis XIV., a loyalty of which the Huguenots had given proof not only by their entire abstention from the troubles of the Fronde, but also by their public adherence to the king. The Roman Catholic clergy had never accepted the Edict of Nantes, and all their efforts were directed to obtaining

its revocation. As long as Mazarin was alive the complaints of the clergy were in vain, but when Louis XIV. attained his majority there commenced a legal persecution which was bound in time to bring about the ruin of the reformed churches. The Edict of Nantes, which was part of the law of the land, might seem to defy all attacks, but the clergy found means to evade the law by demanding that it should be observed with literal accuracy, disregarding the changes which had been produced in France during more than half a century. The clergy in 1661 successfully demanded that commissioners should be sent to the provinces to report infractions of the Edict, and thus began a judicial war which was to last for more than twenty years. All the churches which had been built since the Edict of Nantes were condemned to be demolished. All the privileges which were not explicitly stated -in the actual text of the Edict were suppressed. More than four hundred proclamations, edicts or declarations attacking the Huguenots in their households and their civil freedom, their property and their liberty of conscience were promulgated during the years which preceded the revocation of the Edict of Nantes. In spite of all sufferings which this rigorous legislation inflicted upon them they did not cease to resist, and in order to crush this resistance and to compel them to accept the " king's

religion," there were organized the terrible dragonnades (1683-1686) which effected the forcible conversion of thousands of Protestants who gave way under the tortures which were inflicted upon them. It was then that Louis XIV. declared that " the best of the larger part of our subjects, who formerly held the so-called reformed religion, have embraced the Catholic religion, and therefore the Edict of Nantes has become unnecessary "; on the 18th of October 1685 he pronounced its revocation. Thus under the influence of the clergy was committed one of the most flagrant political and religious blunders in the history of France, which in the course of a few years lost more than 400,000 of its inhabitants, men who, having to choose between their conscience and their country, endowed the nations which received them with their heroism, their courage and their ability.

There is perhaps no example in history of so cruel a persecution as this, which destroyed a church of which Protestant Europe was justly proud. At no period in its career had it numbered among its adherents so many men of eminence, Abbadie, Claude, Bayle, Du Bosc, Jurieu, Elie Benoist, La Placette, Basnage, Daille, Mestrezat, Du Quesne, Schomberg, Ruvigny. There were no Huguenots left in France; those who, conquered by persecution, remained there were described as "New Catholics." All the pastors who refused to abjure their faith were compelled to leave the country within fifteen days. The work was complete. Protestantism, with its churches and its schools, was destroyed. As Bayle wrote, "France was Catholic to a man under the reign of Louis the Great."

Persecution had succeeded in silencing, but it could not convert the people. The Huguenots, before the ruins of their churches, remembered the early Christians and held their services in secret. Their pastors, making light of death, returned from the lands of their exile and visited their own churches to restore their courage. If any one denied the Catholic faith on his death-bed his body was thrown into the common sewers. The galleys were full of brave Huguenots condemned for remain- ing constant to the Protestant faith. For fifteen years the exiles continuously besought Louis XIV. to give them back their religious liberty. For a moment they hoped that the Treaty of Ryswick (1697) would realise their hopes, but Louis XIV. steadily declined to grant their requests. Despair armed the Cevennes, and in 1702 the war of the Camisards broke out, a struggle of giants sustained by Jean Cavalier with his moun- taineers against the royal troops (see Camisards and Cavalier, Jean). The Huguenots seemed to be finally conquered. On the 8th of March 1713 Louis XIV. announced that he had put an end to all exercise of the Protestant religion; but in this very year, on the 21st of August, while the king was dying at Versailles, there assembled together at Monoblet in Languedoc, under the presidency of a young man twenty years of age,

Antoine Court, a number of preachers, as the pastors were then called, with the object of raising the church from its ruins. This was the first synod of the Desert. To re-establish the abandoned worship, to unite the churches in the struggle for liberty of conscience, such was the work to which Court devoted his life, and which earned for him the name of the " Restorer of Protestantism " (see Court, Antoine). In spite of persecu- tion the Protestants continued their assemblies; the fear of death and of the galleys were alike powerless to break their resistance. On the demand of the clergy all marriages celebrated by their pastors were declared null and void, and the children born of these unions were regarded as bastards.

Protestantism, which persecution seemed to have driven from France, drew new life from this very persecution. Outlawed, exiles in their own country, deprived of all civil existence, the Huguenots showed an invincible heroism. The history of their church during the period of the Desert is the history of a church which refused to die. Amongst its famous defenders was Paul Rabaut, the successor of Antoine Court. Year by year the churches became more numerous. In 1756 there were already 40 pastors; several years later, in 1763, the date of the last synod of the Desert, their number had increased to 65. The question of Protestant marriages roused public opinion which could not tolerate the idea that Frenchmen, whose sole crime was their religious belief, should be condemned to civil death. The torture of Jean Calas, who was condemned on a false charge of having killed his son because he desired to become a Catholic, caused general indignation, of which Voltaire became the eloquent mouthpiece. Ideas of tolerance, of which Bayle had been the earliest advocate, became victorious, and owing to the devotion of Rabaut Saint-Etienne, son of Paul Rabaut, and the zeal of Lafayette, the edict of November 1787, in spite of the fierce opposition of the clergy, renewed the civil rights of the Huguenots by recognizing the validity of their marriages. Victories even greater were in store; two years later liberty of conscience was won. On the 22nd of August 1789 the pastor Rabaut Saint-fitienne,' deputy for the s6nechauss6e of Nimes to the States General, cried out, " It is not tolerance which I demand, it is liberty, that my country should accord it equally without distinction of rank, of birth or of religion." The Declara- tion of the Rights of Man affirmed the liberty of religion; the Huguenots had not suffered in vain, for the cause for which their ancestors and themselves had suffered so much was triumphant, and it was the nation itself which proclaimed the victory. But religious passions were always active, and at Montauban as at Nimes (1790) Catholics and Protestants came to blows. The Huguenots, having endured the persecutions of successive monarchs, had to endure those of the Terror; their churches were shut, their pastors dispersed and some died upon the scaffold. On the 3rd of Ventose, year II. (February 21, 1795), the church was divorced from the state and the Protestants devoted themselves

to reorganization. Some years later Bonaparte, having signed the Concordat of the 15th of July 1801, promulgated the law of the 18th of Germinal, year X., which recognized the legal standing of the Protestant church, but took from it the character of free church which it had always claimed. So great was the contrast between a past which recalled to Protestants nothing but persecution, and a present in which they enjoyed liberty of conscience, that they accepted with a profound gratitude a regime of which the ecclesiastical standpoint was so alien to their traditions. With enthusiasm they repeated the words with which Napoleon had received the-pastors at the Tuileries on the 16th of Frimaire, year XII.: " The empire of the law ends where the undefined empire of conscience begins; law and prince are powerless against this liberty."

The Protestants, on the day on which liberty of conscience was restored, could measure the full extent of the misery which they had endured. Of this people, which in the 16th century formed more than one-tenth of the population of France, there survived only a few hundred thousands ; migration and persecu- tion had more than decimated them. In 1626 there were 809

pastors in the service of 751 churches; in 1802 there were only 121 pastors and 171 churches; in Paris there was only a single church with a single pastor. The church had no faculty of theology, no schools, no Bible societies, no asylums, no orphan- ages, no religious literature. Everything had to be created afresh, and this work was pursued during the 19th century with the energy and the earnest faith which is characteristic of the Huguenot character.

At the fall of the Empire (1815) the reaction of the White Terror once more exposed the Protestants to outrage, and once more a number fled from persecution and sought safety in foreign countries. Peace having been established, attention was once more focussed on religious questions, and the period was marked in Protestantism by a remarkable awakening. On all sides churches were built and schools opened. It was an epoch of the greatest importance, for the church concentrated itself more and more on its real mission. During this period were founded the great religious societies: — Societe biblique (1819), Societe de l'instruction primaire (1829), Societe des traites (1821), Societe des missions (1822). The influence of English thought on the development of religious life was remarkable, and theology drew its inspiration from the writings of Paley, David Bogue, Chalmers, Ebenezer Erskine, Robert and James Alexander

Haldane, which were translated into French. Later on German theology and the works of Kant, Neander and Schleiermacher produced a far-reaching effect. This was due to the period of persecution which had checked that development of religious thought which had been so remarkable a feature of French Protestantism of the 16th and 17th centuries.

Slowly Protestantism once more took its place in the national life. The greatest names in its history are those of Guizot and Cuvier; Adolf Monod, with Athanase Coquerel, stand in the front rank of pulpit orators. The Protestants associated them- selves with all the great philanthropic works — Baron Jules Delessert founded savings banks, Baron de Stael condemned slavery, and all France united to honour the pastor, Jean Frederic Oberlin. But the reformers, if they had no longer to fear persecution, had still to fight in order to win respect for religious liberty, which was unceasingly threatened by their adversaries. Numerous were the cases tried at this epoch in order to obtain justice. On the other hand the old union of the reformed churches had ceased to exist since the revolution of July. Ecclesiastical strife broke out and has never entirely ceased. A schism occurred first in 1848, owing to the refusal of the synod to draw up a profession of faith, the comtede Gasparin and the pastor Frederic Monod seceding and founding the Union des Eglises Evangeliques de France, separated from the state, of which later on E. de Pressense was to become the most famous pastor. Under the Second Empire (1852-1870) the divisions between the orthodox and the liberal thinkers were accentuated; they resulted in a separation which followed on the reassembly of the national synod, authorized in 1872 by the government of the Third Republic. The old Huguenot church was thus separated into two parts, having no other link than that of the Concordat of 1802 and each possessing its own peculiar organization.

The descendants of the Huguenots, however, remained faithful to the traditions of their ancestors, and extolled the great past of the French reform movement. Moreover, in 1859 were held the magnificent religious festivals to celebrate the third centenary of the convocation of their first national synod; and when on the 18th of October 1885 they recalled the 200th anniversary of the Revocation of the Edict of Nantes, they were able to assert that the Huguenots had been the first defenders of religious liberties in France. In the early days of the 20th century the work of restoring French Protestantism, which had been pursued with steady perseverance for more than one hundred years, showed great results. This church, which in 1802 had scarcely 100 pastors has seen this number increased to 1000; it possesses more than 900 churches or chapels and 180 presbyteries. In contrast with the poverty of religious life under the First Empire it presented a striking array of Bible societies, missionary societies,

and others for evangelical, educational, pastoral and

charitable work, which bear witness to a church risen from its ruins. French Protestantism in the course of the 19th century reckoned among its members such eminent theologians as Timolhee Colani (1824-1888), who together with Edmond Scherer founded the celebrated Revue de theologie de Strasbourg (1850) ; Edmond de Pressense, editor of the Revue chretienne, Charles Bois and Michel Nicolas, professors of theology at Montauban, Auguste Sabatier, professor of theology at the university of Paris, Albert Reville, professor at the College de France, Felix Pecaut, &c; well-known preachers such as Eugene Bersier, Ernest Dhombres, Ariste Vigu-re, Numa Recolin, Auguste de Coppet, and missionaries, for example Eugene Casalis and Coillard; Jean Bost, who founded the hospitals at Laforce; historians like Napoleon Peyrat, the brothers Haag, who wrote La France protestante, Francois Puaux, Charles Coquerel, Onesime Douen, Henri Bordier, Edouard Sayous, de Felice, Theophile Rollez; Jean Pedezert, Leon Pilatte and others, who were journalists; such statesmen as Guizot, Leon Say, Waddington; such scholars as Cuvier, Broca, Wurtz, Friedel de Quatrefages; such illustrious soldiers and sailors as Rapp, Admirals Baudin, Jaureguiberry, Colonel Denfert-Rochereau. But the population of Protestant France does not exceed 750,000 souls, without counting the Lutherans, who are attached to the Confession of Augsburg, numbering about 75,000. Their chief centres are in the depart- ments of Gard, Ardeche, Drome, Lozere, the Deux Sevres and the Seine.

The law of the 9th of December 1905, which separated the church from the state, has been accepted by the great majority of Protestants as a legitimate consequence of the reform principles. Nor has its application given rise to any difficulty with the state. They used their influence only in the direction of rendering the law more liberal and immediately devoted themselves to the organization of their churches under the new r6gime. If the two great parties, orthodox and liberal, have each their particular constitution, nevertheless a third party has been formed with the object of effecting a reconciliation of all the Protestant churches and of thus reconstituting the old Huguenot church.

Bibliography. — A complete list of works is impossible. The following are the most important : —

General Authorities. — Bulletin de la societe de Vhisloire du pro- testantisme francais (54 vols.), a most valuable collection, indis- pensable as a work of reference; Haag, La France protestante, lives of French Protestants (10 vols., 1846; 2nd ed., Henri Bordier, 6 vols., 1887) ; F. Puaux, Histoire de la Reformation francaise (7 vols,., 1858) and articles ” Calvin ” and ” France protestante ” in Ency- clopedic des sciences

religieuses of Lichtenberger ; Smedley, History of the Reformed Religion in France (3 vols., London, 1832) ; Browning, History of the Huguenots (1 vol., 1840); G. A. de Felice, Histoire des Protestants de France (1874).

Special Periods. The 16th Century. — H. M. Baird, The Huguenots and Henry of Navarre (2 vols., New York, 1886), and History of the Rise of the Huguenots of France (New York, 1879) ; A. W. Whitehead, Gaspard de Coligny (London, 1904) ; J. W. Thompson, The Wars of Religion in France, 155ˆ1576 (1909) ; Th. Beza, Histoire ecclesiastique des eglises reformees an royaume de France (3 vols., Antwerp, 1580; new edition by G. Baum et Cunitz, 1883); Crespin, Histoire des martyrs persecutes et mis a mort pour la verite de I'evangile (2 vols, in fol., Geneva, 1619; abridged translation by Rev. A. Maddock, London, 1780); Pierre de la Place, Commentaires sur I'etat de la religion et de la republique (1565); Florimond de Raemond, V His- toire de la naissance, progres et decadence de Vheresie du siecle (1610) ; De Thou, Histoire universelle (16 vols.) ; Th. Agrippa D'Aubigne, Histoire universelle (3 vols., Geneva, 1626); Hermingard, Correspondance des reformateurs dans les pays de la langue francaise (8 vols., 1866), a scholarly work and the most trustworthy source for the history of the origin of French reform. " Calvini opera '^ in the Corpus reformatorum, edited by Reuss, Baum and Cunitz, particularly the correspondence, vols. x. to xxii. ; Doumergue, Jean Calvin, les hommes et les choses de son temps (3 vols., 1899); G. von ,Polenz, Gesr.hichte des franzosischen Calvinismus (5 vols., 1857); Etienne A. Laval, Compendious history of the reformation in France and of the reformed Church in that Kingdom from the first beginning of the Reformation to the Repealing of the Edict of Nantes (7 vols., London, 1737-1741); Soldan, Geschichte des Protestanlismus in Frankreich bis sum Tode Karls IX. (2 vols., 1855); Merle D'Aubigne, Histoire de la reformation en Europe au temps de Calvin (5 vols., 1863). "

17th Century. — Elie Benoit, Histoire de I' Edit de Nantes (5 vols., Delft, 1693), a work of the first rank; Aymon, Tous les synodes

national) x des iglises reformees de France (2 vols.); J. Quick, Synodicon (2 vols., London, 1692), important for the ecclesiastical history of French Protestantism; D'Huisseau, La Discipline des iglises reformees de France (Amsterdam, 1710); H. de Rohan, Memoires . . . jusqu'en 1629 (Amsterdam, 1644) ; Jean Claude, Les Plainles des Protestans de France (Cologne, 1686, new edition with notes by Frank Puaux, Paris, 1885); Pierre Jurieu, Leilres pastorales (3 vols., Rotterdam, 1688); Brousson, Utat

des Reformis de France (3 vols., The Hague, 1685) ; Anquez, Histoire des assem- blies politiques des riformes de France (1 vol., Paris, 1859); Pilatte, Edits el arrets concernant la religion prelendue reformie, 1662-1711 (1889); Douen, Les Premiers pasteurs du Desert (2 vols., 1879); H. M. Baird, The Huguenots and The Revocation of the Edict of Nantes (2 vols., New York).

18th Century.— Peyrat, Histoire des pasteurs du Desert (2 vols., 1842); Ch. Coquerel, Histoire des iglises du Desert (2 vols., 1841); E. Hugues, Antoine Court, Histoire de la restauration du protestantisme en France (2 vols., 1872); Les Synodes du Desert (3 vols., 1875); A. Coquerel, Jean Calas (1869) ; Court de Gebelin, Les Toulousaines

(1763).

10th Century. — Die protestantische Kirche Frankreichs (2 vols., 1848); Annuaire de Rabaut 1807, de Soulier 1827, de De Prat 1862, (1878); Agenda protestant de Frank Puaux (1880-1894); Agenda annuaire protestant de Gambier (1895-1907); Bersier, Histoire du Synode de 1872 (2 vols.) ; Frank Puaux, Les CEuvres du protestantisme francais au XIX' siecle. See also Camisards, Calvin, Edict of Nantes. (F. Px.)

HUGUES, CLOVIS (1851-1907), French poet and socialist, was born at Menerbes in Vaucluse on the 3rd of November 1851. He studied for the priesthood, but did not take orders. For some revolutionary articles in the local papers of Marseilles he was condemned in 187 1 to three years' imprisonment and a tine of 6000 francs. In 1877 he fought a duel in which he killed his adversary, a rival journalist. Elected deputy by Marseilles in the general elections of 1881, he was at that time the sole representative of the Socialist party in the chambers. He was re-elected in 1885, and in 1893 became one of the deputies for Paris, retaining his seat until 1906. He died on the nth of June

1907.

His poems, novels and comedies are full of wit and exuberant

vitality.

His principal works are: Pocmes de prison (1875), written during his detention, Soirs de balaille (1883); Jours de combat (1883); 9nd Le Travail (1889) ; the novels, Madame Phaeton (1885) and Monsieur le gendarme (1891); and the dramas, Une etoile (1888) and Le sommeil de Danton (1888).

HUICHOL (pronounced Veetchol — a corruption of the native name

Vishalika or Virarika, doctors or healers) , a tribe of Mexican Indians living in a mountainous region on the eastern side of the Chapalagana river, Jalisco. Huichol tradition assigns the south as their place of origin. Their name of " healers " is deserved, for about one-fourth of the men are Shamans. The Huichols are in much the same social condition as at the time of the Aztec empire. They were conquered by the Spaniards in 1722.

For full description of the people and their habits see Carl Lum- holtz, Unknown Mexico (1903).

HUITZILOPOCHTLI, the supreme being in the religions of ancient Mexico, and as a specialized deity, the god of war. He was the mythic leader and chief divinity of the Aztecs, dominant tribe of the Nahua nation. As a humming-bird Huitzilopochtli was alleged to have led the Aztecs to a new home. E. B. Tylor [Primitive Culture, 4th ed., vol. ii. p. 307) calls him an "in- extricable compound parthenogenetic deity"; and finds, in the fact that his chief festival (when his paste idol was shot through with an arrow, and afterwards eaten) was at the winter solstice, ground for believing that he was at first a nature-god, whose life and death were connected with the year's. His idol was a huge block of basalt (still thought to be preserved in Mexico) , on one side of w-hich he is sculptured in hideous form, adorned with the feathers of the humming-bird. The ceremonies of his worship were of the most bloodthirsty character, and hundreds of human beings were murdered annually before his shrine, their limbs being eaten by his worshippers. When his temple was dedicated in i486 it is traditionally reported that 70,000 people were killed. See Mexico.

HULDA, in Teutonic mythology, goddess of marriage. She was a beneficent deity, the patroness and guardian of all maidens (see Berchta).

HULKE, JOHN WHITAKER (1830-1895), British surgeon and geologist, was born on the 6th of November 1830, being the son of a well-known medical practitioner at Deal. He was educated partly at a boarding-school in this country, partly at the Moravian College at Neuwied (1843-1845) , where he gained an intimate knowledge of German and an interest in geology through visits to the Eifel district. He then entered King's College school, and three years later commenced work at the hospital, becoming M.R.C.S. in 1852. In the Crimean War he volunteered, and was appointed (1855) assistant-surgeon at Smyrna and subsequently at Sebastopol. On returning home he became medical tutor at his old hospital, was elected F.R.C.S. in 1857, and afterwards assistant-surgeon to the Royal Oph- thalmic Hospital, Moorfields (1857), and surgeon (1868-1890). In 1870 he became surgeon at the Middlesex hospital, and here much of his more important surgical work was accomplished. His skill as an operator was widely known: he was an excellent general surgeon, but made his special

mark as an ophthal- mologist, while as a geologist he attained a European reputation. He was elected F.R.S. in 1867 for his researches on the anatomy and physiology of the retina in man and the lower animals, particularly the reptiles. He subsequently devoted all his spare time to geology and especially to the fossile reptilia, describing many remains of Dinosaurs, to our knowledge of which as well as of other Saurians he largely contributed. In 1887 the Wollaston medal was awarded to him by the Geological Society of London. He was president of both the Geological and Pathological Societies in 1883, and president of the Royal College of Surgeons from 1893 until his death. He was a man with a wide range of know- ledge not only of science but of literature and art. He died in London on the 19th of February 1895.

HULL, ISAAC (1775-1843), commodore in the U.S. navy, was born at Derby in Connecticut on the 9th of March 1775. He went to sea young in the merchant service and was in command of a vessel at the age of nineteen. In 1798 he was appointed lieutenant in the newly organized U.S. navy. From 1803 to 1805 he served in the squadron sent to chastise the Barbary pirates as commander of the " Enterprise," but was transferred to the " Argus " in November of 1803. When the War of 181 2 broke out he was captain of the U.S. frigate "Constitution" (44), and was on a mission to Europe carrying specie for the payment of a debt in Holland. The " Constitution " was shadowed by British men-of-war, but was not attacked. In July of that year, however, he was pursued by a squadron of British vessels, and escaped by good seamanship and the fine sailing qualities of the " Constitution." He was to have been superseded, but put to sea before the officer who was to have relieved him arrived — an action which might have been his ruin if he had not signalized his cruise by the capture of the British frigate " Guerriere " (38). Captain Hull had been cruising oft" the Gulf of St Lawrence, and the engage- ment, which took place on the 19th of August, was fought south of the Grand Bank. The " Constitution " was a fine ship of 1533 tons, originally designed for a two-decker, but cut down to a frigate. The " Guerriere " was of 1092 tons and very ill-manned, while the " Constitution " had a choice crew. The British ship was easily overpowered. Hull received a gold medal for the capture of the " Guerriere," but had no further opportunity cf distinction in the war. After the peace he held a variety of commands at sea, and was a naval commissioner from 181 5 to 1817. He had a high reputation in the United States navy for practical seamanship. He died at Philadelphia on the 13th of February 1843.

HULL, a city- (1875) and railway junction of the province of Quebec, Canada, and the capital of Wright county, opposite the city of Ottawa. Pop. (1901) 13,988. The magnificent water- power of the Chaudiere Falls of the Ottawa is utilized for the lighting of the city, the operation of a

system of electric railways connecting Hull with Ottawa and Aylmer, and a number of large saw-mills, pulp, paper and match manufactories. Hull has gone through several disastrous fires, but since that of 1900, which swept out most of the town, an efficient system of fire protection has been established. Three bridges unite Ottawa and Hull.

The city is governed by a council composed of a mayor and twelve aldermen elected annually. Champlain was the first white man to set foot on the site of Hull, but long before he came it was a favourite meeting-place for the Indians. Later it became familiar to explorers and fur-traders as the foot of the Chaudiere portage, and many a canoe has been carried shoulder high over the site of future busy streets. Philemon Wright, of Woburn, Massachusetts, was the first man to settle here in 1800. The report he sent back was so favourable that a number of other families followed from the same place and laid the foundations of the future city. His descendants have remained among the substantial men of the town.

HULL (officially Kingston-upon-Hull), a city and county of a city, municipal, county and parliamentary borough, and seaport in the East Riding of Yorkshire, England, at the junction of the river Hull with the Humber, 22 m. from the open sea, and 181 m. N. of London. Pop. (1891) 200,472; (1901) 240,259. Its full name, not in general use, is Kingston-upon-Hull. It is served by the North Eastern. Great Central and Hull & Barnsley railways, the principal station being Paragon Street. The town stands on a level plain so low as to render embank- ments necessary to prevent inundation. The older portion is completely enclosed by the Hull and Humber on the E. and S. and by docks on the N. and W. Here are narrow streets typical of the medieval mercantile town, though modern improvements have destroyed some of them; and there are a few ancient houses. In Holy Trinity church Hull possesses one of the largest English parish churches, having an extreme length of 272 ft. It is cruciform and has a massive central tower. This and the transepts and choir are of Decorated work of various dates. The choir is largely constructed of brick, and thus affords an unusually early example of the use of this material in English ecclesiastical architecture. The nave is Perpendicular, a fine example of the style. William Mason the poet (1725-1797) was the son of a rector of the parish. The church of St Mary, Lowgate, was founded in the 14th century, but is almost wholly a reconstruction. Modern churches are numerous, but of no remarkable architectural merit. Among public buildings the town-hall, in Lowgate, ranks first. It was completed in 1866, but was subsequently extended and in great part rebuilt; it is in Italian

renaissance style, having a richly adorned facade. The exchange, in the same street, was also completed in 1866, in a less ornate Italian style. There are also theatres, a chamber of commerce, corn exchange, market-hall, custom-house, and the dock offices, a handsome Italian building. The principal intellectual institution is the Royal Institution, a fine classical building opened by Albert, prince consort, in 1854, and con- taining a museum and large library. It accommodates the Literary and Philosophical Society. The grammar school was founded in i486. One of its masters was Joseph Milner (1744-1797), author of a history of the Church; and among its students were Andrew Marvell the poet (1621-1678) and William Wilber- force the philanthropist (1759-1833), who is commemorated by a column and statue near the dock offices, and by the preserva- tion of the house of his birth in High Street. This house belongs to the corporation and was opened in 1906 as the Wilber- force and Historical Museum. There are also to be mentioned the Hull and East Riding College, Hymer's College, comprising classical, modern and junior departments, the Trinity House marine school (1716), the Humber industrial school ship " Southampton," and technical and art schools. Charities and benevolent foundations are numerous. Trinity House is a charity for seamen of the merchant service; the building (1753) was founded by the Trinity House Gild instituted in 1369, and contains a noteworthy collection of paintings and a museum. The Charterhouse belongs to a foundation for the support of the old and feeble, established by Sir Michael de la Pole, after- wards earl of Suffolk, in 1384. The infirmary was founded in 1782. Of the three parks, Pearson Park was presented by a mayor of that name in i860, and contains statues of Queen Victoria and the Prince Consort. A botanic garden was opened in 1680.

The original harbour occupied that part of the river Hull which faced the old town, but in 1774 an act was passed for forming a dock on the site of the old fortifications on the right bank of the Hull. This afterwards became known as Queen's dock, and with Prince's and Humber docks completes the circle round the old town. The small railway dock opens from Humber dock. East of the Hull lie the Victoria dock and extensive timber ponds, and west of the Humber dock basin, parallel to .the Humber, is Albert dock. Others are the Alexandra, St Andrew's and fish docks. The total area of the docks is about 186 acres, and the owning companies are the North Eastern and the Hull & Barnsley railways. The ports of Hull and Goole (q.v.) have been administratively combined since 1888, the conservancy of the river being under the Humber Conservancy Board. Hull is one of the principal shipping ports for the manu- factures of Yorkshire and Lancashire, and has direct communica- tion with the coal-fields of the West Riding. Large quantities of grain are imported from Russia, America, &c, and of timber from Norway and Sweden. Iron, fish, butter and fruit are

among other principal imports. The port was an early seat of the whale fisheries. Of passenger steamship services from Hull the principal are those to the Norwegian ports, which are greatly frequented during the summer; these, with others to the pbrts of Sweden, &c, are in the hands of the large shipping firm of Thomas Wilson & Co. A ferry serves New Holland, on the Lincolnshire shore (Great Central railway). The principal industries of Hull are iron-founding, shipbuilding and engineering, and the manu- facture of chemicals, oil-cake, colours, cement, paper, starch, soap and cotton goods; and there are tanneries and breweries.

The parliamentary borough returns three members, an increase from two members in 1885. Hull became the seat of a suffragan bishop in the diocese of York in 1891. This was a revival, as the office was in existence from 1534 till the death of Edward VI. The county borough was created in 1888. The city is governed by a mayor, 16 aldermen and 48 councillors. Area, 8989 acres.

yhe first mention of Hull occurs under the name of Wyke- upon-Hull in a charter of 1 160 by which Maud, daughter of Hugh Camin, granted it to the monks of Meaux, who in 1278 received licence to hold a market here every Thursday and a fair on the vigil, day and morrow of Holy Trinity and twelve following days. Shortly afterwards Edward I., seeing its value as a port, obtained the town from the monks in exchange for other lands in Lincolnshire and changed its name to Kingston-upon-Hull. To induce people to settle here he gave the town a charter in 1299. This granted two weekly markets on Tuesday and Friday and a fair on the eve of St Augustine lasting thirty days; it made the town a free borough and provided that the king would send his justices to deliver the prison when necessary. He sent commissioners in 1303 to inquire how and where the roads to the " new town of Kingston-upon-Hull " could best be made, and in 13 21 Edward II. granted the burgesses licence to enclose the town with a ditch and " a wall of stone and lime." In the 14th century the burgesses of Hull disputed the right of the archbishop of York to prisage of wine and other liberties in Hull, which they said belonged to the king. The archbishop claimed under charters of King iEthelstand and Henry III. The dispute, after lasting several years, was at length decided in favour of the king. In 1381 Edward III., while inspecting former charters, granted that the burgesses might hold the borough with fairs, markets and free customs at a fee-farm of £70, and that every year they might choose a mayor and four bailiffs. The king in 1440 granted the burgesses Hessle, North Ferriby and other places in order that they might obtain a supply of fresh water. The charter also granted that the above places with the town itself should become the county of the town of Kingston-upon-Hull. Henry VIII. visited the town in 1541, and ordered that a castle and other places of defence should be built, and Edward VI. in 1552 granted the manor to the burgesses. The town was

incorporated by Queen Elizabeth in 1576 arid- a new charter was granted by James II. in 1688. During the civil wars Hull, although the majority of the inhabitants were

royalists, was garrisoned by the parliamentarians, and Charles I. was refused admission by the governor Sir John Hotham. In 1643 it stood a siege of six weeks, but the new governor Ferdinando Fairfax, 2nd Baron Fairfax, obliged the Royalist army to retreat by opening the sluices and placing the surround- ing country under water. Hull was represented in the parlia- ment of 1295 and has sent members ever since, save that in 1384 the burgesses were exempted from returning any member on account of the expenses which they were incurring through fortifying their town. Besides the fairs granted to the burgesses by Edward I., two others were granted by Charles II. in 1664 to Henry Hildiard who owned property in the town.

See T. Gent, Annates Regioduni Hullini (York, 1735, re- printed 1869); G. Hadley, History of the Town and County of Kingston-upon-Hull (Hull, 1788); C. Frost, Notices relative to the Early History of the Town and Port of Hull (London, 1827); J. J. Sheaham, General and Concise History of Kingston-upon-Hull (London and Beverley, 1864).

HULL (in O.Eng. hulu, from helan, to cover, cf. Ger. Hiille, covering), the outer covering, pod, or shell of beans, peas, &c, also the enclosing envelope of a chrysalis. The word may be the same as ” hull, ” meaning the body of a ship without its masts or superstructure, &c, but in this sense the word is more usually connected with ” hold,” the interior cargo-carrying part of a vessel. This word was borrowed, as a nautical term, from the Dutch, hoi (cognate with ” hole “), the d being due to confusion with ” to hold,” ” grasp ” (O.Eng. healdan). The meanings of ” hull ” and ” hold ” are somewhat far apart, and the closest sense resemblance is to the word ” hulk,” which is not known till about a century later.

HULLAH, JOHN PYKE (1812-1884), English composer and teacher of music, was born at Worcester on the 27th June 181 2. He was a pupil of William Horsley from 1829, and entered the Royal Academy of Music in 1833. He wrote an opera to words by Dickens, The Village Coquettes, produced in 1836; The Barbers of Bassora in 1837, and The Outpost in 1838, the last two at Covent Garden. From 1839, when he went to Paris to investigate various systems of teaching music to large masses of people, he identified himself with Wilhem’s system of the “fixed Do,” and his adaptation of that system was taught with enormous success from 1840 to

i860. In 1847 a large building in Long Acre, called St Martin's Hall, was built by subscription and presented to Hullah. It was inaugurated in 1850 and burnt to the ground in i860, a blow from which Hullah was long in recovering. He had risked his all in the maintenance of the building, and had to begin the world again. A series of lectures was given at the Royal Institution in 186 1, and in 1864 he lectured in Edinburgh, but in the following year was unsuccessful in his application for the Reid professorship. He conducted concerts in Edinburgh in 1866 and 1867, and the concerts of the Royal Academy of Music from 1870 to 1873; he had been elected to the committee of management in 1869. In 1872 he was appointed by the Council of Education musical inspector of training schools for the United Kingdom. In 1878 he went abroad to report on the condition of musical education in schools, and wrote a very valuable report, quoted in the memoir of him published by his wife in 1886. He was attacked by paralysis in 1880, and again in 1883. His compositions, which remained popular for some years after his death in 1884, consisted mainly of ballads; but his importance in the history of music is owing to his exertions in popularizing musical education, and his persistent opposition to the Topic Sol-Fa system, which had a success he could not foresee. His objections to it were partly grounded on the character of the music which was in common use among the early teachers of the system. While it cannot be doubted that Hullah would have won more success if he had not opposed the Tonic Sol-Fa movement so strenuously, it must be confessed that his work was of great value, for he kept constantly in- view and impressed upon all who followed him or learnt from him the supreme necessity of maintaining the artistic standard of the music taught and studied, and of not allowing trumpery com- positions to usurp the place of good music on account of the greater ease with which they could be read.

HULME, WILLIAM (1631-1691), English philanthropist, was born in the neighbourhood of Manchester, and died on the 29th of October 1691. Having lost his only son Banastre, Hulme left his property in trust to maintain " four exhibitioners of the poorest sort of bachelors for the space of four years " at Brasenose College, Oxford. This was the beginning of the Hulme Trust. Its property was in Manchester, and owing to its favourable situa- tion its value increased rapidly. Eventually in 1881 a scheme was drawn up by the charity commissioners, by which (as amended in 1907) the trust is now governed. Its income of about £10,000 a year is devoted to maintaining the Hulme Grammar School in Manchester and to assisting other schools, to supporting a theological college, Hulme Hall, attached to the university of Manchester, and to providing a number of scholar- ships and exhibitions at Brasenose College. See J. Croston, Hulme's Charity- (1877).

HULS, a town of Germany, in the Prussian Rhine province, 4 m. N. of

Crefeld and 17 N.W. of Diisseldorf by rail. Pop. (1905) 6510. It has two Roman Catholic churches, a synagogue and manufactures of damask and velvet. In the neighbourhood ironstone is obtained.

HULSE, JOHN (1708-1790), English divine, was born — the eldest of a family of nineteen— at Middlewich, in Cheshire, in 1708. Entering St John's College, Cambridge, in 1724, he graduated in 1728; and on taking orders (in 1732) was presented to a small country curacy. His father having died in 1753, Hulse succeeded to his estates in Cheshire, where, owing to feeble health, he lived in retirement till his death in December 1790. He bequeathed his estates to Cambridge University for the purpose of maintaining two divinity scholars (£30 a year each) at St John's College, of founding a prize for a dissertation, and of instituting the offices of Christian advocate and of Christian preacher or Hulsean lecturer. By a statute in i860 the Hulsean professorship of divinity was substituted for the office of Christian advocate, and the lectureship was considerably modified. The first course of lectures under the benefaction was delivered in 1820. In 1830 the number of annual lectures or sermons was reduced from twenty to eight; after 1861 they were further reduced to a minimum of four. The annual value of the Hulse . endowment is between £800 and £900, of which eight-tenths go to the professor of divinity and one-tenth to the prize and lectureship respectively.

An account of the Hulsean lectures from 1820 to 1894 is given in J. Hunt's Religious Thought in the igth Century, 332-338; among the lecturers have been Henry Alford (1C41), R. C. Trench (1845), Christopher Wordsworth (1847), Charles Merivale (1861), James Moorhouse (1865), F. W. Farrar (1870), F. J. A. Hort (1871), W. Boyd Carpenter (1878). W. Cunningham (1885), M. Creighton

(1893).

HUMACAO, a small city and the capital of a municipal district and department of the same name, in Porto Rico, 46 m. S.E. of San Juan. Pop. (1899) of the city, 4428; and of the municipal district, 14,313. Humacao is attractively situated near the E. coast, 9 m. from the port of Naguabo and a little over 6 m. from its own port of Punta Santiago, with which it is connected by a good road; a railway was under construction in 1908, and some of the sugar factories of the department are now connected by rail with the port. The department covers the eastern end of the island and includes all the islands off its coast, among which are Culebra and Vieques; the former (pop. in 1899, 704) has two excellent harbours and is used as a U.S. naval station; the latter is 21 m. long by 6 m. wide and in 1899 had a population of nearly 6000. Grazing is the principal industry, but sugar-cane, tobacco and fruit are cultivated. There are valuable forests in the

mountainous districts, a part of which has been set aside for preservation under the name of the Luquillo forest reserve. Humacao was incorporated as a city in 1899. It suffered severely in the hurricane of 1898, the damage not having been fully repaired as late as 1906.

HUMANE SOCIETY, ROYAL. This society was founded in England in 1774 for the purpose of rendering "first aid" in cases of drowning and for restoring life by artificial means to those apparently drowned. Dr William Hawes (1736- 1808), an

English physician, became known in 1773 for his efforts to convince the public that persons apparently dead from drowning might in many cases be resuscitated by artificial means. For a year he paid a reward out of his own pocket to any one bringing him a body rescued from the water within a reasonable time of immersion. Dr Thomas Cogan (1736-1818), another English physician, who had become interested in the same subject during a stay at Amsterdam, where was instituted in 1767 a society for preservation of life from accidents in water, joined Hawes in his crusade. In the summer of 1774 each of them brought fifteen friends to a meeting at the Chapter Coffee-house, St Paul's Churchyard, when the Royal Humane Society was founded. The society, the chief offices of which are at 4 Trafalgar Square, London, has upwards of 280 depots throughout the kingdom, supplied with life-saving apparatus. The chief and earliest of these depots is the Receiving House in Hyde Park, on the north bank of the Serpentine, which was built in 1704 on a site granted by George III. Boats and boatmen are kept to render aid to bathers, and in the winter ice-men are sent round to the different skating grounds in and around London. The society distributes money-rewards, medals, clasps and testimonials, to those who save or attempt to save drowning people. It further recognizes " all cases of exceptional bravery in rescuing or attempting to rescue persons from asphyxia in mines, wells, blasting furnaces, or in sewers where foul gas may endanger life." It further awards prizes for swimming to public schools and training ships. Since 1873 the Stanhope gold medal has been awarded " to the case exhibiting the greatest gallantry during the year." During the year 1905 873 persons were rewarded for saving or attempting to save 047 lives from drowning. The society is maintained by private subscriptions and bequests. Its motto is Laical scintillula forsan, " a small spark may perhaps lie hid." (See also Drowning and Life-Saving.)

HUMANISM (from Lat. humanus, human, connected with homo, mankind), in general any system of thought or action which assigns a

predominant interest to the affairs of men as compared with the supernatural or the abstract. The term is specially applied to that movement of thought which in western Europe in the 1 5th century broke through the medieval traditions of scholastic theology and philosophy, and devoted itself to the rediscovery and direct study of the ancient classics. This movement was essentially a revolt against intellectual, and especially ecclesiastical authority, and is the parent of all modern developments whether intellectual, scientific or social (sec Renaissance). The term has also been applied to the philosophy of Comte in virtue of its insistence on the dignity of humanity and its refusal to find in the divine anything external or superior to mankind, and the same tendency has had marked influence over the development of modern Christian theology which inclines to obliterate the old orthodox conception of the separate existence and overlordship of God. The narrow sense of the term survives in modern university terminology. Thus in the University of Oxford the curriculum known as Litterae Humaniores (" Humane Literature ") consists of Latin and Greek literature and philosophy, i.e. of the " arts," often described in former times as the " polite letters." In the Scottish universities the professor of Latin is called the professor of " humanity." The plural " humanities " is a generic term for the classics. In ordinary language the adjective " humane" is restricted to the sense of "kind-hearted," "unselfish": the abstract " humanity " has this sense and also the sense of " that which pertains to mankind " derived in this case with the companion adjective " human."

HUMANITARIANS, a term applied (1) to a school of theologians who repudiate the doctrine of the Trinity and hold an extreme view of the person of Christ as simply human. The adoption of this position by men like Nathaniel Lardner, Joseph Priestley and Theophilus Lindsey in the middle: of the 1 8th century led to the establishment of the first definitely organized Unitarian churches in England. (2) It is also applied to those who believe in the perfectibility of man apart from superhuman aid, especially those who follow the teaching of Pierre Lcroux (q.v.).

The name is also sometimes given to the Positivists, and. in a more general sense, to persons whose chief principle of action is the desire to preserve others from pain and discomfort.

HUMAYUN (1508-1556), Mogul emperor of Delhi, succeeded his father Baber in India in 1530, while his brother Kamran obtained the sovereignty of Kabul and Lahore. Humayun was thus left in possession of his father's recent conquests, which were in dispute with the Indian Afghans under Sher Shah, governor of Bengal. After ten years of fighting, Humayun was driven out of India and compelled to flee to Persia through the desert of Sind, where his famous son, Akbarthe Great, was born in the petty fort of

Umarkot (1542). Sher Shah was killed at the storming of Kalinjar (1545), and Humayun, returning to India with Akbar, then only thirteen years of age, defeated the Indo-Afghan army and reoccupied Delhi (1555). India thus passed again from the Afghans to the Moguls, but six months afterwards Humayun was killed by a fall from the parapet of his palace (1556), leaving his kingdom to Akbar. The tomb of Humayun is one of the finest Mogul monuments in the neighbour- hood of Delhi, and it was here that the last of the Moguls, Bahadur Shah, was captured by Major Hodson in 1857.

HUMBER, an estuary on the east coast of England formed by the rivers Trent and Ouse, the northern shore belonging to Yorkshire and the southern to Lincolnshire. The junction of these two important rivers is near the village of Faxfleet, from which point the course of the Humber runs E. for 18 m., and then S.E. for 19 m. to the North Sea. The total area draining to the Humber is 9293 sq. m. The width of the estuary is 1 m. at the head, gradually widening to 35 m. at 8 m. above the mouth, but here, with a great shallow bay on the Yorkshire side, it increases to 8 m. in width. The seaward horn of this bay, however, is formed by a narrow protruding bank of sand and stones, thrown up by a southward current along the York- shire coast, and known as Spurn Head. This reduces the width of the Humber mouth to 55 m. Except where the Humber cuts through a low chalk ridge, between north and south Ferriby, dividing it into the Wolds of Yorkshire and of Lincolnshire, the shores and adjacent lands are nearly flat. The water is muddy; and the course for shipping considerably exceeds in length the distances given above, by reason of the numerous shoals it is necessary to avoid. The course is carefully buoyed and lighted, for the Humber is an important highway of commerce, having on the Yorkshire bank the great port of Hull, and on the Lincoln- shire bank that of Grimsby, while Goole lies on the Ouse a little above the junction with the Trent. Canals connect with the great manufacturing district of South Yorkshire, and the Trent opens up wide communications with the Midlands. The pheno- menon of the tidal bore is sometimes seen on the Humber. The action of the river upon the flat Yorkshire shore towards the mouth alters the shore-line constantly. Many ancient villages have disappeared entirely, notably Ravenspur or Ravenser, once a port, represented in parliament under Edward I., and the scene of the landing of Bolingbroke, afterwards Henry IV., in 1399. Soon after this the town, which lay immediately inside Spurn Point, must have been destroyed.

HUMBERT, RANIERI CARLO EMANUELE GIOVANNI MARIA FERDINANDO EUGENIO, King of Italy (1844-1900), son of Victor Emmanuel II. and of Adelaide, archduchess of Austria, was born at Turin, capital of the kingdom of Sardinia, on the 14th of March 1844. His education was entrusted to the most eminent men of his time, amongst

others to MassiriTo d'Azeglio and Pasquale Stanislao Mancini. Entering the army on the 14th of March 1858 with the rank of captain, he was present at the battle of Solferino in 1859, and in 1866 commanded a division at Custozza. Attacked by the Austrian cavalry near Villafranca, he formed his troops into squares and drove the assailants towards Sommacampagna, remaining himself through- out the action in the square most exposed to attack. With Bixio he covered the retreat of the Italian army, receiving the gold medal for valour. On the 21st of April 1868 he married his cousin, Margherita Teresa Giovanna, princess of Savoy, daughter.

of the duke of Genoa (born at Turin on the 20th of November 185 1). On the nth of November 1869 Margherita gave birth to Victor Emmanuel, prince of Naples, afterwards Victor Emmanuel III. of Italy. Ascending the throne on the death of his father (9th January 1878), Humbert adopted the style " Humbert I. of Italy " instead of Humbert IV., and consented that the remains of his father should be interred at Rome in the Pantheon, and not in the royal mausoleum of Superga (see Ckispi). Accompanied by the premier, Cairoli, he began a tour of the provinces of his kingdom, but on entering Naples (November 17, 1878), amid the acclamations of an immense crowd, was attacked by a fanatic named Passanante. The king warded off the blow with his sabre, but Cairoli, in attempting to defend him, was severely wounded in the thigh. The would-be assassin was condemned to death, but the sentence was by the king commuted to one of penal servitude for life. The occurrence upset for several years the health of Queen Margherita. In 1881 King Humbert, again accompanied by Cairoli, resumed his interrupted tour, and visited Sicily and the southern Italian provinces. In 1882 he took a prominent part in the national mourning for Garibaldi, whose tomb at Caprera he repeatedly visited. When, in the autumn of 1882, Verona and Venetia Were inundated, he hastened to the spot, directed salvage opera- tions, and provided large sums of money for the destitute. Similarly, on the 28th of July 1883, he hurried to Ischia, where an earthquake had engulfed some 50×30 persons. Countermand- ing the order of the minister of public works to cover the ruins with quicklime, the king prosecuted salvage operations for five days longer, and personally saved many victims at the risk of his own life. In 1884 he visited Busca and Naples, where cholera was raging, helping with money and advice the numerous sufferers, and raising the spirit of the population. Compared with the reigns of his grandfather, Charles Albert, and of his father, Victor Emmanuel, the reign of Humbert was tranquil. Scrupulously observant of constitutional principles, he followed, as far as practicable, parliamentary indications in his choice of premiers, only one of whom —

Rudini — was drawn from the Conservative ranks. In foreign policy he approved of the conclusion of the Triple Alliance, and, in repeated visits to Vienna and Berlin, established and consolidated the pact. Towards Great Britain his attitude was invariably cordial, and he considered the Triple Alliance imperfect unless supplemented by an Anglo-Italian naval entente. Favourably disposed towards the policy of colonial expansion inaugurated in 1885 by the occupation of Massawa, he was suspected of aspiring to a vast empire in north-east Africa, a suspicion which tended somewhat to diminish his popularity after the disaster of Adowa on the 1st of March 1896. On the other hand, his popularity was enhanced by the firmness of his attitude towards the Vatican, as exemplified in his telegram declaring Rome " intangible " (September 20, 1886), and affirming the permanence of the Italian possession of the Eternal City. Above all King Humbert was a soldier, jealous of the honour and prestige of the army to such a degree that he promoted a duel between his nephew, the count of Turin, and Prince Henry of Orleans (August 15, 1897) on account of the aspersions cast by the latter upon Italian arms. The claims of King Humbert upon popular gratitude and affection were enhanced by his extraordinary munificence, which was not merely displayed on public occasions, but directed to the relief of innumerable private wants into which he had made personal inquiry. It has been calculated that at least £100,000 per annum was expended by the king in this way. The regard in which he was universally held was abundantly demon- strated on the occasion of the unsuccessful attempt upon his life made by the anarchist Acciarito near Rome on the 22nd of April 1807, and still more after his tragic assassination at Monza by the anarchist Bresci on the evening of the 29th of July 1900. Good-humoured, active, tender-hearted, some- what fatalistic, but, above all, generous, he was spontaneously called " Humbert the Good." He was buried in the Pantheon in Rome, by the side of Victor Emmanuel II., on the 9th of August 1900. (H. W. S.)

HUMBOLDT, FRIEDRICH HEINRICH ALEXANDER, Baron

von (1769-1859), German naturalist and traveller, was born at Berlin, on the 14th of September 1769. His father, who was a major in the Prussian army, belonged to a Pomeranian family of consideration, and was rewarded for his services during the Seven Years' War with the post of royal chamberlain. He married in 1766 Maria Elizabeth von Colomb, widow of Baron von Hollwede, and had by her two sons, of whom the younger is the subject of this article. The childhood of Alexander von Humboldt was not a promising one as regards either health or intellect. His characteristic tastes, however, soon displayed themselves; and from his fancy for collecting and labelling plants, shells and insects he received the playful title of " the little apothecary." The care of his education, on the unexpected death of his father in 1779, devolved upon his mother, who

discharged the trust with constancy and judgment. Destined for a political career, he studied finance during six months at the university of Frankfort-on-the-Oder; and a year later, April 25, 1789, he matriculated at Gottingen, then eminent for the lectures of C. G. Heyne and J. F. Blumenbach. His vast and varied powers were by this time fully developed; and during the vaca- tion of 1789 he gave a fair earnest of his future performances in a scientific excursion up the Rhine, and in the treatise thence issuing, Mineralogische Beobachtungen iiber einige Basalte am Rhein (Brunswick, 1790). His native passion for distant travel was confirmed by the friendship formed by him at Gottingen with George Forster, Heyne's son-in-law, the distinguished companion of Captain Cook's second voyage. Henceforth his studies, which his rare combination of parts enabled him to render at once multifarious, rapid and profound, were directed with extra- ordinary insight and perseverance to the purpose of preparing himself for his distinctive calling as a scientific explorer. With this view he studied commerce and foreign languages at Hamburg, geology at Freiberg under A. G. Werner, anatomy at Jena under J. C. Loder, astronomy and the use of scientific instruments under F. X. von Zach and J. G. Kohler. His researches into the vegetation of the mines of Freiberg led to the publication in 1793 of his Florae Fribergensis Specimen; and the results of a prolonged course of experiments on the phenomena of muscular irritability, then recently discovered by L. Galvani, were con- tained in his Versuche iiber die gereizte Muskei- und Nervenjaser (Berlin, 1797), enriched in the French translation with notes by Blumenbach.

In 1 794 he was admitted to the intimacy of the famous Weimar coterie, and contributed (June 1795) to Schiller's new periodical, Die Horen, a philosophical allegory entitled Die Lebenskrafl, oder der rhodische Genius. In the summer of 1790 he paid a flying visit to England in company with Forster. In 1792 and 1797 he was in Vienna; in 1795 he made a geological and botani- cal tour through Switzerland and Italy. He had obtained in the meantime official employment, having been appointed assessor of mines at Berlin, February '29, 1792. Although the service of the state was consistently regarded by him but as an apprenticeship to the service of science, he fulfilled its duties with such conspicuous ability that he not only rapidly rose to the highest post in his department, but was besides entrusted with several important diplomatic missions. The death of his mother, on the 19th of November 1796, set him free to follow the bent of his genius, and, finally severing his official connexions, he waited for an opportunity of executing his long-cherished schemes of travel. On the postponement of Captain Baudin's proposed voyage of circumnavigation, which he had been officially ■ invited to accompany, he left Paris for Marseilles with Aime Bonpland, the designated botanist of the frustrated expedition, hoping to join Bonaparte in Egypt. Means of transport,

however, were not forthcoming, and the two travellers eventually found their way to Madrid, where the unexpected patronage of the minister d'Urquijo determined them to make Spanish America the scene of their explorations.

Armed with powerful recommendations, they sailed in the " Pizarro " from Corunna, on the 5th of June 1799, stopped six days at Teneriffe for the ascent of the Peak, and landed, on the

16th of July, at Cumana. There Humboldt observed, on the night of the i2-i3th of November, that remarkable meteor- shower which forms the starting-point of our acquaintance with the periodicity of the phenomenon; thence he proceeded with Bonpland to Caracas; and in February 1800 he left the coast for the purpose of exploring the course of the Orinoco. This trip, which lasted four months, and covered 1725 m. of wild and uninhabited country, had the important result of establishing the existence of a communication between the water-systems of the Orinoco and Amazon, and of determining the exact position of the bifurcation. On the 24th of November the two friends set sail for Cuba, and after a stay of some months regained the mainland at Cartagena. Ascending the swollen stream of the Magdalena, and crossing the frozen ridges of the Cordilleras, they reached Quito after a tedious and difficult journey on the 6th of January 1802. Their stay there was signalized by the ascent of Pichincha and Chimborazo, and terminated in an expedition to the sources of the Amazon en route for Lima. At Callao Humboldt observed the transit of Mercury on the 9th of November, and studied the fertilizing properties of guano, the introduction of which into Europe was mainly due to his writings. A tempestuous sea-voyage brought them to the shores of Mexico, and after a year's residence in that province, followed by a short visit to the United States, they set sail for Europe from the mouth of the Delaware, and landed at Bordeaux on the 3rd of August

1804.

Humboldt may justly be regarded as having in this memorable expedition laid the foundation in their larger bearings of the sciences of physical geography and meteorology. By his delinea- tion (in 181 7) of " isothermal lines," he at once suggested the idea and devised the means of comparing the climatic conditions of various countries. He first investigated the rate of decrease in mean temperature with increase of elevation above the sea-level, and afforded, by his inquiries into the origin of tropical storms, the

earliest clue to the detection of the more complicated law governing atmospheric disturbances in higher latitudes; while his essay on the geography of plants was based on the then novel idea of studying the distribution of organic life as affected by varying physical conditions. His discovery of the decrease in intensity of the earth's magnetic force from the poles to the equator was communicated to the Paris Institute in a memoir read by him on the 7th of December 1804, and its importance was attested by the speedy emergence of rival claims. His services to geology were mainly based on his attentive study of the volcanoes of the New World. He showed that they fell naturally into linear groups, presumably corresponding with vast subterranean fissures; and by his demonstration of the igneous origin of rocks previously held to be of aqueous formation, he contributed largely to the elimination of erroneous views.

The reduction into form and publication of the encyclopaedic mass of materials — scientific, political and archaeological- collected by him during his absence from Europe was now Humboldt's most urgent desire. After a short trip to Italy with Gay-Lussac for the purpose of investigating the law of magnetic declination, and a sojourn of two years and a half in his native city, he finally, in the spring of 1808, settled in Paris with the purpose of securing the scientific co-operation required for bringing his great work through the press. This colossal task, which he at first hoped would have occupied but two years, eventually cost him twenty-one, and even then re-mained incomplete. With the exception of Napoleon Bonaparte, he was the most famous man in Europe. A chorus of applause greeted him from every side. Academies, both native and foreign, were eager to enrol him among their members. Frederick William III. of Prussia conferred upon him the honour, without exacting the duties, attached to the post of royal chamberlain, together with a pension of 2500 thalers, afterwards doubled. He refused the appointment of Prussian minister of public in- struction in 1810. In 1814 he accompanied the allied sovereigns to London. Three years later he was summoned by the king of Prussia to attend him at the congress of Aix-la-Chapelle. Again in the autumn of 1822 he accompanied the same monarch to

the congress of Verona, proceeded thence with the royal party to Rome and Naples, and returned to Paris in the spring of 1823. The French capital he had long regarded as his true home. There he found, not only scientific sympathy, but the social stimulus which his vigorous and healthy mind eagerly craved. He was equally in his element as the lion of the salons and as the savant of the institute and the observatory. Thus, when at last he received from his sovereign a summons to join his court at Berlin, he obeyed indeed, but with deep and lasting regret. The provincialism of his native city was odious to him. He never ceased to rail against the bigotry without religion, aestheticism without culture, and philosophy without

common sense, which he found dominant on the banks of the Spree. The unremitting benefits and sincere attachment of two well-meaning princes secured his gratitude, but could not appease his discontent. At first he sought relief from the " nebulous atmosphere " of his new abode by frequent visits to Paris; but as years advanced his excursions were reduced to accompanying the monotonous " oscillations " of the court between Potsdam and Berlin. On the 12th of May 1827 he settled permanently in the Prussian capital, where his first efforts were directed towards the further- ance of the science of terrestrial magnetism. For many years it had been one of his favourite schemes to secure, by means of simultaneous observations at distant points, a thorough investigation of the nature and law of " magnetic storms " — ■ a term invented by him to designate abnormal disturbances of the earth's magnetism. The meeting at Berlin, on the 18th of September 1828, of a newly-formed scientific association, of which he was elected president, gave him the opportunity of setting on foot an extensive system of research in combination with his diligent personal observations. His appeal to the Russian government in 1829 led to the establishment of a line of magnetic and meteorological stations across northern Asia; while his letter to the duke of Sussex, then (April 1836) president of the Royal Society, secured for the undertaking the wide basis of the British dominions. Thus that scientific conspiracy of nations which is one of the noblest fruits of modern civilization was by his exertions first successfully organized.

In 181 1, and again in 1818, projects of Asiatic exploration were proposed to Humboldt, first by the Russian, and afterwards by the Prussian government; but on each occasion untoward circumstances interposed, and it was not until he had entered upon his sixtieth year that he resumed his early rdle of a traveller in the interests of science. Between May and November 1829 he, together with his chosen associates Gustav Rose and C. G. Ehrenberg, traversed the wide expanse of the Russian empire from the Neva to the Yenesei, accomplishing in twenty-five weeks a distance of 9614 m. The journey, however, though carried out with all the advantages afforded by the immediate patronage of the Russian government, was too rapid to be profitable. Its most important fruits were the correction of the prevalent exaggerated estimate of the height of the Central- Asian plateau, and the discovery of diamonds in the gold- washings of the Ural — a result which Humboldt's Brazilian experiences enabled him to predict, and by predicting to secure.

Between 1830 and 1848 Humboldt was frequently employed in diplomatic missions to the court of Louis Philippe, with whom he always maintained the most cordial personal relations. The death of his brother, Wilhelm von Humboldt, who expired in his arms, on the 8th of April 1836, saddened the later years of his life. In losing him, Alexander lamented that he had "

lost half himself." The accession of the crown princess Frederick William IV., on the death of his father, in June 1840, added to rather than detracted from his court favour. Indeed, the new king's craving for his society became at times so im- portunate as to leave him only some hours snatched from sleep for the prosecution of his literary labours.

It is not often that a man postpones to his seventy-sixth year, and then successfully executes, the crowning task of his life. Yet this was Humboldt's case. The first two volumes of the Kosmos were published, and in the main composed, between the years T845 and 1847. The idea of a work which should

convey, not only a graphic description, but an imaginative conception of the physical world— which should support general- ization by details, and dignify details by generalization, had floated before his mind for upwards of half a century. It first took definite shape in a set of lectures delivered by him before the university of Berlin in the winter of 1827-1828. These lectures formed, as his latest biographer expresses it, " the cartoon for the great fresco of the Kosmos." The scope of this remarkable work may be briefly described as the representation of the unity amid the complexity of nature. In it the large and vague ideals of the 18th are sought to be combined with the exact scientific requirements of the 19th century. And, in spite of inevitable shortcomings, the attempt was in an eminent degree successful. Nevertheless, the general effect of the book is rendered to some extent unsatisfactory by its tendency to sub- stitute the indefinite for the infinite, and thus to ignore, while it does not deny, the existence of a power outside and beyond nature. A certain heaviness of style, too, and laborious pictur- esqueness of treatment make it more imposing than attractive to the general reader. But its supreme and abiding value consists in its faithful reflection of the mind of a great man. No higher eulogium can be passed on Alexander von Humboldt than that, in attempting, and not unworthily attempting, to portray the universe, he succeeded still more perfectly in portray- ing his own comprehensive intelligence.

The last decade of his long life — his " improbable " years, as he was accustomed to call them— was devoted to the con- tinuation of this work, of which the third and fourth volumes were published in 1850-1858, while a fragment of a fifth appeared posthumously in 1862. In these he sought to fill up what was wanting of detail as to individual branches of science in the sweeping survey contained in the first volume. Notwithstanding their high separate value, it must be admitted that, from an artistic point of

view, these additions were deformities. The characteristic idea of the work, so far as such a gigantic idea admitted of literary incorporation, was completely developed in its opening portions, and the attempt to convert it into a scientific encyclopaedia was in truth to nullify its generating motive. Humboldt's remarkable industry and accuracy were never more conspicuous than in the erection of this latest trophy to his genius. Nor did he rely entirely on his own labours. He owed much of what he accomplished to his rare power of assimilating the thoughts and availing himself of the co-operation of others. He was not more ready to incur than to acknowledge obligations. The notes to Kosmos overflow with laudatory citations, the current coin in which he discharged his intellectual debts.

On the 24th of February 1857 Humboldt was attacked with a slight apoplectic stroke, which passed away without leaving any perceptible trace. It was not until the winter of 1858-1859 that his strength began to decline, and on the ensuing 6th of May he tranquilly expired, wanting but six months of completing his ninetieth year. The honours which had been showered on him during life followed him after death. His remains, previously to being interred in the family resting-place at Tegel, were conveyed in state through the streets of Berlin, and received by the prince-regent with uncovered head at the door of the cathedral. The first centenary of his birth was celebrated on the 14th of September 1869, with equal enthusiasm in the New and Old Worlds; and the numerous monuments erected in his honour, and newly explored regions called by his name, bear witness to the universal diffusion of his fame and popularity.

Humboldt never married, and seems to have been at all times more social than domestic in his tastes. To his brother's family he was, however, much attached; and in his later years the somewhat arbitrary sway of an old and faithful servant held him in more than matrimonial bondage. By a singular example of weakness, he executed, four years before his death, a deed of gift transferring to this man Seifert the absolute possession of his entire property. It is right to add that no undue advantage appears to have been taken of this extraordinary concession. Of the qualities of his heart it is less easy to speak than of those

of his head. The clue to his inner life might probably be found in a certain egotism of self-culture scarcely separable from the promptings of genius. Yet his attachments, once formed, were sincere and lasting. He made innumerable friends; and it does not stand on record that he ever lost one. His benevolence was throughout his life active and disinterested. His early zeal for the improvement of the condition of the miners in Galicia and Franconia, his consistent detestation of slavery, his earnest patronage of rising men of science, bear witness to the large humanity which formed the ground-work of his character. The faults of his old age have been brought

into undue prominence by the injudicious publication of his letters to Varnhagen von Ense. The chief of these was his habit of smooth speaking, almost amounting to flattery, which formed a painful contrast with the caustic sarcasm of his confidential utterances. His vanity, at all times conspicuous, was tempered by his sense of humour, and was so frankly avowed as to invite sympathy rather than provoke ridicule. After every deduction has been made, he yet stands before us as a colossal figure, not unworthy to take his place beside Goethe as the representative of the scientific side of the culture of his country.

The best biography of Humboldt is that of Professor Karl Bruhns (3 vols., 8vo, Leipzig, 1872), translated into English by the Misses Lasseil in 1873. Brief accounts of his career are given by A. Dove in Allgemeine deutsche Biographie, and by S. Gtinther in Alexander von Humboldt (Berlin, 1900). The Voyage aux regions equinoxiales du Nouveau Continent, fait en ijgg-1804, par Alexandre de Humboldt et Aimi Bonpland (Paris, 1807, &c), consisted of thirty folio and quarto volumes, and comprised a considerable number of subordinate but important works. Among these may be enumerated Vue des Cordilleres et monuments des peuples indigenes de V Amerique (2 vols, folio, 1810) ; Examen critique de I'histoire de la geographie du Nouveau Continent (1814-1834) ; Atlas geographique et physique du royaume de la Nouvelle Espagne (181 1); Essai politique sur le royaume de la Nouvelle Espagne (181 1); Essai sur la geographie des plantes (1805, now very rare); and Relation historique (1814-1825), an unfinished narrative of his travels, including the Essai politique sur Vile de Cuba. The Nova genera et species plantarum (7 vols, folio, 1815-1825), con- taining descriptions of above 4500 species of plants collected by Humboldt and Bonpland, was mainly compiled by C. S. Kunth; J. Oltmanns assisted in preparing the Recueil d' observations astrono- miques (1808); Cuvier, Latreille, Valenciennes and Gay-Lussac co- operated in the Recueil d' observations de zoologie et d'anatomie com- paree (1805-1833). Humboldt's Ansichten der Natur (Stuttgart and Tubingen, 1808) went through three editions in his lifetime, and was translated into nearly every European language. The results of his Asiatic journey were published in Fragments de geologie et de climatologie asiatiques (2 vols. 8vo, 1831), and in Asie centrale (3 vols. 8vo, 1843) — an enlargement of the earlier work. The memoirs and papers read by him before scientific societies, or contributed by him to scientific periodicals, are too numerous for specification.

Since his death considerable portions of his correspondence have been made public. The first of these, in order both of time and of importance, is his Brief e an Varnhagen von Ense (Leipzig, i860). This was followed in rapid succession by Briefwechsel mit einem jungen Freunde (Friedrich Althaus, Berlin, 1861); Briefwechsel mit Heinrich Berghaus (3 vols., Jena,

1863); Correspondance scientifique et litteraire (2 vols., Paris, 1 865-1869) ; " Lettres a Marc-Aug. Pictet," published in Le Globe, tome vii. (Geneva, 1 868) ; Brief e an Bunsen (Leipzig, 1869) ; Brief e zwischen Humboldt und Gauss (1877) ; Brief e an seinen Bruder Wilhelm (Stuttgart, 1880); Jugendbriefe an W. G. Wegener (Leipzig, 1896) ; besides some other collections of less note. An octavio edition of Humboldt's principal works was published in Paris by Th. Morgand (1864-1866). See also Karl von Baer, Bulletin de Vacad. des sciences de St-Petersbourg, xvii. 529 (1859); R. Murchison, Proceedings, Geog. Society of London, vi. (1859); L. Agassiz, American Jour, of Science, xxviii. 96 (1859); Proc. Roy. Society, X. xxxix. ; A. Quetelet, Annuaire de Vacad. des sciences (Brussels, i860), p. 97; J. Madler, Geschichte der Himmels- kunde, ii. 1 13 ; J. C. Houzeau, Bibl. astronomique, ii. 168. (A. M. C.)

HUMBOLDT, KARL WILHELM VON (1767-1835), German philologist and man of letters, the elder brother of the more celebrated Alexander von Humboldt, was born at Potsdam, on the 22nd of June 1767. After being educated at Berlin, Gottingen and Jena, in the last of which places he formed a close and lifelong friendship with Schiller, he married Fraulein von Dacherode, a lady of birth and fortune, and in 1802 was appointed by the Prussian government first resident and then minister pleni- potentiary at Rome. While there he published a poem entitled Rom, which was reprinted in 1824. This was not, however, the first of his literary productions; his critical essay on Goethe's

Hermann und Dorothea, published in 1800, had already placed him in the first rank of authorities on aesthetics, and, together with his family connexions, had much to do with his appoint- ment at Rome; while in the years 1795 and 1797 he had brought out translations of several of the odes of Pindar, which were held in high esteem. On quitting his post at Rome he was made councillor of state and minister of public instruction. He soon, however, retired to his estate at Tegel, near Berlin, but was recalled and sent as ambassador to Vienna in 181 2 during the exciting period which witnessed the closing struggles of the French empire. In the following year, as Prussian plenipo- tentiary at the congress of Prague, he was mainly instrumental in inducing Austria to unite with Prussia and Russia against France; in 18 15 he was one of the signatories of the capitulation of Paris, and the same year was occupied in drawing up the treaty between Prussia and Saxony, by which the territory of the former was largely increased at the expense of the latter. The next year he was at Frankfort settling the future condition of Germany, but was summoned to

London in the midst of his work, and in 1818 had to attend the congress at Aix-la-Chapelle. The reactionary policy of the Prussian government made him resign his office of privy councillor and give up political life in 1819; and from that time forward he devoted himself solely to literature and study.

During the busiest portion of his political career, however, he had found time for literary work. Thus in 1816 he had published a translation of the Agamemnon of Aeschylus, and in 181 7 corrections and additions to Adelung's Mithridates, that famous collection of specimens of the various languages and dialects of the world. Among these additions that on the Basque language is the longest and most important, Basque having for some time specially attracted his attention. In fact, Wilhelm von Humboldt may be said to have been the first who brought Basque before the notice of European philologists, and made a scientific study of it possible. In order to gain a practical knowledge of the language and complete his investigations into it. he visited the Basque country itself, the result of his visit being the valuable " Researches into the Early Inhabitants of Spain by the help of the Basque language " (Prufung der Unter- suchungen Uber die Urbewohner Hispaniens vermittelst der vaski- schen Sprache), published in 182 1. In this work he endeavoured to show, by an examination of geographical names, that a race or races speaking dialects allied to modern Basque once extended through the whole of Spain, the southern coast of France and the Balearic Islands, and suggested that these people, whom he identified with the Iberians of classical writers, had come from northern Africa, where the name of Berber still perhaps perpetuates their old designation. Another work on what has sometimes been termed the metaphysics of language appeared from his pen in 1828, under the title of Uber den Dualis; but the great work of his life, on the ancient Kawi language of Java, was unfortunately interrupted by his death on the 8th of April 1835. The imperfect fragment was edited by his brother and Dr Buschmann in 1836, and contains the remarkable introduc- tion on " The Heterogeneity of Language and its Influence on the Intellectual Development of Mankind " {Uber die Ver- schiedenhcil des menschlichen Sprachbaues und ihren Einfluss auf die geistige Entwickelung des Menschengeschlechts), which was afterwards edited and defended against Steinthal's criticisms by Pott (2 vols., 1876). This essay, which has been called the text-book of the philosophy of speech, first clearly laid down that the character and structure of a language expresses the inner life and knowledge of its speakers, and that languages must differ from one another in the same way and to the same degree as those who use them. Sounds do not become words until a meaning has been put into them, and this meaning embodies the thought of a community. What Humboldt terms the inner form of a language is just that mode of denoting the relations between the parts of a

sentence which reflects the manner in which a particular body of men regards the world about them. It is the task of the morphology of speech to distinguish the farious ways in which languages differ from each other as regards

their inner form, and to classify and arrange them accordingly. Other linguistic publications of Humboldt, which had appeared in the Transactions of the Berlin Academy, the Journal of the Royal Asiatic Society, or elsewhere, were republished by his brother in the seven volumes of Wilhelm von Humboldt's Gesammelte Werke (1841-1852). These volumes also contain poems, essays on aesthetical subjects and other creations of his prolific mind. Perhaps, however, the most generally interesting of his works, outside those which deal with language, is his correspondence with Schiller, published in 1830. Both poet and philosopher come before us in it in their most genial mood. For, though Humboldt was primarily a philosopher, he was a philosopher rendered practical by his knowledge of statesmanship and wide experience of life, and endowed with keen sympathies, warm imagination and active interest in the method of scientific inquiry. (A. H. S.)

HUMBUG, an imposture, sham, fraud. The word seems to have been originally applied to a trick or hoax, and appears as a slang term about 1 750. According to the New English Dictionary, Ferdinando Killigrew's The Universal Jester, which contains the word in its sub-title " a choice collection of many conceits . . . bonmots and humbugs," was published in 1754, not, as is often stated, in 1735-1740. The principal passage in reference to the introduction of the word occurs in The Student, 1750-1751, ii. 41, where it is called " a word very much in vogue with the people of taste and fashion." The origin appears to have been unknown at that date. Skeat connects it (Etytn. Diet. 1898) with " hum," to murmur applause, hence flatter, trick, cajole, and " bug," bogey, spectre, the word thus meaning a false alarm. Many fanciful conjectures have been made, e.g. from Irish uim-bog, soft copper, worthless as opposed to sterling money; from " Hamburg," as the centre from which false coins came into England during the Napoleonic wars; and from the Italian uomo bugiardo, lying man.

HUME, ALEXANDER (c. 1557-1609), Scottish poet, second son of Patrick Hume of Polwarth, Berwickshire, was born, probably at Reidbrais, one of his family's houses, about 1557. It has been generally assumed that he is the Alexander Hume who matriculated at St Mary's college, St Andrews, in 1571, and graduated in 1574. In Ane Epistle to Maister Gilbert Montcreif (Moncriefi), mediciner to the Kings Majestie, wherein is set downe the Experience of the Aulhours youth, he relates the course of his disillusionment. He says he spent four years in France before beginning to

study law in the courts at Edinburgh (1. 136). After three years' experience there he abandoned law in disgust and sought a post at court (ib. 1. 241). Still dissatisfied, he took orders, and became in 1597 minister of Logic, near Stirling, where he lived until his death on the 4th of December 1609. His best known work is his Hymns, or Sacred Songs (printed by Robert Waldegrave at Edinburgh in 1599, and dedicated to Elizabeth Melvill, Lady Comrie) containing an epistle to the Scottish youth, urging them to abandon vanity for religion. One poem of the collection, entitled " A description of the day Estivall," a sketch of a summer's day and its occupa tions, has found its way into several anthologies. " The Triumph of the Lord after the Manner of Men " is a song of victory of some merit, celebrating the defeat of the Armada in 1588. His prose works include Ane Treatise of Conscience (Edinburgh, 1594), A Treatise of the Felicitie of the Life to come (Edinburgh, 1594), and Ane Afold Admonitioun to the Ministerie of Scotland. The last is an argument against prelacy. Hume's elder brother, Lord Polwarth, was probably one of the combatants in-the famous " Flyting betwixt Montgomerie and Polwart."

The editions of Hume's verse are: (a) by Robert Waldegrave (r 599) ; (b) a reprint of (a) by the Bannatyne Club (1832) ; and (i) by the Scottish Text Society (ed. A. Lawson) (1902). The last includes the prose tracts.

HUME, DAVID (1711-1776), English philosopher, historian and political economist, was born at Edinburgh, on the 26th of April (O.S.) 1711. His father, Joseph Hume or Home, a scion of the noble house of Home of Douglas (but see Notes and Queries, 4th ser. iv. 72), was owner of a small estate in

Berwickshire, on the banks of the Whiteadder, called, from the spring rising in front of the dwelling-house, Ninewells. David was the youngest of a family of three, two sons and a daughter, who after the early death of the father were brought up with great care and devotion by their mother, the daughter of Sir David Falconer, president of the college of justice.

Of Hume's early education little is known beyond what he has himself stated in his Life. He appears to have entered the Greek classes of the university of Edinburgh in 1723, and, he tells us, " passed through the ordinary course of education with success." From a letter printed in Burton's Life (i. 30-39), it appears that about 1726 Hume returned to Ninewells with a fair knowledge of Latin, slight acquaintance with Greek and literary tastes decidedly inclining to " books of reasoning and philosophy, and to poetry and the polite authors." We do not know, except by inference, to what studies he especially devoted himself. It is, however, clear that from his earliest years he began to speculate upon the nature of knowledge in the abstract, and its concrete applications, as in theology, and that with this object he studied largely the writings of Cicero and Seneca and recent English philosophers (especially Locke, Berkeley and Butler). His acquaintance with Cicero is clearly proved by the form in which he cast some of the most important of his specula- tions. From his boyhood he devoted himself to acquiring a literary reputation, and throughout his life, in spite of financial and other difficulties, he adhered to his original intention. A man of placid and even phlegmatic temperament, he lived moderately in all things, and sought worldly prosperity only so far as was necessary to give him leisure for his literary work. At first he tried law, but was unable to give his mind to a study which appeared to him to be merely a barren waste of technical jargon. At this time the intensity of his intellectual activity in the area opened up to him by Locke and Berkeley reduced him to a state of physical exhaustion. In these circumstances he

determined to try the effect of complete change of scene and occupation, and in 1734 entered a business house in Bristol. In a few months he found " the scene wholly unsuitable " to him. and about the middle of 1734 set out for France, resolved to spend some years in quiet study. He visited Paris, resided for a time at Rheims and then settled at La Fleche, famous in the history of philosophy as the school of Descartes. His health seems to have been perfectly restored, and during the three years of his stay in France his speculations were worked into systematic form in the Treatise of Human Nature. In the autumn of 1737 he was in London arranging for its publication and polishing it in preparation for the judgments of the learned. In January 1730 appeared the first and second volumes of the Treatise of Human Nature, being an Attempt to Introduce the Experimental Method of Reasoning into Moral Subjects, containing book i.. Of the Understanding, and book ii., Of the Passions. The third volume, containing book iii., Of Morals, was published in the following year. The publisher of the first two volumes, John Noone, gave him £50 and twelve bound copies for a first edition of one thousand copies. Hume's own words best describe its reception. " Never literary attempt was more unfortunate; it fell dead-bom from the press, without reaching such distinction as even to excite a murmur among the zealots." " But," he adds. " being naturally of a cheerful and sanguine temper, I very soon recovered the blow, and prosecuted with great ardour my studies in the country." This brief notice, however, is not sufficient to explain the full significance of the event for Hume's own life. The work undoubtedly failed to do what its author expected from it; even the notice, otherwise not unsatisfactory, which it obtained in the History of the Works of the Learned, then the principal critical journal, did not in the least appreciate the true bearing of the Treatise on current discussions. Hume naturally expected that the world would see as clearly as he did the connexion between the concrete problems agitating contemporary thought and the abstract principles on which their solution depended. Accordingly he looked for opposition, and expected that, if his principles were received, a change in general conceptions of things would ensue. His disappointment at its

reception was great; and though he never entirely relinquished his metaphysical speculations, though all that is of value in his later writings depends on the acute analysis of human nature to which he was from the first attracted, one cannot but regret that his high powers were henceforth withdrawn for the most part from the consideration of the foundations of belief, and expended on its practical applications. In later years he attributed his want of success to the immature style of his early exposition, to the rashness of a young innovator in an old and well-established province of literature. But this has little foundation beyond the irritation of an author at his own failure to attract such attention as he deems his due.

None of the principles of the Treatise is given up in the later writings, and no addition is made to them. Nor can the superior polish of the more mature productions counterbalance the concentrated vigour of the more youthful work.

After the publication of the Treatise Hume retired to his brother's house at Ninewells and carried on his studies, mainly in the direction of politics and political economy. In 1741 he published the first volume of his Essays, which had a considerable and immediate success. A second edition was called for in the following year, in which also a second volume was published. These essays Butler, to whom he had sent a copy of his Treatise, but with whom he had failed to make personal acquaintance, warmly commended. The philosophical relation between Butler and Hume is curious. So far as analysis of knowledge is con- cerned they are in harmony, and Hume's sceptical conclusions regarding belief in matters of fact are the foundations on which Butler's defence of religion rests. Butler, however, retained, in spite of his destructive theory of knowledge, confidence in the rational proofs for the existence of God, and certainly maintains what may be vaguely described as an a priori view of conscience. Hume had the greatest respect for the author of the Analogy, ranks him with Locke and Berkeley as an originator of the experimental method in moral science, and in his specially theological essays, such as that on Particular Providence and a Future State, has Butler's views specifically in mind. (See Butler.)

The success of the Essays, though hardly great enough to satisfy his somewhat exorbitant cravings, was a great encourage- ment to him. He began to hope that his earlier work, if recast and lightened, might share the fortunes of its successor; and at intervals throughout the next four years he occupied himself in rewriting it in a more succinct form with all the literary grace at his command. Meantime he continued to look about for some post which might secure him the modest independence he desired. In 1744 we find him, in anticipation of a vacancy in the chair of moral philosophy at Edinburgh university, moving his friends to advance his cause with the electors; and though, as he tells us, " the accusation of heresy, deism, scepticism or theism, &c, &c, was started " against him, it had no effect, " being bore down by the contrary authority of all the good people in town." To his great mortification, however, he found out, as he thought, that Hutcheson and Leechman, with whom he had been on terms of friendly correspondence, were giving the weight of their opinion against his election. The after history of these negotiations is obscure. Failing in this attempt, he was induced to become tutor, or keeper, to the marquis of Annandale, a harmless literary lunatic. This position, financially advantage ous, was absurdly false (see letters in Burton's Life, i. ch. v.), and when the matter ended Hume had to sue for arrears of salary. In 1746 Hume accepted the

office of secretary to GeneraF St Clair, and was a spectator of the ill-fated expedition to France in the autumn of that year. His admirable account of the transaction has been printed by Burton. After a brief sojourn at Ninewells, doubtless occupied in preparing for publication his Philosophical Essays (afterwards entitled An Inquiry con- cerning Human Understanding), Hume was again associated with General St Clair as secretary in the embassy to Vienna and Turin (1748). The notes of this journey are written in a light and amusing style, showing Hume's usual keenness of sight in some directions and his almost equal blindness in others.

During his absence from England, early in the year 1748, the Philosophical Essays were published; but the first reception of the work was little more favourable than that accorded to the Treatise. To the later editions of the work Hume prepared an " Advertisement " referring to the Treatise, and desiring that the Essays " may alone be regarded as containing his philosophical sentiments and principles." Some modern critics have accepted this disclaimer as of real value, but in fact it has no significance; and Hume himself in a striking letter to Gilbert Elliott indicated the true relation of the two works. " I believe the Philosophical Essays contain everything of consequence relating to the understanding which you would meet with in the Treatise, and I give you my advice against reading the latter. By shortening and simplifying the questions, I really render them much more complete. Addo dumminuo. The philosophical principles are the same in both." The Essays are undoubtedly written with more maturity and skill than the Treatise; they contain in more detail application of the principles to concrete problems, such as miracles, providence, immortality; but the entire omission of the discussion forming part ii. of the first book of the Treatise, and the great compression of part iv., are real defects which must always render the Treatise the more important work.

In 1749 Hume returned to Ninewells, enriched with " near a thousand pounds." In 1751 he removed to Edinburgh, where for the most part he resided during the next twelve years of his life. These years are the richest so far as literary production is concerned. In 1751 he published his Political Discourses, which had a great and well-deserved success both in England and abroad. It was translated into French by Mauvillon (1753) and by the Abbe le Blanc (1754). In the same year appeared the recast of the third book of the Treatise, called Inquiry concerning the Principles of Morals, of which he says that " of all his writings, philosophical, literary or historical, it is incomparably the best." At this time also we hear of the

Dialogues concerning Natural Religion, a work which Hume was prevailed on not to publish, but which he revised with great care, and evidently regarded with the greatest favour. The work itself, left by Hume with instructions that it should be published, did not appear till 1779.

In 1 751 Hume was again unsuccessful in the attempt to gain a professor's chair. In the following year he received, in spite of the usual accusations of heresy, the librarianship of the Advocates' Library in Edinburgh, small in emoluments (£40 a year) but rich in opportunity for literary work. In a playful letter to Dr Clephane, he describes his satisfaction at his appointment, and attributes it in some measure to the support of " the ladies."

In 1753 Hume was fairly settled in Edinburgh, preparing for his History of England. He had decided to begin the History, not with Henry VII., as Adam Smith recommended, but with James I., considering that the political differences of his time took their origin from that period. On the whole his attitude in respect to disputed political principles seems not to have been at first consciously unfair. As for the qualities necessary to secure success as a writer on history, he felt that he possessed them in a high degree; and, though neither his ideal of an historian nor his equipment for the task of historical research would now appear adequate, in both he was much in advance of his time. " But," he writes in the well-known passage of his Life, " miserable was my disappointment. I was assailed by one cry of reproach, disapprobation, and even detestation; . . . what was still more mortifying, the book seemed to sink into oblivion. Mr Millar told me that in a twelvemonth he sold only forty-five copies of it." This account must be accepted with reservations. It expresses Hume's feelings rather than the real facts. In Edinburgh, as we learn from one of his letters, the book succeeded well, no fewer than 450 copies being disposed of in five weeks. Nor is there anything in Hume's correspon- dence to show that the failure of the book was so complete as he declared. Within a very few years the sale of the History was sufficient to gain for the author a larger revenue than had ever

before been known in his country to flow from literature, and to place him in comparative affluence. He seems to have received £400 for the first edition of the first volume, £700 for the first edition of the second and £840 for the copyright of the two together. At the same time the bitterness of Hume's feelings and their effect are of importance in his life. It is from the publication of the History that we date his virulent hatred of everything English, towards society in London, Whig principles, Whig ministers and the public generally (see Burton's Life, ii. 268, 417, 434). He was convinced that there was a conspiracy to suppress and destroy everything Scottish. 1 The remainder of the History became little better than a party pamphlet. The second volume, published in 1756, carrying on the narrative to the Revolution, was better received than the first; but Hume then

resolved to work backwards, and to show from a survey of the Tudor period that his Tory notions were grounded upon the history of the constitution. In 1759 this portion of the work appeared, and in 1761 the work was completed by the history of the pre-Tudor periods. The numerous editions of the various portions — for, despite Hume's wrath and grumblings, the book was a great literary success — gave him an opportunity of careful revision, which he employed to remove from it all the " villainous seditious Whig strokes," and " plaguy prejudices of Whiggism " that he could detect. In other words, he bent all his efforts toward making his History more of a party work than it had been, and in his effort he was entirely successful. The early portion of his History may be regarded as now of little or no value. The sources at Hume's command were few, and he did not use them all. None the less, the History has a distinct place in the literature of England. It was the first attempt at a comprehensive treatment of historic facts, the first to introduce the social and literary aspects of a nation's life as only second in importance to its political fortunes, and the first historical writing in an animated yet refined and polished style. 2

While the History was in process of publication, Hume did not entirely neglect his other lines of activity. In 1757 appeared Four Dissertations: The Natural History of Religion, Of the Passions, Of Tragedy, Of the Standard of Taste. Of these the dissertation on the passions is a very subtle piece of psychology, containing the essence of the second book of the Treatise. It is remarkable that Hume does not appear to have been acquainted with Spinoza's analysis of the affections. The last two essays are contributions of no great importance to aesthetics, a de- partment of philosophy in which Hume was not strong. The Natural History of Religion is a powerful contribution to the deistic controversy; but, as in the case of Hume's earlier work, its significance was at the time overlooked. It is an attempt to carry the war into a province hitherto allowed to remain at peace, the theory of the general development of religious ideas. Deists, though raising doubts regarding the historic narratives of the Christian faith, had never disputed the general fact that belief in one God was natural and primitive. Hume endeavours to show that polytheism was the earliest as well as the most natural form of religious belief, and that theism or deism is

1 See Burton, ii. 265, 148 and 238. Perhaps our knowledge of Johnson's sentiments regarding the Scots in general, and of his expressions regarding Hume and Smith in particular, may lessen our surprise at this vehemence.

2 Macaulay describes Hume's characteristic fault as an historian: " Hume is an accomplished advocate. Without positively asserting much more than he can prove, he gives prominence to all the circum- stances which support his case ; he glides lightly over those whicrrare unfavourable to it ; his own

witnesses are applauded and en- couraged; the statements which seem to throw discredit on them are controverted; the contradictions into which they fall are ex- plained away; a clear and connected abstract of their evidence is given. Everything that is offered on the other side is scrutinized with the utmost severity; every suspicious circumstance is a ground for argument and invective; what cannot be denied is extenuated, or passed by without notice; concessions even are sometimes made; but this insidious candour only increases the effect of the vast mass of sophistry." — Miscell. Writings, " History." With this may be compared the more favourable verdict by J. S. Brewer, in the preface to his edition of the Student's Hume.

the product of reflection upon experience, thus reducing the validity of the historical argument to that of the theoretical proofs.

In 1763 he accompanied Lord Hertford to Paris, doing the duties of secretary to the embassy, with the prospect of the appointment to that post. He was everywhere received " with the most extraordinary honours." The society of Paris was peculiarly ready to receive a great philosopher and historian, especially if he were known to be an avowed antagonist of religion, and Hume made valuable friendships, especially with D'Alembert and Turgot, the latter of whom profited much by Hume's economical essays. In 1766 he left Paris and returned to Edinburgh. In 1 767 he accepted the post of under-secretary to General Conway and spent two years in London.

He settled finally in Edinburgh in 1769, having now through his pension and otherwise an income of £1000 a year. The solitary incident of note in this period of his life is the ridiculous quarrel with Rousseau, which throws much light upon the character of the great sentimentalist. Hume certainly did his utmost to secure for Rousseau a comfortable retreat in England, but his usually sound judgment seems at first to have been quite at fault with regard to his protege. The quarrel which all the acquaintances of the two philosophers had predicted soon came, and no language had expressions strong enough for Rousseau's anger. Hume came well out of the business, and had the sagacity to conclude that his admired friend was little better than a madman. In one of his most charming letters he describes his life in Edinburgh. The new house to which he alludes was built under his own directions at the corner of what is now called St David Street after him; it became the centre of the most cultivated society of Edinburgh. Hume's cheerful temper, his equanimity, his kindness to literary aspirants and to those whose views differed from his own won him universal respect and

affection. He welcomed the work of his friends (e.g. Robertson and Adam Smith), and warmly recognized the worth of his opponents (e.g. George Campbell and Reid). He assisted Blackwell and Smollett in their difficulties and became the acknowledged patriarch of literature.

In the spring of 1775 Hume was struck with a tedious and harassing though not painful illness. A visit to Bath seemed at first to have produced good effects, but on the return journey more alarming symptoms developed themselves, his strength rapidly sank, and, little more than a month later, he died in Edinburgh on the 25th of August 1776.

No notice of Hume would be complete without the sketch of his character drawn by his own hand: — " To conclude historically with my own character, I am, or rather was (for that is the style I must now use in speaking of myself, which emboldens me the more to speak my sentiments), — I was, I say, a man of mild dispositions, of command of temper, of an open, social and cheerful humour, capable of attachment, but little susceptible of enmity, and of great modera- tion in all my passions. Even my love of literary fame, my ruling passion, never soured my temper, notwithstanding my frequent disappointments. My company was not unacceptable to the young and careless, as well as to the studious and literary; and as I took a particular pleasure in the company of modest women, I had no reason to be displeased with the reception I met with from them. In a word, though most men anywise eminent have found reason to complain of calumny, I never was touched, or even attacked, by her baleful tooth; and, though I wantonly exposed myself to the rage of both civil and religious factions, they seem to be disarmed on my behalf of their wonted fury. My friends never had occasion to vindicate any one circumstance of my character and conduct ; not but that the zealots, we may well suppose, would have been glad to invent and propagate any story to my disadvantage, but they could never find any which they thought would wear the face of proba- bility. I cannot say there is no vanity in making this funeral oration of myself, but I hope it is not a misplaced one ; and this is a matter of fact which is easily cleansed and ascertained." The more his life has become known, the more confidence we place in this admirable estimate.

The results of Hume's speculations may be discussed under two heads: — (1) philosophical, (2) economical.

I. The philosophical writings, which mark a distinct epoch in the development of modern thought, can here be considered in two only of the many aspects in which they present themselves Phllo as Q f t fo e highest interest to the historian of philosophy.*

sophy. | n t j lg T rea n se f Human Nature, which is in every respect the most complete exposition of Hume's philosophical conception, we

have the first thorough-going attempt to apply the fundamental principles of Locke's empirical psychology to the construction of a theory of knowledge, and, as a natural consequence, the first system- atic criticism of the chief metaphysical notions from this point of view. Hume, in that work, holds the same relation to Locke and Berkeley as the late J. S. Mill held with his System of Logic to Hartley and James Mill. In certain of the later writings, pre-eminently in the Dialogues on Natural Religion, Hume brings the result of his specu- lative criticism to bear upon the problems of current theological dis- cussion, and gives in their regard, as previously with respect to general philosophy, the final word of the empirical theory in its earlier form. The interesting parallel between Hume and J. S. Mill in this second feature will not be overlooked.

In the first instance, then, Hume's philosophical work is to be regarded as the attempt to supply for empiricism in psychology a consistent, that is, a logically developed theory of knowledge. In Locke, indeed, such theory is not wanting, but, of all the many in- consistencies in the Essay on the Human Understanding, none is more apparent or more significant than the complete want of harmony between the view of knowledge developed in the fourth book and the psychological principles laid down in the earlier part of the work. Though Locke, doubtless, drew no distinction between the problems of psychology and of theory of knowledge, yet the discussion of the various forms of cognition given in the fourth book of the Essay seems to be based on grounds quite distinct from and in many respects inconsistent with the fundamental psychological principle of his work. The perception of relations, which, according to him, is the essence of cognition, the demonstrative character which he thinks attaches to our inference of God's existence, the intuitive knowledge of self, are doctrines incapable of being brought into harmony with the view of mind and its development which is the keynote of his general theory. To some extent Berkeley removed this radical in- consistency, but in his philosophical work it may be said with safety there are two distinct aspects, and while it holds of Locke on the one hand, it stretches forward to Kantianism on the other. Nor in Berkeley are these divergent features ever united into one harmoni- ous whole. It was left for Hume to approach the theory of know- ledge with full consciousness from the psychological point of view, and to work out the final consequences of that view so far as cognition is concerned. The terms whxh he employs in describing the aim and scope of his work are not those which we should now employ, but the declaration, in the introduction to the Treatise, that the science of human nature must be treated according to the experimental method, is in fact equivalent to the statement of the principle implied in Locke's Essay, that the problems of psychology and of

theory of knowledge are identical. This view is the characteristic of what we may call the English school of philosophy.

*In order to make perfectly clear the full significance of the principle which Hume applied to the solution of the chief philosophical questions, it is necessary to render somewhat more precise and complete the statement of the psychological view Theory which lies at the foundation of the empirical theory, and of know- to distinguish from it the problem of the theory of know- **«*• ledge upon which it was brought to bear. Without entering into details, which it is the less necessary to do because the subject has been recently discussed with great fulness in works readily accessible, it may be said that for Locke as for Hume the problem of psychology Was the exact description of the contents of the individual mind, and the determination of the conditions of the origin and development of conscious experience in the individual mind. And the answer to the problem which was furnished by Locke is in effect that with which Hume started. The conscious experience of the individual is the result of interaction between the individual mind and the universe of things. This solution presupposes a peculiar conception of the general relation between the mind and things which in itself requires justification, and which, so far at least as the empirical theory was developed by Locke and his successors, could not be obtained from psychological analysis. Either we have a right to the assumption contained in the conception of the individual mind as standing in relation to things, in which case the grounds of the assumption must be sought elsewhere than in the results of this reciprocal relation, or we have no right to the assumption, in which case reference to the reciprocal relation can hardly be accepted as yielding any solution of the psychological problem. But in any case, — and, as we shall see, Hume endeavours so to state his psychological premises as to conceal the assumption made openly by Locke, — it is apparent that this psychological solution does not contain the answer to the wider and radically distinct problem of the theory of knowledge. For here" we have to consider how the individual intelligence comes to know any fact whatsoever, and what is meant by the cognition of a fact. With Locke, Hume professes to regard this problem as virtually covered or answered by the fundamental psychological theorem; but the superior clearness of his reply enables us to mark with perfect precision the nature of the difficulty inherent in the attempt to regard the two as identical. For purposes of psychological analysis the conscious experience of the individual mind is taken as given fact, to be known, i.e. observed, discriminated, classified and explained in the same way in which any one special portion of experience is treated. Now if this mode of treatment be accepted as the only possible method, and its results assumed to be conclusive as regards*

the problem of knowledge, the fundamental peculiarity of cognition is overlooked. In all cognition, strictly so-called, there is involved a certain synthesis or relation of parts of a characteristic nature, and if we attempt to discuss this synthesis as though it were in itself but one of the facts forming the matter of knowledge, we are driven to regard this relation as being of the quite external kind discovered by ob- servation among matters of knowledge. The difficulty of reconciling the two views is that which gives rise to much of the obscurity in Locke's treatment of the theory of knowledge; in Hume the effort to identify them, and to explain the synthesis which is essential to cognition as merely the accidental result of external relations among the elements of conscious experience, appears with the utmost clear- ness, and gives the keynote of all his philosophical work. The final perplexity, concealed by various forms of expression, comes forward at the close of the Treatise as absolutely unsolved, and leads Hume, as will be pointed out, to a truly remarkable confession of the weak- ness of his own system.

While, then, the general idea of a theory of knowledge as based upon psychological analysis is the groundwork of the Treatise, it is a particular consequence of this idea that furnishes to Hume the characteristic criterion applied by him to all philosophical questions. If the relations involved in the fact of cognition are only those dis- coverable by observation of any particular portion of known experi- ence, then such relations are quite external and contingent. The only necessary relation which can be discovered in a given fact of experience is that of non-contradiction {i.e. purely formal) ; the thing must be what it is, and cannot be conceived as having qualities contradictory of its nature. The universal test, therefore, of any supposed philosophical principle is the possibility or impossibility of imagining its contradictory. All our knowledge is but the sum of our conscious experience, and is consequently material for imagina- tion. " Let us fix our attention out of ourselves as much as possible ; let us chase our imagination to the heavens or to the utmost limits of the universe; we never really advance a step beyond ourselves, nor can conceive any kind of existence, but those perceptions which have appeared in that narrow compass. This is the universe of the imagination, nor have we any idea but what is there produced." {Works, ed. of 1854, '■ 93. cr – >• I0 7-)

The course of Hume's work follows immediately from his funda- mental principle, and the several divisions of the treatise, so far as the theoretical portions are concerned, are but its logical con- sequences. The first part of the first book contains a brief state- ment of the contents of mind, a description of all that observation can discover in conscious experience. The second part deals with those judgments which rest upon the formal

elements of experience, space and time. The third part discusses the principle of real con- nexion among the elements of experience, the relation of cause and effect. The fourth part is virtually a consideration of the ultimate significance of this conscious experience, of the place it is supposed to occupy in the universe of existence, in other words, of the relations between the conscious experience of an individual mind as disclosed to observation and the supposed realities of self and external things. In the first part Hume gives his own statement of the psycho- logical foundations of his theory. Viewing the contents of mind as •matter of experience, he can discover among them only- one distinction, a distinction expressed by the terms oressloas i m P. ress i˚ns and ideas. Ideas are secondary in nature, p ‘ copies of data supplied we know not whence. All that

appears in conscious experience as primary, as arising from some unknown cause, and therefore relatively as original, Hume designates by the term impression, and claims to imply by such term no theory whatsoever as to the origin of this portion of experience. There is simply the fact of conscious experience, ultimate and inexplicable. Moreover, if we remain faithful to the fundamental conception that the contents of the mind are merely matters of experience, it is evident in the first place that as impressions are strictly individual, ideas also must be strictly particular, and in the second place that the faculties of combining, discriminating, abstracting and judging, which Locke had admitted, are merely expressions for particular modes of having mental experience, i.e. are modifications of conceiv- ing (cf. i. 128 n., 137, 192). By this theory, Hume is freed from all the problems of abstraction and judgment. A comparative judg- ment is simplified into an isolated perception of a peculiar form, and a series of similar facts are grouped under a single symbol, represent- ing a particular perception, and only by the accident of custom treated as universal (see i. 37, 38, 100).

Such, in substance, is Hume’s restatement of Locke’s empirical view. Conscious experience consists of isolated states, each of which is to be regarded as a fact and is related to others in a quite external fashion. It remains to be seen how knowledge can be explained on such a basis; but, before proceeding to sketch Hume’s answer to this question, it is necessary to draw attention, first, to the peculiar device invariably resorted to by him when any exception to his general principle that ideas are secondary copies of impressions presents itself, and, secondly, to the nature of the substitute offered by him for that perception of relations or synthesis which even in Locke’s con- fused statements had appeared as the essence of cognition. When- ever Hume finds it impossible to recognize in an. idea the mere copy of a particular impression, he introduces the phrase ” manner, of conceiving.” Thus general or abstract ideas arc merely copies of a

particular impression conceived in a particular manner. The ideas of space and time, as will presently be pointed out, are copies of impressions conceived in a particular manner. The idea of necessary connexion is merely the reproduction of an impression which the mind feels itself compelled to conceive in a particular manner. Such a fashion of disguising difficulties points, not only to an in- consistency in Hume's theory as stated by himself, but to the initial error upon which it proceeds; for these perplexities arc but the consequences of the doctrine that cognition is to be explained on the basis of particular perceptions. These external relations are, in fact, what Hume describes as the natural bonds of connexion among ideas, and, regarded subjectively as principles of association among the facts of mental experience, they form the substitute he offers for the synthesis implied in knowledge. These principles of association determine the imagination to combine ideas in various modes, and by this mechanical combination Hume, for a time, endeavoured to explain what are otherwise called judgments of relation. It was impossible, however, for him to carry out this view consistently. The only combination which, even in appearance, could be explained satisfactorily by its means was the formation of a complex idea out of simpler parts, but the idea of a relation among facts is not accur- ately described as a complex idea; and, as such relations have no basis in impressions, Hume is finally driven to a confession of the absolute impossibility of explaining them. Such confession, however, is only reached after a vigorous effort had been made to render some account of knowledge by the experimental method.

*The psychological conception, then, on the basis of which Hume proceeds to discuss the theory of knowledge, is that of conscious experience as containing merely the succession of isolated . , impressions and their fainter copies, ideas, and as bound **oca' together by merely natural or external links of connexion, the principles of association among ideas. The foundations of cognition must be discovered by observation or analysis of ex- perience so conceived. Hume wavers somewhat in his division of the various kinds of cognition, laying stress now upon one now upon another of the points in which mainly they differ from one another. Nor is it of the first importance, save with the view of criticizing his own consistency, that we should adopt any of the divisions implied in his exposition. For practical purposes we may regard the most important discussions in the Treatise as falling under two heads. I n the first place there are certain principles of cognition which appear to rest upon and to express relations of the universal elements in conscious experience, viz. space and time. The propositions of mathematics seem to be independent of this or that special fact of experience, and to remain unchanged even when the concrete matter of experience varies. They are formal. In the second place, cogni-*

tion, in any real sense of that term, implies connexion for the indi- vidual mind between the present fact of experience and other facts, whether past or future. It appears to involve, therefore, some real relation among the portions of experience, on the basis of which relation judgments and inferences as to matters of fact can be shown to rest. The theoretical question is consequently that of the nature of the supposed relation, and of the certainty of judgments and inferences resting on it.

Hume's well-known distinction between relations of ideas and matters of fact corresponds fairly to this separation of the formal and real problems in the theory of cognition, although that distinction is in itself inadequate and not fully representative of Hume's own conclusions.

With regard, then, to the first problem, the formal element in knowledge, Hume has to consider several questions, distinct in nature and hardly discriminated by him with sufficient precision. For a complete treatment of this portion of the theory of knowledge, there require to be taken into consideration at least the following points: (a) the exact nature and significance of the space and time relations in our experience, (b) the mode in which the primary data, facts or principles, of mathematical cognition are obtained, (c) the nature, extent and certainty of such data, in themselves and with reference to the concrete material of experience, (d) the principle of inference from the data, however obtained. Not all of these points are discussed by Hume with the same fulness, and with regard to some of them it is difficult to state his conclusions. It will be of service, however, to attempt a summary of his treatment under these several heads, — the more so as almost all expositions of his philosophy are entirely defective in the account given of this essential portion. The brief statement in the Inquiry, § iv., is of no value, and indeed is almost unintelligible unless taken in reference tcr

(a) The nature of space and time as elements in conscious experi- ence is considered by Hume in relation to a special problem, that of their supposed infinite divisibility. Evidently upon his _ d

view of conscious experience, of the world of imagination, J 1 f 6 an such infinite divisibility must be a fiction. The ultimate elements of experience must be real units, capable of being repre- sented or imagined in isolation. Whence then do these units arise? or, if we put the problem as it was necessary Hume should put it to himself, in what orders or classes of impressions do we find the elements of space and time? Beyond all question Hume, in en- deavouring to answer this problem, is brought face to face with one of the difficulties inherent in his conception of conscious experience.

Mathe- matics.

For he has to give some explanation of the nature of space and time which shall identify these with impressions, and at the same time is compelled to recognize the fact that they are not identical with any single impression or set of impressions. Putting aside, then, the various obscurities of terminology, such as the distinction between the objects known, viz. " points " or several mental states, and the impressions themselves, which disguise the full significance of his conclusion, we find Hume reduced to the following as his theory of space and time. Certain impressions, the sensations of sight and touch, have in themselves the element of space, for these impressions (Hume skilfully transfers his statement to the points) have a certain order or mode of arrangement. This mode of arrangement or manner of disposition is common to coloured points and tangible points, and, considered separately, is the impression from which our idea of space is taken. All impressions and all ideas are received, or form parts of a mental experience only when received, in a certain order, the order of succession. This manner of presenting themselves is the im- pression from which the idea of time takes its rise.

It is almost superfluous to remark, first, that Hume here deliber- ately gives up his fundamental principle that ideas are but the fainter copies of impressions, for it can never be maintained that order of disposition is an impression, and, secondly, that he fails to offer any explanation of the mode in which coexistence and succession are possible elements of cognition in a conscious experience made up of isolated presentations and representations. For the consistency of his theory, however, it was indispensable that he should insist upon the real, i.e. presentative character of the ultimate units of space and time.

(b) How then are the primary data of mathematical cognition to be derived from an experience containing space and time relations in

the manner just stated? It is important to notice that Hume, in regard to this problem, distinctly separates geometry from algebra and arithmetic, i.e. he views extensive quantity as being cognized differently from number. With regard to geometry, he holds emphatically that it is an em- pirical doctrine, a science founded on observation of concrete facts. The rough appearances of physical facts, their outlines, surfaces and so on, are the data of observation, and only by a method of approxi- mation do we gradually come near to such propositions as are laid down in pure

geometry. He definitely repudiates a view often ascribed to him, and certainly advanced by many later empiricists, that the data of geometry are hypothetical. The ideas of perfect lines, figures and surfaces have not, according to him, any existence. (See Works, i. 66, 69, 73, 97 and iv. 180.) It is impossible to give any consistent account of his doctrine regarding number. He holds, apparently, that the foundation of all the science of number is the fact that each element of conscious experience is presented as a unit, and adds that we are capable of considering any fact or collection of facts as a unit. This manner of conceiving is absolutely general and distinct, and accordingly affords the possibility of an all-compre- hensive and perfect science, the science of discrete quantity. (See Works, i. 97.)

(c) In respect to the third point, the nature, extent and certainty of the elementary propositions of mathematical science, Hume's utter- ances are far from clear. The principle with which he stalls and from which follows his well-known distinction between relations of ideas and matters of fact, a distinction which Kant appears to have thought identical with his distinction between analytical and syn- thetical judgments, is comparatively simple. The ideas of the quantitative aspects of phenomena are exact representations of these aspects or quantitative impressions; consequently, whatever is found true by consideration of the ideas may be asserted regarding the real impressions. No question arises regarding the existence of the fact represented by the idea, and in so far, at least, mathe- matical judgments may be described as hypothetical. For they simply assert what will be found true in any conscious experience containing coexisting impressions of sense (specifically, of sight and touch), and in its nature successive. That the propositions are hypothetical in this fashion does not imply any distinction between the abstract truth of the ideal judgments and the imperfect corre- spondence of concrete material with these abstract relations. Such distinction is quite foreign to Hume, and can only be ascribed to him from an entire misconception of his view regarding the ideas of space and time. (For an example of such misconception, which is almost universal, see Riehl, Der philosopkische Kriticismus, i. 96, 97.)

(d) From this point onwards Hume's treatment becomes ex- ceedingly confused. The identical relation between the ideas of space and time and the impressions corresponding to them apparently leads him to regard judgments of continuous and discrete quantity as standing on the same footing, while the ideal character of the data gives a certain colour to his inexact statements regarding the extent and truth of the judgments founded on them. The emphatic utterances in the Inquiry (iv. 30, 186), and even at the beginning of the relative section in the Treatise (i. 95) may be cited in illustration. But in both works these utterances are qualified in such a manner as to enable us to perceive the real bearings of his doctrine, and to

pronounce at once that it differs widely from that commonly ascribed to him. " It is from the idea of a triangle that we discover the relation of equality which its three angles bear to two right ones; and this relation is invariable, so long as our idea remains the same "

(i. 95). If taken in isolation this passage might appear sufficient justification for Kant's view that, according to Hume, geometrical judgments are analytical and therefore perfect. But it is to be recollected that, according to Hume, an idea is actually a representa- tion or individual picture, not a notion or even a schema, and that he never claims to be able to extract the predicate of a geometrical judgment by analysis of the subject. The properties of this indi- vidual subject, the idea of the triangle, are, according to him, dis- covered by observation, and as observation, whether actual or ideal, never presents us with more than the rough or general appearances of geometrical quantities, the relations so discovered have only ap- proximate exactness. " Ask a mathematician what he means when he pronounces two quantities to be equal, and he must say that the idea of equality is one of those which cannot be defined, and that it is sufficient to place two equal quantities before any one in order to suggest it. Now this is an appeal to the general appearances of objects to the imagination or senses " (iv. 180). " Though it {i.e. geometry) much excels, both in universality and exactness, the loose judgments of the senses and imagination, yet [it] never attains a perfect precision and exactness " (i. 97). Any exactitude attaching to the conclusions of geometrical reasoning arises from the com- parative simplicity of the data for the primary judgments.

So far, then, as geometry is concerned, Hume's opinion is perfectly definite. It is an experimental or observational science, founded on primary or immediate judgments (in his phraseology, perceptions), of relation between facts of intuition; its conclusions are hypo- thetical only in so far as they do not imply the existence at the moment of corresponding real experience; and its propositions have no exact truth. With respect to arithmetic and algebra, the science of numbers, he expresses an equally definite opinion, but unfortun- ately it is quite impossible to state in any satisfactory fashion the grounds for it or even its full bearing. He nowhere explains the origin of the notions of unity and number, but merely asserts that through their means we can have absolutely exact arithmetical pro- positions {Works, L 97, 98). Upon the nature of the reasoning by which in mathematical science we pass from data to conclusions, Hume gives no explicit statement. If we were to say that on his view the essential step must be the establishment of identities or equival- ences, we should probably be doing justice to his doctrine of numerical reasoning, but should have some difficulty in showing the application of the method to geometrical reasoning. For in the latter case we possess, according to Hume, no

standard of equivalence other than that supplied by immediate observation, and consequently transition from one premise to another by way of reasoning must be, in geometrical matters, a purely verbal process.

Hume's theory of mathematics — the only one, perhaps, which is compatible with his fundamental principle of psychology — is a practical condemnation of his empirical theory of perception. He has not offered even a plausible explanation of the mode by which a consciousness made up of isolated momentary impressions and ideas can be aware of coexistence and number, or succession. The relations of ideas are accepted as facts of immediate observation, as being themselves perceptions or individual elements of conscious experience, and to all appearance they are regarded by Hume as being in a sense analytical, because the formal criterion of identity is applicable to them. It is applicable, however, not because the predicate is con- tained in the subject, but on the principle of contradiction. If these judgments are admitted to be facts of immediate perception, the supposition of their non-existence is impossible. The ambiguity in his criterion, however, seems entirely to have escaped Hume's attention.

A somewhat detailed consideration of Hume's doctrine with regard to mathematical science has been given for the reason that this portion of his theory has been very generally overlooked or misinterpreted. It does not seem necessary to endeavour ™-f" c W" to tollow his minute examination ot the principle 01 real

nltioa and causation.

cognition with the same fulness. It will probably be sufficient to indicate the problem as conceived by Hume, and the relation of the method he adopts for solving it to the fundamental doctrine of his theory of knowledge.

Real cognition, as Hume points out, implies transition from the present impression or feeling to something connected with it. As this thing can only be an impression or perception, and is not itself present, it is represented by its copy or ideˆ. Now the supreme, all-comprehensive link of connexion between present feeling or im- pression and either past or future experience is that of causation. The idea in question is, therefore, the idea of something connecfe4 with the present impression as its cause or effect. But this is ex- plicitly the idea of the said thing as having had or as about to have existence, — in other words, belief in the existence of some matter of fact. What, for a conscious experience so constituted as Hume will admit, is the precise significance of such belief in real existence ?

Clearly the real existence of a fact is not demonstrable. For whatever is

may be conceived not to be. " No negation of a fact can involve a contradiction." Existence of any fact, not present as a perception, can only be proved by arguments from cause or effect. But as each perception is in consciousness only as a con- tingent fact, which might not be or might be other than it is, we must admit that the mind can conceive no necessary relations or con- nexions among the several portions of its experience.

If, therefore, a present perception leads us to assert the existence of some other, this can only be interpreted as meaning that in some natural, i.e. psychological, manner the idea of this other perception is excited, and that the idea is viewed by the mind in some peculiar fashion. The natural link of connexion Hume finds in the simi- larities presented by experience. One fact or perception is discovered by experience to be uniformly or generally accompanied by another, and its occurrence therefore naturally excites the idea of that other. But when an idea is so roused up by a present impression, and when this idea, being a consequence of memory, has in itself a certain vivacity or liveliness, we regard it with a peculiar indefinable feeling, and in this feeling consists the immense difference between mere imagination and belief. The mind is led easily and rapidly from the present impression to the ideas of impressions found by experience to be the usual accompaniments of the present fact. The ease and rapidity of the mental transition is the sole ground for the supposed necessity of the causal connexion between portions of experience. The idea of necessity is not intuitively obvious; the ideas of cause and effect are correlative in our minds, but only as a result of ex- perience. Hobbes and Locke were wrong in saying that the mind must find in the relation the idea of Power. We mistake the sub- jective transition resting upon custom or past experience for an objective connexion independent of special feelings. All reasoning about matters of fact is therefore a species of feeling, and belongs to the sensitive rather than to the cogitative side of our nature. It should be noted that this theory of Causation entirely denies the doctrine of Uniformity in Nature, so far as the human mind is concerned. All alleged uniformity is reduced to observed similarity of process. The idea is a mere convention, product of inaccurate thinking and custom.

While it is evident that some such conclusion must follow from the attempt to regard the cognitive consciousness as made up of dis- connected feelings, it is equally clear, not only that the result is self- contradictory, but that it involves certain assumptions not in any way deducible from the fundamental view with which Hume starts. For in the problem of real cognition he is brought face to face with the characteristic feature of

knowledge, distinction of self from matters known, and reference of transitory states to permanent objects or relations. Deferring his criticism of the significance of self and object, Hume yet makes use of both to aid his explanation of the belief attaching to reality. The reference of an idea to past experience has no meaning, unless we assume an identity in the object referred to. For a past impression is purely transitory, and, as Hume occasionally points out, can have no connexion of fact with the present consciousness. His exposition has thus a certain plausi- bility, which would not belong to it had the final view of the per- manent object been already given.

The final problem of Hume's theory of knowledge, the discussion of the real significance of the two factors of cognition, self and external things, is handled in the Treatise with great fulness and dialectical subtlety.

As in the case of the previous problem, it is unnecessary to follow the steps of his analysis, which are, for the most part, attempts to Th If In substitute qualities of feeling for the relations of thought

cognition.

which appear to be involved. The results follow with the utmost ease from his original postulate. If there is nothing in conscious experience save what observation can disclose, while each act of observation is itself an isolated feeling (an impression or idea), it is manifest that a permanent identical thing can never be an object of experience. Whatever permanence or identity is ascribed to an impression or idea is the result of associa- tion, is one of those " propensities to feign " which are due to natural connexions among ideas. We regard as successive presentations of one thing the resembling feelings which are experienced in succession. Identity, then, whether of self or object, there is none, and the supposition of objects, distinct from impressions, is but a further consequence of our " propensity to feign." Hume's explanation of the belief in external things by reference to association is well deserving of careful study and of comparison with the more recent analysis of the same problem by J. S. Mill.

The weak points in Hume's empiricism are so admirably realized by the author himself that it is only fair to quote his own Negative summary in the Appendix to the Treatise. He confesses result o that, in confining all cognition to single perceptions and r"™f s supplying no purely intellectual faculty for modifying, " se " recording and classifying their results, he has destroyed real knowledge altogether:

" If perceptions are distinct existences, they form a whole only by being connected together. But no connexions among distinct existences are ever

discoverable by human understanding. We only feel a connexion or determination of the thought to pass from one object to another. It follows, therefore, that the thought alone feels personal identity, when, reflecting on the train of past percep- tions that compose a mind, the ideas of them are felt to be connected together and naturally introduce each other.

" However extraordinary this conclusion may seem, it need not surprise us. Modern philosophers seem inclined to think that personal identity arises from consciousness, and consciousness is nothing but a reflected thought or perception. The present philo- sophy, therefore, has a promising aspect. But all my hopes vanish

when I come to explain the principles that unite our successive perceptions in our thought or consciousness. I cannot discover any theory which gives me satisfaction on this head. . . .

" In short, there are two principles which I cannot render con- sistent, nor is it in my power to renounce either of them; viz. that all our distinct perceptions are distinct existences, and that the mind never perceives any real connexion among distinct existences. Did our perceptions either inhere in something simple or individual, or did the mind perceive some real connexion among them, there would be no difficulty in the case " (ii. 551).

The closing sentences of this passage may be regarded as pointing to the very essence of the Kantian attempt at solution of the problem of knowledge. Hume sees distinctly that if conscious experience be taken as containing only isolated states, no progress in explanation of cognition is possible, and that the only hope of further develop- ment is to be looked for in a radical change in our mode of conceiving experience. The work of the critical philosophy is the introduction of this new mode of regarding experience, a mode which, in the technical language of philosophers, has received the title of trans- cendental as opposed to the psychological method followed by Locke and Hume. It is because Kant alone perceived the full significance of the change required in order to meet the difficulties of the em- pirical theory that we regard his system as the only sequel to that of Hume. The writers of the Scottish school, Reid in particular, did undoubtedly indicate some of the weaknesses in Hume's funda- mental conception, and their attempts to show that the isolated feeling cannot be taken as the ultimate and primary unit of cognitive experience are efforts in the right direction. But the question of knowledge was never generalized by them, and their reply to Hume, therefore, remains partial and inadequate, while its effect is weakened by the uncritical assumption of principles which is a characteristic feature of their writings.

The results of Hume's theoretical analysis are applied by him to the

problems of practical philosophy and religion. For the first of these the reader is referred to the article Ethics, where fheolosv Hume's views are placed in relation to those of his pre- a ethics decessors in the same field of inquiry. His position, as regards the second, is very noteworthy. As before said, his metaphysic contains in abstracto the principles which were at that time being employed, uncritically, alike by the deists and by their antagonists. There can be no doubt that Hume has continually in mind the theological questions then current, and that he was fully aware of the mode in which his analysis of knowledge might be applied to them. A few of the less important of his criticisms, such as the argument on miracles, became then and have since remained public property and matter of general discussion. But the full significance of his work on the theological side was not at the time perceived, and justice has barely been done to the admirable manner in which he reduced the theological disputes of the century to their ultimate elements. The importance of the Dialogues on Natural Religion, as a contribution to the criticism of theological ideas and methods, can hardly be over-estimated. A brief survey of its contents will be sufficient to show its general nature and its relations to such works as Clarke's Demonstration and Butler's Analogy. The Dialogues introduce three interlocutors, Demea, Cleanthes and Philo, who represent three distinct orders of theological opinion. The first is the type of a certain a priori view, then regarded as the safest bulwark against infidelity, of which the main tenets were that the being of God was capable of a priori proof, and that, owing to the finitude of our faculties, the attributes and modes of operation of deity were absolutely incomprehensible. The second is the typical deist of Locke's school, improved as regards his philosophy, and holding that the only possible proof of God's existence was a posteriori, from design, and that such proof was, on the whole, sufficient. The third is the type of completed empiricism or scepticism, holding that no argument, either from reason or experience, can transcend experience, and consequently that no proof of God's existence is at all possible. The views of the first and second are played off against one another, and criticized by the third with great literary skill and effect. Cleanthes, who maintains that the doctrine of the incomprehensi- bility of God is hardly distinguishable from atheism, is compelled by the arguments of Philo to reduce to a minimum the conclusion capable of being inferred from experience as regards the existence of God. For Philo lays stress upon the weakness of the analogical argument, points out that the demand for an ultimate cause is no more satisfied by thought than by nature itself, shows that the argument from design cannot warrant the inference of a perfect or infinite or even of a single deity, and finally, carrying out his principles to the full extent, maintains that, as we have no experience of the origin of the world, no argument from experience can carry us to its origin, and that the apparent marks of design in the structure of animals are only results from the

conditions of their actual existence. So far as argument from nature is concerned, a total suspension of judgment is our only reasonable resource. Nor does the a priori argument in any of its forms fare better, for reason can never demon- strate a matter of fact, and, unless we know that the world had a beginning in time, we cannot insist that it must have had a cause Demea, who is willing to give up his abstract proof, brings forward the ordinary theological topic, man's consciousness of his own imperfection, misery and dependent condition. Nature is throughout

corrupt and polluted, but " the present evil phenomena are rectified in other regions and in some future period of existence " Such a view satisfies neither of his interlocutors. Cleanthes, pointing out that from a nature thoroughly evil we can never prove the existence ot an infinitely powerful and benevolent Creator, hazards the con- J Tfu-, Ure u that the deity ' though all-benevolent, is not all-powerful Philo, however, pushing his principles to their full consequences, shows that unless we .assumed (or knew) beforehand that the system ot nature was the work of a benevolent but limited deity, we certainly could not, from the facts of nature, infer the benevolence of its creator. Cleanthes s view is, therefore, an hypothesis, and in no sense an inference.

The Dialogues ought here to conclude. There is, however ap- pended one of those perplexing statements of personal opinion (for Hume declares Cleanthes to be his mouthpiece) not uncommon among writers of this period. Cleanthes and Philo come to an agree- ment, in admitting a certain illogical force in the a posteriori argu- ment or, at least, in expressing a conviction as to God's existence which may not perhaps be altogether devoid of foundation The precise value of such a declaration must be matter of conjecture Probably the true statement of Hume's attitude regarding the problem is the somewhat melancholy utterance with which the Dialogues close.

It is apparent, even from the brief summary just given, that the importance of Hume in the history of philosophy consists in the vigour and ogical exactness with which he develops a particular metaphysical view. Inconsistencies, no doubt, are to be detected in his system, but they arise from the limitations of the view itself and not, as in the case of Locke and Berkeley, from imperfect grasp ot the principle and endeavour to unite with it others radically incompatible In Hume s theory of knowledge we have the final expression of what may be called psychological individualism or atomism, while his ethics and doctrine of religion are but the loeical consequences of this theory. So far as metaphysic is concerned Hume has given the final word of the empirical school, and all additions, whether

from the specifically psychological side or from the general history of human culture, are subordinate in character and affect in no way the nature of his results. It is no exaggeration r° | a U-n at th , e ! ate l" En g lish school of philosophy represented by J S Mill made in theory no advance beyond Hume. In the logic ot Mill, eg., we find much of a special character that has no counter- part in Hume, much that is introduced a b extra, from general con- siderations of scientific procedure, but, so far as the groundwork is concerned the System of Logic is a mere reproduction of Hume's doctrine of knowledge. It is impossible for any reader of Mill's remarkable posthumous essay on theism to avoid the reflection that in substance the treatment is identical with that of the Dialogues on Natural Religion, while on the whole the superiority in critical force must be assigned to the earlier work.

2 Hume's eminence in the fields of philosophy and history must not be allowed to obscure his importance as a political economist Economics. Berkeley had already, in the Querist, attacked the mercan- f,,,, ♦• V theor y ? f T the nature of national wealth and the

rETp m ° ney ' a r? ˆehad, in a partial manner, shown that political economy could with advantage be viewed in relation to the modern system of critical philosophy. But Hume was the first to apply to economics the scientific methods of his philosophy His services to economics may be summed up in two heads: (i) he established the relation between economic facts and the fundamental phenomena of social life, and (2) he introduced into the study of these facts the new historical method. Thus, though he gave no special

taiTrnerVnl h< ? >'" ^^ the subject-matfer, and indicated the true method, ot economic science. His economic essays were published in the volumes entitled Political Discourses (1752) and Essays and J realises on Several Subjects (1753) ; the most important are those on Commerce, on Money, on Interest and on the Balance of Trade but notwithstanding the disconnected form of the essays in general the other less important essays combine to make a complete economic system. \e have said that Berkeley and Locke had already be™un the general work for which Hume is most important; in details Ilso Hume had been anticipated to some extent. Nicholas Barbon and Sir Dudley iwth had already attacked the mercantile theory as to BˆrhTTJ m T }S f" d the balance of trade; Joseph Massi and Barbon had anticipated his theory of interest. Yet when we com- pare Hume with Adam Smith, the advance which Hume had made on Ins predecessors in lucmity of exposition and subtlety of intellect becomes clear, and modern criticism is agreed that the main errors of Adam Smith are to be found in those deductions which deviate from ˆp S ! Ult? ii 0f th f P ° ht ˆ Discourses. A very few examples mu™ suffice to illustrate his

services to economics

In dealing with money, he refutes the Mercantile School, which

had tended to confound it with wealth. ” Money,” said Hume “is

Money. none ot the wheels of trade ; it is the oil which renders the

motion of the wheels more smooth and easy.” ” Money

and commodities are the real strength of any community.” From

™ r ema f ‘ aS dlStmCt h0m , the ‘/ˆnational, aspect, the absolute quantity of money supposed as of fixed amount, in a country, is of

interrhfnT T’ whlle a qUan ˆ larger than is required for the and to rir!v P °L C0 – mm0tll f tleS IS ‘ n J urious . as ending to raise prices and to drive foreigners from the home markets. It is only during

883

the period of acquisition of money, and before the rise in prices, that the accumulation of precious metals is advantageous. This principle is R7,i ap ˆ ,, umes most important economic discovery (cf F A Walker s Money m its Relations to Trade and Industry, London 1880′ p. 84 sqq.). He goes on to show that the variations of prices are due solely to money and commodities in circulation. Further it is a misconception to regard as injurious the passage of money into foreign countries. ‘ A government,” he says, ” has great reason to preserve with care its people and its manufactures; it? money it may sate y trust to the course of human affairs without fear or jealousy/’ Dealing with the phenomena of interest, he exposes the old fallacy that the rate depends upon the amount of money /nteres< – in a country; low interest does not follow on abundance of money (lhe reduction in the rate of interest must, in general, result from the increase of industry and frugality, of arts and commerce " In connexion with this he emphasizes a too generally neglected factor in economic phenomena, the constant and insatiable desire of the mind for exercise and employment." " Interest," he says in general is the barometer of the state, and its lowness an almost infallible sign of prosperity," arising as it does, from increased trade, frugality n the merchant class, and the consequent rise of new lenders: low interest and low profits mutually forward each other. In the matter of free trade and protection he compromises. He says on the one hand, not only as a man, but as a British subject Free

1 pray for the flourishing commerce of Germany, Spain trade ‘

Italy and even France itself," and condemns " the numerous bars obstructions and imposts which all nations of Europe, and none more than England, have put upon trade." On the other hand he approves of a protective tax on German linen in favour of home manufactures, and of a tax on brandy as encouraging the sale of rum and so supporting our southern colonies. Indeed it has been fairly observed that Hume retains an attitude of refined mercantilism With regard to taxation he takes very definite views. The best taxS' he says, are those levied on consumption, especially on luxuries, lor these are least heavily felt. He denies that Taxai 'o« all taxes fall finally on the land. Superior frugality and and industry on the part of the artisan will enable him to pav nM,ottal taxes without mechanically raising the price of labour debU Here, as in other points, he differs entirely from the physiocrats, and his criticism of contemporary French views are, as a whole in accordance with received modern opinion. For the modern expe- dient of raising money for national emergencies by way of loan he has a profouncTdistrust He was convinced that what is bad for the individual credit must be bad for the state also. A national debt he maintains enriches the capital at the expense of the provinces- further, it creates a leisured class of stockholders, and possesses all die disadvantages of paper credit. " Either the nation mu tTestroy public credit, or public credit will destroy the nation." To sum up, it may be said that Hume enunciated the principle that " everv- th ng in the world is purchased by labour, and our passions are the only causes of labour "; and further, that, in analysing the complex phenomena of commerce he is superior sometimes to Adam Smith in that he never forgets that the ultimate causes of economic change

of nrnhlˆ" 3 – T S K nd m \ nn ? rS I ° f , the pe °P le – and that the solution of problems is to be sought in the elementary factors of industry

.fDˆTT'l' Life.~JH. Burton's £,/, and Correspondence of David Hume (2 vols. 1846); Dr G. Birkbeck Hill, Letters of HuZ to William Strahan; C. J. W Francke, David Hume Haarlemf 1907T 1 .Woˆ.-Until 1874 the standard edition was that of 1826 (repnnted 1854), m 4 vols. The best modern edition is that in 4 vols ,L 11 fu-t? d T ' ¥■■ G , rose Containing a valuable introduction

and excellent bibliographical matter) ; the Enquiry and the Treatise (1894 and 1896, Oxford), edited by L. A. Selby-Bigge

3. Philosophic (the more important only can be quoted 1) — Huxley sHume (a popular reproduction of Hume's views in " English rvrr°L L r t Tm s); Slr h Ste Phen's English Thought I the XVIIIth Century (1876, especially ch. vi.) ; J. Orr, David Hume and his Influence on Philosophy and Theology (1903, especially chix on

Mora Theory of Hume »); H. Ca&woU Da^UHume M especially ch. vu. on Hume's attitude to religion); A. Seth Scottish

i f HtZrJ^v % a H -T e; % JodI ' Leben ™ d PhUoZpUe fwP' ^ ; E-Paeiderer, Empirismus und Skepsis in D. Humes Philosophic (1874); G Spicker, Kant, Hume und Berkeley U875), U Compayre, La Philosophic de D. Hume (1873)- A Meinong : Hume-Studien (1877, especially Hume's nominalism) :

*Di/rnh% l n A (a * ?T$ ™P° siti ? n of Hume's utilitarianism) Vie Ethik D. Humes (1878 ; G. Lechartier, D. Hume, moraliste e* sociologue (1900); M. Klemme, Die volkswirtschafafcheTlnchau- ungen D Humes (1900); E. Marcus, Rants RevolutionspHnTp. Eineexakte Losung des Kant-Hume' 'schen Erkenntnisproblems(iqo2)- C. Hedvall Humes Erkennlnistheorie (1906); R. Honigswald, tjber die Lehre Humes von der Realitdt der Aussendinge (1904) ; O Ouast Der Begrifdes Belief bei David Hume (1903). Hume's relation to the society of his time is described in the Rev. H. G. Graham's Social Life in Scotland and Scottish Men of Letters; "Jupiter" in Carlvle's Autobiography. J. MacCosh published a short pamphlet "1884) con! ta.ning interesting but perhaps not conclusive arguments on the Agnosticism of Hume and Huxley.*

a L Jr,n° n ?^~" J i; ?° nar ' PUlos °P h y < ™d Political Economy (London, 1893), chapter on Hume; notes to W. G. F Roscher's

Principles of Political Economy (J. Lalor's trans, of lathed., New York, 1878); F. A. Walker's Money (New York, 1877) gives an account of Hume's views on interest and money; H. H. Gibbs (Lord Aldenham), Colloquy on the Currency; for Hume's relation to Adam Smith, John Rae's Life of Adam Smith (London, 1895). See also M. Teisseire, Les Essais economiques de David Hume (1902 ; a critical study) ; A. Schatz, L'CEuvre economique de David Hume (1902). (R. Ad. ; J. M. M.)

HUME, JOSEPH (1777-1855), British politician, was born on the 22nd of January 1777, of humble parents, at Montrose, Scotland. After completing his course of medical study at the university of Edinburgh he sailed in 1797 for India, where he was attached as surgeon to a regiment; and his knowledge of the native tongues and his capacity for business threw open to him the lucrative offices of interpreter and commissary-general. In 1802, on the eve of Lord Lake's Mahratta war, his chemical knowledge enabled him to render a signal service to the admi- nistration by making available a

large quantity of gunpowder which damp had spoiled. In 1808, on the restoration of peace, he resigned all his civil appointments, and returned home in the possession of a fortune of £40,000. Between 1808 and 181 1 he travelled much both in England and the south of Europe, and in 181 2 published a blank verse translation of the Inferno. In 181 2 he purchased a seat in parliament for Weymouth and voted as a Tory. When upon the dissolution of parliament the patron refused to return him he brought an action and re- covered part of his money. Six years elapsed before he again entered the House, and during that interval he had made the acquaintance and imbibed the doctrines of James Mill and the philosophical reformers of the school of Bentham. He had joined his efforts to those of Francis Place, of Westminster, and other philanthropists, to relieve and improve the condition of the working classes, labouring especially to establish schools for them on the Lancasterian system, and promoting the forma- tion of savings banks. In 1818, soon after his marriage with Miss Burnley, the daughter of an East India director, he was returned to parliament as member for the Border burghs. He was afterwards successively elected for Middlesex (1830), Kil- kenny (1837) and for the Montrose burghs (1842), in the service of which constituency he died. From the date of his re-entering the House Hume became the self-elected guardian of the public purse, by challenging and bringing to a direct vote every single item of public expenditure. In 1820 he secured the appointment of a committee to report on the expense of collecting the revenue. He was incessantly on his legs in committee, and became a name for an opposition bandog who gave chancellors of the exchequer no peace. He undoubtedly exercised a check on extravagance, and he did real service by helping to abolish the sinking fund. It was he who caused the word " retrenchment " to be added to the Radical programme " peace and reform." He carried on a suc- cessful warfare against the old combination laws that hampered workmen and favoured masters; he brought about the repeal of the laws prohibiting the export of machinery and of the act preventing workmen from going abroad. He constantly pro- tested against flogging in the army, the impressment of sailors and imprisonment for debt. He took up the question of light- houses and harbours; in the former he secured greater efficiency, in the latter he prevented useless expenditure. Apart from his pertinacious fight for economy Hume was not always fortunate in his political activity. He was conspicuous in the agitation raised by the so-called Orange plot to set aside King William IV. in favour of the duke of Cumberland (1835 and 1836). His action as trustee for the notorious Greek Loan in 1824 was at least not delicate, and was the ground of charges of downright dishonesty. He died on the 20th of February 1855.

A Memorial of Hume was published by his son Joseph Burnley Hume (London, 1855).

HUMILIATI, the name of an Italian monastic order created in the 1 2th century. Its origin is obscure. According to some chroniclers, certain noblemen of Lombardy, who had offended the emperor (either Conrad III. or Frederick Barbarossa), were carried captive into Germany and after suffering the miseries of exile for some time, " humiliated " themselves before the emperor. Returning to their own country, they did penance

and took the name of Humiliati. They do not seem to have had any fixed rule, nor did St Bernard succeed in inducing them to submit to one. The traditions relating to a reform of this order by St John of Meda are ill authenticated, his Acta (Acta sanc- torum Boll., Sept., vii. 320) being almost entirely unsupported by contemporary evidence. The " Chronicon anonymi Laudu- nensis canonici " (Mon. Germ. hist. Scriptores, xxvi. 449), at date 1 1 78, states that a group of Lombards came to Rome with the intention of obtaining the pope's approval of the rule of life which they had spontaneously chosen; while continuing to live in their houses in the midst of their families, they wished to lead a more pious existence than of old, to abandon oaths and litigation, to content themselves with a modest dress, and all in a spirit of Catholic piety. The pope approved their resolve to live in humility and purity, but forbade them to hold assemblies and to preach in public; the chronicler adding that they in- fringed the pope's wish and thus drew upon themselves his excommunication. Their name, Humiliati (" Humiles " would have been more appropriate) , arose from the fact that the clothes they wore were very simple and of one colour. This lay fraternity spread rapidly and soon put forth two new branches, a second order composed of women, and a third composed of priests. No sooner, however, had this order of priests been formed, than it claimed precedence of the others, and, though chronologically last, was called primus ordo by hierarchical right — propter tonsuram (see P. Sabatier, ' " Regula antiqua Fr. et Sor. de poenitentia " in Opuscules de critique historique, part i. p. 15). In 1 201 Pope Innocent III. granted a rule to this third order. Sabatier has drawn attention to the resemblances between this rule and the Regula de poenitentia granted to Franciscanism in the course of its development; on the other hand, it is incon- testable that Innocent III. wished to reconcile the order with the Waldenses, and, indeed, its rule reproduces several of the Waldensian propositions, ingeniously modified in the orthodox sense, but still very easily recognizable. It forbade useless oaths and the taking of God's name in vain; allowed voluntary poverty and marriage; regulated pious exercises; and approved the solidarity which already existed among the members of the association. Finally, by a singular concession, it authorized them to meet on Sunday to listen to the words of a brother " of proved faith and prudent piety," on condition that the hearers should not discuss among themselves either the articles of faith or the sacraments of the church. The bishops were forbidden to oppose any

of the utterances of the Humiliati brethren, " for the spirit must not be stifled." James of Vitry, without being unfavourable to their tendencies, represents their association as one of the peculiarities of the church of his time (Historia orientalis, Douai, 1597)'. So broad a discipline must of necessity have led back some waverers into the pale of the church, but the Waldenses of Lombardy, in their congregationes labor antium, preserved the tradition of the independent Humiliati. Indeed, this tradition is confounded throughout the later 12th century with the history of the Waldenses. The " Chronicon Urspergense " (Mon. Germ. hist. Scriptores, xxiii. 376-377) mentions the Humiliati as one of the two Waldensian sects. The celebrated decretal promulgated in 1184 by Pope Lucius III. at the council of Verona against all heretics condemns at the same time as the " Poor Men of Lyons " " those who attribute to themselves falsely the name of Humiliati," at the very time when this name denoted an order recognized by the papacy. This order, though orthodox, was always held in tacit and ever- increasing suspicion, and, in consequence of grave disorders, Pius V. suppressed the entire congregation in February 1570-71. See Tiraboschi, Vetera humiliatorum monumenta (Milan, 1766) ; K. Milller, Die Waldenser (Gotha, 1886); W. Preger, Beitrage zur Geschichte der Waldensier (Munich, 1875). (P. A.)

HUMITE, a group of minerals consisting of basic magnesium fluo-silicates, with the following formulae: — Chondrodite, Mg 3 [Mg(F,OH)] 2 [Si0 4] 2 ; Humite, Mg 6 [Mg(F,OH)] 2 [Si0 4] 3 ; Clinohumite, Mg 7 [Mg(F,OH)] 2 [Si0 4] 4 . Humite crystallizes in the orthorhombic and the two others in the monoclinic system, but between them there is a close crystallographic relation: the

lengths of the vertical axes are in the ratio 5 ! 7 : 9> md this is also the ratio of the number of magnesium atoms present in each of the three minerals. These minerals are strikingly similar in appearance, and can only be distinguished by the goniometric measurement of the complex crystals. They are honey-yellow to brown or red in colour, and have a vitreous to resinous lustre; the hardness is 6-65, and the specific gravity 3-1-3-2. Further, they often occur associated together, and it is only comparatively recently that the three species have been properly discriminated. The name humite, after Sir Abraham Hume, Bart. (1749-1839), whose collection of diamond crystals is preserved at Cambridge in the University museum, was given by the comte de Bournon in 1813 to the small and brilliant honey-yellow crystals found in the blocks of crystalline limestone ejected from Monte Somma, Vesuvius; all three species have since been recognized at

this locality. Chondrodite (from xovSpos, ” a grain “) was a name early (1817) in use for granular forms of these minerals found embedded in crystalline limestones in Sweden, Finland and at several place in New York and New Jersey. Large hyacinth-red crystals of all three species are associated with magnetite in the Tilly Foster iron-mine at Brewster, New York; and at Kafveltorp in Orebro, Sweden, similar crystals (of chondrodite) occur em- bedded in galena and chalcopyrite.

The relation mentioned above between the crystallographic constants and the chemical composition is unique amongst minerals, and is known as a morphotropic relation. S. L. Penfield and W. T. H. Howe, who in 1894 noticed this relation, predicted the existence of another member of the series, the crystals of which would have a still shorter vertical axis and contain less magnesium, the formula being Mg[Mg(F,OH)]2Si04; this has since been discovered and named prolectite (from irpoKeytiv, ” to foretell “). (L. J. S.)

HUMMEL, JOHAKN NEPOMUK (1778-1837), German com- poser and pianist, was born on the 14th of November 1778, at Pressburg, in Hungary, and received his first artistic training from his father, himself a musician. In 1785 the latter received an appointment as conductor of the orchestra at the theatre of Schikaneder, the friend of Mozart and the librettist of the Magic Flute. It was in this way that Hummel became acquainted with the composer, who took a great fancy to him, and even invited him to his house for a considerable period. During two years, from the age of seven to nine, Hummel received the invaluable instruction of Mozart, after which he set out with his father on an artistic tour through Germany, England and other countries, his clever playing winning the admiration of amateurs. He began to compose in his eleventh year. After his return to Vienna he completed his studies under Albrechtsberger and Haydn, and for a number of years devoted himself exclusively to composition. At a later period he learned song-writing from Salieri. For some years he held the appointment of orchestral conductor to Prince Eszterhazy, probably entering upon this office in 1807. From 181 1 to 1815 he lived in Vienna. On the 18th of May 1813 he married Elisabeth Rockl, a singer, and the sister of one of Beet- hoven’s friends. It was not till 1816 that he again appeared in public as a pianist, his success being quite extraordinary. His gift of improvisation at the piano was especially admired, but his larger compositions also were highly appreciated, and for a time Hummel was considered one of the leading musicians of an age in which Beethoven was in the zenith of his power. In Prussia, which he visited in 1822, the ovations offered to him were un- precedented, and other countries — France in 1825 and 1829, Belgium in 1826 and England in 1830 and 1833 — added further laurels to his crown. He died in 1837 at Weimar, where for a long time he had been the musical

conductor of the court theatre. His compositions are very numerous, and comprise almost every branch of music. He wrote, amongst other things, several operas, both tragic and comic, and two grand masses (Op. 80 and in). Infinitely more important are his compositions for the pianoforte (his two concerti in A minor and B minor, and the sonata in F sharp minor), and his chamber music (the celebrated septet, and several trios, &c). His experience as a player and teacher of the pianoforte was embodied in his Great

Pianoforte School (Vienna), and the excellence of his method is further proved by such pupils as Henselt and Ferdinand Hiller. Both as a composer and as a pianist Hummel continued the traditions of the earlier Viennese school of Mozart and Haydn; his style in both capacities was marked by purity and correctness rather than by passion and imagination.

HUMMING-BIRD, a name in use, possibly ever since English explorers first knew of them, for the beautiful little creatures to which, from the sound occasionally made by the rapid vibra- tions of their wings, it is applied. Among books that are ordi- narily in naturalists' hands, the name seems to be first found in the Musaeum Tradescantianum, published in 1656, but it therein occurs (p. 3) so as to suggest its having already been accepted and commonly understood; and its earliest use, as yet traced, is by Thomas Morton (d. 1646), a disreputable lawyer who had a curiously adventurous career in New England, in the New English Canaan, printed in 1637 — a rare work giving an interesting description of the natural scenery and social life in New England in the 17th century, and reproduced by Peter Force in his Historical Tracts (vol. ii., Washington, 1838). Andre Thevet, in his Singularitez de la France anlarctique (Antwerp, 1558, fol. 92), has been more than once cited as the earliest author to mention humming-birds, which he did under the name of Gouambuch; but it is quite certain that Oviedo, whose Hysteria general de las Indias was published at Toledo in 1525, preceded him by more than thirty years, with an account of the " paxaro mosquito " of Hispaniola, of which island " the first chronicler of the Indies " was governor. 1 This name, though now apparently disused in Spanish, must have been current about that time, for we find Gesner in 1555 {De avium natura, iii. 629) translating it literally into Latin as Passer muscatus, owing, as he says, his knowledge of the bird to Cardan, the celebrated mathematician, astrologer and physician, from whom we learn (Comment, in Ptolem. de astr. judiciis, Basel, 1554, p. 472) that, on his return to Milan from professionally attending Archbishop Hamilton at Edinburgh, he visited Gesner at Zurich, about the end of the year 1552. 2 The name still survives in the French oiseau-mouche; but the ordinary Spanish appellation is, and long has been, Tominejo, from tomin, signifying a weight equal to the third part of an adarme or drachm, and used meta- phorically for anything very small. Humming-birds, however, are called by

a variety of other names, many of them derived from American languages, such as Guainumbi, Ourissia and Colibri, to say nothing of others bestowed upon them (chiefly from some peculiarity of habit) by Europeans, like Picaflores, Chuparosa and Froufrou. Barrere, in 1745, conceiving that humming-birds were allied to the wren, the Trochilus, 3 in part, of

1 In the edition of Oviedo's work published at Salamanca in 1547, the account (lib. xiv. cap. 4) runs thus: " Ay assi mismo enesta ysla vnos paxaricos tan negros como vn terciopelo negro muy bueno & son tan pequenos que ningunos he yo visto en Indias menores/ ex- cepto el que aca se llama paxaro mosquito. El qual es tan pequeno que el bulto del es menor harto o assaz que le cabega del dedo pulgar de la mano. Este no le he visto enesta Ysla pero dizen me que aqui los ay: & por esso dexo de hablar enel pa lo dezir dode los he visto que es en la tierra firme quado della se trate." A modern Spanish version of this passage will be found in the beautiful edition of Oviedo's works published by the Academy of Madrid in 1 851 (i. 444).

2 See also Morley's Life of Girolamo Cardano (ii. 152, 153).

3 Under this name Pliny perpetuated (Hist, naturalis, viii. 25) the confusion that had doubtless arisen before his time of two very distinct birds. As Sundevall remarks (Tentamen, p. 87, note), rpoxfXos was evidently the name commonly given by the anciejit Greeks to the smaller plovers, and was not improperly applied by Herodotus (ii. 68) to the species that feeds in the open mouth of the crocodile — the Pluvianus aegyptius of modern ornithologists — in which sense Aristotle (Hist, animalium, ix. 6) also uses it. But the received text of Aristotle has two other passages (ix. I and n) wherein the word appears in a wholly different connexion, and can there be only taken to mean the wren— the usual Greek name of which would seem to be iipxiXos (Sundevall, Om Aristotl. Djurarter, No. 54). Though none of his editors or commentators has suggested the possibility of such a thing, one can hardly help suspecting that in these passages some early copyist has substituted rpoxDios for opxiXos, and so laid the foundation of a curious error. It may be re- marked that the crocodile of Santo Domingo is said to have the like office done for it by some kind of bird, which is called by Descourtilz

Pliny, applied that name in a generic sense (Ornith. spec, novum, pp. 47, 48) to both. Taking the hint thus afforded, Linnaeus very soon after went farther, and, excluding the wrens, founded his genus Trochilus for the

reception of such humming-birds as were known to him. The unfortunate act of the great nomen- clator cannot be set aside ; and, since his time, ornithologists, with but few exceptions, have followed his example, so that nowadays humming-birds are universally recognized as forming the family Trochilidae.

The relations of the Trochilidae to other birds were for a long while very imperfectly understood. Nitzsch first drew attention to their agreement in many essential characters with the swifts, Cypselidae, and placed the two families in one group, which he called Macrochires, from the great length of their manual bones, or those forming the extremity of the wing. The name was perhaps not very happily chosen, for it is not the distal portion that is so much out of ordinary proportion to the size of the bird, but the proximal and median portions, which in both families are curiously dwarfed. Still the manus, in comparison with the other parts of the wing, is so long that the term Macrochires is not wholly inaccurate. The affinity of the Trochilidae and Cypselidae, once pointed out, became obvious to every careful and unprejudiced investigator, and there are probably few systematists now living who refuse to admit its validity. More than this, it is confirmed by an examination of other osteological characters. The " lines," as a boat-builder would say, upon which the skeleton of each form is constructed are precisely similar, only that whereas the bill is very short and the head wide in the swifts, in the humming-birds the head is narrow and the bill long — the latter developed to an extraordinary degree in some of the Trochilidae, rendering them the longest-billed birds known. 1 Huxley takes these two families, together with the goatsuckers (Caprimulgidae) , to form the division Cypselo- morphae — one of the two into which he separated his larger group Aegithognathae. However, the most noticeable portion of the humming-bird's skeleton is the sternum, which in propor- tion to the size of the bird is enormously developed both longi- tudinally and vertically, its deep keel and posterior protraction affording abundant space for the powerful muscles which drive the wings in their rapid vibrations as the little creature poises itself over the flowers where it finds its food. 2

So far as is known, all humming-birds possess a protrusible tongue, in conformation peculiar among the class Aves, though to some extent similar to that member in the woodpeckers (Picidae) 3 — the " horns " of the hyoid apparatus upon which it is seated being greatly elongated, passing round and over the back part of the head, near the top of which they meet, and thence proceed forward, lodged in a broad and deep groove, till they terminate in front of the eyes. But, unlike the tongue of the woodpeckers, that of the humming-birds consists of two cylindrical tubes, tapering towards the point, and forming two sheaths which contain the extensile portion, and are capable of separation, thereby facilitating the extraction of

honey from the nectaries of flowers, and with it, what is of far greater import- ance for the bird's sustenance, the small insects that have been attracted to feed upon the honey. 4 These, on the tongue being withdrawn into the bill, are caught by the mandibles (furnished

(Voyage, iii. 26), a " Todier," but, as Geoffr. St Hilaire observes (Descr. de VEgypte, ed. 2, xxiv. 440), is more probably a plover. Unfortunately the fauna of Hispaniola is not much better known now than in Oviedo's days.

1 Thus Docimastes ensifer, in which the bill is longer than both head and body together.

2 This is especially the case with the smaller species of the group, for the larger, though shooting with equal celerity from place to place, seem to flap their wings with comparatively slow but not less powerful strokes. The difference was especially observed with re- spect to the largest of all humming-birds, Patagona gigas, by Darwin.

3 The resemblance, so far as it exists, must be merely the result of analogical function, and certainly indicates no affinity between the families.

4 It is probable that in various members of the Trochilidae the structure of the tongue, and other parts correlated therewith, will be found subject to several and perhaps considerable modifications, as is the case in various members of the Picidae.

in the males of many species with fine, horny, saw like teeth 6), and swallowed in the usual way. The stomach is small, mode- rately muscular, and with the inner coat slightly hardened. There seem to be no caeca. The trachea is remarkably short, the bronchi beginning high up on the throat, and song-muscles are wholly wanting, as in all other Cypselomorphae. 6

Humming-birds comprehend the smallest members of the class Aves. The largest among them measures no more than 8| and the least 2% in. in length, for it is now admitted generally that Sloane must have been in error when he described (Voyage, ii. 308) the " least humming-bird of Jamaica" as "about i\ in. long from the end of the bill to that of the tail " — unless, indeed, he meant the proximal end of each. There are, however, several species in which the tail is very much elongated, such as the Aithurus polytmus (fig. 1) of Jamaica, and the remarkable Loddigesia mira- bilis of Chacha- poyas in Peru, which last was for some time only known from a unique specimen

(Ibis, i88o,p. 152);

but "trochilidists"

in giving their

measurements do

not take these ex-

traordinary de- velopments into

account. Next to their generally small

size, the best-known characteristic of the

Trochilidae is the wonderful brilliancy of the

plumage of nearly all their forms, in which

respect they are surpassed by no other

birds, and are only equalled by a few, as,

for instance, by the Nectariniidae, or sun- birds of the tropical parts of the Old World,

in popular estimation so often confounded

with them.

The number of species of , humming-birds

now known to exist considerably exceeds 400;

and, though none departs very widely from what

a morphologist would deem the typical struc- ture of the family, the amount of modification,

within certain limits, presented by the various

forms is surprising and even bewildering to

the uninitiated. But the features that are

*, * 1 I * JJUUJ, UJ J—V uncivil*

ordinarily chosen by systematic ornithologists Macmillan & Co., Ltd.

in drawing up their schemes of classification are p Aithurus

*found by the " trochilidists," or special students polytmus of the Trochilidae, insufficient for the purpose of v * arranging these birds in groups, and characters*

on which genera can be founded have to be sought in the style and coloration of plumage, as well as in the form and proportions of those parts which are most generally deemed sufficient to furnish them. Looking to the large number of species to be taken into account, convenience has demanded what science would withhold, and the genera established by the ornithologists of a preceding generation nave been broken up by their successors into multitudinous sections — the more adventurous making from 150 to 180 of such groups, the modest being content with 120 or thereabouts, but the last dignifying each of them by the title of genus. It is of course obvious that these small divisions cannot be here considered in detail, nor would much advantage accrue by giving statistics from the works of recent trochilidists, such as Gould, 7 Mulsant 8 and Elliot. 9 It would be as unprofitable here to trace the successive steps hy which the original genus Trochilus of Linnaeus, or the two genera Polytmus "a((d Mellisuga of Brisson, have been split into others, or have been added

6 These are especially observable in Rhamphodon naevius and Androdon aequatorialis.

6 P. H. Gosse (Birds of Jamaica, p. 130) says that Mellisuga minima, the smallest species of the family, has " a real song " — but the like is not recorded of any other.

7 A Monograph of the Trochilidae or Humming-birds, 5 vols. imp. fol. (London, 1861, with Introduction in 8vo).

8 Histoire naturelle des oiseaux-mouches, ou colibris, 4 vols., with supplement, imp. 4to (Lyon-Geneve-Bale, 1874-1877).

9 Smithsonian Contributions to Knowledge, No. 317, A Classification and Synopsis of the Trochilidae, 1 vol. imp. 4to (Washington, 1879).

From The Cambridge Natural History, vol. xi., ' Birds," by permission of

to, by modern writers, for not one of these professes to have arrived at any final, but only a provisional, arrangement; it seems, however, expedient to notice the fact that some of the authors of the 1 8th century l supposed themselves to have seen the way to dividing what we now know as the family Trochilidae into two groups, the distinc- tion between which was that in the one the bill was arched and in the other straight, since that difference has been insisted on in many works. This was especially the view taken by Brisson and Buffon, who termed the birds having the arched bill " colibris," and those having it straight " oiseaux-mouches." The distinction wholly breaks down, not merely because there are Trochilidae which possess almost every gradation of decurvation of the bill, but some which have the bill upturned after the manner of that strange bird the avocet, 2 while it may be remarked that several of the species placed by those authorities among the " colibris " are not humming-birds at all.

In describing the extraordinary brilliant plumage which most of the Trochilidae exhibit, ornithologists have been compelled to adopt the vocabulary of the jeweller in order to give an idea of the inde- scribable radiance that so often breaks forth from some part or other of the investments of these feathered gems. In all, save a few other birds, the most imaginative writer sees gleams which heraay adequately designate metallic, from their resemblance to burnished gold, bronze, copper or steel, but such similitudes wholly fail when he has to do with the Trochilidae, and there is hardly a precious stone — ruby, amethyst, sapphire, emerald or topaz — the name of which may not fitly, and without any exaggeration, be employed in regard to humming-birds. In some cases this radiance beams from the brow, in some it glows from the throat, in others it shines from the tail-coverts, in others it sparkles from the tip only of elongated feathers that crest the head or surround the neck as with a frill, while again in others it may appear as a luminous streak across the cheek or auriculars. The feathers that cover the upper parts of the body very frequently have a metallic lustre of golden-green, which in other birds would be thought sufficiently beautiful, but in the Trochilidae its sheen is overpowered by the almost dazzling splendour that radiates from the spots where Nature's lapidary has set her jewels. The flight feathers are almost invariably dusky — the rapidity of their movement would, perhaps, render any display of colour ineffective: while, on the contrary, the feathers of the tail, which, as the bird hovers over its food-bearing flowers, is almost always expanded, and is therefore comparatively motionless, often exhibit a rich trans- lucency, as of stained glass, but iridescent in a manner that no stained glass ever is — cinnamon merging into crimson, crimson changing to purple, purple to violet, and so to indigo and bottle- green. But this part of the humming-bird is subject to quite as much modification in form as in colour, though always consisting of ten rec trices. It may be nearly square, or at

least but slightly rounded, or wedge-shaped with the middle quills prolonged beyond the rest ; or, again, it may be deeply forked, sometimes by the over- growth of one or more of the intermediate pairs, but most generally by the development of the outer pair. In the last case the lateral feathers may be either broadly webbed to their tip or acuminate, or again, in some forms, may lessen to the filiform shaft, and suddenly enlarge into a terminal spatulation as in the forms known as " racquet tails." The wings do not offer so much variation; still there are a few groups in which diversities occur that require notice. The primaries are invariably ten in number, the outermost being the longest, except in the single instance of Aithurus, where it is shorter than the next. The group known as " sabre-wings," comprising the genera Campylopterus, Eupetomena and Sphenoproctus, present a most curious sexual peculiarity, for while the female has nothing remarkable in the form of the wing, in the male the shaft of two or three of the outer primaries is dilated proximally, and bowed near the middle in a manner almost unique among birds. The feet again, diminutive as they are, are very diversified in form. In most the tarsus is bare, but in some groups, as Eriocnemis, it is clothed with tufts of the most delicate down, sometimes black, sometimes buff, but more often of a snowy whiteness. In some the toes are weak, nearly equal in length, and furnished with small rounded nails; in others they are largely developed, and armed with long and sharp claws.

Apart from the well-known brilliancy of plumage, of which enough has been here said, many humming-birds display a large amount of ornamentation in the addition to their attire of crests of various shape and size, elongated ear-tufts, projecting neck-frills, and pend- ant beards — forked or forming a single point. But it would be impossible here to dwell on a tenth of these beautiful modifications, each of which as it comes to our knowledge excites fresh surprise and exemplifies the ancient adage — maxime mira.nda in minimis Natura. It must be remarked, however, that there are certain forms which possess little or no brilliant colouring at all, but, as most tropical birds go, are very soberly clad. These are known to trochilidists as " hermits," and by Gould have been separated as a subfamily under the name of Phaethomithinae, though Elliot says he cannot find any

1 Salerne must be excepted, especially as he was rebuked by Buffon for doing what we now deem right.

2 For example Avocettula recurvirostris of Guiana and A. euryptera of Colombia.

characters to distinguish it from the Trochilidae proper. But sight is not the only sense that is affected by humming-birds. The large species known as

Pterophanes temmincki has a strong musky odour, very similar to that given off by the petrels, though, so far as appears to be known, that is the only one of them that possesses this property. 3

All well-informed people are aware that the Trochilidae are a family peculiar to America and its islands, but one of the commonest of common errors is the belief that humming-birds are found in Africa and India — to say nothing even of England. In the first two cases the mistake arises from confounding them with some of the brightly-coloured sun-birds {Nectariniidae) , to which British colonists or residents are apt to apply the better-known name ; but in the last it can be only due to the want of perception which disables the observer from distinguishing between a bird and an insect — the object seen being a hawk-moth (Macroglossa), whose mode of feeding and rapid flight certainly bears some resemblance to that of the Trochilidae, and hence one of the species {M. stellarum) is very generally called the " humming-bird hawk-moth." But though confined to the New World the Trochilidae pervade almost every part of it. In the south Eustephanus galeritus has been seen flitting about the fuchsias of Tierra del Fuego in a snow-storm, and in the north- west Selatophorus rufus in summer visits the ribes-blossoms of Sitka, while in the north-east Trochilus colubris charms the vision of Canadians as it poises itself over the althaea-bushes in their gardens, and extends its range at least so far as lat. 57° N. Nor is the distri- bution of humming-birds limited to a horizontal direction only, it rises also vertically. Oreotrochilus chimborazo and 0. pichincha live on the lofty mountains whence each takes its specific name, but just beneath the line of perpetual snow, at an elevation of some 16,000 ft., dwelling in a world of almost constant hail, sleet and rain, and- feeding on the insects which resort to the indigenous flower- ing plants, while other peaks, only inferior to these in height, are no less frequented by one or more species. Peru and Bolivia produce some of the most splen- did of the family — the genera Comcles, Diphlogaena and Thau- mastura, whose very names indicate the glories of their bearers. The comparatively gigantic Patagona inhabits the west coast of South America, while the isolated rocks of Juan Fernandez not only afford a home to the Eustephanus but [also to two other species of the same genus which are not found elsewhere. The slopes of the Northern Andes and the hill country of Colombia furnish perhaps the greatest number of Fig. 2. — Eulampis jugularus. forms, and some of the most

beautiful, but leaving that great range, we part company with the largest and most gorgeously arrayed species, and their number dwindles as we approach the eastern coast. Still there are many brilliant humming-birds common enough in the Brazils, Guiana and Venezuela. The Chrysolampis mosquitus is perhaps the most plentiful. Thousands of its skins are annually sent to Europe to be used in the manufacture of ornaments, its rich ruby-

and-topaz glow rendering it one of the most beautiful objects imaginable. In the darkest depths of the Brazilian forests dwell the russet-clothed brotherhood of the genus Phaethornis — the " hermits "; but the great wooded basin of the Amazons seems to be particularly unfavourable to the Trochilidae, and from Para to Ega there are scarcely a dozen species to be met with. There is no island of the Antilles but is inhabited by one or more humming-birds, and there are some very remarkable singu- larities of geographical distribution to be found. Northwards from Panama the highlands present many genera whose names it would be useless here to insert, few or none of which are found in South America — though that must unquestionably be deemed the metro- polis of the family — and advancing towards Mexico the numbers gradually fall off. Eleven species have been enrolled among the fauna of the United States, but some on slender evidence, while others only just cross the frontier line.

The habits of humming-birds have been ably treated by writers like Waterton, Wilson and Audubon, to say nothing of P. H. Gosse, A. R. Wallace, H. W. Bates and others. But there is no one appreciative

3 The specific name of a species of Chrysolampis, commonly written by many writers moschitus, would lead to the belief that it was a mistake for moschatus, i.e. " musky," but in truth it originates with their carelessness, for though they quote Linnaeus as their authority they can never have referred to his works, or they would have found the word to be mosquitus, the " mosquito " of Oviedo, awkwardly, it is true, Latinized. If emendation be needed, muscatus, after Gesner's example, is undoubtedly, preferable.

From The Cambridge National History, vol. ix., " Birds," by permission of Mac- millan & Co. Ltd.

of the beauties of nature who will not recall to memory with delight the time when a live humming-bird first met his gaze. The sudden- ness of the apparition, even when expected, and its brief duration, are alone enough to fix the fluttering vision on the mind's eye. The wings of the bird, if flying, are only visible as a thin grey film, bounded above and below by fine black threads, in form of a St Andrew's cross, — the effect on the observer's retina of the instantane- ous reversal of the motion of the wing at each beat — the strokes being so rapid as to leave no more distinct image. Consequently an ade- quate representation of the bird on the wing cannot be produced by the draughtsman. Humming-birds show to the greatest advantage when engaged in contest with another, for rival cocks fight

fiercely, and, as may be expected, it is then that their plumage flashes with the most glowing tints. But these are quite invisible to the ordinary spectator except when very near at hand, though doubtless efficient enough for their object, whether that be to inflame their mate or to irritate or daunt their opponent, or something that we cannot com- pass. Humming-birds, however, will also often sit still for a while, chiefly in an exposed position, on a dead twig, occasionally darting into the air, either to catch a passing insect or to encounter an adversary; and so pugnacious are they that they will frequently attack birds many times bigger than themselves, without, as would seem, any provocation.

The food of humming-birds consists mainly of insects, mostly gathered in the manner already described from the flowers they visit; but, according to Wallace, there are many species which he has never seen so occupied, and the " hermits " especially seem to live almost entirely upon the insects which are found on the lower surface of leaves, over which they will closely pass their bill, balancing themselves the while vertically in the air. The same excellent observer also remarks that even among the common flower-frequent- ing species he has found the alimentary canal entirely filled with insects, and very rarely a trace of honey. It is this fact doubtless that has hindered almost all attempts at keeping them in confine- ment for any length of time — nearly every one making the experi- ment having fed his captives only with syrup, which, without the addition of some animal food, is insufficient as sustenance, and seeing therefore the wretched creatures gradually sink into inanition and die of hunger. With better management, however, several species have been brought on different occasions to Europe, some of them to England.

The beautiful nests of humming-birds, than which the work of fairies could not be conceived more delicate, are to be seen in most museums, and will be found on examination to be very solidly and tenaciously built, though the materials are generally of the slightest — cot ton- wool or some vegetable down and spiders' webs. They vary greatly in form and ornamentation — for it would seem that the portions of lichen which frequently bestud them are affixed to their exterior with that object, though probably concealment was the original intention. They are mostly cup-shaped, and the singular fact is on record (Zool. Journal, v. p. l) that in one instance as the young grew in size the walls were heightened by the parents, until at last the nest was more than twice as big as when the eggs were laid and hatched. Some species, however, suspend their nests from the stem or tendril of a climbing plant, and more than one case has been known in which it has been attached to a hanging rope. These pensile nests are said to have been found loaded on one side with a small stone or bits of earth to ensure their safe balance, though how the compensatory process is applied no one can say. Other species, and especially those belonging to the

” hermit ” group, weave a frail structure round the side of a drooping palm-leaf. The eggs are never more than two in number, quite white, and having both ends nearly equal. The solicitude for her offspring displayed by the mother is not exceeded by that of any other birds, but it seems doubtful whether the male takes any interest in the brood. (A. N.)

HUMMOCK (of uncertain derivation; cf. hump or hillock), a boss or rounded knoll of ice rising above the general level of an ice-field, making sledge travelling in the Arctic and Antarctic region extremely difficult and unpleasant. Hummocky ice is caused by slow and unequal pressure in the main body of the packed ice, and by unequal structure and temperature at a later period.

HUMOUR (Latin humor), a word of many meanings and of strange fortune in their evolution. It began by meaning simply ” liquid.” It passed through the stage of being a term of art used by the old physicians — whom we should now call physio- logists — and by degrees has come to be generally understood to signify a certain ” habit of the mind,” shown in speech, in literature and in action, or a quality in things and events observed by the human intelligence. The word reached its full development by slow degrees. When Dr Johnson compiled his dictionary, he gave nine definitions of, or equivalents for, ” humour.” They may be conveniently quoted: ” (i) Moisture. (2) The different kinds of moisture in man’s body, reckoned by

the old physicians to be phlegm, blood, choler and melancholy, which as they predominate are supposed to determine the temper of mind. (3) General turn or temper of mind. (4) Present disposition. (5) Grotesque imagery, jocularity, merri- ment. (6) Tendency to disease, morbid disposition. (7) Petu- lance, peevishness. (8) A trick, a practice. (9) Caprice, whim, predominant inclination.” The list was not quite complete, even in Dr Johnson’s own time. Humour was then, as it is now, the name of the semi-fluid parts of the eye. Yet no diction- ary-maker has been more successful than Johnson in giving the literary and conversational meaning of an English word, or the main lines of its history. It is therefore instructive to note that in no one of his nine clauses does humour bear the meaning it has for Thackeray or for George Meredith. ” General turn or temper of mind ” is at the best too vague, and has more- over another application. His list of equivalents only carries the history of the word up to the beginning of the last stage of its growth.

The limited original sense of liquid, moisture, mere wet, in which ” humour ” is used in Wycliffe’s translation of the Bible, continued to attach to it until the 17th century. Thus Shakes- peare, in the first scene of the second act of Julius Caesar, makes Portia say to her husband: —

” Is Brutus sick? and is it physical

To walk unbraced and suck up the humours

Of tne dank morning?”

In the same scene Decius employs the word in the wide meta- phorical sense in which it was used, and abused, then and afterwards. ” Let me work,” he says, referring to Caesar — ” For I can give his humour the true bent, And I will bring him to the Capitol.”

Here we have “the general turn or temper of mind,” which can be flattered, or otherwise directed to ” present disposi- tion.” We have travelled far from mere fluid, and have been led on the road by the old physiologists. We are not concerned with their science, but it is necessary to see what they mean by ” primary humours,” and ” second or third concoctions,” if we are to understand how it was that a name for liquid could come to mean ” general turn ” or ” present disposition,” or ” whim ” or ” jocularity.” Part I., Section 1, Member 2, Subsection 2, of Burton’s Anatomy of Melancholy will supply all that is necessary for literary purposes. ” A humour is a liquid or fluent part of the body Comprehended in it, and is either born with us, or is adventitious and acquisite.” The first four primary humours are — ” Blood, a hot, sweet, tempered, red humour, prepared in the meseraic veins, and made of the most temperate parts of the chylus (chyle) in the liver, whose office it is to nourish the whole body, to give it strength and colour, being dispersed through every part of it. And from it spirits are first begotten in the heart, which afterwards in the arteries are communicated to the other parts. Pituita or phlegm is a cold and moist humour, begotten of the colder parts of the chylus (or white juice coming out of the meat digested in the stomach) in the liver. His office is to nourish and moisten the members of the body,” &c. ” Choler is hot and dry, begotten of the hotter parts of the chylus, and gathered to the gall. It helps the natural heat and senses. Melancholy, cold and dry, thick, black and sour, begotten of the more feculent part of nourishment, and purged from the spleen, is a bridle to the other two hot humours, blood and choler, preserving them in the blood, and nourishing the bones.” Mention must also be made of serum, and of ” those excrementitious humours v of the third concoction, sweat and tears.” An exact balance of the four primary humours makes the justly constituted man, and allows for the undisturbed production of the ” concoctions ” — or processes of digestion and assimilation. Literature seized upon these terms and definitions. Sometimes it applied them gravely in the moral and intellectual sphere. Thus the Jesuit Bouhours, a French critic of the 17th century, in his Entretiens d’Ariste ct d’Eugene, says that in the formation of a bel esprit, ” La bile donne le brillant et la penetration, la melancolie donne le bon sens et la solidite; le

sang donne l'agrement et

la delicatesse." It was, in fact, taken for granted that the character and intellect of men were produced by — were, so to speak, concoctions dependent on— the " humours." In the fallen state of mankind it rarely happens that an exact balance is maintained. One or other humour predominates, and thus we have the long-established doctrine of the existence of the sanguine, the phlegmatic, the choleric, or the melancholy temperaments. Things being so, nothing was more natural than the passage of these terms of art into common speech, and their application in a metaphorical sense, when once they had been adopted by the literary class. The process is admirably described by Asper in the introduction to Ben Jonson's play — Every Man out of his Humour: —

" Why humour, as it is ' ens,' we thus define it, To be a quality of air or water; And in itself holds these two properties Moisture and fluxure: as, for demonstration Pour water on this floor. 'Twill wet and run. Likewise the air forced through a horn or trumpet Flows instantly away, and leaves behind A kind of dew ; and hence we do conclude That whatsoe'er hath fluxure and humidity As wanting power to contain itself Is humour. So in every human body The choler, melancholy, phlegm and blood By reason that they flow continually In some one part and are not continent Receive the name of humours. Now thus far It may, by metaphor, apply itself Unto the general disposition; As when some one peculiar quality Doth so possess a man that it doth draw All his effects, his spirits and his powers, In their confluxion all to run one way, — This may be truly said to be a humour."

A humour in this sense is a " ruling passion," and has done excellent service to English authors of " comedies of humours," to the Spanish authors of comedias de figuron, and to the French followers of Moliere. Nor is the metaphor racked out of its fair proportions if we suppose that there may be a temporary, or even an " adventitious and acquisite " " predominance of a humour," and that " deliveries of a man's self " to passing passion, or to imitation, are also " humours," though not primary, but only second or third .concoctions. By a natural extension, therefore, " humours " might come to mean oddities, tricks, practices, mere whims, and the aping of some model admired for the time being. "But," as Falstaff has told us, " it was always yet the trick of our English, if they have a good thing, to make it too common." The word " humour " was a good thing, but the Elizabethans certainly made it too common. It became a hack epithet of all work, to be used with no more discretion, though with less

imbecile iteration, than the modern " awful." Shakespeare laughed at the folly, and pinned it for ever to the ridiculous company of Corporal Nym — " I like not the humour of lying. He hath wronged me in some humours. I should have borne the humoured letter to her … I love not the humour of bread and cheese; and there's the humour of it." The humour of Jonson was that he tried to clear the air of thistledown by stamping on it. Asper ends in denunciation: —

' But that a rook by wearing a pied feather, The sable hat-band, or the three-piled ruff, A yard of shoe tie, or the Switzer knot On his French gaiters, should affect a humour, O! it is more than most ridiculous."

The abuse of the word was the peculiar practice of England. The use of it was not confined wholly to English writers. The Spaniards of the 16th and 17th centuries knew humores in the same sense, and still employ the word as a name for caprices, whims and vapours. Humorada was, and is, the correct Spanish for a festive saying or writing of epigrammatic form. Martial's immortal reply to the critic who admired only dead poets —

Ignoseas petimus Vacerra : tanti Non est, ut placeam tibi perire, —

is a model humorada. It would be a difficult and would certainly be a lengthy task to exhaust all the applications given

to so elastic a word. We still continue to use it in widely different senses. " Good humour " or " bad humour " are simply good temper or bad temper. There is a slight archaic flavour about the phrases " grim humour," " the humour they were in," in the sense of suspicious, or angry or careless mood, which were favourites with Carlyle, but though somewhat antiquated they are not affected, or very unusual. With the proviso that tha exceptions must always be excepted, we may say that for a long time " humour " came to connote comic matter less refined than the matter of wit. It had about it a smack of the Boar's Head Tavern in Eastcheap, and of the unyoked " humour " of the society in which Prince Henry was content to imitate the sun — " Who doth permit the base contagious clouds To smother up his beauty from the world."

The presence of a base contagious cloud is painfully felt in the so-called humorous literature of England till the 18th century. The reader who does not sometimes wonder whether humour in the mouths of English writers of that period did not stand for maniacal tricks, horse-play, and the foul names of foul things, material and moral, must be very determined to prove himself a whole-hearted admirer of the ancient literature. Addison, who did much to clean it of mere nastiness, gives an excellent example of the base use of the word in his day. In Number 371 of the Spectator he introduces

an example of the " sort of men called Whims and Humourists." It is the delight of this person to play practical jokes on his guests. He is proud when " he has packed together a set of oglers " who had " an unlucky cast in the eye," or has filled his table with stammerers. The humor- ist, in fact, was a mere practical joker, who was very properly answered by a challenge from a military gentleman of peppery temper. Indeed, the pump and a horse-whip would appear to have been the only effective forms of criticism on the prevalent humour and humours of the 16th, 17th and 18th centuries. But the pump and the horse-whip were themselves humours. Carlo Buffone in Jonson's play is put " out of his humour " by the counter humour of Signor Puntarvolo, who knocks him down and gags him with candle wax. The brutal pranks of Fanny Burney's Captain Mirvan, who belongs to the earlier part of the 18th century, were meant for humour, and were accepted as such. Examples might easily be multiplied. A briefer and also a more convincing method of demonstration is to take the de- liberate judgment of a great authority. No writer of the 18th century possessed a finer sense of humour in the noble meaning than Goldsmith. What did he understand the word to mean? Not what he himself wrote when he created Dr Primrose. We have his express testimony in the 9th chapter of The Present State of Polite Learning. Goldsmith complains that " the critic, by demanding an impossibility from the comic poet, has, in effect, banished true comedy from the stage." This he hasdone by banning " low " subjects, and by proscribing " the comic or satirical muse from every walk but high life, which, though abounding in fools as well as the humbler station, is by no means

so fruitful in absurdity Absurdity is the poet's game, and

good breeding is the nice concealment of absurdity. The truth is, the critic generally mistakes ' humour ' for ' wit/ which is a very different excellence; wit raises human nature above its level; humour acts a contrary part, and equally depresses it. To expect exalted humour is a contradition in terms. . . . The poet, therefore, must place the object he would have the subject of humour in a state of inferiority; in other words,the subject of humour must be low.'"

That no doubt may remain in his reader's mind, Goldsmith" gives an example of true humour. It is nothing more or less than the absurdity and incongruity obvious in a man who, though " wanting a nose," is extremely curious in the choice of his snuff- box. We applaud " the humour of it," for " we here see him guilty of an absurdity of which we imagine it impossible for ourselves to be guilty, and therefore applaud Our own good sense on the comparison."

Nothing could be more true as an account of what the Eliza- bethans, the

Restoration, the Queen Anne men, and the 18th century meant by " humour." Nothing could be more false

as an example of what we mean by the humour of Falstaff or of The Vicar of Wakefield.

When we pass from Goldsmith to Hazlitt — one of the greatest names in English criticism — we find that " humour " has grown in meaning, without quite reaching its full development. In the introduction to his Lectures on the English Comic Writers he attempts a classification of the comic spirit into wit and humour. " Humour," he says, " is the describing the ludicrous as it is in itself; wit is the exposing it, by comparing or contrasting it with something else. Humour is, as it were, the growth of nature and accident; wit is the product of art and fancy. Humour, as it is shown in books, is an imitation of the natural or acquired absurdities of mankind, or of the ludicrous in accident, situation and character; wit is the illustrating and heightening the sense of that absurdity by some sudden and unexpected likeness or opposition of one thing to another, which sets off the quality we laugh at cr despise in a still more contemptible or striking point of view." Hazlitt's definition will, indeed, not stand analysis. The element of comparison is surely as necessary for humour as for wit. Yet his classification is valuable as illustrating the growth of the meaning of the word. Observe that Hazlitt has transferred to wit that power of pleasing as by a flattering sense of our own superiority which Goldsmith attri- buted to humour. He had not thought, and had not heard, that sympathy is necessary to complete humour. He cannot have thought it needful, for if he had he would hardly have said of the Arabian Nights that they are " an inexhaustible mine of comic humour and invention," " which from the manners of the East, which they describe, carry the principle of callous in- difference in the jest as far as it can go." He might, and probably would, have dismissed Goldsmith's illustration as " low " in every conceivable sense. He would not have added, as we should to-day, that humour does not lie in laughter, according to the definition of Hobbes, in a " sudden glory," in a guffaw of self- conceited triumph over the follies and deficiencies of others. If there is any place for humour in Goldsmith's sordid example, it must be made by pity, and shown by a deft introduction of the de te fabida dear to Thackeray, by a reminder that the world is full of people, who, though wanting noses, are extremely curious in their choice of snuff-boxes, and that the more each of us thinks himself above the weakness the more likely he is to fall into it. The critical value of Hazlitt's examination of the differences between wit and humour lies in this, that he

ignores the doctrine that the quality of humour lies in the thing or the action and not in the mind of the observer. The examples quoted above, to which any one with a moderate share of reading in English literature could add with ease, show that humour was first held to lie in the trick, the whim, the act, or the event and clash of incidents. It might even be a mere flavour, as when men spoke of the salt humour of sea-sand. Even when it stood for the " general turn or temper of mind " it was a form of the ruling passion which inspires men's actions and words. It was used in that sense by Decius when he spoke of the humour of Caesar, which is a liability to be led by one who can play on his weakness —

" for he loves to hear That unicorns may be betrayed with trees And bears with glasses, elephants with holes, Lions with toils, and men with flatterers; But when I tell him he hates flatterers He says he does; being then most flattered."

It is plain that this is not what Hazlitt meant, or we now mean, by the humour displayed in " describing the ludicrous as it is shown in itself." Nor did he, any more than we do, suppose with Goldsmith that a " low " quality of actions and persons is inseparable from humour. It had become for Hazlitt what Addison called cheerfulness, " a habit of the mind " as distin- guished from mirth, which is " an act." If in Addison's sentences the place of cheerfulness is taken by humour, and that of mirth by wit, we have a very fair description of the two. " I have always preferred cheerfulness to mirth. The latter I consider as an act, the former as a habit of the mind. Mirth is short

and transient, cheerfulness is fixed and permanent." Humour is the fixed and permanent appreciation of the ludicrous, of which wit may be the short and transient expression.

If now we pass to an attempt to define " humour," the tempta- tion to take refuge in the use of an evasion employed by Dr Johnson is very strong. When Boswell asked him, " Then, Sir, what is poetry? " the doctor answered, " Why, Sir, it is much easier to say what it is not. We all know what light is, but it is not easy to tell what it is." But George Meredith has come to our assistance in two passages of his Essay on Comedy and the uses of the Comic Spirit. " If you laugh all round him (to wit, the ridiculous person), tumble him, roll him about, deal him a smack, and drop a tear on him, own his likeness to you, and yours to your neighbour, spare him as little as you shun, pity him as much as you expose, it is spirit of Humour that is moving you. . . . The humourist of mean order is a refreshing laugher, giving tone to the feelings, and sometimes allowing the feelings to be too much for him. But the humourist, if high, has an embrace of contrasts beyond the scope of the comic poet." The third sentence is

required to complete the first. The tumbling and rolling, the smacks and the exposure, may be out of place where there is humour of the most humorous quality. Who could associate them with Sir Walter Scott's characters of Bradwardine or Monkbarns ? Bradwardine, one feels, would have stopped them as he did the ill-timed jests of Sir Hew Halbert, " who was so unthinking as to deride my family name." Monkbarns was a man of peace who loved the company of Sir Priest better than that of Sir Knight. But there is that in him which cows mere ridicule, be it ever so genial. He cared not who knew so much of his valour, and by that very avowal of his preference took his position sturdily in the face of the world. But Meredith has given its due prominence to the quality which, for us, distinguishes humour from pure wit and the harder forms of jocularity. It is the sympathy, the appreciation, the love, which include the follies of Don Quixote, the prosaic absurdities of Sancho Panza, the oddities of Bradwardine, Dr Primrose or Monkbarns, and the jovial animalism of Falstaff, in "an embrace of contrasts beyond the scope of the comic poets."

It is needless to insist that humour of this order is far older than the very modern application of the name. It is assuredly present in Horace. Chaucer, who knew the word only as meaning " liquid," has left a masterpiece of humour in his prologue to the Canterbury Pilgrims. We look for the finest examples in Shakespeare. And if it is old, it is also more universal than is always allowed. National, or at least racial, partiality, has led to the unfortunate judgment that humour is a virtue of the northern peoples. Yet Rabelais came from Touraine, and if the creator of Panurge has not humour, who has? The Italians may say that umore in the English sense is unknown to them. They mean the word, not the thing, for it is in Ariosto. To claim the quality for Cervantes would indeed be to push at an open door. The humour of the Germans has been rarely indeed of so high an order as his. It has been found wherever humanity has been combined with a keen appreciation of the ludicrous. The appreciation may exist without the humanity. When Rivarol met the Chevalier Florian with a manuscript sticking out of his pocket, and said, " How rash you are! if you were not known you would be robbed," he was making use of the comic spirit, but he was not humorous. When Rivarol himself, a man of dubious claim to nobility, was holding forth on the rights, of the nobles, and calling them " our rights," one of the company smiled. " Do you find anything singular in. what I say ? " asked he. " It is the plural which I find singular," was the answer. There is certainly something humorous in the neat overthrow of an insolent wit by a rival insolence, but the humour is in the spectator, not in the answer. The spirit of humour as described by George Meredith cannot be so briefly shown as in the rapid flash of the Frenchmen's wit. It lingers and ex- patiates, as in Dr Johnson's appreciation of Bet Flint. " Oh, a fine character, Madam ! She was

habitually a slut and a drunkard, and occasionally a thief and a harlot. And for heaven's

sake how came you to know her? Why, Madam, she figured in the literary world too! Bet Flint wrote her own life, and called herself Cassandra, and it was in verse; it began:—

' When nature first ordained my birth A diminutive I was born on earth And then I came from a dark abode Into a gay and gaudy world.'

" So Bet brought her verses to me to correct; but I gave her half-a-crown, and she liked it as well. Bet had a fine spirit; she advertised for a husband, but she had no success, for she told me no man aspired to her. Then she hired very handsome lodgings and a footboy, and she got a harpsichord, but Bet could not play; however, she put herself in fine attitudes and drummed. And pray what became of her, Sir? Why, Madam, she stole a quilt from the man of the house, and he had her taken up; but Bet Flint had a spirit not to be subdued, so when she found herself obliged to go to gaol, she ordered a sedan chair, and bid her footboy walk before her. However, the footboy proved refractory, for he was ashamed, though bis mistress was not. And did she ever get out of gaol, Sir? Yes, Madam, when she came to her trial, the judge acquitted her. ' So now,' she said to me, 'the quilt is my own, and now I'll make a petticoat of it.' Oh! I loved Bet Flint."

The subject is low enough to please Goldsmith. The humour may be of that mean order which has only a refreshing laugh, and gives tone to the feelings, but it is the pure spirit of humour.

We need not labour to demonstrate that a kindly appreciation of the ludicrous may find expression in art as well as in literature. But humour in art tends so inevitably to become caricature, which can be genial as well as ferocious, that the reader must be referred to the article on Caricature for an account of its manifestations in that field. (D. H.)

HUMPBACK WHALE (Megaptera longimana or M. boops), the representative of a genus of whalebone whales distinguished by the great length of the flippers. This whale (or a closely

Humpback Whale (Megaptera longimana or boops).

allied species) is found in nearly all seas; and when full-grown may reach

from 45 ft. to 50 ft. in length, the flippers which are indented along their edges measuring from 10 ft. to 12 ft. or more. The general colour is black, but there are often white markings on the under surface; and the flippers may be entirely white, or parti-coloured like the body. Deep longitudinal furrows, folds or plaits occur on the throat and chest. It is said that the popular name refers to a prominence on which the back fin is set; but this " hump " varies greatly in size in different individuals. The humpback is a coast-whale, irregular in its movements, sometimes found in " schools," at others singly. The whalebone is short, broad and coarse; but the yield of oil from a single whale has been as much as 75 barrels. A few examples of this whale have been taken in Scotland and the north of England (see Cetacea).

HUMPERDINCK, ENGELBERT (1854-), German musical composer, was born at Siegburg, in the Rhine Province, and studied under F. Hiller at Cologne, and F. Lachner and J. Rheinberger at Munich. In 1879, by means of a scholarship, he went to Italy, where he met Wagner at Naples; and on the latter's invitation he went to Bayreuth and helped to produce Parsifal there next year. He travelled for the next few years in Italy and Spain but in 1890 became a professor at Frankfort, where he remained till 1896. In 1900 he became the head of a school in Berlin. His fame as a composer was made by his charming children's opera Hansel und Gretel in 189,3, founded very largely (like his later operas) on folk-tunes; but his works

also include other forms of music, in all of which his mastery of technique is apparent.

HUMPHREY (or Humfrey), LAWRENCE (i527?is 9 o), president of Magdalen College, Oxford, and dean successively of Gloucester and Winchester, was born at Newport Pagnel. He was elected demy of Magdalen College in 1546 and fellow in 1548. He graduated B.A. in 1549, M.A. in 1552, and B.D. and D.D. in 1562. He was noted as one of the most promising pupils of Peter Martyr, and on Mary's accession obtained leave from his college to travel abroad. He lived at Basel, Zurich, Frank fort and Geneva, making the acquaintance of the leading Swiss divines, whose ecclesiastical views he adopted. His leave of absence having expired in 1556, he ceased to be fellow of Magdalen. He returned to England at Elizabeth's accession, was appointed regius professor of divinity at Oxford in 1560, and was recommended by Archbishop Parker and others for election as president of Magdalen. The fellows refused at first to elect so pronounced a reformer, but they yielded in 1561, and Humphrey gradually converted the college into a stronghold of Puritanism. In 1564 he and his friend Thomas Sampson, dean of Christ Church, were called before Parker for refusing to wear the prescribed ecclesiastical vestments; and a prolonged controversy broke out, in which Bullinger and other foreign theologians

took part as well as most of the leading divines in England. In spite of Bullinger's advice, Humphrey refused to conform; and Parker wished to deprive him as well as Sampson. But the presidency of Magdalen was elective and the visitor of the college was not Parker but the bishop of Winchester; and Humphrey escaped with temporary retirement. Parker, in fact, was not supported by the council; in 1566 Humphrey was selected to preach at St Paul's Cross, and was allowed to do so without the vestments. In the same year he took a prominent part in the ceremonies connected with Eliza- beth's visit to Oxford. On this occasion he wore his doctor's gown and habit, which the queen told him " became him very well "; and his resistance now began to weaken. He yielded on the point before 1571 when he was made dean of Gloucester. In 1578 he was one of the divines selected to attend a diet at Schmalkalde to discuss the project of a theological accommodation between the Lutheran and Reformed churches; and in 1580 he was made dean of Winchester. In 1585 he was per- suaded by his bishop, Cooper, to restore the use of surplices .in Magdalen College chapel. He died on the 1st of February 1590 and was buried in the college chapel, where there is a mural monument to his memory; a portrait is in Magdalen College school.

Humphrey was a voluminous writer on theological and other subjects. At Parker's desire he wrote a life of his friend and patron Bishop Jewel, which was published in 1573 and was also prefixed to the edition of Jewel's works issued in 1600. One of his books against the Jesuits was included in vol. iii. of the Doctrina Jesuitarum per varios authores, published at La Rochelle (6 vols., 1585-1586).

See Bloxam's Register of Magdalen College, iv. 104-132; Cooper's Athenae Cantabrigienses ; Wood's Athenae Oxonienses; Gough's Index to Parker Soc. Publ.; Strype's Works: Col. State Papers (Dom. 1547-1590); Acts of the Privy Council; Burnet's Hist. Ref.; Collier's Eccles. Hist.; Dixon's Church Hist. vol. vi. ; Diet. Nat, Biog. (A. F. P.)

*HUMPHREYS, ANDREW ATKINSON (1810-1883), American soldier and engineer, was born at Philadelphia on the 2nd of November 1810. He was the son of Samuel Humphreys (1778-1846), chief constructor U.S.N., and grandson of Joshua Humphreys (1751-1838), the designer of the " Constitution '**■ and other famous frigates of the war of 181 2, sometimes known as the " father of the American navy." Graduating from West Point in 1831, he served with the 2nd Artillery in the Florida war in 1835. He resigned soon afterwards and devoted himself to civil engineering. In 1838 he returned to the army for survey duties, and from 1842 to 1849 was assistant in charge of the Coast Survey Office. Later he did similar work in the valley of the Mississippi, and, with Lieut. H. L. Abbott, produced in 1861 a valuable Report on the Physics and Hydraulics*

of the Mississippi River. In connexion with this work he visited Europe in 1851.

In the earlier part of the Civil War Humphreys was employed as a topographical engineer with the Army of the Potomac, and rendered conspicuous services in the Seven Days' Battles. It is stated that he selected the famous position of Malvern Hill, before which Lee's army was defeated. Soon after this he was assigned to command a division of the V. corps, and at the battle of Fredericksburg he distinguished himself greatly in the last attack of Marye's heights. General Burnside recommended him for promotion to the rank of major-general U.S.V., which was not however awarded to Humphreys until after Gettysburg. He took part in the battle of Chancellorsville, and at Gettysburg commanded a division of the III. corps under Sickles. Upon Humphreys' division fell the brunt of Lee's attack on the second day, by which in the end the III. corps was dislodged from its advanced position. His handling of his division in this struggle excited great attention, and was compared to Sheridan's work at Stone river. A few days later he became chief of staff to General Meade, and this position he held throughout the Wilder- ness campaign. Towards the end of the war General Humphreys succeeded General Hancock in command of the famous II. corps. The short campaign of 1865, which terminated in Lee's surrender, afforded him a greater opportunity of showing his capacity for leadership. His corps played a conspicuous part in the final operations around Petersburg, and the credit of the vigorous and relentless pursuit of Lee's army may be claimed hardly less for Humphreys than for Sheridan. After the war, now brevet major-general, he returned to regular engineer duty as chief engineer of the U.S. army, and retired in 1879. He was a member of the American Philosophical Society (1857) and of the American Academy of Arts and Sciences (1863), and received the degree of LL.D. from Harvard University in 1868. He died at Washington on the 27th of December 1883. Amongst his works may be mentioned From Gettysburg to the Rapidan (1882) and The Virginia Campaigns of 1864-1865 (1882).

See Wilson, Critical Sketches of some Commanders (Boston, 1895).

HUMPHRY, OZIAS (1742-1810), English miniature painter, was born at Honiton and educated at the Grammar School of that town. Attracted by the gallery of casts opened by the duke of Richmond, Humphry came to London and studied at Shipley's school; and later he left for Bath, where he lodged with Linley and became a great friend of his beautiful daughter, afterwards Mrs Sheridan. In 1766 he was in London warmly encouraged

by Sir Joshua Reynolds, who was always interested in Devonshire painters. He was a great friend of Romney, with whom in 1773 he went to Italy, staying, on his way to Dover, at Knole, where the duke of Dorset gave him many commissions. In 1785 he went to India, visiting the native courts, painting a large number of miniatures, and making many beautiful sketches. His sight failed him in 1 797, and he died in Hampstead in 18 10. The bulk of his possessions came into the hands of his natural son, William Upcott, the book collector. From him the British Museum acquired a large number of papers relating to Humphry. He was Opie's first master, and is alluded to in some lines by Hayley. His miniatures are exquisite in detail and delightful in colouring. Many of the finest are in the collection of Mr J. Pierpont Morgan.

See The History of Portrait Miniatures, by G. C. Williamson, vol. ii. (London, 1904). (G. C. W.)

HUMUS (a Latin word meaning the ground), a product of decomposing organic matter. It is especially present in peat bogs, and also occurs in surface soils, to which it imparts a brown or black colour. It is one of the most important soil-constituents from the agricultural point of view; it is the chief source of nitrogenous food for plants, and modifies the properties of the soil by increasing its water-holding capacity and diminishing its tenacity. Little is known with regard to its chemical com- position. By treating with a dilute acid to remove the bases present, and then acting on the residue with ammonia, a solution is obtained from which a mineral acid precipitates humic acid; the residue from the ammonia extraction is termed humin. Both the humic acid and humin are mixtures, and several constituents have been separated; ulmic acid and ulmin,

in addition to humic acid and humin, are perhaps the best characterized.

HUNALD, Duke or Aquitaine, succeeded his father Odo, or Eudes, in 735. He refused to recognize the high authority of the Frankish mayor of the palace, Charles Martel, whereupon Charles marched south of the Loire, seized Bordeaux and Blaye, but eventually allowed Hunald to retain Aquitaine on condition that he should promise fidelity. From 736 to 741 the relations between Charles and Hunald seem to have remained amicable. But at Charles's death in 741 Hunald declared war against the Franks, crossed the Loire and burned Chartres. Menaced by Pippin and Carloman, Hunald begged for peace in 745 and retired to a monastery, probably on the Isle of Re. We find him later in Italy, where he allied himself with the Lombards and was stoned to death. He had left the duchy of Aquitaine to Waifer, who was probably his son, and who struggled for eight years in defending his independence against King Pippin. At the death of Pippin and at the beginning of the reign of Charlemagne, there was a last

rising of the Aquitanians. This revolt was directed by a certain Hunald, and was repressed in 768 by Charlemagne and his brother Carloman. Hunald sought refuge with the duke of the Gascons, Lupus, who handed him over to his enemies. In spite of the opinion of certain historians, this Hunald seems to have been a different person from the old duke of Aquitaine.

See J. Vaissette, Histoire generate de Languedoc, vol. i. (ed. of 1872 seq.) ; Th. Breysig, H. Hahn, L. Oelsner, S. Abel and B. Simson, Jahrbucher des deutschen Reichs. (C. Pf.)

HU-NAN, a central province of China, bounded N. by Hu-peh, E. by Kiang-si, S. by Kwang-si and Kwang-tung, and W. by Kwei-chow and Szech'uen. It occupies an area of 84,000 sq. m., and its population is estimated at 22,000,000. The provincial capital is Chang-sha Fu, in addition to which it has eight pre- fectural cities. It is essentially a province of hills, the only considerable plain being that around the Tung-t ? ing lake, but this extends little beyond the area which in summer forms part of the lake. To the north of Heng-chow Fu detached groups of higher mountains than are found in the southern portion of the province are met with. Among these is the Heng-shan, one of the Wu-yo or five sacred mountains of China, upon which the celebrated tablet of Yu was placed. The principal rivers of the province are: (1) The Siang-kiang, which takes its rise in the Nan-shan, and empties into the Tung-t'ing lake; it is navigable for a great distance from its mouth, and the area of its basin is 39,000 sq. m.; (2) the Tsze-kiang, the basin of which covers an area of 10,000 sq. m., and which is full of rapids and navigable only for the smallest boats; (3) the Yuen-kiang, a large river, which has some of its head-waters in the province of Kwei-chow, and empties into the Tung-t'ing lake in the neighbourhood of Chang-te Fu; its basin has an area of 35,000 sq. m., 22,500 of which are in the province of Hu-nan and 12,500 in that of Kwei-chow; its navigation is dangerous, and only small boats are able to pass beyond Hang-kia, a mart about 180 m. above Chang-te Fu; and (4) the Ling-kiang, which flows from the tea district of Ho-feng Chow to the Tung-t'ing lake. Its basin covers an area of about 8000 sq. m., and it is navigable only in its lowest portion. The principal places of commerce are: (1) Siang-t'an, on the Siang-kiang, said to contain 1,000,000 inhabitants, and to extend 3 m. long by nearly 2 m. deep; (2) Chang-sha Fu, the provincial capital which stands on the same river 60 m. above the treaty port of Yo-chow, and between which mart and Han-kow steamers of 500 tons burden run; and (3) Chang-te Fu, on the Yuen-kiang. The products of the province are tea (the best quality of which is grown at Gan-hwa and the greatest quantity at Ping-kiang), hemp, cotton, rice, paper, tobacco, tea-oil and coal. The whole of the south-eastern portion of the province is one vast coal-field, extending over an area of 21,700 sq. m. This area is divided into nearly two equal parts — one, the Lei river coal-fields, yield- ing anthracite, and the other

the Siang river coal-fields, yielding bituminous coal. The people have been, as a rule, more anti- foreign in their ideas, and more generally prosperous than the

inhabitants of the other provinces. Baron von Richthofen noticed with surprise the number of fine country seats, owned by rich men who had retired from business, scattered over the rural districts. Almost all the traffic is conveyed through Hu-nan by water-ways, which lead northward to Han-kow on the Yangtsze Kiang, and Fan-cheng on the Han River, eastward to Fu-kien, southward to Kwang-tung and Kwang-si and west-ward to Sze-ch'uen. One of the leading features of the province is the Tung-t'ing lake. Yo Chow, the treaty port of the province, stands at the outlet of the river Siang into this lake.

HUNDRED, the English name of the cardinal number equal to ten times ten. The O. Eng. hundred is represented in other Teutonic languages; cf. Dutch honderd, Ger. Hundert, Dan. hun- drede, &c. It is properly a compound, hund-red, the suffix meaning " reckoning "; the first part hund is the original Teutonic word for 100 which became obsolete in English in the 13th century. It represents the Indo-European form kanta, seen in Gr. enarbv, Lat. centum, Sans, calano; kanta stands for dakanta and meant the tenth ten, and is therefore connected with Gr. 5e«a, Lat. decern and Eng. " ten," the Teutonic form of Indo-European dakan being tehan, cf. Ger. zehn. In England the term " hundred " is particularly applied to an ancient territorial division inter- mediate between the villa and the county. Such subordinate districts were also known in different parts of the country by other names, e.g. wapentakes in Yorkshire, Lincolnshire, Notting-hamshire, Derbyshire, Rutland and Leicestershire; wards in Northumberland, Durham and Cumberland; while some of the hundreds of Cornwall were formerly called shires. In some parts of England a further intermediate division is to be found between the hundred and the county. Thus we have the trithing, or as it is now called the riding, in Yorkshire, the lathe in Kent, and the rape in Sussex. In Lincolnshire the arrangement is peculiar. The whole county was divided into the three sub- counties of Lindsey, Kesteven and Holland; and of these Lindsey was again divided into three ridings. The division into hundreds is generally ascribed to the creative genius of Alfred, who, according to William of Malmesbury, divided his kingdom into counties, the counties into hundreds, and the hundreds into tithings or villae. It is probable, however, that he merely rearranged existing administrative districts in that part of England which was subject to his rule. The significance of the name hundred is a matter of

some difficulty. The old theory, and perhaps the best, is that the hundred denoted first a group of a hundred families, and then the district which these families occupied. This is not inconsistent with another view, according to which the hundred was originally a term of measurement denoting a hundred hides of land, for there is good reason for considering that the hide was originally as much land as supported one family. It is important to notice that in the document compiled before the Norman Conquest, and now known as the County Hidage, the number of hides in all the counties are multiples of a hundred, and that in many cases the multiples agree with the number of hundreds ascribed to a county in Domesday Book. The hundreds of Devon, however, seem never to have contained a hundred hides; but various multiples of five, such as twenty, forty and sixty. Here, and in some of the other western counties, the hundreds are geographical divisions, to which a varying number pf hides was attributed for fiscal purposes.

In the middle ages the hundred was chiefly important for its court of justice; and the word hundredum was as often applied to the court as to the district over which the court had jurisdiction. According to the compilation known as Leges Henrici, written shortly before 11 18, it was held twelve times a year, but an ordinance of 1234, after stating that it had been held fortnightly in the reign of Henry II., declares that its ordinary sessions were henceforth to take place every three weeks (Dunstable Annals, 139). Existing court rolls show that from the 13th to the 15th centuries it usually sat seventeen times a year, in some hundreds in a fixed place, in others in various places, but in no regular course of rotation. Twice a year a specially full court was held, to which various names such as

hundredum legale or hundredum magnum were applied. This was the sheriffs" turn held after Easter and Michaelmas in accordance with the Magna Carta of 1217. The chief object of these sessions was to see that all who ought to be were in the frank-pledge, and that the articles of the view of frank-pledge had been properly observed during the preceding half-year. Each township of the hundred was represented by a varying number of suitors who were bound to attend at these half-yearly sessions without individual summons. If the proper number failed to appear the whole township was amerced, the entry on the rolls being frequently of the form " Villata de A. est in misericordia quia non venit plenarie." All the seventeen courts, including the two full courts, had jurisdiction in trespass covenant and debt of less than forty shillings, and in these civil cases such of the freeholders of the county as were present were judges. But the sheriff or the lord of the hundred was the sole judge in the criminal business transacted at the full courts. A hundred court, especially in the west of England, was often appurtenant to the chief manor in the hundred, and passed with a grant of the manor without being expressly mentioned. In the 13th century

a large number of hundreds had come in-to private hands by royal grant, and in Devonshire there was scarcely a hundred which still belonged to the king. In private hundreds the lord's steward took the place of the king's sheriff.

Owing to the great fall in the value of money the hundred court began to decay rapidly under the Tudor sovereigns. They were for the most part extinguished by a section in the County Courts Act 1867, which enacts that no action which can be brought in a county court shall thenceforth be brought in a hundred or other inferior court not being a court of record. Until lately the most important of the surviving duties of the hundred was its liability to make good damages occasioned by rioters. This liability was removed by the Riot (Damages) Act 1886, which threw the liability on the police rate.

See Pollock and Maitland, History of English Law;F. W. Maitland, Domesday Book and Beyond (1897); J. H. Round, Feudal England (!895); Annates monaslici, "Rolls" series, iii. (Dunstable), 139; various court rolls at the Public.Record Office, London. (G. J. T.)

HUNDRED DAYS (Fr. Cent Jours), the name commonly given to the period between the 20th of March 1815, the date on which Napoleon arrived in Paris after his return from Elba, and the 28th of June 1815, the date of the restoration of Louis XVIII. The phrase Cent Jours was first used by the prefect of Paris, the comte de Chabrol, in his speech welcoming the king. See Napoleon, and France: History.

HUNDRED YEARS' WAR. This name is given to the protracted conflict between France and England from 1337 to 1453, which continued through the reigns of the French kings Philip VI., John II., Charles V.,. Charles VI., Charles VII., and of the English kings Edward III., Richard II., Henry IV., Henry V. and Henry VI. The principal causes of the war, which broke out in Guienne in 1337, were the disputes arising in connexion with the French possessions of the English kings, in respect to which they were vassals of the kings of France; the pretensions of Edward III. to the French throne after the accession of Philip VI. ; Philip's intervention in the affairs of Flanders and Scotland; and, finally, the machinations of Robert of Artois.

During Philip VI. 's reign fortune favoured the English. The French fleet was destroyed at Sluys on the 24th of June 1340. After the siege of Tournai a truce was arranged on the 25th of September 1340; but the next year the armies of England and France were again at war in Brittany on account of the rival pretensions of Charles of Blois and John of Montfort to the succession of that duchy. In 1346, while the French were trying to invade Guienne, Edward III. landed in Normandy, ravaged that province,

part of the lie de France and Picardy, defeated the French army at Crecy on the 26th of August 1346, and besieged Calais, which surrendered on the 3rd of August 1347. Hostilities were suspended for some years after this, in consequence of the truce of Calais concluded on the 28th of September 1347.

8 94

HUNGARY

The principal feats of arms which mark the first years of John the Good's reign were the taking of St Jean d'Angely by the French in 135 1, the defeat of the English near St Omer in 1352, and the English victory near Guines in the same year. In 1355 Edward III. invaded Artois while the Black Prince was pillaging Languedoc. In 1356 the battle of Poitiers (September 19), in which John was taken prisoner, was the signal for conflicts in Paris between Stephen Marcel and the dauphin, and for the outbreak of the Jacquerie. The treaty of Bretigny, concluded on the 8th of May 1360, procured France several years' repose. Under Charles V. hostilities at first obtained only between French, Anglo-Navarrais (Du Guesclin's victory at Cocherel, May 16, 1364) and Bretons. In 1369, on the pretext that Edward III. had failed to observe the terms of the treaty of Bretigny, the king of France declared war against him. Du Gues- clin, having been appointed Constable, defeated the English at Pontvallain in 1370, at Chiz6 in 1373, and drove them from their possessions between the Loire and the Gironde, while the duke of Anjou retook part of Guienne. Edward IIP. thereupon concluded the truce of Bruges (June 27, 1375), which was pro- longed until the 24th of June 1377. Upon the death of Edward III. (June 21, 1377) Charles V. recommenced war in Artois and Guienne and against Charles the Bad, but failed in his attempt to reunite Brittany and France. Du Guesclin, who had refused to march against his compatriots, died on the 13th of July 1380, and Charles V. on the 16th of the following September.

In the beginning of Charles VI. 's reign the struggle between the two countries seemed to slacken. An attempt at recon- ciliation even took place on the marriage of Richard II. with Isabella of France, daughter of Charles VI. (September 26, 1396). But Richard, having been dethroned by Henry of Lancaster (Henry IV.), hostilities were resumed, Henry profiting little by the internal discords of France. In 1415 his son, Henry V., landed in Normandy on the expiry of the truce of the 25th of September 1413, which had been extended in 1414 and 1415. He won the victory of Agincourt (October 25, 1415), and then seized Caen and part of Normandy, while France was exhausting herself in the feuds of Armagnac"s and Burgundians. By the treaty of Troyes (May 21, 1415) he obtained the

hand of Catherine, Charles VI. 's daughter, with the titles of regent and heir to the kingdom of France. Having taken Meaux on the 2nd of May 1429, and made his entry into Paris on the 30th of May, he died on the 31st of August in the Bois de Vincennes, leaving the throne to his son, Henry VI., with the duke of Bedford as regent in France. Charles VI. died shortly afterwards, on the 21st of October.

His son, who styled himself Charles VII., suffered a series of defeats in the beginning of his reign: Cravant on the Yonne (1423), Verneuil (1424), St James de Beuvron (1426) and Rouvray (1429). Orleans, the last bulwark of royalty, had been besieged since the 12th of October 1428, and was on the point of surrender when Joan of Arc appeared. She saved Orleans (May 8, 1429), defeated the English at Patay on the 16th of June, had Charles VII. crowned at Reims on the 17th of July, was taken at Compiegne on the 24th of May 1430, and was burned at Rouen on the 30th of May 143 1 (see Joan of Arc). From this time on the English lost ground steadily, and the treaty of Arras (March 20, 1435), by which good relations were established between Charles VII. and Philip the Good, duke of Burgundy, dealt them a final blow. Normandy rose against them, while the constable De Richemont 1 drove them from Paris (1436) and

retook Nemours, Montereau (1437) and Meaux (1439). The quickly repressed revolt of the Praguerie made no break in Charles VII. 's successes. In 1442 he relieved successively Saint Sever, Dax, Marmande, La Reole, and in 1444 Henry VI. had to conclude the truce of Tours. In 1448 the English were driven from Mans; and in 1449 , while Richemont was capturing Cotentin and Fougeres, Dunois conquered Lower Normandy and Charles VII. entered Rouen. The defeat of Sir Thomas Kyriel, one of Bedford's veteran captains, at Formigny in 1430, and the taking of Cherbourg, completed the conquest of the 'Arthur, earl of Richmond, afterwards Arthur III., duke of Brittany.

province. During this time Dunois in Guienne was taking Bordeaux and Bayonne. Guienne revolted against France, whereupon Talbot returned there with an army of 5000 men, but was vanquished and killed at Castillon on the 17th of July 1453. Bordeaux capitulated on the 9th of October, and the Hundred Years' War was terminated by the expulsion of the English, who were by this time so fully occupied with the Wars of the Roses as to be unable to take the offensive against France anew. Authorities. — The chronicles of Jean le Bel, Adam Murimuth, Robert of Avesbury, Froissart and " Le Religieux de Saint Denis." See Simeon Luce, Hist, de Bertrand du Guesclin (3rd ed., Paris, 1896); G. du Fresne de Beaucourt, Hist, de Charles VII (6 vols., Paris, 1881-1891); F. J. Snell, articles in the United Service Magazine (1906-1907). (J. V.)*

HUNGARY (Hungarian Magyarorszdg), a country in the south-eastern portion of central Europe, bounded E. by Austria (Bukovina) and Rumania; S. by Rumania, Servia, Bosnia and Austria (Dalmatia); W. by Austria (Istria, Carniola, Styria and Lower Austria); and N. by Austria (Moravia, Silesia and Galicia). It has an area of 125,402 sq. m., being thus about 4000 sq. m. larger than Great Britain and Ireland.

I. Geography and Statistics The kingdom of Hungary (Magyarbiradolom) is one of the two states which constitute the monarchy of Austria-Hungary (q.v.), and occupies 51-8% of the total area of the monarchy. Hungary, unlike Austria, presents a remarkable geographical unity. It is almost

exclusively continental, having only a short extent of seaboard on the Adriatic (a little less than 100 m.). Its land-frontiers are for the most part well defined by natural boundaries: on the N.W., N., E. and S.E. the Carpathian mountains; on the S. the Danube, Save and Unna. On the W. they are not so clearly marked, being formed partly by low ranges of mountains and partly by the rivers March and Leitha. From the last-mentioned river are derived the terms Cisleithania and Transleithania, applied to Austria and Hungary respectively. General Division. — The kingdom of Hungary in its widest extent, or the " Realm of the Crown of St Stephen," comprises Hungary proper (Magyarorszdg), with which is included the former grand principality of Transylvania, and the province of Croatia-Slavonia. This province enjoys to a large extent autonomy, granted by the so-called compromise of 1868. The town and district of Fiume, though united with Hungary proper in respect of administration, possess a larger measure of autonomy than the other cities endowed with municipal rights. Of the total area of the kingdom Hungary proper has 108,982 sq. m. and Croatia-Slavonia 16,420 sq. m. In the present article the kingdom is treated mainly as a whole, especially as regards statistics. In some respects Hungary proper has been particularly dealt with, while special information regard- ing the other regions will be found under Croatia-Slavonia, Transylvania and Fiume.

Mountains. — Orographically Hungary is composed of an extensive central plain surrounded by high mountains. These mountains belong to the Carpathians and the Alps, which are separated by the valley of the Danube. But by far the greater portion of the Hun- garian highlands belongs to the Carpathian mountains, which begin, to the north, on the left bank of the Danube at Deveny near Press- burg (Pozsony), run in a north-easterly and easterly direction, sway round south-eastward and then westward in a vast irregular semicircle, and end near Orsova at the Iron Gates of the Danube, where they meet the Balkan mountains. The greatest elevations are in the Tatra mountains of the north of Hungary proper, in the east and south of Transylvania (the Transylvanian Alps) and in the eastern portion of the Banat. The highest peak, the Gerlsdori or Spitze or Gerlachfalva, situated in the Tatra group, has an altitude of 8700 ft. The portion of Hungary situated on the right bank of the Danube is filled by the Alpine system, namely, the eastern outlying groups of the Alps. These groups are the Leitha mountains, the Styrian highlands, the Lower Hungarian highlands, which are a continuation of the former, and the Bakony Forest. The Bakony Forest, which lies entirely within Hungarian territory, extends to the Danube in the neighbourhood of Budapest, the highest peak being KorOshegy (2320 ft.). The south-western portion of this range is specially called Bakony Forest, while the ramifications to the north-east are known as the Vertes group (1575 ft.), and the Pilis group

(2476 ft.). The Lower Hungarian highlands extend between the Danube, the Mur, and Lake Balaton, and attain in the

Mesek hills near Mohacs and Pecs an altitude of 2200 ft. The province of Croatia-Slavonia belongs mostly to the Karst region, and is traversed by the Dinaric Alps.

Plains. — The mountain systems enclose two extensive plains, the smaller of which, called the " Little Hungarian Alfold " or " Pressburg Basin," covers an area of about 6000 sq. m., and lies to the west of the Bakony and Matra ranges, which separate it from the " Pest Basin " or " Great Hungarian Alfold." This is the largest plain in Europe, and covers about 37,000 sq. m., with an average elevation above sea-level of from 300 to 350 ft. The Pest Basin extends over the greater portion of central and southern Hungary, and is traversed by the Theiss (Tisza) and its numerous tributaries. This immense tract of low land, though in some parts covered with barren wastes of sand, alternating with marshes, presents in general a very rich and productive soil. The monotonous aspect of the Alfold is in summer time varied by the deli-bdb, or Fata Morgana.

Caverns. — The numerous caverns deserve a passing notice. The Aggtelek (?.».) or Baradla cave, in the county of Gomor, is one of the largest in the world. In it various fossil mammalian remains have been found. The Fonacza cave, in the county of Bihar, has also yielded fossils. No less remarkable are the Okno, Vodi and Demenyfalva caverns in the county of Lipto, the Veterani in the Banat and the ice cave at Dobsina (q.v.) in Gomor county. Of the many interesting caverns in Transylvania the most remarkable are the sulphurous Biidos in the county of Haromszck, the Almas to the south of Udvarhcly and the brook-traversed rocky caverns of Csetate-Boli, Pestere and Ponor in the southern mountains of Hunyad county.

Rivers. — The greater part of Hungary is well provided with both rivers and springs, but some trachytic and limestone mountainous districts show a marked deficiency in this respect. The Matra group, e.g.. is poorly supplied, while the outliers of the Vertes mountains towards the Danube are almost entirely wanting in streams, and have but few water sources. A relative scarcity in running waters prevails in the whole region between the Danube and the Drave. The greatest proportionate deficiency, however, is

observable in the arenaceous region between the Danube and Theiss, where for the most part only periodical Hoods occur. But in the north and east of the kingdom rivers are numerous. Owing to its orographical configuration the river system of Hungary presents several char- acteristic features. The first consists in the parallelism in the course of its rivers, as the Danube and the Theiss, the Drave and the Save, the Waag with the Neutra and the Gran, &c. The second is the direction of the rivers, which converge towards the middle of the country, and are collected either mediately or immediately by the Danube. Only the Zsil, the Aluta and the Bodza or Buzeu pierce the Transylvanian Alps, and flow into the Danube outside Hungary. Another characteristic feature is the uneven distribution of the navigable rivers, of which Upper Hungary and Transylvania are almost completely devoid. But even the navigable rivers, owing to the direction of their course, are not available as a means of external communication. The only river communication with foreign countries is furnished by the Danube, on the one hand towards Austria and Germany, and on the other towards the Black Sea All the rivers belong to the watershed of the Danube, with the exception of the Poprad in the north, which as an affluent of the Dunajec flows into the Vistula, and of a few small streams near the Adriatic. The Danube enters Hungary through the narrow defile called the Porta Hungarica at Deveny near Pressburg, and after a course of 585 m leaves it at Orsova by another narrow defile, the Iron Gate. Where it enters Hungary the Danube is 400 ft. above sea- level, and where it leaves it is 127 ft.; it has thus a fall within the country of 273 ft. It forms several large islands, as the Great Schiitt, called in Hungarian Czallokoz or the deceiving island, with at: area ol nearly 1000 sq. m.; the St Andrew's or Szent-Endre inland; the Csepel island; and the Margitta island. The principal tributaries of the Danube in Hungary, of which some are amongst the largest rivers in Europe, are. on the right, the Raab, Drave anc Save, and, on the left, the Waag, Neutra, Gran, Eipel, Theiss (.the principal affluent, which receives numerous tributaries), Temes and Cserna. The total length of the river system of Hungary is about 880c m., of which only about one-third is navigable, while ot the navigable part only one-half is available for steamers. The Danube is navigable for steamers throughout the whole of its course in Hungary. Regulating works have been undertaken to ward off the dangers of periodical inundations, which occur in the valley of me Danube and of the other great rivers, as the Theiss, the Drave :j.nd the Save. The beds of these rivers, as well as that of the Danube, are continually changing, forming morasses and pools, and rendering the country near their banks marshy. Notwithstanding the work already done, such as canalizing and regulating the rivers, the erection of dams, &c, the problems of preventing inundations, and of reclaiming the marshes, have not yet been satisfactorily solved.

Canals. — Hungary is poorly supplied with canals. They are constructed not only as navigable waterways, but also to relieve the rivers from periodical overflow, and to drain the marshy districts. The most important canal is the Franz Josef canal between Becse and Bczdan, above Zombor It is about 70 m. in length, and

considerably shortens the passage between the Theiss and the Danube. A branch of this canal called Uj Csatorna or New Channel, extends from Kis-Sztapar, a few miles below Zombor, to Ujvidek, opposite Petervarad. The Bega canal runs from Temesvar to Nagy-Becskerek, and thence to Titel, where it flows into the Theiss. The Versecz and the Berzava canal, which are connected with one another, drain the numerous marshes of the Banat, including the Alibunar marsh. The Berzava canal ends in the river Temes. The Sio and the Kapos or Zichy canal between Lake Balaton and the Danube is joined by the Sarviz canal, which drains the marshes south of Sopron. The Berettyo canal between the Koros and the Berettyo rivers, and the Koros canal along the White Koros were constructed in conjunction with the regulation of the Theiss, and for the drainage of the marshy region.

Lakes and Marshes. — Hungary has two large lakes, Balaton (q.v.) or Platten-See, the largest lake of southern Europe, and Ferto or Neusiedler See. The Ferto lake lies in the counties of Moson and Sopron, not far from the town of Sopron, and is about 23 m. ift length by 6 to 8 m. in breadth. It is so shallow that it completely evaporated in 1865, but has filled again since 1870, at the same time changing its configuration. It lies in the marshy district known as the Hansag, through which it is in communication with the Danube. In the neighbourhood of this lake are very good vineyards. Several other small lakes are found in the Hansag. The other lowland lakes, as, for instance, the Palics near Szabadka, and the Vclencze in the county of Feher, are much smaller. In the deep hollows between the peaks of the Carpathians are many small lakes, popu- larly called " eyes of the sea." In the puszta are numerous small lakes, named generally Feh&r To or White Lakes, because they evaporate in the summer leaving a white crust of soda on their bed. The vegetation around them contains plants characteristic of the sea shores. The largest of these lakes is the Feher To situated to the north of Szeged.

As already mentioned large tracts of land on the banks of the principal rivers are occupied by marshes. Besides the Hansag, the other principal marshes are the Sarret, which covers a con- siderable portion of the counties of Jasz-Kun-Szolnok, Bekes and Bihar; the Escedi Lap in the county of Szatmar; the Szernye near Munkacs, and the Alibunar in the county of Torontal. Since the last half of the 19th century many thousands of acres have been reclaimed for agricultural purposes.

Geology. — The hilly regions of Transylvania and of the northern part of Hungary consist of Palaeozoic and Mesozoic rocks and are closely connected, both in structure and origin, with the Carpathian chain. The great Hungarian plain is covered by Tertiary and Quaternary deposits, through which rise the Bakony-wald and the Mecsek ridge near P6cs (Funfkirchen). These are composed chiefly of Triassic beds, but Jurassic and Cretaceous beds take some share in their formation. Amongst the most interesting features of the Bakony-wald are the volcanic and the igneous rocks.

The great plain itself is covered for the most part by loess and alluvium, but near its borders the Tertiary deposits rise to the surface. Eocene nummulitic beds occur, but the deposits are mostly of Miocene age. Five subdivisions may be recognised in the Miocene deposits, corresponding with five different stages in the evolution of southern Europe. The first is the First Mediterranean stage of E. Suess, during which the Hungarian plain was covered by the sea, and the deposits were purely marine. The next is the Schlier, a peculiar blue-grey clay, widely spread over southern Europe, and contains extensive deposits of salt and gypsum. During the forma- tion of the Schlier the plain was covered by an inland sea or series of salt lakes, in which evaporation led to the concentration and finally to the deposition of the salts contained in the water. Towards the close of this period great earth movements took place and the gap between the Alps and the Carpathians was formed. The third period is represented by the Second Mediterranean stage of Suess, during which the sea again entered the Hungarian plain and formed true marine deposits. This was followed by the Sarmatian period, when Hungary was covered by extensive lagoons, the fauna being partly marine and partly brackish water. Finally, in the Pontian period, the lagoons became gradually less and less salt, and tht deposits are characterized especially by the abundance of shells which live in brackish water, especially Congeria.

Climate. — Hungary has a continental climate — cold in winter, hot in summer — but owing to the physical configuration of the country it varies considerably. If Transylvania be excepted, three separate zones are roughly distinguishable: the " highland," comprising the counties in the vicinity of the Northern and Eastern Carpathians, where the winters are very severe and continue for half the year; the " intermediate " zone, embracing the country stretch- ing northwards from the Drave and Mur, with the Little Hungarian Plain, and the region of the Upper Alfold, extending from Budapest to Nyiregyhaza and Sarospatak; and the " great lowland " zone, including the main portion of the Great Hungarian Plain, and the region of the lower Danube, where the heat during the summer months is almost tropical. In Transylvania the climate bears the extreme characteristics peculiar to mountainous countries inter- spersed with valleys; whilst the

climate of the districts bordering on the Adriatic is modified by the neighbourhood of the sea. The minimum of the temperature is attained in January and the

maximum in July. The rainfall in Hungary, except in the mountain- ous regions, is small in comparison with that of Austria. In these regions the greatest fall is during the summer, though in, some years the autumn showers are heavier. Hail storms are of frequent occurrence in the Carpathians. On the plains rain rarely falls during the heats of summer; and the showers though violent are generally of short duration, whilst the moisture is quickly evaporated owing to the aridity of the atmosphere. The vast sandy wastes mainly contribute to the dryness of the winds on the Great Hungarian Alfold. Occasionally, the whole country suffers much from drought ; but disastrous floods not unfrequently occur, particularly in the spring, when the beds of the rivers are inadequate to contain the increased volume of water caused by the rapid melting of the snows on the Carpathians. On the whole Hungary is a healthy country, excepting in the marshy tracts, where intermittent fever and diphtheria sometimes occur with great virulence.

The following table gives the mean temperature, relative humidity, and rainfall (including snow) at a series of meteorological stations during the years 1896-1900: —

Stations.

Feet above Sea.

Mean Temperature (Fahrenheit).

js'b

Rainfall

in

Inches.

Annual.

Jan.

July-

Selmeczbanya Budapest Keszthely . Zagrab . Fiume Debreczen . Szeged Nagyszcbcn

2037 502 436

534 16

4 2 3 312

1357

46-2 50-9 52-5 52-3 56-9 50-2

5i-6

48-9

27-9 30-9 30-0

34-3 43-6 28-6

3i-i

259

64-8 68-8 71-4

7o-5

72-7

70

71-1

6o-i

79 76

78 72 75 79 80

79

35-29 24-02 26-67 34-32 70-39 22-26

25-58 28-66

Fauna. — The horned cattle of Hungary are amongst the finest in Europe, and large herds of swine are reared in the oak forests. The wild animals are bears, wolves, foxes, lynxes, wild cats, badgers, otters, martens, stoats and weasels. Among the rodents there are hares, marmots, beavers, squirrels, rats and mice, the last in enor- mous swarms. Of the larger game the chamois and deer are specially noticeable. Among the birds are the vulture, eagle, falcon, buzzard, kite, lark, nightingale, heron, stork and bustard. Domestic and wild fowl are generally abundant. The rivers and lakes yield enormous quantities of fish, and leeches also are plentiful. The Theiss, once better supplied with fish than any other river in Europe, has for many years fallen off in its productiveness. The culture of the silkworm is chiefly carried on in the south, and in Croatia-Slavonia.

Flora. — Almost every description of grain is found, especially wheat and maize, besides Turkish pepper or paprika, rape-seed, hemp and flax, beans, potatoes and root crops. Fruits of various descriptions, and more particularly melons and stone fruits, are abundant. In the southern districts almonds, figs, rice and olives are grown. Amongst the forest and other trees are the oak, which yields large quantities of galls, the beech, fir, pine, ash and alder, also the chestnut, walnut and filbert. The vine is cultivated over the greater part of Hungary, the chief grape-growing districts being those of the Hegyalja (Tokaj), Sopron, and Ruszt, Menes, Somlyo (Schomlau), Bcllye and Villany, Balaton, Neszmely, Visonta, Eger (Erlau) and Buda. Hungary is one of the greatest wine-producing countries in Europe, and the quality of some of the vintages, especi- ally that of Tokaj, is unsurpassed. A great quantity of tobacco is also grown; it is wholly monopolized by the crown. In Hungary proper and in Croatia and Slavonia there are many species of indi- genous plants, which are unrepresented in Transylvania. Besides 12 species peculiar to the former grand-principality, 14 occur only there and in Siberia.

Population. — Hungary had in 1900 a population of 19,254,559, equivalent to 153-7 inhabitants per square mile. The great Alfold and the western districts are the most densely populated parts, whereas the northern and eastern mountainous counties are sparsely inhabited. As regards sex, for every 1000 men there were ion women in Hungary, and 998 women in Croatia- Slavonia. The excess of females over males is great in the western and northern counties, while in the eastern parts and in Croatia-Slavonia there is at slight preponderance of males.

The population of the country at the censuses of 1880, 1890 and 1900 was: —

1880.

1890.

1900.

Hungary proper . Croatia-Slavonia .

Total ….

13,749,603 1,892,499

15,261,864 2,201,927

16,838,255 2,416,304

15.642,102

17,463,791

19,254,559

From 1870 to 1880 there was little increase of population, owing to the great cholera epidemic of 1872-1873, and to many epidemic diseases among children towards the end of the period. More normal conditions having prevailed from 1880 to 1890, the yearly increase rose from 0-13% to 1-09%, declining in the decade 1890-1900 to 1-03.

If compared with the first general census of the country, decreed by Joseph II. in 1785, the population of the kingdom shows an increase of nearly 108% during these 116 years. Recent historical research has ascertained that the country was densely peopled in ths 15th century. Estimates, based on a census of the tax-paying peasantry in the years 1494 and 1495, give five millions of inhabitants, a very respectable number, which explains fully the predominant position of Hungary in the east of Europe at that epoch. The disastrous invasion of the Turks, incessant civil wars and devastation by foreign armies and pestilence, caused a very heavy loss both of population and of prosperity. In 1715 and 1720, when the land was again free from Turkish hordes and peace was restored, the popula- tion did not exceed three millions. Then immigration began to fill the deserted plains once more, and by 1785 the population had trebled itself. But as the immigrants were of very different foreign nationalities, the country became a collection of heterogeneous ethnical elements, amid which the ruling Magyar race formed only a minority.

The most serious drain on the population is caused by emigration, due partly to the grinding poverty of the mass of the peasants, partly to the resentment of the subject races against the process of " Magyarization " to

which they have long been subjected by the government. This movement reached its height in 1900, when 178,170 people left the country; in 1906 the number had sunk to 169,202, of whom 47,920 were women. 1 Altogether, since 1896 Hungary has lost about a million of its inhabitants through this cause, a serious source of weakness in a sparsely populated country ; in 1907 an attempt was made by the Hungarian parliament to restrict emigration by law. The flow of emigration is mainly to the United States, and a certain number of the emigrants return (27,612 in 1906) bringing with them much wealth, and Americanized views which have a considerable effect on the political situation. 2 Of political importance also is the steady immigration of Magyar peasants and workmen into Croatia-Slavonia, where they become rapidly absorbed into the Croat population. From the Transyl- vanian counties there is an emigration to Rumania and the Balkan territories of 4000 or 5000 persons yearly.

This great emigration movement is the more serious in view of the very slow increase of the population through excess of births over deaths. The birth-rate is indeed high (40-2 in 1897), but with the spread of culture it is tending to decline (38-4 in 1902), and its effect is counteracted largely by the appalling death-rate, which exceeds that of any other European country except Russia.

In this respect, however, matters are improving, the death-rate sinking from 33-1 per thousand in 1881-1885 to 28-1 per thousand in 1 896-1900. The improvement, which is mainly due to better sanitation and the draining of the pestilential marshes, is most conspicuous in the case of Hungary proper, which shows the following figures: 33-3 per thousand in 1881-1885, and 27-8 per thousand in

1 896- 1 900.

At the census of 1900 fifteen towns had more than 40,000 in- habitants, namely: Budapest, 732,322; Szeged. 100,270; Sza- badka (Maria-Theresiopel), 81,464; Debreczen, 72,351; Pozsony (Pressburg), 61,537; Hodmezo-Vasarhely, 60,824 : Zagrab (Agram), 61,002; Kecskem6t, 56,786; Arad, 53,903; Temesvar, 53,033; Nagyvarad (Grosswardein), 47,018; Kolozsvar (Klausenburg), 46,670; Pecs (Flinfkirchen), 42,252; Miskolcz, 40,833; Kassa,

35,856-

The number and aggregate population of all towns and boroughs in Hungary proper having in 1890 more than 10,000 inhabitants was at the censuses of 1880, 1890 and 1900: —

Census.

Towns.

Inhabitants.

Percentage of Total Population.

1 880 1890 1900

93 106 122

2,191,878 2,700,852 3,525,377

15-94 17-81 21-58

Thus the relative increase of the population living in urban dis- tricts of more than 10,000 inhabitants amounted in 1900 to nearly 4% of the total population. In Croatia-Slavonia only 5-62% of the population was concentrated in such towns in 1900.

Races. — One of the prominent features of Hungary being the great complexity of the races residing in it (see map, " Distribution of

1 See the table in Seton-Watson's Racial Problems in Hungary, Appendix xiii. p. 470, and Drage, Austria-Hungary, p. 280. Of the emigrants in 1906, 52,121 were Magyars, 32,904 Slovaks, 30,551 Germans, 20,859 Rumanians and 16,016 Croats.

2 Racial Problems, p. 202.

Races," in the article Austria), the census returns of 1880, 1890 and 1900, exhibiting the numerical strength of the different nation- alities, are of great interest. Classifying the population according to the mother-tongue of each individual, there were, in the civil population of Hungary proper, including Fiume: —

Census.

Hungarians (Magyars).

Germans

(Nemet).

Slovaks

(Tot).

Rumanians (Olih).

Ruthenians (Ruthen).

Croatians (Horvdt).

Servians (Szerb).

Others.

1880 1890 1900

6,404,070 7,357,936 8,588,834

1,870,772 1,990,084 1,980,423

1,855.451 1,896,665 1,991,402

2,403,041 2,589,079 2,784,726

353,229 379,786

423ˆ59

ˆ

223,054 259,893 329,837

639,986 194,412 495,133 188,552 434,641

i.e. in percentages of the total population :

1880 1890 1900

46-58 48-53 51-38

1361 13-12

n-88

‘3-49 12-51

n-88

17-48 17-08 16-62

2-57 2-50

2-52

1-62 1-71

i-95

4 ; 65 1-28 1 3-27 1-17 2-60

The censuses show a decided tendency of change in favour of the dominating nationality, the Magyar, which reached an absolute majority in the decade 1890-1900. This is also shown by the data relating to the percentage of members of other Hungarian races speaking this language. Thus in 1900 out of a total civil population of 8,132,740, whose mother-tongue is not Magyar, 1,365,764 could speak Magyar. This represents a percentage of 16-8, while in 1890 the percentage was only 13-8. In Croatia-Slavonia the language of instruction and administration being exclusively Croat, the other races tend to be absorbed in this nationality. The Magyars formed but 3-8 ° , the Germans 5-6% of the population according to the census of 1900.

The various races of Hungary are distributed either in compact ethnographical groups, in larger or smaller colonies surrounded by other nationalities, or — e.g. in the Banat — so intermingled as to defy exact definition. 1 The Magyars occupy almost exclusively the great central plain intersected by the Danube and the Theiss, being in an overwhelming majority in 19 counties (99-7% in Hajdu, east of the Theiss). With these may be grouped the kindred population of the three Szekel counties of Transylvania. In 14 other counties, on the linguistic frontier, they are either in a small majority or a con- siderable minority (61 -6% in Szatmar, 18-9% in Torontal). The Germans differ from the other Hungarian races in that, save in the counties on the borders of Lower Austria and Styria, where they form a compact population in touch with their kin across the frontier, they are scattered in racial islets throughout the country. Excluding the above counties these settlements form three groups: (1) central and northern Hungary, where they form considerable minorities in seven counties (25 % in Szepes, 7 % in Komarom) ; (2) the Swabians of southern Hungary, also fairly numerous in seven counties (35-5 % in Baranya, 32-9% in Temes, 10-5% in Arad); (3) the Saxons of

Transylvania, in a considerable minority in five counties (42-7% in \agy Kiikiillo, 17-6 % in Kis Kiikullo). The Germans are most numerous in the towns, and tend to become absorbed in the Magyar population. The Slavs, the most numerous race after the Magyars, are divided into several groups: the Slovaks, mainly massed in the mountainous districts of northern Hungary; the Ruthenians, established mainly on the slopes of the Carpathians between Poprad and Maramaros Sziget; the Serbs, settled in the south of Hungary from the bend of the Danube eastwards across the Theiss into the Banat; the Croats, overwhelmingly . preponderant in Croatia-Slavonia, with outlying settlements in the counties of Zala, Vas and Sopron along the Croatian and Styrian frontier. Of these the Slovaks are the most important, , having an overwhelming majority in seven counties (94-7% in Arva, 66-1 % in Saros), a bare majority in three (Szepes, Bars and Poszody) and a consider- able minority in five (40-6 % in Gomor, 22-9% in Abauj-Torna). The Ruthenians are not in a majority in any county, but in four they form a minority of from 36 to 46 % (Maramaros, Bereg, Ugocsa, Cng) and in three others (Saros, Zemplen, Szepes) a minority of from 8-2 to 19-7 . The Serbs form considerable minorities in the counties of Torontal (31-2), Bacs-Bodrog (19-0%) and Temes (2i-4°). Next to the Slav races in importance are the Rumanians (Vlachs), who are in an immense majority in ten of the eastern and south-eastern counties (90-2% in Fogaras), in eight others form from 30 to 6o°o of the population, and in two (Maramaros and Torontal) a respectable minority. 2

The Jews in 1900 numbered 851,378, not counting the very great number who have become Christians, who are reckoned as Magyars. Their importance is out of all proportion to their number, since they monopolize a large portion of the trade,' are with the Germans the chief employers of labour, and control not only the finances but

to a great extent the government and press of the country. Owing to the improvidence of the Hungarian landowners and the poverty of the peasants the soil of the country is also gradually passing into their hands. 3

The Gipsies, according to the special census of 1893, numbered

274,940. Of these, how- ever, only 82,000 gave Romany as their lan- guage, while 104,000 described themselves as Magyars and 67,000 as Rumanians. They are scattered in small colonies, especially in Gomor county and in Transylvania. Only

some 9000 are still nomads, while some 20,000 more are semi- nomads. Other races, which are not numerous, are Armenians, Greeks, Bulgars, Albanians and Italians.

The ethnographical map of Hungary does much to explain the political problems of the country. The central plains, which have the most fertile soil, and from the geographical conditions of the country form its centre of gravity, are occupied almost exclusively by the Magyars, the most numerous and the dominant race. But all round these, as far as the frontiers, the country is inhabited by the other races, which, as a rule, occupy it in large, compact and uniform ethnographical groups. The only exception is formed by the Banat, where Magyars, Rumanians, Serbs, Bulgarians, Croats and Germans live mixed together. Another important fact is that these races are all in direct contact with kindred peoples living outside Hungary: the Rumanians in Transylvania and Banat with those in Rumania and Bukovina; the Serbs and Croats with those on the other bank of the Danube, the Save and the Unna ; the Germans in western Hungary with those in Upper Austria and Styria; the Slovaks in northern Hungary with those in Moravia; and lastly the Ruthenians with the Ruthenians of Galicia, who occupy the opposite slopes of the Carpathians. The centrifugal forces within the Hungarian kingdom are thus increased by the attraction of kindred nationalities established beyond its borders, a fact which is of special importance in considering the vexed and difficult racial problem in Hungary.

Agriculture. — Hungary is pre-eminently an agricultural country and one of the principal wheat-growing regions of Europe. At the census of 1900 nearly 69% of the total population of the country derived their income from agriculture, forestry, horticulture and other agricultural pursuits. The agricultural census taken in 1895 shows the great progress made in agriculture by Hungary, mani- fested by the increase in arable lands and the growth of the average production. The increase of the arable land has been effected partly by the reclamation of the marshes, but mostly by the trans- formation of large tracts of puszta (waste prairie land) into arable land. This latter process is growing every year, and is coupled with great improvements in agricultural methods, such as more intensive cultivation, the use of the most modern implements and the application of scientific discoveries. According to the agricul- tural census of 1895, the main varieties of land are distributed as follows : —

1 The colouring of ordinary ethnographical maps is necessarily somewhat misleading. When an attempt is made to represent in colour the actual distribution of the races (as in Dr Chavanne's Geographischer und statistischer Handatlas) the effect is that of occasional blotches of solid colour on a piece of shot silk.

2 The distribution of the races is analysed in greater detail in Mr Seton-Watson's Racial Problems, p. 3 seq.

Hungary Proper.

Croatia- Slavonia.

By area in acres —

Arable land

Gardens

Meadows

Vineyards

Pastures

Forests

Marshes

By percentage of the total area —

Arable land

Gardens

Meadows

Vineyards

Pastures

Forests

Marshes

29,714,382

928,053

7.075,888

482,801

9,042,267

18,464,396

199,685

42-81

i-34

10-19

0-69 13-03 26-60

0-28

13,370,540

136,354 1,099,451

65,475

1,465,930

3,734,094

7,921

32-26

l-3i

10-52 .

0-63 14-03

35-74 0-08

The remainder, such as barren territory, devastated vineyards, water and area of buildings, amounts to 5-1 % of the total.

The chief agricultural products of Hungary are wheat, rye, barley, oats and maize, the acreage and produce of which are shown in the following tables : —

3 Seton- Watson, op. cit. pp. 173, 188, 252; Drage, Austria- Hungary, pp. 280, 588; Gonnard, La Tlongrie, p. 72.

11

8 9 8

[GEOGRAPHY AND STATISTICS

Area in Acres in Hungary Proper.

Cereal.

Average per Annum.

1900.

1907.

1881-85.

1886-90.

1891-95.

Wheat . . Rye . . Barley . Oats . . Maize .

6,483,876 2,475,301 2,420,393 2,460,080 4,567,186

7,014,891 2,727,078 2,491,422 2,546,582 4,681,376

7,551,584 2,510,093 2,407,469

2,339,297 5,222,538

8,142,303 2,546,738 2,485,117 2,324,992 5,469,050

8,773,440 2,529,350 2,885,160 2,898,780 7,017,270

Produce in Millions of Bushels.

Cereal.

Average per Annum.

1900.

1907.

1881-85.

1886-90.

1891-95.

Wheat . . Rye . . Barley . Oats . . Maize .

99-8 41-8 46-2 53-9 92-4

I2I-3

42-1 43-7 52-3 86-4

144-9 46-5 53-6 64-9

n8-o

137-3 392

49-7

63-6

121-7

128-5 38-0 51-0 43-7

158-7

In Croatia-Slavonia no crop statistics were compiled before 1885. Subsequent returns for maize and wheat show an increase both in the area cultivated and quantity yielded. The former is the principal product of this province. Certain districts are distinguished for particular kinds of fruit, which form an important article of com- merce both for inland consumption and for export. The principal of these fruits are: apricots round Kecskemet, cherries round Koros, melons in the Alfold and plums in Croatia-Slavonia. The vineyards of Hungary, which have suffered greatly by the phyl- loxera since 1 88 1, show since 1900 a tendency to recover ground, and their area is again slowly increasing.

Forests. — Of the productive area of Hungary 26-60% is occupied by forests, which for the most part cover the slopes of the Carpathians. Nearly half of them belong to the state, and in them forestry has been carried out on a scientific basis since 1879. The exploitation of this great source of wealth is still hindered by want of proper means of communication, but in many parts of Transyl- vania it is now carried on successfully. The forests are chiefly composed of oak, fir, pine, ash and alder.

Live Stock. — The number of live stock in Hungary proper in two different years is shown in the following table : — ■

Animal.

1884.

1895-

Horses . Cattle . . Sheep Pigs . .

1,749,302

4,879,334

10,594,867

4,803,777

1,972,930 5,829,483 7,526,783 . 6,447,134

In Croatia-Slavonia the live stock was numbered in 1895 at: horses, 309,098; cattle, 908,774; sheep, 595,898; pigs, 882,957. But the improved quality of the live stock is more worthy of notice than the growth in numbers.

The small Magyar horse, once famous for its swiftness and endur- ance, was improved during the Turkish wars, so far as height and beauty were concerned, by being crossed with Arabs; but it de- generated after the 17th century as the result of injudicious cross- breeding. The breed has, however, been since improved by govern- ment action, the establishment of state studs supported since 1867 by annual parliamentary grants, and the importation especially of English stock. The largest of the studs is that at Mezohegyes (founded 1785) in the county of Csanad, the most extensive and remarkable of those " economies," model farms on a gigantic scale, which the government has established on its domains. 1 In 1905 it had 2224 horses, including 27 stallions and 422 blood mares. The next most important stud is at Kisber (founded 1853), with 731 horses; others are at Babolna (founded 1798), with 802 horses and Fogaras (founded 1874), with 400 horses. 2 Besides these there are several large depdts of state stallions, which are hired out or sold at moderate rates; but buyers have to guarantee not to export them without permission of the government. Large numbers of horses are exported annually, principally to Austria, Germany, Italy, France and Rumania.

Owing to its wide stretches of pasture-land Hungary is admirably suited for cattle-raising, and in the government " economies " the same care has been bestowed on improving the breed of horned beasts as in the case of horses. The principal breeds are either native or Swiss (especially that of

Simmenthal). The export trade in cattle is considerable, amounting in 1905 to 238,296 head of

An admirable account of this " little world, which produces almost everything and is almost self-sufficient " is given by M. Gonnard in his Hongrie au XX me siecle, p. 159 seq. 2 lb. p. 349 seq.

oxen, 56,540 cows, 23,765 bulls and 19,643 breeding cattle, as well as a large number of carcases.

Sheep are not stocked so extensively as cattle, and are tending rapidly to decrease, a result due to the spread of intensive cultiva- tion and the rise in value of the soil. They are not exported, but there is a considerable export trade in wool.

Pigs are reared in large quantities all over the country, but the principal centres for distribution are Debreczen, Gyula, Bares, Szeged and Budapest. They are exported in large numbers (408,000 in 1905), almost exclusively to Austria. There fs also a considerable export trade in geese and eggs.

Minerals. — Hungary is one of the richest countries in Europe as regards both the variety and the extent of its mineral wealth. Its chief mineral products are coal, nitre, sulphur, alum, soda, saltpetre, gypsum, porcelain-earth, pipe-clay, asphalt, petroleum, marble and ores of gold,_ silver, mercury, copper, iron, lead, zinc, antimony, cobalt and arsenic. The principal mining regions are Zsepes-Gomor in Upper Hungary, the Kremnitz-Schemnitz district, the Nagy- banya district, the Transylvanian deposits and the Banat. Gold and silver are chiefly found in Transylvania, where their exploitation dates back to the Roman period, and are mined at Zalatna and Abrudbanya ; rich deposits are also found in the Kremnitz-Schem- nitz, and the Nagybanya districts. The average yearly yield of gold is about £100,000, and that of silver about the same amount. The sand of some of the rivers, as for instance the Maros, Szamos, Koros and Aranyos, is auriferous. Coal is extensively mined in the region of Budapest-Oravicza, Nagybanya, Zalatna, at Brennberg near Sopron, at Salgo-Tarjan, Pecs, in the counties of Krass6-Szdr6ny, and of Esztergom, and in the valley of the river Zsil. Iron is ex- tracted in the counties of Zsepes, Gomor and Abauj-Torna. The production of coal and iron trebled during the period 1880-1900, amounting in 1900 to 6,600,000 tons, and 463,000 tons respectively. The principal salt-mines are in Transylvania at Torda, Parajd, Deesakna and Maros-Ujvar; and in Hungary at Szlatina, Ronazsek and Sugatag. The salt-mines are a state monopoly. Hungary is the only country in Europe where the opal is found, namely at the famous mines of Vorosvagas in the county of Saros, and at Nagy- Mihaly in that of Zemplin. Other precious stones found are chalce- dony, garnet, jacinth,

amethyst, carnelian, agate, rock-crystals, &c. Amber is found at Magura in Zsepes, while fine marble quarries are found in the counties of Esztergom, Komarom, Veszprˆm and Szepes. The value of the mining (except salt) and smelting pro- duction in Hungary amounted in 1900 to £4,500,000, while in 1877 the value was only £1,500,000. The number of persons employed in mining and smelting works was (1900 census) 70,476.

Mineral Springs. — Hungary possesses a great number of cold, and several hot mineral springs, some of them being greatly fre- quented. Among the principal in Hungary proper except Transyl- vania are those of Budapest, Mehadia, Eger, Sztubnya (Turocz county), Szliacs (Zolyom county), Harkany (Baranya county), Pistyan (Nyitra county) and Trencsen-Teplitz, where there are hot springs. Cold mineral springs are at Bartfa, with alkaline ferru- ginous waters; Czigelka, with iodate waters; Parad, with ferru- ginous and sulphate springs; Koritnicza or Korytnica, with strong iron springs; and the mineral springs of Budapest. Among the principal health resorts of Hungary are Tatrafiired in the Tatra mountains, and Balatonfured on the shores of Lake Balaton.

Industrial Development. — Efforts to create a native industry date only from 1867, and, considering the shortness of the time and other adverse factors, such as scarcity of capital, lack of means of com- munication, the development of industry in the neighbouring state of Austria, &c, the industry of Hungary has made great strides. Much of this progress is due to the state, one of the principal aims of the Hungarian government being the creation of a large and inde- pendent native industry. For this purpose legislation was promoted in 1867, 1881, 1890 and 1907. The principal facilities granted by the state are, exemption of taxation for a determined period of years, reduced railway fares for the goods manufactured, placing of government contracts, the grant of subsidies and loans and the foundation of industrial schools for the training of engineers and of skilled workmen. The branches of industry which have received special encouragement are those whose products are in universal request, such as cotton and woollen goods, and those which are in the service of natural production. In this category are the manu- facture of agricultural machines, of tools and implements for agri- culture, forestry and mining; such industries as depend for their raw material on the exploitation of the natural resources of the country, viz. those related to agriculture, forestry, mining, &c. Lastly, encouragement is given to all branches of industry concerned with the manufacture of articles used in the more important Hun- garian industries, i.e. machinery, or semi-manufactured goods which serve as raw material for those industries. For the period 1890-1905, an average of 40 to 50 industrial establishments with an invested capital of £1,250,000 to £1,750,000 were founded yearly.

The principal industry of Hungary is flour-milling. The number of steam-mills, which in 1867 was about 150, rose to 1723 in 1895 and to 1845 in 1905. Between 3,000,000 and 3,200,000 tons of wheat-flour are produced annually. The principal steam-mills are at Budapest; large steam-mills are also established in many towns, while there are a great number of water-mills and some wind-mills.

The products of these mills form the principal article of export of Hungary. Brewing and distilling, as other branches of industry connected with agriculture, are also greatly developed. The sugar industry has made great strides, the amount of beetroot used having increased tenfold between 1880 and 1905. Other principal branches of industry are: tobacco manufactories, belonging to the state, tobacco being a government monopoly; iron foundries, mostly in the mining region; agricultural machinery and implements, notably at Budapest; leather manufactures; paper-mills, the largest at Fiume; glass (only the more common sort) and earthenwares; chemicals; wooden products; petroleum-refineries; woollen yarns and cloth manufactories, as well as several establishments of knitting and weaving. The various industrial establishments are located jn the larger towns, but principally at Budapest, the only real industrial town of Hungary.

In 1900 the various industries of Hungary (including Croatia- Slavonia) employed 1,127,730 persons, or 12-8 % of the earning population. In 1890 the number of persons employed was 913,010. Including families and domestic servants, 2,605,000 persons or 13-5 % of the total population were dependent on industries for their livelihood in Hungary in 1900.

Commerce. — Hungary forms together with Austria one customs and commercial territory, and the statistics for the foreign trade is given under Austria-Hungary. The following table gives the foreign trade of Hungary only for a period of years in millions sterling: —

Year.

Imports.

Exports.

1886-1890 1891-1895

1900

1907

37-3

43-7 46-3

66-o

37-5 44-1

55-3 64-7

Of the merchandise l entering the country, 75-80 % comes from Austria, and exports go to the same country to the extent of 75%. Next comes Germany with about 10% of the value of the total exports and 5% of that of imports. The neighbouring Balkan states — Rumania and Servia — follow, and the United Kingdom receives somewhat more than 2 % of the exports, while supplying about 1-5% of the imports. The principal imports are: cotton goods, woollen manufactures; apparel, haberdashery and linen; silk manufactures; leather and leather goods. The exports, which show plainly the prevailing agricultural character of the country, are flour, wheat, cattle, beef, barley, pigs, wine in barrels, horses and maize.

With but a short stretch of sea-coast, and possessing only one important seaport, Fiume, the mercantile marine of Hungary is not very developed. It consisted in 1905 of 434 vessels with a tonnage of 91,784 tons and with crews of 2359 persons. Of these 95 vessels with a tonnage of 89,161 tons were steamers. Fifty-four vessels with 84,844 tons and crews numbering 1168 persons were sea-going; 134 with 6587 tons were coasting-vessels, and 246 with 353 tons were fishing vessels.

At all the Hungarian ports in 1900 there entered 19,223 vessels of 2,223,302 tons; cleared 19,218 vessels of 2,226,733 tons. The tonnage of British steamers amounted to somewhat more than 11 % of the total tonnage of steamers entered and cleared.

Railways.— Hungary is covered by a fairly extensive network of railways, although in the sparsely populated parts of the kingdom the high road is still the only means of communication. The first railway in Hungary was the line between Budapest and Vacz (Waitzen), 20 m. long, opened in 1846 (15th of July). After the Compromise of 1867, the policy of the Hungarian government was to construct its own railways, and to take over

the lines constructed and worked by private companies. 2 In 1907 the total length of the Hungarian railways, in which over £145,000,000 had been invested was 12,100 m., of which 5000 m. belonged to and were worked by the state, 5100 m. belonged to private companies but were worked by the state, and 2000 m. belonged to and were worked by private companies. The passengers carried in 1907 numbered 107 171 000 the goods traffic was 61,483,000 tons; the traffic receipts for the year were £16,420,000. The corresponding figures for 1880 were as follows: passengers carried, 9,346,000; goods carried, 11,22=; 000 tons ; traffic receipts, £4,300,000. The so-called zone tariff, adopted for the first time in Europe by the Hungarian state railways, was inaugurated in 1889 for passengers and in 1891 for goods The principle of this system is to offer cheap fares and relatively low tariffs for greater distances, and to promote, therefore, long-distance travelling. The zone tariff has given a great impetus both to passenger and goods traffic in Hungary, and has been adopted on some of the Austrian railways.

1 Merchandise passing the boundaries is subject to declaration • the respective values are stated by a special commission of experts residing m Budapest.

2 The acquisition of the Austrian Staatsbahn in 1891 practically gave to the state the control of the whole railway net of Hungary By 1900 all the main lines, except the Siidbahn and the Kaschan- (Jberbergar Bahn, were in its hands.

In 1907 the length of the navigable waterways of Hungary was 3200 m., of which 2450 m. were navigable by steamers.

Seaports. — On the Adriatic lies the port of Fiume (

Government. — Hungary is a constitutional monarchy, its monarch bearing the title of king. The succession to the throne is hereditary in the order of primogeniture in the male line of the house of Habsburg-Lorraine; and failing this, in the female line. The king must be a member of the Roman Catholic Church. The king of Hungary is also emperor of Austria, but beyond this personal union, and certain matters regulated by both governments jointly (see Austria-Hungary), the two states are independent of each other, having each its own constitution, legislature and administration. The king is the head of the executive, the supreme commander of the armed forces of the nation, and shares the legislative power with the parliament.

The constitution of Hungary is in many respects strikingly analogous to that of Great Britain, more especially in the fact that it is based on no written document but on immemorial prescription, confirmed or modified

by a series of enactments, of which the earliest and most famous was the Golden Bull of Andrew III. (1222), the Magna Carta of Hungary. The ancient constitution, often suspended and modified, based upon this charter, was reformed under the influence of Western Liberalism in 1848, the supremacy of the Magyar race, however, being secured by a somewhat narrow franchise. Suspended after the collapse of the Hungarian revolt in 1849 for some eighteen years, the constitution was restored in 1867 under the terms of the Compromise (Ausgleich) with Austria, which established the actual organization of the country (see History, below).

The legislative power is vested in the parliament (Orszdggyiilis), which consists of two houses: an upper house or the House of Magnates (Forendihdz), and a lower house or House of Repre- sentatives (Kepviselohdz). The House of Magnates is composed as follows: princes of the royal house who have attained their majority (16 in 1904); hereditary peers who pay at least £250 a yearland tax (237 in 1904); high dignitaries of the Roman Catholic and Eastern Orthodox churches (42 in 1904) ; repre- sentatives of the Protestant confessions (13 in 1904); life peers appointed by the crown, not exceeding 50 in number, and life peers elected by the house itself (73 altogether in 1904) ; members ex officio consisting of state dignitaries and high judges (19 in 1904); and three delegates of Croatia-Slavonia. The House of Representatives consists of members elected, under the Electoral Law of 1874, by a complicated franchise based upon property, taxation, profession or official position, and ancestral privileges. 3 The house consists of 453 members, of which 413 are deputies elected in Hungary and- 43 delegates of Croatia-Slavonia sent by the parliament of that province. The members are elected for five years and receive payment for their services. The parliament is summoned annually by the king at Budapest. The official language is Magyar, but the delegates of Croatia- Slavonia may use their own language. The Hungarian parlia- ment has power to legislate on all matters concerning Hungary, but for Croatia-Slavonia only on matters which concern these provinces in common with Hungary. The . executive power is vested in a responsible cabinet, consisting of ten ministers, namely, the president of the council, the minister of the interior, of national defence, of education and public worship, of finance,

3 The franchise is " probably the most illiberal in Europe." Servants, in the widest sense of the word, apprenticed workmen and agricultural labourers are carefully excluded. The result is that the working classes are wholly unrepresented in the parliament, only 6% of them, and 13% of the small trading class, possessing the franchise, which is only enjoyed by 6% of the entire population (see Seton-Watson, Racial Problems, 250, 251). For the question of franchise reform which played so great a part in the Austro-Hungarian crisis of 1909-1910 see History, below. — [Ed.]

of agriculture, of industry and commerce, of justice, the minister for Croatia-Slavonia, and the minister ad latus or near the king's person. As regards local government, the country is divided into municipalities or counties, which possess a certain amount of self-government. Hungary proper is divided into sixty-three rural, and — including Fiume — twenty-six urban municipalities (see section on Administrative Divisions). These urban munici- palities are towns which for their local government are independent of the counties in which they are situated, and have, therefore, a larger amount of municipal autonomy than the communes or the other towns. The administration of the municipalities is carried on by an official appointed by the king, aided by a representative body. The representative body is composed half of elected members, and half of citizens who pay the highest taxes. Since 1876 each municipality has a council of twenty members to exercise control over its administration.

Administrative Divisions. — Since 1867 the administrative and political divisions of the lands belonging to the Hungarian crown have been in great measure remodelled. In 1868 Transylvania was definitely reunited to Hungary proper, and the town and district of Fiume declared autonomous. In 1873 part of the " Military Frontier " was united with Hungary proper and part with Croatia- Slavonia. Hungary proper, according to ancient usage, was generally divided into four great divisions or circles, and Transylvania up to 1876 was regarded as the fifth. In 1876 a general system of counties was introduced. According to this division Hungary proper is divided into seven circles, of which Transylvania forms one. The whole country is divided into the following counties : —

(a) The circle, on the left bank of the Danube contains eleven counties: (1) Arva, (2) Bars, (3) Esztergom, (4) Hont, (5) Lipto, (6) N6grad, (7) Nyitra, (8) Pozsony (Pressburg), (9) Trencsen, (10) Turocz and (11) Zolyom.

(6) The circle on the right bank of the Danube contains eleven counties: Baranya, Fejer, Gyor, Komarom, Moson, Somogy, Sopron, Tolna, Vas, Veszprem and Zala.

(c) The circle between the Danube and Theiss contains five counties: Bacs-Bodrog, Csongrad, Heves, Jasz-Nagykun-Szolnok and Pest-Pilis-Solt-Kiskun.

(d) The circle on the right bank of the Theiss contains eight counties:

Abauj-Torna, Bereg, Borsod, Gomor-es Kis-Hont, Saros, Szepes, Ung, Zemplcn.

(e) The circle on the left bank of the Theiss contains eight counties : B6k6s, Bihar, Hajdu, Maramaros, Szabolcs, Szatmar, Szilagy and Ugocsa.

(/) The circle between the Theiss and the Maros contains five counties: Arad, Csanad, Krasso-Szore-ny, Temes and Torontal.

(g) Transylvania contains fifteen counties : Als6-Feher, Besztercze-Naszod, Brasso, Csik, Fogaras, Haromszek, Hunyad, Kis-Kukullo, Kolozs, Maros-Torda, Nagy-Kukullo, Szeben, Szolnok-Doboka, Torda-Aranyos and Udvarhely.

Fiume town and district forms a separate division.

Croatia-Slavonia is divided into eight counties: Belovar-Koros, Lika-Krbava, Modrus-Fiume, Pozsega, Szer6m, Varasd, Verocze and Zagrab.

Besides these sixty-three rural counties for Hungary, and eight for Croatia-Slavonia, Hungary has twenty-six urban counties or towns wich municipal rights. These are: Arad, Baja, Debreczen, Gyor, Hodmezo-Vasarhely, Kassa, Kecskemet, Kolozsvar, Komarom, Maros-Vasarhely, Nagyvarad, Pancsova, Pecs, Pozsony, Selmecz-es Belabanya, Sopron, Szabadka, Szatmar-Nemeti, Szeged, Szekes- fchervar, Temesvar, Ujvid6k, Versecz, Zombor, the town of Fiume, and Budapest, the capital of the county.

In Croatia-Slavonia there are four urban counties or towns with municipal rights namely: Eszek, Varasd, Zagrab and Zimony.

Justice. — The judicial power is independent of the administrative power. The judicial authorities in Hungary are: (1) the district courts with single judges (458 in 1905) ; (2) the county courts with collegiate judgeships (76 in number); to these are attached 15 jury courts for press offences. These are courts of first instance. (3) Royal Tables (12 in number), which are courts of second instance, established at Budapest, Debreczen, Gyor, Kassa, Kolozsvar, Maros-Vasarhely, Nagyvarad, Pecs, Pressburg, Szeged, Temesvar and Zagrab. (4) The Royal Supreme Court at Budapest, and the Supreme Court of Justice, or Table of Septemvirs, at Zagrab, which are the highest judicial authorities. There are also a special com- mercial court at Budapest, a naval court at Fiume, and special army courts.

Finance. — After the revolution of 1848-1849 the Hungarian budget was amalgamated with the Austrian, and it was only after the Compromise of 1867 that Hungary received a separate budget. The development of the Hungarian kingdom can be better ap- preciated by a comparison of the

estimates for the year 1849 prepared by the Hungarian minister of finance, which shows a revenue of £l.335.ooo and an expenditure of £5,166,000 (including £3,500,000 for warlike purposes), with the budget of 1905, which shows a revenue

Expenditure.

£49,592,400

57,894,923

is derived from direct and dues, &c. In 1904 direct

˚f £5!, 583,000, and an expenditure of about the same sum. Owing to the amount spent on railways, the Fiume harbour works and other causes, the Hungarian budgets after 1867 showed big annual deficits, until in 1888 great reforms were introduced and the finances of the country were established on a more solid basis. During the years 1891-1895 the annual revenue was £42,100,000 and the ex- penditure £39,000,000; in 1900 the revenue and expenditure balanced themselves at £45,400,000. The following figures in later years are typical : —

Revenue.

1904 . . £49,611,200

1908 . . . 57,896,845

The ordinary revenue of the state indirect taxation, monopolies, stamp

taxes amounted to £9,048,000, and the chief heads of direct taxes yielded as follows: ground tax, £2,317,000; trade tax, £1,879,000; income tax, £1,400,000; house tax, £1,000,000. Indirect taxes amounted in 1904 to £7,363,000, and the chief heads of indirect taxation yielded as follows: taxes on alcoholic drinks, £4,375,000; sugar tax, £1,292,000; petroleum tax, £418,000; meat tax, £375,000. The principal monopolies yielded as follows: salt monopoly, £1,210,000; tobacco monopoly, £2,850,000; lottery monopoly, £105,000. Other revenues yielded as follows: stamp taxes and dues, £3,632,000; state railways, £3,545,000; post and telegraphs, £710,000; state landed property and forests, £250,000.

The national debt of Hungary alone, excluding the debt incurred jointty by both members of the Austro-Hungarian monarchy, was £192,175,000 at the end of 1903. The following table shows the growth of the total debt,

due chiefly to expenditure on public works, in millions sterling : —

1880. 1890. 1900. 1905.

£83-6 £171-9 £192-8 £198-02

Religion. — There is in Hungary just as great a variety of religious confessions as there is of nationalities and of languages. None of them possesses an overwhelming majority, but perfect equality is granted to all religious creeds legally recognized. According to the census returns of 1900 in Hungary proper there were: — ■

Per Cent, of Population. 8,198,497 or 48-69

Roman Catholics

Uniat Greeks l

Greek Orthodox

Evangelicals —

Augsburg confession, or Lutherans Helvetian confession, or Calvinists

Unitarians

Jews

Others

1,841,272 or 10-93 2,199,195 or 13-06

1,258,860 or 7-48

2,427,232 or 14-41

68,551 or 0-41

831,162 or 4-94

13,486 or 0-08

In many instances nationality and religious faith are conterminous. Thus the Servians are mostly Greek Orthodox; the Ruthenians are Uniat Greeks; the Rumanians are either Greek Orthodox or Greek Uniats; the Slovaks are Lutherans; the only other Lutherans are the Germans in Transylvania and in the Zsepes county. The Calvinists are composed mostly of Magyars, so

that in the country the Lutherans are designated as the " German Church," and the Calvinists as the " Hungarian Church." The Unitarians are all Magyars. Only to the Roman Catholic Church belong several nationalities. The Roman Catholic Church has 4 archbishops; Esztergom (Gran), Kalocsa, Eger (Erlau) and Zagrab (Agram), and 17 diocesan bishops; to the latter must be added the chief abbot of Pannonhalma, who likewise enjoys episcopal rights. The primate is the archbishop of Esztergom, who also bears the title of prince, and whose special privilege it is to crown the sovereigns of Hungary. The Greek Uniat Church owns besides the archbishop of Esztergom the archbishop of Gyulafehervar (Carlsburg), or rather Balasfalva (i.e. " the city of Blasius "), and 6 bishops. The Armenian Uniat Church is partly under the jurisdiction of the Roman Catholic bishop of Transylvania, and partly under that of the Roman Catholic archbishop of Kalocsa. The Orthodox Eastern Church in Hungary is subject to the authority of the metropolitan of Carlowitz and the archbishop of Nagyszeben (Hermannstadt) ; under the former are the bishops of Bacs, Buda, Temesvar, Versecz and Pakracz, and under the latter the bishops of Arad and Karansebes. The two great Protestant communities are divided into ecclesiastical districts, five for each; the heads of these districts bear the title of super- intendents. The Unitarians, chiefly resident in Transylvania, are under the authority of a bishop, whose see is Kolozsvar (Klausen- burg). The Jewish communities are comprised in ecclesiastical districts, the head direction being at Budapest.

Education. — Although great improvements have been effected in the educational system of the country since 1867, Hungary is still backward in the matter of general education, as in 1900 only a little over 50% of the population could read and write. Before 1867 public instruction was entirely in the hands of the clergy of the various confessions, as is still the case with the majority of the

1 i.e. Catholics of the Oriental rite in communion with Rome.

primary and secondary schools. One of the first measures of newly established Hungarian government was to provide supplementary schools of a non-denominational character. By a law passed in 1868 attendance at school is obligatory on all children between the ages of 6 and 12 years. The communes or parishes are bound to maintain elementary schools, and they are entitled to levy an additional tax of 5 % on the state taxes for their

maintenance. But the number of state-aided elementary schools is continually increasing, as the spread of the Magyar language to the other races through the medium of the elementary schools is one of the principal concerns of the Hungarian government, and is vigorously pursued. 1 In 1902 there were in Hungary 18,729 elementary schools with 32,020 teachers, attended by 2,573,377 pupils, figures which compare favourably with those of 1877, when there were 15,486 schools with 20,717 teachers, attended by 1,559,636 pupils. In about 61% of these schools the language used was exclusively Magyar, in about 20% it was mixed, and in the remainder some non-Magyar language was used. In 1902, 80-56% of the children of school age actually attended school. Since 1891 infant schools, for children between the ages of 3 and 6 years, have been maintained either by the com- munes or by the state.

The public instruction of Hungary contains three other groups of educational institutions: middle or secondary schools, " high schools " and technical schools. The middle schools comprise classical schools (gymnasia) which are preparatory for the uni- versities and other " high schools," and modern schools (Realschulen) preparatory for the technical schools. Their course of study is generally eight years, and they are maintained mostly by the state. The state-maintained gymnasia are mostly of recent foundation, but some schools maintained by the various churches have been in existence for three, or sometimes four, centuries. The number of middle schools in 1902 was 243 with 4705 teachers, attended by 71,788 pupils; in 1880 their number was 185, attended by 40,747 Dupils.

The high schools include the universities, of which Hungary possesses three, all maintained by the state: at Budapest (founded in 1635), at Kolozsvar (founded in 1872), and at Zagrab (founded in 1874). They have four faculties: of theology, law, philosophy and medicine. (The university at Zagrab is without a faculty of medi- cine.) There are besides ten high schools of law, called academies, which in 1900 were attended by 1569 pupils. The Polytechnicum in Budapest, founded in 1844, which contains four faculties and was attended in 1900 by 1772 pupils, is also considered a high school. There were in Hungary in 1900 forty-nine high theological colleges, twenty-nine Roman Catholic; five Greek Uniat, four Greek Orthodox, ten Protestant and one Jewish. Among special schools the principal mining schools are at Selmeczbanya, Nagyag and Felsobanya; the principal agricultural colleges at Debreczen and Kolozsvar; and there are a school of forestry at Selmeczbanya, military colleges at Budapest, Kassa, Deva and Zagrab, and a naval school at Fiume. There are besides an adequate number of training institutes for teachers, a great number of schools of commerce, several art schools — for design, painting, sculpture, music, &c. Most of these special schools are of recent origin, and are almost entirely maintained by the state or the communes.

The richest libraries in Hungary are the National Library at Budapest ; the University Library, also at Budapest, and the library of the abbey of Pannonhalma. Besides the museums mentioned in the article Budapest, several provincial towns contain interesting museums, namely, Pressburg, Temesvar, Deva, Kolozsvar, Nagysze- ben; further, the national museum at Zagram, the national (Szekler) museum at Maros-Vasarhely, and the Carpathian museum at Poprad should be mentioned.

At the head of the learned and scientific societies stands the Hungarian Academy of Sciences, founded in 1830; the Kisfaludy Society, the Petofi Society, and numerous societies of specialists, as the historical, geographical, &c, with their centre at Budapest. There are besides a number of learned societies in the various provinces for the fostering of special provincial or national aims. There are also a number of societies for the propagation of culture, both amongst the Hungarian and the non-Hungarian nationalities. Worth mentioning are also the two Carpathian societies: the Hungarian and the Transylvanian.

Bibliography. — F. Umiauft, Die Lander Osterreich-Ungarns in Wort und Bild (Vienna, 1879-1889, 15 vols., 12th volume, 1886, deals with Hungary), Die osterreichische Monarchic in Wort und Bild (Vienna.. 1888-1902, 24 vols., 7 vols, are devoted to Hungary), Die Vblker Osterreich-Ungarns (Teschen, 1881-1885, I2 vols.); A. Supan, " Osterreich-Ungarn " (Vienna, 1889, in Kirchhoff's Ldnder- kunde von Europa, vol. ii.); Auerbach, Les Races.et les nationalites en Autriche-Hongrie (Paris, 1897); Mayerhofer, Osterreich-ungarisches Ortslexikon (Vienna, 1896); Hungary, Its People, Places and Politics. The Journey of the Eighty Club to Hungary in 1906 (London, 1907); R. W. Seton-Watson (" Scotus Viator"), Racial Problems in Hungary (London, 1908), a strong indictment of the racial policy of the Magyars, supported by exact references and many

1 The methods pursued to this end are exposed in pitiless detail by Mr Seton-Watson in his chapter on the Education Laws of Hungary, in Racial Problems, 205.

documents, mainly concerned with the Slovaks; Ren6 Gonnard, La Hongrie au XX' siecle (Paris, 1908), an admirable descrip- tion of the country and its people, mainly from the point of view of economic development and social conditions; Geoffrey Drage, Austria-Hungary (London, 1909), a very useful book of reference; P. Alden (editor), Hungary of To-day, by members of the Hungarian Government (London, 1909) ; see also " The Problem of Hungary " in the Edinburgh Review (No. 429) for July 1909. The various reports of the Central Statistical Office at Budapest contain all the necessary statistical data. A summary of them is annually published

under the title Magyar statisztikai Avkonyo {Statistical Year-Book of Hungary). (0. Br.)

II. History

When Arpad, the semi-mythical founder of the Magyar monarchy, at the end of a.d. 895 led his savage hordes through the Vereczka pass into the regions of the Upper Theiss, the land, now called Hungary, was, for the most conquest. part, in the possession of Slavs or semi-Slavs. From the Riesengebirge to the Vistula, and from the Moldau to the Drave, extended the shadowy empire of Moravia, founded by Moimir and Svatopluk (c. 850-890), which collapsed so com- pletely at the first impact of the Magyars that, ten years after their arrival, not a trace of it remained. The Bulgarians, Serbs, Croats and Avars in the southern provinces were subdued with equal ease. Details are wanting, but the traditional decisive battle was fought at Alpar on the Theiss, whereupon the victors pressed on to Orsova, and the conquest was completed by Arpad about the year 906. This forcible intrusion of a non- Aryan race altered the whole history of Europe; but its peculiar significance lay in the fact that it permanently divided the northern from the southern and the eastern from the western Slavs. The inevitable consequence of this rupture was the Teutonizing of the western branch of the great Slav family, which, no longer able to stand alone, and cut off from both Rome and Constantinople, was forced, in self-defence, to take Christianity, and civilization along with it, from Germany.

During the following seventy years we know next to nothing of the internal history of the Magyars. Arpad died in 907, and his immediate successors, Zsolt (907-947) and Taksony (947-972), are little more than chronological landmarks. This was the period of those devastating raids which made the savage Magyar horsemen the scourge and the terror of Europe. We have an interesting description of their tactics from the pen of the emperor Leo VI., whose account of them is confirmed by the contemporary Russian annals. Trained riders, archers and javelin-throwers from infancy, they advanced to the attack in numerous companies following hard upon each other, avoiding close quarters, but wearing out their antagonists by the persist- ency of their onslaughts. Scarce a corner of Europe was safe from them. First (908-910) they ravaged Thuringia, Swabia and Bavaria, and defeated the Germans on the Lechfeld, where-upon the German king Henry I. bought them off for nine years, employing the respite in reorganizing his army and training cavalry, which henceforth became the principal military arm of the Empire. In 933 the war was resumed, and Henry, at the head of what was really the first national German army, defeated the Magyars at Gotha and at Ried (933). The only effect of these reverses was to divert them elsewhere. Already, in 926, they had crossed the Rhine and ravaged Lotharingia. In 934 and 942 they

raided the Eastern Empire, and were bought off under the very walls of Constantinople. In 943 Taksony led them into Italy, when they penetrated as far as Otranto.. In 955 they ravaged Burgundy. The same year the emperSr Otto I. proclaimed them the enemies of God and humanity, refused to receive their ambassadors, and finally, at the famous battle of the Lechfeld, overwhelmed them on the very scene of their first victory, near Augsburg, which they were besieging (Aug. 10, 955). Only seven of the Magyars escaped, and these were sold as slaves on their return home.

The catastrophe of the Lechfeld convinced the leading Magyars of the necessity of accommodating themselves as far as possible to the Empire, especially in the matter of religion. Christianity had already begun to percolate Hungary. A large proportion

of the capfives of the Magyars had been settled all over the country to teach their conquerors the arts of peace, and close Accept- contact with this civilizing element was of itself an ance of enlightenment. The moral superiority of Christianity Christi- to paganism was speedily obvious. The only question was which form of Christianity were the Magyars to

antty.

adopt, the Eastern or the Western? Constantinople was the first in the field. The splendour of the imperial city profoundly impressed all the northern barbarians, and the Magyars, during the ioth century, saw a great deal of the Greeks. One Tran- sylvanian raider, Gyula, brought back with him from Constanti- nople a Greek monk, Hierothus (c. 950), who was consecrated " first bishop of Turkia." Simultaneously a brisk border trade was springing up between the Greeks and the Magyars, and the Greek chapmen brought with them their religion as well as their wares. Everything at first tended to favour the propaganda of the Greek Church. But ultimately political prevailed over religious considerations. Alarmed at the sudden revival of the Eastern Empire, which under the Macedonian dynasty extended once more to the Danube, and thus became the immediate neighbour of Hungary, Duke Geza, who succeeded Taksony in 972, shrewdly resolved to accept Christianity from the more distant and therefore less dangerous emperor of the West. Accordingly an embassy was sent to Otto II. at Quedlinburg in 973, and in 975 Geza and his whole family were baptized. During his reign, however, Hungarian Christianity

did not extend much beyond the limits of his court. The nation at large was resolutely pagan, and Geza, for his own sake, was obliged to act warily. Moreover, by accepting Christianity from Germany, he ran the risk of imperilling the independence of Hungary. Hence his cautious, dilatory tactics: the encourage- ment of Italian propagandists, who were few, the discouragement of German propagandists, who were many. Geza, in short, regarded the whole matter from a statesman's point of view, and was content to leave the solution to time and his successor. That successor, Stephen I. (q.v.), was one of the great construc- tive statesmen of history. His long and strenuous reign (997- 1038) resulted in the firm establishment of the Hun- ep en ' garian church and the Hungarian state. The great work may be said to have begun in 1001, when Pope Silvester II. recognized Magyar nationality by endowing the young Magyar prince with a kingly crown. Less fortunate than his great exemplar, Charlemagne, Stephen had to depend entirely upon foreigners — men like the Saxon Asztrik 1 (c. 976-1010), the first Hungarian primate; the Lombard St Gellert (c. 977-1046); the Bosomanns, a German family, better known under the Magyarized form of their name Pa.zma.ny, and many others who came to Hungary in the suite of his enlightened consort Gisela of Bavaria. By these men Hungary was divided into dioceses, with a metropolitan see at Esztergom (Gran), a city originally founded by Geza, but richly embellished by Stephen, whose Italian architects built for him there the first Hungarian cathedral dedicated to St Adalbert. Towns, most of them also the sees of bishops, now sprang up everywhere, including Szekesfehervar (Stuhlweissenburg), Veszprem, Pecs (Fiinfkirchen) and Gyor (Raab). Esztergom, Stephen's favourite residence, was the capital, and continued to be so for the next two centuries. But the Benedictines, whose settlement in Hungary dates from the establishment of their monastery at Pannonhalma (c. 1001), were the chief pioneers. Every monastery erected in the Magyar wildernesses was not only a centre of religion, but a focus of civilization. The monks cleared the forests, cultivated the recovered land, and built villages for the colonists who flocked to them, teaching the people western methods of agriculture and western arts and handicrafts. But conversion, after all, was the chief aim of these devoted missionaries, and when some Venetian priests had invented a Latin alphabet for the Magyar language a great step had been taken towards its accomplishment.

The monks were soon followed by foreign husbandmen, artificers and handicraftsmen, who were encouraged to come to Hungary by reports of the abundance of good land there and 1 Ger. Ottrik, in religion Anastasius.

the promise of privileges. This immigration was also stimulated by the terrible condition of western Europe between 987 and 1060, when it was visited by an endless succession of bad harvests and epidemics. 2 Hungary,

now better known to Europe, came to be regarded as a Promised Land, and, by the end of Stephen's reign, Catholics of all nationalities, Greeks, Pagans, Jews and Mahommedans were living securely together within her borders. For, inexorable as Stephen ever was towards fanatical pagans, renegades and rebels, he was too good a statesman to inquire too closely into the private religious opinions of useful and quiet citizens.

In endeavouring, with the aid of the church, to establish his kingship on the Western model Stephen had the immense advantage of building on unencumbered ground, the greater part of the soil of the country being at his The absolute disposal. His authority, too, was absolute, "syˆem. being tempered only by the shadowy right of the Magyar nation to meet in general assembly; and this authority he was careful not to compromise by any slavish imitation of that feudal polity by which in the West the royal power was becoming obscured. Although he broke off the Magyar tribal system, encouraged the private ownership of land, and even made grants of land on condition of military service — in order to secure an armed force independent of the national levy — he based his new principle of government, not on feudalism, but on the organization of the Frankish empire, which he adapted to suit the peculiar exigencies of his realm. Of the institutions thus borrowed and adapted the most notable was the famous county system which still plays so conspicuous a part in Hungarian national life. Central and western Hungary (the south and north-east still being desolate) were divided into forty-six counties (vdrmegyek, Lat. comitatus). At the head of each county was placed a count, or lord-lieutenant 3 {Foispdn, Lat. comes), who nominated his subordinate officials: the castellan (vdrnagy), chief captain (hadttagy) and " hundredor " (szdzados, Lat. centurio). The lord-lieutenant was nominated by the king, whom he was bound to follow to battle at the first summons. Two-thirds of the revenue of the county went into the royal treasury, the remaining third the lord-lieutenant retained for administrative purposes. In the county system were in- cluded all the inhabitants of the country save two classes: the still numerous pagan clans, and those nobles who were attached to the king's person, from whom he selected his chief officers of state and the members of his council, of which we now hear for the first time.

It is significant for the whole future of Hungary that no effort was or could be made by Stephen to weld the heterogeneous races under his crown into a united nation. The body politic consisted, after as before, of the king and the whole mass of Magyar freemen or nobles, descendants of Arpad's warriors, theoretically all equal in spite of growing inequalities of wealth and power, who constituted the populus; privileges were granted by the king to foreign immigrants in the cities, and the rights of nobility were granted to non-Magyars for special services; but, in general, the non-Magyars were ruled by the royal governors as subject races, forming — in

contradistinction to the ” nobles ” — – the mass of the peasants, the misera contribuens plebs upon whom until 1848 nearly the whole burden of taxation fell. The right, not often exercised, of the Magyar nobles to meet in general assembly and the elective character of the crown Stephen also did not venture to touch. On the other hand, his example in manumitting most of his slaves, together with the precepts of the church, practically put an end to slavery in the course of the 13th century, the slaves becoming for the most part serfs, who differed from the free peasants only in the fact that they were attached to the soil {adscripti glebae).

At this time all the conditions of life in Hungary were simple

- At its worst, c. 1030-1033, cannibalism was common.

3 The English title of lord-lieutenant is generally used as the best translation of Foispdn or comes (in this connexion). The title of count {grof) was assumed later (15th century) by those nobles who had succeeded, in spite of the Golden Bull, in making’ their authority over whole counties independent and hereditary. — [Ed.]

and primitive. The court itself was perambulatory. In summer the king dispensed justice in the open air, under a large tree. Only in the short winter months did he dwell in the house built for him at Esztergom by his Italian architects. The most valuable part of his property still consisted of flocks and herds, or the products of the labours of his serfs, a large proportion of whom were bee-keepers, hunters and fishers employed in and around the interminable virgin-forests of the rough-hewn young monarchy.

A troubled forty years (1038-1077) divides the age of St Stephen from the age of St Ladislaus. Of the six kings who reigned in Hungary during that period three died violent deaths, and the other three were fighting incessantly against foreign and domestic foes. In 1046, and again in 1061, two dangerous pagan risings shook the very foundations of the infant church and state; the western provinces were in constant danger from the attacks of the acquisitive emperors, and from the south and south- east two separate hordes of fierce barbarians (the Petchenegs in 1067-1068, and the Rumanians in 1071-1072) burst over the land. It was the general opinion abroad that the Magyars would either relapse into heathendom, or

become the vassals of the Holy Roman Empire, and this opinion was reflected in the increasingly hostile attitude of the popes towards the Arpad kings. The political independence of Hungary was ultimately secured by the outbreak of the quarrel about investiture (1076), when Geza I. (1074-1077) shrewdly applied to Pope Gregory VII. for assistance, and submitted to accept his kingdom from him as a fief of the Holy See. The immediate result of the papal alliance was to enable Hungary, under both Ladislaus and his capable successor Coloman [Kalman] (1095- 11 16), to hold her own against all her enemies, and extend her dominion abroad by conquering Croatia and a portion of the Dalmatian coast. As an incipient great power, she was beginning to feel the need of a seaboard.

In the internal administration both Ladislaus I. and Coloman approved themselves worthy followers of St Stephen. Ladislaus planted large Petcheneg colonies in Transylvania and Ladislaus tne trans-Dravian provinces, and established military Coloman. cordons along the constantly threatened south-eastern boundary, the germs of the future banates l (bdnsdgok) which were to play such an important part in the national defence in the following century. Law and order were enforced with the utmost rigour. In that rough age crimes of violence predominated, and the king's justiciars regularly perambulated the land in search of offenders, and decimated every village which refused to surrender fugitive criminals. On the other hand, both the Jews and the " Ishmaelites " (Mahommedans) enjoyed complete civil and religious liberty in Hungary, where, indeed, they were too valuable to be persecuted. The Ishmaelites, the financial experts of the day, were the official mint-masters, treasurers and bankers. The clergy, the only other educated class, supplied the king with his lawyers, secretaries and ambassadors. The Magyar clergy was still a married clergy, and their connubial privileges were solemnly confirmed by the synod of Szabolcs, presided over by the king, in 1092. So firmly rooted in the land was this practice, that Coloman, much as he needed the assistance of the Holy See in his foreign policy, was only with the utmost difficulty induced, in 1106, to bring the Hungarian church into line with the rest of the Catholic world by enforcing clerical celibacy. Coloman was especially remarkable as an administrative reformer, and Hungary, during his reign, is said to have been the best-governed state in Europe. He regulated and simplified the whole system of taxation, encouraged agriculture by dif- ferential duties in favour of the farmers, and promoted trade by a systematic improvement of the ways of communication. The Magna v-ia Colomanni Regis was in use for centuries after his death. Another important reform was the law permitting the free disposal of landed estate, which gave the holders an increased interest in their property, and an inducement to im- prove it. During the reign of Coloman, moreover, the number of freemen was increased by the frequent manumission of serfs. 1 The ban is equivalent to

the margrave, or count of the marches.

The lot of the slaves was also somewhat ameliorated by the law forbidding their exportation.

Throughout the greater part of the 12th century the chief impediment in the way of the external development of the Hungarian monarchy was the Eastern Empire, which, mvairv under the first three princes of the Comnenian dynasty, with the dominated south-eastern Europe. During the earlier Eastern part of that period the Magyars competed on fairly Empire. equal terms with their imperial rivals for the possession of Dalmatia, Rascia (the original home of the Servians, situated between Bosnia, Dalmatia and Albania) and Rama or northern Bosnia (acquired by Hungary in 1135); but on the accession of Manuel Comnenus in 1143 the struggle became acute. As the grandson of St Ladislaus, Manuel had Hungarian blood in his veins; his court was the ready and constant refuge of the numerous Magyar malcontents, and he aimed not so much at the conquest as at the suzerainty of Hungary, by placing one of his Magyar kinsmen on the throne of St Stephen.- He success- fully supported the claims of no fewer than three pretenders to the Magyar throne, and finally made Bela III. (11 73-1 196) king of Hungary, on condition that he left him, Manuel, a free hand in Dalmatia. The intervention of the Greek emperors had im- portant consequences for Hungary. Politically it increased the power of the nobility at the expense of the crown, every com- peting pretender naturally endeavouring to win adherents by distributing largesse in the shape of crown-lands. Ecclesi- astically it weakened the influence of the Catholic Church in Hungary, the Greek Orthodox Church, which permitted a married clergy and did not impose the detested tithe (the principal cause of nearly every pagan revolt) attracting thousands of adherents even among the higher clergy. At one time, indeed, a Magyar archbishop and four or five bishops openly joined the Orthodox communion and willingly crowned Manuel's nominees despite the anathemas of their Catholic brethren.

The Eastern Empire ceased to be formidable on the death of Manuel (1080), and Hungary was free once more to pursue a policy of aggrandizement. In Dalmatia the Venetians were too strong for her; but she helped materially to break up the Byzantine rule in the Balkan peninsula by assisting Stephen Nemanya to establish an independent Servian kingdom, originally under nominal Hungarian suzerainty. Bela en- deavoured to strengthen his own monarchy by introducing the hereditary principle, crowning his infant son Emerich, as his successor during his own lifetime, a practice followed by most of the later Arpads; he also held a brilliant court on the Byzan- tine model, and replenished the treasury by his wise economies. Unfortunately the fruits of his diligence and foresight

were dissipated by the follies of his two immediate successors, Emerich (1196-1204) and Andrew II. (q.v.), who weakened the Aadrew n royal power in attempting to win support by lavish grants of the crown domains on the already over-influential magnates, a policy from which dates the supremacy of the semi-savage Magyar oligarchs, that insolent and self-seeking class which would obey no superior and trampled ruthlessly on every inferior. The most conspicuous event of Andrew's reign was the promulgation in 1222 of the so-called Golden Bull, which has aptly been called the Magna Carta of Hungary, and is in some of its provisions strikingly reminiscent of that signed seven years previously by the English king John.

The Golden Bull has been described as consecrating the humiliation of the crown by the great barons, whose usurpations it legalized; the more usually accepted view, however, is that it was directeti not so much to weakening as to strengthening the crown by uniting its interests with those of the mass of the Magyar nobility, equally threatened by the encroachments of the great barons. 2 The pre- amble, indeed, speaks of the curtailment of the liberties of the^ nobles by the power of certain of the kings, and at the end the right of armed resistance to any attempt to infringe the charter is conceded to " the bishops and the higher and lower nobles " of the realm; but, for the rest, its contents clearly show that it Was intended to strengthen the monarchy by ensuring " that the momentary folly

2 Andrassy, Development of Hung. Const. Liberty (Eng._ trans., p. 93) ; Knatchbull-Hugessen, i. 26 seq., where its provisions are given in some detail.

Bile 111.

Beta IV.

or weakness of the king should not endanger the institution itself." This is especially clear from clause xvi., which decrees that the title and estates of the lords-lieutenant of counties should not be hereditary, thus attacking feudalism at its very roots, while clause xiv. provides for the degradation of any lord-lieutenant who should abuse his office. On the other hand, the principle of the exemption of all the nobles from taxation is confirmed, as well as their right to refuse military service abroad, the defence of the realm being their sole obligation. All nobles were also to have the right to

appear at the court which was to be held once a year at Szekesfeh6r- var, by the king, or in his absence by the palatine, 1 for the purpose of hearing causes. A clause also guarantees all nobles against arbitrary arrest and punishment at the instance of any powerful person.

This famous charter, which was amplified, under the influence of the clergy, in 1231, when its articles were placed under the guardianship of the archbishop of Esztergom (who was authorized to punish their violation by the king with excommunication), is generally regarded as the foundation of Hungarian constitu- tional liberty, though like Magna Carta it purported only to confirm immemorial rights; and as such it was expressly ratified as a whole in the coronation oaths of all the Habsburg kings from Ferdinand to Leopold I. Its actual effect in the period succeeding its issue was, however, practically nugatory ; if indeed it did not actually give a new handle to the subversive claims of the powerful barons.

Bela IV. (1235-1270), the last man of genius whom the Arpads produced, did something to curb the aristocratic misrule which was to be one of the determining causes of the collapse of his dynasty. But he is best known as the regenerator of the realm after the cataclysm of 1241-1242 (see Bela IV.). On his return from exile, after the subsidence of the Tatar deluge, he found his kingdom in ashes; and his two great remedies, wholesale immigration and castle-building, only sowed the seeds of fresh disasters. Thus the Rumanian colonists, mostly pagans, whom he settled in vast numbers on the waste lands, threatened to overwhelm the Christian population; while the numerous strongholds, which he encouraged his nobles to build as a protec- tion against future Tatar invasions, subsequently became so many centres of disloyalty. To bind the Rumanian still more closely to his dynasty, Bela married his son Stephen V.- ste ˆ l ! e ° , V ‘ (1270-1272) to a Rumanian girl, and during the lausiv. ‘ re ig n °f ner son Ladislaus IV. (1272-1290) the court was certainly more pagan than Christian. Valiant and enterprising as both these princes were (Stephen successfully resisted the aggressions of the brilliant ” golden Ring,” Ottakar II. of Bohemia, and Ladislaus materially contributed to his utter overthrow at Durnkriit in 1278), neither of them was strong enough to make head against the disintegrating influences all around them. Stephen contrived to hold his own by adroitly contracting an alliance with the powerful Neapolitan Angevins who had the ear of the pope; but Ladislaus (q.v.) End of the was s0 completely caught in the toils of the Rumanians, Dynasty. tnat tne Holy See, the suzerain of Hungary, was forced to intervene to prevent the relapse of the kingdom into barbarism, and the unfortunate Ladislaus perished in the crusade that was preached against him. An attempt of a patriotic party to keep the last Arpad, Andrew III. (1200- 1301), on the throne was only temporarily successful, and after a horrible eight years’ civil war (1301-1308) the crown of St Stephen finally

passed into the capable hands of Charles Robert of Naples.

During the four hundred years of the Arpad dominion the nomadic Magyar race had established itself permanently in central Europe, adopted western Christianity and founded a national monarchy on the western model. Hastily and violently converted, driven like a wedge between the Eastern and the Western Empires, the young kingdom was exposed from the first to extraordinary perils. But, under the guidance of a

1 The full title of the palatine (Mag. nddor or nddor-ispdn, Lat. palatinus) was comes palatii regni, the first palatine being Abu Samuel (c. 1041). By the Golden Bull the palatine acquired something of the quality of a responsible minister, as " intermediary between the crown and people, guardian of the nation's rights, and keeper of the king's conscience " (Knalchbull-Hugessen, i. 30).

series of eminent rulers, it successfully asserted itself alike against pagan reaction from within, and aggressive pressure from without, and, as it grew in strength and skill, expanded territori- ally at the expense of all its neighbours. These triumphs were achieved while the monarchy was absolute, and thus able to concentrate in its hands all the resources of the state, but towards the end of the period a political revolution began. The weakness and prodigality of the later Arpads, the depopulation of the realm during the Tatar invasion, the infiltration of western feudalism and, finally, the endless civil discords of the 13th century, brought to the front a powerful and predacious class of barons who ultimately overshadowed the throne. The ancient county system was gradually absorbed by this new governing element. The ancient royal tenants became the feudatories of the great nobles, and fell naturally into two classes, the nobiles bene possessionati, and the nobiles unius sessionis, in other words the richer and the poorer gentry. We cannot trace the gradations of this political revolution, but we know that it met with determined opposition from the crown, which resulted in the utter destruction of the Arpads, who, while retaining to the last their splendid physical qualities, now exhibited unmistakeable signs of moral deterioration, partly due perhaps to their too frequent marriages with semi-Oriental Greeks and semi-savage Rumanians. On the other hand the great nobles were the only class who won for themselves a recognized political position. The tendency towards a repre- sentative system of government had begun, but the almost uninterrupted anarchy which marked the last thirty years of the Arpad rule was no favourable time for constitutional development. The kings were fighting for their lives, the great nobles were indistinguishable from brigands and the whole nation seemed to be relapsing into savagery. ,

It was reserved for the two great princes of the house of Anjou, Charles I.

(1310-1342) and Louis I. (1342-1382), to rebuild the Hungarian state, and lead the Magyars back to civilization. Both by character and education they ˆtou were eminently fitted for the task, and all the circum- stances were in their favour. They brought from their native Italy a thorough knowledge of the science of government as the middle ages understood it, and the decimation of the Hungarian magnates during the civil wars enabled them to re-create the noble hierarchy on a feudal basis, in which full allowance was made for Magyar idiosyncracies. Both these monarchs were absolute. The national assembly (Orszaggyules) was still summoned occasionally, but at very irregular intervals, the real business of the state being transacted in the royal council, where able men of the middle class, ˆ0°™ ”’ principally Italians, held confidential positions. The lesser gentry were protected against the tyranny of the magnates, encouraged to appear at court and taxed for military service by the royal treasury direct — so as to draw them closer to the crown. Scores of towns, too, owe their origin and enlargement to the care of the Angevin princes, who were lavish of privileges and charters, and saw to it that the high-roads were clear of robbers. Charles, moreover, was a born financier, and his reform of the currency and of the whole fiscal system greatly contributed to enrich both the merchant class and the treasury. Louis encouraged the cities to surround themselves with strong walls. He himself erected a whole cordon of forts round the flourishing mining towns of northern Hungary. He also appointed Hungarian consuls in foreign trade centres, and established a system of protective tariffs. More important in its ulterior consequences to Hungary was the law of 1351 which, while confirming the Golden Bull in general, abrogated the clause (iv.) by which the nobles had the right to alienate their lands. Henceforward their possessions were to descend directly and as of right to their brothers and their issue, whose claim was to be absolute. This ” principle of aviticity ” (osis&g, aviticum), which survived till 1848, was intended to preserve the large feudal estates as part of the new military system, but its ultimate effect was to hamper the development of the country by preventing the alienation, and therefore the mortgaging of*

lands, so long as any, however distant, scion of the original owning family survived. 1 Louis’s efforts to increase the national wealth were also largely frustrated by the Black Death, which ravaged Hungary from 1347 to 1360, and again during 1380-1381, carrying off at least one-fourth of the population.

Externally Hungary, under the Angevin kings, occupied a commanding position. Both Charles and Louis were diplo- matists as well as soldiers, and their foreign policy, largely based on family alliances, was almost invariably successful. Charles married Elizabeth, the sister of Casimir the Great of Poland, with whom he was connected by ties of close friendship, and Louis, by virtue of a compact made by his father thirty-one years previously, added the Polish crown to that of Hungary in 1370. Thus, during the last twelve years of his reign, the dominions of Louis the Great included the greater part of central Europe, from Pomerania to the Danube, and from the Adriatic to the steppes of the Dnieper.

The Angevins were less successful towards the south, where the first signs were appearing of that storm which ultimately swept away the Hungarian monarchy. In 1353 the Ottoman invasions. Turks crossed the Hellespont from Asia Minor and began that career of conquest which made them the terror of Europe for the next three centuries. In 1360 they conquered southern Bulgaria. In 1365 they transferred their capital from Brusa to Adrianople. In 1371 they overwhelmed the Servian tsar Vukashin at the battle of Taenarus and pene- trated to the heart of old Servia. In 1380 they threatened Croatia and Dalmatia. Hungary herself was now directly menaced, and the very circumstances which had facilitated the advance of the Turks, enfeebled the potential resistance of the Magyars. The Arpad kings had succeeded in encircling their whole southern frontier with half a dozen military colonies or banates, comprising, roughly speaking, Little Walachia, 2 and the northern parts of Bulgaria, Servia and Bosnia. But during this period a redistribution of territory had occurred in these parts, which converted most of the old banates into semi-independent and violently anti-Magyar principalities. This was due partly to the excessive proselytizing energy of the Angevins, which provoked rebellion on the part of their Greek-Orthodox subjects, partly to the natural dynastic competition of the Servian and Bulgarian tsars, and partly to the emergence of a new nationality, the Walachian. Previously to 1320, what is now called Walachia was regarded by the Magyars as part of the banate of Szoreny. The base of the very mixed and ever- shifting population in these parts were the Vlachs (Rumanians), perhaps the descendants of Trajan's colonists, who, under their voivode, Bazarad, led King Charles into an ambuscade from which he barely escaped with his life (Nov. 9-12, 1330). From this disaster are to be dated the beginnings of Walachia as an independent state. Moldavia, again, ever since the nth century, had been claimed by the Magyars as forming, along with Bessar- abia and the Bukowina, a portion of the semi-mythical Etelkoz, the original seat of the Magyars before they occupied modern Hungary. This desolate region was subsequently peopled by Vlachs, whom the religious persecutions of Louis the Great had driven thither from other parts of his domains, and, between 1350 and 1360,

their voivode Bogdan threw off the Hungarian yoke altogether. In Bosnia the persistent attempts of the Magyar princes to root out the stubborn, crazy and poisonous sect of the Bogomils had alienated the originally amicable Bosnians, and in 1353 Louis was compelled to buy the friendship of their Bar Tvrtko by acknowledging him as king of Bosnia. Both Servia and Bulgaria were by this time split up into half a dozen principalities which, as much for religious as for political reasons, preferred paying tribute to the Turks to acknowledging the hegemony of Hungary. Thus, towards the end of his reign, Louis found himself cut off from the Greek emperor, his sole ally in the Balkans, by a chain of bitterly hostile Greek-Orthodox states, extending from the Black Sea to the Adriatic. The

1 Knatchhull-Hugessen, i. 41.

■ *That is to say the western portion of Walachia, which lies between the Aluta and the Danube.*

The Vlachs.

commercial greed of the Venetians, who refused to aid him with a fleet to cut off the Turks in Europe from the Turks in Asia Minor, nullified Louis' last practical endeavour to cope with a danger which from the first he had estimated at its true value.

Louis the Great left two infant daughters: Maria, who was to share the throne of Poland with her betrothed, Sigismund of Pomerania, and Hedwig, better known by her Polish name of Jadwiga, who was to reign over Hungary with her young bride- groom, William of Austria. This plan was upset by the queen- dowager Elizabeth, who determined to rule both kingdoms during the minority of her children. Maria, her favourite, with whom she refused to part, was crowned queen of Hungary a week after her father's death (Sept. 17, 1382). Two years later Jadwiga, reluctantly transferred to the Poles instead of her sister, was crowned queen of Poland at Cracow (Oct. 15. 1384) and subsequently compelled to marry Jagiello, grand-duke of Lithuania. In Hungary, meanwhile, impatience at the rule of women induced the great family of the Horvathys to offer the crown of St Stephen to Charles III. of Naples, who, despite the oath of loyalty he had sworn to his benefactor, Louis the Great, accepted the offer, landed in Dalmatia with a small Italian army, and, after occupying Buda, was crowned king of Hungary on the 31st of December, 1385, as Charles II. His reign lasted thirty- eight days. On the 7th of February, 1386, he was treacherously attacked in the queen-dowager's own apartments, at her instiga- tion, and died of his injuries a few days later. But Elizabeth did not profit long by this atrocity. In July the same year, while on a pleasure trip with her daughter, she was captured by the Horvathys, and tortured to

death in her daughter's presence. Maria herself would doubtless have shared the same fate, but for the speedy intervention of her fiance, whom a diet, by the advice of the Venetians, had elected to rule the headless realm on the 31st of March 1387. He married Maria in June the same year, and she shared the sceptre with him till her sudden death by accident on the 17th of May 1395.

During the long reign of Sigismund (1387-1437) Hungary was brought face to face with the Turkish peril in its most threatening shape, and all the efforts of the king were directed towards combating or averting it. However sorry a nmnd. figure Sigismund may have cut as emperor in Germany, as king of Hungary he claims our respect, and as king of Hungary he should be judged, for he ruled her, not unsuccessfully, for fifty years during one of the most difficult crises of her history, whereas his connexion with Germany was at best but casual and transient. 3 From the first he recognized that his chief duty was to drive the Turks from Europe, or, at least, keep them out of Hungary, and this noble ambition was the pivot of his whole policy. A domestic rebellion (1387-1395) prevented him at the outset from executing his design till 1396, and if the hopes of Christendom were shattered at Nicopolis, the failure was due to no fault of his, but to the haughty insubordina- tion of the feudal levies. Again, his inaction during those memor- able twelve years (1401-1413) when the Turkish empire, after the collapse at Angora (1402), seemed about to be swallowed up by " the great wolf " Tamerlane, was due entirely to the malice of the Holy See, which, enraged at his endeavours to maintain the independence of the Magyar church against papal aggression (the diet of 1404, on Sigismund's initiative, had declared bulls bestowing Magyar benefices on foreigners, without the royal consent, pernicious and illegal), saddled him with a fresh rebellion and two wars with Venice, resulting ultimately in the total loss of Dalmatia (c. 1430). Not till 1409 could Sigismund be said "to be king in his own realm, yet in 14 13 we find him traversing Europe in his endeavour to terminate the Great Schism, as the first step towards uniting Christendom once more against the Turk. Hence the council of Constance to depose three rival popes; hence the council of Basel to pacify the Hussites, and promote another anti-Moslem league. But by this time the Turkish

3 Though elected king of the Romans in 141 1, he cannot be regarded as the legal emperor till his coronation at Rome in 1423, and if he was titular king of Bohemia as early as 1419, he was not acknowledged as king by the Czechs themselves till 1436.

empire had been raised again from its ruins by Mahommed I. (1402-1421), and resumed its triumphal progress under Murad II. (1421-1451). Yet even now Sigismund, at the head of his Magyars, thrice (1422-1424, 1426-1427, and 1430-1431) en- countered the Turks, not ingloriously, in the open field, till, recognizing that Hungary must thenceforth rely entirely on her own resources in any future struggle with Islam, he elaborately fortified the whole southern frontier, and converted the little fort of Nandorfehervar, later Belgrade, at the junction of the Danube and Save, into an enormous first-class fortress, which proved strong enough to repel all the attacks of the Turks for more than a century. It argued no ordinary foresight thus to recognize that Hungary's strategy in her contest with the Turks must be strictly defensive, and the wisdom of Sigismund was justified by the disasters which almost invariably overcame the later Magyar kings whenever they ventured upon aggressive warfare with the sultans.

A monarch so overburdened with cares was naturally always in need of money, 1 and thus obliged to lean heavily upon the support of the estates of the realm. The importance and influence of the diet increased proportionately. It met every year, sometimes twice a year, during Sigismund's reign, and was no longer, as in the days of Louis the Great, merely a consultative council, but a legislative body in partnership with the king. It was still, however, essentially an assembly of notables, lay and clerical, at which the gentry, though technically eligible, do not seem to have been directly represented. At Sigismund's first diet (1307) it was declared that the king might choose his counsellors where he listed, and at the diet of 1397 he invited the free and royal towns to send their deputies to the parliament. Subsequently this privilege was apparently erected into a statute, but how far it was acted upon we know not. Sigismund, more fortunate than the Polish kings, seems to have had little trouble with his diets. This was largely due to his friendly intimacy with the majority of the Magyar notables, from among whom he chose his chief counsellors. The estates loyally supported him against the attempted exactions of the popes, and do not seem to have objected to any of his reforms, chief among which was the army-reform project of 1435, to provide for the better defence of the land against the Turks. This measure obliged all the great dignitaries, and the principal towns also, according to their means, to maintain a banderiam of five hundred horsemen, or a proportional part thereof, and hold it ready, at the first summons, thus supplying the crown with a standing army 76,875 strong. In addition to this, a reserve force called the lelckkatonasdg was recruited from among the lesser gentry according to their teleks or holdings, every thirty-three teleks being held responsible for a mounted and fully equipped archer. Moreover, river fleets, built by Genoese

masters and manned by Servians, were constructed to patrol and defend" the great rivers of Hungary, especially on the Turkish frontier. Much as he owed to them, however, Sigismund was no mere nobles' king. His care for the common people was sincere and constant, but his beneficial efforts in this direction were thwarted by the curious interaction of two totally dissimilar social system. factors, feudalism and Hussitism. In Sigismund's reign the feudal system, for the first time, became deeply rooted in Magyar soil, and it is a lamentable fact that in 15th-century Hungary it is to be seen at its very worst, especially in those wild tracts, and they were many, in which the king's writ could hardly be said to run. Simultaneously from Hussites t ' le west came tne Hussite propagandists teaching that all men were equal, and that all property should be held in common. The suffering Magyar multitudes eagerly responded to these seductive teachings, and the result was a series of dangerous popular risings (the worst in 1433 and 1436) in which heresy and communism were inextricably intermingled. With the aid of inquisitors from Rome, the evil was literally burnt out, but not before provinces, especially in the south and

1 In 1412 he pawned the twenty-four Zips towns to Poland, and, in 141 1 he pledged his margraviate of Brandenburg to the Hohen- zollerns.

south-east, had been utterly depopulated. They were re- peopled by Vlachs.

Yet despite the interminable wars and rebellions which darken the history of Hungary in the reign of Sigismund, the country, on the whole, was progressing. Its ready response to the king's heavy demands for the purpose of the national defence points to the existence of a healthy and self-sacrificing public spirit, and the eagerness with which the youth of all classes now began to flock to the foreign universities is another satis-factory feature of the age. Between 1362 and 1450 no fewer than 41 5 1 Magyar students frequented the university of Vienna, nearly as many went by preference to Prague, and this, too, despite the fact that there were now two universities in Hungary itself, the old foundation of Louis the Great at Pecs, and a new one established at Buda by Sigismund.

Like Louis the Great before him, Sigismund had failed to found a dynasty, but, fifteen years before his death, he had succeeded in providing his only daughter Elizabeth with a consort apparently well able to protect both her and her in- heritance in the person of Albert V., duke of Austria. Albert, a sturdy soldier, who had given brilliant proofs of valour and generalship in the Hussite wars, was crowned king of Hungary at Szekesfehervar (Stuhlweissenburg) on the 1st of January 1438, elected king of the Romans at Frankfort on the 18th of March 1438, and crowned king of Bohemia at Prague on the 29th of June 1438. On returning to Buda in 1439, he at once lounged into a war with the Turks, who had, in the meantime,

captured the important Servian fortress of Semendria and subjugated the greater part of Bosnia. But the king got no farther than Servia, and was carried off by dysentery (Oct. 27, 1439), in the forty-second year of his age, in the course of the campaign.

Albert left behind him two infant daughters only, but his consort was big with child, and, in the event of that child proving to be an heir male, his father's will bequeathed to him the kingdoms of Hungary and Bohemia, under the regency of his mother. Thus, with the succession uncertain, with ' the Turk at the very door, with the prospect, dismal at the best, of a long minority, the political outlook was both embarrassing and perilous. Obviously a warrior-king was preferable to a regimen of women and children, and the eyes of the wiser Magyars turned involuntarily towards Wladislaus III. of Poland, who, though only in his nineteenth year, was already renowned for his martial disposition. Wladislaus accepted the proffered throne from the Magyar delegates at Cracow on the 8th of March 1440; but in the meantime (Feb. 22) the queen-widow gave birth to a son who, six weeks later, as Ladislaus V. (q.v.) was crowned king of Hungary (May 15) at Szekesfehervar. On the 22nd of May the Polish monarch appeared at Buda, was unanimously elected king of Hungary under the title of Wladislaus I. (June 24) and crowned on the 17th of July. This duoregnum proved even more injurious to Hungary than the dreaded interregnum. Queen Elizabeth, aided by her kinsmen, the emperor Frederick III. and the counts of Cilli, flooded northern and western Hungary with Hussite mercenaries, one of whom, Jan Giszkra, she made her captain-general, while Wladislaus held the central and south-eastern parts of the realm. The resulting civil war was terminated only by the death of Elizabeth on the 13th of December 1443.

All this time the pressure of the Turks upon the southern provinces of Hungary had been continuous, but fortunately all their efforts had so far been frustrated by the valour and generalship of the ban of Szoreny, John Huayadl. Hunyadi, the fame of whose victories, notably in 1442 and 1443, encouraged the Holy See to place Hungary for the third time at the head of a general crusade against the infidel. The experienced diplomatist Cardinal Cesarini was accordingly sent to Hungary to reconcile Wladislaus with the emperor. The king, who had just returned from the famous " long cam- paign " of 1443, willingly accepted the leadership of the Christian League. At the diet of Buda, early in 1444, supplies were voted for the enterprise, and Wladislaus was on the point of quitting

his camp at Szeged for the seat of war, when envoys from Sultan Murad arrived with the offer of a ten years' truce on such favour- able conditions (they included the relinquishment of Servia, Walachia and Moldavia, and the payment of an indemnity) that Hunyadi persuaded the king to conclude (in July) a peace which gave him more than could reasonably be anticipated from the most successful campaign. Unfortunately, two days later, Cardinal Cesarini absolved the king from the oath whereby he had sworn to observe the peace of Szeged, and was thus mainly responsible for the catastrophe of Varna, when four months later (Nov. 10) the young monarch and the flower of the Magyar chivalry were overwhelmed by fourfold odds on Turkish soil. (See Hunyadi, Janos; and Wladislaus III.)

The next fourteen years form one of the most interesting and pregnant periods of Hungarian history. It marks the dawn of a public spirit as represented by the gentry, who, alarmed at the national peril and justly suspicious of the ruling magnates, unhesitatingly placed their destinies in the hands of Hunyadi, the one honest man who by sheer merit had risen within the last ten years from the humble position of a country squire to a leading position in the state. This feeling of confidence found due expression at the diet of 1446, which deliberately passing over the palatine Laszlo Garai elected Hunyadi governor of Hungary, and passed a whole series of popular measures intended to be remedial, e.g. the decree ordering the demolition of the new castles, most of them little better than robber-strong- holds; the decree compelling the great officers of state to suspend their functions during the session of the diet; the decree declaring illegal the new fashion of forming confederations on the Polish model, all of which measures were obviously directed against the tyranny and the lawlessness of the oligarchy. Unfortunately this salutary legislation remained a dead letter. It was as much as the governor could do to save the state from destruction, let alone reform it. At this very time northern Hungary, including the wealthy mining towns, was in the possession of the Hussite mercenary Jan Giszkra, who held them nominally for the infant king Ladislaus V., still detained at Vienna by his kinsman the emperor. The western provinces were held by Frederick himself. Invaluable time was wasted in negotiating with these intruders before the governor could safely devote himself to the task of expelling the Turk from the southern provinces. He had to be content with armistices, reconciliations and matrimonial contracts, because the great dignitaries of the state, men like the palatine Laszlo Garai, Count Ulrich of Cilli, and the voivode of Transylvania, Mihaly Ujlaky, thwarted in every way the novus homo whom they hated and envied. From them, the official guardians of Hungary's safety, he received no help, either during his governorship (1446- 1453), or when, in 1454, on the eve of his departure for his last

and most glorious campaign, the diet commanded a levSe en masse of the whole population in his support. At that critical hour it was at his own expense that Hunyadi fortified Belgrade, now the sole obstacle between Hungary and destruction, with the sole assistance of the Franciscan friar Giovanni da Capistrano, equipped the fleet and the army which relieved the beleaguered fortress and overthrew Mahommed II. But the nation at least was grateful, and after his death (Aug. n, 1456) it freely trans- ferred its allegiance to his family as represented by his two sons, Laszlo, now in his 23rd, and Matthias, now in his 16th year. The judicial murder of Laszlo Hunyadi (q.v.) by the enemies of his house (March 16, 1457) was therefore a stupid blunder as well as the foulest of crimes, and on the death of his chief assassin, Ladislaus V., six months later (Nov. 23, 1457), the diet which assembled on the banks of the Rakos, in defiance of the magnates and all foreign competitors, unanimously and enthusiastically elected Matthias Hunyadi king of Hungary (Jan. 24, 1458).

In less than three years the young king had justified their confidence, and delivered his country from its worst embarrass-

« ...., . ments. (See Matthias I., king of Hungary.) This Matthias /. .. i-ij..i£ r

prodigy was accomplished in the face 01 every

conceivable obstacle. His first diet grudgingly granted him

supplies and soldiers for the Turkish war, on condition that under no circumstances whatever should they henceforth be called upon to contribute towards the national defence, and he was practically deprived of the control of the banderia or mounted militia. It was with a small force of mercenaries, raised at his own expense, that the young king won his first Turkish victories, and expelled the Czechs from his northern and the Habsburgs from his western provinces. But his limited resources, and, above all, the proved incapacity of the militia in the field, compelled him instantly to take in hand the vital question of army reform. In the second year of his reign he undertook personally the gigantic task of providing Hungary with an army adequate to her various needs on the model of the best military science of the day. The landless younger sons of the gentry and the Servian and Vlach immigrants provided him with excellent and practically inexhaustible military material. The old feudal levies he put aside. Brave enough personally, as soldiers they were distinctly inferior both to the Janissaries and the Hussites, with both of whom Matthias had constantly to contend. It was a trained regular army in his pay and consequently at his disposal that he wanted. The nucleus of the new army he found in the Czech mercenaries, seasoned veterans who readily

transferred their services to the best payer. This force, formed in 1459, was generally known as the Fekete Sereg, or "Black Brigade," from the colour of its armour. From 1465 the pick of the Magyars and Croatians were enlisted in the same way every year, till, towards the end of his reign, Matthias could count upon 20,000 horse and 8000 foot, besides 6000 black brigaders. The cavalry consisted of the famous Hussars, or light horse, of which he may be said to have been the creator, and the heavily armed mounted musketeers on the Czech-German model. The infantry, in like manner, was divided into light and heavy. This army was provided with a regular commissariat, cannon 1 and ballistic machines, and, being constantly on active service, was always in a high state of efficiency. The land forces were supported by a river fleet consisting (in 1479) of 360 vessels, mostly sloops and corvettes, manned by 2600 sailors, generally Croats, and carrying 10,000 soldiers. Eight large military stations were also built at the chief strategic points on the Danube, Save and Theiss. These armaments, which cost Matthias 1,000,000 florins per annum, equivalent to £200,000, did not include the auxiliary troops of the hospodars of Walachia and Moldavia, or the feudal levies of the barons and prelates.

The army of Matthias was not only a military machine of first-rate efficiency, but an indispensable civilizing medium. It enabled the king to curb the lawlessness of the Magyar nobility, and explains why none of the numerous rebellions against him ever succeeded. Again and again, during his absence on the public service, the barons and prelates would assemble to compass his ruin or dispose of his crown, when, suddenly, " like a tempest," from the depths of Silesia or of Bosnia, he would himself appear among them, confounding and scattering them, often without resistance, always without bloodshed. He also frequently employed his soldiers in collecting the taxes from the estates of those magnates who refused to contribute to the public burdens, in protecting the towns from the depredations of the robber barons, or in convoying the caravans of the merchants. In fact, they were a police force as well as an army. Despite the enormous expense of maintaining the army, Matthias, after the first ten years of his reign, was never in want of money. This miracle was achieved by tact and management. No Hungarian king had so little trouble with the turbulent diet as Matthias. By this time the gentry, as well as the barons and prelates, took part in the legislature. But attendance at the diet was regarded by the bulk of the poorer deputies as an intolerable burden, and they frequently agreed to grant the taxes for two or three years in advance, so as to be saved the expense

1 Some of these were of gigantic size, e.g. the Varga Mozsar, or great mortar, which sixty horses could scarce move from its place, and a ballistic machine invented by Matthias which could huri stones of 3 cwt.

of attending every year. Moreover, to promote their own convenience, they readily allowed the king to assess as well as to collect the taxes, which consequently tended to become regular and permanent, while Matthias' reform of the treasury, which was now administered by specialists with separate functions, was economically of great benefit to the state. Yet Matthias never dispensed with the diet. During the thirty-two years of his reign he held at least fifteen diets, 1 at which no fewer than 450 statutes were passed. He re-codified the Hungarian common law; strictly defined the jurisdiction of the whole official hierarchy from the palatine to the humblest village judge ; cheapened and accelerated legal procedure, and in an age when might was right did his utmost to protect the weak from the strong. There is not a single branch of the law which he did not simplify and amend, and the iron firmness with which he caused justice to be administered, irrespective of persons, if it exposed him to the charge of tyranny from the nobles, also won for him from the common people the epithet of " the Just." To Matthias is also due the credit of creating an efficient official class. Merit was with him the sole qualification for advancement. One cf his best generals, Pal Kinizsy, was a miller's son, and his capable chancellor, Peter Varady, whom he made archbishop of Kalocsa, came of a family of small squires. For education so scholarly a monarch as Matthias naturally did what he could. He founded the university of Pressburg (Academia Istropolitana, 1467), revived the declining university of Pecs, and, at the time of his death, was meditating the establishment of a third university at Buda.

Unfortunately the civilizing efforts of Matthias made but little impression on society at large. The bulk of the Magyar nobility was still semi-barbaric. Immensely wealthy (it is estimated that most of the land, at this time, was in the hands of 25 great families, the Zapolyas alone holding an eighth of it), it was a point of honour with them to appear in public in costly raiment ablaze with silver, gold and precious stones, followed at every step by armies of retainers scarcely less gorgeous. At the same time their ignorance was profound. Many of the highest dignitaries of state did not know their alphabet. Signatures to documents of the period are rare; seals served instead of signa- tures, because most of the nobles were unable to sign their names. Learning, indeed, was often ridiculed as pedantry in a gentleman of good family. – * .

The clergy, the chief official class, were naturally less ignorant than the

gentry. Some of the prelates — notably Janos Csezmeczey, better known as Janus Pannonius (1433-147 2) — had a European reputation for learning. The primate Cardinal, Janos Vitez (1408-1472), at the beginning, and the primate, Cardinal Tamas Bakocz (q.v.), at the end of the reign were men of eminent ability and the highest culture. But the moral tone of the Magyar church at this period was very low. The bishops prided themselves on being great statesmen, great scholars, great financiers, great diplomatists — anything, in fact, but good Christians. Most of them, except when actually celebrating mass, were indistinguishable alike in costume and conduct from the temporal magnates. Of twelve of them it is said that foreigners took them at first for independent temporal princes, so vast were their estates, so splendid their courts, so numerous their armed retainers. Under such guides as these the lower clergy erred deplorably, and drunkenness, gross immorality, brawling and manslaughter were common occurrences in the lives of the parish priests. The regular clergy were if possible worse than the secular, with the exception of the Paulicians, the sole religious order which steadily resisted the general corruption, of whose abbot, the saintly Gregory, was the personal friend of Matthias.

What little culture there was outside the court, the capital and the palaces of a few prelates, was to be found in the towns, most of them of German origin. Matthias laboured strenuously to develop and protect the towns, multiplied municipal charters, and materially improved the means of communication, especially in

1 We know actually of fifteen, but there may have been many more.

Transylvania. His Silesian and Austrian acquisitions were also very beneficial to trade, throwing open as they did the western markets to Hungarian produce. Wine and meat were the chief exports. The wines of Hungary were already renowned through- out Europe, and cattle breeding was conducted on a great scale. Of agricultural produce there was barely sufficient for home consumption, but the mining industries had reached a very high level of excellence, and iron, tin and copper were very largely exported from the northern counties to Danzig and other Baltic ports. So highly developed indeed were the Magyar methods of smelting, that Louis XI. of France took the Hungarian mining system as the model for his metallurgical reforms, and Hungarian master-miners were also in great demand at the court of Ivan the Terrible. Moreover, the keen artistic instincts of Matthias led him to embellish his cities as well as fortify them. Debreczen was practically rebuilt by him, and dates its prosperity from his reign. Breslau, his favourite town, he endowed with many fine public buildings. Buda he endeavoured to make the worthy capital of a great realm, and the palace which he built there was pronounced by the papal legates to be superior to any in Italy.

Politically Matthias raised Hungary to the rank of che greatest power in central Europe, her influence extending into Asia and Africa. Poland was restrained by his alliances with _

rOWCP IB

the Teutonic Knights and the tsardom of Muscovy, E urope . and his envoys appeared in Persia and in Egypt to combat the diplomacy of the Porte. He never, indeed, jeo- pardized the position of the Moslems in Europe as his father had done, and thus the peace of Szeged (1444), which regained the line of the Danube and drove the Turk behind the Balkans, must always be reckoned as the high-water mark of Hungary's Turkish triumphs. But Matthias at least taught the sultan to respect the territorial integrity of Hungary, and throughout his reign the Eastern Question, though often vexatious, was never acute. Only after his death did the Ottoman empire become a menace to Christendom. Besides, his hands were tied by the unappeasable enmity of the emperor and the emperor's allies, and he could never count upon any material help from the West against the East. The age of the crusades had gone. Through- out his reign the Czechs and the Germans were every whit as dangerous to Hungary as the Turks, and the political necessity which finally compelled Matthias to partition Austria and Bohemia, in order to secure Hungary, committed him to a policy of extreme circumspection. He has sometimes been blamed for not crushing his incurably disloyal and rebellious nobles, instead of cajoling them, after the example of his contemporary, Louis XL, who laid the foundations of the greatness of France on the ruin of the vassals. But Louis XL had a relatively civilized and politically developed middle class behind him, whereas Matthias had not. It was as much as Matthias could do to keep the civic life of Hungary from expiring altogether, and nine-tenths of his burgesses were foreigners with no political interest in the country of their adoption. Never was any dominion so purely personal, and therefore so artificial as his. His astounding energy and resource curbed all his enemies during his lifetime, but they were content to wait patiently for his death, well aware that the collapse of his empire would immediately follow.

All that human foresight could devise for the consolidation and perpetuation of the newly established Hungarian empire had been done by Matthias in the last years of his reign. He had designated as his successor his natural son, decline. the highly gifted Janos (John) Corvinus, a youth of seventeen. He had raised him to princely rank, endowed him wifch property which made him the greatest territorial magnate in the kingdom, placed in his hands the sacred crown and half-a-dozen of the strongest fortresses, and won over to his cause the majority of the royal council. How Janos was cajoled out of an almost impregnable position, and gradually reduced to insignificance, is told elsewhere (see Corvinus,

JAnos). The nobles and prelates, who detested the severe and strenuous faus w> Matthian system, desired, as they expressed it, " a king whose beard they could hold in their fists," and they found a monarch after their own heart in Wladislaus Jagiello, since 147 1

king of Bohemia, who as Wladislaus II. was elected unanimously king of Hungary on the 1 5th of July 1490. Wladislaus was the personification of helpless inertia. His Bohemian subjects had long since dubbed him "King All Right " because he said yes to everything. As king of Hungary he was, from first to last, the puppet of the Magyar oligarchs, who proceeded to abolish all the royal prerogatives and safeguards which had galled them under Matthias. By the compact of Farkashida (1490) Wladislaus not only confirmed all the Matthian privileges, but also repealed all the Matthian novelties, including the system of taxation which had enabled his predecessor to keep on foot an adequate national army. The virtual suppression of Wladislaus was completed at the diet of 1492, when " King All Right " consented to live on the receipts of the treasury, which were barely sufficient to maintain his court, and engaged never to impose any new taxes on his Magyar subjects. The dissolution of the standing army, including the Black Brigade, was the immediate result of these decrees. Thus, at the very time when the modernization of the means of national defence had become the first principle, in every other part of Europe, of the strongly centralized monarchies which were rising on the ruins of feudalism, the Hungarian magnates deliber- ately plunged their country back into the chaos of medievalism. The same diet which destroyed the national armaments and depleted the exchequer confirmed the disgraceful peace of Pressburg, concluded between Wladislaus and the emperor Maximilian on the 7th of November 1491, whereby Hungary retroceded all the Austrian conquests of Matthias, together with a long strip of Magyar territory, and paid a war indemnity equivalent to £200,000.

The thirty-six years which elapsed between the accession of Wladislaus II. and the battle of Moh&cs is the most melancholy and discreditable period of Hungarian history. Like Poland two centuries later, Hungary had ceased to be a civilized autonomous state because her prelates and her magnates, uncontrolled by any higher authority, and too ignorant or corrupt to look beyond their own immediate interests, abandoned themselves to the exclusive enjoyment of their inordinate privileges, while openly repudiating their primal obligation of defending the state against extraneous enemies.

During these miserable years everything like patriotism or public spirit seems to have died out of the hearts of the Hungarian aristocracy. The great officers of state acted habitually on the principle that might is right. Stephen Bathory, voivode of Transylvania and count of the Szeklers, for instance, ruled Transylvania like a Turkish pasha, and threatened to behead all who dared to complain of his exactions; " Stinking carrion," he said, was better than living Szeklers. Thousands of Transylvanian gentlemen emigrated to Turkey to get out of his reach. Other great nobles were at perpetual feud with the towns whose wealth they coveted. Thus the Zapolyas, in 1500 and again in 1507, burnt a large part of Breznobanya and Besztercze banya, two of the chief industrial towns of north Hungary. Kronstadt, now the sole flourishing trade centre in the kingdom, defended itself with hired mercenaries against the robber barons. Everywhere the civic communities were declining; even Buda and Pressburg were half in ruins. In their misery the cities frequently appealed for protection to the emperor and other foreign potentates, as no redress was attainable at home. Compared even with the contemporary Polish diet the Hungarian national assembly was a tumultuous mob. The diet of 1497 passed most of its time in constructing, and then battering to pieces with axes and hammers, a huge wooden image representing the ministers of the crown, who were corrupt enough, but immovable, since they regularly appeared at the diet with thousands of retainers armed to the teeth, and openly derided the reforming endeavours of the lower gentry, who perceived that something was seriously wrong, yet were powerless to remedy it. All that the gentry could do was to depress the lower orders, and this they did at every opportunity. Thus, many of the towns, notably Visegrad, were deprived of the charters granted to them by Matthias, and a whole series of anti-civic ordinances were passed. Noblemen dwelling within the walls of the towns were especially exempted from all civic burdens,

while every burgess who bought an extra-mural estate was made to pay double for the privilege. 1 Every nobleman had the right to engage in trade toll-free, to the great detriment of their competitors the burgesses. The peasant class suffered most of all. In 1496 Varady, archbishop of Kalocsa, one of the few good prelates, declared that their lot was worse than that of brute beasts. The whole burden of taxation rested on their shoulders, and so ground down were they by ingeniously multiplied exactions, that thousands of them were reduced to literal beggary.

Yet, despite this inward rottenness, Hungary, for nearly twenty years after the death of Matthias, enjoyed an undeserved prestige abroad, due entirely to the reputation which that great monarch had won for her. Circumstances, indeed, were especi- ally favourable. The emperor Maximilian was so absorbed by German affairs, that he could do her little harm, and under Bayezid II. and Selim I. the Turkish menace gave little

anxiety to the court of Buda, Bayezid being no warrior, while Selim's energies were claimed exclusively by the East, so that he was glad to renew the triennial truce with Hungary as often as it expired. Hungary, therefore, for almost the first time in her history, was free to choose a foreign policy of her own, and had she been guided by a patriot, she might now have easily regained Dalmatia, and acquired besides a considerable sea-board. Unfortunately Tamas Bakocz, her leading diplomatist from 1499 to 1521, was as much an egotist as the other magnates, and he sacrificed the political interests of Hungary entirely to personal considerations. Primate of Hungary since 1497, he coveted the popedom — and the red hat as the first step thereto above all things, — and looked mainly to Venetian influence for both. He therefore supported Venice against her enemies, refused to enter the League of Cambray in 1 508, and concluded a ten years' alliance with the Signoria, which obliged Hungary to defend Venetian territory without any equivalent gain. Less reprehensible, though equally self-seeking, were his dealings with the emperor, which aimed at a family alliance between the Jagiellos and the Habsburgs on the basis of a double marriage between the son and daughter of Wladislaus, Louis and Anne, and an Austrian archduke and archduchess; this was concluded by the family congress at Vienna, July 22, 151 5, to which Sigis- mund I. of Poland, the brother of Wladislaus, acceded. The Hungarian diet frantically opposed every Austrian alliance as endangering the national independence, but to any unpre- judiced observer a union with the house of Habsburg, even with the contingent probability of a Habsburg king, was infinitely preferable to the condition into which Hungary, under native aristocratic misrule, was swiftly drifting. The diet itself had become as much a nullity as the king, and its decrees were . systematically disregarded. Still more pitiable was the condition of the court. The penury of Wladislaus II. was by this time so extreme, that he owed his very meals to the charity of his servants. The diet, indeed, voted him aids and subsidies, but the great nobles either forbade their collection within their estates, or confiscated the amount collected. Under the cir- cumstances, we cannot wonder if the frontier fortresses fell to pieces, and the border troops, unpaid for years, took to brigandage.

*The last reserves of the national wealth and strength were dissipated by the terrible peasant rising of Gyorgy Dozsa (q.v.) in 1514, of which the enslavement of the Hungarian peasantry was the immediate consequence. The ™^**"' " Savage Diet " which assembled on the 18th of isii. October the same year, to punish the rebels and restore order, well deserved its name. Sixty-two of its seventy-one enactments were directed against the peasants, who were hence- forth bound to the soil and committed absolutely into the hands of " their natural lords." To this vindictive legislation, which converted the labouring population into a sullenly hostile*

1 It should be remembered that at this time one-third of the land belonged to the church, and the remainder was in the hands of less than a dozen great families who had also appropriated the royal domains.

force within the state, it is mainly due that a healthy political life in Hungary became henceforth impossible. The same

spirit of hostility to the peasantry breathed through partitum. t ˆ le famous condification of the Hungarian customary

law known as the Tripartitum, which, though never actually formally passed into law, continued until 1845 to be the only document denning the relations of king and people, of nobles and their peasants, and of Hungary and her dependent states. 1

Wladislaus II. died on the 13th of March 15 16, two years after the " Savage Diet," the ferocity of whose decrees he had

feebly endeavoured to mitigate, leaving his two Subjection kingdoms to his son Louis, a child of ten, who was Turks. pronounced of age in order that his foreign guardians,

the emperor Maximilian and Sigismund of Poland, might be dispensed with. The government remained in the hands of Cardinal Bak6cz till his death in 1521, when the supreme authority at court was disputed between the lame palatine Istvan Bathory, and his rival, the eminent jurist and orator Istvan Verbbczy (q.v.), — both of them incompetent, unprincipled place-hunters, — while, in the background lurked Janos Zapolya (see John (Zapolya), king of Hungary), voivode of Tran- sylvania, patiently waiting till the death of the feeble and childless king (who, in 1522, married Maria of Austria) should open for him a way to the throne. Every one felt that a catas- trophe was approaching. " Things cannot go on like this much longer," wrote the Venetian ambassador to his government. The war of each against all continued; no taxes could be collected; the holders of the royal domains refused to surrender them at the command of the diet; and the boy king had very often neither clothes to wear nor food to eat. The whole atmo- sphere of society was one of rapine and corruption, and only on the frontier a few self-sacrificing patriots like the ban-bishop, Peter Biriszlo, the last of Matthias's veterans, and his successor the saintly Pal Tomori, archbishop of Kalocsa, showed, in their ceaseless war against the predatory

Turkish bands, that the ancient Magyar valour was not yet wholly extinct. But the number of the righteous men was too few to save the state. The first blow fell in 1521, when Sultan Suleiman appeared before the southern fortresses of Sabac and Belgrade, both of which fell into his hands during the course of the year. After this Venice openly declared that Hungary was no longer worth the saving. Yet the coup de grdce was postponed for another five years, during which time Suleiman was occupied with the conquest of Egypt and the siege of Rhodes. The Magyars fancied they were safe from attack, because the final assault was suspended; and everything went on in the old haphazard way. Every obstacle was opposed to the collection of the taxes which had been voted to put the kingdom in a state of defence. " If this realm could be saved at the expense of three florins," exclaimed the papal envoy, Antonio Burgio, " there is not a man here willing to make the sacrifice." Only on the southern frontier did Archbishop Tomori painfully assemble a fresh army and fleet, and succeed, by incredible efforts, in constructing at Peterwardein, on the right bank of the Danube, a new fortress which served him as a refuge and sally post in his interminable guerilla war with the Turks.

In the spring of 1526 came the tidings that Sultan Suleiman had quitted Constantinople, at the head of a countless host, to conquer Hungary. On the 28th of July Peterwardein, after a valiant resistance, was blown into the air. The diet, which met at Buda in hot haste, proclaimed the young king 2 dictator,

1 The Opus tripartitum juris consuetudinarii regni Hungarian was drawn up by Verboczy at the instance of the diet in 1507. It was approved by a committee of the diet and received the royal imprimatur in 1 5 14, but was never published. In the constitutional history of Hungary the Tripartitum is of great importance as re- asserting the fundamental equality of all the members of the populus (i.e. the whole body of the nobles) and, more especially, as defining the co-ordinate power of the king and "people" in legislation: i.e. the king may propose laws, but they had no force without the consent of the people, and vice versa. See Knatchbull-Hugessen, i. 64.

- *He was just twenty.*

granted him unlimited subsidies which there was no time to collect, and ordered a levte en masse of the entire male population, which could not possibly assemble within the given time. Louis at once formed a camp at Tolna, whence he issued despairing summonses to the lieges, and, by the middle of August, some 25,000 ill-equipped gentlemen had gathered around him. With these he marched southwards to the plain of Mohacs, where, on the 29th of August, the Hungarians, after a two hours' fight, were annihilated, the king, both the archbishops, five bishops and 24,000

men perishing on the field. The sultan refused to believe that the pitiful array he had so easily overcome could be the national army of Hungary. Advancing with extreme caution, he occupied Buda on the 1 2th of September, but speedily returned to his own dominions, carrying off with him 105,000 captives, and an amount of spoil which filled the bazaars of the East for months to come. By the end of October the last Turkish regular had quitted Magyar soil, and, to use the words of a contemporary observer, one quarter of Hungary was as utterly destroyed as if a flood had passed over it.

The Turks had no sooner quitted the land than John Zapolya, voivode of Transylvania, assembled a diet at Tokaj (Oct. 14, 1526) at which the towns were represented as well as Jobn the counties. The tone of the assembly being violently Zapolya anti- German, and. John being the only conceivable elected national candidate, his election was a matter of course; Kla s- but his misgivings were so great that it was not till the beginning of November that he very reluctantly allowed himself to be crowned at a second diet, held at Szekesfehervar. By this time a competitor had entered the field. This was the archduke Ferdinand, who claimed the Hungarian crown by right of inheritance in the name of his wife, Anne, sister of the late king. Ferdinand was elected (Dec. 16) by a scratch assembly consisting of deputies from Croatia and the towns Fe t r f ,n f l a of Pressburg and Sopron; but he speedily improved e i ec tea. his position in the course of 1527, by driving King John first from Buda and then from Hungary. In November the same year he was elected and crowned by a properly con- stituted diet at Szekesfehervar (Stuhlweissenburg). In 1529 Zapolya was reinstated in Buda by Suleiman the Magnificent in person, who, at this period, preferred setting up a rival to " the king of Vienna " to conquering Hungary kims. outright. Thus the Magyars were saddled with two rival kings with equally valid titles, which proved an even worse disaster than the Mohacs catastrophe; for in most of the counties of the unhappy kingdom desperadoes of every descrip- tion plundered the estates of the gentry, and oppressed the com- mon people, under the pretext that they were fighting the battles of the contending monarchs. The determination of Ferdinand to partition Hungary rather than drive the Turks out, which he might easily have done after Suleiman's unsuccessful attempts on Vienna in 1529-1530, led to a prolongation of the struggle till the 24th of February 1538, when, by the secret peace of Nagyvarad, 3 Hungary was divided between the two competitors. By this treaty Ferdinand retained Croatia-Slavonia and the five western counties with Pressburg and Esztergom (Gran), while Zapolya kept the remaining two-thirds with the royal title. He was indeed the last national king of Hungary till modern times. His court at Buda was maintained according to the ancient traditions, and his gytiles, at which 67 of the 73 counties were generally represented, was the

true national diet, the phantom assembly occasionally convened at Pressburg by Ferdinand scarcely deserving the title. Indeed, Ferdinand regarded his narrow strip of Hungarian territory as simply a barrier behind which he could better defend the hereditary states. During the last six years (r 534-1 540) of John's reign, his kingdom, beneath the guidance of the Paulician monk, Frater Gyorgy, or George Martinuzzi {q.v.), the last great statesman of old Hungary, enjoyed a stability and prosperity marvellous in the difficult circumstances of the period, Martinuzzi holding the balance exactly between the emperor and the Porte with

- *It was kept secret for some years for fear of Turkish inter- vention.*

astounding diplomatic dexterity, and at the same time intro- ducing several important domestic reforms. Zapolya died on the 1 8th of July 1540, whereupon the estates of Hungary elected his baby son John Sigismund king, in direct violation of the peace of Grosswardein which had formally acknowledged Ferdinand as John's successor, whether he left male issue or not. Ferdinand at once asserted his rights by force of arms, and attacked Buda in May 1541, despite the urgent remonstrances of Martinuzzi, who knew that the Turk would never suffer the emperor to reign at Buda. His fears were instantly justified. In August 1541, Suleiman, at the head of a vast army, invaded Hungary, and on the 30th of August, Buda was in his hands. During the six following years the sultan still further improved his position, capturing, amongst many other places, Pecs, and the primatial city of Esztergom; but, in 1547, the exigencies of the Persian war induced him to sell a truce of five Partition years to Ferdinand for £100,000, on a uti possidetis basis, Hungary. Ferdinand holding thirty-five counties (including Croatia and Slavonia) for which he was to pay an annual tribute of £60,000; John Sigismund retaining Tran- sylvania and sixteen adjacent counties with the title of prince, while the rest of the land, comprising most of the central counties, was annexed to the Turkish empire. Thus the ancient kingdom was divided into three separate states with divergent aims and interests, a condition of things which, with frequent rearrange- ments, continued for more than 150 years.

A period of infinite confusion and extreme misery now ensued, of which only the salient points can here be noted. The attempts of the Habsburgs to conquer Transylvania drew down Sziretvar. u P on them two fresh Turkish invasions, the first in 1552, when the sultan's generals captured Temesvar

and fifty-four lesser forts or fortresses, and the second in 1566, memorable as Suleiman's last descent upon Hungary, and also for the heroic defence of Szigetvar by Miklos Zrinyi (q.v.), one of the classical sieges of history. The truce of Adrianople in 1568, nominally for eight years, but prolonged from time to time till 1593, finally suspended regular hostilities, and introduced the epoch known as " The Long Peace," though, throughout these twenty-five years, the guerilla warfare on the frontier never ceased for more than a few months at a time, and the relations between the Habsburgs and Transylvania were persistently hostile.

Probably no other country ever suffered so much from its rulers as Hungary suffered during the second half of the 16th century. This was due partly to political and partly to religious causes. To begin with, there can be no doubt that from 1558, when the German imperial crown was transferred from the Spanish to the Austrian branch of the Habsburg family, royal Hungary l was regarded by the emperors as an insignificant barrier province yielding far more trouble than profit. The visible signs of this contemptuous point of view were (1) the suspension of the august dignity of palatine, which, after the death of Tamas Nadasdy, " the great palatine," in 1562, was left vacant for many years; (2) the abolition or attenuation of all the ancient Hungarian court dignitaries; (3) the degradation of the capital, Pressburg, into a mere provincial town; and (4) the more and more openly expressed determination to govern Hungary from Vienna by means of foreigners, principally German or Czech. During the reign of Ferdinand, whose consort, Anne, was a Hungarian princess, things were at least tolerable; but under Maximilian (1564-1576) and Rudolph (1576-1612) the antagonism of the Habsburgs towards their Magyar subjects was only too apparent. The diet, which had the power of the purse, could not be absolutely dispensed with; but it was summoned as seldom as possible, the king often preferring to forego his subsidies rather than listen to the unanswerable remonstrances of the estates against the illegalities of his government. In the days of the semi-insane recluse Rudolph things went from bad to worse. The Magyar nobles were now systematically spoliated on trumped-up charges of treason;

1 In contradistinction to Turkish Hungary and Transylvanian Hungary.

hundreds of them were ruined. At last they either durst not attend the diet, or " sat like dumb dogs " during its session, allowing the king to alter and interpret the statutes at his good pleasure. Presently religious was superadded to political persecution.

The Reformation had at first produced little effect on Hungary. Except in the towns, mostly of German origin, it was generally detested, just because it came from Germany. The battle of Mohacs, however, severely shook the

faith Effect of of the Hungarians. " Where are the old Magyar Hon"""" saints? Why do they not defend the realm against the Turks? " was the general cry. Moreover, the corrupt church had lost its hold on the affections of the people. Zapolya, a devout Catholic, is lauded by Archbishop Frangipan in 1533 for arresting the spread of the new doctrines, though he would not allow Martinuzzi to take the extreme step of burning perverts at the stake. These perverts were mostly to be found among nobles desirous of amassing church property, or among those of the clergy who clamoured for communion in both kinds. So long, however, as the old national kingdom survived, the majority of the people still clung to the old faith. Under Ferdinand the parochial clergy were tempted to become Lutherans by the prospect of matrimony, and, in reply to the remonstrances of their bishops, declared that they would rather give up their cures than their wives. In Transylvania matters were at first ordered more peaceably. In 1552 the new doctrines obtained complete recognition there, the diet of Torda (1557) going so far as to permit every one to worship in his own way so long as he did not molest his neighbour. Yet, in the following year, the whole of the property of the Catholic Church there was diverted to secular uses, and the Calvinists were simul- taneously banished, though they regained complete tolerance in 1564, a privilege at the same time extended to the Unitarians, who were now very influential at court and converted Prince John Sigismund to their views. In Turkish Hungary all the confessions enjoyed liberty of worship, though the Catholics, as possible partisans of the " king of Vienna," were liked the least. It was only when the Jesuits obtained a footing both at Prague 2 and Klausenburg that persecution began, but then it was very violent. In Transylvania the princes of the Bathory family (1 571-1604) were ardent disciples of the Jesuit fathers, and Sigismund Bathory in particular persecuted fiercely, his fury being especially directed against the queer judaizing sect known as the Sabbatarians, whose tenets were adopted by the Szeklers, the most savage of " the three nations " of Transylvania, many thousands of whom were, after a bloody struggle, forced to emigrate. In royal Hungary also the Jesuits were the chief persecutors. The extirpation of Protestantism was a deliberate prearranged programme, and as Protestantism was by this time identical with Magyarism 3 the extirpation of the one was tantamount to the extirpation of the other. The method gener- ally adopted was to deprive the preachers in the towns of their churches by force, Italian mercenaries being preferably employed for the purpose. It was assumed that the Protestant nobles' jealousy of the burgesses would prevent them from interfering; but religious sympathy proved stronger than caste prejudice, and the diets protested against the persecution of their fellow citizens so vehemently that religious matters were withdrawn from their jurisdiction.*

This persecution raged most fiercely towards the end of what is generally called " The Long War," which began in 1593, and lasted till 1606. It was a confused four-cornered struggle between the emperor and the Turks, the J e Turks and Transylvania, Michael of Moldavia and war." Transylvania, and Transylvania and the emperor, desultory and languishing as regards the Turks (the one notable battle being Sigismund Bathory's brilliant victory over the 2 At first the Habsburgs held their court at Prague instead of at Vienna.*

5 According to contemporary records the number of prelates and priests in the three parts of Hungary at the beginning of the I 17th century was but 103, all told, and of the great families not ' above half a dozen still clung to Catholicism.

grand vizier in Walachia in 1595, when the Magyar army pene- trated as far as Giurgevo), but very bitter as between the emperor and Transylvania, the principality being finally subdued by the imperial general, George Basta, in August 1604. A reign of terror ensued, during which the unfortunate principality was well-nigh ruined. Basta was authorized to Germanize and Catholicize without delay, and he began by dividing the property of most of the nobles among his officers, appropriating the lion's share him- self. In royal Hungary the same object was aimed at by in- numerable indictments against the richer landowners, indictments supported by false title-deeds and carried through by forged or purchased judgments of the courts. At last the estates of even the most devoted adherents of the Habsburgs were not safe, and some of them, like the wealthy Istvan Illeshazy (1540-1609), had to fly abroad to save their heads. Fortunately a peculiarly shameless attempt to blackmail Stephen Bocskay, a rich and powerful Transylvanian nobleman, converted a long- Bocskay. suffering friend of the emperor into a national deliverer. Bocskay (q.v.), a quiet but resolute man, having once made up his mind to rebel, never paused till he had estab- lished satisfactory relations between the Austrian court and the Hungarians. The two great achievements of his brief reign (he was elected prince of Transylvania on the 5th of April 1605, and died on the 29th of December 1606) were the peace of Vienna (June 23, 1606) and the truce of Zsitvatorok (November 1606). By the peace of Vienna, Bocskay obtained religious liberty and political autonomy, the restoration of all confiscated estates, the repeal of all unrighteous judgments and a complete retro- spective amnesty for all the Magyars in

royal Hungary, besides his own recognition as independent sovereign prince of an enlarged l Transylvania. This treaty is remarkable as being the first constitutional compact between the ruling dynasty and the Hungarian nation. Almost equally important was the twenty years' truce of Zsitvatorok, negotiated by Bocskay between the emperor and the sultan, which established for the first time a working equilibrium between the three parts of Hungary, with a distinct political preponderance in favour of Transylvania. Of the 5163 sq. m. of Hungarian territory, Transylvania now possessed 2082, Turkish Hungary 1859, and royal Hungary only 1222. The emperor, on the other hand, was freed from the humiliating annual tribute to the Porte on payment of a war indemnity of £400,000. The position of royal Hungary was still further improved when the popular and patriotic Archduke Matthias was elected king of Hungary on the 16th of November 1608. He had previously confirmed the treaty of Vienna, and the day after his election he appointed Illeshazy, now reinstated in all his possessions and dignities, palatine of Hungary. 2 In Transylvania, meantime, Gabriel Bathory had been elected (Nov. ii, 1608) in place of the decrepit Sigismund Rakoczy, Bocskay's immediate successor.

For more than fifty years after the peace of Vienna the princi- pality of Transylvania continued to be the bulwark of the liberties of the Magyars. It owed its ascendancy in v"aiaa' tne first P !ace to tne abilities 01 tne two princes who Hegemony, ruled it from 1613 to 1648. The first and most famous of these rulers was Gabriel Bethlen (q.v.), who reigned from 1613 to 1629, perpetually thwarted all the efforts of the emperor to oppress or circumvent his Hungarian subjects, and won some reputation abroad by adroitly pretend- ing to champion the Protestant cause. Three times he waged war on the emperor, twice he was proclaimed king of Hungary, and by the peace of Nikolsburg (Dec. 31, 1621) he obtained for the Protestants a confirmation of the treaty of Vienna, and for himself seven additional counties in northern Hungary besides other substantial advantages. Bethlen's successor, George I. Rikoczy, was equally successful. His principal achievement was the peace of Linz (Sept. 16, 1645), tne last political triumph of Hungarian Protestantism, whereby the emperor was forced to confirm once more the oft-broken articles of the peace of Vienna,

1 The counties of Szatmar, Ugocsa and Bereg and the fortress of Tokaj were formally ceded to him.

2 He was the first Protestant palatine.

to restore nearly a hundred churches to the sects and to acknow- ledge the sway of Rakoczy over the north Hungarian counties. Gabriel Bethlen and George I. Rakoczy also did much for educa- tion and civilization generally, and their era has justly been called the golden era of Transylvania. They

lavished money on the embellishment of their capital, Gyulafehervar, which became a sort of Protestant Mecca, whither scholars and divines of every anti-Roman denomination flocked to bask in the favour of princes who were as liberal as they were pious. Yet both Bethlen and Rakoczy owed far more to favourable circumstances than to their own cunning. Their reigns synchronized with the Thirty Years' War, during which the emperors were never in a position seriously to withstand the attacks of the malcontent Magyars, the vast majority of whom were still Protestants, who naturally looked -upon the Transylvanian princes as their protectors and joined them in thousands whenever they raided Moravia or Lower Austria, or threatened to advance upon Vienna. In all these risings no battle of importance was fought. Generally speaking, the Transylvanians had only to appear, to have their demands promptly complied with; for these marauders had to be bought off because the emperor had more pressing business elsewhere. Yet their military efficiency must have been small, for their allies the Swedes invariably allude to them as wild and ragged semi-barbarians.

Another fortunate accident which favoured the hegemony of Transylvania was the temporary collapse of Hungary's most formidable adversary, the Turk. From the peace of

Zsitvat5rok (1606) to the ninth year of the reign of conflict. George Rakoczy II., who succeeded his father in 1648, the Turkish empire, misruled by a series of incompetent sultans and distracted by internal dissensions, was unable to intervene in Hungarian politics. But in the autumn of 1656 a great statesman, Mahommed Kuprili (q.v.), obtained the supreme control of affairs at Constantinople, and all Europe instantly felt the pressure of the Turk once more. It was George Rakoczy II. (q.v.) who gave the new grand vizier a pretext for interference. Against the advice of all his counsellors, and without the knowledge of the estates, Rakoczy, in 1657, plunged into the troubled sea of Polish politics, in the hope of winning the Polish throne, and not only failed miserably but overwhelmed Transylvania in his own ruin. Kuprili, who had forbidden the Polish enterprise, at once occupied Transylvania, and, in the course of the next five years, no fewer than four princes, three of whom died violent deaths, were forced to accept the kaftan and kalpag of investiture in the camp of the grand vizier. When, at the end of 1661, a more stable administration was set up with Michael Apaffy (1661-1690) as prince, Transylvania had descended to the rank of a feudatory of the Turkish empire. On the death of Mahommed Kuprili (Oct. 11, 1661) his son Fazil Ahmed succeeded him as grand vizier, and pursued his father's policy with equal genius and determination. In 1663 he invaded royal Hungary, with the intention of uniting all the Magyars against the emperor, but, the Magyars steadily refusing to attend any diet summoned under Turkish influence, his plan fell

through, and his only notable military success was the capture of the fortress of Ersekujvar (Neuhausel). In the following year, thanks to the generalship and heroism of Miklos Zrinyi the younger (q.v.), Kuprili was still less successful. Zrinyi captured fortress after fortress, and interrupted the Turkish teaceot communications by destroying the famous bridge of 1664. Esseg, while Montecuculi defeated the grand vizier at the battle of St Gothard (Aug. 1, 1664). Yet, despite these reverses, Kupi ili's superior diplomacy enabled him, at the peace of Vasvar (Aug. 10, 1664) to obtain terms which should only have been conceded to a conqueror. The fortress of Ersekujvar and surrounding territory were now ceded to the Turks, with the result that royal Hungary was not only still further diminished, but its northern practically separated from its southern portion. On the other hand the treaty of Vasvar gave Hungary a respite from regular Turkish invasions for twenty years, though the border raiding continued uninterruptedly.

Of far more political importance than these fluctuating wars of

invasion and conquest was the simultaneous Catholic reaction in Hungary. The movement may be said to have begun about 1601, when the great Jesuit preacher and reaction, controversialist, Peter Pazmany (

Unfortunately the court of Vienna was not content with winning back the Magyars to the Church. The Habsburg kings were as jealous of the political as of the religious repression, liberties of their Hungarian subjects. This was partly owing to the fact that national aspirations of any sort were contrary to the imperial system, which claimed to rule by right divine, and partly to an inveterate distrust of the Magyars, who were regarded at court as rebels by nature, and therefore as enemies far more troublesome than the Turks. The conduct of the Hungarian nobles in the past, indeed, some- what justified this estimate, for the fall of the ancient monarchy was entirely due to their persistent disregard of authority, to their refusal to bear their share of the public burdens. They were now to suffer severely for their past misdoings, but un- fortunately the innocent nation was forced to suffer with them. Throughout the latter part of the 17th and the beginning of the 18th century, the Hungarian gentry underwent a cruel discipline at the hands of their Habsburg kings. Their privileges were overridden, their petitions were disregarded, their diets were degraded into mere registries of the royal decrees. They were never fairly represented in the royal council, they were excluded as far as possible from commands in Hungarian regiments, and

were treated, generally, as the members of an inferior and guilty race. This era of repression corresponds roughly with the reign of Leopold I. (1657-1705), who left the government of the country to two bigoted Magyar prelates, Gyorgy Szele- pesenyi (1505-1685) and Lipot (Leopold) Kollonich (1631-1707), whose domination represents the high-water mark of the anti- national regimen. The stupid and abortive conspiracy of Peter Zrinyi and three other magnates, who were publicly executed (April 30, 1671), was followed by wholesale arrests and confisca-

1 The jobbagyok, or under-tenants, had to follow the example of their lords; they were, by this time, mere serfs with no privileges either political or religious.

tions, and for a time the legal government of Hungary was superseded (Patent of March 3, 1673) by a committee of eight persons, four Magyars and four Germans, presided over by a German governor; but the most influential person in this committee was Bishop Kollonich, of whom it was said that, while Pazmany hated the heretic in the Magyar, Kollonich hated the Magyar in the heretic. A gigantic process against leading Protestant ministers for alleged conspiracy was the first act of this committee. It began at Pressburg in March 1674, when 236 of the ministers were " converted " or confessed to acts of rebellion. But the remaining 93 stood firm and were condemned to death, a punishment commuted to slavery in the Neapolitan galleys. Sweden, as one of the guarantors of the peace of Westphalia, and several north German states, protested against the injury thus done to their coreligionists. It was replied that Hungary was outside the operation of the treaty of Westphalia, and that the Protestants had been condemned not ex odio religionis but crimine rebellionis.

But a high-spirited nation cannot be extinguished by any number of patents and persecutions. So long as the Magyar people had any life left, it was bound to fight in self-defence, it was bound to produce " malcontents " re "a" who looked abroad for help to the enemies of the house of Habsburg. The first and most famous of the malcontent leaders was Count Imre Tokoli (q.v.). Between 1678 and 1682 Tokoli waged three wars with Leopold, and, in September 1682, was acknowledged both by the emperor and the sultan as prince of North Hungary as far as the river Garam, to the great relief of the Magyar Protestants. The success of Tokoli rekindled the martial ardour of the Turks, and a war party, under the grand vizier Kara Mustafa, determined to wrest from Leopold his twelve remaining Hungarian counties, gained the ascendancy at Constantinople in the course of 1682. Leopold, intent on the doings of his perennial rival Louis XIV., was loth to engage in an eastern war even for the liberation of Hungary, which he regarded as of far less importance than a strip or two of German territory on the Rhine. But, stimulated by the representations of Pope

Innocent XL, who, well aware of the internal weakness of the Turk, was bent upon forming a Holy League to drive them out of Europe, and alarmed, besides, by the danger of Vienna and the hereditary states, Leopold reluctantly contracted an alliance with John III. of Poland, and gave the command of the army which, mainly through the efforts of the pope he had been able to assemble, to Prince Charles of Lorraine. The war, which lasted for 16 years and put an end to the Turkish dominion in Hungary, began with the world- renowned siege of Vienna (July 14-Sept. 12, 1683). There is no need to recount the oft-told victories of Sobieski (see John III. Sobieski, King of Poland). What is not quite so generally known is the fact that Leopold slackened at once and would have been quite content with the results of these earlier victories had not the pope stiffened his resistance by forming a Holy League between the Emperor, Poland, Venice, Muscovy and the papacy, with the avowed object of dealing the Turk the coup de grdce (March 5, 1684). This statesmanlike persistence was rewarded by an uninterrupted series of triumphs, culminating in the recapture of Buda (1686) and Belgrade (1688), and the recovery of Bosnia (1689). But, in 1690, the third of the famous Kuprilis, Mustafa, brother of Fazil Ahmed, became grand vizier, and the Turk, still further encouraged by the death of Innocent XL, rallied once more. In the course of that year Kuprili regained Servia and Bulgaria, placed Tokoli on the throne of Transylvania, and on the 6th of October took Belgrade by assault. Once more the road to Vienna lay open, but the grand vizier wasted the remainder of the year Liberation in fortifying Belgrade, and on August 18th, 1691, he Turks. was defeated and slain at Slankamen by the margrave of Baden. For the next six years the war languished owing to the timidity of the emperor, the incompetence of his generals and the exhaustion of the Porte; but on the nth of September 1697 Prince Eugene of Savoy routed the Turks at Zenta and on the 13th of November 1698 a peace-congress was opened at

Karlowitz which resulted in the peace of that name (Jan. 26, 1699). Nominally a truce for 25 years on the uti possidetis basis, the peace of Karlowitz left in the emperor's hands the Karlowitz. wnoie of Hungary except Syrmia and the territory lying between the rivers Maros, Theiss, Danube and the mountains of Transylvania, the so-called Temeskoz, or about one-eleventh of the modern kingdom. The peace of Karlowitz marks the term of the Magyar's secular struggle with Mahommedanism and finally reunited her long-separated provinces beneath a common sceptre.

But the liberation of Hungary from the Turks brought no relief to the Hungarians. The ruthless suppression of the Magyar malcontents, in which there was little discrimination between the innocent and the guilty, had so crushed the spirit of the country that Leopold considered the time ripe for realizing a long-cherished ideal of the Habsburgs and changing Hungary from an elective into an hereditary monarchy. For this purpose a diet was assembled at Pressburg in the autumn of 1687. It was a mere rump, for wholesale executions had thinned its numbers and the reconquered countries were not represented in it. To this weakened and terrorized assembly the emperor- king explained that he had the right to treat Hungary as a conquered country, but that he was prepared to confirm its constitutional liberties under three conditions: the inaugural diploma was to be in the form signed by Ferdinand I., the crown was to be declared hereditary in the house of Habsburg, and the 31st clause of the Golden Bull, authorizing armed resistance to unconstitutional acts of the sovereign, was to be abrogated. These conditions the diet had no choice but to accept, and, in October 1687, the elective monarchy of Hungary, which had been in existence for nearly seven hundred years, ceased to exist. The immediate effect of the peace of Karlowitz was thus only to strengthen despotism in Hungary. Kollonich, who had been created a cardinal in 1685, archbishop of Kalocsa in 1691 and archbishop of Esztergom (Gran) and primate of Hungary in 1695, was now at the head of affairs, and his plan was to germanize Hungary as speedily as possible by promoting a wholesale immigration into the recovered provinces, all of which were in a terrible state of dilapidation. 1

The border counties, now formed into a military zone, were planted exclusively with Croatian colonists as being more trustworthy defenders of the Hungarian frontier than the Hungarians themselves. Moreover, a neo-acquisita commissio was constituted to inquire into the title-deeds of the Magyar land- owners in the old Turkish provinces, and hundreds of estates were transferred, on the flimsiest of pretexts, to naturalized foreigners. Transylvania since 1690 had been administered from Vienna, and though the farce of assembling a diet there was still kept up, even the promise of religious liberty, conceded to it on its surrender in 1687, was not kept. No wonder then if the whole country was now seething with discontent and only awaiting an opportunity to burst forth in open re- Rak&czy. bellion. This opportunity came when the emperor, involved in the War of the Spanish Succession, with- drew all his troops from Hungary except some 1600 men. In 1703 the malcontents found a leader in Francis Rakoczy II. (q.v.), who was elected prince by the Hungarian estates on the 6th of July 1704, and during the next six years gave the emperor Joseph I., who had succeeded Leopold in May 1705, considerable anxiety. Rakoczy had often as many as 100,000 men under him, and his bands penetrated as far as

Moravia and even approached within a few miles of Vienna. But they were guerillas, not regulars; they had no good officers, no serviceable artillery, and very little money; and all the foreign powers to whom Rakoczy turned for assistance (excepting France, who fed them occasion- ally with paltry subsidies) would not commit themselves to a formal alliance with rebels who were defeated in every pitched battle they fought. On the other hand,- if the Rakoczians were easily dispersed, they as quickly reassembled, and at one time they held all Transylvania and the greater part of Hungary.

1 E.g. in Esztergom, the primatial city, there were only two buildings still standing.

In the course of 1707 two Rakoczian diets even went so far as formally to depose the Habsburgs and form an interim govern- ment with Rakoczy at its head, till a national king could be legally elected. The Maritime Powers, too, fearful lest Louis XIV. should materially assist the Rakoczians and thus divert part of the emperor's forces at the very crisis of the War of the Spanish Succession, intervened, repeatedly ˆf "f and energetically, to bring about a compromise be- 17lu ' tween the court and the insurgents, whose claims they considered to be just and fair. But the obstinate refusal of Joseph to admit that the Rak6czians were anything but rebels was always the insurmountable object in all such negotiations. But when,- on the 7th of April 1711, Joseph died without issue, leaving the crown to his brother the Archduke Charles, then fighting the battles of the Allies in Spain, a peace-congress met at Szatmar on the 27th of April, and, two days later, an under- standing was arrived at on the basis of a general amnesty, full religious liberty and the recognition of the inviolability of the ancient rights and privileges of the Magyars.*

Thus the peace of Szatmar assured to the Hungarian nation all that it had won by former compacts with the Habsburgs; but whereas hitherto the Transylvanian principality had been the permanent guardian of all such compacts, and the authority of the reigning house had been counterpoised by the Turk, the effect and validity of the peace of Szatmar depended entirely upon the support it might derive from the nation itself. It was a fortunate thing for Hungary that the conclusion of the War of the Spanish Succession introduced a new period, in which, at last, the interests of the dynasty and the nation were identical, thus rendering a reconciliation between them desirable. Moreover, the next century and a half was a period of domestic tranquillity, during which Hungary was able to repair the ruin of the long Turkish wars, nurse her material resources, and take the first steps in the direction of social and political reform. The first reforms, however, were dynastic IIL rather than national. Thus, in 1715, King Charles III. 2 persuaded the diet to consent to the establishment of a standing army, which — though the diet reserved the right to fix the

number of recruits and vote the necessary subsidies from time to time — was placed under the control of the Austrian council of war. The same centralizing tendency was shown in the administrative and judicial reforms taken in hand by the diet of 1722. A Hungarian court chancery was now established at Vienna, while the government of Hungary proper was committed to a royal stadholdership at Pressburg. Both the chancery and the stadholdership were independent of the diet and responsible to the king alone, being, in fact, his executive instruments. It was this diet also which accepted the Pragmatic Sanction, first issued in 17 13, by which j^f ^/"n' the emperor Charles VI., in default of his leaving j 72 3. male heirs, settled the succession to his hereditary dominions on his daughter Maria Theresa and her heirs. By the laws of 1723, which gave effect to the resolution of the diet in favour of accepting the principle of female succession, the Habsburg king entered into a fresh contract with his Hungarian subjects, a contract which remained the basis of the relations of the crown and nation until 1848. On the one hand it was declared that the kingdom of Hungary was an integral part of the Habsburg dominions and inseparable from these so long as a male or female heir of the kings Charles, Joseph and Leopold should be found to succeed to them. On the other hand, Charles swore, on behalf of himself and his heirs, to preserve the Hungarian constitution intact, with all the rights, privileges, customs, laws, &c, of the kingdom and its dependencies. Moreover, in the event of the failure of a Habsburg heir, the diet reserved the right to revive the " ancient, approved and accepted custom and prerogative of the estates and orders in the matter of the election and coronation of their king."

The reign of Charles III . is also memorable for two Turkish wars, the first of which, beginning in 1716, and made glorious by the victories of Prince Eugene and Janos Pallfy, was terminated by 2 Charles VI. as emperor.

the peace of Passarowitz (July 21, 17 18), by which the Temeskoz was also freed from the Turks, and Servia, Northern Bosnia and Little Walachia, all of them ancient conquests of Hungary, were once more incorporated with the territories of the crown of St Stephen. The second war, though undertaken in league with Russia, proved unlucky, and, at the peace of Belgrade (Sept. 1, 1739), all the conquests of the peace of Passarowitz, including Belgrade itself, were lost, except the banat of

Temesvar. With Maria Theresa (1740-1780) began the age of enlightened despotism. Deeply grateful to the Magyars for their sacrifices and services during the War of the Austrian Succession, she dedicated her whole authority to the good of the nation, but she was very unwilling to share that authority with the people. Only in the first stormy years of her reign did she summon the diet; after 1764 she dispensed with it altogether. She did not fill up the dignity of palatine, vacant since the 26th of October 1765, and governed Hungary through her son-in-law, Albert of Saxe-Teschen. She did not attack the Hungarian constitution; she simply put it on one side. Her reforms were made not by statute, but by royal decree. Yet the nation patiently endured the mild yoke of the great queen, because it felt and knew that its welfare was safe in her motherly hands. Her greatest achievement lay in the direction of educa- tional reform. She employed the proceeds of the vast sums coming to her from the confiscation of the property of the sup- pressed Jesuit order in founding schools and colleges all over Hungary. The kingdom was divided into ten educational districts for the purpose, with a university at Buda. Towards all her Magyars, especially the Catholics, she was ever most gracious; but the magnates, the Batthyanis, the Nadasdys, the Pallfys, the Andrassys, who had chased her enemies from Bohemia and routed them in Bavaria, enjoyed the lion's share of her benefactions. In fact, most of them became professional courtiers, and lived habitually at Vienna. She also attracted the gentry to her capital by forming a Magyar body-guard from the cadets of noble families. But she was good to all, not even forgetting the serfs. The tirberi szabdlyzal (feudal prescription) of 1767 restored to the peasants the right of transmigration and, in some respects, protected them against the exactions of their landlords.

Joseph II. (1780-1700) was as true to the principles of en- lightened despotism and family politics as his mother; but he had none of the common sense which had led her to realize the limits of her power. Joseph was an idealist and a doctrinaire, whose dream was to build up his ideal body politic; the first step toward which was to be the amalgamation of all his dominions into a common state under an absolute sovereign (see Austria-Hungary; and Joseph II., Emperor). Unfortunately, the Hungarian constitution stood in the way of this political paradise, so Joseph resolved that the Hungarian constitution must be sacrificed. Refusing to be crowned, or even to take the usual oaths of observance, he simply announced his accession to the Hungarian counties, and then deliberately proceeded to break down all the ancient Magyar institutions. In 1784 the Language Edict made German the official language of the common state. The same year he ordered a census and a land-survey to be taken, to enable him to tax every one irrespective of birth or wealth. Protests came in from every quarter and a dangerous rebellion broke out in Transylvania; but

opposition only made Joseph more obstinate, and he endeavoured to anticipate any further resistance by abolishing the ancient county assemblies and dividing the kingdom into two districts administered by German officials.

In taking this course Joseph made the capital mistake of neglecting the Machiavellian maxim that in changing the substance of cherished institutions the prince should be careful to preserve the semblance. In substance the county assemblies were worse than ineffective: . mere turbulent gatherings of country squires and peasants, corrupt and prejudiced, represent- ing nothing but their own pride of race and class; and to try and govern without them, or to administer in spite of them, may have been the only expedient possible to statesmen. But to the

Magyars they were the immemorial strongholds of their liberties, the last defences of their constitution; and the attempt to suppress them, which made every county a centre of disaffection and resistance, was the action not of a statesman, but of a visionary. The failure of Joseph's " enlightened " policy in Hungary was inevitable in any case; it was hastened by the disastrous Turkish war of 1787-92, which withdrew Joseph altogether from domestic affairs; and on his death-bed (Feb. 22, 1790) he felt it to be his duty to annul all his principal reforms, so as to lighten the difficulties of his successor.

Leopold II. found the country on the verge of revolution; but the wisdom of the new monarch saved the situation and won back the Magyars. At the diet of 1 790-1 791 laws were passed not only confirming the royal prerogatives hf opoI i and the national liberties, but leaving the way open for 1792. future developments. Hungary was declared to be a free, independent and unsubjected kingdom governed by its own laws and customs. The legislative functions were to be exercised by the king and the diet conjointly and by them alone. The diets were henceforth to be triennial, and every new king was to pledge himself to be crowned and issue his credentials l within six months of the death of his predecessor. Latin was still to be the official language, but Magyar was now introduced into the university and all the schools. Leopold's successor Francis I. (1792-1835) received a declaration of war from the French Legislative Assembly immediately on ascending the throne. For the next quarter of a century he, as fr?" cte L ' the champion of Iegitimacy,was fighting the Revolution l835 " on countless battle-fields, and the fearful struggle only bound the Magyar nation closer to the Habsburg dynasty. Ignaz Jozsef Martinovics (1755—1795) and his associates, the Hungarian Jacobins, vainly attempted a revolutionary propa- ganda (1795), and Napoleon's mutilations of the ancient kingdom of St Stephen did not predispose the Hungarian gentry in his favour. Politically, indeed, the whole period was

one of retro- gression and stagnation. The frequent diets held in the earlier part of the reign occupied themselves with little else but war subsidies; after 181 1 they ceased to be summoned. In the latter years of Francis I. the dark shadow of Metternich's policy of " stability " fell across the kingdom, and the forces of re- actionary absolutism were everywhere supreme. But beneath the surface a strong popular current was beginning to run in a contrary direction. Hungarian society, not unaffected by western Liberalism, but without any direct help from abroad, was preparing for the future emancipation. Writers, savants, poets, artists, noble and plebeian, layman and cleric, without any previous concert, or obvious connexion, were working towards that ideal of political liberty which was to unite all the Magyars. Mihaly Vorosmartyo, Ferencz Kolcsey, Ferencz Kazinczy and his associates, to mention but a few of many great names, were, consciously or unconsciously, as the representatives of the renascent national literature, accomplishing a political mission, and their pens proved no less efficacious than the swords of their ancestors.

It was a direct attack upon the constitution which, to use the words of Istvan Szechenyi, first " startled the nation out of its sickly drowsiness." In 1823, when the reactionary powers were meditating joint action to suppress the Una revolution in Spain, the government, without consulting reWva/. the diet, imposed a war-tax and called out the recruits. The county assemblies instantly protested against this illegal act, and Francis I. was obliged, at the diet of 1823, to repudiate the action of his ministers. But the estates felt that the mainten- ance of their liberties demanded more substantia! guarantees than the dead letter of ancient laws. Szechenyi, who had resided abroad and studied Western institutions, was the recognized leader of all those who wished to create a new Hungary out of the old. For years he and his friends educated public opinion by issuing innumerable pamphlets in which the new Liberalism was eloquently expounded. In particular Szechenyi insisted that the people must not look exclusively to the government,*

1 Litterae ctedentiales, nearly equivalent to a coronation oath.

or even to the diet, for the necessary reforms. Society itself must take the initiative by breaking down the barriers of class exclusiveness and reviving a healthy public spirit. The effect of this teaching was manifest at the diet of 1832, when the Liberals in the Lower Chamber had a large majority,

prominent among whom were Francis Deak and Odon Beothy. In the Upper House, however, the magnates united with the government to form a conservative party obstinately opposed to any project of reform, which frustrated all the efforts of the Liberals.

The alarm of the government at the power and popularity of the Liberal party induced it, soon after the accession of the new king, the emperor Ferdinand I. (1835-1848), to attempt to crush the reform movement by arresting and imprisoning the most active agitators among them, Louis Kossuth and Miklos Wesselenyi. But the nation was no longer to be cowed. The diet of 1839 refused to proceed to business till the political prisoners had been released, and, while in the Lower Chamber the reforming majority was larger than ever, a Liberal party was now also formed in the Upper House under the brilliant leadership of Count Louis Batthyany and Baron Joseph Eotvos. Two progressive measures of the highest importance were passed by this diet, one making Magyar the official language of Hungary, the other freeing the peasants' holdings from all feudal obligations.*

The results of the diet of 1839 did not satisfy the advanced Liberals, while the opposition of the government and of the Upper House still further embittered the general discontent. The chief exponent of this temper was the Pesti Hirlap, Hungary's first political newspaper, founded in . 1841 by Kossuth, whose articles, advocating armed reprisals if necessary, inflamed the extremists but alienated Szechenyi, who openly attacked Kossuth's opinions. The polemic on both sides was violent; but, as usual, the extreme views prevailed, and on the assembling of the diet of 1843 Kossuth was more popular than ever, while the influence of Szechenyi had sensibly declined. The tone of this diet was passionate, and the govern- ment was fiercely attacked for interfering with the elections. Fresh triumphs were won by the Liberals. Magyar was now declared to be the language of the schools and the law-courts as well as of the legislature; mixed marriages were legalized; and official positions were thrown open to non-nobles.

The interval between the diet of 1843 and that of 1847 saw a complete disintegration and transformation of the various political parties. Szechenyi openly joined the government, while the moderate Liberals separated from the extremists and formed a new party, the Centralists. Immediately before the elections, however, Deak succeeded in reuniting all the Liberals on the common platform of " The Ten Points " : (1) Responsible ministries, (2) Popular representation, (3) The incorporation of Transylvania, (4) Right of public meeting, (6) Absolute religious liberty, (7) Universal equality before the law, (8) Universal taxation, (9) The abolition of the Aviticum, an obsolete and anomalous land-tenure, (10) The abolition of serfdom, with compensation to the landlords. The ensuing elections resulted in a

complete victory of the Progressives. All efforts to bring about an understanding between the government and the opposi- tion were fruitless. Kossuth demanded not merely the redress of actual grievances, but a reform which would make grievances impossible in the future. In the highest circles a dissolution of the diet now seemed to be the sole remedy; but, before it could be carried out, tidings of the February revolution tionoi m Paris reached Pressburg 1 (March 1), and on the 3rd 1848. of March Kossuth's motion for the appointment of an

The independent, responsible ministry was accepted by the

Lower House. The moderates, alarmed not so much by the motion itself as by its tone, again tried to inter- vene; but on the 13th of March the Vienna revolution broke out, and the king, yielding to pressure or panic, appointed Count Louis Batthyany premier of the first Hungarian responsible ministry, which included Kossuth, Szechenyi and Deak. The Ten Points, or the March Laws as they were now called, were 1 Up to 1848 the Hungarian diet was usually held at Pressburg.

March Laws.

then adopted by the legislature and received the royal assent (April 10). Hungary had, to all intents and purposes, become an independent state bound to Austria only by the fact that the palatine chanced to be an Austrian archduke.

In the assertion of their national aspirations, confused as these were with the new democratic ideals, the Magyars had had the support of the German democrats who temporarily held the reins of power in Vienna. On the other hand, ?? e non ' they were threatened by an ominous stirring of the races. subject races in Hungary itself. Croats, Vlachs, Serbs and Slovaks resented Magyar domination — a domination which had been carefully secured under the revolutionary constitution by a very narrow franchise, and out of the general chaos each race hoped to create for itself a separate national existence. The separatist movement was strongest in the south, where the Rumans were in touch with their kinsmen in Walachia and Moldavia, the Serbs with their brethren in Servia, and the Croats intent on reasserting the independence of the " Tri-une Kingdom." The attitude of the distracted imperial government towards these movements was at first openly suspicious and hostile. The emperor and his ministers hoped that, having conceded the demands of the Magyars, they would chicb.

receive the help of the Hungarian government in crushing the revolution elsewhere, a hope that seemed to be justified by the readiness with which Batthyany consented to send a contingent to the assistance of the

imperialists in Italy. That the encouragement of the Slav aspirations was soon deliberately adopted as a weapon against the Hungarian govern- ment was due, partly to the speedy predominance at Pest of Kossuth and the extreme party of which he was the mouthpiece, but mainly to the calculated policy of Baron Jellachich, who on the 14th of April was appointed ban of Croatia. Jellachich, who as a soldier was devoted to the interests of the imperial house, realized that the best way to break the revolutionary power of the Magyars and Germans would be to encourage the Slav national ideas, which were equally hostile to both; to set up against the Dualism in favour at Pest and Vienna the federal system advocated by the Slavs, and so to restore the traditional Habsburg principle of Divide et impera. This policy he pursued with masterly skill. His first acts on taking up his office were to repudiate the authority of the Hungarian diet, to replace the Maygar officials with ardent " Illyrians," and to proclaim martial law. Under pressure from the palatine of Batthyany an imperial edict was issued, on the 7th day of May, ordering the ban to desist from his separatist plans and take his orders from Pest. He not only refused to obey, but on the 5th of June conˆ voked to Agram the Croatian national diet, of which the first act was to declare the independence of the Tri-une Kingdom. Once more, at the instance of Batthyany, the emperor intervened; and on the 10th an imperial edict stripped Jellachich of all his offices. Meanwhile, however, Jellachich had himself started for Innsbruck, where he succeeded in persuading the emperor of the loyalty of his intentions, and whence, though not as yet formally reinstated, he was allowed to return to Croatia with practically unfettered discretion. The Hungarian government, in fact, had played into his hands. At a time when everything depended on the army, they had destroyed the main tie which bound the Austrian court to their interests by tampering with the relation of the Hungarian army to the crown. In May a national guard had been created, the disaffected troops being bribed by increased pay to desert their colours and join this; and on the 1st of June the garrison of Pest had taken an oath to the constitution. AM hope of crushing revolutionary Vienna with Magyar aid was thus at an end, and Jellachich, who on the 20th issued a proclama- tion to the Croat regiments in Italy to remain with their colours and fight for the common fatherland, was free to carry out his policy of identifying the cause of the southern Slavs with that of the imperial army. The alliance was cemented in July by a military demonstration, of which Jellachich was the hero, at Vienna; as the result of which the government mustered up courage to declare publicly that the basis of the Austrian state was " the recognition of the equal rights of all nationalities."

HISTORY]

HUNGARY

Tliis was the challenge which the Magyars were not slow to accept.

In the Hungarian diet, which met on the 2nd of July, the influence of the conservative cabinet was wholly overshadowed by that of Kossuth, whose inflammatory orations — Jellachich directed against the disruptive designs of the Slavs and Hungary, the treachery of the Austrian government — precipitated the crisis. At his instance the diet not only refused to vote supplies for the troops of the ban of Croatia, but only consented to pass a motion for sending reinforcements to the army in Italy on condition that the anti-Magyar races in Hungary should be first disarmed. On the nth, on his motion, a decree was passed by acclamation for a levy of 200,000 men and the raising of £4,500,000 for the defence of the independence of the country. Desultory fighting, in which Austrian officers with the tacit consent of the minister of war took part against the Magyars, had already broken out in the south. It was not, however, until the victory of Custozza (July 2 5) set free the army in Italy, that the Austrian government ventured on bolder measures. On the 4th of September, after weeks of fruitless negotiation, the king-emperor threw down the gauntlet by reinstating Jellachich in all his honours. Seven days later the ban declared open war on Hungary by crossing the Drave at the head of 36,000 Croatian troops (see Austria-Hungary : History) . The immediate result was to place the extreme revolutionaries in power at Pest. Szechenyi had lost his reason some days before; Eotvos and Deak retired into private life; of the conservative ministers only Batthyany, to his undoing, consented to remain in office, though hardly in power. Kossuth alone was supreme.

The advance of Jellachich as far as Lake Balaton had not been checked, the Magyar troops, though — contrary to his expecta- tion — none joined him, offering no opposition. The palatine, the Austrian Archduke Stephen, after fruitless attempts at negotiation, laid down his office on the 24th of September and left for Vienna. One more attempt at compromise was made, General Count Lamberg 1 being sent to take command of all the troops, Slav or Magyar, in Hungary, with a view to arranging an armistice. His mission, which was a slight to Jellachich, was conceived as a concession to the Magyars, and had the general approval of Batthyany. Unhappily, however, when Lamberg arrived in Pest, Batthyany had not yet returned; the diet, on Kossuth's motion, called on the army not to obey the new commander-in-chief, on the ground that his commission had not been countersigned by a minister at Pest. Next day, as he was crossing the bridge of Buda, Lamberg was dragged from his carriage by a frantic mob and torn to pieces. This made war inevitable; though Batthyany hurried to Vienna to try and arrange a settlement. Failing in this, he retired, and on the 2nd of October a royal proclamation, countersigned by his successor, Recssey,

placed Hungary under martial law and appointed Jellachich viceroy and commander of all the forces. This proclamation, together with the order given to certain Viennese regiments to march to the assistance of Jellachich, who had been defeated at Pakozd on the 29th of September, led to the entente (Oct. 3) which ended in the murder of the minister of war, Latour, and the second flight of the emperor to Innsbruck. The fortunes of the German revolutionaries in Vienna and the Magyar revolutionists in Pest were now closely bound up together; and when, on the nth, Prince Vienna. Windischgratz laid siege to Vienna, it was to Hungary that the democrats of the capital looked for relief. The despatch of a large force of militia to the assistance of the Viennese was, in fact, the first act of open rebellion of the Hungarians. They suffered a defeat at Schwechat on the 30th of October, which sealed the fate of the revolutionists in Vienna and thus precipitated a conflict d outrance in Hungary itself.

1 Franz Phillip, Count von Lamberg (1791-1848), a field-marshal in the Austrian army, who had seen service in the campaigns of 1814-1815 in France, belonged to the Stockerau branch of the ancient countly family of Orteneck-Ottenstein. He was chosen for this particular mission as being himself a Hungarian magnate conversant with Hungarian affairs, but at the same time of the party devoted to the court.

In Austria the army was now supreme, and the appointment of Prince Felix Schwarzenberg as head of the government was a guarantee that its power would be used in a reactionary sense without weakness or scruple. The Austrian j OS eph. diet was transferred on the 15th of November to Kremsier, remote from revolutionary influences; and, though the government still thought it prudent to proclaim its con- stitutional principles, it also proclaimed its intention to preserve the unity of the monarchy. A still further step was taken when, on the 2nd of December, the emperor Ferdinand abdicated in favour of his nephew Francis Joseph. The new sovereign was a lad of eighteen, who for the present was likely to be the mere mouthpiece of Schwarzenberg's policy. Moreover, he was not bound by the constitutional obligations unwillingly accepted by his uncle. The Magyars at once took up the challenge. On the 7th the Hungarian diet formally refused to acknowledge the title of the new king, " as without the knowledge and consent of the diet no one could sit on the Hungarian throne," and called the nation to arms. Constitutionally, in the Magyar opinion, Ferdinand was still king of Hungary, and this gave to the revolt an excuse of legality. Actually, from this time until the collapse of the rising, Louis Kossuth was the ruler of Hungary.

The struggle opened with a series of Austrian successes. Prince Windischgratz, who had received orders to reduce Hungary by fire and sword, began his advance on the 15th of December; opened up the way to

the capital iˆnn' by the victory of Mor (Oct. 30), and on the 5th of dence. January 1849 occupied Pest, while the Hungarian government and diet retired behind the Theiss and established themselves at Debreczen. A last attempt at reconciliation, made by the more moderate members of the diet in Windisch- gratz's camp at Bieske (Jan. 3), had foundered on the uncompromising attitude of the Austrian commander, who demanded unconditional submission; whereupon the moderates, including Deak and Batthyany, retired into private life, leaving Kossuth to carry on the struggle with the support of the enthusiastic extremists who constituted the rump of the diet at Debreczen. The question now was: how far the military would subordinate itself to the civil element of the national government. The first symptom of dissonance was a proclamation by the com- mander of the Upper Danube division, Arthur Gorgei, from his camp at Vacz (Jan. 5) emphasizing the fact that the national defence was purely constitutional, and menacing all who might be led astray from this standpoint by republican aspirations. Immediately after this proclamation Gorgei disappeared with his army among the hills of Upper Hungary, and, despite the difficulties of a phenomenally severe winter and the constant pursuit of vastly superior forces, fought his way down to the valley of Hernad — and safety. This masterly winter-campaign first revealed Gorgei's military genius, and the discipline of that terrible month of marching and countermarching had hardened his recruits into veterans whom his country regarded with pride and his country's enemies with respect. Unfortu- nately his success caused some jealousy in official quarters, and when, in the middle of February 1849, a commander-in-chief was appointed to carry out Kossuth's plan of campaign, that vital appointment was given, not to the man who had made the army what it was, but to a foreigner, a Polish refugee, Count Henrik Dembinski, who, after fighting the bloody and indecisive battle of Kapolna (Feb. 26-27), Kapolna. was forced to retreat. Gorgei was immediately appointed his successor, and the new generalissimo led the Honveds from victory to victory. Ably supported by Klapka and Damjanich he pressed forward irresistibly. Szolnok (March 5), Isaszeg (April 6), Vacz (April 10), and Nagysarlo (April 19) were so many milestones in his triumphal progress. On the 25th of May the Hungarian capital was once more in the hands of the Hungarians.

Meanwhile, the earlier events of the war had so altered the political situation that any idea which the diet at Debreczen had cherished of a compromise with Austria was destroyed. The capture of Pest had confirmed the Austrian court in its policy

of unification, which after the victory of Kapolna they thought it safe to proclaim. On the 7th of March the diet of Kremsier Proclama- was dissolved, and immediately afterwards a proclama- tioaofa tion was issued in the name of the emperor Francis united Joseph establishing a united constitution for the whole empire. empire, of which Hungary, cut up into half a dozen administrative districts, was henceforth to be little more than the largest of several subject provinces. The news of this manifesto, arriving as it did simultaneously with that of Gorgei's successes, destroyed the last vestiges of a desire of the Hungarian revolutionists to compromise, and on the 14th of April, on the motion of Kossuth, the diet proclaimed the independence of Hungary, declared the house of Habsburg as false and perjured, for ever excluded from the throne, and elected Kossuth president of the Hungarian Republic. This was an execrable blunder in the circumstances, and the results were fatal to the national cause. Neither the government nor the army could accom- modate itself to the new situation. From henceforth the military and civil authorities, as represented by Kossuth and Gorgei, were hopelessly out of sympathy with each other, and the breach widened till all effective co-operation became impossible.

Meanwhile the humiliating defeats of the imperial army and the course of events in Hungary had compelled the court of Vienna to accept the assistance which the emperor UolZf" Nicholas I. of Russia had proffered in the loftiest Russia. spirit of the Holy Alliance. The Austro-Russian alliance was announced at the beginning of May, and before the end of the month the common plan of campaign had been arranged. The Austrian commander-in-chief, Count Haynau, was to attack Hungary from the west, the Russian, Prince Paskevich, from the north, gradually environing the kingdom, and then advancing to end the business by one decisive blow in the mid-Theissian counties. They had at their dis- posal 375, 000 men, to which the Magyars could only oppose 160,000. The Magyars, too, were now more than ever divided among themselves, no plan of campaign had yet been drawn up, no commander-in-chief appointed to replace Gorgei, whom Kossuth had deposed. Haynau's first victories (June 20-28) put an end to their indecisions. On the 2nd of July the Hungarian government abandoned Pest and transferred its capital first to Szeged and finally to Arad. The Russians were by this time well on their way to the Theiss, and the terrible girdle which was to throttle the liberties of Hungary was all but completed. Kossuth again appointed as commander-in- chief the brave but inefficient Dembinski, who was utterly routed at Temesvar (Aug. 9) by Haynau. This was the last great battle of the War of Independence. The final catastrophe was now unavoidable. On the 13th of August Gorgei, who had been appointed dictator by the panic-stricken government two days before, surrendered the remnant of his hardly pressed army to the Russian

General Riidiger at Vilagos. The other army corps and all the fortresses followed his example, Komarom, heroically defended by Klapka, being the last to capitulate (Sept. 27). Kossuth and his associates, who had quitted Arad on the 10th of August, took refuge in Turkish territory. By the end of the month Paskevich could write to the Emperor Nicholas: " Hungary lies at the feet of your Imperial Majesty."

From October 1849 to July 1850 Hungary was governed by martial law administered by " the butcher " Haynau. This was a period of military tribunals, dragooning, wholesale ™ e . confiscation and all manner of brutalities. 1 From System." 1851 to i860 pure terrorism was succeeded by the " Bach System," which derives its name from the imperial minister of the interior, Baron Alexander von Bach. The Bach System did not recognize historical Hungary. It

1 The crowning atrocities, which the Magyars have never wholly forgiven, were the shooting and hanging of the " Arad Martyrs " and the execution of Batthyany. On October 6, 1849, thirteen generals who had taken part in the war, including Damjanics and Counts Vecsey and Leiningen, were hanged or shot at Arad. On the same day Count Louis Batthyany, who had taken no part in the war and had done his utmost to restrain his countrymen within the bounds of legality, was shot at Pest.

postulated the existence of one common indivisible state of which mutilated Hungary 2 formed an important section. The supreme government was entrusted to an imperial council responsible to the emperor alone. The counties were ad- ministered by imperial officials, Germans, Czechs and Galicians, who did not understand the Magyar tongue. German was the official language. But though reaction was the motive power of this new machinery of government, it could not do away with many of the practical and obvious improvements of 1848, and it was not blind to some of the indispensable requirements of a modern state. The material welfare of the nation was certainly promoted by it. Modern roads were made, the first railways were laid down, the regulation of the river Theiss was taken in hand, a new and better scheme of finance was inaugurated. But the whole system, so to speak, hung in the air. It took no root in the soil. The Magyar nation stood aloof from it. It was plain that at the first revolutionary blast from without, or the first insurrectionary outburst from within, the " Bach System " would vanish like a mirage.

Meanwhile the new Austrian empire had failed to stand the test of international complications. The Crimean War had isolated it in Europe. The Italian war of 1859 had The revealed its essential instability. It was felt at court October that some concessions were now due to the subject Diploma, nationalities. Hence the October Diploma (Oct. 20, i860) which

proposed to prop up the crazy common state with the shadow of a constitution and to grant some measure of local autonomy to Hungary, subject always to the supervision of the imperial council (Reichsrath). 3 This project was favoured by the Magyar conservative magnates who had never broken with the court, but was steadily opposed by the Liberal leader Ferencz Deak whose upright and tenacious character made him at this crisis the oracle and the buttress of the national cause. Deak's standpoint was as simple as it was unchangeable. He demanded the re-establishment of the constitution of 1848 in its entirety, the whole constitution and nothing but the constitution.

The October Diploma was followed by the February Patent (Feb. 26, 1861), which proposed to convert the Reichsrath into a constitutional representative assembly, with two The chambers, to which all the provinces of the empire February were to send deputies. The project, elaborated by Patent, Anton von Schmerling, was submitted to a Hungarian diet which assembled at Pest on the 2nd of April 1861. After long and violent debates, the diet, on the 8th of August, unanim- ously adopted an address to the crown, drawn up by Deak, praying for the restoration of the political and territorial integrity of Hungary, for the public coronation of the king with all its accompaniments, and the full restitution of the fundamental laws. The executive retorted by dissolving the diet on the 21st of August and levying the taxes by military execution. The so-called Provisorium had begun.

But the politicians of Vienna had neither the power nor the time to realize their intentions. The question of Italian unity had no sooner been settled than the question of The German unity arose, and fresh international difficulties Austro- once more inclined the Austrian government towards Prussian moderation and concession. In the beginning of June „" ° 1865, Francis Joseph came to Buda; on the 26th a provisional Hungarian government was formed, on the 20th of September the February constitution was suspended, and on the 14th of December a diet was summoned to Buda T Pest. The great majority of the nation naturally desired a composition with its ruler and with Austria, and this general desire was unerringly interpreted and directed by Deak, who carried two-thirds of the deputies along with him. The session was interrupted by the outbreak of the Austro-Prussian War, but not before a

2 Transylvania t Croatio-Slavonia with Fiume and the Temes Banat were separated from the kingdom and provided with local governments.

8 This Reichsrath was a purely consultative body, the ultimate control of all important affairs being reserved to the emperor. Its representative element consisted of 100 members elected by the provinces.

eat Hungary.

committee had been formed to draft the new constitution. The peace of Prague (Aug. 20, 1866), excluding Austria from Italy and Germany, made the fate of the Habsburg monarchy absolutely dependent upon a compromise with the Magyars. (For the Compromise or Ausgleick, see Austria-Hungary: History.) On the 7th of November 1866, the diet-reassembled.

On the 17th of February 1867 a responsible inde- promise ‘ pendent ministry was formed under Count Gyula of 1867. Andrassy. On the 29th of May the new constitution

was adopted by 209 votes to 89. Practically it was an amplification of the March Laws of 1848. The coronation took place on the 8th of June, on which occasion the king solemnly declared that he wished ” a veil to be drawn over the past.” The usual coronation gifts he devoted to the benefit of the Honved invalids who had fought in the War of Independ- ence. The reconciliation between monarch and people was assured.

Hungary was now a free and independent modern state; but the very completeness and suddenness of her constitutional Parties la victory made it impossible for the strongly flowing ladepead- current of political life to keep within due bounds.

The circumstance that the formation of political

parties had not come about naturally, was an additional difficulty. Broadly speaking, there have been in Hungary since 1867 two parties: those who accept the compromise with Austria, and affirm that under it Hungary, so far from having surrendered any of her rights, has acquired an influence which she previously did not actually possess, and secondly, those who see in the compromise an abandonment of the essentials of independence and aim at the restoration of the conditions established in 1848. Within this broad division, however, have appeared from time to time political groups in bewildering variety, each adopting a party designation according to the exigencies of the moment, but each basing its programme on one or other of the theoretical foundations above mentioned. Thus, at the outset, the most heterogeneous elements were to be found both on the Left and Right. . The Extreme Left was infected by the fanaticism of Kossuth, who condemned the compromise and refused to take the benefit of the amnesty, while the prelates and magnates who had originally opposed the compromise were now to be found by the side of Deak and Andrassy. The Deak party preserved its majority at the elections of 1869, but the Left Centre and Extreme Left returned to the diet considerably reinforced. The outbreak of the Franco- German War of 1870 turned the attention of the Magyars to Andrassy Iorel g n affairs. Andrassy never rendered a greater

service to his country than when he prevented the imperial chancellor and joint foreign minister, Count Beust, 1 from intervening in favour of France. On the retirement of Beust in 187 1, Andrassy was appointed his successor, the first instance, since Hungary came beneath the dominion of the Habsburgs, of an Hungarian statesman being entrusted with the conduct of

foreign affairs. But, however gratifying such an elevation might be, it was distinctly prejudicial, at first, to Hungary's domestic affairs, for no one else at this time, in Hungary, possessed either the prestige or the popularity of Andrassy. . Within the next five years ministry followed ministry in rapid succession. A hopeless political confusion ensued. Few measures could.be passed. The finances fell into disorder. The national credit was so seriously impaired abroad that foreign loans could only be obtained at ruinous rates of interest. During this period Deak had almost entirely withdrawn from public life. His last great speech was delivered on the 28th of June 1873, Lin d ne died on the 29th of January 1876. Fortun- ately, in Kalman Tisza, the leader of the Liberal TuTa." (Szabadclmii, i.e. " Free Principle ") party, he left behind him a statesman of the first rank, who for the next eighteen years was to rule Hungary uninterruptedly.

1 Beust was the only " imperial chancellor " in Austro-Hungarian history; even Metternich bore only the title of " chancellor "; and Andrassy, who succeeded Beust, styled himself " minister of the imperial and royal household and for foreign affairs."

From the first, Tisza was exposed to the violent attacks of the opposition, which embraced, not only the party of Independence, champions of the principles of 1848, but the so-called National party, led by the brilliant orator Count Albert Apponyi, which aimed at much the same ends but looked upon the Compromise of 1867 as a convenient substructure on which to build up the Magyar state. Neither could forgive Tisza for repudiating his earlier Radical policy, the so-called Bihar Programme (March 6, 1868), which went far beyond the Compromise in the direction of independence, and both attacked him with a violence which his unyielding temper, and the ruthless methods by which he always knew how to secure victory, tended ever to fan into fury. Yet Tisza's aim also was to convert the old polyglot Hungarian kingdom into a homogeneous Magyar state, and the methods which he employed — notably the enforced magyariza- tion of the subject races, which formed part of the reformed educational system introduced by him — certainly did not err on the side of moderation. 2 Whatever view may be held of Tisza's policy in this respect, or of the corrupt methods by which he maintained his party in power, 3 there can be no doubt that during his long tenure of office — which practically amounted to a dictatorship — he did much to promote the astonishing progress of his country, which ran a risk of being stifled in the strife of factions. Himself a Calvinist, he succeeded in putting an end to the old quarrel of Catholic and Protestant and uniting them in a common enthusiasm for a race ideal; nominally a Liberal, he trampled on every Liberal principle in order to secure the means for governing with a firm hand; and if the political corruption of modern Hungary is largely his work, 4 to him also belongs the credit for the measures which have placed

the country on a sound economic basis and the statesmanlike temper which made Hungary a power in the affairs of Europe. In this latter respect Tisza rendered substantial aid to the joint minister for foreign affairs by repressing the anti-Russian ardour of the Magyars on the outbreak of the Russo-Turkish war of 1877-78, and by supporting Andrassy's execution of the mandate from the Berlin Congress to Austria-Hungary for the occupation of Bosnia, against which the Hungarian opposition agitated for reasons ostensibly financial. Tisza's policy on both these occasions increased his unpopularity in Hungary, but in the highest circles at Vienna he was now regarded as indispensable. The following nine years mark the financial and commercial rehabilitation of Hungary, the establishment of a vast and original railway system which won the admiration of Europe, the liberation and expansion of her over-sea trade, the conversion of her national debt under the most favourable conditions and the consequent equilibrium of her finances. These benefits the nation owed for the most part to Gabor Baross, Hungary's greatest finance minister, who entered the cabinet in 1886 and greatly strengthened it. But the opposition, while unable to deny the recuperation of Hungary, shut their eyes to everything but Tisza's " tyranny, " and their attacks were never so savage and unscrupulous as during the session of 1889, when threats of a revolution were uttered by the opposition leaders and the premier could only enter or leave the House under police protection. The tragic death of the crown prince Rudolph hushed for a time the strife of tongues, and in the meantime Tisza brought into the ministry Dezsd Szilagyi, the most powerful debater in the House, and Sandor Wekerle, whose solid talents had hitherto been hidden beneath the bushel of an under-secretaryship. But in 1890, during the debates on the Kossuth Repatriation Bill, the attacks on the premier were renewed, and on the 13th of March he placed his resignation in the king's hands.

The withdrawal of Tisza scarcely changed the situation, but the period of brief ministries now began. Tisza's successor,

2 See for this Mr Seton-Watson's Racial Problems of Hungary, passim. 3 Ibid. p. 168.

4 Especially the Electoral Law of 1874, which established a very unequal distribution of electoral areas, a highly complicated franchise, and voting by public declaration, thus making it easy for the govern- ment to intimidate the electors and generally to gerrymander the

Material progress.

HUNGARY

[HISTORY

Count Gyula Szapary, formerly minister of agriculture, held office for eighteen months, and was succeeded (Nov. 21, 1892) by Fl . Wekerle. Wekerle, essentially a business man, had

Wekerle taken office for the express purpose of equilibrating Ministry, the finances, but the religious question aroused by the ,89 \m The encroac h ments °f the Catholic clergy, and notably 'auction, their insistence on the baptism of the children of mixed marriages, had by this time (1893-1894) excluded all others, and the government were forced to postpone their financial programme to its consideration. The Obligatory Civil Marriage Bill, the State Registries Bill and the Religion of Children of Mixed Marriages Bill, were finally adopted on the 21st of June 1894, after fierce debates and a ministerial interregnum of ten days (June 10-20); but on the 25th of December, Wekerle, who no longer possessed the king's confidence, 1 resigned a second time, and was succeeded by Baron Dezso (Desiderius) Banffy. The various parties meanwhile had split up into some half a dozen sub-sections; but the expected fusion of the Ministry, P art y of independence and the government fell through, 1894. and the barren struggle continued till the celebration of

the millennium of the foundation of the monarchy pro- duced for some months a lull in politics. Subsequently, Banffy still further exasperated the opposition by exercising undue influence during the elections of 1896. The majority he obtained on this occasion enabled him, however, to carry through the Army Education Bill, which tended to magyarize the Hungarian portion of the joint army; and another period of comparative calm ensued, during which Banffy attempted to adjust various out- standing financial and economical differences with Austria. But in November 1898, on the occasion of the renewal of the com- mercial convention with Austria, the attack on the ministry was renewed with unprecedented virulence, obstruction being systematically practised with the object of goading the govern- ment into committing illegalities, till Banffy, finding the situation impossible, resigned on the 1 7th of February 1899. His successor, Kalman Szell, obtained an immense but artificial Ministry majority by a fresh fusion of parties, and the minority 1899. pledged itself to grant an indemnity for the extra-

parliamentary financial decrees rendered necessary by Hungary's understanding with Austria, as well as to cease from obstruction. As a result of this compromise the budget of 1899 was passed in little more than a month, and the commercial and tariff treaty with Austria were renewed

till 1903. 2 But the government had to pay for this complacency with a so-called " pactum," which bound its hands in several directions, much to the profit of the opposition during the " pure " elections of 1901. On the reassembling of the diet, Count Albert Apponyi taasruaiie was elected speaker, and the minority seemed disposed question, to let the government try to govern. But the proposed raising of the contingent of recruits by 15,000 men (Oct. 1902) once more brought up the question of the common army, the parliament refusing to pass the bill, except in return for the introduction of the Hungarian national flag into the Hungarian regiments and the substitution of Magyar for German in the words of command. The king refusing to yield an inch of his rights under clause ii. of Law XII. of the Compromise of 1867, the opposition once more took to obstruction, and on the 1st of May 1903 Szell was forced to resign.

Every one now looked to the crown to extract the nation from an ex-lcx, or extra-constitutional situation, but when the F . , king, passing over the ordinary party-leaders, appointed

Khuen- as premier Count Karoly Khuen-Hedervary, who had HedirvSry made himself impossible as ban of Croatia, there was M £" stry > general amazement and indignation. The fact was that the king, weary of the tactics of a minority which for years had terrorized every majority and prevented the government from exercising its proper constitutional functions, had resolved to show the Magyars that he was prepared to rule unconstitu-

1 The Austrian court resented especially the decree proclaiming national mourning for Louis Kossuth, though no minister was present at the funeral.

"- Subsequently extended till 1907.

tionally rather than imperil the stability of the Dual Monarchy by allowing any tampering with the joint army. In an ordinance on the army word of command, promulgated on the 16th of September, he reaffirmed the inalienable character of the powers of the crown over the joint army and the necessity for maintaining German as the common military language. This was followed by the fall of Khuen-Hedervary (September 29), and a quarrel d outrance between crown and parliament seemed unavoidable. The Liberal party, however, realized the abyss towards which they were hurrying the country, and united their efforts to come to a constitutional understanding with the king. The problem was to keep the army an Hungarian army without infringing on the prerogative of the king as commander-in-chief, for, un- constitutional as the new ordinance might be, it could not constitutionally be set aside without the royal assent. The king met them half way by inviting the majority to appoint a com- mittee to

settle the army question provisionally, and a committee was formed, which included Szell, Apponyi, Count Istvan Tisza and other experienced statesmen.

A programme approved of by all the members of the com- mittee was drawn up, and on the 3rd of November 1903, Count Istvan Tisza was appointed minister president to istvkn carry it out. Thus, out of respect for the wishes of Tisza the nation, the king had voluntarily thrown open to % £'J stry ' public discussion the hitherto strictly closed and jealously guarded domain of the army. Tisza, a statesman of singular probity and tenacity, seemed to be the one person capable of carrying out the programme of the king and the majority. The irreconcilable minority, recognizing this, ex- hausted all the resources of " technical obstruction " in order to reduce the government to impotence, a task made easy by the absurd standing-rules of the House which enabled any single member to block a measure. These tactics soon rendered legislation impossible, and a modification of the rule of procedure became absolutely necessary if any business at all was to be done. The Modification of the Standing-orders Bill was accordingly introduced by the deputy Gabor Daniel t904- (Nov. 18, 1904); but the opposition, to which the 1906. National party had attached itself, denounced it as " a gagging order " inspired at Vienna, and shouted it down so vehemently that no debate could be held; whereupon the president declared the bill carried and adjourned the House till the 13th of December 1904. This was at once followed by an anti-ministerial fusion of the extremists of all parties, including seceders from the government (known as the „ CoaW . Constitutional party); and when the diet reassembled, tion." the opposition broke into the House by force and wrecked all the furniture, so that a session was physically impossible (Jan. 5, 1905). Tisza now appealed to the country, but was utterly defeated. The opposition thereupon proceeded to annul the Lex Daniel (April 7) and stubbornly to clamour for the adoption of the Magyar word of command in the Hungarian part of the common army. To this demand the king as stubbornly refused to accede; 3 and as the result of the con- sequent dead-lock, Tisza, who had courageously continued in office at the king's request, after every other leading politician had refused to form a ministry, was finally dismissed on the 17th of June. (R. N. B.; W. A. R)

Long negotiations between the crown .and the leaders of the Coalition having failed to give any promise of a modus vivendi, the king-emperor at last determined to appoint an

3 The question involves rather complex issues. Apart from the question of constitutional right, the Magyars objected to German as the medium of military education as increasing the difficulty of magyarizing the subordinate races of Hungary (see Knatchbull- llugessen, ii. 296). On the

other hand the Austrians pointed out that not only would failure to understand each other's language cause fatal confusion on a battlefield, but also tend to disintegrate the forces even in peace time. They also laid stress on the fact that Magyar was not, any more than German, the language of many Hungarian regiments, consisting as these did mainly of Slovaks, Vlachs, Serbs and Croats. In resisting the Magyar word of command, then, the king-emperor was able to appeal to the anti- Magyar feeling of the other Hungarian races. (W. A. P.)

extra-parliamentary ministry, and on the 21st of June Baron Fejervary, an officer in the royal bodyguard, was nominated minister president with a cabinet consisting of little- Fejervary k nown permanent officials. Instead of presenting the went. usual programme, the new premier read to the parlia-

ment a royal autograph letter stating the reasons which had actuated the king in taking this course, and giving as the task of the new ministry the continuance of negotiations with the Coalition on the basis of the exclusion of the language question. The parliament was at the same time prorogued. A period followed of arbitrary government on the one hand and of stubborn passive resistance on the other. Three times .the parliament was again prorogued — from the 15th of September to the 10th of October, from this date to the 19th of December, and from this yet again to the 1st of March 1906 — in spite of the protests of both Houses. To the repressive measures of the government — ■ press censorship, curtailment of the right of public meeting, dismissal of recalcitrant officials, and dragooning of disaffected county assemblies and municipalities — the Magyar nation opposed a sturdy refusal to pay taxes, to supply recruits or to carry on the machinery of administration.

Had this attitude represented the temper of the whole Hungarian people, it would have been impossible for the crown to have coped with it. But the Coalition represented, in fact, not the mass of the people, but only a small dominant minority, 1 and for years past this minority had neglected the social and economic needs of the mass of the people in the eager pursuit of party advantage and the effort to impose, by coercion and corruption failing other means, the Magyar language and Magyar culture on the non-Magyar races. In this supreme crisis, then, it is not surprising that the masses listened with sullen indifference to the fiery eloquence of the Coalition leaders. Moreover, by refusing the royal terms, the Coalition had

forced the crown into an alliance with the extreme democratic elements in the state. Universal suffrage had already been adopted in the Cis-leithan half of the monarchy; it was an obvious policy to propose it for Hungary also, and thus, by an appeal to the non-Magyar Krlstoffy's majority, to reduce the irreconcilable Magyar minority Universal to reason. Universal suffrage, then, was the first and Suffrage most important of the proposals put forward by Mr proposa . j osze f Kristoffy, the minister of the interior, in the programme issued by him on the 26th of November 1905. Other proposals were: the maintenance of the system of the joint army as established in 1867, but with the con- cession that all Hungarian recruits were to receive their education in Magyar; the maintenance till 1917 of the actual customs convention with Austria; a reform of the land laws, with a view to assisting the poorer proprietors; complete religious equality; universal and compulsory primary education. The issue of a programme so liberal, and notably the inclusion in it of the idea of universal suffrage, entirely checkmated the opposition parties. Their official organs, indeed, continued to fulminate against the " unconstitutional " government, but the enthusiasm with which the programme had been received in the country showed the Coalition leaders the danger of their position, and henceforth, though they continued their denuncia- tions of Austria, they entered into secret negotiations with the king-emperor, in order, by coming to terms with him, to ward off the fatal consequences of Kristoffy's proposals.

On the 19th of February 1906 the parliament was dissolved, without writs being issued for a new election, a fact accepted by the country with an equanimity highly disconcerting Coalition t0 p a t r i [S Meanwhile the negotiations continued, 1906. ' so secretly that when, on the 9th of April, the appoint- ment of a Coalition cabinet 2 under Dr Sandor Wekerle was announced, the world was taken completely by surprise.

1 Of the 16,000,000 inhabitants of Hungary barely a half were Magyar; and the franchise was possessed by only 800,000, of whom the Magyars formed the overwhelming majority.

"- The cabinet consisted of Dr Wekerle (premier and finance), Ferencz Kossuth (commerce), Count Gyula Andrassy (interior), Count Albert Apponyi (education), Davanyi (agriculture), Polonyi (justice) and Count Aladar Zichy (court).

The agreement with the crown which had made this course possible included the postponement of the military questions that had evoked the crisis, and the acceptance of the principle of Universal Suffrage by the Coalition leaders, who announced that their main tasks would be to repair the mischief wrought by the " unconstitutional " Fejervary cabinet, and then to introduce a measure of franchise reform so wide that it would be

possible to ascertain the will of the whole people on the questions at issue between themselves and the crown. 3 In the general elections that followed the Liberal party was practically wiped out, its leader, Count Istvan Tisza, retiring into private life. For two years and a half the Coalition ministry continued in office without showing any signs that they intended to carry out the most important item of their programme. The An(fri { , s old abuses continued: the muzzling of the press in the Universal interests of Magyar nationalism, the imprisonment Suffrage of non-Magyar deputies for "incitement against B '"' Magyar nationality," the persecution of Socialists and of the subordinate races. That this condition of things could not be allowed to continue was, indeed, recognized by all parties; the fundamental difference of opinion was as to the method by which it was to be ended. The dominant Magyar parties were committed to the principle of franchise reform; but they were determined that this reform should be of such a nature as not to imperil their own hegemony. What this would mean was pointed out by Mr Kristoffy in an address delivered at Budapest on the 14th of March 1907. " If the work of social reform," he said, " is scamped by a measure calculated to falsify the essence of reform, the struggle will be continued in the Chamber until full electoral liberty is attained. Till then there can be no social peace in Hungary." 4 The postponement of the question was, indeed, already producing ugly symptoms of popular indignation. On the 10th of October 1907 there was a great and orderly demon- stration at Budapest, organized by the socialists, in favour of reform. About 100,000 people assembled, and a deputation handed to Mr Justh, the president of the Chamber, a monster petition in favour of universal suffrage. The reception it met with was not calculated to encourage constitutional methods. The Socialist deputy, Mr Mezoffy, who wished to move an interpellation on the question, was howled down by the Inde- pendents with shouts of " Away with him! Down with him!" 5 Four days later, in answer to a question by the same deputy, Count Andrassy said that the Franchise Bill would be introduced shortly, but that it would be of such a nature that "the Magyar State idea would remain intact and suffer no diminution." 6 Yet more than a year was to pass before the promised bill was introduced, and meanwhile the feeling in the country had grown more intense, culminating in serious riots at Budapest on the 13th of March 1908.

At last (November n, 1908) Count Andrassy introduced the long-promised bill. How far it was from satisfying the demands of the Hungarian peoples was at once apparent. It granted manhood suffrage, it is true, but hedged with so many qualifying conditions and complicated with so elaborate a system of plural voting as to make its effect nugatory. Every male Hungarian citizen, able to read and write, was to receive the vote at the beginning of his twenty-fifth year, subject to a residential qualification of

twelve months. Illiterate citizens were to choose one elector for every ten of their number. All electors not having the qualifications for the plural franchise were to have one vote. Electors who, e.g., had passed four standards of a secondary school, or paid 16s. 8d. in direct taxation, were to have two votes. Electors who had passed five standards, or who paid £4, 3s. 4d. in direct taxes, were to have three votes. Voting was to be public, as before, on the ground, according to the Preamble, that " the secret ballot protects electors in dependent positions only in so far as they break their promises under the veil of secrecy."

It was at once seen that this elaborate scheme was intended

3 Seton-Watson, Racial Problems, p. 194.

4 The Times, March 14, 1907.

5 Ibid. October 11, 1907. 6 Ibid. October 15, 1907.

to preserve " the Magyar State idea intact." Its result, had it passed, would have been to strengthen the representation of the Magyar and German elements, to reduce that of the Slovaks, and almost to destroy that of the Rumans and other non-Magyar races whose educational status was low. 1 On the other hand, according to the Neue Freie Presse, it would have increased the number of electors from some million odd to 2,600,000, and the number of votes to 4,000,000; incidentally it would have largely increased the working-class representation. This proposal was at once recognized by public opinion — to use the language of the Journal des Debats (May 21, 1909) — as " an instrument of domination " rather than as an attempt to carry out the spirit of the compact under which the Coalition government had been summoned to power. It was not, indeed, simply a reactionary or undemocratic measure; it was, as The Times correspondent pointed out, " a measure sui generis, designed to defeat the objects of the universal suffrage movement that compelled the Coalition to take office in April 1906, and framed in accordance with Magyar needs as understood by one of the foremost Magyar noblemen." Under this bill culture was to be the gate to a share in political power, and in Hungary culture must necessarily be Magyar.

*Plainly, this bill was not destined to settle the Hungarian problem, and other questions soon arose which showed that the crisis, so far from being near a settlement, was destined T*f~ crls,s to become more acute than ever. In December 1908 it was clear that the Coalition Ministry was falling to pieces. Those ministers who belonged to the con- stitutional and popular parties, i.e. the Liberals and Clericals, desired to maintain the compact with the crown; their col- leagues of the Independence party were eager to advance the cause they have at heart by pressing on the question of a separate Hungarian bank. So early as March 1908 Mr Hallo had laid a formal proposal before the House that the charter of the Austro- Hungarian bank, which was to expire on the 31st of December Demand z 9 10 ' should not be renewed; that negotiations should t or be opened with the Austrian government with a view*

separate to a convention between the banks of Austria and Hungarian Hungary; and that, in the event of these negotiations failing, an entirely separate Hungarian bank should be established. The Balkan crisis threw this question into the background during the winter; but, with the settlement of the international questions raised by the annexation of Bosnia and Herzegovina, it once more came to the front. The ministry was divided on the issue, Count Andrassy opposing and Mr Ferencz Kossuth supporting the proposal for a separate bank. Finally, the prime minister, Dr Wekerle, mainly owing to the pressure put upon him by Air Justh, the president of the Chamber, yielded to the importunity of the Independence party, and, in the name of the Hungarian government, laid the proposals for a separate bank before the king-emperor and the Austrian government.

The result was a foregone conclusion. The conference at Vienna revealed the irreconcilable difference within the ministry ; but it revealed also something more — the determination of the emperor Francis Joseph, if pressed beyond the limits of his patience, to appeal again to the non-Magyar Hungarians against the Magyar chauvinists. He admitted that under the Com- promise of 1867 Hungary might have a separate bank, while urging the expediency of such an arrangement from the point of view of the international position of the Dual Monarchy. But he pointed out also that the question of a separate bank did not actually figure in the act of 1867, and that it could not be introduced into it, more especially since the capital article of the ministerial programme, i.e. electoral reform, was not realized, nor near being realized. On the 27th of April, in consequence of this rebuff, Dr Wekerle tendered his resignation, but consented to hold office pending the completion of the difficult task of forming another government.

This task was destined to prove one of almost insuperable difficulty. Had the issues involved been purely Hungarian and 1 The Times, September 27,

constitutional, the natural course would have been for the king to have sent for Mr Kossuth, who commanded the strongest party in the parliament, and to have entrusted him with the formation of a government. But the issues involved affected the stability of the Dual Monarchy and its position in Europe; and neither the king-emperor nor his Austrian advisers, their position strengthened by the success of Baron Aehrenthal's diplomatic victory in the Balkans, were prepared to make any substantial concessions to the party of Independence. In these circumstances the king sent for Dr Laszlo Lukacs, once finance minister in the Fejervary cabinet, whose task was, acting as a homo regius apart from parties, to construct a government out of any elements that might be persuaded to co-operate with him. But Lukacs had no choice but to apply in the first instance to Mr Kossuth and his friends, and these, suspecting an intention of crushing their party by entrapping them into unpopular engage- ments, rejected his overtures. Nothing now remained but for the king to request Dr Wekerle to remain " for the present " in office with his colleagues, thus postponing the settlement of the crisis (July 4).

This procrastinating policy played into the hands of the extremists; for supplies had not been voted, and the question of the credits for the expenditure incurred in connexion with the annexation of Bosnia and Herzegovina, increasingly urgent, placed a powerful weapon in the hands of the Magyars, and made it certain that in the autumn the crisis would assume an even more acute form. By the middle of September affairs had again reached an impasse. On the 14th Dr Wekerle, at the ministerial conference assembled at Vienna for the pur- pose of discussing the estimates to be laid before the delegations, announced that the dissensions among his colleagues made the continuance of the Coalition government impossible. The burning points of controversy were the magyarization of the Hungarian regiments and the question of the separate state bank. On the first of these Wekerle, Andrassy and Apponyi were prepared to accept moderate concessions; as to the second, they were opposed to the question being raised at all. Kossuth and Justh, on the other hand, competitors for the leadership of the Independence party, declared themselves not prepared to accept anything short of the full rights of the Magyars in those matters. The matter was urgent; for parliament was to meet on the 28th, and it was important that a new cabinet, acceptable to it, should be appointed before that date, or that the Houses should be prorogued pending such appointment; otherwise the delegations would be postponed and no credits would be voted for the cost of the new Austro-Hungarian " Dreadnoughts " and of the annexation of Bosnia-Herzegovina. In the event, neither of these courses proved possible, and on the 28th Dr Wekerle once more announced his resignation to the parliament.

The prime minister was not, however, as yet to be relieved of an impossible responsibility. After a period of wavering Mr Kossuth had consented to shelve for the time the question of the separate bank, and on the strength of this Dr Wekerle advised the crown to entrust to him the formation of a govern- ment. The position thus created raised a twofold question: Would the crown accept? In that event, would he be able to carry his party with him in support of his modified programme? The answer to the first question, in effect, depended on that given by events to the second; and this was not long in declaring itself. The plan, concerted by Kossuth and Apponyi, with the approval of Baron Aehrenthal, was to carry on a modified coalition government with the aid of the Andrassy Liberals, the National party, the Clerical People's party 2 and the Independence party, on a basis of suffrage reform with plural franchise, the

2 The People's party first emerged during the elections of 1896, when it contested 98 seats. Its object was to resist the anti-clerical tendencies of the Liberals, and for this purpose it appealed to the " nationalities " against the dominant Magyar parties, the due enforcement of the Law of Equal Rights of Nationalities (1868) forming a main item of its programme. Its leader, Count Zichy, in a speech of Jan. I, 1897, declared it to be neither national, nor Liberal, nor Christian to oppress the nationalities. See Seton- Watson, p. 185.

prolongation of the charter of the joint bank, and certain con- cessions to Magyar demands in the matter of the army. It was soon clear, however, that in this Kossuth would not carry his party with him. A trial of strength took place between him and Mr de Justh, the champion of the extreme demands in the matter of Hungarian financial and economic autonomy; on the 7th of November rival banquets were held, one at Mako, Justh's constituency, over which he presided, one at Budapest with Kossuth in the chair; the attendance at each foreshadowed the outcome of the general meeting of the party held at Budapest on the nth, when Kossuth found himself in a minority of 46. The Independence party was now split into two groups: the " Independence and 1848 party," and the " Independence, 1848 and Kossuth party."

On the r2th Mr de Justh resigned the presidency of the Lower House and sought re-election, so as to test the relative strength of parties. He was defeated by a combination of the Kossuthists, Andrassy Liberals and

Clerical People's party, the 30 Croatian deputies, whose vote might have turned the election, abstaining on Dr Wekerle promising them to deliver Croatia from the oppressive rule of the ban, Baron Rauch. A majority was thus secured for the Kossuthist programme of compromise, but a majority so obviously precarious that the king-emperor, in- fluenced also — it was rumoured — by the views of the heir- apparent, in an interview with Count Andrassy and Mr Kossuth on the 15th, refused to make any concessions to the Magyar national demands. Hereupon Kossuth publicly declared (Nov. 22) to a deputation of his constituents from Czegled that he himself was in favour of an independent bank, but that the king opposed it, and that in the event of no concessions being made he would join the opposition.

How desperate the situation had now become was shown by the fact that on the 27th the king sent for Count Tisza, on the recommendation of the very Coalition ministry which had been formed io overthrow him. This also proved abortive, and affairs rapidly tended to revert to the ex-lex situation. On the 23rd of December Dr Lukacs was again sent for. On the previous day the Hungarian parliament had adopted a proposal in favour of an address to the crown asking for a separate state bank. Against this Dr Wekerle had protested, as opposed to general Hungarian opinion and ruinous to the national credit, pointing out that whenever it was a question of raising a loan, the mainten- ance of the financial community between Hungary and Austria was always postulated as a preliminary condition. Point was given to this argument by the fact that the premier had just concluded the preliminaries for the negotiation of a loan of £20,000,000 in France, and that the money — which could not be raised in the Austrian market, already glutted with Hungarian securities — was urgently needed to pay for the Hungarian share in the expenses of the annexation policy, for public works (notably the new railway scheme), and for the redemption in 1910 of treasury bonds. It was hoped that, in the circumstances, Dr Lukacs, a financier of experience, might be able to come to terms with Mr de Justh, on the basis of dropping the bank question for the time, or, failing that, to patch together out of the rival parties some sort of a working majority.

On the 28th the Hungarian parliament adjourned sine die, pending the settlement of the crisis, without having voted the estimates for 1010, and without there being any prospect of a meeting of the delegations. On the two following days Dr Lukacs and Mr de Justh had audiences of the king, but without result; and on the 31st Hungary once more entered on a period of extra-constitutional government.

After much negotiation a new cabinet was finally constituted on the 17th of January 1910. At its head was Count Khuen Khuen Hedervary, who in addition to the premiership, was Hedirvkry minister of the interior, minister

for Croatia, and Oovera- minister in waiting on the crown. Other ministers meat. were ˆ r K£ ro] v je Hieronymi (commerce), Dr Lukacs

(finance), Ferencz de Szekely (justice, education, public worship), Beta Serenyi (agriculture) and General Hazay (national defence). The two main items in the published programme of the new

government were the introduction of universal suffrage and — even more revolutionary from the Magyar point of view — the substitution of state-appointed for elected officials in the counties. The real programme was to secure, by hook or by crook, a majority at the polls. Meanwhile, the immediate necessities of the government were provided for by the issue through Messrs Rothschild of £2,000,000 fresh treasury bills. These were to be redeemed in December 1910, together with the £9,000,000 worth issued in 1909, out of the £20,000,000 loan agreed on in principle with the French government; but in view of the opposition in Paris to the idea of advancing money to a member of the Triple Alliance, it was doubtful whether the loan would ever be floated. The overwhelming victory of the government in June at the polls produced a lull in a crisis which at the beginning of the year had threatened the stability of the Dual Monarchy and the peace of Europe; but, in view of the methods by which the victory had been won, not the most sanguine could assert that the crisis was overpassed. Its deep underlying causes can only be understood in the light of the whole of Hungarian history. It is easy to denounce the dominant Magyar classes as a selfish oligarchy, and to criticize the methods by which they have sought to maintain their power. But a nation that for a thousand years had maintained its in- dividuality in the midst of hostile and rival races could not be expected to allow itself without a struggle to be sacrificed to the force of mere numbers, and the less so if it were justified in its. claim that it stood for a higher ideal of culture and civilization. The Magyars had certainly done much to justify their claim to a special measure of enlightenment. In their efforts to establish Hungarian independence on the firm basis of national efficiency they had succeeded in changing their country from one of very backward economic conditions into one which promised to be in a position to hold its own on equal terms with any in the world. (W. A. P.) ‘

Bibliography. — (a) Sources. The earliest important collection of sources of Hungarian history was Johann Georg Schrandtner’s Scriptores rerum Hungaricarum (4th ed., Vienna, 1766-1768). The Codex diplomaticus of Gyorgy Fejer (40 vols., Buda, 1829-1844), though full of errors, remains an inexhaustible storehouse of materials. In 1849 Stephen Ladislaus Endlicher (1804-1849), better known as a botanist than as a historian, published a collection of documents, Rerum hungaricarum monumenta Arpadiana. This was followed by Gustav Wenzel’s Codex diplomaticus

arpadianus continuens (12 vols., Pest, 1857) and A. Theiner's Vet. monumenta hist. Hungariam sacram illustrantia (2 vols., Rome, 1859, &c). Later collections are Documents of the Angevin Period, ed. by G. Wenzel and Imre Nagy (8 vols., ib. 1874-1876); Diplomatic Records of the Time of King Matthias (Mag. and Lat.), ed. by Ivan Nagy {ib. 1875-1878); National Documents (Mag. and Lat.), ed. by Parkas Deak and others (Pest, 1878-1891); Monumenta Vaticana historiam regni Hungariae illustrantia (8 vols., Budapest, 1885- 1891), a valuable collection of materials from the Vatican archives, edited under the auspices of the Hungarian bishops; Principal Sources for the Magyar Conquest (Mag.), by Gyula Pauler and Sandor Szilagyi (ib. 1900). Numerous documents have also been issued in the various publications of the Hungarian Academy and the Hun- garian Historical Society. Of these the most important is the Monumenta Hungariae Historica, published by the Academy. This falls into three main groups : Diplomata (30 vols.) ; Scriptores (40 vols.) ; Monumenta Comitialia (records of the Hungarian and Transylvanian diets, 12 vols, and 21 vols.). With these are as- sociated the Turkish- Hungarian Records (9 vols.), Turkish Historians (2 vols, pubd.), and the Archives of the Hungarian subordinate countries (2 vols. pubd.).

On the sources see Hendrik Marczali, Ungarns Geschichtsquellen im Zeitalter des Arpdden (Berlin, 1882); Kaindl, Studien zu den ungarischen Geschichtsquellen (Vienna, 1894-1902); and, for a general appreciation, Mangold, Pragmatic History of the Hungarians (in Mag,, 5th ed., Budapest, 1907).

(b) Works: The modern literature of Hungary is very rich in historical monographs, of which a long list will be found in the Subject Index of the London Library. Here it is only possible to give some of the more important general histories, together with such special works as are most readily accessible to English readers. Of the earlier Hungarian historians two are still of some value: Katona, Hist, critica regum Hungariae (42 vols., Pest, 1779-1810), and Pray, Annates regum Hungariae (5 vois., Vienna, 1764-1770). Of modern histories written in Magyar the most imposing is the History of the Hungarian Nation (10 vols., Budapest, 1898), issued to commemorate the celebration of the millennium of the foundation of the monarchy, by Sandor Szilagyi and numerous collaborators. Of importance, too,

is Ignacz Acsady's History of the Magyar Empire (2 vols., Budapest,

1904), though its author is too often ultra-chauvinistic in tone.

To those who do not read Magyar the following books on the general history of Hungary may be recommended: Armfn Vambery, Hungary in Ancient and, Modem Times (London, 1897); R. Chelard' LaHongriemillenaire (Paris, 1896) ; Mor Gelleri, Ausder Vergangen- heit und Gegenwart des tausendjdhrigen Ungarn (Budapest, 1896); Jozsef Jekelfalussy, The Millennium of Hungary (Budapest, 1897); E. Sayous, Histoire generate des Hongrois (2 vols., Budapest, 1st ed., 1876, 2nd ed., ib. 1900); Janos Majlath, Geschichte der Magyaren 5 vols., 3rd ed., Regensburg, 1 852-1 853)— somewhat out of date (it first appeared in 1828), but useful for those who like a little more detail; Count Julius Andrassy, The Development of Hungarian Constitutional Liberty, translated by C. Arthur and Bona Ginever (London, 1908), containing an interesting comparison with English constitutional development; C. M. Knatchbull-Hugessen, The Political Evolution of the Hungarian Nation (2 vols., London, 1908) strongly Magyar in sympathy; R. W. Seton- Watson (Scotus Viator), Racial Problems in Hungary (London, 1908), a strong criticism of the Magyar attitude towards the Slav subject races, especially the Slovaks, with documents and a full bibliography.

(c) Constitutional: Anton von Virozsil, Das Staatsrecht des Konigreichs Ungarn (3 vols., Pest, 1865); S. Rado-Rothfeld, Die ungansche Verfassung (Berlin, 1898) and, based on this, A. de Bertha, La Constitution Hongroise (Paris, 1898), both supporting the policy of Magyarization ; Akos von Timon, Ungansche Ver- fassungs- und Rechisgeschichte (Berlin, 1904) ; Knatchbull-Hugessen, op. cit.

(d) Biographical: In Magyar, the great serial entitled Hungarian Historical Biographies (Budapest, 1884, &c), edited by Sandor Szilagyi, is a collection of lives of famous Hungarian men and women from the earliest times by many scholars of' note, finely illus- trated.

For works on special periods see the separate articles on the sovereigns and other notabilities of Hungary. For works on the Compromise of 1867 and the relations of Austria and Hungary generally, see the bibliography to the article Austria-Hungary.

III. Language

The Magyar or Hungarian language belongs to the northern or. Finno-Ugric (q.v.) division of the Ural-Altaic family, and forms, along with Ostiak and Vogul, the Ugric branch of that division. The affinity existing between the Magyar and the Finnic languages, first noticed by John Amos Comenius (Komensky) in the middle of the 17th century, 1 and later by Olav

Rudbeck, 2 Leibnitz, 3 Strahlenberg, 4 Eccard, Sajnovics, 5 and others, was proved " grammatically " by Samuel Gyarmath'i in his work entitled Affinitas linguae Hungaricae cum Unguis Finnicae originis grammatice demonstrata (Gottingen, 1799). The Uralian travels of Anthony Reguly (1843-1845), and the philological labours of Paul Hunfalvy and Joseph Budenz, may be said to have established it, and no doubt has been thrown on it by recent research, though most authorities regard the Magyars as of mixed origin physically and combining Turkish with Finno-Ugric elements.

Although for nearly a thousand years established in Europe and subjected to Aryan influences, the Magyar has yet retained its essential Ural-Altaic or Turanian features. The grammatical forms are expressed, as in Turkish, by means of affixes modulated according tc the high or low vowel power of the root or chief syllables of the word to f which they are appended — the former being represented by e, 6, 0, u, ii, the latter by a, a, 0, 6, u, u\ the sounds e, i, i are regarded as neutral. In some respects the value of the consonants varies from that usual in the Latin alphabet. S is pronounced as sh in English, the sound of simple s being represented bv sz. C or cz is pronounced as English ts\ cs as English ch; ds as English j; zs as French j ; gy as dy. Among the striking peculiarities of the language arc the definite and indefinite forms of the active verb, e.g. Idtom, " I see " (definite, viz. " him," " her," " the man," &c), latok, " I see " (indefinite) ; the insertion of the causative, frequentative, diminutive and potential syllables after the root of the verb, e.g. ver, "he beats"; veret, "he causes to beat"; vereget, "he beats re- peatedly"; verint, "he beats a little"; verhet, "he can beat"; the mode of expressing possession by the tenses of the irregular verb lenni, " to be " (viz. van, " is "; vannak, " are "; volt, " was"; lesz,

'Sec Hunfalvy 's "Die ungarische Sprachwissenschaft," Litera- rische Berichte aus Ungarn, pp. 80-87 (Budapest, 1877).

2 Specimen usus linguae Gothicae in eruendis atque illustrandis obscurissimis quibusdam Sacrae Scripturae locis; addita analogia linguae Gothicae cum Sinica, necnon Finnicae cum Ungarica (Upsala 1/I7)-

*3 Hunfalvy, p. 81. * Id. pp. 82-86.*

s Demonstrate Idioma Ungarorum et Lapponum idem esse (Copen- hagen und Tyrnau, 1770).

[LANGUAGE AND

" will be," &c), with the object and its possessive affixes, e.g. nekem vannak konyveim, literally, "to me are books — my" = "I have books"; neki volt kbnyve, "to him was book — his'" = "he had a book." Other characteristic features are the use of the singular substantive after numerals, and adjectives of quantity, e.g. kit ember, literally, " two man "; sok szo,

" many word," &c; the position of the Christian name and title after the family name, e.g. Olmosy Kdroly tandr ur, " Mr Professor Charles Olmosy " ; and the possessive forms of the nouns, which are varied according to the number and person of the possessor and the number of the object in the following way tollam, "my pen"; tollaim, "my pens"; tollad, "thy pen"; tollaid, "thy pens"; tollunk, "our pen"; tollaink, "our pens/'^&c. ^There is no gender, not even a distinction between " he," " she," and " it," in the personal pronouns, and the declension is less developed than in Finnish. But there is a wealth of verbal derivatives, the vocabulary is copious, and the intonation harmoni- ous. Logical in its derivatives and in its grammatical structure, the Magyar language is, moreover, copious in idiomatic expressions, rich in its store of words, and almost musical in its harmonious intonation. It is, therefore, admirably adapted for both literary and rhetorical purposes.

The first Hungarian grammar known is the Grammatica Hungaro- Latina of John Erdosi alias Sylvester Pannonius, printed at Sarvar- Ujsziget in 1539. Others are the posthumous treatises of Nicholas Revai (Pest, 1809); the Magyar nyelvmester of Samuel Gyarmathi, published at Klausenburg in 1794; and grammars by J. Farkas (9th ed., Vienna, 1816), Mailath (2nd ed., Pest, 1832), Kis (Vienna, 1834), Marton (8th ed., Vienna, 1836), Maurice Ballagi or (in German) Bloch (5th ed., Pest, 1869), Tdpler (Pest, 1854), Riedl (Vienna, 1858), Schuster (Pest, 1866), Charles Ballagi (Pest, 1868), Remele (Pest and Vienna, 1869), Roder (Budapest, 1875), Fuhrer (Budapest, 1878), Ney (20th ed., Budapest, 1879), C. E. de Ujfalvy (Paris, 1876), S. Wekey (London, 1852), j. Csink (London, 1853), Ballantik (Budapest, i88i)_; Singer (London, 1882).

The earliest lexicon is that of Gabriel (Mizser) Pesti alias Pestinus Pannonius, Nomenclatura sex linguarum, Latinae, Italicae, Gallicae, Bohemicae, Ungaricae et Germanicae (Vienna, 1538), which was several times reprinted. The Vocabula Hungarica of Bernardino Baldi (1583), the original MS. of which is in the Biblioteca Nazionale at Naples, contains 2899 Hungarian words with renderings in Latin or Italian. 6 In the Dictionarium undecim linguarum of Calepinus (Basel, 1590) are found also Polish, Hungarian and English words and phrases. This work continued to be reissued until 1682. The Lexicon Latina-Hungaricum of Albert Molnar first appeared at Nuremberg in 1604, and with the addition of Greek was reprinted till 1708. Of modern Hungarian dictionaries the best is that of the Academy of Sciences, containing 110,784 articles in 6 vols., by Czuczor and Fogarasi (Pest, 1 862-1 874). The next best native dictionary is that of Maurice Ballagi, A Magyar nyelv teljes szotdra, (Pest, 1 868-1 873). In addition to the above may be mentioned the work of Kresznerics, where the words are arranged according to the roots (Buda, 1831-1832); the Etymologisches Wbrterbuch . . . aus chinesischen Wurzeln, of Podhorszky (Paris, 1877); Lexicon linguae Hungaricae aevi

antiquioris, by Szarvas Gabor and Simonyi Zsig- mond (1889) ; and " Magyar-Ugor osszehasonlito szotar " Hungarian Ugrian Comparative Dictionary, by Bydenz (Budapest, 1872-1879). Other and more general dictionaries for German scholars are those of Marton, Lexicon trilingue Latino-Hungarico-Germanicum (Vienna, 1818-1823), A. F. Richter (Vienna, 1836), E. Farkas (Pest, 1848- 1851), Fogarasi (4th ed., Pest, i860), Loos (Pest, 1869) and M. Ballagi (Budapest, 3rd ed., 1872-1874). There are, moreover, Hungarian- French dictionaries by Kiss and Karady (Pest and Leipzig, 1844- 1848) and Babos and Mole (Pest, 1865), and English-Hungarian dictionaries by Dallos (Pest, i860) and Bizonfy (Budapest, 1886).

(C. El.) IV . Literature

The Catholic ecclesiastics who settled in Hungary during the nth century, and who found their way into the chief offices of the state, were mainly instrumental in establishing Latin as the predominant language of the court, the higher schools and public worship, and of eventually introducing it into the admini- stration. Having thus become the tongue of the educated and privileged classes, Latin continued to monopolize the chief fields of literature until the revival of the native language at the close of the 18th century.

Amongst the earliest Latin works that claim attention are the " Chronicle " (Gesta Hungarorum), by the " anonymous notary " of King Bfila, probably B61a II. (see Podhradczky, 7 Beta kirdly nevtelen jegyzoje, Buda, 1861, p. 48), which describes the early ages of

6 See Count G6za Kuun's " Lettere Ungheresi," La Rivista Europea, anno vi., vol. ii. fasc. 3, pp. 561-562 (Florence, 1875).

7 So also Jambor {A Magyar Irod. Tort., Pest, 1864, p. 104). Kornyei, Imre and others incline to the belief that it was B6Ia I. and that consequently the " anonymous notary " belongs rather to the nth than to the 12th century.

Early Latin chronicles.

Magyar literature. Earliest relics.

Arpadlaa period,

1000- 1301.

Hungarian history, and may be assigned to the middle of the 12th century; the Carmen Miserabile of Rogerius; the Liber Cronicorum of Simon Kezai, belonging to the end of the 13th century, the so-called ” Chronicon Budense,” Cronica Hungarorum, printed at Buda in 1473 (Eichhorn, Geschichte der Litteratur, ii. 319); and the Chronicon Rerum Hungaricarum of John Thuroczi. 1 An extraordinary stimulus was given to literary enterprise by King Matthias Corvinus, who attracted both foreign and native scholars to his court. Foremost amongst the Italians was Antonio Bonfini, whose work, Rerum Hungaricarum Decades IV., comprising Hungarian history from the earliest times to the death of King Matthias, was published with a continuation by Sambucus (Basel, 1568). 2 Marzio Galeotti, the king’s chief librarian, wrote an historical account of his reign. The most distinguished of the native scholars was John Cesinge, alias Janus Pannonius, who composed Latin epigrams, panegyrics and epic poems. The best edition of his works was published by Count S. Teleki at Utrecht in

1784.

As there are no traces of literary productions in the native or Magyar dialect before the 12th century, the early condition of the language is concealed from the philologist. It is, however, known that the Hungarians had their own martial songs, and that their princes kept lyre and lute players who sang festal odes in praise of the national heroes. In the nth century Christian teachers intro- duced the use of the Roman letters, but the employment of the Latin language was not formally decreed until 11 14 (see Bowring, Poetry of the Magyars, Introd. xix.). It appears, moreover, that up to that date public business was transacted in Hungarian, for the decrees of King Coloman the Learned (1 095-1 1 1 4) were translated from that language into Latin. Among the literary relics of the 12th century are the ” Latiatuc ” or Halotli Beszed funeral discourse and prayer in Hungarian, to which Dobrentei in his Regi Magyar Nyelvemlekek assigns as a probable date the year 1171 (others, however, n 82 or 1 183). From the Margit-Legenda, or “Legend of St Margaret,” composed in the early part of the 14th century, 3 it is evident that from time to time the native language continued to be employed as a means of religious edification. Under the kings of the house of Anjou, the Magyar became the language of the court. ,4n/ou- That it was used also in official documents and ordinances 1 ™° is shown by copies of formularies of oaths, the import of MOl- which proves beyond a doubt that the originals belonged

.,,j to the reigns of Louis I. and Sigismond ; by a statute of the

town of Sajo-St-Peter (1403) relating to the wine trade; by the testament of Kazzai-Karacson (1413); and, by other relics of this period published by Dobrentei in vol. ii. of the R. M. Nyelvem- lekek. To the early part of the 15th century may be assigned also the legends of " St Francis "and of " St Ursula," and possibly the original of the Enek Pannonia megvelelerol, an historical " Song about the Conquest of Pannonia." But not until the dawn of the Reformation did Magyar begin in any sense to replace Latin for literary purposes. The period placed by Hungarian authors between 1437 and 1530 marks the first development of Magyar literature.

About the year 1437 two Hussite monks named Tamas and Balint {i.e. Thomas and Valentine) adapted from older sources a large portion of the Bible for the use of the Hungarian refugees in Moldavia. To these monks the first extant Magyar version of part of the Scriptures (the Vienna or Revai Codex 4) is directly assigned by Dobrentei, but the exact date either of this copy or of the original transla- tion cannot be ascertained. With approximate certainty may be ascribed also to Tamas and Balint the original of the still extant transcript, by George Nemeti, of the Four Gospels, the Jdszay or Munich Codex (finished at Tatros Moldavia in 1466). Amongst other important codices are the

Jagellb-

Matthias

orpre-

*Reforma**

tlon

period

(1437-

1530).

17th

century

period

{1606-

1711).

in

Jorddnszky Codex (1516-1519), an incomplete copy of the translation of the Bible made by Ladislaus Batori, who died about 1456; and the Dobrentei or Gyulafehervdr Codex (1508), containing a version of the Psalter, Song of Solomon, and the liturgical epistles and gospels, copied by Bartholomew Halabori from an earlier translation (Kornyei, A Magyar nemzeti irodalomtortenet vdzlata, 1861, p. 30). Other relics belonging to this period are the oath which John Hunyady took when elected governor of Hungary (1446); a few verses sung by the children of Pest at the coronation of his son Matthias (1458) ;

1 An example of this work, printed on vellum in Gothic letter (Augsburg, 1488), and formerly belonging to the library of Matthias Corvinus, king of Hungary, may be seen in the British Museum. Of the three first-mentioned chronicles Hungarian translations by Charles Szabo appeared at Budapest in i860, 1861 and 1862.

2 Both this and the later editions of Frankfort (1581), Cologne (1690) and Pressburg (1744) are represented in the British Museum.

3 The only copy existing at the present time appears to have been transcribed at the beginning of the 16th century. Both this and the Halotti Beszed (Pray Codex) are preserved in the National Museum at Budapest.

4 This codex contains Ruth, the lesser prophets, and part of the Apocrypha. According to Toldy, it is copied from an earlier one of the 14th century.

the Siralomenek Both Jdnos veszedelmen (Elegy upon John Both), written by a certain " Gregori," as the initial letters of the verses show, and during the reign of the above-mentioned monarch ; and the Emlekdal Mdtyds kirdly haldldra (Memorial Song on the Death of King Matthias, 1490). To these may be added the rhapsody 5 on the taking of " Szabacs " (1476); the Katalin-Legenda, a metrical " Legend of St Catherine of Alexandria," extending to over 4000 lines: and the Feddoenek (Upbraiding Song), by Francis Apathi.

*In the next literary period (1530-1606) several translations of the Scriptures are recorded. Among these there are — versions of the Epistles of St Paul, by Benedict Komjati (Cracow, 1533); of the Four Gospels, by Gabriel (Mizser) Pesti * eiorma- Vienna, 1536); of the New Testament, by John Erdosi ,,-„ (Ujsziget, 1541; 2nd ed., Vienna, 1574 .«), and by Thomas \^\ Felegyhazi (1586); and the translations of the Bible, by Caspar Heltai (Klausenburg, 1551-1565), and by Caspar Karoli (Vizsoly,*

near Goncz, 1589-1590). The last, considered the best, was corrected and re-edited by Albert Molnar at Hanau in 1608. 7 Heltai published also (1571) a translation, improved from that by Blasius Veres (1565), of the Triparlitum of Verboczy, and Chronika (1575) adapted from the Decades of Bonfini. Karadi in 1569 brought to light the earliest national drama, Balassi Menyhert. Among the native poets, mostly mere rhyming chroniclers of the 16th century, were Csanadi, Tinodi, Nagy-Baczai, Bogati, Ilosvay, Istvanfi, Gorgei, Temesvan and Valkai. Of these the best and most prolific writer was Tin6di. Szekely wrote in prose, with verse introduction, a "Chronicle of the World " under the title of Cronica ez vildgnac yeles dolgairdl (Cracow, 1559). Csaktornya and Kakony imitated the ancient classical poets, and Erdosi introduced the hexameter. Andrew Farkas and thj homilist Peter Melius (Juhasz) attempted didactic verse; and Batizi busied himself with sacred song and Biblical history. During the latter part of the 16th century and the beginning of the 17th two pa its of a higher order appeared in Valentine Balassa, the earliest Magyar lyrical writer, and his con- temporary John Rimay, whose poems are of a contemplative and pleasing character.

The melancholy state of the country consequent upon the perse- cutions of Rudolph I., Ferdinand II. and Leopold I., as also the continual encroachment of Germanize ˆg influences under the Habsburgs, were unfavourable to the development of the national literature during the next literary period, dating froni the Peace of Vienna (1606) to that of Szatmar (171 1). A few names were, however, distinguished in theology, philology and poetry. In 1626 a Hungarian version of the Vulgate was published at Vienna by the Jesuit George Kaldi, 8 and another complete translation of the Scriptures, the so-called Komdromi Biblia (Komorn Bible) was made in 1685 by the Protestant George Csipkes, though it was not published till 1717 at Leiden, twenty-nine years after his death. 9 On behalf of the Catholics the Jesuit Peter Pazman, eventually primate, Nicholas Eszterhazy, Sambar, Balasfi and others were the authors of various works of a polemical nature. Especially famous was the Hodaegus, kalauz of Pazman, which first appeared at Pozsony (Pressburg) in 1613. Among the Protestants who exerted themselves in theological and controversial writings were Nemeti, Alvinczy, Alexander Felvinczy, Martonfalvi and Melotai, who was attached to the court of Bethlen Gabor. Telkibanyai wrote on "English Puritanism" (1654). The Calvinist Albert Molnar, already mentioned, was more remarkable for his philological than for his theological labours. Parispapai compiled an Hungarian-Latin Dictionary, Dictionarium magyar es dedk nyelven (Locse, 1708), and Apaczai-Csere, a Magyar Encyclopaedia (Utrecht, 1653). John Szalardi, Paul Lisznyai, Gregory Petho, John Kemeny and Benjamin Szilagyi, which last, however, wrote in Latin, were the authors of various historical works. In polite

literature the heroic poem Zrinyidsz (1651), descriptive of the fall of Sziget, by Nicholas Zrinyi, grandson of the defender of that fortress, marks a new era in Hungarian poetry. Of a far inferior character was the monotonous Mohdcsi veszedelem (Disaster of Mohacs),in 13 cantos, produced two years afterwards at Vienna by Baron Liszti. The lyric and epic poems of Stephen Gyongyosi, who sang the deeds of Maria Szechy, the heroine of Murany, Murdnyi Venus (Kassa, 1664), are samples rather of a general improvement in the style than of the purity of the language. As a didactic and elegiac poet Stephen Kohari is much esteemed. More fluent but not less gloomy are the sacred lyrics of Nyeki-Veres first published in 1636 under the Latin title of Tintinnabulum Tripudiantium. The songs and proverbs of Peter Beniczky, who lived in the early part of the 17th century, are not without merit, and have been several times reprinted. From the appearance of the first extant printed Magyar

5 First made known by Coloman Thaly (1871) from a discovery by MM. E. Nagy and D. Veghelyi in the archives of the Csicsery family, in the county of Ung.

One of the only seven perfect copies extant of the Vienna (1574) edition is in the British Museum library.

7 A copy, with the autograph of the editor, is in the British Museum.

8 A copy is in the British Museum library.

9 There are two copies of this edition in the British Museum library.

Period of decline

(1711- 1772).

Regenera- tion of the literature {1772-

1807).

poetry, school,

work ‘ at Cracow in 153 1 to the end of the period just treated, more than 1800 publications in the native language are known. 2

The period comprised between the peace of Szatmar (1711) and the year 1772 is far more barren in literary results than even that which preceded it. The exhaustion of the nation from its protracted civil and foreign wars, the extinction of the court of the Transylvanian princes where the native language had been cherished, and the prevalent use of Latin in the schools, public transactions and county courts, all combined to bring about a complete neglect of the Magyar language and literature. Among the few prose writers of distinction were Andrew Spangar, whose " Hungarian Bookstore," Magyar Konyvtdr (Kassa, 1738), is said to be the earliest work of the kind in the Magyar dialect; George Baranyi, who translated the New Testa- ment (Lauba, 1754); the historians Michael Cserei and Matthew Bel, which last, however, wrote chiefly in Latin; and Peter Bod, who besides his theological treatises compiled a history of Hungarian literature under the title Magyar Attends (Szeben, 1766). But the most celebrated writer of this period was the Jesuit Francis Faludi, the translator, through the Italian, of William Darrell's works. On account of the classic purity of his style in prose, Faludi was known as the " Magyar Cicero." Not only as a philosophic and didactic writer, but also as a lyric and dramatic poet he surpassed all his con- temporaries. Another pleasing lyric poet of this period was Ladislaus Amade, the naturalness and genuine sentiment of whose lightly running verses are suggestive of the love songs of Italian authors. Of considerable merit are also the sacred lyrical melodies of Paul Radai in his Lelki hodolds (Spiritual Homage), published at Debreczen in 1 71 5. Among the didactic poets may be mentioned Lewis Nagy, George Kalmar, John Illey and Paul Bertalanfi, especially noted for his rhymed " Life of St Stephen, first Hungarian king," Dicsbsiges Sz. Istvdn elsb magyar kirdlynak ilete (Vienna, 1751).

The next three literary periods stand in special relationship to one another, and are sometimes regarded as the same. The first two, marking respectively the progress of the " Regeneration of the Native Literature " (1772-1807) and the " Revival of the Language " (1807-1830), were introductory to and preparatory for the third or "Academy," period, which began about 1830.

In consequence of the general neglect of the Magyar language during the reigns of Maria Theresa and her successor Joseph II., the more important prose productions of the latter part of the 1 8th century, as for instance the historical works of George Pray, Stephen Katona, John Engel and Ignatius Fessler, were written either in Latin or in German. The reaction in favour of the native literature manifested itself at first chiefly in the creation of various schools of Foremost among these stood the so-called " French " founded by George Bessenyei, the author of several dramatic pieces, and of an imitation of Pope's " Essay on Man," under the title of Az embernek probdja (Vienna, 1772). Bes- senyei introduced the use of rhymed

alexandrines in place of the monotonous Zrinian measure. Other writers of the same school were Laurence Orczy and Abraham Barcsay, whose works have a striking resemblance to each other, and were published together by Revai (1789). The songs and elegies of the short-lived Paul Anyos, edited by Bacsanyi in 1798, show great depth of feeling. Versifiers and adapters from the French appeared also in Counts Adam and Joseph Teleki, Alexander Baroczi and Joseph Peczeli, known also as the translator of Young's " Night Thoughts." The chief repre- sentatives of the strictly " classical " school, which adopted the ancient Greek and Latin authors as its models, were David Baroti Szabo, Nicholas Revai, Joseph Rajnis and Benedict Virag. Among the most noteworthy works of Baroti are the Uj mertekre vett kulbmb versek (Kassa, 1777), comprising hexameter verses, Horatian odes, distichs, epistles and epigrams; the Paraszti Majorsdg (Kassa, 1 779-1 780), an hexameter version of Vaniere's Praedium rusticum; and an abridged version of "Paradise Lost," contained in the Kbltemenyes munkaji (Komarom, 1802). Baroti, moreover, published (1810-1813) a translation of Virgil's Aeneid and Eclogues. Of Baroti's purely linguistic works the best known are his Orto- graphia es Prosodia (Komarom, 1800) ; and the Kisded Szotdr (Kassa, 1784 and 1792) or " Small Lexicon " of rare Hungarian words. As a philologist Baroti was far surpassed by Nicholas Revai, but as a poet he may be considered superior to Rajnis, translator of Virgil's Bucolics and Georgics, and author of the Magyar Helikonra vezeto kalauz (Guide to the Magyar Helicon, 1781). The " classical " school reached its highest state of culture under Virag, whose poetical works, consisting chiefly of Horatian odes and epistles, on account of the perfection of their style, obtained for him the name of the " Magyar Horace." The Poetai Munkai (Poetical Works) of Virag were published at Pest in 1799, and again in 1822. Of his prose works the most important is the Magyar Szdzadok or " Pragmatic History of Hungary " (Buda, 1808 and 1816). Valyi-Nagy, the first Magyar

1 The earliest, styled " Song on the Discovery of the right hand of the Holy King Stephen," and printed at Nuremberg by Anton Koburger in 1484, is lost.

2 See Chas. Szabo's Regi Magyar Konyvtdr (Budapest, 1879). Cf. also Lit. Ber. aus Vngarn for 1879, Bd. iii. Heft 2, pp. 433-434.

translator of Homer, belongs rather to the " popular " than the " classical " school. His translation of the Iliad appeared at Sarospatak in 1 82 1. The establishment of the " national " or " popular " school is attributable chiefly to Andrew Dugonics, though his earliest works, Troja veszedelme (1774) and Ulysses (1780), indicate a classical bias. His national romances, however, and especially Etelka (Pozsony, 1787) and Az arany pereczek (Pest and Pozsony, 1790), attracted! public attention, and were

soon adapted for the stage. The most valuable of his productions is his collection of " Hungarian Proverbs and Famous Sayings," which appeared in 1820 at Szeged, under the title of Magyar peldabeszedek es jeles monddsok. The most noteworthy follower of Dugonics was Adam Horvath, author of the epic poems Hunnidsz (Gyor, 1787) and Rudolphidsz (Vienna, 1817). Joseph Gvadanyi's tripartite work Falusi notdrius (Village Notary), published between 1790 and 1796, as also his Ronto Pal es gr. Benyowsky torteneteik (Adventures of Paul Ronto and Count Benyowski), are humorous and readable, but careless in style. As writers of didactic poetry may be mentioned John Endrody, Caspar Gobol, Joseph Takacs and Barbara Molnar, the earliest distinguished Magyar poetess.

Of a more general character, and combining the merits of the above schools, are the works of the authors who constituted the so- called " Debreczen Class," which boasts the names of the naturalist and philologist John Foldi, compiler of a considerable part of the Debreczeni magyar grammatical Michael Fazekas, author of Ludas Matyi (Vienna, 1817), an epic poem, in 4 cantos; and Joseph Kovacs. Other precursors of the modern school were the poet and philologist Francis Verseghy, whose works extend to nearly forty volumes; the gifted didactic prose writer, Joseph Karman; the metrical rhymster, Gideon Raday; the lyric poets, Ssentjobi Szabo, Janos Bacsanyi (q.v.), and the short-lived Gabriel Dayka, whose posthumous " Verses " were published in 1813 by Kazinczy. Still more celebrated were Mihaly Csokonai (q.v.) and Alexander Kisfaludy (q.v.). The first volume of Alexander Kisfaludy's Himfy, a series of short lyrics of a descriptive and reflective nature, appeared at Buda in 1801, under the title of Kesergo szerelem (Unhappy Love), and was received with great enthusiasm ; nor was the success of the second volume Boldog szerelem (Happy Love), which appeared in 1807, inferior. The Regik, or " Tales of the Past," were published at Buda from 1807 to 1808, and still further increased Kisfaludy's fame; but in his dramatic works he was not equally successful. Journalistic literature in the native language begins with the Magyar Hirmondo (Harbinger) started by Matthias Rath at Pozsony in 1780. Among the magazines the most important was the Magyar Muzeum, established at Kassa (Kaschau) in 1788 by Baroti, Kazinczy and Bacsanyi. The Orpheus (1790) was the special work of Kazinczy, and the Urania (1794) of Karman and of Pajor.

Closely connected with the preceding period is that of the " Re- vival of the Language " (1807-1830), with which the name of Francis Kazinczy (q.v.) is especially associated. To him it was left to perfect that work of restoration begun by Baroti and amplified by Revai. Poetry and belles lettres still continued to occupy the chief place in the native literature, but under Kazinczy and his immediate followers Berzsenyi, Kolcsey, Fay and others, a correctness of style and ex- cellence of taste hitherto unknown

soon became apparent. Kazinczy, in his efforts to accommodate the national language to the demands of an improved civilization, availed himself of the treasures of European literature, but thereby incurred the opposition of those who were prejudiced by a too biased feeling ef nationality. The opinions of his enemies were ventilated in a lampoon styled Mondolat. Daniel Berzsenyi, whose odes are among the finest in the Hungarian language, was the correspondent of Kazinczy, and like him a victim of the attacks of the Mondolat. But the fervent patriotism, elevated style, and glowing diction of Berzsenyi soon caused him to be re- cognized as a truly national bard. A too frequent allusion to Greek mythological names is a defect sometimes observable in his writings. His collective works were published at Buda by Dobrentei in 1842. Those of John Kis, the friend of Berzsenyi, cover a wide range of subjects, and comprise, besides original poetry, many translations from the Greek, Latin, French, German and English, among which last may be mentioned renderings from Blair, Pope and Thomson, and notably his translation, published at Vienna in 1791, of Lowth's " Choice of Hercules." The style of Kis is unaffected and easy. As a sonnet writer none stands higher than Paul Szemere, known also for his rendering of Korner's drama Zrinyi (1818), and his contribu- tions to the Elet es Literalura (Life and Literature). The articles'of, Francis Kolcsey in the same periodical are among the_ finest speci- mens of Hungarian aesthetical criticism. The lyric poems of Kolcsey can hardly be surpassed, whilst his orations, and markedly the EmUk beszed Kazinczy felett (Commemorative Speech on Kazinczy), exhibit not only his own powers, but the singular ex- cellence of the Magyar language as an oratorical medium. Andrew Fay, sometimes styled the " Hungarian Aesop," is chiefly re- membered for his Eredeli Mesek (Original Fables). The dramatic works of Charles Kisfaludy, brother of Alexander, won him enthusi- astic recognition as a regenerator of the drama. His plays bear a distinctive national character, the subjects of most of them referring to the golden era of the country. His genuine simplicity as a lyrical writer is shown by the fact that several of his shorter pieces have

Revival of the language

11807- 1830).

LITERATURE]

HUNGARY

927

1830- 1880.

passed into popular song. As the earliest Magyarizer of Servian I folk-song, Miehael Vitkovics did valuable service. Not without interest to Englishmen is the name of Gabriel Dobrentei {qw.), the I translator oi Shakespeare's Macbeth, represented at Pozsony in 1825. An historical poem of a somewhat philosophical nature was produced in 18 14 by Andreas Horvath under the title of Zircz emlekezele (Reminiscence of Zircz); but his Arpdd, in 12 books, finished in 1830, and published at Pest in the following year, is a great national epic. Among other poets of this period were Alois Szentmiklossy, George Gaal, Emil Buczy, Joseph Szasz, Ladislaus Toth and Joseph Katona, author of the much-extolled historical drama Bank Ban. 1 Izidore Guzmics, the translator of Theocritus into Magyar hexameters, is chiefly noted for his prose writings on ecclesiastical and philosophical subjects. As authors of special works on philosophy, we find Samuel Koteles, John Imre, Joseph Ruszek, Daniel Ercsei and Paul Sarvari; as a theologian and Hebraist John Somossy; as an historian and philologist Stephen Horvath, who endeavoured to trace the Magyar descent from the earliest historic times; as writers on jurisprudence Alexander Koyy and Paul Szlemenics. For an account of the historian George Fejcr, the laborious compiler of the Codex Diplomaticus , see Fej£r.

The establishment of the Hungarian Academy of Sciences 2 (17th November 1830) marks the commencement of a new period, in the first eighteen years of which gigantic exertions were Academy mac j e as regards the literary and intellectual life of the period, nation. The language, nursed by the academy, developed rapidly, and showed its capacity for giving expression to almost every form cf scientific knowledge. 3 By offering rewards for the best original dramatic productions, the academy provided that the national theatre should not suffer from a lack of classical dramas. During the earlier part of its existence the Hungarian academy devoted itself mainly to the scientific develop- ment of the language and philological research. Since its reorganiza- tion in 1869 the academy has, however, paid equal attention to the various departments of history, archaeology, national economy and the physical sciences. The encouragement of polite literature was more especially the object of the Kisfaludy Society, founded in 1836. 4 Polite literature had received a great impulse in the preceding period (1807-1830), but after the formation of the academy and the Kisfaludy society it advanced with accelerated speed towards the point attained by other nations. Foremost among epic poets, though not equally successful as a dramatist, was Mihaly Voros- marty (q.v.), who, belonging also to the close of the last period, combines great power of imagination with elegance of language. Generally less varied and romantic, though easier in style, are the heroic poems Augsburgi illkozet (Battle of Augsburg) and Aradi eyiiles (Diet of Arad) of Gregory Czuczor, who was, moreover, very felicitous as an epigrammatist. Martin Debreczeni

was chiefly famed for his Kiovi csata (Battle of Kieff), published at Pest in 1854 after his death by Count Emeric Miko. The laborious John Garay in his Szent Ldszlo shows considerable ability as an epic poet, but his greatest merit was rather as a romancist and ballad writer, as shown by the/' Pen Sketches" or Tollrajzok (1845); and his legendary series Arpddok (1847). Joseph Bajza was a lyricist of a somewhat melancholy cast, but his Borenek (Wine Song) , Sohajtds (Sigh) , Hbreszto (Awakening) and Apotheosis are much admired. He is known further as the translator of F. C. Dahlmann's Geschichte der englischen

Revolution. As generally able writers of lyrical poetry during the earlier part of this period may be mentioned among others Francis Csaszar, Joseph Szekacs and Andrew Kunoss — also Lewis Szaka.1 and Alexander Vachott, whose songs and romances are of an artless and simple character, and the sacred lyricist Bela Tarkanyi. As an original but rather heavy lyric and didactic poet we may mention Peter Vajda, who was, moreover, the translator of Bulwer's " Night and Morning." Of a more distinctly national tendency are the lyrics of John Kriza 5 and John Erdelyi, but the reputation of the latter was more especially due to his collections of folk-lore made on behalf of the Kisfaludy society. More popular than any of the preceding, and well known in England through Sir John Bowring's translation, are the charming lyrics of Alexander Petdfi {q.v.), the " Burns " of Hungary. His poems, which embody the national genius, have passed into the very life of the people; particularly is he happy in the pieces descriptive of rural life. Among lyricists were: Coloman Toth, who is also the author of several epic and dramatic pieces; John Vajda, whose Kisebb Koltemenyek (Minor Poems), published by the Kisfaludy society in 1872, are partly written in the mode of Heine, and are of a pleasing but melancholy character; Joseph Levay, known also as the translator of Shake- speare's Titus Andronicus, Taming of the Shrew and Henry IV.; and Paul Gyulai, who, not only as a faultless lyric and epic poet, but as an impartial critical writer, is highly esteemed, and whose Romhdnyi is justly prized as one of the best Magyar poems that has appeared in modern times. To these may be added the names of Charles Berecz, Joseph Zalar, Samuel Nyilas, Joseph Vida, Lewis Tolnai, the sentimental Ladislaus Szelestey, and the talented painter Zoltan Balogh, whose romantic poem Alpdri was published in 1871 by the Kisfaludy society. The lyrics of Anthony Varady (1875, 1877) are somewhat dull and unequal in tone; both he and Baron Ivor Kaas, author of Az itelet napja (Day of Judgment, 1876), have shown skill rather in the art of dramatic verse. The poems of Count Geza Zichy and Victor Dalmady, those of the latter published at Budapest in 1876, are mostly written on subjects _of a domestic nature, but are conceived in a patriotic spirit. Emil Abranyi adopts a rather romantic style, but his Nagypentek (Good Friday) is an excellent descriptive sketch. Alexander

Endrody, author of Tiicsok dalok (Cricket Songs, 1876), is a glowing writer, with great power of conception, but his metaphors, following rapidly one upon the other, become often confused. Joseph Kiss in 1876 brought out a few lyric and epic poems of considerable merit. The Mesek of Augustus Greguss (1878), a collection of verse " Fables," belonging to the school of Gay, partake more of a didactic than lyrical nature. This feature is noticeable also in the Koltemenyek (1873) of Ladislaus Torkos and the Modern Mesek (1874) of Ladislaus Nevy. The Salamon (1878) of Charles Szasz (b. 1829) was rewarded with the prize of the academy. The subject, taken from the age of Hungarian chivalry, is artistically worked out from medieval legends, and gives an excellent description of the times of St Ladislaus of Hungary. Charles Szasz is generally better known as a metrical translator than as an original poet. He is the Magyarizer of Shakespeare's Anthony and Cleopatra, Othello, Macbeth, Henry VIII., Winter's Tale, Romeo and Juliet and Tempest, as also of some of the best pieces of Burns, Moore, Byron, Shelley, Milton, Beranger, Lamartine, Victor Hugo, Goethe and others. A translator from Byron and Pope appeared also in Maurice Lukacs. 6

1 The subject is similar to that of Grillparzer's tragedy, Ein treuer Diener seines Herrn.

2 It was founded in 1825 through the generosity of Count Szechenyi, who devoted his whole income for one year (60,000 florins) to the purpose. It was soon supported by contributions from all quarters except from the government.

3 Among the earlier publications of the academy were the Tudo- mdnytdr (Treasury of Sciences, 1834-1844), with its supplement Literatura ; the Kulfbldi jdtekszin (Foreign Theatres) ; the Magyar nyelv rendszere (System of the Hungarian language, 1846; 2nd ed., 1847); various dictionaries of scientific, mathematical, philosophical and legal terms; a Hungarian-German dictionary (1835-1838), and a Glossary of Provincialisms (1838). The Nagy-Szotdr (Great Dictionary), begun by Czuczor and Fogarasi in 1845, was not issued till 1862-1874. Among the regular organs of the academy are the Transactions (from 1840), in some 60 vols., and the Annuals.

4 Among its earlier productions were the Nemzeti konyvtdr (National Library), published 1843-1847, and continued in 1852 under the title Ujabb Nemzeti konyvtdr, a repository of works by celebrated authors; the Kulfbldi Regenytdr (Treasury of Foreign Romanceo), consisting of translations; and some valuable collections of proverbs, folk-songs, traditions and fables. Of the many later publications of the Kisfaludy society the most important as regards English literature is the Shakspere

Minden Munkdi (Complete Works of Shakespeare), in 19 vols. (1864-1878), to which a supplementary vol., Shakspere Pdlydja (1880), containing a critical account of the life and writings of Shakespeare, has been added by Professor A. Greguss. Translations from Moliere, Racine, Corneille, Calderon and Moreto have also been issued by the Kisfaludy society. The txlapok iij folyama, or " New Series of Annuals," from i860 (Buda- pest, 1868, &c), is a chrestomathy of prize orations, and translations and original pieces, both in poetry and prose.

5 Unitarian bishop of Transylvania, author of Vadrozsdk, or " Wild Roses " (1863), a collection of Szekler folk-songs, ballads and sayings.

6 Besides the various translators from the English, as for instance William Gyori, Augustus Greguss, Ladislaus Arany, Sigismond Acs, Stephen Fejes and Eugene Rakosy, who, like those already incident- ally mentioned, assisted in the Kisfaludy society's version of Shake- speare's complete works, metrical translations from foreign languages were successfully made by Emil Abranyi, Dr Ignatius Barna, Anthony Varady, Andrew Szabo, Charles Berczy, Julius Greguss, Lewis Doczi, Bela Erodi, Emeric Caspar and many others. A Magyar version, by Ferdinand Barna, of the Kalewala was published at Pest in 1871. Faithful renderings by Lewis Szeberenyi, Theodore Lehoczky and Michael Fincicky of the popular poetry of the Slavic nationalities appeared in vols. i. and ii. of the Hazai nep kolteszet tdra (Treasury of the Country's Popular Song), commenced in 1866, under the auspices of the Kisfaludy society. In vol. iii. Rumanian folk- songs were Magyarized by George Ember, Julian Grozescu and Joseph Vulcanu, under the title Roman nepdalok (Budapest, 1877). The Rdzsdk (Zombor, 1875) is a translation by Eugene Pavlovits from the Servian of Jovan Jovanovits. Both the last-mentioned works are interesting from an ethnographical point of view. We may here note that for foreigners unacquainted with Hungarian there are, besides several special versions of Petofi and of Arany, numerous anthologies of Magyar poetry in German, by Count Majlath (1825), J. Fenyery and F. Toldy (1828), G. Steinacker (1840, 1875), G. Stier (1850), K. M. Kertbeny (1854, i860), A. Dux (1854), Count Pongracz (1859- 1861), A. M. Riedl (i860), J. Nordheim (1872), G. M. Henning (1874), A. von der Heide (1879) and others. Selections have also been published in English by Sir John Bowring (1830), S. Wekey in his grammar (1852) and E. D. Butler (1877), and in French by H. Desbordes-Valmore and C. E. de Ujfalvy (1873).

Meanwhile dramatic literature found many champions, of whom the most energetic was Edward Szigligeti, proprie Joseph Szathmary, who enriched the Hungarian stage with more than a hundred pieces. Of these the most popular are comedies and serio-comic national dramas. A less prolific but more classical writer appeared in Charles Obernyik, whose George Brankovics is, next to Katona's Bdnk Ban, one of the best historical tragedies in the language. Several of the already mentioned lyric and epic poets were occasional writers also for the drama. To these we may add the gifted but unfortunate Sigismund Czako, Lewis Dobsa, Joseph Szigeti, Ignatius Nagy, Joseph Szenvey (a translator from Schiller), Joseph Gaal, Charles Hugo, Lawrence Toth (the Magyarizer of the School for Scandal), Emeric Vahot, Alois Degre (equally famous as a novelist), Stephen Toldy and Lewis Doczi, author of the popular prize drama Csdk (The Kiss). Az ember tragoedidja (The Tragedy of Man), by Emeric Madach (1861), is a dramatic poem of a philosophical and contem- plative character, and is not intended for the stage. Among suc- cessful dramatic pieces may be mentioned the Falu rossza (Village Scamp) of Edward Toth (1875), which represents the life of the Hungarian peasantry, and shows both poetic sentiment and dramatic skill; A szerelem harcza (Combat of Love), by Count Geza Zichy; Iskdriot (1876) and the prize tragedy Tamora (1879), by Anthony Varady; Janus (1877), by Gregory Csiky; and the dramatized romance Szep Mikhal (Handsome Michal), by Maurus Jokai (1877). The principal merit of this author's drama Milton (1876) consists in its brilliance of language. The Szerelem iskoldja (School of Love), by Eugene Rakosy, although in some parts exquisitely worded, did not meet with the applause accorded to his Ripacsos Pista Dolmdnya (1874). The Grof Dormdndi Kdlmdn(Count Coloman Dormandi) of Bela Bercsenyi (1877) is a social tragedy of the French school. Among the most recent writers of comedy we single out Arpad Berczik for his A hdzasilok (The Matchmakers) ;Ignatius Siilyovsky for his Nbi diplomatia (Female Diplomacy) ; and the above-mentioned Gregory Csiky for his Ellendllhatatlan (The Irresistible), produced on the stage in 1878. As popular plays the Sdrga csiko (Bay Foal) and A piros bugyelldru (The Red Purse), by Francis Csepreghy, have their own special merit, and were often represented in 1878 and 1879 at Budapest and elsewhere.

Original romance writing, which may be said to have commenced with Dugonics and Karman at the close of the 1 8th, and to have found a representative in Francis Verseghy at the beginning of the 19th century, was afterwards revived by Fay in his Bclteky hdz (1832), arid by the contributors to certain literary magazines, especially the Aurora, an almanack conducted by Charles Kisfaludy, 1821- 1830, and continued by Joseph Bajza to 1837. Almost simultane- ously with the rise of the Kisfaludy society, works of fiction assumed a more vigorous tone, and

began to present just claims for literary recognition. Far from adopting the levity of style too often ob- servable in French romances, the Magyar novels, although enlivened by touches of humour, have generally rather a serious historical or political bearing. Especially is this the case with Nicholas Josika's Abafi (1835), A csehek Magyar or szdgon (The Bohemians in Hungary), and Az utolso Bdtori (The Last of the Bathoris), published in 1847. In these, as in many other of the romances of Josika, a high moral standard is aimed at. The same may be said of Baron Joseph Eotvos's Karthausi (1839) and Falu Jegyzbje (Village Notary), published in 1845, and translated into English (1850) by O. Wenck- stern (see EoTVos). The Arvizonyv or " Inundation Book," edited by Eotvos (1839-1841), is a collection of narratives and poems by the most celebrated authors of the time. Of the novels pro'duced by Baron Sigismond Kemeny the Gyulai Pal (1847); in 5 vols., is, from its historical character, the most important. His Ferj es no (Husband and Wife) appeared in 1853 (latest ed., 1878), theRajongok (Fanatics), in 4 vols., in 1858-1859. The graphic descriptions of Hungarian life in the middle and lower classes by Lewis Kuthy won for him tempor- ary renown; but his style, though flowery, is careless. Another popular writer of great originality was Joseph Radakovics alias Vas-Gereben. The romances of Baron Frederick Podmaniczky are simpler, and rather of a narrative than colloquial character. The fertile writer Paul Kovacs excels more particularly in humorous narration. Fay's singular powers in this direction were well shown by his Jdvor orvos es Bakator Ambrns szolgdja (Doctor Javor and his servant Ambrose Bakator), brought out at Pest in 1855. The Beszelyek (Talcs) of Ladislaus Beothy were produced in the same year, his Pusztdk fia (Son of the Pusztas) in 1857. Pleasing humorous sketches are contained also in Ignatius Nagy's Beszelyek (1843) and "Caricatures" or Torzkepek (1844); in Caspar Bernat's Fresko kepek (1847-1850); in Gustavus Lauka's Videk, and his A jo regi vildg (The Good Old World), .published respectivety in 1857 and 1863; and in Alexander Balazs's Beszelyei (1855) an|| Tiikordarabok (1865). Among authors of other historical or humorous romances and tales which have appeared from time to time are Francis Marton alias Lewis Abonyi, Joseph Gaal, Paul Gyulai, William Gyori, Lazarus Horvath, the short-lived Joseph Irinyi, translator of Uncle Tom's Cabin, Francis Ney, Albert Palffy, Alexander Vachott and his brother Emeric (Vahot), Charles Szathmary, Desider Margittay, Victor Vajda, Joseph Bodon, Atala Kisfaludy and John Kratky. But by far the most prolific and talented novelist that Hungary can boast of is Maurus Jokai (q.v.), whose power of imagina- tion and brilliancy of style, no less than his true representations of

Hungarian life and character, have earned for him a European reputation. Of the novels produced by other authors between 1870 and 1880, we may

mention A hoi az ember kezdodik (Where the Man Begins), by Edward Kavassy (1871), in which he severely lashes the idling Magyar nobility; Az en ismeroseim (My Acquaintances), by Lewis Tolnai (1871); and Anatol, by Stephen Toldy (1872); the versified romances Deli bdbok hose (Hero of the Fata Morgana), generally ascribed to Ladislaus Arany, but anonymously published, A szerelem hose (Hero of Love), by John Vajda (1873), and Taldl- kozdsok (Rencounters) by the same (1877), and A Tiinderov (The Fairy Zone), by John Bulla (1876), all four interesting as specimens of narrative poetry; Kdlozdy Bela (1875), a tale of Hungarian pro- vincial life, by Zoltan Beothy, a pleasing writer who possesses a fund of humour, and appears to follow the best English models; Edith tortenete (History of Edith), by Joseph Prem (1876); Nyomorusdg iskoldja (School of Misery), by the prolific author _Arnold Vertesi (1878); Titkolt szerelem (Secret Love), by Cornelius Abranyi (1879), a social-political romance of some merit ; and Uj idbk, avult emberek (Modern Times, Men of the Past), by L. Veka (1879). In the Itihon (At Home), by Alois Degre (1877), the tale is made the medium for a satirical attack upon official corruption and Hungarian national vanity; and in the Almok dlmSdoja (Dreamer of Dreams), by John Asboth (1878), other national defects are aimed at. A rosz szomszed (The Bad Neighbour), by Charles Vadnay (1878), is a felicitous representation of the power of love. The Az utolso Bebek (The Last of the Bebeks), by the late Charles Petery, is a work rich in poetic invention, but meagre in historical matter. The reverse is the case with the Lajos pap (Priest Lewis), by Charles Vajkay (1879), the scene of which is placed at Pest, in the beginning of the 14th century. In this romance the interest of the narrative is weakened by a superabundance of historical and archaeological detail.

As regards works of a scientific character, the Magyars until recently were confessedly behindhand as compared with many other European nations. Indeed, before the foundation of the Hungarian academy in 1830, but few such works claiming general recognition had been published in the native language. Even in 1847 astronomy, physics, logic and other subjects of the kind had to be taught in several of the lyceums through the medium of Latin. The violent political commotions of the next few years allowed but little oppor- tunity for the prosecution of serious studies ; the subsequent quieter state of the country, and gradual re-establishment of the language as a means of education, were, however, more favourable to the development of scientific knowledge.

In the department of philosophy, besides several writers of dis- sertations bearing an imitative, didactic or polemical character, Hungary could boast a few authors of independent and original thought. Of these one of the most notable is Cyril Horvath, whose treatises published in the organs of the academy display a rare freedom and comprehensiveness of

imagination. John Hetenyi and Gustavus Szontagh must be rather regarded as adopters and de- velopers of the ethical teaching of Samuel Koteles in the previous period. Hyacinth Ronay in his Mutatvdny (Representation) and Jellemisme (Characteristics) endeavoured to popularize psychological studies. The philosophical labours of the already mentioned John Erdelyi and of Augustus Greguss won for them well-deserved recognition, the latter especially being famous for his aesthetical productions, in which he appears to follow out the principles of Vischer. The Tanulmdnyok (Studies) of Greguss were brought out at Pest in 1872. The reputation of John Szilasy, John Varga, Fidelius Beely and Francis Ney arose rather from their works bear- ing on the subject of education than from their contributions to philosophy.

The labours of Stephen Horvath in the preceding period had pre- pared the way for future workers in the field of historical literature. Specially meritorious among these are Michael Horvath, Ladislaus Szalay, Paul Jaszay and Count Joseph Teleki. The Magyaroh tortenete (History of the Magyars), in 4 vols., first published at Papa (1842-1846), and afterwards in 6 vols, at Pest (1860-1863), and in 8 vols. (1871-1873), is the most famous of Michael Horvath's numer- ous historical productions. Ladislaus Szalay's Magyarorszdg tortenete (History of Hungary), vols, i.-iv. (Leipzig, 1852-1854), vols, v.-vi. (Pest, 1856-1861), 2nd ed., i.-v. (1861-1866), is a most comprehensive work, showing more particularly the progress of Hungarian legislative development in past times. His style is elevated and concise, but somewhat difficult. Magyar history is indebted to Paul Jaszay for his careful working out of certain special periods, as, for instance, in his A Magyar nemzet napjai a legregibb idbtbl az Srq/iy bulldig (Days of the Hungarian nation from the earliest times to the date of the Golden Bull). Count Joseph Teleki is famed chiefly for his Hunyadiak kora Magyarorszdgon (The Times of the Hunyadys in Hungary), vols, i.-vi. (Pest, 1852-1863), x.-xii. (1853-1857), the result of thirty jrears' labour and research. In particular depart- ments of historical literature we find George Bartal, author of Commentariorum . . . libri XV., torn, i.iii. (Pozsony, 1847), John Czech, Gustavus Wenczel, Frederick Pesty and Paul Szlemenics as writers on legal history; Joseph Bajza, who in 1845 commenced a History of the World; Alexander Szilagyi, some of whose works, like those of Ladislaus Kovary, bear on the past of Transyl vania, others on the Hungarian revolution of 1848-1849; Charles Lanyi and John Pauer, authors of treatises on Roman Catholic

ecclesiastical history; John Szombathi, Emeric Revesz and Balogh, writers on Protestant church history; William Fraknoi, biographer of Cardinal Pazman, and historian of the Hungarian diets; and Anthony Gevay, Aaron Sziladi, Joseph Podhradczky, Charles Szabo, John Jerney and Francis Salamon, who have investigated and elucidated many special historical subjects. For the medieval history of Hungary the Mdtydskori diplomatikai emlekek (Diplomatic Memorials of the Time of Matthias Corvinus), issued by the academy tinder the joint editorship of Ivan Nagy and Baron Albert Nyary, affords interesting material. As a masterly production based on extensive investigation, we note the Wesselenyi Ferencz . . . osszees- kiivese (The Secret Plot of Francis Wesselenyi, 1664-1671), by Julius Pauler (1876). Among the many historians of Magyar literature Francis Toldy alias Schedel holds the foremost place. As compilers of useful manuals may be mentioned also Joseph Szvorenyi, Zoltan Beothy, Alexander Imre, Paul jambor, Ladislaus N6vy, John Kornyei and Joseph Szinnyei, junior. For philological and ethno- graphical research into the origin and growth of the language none excels Paul Hunfalvy. He is, moreover, the warm advocate of the theory of its Ugrio-Finnic origin, as established by the Uralian traveller Anthony Reguly, the result of whose labours Hunfalvy published in 1864, under the title A Vogul fold es nip (The Vogul Land and People). Between 1862 and 1866 valuable philological studies bearing on the same subject were published by Joseph Budenz in the Nyelvtudomdnyi kbzleminyek (Philological Trans- actions). This periodical, issued by the academy, has during the last decade (1870-1880) contained also comparative studies, by Arminius Vambery and Gabriel Balint, of the Magyar, Turkish- Tatar and Mongolian dialects.

As compilers and authors of works in various scientific branches allied to history, may be particularly mentioned — in statistics and geography, Alexius Fenyes, Emeric Palugyay, Alexander Konek, John Hunfalvy, Charles Galgoczy, Charles Keleti, Leo Beothy, Joseph KOriisi. Charles Ballagi and Paul Kiraly, and, as regards Transyl- vania, Ladislaus Kovary; in travel, Arminius Vambery, Ignatius Goldziher, Ladislaus Magyar, John Xantus, John Jerney, Count Andrassy, Ladislaus Podmaniczky, Paul Hunfalvy; in astronomy, Nicholas Konkoly; in archaeology, Bishop Arnold Ipolyi, Florian Romer, Emeric Henszlrnann, John Erdy, Baron Albert Nyary, Francis Pulszky and Francis Kiss; in Hungarian mythology, Bishop Ipolyi, Anthony Csengery, 1 and Arpad Kerekgyarto; in numismatics, John Erdy and Jacob Rupp; and in jurisprudence, Augustus Karvassy, Theodore Pauler, Gustavus Wenczel, Emeric Csacsko, John Fogarasi and Ignatius Frank. After 1867 great activity was displayed in history and its allied branches, owing to the direct encouragement given by the Hungarian Historical Society, and by the historical, archaeological, and statistical committees of the academy.

Notwithstanding the exertions of Paul Bugat to arouse an interest in the natural sciences by the establishment in 1841 of the ‘ Hungarian Royal Natural Science Association,” no general activity ivas manifested in this department of knowledge, so far as the native literature was concerned, until i860, when the academy organized a special committee for the advancement of mathematical and natural science. 2 The principal contributors to the ” Trans- actions ” of this section of the academy were — for anatomy and physiology, Coloman Balogh, Eugene Jendrassik, Joseph Lenhossek and Lewis Thanhoffer; for zoology, John Frivaldszky, John Kriesch and Theodore Margo; for botany, Frederick Hazslinszky, Lewis Juranyi and Julius Klein; for mineralogy and geology, Joseph Szabo, Max Hantken, Joseph Krenner, Anthony Koch and Charles Hoffman ; for physics. Baron Lorando Eotvos, Coloman Szily and Joseph Sztoczek ; for chemistry, Charles Than and Vincent Wartha ; for meteorology, Guido Schenzl. As good text-books, for which the so-called ” Indies’ Prize ” was awarded by the academy, we may mention the ” Termeszettan (Physics) and Termeszettani foldrajz (Physical Geography) of Julius Greguss.

Almost simultaneously with the foimation of the above-mentioned committee of the academy, the ” Natural Science Association ” showed signs of renewed animation, and soon advanced with rapid strides in the same direction, but with a more popular aim than the academy. Between 1868 and 1878 the number of its members increased from some 600 to about 5000. After 1872, in addition to its regular organs, it issued Hungarian translations of several popular scientific English works, as, for instance, Darwin’s Origin of Species; Huxley’s Lessons in Physiology; Lubbock’s Prehistoric Times; Proctor’s Oilier Worlds than Ours; Tyndall’s Heat as a Mode of Motion, &.C. Versions were also made of Cotta’s Geologie der Gegen- wart and Helmholtz’s Populdre Vorlesungen. As important original monographs we note — Az drapdly a Fiumei obolben (Ebb and Flow in the Gulf of Fiume), by Emil Stahlberger (1874); Magyarorszdg pokfaundja (The Arachnida of Hungary), by Otto Hermann (1876- 1878); Magyarorszdg vaskbvei es vastermenyei (The Iron Ores and

1 The translator of Macaulay.

3 See, however, J. Szinnyei & Son’s Bibliotheca Itungarica historiae naturalis el matheseos, 1472-1875 (Budapest, 1878), where the number of Magyar works bearing on the natural sciences and mathematics printed from the earliest date to the end of 1875 is stated to be 381 1. of which 106 arc referred to periodicals.

Iron Products of Hungary), by Anthony Kerpely (1877); Mag- yarorszdg

necezetesebb dohdnyfajainak chemiai . . . meeyizsgdldsa (Chemical Examination of the most famous Tobaccos of Hungary), by Dr Thomas Kosutany (1877). (E. D. Bu.)

The number of Magyar writers has since 1880 increased to an extent hardly expected by the reading public in Hungary itself. In 1830 there were only 10 Magyar periodical publications; in 1880 we find 368; in 1885 their "^ atore number rose to 494; in 1890 to 636; and at the jsso. beginning of 1895 no fewer than 806 periodical publica- tions, written in the Hungarian language, appeared in Hungary. Since that time (1895) the number of periodical as well as of non-periodical literary works has been constantly rising, although, as in all countries with a literature of rather recent origin, the periodical publications are, in proportion to the whole of the output, far more numerous than the non-periodical. 3 This remarkable increase in the quantity of literary work was, on the whole, accompanied by a fair advance in literary quality.

In lyrical poetry, among the poets who first came to the fore in the 'sixties several were active after 1880, such as Joseph Komocsy (d. 1894), whose Szerelem Kbnyve (" Book of Love ") has become a popular classic; Victor Dalmady, who published in the 'nineties his Hazafias Kbltemenyek (Patriotic Poems) ; and Ladislas Arany, son of the great John. Among the prominent lyrists whose works, although partly published before 1880, belong largely to the later period, the following deserve special mention: The poetry of Emil Abranyi (born 1850) is filled with the ideas and ideals of Victor Hugo. Abtanyi excels also as a translator, more particularly of Byron. Julius Reviczky (1855-1899) also inclined to the Occidental rather than to the specifically Magyar type of poets; his lyrics are highly finished, aristocratic and pessimistic {Pan haldla, " The Death of Pan "). Count Geza Zichy (b. 1849) published his lyrical poems in 1892. Joseph Kiss (b. 1843) is especially felicitous in ballads taken from village and Jewish life, and in love-songs; Alexander Endrodi (b. 1850), one of the most gifted modern lyrical poets of Hungary, has the charm of tenderness and delicacy together with that of a peculiar and original style, his Kurucz notdk being so far his most successful attempt at romantic lyrics. Louis Bartok (b. 1851) is a remarkable satirist and epigrammatist {Kdrpdti emlekek). Odon Jakab (b. 1850) leans towards the poetic manner of Tompa, with perhaps a greater power of expression than the author of the Virdgregek (" Flower-fables ") ; Jakab wrote Hangok az ifjusdgbol (" Sounds of Youth "), Nydr (" Summer "), both collections of lyrical poems. Louis Posa (b. 1850) has made a sphere of his own in his charming poems for and about children, Edes anydm (" My dear Mother). In Andor Kozma (b. i860), author of A tegnap es a ma (" Yesterday and To-day," 1889), Versek (Poems, 1893), &c, there is undoubted power of genuine satire and deep humour. Michael Szabolcska (b. 1864), author of Hangulatok (" Moods," 1894), showed

great promise; Julius Vargha (b. 1853) cultivates the nepies or folk-poetry as represented by Hungary's two greatest poets, Petofi and Arany; Vargha has also published excellent trans- lations of Schiller and Goethe. Perhaps scarcely less remarkable are the modern Magyar lyrists, such as, of the older set, John Bulla (b. 1843), J. D. Temerdek, Gustavus Csengey (b. 1842), Paul Koroda (b. 1854), E. Julius Kovacs (b. 1839, Poems, 1892), Ladislas Incz6di, Julius Nogradi Pap, Julius Szavay (b. 1S60), John Dengi (b. 1853); among the juniors, Anton Rado (also an excellent translator), Louis Palagyi (Magdnyos uton, " On Lonely Way," &c), Geza Gardonyi (b. 1863, Aprilis, 1894), Zoltan Pap, Eugen Heltai (Ignotus), Julius, Rudnyanszky (b. i860, Szerelem, " Love "; Nydr, " Summer "), Arpad Zemplenyi, Julius Szentessy, Emil Makai (b. 1870), Cornelius Caspar, Julius Varsanyi (b. 1863, Mulandosdg, " The Unstableness of Things "), Alexander Luby {Vcrgbdes, "Striving"), Eugen V. Szaszvarosi, Endre Szabo (b. 1849), political satirist. In the most recent lyrics of Hungary there is a growing tendency to socialistic poetry, to the " poetry of misery " (A nyomor kblteszete). In epic poetry Josef Kiss's Jehova is the most popular work. Amongst rhymed novels — novels in verse form — the best is the Delibdbok hose (" The Hero of Mirages "), in which Ladislas Arany tells, in brilliantly humorous and captivating fashion, the story of a young Magyar nobleman who, at first full of great ideals and aspirations, finally ends as a commonplace country squire.

Among Hungarian novels we may distinguish, four dominant genres or tendencies. The first is represented almost exclusively by Maurus Jokai (2-».). To the school so perfectly represented by

3 This will appear even more striking by a consideration of the number of periodical publications published in Hungary in languages other than Magyar. Thus, while of German periodicals apocaring in Hungary there were in 1871 only 85, they increased in 18S0 to 114. in 1885 to 141; and they were, at the beginning of 1895, still 128, in spite of the constant spread of that process of Magyarization which has, since 1880, considerably changed the linguistic habits o the people of Hungary.

Jokai belong Arpad Kupa (A napszdmosok, " The Labourers "; Kepselt kirdlyok, " Imaginary Kings ") ; Robert Tabori {Nagy jdtek, " Great Game

“; A negyvenSves ferfiu, ” The Man at Forty “) ; and Julius Werner (Kendi Imre hdzassdga, ” The Wedding of Emericus Kendi ” ; Olga; Megvirrad meg valaha, “Dawn will come in the End “). The second class of Hungarian modern novelists is led by the well-known Koloman Mikszath, a poet endowed with originality, a charming naivete, and a freshness of observation from life. A close observer of the multifarious low life of Hungary, Mikszath has, in his short stories, given a delightful yet instructive picture of all the minor varied phases of the peasant life of the Slavs, the Palocok, the Saxons, the town artisan. Amongst his numerous works may be mentioned A jo paloczok (” The Good Paloczok,” Slav peasants) ; Egy vdlaszlds Magyarorszdgon (” An Election in Hungary”); Pipac- sok a buzdban (“Wild Poppies in the Wheatfield “) ; A tekintetes vdrmegye (” The Worshipful County “) ; Ne okoskodj Pista (” Don’t reason, Pista “) ; Szent Peter esernySje (” St Peter’s Umbrella,” translated from the original into English by Miss B. W. Worswick), &c. Mikszath has had considerable influence upon other writers. Such are Victor Rakosi (Sipulus tdrcdi, ” The Essays of Sipulus “; Rejtett feszkek, ” Hidden Nests “) ; Stephen Mora (Atydnkfiai, ” Our Compatriots “) ; Alexius Benedek, the author of numerous distinctly sympathetic and truly Magyar tales, fables and novels, one of the most gifted and deserving literary workers of modern Hungary (Huszdr Anna, ” Anna Huszar “; Egy szalmabzvegy levelei, ” Letters of a grass widow”; A sziv konyve, “The Book of the Heart”; Katalin, “Catherine”; Csendes Srdk, “Quiet Hours”; Testa- mentum es hat level, ” Last Will and Six Letters,” translated into German by Dr W. Schonwald, &c.) ; Geza Gardonyi (several novels containing the adventures, observations, &c, of Mr Gabriel Gore; A kekszemii Davidkdne, ” Blue-eyed Mrs Davidka “; A Kdtsa, scenes from gipsy life); Charles Murai (Vig tortenetek, “Jolly Stories”; Bandj, a collection of short tales); Stephen Barsony (Csend, ” Silence “; A Kameleon-ledny , ” The Chamaeleon Girl, and other Stories “; Erdon-mez’on, ” In Wood and Field “). The third class of Magyar novelists comprises those cosmopolitan writers who take their method of work, their inspiration and even many of their subjects from foreign authors, chiefly French, German, Russian and also Norwegian. A people with an intense national sentiment, such as the Hungarians, do not as a rule incline towards permanent admiration of foreign-born or imported literary styles; and ac- cordingly the work of this class of novelists has frequently met with very severe criticism on the part of various Magyar critics. Yet it can scarcely be denied that several of the ” foreign ” novelists have contributed a wholesome, if not quite Magyar, element of form or thought to literary narrative style in Hungary. Probably the fore- most among them is Sigismund Justh, who died prematurely in the midst of his painful attempt at reconciling French ” realistic ” modes of thought with what he conceived to be Magyar simplicity (.4 puszta konyve, ” The Book of the Puszta,” prairie of Hungary; A Penz legenddja, ” The Legend of

Money “; Gdnyo Julcsa, ” Juliet Ganyo”; Futmus). Other novelists belonging to this school are: Desiderius Malonyai (Az utolso, ” The Last “; Judith konyve, ” The Book of Judith”; Tanulmdnyfejek, “Typical Heads”); Julius Pekar {Dodo fohadnagy problemdi, ” Lieutenant Dodo’s Problems “; Az aranykesztyus kisasszony, ” The Maid with the Golden Gloves “; A szoborszep asszony, “The Lady as Beautiful as a Statue”; Az esztendo legenddja, “The Legend of the Year”); Thomas Kobor , (Aszfalt, ” Asphalt ” ; O akarta, ” He Wanted It ” ; A csillagok fele, ““Towards the Stars”); Stephen Szomahazy (Hv.szonnegy ora, “Twenty-four Hours”; A Clairette KeringS, “The Clairette Valse ” : Pdratlan szerddk, “Incomparable Wednesdays”; Nydri felhok, ” Clouds of Summer “) ; Zoltan Thury (Ullrich fShadnagy es egyeb tortenetek, “Lieutenant Ullrich and other Tales “; Urak es parasztok, ” Gentlemen and Peasants “) ; also Desiderius Szomory, Odon Gero, Arpad Abonyi, Koloman Szanto, Edward Sas, Julius Vertesi, Tibor Denes, Akos Pinter, the Misses Janka and Stephanie Wohl. Mrs Sigismund Gyarmathy and others. In the fourth class may be grouped such of the latest Hungarian novelists as have tried, and on the whole succeeded, in clothing their ideas and characters in a style peculiar to themselves. Besides Stephen Petelei (Jetti, a name — “Henrietta” — Felhok, “Clouds”) and Zoltan Ambrus {Pokhdid Kisasszony, “Miss Cobweb”; Gyanu, “Suspicion”) must be mentioned especially Francis Herczeg, who has published a number of very interesting studies of Hungarian social life (Simon Zsuzsa, “Susanna Simon”; Fenn es lenn, “Above and Below”; Egy ledny lortenete, “The History of a Girl”; Idegenek kozbtt, “Amongst Strangers”); Alexander Brody, who brings a delicate vet resolute analysis to unfold the mysterious and fascinating inner life 01 persons suffering from overwrought nerves or overstrung mind (A ketlelkii asszony, “The Double-Souled Lady”; Don Quixote kisasszony, ” Miss Don Quixote “; Faust orvos, ” Faust the Physician”; Tiinder Ilona, Rejtelmek, “Mysteries”; Az eziist kecske, ” The Silver Goat “) ; and Edward Kabos, whose sombre and powerful genius has already produced works, not popular by any means, but full of great promise. In him we may trace the influence of Nietzsche’s philosophy (Koldusok, “Beggars”; Vdndorok, “Wanderers”). To this list we must add the short but incom- parable feuHhtnns (tdnzalevelek) of Dr Adolf Agai (writing under the nom de plume of Porzo), whose influence on the formation of modern

Hungarian literary prose is hardly less important than the unique esprit and charm of his writings.

Dramatic literature, liberally supported by the king and the government, and aided by magnificent theatres in the capital and also in the provinces (the finest provincial theatre is in Kolozsvar, in Transylvania), has developed remarkably. The Hungarians have the genuine dramatic gift in abundance ; they have, moreover, actors and actresses of the first rank. In

the modern drama three great and clearly differentiated groups may be distinguished. First the neo- romantic group, whose chief representatives are Eugen Rakosi, Louis Doczi (b. 1845), who, in addition to Csdk (" The Kiss "), has written Utolso szerelem (" Last Love "), Szechy Maria (" Maria Szechy "), Vegyes Fdrok (" Mixed Couples "). In these and other dramatic writings, more remarkable perhaps for poetic than for stage effects, Doczi still maintains his brilliancy of diction and the delicacy of his poetic touch. To the same school belong Louis Bartok, Anton Varadi and Alexander Somlo. The next group of Hungarian drama- tists is dominated by the master spirit of Gregor Csiky (q.v.). Among Csiky's most promising disciples is Francis Herczeg (already mentioned as a novelist), author of the successful society comedy, A Gyurkovics lednyok (" The Misses Gyurkovics "), Hdrom testor (" Three Guardsmen "), Honty hdza (" The House of Honty "). Arpad Berczik's Nezd meg az anyjdt (" Look at her Mother "), A protekczio (" Patronizing "), also followed on the lines of Csiky. The third group of dramatic writers take their subjects, surroundings and diction from the folk-life of the villages (nepszinmil, " folk- draina "). The greatest of these dramatists has so far been Edward Toth (Toioncz, ' The Ousted Pauper "). Amongst his numerous followers, who have, however, sometimes vulgarized their figures and plots, may be mentioned Tihamer Almasi (Milimdri, A Min- iszterelnok bdlja, " The Ball of the Premier ") and Alexander Somlo. In philosophy there has been a remarkable increase of activity, partly assimilative or eclectic and partly original. Peter Bihari and Maurice Karman have in various writings spread the ideas of Herbart. After the school of Comte, yet to a large extent original, is the Az ember es vildga (" Man and his World ') of Charles Bohm, who in 1 88 1 started a philosophical review (Magyar Filozofiai Szemle), subsequently edited by Joseph Bokor, a vigorous thinker. Realism, more particularly of the Wundt type, is represented by Emericus Pauer, Az ethikai determinismus (" Ethical Determinism "), and Eugen Posch (Az idorol, " On Time "). On a Thomistic basis John Kiss edits a philosophical review (Bolcseleti Folyoirat) ; on similar lines have been working Akos Mihalyfi, Repassy, Augustin Lubrich and others. Neo-Hegelianism is cultivated by Eugen Schmitt, efficiently assisted by Joseph Alexander Simon (Az egyseges es redlis termeszet filozofia alapvonalai, " Outlines of a Uniform and Realistic Philosophy of Nature "). F. Medveczky (formerly a German author under the name of Fr. von Barenbach) espouses Neo-Kantism (Tdrsadalmi elmeletek es eszmenyek, 1887, " Social Theories and Ideals "). The Hungarian scholar Samuel Brassai published, in 1896, Azigazipozitivfilozojia(" The True Positive Philosophy "). Amongst the ablest and most zealous students of the history of philosophy are Bernhard Alexander, under whose editorship, aided by Joseph Banoczi, a series of the works of the world's great thinkers has appeared; Andrew Domanovszky, author of an elaborate History of Philosophy; Julius

Gyomlai, translator of Plato; Eugen Peterfy, likewise translator of philosophical works, &c.

Juristic literature has been stimulated by the activity in positive legislation. On 1st January 1900 a new criminal code, thoroughly modern in spirit, was put in force; and in 1901 a Civil Code Bill, to replace the old Hungarian customary system, was introduced. Among the newer writers on common and commercial law may be mentioned Wenczal, Zlinsky, Zogod, Gustave Schwarz, Alexander Plosz, Francis Nagy and Neumann; on constitutional law, Korbuly, Boncz, Stephen Kiss, Ernest Nagy, Kmety, Arthur Balogh, Ferdin- andy, Bela Griinwald, Julius Andrassy and Emeric Hajnik; on administration, George Fesiis, Kmety and Csiky; on finance, Mariska, Exner and Laszlo. Among the later writers on statistics, moreover, have been Konek, Keleti, Lang, Foldes, Jekelfalussy, Vorgha, Korosy, Rath and Vizaknai.

On subjects of politics, amongst the more important works are the various monographs of Gustavus Beksics on the Dualism of Austria- Hungary, on the " New Foundations of Magyar Politics " (A magyar politika uj alapjai, 1899), on the Rumanian question, &c. ; the writings of Emericus Balint, Akos Beothy, Victor Concha (system- atic politics), L. Ecsery, Geza Ferdinandy (historical and systematic politics), Arpad Zigany, Bela Foldes (political economy), Julius Mandello (political economy), Alexander Matlekovics (Hungary's administrative service; Allamhdztartds , 3 vols.), J. Polya (agrarian politics), M. Somogyi (sociology), and the late Augustus Pulszky-

In history there has been great activity. The millennial festivities in 1896 gave rise to the publication of what was then the most extensive history of the Hungarian nation (A magyar nemzet tortenete, 1895-1901), ten large and splendidly illustrated volumes, edited by Alexander Szilagyi, with the collaboration of the best specialists of modern Hungary, Robert Frohlich, B. Kuzsinszky, Geza Nagy, H. Marczali, Anton Por, Schonherr, V. Fraknoi, Arpad Karolyi, David Angyal, Coloman Thaly, Geza Ballagi.

Literary criticism is actively pursued. Among the more authori- tative writers Paul Gyulai and Zsolt Beothy represent the

conservative school; younger critics, like Bela Lazar, Alexander Hevesi, H. Lenkei, Zoltan Ferenczy, Aladar Ballagi, Ladislas Negyessy, have shown themselves somewhat too ready to follow the latest Norwegian or Parisian

sensation.

Authorities.— The best authorities on Magyar literature are: F. Toldy, A Magyar nemzeti irodalom tortenete a legrigibb idbktbl a jelenkorig (Pest, 1864-1865; 3rd ed., 1872); S. Imre, A Magyar irodalom es nyelv rbvid tortenete (Debreczen, 1865; 4th ed., 1878); J. Szvorenyi, Magyar irodalmi szemelvenyek (Pest, 1867), and A Magyar irodalmi tanulmdnyok kezikbnyve (Pest, 1868); P. Jambor, A Magyar irodalom tortenete (Pest, 1864); J. Kornyei, A Magyar nemzeti irodalomlbrlenet vdzlata (Pest, 1861 ; 3rd ed., 1874); A. Lonkay, A Magyar irodalom ismertetese (Budan, 1855; 3rd ed., Pest, 1864); J. Ferencz, Magyar irodalom es tudomdnyossdg tortinete (Pest, 1854); J- Ferencz es J. Danielik, Magyar Irdk. Eletrajz- Gyiitemeny (2 vols., Pest, 1856-1858); and the literary histories of L. Nevy, Z. Beothy and B. Erodi. One of the most useful mono-graphs on " Magyar Literary History Writing " is that of J. Szinnyei, junior, A Magyar Irodalomtortenet-Irds ismertetese (Budapest, 1878). For information as to the most recent literature see A. Dux, Aus Ungarn (Leipzig, 1880); Zsolt Beothy, A Magy. nemz. irod. tort.; S. Bodnar, A magy. irod. tort.; Bela Lazar, A tegnap, a ma, es a holnap (Budapest, 1896-1900); Joseph Szinnyei, Magy. irok elete es munkdi (an extensive biographical dictionary of Hungarian authors) ; Irodalom torteneti Kozlemenyek (a periodical edited by Aron Szilady, for the history of literature); Emil Reich, Hungarian Literature (London, 1898). (E. Re.)*

HUNGER and THIRST. These terms are used to express peculiar sensations which are produced by and give expression to general wants of the system, satisfied respectively by the ingestion of organic solids containing substances capable of acting as food, and by water or liquids and solids containing water.

Hunger (a word common to Teutonic languages) is a peculiarly indefinite sensation of craving or want which is referred to the stomach, but with which is often combined, always indeed in its most pronounced stages, a general feeling of weakness or f aintness. The earliest stages are unattended with suffering, and are charac- terized as " appetite for food." Hunger is normally appeased by the introduction of solid or semi-solid nutriment into the stomach, and it is probable that the almost immediate alleviation of the sensation in these circumstances is in part due to a local influence, perhaps connected with a free secretion of gastric juice. Essentially, however, the sensation of hunger is a mere local expression of a general want, and this local expression ceases when the want is satisfied, even though no food be intro- duced into the stomach, the needs of the economy being satisfied by the introduction of food through other channels, as, for example, when food which admits of being readily absorbed is injected into the large intestine.

Thirst (a word of Teutonic origin, Ger. Durst, Swed. and Dan. torsi, akin to the Lat. torrere, to parch) is a peculiar sensation of dryness and heat localized in the tongue and throat. Although thirst may be artificially produced by drying, as by the passage of a current of air over the mucous membrane of the above parts, normally it depends upon an impoverishment of the system in water. And, when this impoverishment ceases, in whichever way this be effected, the sensation likewise ceases. The in- jection of water into the blood, the stomach, or the large intestine appeases thirst, though no fluid is brought in contact with the part to which the sensation is referred.

The sensations of hunger and thirst lead us, or when urgent compel us, to take food and drink into the mouth. Once in the mouth, the entrance to the alimentary canal, the food begins to undergo a series of processes, the object of which is to extract from it as much as possible of its nutritive constituents. Food in the alimentary canal is, strictly speaking, outside the confines of the body; as much so as the fly grasped in the leaves of the insectivorous Dionea is outside of the plant itself. The mechanical and chemical processes to which the food is subjected have their seat and conditions outside the body which it is destined to nourish, though unquestionably the body is no passive agent, and innumerable glands come into action to supply the chemical agents which dissolve and render assimilable those constituents of the food capable of being absorbed into the organism, and of forming Dart and parcel of its substance (see further under .Nutrition;.

HUNGERFORD, WALTER HUNGERFORD, Baron (d. 1449), English soldier, belonged to a Wiltshire family. His father, Sir Thomas Hungerford (d. 1398), was speaker of the House of Commons in 1377, a position which he owed to his friend John of Gaunt, and is the first person formally mentioned in the rolls of parliament as holding the office. Walter Hungerford also served as speaker, but he is more celebrated as a warrior and diplomatist, serving in the former capacity at Agincourt and in the latter at the council of Constance and the congress of Arras. An executor of Henry V.'s will and a member of the council under Henry VI., Hungerford became a baron in 1426, and he was lord treasurer from 1426 to 143 1. Remains of his benefactions still exist at Heytesbury, long the principal re- sidence of the family.

' Hungerford's son Robert (c. 1400-1459) was also called to parliament as a baron; he was very wealthy, both his mother and his wife being heiresses. Like several other members of the family, Robert was buried in the cathedral at Salisbury.

Robert's son and heir, Robert, Lord Moleyns and Hungerford (c. 1420-1464), married Eleanor, daughter of Sir William de Moleyns, and

was called to parliament as Lord de Moleyns in 1445. He is chiefly remembered through his dispute with John Paston over the possession of the Norfolk manor of Gresham. After losing this case he was taken prisoner in France in 1452, not securing his release until 14.59. During the Wars of the Roses he fought for Henry VI., with whom he fled to Scotland; then he was attainted, was taken prisoner at the battle of Hexham, and was executed at Newcastle in May 1464.

His eldest son, Sir Thomas Hungerford (d. 1469), was attainted and executed for attempting the restoration of Henry VI.; a younger son, Sir Walter Hungerford (d. 1516), who fought for Henry VII. at Bosworth, received some of the estates forfeited by his ancestors. Sir Thomas, who had no sons, left an only daughter Mary (d. c. 1534). When the attainders of her father and grandfather were reversed in 1485 this lady became Baroness Hungerford and Baroness de Moleyns; she married into the Hastings family and was the mother of George Hastings, 1st earl of Huntingdon.

Sir Walter Hungerford's son Edward (d. 1522) was the father of Walter, Lord Hungerford of Heytesbury (1503-1540), who was created a baron in 1536, but was attainted for his alleged sympathy with the Pilgrimage of Grace; he was beheaded on the 28th of July 1540, the same day as his patron Thomas Cromwell. As his sons Sir Walter (1532-1596) and Sir Edward (d. 1607) both died without sons the estates passed to another branch of the family.

Sir Edward Hungerford (1 596-1648), who inherited the estates of his kinsman Sir Edward in' 1607, was the son of Sir Anthony (1 564-1627) and a descendant of Walter, Lord Hungerford. He was a member of both the Short and Long Parliaments in 1640; during the Civil War he attached himself to the parlia- mentary party, fighting at Lansdowne and at Roundway Down. His half-brother Anthony (d. 1657) was also a member of both the Short and the Long Parliaments, but was on the royalist side during the war. This Anthony's son and heir was Sir Edward Hungerford (1632-1711), the founder of Hungerford market at Charing Cross, London. He was a member of parlia- ment for over forty years, but was very extravagant and was obliged to sell much of his property; and little is known of the family after his death.

See Sir R. C. Hoare, History of Modern Wiltshire (1822-1844).

HUNGERFORD, a market town in the Newbury parliamentary division of - Berkshire, England, extending into Wiltshire, 61 m. W. by S. of London by the Great Western railway. Pop. (1901) 2906. It is beautifully situated in the narrow valley of the Kennet at the junction of tributary valleys from

the south and south-west, the second of which is followed by the Bath road, an important highway from London to the west. The town, which lies on the Kennet and Avon canal, has agricultural trade. John of Gaunt, duke of Lancaster, presented to the citizens manorial rights, including common pasture and fishing. The fishing is valuable, for the trout of the Kennet and other streams

in the locality are numerous and carefully preserved. Hunger- ford is also a favourite hunting centre. A horn given to the town by John of Gaunt is preserved in the town hall, another horn dating from 1634 being used to summon the manorial court of twelve citizens called feoffees (the president being called the constable), at Hocktide, the Tuesday following Easter week. In 1774, when a number of towns had taken action against the imposition of a fee for the delivery of letters from their local post-offices, Hungerford was selected as a typical case, and was first relieved of the imposition.

HUNINGEN, a town of Germany, in Alsace-Lorraine, situated on the left bank of the Rhine, on a branch of the Rhine-Rhone canal, and 3 m. N. of Basel by rail. Pop. (1905) 3304. The Rhine is here crossed by an iron railway bridge. The town boasts a handsome Roman Catholic church, and has manufactures of silk, watches, chemicals and cigars. Hiiningen is an ancient place and grew up round a stronghold placed to guard the passage of the Rhine. It was wrested from the Imperialists by the duke of Lauenburg in 1634, and subsequently passed by purchase to Louis XIV. of France. It was fortified by Vauban (1679- 1681) and a bridge was built across the Rhine. The fortress capitulated to the Austrians on the 26th of August 181 5 and the works were shortly afterwards dismantled. In 1871, the town passed, with Alsace-Lorraine, to the German empire.

See Tschamber, Geschichte der Stadt und ehemaligen Festung Hiiningen (St Ludwig, 1894); and Latruffe, Huningue et Bdle devantles traites de 1815 (Paris, 1863).

HUNNERIC (d. 484), king of the Vandals, was a- son of King Gaiseric, and was sent to Italy as a hostage in 435 when his father made a treaty with the emperor Valentinian III. After his return to the Vandal court at Carthage, he married a daughter of Theodoric I., king of the Visigoths; but when this princess was suspected of attempting to poison her father-in-law, she was mutilated and was sent back to Europe. Hunneric became king of the Vandals on his father's death in 477. Like Gaiseric he was an Arian,

and his reign is chiefly memorable for his cruel perse- cution of members of the orthodox Christian Church in his dominions. Hunneric's second wife was Eudocia, a daughter of Valentinian III. and his wife Eudocia. (See Vandals.)

HUNNIS, WILLIAM (d. 1597), English musician and poet, was as early as 1549 in the service of William Herbert, afterwards earl of Pembroke. His friend Thomas Newton, in a poem prefixed to The Hive of Hunnye (1578), says: " In prime of youth thy pleasant Penne depaincted Sonets sweete," and mentions his interludes, gallant lays, rondelets and songs, explaining that it was in the winter of his age that he turned to sacred lore and high philosophy. In 1550 he published Certayne Psalms . . . in Englishe metre, and shortly afterwards was made a gentleman of the Chapel Royal. At Mary's accession he retained his appoint- ment, but in 1555 he is said to have been one of a party of twelve conspirators who had determined to take Mary's life. Nothing came of this plot, but shortly afterwards he was party to a conspiracy to dethrone Mary in favour of Elizabeth. Hunnis, having some knowledge of alchemy, was to go abroad to coin the necessary gold, but this doubtful mission was exchanged for the task of making false keys to the treasury in London, which he was able to do because of his friendship with Nicholas Brigham, the receiver of the exchequer. The conspirators were, however, betrayed by one of their number, Thomas Whyte. Some of them were executed, but Hunnis escaped with imprisonment. The death of Mary made him a free man, and in 1559 he married Margaret, Brigham's widow, but she died within the year, and Hunnis married in 1 560 the widow of a grocer. He himself became a grocer and freeman of the City of London, and super- visor of the Queen's Gardens at Greenwich. In 1566 he was made Master of the Children of the Chapel Royal. No complete piece of his is extant, perhaps because of the rule that the plays acted by the Children should not have boen previously printed. In his later years he purchased land at Barking, Essex. If the lines above his signature on a 1557 edition of Sir Thomas More's works are genuine, he remained a poor man, for he refuses to make a will on the ground that " the good that I shall leave, will not

pay all I owe." In Harleian MS. 6403 is a story that one of his sons,in the capacity of page, drank the remainder of the poisoned cup supposed to have been provided by Leicester for Walter Devereux, 1st earl of Essex, but escaped with no injury beyond the loss of his hair.

Hunnis's extant works include Certayne Psalms (1549), A Hive full of Hunnye (1578), Seven Sobbes of a sorrowful Soule for Sinne (1583), Hunnies Recreations (1588), sixteen poems in the Paradise of Dainty Devices (1576), and two in England's Helicon (1600). See Mrs C. Carmichael Stopes's tract on William Hunnis, reprinted (1892) from the

Jahrbuch der deutschen Shakespeare Gesellschaft.

HUNS. This or some similar name is given to at least four peoples, whose identity cannot be regarded as certain. (1) The Huns, who invaded the East Roman empire from about a.d. 372 to 4S3 and were most formidable under the leadership of Attila. (2) The Hungarians or Magyars. The Magyars crossed the Carpathians into Hungary in a.d. 898 and mingled with the races they found there. The modern Hungarians (excluding Slavonic elements) are probably a mixture of these Magyars with the remnants of older invaders such as Huns, Petchenegs and Kumans. (3) The White Huns (AevKoi Ovvvoi or Ephthalites), who troubled the Persian empire from about 420 to 557 and were known to the Byzantines. (4) The Hunas, who invaded India during the same period. There is not much doubt that the third and fourth of these tribes are the same, and it is quite likely that the Magyars are descended from the horde which sent forth the Huns in the 4th century, but it is not demonstrable. Neither can it be proved that the Huns and Magyars belonged either physically or linguistically to the same section as the Hunas and Ephthalites. But the occurrence of the name in both India and Europe is prima facie evidence in favour of a connexion between those who bore it, for, though civilized races often lumped all their barbarian neighbours together under one general name, it would seem that, when the same name is applied independently to similar invaders in both India and eastern Europe, the only explanation can be that they gave themselves that name, and this fact probably indicates that they were members of the same tribe or group. What we know of the history and distribution of the Huns does not conflict with this idea. They appear in Europe towards the end of the 4th century and the Ephthalites and Hunas in western Asia about fifty years later. It may be supposed that some defeat in China (and the Chinese were successful in driving back the Hiung-nu in the 1st century a.d.) had sent them westwards some time earlier. One body remained in Transoxiana and, after resting for a time, pushed their way through the mountains into Afghanistan and India, exactly as the Ytie-Chi had done before them. Another division pressed farther westwards and probably made its head-quarters near the northern end of the Caspian Sea and the southern part of the Ural Mountains. It was from here that the Huns invaded Europe, and when their power collapsed, after the death of Attila, many of them may have returned to their original haunts. Possibly the Bulgarians and Khazars were offshoots of the same horde. The Magyars may very well have gradually spread first to the Don and then beyond it, until in the 9th century they entered Hungary. But this sketch of possible migrations is largely conjectural, and authorities are not even agreed as to the branch of the Turanians to which the Huns should be referred. The physical characteristics of these nomadic armies were very variable, since they

continually increased their numbers by slaves, women and soldiers of fortune drawn from all the surrounding races. The language of the Magyars is Finno- Ugric and most nearly allied to the speech of the Ostiaks now found on the east of the Ural, but we have no warrant for assum- ing that the Huns, and still less that the Ephthalites and Hunas, spoke the same language. Neither can we assume that the Huns and Hunas are the same as the Hiung-nu of the Chinese. The names may be identical, but it is not certain, for in Hun may lurk some such designation as the ten (Turkish on or un) tribes. Also Hiung-nu seems to be the name of warlike nomads in general, not of a particular section. Again the Finnish languages spoken in various parts of Russia and more or less allied to Magyar

must have spread gradually westwards from the Urals, and their

development and diffusion seem to postulate a long period (for the history of the Finns shows that they were not mobile like the Turks and Mongols) , so that the ancestral language from which spring Finnish and Magyar can hardly have been brought across Asia after the Christian era. The warlike and vigorous temper of the Huns has led many writers to regard them as Turks. The Turks were perhaps not distinguished by name or institutions from other tribes before the 5th century, but the Huns may have been an earlier offshoot of the same stock. Apart from this the Hungarians may have received an infusion of Turkish blood not only from the Osmanlis but from the Kumans and other tribes who settled in the country.

History. — The authentic history of the Huns in Europe practically begins about the year a.d. 372, when under a leader named Balamir (or, according to some MSS., Balamber) they began a westward movement from their settlements in the steppes lying to the north of the Caspian. After crushing, or compelling the alliance of, various nations unknown to fame (Alpilzuri, Alcidzuri, Himari, Tuncarsi, Boisci), they at length reached the Alani, a powerful nation which had its seat between the Volga and the Don; these also, after a struggle, they defeated and finally enlisted in their service. They then proceeded, in 374, to invade the empire of the Ostrogoths (Greutungi), ruled over by the aged Ermanaric, or Hermanric, who died (perhaps by his own hand) while the critical attack was still impending. Under his son Hunimund a section of his subjects promptly made a humiliating peace; under Withemir (Winithar), however, who succeeded him in the larger part of his dominions, an armed resistance was organized; but it resulted only in repeated defeat, and finally in the death of the king. The representatives of his son Witheric put an end to the

conflict by accepting the condition of vassalage. Balamir now directed his victorious arms still farther westward against that portion of the Visigothic nation (or Tervingi) which acknowledged the authority of Athanaric. The latter entrenched himself on the frontier which had separated him from the Ostrogoths, behind the " Greutung- rampart " and the Dniester; but he was surprised by the enemy, who forded the river in the night, fell suddenly upon his camp, and compelled him to abandon his position. Athanaric next attempted to establish himself in the territory between the Pruth and the Danube, and with this object set about heightening the old Roman wall which Trajan had erected in north-eastern Dacia; before his fortifications, however, were complete, the Huns were again upon him, and without a battle he was forced to retreat to the Danube. The remainder of the Visigoths, under Alavivus and Fritigern, now began to seek, and ultimately were successful in obtaining (376), the permission of the emperor Valens to settle in Thrace; Athanaric meanwhile took refuge in Transylvania, thus abandoning the field without any serious struggle to the irresistible Huns. For more than fifty years the Roman world was undisturbed by any aggressive act on the part of the new invaders, who contented themselves with over- powering various tribes which lived to the north of the Danube. In some instances, in fact, the Huns lent their aid to the Romans against third parties; thus in 404-405 certain Hunnic tribes, under a chief or king named Uldin, assisted Honorius in the struggle with Radagaisus (Ratigar) and his Ostrogoths, and took a prominent part in the decisive battle fought in the neighbourhood of Florence. Once indeed, in 409, they are said to have crossed the Danube and invaded Bulgaria under perhaps the same chief (Uldin), but extensive desertions soon compelled a retreat.

About the year 432 a Hunnic king, Ruas or Rugulas, made himself of such importance that he received from Theodosius II. an annual stipend or tribute of 350 pounds of gold (£14,000), along with the rank of Roman general. Quarrels soon arose, partly out of the circumstance that the Romans had sought tc make alliances with certain Danubian tribes which Ruas chose to regard as properly subject to himself, partly also because some of the undoubted subjects of the Hun had found refuge on Roman territory; and Theodosius, in reply to an indignant and insulting message which he had received about this cause

of dispute, was preparing to send off a special embassy when tidings arrived that Ruas was dead and that he had been succeeded in his kingdom by Attila and Bleda, the two sons of his brother Mundzuk (433). Shortly afterwards the treaty of Margus (not far from the modern Belgrade), where both sides negotiated on horseback, was ratified. By its stipulations the yearly stipendium or tribute payable to Attila by the Romans was doubled; the fugitives were to be surrendered, or a fine of £8 to be paid for each of those who should be missing; free markets, open to Hun and Roman alike,

were to be instituted; and any tribe with which Attila might be at any time at war was thereby to be held as excluded from alliance with Rome. For eight years afterwards there was peace so far as the Romans were concerned; and it was probably during this period that the Huns proceeded to the extensive conquests to which the con- temporary historian Priscus so vaguely alludes in the words: " He (Attila) has made the whole of Scythia his own, he has laid the Roman empire under tribute, and he thinks of renewing his attacks upon Persia. The road to that eastern kingdom is not untrodden by the Huns; already they have marched fifteen days from a certain lake, and have ravaged Media." They also appear before the end of this interval to have pushed westward as far as to the Rhone, and to have come into conflict with the Burgundians. Overt acts of hostility, how- ever, occurred against the Eastern empire when the town of Margus (by the treachery of its bishop) was seized and sacked (441), and against the Western when Sirmium was invested and taken.

In 445 Bleda died, and two years afterwards Attila, now sole ruler, undertook one of his most important expeditions against the Eastern empire; on this occasion he pushed southwards as far as Thermopylae, Gallipoli and the walls of Constantinople; peace was cheaply purchased by tripling the yearly tribute (which accordingly now stood at 2100 pounds of gold, or £84,000 sterling) and by the payment of a heavy indemnity. In 448 again occurred various diplomatic negotiations, and especially the embassy of Maximinus, of which many curious details have been recorded by Priscus his companion. Then followed, in 451, that westward movement across the Rhine which was only arrested at last, with terrible slaughter, on the Catalaunian plains (according to common belief, in the neighbourhood of the modern Chalons, but more probably at a point some 50 m. to the south-east, near Mery-sur-Seine). The following year (452), that of the Italian campaign, was marked by such events as the sack of Aquileia, the destruction of the cities of Venetia, and finally, on the banks of the Mincio, that historical interview with Pope Leo I. which resulted in the return of Attila to Pannonia, where in 453 he died (see Attila). Almost immediately after- wards the empire he had amassed rather than consolidated fell to pieces. His too numerous sons began to quarrel about their inheritance, while Ardaric, the king of the Gepidae, was placing himself at the head of a general revolt of the dependent nations. The inevitable struggle came to a crisis near the river Netad in Pannonia, in a battle in which 30,000 of the Huns and their confederates, including Ellak, Attila's eldest son, were slain. The nation, thus broken, rapidly dispersed, exactly as the White Huns did after a similar defeat about a hundred years later. One horde settled under Roman protection in Little Scythia (the Dobrudzha), others in Dacia Ripensis (on the confines of Servia and Bulgaria) or on the southern borders of Pannonia. Many, however, appear to have returned to what is

now South Russia, and may perhaps have taken part in the ethnical combinations which produced the Bulgarians.

The chief original authorities are Ammianus Marcellinus, Priscus, Jordanes, Procopius, Sidonius Apollinaris and Menander Protector. See also Gibbon, Decline and Fall of the Roman Empire ; J. B. Bury, History of the Later Roman Empire (1889); H. H. Howorth, History of the Mongols (1876-1888) ; J. Hodgkin, Italy and her Invaders (1892); and articles in the Revue orientate pour les etudes Oural- altaiques. For the Chinese sources see E. H. Parker, A Thousand Years of the Tartars (1905), and numerous articles by the same author in the Asiatic Quarterly; also articles by Chavannes, O. Franke, Stein and others in various learned periodicals. For the literature on the White Huns see Ephthalites. (C. El.)

HUNSDON, HENRY CAREY, ist Baron (c. 1524-1596), English soldier and courtier, was a son of William Carey (d. 1529); his mother was Mary (d. 1543), a sister of Anne Boleyn, and he was consequently cousin to Queen Elizabeth. Member of parliament for Buckingham under Edward VI. and Mary, he was knighted in 1558, was created Baron Hunsdon in 1559, and in 1561 became a privy councillor and a knight of the Garter. In 1568 he became governor of Berwick and warden of the east Marches, and he was largely instrumental in quelling the rising in the north of England in 1569, gaining a decisive victory over Leonard Dacre near Carlisle in February 1570. Hunsdon received very little money to cover his expenses, but Elizabeth lavished honours upon him, although he did not always carry out her wishes. In 1583 he became lord chamberlain, but he did not relinquish his post at Berwick. Hunsdon was one of the commissioners appointed to try Mary queen of Scots; after Mary's execution he went on a mission to James VI. of Scotland, and when the Spanish Armada was expected he commanded the queen's bodyguard. He died in London, at Somerset House, on the 23rd of July 1596.

His eldest son, George (1 547-1603), 2nd Baron Hunsdon, was a member of parliament, a diplomatist, a soldier and lord chamberlain. He was also captain-general of the Isle of Wight during the time of the Spanish Armada. He was succeeded by his brother John (d. 1617). In 1628 John's son Henry, 4th Baron Hunsdon, was created earl of Dover. This title became extinct on the death of the 2nd earl, John, in 1677, and a like fate befell the barony of Hunsdon on the death of the 8th baron, William Ferdinand, in June 1765. Elizabeth, daughter of Sir John Spencer of Althorp, and wife of the 2nd Lord Hunsdon, is celebrated as the patroness of her kinsman,

the poet Spenser; and either this lady or her daughter Elizabeth was the author of the Tragedie of Marian (16 13).

The ist lord's youngest son, Robert Carey (c. 1560-1639), was for a long time a member of the English parliament. He 'was frequently employed on the Scottish borders; he announced the death of Elizabeth to James VI. of Scotland; and he was created earl of Monmouth in 1626. He wrote some interesting Memoirs, first published in 1759. His son and successor, Henry (1596-1661), is known as a translator of various French and Italian books. The title of earl of Monmouth became extinct on his death in June 1661.

HUNSTANTON [commonly pronounced Hunston], a seaside resort in the north-western parliamentary division of Norfolk, England, on the east shore of the Wash, 112 m. N. by E. from London by the Great Eastern railway. Pop. of urban district of New Hunstanton (1901) 1893. The new watering-place is about 1 m. from the old village. It has a good beach, a golf course and a pier. The parish church of St Mary is a fine Decorated building, containing monuments of the L'Estrange family, whose mansion, Hunstanton Hall, is a picturesque Tudor building of brick in a well-wooded park. A convalescent home (1872) commemorates the recovery from illness of King Edward VII. when Prince of Wales. At Brancaster, 6 m. E., there is a Roman fort which formed part of the defences of the Litus Saxonicum (4th century a.d.)

HUNT, ALFRED WILLIAM (1830-1896), English painter, son of Andrew Hunt, a landscape painter, was born at Liverpool in 1830. He began to paint while at the Liverpool Collegiate School; but as the idea of adopting the artist's profession was not favoured by his father, he went in 1848 to Corpus Christi College, Oxford. His career there was distinguished; he won the Newdigate Prize in 1851, and became a Fellow of Corpus in 1858. He did not, however, abandon his artistic practice, for, encouraged by Ruskin, he exhibited at the Royal Academy in 1854, and thenceforward regularly contributed landscapes in oil and water-colour to the London and provincial exhibitions. In 1 86 1 he married, gave up his Fellowship, and was elected an Associate of the Royal Society of Painters in Water-Colours, receiving full membership three years later. His work is distin- guished mainly by its exquisite quality and a poetic rendering of atmosphere. Hunt died on 3rd May 1896. Mrs A. W. Hunt

{nee Margaret Raine) wrote several works of fiction; and one of her daughters, Violet Hunt, is well known as a novelist.

See Frederick Wedmore, " Alfred Hunt," Magazine of Art (1891); Exhibition of Drawings in Water Colour by Alfred William Hunt,

Burlington Fine Arts Club (1897).

HUNT, HENRY (1773-1835), English politician, commonly called " Orator Hunt," was born at Widdington Farm, Upavon, Wiltshire, on the 6th of November 1773. While following the vocation of a farmer he made the acquaintance of John Home Tooke, with whose advanced views he soon began to sympathize. At the general election of 1806 he came to the front in Wiltshire; he soon associated himself with William Cobbett, and in 181 2 he was an unsuccessful candidate for Bristol. He was one of the speakers at the meeting held in Spa Fields, London, in November 1816; in 1818 he tried in vain to become member of parliament for Westminster, and in 1820 for Preston. In August 1819 Hunt presided over the great meeting in St Peter's Field, Manchester, which developed into a riot and was called the " Peterloo massacre. " He was arrested and was tried for conspiracy, being sentenced to imprisonment for two years and a half. In August 1830 he was elected member of parliament for Preston, but he lost his seat in 1833. While in parliament Hunt presented a petition in favour of women's rights, probably the first of this kind, and he moved for a repeal of the corn laws. He died on the 15th of February 1835. During his imprisonment Hunt wrote his Memoirs which were published in 1820.

See R. Huish, Life of Hunt (1836); and S. Bamford, Passages in the Life of a Radical (2nd ed., 1893).

HUNT, HENRY JACKSON (1819-1889), American soldier, was born in Detroit, Michigan, on the 14th of September 1819, and graduated at the U.S. military academy in 1839. He served in the Mexican War under Scott, and was breveted for gallantry at Contreras and Churubusco and at Chapultepec. He became captain in 1852 and major in 1861. His professional attainments were great, and in 1856 he was a member of a board entrusted with the revision of light artillery drill and tactics. He took part in the first battle of Bull Run in 1861, and soon afterwards became chief of artillery in the Washington defences. As a colonel on the staff of General M'Clellan he organized and trained the artillery reserve of the Army of the Potomac. Throughout the Civil War he contributed more than any officer to the effective employment of the artillery arm. With the artillery reserve he rendered the greatest assistance at the battle of Malvern Hill, and soon afterwards he became chief of artillery in the Army of the Potomac. On the day after the battle of South Mountain he was made brigadier-general of volunteers. At the Antietam, Fredericksburg and Chancellors- ville, he rendered further good service, and at Gettysburg his handling of the artillery was conspicuous in the repulse of Pickett's charge, and he was rewarded with the brevet of colonel. He served in Virginia to the end of the war, attaining the brevet ranks of major-general of volunteers and brigadier-general of regulars. When the U.S. army was

reorganized in 1866 he became colonel of the 5th artillery and president of the permanent Artillery Board. He held various commands until 1883, when he retired to become governor of the Soldiers' Home, Washington, D.C. He died on the nth of February 1889. He was the author of Instructions for Field Artillery (i860), and of papers on Gettysburg in the " Battles and Leaders " series.

His brother, Lewis Cass Hunt (1 824-1886), served throughout the Civil War in the infantry arm, becoming brigadier-general of volunteers in 1862, and brevet brigadier-general U.S.A. in 1865. HUNT, JAMES HENRY LEIGH (1784-1859), English essayist and miscellaneous writer, was born at Southgate, Middlesex, on the 19th of October 1784. His father, the son of a West Indian clergyman, had settled as a lawyer in Philadelphia, and his mother was the daughter of a merchant there. Having embraced the loyalist side, Leigh Hunt's father was compelled to fly to England, where he took orders, and acquired some reputation as a popular preacher, but want of steadiness, want of orthodoxy, and want of interest conspired to prevent his obtaining any preferment. He was engaged by James Brydges, 3rd duke of Chandos, to act as tutor to his nephew, James

Henry Leigh, after wbom Leigh Hunt was called. The boy was educated at Christ's Hospital, of which school he has left a lively account in his autobiography. As a boy at school he was an ardent admirer of Gray and Collins, writing many verses in imitation of them. An impediment in his speech, afterwards removed, prevented his being sent to the university. " For some time after I left school," he says, " I did nothing but visit my school-fellows, haunt the book-stalls and write verses." These latter were published in 1801 under the title of Juvenilia, and contributed to introduce him into literary and theatrical society. He began to write for the newspapers, and published in 1807 a volume of theatrical criticisms, and a series of Classic Tales with critical essays on the authors.

In 1808 he quitted the War Office, where he had for some time been a clerk, to become editor of the Examiner newspaper, a speculation of his brother John. The new journal with which Leigh Hunt was connected for thirteen years soon acquired a high reputation. It was perhaps the only newspaper of the time which owed no allegiance to any political party, but assailed whatever seemed amiss, " from a principle of taste," as Keats happily expressed it. The taste of the attack itself, indeed, was not alwavs unexceptionable; and one upon the Prince Regent, the chief sting of which lay in its substantial truth, occasioned (1813) a prosecution and a sentence

of two years' imprisonment for each of the brothers. The effect was to give a political direction to what should have been the career of a man of letters. But the cheerfulness and gaiety with which Leigh Hunt bore his imprisonment attracted general attention and sympathy, and brought him visits from Byron, Moore, Brougham and others, whose acquaintance exerted much influence on his future destiny.

In 1810-1811 he edited for his brother John a quarterly magazine, the Reflector, for which he wrote " The Feast of the Poets," a satire which gave offence to many contemporary poets, and particularly offended William Gifford of the Quarterly. The essays afterwards published under the title of the Round Table (2 vols., 1816-1817), conjointly with William Hazlitt, appeared in the Examiner. In 1816 he made a permanent mark in English literature by the publication of his Story of Rimini. There is perhaps no other instance of a poem short of the highest excellence having produced so important and durable an effect in modifying the accepted standards of literary com- position. The secret of Hunt's success consists less in superiority of genius than of taste. His refined critical perception had detected the superiority of Chaucer's versification, as adapted to the present state of the language by Dryden, over the sententious epigrammatic couplet of Pope which had superseded it. By a simple return to the old manner he effected for English poetry in the comparatively restricted domain of metrical art what Wordsworth had already effected in the domain of nature; his is an achievement of the same class, though not of the same calibre. His poem is also a triumph in the art of poetical narra- tive, abounds with verbal felicities, and is pervaded throughout by a free, cheerful and animated spirit, notwithstanding the tragic nature of the subject. It has been remarked that it does not contain one hackneyed or conventional rhyme. But the writer's occasional flippancy and familiarity, not seldom degen- erating into the ludicrous, made him a mark for ridicule and parody on the part of his opponents, whose animosity, however, was rather political than literary.

In 1818 appeared a collection of poems entitled Foliage, followed in 1819 by Hero and Leander, and Bacchus and Ariadne. In the same year he reprinted these two works with The Story of Rimini and The Descent of Liberty with the title of Poetical Works, and started the Indicator, in which some of his best work appeared. Both Keats and Shelley belonged to the circle gathered around him at Hampstead, which also included William Hazlitt, Charles Lamb, Bryan Procter, Benjamin Haydon, Cowden Clarke, C. W. Dilke, Walter Coulson, 1 John Hamilton

1 Walter Coulson (1794? — 1860), lawyer and journalist, was at one time amanuensis to Jeremy Bentham, and became in 1823 editor of the Globe.

Reynolds, 2 and in general almost all the rising young men of letters of liberal sympathies. He had now for some years been married to Marianne Kent, who seems to have been sincerely attached to him, but was not in every respect a desirable partner. His own affairs were by this time in the utmost confusion, and he was only saved from ruin by the romantic generosity of Shelley. In return he was lavish of sympathy to Shelley at the time of the latter's domestic distresses, and defended him with spirit in the Examiner, although he does not appear to have at this date appreciated his genius with either the discernment or the warmth of his generous adversary, Professor Wilson. Keats he welcomed with enthusiasm, and introduced to Shelley. He also wrote a very generous appreciation of him in the Indicator, and, before leaving for Italy, Keats stayed with Hunt at Hampstead. Keats seems, however, to have subsequently felt that Hunt's example as a poet had been in some respects detrimental to him. After Shelley's departure for Italy (1818) Leigh Hunt's affairs became still more embarrassed, and the pro- spects of political reform less and less satisfactory. His health and his wife's failed, and he was obliged to discontinue his charming series of essays entitled the Indicator (1819-1821), having, he says, " almost died over the last numbers." These circumstances induced him to listen to a proposal, which seems to have originated with Shelley, that he should proceed to Italy and join Shelley and Byron in the establishment of a quarterly magazine in which Liberal opinions should be advocated with more freedom than was possible at home. The project was injudicious from every point of view; it would have done little for Hunt or the Liberal cause at the best, and depended entirely upon the co-operation of Byron, the most capricious of allies, and the most parsimonious of paymasters. Byron's principal motive for acceding to it appears to have been the expectation of acquiring influence over the Examiner, and he was exceedingly mortified on discovering when too late that Hunt had parted, or was con- sidered to have parted, with his interest in the journal. Leigh Hunt left England for Italy in November 1821, but storm, sickness and misadventure retarded his arrival until the 1st of July 1822, a rate of progress which T. L. Peacock appropriately compares to the navigation of Ulysses.

The tragic death of Shelley, a few weeks later, destroyed every prospect of success for the Liberal. Hunt was now virtually a dependant upon Byron, whose least amiable qualities were called forth by the relation of patron to an unsympathetic dependant, burdened with a large and troublesome family. He was moreover incessantly wounded by the representations of his friends that he was losing caste by the connexion. The Liberal lived through four quarterly numbers, containing contributions no less memorable than Byron's " Vision of Judgment " and Shelley's translations from Faust; but in 1823 Byron sailed for Greece, leaving his coadjutor at Genoa to shift for

himself. The Italian climate and manners, however, were entirely to Hunt's taste, and he pro- tracted his residence until 1825, producing in the interim Ultra- Crepidarius, a Satire on William Gifford (1823), and his matchless translation (1825) of Francesco Redi's Bacco in Toscana. In 1825 an unfortunate litigation with his brother brought him back to England, and in 1828 he committed his greatest mistake by the publication of his Lord Byron and some of his Contemporaries. The work is of considerable value as a corrective of merely idealized estimates of Lord Byron. But such a corrective should not have come from one who had lain under obligations to Byron. British ideas of what was decent were shocked, and the author especially writhed under the withering satire of Moofe. For many years ensuing the history of Hunt's life is that of a painful struggle with poverty and sickness. He worked un- remittingly, but one effort failed after another. Two journalistic ventures, the Taller (1830-183 2), a daily devoted to literary and dramatic criticism, and Leigh Hunt' s London Journal ! (1834-183 5) ,

2 John Hamilton Reynolds (1796-1852), best known for his friend- ship and correspondence with Keats. His narrative verse founded on the tales of Boccaccio appeared in 1821 as The Garden of Florence and other Poems. He wrote some admirable sonnets, one of which is addressed to Keats.

were discontinued for want of subscribers, although in the latter Leigh Hunt had able coadjutors, and it contained some of his best writing. His editorship (1837-1838) of the Monthly Repository, in which he succeeded W. J. Fox, was also unsuccess- ful. The adventitious circumstances which had for a time made the fortune of the Examiner no longer existed, and Hunt's strong and weak points, his refinement and his affectations, were alike unsuited to the general'.body of readers.

In 1832 a collected edition of his poems was published by subscription, the list of subscribers including many of his opponents. In the same year was printed for private circulation Chrislianism, the work afterwards published (1853) as The Religion of the Heart. A copy sent to Carlyle secured his friend- ship, and Hunt went to live next door to him in Cheyne Row in 1833. Sir Ralph Esher, a romance of Charles II. 's period, had a success, and Captain Sword and Captain Pen (1835), a spirited contrast between the victories of peace and the victories of war, deserves to be ranked among his best poems. In 1840 his cir- cumstances were improved by the successful representation at Covent Garden of his Legend of Florence, a play of considerable merit. Lover's Amazements, a comedy, was acted

several years afterwards, and was printed in Leigh Hunt's Journal (1850-1851) ; and other plays remained in MS. In 1840 he wrote introductory notices to the work of R. B. Sheridan and to Moxon's edition of the works of Wycherley, Congreve, Vanbrugh and Farquhar, a work which furnished the occasion of Macaulay's essay on the Dramatists 0} the Restoration. The pretty narrative poem of The Palfrey was published in 1842.

The time of Hunt's greatest difficulties was between 1834 and 1840. He was at times in absolute want, and his distress was | aggravated by domestic complications. By Macaulay's recom- mendation he began to write for the Edinburgh Review. In 1844 he was further benefited by the generosity of Mrs Shelley and her son, who, on succeeding to the family estates, settled an annuity of £120 upon him; and in 1847 Lord John Russell procured him a civil list pension of £200. The fruits of the improved comfort and augmented leisure of these latter years were visible in the production of some charming volumes. Foremost among these are the companion books, Imagination and Fancy (1844), and Wit and Humour (1846), two volumes of selections from the English poets. In these Leigh Hunt shows himself within a certain range the most refined, appreciative and felicitous of critics. Homer and Milton may be upon the whole beyond his reach, though even here he is great in the detection of minor and unapprehended beauties; with Spenser and the old English dramatists he is perfectly at home, and his subtle and discriminating criticism upon them, as well as upon his own great contemporaries, is continually bringing to light unsuspected beauties. His companion volume on the pastoral poetry of Sicily, quaintly entitled A Jar of Honey from Mount Hybla (1848). is aimost equally delightful. The Town (2 vols., 1848) and Men, Women and Books (2 vols., 1847) are partly made up from former material. The Old Court Suburb (2 vols., 1855; ed. A. Dobson, 1902) is an anecdotic sketch of Kensington, where he long resided before his final removal to Hammersmith. In 1850 he published his Autobiography (3 vols.), a na'ive and accurate piece of self-portraiture, full of affectations, but on that account free from the affectation of unreality. It contains very detailed accounts of some of the most interesting periods of the author's life, his education at Christ's Hospital, his imprisonment, and his residence in Italy. A Book for a Corner (2 vols.) was published in 1840, and his Table Talk appeared in 1851. In 1855 his narrative poems, original and translated, were collected under the title of Stories in Verse, with an interest- ing preface. He died at Putney on the 28th of August 1859.

Leigh Hunt's virtues were charming rather than imposing or brilliant; he had no vices, but very many foibles. His great misfortune was that these foibles were for the most part of an undignified sort. His affectation is not comparable to Byron's, nor his egotism to Wordsworth's, but their very

pettiness excites a sensation of the ludicrous. The very sincerity of his nature is detrimental to him; the whole man seems to be revealed

in everything he ever wrote, and hence the most beautiful pro- ductions of his pen appear in a manner tainted by his really very pardonable weaknesses. Some of these, such as his helplessness in money matters, and his facility in accepting the obligations which he would have delighted to confer, involved him in painful and humiliating embarrassments, which seem to have been aggravated by the mismanagement of those around him. The notoriety of these things has deprived him of much of the honour due to him for his fortitude under the severest calamities, for his unremitting literary industry under the most discouraging circumstances, and for his uncompromising independence as a journalist and an author. It was his misfortune to be involved in politics, for he was as thorough a man of letters as ever existed, and most of his failings were more or less incidental to that character. But it is not every consummate man of letters of whom it can be unhesitatingly affirmed that he was brave, just and pious. When it was suggested that Leigh Hunt was the original of Harold Skimpole in Bleak House, Charles Dickens denied that any of the shadows in the portrait were suggested by Hunt, who was, he said, " the very soul of truth and honour." Leigh Hunt's character as an author was the counterpart of his character as a man. In some respects his literary position is unique. Few men have effected so much by mere exquisiteness of taste in the absence of high creative power; fewer still, so richly endowed with taste, have so frequently and conspicuously betrayed the want of it; and he was incapable of discovering where familiarity became flippancy. But his poetry possesses a brightness, animation, artistic symmetry and metrical harmony, which lift the author out of the rank of minor poets, particularly when the influence of his example upon his contemporaries is taken into account. He excelled especially in narrative poetry, of which, upon a small scale, there are probably no better examples than " Abou ben Adhem " and " Solomon's Ring." He possessed every qualification for a translator; and as an appreciative critic, whether literary or dramatic, he has hardly been equalled.

Leigh Hunt's other works include: Amyntas, A Tale of the Woods (1820), translated from Tasso; The Seer, or Common-Places refreshed (2 pts., 1840-1841); three of the Canterbury Tales in Tlie Poems of Geoffrey Chaucer, modernized (1841); Stories from the Italian Poets (1846}; compilations such as One Hundred Romances of Real Life (1843); selections from Beaumont and Fletcher (1855); and, with S, Adams Lee, The Book of the Sonnet (Boston, 1867). His Poetical Works (2 vols.), revised by himself and edited by Lee, were printed at Boston, U.S.A., in 1857, and an edition (London and New York) by his son, Thornton Hunt, appeared in i860. Among volumes of selections are: Essays (1887), ed. A.

Symons; Leigh Hunt as Poet and Essayist (1889), ed. C. Kent; Essays and Poems (1891), ed. I R. B. Johnson for the " Temple Library."

I His Autobiography was revised by himself shortly before his death, and edited (1859) by his son Thornton Hunt, who also arranged his Correspondence (2 vols., 1862). Additional letters were printed by the Covvden Clarkes in their Recollections of Writers (1878). The Autobiography was edited (2 vols., 1903) with full bibliographical note by R. Ingpen. A bibliography of his works was compiled by Alexander Ireland (List of the Writings of William Hazlitt and Leigh Hunt, 1868). There are short lives of Hunt by Cosmo Monkhouse (" Great Writers," 1893) and by R. B. Johnson (1896).

HUNT, ROBERT (1807-1887), English natural philosopher, was born at Devonport on the 6th of September 1807. His father, a naval officer, was drowned while Robert was a youth. He began to study in London for the medical profession, but ill-health caused him to return to the west of England, and in 1840 he became secretary to the Royal Cornwall Polytechnic Society at Falmouth. Here he was brought into contact with Robert Were Fox, and carried on some physical and chemical investigations with him. He took up photography with great zeal, following Daguerre's discovery, and introducing new processes. His Manual of Photography (1841, ed. 5, 1857) was the first English treatise on the subject. He also experimented generally on the action of light, and published Researches on Light (1844). In 1845 he accepted the invitation of Sir Henry de la Beche to become keeper of mining records at the Museum of Economic (afterwards " Practical ") Geology, and when the school of mines was established in 1851 he lectured for two years on mechanical science, and afterwards for a short time on

experimental physics. His principal work was the collection and editing of the Mineral Statistics of the United Kingdom, and this he continued to the date of his retirement (1883), when the mining record office was transferred to the Home Office. He was elected F.R.S. in 1854. In 1884 he published a large volume on British Mining, in which the subject was dealt with very fully from an historical as well as a practical point of view. He also edited the fifth and some later editions of Ure's Dictionary of Arts, Mines and Manufactures. He died in London on the 17th of October 1887. A mineralogical museum at Redruth has been established in his memory.

HUNT, THOMAS STERRY (1826-1892), American geologist and chemist,

was born at Norwich, Conn., on the 5th of September 1826. He lost his father when twelve years old, and had to earn his own livelihood. In the course of two years he found employ- ment in a printing office, in an apothecary's shop, in a book store and as a clerk. He became interested in natural science, and especially in chemical and medical studies, and in 1845 he was elected a member of the Association of American Geologists and Naturalists at Yale — a body which four years later became the American Association for the Advancement of Science. In 1848 he read a paper in Philadelphia On Acid Springs and Gypsum Deposits of the Onondaga Salt Group. At Yale he became assistant to Professor B. Silliman, Jun., and in 1846 was appointed chemist to the Geological Survey of Vermont. In 1847 ne was appointed to similar duties on the Canadian Geological Survey at Montreal under Sir William Logan, and this post he held until 1872. In 1859 he was elected F.R.S., and he was one of the original members and president of the Royal Society of Canada. He was a frequent contributor to scientific journals, writing on the crystalline limestones, the origin of continents, the chemistry of the primeval earth, on serpentines, &c. He also wrote a notable " Essay on the History of the names Cambrian and Silurian" (Canadian Naturalist, 1872), in which the claims of Sedgwick, with respect to the grouping of the Cambrian strata, were forcibly advocated. He died in New York City on the 12th of February 1892.

His publications include Chemical and Geological Essays (1875, ed. 2, 1879); Mineral Physiology and Physiography (1886); A New Basis for Chemistry (1887, ed. 3, 1891); Systematic Mineralogy (1891). See an obituary notice by Persifor Frazer, Amer. Geologist (xi. Jan. 1893), with portrait.

HUNT, WILLIAM HENRY (1790-1864), English water-colour painter, was born near Long Acre, London, on the 28th of March 1790. He was apprenticed about 1805 to John Varley, the landscape-painter, with whom he remained five or six years, exhibiting three oil pictures at the Royal Academy in 1807. He was early connected with the Society of Painters in Water- colour, of which body, then in a transition state, he was elected associate in 1824, and full member in 1827. To its exhibitions he was until the year of his death one of the most prolific contributors. Many years of Hunt's uneventful and industrious life were passed at Hastings. He died of apoplexy on the 10th of February 1864. Hunt was one of the creators of the English school of water-colour painting. His subjects, especially those of his later life, are extremely simple; but, by the delicacy, humour and fine power of their treatment, they rank second to works of the highest. art only. Considered technically, his works exhibit all the resources of the water-colour painter's craft, from the purest transparent tinting to the boldest use of body- colour, rough paper and scraping for texture. His sense

of colour is perhaps as true as that of any English artist. " He was," says Ruskin, " take him for all in all, the finest painter of still life that ever existed." Several characteristic examples of Hunt's work, as the "Boy and Goat," "Brown Study" and " Plums, Primroses and Birds' Nests " are in the Victoria and Albert Museum.

HUNT, WILLIAM HOLMAN (1827-1910), English artist, was born in London on the 2nd of April 1827. An ancestor on his father's side bore arms against Charles I., and went over to Holland, where he fought in the Protestant cause. He returned with William III., but the family failed to recover their property. Holman Hunt's father was the manager of a city warehouse,

with tastes superior to his position in life. He loved books and pictures, and encouraged his son to pursue art as an amusement, though not as a profession. At the age of twelve and a half Holman Hunt was placed in a city office, but he employed his leisure in reading, drawing and painting, and at sixteen began an independent career as an artist. When he was between seventeen and eighteen he entered the Royal Academy schools, where he soon made acquaintance with his lifelong friend John Everett Millais, then a boy of fifteen. In 1846 Holman Hunt sent to the Royal Academy his first picture (" Hark ! "), which was followed by " Dr Rochecliffe performing Divine Service in the Cottage of Joceline Joliffe at Woodstock," in 1847, and " The Flight of Madeline and Porphyrio" (from Keats's Eve of St Aghes) in 1848. In this year he and Millais, with the co-operation of Dante Gabriel Rossetti and others, initiated the famous Pre-Raphaelite movement in art. Typical examples of the new creed were furnished in the next year's Academy by Millais's " Isabella " and Holman Hunt's " Rienzi vowing to obtain Justice for the Death of his Young Brother." This last pathetic picture, which was sold to Mr Gibbons for £105, was followed in 1850 by " A Converted British Family sheltering a Christian Missionary from the Persecution of the Druids " (bought by Mr Combe, of the Clarendon Press, Oxford, for £150), and in 1851 by " Valentine protecting Sylvia from Proteus." This scene from The Two Gentlemen of Verona was very warmly praised by Ruskin (in letters to The Times), who declared that as studies both of drapery and of every minor detail there had been nothing in art so earnest and complete since the days of Albert Durer. It gained a prize at Liverpool, and is reckoned as the finest of Holman Hunt's earlier works. In 1852 he exhibited " A Hireling Shepherd." " Claudio and Isabella," from Measure for Measure, and a brilliant study of the Downs near Hastings, called in the catalogue " Our English Coasts, 1852 " (since generally known as " Strayed Sheep "), were exhibited in 1853. For three of his works Holman Hunt was awarded prizes of £50 and £60 at Liverpool and Birmingham, but in 1851 he had become so discouraged by the difficulty of selling his pictures, that he had

resolved to give up art and learn farming, with a view to emigration. In 1854 he achieved his first great success by the famous picture of " The Light of the World," an allegorical representation of Christ knocking at the door of the human soul. This work produced perhaps the greatest effect of any religious painting of the century. " For the first time in England," wrote William Bell Scott, " a picture became a subject of con- versation and general interest from one end of the island to the other, and indeed continued so for many years." " The Awaken- ing Conscience," exhibited at the same time, depicted a tragic moment in a life of sin, when a girl, stricken with memories of her innocent childhood, rises suddenly from the knees of her para- mour. The inner meaning of both these pictures was explained by Ruskin in letters to The Times in May 1854. " The Light of the World " was purchased by Mr Combe, and was given by his wife to Keble College. In 1904 Holman Hunt completed a second " Light of the World," slightly altered from the original, the execution of which was due to his dissatisfaction with the way in which the Keble picture was shown there; and he in- tended the second edition of it for as wide public exhibition as possible. It was acquired by Mr Charles Booth, who arranged for the exhibition of the new " Light of the World " in all the large cities of the colonies.

In January 1854 Holman Hunt left England for Syria and Palestine with thedesire to revivifyoncanvas the facts of Scripture, history, " surrounded by the very people and circumstances of the life in Judaea of old days." The first fruit of this idea, which may be. said to have dominated the artist's life, was " The Scapegoat," a solitary outcast animal standing alone on the salt-encrusted shores of the Dead Sea, with the mountains of Edom in the distance, seen under a gorgeous effect of purple evening light. It was exhibited at the Royal Academy in 1856, together with three Eastern landscapes. His next picture (i860), one of the most elaborate and most successful of his works, was " The Finding of our Saviour in the Temple." Like all his

important pictures, it was the work of years. Many causes contributed to the delay in its completion, including a sentence of what was tantamount to excommunication (afterwards revoked) passed on all Jews acting as models. Thousands crowded to see this picture, which was exhibited in London and in many English provincial towns. It was purchased for £5500, and is now in the Birmingham Municipal Art Gallery. Holman Hunt's next great religious picture was " The Shadow of Death " (exhibited separately in 1873), an imaginary incident in the life of our Lord, who, lifting His arms with weariness after labour in His workshop, throws a shadow on the wall as of a man crucified, which is perceived by His mother. This work was presented to Manchester by Sir William Agnew. Meanwhile there had appeared at the Royal Academy in 1861 " A Street in Cairo: The Lanternmaker's Courtship," and in 1863 " The King of Hearts," and a portrait of the Right Hon. Stephen Lushington, D.C.L. In 1866 came " Isabella and the Pot of Basil," " London Bridge on the Night of the Marriage of the Prince of Wales," and " The Afterglow." In 1867 Holman Hunt sent a charming head of " A Tuscan Girl " to the Grosvenor Gallery and two pictures to the Royal Academy. These were " II dolce far niente " and a lifelike study of pigeons in rain called " The Festival of St Swithin," now in the Taylor Building, Oxford, with many others of this artist's work. After two years' absence Holman Hunt returned to Jerusalem in 1875, where he was engaged upon his great picture of " The Triumph of the Innocents," which proved to be the most serious labour of his life. The subject is an imaginary episode of the flight into Egypt, in which the Holy Family are attended by a procession of the Holy Innocents, marching along the waters of life and illuminated with unearthly light. Its execution was delayed by an extraordinary chapter of accidents. For months Holman Hunt waited in vain for the arrival of his materials, and at last he unfortunately began on an unsuitable piece of linen procured in despair at Jerusalem. Other troubles supervened, and when he arrived in England he found his picture in such a state that he was compelled to abandon it and begin again. The new version of the work, which is somewhat larger and changed in several points, was not completed till 1885. Meanwhile the old picture was relined and so skilfully treated that the artist was able to complete it satisfactorily, and there are now two pictures entitled " The Triumph of the Innocents," one in the Liverpool, the other in the Birmingham Art Gallery. The pictures ex- hibited between 1875 and 1885 included "The Ship," a realistic picture of the deck of a passenger ship by night (1878), and portraits of his son (1880), Sir Richard Owen (1881) and Dante Gabriel Rossetti (1884). All of these were exhibited at the Grosvenor Gallery, where they were followed by " The Bride of Bethlehem " (1885), " Amaryllis " and a portrait of his son (tracing a drawing on a

window) in 1886. His most important later work is " May-Day, Magdalen Tower," a record of the service of song which has been held on the tower of Magdalen, Oxford, at sunrise on May-Day from time immemorial. The subject had interested the artist for a great many years, and, after " The Triumph of the Innocents " was completed, he worked at it with his usual devotion, climbing up the tower for weeks together in the early morning to study the sunrise from the top. This radiant poem of the simplest and purest devotion was exhibited at the Gainsborough Gallery in Old Bond Street in 1 89 1. He continued to send occasional contributions to the exhibitions cf the Royal Water-Colour Society, to the New Gallery and to the New English Art Club. One of the most remarkable of his later works (New Gallery, 1899) is " The Miracle of Sacred Fire in the Church of the Sepulchre, Jerusalem." By his strong and constant individuality, no less than by his peculiar methods of work, Holman Hunt holds a somewhat isolated position among artists. He remained entirely unaffected by all the various movements in the art-world after 1850. His ambition was always " to serve as high priest and expounder of the excellence of the works of the Creator." He spent too much labour on each work to complete many; but perhaps no painter of the 19th century produced so great an impression by a

few pictures as the painter of " The Light of the World," " The Scapegoat," " The Finding of our Saviour in the Temple " and " The Triumph of the Innocents "; and his greatness was recognized by his inclusion in the Order of Merit. His History of Pre-Raphaelitism, a subject on which he could speak as a first authority, but not without dissent from at least one living member of the P.R.B., was published in 1905. On the 7th of September 19 10 he died in London, and on September 12th his remains, after cremation at Golder's Green, were buried in St Paul's Cathedral, with national honours.

See Archdeacon Farrar and Mrs Alice Meynell, " William Holman Hunt, his Life and Work" {Art Annual) (London, 1893); John Ruskin, Modern Painters; The Art of England (Lecture) [consult Gordon Crauford's Ruskin's Notes on the Pictures of Mr Holman Hunt, 1886]; Robert de la Sizeranne, La Peinture anglaise con- temporaine (Paris, 1895); W. B. Scott, Autobiographical Notes; W. M. Rossetti, Pre-Raphaelite Diaries and Letters; Percy H. Bate, The Pre-Raphaelite Painters (1899); Sir W. Bayliss, Five Great Painters of the Victorian Era (1902). (C. Mo.)

HUNT, WILLIAM MORRIS (1824-1879), American painter, was born at Brattleboro, Vermont, on the 31st of March 1824. His father's family were large landowners in the state. He was for a time (1840) at Harvard, but his real education began when he accompanied his mother and brother to Europe, where he studied with Couture in Paris and then came under the

influence of Jean Francois Millet. The companionship of Millet had a lasting influence on Hunt's character and style, and his work grew in strength, in beauty and in seriousness. He was the real introducer of the Barbizon school to America, and he more than any other turned the rising generation of American painters towards Paris. On his return in 1855 he painted some of his most beautiful pictures, all reminiscent of his life in France and of Millet's influence. Suchare " The Belated Kid," " Girlatthe Fountain," " Hurdy-Gurdy Boy," &c. But the public called for portraits, and it became the fashion to sit to him, among his best paintings in this kind being those of William M. Evarts, Mrs Charles Francis Adams, the Rev. James Freeman Clarke, William H. Gardner, Chief Justice Shaw and Judge Horace Gray. Unfortunately many of his paintings and sketches, together with five large Millets and other art treasures collected by him in Europe, were destroyed in the great Boston fire of 1872. Among his later works American landscapes predominated. They also include the " Bathers " — twice painted — and the allegories for the senate chamber of the State Capitol at Albany, N.Y., now lost by the disintegration of the stone panels on which they were painted. Hunt was drowned at the Isles of Shoals on the 8th of September 1879. His book, Talks about Art (London, 1878), is well known. His brother, Richard Morris Hunt (1828-1895), tne famous architect, was born in Brattleboro, Vermont, on the 31st of October 1828. He studied in Europe (1843-1854), mainly in the Ecole des Beaux Arts at Paris, and in 1854 was appointed inspector of works on the buildings connecting the Tuileries with the Louvre. Under Hector Lefuel he designed the Pavilion de la BibliothSque, opposite the Palais Royal. In 1855 he returned to New York, and was employed on the extension of the Capitol at Washington. He designed the Lenox Library, the Stuyvesant and the Tribune buildings in New York; the theological library, and Marquand chapel at Princeton; the Divinity College and the Scroll and Key building at Yale; the Vanderbilt mausoleum on Staten Island, and the Yorktown monument. For the Administration Building at the World's Columbian Exposition at Chicago in 1893 Hunt received .the gold medal of the Institute of British Architects. Among tftfe most noteworthy of his domestic buildings were the residences of W. K. Vanderbilt and Henry G. Marquand in New York City; George W. Vanderbilt's country house at Biltinore, and several of the large " cottages " at Newport, R.I., including " Marble House " and " The Breakers." He was one of three foreign members of the Italian Society of St Luke, an honorary and corresponding member of the Academie des Beaux Arts and of the Royal Institute of British Architects, and a Chevalier of the Legion of Honour. He was the first to command respect in foreign countries for American architecture, and was the leader

of a school that has established in the United States the manner and the traditions of the Beaux Arts. He took a prominent part in the founding of the American Institute of Architects, and, from 1888, was its president. His talent was eminently practical; and he was almost equally successful in the ornate style of the early Renaissance in France, in the picturesque style of his comfortable villas, and the monumental style of the Lenox Library. There is a beautiful memorial to Hunt in the wall of Central Park, opposite this building, erected in 1898 by the associated art and architectural societies of New York, from designs by Daniel C. French and Bruce Price. He died on the 31st of July 1895.

HUNTER, JOHN (1728-1793), British physiologist and surgeon, was born on the 13th 1 of February 1728, at Long Calderwood, in the parish of East Kilbride, Lanarkshire, being the youngest of the ten children of John and Agnes Hunter. His father, who died on the 30th of October 1741, 2 aged 78, was descended from the old Ayrshire family of Hunter of Hunterston, and his mother was the daughter of a Mr Paul, treasurer of Glasgow. Hunter is said to have made little progress at school, being averse to its restraints and pursuits, and fond of country amusements. When seventeen years old he went to Glasgow, where for a short time he assisted his brother-in-law, Mr Buchanan, a cabinetmaker. Being desirous at length of some settled occupation, he obtained from his brother William (q.v.) permission to aid, under Mr Symonds, in making dissections in his anatomical school, then the most celebrated in London, intending, should he be unsuccess- ful there, to enter the army. He arrived accordingly in the metropolis in September 1748, about a fortnight before the beginning of his brother's autumnal course of lectures. After succeeding beyond expectation with the dissection of the muscles of an arm, he was entrusted with a similar part injected, and from the excellence of his second essay Dr Hunter predicted that he would become a good anatomist. Seemingly John Hunter had hitherto received no instruction in preparation for the special course of life upon which he had entered.

Hard-working, and singularly patient and skilful in dissection, Hunter had by his second winter in London acquired sufficient anatomical knowledge to be entrusted with the charge of his brother's practical class. In the summer months of 1749-1750, at Chelsea Military Hospital, he attended the lectures and operations of William Cheselden, on whose retirement in the following year he became a surgeon's pupil at St Bartholomew's, where Percivall Pott was one of the senior surgeons. In the summer of 1752 he visited Scotland. Sir Everard Home and, following him, Drewry Ottley state that Hunter began in 1754 to assist his brother as his partner in lecturing; according, however, to the European Magazine for 1782, the office of lecturer was offered to Hunter by his brother in 1758, but declined by him on account of the " insuperable embarrassments and objections " which he

felt to speaking in public. In 1734 he became a surgeon's pupil at St George's. Hospital, where he was appointed house-surgeon in 1756. 3 During the period of his connexion with Dr Hunter's school he, in addition to other labours, solved the problem of the descent of the testis in the foetus, traced the ramifications of the nasal and olfactory nerves within the nose, experimentally tested the question whether veins could act as absorbents, studied the formation of pus and the nature of the placental circulation, and with his brother earned the chief merit of practically proving the function and importance of the lymphatics in the animal economy. On the 5th of June 1755, 4 he

1 The date is thus entered in the parish register, see Joseph Adams, Memoirs, Appendix, p. 203. The Hunterian Oration, instituted in 1813 by Dr Matthew Baillie and Sir Everard Home, is delivered at the Royal College of Surgeons on the 14th of February, which Hunter used to give as the anniversary of his birth.

2 Ottley's date, 1738, is inaccurate, see S. F. Simmons, Account of . . . W. Hunter, p. 7. Hunter's mother died on the 3rd of November 1751, aged 66.

3 So in Home's Life, p. xvi., and Ottley's, p. 15. Hunter himself {Treatise on the Blood, p. 62) mentions the date 1755.

4 Ottley incorrectly gives 1753 as the date. In the buttery book for 1755 at St Mary's Hall his admission is thus noted: " Die Junii 5 to 1 755 Admissus est Johannes Hunter superioris ordinis Commen-

was induced to enter as a gentleman commoner at St Mary's Hall, Oxford, but his instincts would not permit him, to use his own expression, " to stuff Latin and Greek at the university." Some three and thirty years later he thus significantly wrote of an opponent: "Jesse Foot accuses me of not understanding the dead languages; but I could teach him that on the dead body which he never knew in any language dead or living." 5 Doubtless, however, linguistic studies would have served to correct in him what was perhaps a natural defect — a difficulty in the presentation of abstract ideas not wholly attributable to the novelty of his doctrines.

An attack of inflammation of the lungs in the spring of 1759 having produced symptoms threatening consumption, by which the promising medical career of his brother James had been cut short, Hunter obtained in October 1760 the appointment of staff-surgeon in Hodgson and Keppel's expedition to Belleisle, With this he sailed in 1761. In the following year he served with the English forces on the frontier of Portugal. Whilst with the army he acquired the extensive knowledge of gunshot wounds embodied in his important treatise (1794) on that subject, in which, amongst other

matters of moment, he insists on the rejection of the indiscriminate practice of dilating with the knife followed almost universally by surgeons of his time. When not engaged in the active duties of his profession, he occupied himself with physiological and other scientific researches. Thus, in 1761, off Belleisle, the conditions of the coagulation of the blood were among the subjects of his inquiries. 6 Later, on land, he continued the study of human anatomy, and arranged his notes and memoranda on inflammation; he also ascertained by experiment that digestion does not take place in snakes and lizards during hibernation, and observed that enforced vigorous movement at that season proves fatal to such animals, the waste so occasioned not being compensated, whence he drew the inference that, in the diminution of the power of a part attendant on mortification, resort to stimulants which increase action without giving real strength is inadvisable, 7 A MS. catalogue by Hunter, probably written soon after his return from Portugal, shows that he had already made a collection of about two hundred specimens of natural and morbid structures.

On arriving in England early in 1763, Hunter, having retired from the army on half-pay, took a house in Golden Square, and began the career of a London surgeon. Most of the metropolitan practice at the time was held by P. Pott, C. Hawkins, Samuel Sharp, Joseph Warner and Robert Adair; and Hunter sought to eke out his at first slender income by teaching practical anatomy and operative surgery to a private class. His leisure was devoted to the study of comparative anatomy, to procure subjects for which he obtained the refusal of animals dying in the Tower menagerie and in various travelling zoological collections. In connexion with his rupture of a tendo Achillis, 8 in 1767, he performed on dogs several experiments which, with the illustra- tions in his museum of the reunion of such structures after division, laid the foundation of the modern practice of cutting through tendons (tenotomy) for the relief of distorted and con- tracted joints. In the same year he was elected F.R.S. His first contribution to the Philosophical Transactions, with the

salis." Hunter apparently left Oxford after less than two months' residence, as the last entry in the buttery book with charges for battels against his name is on July 25, 1755. His name was, how- ever, retained on the books of the Hall till December 10, 1756. The record of Hunter's matriculation runs: " Ter° Trin. 1755. — Junii 5 to Aul. S. Mar. Johannes Hunter 24 Johannis de Kilbride in Com. Clidesdale Scotiae Arm. fil."

5 Ottley, Life of J. Hunter, p. 22.

6 Treatise on the Blood, p. 2 1.

7 See Adams, Memoirs, pp. 32, 33. Cf. Hunter's Treatise on the Blood, p.

8, and Works, ed. Palmer, i. 604. — On the employment of Hunter's term " increased action " with respect to inflammation, sec- Sir James Paget, Led. on Surg. Path., 3rd ed., p. 321 sqq.

8 According to Hunter, as quoted in Palmer's edition of his lectures, p. 437, the accident was " after dancing, and after a violent fit of the cramp "; W. Clift, however, who says he probably never danced, believed that he met with the accident " in getting up from the dis- secting table after being cramped by long sitting " (see W. Lawrence, Hunt. Oral., 1834, p. 64).

exception of a supplement to a paper by J. Ellis in the volume for 1766, was an essay on post-mortem digestion of the stomach, written at the request of Sir J. Pringle, and read on the 18th of June 1772, in which he explained that phenomenon as a result of the action of the gastric juice. 1 On the gth of December 1768 he was elected a surgeon to St George's Hospital, and, soon after, a member of the Corporation of Surgeons. He now began to take house-pupils. Among these were Edward Jenner, who came to him in 1770, and until the time of Hunter's death corresponded with him on the most intimate and affectionate terms, W. Guy, Dr P. S. Physick of Philadelphia, and Everard Home, his brother- in-law. William Lynn and Sir A. Carlisle, though not inmates of his house, were frequent visitors there. His pupils at St George's included John Abernethy, Henry Cline, James Earle and Astley Cooper. In 1770 he settled in Jermyn Street, in the house which his brother William had previously occupied; and in July 177 1 he married Anne, the eldest daughter of Robert Home, surgeon to Burgoyne's regiment of light horse. 2

From 1772 till his death Hunter resided during autumn at a house built by him at Earl's Court, Brompton, where most of his biological researches were carried on. There he kept for the purpose of study and experiment the fishes, lizards, blackbirds, hedgehogs and other animals sent him from time to time by Jenner; tame pheasants and partridges, at least one eagle, toads, silkworms, and many more creatures, obtained from every quarter of the globe. Bees he had under observation in his conservatory for upwards of twenty years; hornets and wasps were also diligently studied by him. On two occasions his life was in risk from his pets — once in wrestling with a young bull, and again when he fearlessly took back to their dens two leopards which had broken loose among his dogs.

Choosing intuitively the only true method of philosophical discovery, Hunter, ever cautious of confounding fact and hypothesis, besought of

*nature the truth through the medium of manifold experiments and observations. " He had never read Bacon," says G. G. Babington, " but his mode of studying nature was as strictly Baconian as if he had." 3 To Jenner, who had offered a conjectural explanation of a phenomenon, he writes, on the 2nd of August 1775: "I think your solution is just; but why think? why not try the experiment? Repeat all the experiments upon a hedgehog * as soon as you receive this, and they will give you the solution." It was his axiom however, " that experiments should not be often repeated which tend merely to establish a principle already known and admitted, but that the next step should be the application of that principle to useful purposes " (" Anim. Oecon.," Works, iv. 86). During*

1 The subjects and dates of his subsequent papers in the Trans- actions, the titles of which give little notion of the richness of their contents, are as follows: The torpedo (1773); air-receptacles in birds, and the Gillaroo trout (1774) ; the Gymnotus electricus, and the production of heat by animals and vegetables (supplemented in 1777), (■775); the recovery of people apparently drowned (1776); the free martin (1779); the communication of smallpox to the foetus in utero, and the occurrence of male plumage in old hen pheasants (1780); the organ of hearing in fishes (1782); the anatomy of a "new marine animal" described by Home (1785); the specific identity of the wolf, jackal and dog (supplemented in 1789), the effect on fertility of extirpation of one ovarium, and the structure and economy of whales (1787); observations on bees (1793); and some remarkable caves in Bayreuth and fossil bones found therein (1794). With these may be included a paper by Home, from materials supplied by Hunter, on certain horny excrescences of the human body.

- Mrs Hunter died on the 7th of January 1821, in Holies Street, Cavendish Square, London, in her seventy-ninth year. She was a handsome and accomplished woman, and well fulfilled the social duties of her position. The words for Haydn's English canzonets were supplied by her, and were mostly original poems; of these the lines beginning " My mother bids me bind my hair " are, from the beauty of the accompanying music, among the best known. (See R. Nares in Gent. Mag. xci. pt. I, p. 89, quoted in Nichols's Lit. Anec, 2nd ser., vii. 638.)

3 Hunt. Orat., 1842, p. 15.

4 The condition of this animal during hibernation was a subject of special interest to Hunter, who thus introduces it, even in a letter of condolence to Jenner in 1778 on a disappointment in love: " But let her go, never mind her. I shall employ you with hedgehogs, for I do not know how far I mav trust mine."

fifteen years he kept a flock of geese simply in order to acquaint himself with the development of birds in eggs, with reference to which he remarked: " It would almost appear that this mode of propagation was intended for investigation. " In his toxicological and other researches, in which his experience had led him to believe that the effects of noxious drugs are nearly similar in the brute creation and in man, he had already, in 1780, as he states, " poisoned some thousands of animals." 5

By inserting shot at definite distances in the leg-bones of young pigs, and also by feeding them with madder, by which all fresh osseous deposits are tinged, 6 Hunter obtained evidence that bones increase in size, not by the intercalation of new amongst old particles, as had been imagined by H.L. Duhamel du Monceau, but by means of additions to their extremities and circumference, excess of calcareous tissue being removed by the absorbents. Some of his most extraordinary experiments were to illustrate the relation of the strength of constitution to sex. He exchanged the spurs of a young cock and a young pullet, and found that on the former the transplanted structure grew to a fair size, on the latter but little; whereas a spur from one leg of a cock transferred to its comb, a part well supplied with blood, grew more than twice as fast as that left on the other leg. Another experiment of his, which required many trials for success, was the engrafting of a human incisor on the comb of a cock. 7 The uniting of parts of different animals when brought into contact he attributed to the production of adhesive instead of suppurative inflammation, owing to their possession of " the simple living principle." 8 The effects of habit upon structure were illustrated by Hunter's observation that in a sea-gull which he had brought to feed on barley the muscular parietes of the gizzard became greatly thickened.% A similar phenomenon was noticed by him in the case of other carnivorous birds fed on a vegetable diet.

It was in 1772 that Hunter, in order effectually to gauge the extent of his own knowledge, and also correctly to express his views, which had been repeatedly misstated or ascribed to others, began his lectures on the theory and practice of surgery, at first delivered free to his pupils and a few friends, but sub- sequent to 1774 on the usual terms, four guineas. Though Pott, indeed, had perceived that the only true system of surgery is that which most closely accords with the curative efforts of nature, a rational pathology can hardly be said to have had at this time any existence; and it was generally assumed that a knowledge of anatomy alone was a sufficient foundation for the study of surgery. Hunter, unlike his contemporaries, to most of whom his philosophic habit of thought was a mystery, and whose books contained little else than relations of cases and modes of treatment, sought the reason for each phenomenon that came under his notice. The principles of surgery, he maintained, are not less necessary to be understood than the principles of other sciences; unless, indeed, the surgeon

should wish to resemble " the Chinese philosopher whose knowledge consisted only in facts." Too much attention, he remarked, cannot be paid to facts; yet a multitude of facts overcrowd the memory without advantage if they do not lead us to establish principles, by an acquaintance with which we learn the causes of diseases. Hunter's course, which latterly comprised eighty-six lectures, delivered on alternate evenings between the hours of seven and eight, lasted from October to April. Some teachers of his time were content to dismiss the subjects of anatomy and surgery in a course of only six weeks' duration. His class was usually small and never exceeded thirty. He was deficient in the gifts of a good extempore speaker, being in this respect a remarkable contrast to his brother William ; and he read his lectures, seldom raising his eyes from the manuscript. His manner with his

8 See his evidence at the trial of Captain Donellan, Works, i. 195.

6 On the discovery of the dyeing of bones by madder, see Belchier, Phil. Trans., vol. xxxix., 1736, pp. 287 and 299.

' Essays and Observations, i. 55, 56. " May we not claim for him," says Sir Win. Fergusson, with reference to these experiments, " that he anticipated by a hundred years the scientific data on which the present system of human grafting is conducted? " (Hunt. Orat., 1871, p. 17).

8 Essays and Observations, 1. 115; cf. Works, i. 391.

auditory is stated to have been embarrassed and awkward, or, as Adams puts it (Obs. on Morbid Pois., p. 272), "frequently ungraceful," and his language always unadorned; but that his " expressions for the explaining of his new theories rendered his lectures often unintelligible " is scarcely evident in his pupils' notes still extant. His own and others' errors and fallacies were exposed with equal freedom in his teaching. Occasionally he would tell his pupils, " You had better not write down that observation, for very likely I shall think differently next year "; and once in answer to a question he replied, " Never ask me what I have said or what I have written; but, if you will ask me what my present opinions are, I will tell you."

In January 1776 Hunter was appointed surgeon-extraordinary to the king. He began in the same year his Croonian lectures on muscular motion, continued annually, except in 1777, till 1782: they were never published by him, being in his opinion too incomplete. In 1778 appeared the second

part of his Treatise on the Natural History of the Human Teeth, the first part of which was published in 1771. It was in the waste of the dental alveoli and of the fangs of shedding teeth that in 1754-1755, as he tells us. he received his first hint of the use of the absorbents. \bernethy (Physiological Lectures, p. 196) relates that Hunter, jeing once asked how he could suppose it possible for absorbents o do such things as he attributed to them, replied, " Nay, I know not, unless they possess powers similar to those which a caterpillar exerts when feeding on a leaf." Hunter in 1780 read before the Royal Society a paper in which he laid claim to have been the first to make out the nature of the utero-placental circulation. His brother William, who had five years previously described the same in his Anatomy of the Gravid Uterus, there- upon wrote to the Society attributing to himself this honour. John Hunter in a rejoinder to his brother's letter, dated the 17th of February 1780, reiterated his former statement, viz. that his dis- covery, on the evening of the day in 1754 that he had made it in a specimen injected by a Dr Mackenzie, had been communicated by him to Dr Hunter. Thus arose an estrangement between the two Hunters, which continued until the time of William's last illness, when his brother obtained permission to visit him.

In 1783 Hunter was elected a member of the Royal Society of Medicine and of the Royal Academy of Surgery at Paris, and took part in the formation of " A Society for the Improvement of Medical and Chirurgical Knowledge." 1 It appears from a letter by Hunter that in the latter part of 1783, he, with Jenner, had the subject of colour-blindness under consideration. As in that year the lease of his premises in Jermyn Street was to expire, he purchased the twenty-four years' leasehold of two houses, the one on the east side of Leicester Square, the other in Castle Street with intervening ground. Between the houses he built in 1783- 1 7S5, at an expense of above £3000, a museum for his anatomical and other collections which by 1782 had cost him £10,000. The new edifice consisted of a hall 52 ft. long by 28 ft. wide, and lighted from the top, with a gallery all round, and having beneath it a lecture theatre. In April 1785 Hunter's collections were removed into it under the superintendence of Home and William Bell, 2 and another assistant, Andre. Among the foreigners of distinction who inspected the museum, which was now shown by Hunter twice a year — in October to medical men, and in May to other visitors — were J. F. Blumenbach, P. Camper and A. Scarpa. In the acquisition of subjects for his varied biological investigations and of specimens for his museum, expense was a matter of small moment with Hunter. Thus he endeavoured, at his own cost, to obtain information respecting the Cetacea by

1 The Transactions of the Society contain papers by Hunter on inflammation of veins (1784), intussusception (1789), a case of para- lysis

of the muscles of deglutition (1790), and a case of poisoning during pregnancy (1794), with others written by Home, from materials supplied by him, on Hunter's operation for the cure of popliteal aneurism, on loose cartilages in joints, on certain horny excrescences of the human body, and on the growth of bones.

2 Bell lived with Hunter fourteen years, i.e. from 1775 to 1789, and was employed by him chiefly in making and drawing anatomical pre- parations for the museum. He died in 1792 at Sumatra, where he was assistant-surgeon to the East India Company.

sending out a surgeon to the North in a Greenland whaler. He is said, moreover, to have given, in June 1783, £500 for the body of O'Brien, or Byrne, the Irish giant, whose skeleton, 7 ft. 7 in. high, is so conspicuous an object in the museum of the College of Surgeons of London. 3

Hunter, who in the spring of 1 769-1 772 had suffered from gout, in spring 1773 from spasm apparently in the pyloric region, accompanied by failure of the heart's action (Ottley, Life, p. 44), and in 1777 from vertigo with symptoms of angina pectoris, had in 1783 another attack of the last mentioned complaint, to which he was henceforward subject when under anxiety or excitement of mind.

In May 1785, 4 chiefly to oblige William Sharp the engraver, Hunter consented to have his portrait taken by Sir Joshua Reynolds. He proved a bad sitter, and Reynolds made little satisfactory progress, till one day Hunter, while resting his somewhat upraised head on his left hand, fell into a profound reverie — one of those waking dreams, seemingly, which in his lectures he has so well described, when " the body loses the consciousness of its own existence." 5 The painter had now before him the man he would fain depict, and, turning his canvas upside down, he sketched out the admirable portrait which, afterwards skilfully restored by H. Farrar, is in the possession of the Royal College of Surgeons. A copy by Jackson, acquired from Lady Bell, is to be seen at the National Portrait Gallery, and St Mary's Hall, Oxford, also possesses a copy. Sharp's engraving of the original, published in 1788, is one of the finest of his productions. The volumes seen in Reynolds' picture are a portion of the unpublished records of anatomical researches left by Hunter at his death, which, with other manuscripts, Sir Everard Home in 181 2 removed from his museum, and eventually, in order, it has been supposed, to keep secret the source of many of his papers in the Philosophical Transactions, and of facts mentioned in his lectures, committed to the flames. 6 Among the subjects of Hunter's physiological investigation in 1 785 was the mode of growth of deer's antlers. As he possessed the privilege of making experiments on the deer in Richmond Park, he in July of that year had a buck there caught

and thrown, and tied one of its external carotid arteries. He observed that the antler which obtained its blood supply therefrom, then half-grown, became in consequence cold to the touch. Hunter debated with himself whether it would be shed in due time, or be longer retained than ordinarily. To his surprise he found, on re-examining the antler a week or two later, when the wound around the ligatured artery was healed, that it had regained its warmth, and was still increasing in size. Had, then, his operation been in some way defective? To determine this question, the buck was killed and sent to Leicester Fields. On examination Hunter ascertained that the external carotid had been duly tied, but that certain small branches of the artery above and below the ligature had enlarged, and by their anasto- moses had restored the blood supply of the growing part. Thus it was evident that under " the stimulus of necessity," to use a phrase of the experimenter, the smaller arterial channels are

3 O'Brien, dreading dissection by Hunter, had shortly before his death arranged with several of his countrymen that his corpse should be conveyed by them to the sea, and sunk in deep water; but his undertaker, who had entered into a pecuniary compact with the great anatomist, managed that while the escort was drinking at a certain stage on the march seawards, the coffin should be locked up in a barn. There some men he had concealed speedily substituted an equivalent weight of paving-stones for the body, which was at night forwarded to Hunter, and by him taken in his carriage to Earl's Court, and, to avoid risk of a discovery, immediately after suitable division boiled to obtain the bones. See Tom Taylor, Leicester Square, ch. xiv. (1874); cf. Annual Register, xxvi. 209 (1783).

4 See C. R. Leslie and Tom Taylor, Life and Times of Sir J. Reynolds, ii. 474 (1865).

6 Works, i. 265-266.

6 A transcript of a portion of Hunter's MSS., made by Clift in 1793 and 1800, was edited by Sir Richard Owen, in two volumes with notes, in 1861, under the title of Essays and Observations in Natural History, Anatomy, Physiology, Psychology and Geology. On the destruction of Hunter's papers see Clift's " Appendix " in vol. ii. p. 497, also W. H. Flower, Introd. Led., pp. 7-9 (1870).

capable of rapid increase in dimensions to perform the offices of the larger. 1 It happened that, in the ensuing December, there lay in one of the wards

of St George's Hospital a patient admitted for popliteal aneurism. The disease must soon prove fatal unless by some means arrested. Should the surgeon, following the usual and commonly fatal method of treatment, cut down upon the tumour, and, after tying the artery above and below it, evacuate its contents ? Or should he adopt the procedure, deemed by Pott generally advisable, of amputating the limb above it? It was Hunter's aim in his practice, even if he could not dispense with the necessity, at least to diminish the severity of operations, which he considered were an acknowledgment of the imperfection of the art of healing, and compared to " the acts of the armed savage, who attempts to get that by force which a civilized man would get by stratagem." Since, he argued, the experiment with the buck had shown that collateral vessels are capable of continuing the circulation when passage through a main trunk is arrested, why should he not, in the aneurism case, leaving the absorbents to deal with the contents of the tumour, tie the artery in the sound parts, where it is tied in amputation, and preserve the limb? Acting upon this idea, he ligatured his patient's femoral artery in the lower part of its course in the thigh, in the fibrous sheath enclosing the space since known as " Hunter's canal." 2 The leg was found, some hours after the operation, to have acquired a temperature even above the normal. 3 At the end of January 1786, that is, in six weeks' time, the patient was well enough to be able to leave the hospital. Thus it was that Hunter inaugurated an operation which has been the means of preserving to hundreds life with integrity of limb — an operation which, as the Italian P. Assalini, who saw it first performed, testifies, " excited the greatest wonder, and awakened the attention of all the surgeons in Europe."

Early in 1786 Hunter published his Treatise on the Venereal Disease, which, like some of his previous writings, was printed in his own house. Without the aid of the booksellers, 1000 copies of it were sold within a twelvemonth. Although certain views therein expressed with regard to the relationship of syphilis have been proved erroneous, the work is a valuable compendium of observations of cases and modes of treatment (cf. John Hilton, Hunt. Orat. p. 40). Towards the end of the year appeared his Observations on certain parts of the Animal Oeconomy, which, besides the more important of his contributions to the Philosophical Transactions, contains nine papers on various subjects. In 1786 Hunter became deputy surgeon- general to the army; his appointment as surgeon-general and as inspector-general of hospitals followed in 1790. In 1787 he received the Royal Society's Copley medal, and was also elected a member of the American Philosophical Society. On account of the increase in his practice and his impaired health, he now obtained the services of Home as his assistant at St George's Hospital. The death of Pott in December 1788 secured to him the undisputed title of the first surgeon in England. He

resigned to Home, in 1792, the delivery of his surgical lectures, in order to devote himself more fully to the completion of his Treatise on the Blood, Inflammation and Gunshot Wounds, which was published by his executors in 1794. In this, his masterpiece, the application of physiology to practice is especially noticeable.

1 In his Treatise en the Blood, p. 288, Hunter observes: " We find it a common principle in the animal machine, that every part increases in some degree according to the action required. Thus we find . . . vessels become larger in proportion to the necessity of supply, as for instance, in the gravid uterus; the external carotids in the stag, also, when his horns are growing, are much larger than at any other time.

2 See Sir R. Owen, " John Hunter and Vivisection," Brit. Med. Journ. (February 22, 1879, p. 284). In the fourth of his operations lor popliteal aneurism, Hunter for the first time did not include the vein in the ligature. His patient lived for fifty years afterwards. The results on the artery of this operation are to be seen in specimen 3472A (.Path. Scr.) in the Hunterian Museum.

3 Home, Trans, of Soc. for Impr. of Med. and Chirurg. Knowl. i. 147 (1793). Excess of heat in the injured limb was noticed also in Hunter's second case on the day after the operation; and in his fourth case it reached 4°-5° on the first day, and continued during a fortnight.

Certain experiments described in the first part, which demon- strate that arterialization of the blood in respiration ' takes place by a process of diffusion of " pure air " or " vital air " {i.e. oxygen) through membrane, were made so early as the summer of 1755.

Hunter in 1 792 announced to his colleagues at St George's, who, he considered, neglected the proper instruction of the students under their charge, his intention no longer to divide with them the fees which he received for his hospital pupils. Against this innovation, however, the governors of the hospital decided in March 1793. Subsequently, by a committee of their appointing, a code of rules respecting pupils was promulgated, one clause of which, probably directed against an occasional practice of Hunter's, stipulated that no person should be admitted as a student of the hospital without certificates that he had been educated for the medical profession. In the autumn two young Scotchmen, ignorant of the new rule, came up to town and applied to Hunter for admission as his pupils at St George's. Hunter explained to them how he was situated, but promised to advance their request at the next board meeting at the hospital on the 16th of October. On that day, having finished a difficult piece of dissection, he went down to breakfast in excel- lent spirits and in his usual

health. After making a professional call, he attended the board meeting. There the interruption of his remarks in behalf of his applicants by a flat contradic- tion from a colleague brought on one of the old spasmodic heart attacks; he ceased speaking, and retired into an adjoining room only to fall lifeless into the arms of Dr Robertson, one of the hospital physicians. After an hour had been spent in vain attempts to restore animation, his body was conveyed to his house in a sedan chair. 4 His remains were interred privately on the 22nd of October 1793, in the vaults of St Martin's in the Fields. Thence, on the 28th of March 1859, through the instrumentality of F. T. Buckland, they were removed to Abbot Islip's chapel in Westminster Abbey, to be finally deposited in the grave in the north aisle of the nave, close to the resting- place of Ben Jonson.

*Hunter was of about medium height, strongly built and high- shouldered and short-necked. He had an open countenance, and large features, eyes light-blue or grey, eyebrows prominent, and hair reddish-yellow in youth, later white, and worn curled behind; and he dressed plainly and neatly. He rose at or before six, dissected till nine (his breakfast hour), received patients from half-past nine till twelve, at least during the latter part of his life, and saw his out- door and hospital patients till about four, when he dined, taking, according to Home, as at other meals in the twenty years preceding his death, no wine. After dinner he slept an hour; he then super- intended experiments, read or prepared his lectures, and made, usually by means of an amanuensis, records of the day's dissections. " I never could understand," says W. Clift, " how Mr Hunter ob- tained rest: when I left him at midnight, it was with a lamp fresh trimmed for further study, and with the usual appointment to meet him again at six in the morning." H. Leigh Thomas records 5 that, on his first arrival in London, having by desire called on Hunter at five o'clock in the morning, he found him already busily engaged in the dissection of insects. Rigidly economical of time, Hunter was always at work, and he had always in view some fresh enter- prise. To his museum he gave a very large share of his attention, being fearful lest the ordering of it should be incomplete at his death, and knowing of none who could continue his work for him. " When I am dead," said he one day to Dr Maxwell Garthshore, " you will not soon meet with another John Hunter." At the time of his death he had anatomized over 500 different species of animals, some of them repeatedly, and had made numerous dissections of plants. The manuscript works by him, appropriated and destroyed by Home, among which were his eighty-six surgical lectures, all in full, are stated to have been " literally a cartload "; and many pages of his records were written by Clift under his directions " at least half-^*

4 The record of Hunter's death in the St James Chronicle for October 15-17, 1793, p. 4, col. 4, makes no allusion to the immediate cause of Hunter's death, but gives the following statement: " John Hunter. — This

eminent Surgeon and valuable man was suddenly taken ill, yesterday, in the Council-room of St George's Hospital. After receiving the assistance which could be afforded by two Physicians and a Surgeon, he was removed in a close chair to his house, in Leicester Fields, where he expired about two o'clock." Examination of the heart revealed disease involving the pericairdium, endocardium and arteries, the coronary arteries in particular showing ossific change. ' Hunt. Orat., 1827, p. 5.

dozen times over, with corrections and transpositions almost without end."

To the kindness of his disposition, his fondness for animals, his aversion to operations, his thoughtful and self-sacrificing attention to his patients, and especially his zeal to help forward struggling practitioners and others in any want abundantly testify. Pecuniary means he valued no further than they enabled him to promote his researches; and to the poor, to non-beneficed clergymen, professional authors and artists his services were rendered without remuneration. His yearly income in 1 763-1 774 was never £1000; it exceeded that sum in 1778, for several years before his death was £5000, and at the time of that event had reached above £6000. All his earnings not required for domestic expenses were, during the last ten years of his life, devoted to the improvement of his museum; and his property, this excepted, was found on his decease to be barely sufficient to pay his debts. By his contemporaries generally Hunter was respected as a master of the art and science of anatomy, and as a cautious and trustworthy if not an elegant or very dexterous operator. Few, however, perceived the drift of his biological researches. Although it was admitted, even by Jesse Foot, 1 that the idea after which his unique museum had been formed — namely, that of mor- phology as the only true basis of a systematic zoological classification — was entirely his own, yet his investigations into the structure of the lower orders of animals were regarded as works of unprofitable curiosity. One surgeon, of no inconsiderable repute, is said to have ventured the remark that Hunter's preparations were " just as valuable as so many pig's pettitoes "; 2 and the president of the Royal Society, Sir Joseph Banks, writing in 1796, plainly expressed his disbelief as to the collection being " an object of importance to the general study of natural history, or indeed to any branch of science except to that of medicine." It was " without the solace of sympathy or encouragement of approbation, without collateral assistance," 3 and careless of achieving fame — for he held that " no man ever was a great man who wanted to be one " — that Hunter laboured to perfect his designs, and established the science of com- parative anatomy, and principles which, however neglected in his lifetime, became the ground-work of all medical study and teaching. In accordance with the directions

given by Hunter in his will, his collection was offered for purchase to the British government. But the prime minister, Pitt, on being asked to consider the matter, exclaimed: "What! buy preparations! Why, I have not money enough to purchase gunpowder." He, however, consented to the bestowal of a portion of the king's bounty for a couple of years on Mrs Hunter and her two surviving children. In 1796 Lord Auckland undertook to urge upon the government the advisability of acquiring the collection, and on the 13th of June 1799, parliament voted £15,000 for this purpose. Its custodianship, after refusal by the College of Physicians, was unanimously accepted by the Corporation of Surgeons on the terms proposed. These were in brief — that the collection be open four hours in the forenoon, two days every week, for the inspection and consultation of the fellows of the College of Physicians, the members of the Company of Surgeons and persons properly introduced by them, a catalogue of the preparations and an official to explain it being at those times always at hand; that a course of not less than twenty-four lectures 4 on comparative anatomy and other subjects illustrated by the collection be given every year by some member of the Company ; and that the preparations be kept in good preservation at the expense of the Corporation, and be subject to the superintendence of a board of sixteen trustees. 6 The fulfil- ment of these conditions was rendered possible by the receipt of fees for examinations and diplomas, under the charter by which, in 1800, the Corporation was constituted the Royal College of Surgeons. In 1806 the collection was placed in temporary quarters in Lincoln's Inn Fields, and the sum of £15,000 was voted by parliament for the erection of a proper and commodious building for its preservation and extension. This was followed by a grant of £12,500 in 1807. The collection was removed in 1812 to the new museum, and opened to visitors in 1813. The greater part of the present edifice was built in 1835, at an expense to the college of about £40,000; and the combined Hunterian and collegiate collections, having been re- arranged in what are now termed the western and middle museums, were in 1836 made accessible to the public. The erection of the eastern museum in 1852, on premises in Portugal Street, bought in 1847 for £16,000, cost £25,000, of which parliament granted £15,000; it was opened in 1855.

The scope of Hunter's labours may be defined as the explication of the various phases of life exhibited in organized structures, both animal and vegetable, from the simplest to the most highly differen- tiated. By him, therefore, comparative anatomy was employed, not in subservience to the classification of living forms, as by Cuvier, but as a means of gaining insight into the principle animating and producing these forms, by virtue of which he perceived that, how- ever different in form and faculty, they were all allied to himself. In what does life consist? is a question which in his writings he frequently considers, and which seems to have been ever present

1 See p. 266 of his malicious so-called Life of John Hunter (1794).

2 Cf. J. H. Green, Hunt. Oral., 1840, p. 27.

3 Abernethy, Physiological Lectures, p. 11 (1817).

- *Instituted in 1806. 5 Increased to seventeen in 1856.*

in his mind. Life, he taught, was a principle independent of struc- ture, 6 most tenaciously held by the least highly organized beings, but capable of readier destruction as a whole, as, e.g., by deprivation of heat or by pain, in young than in old animals. In life he beheld an agency working under the control of law, and exercising its functions in various modes and degrees. He perceived it, as Abernethy observes, to be " a great chemist," a power capable of manufacturing a variety of substances into one kind of generally distributed nutriment, and of furnishing from this a still greater variety of dissimilar substances. Like Harvey, who terms it the anima vegetiva, he regarded it as a principle of self-preservation, which keeps the body from dissolution. Life is shown, said he, in renovation and action ; but, although facilitated in its working by mechanical causes, it can exist without action, as in an egg new-laid or undergoing incubation. It is not simply a regulator of tempera- ture; it is a principle which resists cold, conferring on the structures which it endows the capacity of passing some degrees below the freezing-point of ordinary inanimate matter without suffering congelation. Hunter found, in short, that there exists in animals a latent heat of life, set free in the process of death (see Treatise on the Blood, p. 80). Thus he observed that sap if removed from trees froze at 32 ° F., but within them might be fluid even at 15°; that a living snail placed in a freezing mixture acquired first a temperature of 28 , and afterwards of 32° ere it froze; and that, whereas a dead egg congealed immediately at 32 °, a living egg did so only when its temperature had risen to that point after a previous fall to 295°. The idea that the fluid and semifluid as well as the solid constituents of the body contain the vital principle diffused through them he formed in 1755— 1756, when, in making drawings illustrative of the. changes that take place in the incubated egg, he noted specially that neither the white nor the yolk undergoes putrefaction. The blood he, with Harvey, considered to possess a vitality of its own, more or less independent of that of the animal in which it circulates. Life, he held, is preserved by the compound of the living body and the source of its solid constituents, the living blood. It is to the susceptibility of the latter to be converted into living organized tissue that the union of severed structures by the first intention is due. He even inclined to the belief that the chyle has life, and he considered that food becomes " animalized " in digestion.

Coagula- tion of the blood he compared to the contraction of muscles, and believed to be an operation of life distinct from chemical coagulation, adducing in support of his opinion the fact that, in animals killed by lightning, by violent blows on the stomach, or by the exhaustion of hunting, it does not take place. " Breathing," said Hunter, " seems to render life to the blood, and the blood continues it in every part of the body." 7 Life, he held, could be regarded as a fire, or something similar, and might for distinction's sake be called " animal fire." Of this the process of respiration might afford a constant supply, the fixed life supplied to the body in the food being set free and rendered active in the lungs, whilst the air carried off that principle which encloses and retains the animal fire. 8 The living principle, said Hunter, is coeval with the existence of animal or vegetable matter itself, and may long exist without sensation. The principle upon which depends the power of sensation regulates all our external actions, as the principle of life does our internal, and the two act mutually on each other in consequence of changes produced in the brain. Something (the " materia vitae diffusa ") similar to the components of the brain (the " materia vitae coacer- vata ") may be supposed to be diffused through the body and even contained in the blood ; between these a communication is kept up by the nerves (the " chordae internunciae "). 9 Neither a material nor a chemical theory of life, however, formed a part of Hunter's creed. " Mere composition of matter," he remarked, " does not give life; for the dead body has all the composition it ever had; life is a property we do not understand ; we can only see the necessary leading steps towards it." 10 As from life only, said he in one of his lectures, we can gain an idea of death, so from death only we gain an idea of life. Life, being an agency leading to, but not consisting of, any modification of matter, " either is something superadded to matter, or else consists in a peculiar arrangement of certain fine particles of matter, which being thus disposed acquire the properties of life." As a bar of iron may gain magnetic virtue by being placed for a time in a special position, so perhaps the particles of matter arranged and long continued in a certain posture eventually gain the power of life. " I enquired of Mr Hunter," writes one of his pupils, 11 " if this did not make for the Exploded Doctrine of Equivocal

6 How clearly he held this view is seen in his remark {Treatise on the Blood, p. 28, cf. p. 46) that, as the coagulating lymph of the blood is probably common to all animals, whereas the red corpuscles are not, we must suppose the lymph to be the essential part of that fluid. Hunter was the first to discover that the blood of the embryos of red-blooded animals is at first colourless, resembling that of inverte- brates. (See Owen, Preface to vol. iv. of Works, p. xiii.)

7 Treatise on the Blood, p. 63.

8 Essays and Observations, i. 113.

9 Treatise on the Blood, p. 89. 10 lb. p. 90.

11 P. P. Staple, with the loan of whose volume of MS. notes of Hunter's " Chirurgical Lectures," dated, on the last page, Sept. 20th, 1787, the writer was favoured by Sir W. H. Broadbent.

Generation: he told me perhaps it did, and that as to Equivocal Generation all we c d have was negative Proofs of its not taking Place. He did not deny that Equivocal Generation happened; there were neither positive proofs for nor against its taking place."

To exemplify the differences between organic and inorganic growth, Hunter made and employed in his lectures a collection of crystallized specimens of minerals, or, as he termed them, " natural or native fossils." Of fossils, designated by him " extraneous fossils," because extraneous respecting the rocks in which they occur, he recognized the true nature, and he arranged them according to a system agreeing with that adopted for recent organisms. The study of fossils enabled him to apply his knowledge of the relations of the phenomena of life to conditions, as exhibited in times present, to the elucidation of the history of the earth in geological epochs. He observed the non- occurrence of fossils in granite, but with his customary scientific caution and insight could perceive no reason for supposing it to be the original matter of the globe, prior to vegetable or animal, or that its formation was different from that of other rocks. In water he recognized the chief agent in producing terrestrial changes (cf. Treatise on the Blood, p. 15, note); but the popular notion that the Noachian deluge might account for the marine organisms discovered on land he pointed out was untenable. From the diversity of the situations in which many fossils and allied living structures are found, he was led to infer that at various periods not only repeated oscillations of the level of the land, lasting thousands of centuries, but also great climatic variations, perhaps due to a change in the ecliptic, had taken place in geological times. Hunter considered that very few fossils of those that resemble recent forms are identical with them. He conceived that the latter might be varieties, but that if they are really different species, then " we must suppose that a new creation must have taken place." It would appear, therefore, that the origin of species in variation had not struck him as possible. That he believed varieties to have resulted from the influence of changes in the conditions of life in times past is shown by a some- what obscure passage in his "

Introduction to Natural History " (Essays and Observations, i. 4), in which he remarks, " But, I think, we have reason to suppose that there was a period of time in which every species of natural production was the same, there being then no variety in any species," and adds that " civilization has made varieties in many species, which are the domesticated." Modern discoveries and doctrines as to the succession of life in time are again foreshadowed by him in the observation in his introduction to the description of drawings relative in incubation (quoted in Pref. to Cat. of Phys. Ser. i. p. iv., 1833) that : " If we were capable of follow- ing the progress of increase of the number of the parts of the most perfect animal, as they first formed in succession, from the very first, to its state of full perfection, we should probably be able to compare it with some one of the incomplete animals themselves, of every order of animals in the creation, being at no stage different from some of those inferior orders ; or, in other words, if we were to take a series of animals from the more imperfect to the perfect, we should probably find an imperfect animal corresponding with some stage of the most perfect." In pathological phenomena Hunter discerned the results of the perturbation of those laws of life by which the healthy organism subsists. With him pathology was a science of vital dynamics. He afforded principles bearing not on single complaints only, but on the effects of injury and disease in general. To attempt to set forth what in Hunter's teaching was new to pathology and systematic surgery, or was rendered so by his mode of treatment, would be well-nigh to present an epitome of all that he wrote on those subjects. " When we make a discovery in pathology," says Adams, writing in 18 18, " we only learn what we have overlooked in his writings or forgotten in his lectures." Surgery, which only in 1745 had formally ceased to be associated with " the art and mystery of barbers," he raised to the rank of a scientific profession. His doctrines were, necessarily, not those of his age: while lesser minds around him w-ere still dim with the mists of the ignorance and dogmatism of times past, his loftv intellect was illumined by the dawn of a distant day.

Authorities. — See, ˆbesides the above quoted publications, An Appeal to the present Parliament . . . on the subject of the late J. Hunter's Museum (1795); Sir C. Bell, A Lecture . . . being a Commentary on Mr J. Hunter's preparations of the Diseases of the Urethra (1830); The President of the Royal College of Surgeons of England, Address to the Committee for the Erection of a Statue of Hunter (Lond., March 29, 1859) ; Sir R. Owen, " Sketch of Hunter's Scientific Character and Works," in Tom Taylor's Leicester Square (1874), also in Hunter's Works, ed. by Palmer, vol. iv. (1837), and in Essays and Observations ; the invaluable catalogues of the Hunterian Collection issued by the Royal College of Surgeons; and numerous Hunterian Orations. In the Journal of a Voyage to New South Wales, by John White, is a- paper containing directions for preserving

animals, printed separately in 1809, besides six zoological descriptions by Hunter; and in the Natural History of Aleppo, by A. Russell, are remarks of Hunter's on the anatomy of the jerboa and the camel's stomach. Notes of his lectures on surgery, edited by J. W. K. Parkinson, appeared in 1833 under the title of Hunterian Remi- niscences. Hunter's Observations and Reflections on Geology, intended to serve as an introduction to the catalogue of his collection of extraneous fossils, was published in 1859, and his Memoranda on Vegetation in i860. (F. H. B.)

HUNTER, ROBERT MERCER TALIAFERRO (1809-1887), American statesman, was born in Essex county, Virginia, on the 21st of April 1809. He entered the university of Virginia in his seventeenth year and was one of its first graduates; he then studied law at the Winchester (Va.) Law School, and in 1830 was admitted to the bar. From 1835 to 1837 he was a member of the Virginia house of delegates; from 1837 to 1843 and from 1845 to 1847 was a member of the national house of representatives, being Speaker from 1839 to 1841; and from 1847 to 1861 he was in the senate, where he was chairman of the finance committee (1850-1861). He is credited with having brought about a reduction of the quantity of silver in the smaller coins; he was the author of the Tariff Act of 1857 and of the bonded-warehouse system, and was one of the first to advocate civil service reform. In 1853 he declined President Fillmore's offer to make him secretary of state. At the National Demo- cratic Convention at Charleston, S.C., in i860 he was the Virginia delegation's choice as candidate for the presidency of the United States, but was defeated for the nomination by Stephen A. Douglas. Hunter did not regard Lincoln's election as being of itself a sufficient cause for secession, and on the nth of January 1861 he proposed an elaborate but impracticable scheme for the adjustment of differences between the North and the South, but when this and several other efforts to the same end had failed he quietly urged his own state to pass the ordinance of secession. From 1861 to 1862 he was secretary of state in the Southern Confederacy; and from 1862 to 1865 was a member of the Confederate senate, in which he was, at times, a caustic critic of the Davis administration. He was one of the com- missioners to treat at the Hampton Roads Conference in 1865 (see Lincoln, Abraham), and after the surrender of General Lee was summoned by President Lincoln to Richmond to confer regarding the restoration of Virginia in the Union. From 1874 to 1880 he Was treasurer of Virginia, and from 1885 until his death near Lloyds, Virginia, on the 18th of July 1887, was collector of the Port of Tappahannock, Virginia.

See Martha T. Hunter, A Memoir of Robert M. T. Hunter (Washing- ton, 1903) for his private life, and D. R. Anderson, Robert Mercer Taliaferro Hunter, in the John P. Branch Historical Papers of Randolph Macon College (vol. ii. No. 2, 1906), for his public career.

HUNTER, WILLIAM (1718-1783), British physiologist and physician, the first great teacher of anatomy in England, was born on the 23rd of May 1718, at East Kilbride, Lanark. He was the seventh child of his parents, and an elder brother of the still more famous John Hunter (q.v.). When fourteen years of age, he was sent to the university of Glasgow, where he studied for five years. He had originally been intended for the church, but, scruples concerning subscription arising in his mind, he followed the advice of his friend William Cullen, and resolved to devote himself to physic. During 173 7-1 740 he resided with Cullen at Hamilton, and then, to increase his medical knowledge before settling in partnership with his friend, he spent the winter of 1740-1741 at Edinburgh. Thence he went to London, where Dr James Douglas (1675-1742), an anatomist and obstetrician of some note, to whom he had been recommended, engaged his services as a tutor to his son and as a dissector, and assisted him to enter as a surgeon's pupil at St George's Hospital and to procure the instruction of the anatomist Frank Nicholls (1699- 1778). When Dr Douglas died Hunter still continued to live with his family. In 1 746 he undertook, in place of Samuel Sharp, the delivery, for a society of naval practitioners, of a series_ of lectures on operative surgery, so satisfactorily that he was requested to include anatomy in his course. It was not long before he attained considerable fame as a lecturer; for not only was his oratorical ability great, but he differed from his con- temporaries in the fullness and thoroughness of his teaching, and in the care which he took to provide the best possible practical illustrations of his discourses. We read that the syllabus of Edward Nourse (1701-1761), published in 1748, totam rem anatomicam complect ens, comprised only twenty-three lectures, exclusive of a short and defective " Syllabus Chirurgicus," and that at " one of the most reputable courses of anatomy in

Europe," which Hunter had himself attended, the professor was obliged to demonstrate all the parts of the body, except the nerves and vessels (shown in a foetus) and the bones, on a single dead subject, and for the explanation of the operations of surgery used a dog! In 1747 Hunter became a member of the Corporation of Surgeons. In the course of a tour through Holland to Paris with his pupil, J. Douglas, in 1728, he visited Albinus at Leiden, and inspected with admiration his injected preparations. By degrees Hunter renounced surgical for obstetric practice, in which he excelled. He was appointed a surgeon- accoucheur at the Middlesex Hospital in 1748, and at the British Lying-in Hospital in the year following. The degree of M.D. was conferred upon him by the university of Glasgow on the 24th of October 1750. About the same time he left his old abode at

Mrs Douglas's, and settled as a physician in Jermyn Street. He became a licentiate of the College of Physicians on the 30th of September 1756. In 1762 he was consulted by Queen Charlotte, and in 1764 was made physician-extraordinary to her Majesty.

On the departure of his brother John for the army, Hunter engaged as an assistant William Hewson (1739-1774), whom he subsequently admitted to partnership in his lectures. Hewson was succeeded in 1770 by W. C. Cruikshank (1 745-1800). Hunter was elected F.R.S. in 1767; F.S.A. in 1768, and third professor of anatomy to the Royal Academy of Arts; and in 1780 and 1782 respectively an associate of the Royal Medical Society and of the Royal Academy of Sciences of Paris. During the closing ten years of his life his health failed greatly. His last lecture, at the conclusion of which he fainted, was given, contrary to the remonstrances of friends, only a few days before his death, which took place in London on the 30th of March 1783. He was buried in the rector's vault at St James's, Piccadilly.

Hunter had in 1765 requested of the prime minister, George Grenville, the grant of a plot of ground on which he might estab- lish " a museum in London for the improvement of anatomy, surgery, and physics " (see " Papers " at end of his Two Intro- ductory Lectures, 1784), and had offered to expend on its erection £7000, and to endow in perpetuity a professorship of anatomy in connexion with it. His application receiving no recognition, he after many months abandoned his scheme, and built himself a house, with lecture and dissecting-rooms, in Great Windmill Street, whither he removed in 1770. In one fine apartment in this house was accommodated his collection, comprising anatomi- cal and pathological preparations, ancient coins and medals, minerals, shells and corals. His natural history specimens were in part a purchase, for £1200, of the executors of his friend, Dr John Fothergill (1712-1780). Hunter's whole collection, together with his fine library of Greek and Latin classics, and an endowment of £8000, by his will became, after the lapse of twenty years, the property of the university of Glasgow.

Hunter was never married, and was a man of frugal habits. Like his brother John, he was an early riser, and a man ©f untiring industry. He is described as being in his lectures, which were of two hours' duration, " both simple and profound, minute in demonstration, and yet the reverse of dry and tedious"; and his mode of introducing anecdotal illustrations of his topic was most happy. Lecturing was to him a pleasure, and, not-withstanding his many professional distractions, he regularly continued it, because, as he said, he " conceived that a man may do infinitely -more good to the public by teaching his art than by practising it " (see " Memorial " appended to Introd. Led. p. 120).

Hunter was the author of several contributions to the Medical Observations and Enquiries and the Philosophical Transactions. In his paper on the structure of cartilages and joints, published in the latter in 1743, he anticipated what M. F. X. Bichat sixty years after- wards wrote concerning the structure and arrangement of the synovial membranes. His Medical Commentaries (pt. i., 1762, supplemented 1764) contains, among other like matter, details of his disputes with the Monros as to who first had successfully performed the injection of the tubuli testis (in which, however, both he and they had been forestalled by A. von Haller in 1745), and as to who had discovered the true office of the lymphatics, and also a discussion on the question whether he or Percivall Pott ought to be considered the

earliest to have elucidated the nature of hernia congenita, which, as a matter of fact, had been previously explained by Haller. In the Commentaries is exhibited Hunter's one weakness — an inordinate love of controversy. His impatience of contradiction he averred to be a characteristic of anatomists, in whom he once jocularly condoned it, on the plea that " the passive submission of dead bodies " rendered the crossing of their will the less bearable. His great work, The Anatomy of the Gravid Uterus, exhibited in Figures, fob, was published in 1774. His posthumous works are Two Introdtictory Lectures (1784), and Anatomical Description of the Human Gravid Uterus (1794), which was re-edited by Dr E. Rigby in 1843.

See Gent. Mag. liii. pt. I, p. 364 (1783); S. F. Simmons, An Account of the Life of W. Hunter (1783) ; Adams's and Ottley's Lives of J. Hunter; Sir B. C. Brodie, Hunterian Oration (1837); W. Munk, The Roll of the Royal College of Physicians of London, ii. 205 (1878). (F. H. B.)

HUNTER, WILLIAM ALEXANDER (1844-1898), Scottish jurist and politician, was born in Aberdeen on the 8th of May 1844, and educated at Aberdeen grammar school and university. He entered the Middle Temple, and was called to the English bar in 1867, but then was occupied mainly with teaching. In 1869 he was appointed professor of Roman law at University College, London, and in 1878 professor of jurisprudence, resigning that chair in 1882. His name became well known during this period as the author of a standard work on Roman law, Roman Law in the Order of a Code, together with a smaller introductory volume for students, Introduction to Roman Law. After 1882 Hunter took up politics and was elected to parliament for Aberdeen as a Liberal in 1885. In the House of Commons he was a prominent supporter of Charles Bradlaugh; he was the first to advocate old age pensions, and in 1890 carried a proposal to free elementary education in Scotland. In 1895 his health broke down; he retired from parliament in 1896 and died on the 21st of July 1898.

HUNTER, SIR WILLIAM WILSON (1840-1900), British publicist, son of Andrew Galloway Hunter, a Glasgow manu- facturer, was born at Glasgow on the 15th of July 1840. He was educated at Glasgow University (B.A. i860), Paris and Bonn, acquiring a knowledge of Sanscrit, and passing first in the final examination for the Indian Civil Service in 1862. Posted in the remote district of Birbhum in the lower provinces of Bengal, he began collecting local traditions and records, which formed the materials for his novel and suggestive publication, entitled The Annals of Rural Bengal, a book which did much to stimulate public interest in the details of Indian administration. He also compiled A Comparative Dictionary of the N on-Aryan Languages of India, a glossary of dialects based mainly upon the collections of Brian Houghton Hodgson, which testifies to the industry of the writer but contains much immature philological speculation. In 1872 he brought out two attractive volumes on the province of Orissa and its far-famed temple of Jagannath. In 1869 Lord Mayo asked Hunter to submit a scheme for a comprehensive statistical survey of the Indian empire. The work involved the compilation of a number of local gazetteers, in various stages of progress, and their consolidation in a con- densed form upon a single and uniform plan. The conception was worthy of the gigantic projects formed by Arthur Young and Sir John Sinclair at the close of the 18th century, and the fact that it was successfully carried through between 1869 and 1 88 1 was owing mainly to the energy and determination of Hunter. The early period of his undertaking was devoted to a series of tours which took him into every corner of India. He himself undertook the supervision of the statistical accounts of Bengal (20 vols., 1875-1877) and of Assam (2 vols., 1879). The various statistical accounts, when completed, comprised no fewer than 128 volumes. The immense task of condensing this mass of material proceeded concurrently with their com- pilation, an administrative feat which enabled The Imperial Gazetteer of India to appear in g volumes in 1881 (2nd ed., 14 vols., 1885-1887; 3rd ed., 26 vols., including atlas, 1908). Hunter adopted a transliteration of vernacular place-names, by which means the correct pronunciation is ordinarily indicated; but hardly sufficient allowance was made for old spellings consecrated by history and long usage. Hunter's own article on India was published in 1880 as A Brief History of the Indian Peoples, and

has been widely translated and utilized in Indian schools. A revised form was issued in 1895, under the title of The Indian Empire: its People, History and Products. In 1882 Hunter, as a member of the governor-general's council, presided over the commission on Indian Education; in 1886 he was elected vice- chancellor of the university of Calcutta. In 1887

he retired from the service, was created K.C.S.I., and settled at Oaken Holt, near Oxford. He arranged with the Clarendon Press to publish a series of Rulers of India, to which he himself contributed volumes on Dalhousie (1890) and Mayo (1892). He had previously, in 1875, written an official Life of Lord Mayo, in two volumes. He also wrote a weekly article on Indian affairs for The Times. But the great task to which he applied himself on his settlement in England was a history upon a large scale of the British Dominion in India, two volumes of which only had appeared when he died, carrying the reader barely down to 1700. He was much hindered by the confusecPstate of his materials, a portion of which he arranged and published in 1894 as Bengal Manuscript Records, in three volumes. A delightful story, TheOld Missionary (1895), and The Thackerays in India (1897), a gossipy volume which appeals to all readers of The Newcomes, may be regarded as the relaxations of an Anglo- Indian amid the stress of severer studies. In the winter of 1898- 1899, in consequence of the fatigue incurred in a journey to the Caspian and back, on a visit to the sick-bed of one of his two sons, Hunter was stricken down by a severe attack of influenza, which affected his heart. He died at Oaken Holt on the 6th of February 1900.

HUNTING (the verbal substantive from "hunt"; O. Eng. huntian, hunta; apparently connected with O. Eng. hentan, Gothic hinpan, to capture, O.H.G. hunda, booty), the pursuit of game and wild animals, for profit or sport; equivalent to "chase" (like " catch," from Lat. captare, Fr. chasse, Ital. caccia). The circumstances which render necessary the habitual pursuit of wild animals, either as a means of subsistence or for self-defence, generally accompany a phase of human progress distinctly inferior to the pastoral and agricultural stages; resorted to as a recreation, however, the practice of the chase in most cases indicates a con- siderable degree of civilization, and sometimes ultimately be- comes the almost distinctive employment of the classes which are possessed of most leisure and wealth. It is in some of its latter aspects, viz. as a " sport," pursued on fixed rules and principles, that hunting is dealt with here.

*Information as to the field sports of the ancients is in many directions extremely fragmentary. With regard to the ancient Egyptians, however, we learn that the huntsmen *5? r constituted an entire sub-division of the great second Sports. caste; they either followed the chase on their own account, or acted as the attendants of the chiefs in their hunting excursions, taking charge of the dogs, and securing and bringing home the game. The game was sought in the open deserts which border on both sides the valley of the Nile; but (by the wealthy) sometimes in enclosed spaces into which the animals had been driven or in preserves. Besides the noose and the net, the arrow, the dart and the hunting pole or vena- bulutn were frequently employed. The animals chiefly hunted were the gazelle, ibex, oryx, stag,*

wild ox, wild sheep, hare and porcupine; also the ostrich for its plumes, and the fox, jackal, wolf, hyaena and leopard for their skins, or as enemies of the farm-yard. The lion was occasionally trained as a hunting animal instead of the dog. The sportsman appears, occasionally at least, in the later periods, to have gone to cover in his chariot or on horseback; according to Wilkinson, when the dogs threw off in a level plain of great extent, it was even usual for him "to remain in his chariot, and, urging his horses to their full speed, endeavour to turn or intercept them as they doubled, discharging a well-directed arrow whenever they came within its range." 1 The partiality for the chase which the ancient Egyptians manifested was shared by the Assyrians and Babylonians, as is shown by the frequency with which hunting scenes are depicted on the walls of their temples and palaces; it is even said that their

1 See on this whole subject ch. viii. of Wilkinson's Ancient Egyptians (ii. 78-92, ed. Birch, 1878).

dresses and furniture were ornamented with similar subjects. 2 The game pursued included the lion, the wild ass, the gazelle and the hare, and the implements chiefly employed seem to have been the javelin and the bow. There are indications that hawk- ing was also known. The Assyrian kings also maintained magnificent parks, or " paradises," in which game of every kind was enclosed; and perhaps it was from them that the Persian sovereigns borrowed the practice mentioned both by Xenophon in the Cyropaedia and by Curtius. According to Herodotus, Cyrus devoted the revenue of four great towns to meet the expenses of his hunting establishments. The circumstances under which the death of the son of Croesus is by the same writer (i. 34-45) related to have occurred, incidentally show in what high estimation the recreation of hunting was held in Lydia. In Palestine game has always been plentiful, and the Biblical indications that it was much sought and duly appreciated -are numerous. As means of capture, nets, traps, snares and pitfalls are most frequently alluded to; but the arrow (Isa. vii.24),the spear and the dart (Job. xli. 26-29) are a ls° mentioned. There is no evidence that the use of the dog (Jos. Ant. iv. 8, 10, not- withstanding) or of the horse in hunting was known among the Jews during the period covered by the Old Testament history; Herod, however, was a keen and successful sportsman, and is recorded by Josephus {B.J. i. 21, 13, compare Ant. xv. 7, 7; xvi. 10, 3) to have killed no fewer than forty head of game (boar, wild ass, deer) in one day.

The sporting tastes of the ancient Greeks, as may be gathered from many references in Homer (//. ix. 538-545; Od. ix. 120, xvii. 295, 316, xix. 429 seq.), had developed at a very early period; they first found adequate literary expression in the work of Xenophon entitled Cynegeticus, 3 which

expounds his principles and embodies his experience in his favourite art of hunting. The treatise chiefly deals with the capture of the hare; in the author's day the approved method was to find the hare in her form by the use of dogs; when found she was either driven into nets previously set in her runs or else run down in the open. Boar-hunting is also described; it was effected by nets into which the animal was pursued, and in which when fairly entangled he was speared. The stag, according to the same work, was taken by means of a kind of wooden trap {irodoarpaPri) , which attached itself to the foot. Lions, leopards, lynxes, panthers and bears are also specially mentioned among the large game; sometimes they were taken in pitfalls, sometimes speared by mounted horsemen. As a writer on field sports Xenophon was followed by Arrian, who in his Cynegeticus, in avowed dependence on his predecessor, seeks to supplement such deficiencies in the earlier treatise as arose from its author's unacquaintance with the dogs of Gaul and the horses of Scythia and Libya. Four books of Cynegetica, extending to about 2100 hexameters, by Oppian have also been preserved; the last of these is incomplete, and it is probable that a fifth at one time existed. The poem contains some good descriptive passages, as well as some very curious indications of the state of zoological knowledge in the author's time. Hunting scenes are frequently represented in ancient works of art, especially the boar-hunt, and also that of the hare. In Roman literature allusions to the pleasures of the chase (wild ass, boar, hare, fallow deer being specially mentioned as favourite game) are not wanting (Virg. Georg. iii. 409-413; Eel. iii. 75; Hor. Od. i. 1, 25-28); it seems to have been viewed; however, with less favour as an occupation for gentlemen, and to have been chiefly left to inferiors and professionals. The immense vivaria or theriotropheia, in which various wild animals, such as boars, stags and roe-deer, were kept in a state of semi- domestication, were developments which arose at a compara— tively late period; as also were the venationes in the circus, although these are mentioned as having been known as early as 186 B.C. The bald and meagre poem of Grattius Faliscus on hunting {Cynegetica) is modelled upon Xenophon's prose work; a still extant fragment (315 lines) of a similar poem with the same title, of much later date, by Nemesianus, seems to have at one

2 See Layard {Nineveh, ii. 431, 432), who cites Ammian. Marcell. xxvi. 6, and Athen. xii. 9. 3 Engl, transl. by Blane.

time formed the introduction to an extended work corresponding to thtt of Oppian,

That the Romans had borrowed some things in the art of hunting from the Gauls may be inferred from the name canis gallicus (Spanish galgo) for a greyhound, which is to be met with both in Ovid and Martial; also in the words (canis) vertragus and scgusius, both of Celtic origin. 1 According to Strabo (p. 200) the Britons also bred dogs well adapted for hunting purposes. The addiction of the Franks in later centuries to the chase is evidenced by the frequency with which not only the laity but also the clergy were warned by provincial councils against expending so much of their time and money on hounds, hawks and falcons; and we have similar proof with regard to the habits of other Teutonic nations subsequent to the introduction of Christianity. 2 Originally among the northern nations sport was open to every one 3 except to slaves, who were not permitted to bear arms; the growth of the idea of game-preserving kept pace with the development of feudalism. For its ultimate development in Britain see Forest Law, where also the distinc- tion between beasts of forest or venery, beasts of chase and beasts and fowls of warren is explained. See also Game Laws.

Modern Hunting. — The term " hunting " has come to be applied specially to the pursuit of such quarries as the stag or fox, or to following an artificially laid scent, with horse and hound. It thus corresponds to the F"r. chasse au courre, as distinguished from chasse au tir, a I'oiseau, &c, and to the Ger. hetzjagd as distinguished from birsch. In the following article the English practice is mainly considered.

Doubtless the early inhabitants of Britain shared to a large extent in the habits of the other Celtic peoples; the fact that they kept good hunting dogs is vouched for by Strabo; and an interesting illustration of the manner in which these were used is given in the inscription quoted by Orelli in. 1603) — " Silvano Invicto Sacrum — ob aprum eximiae formae captum, quern multi antecessorcs praedari non potuerunt." Asser, the biographer of Alfred the Great, states that before the prince was twelve years of age he " was a most expert and active hunter, and excelled in all the branches of that noble art, to which he applied with inces- sant labour and amazing success." 4 Of his grandson Athelstan it is related by William of Malmesbury that after the victory of Brunanburgh he imposed upon the vanquished king of Wales a yearly tribute, which included a certain number of " hawks and sharp-scented dogs fit for hunting wild beasts." According to the same authority, one of the greatest delights of Edward the Confessor was " to follow a pack of swift hounds in pursuit of game, and to cheer them with his voice." It was under the Anglo-Saxon kings that the distinction between the higher and lower chase first came to be made — the former being expressly for the king or those on whom he had bestowed the pleasure of sharing in it, while only the latter was allowed to the proprietors of the land. To the reign of Cnut belong the " Constitutiones de

Foresta," according to which four thanes were appointed in every province for the administration of justice in all matters connected with the forests; under them were four inferior thanes to whom was committed immediate care of the vert and venison. 5 TTie severity of the forest laws which prevailed during the Norman period is sufficient evidence of the sporting ardour of William and his successors. The Conqueror himself " loved the high game as if he were their father"; and the penalty for the unauthorized slaughter of a hart or hind was loss of both eyes.

1 Hehn, Kulturpflanzen u. Hausthiere, p. 327.

2 References will be found in Smith's Dictionary of Christian Antiquities — art. on " Hunting."

3 " Vita omnis in venationibus . . . consistit," Caes. B.G., vi. 21. " Quoties bella non ineunt, multum venatibus, plus per otium transi- gunt," Tacitus, Germ. 15.

- *See Strutt, Sports and Pastimes, who also gives an illustration, " taken from a manuscriptal painting of the 9th century in the Cotton Library," representing " a Saxon chieftain, attended by his hunts- man and a couple of hounds, pursuing the wild swine in a forest."*

5 See Lappenberg, Hist, of England under the Anglo-Saxon Kings (ii. 361, Thorpe's trans.).

At an early period stag hunting was a favourite recreation with English royalty. It seems probable that in the reign of Henry VIII . the royal pack of buckhounds was kennelled at Swinley, where, in the reign of Charles II. (1684), a hunting. deer was found that went away to Lord Petre's seat in Essex; only five got to the end of this 70 m. run, one being the king's brother, the duke of York. George III. was a great stag hunter, and met the royal pack as often as possible.

In The Chase of the Wild Red Deer, Mr Collyns says that the earliest record of a pack of staghounds in the Exmoor district is in 1598, when Hugh Polland, Queen Elizabeth's ranger, kept one at Simonsbath. The succeeding rangers of Exmoor forest kept up the pack until some 200 years ago, the hounds subsequently passing into the possession of Mr Walter of Stevenstone, an ancestor of the Rolle family. Successive masters continued the sport until 1825, when the fine pack, descended probably from the bloodhound crossed with the old southern hound, was sold in London. It is difficult to imagine how the dispersion of such a pack could have come about in such a sporting country, but in 1827 Sir Arthur Chichester got a pack together again. Stag hunting begins on the 12th of August, and ends

on the 8th of October; there is then a cessation until the end of the month, when the hounds are unkennelled for hind hunting, which con- tinues up to Christmas; it begins again about Ladyday, and lasts till the 10th of May. The mode of hunting with the Devon and Somerset hounds is briefly this: the whereabouts of a warrant- able stag is communicated to the master by that important functionary the harbourer; two couple of steady hounds called tufters are then thrown into cover, and, having singled out a warrantable deer, follow him until he is forced to make for the open, when the. body of the pack are laid on. Very often two or three hours elapse before the stag breaks, but a run over the wild country fully atones for the delay.

It is only within comparatively recent times that the fox has come to be considered as an animal of the higher chase. William Twici, indeed, who was huntsman-in-chief to Edward II., and who wrote in Norman French a treatise on huatiar. hunting, 6 mentions the fox as a beast of venery, but obviously as an altogether inferior object of sport. Strutt also gives an engraving, assigned by him to the 14th century, in which three hunters, one of whom blows a horn, are represented as unearthing a fox, which is pursued by a single hound. The precise date of the establishment of the first English pack of hounds kept entirely for fox hunting cannot be accurately fixed. In the work of " Nimrod " (C. J. Apperley), entitled The Chase, there is (p. 4) an extract from a letter from Lord Arundel, dated February 1833, i n which the writer says that his ancestor, Lord Arundel, kept a pack of foxhounds between 1690 and 1700, and that they remained in the family till 1782, when they were sold to the celebrated Hugh Meynell, of Quorndon Hall, Leicester- shire. Lord Wilton again, in his Sports and Pursuits of the English, says that " about the year 1750 hounds began to be entered solely to fox." The Field of November 6, 1875, p. 512, contains an engraving of a hunting-horn then in the possession of the late master of the Cheshire hounds, and upon the horn is the inscription: — " Thomas Boothby, Esq., Tooley Park, Leicester. With this horn he hunted the first pack of foxhounds then in Eng- land fifty-five years. Born 1677. Died 1752. Now the property of Thomas d'Avenant, Esq., county Salop, his grandson." These extracts do not finally decide the point, because both Mr Boothby's and Lord Arundel's hounds may have hunted other game besides fox, just as in Edward IV. 's time there were " fox dogs " though not kept exclusively for fox. On the whole, it is probable that Lord Wilton's surmise is not far from correct. Since fox hunting first commenced, however, the system of the sport has been much changed. In our great-grandfathers' time the hounds met early, and found the fox by the drag, that is, by the line he took to his kennel on his return from a foraging expedition. Hunting the

6 Le Art de venerie, translated with preface and notes by Sir Henry Dryden (1893), new edition by Miss A. Dryden (1909J, in- cluding The Craft of

Venerie from a 15th-century MS. and a 13th- century poem La Chasse a" on cer'j.

Hare.

drag was doubtless a great test of nose, but many good runs must have been lost thereby, for the fox must often have heard the hounds upwind, and have moved off before they could get on good terms with him. At the present day, the woodlands are neither so large nor so numerous as they formerly were, while there are many more gorse covers; therefore, instead of hunting the drag up to it, a much quicker way of getting to work is to find a fox in his kennel; and, the hour of the meeting being later, the fox is not likely to be gorged with food, and so unable to take care of himself at the pace at which the modern foxhound travels.

Cub hunting carried out on a proper principle is one of the secrets of a successful season. To the man who cares for hunting, as distinct from riding, September and October are not the least enjoyable months of the whole hunting season. As soon as the young entry have recovered from the operation of " rounding," arrangements for cub hunting begin. The hounds must have first of all walking, then trotting and fast exercise, so that their feet may be hardened, and all superfluous fat worked off by the last week in August. So far as the hounds are concerned, the object of cub hunting is to teach them their duty; it is a dress rehearsal of the November business. In company with a certain proportion of old hounds, the youngsters learn to stick to the scent of a fox, in spite of the fondness they have acquired for that of a hare, from running about when at walk. When cubbing begins, a start is made at 4 or 5 a.m., and then the system is adopted of tracking the cub by his drag. A certain amount of blood is of course indispensable for hounds, but it should never be forgotten that a fox cub of seven or eight months old, though tolerably cunning, is not so very strong; the huntsman should not, therefore, be over-eager in bringing to hand every cub he can find.

Hare hunting, which must not be confounded with Coursing (q.v.), is an excellent school both for men and for horses. It is attended with the advantages of being cheaper than any other kind, and of not needing so large an area of country. Hare hunting requires considerable skill; Beckford even goes so far as to say: " There is more of true hunting with harriers than with any other description of hounds. ... In the first place, a hare, when found, generally describes a circle in her course which naturally

brings her upon her foil, which is the greatest trial for hounds. Secondly, the scent of the hare is weaker than that of any other animal we hunt, and, unlike some, it is always the worse the nearer she is to her end." Hare hunting is essentially a quiet amusement; no hallooing at hounds nor whip-cracking should be permitted; nor should the field make any noise when a hare is found, for, being a timid animal, she might be headed into the hounds' mouths. Capital exercise and much useful knowledge are to be derived by running with a pack of beagles. There are the same difficulties to be contended with as in hunting with the ordinary harrier, and a very few days' running will teach the youthful sportsman that he cannot run at the same pace over sound ground aild over a deep ploughed field, up hill and down, or along and across furrows.

Otter hunting, which is less practised now than formerly, begins just as all other hunting is drawing to a close. When the waterside is reached an attempt is made to hit upon the track by which the otter passed to his " couch," which is generally a hole communicating with the river, into which the otter often dives on first hearing the hounds. When the otter " vents " or comes to the surface to breathe, his muzzle only appears above water, and when he is viewed or traced by the mud he stirs up, or by air bubbles, the hounds are laid on. Notwithstanding the strong scent of the otter, he often escapes the hounds, and then a cast has to be made. When he is viewed an attempt is made to spear him by any of the field who may be within distance; if their spears miss, the owners must wade to recover them. Should the otter be transfixed by a spear, the person who threw it goes into the water and raises the game over his head on the spear's point. If instead of being speared, he is caught by the hounds, he is soon worried to death by them, though frequently not before he has inflicted some severe wounds on one or more of the pack.

Packs.

Otter.

When railways were first started in England dismal prophecies were made that the end of hunting would speedily be brought about. The result on the whole has been the reverse. While in some counties the sport has suffered, towns- men who formerly would have been too far from a meet can now secure transport for themselves and their horses in all directions; and as a consequence, meets of certain packs are not advertised because of the number of strangers who would be induced to attend. The sport has never been so vigorously pursued as it was at the beginning of the 20th century, 19 packs of staghounds being kept in England and 4 in Ireland, over 1 70 packs of foxhounds in England, 10 in Scotland and 23 in Ireland, with packs of harriers and beagles too numerous to be counted. The chase of the

wild stag is carried on in the west country by the Devon and Somerset hounds, which hunt three or four days a week from kennels at Dunster; by the Quantock; and by a few other local packs. In other parts of England staghound packs are devoted to the capture of the carted deer, a business which is more or less of a parody on the genuine sport, but is popular for the reason that whereas with foxhounds men may have a blank day, they are practically sure of a gallop when a deer is taken out in a cart to be enlarged before the hounds are laid on. Complaints are often raised about the cruelty of what is called tame stag hunting, and it became a special subject of criticism that a pack should still be kept at the Royal kenneb at Ascot (it was abolished in rgor) and hunted by the Master of the Buckhounds; but it is the constant endeavour of all masters and hunt servants to prevent the infliction of any injury on the deer. Their efforts in this direction are seldom unsuccessful; and it appears to be a fact that stags which are hunted season after season come to understand that they are in no grave danger. Packs of fox- hounds vary, from large establishments in the " Shires," the meets of which are attended by hundreds of horsemen, some of whom keep large stables of hunters in constant work — for though a man at Melton, for instance, may see a great deal of sport with half-a-dozen well-seasoned animals, the number is not sufficient if he is anxious to be at all times well mounted — to small kennels in the north of England, where the field follow on foot. The " Shires " is a recognized term, but is nevertheless somewhat vague. The three counties included in the expression are Leicester- shire, Rutlandshire and Northamptonshire. Several packs which hunt within these limits are not supposed, however, to belong to the " Shires," whereas a district of the Belvoir country is in Lincolnshire, and to hunt with the Belvoir is certainly understood to be hunting in the " Shires." The Shire hounds include the Belvoir, the Cottesmore, the Quorn and the Pytchleys; for besides the Pytchley proper, there is a pack distinguished as the Woodland. It is generally considered that the cream of the sport lies here, but with many of the packs which are generally described as " provincial " equally good hunting may be obtained. Round about London a man who is bent on the pursuit of fox or stag may gratify his desire in many directions. The Essex and the Essex Union, the Surrey and the Surrey Union, the Old Berkeley, the West Kent, the Burstow, the Hertfordshire, the Crawley and Horsham, the Puckeridge, as regards foxhounds; the Berkhampstead, the Enfield Chase, Lord Rothschild's, the Surrey, the West Surrey and the Warnham, as regards stag- hounds — as well as the Bucks and Berks, which was substituted for the Royal Buckhounds — are within easy reach of the capital. Questions are constantly raised as to whether horse and hounds have improved or deteriorated in modern times. It is probable that the introduction of scientific agriculture has

brought about an increase of pace. Hounds hunt Modern

11 i 1 t 1 r i horses ana*

as well as ever they did, are probably faster on the hounds.

whole, and in the principal hunts more thoroughbred

horses are employed. For pace and endurance no hunter

approaches the English thoroughbred; and for a bold man

who " means going," a steeplechase horse is often the best

animal that could be obtained, for when he has become too slow

to win races " between the flags," he can always gallop much

faster, and usually lasts much longer, than animals who have

not his advantage of blood. The quondam " 'chaser " is, how-

ever, usually apt to be somewhat impetuous at his fences. But it must by no means be supposed that every man who goes out hunting desires to gallop at a great pace and to jump formidable obstacles, or indeed any obstacles at all. A large proportion of men who follow hounds are quite content to do so passively through gates and gaps, with a canter along the road whenever one 1S available. A few of the principal packs hunt five days a week, and sometimes even six, and for such an establishment not fewer than seventy-five couples of hounds are requisite. A pack which hunts four days a week will be well supplied with anything between fifty and sixty couples, and for two days a week from twenty-five to thirty will suffice. The young hound begins cub-hunting when he is some eighteen months old, and as a rule is found to improve until his third or fourth season, though some last longer than this. Often, however, when a hound is five or six years old he begins to lack speed. Exceptional animals naturally do exceptional things, and a famous hound called Potentate is recorded by the 8th duke of Beaufort to have done notable service in the hunting field for eleven seasons. Servants necessary for a pack include the huntsman, the duties of whose office a master sometimes fulfils himself; two Hunt whippers-in, an earth-stopper and often a kennel hunts-

aervaats. man is also employed, though the 1 8th Lord Willoughby de Broke (d. 1902), a great authority, laid it down that " the man who hunts the hounds should always feed them." In all but the largest establishments the kennel huntsman is generally called the " feeder." It is his business to

look after the pack which is not hunting, to walk them out, to prepare the food for the hunting pack so that it is ready when they return, and in the spring to attend to the wants of the matrons and whelps. A ker.nel huntsman proper may be described as the man who does duty when the master hunts his own hounds undertaking all the responsibilities of the huntsman except actually hunting the pack. It may be said that the first duty af a huntsman is to obtain the confidence of his hounds, to understand them and to make himself understood; and 'the intelligence of hounds is remarkable. If, for example, it is the habit of the huntsman to give a single note on his horn when hounds are drawing a covert, and a double note when a fox is found, the pack speedily understand the significance. The mysteries of scent are certainly no better comprehended now than they were more than a hundred years ago when Peter Beckford wrote his Thoughts on Hunting. The subject of scent is full of mysteries. The great authority already quoted, the Sth duke of Beaufort, noted as a very extraordinary but well-known fact, for example, " that in nine cases out of ten if a fox is coursed by a dog during a run all scent ceases after- wards, even when you get your hounds to the line of the fox beyond where the dog has been." This is one of many phenomena which have always remained inexplicable. The duties of the whipper-in are to a great extent explained by his title. Whilst the huntsman is drawing the cover the whipper-in is stationed at the spot from which he can best see what is going on, in order to view the fox away; and it is his business to keep the hounds together when they have found and got away after the fox There are many ways in which a whipper-in who is not intelligent and alert may spoil sport; indeed, the duke of Beaufort went so far as to declare that "in his experience, with very few exceptions, nine days out of ten that the whipper-in goes out hunting he does more harm than good." In woodland countries however, a good whipper-in is really of almost as much import- ance as the huntsman himself; if he is not alert the hounds are likely to divide, as when running a little wide they are apt to put up a fresh fox. The earth-stopper " stops out " and puts to "—the first expression signifying blocking, during the night, earths and drains to which foxes resort, the second perform- ing the same duties in the morning so as to prevent the fox from getting to ground when he has been found. In the interests of humanity care should be taken that the earth-stopper alwavs has with him a small terrier, as it is often necessary to " stop-out " permanently; and unless a dog is run through the drain some unfortunate creature in it, a fox, cat or rabbit, may be imprisoned

and starved to death. This business is frequently performed by a gamekeeper, a sum being paid him for any litter of cubs or fox found on his beat.

With regard to the expenses of hunting, it is calculated that a master of hounds should be prepared to spend at the rate of £500 a year for every day in the week that his hounds are supposed to hunt. Taking one thing with another C ° Bt ?' this is probably rather under than over the mark, and huaiiag – the cost of hunting three days a week, if the thing be really properly done, will fnost likely be nearer £2000 than £1 500. The expenses to the individual naturally vary so much that no figures can be given. As long ago as 1826 twenty-seven hunters and hacks were sold for 7500 guineas, an average of over £290- and when Lord Stamford ceased to hunt the Quorn in 1853, seventy- three of his horses fetched at auction an average of close on £200. Early m the 19th century, when on the whole horses were much cheaper than they are at present, 700 and 800 guineas are prices recorded as having been occasionally paid for hunters of special repute. A man may see some sport on an animal that cost him £40; others may consider it necessary to keep an expensive establishment at Melton Mowbray or elsewhere in the Shires, with a dozen or more 500-guinea hunters, some covert-hacks, and a corresponding staff of servants. Few people realize what enormous sums of money are annually distributed in connexion with hunting. Horses must be fed; the wages of grooms and helpers be paid; saddlery, clothing, shoeing, &c, are items; tarmers, innkeepers, railway companies, fly-men and innumerable others benefit more or less directly. (A. E. T. W.)

HUNTING DOG (Lycaon pictus), an African wild dog, differing from the rest of the family in having only four toes on each foot, and its blotched coloration of ochery yellow, black and white The species is nearly as large as a mastiff, with long li

Cape Hunting Dog (Lycaon pictus).

flat head, short muzzle and large erect ears, and presents a superficial resemblance to the spotted hyena on which account it is sometimes called the hyena-dog. " Mimicry " has been suggested as an explanation of this likeness; but it is difficult to see what advantage a strong animal hunting in packs like the present species can gain by being mistaken for a hyena, as it is in every respect fully qualified to take care of itself These wild dogs are found in nearly the whole of Africa south' and east of the Sahara. The statement of Gordon Cumming that a pack " could run into the swiftest or overcome the largest and most powerful antelope," is abundantly confirmed, and these dogs do great damage to sheep flocks. Several local races of the species have been named.

HUNTINGDON, EARLS OF. George Hastings, 1st earl of Huntingdon 1 (c. 1488-1545), was the son and successor of

‘The title of earl of Huntingdon had previously been held in other families (see Huntingdonshire). The famous RobinHood t.‘li6o-ri247) is said to have had a claim to the earldom.

HUNTINGDON, COUNTESS OF— HUNTINGDON

Edward, 2nd Baron Hastings (d. 1506), and the grandson of William, Baron Hastings, who was put to death by Richard III. in 1483. Being in high favour with Henry VIII., he was created earl of Huntingdon in 1529, and he was one of the royalist leaders during the suppression of the rising known as the Pilgrim- age of Grace in 1536. His eldest son Francis, the 2nd earl (c. 1514-1561), was a close friend and political ally of John Dudley, duke of Northumberland, sharing the duke’s fall and imprisonment after the death of Edward VI. in 1553; but he was quickly released, and was employed on public business by Mary. His brother Edward (c. 1520-1572) was one of Mary’s most valuable servants; a stout Roman Catholic, he was master of the horse and then lord chamberlain to the queen, and was created Baron Hastings of Loughborough in 1558, this title becoming extinct when he died.

The 2nd earl’s eldest son Henry, the 3rd earl (c. 1535-1595), married Northumberland’s daughter Catherine. His mother was Catherine Pole (d. 1576), a descendant of George, duke of Clarence; and, asserting that he was thus entitled to succeed Elizabeth on the English throne, Huntingdon won a certain amount of support, especially from the Protestants and the enemies of Mary, queen of Scots. In 1572 he was appointed president of the council of the north, and during the troubled period between the flight of Mary to England in 1568 and the defeat of the Spanish armada twenty years later he was frequently employed in the north of England. It was doubtless felt that the earl’s own title to the crown was a pledge that he would show scant sympathy with the advocates of Mary’s claim. He assisted George Talbot, earl of Shrewsbury, to remove the Scottish queen from Wingfield to Tutbury, and for a short time in 1569 he was one of her custodians. Huntingdon was re- sponsible for the compilation of an elaborate history of the Hastings family, a manuscript copy of which is now in the British Museum. As he died childless, his earldom passed to his brother George. Another brother, Sir Francis Hastings (d. 16 10), was a member of parliament and a prominent puritan during Elizabeth’s reign, but is perhaps more celebrated as a writer. George, the 4th earl (c. 1540-1604), was the grandfather of Henry, the 5th earl (1 586-1643), and the father of Henry Hastings (c. 1560-1650), a famous sportsman, whose character has been delineated by the 1st earl of Shaftesbury (see L. Howard, A Collection of Letters, &c, 1753). The 6th earl was the 5th earl’s

son Ferdinando (c. 1608-1656). His brother Henry, Baron Loughborough (c. 1610-1667), won fame as a royalist during the Civil War, and was created a baron in 1643.

Theophilus, the 7th earl (1650-1701), was the only surviving son of the 6th earl. In early life he showed some animus against the Roman Catholics and a certain sympathy for the duke of Monmouth; afterwards, however, he was a firm supporter of James II., who appointed him to several official positions. He remained in England after the king's flight and was imprisoned, but after his release he continued to show his hostility to William III. One of his daughters, Lady Elizabeth Hastings (1682-1)39), gained celebrity for her charities and her piety. Her beauty drew encomiums from Congreve and from Steele in the pages of the Tatler, and her other qualities were praised by William Law. She was a benefactor to Queen's College, Oxford. The 7th earl's sons, George and Theophilus, succeeded in turn to the earldom. George (1677-1705) was a soldier who served under Marlborough, and Theophilus (1 696-1 746) was the husband of the famous Selina, countess of Huntingdon (q.v.). Theophilus was succeeded by his son Francis (1729-1789), on whose death unmarried the baronies passed to his sister Elizabeth (1731-1808), wife of John Rawdon, earl of Moira, and the earldom became dormant.

The title of earl of Huntingdon was assumed by Theophilus Henry Hastings ˆ728-1804), a descendant of the 2nd earl, who, however, had taken no steps to prove his title when he died. But, aided by his friend Henry Nugent Bell (1792-1822), his nephew and heir, Hans Francis Hastings (1779-ˆ28), was more energetic, and in 1818 his right to the earldom was declared proved, and he took his seat in the House of Lords. He did not.

however, recover the estates. Before thus becoming the nth (or 1 2th) earl, Hastings had served for many years in the navy, and after the event he was appointed governor of Dominica. He died on the 9th of December 1828 and was succeeded by his son Francis Theophilus Henry (1808-1875), whose grandson, Warner Francis, became 14th or 15th earl of Huntingdon in 1885. Another of the nth earl's sons was Vice-admiral George Fowler Hastings (1814-1876).

See H. N. Bell, The Huntingdon Peerage (1820).

HUNTINGDON, SELINA HASTINGS, Countess of (1707- 1791), English religious leader and founder of a sect of Calvinistic Methodists, known as the Countess of Huntingdon's Connexion, was the daughter of Washington Shirley, 2nd Earl Ferrers. She was born at Stanton Harold, a mansion near Ashby-de-la-Zouch in Leicestershire, on the 24th of August 1707, and in her twenty- first year was married to Theophilus Hastings, 9th earl of

Huntingdon. In 1739 she joined the first Methodist society in Fetter Lane, London. On the death of her husband in 1746 she threw in her lot with Wesley and Whitefield in the work of the great revival. Isaac Watts, Philip Doddridge and A. M. Toplady were among her friends. In 1748 she gave Whitefield a scarf as her chaplain, and in that capacity he frequently preached in her London house in Park Street to audiences that included Chesterfield, Walpole and Bolingbroke. In her chapel at Bath there was a curtained recess dubbed " Nicodemus's corner " where some of the bishops sat incognito to hear him. Lady Huntingdon spent her ample means in building chapels in different parts of England, e.g. at Brighton'(i76r), London and Bath (1765), Tunbridge Wells (1769), and appointed ministers to officiate in them, under the impression that as a peeress she had a right to employ as many chaplains as she pleased. It is said that she expended £100,000 in the cause of religion. In 1768 she con- verted the old mansion of Trevecca, near Talgarth, in South Wales, into a theological seminary for young ministers for the connexion. Up to 1779 Lady Huntingdon and her chaplains continued members of the Church of England, but in that year the prohibition of her chaplains by the consistorial court from preaching in the Pantheon, a large building in London rented for the purpose by the countess, compelled her, in order to evade the injunction, to take shelter under the Toleration Act. This step, which placed her legally among dissenters, had the effect of severing from the connexion several eminent and useful members, among them William Romaine (1714-1795) and Henry Venn (1725-1797). Till her death in London on the 17th of June 1791, Lady Huntingdon continued to exercise an active, and even autocratic, superintendence over ■ her chapels and chaplains. She successfully petitioned George III. in regard to the gaiety of Archbishop Cornwallis's establishment, and made a vigorous protest against the anti-Calvinistic minutes of the Wesleyan Conference of 1770, and against relaxing the terms of subscription in 1772. Her sixty-four chapels and the college were bequeathed to four trustees. In 1792 the college was removed to Cheshunt, Hertfordshire, where it remained till 1905, when it was transferred to Cambridge. The college is remarkable for the number of men it has sent into the foreign mission field.

The connexion in 1910 consisted of 44 churches and mission stations, with a roll of about 2400 communicants under 26 ordained pastors. The government is vested by the trust deed, sanctioned by the court of Chancery on the 1st of January 1899, in nine trustees assisted by a conference of delegates from each church in the trust. The endow- ments of the trust produce £1500 per annum, and are devoted to four purposes: grants in aid of the ministry; annuities to ministers aver sixty years of age who have given more than twenty years' continuous service in the connexion, or to their widows; grants for the main- tenance and extension of the existing

buildings belonging to the trust ; grants to assist in purchasing chapels and chapel sites. In addition the trustees may grant loans for the encouragement of new pro- gressive work from a loan fund of about £8000.

See The Life of the Countess of Huntingdon (London, 2 vols., 1844) ; A. H. New, The Coronet and the Cross, or Memorials of Selina, Countess of Huntingdon (1857); Sarah Tytler, The Countess of Huntingdon and her Circle (1907).

HUNTINGDON, a market town and municipal borough and the county town of Huntingdonshire, England, on the left bank of the Ouse, on the Great Northern, Great Eastern and Midland

railways, 59 m. N. of London. Pop. (1901) 4261. It consists principally of one street, about a mile long, in the centre of which is the market-place. Of the ancient religious houses in Huntingdon few traces remain. The parish church of St Mary occupies the site of the priory of Augustinian Canons already existing in the 10th century, in which David Bruce, Scottish earl of Huntingdon, was afterwards buried. The church, which was restored by Sir A. W. Blomfield, in 1876, contains portions of the earlier building which it replaced in 1620. All Saints' church, rebuilt about a century earlier, has slight remains of the original Norman church and some good modern, as well as ancient, carved woodwork. The church registers dating from 1558 are preserved, together with those of the old parish of St John, which date from 1585 and contain the entry of Oliver Cromwell's baptism on the 29th of April 1599, the house in which he was born being still in existence. Some Norman remains of the hospice of St John the Baptist founded by David, king of Scotland, at the end of the 12th century were incorporated in the buildings of Huntingdon grammar school, once attended by Oliver Cromwell and by Samuel Pepys. Hinchingbrooke House, on the outskirts of the town, an Elizabethan mansion chiefly of the 16th century, was the seat of the Cromwell family, others of the Montagus, earls of Sandwich. It occupies the site of a Benedictine nunnery granted by Henry VIII. at the Dissolution, together with many other manors in Huntingdonshire, to Sir Richard Williams, alias Cromwell, whose son, Sir Henry Cromwell, entertained Queen Elizabeth here in 1564. His son, Sir Oliver Cromwell, was the uncle and godfather of the Protector. Among the buildings of Huntingdon are the town hall (1745). county gaol, barracks, county hospital and the Montagu Institute (1897). A racecourse is situated in the bend of the Ouse to the south of the town, and meetings are held here in August. The town is governed by a mayor, 4 aldermen and 12 councillors.

Area, 1074 acres.

Huntingdon (Huntandun, Hunter sdune) was taken by the Danes in King Alfred's reign but recovered c. 919 by Edward the Elder, who raised a castle there, probably on the site of an older fortress. In 1010 the Danes destroyed the town. The castle was strengthened by David, king of Scotland, after the Conquest, but was among the castles destroyed by order of Henry II. At the time of the Domesday Survey Huntingdon was divided into four divisions, two containing 116 burgesses and the other two 140. Most of the burgesses belonged to the king and paid a rent of £10 yearly. King John in 1205 granted them the liberties and privileges held by the men of other boroughs in England and increased the farm to £20. Henry III. further increased it to £40 in r252. The borough was incorporated by Richard III. in 1483 under the title of bailiffs and burgesses, and in 1630 Charles I. granted a new charter, appointing a mayor and 12 aldermen, which remained the governing charter until the Municipal Corporations Act of 1835 changed the corporation to a mayor, 4 aldermen and 12 councillors. The burgesses were represented in parliament by two members from 1295 to 1867, when the number was reduced to one, and in 1885 they ceased to be separately represented. Huntingdon owed its prosperity to its situation on the Roman Ermine Street. It has never been noted for manufactures, but is the centre of an agricultural district. The market held on Saturday was granted to the burgesses by King John. During the Civil Wars Huntingdon was several times occupied by the Royalists.

See Victoria County History, Huntingdon; Robert Carruthers, The History of Huntingdon from the Earliest to the Present Times 1 1824); Edward Griffith, A Collection of Ancient Records relating to {he Borough of Huntingdon (1827).

HUNTINGDON, a borough and the county-seat of Huntingdon county, Pennsylvania, U.S.A., on the Juniata river, about 150 m. E. of Pittsburg, in the S. central part of the state. Pop. (1890) 5729; (1900) 6053 (225 foreign-born); (1910) 6861. It is served by the Pennsylvania and the Huntingdon & Broad Top Mountain railways, the latter running to the Broad Top Mountain coalfields in the S.W. part of the county. The borough is built on ground sloping gently towards the river, which furnishes valuable water power. The surrounding country is well adapted

to agriculture, and abounds in coal, iron, tire clay, limestone and white sand. Huntingdon's principal manufactures are stationery, flour, knitting-goods, furniture, boilers, radiators and sewer pipe. It is the seat of Juniata College (German Baptist Brethren) , opened in 1876 as the Brethren's Normal School and Collegiate Institute, and rechartered as Juniata College in 1896, and of the State Industrial Reformatory, opened in 1888. Indians

(probably Oneidas) settled near the site of Huntingdon, erected here a tall pillar, known as "Standing Stone"; the original was removed by the Indians, but another has been erected by the borough on the same spot. The place was laid out as a town in 1767 under the direction of Dr William Smith (1727-1803), at the time provost of the college of Pennsylvania (afterwards the university of Pennsylvania) ; and it was named in honour of the countess of Huntingdon, who had contributed liberally toward the maintenance of that institution. It was incorporated as a borough in 1796.

HUNTINGDONSHIRE (HUNTS), an east midland county of England, bounded N. and W. by Northamptonshire, S.W. by Bedfordshire and E. by Cambridgeshire. Among English counties it is the smallest with the exception of Middlesex and Rutland, having an area of 366 sq. m. The surface is low, and for the most part bare of trees. The south-eastern corner of the county, bounded by the Ouse valley, is traversed by a low ridge of hills entering from Cambridgeshire, and continued over the whole western half of the county, as well as in a strip about 6 m. broad north of the Ouse, between Huntingdon and St Ives. These hills never exceed 300 ft. in height, but form a pleasantly undulating surface. The north-eastern part of the county, comprising 50,000 acres, belongs to that division of the great Fen district called the Bedford Levels. The prin- cipal rivers are the Ouse and Nene. The Ouse from Bedfordshire skirts the borders of the county near St Neots, and after flow- ing north to Huntingdon takes an easterly direction past St Ives into Cambridgeshire on its way to the Wash. The Kym, from Northamptonshire, follows a south-easterly course and joins the Ouse at St Neots, while the Alconbury brook, flowing in a parallel direction, falls into it at Huntingdon. The Nene forms for 15 m. the north-western border of the county, and quitting it near Peterborough, enters the Wash below Wisbech, in Cambridgeshire. The course of the Old River Nene is eastward across the county midway between Huntingdon and Peterborough, and about ij m. N. by E. of Ramsey it is intersected by the Forty Foot, or Vermuyden's Drain, a navigable cut connecting it with the Old Bedford river in Cambridgeshire.

Geology. — The geological structure is very simple. All the strati- fied rocks are of Jurassic age, with the exception of a small area of Lower Greensand which extends for a short distance along the border, north of Potton. The Greensands form low, rounded hills. Phosphatic nodules are obtained from these beds. On the north- western border is a narrow strip of Inferior Oolite, reaching from Thrapston by Oundle to Wansford near Peterborough. It is repre- sented about Wansford by the Northampton sands and by a feeble development of the Lincolnshire limestone. The Great Oolite Series has at the base the Upper Estuarine clays; in the middle, the Great Oolite limestone, which forms the escarpment of Alwalton Lynch; and at the top, the Great Oolite clay. The Cornbrash is exposed along part

of the Billing brook, and in a small infier near Yaxley. Over the remainder of the county the lower rocks are covered by the Oxford clay. It is about 600 ft. thick. This clay cannot be dis- tinguished from the Kimmeridge clay except by the fossils; the two formations probably graduate into one another, but thin limestones are found in places, and at St Ives a patch of the intermediate Corallian rock is present. All the stratified rocks have a general dip towards the south-east.

Much glacial drift clay with stones covers the older rocks over a good deal of the county ; it is a bluish clay, often containing masses of chalk, some of them being of considerable size, e.g. the one at Catworth. The Fens on the eastern side of the county are under- lain by Oxford clay, which here and there projects through the prevailing newer deposit of silt and loam. There are usually two beds of peat or peaty soil observable in the numerous drains; they are separated by a bed of marine warp. Black loamy alluvium and valley gravels, the most recent deposits, occur in the valleys of the Ouse and Nene. Calcareous tufa is formed by the springs near Alwalton. Oxford clay is dug on a considerable scale for brick- making at Fletton, also at St Ives, Ramsey and St Neots.

952

HUNTINGDONSHIRE

Agriculture. — Huntingdonshire is almost wholly an agricultural county; nearly nine-tenths of its total area is under cultivation, and much improvement has been effected by drainage. On account of the tenacity of the clay the drains often require to be placed very close. Much of the soil is, however, undrained, and only partly used for pasturage. On the drained pasturage a large number of cattle are fed. The district comprising the gravel of the Ouse valley embraces an area of 50,000 acres. On the banks of the Ouse it consists of fine black loam deposited by the overflow of the river, and its meadows form very rich pasture grounds. "The upland district is under arable culture. Wheat is much more extensively grown than any other grain. Barley is more widely cultivated than oats, but its quality on many soils is lean and inferior, and unsuitable for malting purposes. Beans and pease are largely grown, while mangold and cabbage and similar green crops are chiefly used for the feeding of sheep. During the last quarter of the 19th century there was a large decrease in the areas of grain crops and of fallow, and an increase in that of permanent pasture. Market- gardening and fruit-farming, however, greatly increased in importance. Willows are largely grown in the fen district. Good drinking water is deficient in many districts, but there are three natural springs, once famous for the healing virtues their waters were thought to possess, namely, at Hail Weston near St Neots, at Holywell near St Ives and at Somersham in the same district.

Bee-farming is largely practised. Dairy-farming is not much followed, the milk being chiefly used for rearing calves. The village of Stilton, on the Great North Road, had formerly a large market for the well-known cheese to which it has given its name. Large numbers of cattle are fattened in the field or the fold-yard, and are sold when rising three years old. They are mostly of the shorthorn breed, large numbers of Irish shorthorns being wintered in the fens. Leicesters and Lincolns are the most common breeds of sheep; they usually attain great weights at an early age. Pigs include Berkshire, Suffolk and Neapolitan breeds, and a number of crosses. Their fattening and breeding are extensively practised.

Other Industries. — There is no extensive manufacture, but the chief is that of paper and parchment. Madder is obtained in considerable quantities, and in nearly every part of the county lime burning is carried on. Lace-making is practised by the female peasantry; and the other industries are printing, iron- founding, tanning and currying, brick and tile making, malting and brewing.

Communications. — The middle of the county is traversed from south to north by the Great Northern railway, which enters it at St Neots and passing by Huntingdon leaves it at Peter- borough. A branch line running eastward to Ramsey is given off at Holme junction, midway between Huntingdon and Peterborough. From Huntingdon branch lines of the Midland and the Great Eastern run respectively west and east to Thrapston (Northamptonshire) and to Cambridge via St Ives. From St Ives Great Eastern lines also run N.E. to Ely (Cambridgeshire) via Earith Bridges on the county border, and N. to Wisbech (Cambridgeshire) with a branch line westward from Somersham to Ramsey. The north-western border is served by the Great Northern and the London and North- Western railways between Peterborough and Wansford, where they part.

Population and Administration. — The area of the ancient county is 234,218 acres, with a population in 1891 of 57,761, and in 1901 of 57,771. The area of the administrative county is 233,984 acres. The county contains 4 hundreds. The muni- cipal boroughs are Godmanchester (pop. 2017), Huntingdon, the county town (4261) and St Ives (2910). The other urban districts are Old Fletton (4585), Ramsey (4823) and St Neots (3880). The county is in the south-eastern circuit, and assizes are held at Huntingdon. It has one court of quarter sessions, and is divided into five petty sessional divisions. There are 105 civil parishes. Huntingdonshire, which contains 87 ecclesiastical parishes or districts wholly or in part, is almost wholly in the diocese of Ely, but a small part is in that of Peterborough. The parliamentary divisions, each of which returns one member,

are the Northern or Ramsey and the Southern or Huntingdon. Part of the parliamentary borough of Peterborough also fails within the county.

History. — The earliest English settlers in the district were the Gyrwas, an East Anglian tribe, who early in the 6th century worked their way up the Ouse and the Cam as far as Huntingdon. After their conquest of East Anglia in the latter half of the 9th century, Huntingdon became an important seat of the Danes, and the Danish origin of the shire is borne out by an entry in the Saxon Chronicle (918-921) referring to Huntingdon as a military centre to which the surrounding district owed allegiance, while the shire itself is mentioned in the Historic Eliensis in connexion with events which took place before or shortly after the death of Edgar. About 915 Edward the Elder wrested the fen-country from the Danes, repairing and fortifying Huntingdon, and a few years later the district was included in the earldom of East Anglia. Religious foundations were established at Ramsey, Huntingdon and St Neots in the 10th century, and that of Ramsey accumulated vast wealth and influence, owning twenty- six manors in this county alone at the time of the Domesday Survey. In ion Huntingdonshire was again overrun by the Danes and in 1016 was attacked by Canute. A few years later the shire was included in the earldom of Thored (of the Middle Angles), but in 105 1 it was detached from Mercia and formed part of the East Anglian earldom of Harold. Shortly before the Conquest, however, it was bestowed on Siward, as a reward for his part in Godwin's overthrow, and became an outlying portion of the earldom of Northumberland, passing through Waltheof and Simon de St Liz to David of Scotland. After the separation of the earldom from the crown of Scotland during the Bruce and Balliol disputes, it was conferred in 1336 on William Clinton; in 1377 on Guichard d'Angle; in 1387 on John Holand; in 1471 on Thomas Grey, afterwards marquess of Dorset; and in 1529 on George, Baron Hastings, whose descend- ants hold it at the present day.

The Norman Conquest was followed by a general confiscation of estates, and only four or five thanes retained lands which they or their fathers had held in the time of Edward the Confessor. Large estates were held by the church, and the rest of the county for the most part formed outlying portions of the fiefs of William's Norman favourites, that of Count Eustace of Boulogne, the sheriff, of whose tyrannous exactions bitter complaints are recorded, being by far the most considerable. Kimbolton was fortified by Geoffrey de Mandeville and afterwards passed to the families of Bohun and Stafford.

The hundreds of Huntingdon were probably of very early origin, and that of Norman Cross is referred to in 963. The Domesday Survey, besides the four existing divisions of Norman Cross, Toseland, Hurstingstone and Leightonstone, which from their assessment appear to have been double

hundreds, mentions an additional hundred of Kimbolton, since absorbed in Leighton- stone, while Huntingdon is assessed separately at fifty hides The boundaries of the county have scarcely changed since the time of the Domesday Survey, except that parts of the Bedford- shire parishes of Everton, Pertenhall and Keysoe and the Northamptonshire parish of Hargrave were then assessed under this county. Huntingdonshire was formerly in the diocese of Lincoln, but in 1837 was transferred to Ely. In 1291 it consti- tuted an archdeaconry, comprising the deaneries of Huntingdon, St Ives, Yaxley and Leightonstone, and the divisions re- mained unchanged until the creation of the deanery of Kimbolton in 1879.

At the time of the Domesday Survey Huntingdonshire had an independent shrievalty, but from n 54 it was united with Cambridgeshire under one sheriff, until in 1637 the two counties were separated for six years, after which they were reunited and have remained so to the present day. The shire-court was held at Huntingdon.

In 1 1 74 Henry H. captured and destroyed Huntingdon Castle. After signing the Great Charter John sent an army to ravage this county under William, earl of Salisbury, and Falkes de Breaut6. During the wars of the Roses Huntingdon was sacked by the

Lancastrians. The county resisted the illegal taxation of Charles I. and joined in a protest against the arrest of the five members. In 1642 it was one of the seven associated counties in which the king had no visible party. Hinchingbrook, however, was held for Charles by Sir Sydney Montagu, and in 1645 Huntingdon was captured and plundered by the Royalist forces. The chief historic family connected with this county were the Cromwells, who held considerable estates in the 16th century.

Huntingdonshire has always been mainly an agricultural county, and at the time of the Domesday Survey contained thirty-one mills, besides valuable fisheries in its meres and rivers. The woollen industry flourished in the county from Norman times, and previous to the draining of its fens in the 17th century, by which large areas were brought under cultivation, the in- dustries of turf-cutting, reed-cutting for thatch and the manu- facture of horse-collars from rushes were carried on in Ramsey and the surrounding district. In the 17th century saltpetre was manufactured in the county. In the 18th century women and children were largely employed in spinning yarn, and pillow- lace making and the straw-plait industry flourished in the St Neots district, where it survives; pillow lace was also manu- factured at

Godmanchester. In the early 19th century there were two large sacking manufactures at Standground, and brewing and malting were largely carried on.

Huntingdonshire was represented by three members in parlia- ment in 1200. From 1295 the county and borough of Huntingdon returned two members each, until in 1868 the representation of the borough was reduced to one member. By the act of 1885 the borough was disfranchised.

A ntiquities. — Huntingdonshire early became famous on account of its great Benedictine abbey at Ramsey and the Cistercian abbey founded in 1146 at Sawtry, 7 m. W. of Ramsey; besides which there were priories at Huntingdon and Stonely, both belonging to the Augustinian canons, and at St Ives and St Neots belonging to the Benedictines, together with a Benedictine nunnery at Hinchingbrook, near Huntingdon. Of these buildings almost the only remains are at Ramsey and St Ives. The most interesting churches for Norman architecture are Hartford near Huntingdon, Old Fletton near Peterborough (containing on the exterior some carved ornament said to have belonged to the original Saxon cathedral at Peterborough), Ramsey and Alwalton, a singular combination of Norman and Early English. Early English churches are Kimbolton, Alcon- bury, Warboys and Somersham, near Ramsey, and Hail Weston near St Neots, with a 15th-century wooden tower and spire. Decorated are Orton Longueville and Yaxley, both near Peter- borough, the latter containing remains of frescoes on its walls; Perpendicular, St Neots, Connington near Ramsey and God- manchester. At Buckden near Huntingdon are remains of a palace (15th century) of the bishops of Lincoln. There were two ancient castles in the county, at Huntingdon and at Kimbolton, of which only the second remains as a mansion. Hinchingbrook House, Huntingdon, was the seat of the Cromwell family. Connington Castle passed, like the title of earl of Huntingdon, through the hands of Waltheof, Simon de St Liz and the Scottish royal family, and was finally inherited by Sir Robert Cotton the antiquary, who was born in the neighbourhood, and is buried in Connington church. Elton Hall, on the north-west border of the county, was rebuilt about 1660, and contains, besides a good collection of pictures, chiefly by English masters, a library which includes many old and rare prayer-books, Bibles and missals.

Norman Cross, 13 m. N. of Huntingdon, on the Great North Road, marks the site of the place of confinement of several thousand French soldiers during the Napoleonic wars at the beginning of the 19th century. The village of Little Gidding, 9 m. N.W. of Hunt- ingdon, is memorable for its connexion with Nicholas Ferrar in the reign of Charles I., when the religious community of which Ferrar was the head was organized. Relics connected with this community are preserved in the British Museum.

HUNTINGTON, DANIEL (1816-1906), American artist, was born in New York on the 14th of October 1816. In 1835 he studied with S. F. B. Morse, and produced " A Bar-Room

Politician " and " A Toper Asleep." Subsequently he painted some landscapes on the river Hudson, and in 1839 went to Rome. On his return to America he painted portraits and began the illustration of The Pilgrim's Progress, but his eyesight failed, and in 1844 he went back to Rome. Returning to New York in 1846, he devoted his time chiefly to portrait - painting, although he has painted many genre, religious and historical subjects. He was president of the National Academy from 1862 to 1870, and again in 1877-1890. Among his principal works ■>«■: " The Florentine Girl," " Early Christian Prisoners," " The Shepherd Boy of the Campagna," " The Roman Penitents," " Christiana and Her Children," " Queen Mary signing the Death Warrant of Lady Jane Grey," and " Feckenham in the Tower " (1850), " Chocorua " (i860), " Republican Court in the Time of Washington," containing sixty-four careful portraits (1861), " Sowing the Word " (1869), " St Jerome," " Juliet on the Balcony "(1870), "The Narrows, Lake George "(1871), "Titian," " Clement VII. and Charles V. at Bologna," " Philosophy and Christian Art " (1878), " Goldsmith's Daughter " (1884). His principal portraits are: President Lincoln, in Union League Club, New York; Chancellor Ferris of New York University; Sir Charles Eastlake and the earl of Carlyle, the property of the New York Historical Society; President Van Buren, in the State Library at Albany; James Lenox, in the Lenox Library; Louis Agassiz (1856-1857), William Cullen Bryant (1E66), Jthn A. Dix (1880) and John Sherman (1881). He died on the 19th of April 1906 in New York City.

HUNTINGTON, FREDERIC DAN (1819-1904), American clergyman, first Protestant Episcopal bishop of central New York, was born in Hadley, Massachusetts, on the 28th of May 1819. He graduated at Amherst in 1839 and at the Harvard Divinity School in 1842. In 1842-1855 he was pastor of the South Congregational Church of Boston, and in 1855-1860 was preacher to the university and Plummer professor of Christian Morals at Harvard; he then left the Unitarian Church, with which his father had been connected as a clergyman at Hadley, resigned his professorship and became pastor of the newly established Emmanuel Church of Boston. He had refused the bishopric of Maine when in 1868 he was elected to the diocese of central New York. He was consecrated on the 9th of April 1S69, and thereafter lived in Syracuse. He died in Hadley, Massa- chusetts, on the nth of July 1904. His more important publica- tions were Lectures on Human Society (i860); Memorials of a Quiet Life (1874); and The Golden Rule applied to Business and Social Conditions (1892).

See Memoir and Letters of Frederic Dan Huntington (Boston, 1906), by Arria S. Huntington, his wife.

HUNTINGTON, a city and the county-seat of Huntington county, Indiana, U.S.A., on the Little river, about 25 m. S.W. of Fort Wayne. Pop. (1900) 9491, of whom 621 were foreign- born; (1910 census) 10,272. Huntington is served by three railways — the Wabash, the Erie (which has car shops and division headquarters here) and the Cincinnati, Bluffton & Chicago (which has machine shops here), and by the Fort Wayne & Wabash Valley Traction Company, whose car and repair shops and power station are in Huntington. The city has a public library, a business college and Central College (1897), controlled by the United Brethren in Christ (Old Constitution). Wooden- ware is the principal manufacture. The value of the factory product in 1905 was $2,081,019, an increase of 20-6% since 1900. The municipality owns and operates the waterworks… and the electric-lighting plant. Huntington, named in honour of Samuel Huntington (1736-1796), of Connecticut, a signer of the Declaration of Independence, was first settled about 1829, was incorporated as a town in 1848 and was chartered as a city in 1873.

HUNTINGTON, a township of Suffolk county, New York, U.S.A., in the central part of the N. side of Long Island, bounded on the N. by Huntington Bay, a part of Long Island Sound. Pop. (1905, state census,) 10.2ˆ0; (.19! °) 12,004. The S. part of the township is largely taken up with market-gardening; but along the Sound are the villages of Huntington, Cold Spring

Harbor, Centreport and Northport, which are famous for the fine residences owned by New York business men; they are served by the Wading river branch of the Long Island Railroad. Northport — pop. , (1910 census) 2096 — incorporated in 1894, is the most easterly of these; it has a large law-publishing house, shipbuilding yards and valuable oyster-fisheries. Cold Spring Harbor, 32 m. E. of Brooklyn, is a small unincorporated village, once famous for its whale-fisheries, and now best known for the presence here of the New York State Fish Hatchery, and of the Biological Laboratory of the Brooklyn Institute of Arts and Sciences and of the laboratory of the Department of Experimental Evolution of the Carnegie Institution of Washington. The village of Huntington, 35 m. E. of Cold Spring, is unincorporated, but is the most important of the three and has the largest summer colony. There is a public park on the water-front. The Soldiers' and Sailors' Memorial Building is occupied by the public library, which faces a monument to Nathan Hale on Main Street. A big

boulder on the shore of the bay marks the place of Hale's capture by the British on the 21st of September 1776. Benjamin Thompson (Count Rumford) occupied the village and built a British fort here near the close of the American War of Inde- pendence. Huntington 's inhabitants were mostly strong patriots, notably Ebenezer Prime (1700-1779), pastor of the First Presbyterian Church, which the British used as a barracks, and his son Benjamin Young Prime (1733-1791), a physician, linguist and patriot poet, who was the father of Samuel Irenaeus Prime (181 2-1885), editor of the New York Observer. Walt Whitman was born near the village of Huntington, and established there in 1836, and for three years edited, the weekly newspaper the Long Islander. The first settlement in the township was made in 1653; in 1662-1664 Huntington was under the govern- ment of Connecticut. The township until 1872 included the present township of Babylon to the S., along the Great South Bay.

HUNTINGTON, a city and the county-seat of Cabell county, West Virginia. U.S.A., about 50 m. W. of Charleston, W. Va., on the S. bank of the Ohio river, just below the mouth of the Guyandotte river. Pop. (1900) 11,923, of whom 1212 were negroes ; (icio census) 31,161. It is served by the Baltimore & Ohio and the Chesapeake & Ohio railways, and by several lines of river steamboats. The city is the seat of Marshall College (founded in 1837; a State Normal School in 1867), which in 1907-1908 had 34 instructors and 1100 students; and of the West Virginia State Asylum for the Incurable Insane; and it has a Carnegie library and a city hospital. Huntington has extensive railway car and repair shops, besides foundries and machine shops, steel rolling mills, manufactories of stoves and ranges, breweries and glass works. The value of the city's factory product in 1905 was $4,407,153, an increase of 21% over that of 1900. Huntington dates from 1871, when it became the western terminus of the Chesapeake & Ohio railway, was named in honour of Collis P. Huntington (1821-1900), the president of the road, and was incorporated.

HUNTINGTOWER AND RUTHVENFIELD, a village of Perthshire, Scotland, on the Almond, 3 m. N.W. of Perth, and within 1 m. of Almondbank station on the Caledonian railway. Pop. (1901) 459. Bleaching, the chief industry, dates from 1774, when the bleaching-field was formed. By means of an old aqueduct, said to have been built by the Romans, it was provided with water from the Almond, the properties of which render it specially suited for bleaching. Huntingtower (originally Ruthven) Castle, a once formidable structure, was the scene of the Raid of Ruthven (pron. Rivven), when the Protestant lords, headed by William, 4th Lord Ruthven and 1st earl of Gowrie (1541-1584), kidnapped the boy-king James VI., on the 22nd of August 1582. The earl's sons were slain in the attempt (known as the Gowrie conspiracy) to capture James VI. (1600), con- sequent on which the Scots parliament ordered the name of

Ruthven to be abolished, and the barony to be known in future as Huntingtower.

HUNTLY, EARLS AND MARQUESSES OF. This Scottish title, in the Gordon family, dates as to the earldom from 1449,

and as to the marquessate (the premier marquessate in Scotland) from 1599. The first earl (d. 1470) was Alexander de Seton, lord of Gordon — a title known before 1408; and his son George (d. 1502), by his marriage with Princess Annabella (afterwards divorced), daughter of James I. of Scotland, had several children, including, besides his successor the 3rd earl (Alexander), a second son Adam (who became earl of Sutherland) , a third son William (from whom the mother of the poet Byron was descended) and a daughter Katherine, who first married Perkin Warbeck and afterwards Sir Matthew Cradock (from whom the earls of Pembroke descended). Alexander, the 3rd earl (d. 1524), con- solidated the position of his house as supreme in the north; he led the Scottish vanguard at Flodden, and was a supporter of Albany against Angus. His grandson George, 4th earl (1514- 1562), who in 1548 was granted the earldom of Moray, played a leading part in the troubles of his time in Scotland, and in 1562 revolted against Queen Mary and was killed in fight at Corrichie, near Aberdeen. His son George (d. 1576) was restored to the forfeited earldom in 1565; he became Bothwell's close associate —he helped Bothwell, who had married his sister, to obtain a divorce from her; and he was a powerful supporter of Mary till he seceded from her cause in 1572.

George Gordon, 1st marquess of Huntly (1 562-1626), son of the 5th earl of Huntly, and of Anne, daughter of James Hamilton, earl of Arran and duke of Chatelherault, was born in 1562, and educated in France as a Roman Catholic. He took part in the plot which led to the execution of Morton in i58r and in the conspiracy which delivered King James VI. from the Ruthven raiders in 1583. In 1588 he signed the Presbyterian confession of faith, but continued to engage in plots for the Spanish invasion of Scotland. On the 28th of November he was appointed captain of the guard, and while carrying out his duties at Holyrood his treasonable correspondence was discovered. James, however, who found the Roman Catholic lords useful as a foil to the tyranny of the Kirk, and was at this time seeking Spanish aid in case of Elizabeth's denial of his right to the English throne, and with whom Huntly was always a favourite, pardoned him. Subsequently in April 1589 he raised a rebellion in the north, but was obliged to submit, and after a short imprisonment in Borthwick Castle was again set at liberty. He next involved himself in a private war with the Grants and the Mackintoshes, who were assisted by the earls of Atholl and Murray; and on the 8th of February 1592 he set fire to Murray's castle of Donibristle in Fife, and stabbed the earl to death with his own hand. This

outrage, which originated the ballad " The Bonnie Earl of Moray," brought down upon Huntly his enemies, who ravaged his lands. In December the " Spanish Blanks " were inter- cepted (see Erroll, Francis Hay, 9TH Earl or), two of which bore Huntly's signature, and a charge of treason was again preferred against him, while on the 25th of September 1593 he was excommunicated. James treated him and the other rebel lords with great leniency. On the 26th of November they were freed from the charge of treason, being ordered at the same time, however, to renounce Romanism or leave the kingdom. On their refusal to comply they were attainted. Subsequently Huntly joined Erroll and Bothwell in a conspiracy to imprison the king, and the former two defeated the royal forces under Argyll at Glenlivat on the 3rd of October 1 594, Huntly especially distinguishing himself. His victory, however, gained no real advantage; his castle of Strathbogie was blown up by James, and he left Scotland about March 1595. He returned secretly very soon afterwards, and his presence in Scotland was at first connived at by James; but owing to the hostile feeling aroused, and the " No Popery " riot in Edinburgh, the king demanded that he should abjure Romanism or go into permanent banish- ment. He submitted to the Kirk in June 1597, and was restored to his estates in December. On the 7th of April 1599 he was created a marquess, and on the gth of July, together with Lennox, appointed lieutenant of the north. He was treated with great favour by the king and was reconciled with Murray and Argyll Doubts, however, as to the genuineness of his abjuration again troubled the Kirk. On the 10th of December 1606 he was confined*

to Aberdeen, and on the igth of March 1607 he was summoned before the privy council. Huntly thereupon went to England and appealed to James himself. He was excommunicated in 1608, and imprisoned in Stirling Castle till the 10th of December 1610, when he signed again the confession of faith. Accused of Romanist intrigues in 1616, he was ordered once more to sub- scribe the confession, which this time he refused to do; imprisoned at Edinburgh, he was liberated by James's order on the 18th of June, and having joined the court in London was absolved from excommunication by Abbot, archbishop of Canterbury; which absolution, after some heartburnings at the archbishop's inter- ference, and after a further subscription to the confession by Huntly, was confirmed by the Kirk. At the accession of Charlesl. Huntly lost much of his influence at court. He was deprived in 1630 of his heritable sheriffships of Aberdeen and Inverness. The same year a feud broke out between the Crichtons and Gordons, in the course of which Huntly's second son, Lord Melgum, was burnt to death either by treachery or by accident, while being entertained in the house of

James Crichton of Fren- draught. For the ravaging of the lands of the Crichtons Huntly was held responsible, and having been summoned before the privy council in 1635 he was imprisoned in Edinburgh Castle from December till June 1636. He left his confinement with shattered health, and died at Dundee while on his journey to Strathbogie on the 13th of June 1636, after declaring himself a Roman Catholic.

George Gordon, 2nd marquess of Huntly (d. 1649), his eldest son by Lady Henrietta, daughter of the duke of Lennox, was brought up in England as a Protestant, and created earl of Enzie by James I. On succeeding to his father's title his influence in Scotland was employed by the king to balance that of Argyll in the dealings with the Covenanters, but without success. In the civil war he distinguished himself as a royalist, and in 1647 was excepted from the general pardon; in March 1649, having been captured and given up, he was beheaded by order of the Scots parliament at Edinburgh. His fourth son Charles (d. 1681) was created earl of Aboyne in 1660; and the eldest son Lewis was proclaimed 3rd marquess of Huntly by Charles II. in 1651. But the attainder was not reversed by parliament till 1661.

George Gordon, 4th marquess (1643-1716), served under Turenne, and was created 1st duke of Gordon by Charles II. in 1684 (see Gordon). On the death of the 5th duke of Gordon in 1836 the title of 9th marquess of Huntly passed to his relative George Gordon (1761-1853), son and heir of the 4th earl of Aboyne; who in 181 5 was made a peer of the United Kingdom as Baron Meldr'um, his descendants being the 10th and nth marquesses.

HUNTLY, a police burgh, burgh of barony and parish of Aberdeenshire, Scotland, capital of the district of Strathbogie. Pop. (1001) 4136. It lies at the confluence of the rivers Deveron and Bogie, 41 m. N.W. of Aberdeen on the Great North of Scotland Railway. It is a market town and the centre of a large agricultural district, its chief industries including agricultural implement-making, hosiery weaving, weaving of woollen cloth, and the manufacture of lamps and boots. Huntly Castle, half a mile to the north, now in ruins, was once a fortalice of the Comyns. From them it passed in the 14th century to the Gordons, by whom it was rebuilt. It was blown up in 1 594, but was restored in 1602. It gradually fell into disrepair, some of its stones being utilized in the building of Huntly Lodge, the residence of the widow of the " last " duke of Gordon, who (in 1840) founded the adjoining Gordon schools to his memory. The Standing Stones of Strathbogie in Market Square have offered a permanent puzzle to antiquaries.

HUNTSMAN, BENJAMIN (1704-1776), English inventor and steel-

manufacturer, was born in Lincolnshire in 1704. His parents were Germans. He started business as a clock, lock and tool maker at Doncaster, and attained a considerable local reputation for scientific knowledge and skilled workmanship. He also practised surgery in an experimental fashion, and was frequently consulted as an oculist. Finding that the bad quality

of the steel then available for his products seriously hampered him, he began to experiment in steel-manufacture, first at Doncaster, and subsequently at Handsworth, near Sheffield, whither he removed in 1 740 to secure cheaper fuel for his furnaces. After several years' trials he at last produced a satisfactory cast steel, purer and harder than any steel then in use. The Sheffield cutlery manufacturers, however, refused to buy it, on the ground that it was too hard, and for a long time Huntsman exported his whole output to France. The growing competition of imported French cutlery made from Huntsman's cast-steel at length alarmed the Sheffield cutlers, who, after vainly endeavouring to get the exportation of the steel prohibited by the British govern- ment, were compelled in self-defence to use it. Huntsman had not patented his process, and its secret was discovered by a Sheffield ironfounder, who, according to a popular story, obtained ad- mission to Huntsman's works in the disguise of a tramp. Benjamin Huntsman died in 1776, his business being sub- sequently greatly developed by his son, William Huntsman

(1733-1809).

See Smiles, Industrial Biography (1879).

HUNTSVILLE, a city and the county-seat of Madison county, Alabama, U.S.A., situated on a plain 10 m. N. of the Tennessee river, 18 m. from the northern boundary of the state, at an altitude of about 617 ft. Pop. (1900) 8068, of whom 3909 were of negro descent; (1910 census) 7611. There is a considerable suburban population. Huntsville is served by the Southern and the Nashville, Chattanooga & St Louis railways. The public square is on a high bluff (about 750 ft. above sea-level), at the base of which a large spring furnishes the city with water, and also forms a stream once used for floating boats, loaded with cotton, to the Tennessee river. The surrounding country has rich deposits of iron, coal and marble, and cotton, Indian corn and fruit are grown and shipped from Huntsville. Natural gas is found in the vicinity. The principal industry is the manu- facture of cotton. The value of the city's factory products increased from $692,340 in 1900 to $1,758,718 in 1905, or 154%. At Normal, about 3§ m. N.E. of Huntsville, is the State Agri- cultural and Mechanical College for Negroes. Huntsville was founded in 1805 by John Hunt, a Virginian and a soldier in the War of Independence; in 1809 its name was changed to Twickenham, in memory of the home of the poet Alexander Pope, some of whose

relatives were among the first settlers; but in 181 1 the earlier name was restored, under which the town was incorporated by the Territorial Government, the first Alabama settlement to receive a charter. Huntsville was chartered as a city in 1844. Here, in 1819, met the convention that framed the first state constitution, and in 1820 the first state legislature. On the nth of April 1862 Huntsville was seized by Federal troops, who were forced to retire in the following September, but secured permanent possession in July 1863.

HUNYADI, JANOS (c. 1387-1456), Hungarian statesman and warrior, was the son of Vojk, a Magyarized Vlach who married Elizabeth Morzsinay. He derived his family name from the small estate of Hunyad, which came into his father's possession in 1409. The later epithet Corvinus, adopted by his son Matthias, was doubtless derived from another property, Piatra da Corvo or Raven's Rock. He has sometimes been confounded with an elder brother who died fighting for Hungary about 1440. While still a youth, he entered the service of King Sigismund, who appreci- ated his qualities and borrowed money from him ; he accompanied that monarch to Frankfort in his quest for the imperial crown in 1410; took part in the Hussite War in 1420, and in 1437 drove the Turks from Semendria. For these services he got numerous estates and a seat in the royal council. In 1438 King Albert II. made him ban of Szoreny, the district lying between the Aluta and the Danube, a most dangerous dignity entailing constant warfare with the Turks. On the sudden death of Albert in 1439, Hunyadi, feeling acutely that the situation demanded a warrior- king on the throne of St Stephen, lent the whole weight of his influence to the candidature of the young Polish king Wladis- laus III. (1440), and thus came into collision with the powerful Cilleis, the chief supporters of Albert's widow Elizabeth and her

infant son, Ladislaus V. (see Cillei, Ulrich; and Ladislaus V.). He took a prominent part in the ensuing civil war and was rewarded by Wladislaus III. with the captaincy of the fortress of Belgrade and the voivodeship of Transylvania, which latter dignity, however, he shared with his rival Mihaly Ujlaki.

The burden of the Turkish War now rested entirely on his shoulders. In 1441 he delivered Servia by the victory of Semendria. In 1442, not far from Hermannstadt, on which he had been forced to retire, he annihilated an immense Turkish host, and recovered for Hungary the suzerainty of Wallachia and Moldavia; and in July he vanquished a third Turkish army

near the Iron Gates. These victories made Hunyadi's name terrible to the Turks and renowned throughout Christendom, and stimulated him in 1443 to undertake, along with King Wladislaus, the famous expedition known as the hosszu hdboru or " long campaign." Hunyadi, at the head of the vanguard, crossed the Balkans through the Gate of Trajan, captured Nish, defeated three Turkish pashas, and, after taking Sofia, united with the royal army and defeated Murad II. at Snaim. The impatience of the king and the severity of the winter then com- pelled him (February 1444) to return home, but not before he had utterly broken the sultan's power in Bosnia, Herzegovina, Servia, Bulgaria and Albania. No sooner had he regained Hungary than he received tempting offers from the pope, repre- sented by the legate Cardinal Cesarini, from George Brankovic, despot of Servia, and George Castriota, prince of Albania, to resume the war and realize his favourite idea of driving the Turk from Europe. All the preparations had been made, when Murad's envoys arrived in the royal camp at Szeged and offered a ten years' truce on advantageous terms. Both Hunyadi and Brankovic counselled their acceptance, and Wladislaus swore on the Gospels to observe them. Two days later Cesarini received the tidings that a fleet of galleys had set off for the Bosporus to prevent Murad (who, crushed by his recent disasters, had retired to Asia Minor) from recrossing into Europe, and the cardinal reminded the king that he had sworn to co-operate by land if the western powers attacked the Turks by sea. He then, by virtue of his legatine powers, absolved the king from his second oath, and in July the Hungarian army recrossed the frontier and advanced towards the Euxine coast in order to march to Constantinople escorted by the galleys. Brankovic, however, fearful of the sultan's vengeance in case of disaster, privately informed Murad of the advance of the Christian host, and prevented Castriota from joining it. On reaching Varna, the Hungarians found that the Venetian galleys had failed to prevent the transit of the sultan, who now confronted them with fourfold odds, and on the 10th of November 1444 they were utterly routed, Wladislaus falling on the field and Hunyadi narrowly escaping.

At the diet which met in February 1445 a provisional govern- ment, consisting of five Magyar captain-generals, was formed, Hunyadi receiving Transylvania and the ultra-Theissian counties as his district; but the resulting anarchy became unendurable, and on the 5th of June r446 Hunyadi was unanimously elected governor of Hungary in the name of Ladislaus V., with regal powers. His first act as governor was to proceed against the German king Frederick. III., who refused to deliver up the young king. After ravaging Styria, Carinthia and Carniola and threatening Vienna, Hunyadi's difficulties elsewhere compelled him to make a truce with Frederick for two years. In 1448 he received a golden chain and the title of prince from Pope Nicholas V., and immediately afterwards resumed

the war with the Turks. He lost the two days' battle of Kossovo (October i7th-ioth) owing to the treachery of Dan, hospodar of Wallachia, and of his old enemy Brankovi6, who imprisoned him for a time in the dungeons of the fortress of Semendria; but he was ransomed by the Magyars, and, after composing his differences with his powerful and jealous enemies in Hungary, led a punitive expedition against the Servian prince, who was comp lied to accept most humiliating terms of peace. In 1450 Hunyadi went to Pressburg to negotiate with Frederick the terms of the surrender of Ladislaus V., but no ag r eement could be come to,

whereupon the Cilleis and Hunyadi's other enemies accused him of aiming at the throne. He shut their mouths by resigning all his dignities into the hands of the young king, on his return to Hungary at the beginning of 1453, whereupon Ladislaus created him count of Bestercze and captain-general of the kingdom.

Meanwhile the Turkish question had again become acute, and it was plain, after the fall of Constantinople in 1453, that Mahommed II. was rallying his resources in order to subjugate Hungary. His immediate objective was Belgrade, and thither, at the end of 1455, Hunyadi repaired, after a public reconciliation with all his enemies. At his own expense he provisioned and armed the fortress, and leaving in it a strong garrison under the command of his brother-in-law Mihaly Szilagyi and his own eldest son Laszlo, he proceeded to form a relief army and a fleet of two hundred corvettes. To the eternal shame of the Magyar nobles, he was left entirely to his own resources. His one ally was the Franciscan friar, Giovanni da Capistrano (q.v.), who preached a crusade so effectually that the peasants and yeomanry, ill-armed (most of them had but slings and scythes) but full of enthusiasm, flocked to the standard of Hunyadi, the kernel of whose host consisted of a small band of seasoned mercenaries and a few banderia of noble horsemen. On the 14th of July 1456 Hunyadi with his flotilla destroyed the Turkish fleet; on the 21st Szilagyi beat off a fierce assault, and the same day Hunyadi, taking advantage of the confusion of the Turks, pursued them into their camp, which he captured after a desperate encounter. Mahommed thereupon raised the siege and returned to Constantinople, and the independence of Hungary was secured for another seventy years. The Magyars had, however, to pay dearly for this crowning victory, the hero dying of plague in his camp three weeks later (1 ith August 1456).

We are so accustomed to regard Hunyadi as the incarnation of Christian chivalry that we are apt to forget that he was a great captain and a great statesman as well as a great hero. It has well been said that he fought with his head rather than with his arm. He was the first to recognize the insufficiency and the unreliability of the feudal levies, the first to employ a

regular army on a large scale, the first to depend more upon strategy and tactics than upon mere courage. He was in fact the first Hungarian general in the modern sense of the word. It was only late in life that he learnt to read and write, and his Latin was always very defective. He owed his influence partly to his natural genius and partly to the transparent integrity and nobility of his character. He is described as an undersized, stalwart man with full, rosy cheeks, long snow-white locks, and bright, smiling, black eyes.

See J. Teleki, The Age of the Hunyadis in Hungary (Hung.), (Pesth, 1852-1857; supplementary volume's by D. Csanki 1895); G. Fejer, Genus, incunabula et virtus Joannis Corvini de Hunyad (Buda, 1844); J. de Chassin, Jean de Hunyad (Paris, 1859); A. Per, Life of Hunyadi (Hung.) (Budapest, 1873); V. Fraknoi, Car- dinal Carjaval and his Missions to Hungary (Hung.) (Budapest, 1889); P. Frankl, Der Friede von Szegedin und die Geschichte seines Bruches (Leipzig, 1904) ; R. N. Bain, " The Siege of Belgrade, 1456," (Eng. Hist. Rev., 1892); A. Bonfini, Rerum ungaricarum libri xlv, edilio septima (Leipzig, 1771). (R. N. B.)

HUNYADI, LASZLO (1433-1457), Hungarian statesman and warrior, was the eldest son of Janos Hunyadi and Elizabeth Szilagyi. At a very early age he accompanied his father in his campaigns. After the battle of Kossovo (1448) he was left for a time, as a hostage for his father, in the hands of George Brankovic, despot of Servia. In 1452 he was a member of the deputation which went to Vienna to receive back the Hungarian- king Ladislaus V. In 1453 he was already ban of Croatia- Dalmatia. At the diet of Buda (1455) he resigned all his dignities, because of the accusations of Ulrich Cillei and the other enemies of his house, but a reconciliation was ultimately patched up and he was betrothed to Maria, the daughter of the palatine, Laszlo Garai. After his father's death in 1456, he was declared by his arch-enemy Cillei (now governor of Hungary with unlimited power), responsible for the debts alleged to be owing by the elder Hunyadi to the state; but he defended himself so ably at the diet of Futak (October 1456) that Cillei feigned a reconcilia-

tion, promising to protect the Hunyadis on condition that they first surrendered all the royal castles entrusted to them. A beginning was to be made with the fortress of Belgrade, of which Laszlo was commandant, Cillei intending to take the king with him to Belgrade and assassinate Laszlo within its walls. But Hunyadi was warned betimes, and while admitting Ladislaus V. and Cillei, he excluded their army of mercenaries.

On the following morning (9th of November 1456) Cillei, during a private interview, suddenly drew upon Laszlo, but was himself cut down by the commandant's friends, who rushed in on hearing the clash of weapons. The terrified young king, who had been privy to the plot, thereupon pardoned Hunyadi, and at a sub- sequent interview with his mother at Temesvar swore that he would protect the whole family. As a pledge of his sincerity he appointed Laszlo lord treasurer and captain-general of the kingdom. Suspecting no evil, Hunyadi accompanied the king to Buda, but on arriving there was arrested on a charge of compassing Ladislaus's ruin, condemned to death without the observance of any legal formalities, and beheaded on the 16th of March 1457.

See I. Acsady, History of the Hungarian Realm (Hung.), vol. i. (Budapest, 1904). (R. N. B.)

HUNZA (also known as Kanjut) and NAGAR, two small states on the North-west frontier of Kashmir, formerly under the administration of the Gilgit agency. The two states, which are divided by a river which runs in a bed 600 ft. wide between cliffs 300 ft. high, are inhabited generally by people of the same stock, speaking the same language, professing the same form of the Mahommedan religion, and ruled by princes sprung from the same family. Nevertheless they have been for centuries persistent rivals, and frequently at war with each other. Formerly Hunza was the more prominent of the two, because it held possession of the passes leading to the Pamirs, and could plunder the caravans on their way between Turkestan and India. But they are both shut up in a recess of the mountains, and were of no importance until about 1889, when the advance of Russia up to the frontiers of Afghanistan, and the great development of her military sources in Asia, increased the necessity for strengthening the British line of defence. This led to the establishment of the Gilgit agency, the occupation of Chitral, and the Hunza expedition of 1891, which asserted British authority over Hunza and Nagar. The country is inhabited by a Dard race of the Yeshkun caste speaking Burishki. For a description of the people see Gilgit. The Hunza-Nagar Expedition of 1891, under Colonel A. Durand, was due to the defiant attitude of the Hunza and Nagar chiefs towards the • British agent at Gilgit. The fort at Nilt was stormed, and after a fortnight's delay the cliffs (1000 ft. high) beyond it were also carried by assault. Hunza and Nagar were occupied, the chief of Nagar was reinstated on making his submission, and the half-brother of the raja of Hunza was installed as chief in the place of his brother.

HUON OF BORDEAUX, hero of romance. The French chanson de geste of Huon de Bordeaux dates from the first half of the 13th century, and marks the transition between the epic chanson founded on national history and the roman d'aventures. Huon, son of Seguin of Bordeaux, kills Chariot, the

emperor's son, who had laid an ambush for him, without being aware of the rank of his assailant. He is condemned to be hanged by Charlemagne, but reprieved on condition that he visits the court of Gaudisse, the amir of Babylon, and brings back a handful of hair from the amir's beard and four of his back teeth, after having slain the greatest of his knights and three times kissed his daughter Esclarmonde. By the help of the fairy dwarf Oberon, Huon succeeds in this errand, in the course of which he meets with further adventures. The Chariot of the story has been identified by A. Longnon (Romania viii. i-n) with Charles l'Enfant, one of the sons of Charles the Bald and Irmintrude, who died in 866 in consequence of wounds inflicted by a certain Aubouin in precisely similar circumstances to those related in the romance. The epic father of Huon may safely be identified with Seguin, who was count of Bordeaux under Louis the Pious in 839, and died

fighting against the Normans six years later. A Turin manu- script of the romance contains a prologue in the shape of a separate romance of Auberon, and four sequels, the Chanson d' Esclarmonde, the Chanson de Clarisse el Florent, the Chanson d'Ide el d'Olive and the Chanson de Godin. The same MS. con- tains in the romance of Les Lorrains a summary in seventeen lines of another version of the story, according to which Huon's exile is due to his having slain a count in the emperor's palace. The poem exists in a later version in alexandrines, and, with its continuations, was put into prose in 1454 and printed by Michel le Noir in 1516, since when it has appeared in many forms, notably in a beautifully printed and illustrated adaptation (1898) in modern French by Gaston Paris. The romance had a great vogue in England through the translation (c. 1 540) of John Bourchier, Lord Berners, as Huon of Burdeuxe. The tale was dramatized and produced in Paris by the Confrerie de la Passion in 1557, and in Philip Henslowe's diary there is a note of a performance of a play, Hewen of Burdoche, on the 28th of December 1593. For the literary fortune of the fairy part of the romance see Oberon.

The Chanson de geste of Huon de Bordeaux was edited by MM F. Guessard and C. Grandmaison for the Anciens poetes de la France in i860; Lord Berners's translation was edited for the E.E.T.S. by S. L. Lee in 1 883-1885. See also L. Gautier, Les Epopees frangaises (2nd ed. vol. iii. pp. 719-773); A. Graf, / complemenli della Chanson ■ de Huon de Bordeaux (Halle, 1878); "Esclarmonde, &c," by Max Schweigel, in Ausg. u. Abhandl. . . .der roman. phil. (Marburg, 1889) ; C. Voretzsch, Epische Studien (vol. i., Halle, 1900) ; Hist. lilt, de la France (vol. xxvi., 1873).

HUON PINE, botanical name Dacrydium Franklinii, the most valuable timber tree of Tasmania, a member of the order Coni- ferae (see Gymnosperms). It is a fine tree of pyramidal outline 80 to 100 ft. high,

and 10 to 20 ft. in girth at the base, with slender pendulous much-divided branchlets densely covered with the minute scale-like sharply-keeled bright green leaves. It occurs in swampy localities from the upper Huon river to Port Davey and Macquarie Harbour, but is less abundant than formerly owing to the demand for its timber, especially for ship- and boat-building. The wood is close-grained and easily worked.

HU-PEH, a central province of China, bounded N. by Ho-nan, E. by Ngan-hui, S. by Hu-nan, and W. by Shen-si and Szech'uen. It has an area of 70,450 sq. m. and contains a population of 34,000,000. Han-kow, Ich'ang and Shasi are the three open ports of the province, besides which it contains ten other pre- fectural cities. The greater part of the province forms a plain, and its most noticeable feature is the Han river, which runs in a south-easterly direction across the province from its north- westerly corner to its junction with the Yangtsze Kiang at Han- kow. The products of the Han valley are exclusively agri- cultural, consisting of cotton, wheat, rape seed, tobacco and various kinds of beans. Vegetable tallow is also exported in large quantities from this part of Hu-peh. Gold is found in the Han, but not in sufficient quantities to make working it more than barely remunerative. It is washed every winter from banks of coarse gravel, a little above I-ch'eng Hien, on which it is deposited by the river. Every winter the supply is exhausted by the washers, and every summer it is renewed by the river. Baron von Richthofen reckoned that the digger earned from 50 to 150 cash (i.e. about ifd. to 4jd.) a day. Only one waggon road leads northwards from Hu-peh, and that is to Nan-yang Fu in Ho-nan, where it forks, one branch going to Peking by way of K'ai-feng Fu, and the other into Shan-si by Ho-nan Fu.

HUPFELD, HERMANN (1796-1866), German Orientalist and Biblical commentator, was born on the 31st of March 1796 at Marburg, where he studied philosophy and theology from 1813 to 1817; in 1819 he became a teacher in the gymnasium at Hanau, but in 1822 resigned that appointment. After studying for some time at Halle, he in 1824 settled as Privaldocent in philosophy at that university, and in the following year was appointed extraordinary professor of theology at Marburg. There he received the ordinary professorships of Oriental languages and of theology in 1827 and 1830 respectively; thirteen years later he removed as successor of Wilhelm Gesenius

(1 786-1842) to Halle. In 1865 he was accused by some theo- logians of the Hengstenberg school of heretical doctrines. From this charge, however,

he successfully cleared himself, the entire theological faculty, including Julius Miiller (1801-1878) and August Tholuck (1799-1877), bearing testimony to his sufficient orthodoxy. He died at Halle on the 24th of April 1866.

His earliest works in the department of Semitic philology (Exerci- tationes Aethiopicae, 1825, and De emendanda ratione lexicographiae Semiticae, 1827) were followed by the first part (1841), mainly historical and critical, of an Ausfiihrliche Hebrdische Grammatik, which he did not live to complete, and by a treatise on the early history of Hebrew grammar among the Jews (De rei grammaticae apud Judaeos initiis antiquissimisque scriptoribus , Halle, 1846). His principal contribution to Biblical literature, the exegetical and critical Ubersetzung und A uslegung der Psalmen, began to appear in 1855, and was completed in 1861 (2nd ed. by E. Riehm, 1867-1871, 3rd ed. 1888). Other writings are Uber Begriff und Methode der sogenannten biblischen Einleitung (Marburg, 1844); De primitiva et vera festorum apud Hebraeos ratione (Halle, 1851-1864); Die Quellen der Genesis von neuem untersucht (Berlin, 1853); Die heutige theo- sophische oder mythologische Theologie und Schrifterhldrung (1861).

See E. Riehm, Hermann Hupfeld (Halle, 1867); W. Kay, Crisis Hupeldiana (1865); and the article by A. Kamphausen in Band viii. of Herzog-Hauck's Realencyklopadie (1900).

HURD, RICHARD (1720-1808), English divine and writer, bishop of Worcester, was born at Congreve, in the parish of Penkridge, Staffordshire, where his father was a farmer, on the 13th of January 1720. He was educated at the grammar- school of Brewood and at Emmanuel College, Cambridge. He took his B.A. degree in 1739, and in 1742 he proceeded M.A. and became a fellow of his college. In the same year he was ordained deacon, and given charge of the parish of Reymerston, Norfolk, but he returned to Cambridge early in 1743. He was ordained priest in 1744. In 1748 he published some Remarks on an Enquiry into the Rejection of Christian Miracles by the Heathens (1746), by William Weston, a fellow of St John's College, Cambridge. He prepared editions, which won the praise of Edward Gibbon, 1 of the Ars poetica and Epistola ad Pisones (1749), and the Epistola ad Augustum (1751) of Horace. A com- pliment in the preface to the edition of 1 749 was the starting-point of a lasting friendship with William Warburton, through whose influence he was appointed one of the preachers at Whitehall in 1750. In 1765 he was appointed preacher at Lincoln's Inn, and in 1767 he became archdeacon of Gloucester. In 1768 he proceeded D.D. at Cambridge, and delivered at Lincoln's Inn the first Warburton lectures, which were published later (1772) as An Introduction to the Study of the Prophecies concerning the Christian Church. He became bishop of Lichfield and Coventry in 1774, and two years later was selected

to be tutor to the prince of Wales and the duke of York. In 1781 he was translated to the see of Worcester. He lived chiefly at Hartlebury Castle, where he built a fine library, to which he transferred Alexander Pope's and Warburton's books, purchased on the latter's death. He was extremely popular at court, and in 1783, on the death of Arch- bishop Cornwallis, the king pressed him to accept the primacy, but Hurd, who was known, says Madame d'Arblay, as " The Beauty of Holiness," declined it as a charge not suited to his temper and talents, and much too heavy for him to sustain. He died, unmarried, on the 28th of May 1808.

Hurd's Letters on Chivalry and Romance (1762) retain a certain interest for their importance in the history of the romantic movement, which they did something to stimulate. They were written in continuation of a dialogue on the age of Queen Elizabeth included in his Moral and Political Dialogues (1759). Two later dialogues On the Uses of Foreign Travel were printed in 1763. Hurd wrote two acrimonious defences of Warburton: On the Delicacy of Friendship (1755), in answer to Dr J. Jortin; and a Letter (1764) to Dr Thomas Leland, who had criticized Warburton's Doctrine of Grace. He edited the Works of William Warburton, the Select Works (1772) of Abraham Cowley, and left materials for an edition (6 vols., 181 1) of Addison. His own works appeared in a collected edition in 8 vols, in

1811.

1 " Examination of Dr Hurd's Commentary on Horace's Epistles " (Misc. Works, ed. John,' Lord Sheffield, 1837, pp. 403-427).

The chief sources for Bishop Hurd's biography are " Dates of some occurrences in the life of the author," written by himself and pre- fixed to vol. i. of his works (1811); " Memoirs of Dr Hurd " in the Ecclesiastical and University . . . Register (1809), pp. 399-452; John Nichols, Literary anecdotes, vol. vi. (1812), pp. 468-612 ; Francis Kilvert, Memoirs of . . . Richard Hurd (1860), giving selections from Hurd's commonplace book, some correspondence, and extracts from contemporary accounts of the bishop. A review of this work, entitled " Bishop Hurd and his Contemporaries," appeared in the North British Review, vol. xxxiv. (1861), pp. 375-398.

HURDLE (O. Eng. hyrdel, cognate with such Teutonic forms as Ger. Hiirde, Dutch horde, Eng. "hoarding"; in pre-Teutonic languages the word appears in Gr. Kvpria, wickerwork, KVprr), Lat. cratis, basket, cf. "crate," "grate"), a movable tem- porary fence, formed of a framework of light timber, wattled with smaller pieces of hazel, willow or other pliable wood, or constructed on the plan of a light five-barred field gate, filled in with brushwood. Similar movable frames can be made of iron, wire or other

material. A construction of the same type is used in military engineering and fortification as a foundation for a temporary roadway across boggy ground or as a backing for earthworks.

HURDLE RACING, running races over short distances, at intervals in which a number of hurdles, or fence-like obstacles, must be jumped. This has always been a favourite branch of track athletics, the usual distances being 120 yds., 220 yds. and 440 yds. The 120 yds. hurdle race is run over ten hurdles 3 ft. 6 in. high and 10 yds. apart, with a space of 15 yds. from the start to the first hurdle and a like distance from the last hurdle to the finish. In Great Britain the hurdles are fixed and the race is run on grass; in America the hurdles, although of the same height, are not fixed, and the races are run on the cinder track. The " low hurdle race " of 220 yds. is run over ten hurdles 2 ft. 6. in. high and 20 yds. apart, with like distances between the start and the first hurdle and between the last hurdle and the finish. The record time for the 1 20 yds. race on grass is 15$ sees., and on cinders 15ˆ sees., both of which were performed by A. C. Kraenzlein, who also holds the record for the 220 yds. low hurdle race, 23f sees. For 440 yds. over hurdles the record time is 57ˆ sees., by T. M. Donovan, and by J. B. Densham at Kennington Oval in 1907.

HURDY-GURDY (Fr. vielle d manivelle, symphonie or chyfonie & roue; Ger. Bauernleier, Deutscheleier , Bettlerleier, Radleier; Ital. lira tedesca, lira rustica, lira pagana), now loosely used as a synonym for any grinding organ, but strictly a medieval drone instrument with strings set in vibration by the friction of a wheel, being a development of the organistrum (q.v.) reduced in size so that it could be conveniently played by one person instead of two. It consisted of a box or soundchest, sometimes , rectangular, but more generally having the outline of the guitar; inside it had a wheel, covered with leather and rosined, and worked by means of a crank at the tail end of the instrument. On the fingerboard were placed movable frets or keys, which, on being depressed, stopped the strings, at points corresponding to the diatonic intervals of the scale. At first there were 4 strings, later 6. In the organistrum three strings, acted on simultaneously by the keys, produced the rude harmony known as organum. When this passed out of favour, superseded by the first beginnings of polyphony over a pedal bass, the organistrum gave place to the hurdy-gurdy. Instead of acting on all the strings, the keys now affected the first string only, or " chanterelle," though in some cases certain keys, made longer, also reached the third string or " trompette "; the result was that, a diatonic melody could be played on the chanterelles. The other open strings always sounded simultaneously as long as the wheel was turned, like drones on the bag-pipe.

The hurdy-gurdy originated in France at the time when the Paris School or

Old French School was laying the foundations 6 counterpoint and polyphony. During the 13th and 14th centuries it was known by the name of Symphonia or Chyfonie, and- in Germany Lira or Leyer. Its popularity remained undiminished in France until late in the 18th century. Although the hurdy- gurdy never obtained recognition among serious musicians in Germany, the idea embodied in the mechanism stimulated

ingenuity, the result being such musical curiosities as the Gcigen- werk or Geigen-Clavicymbel of Hans Hayden of Nuremberg (c. 1600), a harpsichord in which the strings, instead of being plucked by quills, were set in vibration by friction of one of the little steel wheels, covered with parchment and well rosined, which were kept rotating by means of a large wheel and a series of cylinders worked by treadles. Other instruments of similar type were the Bogendavier invented by Joh. Hohlfeld of Berlin in 1 75 1 and the Bogenfliigel by C. A. Meyer of Gorlitz in 1794. In Adam Walker's Celestina (1772) the friction was provided by a running band instead of a bow. (K. S.)

HURLSTONE, FREDERICK YEATES (1800-1869), English painter, was born in London, his father being a prcprietor of the Morning Chronicle. His grand-uncle, Richard Hurlstone, had been a well-known portrait-painter a generation earlier. F. Y. Hurlstone studied under Sir W. Beechey, Sir T. Lawrence and B. R. Haydon, and in 1820 became a student at the Royal Academy, where he soon began to exhibit. In 1823 he won the Academy's gold medal for historical painting. In 183 1 he was elected to the Society of British Artists, of which in 1835 he became president; it was to their exhibitions that he sent most of his pictures, as he became a pronounced critic of the manage- ment of the Academy. He died in London on the 10th of June 1869. His historical paintings and portraits were very numerous. Some of the most representative are " A Venetian Page " (1824), " The Enchantress Armida " (1831), " Eros " (1836), " Prisoner of Chillon " (1837), " Girl of Sorrento " (1847), " Boabdil " (1854), and his portrait of the 7th earl of Cavan (1833).

HURON (a French term, from hurt, bristled, early used as an expression of contempt, signifying "lout "), a nickname given by the French when first in Canada to certain Indian tribes of Iroquoian stock, occupying a territory, which similarly was called Huronia, in Ontario, and constituting a confederation called in their own tongue Wendat (" islanders "), which was corrupted by the English into Yendat, Guyandotte and then Wyandot. The name persists for the small section of " Hurons of Lorette," in Quebec,

but the remnant of the old Huron Confederacy which after its dispersal in the 17th century settled in Ohio and was afterwards removed to Oklahoma is generally called Wyandot. For their history see Wyandot, and Indians, North American (under " Indian Wars "; Algonkian and Iroquoian).

See Handbook of American Indians (Washington, 1907), s.v. " Huron."

HURON, the second largest of the Great Lakes of North America, including Georgian Bay and the channel north of Manitoulin Island, which are always associated with it. It lies between the parallels of 43° and 46 20′ N. and between the meridians of 8o° and 84 W., and is bounded W. by the state of Michigan, and N. and E. by the province of Ontario, Georgian Bay and North Channel being wholly within Canadian territory. The main portion of the lake is 235 m. long from the Strait of Mackinac to St Clair river, and 98 m. wide on the 45th parallel of latitude. Georgian Bay is 125 m. long, with a greatest width of 60 m., while North Channel is 120 m. long, with an extreme width of 16 m., the whole lake having an area of 23,200 sq. m. The surface is 581 ft. above the sea. The main lake reaches a depth of 802 ft.; Georgian bay shows depths, especially near its west shore, of over 300 ft.; North Channel has depths of 180 ft. Lake Huron is 20 ft. lower than Lake Superior, whose waters it receives at its northern extremity through St. Mary river, is on the same level as Lake Michigan, which connects with its north-west extremity through the Strait of Mackinac, and is nearly 9 ft. higher than Lake Erie, into which it discharges at its south extremity through St Clair river.

On the mainland, the north and east shores are of gneisses and granites of archaean age, with a broken and hilly surface rising in places to 600 ft. above the lake and giving a profusion of islands following the whole shore line from the river St Mary to Waubau- shene at the extreme east end of Georgian bay. Manitoulin Island and the Saugeen Peninsula are comparatively flat and underlaid by a level bed of Trenton limestone. The southern shores, skirting the peninsula of Michigan, are flat. The rock formations are of sand-

stone and limestone, while the forests are either a tangled growth of pine and spruce or a scattered growth of small trees on a sandy soil. This shore is indented by Thunder bay, 78 sq. m. in area, and Saginaw bay, 50 m. deep and 26 m. wide across .its mouth.

The chief tributaries of the lake on the U.S. side are Thunder bay river, Au Sable river and Saginaw river. On the Canadian side are Serpent river, Spanish river, French river, draining Lake Nipissing, Muskoka river, Severn river, draining lake Simcoe, and Nottawasaga river, all emptying into Georgian bay and North Channel, and Saugeen and Maitland rivers,

flowing into the main lake. These have been or are largely used in connexion with pine lumbering operations. They, with smaller streams, drain a basin of 75,300 sq. m.

There is a slight current in Lake Huron skirting the west shore from inlet to outlet. At the south end it turns and passes up the east coast. There is also a return current south of Manitoulin Island and a current, sometimes' attaining a strength of half a knot, passes into Georgian bay through the main entrance. Ice and navigation conditions and yearly levels are similar to those on the other Great Lakes (

Practically all the United States traffic is confined to vessels passing through the main lake between Lakes Superior and Michigan and Lake Erie, but on the Canadian side are several railway termini which receive grain mostly from Lake Superior, and deliver mixed freight to ports on that lake. The chief of these are Parry Sound, Midland, Victoria Harbour, Collingwood, Owen Sound, Southampton, Kincardine, Goderich and Sarnia, at the outlet of the lake. The construction of a ship canal to connect Georgian bay with Montreal by way of French river, Lake Nipissing and Ottawa river began in 1 910. A river and lake route with connecting canals, in all about 440 m. long, will be opened for vessels of 20 ft. draught at a cost estimated at £20,000,000 saving some 340 miles in the distance from Lake Superior or Lake Michigan to the sea.

There is a large fishing industry in Lake Huron, the Canadian catch being valued at over a quarter million dollars per annum. Salmon trout (Salvelinus namaycush, Walb.) and whitefish (Coregonus clupeiformis, Mitchill) are the most numerous and valuable. Amongst the islands on the east shore of Georgian bay, which are greatly frequented as a summer resort, black bass {micropterus) and maskinonge (Esox nobilior, Le Sueur) are a great attraction to anglers.

See Georgian Bay and North Channel Pilot, Department of Marine and Fisheries (Ottawa, 1903) ; Sailing Directions for Lake Huron, Canadian Shore, Department of Marine and Fisheries (Ottawa, 1905) ; Bulletin No. 17, Survey of Northern and North-Western Lakes, United States, War Department (Washington, 1907) ; U.S. Hydro- graphic Office Publication, No. 108 C. Sailing Directions for Lake Huron, &c. U.S. Navy Department (Washington, 1901).

HURRICANE, a wind-storm of great force and violence, originally as experienced in the West Indies; it is now used to describe similar storms in other regions, except in the East Indies and the Chinese seas, where they are generally known as " typhoons." Hurricane is the strongest force of wind in the Beaufort scale. The Caribbean word huracan was introduced

by the Portuguese, Spanish and Dutch explorers of the 15th and 16th centuries into many European languages, as in Span. huracan, Portu. furacao, Ital. uracane, Fr. ouragan, and in Swed., Ger. and Dutch as orkan, or orkaan. A " hurricane-deck " is an upper deck on a steamer which protects the lower one, and incidentally serves as a promenade.

HURRY (or Urry), SIR JOHN (d. 1650), British soldier, was born in Aberdeenshire, and saw much service as a young man in Germany. In 1641 he returned home and became Lieut.-Colonel in a Scottish regiment. At the end of the same year he was involved in the plot known as the " Incident. "' At the outbreak of the Civil War Hurry joined the army of the earl of Essex, and was distinguished at Edgehill and Brentford. Early in 1643 he deserted to the Royalists, bringing with him information on which Rupert acted at once. Thus was brought about the action of Chalgrove Field, where Hurry again showed conspicuous valour; he was knighted on the same evening. In 1644 he was with Rupert at Marston Moor, where with Lucas he led the victorious left wing of horse. But a little later, thinking the King's cause lost, he again deserted, and eventually was sent with Baillie against Montrose in the Highlands. His

detached operations were conducted with great skill, but his attempt to surprise Montrose's camp at Auldearn ended in a complete disaster, partly on account of the accident of the men discharging their pieces before starting on the march. Soon afterwards he once more joined Charles's party, and he was taken prisoner in the disastrous campaign of Preston (1648). Sir John Hurry was Montrose's Major-General in the last desperate attempt of the Scottish Royalists. Taken at Carbis- dale, he was beheaded at Edinburgh, May 29th, 1650. A soldier of fortune of great bravery, experience and skill, his frequent changes of front were due rather to laxity of political principles than to any calculated idea of treason.

HURST, JOHN FLETCHER (1834-1903), American Methodist Episcopal bishop, was born • in Salem, Dorchester county, Maryland, on the 17th of August 1834. He graduated at Dickinson College in 1854, and in 1856 went to Germany and studied at Halle and Heidelberg. From 1858 to 1867 he was engaged in pastoral work in America, and from 1867 to 1871 he taughtin Methodist mission institutes in Germany. ˆ1871-1873 he was professor of historical theology at Drew Theological Seminary, Madison, New Jersey, of which he was president from 1873 till 1880, when he was made a bishop. He died at Bethesda, Maryland, on the 4th of May 1903. Bishop Hurst, by his splendid devotion in 1876-1879, recovered the

endowment of Drew Theological Seminary, lost by the failure in 1876 of Daniel Drew, its founder; and with McCIintock and Crooks he improved the quality of Methodist scholarship. The American University (Methodist Episcopal) at Washington, D.C., for postgraduate work was the outcome of his projects, and he was its chancellor from 1891 to his death.

He published A History of Rationalism (1866); Hagenbach's Church History of the Eighteenth and Nineteenth Centuriss (2 vols., 1869); von Oosterzee's John's Gospel: Apologetical Lectures (1869); Lange's Commentary on the Epistle to the Romans (1869); Marty; s to the Tract Cause: A Contribution to the History of the Reformation (1872), a translation and revision of Thelemann's Martyrer der Traktatsache (1864); Outlines of Bible History (1873); Outlines of Church History (1874); Life and Literature in the Fatherland (1875), brilliant sketches of Germany; a brief pamphlet, Our Theological Century (1877); Bibliotheca Theologica (1883), a compilation by his students, revised by G. W. Gillmore in 1895 under the title Literature of Theology; Indika: the Country and People of India and Ceylon (1891), the outgrowth of his travels in 1884-1885 when he held the conferences of India; and several church histories (Chautauqua text-books) published together as A Short History of the Christian Church (1893).

HURSTMONCEAUX (also Herstmonceux), a village in the Eastbourne parliamentary division of Sussex, England, 9 m. N.E. of Eastbourne. Pop. (1901) 1429. The village takes its name from Waleran de Monceux, lord of the manor af.ter the Conquest, but the castle, for the picturesque ruins of which the village is famous, was built in the reign of Henry VI. by Sir Roger de Fiennes. It is moated, and is a fine specimen of 15th-century brickwork, the buildings covering an almost square quadrangle measuring about 70 yds. in the side. Towers flank the corners, and there is a beautiful turreted entrance gate, but only the foundations of most of the buildings ranged round the inner courts are to be traced. The church of All Saints is in the main Early English, and contains interesting monuments to members of the Fiennes family and others. In the churchyard is the tomb of Archdeacon Julius Charles Hare, the theologian (1855). Much material from the castle was used in the erection of Hurstmonceaux Place, a mansion of the 18th century.

PHDJTED IN C.S.A.

VOL14_HUSBAND-ITALIC

Britannica

THE

ENCYCLOPEDIA BRITANNICA

ELEVENTH EDITION

FIRST

edit!

on,

published

n three volumes,

1768-

-1771.

SECOND

»

,,

ten

> >

1777-

-1784.

THIRD

>

,

eighteen

»

1788-

-1797.

FOURTH

>

y

twenty

»>

1801-

-1810.

FIFTH

>

j

twenty

»

1815-

-1817.

SIXTH

•

,

twenty

»»

1823-

-1824.

SEVENTH

»

>

twenty-one

>»

1830-

-1842.

EIGHTH

»

»

twenty-two

> >

1853-

-i860

NINTH

>

7

twenty-five

>j

1875-

-1889.

TENTH

9

ninth ed

ition and eleven

supplementary volumes,

1902-

-1903.

ELEVENTH

>

>

pub]

ished

in twenty-nine volumes,

1910 — 1911,

COPYRIGHT

in all countries subscribing to the

Bern Convention

by

THE CHANCELLOR, MASTERS AND SCHOLARS

of the UNIVERSITY OF CAMBRIDGE

All rights reserved

THE

ENCYCLOPEDIA BRITANNICA

A

DICTIONARY

OF

ARTS, SCIENCES, LITERATURE AND GENERAL

INFORMATION

ELEVENTH EDITION

VOLUME XIV

New York

Encyclopaedia Britannica, Inc. 342 Madison Avenue

Copyright, in the United States of America, 191 1,

by

The Encyclopaedia Britannica Company.

INITIALS USED IN VOLUME XIV. TO IDENTIFY INDIVIDUAL

CONTRIBUTORS, 1 WITH THE HEADINGS OF THE

ARTICLES IN THIS VOLUME SO SIGNED.

A* lift*

A.

Bo.*

A.

Cy.

A.

C. G

Adolfo Bartoli (1833-1894). f

Formerly Professor of Literature at the Istituto di studi superior! at Florence. “1 Italian Literature (in part).

A. E. G.*

A. E. H. L.

A. F. C.

A. G.

A.

Ge.

A.

Go.*

A.

G. G.

A.

H.-S.

A.

M. C.

A.

N.

A.

So.

A

S. Wo.

A

. W. H.*

A

. W. Po.

Honorary Canon of

Author of Sto in delta letter atura Italiana; &c.

Augxiste Boudinhon, D.D., D.C.L.

Professor of Canon Law at the Catholic University of Paris. Paris. Editor of the Canonists contemporain.

Arthur Ernest Cowley, M.A., Litt.D.

Sub-Librarian of the Bodleian Library, Oxford. Fellow of Magdalen

College.

Albert Charles Lewis Gotthilf Gunther, M.A., M.D., Ph.D., F.R.S.

Keeper of Zoological Department, British Museum, 1875-1895. Cold Medallist, Royal Society, 1878. Author of Catalogues of Colubrine Snakes, Balrachia Salientia, – and Fishes in the British Museum ; Reptiles of British India ; Fishes of Zanzibar ; Reports on the ” Challenger ” Fishes; &c.

Rev. Alfred Ernest Garvie, M.A., D.D.

Principal of New College, Hampstead. Member of the Board of Theology and the . Board of Philosophy, London University. Author of Studies in the inner Life of Jesus ; &c.

Augustus Edward Hough Love, M.A., D.Sc, F.R.S.

Sedleian Professor of Natural Philosophy in the University of Oxford. Hon. _ Fellow of Queen’s College, Oxford ; formerly Fellow of St John’s College, Cambridge. Secretary to the London Mathematical Society.

Alexander Francis Chamberlain, A.M., Ph.D.

Assistant Professor of Anthropology, Clark University, Worcester, Massachusetts. . Member of American Antiquarian Society; Hon. Member of American Folk-lore Society. Author of The Child and Childhood in Folk Thought.

Major Arthur George Frederick Griffiths (d. 1908).

H.M. Inspector of Prisons, 1878-1896. Author of The Chronicles of Newgale; Secrets of the Prison House ; &c.

Sir Archibald Geikie, LL.D.

See the biographical article, Geikie, Sir A.

Rev. Alexander Gordon, M.A.

Lecturer on Church History in the University of Manchester.

Sir Alfred George Greenhill, M.A., F.R.S.

Formerly Professor of Mathematics in the Ordnance College, Woolwich. Author of Differential and Integral Calculus with

Applications; Hydrostatics; Notes on Dynamics ; &c.

Sir A. Houtum-Schindler, CLE.

General in the Persian Army. Author of Eastern Persian Irak.

Agnes Mary Clerke.

See the biographical article, Clerke, A. M.

Alfred Newton, F.R.S.

See the biographical article, Newton, Alfred.

Albrecht Socin, Ph.D. (184.4-1899).

Formerly Professor of Semitic Philology in the Universities of Leipzig and Tubingen. Author of Arabische Grammatik; &c.

Arthur Smith Woodward, LL.D., F.R.S.

Keeper of Geology, Natural History Museum, South Kensington. Secretary of the Geological Society, London.

Arthur -William Holland.

Formerly Scholar of St John's College, Oxford. Bacon Scholar of Gray's Inn,

1900.

Alfred William Pollard, M.A.

Assistant Keeper of Printed Books, British Museum. Fellow of King's College, London. Hon. Secretary Bibliographical Society. Editor of Books about Books and Bibliographica. Joint-editor of The Library. Chief Editor of the " Globe " Chaucer.

Index Librorum Prohl- bitorum; Infallibility.

f Ibn Gabirol;

\ Inscriptions: Semitic.

Ichthyology (in part).

Immortality; Inspiration.

Infinitesimal Calculus.

Indians, North American.

-! Identification.

\ Hutton, James. \ Illuminati.

\ Hydromechanics.

-j Isfahan (in part). -j Huygens, Christiaan. \ Ibis; Icterus.

Irak-Arabi (in pari).

(Ichthyosaurus; 1 Iguanodon.

Imperial Cities; Instrument of Government

Incunabula.

tk» W. K.

Alexander Wood Renton, M.A., LL.B. J Inebriety, Law of;

Puisne Judge of the Supreme Court of Ceylon. Editor of Encyclopaedia of the~] i ns anity: Law. Laws of England. *-

1 A complete list, showing all individual contributors, appears in the final volume.

VI

CP.A.

ao.

C. H.

Ha.

C. LI

M.

C. R.

B.

INITIALS AND HEADINGS OF ARTICLES

c.s.*

C. T.L.

C. We.

D. B. Ma.

D. G. H.

D. H. D. P. T.

D. S. M.

E. A. M. E.Br.

E.

Bra.

E.

C. B.

E.

C. Q.

E.

P.S.

E.

P. S.D

E.

G.

E

Htt.

E

H. B.

E

. H. M.

E

. H. P.

Charles Francis Atkinson. J Infantry;

Formerly Scholar of Queen’s College, Oxford. Captain, 1st City of London (Royal | Julian Wars. Fusiliers). Author of The Wilderness and Cold Harbour.

Colonel Charles Grant.

Formerly Inspector of Military Education in India.

Carlton Huntley Hayes, A.M., Ph.D.

Assistant Professor of History at Columbia University, New York City, of the American Historical Association.

{

India: Costume.

Member! Innocent V., VIII.

J Instinct; Principal of University College, | Inte lligence in Animals,

Ibn Batuta Iclrisi.

part) ;

| Italian Language {in pari). Insurance {in part).

Barrister-at-Law, Inner Temple.

Infant Schools.

Author J Theory ; j

Imam.

Ionia {in Isauria.

part);

Author of Short History of Royal 1 Impressment,

Instrumentation.

Conway Lloyd Morgan, LL.D., F.R.S.

Professor of Psychology at the University of Bristol.

Bristol, 1887-1909. Author of Animal Life and Intelligence; Habit and Instinct.

Charles Raymond Beazley, M.A., D.Litt., F.R.G.S., F.R.Hist.S.

Professor of Modern History in the University of Birmingham. Formerly Fellow of Merton College, Oxford; and University Lecturer in the History of Geography. Lothian Prizeman, Oxford, 1889. Lowell ˆ Lecturer, Boston, 1908. Author of Henry the Navigator; The Dawn of Modern Geography; &c. Carlo Sat.viont.

Professor of Classical and Romance Languages, University of Milan.

Charlton Thomas Lewis, Ph.D. (1834-1904}.

Formerly Lecturer on Life Insurance, Harvard and Columbia Universities, and on. Principles of Insurance. Cornell University. Author of History of Germany; Essays; Addresses; &c.

Cecil Weatherly.

Formerly Scholar of Queen's College, Oxford.

Duncan Black Macdonald, M.A., D.D.

Professor of Semitic Languages, Hartford Theological Seminary, U.S.A. of Development of Muslim Theology, Jurisprudence and Constitutional Selection from Ibn Khaldum; Religious Attitude and Life in Islam; &c.

Davtd George Hogarth, M.A.

Keeper of the Ashmolean Museum, Oxford. Fellow of Magdalen College, Oxford. Fellow of the British Academy. Excavated at Paphos, 1888; Naucratis, 1 899 and – 1903; Ephesus, 1904-1905; Assiut, 1906-1907; Director, British School at Athens. 1897-1900; Director, Cretan Exploration Fund, 1899.

David Hannay.

Formerly British Vice-Consul at Barcelona. Navy, 1 217-1688; Life of Emilio Castelar; &c.

Donald Francis Tovey. _ .

Author of Essays in Musical Analysis; comprising The Classical Concerto, The Goldberg Variations, and analyses of many other classical works.

Dugald Sutherland MacColl, M.A., LL.D. f

Keeper of the National Gallery of British Art (Tate Gallery). Lecturer on the History J Impressionism.

of Art, University College, London; Fellow of University College, London, j

Author of Nineteenth Century Art; &c. L

Edward Alfred Minchin, M.A., F.Z.S. f

Professor of Protozoology in the University of London. Formerly Fellow of Merton J ny° r 0meausae;

College, Oxford ; and Lecturer on Comparative Anatomy in the University of Oxford, j Hydrozoa.

Author of ” Sponges and Sporozoa ” in Lankester’s Treatise on Zoology; &c. *~

Erjtest Barker, M.A. f

Fellow and Lecturer in Modern History, St John’s College, Oxford. Formerly -\ Imperial Chamber.

Fellow and Tutor of Merton College. Craven Scholar, 1895. . I

Edwin Bramwell, M.B., F.R.C.P., F.R.S. (Edin.). f

Assistant Physician, Royal Infirmary, Edinburgh. -ˆHysteria {in part).

Right Rev. Edward Cuthbert Butler, O.S.B., D.Litt. r

AbDot of Downside Abbey, Bath. An + tiru- n(” The. I ,1 = 1 H,“ctr,ˆi, ,-,f Polios;, ,. = ” J in Cambridge Texts and Studies.

Edmund Crosby Quiggin, M.A.

Fellow, Lecturer in Modern History, and Monro Lecturer in Celtic, Gonville and -i Ireland: Early History. Caius College, Cambridge.

Edward Fairbrother Strange.

Assistant Keeper, Victoria and Albert Museum, South Kensington. Council, Japan Society. Author of numerous works on art subjects, of Bell's " Cathedral " Series.

Lady Dilke.

See the biographical article: Dilke, Sir C. W., Bart.

Edmund Gosse, LL.D.

See the biographical article, Gosse, Edmund.

EMIL HUBNER.

See the biographical article, Hubner, Emil.

Sir Edward Herbert Bunbury, Bart., M.A., F.R.G.S. (d. 1895). f

M.P. for Bury St Edmunds, 1 847-1 852. Author of a History of Ancient Geography; \ Ionia {in part).- &c. L

Author of " The Lausiac History of Palladius " i Imitation of Christ.

Member of J Illustration: Technical Joint-editor | Developments.

\ Ingres.

f Huygen

\ Ibsen; '.

\ Inscriptions: Latin {in pari).

("Huygens, Sir Constantijn; 1 Ibsen; Idyl.

Ellis Hovell Minns, M.A.

Lecturer and Assistant Librarian, and formerly Fellow, Pembroke College, Cambridge University Lecturer in Palaeography.

Edward Henry Palmer, M.A.

See the biographical article, Palmer, E. H.

Iazyges; Issedones. Ibn Khaldun [in part).

INITIALS AND HEADINGS OF ARTICLES

Vll

E, K.

E. L.H.

Ed. M. E. M. T.

E.O.*

F. A. F.

F. C. C.

F. G. M. B. F. J. H.

F. LI. G.

F.

P.*

F.

S.P.

F.

Wa.

F.

W. R.*

F.

Y. P.

G

A. B.

G. A. Gr.

G. A. J. C.

G. B. G. F. H.*

G. G. Co.

3. H. C.

Edmund Knecht, Ph.D., M.Sc.TECH.(Manchester), F.I.C.

Professor of Technological Chemistry, Manchester University. Head of Chemical Department, Municipal School of Technology, Manchester. Examiner in Dyeing, ” City and Guilds of London Institute. Author of A Manual of Dyeing; &c. Editor of Journal of the Society of Dyers and Colourisls.

The Right Rev. the Bishop of Lincoln (Edward Lee Hicks).

Honorary Fellow of Corpus Christi College, Oxford. Formerly Canon Residentiary, of Manchester. Fellow and Tutor of Corpus Christi College. Author of Manual of Greek Historical Inscriptions ; &c.

Eduard Meyer, Ph.D., D.Lrrr.(Oxon.), LL.D. *

Professor of Ancient History in the University of Berlin. Author of Geschichte des ~ Alterthums ; Geschichte des alien Aegyptens; Die Israelilen und ihre Nachbarsldmme.

Sir Edward Maunde Thompson, G.C.B., I.S.O., D.C.L., Litt.D., LL.D.

Director and Principal Librarian, British Museum, 1 898-1 909. Sandars Reader in Bibliography, Cambridge, 1895-1896. Hon. Fellow of University College, Oxford. Correspondent of the Institute of France and of the Royal Prussian . Academy of Sciences. Author of Handbook of Greek and Latin Palaeography. Editor of Chronicon Angliae. Joint-editor of publications of the Palaeographical Society, the New Palaeographical Society, and of the Facsimile of the Laurentian Sophocles.

Edmund Owen, M.B., F.R.C.S., LL.D., D.Sc.

Consulting Surgeon to St Mary’s Hospital, London, and to the Children’s Hospital, . Great Ormond Street; late Examiner in Surgery at the Universities of Cambridge, Durham and London. Author of A Manual of Anatomy for Senior Students.

Frank Albert Fetter, Ph.D.

Professor of Political Economy and Finance, Cornell University. Member of the State Board of Charities. Author of The Principles of Economics; &c.

Frederick C'ornwallis Conybeare, M.A., D.TH.(Giessen).

Fellow of the British Academy. Formerly Fellow of University College, Oxford. Author of The Ancient Armenian Texts of Aristotle; Myth, Magic and Morals; &c.

Frederick George Meeson Beck, M.A.

Fellow and Lecturer in Classics, Clare College, Cambridge.

Francis John Haverfield, M.A., LL.D., F.S.A.

Camden Professor of Ancient History in the University of Oxford. Fellow of Brasenose College. Fellow of the British Academy. Formerly Censor, Student, – Tutor and Librarian of Christ Church, Oxford. Ford's Lecturer, 1906-1907. Author of Monographs on Roman History, especially Roman Britain; &c.

Francis Llewellyn Griffith, M.A., Ph.D., F.S.A.

Reader in Egyptology, Oxford University. Editor of the Archaeological Survey and Archaeological Reports of the Egypt Exploration Fund. Fellow of Imperial German Archaeological Institute.

Frederick Peterson M.DPh.D j Insanity: Hospital

Professor of Psychiatry, Columbia University. President of New York State ˆ r

Commission in Lunacy, 1902-1906. Author of Mental Diseases; &c.

Francis Samuel Philbrick, A.M., Ph.D.

Formerly Fellow of Nebraska State University, and Scholar and Resident Fellow of Harvard University. Member of American Historical Association.

Indigo.

Inscriptions: Greek

{in pari).

Hystaspes; Iran.

Illuminated MSS.

Hydrocephalus.

Interstate Commerce.

j Iconoclasts; [Image Worship.

j Hwicce. Icknield Street.

Hyksos; Isis.

I Treatment.

Independence, Declaration of.

Francis Watt, M.A.

Barrister-at-Law, Middle Temple. Author of Law's Lumber Room.

Frederick William Rudler, I.S.O., F.G.S.

Curator and Librarian of the Museum of Practical Geology, London, 1879-1902. President of the Geologists' Association, 1 887-1 889.

Frederick York Powell, D.C.L., LL.D.

See the biographical article, Powell, Frederick York.

George A. Boulenger, F.R.S., D.Sc, Ph.D.

In charge of the collections of Reptiles and Fishes, Department of Zoology, British Museum. Vice-President of the Zoological Society of London.

George Abraham Grierson, CLE., Ph.D., D.Litt. (Dublin).

Member of the Indian Civil Service, 1873-1903. In charge of Linguistic Survey of India, 1898-1902. Gold Medallist, Royal Asiatic Society, 1909. Vice-President of the Royal Asiatic Society. Formerly Fellow of Calcutta University. Author of The Languages of India ; &c.

Grenville Arthur James Cole. r

Director of the Geological Survey of Ireland. Professor of Geology, Royal College -j of Science for Ireland, Dublin. Author of Aids in Practical Geology; &c. I

Sir George Christopher Molesworth Birdwood, K.C.I.E. f

See the biographical article, Birdwood, Sir G. C. M. ˆ

George Francis Hill, M.A.

Assistant in Department of Coins and Medals, British Museum. Author of Sources for Greek History 478-431 B.C.; Handbook of Greek and Roman Coins; &c.

George Gordon Coulton, M.A.

Birkbeck Lecturer in Ecclesiastical History, Trinity College, Cambridge, of Medieval Studies; Chaucer and his England; &c.

Inn and Innkeeper.

Hyacinth; Iolite.

r

i

{

f Iceland: History, and l Ancient Literature.

Ichthyology {in part).

Indo-Aryan Languages.

Ireland: Geology. Incense.

Inscriptions: Greek

{in part).

Author-! Indulgence.

Gf.org;; Herbert Carpenter, B.Sc. (Lond.).

Professor of Zoology in the Royal College of Science, Dublin. their Structure and Life.

Author of Insects:

Hymenoptesˆg

Ichneumon-Fly;

Insect.

Vlll

INITIALS AND HEADINGS OF ARTICLES

G. I. A. G.J.

G. K. G. P. M. G. W. K.

G. W. T.

H. Ch.

H. C. R.

H.

L.

H.

H.

M.

H.

H.

N.

B.

H

0.

H.

St.

H.

T.

A.

H

y.

I.

A.

J. A. P.

J. Bs.

J. B. T.

GRA/ Senator L ot S th e L Kingdom of Italy. Professor of Comparative Grammar at the! Italian Language (in part). University of Milan. Author of Codice Islandese; &c. I

George Jamieson, C.M.G., M.A. J

Formerly Consul-General at Shanghai, and Consul and Judge of the Supreme Court, 1 Hwang HO. Shanghai. ^-

Gustav Kruger, Ph.D. f

Professor of Church History in the University of Giessen. Author of Das Papstthum ; i lrenaeus. &c. <-

George Percival Mudge, A.R.C.S., F.Z.S.

Lecturer on Biology, London Hospital Medical College, and London School of * Medicine for Women, University of London. Author of A Text Book of Zoology ; &c.

Very Rev. George William Kitchin, M.A., D.D., F.S.A.

Dean of Durham, and Warden of the University of Durham. Hon. Student of – x Christ Church, Oxford. Fellow of King's College, London. Dean of Winchester, 1883-1894. Author of A History of France; &c.

Incubation and Incubators.

Rev. Griffithes Wheeler Thatcher, M.A., B.D.

Warden of Camden College, Sydney, N.S.W. Formerly Tutor in Hebrew and Old Testament History at Mansfield College, Oxford. Author of a Commentary on Judges; An Arabic Grammar; &c.

Hutten, Ulrieh von.

Ibn ‘Abd Rabbihi; Ibn ‘Arabi; Ibn Athlr; Ibn Duraid; Ibn Farad!; Ibn Farid; Ibn Hazm; Ibn Hisham; Ibn Ishaq; Ibn Jubair; Ibn Khaldun

(in part); Ibn Khallikan; Ibn Qutaiba; Ibn Sa’d; Ibn fufail; Ibn Usaibi’a; Ibrahim Al-MausUT.

Iron Mask; Ismail.

1

1 Isfahan: History.

J Infancy;

I Intestinal Obstruction.

Iron and Steel.

Hugh Chisholm, M.A.

Formerly Scholar of Corpus Christi College, Oxford. Editor the 11th edition – of the Encyclopaedia Britannica; Co-editor of the 10th edition.

Sir Henry Creswicke Rawlinson, Bart., K.C.B.

See the biographical article, Rawlinson, Sir Henry Creswicke,

Harriet L. Hennessv, M.D., (Brux.) L.R.C.P.I., L.R.C.S.I.

Henry Marion Howe, A.M., LL.D.

Professor of Metallurgy, Columbia University. Author of Metallurgy of Steel; &c.

Henry Newton Dickson, M.A., D.Sc, F.R.G.S. J

Professor of Geography, University College, Reading. Author of

Elementary] Indian Ocean.

Meteorology ; Papers on Oceanography; &c. *-

Hermann Oelsner, M.A., Ph.D. f

Taylorian Professor of the Romance Languages in University of Oxford. Member J xtalian Literature (in part). of Council of the Philological Soaety. Author of A History of Provencal Literature; &c. >

Henry Sturt. M.A. \ induction.

Author of Idola Thealri; The Idea of a Free Church; and Personal Idealism. I

Rev. Herbert Thomas Andrews. f

Professor of New Testament Exegesis, New College, London. Author of the J Ignatius. ” Commentary on Acts ” in the Westminster New Testament; Handbook on the ‘ Apocryphal Books in the ” Century Bible.”

I

Ibn Batuta (in part).

%J. C. H. J. C. Van D.

Sir Henry Yule, K.C.S.I., C.B.

See the biographical article, Yule, Sir Henry.

Israel Abrahams, M.A.

Reader in Talmudic and Rabbinic Literature in the University of Cambridge. J Ibn Tlbbon;

Formerly President, Jewish Historical Society in England. Author of A Short Immanuel Ben Solomon.

History of Jewish Literature; Jewish Life in the Middle Ages; &c. *-

John Ambrose Fleming, M.A., F.R.S., D.Sc. _ _ f

Pender Professor of Electrical Engineering in the University of London. Fellow of University College, London. Formerly Fellow of St John’s

College, Cambridge, \ Induction Coil. and Lecturer on Applied Mechanics in the University. Author of Magnets and Electric Currents. _

James Burgess, CLE., LL.D., F.R.S.(Edin-), F.R.G.S., Hon.A.R.I.B.A. r

Formerly Director General of Archaeological Survey of India. Author of Archaeo- ! . M ArnhitontnrA logical Survey of Western India. Editor of Fergusson's History of Indian Archi-'\ MOJan Arcnueciure. lecture. I

Sir Tohn Batty Tuke, Kt., M.D., F.R.S.(Edin.), D.Sc, LL.D. f „ .„.„ ,. . ,.

President of the Neurological Society of the United Kingdom. Medical Director J HySiena \m part),

of New Saughton Hall Asylum, Edinburgh. M.P. for the Universities of Edinburgh] Insanity: Medical. and St Andrews, 1900-1910. *-

Right Rev. John Cuthbert Hedley, O.S.B., D.D. J

K.C. Bishop of Newport. Author of The Holy Eucharist; &c. 1

John Charles Van Dyke. I

Professor of the History of Art, Rutgers College, New Brunswick, N.J. Formerly < Editor of The Studio and Art Review. Author of Art for Art's Sake; History of Painting; Old. English Masters; &c.

Immaculate Conception.

Inness, George.

INITIALS AND HEADINGS OF ARTICLES

IX

J. c. w.

J. D. B.

J. P. P. J. F.-K.

J. G. K.

J. G. Sc.

J. H. A. H. J. H. Mu.

J. H. Be.

J. H. van't H. J. L. M.

J. Mn.

J. M. A. de L.

J. M. M.

J. P. E. J. P. Pe.

J. S. Bl. J. S. Co.

J. S. F.

J. T. Be. J. V.* Jno. W.

{

Inns of Court.

James Claude Webster.

Barrister-at-Law, Middle Temple.

James David Bourchier, M.A., F.R.G.S. f

King's College, Cambridge. Correspondent of The Times in South-Eastern Europe. J j on j an Islands. Commander of the Orders of Prince Danilo of Montenegro and of the Saviour of Greece, and Officer of the Order of St Alexander of Bulgaria. *-

John Faithfull Fleet, CLE. Ph.D.

Commissioner of Central and Southern Divisions of Bombay, 1891-1897. of Inscriptions of the Early Gupta Kings ; &c.

Author j Inscriptions:

Indian.

Isla, J. F. de.

James Fitzmaurice-Kelly, Litt.D., F.R.Hist.S.

Gilmour Professor of Spanish Language and Literature, Liverpool University. Norman McColl Lecturer, Cambridge University. Fellow of the British Academy. ‘ Member of the Royal Spanish Academy. Knight Commander of the Order of Alphonso XII. Author of A History of Spanish Literature; &c.

John Graham Kerr, M.A., F.R.S. f

Regius Professor of Zoology in the University of Glasgow. Formerly Demonstrator J ..

in Animal Morphology in the University of Cambridge. Fellow of Christ’s College, 1 Ichthyology Km part).

Cambridge, 1 898-1904. Walsingham Medallist, 1898. Neill Prizeman, Royal

Society of Edinburgh, 1904.

Sir James George Scott, K.C.I.E. j

Superintendent and Political Officer, Southern Shan States. Author of Burma, 1 Irrawaddy. a Handbook ; The Upper Burma Gazetteer ; &c. <■

John Henry Arthur Hart, M.A. j Hyrcanus.

Fellow, Theological Lecturer and Librarian, St John’s College, Cambridge. I

John Henry Muirhead, M.A., LL.D. f

Professor of Philosophy in the University of Birmingham. Author of Elementsˆ Idealism. of Ethics ; Philosophy and Life ; &c. Editor of Library of Philosophy. I

Very Rev. John Henry Bernard, M.A., D.D., D.C.L. f

Dean of St Patrick’s Cathedral, Dublin. Archbishop King’s Professor of Divinity J , . ,

and formerly Fellow of Trinity College, Dublin. Joint-editor of the Irish Liber \ “eland, Lnurcn 01. Hymnorum ; &c. I

Isomerism.

Iberians; Ionians.

Jacobus Henricus van't Hoff, LL.D., D.Sc, D.M.

See the biographical article van't Hoff, Jacobus Henricus.

John Lynton Myres, M.A., F.S.A., F.R.G.S.

Wykeham Professor of Ancient History in the University of Oxford. Formerly . Gladstone Professor of Greek and Lecturer in Ancient Geography, University of Liverpool. Lecturer in Classical Archaeology in University of Oxford.

John Macpherson, M.D.

Formerly Inspector-General of Hospitals, Bengal.

Jean Marie Antoine de Lanessan.

See the biographical article, Lanessan, J. M. A. de.

John Malcolm Mitchell. f

Sometime Scholar of Queen's College, Oxford. Lecturer in Classics, East London

Jean Paul Hippolyte Emmanuel Adhemar Esmein. [

Professor of Law in the University of Paris. Officer of the Legion of Honour. _ Member of the Institute of France. Author of Cours elementaire d'histoire du droit francais ; &c.

Rev. John Punnett Peters, Ph.D., D.D.

Canon Residentiary, Cathedral of New York. Formerly Professor of Hebrew in the University of Pennsylvania. Director of the University Expedition to Baby- – Ionia, 1888-1895. Author of Nippur, or Explorations and Adventures on the Euphrates. I

John Sutherland Black, M.A., LL.D. [

Assistant Editor of the 9th edition of the Encyclopaedia Britannica. Joint-editors HllSS, John. of the Encyclopaedia Biblica. _

\ Insanity : Medical {in part) . \ Indo-China, French {in part).

Intendant.

Irak-Arabi {in part).

India : Geography and Statistics {in part),' History {in part);

Indore.

Itacolumite.

James Sutherland Cotton, M.A.

Editor of the Imperial Gazetteer of India. Hon. Secretary of the Egyptian Explora- tion Fund. Formerly Fellow and Lecturer of Queen's College, Oxford. Author " of India; &c.

John Smith Flett, D.Sc, F.G.S.

Petrographer to the Geological Survey. Formerly Lecturer on Petrology in Edin- burgh University. Neill Medallist of the Royal Society of Edinburgh. Bigsby Medallist of the Geological Society of London. 1

John Thomas Bealby. r

Joint-author of Stanford's Europe. Formerly Editor of the Scottish Geographical \ Irkutsk {in part). Magazine. Translator of Sven Hedin's Through Asia, Central Asia and Tibet; &c. [

Jules Viard. c

Archivist at the National Archives, Paris. Officer of Public Instruction, of La France sous Philippe VI. de Valois; &c.

John Westlake, K.C., LL.D.

Professor of International Law, Cambridge. 1888-1908. One of the Members for the f United Kingdom of International Court of Arbitration under the Hague Convention, I 1900-1906. Bencher of Lincoln's Inn. Author of A Treatise on Private International i Law, or the Conflict of Laws: ChaW*r* on the Principles of International Law, pt. i. j " Peace," nt. ii. " War." '

Author X Isabella of Bavarfa.

International Law:

Private.

X

L,

L. C. B. L. Ho. L. J. S,

L. T. D.

INITIALS AND HEADINGS OF ARTICLES

Count Lutzow, Litt.D. (Oxon.), Ph.D. (Prague), F.R.G.S.

Chamberlain of H.M. the Emperor of Austria, King of Bohemia. Hon. Member of the Royal Soeiety of Literature. Member of the Bohemian Academy; &c. Author of Bohemia, a Historical Sketch; The Historians of Bohemia (Ilchester Lecture, Oxford, 1904) ; The Life and Times of John Hus; &c.

Lewis Campbell Bruce, M.D., F.R.C.P. Author of Studies in Clinical Psychiatry.

Hussites.

M.

Ha.

M.

Ja.

M.

0. B.

C.

N.

M.

0.

J. R.

H.

P.

A.

P.

A. K

P.

CM.

P. Gi.

P. Sm. R.

R. A. S. M.

R. Ba.

R.C.J. R. G. R. H. C.

R. L.* R. P. S.

Laurence Housman.

See the biographical article, Housman, L.

Leonard James Spencer, M.A.

Assistant in Department of Mineralogy, British Museum. Sidney Sussex College, Cambridge, and Harkness Scholar.

logical Magazine.

\ Insanity: Medical {in part). \ Illustration {in part).

Formerly Scholar of J Editor of the Minera- 1

Hypersthene; Ilmenite.

Sir Lewis Tonna Dibdin, M.A., D.C.L., F.S.A.

Dean of the Arches; Master of the Faculties; and First Church Estates Commissioner. Bencher of Lincoln's Inn. Author of Monasticism in England; &c.

Marcus Hartog, M.A., D.Sc, F.L.S. [

Professor of Zoology, University College, Cork. Author of " Protozoa " in Cam- -j Infusoria. bridge Natural History; and papers for various scientific journals. t

Morris Jastrow, Jun., Ph.D.

Incense: Ritual Use.

Assistant Secretary of the J Ireland: Geography.

Inquisition.

Professor of Semitic Languages, University of Pennsylvania, U.S.A. Author of -! Ishtar. Religion of the Babylonians and Assyrians; &c. |_

Maximilian Otto Bismarck Caspari, M.A. r

Reader in Ancient History at London University. Lecturer in Greek at Birmingham -J Irene (7 <;2-8cn) University, 1905-1908. [°

Norman McLean, M.A. r

Fellow, Lecturer and Librarian of Christ's College, Cambridge. University Lecturer j T,- aap _t AntinpJi in Aramaic. Examiner for the Oriental Languages Tripos and the Theological 1 Anuocn.

Tripos at Cambridge. L

Osbert John Radcliffe Howarth, M.A.

Christ Church, Oxford. Geographical Scholar, 1901. British Association.

Paul Daniel Alphandery.

Professor of the History of Dogma, Ecole pratique des hautes etudes, Sorbonne, Paris. Author of Les Idees morales chez Us hMerodoxes latines au debut du XIII'. ' siecle.

Prince Peter Alexeivitch Kropotkin.

See the biographical article, Kropotkin, Prince P. A.

Peter Chalmers Mitchell, M.A., F.R.S., F.Z.S., D.Sc, LL.D.

Secretary to the Zoological Society of London. University Demonstrator in Comparative Anatomy and Assistant to Linacre Professor at Oxford, 1 888-1 891 Examiner in Zoology to the University of London, 1903. Author of Outlines of Biology; &c.

Peter Giles. M.A., LL.D., Litt.D.

Fellow and Classical Lecturer of Emmanuel College, Cambridge, and

University Reader in Comparative Philology. Formerly Secretary of the Cambridge Philo- logical Society. Author of Manual of Comparative Philology; &c.

Preserved Smith, Ph.D.

Rufus B. Kellogg Fellow, Amherst College, Amherst, Mass.

The Right Hon. Lord Rayleigh.

See the biographical article, Rayleigh, 3rd Baron.

Irkutsk {in part).

891-ˆ Hybridism.

i;

Indo-European Languages.

Innocent I., II.

J Interference of Light.

Robert Alexander Stewart Macalister, M.A., F.S.A.

St John's College, Cambridge. Director of Excavations for the Palestine Explora- tion Fund.

Richard Bagwell, M.A., LL.D.

Commissioner of National Education for Ireland. Tudor s ; Ireland under the Stuarts.

Sir Richard Clavf.rhouse Jebb, D.C.L., LL.D.

See the biographical article, Jebb, Sir Richard Claverhouse. Richard Garnett, LL.D.

See the biographical article, Garnett, Richard.

Idumaea.

Author of Ireland under the \ Ireland: Modern History

I

J Isaeus; Isocrates.

Irving, Washington.

Rev. Robert Henry Charles, M.A., D.D., D.Litt. c

Grinfield Lecturer, and Lecturer in Biblical Studies, Oxford. Fellow of the British Academy. Formerly Professor of Biblical Greek, Trinity College, Dublin. Author”! Isaiah, Ascension of.

of Critical History of the Doctrine of a Future Life; Book of Jubilees; &c. !

Richard Lydekker, F.R.S., F.Z.S., F.G.S. ,

Member of the Staff of the Geological Survey of India 1 874-1 882. Author of Cata- Hyracoidea; logues of Fossil Mammals, Reptiles and Birds in the British Museum; The Deer of \ Ibex {in part); all Lands; &c. [Indri; Insectivora.

R. Phene Spiers. F.S.A., F.R.I.B.A.

Formerly Master of the Architectural School, Royal Academy, London. Past President of Architectural Association. Associate and Fellow of King’s College, London. Corresponding Member of the Institute of France. Editor of Fergusson’s History of Architecture. Author of Architecture; East and West; &c.

Hypaethros.

INITIALS AND HEADINGS OF ARTICLES

XJ

R. S. C.

s.

R. Tr. S. A. C.

Robert Seymour Conway, M.A., D.Litt. (Cantab.). [

Professor of Latin and Indo-European Philology in the University of Manchester. J Formerly Professor of Latin in University College, Cardiff; and Fellow of Gonville and Caius College, Cambridge. Author of The Italic Dialects. *■

The Right Hon. the Earl of Selborne. J”

See the biographical article, Selborne, ist Earl of. \

Iguvium; Iovilae.

Hymns.

Roland Truslove, M.A.

Formerly Scholar of Christ Church, Oxford. at Worcester College, Oxford.

flndo-China, French

Dean, Fellow and Lecturer in Classics -\ /■ ■hart)

Ishmael.

s.

Bl.

T.

As.

T.

A.I

T

Ba.

-j Iceland:

T. F.

T. F. C. T. H. H.*

T. K. C. Th. T.

W. A. B. C.

W. A. P. W. C. U.

W. F. C. W. F. Sh. W. G.

W.Go.

W. H. F. W. H. Po.

Stanley Arthur Cook, M.A.

Lecturer in Hebrew and Syriac, and formerly Fellow, Gonville and Caius College, Cambridge. Editor for Palestine Exploration Fund. Author of Glossary of Aramaic Inscriptions; The. Laws of Moses and the Code of Hammurabi; Critical Notes on Old Testament History; Religion of Ancient Palestine; &c.

Sigfus Blondal.

Librarian of the University of Copenhagen.

Thomas Ashby, M.A., D.Litt. (Oxon.).

Director of British School of Archaeology at Rome. Formerly Scholar of Christ. Church, Oxford. Craven Fellow, 1897. Conington Prizeman, 1906. Member of the Imperial German Archaeological Institute.

Thomas Allan Ingram, M.A., LL.D. Trinity College, Dublin.

Sir Thomas Barclay, M.P.

Member of the Institute of International Law. Member of the Supreme Council of the Congo Free State. Officer of the Legion of Honour. Author of Problems of International Practice and Diplomacy; &c. M.P. for Blackburn, 1910.

Rev. Thomas Fowler, M.A., D.D., LL.D. (1832-1004).

President of Corpus Christi College, Oxford, 1881-1904. Honorary Fellow of Lincoln College. Professor of Logic, 1873-1888. Vice-Chancellor of the University of Oxford, 1899-1901. Author of Elements of Deductive Logic; Elements of Inductive Logic; Locke (“English Men of Letters “); Shaftesbury and Hutcheson (” English Philosophers “); &c.

Theodore Freylinghuysen Collier, Ph.D.

Assistant Professor of History, Williams College, Williamstown, Mass., U.S.A.

Colonel Sir Thomas Hungerford Holdich, K.C.M.G., K.C.I.E., Hon.D.Sc. f

Superintendent, Frontier Surveys, India^ 1892-1898^ Gold Medallist,

R.G.S., J r n(j us

Recent Literature,

Interamna Lirenas; Ischia

f Illegitimacy;

\ Insurance (in par')

Immunity. International Law.

Hutcheson, Francis

(in part).

Innocent IX.-XII1.

Author of The Indian Borderland; The Countries of the King's', Tibet; &c. I

London, 1887 Award; India;

Rev. Thomas Kelly Cheyne, D.D.

See the biographical article, Cheyne, T. K

Thorvaldur Thoroddsen.

Icelandic Expert and Explorer. Honorary Professor in the University of Copenhagen. Author of History of Icelandic Geography; Geological Map of Iceland; &c.

J Isaiah.

j Iceland: Geography and

j Statistics.

Hyeres; Innsbruck; Interlaken; Iseo, Lake of Isere (River); Isere (Department).

Hydraulics.

Rev. William Augustus Brevoort Coolidge, M.A., F.R.G.S., Ph.D. (Bern).

Fellow of Magdalen College, Oxford. Professor of English History, St

David's College, Lampeter, 1 880-1 881. Author of Guide du Haut Dauphine; The Range of the Todi; Guide to Grindelwald; Guide to Switzerland; The Alps in Nature and in History; &c. Editor of The Alpine Journal, 1880-1881 ; &c.

Walter Alison Phillips, M.A. r

Formerly Exhibitioner of Merton College and Senior Scholar of St John's College, J Innocent III. IV. Oxford. Author of Modern Europe; &c. j ”'

William Cawthorne Unwin, LL.D., F.R.S., M.Inst.CE., M.Inst.M.E r A.R.I. B. A.

Emeritus Professor, Central Technical College, City and Guilds of London Institute. Author of Wrought Iron Bridges and Roofs; Treatise on Hydraulics; &c. I

William Feilden Craies, M.A. 1″

B.irristei'-at-Law, Inner Temple. Lecturer on Criminal Law, King's College,-^ Indictment. London. Editor of Archbold's Criminal Pleading (23rd edition). [

William Fleetwood Sheppard, M.A. r

Senior Examiner in the Board of Education, London. Formerly Fellow of Trinity \ Interpolation. College, Cambridge. Senior Wrangler, 1884. [

William Garxt.tt, M.A., D.C.L. r

Educational Adviser to the London County Council. Formerly Fellow and Lecturer J n j f

of St John's College, Cambridge. Principal and Professor of Mathematics, Durham 1 H y arometer ‘ College of Science, Newcastle-on-Tyne. Author of Elementary Dynamics ; &c. I

William Gow, M.A., Ph.D. r

Secretary of the British and Foreign Marine Insurance Co. Ltd., Liverpool. Lecturer J Insurance* Marine on Marine 1 nsurance at University College, Liverpool. Author of Marine Insurance ■ \ &c. ‘ I

Sir William Henry Flower, F.R.S.

See the biographical article, Flower, Sir W. H.

W. Haldaxe Porter.

Barrister-at-Law, Middle Temple.

-j Ibex (in part).

j Ireland: Statistics and \ Administration.

W. Ma. W. McD.

W. M. L.

W. M. Ra. W. P.. So.

W. T. T.-D,

W.Wn. W. W H.

INITIALS AND HEADINGS OF ARTICLES

Sir William Markby, K.C.I.E.

See the biographical article, Markby, Sir William.

■{ Indian Law.

William McDougall, M.A.

Wilde Reader in Mental Philosophy in the University of Oxford. Formerly Fellow ■< Hypnotism. of St John's College, Cambridge. '

Wallace Martin Lindsay, M.A., Litt.D., LL.D. f

Professor of Humanity, University of St Andrews. Fellow of the British Academy. J »_ ._*. . r .. /. _,.

Formerly Fellow of Jesus College, Oxford. Author of Handbook of Latin Inscrip- 1 inscriptions, Latin (til pari).

tions ; The Latin Language ; &c. I

Sir William Mitchell RamSay, Litt.D., D.C.L. J.

See the biographical article, Ramsay, Sir W. Mitchell. |_ lconiun *.

William Ritchie Sorley, M.A., Litt.D., LL.D. ˆ r

Professor of Moral Philosophy in the University” of Cambridge. Fellow of King’s J T … .

College, Cambridge. Fellow of the British Academy. Formerly Fellow of Trinity 1 * a mollCmlS.

College. Author of The Ethics of Naturalism; The Interpretation of Evolution; &c. L Sir William Turner Thiselton-Dyer, F.R.S., K.C.M.G., CLE., D.Sc, LL.D Ph.D., F.L.S.

Hon. Student of Christ Church, Oxford. Director, Royal Botanic Gardens, Kew, .

1885-1905. Botanical Adviser to Secretary of State for Colonies, 1902-1906.

Joint-author of Flora of Middlesex. Editor of Flora Capenses and Flora of Tropical

Africa.

William Watson, D.Sc, F.R.S., A.R.C.S.

Assistant Professor of Physics, Royal College of Science, London. Vice-President of the Physical Society. Author of A Text Book of Practical Physics; &c.

Sir William Wilson Hunter.

See the biographical article, Hunter, Sir William Wilson.

Huxley.

Inclinometer.

J

L

f India: History {in part); ■y Geography and Statistics [{in part).

PRINCIPAL UNSIGNED ARTICLES

Husband and Wife.

Illinois.

Infant.

Intestacy.

Hyacinth.

Illumination.

Infanticide.

Inverness-shire

Hyderabad.

Illyria.

Infinite.

Investiture.

Hydrogen.

Image.

Influenza.

Iodine.

Hydropathy.

Impeachment.

Inheritance.

Iowa.

Hydrophobia.

Income Tax.

Injunction.

Ipecacuanha.

Ice.

Indiana.

Ink.

Iris.

Ice- Yachting.

Indian Mutiny.

Inkerman.

Iron.

Idaho.

Indicator.

International, The.

Irrigation.

Iguana.

ENCYCLOPEDIA BRITANNICA

ELEVENTH EDITION

VOLUME XIV

HUSBAND, properly the ” head of a household,” but now chiefly used in the sense of a man legally joined by marriage to a woman, his “wife”; the legal relations between them are treated below under Husband and Wife. The word appears in O. Eng. as husbonda, answering to the Old Norwegian husbondi, and means the owner or freeholder of a hus, or house. The last part of the word still survives in ” bondage ” and ” bond- man,” and is derived from bua, to dwell, which, like Lat. colere, means also to till or cultivate, and to have a household. ” Wife,” in O. Eng. wif, appears in all Teutonic languages except Gothic; cf. Ger. Weib, Dutch wijf, &c, and meant originally simply a female, ” woman ” itself being derived from wijman, the pronunciation of the plural wimmen still preserving the original i. Many derivations of ” wife ” have been given; thus it has been connected with the root of ” weave,” with the Gothic waibjan, to fold or wrap up* referring to the entangling clothes worn by a woman, and also with the root of vibrare, to tremble. These are all merely guesses, and the ultimate history of the word is lost. It does not appear outside Teutonic languages. Parallel to ” husband ” is ” housewife,” the woman managing a household. The earlier kuswif was pronounced

hussif, and this pronunciation survives in the application of the word to a small case containing scissors, needles and pins, cottons, &c. From this form also derives ” hussy,” now only used in a de- preciatory sense of a light, impertinent girl. Beyond the meaning of a husband as a married man, the word appears in connexion with agriculture, in ” husbandry “and ” husbandman.” Accord- ing to some authorities ” husbandman ” meant originally in the north of England a holder of a ” husbandland,” a manorial tenant who held two ox-gangs or virgates, and ranked next below the yeoman (see J. C. Atkinson in Notes and Queries, 6th series, vol. xii., and E. Bateson, History of Northumberland, ii., 1893). From the idea of the manager of a household, ” husband ” was in use transferred to the manager of an estate, and the title was held by certain officials, especially in the great trading companies. Thus the ” husband ” of the East India Company looked after the interests of the company at the custom-house. The word in this sense is practically obsolete, but it still appears in ” ship’s husband,” an agent of the owners of a ship who looks to the proper equipping of the vessel, and her repairs, procures and adjusts freights, keeps the accounts, makes

charter-parties and acts generally as manager of the ship’s employment. Where such an agent is himself one of the owners of the vessel, the name of ” managing owner ” is used. The ” ship’s husband ” or ” managing owner ” must register his name and address at the port of registry (Merchant Shipping Act 1894, § 59). From the use of ” husband ” for a good and thrifty manager of a household, the verb ” to husband ” means to economize, to lay up a store, to save.

HUSBAND AND WIFE, Law relating to. For the modes in which the relation of husband and wife may be constituted and dissolved, see Marriage and Divorce. The present article will deal only with the effect of marriage on the legal position of the spouses. The person chiefly affected is the wife, who probably in all political systems becomes subject, in consequence of marriage, to some kind of disability. The most favourable system scarcely leaves her as free as an unmarried woman; and the most unfavourable subjects her absolutely to the authority of her husband. In modern times the effect of marriage on property is perhaps the most important of its consequences, and on this point the laws of different states show wide diversity of principles.

The history of Roman law exhibits a transition from an extreme theory to its opposite. The position of the wife in the earliest Roman household was regulated by the law of Manus. She fell under the ” hand ” of her husband, — became one of his family, along with his

sons and daughters, natural or adopted, and his slaves. The dominion which, so far as the children was concerned, was known as the patria potestas, was, with reference to the wife, called the manus. The subject members of the family, whether wife or children, had, broadly speaking, no rights of their own. If this institution implied the complete subjection of the wife to the husband, it also implied a much closer bond of union between them than we find in the later Roman law. The wife on her husband's death succeeded, like the children, to freedom and a share of the inheritance. Manus, however, was not essential to a legal marriage; its restraints were irksome and unpopular, and in course of time it ceased to exist, leaving no equivalent protection of the stability of family life. The later Roman marriage left the spouses com- paratively independent of each other. The distance between the two modes of marriage may be estimated by the fact that,

while under the former the wife was one of the husband's immediate heirs, under the latter she was called to the inheritance only after his kith and kin had been exhausted, and only in preference to the treasury. It seems doubtful how far she had, during the continuance of marriage, a legal right to enforce aliment from her husband, although if he neglected her she had the unsatisfactory remedy of an easy divorce. The law, in fact, pre- ferred to leave the parties to arrange their mutual rights and obligations by private contracts. Hence the importance of the law of settlements {Dotes) . The Dos and the Donatio ante nuptias were settlements by or on behalf of the husband or wife, during the continuance of the marriage, and the law seems to have looked with some jealousy on gifts made by one to the other in any less formal way, as possibly tainted with undue influence. During the marriage the husband had the administration of the property. The manus of the Roman law appears to be only one instance of an institution common to all primitive societies. On the continent of Europe after many centuries, during which local usages were brought under the influence of principles derived from the Roman law, a theory of marriage became established, the leading feature of which is the community of goods between husband and wife. Describing the principle as it prevails in France, Story {Conflict of Laws, § 130) says: " This community or nuptial partnership (in the absence of any special contract) generally extends to all the movable property of the husband and wife, and to the fruits, income and revenue thereof. . . . It extends also to all immovable property of the husband and wife acquired during the marriage, but not to such immovable property as either possessed at the time of the marriage, or which came to them

afterwards by title of succession or by gift. The property thus acquired by this nuptial partnership is liable to the debts of the parties existing at the time of the marriage; to the debts contracted by the husband during the community, or by the wife during the community with the consent of the husband; and to debts contracted for the maintenance of the family. . . . The husband alone is entitled to administer the property of the community, and he may alien, sell or mortgage it without the concurrence of the wife." But he cannot dispose by will of more than his share of the common property, nor can he part with it gratuitously inter vivos. The community is dissolved by death (natural or civil), divorce, separation of body or separation of property. On separation of body or of property the wife is entitled to the full control of her movable property, but cannot alien her immovable property, without her husband's consent or legal authority. On the death of either party the property is divided in equal moieties between the survivor and the heirs of the deceased.

Law of England. — The English common law as usual followed its own course in dealing with this subject, and in no department were its rules more entirely insular and independent. The text writers all assumed two fundamental principles, which between them established a system of rights totally unlike that just described. Husband and wife were said to be one person in the eye of the law — unica persona, quia caro una et sanguis unus. Hence a man could not grant or give anything to his wife, because she was himself, and if there were any compacts between them before marriage they were dissolved by the union of persons. Hence, too, the old rule of law, now greatly modified, that husband and wife could not be allowed to give evidence against each other, in any trial, civil or criminal. The unity, however, was one-sided only; it was the wife who was merged in the husband, not the husband in the wife. And when the theory did not

apply, the disabilities of ” coverture ” suspended the active exercise of the wife’s legal faculties. The old technical phraseology described husband and wife as baron and feme ; the rights of the husband were baronial rights. From one point of view the wife was merged in the husband, from another she was as one of his vassals. A curious example is the immunity of the wife in certain cases from punishment for crime committed in the presence and on the presumed coercion of the husband. ” So great a favourite,” says Blackstone, ” is the female sex of the laws of England.”

The application of these principles with reference to the property of the wife, and her capacity to contract, may now be briefly traced.

The freehold property of the wife became vested in the husband and herself during the coverture, and he had the management and the profits. If the wife had been in actual possession at any time during the marriage of an estate of inheritance, and if there had been a child of the marriage capable of inheriting, then the husband became entitled on his wife’s death to hold the estate for his own life as tenant by the curtesy of England {curialitas) } Beyond this, however, the husband’s rights did not extend, and the wife’s heir at last succeeded to the inheritance. The wife could not part with her real estate without the concur- rence of the husband; and even so she must be examined apart from her husband, to ascertain whether she freely and voluntarily consented to the deed.

With regard to personal property, it passed absolutely at common law to the husband. Specific things in the possession of the wife {choses in possession) became the property of the husband at once; things not in possession, but due and re- coverable from others {choses in action), might be recovered by the husband. A chose in action not reduced into actual possession, when the marriage was dissolved by death, reverted to the wife if she was the survivor; if the husband survived he could obtain possession by taking out letters of administra- tion. A chose in action was to be distinguished from a specific thing which, although the property of the wife, was for the time being in the hands

of another. In the latter case the property was in the wife, and passed at once to the husband; in the former the wife had a mere jus in personam, which the husband might enforce if he chose, but which was still cap- able of reverting to the wife if the husband died without enforcing it.

The chattels real of the wife {i.e., personal property, dependent on, and partaking of, the nature of realty, such as leaseholds) passed to the husband, subject to the wife's right of survivorship, unless barred by the husband by some act done during his life. A disposition by will did not bar the wife's interest; but any disposition inter vivos by the husband was valid and effective.

The courts of equity, however, greatly modified the rules of the common law by the introduction of the wife's separate estate, i.e. property settled to the wife for her separate use, independently of her husband. The principle seems to have been originally admitted in a case of actual separation, when a fund was given for the maintenance of the wife while living apart from her husband. And the conditions under which separate estate might be enjoyed had taken the Court of Chancery many generations to develop. No particular form of words was necessary to create a separate estate, and the intervention of trustees, though common, was not necessary. A clear intention to deprive the husband of his common law rights was sufficient to do so. In such a case a married woman was entitled to deal with her property as if she was unmarried, although the earlier decisions were in favour of requiring her binding engagements to be in writing or under seal. But it was afterwards held that any engagements, clearly made with reference to the separate estate, would bind that estate, exactly as if the woman had been a feme sole. Connected with the doctrine of separate use was the equitable contrivance of restraint on anticipation with which later legislation has not interfered, whereby property might be so settled to the separate use of a married woman that she could not, during coverture, alienate it or anticipate the income. No such restraint is recognized in the case of a man or of a feme sole, and it depends entirely on the separate estate; and the separate estate has its existence only during coverture, so that a woman to whom such an estate is given may dispose of it so long as she is unmarried, but becomes bound by the restraint as soon as she is married. In yet another way the court of Chancery interfered to protect the interests of married women. When a

1 Curtesy or courtesy has been explained by legal writers as " arising by favour of the law of England." The word has nothing to do with courtesy in the sense of complaisance.

husband sought the aid of that court to get possession of his wife's choses in action, he was required to make a provision for her and her children out of the fund sought to be recovered. This is called the wife's equity to a settlement, and is said to be based on the original maxim of Chancery jurisprudence, that " he who seeks equity must do equity." Two other property interests of minor importance are recognised. The wife's pin- money is a provision for the purchase of clothes and ornaments suitable to her husband's station, but it is not an absolute gift to the separate use of the wife; and a wife surviving her husband cannot claim for more than one year's arrears of pin-money. Paraphernalia are jewels and other ornaments given to the wife by her husband for the purpose of being worn by her, but not as her separate property. The husband may dispose of them by act inter vivos but not by will, unless the will confers other benefits on the wife, in which case she must elect between the will and the paraphernalia. She may also on the death of the husband claim paraphernalia, provided all creditc rs have been satisfied, her right being superior to that of any legatee.

The corresponding interest of the wife in the property of the husband is much more meagre and illusory. Besides a general right to maintenance at her husband's expense, she has at common law a right to dower (q.v.) in her husband's lands, and to a pars rationabilis (third) of his personal estate, if he dies intestate. The former, which originally was a solid provision for widows, has by the ingenuity of conveyancers, as well as by positive enactment, been reduced to very slender dimensions. It may be destroyed by a mere declaration to that effect on the part of the husband, as well as by his conveyance of the land or by his will.

The common practice of regulating the rights of husband, wife and children by marriage settlements obviates the hardships of the common law — at least for the women of the wealthier classes. The legislature by the Married Women's Property Acts of 1870, 1874, 1882 (which repealed and consolidated the acts of 1870 and 1874), 1893 and 1907 introduced very considerable changes. The chief provisions of the Married Women's Property Act 1882, which enormously improved the position of women unprotected by marriage settlement, are, shortly, that a married woman is capable of acquiring, holding and disposing of by will or otherwise, any real and personal property, in the same manner as if she were a. feme sole, without the intervention of any trustee. The property of a woman married after the beginning of the act, whether belonging to her at the time of

marriage or acquired after marriage, is held by her as a, feme sole. The same is the case with property acquired after the beginning of the act by a woman married before the act. After marriage a woman remains liable for antenuptial debts and liabilities, and as between her and her husband, in the absence of contract to the contrary, her separate property is deemed primarily liable. The husband is only liable to the extent of property acquired from or through his wife. The act also contained provisions as to stock, investment, insurance, evidence and other matters. The effect of the act was to render obsolete the law as to what created a separate use or a reduction into possession of choses in action, as to equity to a settlement, as to fraud on the husband's marital rights, and as to the inability of one of two married persons to give a gift to the other. Also, in the case of a gift to a husband and wife in terms which would make them joint tenants if unmarried, they no longer take as one person but as two. The act contained a. special saving of existing and future settlements; a settlement being still necessary where it is desired to secure only the enjoy- ment of the income to the wife and to provide for children. The act by itself would enable the wife, without regard to family claims, instantly to part with the whole of any property which might come to her. Restraint on anticipation was preserved by the act, subject to the liability of such property for antenuptial debts, and to the power given by the Conveyancing Act 1881 to bind a married woman's interest notwithstanding a clause of restraint. The Married Women's Property Act of 1893 repealed two clauses in the act of 1882, the exact bearing of

which had been a matter of controversy. It provided specifically that every contract thereinafter entered into by a married woman, otherwise than as an agent, should be deemed to be a contract entered into by her with respect to and be binding upon her separate property, whether she was or was not in fact possessed of or entitled to any separate property at the time when she entered into such contract, that it should bind all separate property which she might at any time or thereafter be possessed of or entitled to, and that it should be enforceable by process of law against all property which she might thereafter, while discovert, be possessed of or entitled to. The act of 1907 enabled a mprried woman, without her husband, to dispose of or join in disposing of, real or personal property held by her solely or jointly as trustee or personal representative, in like manner as if she were a. feme sole. It also provided that a settle- ment or agreement for settlement whether before or after marriage, respecting the property of the woman, should not be valid unless executed by her if she was of full age or confirmed by her after she attained full age. The Married

Women's Property Act 1908 removed a curious anomaly by enacting that a married woman having separate property should be equally liable with single women and widows for the maintenance of parents who are in receipt of poor relief.

The British colonies generally have adopted the principles of the English acts of 1882 and 1893.

Law of Scotland. — The law of Scotland differs less from English law than the use of a very different terminology would lead us to suppose. The phrase communio bonorum has been employed to express the interest which the spouses have in the movable property of both, but its use has been severely censured as essentially in- accurate and misleading. It has been contended that there was no real community of goods, and no partnership or societas between the spouses. The wife's movable property, with certain exceptions, and subject to special agreements, became as absolutely the property of the husband as it did in English law. The notion of a communio was, however, favoured by the peculiar rights of the wife and children on the dissolution of the marriage. Previous to the Intestate Movable Succession (Scotland) Act 1855 the law stood as follows. The fund formed by the movable property of both spouses may be dealt with by the husband as he pleases during life; it is increased by his acquisitions and diminished by his debts. The respective shares contributed by husband and wife return on the dissolution of the marriage to them or their representatives if the marriage be dissolved within a year and a day, and without a living child. Other- wise the division is into two or three shares, according as children are existing or not at the dissolution of the marriage. On the death of the husband, his children take one-third (called legitim), the widow takes" one-third (jus relictae), and the remaining one-third (the dead part) goes according to his will or to his next of kin. If there be no children, the jus relictae and the dead's part are each one-half. If the wife die before the husband, her representatives, whether children or not, are creditors for the value of her share. The statute above- mentioned, however, enacts that " where a wife shall predecease her husband, the next of kin, executors or other representatives of such wife, whether testate or intestate, shall have no right to any share of the goods in communion; nor shall any legacy or bequest or testa- mentary disposition thereof by such wife, affect or attach to the said goods or any portion thereof." It also abolishes the rule by which the shares revert if the marriage does not subsist for a year and a day. Several later acts apply to Scotland some of the principles of the English Married Women's Property Acts. These are the Married Women's Property (Scotland) Act 1877, which protects the earnings, &c, of

wives, and limits the husband's liability for antenuptial debts of the wife, the Married Women's Policies of Assurance (Scotland) Act 1880, which enables a woman to contract for a policy of assurance for her separate use, and the Married Women's Property (Scotland) Act 1 88 1, which abolished the jot mariti.

A wife's heritable property does not pass to the husband on marriage, but he acquires a right to the administration and profits. His courtesy, as in English law, is also recognized. On the other hand, a widow has a terce or life-rent of a third part of the husband's heritable estate, unless she has accepted a conventional provision.

Continental Europe. — Since 1882 English legislation in the matter of married women's property has progressed from perhaps the most backward to the foremost place in Europe. By a curious contrast, the only two European countries where, in the absence of a settle- ment to the contrary, independence of the wife's property was recog- nized, were Russia and Italy. But there is now a marked tendency towards contractual emancipation. Sweden adopted a law on this subject in 1874, Denmark in 1880, Norway in 1888. Germany followed, the Civil Code which came into operation in 1900 (Art, 1367) providing that the wife's wages or earnings shall form part of her Vorbehaltsgut or separate property, which a previous article

(!365) placed beyond the husband's control. As regards property accruing to the wife in Germany by succession, will or gift inter vivos, it is only separate property where the donor has deliberately stipulated exclusion of the husband's right.

In France it seemed as if the system of community of property was ingrained in the institutions of the country. But a law of 1907 has brought France into line with other countries. This law gives a married woman sole control over earnings from her personal work and savings therefrom. She can with such money acquire personalty or realty, over the former of which she has absolute control. But if she abuses her rights by squandering her money or administering her property badly or imprudently the husband may apply to the court to have her freedom restricted.

American Law. — In the United States, the revolt against the common law theory of husband and wife was carried farther than in England, and legislation early tended in the direction of absolute equality between the sexes. Each state has, however, taken its own way and

selected its own time for introducing modifications of the existing law, so that the legislation on this subject is now exceedingly complicated and difficult. James Schouler (Law of Domestic Relations) gives an account of the general result in the different states to which reference may be made. The peculiar system of Homestead Laws in many of the states (see Homestead and Exemption Laws) constitutes an inalienable provision for the wife and family of the householder.

HUSHI (Rumanian Husi), the capital of the department of Falciu, Rumania; on a branch of the Jassy-Galatz railway, 9 m. W. of the river Pruth and the Russian frontier. Pop. (1900) 15,404, about one-fourth being Jews. Hushi is an episcopal see. The cathedral was built in 1491 by Stephen the Great of Moldavia. There are no important manufactures, but a large fair is held annually in September for the sale of live-stock, and wine is produced in considerable quantities. Hushi is said to have been founded in the 15th century by a colony of Hussites, from whom its name is derived. The treaty of the Pruth between Russia and Turkey was signed here in 1711.

HUSKISSON, WILLIAM (1770-1830), English statesman and financier, was descended from an old Staffordshire family of moderate fortune, and was born at Birch Moreton, Worcester- shire, on the nth of March 1770. Having been placed in his fourteenth year under the charge of his maternal great-uncle Dr Gem, physician to the English embassy at Paris, in 1783 he passed his early years amidst a political fermentation which led him to take a deep interest in politics. Though he approved of the French Revolution, his sympathies were with the more moderate party, and he became a member of the ” club of 1789,” instituted to support the new form of constitutional monarchy in opposition to the anarchical attempts of the Jacobins. He early displayed his mastery of the principles of finance by a Di scours delivered in August 1790 before this society, in regard to the issue of assignats by the government. The Discours gained him considerable reputation, but as it failed in its purpose he withdrew from the society. In January 1 793 he was appointed by Dundas to an office created to direct the execution of the Aliens Act; and in the discharge of his delicate duties he mani- fested such ability that in 1795 he was appointed under-secretary at war. In the following year he entered parliament as member for Morpeth, but for a considerable period he took scarcely any part in the debates. In 1800 he inherited a fortune from Dr Gem. On the retirement of Pitt in 1801 he resigned office, and after contesting Dover unsuccessfully he withdrew for a time into private life. Having in 1804 been chosen to represent Liskeard, he was on the restoration of the Pitt ministry appointed secretary of the treasury, holding office till the dissolution of the ministry after the

death of Pitt in January 1806. After being elected for Harwich in 1807, he accepted the same office under the duke of Portland, but he withdrew from the ministry along with Canning in 1809. In the following year he published a pamphlet on the currency system, which confirmed his reputation as the ablest financier of his time; but his free-trade principles did not accord with those of his party. In 1812 he was returned for Chichester. When in 1814 he re-entered the public service, it was only as chief commissioner of woods and forests, but his influence was from this time very great in the commercial and financial legislation of the country. He took a prominent part in the corn-law debates of 1814 and 1815; and in 1819 he presented a memorandum to Lord Liverpool advocating a large

reduction in the unfunded debt, and explaining a method fot the resumption of cash payments, which was embodied in the act passed the same year. In 1821 he was a member of the committee appointed to inquire into the causes of the agricultural distress then prevailing, and the proposed relaxation of the corn laws embodied in the report was understood to have been chiefly due to his strenuous advocacy. In 1823 he was appointed president of the board of trade and treasurer of the navy, and shortly afterwards he received a seat in the cabinet. In the same year he was returned for Liverpool as successor to Canning, and as the only man who could reconcile the Tory merchants to a free trade policy. Among the more important legislative changes with which he was principally connected were a reform of the Navigation Acts, admitting other nations to a full equality and reciprocity of shipping duties; the repeal of the labour laws; the introduction of a new sinking fund; the reduction of the duties on manufactures and on the importation of foreign goods, and the repeal of the quarantine duties. In accordance with his suggestion Canning in 1827 introduced a measure on the corn laws proposing the adoption of a sliding scale to regulate the amount of duty. A misapprehension between Huskisson and the duke of Wellington led to the duke proposing an amend- ment, the success of which caused the abandonment of the measure by the government. After the death of Canning in the same year Huskisson accepted the secretaryship of the colonies under Lord Goderich, an office which he continued to hold in the new cabinet formed by the duke of Wellington in the following year. After succeeding with great difficulty in inducing the cabinet to agree to a compromise on the corn laws, Huskisson finally resigned office in May 1829 on account of a difference with his colleagues in regard to the disfranchisement of East Retford. On the 1 5th of September of the following year he was accidentally killed by a locomotive engine while present at the opening of the Liverpool and

Manchester railway. See the Life of Huskisson, by J. Wright (London, 1831).

HUSS (or Hus), JOHN (c. 1373-1415), Bohemian reformer and martyr, was born at Hussinecz, 1 a market village at the foot of the Bohmerwald, and not far from the Bavarian frontier, between 1373 and 1375, the exact date being uncertain. His parents appear to have been well-to-do Czechs of the peasant class. Of his early life nothing is recorded except that, notwithstanding the early loss of his father, he obtained a good elementary education, first at Hussinecz, and afterwards at the neighbouring town of Prachaticz. At, or only a very little beyond, the usual age he entered the recently (1348) founded university of Prague, where he became bachelor of arts in 1393, bachelor of theology in 1394, and master of arts in 1396. In 1398 he was chosen by the Bohemian ” nation ” of the university to an examinership for the bachelor's degree; in the same year he began to lecture also, and there is reason to believe that the philosophical writings of Wycliffe, with which he had been for some years acquainted, were his text-books. In October 1401 he was made dean of the philosophical faculty, and for the half-yearly period from October 1402 to April 1403 he held the office of rector of the university. In 1402 also he was made rector or curate (capellarius) of the Bethlehem chapel, which had in 1391 been erected and endowed by some zealous citizens of Prague for the purpose of providing good popular preaching in the Bohemian tongue. This appoinment had a deep influence on the already vigorous religious life of Huss himself; and one of the effects of the earnest and independent study of Scripture into which it led him was a profound convictioft of the great value not only Of the philosophical but also of the theological writings of Wycliffe.

This newly-formed sympathy with the English reformer did” not, in the first instance at least, involve Huss in any conscious opposition to the established doctrines of Catholicism, or in any direct conflict with the authorities of the church; and for

1 From which the name Huss, or more properly Hus, an abbrevia- tion adopted by himself about 1396, is derived. Prior to that date he was invariably known as Johann Hussynecz, Hussinecz, Hussenicz or de Hussynecz.

several years he continued to act in full accord with his archbishop (Sbynjek, or Sbynko, of Hasenburg). Thus in 1405 he, with other two

masters, was commissioned to examine into certain reputed miracles at Wilsnack, near Wittenberg, which had caused that church to be made a resort of pilgrims from all parts of Europe. The result of their report was that all pilgrimage thither from the province of Bohemia was prohibited by the archbishop on pain of excommunication, while Huss, with the full sanction of his superior, gave to the world his first published writing, entitled De Omni Sanguine Christi Glorificato, in which he declaimed in no measured terms against forged miracles and ecclesiastical greed, urging Christians at the same time to desist from looking for sensible signs of Christ's presence, but rather to seek Him in His enduring word. More than once also Huss, together with his friend Stanislaus of Znaim, was appointed to be synod preacher, and in this capacity he delivered at the provincial councils of Bohemia many faithful admonitions. As early as the 28th of May r403, it is true, there had been held a university disputation about the new doctrines of Wycliffe, which had resulted in the condemnation of certain propositions presumed to be his; five years later (May 20, 1408) this decision had been refined into a declaration that these, forty-five in number, were not to be taught in any heretical, erroneous or offensive sense. But it was only slowly that the growing sympathy of Huss with Wycliffe unfavourably affected his relations with his colleagues in the priesthood. In 1408, however, the clergy of the city and archiepiscopal diocese of Prague laid before the archbishop a formal complaint against Huss, arising out of strong expressions with regard to clerical abuses of which he had made use in his public discourses; and the result was that, having been first deprived of his appointment as synodal preacher, he was, after a vain attempt to defend himself in writing, publicly forbidden the exercise of any priestly function throughout the diocese. Simultaneously with these proceedings in Bohemia, negotiations had been going on for the removal of the long-continued papal schism, and it had become apparent that a satisfactory solution could only be secured if, as seemed not impossible, the supporters of the rival popes, Benedict XIII. and Gregory XII., could be induced, in view of the approaching council of Pisa, to pledge themselves to a strict neutrality. With this end King Wenceslaus of Bohemia had requested the co-operation of the archbishop and his clergy, and also the support of the university, in both instances unsuccessfully, although in the case of the latter the Bohemian " nation," with Huss at its head, had only been overborne by the votes of the Bavarians, Saxons and Poles. There followed an expression of nationalist and particularistic as opposed to ultramontane and also to German feeling, which undoubtedly was of supreme importance for the whole of the subsequent career of Huss. In compliance with this feeling a royal edict (January 18, 1409) was

issued, by which, in alleged conformity with Paris usage, and with the original charter of the university, the Bohemian ” nation ” received three votes, while only one was allotted to the other three ” nations ” combined; whereupon all the foreigners, to the number of several thousands, almost im mediately withdrew from Prague, an occurrence which led to the formation shortly afterwards of the university of Leipzig.

It was a dangerous triumph for Huss; for his popularity at court and in the general community had been secured only at the price of clerical antipathy everywhere and of much German ill-will. Among the first results of the changed order of things were on the one hand the election of Huss (October 1400”) to be again rector of the university, but on the other hand the appoint- ment by the archbishop of an inquisitor to inquire into charges of heretical teaching and inflammatory preaching brought against him. He had spoken disrespectfully of the church, it was said, had even hinted that Antichrist might be found to be in Rome, had fomented in his preaching the quarrel between Bohemians and Germans, and had, notwithstanding all that had passed, continued to speak of Wycliffe as both a pious man and an orthodox teacher. The direct result of this investigation is not known, but it is impossible to disconnect from it the

promulgation by Pope Alexander V., on the 20th of December 1409, of a bull which ordered the abjuration of all Wycliffite heresies and the surrender of all his books, while at the same time — a measure specially levelled at the pulpit of Bethlehem chapel — all preaching was prohibited except in localities which’ had been by long usage set apart for that use. This decree, as soon as it was published in Prague (March 9, 1410), led to much popular agitation, and provoked an appeal by Huss to the pope’s better informed judgment; the archbishop, however, resolutely insisted on carrying out his instructions, and in the following July caused to be publicly burned, in the courtyard of his own palace, upwards of 200 volumes of. the writings of Wycliffe, while he pronounced solemn sentence of excommunica- tion against Huss and certain of his friends, who had in the meantime again protested and appealed to the new pope (John XXIII.). Again the populace rose on behalf of their hero, who, in his turn, strong in the conscientious conviction that ” in the things which pertain to salvation God is to be obeyed rather than man,” continued uninterruptedly to preach in the Bethlehem chapel, and in the university began publicly to defend the so- called heretical treatises of Wycliffe, while from king and queen, nobles and burghers, a petition was sent to Rome praying that the condemnation and prohibition in

the bull of Alexander V. might be quashed. Negotiations were carried on for some months, but in vain; in March 141 1 the ban was anew pronounced upon Huss as a disobedient son of the church, while the magistrates and councillors of Prague who had favoured him were threatened with a similar penalty in case of their giving him a contumacious support. Ultimately the whole city, which continued to harbour him, was laid under interdict; yet he went on preaching, and masses were celebrated as usual, so that at the date of Archbishop Sbynko's death in September 141 1, it seemed as if the efforts of ecclesiastical authority had resulted in absolute failure.

The struggle, however, entered on a new phase with the appearance at Prague in May 141 2 of the papal emissary charged with the proclamation of the papal bulls by which a religious war was decreed against the excommunicated King Ladislaus of Naples, and indulgence was promised to all who should take part in it, on terms similar to those which had been enjoyed by the earlier crusaders to the Holy Land. By his bold and thorough-going opposition to this mode of procedure against Ladislaus, and still more by his doctrine that indulgence could never be sold without simony, and could not be lawfully granted by the church except on condition of genuine contrition and repentance, Huss at last isolated himself, not only from the archiepiscopal party under Albik of Unitschow, but also from the theological faculty of the university, and especially from such men as Stanislaus of Znaim and Stephen Paletz, who until then had been his chief supporters. A popular demonstration, in which the papal bulls had been paraded through the streets with circumstances of peculiar ignominy and finally burnt, led to intervention by Wenceslaus on behalf of public order; three young men, for having openly asserted the unlawfulness of the papal indulgence after silence had been enjoined, were sentenced to death (June 141 2); the excommunication against Huss was renewed, and the interdict again laid on all places which should give him shelter — a measure which now began to be more strictly regarded by the clergy, so that in the following December Huss had no alternative but to yield to the express wish of the king by temporarily withdrawing from Prague. A provincial synod, held at the instance of Wenceslaus in February 1413, broke up without having reached any practical result;" and a commission appointed shortly afterwards also failed to bring about a reconciliation between Huss and his adversaries. The so-called heretic meanwhile spent his time partly at Kozihradek, some 45 m. south of Prague, and partly at Krakowitz in the immediate neighbourhood of the capital, occasionally giving a course of open-air preaching, but finding his chief employment in maintaining that copious correspondence of

which some precious fragments still are extant, and in the composition of the treatise, De Ecclesia, which subsequently furnished most of the material for the capital charges brought

against him, and was formerly considered the most important of his works, though it is mainly a transcript of Wycliffe's work of the same name.

During the year 1413 the arrangements for the meeting of a general council at Constance were agreed upon between Sigismund and Pope John XXIII. The objects originally contemplated had been the restoration of the unity of the church and its reform in head and members; but so great had become the prominence of Bohemian affairs that to these also a first place in the programme of the approaching oecumenical assembly required to be assigned, and for their satisfactory settlement the presence of Huss was necessary. His attendance was ac- cordingly requested, and the invitation was willingly accepted as giving him a long-wished-for opportunity both of publicly vindicating himself from charges which he felt to be grievous, and of loyally making confession for Christ. He set out from Bohemia on the 14th of October 1414, not, however, until he had carefully ordered all his private affairs, with a presentiment, which he did not conceal, that in all probability he was going to his death. The journey, which appears to have been under- taken with the usual passport, and under the protection of several powerful Bohemian friends (John of Chlum, Wenceslaus of Duba, Henry of Chlum) who accompanied him, was a very prosperous one; and at almost all the halting-places he was received with a consideration and enthusiastic sympathy which he had hardly expected to meet with anywhere in Germany. On the 3rd of November he arrived at Constance; shortly after- wards there was put into his hands the famous imperial " safe conduct," the promise of which had been one of his inducements to quit the comparative security he had enjoyed in Bohemia. This safe conduct, which had been frequently printed, stated that Huss should, whatever judgment might be passed on him, be allowed to return freely to Bohemia. This by no means provided for his immunity from punishment. If faith to him had not been broken he would have been sent back to Bohemia to be punished by his sovereign, the king of Bohemia. The treachery of King Sigismund is undeniable, and was indeed admitted by the king himself. The safe conduct was probably indeed given by him to entice Huss to Constance. On the 4th of December the pope appointed a commission of three bishops to investigate the case against the heretic, and to procure witnesses; to the demand of Huss that he

might be permitted to employ an agent in his defence a favourable answer was at first given, but afterwards even this concession to the forms of justice was denied. While the commission was engaged in the prosecution of its enquiries, the flight of Pope John XXIII. took place on the 20th of March, an event which furnished a pretext for the removal of Huss from the Dominican convent to a more secure and more severe place of confinement under the charge of the bishop of Constance at Gottlieben on the Rhine. On the 4th of May the temper of the council on the doctrinal questions in dispute was fully revealed in its unanimous condemnation of Wycliffe, especially of the so-called ” forty-five articles ” as erroneous, heretical, revolutionary. It was not, however, until the 5th of June that the case of Huss came up for hearing; the meeting, which was an exceptionally full one, took place in the refectory of the Franciscan cloister. Autograph copies of his work De Ecclesia and of the controversial tracts which he had written against Paletz and Stanislaus of Znaim having been acknowledged by him, the extracted propositions on which the prosecution based their charge of heresy were read; but as soon as the accused began to enter upon his defence, he was assailed by violent outcries, amidst which it was impossible for him to be heard, so that he was compelled to bring his speech to an abrupt close, which he did with the calm remark: ” In such a council as this I had expected to find more propriety, piety and order.” It was found necessary to adjourn the sitting until the 7th of June, on which occasion the outward decencies were better observed, partly no doubt from the circum- stance that Sigismund was present in person. The propositions which had been extracted from the De Ecclesia were again brought up, and the relations between Wycliffe and Huss were discussed,

the object of the prosecution being to fasten upon the latter the charge of having entirely adopted the doctrinal system of the former, including especially a denial of the doctrine of transub- stantiation. The accused repudiated the charge of having abandoned the Catholic doctrine, while expressing hearty admiration and respect for the memory of Wycliffe. Being next asRed to make an unqualified submission to the council, he expressed himself as unable to do so, while stating his willing- ness to amend his teaching wherever it had been shown to be false. With this the proceedings of the day were brought to a close. On the 8th of June the propositions extracted from the De Ecclesia were again taken up with some fulness of detail; some of these he repudiated as incorrectly given, others he defended; but when asked to make a general recantation he steadfastly declined, on the ground that to do so would be a dishonest admission of previous guilt. Among the propositions he could heartily abjure was that

relating to transubstantiation ; among those he felt constrained unflinchingly to maintain was one which had given great offence, to the effect that Christ, not Peter, is the head of the church to whom ultimate appeal must be made. The council, however, showed itself inaccessible to all his arguments and explanations, and its final resolution, as announced by Pierre d'Ailly, was threefold: first, that Huss should humbly declare that he had erred in all the articles cited against him; secondly, that he should promise on oath neither to hold nor teach them in the future; thirdly, that he should publicly recant them. On his declining to make this submission he was removed from the bar. Sigismund himself gave it as his opinion that it had been clearly proved by many witnesses that the accused had taught many pernicious heresies, and that even should he recant he ought never to be allowed to preach or teach again or to return to Bohemia, but that should he refuse recantation there was no remedy but the stake. During the next four weeks no effort was spared to shake the determination of Huss; but he steadfastly refused to swerve from the path which conscience had once made clear. " I write this," says he, in a letter to his friends at Prague, " in prison and in chains, expecting to-morrow to receive sentence of death, full of hope in God that I shall not swerve from the truth, nor abjure errors imputed to me by false witnesses." The sentence he expected was pronounced on the 6th of July in the presence of Sigismund and a full sitting of the council; once and again he attempted to remonstrate, but in vain, and finally he betook himself to silent prayer. After he had under- gone the ceremony of degradation with all the childish formalities usual on such occasions, his soul was formally consigned by aE those present to the devil, while he himself with clasped hands and uplifted eyes reverently committed it to Christ. He was then handed over to the secular arm, and immediately led to the place of execution, the council meanwhile proceeding uncon- cernedly with the rest of its business for the day. Many incidents recorded in the histories make manifest the meek- ness, fortitude and even cheerfulness with which he went to his death. After he had been tied to the stake and the faggots had been piled, he was for the last time urged to recant, but his only reply was: " God is my witness that I have never taught or preached that which false witnesses have testified against me. He knows that the great object of all my preaching and writing was to convert men from sin. In the truth of that gospel which hitherto I have written, taught and preached, I now joyfully die." The fire was then kindled, and his voice as it audibly prayed in the words of the " Kyrie Eleison " was soon stifled in the smoke. When the flames had done their office, the ashes that were left and even the soil on which they lay were carefully removed and thrown into the Rhine.

Not many words are needed to convey a tolerably adequate estimate of the character and work of the ” pale thin man in mean attire,” who in sickness and poverty thus completed the forty-sixth year of a busy life at the stake. The value of Huss as a scholar was formerly underrated. The publication of his Super IV. Sententiarum has proved that he was a man of profound learning. Yet his principal glory will always be founded on his

spiritual teaching. It might not be easy to formulate precisely the doctrines for which he died, and certainly some of them, as, for example, that regarding the church, were such as many Protestants even would regard as unguarded and difficult to harmonize with the maintenance of external church order; but his is undoubtedly the honour of having been the chief inter- mediary in handing on from Wycliffe to Luther the torch which kindled the Reformation, and of having been one of the bravest oi the martyrs who have died in the cause of honesty and freedom, of progress and of growth towards the light. (J. S. Bl.)

The works of Huss are usually classed under four heads: the dogmatical and polemical, the homiletical, the exegetical and the epistolary. In the earlier editions of his works sufficient care was not taken to distinguish between his own writings and those of Wycliffe and others who were associated with him. In connexion with his sermons it is worthy of note that by means of them and by his public teaching generally Huss exercised a considerable influence not only on the religious life of his time, but on the literary develop- ment of his native tongue. The earliest collected edition of his works, Historia et monumenta Joannis Hus et Hieronymi Pragensis, was published at Nuremberg in 1558 and was reprinted with a con- siderable quantity of new matter at Frankfort in 1715. A Bohemian edition of the works has been edited by K. J. Erben (Prague, 1865- 1868), and the Documenta J. Hus vitain, doctrinam, causam in Constantiensi concilio (1869), edited by F. Palacky, is very valuable. More recently Joannis Hus. Opera omnia have been edited by W. Flojshaus (Prague, 1904 fob). The De Ecclesia was published by Ulnch von Hutten in 1520; other controversial writings by Otto Brumfels in 1524; and Luther wrote an interesting preface to Epistolae Quaedam, which were published in 1537. These Epistolae have been translated into French by E. de Bonnechose (1846), and the letters written during his imprisonment have been edited by C. von Kugelgen (Leipzig, 1902).

The best and most easily accessible information for the English reader

on Huss is found in J. A. W. Neander's Allgemeine Geschichte der chrisllichen Religion und Kirche, translated by J. Torrey (1850- 1858) ; in G. von Lechler's Wiclif und die V or geschichte der Reforma- tion, translated by P. Lorimer (1878); in H. H. Milman's History of Latin Christianity, vol. viii. (1867) ; and in M. Creighton's History of the Papacy (1897). Among the earlier authorities is the Historia Bohemica of Aeneas Sylvius (1475). The Acta of the council of Constance (published by P. Labbe in his Concilia, vol. xvi., 1731 ; by H. von der Haardt in his Magnum Constantiense concilium, vol. vi., 1700; and by H. Finke in his Acta concilii Constantiensis, 1896); and J. Lenfant's Histoire de la guerre des Hussites (1731) and the same writer's Histoire du concile de Constance (1714) should be consulted. F. Palacky's Geschichte Bohmens (1864-1867) is also very useful. Monographs on Huss are very numerous. Among them may be mentioned J. A. von Helfert, Studien ilber Hus und Hieronymus (1853; this work is ultramontane in its sympathies) ; C. von Hofier, H us und der A bzug der deutsclien Professoren und Studenten aus Prag (1864); YV. Berger, Johannes Hus und Kbnig Sigmund (1871); E. Denis, Huss et la guerre des Hussites (1878); P. Uhlmann, Konig Sigmunds Geleit fur Hus (1894); J. Loserth, Hus und Wiclif (1884), translated into English by M. J. Evans (1884); A. Jeep, Gerson, Wiclefus, Hussus, inter se comparati (1857); and G. von Lechler, Johannes Hus (1889). See also Count Liitzow, The Life and Times of John Hus (London, 1909).

HUSSAR, originally the name of a soldier belonging to a corps of light horse raised by Matthias Corvinus, king of Hungary, in 1458, to fight against the Turks. The Magyar huszar, from which the word is derived, was formerly connected with the Magyar husz, twenty, and was explained by a supposed raising of the troops by the taking of each twentieth man. According to the New English Dictionary the word is an adaptation of the Italian corsaro, corsair, a robber, and is found in 15th-century documents coupled with praedones. The hussar was the typical Hungarian cavalry soldier, and, in the absence of good light cavalry in the regular armies of central and western Europe, the name and character of the hussars gradually spread into Prussia, France, &c. Frederick the Great sent Major H. J. von Zieten to study the work of this type of cavalry in the Austrian service, and Zieten so far improved on the Austrian model that he defeated his old teacher, General Baranyai, in an encounter between the Prussian and Austrian hussars at Rothschloss in 1 741. The typical uniform of the Hungarian hussar was followed with modifications in other European armies. It consisted of a busby or a high cylindrical cloth cap, jacket with heavy braiding, and a dolman or pelisse, a loose coat worn hanging from the

left shoulder. The hussar regiments of the British army were converted from light dragoons at the following dates:

7th (1805), 10th and 15th (1806), 18th (1807, and again on revival after disbandment, 1858), 8th (1822), nth (1840), 20th (late 2nd Bengal European Cavalry) (i860), 13th, 14th, and 19th (late 1st Bengal European Cavalry) (1861). The 21st Lancers were hussars from 1862 to 1897.

HUSSITES, the name given to the followers of John Huss (1369-1415), the Bohemian reformer. They were at first often called Wycliffites, as the theological theories of Huss were largely founded on the teachings of Wycliffe. Huss indeed laid more stress on church reform than on theological controversy. On such matters he always writes as a disciple of Wycliffe. The Hussite movement may be said to have sprung from three sources, which are however closely connected. Bohemia, which had first received Christianity from the East, was from geo- graphical and other causes long but very loosely connected with the Church of Rome. The connexion became closer at the time when the schism with its violent controversies between the rival pontiffs, waged with the coarse invective customary to medieval theologians, had brought great discredit on the papacy. The terrible rapacity of its representatives in Bohemia, which increased in proportion as it became more difficult to obtain money from western countries such as England and France, caused general indignation; and this was still further intensified by the gross immorality of the Roman priests. The Hussite movement was also a democratic one, an uprising of the peasantry against the landowners at a period when a third of the soil belonged to the clergy. Finally national enthusiasm for the Slavic race contributed largely to its importance. The towns, in most cases creations of the rulers of Bohemia who had called in German immigrants, were, with the exception of the ” new town ” of Prague, mainly German; and in consequence of the regulations of the university, Germans also held almost all the more important ecclesiastical offices — a condition of things greatly resented by the natives of Bohemia, which at this period had reached a high degree of intellectual development.

The Hussite movement assumed a revolutionary character as soon as the news of the death of Huss reached Prague. The knights and nobles of Bohemia and Moravia, who were in favour of church reform, sent to the council at Constance (September 2nd, 141 5) a protest, known as the ” protestatio Bohemorum ” which condemned the execution of Huss in the strongest language. The attitude of Sigismund, king of the Romans, who sent threatening letters to Bohemia declaring that he

would shortly ” drown all Wycliffites and Hussites,” greatly incensed the people. Troubles broke out in various parts of Bohemia, and many Romanist priests were driven from their parishes. Almost from the first the Hussites were divided into two sections, though many minor divisions also arose among them. Shortly before his death Huss had accepted a doctrine preached during his absence by his adherents at Prague, namely that of ” utraquism,” i.e. the obligation of the faithful to receive communion in both kinds (sub ulraque specie). This doctrine became the watchword of the moderate Hussites who were known as the Utraquists or Calixtines (caiix, the chalice), in Bohemian, podoboji ; while the more advanced Hussites were soon known as the Taborites, from the city of Tabor that became their centre.

Under the influence of his brother Sigismund, king of the Romans, King Wenceslaus endeavoured to stem the Hussite movement. A certain number of Hussites lead by Nicolas of Hus — no relation of John Huss — left Prague. They held meetings in various parts of Bohemia, particularly at Usti, near the spot where the town of Tabor was founded soon afterwards. “At these meetings Sigismund was violently denounced, and the people everywhere prepared for war. In spite of the departure of many prominent Hussites the troubles at Prague continued. On the 30th of July 1419, when a Hussite procession headed by the priest John of Zelivo (in Ger. Selau) marched through the streets of Prague, stones were thrown at the Hussites from the windows of the town-hall of the ” new town.” The people, headed by John 2izka (1376-1424), threw the burgomaster and several town-councillors, who were the instigators of this outrage, from the windows and they were immediately killed by the

crowd. On hearing this news King Wenceslaus was seized with an apoplectic fit, and died a few days afterwards. The death of the king resulted in renewed troubles in Prague and in almost all parts of Bohemia. Many Romanists, mostly Germans — for they had almost all remained faithful to the papal cause — were expelled from the Bohemian cities. In Prague, in November 14 1 9, severe fighting took place between the Hussites and the mercenaries whom Queen Sophia (widow of Wenceslaus and regent after the death of her husband) had hurriedly collected. After a considerable part of the city had been destroyed a truce was concluded on the 13th of November. The nobles, who though favourable to the Hussite cause yet supported the

regent, promised to act as mediators with Sigismund; while the citizens of Prague consented to restore to the royal forces the castle of Vysehrad, which had fallen into their hands. Zizka, who disapproved of this compromise, left Prague and retired to Plzen (Pilsen). Unable to maintain himself there he marched to southern Bohemia, and after defeating the Romanists at Sudomef — the first pitched battle of the Hussite wars — he arrived at Usti, one of the earliest meeting-places of the Hussites. Not considering its situation sufficiently strong, he moved to the neighbouring new settlement of the Hussites, to which the biblical name of Tabor was given. Tabor soon became the centre of the advanced Hussites, who differed from the Utraquists by recognizing only two sacraments — Baptism and Communion — and by rejecting most of the ceremonial of the Roman Church. The ecclesiastical organization of Tabor had a somewhat puritanic character, and the government was established on a thoroughly democratic basis. Four captains of the people (hejtmane) were elected, one of whom was Zizka; and a very strictly military discipline was instituted.

Sigismund, king of the Romans, had, by the death of his brother Wenceslaus without issue, acquired a claim on the Bohemian crown; though it was then, and remained till much later, doubtful whether Bohemia was an hereditary or an elective monarchy. A firm adherent of the Church of Rome, Sigismund was successful in obtaining aid from the pope. Martin V. issued a bull on the 17th of March 1420 which proclaimed a crusade ” for the destruction of the WyclifBtes, Hussites and all other heretics in Bohemia.” The vast army of crusaders, with which were Sigismund and many German princes, and which consisted of adventurers attracted by the hope of pillage from all parts of Europe, arrived before Prague on the 30th of June and immediately began the siege of the city, which had, however, soon to be abandoned (see Zizka, John). Negotiations took place for a settlement of the religious differences. The united Hussites formulated their demands in a statement known as the ” articles of Prague.” This document, the most important of the Hussite period, runs thus in the wording of the con- temporary chronicler, Laurence of Brezova: —

I. The word of God shall be preached and made known in the kingdom of Bohemia freely and in an orderly manner by the priests of the Lord. . . .

II. The sacrament of the most Holy Eucharist shall be freely administered in the two kinds, that is bread and wine, to all the faithful in Christ who are not precluded by mortal sin — according to the word and disposition of Our Saviour.

III. The secular power over riches and worldly goods which the clergy possesses in contradiction to Christ's precept, to the prejudice of its office and to the detriment of the secular arm, shall be taken and withdrawn from it, and the clergy itself shall be brought back to the evangelical rule and an apostolic life such as that which Christ and his apostles led. . . .

IV. All mortal sins, and in particular all public and other dis- orders, which are contrary to God's law. shall in every rank of life be duly and judiciously prohibited and destroyed by those whose office it is.

These articles, which contain the essence of the Hussite doctrine, were rejected by Sigismund, mainly through the influence of the papal legates, who considered them prejudicial to the authority of the Roman see. Hostilities therefore continued. Though Sigismund had retired from Prague, the castles of Vysehrad and Hradcany remained in possession of his troops. The citizens of Prague laid siege to the Vysehrad, and towards

the end of October (1420) the garrison was on the point of capitulating through famine. Sigismund attempted to relieve the fortress, but was decisively defeated by the Hussites on the 1st of November near the village of Pankrac. The castles of Vysehrad and Hradcany now capitulated, and shortly after- wards almost all Bohemia fell into the hands of the Hussites. Internal troubles prevented them from availing themselves completely of their victory. At Prague a demagogue, the priest John of Zelivo, for a time obtained almost unlimited authority over the lower classes of the townsmen; and at Tabor a communistic movement (that of the so-called Adamites) was sternly suppressed by Zizka. Shortly afterwards a new crusade against the Hussites was undertaken. A large German army entered Bohemia, and in August 142 1 laid siege to the town of Zatec (Saaz). The crusaders hoped to be joined in Bohemia by King Sigismund, but that prince was detained in Hungary. After an unsuccessful attempt to storm Zatec the crusaders retreated somewhat ingloriously, on hearing that the Hussite troops were approaching. Sigismund only arrived in Bohemia at the end of the year 142 1. He took possession of the town of Kutna Hora (Kuttenberg), but was decisively defeated by Zizka at Nemecky Brod (Deutschbrod) on the 6th of January 1422. Bohemia was now again for a time free from foreign intervention, but internal discord again broke out caused partly by theological strife, partly by the ambition of agitators. John of Zelivo was on the 9th of March 1422 arrested by the town council of Prague and decapitated. There were troubles at Tabor also, where a more advanced party opposed Zizka's authority. Bohemia obtained a

temporary respite when, in 1422, Prince Sigismund Korybutovic of Poland became for a short time ruler of the country. His authority was recognized by the Utraquist nobles, the citizens of Prague, and the more moderate Taborites, including Zizka. Korybutovic, however, remained but a short time in Bohemia; after his departure civil war broke out, the Taborites opposing in arms the more moderate Utraquists, who at this period are also called by the chroniclers the " Praguers," as Prague was their principal stronghold. On the 27th of April 1423, Zizka now again leading, the Taborites defeated at Horic the Utraquist army under Cenek of Wartemberg; shortly afterwards an armistice was concluded at Konopist.

Papal influence had meanwhile succeeded in calling forth a new crusade against Bohemia, but it resulted in complete failure. In spite of the endeavours of their rulers, the Slavs of Poland and Lithuania did not wish to attack the kindred Bohemians; the Germans were prevented by internal discord from taking joint action against the Hussites; and the king of Denmark, who had landed in Germany with a large force intending to take part in the crusade, soon returned to his own country. Free for a time from foreign aggression, the Hussites invaded Moravia, where a large part of the population favoured their creed; but, again paralysed by dissensions, soon returned to Bohemia. The city of Koniggratz (Kralove Hradec), which had been under Utraquist rule, espoused the doctrine of Tabor, and called Zizka to its aid. After several military successes gained by Zizka (q.v.) in 1423 and the following year, a treaty of peace between the Hussites was concluded on the 13 th of September 1424 at Liben, a village near Prague, now part of that city.

In 1426 the Hussites were again attacked by foreign enemies. In June of that year their forces, led by Prokop the Great— who took the command of the Taborites shortly after Zizka's death in October 1424 — and Sigismund Korybutovic, who had returned to Bohemia, signally defeated the Germans at Aussig (Usti nad Labem). After this great victory, and another at Tachau in 1427, the Hussites repeatedly invaded Germany, though they made no attempt to occupy permanently any part of the country.

The almost uninterrupted series of victories of the Hussites now rendered vain all hope of subduing them by force of arms. Moreover, the conspicuously democratic character of the Hussite movement caused the German princes, who were afraid that

such views might extend to their own countries, to desire peace. Many Hussites, particularly the Utraquist clergy, were also in favour of peace. Negotiations for this purpose were to take place at the oecumenical council which had been summoned to meet at Basel on the 3rd of March 1431. The Roman see re- luctantly consented to the presence of heretics at this council, but indignantly rejected the suggestion of the Hussites that members of the Greek Church, and representatives of all Christian creeds, should also be present. Before definitely giving its consent to peace negotiations, the Roman Church determined on making a last effort to reduce the Hussites to subjection. On the 1st of August 143 1 a large army of crusaders, under Frederick, margrave of Brandenburg, whom Cardinal Cesarini accompanied as papal legate, crossed the Bohemian frontier; on the 14th of August it reached the town of Domazlice (Tauss); but on the arrival of the Hussite army under Prokop the crusaders immediately took to flight, almost without offering resistance.

On the 15th of October the members of the a uncil, who had already assembled at Basel, issued a formal invitation to the Hussites to take part ir4 its deliberations. Prolonged negotiations ensued; but finally a Hussite embassy, led oy Prokop and including John of Rokycan, the Taborite bishop Nicolas of Pelhfimov, the ” English Hussite,” Peter Payne and many others, arrived at Basel on the 4th of January 1433. It was found impossible to arrive at an agreement. Negotiations were not, however, broken off; and a change in the political situation of Bohemia finally resulted in a settlement. In 1434 war again broke out between the Utraquists and the Taborites. On the 30th of May of that year the Taborite army, led by Prokop the Great and Prokop the Less, who both fell in the battle, was totally defeated and almost annihilated at Lipan. The moderate party thus obtained the upper hand; and it formulated its demands in a document which was finally accepted by the Church of Rome in a slightly modified form, and which is known as ” the compacts.” The compacts, mainly founded on the articles of Prague, declare that: —

1. The Holy Sacrament is to be given freely in both kinds to all Christians in Bohemia and Moravia, and to those elsewhere who

adhere to the faith of these two countries.

2. All mortal sins shall be punished and extirpated by those whose office it is so to do.

3. The word of God is to be freely and truthfully preached by the priests of the Lord, and by worthy deacons.

4. The priests in the time of the law of grace shall claim no ownership of worldly possessions.

On the 5th of July 1436 the compacts were formally accepted and signed at Iglau, in Moravia, by King Sigismund, by the Hussite delegates, and by the representatives of the Roman Church. The last-named, however, refused to recognize as archbishop of Prague, John of Rokycan, who had been elected to that dignity by the estates of Bohemia. The Utraquist creed, frequently varying in its details, continued to be that of the established church of Bohemia till all non-Roman religious services were prohibited shortly after the battle of the White Mountain in 1620. The .Taborite party never recovered from its defeat at Lipan, and after the town of Tabor had been captured by George of Podebrad in 1452 Utraquist religious worship was established there. The Bohemian brethren, whose intellectual originator was Peter Cheldcky, but whose actual founders were Brother Gregory, a nephew of Archbishop Rokycan, and Michael, curate of Zamberk, to a certain extent continued the Taborite traditions, and in the 15th and 16th centuries included most of the strongest opponents of Rome in Bohemia. J. A. Komensky (Comenius), a member of the brotherhood, claimed for the members of his church that they were the genuine inheritors of the doctrines of Hus. After the beginning of the German Reformation many Utraquists adopted to a large extent the doctrines of Luther and Calvin; and in 1567 obtained the repeal of the compacts, which no longer seemed sufficiently far-reaching. From the end of the 16th century the inheritors of the Hussite tradition in Bohemia were included in the more general name of ” Protestants ” borne by the adherents of the Reformation.

All histories of Bohemia devote a large amount of space to the Hussite movement. See Count Ltitzow, Bohemia; an Historical Sketch (London, 1896); Palacky, Geschichte von Bbhmen; Bach- mann, Geschichte Bbhmens; L. Krummel, Geschichte der bbhmischen Reformation (Gotha, 1866) and Vtraquisten und Taboriten (Gotha, 1 871); Ernest Denis, Huss et la guerre des Hussites (Paris, 1878); H. Toman, Husitske Vdlecnictvi (Prague, 1898). (L.)

HUSTING (O. Eng. husting, from Old Norwegian husthing), the ” thing ” or ” ting,” i.e. assembly, of the household of personal followers or retainers of a king, earl or chief, contrasted with the ” folkmoot,” the assembly of the whole people. “Thing” meant an inanimate object, the ordinary meaning at the present day, also a cause or suit, and an assembly; a similar develop- ment of meaning is found in the Latin res. The word still appears in the names of the legislative assemblies of Norway, the Storthing and of Iceland, the Althing. ” Husting,” or more usually in the plural ” hustings,” was the name of a court of the city of London. This court was formerly the county court for the city and was held before the lord mayor, the sheriffs and aldermen, for pleas of land, common pleas and appeals from the sheriffs. It had probate jurisdiction and wills were registered. All this jurisdiction has long been obsolete, but the court still sits occasionally for registering gifts made to the city. The charter of Canute (1032) contains a reference to ” hustings ” weights, which points to the early establishment of the court. It is doubtful whether courts of this name were held in other towns, but John Cowell (1554-1611) in his Inter- preter (1601) s.v., “Hustings,” says that according to Fleta there were such courts at Winchester, York, Lincoln, Sheppey and elsewhere, but the passage from Fleta, as the New English Dictionary points out, does not necessarily imply this (n. lv. Habet etiam Rex curiam in civitatibus . . . et in locis . . . sicut in Hustingis London, Winton, cVc). The ordinary use of ” hustings ” at the present day for the platform from which a candidate sDeaks at a parliamentary or other election, or more widely for a political candidate’s election campaign, is derived from the application of the word, first to the platform in the Guildhall on which the London court was held, and next to that from which the public nomination of candidates for a parliamentary election was formerly made, and from which the candidate addressed the electors. The Ballot Act of 1872 did away with this public declaration of the nomination.

HUSUM, a town in the Prussian province of Schleswig-Holstein, in a fertile district 23 m. inland from the North Sea, on the canalized Husumer Au, which forms its harbour and roadstead, 99 m. N.W. from Hamburg on a branch line from Tonning. Pop. (1900) 8268. It has steam communication with the North Frisian Islands (Nordstrand, Fohr and Sylt), and is a port for the cattle trade with England. Besides a ducal palace and park, it possesses an Evangelical church and a gymnasium. Cattle markets are held weekly, and in them, as also in cereals, a lively export trade is done. There are also extensive oyster fisheries, the property of the state, the yield during the season being very considerable. Husum is the birthplace of Johann Georg

Forchhammer (1794-ˆ65), the mineralogist, Peter Wilhelm Forchhammer (1801-1894), the archaeologist, and Theodore Storm (1817-1888), the poet, to the last of whom a monument has been erected here.

Husum is first mentioned in 1252, and its first church was built in 1431. Wisby rights were granted it in 1582, and in 1603 it received municipal privileges from the duke of Holstein. It suffered greatly from inundations in 1634 and 171 7.

See Christiansen, Die Geschichte Husums (Husum, 1903) ;. and Henningsen, Das Stiftungsbuch der Stadt Husum (Husum, 1904). ~*

HUTCHESON, FRANCIS (1694-1746), English philosopher, was born on the 8th of August 1694. His birthplace was probably the townland of Drumalig, in the parish of Saintfield and county of Down, Ireland. 1 Though the family had sprung from Ayrshire, in Scotland, both his father and grandfather were ministers of dissenting congregations in the north of Ireland. Hutcheson was educated partly by his grandfather, partly at an academy, where according to his biographer, Dr Leechman, he was taught 1 See Belfast Magazine for August 1813.

” the ordinary scholastic philosophy which was in vogue in those days.” In 1710 he entered the university of Glasgow, where he spent six years, at first in the study of philosophy, classics and general literature, and afterwards in the study of theology. On quitting the university, he returned to the north of Ireland, and received a licence to preach. When, however, he was about to enter upon the pastorate of a small dissenting congregation he changed his plans on the advice of a friend and opened a private academy in Dublin. In Dublin his literary attainments gained him the friendship of many prominent inhabitants. Among these was Archbishop King (author of the De arigine mall), who resisted all attempts to prosecute Hutcheson in the archbishop’s court for keeping a school without the episcopal licence. Hutcheson’s relations with the clergy of the Established Church, especially with the archbishops of Armagh and Dublin, Hugh Boulter (1672-1742) and William King (1650-1729), seem to have been most cordial, and his biographer, in speaking of ” the inclination of his friends to serve him, the schemes proposed to him for obtaining pro-motion,” &c, probably refers to some offers of preferment, on condition of his accepting episcopal ordination. These offers, however,

were unavailing.

While residing in Dublin, Hutcheson published anonymously the four essays by which he is best known, namely, the Inquiry concerning Beauty, Order, Harmony and. Design, the Inquiry con- cerning Moral Good and Evil, in 1725, the Essay on the Nature and Conduct of the Passions and AJfections and Illustrations upon the Moral Sense, in 1728. The alterations and additions made in the second edition of these Essays were published in a separate form in 1726. To the period of his Dublin residence are also to be referred the Thoughts on Laughter (a criticism of Hobbes) and the Observations on the Fable of the Bees, being in all six letters contributed to Hibernicus' Letters, a periodical which appeared in Dublin (1725-1727, 2nd ed. 1734). Attheend of the same period occurred the controversy in the London Journal with Gilbert Burnet (probably the second son of Dr Gilbert Burnet, bishop of Salisbury); on the " True Foundation of Virtue or Moral Goodness." All these letters were collected in one volume (Glasgow, 1772).

In 1729 Hutcheson succeeded his old master, Gershom Carmichael, in the chair of moral philosophy in the university of Glasgow. It is curious that up to this time all his essays and letters had been published anonymously, though their authorship appears to have been well known. In 1730 he entered on the duties of his office, delivering an inaugural lecture (afterwards published), De naturali hominum socialitate. It was a great relief to him after the drudgery of school work to secure leisure for his favourite studies; " non levi igitur laetitia commovebar cum almam matrem Academiam me, suum olim alumnum, in libertatem asseruisse audiveram." Yet the works on which Hutcheson's reputation rests had already been published.

The remainder of his life he devoted to his professorial duties. His reputation as a teacher attracted many young men, belonging to dissenting families, from England and Ireland, and he enjoyed a well-deserved popularity among both his pupils and his colleagues. Though somewhat quick-tempered, he was remarkable for his warm feelings and generous impulses. He was accused in 1738 before the Glasgow presbytery for " following two false and dangerous doctrines: first, that the standard of moral goodness was the promotion of the happiness of others; and second, that we could have a knowledge of good and evil without and prior to a knowledge of God" (Rae, Life of Adam Smith, 1895). The accusation seems to have had no result.

In addition to the works named, the following were published during Hutcheson's lifetime: a pamphlet entitled Considerations on Patronage

(1735); Philosophiae moralis institutio com- pendiaria, ethices et jurisprudentiae naturalis elementa continens, lib. Hi. (Glasgow, 1742); Metaphysicae synapsis ontologiam et pneumatologiam complectens (Glasgow, 1742). The last work was published anonymously. After his death, his son,

Francis Hutcheson (c. 1722-1773), author of a number of popular songs (e.g. ” As Colin one evening,” ” Jolly Bacchus,” ” Where Weeping Yews “), published much the longest, though by no means the most interesting, of his works, A System of Moral Philosophy, in Three Books (2 vols. , London, 1755). To this is prefixed a life of the author, by Dr William Leechman (1706- 1785), professor of divinity in the university of Glasgow. The only remaining work assigned to Hutcheson is a small treatise on Logic (Glasgow, 1 764) . This compendium, together with the Com- pendium of Metaphysics, was republished at Strassburg in 1722. Thus Hutcheson dealt with metaphysics, logic and ethics. His importance is, however, due almost entirely to his ethical writings, and among these primarily to the four essays and the letters published during his residence in Dublin. His standpoint has a negative and a positive aspect; he is in strong opposition to Thomas Hobbes and Bernard de Mandeville, and in funda- mental agreement with Shaftesbury (Anthony Ashley Cooper, 3rd earl of Shaftesbury), whost name he very properly coupled with his own on the title-page of the first two essays. There are no two names, perhaps, in the histywy of English moral philosophy, which stand in a closer connexion. The analogy drawn between beauty and virtue, the functions assigned to the moral sense, the position that the benevolent feelings form an original and irreducible part of our nature, and the unhesitating adoption of the principle that the test of virtuous action is its tendency to promote the general welfare are obvious and funda- mental points of agreement between the two authors.

I. Ethics. — According to Hutcheson, man has a variety of senses, internal as well as external, reflex as well as direct, the general definition of a sense being ” any determination of our minds to receive ideas independently on our will, and to have perceptions of pleasure and pain ” (Essay on the Nature and Conduct of the Passions, sect. 1). He does not attempt to give an exhaustive enumeration of these ” senses,” but, in various parts of his works, he specifies, besides the five external senses commonly recognized (which, he rightly hints, might be added to), — (1) consciousness, by which each man has a perception of himself and of all that is going on in his own mind (Metaph. Syn. pars i. cap. 2) ; (2) the sense of beauty (sometimes called specifically ” an internal sense “) ; (3) a public sense, or sensus

communis, ” a determination to be pleased with the happiness of others and to be uneasy at their misery “; (4) the moral sense, or ” moral sense of beauty in actions and affections, by which we perceive virtue or vice, in ourselves or others ” ; (5) a sense of honour, or praise and blame, ” which makes the approbation or gratitude of others the necessary occasion of pleasure, and their dislike, condemnation or resentment of injuries done by us the occasion of that uneasy sensation called shame”; (6) a sense of the ridiculous. It is plain, as the author confesses, that there may be ” other percep- tions, distinct from all these classes,” and, in fact, there seems to be no limit to the number of ” senses ” in which a psychological division of this kind might result.

Of these ” senses ” that which plays the most important part in Hutcheson’s ethical system is the ” moral sense.” It is this which pronounces immediately on the character of actions and affections, approving those which are virtuous, and disapproving those which are vicious. ” His principal design,” he says in the preface to the two first treatises, ” is to show that human nature was not left quite indifferent in the affair of virtue, to form to itself observations con- cerning the advantage or disadvantage of actions, and accordingly to regulate its conduct. The weakness of our reason, and the avocations arising from the infirmity and necessities of our nature, are so great that very few men could ever have formed those long deductions of reasons which show some actions tc be in the whole advantageous to the agent, and their contraries pernicious. The Author of nature has much better furnished us for a virtuous conduct than our moralists seem to imagine, by almost as quick and powerful instruc- tions as we have for the preservation of our bodies. He has made virtue a lovely form, to excite our pursuit of it, and has given us strong affections to be the springs of each virtuous action.” Passing over the appeal to final causes involved in this and similar passages, as well as the assumption that the ” moral sense ” has had no growth or history, but was ” implanted ” in man exactly in the condition in which it is now to be found among the more civilized races, an assumption common to the systems of both Hutcheson and Butler, it may be remarked that this use of the term ” sense ” has a tendency to obscure the real nature of the process which goes on in an act of moral judgment. For, as is so clearly established by Hume, this act really consists of two parts: one an act of deliberation, more or less prolonged, resulting in an intellectual judgment; the other a reflex feeling, probably instantaneous, of satisfaction at actions which we denominate good, of dissatisfaction at those which we denominate bad. By the intellectual part of this process we refer the action or habit to a certain class ; but

no sooner is the intellectual process completed

than there is excited in us a feeling similar to that which myriads of actions and habits of the same class, or deemed to be of the same class, have e.xcited in us on former occasions. Now, supposing the latter part of this process to be instantaneous, uniform and exempt from error, the former certainly is not. All mankind may, apart from their selfish interests, approve that which is virtuous or makes for the general good, but surely they entertain the most widely divergent opinions, and, in fact, freq jently arrive at directly opposite conclusions as to particular actions and habits. This obvious distinction is undoubtedly recognized by Hutcheson in his analysis of the mental process preceding moral action, nor does he invariably ignore it, even when treating of the moral approbation or disapprobation which is subsequent on action. None the less, it remains true that Hutcheson, both by his phraseology, and by the language in which he describes the process of moral approbation, has done much to favour that loose, popular view of morality which, ignoring the necessity of deliberation and reflection, encourages hasty resolves and unpre- meditated judgments. The term ” moral sense ” (which, it may be noticed, had already been employed by Shaftesbury, not only, as Dr Whewell appears to intimate, in the margin, but also in the text of his Inquiry), if invariably coupled with the term ” moral judgment,” would be open to little objection; but, taken alone, as designating the complex process of moral approbation, it is liable to lead not only to serious misapprehension but to grave practical errors. For, if each man’s decisions are solely the result of an immediate intuition of the moral sense, why be at any pains to test, correct or review them? Or why educate a faculty whose decisions are infallible? And how do we account for differences in the moral decisions of different societies, and the observable changes in a man’s own views? The expression has, in fact, the fault of most metaphorical terms: it leads to an exaggeration of the truth which it is intended to suggest.

But though Hutcheson usually describes the moral faculty as acting instinctively and immediately, he does not, like Butler, con- found the moral faculty with the moral standard. The test or criterion of right action is with Hutcheson, as with Shaftesbury, its tendency to promote the general welfare of mankind. He thus anticipates the utilitarianism of Bentham — and not only in principle, but even in the use of the phrase ” the greatest happiness for the greatest number ” (Inquiry

concerning Moral Good and Evil, sect. 3). It is curious that Hutcheson did not realize the inconsistency of this external criterion with his fundamental ethical principle. In- tuition has no possible connexion with an empirical calculation of results, and Hutcheson in adopting such a criterion practically denies his fundamental assumption.

As connected with Hutcheson's virtual adoption of the utilitarian standard may be noticed a kind of moral algebra, proposed for the purpose of " computing the morality of actions." This calculus occurs in the Inquiry concerning Moral Good and Evil, sect. 3.

The most distinctive of Hutcheson's ethical doctrines still remaining to be noticed is what has been called the " benevolent theory " of morals. Hobbes had maintained that all our actions, how- ever disguised under apparent sympathy, have their roots in self-love. Hutcheson not only maintains that benevolence is the sole and direct source of many of our actions, but, by a not un- natural recoil, that it is the only source of those actions of which, on reflection, we approve. Consistently with this position, actions which flow from self-love only are pronounced to be morally indifferent. But surely, by the common consent of civilized men, prudence, temperance, cleanliness, industry, self-respect and, in general, the '" personal virtues," are regarded, and rightly regarded, as fitting objects of moral approbation. This consideration could hardly escape any author, however wedded to his own system, and Hutcheson attempts to extricate himself from the difficulty by laying down the position that a man may justly regard himself as a part of the rational system, and may thus " be, in part, an object of his own benevo- lence " (Ibid.), — a curious abuse of terms, which really concedes the question at issue. Moreover, he acknowledges that, though self-love does not merit approbation, neither, except in its extreme forms, does it merit condemnation, indeed the satisfaction of the dictates of self- love is one.of the very conditions of the preservation of society. To press home the inconsistencies involved in these various statements would be a superfluous task.

The vexed question of liberty and necessity appears to be carefully avoided in Hutcheson's professedly ethical works. But, in the Synopsis metaphysical, he touches on it in three places, briefly stating both sides of the question, but evidently inclining to that which he designates as the opinion of the Stoics in opposition to what he designates as the opinion of the Peripatetics. This is substantially the same as the doctrine propounded by Hobbes and Locke (to the latter of whom Hutcheson refers in a note), namely, that our will is determined by motives in conjunction with our general character and

habit ‘of mind, and that the only true liberty is the liberty of acting as we will, not the liberty of willing as we will. Though, however, his leaning is clear, he carefully avoids dogmatiz- ing, and deprecates the angry controversies to which the speculations on this subject had given rise.

It is easy to trace ihe influence of Hutcheson’s ethical theories on the systems of Hume and Adam Smith. The prominence given by these writers to the analysis of moral action and moral approbation,

Benevo- lence.

with the attempt to discriminate the respective provinces of the reason and the emotions in these processes, is undoubtedly due to the influence of Hutcheson. To a study of the writings of Shaftesbury and Hutcheson we might, probably, in large measure, attribute the unequivocal adoption of the utilitarian standard by Hume, and, if this be the case, the name of Hutcheson connects itself, through Hume, with the names of Priestley, Paley and Bentham. Butler’s Sermons appeared in 1726, the year after the publication of Hutcheson’s two first essays, and the parallelism between the ” conscience ” of the one writer and the ” moral sense ” of the othet is, at least, worthy of remark.

II. Mental Philosophy. — In the sphere of mental philosophy and logic Hutcheson’s contributions are by no means so important or original as in that of moral philosophy. They are interesting mainly as a link between Locke and the Scottish school. In the former subject the influence of Locke is apparent throughout. All the main outlines of Locke’s philosophy seem, at first sight, to be accepted as a matter of course. Thus, in stating his theory of the moral sense, Hutcheson is peculiarly careful to repudiate the doctrine of innate ideas (see, for instance, Inquiry concerning Moral Good and Evil, sect. 1 ad fin., and sect. 4; and compare Synopsis Metaphysicae, pars i. cap. 2). At the same time he shows more discrimination than does Locke in distinguishing between the two uses of this expression, and between the legitimate and illegitimate form of the doctrine (Syn. Metaph. pars i. cap. 2). All our ideas are, as by Locke, referred to external or internal sense, or, in other words, to sensation and re- flection (see, for instance, Syn. Metaph. pars i. cap. I ; Logicae Compend. pars i. cap. 1; System of Moral Philosophy, bk. i. ch. 1). It is, however, a most important modification of Locke’s doctrine, and one which connects Hutcheson’s mental philosophy with that of Reid, when he states that the ideas of extension, figure, motion and rest “are more properly ideas accompanying the sensations of sight and touch than the

sensations of either of these senses “; that the idea of self accompanies every thought, and that the ideas of number, duration and existence accompany every other idea what- soever (see Essay on the Nature and Conduct of the Passions, sect. i. art. 1; Syn. Metaph. pars i. cap. I, pars ii. cap. 1; Hamilton on Reid, p. 124, note). Other important points in which Hutcheson follows the lead of Locke are his depreciation of the importance of the so-called laws of thought, his distinction between the primary and secondary qualities of bodies, the position that we cannot know the inmost essences of things (” intimae rerum naturae sive essentiae “), though they excite various ideas in us, and the assumption that ex- ternal things are known only through the medium of ideas (Syn. Metaph. pars i. cap. 1), though, at the same time, we are assured of the existence of an external world corresponding to these ideas. Hutcheson attempts to account for our assurance of the reality of an external world by referring it to a natural instinct (Syn. Metaph. pars i. cap_. 1). Of the correspondence or similitude between our ideas of the primary qualities of things and the things themselves God alone can be assigned as the cause. This similitude has been effected by Him through a law of nature. ” Haec prima qualitatum prima- riarum perceptio, sive mentis actio quaedam sive passio dicatur, non alia similitudinis aut convenientiae inter ejusmodi ideas et res ipsas causa assignari posse videtur, quam ipse Deus, qui certa naturae lege hoc efficit, ut notiones, quae rebus praesentibus excitantur, sint ipsis similes, aut saltern earum habitudines, si non veras quantitates, depingant ” (pars ii. cap. 1). Locke does speak of God ” annexing ” certain ideas to certain motions of bodies; but nowhere does he propound a theory so definite as that here propounded by Hutcheson, which reminds us at least as much of the speculations of Malebranche as of those of Locke.

Amongst the more important points in which Hutcheson diverges from Locke is his account of the idea of personal identity, which he appears to have regarded as made known to us directly by conscious- ness. The distinction between body and mind, corpus or materia and res cogitans, is more emphatically accentuated by Hutcheson than by Locke. Generally, he speaks as if we had a direct consciousness of mind as distinct from body (see, for instance, Syn. Metaph. pars ii. cap. 3), though, in the posthumous work on Moral Philosophy, he expressly states that we know mind as we know body ” by qualities immediately perceived though the substance of both be unknown ” (bk. i. ch. 1). The distinction between perception proper and sensa tion proper, which occurs by implication though it is not explicitly worked out (see Hamilton’s Lectures on Metaphysics,. Lect. 24; Hamilton’s edition of Dugald Stewart’s Works, v. 420),- the

imperfection of the ordinary division of the external senses into five classes, the limitation of consciousness to a special mental faculty (severely criticized in Sir W. Hamilton's Lectures on Metaphysics, Lect. xii.) and the disposition to refer on disputed questions of philo- sophy not so much to formal arguments as to the testimony of consciousness and our natural instincts are also amongst the points in which Hutcheson supplemented or departed from the philosophy of Locke. The last point can hardly fail to suggest the " common- sense philosophy " of Reid.

Thus, in estimating Hutcheson's position, we find that in particular questions he stands nearer to Locke, but in the general spirit of his philosophy he seems to approach more closely to his Scottish successors.

The short Compendium of Logic, which is more original than such

works usually are, is remarkable chiefly for the large proportion of psychological matter which it contains. In these parts of the book Hutcheson mainly follows Locke. The technicalities of the subject are passed lightly over, and the book is readable. It may be specially noticed that he distinguishes between the mental result and its verbal expression [idea — term; judgment — proposition], that he constantly employs the word " idea," and that he defines logical truth as " convenientia signorum cum rebus significatis " (or " propositionis convenientia cum rebus ipsis," Syn. Metaph. pars i. cap 3), thus implicitly repudiating a merely formal view of logic.

III. Aesthetics. — Hutcheson may further be regarded as one of the earliest modern writers on aesthetics. His speculations on this subject are contained in the Inquiry concerning Beauty, Order, Harmony and Design, the first of the two treatises published in 1725.. He maintains that we are endowed with a special sense by which we perceive beauty, harmony and proportion. This is a reflex sense, because it presupposes the action of the external senses of sight and hearing. It may be called an internal sense, both in order to dis- tinguish its perceptions from the mere perceptions of sight and hearing, and because " in some other affairs, where our external senses are not much concerned, we discern a sort of beauty, very like in many respects to that observed in sensible objects, and accompanied with like pleasure " {Inquiry, &c, sect. 1). The latter reason leads him to

call attention to the beauty perceived in universal truths, in the operations of general causes and in moral principles and actions. Thus, the analogy between beauty and virtue, which was so favourite a topic with Shaftesbury, is prominent in the writings of Hutcheson also. Scattered up and down the treatise there are many important and interesting observations which our limits prevent us from noticing. But to the student of mental philosophy it may be specially interesting to remark that Hutcheson both applies the principle of association to explain our ideas of beauty and also sets limits to its application, insisting on there being " a natural power of perception or sense of beauty in objects, antecedent to all custom, education or example" (see Inquiry, &c, sects. 6, 7; Hamilton's Lectures on Metaphysics, Lect. 44 ad fin.).

Hutcheson's writings naturally gave rise to much controversy. To say nothing of minor opponents, such as " Philaretus " (Gilbert Burnet, already alluded to), Dr John Balguy (1686-1748), pre- bendary of Salisbury, the author of two tracts on " The Foundation of Moral Goodness, ' and Dr John Taylor (1694-1761) of Norwich, a minister of considerable reputation in his time (author olAn Examina- tion of the Scheme of Morality advanced by Dr Hutcheson) , the essays appear to have suggested, by antagonism, at least two works which hold a permanent place in the literature of English ethics — Butler's Dissertation on the Nature of Virtue, and Richard Price's Treatise of Moral Good and Evil (1757). In this latter work the author maintains, in opposition to Hutcheson, that actions are in themselves right or wrong, that right and wrong are simple ideas incapable of analysis, and that these ideas are perceived immediately by the understanding. We thus see that, not only directly but also through the replies which it called forth, the system of Hutcheson, or at least the system of Hutcheson combined with that of Shaftesbury, contributed, in large measure, to the formation and development of some of the most important of the modern schools of ethics (see especially art. Ethics).

Authorities. — Notices of Hutcheson occur in most histories, both of general philosophy and of moral philosophy, as, for instance, in pt. vii. of Adam Smith's Theory of Moral Sentiments; Mackintosh's Progress of Ethical Philosophy; Cousin, Cours d'histoire de la philosophic morale du XV III" Steele; Whewell's Lectures on the History of Moral Philosophy in England; A. Bain's Mental and Moral Science; Noah Porter's Appendix to the English translation of Ueberweg's History of Philosophy; Sir Leslie Stephen's History of English Thought in the Eighteenth Century, &c. See also Martineau, Types of Ethical Theory (London, 1902) ; W. R. Scott, Francis Hutcheson (Cambridge, 1900) ; Albee, History of English Utilitarian-

ism (London, 1902) ; T. Fowler, Shaftesbury and Hutcheson (London, 1882); J. McCosh, Scottish Philosophy (New York, 1874). Of Dr Leechman's Biography of Hutcheson we have already spoken. J. Veitch gives an interesting account of his professorial work in Glasgow, Mind, ii. 209-212. (T. F. ; X.)

HUTCHINSON, ANNE (c. 1 600-1 643), American religious enthusiast, leader of the " Antinomians " in New England, was born in Lincolnshire, England, about 1600. She was the daughter of a clergyman named Francis Marbury, and, according to tradition, was a cousin of John Dryden. She married William Hutchinson, and in 1634 emigrated to Boston, Massachusetts, as a follower and admirer of the Rev. John Cotton. Her orthodoxy was suspected and for a time she was not admitted to the church, but soon she organized meetings among the Boston women, among whom her exceptional ability and her services as a nurse had given her great influence; and at these meetings she dis- cussed and commented upon recent sermons and gave expression to her own theological views. The meetings became increasingly popular, and were soon attended not only by the women but

even by some of the ministers and magistrates, including Governoi Henry Vane. At these meetings she asserted that she, Cotton and her brother-in-law, the Rev. John Wheelwright — whom she was trying to make second " teacher " in the Boston church — were under a " covenant of grace," that they had a special inspiration, a " peculiar indwelling of the Holy Ghost," whereas the Rev. John Wilson, the pastor of the Boston church, and the other ministers of the colony were under a " covenant of works." Anne Hutchinson was, in fact, voicing a protest against the legalism of the Massachusetts Puritans, and was also striking at the authority of the clergy in an intensely theocratic community. In such a community a theological controversy inevitably was carried into secular politics, and the entire colony was divided into factions. Mrs Hutchinson was supported by Governor Vane, Cotton, Wheelwright and the great majority of the Boston church; opposed to her were Deputy-Governor John Winthrop, Wilson and all of the country magistrates and churches. At a general fast, held late in January 1637, Wheel- wright preached a sermon which was taken as a criticism of Wilson and his friends. The strength of the parties was tested at the General Court of Election of May 1637, when Winthrop defeated Vane for the governorship. Cotton recanted, Vane re- turned to England in disgust, Wheelwright was tried and banished and the rank and file either followed Cotton in making sub- mission or suffered various minor punishments. Mrs Hutchinson was tried (November 1637) by the General Court chiefly for " traducing the

ministers," and was sentenced to banishment; later, in March 1638, she was tried before the Boston church and was formally excommunicated. With William Coddington (d. 1678), John Clarke and others, she established a settlement on the island of Aquidneck (now Rhode Island) in 1638. Four years later, after the death of her husband, she settled on Long Island Sound near what is now New Rochelle, Westchester county, New York, and was killed in an Indian rising in August 1643, an event regarded. in Massachusetts as a manifestation of Divine Providence. Anne Hutchinson and her followers were called " Antinomians," probably more as a term of reproach than with any special reference to her doctrinal theories; and the controversy in which she was involved is known as the " Antinomian Controversy."

See C. F. Adams, Antinomianism in the Colony of Massachusetts Bay, vol. xiv. of the Prince Society Publications (Boston, 1894); and Three Episodes of Massachusetts History (Boston and New York,

1896).

HUTCHINSON, JOHN (1615-1664), Puritan soldier, son of Sir Thomas Hutchinson of Owthorpe, Nottinghamshire, and of Margaret, daughter of Sir John Byron of Newstead, was baptized on the 18th of September 1615. He was educated at Nottingham and Lincoln schools and at Peterhouse, Cambridge, and in 1637 he entered Lincoln's Inn. On the outbreak of the great Rebellion he took the side of the Parliament, and was made in 1643 governor of Nottingham Castle, which he defended against external attacks and internal divisions, till the triumph of the parliamentary cause. He was chosen member for Nottinghamshire in March 1646, took the side of the Independents, opposed the offers of the king at Newport, and signed the death- warrant. Though a member at first of the council of state, he disapproved of the subsequent political conduct of Cromwell and took no further part in politics during the lifetime of the protector. He resumed his seat in the recalled Long Parliament in May 1659, and followed Monk in opposing Lambert, believing that the former intended to maintain the commonwealth. He was returned to the Convention Parliament for Nottingham but expelled on the 9th of June 1660, and while not excepted from the Act of Indemnity was declared incapable of holding public office. In October 1663, however, he was arrested upon suspicion of being concerned in the Yorkshire plot, and after a rigorous confinement in the Tower of London, of which he published an account (reprinted in the Harleian Miscellany, vol. iii.), and in Sandown Castle, Kent, he died on the nth of September 1664. His career draws its chief interest from the Life by his wife, Lucy,

daughter of Sir Allen Apsley. written

after the death of her husband but not published till 1806 (since often reprinted), a work not only valuable for the picture which it gives of the man and of the time in which he lived, but for the simple beauty of its style, and the naivete with which the writer records her sentiments and opinions, and details the incidents of her private life.

See the edition of Lucy Hutchinson's Memoirs of the Life of Colonel Hutchinson by C. H. Firth (1885); Brit. Mus. Add. MSS. 25,901 (a fragment of the Life), also Add. MSS. 19, 333, 36,247 f. 51 ; Notes and Queries, 7, ser. iii. 25, viii. 422 ; Monk's Contemporaries, by Guizot.

HUTCHINSON, JOHN (1674-1737), English theological writer, was born at Spennithorne, Yorkshire, in 1674. He served as steward in several families of position, latterly in that of the duke of Somerset, who ultimately obtained for him the post of riding purveyor to the master of the horse, a sinecure worth about £200 a year. In 1700 he became acquainted with Dr John Woodward (1665-1728) physician to the duke and author of a work entitled The Natural History of the Earth, to whom he entrusted a large number of fossils of his own collecting, along with a mass of manuscript notes, for arrangement and publication. A misunderstanding as to the manner in which these should be dealt with was the immediate occasion of the publication by Hutchinson in 1724 of Moses's Principia, part i., in which Woodward's Natural History was bitterly ridiculed, his conduct with regard to the mineralogical specimens not obscurely characterized, and a refutation of the Newtonian doctrine of gravitation seriously attempted. It was followed by part ii. in 1727, and by various other works, including Moses's Sine Principio, 1730; The Confusion of Tongues and Trinity of the Gentiles, 1731; Power Essential and Mechanical, or what power belongs to God and what to his creatures, in which the design of Sir I. Newton and Dr Samuel Clarke is laid open, 1732; Glory or Gravity, 1733; The Religion of Satan, or Antichrist Delineated, 1736. He taught that the Bible contained the elements not only of true religion but also of all rational philosophy. He held that the Hebrew must be read without points, and his interpreta- tion rested largely on fanciful symbolism. Bishop George Home of Norwich was during some of his earlier years an avowed Hutchinsonian; and William Jones of Nayland continued to be so to the end of his life.

A complete edition of his publications, edited by Robert Spearman and Julius Bate, appeared in 1748 (12 vols.); an Abstract of these followed in 1753; and a Supplement, with Life by Spearman pre- fixed, in 1765.

HUTCHINSON, SIR JONATHAN (1828-), English surgeon and pathologist, was born on the 23rd of July 1828 at Selby, Yorkshire, his parents belonging to the Society of Friends. He entered St Bartholomew's Hospital, became a member of the Royal College of Surgeons in 1850 (F.R.C.S. 1862), and rapidly gained reputation as a skilful operator and a scientific inquirer. He was president of the Hunterian Society in 1869 and 1870, professor of surgery and pathology at the College of Surgeons from 1877 to 1882, president of the Pathological Society, 1879- 1880, of the Ophthalmological Society, 1883, of the Neurological Society, 1887, of the Medical Society, 1890, and of the Royal Medical and Chirurgical in 1894-1896. In 1889 he was president of the Royal College of Surgeons. He was a member of two Royal Commissions, that of 1881 to inquire into the provision for smallpox and fever cases in the London hospitals, and that of 1 889- 1 896 on vaccination and leprosy. He also acted as honorary secretary to the Sydenham Society. His activity in the cause of scientific surgery and in advancing the study of the natural sciences was unwearying. His lectures on neuro- pathogenesis, gout, leprosy, diseases of the tongue, &c, were full of original observation; but his principal work was connected with the study of syphilis, on which he became the first living authority. He was the founder of the London Polyclinic or Postgraduate School of Medicine; and both in his native town of Selby and at Haslemere, Surrey, he started (about 1890) educational museums for popular instruction in natural history. He published several volumes on his own subjects, was editor of the quarterly Archives of Surgery, and was given the Hon. LL.D.

degree by both Glasgow and Cambridge. After his retirement from active consultative work he continued to take great interest in the question of leprosy, asserting the existence of a definite connexion between this disease and the eating of salted fish. He received a knighthood in 1908.

HUTCHINSON, THOMAS (1711-1780), the last royal governor of the province of Massachusetts, son of a wealthy merchant of Boston, Mass., was born there on the 9th of September 1711. He graduated at Harvard in 1727, then became an apprentice in his father's counting-room, and for several years devoted himself to business. In 1737 he began his public career as a member of the Boston Board of Selectmen, and a few weeks later he was elected to the General Court of Massachusetts Bay, of which he was a member until 1740 and again

from 1742 to 1749, serving as speaker in 1747, 1748 and 1749. He con- sistently contended for a sound financial system, and vigorously opposed the operations of the ” Land Bank ” and the issue of pernicious bills of credit. In 1748 he carried through the General Court a bill providing for the cancellation and redemption of the outstanding paper currency. Hutchinson went to England in 1740 as the representative of Massachusetts in a boundary dispute with New Hampshire. He was a member of the Massa- chusetts Council from 1749 to 1756, was appointed judge of probate in 1752 and was chief justice of the superior court of the province from 1761 to 1769, was lieutenant-governor from 1758 to 1 77 1, acting as governor in the latter two years, and from 1 771 to 1774 was governor. In 1754 he was a delegate from Massachusetts to the Albany Convention, and, with Franklin, was a member of the committee appointed to draw up a plan of union. Though he recognized the legality of the Stamp Act of 1765, he considered the measure inexpedient and impolitic and urged its repeal, but his attitude was misunderstood; he was considered by many to have instigated the passage of the Act, and in August 1765 a mob sacked his Boston residence and destroyed many valuable manuscripts and documents. He was acting governor at the time of the ” Boston Massacre ” in 1770, and was virtually forced by the citizens of Boston, under the leadership of Samuel Adams, to order the removal of the British troops from the town. Throughout the pre-Revolutionary disturbances in Massachusetts he was the re- presentative of the British ministry, and though he disapproved of some of the ministerial measures he felt impelled to enforce them and necessarily incurred the hostility of the Whig or Patriot element. In 1774, upon the appointment of General Thomas Gage as military governor he went to England, and acted as an adviser to George III. and the British ministry on American affairs, uniformly counselling moderation. He died at Brompton, now part of London, on the 3rd of June

1780.

He wrote A Brief Statement of the Claim of the Colonies (1764) ; a Collection of Original Papers relative to the History of Massachusetts Bay (1769), reprinted as The Hutchinson Papers by the Prince Society in 1865; and a judicious, accurate and very valuable History of the Province of Massachusetts Bay (vol. i., 1764, vol. ii., 1767, and vol. iii., 1828). His Diary and Letters, with an Account of his Ad- ministration, was published at Boston in 1 884-1 886.

See James K. Hosmer’s Life of Thomas Hutchinson (Boston, 1896), and a biographical chapter in John Fiske’s Essays Historical and Literary

(New York, 1902). For an estimate of Hutchinson as an historian, see M. C. Tyler's Literary History of the American Revolu- tion (New York, 1897).

HUTCHINSON, a city and the county-seat of Reno county, Kansas, U.S.A., in the broad bottom-land on the N. side. of the Arkansas river. Pop. (1900) 9379, of whom 414 were foreign-born and 442 negroes; (1910 census) 16,364. It is served by the Atchison, Topeka & Santa Fe, the Missouri Pacific and the Chicago, Rock Island & Pacific railways. The principal public buildings are the Federal building and the county court house. The city has a public library, and an industrial reformatory is maintained here by the state. Hutchinson is situated in a stock-raising, fruit-growing and farming region (the principal products of which are wheat, Indian corn and fodder), with which it has a considerable wholesale trade. An ■ enormous deposit of rock salt underlies the city and its vicinity,

H

and Hutchinson's principal industry is the manufacture (by the open-pan and grainer processes) and the shipping of salt; the city has one of the largest salt plants in the world. Among the other manufactures are flour, creamery products, soda- ash, straw-board, planing-mill products and packed meats. Natural gas is largely used as a factory fuel. The city's factory product was valued at $2,031,048 in 1905, an increase of 31-8% since 1900. Hutchinson was chartered as a city in 1871.

HUTTEN, PHILIPP VON (c. 1511-1546), German knight, was a relative of Ulrich von Hutten and passed some of his early years at the court of the emperor Charles V. Later he joined the band of adventurers which under Georg Hohermuth, or George of Spires, sailed to Venezuela, or Venosala as Hutten calls it, with the object of conquering and exploiting this land in the interests of the Augsburg family of Welser. The party landed at Coro in February 1535 and Hutten accompanied Hohermuth on his long and toilsome expedition into the interior in search of treasure. After the death of Hohermuth in December 1540 he became captain-general of Venezuela. Soon after this event he vanished into the interior, returning after five years of wandering to find that a Spaniard, Juan de Caravazil, or Caravajil, had been appointed governor in his absence. With his travelling companion, Bartholomew Welser the younger, he was seized by CaravaziL in April 1546 and the two were afterwards put to death.

Hutten left some letters, and also a narrative of the earlier part of his adventures, this Zeitung aus India Junkher Philipps von Hutten being published in 1785.

HUTTEN, ULRICH VON (1488-1523), was born on the 21st of April 1488, at the castle of Steckelberg, near Fulda, in Hesse. Like Erasmus or Pirckheimer, he was one of those men who form the bridge between Humanists and Reformers. He lived with both, sympathized with both, though he died before the Reformation had time fully to develop. His life may be divided into four parts: — his youth and cloister-life (1488-1504); his wanderings in pursuit of knowledge (1 504-1 51 5); his strife with Ulrich of Wurttemberg (1515-1519); and his connexion with the Reformation (1 519-1523). Each of these periods had its own special antagonism, which coloured Hutten's career: in the first, his horror of dull monastic routine; in the second, the ill-treatment he met with at Greifswald; in the third, the crime of Duke Ulrich; in the fourth, his disgust with Rome and with Erasmus. He was the eldest son of a poor and not undistinguished knightly family. As he was mean of stature and sickly his father destined him for the cloister, and he was sent to the Benedictine house at Fulda; the thirst for learning there seized on him, and in 1505 he fled from the monastic life, and won his freedom with the sacrifice of his worldly prospects, and at the cost of incurring his father's undying anger. From the Fulda cloister he went first to Cologne, next to Erfurt, and then

to Frankfort-on-Oder on the opening in 1 506 of the new university of that town. For a time he was in Leipzig, and in 1508 we find him a shipwrecked beggar on the Pomeranian coast. In 1509 the university of Greifswald welcomed him, but here too those who at first received him kindly became his foes; the sensitive ill-regulated youth, who took the liberties of genius, wearied his burgher patrons; they could not brook the poet's airs and vanity, and ill-timed assertions of his higher rank. Wherefore he left Greifswald, and as he went was robbed of clothes and books, his only baggage, by the servants of his late friends; in the dead of winter, half starved, frozen, penniless, he reached Rostock. Here again the Humanists received him gladly, and under their protection he wrote against his Greifswald patrons, thus beginning the long list of his satires and fierce attacks on personal or public foes. Rostock could not hold him long; he wandered on to Wittenberg and Leipzig, and thence to Vienna, where he hoped to win the emperor Maximilian's favour by an elaborate national poem on the war with Venice. But neither Maximilian nor the university of Vienna would lift a hand for him, and he passed into Italy, where, at Pavia, he sojourned throughout 151 1 and part of 151 2. In the latter year his studies were interrupted by war; in the siege of Pavia by papal troops and Swiss, he was plundered by both sides, and escaped, sick and penniless, to Bologna; on his recovery he even took service as a private soldier in the emperor's army. This dark period lasted no long time; in 15 14 he was again in Germany, where, thanks

to his poetic gifts and the friendship of Eitelwolf von Stein (d. 151 5), he won the favour of the elector of Mainz, Archbishop Albert of Brandenburg. Here high dreams of a learned career rose on him; Mainz should be made the metropolis of a grand Humanist movement, the centre of good style and literary form. But the murder in 1515 of his relative Hans von Hutten by Ulrich, duke of Wurttemberg, changed the whole course of his life; satire, chief refuge of the weak, became Hutten's weapon; with one hand he took his part in the famous Epistolae obscurorum virorum, and with the other launched scathing letters, eloquent Ciceronian orations, or biting satires against the duke. Though the emperor was too lazy and indifferent to smite a great prince, he took Hutten under his protection and bestowed on him the honour of a laureate crown -in 151 7. Hutten, who had meanwhile revisited Italy, again attached himself to the electoral court at Mainz; and he was there when in 1518 his friend Pirckheimer wrote, urging him to abandon the court and dedicate himself to letters. We have the poet's long reply, in an epistle on his " way of life," an amusing mixture of earnestness and vanity, self-satisfaction and satire; he tells his friend that his career is just begun, that he has had twelve years of wandering, and will now enjoy himself a while in patriotic literary work; that he has by no means deserted the humaner studies, but carries with him a little library of standard books. Pirckheimer in his burgher life may have ease and even luxury; he, a knight of the empire, how can he condescend to obscurity? He must abide where he can shine.

In 1 519 he issued in one volume his attacks on Duke Ulrich, and then, drawing sword, took part in the private war which overthrew that prince; in this affair he became intimate with Franz von Sickingen, the champion of the knightly order (Ritterstand). Hutten now warmly and openly espoused the Lutheran cause, but he was at the same time mixed up in the attempt of the " Ritterstand " to assert itself as the militia of the empire against the independence of the German princes. Soon after this time he discovered at Fulda a copy of the mani- festo of the emperor Henry IV. against Hildebrand, and published it with comments as an attack on the papal claims over Germany. He hoped thereby to interest the new emperor Charles V., and the higher orders in the empire, in behalf of German liberties; but the appeal failed. What Luther had achieved by speaking to cities and common folk in homely phrase, because he touched heart and conscience, that the far finer weapons of Hutten failed to effect, because he tried to touch the more cultivated sympathies and dormant patriotism of princes and bishops, nobles and knights. And so he at once gained an undying name in the republic of letters and ruined his

own career. He showed that the artificial verse-making of the Humanists could be connected with the new outburst of genuine German poetry. The Minne- singer was gone; the new national singer, a Luther or a Hans Sachs, was heralded by the stirring lines of Hutten's pen. These have in them a splendid natural swing and ring, strong and patriotic, though unfortunately addressed to knight and lands- knecht rather than to the German people.

The poet's high dream of a knightly national regeneration had a rude awakening. The attack on the papacy, and Luther's vast and sudden popularity, frightened Elector Albert, who_ dismissed Hutten from his court. Hoping for imperial favour, he betook himself to Charles V.; but that young prince would have none of him. So he returned to his friends, and they rejoiced greatly to see him still alive; for Pope Leo X. had ordered him to be arrested and sent to Rome, and assassins dogged his steps. He now attached himself more closely to Franz von Sickingen and the knightly movement. This also came to a disastrous end in the capture of the Ebernberg, and Sickingen's death; the higher nobles had triumphed; the- archbishops avenged themselves on Lutheranism as interpreted

by the knightly order. With Sickingen Hutten also finally fell. He fled to Basel, where Erasmus refused to see him, both for fear of his loathsome diseases, and also because the beggared knight was sure to borrow money from him. A paper war consequently broke out between the two Humanists, which embittered Hutten's last days, and stained the memory of Erasmus. From Basel Ulrich dragged himself to Mulhausen; and when the vengeance of Erasmus drove him thence, he went to Zurich. There the large heart of Zwingli welcomed him; he helped him with money, and found him a quiet refuge with the pastor of the little isle of Ufnau on the Zurich lake. There the frail and worn-out poet, writing swift satire to the end, died at the end of August or beginning of September 1523 at the age of thirty-five. He left behind him some debts due to com- passionate friends; he did not even own a single book, and all his goods amounted to the clothes on his back, a bundle of letters, and that valiant pen which had fought so many a sharp battle, and had won for the poor knight-errant a sure place in the annals of literature.

Ulrich von Hutten is one of those men of genius at whom propriety is shocked, and whom the mean-spirited avoid. Yet through his short

and buffeted life he was befriended, with wonderful charity and patience, by the chief leaders of the Humanist movement. For, in spite of his irritable vanity, his immoral life and habits, his odious diseases, his painful restlessness, Hutten had much in him that strong men could love. He passionately loved the truth, and was ever open to all good influences. He was a patriot, whose soul soared to ideal schemes and a grand Utopian restoration of his country. In spite of all. his was a frank and noble nature; his faults chiefly the faults of genius ill-controlled, and of a life cast in the eventful changes of an age of novelty. A swarm of writings issued from his pen; at first the smooth elegance of his Latin prose and verse seemed strangely to miss his real character; he was the Cicero and Ovid of Germany before he became its Lucian.

His chief works were his Ars versificandi (1511) ; the Nemo (1518) ; a work on the Morbus Gallicus (1519); the volume of Steckelberg complaints against Duke Ulrich (including his four Ciceronian Orations, his Letters and the Phalarismus) also in 1519; the Vadismus (1520); and the controversy with Erasmus at the end of his life. Besides these were many admirable poems in Latin and German. It is not known with certainty how far Hutten was the parent of the celebrated Epistolae obscurorum virorum, that famous satire on monastic ignorance as represented by the theologians of Cologne with which the friends of Reuchlin defended him. At first the cloister-world, not discerning its irony, welcomed the work as a defence of their position; though their eyes were soon opened by the favour with which the learned world received it. The Epistolae were eagerly bought up; the first part (41 letters) appeared at the end of 1515; early in 1516 there was a second edition; later in 1516 a third, with an appendix of seven letters; in 1517 appeared the second part (62 letters), to which a fresh appendix of eight letters was subjoined soon after. In 1909 the Latin text of the Epistolae with an English translation was published by F. G. Stokes. Hutten, in a letter addressed to Robert Crocus, denied that he was the author of the book, but there is no doubt as to his connexion with it. Erasmus was of opinion that there were three authors, of whom Crotus Rubianus was the originator of the idea, and Hutten a chief contributor. IX F. Strauss, who dedicates to the subject a chapter of his admirable work on Hutten, concludes that he had no share in the first part, but that his hand is clearly visible in the second part, which he attributes in the main to him. To him is due the more serious and severe tone of that bitter portion of the satire. See VV. Brecht, Die Verfasser der Epistolae obscurorum virorum (1904).

For a complete catalogue of trie writings of Hutten, see E. Booking’s

Index bibliographicus Hullenianus (1858). Booking is also the editor of the complete edition of Hutten's works (7 vols., 1859-1862). A selection of Hutten's German writings, edited by G. Balke, appeared in 1891. Cp. S. Szamatolski, Hultens deutsche Schriften (1891). The best biography (though it is also somewhat of a political pamphlet) is that of D. F. Strauss (Ulrich von Hutten, 1857; 4th ed., 1S78; English translation by G. Sturge, 1874), with which may be compared the older monographs by A. Wagenseil (1823), A. Biirck (1846) and J. Zeller (Paris, 1849). See also J. Deckert, Ulrich von Huttens Leben und Wirken. Eine historische Skizze (1901). (G. VV. K.)

HUTTER, LEONHARD (1 563-1616), German Lutheran theologian, was born at Nellingen near Ulm in January 1563. From 1 58 1 he studied at the universities of Strassburg, Leipzig,

Heidelberg and Jena. In 1594 he began to give theological lectures at Jena, and in 1596 accepted a call as professor of theology at Wittenberg, where he died on the 23rd of October 1616. Hutter was a stern champion of Lutheran orthodoxy, as set down in the confessions and embodied in his own Compendium locorum theologicorum (1610; reprinted 1863), being so faithful to his master as to win the title of " Luther redonatus."

In reply to Rudolf Hospinian's Concordia discors (1607), he wrote a work, rich in historical material but one-sided in its apologetics, Concordia concors (1614), defending the formula of Concord, which he regarded as inspired. His Irenicum vere christianum is directed against David Pareus (1548-1622), professor primariusat Heidelberg, who in Irenicum sive de unione et synodo Evangelicorum (1614) had pleaded for a reconciliation of Lutheranism and Calvinism; his Calvinista aulopoliticus (1610) was written against the " damnable Calvinism " which was becoming prevalent in Holstein and Brandenburg. Another work, based on the formula of Concord, was entitled Loci communes theologici.

HUTTON, CHARLES (1737-1823), English mathematician, was born at Newcastle-on-Tyne on the 14th of August 1737. He was educated in a school at Jesmond, kept by Mr Ivison, a clergyman of the church of England. There is reason to believe, on the evidence of two pay-bills, that for a short time in 1755 and 1756 Hutton worked in Old Long Benton colliery; at any rate, on Ivison's promotion to a living, Hutton succeeded to the Jesmond school, whence, in consequence of increasing pupils, he removed to Stote's Hall. While he taught during the day at Stote's Hall, he studied mathematics in the evening at a school in Newcastle. In 1760 he married, and began tuition on a larger

scale in Newcastle, where he had among his pupils John Scott, afterwards Lord Eldon, chancellor of England. In 1764 he published his first work, The Schoolmaster's Guide, or a Complete System of Practical Arithmetic, which in 1770 was followed by his Treatise on Mensuration both in Theory and Practice. In 1772 appeared a tract on The Principles of Bridges, suggested by the destruction of Newcastle bridge by a high flood on the 17th of November 1771. In 1773 he was appointed professor of mathematics at the Royal Military Academy, Woolwich, and in the following year he was elected F.R.S. and reported on Nevil Maskelyne's determination of the mean density and mass of the earth from measurements taken in 1774-1776 at Mount Schiehallion in Perthshire. This account appeared in the Philosophical Transactions for 1778, was afterwards reprinted in the second volume of his Tracts on Mathematical and Philo- sophical Subjects, and procured for Hutton the degree of LL.D. from the university of Edinburgh. He was elected foreign secretary to the Royal Society in 1779, but his resignation in 1783 was brought about by the president Sir Joseph Banks, whose behaviour to the mathematical section of the society was somewhat high-handed (see Kippis's Observations on the late Contests in the Royal Society, London, 1784). After his Tables of the Products and Powers of Numbers, 1781, and his Mathematical Tables, 1785, he issued, for the use of the Royal Military Academy, in 1787 Elements of Conic Sections, and in 1798 his Course of Mathematics. His Mathematical and Philosophical Dictionary, a valuable contribution to scientific biography, was published in 179s (2nd ed., 1815), and the four volumes of Recreations in Mathematics and Natural Philosophy, mostly a translation from the French, in 1803. One of the most laborious of his works was the abridgment, in conjunction with G. Shaw and R. Pearson, of the Philosophical Transactions. This under- taking, the mathematical and scientific parts of which fell to Hutton's share, was completed in 1809, and filled eighteen volumes quarto. His name first appears in the Ladies' Diary (a poetical and mathematical almanac which was begun in 1704, and lasted till 1871) in 1764; ten years later he was appointed editor of the almanac, a post which he retained till 1817. Previously he had begun a small periodical, Miscellanea Mathematica, which extended only to thirteen numbers; subse quently he published in five volumes The Diarian Miscellany, which contained large extracts from the Diary. He resigned his professorship in 1807, and died on the 27th of January 1823. See John Bruce, Charles Hutton (Newcastle, 1823).

i6

HUTTON, JAMES (1726-1707), Scottish geologist, was born in Edinburgh on the 3rd of June 1726. Educated at the high school and university of his native city, he acquired while a student a passionate love of scientific inquiry. He was ap- prenticed to a lawyer, but his employer advised that a moie congenial profession should be chosen for him. The young apprentice chose medicine as being nearest akin to his favourite pursuit of chemistry. He studied for three years at Edinburgh, and completed his medical education in Paris, returning by the Low Countries, and taking his degree of doctor of medicine at Leiden in 1749. Finding, however, that there seemed hardly any opening for him, he abandoned the medical profession, and, having inherited a small property in Berwickshire from his father, resolved to devote himself to agriculture. He then went to Norfolk to learn the practical work of farming, and subsequently travelled in Holland, Belgium and the north of France. During these years he began to study the surface of the earth, gradually shaping in his mind the problem to which he afterwards devoted his energies. In the summer of 1754 he established himself on his own farm in Berwickshire, where he resided for fourteen years, and where he introduced the most improved forms of husbandry. As the farm was brought into excellent order, and as its management, becoming more easy, grew less interesting, he was induced to let it, and establish himself for the rest of his life in Edinburgh. This took place about the year 1768. He was unmarried, and from this period until his death in 1797 he lived with his three sisters. Surrounded by congenial literary and scientific friends he devoted himself to research.

At that time geology in any proper sense of the term did

not exist. Mineralogy, however, had made considerable progress.

But Hutton had conceived larger ideas than were entertained

by the mineralogists of his day. He desired to trace back the

origin of the various minerals and rocks, and thus to arrive

at some clear understanding of the history of the earth. For

many years he continued to study the subject. At last, in the

spring of the year 1785, he communicated his views to the

recently established Royal Society of Edinburgh in a paper

entitled Theory of the Earth, or an Investigation of the Laws

Observable in the Composition, Dissolution and Restoration of Land upon the Globe. In this remarkable work the doctrine is expounded that geology is not cosmogony, but must confine itself to the study of the materials of the earth; that everywhere evidence may be seen that the present rocks of the earth's surface have been in great part formed out of the waste of older rocks; that these materials having been laid down under the sea were there consolidated under great pressure, and were subsequently disrupted and upheaved by the expansive power of subterranean heat; that during these convulsions veins and masses of molten rock were injected into the rents of the dislocated strata; that every portion of the upraised land, as soon as exposed to the atmosphere, is subject to decay; and that this decay must tend to advance until the whole of the land has been worn away and laid down on the sea-floor, whence future upheavals will once more raise the consolidated sediments into new land. In some of these broad and bold generalizations Hutton was anticipated by the Italian geologists; but to him belongs the credit of having first perceived their mutual relations, and combined them in a luminous coherent theory based upon observation.

It was not merely the earth to which Hutton directed his attention. He had long studied the changes of the atmosphere. The same volume in which his Theory of the Earth appeared contained also a Theory of Rain, which was read to the Royal Society of Edinburgh in 1784. He contended that the amount of moisture which the air can retain in solution increases with augmentation of temperature, and, therefore,

that on the mixture of two masses of air of different temperatures a portion of the moisture must be condensed and appear in visible form. He investigated the available data regarding rainfall and climate in different regions of the globe, and came to the conclusion that the rainfall is everywhere regulated by the humidity of the

air on the one hand, and the causes which promote mixtures of different aerial currents in the higher atmosphere on the other.

The vigour and versatility of his genius may be understood from the variety of works which, during his thirty years' residence in Edinburgh, he gave to the world. In 1792 he published a . quarto volume entitled Dissertations on different Subjects in Natural Philosophy, in which he discussed the nature of matter, fluidity, cohesion, light, heat and electricity. Some of these subjects were further illustrated by him in papers read before the Royal Society of Edinburgh. He did not restrain himself within the domain of physics, but boldly marched into that of metaphysics, publishing three quarto volumes with the title A n Investigation of the Principles of Knowledge, and of the Progress of Reason — from Sense to Science and Philosophy. In this work he developed the idea that the external world, as conceived by us, is the creation of our own minds influenced by impressions from without, that there is no resemblance between our picture of the outer world and the reality, yet that the impressions produced upon our minds, being constant and consistent, become as much realities to us as if they precisely resembled things actually existing, and, therefore, that our moral conduct must remain the same as if our ideas perfectly corresponded to the causes producing them. His closing years were devoted to the extension and republication of his Theory of the Earth, of which two volumes appeared in 1795. A third volume, necessary to complete the work, was left by him in manuscript, and is referred to by his biographer John Playfair. A portion of the MS. of this volume, which had been given to the Geological Society of London by Leonard Horner, was published by the Society in 1899, under the editorship of Sir A. Geikie. The rest of the manuscript appears to be lost. Soon afterwards Hutton set to work to collect and systematize his numerous writings on husbandry, which he proposed to publish under the title of Elements of Agriculture. He had nearly completed this labour when an incurable disease brought his active career to a close on the 26th of March 1797.

It is by his Theory of the Earth that Hutton will be remembered with reverence while geology continues to be cultivated. The author's style, however, being somewhat heavy and obscure, the book did not attract during his lifetime so much attention as it de- served. Happily for

science Hutton numbered among his friends John Playfair (q.v.), professor of mathematics in the university of Edinburgh, whose enthusiasm for the spread of Hutton's doctrine was combined with a rare gift of graceful and luminous exposition. Five years after Hutton's death he published a volume, Illustrations of the Huttonian Theory of the Earth, in which he gave an admirable summary of that theory, with numerous additional illustrations and arguments. This work is justly regarded as one of the classical con- tributions to geological literature. To its influence much of the sound progress of British geology must be ascribed. In the year 1805 a biographical account of Hutton, written by Playfair, was published in vol. v. of the Transactions of the Royal Society of Edin- burgh. (A. Ge.)

HUTTON, RICHARD HOLT (1826-1897), English writer and theologian, son of Joseph Hutton, Unitarian minister at Leeds, was born at Leeds on the 2nd of June 1826. His family removed to London in 1835, and he was educated at University College School and University College, where he began a lifelong friendship with Walter Bagehot, of whose works he afterwards was the editor; he took the degree in 1845, being awarded the gold medal for philosophy. Meanwhile he had also studied for short periods at Heidelberg and Berlin, and in 1847 ne entered Manchester New College with the idea of becoming a minister like his father, and studied there under James Martinealu He did not, however, succeed in obtaining a call to any church, and for some little time his future was unsettled. He married in 1851 his cousin, Anne Roscoe, and became joint-editor with J. L. Sanford of the Inquirer, the principal Unitarian organ. But his innovations and his unconventional views about stereo- typed Unitarian doctrines caused alarm, and in 1853 he resigned. His health had broken down, and he visited the West Indies, where his wife died of yellow fever. In 1855 Hutton and Bagehot became joint-editors of the National Review, a new monthly, and conducted it for ten years. During this time Hutton's theological views, influenced largely by Coleridge, and more

directly by F. W. Robertson and F. D. Maurice, gradually approached more and more to those of the Church of England, which he ultimately joined. His interest in theology was profound, and he brought to it a spirituality of outlook and an aptitude for metaphysical inquiry and exposition which added a singular attraction to his writings. In 1861 he joined Meredith Townsend as joint-editor and

part proprietor of the Spectator, then a well-known liberal weekly, which, however, was not remunerative from the business point of view. Hutton took charge of the literary side of the paper, and by degrees his own articles became and remained up to the last one of the best-known features of serious and thoughtful English journalism. The Spectator, which gradually became a prosperous property, was his pulpit, in which unwearyingly he gave expression to his views, particularly on literary, religious and philosophical subjects, in opposition to the agnostic and rationalistic opinions then current in intellectual circles, as popularized by Huxley. A man of fearless honesty, quick and catholic sympathies, broad culture, and many friends in intellectual and religious circles, he became one of the most influential journalists of the day, his fine character and conscience earning universal respect and confidence. He was an original member of the Metaphysical Society (1869). He was an anti-vivisectionist, and a member of the royal commission (1875) on that subject. In 1858 he had married Eliza Roscoe, a cousin of his first wife; she died early in 1897, and Hutton's own death followed on the 9th of September of the same year.

Among his other publications may be mentioned Essays, Theo- logical and Literary (1871; revised 1888), and Criticisms on Con- temporary Thought and Thinkers (1894); and his opinions may be studied compendiously in the selections from his Spectator articles published in 1899 under the title of Aspects of Religious and Scientific Thought.

HUXLEY, THOMAS HENRY (1825-1895), English biologist, was born on the 4th of May 1825 at Ealing, where his father, George Huxley, was senior assistant-master in the school of Dr Nicholas. This was an establishment of repute, and is at any rate remarkable for having produced two men with so little in common in after life as Huxley and Cardinal Newman. The cardinal's brother, Francis William, had been " captain " of the school in 1821. Huxley was a seventh child (as his father had also been), and the youngest who survived infancy. Of Huxley's ancestry no more is ascertainable than in the case of most middle-class families. He himself thought it sprang from the Cheshire Huxleys of Huxley Hall. Different branches migrated south, one, now extinct, reaching London, where its members were apparently engaged in commerce. They estab- lished themselves for four generations at Wyre Hall, near Edmonton, and one was knighted by Charles II. Huxley describes his paternal race as " mainly Iberian mongrels, with a good dash of Norman and a little Saxon." 1 From his father he thought he derived little except a quick temper and the artistic faculty which proved of great service to him and reappeared in an even more striking degree in his daughter, the Hon. Mrs Collier. " Mentally and

physically," he wrote, " I am a piece of my mother." Her maiden name was Rachel Withers. " She came of Wiltshire people," he adds, and describes her as " a typical example of the Iberian variety." He tells us that " her most distinguishing characteristic was rapidity of thought. . . That peculiarity has been passed on to me in full strength " (Essays, i. 4). One of the not least striking facts in Huxley's life is that of education in the formal sense he received none. " I had two years of a pandemonium of a school (between eight and ten), and after that neither help nor sympathy in any intellectual direction till I reached manhood " (Life, ii. 145). After the death of Dr Nicholas the Ealing school broke up, and Huxley's father returned about 1835 to his native town, Coventry, where he had obtained a small appointment. Huxley was left to his own devices; few histories of boyhood could offer any parallel. At twelve he was sitting up in bed to read Hutton's Geology. His great desire was to be a mechanical engineer; it ended in his devotion to " the mechanical engineering of living 1 Nature, lxiii. 127.

machines." His curiosity in this direction was nearly fatal; a post-mortem he was taken to between thirteen and fourteen was followed by an illness which seems to have been the starting- point of the ill-health which pursued him all through life. At fifteen he devoured Sir William Hamilton's Logic, and thus acquired the taste for metaphysics, which he cultivated to the end. At seventeen he came under the influence of Thomas Carlyle's writings. Fifty years later he wrote: " To make things clear and get rid of cant and shows of all sorts. This was the lesson I learnt from Carlyle's books when I was a boy, and it has stuck by me all my life " (Life, ii. 268). Incidentally they led him to begin to learn German; he had already acquired French., At seventeen Huxley, with his elder brother James, commenced regular medical studies at Charing Cross Hospital, where they had both obtained scholarships. He studied under Wharton Jones, a physiologist who never seems to have attained the reputation he deserved. Huxley said of him: "I do not know that I ever felt so much respect for a teacher before or since " (Life, i. 20). At twenty he passed his first M.B. examina- tion at the University of London, winning the gold medal for anatomy and physiology; W. H. Ransom, the well-known Nottingham physician, obtaining the exhibition. In 1845 ■ he published, at the suggestion of Wharton Jones, his first scientific paper, demonstrating the existence of a hitherto unrecognized layer in the inner sheath of hairs, a layer that has been known since as " Huxley's layer."

Something had to be done for a livelihood, and at the sugges- tion of a fellow-student, Mr (afterwards Sir Joseph) Fayrer, he applied for an appointment in the navy. He passed the necessary examination, and at

the same time obtained the qualification of the Royal College of Surgeons. He was ” entered on the books of Nelson’s old ship, the ‘ Victory,’ for duty at Haslar Hospital.” Its chief, Sir John Richardson, who was a well-known Arctic explorer and naturalist, recognized Huxley’s ability, and pro- cured for him the post of surgeon to H.M.S. ” Rattlesnake,” about to start for surveying work in Torres Strait. The com- mander, Captain Owen Stanley, was a son of the bishop of Norwich and brother of Dean Stanley, and wished for an officer with some scientific knowledge. Besides Huxley the ” Rattle- snake ” also carried a naturalist by profession, John Macgillivray, who, however, beyond a dull narrative of the expedition, ac- complished nothing. The ” Rattlesnake ” left England on the 3rd of December 1846, and was ordered home after the lamented death of Captain Stanley at Sydney, to be paid off at Chatham on the gth of November 1850. The tropical seas teem with delicate surface-life, and to the study of this Huxley devoted himself with unremitting devotion. At that time no known methods existed by which it could be preserved for study in museums at home. He gathered a magnificent harvest in the almost unreaped field, and the conclusions he drew from it were the beginning of the revolution in zoological science which he lived to see accomplished.

Baron Cuvier (1769-1832), whose classification still held its ground, had divided the animal kingdom into four great embranchements. Each of these corresponded to an independent archetype, of which the “idea” had existed in the mind of the Creator. There was no other connexion between these classes, and the ” ideas ” which animated them were, as far as one can see, arbitrary. Cuvier’s groups, without their theoretical basis, were accepted by K. E. von Baer (1792-1876). The ” idea ” of the group, or archetype, admitted of endless variation within it; but this was subordinate to essential conformity with the archetype, and hence Cuvier deduced the important principle of the ” correlation of parts,” of which he made such conspicuous use in palaeontological reconstruction. Meanwhile the ” Naturphilosophen,” with J. W. Goethe (1740- 1832) and L. Oken (1770-1851), had in effect grasped the under- lying principle of correlation, and so far anticipated evolution by asserting the possibility of deriving specialized from simpler structures. Though they were still hampered by idealistic conceptions, they established morphology. Cuvier’s four great groups were Vertebrata, Mollusca, Articulata and Radiata.

It was amongst the members of the last class that Huxley found most

material ready to his hand in the seas of the tropics. It included organisms of the most varied kind, with nothing more in common than that their parts were more or less distributed round a centre. Huxley sent home ” communication after communication to the Linnean Society,” then a somewhat somnolent body, ” with the same result as that obtained by Noah when he sent the raven out of the ark ” (Essays, i. 13). His important paper, On the Anatomy and the Affinities of the Family of Medusae, met with a better fate. It was communicated by the bishop of Norwich to the Royal Society, and printed by it in the Philosophical Transactions in 1849. Huxley united, with the Medusae, the Hydroid and Sertularian polyps, to form a class to which he subsequently gave the name of Hydrozoa. This alone was no inconsiderable feat for a young surgeon who had only had the training of the medical school. But the ground on which it was done has led to far-reaching theoretical developments. Huxley realized that something more than superficial characters were necessary in determining the affinities of animal organisms. He found that all the members of the class consisted of two membranes enclosing a central cavity or stomach. This is characteristic of what are now called the Coelenterata. All animals higher than these have been termed Coelomata; they possess a distinct body-cavity in addition to the stomach. Huxley went further than this, and the most profound suggestion in his paper is the comparison of the two layers with those which appear in the germ of the higher animals. The consequences which have flowed from this prophetic generalization of the ectoderm and endoderm are familiar to every student of evolution. The conclusion was the more remarkable as at the time he was not merely free from any evolutionary belief, but actually rejected it. The value of Huxley’s work was immediately recognized. On returning to England in 1850 he was elected a Fellow of the Royal Society. In the following year, at the age of twenty-six, he not merely received the Royal medal, but was elected on the council. With absolutely no aid from any one he had placed himself in the front rank of English scientific men. He secured the friendship of Sir J. D. Hooker and John Tyndall, who remained his lifelong friends. The Admiralty retained him as a nominal assistant-surgeon, in order that he might work up the observations he had made during the voyage of the ” Rattlesnake.” He was thus enabled to produce various important memoirs, especially those on certain Ascidians, in which he solved the problem of Appendicularia — an organism whose place in the animal kingdom Johannes Miiller had found himself wholly unable to assign — and on the morphology of the Cephalous Mollusca.

Richard Owen, then the leading comparative anatomist in Great

Britain, was a disciple of Cuvier, and adopted largely from him the deductive explanation of anatomical fact from idealistic conceptions. He superadded the evolutionary theories of Oken, which were equally idealistic, but were altogether re- pugnant to Cuvier. Huxley would have none of either. Imbued with the methods of von Baer and Johannes Miiller, his methods were purely inductive. He would not hazard any statement beyond what the facts revealed. He retained, however, as has been done by his successors, the use of archetypes, though they no longer represented fundamental ” ideas ” but generalizations of the essential points of structure common to the individuals of each class. He had not wholly freed himself, however, from archetypal trammels. ” The doctrine,” he says, ” that every natural group is organized after a definite archetype . . . seems to me as important for zoology as the doctrine of definite pro- portions for chemistry.” This was in 1853. He further stated: ” There is no progression from a lower to a higher type, but merely a more or less complete evolution of one type ” (Phil. Trans., 1853, p. 63). As Chalmers Mitchell points out, this state- ment is of great historical interest. Huxley definitely uses the word ” evolution,” and admits its existence within the great groups. He had not, however, rid himself of the notion that the archetype was a property inherent in the group. Herbert Spencer, whose acquaintance he made in 1852, was unable to convert him to

evolution in its widest sense (Life, i. 168). He could not bring himself to acceptance of the theory — owing, no doubt, to his rooted aversion from a priori reasoning — without a mechanical conception of its mode of operation. In his first interview with Darwin, which seems to have been about the same time, he expressed his belief ” in the sharpness of the lines of demarca- tion between natural groups,” and was received with a humorous smile (Life, i. 169).

The naval medical service exists for practical purposes. It is not surprising, therefore, that after his three years’ nominal employment Huxley was ordered on active service. Though without private means of any kind, he resigned. The navy, however, retains the credit of having started his scientific career as well as that of Hooker and Darwin. Huxley was now thrown on his own resources, the immediate prospects of which were slender enough. As a matter of fact, he had not to wait many months. His friend, Edward Forbes, was appointed to the chair of natural history in Edinburgh, and in July 1854 he succeeded him as lecturer at the School of Mines and as naturalist to the Geological Survey in the following year. The latter post he hesitated at first to accept, as he ” did not care for fossils ” (Essays, i. 15). In 1855 he married Miss H. A. Heathorn, whose acquaintance he

had made in Sydney. They were engaged when Huxley could offer nothing but the future promise of his ability. The confidence of his devoted helpmate was not mis- placed, and her affection sustained him to the end, after she had seen him the recipient of every honour which English science could bestow. His most important research belonging to this period was the Croonian Lecture delivered before the Royal Society in 1858 on ” The Theory of the Vertebrate Skull.” In this he completely and finally demolished, by applying as before the inductive method, the idealistic, if in some degree evolutionary, views of its origin which Owen had derived from Goethe and Oken. This finally disposed of the ” archetype,” and may be said once for all to have liberated the English anatomical school from the deductive method.

In 1859 The Origin of Species was published. This was a momentous event in the history of science, and not least for Huxley. Hitherto he had turned a deaf ear to evolution. ” I took my stand,” he says, ” upon two grounds: firstly, that . . . the evidence in favour of transmutation was wholly insufficient; and secondly, that no suggestion respecting the causes of the transmutation assumed, which had been made, was in any way adequate to explain the phenomena ” (Life, i. 168). Huxley had studied Lamarck ” attentively,” but to no purpose. Sir Charles Lyell ” was the chief agent in smoothing the road for Darwin. For consistent uniformitarianism postulates evolution as much in the organic as in the inorganic world” (I.e.); and Huxley found in Darwin what he had failed to find in Lamarck, an intelligible hypothesis good enough as a working basis. Yet with the transparent candour which was characteristic of him, he never to the end of his life concealed the fact that he thought it wanting in rigorous proof. Darwin, however, was a naturalist; Huxley was not. He says: “I am afraid there is very little of the genuine naturalist in me. I never collected anything, and species- work was always a burden to me; what I cared for was the architectural and engineering part of the business ” (Essays, i. 7). But the solution of the problem of organic evolu- tion must work upwards from the initial stages, and it is precisely for the study of these that ” species- work ” is necessary. Darwin, by observing the peculiarities in the distribution of the plants which he had collected in the Galapagos, was started on the path that led to his theory. Anatomical research had only so far led to transcendental hypothesis, though in Huxley’s hands it had cleared the decks of that lumber. He quotes with approval Darwin’s remark that ” no one has a right to examine the question of species who has not minutely described many ” (Essays, ii. 283). The rigorous proof which Huxley demanded was the production of species sterile to one another by selective breeding (Life, i. 193).

But this was a misconception of the question. Sterility is a physiological character, and the specific differences which the theory undertook to account for are

morphological; there is no necessary nexus between the two. Huxley, however, felt that he had at last a secure grip of evolution. He warned Darwin: ” I will stop at no point as long as clear reasoning will carry me further” {Life, i. 172). Owen, who had some evolutionary tendencies, was at first favourably disposed to Darwin’s theory, and even claimed that he had to some extent anticipated it in his own writings. But Darwin, though he did not thrust it into the foreground, never flinched from recognizing that man could not be excluded from his theory. ” Light will be thrown on the origin of man and his history ” (Origin, ed. i. 488). Owen could not face the wrath of fashionable orthodoxy. In his Rede Lecture he endeavoured to save the position by asserting that man was clearly marked off from all other animals by the anatomical structure of his brain. This was actually inconsistent with known facts, and was effectually refuted by Huxley in various papers and lectures, summed up in 1 863 in Man’s Place in Nature. This ” monkey damnification ” of mankind was too much even for the ” veracity ” of Carlyle, who is said to have never forgiven it. Huxley had not the smallest respect for authority as a basis for belief, scientific or other- wise. He held that scientific men were morally bound ” to try all things and hold fast to that which is good ” (Life, ii. 161). Called upon in 1862, in the absence of the president, to deliver the presi- dential address to the Geological Society, he disposed once for all of one of the principles accepted by geologists, that similar fossils in distinct regions indicated that the strata containing them were contemporary. All that could be concluded, he pointed out, was that the general order of succession was the same. In 1854 Huxley had refused the post of palaeontologist to the Geological Survey; but the fossils for which he then said that he ” did not care ” soon acquired importance in his eyes, as supplying evidence for the support of the evolutionary theory. The thirty-one years during which he occupied the chair of natural history at the School of Mines were largely occupied with palaeontological research. Numerous memoirs on fossil fishes established many far-reaching morphological facts. The study of fossil reptiles led to his demonstrating, in the course of lectures on birds, delivered at the College of Surgeons in 1867, the fundamental affinity of the two groups which he united under the title of Sauropsida. An incidental result of the same course was his proposed

rearrangement of the zoological regions into which P. L. Sclater had divided the world in 1857. Huxley anticipated, to a large extent, the results at which botanists have since arrived: he proposed as primary divisions, Arctogaea — to include the land areas of the northern hemisphere — and Notogaea for the remainder. Successive waves of life originated in and spread from the northern area, the survivors of the more ancient types finding successively a refuge in the south. Though Huxley had accepted the Darwinian theory as a working hypothesis, he never succeeded in firmly grasping it in detail. He thought ” evolution might conceivably have taken place without the development of groups possessing the characters of species ” (Essays, v. 41). His palaeontological researches ultimately led him to dispense with Darwin. In 1892 he wrote: ” The doctrine of evolution is no speculation, but a generalization of certain facts . . . classed by biologists under the heads of Embryology and of Palaeontology ” (Essays, v. 42). Earlier in 1 88 1 he had asserted even more emphatically that if the hypothesis of evolution ” had not existed, the palaeontologist would have had to invent it ” (Essays, iv. 44).

From 1870 onwards he was more and more drawn away from scientific research by the claims of public duty. Some men yield the more readily to such demands, as their fulfilment is not unaccompanied by public esteem. But he felt, as he himself said of Joseph Priestley, ” that he was a man and a citizen before he was a philosopher, and that the duties of the two former positions are at least as imperative as those of the latter ” (Essays, iii. 13). From 1862 to 1884 he served on no less than ten Royal Commissions, dealing in every case with subjects of great importance, and in many with matters of the gravest moment to the community. He held and filled with invariable dignity and distinction more public positions than

have perhaps ever fallen to the lot of a scientific man in England. From 1871 to 1880 he was a secretary of the Royal Society. From 1881 to 1885 he was president. For honours he cared little, though they were within his reach; it is said that he might have received a peerage. He accepted, however, in 1892, a Privy Councillorship, at once the most democratic and the most aristocratic honour accessible to an English citizen. In 1870 he was president of the British Association at Liverpool, and in the same year was elected a member of the newly constituted London School Board. He resigned the latter position in 1872, but in the brief period during which he acted, probably more than any man, he left his mark on the foundations of national elementary education. He made war on the scholastic methods which wearied the mind in merely taxing the memory; the children were to be prepared to take their place worthily in the

community. Physical training was the basis; domestic economy, at any rate for girls, was insisted upon, and for all some development of the aesthetic sense by means of drawing and singing. Reading, writing and arithmetic were the in- dispensable tools for acquiring knowledge, and intellectual discipline was to be gained through the rudiments of physical science. He insisted on the teaching of the Bible partly as a great literary heritage, partly because he was ” seriously perplexed to know by what practical measures the religious feeling, which is the essential basis of conduct, was to be kept up, in the present utterly chaotic state of opinion in these matters, without its use ” (Essays, iii. 397). In 1872 the School of Mines was moved to South Kensington, and Huxley had, for the first time after eighteen years, those appliances for teaching beyond the lecture room, which to the lasting injury of the interests of biological science in Great Britain had been withheld from him by the short-sightedness of government. Huxley had only been able to bring his influence to bear upon his pupils by oral teaching, and had had no opportunity by personal intercourse in the laboratory of forming a school. He was now able to organize a system of instruction for classes of elementary teachers in the general principles of biology, which indirectly affected the teaching of the subject throughout the country.

The first symptoms of physical failure to meet the strain of the scientific and public duties demanded of him made some rest imperative, and he took a long holiday in Egypt. He still continued for some years to occupy himself mainly with verte- brate morphology. But he seemed to find more interest and the necessary mental stimulus to exertion in lectures, public addresses and more or less controversial writings. His health, which had for a time been fairly restored, completely broke down again in 1885. In 1890 he removed from London to East- bourne, where after a painful illness he died on the 29th of June 1895.

The latter years of Huxley’s life were mainly occupied with contributions to periodical literature on subjects connected with philosophy and theology. The effect produced by these on popular opinion was profound. This was partly due to his position as a man of science, partly to his obvious earnestness and sincerity, but in the main to his strenuous and attractive method of exposition. Such studies were not wholly new to him, as they had more or less engaged his thoughts from his earliest days. That his views exhibit some process of development and are not wholly consistent was, therefore, to be expected, and for this reason it is not easy to summarize them as a connected body of teaching. They may be found perhaps in their most systematic form in the volume on Hume published in 1879.

Huxley's general attitude to the problems of theology and philosophy was technically that of scepticism. " I am," he wrote, " too much of a sceptic to deny the possibility of anything " (Life-, iL 127). " Doubt is a beneficent demon " (Essays, ix. 56). He was anxious, nevertheless, to avoid the accusation of Pyrrhonism (Life, ii. 280), but the Agnosticism which he defined to express his position in 1869 suggests the Pyrrhonist Aphasia. The only approach to certainty which he admitted lay in the order of nature. "The conception of the constancy of the order of nature has become the dominant idea of modern thought. . . . Whatever may be man's speculative doctrines, it is quite certain that every intelligent person guides his life and risks his fortune upon the belief that the order of nature is constant, and that the chain of natural causation is never broken." He adds, however, that "it by no means necessarily follows that we are justified in expanding this generalization into the infinite past " (Essays, iv. 47, 48). This was little more than a pious

reservation, as evolution implies the principle of continuity (I.e. p. 55). Later he stated his belief even more absolutely: " If there is anything in the world which I do firmly believe in, it is the universal validity of the law of causation, but that universality cannot be proved by any amount of experience " (Essays, ix. 121). The assertion that " There is only one method by which intellectual truth can be reached, whether the subject-matter of investigation belongs to the world of physics or to the world of consciousness " (Essays, ix. 126) laid him open to the charge of materialism, which he vigorously repelled. His defence, when he rested it on the imperfection of the physical analysis of matter and force (I.e. p. 131), was irrelevant; he was- on sounder ground when he contended with Berkeley " that our certain knowledge does not extend beyond our states of conscious- ness " (I.e. p. 130). " Legitimate materialism, that is, the extension of the conceptions and of the methods of physical science to the highest as well as to the lowest phenomena of vitality, is neither more nor less than a sort of shorthand idealism " (Essays, i. 194). While " the substance of matter is a metaphysical unknown quality of the existence of which there is no proof . . . the non-existence of a substance of mind is equally arguable ; . . . the result … is the reduction of the All to co-existences and sequences of phenomena beneath and beyond which there is nothing cognoscible " (Essays, ix. 66). Hume had defined a miracle as a " violation of the laws of nature." Huxley refused to accept this. While, on the one hand, he

insists that ” the whole fabric of practical life is built upon our faith in its continuity ” (Hume, p. 129), on the other ” nobody can presume to say what the order of nature must be ” ; this ” knocks the bottom out of all a priori objections either to ordinary ‘miracles’ or to the efficacy of prayer ” (Essays, v. 133). ” If by the term miracles we mean only extremely wonderful events, there can be no just ground for denying the possibility of their occurrence ” (Hume, p. 134). Assuming the chemical elements to be aggregates of uniform primitive matter, he saw no more theoretical difficulty in water being turned into alcohol in the miracle at Cana, than in sugar undergoing a similar conversion (Essays, v. 81). The credibility of miracles with Huxley is a question of evidence. It may be remarked that a scientific explanation is destructive of the supernatural character of a miracle, and that the demand for evidence may be so framed as to preclude the credibility of any historical event. Throughout his life theology had a strong attraction, not without elements of repulsion, for Huxley. The circumstances of his early training, when Paley was the ” most interesting Sunday reading allowed him when a boy ” (Life, ii. 57), probably had something to do with both. In i860 his beliefs were apparently theistic: ” Science seems to me to teach in the highest and strongest manner the great truth which is embodied in the Christian conception of entire surrender to the will of God ” (Life, i. 219). In 1885 he formulates ” the perfect ideal of religion ” in a passage which has become almost famous: ” In the 8th century B.C. in the heart of a world of idolatrous polytheists, the Hebrew prophets put forth a conception of religion which appears to be as wonderful an inspiration of genius as the art of Pheidias or the science of Aristotle. ‘ And what doth the Lord require of thee, but to do justly, and to love mercy, and to walk numbly with thy God ‘ ” (Essays, iv. 161). Two years later he was writing: ” That there is no evidence of the existence of such a being as the God of the theologians is true enough ” (Life, ii. 162). He insisted, however, that ” atheism is on purely philosophical grounds untenable ” (I.e.). His theism never really advanced beyond the recognition of ” the passionless impersonality of the unknown and unknowable, which science shows everywhere under- lying the thin veil of phenomena ” (Life, i. 239) ; In other respects his personal creed was a kind of scientific Calvinism. There is an interesting passage in an essay written in 1892, “An Apologetic Eirenicon/’ which has not been republished, which illustrates this: ” It is the secret of the superiority of the best theological teachers to the majority of their opponents that they substantially recognize these realities of things, however strange the forms in which they clothe their conceptions. The doctrines of predestination, of original sin, of the innate depravity of man and the evil fate of the greater part of the race, of the primacy of

Satan in this world, of the essential vileness of matter, of a malevolent Demiurgus subordinate to a benevolent Almighty, who has only lately revealed himself, faulty as they are, appear to me to be vastly nearer the truth than the ‘ liberal ‘ popular illusions that babies are all born good, and that the example of a corrupt society is responsible for their failure to remain so ; that it is given to everybody to reach the ethical ideal if he will only try; that all partial evil is universal good, and other optimistic figments, such as that which represents ‘ Providence ‘ under the guise of a paternal philanthropist, and bids us believe that everything will come right (according to our notions) at last.” But his ” slender definite creed,” R. H. Hutton, who was associated with him in the Metaphysical Society, thought — and no doubt rightly — in no respect ” represented the cravings of his larger nature.’

From 1880 onwards till the very end of his life, Huxley was continuously occupied in a controversial campaign against orthodox beliefs. As Professor W. F. R. Weldon justly said of his earlier polemics: “They were certainly among the principal agents in winning a larger measure of toleration for the critical examination of fundamental beliefs, and for the free expression of honest reverent doubt.” He threw Christianity overboard bodily and with little

appreciation of its historic effect as a civilizing agency. He thought that ” the exact nature of the teachings and the convictions of Jesus is extremely uncertain ” (Essays, v. 348). ” What we are usually pleased to call religion nowadays is, for the most part, Hellenized Judaism ” (Essays, iv. 162). His final analysis of what ” since the second century, has assumed to itself the title of Orthodox Christianity ” is a ” varying compound of some of the best and some of the worst elements of Paganism and Judaism, moulded in practice by the innate character of certain people of the Western world ” (Essays, v. 142). He concludes ” That this Christianity is doomed to fall is, to my mind, beyond a doubt; but its fall will neither be sudden nor speedy ” (I.e.). He did not omit, however, to do justice to ” the bright side of Christianity,” and was deeply impressed with the life of Catherine of Siena. Failing Christianity, he thought that some other ” hypostasis of men’s hopes ” will arise (Essays, v. 254). His latest speculations on ethical problems are perhaps the least satisfactory of his writings. In 1892 he wrote: ” The moral sense is a very complex affair — dependent in part upon associations of pleasure and pain, approbation and disapprobation, formed by education in early youth, but in part also on an innate sense of moral beauty and ugliness (how originated need not be discussed), which is possessed by some people in great strength, while some are totally devoid of it ‘ (Life, ii. 305). This is an intuitional theory, and he compares the moral with the aesthetic sense, which he

repeatedly declares to be intuitive; thus: “All the understanding in the world will neither increase nor diminish the force of the intuition that this is beautiful and this is ugly ” (Essays, ix. 80). In the Romanes Lecture delivered in 1894, in which this passage occurs, he defines ” law and morals ” to be ” restraints upon the struggle for existence between men in society.” It follows that ” the ethical process is in opposition to the cosmic process,” to which the struggle for existence belongs (Essays, ix. 31). Apparently he thought that the moral sense in its origin was intuitional and in its development utilitarian. ” Morality commenced with society ” (Essays, v. 52). The ” ethical process ‘ is the ” gradual strengthening of the social bond ” (Essays, ix. 35). ” The cosmic process has no sort of relation to moral ends ” (I.e. p. 83) ; ” of moral purpose I see no trace in nature. That is an article of exclusive human manufacture ” (Life, ii. 268). The cosmic process Huxley identified with evil, and the ethical process with good; the two are in necessary conflict. ” The reality at the bottom of the doctrine of original sin ” is the ” innate tendency to self-assertion ” inherited by man from the cosmic order (Essays, ix. 27). ” The actions we call sinful are part and parcel of the struggle for existence ” (Life, ii. 282). ” The prospect of attaining untroubled happiness ” is ” an illusion ” (Essays, ix. 44), and the cosmic process in the long run will get the best of the contest, and ” resume its sway ” when evolution enters on its downward course (I.e. p. 45). This approaches pure pessimism, and though in Huxley’s view the ” pessimism of Schopenhauer is a nightmare ” (Essays, ix. 200), his own philosophy of life is not distinguishable, and is often expressed in the same language. The cosmic order is obviously non-moral (Essays, ix. 197). That it is, as has been said, immoral is really meaningless. Pain and suffering are affections which imply a complex nervous organization, and we are not justified in projecting them into nature external to ourselves. Darwin and A. R. Wallace disagreed with Huxley in seeing rather the joyous than the suffering side of nature. Nor can it be assumed that the descending scale of evolution will reproduce the ascent, or that man will ever be conscious of his doom.

As has been said, Huxley never thoroughly grasped the Darwinian principle. He thought ” transmutation may take place without transition ” ‘(Life, i. 173). In other words, that evolution is accomplished by leaps and not by the accumulation of small variations. He recognized the ” struggle for existence ” but not the gradual adjustment of the organism to its environment which is implied in ” natural selection.” In highly civilized societies he thought that the former was at an end (Essays, ix. 36) and had been replaced by the ” struggle for enjoyment ” (I.e. p. 40). But a consideration of the

stationary population of France might have shown him that the effect in the one case may be as restrictive as in the other. So far from natural selection being in abeyance under modern social conditions, ” it is,” as Professor Karl Pearson points out, ” some- thing we run up against at once, almost as soon as we examine a mortality table ” (Biometrika, i. 76). The inevitable conclusion, whether we like it or not, is that the future evolution of humanity is as much a part of the cosmic process as its past history, and Huxley’s attempt to shut the door on it cannot be maintained scientifically.” , Authorities. — Life and Letters of Thomas Henry Huxley, by his son Leonard Huxley (2 vols., 1900); Scientific Memoirs of T. H. Huxley (4 vols., 1898-1901); Collected Essays by T. H. Huxley (9 vols., 1898) ; Thomas Henry Huxley, a Sketch of his Life and Work, by P. Chalmers Mitchell, M.A. (Oxon., 1900); a critical study founded on careful research and of great value. (W. T. T.-D.)

HUY (Lat. Hoium, and Flem. Hoey), a town of Belgium, on the right bank of the Meuse, at the point where it is joined by the Hoyoux. Pop. (1Q04), 14,164. It is 19 m. E. of Namur and a trifle less west of Liege. Huy certainly dates from the 7th ceˆ‘ury, and, according to some, was founded by the emperor

Antoninus in a.d. 148. Its situation is striking, with its grey citadel crowning a grey rock, and the fine collegiate church (with a 13th-century gateway) of Notre Dame built against it. The citadel is now used partly as a depot of military equipment and partly as a prison. The ruins are still shown of the abbey of Neumoustier founded by Peter the Hermit on his return from the first crusade. He was buried there in 1115, and a statue was erected to his memory in the abbey grounds in 1858. Neumoustier was one of seventeen abbeys in this town alone dependent on the bishopric of Liege. Huy is surrounded by vineyards, and the bridge which crosses the Meuse at this point connects the fertile Hesbaye north of the river with the rocky and barren Condroz south of it.

HUYGENS, CHRISTIAAN (1620-1695), Dutch mathematician, mechanician, astronomer and physicist, was born at the Hague on the 14th of April 1629. He was the second son of Sir Constantijn Huygens. From his father he received the rudiments of his education, which was continued at Leiden under A. Vinnius and F. van Schooten, and completed in the juridical school of Breda. His mathematical bent,

however, soon diverted him from legal studies, and the perusal of some of his earliest theorems enabled Descartes to predict his future greatness. In 1649 he accompanied the mission of Henry, count of Nassau, to Denmark, and in 1651 entered the lists of science as an assailant of the unsound system of quadratures adopted by Gregory of St Vincent. This first essay (Exetasis quadraturae circuit, Leiden, 1651) was quickly succeeded by his Theoremala de quadratura hyperboles, ellipsis, et circuli; while, in a treatise entitled De circuli magnitudine inventa, he made, three years later, the closest approximation so far obtained to the ratio of the circumference to the diameter of a circle.

Another class of subjects was now to engage his attention. The improvement of the telescope was justly regarded as a sine qua non for the advancement of astronomical knowledge. But the difficulties interposed by spherical and chromatic aberration had arrested progress in that direction until, in 1655, Huygens, working with his brother Constantijn, hit upon a new method of grinding and polishing lenses. The immediate results of the clearer definition obtained were the detection of a satellite to Saturn (the sixth in order of distance from its primary), and the resolution into their true form of the abnormal appendages to that planet. Each discovery in turn was, according to the prevailing custom, announced to the learned world under the veil of an anagram — removed, in the case of the first, by the publication, early in 1656, of the little tract De Salurni luna observatio nova; but retained, as regards the second, until 1659, when in the Sy sterna Saturnium the varying appearances of the so-called ” triple planet ” were clearly explained as the phases of a ring inclined at an angle of 28 to the ecliptic. Huygens was also in 1656 the first effective observer of the Orion nebula; he delineated the bright region still known by his name, and detected the multiple character of its nuclear star. His applica- tion of the pendulum to regulate the movement of clocks sprang from his experience of the need for an exact measure of time in observing the heavens. The invention dates from 1656; on the 16th of June 1657 Huygens presented his first ” pendulum- clock ” to the states-general; and the Horologium, containing a description of the requisite mechanism, was published in

1658.

His reputation now became cosmopolitan. As early as 1655 the university of Angers had distinguished him with an honorary degree of doctor of laws. In 1663, on the occasion of his second visit to England, he was elected a fellow of the Royal Society, and imparted to that body in January 1669 a clear and concise statement of the laws governing the collision of elastic bodies. Although these conclusions

were arrived at independently, and, as it would seem, several years previous to their publication, they were in great measure anticipated by the communications on the same subject of John Wallis and Christopher Wren, aiade respectively in November and December 1668.

Huygens had before this time fixed his abode in France. In 1665 Colbert made to him on behalf of Louis XIV. an offer

too tempting to be refused, and between the following year and 1681 his residence in the philosophic seclusion of the Bibliotheque du Roi was only interrupted by two short visits to his native country. His magnum opus dates from this period. The Horologium oscillalorium, published with a dedication to his royal patron in 1673, contained original discoveries sufficient to have furnished materials for half a dozen striking disquisitions. His solution of the celebrated problem of the “centre of oscilla- tion ” formed in itself an important event in the history of mechanics. Assuming as an axiom that the centre of gravity of any number of interdependent bodies cannot rise higher than the point from which it fell, he arrived, by anticipating in the particular case the general principle of the conservation of vis viva, at correct although not strictly demonstrated con- clusions. His treatment of the subject was the first successful attempt to deal with the dynamics of a system. The determina- tion of the true relation between the length of a pendulum and the time of its oscillation; the invention of the theory of evolutes; the discovery, hence ensuing, that the cycloid is its own evolute, and is strictly isochronous; the ingenious although practically inoperative idea of correcting the ” circular error ” of the pendulum by applying cycloidal cheeks to clocks — were all contained in this remarkable treatise. The theorems on the composition of forces in circular motion with which it concluded formed the true prelude to Newton’s Principia, and would alone suffice to establish the claim of Huygens to the highest rank among mechanical inventors.

In 1 68 1 he finally severed his French connexions, and returned to Holland. The harsher measures which about that time began to be adopted towards his co-religionists in France are usually assigned as the motive of this step. He now devoted himself during six years to the production of lenses of enormous focal distance, which, mounted on high poles, and connected with the eye-piece by means of a cord, formed what were called ” aerial telescopes.” Three of his object-glasses, of respectively 123, 180 and 210 ft. focallength, are in the possession of the Royal Society. He also succeeded in constructing an almost perfectly achromatic eye-piece, still known by his name. But his re- searches in physical optics constitute his chief title-deed to

immortality. Although Robert Hooke in 1668 and Ignace Pardies in 1672 had adopted a vibratory hypothesis of light, the conception was a mere floating possibility until Huygens provided it with a sure foundation. His powerful scientific imagination enabled him to realize that all the points of a wave- front originate partial waves, the aggregate effect of which is to reconstitute the primary disturbance at the subsequent stages of its advance, thus accomplishing its propagation; so that each primary undulation is the envelope of an indefinite number of secondary undulations. This resolution of the original wave is the well-known " Principle of Huygens," and by its means he was enabled to prove the fundamental laws of optics, and to assign the correct construction for the direction of the extra- ordinary ray in uniaxial crystals. These investigations, together with his discovery of the " wonderful phenomenon " of polariza- tion, are recorded in his Traite de la lumiere, published at Leiden in 1690, but composed in 1678. In the appended treatise Sur la Cause de la pesanteur, he rejected gravitation as a universal quality of matter, although admitting the Newtonian theory of the planetary revolutions. From his views on centri- fugal force he deduced the oblate figure of the earth, estimating its compression, however, at little more than one-half its actual amount.

Huygens never married. He died at the Hague on the 8th of June 1695, bequeathing his manuscripts to the university of Leiden, and his considerable property to the sons of his younger brother. In character he was as estimable as he was brilliant in intellect. Although, like most men of strong originative power, he assimilated with difficulty the ideas of others, his tardiness sprang rather from inability to depart from the track of his own methods than from reluctance to acknowledge the merits of his competitors.

In addition to the works already mentioned, his Cosmotheoros —

a speculation concerning the inhabitants of the planets— was printed posthumously at the Hague in 1698, and appeared almost simultane- ously in an English translation. A volume entitled Opera posthuma (Leiden, 1703) contained his " Dioptrica," in which the ratio between the respective focal lengths of object-glass and eye-glass is given as the measure of magnifying power, together with the shorter essays De yitris figurandis, De corona et parheliis, &c. An early tract De ratiociniis in ludo aleae, printed in 1657 with Schooten's Exercita-

tiones mathematicae, is notable as one of the first formal treatises on the theory of probabilities; nor should his investigations of the properties of the cissoid, logarithmic and catenary curves be left unnoticed. His invention of the spiral watch-spring was explained m the Journal des savants (Feb. 25, 1675). An edition of his works was published by G. J. ‘s Gravesande, in four quarto volumes entitled Opera varia (Leiden, 1724) and Opera reliqua (Amsterdam, 1728). His scientific correspondence was edited by P. J. Uylenbroek from manuscripts preserved at Leiden, with the title Christiani Hugenii aliommque seculi X VII. virorum cclebrium exercitationes mathematicae et philosophicae (the Hague, 1833).

The publication of a monumental edition of the letters and works of Huygens was undertaken at the Hague by the Society Hollandaise des Sciences, with the heading CEuvres de Christian Huygens (1888), &c. Ten quarto volumes, comprising the whole of his correspondence, had already been issued in 1905. A biography of Huygens was prefixed to his Opera varia (1724); his Eloge in the character of a French academician was printed by J. A. N. Condorcet in 1773. Consult further: P. J. Uylenbroek, Oratio de fratribus Chrisliano atque Constantino Hugenio (Groningen, 1838) ; P. Harting, Christiaan Huygens in zijn Leven en Werken geschetzt (Groningen, 1868) ; J. B. J. Delambre, Hist, de I’astronomie moderne (ii. 549) ; J. E. Montucla, Hist, des mathematiques (ii. 84, 412, 549); M. Chasles, Apercu historique sur I’origine des methodes en geometrie, pp. 101-109; E. Diihring, Kritische Geschichte der allgemeinen Principien der Mechanik, Abschnitt (ii. 120, 163, iii. 227); A. Berry, A Short History of Astronomy, p. 200; R. Wolf, Geschichte der Asironomie, passim; Houzeau, Bibliographic astronomique (ii. 169) ; F. Kaiser, Astr. Nach. (xxv. 245, 1847); Tijdschrift voor de Wetenschappen (i. 7, 1848); Allgemeine deutsche Biographie (M. B. Cantor) ; J. C. Poggendorff, Biog. lit. Handworterbuch. (A. M. C.)

HUYGENS, SIR CONSTANTIJN (1596-1687), Dutch poet and diplomatist, was born at the Hague on the 4th of September 1596. His father, Christiaan Huygens, was secretary to the state council, and a man of great political importance. At the baptism of the child, the city of Breda was one of his sponsors, and the admiral Justinus van Nassau the other. He was trained in every polite accomplishment, and before he was seven could speak French with fluency. He was taught Latin by Johannes Dedelus, and soon became a master of classic versification. He developed not only extraordinary intellectual gifts but great physical beauty and strength, and was one of the most accomplished athletes and gymnasts of his age; his skill in playing the lute and in the arts of painting and engraving attracted general attention before

he began to develop his genius as a writer. In 1616 he proceeded, with his elder brother, to the university of Leiden. He stayed there only one year, and in 1618 went to London with the English ambassador Dudley Carleton; he remained in London for some months, and then went to Oxford, where he studied for some time in the Bodleian Library, and to Woodstock, Windsor and Cambridge; he was introduced at the English court, and played the lute before James I. The most interesting feature of this visit was the intimacy which sprang up between the young Dutch poet and Dr Donne, for whose genius Huygens preserved through life an unbounded admiration. He returned to Holland in company with the English contingent of the synod of Dort, and in 16 19 he proceeded to Venice in the diplomatic service of his country; on his return he nearly lost his life by a foolhardy exploit, namely, the scaling of the topmost spire of Strassburg cathedral. In 162 1 he published one of his most weighty and popular poems, his Batava Tempe, and in the same year he proceeded again to London, as secretary to the ambassador, Wijngaerdan, but returned in three months. His third diplo- matic visit to England lasted longer, from the 5th of December 1621 to the 1st of March 1623. During his absence, his volume of satires, '/ Costelick Mai, dedicated to Jacob Cats, appeared at the Hague. In the autumn of 1622 he was knighted by James I. He published a large volume of miscellaneous poems in 1625 under the title of Otiorum libri sex; and in the same year he was appointed private secretary to the stadholder.

In 1627 Huygens married Susanna van Baerle, and settled at the Hague; four sons and a daughter were born to them. In 1630 Huygens was called to a seat in the privy council, and he continued to exercise political power with wisdom and vigour for many years, under the title of the lord of Zuylichem. In 1634 he is supposed to have completed his long-talked-of version of the poems of Donne, fragments of which exist. In 1637 his wife died,- and he immediately began to celebrate the virtues and pleasures of their married life in the remarkable didactic poem called Dagwerck, which was not published till long after- wards. From 1639 to 1641 he occupied himself by building a magnificent house and garden outside the Hague, and by celebrating their beauties in a poem entitled Hofwijck, which was published in 1653. In 1647 he wrote his beautiful poem of Oogentroost or " Eye Consolation," to gratify his blind friend Lucretia van Trollo. He made his solitary effort in the dramatic line in 1657, when he brought out his comedy of Trijntje Cornells Klachl, Which deals, in rather broad humour, with the adventures of the wife of a ship's captain at Zaandam. In 1658 he rearranged his poems, and issued them with many additions, under the title of Corn Flowers. He

proposed to the government that the present highway from the Hague to the sea at Scheveningen should be constructed, and during his absence on a diplomatic mission to the French court in 1666 the road was made as a compliment to the venerable statesman, who expressed his gratitude in a descriptive poem entitled Zeestraet. Huygens edited his poems for the last time in 1672, and died in his ninety- first year, on the 28th of March 1687. He was buried, with the pomp of a national funeral, in the church of St Jacob, on the 4th of April. His second son, Christiaan, the eminent astronomer, is noticed separately.

Constantijn Huygens is the most brilliant figure in Dutch literary history. Other statesmen surpassed him in political influence, and at least two other poets surpassed him in the value and originality of their writings. But his figure was more dignified and, splendid, his talents were more varied, and his general accomplishments more remarkable than those of any other person of his age, the greatest age in the history of the Netherlands. Huygens is the grand seigneur of the republic, the type of aristocratic oligarchy, the jewel and ornament of Dutch liberty. When we consider his imposing character and the positive value of his writings, we may well be surprised that he has not found a modern editor. It is a disgrace to Dutch scholar- ship that no complete collection of the writings of Huygens exists. His autobiography, De vita propria sermonum libri duo, did not see the light until 1817, and his remarkable poem, Chiyswerck, was not printed until 1841. As a poet Huygens shows a finer sense of form than any other early Dutch writer; the language, in his hands, becomes as flexible as Italian. His epistles and lighter pieces, in particular, display his metrical ease and facility to perfection. (E. G.)

HUYSMANS, the name of four Flemish painters who matricu- lated in the Antwerp gild in the 17th century. Cornelis the elder, apprenticed in 1633, passed for a mastership in 1636, and remained obscure. Jacob, apprenticed to Frans Wouters in 1650, wandered to England towards the close of the reign of Charles II., and competed with Lely as a fashionable portrait painter. He executed a portrait of the queen, Catherine of Braganza, now in the national portrait gallery, and Horace Walpole assigns to him the likeness of Lady Bellasys, catalogued at Hampton Court as a work of Lely. His portrait of Izaak Walton in the National Gallery shows a disposition to imitate the styles of Rubens and Van Dyke. According to most accounts he died in London in 1696. Jan Baptist Huysmans, born at Antwerp in 1654, matriculated in 1676-1677, and died there in 1715-1716- He was younger brother to Cornelis Huysmans the second, who was born at Antwerp in 1648, and educated by Gaspar de Wit and Jacob van Artois. Of Jan Baptist little or nothing has been preserved, except that

he registered numerous apprentices at Antwerp, and painted a landscape dated 1697 now in the Brussels museum. Cornelis the second is the only master of the name of Huysmans whose talent was largely acknowledged. He received lessons from two artists, one of whom was familiar with the Roman art of the Poussins, whilst the other inherited the scenic style of the school of Rubens. He combined the two in a rich, highly coloured, and usually effective style, which, however, was not free from monotony.

Seldom attempting anything but woodside views with fancy backgrounds, half Italian, half Flemish, he painted with great facility, and left numerous examples behind. At the outset of his career he practised at Malines, where he married in 1682, and there too he entered into some business connexion with van der Meulen, for whom he painted some backgrounds. In 1706 he withdrew to Antwerp, where he resided till 1717, returning then to Malines, where he died on the 1st of June

1727.

Though most of his pictures were composed for cabinets rather than churches, he sometimes emulated van Artois in the production of large sacred pieces, and for many years his ” Christ on the Road to Emmaus ” adorned the choir of Notre Dame of Malines. In the gallery of Nantes, where three of his small landscapes are preserved, there hangs an ” Investment of Luxembourg,” by van der Meulen, of which he is known to have laid in the background. The national galleries of London and Edinburgh contain each one example of his skill. Blenheim, too, and other private galleries in England, possess one or more of his pictures. But most of his works are on the European continent.

HUYSMANS, JORIS KARL (1848-1007), French novelist, was born at Paris on the 5th of February 1848. He belonged to a family of artists of Dutch extraction; he entered the ministry of the interior, and was pensioned after thirty years’ service. His earliest venture in literature, Le Drageoir a Spices (1874), contained stories and short prose poems showing the influence of Baudelaire. Marthe (1876), the life of a courtesan, was published in Brussels, and Huysmans contributed a story, ” Sac au dos,” to Les Soirees de Midan, the collection of stories of the Franco-German war published by Zola. He then pro- duced a

series of novels of everyday life, including Les Sosurs Vatard (1879), En Menage (1 88 1) , and ˆ vau-l'eau (1 88 2) , in which he outdid Zola in minute and uncompromising realism. He was influenced, however, more directly by Flaubert and the brothers de Goncourt than by Zola. In L' Art moderne (1883) he gave a careful study of impressionism and in Certains (1889) a series of studies of contemporary artists. .4 Rebours (1884), the history of the morbid tastes of a decadent aristocrat, des Esseintes, created a literary sensation, its caricature of literary and artistic symbolism covering much of the real beliefs of the leaders of the aesthetic revolt. In Ld-Bas Huysmans's most characteristic hero, Durtal, makes his appearance. Durtal is occupied in writing the life of Gilles de Rais; the insight he gains into Satanism is supplemented by modern Parisian students of the black art; but already there are signs of a leaning to religion in the sympathetic figures of the religious bell-ringer of Saint Sulpice and his wife. En Route (1895) relates the strange conversion of Durtal to mysticism and Catholicism in his retreat to La Trappe. In La Cathedrale (1898), Huysmans's symbolistic interpretation of the cathedral of Chartres, he develops his enthusiasm for the purity of Catholic ritual. The life of Sainte Lydwine de Schiedam (1901), an exposition of the value of suffering, gives further proof of his conversion; and L'Oblat (1903) describes Durtal's retreat to the Val des Saints, where he is attached as an oblate to a Benedictine monastery. Huysmans was nominated by Edmond de Gon- court as a member of the Academie des Goncourt. He died as a devout Catholic, after a long illness of cancer in the palate on the 13th of May 1907. Before his death he destroyed his unpublished MSS. His last book was Les Foules de Lourdes

(1906).

See Arthur Symons, Studies in two Literatures (1897) and The Symbolist Movement in Literature (1899); Jean Lionnet in VEvolu- tion des idees (1903); Eugene Gilbert in France et Belgique (1905); J. Sargeret in Les Grands convertis (1906).

HUYSUM, JAN VAN (1682-1749), Dutch painter, was born at Amsterdam in 1682, and died in his native city on the 8th of February 1749. He was the son of Justus van Huysum, who is said to have been expeditious in decorating doorways, screens and vases. A picture by this artist is preserved in the gallery of Brunswick, representing Orpheus and the Beasts in a wooded landscape, and here we have some explanation of his son's fondness for landscapes of a conventional and Arcadian kind; for Jan van Huysum, though skilled as a painter of still life, believed himself to possess the genius of a

landscape painter.

Half his pictures in public galleries are landscapes, views of imaginary lakes and harbours with impossible ruins and classic edifices, and woods of tall and motionless trees — the whole very glossy and smooth, and entirely lifeless. The earliest dated work of this kind is that of 1717, in the Louvre, a grove with maidens culling flowers near a tomb, ruins of a portico, and a distant palace on the shores of a lake bounded by mountains. It is doubtful whether any artist ever surpassed van Huysum in representing fruit and flowers. It has been said that his fruit has no savour and his flowers have no perfume — in other words, that they are hard and artificial — but this is scarcely true. In substance fruit and flower are delicate and finished imitations of nature in its more subtle varieties of matter. The fruit has an incomparable blush of down, the flowers have a perfect delicacy of tissue. Van Huysum, too, shows supreme art in relieving flowers of various colours against each other, and often against a light and transparent background. He is always bright, sometimes even gaudy. Great taste and much grace and elegance are apparent in the arrangement of bouquets and fruit in vases adorned with bas reliefs or in baskets on marble tables. There is exquisite and faultless finish every- where. But what van Huysum has not is the breadth, the bold effectiveness, and the depth of thought of de Heem, from whom he descends through Abraham Mignon.

Some of the finest of van Huysum's fruit and flower pieces have been in English private collections: those of 1723 in the earl of Ellesmere's gallery, others of 1730-1732 in the collections of Hope and Ashburton. One of the best examples is now in the National Gallery (1736-1737). No public museum has finer and more numer- ous specimens than the Louvre, which boasts of four landscapes and six panels with still life; then come Berlin and Amsterdam with four fruit and flower pieces; then St Petersburg, Munich, Hanover, Dresden, the Hague, Brunswick, Vienna, Carlsruhe and Copenhagen. HWANG HO [Hoang Ho], the second largest river in China. It is known to foreigners as the Yellow river — a name which is a literal translation of the Chinese. It rises among the Kuen- lun mountains in central Asia, its head-waters being in close proximity to those of the Yangtsze-Kiang. It has a total length of about 2400 m. and drains an area of approximately 400,000 sq. m. The main stream has its source in two lakes named Tsaring-nor and Oring-nor, lying about 35 N., 97 E., and after flowing with a south-easterly course it bends sharply to the north-west and north, entering China in the province of Kansuh in lat. 36 . After passing Lanchow-fu, the capital of this province, the river takes an immense sweep to the north and north-east, until it encounters the rugged barrier ranges that

here run north and south through the provinces of Shansi and Chihli. By these ranges it is forced due south for 500 m., forming the boundary between the provinces of Shansi and Shensi, until it finds an outlet eastwards at Tung Kwan — a pass which for centuries has been renowned as the gate of Asia, being indeed the sole commercial passage between central China and the West. At Tung Kwan the river is joined by its only considerable affluent in China proper, the Wei (Wei-ho), which drains the large province of Shensi, and the combined volume of water continues its way at first east and then north- east across the great plain to the sea. At low water in the winter season the discharge is only about 36,000 cub. ft. per second, whereas during the summer flood it reaches 116,000 ft. or more. The amount of sediment carried down is very large, though no accurate observations have been made. In the account of Lord Macartney's embassy, which crossed the Yellow river in 1792, it was calculated to be 17,520 million cub. ft. a year, but this is considered very much over the mark. Two reasoift, however, combine to render it probable that the sedimentary matter is very large in proportion to the volume of water: the first being the great fall, and the consequently rapid current over two-thirds of the river's course; the second that the drainage area is nearly all covered with deposits of loess, which, being very friable, readily gives way before the rainfall and is washed down in large quantity. The ubiquity of this loess or yellow earth, as the Chinese call it, has in fact given its name both to the river which carries it in solution and to the sea (the Yellow Sea) into which it is discharged. It is calculated

by Dr Guppy {Journal of China Branch of Royal Asiatic Society, vol. xvi.) that the sediment brought down by the three northern rivers of China, viz., the Yangtsze, the Hwang-ho and the Peiho, is 24,000 million cub. ft. per annum, and is sufficient to fill up the whole of the Yellow Sea and the Gulf of Pechili in the space of about 36,000 years.

Unlike the Yangtsze, the Hwang-ho is of no practical value for navigation. The silt and sand form banks and bars at the mouth, the water is too shallow in winter and the current is too strong in summer, and, further, the bed of the river is continually shifting. It is this last feature which has earned for the river the name " China's sorrow." As the silt-laden waters debouch from the rocky bed of the upper reaches on to the plains, the current slackens, and the coarser detritus settles on the bottom. By degrees the bed rises, and the people build embankments to prevent the river from overflowing. As the bed rises

the embankments must be raised too, until the stream is flowing many feet above the level of the surrounding country. As time goes on the situation becomes more and more dangerous; finally, a breach occurs, and the whole river pours over the country, carrying destruction and ruin with it. If the breach cannot be re- paired the river leaves its old channel entirely and finds a new exit to the sea along the line of least resistance. Such in brief has been the story of the river since the dawn of Chinese history. At various times it has discharged its waters alternately on one side or the other of the great mass of mountains forming the promontory of Shantung, and by mouths as far apart from each other as 500 m. At each change it has worked havoc and disaster by covering the cultivated fields with 2 or 3 ft. of sand and mud.

A great change in the river's course occurred in 1851, when a breach was made in the north embankment near Kaifengfu in Honan. At this point the river bed was some 25 ft. above the plain; the water consequently forsook the old channel entirely and poured over the level country, finally seizing on the bed of a small river called the Tsing, and thereby finding an exit to the sea. Since that time the new channel thus carved out has remained the proper course of the river, the old or southerly channel being left quite dry. It re- quired some fifteen or more years to repair damages from this out- break, and to confine the stream by new embankments. After that there was for a time comparative immunity from inundations, but in 1882 fresh outbursts again began. The most serious of all took place in 1887, when it appeared probable that there would be again a permanent change in the river's course. By dint of great exertions, however, the government succeeded in closing the breach, though not till January 1889, and not until there had been immense destruc- tion of life and property. The outbreak on this occasion occurred, as all the more serious outbreaks have done, in Honan, a few miles west of the city of Kaifengfu. The stream poured itself over the level and fertile country to the southwards, sweeping whole villages before it, and converting the plain into one vast lake. The area affected was not less than 50,000 sq. m. and the loss of life was computed at over one million. Since 1887 there have been a series of smaller outbreaks, mostly at points lower down and in the neighbourhood of Chinanfu, the capital of Shantung. These perpetually occurring disasters entail a heavy expense on the government; and from the mere pecuniary point of view it would well repay them to call in the best foreign engineering skill available, an expedient, however, which has not commended itself to the Chinese authorities. (G. J.)

HWICCE, one of the kingdoms of Anglo-Saxon Britain. Its exact dimensions are unknown; they probably coincided with those of the

old diocese of Worcester, the early bishops of which bore the title ” Episcopus Hwicciorum.” It would there- fore include Worcestershire, Gloucestershire except the Forest of Dean, the southern half of Warwickshire, and the neighbour- hood of Bath. The name Hwicce survives in Wychwood in Oxfordshire and Whichford in Warwickshire. These districts, or at all events the southern portion of them, were according to the Anglo-Saxon Chronicle, s.a. 577, originally conquered by the West Saxons under Ceawlin. In later times, however, the kingdom of the Hwicce appears to have been always subject to Mercian supremacy, and possibly it was separated from VVessex in the time of Edwin. The first kings of whom we read were two brothers, Eanhere and Eanfrith, probably contempor- aries of Wulfhere. They were followed by a king named Osric, a contemporary of iEthelred, and he by a king Oshere. Oshere had three sons who reigned after him, ˆEthelheard, ˆEthelweard and /Ethelric. The two last named appear to have been reigning in the year 706. At the beginning of Offa’s reign we again find the kingdom ruled by three brothers, named Eanberht, Uhtred and Aldred, the two latter of whom lived until about 780. After them the title of king seems to have been given up. Their successor iEthelmund, who was killed in a campaign against

Wessex in 802, is described only as an earl. The district re- mained in possession of the rulers of Mercia until the fall of that kingdom. Together with the rest of English Mercia it submitted to King Alfred about 877-883 under Earl yEthelred, who possibly himself belonged to the Hwicce. No genealogy or list of kings has been preserved, and we do not know whether the dynasty was connected with that of Wessex or Mercia.

See Bede, Historia eccles. (edited by C. Plummer) iv. 13 (Oxford, l896);W.deG. Birch, Cartularium Saxonicum, 43, gi, 76,85 116, 117, 122, 163, 187, 232, 233, 238 (Oxford, 1885-1889). (F. G. M. B.)

HYACINTH (Gr. vo.ki.v6os), also called Jacinth (through Ital. giacinto), one of the most popular of spring garden flowers. It was in cultivation prior to 1597, at which date it is mentioned by Gerard. Rea in 1665 mentions several single and double varieties as being then in English gardens, and Justice in 1754 describes upwards of fifty single-flowered varieties, and nearly one hundred double-flowered ones, as a selection of the best from the catalogues of two then celebrated Dutch growers. One of the Dutch sorts, called La Reine de Femmes, a single white, is said to have produced from thirty-four to thirty-eight flowers in a spike, and on its first appearance to have sold for 50 guilders a bulb; while one called Overwinnaar, or Conqueror, a double blue, sold at first for 100 guilders, Gloria Mundi for 500 guilders, and Koning Saloman for 600 guilders. Several sorts are at that date mentioned as blooming well in water-glasses. Justice relates that he himself raised several very valuable double- flowered kinds from seeds, which many of the sorts he describes are noted for producing freely.

The original of the cultivated hyacinth, Hyacinthus orientalis, a native of Greece and Asia Minor, is by comparison an insignifi- cant plant, bearing on a spike only a few small, narrow-lobed, washy blue flowers, resembling in form those of our common bluebell. So great has been the improvement effected by the florists, and chiefly by the Dutch, that the modern hyacinth would scarcely be recognized as the descendant of the type above referred to, the spikes being long and dense, composed of a large number of flowers; the spikes produced by strong bulbs not unfrequently measure 6 to 9 in. in length and from 7 to 9 in. in circumference, with the flowers closely set on from bottom to top. Of late years much improvement has been effected in the size of the individual flowers and the breadth of their recurving lobes, as well as in securing increased brilliancy and depth of colour.

The peculiarities of the soil and climate of Holland are so very favourable to their production that Dutch florists have made a specialty of the growth of those and other bulbous-rooted flowers. Hundreds of acres are devoted to the growth of hyacinths in the vicinity of Haarlem, and bring in a revenue of several hundreds of thousands of pounds. Some notion of the vast number imported into England annually may be formed from the fact that, for the supply of flowering plants to Covent Garden, one market grower alone produces from 60,000 to 70,000 in pots under glass, their blooming period being accelerated by artificial heat, and extending from Christmas onwards until they bloom naturally in the open ground.

In the spring flower garden few plants make a more effective display

than the hyacinth. Dotted in clumps in the flower borders, and arranged in masses of well-contrasted colours in beds in the flower garden, there are no flowers which impart during their season — March and April — a gayer tone to the par- terre. The bulbs are rarely grown a second time, either for indoor or outdoor culture, though with care they might be utilized for the latter purpose; and hence the enormous numbers which are procured each recurring year from Holland.

The first hyacinths were single-flowered, but towards the close of the 17th century double-flowered ones began to appear, and till a recent period these bulbs were the most esteemed. At the present time, however, the single-flowered sorts are in the ascendant, as they produce more regular and symmetrical spikes of blossom, the flowers being closely set and more or less horizontal in direction, while most of the double sorts have the bells distant and dependent, so that the spike is loose and by comparison

ineffective. For pot culture, and for growth in water-glasses especially, the single-flowered sorts are greatly to be preferred. Pew if any of the original kinds are now in cultivation, a succes- sion of new and improved varieties having been raised, the demand for which is regulated in some respects by fashion.

The hyacinth delights in a rich light sandy soil. The Dutch in- corporate freely witu tueir naturally light soil a compost consisting of one-third coarse sea or river sand, one-third rotten cow dung without litter and one-third leaf-mould. The soil thus renovated retains its qualities for six or seven years, but hyacinths are not planted upon the same place for two years successively, intermediary crops of narcissus, crocus or tulips being taken. A good compost for hyacinths is sandy loam, decayed leaf-mould, rott-n cow dung and sharp sand in equal parts, the whole being collected and laid up in a heap and turned over occasionally. Well-drained beds made up of this soil, and refreshed with a portion of new compost annually, would grow the hyacinth to perfection. The best time to plant the bulbs is towards the end of September and during October; they should be arranged in rows, 6 to 8 in. asunder, there being four rows in each bed. The bulbs should be sunk about 4 to 6 in. deep, with a small quantity of clean sand placed below and around each of them. The beds should be covered with decayed tan-bark, coco-nut fibre or half-rotten dung litter. As the

flower-stems appear, they are tied to rigid but slender stakes to preserve them from accident. If the bulbs are at all prized, the stems should be broken off as soon as the flower- ing is over, so as not to exhaust the bulbs; the leaves, however, must be allowed to grow on till matured, but as soon as they assume a yellow colour, the bulbs are taken up, the leaves cut off near their base, and the bulbs laid out in a dry, airy, shady place to ripen, after which they are cleaned of loose earth and skin, ready for storing. It is the practice in Holland, about a month after the bloom, or when the tips of the leaves assume a withered appearance, to take up the bulos, and to lay them sideways on the ground, covering them with an inch or two of earth. About three weeks later they are again taken up and cleaned. In the store-room they should be kept dry, well-aired and apart from each other.

Few plants are better adapted than the hyacinth for pot culture as greenhouse decorative plants; and by the aid of forcing they may be had in bloom as early as Christmas. They flower fairly well in 5-in. pots, the stronger bulbs in 6-in. pots. To bloom at Christmas, they should be potted early in September, in a compost resembling that already recommended for the open-air beds; and, to keep up a succession of bloom, others should be potted at intervals of a few weeks till the middle or end of November. The tops of the bulbs should be about level with the soil, and if a little sand is put im-mediately around them so much the better. The pots should be set in an open place on a dry hard bed of ashes, and be covered over to a depth of 6 or 8 in. with the same material or with fibre or soil; and when the roots are well developed, which will take from six to eight weeks, they may be removed to a frame, and gradually exposed to light, and then placed in a forcing pit in a heat of from 60 to 70°. When the flowers are fairly open, they may be removed to the green-house or conservatory.

The hyacinth may be very successfully grown in glasses for orna- ment in dwelling-houses. The glasses are filled to the neck with rain or even tap water, a few lumps of charcoal being dropped into them. The bulbs are placed in the hollow provided for them, so that their base just touches the water. This may be done in September or October. They are then set in a dark cupboard for a few weeks till roots are freely produced, and then gradually exposed to light. The early-flowering single white Roman hyacinth, a small-growing pure white variety, remarkable for its fragrance, is well adapted for forcing, as it can be had in bloom if required by November. For windows it grows well in the small glasses commonly used for crocuses; and for decorative purposes should be planted about five bulbs in a 5-in. pot, or in pans holding a dozen each. If grown for cut flowers it can be

planted thickly in boxes of any convenient size. It is highly esteemed during the winter months by florists.

The Spanish hyacinth (H. amethystinus) and H. azureus are charming little bulbs for growing in masses in the rock garden or front of the flower border. The older botanists included in the genus Hyacinthus species of Muscari, Scilla and other genera of bulbous Liliaceae, and the name of hyacinth is still popularly applied to several other bulbous plants. Thus Muscari botryoides is the grape hyacinth, 6 in., blue or white, the handsomest; M. moschatum, the musk hyacinth, 10 in., has peculiar livid greenish-yellow flowers and a strong musky odour; M. comosum var. monstrosum, the feather hyacinth, bears sterile flowers broken up into a featherlike mass; M. racemosum, the starch hyacinth, is a native with deep blue plum- scented flowers. The Cape hyacinth is Galtonia candicans, a magnifi- cent border plant, 3-4 ft. high, with large drooping white bell-shaped flowers; the star hyacinth, Scilla amoena; the Peruvian hyacinth or Cuban lily, 5. peruviana, a native of the Mediterranean region, to which Linnaeus gave the species name peruviana on a mistaken assumption of its origin; the wild hyacinth or blue-bell, known variously as Endymion nonscriptum, Hyacinthus nonscriptus or Scilla nutans; the wild hyacinth of western North Amercia, Camassia ■acidenla. They all flourish in good garden soil of a gritty nature.

HYACINTH, or Jacinth, in mineralogy, a variety of zircon (q.v.) of yellowish red colour, used as a gem-stone. The hyacinthus of ancient writers must have been our sapphire, or blue corundum, while the hyacinth of modern mineralogists may have been the stone known as lyncurium (KvyKoV/jLOv). The Hebrew word leshem, translated ligure in the Authorized Version (Ex. xxviii. 19), from the Xtyvptov of the Septuagint, appears in the Revised Version as jacinth, but with a marginal alternative of amber. Both jacinth and amber may be reddish yellow, but their identification is doubtful. As our jacinth (zircon) is not known in ancient Egyptian work, Professor Flinders Petrie has suggested that the leshem may have been a yellow quartz, or perhaps agate. Some old English writers describe the jacinth as yellow, whilst others refer to it as a blue stone, and the hyacinthus of some authorities seems undoubtedly to have been our sapphire. In Rev. xx. 20 the Revised Version retains the word jacinth, but gives sapphire as an alternative.

Most of the gems known in trade as hyacinth are only garnets — generally the deep orange-brown hessonite or cinnamon-stone — and many of the antique engraved stones reputed to be hyacinth are probably garnets. The difference may be detected optically, since the

garnet is singly and the hyacinth doubly refracting; moreover the specific gravity affords a simple means of diagnosis, that of garnet being only about 3-7, whilst hyacinth may have a density as high as 4-7. Again, it was shown many years ago- by Sir A. H. Church that most hyacinths, when examined by the spectroscope, show a series of dark absorption bands, due perhaps to the presence of some rare element such as uranium or erbium.

Hyacinth is not a common mineral. It occurs, with other zircons, in the gem-gravels of Ceylon, and very fine stones have been found as pebbles at Mudgee in New South Wales. Crystals of zircon, with all the typical characters of hyacinth, occur at Expailly, Le Puy-en-Velay, in Central France, but they are not large enough for cutting. The stones which have been called Compostella hyacinths are simply ferruginous quartz from Santiago de Compostella in Spain. (F. W. R.*)

HYACINTHUS,' in Greek mythology, the youngest son of the Spartan king Amyclas, who reigned at Amyclae (so Pausanias iii. 1. 3, iii. 19. 5; and Apollodorus i. 3. 3, iii. 10. 3). Other stories make him son of Oebalus, of Eurotas, or of Pierus and the nymph Clio (see Hyginus, Fabulae, 271; Lucian, De saltatione, 45, and Dial. deor. 14). According to the general story, which is probably late and composite, his great beauty attracted the love of Apollo, who killed him accidentally when teaching him to throw the discus (quoit); others say that Zephyrus (or Boreas) out of jealousy deflected the quoit so that it hit Hyacinthus on the head and killed him. According to the representation on the tomb at Amyclae (Pausanias, loc. cil.) Hyacinthus was translated into heaven with his virgin sister Polyboea. Out of his blood there grew the flower known as the hyacinth, the petals of which were marked with the mournful exclamation AI, AI, " alas " (cf. " that sanguine flower inscribed with woe "). This Greek hyacinth cannot have been the flower which now bears the name : it has been identified with a species of iris and with the larkspur [delphinium Aiacis), which appear to have the markings described. The Greek hyacinth was also said to have sprung from the blood of Ajax. Evidently the Greek authorities confused both the flowers and the traditions.

The death of Hyacinthus was celebrated at Amyclae by the second most important of Spartan festivals, the Hyacinthia, which took place in the Spartan month Hecatombeus. What month this was is not certain. Arguing from Xenophon (Hell. iv. 5) we get May; assuming that the Spartan Hecatombeus is the Attic Hecatombaion, we get July; or again it may be the Attic Scirophorion, June. At all events the Hyacinthia was an early summer festival. It lasted three days, and the rites gradually passed from mourning for Hyacinthus to rejoicings

1 The word is probably derived from an Indo-European root, meaning ” youthful,” found in Latin, Greek, English and Sanskrit. Some have suggested that the first two letters are from vtw, to rain, (cf. Hyades).

in the majesty of Apollo, the god of light and warmth, and giver of the ripe fruits of the earth (see a passage from Polycrates, Laconica, quoted by Athenaeus 139 d; criticized by L. R. Farnell, Cults of the Greek States, iv. 266 foil.). This festival is clearly connected with vegetation, and marks the passage from the youthful verdure of spring to the dry heat of summer and the ripening of the corn.

The precise relation which Apollo bears to Hyacinthus is obscure. The fact that at Tarentum a Hyacinthus tomb is ascribed by Polybius to Apollo Hyacinthus (not Hyacinthius) has led some to think that the personalities are one, and that the hero is merely an emanation from the god; confirmation is sought in the Apolline appellation rerpaxeip, alleged by Hesychius to have been used in Laconia, and assumed to describe a composite figure of Apollo-Hyacinthus. Against this theory is the essential difference between the two figures. Hyacinthus is a chthonian vegetation god whose worshippers are afflicted and sorrowful; Apollo, though interested in vegetation, is never regarded as inhabiting the lower world, his death is not celebrated in any ritual, his worship is joyous and triumphant, and finally the Amyclean Apollo is specifically the god of war and song. Moreover, Pausanias describes the monument at Amyclae as consisting of a rude figure of Apollo standing on an altar-shaped base which formed the tomb of Hyacinthus. Into the latter bfferings were put for the hero before gifts were made to the god. On the whole it is probable that Hyacinthus belongs originally to the pre-Dorian period, and that his story was appropriated and woven into their own Apollo myth by the conquering Dorians. Possibly he may be the apotheosis of a pre-Dorian king of Amyclae. J. G. Frazer further suggests that he may have been regarded as spending the winter months in the under- world and returning to earth in the spring when the ” hyacinth ” blooms. In this case his festival represents perhaps both the Dorian conquest of Amyclae and the death of spring before the ardent heat of the summer sun, typified as usual by the discus (quoit) with which Apollo is said to have slain him. With the growth of the hyacinth from his blood should be compared the oriental stories of violets springing from the blood of Attis, and roses and anemones from that of Adonis. As a youthful vegeta- tion god, Hyacinthus may be compared with Linus

and Scephrus, both of whom are connected with Apollo Agyieus.

See L. R. Farnell, Cults of the Greek States, vol. iv. (1907), pp. 125 foil., 264 foil.; J. G. Frazer, Adonis, Attis, Osiris (1906), bk. ii. ch. 7; S. Wide, Lakonische Kulte, p. 290; E. Rhode, Psyche, 3rd ed. i. 137 foil.; Roscher, Lexikon d. griech. u. rom. Myth., s.v. ” Hyakinthos ” (Greve) ; L. Preller, Griechische Mythol. 4th ed. i. 248 foil. (J. M. M.)

HYADES (“the rainy ones”), in Greek mythology, the daughters of Atlas and Aethra; their number varies between two and seven. As a reward for having brought up Zeus at Dodona and taken care of the infant Dionysus Hyes, whom they conveyed to Ino (sister of his mother Semele) at Thebes when his life was threatened by Lycurgus, they were translated to heaven and placed among the stars (Hyginus, Poet, astron. ii. 21). Another form of the story combines them with the Pleiades. According to this they were twelve (or fifteen) sisters, whose brother Hyas was killed by a snake while hunting in Libya (Ovid, Fasti, v. 165; Hyginus, Fab. 192). They lamented him so bitterly that Zeus, out of compassion, changed them into stars — five into the Hyades, at the head of the constellation of the Bull, the remainder into the Pleiades. Their name is derived from the fact that the rainy season commenced when they rose at the same time as the sun (May 7-21); the original conception of them is that of the fertilizing principle of moisture. The Romans derived the name from vs (pig), and translated it by Sucnlae (Cicero, De nat. dcorum, ii. 43).

HYATT, ALPHEUS (1 838-1 902), American naturalist, was born at Washington, D.C., on the 5th of April 1838. From 1858 to 1862 he studied at Harvard, where he had Louis Agassiz for his master, and in 1863 he served as a volunteer in the Civil War, attaining the rank of captain. In 1867 he was appointed curator of the Essex Institute at Salem, and in 1870 became professor of zoology and palaeontology at the Massachusetts

Institute of Technology (resigned 1888), and custodian of the Boston Society of Natural History (curator in 1881). In 1886 he was appointed assistant for palaeontology in the Cambridge museum of comparative anatomy, and in 1889 was attached to the United States Geological Survey as palaeontologist for the Trias and Jura. He was the chief founder of the American Society of Naturalists, of which he acted as first president in 1883, and he also took a leading part in establishing the marine – biological laboratories at Annisquam and Woods Hole, Mass. He died at Cambridge on the 15th of January 1902.

His works include Observations on Fresh-water Polyzoa (1866) ; Fossil Cephalopods of the Museum of Comparative Zoology (1872); Revision of North American Porifera (1875-1877); Genera of Fossil Cephalopoda (1883); Larval Theory of the Origin of Cellular Tissue (1884); Genesis of the Arietidae (1889); and Phytogeny of an acquired characteristic (1894). He wrote the section on Cephalopoda in Karl von Zittel's Palaontologie (1900), and his well-known study on the fossil pond snails of Steinheim (" The Genesis of the Tertiary Species of Planorbis at Steinheim ") appeared in the Memoirs of the Boston Natural History Society in 1880. He was one of the founders and editors of the American Naturalist.

HYBLA, the name of several cities in Sicily. The best known historically, though its exact site is uncertain, is Hybla Major, near (or by some supposed to be identical with) Megara Hyblaea (q.v.) : another Hybla, known as Hybla Minor or Galeatis, is represented by the modern Paterno; while the site of Hybla Heraea is to be sought near Ragusa.

HYBRIDISM. The Latin word hybrida, hibrida or ibrida has been assumed to be derived from the Greek fy3pis, an insult or outrage, and a hybrid or mongrel has been supposed to be an outrage on nature, an unnatural product. As a general rule animals and plants belonging to distinct species do not produce offspring when crossed with each other, and the term hybrid has been employed for the result of a fertile cross between individuals of different species, the word mongrel for the more common result of the crossing of distinct varieties. A closer scrutiny of the facts, however, makes the term hybridism less isolated and more vague. The words species and genus, and still more subspecies and variety, do not correspond with clearly marked and sharply defined zoological categories, and no exact line can be drawn between the various kinds of crossings from those between individuals apparently identical to those belonging to genera universally recognized as distinct. Hybridism therefore grades into mongrelism, mongrelism into cross-breeding, and cross- breeding into normal pairing, and we can say little more than that the success of the union is the more unlikely or more un- natural the further apart the parents are in natural affinity.

The interest in hybridism was for a long time chiefly of a practical nature, and was due to the fact that hybrids are often found to present characters somewhat different from those of either parent. The leading facts have been known in the case of the horse and ass from time immemorial. The earliest recorded observation of a hybrid plant is by J. G. Gmelin towards the end of the 17th century; the next is that of

Thomas Fairchild, who in the second decade of the 18th century, produced the cross which is still grown in gardens under the name of ” Fairchild’s Sweet William.” Linnaeus made many experiments in the cross-fertilization of plants and produced several hybrids, but Joseph Gottlieb Kolreuter (1 733-1806) laid the first real founda- tion of our scientific knowledge of the subject. Later on Thomas Andrew Knight, a celebrated English horticulturist, devoted much successful labour to the improvement of fruit trees and vegetables by crossing. In the second quarter of the icpth century C. F. Gartner made and published the results of a number of experiments that had not been equalled by any earlier worker. Next came Charles Darwin, who first in the Origin of Species, and later in Cross and Self -Fertilization of Plants, subjected the whole question to a critical examination, reviewed the known facts and added many to them.

Darwin’s conclusions were summed up by G. J. Romanes in the 9th edition of this Encyclopaedia as follows : —

1. The laws governing the production of hybrids are identical, or nearly identical, in the animal and vegetable kingdoms.

2. The sterility which so generally attends the crossing of two specific forms is to be distinguished as of two kinds, which, although

often confounded by naturalists, are in reality quite distinct. For the sterility may obtain between the two parent species when first crossed, or it may first assert itself in their hybrid progeny. In the latter case the hybrids, although possibly produced without any appearance of infertility on the part of their parent species, neverthe- less prove more or less infertile among themselves, and also with members of either parent species.

3. The degree of both kinds of infertility varies in the case of different species, and in that of their hybrid progeny, from absolute sterility up to complete fertility. Thus, to take the case of plants, ” when pollen from a plant of one family is placed on the stigma of a plant of a distinct family, it exerts no more influence than so much inorganic dust. From this absolute zero of fertility, the pollen of different species, applied to the stigma of some one species of the same genus, yields a perfect gradation in the number of seeds produced, up to nearly complete, or even quite complete, fertility; so, in hybrids

themselves, there are some which never have produced, and probably never would produce, even with the pollen of the pure parents, a single fertile seed; but in some of these cases a first trace of fertility may be detected, by the pollen of one of the pure parent species causing the flower of the hybrid to wither earlier than it otherwise would have done; and the early withering of the flower is well known to be a sign of incipient fertilization. From this extreme degree of sterility we have self-fertilized hybrids producing a greater and greater number of seeds up to perfect fertility."

4. Although there is, as a rule, a certain parallelism, there is no fixed relation between the degree of sterility manifested by the parent species when crossed and that which is manifested by their hybrid progeny. There are many cases in which two pure species can be crossed with unusual facility, while the resulting hybrids are remarkably sterile; and, contrariwise, there are species which can only be crossed with extreme difficulty, though the hybrids, when produced, are very fertile. Even within the limits of the same genus, these two opposite cases may occur.

5. When two species are reciprocally crossed, i.e. male A with female B, and male B with female A, the degree of sterility often differs greatly in the two cases. The sterility of the resulting hybrids may differ likewise.

6. The degree of sterility of first crosses and of hybrids runs, to a certain extent, parallel with the systematic affinity of the forms which are united. " For species belonging to distinct genera can rarely, and those belonging to distinct families can never, be crossed. The parallelism, however, is far from complete; for a multitude of closely allied species will not unite, or unite with extreme difficulty, whilst other species, widely different from each other, can be crossed with perfect facility. Nor does the difficulty depend on ordinary constitutional differences; for annual and perennial plants, decidu- ous and evergreen trees, plants flowering at different seasons, in- habiting different stations, and naturally living under the most opposite climates, can often be crossed with ease. The difficulty or facility apparently depends exclusively on the sexual constitution of the species which are crossed, or on their sexual elective affinity."

There are many new records as to the production of hybrids. Horticulturists have been extremely active and successful in their attempts to produce new flowers or new varieties of vege- tables by seminal or graft-hybrids, and any florist's catalogue or the account of any special plant, such as is to be found in Foster- Melliar's Book of

the Rose, is in great part a history of successful hybridization. Much special experimental work has been done by botanists, notably by de Vries, to the results of whose experi- ments we shall recur. Experiments show clearly that the obtaining of hybrids is in many cases merely a matter of taking sufficient trouble, and the successful crossing of genera is not infrequent.

Focke, for instance, cites cases where hybrids were obtained between Brassica and Raphanus, Galium and Asperula, Campanula and Phyteuma, Verbascum and Celsia. Among animals, new records and new experiments are almost equally numerous. Boveri has crossed Echinus microtuberculatus with Sphaerechinus granulans. Thomas Hunt Morgan even obtained hybrids between Asterias, a starfish, and Arbacia, a sea-urchin, a cross as remote as would be that between a fish and a mammal. Vernon got many hybrids by fertilizing the eggs of Strongylocentrotus lividus with the sperm of Sphaerechinus granulans. Standfuss has carried on an enormous series of experiments with Lepidopterous insects, and has obtained a very large series of hybrids, of which he has kept careful record. Lepidopterists generally begin to suspect that many curious forms offered by dealers as new species are products got by crossing known species. Apello has succeeded with Teleostean fish; Gebhardt and others with Amphibia. Elliot and Suchetet have studied carefully the question of hybridization occurring normally among birds, and have got together a very large body of evidence. Among the cases eked by Elliot the most striking are that of the hybrid between Colaptes cafer and C. auratus, which occurs over a very wide area of North America and is known as C. hybridus, and the hybrid between Euplocamus lineatus and E. horsfieldi, which appears to be common in

Assam. St M. Podmore has produced successful crosses between the wood-pigeon (Columba palumbus) and a domesticated variety of the rock pigeon (C. livia). Among mammals noteworthy results have been obtained by Professor Cossar Ewart, who has bred nine zebra hybrids by crossing mares of various sizes with a zebra stallion, and who has studied in addition three hybrids out of zebra mares, one sired by a donkey, the others by ponies. Crosses have been made between the common rabbit (Lepus cuniculus) and the guinea-pig (Cavia cobaya), and examples of the results have been exhibited in the Zoological Gardens of Sydney, New South Wales. The Carnivora generally are very easy to hybridize, and many successful experiments have been made with animals in captivity. Karl Hagenbeck of Hamburg has produced crosses between the lion (Felis leo) and the tiger (F. tigris). What was probably a ” tri-hybrid ” in which lion, leopard and jaguar were mingled was exhibited by a London show- man in 1908. Crosses

between various species of the smaller cats have been fertile on many occasions. The black bear (Ursus ameri- canus) and the European brown bear (U. arctos) bred in the London Zoological Gardens in 1859, but the three cubs did not reach maturity. Hybrids between the brown bear and the grizzly-bear (U. horribilis) have been produced in Cologne, whilst at Halle since 1874 a series of successful matings of polar {U. maritimus) and brown bears have been made. Examples of these hybrid bears have been exhibited by the London Zoological Society. The London Zoological Society has also successfully mated several species of antelopes, for instance, the water-bucks Kobus ellipsiprymnus and K. unctuosus, and Selous's antelope Limnotragus selousi with L. gratus.

The causes militating against the production of hybrids have also received considerable attention. Delage, discussing the question, states that there is a general proportion between sexual attraction and zoological affinity, and in many cases hybrids are not naturally produced simply from absence of the stimulus to sexual mating, or because of preferential mating within the species or variety. In addition to differences of habit, temperament, time of maturity, and so forth, gross structural differences may make mating impossible. Thus Escherick contends that among insects the peculiar structure of the genital appendages makes cross-impregnation impossible, and there is reason to believe that the specific peculiarities of the modified sexual palps in male spiders have a similar result.

The difficulties, however, may not exist, or may be overcome by experiment, and frequently it is only careful management that is required to produce crossing. Thus it has been found that when the pollen of one species does not succeed in fertilizing the ovules of another species, yet the reciprocal cross may be successful ; that is to say, the pollen of the second species may fertilize the ovules of the first. H. M. Vernon, working with sea-urchins, found that the obtaining of hybrids depended on the relative maturity of the sexual products. The difficulties in crossing apparently may ex- tend to the chemiotaxic processes of the actual sexual cells. Thus when the spermatozoa of an urchin were placed in a drop of sea- water containing ripe eggs of an urchin and of a starfish, the former eggs became surrounded by clusters of the male cells, while the latter appeared to exert little attraction for the alien germ-cells. Finally, when the actual impregnation of the egg is possible naturally, or has been secured by artificial means, the development of the hybrid may stop at an early stage. Thus hybrids between the urchin and the starfish, animals belonging to different classes, reached only the stage of the pluteus larva. A. D. Apello, experimenting with Teleostean fish,

found that very often impregnation and segmenta- tion occurred, but that the development broke down immediately afterwards. W. Gebhardt, crossing Rana esculenta with R. arvalis, found that the cleavage of the ovum was normal, but that ab- normality began with the gastrula, and that development soon stopped. In a very general fashion there appears to be a parallel between the zoological affinity and the extent to which the incomplete development of the hybrid proceeds.

As to the sterility of hybrids inter se, or with either of the parent forms, information is still wanted. Delage, summing up the evidence in a general way, states that mongrels are more fertile and stronger than their parents, while hybrids are ‘at least equally hardy but less fertile. While many of the hybrid products of horticulturists are certainly infertile, others appear to be indefinitely fertile.

Focke, it is true, states that the hybrids between Primula auricula and P. hirsuta are fertile for many generations, but not indefinitely so; but, while this may be true for the particular case, there seems no reason to doubt that many plant hybrids are quite fertile. In the case of animals the evidence is rather against fertility. Standfuss, who has made experiments lasting over many years, and who has dealt with many genera of Lepidoptera, obtained no fertile hybrid females, although he found that hybrid males paired readily and successfully with pure-bred females of the parent races. Elliot,

dealing with birds, concluded that no hybrids were fertile with one another beyord the second generation, but thought that they were fertile with nembers of the parent races. Wallace, on the other hand, cites from (juatrefages tne case of hybrids between the moths Bombyx cynthia and B. arrindia, which were stated to be fertile inter se for eight generations. He also states that hybrids between the sheep and goat have a limited fertility inter se. Charles Darwin, however, had evidence that some hybrid pheasants were completely fertile, and he himself interbred the progeny of crosses between the common and Chinese geese, whilst there appears to be no doubt as to the complete fertility of the crosses between many species of ducks, J. L. Bonhote having interbred in various crosses for several genera tions the mallard (Anas boschas), the Indian spot-bill duck (A. poecilorhyncha) , the New Zealand grey duck {A. superciliosa) and the pin-tail (Dafila acuta). Podmore’s pigeon hybrids were fertile inter se, a specimen

having been exhibited at the London Zoological Gardens. The hybrids between the brown and polar bears bred at Halle proved to be fertile, both with one of the parent species and with one another.

Cornevin and Lesbre state that in 1873 an Arab mule was fertilized in Africa by a stallion, and gave birth to female offspring which she suckled. All three were brought to the Jardin d'Acclimatation in Paris, and there the mule had a second female colt to the same father, and subsequently two male colts in succession to an ass and to a stallion. The female progeny were fertilized, but their offspring were feeble and died at birth. Cossar Ewart gives an account of a recent Indian case in which a female mule gave birth to a male colt. He points out, however, that many mistakes have been made about the breeding of hybrids, and is not altogether inclined to accept this supposed case. Very little has been published with regard to the most important question, as to the actual condition of the sexual organs and cells in hybrids. There does not appear to be gross anatomical defect to account for the infertility of hybrids, but microscopical examination in a large number of cases is wanted. Cossar Ewart, to whom indeed much of the most interesting recent work on hybrids is due, states that in male zebra-hybrids the sexual cells were immature, the tails of the spermatozoa being much shorter than those of the similar cells in stallions and zebras. He adds, however, that the. male hybrids he examined were young, and might not have been sexually mature. He examined microscopically the ovary of a female zebra-hybrid and found one large and several small Graafian follicles, in all respects similar to those in a normal mare or female zebra. A careful study of the sexual organs in animal and plant hybrids is very much to be desired, but it may be said that so far as our present knowledge goes there is not to be expected any obvious microscopical cause of the relative infertility of hybrids.

The relative variability of hybrids has received considerable

attention from many writers. Horticulturists, as Bateson has

written, are " aware of the great and striking variations which

occur in so many orders of plants when hybridization is effected."

The phrase has been used " breaking the constitution of a

plant " to indicate the effect produced in the offspring of a

hybrid union, and the device is frequently used by those who are

seeking for novelties to introduce on the market. It may be said generally that hybrids are variable, and that the products of hybrids are still more variable. J. L. Bonhote found extreme variations amongst his hybrid ducks. Y. Delage states that in reciprocal crosses there is always a marked tendency for the offspring to resemble the male parents; he quotes from Huxley that the mule, whose male parent is an ass, is more like the ass, and that the hinny, whose male parent is a horse, is more like the horse. Standfuss found among Lepidoptera that males were produced much more often than females, and that these males paired readily. The freshly hatched larvae closely resembled the larvae of the female parent, but in the course of growth the resemblance to the male increased, the extent of the final approximation to the male depending on the relative phylogenetic age of the two parents, the parent of the older species being prepotent. In reciprocal pairing, he found that the male was able to transmit the characters of the parents in a higher degree. Cossar Ewart, in relation to zebra hybrids, has discussed the matter of resemblance to parents in very great detail, and fuller information must be sought in his writings. He shows that the wild parent is not necessarily prepotent, although many writers have urged that view. He described three hybrids bred out of a zebra mare by different horses, and found in all cases that the resemblance to the male or horse

parent was more profound. Similarly, zebra-donkey hybrids

out of zebra mares bred in France and in Australia were in

characters and disposition far more like the donkey parents.

The results which he obtained in the hybrids which he bred

from a zebra stallion and different mothers were more variable, but there was rather a balance in favour of zebra disposition and against zebra shape and marking.

" Of the nine zebra-horse hybrids I have bred," he says, " only two in their make and disposition take decidedly after the wild parent. As explained fully below, all the hybrids differ profoundly in the plan of their markings from the zebra, while in their ground colour they take after their respective dams or the ancestors of their dams far more than after the zebra — the hybrid out of the yellow and white Iceland pony, e.g. instead of being light in colour, as I anticipated, is for the most part of a dark dun colour, with but indistinct stripes. The hoofs, mane and tail of the hybrids are at the most intermediate, but this is perhaps partly owing to reversion towards the ancestors of these respective dams. In their disposition and habits they all undoubtedly agree more with the wild sire."

Ewart's experiments and his discussion of them also throw important light on the general relation of hybrids to their parents. He found that the coloration and pattern of his zebra hybrids resembled far more those of the Somali or Grevy's zebra than those of their sire — a Burchell's zebra. In a general discussion of the stripings of horses, asses and zebras, he came to the conclusion that the Somali zebra represented the older type, and that therefore his zebra hybrids furnished important evidence of the effect of crossing in producing reversion to ancestral type. The same subject has of course been discussed at length by Darwin, in relation to the cross-breeding of varieties of pigeons; but the modern experimentalists who are following the work of Mendel interpret reversion differently (see Mendelism).

Graft-Hybridism. — It is well known that, when two varieties or allied species are grafted together, each retains its distinctive characters. But to this general, if not universal, rule there are on record several alleged exceptions, in which either the scion is said to have partaken of the qualities of the stock, the stock of the scion, or each to have affected the other. Supposing any of these influences to have been

exerted, the resulting product would deserve to be called a graft-hybrid. It is clearly a matter of great interest to ascertain whether such formation of hybrids by grafting is really possible; for, if even one instance of such formation could be unequivocally proved, it would show that sexual and asexual reproduction are essentially identical.

The cases of alleged graft-hybridism are exceedingly few, con- sidering the enormous number of grafts that are made every year by horticulturists, and have been so made for centuries. Of these cases the most celebrated are those of Adam's laburnum (Cytisus Adami) and the bizzarria orange. Adam's laburnum is now flourishing in numerous places throughout Europe, all the trees having been raised as cuttings from the original graft, which was made by inserting a bud' of the purple laburnum into a stock of the yellow. M. Adam, who made the graft, has left on record that from it there sprang the existing hybrid. There can be no question as to the truly hybrid character of the latter — all the peculiarities of both parent species being often blended in the same raceme, flower or even petal; but until the experiment shall have been successfully repeated there must always remain a strong suspicion that, notwithstanding the assertion and doubt- less the belief of M. Adam, the hybrid arose as a cross in the ordinary way of seminal reproduction. Similarly, the bizzarria orange, which is unquestionably a hybrid between the bitter orange and the citron — since it presents the remarkable spectacle of these two different fruits blended into one — is stated by the gardener who first succeeded in producing it to have arisen as a graft-hybrid; but here again a similar doubt, similarly due to the need of corroboration, attaches to the statement. And the same remark applies to the still more wonderful case of the so-called trifacial orange, which blends three distinct kinds of fruit in one, and which is said to have been produced by artificially splitting and uniting the seeds taken from the three distinct species, the fruits of which now occur blended in the triple hybrid.

The other instances of alleged graft-hybridism are too numer- ous to be here noticed in detail; they refer to jessamine, ash, hazel, vine, hyacinth, potato, beet and rose. Of these the cases of the vine, beet and rose are the strongest as evidence of graft- hybridization, from the fact that some of them were produced

as the result of careful experiments made by very competent

experimentalists. On the whole, the results of some of these experiments, although so few in number, must be regarded as making out a strong case in favour of the possibility of graft- hybridism. For it must always be remembered that, in experi- ments of this kind, negative evidence, however great in amount, may be logically dissipated by a single positive result.

Theory of Hybridism. — Charles Darwin was interested in hybridism as an experimental side of biology, but still more from the bearing of the facts on the theory of the origin of species. It is obvious that although hybridism is occasionally possible as an exception to the general infertility of species inter se, the exception is still more minimized when it is re- membered that the hybrid progeny usually display some degree of sterility. The main facts of hybridism appear to lend support to the old doctrine that there are placed between all species the barriers of mutual sterility. The argument for the fixity of species appears still stronger when the general infertility of species crossing is contrasted with the general fertility of the crossing of natural and artificial varieties. Darwin himself, and afterwards G. J. Romanes, showed, however, that the theory of natural selection did not require the possibility of the commingling of specific types, and that there was no reason to suppose that the mutation of species should depend upon their mutual crossing. There existed more than enough evidence, and this has been added to since, to show that infertility with other species is no criterion of a species, and that there is no exact parallel between the degree of affinity between forms and their readiness to cross. The problem of hybridism is no more than the explanation of the generally reduced fertility of remoter crosses as compared with the generally increased fertility of crosses between organisms slightly different. Darwin considered and rejected the view that the inter-sterility of species could have been the result of natural selection.

” At one time it appeared to me probable,” he wrote (Origin of Species, 6th ed. p. 247), ” as it has to others, that the sterility of first crosses and of hybrids might have been slowly acquired through the natural selection of slightly lessened degrees of fertility, which, like any other variation, spontaneously appeared in certain indi- viduals of one variety when crossed with those of another variety. For it would clearly be advantageous to two varieties or incipient species if they could be kept from blending, on the same principle that, when man is selecting at the same time two varieties, it is necessary that he should keep them separate. In the first place, it may be remarked that species inhabiting distinct regions are often sterile when crossed ; now it could clearly have been of no advantage to such separated species to

have been rendered mutually sterile and, consequently, this could not have been effected through natural selection; but it may perhaps be argued that, if a species were rendered sterile with some one compatriot, sterility with other species would follow as a necessary contingency. In the second place, it is almost as much opposed to the theory of natural selection as to that of special creation, that in reciprocal crosses the male element of one form should have been rendered utterly impotent on a second form, whilst at the same time the male element of this second form is enabled freely to fertilize the first form; for this peculiar state of the reproductive system could hardly have been advantage- ous to either species."

Darwin came to the conclusion that the sterility of crossed species must be due to some principle quite independent of natural selection. In his search for such a principle he brought together much evidence as to the instability of the reproductive system, pointing out in particular how frequently wild animals in captivity fail to breed, whereas some domesticated races have been so modified by confinement as to be fertile together although they are descended from species probably mutually infertile. He was disposed to regard the phenomena of differential sterility as, so to speak, by-products of the process of evolution. G. J. Romanes afterwards developed his theory of physiological selection, in which he supposed that the appearance of differential fertility within a species was the starting-point of new species; certain individuals by becoming fertile only inter se proceeded along lines of modification diverging from the lines followed by other members of the species. Physiological selection in fact would operate in the same fashion as geographical isolation; if a portion of a species separated on an island tends to become

a new species, so also a portion separated by infertility with the others would tend to form a new species. According to Romanes, therefore, mutual infertility was the starting-point, not the result, of specific modification. Romanes, however, did not associate his interesting theory with a sufficient number of facts, and it has left little mark on the history of the subject. A. R. Wallace, on the other hand, has argued that sterility between incipient species may have been increased by natural selection in the same fashion as other favourable variations are supposed to have been accumulated. He thought that " some slight degree of infertility was a not infrequent accompaniment of the external differences which always arise in ,a state of nature between varieties and incipient species."

Weismann concluded, from an examination of a series of plant hybrids, that from the same cross hybrids of different character may

be obtained, but that the characters are determined at the moment of fertilization; for he found that all the flowers on the same hybrid plant resembled one another in the minutest details of colour and pattern. Darwin already had pointed to the act of fertilization as the determining point, and it is in this direction that the theory of hybridism has made the greatest advance.

The starting-point of the modern views comes from the experiments and conclusions on plant hybrids made by Gregor Mendel and published in 1865. It is uncertain if Darwin had paid attention to this work; Romanes, writing in the 9th edition of this Encyclopaedia, cited it without comment. First H. de Vries, then W. Bateson and a series of observers returned to the work of Mendel (see Mendelism), and made it the foundation of much experimental work and still more theory. It is still too soon to decide if the confident predictions of the Mendelians are justified, but it seems clear that a combination of Mendel's numerical results with Weismann's (see Heredity) conception of the particulate character of the germ-plasm, or hereditary material, is at the root of the phenomena of hybridism, and that Darwin was justified in supposing it to lie outside the sphere of natural selection and to be a fundamental fact of living matter.

Authorities. — Apello, " tlber einige Resultate der Kreuz- befruchtung bei Knochenfischen," Bergens mus. aarbog (1894) ; Bateson, " Hybridization and Cross-breeding," Journal of the Royal Horticultural Society (1900); J. L. Bonhote, " Hybrid Ducks," Proc. Zool. Soc. of London (1905), p. 147; Boveri, article " Befruchtung," in Ergebnisse der Anatomie und Entwickelungsgeschichle von Merkel und Bonnet, i. 385-485; Cornevin et Lesbre, " jjtude sur un hybride issu d'une mule f&onde et d'un cheval," Rev. Set. li. 144; Charles Darwin, Origin of Species (1859), The Effects of Cross and Self- Ferlilization in the Vegetable Kingdom (1878); Delage, La Structure du protoplasma et les theories sur I'heredite (1895, with a literature); de Vries, " The Law of Disjunction of Hybrids," Comples rendus (1900), p. 845; Elliot, Hybridism; Escherick, " Die Diologische Bedeutung der Genitalabhange der Insecten," Verh. z. B. Wien, xlii. 225; Ewart, The Ptnycuik Experiments (1899); Focke, Die Pflanzen-Mischlinge (1881); Foster-Melliar, The Book of the Rose (1894); C. F. Gaertner, various papers in Flora, 1828, 1831, 1832, 1833, 1836, 1847, on " Bastard-Pflanzen " ; Gebhardt, "fiber die Bastardirung von Rana esculenla mit R. arvalis," Inaug. Dissert. (Breslau, 1894); G. Mendel, " Versuche iiber Pflanzen-Hybriden," Verh. Natur. Vereins in Briinn (1865), pp. 1-52; Morgan, " Experi- mental Studies," Anat. Anz. (1893), p. 141; id. p. 803; G. J. Romanes, " Physiological Selection," Jour. Linn. Soc. xix. 337; H. Scherren, Notes on Hybrid Bears," Proc. Zool. Soc. of London

(1907), p. 431; Saunders, Proc. Roy. Soc. (1897), lxii. 11; Standfuss, ” Etudes de zoologie experimentale,” Arch. Sci. Nat. vi. 495; Suchetet, “Les Oiseaux hy brides rencontres a 1’iStat sauvage,” Mim. Soc. Zool. v. 253-525, and vi. 26-45 ! Vernon, ” The Relation between the Hybrid and Parent Forms of Echinotd Larvae,” Proc. Roy. Soc. lxv. 350; Wallace, Darwinism (1889); Weismann, The Germ-Plasm (1893). (?• C. M.)

a

HYDANTOIN (glycolyl urea), Cjˆ NjOz or CO<" NH-(? H2 .

ˆNH-CO v the ureide of glycollic acid, may be obtained by heating allantoin or alloxan with hydriodic acid, or by heating bromacetyl urea with alcoholic ammonia. It crystallizes in needles, melting at 216 C. When hydrolysed with baryta water yields hydantoic

3°

HYDE (FAMILY)— HYDE

(glycoluric)acid) H 2 N’CO’NH-CH 2 -C0 2 H, which isreadily soluble in hot water, and on heating with hydriodic acid decomposes into ammonia, carbon dioxide and glycocoll, CH2-NHrC0 2 -H. Many substituted hydantoins are known; the a-alkyl hydantoins are formed on fusion of aldehyde- or ketone-cyanhydrins with urea, the |3-alkyl hydantoins from the fusion of mono-alkyl glycocolls with urea, and the 7-alkyl hydantoins from the action of alkalis and alkyl iodides on the a-compounds. 7-Methyl hydantoin has been obtained as a splitting product of caffeine (E. Fischer, Ann., 1882, 215, p. 253).

HYDE, the name of an English family distinguished in the 17th century. Robert Hyde of Norbury, Cheshire, had several sons, of whom the third was Lawrence Hyde of Gussage St Michael, Dorsetshire. Lawrence’s son Henry was father of Edward Hyde, earl of Clarendon (q.v.), whose second son by his second wife was Lawrence, earl of Rochester (q.v.) ; another son was Sir Lawrence Hyde, attorney - general to Anne of Denmark, James I.‘s consort; and a third son was Sir Nicholas Hyde (d. 1631), chief-justice of England. Sir Nicholas entered parlia- ment in 1601 and soon-became prominent as an opponent of the court, though he does not appear to have distinguished himself in the law. Before long, however, he deserted the popular party, and in 1626 he was employed by the duke of Buckingham in his defence to impeachment by the Commons; and in the following year he was appointed chief-justice of the king’s bench,

in which office it fell to him to give judgment in the celebrated case of Sir Thomas Darnell and others who had been committed to prison on warrants signed by members of the privy council, which contained no statement of the nature of the charge against the prisoners. In answer to the writ of habeas corpus the attorney- general relied on the prerogative of the crown, supported by a precedent of Queen Elizabeth's reign. Hyde, three other judges concurring, decided in favour of the crown, but without going so far as to declare the right of the crown to refuse in- definitely to show cause against the discharge of the prisoners. In 1629 Hyde was one of the judges who condemned Eliot, Holies and Valentine for conspiracy in parliament to resist the king's orders; refusing to admit their plea that they could not be called upon to answer out of parliament for acts done in parliament. Sir Nicholas Hyde died in August 1631.

Sir Lawrence Hyde, attorney-general to Anne of Denmark, had eleven sons, four of whom were men of some mark. Henry was an ardent royalist who accompanied Charles II. to the continent, and returning to England was beheaded in 1650; Alexander (1 598-1667) became bishop of Salisbury in 1665; Edward (1607-1659) was a royalist divine who was nominated dean of Windsor in 1658, but died before taking up the appoint- ment, and who was the author of many controversial works in Anglican theology; and Robert (1595-1665) became recorder of Salisbury and represented that borough in the Long Parliament, in which he professed royalist principles, voting against the attainder of Strafford. Having been imprisoned and deprived of his recordership by the parliament in 1645/6, Robert Hyde gave refuge to Charles II. on his flight from Worcester in 1651, and on the Restoration he was knighted and made a judge of the common pleas. He died in 1665. Henry Hyde (1672-1753), only son of Lawrence, earl of Rochester, became 4th earl of Clarendon and 2nd earl of Rochester, both of which titles became extinct at his death. He was in no way distinguished, but his wife Jane Hyde, countess of Clarendon and Rochester (d. 1725), was a famous beauty celebrated by the homage of Swift, Prior and Pope, and by the groundless scandal of Lady Mary Wortley Montagu. Two of her daughters, Jane, countess of Essex, and Catherine, duchess of Queensberry, were also famous beauties of the reign of Queen Anne. Her son, Henry Hyde (1710-1753), known as Viscount Cornbury, was a Tory and Jacobite member of parliament, and an intimate friend of Bolingbroke, who addressed to him his Letters on the Study and Use of History, and On the Spirit of Patriotism. In 1750 Lord Cornbury was created Baron Hyde of Hindon, but, as he predeceased his father, this title reverted to the latter and became extinct at his death. Lord Cornbury was celebrated as a wit

and a conversationalist.

By his will he bequeathed the papers of his great-grandfather, Lord Clarendon, the historian, to the Bodleian Library at Oxford. See Lord Clarendon, The Life of Edward, Earl of Clarendon (3 vols., Oxford, 1827); Edward Foss, The Judges of England (London, 1848-1864); Anthony a Wood, Athenae oxonienses (London, 1813- 1820); Samuel Pepys, Diary and Correspondence, edited by Lord Braybrooke (4 vols., London, 1854).

HYDE, THOMAS (1636-1703), English Orientalist, was born at Billingsley, near Bridgnorth, in Shropshire, on the 29th of June 1636. He inherited his taste for linguistic studies, and received his first lessons in some of the Eastern tongues, from his father, who was rector of the parish. In his sixteenth year Hyde entered King's College, Cambridge, where, under Wheelock, professor of Arabic, he made rapid progress in Oriental languages, so that, after only one year of residence, he was invited to London to assist Brian Walton in his edition of the Polyglott Bible. Besides correcting the Arabic, Persic and Syriac texts for that work, Hyde transcribed into Persic characters the Persian translation of the Pentateuch, which had been printed in Hebrew letters at Constantinople in 1546. To this work, which Archbishop Ussher had thought well-nigh impossible even for a native of Persia, Hyde appended the Latin version which accom- panies it in the Polyglott. In 1658 he was chosen Hebrew reader at Queen's College, Oxford, and in 1659, in consideration of his erudition in Oriental tongues, he was admitted to the degree of M.A. In the same year he was appointed under-keeper of the Bodleian Library, and in 1665 librarian-in-chief. Next year he was collated to a prebend at Salisbury, and in 1673 to the arch- deaconry of Gloucester, receiving the degree of D.D. shortly afterwards. In 1691 the death of Edward Pococke opened up to Hyde the Laudian professorship of Arabic; and in 1697, on the deprivation of Roger Altham, he succeeded to "the regius chair of Hebrew and a canonry of Christ Church. Under Charles II., James II. and William III. Hyde discharged the duties of Eastern interpreter to the court. Worn out by his unremitting labours, he resigned his librarianship in 1701, and died at Oxford on the 1 8th of February 1703. Hyde, who was one of the first to direct attention to the vast treasures of Oriental antiquity, was an excellent classical scholar, and there was hardly an Eastern tongue accessible to foreigners with which he was not familiar. He had even acquired Chinese, while his writings are the best testimony to his mastery of Turkish, Arabic, Syriac, Persian, Hebrew and Malay.

In his chief work, Historia religionis veterum Persarum (1700), he

made the first attempt to correct from Oriental sources the errors of the Greek and Roman historians who had described the religion of the ancient Persians. His other writings and transla- tions comprise Tabulae longitudinum et latitudinum stellarum fixarum ex observatione principis Ulugh Beighi (1665), to which his notes have given additional value; Quatuor evangelia et acta apostolorum lingua Malaica, caracteribus Europaeis (1677); Epislola de mensuris et ponderibus serum sive sinensium (1688), appended to Bernard's De mensuris et ponderibus antiquis; Abraham Peritsol itinera mundi (1691); and De ludis orientalibus libri II. (1694).

With the exception of the Historia religionis, which was repub- lished by Hunt and Costard in 1760, the writings of Hyde, including some unpublished MSS., were collected and printed by Dr Gregory Sharpe in 1767 under the title Syntagma 'dissertationum quas olim. . . Thomas Hyde separatim edidit. There is a life of the author pre- fixed. Hyde also published a catalogue of the Bodleian Library in 1674.

HYDE, a market town and municipal borough in the Hyde parliamentary division of Cheshire, England, 7ˆ m. E. of Man- chester, by the Great Central railway. Pop. (1901) 32,766. It lies in the densely populated district in the north-east of the county, on the river Tame, which here forms the boundary of Cheshire with Lancashire. To the east the outlying hills of the Peak district of Derbyshire rise abruptly. The town has cotton weaving factories, spinning mills, print-works, iron foundries and machine works; also manufactures of hats and margarine. There are extensive coal mines in the vicinity. Hyde is wholly of modern growth, though it contains a few ancient houses, such

as Newton Hall, in the part of the town so called. The old family of Hyde held possession of the manor as early as the reign of John. The borough, incorporated in 1881, is under a mayor, 6 aldermen and 18 councillors. Area, 3081 acres.

HYDE DE NEUVILLE, JEAN GUILLAUME, Baron (1776- 1857), French politician, was born at La Charite-sur-Loire (Nievre) on the 24th of January 1776, the son of Guillaume Hyde, who belonged to an English family which had emigrated with the Stuarts after the rebellion of 1745. He was only seven- teen when he successfully defended a man denounced by Fouche before the revolutionary tribunal of Nevers.

From 1 793 onwards he was an active agent of the exiled princes; he took part in the Royalist rising in Berry in 1796, and after the coup d'etat of the 1 8th Brumaire (November 9, 1799) tried to persuade Bonaparte to recall the Bourbons. An accusation of complicity in the infernal machine conspiracy of 1800-1801 was speedily retracted, but Hyde de Neuville retired to the United States, only to return after the Restoration. He was sent by Louis XVIII. to London to endeavour to persuade the British government to transfer Napoleon to a remoter and safer place of exile than the isle of Elba, but the negotiations were cut short by the emperor's return to France in March 181 5. In January 1816 de Neuville became French ambassador at Washington, where he negotiated a commercial treaty. On his return in 182 1 he declined the Constantinople embassy, and in November 1822 was elected deputy for Cosne. Shortly afterwards he was appointed French ambassador at Lisbon, where his efforts to oust British influence culminated, in connexion with the coup d'6tat of Dom Miguel (April 30, 1824), in his suggestion to the Portuguese minister to invite the armed intervention of Great Britain. It was assumed that this would be refused, in view of the loudly proclaimed British principle of non-intervention, and that France would then be in a position to undertake a duty that Great Britain had declined. The scheme broke down, however, owing to the atti- tude of the reactionary party in the government of Paris, which disapproved of the Portuguese constitution. This destroyed his influence at Lisbon, and he returned to Paris to take his seat in the Chamber of Deputies. In spite of his pronounced Royalism, he now showed Liberal tendencies, opposed the policy of Villele's cabinet, and in 1828 became a member of the moderate administration of Martignac as minister of marine. In this capacity he showed active sympathy with the cause of Greek independence. During the Polignac ministry (1829- 1830) he was again in opposition, being a firm upholder of the charter; but after the revolution of July 1830 he entered an all but solitary protest against the exclusion of the legitimate line of the Bourbons from the throne, and resigned his seat. He died in Paris on the 28th of May 1857.

His Memoires el souvenirs (3 vols., 1888), compiled from his notes by his nieces, the vicomtesse de Bardonnet and the baronne Lauren- ceau, are of great interest for the Revolution and the Restoration.

HYDE PARK, a small township of Norfolk county, Massa- chusetts, U.S.A., about 8 m. S.W. of the business centre of Boston. Pop. (1890) 10,193; (1900) 13,244, of whom 3805 were foreign-born; (1910 census) 15,507. Its area is about 45 sq. m. It is traversed by the New York, New Haven & Hartford railway, which has large repair shops here, and by the Neponset river and smaller streams. The township

contains the villages of Hyde Park, Readville (in which there is the famous " Weil " trotting-track), Fairmount, Hazelwood and Clarendon Hills. Until about 1856 Hyde Park was a farmstead. The value of the total factory product increased from $4,383,959 in 1900 to $6,739,307 in 1905, or 53-7%. In 1868 Hyde Park was incorporated as a township, being formed of territory taken from Dorchester, Dedham and Milton.

HYDERABAD, or Haidarabad, a city and district of British India, in the Sind province of Bombay. The city stands on a hill about 3 m. from the left bank of the Indus, and Jiad a popula- tion in 1901 of 69,378. Upon the site of the present fort is supposed to have stood the ancient town of Nerankot, which in the 8th century submitted to Mahommed bin Kasim. In 1768 the present city was founded by Ghulam Shah Kalhora;

and it remained the capital of Sind until 1843, when, after the battle of Meeanee, it was surrendered to the British, and the capital transferred to Karachi. The city is built on the most northerly hills of the Ganga range, a site of great natural strength. In the fort, which covers an area of 36 acres, is the arsenal of the province, transferred thither from Karachi in 1861, and the palaces of the ex-mirs of Sind. An excellent water supply is derived from the Indus. In addition to manufactures of silk, gold and silver embroidery, lacquered ware and pottery, there are three factories for ginning cotton. There are three high schools, training colleges for masters and mistresses, a medical school, an agricultural school for village officials, and a technical school. The city suffered from plague in 1896-1897.

The District of Hyderabad has an area of 8291 sq. m., with a population in 1901 of 989,030, showing an increase of 15% in the decade. It consists of a vast alluvial plain, on the left bank of the Indus, 216 m. long and 48 broad. Fertile along the course of the river, it degenerates towards the east into sandy wastes, sparsely populated, and defying cultivation. The monotony is relieved by the fringe of forest which marks the course of the river, and by the avenues of trees that line the irrigation channels branching eastward from this stream. The south of the district has a special feature in its large natural water-courses (called dhoras) and basin-like shallows (chhaus), which retain the rains for a long time. A limestone range called the Ganga and the pleasant frequency of garden lands break the monotonous landscape. The principal crops are millets, rice, oil-seeds, cotton and wheat, which are dependent on irrigation, mostly from government canals. There is a special manufacture at Hala of glazed pottery and striped cotton cloth. Three railways traverse the district: (1) one of the

main lines of the North-Western system, following the Indus valley and crossing the river near Hyderabad; (2) a broad-gauge branch running south to Badin, which will ultimately be extended to Bombay; and (3) a metre-gauge line from Hyderabad city into Rajputana.

HYDERABAD, Haidarabad, also known as the Nizam's Dominions, the principal native state of India in extent, popula- tion and political importance; area, 82,698 sq. m.; pop. (1901) 11,141,142, showing a decrease of 3-4% in the decade: estimated revenue 45 crores of Hyderabad rupees (£2,500,000). The state occupies a large portion of the eastern plateau of the Deccan. It is bounded on the north and north-east by Berar, on the south and south-east by Madras, and on the west by Bombay. The country presents much variety of surface and feature; but it may be broadly divided into two tracts, dis- tinguished from one another geologically and ethnically, which are locally known from the languages spoken as Telingana and Marathwara. In some parts it is mountainous, wooded and picturesque, in others flat and undulating. The open country includes lands of all descriptions, including many rich and fertile plains, much good land not yet brought under cultivation, and numerous tracts too sterile ever to be cultivated. In the north- west the geological formations are volcanic, consisting principally of trap, but in some parts of basalt; in the middle, southern and south-western parts the country is overlaid with gneissic formations. The territory is well watered, rivers being numerous, and tanks or artificial pieces of water abundant, especially in Telingana. The principal rivers are the Godavari, with its tributaries the Dudna, Manjira and Pranhita; the Wardha, with its tributary the Penganga; and the Kistna, with its tributary the Tungabhadra. The climate may be considered in general good; and as there are no arid bare deserts, hot winds are little felt.

More than half the revenue of the state is derived from the land, and the development of the country by irrigation and railways has caused considerable expansion in this revenue, though the rate of increase in the decade 1891-1901 was retarded by a succession of unfavourable seasons. The soil is generally fertile, though in some parts it consists of chilka, a red and gritty mould little fitted for purposes of agriculture. The principal crops are millets of various kinds, rice, wheat, oil-seeds, cotton.

tobacco, sugar-cane, and fruits and garden produce in great variety.

Silk, known as lussur, the produce of a wild species of worm, is utilized on a large scale. Lac, suitable for use as a resin or dye, gums and oils are found in great quantities. Hides, raw and tanned, are articles of some importance in commerce. The principal exports are cotton, oil-seeds, country-clothes and hides; the imports are salt, grain, timber, European piece- goods and hardware. The mineral wealth of the state consists of coal, copper, iron, diamonds and gold; but the development of these resources has not hitherto been very successful. The only coal mine now worked is the large one at Singareni, with an annual out-turn of nearly half a million tons. This coal has enabled the nizam's guaranteed state railway to be worked so cheaply that it now returns a handsome profit to the state. It also gives encouragement to much-needed schemes of railway extension, and to the erection of cotton presses and of spinning and weaving mills. The Hyderabad-Godavari railway (opened in 1901) traverses a rich cotton country, and cotton presses have been erected along the line. The currency of the state is based on the halt sikka, which contains approximately the same weight of silver as the British rupee, but its exchange value fell heavily after 1893, when free coinage ceased in the mint. In 1004, however, a new coin (the Mahbubia rupee) was minted; the supply was regulated, and the rate of exchange became about 115 = 100 British rupees. The state suffered from famine during 1900, the total number of persons in receipt of relief rising to nearly 500,000 in June of that year. The nizam met the demands for relief with great liberality.

The nizam of Hyderabad is the principal Mahommedan ruler in India. The family was founded by Asaf Jah, a distinguished Turkoman soldier of the emperor Aurangzeb, who in 17 13 was appointed subahdar of the Deccan, with the title of nizam- ul-mulk (regulator of the state), but eventually threw off the control of the Delhi court. Azaf Jah's death in 1748 was followed by an internecine struggle for the throne among his descendants, in which the British and the French took part. At one time the French nominee, Salabat Jang, established himself with the help of Bussy. But finally, in 1761, when the British had secured their predominance throughout southern India, Nizam Ali took his place and ruled till 1803. It was he who confirmed the grant of the Northern Circars in 1766, and joined in the two wars against Tippoo Sultan in 1792 and 1799. The additions of territory which he acquired by these wars was afterwards (1800) ceded to the British, as payment for the subsidiary force which he had undertaken to maintain. By a later treaty in 1853, the districts known as Berar were " assigned " to defray the cost of the Hyderabad contingent. In 1857 when the Mutiny broke out, the attitude of Hyderabad as the premier

native state and the cynosure of the Mabommedans in India became a matter of extreme importance; but Afzul-ud-Dowla, the father of the present ruler, and his famous minister, Sir Salar Jang, remained loyal to the British. An attack on the residency was repulsed, and the Hyderabad contingent displayed their loyalty in the field against the rebels. In 1902 by a treaty made by Lord Curzon, Berar was leased in perpetuity to the British government, and the Hyderabad contingent was merged in the Indian army. The nizam Mir Mahbub Ali Khan Bahadur, Asaf Jah, a direct descendant of the famous nizam-ul-mulk, was born on the 18th of August 1866. On the death of his father in 1869 he succeeded to the throne as a minor, and was invested with full powers in 1884. He is notable as the originator of the Imperial Service Troops, which now form the contribution of the native chiefs to the defence of India. On the occasion of the Panjdeh incident in 1885 he made an offer of money and men, and subsequently on the occasion of Queen Victoria's Jubilee in 1887 he offered 20 lakhs (£130,000) annually for three years for the purpose of frontier defence. It was finally decided that the native chiefs should maintain small but well-equipped bodies of infantry and cavalry for imperial defence. For many years past the Hyderabad finances were in a very unhealthy condition; the expenditure consistently outran the revenue, and the nobles, who held their tenure under an obsolete feudal

system, vied with each other in ostentatious extravagance. But in 1902, on the revision of the Berar agreement, the nizam received 25 lakhs (£167,000) a year for the rent of Berar, thus substituting a fixed for a fluctuating source of income, and a British financial adviser was appointed for the purpose of reorganizing the resources of the state.

See S. H. Bilgrami and C. Willmott, Historical and Descriptive Sketch of the Nizam's Dominions (Bombay, 1883-1884).

HYDERABAD or Haidarabad, capital of the above state, is situated on the right bank of the river Musi, a tributary of the Kistna, with Golconda to the west, and the residency and its bazaars and the British cantonment of Secunderabad to the north-east. It is the fourth largest city in India; pop. (1901) 448,466, including suburbs and cantonment. The city itself is in shape a parallelogram, with an area of more than 2 sq. m. It was founded in 1589 by Mahommed Kuli, fifth of the Kutb Shahi kings, of whose. period several important buildings remain as monuments. The principal of these is the Char Minar or Four Minarets (1591). The minarets rise from arches facing the cardinal points, and stand in the centre of the city, with four roads radiating from their base. The Ashur Khana (1594), a ceremonial building, the hospital, the Gosha Mahal palace and the Mecca mosque,

a sombre building designed after a mosque at Mecca, surrounding a paved quadrangle 360 ft. square, were the other principal buildings of the Kutb Shahi period, though the mosque was only completed in the time of Aurangzeb. The city proper is surrounded by a stone wall with thirteen gates, completed in the time of the first nizam, who made Hyderabad his capital. The suburbs, of which the most important is Chadarghat, extend over an additional area of 9 sq. m. There are several fine palaces built by various nizams, and the British residency is an imposing building in a large park on the left bank of the Musi, N.E. of the city. The bazaars surrounding it, and under its jurisdiction, are extremely picturesque and are thronged with natives from all parts of India. Four bridges crossed the Musi, the most notable of which was the Furana Pul, of 23 arches, built in 1593. On the ‘27th and 28th of September 1908, however, the Musi, swollen by torrential rainfall (during which 15 in. fell in 36 hours), rose in flood to a height of 12 ft. above the bridges and swept them away. The damage done was widespread ; several important buildings were involved, including the palace of Salar Jang and the Victoria zenana hospital, while the beautiful grounds of the residency were destroyed. A large and densely populated part of the city was wrecked, and thousands of lives were lost. The principal educational establishments are the Nizam college (first grade), engineering, law, medical, normal, industrial and Sanskrit schools, and a number of schools for Europeans and Eurasians. Hyderabad is an important centre of general trade, and there is a cotton mill in its vicinity. The city is supplied with water from two notable works, the Husain Sagar and the Mir Alam, both large lakes retained by great dams. Secunderabad, the British military cantonment, is situated s| m. N. of the residency; it includes Bolaram, the former headquarters of the Hyderabad contingent.

HYDER ALI, or Haidar ‘Ali (c. 1722-1782), Indian ruler and commander. This Mahommedan soldier-adventurer, who, followed by his son Tippoo, became the most formidable Asiatic rival the British ever encountered in India, was the great-grandson of & fakir or wandering ascetic of Islam, who had found his way from the Punjab to Gulburga in the Eeccan, and the second sen of a naik or chief constable at Budikota, near Kolar in Mysore. He was born in 1722, or according to other authorities 1717. An elder brother, who like himself was early turned out into the world to seek his own fortune, rose to command a brigade in the Mysore army, while Hyder, who never learned to read or write, passed the first years of his life aimlessly in sport and sensuality, sometimes, however, acting as the agent of his brother, and meanwhile acquiring a useful familiarity with the tactics of the French when at the height of their reputation

under Dupleix. He is said to have induced his brother to employ a Parsee to purchase artillery and small arms from the Bombay

government, and to enrol some thirty sailors of different European nations as gunners, and is thus credited with having been ” the first Indian who formed a corps of sepoys armed with fire- locks and bayonets, and who had a train of artillery served by Europeans.” At the siege of Devanhalli (1749) Hyder’s services attracted the attention of Nanjiraj, the minister of the raja of Mysore, and he at once received an independent command; within the next twelve years his energy and ability had made him completely master of minister and raja alike, and in every- thing but in name he was ruler of the kingdom. In 1763 the conquest of Kanara gave him possession of the treasures of Bednor, which he resolved to make the most splendid capital in India, under his own name, thenceforth changed from Hyder Naik into Hyder Ali Khan Bahadur; and in 1765 he retrieved previous defeat at the hands of the Mahrattas by the destruction of the Nairs or military caste of the Malabar coast, and the conquest of Calicut. Hyder Ali now began to occupy the serious attention of the Madras government, which in 1766 entered into an agreement with the nizam to furnish him with troops to be used against the common foe. But hardly had this alliance been formed when a secret arrangement was come to between the two Indian powers, the result of which was that Colonel Smith’s small force was met with a united army of 80,000 men and 100 guns. British dash and sepoy fidelity, however, prevailed, first in the battle of Chengam (September 3rd, 1767), and again still more remarkably in that of Tiruvannamalai (Trinomalai). On the loss of his recently made fleet and forts on the western coast, Hyder Ali now offered overtures for peace; on the rejection of these, bringing all his resources and strategy into play, he forced Colonel Smith to raise the siege of Bangalore, and brought his army within 5 m. of Madras. The result was the treaty of April 1769, providing for the mutual restitution of all conquests, and for mutual aid and alliance in defensive war; it was followed by a commercial treaty in 1770 with the authorities of Bombay. Under these arrangements Hyder Ali, when defeated by the Mahrattas in 1772, claimed British assist- ance, but in vain; this breach of faith stung him to fury, and thenceforward he and his son did not cease to thirst for vengeance. His time came when in 1778 the British, on the declaration of war with France, resolved to drive the French out of India. The capture of Mahe on the coast of Malabar in 1779, followed by the annexation of lands belonging to a

dependent of his own, gave him the needed pretext. Again master of all that the Mahrattas had taken from him, and with empire extended to the Kistna, he descended through the passes of the Ghats amid burning villages, reaching Conjeeveram, only 45 m. from Madras, unopposed. Not till the smoke was seen from St Thomas's Mount, where Sir Hector Munro commanded some 5200 troops, was any movement made; then, however, the British general sought to effect a junction with a smaller body under Colonel Baillie recalled from Guntur. The incapacity of these officers, notwithstanding the splendid courage of their men, resulted in the total destruction of Baillie's force of 2800 (September the 10th, 1780). Warren Hastings sent from Bengal Sir Eyre Coote, who, though repulsed at Chidambaram, defeated Hyder thrice successively in the battles of Porto Novo, Pollilur and Sholingarh, while Tippoo was forced to raise the siege of Wandi- vvash, and Vellore was provisioned. On the arrival of Lord Macartney as governor of Madras, the British fleet captured Negapatam, and forced Hyder Ali to confess that he could never ruin a power which had command of the sea. He had sent his son Tippoo to the west coast, to seek the assistance of the French fleet, when his death took place suddenly at Chittur in December

1782.

See L. B. Bowring, Haidar Ali and Tipu Sultan, " Rulers of India " series (1893). For the personal character and administration of Hyder Ali see the History of Hyder Naik, written by Mir Hussein Ali Khan Kirmani (translated from the Persian by Colonel Miles, and published by the Oriental Translation Fund), and the curious work written by M. Le Maitre de La Tour, commandant of his artillery {Histoire 'd'Hayder-AH Khan, Paris, 1783). For the whole life and times see Wilks, Historical Sketches of the South of India (1810-1817) ; \itchison's Treaties, vol. v. (2nd ed., 1876}; and Pearson, Memoirs of Schwartz (1834).

HYDRA (or Sidra, Nidra, Idero, &c; anc. Hydrea), an island of Greece, lying about 4 m. off the S.E. coast of Argolis in the Peloponnesus, and forming along with the neighbouring island of Dokos (Dhoko) the Bay of Hydra. Pop. about 6200. The greatest length from south-west to north-east is about n m., and the area is about 21 sq. m.; but it is little better than a rocky and treeless ridge with hardly a patch or two of arable soil. Hence the epigram of Antonios Kriezes to the queen of Greece: " The island produces prickly pears in abundance, splendid sea captains and excellent prime ministers." The highest point, Mount Ere, so called (according to Mjaoules) from the Albanian word for wind, is 1958 ft. high. The next in importance is known as the Prophet

Elias, from the large convent of that name on its summit. It was there that the patriot Theodorus Kolokotrones was imprisoned, and a large pine tree is still called after him. The fact that in former times the island was richly clad with woods is indicated by the name still employed by the Turks, Tchamliza, the place of pines; but it is only in some favoured spots that a few trees are now to be found. Tradition also has it that it was once a well-watered island (hence the designation Hydrea), but the inhabitants are now wholly dependent on the rain supply, and they have sometimes had to bring water from the mainland. This lack of fountains is probably to be ascribed in part to the effect of earthquakes, which are not infrequent; that of 1769 continued for six whole days. Hydra, the chief town, is built near the middle of the northern coast, on a very irregular site, consisting of three hills and the intervening ravines. From the sea its white and hand- some houses present a picturesque appearance, and its streets though narrow are clean and attractive. Besides the principal harbour, round which the town is built, there are three other ports on the north coast — Mandraki, Molo, Panagia, but none of them is sufficiently sheltered. Almost all the population of the island is collected in the chief town, which is the seat of a bishop, and has a local court, numerous churches and a high school. Cotton and silk weaving, tanning and shipbuilding are carried on, and there is a fairly active trade.

Hydra was of no importance in ancient times. The only fact in its history is that the people of Hermione (a city on the neighbouring mainland now known by the common name of Kastri) surrendered it to Samian refugees, and that from these the people of Troezen received it in trust. It appears to be com- pletely ignored by the Byzantine chroniclers. In 1580 it was chosen as a refuge by a body of Albanians from Kokkinyas in Troezenia; and other emigrants followed in 1590, 1628, 1635, 1640, &c. At the close of the 17th century the Hydriotes took part in the reviving commerce of the Peloponnesus; and in course of time they extended their range. About 17 16 they began to build sakturia (of from 10 to 15 tons burden), and to visit the islands of the Aegean; not long after they introduced the latinadika (40-50 tons), and sailed as far as Alexandria, Constantinople, Trieste and Venice; and by and by they ventured to France and even America. From the grain trade of south Russia more especially they derived great wealth. In 1813 there were about 22,000 people in the island, and of these 10,000 were seafarers. At the time of the outbreak of the war of Greek independence the total population was 28,190, of whom 16,460 were natives and the rest foreigners. One of their chief families, the Konduriotti, was worth £2,000,000. Into the struggle the

Hydriotes flung themselves with rare enthusiasm and devotion, and the final deliverance of Greece was mainly due to the service rendered by their fleets.

See Pouqueville, Voy. de la Grece, vol. vi. ; Antonios Miaoules, “twofimiˆa irtpl rijs vf)

HYDRA (watersnake), in Greek legend, the offspring of Typhon

and Echidna, a gigantic monster with nine heads (the number

is variously given), the centre one being immortal. Its haunt

was a hill beneath a plane tree near the river Amymone, in the

I marshes of Lerna by Argos. The destruction of this Lernaean

hydra was one of the twelve ” labours ” of Heracles, which he accomplished with the assistance of Iolaus. Finding that as soon as one head was cut off two grew up in its place, they burnt out the roots with firebrands, and at last severed the immortal head from the body, and buried it under a mighty block of rock. The arrows dipped by Heracles in the poisonous blood or gall of the monster ever afterwards inflicted fatal wounds. The generally accepted interpretation of the legend is that ” the hydra denotes the damp, swampy ground of Lerna with its numerous springs (necpaXai, heads) ; its poison the miasmic vapours rising from the stagnant water; its death at the hands of Heracles the introduction of the culture and consequent purification of the soil ” (Preller). A euhemeristic explanation is given by Palaephatus (39). An ancient king named Lernus occupied a small citadel named Hydra, which was defended by 50 bowmen. Heracles besieged the citadel and hurled firebrands at the garrison. As often as one of the defenders fell, two others at once stepped into his place. The citadel was finally taken with the assistance of the army of Iolaus and the garrison slain.

See Hesiod, Theog., 313; Euripides, Hercules furens, 419; Pausanias ii. 37; Apollodorus ii. 5, 2; Diod. Sic. iv. n; Roscher’s Lexikon der Mythologie. In the article Greek Art, fig. 20 represents the slaying of the Lernaean hydra by Heracles.

HYDRA, in astronomy, a constellation of the southern hemisphere,

mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.), and catalogued by Ptolemy (27 stars), Tycho Brahe (19) and Hevelius (31). Interesting objects are: the nebula H. I V. 27 Hydrae, a planetary nebula, gaseous and whose light is about equal to an 8th magnitude star; e Hydrae, a beautiful triple star, composed of two yellow stars of the 4th and 6th magnitudes, and a blue star of the 7th magnitude; R. Hydrae, a long period (425 days) variable, the range in magnitude being from 4 to 9-7; and U. Hydrae, an irregularly variable, the range in magnitude being 4-5 to 6.

HYDRACRYLIC ACID (ethylene lactic acid), CH 2 OH-CH 2 – C0 2 H. an organic oxyacid prepared by acting with silver oxide and water on /3-iodopropionic acid, or from ethylene by the addition of hypochlorous acid, the addition product being then treated with potassium cyanide and hydrolysed by an acid. It may also be prepared by oxidizing the trimethylene glycol obtained by the action of hydrobromic acid on allylbromide. It is a syrupy liquid, which on distillation is resolved into water and the unsaturated acrylic acid, CII2: CH-C0 2 H. Chromic and nitric acids oxidize it to oxalic acid and carbon dioxide. Hydracrylic aldehyde, CH 2 OH-CH 2 CHO, was obtained in 1904 by J. U. Nef (Ann. 335, p. 219) as a colourless oil by heating acrolein with water. Dilute alkalis convert it into crotonalde hyde, CH r CH : CH-CHO.

HYDRANGEA, a popular flower, the plant to which the name is most commonly applied being Hydrangea Hortensia, a low deciduous shrub, producing rather large oval strongly-veined leaves in opposite pairs along the stem. It is terminated by a massive globular corymbose head of flowers, which remain a long period in an ornamental condition. The normal colour of the flowers, the majority of which have neither stamens nor pistil, is pink; but by the influence of sundry agents in the soil, such as alum or iron, they become changed to blue. There are numerous varieties, one of the most noteworthy being ” Thomas Hogg ” with pure white flowers. The part of the inflorescence which appears to be the flower is an exaggerated expansion of the sepals, the other parts being generally abortive. The perfect flowers are small, rarely produced in the species above referred to, but well illustrated by others, in which they occupy the inner parts of the corymb, the larger showy neuter flowers being produced at the circumference.

There are upwards of thirty species, found chiefly in Japan, ki the mountains of India, and in North America, and many of them are familiar in gardens. H. Hortensia (a species long known in cultivation in China and Japan) is the most useful for decoration, as the head of

flowers lasts long in a fresh state, and by the aid of forcing can be had for a considerable period

for the ornamentation of the greenhouse and conservatory. Their natural flowering season is towards the end of the summer, but they may be had earlier by means of forcing. H . japonica is another fine conservatory plant, with foliage and habit much resembling the last named, but this has flat corymbs of flowers, the central ones small and perfect, and the outer ones only enlarged and neutei. This also produces pink or blue flowers under the influence of different soils.

The Japanese species of hydrangea are sufficiently hardy to grow in any tolerably favourable situation, but except in the most sheltered localities they seldom blossom to any degree of perfection in the open air, the head of blossom depending on the uninjured development of a well-ripened terminal bud, and this growth being frequently affected by late spring frosts. They are much more useful for pot-culture indoors, and should be reared from cuttings of shoots having the terminal bud plump and prominent, put in during summer, these developing a single head of flowers the succeeding summer. Somewhat larger plants may be had by nipping out the terminal bud and inducing three or four shoots to start in its place, and these, being steadily developed and well ripened, should each yield its inflorescence in the following summer, that is, when two years old. Large plants grown in tubs and vases are fine subjects for large conservatories, and useful for decorating terrace walks and similar places during summer, being – housed in winter, and started under glass in spring.

Hydrangea paniculata var. grandiflora is a very handsome plant; the branched inflorescence under favourable circum- stances is a yard or more in length, and consists of large spreading masses of crowded white neuter flowers which completely conceal the few inconspicuous fertile ones. The plant attains a height of 8 to 10 ft. and when in flower late in summer and in autumn is a very attractive object in the shrubbery.

The Indian and American species, especially the latter, are quite hardy, and some of them are extremely effective.

HYDRASTINE, C 21 H 2 iN0 6 , an alkaloid found with berberine in the root of golden seal, Hydrastis canadensis, a plant indigenous to North America. It was discovered by Durand in 1851, and its chemistry formed the subject of numerous communications by E. Schmidt and M. Freund (see Ann., 1892, 271, p. 311) who, aided by P.

Fritsch {Ann., 1895, 286, p. 1), established its constitution. It is related to narcotine, which is methoxy hydrastine. The root of golden seal is used in medicine under the name hydrastis rhizome, as a stomachic and nervine stimulant.

HYDRATE, in chemistry, a compound containing the elements of water in combination; more specifically, a compound contain- ing the monovalent hydroxyl or OH group. The first and more general definition includes substances containing water of crystallization; such salts are said to be hydrated, and when deprived of their water to be dehydrated or anhydrous. Com- pounds embraced by the second definition are more usually termed hydroxides, since at one time they were regarded as com binations of an oxide with water, for example, calcium oxide or lime when slaked with water yielded calcium hydroxide, written formerly as CaO-H 2 0. The general formulae of hydroxides are: M'OH, M ii (OH) 2 ,M iii (OH) 3 ,M iv (OH) 4 ,&c, corresponding to the oxides M 2 i O, M u O, M 2 iU 3 , M iv 2 , &c, the Roman index denoting the valency of the element. There is an important difference between non-metallic and metallic hydroxides; the former are invariably acids (oxyacids), the latter are more usually basic, although acidic metallic oxides yield acidic hydroxides. Elements exhibiting strong basigenic or oxygenic characters yield the most, stable hydroxides; in other words, stable hydroxides are associated with elements belonging to the extreme groups of the periodic system, and unstable hydroxides with the central members. The most stable basic hydroxides are those of the alkali metals, viz. lithium, sodium, potassium, rubidium and caesium, and of the alkaline earth metals, viz. calcium, barium and strontium; the most stable acidic hydroxides are those of the elements placed in groups VB, VIB and VIIB of the periodic table.

HYDRAULICS (Gr. SScop, water, and auXos, a pipe), the branch of engineering science which deals with the practical applications of the laws of hydromechanics.

I. THE DATA OF HYDRAULICS '

§ i. Properties of Fluids. — The fluids to which the laws of practical hydraulics relate are substances the parts of which possess very great mobility, or which offer a very small resistance to distortion independently of inertia. Under the general head'ig Hydromechanics a

fluid is denned to be a substance which yields continually to the slightest tangential stress, and hence in a fluid at rest there can be no tangential stress. But, further, in fluids such as water, air, steam, &c, to which the present division of the article relates, the tangential stresses that are called into action between contiguous portions during distortion or change of figure are always small compared with the weight, inertia, pressure, &c, which produce the visible motions it is the object of hydraulics to estimate. On the other hand, while a fluid passes easily from one form to another, it opposes considerable resistance to change of volume.

It is easily deduced from the absence or smallness of the tangential stress that contiguous portions of fluid act on each other with a pressure which is exactly or very nearly normal to the interface which separates them. The stress must be a pressure, not a tension, or the parts would separate. Further, at any point in a fluid the pressure in all directions must be the same; or, in other words, the pressure on any small element of surface is independent of the orientation of the surface.

§ 2. Fluids are divided into liquids, or incompressible fluids, and gases, or compressible fluids. Very great changes of pressure change the volume of liquids only by a small amount, and if the pressure on them is reduced to zero they do not sensibly dilate. In gases or compressible fluids the volume alters sensibly for small changes of pressure, and if the pressure is indefinitely diminished they dilate without limit.

In ordinary hydraulics, liquids are treated as absolutely incompressible. In dealing with gases the changes of volume which accompany changes of pressure must be taken into account.

§ 3. Viscous fluids are those in which change of form under a continued stress proceeds gradually and increases indefinitely. A very viscous fluid opposes great resistance to change of form in a short time, and yet may be deformed considerably by a small stress acting for a long period. A block of pitch is more easily splintered than indented by a hammer, but under the action of the mere weight of its parts acting for a long enough time it flattens out and flows like a liquid.

All actual fluids are viscous. They oppose a resistance to the relative motion of their parts. This resistance diminishes with the velocity of the relative motion, and becomes zero in a fluid the parts of which are relatively at rest. When the relative motion of different parts of a fluid

is small, the viscosity may be neglected without introducing important errors. On the other hand, where there is considerable relative motion,

the viscosity may be ex- “tL» pected to have an influence too great to be neglected.

Measurement of Viscosity. Coefficient of Viscosity. — Suppose the plane ab. fig. z of area a, to move with the velocity V relative.lv to the surface cd and parallel to it.

Fig. 1.

Let the space between be filled with liquid. The layers of liquid in contact with ab and cd adhere to them. The intermediate layers all offering an equal resistance to shearing or distortion, the rect- angle of fluid abed will take the form of the parallelogram a’b’cd. Further, the resistance to the motion of ab may be expressed in the form

R = /c M V, (1)

where k is a coefficient the nature of which remains to be deter- mined.

‘ Except where other units are given, the units throughout this article are feet, pounds, pounds per sq. ft., feet per second.

If we suppose the liquid between ab and cd divided into layers as shown in fig. 2, it will be clear that the stress R acts, at each dividing face, forwards in the direction of motion if we consider the upper layer, backwards if we consider the lower layer. Now suppose the original thickness of the layer T increased to »T; if the bounding plane in its new position has the velocity «V, the shearing at each dividing face will be exactly the same as before, and the resistance must therefore be the same. Hence,

R = k’w(mV). (2)

But equations (1) and (2) may both be expressed in one equation if k and k’ are replaced by a constant varying inversely as the thickness of the layer. Putting k =m/T. k’ —n/nt, R= M oV7T; or, for an indefinitely thin layer,

R =na>dVldt, (3)

an expression first proposed by L. M. H. Navier. The coefficient m is termed the coefficient of viscosity.

According to J. Clerk Maxwell, the value of m for air at 0° Fahr. in pounds, when the velocities are expressed in feet per second, is

ix = o-ooo 000 025 6(46i°-f-0); that is, the coefficient of viscosity is proportional to the absolute temperature and independent of the pressure.

The value of « for water at 77° Fahr. is, according to H. von Helmholtz and G. Piotrowski,

M = o-ooo 018 8, the units being the same as before. For water p decreases rapidly with increase of temperature.

§ 4. When a fluid flows in a very regular manner, as for instance when it flows in a capillary tube, the velocities vary gradually at any moment from

one point of the fluid i, 2 V- – - ˆ

to a neighbouring „ r !_.' [TJZ'.'S-'SZZZZZZZZZZ

point. The layer ad- jacent to the sides of the tube adheres to it and is at rest. The layers more interior than this slide on each other. But the resist- ance developed by these regular move- ments is very small. If in large pipes and open channels.there were a similar regularity of movement, the neighbouring filaments would acquire, especially near the sides, very great relative velocities. V. J. Boussinesq has shown that the central filament in a semicircular canal of 1 metre radius, and inclined at a slope of only o-oooi, would have a velocity of 187 metres per second, 2 the layer next the boundary remaining at rest. But before such a difference of velocity can arise, the motion of the fluid becomes much more complicated. Volumes of fluid are detached continually from the boundaries, and, revolving, form eddies traversing the fluid in all directions, and sliding with finite relative velocities against those surrounding them. These slidings develop resistances incomparably greater than the viscous resistance due to movements varying continuously from point to point. The movements which produce the phenomena commonly ascribed to fluid friction must be regarded as rapidly or even suddenly varying from one point to another. The internal resistances to the motion of the fluid do not depend merely on the general velocities of translation at different points of the fluid (or what Boussinesq terms the mean local velocities), but rather on the intensity at each point of the eddying agitation. The problems of hydraulics are therefore much more complicated than problems in which a regular motion of the fluid is

assumed, hindered by the viscosity of the fluid.

Relation of Pressure, Density, asd Temperature of Liquids

§ 5. Units of Volume. — In practical calculations the cubic foot and gallon are largely used, and in metric countries the litre and cubic metre (= 1000 litres). The imperial gallon is now exclusively used in England, but the United States have retained the old English wine gallon.

2 Journal de M. Liouville, t. xiii. (1868); Memoires de I' Academic, des Sciences de I'Institut de France, t. xxiii., xxiv. (1877).

I cub. ft. = 6-236 imp. gallons

1 imp. gallon = 0-1605 cub. ft.

1 U.S. gallon = 0-1337 cub. ft.

I litre = 0-2201 imp. gallon

= 7-481 U.S. gallons. = 1 -200 U.S. gallons. = 0-8333 imp. gallon. = 0-2641 U.S. gallon.

Density of Water. — Water at 53° F. and ordinary pressure contains 62-4 ft per cub. ft., or 10 lb per imperial gallon at 62° F. The litre contains one kilogram of water at 4 C. or 1000 kilograms per cubic metre. River and spring water is not sensibly denser than pure water. But average sea water weighs 64 lb per cub. ft. at 53° F. The weight of water per cubic unit will be denoted by G. Ice free from air weighs 57-28 ft per cub. ft. (Leduc).

§ 6. Compressibility of Liquids. — The most accurate experiments show that liquids are sensibly compressed by very great pressures, and that up to a pressure of 65 atmospheres, or about 1000 lb per sq. in., the compression is proportional to the pressure. The chief results of experiment are given in the following table. Let Vi be the volume of a liquid in cubic feet under a pressure pi lb per sq. ft., and V2 its volume under a pressure pi. Then the cubical compres- sion is (V2 — Vi)/Vi, and the ratio of the increase of pressure pi— pi to the cubical

compression is sensibly constant. That is, k — (,p2~ pi)'il(Vz — Vi) is constant. This constant is termed the elasticity of volume. With the notation of the differential calculus,

‘»/($)—

-V

dp dV

Elasticity of Volume of Liquids.

Canton.

Oersted.

Colladon and Sturm.

Regnault.

Water . . Sea water Mercury Oil . . . Alcohol

45,990,000 52,900,000 705,300,000 44,090,000 32,060,000

45,900,000

42,660,000

626,100,000

23,100,000

44,090,000 604,500,000

According to the experiments of Grassi, the compressibility of water diminishes as the temperature increases, while that of ether, alcohol and chloroform is increased.

§ 7. Change of Volume and Density of Water with Change of Temperature. — Although the change of volume of water with change of temperature is so small that it may generally be neglected in ordinary hydraulic calculations, yet it should be noted that there is a change of volume which should be allowed for in very exact calculations. The values of p in the following short table, which gives data enough for hydraulic purposes, are taken from Professor Everett’s System of Units.

Density of Water at Different Temperatures.

Temperature.

P

G 1

Temperature.

p

G

ensity of Water.

Weight of

Density of Water.

Weight of

Cent.

Fahr.

1 cub. ft.

in TK ‘

Cent.

Fahr.

1 cub. ft. in It).

320

999884

62-417

20

68-o

•998272

62316

I

33*8

999941

62-420

22

71-6

•997839

62-28Q

2

35-6

999982

62-423

24

75-2

•997380

62-26I

3

37-4 1

OOOO04

62-424

26

78-8

•996879

62229

4

39-2 1

OOOO13

62-425

28

82-4

•996344

62-196

5

41-0 1

OOOOO3

62-424

30

86

•995778

62-I6I

6

42-8

999983

62-423

35

95

•99469

62-093

7

44-6

999946

62-421

40

104

■99236

61-947

8

46-4

999899

62-418

45

“3

•99038

61-823

9

48-2

999837

62-414

50

122

•9882I

61-688

10

50-0

999760

62-409

55

131

•98583

61-540

11

5i-8

999668

62-403

60

140

•98339

61-387

12

53-6

999562

62-397

65

149

•98075

61-222

‘3

55-4

999443

62-389

70

158

•97795

61-048

14

57-2

999312

62-381

75

167

•97499

60-863

15

59-0

999173

62-373

80

176

•97195

60-674

16

6o-8

999015

62-363

85

185

•96880

60-477

17

62-6

998854

62-353

90

194

•96557

60-275

18

64-4

998667

62-341

100

212

•95866

59-844

19

66-2

•998473

62-329

The weight per cubic foot has been calculated from the values of p, on the assumption that 1 cub. ft. of water at 39-2° Fahr. is 62-425 ft. For ordinary calculations in hydraulics, the density of water (which will in future be designated by the symbol G) will be taken at 62-4 ft per cub. ft., which is its density at 53° Fahr. It may be noted also that ice at 32° Fahr. contains 57-3 ft per cub. ft. The values of p are the densities in grammes per cubic centimetre.

§ 8. Pressure Column. Free Surface Level. — Suppose a small vertical pipe introduced into a liquid at any point P (fig. 3). Then the liquid

will rise in the pipe to a level 00, such that the pressure due to the column in the pipe exactly balances the pressure on its mouth. If the fluid is in motion the mouth of the pipe must be supposed accurately parallel to the direction of motion, or the impact of the liquid at the mouth of the pipe will have an influence on the height of the column. If this condition is complied with,

the height h of the column is a measure of the pressure at the point P. Let o> be the area of section of the pipe, h the height of the pressure column, p the intensity of pressure at P; then

pw = Ghoi%,

p/G = h; that is, h is the height due to the pressure at p. The level 00 will be termed the free surface level corresponding to the pressure at P.

Relation of Pressure, Temperature, and Density of Gases

§ 9. Relation of Pressure, Volume, Temperature and Density in Compressible Fluids. — Certain problems on the flow of air and steam are so similar to those relating to the flow of water that they are conveniently treated together. It is neces- sary, therefore, to state as briefly as possible the properties ol compres- sible fluids so far as know- ledge of them is requisite in the solution of these problems. Air may be taken as a type of these fluids, and the numerical data here given will relate to air.

Relation of Pressure

Fig. 3.

and Volume at Constant Temperature. — At constant temperature the product of the pressure p and volume V of a given quantity of air is a constant (Boyle's law).

Let po be mean atmospheric pressure (2116-8 ft per sq. ft.), Vo the volume of 1 ft of air at 32° Fahr. under the pressure po. Then poVo = 26214. (1)

If Go is the weight per cubic foot of air in the same conditions,

Go = i/Vo = 2ii6-8/262i4 = -o8o75. (2)

For any other pressure p, at which the volume of 1 ft is V and the weight per cubic foot is G, the temperature being 32° Fahr.,

pV= p!G =26214; or G=£/262i4. (3)

Change of Pressure or Volume by Change of Temperature. — Let pn, Vo, Go, as before be the pressure, the volume of a pound in cubic feet, and the weight of a cubic foot in pounds, at 32° Fahr. Let p, V, G be the same quantities at a temperature / (measured strictly by the air thermometer, the degrees of which differ a little from those of a mercurial thermometer). Then, by experiment,

£V = £oVo(46o-6+/)/(46o-6+32) =A,V t/t , (4)

where t, t are the temperatures / and 32° reckoned from the absolute zero, which is —460-6 Fahr. ;

pjG = £ot/Got ; (4a)

G=pT Go/poT. (5)

If £0 = 2116-8, Go = -08075, to = 460-6+32 =492-6, then

p/G = 53-27-. (5a)

Or quite generally p/G = Rt for all gases, if R is a constant varying inversely as the density of the gas at 32° F. For steam R = 85-5-

II. KINEMATICS OF FLUIDS

§ 10. Moving fluids as commonly observed are conveniently classified thus:

(1) Streams are moving masses of indefinite length, completely or incompletely bounded laterally by solid boundaries. When the solid boundaries are complete, the flow is said to take place in a pipe. When the solid boundary is incomplete and leaves the upper surface of the fluid free, it is termed a stream bed or channel or canal.

(2) A stream bounded laterally by differently moving fluid of the same kind is termed a current.

(3) A jet is a stream bounded by fluid of a different kind.

(4) An eddy, vortex or whirlpool is a mass of fluid the particles of which are moving circularly or spirally.

(5) In a stream we may often regard the particles as flowing along definite paths in space. A chain of particles following each other along such a constant path may be termed a fluid filament or elementary

stream.

§ 11. Steady and Unsteady, Uniform and Varying, Motion. — There are two quite distinct ways of treating hydrodynamical questions. We may either fix attention on a given mass of fluid and consider its changes of position and energy under the action of the stresses to which it is subjected, or we may have regard to a given fixed portion of space, and consider the volume and energy of the fluid entering and leaving that space.

If, in following a given path ab (fig. 4), a mass of water a has a

constant velocity, the motion is said to be uniform. The kinetic

energy of the mass a remains unchanged. If the velocity varies

from point to point of the path, the motion is called varying motion.

If at a given point a in space, the particles of water always arrive

with the same velocity and in the same direction, during any given

time, then the motion is termed steady motion. On the contrary,

if at the point a the velocity or direction varies from moment to

moment the motion is termed a.

— a

Fig. 4.

unsteady. A river which ex- cavates its own bed is in unsteady motion so long as the slope and form of the bed is changing. It, however,

tends always towards a condition in which the bed ceases to change, and it is then said to have reached a condition of permanent regime. No river probably is in absolutely permanent regime, except perhaps in rocky channels. In other cases the bed is scoured more or less during the rise of a flood, and silted again during the subsidence of the flood. But while many streams of a torrential character change the

condition of their bed often and to a large extent, in others the changes are comparatively small and not easily observed.

As a stream approaches a condition of steady motion, its regime becomes permanent. Hence steady motion and permanent regime are sometimes used as meaning the same thing. The one, however, is a definite term applicable to the motion of the water, the other a less definite term applicable in strictness only to the condition of the stream bed.

§ 12. Theoretical Notions on the Motion of Water. — The actual motion of the particles of water is in most cases very complex. To simplify hydrodynamic problems, simpler modes of motion are assumed, and the results of theory so obtained are compared experimentally with the actual motions.

Motion in Plane Layers. — The simplest kind of motion in a stream is one in which the particles initially situated in any plane cross

section of the stream con- tinue to be found in plane cross sections during the subsequent motion. Thus, if the particles in a thin plane layer ab (fig. 5) are found again in a thin plane layer a'V after any interval of time, the motion is said to be motion in plane layers. In such motion the internal work in deforming the layer may usually be disregarded, and the resist- ance to the motion is confined to the circumference. . Laminar Motion. — In the case of streams having solid boundaries, it is observed that the central parts move faster than the lateral parts. To take account of these differences of velocity, the stream may be conceived to be divided into thin laminae, having cross sections somewhat similar to the solid boundary of the stream, and sliding on each other. The different laminae can then be treated as having differing velocities according to any law either observed or deduced from their mutual friction. A much closer approxima- tion to the real motion of ordinary streams is thus obtained.

Stream Line Motion. — In the preceding hypothesis, all the particles in each lamina have the same velocity at any given cross section of the stream. If this assumption is abandoned, the cross section of the stream must be supposed divided into indefinitely small areas, each representing the section of a fluid filament. Then these fila- ments may have any law of variation of velocity assigned to them. If the motion is steady motion these fluid filaments (or as they are then termed stream lines) will have fixed positions in space.

Periodic Unsteady Motion. — In ordinary streams with rough

boundaries, it is observed that at any given point the velocity varies from moment to moment in magnitude and direction, but that the average velocity for a sensible period (say for 5 or 10 minutes) varies very little either in magnitude or velocity. It has hence

Fig. 5.

be the velocity of the fluid. Then the volume flowing through the surface A in unit time is

Q = coV. _ (1)

Thus, if the motion is rectilinear, all the particles at any instant in the surface A will be found after one second in a similar surface A', at a distance V, and as each particle is followed by a continuous thread of other particles, the volume of flow is the right prism AA' having a base w and length V.

If the direction of motion makes an angle 8 with the normal to the surface, the volume of flow is represented by an oblique prism AA' (fig. 7), and in that case

Q = wV cos 9.

If the velocity varies at different points of the surface, let the sur- face be divided into very small portions, for each of which the

W»-

V

Fig. 6.

been conceived that the variations of direction and magnitude of the velocity are periodic, and that, if for each point of the stream the mean velocity and direction of motion were substituted for the actual more or less varying motions, the motion of the stream might be treated as steady stream line or steady laminar motion.

§ 13. Volume of Flow. — Let A (fig. 6) be any ideal plane surface, of area u>, in a stream, normal to the direction of motion, and let V

W»

Fig. 7.

velocity may be regarded as constant. If da is the area and v, or v cos

0, the normal velocity for this element of the surface, the volume of flow is

Q =fvdo>, or fv cos 9 da, as the case may be.

§ 14. Principle of Continuity. — If we consider any completely bounded fixed space in a moving liquid initially and finally filled continuously with liquid, the inflow must be equal to the outflow. Expressing the inflow with a positive and the outflow with a negative sign, and estimating the volume of flow Q for all the boundaries,

S Q=.°-

In general the space will remain filled with fluid if the pressure at every point remains positive. There will be a break of continuity, if at any point the pressure becomes negative, indicating that the stress at that point is tensile. In the case of ordinary water this statement requires modification. Water contains a variable amount of air in solution, often about one-twentieth of its volume. This air is disengaged and breaks the continuity of the liquid, if the pressure falls below a point corresponding to its tension. It is for this reason that pumps will not draw water to the full height due to atmospheric pressure.

Application of the Principle of Continuity to the case of a Stream. — If Ai, A2 are the areas of two normal cross sections of a stream, and Vi, V 2 are the velocities of the stream at those sections, then from the principle of continuity,

ViAˆViA;

V 1 /V 2 =A 2 /A 1 (2)

that is, the normal velocities are inversely as the areas of the cross sections. This is true of the mean velocities, if at each section the velocity of the stream varies. In a river of varying slope the velocity varies with the slope. It is easy therefore to see that in parts of large cross section the slope is smaller than in parts of small cross section.

If we conceive a space in a liquid bounded by normal sections at Ai, A 2 and between Ai, A 2 by stream lines (fig. 8), then, as there is no flow across the stream lines,

V 1 /V 2 = A 2 /A I , as in a stream with rigid boundaries.

In the case of compressible fluids the variation of volume due to the

difference of pressure at the two sections must be taken into

Fig. 8.

account. If the motion is steady the weight of fluid between two cross sections of a stream must remain constant. Hence the weight flowing in must be the same as the weight flowing out. Let pi, pz be the pressures, v x , v 2 the velocities, Gi, G 2 the weight per cubic foot of fluid, at cross sections of a stream of areas Ai, A 2 . The volumes of inflow and outflow are

Ai»i and A 2 t> 2 , and, if the weights of these are the same,

GiAi!>i = G 2 A 2 z> 2 ; and hence, from (50) § 9, if the temperature is constant,

piAiVi=p 2 A 2 v 2 . (3)

[DISCHARGE OF LIQUIDS

§ IS. Stream Lines. — The characteristic of a perfect fluid, that is, a fluid free from viscosity, is that the pressure between any two parts ‘ into which it is divided by a plane must be normal to the plane. One consequence of this is that the particles can have no rotation impressed upon them, and the motion of such a fluid is irrotational. A stream line is the line, straight or curved, traced by a particle in a current of fluid in irrotational movement. In a steady current

Fig. 9.

each stream line preserves its figure and position unchanged, and marks the track of a stream of particles forming a fluid filament or elementary stream. A current in steady irrotational movement may be conceived to be divided by insensibly thin partitions follow- ing the course of the stream lines into a number of elementary streams. If the positions of these partitions are so adjusted that the volumes of flow in all the elementary streams are equal, they represent to the mind the velocity as well as the direction of motion of the particles in different parts of the current, for the velocities

“r

Fig. 11.

Fig. 12.

are inversely proportional to the cross sections of the elementary streams. No actual fluid is devoid of viscosity, and the effect of viscosity is to render the motion of a fluid sinuous, or rotational or eddying under most ordinary conditions. At very low velocities in a tube of moderate size the motion of water may be nearly pure stream line motion. But at some velocity, smaller as the diameter of the tube is greater, the motion suddenly becomes tumultuous. The laws of simple stream line motion have hitherto been investi- gated theoretically, and from mathematical difficulties have only been determined for certain simple cases. Professor H. S. Hele Shaw has found means of exhibiting stream line motion in a number of very interesting cases experimentally. Generally in these ex- periments a thin sheet of fluid is caused to flow between two parallel plates of glass. In the earlier experiments streams of very small air bubbles introduced into the water current rendered visible the motions of the water. By the use of a lantern the image of a portion of the current can be shown on a screen or photo- graphed. In later experiments streams of coloured liquid at regular distances were intro- duced into the sheet and these much more clearly marked out the forms of the stream lines. With a fluid sheet 0-02 in. thick, the stream lines were found to be stable at almost any required velocity. For certain simple cases Professor Hele Shaw has shown that the experimental stream lines of a viscous fluid are so far as can be measured identical with the calculated stream lines of a perfect fluid. Sir G. G. Stokes pointed out that in this case, either from the thinness of the stream between its glass walls, or the slowness of the motion, or the high viscosity of the liquid, or from a combination of all these, the flow is regular, and the effects of inertia disappear, the viscosity dominating everything. Glycerine gives the stream lines very satisfactorily.

Fig. 9 shows the stream lines of a sheet of fluid passing a fairly

Fig. 13.

shipshape body such as a screwshaft strut. The arrow shows the direction of motion of the fluid. Fig. 10 shows the stream lines for a very thin glycerine sheet passing a non-shipshape body, the stream lines being practically perfect. Fig. II shows one of the earlier air-bubble experiments with a thicker sheet of water. In this case the stream lines break up behind the obstruction, forming an eddying wake. Fig. 12 shows the stream lines of a fluid passing a sudden

contraction or sudden enlargement of a pipe. Lastly, fig. 13 shows the stream lines of a current passing an oblique plane. H. S. Hele Shaw, " Experiments on the Nature of the Surface Re- sistance in Pipes and on Ships," Trans. Inst. Naval Arch. (1897). " Investigation of Stream Line Motion under certain Experimental Conditions," Trans. Inst. Naval Arch. (1898) ; " Stream Line Motion of a Viscous Fluid," Report of British Association (1898).

III. PHENOMENA OF THE DISCHARGE OF LIQUIDS FROM ORIFICES AS ASCERTAINABLE BY EXPERIMENTS

§ 16. When a liquid issues vertically from a small orifice, it forms a jet which rises nearly to the level of the free surface of the liquid in the vessel from which it flows. The difference of level h, (fig. 14) is so small that it may be at once suspected to be due either to air resistance on the surface of the jet or to the viscosity of the liquid or to friction against the sides of the orifice. Neglecting for the moment this small quantity, we may infer, from the eleva- tion of the jet, that each molecule on leaving the orifice possessed the velo- city required to lift it against gravity to the height h. From ordinary dynamics, the relation between the velocity and height of projection is given by the equ ation

V = ij2gh._ (1)

As this velocity is nearly reached in the flow from well-formed orifices, it is sometimes called the theoretical velocity of discharge. This relation was first obtained by Torricelli.

If the orifice is of a suitable conoidal form, the water issues in filaments normal to the plane of the orifice. Let o> be the area of the orifice, then the discharge per second must be, from eq. (1),

Q = av = w V 2gh nearly . (2)

This is sometimes quite improperly called the theoretical dis- charge for any kind of orifice. Except for a well-formed conoidal orifice the result is not approximate even, so that if it is supposed to be based on a theory the theory is a false one.

Use of the term Head in Hydraulics. — The term head is an old millwright's term, and meant primarily the height through which a mass of water descended in actuating a hydraulic machine. Since the water in fig. 14 descends through a height h to the orifice, we may say there are h ft. of head above the orifice. Still more generally any mass of liquid h ft. above a horizontal plane may be said to have h ft. of

elevation head relatively to that datum plane. Further, since the pressure p at the orifice which produces outflow is connected with h by the relation p/G = h, the quantity p/G may be termed the pressure head at the orifice. Lastly, the velocity v is connected with h by the relation D 2 /2g = /s, so that v 2 /2g may be termed the head due to the velocity v.

§ 1 7. Coefficients of Veloc ity a nd Resistance. — As the actual velocity of discharge differs from V 2gh by a small quantity, let the actual velocity

= V a =C v Tj2gh, (3)

where c„ is a coefficient to be determined by experiment, called the coefficient of velocity. This coefficient is found to be tolerably constant for different heads with well-formed simple orifices, and it very often has the value 0-97.

The difference between the velocity of discharge and the velocity due to the head may be reckoned in another way. The total height h causing outflow consists of two parts — one part h e expended effectively in producing the velocity of outflow, another hr in overcoming the resistances due to viscosity and friction. Let

h r = C r ke,

where c, is a coefficient determined by experiment, and called the coefficient of resistance of the orifice. It is tolerably constant for different heads with well-formed orifices. Then

J>„ = V 2gh, = V \2gh!{\ +C r)}.

(4)

The relation between c» and c, for any orifice is easily found : —

Va = C„V 2gA = V [2ghKl +C r)}

e. = V|i/(i+*)}. (5)

Cr=l/C„ 2 -I. (5fl)

Thus if c, =0-97, then c r = o-o628. That is, for such an orifice about 6j % of the head is expended in overcoming frictional resistances to flow.

Coefficient of Contraction — Sharp-edged Orifices in Plane Surfaces. — When a jet issues from an aperture in a vessel, it may either spring

Fig. 15.

clear from the inner edge of the orifice as at a or & (fig. 15), or it may adhere to the sides of the orifice as at c. The former condition will be found if the orifice is bevelled outwards as at a, so as to be sharp edged, and it will also occur generally for a prismatic aperture like b, provided the thickness of the plate in which the aperture is formed is less than the diameter of the jet. But if the thickness is greater the condition shown at c will occur.

When the discharge occurs as at a or b, the filaments con- verging towards the orifice continue to converge beyond it, so that the section of the jet where the filaments have become parallel is smaller than the section of the orifice. The inertia of the filaments opposes sudden change of direction of motion at the edge of the orifice, and the convergence continues for a distance of about half the diameter of the orifice beyond it. Let u be the

area of the orifice, and c c a> the area of the jet at the point where convergence ceases; then c c is a coefficient to be determined experi- mentally for each kind of orifice, called the coefficient of contraction. When the orifice is a sharp-edged orifice in a plane surface, the value of c e is on the average 0-64, or the section of the jet is very nearly five-eighths of the area of the orifice.

Coefficient of Discharge. — In applying the general formula Q=ui> to a stream, it is assumed that the filaments have a common velocity

v normal to the section u. But if the jet contracts, it is at the con- tracted section of the jet that the direction of motion is normal to a transverse section of the jet. Hence the actual discharge when contraction occurs is

Qo = c„z)XCcw = CcCi,wV (2 gh), or simply, if c = cc c ,

Qa = ClW(2g/l),'

where c is called the coefficient of discharge. Thus for a sharp- edged plane orifice c = o-gjX o-64 = o-62.

§ 18. Experimental Determina- tion of c„, c c , and c. — The co- efficient of contraction c c is directly determined by measur- ing the dimensions of the jet.

the orifice, and t the time in which a particle moves from O to A, then

x=v a l;y = \gP. Eliminating t,

Va = <{gX i l2y).

Then

c v =VaH (2gh) = V (x*/4yh).

In the case of large orifices such as weirs, the velocity can be directly determined by using a Pitot tube (§ 144).

The coefficient of discharge, which for practical purposes is the most important of the three coefficients, is best determined by tank measurement of the flow from the given orifice in a suitable time. If Q is the discharge measured in the tank per second, then

C=Q/

Measurements of

this kind though

simple in principle

are not free from

some practical

difficulties, and

require m uch care.

In fig. 18 is shown

an arrangement of

measuring tank.

The orifice is fixed

in the wall of the cistern A and discharges either into the waste

channel BB, or into the measuring tank. There is a short trough

on rollers C which when run under the jet directs the discharge

into the tank, and when run back again allows the discharge to drop

Fig. 17.

Fig. 16.

For this purpose fixed screws of fine pitch (fig. 16) are convenient. These are set to touch the jet, and then the distance between them can be measured at leisure.

The coefficient of velocity is determined directly by measuring the parabolic path of a horizontal jet.

Let OX, OY (fig. 17) be horizontal and vertical axes, the origin being at the orifice. Let h be the head, and x, y the coordinates of a point A on the parabolic path of the jet. If j > „ is the velocity at

into the waste channel. D is a stilling screen to prevent agitation of the surface at the measuring point, E, and F is a discharge valve for emptying the measuring tank. The rise of level in the tank, the time of the flow and the head over the orifice at that time must be exactly observed.

For well made sharp-edged orifices, small relatively to the water surface in the supply reservoir, the coefficients under different conditions of head are pretty exactly known. Suppose the same quantity of water is made to flow in succession through such an orifice and through another orifice of which the coefficient is re- quired, and when the rate of flow is constant the heads over each orifice are noted. Let hi, fe be the heads, coi, coj the areas of the orifices, c\, Ci the coefficients. Then since the flow through each orifice is the same

Q = CiwiV (2gfcl) = c 2 wjV (2gfe). c 2 = ci(wi/cu 2) V (hi/h). § 19. Coefficients for Bellmoulhs and Bellmouthed Orifices. — If an orifice is furnished with a mouthpiece exactly of the form of the

-D’l-2Sd-

tfS*«**“‘j

0-3 D

-OG2.5 d

d-0-8D .—

r

Fig. 19.

contracted vein, then the whole of the contraction occurs within the mouthpiece, and if the area of the orifice is measured at the smaller end, c„ must be put = i. It is often desirable to bellmouth the ends of pipes, to avoid the loss of head which occurs if this is

not done; and such a bellmouth may also have the form of the contracted jet. Fig. 19 shows the proportions of such a bellmouth or bellmouthed orifice, which approximates to the form of the contracted jet sufficiently for any practical purpose.

For such an orifice L. J. Weisbach found the following values of the coefficients with different heads.

Head over orifice, in ft. = h

•66

1-64

11-48

5577

337-93

Coefficient of velocity = c„ . Coefficient of resistance = c r

•959 •087

•967 •069

•975 •052

•994 •012

•994 •012

As there is no contraction after the jet issues from the orifice, c c — I , c = c v ; and therefore

Q =c„«V (2gh) =«V \2gh/(l +c r)}.

§ 20. Coefficients for Sharp-edged or virtually Sharp-edged Orifices. — There are a very large number of measurements of discharge from sharp-edged orifices under different conditions of head. An account of these and a very careful tabulation of the average values of the coefficients will be found in the Hydraulics of the late Hamilton Smith (Wiley & Sons, New York, 1886). The following short table abstracted from a larger one will give a fair notion of how the co- efficient varies according to the most trustworthy of the experiments.

Coefficient of Discharge for Vertical Circular Orifices, Sharp-edged, with free Discharge into the Air. Q = c«V (2gh).

Head

measured to

Centre of

Orifice.

°‘3

0-4

o-6

0-8

i-o

2-0 4-0

8-o

20-O

Diameters of Orifice.

■04

•40

■60

Values of C.

■655 •648 •644 •632 •623 •614 •601

•637 •630 •626 •623 •614 •609 •605 •599

621

618

613

•601

•596

•588

610

•601

•597

•594

•58.3

608

•600

•598

•595

•59i

604

•599

•599

•597

•595

602

•599

•598

•597

•596

600

•598

•597

•596

•596

596

•596

•596

■596

•594

At the same time it must be observed that differences of sharpness in the edge of the orifice and some other circumstances affect the results, so that the values found by different careful experimenters are not a little discrepant. When exact measurement of flow has to be made by a sharp-edged orifice it is desirable that the coefficient for the particular orifice should be directly determined.

The following results were obtained by Dr H. T. Bovey in the laboratory of McGill University.

Coefficient of Discharge for Sharp-edged Orifices.

Head in ft.

Form of Orifice.

Cir- cular.

Square.

Rectangular Ratio of Sides 4:1.

Rectangular Ratio of Sides 16:1.

Tri- angular.

Sides vertical.

Dia- gonal vertical.

Long

Sides

vertical.

Long Sides hori- zontal.

Long

Sides

vertical.

Long Sides hori- zontal.

I

2

4

6

8

10

12

14 16

18 20

•620 •613 •608 •607 ■606 ■605 •604 •604 •603 •603 •603

•627 •620 •616 •614 •613 •6l2 •6ll •6lO •6lO •6l0 •609

■628 •628 •618 •616 •614 •613 •612 •6l2 •6ll •6ll •6ll

•642

•634 •628 ■626 •623 ■622 •622 •621 •620 •620 •620

•643 •636 •629 •627 •625 •624 •623 •622 •622 •621 •621

•663 •650 ■64I •637 •634 •632 •63I ■630 •63O •630 ■629

•664 •6 5 I •642 •637 ■635 •633 ■631 •630 ■630 •629 ■628

•636 •628 •623 •620 •619 •618 •618 •618 •617 •616 ■616

The orifice was 0-196 sq. in. area and the reductions were made with g =32- 176 the value for Montreal. The value of the coefficient appears to increase as (perimeter) / (area) increases. It decreases as the head increases. It decreases a little as the size of the orifice is greater.

Very careful experiments by J. G. Mair (Proc. Inst. Civ. Eng. lxxxiv.) on the discharge from circular orifices gave the results shown on top of next column.

The edges of the orifices were got up with scrapers to a sharp square edge. The coefficients generally fall as the head increases and as the diameter increases. Professor W. C. Unwin found that the results agree with the formula

c = 0-6075 +0-0098/V h- o-ootfd, where h is in feet and d in inches.

Coefficients of Discharge from Circular Orifices Temperature 51° to 55°.

1 Head in

Diameters of Orifices in Inches (d).

feet

h.

1

ii

1 1

1*

2

ai

2i

2i

3

•75

Coefficients ©.

•616

•614

•616

•610

•616

•612

•607

•607

•609

I-O

•613

•612

•612

•611

•612

•611

•604

•608

•609

1-25

■613

•614

■610

•608

•612

•608

•605

•60s

■606

I -50

•610

■612

•611

•606

•610

•607

•603

•607

•605

i-75

•612

•611

•611

•605

•611

•605

•604

■607

•605

2-00

•609

•613

•609

•606

■609

■606

•604

■604

•605

The following table, compiled by J. T. Fanning (Treatise on Water Supply Engineering), gives values for rectangular orifices in ver- tical plane surfaces, the head being measured, not immediately over the orifice, where the surface is depressed, but to the still- water surface at some distance from the orifice. The values were obtained by graphic interpolation, all the most reliable ex- periments being plotted and curves drawn so as to average the discrepancies.

Coefficients of Discharge for Rectangular Orifices, Sharp- in Vertical Plane Surfaces.

Head to

Centre of

Orifice.

Ratio of Height to Width.

Feet.

0-2

•3 •4 •5 •6

•7 •8

•9 i-o

1-25 1-50

1-75 2

2-25 2-50

2-75

3

3-5

4

4-5

5

6

7 8

9 10

15 20

25 30 35 40

45 50

•6290 •6280 •6273 •6250 •6245 •6226 •6208 ■6158 •6124 •6090
•6060 ■6035 •6040 •6045 •6048 •6054 ■6060 •6066 •6054 •6086

•6188 •6187 •6186 •6183 ■6180 •6176

•6i73 •6170 •6160 ■6150 •6138 •6124 •6094 •6064 •6036 •6020 •6015 ■6018 ■6024 •6028 •6034 •6039 ■6045 •6052 •6060

•6130 •6134

•6i35 •6140 •6144 •6145 •6144 •6143 •6139 •6136 •6132 •6123 •6110 ■6100 •6088 •6063 •6038 •6022 •6014 •6010 ■6010 •6012 •6014 •6017 ■6021 ■6025 •6029 •6034

‘.3 ‘is

•5984

•5994 •6000 ■6006 •6010 •6018 •6026 •6033 •6036 ■6029 •6043 •6046 •6048 •6050 •6047 •6044 •6038 •6020 •601 1 •6010 •6010 •6010 •601 1 •6012 •6012 ■6013 •6014 •6015 •6016 •6018

i

•6050 ■6063 •6074 •6082 •6086 •6090 ■6095 ■6100 •6103 •6104 •6103 •6102 •6101 ■6100 ■6094 •6085 •6074 •6063 •6044 •6032 •6022 •6015 ■6010 •6012 •6014 •6016 •6018 •6022 •6026 •6030 •6035

6140 6150 6156 6162 6165 6168 6172

6i73

6172 6168 6166 6163

6i57 6i55 6i53

6146 6136 6125 6114 6087 6058 6033 6020 6010 6013 6018 6022 6027 6032 6037 6043 6050

23

•6293 •6306 •6313 •6317 •6319 •6322 •6323 •6320 •6317 •6313 •6307 •6302 •6293 •6282 •6274 •6267 •6254 •6236 •6222 •6202 •6154 •6lIO •6073 •6045 •6O30 ■6033 •6036 •604O •6044 •6049

•6055 •6062 •6070

•6333 •6334 •6334 •6333 •6332 •6328 •6326 •6324 •6320 ■6312 •6303 •6296 ■6291 ■6286 •6278 •6273 •6267 •6254 •6236 •6222 •6202 •6154 •6II4 •6087 •6O70 •606O •6066 •6074 •6083 •6092 •6IO3 •6II4 •6125 •6I4O

§21. Orifices with Edges of Sensible Thickness. — When the edges of the orifice are not bevelled outwards, but have a sensible thickness, the coefficient of discharge is somewhat altered. The following table gives values of the coefficient of discharge for the arrangerrieats of the orifice shown in vertical section at P, Q, R (fig. 20). The plan of all the orifices is shown at S. The planks forming the orifice and sluice were each 2 in. thick, and the orifices were all 24 in. wide. The heads were measured immediately over the orifice. In this case, Q = r&(H-ft)V{2g(H + ft)/2}.

§ 22. Partially Suppressed Contraction. — Since the contraction of the jet is due to the convergence towards the orifice of the issuing streams, it will be diminished if for any portion of the edge of the orifice the convergence is prevented. Thus, if an internal rim or border is applied to part of the edge of the orifice (fig. 21), the con- vergence for so much of the edge is suppressed. For such cases G. Bidone found the following empirical formulae applicable : —

Table

of Coefficients of Discharge for Rectangular Vertical Orifices in Fig

. 20.

Head h above upper edgj oi

Height of Orifice, H – h, in feet.

i-3i

0-66

0-16

O-IO

Orifice

in feet.

P

Q

R

P

Q

R

P

R

p

Q

R

0-328

0-598

0-644

0-648

0-634

0-665

0-668

0-691

0-664

o-666

0-710

0-694

0-696

•656

0-609

0-653

0-657

0-640

0-672

0-675

0-685

0-687

0-688

0-696

0-704

0-706

•787

0-612

0-655

0-659

0-641

0-674

0-677

0-684

0-690

0-692

0-694

0-706

0-708

■984

0-616

0-656

o-66o

0-641

0-675

0-678

0-683

0-693

0-695

0-692

0-709

0-711

1-968

0-618

0-649

0-653

0-640

0-676

0-679

0-678

0-695

0-697

o-688

0-710

0-712

3-28

0-608

0-632

0-634

0-638

0-674

0-676

0-673

0-694

0-695

0-680

0-704

0-705

4-27

0-602

0-624

0-626

0-637

0-673

0-675

0-672

0-693

0-694

0-678

0-701

0-702

4-92

0-598

0-620

0-622

0-637

0-673

0-674

0-672

0-692

0-693

0-676

0-699

0-699

5-58

0-596

0-618

0-620

0-637

0-672

0-673

0-672

0-692

0-693

0-676

0-698

0-698

6-56

0-595

0-615

0-617

0-636

0-671

0-672

0-671

0-691

0-692

0-675

0-696

0-696

9-84

0-592

o-6u

0-612

0-634

0-669

0-670

0-668

0-689

0-690

0-672

0-693

0-693

For rectangular orifices,

c c =0-62(1 +o-l52«/£) ; and for circular orifices,

c c = 0-62(1 -\~o-l28n/p) ; when n is the length of the edge of the orifice over which the border extends, and p is the whole length of edge or perimeter of the orifice. The following are the values of c c , when the border extends over i, J or j of the whole perimeter: —

nip

Cc

Rectangular Orifices.

Cc

Circular Orifices.

0-25

0-50

o-75

0-643 0-667 0-691

•640 •660 •680

For larger values of nip the formulae are not applicable. C. R.

Bornemann has shown, however, that these for- mulae for suppressed con- traction are not reliable.

§ 23. Imperfect Con- traction. — If the sides of the vessel approach near to the edge of the orifice, they interfere with the convergence of the streams ˆ to which the contraction is due, and the contraction is then modified. It is generally stated that the influence of the sides begins to be felt if their distance from the edge of the orifice is less than 2-7 times the corresDonding

§ 24. Orifices Furnished with Channels of Discharge. — These ex- ternal borders to an orifice also modify the contraction.

The following coefficients of discharge were obtained with open- ings 8 in. wide, and small in proportion to the channel of approach (fig. 22, A, B, C).

ft-j— k\ in feet.

h\ in feet.

■0656

‘l64

•328

•656

1-640

3′ 28

4-92

656

984

B \ 0-656 C)

A)

B \ 0-164

c)

•480 ■48O

•527 •488 •487 •585

•5″ •510

•553 •577 •57i •614

■542 •538

•574 ■624 •606 ■633

•574 •506

•592 •631 •617 •645

•599 •592 •607 •625 •626 •652

•601 •600 •610 ■624 •628 ■651

•601 •602 •610 •619 •627 •650

•601 •602 •609 ■613 •623 •650

■601 ■601 •608 ■606 •618 ■649

§ 25. Inversion of the Jet. — When a jet issues from a horizontal orifice, or is of small size compared with the head, it presents no

A

Fig. 20.

Fig. 21.

Fig. 23.

width of the orifice. The coefficients of contraction for this case | marked peculiarity of form. But if the orifice is in a vertical sur- are imperfectly known. | face, and if its dimensions are not small compared with the head,

_l

*l

h 3

1

.i

\

1

•

Fig. 22.

Slope 2 in 10

U- ■#- 4

it undergoes a series of singular changes of form after leaving the orifice. These were first investigated by G. Bidone (1781-1839); subsequently H. G. Magnus (1802-1870) measured jets from different orifices; and later Lord Rayleigh {Proc. Roy. Soc. xxix. 71) investigated them anew.

Fig. 23 shows some forms, the upper figure giving the shape of the orifices, and the others sections of the jet. The jet first contracts as described above, in consequence of the convergence of the fluid streams within the vessel, retaining, however, a form similar to that of the orifice. Afterwards it expands into sheets in planes per- pendicular to the sides of the orifice. Thus the jet from a triangular orifice expands into three sheets, in planes bisecting at right angles the three sides of the triangle. Generally a jet from an orifice, in the form of a regular polygon of n sides, forms n sheets in planes perpendicular to the sides of the polygon.

Bidone explains this by reference to the simpler case of meeting streams. If two equal streams having the same axis, but moving in opposite directions, meet, they spread out into a thin disk normal to the common axis of the streams. If the directions of two streams intersect obliquely they spread into a symmetrical sheet perpendicular to the plane of the streams.

Let 01, a 2 (fig. 24) be two points in an orifice at depths hi, hi from

the free surface. The filaments issuing at ai, 02 will have the different

velocities V 2ghi and V 2ghi. Consequently they will tend to describe parabolic paths dicbi and ancbz of different horizontal range, and intersecting in the point c. But since two filaments cannot simultaneously flow through the same point, they must exercise mutual pressure, and will be deflected out of the paths they tend to describe. It is this mutual pressure which causes the expansion of the jet into sheets.

Lord Rayleigh pointed out that, when the orifices are small and the head is not great, the expansion of the sheets in directions perpendicular to the direction of flow reaches a limit. Sections taken at greater distance from the orifice show a contraction of the sheets until a compact form is reached similar to that at the first contrac- tion. Beyond this point, if the jet retains its coherence, sheets are thrown out again, but in directions bisecting the angles between the previous sheets. Lord Rayleigh accepts an explanation of this con- traction first suggested by H. Buff (1805-1878), namely, that it is due to surface tension.

§ 26. Influence of Temperature on Discharge of Orifices. — Professor VV. C. Unwin found {Phil. Mag., October 1878, p. 281) that for sharp-edged orifices temperature has a very small influence on the discharge. For an orifice I cm. in diameter with heads of about I to 1 5 ft. the coefficients were: —

Temperature F C.

2°5° • -594

62 -598

For a conoidal or bell-mouthed orifice I cm. diameter the effect of temperature was greater: —

Temperature F C.

190 0-987

130° 0-974

60 . 0-942

an increase in velocity of discharge of 4% when the temperature increased 130 .

J. G. Mair repeated these experiments on a much larger scale (Proc. Inst. Civ. Eng. lxxxiv.). For a sharp-edged orifice 2§ in. diameter, with a head of 1-75 ft., the coefficient was 0-604 at 57 and 0607 at 179 F., a very small difference. With a conoidal orifice the coefficient was 0-961 at 55 and 0-981 at 170 F. The corresponding coefficients of resistance are 0-0828 and 0-0391, showing that the resistance decreases to about half at the higher temperature.

§ 27. Fire Hose Nozzles. — Experiments have been made by J. R. Freeman on the coefficient of discharge from smooth cone nozzles used for fire purposes. The coefficient was found to be 0-983 for f-in

Fig. 24.

82 for

in.

0-972 for 1 in.; 0-976 for if in.; and

open channel, for instance, when the effect of eddies produced by the roughness of the sides is neglected, the pressure at each point is simply the hydrostatic pressure due to the depth below the free surface.

(6) If the velocity of the fluid is very small, the distribution of pressure is approximately the same as in a fluid at rest.

(c) If the fluid molecules take precisely the accelerations which they would have if independent and submitted only to the external forces, the pressure is uniform. Thus in a jet falling freely in the air the pressure throughout any cross section is uniform and equal to the atmospheric pressure.

(d) In any bounded plane section traversed normally by streams which are rectilinear for a certain distance on either side of the section, the distribution of pressure is the same as in a fluid at rest.

Distribution of Energy in Incompressible Fluids.

§ 29. Application of the Principle of the Conservation of Energy to Cases of Stream Line Motion. — The external and internal work done on a mass is equal to the change of kinetic energy produced. In many hydraulic questions this principle is difficult to apply, be- cause from the complicated nature of the motion produced it is difficult to estimate the total kinetic energy generated, and because in some cases

the internal work done in overcoming frictional or viscous resistances cannot be ascertained ; but in the case of stream line motion it furnishes a simple and important result known as Bernoulli's theorem.

Let AB (fig. 25) be any one elementary stream, in a steadily moving fluid mass. Then, from the steadiness of the motion, AB is a fixed path in space through which a stream of fluid is constantly flowing. Let 00 be the free surface and XX any horizontal datum line. Let

o o

nozzle ; o

097 1 for 1} in. The nozzles were fixed on a taper play-pipe, and the coefficient includes the resistance of this pipe (Amer. Soc. Civ. Eng. xxi.. 1889). Other forms of nozzle were tried such as ring nozzles for which the coefficient was smaller.

IV. THEORY OF THE STEADY MOTION OF FLUIDS.

§ 28. The general equation of the steady motion of a fluid given under Hydrodynamics furnishes immediately three results as to the distribution of pressure in a stream which may here be assumed.

(a) If the motion is rectilinear and uniform, the variation of pressure is the same as in a fluid at rest. In a stream flowing in an

Fig. 25.

w be the area of a normal cross section, v the velocity, p the intensity of pressure, and 2 the elevation above XX, of the elementary stream AB at A, and o > i, pi, Vi, 21 the same quantities at B. Suppose that in a short time t the mass of fluid initially occupying AB comes to A'B'. Then AA', BB' are equal to vt, Vit, and the volumes of fluid AA', BB' are the equal inflow and outflow = Qt = uvt = uiVit, in the given time. If we suppose the filament AB surrounded by other filaments moving with not very different velocities, the frictional or viscous resistance on its surface will be small enough to be neglected, and if the fluid is incompressible no internal work is done in change of volume. Then the work done by external forces will be equal to the kinetic energy produced in the time considered. The normal pressures on the surface of the mass (excluding the ends A, B) are at each point normal to the direction of motion, and do no work. Hence the only external forces to be reckoned are gravity and the pressures on the ends of the stream.

The work of gravity when AB falls to A'B' is the same as that of transferring AA' to BB'; that is, GQt (z—Zi). The work of the pressures on the ends, reckoning that at B negative, because it is opposite to the direction of motion, is (puiy.vt) — (piuiXvit) = Qt{p—pi). The change of kinetic energy in the time / is the differ- ence of the kinetic energy originally possessed by AA' and that finally acquired by BB', for in the intermediate part A'B there is no change of kinetic energy, in consequence of the steadiness of the motion. But the mass of AA' and BB' is GQt/g, and the change of kinetic energy is therefore (GQ// g) (z>i 2 /2 — 1> 2 /2). Equating this to the work done on the mass AB,

GQt(z- Zl)+Qt(p-Pi) = (GQt/g)Wl2-vV2). Dividing by GQt and rearranging the terms,

vV2g+plG+z=v 1 -/2g+p 1 IG+z 1 ; (1)

or, as A and B are any two points,

» 2 /2g+p/G-r-3=constant = H. _ (2)

Now n 2 /2g is the head due to the velocity v, pjG is the head equivalent to the pressure, and 2 is the elevation above the datum (see § 16). Hence the terms on the left are the total head due to velocity, pressure, and elevation at a given cross section of the filament, 2 is easily seen to be the work in foot-pounds which would be done by I lb of fluid falling to the datum line, and similarly pjG and i> 2 /2g are the quantities of work which would be done by I lb of fluid due to the pressure p and velocity v. The expression on the left of the equation is, therefore, the total energy of the stream at the section considered, per lb of fluid, estimated with reference to the

datum line XX. Hence we see that in stream line motion, under the restrictions named above, the total energy per lb of fluid is uniformly distributed along the stream line. If the free surface of the fluid 00 is taken as the datum, and -h, -hi are the depths of A and a measured down from the free surface, the equation takes the form

ˆ/2g+plG-h=v 1 */2g+p l /G-h l ; (,)

or generally

i' 2 /2£ +p/G — h = constant . (3 o)

§ 30. Second Form of the Theorem of Bernoulli.— Suppose at the two sections A, B (fig. 26) of an elementary stream small vertical pipes are introduced, which may be termed pressure columns

projected surface as HI, and the pressures parallel to the axis of the pipe, normal to these projected surfaces, balance each other Similarly the pressures on BC, CD balance those on GH, EG In the same way, in any combination of enlargements and contrac- tions, a balance of pressures, due to the flow of liquid parallel to the

^^^

-^Y ~ “~

a~

1

—)•

,

1

H

1

1

-vl

‘?

Fig. 26.

(I 8), having their lower ends accurately parallel to the direction of flew. In such tubes the water will rise to heights corresponding to the pressures at A and B. Hence b = p/G, and b’=p,/G. Conse- quently the tops of the pressure columns A’ and B’ will be at total heights b -\ c=p/G+z and b’+c’ = p l /G+z 1 above the datum line XX. Ihe difference of level of the pressure column tops, or the fall of free surface level between A and B, is therefore

. S = (i>-£i)/G + (z-z,); and this by equation (1), § 29 is (iˆ-iˆg. That is, the fall of free surface level between two sections is equal to the difference of the heights due to the velocities at the sections. The line A'B' is sometimes called the line of hydraulic gradient, though this term is also used in cases where friction needs to be taken into account. It is the line the height of which above datum is the sum of the elevation and pressure head at that point, and it falls below a horizontal line A"B" drawn at H ft. above XX by the quantities a=t' 2 /2g and a' =vi 2 /2g, when friction is absent.

§ 31. Illustrations of the Theorem of Bernoulli. In a lecture to the mechanical section of the British Association in 1875, W. Fronde gave some experimental illustrations of the principle of Bernoulli. He remarked that it was a common but erroneous impression that a fluid exercises in a contracting pipe A (fig. 27) an excess of pressure against the entire converging surface which it meets, and that, conversely, as it enters an enlargement B, a relief of pressure is experienced by the entire diverging surface of the' pipe. Further it is commonly assumed that when passing through a contraction C, there is in the narrow neck an excess of pressure due to the squeezing together of the liquid at that point. These impressions are in no respect correct; the pressure is smaller as the section of the pipe is smaller and conversely.

Fig. 28 shows a pipe so formed that a contraction is followed by an enlargement, and fig. 29 one in which an enlargement is followed

by a contraction. The

A B vertical pressure columns

show the decrease of pressure at the contrac- tion and increase of pressure at the enlarge- ment. The line 06c in both figures shows the variation of free surface level, supposing the pipe frictionless. In actual pipes, however, work is expended in friction ..,,,,..., . , against the pipe; the

total head diminishes in proceeding along the pipe, and the free surface level is a line such as ahc u falling below abc.

Froude further pointed out that, if a pipe contracts and enlarges again to the same size, the resultant pressure on the converging part exactly balances the resultant pressure on the diverging part so that there is no tendency to move the pipe bodily when water flows through it. Thus the conical part AB (fig. 30) presents the same

axis of the pipe, will be found, provided the sectional area and

direction of the ends are the same.

The following experiment is interesting. Two cisterns provided with converging pipes were placed so that the jet from one was ex- actly opposite the entrance to the other. The cisterns being filled

0 „

Fig. 29.

very nearly to the same level, the jet from the left-hand cistern A entered the right-hand cistern B (fig. 31), shooting across the free space between them without any waste, except that due to indirect- ness of aim and want of exact correspondence in the form of the onhces. In the actual experiment there was 18 in. of head in the right and 2o| in. of head in the left-hand cistern, so that about

Fig. 27.

Fig. 30.

2| in. were wasted in friction. It will be seen that in the open space between the orifices there was no pressure, except the atmospheric pressure acting uniformly throughout the system.

§ 32- Ventur— Meter.— An ingenious application of the variation oi pressure a-.d velocity in a converging and diverging pipe has been

Fig. 31.

made by Clemens Herschel in the construction of what he terms a Ventun Meter for measuring the flow in water mains. Suppose that, as in ng. 32, a contraction is made in a water main, the change of section being gradual to avoid the production of eddies. The ratio p

of the cross sections at A and B, that is at inlet and throat, is in actual meters 5 to I to 20 to I , and is very carefully determined by the maker of the meter. Then, if v and u are the velocities at A and B, -u — pv. Let pressure pipes be introduced at A, B and C,

and let Hi, H, H2 be the pressure heads at those points. Since the velocity at B is greater than at A the pressure will be less. Neglect- ing friction

Hi + P 2 /2g = H + K 2 /2g, Hi-H = (u^u-)l2g = **-l)v**/2g.

Let h = Hi-H be termed the Venturi head, then

M = V!p 2 .2g/*/(p—l)j,

from which the velocity through the throat and the discharge of the main can be calculated if the areas at A and B are known and h observed. Thus if the diameters at A and B are 4 and 12 in., the areas are 12-57 an d 113-1 sq. in., and p = 9,

m = V8i/8oV (2gft) = i-007V (2gh). If the observed Venturi head is 12 ft.,

m = 28 ft. per sec, and the discharge of the main is

28X12-57 = 351 cub. ft. per sec. Hence by a simple observation of pressure difference, the flow in the main at any moment can be determined. Notice that the pressure height at C will be the same as at A except for a small loss hf due to friction and eddying between A and B. To get the pressure at the throat very exactly Herschel surrounds it by an annular passage communicating with the throat by several small holes, sometimes formed in vulcanite to prevent corrosion. Though con structed to prevent eddying as much as possijle there is some eddy loss The main effect of this is to cause a loss of head between A and C which may vary from a fraction of a foot to perhaps 5 ft. at the highest velocities at which a meter can be used. The eddying also affects a little the Venturi head h. Consequently an experi- mental coefficient must be determined for each meter by tank measure- ment. The range of this coefficient is, however, surprisingly small. If to allow for friction, u = k\j |p 2 /(p 2 -i))v (2gh), then Herschel found values of k from 0-97 to i-o for throat velocities varying from

8 to 28 ft. per sec. The meter is extremely con- venient. At Staines reser- voirs there are two meters of this type on mains 94 in. in diameter. Herschel con- trived a recording arrange- ment which records the variation of flow from hour to hour and also the total flow in any g ; ven time. In Great Britain Jie meter is constructed by 3. Kent, who has made improvements in the recording arrange- ment.

In the Deacon Waste Water Meter (fig. 33) a different principle is used. A disk D, partly counter- balanced by a weight, is suspended in

the water flow- ing through the main in a conical chamber. The un- balanced weight of the disk is supported by the impact of the water. If the discharge of the main increases the disk rises, but as it rises its position in the chamber is such that in consequence of the larger area the velocity is less. It finds, therefore, a new position of equilibrium. A pencil P records on a drum moved by clockwork the position of the disk, and from this the variation of flow is in- ferred.

§ 33. Pressure, Velocity and Energy in Different Stream Lines.— The equation of Bernoulli gives the variation of pressure and velocity

Outlet

from point to point along a stream line, and shows that the total energy of the flow across any two sections is the same. Two other directions may be defined, one normal to the stream line and in the plane containing its radius of curvature at any point, the other normal to the stream line and the radius of curvature. For the problems most practically useful it will be sufficient to consider the stream lines as parallel to a vertical or horizontal plane. If the motion is in a vertical plane, the action of gravity must be taken into the reckoning ; if the motion is in a horizontal plane, the terms expressing variation of elevation of the filament will disappear. 1

Let AB, CD (fig. 34) be two consecutive stream lines, at present assumed to be in a vertical plane, and PQ a normal to these lines

j»dp

A

- P:

■v*d\r

But

(1)

Fig. 34.

making an angle <#> with the vertical. Let P, Q be two particles moving along these lines at a distance PQ = ds, and let z be the height of Q above the horizontal plane with reference to which the energy is measured, v its velocity, and p its pressure. Then, if H is the total energy at Q per unit of weight of fluid,

n = z + p/G + v 2 /2 S .

Differentiating, we get

dH = ds + dp/G + vdv/g, for the increment of energy between Q and P.
dz — PQ cos = ds cos 4 > \ .'.dHˆdp/G + vdv/g + ds cos 0, (ia)

where the last term disappears if the motion is in a horizontal plane. Now imagine a small cylinder of section w described round PQ as an axis. This will be in equilibrium under the action of its centrifugal force, its weight and the pressure on its ends. But its volume is cods and its weight Gads. Hence, taking the components of the forces parallel to PQ —

o > dp = Gv 2 oids/gp-Gui cos

dH. = vHs/gp + vdv/g = (v/g) (vfp --dv/ds)ds. (2)

Currents § 34. Rectilinear Current. — Suppose the motion is in parallel straight stream lines (fig. 35) in a vertical plane. Then p is infinite, and from eq. (2), § 33,

dH = vdvjg. Comparing this with (1) we see that

dz + dp/G < = o;

.'. z--p/G = constant; (3)

or the pressure varies hydrostatically as in a fluid at rest. For two stream lines in a horizontal D

plane, z is constant, and there- fore p is constant.

Radiating Current. — Suppose water flowing radially between horizontal parallel planes, at a distance apart = 5. Conceive two cylindrical sections of the current at radii n and ri, where

e

1 1 1 1

e

1

I

■!■ ,.

Fig. 35.

the velocities are Vi and V2, and the pressures pi and pi. Since the flow across each cylindrical section of the current is the same, Q = 2wriSvi = 2wnSv2 r\Vi—riVt ri/r 2 = K 2 /»i. (4)

1 The following theorem is taken from a paper by J. H. Cotterill, ” On the Distribution of Energy in a Mass of Fluid in Steady Motion,” Phil. Mag., February 1876.

STEADY MOTION OF FLUIDS]

HYDRAULICS

4.5

The velocity would be infinite at radius o, if the current could be conceived to extend to the axis. Now, if the motion is steady,

H = />i/G +Kr/2g = pzfG +v 2 2 /2g ;

= ptlG+nWlrf2g; (&-£i)/G=i’, 2 (i-n7>Y !)/2g;

(5)

(6)

Hence the pressure increases from the interior outwards, in a way indicated by the pressure columns in fig. 36, the curve through the free surfaces of the pressure columns being, in a radial section, the quasi-hyperbola of the form xy l = c z . This curve is asymptotic to a horizontal line, H ft. above the line from which the pressures are measured, and to the axis of the current.

Free Circular Vortex. — A free circular vortex is a revolving mass){ water, in which the stream lines are concentric circles, and in which

Fig. 36.

the total head for each stream line is the same. Hence, if by any slow radial motion portions of the water strayed from one stream line to another, they would take freely the velocities propei to their’ new positions under the action of the existing fluid pressures only. For such a current, the motion being horizontal, we have for all the circular elementary streams]

H = p/G+v 2 /2g = constant; \dH = dp/G --vdvjg = o.

(7)

pressure increasing according to the law stated above, and the head along each spiral stream line is constant.

§ 35. Forced Vortex. — If the law of motion in a rotating current is different from that in a free vortex, some force must be applied to cause the variation of velocity. The simplest case is that of a rotating current in which all the particles have equal angular velocity, as for instance when they are driven round by radiating paddles revolving uniformly. Then in equation (2), § 33, considering two circular stream lines of radii r and r--dr (fig. 37), we have p = r, ds = dr. If the angular velocity is a, then v = ar and dv = adr. Hence

dH — a. 2 rdrjg-{-a-rdrlg = 2tt.' 1 rdrlg. Comparing this with (1), § 33, and putting

dp/G + a?rdrlg = 2 a-rdr/g, dp/G = a-rdr/g, pIG =aV / '2 g+ constant. (9)

Let pi, n, »i be the pressure, radius and velocity of one cylindrical section, p 2 , r 2 , v 2 those of another; then

pi/G-a"ri i /2g = pilG-a-rˆl 2g ; (ft-?i)/G=a'(r 2 2 r, 2)/2g = (1 ^^)/2g. (10)

That is, the pressure increases from within outwards in a curve

Consider two stream lines at radii r and r+dr (fig. 36). Then in (■2). § 33. P*=r and ds = dr,

Mr I gr +vdv I g = o, dv/v = -dr/r,

v r i/r, _ _ (8)

precisely as in a radiating current; and hence the distribution of pressure is the same, and formulae 5 and 6 are applicable to this case.

Free Spiral Vortex. — As in a radiating and circular current the equations of motion are the same, they will also apply to a vortex in which the motion is compounded of these motions in any proportions, provided the radial component of the motion varies inversely as the radius as in a radial current, and the tangential component varies inversely as the radius as in a free vortex. Then the

whole velocity at any point will be inversely proportional to the radius of the point, and the fluid will describe stream lines having a constant inclination to the radius drawn to the axis of tie current. That is, the stream lines will be logarithmic spirals. When water is delivered from the circumference of a centrifugal pump or turbine into a chamber, it forms a free vortex of this kind. The water flows spirally outwards, its velocity diminishing and its

\]

■*-h

! !\

: =

\

v° 2

- :

K

1 1

\

1

J

^m ^m

: 1

A I

q I ■ ■■

.il

Fig. 37.

which in radial sections is a parabola, and surfaces of equal pressure are paraboloids of revolution (iig. 37).

Dissipation of Head in Shock § 36. Relation of Pressure and Velocity in

a Stream in Steady Motion when the Changes of Section of the Stream are Abrupt. — When a stream changes section abruptly, rotating eddies are formed which dissipate energy. The energy absorbed in producing rotation is at once abstracted from that effective in causing the flow, and sooner or later it is wasted by frictional resistances due to the rapid relative motion of the eddying parts of the fluid. In such cases the work thus expended internally in the fluid is too important to be neglected, and the energy thus lost is commonly termed energy lost in shock. Suppose fig. 38 to represent a stream having such an abrupt change of section. Let AB, CD be normal sections at points where ordinary stream line motion has not been disturbed and where it has been re-established. Let w, p, v be the area of section, pressure and velocity at AB, and an, pi, v s corresponding quantities at CD. Then if no work were expended internally, and assuming the stream horizontal, we should have

P/G+v>/2g = p i /G+v 1 ‘/2g. (1)

Fig. 38.

DUf

But if work is expended in producing irregular eddying motion, the head at the section CD will be diminished.

Suppose the mass ABCD comes in a short time t to A’B’C’D’. The resultant force parallel to the axis of the stream is

pill +/>o(wi-w)— pltAl,

where p is put for the unknown pressure on the annular space between AB and EF. The impulse of that force is

\P”+Po(“i-“)-piˆ\)t. I he horizontal change of momentum in the same time is the differ-

_ _. ence of the momenta of

- £ -ˆ pCDC’D’ and ABA’B’,

. because the amount of momentum be- tween A’B’ and CD remains

unchanged if the motion is steady. The volume of ABA'B' or CDC'D', being the inflow and outflow in the time t, is Qt = owt = aiVit, and the momentum of these masses is (G/g)QvUnd(Glg)Qv 1 t. lhe change of mo- mentum is therefore (G/g)Qt(vi-v). Equating this to the impulse,

{pu+M-*i-«>)-pi<'>i)t = (G/g)Q/(»i-»). Assume that po = p, the pressure at AB extending unchanged through the portions of fluid in contact with AE, BF which lie out of the path of the stream. Then (since Q=wifi)

(£-£i) = (G/g)i>i(i'i-tO; P/G-p l /G=v l (vi-n)lg; (2)

p/G+v i l2 S = p 1 IG+v 1 y2g+(v-v i yi2g. (3)

This differs from the expression (1), § 29, obtained for cases where no sensible internal work is done, by the last term on the right. That is, (»-z>i) 2 /2g has to be added to the total head at CD, which is pi!'G +Vi*/2g, to make it equal to the total head at AB, or {v-^i) 2 /2g is the head lost in shock at the abrupt change of section. But r-i'i is the relative velocity of the two parts of the stream. Hence, when an abrupt change of section occurs, the head due to the relative velocity is lost in shock, or (i>-»i) 2 /2g foot-pounds of energy is wasted for each pound of fluid. Experiment verifies this result, so that the assumption that po = p appears to be admissible. If there is no shock,

pilG=p/G + (v 2 ^)l3g. It there is shock,

PiiG = £/G-t>i (»r-»)/g.

Hence the pressure head at CD in the second case is less than in the former by the quantity (v-viffeg, or, putting o>iVi=uv, by the quantity

(t' 2 /2g)(l-o>/ Ul) 2 . (4)

V. THEORY OF THE DISCHARGE FROM ORIFICES AND MOUTHPIECES § 37. Minimum Coefficient of Contraction. Re-entrant Mouth- piece of Borda. — In one special case the coefficient of contraction

can be determined theoretically, and, as it is the case where the convergence of the streams approaching the orifice takes place through the greatest possible angle, the co- efficient thus deter- mined is the minimum coefficient.

Let fig. 39 represent a vessel with vertical sides, 00 being the free water surface, at which the pressure is pa. Suppose the liquid issues by a horizontal mouthpiece, which is re-entrant and of the greatest length which permits the jet to spring clear from the inner end of the orifice, without adher- ing to its sides. With such an orifice the velocity near the points CD is negligible, and the pressure at those points may be taken equal to the hydro- static pressure due to the depth from the free surface. Let S2 be the area of the mouthpiece AB, w that of the contracted jet aa

Fig. 39.

Suppose that in a short time /, the mass OOaa comes to the position O'O' a'a'; the impulse of the horizontal external forces acting on the mass during that time is equal to the horizontal change of momentum.

The pressure on the side OC of the mass will be balanced by the pressure on the opposite side OE, and so for all other portions of the vertical surfaces of the mass, excepting the portion EF opposite the mouthpiece and the surface AaoB of the jet. On EF the pressure is simply the hydrostatic pressure due to the depth, that is, (p a +Gh)Q. On the surface and section AaaB of the jet, the horizontal resultant of the pressure is equal to the atmospheric pressure pa acting on the vertical projection AB of the jet; that is, the resultant pressure is -paQ. Hence the resultant horizontal force for the whole mass OOaa is (p a +Gh)p-pail = Ghii. Its impulse in the time / is GhSl t. Since the motion is steady there is no change of momentum between O'O' and aa. The change of horizontal momentum is, therefore, the difference of the horizontal momentum lost in the space OOO'O' and gained in the space aaa'a'. In the former space there is no horizontal momentum.

The volume of the space aaa'a' is uvt; the mass of liquid in that space is (Glg)arvt; its momentum is (G/g)«i/ 2 /. Equating impulse to momentum gained,

Gto = (G/g)utft; .'. »/Q = gh/v 2 . But u 2 = 2gh, and a/Q = c c ;

.'.a}/Q = i=c c ;

a result confirmed by experiment with mouthpieces of this kind. A similar theoretical investigation is not possible for orifices in plane surfaces, because the velocity along the sides of the vessel in the neighbourhood of the orifice is not so small that it can be neglected. The resultant horizontal pressure is therefore greater than Ghil, and

the contraction is less. The experimental values of the coefficient of discharge for a re-entrant mouthpiece are 0-5149 (Borda), 0-5547 (Bidone), 0-5324 (Weisbach), values which differ little from the theoretical value, 0-5, given above.

§ 38. Velocity of Filaments issuing in a Jet. — A jet is composed of fluid filaments or elementary streams, which start into motion at some point in the interior of the vessel from which the fluid is discharged, and gradually acquire the velocity of the jet. Let Mot, fig. 40 be such a fila- ment, the point M being taken where the velocity is in- sensibly small, and m at the most con- tracted section of the jet, where the filaments have be- come parallel and exercise uniform mutual pressure. Take the free surface AB for datum line, and let pi, i'i, hi, be the pressure, velocity and depth below datum at M; p, v, h, the corresponding quantities at m. Then § 29, eq. (3a),

vJfrg + pilG-hiˆffeg + plG-h. (1)

But at M, since the velocity is insensible, the pressure is the hydro- static pressure due to the depth'; that is, »i = o, pi = p a --Ghi. At m, p — pa, the atmospheric pressure round the jet. Hence, inserting these values,

o + palG + hi-h = &l2g + palG-k ;

vV2g = h; (2)

or ti = V (2g/i) = 8-025 V A. (2a)

That is, neglecting the viscosity of the fluid, the velocity of fila- ments at the contracted section of the jet is simply the velocity due to the difference of level of the free surface in the reservoir and the orifice. If the orifice is small in dimensions compared with h, the filaments will all have nearly the same vel- ocity, and if h is measured to the centre of the orifice, the equation above gives the mean velocity of the jet.

Case of a Submerged Orifice. — Let the orifice discharge below the level of the tail water. Then

Fig. 40.

Fig.

4i-

using the notation shown in fig. 41, we have at M, Vi = o,pi = Gh;

+p. at m, p = Gh 3 +pa. Inserting these values in (3), § 29,

o+hi+ptlG-hˆifi/ag+hx-hi+palG;

v 2 /2g = h r h2 = k. (3)

where h is the difference of level of the head and tail water, and may

be termed the effective head producing flow.

Case where the Pressures are different on the Free Surface and at

the Orifice.— Let the fluid flow from a vessel in which the pressure is pa into a vessel in which the pressure is p, fig. 42. The pres sure po will produce the same effect as a layer of fluid of thickness po/G added to the head water; and the pres- sure p , will produce the same effect as a layer of thickness pjG added to the tail water. Hence the effective difference of level, or effective head producing flow, will be

h = ho+p IG-p/G; and the velocity of discharge will be

f = V[2g{fc> +0-£)/Gi]. (4)

We may express this result by saying that differences of pressure at the free surface and at the orifice are to be reckoned as part of the effective head.

Hence in all cases thus far treated the velocity of the jet is the velocity due to the effective head, and the discharge, allowing for contraction of the jet, is

Q=OM=Cuyl(2gh), (5)

where « is the area of the orifice, co> the area of the contracted section of the jet, and h the effective head measured to the centre of the orifice. If h and 01 are taken in feet, Q is in cubic feet per second.

It is obvious, however, that this formula assumes that all the filaments have sensibly the same velocity. That will be true for horizontal orifices, and very approximately true in other cases, if the dimensions of the orifice are not large compared with the head h. In large orifices

in say a vertical surface, the value of h is different for different filaments, and then the velocity of different filaments is not sensibly the same.

Simple Orifices — Head Constant § 39. Large Rectangular Jets from Orifices in Vertical Plane Sur- faces. — Let an orifice in a vertical plane surface be so formed that it

produces a jet having A B\ a rectangular con-

tracted section with vertical and horizon- tal sides. Let b (fig. 43) be the breadth of the jet, hi and fe the depths below the free surface of its upper and lower surfaces. Consider a lamina of the jet between the depths h and h + dh. Its normal section is bdh, and the velocity of discharge -^2gh. The discharge pet

Fig. 43.

second in this lamina jet is therefore

therefore b^2gh dh, and that of the whole

Q = /£w(2«ft)

PV2g

'-hS

(°)

where the first factor on the right is a coefficient depending on the form of the orifice.

Now an orifice producing a rectangular jet must itself be very approximately rectangular. Let B be the breadth, Hi, H 2 , the depths to the upper and lower edges of the orifice. Put

6(*2 g -Ai ?)/B(H 2 2-H 1 ') = c. (7)

Then the discharge, in terms of the dimensions of the orifice, instead of those of the jet, is

Q = fcBV^(H^-H 1 ?), (8)

the formula commonly given for the discharge of rectangular orifices. The coefficient c is not, however, simply the coefficient of contraction, the value of which is

&(fe-W/B(H 2 -Hi),

and not that given in (7). It cannot be assumed, therefore, that c

in equation (8) is constant, and in fact it is found to vary for different

values of B/H 2 and B/Hi, and must be ascertained experimentally.

Relation between the Expressions (5) and (8). — For a rectangular

orifice the area of the orifice is u = B (H 2 – Hi) , and the depth measured to its centre is J(H 2 +Hi). Putting these values in (%), v ™ u ,- u Q'=eB(H»-Hi)V{g(H,+H 1)|. b rom (8) the discharge is

, , Q 2 = |cBV2l(H 2 ?-H,?).

Hence, for the same value of c in the two cases, t iTrt, Qs/Qi = ^ H23 – Hl8 M(H *- H 0V|(H 2 +Hi)/2}]. Let Hi/H 2 =

Q2/Q1 =0-9427 (l-

If Hi varies from o to 00 ,

Hi/H 2 =

Q2/Q1.

Hi/H 2 =

Q2/Q1.

0-0 0-2

o-5

07

•943 •979 •995 •998

o-8

0-9

1-0

•999 •999

1-000

_ Hence it is obvious that, except for very small values of a, the simpler equation (5) gives values sensibly identical with those of (8). When

§ 40. Large Jets having a Circular Section from Orifices in a Vertical Plane Surface. — Let fig. 44 represent the section of the jet, 00 being O o

Fig. 44. the free surface level in the reservoir. The discharge through the horizontal strip aabb, of breadth aa = b, between the depths hi--y and h-jry + dy, is

ti, t. 1 a- u , d g = .Wj2«(*i + y)) < *y. I he whole discharge of the jet is

Q = J\i{2g(hi + y)}dy.

But6 = rfsin0; y = |i(i -cos) ; dy = \d sin d. Let e = d/(2ki + d), then

Q = i.

From eq. (5), putting co = «P/4, h = hi + dJ2, c = i when d is the diameter of the jet and not that of the orifice,

Qi = iˆy|2g(Ai +

Q/Qi = 2/?rJ sin 2 <#>V {1— ecos 4>\d

For hi = 00 , e = o and Q/Qi = 1 ;

and for hi = o, e = i and Q/Qi = 0-96.

So that in this case also the difference between the simple formula (5) and the formula above, in which the variation of head at different parts of the orifice is taken into account, is very small.

Notches and Weirs § 41. Notches, Weirs and Eyewashes. — A notch is an orifice ex- tending up to the free surface level in the reservoir from which the discharge takes place. A weir is a structure over which the water flows, the discharge being in the same conditions as for a notch. The formula of discharge for an orifice of this kind is ordinarily deduced by putting Hi = 0 in the formula for the corresponding orifice, obtained as in the preceding section. Thus for a rectangular notch, put H! = oin (8). Then

Q = !cBV(2g)H?, (11)

where H is put for the depth to the crest of the weir or the bottom of

the notch. Fig. 45 shows the mode in which the discharge occurs in the case of a rectangular notch or weir with a level crest. As. the free surface level falls very sensibly near the notch, the head H should be measured at some distance back from the notch, at a point where the velocity of the water is very small.

Since the area of the notch opening is BH, the above formula is of the form

Q = eXBHXfeV(2gH), where Hs a factor depending on the form of the notch and expressing the ratio of the mean velocity of discharge to the velocity due to the depth H.

§ 42. Francis's Formula for Rectangular Notches. — The jet discharged through a rectangular notch has a section smaller than BH, (a) because of the fall of the water surface from the point where H

is measured towards the weir, (6) in consequence of the crest contraction, (c) in consequence of the end contractions. It may be pointed out that while the diminution of the section of the jet due

to the surface fall and

m

to the crest contraction is proportional to the length of the weir, the end contractions have nearly the same effect whether the weir is wide or narrow.

J. B. Francis's experi- ments showed that a perfect end contraction, when the heads varied from 3 to 24 in., and the length of the weir was not less than three times the head, dimin- ished the effective length of the weir by an amount approxi- mately equal to one- tenth of the head. Hence, if I is the length of the notch or weir, and H the head measured behind the weir where the water is nearly still, then the width of the jet passing through the notch would be /—o-2H, allowing for two end contractions. In a weir divided by posts there may be more than two „ end contractions.

45- Hence, generally, the

width of the jet is I — o- iraH, where n is the number of end contractions of the stream. The contractions due to the fall of surface and to the crest contraction are proportional to the width of the jet. Hence, if cH is the thickness of the stream over the weir, measured at the contracted section, the section of the jet will be c(l— o-mH)H and (§ 41) the mean velocity will be f V(2gH). Consequently the discharge will

be given by an equation of the form

Q = fc(/-o-i«H)HV2gH = 5-35c(/-o-mH;Hi. This is Francis's formula, in which the coefficient of discharge c is much more nearly constant for different values of I and h than in the ordinary formula. Francis found for c the mean value 0-622, the weir being sharp-edged.

§ 43. Triangular Notch (fig. 46). — Consider a lamina issuing between the depths h and h + dh. Its area, neglecting contraction, will be bdh, and the velocity at that depth is V {2gh). Hence the dis- charge for this lamina is

6V 2gh dh. But B/6 = H/(H-A);6 = B(H-«)/H.

Hence discharge of lamina

= B(H-/s)V (2gh)dh/H; and total discharge of notch rn

= Q = BV(2g)Jo {H-h)Mdh/H = ABVH3.

I or, introducing a coefficient to allow for contraction, Q = 1 VBVHJ, When a notch is used to gauge a stream of varying flow, the ratio B/H varies if the notch is rectangular, but is constant if the notch is triangular. This led Professor James Thomson to suspect that the coefficient of dis-

charge, c, be much constant different

would more with

values

Fig. 46.

of H in a trian- gular than in a rectangular notch, and this has been experi- mentally shown to be the case. Hence a trian- gular notch is more suitable for accurate gaugings than a rectangular notch. For a sharp-edged triangular notcti Professor J. Thomson found c =0-617. It

will be seen, as in § 41, that since JBH is the area of section of the stream through the notch, the formula is again of the form

Q = cXiBHXW(2gH), where k = j% is the ratio of the mean velocity in the notch to the velocity at the depth H. it may easily be shown that for all notches the discharge can be expressed in this form.

§ 44. Weir with a Broad Sloping Crest. — Suppose a weir formed with a broad crest so sloped that the streams flowing over it have a movement sensibly rectilinear and uniform (fig. 47). Let the inner edˆe be so rounded as to prevent a crest contraction. Consider a filament aa', the point a being so far back from the weir that the

Fig. 47.

velocity of approach is negligible. Let 00 be the surface level in the reservoir, and let a be at a height h" below OO, and h' above a'. Let h be the distance from OO to the weir crest and e the thickness of the stream upon it. Neglecting atmospheric pressure, which has no influence, the pressure at a is Gh" ; at a' it is Gz. If v be the velocity at a',

&l2g = h' +h"-z = h – e ; Q = be V2g(fe— e). Theory does not furnish a value for e, but Q = o for e=o and for e = h. Q has therefore a maximum for a value of e between o and h, obtained by equating dQ/de to zero. This gives e = \h, and, inserting

this value,

0=0-385 bhˆ2gh, as a maximum value of the discharge with the conditions assigned. Experiment shows that the actual discharge is very approximately equal to this maximum, and the formula is more legitimately ap- plicable to the discharge over broad-crested weirs and to cases such as the discharge with free upper surface through large masonry

Coefficients for the Discharge over Weirs, derived from the Experiments of T. E. Blackwell. When more than one experiment was made with the same head, and the results were pretty uniform, the resulting coefficients are marked with an (*). The effect of the converging wing-boards is very strongly marked.

Headi in

inches measured

Sharp Edge.

Planks 2 in. thick, square

jn Crest.

Crests 3 ft. wide.

ro ft. long,

from still Water in

3 ft. long.

10 ft. long.

3 ft. long.

6 ft. long.

10 ft. long.

wing-boards making an angle

3 ft. long, level.

3 ft. long, fall 1 in 18.

3 ft. long, fall 1 in 12.

6 ft. long, level.

10 ft. long, level.

10 ft. long, fall 1 in 18.

Reservoir.

of 6o°.

I

■677

•809

■467

•459

•435 l

•754

■452

•545

•467

•381

•467

2

•675

•803

■509*

■561

•585*

•675

•482

•54°

•533

•479*

•495*

3

•630

•642*

■563*

•597*

•569*

•441

•537

•539

•492*

4

•617

•656

•549

•575

•602*

•656

•419

■43i

•455

•497*

•515

5

•602

•650*

■588

■601*

•609*

•671

•479

•516

•518

6

•593

■593*

•608*

■576*

-501*

■531

•507

•513

•543

7

•617*

•608*

■576*

•488

•513

■527

•497

8

•581

•606*

•590*

•548*

•470

•491

•468

•507

9

•530

•600

■569*

•558*

■476

■492*

•498

•480*

•486

10

•614*

■539

•534*

•465*

•455

1 »

•525

•534*

•467*

•549*

1

‘The discharge per second varied from -461 to -665 cub. ft. in two experiments. The coefficient -435 is derived from the mean value.

sluice openings than the ordinary weir formula for sharp-edged weirs. It should be remembered, however, that the friction on the sides and crest of the weir has been neglected, and that this tends to reduce a little the discharge. The formula is equivalent to the ordinary weir formula with (-‘ = 0-577.

Special Cases of Discharge from Orifices

§ 45. Cases in which the Velocity of Approach needs to be taken into Account. Rectangular Orifices and Notches. — In finding the velocity at the orifice in the preceding investigations, it has been assumed that the head h has been measured from the free surface of still water above the orifice. In many cases which occur in practice the channel of approach to an orifice or notch is not so large, relatively to the stream through the orifice or notch, that the velocity in it can be disregarded.

Let «i, hi (fig. 48) be the heads measured from the free surface to the top and bottom edges of a rectangular orifice, at a point in the

Fig. 48.

channel of approach where the velocity is u. It is obvious that a fall of the free surface,

has been somewhere expended in producing the velocity u, and hence the true heads measured in still water would have been Ai + E) and A2 + 6. Consequently the discharge, allowing for the velocity of

approach, is

Q=IˆVTg|(fe+h)i-(7; 1 +f|)5]. _ (1)

And for a rectangular notch for which hi = o, the discharge is

Q=icbˆ2g{(i h +i))i-m- _ (2)

In cases where u can be directly determined, these formulae give the discharge quite simply. When, however, u is only known as a function of the section of the stream in the channel of approach, they become complicated. Let Q be the sectional area of the channel where h, and Ih are measured. Then «= =Q/ U and fj = Q 2 /2g S2 2 .

This value introduced in the equations above would render them excessively cumbrous. In cases therefore where U only is known, it is best to proceed by approximation. Calculate an approximate value Q' of Q by the equation

Q.' = §c&VˆI(M-fci*}. Then f) = Q' 2 /2g!2 2 nearly. This value of 6 introduced in the equations above will give a second and much more approximate value of Q.

§ 46. Partially Submerged Rectangular Orifices and Notches. — When the tail water is above the lower but below the upper edge of the orifice, the flow in the two parts of the orifice, into which it is divided by the surface of the tail water, takes place under different conditions. A filament MjOTi (fig. 49) in the upper part of the orifice issues with a head h' which may have any value between

Qi = fc&V2g{fci-M)) Qz = cb(h 2 -h)ˆ2gh f

(3)

In the case of a rectangular notch or weir, hi = o. Inserting this value, and adding the two portions of the discharge together, we get for a drowned weir

Q = cbˆTgh(,h 2 -h/ 2), (4)

where h is the difference of level of the head and tail water, and fc is the head from the free surface above the weir to the weir crest (fig. 50).

From some experiments by Messrs A. Fteley and F. P. Stearns (Trans. Am. Soc. C.E., 1883, p. 102) some values of the coefficient c can be

reduced

Fig. 49.

hi and h. But a filament M 2 m 2 issuing in the lower part of the orifice has a velocity due to h” — h”’, or k, simply. In the upper part of the orifice the head is variable, in the lower constant. If Qi, Q2 are the discharges from the upper and lower parts of the orifice, b the width of the orifice, then

ha/fa

c”

h/h 2

c

O-I

0-629

0-7

0-578

0-2

0-614

o-8

0-583

o-3

o-6oo

0-9

0-596

0-4

0-590

o-95

0-607

o-5

0-582

I -00

0-628

06

0-578

If velocity of approach is taken into account, let \ be the head due to that velocity ; then, adding 6 to each of the heads in the equations (3), and reducing, we get for a weir

Q = cbT]Tg[(h 2 + i))(h + W-i(h + W-im; (5)

an equation which may be useful in estimating flood discharges.

Bridge Piers and other Obstructions in Streams. — When the piers of a bridge are erected in a stream they create an obstruction to the flow of the stream, which causes a difference of surface- level above and below the pier (fig. 51). If it is neces- sary to estimate this differ- ence of level, the flow between the piers may be treated as if it occurred over a drowned weir. But the

value of c in this case is ‘v/////yy/yy/yy;sˆyyjyj;syZ4My/Jss!;Jsyji, > .’ ■ -• imperfectly known. Fig. 50.

§ 47. Bazin’s Researches on Weirs. — H. Bazin has executed a long series of researches on the flow over weirs, so systematic and complete that they almost supersede other observations. The account of them is contained in a series of papers in the Annates des Ponts et Chaussees (October 1888, January 1890, November 1891, February 1894, December 1896, 2nd trimestre 1898). Only a very abbreviated account can be given here. The general plan of the experiments was to establish first the coefficients of discharge for a standard weir without end contractions; next to establish weirs of other types in series with the standard weir on a channel with steady flow, to compare the observed heads on the different weirs and to determine their coefficients from the discharge computed at the standard weir. A channel was constructed parallel to the Canal de Bourgogne, taking water from it through three sluices 0-3X1-0 metres. The water enters a

masonry chamber 15 metres long by 4 metres wide where it is stilled and passes into the canal at the end of which is the standard weir. The canal has a length of 15 metres, a width of 2 metres and a depth of 1-6 metres. From

mmmmmmmmM. Fig. 51.1

this extends a channel 200 metres in length with a slope of 1 mm. per metre. The channel is 2 metres wide with vertical sides. The channels were constructed of concrete rendered with cement. The water levels were taken in chambers constructed near the canal, by floats actuating an index on a dial. Hook gauges were used in determining the heads on the weirs.

Standard Weir. — The weir crest was 3-72 ft. above the bottom of the canal and formed by a plate i in. thick. It was sharp-edged with free overfall. It was as wide as the canal so that end con- tractions were suppressed, and enlargements were formed below the crest to admit air under the water sheet. The channel below the weir was used as a gauging tank. Gaugings were made with the weir 2 metres in length and afterwards with the weir reduced to 1 metre and 0-5 metre in length, the end contractions being sup- pressed in all cases. Assuming the general formula

Q = mlH{2gh), (1)

5o

Bazin arrives at the following values of m : —

Coefficients of Discharge of Standard Weir.

HYDRAULICS

[DISCHARGE FROM ORIFICES

Head h metres.

Head h feet.

m

0-05

•164

0-4485 I

O-IO

■328

0-4336 !

0-15

•492

0-4284 !

0-20

•656

0-4262

0-25

•820

o-4259 1

0-30

•984

0-4266 j

o-35

1-148

o-4275 j

0-40

1-312

0-4286

o-45

1-476

0-4299

0-50

1-640

o-43i3

o-55

1-804

0-4327

o-6o

1-968

0-4341

Bazin compares his results with those of Fteley and Stearns in 1877 and 1879, correcting for a different velocity of approach, and finds a close agreement.

Influence of Velocity of Approach. — To take account of the velocity of approach u it is usual to replace h in the formula by h + ay?/2g where o is a coefficient not very well ascertained. Then Q = M /(fc + a«*/2g)V \2g{h + au'/2g)}

= nlhT](2gh){i + aii i !2gh)i. (2)

The original simple equation can be used if m =)i(l--au 2 l2gh)i or very approximately, since u?J2gh is small,

m = n{i + Uu'l2gh). (3)

Now if p is the height of the weir crest above the bottom of the

canal (fig. 52), « = Q//(/> + ft). Replacing Q by its value in (1)

= m?{h((,p + h)\ (4) so that (3) may be written

m = *[i + k{h[(p + h)n. (5) Gaugings were made with weirs of 0-75, 0-50, 0-35, and 0-24 metres height above the canal bottom and the results compared with those of the standard weir taken at the same time. The discussion of the results leads to the following values of m in the general equation (1) : —

W = M(l + 2-5M 2 /2gW

=n[i+o-55\h/(.P+h)n. Values of m —

w/////////////////////mc

Fig. 52.

Head h metres.

Head h feet.

0-05 .

•164

0-4481

O-IO

•328

0-4322

0-20

■656

p-4215

0-30

.984

0-4174

0-40

1-312

0-4144

0-50

1-640

0-4118

o-6o

1-968

0-4092

An approximate formula for y. is :

M = 0-405 +0-003//! (h in metres)

M = 0-405+0-01 (h (h in feet). Inclined Weirs.- — Experiments were made in which the plank weir was inclined up or down stream, the crest being sharp and the end contraction suppressed. The following are coefficients by which the discharge of a vertical weir should be multiplied to obtain the discharge of the inclined weir.

Inclination up stream

Vertical weir Inclination down stream

1 to 1 3 to 2 3 to 1

Coefficient.

o-93

0-94 0-96

1 -oo

1-04 1-07

I-IO I-I2

1-09

from the weir, but encloses a volume of air which is at less than atmospheric pressure, and the tail water rises under the sheet. The discharge is a little greater than for free overfall. At greater head the air disappears from below the sheet and the sheet is said to be ” drowned.” The drowned sheet may be independent of the tail water level or influenced by it. In the former case the fall is followed by a rapid, terminating in a standing wave. In the latter

case when the foot of the _ _ _ _

sheet is drowned the level – - – - – -T— o^

of the tail water influences b Vc-

the discharge even if it is below the weir crest.

Weirs with Flat Crests.— The water sheet may spring

clear from the upstream edge .

or may adhere to the fa%V/jMW//////////////,

m

■ 3 to I ,, „ 3 to 2

1 to 1

,, I to 2

1 to 4

The coefficient varies appreciably, if h/p approaches unity, which case should be avoided.

In all the preceding cases the sheet passing over the weir is de- tached completely from the weir and its under-surface is subject to atmospheric pressure. These conditions permit the most exact determination of the coefficient of discharge. If the sides of the canal below the weir are not so arranged as to permit the access of air under the sheet, the phenomena are more complicated. So long as the head does not exceed a certain limit the sheet is detached

W////S////////J

crest falling free beyond the downstream edge. In the former case the condition is that of a sharp-edged weir and it is realized when the head is at least double the width of crest. It may arise if the head is at least iˆ the width of crest. Between these limits the condition of the sheet is unstable. When the sheet is adherent the coefficient m depends on the ratio of the head h to the width of crest c (fig. 53), and is given by the equation m = mi [0-70 + 0- i85h/c], where mi is the coefficient for a sharp- edged weir in similar con- ditions. Rounding the up- stream edge even to a small extent modifies the dis- charge. If R is the radius of the rounding the co- efficient m is increased in the ratio 1 to 1 + R/& nearly. The results are limited to R less than \ in.

Drowned Weirs.— Let h ˆˆˆpˆˆW5ˆ?Wˆ (fig. 54) be the height of F

head water and hi that of . .

tail water above the weir crest. Then Bazin obtains as the approximate formula for the coefficient of discharge

m = 1 -05Wi[i +lhlp] $ { Qi – hi)lh), where as before mi is the coefficient for a sharp-edged weir in similar conditions, that is, when the sheet is free and the weir of the same height. § 48. Separating Weirs. — Many towns derive their water-supply from streams in high m o o rl a n d dis- tricts, in which the flow is extremely variable. The water is collected in large storage reservoirs, from which an uniform supply can be sent to the town. In

Fig. 55.

JPlarv of

C&st Iran

Key

Fig. 56.

such cases it is desirable to separate the coloured water which comes down the streams in high floods from the purer water of ordinary flow. The latter is sent into the reservoirs; the former is allowed

to flow away down the original stream channel, or is stored in separate reservoirs and used as compensation water. To accomplish the separation of the flood and ordinary water, advantage is taken of the different horizontal range of the parabolic path of the water falling over a weir, as the depth on the weir and, consequently, the velocity change. Fig. 55 shows one of these separating weirs in the form in which they were first introduced on the Manchester Water- works; fig. 56 a more modern weir of the same kind designed by Sir A. Binnie for the Bradford Waterworks. When the quantity of water coming down the stream is not excessive, it drops over the weir into a transverse channel leading to the reservoirs. In flood, the water springs over the mouth of this channel and is led into a waste channel.

‘ It may be assumed, probably with accuracy enough for practical purposes, that the particles describe the parabolas due to the mean

velocity of the water passing over the weir, that is, to a velocity

§V(2gfc),

where h is the head above the crest of the weir.

Let cb = x be the width of the orifice and ac = y the difference of level of its edges (fig. 57). Then, if a particle passes from a to b in t seconds,

y = \gf, * = f V(2gfc) < ;

■ :y = &xi/h,

which gives the width * for any given difference of level y and head

h, which the jet will just pass over the orifice. Set off ad vertically

9

2

ˆ \\ :-■•” ;

\ˆ\ W:\; ;- ■

\N\VJH i

V\\KI ■-•:

\\ :\:

O 1

\ V,

d

A e

iˆh-

Fig. 57.

and equal to §g on any scale; af horizontally and equal to | V (gˆ)- Divide af, fe into an equal number of equal parts. Join a with the divisions on ef. The intersections of these lines with verticals from the divisions on af give the parabolic path of the jet.

§ 49. Cylindrical Mouthpieces. — When water issues from, a short cylindrical pipe or mouthpiece of a length at least equal to I J times its smallest transverse dimension, the stream, after contraction within the mouthpiece, expands to fill it and issues full bore, or without contraction, at the point of discharge. The discharge is found to be about one-third greater than that from a simple orifice of the same size. On the other hand, the energy of the fluid per unit of weight is less than that of the stream from a simple orifice with the same head, because part of the energy is wasted in eddies produced at the point where the stream expands to fill the mouthpiece, the action being something like that which occurs at an abrupt change of section.

Let fig. 58 represent a vessel discharging through a cylindrical mouthpiece at the depth h from the free surface, and let the axis of the jet XX be taken as the datum with reference to which the head is estimated. Let 12 be the area of the mouthpiece, o > the aiea of the stream at the contracted section EF. Let v, p be the velocity and pressure at EF, and vi, p\ the same quantities at GH. If the discharge is into the air, pi is equal to the atmospheric pressure p a .

The total head of any filament which goes to form the jet, taken

at a point where its velocity is sensibly zero, is h--p a jG; at EF the total head is vˆfeg + p/G; at GH it is vfˆg + pi/G.

Between EF and GH there is a loss of head due to abtupt change of velocity, which from eq. (3), § 36, may have the value

(»-Z > l) 2 /2g.

Adding this head lost to the head at GH, before equating it to the heads at EF and at the point where the filaments start into motion, —

h + pa/G = vy 2 g + p/G = Vl *l2g + p i IG + {v-v l yi2g. But arj = Qvi, and w = c c ft, if c c is the coefficient of contraction within the mouthpiece. Hence

» = fii'i/oˆri/c. Supposing the discharge into the air, so that pi = p«,

h + p„IG = vˆf 2 g + p a /G--(v l V2g) (l/c-i)*; (»i/?f) (i + (ifc-i) 2 j = A; ••■ vi = ,1 (2gh)H [i + U/cc-i)*); (1)

where the coefficient on the right is evidently the coefficient of velocity for the cylindrical mouthpiece in terms of the coefficient of

con- traction at EF. Let £0 = 0-64, the value for simple orifices, then the coefficient of velocity is

c„ = i/V!i + (i/cc-i) ! !

= 0-87 (2)

The actual value of c v found by experiment is 0-82, which does not differ more from the theoretical value than might be expected if the friction of the mouthpiece is allowed for. GH,

C„ = 0-82

Fig. 58. Hence, for mouthpieces of this kind, and for the section at

c c = i-oo c = o-82,

Q = 0-82flV(2g/t).

It is easy to see from the equations that the pressure p at EF is less than atmospheric pressure. Eliminating v u we get

(pa~P)IG = ih nearly; (3)

or P = P*~ iGhVo per sq. ft.

If a pipe connected with a reservoir on a lower level is introduced into the mouthpiece at the part where the contraction is formed (fig- 59)i the water will rise in this pipe to a height

KL = (/>„-£)/G = ffc nearly. If the distance X is less than this, the water from the lower reservoir will be forced continuously into the jet by the atmospheric pressure, and discharged with it. This is the crudest form of a kind of pump known as the jet pump.

§ 50. Convergent Mouthpieces. — With convergent mouthpieces there is a contraction within the mouthpiece causing a loss of head, and a diminution of the velocity of discharge, as with cylindrical mouthpieces. There is also a second contraction of the stream out- side the mouthpiece. Hence the discharge is given by an equation of the form

Q = Cc c QV(2gft), _ (4)

where fl is the area of the external end of the mouthpiece, and c c Sl the section of the contracted jet beyond the mouthpiece.

Convergent Mouthpieces (Castel's Experiments). — Smallest diameter of orifice = 0-05085 //. Length of mouthpiece — 2-6 Diameters.

Angle of Convergence.

Coefficient of

Coefficient of

Coefficient of

Contraction,

Cc

Velocity,

Cv

Discharge, c

0° 0′

•999

•830

•829

i°3°'

i- 000

■866

866

3° 10′

I-OOI

•894

895

4° 10′

1-002

•910

912

K 26 ‘,

I-004

■920

924

7° 52′

•998

•931

929

8° 58′

•992

•942

934

10° 20′

•987

•950

938

12° 4′

•986

•955

942 ,

13° 24′

•983

•962

946

14 28

•979

•966

941

16° 36′

.969

•971

938

19″ 28′

•953

•97°

924

21° O’

•945

•971

918

23° 0′

•937

•974

913

29° 58′

•919

•975

896

40 20

•887

•980

869

4 8° 50′

•861

■984

•847

The maximum coefficient of discharge is that for a mouthpiece with a convergence of 13 24’.

HYDRAULICS

The values of c v and c c must here be determined by experiment. The above table gives values sufficient for practical purposes. Since

the contraction beyond the mouthpiece increases with the convergence, or, what is the same thing, c c diminishes, and on the other hand the loss of energy diminishes, so that Cv increases with the convergence, there is an angle for which the product c c c v , and con- sequently the discharge, •is a maximum.

§ 51. Divergent Con- oidal Mouthpiece. — Sup- pose a mouthpiece so designed that there is no abrupt change in the section or velocity of the stream passing through it. It may have a form at the inner end approxi- mately the same as that of a simple contracted vein, and may then enlarge gradu- ally, as shown in fig. 60. Suppose that at EF it becomes cylindrical, so that the jet may be taken to be of the diameter EF. Let

since there is no loss of energy, except the small frictional resistance of the surface of the mouthpiece, h + p a /G = vy 2 g + p/G

= y/2g + £./G.

If the jet discharges into the air, pi = pa) and Vi 2 l2g = h; v, = V (2gh) ;_ or, if a coefficient is intro- duced to allow for friction,

»i = c_v V (2gh) ; where c v is about 0-97 if the mouthpiece is smooth and well formed.

Q = Qoi = c»nV (2gh). Hence the discharge de- pends on the area of the stream at EF, and not at all on that at CD, and the latter may be made as small as we please without affecting the amount of water discharged. There is, however, a limit to this. .As the velocity at CD is greater than at EF the pressure is less, and therefore less than atmospheric pressure, if the discharge is into the air. If CD is so contracted that p = o, the continuity of flow is impossible. In fact the stream

disengages itself from the mouthpiece for some value of p greater than o (fig. 61). From the equations,

plG = PajG-{v > -v?)l2g. Let Uja = m. Then

v — v\m ; £/G = /> «/G-f, ! (»» 2 i)/2g = Pa/G(m 2 -i)h;

whence we find that pjG will become zero or nega- tive if

ahmˆJ\(h + pJG)lh\ -V!i + A./GA);

or, putting £«/G = 34 ft., if

In practice there will be an interruption of the full bore flow with a less ratio of Sljw, because of the disengagement of air from the water. But, supposing this does not occur, the maximum discharge of a mouthpiece of this kind is

Q = w V{2g(A + * > ./G)|; that is, the discharge is the same as for a well-bellmouthed mouth- piece of area a, and without the expanding part, discharging into a vacuum.

§ 32. Jet Pump. — A divergent mouthpiece may be arranged to act as a pump, as shown in fig. 62. The water which supplies the energy

Fig. 60.

required for pumping enters at A. The water to be pumped enters at B. The streams combine at DD where the velocity is greatest and the pressure least. Beyond DD the stream enlarges in section,

Fig. 62.

arid its pressure increases, till it is sufficient to balance the head due to the height of the lift, and the water flows away by the discharge pipe C.

Fig. 63 shows the whole arrangement in a diagrammatic way. A is the reservoir which supplies the water that effects the pumping;

Fig. 63.

B is the reservoir of water to be pumped ; C is the reservoir into which the water is pumped.

Discharge with Varying Head

§ 53. Flow from a Vessel when the Effective Head varies with the Time. — Various useful problems arise relating to the time of emptying and filling vessels, reservoirs, lock chambers, &c, where the flow is dependent on a head which increases or diminishes during the operation. The simplest of these problems is the case of filling or emptying a vessel of constant horizontal section.

Time of Emptying or Filling a Vertical-sided Lock Chamber. — Suppose the lock chamber, which has a water surface of O square ft., is emptied through a sluice in the tail gates, of area w, placed below the tail-water level. Then the effective head producing flow through the sluice is the difference of level in the chamber and tail bay. Let H (fig. 64) be the initial difference of level, h the difference

Head, water Uvr.l

Fig. 64.

of level after t seconds. Let — dh be the fall of level in the chamber during an interval dt. Then in the time dt the volume in the chamber is altered by the amount —Qdh, and the outflow from the sluice in the same time is cuV {2gh)dt. Hence the differential equation con- necting h and t is

$$cwV\ (2gh)dt + Qh\ = 0.$$

For the time /, during which the initial head H diminishes to any other value h,

-in/(

.•.t = 2Q(VH-VA)/{c«V(2g)} = (Q/c«)(V(2H/g)-V(2A/g)}. For the whole time of emptying, during which h diminishes from H to o,

T = (Q/c w)V(2H/g). Comparing this with the equation for flow under a constant head, it will be seen that the time is double that required for the discharge of an equal volume under a constant head.

The time of filling the lock through a sluice in the head gates is exactly the same, if the sluice is below the tail-water level. But if the sluice is above the tail-water level, then the head is constant till the level of the sluice is reached, and afterwards it diminishes with the time.

Practical Use of Orifices in Gauging Water § 54. If the water to be measured is passed through a known orifice under an arrangement by which the constancy of the head is ensured, the amount which passes in a given time can be ascertained by the formulae already given. It will obviously be best to make the orifices of the forms for which the coefficients are most accurately determined; hence sharp-edged orifices or notches are most com- monly used.

Water Inch. — For measuring small quantities of water circular sharp-edged orifices have been used. The discharge from a circular orifice one French inch in diameter, with a head of one line above the top edge, was termed by the older hydraulic writers a water-inch. A common estimate of its value was 14 pints per minute, or 677 English cub. ft. in 24 hours. An experiment by C. Bossut gave 634 cub. ft. in 24 hours (see Navier's edition of Belidor's Arch. Hydr., p. 212).

L. J. Weisbach points out that measurements of this kind would be made more accurately with a greater head over the orifice, and he proposes that the head should be equal to the diameter of the orifice. Several equal orifices may be used for larger discharges.

Pin Ferrules or Measuring Cocks. — To give a tolerably definite supply of water to houses, without the expense of a meter, a ferrule with an orifice of a definite size, or a cock, is introduced in the service-pipe. If the head in the water main is constant, then a definite quantity of water would be delivered in a given time. The arrangement is not a very satisfactory one, and acts chiefly as a check on extravagant use of water. It is interesting here chiefly as an example of regulation of

discharge by means of an orifice. Fig. 65

shows a cock of this kind used at Zurich. It consists of three cocks, the middle one having the orifice of the predetermined size in a small circular plate, protected by wire gauze from stoppage by im- purities in the water. The cock p IG g, on the right hand

can be used by the consumer for emptying the pipes. The one on the left and the measuring cock are connected by a key which can be locked by a padlock, which is under the control of the water company.

§ 55. Measurement of the Flow in Streams. — To determine the quantity of water flowing off the ground in small streams, which is available for water supply or for obtaining water power, small temporary weirs are often used. These may be formed of planks supported by piles and puddled to prevent leakage. The measure- ment of the head may be made by a thin-edged scale at a short distance behind the weir, where the water surface has not begun to slope down to the weir and where the velocity of approach is not high. The measurements are conveniently made from a short pile driven into the bed of the river, accurately level with the crest of the weir (fig. 66). Then if at any moment the head is h, the dis- charge is, for a rectangular notch of breadth b,

Q = §c«*V2l¥ where c = o-62; or, better, the formula in § 42 may be used.

Gauging weirs are most commonly in the form of rectangular notches; and care should be taken that the crest is accurately horizontal, and that the weir is normal to the direction of flow of the stream. If the planks are thick, they should be bevelled (fig. 67), and then the edge may be protected by a metal plate about ˆth in. thick to secure the requisite accuracy of form and sharpness of edge. In permanent gauging weirs, a cast steel plate is sometimes used to form the edge of the weir crest. The weir should be large enough to discharge the maximum volume flowing in the stream, and at the same time it is desirable that the minimum head should

not be too small (say half a foot) to decrease the effects of errors of measurement. The section of the jet over the weir should not exceed one-fifth the section of the stream behind the weir, or the velocity of approach will need to be taken into account. A triangular notch is very suitable for measurements of this kind.

If the flow is variable, the head h must be recorded at equidistant

intervals of time, say twice daily, and then for each 12-hour period

Seal

Weir

Fig. 66.

the discharge must be calculated for the mean of the heads at the beginning and end of the time. As this involves a good deal of troublesome calculation, E. Sang proposed to use a scale so graduated as to read off the discharge in cubic feet per second. The lengths of the principal graduations of such a scale are easily calculated by putting Q = l,2, 3 . . . in the ordinary formulae for notches; the intermediate graduations may be taken accurately enough by subdividing equally the distances between the principal graduations.

The accurate measurement of the discharge of a stream by means of a weir is, however, in practice, rather more difficult than might be inferred from the simplicity of the principle of the operation. Apart from the difficulty of selecting a suit- able coefficient of discharge, which need not be serious if the form of the weir and the nature of its crest are pro- perly attended to, t? t _ ˆ other difficulties of * IG ” ° 7 ‘ measurement arise. The length of the weir should be very accurately deter- mined, and if the weir is rectangular its deviations from exactness of level should be tested. Then the agitation of the water, the ripple on its surface, and the adhesion of the water to the scale on which the head is measured, are liable to introduce errors. Upon a weir 10 ft. long, with I ft. depth of water flowing over, an error of l-ioooth of a foot in measuring the head, or an error of i-iooth of a foot in measuring the length of the weir, would cause an error in computing the discharge of 2 cub. ft. per minute.

Hook Gauge. — For the determination of the surface level of water, the most accurate instrument is the hook gauge used first by U. Boyden of Boston, in 1840. It consists of a fixed frame with scale and vernier. In the instrument in fig. 68 the vernier is fixed to the frame, and the scale slides vertically. The scale carries at its lower end a hook with a fine point, and the scale can be raised or lowered by a fine pitched screw. If the hook is depressed below

the water surface and then raised by the screw, the moment of its reaching the water surface will be very distinctly marked, by the reflection from a small capillary elevation of the water surface over the point of the hook. In ordinary light, differences of level of the

water of -ooi of a foot are easily detected by the hook gauge. If such a gauge is used to determine the heads at a weir, the hook should

= = liE = ?

Fig. 68

first be set accurately level with the weir crest, and a reading taken. Then the difference of the reading at the water surface and that tor the weir crest will be the head at the weir.

§ 56. Modules used in Irrigation. — In distributing water for irrigation, the charge for the water may be simply assessed on the area of the land irrigated for each consumer, a method followed in India; or a regulated quantity of water may be given to each consumer, and the charge may be made proportional to the quantity of water supplied, a method employed for a long time in Italy and other parts of Europe. To deliver a regulated quantity of water

time to time. It has further the advantage that the cultivator, by observing the level of the water in the chamber, can always see whether or not he is receiving the proper quantity of water.

On each canal the orifices are of the same height, and intended to work with the same normal head, the width of the orifices being varied to suit the demand for water. The unit of discharge varies on different canals, being fixed in each case by legal arrangements. Thus on the Canal Lodi the unit of discharge or one module of water is the discharge through an orifice 1-12 ft. high, 0-12416 ft. wide, with a head of 0-32 ft. above the top edge of the orifice, or -88 ft. above the centre. This corresponds to a discharge of about 0-6165 cub. ft. per second.

In the most elaborate Italian modules the regulating chamber is arched over, and its dimensions are very exactly prescribed. Thus in the modules of the Naviglio Grande of Milan, shown in fig. 70, the measuring orifice is cut in a thin stone slab, and so placed that the discharge is into the air with free contraction on all sides. The

Fig. 69.

from the irrigation channel, arrangements termed modules are used. These are constructions intended to maintain a constant or approximately constant head above an orifice of fixed size, or to regulate the size of the orifice so as to give a constant discharge, notwith- standing the variation of level in the irrigating channel.

§ 57. Italian Module. — The Italian modules are masonry constructions, consisting of a regulating chamber, to which water is admitted by an adjustable sluice from the canal. At the other end of the chamber is an orifice in a thin flagstone of fixed size. By means of the adjustable sluice a tolerably constant head above the fixed orifice is maintained, and therefore there is a nearly constant dis- charge of ascertainable amount through the orifice, into the channel leading to the fields which are to be irrigated.

In fig. 69, A is the adjustable sluice by which water is admitted to the regulating chamber, B is the fixed orifice through which the water is discharged. The sluice A is adjusted from time to time by the canal officers, so as to bring the level of the water in the regulating chamber to a fixed level marked on the wall of the chamber. When

r adjusted it is locked. Let ui be the area of the orifice through the sluice at A, and u 2 that of the fixed orifice at B ; let hi be the difference of level between the surface of the water in the canal and regulating chamber; h« the head above the centre of the discharging orifice, when the sluice has been adjusted and the flow has become steady; Q the normal discharge in cubic feet per second. Then, since the flow through the orifices at A and B is the same,

Q = ciwi V (2gh) = C2U2V (2gh) ,

where c\ and c 2 are the coefficients of discharge suitable for the two orifices. Hence

Cimi/c2«2 = V (hilhi).

If the orifice at B opened directly into the canal without any intermediate regulating chamber, the discharge would increase for a given change of level in the canal in exactly the same ratio. Consequently the Italian module in no way moderates the fluctuations of discharge, except so far as it affords means of easy adjustment from

Fig. 71.

adjusting sluice is placed with its sill flush with the bottom of the canal, and is provided with a rack and lever and locking arrange-

ment. The covered regulating chamber is about 20 ft. long, with a breadth 1-64 ft. greater than that of the discharging orifice. At precisely the normal level of the water in the regulating chamber, there is a ceiling of planks intended to still the agitation of the water. A block of stone serves to indicate the normal level of the water in the chamber. The water is discharged into an open channel 0-655 ft- wider than the orifice, splaying out till it is 1-637 ft. wider than the orifice, and about 18 ft. in length.

§ 58. Spanish Module. — On the canal of Isabella II., which supplies water to Madrid, a module much more perfect in principle than the Italian module is employed. Part of the water is supplied for irriga- tion, and as it is very valuable its strict measurement is essential. The module (fig. 72) consists of two chambers one above the other, the upper chamber being in free communi- cation with the irrigation canal, and the lower chamber discharging by a culvert to the fields. In the arched roof between the chambers there is a circular sharp-edged orifice in a bronze plate. Hanging in this there is a bronze plug of variable diameter sus- pended from a hollow brass float. If the water level in the canal lowers, the plug descends and gives an enlarged opening, and conversely. Thus a per- fectly constant discharge with a vary- ing head can be obtained, provided no clogging or silting of the chambers pre- vents the free discharge of the water or the rise and fall of the float. The theory of the module is very simple. Let R (fig. 71) be the radius of the fixed opening, r the radius of the plug at a distance h from the plane of flotation of the float, and Q the required discharge of the module. Then

Taking c =0-63,

Q = i5-88(R 2 -r !)Vfe; r = V!R 2 -Q/i5-88V^|.

Choosing a value for R, successive values of r can be found for different values of h, and from these the curve of the plug can be drawn. The module shown in fig. 72 will discharge I cubic metre per second. The fixed opening is 0-2 metre diameter, and the greatest head above the fixed orifice is I metre. The use of this module involves a great sacrifice of level between the canal and the fields. The module is described in Sir C. Scott-Moncrieff ‘ s Irrigation in Southern Europe.

§ 59. Reservoir Gauging Basins. — In obtaining the power to store the water of streams in reservoirs, it is usual to concede to riparian

owners below the reservoirs a right to a regulated supply through- out the year. This compensation water requires to be measured in such a way that the millowners and others interested in the matter can assure themselves that they are receiving a proper quantity, and they are generally allowed a certain amount of control as to the times during which the daily supply is discharged into the stream.

Fig. 74 shows an arrangement designed for the Manchester water works. The water enters from the reservoir a chamber A, the object of which is to still the irregular motion of the water. The admission is regulated by sluices at b, b, b. The water is discharged by orifices or notches at a, a, over which a tolerably constant head is maintained by adjusting the sluices at b, b, b. At any time the millowners can see w'hether the discharge is given and whether the proper head is maintained over the orifices. To test at any time the discharge of the orifices, a gauging basin B is provided. The water ordinarily

flows oyer this, without entering it, on a floor of cast-iron plates. If the discharge is to be tested, the water is turned for a definite time into the gauging basin, by suddenly opening and closing a sluice at c. The volume of flow can be ascertained from the depth in the gauging chamber. A mechanical arrangement (fig. 73) was designed for securing an absolutely constant head over the orifices at a, a. The orifices were formed in a cast-iron plate capable of sliding up and

Fig. 73. — Scale T | .

down, without sensible leakage, on the face of the wall of the chamber. The orifice plate was attached by a link to a lever, one end of which rested on the wall and the other on floats / in the chamber A. The floats rose and fell with the changes of level in the chamber, and raised and lowered the orifice plate at the same time. This

Fig. 74.— Scale 5 J B .

mechanical arrangement was not finally adopted, careful watching of the sluices at b, b, b, being sufficient to secure a regular discharge. The arrangement is then equivalent to an Italian module, but on a large scale.

§ 60. Professor Fleeming Jenkin's Constant Flow Valve. — In the modules thus far described constant discharge is obtained by vary- ing

the area of the orifice through which the water flows. Professor F. Jenkin has contrived a valve in which a constant pressure head is obtained, so that the orifice need not be varied {Roy. Scot. Society

of Arts, 1876). Fig. 75 shows a valve of this kind suitable for a 6-in. water main. The water arriving by the main C passes through an equilibrium valve D into the chamber A, and thence through a sluice 0, which can be set for any required area of opening, into the discharging main B. The object of the arrangement is to secure a constant difference of pressure between the chambers A and B, so that a constant discharge flows through the stop valve O. The equilibrium valve D is rigidly connected with a plunger P loosely fitted in a diaphragm, separating A from a chamber B2 connected by a pipe Bi with the discharging main B. Any increase of the differ- ence of pressure in A and B will drive the plunger up and close the

Fig. 75. — Scale 4 4 .

equilibrium valve, and conversely a decrease of the difference of pressure will cause the descent of the plunger and open the equilibrium valve wider. Thus a constant difference of pressure is obtained in the chambers A and B. Let w be the area of the plunger in square feet, p the difference of pressure in the chambers A and B in pounds per square foot, w the weight of the plunger and valve. Then if at any moment pa exceeds w the plunger will rise, and if it is less than w the plunger will descend. Apart from friction, and assuming the valve D to be strictly an equilibrium valve, since 01 and w are constant, p must be constant also, and equal to w/oi. By making w small and w large, the difference of pressure required to ensure the working of the apparatus may be made very small. Valves working with a difference of pressure of \ in. of water have been constructed.

VI. STEADY FLOW OF COMPRESSIBLE FLUIDS.

§ 61. External Work during the Expansion of Air. — If air expands without doing any external work, its temperature remains constant.

This result was first experimentally demon- strated by J. P. Joule. It leads to the conclu- sion that, however air changes its state, the in- ternal work done is pro- portional to the change of temperature.

When, in expanding, air does work against an external resistance, either heat must be supplied or the temperature falls.

To fix the conditions, suppose 1 lb of air con- fined behind a piston of I sq. ft. area (fig. 76). Let the initial pressure be pi and the volume of the air vi, and suppose this to expand to the pressure pt and volume

\o.

p,\ c Pi

- V, -■* ;
- ; v • ■•■-»;

<• – ; v,—{-~

f

EH

! i

: 1

Fig. 76.

»2- If p and v are the corresponding pressure and volume at any intermediate point in the expansion, the work done on the piston during the expansion from v to v + dv is pdv, and the whole work during the expansion from »i to » 2 , represented by the area abed, is

Case 1. — So much heat is supplied to the air during expansion that the temperature remains constant. Hyperbolic expansion. Then pv—piVi.

Work done during expansion per pound of air

= fl[pdv = p 1 v 1 fl

‘dv/v

Fig. 77.

pdv.

Amongst possible cases two may be selected.

= £l! >l loge Vs/vi = piUi loge pi/pt. (i)

Since the weight per cubic foot is the reciprocal of the volume per pound, this may be written

(P1IG1) loge G1/G2. (10)

Then the expansion curve ab is a common hyperbola.

Case 2. — No heat is supplied to the air during expansion. Then the air loses an amount of heat equivalent to the external work done and the temperature falls. Adiabatic expansion.

In this case it can be shown that

pvy = piv{*, where 7 is the ratio of the specific heats of air at constant pressure and volume. Its value for air is 1-408, and for dry steam 1-135.

Work done during expansion per pound of air.

= flpdv = p l v l yfl°dvlvy

= -{Ml?/(t-i)HiM?- 1 -iM v – 1 }

= [?.w/(7-i)](iM y – 1 iM'']

= \PiV l /(y-i)}{i-(v 1 lvd y – 1 l (2)

The value of piVi for any given temperature can be found from the data already given.

As before, substituting the weights Gi, G 2 per cubic foot for the volumes per pound, we get for the work of expansion

(i >./G,){i/(7-i)i fi-(G 2 /G 1) y – 1 !. (2a)

=*Wi/(7-i)} [i-fa/pov-v/y]- (2b)

§ 62. Modification of the Theorem of Bernoulli for the Case of a Compressible Fluid. — In the application of the principle of work to a filament of compressible fluid, the internal work done by the expansion of the fluid, or absorbed in its compression, must be taken into account. Suppose, as before, that AB (fig. 77) comes to A'B' in a short time t. Let pi, Mi, Vi, Gi be the pres- sure, sectional area of stream, velocity and weight of a cubic foot at A, and p 2 , « 2 , v*, G2 the same quantities at B. Then, from the steadiness of motion, the

weight of fluid passing A in any given time must be equal to the weight passing fi :

GiioiVit = GzoizVzt. Let Zi, z 2 be the heights of the sections A and B above any given datum. Then the work of gravity on the mass AB in t seconds is

Gia>iz>i<(zi — z 2) = W(zi — zi)t, where W is the weight of gas passing A or B per second. As in the case of an incompressible fluid, the work of the pressures on the ends of the mass AB is

plQJlVit — pˆtfl-it,

= (pilGi-p 2 /G i Wt. The work done by expansion of Wi lb of fluid between A and B is W« fˆpdv. The change of kinetic energy as before is (W/2g) (u 2 2 — »i 2)f. Hence, equating work to change of kinetic energy,

W(z 1 -z 2)Z+(i/G 1 – /G 2)W/+W = (W/2g) W-vi*)t;

.'. zi+Pi/Gi+vi' i J2g=z 2 +pVG 2 +v 2 y2g-pˆpdv. (1)

Now the work of expansion per pound of fluid has already been given. If the temperature is constant, we get (eq. ia, § 61)

Zl+£l/Gl+»r72g=S2+£2/G 2 +Z> 2 72g-(£l/Gl) loge (G1/G2).

But at constant temperature pi/Gi = £ 2 /G 2 ;

/. Zi+»i 2 /2g = Z2-|-I>2 2 /2g-(£l/Gi) loge (pl/pz),

or, neglecting the difference of level,

(tf-l'l 2)/2g = (ˆl/G 1)loge (pi/pl).

Similarly, if the expansion is adiabatic (eq. 2a, § 61), zi+pi/Gi -Hi 2 /2g = z 2 -r-fc/Gs +f2 2 /2g – (pi/Gi) 1 1 l(y – 1) j

[i-(ptfpi)Wy\;

or neglecting the difference of level W -tf)/2g = (A/G0[i +1/(7 – i) {i – (frlpiW-viyft-ptlGi.

It will be seen hereafter that there is a limit in the ratio pilpt beyond which these expressions cease to be true.

§ 63. Discharge of Air from an Orifice.— The form of the equation of

work for a steady stream of compressible fluid is Zi + WGi + ! > i 2 /2g = Z2 + £2/G2 + %V2g-(£i/Gi){i/(7-i)} , , s/V „, ,

(2)

(2a)

(3) (30)

FRICTION OF LIQUIDS]

HYDRAULICS

57

the expansion being adiabatic, because in the flow of the streams of air through an orifice no sensible amount of heat can be communicated from outside.

Suppose the air flows from a vessel, where the pressure is pi and the velocity sensibly zero, through an orifice, into a space where the pressure is pi. Let vt be the velocity of the jet at a point where the convergence of the streams has ceased, so that the pressure in the jet is also p 2 . As air is light, the work of gravity will be small compared with that of the pressures and expansion, so that Ziz 2 may be neglected. Putting these values in the equation above —

A/G 1 =/> 2 /G 2 + tf/2g-(A/G 1)!i/(7-i)){i-(^2/A) (v – l)/Y ;

/2g = WG 1 – /G 2 + (A/G 1)(i/(T-i)){i-to/pi) (v – l)/Y)

= (?i/G 1)!t/(t-i)-(/A) 7 – i/v /(t-i)}-/G 2 .

But NU y = £2/W .. fc/G 2 = fi > i/Gi)(p 2 /pi) (l ‘ l)/1 ‘

»iV2« = (fr/G,){7/(Y-l)} \i-(p2/Pi) iy ~ l)/y h (0

or _ vi-/2g = [7/ (7 – 1) j j (pi/Gi) – (> 2 /G 2)) ;

an equation commonly ascribed to L. J. Weisbach (Civilingenieur, 1856), though it appears to have been given earlier by A. J. C. Barre de Saint Venant and L. Wantzel.

It has already (§ 9, eq. 4a) been seen that ^/G I = (^„/Go)(7- 1 /r) where for air £0 = 2116-8, Go = -o8o75 and 1-0 = 492-6.

* < 2 2 /2g = {/ > oTi- > 7Goro(7-l)! \l-(p2/pi) (y – l)/y }; (2)

or, inserting numerical values,

»2 2 /2g = i83-6ti(i – (P2IP1) °- 29 | ; (20)

which gives the velocity of discharge v 2 in terms of the pressure and absolute temperature, pi, n, in the vessel from which the air flows, and the pressure pi in the vessel into which it flows.

Proceeding now as for liquids, and putting w for the area of the orifice and c for the coefficient of discharge, the volume of air dis- charged per second at the pressure pi and temperature t 2 is

Q 2 = CM , 2 = c<0 V [(2g7M7- I)G,)(I – 0/fr) (y – l)/Y)]

= loS-jco 1 [n\i-(p 2 lPir)). (3)

If the volume discharged is measured at the pressure pi and absolute temperature n in the vessel from which the air flows, let Qi be that volume ; then

piQi y =p2QS; Qi = (ft/£i) l/Y Q2; Qi=cu V[{2g7M7-i)G 1 | \(p 1 / p0 2/y (p2/Pi) iy+t)/y \] Let (p2/pi) 2/y -(p-2lPi) {y – l)/y = (p2/ piy n (p2/Piy‘= + ; then Qi =coi V [2gypnpi{y — l)Gi]

= lo8-7co>V(riiA). (4)

The weight of air at pressure pi and temperature n is

Gi =£1/53-2×1 lb per cubic foot.

Hence the weight of air discharged is

W = GiQi=cw V[2g7£iGiˆ/(7-i)]

= 2-043c

Weisbach found the following values of the coefficient of dis- charge c: —

Conoidal mouthpieces of the form of the!

contracted vein with effective pressures r c =

of 23 to I 1 atmosphere …. J 0-97 too-99

Circular sharp-edged orifices …. 0-563 ,, 0-788

Short cylindrical mouthpieces .... o-8l ,, 0-84

The same rounded at the inner end . 0-92 ,, 0-93

Conical converging mouthpieces . . . 0-90 ,, 0-99

§ 64. Limit to the Application of the above Formulae. — In the formulae above it is assumed that the fluid issuing from the orifice expands from the pressure pi to the pressure £ 2 , while passing from the vessel to the section of the jet considered in estimating the area u. Hence p 2 is strictly the pressure in the jet at the plane of the external orifice in the case of mouthpieces, or at the plane of the contracted section in the case of simple orifices. Till recently it was tacitly assumed that this pressure pi was identical with the general pressure external to the orifice. R. D. Napier first discovered that, when the ratio P2IP1 exceeded a value which does not greatly differ from 0-5, this was no longer true. In that case the expansion of the fluid down to the external pressure is not completed at the time it reaches the plane of the contracted section, and the pressure there is greater than the general external pressure; or, what amounts to the same thing, the section of the jet where the expansion is com- pleted is a section which is greater than the area c c a of the contracted section of the jet, and may be greater than the area a of the orifice. Napier made experiments with steam which showed that, so long as ptlpi > 0‘5t the formulae above were trustworthy, when pi was taken to be the general external pressure, but that, if pi/pi

It is easily deduced from Weisbach’s theory that, if the pressure external to an orifice is gradually diminished, the weight of air dis- charged per second increases to a maximum for a value of the ratio p2/Pi = {2/(y + i)\ y – l/y = 0-527 for air = 0-58 for dry steam. For a further decrease of external pressure the discharge diminishes, — a result no doubt improbable. The new view of Weisbach’s formula is that from the point where the maximum is reached, or not greatly differing from it, the pressure at the contracted section ceases to diminish.

A. F. Fliegner showed {Civilingenieur xx., 1874) that for air flow- ing from well-rounded mouthpieces there is no discontinuity of the law of flow, as Napier’s hypothesis implies, but the curve of flow bends so sharply that Napier’s rule may be taken to be a good approximation to the true law. The limiting value of the ratio P2IP1, for which Weisbach’s formula, as originally understood, ceases to apply, is for air 0-5767; and this is the number to be substituted for pilpi in the formulae when P2/P1 falls below that value. For later researches on

the flow of air, reference may be made to G. A. Zeuner's paper (Civilingenieur, 1871), and Fliegner's papers (ibid., 1877,

1878).

VII. FRICTION OF LIQUIDS.

§ 65. When a stream of fluid flows over a solid surface, or con- versely when a solid moves in still fluid, a resistance to the motion is generated, commonly termed fluid friction. It is due to the vis- cosity of the fluid, but generally the laws of fluid friction are very different from those of simple viscous resistance. It would appear that at all speeds, except the slowest, rotating eddies are formed by the roughness of the solid surface, or by abrupt changes of velocity distributed throughout the fluid; and the energy expended in pro- ducing these eddying motions is gradually lost in overcoming the viscosity of the fluid in regions more or less distant from that where they are first produced.

The laws of fluid friction are generally stated thus : —

1. The frictional resistance is independent of the pressure between the fluid and the solid against which it flows. This may be verified by a simple direct experiment. C. H. Coulomb, for instance, oscil- lated a disk under water, first with atmospheric pressure acting on the water surface, afterwards with the atmospheric pressure removed. No difference in the rate of decrease of the oscillations was observed. The chief proof that the friction is independent of the pressure is that no difference of resistance has been observed in water mains and in other cases, where water flows over solid surfaces under widely different pressures.

2. The frictional resistance of large surfaces is proportional to the area of the surface.

3. At low velocities of not more than 1 in. per second for water, the frictional resistance increases directly as the relative velocity of the fluid and the surface against which it flows. At velocities of I ft. per second and greater velocities, the frictional resistance is more nearly proportional to the square of the relative velocity.

In many treatises on hydraulics it is stated that the frictional resistance is independent of the nature of the solid surface. The explanation of this was supposed to be that a film of fluid remained attached to the solid surface, the resistance being generated between this fluid layer and layers more distant from the surface. At ex-

tremely low velocities the solid surface docs not seem to have much influence on the friction. In Coulomb's experiments a metal surface covered with tallow, and oscillated in water, had exactly the same resistance as a clean metal surface, and when sand was scattered over the tallow the resistance was only very slightly increased. The earlier calculations of the resistance of water at higher velocities in iron and wood pipes and earthen channels seemed to give a similar result. These, however, were erroneous, and it is now well understood that differences of roughness of the solid surface very greatly influ- ence the friction, at such velocities as are common in engineering practice. H. P. G. Darcy's experiments, for instance, showed that in old and incrusted water mains the resistance was twice or some- times thrice as great as in new and clean mains.

§ 66. Ordinary Expressions for Fluid Friction at Velocities not Extremely Small. — Let / be the frictional resistance estimated in pounds per square foot of surface at a velocity of 1 ft. per second; « the area of the surface in square feet; and v its velocity in feet per second relatively to the water in which it is immersed. Then, in accordance with the laws stated above, the total resistance of the surface is

R =/W (1)

where / is a quantity approximately constant for any given surface.

I=2«//G,

R = fG&>i> 2 /2g, (2)

where £ is, like /, nearly constant for a given surface, and is termed the coefficient of friction.

The following are average values of the coefficient of friction for water, obtained from experiments on large plane surfaces, moved in an indefinitely large mass of water.

Coefficient

of Friction,

I

Frictional

Resistance in

lb per sq. ft.

/

New well-painted iron plate . Painted and planed plank (Beaufoy) Surface of iron ships (Rankine) . Varnished surface (Froude) . Fine sand surface ,, ... Coarser sand surface ,, .

•00489 •00350 •00362 •00258 •00418 •00503

•00473 •00339 •00351 •00250 •00405 •00488

The distance through which the frictional resistance is overcome is r ft. per second. The work expended in fluid friction is therefore given by the equation —

Work expended =/wi> 3 foot-pounds per second ((3).

= £Guv 3 /2g „ ,,]

The coefficient of friction and the friction per square foot of surface can be indirectly obtained from observations of the discharge of pipes and canals. In obtaining them, however, some assumptions as to the motion of the water must be made, and it will be better therefore to discuss these values in connexion with the cases to which they are related.

Many attempts have been made to express the coefficient of friction in a form applicable to low as well as high velocities. The older hydraulic writers considered the resistance termed fluid friction to be made up of two parts, — a part due directly to the distortion of the mass of water and proportional to the velocity of the water relatively to the solid sur- face, and another part due to kinetic energy imparted to the water striking the roughnesses of the solid surface and proportional to the square of the velocity. Hence they proposed to take

| = o+/3/o

in which expression the second term is

of greatest importance at very low = = ___^___

velocities, and of comparatively little kˆJJˆjJˆˆˆsˆgˆ-sMJ

importance at velocities over about j ft. r—

per second. Values of £ expressed in this ~_Z

and similar forms will be given in con- ; iˆS» A

nexion with pipes and canals. ■

All these expressions must at present 1 –

be regarded as merely empirical ex- ;_~ ‘ ~

pressions serving practical purposes. — — ■ — • — — — –

The frictional resistance will be seen’ to vary through wider limits than these

expressions allow, and to depend on circumstances of which they do not take account.

§ 67. Coulomb’s Experiments. —The first direct experiments on fluid friction were made by Coulomb, who employed a circular disk suspended by a thin brass wire and oscillated in its own plane. His experiments were chiefly made at very low velocities. When the disk is rotated to any given angle, it oscillates under the action of its inertia and the torsion of the wire. The oscillations diminish gradually in consequence of the work done in overcoming the friction of the disk. The diminution furnishes a means of determining the friction.

Fig. 78 shows Coulomb’s apparatus. LK supports the wire and disk; ag is the brass wire, the torsion of which causes the oscilla- tions ; DS is a graduated disk serving to measure the angles through which the apparatus oscillates. To this the friction disk is rigidly attached hang- ing in a vessel of water. The friction disks were from 4-7 to 7-7 in. dia- meter, and they gener- ally made one oscillation in from 20 to 30 seconds, through angles varying from 360° to 6°. When the velocity of the cir- cumference of the disk was less than 6 in. per second, the resistance was sensibly propor- tionalto the velocity. Beaufoy’ s Experiments. — Towards the end of the 18th century Colonel Mark Beaufoy (1 764-1 827) made an immense mass of experiments on the resistance of bodies moved through water (Nautical and Hydraulic Experiments, London, 1834). Of these the only ones directly bearing on surface friction were some made in 1796 and 1798. Smooth painted planks were drawn through water and

the resistance measured. For two planks differing in area by 46 sq. ft., at a velocity of 10 ft. per second, the difference of resistance, measured on the difference of area, was 0-339 lb per square foot. Also the resistance varied as the 1 -949th power of the velocity.

§ 68. Froude's Experiments. — The most important direct experiments on fluid friction at ordinary velocities are those made by William Froude (1810-1879) at Torquay. The method adopted in these experiments was to tow a board in a still water canal, the velocity and the resistance being registered by very ingenious re- cording arrangements. The general arrangement of the apparatus is shown in fig. 79. AA is the board the resistance of which is to be determined. B is a cut-water giving a fine entrance to the plane surfaces of the board. CC is a bar to which the board AA is attached, and which is suspended by a parallel motion from a carriage running on rails above the still water canal. G is a link by which the re- sistance of the board is transmitted to a spiral spring H. A bar I rigidly connects the other end of the spring to the carriage. The dotted lines K, L indicate the position of a couple of levers by which the extension of the spring is caused to move a pen M, which records the extension on a greatly increased scale, by a line drawn on the paper cylinder N. This cylinder revolves at a speed proportionate to that of the carriage, its motion being obtained from the axle of the carriage wheels. A second pen O, receiving jerks at every second and a quarter from a clock P, records time on the paper cylinder. The scale for the line of resistance is ascertained by stretching the spiral spring by known weights. The boards used for the experiment

Fig. 78.

Fig. 79.

were ˆ in. thick, 19 in. deep, and from I to 50 ft. in length, cutwater included. A lead keel counteracted the buoyancy of the board. The boards were covered with various substances, such as paint, varnish, Hay's composition, tinfoil, &c, so as to try the effect of different degrees of roughness of surface. The results obtained by Froude may be summarized as follows : —

1. The friction per square foot of surface varies very greatly for different surfaces, being generally greater as the sensible roughness of the surface is greater. Thus, when the surface of the board was covered as mentioned below, the resistance for boards 50 ft. long, at 10 ft. per second, was—

Tinfoil or varnish 0-25 fb per sq. ft.

Calico 0-47 ,, ,,

Fine sand 0-405 ,, ,,

Coarser sand 0-488 ,, ,,

2. The power of the velocity to which the friction is proportional varies for different surfaces. Thus, with short boards 2 ft. long,

For tinfoil the resistance varied as v 2,16 .

For other surfaces the resistance varied as v i,ta . With boards 50 ft. long,

For varnish or tinfoil the resistance varied as t 4 ” 83 . For sand the resistance varied as t> 2 ‘ ra .

3. The average resistance per square foot of surface was much greater for short than for long boards; or, what is the same thing; the resistance per square foot at the forward part of the board was greater than the friction per square foot of portions more sternward. Thus,

Mean Resistance in lb per sq . ft. Varnished surface . . 2 ft. long 0-41

50 „ 0-25

Fine sand surface . . 2 ,, o-8l

50 ,, 0-405

This remarkable result is explained thus by Froude : ” The portion of surface that goes first in the line of motion, in experiencing resistance from the water, must in turn communicate motion to the water, in the direction in which it is itself travelling. Consequently

the portion of surface which succeeds the first will be rubbing, not against stationary water, but against water partially moving in its owrl direction, and cannot therefore experience so much resistance from it.”

§ 69. The following table gives a general statement of Froude's results. In all the experiments in this table, the boards had a fine cutwater and a fine stern end or run, so that the resistance was entirely due to the surface. The table gives the resistances per square foot in pounds, at the standard speed of 600 feet per minute, and the power of the speed to which the friction is proportional, so that the resistance at other speeds is easily calculated.

Length of Surface, or Distance from Cutwater, in feet.

2 ft.

8 ft.

20 ft.

50 ft.

A

B

C

A

B

C

A

B

C

A

B

C

Varnish

Paraffin 1 Tinfoil I Calico ! Fine sand

Medium sand

Coarse sand .

2-00

2-l6

i-93

2-O0

2-00 2-00

•41 •38 •30 •87 •81 •90

I-IO

•390 •37° •295

725

•690

•730 •880

1-85 1-94 1-99 1-92

2-00 2-00 2-00

•325 •3H •278 ■626 •583 •625 ■714

•264 •260 •263 •504 ■450 •488 •520

1-85 1-93 1-90 1-89

2-00 2-00 2-00

•278

•271 •262

•S3i •480

•534 •588

•240 •237 •244 •447 •3”84 •465 •490

1-83

1 -83 1-87

2-06 2-00

•250

•246 •474 •405

•488

•226

•232 •423 •337 •456

Columns A give the power of the speed to which the resistance is approximately proportional.

Columns B give the mean resistance per square foot of the whole surface of a board of the lengths stated in the table.

Columns C give the resistance in pounds of a square foot of surface at the distance sternward from the cutwater stated in the heading.

Although these experiments do not directly deal with surfaces of greater length than 50 ft., they indicate what would be the resistances of longer surfaces. For at 50 ft. the decrease of resistance for an increase of length is so small that it will make no very great difference in the estimate of the friction whether we suppose it to continue to diminish at the same rate or not to diminish at all. For a varnished surface the friction at 10 ft. per second diminishes from 0-41 to 0-32 ft per square foot when the length is increased from 2 to 8 ft., but it only diminishes from 0-278 to 0-250 lb per square foot for an increase from 20 ft. to 50 ft.

If the decrease of friction sternwards is due to the generation of a current accompanying the moving plane, there is not at first sight any reason why the decrease should not be greater than that shown by the experiments. The current accompanying the board might be assumed to gain in volume and velocity sternwards, till the velocity was nearly the same as that of the moving plane and the friction per square foot nearly zero. That this does not happen appears to be due to the mixing up of the current with the still water surrounding it. Part of the water in contact with the board at any point, and receiv- ing energy of motion from it, passes afterwards to distant regions of still water, and portions of still water are fed in towards the board to take its place. In the forward part of the board more kinetic energy is given to the

current than is diffused into surrounding space, and the current gains in velocity. At a greater distance back there is an approximate balance between the energy communicated to the water and that diffused. The velocity of the current accompanying the board becomes constant or nearly constant, and the friction per square foot is therefore nearly constant also.

§ 70. Friction of Rotating Disks. — A rotating disk is virtually a surface of unlimited extent and it is convenient for experiments on friction with different surfaces at different speeds. Experiments carried out by Professor W. C. LTnwin {Proc. Inst. Civ. Eng. lxxx.) are useful both as illustrating the laws of fluid friction and as giving data for calculating the resistance of the disks of turbines and centrifugal pumps. Disks of 10, 15 and 20 in. diameter fixed on a vertical shaft were rotated by a belt driven by an engine. They were enclosed in a cistern of water between parallel top and bottom fixed surfaces. The cistern was suspended by three fine wires. The friction of the disk is equal to the tendency of the cistern to rotate, and this was measured by balancing the cistern by a fine silk cord passing over a pulley and carrying a scale pan in which weights could be placed.

If w is an element of area on the disk moving with the velocity v, the friction on this element is fun", where / and n arc constant for any given kind of surface. Let a be the angular velocity of rotation, K the radius of the disk. Consider a ring of the surface between rand r+dr. Its area is 2ivrdr, its velocity ar and the friction of this ring is f2irrdra"r n . The moment of the friction about the axis of rotation is 2ira"fr" + -dr, and the total moment of friction for the two sides of the disk is

M = ˆIjfrˆdr = |4*-a»/(» +3) !/R n+3 – If N is the number of revolutions per sec,

M = 52"«7r»+ 1 N"/(n+3)!/R»« l and the work expended in rotating the disk is

Ma = !2″ +3 7r" +2 N" +1 /(«+3)!/R" +3 foot lb per sec. The experiments give directly the values of M for the disks corre-

sponding to any speed N. From these the values of/ and n can be deduced, / being the friction per square foot at unit velocity. For comparison with Froude's results it is convenient to calculate the resistance at 10 ft. per second, which is F=/io".

The disks were rotated in chambers 22 in. diameter and 3, 6 and 12

in. deep. In all cases the friction of the disks increased a little as the chamber was made larger. This is probably due to the stilling of the eddies against the surface of the chamber and the feeding back of the stilled water to the disk. Hence the friction depends not only on the surface of the disk but to some extent on the surface of the chamber in which it rotates. If the surface of the chamber is made rougher by covering with coarse sand there is also an increase of resistance.

For the smoother surfaces the friction varied as the 1 -85th power of the velocity. For the rougher surfaces the power of the velocity to which the resistance was proportional varied from 1-9 to 2-1. This is in agreement with Froude's results.

Experiments with a bright brass disk showed that the friction decreased with increase of temperature. The diminution between 41 and 130° F. amounted to 18%. In the general equation M =cN" for any given disk,

Ct=o-i328(i — 0-002I(), where c t is the value of c for a bright brass disk 0-85 ft- i n diameter at a temperature t° F. The disks used were either polished or made rougher by varnish or by varnish and sand. The following table gives a comparison of the results obtained with the disks and Froude's results on planks 50 ft. long. The values given are the resistances per square foot at 10 ft. per sec.

Froude's Experiments. Tinfoil surface . . 0-232

Varnish 0-226

Fine sand .... 0-337 Medium sand . . 0-456

Disk Experiments. Bright brass . 0-202 to 0-229 Varnish . . 0-220 to 0-233 Fine sand °"339

Very coarse sand 0-587 to 0-715

'-dl

VIII. STEADY FLOW OF WATER IN PIPES OF UNIFORM SECTION.

§ 71. The ordinary theory of the flow of water in pipes, on which all practical formulae are based, assumes that the variation of velocity at different points of any cross section may be neglected. The water is considered as moving in plane layers, which are driven through the pipe against the frictional resistance, by the difference of pressure at or elevation of the ends of the pipe. If the motion is steady the

velocity at each cross section remains the same from moment to moment, and if the cross sectional area is constant the velocity at all sections must be the same. Hence the motion is uniform. The most important resistance to the motion of the water is the surface friction of the pipe, and it is convenient to estimate this independently of some smaller resistances which will be ac- counted for presently.

In any portion of a uniform pipe, excluding for the present the ends of the pipe, the water enters and leaves at the same velocity. For that portion there- fore the work of the external forces and of the surface friction must be equal. Let fig. 80 represent a very short portion of the pipe, of length dl, be- tween cross sections at 2 and z--dz ft. above any horizontal datum line xx, the pressures at

the cross Sections being -~ A ^" V

p and p + dp lb per '

square foot. Further, p g

let Q be the volume of

flow or discharge of the pipe per second, it the area of a norma!

cross section, and x the perimeter of the pipe. The Q cubic feet,

which flow through the space considered per second, weigh GQ lb,

and fall through a height — dz ft. The work done by gravity is then

GQ\~dp) = —dp lb per square foot of the cross section. The work of this pressure on the volume Q is

-Qdp. The only remaining force doing work on the system is the friction against the surface of the pipe. The area of that surface is % dl.

The work expended in overcoming the frictional resistance per second is (see § 66, eq. 3)

-ZGxdlv'l2g, or, since Q — Qv,

-rG(x/n)Q(* ! /2, ?)tf7;

the negative sign being taken because the work is done against a resistance. Adding all these portions of work, and equating the result to zero, since the motion is uniform, —

-GQdz-Qdp-t;G(xln)Q(vV2g)dl = o. Dividing by GQ,

dz + dp/G + UxM(v-/2g)dl = o. Integrating,

z + pi'G + r(x/Q) 2 /2g)/ = constant. (i)

§ 72. Let A and B (fig. 81) be any two sections of the pipe for which p, z, / have the values pi, z lt h, and pi, z 2 , h, respectively. Then

zi + PJG + f (x/Q) (vV2g)h = Z2 + P2/G + f (x/o) (» 2 /2g)4 ;

or, if h—h = L, rearranging the terms,

r^/2g = (i/L)((z 1 + pi/G)-(z 2 + ^/G)}n/ x . (2)

Suppose pressure columns introduced at A and B. The water will rise in those columns to the heights pi/G and pzjG due to the

Fig. 81.

pressures pi and p-i at A and B. Hence (zi + pi/G) — (z 2 + p 2 /G) is the quantity represented in the figure by DE, the fall of level of the pressure columns, or virtual fall of the pipe. If there were no friction in the pipe, then by Bernoulli's equation there would be no fall of level of the pressure columns, the velocity being the same at A and B. Hence DE or h is the head lost in friction in the distance AB. The quantity DE/AB = /t/L is termed the virtual slope of the pipe or virtual fall per foot of length. It is sometimes termed very conveniently the relative fall. It will be denoted by the symbol i.

The quantity fi/x which appears in many hydraulic equations is called the hydraulic mean radius of the pipe. It will be denoted by m.

Introducing these values,

f v-hg = mh/L = mi. For pipes of circular section, and diameter d, m = il/x = {ird 2 /ird = \d.

Then or

Wl2g = \dhlL = \di; fc = r(4L/W/2g);

(3)

(4)

(4a)

which shows that the head lost in friction is proportional to the head due to the velocity, and is found by multiplying that head by the coefficient 4fL/d. It is assumed above that the atmospheric pressure at C and D is the same, and this is usually nearly the case. But if C and D are at greatly different levels the excess of baro- metric pressure at C, in feet of water, must be added to pi/G.

§ 73. Hydraulic Gradient or Line of Virtual Slope. — Jo'n CD. Since the head lost in friction is proportional to L, any intermediate pressure column between A and B will have its free surface on the line CD, and the vertical distance between CD and the pipe at any point measures the pressure, exclusive of atmospheric pressure, in the pipe at that point. If the pipe were laid along the line CD instead of AB, the water would flow at the same velocity by gravity without any change of pressure from section to section. Hence CD is termed the virtual slope or hydraulic gradient of the pipe . It is the line of free surface level for each point of the pipe.

If an ordinary pipe, connecting reservoirs open to the air, rises at any joint above the line of virtual slope, the pressure at that point is less than the atmospheric pressure transmitted through the pipe. At such a point there is a liability that air may be disengaged from the water, and the flow stopped or impeded by the accumulation of air. If the pipe rises more than 34 ft. above the line of virtual slope, the pressure is negative. But as this is impossible, the continuity of the flow will be broken.

If the pipe is not straight, the line of virtual slope becomes a curved line, but since in actual pipes the vertical alterations of level are generally small, compared with the length of the pipe, distances measured along the pipe are sensibly proportional to distances

measured along the horizontal projection of the pipe. Hence the line of hydraulic gradient may be taken to be a straight line without error of practical importance. *

§ 74. Case of a Uniform Pipe connecting two Reservoirs, when all the Resistances are taken into account. — Let h (fig. 82) be the difference of level of the reservoirs, and v the velocity, in a pipe of length L and diameter d. The whole work done per second is virtually the removal

of Q cub. ft. of water from the surface of the upper reservoir to the surface of the lower reservoir, that is GQh foot- pounds. This is expended in three ways. (1) The head iˆ/2g, corre- sponding to an expenditure of GQi» 2 /2g foot-pounds of work, is employed in giving energy of motion to the water. This is ulti-

(i + £}_fl .‘■

J-

-*! > !*_

(5)

Fig. 82.

mately wasted in eddying motions in the lower reservoir. (2) A portion of head, which experience shows may be expressed in the form foi’ 2 /2g, corresponding to an expenditure of GQ£aP/2g foot-pounds of work, is employed in overcoming the resistance at the entrance to the pipe. (3) As already shown the head expended in overcoming the surface friction of the pipe is f (4L/tf”) (» 2 /2g) correspond- ing to GQf(4L/J)(» 2 / 2 g) foot-pounds of work. Hence

GQA = GQˆ/2g + GQfoˆ/2g + GQr.4L.» 2 /rf.2g;

ˆ = (i + fo + f.4L,«y/2g. ?

tr = 8-025V[Ad/{(i + fo)d + 4fL)]. J

If the pipe is bellmouthed, f is about = -08. If the entrance to the pipe is cylindrical, £0 = 0-505. Hence i + f = i-o8 to 1-505. In general this is so small compared with f4L/d that, for practical calculations, it may be neglected; that is, the losses of head other than the loss in surface friction are left out of the reckoning. It is only in short pipes and at high velocities that it is necessary to take account of the first two terms in the bracket, as well as the third. For instance, in pipes for the supply of turbines, v is usually limited to 2 ft. per second, and the pipe is bellmouthed. Then I- o8v 2 /2g = 0-067 ft. In pipes for towns’ supply v may range from 2 to 4J ft. per second, and then i-5» 2 /2g = o-i to 0-5 ft. In either case this amount of head is small compared with the whole virtual fall in the cases which most commonly occur.

When d and v or d and h are given, the equations above are solved quite simply. When v and h are given and d is required, it is better to proceed by approximation. Find an approximate value of d by

assuming a probable value for f as mentioned below. Then from that value of d find a corrected value for f and repeat the calculation.

The equation above may be put in the form

A = (4f/d)[((i+foW4f}+L]^/2g; (6)

from which it is clear that the head expended at the mouthpiece is equivalent to that of a length

(i+r)d/4f

of the pipe. Putting l+? = 1-505 and f = o-oi, the length of pipe equivalent to the mouthpiece is 37-6 d nearly. This may be added to the actual length of the pipe to allow for mouthpiece resistance in approximate calculations.

§ 75. Coefficient of Friction for Pipes discharging Water. — From the average of a large number of experiments, the value of f for ordinary iron pipes is

$- = 0-007567. (7)

But practical experience shows that no single value can be taken applicable to very different cases. The earlier hydraulicians occupied themselves chiefly with the dependence of f on the velocity. Having regard to the difference of the law of resistance at very low and at ordinary velocities, they assumed that f might be expressed in the form

f = a-|-0/t'. The following are the best numerical values obtained for f so ex- pressed : —

a

.

R. de Prony (from 51 experiments)

J. F. d'Aubuisson de Voisins

J. A. Eytelwein

0-006836

0-00673

0-005493

o-ooin6

0-001211

0-00143

Weisbach proposed the formula

4f = a+ff/tl v = 0-003598 +0-004289/-ˆ v.

(8)

STEADY FLOW IN PIPES]

HYDRAULICS

61

§ 76. Darcy's Experiments on Friction in Pipes. — All previous experiments on the resistance of pipes were superseded by the remarkable researches carried out by H. P. G. Darcy (1803-185&), the Inspector-General of the Paris water works. His experiments were carried out on a scale, under a variation of conditions, and with a degree of accuracy which leaves little to be desired, and the results obtained are of very great practical importance. These results may be stated thus : —

1. For new and clean pipes the friction varies considerably with the nature and polish of the surface of the pipe. For clean cast iron it is about 1 J times as great as for cast iron covered with pitch.

2. The nature of the surface has less influence when the pipes are old and incrusted with deposits, due to the action of the water. Thus old and incrusted pipes give twice as great a frictional resist- ance as new and clean pipes. Darcy's coefficients were chiefly determined from experiments on new pipes. He doubles these co- efficients for old and incrusted pipes, in accordance with the results of a very limited number of experiments on pipes containing incrus- tations and deposits.

3. The coefficient of friction may be expressed in the form f = a + 0/ v; but in pipes which have been some time in use it is sufficiently accurate to take f = oi simply, where ai depends on the diameter of the pipe alone, but a and on the other hand depend both on the

diameter of the pipe and the nature of its surface. The following are the values of the constants.

For pipes which have been some time in use, neglecting the term depending on the velocity ;

f = o(l+/9/d). (9)

For drawn wrought-iron or smooth cast- iron pipes

For pipes altered by light incrustations

•004973 •00996

•084 •084

These coefficients may be put in the following very simple form, without sensibly altering their value : —

For clean pipes f = ‘005(1 + i/l2d)

For slightly incrusted pipes . f =-oi(i + i/l2(J)

(9a)

Darcy’s Value of the Coefficient of Friction than 4 in. per second.

f for Velocities not less

Diameter

of Pipe

in Inches.

f

Diameter

of Pipe in Inches.

r

New Pipes.

Incrusted Pipes.

New Pipes.

Incrusted Pipes.

2 3 4 5 6

7 8

9 12

15

0-00750

•00667 ■00625 ■00600 ■00583 •00571 •00563 ■00556 ■00542 •O0533

0-01500

•01333 •01250 •01200 •01 167 •01 143 •01 125

•OIIII

•01083 •01067

18 21 24 27 30 36 42 48

54

•00528 •00524 •00521 •00519 •00517 •00514 •00512 •00510 •00509

•01056 •01048 •01042 •01037 •01033 •01028 •01024 •0102 1 •01019

even selected experiments the values of the empirical coefficient f range from 0-16 to 0-0028 in different cases. Hence means of dis- criminating the probable value of f are necessary in using the equa- tions for practical purposes. To a certain extent the knowledge that f decreases with the size of the pipe and increases very much with the roughness of its surface is a guide, and Darcy's method of deal- ing with these causes of variation is very helpful. But a further difficulty arises from the discordance of the results of different ex- periments. For instance F. P. Stearns and J. M. Gale both experi- mented on clean asphalted cast-iron pipes, 4 ft. in diameter. Ac- cording to one set of gaugings f =-0051, and according to the other f = -0031. It is impossible in such cases not to suspect some error in the observations or some difference in the condition of the pipes not noticed by the observers.

It is not likely that any formula can be found which will give exactly

the discharge of any given pipe. For one of the chief factors in any such formula must express the exact roughness of the pipe surface, and there is no scientific measure of roughness. The most that can be done is to limit the choice of the coefficient for a pipe within certain comparatively narrow limits. The experiments on fluid friction show that the power of the velocity to which the resistance is proportional is not exactly the square. Also in deter- mining the form of his equation for f Darcy used only eight out of his seventeen series of experiments, and there is reason to think that some of these were exceptional. Barre de Saint-Venant was the first to propose a formula with two constants, dh\al = mV”,

where m and n are experimental constants. If this is written in the form

log m-j-n log w = log (dh/41),

we have, as Saint-Venant pointed out, the equation to a straight line, of which m is the ordinate at the origin and n the ratio of the slope. If a series of experimental values are plotted logarithmically the determination of the constants is reduced to finding the straight line which most nearly passes through the plotted points. Saint- Venant found for n the value of 1-71. In a memoir on the influence of temperature on the movement of water in pipes (Berlin, 1854) by G. H. L. Hagen (1797-1884) another modification of the Saint-Venant formula was given. This is h/l = mv n /d’, which involves three ex- perimental coefficients. Hagen found » = i-75; x = i-25; and m was then nearly independent of variations of v and d. But the range of cases examined was small. In a remarkable paper in the Trans. Roy. Soc, 1883, Professor Osborne Reynolds made much clearer the change from regular stream line motion at low velocities to the eddying motion, which occurs in almost all the cases with which the engineer has to deal. Partly by reasoning, partly by induction from the form of logarithmically plotted curves of experimental results, he arrived at the general equation hll = c{v n ld 3 “)V n , where n — \ for low velocities and n — 1-7 to 2 for ordinary velocities. P is a function of the temperature. Neglecting variations of tempera- ture Reynold’s formula is identical with Hagen’s if x = 3~». For practical purposes Hagen’s form is the more convenient.

Values of Index of Velocity.

These values of f are, however, not exact for widely differing velocities. To embrace all cases Darcy proposed the expression

f = (a+a 1 /d) + (^+A/(i 2)/f;

(10)

which is a modification of Coulomb's, including terms expressing the influence of the diameter and of the velocity. For clean pipes Darcy found these values

a = -004346

ai = -0003992

(3 =-0010182

ft = -000005205.

It has become not uncommon to calculate the discharge of pipes by the formula of E. Ganguillet and W. R. Kutter, which will be discussed under the head of channels. For the value of c in the relation v = cV {mi), Ganguillet and Kutter take

4i-6 + i-8ii/n + -oo28i/t

c_ l+ [(4i-6-r—0O28i/i)(«/V»w)]

where n is a coefficient depending only on the roughness of the pipe. For pipes uncoated as ordinarily laid » = o-oi3. The formula is very cumbrous, its form is not rationally justifiable and it is not at all clear that it gives more accurate values of the discharge than simpler formulae.

§ 77. Later Investigations on Flow in Pipes. — The foregoing statement gives the theory of flow in pipes so far as it can be put in a simple rational form. But the conditions of flow are really more complicated than can be expressed in any rational form. Taking

Surface of Pipe.

Authority.

Tin plate

Wrought iron (gas Pipe)

Lead ....

Clean brass

Asphalted

Riveted wrought iron

Wrought iron (gas Pipe)

New cast iron

Cleaned cast iron

Incrusted cast iron

Bossut . Hamilton Smith

Darcy .

Mair . . . Hamilton Smith Lampe . W. W. Bonn Stearns .

Hamilton Smith

Darcy

Darcy

Darcy

Darcy

I | ■ — .; -B IT

.fell ,-‘^ . + * ■ –

s’ ‘■”*

•4 i* f ,, ■ *s S …r,

± .J^c^^g: *.

4 – - ■ ■■ ■ >• – v**~‘iy**’ r>V s* ■

~1 ^^‘f^’C 1 y^ xPs J?

j – pr” J ‘ ^^ s\° > j X

—L J^.—^^^k,^

— — ^’ wOV \rf-T J 1 ^

^’ 4I$»L^l_ /”

it ^^^Jgfe^^te”

‘ ” ^” ^^qj^:

^ Sfc d <

^^%^^ iga?

^ _^ < ^L^ l

•5 ft^” „-^^ -^

,? 6 > { V 8 j£ < • . _ . _ _ : _

■a. •*[= V^o«l … ….. . ,

— — -^^§\iv ■

•3 –

-2

.1.1 , . _ _

1 _J

29 io 1 -2 -3 4 -5 6 -7 -8 -9 00 .1 .2 -3 4 < 5 -6 -7 -8 -9

Fig. 83.

In 1886, Professor \V. C. Unwin plotted logarithmically all the most trustworthy experiments on flow in pipes then available. 1 Fig. 83 gives one such plotting. The results of measuring the slopes of the lines drawn through the plotted points are given in the table.

It will be seen that the values of the index n range from 1-72 for the smoothest and cleanest surface, to 2-00 for the roughest. The numbers after the brackets are rounded off numbers.

The value of n having been thus determined, values of mid” were next

found and averaged for each pipe. These were again plotted logarithmically in order to find a value for x. The lines were not very regular, but in all cases the slope was greater than I to I, so that the value of x must be greater than unity. The following table gives the results and a comparison of the value of x and Reynolds's value 3-H.

Kind of Pipe.

n

3-»

■

X

Tin plate ….

1-72

1-28

I-IOO

Wrought iron (Smith).

i-75

1-25

I-2I0

Asphalted pipes

1-85

115

1-127

i Wrought iron (Darcv) .

1 -87

i-i3

l-68o

Riveted wrought iron .

1-87

I-I3

1-390

Xew cast iron .

i-95

1-05

1-168

Cleaned cast iron

2-00

l-OO

1-168

ilncrusted cast iron

2-00

I'OO

1 160

Here, considering the great range of diameters and velocities in the experiments, the constancy of m is very satisfactorily close. The asphalted pipes give lather variable values. But, as some of these were new and some old, the variation is, perhaps, not surprising. The incrusted pipes give a value of m quite double that for new pipes but that is perfectly consistent with what is known of fluid friction in other cases.

With the exception of the anomalous values for Darcy's wrought- iron pipes, there is no great discrepancy between the values of x and 3-ra, but there is no appearance of relation in the two quantities. For the present it appears preferable to assume that x is independent of n.

It is now possible to obtain values of the third constant m, using the values found for n and x. The following table gives the results, the

values of m being for metric measures.

Kind of Pipe.

1 ” Formulae for the Flow of Water in Pipes,” Industries (Man- chester, 1886).

Tin plate Wrought iron

Asphalted pipes

Riveted

wrought iron

New cast iron

Cleaned cast iron

Incrusted cast iron

Diameter

in Metres.

Value of

•01697”!

•01676/

•01302 1

■01319J

•01749

•02058

•02107

•01650

•01317

•02107

•01370-1

•01440

•01390 y •01368 ■01 448 J

•01725] •01427 1 •01734 •01745J ■01979 •02091 f- •01913J •03693 1 •03530 y •03706 j

Mean Value of m.

Authority.

•01686 •01310

•01831 •

•01403

•01658

■01994

03643

Bossut

Hamilton Smith

Hamilton Smith W. W. Bonn W. W. Bonn Lampe Stearns Gale

Hamilton Smith

Darcy

Darcy Darcy

STEADY FLOW IN PIPES]

HYDRAULICS

63

General Mean Values of Constants. The general formula (Hagen's) — hjl = mv n /d".2g — can therefore be taken to fit the results with convenient closeness, if the following mean values of the coefficients are taken, the unit being a metre : —

Kind of Pipe.

m

X

n

Tin plate ….

•0169

I-IO

1-72

Wrought iron

•0131

I-2I

i-75

Asphalted iron .

•0183

I-I27

1-85

Riveted wrought iron .

•0140

I -390

1-87

New cast iron

•0166

I- 168

1-95

Cleaned cast iron

•0199

1-168

2-0

Incrusted cast iron

•0364

1-160

2-0

The variation of each of these coefficients is within a comparatively narrow range, and the selection of the proper coefficient for any given case presents no difficulty, if the character of the surface of the pipe is known.

It only remains to give the values of these coefficients when the quantities are expressed in English feet. For English measures the following are the values of the coefficients : —

Kind of Pipe.

m

X

• !

Tin plate ….

•0265

I-IO

1-72

Wrought iron

•0226

I-2I

i-75

Asphalted iron .

•0254

1-127

1-85

Riveted wrought iron .

■0260

I -390

1-87

New cast iron .

•0215

1-168

i-95

Cleaned cast iron

•0243

I- 168

2-0

Incrusted cast iron

•0440

i- 160

2-0

§ 78. Distribution of Velocity in the Cross Section of a Pipe. — Darcy made experiments with a Pitot tube in 1850 on the velocity at different points in the cross section of a pipe. He deduced the relation

V — » = ll‘3(/3/R)V*\ where V is the velocity at the centre and v the velocity at radius r in a pipe of radius R with a hydraulic gradient i. Later Bazin repeated the experiments and extended them (Mem. de V Acadimie des Sciences, xxxii. No. 6). The most important result was the ratio of mean to central velocity. Let b = Ri/U 2 , where U is the mean velocity in the pipe; then V/U = 1 +9-03V6. A very useful

result for practical purposes is that at 0-74 of the radius of the pipe the velocity is equal to the mean velocity. Fig. 84 gives the velocities at different radii as determined by Bazin.

§ 79. Influence of Temperature on the Flow through Pipes. — Very careful experiments on the flow through a pipe 0-1236 ft. in diameter

This shows a marked decrease of resistance as the temperature rises. If Professor Osborne Reynolds's equation is assumed h — niLV n /d i ~", and n is taken 1-795, then values of m at each temperature are practically constant —

Temp. F. m. Temp. F. m.

57 0-000276 100 0-000244

70 0-000263 no 0-000235

80 0-000257 120 0-000229

90 0-000250 130 0-000225

160 0-000206

where again a regular decrease of the coefficient occurs as the temperature rises. In experiments on the friction of disks at different temperatures Professor W. C. Unwin found th-at the re- sistance was proportional to constant X (i-o-oo2i<) and the values of m given above are expressed almost exactly by the relation m =0-00031 1 (1-0-00215 /). In tank experiments on ship models for small ordinary variations of temperature, it is usual to allow a decrease of 3 % of resistance for io° F. increase of temperature.

§ 80. Influence of Deposits in Pipes on the Discharge. Scraping Water Mains. — The influence of the condition of the surface of a pipe on the friction is shown by various facts known to the engineers of waterworks. Jn pipes which convey certain kinds of water, oxidation proceeds rapidly and the discharge is considerably diminished. A main laid at Torquay in 1858, 14 m. in length, consists of 10-in., 9-in. and 8-in. pipes. It was not protected from corrosion by any coating. But it was found to the surprise of the engineer that in eight years the discharge had diminished to 51 % of the original discharge. J. G. Appold suggested an apparatus for scraping the interior of the pipe, and this was constructed and used under the direction of William Froude (see " Incrustation of Iron Pipes," by W. Ingham, Proc. Inst. Mech. Eng., 1899). it was found that by scraping the interior of the

pipe the discharge was increased 56%. The scraping requires to be repeated at intervals. After each scraping the dis- charge diminishes rather rapidly to 10% and afterwards more slowly, the diminution in a year being about 25 %.

Fig. 85 shows a scraper for water mains, similar to Appold's but modified in details, as constructed by the Glenfield Company, at Kilmarnock. A is a longitudinal section of the pipe, showing the scraper in place; B is an end view of the plungers, and C, D sections of the boxes placed at intervals on the main for introducing or with- drawing the scraper. The apparatus consists of two plungers, packed with leather so as to fit the main pretty closely. On the spindle of these plungers are fixed eight steel scraping blades, with curved scraping edges fitting the surface of the main. The apparatus is placed in the main by removing the cover from one of the boxes shown at C, D. The cover is then replaced, water pressure is ad- mitted behind the plungers, and the apparatus driven through the

Fig. 84.

and 25 ft. long, with water at different temperatures, have been made by J. G. Mair (Proc. Inst. Civ. Eng. lxxxiv.). The loss of head was measured from a point 1 ft. from the inlet, so that the loss at entry was eliminated. The 15 in. pipe was made smooth inside and to gauge, by drawing a mandril through it. Plotting the results logarithmically, it was found that the resistance for all temperatures varied very exactly as » 1795 , the index being less than 2 as in other experiments with very smooth surfaces. Taking the ordinary equation of flow /j = f(4L/D)(» 2 /2g), then for heads varying from 1 ft. to nearly 4 ft., and velocities in the pipe varying from 4 ft. to 9 ft. per second, the values of f were as follows: —

Temp. F.

f

Temp. F.

f

57

•0044 to -0052

100

•0039 to -0042

70

•0042 to -0045

no

•0037 to -0041

80

•0041 to -0045

120

■0037 to -0041

90

•0040 to -0045

130

•0035 to -0039

160

•003-5 to -0038

Fig. 85. Scale ˆ 5 .

main. At Lancaster after twice scraping the discharge was increased 56!, at Oswestry 545. The increased discharge is due to the diminution of the friction of the pipe by removing the roughnesses due to oxidation. The scraper can be easily followed when the mains are about 3 ft. deep by the noise it makes. The average speed of the scraper at Torquay is 2\ rri. per hour. At Torquay 49 % of the deposit is iron rust, the rest being silica, lime and organic matter.

In the opinion of some engineers it is inadvisable to use the scraper. The incrustation is only temporarily removed, and if the use of the scraper is continued the life of the pipe is reduced. The only treatment effective in preventing or retarding the incrustation due to corrosion is to coat the pipes when hot with a smooth and perfect layer of pitch. With certain waters such as those derived from the chalk the incrustation is of a different character, consisting of nearly pure

calcium carbonate. A deposit of another character which has led to trouble in some mains is a black slime containing a good deal of iron not derived from the pipes. It appears to be an

organic growth. Filtration of the water appears to prevent the growth of the slime, and its temporary removal may be effected by a kind of brush scraper devised by G. F. Deacon (see ” Deposits in Pipes,” by Professor J. C. Campbell Brown, Eroc. Inst. Civ. Eng.,

1 903- 1 904).

§ 81. Flow of Water through Fire Hose. — The hose pipes used for fire purposes are of very varied character, and the roughness of the surface varies. Very careful experiments have been made by J. R. Freeman' (Am. Soc. Civ. Eng. xxi., 1889). It was noted that under pressure the diameter of the hose increased sufficiently to have a marked influence on the discharge. In reducing the results the true diameter has been taken. Let v = mean velocity in ft. per sec; r = hydraulic mean radius or one-fourth the diameter in feet; »' = hydraulic gradient. Then i> = »V (ri).

Diameter

Gallons (United

Inches.

States) per min.

1

V

n

Solid rubber

\

2-65

215

•1863

12-50

i23'3

hose

,,

344

■4714

20-00

124-0

Woven cotton,

\

2-47

200

•2464

13-40

119-1

rubber lined

,,

299

•5269

2O-00

I2I-5

Woven cotton,

{

2-49

200

•2427

13-20

117-7

rubber lined

,,

319

•5708

21 -OO

122- 1

Knit cotton,

(

2-68

132

•0809

7-50

III-6

rubber lined

(

,,

299

•3931

I7-00

II4-8

Knit cotton,

(

2-69

204

•2357

11-50

100- 1

! rubber lined

(

”

319

•5165

18-00

105-8

Woven cotton ,

t

2-12

154

•3448

1.4-00

“3-4

rubber lined

(

240

•7673

2I-8I

n8-4

Woven cotton,

\

2-53

54-8

•0261

3-50

94-3

rubber lined

298

•8264

19-00

91-0

Unlined linen

{

2-60

57-9

•0414

3-50

73-9

hose

”

33i

1-1624

20-00

79-6

§ 82. Reduction of a Long Pipe of Varying Diameter to an Equivalent Pipe of Uniform Diameter. Dupuit’s Equation. — Water mains for the supply of towns often consist of a series of lengths, the diameter being the same for each length, but differing from length to length. In approximate calculations of the head lost in such mains, it is generally accurate enough to neglect the smaller losses of head and to have

regard to the pipe friction only, and then the calcula- tions may be facilitated by reducing the main to a main of uniform diameter, in which there would be the same loss of head. Such a uniform main will be termed an equivalent main.

— h-

-U

— 1$ –

1

“W

B

Fig. 86.

§ 83. Other Losses of Head in Pipes. — Most of the losses of head in pipes, other than that due to surface friction against the pipe, are due to abrupt changes in the velocity of the stream producing eddies. The kinetic energy of these is deducted from the general energy of translation, and practically wasted.

Sudden Enlargement of Section. — Suppose a pipe enlarges in section from an area too to an area «i (fig. 87); then II

fli/vo •= «o/ wi ; i^^HHˆMaJI

or, if the section is circular, »iM> = (do/‘di) 2 .

The head lost at the abrupt change

of velocity has already been wm shown to be the head due to the relative velocity of the two parts of the stream. Hence head lost

In fig. 86 let A be the main of variable diameter, and B the equiva- lent uniform main. In the given main of variable diameter A, let h, h… be the lengths, di, di… the diameters, »i, »2… the velocities, ii, ii… the slopes, for the successive portions, and let I, d, v and i be corresponding quantities for the equivalent uniform main B. The total loss of head in A due to friction is

h = i 1 l 1 --i 2 l 2 \ . . . = f W-4il2&di) + f W-<\kl2ga\) + ... and in the uniform main

il = ?(fl 2 – 4l/2gd). If the mains are equivalent, as defined above,

f(y-4//2g

\tt(Pv = jxii 2 f 1 = jfttj = . . . Vi = vd l jd? ; ! > 2 = vtPjcL? . . .

Also suppose that f may be treated as constant for all the pipes. Then

lid = (rfVdi 4) (hid,) + (dW) (hid*) + ... l=(d°jd l >)h + (d i /d 2 °)h+... which gives the length of the equivalent uniform main which would have the same total loss of head for any given discharge.

V.

Fig. 87.

h = (l'»-ViYl2g = (W"0 – I) V/2g = { (djdtf- Or fi e = £eVl*/2g,

if f,. is put for the expression in brackets.

■i}V/2g

(1)

ui/uo =

1.1

1.2

1-5

1-7

1.8

1-9

2.0

2-5

30

3-5

4-0

5-0

6.0

7.0

S.o

di/do =

1.05

1. 10

1.22

1.30

1-34

1.38

1.41

1.58

1-73

1.87

2.00

2.24

2.45

2.65

2.83

f. =

.01

.04

•25

•49

.64

.81

1. 00

2.25

4.00

6.2s

9.00

16.00

25-00

36.0

49-0

Abrupt Contraction of Section. — When water passes from a larger to a smaller section, as in figs. 88, 89, a contraction is formed, and the contracted stream abruptly expands to fill the section of the pipe.

Fig.

Fig.

Let &> be the section and v the velocity of the stream at bb. At aa the section will be c c a, and the velocity (io/ccu)v = v/ci, where c c is the coefficient of contraction. Then the head lost is

T)m = (vlc c -vy/2g=(i/c c -i)V/2g;

and, if c c is taken 0-64,

| m = o-3i6i- 2 /2g. (2)

The value of the coefficient of contraction for this case is, however, not well ascertained, and the result is somewhat modified by friction. For water entering a cylindrical, not bell-mouthed, pipe from a reservoir of indefinitely large size, experiment gives

§.. = 0-505 vy 2 g. (3)

If there is a diaphragm at the mouth of the pipe as in fig. 89, let wi be the area of this orifice. Then the area of the contracted stream is c C “>i, and the head lost is

h c = !(a)/CcWi)-llV/2g

= f^/2g (4)

if f, is put for { (w/c c o>i) — I) 2 . Weisbach has found experimentally the following values of the coefficient, when the stream approaching the orifice was considerably larger than the orifice : —

OJl/W =

0.1

0.2

0-3

0.4

0-5

0.6

0.7

0.8

0.9

1.0

C c =

.616

.614

.612

.610

.617

.605

.603

.601

■598

•596

f. =

231-7

5°-99

19.78

9.612

5-256

3-077

1.876

1 169

0-734

0.480

When a diaphragm was placed in a tube of uniform section (fig. 90)

JL

Fig. 90.

the following values were obtained, ui being the area of the orifice and w that of the pipe: —

t*)i/co =

O.I

0.2

0.3

O.A

OS

0.6

0.7

0.8

0.0

1.0

Ce =

.624

.632

.643

•659

.68:

.712

• 755

.813

.892

1 .00

*« =

225.9

47-77

30.83

7.801

1.753

1.796

• 797

.290

.060

.000

STEADY FLOW IN PIPES]

HYDRAULICS

65

Elbows. — Weisbach considers the loss of head at elbows (fig.91) to be due to a contraction formed by the stream. From experiments with a pipe 1 { in. diameter, he found the loss of head

fi« = f^/2g; (5)

fe =0-9457 sin 2 j0+2-o47 sin 4 \$.

=

20° O.O46

40°

0.130

60°

0.364

80°

0.740

90

O.984

I0O°

1.260

IIO°

1.556

120°

1. 861

I30° 2.IS8

I40

2.431

Hence at a right-angled elbow the whole head due to the velocity

very nearly is lost.

Bends. — Weisbach traces the loss of head at curved bends to a

similar cause to that at elbows, but the coeffi- cients for bends are not very satisfactorily ascer- tained. Weisbach ob- tained for the loss of head at a bend in a pipe of circular section

ˆ = fi,f 2 /2g; (6)

ft =0-131 +i-847(d/2p)S,

where d is the diameter

V of the pipe and p the

Fig. 91. radius of curvature of

the bend. The resistance

at bends is small and at present very ill determined.

Valves, Cocks and Sluices. — These produce a contraction of the water-stream, similar to that for an abrupt diminution of section already discussed. The loss of head may be taken as before to be

$» = f,»72g; (7)

where v is the velocity in the pipe beyond the valve and f„ a coefficient determined by experiment. The following are Weisbach's results.

Sluice in Pipe of Rectangular Section (fig. 92). Section at sluice =wi in pipe=co.

Fig. 92.

1 f –

1-0 0-00

0-9

•09

o-8 •39

0-7

•95

o-6

2-08

o-5

4-02

0-4

8-12

o-3

17-8

0-2

44-5

O-I

193

Sluice in Cylindrical Pipe (fig. 93).

Ratio of height oft

opening to diameter >

1.0

4

i

-

-

if

}

i

of pipe]

wi/co —

1. 00

0.948

.856

.740

.609

.466

■315

• 159

f. =

0.00

0.07

0.26

0.81

2.06

552

17.0

07.8

Fig. 93.

Fig. 94.

Cock in a Cylindrical Pipe (fig. 94). Angle through which cock is turned =0.

8 =

5°

10°

15°

20°

25°

30°

35°

Ratio of”j

cross :- sections J

•926

•850

•772

•692

■613

•535

•458

f > =

■05

•29

•75

1-56

3-10

5-47

9-68

8 =

Ratio of cross sections

f- =

40″

•385

17-3

45° •315

31-2

J 55

•250

526

•190 10G

60° •137

2”6

65° •091

486

82°

o

00

Throttle Valve in a Cylindrical Pipe (fig. 95)

”

=

-

10°

15°

20°

25°

30*

35°

40°

f» =

•24

•52

•90

i-54

2-51

3-91

6-22

io-8

=

r. =

45° i8- 7

5o°

32-6

55°

58-8

60 °

118

65°

256

70°

751

90°

00

M'fi’-l’«^

„i

§ 84. Practical Calculations on the Flow of Water in Pipes. — In the following explanations it will be assumed that the pipe is of so great a length that only the

loss of head in friction against ..-”

the surface of the pipe needs to be considered. In general it is one of the four quantities d, i, v or Q which requires to be determined. For since the loss of head h is given by the relation h = il, this need not be separately considered.

There are then three equa tions (see eq. 4, as arise : —

f = o(i + i/i2d); where 0 = 0-005 for new and = o-oi for incrusted pipes. f» 2 /2g = \di. Q = l-xdh).

w///,w/w/#. //

Y’f/?0/////tf///ttS//{//////M} t

Fig. 95. 72, and 9a, § 76) for the solution of such problems

(1)

(2) (3)

Problem 1. Given the diameter of the pipe and its virtual slope, to find the discharge and velocity of flow. Here d and i are given, and Q and v are required. Find f from (1) ; then v from (2) ; lastly Q from (3). This case presents no difficulty.

By combining equations (1) and (2), v is obtained directly: —

!> = V(g

For new pipes . . V (g/2a) =56-72

For incrusted pipes . =40-13

For pipes not less than 1, or more than 4 ft. in diameter, the mean values of f are

For new pipes 0-00526

For incrusted pipes 0-01052.

Using these values we get the very simple expressions —

i> = 55-3iV (di) for new pipes £ (4a)

= 39-1 1 V (di) for incrusted pipes 5 ‘ Within the limits stated, these are accurate enough for practical purposes, especially as the precise value of the coefficient \ cannot be known for each special case.

Problem 2. Given the diameter of a pipe and the velocity of flow, to find the virtual slope and discharge. The discharge is given by (3); the proper value of f by (1); and the virtual slope by (2). This also presents no special difficulty.

Problem 3. Given the diameter of the pipe and the discharge, to find the virtual slope and velocity. Find v from (3); f from (1); lastly i from (2). If we combine (1) and (2) we get

- = f(W2g) (4/d)=2a{i + i/i2dy/gd; (5)

and, taking the mean values of f for pipes from 1 to 4 ft. diameter, given above, the approximate formulae are

1 = 0-0003268 v 2 /d for new pipes \ (5a)

= 0-0006536 v*/d for incrusted pipes) ” Problem 4. Given the virtual slope and the velocity, to find the diameter of the pipe and the discharge. The diameter is obtained from equations (2) and (1), which give the quadratic expression d i — d(2av 2 jgi) — av 2 /6gi = o . .■.d = avygi+ij{(a v l ‘lgi) (a.vVgi+l/6)}. (6).

For practical purposes, the approximate equations

d = 2av i lgi + ili2 (6a)

= 0-00031 v 2 /i+-o83 for new pipes = 0-00062 ti 2 /i+-o83 for incrusted pipes are sufficiently accurate.

Problem 5. Given the virtual slope and the discharge, to find the diameter of the pipe and velocity of flow. This case, which often occurs in designing, is the one which is least easy of direct solution. From equations (2) and (3) we get—

<2 B = 32fQ7g*- 2 *'- (7)

If now the value of f in (1) is introduced, the equation becomes very cumbrous. Various approximate methods of meeting the difficulty may be used.

(a) Taking the mean values of f given above for pipes of 1 to 4 ft. diameter we get

= 0-22 16 V (Q 2 /i) for new pipes = 0-2541 V (Q 2 /*) for incrusted pipes;

equations which are interesting as showing that when the value of f is doubled the diameter of pipe for a given discharge is only in- creased by 13%.

(b) A second method is to obtain a rough value of d by assuming f = a. This value is

d’ = V (32QVgT’i) V a =06319 V (Q7»’)V a.

Then a very approximate value of f is

f' = o(l + i/i2d'); and a revised value of d, not sensibly differing from the exact value, is

d" = V (32Q 2 , g* 2 i) V f =0-6319 V (Q7»)V r'.

(c) Equation 7 may be put in the form

d = V (32aQ 2 /gxˆ)V (I +ljI2d). (9)

Expanding the term in brackets,

K l (i+ili2d)=i+i,'6od-ili8ood i ...

Xeglectingthetermsafterthesecond,

d = ˆ(32

= V (32a/g7r 2)V (Q 2 /*) +o-oi667;(9 o) and V(32a/g7r 2) =0-219 for new pipes

= 0-252 f or incrusted pipes.

§ 85. Arrangement of Water Mains i

/or Towns' Supply. — Town mains are J'-

usually supplied oy gravitation from a service reservoir, which in turn is

supplied by gravitation from a storage reservoir or by pumping from a lower level. The service reservoir should contain three days' supply or in important cases much more. Its elevation should be such that water is delivered at a pressure of at least about 100 ft. to the highest parts of the district. The greatest pressure in the mains is usually about 200 ft., the pressure for which ordinary pipes and fittings are designed. Hence if the district supplied has

if the average demand is 25 gallons per head per day, the mains should be calculated for 50 gallons per head per day.

§ 86. Determination of the Diameters of Different Parts of a Water Main. — When the plan of the arrangement of mains is determined upon, and the supply to each locality and the pressure required is ascertained, it remains to determine the diameters of the pipes. Let fig. 97 show an elevation of a main ABCD . . . , R being the reservoir from

which the supply is derived. Let NN be the datum line of the levelling operations, and H„, Hi… the heights of the main above the datum line, H r being the height of the water surface in the

Fig. 96.

great variations of level it must be divided into zones of higher and lower pressure. Fig. 96 shows a district of two zones each with its service reservoir and a range of pressure in the lower district from 100 to 200 ft. The total supply required is in England about 25 gallons per head per day. But in many towns, and especially in America, the supply is considerably greater, but also in many cases

‘*N ”

....hrrˆ?. ‘iˆ;Aˆ:.’::i:ˆ:::::r:f?.\7:i;.

Fig. 97.

a good deal of the supply is lost by leakage of the mains. The supply through the branch mains of a distributing system is calculated from the population supplied. But in determining the capacity of the mains the fluctuation of the demand must be allowed for. It is usual to take tfee saaximum demand at twice the average demand. Hence

reservoir from the same datum. Set up next heights AAl, BBi, . . . representing the minimum pressure height necessary for the adequate supply of each locality. Then A1B1OD1 … is a line which should form a lower limit to the line of virtual slope. Then if heights &<., t)b, fyc… are taken representing the actual losses of head in each length U, h, h— of the main, AoB Co will be the line of virtual slope, and it will be obvious at what points such as Do and E , the pressure is deficient, and a different choice of diameter of main is required. For any point z in the length of the main, we have < Pressure height = H r -H i -(B„+B f ,+ . . .6,). Where no other circumstance limits the loss of head to be assigned to a given length of main, a consideration of the safety of the main from fracture by hydraulic shock leads to a limitation of the velocity of flow. Generally the velocity in water mains lies between I J and 4! ft. per second. Occasionally the velocity in pipes reaches 10 ft. per second, and in hydraulic machinery working under enormous pressures even 20 ft. per second. Usually the velocity diminishes along the main as the discharge diminishes, so as to reduce somewhat the total loss of head which is liable to render the pressure insufficient at the end of the main.

J. T. Fanning gives the following velocities as suitable in pipes for

towns' supply : —

Diameter in inches . 4 8 12 18 24 30 36

Velocity in feet per sec. . 2-5 3-0 3-5 4-5 5-3 6-2 7-0

§ 87. Branched Pipe connecting Reservoirs at Different Levels. — Let A, B, C (fig. 98) be three reservoirs connected by the arrangement of pipes shown, — h, di, Qi, »i; h, d 2 , Q 2 , Vi\ h, d 3 , Q 3 , v 3 being the length, diameter, discharge and velocity in the three portions of the main pipe. Suppose the dimensions and positions of the pipes known and the discharges required.

If a pressure column is introduced at X, the water will rise to a height XR, measuring the pressure at X, and aR, R6, Re will be the lines of virtual slope. If the free surface level at R is above b, the

reservoir A supplies B and C, and if R is below b, A and B supply C. Consequently there are three cases : —

I. R above i;Qi=Q 2 +Q 3 . II. R level with b; Qi = Q 3 ; Q 2 =0 III. R below ftˆ+QˆQ,. To determine which case has to be dealt with in the given conditions, suppose the pipe from X to B closed by a sluice. Then there is a simple main, and the height of free surface ¥ at X can be determined. For this condition

h a -h' = f (i>i 2 /2g) (ˆlifdi)

= 32fQ' 2 />/g*- 2 d l 5 ; h'-h c = i{vˆl2g){4zld,)

=32fQ%fer 2 d3 5 ; where Q' is the common discharge of the two portions of the pipe. Hence

(/i„-/0/(/i'-W=W3 5 /Wi 5 ,

from which h' is easily obtained. If then V is greater than hb. opening the sluice between X and B will allow flow towards B, and the case in hand is case I. If h' is less than h b , opening the sluice will allow flow from B, and the case is case III. If h' = h b , the case is case II., and is already completely solved.

ar

COMPRESSIBLE FLUIDS IN PIPES]

HYDRAULICS

The true value of h must lie between V and lib- Choose a new value of h, and recalculate Qi, Q 2 , Q 3 . Then if

Qi > Qi + Qs in case I., or 0i + Q2 > Qa in case III.,

the value chosen for h is too small, and a new value must be chosen.

If

QiIII.,

the value of h is too great.

Since the limits between which h can vary are in practical cases not very distant, it is easy to approximate to values sufficiently accurate.

§ 88. Water Hammer. — If in a pipe through which water is flowing a sluice is suddenly closed so as to arrest the forward movement of the water, there is a rise of pressure which in some cases is serious enough to burst the pipe. This action is termed water hammer or water ram. The fluctuation of pressure is an oscillating one and gradually dies out. Care is usually taken that sluices should only be closed gradually and then the effect is inappreciable. Very careful experiments on water hammer were made by N. J. joukowsky at Moscow in 1898 (Stoss in Wasserleilungen, St Petersburg, 1900), and the results are generally confirmed by experiments made by E. B. Weston and R. C. Carpenter in America. Joukowsky used pipes, 2, 4 and 6 in. diameter, from 1000 to 2500 ft. in length. The sluice closed in 0-03 second, and the fluctuations of pressure were auto- matically registered. The maximum excess pressure due to water- hammer action was as follows : —

Pipe 4-in. diameter.

Pipe 6-in. diameter.

Velocity ft. per sec.

Excess Pressure, lb per sq. in.

Velocity ft. per sec.

Excess Pressure, lb per sq. in.

o-5

2-9

41

31 168 232 519

0-6 3-0 5-6

7-5

43 173 369 426

In some cases, in fixing the thickness of water mains, 100 lb per sq. in. excess pressure is allowed to cover the effect of water hammer. With the velocities usual in water mains, especially as no valves can be quite suddenly closed, this appears to be a reasonable allowance (see also Carpenter, Am. Soc. Mech. Eng., 1893).

IX. FLOW OF COMPRESSIBLE FLUIDS IN PIPES § 89. Flow of A ir in Long Pipes. — When air flows through a long pipe, by far the greater part of the work expended is used in over- coming frictional resistances due to the surface of the pipe. The work expended in friction generates heat, which for the most part must be developed in and given back to the air. Some heat may be transmitted through the sides of the pipe to surrounding materials, but in experiments hitherto made the amount so conducted away appears to be very small, and if no heat is transmitted the air in the tube must remain sensibly at the same temperature during expansion. In other words, the expansion may be regarded as isothermal expansion, the heat generated by friction exactly neutralizing the cooling due to the work done. Experiments on the pneumatic tubes used for the transmission of messages, by R. S. Culley and R. Sabine (Proc. Inst. Civ. Eng. xliii.), show that the change of temperature of the air flowing along the tube is much less than it would be in adia- batic expansion.

§ 90. Differential Equation of the Steady Motion of Air Flowing in a Long Pipe of Uniform Section. — When air expands at a constant absolute temperature r, the relation between the pressure p in pounds per square foot and the density or weight per cubic foot G is given by the equation

P!G = ct, (1)

where £ = 53-15. Taking 7 = 521, corresponding to a temperature of 60° Fahr.,

ct = 27690 foot-pounds. (2)

The equation of continuity, which expresses the condition that in steady motion the same weight of fluid, W, must pass through each

cross section of the stream in

BBBoHBBSBBBBBBBBEmB, the unit of time, is

1 i ; ; Gf2w = W = constant, (3)

where SI is the section of the pipe and u the velocity of the air. Combining (1) and

(3).

Slup/W =cr = constant. (3a)

Since the work done by

gravity on the air during its

flow through a pipe due to

A Q

A'o

■&i

Aj

Fig. 99.

time dt the mass of air between A0A1 comes to A'oA'i so that A A'o = udt and AiA'j = {u-\rdu)dti. Let il be the section, and m the hydraulic mean radius of the pipe, and W the weight of air flowing through the pipe per second.

From the steadiness of the motion the weight of air between the sections AoA'o, and AiA'i is the same. That is, \ 1 dt = GSludt = GQ(u+du)dt. By analogy with liquids the head lost in friction is, for the length dl (see § 72, eq. 3), £(u 2 /2g)(dl/m). Let H=« 2 /2g. Then the head lost is f(H/j»)a7; and, since Wd/ lb of air flow through the pipe in the time considered, ˆhe work expended in friction is — f(H/«)Wtf7 dt. The change of kinetic energy in dt seconds is the difference of the kinetic energy of AoA'o and AiA\, that is, (W/g)dt\

(u+du) 2 – w 2 !/2 = (W/g) u du dt = W'dHd t. The work of expansion when Qttdt cub. ft. of air at a pressure p expand to il(u-du)dt cub. ft. is Qpdudt. But from (3a) u = CT\V/ap, and therefore

duldpˆ-crVvjilpK And the work done by expansion is— (crW lp)dp dt.

The work done by gravity on the mass between Ao and Ai is zero if the pipe is horizontal, and may in other cases be neglected without great error. The work of the pressures at the sections A0A1 is pnudt— (p+dp)Q(u+du)dt = ~(pdu+udp)Odt But from (3a)

pu = constant, pdu+udp — o, and the work of the pressures is zero. Adding together the quantities of work, and equating them to the change of kinetic energy. WdUdt = – {cTVJIp)dpdt-ˆ{H/m)\dldt dH + (cr/p)dp + t;(Hlm)dl = o, dH/H + (crlHp)dp+ˆdl/m = o (4)

But v = CTWXtp,

and H=w 2 /2g = cV 2 W 2 /2,?Q 2 £ 2 ,

.'. dll/H + (2gil i p/crW 2)dp + t:dllm = o. (4a)

For tubes of uniform section m is constant ; for steady motion W is constant ; and for isothermal expansion 7- is constant. Integrating,

log H-f-gfi 2 £ 2 /W 2 cr+f//« = constant; (5)

for l = o, let H = H , and p = pt>;

and for / = /, let H = Hi, and p — pi.

log (Hi/Ho) + (gfiVWVr) (p? – pj) + Him = o. (5a)

where pa is the greater pressure and pi the less, and the flow is from Ao towards Ai.

By replacing W and H,

log(pt>/p 1) + (gcTi'uti i p

«o = V [{sCTW-pSMPoKil/m+logfalpO}]. When / is great, log palpi is comparatively small, and then

«o = V[(gcrw/f/){(-/. 1 »)/)], a very simple and easily used expression. For pipes section m=d/4, where d is the diameter: —

«o = V [(gCTdltflMPo'-pftlp**}] ; or approximately

Wo = (i ■ 1319 — 0-J264pi/po)' (gcrd/tfl).

§ 91. Coefficient of Friction for Air. — A discussion by Unwin of the experiments by Culley and Sabine on the rate of transmission of light carriers through pneumatic tubes, in which there is steady flow of air not sensibly affected by any resistances other than surface friction, furnished the value f =-007. The pipes were lead pipes, slightly moist, 2f in. (0-187 ft-) m diameter, and in lengths of 2000 to nearly 6000 ft.

In some experiments on the flow of air through cast-iron pipes A. Arson found the coefficient of friction to vary with the velocity and diameter of the pipe. Putting

r=«A'+/3, (8)

he obtained the following values —

variations of its level is generally small compared with the work done by changes of pressure, the former may in many cases be neglected.

Consider a short length dl of the pipe limited by sections Ao, Ai at a distance dl (fig. 99). Let p, u be the pressure and velocity at Ao, p+dp and u+du those at Ai. Further, suppose that in a very short

(6)

(7)

(7a) of circular

(7b)

(7f) Professor

Diameter of Pipe

P

f for 100 ft. j

in feet.

per second.

1-64

•00129

•00483

•00484

1-07

■00972

•00640

•00650

•83

•01525

•00704

•00719 .

■338

•03604

■00941

■00977

•266

•03790

■00959

•00997

•164

•04518

•01 167

•01212 J

It is worth while to try if these numbers can be expressed in the form proposed by Darcy for water. For a velocity of 100 ft. per second, and without much enor for higher velocities, these numbers agree fairly with the formula

c = 0-005(1 +3/10J), (q)

which only differs from Darcy's value for water in that the second term, which is always small except for very small pipes, is larger.

Some later experiments on a very large scale, by E. Stockalper at the St Gotthard Tunnel, agree better with the value f = 0-0028(1 +3/ iod).

These pipes were probably less rough than Arson's.

When the variation of pressure is very small, it is no longer safe to neglect the variation of level of the pipe. For that case we may neglect the work done by expansion, and then

zo-2i-po/Go-£i/Gi-r(»V22) (JIm)=o, (10)

precisely equivalent to the equation for the flow of water, So and Zi being the elevations of the two ends of the pipe above any datum, ft and ft the pressures, Go and Gi the densities, and v the mean velocity in the pipe. This equation may be used for the flow of coal gas.

§ 92. Distribution of Pressure in a Pipe in which Air is Flowing. — From equation (7a) it results that the pressure p, at / ft. from that end of the pipe where the pressure is po, is

p = ft V { 1 – iWlmgcr j ; (11)

which is of the form

p = TJ(al+b) for any given pipe with given end pressures. The curve of free sur- face level for the pipe is, therefore, a parabola with horizontal axis. Fig. 100 shows calculated curves of pressure for two of Sabine's experiments, in one of which the pressure was greater than atmo-

;1S75

2113-SFt.

4-2 27 Ft.

Fig. 100.

eaio-JtF*-

s*s*Ft,

spheric pressure, and in the other less than atmospheric pressure. The observed pressures are given in brackets and the calculated pressures without brackets. The pipe was the pneumatic tube be- tween Fenchurch Street and the Central Station, 2818 yds. in length. The pressures are given in inches of mercury.

Variation of Velocity in the Pipe. — Let pa, Uo be the pressure and velocity at a given section ot the pipe; p, u, the pressure and velocity at any other section. From equation (3a)

up = ci-WVn = constant ; so that, for any given uniform pipe,

Up=U($pt>,

u = u po!p; (12)

which gives the velocity at any section in terms of the pressure, which has already been determined. Fig. 101 gives the velocity

,_^---Hr*55*^^^-£

Vo*” 1 “^— — –

■ Pr*asur* — .

_- —yrvl ‘

— — — “jfe*”** —

_ — ~Y2* fl

?22′ a

1

T»*

1 1

1 1 1

I

21I.i-.SH.

+2 27 n.

634-oatt. 04-54

than to telegraph by electricity. The tubes are laid underground with easy curves; the messages are made into a roll and placed in a light felt carrier, the resistance of which in the tubes in Lor.don is only J oz. A current of air forced into the tube or drawn through it propels the carrier. In most systems the current of air is steady and continuous, and the carriers are introduced or removed without materially altering the flow of air.

Time of Transit through the Tube. — Putting t for the time of transit from o to /,

t= I dl/u,

1

From (40) neglecting rfH/H, and putting m=dja r% dl = gdSPpdpfciW'-cr.

From (1) and (3)

Fig. ioi.

curves for the two experiments of Culley and Sabine, for which the pressure curves have already been drawn. It will be seen that the velocity increases considerably towards that end of the pipe where the pressure is least.

§ 93. 'Weight of Air Flowing per Second. — The weight of air discharged per second is (equation 30) —

W = S2woft/ci-. From equation (76), for a pipe of circular section and diameter d, W = iH kdHpf-pVlrlcT),

= -6nVi<2 5 (A> 2 -£iWr|. (13)

Approximately

W = (6916ft -4438ft) (d b l^r)i. (13a)

§ 94. A pplication to the Case cf Pneumatic Tubes for the Transmission of Messages. — In Paris, Berlin, London, and other towns, it

has been found cheaper to transmit messages in pneumatic tubes

w = Wc-r/ft2; dlju =gda 3 p-dp/2ˆWVT- ;

/ =

(ˆgda 3 pHpl2tw s c 2 T\

= g

.-. t =gdcr(ft 3 -ft 3)/6rft 3 «o 3 ,

= firs(ftˆft 3)/6(gcrrf)i(ft 2 ft 2)? If r = 52i°, corresponding to 60° F.,

/ = -ooi4i2rˆ(ft 3 -ft 3)/iKft 2 -ft 2)5; which gives the time of transmission in terms of the initial and final pressures and the dimensions of the tube.

Mean Velocity of Transmission. — The mean velocity is Ijt; or, for t = 52i°,

2*mean=0-708V{ft 3)! (l6)

The following table gives some results :—

(14)

(15)

(15a)

Absolute Pressures in ft per sq. in.

Mean Velocities for Tubes of a length in feet.

po

ft

1000

2000

3000

4000

5000

Vacuum (. Working / .

Pressure 1 ‘ Working 1 ‘

15 15 20

25 30

5 10

15 15 15

99-4 67-2 57-2 74-6 84-7

70-3 47-5 40-5 52-7

6o-o

57-4 38-8 33-0

43-i

49..0

497

34-4 28-6

37-3 42-4

44-5 30-1 25-6 33-3 37-9

Limiting Velocity in the Pipe when the Pressure at one End is diminished indefinitely. — If in the last equation there be put ft = o, then

tt’ mean = o-7o8V WfO; where the velocity is independent of the pressure ft at the other end, a result which apparently must be absurd. Probably for long pipes, as for orifices, there is a limit to the ratio of the initial and terminal pressures for which the formula is applicable.

X. FLOW IN RIVERS AND CANALS

§ 95. Flow of Water in Open Canals and Rivers. — When water flows in a pipe the section at any point is determined by the form of the boundary. When it flows in an open channel with free upper surface,

the section depends on the velocity due to the dynamical conditions.

Suppose water admitted to an unfilled canal. The channel will gradually fill, the section and velocity at each point gradually changing. But if the inflow to the canal at its head is constant, the increase of cross section and diminution of velocity at each point attain after a time a limit. Thenceforward the section and velocity at each point are constant, and the motion is steady, or permanent regime is established.

If when the motion is steady the sections of the stream are all equal, the motion is uniform. By hypothesis, the inflow Qv is con- stant for all sections, andfl is constant; therefore v must be constant also from section to section. The case is then one of uniform steady motion. In most artificial channels the form of section is constant, and the bed has a uniform slope. In that case the motion is uniform, the depth is constant, and the stream surface is parallel to the bed. If when steady motion is established the sections are unequal, the motion is steady motion with varying velocity from section to section. Ordinary rivers are in this condition, especially where the flow is modified by weirs or obstructions. Short unobstructed lengths of a river may be treated as of uniform section without great error, the mean section in the length being put for the actual sections.

In all actual streams the different fluid filaments have different velocities, those near the surface and centre moving faster than those near the bottom and sides. The ordinary formulae for the flow of streams rest on a hypothesis that this variation of velocity may be neglected, and that all the filaments may be treated as having a common velocity equal to the mean velocity of the stream. On this hypothesis, a plane layer abab (fig. 102) between sections normal

to the direction of motion is treated as sliding down the channel to a’a’b’V without deformation. The component of the weight parallel to the channel bed balances the friction against the channel, and in estimating the friction the velocity of rubbing is taken to be the mean velocity of the stream. In actual streams, however, the velocity of rubbing on which the friction depends is not the mean

variation of the coefficient of friction with the velocity, proposed an

expression of the form

f = a(l+/3/D), (5)

and from 255 experiments obtained for the constants the values

a = 0-0O7409; (3 = 0-1920.

This gives the following values at different velocities: —

v =

o-3

0-01215

o-5

0-01025

0-7 0-00944

1

0-00883

0-00836

2

0-00812

3 0-90788

5 0-00769

7 0-00761

10 0-00755

15 0-00750

velocity of the stream, and is not in any simple relation with it, for

channels of different forms. The theory is therefore obviously based on an imperfect hypothesis. How- ever, by taking variable values for the coefficient of friction, the errors of the ordinary formulae are to a great extent neutralized, and they may be used without leading to

practical errors. Formulae have been obtained based on less restricted hypotheses, but at present they are not practically so reliable, and are more complicated than the formulae obtained in the manner described above.

§ 96. Steady Flow of Water with Uniform Velocity in Channels of Constant Section. — Let aa', bV (fig. 103) be two cross sections normal to the direction of motion at a distance dl. Since the mass aa'bb' moves uniformly, the external forces acting on it are in equilibrium. Let U be the area of the cross sections, x the wetted perimeter,

Fig. 102.

t W

Fig. 103.

pa-{-qr--rs, of a section. Then the quantity m = £l/x is termed the hydraulic mean depth of the section. Let v be the mean velocity of the stream, which is taken as the common velocity of all the particles, i, the slope or fall of the stream in feet, per foot, being the ratio bejab.

The external forces acting on aa'bb' parallel to the direction of motion are three: — (a) The pressures on aa' and bb', which are equal and opposite since the sections are equal and similar, and the mean pressures on each are the same, (b) The component of the weight \V of the mass in the direction of motion, acting at its centre of gravity g. The weight of the mass aa'bb' is GQdl, and the com- ponent of the weight in the direction of motion is GildlX the cosine of the angle between Wg and ab, that is, Gildl cos abc = GUdl bc/ab = GUidl. (c) There is the friction of the stream on the sides and bottom of the channel. This is proportional to the area x

f(v)/G = ai/x = mi. (1)

But it has been already shown (§ 66) that/(») = fGf 2 / 2 g,

.'. ff 2 /2g = mi. (2)

This may be put in the form

v = V(2g/f)V (mi) =cV ("»»'); (2a)

where c is a coefficient depending on the roughness and form of the

channel.

The coefficient of friction f varies greatly with the degree of roughness of the channel sides, and somewhat also with the velocity. It must also be made to depend on the absolute dimensions of the section, to eliminate the error of neglecting the variations of velocity in the cross section. A common mean value assumed for f is 0-00757. The range of values will be discussed presently.

It is often convenient to estimate the fall of the stream in feet per mile, instead of in feet per foot. If/ is the fall in feet per mile f

/ = 52801.

Putting this and the above value of f in (2a), we get the very simple and long-known approximate formula for the mean velocity of a stream —

v = \y{2tnf). _ (3)

The flow down the stream per second, or discharge of the stream, is Q = S2f = f2fV (mi). (4)

§ 97. Coefficient of Friction for O-ben Channels. — Various expressions have been proposed for cne coefficient of friction ior channels as .'„r pipes. Weisbach, giving attention chiefly to the

In using this value of f when v is not known, it is best to proceed by approximation.

§ 98. Darcy and Bazin's Expression for the Coefficient of Friction. — Darcy and Bazin's researches have shown that f varies very greatly for different degrees of roughness of the channel bed, and that it also varies with the dimensions of the channel. They give for f an empirical expression (similar to that for pipes) of the form

f = a(l+/8/w); (6)

where m is the hydraulic mean depth. For different kinds of channels they give the following values of the coefficient of friction : —

Kind of Channel.

a

I. Very smooth channels, sides of smooth

cement or planed timber

II. Smooth channels, sides of ashlar, brick- work, planks

III. Rough channels, sides of rubble masonry or

pitched w4th stone

IV. Very rough canals in earth

V. Torrential streams encumbered with detritus

0-00294

0-00373

0-00471 0-00549 0-00785

O-IO

0-23

0-82 4-10

5-74

The last values (Class V.) are not Darcy and Bazin's, but are taken from experiments by Ganguillet and Kutter on Swiss streams.

The following table very much facilitates the calculation of the mean velocity and discharge of channels, when Darcy and Bazin's value of the coefficient of friction is used. Taking the general formula for the mean velocity already given in equation (20) above,

v = cy[(mi), where c = V (2g/f), the following table gives values of c for channels of different degrees of roughness, and for such values of the hydraulic mean depths as are likely to occur in practical calculations : —

Values ofc in v = cV (mi), deduced from Darcy and Bazin's Values.

a u II

c « §1

%3

■S3

J3 r 2

si

2£

a

8 e

c tn

“a3 .

C-a

SE.3

3:5

usq

ug

j＝.S

“S-3- 13

3-5

m .

Cm

J3.9

■5 -3 -a

si

＞ rf O

＝ -3

rt ＞

■sl‘1

a a,

> C O

■3 m ni S3

•S-o n

3 —

2

>

$ a z

l.S-3 Aug

•25

125

95

57

26

i8-5

8-5

147

130

112

89

•5

135

no

72

36

25-6

9-0

147

130

112

90

7i

•75

139

lib

81

42

30-8

9-5

147

130

112

90

1-0

141

119

87

48

34-9

100

147

130

112

91

72

i-5

143

122

94

56

41-2

11

147

130

113

92

2-0

144

124

98

62

46-0

12

147

130

113

93

74

2-5

145

126

101

67

13

147

130

“3

94

3-0

H5

126

104

70

53

H

147

130

113

95

3-5

146

127

105

73

15

147

130

114

96

77

4-0

146

128

106

76

58

16

147

130

II4

97

4-5

146

128

107

78

17

147

130

114

97

5-0

146

128

108

80

62

18

147

130

II4

98

,V5

146

129

109

82

20

147

131

II4

98

80

6-0

147

129

no

«4

65

25

I48

131

“5

100

6-5

H7

129

no

«5

30

148

131

“5

102

8.3

7-0

147

129

no

8b

67

40

I48

I.3I

116

103

8.5

7-5

H7

129

in

87

5°

I48

I.3I

lib

104

86

8-0

147

130

in

88

69

00

I48

131

117

108

91

§ 99. Ganguillet and Kutter's Modified Darcy Formula. — Starting from the general expression v = cˆmi, Ganguillet and Kutter examined the variations of c for a wider variety of cases than those discussed by Darcy and Bazin. Darcy and Bazin's experiments were confined to channels of moderate section, and to a limited variation of slope. Ganguillet and Kutter brcugnt into the dis- cussion two very distinct and important additional series of results. The gaugings of the Mississippi by A. A. Humphreys and H. L. Abbot afford data of discharge for the case of a stream of exceotion- ally large section and

or very low slope, on tne otner nana, their own measurements of the flow in the regulated channels of some

Swiss torrents gave data for cases in which the inclination and roughness of the channels were exceptionally great. Darcy and Bazin's experiments alone were conclusive as to the dependence of the coefficient c on the dimensions of the channel and on its rough- ness of surface. Plotting values of c for channels of different in- clination appeared to indicate that it also depended on the slope of the stream. Taking the Mississippi data only, they found

£ = 256 for an inclination of 0-0034 per thousand, = 154 .. .. °-° 2 ....

so that for very low inclinations no constant value of c independent of the slope would furnish good values of the discharge. In small rivers, on the other hand, the values of c vary little with the slope. As regards the influence of roughness of the sides of the channel a different law holds. For very small channels differences of rough- ness have a great influence on the discharge, but for very large channels different degrees of roughness have but little influence, and for indefinitely large channels the influence of different degrees of roughness must be assumed to vanish. The coefficients given by Darcy and Bazin are different for each of the classes of channels of different roughness, even when the dimensions of the channel are infinite. But, as it is much more'probable that the influence of the nature of the sides diminishes indefinitely as the channel is larger, this must be regarded as a defect in their formula.

Comparing their own measurements in torrential streams in Switzerland with those of Darcy and Bazin, Ganguillet and Kutter found that the four classes of coefficients proposed by Darcy and Bazin were insufficient to cover all cases. Some of the Swiss streams gave results which showed that the roughness of the' bed was markedly greater than in any of the channels tried by the French engineers. It was necessary therefore in adopting the plan of arranging the different channels in classes of approximately similar roughness to increase the number of classes. Especially an additional class was required for channels obstructed by detritus.

To obtain a new expression for the coefficient in the formula z> = V

(2g/f)V {mi) =cV {mi), Ganguillet and Kutter proceeded in a purely empirical way. They found that an expression of the form

c = o/(i+(S/V»0 could be made to fit the experiments somewhat better than Darcy's expression. Inverting this, we get

l/c = l/a+/S/aV»», an equation to a straight line having i/Vwz for abscissa, i/c for ordinate, and inclined to the axis of abscissae at an angle the tangent of which is /3/o.

Plotting the experimental values of l/c and i/V m, the points so found indicated a curved rather than a straight line, so that /3 must depend on o. After much comparison the following form was arrived at —

c = (A+//»)/(i -f-A»/V m), where 11 is a coefficient depending only on the roughness o| the sides of the channel, and A and / are new coefficients, the value of which remains to be determined. From what has been already stated, the coefficient c depends on the inclination of the stream, decreasing as the slope i increases. Let A = a+p/i.

Then c = (a+l/n+p/i)/li + {a-{-p/i)n/ˆm.},

the form of the expression for c ultimately adopted by Ganguillet and Kutter.

For the constants a, /, p Ganguillet and Kutter obtain the values 23, 1 and 0-00155 for metrical measures, or 41-6, i-8n and 0-00281 for English feet. The coefficient of roughness n is found to vary from 0-008 to 0-050 for either metrical or English measures.

The most practically useful values of the coefficient of roughness n are given in the following table : —

Nature of Sides of Channel. Coefficient of

Roughness ».

Well-planed timber 0-009

Cement plaster o-oio

Plaster of cement with one-third sand .... o-oi I

Unplaned planks 0-012

Ashlar and brickwork 0-013

Canvas on frames 0-015

Rubble masonry 0-017

Canals in very firm gravel 0-020

Rivers and canals in perfect order, free from stones)

or weeds \

Rivers and canals in moderately good order, not / _

quite free from stones and weeds . . . . \ Rivers and canals in bad order, with weeds and , „ „

detritus _ \ °-°35

Torrential streams encumbered with detritus . . 0-050

Ganguillet and Kutter's formula is so cumbrous that it is difficult to use without the aid of tables.

Lowis D'A. Jackson published complete and extensive tables for facilitating the use of the Ganguillet and Kutter formula {Canal

and Culvert Tables, London, 1878). To lessen calculation he puts the formula in this form : —

M =n(4.i-6--0-0028i (i) • z> = (Vm/»)l(M + i-8ii)/(M+Vm))V (»*')• The following table gives a selection of values of M, taken from Jackson's tables: —

'•025

3-030

i —

Values of M for n —

O-OIO

0-012

0-015

0-017

0-020

0-025

OO3O

•0000 1

3-2260

3-8712

4-8390

5-4842

6-4520

8-0650

9-6780

•00002

I-82IO

2-1852

2-73I5

3-0957

3-6420

4-5525

5-4630

•00004

1-1185

1-3422

1-6777

1-9014

2-2370

2-7962

3-3555

•00006

0-8843

1-0612

1-3264

1-5033

1-7686

2-2107

2-6529

•00008

0-7672

0-9206

1-1508

1-3042

1-5344

1-9180

2-3016

•OOOIO

0-6970

0-8364

1 -0455

1 • 1 849

1-3940

1-7425

2-0910

•00025

0-5284

0-6341

0-7926

0-8983

1-0568

1-3210

1-5852

•00050

0-4722

0-5666

0-7083

0-8027

0-9444

1-1805

1-4166

•00075

0-4535

0-5442

0-6802

0-7709

0-9070

I-I337

1-3605

•OOIOO

0-4441

0-5329

o-666i

0-7550

0-8882

I-II02

1-3323

•00200

0-4300

0-5160

0-6450

0-7310

o-86oo

1-0750

1-2900

•00300

0-4254

0-5105

0-6381

0-7232

0-8508

I-0635

1-2762

A difficulty in the use of this formula is the selection of the co-efficient of roughness. The difficulty is one which no theory will overcome, because no absolute measure of the roughness of stream beds is possible. For channels lined with timber or masonry the difficulty is not so great. The constants in that case are few and sufficiently defined. But in the case of ordinary canals and rivers the case is different, the coefficients having a much greater range. For artificial canals in rammed earth or gravel n varies from o 0163 to 0-0301. For natural channels or rivers » varies from 0-020 to 0-035.

In Jackson's opinion even Kutter's numerous classes of channels seem inadequately graduated, and he proposes for artificial canals the following classification : —

I. Canals in very firm gravel, in perfect order w = o-02

II. Canals in earth, above the average in order ˆ = 0-0225 III. Canals in earth, in fair order .... n =0-025

■ IV. Canals in earth, below the average in order n = 0-0275

V. Canalsin earth, inratherbad order, partially)

overgrown with weeds and obstructed by > n = 0-03

detritus . . '

Ganguillet and Kutter's formula has been considerably used partly from its adoption in calculating tables for irrigation work in India. But it is an empirical formula of an unsatisfactory form. Some engineers apparently have assumed that because it is com- plicated it must be more accurate than simpler formulae. Com- parison with the results of gaugings shows that this is not the case. The term involving the slope was introduced to secure agreement with some early experiments on the Mississippi, and there is strong reason for doubting the accuracy of these results.

§ 100. Bazin's New Formula. — Bazin subsequently re-examined all the trustworthy gaugings of flow in channels and proposed a modification of the original Darcy formula which appears to be more

satisfactory than any hitherto suggested {iLtude d'une nouvelle formule, Paris, 1898). He points out that Darcy's original formula, which is of the form mi/v 2 = a-}-p/m, does not agree with experiments on channels as well as with experiments on pipes. It is an objection to it that if m increases indefinitely the limit towards which mi/v 2 tends is different for different values of the roughness. It would seem that if the dimensions of a canal are indefinitely increased the variation of resistance due to differing roughness should vanish. This objection is met if it is assumed that V {mijv 1) =a-f-/3/Vm, so that if a is a constant mi/v* tends to the limit a when m increases. A very careful discussion of the results of gaugings shows that they can be expressed more satisfactorily by this new formula than by Ganguillet and Kutter's. Putting the equation in the form $> l l2g = mi, f = 0-002594(1 +7/Vm), where y has the following values: — I. Very smooth sides, cement, planed plank, 7= 0-109

II. Smooth sides, planks, brickwork 0-290

III. Rubble masonry sides 0-833

IV. Sides of very smooth earth, or pitching . . 1-539 V. Canals in earth in ordinary condition . . . 2-353

VI. Canals in earth exceptionally rough . . . 3-168

§ 101. The Vertical Velocity Curve. — If at each point along a vertical representing the depth of a stream, the velocity at that point is plotted horizontally, the curve obtained is the vertical velocity curve and it has been shown by many observations that it approximates to a parabola with horizontal axis. The vertex of the parabola is at the level of the greatest velocity. Thus in fig. 104 OA is the vertical at which velocities are observed ; v is the sur face; v z the maximum and Vd the bottom velocity. B C D is the vertical velocity curve which corresponds with a parabola having its vertex at C. The mean velocity at the vertical is

Vm = \2V z +V d \ {dz/d) (»„ —Vd)].

The Horizontal Velocity Curve. — Similarly if at each point along a horizontal representing the width of the stream the velocities are

plotted, a curve is obtained called the horizontal velocity curve. In streams of symmetrical section this is a curve symmetrical about the centre line of the stream. The velocity varies little near the centre of the stream, but very rapidly near the banks. In un-

symmetrical sections the greatest velocity is at the point where the stream is deepest, and the general form of the horizontal velocity curve is roughly similar to the section of the stream.

§ 102. Curves or Contours of Equal Velocity. — If velocities are observed at a number of points at different widths and depths in a stream, it is possible to draw curves on the cross section through points at which the velocity is the same. These repre- sent contours of a solid, the volume of which is the discharge of the stream per second. Fig. 105 shows the vertical and horizontal velocity curves and the contours of equal velocity in a rectangular channel, from one of Bazin's gaugings.

§ 103. Experimental Observations on the Vertical Velocity Curve. — A preliminary difficulty arises in observing the velocity at a given point in a stream because the velocity rapidly varies, the motion not being strictly steady. If an average of several velocities at the same point is taken, or the average velocity for a sensible period of time, this average is found to be constant. It may be inferred that

Fig. 104.

.1 .-‘

“‘‘1′

Vertical Velocity [Curves

• i Horizontal Velocity Cuijves ; I

• 1 < i i , 1 1 '

►1

I Vertical Velocity I Curves

e f g h i j k Contours of Ecjual Velocity

Fig. 105.

though the velocity at a point fluctuates about a mean value, the fluctuations being due to eddying motions superposed on the general

motion of the stream, yet these fluctuations produce effects which disappear in the mean of a series of observations and, in calculating the volume of flow, may be disregarded.

In the next place it is found that in most of the best observations on the velocity in streams, the greatest velocity at any vertical is found not at the surface but at some distance below it. In various river gaugings the depth d z at the centre of the stream has been found to vary from o to o-ˆd.

§ 104. Influence of tlie Wind. — In the experiments on the Mississippi the vertical velocity curve in calm weather was found to agree fairly with a parabola, the greatest velocity being at iˆths of the depth of the stream from the surface. With a wind blowing down stream the surface velocity is increased, and the axis of the parabola approaches the surface. On the contrary, with a wind blowing up stream the surface velocity is diminished, and the axis of the para- bola is lowered, sometimes to half the depth of the stream. The American observers drew from their observations the conclusion that there was an energetic retarding action at the surface of a stream like that due to the bottom and sides. If there were such a retarding action the position of the filament of maximum velocity below the surface would be explained.

It is not difficult to understand that a wind acting on surface ripples or waves should accelerate or retard the surface motion of the stream, and the Mississippi results may be accepted so far as showing that the surface velocity of a stream is variable when the mean velocity of the stream is constant. Hence observations of surface velocity by floats or otherwise should only be made in very calm weather. But it is very difficult to suppose that, in still air, there is a resistance at the free surface of the stream at all analogous to that at the sides and bottom. Further, in very careful experi- ments, P. P. Boileau found the maximum velocity, though raised a little above its position for calm weather, still at a considerable distance below the surface, even when the wind was blowing down stream with a velocity greater than that of the stream, and when the action of the air must have been an accelerating and not a re- tarding action. A much more probable explanation of the diminution

of the velocity at and near the free surface is that portions of water, with a diminished velocity from retardation by the sides or bottom, are thrown off in eddying masses and mingle with the rest of the stream. These eddying masses modify the velocity in all parts of the stream, but have their greatest influence at the free surface. Reaching

the free surface they spread out and remain there, mingling with the water at that level and diminishing the velocity which would otherwise be found there.

Influence of the Wind on the Depth at which the Maximum Velocity is found. — In the gaugings of the Mississippi the vertical velocity curve was found to agree well with a parabola having a horizontal axis at some distance below the water surface, the ordinate of the parabola at the axis being the maximum velocity of the section. During the gaugings the force of the wind was registered on a scale ranging from o for a calm to 10 for a hurricane. Arranging the velocity curves in three sets — (1) with the wind blowing up stream, (2) with the wind blowing down stream, (3) calm or wind blowing across stream — it was found that an up-stream wind lowered, and a down-stream wind raised, the axis of the parabolic velocity curve. In calm weather the axis was at jˆths of the total depth from the surface for all conditions of the stream.

Let h' be the depth of the axis of the parabola, m the hydraulic mean depth, / the number expressing the force of the wind, which may range from + 10 to — 10, positive if the wind is up stream, negative if it is down stream. Then Humphreys and Abbot find their results agree with the expression

h'/m = 0-3 1 7 ± 0-06/. Fig. 106 shows the parabolic velocity curves according to the American observers for calm weather, and for an up- or down-stream wind of a force represented by 4.

Fig. 106.

It is impossible at present to give a theoretical rule for the vertical velocity curve, but in very many gaugings it has been found that a parabola with horizontal axis fits the observed results fairly well. The mean velocity on any vertical in a stream varies from 0-85 to 0-0,2 of the surface velocity at that vertical, and on the average if v is the surface and Vm the mean velocity at a vertical v m = %v , a result useful in float gauging. On any vertical there is a point at which the velocity is equal to the mean velocity, and if this point were known it would be useful in gauging. Humphreys and Abbot in the Mississippi found the mean velocity at o-66 of the depth ; G. H. L. Hagen and H. Heinemann at 0-56 to 0-58 of the depth. The mean of observations by various observers gave the mean velocity at from 0-587 to 0-62 of the depth, the average of all being almost exactly 0-6 of the depth. The mid-depth velocity is therefore nearly equal to, but a little greater than, the mean velocity on a vertical. If Vmd is the mid-depth

velocity, then on the average v m = o-g8v md .

§ 105. Mean Velocity on a Vertical from Two Velocity Observations. — A. J. C. Cunningham, in gaugings on the Ganges canal, found the following useful results. Let v be the surface, v m the mean, and v x d the velocity at the depth xd ; then

am = iOo+3»2/3<;)

= h(v.m d +v. 7 M d). § 106. Ratio of Mean to Greatest Surface Velocity, for the whole Cross Section in Trapezoidal Channels. — It is often very important to be able to deduce the mean velocity, and thence the discharge, from observation of the greatest surface velocity. The simplest method of gauging small streams and channels is to observe the greatest surface velocity by floats, and thence to deduce the mean velocity. In general in streams of fairly regular section the mean velocity for the whole section varies from 0-7 ‘to 0-85 of the greatest surface velocity. For channels not widely differing from those experimented on by Bazin, the expression obtained by him for the ratio of surface to mean velocity may be relied on as at least a good approximation to the truth. Let v be the greatest surface velocity, v m the mean velocity of the stream. Then, according to Bazin,

v m = v — 25-4 V {mi). But v m = cˆJ (mi),

where c is a coefficient, the values of which have been already given in the table in § 98. Hence

»m = tW(c+25-4).

Values of Coefficient cl{c--2§-$) in the Formula v m =cv /(c+2ˆ-ˆ)

Hydraulic Mean Depth

Very

Smooth

Rough

Very Rough

Channels

Smooth

Channels.

Channels.

Channels.

encumbered

Channels.

Ashlar or

Rubble

Canals in

with

Cement.

Brickwork.

Masonry.

Earth.

Detritus.

0-25

•83

•79

•69

■51

•42

o-5

•84

•81

•74

•58

•50

o-75

■84

•82

•76

•63

•55

1-0

•85

•77

•65

■58

2-0

•83

•79

•71

■64

3-0

■80

•73

•67

4-o

•81

•75

•70

5-o

•76

•71

6o

•8 4

•77

•72

7-o

•78

•73

8-o

9-o

•82

•74

10-0

15-0

•79

•75

20-0

•80

•76

300

•82

•77

40-0

500

00

•79

general mass of water must flow outwards to take its place. Fig. 107 shows the directions of flow as observed in a small artificial stream, by means of light seeds and specks of aniline dye. The lines CC show the directions of flow immediately in contact with the sides and bottom. The dotted line AB shows the direction of motion of floating particles on the surface of the stream.

§ 108. Discharge of a River when flowing at different Depths. — When frequent observations must be made on the flow of a river or canal, the depth of which varies at different times, it is very convenient to have to observe the depth only. A formula can be established giving the flow in terms of the depth. Let Q be the discharge in cubic feet per second ; H the depth of the river in some straight and uniform part. Then Q = aH + &H 2 , where the constants a and b must be found by preliminary gaugings in different con- ditions of the river. M. C. Moquerey found for part of the upper Saone, Q = 64-71! +8-2H 2 in metric measures, or Q = 696H+26-8H 2 in English measures.

§ 109. Forms of Section of Channels. — The simplest form of section for channels is the semicircular or nearly semicircular channel (fig. log), a form now often adopted from the facility with which it can be

§ 107. River Bends. — In rivers flowing in alluvial plains, the wind- ings which already exist tend to increase in curvature by the scouring away of material from the outer bank and the deposition of detritus along the inner bank. The sinuosities sometimes increase till a loop is formed with only a narrow strip of land between the two encroaching branches of the river. Finally a ” cut off ” may occur, a waterway being opened through the strip of land and the loop

left separated from the iCWMillim^^ stream, forming a horse-

“*”’”’”’”■ shoe shaped lagoon or

marsh. Professor James Thomson pointed out (Proc. Roy. Soc, 1877, p. 356; Proc. Inst, of Mech. Eng., 1879, p. 456) that the usual supposition is that the water jy tending to go forwards in a straight line rushes against the outer bank and scours it, at the same time creating de- posits at the inner bank. That view is very far from a complete account of the matter, and Pro- fessor Thomson gave a p much more ingenious

‘ ‘ account of the action at

the bend, which he completely confirmed by experiment.

When water moves round a circular curve under the action of gravity only, it takes a motion like that in a free vortex. Its velocity is greater parallel to the axis of the stream at the inner than at the outer side of the bend. Hence the scouring at the outer side and the deposit at the inner side of the bend are not due to mere difference of velocity of flow in the general direction of the stream; but, in virtue of the centrifugal force, the water passing round the bend presses outwards, and the free surface in a radial cross section has a slope from the inner side upwards to the outer side (fig. 108). For the greater part of the water flowing in curved paths, this difference of pressure produces no tendency to transverse motion.

But the water im- Inner Bank

Outer Bank

mediately in contact with the rough bot- tom and sides of the channel is retarded, and its centrifugal force is insufficient to balance the pressure due to the greater depth at the outside of the bend. It there- fore flows inwards towards the inner side of the bend, carrying with it detritus which is deposited at the inner bank. Con- jointly with this flow inwards along the bottom and sides, the

Section at M N. Fig. 108.

Fig. 109.

executed in concrete. It has the advantage that the rubbing surface is less in proportion to the area than in any other form.

Wooden channels or flumes, of which there are examples on a large scale in America, are rectangular in section, and the same form is adopted for wrought and cast-iron aqueducts. Channels built with brickwork or masonry may be also rectangular, but they are often trapezoidal, and are always so if the sides are pitched with masonry laid dry. In a trapezoidal channel, let b (fig. no)

l^. .

% = 2£

vFwj-rzEr-

“^

1 =

: :3£E^f^y

—

J i

^■5^vjYjQS2

nanrrmfei

YrTflPj:£-‘pr~C

Concrete Fig. no.

be the bottom breadth, 6 the top breadth, d the depth, and let the slope of the sides be n horizontal to 1 vertical. Then the area of section is fl = {b+nd)d — (b — nd)d, and the wetted perimeter X = b+2d V(» ! + l).

When a channel is simply excavated in earth it is always originally trapezoidal, though it becomes more or less rounded in course of time. The slope of the sides then depends on the stability of the earth, a slope of 2 to 1 being the one most commonly adopted.

Figs, in, 112 show the form of canals excavated in earth, the former being the section of a navigation canal and the latter the section of an irrigation canal.

§110. Channels of Circular Section. — The following short table facilitates calculations of the discharge with different depths of water

in the channel. Let r be the radius of the channel section; then for a depth of water = «r, the hydraulic mean radius is /xr and the area of section of the waterway vr 2 , where k, m. and v have* the following values : —

Depth of water in) _ terms of radius . .) ~

.01

•OS

.10

■IS

.20

■25

■30

■3S

.40

•45

•SO

•S5

.60

• 65

.70

•75

.80

•85

.90

■95

1.0

Hydraulic mean depth) _ in termsof radius . S

.00668

.0321

■0523

.0963

.1278

■ 1574

■ I8S2

.2142

.242

.269

■ 293

.320

■343

■ 365

.387

.408

.429

■ 449

.466

.484

■ Soo

Waterway in terms of (v _ square of radius . .)

.00189

.0211

•0598

.1067

.i6si

.228

.294

•370

■450

■S3 2

.614

.709

■795

.885

■979

I-C75

I-I75

1.276

I-37I

1.470

1. 571

AND CANALS]

HYDRAULICS

73

§ in. Egg-Shaped Channels or Sewers. — In sewers for discharging | could be found satisfying the foregoing conditions. To render

storm water and house drainage the volume of flow is extremely variable ; and there is a great liability for deposits to be left when the flow is small, which are not removed during the short periods when the flow is large. The sewer in consequence becomes choked.

a given discharge Oco y/ x, amount of excavation will the least wetted perimeter.

In Bank

In Cutti

Fig. i ii. — Scale 20 ft. = 1 in.

Fig. 112. — Scale 80 ft. = 1 in.

To obtain uniform scouring action, the velocity of flow should be constant or nearly so ; a complete uniformity of velocity cannot be obtained with any form of section suitable for sewers, but an approximation to uniform velocity {s obtained by making the sewers of oval section. Various forms of oval have been suggested, the

simplest being one in which the radius of the crown is double the radius of the invert, and the greatest width is two- thirds the height. The section of such a sewer I is shown in fig. 113, the numbers marked on the figure being proportional numbers.

§ 112. Problems on Channels in which the Flow is Steady and at Uniform Velocity. — The general equations given in §§ 96, 98 are

f = a(i+/S/m); (1) fi;2/2g =mi; (2)

Fig- “3- Q = Qp. (3)

Problem I. — Given the transverse section of stream and dis- charge, to find the slope. From the dimensions of the section find it and m; from (1) find f, from (3) find v, and lastly from (2) find i.

Problem II. — Given the transverse section and slope, to find the discharge. Find v from (2), then Q from (3).

Problem III. — Given the discharge and slope, and either the breadth, depth, or general form of the section of the channel, to determine its remaining dimensions. This must generally be solved by approximations. A breadth or depth or both are chosen, and the discharge calculated. If this is greater than the given discharge, the

dimensions are reduced and the discharge recalculated.

Since m lies generally between the limits m = d and m = \d, where j d is the depth of the stream, and since, moreover, the velocity varies as V (m) so that an error in the value of m leads only to a much less error in the value of the velocity calculated from it, we may proceed thus. Assume a value for m, and calculate v from it. Let i'i be this first approximation to v. Then Q/i'i is a first approxi- mation to SI, say fii. With this value of design the section of the channel ; calculate a second value for m ; calculate from it a second

ˆ_ value of v, and from that a

7 i\ " ~ ' i 7 second value for Q. Repeat

the process till the succes- sive values of m approxi- mately coincide.

§ 113. Problem IV. Most

Economical Form of Channel

p for given Side Slopes. — Sup-

4- pose the channel is to be

trapezoidal in section (fig. 114), and that the sides are to have a

given slope. Let the longitudinal slope of the stream be given,

and also the mean velocity. An infinite number of channels

the problem determinate, let it be remembered that, since for

other things being the same, the

be least for that channel which has

Let d be the depth and b the bottom

width of the channel, and let the

sides slope n horizontal to I vertical

(fig. 114), then

tt = (b+nd)d; X-=i+2dV(re 2 + i). Both fi and x are to be minima. Differentiating, and equating to zero.

(db/dd+n)d+b+nd = o, <26/

eliminating db/dd,

\n — 2V {ri l --i))d--b--nd=o; b = 2 {V (» 2 + i) — n)d. But

a/ x = (b+nd)d/{b+2dˆ (n 2 + l)]. Inserting the value of b, fi/x = | 2rfV (n 2 + iy-nd}l

UW(n* + i)-2nd] = hd.

That is, with given side slopes,

the section is least for a given

discharge when the hydraulic mean

depth is half the actual depth.

A simple construction gives the form of the channel which fulfils shown that when m = id the sides

this condition, for of the channel water line. Since therefore

it can be are tangential

to a semicircle drawn on the

(I)

n=hxd.

Let ABCD be the channel (fig. 115) ; from E the centre of AD drop

perpendiculars EF, EG, EH on the sides.

Let

AB=CD=o; BC = Z>; EF = EH=c; and EG=d. fi = area AEB+BEC +CED,

= ac--\od. X = 2a+b.

Putting these values in (1),

ac--\bd={a J r\b)d; and hence c = d.

E

7D

IB.

Fig. 115. That is, EF, EG, EH are all equal, hence a semicircle struck

io the depth of the stream will pass

a

—&....

from E with radius equal through F and H and be tangential to the sides of the channel.

To draw the channel, describe a semicircle on

a' horizontal line with ,

radius = depth of channel. k- b

The bottom will be a Fig. 116.

horizontal tangent of that semicircle, and the sides slopes.

The above result may be obtained thus (fig. 116) :-

tangents drawn at the required side

x — b-{-2djs\n p.

U = d(b+d cot p); il/d = b+d cot P; i2ld? = b/d+cotp.

From (1) and (2),

X = fi/

■d cot |8+2rf/sin p.

or or

From (3) and (4),

dx/dd = Q/d 2 +cot |8-2/sin/3 = o, il/d? = 2 cosec. P — cot p. d = V(fl sin 0/(2 -cos 0)).

(1)

(2) (3)

(4)

6/i = 2(l-cos/3)/sin p-2 tan \p.

Proportions of Channels of Maximum Discharge for given Area and Side Slopes. Depth of channel = d\ Hydraulic mean depth = id; Area of section = S2.

Inclination

Ratio of Side

Area of

Bottom

Top width ~ twice length

Horizon.

Slopes.

Section a.

Width.

of each Side Slope.

Semicircle .

1-571*

O

2d

Semi-hexagon ,

60 ° 0′

3 -5

1-732*

i-i55 < *

2-310(2

Semi-square

90 ° 0′

: 1

2*

2d

2(2

75° 58′

1 :4

I-8I2*

1 562*2

2-062(2

63° 26′

1 : 2

1-736*

1-236(2

2-236(2

53° 8′

3 :4

1-750*

d

2-50O(2

45° 0′

1 : 1

1-828*

0-828 < 2

2-828(2

38° 40′

li : 1

1 -952*

0-702*2

3-202(2

33° 42′

ii : 1

2- 106*

o-6o6 < 2

3-6o6 < 2

29° 44′

if :i

2-282*

o-532

4-032(2

26° 34′

2 : 1

2-472*

0-472(2

4-472(2

23° 58

2\: 1

2-674*

0-424(2

4-924*2

21° 48′

2j :i

2-885*

0-385(2

5-385d

I 9 ° 58′

2f : 1

3-104*

o-354 < *

5-854ˆ

18 26′

3 : 1

3-325* | o-325 < 2

6-325*2

velocity and slope _are greatest. If in a stream of tolerably uniform slope an obstruction such as a weir is built, that will cause an altera- tion of flow similar to that of an alteration of the slope of the bed for a greater or less distance above the weir, and the originally uni- form cross section of the stream will become a varied one. In such cases it is often of much practical importance to determine the longitudinal

section of the stream.

The cases now considered will be those in which the changes of velocity and cross section are gradual and not abrupt, and in which the only internal work which needs to be taken into account is that due to the friction of the stream bed, as in cases of uniform motion. Further, the motion will be supposed to be steady, the mean velocity ateach given cross section remaining constant, though it varies from section to section along the course of the stream.

Let fig. 118 represent a longitudinal section of the stream, A0A1 being the water surface, ,BoBi the stream bed. Let A0B0, A1B1 be

Half the top width is the length of each side slope. The wetted perimeter is the sum of the top and bottom widths

§ 1 1 4. Form of Cross Section of Channel in which the Mean Velocity is Constant with Varying Discharge. — In designing waste channels from canals, and in some other cases, it is desirable that the mean velocity should be restricted within narrow limits with very different volumes of discharge. In channels of trapezoidal form the velocity increases and diminishes with the discharge. Hence when the discharge is large there is danger of erosion, and when it is small of silting or obstruction by weeds. A theoretical form of section for which the mean velocity would be constant can be found, and, although this is not very suitable for practical purposes, it can be more or less approximated to in actual channels.

Let fig. 117 represent the cross section of the channel. From the symmetry of the section, only half the channel need be considered.

Scale id Inch = 1 Foot- Fig. 117.

Let obac be any section suitable for the minimum flow, and let it be required to find the curve beg for the upper part of the channel so that the mean velocity shall be constant. Take o as origin of coordinates, and let de, fg be two levels of the water above ob. Let ob = b(2 ; de = y, fg = y+dy, od = x, of=x+dx; eg = ds. The condition to be satisfied is that ii = cV {mi) should be constant, whether the water-level is at ob, de, or fg. Con- sequently

m = constant = k for all three sections, and can be found from the section 060c. Hence also

Increment of section ydx , Increment of perimeter – ds ~ y*dx> = k 2 ds 1 =:kHdx'-+dy*) and dx = kdyH {f-h?). Integrating,

x-k \oge\y-- V(y” — fe 1))+constant ; and, since y = b, ! 2 when x = o,

.r = felog,[iy+V(y a -fc 2)}/U&+va

The figure has been drawn for a channel the minimum section of which is a half hexagon of 4 ft. depth. Hence k = 2; 6 = 9-2; the rapid flattening of the side slopes is remarkable.

Steady Motion of Water in Open Channels of Varying Cross Section and Slope

§ 1 15. In every stream the discharge of which is constant, or may be regarded as constant for the time considered, the velocity at different places depends on the slope of the bed. Except at certain exceptional points the velocity will be greater as the slope of the bed is greater, and, as the velocity and cross section of the stream vary inversely, the section of the stream will be least where the

Fig. 118.

cross sections normal to the direction of flow. Suppose the mass of water A0B0A1B1 comes in a short time 8 to C0D0C1D1, and let the work done on the mass be equated to its change of kinetic energy during that period. Let / be the length A0A1 of the portion of the stream considered, and z the fall, of surface level in that distance. Let Q be the discharge of the stream per second.

Change of Kinetic Energy. — At the end of the time 6 there are as many particles possessing the same velocities in the space C0D0A1B1 as at the beginning. The change of kinetic energy is therefore the difference of the kinetic energies of A0B0C0D0 and A1B1GD1.

Let fig. 119 represent the cross section A 6o, and let 10 bea small element of its area at a point where the p

velocity is v. Let S2o be the ‘ ”’

whole area of the cross section and «o the mean velocity for the whole cross section. From the definition of mean velocity we have

«o=2u»/Qd. Let u = «o+w, where w is the difference between the velocity at the small element u and the mean velocity. For the whole cross section, 2wtt> = o.

The mass of fluid passing through the element of section w, in 8

seconds, is (G/g)wv8, and its kinetic energy is (G/2g)uv 3 8. For the whole section, the kinetic energy of the mass A0B0C0D0 passing in 8 seconds is

(G0/2g)2«f s – (Gt9/2g)2a)(«o 3 +3«o 2 Jf+3«oie' 2 +w 3), = (Gt9/2£){»o 3 fl+2aja> 2 (3« +Kj)}. The factor 3U0+W is equal to 2Uo+v, a quantity necessarily positive. Consequently 2*oi l3 > fioWo 3 , and consequently the kinetic energy of A0B0C0D0 is greater than

(G0/2g)ftotto 3 or (G8/2g)Qu \ which would be its value if all the particles passing the section had the same velocity #0. Let the kinetic energy be taken at

o(G8/2g) SW = a(G0/2g) Q«o 2 , where a is a corrective factor, the value of which was estimated by J. B. C. J. Belanger at l-i. 1 Its precise value is not of great im- portance.

In a similar way we should obtain for the kinetic energy of A 1 BiCiDj the expression

a(G0/2g)»Ki 3 = a(Gf?/2g)Q«i 2 , where ft, «i are the section and mean velocity at AiBj, and where a may be taken to have the same value as before without any im- portant error.

Hence the change of kinetic energy in the whole mass A0B0A1B1 in 8 seconds is

t(G6/2g)Q(Ml 2 -«o 2). (1)

Motive Work of the Weight and Pressures. — Consider a small filament aodi which comes in 8 seconds to foci. The work done by gravity during that movement is the same as if the portion aoCo were carried to aiCi. Let dQ8 be the volume of aoco or a\c\, and yo, y\ the depths of do,

1 Boussinesq has shown that this mode of determining the corrective factor a is not satisfactory.

and

dQ9 or GdQd pounds falls through a vertical height z+yi—yo, the

work done by gravity is

GdQ8(z+ yi -y). Putting pa for atmospheric pressure, the whole pressure per unit of area at ao is Gyo+p a , and that at Oi is — (Gyi +pa). The work of these pressures is

G(y<,+p./G-y 1 -palG)dQ8 = G{y a -y 1)dQB. Adding this to the work of gravity, the whole work is GzdQB; or, for the whole cross section,

GsQ0. _ (2)

Work expended in Overcoming the Friction of the Stream Bed. — Let A'B', A"B" be two cross sections at distances s and s-j-ds from AoBo. Between these sections the velocity may be treated as uni- form, because by hypothesis the changes of velocity from section to section are gradual. Hence, to this short length of stream the equation for uniform motion is applicable. But in that case the work in overcoming the friction of the stream bed between A'B' and A"B"is

GQ0r(« 2 /2|i)(x/a)

(3)

;GQfl/ o V(« 2 /2g)(x/n)^.

Equating the work given in (2) and (3) to the change of kinetic energy given in (1),

a(GQ0/ 2 g) («, 2 -W) =GQ30-GQe/- o 'r(«72g)(x/a)

§ 116. Fundamental Differential Equation of Steady VariedMotion. — Suppose the equation just found to be applied to an indefinitely short length ds of the stream, limited by the end sections ab, 0161, taken for simplicity normal to the stream bed (fig. 120). For that short length of stream the fall of surface level, or difference of level of

BoBi the bed in a longitudinal section of the stream, and ab any section at a distance 5 from Bo, the depth ab being h. Suppose B0B1, B0A0 taken as rectangular coordinate axes, then dh/ds is the trigonometric tangent of the angle which the surface of the stream at a makes with the axis BoBi_ This tangent dh/ds will be positive, if the stream is increasing in depth in the direction B0B1; negative,

Fig. 120.

o and ai, may be written dz. Also, if we write u for uo, and u + du for «i, the term (wo 2 — tti 2)/2g becomes udu/g. Hence the equation applicable to an indefinitely short length of the stream is

dz = udulg + (xlil)t(u y2g)ds. _ (1)

From this equation some general conclusions may be arrived at as to the form of the longitudinal section of the stream, but, as the investigation is somewhat complicated, it is convenient to simplify it by restricting the conditions of the problem.

Modification of the Formula for the Restricted Case of a Stream flowing in a Prismatic Stream Bed of Constant Slope. — Let i be the constant slope of the bed. Draw ad parallel to the bed, and ac horizontal. Then dz is sensibly equal to a'c. The depths of the stream, h and h--dh, are sensibly equal to ab and a'b' , and therefore dh—a'd. Also cd is the fall of the bed in the distance ds, and is equal to ids. Hence

dz = a'c = cd—a'd = ids—dh. (2)

Since the motion is steady —

Q = Uu = constant. Differentiating,

ildu + udil = o ; :.du = — udtt/Q. Let x be the width of the stream, then dXl = xdh very nearly. In- serting this value,

du — —{uxi\i)dh. (3)

Putting the values of du and dz fouftd in (2) and (3) in equation (1), ids-dh = – {u i xl0.l)dh + (xlˆ)i{u 1 l2g)ds. dhlds = {i-(x lil)!; (u > l2g)\l\i-Wg)(xln).\ (4)

Further Restriction to the Case of a Stream of Rectangular Section and of Indefinite Width. — The equation might be discussed in the form just given, but it becomes a little simpler if restricted in the way just stated. For, if the stream is rectangular, xh = Q, and if x is large compared with h, tt/x = xh/x = h nearly. Then equation (4) becomes

dh/ds = ((i -r« 2 /2g*)/(i -u*/gh). (5)

§ 117. General Indications as to the Form of Water Surface fur- nished by Equation (5). — Let A0A1 (fig. 121) be the water surface,

Fig. 121.

if the stream is diminishing in depth from Bo towards Bi. If dh/ds = 0, the surface of the stream is parallel to the bed, as in cases of uniform motion. But from equation (4)

dh/ds = o, if ;-(x/S2)f(w 2 /2g)=o; .". f(w 2 /2g) = (O/xH = mi, which is the well-known general equation for uniform motion, based on the same assumptions as the equation for varied steady motion now being considered. The case of uniform motion is therefore a limiting case between two different kinds of varied motion. Consider the possible changes of value of the fraction

{l-W/2gih)l{l-li>lgh).

As h tends towards the limit o, and consequently « is large, the numerator tends to the limit — 00. On the other hand if h = , in which case u is small, the numerator becomes equal to I. For a value H of h given by the equation

l-f«72gi'H=o, H=f« 2 /2gi, we fall upon the case of uniform motion. The results just stated may be tabulated thus : —

For h=o, H, >H, o, 1.

Next consider the denominator, if h becomes very small, in which case u must be very large, the denominator tends to the limit — 00 . As h becomes very large and u consequently very small, the de- nominator tends to the limit 1. For h — u 2 /g, or « = V(g/»)> the denominator becomes zero. Hence, tabulating these results as before : —

For h = 0, u 2 /g, > tt 2 /g, °° . the denominator becomes — 00, o, > o, 1.

§ 118. Case 1. — Suppose h>u?/g, and also h>H, or the depth greater than that corresponding to uniform motion. In this case dh/ds is positive, and the stream increases in depth in the direction of flow. In fig. 122 let B0B1 be the bed, CcCi a line parallel to the bed and at a height above it equal to H. By hypothesis, the surface

Fig. 122.

A0A1 of the stream is above C0C1, and it has just been shown that the depth of the stream increases from Bo towards Bi. But going up stream h approaches more and more nearly the value H, and there- fore dh/ ds approaches the limit o, or the surface of the stream is asymptotic to C0C1. Going down stream h increases and u diminishes, thenumeratorand denominator of thefraction(i — fw 2 _/2gi/j)/(l —

u’jgh) both tend towards the limit I, and dh/ds to the limit i. That is, the surface of the stream tends to become asymptotic to a horizontal line D0D1.

The form of water surface here discussed is produced when the flow of a stream originally uniform is altered by the construction of a weir. The raising of the water surface above the level C0C1 is termed the backwater due to the weir.

§ 119. Case 2. — Suppose h > u l /g, and also h

negative, and the stream is diminishing in depth in the direction of flow. In fig. 123 let BoB! be the stream bed as before; C0Q a line drawn parallel to B0B1 at a height above it equal to H. By hypo- thesis the surface A0A1 of the stream is below C0C1, and the depth has

•just been shown to diminish from Bo towards Bi. Going up stream h ap- _Cj proaches the limit f H, and dh/ds tends to the limit zero. That is, up stream A0A1 is asymptotic to C0C1. Going down p IG j 2 -i ‘ stream h diminishes

and u increases; the inequality h > u 2 ,‘g diminishes; the denominator of the frac- tion (i—t;u 2 i2gih)l{i-u’lgk-) tends to the limit zero, and con- sequently dhjds tends to co . That is, down stream A0A1 tends to a direction perpendicular to the bed. Before, however, this limit was reached the assumptions on which the general equation is based would cease to be even approximately true, and the equation would cease_ to be applicable. The filaments would have a relative motion, which would make the influence of internal friction in the fluid too important to be neglected. A stream surface of this form

may be pro- duced if there is an abrupt fall in the bed of the stream (fig. 124). On the Ganges canal, as orig- inally con- structed, there were abrupt falls precisely of this kind, and it appears

that the lowering of the water surface and increase of velocity which such falls occasion, for a distance of some miles up stream, was not foreseen. The result was that, the velocity above the falls being greater than was intended, the bed was scoured and considerable damage was done to the works. ” When the canal was first opened the water was

allowed to pass freely over the crests of the overfalls, which were laid on the level of the bed of the earthen channel; erosion of bed and sides for some miles up rapidly followed, and it soon became apparent that means must be adopted for raising the surface of the stream at those points (that is, the crests of the falls). Planks were accord- ingly fixed in the grooves above the bridge arches, or temporary weirs were formed over which the water was allowed to fall ; in some cases the surface of the water was thus raised above its normal height, causing a backwater in the channel above ” (Crofton’s Report on the Ganges Canal, p. 14). Fig. 125 represents in an ex- aggerated form what probably occurred, the diagram being intended

Fig. 124.

Fig. 125.

to represent some miles’ length of the canal bed above the fall. AA parallel to the cana! bed is the level corresponding to uniform motion with the intended velocity of the canal. In consequence of the presence of the ogee fall, however, the water surface would take some such form as BB, corresponding to Case 2 above, and the velocity would be greater than the intended velocity, nearly in the inverse ratio of the actual to the intended depth. By constructing a weir on the crest of the fall, as shown by dotted lines, a new water surface CC corresponding to Case 1 would be produced, and by suitably choosing the height of the weir this might be made to agree approximately with the intended level AA.

§ 120. Case 3. — Suppose a stream flowing uniformly with a depth h

stream is of indefinitely great width, so that m = H,then fw 2 /2g=iH, and H = fM 2 /2gi. Consequently the condition stated above involves that

|w 2 /2g»’f/2. If such a stream is interfered with by the construction of a weir which raises its level, so that its depth at the weir becomes / fi>« 2 /g, then for a portion of the stream the depth h will satisfy the con- ditions hH, which are not the same as those assumed in the two previous cases. At some point of the stream above the weir the depth h becomes equal to u 2 /g, and at that point dh/ds becomes infinite, or the surface of the stream is normal to the bed. It is obvious that at that point the influence of internal friction will be too great to be neglected, and the general equation will cease to represent the true conditions of the motion of the water. It is known that, in cases such as this, there occurs an abrupt rise of the free surface of the stream, or

a standing wave is formed, the conditions of motion in which will be examined presently.

It appears that the condition necessary to give rise to a standing wave is that i > f/2. Now f depends for different channels on the roughness of the channel and its hydraulic mean depth. Bazin calculated the values of f for channels of different degrees of rough- ness and different depths given in the following table, and the corre- sponding minimum values of i for which the exceptional case of the production of a standing wave may occur.

Slope below which a Stand-

Standing Wave Formed.

impossible in

Slope in feet Least Depth

feet per foot.

per foot.

in feet .

(“0-002

0-262

Very smooth cemented surface

0-OOI47

< 0-003

•O98

1.0-004

•O65

(O-O03

•394

Ashlar or brickwork .

0-OOI86

< 0-004

• 197

I 0-O06

•098

C 0-004

■ 1-181

Rubble masonry ….

0-00235

< 0-006

•525

lo-oio

•262

ro-oo6

3-478

Earth

0-00275

< 0-010

1-542

lo-OI5

•919

Standing Waves

§ 121. The formation of a standing wave was first observed by Bidone. Into a small rectangular masonry channel, having a slope of 0-023 ft-per foot, he admitted water till it flowed uniformly with a depth of 0-2 ft. He then placed a plank across the stream which raised the level just above the obstruction to 0-95 ft. He found that the stream above the obstruction was sensibly unaffected up to a point 15 ft. from it. At that

point the depth suddenly increased from 0-2 ft. to 0-56 ft. The velocity of the stream in the part un- affected by the obstruction was 5-54 ft. per second. Above the point where the abrupt change of depth occurred w 2 = 5-54 2 = 30-7, and gh = 32-2X0-2 =6-44; hence « 2 was>g&. Just below the abrupt change of depth « = 5-54Xo-2/o-56 = i-97; « 2 = 3-88; and gh = 32-2X0-56 = 18-03; hence at this point u 2

The change of level at a standing wave may be found thus. Let fig. 126 represent the longitudinal section of a stream and ab, cd

cross sections normal to the bed, which for the short distance con- sidered may be assumed horizontal. Suppose the mass of water abed to come to a'b'c'd' in a short time /; and let Mo, «i be the velocities at ab and cd, fio, Sii the areas of the cross sections. The force causing change of momentum in the mass abed estimated horizont- ally is simply the difference of the pressures on ab and cd. Putting ht,, hi for the depths of the centres of gravity of ab and cd measured down from the free water surface, the force is G(M4> — h$li) pounds, and the impulse in t seconds is G (/zofio — h\Q{) t second pounds. The horizontal change of momentum is the difference of the momenta of ede'd' and aba'V ; that is,

(G/g)(n 1 « 1 2 -n « 2)^

Hence, equating impulse and change of momentum,

G(WJo-Ai«i)' = (G/g)(att! 2 SW)<; .. hno-h,i2i = (UiUi 2 -^ku 2)/g. (i)

For simplicity let the section be rectangular, of breadth B and depths Ho and Hi, at the two cross sections considered; then ho = jHo, and hi = jHi. Hence

H„ 2 -Hi 2 = (2/g)(Hi«i 2 -Ho«o 2). But, since f2e«o = Bi«i, we have

Wi a = «oW/Hi s , ■ H 2 -Hi 2 = (2M 2 /g)(H„ 2 /Hi-H„). (2)

This equation is satisfied if H = Hi, which corresponds to the case of uniform motion. Dividing by Ho — Hi, the equation becomes (H I /

H„)(H„ + H,) = 2«„ 2 /g; (3)

.-. Hi = V(2«o 2 Ho/g + iI-Io 2)-§Ho. (4)

In Bidone's experiment 00 = 5-54, andH = o-2. Hence Hi = o-52, which agrees very well with the observed height.

§ 122. A standing wave is frequently produced at the foot of a weir. Thus in the ogee falls originally constructed on the Ganges canal a standing wave was observed as shown in fig. 127. The water falling over the weir crest A acquired a very high velocity on the

Cultivated land and spring-) forming declivities . . \ Wooded hilly slopes . Naked unfissured mountains

Ratio of average

Discharge to average Rainfall.

•3 to -33 •35 to -45 ■55 to -6o

Loss by Evaporation,

&c, in percent of

total Rainfall.

67 to 70

55 to 65

40 to 45

Fig. 127.

steep slope AB, and the section of the stream at B became very small. It easily happened, therefore, that at B the depth h

A standing wave is sometimes formed on the down stream side of bridges the piers of which obstruct the flow of the water. Some interesting cases of this kind are described in a paper on the " Floods in the Nerbudda Valley " in the Proc. Inst. Civ. Eng. vol. xxvii. p. 222, by A. C. Howden. Fig. 128 is compiled from the data given in that paper. It represents the section of the stream at pier 8 of

the Towah Viaduct, during the flood of 1865. The ground level is not exactly given by How- den, but has been in- ferred from data given on

another drawing. The velocity of the stream was not observed, but the author states it was probably the same as at the Gunjal river during a similar flood, that is 16-58 ft. per second. Now, taking the depth on the down stream face of the pier at 26 ft., the velocity necessary for the production of a standing wave would be u = V (gh) = V (32-2X26) = 29 ft. per second nearly. But the velocity at this point was probably from Howden's statements 16-58 × 1? = 25-5 ft., an agreement as close as the approximate character of the data would lead us to expect.

XI. ON STREAMS AND RIVERS

§ 123. Catchment Basin. — A stream or river is the channel for the discharge of the available rainfall of a district, termed its catchment basin. The catchment basin is surrounded by a ridge or watershed line, continuous except at the point where the river finds an outlet. The area of the catchment basin may be determined from a suitable contoured map on a scale of at least 1 in 100,000. Of the whole rain-fall on the catchment basin, a part only finds its way to the stream. Part is directly re-evaporated, part is absorbed by vegetation, part may escape by percolation into neighbouring districts. The follow- ing table gives the relation of the average stream discharge to the average rainfall on the catchment basin (Tiefenbacher).

§ 124. Flood Discharge. — The flood discharge can generally only be determined by examining the greatest height to which floods have been known to rise. To produce a flood the rainfall must be heavy and widely distributed, and to produce a flood of exceptional height the duration of the rainfall must be so gˆeat that the flood waters of the most distant affluents reach the point considered, simultane- ously with those from nearer points. The larger the catchment basin the less probable is it that all the conditions tending to pro- duce a maximum discharge should simultaneously occur. Further, lakes and the river bed itself act as storage reservoirs during the rise of water level and diminish the rate of discharge, or serve as flood moderators. The influence of these is often important, because very heavy rain storms are in most countries of comparatively short duration. Tiefenbacher gives the following estimate of the flood discharge of streams in Europe : — –

Flood discharge of Streams

per Second per Square Mile

of Catchment Basin.

In flat country 8-7 to 12-5 cub. ft.

In hilly districts 17-5 to 22-5 ,,

In moderately mountainous districts 36-2 to 45-0 ,, In very mountainous districts . . 50-0 to 75-0 ,, It has been attempted to express the decrease of the rate of flood discharge with the increase of extent of the catchment basin by empirical formulae. Thus Colonel P. P. L. O'Connell proposed the formula j = MV*, where M is a constant called the modulus of the river, the value of which depends on the amount of rainfall, the physical characters of the basin, and the extent to which the floods are moderated by storage of the water. If M is small for any given river, it shows that the rainfall is small, or that the permeability or slope of the sides of the valley is such that the water does not drain rapidly to the river, or that lakes and river bed moderate the rise of the floods. If values of M are known for a number of rivers, they may be used in inferring the probable discharge of other similar rivers. For British rivers M varies from 0-43 for a small stteam draining meadow land to 37 for the Tyne. Generally it is about 15 or 20. For large European rivers M varies from 16 for the Seine to 67-5 for the Danube. For the Nile M = 1 1 , a low value which results from the immense length of the Nile throughout which it receives no affluent, and probably also from the influence of lakes. For different tribu- taries of the Mississippi M varies from 13 to 56. For various Indian rivers it varies from 40 to 303, this variation being due to the great variations of rainfall, slope and character of Indian rivers.

In some of the tank projects in India, the flood discharge has been calculated from the formula D=C-v'w 2 , where D is the discharge in cubic yards per hour from n square miles of basin. The constant C was taken =61,523 in the designs for the Ekrooka tank, =75,000 on Ganges and Godavery works, and =10,000 on Madras works.

§ 125. Action of a Stream on its Bed. — If the velocity of a stream exceeds a certain limit, depending on its size, and on the size, heaviness, form and coherence of the material of which its bed is composed, it scours its bed and carries forward the materials. The quantity of material which a given stream can carry in suspension depends on the size a

and density of the particles in Fig. 129.

suspension, and is greater as the velocity of the stream is greater, velocity of a stream is great enough

If in one part of its course the to scour the bed and the water becomes loaded with silt, and in a subsequent part of the river's course the velocity is diminished, then part of the transported material must be deposited. Probably deposit and scour go on simultaneously over the whole river bed, but in some parts the rate of scour is in excess of the rate of deposit, and in other parts the rate of deposit is in excess of the rate of scour. Deep streams appear to have the greatest scour- ing power at any given

velocity. It is possible «.”” C'

that the difference is p

strictly a difference of • o •

transporting, not of scouring action. Let fig. 129 represent a section of

a stream. The material lifted at a will be diffused through the mass of

the stream and deposited at different distances down stream. The

average path of a particle lifted at a will be some such curve as abc,

and the average distance of transport each time a particle is lifted

will be represented by ac. In a deeper stream such as that in fig. 130, the average height to which particles are lifted, and, since the rate of vertical fall through the water may be assumed the same as before, the average distance a'c' of transport will be greater. Con- sequently, although the scouring action may be identical in the two streams, the velocity of transport of material down stream is greater as the depth of the stream is greater. The effect is that the deep stream excavates its bed more rapidly than the shallow stream.

§ 126. Bottom Velocity at which Scour commences. — The following bottom velocities were determined by P. L. G. Dubuat to be the maximum velocities consistent with stability of the stream bed for different materials.

Darcy and Bazin give, for the relation of the mean velocity v m and bottom velocity vt,.

*ra = t'i4-iO'8/V (mi). But

V»»t' = f m v(f/2g);

.-. » m = »6/(l-IO-87V(r/2g)).

Taking a mean value for f , we get

t' m = I-3I2l > 6,

and from this the following values of the mean velocity are ob- tained : —

Bottom Velocity

Mean Velocity

= V m .

1. Soft earth

2. Loam ....

3. Sand ....

4. Gravel

5. Pebbles

6. Broken stone, flint

7. Chalk, soft shale

8. Rock in beds .

9. Hard rock

0-25 0-50

I-OO 2-0O

3-40 4-00 5-00

6-oo

10-00

•33

•65

i-3°

2-62

4-46

5-25

656

7-87

13-12

The following table of velocities which should not be exceeded in channels is given in the Ingenieurs Taschenbuch of the Verein ” Hiitte “: —

Slimy earth or brown clay

Clay

Firm sand

Pebbly bed

Boulder bed .

Conglomerate of slaty fragments

Stratified rocks

Hard rocks

§ 127. Regime of a River Channel. — A river channel is said to be in a state of regime, or stability, when it changes little in draught or form in a series of years. In some rivers the deepest part of the channel changes its position perpetually, and is seldom found in the same place in two successive years. The sinuousness of the river also changes by the erosion of the banks, so that in time the position of the river is completely altered. In other rivers the change from year to year is very small, but probably the regime is never perfectly stable except where the rivers flow over a rocky bed.

If a river had a constant discharge it would gradually modify its bed

till a permanent regime was established

9

3

it. Tijne

3-Sff:

— – ym-.— If*

Fig. 131

discharged is constantly changing, and therefore

the velocity, silt is deposited when the velocity

decreases, and scour goes on when the velocity

increases in the same place. When the scouring

and silting are considerable, a perfect balance

between the two is rarely established, and hence

continual variations occur in the form of the river

and the direction of its currents. In other cases,

where the action is less violent , a tolerable balance may be established,

and the deepening of the bed by scour at one time is compensated by

the silting at another. In that case the general regime is permanent,

though alteration is constantly going on. This is more likely to

happen if by artificial means the erosion of the banks is prevented. If a river flows in soil incapable of resisting its tendency to scour it is necessarily sinuous (§ 107), for the slightest deflection of the current to either side begins an erosion which increases progres- sively till a considerable bend is formed. If such a river is straightened it becomes sinuous again unless its banks are pro- tected from scour.

§ 128. Longitudinal Section of River Bed. — The declivity of rivers decreases from source to mouth. In their higher parts rapid and

torrential, flowing over beds of gravel or boulders, they enlarge in volume by receiving affluent streams, their slope diminishes, their bed consists of smaller materials, and finally they reach the sea. Fig. 131 shows the length in miles, and the surface fall in feet per mile, of the Tyne and its tributaries.

The decrease of the slope is due to two causes. (1) The action of the transporting power of the water, carrying the smallest debris the greatest distance, causes the bed to be less stable near the mouth than in the higher parts of the river; and, as the river adjusts its slope to the stability of the bed by scouring or increasing its sinuous- ness when the slope is too great, and by silting or straightening its course if the slope is too small, the decreasing stability of the bed would coincide with a decreasing slope. (2) The increase of volume and section of the river leads to a decrease of slope; for the larger the section the less slope is necessary to ensure a given velocity.

The following investigation, though it relates to a purely arbitrary case, is not without interest. Let it be assumed, to make the con- ditions definite — (1) that a river flows over a bed of uniform resist- ance to scour, and let it be further assumed that to maintain stability the velocity of the river in these circumstances is constant from source to mouth; (2) suppose the sections of the river at all points are similar, so that, b being the breadth of the river at any point, its hydraulic mean depth is ab and its section is cb”-, where a and c are constants applicable to all parts of the river; (3) let us further assume that the discharge increases uniformly in consequence of the supply from affluents, so that, if I is the length of the river from its source to any given point, the

discharge there will be ˆ jy %

kl, where k is another — constant applicable to all points in the course of the river.

Let AB (fig. 132) be the longitudinal section of the river, whose source is at A; and take A for the origin of

vertical and horizontal coordinates. Let C be a point whose ordinates are x and y, and let the river at C have the breadth b, the slope i, and the velocity v.

Since velocity X area of section = discharge, vcb 2 = kl, or i = V (kl/cv). Hydraulic mean depth — ab = a-4 (kl/cv). But, by the ordinary formula for the flow of rivers, mi — ty 1 ;

:. i = tv 2 /m = (i'vVa)^ (c/kl). But i is the tangent of the angle which the curve at C makes with the axis of X, and is therefore = dy/dx. Also, as the slope is small, I = AC = AD =x nearly.

.". dy/dx – (jti"/o) V (c/kx) ; and, remembering that v is constant,

y = (2f»l/o)V(c*/*); or y 2 = constant X x ;

so that the curve is a common parabola, of which the axis is hori- But as the volume zontal and the vertex at the source. This may be considered an

ideal longitudinal section, to which actual rivers ap- proximate more or less, with exceptions due to the vary- ing hardness of their beds, and the irregular manner in which their volume increases.

§ 129. Surface Level of River. — The surface level of a river is a plane changing constantly in position from changes in the volume of water discharged, and more slowly from changes in the river bed, and the circum- stances affecting the drainage into the river.

For the purposes 01 the engineer, it is important to determine (1) the extreme low water level, (2) the extreme high water or flood level, and (3) the highest navigable level.

I. Low Water Level cannot be absolutely known, because a river reaches its lowest level only at rare inter- vals, and because alterations in the cultivation of the land, the drainage, tne removal of forests, the removal or erection of obstructions in the river bed, &c, gradu- ally alter the conditions of discharge. The lowest level of which records can be found is taken as the conven- tional or approximate low water level, and allowance is made for possible changes. 2. High Water or Flood Level. — The engineer assumes as the highest flood level the highest level of which records can be obtained. In forming a judgment of the data available, it must be remembered that the highest level at one point of a river is not always simultaneous

Surface

Mean

Bottom

Velocity.

Velocity.

Velocity.

•49

•36

•26

•98

•75

•52

1-97

i-5i

1-02

4-00

3-15

2-30

5-00

4-o3

3-o8

7-28

6-io

4-90

8-oo

7-45

6-oo

14-00

12-15

10-36

with the attainment of the highest level at other points., and that the rise of a river in flood is very different in different parts of its course. In temperate regions, the floods of rivers seldom rise more than 20 ft. above low-water level, but in the tropics the rise of floods is greater.

3. Highest Navigable Level. — When the river rises above a certain level, navigation becomes difficult from the increase of the velocity of the current, or from submersion of the tow paths, or from the head-way under bridges becoming insufficient. Ordinarily the highest navigable level may be taken to be that at which the river begins to overflow its banks.

§ 130. Relative Value of Different. Materials for Submerged Works. — That the power of water to remove and transport different materials depends on their density has an important bearing on the selection of materials for submerged works. In many cases, as in the aprons or floorings beneath bridges, or in front of locks or falls, and in the formation of training walls and breakwaters by pierres perdus, which have to resist a violent current, the materials of which the structures are composed should be of such a size and weight as to be able individually to resist the scouring action of the water. The heaviest materials will therefore be the best; and the different value of materials in this respect will appear much more striking, if it is remembered that all materials lose part of their weight in water. A block whose volume is V cubic feet, and whose density in air is w lb per cubic foot, weighs in air w\ lb, but in water only (w — 62-4.) V ft.

Weight of a. Cub. Ft. in lb.

In Air.

In Water.

Basalt

Brick

Brickwork …. Granite and limestone Sandstone Masonry ….

187-3 130-0

II2-0 I70-0

144-0 116-144

124-9

67-6

49-6

107-6

8i-6

53-6-81-6

river, and chained and levelled. The cross sections are referred to the line of stakes, both as to position and direction. The determina- tion of the surface slope is very difficult, partly from its extreme smallness, partly from oscillation of the water. Cunningham recom- mends that the slope be taken in a length of 2000 ft. by four simul- taneous observations, two on each side of the river.

§ 134. Cross Sections — A stake is planted flush with the water, and its level relatively to some point on the line of levels is determined. Then the depth of the water is determined at a series of points (if

§ 131. Inundation Deposits from a River. — When a river carrying silt periodically overflows its banks, it deposits silt over the area flooded, and gradually raises the surface of the country. The silt is deposited in greatest abundance where the water first leaves the river. It hence results that the section of the country assumes a peculiar form, the river flowing in a trough along the crest of a ridge, from which the land slopes downwards on both sides. The silt deposited from the water forms two wedges, having their thick ends towards the river (fig. 133).

Fig. 133.

This is strikingly the case with the Mississippi, and that river is now kept from flooding immense areas by artificial embankments or levees. In India, the term deltaic segment is sometimes applied to that portion of a river running through deposits formed by inunda- tion, and having this characteristic section. The irrigation of the country in this case is very easy; a comparatively slight raising of the river surface by a weir or annicut gives a command of level which permits the water to be conveyed to any part of the district.

§ 132. Deltas. — The name delta was originally given to the A- shaped portion of Lower Egypt, included between seven branches of the Nile. It is now given to the whole of the alluvial tracts round river mouths formed by deposition of sediment from the river, where its velocity is checked on its entrance to the sea. The characteristic feature of these alluvial deltas is that the river traverses them, not in a single channel, but in two or many bifurcating branches. Each branch has a tract of the delta under its influence, and gradually raises the surface of that tract, and extends it seaward. As the delta extends itself seaward, the conditions of discharge through the different branches change. The water. finds the passage through one of the branches less obstructed than through the others; the velocity and scouring action in that branch are increased ; in the others they diminish. The one channel gradually absorbs the whole of the water supply, while the other branches silt up. But as the mouth of the new main channel extends seaward the resistance in- creases both from the greater length of the channel and the formation of shoals at its mouth, and the river tends to form new bifurcations AC or AD (fig. 134), and one of these may in time become the main channel of the river.

§ 133. Field Operations preliminary to a Study of River Improve- ment. — There are required (1) a plan of the river, on which the positions of lines of levelling and cross sections are marked; (2) a longitudinal section and numerous cross sections of the river; (3) a series of gaugings of the discharge at different points and in different conditions of the river.

Longitudinal Section. — This requires to be carried out with great accuracy. A line of stakes is planted, following the sinuosities of the

Fig. 134.

possible at uniform distances) in a line starting from the stake and perpendicular to the thread of the stream. To obtain these, a wire may be stretched across with equal distances marked on it by hang- ing tags. The depth at each of these tags may be obtained by a light

wooden staff, with a disk-shaped shoe 4 to 6 in. in diameter. If the depth is great, soundings may be taken by a chain and weight. To ensure the wire being perpendicular to the thread of the stream, it is desirable to stretch two other wires similarly graduated, one above and the other below, at a distance of 20 to 40 yds. A number of floats being then thrown in, it is observed whether they pass the same graduation on each wire.

For large and rapid rivers the cross section is obtained by sounding in the following way. Let AC (fig. 135) be the line on which sound- ings are required. A base line AB is measured out at right angles to AC, and ranging staves are set up at AB and at D in line with AC. A boat is allowed to drop down stream, and, at the moment it comes in line with AD, the lead is dropped, and an observer in the

boat takes, with a box sextant, £

the angle AEB subtended by AB. The sounding line may have a weight of 14 lb of lead, and, if the boat drops down stream slowly, it may hang near the bottom, so that the observa- tion is made instantly. In ex- tensive surveys of the Missis- sippi observers with theodolites were stationed at A and B. The 1 I

theodolite at A was directed towards C, that at B was kept on the boat. When the boat came on the line AC, the ob- server at A signalled, the sound- ing line was dropped, and the Fig. 135. observer at B read off the angle ABE. By repeating observations a number of soundings are ob- tained, which can be plotted in their proper position, and the form of the river bed drawn by connecting the extremities of the lines. From the section can be measured the sectional area of the stream SI and its wetted perimeter x; and from these the hydraulic mean depth m can be calculated.

§ 135. Measurement of the Discharge of Rivers. — The area of cross section multiplied by the mean velocity gives the discharge of the stream. The height of the river with reference to some fixed mark should be noted whenever the velocity is observed, as the velocity and area of cross section are different in differest states of the river. To determine the mean velocity various methods may be adopted; and, since no method is free from liability to error, either from the difficulty of the observations or from uncertainty as to the ratio of the mean velocity to the velocity observed, it is desirable that more than one method should be used.

Instruments for Measuring the Velocity of Water

§ 136. Surface Floats are convenient for determining the surface velocities of a stream, though their use is difficult near the banks. The floats may be small balls of wood, of wax or of hollow metal, so loaded as to float nearly flush with the water surface. To render

6

B

8o

HYDRAULICS

[ON STREAMS

A

9-

B

ii

ll

r

!i

il

i

/

i

i

i

•

\v

«

I

II

!

X

\ \

\

1 ‘

!

\ **

1:1

.4′

them visible they may have a vertical painted stem. In experi- ments on the Seine, cork balls if in. diameter were used, loaded to float flush with the water, and provided with a stem. In A. J. C. Cunningham’s observations at Roorkee, the floats were thin circular disks of English deal, 3 in. diameter and \ in. thick. For observa- tions near the banks, floats 1 in. diameter and \ in. thick were used. To render them visible a tuft of cotton wool was used loosely hxed in a hole at the centre.

The velocity is obtained by allowing the float to be carried down, and noting the time of passage over a measured length of the stream. If 11 is the velocity of any float, I the time of passing over a length /, then v = l/t. To mark out distinctly the length of stream over which the floats pass, two ropes may be stretched across the stream at a distance apart, which varies usually from 50 to25oft., according to the size and rapidity of the river. In the Roorkee experiments a length of run of 50 ft. was found best for the central two- fifths of the width, and 25 ft. for the remainder, except very close to the banks, where the run was made 12J ft. only. The longer the run the less is the proportionate error of the time observations, but on the other hand the greater the deviation of the floats from a straight course parallel to the axis of the stream. To mark the precise position at which the floats cross the ropes, Cunningham used short white rope pendants, hanging so as nearly to touch the surface of the water. In this case the streams were 80 to 180 ft. in width. In wider streams the use of ropes to mark the length of run is impossible, and recourse must be had to box sextants or theodolites to mark the path of the floats.

Let AB (fig. 136) be a measured base line strictly parallel to the thread of the stream, and AAi, BBi lines at right angles to AB marked out by ranging rods at Ai and Bi. Suppose observers stationed at A and B with sextants or theodolites, and let CD be the path of any float down stream. As the float approaches AAi, the observer at B keeps it on the cross wire of his instrument. The observer at A observes the instant of the float reaching the line AAi, and signals to B who then reads off the angle ABC. Similarly, as the float approaches BBi, the observer at A keeps it in sight, and when signalled to by B reads the angle BAD. The data so obtained are sufficient for plotting the path of the float and determining the distances AC, BD.

The time taken by the float in passing over the measured distance may be ob- served by a chronograph, started as the float passes the upper rope or line, and stopped when it passes the lower. In Cunningham's observations two chrono- meters were sometimes used, the time of passing one end of the run being noted on one, and that of passing the other end of the run being noted on the other. The chronometers were compared immediately before the observations. In other cases a single chronometer was used placed midway of the run. The moment of the floats passing the ends of the run was signalled to a time- keeper at the chronometer by shouting. It was found quite pos- sible to count the chronometer beats to the nearest half second, and in some cases to the nearest quarter second.

§ 137. Sub-surface Floats. — The velocity at different depths below the surface of a stream may be obtained by sub-surface floats, used precisely in the same way as surface floats. The most usual arrange- ment is to have a large float, of slightly greater density than water, connected with a small and very light surface float. The motion of the combined arrangement is not sensibly different from that of the large float, and the small surface float enables an observer to note the path and velo- city of the sub-surface float. The in- strument is, however, not free from objection. If the large submerged float is made of very nearly the same density as water, then it is liable to be thrown upwards by very slight eddies in the water, and it does not maintain its position at the depth at which it is intended to float. On the other hand, if the large float is made sensibly heavier than water, the indicating or surface float must be made rather large, and then it to seme extent influences the motion of the submerged float. Fig. 137 shows one form of sub- surface float. It consists of a couple of tin plates bent at a right angle and soldered together at the angle. This is connected with a wooden ball at the surface by a very thin wire or cord. As the tin alone makes a heavy submerged float, it is better to attach to the tin float some pieces of wood to diminish its weight in

water. Fig. 138 shows the form of submerged float used

by Cunningham. It consists of a hollow metal ball connected to a slice of cork, which serves as the surface float.

§ 138. Twin Floats. — Suppose two equal and similar floats (fig. 139) connected by a wire. Let one float be a little lighter and the other a little heavier than water. Then the velocity of the combined

Fig. 136.

Fig. 138.

Fig. 139.

Fig. 137.

floats will be the mean of the surface velocity and the velocity at the depth at which the heavier float swims, which is determined by the length of the connecting wire. Thus if v, is the surface velocity and v d the velocity at the depth to which the lower float is sunk, the velocity of the combined floats will be

v = i(v s +v d). Consequently, if v is observed, and v, determined by an experiment with a single float,

Vd = 2V—V„

According to Cunningham, the twin float gives better results than

the sub-surface float.

§ 139. Velocity Rods. — Another form of float is shown in fig. 140.

This consists of a cylindrical rod loaded at the lower end so as to

float nearly vertical in water. A wooden rod, with a metal cap at the

bottom in which shot can be placed,

answers better than anything else, and

sometimes the wooden rod is made in

lengths, which can be screwed together

so as to suit streams of different depths.

A tuft of cotton wool at the top serves

to make the float more easily visible.

Such a rod, so adjusted in length that it

sinks nearly to the bed of the stream,

gives directly the mean velocity of the

whole vertical section in which it floats.

§ 140. Revy's Current Meter. — No in- strument has been so much used in

directly determining the velocity of a

stream at a given point as the screw

current meter. Of this there are a

dozen varieties at least. As an example

of the instrument in its simplest form, Revy's meter may be selected. This is an

ordinary screw meter of a larger size than

usual, more carefully made, and with its I

details carefully studied (figs. 141, 142). It was designed after experience in gaug- ing the great South American rivers. The screw, which is actuated by the water, is 6 in. in diameter, and is of the type of the Griffiths screw used in ships. The hollow spherical boss serves to make the weight of the screw sensibly equal to its displacement, so that friction is much reduced. On the axis aa of the screw is a worm which drives the counter. This consists of two worm wheels g and h fixed on a common axis. The worm wheels are carried on a frame attached to the pin I. By means of a string attached to / they can be pulled into gear with the worm, or dropped out of gear and stopped at any instant. A nut m can be screwed up, if necessary, to keep the counter per- manently in gear. The worm is two-threaded, and the worm wheel g has 200 teeth. Consequently it makes one rotation for 100 rota- tions of the screw, and the number of rotations up to 100 is marked by the passage of the graduations on its edge in front of a fixed index. The second worm wheel has 196 teeth, and its edge is divided into 49 divisions. Hence it falls behind the first wheel one

division for a complete rotation of the latter. The number of hundreds of rota- tions of the screw are therefore shown by the number of divisions on h passed over by an index fixed to g. One difficulty in the use of the ordinary screw meter is that particles of grit, getting into the working parts, very sensibly alter the friction, and therefore the speed of the meter. Revy obviates this by enclosing the counter in a brass box with a glass face. This box is filled with pure water, which ensures a constant coefficient of friction for the rubbing parts, and prevents any mud or grit finding its way in. In order that the meter may place itself with the axis parallel to the current, it is pivoted on a vertical axis and directed by a large vane shown in fig. 142. To give the vane

Fig. 140.

more directing power the vertical axis is nearer the screw than in ordinary meters, and the vane is larger. A second horizontal vane is attached by the screws x, x, the object of which is to allow the meter to rest on the ground without the motion of the screw being inter- fered with. The string or wire for starting and stopping the meter is

counter has to be held in gear. For deep streams the meter A is suspended by a wire with a heavy lenticular weight below (fig. 144). The wire is payed out from a small winch D, with an index showing the depth of the meter, and passes over a pulley B. The meter is in gimbals and is directed by a conical rudder which keeps it facing the stream with its axis horizontal. There is an electric circuit from a battery C through the meter, and a contact is made closing the circuit every 100 revolutions. The moment the circuit closes a bell rings. By a subsidiary arrangement, when the foot of the instrument, 0-3 metres below the axis of the meter, touches the ground the circuit is also closed and the bell rings. It is easy to distinguish the continuous ring when the ground is reached from the short ring when the counter signals. A convenient winch for the wire is so graduated that if

Fig. 141. carried through the centre of the vertical axis, so that the strain on it may not tend to pull the meter oblique to the current. The pitch of the screw is about 9 in. The screws at x serve for filling the meter with water. The whole apparatus is fixed to a rod (fig. 142), of

a length proportionate to the depth, or for very great depths it is fixed to a weighted bar lowered by ropes, a plan invented by Revy. The instrument is generally used thus. The reading of the counter is noted, and it is put out of gear. The meter is then lowered into the water to the required position from a platform between two boats, or better from a temporary bridge. Then the counter is put into gear for one, two or five minutes. Lastly, the instrument is raised and the counter again read. The velocity is deduced from the number of rotations in unit time by the formulae given below. For surface velocities the counter may be kept permanently in gear, the screw being started and stopped by hand.

§ 141. The Harlacher Current Meter. — In this the ordinary counting apparatus is aban- doned. A worm drives a worm wheel, which makes an electrical contact once for each 100 rotations of the worm. This contact gives a signal above water. With this arrangement, a series of velocity observations can be made, without removing the instrument from the water, and a number of practical difficulties attending the accurate starting and stopping of the ordinary counter are entirely got rid of. Fig. 143 shows the meter. The worm wheel z makes one rotation for 100 of the screw. A pin moving the lever x makes the electrical contact. The wires b, c are led through a gas pipe B ; this also serves to adjust the meter to any required position on the wooden rod dd. The rudder or vane is shown at WH. The galvanic current acts on the electromagnet m, which is fixed in a small metal box containing also the battery. The magnet exposes and withdraws a coloured disk at an opening in the cover of the box.

§ 142. Amsler Laffon Current Meter. — A very convenient and accurate current meter is constructed by Amsler Laffon of Schaff- hausen. This can be used on a rod, and put into and out of gear by a ratchet. The peculiarity in this case is that there is a double ratchet, so that one pull on the string puts the counter into gear and a second puts it out of gear. The string may be slack during the action of the meter, and there is less uncertainty than when the

Fig. 142.

Fig. 143.

set when the axis of the meter is at the water surface it indicates at any moment the depth of the meter below the surface. Fig. 144 shows the meter as used on a boat. It is a very convenient instru- ment for obtaining the velocity at different depths and can also be used as a sounding instrument.

§ 143. Determination of the Coefficients of the Current Meter. — Suppose a series of observations has been made by towing the meter in still water at different speeds, and that it is required to ascertain from these the constants of the meter. If v is the velocity of the water and n the observed number of rotations per second, let

. v=a+0n (1)

where a and /3 are constants. Now let the meter be towed over a measured distance L, and let N be the revolutions of the meter and t the time of transit. Then the speed of the meter relatively 10 the water is L/t = v feet per second, and the number of revolutions per second is N/t = n. Suppose m observations have been made in this way, furnishing corresponding values of v and ra, the speed in each trial being as uniform as possible,

2» = »l+«2+ . . . 2D=fl+t>2+ ■ ■ ■

2nv = niVi+n 2 V2+ . . . 2« s = n;«i . . .

[2»] 2 = [»l+»2+ . . .f

Then for the determination of the constants a and /3 in (l), by the method of least squares —

_2m 2 Sz> — S«Zra» a ~ mXn 2 -[Xnf ‘

m’Snv — TvTn P ~~ niZn* – [2w] 2 – In a few cases the constants for screw current meters have been determined by towing them in R. E. Froude’s experimental tank in

Fig. 144.

which the resistance of ship models is ascertained. In that case the data are found with exceptional accuracy.

§ 144. Darcy Gauge or modified Pilot Tube. — A very old instru- ment for measuring velocities, invented by Henri Pitot in 1730 (Histoire de I’Acadcmie des Sciences, 1732, p. 376), consisted simply of a vertical glass tube with a right-angled bend, placed so that its mouth was normal to the direction of flow (fig. 145).

The impact of the stream on the mouth of the tube balances a column in the tube, the height of which is approximately h = v 2 J2g,

where v is the velocity |p] f-j ij — 11 at the depth x. Placed

L ” ‘ with its mouth parallel

to the stream the water inside the tube is nearly at the same level as the surface of the stream, and turned with the mouth down stream, the fluid sinks a depth /i’=» 2 /2g nearly, though the tube in that case interferes with the free flow of the liquid and somewhat modifies the result. Pitot expanded the mouth of the tube so as to form a funnel or bell mouth. In that case he found by experiment

h = i-sv-/2g. But there is more disturbance of the stream. Darcy preferred to mak« the mouth of the tube very small to avoid interference with the

stream and to check oscillations of the water column. Let the difference of level of a pair of tubes A and B (fig. 145) be taken to be h = kv 2 /2g, then k may be taken to be a corrective coefficient whose value in well-shaped instruments is very nearly unity. By placing his instrument in front of a boat towed through water Darcy found k = 1 -034 ; by placing the instrument in a stream the velocity of which had been ascertained by floats, he found k = 1 -006 ; by readings taken in different parts of the section of a canal in which a known volume of water was flowing, he found k =0-993. He believed the

first value to be too high in con- sequence of the disturbance caused by the boat. The mean of the other two values is almost exactly unity {Recherches hydrauliques, Darcy and Bazin, 1865, p. 63). W. B. Gregory used somewhat differently formed Pitot tubes for which the k = 1 (Am. Soc. Mech. Eng., 1903, 25). T. E. Stanton used a Pitot tube in deter- mining the velocity of an air current, and for his instrument he found £ = 1-030 to £ = 1-032 (” On the Re- sistance of Plane Surfaces in a Current of Air,” Proc. Inst. Civ. Eng., 1904, 156).

One objection to the Pitot tube in its original form was the great difficulty and inconvenience of reading the height h in the imme- diate neighbourhood of the stream surface. This is obviated in the Darcy gauge, which can be removed from the stream to be read.

Fig. 146 shows a Darcy gauge. It consists of two Pitot tubes having their mouths at right angles. In the instrument shown, the two tubes, formed of copper in the lower part, are united into one for strength,

and the mouths of the tubes open vertically and horizon- tally. The upper part of the tubes is of glass, and they are provided with a brass scale and two verniers b, b. The whole instrument is sup- ported on a vertical rod or small pile AA, the fixing at B permitting the instrument to be adjusted to any height on the rod, and at the same time allowing free rotation, so that it can be held parallel to the current. At c is a two-way cock, which can be opened or closed by cords. If this is shut, the instrument can be lifted out of the stream for reading. The glass tubes are connected at top by a brass fixing, with a stop cock a, and a flexible tube and mouthpiece m. The use of this is as follows. If the velocity is re- quired at a point near the surface of the stream, one at least of the water columns would be below the level at which it could be read. It would be in the copper part of the instrument. Suppose then a little air is sucked out by the tube m, and the cock a closed, the two columns will be forced up an amount correspond- ing to the difference between atmospheric pressure and that in the tubes. But the difference of level will remain unaltered.

When the velocities to be measured are not very small, this instru- ment is an admirable one. It requires observation only of a single linear quantity, and does not require any time observation. The law connecting the velocity and the observed height is a rational one, and it is not absolutely necessary to make any experiments on the coefficient of the instrument. If we take i> = £V(2gft), then it appears from Darcy's experiments that for a well-formed instrument k does not sensibly differ from unity. Jt gives the velocity at a definite point in the stream. The chief difficulty arises from the fact that at any given point in a stream the velocity is not absolutely constant, but varies a little from moment to moment. Darcy in some of his experiments took several readings, and deduced the velocity from the mean of the highest and lowest.

§ 145. Perrodil Hydrodynamometer. — This consists of a frame abed (fig. 147) placed vertically in the stream, and of a height not less than the stream's depth. The two vertical members of this frame are connected by cross bars, and united above water by a circular bar, situated in the vertical plane and carrying a horizontai 1 graduated circle ef. This whole system is movable round its axis, being suspended on a pivot at g connected with the fixed support mn. Other horizontal arms serve as guides. The central vertical rod gr forms a torsion rod, being fixed at r to the frame abed, and, passing freely upwards through the guides, it carries a horizontal

needle moving over the graduated circle ef. The support g, which carries the apparatus, also receives in a tubular guide the end of the torsion rod gr and a set screw for fixing the upper end of the torsion rod when necessary. The impulse of the stream of water is received on a circular disk *, in the plane of the torsion rod and the frame abed. To raise and lower the apparatus easily, it is not fixed directly to the rod mn, but to a tube kl sliding on mn.

■Suppose the apparatus arranged so that the disk x is at that level *he stream where the velocity is to be determined. The plane

Fig. 146.

abed is placed parallel to the direction of motion of the water. Then the disk * (acting as a rudder) will place itself parallel to the stream on the down stream side of the frame. The torsion rod will be un-strained, and the needle will be at zero on the graduated circle. If, then, the instrument is turned by pressing the needle, till the plane abed of the disk and the zero of the graduated circle is at right angles to the stream, the torsion rod will be twisted through an angle which measures the normal impulse of the stream on the disk x. That angle

will be given by the distance of the needle from zero. Observation shows that the velocity of the water at a given point is not constant. It varies between limits more or less wide. When the apparatus is nearly in its right position, the set screw at g is made to clamp the torsion spring. Then the needle is fixed, and the apparatus carrying the graduated circle oscillates. It is not, then, difficult to note the mean angle marked by the needle. Let r be the radius of the torsion rod, / its length from the needle over ef to r, and a the observed torsion angle. Then the moment of the couple due to the molecular forces in the torsion rod is

M = EJo/Z; where E (is the modulus of elas- ticity for torsion, and I the polar moment of inertia of the section of the rod. If the rod is of circular section, I = Jirr 4 . Let R be the radius of the disk, and b its leverage, or the distance of its centre from the axis of the torsion rod. The moment of the pressure of the water on the disk is

Fb = kb(Gl2g)vRV, where G is the heaviness of water and k an experimental coefficient. Then

E (Io// = *6(G/2g)irRV. For any given instrument,

w = cV a, where c is a constant coefficient for the instrument. _

The instrument as constructed had three disks which could be used at will. Their radii and leverages were in feet

Fig. 147. n\

R =

6 =

1st disk

. . 0-052

0-16

2nd „

. . 0-105

0-32

3rd „

. 0-2IO

o-66

For a thin circular plate, the coefficient k = i-i2. In the actual instrument the torsion rod was a brass wire 0-06 in. diameter and 6| ft. long. Supposing a measured in degrees, we get by calculation V = 0-335ˆJa; 0-II5Va; 0-042V<*.

Very careful experiments were made with the instrument. It

was fixed to a wooden turning bridge, revolving over a circular

channel of 2 ft. width, and about 76 ft ‘circumferential length. An

allowance was made for the slight current produced in the channel.

These experiments gave for the coefficient c, in the f ormula v = cV a,

1st disk, c =0-3126 for velocities of 3 to 16 ft.

2nd ,, 0-1177 ., .. iito3} ,,

3rd „ 0-0349 .. » less than ij

The instrument is preferable to the current meter in giving the velocity in terms of a single observed quantity, the angle of torsion, while the current meter involves the observation of two quantities, the number of rotations and the time. The current meter, except in some improved forms, must be withdrawn from the water to read the result of each experiment, and the law connecting the velocity and number of rotations of a current meter is less well-determined than that connecting the pressure on a disk and the torsion of the wire of a hydrodynamometer.

_ The Pitot tube, like the hydrodynamometer, does not require a time observation. But, where the velocity is a varying one, and consequently the columns of water in the Pitot tube are oscillating, there is room for doubt as to whether, at any given moment of closing the cock, the difference of level exactly measures the impulse of the stream at the moment. The Pitot tube also fails to give measur- able indications of very low velocities.

Processes for Gauging Streams

§ 146. Gauging by Observation of the Maximum. Surface Velocity. — The method of gauging which involves the least trouble is to determine the surface velocity at the thread of the stream, and to deduce from it the mean velocity of the whole cross section. The maximum surface velocity may be determined by floats or by a current meter. Unfortunately the ratio of the maximum surface to the mean velo- city is extremely variable. Thus putting v„ for the surface velocity at the thread of the stream, and v m for the mean velocity of the whole cross section, v m /v has been found to have the following values: —

V m /Vo

De Prony, experiments on small wooden channels 0-8164

Experiments on the Seine 0-62

Destrem and De Prony, experiments on the Neva 0-78

Boileau, experiments on canals 0-82

Baumgartner, experiments on the Garonne . . o-8o

Brunings (mean) 0-85

Cunningham, Solani aqueduct 0-823

Various formulae, either empirical or based on some theory of the vertical and horizontal velocity curves, have been proposed for determining the ratio v m jv . Bazin found from his experiments the empirical expression

“Om = Vo — 25 4V {mi) ; where m is the hydraulic mean depth and i the slope of the stream. In the case of irrigation canals and rivers, it is often important to determine the discharge either daily or at other intervals of time, while the depth and consequently the mean velocity is varying. Cunningham {Roorkee Prof. Papers, iv. 47), has shown that, for a given part of such a stream, where the bed is regular and of permanent section, a simple formula may be found for the variation of the central surface velocity with the depth. When once the constants of this formula have been determined by measuring the central surface velocity and depth, in different conditions of the stream, the surface velocity can be obtained by simply observing the depth of the stream, and from this the mean velocity and discharge can be calculated. Let z be the depth of the stream, and v a the surface velocity, both measured at the thread of the stream. Then v

§ 147. Mean Velocity determined by observing a Series of Surface Velocities. — The ratio of the mean velocity to the surface velocity in one longitudinal section is better ascertained than the ratio of the central surface velocity to the mean velocity of the whole cross section. Suppose the river divided into a number of compartments by equidistant longitudinal planes, and the surface velocity observed in each compartment. From this the mean velocity in each compartment and the discharge can be calculated. The sum of the partial discharges will be the total discharge of the stream. When wires or ropes can be stretched across the stream, the compartments can be marked out by tags attached to them. Suppose two such ropes stretched across the stream, and floats dropped in above the upper rope. By observing within which compartment the path of the float lies, and noting the time of transit between the ropes, the surface velocity in each compartment can be ascertained The mean velocity in

each compartment is 0-85 to o-gi of the surface velocity in that compartment. Putting k for this ratio, and vi, v-2 . . . for the observed velocities, in compartments of area ill, ik … then the total discharge is

Q = HQiv 1 a 2 Vi ...).

If several floats are allowed to pass over each compartment, the mean of all those corresponding'to one compartment is to be taken as the surface velocity of that compartment.

This method is very applicable in the case of large streams or rivers too wide to stretch a rope across. The paths of the floats are then ascertained in this way. Let fig. 148 represent a portion of the river, which should be straight and free from obstructions.

Suppose a base line AB measured parallel to the thread of the stream, and let the mean cross section of the stream be ascertained either by

■ J£ sounding the terminal cross sections AE, BF, or by sounding a series of equidistant cross sections. The cross sections are taken at right angles to the base line. Observers are placed at A and B with theo- dolites or box sextants. The floats are dropped in from a boat above AE, and picked up by another boat below BF. An observer with a chronograph or watch notes the time in which each float passes from AE to BF. The method of proceeding is this. The observer _ -F A sets his theodolite in the direc- tion AE, and gives a signal to drop a float. B keeps his instrument on the float as it comes down. At the moment the float arrives at C in the line AE, the observer at A calls out. B clamps his instrument and reads off the angle ABC, and the time observer begins to note the time of transit. B now points his instrument in the direction BF, and A keeps the float on the cross wire of his instrument. At the moment the float arrives at D in the line BF, the observer B calls out,- A clamps his instru- ment and reads off the angle BAD, and the time observer notes the time of transit from C to D. Thus all the data are determined for plotting the path CD of the float and determining its velocity. By dropping in a series of floats, a number of surface velocities can be determined. When all these have been plotted, the river can be

A—

B >

ft-

n

Fig. 148

divided into convenient compartments. The observations belonging to

each compartment are then averaged, and the mean velocity and discharge calculated. It is obvious that, as the surface velocity is greatly altered by wind, experiments of this kind should be made in very calm weather.

The ratio of the surface velocity to the mean velocity in the same vertical can be ascertained from the formulae for the vertical velocity curve already given (§ 101). Exner, in Erbkam's Zeitschrift for 1875, gave the following convenient formula. Let v be the mean and V the surface velocity in any given vertical longitudinal section, the depth of which is h

v/V = (1 +0-I478V h)/{i +0-22I6V h).

If vertical velocity rods are used instead of common floats, the mean velocity is directly determined for the vertical section in which the rod floats. No formula of reduction is then necessary. The observed velocity has simply to be multiplied by the area of the compartment to which it belongs.

§ 148. Mean Velocity of the Stream from a Series of Mid Depth Velocities. — In the gaugings of the Mississippi it was found that the mid depth velocity differed by only a very small quantity from the mean velocity in the vertical section, and it was uninfluenced by wind. If therefore a series of mid depth velocities are determined by double floats or by a current meter, they may be taken to be the mean velocities of the compartments in which they occur, and no formula of reduction is necessary. If floats are used, the method is precisely the same as that described in the last paragraph for sur- face floats. The paths of the double floats are observed and plotted, and the mean taken of those corresponding to each of the compart- ments into which the river is divided. The discharge is the sum of the products of the observed mean mid depth velocities and the areas of the compartments.

§ 149. P. P. Boileau's Process for Gauging Streams. — Let U be the mean velocity at a given section of a stream, V the maximum velocity, or that of the principal filament, which is generally a little below the surface, W and w the greatest and least velocities at the surface. The distance of the principal filament from the surface is generally less than one-fourth of the depth of the stream; W is a little less than V; and U lies between W and w. As the surface velocities change continuously from the centre towards the sides there are at the surface two filaments having a velocity equal to U. The deter- mination of the position of these filaments, which Boileau terms the gauging

filaments, cannot be effected entirely by theory. But, for sections of a stream in which there are no abrupt changes of depth, their position can be very approximately assigned. Let A and / be the horizontal distances of the surface filament, having the velocity W, from the gauging filament, which has the velocity U, and from the bank on one side. Then

A// = c 4 V{(W+2a;)/7(W T TO)!, c being a numerical constant. From gaugings by Humphreys and Abbot, Bazin and Baumgarten, the values c =0-919, 0-922 and 0-925 are obtained. Boileau adopts as a mean value 0-922. Hence, if W and w are determined by float gauging or otherwise, A can be found, and then a single velocity observation at A ft. from the filament of maximum velocity gives, without need of any reduction, the mean velocity of the stream. More conveniently W, w, and U can be measured from a horizontal surface velocity curve, obtained from a series of float observations.

§ 150. Direct Determination of the Mean Velocity by a Current Meter or Darcy Gauge. — The only method of determining the mean velocity at a cross section of a stream which involves no assumption of the ratio of the mean velocity to other quantities is this — a plank bridge is fixed across the stream near its surface. From this, velocities are observed at a sufficient number of points in the cross section of the stream, evenly distributed over its area. The mean of these is the true mean velocity of the stream. In Darcy and Bazin's ex- periments on small streams, the velocity was thus observed at 36 points in the cross section.

When the stream is too large to fix a bridge across it, the observa- tions may be taken from a boat, or from a couple of boats with a gangway between them, anchored successively at a series of points across the width of the stream. The position of the boat for e=vm series of observations is fixed by angular observations to a base line on shore.

§ 151. A. R. Harlacher's Graphic Method of determining the Dis- charge jrom a Series of Current Meter Observations. — Let ABC (fig. 149) be the cross section of a river at which a complete series of

*p5

Fig. 149.

current meter observations have been taken. Let I., II., VI … be the verticals at different points of which the velocities were men ˆuted.

Suppose the depths at I., II., III., . . . (fig. 149), set off as vertical ordinates in fig. 150, and on these vertical ordinates suppose the velocities set off horizontally at their proper depths. Thus, if v is the measured velocity at the depth h from the surface in fig. 149, on vertical marked III., then at III. in fig. 150 take cd = h and ac = v. Then d is a point in the vertical velocity curve for the vertical III., and, all the velocities for that ordinate being similarly set off, the curve can be drawn. Suppose all the vertical velocity curves I. . . . V. (fig. 150), thus drawn. On each of these figures draw verticals

corresponding to veloci-

[

R

m

V

0 > 1TMI 9 f ˆ

y //«• 1/ V which a

Fig. 150.’

ties of x, 2x, i,x . . . ft. second. Then for cd at III. (fig. the depth at which a velocity of 2x ft. per second existed on the vertical III. in fig. 149 and if cd is set off at III. in fig. 149 it gives a point in a curve passing through points of the section where the velocity was 2x ft. per second. Set off on each of the verticals in fig. 149 all the depths thus found in the corresponding diagram in fig. 150. Curves drawn through the corresponding points on the verticals are curves of equal velocity.

The discharge of the stream per second may be regarded as a solid having the cross section of the river (fig. 149) as a base, and cross

Left bank-

out in this way. The upper figure shows the section of the river and the positions of the verticals at which the soundings and gaugings

were taken. The lower gives the curves of equal velocity, worked out from the current meter observations, by the aid of vertical velocity curves. The vertical scale in this figure is ten times as great as in the other. The discharge calculated from the contour curves is 14-1087 cubic metres per second. In the lower figure some other interesting curves are drawn. Thus, the uppermost dotted curve is the curve through points at which the maximum velocity was found ; it shows that the maximum velocity was always a little below the surface, and at a greater depth at the centre than at the sides. The next curve shows the depth at which the mean velocity for each vertical was found. The next is the curve of equal velocity corre- sponding to the mean velocity of the stream; that is, it passes through points in the cross section where the velocity was identical with the mean velocity of the stream.

Hydraulic Machines

§ 152. Hydraulic machines may be broadly divided into two classes: (1) Motors, in which water descending from a higher to a lower level, or from a higher to a lower pressure, gives up energy which is available for mechanical operations; (2) Pumps, in which the energy of a steam engine or other motor is expended in raising water from a lower to a higher level. A few machines such as the ram and jet pump combine the functions of motor

Riqht bank .

s S <» =• s S Sfc SS S5 ss

♦•08 4-80 6-66 7-30 9-2* 9-80 H-82 12-30 l*-fl 14-80 J6-92 17-30 SSI 19-80 22-15 22-30 24.-80

Discharge per Second = Q = 14-1087 cui> – m Curves of ean-aX velocity.

27-30

29-43

Fig. 151.

sections normal to the plane of fig. 149 given by the diagrams in fig. 150. The curves of equal velocity may therefore be considered as contour lines of the solid whose volume is the discharge of the stream per second. Let ilo be the area of the cross section of the river, il u £1* ■ ■ • the areas contained by the successive curves of equal velocity,

or, if these cut the surface of the stream, by the curves and that surface. Let x be the difference of velocity for which the successive curves are drawn, assumed above for simplicity at 1 ft. per second. Then the volume of the successive layers of the solid body whose volume represents the discharge, limited by successive planes passing through the contour curves, will be

j*(!2o + $2i), ˆ(fii-Fty, and so on. Consequently the discharge is

Q = *U(Qb + Q») + Qi = 0! + • + Q»-i}. The areas I2o, Q t . . . are easily ascertained by means of the polar planimeter. A slight difficulty arises in the part of the solid lying above the last contour curve. This will have generally a height which is not exactly x, and a form more rounded than the other layers and less like a conical frustum. The volume of this may be estimated separately, and taken to be the area of its base (the area tt») multiplied by i to \ its height.

Fig. 151 shows the results of one of Harlacher's gaugings worked'

and pump. It may be noted that constructively pumps are essentially reversed motors. The reciprocating pump is a re- versed pressure engine, and the centrifugal pump a reversed turbine. Hydraulic machine tools are in principle motors com- bined with tools, and they now form an important special class. Water under pressure conveyed in pipes is a convenient and economical means of transmitting energy and distributing it to many scattered working points. Hence large and important hydraulic systems are adopted in which at a central station water is pumped at high pressure into distributing mains, which convey it to various points where it actuates hydraulic motors operating cranes, lifts, dock gates, and in some cases riveting and shearing machines. In this case the head driving the hydraulic machinery is artificially created, and it is the con- venience of distributing power in an easily applied form to distant points which makes the system advantageous. As there is some unavoidable loss in creating an artificial head this system is most suitable for driving machines which work intermittently

(see Power Transmission). The development of electrical methods of transmitting and distributing energy has led to the utilization of many natural waterfalls so situated as to be useless without such a means of

transferring the power to points where it can be conveniently applied. In some cases, as at Niagara, the hydraulic power can only be economically developed in very large units, and it can be most conveniently subdivided and distributed by transformation into electrical energy. Partly from the development of new industries such as paper-making from wood pulp and electro-metallurgical processes, which require large amounts of cheap power, partly from the facility with which energy can now be transmitted to great distances electrically, there has been a great increase in the utilization of water-power in countries having natural waterfalls. According to the twelfth census of the United States the total amount of water-power reported as used in manufacturing establishments in that country was 1,130,431 h.p. in 1870; 1,263,343 h.p. in 1890; and 1,727,258 h.p. in 1900. The increase was 8-4% in the decade 1870-1880, 3-1% in 1880-1890, and no less than 36-7% in 1890-1900. The increase is the more striking because in this census the large amounts of hydraulic power which are transmitted electrically are not included.

XII. IMPACT AND REACTION OF WATER § 153- When a stream of fluid in steady motion impinges on a solid surface, it presses on the surface with a force equal and opposite to that by which the velocity and direction of motion of the fluid are changed. Generally, in problems on the impact of fluids, it is necessary to neglect the effect of friction between the fluid and the surface on which it moves.

During Impact the Velocity of the Fluid relatively to the Surface on ■which it impinges remains unchanged in Magnitude. — Consider a mass of fluid flowing in contact with a solid surface also in motion, the motion of both fluid and solid being estimated relatively to the earth. Then the motion of the fluid may be resolved into two parts, one a motion equal to that of the solid, and in the same direction, the other a motion relatively to the solid. The motion which the fluid has in common with the solid cannot at all be influenced by the con- tact. The relative component of the motion of the fluid can only be altered in direction, but not in magnitude. The fluid moving in contact with the surface can only have a relative motion parallel to the surface, while the pressure between the fluid and solid, if friction is neglected, is normal to the surface. The pressure therefore can only deviate the fluid, without altering the magnitude of the relative velocity. The unchanged common component and, combined with it, the deviated relative component give the resultant final velocity, which may differ greatly in magnitude and direction from the initial velocity.

From the principle of momentum, the impulse of any mass of fluid reaching the surface in any given time is equal to the change of

momentum estimated in the same direction. The pressure between the fluid and surface, in any direction, is equal to the change of momentum in that direction of so much fluid as reaches the surface in one second. If Pa is the pressure in any direction, m the mass of fluid impinging per second, v a the change of velocity in the direction of Pa due to impact, then

Pa = mv a – If ;‘i (fig. 152) is the velocity and direction of motion before impact, v* that after impact, then v is the total change of motion due to impact. The resultant pressure of the fluid on the surface is in the direction of », and is equal to v multiplied by the mass impinging per second. That is, putting ‘ P for the resultant pressure, P = mn. Let P be resolved into two components, N and T, normal and tangential to the direction of motion of the solid on which the fluid impinges. Then N is a lateral force producing a pressure on the supports of the solid, T is an effort which does work on the solid. If u is the velocity of the solid, Tm is the work done per second by the fluid in moving the solid surface.

Let Q be the volume, and GQ the weight of the fluid impinging per second, and let Vi be the initial velocity of the fluid before striking the surface. Then GQ > i 2 /2g is the original kinetic energy of Q cub. ft. oi fluid, and the efficiency of the stream considered as an arrange- ment for moving the solid surface is

i, = T«/(GQV/2g).

§ 154. Jet deviated entirely in one Direction. — Geometrical Solution

(fig- J53)- — Suppose a jet of water impinges on a surface ac with a

velocity ab, and let it be wholly deviated in planes parallel to the

figure. Also let ae be the velocity and direction of motion of the

surface. Join eb; then the water moves with respect to the surface in the direction and with the velocity eb. As this relative velocity is unaltered by contact with the surface, take cd = eb, tangent to the surface at c, then cd is the relative motion of the water with respect to the surface at c. Take df equal and parallel to ae. Then/c (obtained by compounding the relative motion of water to surface and common velocity of water and surface) is the absolute velocity and direction

Fig. 152.

Fig. 153.

of the water leaving the surface. Take ag equal and parallel to fc. Then, since ab is the initial and ag the final velocity and direction of motion, gb is the total change of motion of the water. The resultant pressure on the plane is in the direction gb. Join eg. In the triangle gae, ae is equal and parallel to df, and ag to fc. Hence eg is equal and parallel to cd. But cd = eb = relative motion of water and surface. Hence the change of motion of the water is represented in magnitude and direction by the third side of an isosceles triangle, of which the other sides are equal to the relative velocity of the water and surface, and parallel to the initial and final directions of relative motion.

Special Cases

§ 155- (1) 4 Jet impinges on a plane surface at rest, in a direction normal to the plane (fig. 154). — Let a jet whose section is w impinge with a velocity v on a plane surface at rest, in a direction normal to the plane. The particles approach the plane, are gradually deviated, and finally flow away parallel to the plane, having then no velocity in the original direction of the jet. The quantity of water impinging per second is uiv. The pressure on the plane, which is equal to the change of momentum per second, is P = (G/g)o»».

(2) If the plane is moving in the direction of the jet with the velocity = < = w, the quantity impinging per second is w(i > = * = «). The momentum of this quantity before impact is (G/g)u(u = t = w)ii. After impact, the water still possesses the velocity = * = u in the direction of the jet; and the momentum, in that direction, of so much water as impinges in one second, after impact, is = fc(G/g)w(» = Ftt)tt. The pressure on the plane, which is the change of momentum

per second, is the difference of these quantities or P = (G/g)w(t) = F«) 2 . This differs from the expression obtained in the previous case, in that the relative velocity of the water and plane v = fu is sub- stituted iorv. Theexpression maybe written P = 2XGXw(d = f u) 2 l2g, where the last two terms are the volume of a prism of water whose section is the area of the jet and whose length is the head due to the relative velocity. The pressure on the plane is twice the weight of that prism of water. The work done when the plane

= i— J

Fig. 154.

OF WATER

HYDRAULICS

is moving in the same direction as the jet is Pu = {G/g)u{v-ufu foot-pounds per second. There issue from the jet w cub. ft. per second, and the energy of this quantity before impact is (G/2g)wz> 3 . The efficiency of the jet is therefore 17 = 2 (v — uˆn/v 3 . The value of u which makesthisa maximum isfound by differentiating and equating the differential coefficient to zero : — d-qjclu = 2 (v 2 – \vu +3» 2)/ i' 3 = o ; .'. u =v or jf. The former gives a minimum, the latter a maximum efficiency. Putting w = \v in the expression above, t) max. = s 3 7 . (3) If, instead of one plane moving before the jet, a series of planes are introduced at short intervals at the same point, the quantity of water impinging on the series will be wv instead of a(v-u), and the whole pressure = (G/g)wti(o-tt)- The work done is (G/g)avu (v-u). The efficiency 7;=— (G!g)o>vu(v-u)-i-(Gl2g)uv* = 2u(v-u)/v 2 . This be- comes a maximum for d-qjdu = 2{v-2u)=o, or M = J», and the ?) = §. This result is often used as an approximate expression for the velocity of greatest efficiency when a jet of water strikes the floats of a water wheel. The work wasted in this case is half the whole energy of the jet when the floats run at the best speed.

§ T 56- (4) Case of a Jet impinging on a Concave Cup Vane, velocity of water », velocity of vane in the same direction u (fig. 155), weight impinging per second = Gw(v – u).

If the cup is hemispherical, the water leaves the cup in a direction parallel to the jet. Its relative velocity is v-u when ap- proaching the cup, and -(»-«) when leaving it. Hence its absolute velocity when leaving the cup is u – (v – u) = 2u-v. The change of momentum per second = (G/g)w(i>tt) \v

(2U-V)\ = 2(G/g)w(fl-K) 2 .

Comparing this with case 2, it is seen that the pressure on a hemispherical cup is double that on a flat plane. p IG jcc The work done on the

cup = 2(G/g)u (v-u) 2 u foot- pounds per second. The efficiency of the jet is greatest when z> = 3«; in that case the efficiency = \§.

If a series of cup vanes are introduced in front of the jet, so that the quantity of water acted upon is us instead of u>(v-u), then the whole pressure on the chain of cups is (G/g)wi>Si>-(2tt-2))| = 2(G/ g)uv(v-u). In this case the efficiency is greatest when t> = 2«, and the maximum efficiency is unity, or all the energy of the water is expended on the cups.

§157- (5) Caseof a FlatVane oblique to the Jet (fig.156). — Thiscase presents some difficulty. The water spreading on the plane in all

2u

Fig. 156.

directions from the point of impact, different particles leave the plane with different absolute velocities. Let AB = v = velocity of water, AC = m = velocity of plane. Then, completing the parallelogram, AD represents in magnitude and direction the relative velocity of water and plane. Draw AE normal to the plane and DE parallel to the plane. Then the relative velocity AD may be regarded as con- sisting of two components, one AE normal, the other DE parallel to the plane. On the assumption that friction is insensible, DE is unaffected by impact, but AE is destroyed. Hence AE represents the entire change of velocity due to impact and the direction of that change. The pressure on the plane is in the direction AE, and its amount is = mass of water impinging per second X AE.

Let DAE=0, and let AD=i>. Then AE=i>, cos0; DE=u, sin 9. If Q is the volume of water impinging on the plane per second, the change of momentum is (G/g)Qiv cos 0. Let AC = w = velocity of the plane, and let AC make the angle CAE = 8 with the normal to the plane. The velocity of the plane in the direction AE = u cos 8. The work of the jet on the plane = (G/g)G> r cos 6 u cos 8. The same problem may be thus treated algebraically (fig. 157). Let BAF =a, and CAF =5. The velocity v of the water may be de- composed into AF=i> cos a normal to the plane, and FB=i> sin a parallel to the plane. Similarly the velocity of the plane =w = AC = BD can be decomposed into BG = FE = u cos 5 normal to the plane, and DG u sin 8 parallel to the plane. As friction is neglected, the velocity of the water parallel to the plane is unaffected by the im pact, but its component v cos o normal to the plane becomes after

impact the same as that of the plane, that is, u cos 8. Hence the change of velocity during impact =AE=t> cos a-u cos 8. The change of momentum per second, and consequently the normal

i Fig. 157. pressure on the plane is N = (G/g) Q (» cos a-«cos 8). The pressure in the direction in which the plane is moving is P = N cos 8 = (GMQ

&7T0? – ” COS S) C0S S ‘ and the work done on the P lane is P« = (G/

g)0> cos a- M cos 8) u cos 8, which is the same expression as before, since AE =v r cos =» cos a-u cos 8.

In one second the plane moves so that the point A (fig. 1-58) comes to C, or from the position shown in full lines to the position shown in dotted lines. If the plane remained stationary, a length AB=j; of the jet would impinge on the plane, but, since the plane moves in the same direction as the jet, only the length HB=AB-AH impinges on the plane.

But AH = AC cos 8/ cos o = « cos 8/ cos a, and therefore HB=s-m cos 8/ cos a. Let w = sectional area of jet; ”[■•”

volume impinging on plane P

per second = Q = w(v-u cos IG- I 5°-

8/cos a) =«(«; cos a-u cos 8)/ cos a. Inserting this in the formulae above, we get

N = (v cos a-u cos 8) 2 ; (1)

g cos a ‘ ‘ v ‘

xi cos 8/ ...

(v cos a-u cos 8) 2 ;

cos a ‘ ‘

cos 8/

p_G 1

g G

Pm

w u ^”° ” (v cos a-u cos 8) J .

cos a ‘

(2) (3)

Three cases may be distinguished : —

(a) The plane is at rest. Then u =0, N = (G/g)wi; 2 cos o ; and the

work done on the plane and the efficiency of the jet are zero.

(b) The plane moves parallel to the jet. Then 8 = 0, and P« = (G/g) au cos 2 a(v — uY, which is a maximum when u = iv.

When m = |zj then Pu max. = s % (Glg)uv 3 cos 2 a, and the efficiency = ij = J cos 2 a.

(c) The plane moves perpendicularly to the jet. Then S = c.o°-a; cosS=sin a; and P M =^ u «2i n _?(t , cos a Msina) 2 . This is a maxi mum when u = \v cos a.

When u = \v cos a, the maximum work and the efficiency are the same as in the last case.

§ 158. Best Form of Vane to receive Water. — When water impinges normally or obliquely on a plane, it is scattered in all directions a | ter impact, and the work carried away by the water is then gener- ally lost, from the impossibility of dealing afterwards with streams of water deviated in so many directions. By suitably forming the vane,

Fig. 159. however, the water may be entirely deviated in one direction, anfc the loss of energy from agitation of the water is entirely avoided.

Let AB (fig. 159) be a vane, on which a jet of water impinges at the point A and in the direction AC. Take AC =n = velocity of

water, and let AD represent in magnitude and direction the velocity of the vane. Completing the parallelogram, DC or AE represents the direction in which the water is moving relatively to the vane. If the lip of the vane at A is tangential to AE, the water will not have its direction suddenly changed when it impinges on the vane, and will therefore have no tendency to spread laterally. On the contrary it will be so gradually deviated that it will glide up the vane in the direction AB. This is sometimes expressed by saying that the vane receives the water without shock.

§ 159. Floats of Poncelet Water Wheels. — Let AC (fig. 160) repre- sent the direction of a thin horizontal stream of water having the

cityu. — The relative velocity = v—u. The final velocity BF (fig. 162} is found by combining the relative velocity BD=i> — u tangential to the surface with the velocity BE = u of the surface. The intensity of normal pressure, as in the last case, is (G/g)t(v — u) 2 /r. The resultant

velocity v. Let AB be a curved float moving horizontally with velocity u. The relative motion of water and float is then initially horizontal, and equal to v — u.

In order that the float may receive the water without shock, it is necessary and sufficient that the lip of the float at A should be tangential to the direction AC of relative motion. At the end of (v — u)/g seconds the float moving with the velocity u comes to the position A1B1, and during this time a particle of water received at A and gliding up the float with the relative velocity v — u, attains a height DE = (zj — u)-J2g. At E the water comes to relative rest. It then descends along the float, and when after 2(y—u)/g seconds the float has come to A 2 B 2 the water will again have reached the lip at Ao and will quit it tangentially, that is, in the direction CA 2 , with a relative velocity — (v — u) = — V (2gDE) acquired under the influence of gravity. The absolute velocity of the water leaving the float is therefore u— (v — u) =211 — v. If u = \ v, the water will drop off the bucket deprived of all energy of motion. The whole of the work of the jet must therefore have been expended in driving the float. The water will have been received without shock and discharged without velocity. This is the principle of the Poncelet wheel, but in that case the floats move over an arc of a large circle ; the stream of water has considerable thickness (about 8 in.); in order to get the water into and out of the wheel, it is then necessary that the lip of the float should make a small angle (about 15) with the direction of its motion. The water quits the wheel with a little of its energy of motion remaining.

§ 160. Pressure on a Curved Surface when the Water is deviated wholly in one Direction. — When a jet of water impinges on a curved surface in such a direction that it is received without shock, the pressure on the surface is due to its gradual deviation from its first direction. On any portion of the area the pressure is equal and opposite to the force required to cause the deviation of so much water as rests on that surface. In common language, it is equal to the centrifugal force of that quantity of water.

Case I. Surface Cylindrical and Stationary. — Let AB (fig. 161) be the surface, having its axis at O and its radius ~r. Let the

water impinge at A tangentially, and quit the surface tangentially at B. Since the surface is at rest, v is both the absolute velocity of the water and the velocity relatively to the surface, and this remains unchanged during contact with the surface, because the deviating force is at each point perpendicular to the direction of motion. The water is deviated through an angle BCD = AOB = <£. Each particle of water of weight p exerts radially a centrifugal force pv-/rg. Let the thickness of the stream = t ft. Then the weight of water resting on unit of surface = Gt lb ; and the normal pressure per unit of surface = n = Gtv-/gr. The resultant of the radial pressures uni- formly distiibuted from A to B will be a force acting in the direction OC bisecting AOB, and its magnitude will equal that of a force of intensity = n, acting on the projection of AB on a plane perpendicular to the direction OC. The length of the chord AB = 2r sin \if>\ let b = breadth of the surface perpendicular to the plane of the figure. The resultant pressure on surface

= R

, . 4, _ Gt v 2 = 2rt> sin — X =

■2 — to 2 sin — 1 g 2

2 g r

which is independent of the radius of curvature. It may be inferred that the resultant pressure is the same for any curved surface of the same projected area, which deviates the water through the same angle.

Case 2. Cylindrical Surface moving in the Direction AC with Velo-

Tig. 162.

normalpressureR = 2(G/g)6<(f— «) 2 sin j <#>. This resultant pressure may be resolved into two components P and L, one parallel and tne other perpendicular to the direction of the vane's motion. The former is an effort doing work on the vane. The latter is a lateral force which does no work.

P = R sin l = (G/g)bt(v-uy{i -cos <#>) ; L = R cos i = (G/g)bt(v — u) 2 sin.

The work done by the jet on the vane is Pu = (G/g)btu(v — tt) 2 (l-cos (j>), which is a maximum when m = Jz>. This result can also be obtained by considering that the work done on the plane must be

equal to the energy lost by the water, when friction is neglected.

If <£ = i8o°, cos <£= — 1, 1 -cos = 2; then P = 2{G/g)bt(v-u)\ the same result as for a concave cup.

§ 161. Position which a Movable Plane takes in Flowing Water. — ■ When a rectangular plane, movable about an axis parallel to one of its sides, is placed in an in- definite current of fluid, it takes a position such that the resultant of the normal pres- sures on the two sides of the axis passes through the axis. If, therefore, planes pivoted so that the ratio a/b (fig. 163) is varied are placed in water, and the angle they make with the direction of the stream is observed, the position of the resultar.t of the pressures on Fig. 163.

the plane is determined for

different angular positions. Experiments of this kind have been made by Hagen. Some of his results are given in the following table : —

1

Larger plane.

Smaller Plane.

a/b = 1 -o

= .-..

4> = 9o°

0-9

7 K

72i°

o-8

6o°

57°

0-7

*K

43°

o-6

25°

29°

o-5

13

13°

0-4

8°

6i°

o-3

6i°

0-2

4°

§ 162. Direct Action distinguished from Reaction (Rankine, Steam Engine, § 147).

The pressure which a jet exerts on a vane can be distinguished into two parts, viz. : —

(1) The pressure arising from changing the direct component of the velocity of the water into the velocity of the vane. In fig. J 53. § : 54i a° cos bae is the direct component of the water's velocity, or component in the direction of motion of vane. This is changed into the velocity ae of the vane. The pressure due to direct impulse is then

Pi = GQ(ab cos bae — ae)/g. ‘ •

For a flat vane moving normally, this direct action is the only action producing pressure on the vane.

(2) The term reaction is applied to the additional action due to the direction and velocity with which the water glances off the vane. It is

this which is diminished by the friction between the water and the vane. In Case 2, § 160, the direct pressure is

Pi = G&*(»-w)7g- That due to reaction is

P 2 = – Gbt{v – m) 2 cos lg. If <£<90°, the direct component of the water's motion is not wholly converted into the velocity of the vane, and the whoU

Fig. 164.

pressure due to direct impulse is not obtained. If <£>ao°, cos 1ˆ is negative and an additional pressure due to reaction is obtained

§ 163. Jet Propeller. — In the case of vessels propelled by a jet of water (fig. 164), driven stern wards from orifices at the side of the vessel, the water, originally at rest out- side the vessel, is drawn into the ship and caused to move with the forward velocity V of the ship. Afterwards it is projected sternwards from the jets with a velocity v relatively to the ship, or v— V relatively to the earth. If Q is the total sectional area of the jets, Shv is the quantity of water discharged per second. The momentum generated per second in a sternward direction is (G/g)Sto(t>— V), and this is equal to the forward acting reaction P which propels the ship.

The energy carried away by the water

= i(Gk)Q-j(v-V)\ The useful work done on the ship

PV = (C/g)Sto(»-V)V. (2)

Adding (1) and (2), we get the whole work expended on the water, neglecting friction: —

W = i(G/g)Sto(» 2 -V 2). Hence the efficiency of the jet propeller is

PVAV = 2V/(»+V). (3)

This increases towards unity as v approaches V. In other words, the less the velocity of the jets exceeds that of the ship, and there- fore the greater the area of the orifice of discharge, the greater is the efficiency

of the propeller.

In the ” Waterwitch ” v was about twice V. Hence in this case the theoretical efficiency of the propeller, friction neglected, was about f.

§ 164. Pressure of a Steady Stream in a Uniform Pipe on a Plane normal to the Direction of Motion. — Let CD (fig. 165) be a plane

(1)

\A \Aj \ A a 1

i i^^f^S^^; ‘■■ — ““nl

i ^/r’C’ ””- x -”” — ‘■ I

.

: :_ :IUS5= “- = 1

_i ~~^> >X’<^^ ; ■ – 1

i I i ■

\A I A! \A B 1

an expression like that for the pressure of an isolated jet on an indefinitely extended plane, with the addition of the term in brackets, which depends only on the areas of the stream and the plane. For a given plane_ the expression in brackets diminishes as fi increases. If il/ oi = p, the equation (4) becomes

R = Go>— !

2g I

■)”!■

(40)

_ . Cc(p-l)

which is of the form

R = Gco(i» 2 /2g)K, where K depends only on the ratio of the sections of the stream and plane.

For example, let c=o-85, a value which is probable, if we allow that

the sides of the pipe act as internal borders to an orifice. Then

p

Fig. 165.

placed normally to the stream which, for simplicity, may be supposed to flow horizontally. The fluid filaments are deviated in front of the plane, form a contraction at AiAt, and converge again, leaving a mass of eddying water behind the plane. Suppose the section A0A0 taken at a point where the parallel motion has not begun to be disturbed, and A2A2 where the parallel motion is re- established. Then since the same quantity of water with the same velocity passes A0A0, A2A2 in any given time, the external forces produce no change of momentum on the mass A0A0A2A2, and must therefore be in equilibrium. If U is the section of the stream at AoAo or AjAj, and u the area of the plate CD, the area of the con- tracted section of the stream at A1A1 will be c c (il— w), where c c is the coefficient of contraction. Hence, if v is the velocity at AoAo or A2A2, and “i>i the velocity at A1A1,

vU— c c v (CI — «);

.”. fi = vQ/c c (Q — w). (I)

Let pa, pi, p 2 be the pressures at the three sections. Applying Bernoulli’s theorem to the sections AoAo and A1A1,

G + 2g Gˆzg’ Also, for the sections A1A1 and A 2 A 2 , allowing that the head due to the relative velocity Vi—v is lost in shock: —

P\ . gl 2 _ˆ2 , b 8 , (vi-v) 2 . G + 2g G _l “2g” 1 ” 2g ‘

(2)

■ ‘■po-p2 = G(v 1 -v) 2 /2g; or, introducing the value in (1),

Po -p 2 = (i(_° -,y»» (3)

2g\c c (tt-u)) _ w

Now the external forces in the direction of motion acting on the

mass A0A0A2A2 are the pressures pA —pitl at the ends, and the

reaction — R of the plane on the water, which is equal and opposite

to the pressure of the water on the plane. As these are in equilibrium,

(i > o-£ 2)n-R = 0;

.•■R = G0(° , -.)¥; (4)

K-

1-176-

p =

1 2 3 4 5 10

50 100

K =

CO

3-66

1-75 1-29

I-IO

•94

2-00

3-50

The assumption that the coefficient of contraction c c is constant for different values of p is probably only true when p is not very large. Further, the increase of K for large values of p is contrary to experience, and hence it may be inferred that the assumption that ‘ all the filaments have a common velocity Vi at the section A1A1 and a common velocity v at the section A2A2 is not true when the stream is very much larger than the plane. Hence, in the expression

R = KGcoz/ 2 /2g, K must be determined by experiment in each special case. For a cylindrical body putting o > for the section, c c for the coefficient of contraction, c c (Q— w) for the area of the stream at A1A1,

vi = vil/c c (Q— w); D2 = ! > n/(fi — u) ; or, putting p = il/w,

Vi = vplc c (p — i), v 2 = vpl(p~i).

R = KiG«D 2 /2g,

K H(ˆra-)H-v-n-

Then where

Taking c c = o-85 and p = 4, Ki = 0-467, a value less than before. Hence there is less pressure on the cylinder than on the thin plane.

§ 165. Distribution of Pressure on a Surface on which a Jet impinges normally. — The principle of momentum gives readily enough the total or resultant pressure of a jet impinging on a plane surface, but in some cases it is useful to know the distribution of the pressure.

The problem in the case in which the plane is struck normally, and the jet spreads in all directions, is one of great complexity, but even in that case the maximum intensity of the pressure is easily assigned. Each layer of water flowing from an orifice is gradually deviated (fig. 166) by contact with the sur- face, and during deviation exercises a centrifugal pressure towards the axis of the jet. The force exerted by each small mass of water is normal to its path and inversely as the radius of curvature of the path. Hence the greatest pressure on the plane must be at the axis of the jet, and the pressure must decrease from the axis outwards, in some such way as is shown by the curve of pressure in fig. 167, the branches of the curve being probably asymptotic to the plane.

For simplicity suppose the jet is a vertical one. Let hi (fig. 167) be the depth of the orifice from the free surface, and Vi the velocity of discharge. Then, if a; is the area of the orifice, the quantity of water impinging on the plane is obviously

Q = w»i = wV(2gW; that is, supposing the orifice rounded, and neglecting the coefficient of discharge.

The velocity with which the fluid reaches the plane is, however, greater than this, and may reach the value

v = V (2gh) ; where h is the depth of the plane below the free surface. The external layers of fluid subjected throughout, after leaving the orifice, to the atmospheric pressure will attain the velocity v, and will flow away with this velocity unchanged except by friction. The layers towards the interior of the jet, being subjected to a pressure greater than atmospheric pressure, will attain a less velocity, and so much less

as they are nearer the centre of the jet. But the pressure

Fig. 166.

9°

can in no case exceed the pressure i > 5 /2g or h measured in feet of water, or the direction of motion of the water would be reversed, and there would be reflux. Hence the maximum intensity of the pressure

Fig. 1 68 shows the pressure curves obtained in three experiments with three jets of the sizes shown, and with the free surface level in the reservoir at the heights marked.

Fig. 167.

of the jet on the plane is h ft. of water. If the pressure curve is drawn with pressures represented by feet of water, it will touch the free water surface at the centre of the jet.

Suppose the pressure curve rotated so as to form a solid of revolution. The weight of water contained in that solid is the total pressure of the jet on the surface, which has already been deter- mined. Let V = volume of this solid, then GV is its weight in pounds. Consequently

GV = (G/g)«B l »;

V = 2«V(«!l)-

We have already, therefore, two conditions to be satisfied by the pressure curve.

Some very interesting experiments on the distribution of pressure on a surface struck by a jet have been made by J. S. Beresford (Prof. Papers on Indian Engineering, No. cccxxii.), with a view to afford information as to the forces acting on the aprons of weirs. Cylindrical jets § in. to 2 in. diameter, issuing from a vessel in which the water level was constant, were allowed to fall vertically on a brass plate 9 in. in diameter. A small hole in the brass plate communicated by a flexible tube with a vertical pressure column. Arrangements were made by which this aperture could be moved jV in. at a time across the area struck by the jet. The height of the pressure column, for each position

of the aperture, gave the pressure at that point of the area struck by the jet. When the aperture was

I T , I I

*---t-Diaii.99-\ »-p

Distance from axis of jet in inches.

Fig. 168. — Curves of Pressure of Jets impinging normally on a Plane.

exactly in the axis of the jet, the pressure column was very nearly level with the free surface in the reservoir supplying the jet; that is, the pressure was very nearly v*l2g. As the aperture moved away from the axis of the jet, the pressure diminished, and it became insensibly small at a distance from the axis of the jet about equal to the diameter of the jet. Hence, roughly, the pressure due to the jet extends over an area about four times the area of section of the jet.

Experiment i.

Experiment 2.

Experiment 3.

Jet “475 in. diameter.

Jet ‘988 in. diameter.

Jet 19′ 5 in. diameter.

8 <* •

£JJ

JSVS Bus™

< <3 11

•;.s P

S

A u

1°

Hi

§0.2

w (1 ‘

£ =S

■a

!-s

ˆ a

c « rt”— »

P

53

.at»

A,

»- S3 “5

io.s

Id

8-9

U *j C

P

.5 M .S rf

r

43

40-5

42-I5

42

27-15

26-9

,,

•05

39-40

i >

•05

41-9

,,

•08

26-9

,

•1

37-5-39-5

,,

•1

41-5-41-8

,,

•13

26-8

,

■15

35

,,

•15

4i

,,

• 18

26-5-26-6

,

•2

33-5-37

,,

•2

40-3

,,

•23

26-4-26-5

,

•25

3i

,,

■25

39-2

,,

•28

26-3-26-6

t

■3

21-27

,,

•3

37-5

27

•33

26-2

,

•35

21

,,

•35

34-8

,,

•38

25-9

,

•4

14

,,

•45

27

j»

•43

25-5

,

•45

8

42-25

•5

23

,,

•48

25

,

•5

3-5

,,

•55

i8-5

,,

•53

24-5

,

•55

1

,,

•6

13

,,

•58

24

•b

o-5

,,

•05

8-3

,,

•63

23-3

n

•t > 5

,,

•7

5

,,

•68

22-5

»»

•75

3

,,

•73

21-8

,,

•8

2-2

M

•78

21

42-15

•«5 •95

1-6 1

26-5

J) »»

H >J

•«3 •88

•93 •98

1-13 1-18 1-23

1-28

i-33

1-38 1-43 1-48

i-53

1-58 1-9

20-3

19-3

18

17 13-5 12-5

io-8

9-5 8

7

6-3

5

4-3

3-5

2

As the general form of the pressure curve has been already indi- cated, it may be assumed that its equation is of the form

y = ab-‘ 2 – (1)

But it has already been shown that for jc = o, y = ft, hence a = h. To determine the remaining constant, the other condition may be used, that the solid formed by rotating the pressure curve represents the total pressure on the plane The volume of the solid is

V = I 2irxydx

= 2irh I „ J

= (7rA/log 6 6)6 l2]J

= Trh/\og e b. Using the condition already stated,

2wV (hhi) =wh/\og e b,

log e b = (7r/2w) V {hjhi).

Putting the value of b in (2) in eq. (1), and also r for the radius of the jet at the orifice, so that

_ 2

b x xdx

§ 166. Resistance of a Plane moving through a Fluid, or Pressure of a Current on a Plane. — When a thin plate moves through the air, or through an indefinitely large mass of still water, in a direction normal to its surface, there is an excess of pressure on the anterior face and a diminution of pressure on the posterior face. Let v he the relative velocity of the plate and fluid, the area of the plate, G the density of the fluid, h the height due to the velocity, then the total resistance is expressed by the equation

R =/Gfi D 2 /2g pounds =fGtih ; where /is a coefficient having about the value 1-3 for a plate moving in still fluid, and I -8 for a current impinging on a fixed plane, whether the fluid is air or water. The difference in the value of the coefficient in the two cases is perhaps due to errors of experiment. There is a similar resistance to motion in the case of all bodies of ” unfair ” form, that is, in which the surfaces over which the water slides are not of gradual and continuous curvature.

The stress between the fluid and plate arises chiefly in this way.

The streams of fluid deviated in front of the plate, supposed for definiteness to be moving through the fluid, receive from it forward momentum. Portions of this forward moving water are thrown off laterally at the edges of the plate, and diffused through the surrounding fluid, instead of falling to their original position behind the plate. Other portions of comparatively still water are dragged into motion to fill the space left behind the plate; and there is thus a pressure less than hydrostatic pressure at the back of the plate. The whole resistance to the motion of the plate is the sum of the excess of pressure in front and deficiency of pressure behind. This resistance is independent of any friction or viscosity in the fluid, and is due simply to its inertia resisting a sudden change of direction at the edge of the plate.

Experiments made by a whirling machine, in which the plate is fixed on a long arm and moved circularly, gave the following values of the coefficient /. The method is not free from objection, as the centrifugal force causes a flow outwards across the plate.

Approximate

Area of Plate

in sq. ft.

Values of /.

Borda.

Hutton.

Thibault.

013 0-25 0-63

1 -l 1

1-39 1-49 1-64

1-24

i-43

1-525 1-784

There is a steady increase of resistance with the size of the plate, in part or wholly due to centrifugal action.

P. L. G. Dubuat (1734-1809) made experiments on a plane I ft. square, moved in a straight line in water at 3 to 6| ft. per second. Calling m the coefficient of excess of pressure in front, and n the coefficient of deficiency of pressure behind, so that /=«+», he found the following values: —

ot = i; n =0-433;/= I -433. The pressures were measured by pressure columns. Experiments by A. J. Morin (1795-1880), G. Piobert (1793-1871) and I. Didion (1798-1878) on plates of 0-3 to 2-7 sq. ft. area, drawn vertically through water, gave/ = 2-i8; but the experiments were made in a reservoir of comparatively small depth. For similar plates moved through air they found /= 1-36, a result more in accordance with those which precede.

For a fixed plane in a moving current of water E. Mariotte found / =l-25- Dubuat, in experiments in a current of water like those mentioned above, obtained the values »» = l-i86; n = 0-670; / = 1-856. Thibault exposed to wind pressure planes of 1-17 and 2-5 sq. ft.

area, and found/to vary from 1-568 to 2-125, the mean value being / = 1-834, a result agreeing well with Dubuat.

§ 167. Stanton's Experiments on the Pressure of Air on Surfaces. — At the National Physical Laboratory, London, T. E. Stanton carried out a series of experiments on the distribution of pressure on surfaces in a current of air passing through an air trunk. These were on a small scale but with exceptionally accurate means of measurement. These experiments differ from those already given in that the plane is small relatively to the cross section of the current (Proc. Inst. Civ. Eng. clvi., 1904). Fig. 169 shows the distribution of pressure on a square plate, ab is the plate in vertical section, acb the distribution of pressure on the windward and adb that on the leeward side of the central section. Similarly aeb is the distribu- tion of pressure on the windward and afb on the leeward side of a diagonal ' section. The intensity of pressure at the centre of the plate on the windward side was in all cases p = Gv 2 /2g lb per sq. ft., where G is the weight of a cubic foot of air and v the velocity of the current in ft. per sec. On the leeward side the negative pressure is uniform except near the edges, and its value depends on the form of the plate. For a circular plate the pressure on the leeward side was 0-48 Gv 2 /2g and for a rectangular plate 0-66 Gi/ 2 /2g. For circular or square plates the resultant pressure on the plate was P =0-00126 11 2 lb per sq. ft. where v is the velocity of the current in ft. per sec. On a long narrow rectangular plate the resultant pressure was nearly 60% greater than on a circular plate. In later tests on larger planes in free air, Stanton found resistances 18% greater than those observed with small planes in the air trunk.

§ 168. Case when the Direction of Motion is oblique to the Plane.— The determination of the pressure between a fluid and surface in this case is of importance in many practical questions, for instance, in assigning the load due to wind pressure on sloping and curved roofs, and experiments have been made by Hutton, Vince, and Thibault on planes moved circularly through air and water on a whirling machine.

Let AB (fig. 170) be a plane moving in the direction R making an angle with the plane. The resultant pressure between the fluid and the plane will be a normal pressure N. The component R of this normal pressure is the resistance to the motion of the plane and the other component L is a lateral force resisted by the guides which support the plane. Obviously

R = N sin ; L = N cos 0. In the case of wind pressure on a sloping roof surface, R is the horizontal and L the vertical component of the normal pres- sure.

In experiments with the whirling machine it is the resistance to motion, R, which is directly measured. Let P be the pressure on a plane moved normally through a fluid. Then, for the same plane inclined at an angle tj> to its direction of motion, the resistance was found by Hutton to be

R = P(sin 0)1-842 cos*. A simpler and more convenient expression given by Colonel Duchemin is

R = 2P sin 2 0/(i +sin 2 <*>). Consequently, the total pressure between the fluid and plane is

N=2P sin /(l+sin z), and the lateral force is

L =2P sin /(i +sin 2

Angle between Plane and Direction) of Blast \

15°

20°

6o°

90°

Horizontal pressure R . . . .

Lateral pressure L

Normal pressure VL 2 + R 2 . Normal pressure by Duchemin's rule

0-4

i-6

1-65 1-605

o-6i

1-96 2-05 2-027

2-73 1-26 3-01 3-276

3-3i

3-3i

Water Motors

In every system of machinery deriving energy from a natural water-fall there exist the following parts: — •

1. A supply channel or head race, leading the water from the highest accessible level to the site of the machine. This may be an open channel of earth, masonry or wood, laid at as small a slope as is consistent with the delivery of the necessary supply of water, or it may be a closed cast or wrought-iron pipe, laid at the natural slope of the ground, and about 3 ft. below the surface. In some cases part of the head race is an open channel, part a closed pipe. The channel often starts from a small storage reservoir, constructed near the stream supplying the water motor, in which the water accumulates when the motor is not working. There are sluices or penstocks by which the supply can be cut off when necessary.

2. Leading from the motor there is a tail race, culvert, or discharge pipe delivering the water after it has done its work at the lowest convenient level.

3. A waste channel, weir, or bye- wash is placed at the origin of the head race, by which surplus water, in floods, escapes.

4. The motor itself, of one of the kinds to be described presently, which either overcomes a useful resistance directly, as in the case of a ram acting on a lift or crane chain, or indirectly by actuating transmissive machinery, as when a turbine drives the shafting, belting and gearing of a mill. With the motor is usually com- bined regulating machinery for adjusting the power and speed to the work done. This may be controlled in some cases by automatic governing machinery.

[WATER MOTORS

§ 169. Water Motors with Artificial Sources of Energy. — The great convenience and simplicity of water motors has led to their adoption in certain cases, where no natural source of water power is available. In these cases, an artificial source of water power is created by using a steam-engine to pump water to a reservoir at a great elevation, or to pump water into a closed reservoir in which there is great pressure.

The water flowing from the reservoir through hydraulic engines gives back the energy expended, less so much as has been wasted by friction. Such arrangements are most useful where a continuously acting steam engine stores up energy by pumping the water, while the work done by the hydraulic engines is done intermittently.

§ 170. Energy of a Water-fall. — Let Hi be the total fall of level from the point where the water is taken from a natural stream to the point where it is discharged into it again. Of this total fall a portion, which can be estimated independently, is expended in overcoming the resistances of the head and tail races or the supply and discharge pipes. Let this portion of head wasted be f) r . Then the available head to work the motor is H = H (— I) r . It is this available head which should be used in all calculations of the proportions of the motor. Let Q be the supply of water per second. Then GQH foot-pounds per second is the gross available work of the fall. The power of the fall may be utilized in three ways, (a) The GQ pounds of water may be placed on a machine at the highest level, and descending in con- tact with it a distance of H ft., the work done will be (neglecting losses from friction or leakage) GQH foot-pounds per second, (b) Or the water may descend in a closed pipe from the higher to the lower level, in which case, with the same reservation as before, the pressure at the foot of the pipe will be p = GH pounds per square foot. If the water with this pressure acts on a movable piston like that of a steam engine, it will drive the piston so that the volume described is Q cubic feet per second. Then the work done will be pQ = GHQ foot-pounds per second as before, (c) Or lastly, the water may be allowed to acquire the velocity v = V 2gH by its descent. The kinetic energy of Q cubic feet will then be 2GQi< 2 /g = GQH, and if the water is allowed to impinge on surfaces suitably curved which bring it finally to rest, it will impart to these the same energy as in the previous cases. Motors which receive energy mainly in the three ways described in (a), (6), (c) may be termed gravity, pressure and inertia motors respectively. Generally, if Q ft. per second of water act by weight through a distance hi, at a pressure p due to hi ft. of fall, and with a velocity v due to h% ft. of fall, so that /!i+fa-|-/i3 = H, then, apart from energy wasted by friction or leakage or imperfection of the machine, the work done will be

GQh i +pQ + (Gk)Q(v'-/2 S)=GQH foot pounds, the same as if the water acted simply by its weight while descending Hft.

§ 171. Site for Water Motor. — Wherever a stream flows from a higher to a lower level it is possible to erect a water motor. The amount of power obtainable depends on the available head and the supply of

water. In choosing a site the engineer will select a portion of the stream where there is an abrupt natural fall, or at least a considerable slope of the bed. He will have regard to the facility of constructing the channels which are to convey the water, and will take advantage of any bend in the river which enables him to shorten them. He will have accurate measurements made of the quantity of water flowing in the stream, and he will endeavour to ascertain the average quantity available throughout the year, the minimum quantity in dry seasons, and the maximum for which bye-wash channels must be provided. In many cases the natural fall can be increased by a dam or weir thrown across the stream. The engineer will also examine to what extent the head will vary in different seasons, and whether it is necessary to sacrifice part of the fall and give a steep slope to the tail race to prevent the motor being drowned by backwater in floods. Streams fed from lakes which form natural reservoirs or fed from glaciers are less variable than streams depending directly on rainfall, and are therefore advan- tageous for water-power purposes.

§ 172. Water Power at Holyoke, U.S.A. — About 85 m. from the mouth of the Connecticut river there was a fall of about 60 ft. in a short distance, forming what were called the Grand Rapids, below which the river turned sharply, forming a kind of peninsula on which the city of Holyoke is built. In 1845 the magnitude of the water-power available attracted attention, and it was decided to build a dam across the river. The ordinary flow of the river is 6000 cub. ft. per sec, giving a gross power of 30,000 h.p. In dry seasons the power is 20,000 h.p., or occasionally less. From above the dam a system of canals takes the water to mills on three levels. The first canal starts with a width of 140 ft. and depth of 22 ft., and supplies

the highest range of mills. A second canal takes the water which has driven turbines in the highest mills and supplies it to a second series of mills. There is a third canal on a still lower level supplying the lowest mills. The water then finds its way back to the river. With the grant of a mill site is also Lased the right to use the water- power. A mill-power is defined as 38 cub. ft. of water per sec. during 16 hours per day on a fall of 20 ft. This gives about 60 h.p. effective. The charge for the power water is at the rate of 20s. per h.p. per annum.

§ 173. Action of Water in a Water Motor. — Water motors may be divided into water-pressure engines, water-wheels and turbines.

Water-pressure engines are machines with a cylinder and piston or ram, in principle identical with the corresponding part of a steam-engine. The water is alternately admitted to and dis- charged from the

cylinder, causing a reciprocating action of the piston or plunger. It is admitted at a high pressure and dis- charged at a low one, and consequently work is done on the piston. The water in these machines never acquires a high velocity, and for the most part the kinetic energy of the water is wasted. The useful work is due to the difference of the pressure of admission and discharge, whether that pressure is due to the weight of a column of water of more or less considerable height, or is artificially produced in ways to be described presently.

Water-wheels are large vertical wheels driven by water falling from a higher to a lower level. In most water-wheels, the water acts directly by its weight loading one side of the wheel and so causing rotation. But in all water-wheels a portion, and in some a considerable portion, of the work due to gravity is first em- ployed to generate kinetic energy in the water; during its action on the water-wheel the velocity of the water diminishes, and the wheel is therefore in part driven by the impulse due to the change of .the water's momentum. Water-wheels are there- fore motors on which the water acts, partly by weight, partly by impulse.

Turbines are wheels, generally of small size compared with water wheels, driven chiefly by the impulse of the water. Before entering the moving part of the turbine, the water is allowed to acquire a considerable velocity; during its action on the turbine this velocity is diminished, and the impulse due to the change of momentum drives the turbine.

In designing or selecting a water motor it is not sufficient to consider only its efficiency in normal conditions of working. It is generally quite as important to know how it will act with a scanty water supply or a diminished head. The greatest difference in water motors is in their adaptability to varying conditions of working.

Water-pressure Engines.

§174. In these the water acts by pressure either due to the height of the column in a supply pipe descending from a high- level reservoir, or created by pumping. Pressure engines were first used in mine-pumping on waterfalls of greater height than could at that time be utilized by water wheels. Usually they were single acting, the water-pressure lifting the heavy pump rods which then made the return or pumping stroke by their own weight. To avoid losses by fluid friction and shock the velocity of the water in the pipes and passages was restricted to from 3 to 10 ft. per second, and the mean speed of plunger to 1 ft. per second. The stroke was long and the number of

strokes 3 to 6 per minute. The pumping lift being constant, such engines worked practically always at full load, and the efficiency was high, about 84%. But they were cumbrous machines. They are described in Weisbach's Mechanics of Engineering.

The convenience of distributing energy from a central station to scattered working-points by pressure water conveyed in pipes — a system invented by Lord Armstrong— has already been mentioned. This system has led to the development of a great variety of hydraulic pressure engines of very various types. The cost of pumping the pressure water to some extent restncts its use to intermittent operations, such as working lifts and cranes, punching, shearing and riveting machines, forging and flanging presses. To keep down the cost of the distributing

mains very high pressures are adopted, generally 700 lb per sq. in. or 1600 ft. of head or more.

In a large number of hydraulic machines worked by water at high pressure, especially lifting machines, the motor consists of a direct, single acting ram and cylinder. In a few cases double- acting pistons and cylinders are used; but they involve a water-tight packing of the piston not easily accessible. In some cases pressure engines are used to obtain rotative movement, and then two double-acting cylinders or three single-acting cylinders are used, driving a crank shaft. Some double-acting cylinders have a piston rod half the area of the piston. The pressure water acts continuously on the annular area in front of the piston. During the forward stroke the pressure on the front of the piston balances half the pressure on the back. During the return stroke the pressure on the front is unopposed. The water in front of the piston is not exhausted, but returns to the supply pipe. As the frictional losses in a fluid are independent of the pressure, and the work done increases directly as the pressure, the percentage loss decreases for given velocities of flow as the pressure increases. Hence for high-pressure machines somewhat greater velocities are permitted in the passages than for low-pressure machines. In supply mains the velocity is from 3 to 6 ft. per second, in valve passages 5 to 10 ft. per second, or in extreme cases 20 ft. per second, where there is less object in economizing energy. As the water is incompressible, slide

valves must have neither lap nor lead, and piston valves are preferable to ordinary slide valves. To prevent injurious com- pression from exhaust valves closing too soon in rotative engines i with a fixed stroke, small self-acting relief valves are fitted to the cylinder ends, opening outwards against the pressure into the valve chest. Imprisoned water can then escape without over- straining the machines.

In direct single-acting lift machines, in which the stroke is fixed, and in rotative machines at constant speed it is obvious that the cylinder must be filled at each stroke irrespective of the amount of work to be done. The same amount of water is used whether much or little work is done, or whether great or small weights are lifted. Hence while pressure engines are very efficient at full load, their efficiency decreases as the load de- creases. Various arrangements have been adopted to diminish this defect in engines working with a variable load. In lifting machinery there is sometimes a double ram, a hollow ram enclosing a solid ram. By simple arrangements the solid ram only is used for small loads, but for large loads the hollow ram is locked to the solid ram, and the two act as a ram of larger area. In rotative engines the case is more difficult. In Hastie's and Rigg's engines the stroke is automatically varied with the load, increasing when the load is large and decreasing when it is small. But such engines are complicated and have not achieved much success. Where pressure engines are used simplicity is generally a first consideration, and economy is of less importance.

§ 175. Efficiency of Pressure Engines. — It is hardly possible to form a theoretical expression for the efficiency of pressure engines, but some general considerations are useful. Consider the case of a long stroke hydraulic ram, which has a fairly constant velocity v during the stroke, and valves which are fairly wide open during most of the stroke. Let r be the ratio of area of ram to area of valve passage, a ratio which may vary in ordinary cases from 4 to 12. Then the loss in shock of the water entering the cylinder will be (r — i)V/2g in ft. of head. The friction in the supply pipe is also proportional to :-. The energy carried away in exhaust will be proportional to v 2 . Hence the total hydraulic losses may be taken to be approximately !"//2g ft., where f is a coefficient depending on the proportions of the machine. Let / be the friction of the ram packing and mechanism reckoned in lb per sq. ft. of ram area. Then if the supply-pipe pressure driving the machine is p lb per sq. ft., the effective working pressure will be

p — Gˆv 2 /2g—f lb per sq. ft. Let A be the area of the ram in sq. ft., v its velocity in ft. per sac. The useful work done will be

(p — Grv' i /2g—f)Av ft. lb per sec, and the efficiency of the machine will be

T, = {p-GpP[2g-f)Ip : This shows that the efficiency increases with the pressure p, and diminishes with the speed v, other things being the same. If in

regulating the engine for varying load the pressure is throttled, part of the available head is destroyed at the throttle valve, and p in the bracket above is reduced. Direct-acting hydraulic lifts, without intermediate gearing, may have an efficiency of 95 % during the working stroke. If a hydraulic jigger is used with ropes and sheaves to change

the speed of the ram to the speed of Level of Supply

the lift, the efficiency may be only | ;

50%. E. B. Ellington has given the efficiency of lifts with hydraulic balance at 85 % during the working stroke. Large pressure engines have an efficiency of 85 %, but small rota- tive engines probably not more than 50 % and that only when fully loaded.

fiarge

fy

§ 176. Direct- Acting Hydraulic Lift (fig. 171).— This is the simplest of all kinds of hydraulic motor. A cage W is lifted directly by water pressure acting in a cylinder C, the length of which is a little greater than the lift. A ram or plunger R of the same length is attached to the cage. The water-pressure admitted by a cock to the cylinder forces up the ram, and when the supply valve is closed and the discharge valve opened, the ram descends. In this case the ram is 9 in. diameter, with a stroke of 49 ft. It consists of lengths of wrought-iron pipe screwed together perfectly water- tight, the lower end being closed by a cast-iron plug. The ram works in a cylinder n in. dia- meter of 9 ft. lengths of flanged cast-iron pipe. The ram passes water-tight through the cylinder cover, which is provided with

double hat leathers to prevent H II1H H

leakage outwards or inwards. As the weight of the ram and cage is much more than sufficient to cause a descent of the cage, part of the weight is balanced. A chain at- tached to the cage passes over a pulley at the top of the lift, and carries at its free end a balance weight B,

Disˆ working in T iron guides. Water is ad- mitted to the cylinder from a 4-in. supply pipe through a two- way slide, worked by a rack, spindle and endless rope. The lift works under 73 ft. of head, and lifts 1350 ft) at 2 ft. per second. The effi- ciency is from 75 to

80%.

The principal pre- judicial resistance to the motion of a ram

of this kind is the fric- i IBM- -J-wi& '- 't. _

tion of the cup leathers,

which make the joint _

between the cylinder p

and ram. Some ex- ' ' '

periments by John Hick give for the friction of these leathers

the following formula. Let F= the total friction in pounds;

p = water-pressure in pounds per sq. ft.;

d = diameter of ram in ft k a coefficient. Y* = kpd

£ = 0-00393 if the leathers are new or badly lubricated; = 0-00262 if the leathers are in good condition and well lubricated.

Since the total pressure on the ram is P = \ird?p, the fraction of the total pressure expended in overcoming the friction of the leathers is F/P = -oo$jd to •0033/d, d being in feet.

Let H be the height of the pressure column measured from the free surface of the supply reservoir to the bottom of the ram in its lowest position, H& the height from the discharge reservoir to the same point, h the height of the ram above its lowest point at any moment, S the length of stroke, J2 the area of the ram, W the weight of cage, R the weight of ram, 6 the weight of balance weight, w the weight of balance chain per foot run, F the friction of the cup leather and slides.

Then, neglecting fluid friction, if the ram is rising the accelerating force is

Pi = G(H-fc)Q-R-W + B-w(S-fc) + wA-F, and if the ram is descending

Pj = -G(Hi-A)a + W + R-B + w(S-/t)-wA-F. If if = I GJJ, Pi and P 2 are constant throughout the stroke; and the moving force in ascending and descending is the same, if

B = W + R + wS-GQ(H + H 6)/2. Using the values just found for w and B,

P 1 = P 2 = iGQ(H-Hf,)-F. Let W + R + wS + B = U, and let P be the constant accelerating force acting on the system, then the acceleration is (P/U)g. The velocity at the end of the stroke is (assuming the friction to be constant)

t- = VOPgS/U); and the mean velocity of ascent is \v.

§ 177. Armstrong's Hydraulic Jigger. — This is simply a single- acting hydraulic cylinder and ram, provided with sheaves so as to give motion to a wire rope or chain. It is used in various forms of lift and crane. Fig. 172 shows the arrangement. A hydraulic ram or plunger B works in a stationary cylinder A. Ram and cylinder carry sets of sheaves over which passes a chain or rope, fixed at one end to the cylinder, and at the other connected over guide pulleys to a lift or crane. For each pair of pulleys, one on the cylinder and one on the ram, the movement of the free end of the rope is doubled compared with that of the ram. With three pairs of pulleys the free end of the rope has a movement equal to six times the stroke of the ram, the force exerted being in the inverse proportion.

§ 178. Rotative Hydraulic Engines. — Valve- gear mechanism similar in principle to that of steam engines can be applied to actuate the admission and discharge valves, and the pressure engine is then converted into a con- tinuously-acting motor.

Let H be the available fall to work the engine after deducting the loss of head in the supply and discharge pipes, Q the supply cf water in cubic feet per second, and 17 the efficiency of the engine. Then the horse-power of the engine is

H.P. = „GQH/5 5 o. The efficiency of large slow-moving pressure engines is ij = -66 to -8. In small motors of this kind probably ij is not greater than -5. Let v be the mean velocity of the piston, then its diameter d is given by the relation

Q = 7rd 2 t'/4 in double-acting engines, = ird 2 zi/8 in single-acting engines.

If there are n cylinders put Q/n for Q in these equations.

Small rotative pressure engines form extremely convenient motors for hoists, capstans or winches, and for driving small machinery. The single-acting engine has the advantage that the pressure of the piston on the crank pin is always in one direction; there is then no knocking as the dead centres are passed. Generally three single-acting cylinders are used, so that the engine will readily start in all positions, and the driving effort on the crank pin is very uniform.

Brotherhood Hydraulic Engine. — Three cylinders at angles of 120° with each other are formed in one casting with the frame. The

Fig. 173.

plungers are hollow trunks, and the connecting rods abut in cylindrical recesses in them and are connected to a common crank pin. A circular valve disk with concentric segmental ports revolves at the same rate as the crank over ports in the valve face common to the three cylinders. Each cylinder is always in communication with either an admission or exhaust port. The blank parts of the circular valve close the admission and exhaust ports alternately. The fixed valve face is of lignum vitae in a metal recess, and the revolving valve of gun-metal. In the case of a small capstan engine the cylinders are 35 in. diameter and 3 in. stroke. At 40 revs, per minute, the piston speed is 31 ft. per minute. The ports are 1 in. diameter or-fV of the piston area, and the mean velocity in the ports 6-4 ft. per sec. With 700 lb per sq. in. water pressure and an efficiency of 50%, the engine is about 3 h.p. A com- mon arrangement is to have three parallel cylinders acting on a three-throw crank shaft, the cylinders oscillating on trunnions.

Hastie' s Engine. — Fig. 173 shows a similar engine made by Messrs Hastie of Greenock. G, G, G are the three plungers which pass out

of the cylinders through cup leathers, and act on the same crank pin. A is the inlet pipe which communicates with the cock B. This cock controls the action of the engine, being so constructed that it acts as a reversing valve when the handle C is in its extreme positions and as a brake_ when in its middle position. With the handle in its middle position, the ports of the cylinders are in communication with the exhaust. Two passages are formed in the framing leading from the cock B to the ends of the cylinders, one being in com- munication with

the supply pipe A, the other with the discharge pipe Q. These passages end as shown at E. The oscillation of the cylinders puts them alternately in com- munication with each of these passages, and thus the water is alternately admitted and exhausted. In any ordinary rota- tive engine the length of stroke is invariable. Consequently the con- sumption of water de- pends simply on the speed of the engine,

irrespective of the effort overcome. If the power of the engine must be varied without altering the number of rotations, then the stroke must be made variable. Messrs Hastie have con- trived an exceedingly ingenious method of varying the stroke automatically, in proportion to the amount of work to be done (fig. 174). The crank pin I is carried in a slide H moving in a disk M. In this is a double cam K acting on two small steel rollers J, L attached to the slide H. If the cam rotates it moves the slide and increases or decreases the radius of the circle in which the crank pin I rotates. The disk M is keyed on a hollow shaft sur- rounding the driving shaft P, to which the cams are attached. The hollow shaft N has two snugs to which the chains RR are attached (fig. 175). The shaft P carries the spring case SS to which also are attached the

other ends of the chains. When the engine is at rest the springs extend themselves, rotating the hollow shaft N and the frame M, so as to place the crank pin I at its nearest position to the axis of rotation. When a resistance has to be overcome, the shaft N rotates

Fig. 174.

Fig. 175.

relatively to P, compressing the springs, till their resistance balances the pressure due to the resistance to the rotation of P. The engine then commences to work, the crank pin being in the position in which the turning effort just overcomes the resistance. If the resistance diminishes, the springs force out the chains and shorten the stroke of the plungers, and vice versa. The following experiments, on an engine of this kind working a hoist, show how the automatic arrangement adjusted the water used to the work done. The lift was 22 ft. and the water pressure in the cylinders 80 lb per sq. in. Weight lifted, j Chain J ^ ^

W gaˆnf’ in i 7i <° H 16 17 20 „

745 16

857 969 1081 1 193

m~®

§ 179. Accumulator Machinery. — It has already been pointed out that it is in some cases convenient to use a steam engine to create an artificial head of water, which is afterwards employed in driving water-pressure machinery. Where power is required intermittently, for short periods, at a number of different points, as, for instance, in moving the cranes, lock gates, &c, of a dockyard, a separate steam engine and boiler at each point is very inconvenient; nor can engines worked from a common boiler be used, because of the great loss of heat and the difficulties which arise out of condensation in the pipes. If a tank, into which water is continuously pumped, can be placed at a great elevation, the water can then be used in hydraulic machinery in a very convenient way. Each hydraulic machine is put in communication with the tank by a pipe, and on opening a valve it commences work, using a quantity of water directly proportional to the work done. No attendance is required when the machine is not working.

A site for such an elevated tank is, however, seldom available, and in place of it a beautiful arrangement termed an accumulator, invented by Lord Armstrong, is used. This consists of a tall vertical cylinder; into this works a solid ram through cup leathers or hemp packing, and the ram is loaded by fixed weights, so that the pressure in the cylinder is 700 lb or 800 lb per sq.in. In some cases the ram is fixed and the cylinder moves on it.

The pumping en- gines which supply the energy that is stored in the ac- cumulator should be a pair coupled at right angles, so as to start in any position. The en- gines pump into the accumulator cylinder till the ram is at the top of its stroke, when by a catch ar- rangement acting on the engine throttle valve the engines are stopped. If the accumulator ram descends, in con- sequence of water being taken to work machinery, the engines im- mediately recom- mence working. Pipes lead from the accumulator to each of the machines requir- ing to be driven, and do not require to be of large size, as the pressure is so great.

Fig. 176 shows a diagrammatic way the scheme of a system o’

accumulator machinery. A is the accumulator, with its ram carry-

V

B

ing a cylindrical wrought-iron tank W, in which weights are placed to load the accumulator. At R is one of the pressure engines or jiggers, worked from the accumulator, discharging the water after use into the tank T. In this case the pressure engine is shown working a set of blocks, the fixed block being on the ram cylinder, the running block on the ram. The chain running over these blocks works a lift cage C, the speed of which is as many times greater than that of the ram as there are plies of chain on the block tackle. B is the balance weight of the cage.

In the use of accumulators on ship- board for working gun gear or steering gear, the accumulator ram is loaded by springs, or by steam pressure acting on a piston much larger than the ram.

R. H. Tweddell has used accumula- tors with a pressure of 2000 lb per sq. in. to work hydraulic riveting ma- chinery.

The amount of energy stored in the accumulator, having a ram d in. in diameter, a stroke of S ft., and deliver- ing at p lb pressure per sq. in., is

—p(PS foot-pounds.

Thus, if the ram is 9 in., the stroke 20 ft., and the pressure 800 lb per sq. in., the work stored in the accumulator when the ram is at the top of the stroke is 1 ,01 7,600 foot-pounds, that is, enough to drive a machine requiring one horse power for about half an hour. As, however, the pumping engine replaces water as soon as it is drawn off, the working capacity of the accumulator is very much greater than this. Tweddell found that an ac- cumulator charged at 1250 lb discharged at 1225 lb per sq. in. Hence the friction was equivalent to 12 \ ft) per sq. in. and the efficiency 98 %.

When a very great pressure is required Fig. 177,

a differential accumulator (fig. 177) is

convenient. The ram is fixed and passes through both ends of the cylinder, but is of different diameters at the_ two ends, A and B. Hence if d\,

Sometimes an accumulator is loaded by water or steam pressure instead of by a dead weight. Fig. 178 shows the arrangement. A piston A is connected to a plunger B of much smaller area. Water pressure, say from town mains, is admitted below A, and the high pressure water is pumped into and discharged from the cylinder C in which B works. If r is the ratio of the areas of A and B, then, neglect- ing friction, the pressure in the upper cylinder is r times that under the piston A. With a variable rate of supply and demand from the upper cylinder, the piston A rises and falls, maintaining always a constant pressure in the upper cylinder.

Water Wheels.

§ 180. Overshot and High Breast Wheels. ■ — When a water fall ranges between 10 and 70 ft. and the water supply is from 3 to 25 cub. ft. per second, it is possible to construct a bucket wheel on which the water acts chiefly by its weight. If the variation of the head-water level does not exceed 2 ft., an overshot wheel may be used (fig. 179). The water is then projected over the summit Fig. 178.

of the wheel, and falls in a parabolic path into the buckets. With greater variation of head-water level, a pitch-back or high breast wheel is better. The water falls over the top of a sliding sluice into the wheel, on the same side as the head race channel. By adjusting the height of the sluice, the requisite supply is given to the wheel in all positions of the head-water level.

The wheel consists of a cast-iron or wrought-iron axle C supporting the weight of the wheel. To this are attached two

sets of arms A of wood or iron, which support circular segmental plates, B, termed shrouds. A cylindrical sole plate id extends between the shrouds on the inner side. The buckets are formed

Fig. 179.

by wood planks or curved wrought-iron plates extending from shroud to shroud, the back of the buckets being formed by the sole plate.

The efficiency may be taken at 0-75. Hence, if h.p. is the effective

horse power, H the available fall, and Q the available water supply per second,

h. p. =o-75(GQH/5 5 o) =0-085 QH.

If the peripheral velocity of the water wheel is too great, water is thrown out of the buckets before reaching the bottom of the fall. In practice, the circumferential velocity of water wheels of the kind now described is from 4! to 10 ft. per second, about 6 ft. being the usual velocity of good iron wheels not of very small size. In order that the water may enter the buckets easily, it must have a greater velocity than the wheel. Usually the velocity of the water at the point where it enters the wheel is from 9 to 12 ft. per second, and to produce this it must enter the wheel at a point 16 to 27 in. below the head-water level. Hence the diameter of an overshot wheel may be

D = H-iJ toH-2* ft. Overshot and high breast wheels work badly in back-water, and hence if the tail- water level varies, it is better to reduce the diameter of the wheel so that its greatest immersion in flood is not more than

1 ft. The depth d of the shrouds is about 10 to 16 in. The number of buckets may be about

N=xD/d. Let v be the peripheral velocity of the wheel. Then the capacity of that portion of the wheel which passes the sluice in one second is Qi = i>Z>(D<2-d 2)/D

= v b d nearly, 6 being the breadth of the wheel between the shrouds. If, however, this quantity of water were allowed to pass on to the wheel the buckets would begin to spill their contents almost at the top of the fall. To diminish the loss from spilling, it is not only necessary to give the buckets a suitable form, but to restrict the water supply to one-fourth or one-third of the gross bucket capacity. Let m be the value of this ratio; then, Q being the supply of water per second,

Q = OT Qi = ntbdv. This gives the breadth of the wheel if the water supply is known. The form of the buckets should be determined thus. The outer element of the bucket should be in the direction of motion of the water entering relatively to the wheel, so that the water may enter without splashing or shock. The buckets should retain the water as long as possible, and the width of opening of the buckets should be

2 or 3 in. greater than the thickness of the sheet of water entering.

For a wooden bucket (fig. 180, A), take ab = distance between two

buckets on periphery of wheel. Make ed = \ eb. and bc = % to \ ab. Join cd. For an iron bucket (fig. 180, B), take ed = \ eb; bc= lab. Draw cO making an . „

angle of lo° to 15° with — -“* -”

the radius at c. On Oc take a centre giving a circular arc passing near d, and round the curve into the radial part of the bucket de.

There are two ways in which the power of a water wheel is given off to the machinery driven. In wooden wheels and wheels with rigid arms, a spur or bevil wheel keyed on the axle of the

turbine will transmit FlG – l8 °’

the power to the shafting. It is obvious that the whole turning moment due to the weight of the water is then trans- mitted through the arms and axle of the water wheel. When the water wheel is an iron one, it usually has light iron suspension arms incapable of resisting the bending action due to the transmission of the turning effort tc the axle. In that case spur segments are bolted to one of the shrouds, and the pinion to which the power is transmitted is placed so that the teeth in gear are, as nearly as may be, on the line of action of the resultant of the weight of the water in the loaded arc of the wheel.

The largest high breast wheels ever constructed were probably the four wheels, each 50 ft. in diameter, and of 125 h.p., erected by Sir W. Fairbairn in 1825 at Catrine in Ayrshire. These wheels are still working.

§ 181. Poncelet Water Wheel. — When the fall does not exceed 6 ft., the best water motor to adopt in many cases is the Poncelet undershot water wheel. In this the water acts very nearly in the same way as in a turbine, and the Poncelet wheel, although slightly less efficient than the best turbines, in normal conditions of working, is superior to most of them when working with a reduced supply of water. A general notion of the action of the water on a Poncelet wheel has already been given in § 159. Fig. 181 shows its construction. The water penned back between the side walls of the wheel pit is allowed to flow to the

Fig. 181.

wheel under a movable sluice, at a velocity nearly equal to the velocity due to the whole fall. The water is guided down a slope of 1 in 10, or a curved race, and enters the wheel without shock. Gliding up the curved floats it comes to rest, falls back, ami acquires at the

point of discharge a backward velocity relative to the wheel nearly equal to the forward velocity of the wheel. Consequently it leaves the wheel deprived of nearly the whole of its original kinetic energy.

Taking the efficiency at o-6o, and putting H for the available fall, h.p. for the horse-power, and Q for the water supply per second,

h.p. = 0-068 QH. The diameter D of the wheel may be taken arbitrarily. It should not be less than twice the fall and is more often four times the fall. For ordinary cases the smallest convenient diameter is 14 ft. with_ a straight, or 10 ft. with a curved, approach channel. The radial

depth of buckei should be at least half the fall, and radius of curvature of buckets about half the radius of the wheel. The shrouds are usually of cast iron with flanges to receive the buckets. The buckets may be of iron | in thick bolted to the flanges with f 6 in. bolts.

Let H' be the fall measured from the free surface of the head- water to the point F where the mean layer enters the wheel ; then the velocity at which the water enters is t/ = V (2gH'), and the best circumferential velocity of the wheel is V = 0-551) to o-6». The number of rotations of the wheel per second is N = V/VD. The thickness of the sheet of water entering the wheel is very im- portant. The best thickness according to experiment is 8 to 10 in. The maximum thickness should not exceed 12 to 15 in., when there is a surplus water supply. Let e be the thickness of the sheet of water entering the wheel, and b its width ; then

bev = Q ; or b — Q/ev. Grashof takes e = £H, and then

i=6Q/HV(2 g H). Allowing for the contraction of the stream, the area of opening through the sluice may be 1-25 be to 1-3 be. The inside width of the wheel is made about 4 in. greater than b.

Several constructions have been given for the floats of Poncelet wheels. One of the simplest is that shown in figs. 181, 182

Let OA (fig. 181) be the vertical radius of the wheel. Set off OB, OD making angles of 15 with OA. Then BD may be the length of

WPMBMMPMiZmdˆWU/M*

Fig. 182.

the close breasting fitted to the wheel. Draw the bottom of the head race BC at a slope of 1 in 10. Parallel to this, at distances \e and e, draw EF and GH. Then EF is the mean layer and GH the surface layer entering the wheel. Join OF, and make OFK = 23°. Take FK = o-5 to 0-7 H. Then K is the centre from which the bucket curve is struck and KF is the radius. The depth of the shrouds must be sufficient to prevent the water from rising over the top of the float. It is JH to §H. The number of buckets is not very important. They are usually I ft. apart on the circumference of the wheel.

The efficiency of a Poncelet wheel has been found in experiments to reach 0-68. It is better to take it at o-6 in estimating the power of the wheel, so as to allow some margin.

In fig. 182 s; is the initial and v the final velocity of the water, IV parallel to the vane the relative velocity of the water and wheel, and V the velocity of the wheel.

Turbines.

§ 182. The name turbine was originally given in France to any water motor which revolved in a horizontal plane, the axis being vertical. The rapid development of this class of motors dates from 1827, when a prize was offered by the Societe d'Encouragement for a motor of this kind, which should be an improvement on certain wheels then in use. The prize was ultimately awarded to Benoit Fourneyron (1802-1867), whose turbine, but little modified, is still constructed.

Classification of Turbines. — In some turbines the whole available energy of the water is converted into kinetic energy before the water acts on the moving part of the turbine. Such turbines are termed Impulse or Action Turbines, and they are distinguished by this that the wheel passages are never entirely filled by the water. To ensure this condition they must be placed a little above the tail water and discharge into free air. Turbines in which part only of die available energy is converted into kinetic energy before the water enters the wheel are termed Pressure or Reaction Turbines. In these there is a pressure which in some cases amounts to half the head in the clearance space between the guide vanes and wheel vanes. The velocity with which the water enters the wheel is due to the difference between the pressure due to the head and the pressure in the

clearance space. In pressure turbines the wheel passages must

be continuously filled with water for good efficiency, and the wheel may be and generally is placed below the tail water level.

Some turbines are designed to act normally as impulse turbines discharging above the tail water level. But the passages are so designed that they are just filled by the water. If the tail water rises and drowns the turbine they become pressure turbines with a small clearance pressure, but the efficiency is not much affected. Such turbines are termed Limit turbines.

Next there is a difference of constructive arrangement of turbines, which does not very essentially alter the mode of action of the water. In axial flow or so-called parallel flow turbines, the water enters and leaves the turbine in a direction parallel to the axis of rotation, and the paths of the molecules lie on cylindrical surfaces concentric with that axis. In radial outward and inward flow turbines, the water enters and leaves the turbine in directions normal to the axis of rotation, and the paths of the molecules lie exactly or nearly in planes normal to the axis of rotation. In outward flow turbines the general direction of flow is away from the axis, and in inward flow turbines towards the axis. There are also mixed flow turbines in which the water enters normally and is discharged parallel to the axis of rotation.

Another difference of construction is this, that the water may be admitted equally to every part of the circumference of the turbine wheel or to a portion of the circumference only. In the former case, the condition of the wheel passages is always the same; they receive water equally in all positions during rotation. In the latter case, they receive water during a part of the rotation only. The former may be termed turbines with complete admission, the latter turbines with partial admission. A reaction turbine should always have complete admission. An impulse turbine may have complete or partial admission.

When two turbine wheels similarly constructed are placed on the same axis, in order to balance the pressures and diminish journal friction, the arrangement may be termed a twin turbine.

If the water, having acted on one turbine wheel, is then passed through a second on the same axis, the arrangement may be termed a compound turbine. The object of such an arrangement would be to diminish the speed of rotation.

Many forms of reaction turbine may be placed at any height not exceeding 30 ft. above the tail water. They then discharge into an air-tight suction pipe. The weight of the column of water in this pipe balances part of the atmospheric pressure, and the difference of pressure, producing the flow through the turbine, is the same as if the turbine were placed at the bottom of the fall.

I. Impulse Turbines. (Wheel passages not filled, and discharging above the tail water.)

(a) Complete admission. (Rare.)

(b) Partial admission. (Usual.)

II. Reaction Turbines.

(Wheel passages filled, discharg- ing above or below the tail water or into a suction-pipe.)

Always with complete admis- sion.

Axial flow, outward flow, inward flow, or mixed flow.

Simple turbines ; twin turbines ; compound turbines.

§ 183. The Simple Reaction Wheel. — It has been shown, in § 162, that, when water issues from a vessel, there is a reaction on the vessel tending to cause motion in a direction opposite to that of the jet. This principle was applied in a rotating water motor at a very early period, and the Scotch turbine, at one time much used, differs in no essential respect from the older form of reaction wheel.

The old reaction wheel consisted of a vertical pipe balanced on a vertical axis, and supplied with water (fig. 183). From the bottom of the vertical pipe two or more hollow horizontal arms extended, at the ends of which were orifices from which the water was dis- charged. The reaction of the jets caused the rotation of the machine.

Let H be the available fall measured from the level of the water in the ver- tical pipe to the centres e f the orifices, r the radius from the axis of rotation to the centres of the orifices, v the velocity of discharge through the jets, a the angular velocity of

Fig. 183.

the machine. When the machine is at rest the water issues from the orifices with the velocity V (2gH) (friction being neglected). But when the machine rotates the water in the arms rotates also, and is in the condition of a forced vortex, all the particles having the same angular velocity. Consequently the pressure in the arms at the orifices is H-)-aV 2 /2g ft. of water, and the velocity of discharge through the orifices is v = tl (2gH + a 2 r 2). If the total area of the orifices is «,

the quantity discharged from the wheel per second is

Q = wD = wV(2gH + aV). While the water passes through the orifices with the velocity v, the orifices are moving in the opposite direction with the velocity ar. The absolute velocity of the water is therefore

v- ar = sl (2gH + aV 2)-ar. The momentum generated per second is (GQ/g)(i > -ar), which is numerically equal to the force driving the motor at the radius r. The work done by the water in rotating the wheel is therefore

(GQ/ g)(v-ar)ar foot-pounds per sec. The work expended by the water fall is GQH foot-pounds per second. Consequently the efficiency of the motor is

_ (v-ar) ar _ }V2gH + aV 2 -ar)ar V ~~ gH ~~ gH

. ,|H_g 2 H 2

V2gH-faV 2

Let

then T) = i-gR! 2ar + ...

which increases towards the limit I as ar increases towards infinity. Neglecting friction, therefore, the maximum efficiency is reached when the wheel has an infinitely great velocity of rotation. But this condition is impracticable to realize, and even, at practicable but high velocities of rotation, the friction would considerably reduce the efficiency. Experiment seems to show that the best efficiency is reached when w = V (2gH). Then the efficiency apart from friction is i7 = {V(2o 2 »- 2)-ar!ar/gH = 0-4i4aV 2 /gH = 0-828, about 1 7 % of the energy of the fall being carried away by the water discharged. The actual efficiency realized appears to be about 60 %, so that about 21 % of the energy of the fall is lost in friction, in addition to the energy carried away by the water.

§ 184. General Statement of Hydrodynamical Principles necessary for the Theory of Turbines.

(a) When water flows through any pipe-shaped passage, such as the passage between the vanes of a turbine wheel, the relation be- tween the changes of pressure and velocity is given by Bernoulli's theorem (§ 29). Suppose that, at a section A of such a passage, hi is the pressure measured in feet of water, Vi the velocity, and Z\ the elevation above

any horizontal datum plane, and that at a section B the same quantities are denoted by h%, i> 2 , Zi. Then

h-hi = (% 2 -fi 2)/2g +Z2-Z1. (1)

If the flow is horizontal, z 2 =Zi; and

h-ht – (» 2 2 -V)/2g. (la)

(b) When there is an abrupt change of section of the passage, or an abrupt change of section of the stream due to a contraction, then, in applying Bernoulli's equation allowance must be made for the loss of head in shock (§ 36). Let »i, Vt be the velocities before and after the abrupt change, then a stream of velocity i\ impinges on a stream at a velocity v 2 , and the relative velocity is vi-vˆ. The head lost is (t>i-t> 2) 2 /2g- Then equation (la) becomes

hi-h = (i , i 2 T2 5)/2g(i'i-f2) 2 /2g =i> 2 (j>i-%)/g. (2)

To diminish as much as possible the loss of energy from irregular eddying motions, the change of section in the turbine passages must

be very gradual, and the curva- ture without discontinuity.

(c) Equality of A ngular Impulse and Change of Angular Momen- tum. — Suppose that a couple, the moment of which is M, acts on a body of weight W for / seconds, during which it moves from Ai to A 2 (fig. 184). Let vi be the velocity of the body at Ai, ˆ2 its velocity at A 2 , and let p it pi be the perpendiculars from C on Vi and Vt. Then Mt is termed the angular impulse of the couple, and the quantity

is the change of angular momen- p g turn relatively to C. Then, from

"*' the equality of angular impulse

and change of angular momentum

m = QNIg)(viprDipi), or, if the change of momentum is estimated for one second,

M=(W/g)(u 2 />2-!>lpl).

Let n, n be the radii drawn from C to Ai, A 2 , and let w u Wi be the components of vi, i> 2 , perpendicular to these radii, making angles (3 and a with vi, v%. Then

Vi = Wi sec ft ; vi = a> 2 sec a ; pi = ri cos /3 ; p 2 = r 2 cos a. .-.

M = (W/g) (uˆs-wi) , (3)

where the moment of the couple is expressed in terms of the radii drawn to the positions of the body at the beginning and end of a second, and the tangential components of its velocity at those points.

Now the water flowing through a turbine enters at the admission surface and leaves at the discharge surface of the wheel, with its angular momentum relatively to the axis of the wheel changed. It therefore exerts a couple — M tending to rotate the wheel, equal and opposite to the couple M which the wheel exerts on the water. Let Q cub. ft. enter and leave the wheel per second, and let v>\, Vh be the tangential components of the velocity of the water at the receiv- ing and discharging surfaces of the wheel, r it r% the radii of those surfaces By the principle above,

- M = (GQ/g) (wr-Wi) . (4)

If a is the angular velocity of the wheel, the work done by the water on the wheel is

T = Mo= (GQ/g) (it'iri-tt> 2 r 2) a foot-pounds per second. (5) § 185. Total and Available Fall. — Let H, be the total difference of level from the head-water to the tail-water surface. Of this total head a portion is expended in overcoming the resistances of the head race, tail race, supply pipe, or other channel conveying the water. Let i) p be that loss of head, which varies with the local conditions in which the turbine is placed. Then

H=HH> P is the available head for working the turbine, and on this the calcu- lations for the turbine should be based. In some cases it is necessary to place the turbine above the tail-water level, and there is then a fall h from the centre of the outlet surface of the turbine to the tail- water level which is wasted, but which is properly one of the losses belonging to the turbine itself. In that case the velocities of the water in the turbine should be calculated for a head H-b, but the efficiency of the turbine for the head H.

§ 186. Gross Efficiency and Hydraulic Efficiency of a Turbine. — Let Td be the useful work done by the turbine, in foot-pounds per second, T< the work expended in friction of the turbine shaft, gearing, &c, a quantity which varies with the local, conditions in which the turbine is placed. Then the effective work done by the water in the turbine is

T = T,+T (. The gross efficiency of the whole arrangement of turbine, races, and transmissive machinery is

7,«=T d /GQH,. (6)

And the hydraulic efficiency of the turbine alone is

,=T/GQH. (7)

It is this last efficiency only with which the theory of turbines is concerned.

From equations (5) and (7) we get

r/GQH = (GQ/g) (ovi-ws)”! ;

i) = {wimiliTi) algii. (8)

This is the fundamental equation in the theory of turbines. In general, 1 Wi and w-i, the tangential components of the water’s motion on entering and leaving the wheel, are completely inde- pendent. That the efficiency may be as great as possible, it is obviously necessary that kj 2 = o. In that case

ij = ttVia/gH. (9)

ari is the circumferential velocity of the wheel at the inlet surface. Calling this Vi, the equation becomes

ij=WiVi/gH. (90)

This remarkably simple equation is the fundamental equation in the theory of turbines. It was first given by Reiche (Turbinen- baues, 1877).

§ 187. General Description of a Reaction Turbine. — Professor James Thomson’s inward flow or vortex turbine has been selected as the type of reaction turbines. It is one of the best in normal conditions of working, and the mode of regulation introduced is decidedly superior to that in most reaction turbines. Figs. 185 and 186 are external views of the turbine case; figs. 187 and 188 are the corresponding sections; fig. 189 is the turbine wheel. The example chosen for illustration has suction pipes, which permit the turbine to be placed above the tail-water level. The water enters the turbine by cast-iron supply pipes at A, and is discharged through two suction pipes S, S. The water

1 In general, because when the water leaves the turbine wheel it ceases to act on the machine. If deflecting vanes or a whirlpool are added to a turbine at the discharging side, then Vi may in part depend

on » 2 , and the statement above is no longer true.

on entering the case distributes itself through a rectangular supply chamber SC, from which it finds its way equally to the four guide-blade passages G, G, G, G. In these passages it

in equal proportions from each guide-blade passage. It consists of a centre plate p (fig. 189) keyed on the shaft aa, which passes through stuffing boxes on the suction pipes. On each side of

Fig. 185.

Fig. 186.

Fig. 187

Fig. 18

acquires a. velocity about equal to tnat due to half the fall, and is l the centre plate are the curved wheel vanes, on which the pressure directed into the wheel at an angle of about io° or 12 with the of the water acts, and the vanes are bounded on each side by tangent to its circumference. The wheel W receives the water I dished or conical cover plates c, c. Joint-rings j, j on the cover

plates make a sufficiently water-tight joint with the casing, to prevent leakage from the guide-blade chamber into the suction pipes. The pressure near the joint rings is not very great, probably not one-fourth the total head. The wheel vanes

receive the water without shock, and deliver it into central spaces, from which it flows on either side to the suction pipes. The mode of regu- lating the power of the turbine is very simple. The guide- blades are pivoted to the case at their inner ends, and they are connected by a link- work, so that they all open and close simul- taneously and

equally. In this way the area of opening through the guide- blades is altered with- out materially alter- ing the angle or the other conditions of the delivery into the wheel. The guide- blade gear may be variously arranged. In this example four spindles, passing through the case, are linked to the guide- blades inside the case, and connected together by the links

Fig. i

Fig. 190.

I, I, I on the outside of the case. A worm wheel on one of the spindles is rotated by a worm d, the motion being thus slow

enough to adjust the guide-blades very exactly. These turbines are made by Messrs Gilkes & Co. of Kendal

Fig. 190 shows another arrangement of a similar turbine, with some adjuncts not shown in the other drawings. In this case the turbine rotates horizontally, and the turbine case is placed entirely below the tail water. The water is supplied to the turbine by a vertical pipe, over which is a wooden pentrough, containing a strainer, which prevents sticks and other solid bodies getting into tH turbine. The turbine rests on three foundation stones, and, the pivot for the vertical shaft being under water, there is a screw and lever ar-ange- ment for adjusting it as it wears. The vertical shaft gives motion to the machinery driven by a pair of bevel wheels. On the rigbˆ are the worm and wheel for working the guide-blade gear.

§ 188. Hydraulic Power at Niagara. — The largest development of hydraulic power is that at Niagara. The Niagara Falls Power Company have constructed two power houses on the United States side, the first with 10 turbines of 5000 h.p. each, and the second with 10 turbines of 5500 h.p. The effective fall is 136 to 140 ft. In the first power house the turbines are twin outward flow reaction turbines with vertical shafts running at 250 revs, per minute and driving the dynamos direct. In the second power house the turbines

Fig. 191.

are inward flow turbines with draft tubes or suction pipes. Fig. 191 shows a section of one of these turbines. There is a balancing piston keyed on the shaft, to the under side of which the pressure due to the fall is admitted, so that the weight of turbine, vertical shaft and part of the dynamo is water borne. About 70,000 h.p. is daily distributed electrically from these two power houses. The Canadian Niagara

Power Company are erecting a power house to contain eleven units of 10,250 h.p. each, the turbines being twin inward flow reaction turbines. The Electrical Development Com pany of Ontario are erecting a power house to contain 1 1 units of 12,500 h.p. each. The Ontario Power Company are carrying out another scheme for developing 200,000 h.p. by twin inward flow turbines of 12,000 h.p. each. Lastly the Niagara Falls Power and Manufacturing Company on the United States side have a station giving 35,000 h.p. and are constructing another to furnish 100,000 h.p. The mean flow of the Niagara river is about 222,000 cub. ft. per second with a fall of 160 ft. The works in progress if completed will utilize 650,000 h.p. and require 48,000 cub. ft. per second or 2iJ % of the mean flow of the river (Unwin, " The Niagara Falls Power Stations," Proc. Inst. Mech. Eng., 1906).

§ 189. Different Forms of Turbine Wheel. — The wheel of a turbine or part of the machine on which the water acts is an annular space, furnished with curved vanes dividing it into passages exactly or roughly rectangular in cross section. For radial flow turbines the wheel may have the form A or B, fig. 192, A being most usual with

«■ To

Fig. 192.

inward, and B with outward flow turbines. In A the wheel vanes are fixed on each side of a centre plate keyed on the turbine shaft. The vanes are limited by slightly-coned annular cover plates. In B the vanes are fixed on one side of a disk, keyed on the shaft, and limited by a cover plate parallel to the disk. Parallel flow or axial flow turbines have the wheel as in C. The vanes are limited by two concentric cylinders.

Theory of Reaction Turbines.

§ 190. Velocity of Whirl and Velocity of Flow. — Let acb (fig. 193) be the path of the particles of water in a turbine wheel. That

path will be in a plane normal to the axis of rotation in radial flow turbines, and on a cylindrical surface in axial flow turbines. At any

point c of the path the water will have some velocity v, in the direction of a tangent to the path. That velocity may be resolved into two components, a whirl- FlG. I<«. ' n .£ velocity w in the

direction of the wheel's rotation at the point c, and a component u at right angles to this, radial in radial flow, and parallel to the axis in axial flow turbines. This second component is termed the velocity of flow. Let t» ? , Wo, Uo be the velocity of the water, the whirling velocity and velocity of flow at the outlet surface of the wheel, and Vi, Wi, Vi the same quantities at the inlet surface of the wheel. Let a and j8 be the angles which the water's direction of motion makes with the direction of motion of the wheel at those surfaces. Then

Wo = o cos£; u =v An) / IQ \

Wi~ViCosa: tii=v; sin ay

The velocities of flow are easily ascertained independently from the dimensions of the wheel. The velocities of flow at the inlet and outlet surfaces of the wheel are normal to those surfaces. Let S2,,, V.i be the areas of the outlet and inlet surfaces of the wheel, and Q the volume of water passing through the wheel per second; then

Using the notation in fig. 191, we have, for an inward flow turbine (neglecting the space occupied by the vanes),

n =2irr<,(J ; 0,=2irriii. (12a)

Similarly, for an outward flow turbine,

i2 = 27rr<,d; Qi=2irnd; (126)

and, for an axial flow turbine,

fio=Qi = x(r 2 —ri 2). (12c)

Relative and Common Velocity of the Water and Wheel. — There is another way of resolving the velocity of the water. Let V be the velocity of the wheel at the point c, fig. 194. Then the velocity of the

water mayjˆe resolved into a component V, which the water has in common with the wheel, and a component v r , which is the velocity of the water relatively to the wheel.

Velocity of Flow. —

It is obvious that the

frictional losses of head

in the wheel passages

will increase as the

velocity of flow is

greater, that is, the

smaller the wheel is

made. But if the wheel

works under water, the

skin friction of the wheel cover increases as the diameter of the

wheel is made greater, and in any case the weight of the wheel

and consequently the journal friction increase as the wheel is made

larger. It is therefore desirable to choose, for the velocity of flow,

as large a value as is consistent with the condition that the frictional

losses in the wheel passages are a small fraction of the total head.

The values most commonly assumed in practice are these : —

In axial flow turbines, «„ = «< = Q- I5 to0 " 2 V (2

In outward flow turbines, ». =o-25V2g(H-f)),

«» = o-2i to o-l 7V2g(H-f)) ; In inward flow turbines, u = Ui =o-izsV (2gH). § 191. Speed of the Wheel. — The best speed of the wheel depends partly on the frictional losses, which the ordinary theory of turbines

Fig. 194.

disregards. It is best, therefore, to assume for V and Vi values which experiment has shown to be most advantageous.

In axial flow turbines, the circumferential velocities at the mean radius of the wheel may be taken

V„ = Vi=o-6V2gH to o-66V2gH. In a radial outward flow turbine,

V< =o- 5 6V2g(H-b) V„ = V

V < =o-66V2ilL

V = V be the angles the wheel vanes make with the inlet and outlet surfaces; then

!>„ 2 = V (v„, ! +V„ s -2V„lVo cos 4>) I , s

v> =V>ri 2 +Vi 2 -2Vi% cos 61) y (3)

equations which may be used to determine <£ and 8.

§ 192. Condition determining the Angle of the Vanes at the Outlet Surface of the Wheel. — It has been shown that, when the water leaves the wheel, it should have no tangential velocity, if the efficiency is to be as great as possible ; that is, w<, = 0. Hence, from (10), cos /3 = o, = 90°, «o = »o, and the direction of the water's motion is normal to the outlet surface of the wheel, radial in radial flow, and axial in axial flow turbines.

Drawing v or u„ radial or axial as the case may be, and V,,

tangential to the direction of motion, v r , parallelogram of velocities. From fig. 195,

tan=v fVo = u t ,[V„; (14)

but is the angle which the wheel vane makes with the outlet surface of the wheel, which is thus determined when the velocity of flow « and velocity of the wheel V„ are known. When is thus determined,

ti r< , = M<,cosec <#> =V<,V(i+w,,YVo 2)- (14a)

Correction of the Angle to allow for Thickness of Vanes. — In determining , it is most convenient to calculate its value approximately at first, from a value of u obtained by neglecting the thickness of the vanes. As, however, this angle is the most important angle in the turbine, the value should be afterwards corrected to allow for the vane thickness.

Let

‘ = tan-Kwo/V,) = tan->(Q/Q„V,)

be the first or approximate value of <£, and let t be the thickness, and n the number of wheel vanes which reach the outlet surface of the

wheel. As the vanes cut the outlet surface approximately at the angle ‘, their width measured on that surface is t cosec $’. Hence the space occupied by the vanes on the outlet surface is

For A, fig. 192, ntd„ cosec 4> 1

B, fig. 192, ntd cosec >■ (15)

C, fig. 192, ntirˆ-n) cosec]

Call this area occupied by the vanes a. Then the true value of the clear discharging outlet of the wheel is U – w, and the true value of ito is Qliito – w) . The, corrected value of the angle of the vanes will be

<2> = tan[Q/V<,(n,,-co)]. (16)

§ 193. Head producing Velocity with which the Water enters the Wheel. — Consider the variation of pressure in a wheel passage, which satisfies the condition that the sections change so gradually that there is no loss of head in shock. When the flow is in a hori- zontal plane, there is no work done by gravity on the water passing through the wheel. In the case of an axial flow turbine, in which the flow is vertical, the fall d between the inlet and outlet surfaces should be taken into account.

Fig. 195.

can be found by the

Let Vi, V„ be the velocities of the wheel at the inlet and |

outlet surfaces, I

V(, v the velocities of the water, m, u„ the velocities of flow, Vri,v r „ the relative velocities, hi, ho the pressures, measured in feet of water, re, r c the radii of the wheel,

o the angular velocity of the wheel. At any point in the path of a portion of water, at radius r, the velocity v of the water may be resolved into a component V = ar equal to the velocity at that point of the whee’, and a relative com- ponent v r – Hence the motion of the

water may be considered to consist of two parts: — (a) a motion identical with that in a forced vortex of constant angular velocity a; (i) a flow along curves parallel to the wheel vane curves. Taking the latter first, fand using Bernoulli's theorem, the change of pressure due to flow through the wheel passages is given by the equation

h'i + VriVˆgˆh'o + vJˆg; h'i —h'o = (iVo 2 — iw 2)/2g.

The variation of pressure due to rotation in a forced vortex is

*"i-&",, = (V,- s -V

Consequently the whole difference of pressure at the inlet and outlet surfaces of the wheel is

hi -ho = k'i + h'i -h' – h',,

= (Vi s -V,, s)/2g + (s,,*-lV,- 2)/2g. (17)

Case 1. Axial Flow Turbines. — Vi = Vo; and the first term on the right, in equation 17, disappears. Adding, however, the work of gravity due to a fall of d ft. in passing through the wheel,

hi-hoˆiVrJt-Vriˆfeg-d. (170)

Case 2. Outward Flow Turbines. — The inlet radius is less than the outlet radius, and (Vi 2 — V,, 2)/2g is negative. The centrifugal head diminishes the pressure at the inlet surface, and increases the velocity with which the water enters the wheel. This somewhat increases the frictional loss of head. Further, if the wheel varies in velocity from variations in the useful work done, the quantity (V* 2 — V,, 2)/2g increases when the turbine speed increases, and vice versa. Consequently the flow into the turbine increases when the speed increases, and diminishes when the speed diminishes, and this again augments the variation of speed. The action of the centrifugal head in an outward flow turbine is therefore prejudicial to steadiness of motion. For this reason r,,:r,' is made small, generally about 5 : 4. Even then a governor is sometimes required to regulate the speed cf the turbine.

Case 3. Inward Flow Turbines. — The inlet radius is greater than the outlet radius, and the centrifugal head diminishes the velocity of flow into the turbine. This tends to diminish the frictional losses, but it has a more important influence in securing steadiness of motion. Any increase of speed diminishes the flow into the turbine, and vice versa. Hence the variation of speed is less than the variation of resistance overcome. In the so-called centre vent wheels in America, the ratio ri

\r„ is about 5: 4, and then the influ- ence of the centrifugal head is not very important. Professor James Thomson first pointed out the advantage of a much greater difference of radii. By making n:ro = 2:i, the centrifugal head balances about half the head in the supply chamber. Then the velocity through the guide-blades does not exceed the velocity due to half the fall, and the action of the centrifugal head in securing steadiness of speed is considerable.

Since the total head producing flow through the turbine is H — £, and of this hi—h is expended in overcoming the pressure in the wheel, the velocity of flow into the wheel is

‘ f i =C„V!2g(H-l)-(V i 2 -V„ 2 /2g + (I » ro 2 – P H 2)/2g)j, (18)

where c v may be taken 0-96. From (14a),

tV. = V.V(i+«„VV„ 2). It will be shown immediately that

iw=M;cosec0; or, as this is only a small term, and is on the average 90 , we may take, for the present purpose, tw = »> nearly.

Inserting these values, and remembering that for an axial flow turbine V,- = V„, i) = 0, and the fall d in the wheel is to be added,

For an outward flow turbine,

,-WW H ˆ-l(-+«)+S!]’

For an inward flow turbine,

§ 194. Angle which the Guide-Blades make with the Circumference of the Wheel. — At the moment the water enters the wheel, the radial component of the velocity is ut, and the velocity is Vi. Hence, if 7 is the angle between the guide-blades and a tangent to the wheel

y=sin~ , (ui/vi).

This angle can, if necessary, be corrected to allow for the thickness of the guide-blades.

§ 195. Condition determining the Angle of the Vanes at the Inlet Surface of the Wheel. — The single condition necessary to be satisfied at the inlet surface of the wheel is that the water should enter the wheel without shock. This condition is satis- fied if the direction of relative motion of the water and wheel is parallel to the first element of the wheel vanes.

Let A (fig. 196) be a point on the inlet sur- face of the wheel, and let Vi represent in magnitude and direc- tion the velocity of the water entering the wheel, and V,- the velocity of the wheel. Completing the parallelogram, v r , is the direction of relative motion. Hence the angle between vh and Vi is the angle 9 which the vanes should make with the inlet surface of the wheel.

§ 196. Example of the Method of designing a Turbine. Professor James Thomson's Inward Flow Turbine. —

Let H = the available fall after deducting loss of head in pipes and channels from the gross fall ; Q = the supply of water in cubic feet per second; and 7j = the efficiency of the turbine. The work done per second is ijGQH, and the horse-power of the turbine is h.p. = i;GQH/550. If t\ is taken at 0-75, an allowance will be made for the frictional losses in the turbine, the leakage and the friction of the turbine shaft. Then h.p. = o-o85QH.

The velocity of flow through the turbine (uncorrected for the space occupied by the vanes and guide -blad es) may be taken

Mi = «o = 0-I25V2gH,

in which case about ˆth of the energy of the fall is carried away by the water discharged.

The areas of the outlet and inlet surface of the wheel are then

2*rcdo = 2Widi = Q/o- 1 25V (2gH). If we take r„, so that the axial velocity of discharge from the central orifices of the wheel is equal to « , we get

r„ = o-3984V(Q/VH),

do = To-

If, to obtain considerable steadying action of the centrifugal head,

ri = 2r , then di = \d .

Speed of the Wheel. — Let Vi = o-66V2gH, or the speed due to half the fall nearly. Then the number of rotations of the turbine per second is

N = V,/27rr ; = 1 -0579V (HV H/Q) ; also V„ = Vi > -„/ n = o-33V2gH.

Angle of Vanes with Outlet Surface.

Tan0 = «„/V„=o-i25/o-33 = -3788; = 21° nearly. If this value is revised for the vane thickness it will ordinarily become about 25 .

Velocity with which the Water enters the Wheel. — The head producing the velocity is

H – (Vi 2 /2g) (I + M„ 2 /Vi 2) +«i 2 /2g

= H{i —4356(1 0-0358) – -0156}

= 0-564611.

Then the velocity is

Vi = -96V 2g(-5646H) =0-721 V2gH. Angle of Guide-Blades.

Sin 7 = Mi M =0-125/0-721 =0-173; y — 10° nearly. Tangential Velocity of Water entering Wheel. Wi =ViCOS y =0-7101 V 2gH. Angle of Vanes at Inlet Surface.

Cot e = (o»i-Vi)/«i = (7ioi-66)/-i25 = -40o8; 9=68° nearly. Hydraulic Efficiency of Wheel.

7/=tt>iVi/gH = -7ioiX-66X2

= 0-9373-

This, however, neglects the friction of wheel covers and leakage. The efficiency from experiment has been found to be 0-75 to o-8o.

Impulse and Partial Admission Turbines.

§ 197. The principal defect of most turbines with complete

admission is the imperfection of the arrangements for working

with less than the normal supply. With many forms of reaction

turbine the efficiency is considerably reduced when the regulating

sluices are partially closed, but it is exactly when the supply of water is deficient that it is most important to get out of it the greatest

possible amount of work. The imperfection of the regulating arrangements is therefore, from the practical point of view, a serious defect. All turbine makers have sought by various methods to improve the regulating mechanism. B. Fourneyron, by dividing his wheel by horizontal diaphragms, virtually obtained three or more separate radial flow turbines, which could be successively set in action at their full power, but the arrangement is not altogether successful, because of the spreading of the water in the space between the wheel and guide-blades. Fontaine similarly employed two concentric axial flow turbines formed in the same casing. One was worked at full power, the other regulated. By this arrangement the loss of efficiency due to the action of the regulating sluice affected only half the water power. Many makers have adopted the expedient of erecting two or three separate turbines on the same waterfall. Then one or more could be put out of action and the others worked at full power. All these methods are rather palliatives than remedies. The movable guide-blades of Professor James Thomson meet the difficulty directly, but they are not applicable to every form of turbine.

C. Callon, in 1840, patented an arrangement of sluices for axial or outward flow turbines, which were to be closed success- ively as the wat# supply diminished. By preference the sluices were closed by pairs, two diametrically opposite sluices forming a pair. The water was thus admitted to opposite but equal arcs of the wheel, and the forces driving the turbine were sym- metrically placed. As soon as this arrangement was adopted,

Fig. 197.

a modification of the mode of action of the water in the turbine became necessary. If the turbine wheel passages remain full of water during the whole rotation, the water contained in each passage must be put into motion each time it passes an open

portion of the sluice, and stopped each time it passes a closed portion of the sluice. It is thus put into motion and stopped twice in each rotation. This gives rise to violent eddying motions and great loss of energy in shock. To prevent this, the turbine wheel with partial admission must be placed above the tail water, and the wheel passages be allowed to clear themselves of water, while passing from one open portion of the sluices to the next.

But if the wheel passages are free of water when they arrive at the open guide passages, then there can be no pressure other than atmospheric pressure in the clearance space between guides and

wheel. The water must issue from the sluices with the whole velocity due to the head; received on the curved vanes of the wheel, the jets must be gradually deviated and discharged with a small final velocity only, precisely in the same way as when a single jet strikes a curved vane in the free air. Turbines of this kind are therefore termed turbines of free deviation. There is no variation of pressure in the jet during the Whole time of its action on the wheel, and the whole energy of the jet is im- parted to the wheel, simply by the impulse due to its gradual change of momentum. It is clear that the water may be admitted in exactly the same way to any fraction of the circumference at pleasure, without altering the efficiency of the wheel. The diameter of the wheel may be made as large as convenient, and the water admitted to a small fraction of the circumference only. Then the number of revolutions is independent of the water velocity, and may be kept down to a manageable value.

§ 198. General Description of an Impulse Turbine or Turbine with Free Deviation. — Fig. 197 shows a general sectional elevation of a Girard turbine, in which the flow is axial. The water, . admitted above a horizontal floor, passes down through the annular wheel containing the guide- blades G, G, and thence into the re- volving wheel WW. The revolving wheel is fixed to a hollow shaft suspended from the pivot p. The solid internal shaft ss is merely a fixed column supporting the pivot. The advantage of this _

is that the pivot is tIG – *9 8 –

accessible for lubrication and adjustment. B is the mortise bevel wheel by which the power of the turbine is given off. The sluices are worked by the hand wheel h, which raises them successively, in a way to be described presently, d, d are the sluice rods. Figs. iq8, 199 show the sectional form of the guide-blade chamber and wheel and the curves of the wheel vanes and guide-blades, when drawn on a plane de- velopment of the cylin- ‘ drical section of the wheel; a, a, a are the sluices for cutting off the water; b, b, b are apertures by which the entrance or exit of air is facilitated as the buckets empty and fill. Figs. 200, 201 show the guide-blade gear, a, a, a are the sluice rods as before. At the top of each sluice rod is a small block c, having a projecting tongue, which slides in the groove of the circular cam plate d, d. This circular plate is sup- ported on the frame e, and revolves on it by means of the flanged rollers/. Inside, at the top, the cam plate is toothed, and gears into a spur pinion connected with the hand wheel h. At gg is an inclined groove Or shunt. When the tongues of the blocks c, c arrive at g, they slide up to a second groove, or the reverse, according as the cam plate is revolved in one direction or in the other.

As this operation takes place with each

Fig. 199.

sluice successively, any number of sluices can be opened or closed as desired. The turbine is of 48 horse power on 5′ 12 ft. fall, and the supply of water varies from 35 to 112 cub. ft. per second. The

a a a

Fig. 200.

efficiency in normal working is given as 73 %. The mean diameter of the wheel is 6 ft., and the speed 27-4 revolutions per minute.

As an example of a partial admission radial flow impulse turbine, a 100 h.p. turbine at Immenstadt may be taken. The fall varies from 538 to 570 ft. The external diameter of the wheel is 4i ft., and

*fcA

QF Q = Q=gDˆ gm

a

11

Fig. 201.

its internal diameter 3 ft. 10 in. Normal speed 400 revs, per minute. Water is discharged into the wheel by a single nozzle, shown in fig. 202 with its regulating apparatus and some of the vanes. The water

enters the wheel at an angle of 22° with the direc- tion of motion, and the final angle of the wheel vanes is 20 . The efficiency on trial was from 75 to

78%.

§ 199. Theory of the Impulse Turbine. — The theory of the im- pulse turbine does not essen- tially differ from that of the re- action turbine,

except that there is no pressure in the wheel oppos- ing the discharge from the guide-blades. Hence the velocity with which the water

enters the wheel is simply

i\=o-96V2g(H-h), where h is the height of the top of the wheel above the tail water. If the hydropneumatic system is used, then 6=0. Let Q m be the maximum supply of water, n, r 2 the internal and external radii of the wheel at the inlet surface; then

tti=Qm/ta-W -ri*)l. The value of m may be about o-45V2g(H-h), whence n, h can be determined.

The guide-blade angle is then given by the equation , sin y = M; Ivi =0-45/0-94 = -48; 7 = 29°. The value of «; should, however, be corrected for the space occupied by the guide-blades.

The tangential velocity of the enter ing water is

1. Wi=Vi COS7'=0-82V2g(H-t)).

The circumferential velocity of t he wheel m ay be (at mean radius) V< =o-5V2g(H-h).

Fig. 202.

Hence the vane angle at inlet surface is given by the equation

cote = (a)i-Vi)/«i = (o-82-o-5)/o-45 = -7i;

= 55°- t

The relative velocity of the water striking the vane at the inlet edge is v,i=m cosec0 = l-22«j. This relative velocity remains unchanged during the passage of the water over the vane; conse- quently the relative velocity at the point of discharge is v T0 = 1 -222*1. Also in an axial flow turbine V = V«.

If the final velocity of the water is axial, then

cos = V,,/f r(, = Vi/p,i =0-5/(1 -22 Xo-45)=cos24° 23'. This should be corrected for the vane thickness. Neglecting this, Wo=iVosin< £=tVisin <£ = «.- cosec sin = o-5«,-. The discharging area of the wheel must therefore be greater than the inlet area in the ratio of at least 2 to 1. In some actual turbines the ratio is 7 to 3. This greater outlet area is obtained by splaying the wheel, as shown in the section (fig. 199).

§ 200. Pelton Wheel. — In the mining district of California about i860 simple impulse wheels were used, termed hurdy-gurdy wheels. The wheels rotated in a vertical plane, being supported on a hori- zontal axis. Round the circumference were fixed flat vanes which were struck normally by a jet from a nozzle of size varying with the head and quantity of water. Such wheels have in fact long been used. They are not efficient, but they are very simply constructed. Then attempts were made to improve the efficiency, first by using hemispherical cup vanes, and then by using a double cup vane with a central dividing ridge, an arrangement invented by Pelton. In this last form the water from the nozzle passes half to each side of the wheel, just escaping clear of the backs of the advancing buckets. Fig. 203 shows a Pelton vane. Some small modifications have been made by other makers, but they are not of any great importance. Fig. 204 shows a complete Pelton wheel with frame and casing, supply pipe and nozzle. Pelton wheels have been very largely used in America and to some extent in Europe. They are extremely simple and easy to construct or repair and on falls of 100 ft. or more are very efficient. The jet strikes tangentially to the mean radius of the buckets, and the face of the buckets is not quite radial but at right angles to the direction of the jet at the point of first impact. For greatest efficiency the peripheral velocity of the wheel at the mean radius of the buckets should be a little less than half the velocity of the jet. As the radius of the wheel can be taken arbitrarily, the number of revolutions per minute can be accommodated to that of the machinery to be driven. Pelton wheels have been made as small

Fig. 203.

I MIL.'l , JJp Ifk \ 1 JJI ■

FlG.204.

as 4 in. diameter, for driving sewing machines, and as large as 24 ft. The efficiency on high falls is about 80 %. – When large power is required two or three nozzles are used delivering on one wheel. The width of the buckets should be not less than seven times the diameter of the jet.

At the Comstock mines, Nevada, there is a 36-in. Pelton wheel made of a solid steel disk with phosphor bronze buckets riveted to the rim. The head is 2100 ft. and the wheel makes 1 150 revolutions per minute, the peripheral velocity being 180 ft. per sec. With a J-in. nozzle the wheel uses 32 cub. ft. of water per minute and develops 100 h.p. At the Chollarshaft, Nevada, there are six Pelton wheels on a

fall of 1680 ft. driving electrical generators. With f-in. nozzles each develops 125 h.p.

§ 201. Theory of the Pelton Wheel. — Suppose a jet with a velocity v strikes tangentially a curved vane AB (fig. 205) moving in the same direction with the velocity u. The water will flow over the vane with the relative velocity v — u and at B will have the tangential

Fig. 205.

relative velocity v — u making .an angle o with the direction of the vane's motion. Combining this with the velocity w of the vane, the absolute velocity of the water leaving the vane will bew = Be. The com- ponent of w in the direction of motion of the vane is Bo = BJ— ab

= « — (»—«) cos a. Hence if Q is the quantity of water reaching the vane per second the change of momentum per second in the direction of the vane's motion is (GQ/g) [» — {« — (v-u)cos o,[] = (GQ/g)(p-«) (I + cos a). If a = 0°, cos = 1, and the change of momentum per second, which is equal to the effort driving the vane, is P =2 (GQ/g) (»-«)! The work done on the vane is Pu = 2(GQ!g)(v-u)u. If a series of vanes are inter- posed in succession, the quantity of water imping- ing on the vanes per second is the total discharge of the nozzle, and the energy expended at the nozzle is GQtf 2 /2g. Hence the efficiency of the arrangement is, when a = o°, neglecting friction,

t) = 2Pk/GQ!/ 2 = 4(ii-w)m/ii 2 , which is a maximum and equal to unity if « = §». In that case the whole energy of the jet is usefully expended in driving the series of vanes. In practice o cannot be quite zero or the water leaving one vane would strike the back of the next advancing vane. Fig. 203 shows a Pelton vane. The water divides each way, and leaves the vane on each side in a direction nearly parallel to the direction of motion of the vane. The best velocity of the vane is very approxi- mately half the velocity of the jet.

§ 202. Regulation of the Pelton Wheel. — At first Pelton wheels were adjusted to varying loads merely by throttling the supply. This method involves a total loss of part of the head at the sluice or throttle valve. In addition as the working head is reduced, the relation between

wheel velocity and jet velocity is no longer that of greatest efficiency. Next a plan was adopted of deflecting the jet so that only part of the water reached the wheel when the load was reduced, the rest going to waste. This involved the use of an equal quantity of water for large and small loads, but it had, what in some cases is an advantage, the effect of preventing any water hammer in the supply pipe due to the action of the regulator. In most cases now regulation is effected by varying the section of the jet. A conical needle in the nozzle can be advanced or withdrawn so as to occupy more or less of the aperture of the nozzle. Such a needle can be controlled by an ordinary governor.

§ 203. General Considerations on the Choice of a Type of Turbine. — The circumferential speed of any turbine is necessarily a fraction of the initial velocity of the water, and therefore M greater as the head is greater. In reaction turbines with com- plete admission the number of revolutions per minute becomes inconveniently great, for the diameter cannot be increased beyond certain limits without greatly reducing the efficiency. In impulse turbines with partial admission the diameter can be chosen arbitrarily and the number of revolutions kept down on high falls to any desired amount. Hence broadly reaction turbines are better and less costly on low falls, and impulse turbines on high falls. For variable water flow impulse turbines have some advantage, being more efficiently regulated. On the other hand, impulse turbines lose efficiency seriously if their speed varies from the normal speed due to the head. If the head is very variable, as it often is on low falls, and the turbine must run at the same speed whatever the head, the impulse turbine is not suitable. Reaction turbines can be constructed so as to overcome this difficulty to a great extent. Axial flow turbines with vertical shafts have the disadvantage that in addition to the weight of the turbine there is an unbalanced water pressure to be carried by the footstep or collar bearing. In radial flow turbines the hydraulic pressures are balanced. The application of turbines to drive dynamos directly has involved some new con- ditions. The electrical engineer generally desires a high speed of rotation, and a very constant speed at all times. The reaction turbine is generally more suitable than the impulse turbine. As the diameter of the turbine depends on the quantity of water and cannot be much varied without great inefficiency, a difficulty arises on low falls. This has been met by constructing four independent reaction turbines on the same shaft, each having of

course the diameter suitable for one-quarter of the whole dis- charge, and having a higher speed of rotation than a larger turbine. The turbines at Rheinfelden and Chevres are so con- structed. To ensure constant speed of rotation when the head varies considerably without

serious inefficiency, an axial flow turbine is generally used. It is constructed of three or four concentric rings of vanes, with independent regulating sluices, forming practically independent turbines of different radii. Any one of these or any combination can be used according to the state of the water. With a high fall the turbine of largest radius only is used, and the speed of rotation is less than with a turbine of smaller radius. On the other hand, as the fall decreases the inner turbines are used either singly or together, according to the power required. At the Zurich waterworks there are turbines of 90 h.p. on a fall varying from 10ˆ ft. to 4$ ft. The power and speed are kept constant. Each turbine has three concentric rings. The outermost ring gives 90 h.p. with 105 cub. ft. per second and the maximum fall. The outer and middle compartments give the same power with 140 cub. ft. per second and a fall of 7 ft. 10 in. All three compartments working together develop the power with about 250 cub. ft. per second. In some tests the efficiency was 74% with the outer ring working alone, 75.4% with the outer and middle ring working and a fall of 7 ft., and 80-7 % with all the rings working.

§ 204. Speed Governing.ˆ-‘Wheii turbines are used to drive dynamos direct, the question of speed regulation is of great im- portance. Steam engines using a light elastic fluid can be easily regulated by governors acting on throttle or expansion valves. It is different, with water turbines using a fluid of great inertia.

Hand

Regulator

Fig. 206.

In one of the Niagara penstocks there are 400 tons of water flowing at 10 ft. per second, opposing enormous resistance to rapid change of speed of flow. The sluices of water turbines also are necessarily large and heavy. Hence relay governors must be

used, and the tendency of relay governors to hunt must be overcome. In the Niagara Falls Power House No. i, each tur- bine has a very sensitive centrifugal governor acting on a ratchet relay. The governor puts into gear one or other of two ratchets driven by the turbine itself.

According as one or the other ratchet is in gear the sluices are raised or lowered. By a sub- sidiary arrangement the ratchets are gradually put out of gear unless the governor puts them in gear again, and this prevents the over correction of the speed from the lag in the action of the governor. In the Niagara Power House No. 2, the relay is an hydraulic relay similar in principle, but rather more complicated in arrangement, to that shown in figi 206, which is a governor used for the 1250 h.p. turbines at Lyons. The sensitive governor G opens a valve and puts into action a plunger driven by oil pressure from an oil reservoir. As the plunger moves forward it gradually closes the oil admission valve by lowering the fulcrum end/ of the valve lever which rests on a wedge k> attached to the plunger. If the speed is still too high, the governor re- opens the valve. In the case of the Niagara turbines the oil pressure is 1200 lb per sq. in. One , millimetre of movement of the governor sleeve completely opens the relay valve, and the relay plunger exerts a force of 50 tons. The sluices can be completely opened or shut in twelve seconds. The ordinary variation of speed of the turbine with varying load does not exceed 1%. If all the load is thrown off, the momentary variation of speed is not more than 5 %. To prevent hydraulic shock in the supply pipes, a relief valve is provided which opens if the pressure is in excess of that due to the head.

§ 205. The Hydraulic Ram. — The hydraulic ram is an arrange- ment by which a quantity of water falling a distance h forces a portion of the water to rise to a height k\, greater than h. It consists of a supply reservoir (A, fig. 207), into which the water enters from some natural stream. A pipe j of considerable length conducts the water to a lower level, where it is discharged intermittently through a self-acting pulsating valve, at d. The supply pipe J may be fitted with a flap valve for stopping the ram, and this is attached in some cases to a float, so tlwtt the ram starts and stops itself automatically,; according as the supply cistern fills or empties. The lower float is just sumcienfc'to keep open the flap after it has been raised by the action of the upper float. The length of chain is adjusted so that the upper float opens the flap when the level in the cistern is at the desired height. If the water-level falls below the lower float the flap closes. The pipe s should be as long and as straight as possible, and as it is subjected to considerable pressure from the sudden arrest of the motion of the water, it must be strong and strongly

Fig. 208.

Fig. 207.

jointed, a is an air vessel, and e the delivery pipe leading to the reservoir at a higher level than A, into which water is to be pumped. Fig. 208 shows in section the construction of the ram itself, d is the pulsating discharge valve already mentioned, which opens inwards and downwards. The stroke Of the valve is regulated by the cotter through the spindle, under which are washers by which the amount of fall can be regulated. At is a delivery valve, opening outwards, which is often a ball- valve but sometimes a flap-valve. The water which is pumped passes through this valve into the air vessel a, from which it flows by the delivery pipe in a regular stream into the cistern to which the water is to be raised. In the vertical chamber behind the outer valve a small air vessel is formed, and into

this opens an aperture -J in. in'diameter, made in a brass screw plug b. The hole is reduced ■ to' iV in. in diameter at the outer end of the plug and is closed by a small valve opening inwards. Through this, during the rebound after each stroke of the ram, a small quantity of air is sucked in which keeps the air vessel supplied with its elastic cushion of air.

During the recoil after a sudden closing of the valve d, the pressure below it is diminished and the valve opens, permitting outflow. In consequence of the flow through this valve, the Water in the supply pipe acquires a gradually increasing velocity. The upward flow of , the water, towards the valve d, increases the pressure tending to lift the valve, and at last, if the valve is not too heavy, lifts and closes it. The forward mo- mentum of thecolumn in the supply pipe being destroyed by the stoppage of the flow, the water exerts a pressure at the end of the pipe sufficient to open the delivery valve o, and to cause a portion of the water to flow into the air vessel. As the water in the supply pipe comes to rest and recoils, the valve d opens again and the operation is repeated. Part of the energy of the descending column is employed in compressing the air at the end of the supply pipe arid expanding the pipe itself. This causes a recoil of the water which momentarily diminishes the pressure in the pipe below the pressure due to the statical head. This assists in opening the valve d. The recoil of the water is sufficiently great to enable a pump to be attached to the ram body instead of the direct rising pipe. With this arrangement a ram working with muddy water may be employed to raise clear spring water. Instead of lifting the delivery valve as in the ordinary ram, the momentum of the column drives a sliding or elastic piston, and the recoil brings it back. This piston lifts and forces alternately the clear water through ordinary pump valves.

Pumps § 206. The different classes of pumps corre- spond almost

exactly to the different classes of water motors, although the mechanical details of the construction are somewhat different. They are properly reversed water motors. Ordinary reciprocating pumps corre- spond to water-pressure engines. Chain and bucket pumps are in principle similar to water wheels in which the water acts by weight. Scoop wheels are similar to undershot water wheels, and centrifugal pumps to turbines.

Reciprocating Pumps are single or double acting, and differ from water-pressure engines in that the valves are moved by the water instead of by automatic machinery. They may be classed thus:-—

1. Lift Pumps. -—The water drawn through a foot valve on the ascent of the pump bucket is forced through the bucket valve when it descends, and lifted by the bucket when it reascends. Such pumps give an intermittent discharge.

2. Plunger or Force Pumps, in which the water drawn through the foot valve is displaced by the descent of a solid plunger, and forced through a delivery valve. They have the advantage that

ilt ˆini,

the friction is less than that of lift pumps, and the packing round the plunger is easily accessible, whilst that round a lift pump bucket is not. The flow is intermittent.

3. The Double-acting Force Pump is in principle a double plunger pump. The discharge fluctuates from zero to a maximum and back to zero each stroke, but is not arrested for any appreciable time.

4. Bucket and Plunger Pumps consist of a lift pump bucket combined with a plunger of half its area. The flow varies as in a double-acting pump.

5. Diaphragm Pumps have been used, in which the solid plunger is replaced by an elastic diaphragm, alternately depressed into and raised out of a cylinder.

As single-acting pumps give an intermittent discharge three are

generally used on cranks at 120 . But with all pumps the variation of velocity of discharge would cause great waste of work in the delivery pipes when they are long, and even danger from the hydraulic ramming action of the long column of water. An air vessel is interposed between the pump and the delivery pipes, of a volume from 5 to 100 times the space described by the plunger per stroke. The air in this must be replenished from time to time, or continuously, by a special air-pump. At low speeds not exceeding 30 ft. per minute the delivery of a pump is about 90 to 05% of the volume described by the plunger or bucket, from 5 to 10% of the discharge being lost by leakage. At high speeds the quantity pumped. occasionally exceeds the volume described by the plunger, the momentum of the water keeping the valves open after the turn of the stroke.

The velocity of large mining pumps is about 140 ft. per minute, the indoor or suction stroke being sometimes made at 250 ft. per minute. Rotative pumping engines of large size have a plunger speed of 90 ft. per minute. Small rotative pumps are run faster, but at some loss of efficiency. Fire-engine pumps have a speed of 180 to 220 ft. per minute.

The efficiency of reciprocating pumps varies very greatly. Small reciprocating pumps, with metal valves on lifts of 15 ft., were found by Morin to have an efficiency of 16 to 40%, or on the average 25%. When used to pump water at considerable pressure, through hose pipes, the efficiency rose to from 28 to 57%, or on the average, with 50 to 100 ft. of lift, about 50%. A large pump with barrels 18 in. diameter, at speeds under 60 ft. per minute, gave the following results: —

Lift in feet 141 34 47

Efficiency …. -46 -66 -70

The very large steam-pumps employed for waterworks, with 150 ft. or more of lift, appear to reach an efficiency of 90%, not including the friction of the discharge pipes. Reckoned on the indicated work of the steam-engine the efficiency may be

80%.

Many small pumps are now driven electrically and are usually three-throw single-acting pumps driven from the electric motor by gearing. It is not convenient to vary the speed of the motor to accommodate it to the varying rate of pumping usually required. Messrs Hayward

Tyler have introduced a mechanism for varying the stroke of the pumps (Sinclair's patent) from full stroke to nil, without stopping the pumps.

§ 207. Centrifugal Pump. — For large volumes of water on lifts not exceeding about 60 ft. the most convenient pump is the centrifugal pump. Recent improvements have made it available also for very high lifts. It consists of a wheel or fan with curved vanes enclosed in an annular chamber. Water flows in at the centre and is discharged at the periphery. The fan may rotate in a vertical or horizontal plane and the water may enter on one or both sides of the fan. In the latter case there is no axial unbalanced pressure. The fan and its casing must be filled with water before it can start, so that if not drowned there must be a foot valve on the suction pipe. When no special attention needs to be paid to efficiency the water may have a velocity of 6 to 7 ft. in the suction and delivery pipes. The fan often has 6 to 12 vanes. For a double-inlet fan of diameter D, the diameter of the inlets is D/2. If Q \i the discharge in cub. ft. per second D = about o-6 VQ in average cases. The

peripheral speed is a little greater than the velocity due to the lift. Ordinary centrifugal pumps will have an efficiency of 40 to 60%.

The first pump of this kind which attracted notice was one exhibited by J. G. Appold in 1851, and the special features of his pump have been retained in the best pumps since constructed. Appold's pump raised continuously a volume of water equal to 1400 times its own capacity per minute. It had no valves, and it permitted the passage of solid bodies, such as walnuts and oranges, without obstruction to its working. Its efficiency was also found to be good.

Fig. 209 shows the ordinary form of a centrifugal pump. The pump disk and vanes B are cast in one, usually of bronze,

and the disk is keyed on the driving shaft C. The casing A has a spirally enlarging discharge passage into the discharge pipe K. A cover L gives access to the pump. S is the suction pipe which opens into the pump disk on both sides at D.

Fig. 210 shows a centrifugal pump differing from ordinary centrifugal pumps in one feature only. The water rises through a suction pipe S, which divides so as to enter the pump wheel W at the centre on each side. The pump disk or wheel is very similar to a turbine wheel. It is keyed on a shaft driven by a belt on a fast and loose pulley arrangement at P. The water rotating in the pump disk presses

outwards, and if the speed is sufficient a continuous flow is maintained through the pump and into the discharge pipe D. The special feature in this pump is that the water, discharged by the pump disk with a whirling yelocity of not inconsiderable magnitude, is allowed to continue rotation in a chamber somewhat larger than the pump. The use of this whirlpool chamber was first suggested by Professor James Thomson. It utilizes the energy due to the whirling velocity of the water which in most pumps is wasted in eddies in the discharge pipe. In the pump shown guide-blades are also added which have the direction of the stream lines in a free vortex. They do not therefore interfere with the action of th”e. water when pumping the normal quantity, but only prevent irregular motion. At A is a plug by which the pump case is filled before starting. If the pump is above the water to be pumped, a foot valve is required to permit the pump to be filled. Sometimes instead of the foot valve a delivery valve is used, an air-pump or steam jet pump being employed to exhaust the air from the pump case.

§ 208. Design and Proportions 0} a Centrifugal Pump.— The design of the pump disk is very simple. Let r { , n be the radii of the inlet and outlet surfaces of the pump disk, &i, d the clear axial width at those radii. The velocity of flow through the pump may be taken

io8

HYDRAULICS

[PUMPS

Fig. 2io.

the same as for a turbine. If Q is the quantity pumped, and H the lift,

Mi = 0-25V2fiH. (i)

2-irndi = Q/m >. Also in practice

di-V2Ti .... I Hence, f (2)

r < = -257W(Q/VH).J Usually r = 2r >,

and d = di or jd,-

according as the disk is parallel-sided or coned. The water enters the wheel radially with the velocity «.-, and

u =Ql2irr„d„. (3)

Fig. 211 shows the notation adopted for the velocities. Suppose the water enters the wheel with the velocity Vi, while

the velocity of the “• » ? wheel is V.. Com

pleting the parallelo- gram, vh is the rela- tive velocity of the water and wheel, and is the proper direction of the wheel vanes. Also, by resolving, tu and Wi are the com- ponent velocities of flow and velocities of whir of the velocity k &f the water. At the outlet surface, v is the Fig. 211. finaV velocity of dis-

charge, and the rest of the notation is similar to that for the inlet surface. _

Usually the water flows equally in all directions in the eye of the wheel, in that case d< is radial. Then, in normal conditions of work- ing, at the inlet surface,

Vi = M; “|

Wi=0 I /.s

tane=UilWi J w

v,i = Ui cosec = V(tti 2 +Vv 2 J u If the pump is raising less or more than its proper quantity, fl will not satisfy the last condition, and there is then some loss of head in shock.

At the outer circumference of the wheel or outlet surface, »ro =«• cosec T

W —Vo — Mo COt ‘{■ (5)

»o = VK 2 + (V,,-M COt<*.) 2 !j

Variation of Pressure in the Pump I>«fe.— Precisely as in the case of turbines, it can be shown that the variation of pressure between the inlet and outlet surfaces of the pump is

h -hi = (Vo 2 Vi 2)/2g (tv<, 2 -iVi 2)/2«.

Inserting the values of v r „ iw in (4) and (5), we get for normal conditions of working

ho-h = (V„ ! -Vv 2)/2g-«„ 2 COseC 2 4./2g + (Mi 2 +Vi 2)/2g

= V„ 2 /2g-M 2 cosec 2 0/2g + Z(i 2 /2g. (6)

Hydraulic Efficiency of the Pump. — Neglecting disk friction, journal friction, and leakage, the efficiency of the pump can be found in the same way as that of- turbines (§ 186). Let M be the moment of the couple rotating the pump, and a its angular velocity; i»„ r„ the tangential velocity of the water and radius at the outlet surface; iw, n the same quantities at the inlet surface. Q being the discharge per second, the change of angular momentum per second is

(GQ/g)(w.r„-«iiri). Hence M = (GQ/g) (tp„r„ — Win).

In normal working, «i» = o. Also, multiplying by the angular velocity, the work done per second is

Ma = {GQIg)w a r a.

But the useful work done in pumping is GQH. Therefore the efficiency is

,, =GQH/Ma =gH/Kv„a =gH/wM . (7)

§ 209. Case 1. Centrifugal Pump with no Whirlpool Chamber. — When no special provision is made to utilize the energy of motion of the water leaving the wheel, and the pump discharges directly into a chamber in which the water is flowing to the discharge pipe, nearly the whole of the energy of the water leaving the disk is wasted. The water leaves the disk with the more or less considerable velocity v , and impinges on a mass flowing to the discharge pipe at the much slower velocity v,. The radial component of v is almost necessarily wasted. From the tangential component there is a gain of pressure

(«>„ 2 — l> s 2)/2g— (w„ — fl s) 2 /2g = V,(W — V.)[g,

which will be small, if v, is small compared with iv . Its greatest value, if v, =!jWo, is \wJ-\2g, which will always be a small part of the whole head. Suppose this neglected. The whole variation of pressure in the pump disk then balances the lift and the head tti 2 /2g necessary to give the initial velocity of flow in the eye of the wheel.

K.-ˆg+H =V„ 2 /2g-M„ 2 COSeC 2

H=V//2g-«„ 2 cosec '/2g} r (8)

or V„ = V (2gH --Uo- cosec 2 $.)

and the efficiency of the pump is, from (7),

,=gH/V.w„=gH/{V(V„-»„cot0)), = (V«, 2 «„ 2 cosec 2 Wo cot \, (9)

For<*>=90°, 77=(V„ 2 -m„ 2)/2YV,

which is necessarily less than J. That is, half the work expended in driving the pump is wasted. By recurving the vanes, a plan introduced by Appold, the efficiency is increased, because the velocity v, of discharge from the pump is diminished. If <#> is very small,

cosec = cot ; and then ij = (V„+w„ cosec *)/2V„,

which may approach the value I, as tends towards o. Equation (8) shows that u„ cosec 4> cannot be greater than V». Putting w„ =o – 25V (2gH) we Sˆt the following numerical values of the efficiency and the circumferential velocity of the pump:—

PUMPS]

HYDRAULICS

109

*o

V

9°!

0-47

45:

0-56

3°:

0-65

20°

o-73

IO°

0-84

v„

i-03V2gH 1-06 „

I-I2 „

1-24 -,

i-75 ..

cannot practically be made less than 20°; and, allowing for the frictional losses neglected, the efficiency of a pump in which <£ = 20° is found to be about -6o.

§ 210. Case 2. Pump with a Whirlpool Chamber, as in fig. 210. — Professor James Thomson first suggested that the energy of the water after leaving the pump disk might be utilized, if a space were left in which a free vortex could be formed. In such a free vortex the velocity varies inversely as the radius. The gain of pressure in the vortex chamber is, putting r„, r„ for the radii to the outlet surface of wheel and to outside of free vortex,

M-Sv-‘)-

if k = rjr w .

The lift is then, adding this to the lift in the last case,

H = jVˆ-Mo 2 cosec 2 0+». s (i -* 2)!/2£. But t , „ 2 =V 1 , 2 -2’V M o cot ip+Uo 1 cosec 2 -|>;

.-.H = ((2 ~k r)V|/2g. (10)

Putting this in the expression for the efficiency, we find a considerable increase of efficiency. Thus with

= 90° and k = i, v\ nearly,

ij> a small angle and k — \, ij = I nearly.

With this arrangement of pump, therefore, the angle at the outer ends of the vanes is of comparatively little importance. A moderate angle of 30 or 40 may very well be adopted. The following numerical values of the velocity of the circumference of the pump

= 0-25V(2gH).

have been obtained by taking k –

= J, and «„ = ()•

V.

90

■762 V 2gH

<

•842 „

30

•911 ..

20°

1-023 „

The quantity of water to be pumped by a centrifugal pump necessarily varies, and an adjustment for different quantities of water cannot easily be introduced. Hence it is that the average efficiency of pumps of this kind is in practice less than the efficiencies given above. The advantage of a vortex chamber is also generally neglected. The velocity in the supply and discharge pipes is also often made greater than is consistent with a high degree of efficiency. Velocities of 6 or 7 ft. per second in the discharge and suction pipes, when the lift is small, cause a very sensible waste of energy; 3 to 6 ft. would be much better. Centrifugal pumps of very large size have been constructed. Easton and Anderson made pumps for the North Sea canal in Holland to deliver each 670 tons of water per minute on a lift of 5 ft. The pump disks are 8 ft. diameter. J. and H. Gwynne constructed some pumps for draining the Ferrarese Marshes, which together deliver 2000 tons per minute. A pump made under Pro- fessor J. Thomson's direction for drainage works in Barbados had a pump disk 16 ft. in diameter and a whirlpool chamber 32 ft. in diameter. The efficiency of centrifugal pumps. when delivering less or more than the normal quantity of water is discussed in a paper in the Proc. Inst. Civ. Eng. vol. 53.

§ 211. High Lift Centrifugal Pumps. — It has long been known that centrifugal pumps could be worked in series, each pump overcoming a

part of the lift. This method has been perfected, and centrifugal pumps for very high lifts with great efficiency have been used by Sulzer and others. C. W. Darley (Proc. Inst. Civ. Eng., supplement to vol. 154, p. 156) has described some pumps of this new type driven by Parsons steam turbines for the water supply of Sydney, N.S.W. Each pump was designed to deliver 1 5 million gallons per twenty-four hours against a head of 240 ft. at 3300 revs, per minute. Three pumps in series give therefore a lift of 720 ft. The pump consists of a central double- sided impeller 12 in. diameter. The water entering at the bottom divides and enters the runner at each side through a bell-mouthed passage. The shaft is provided with ring and groove glands which on the suction side keep the air out and on the pressure side prevent leakage. Some water from the pressure side leaks through the glands, but beyond the first grooves it passes into a pocket and is returned to the suction side of the pump. For the glands on the suction side water is supplied from a low- pressure service. No packing is used in the glands. During the trials no water was seen at the gk>nds. The following are the results of tests made at Newcastle:- –

Duration of test . hours

Steam pressure lb per sq. in. Weight of steam per water

h.p. hour ft

Speed in revs, per min. Height of suction . . .ft.

Total lift ft.

Million galls, per day pumped —

By Ventun meter

By orifice ….. Water h.p. .....

2

57

27-93

3300

11

762

1-573 1-623

252

II.

1-54

57

30-67

3330 11

744

1-499 1-513 235

III.

1-2

84

28-83 3710

II

917

1-689 1-723 326

IV.

1-55 55

27-89

3340

11

756

I-503

1-555 239

Stand Pipe

In trial IV. the steam was superheated 95° F. From other trials under the same conditions as trial I. the Parsons turbine uses 15-6 lb of steam per brake h.p. hour, so that the combined efficiency of turbine and pumps is about 56%, a remarkably good result.

§ 212. Air-Lift Pumps.— An interesting and simple method of pumping by compressed air, invented by Dr J. Pohle of Arizona, is likely to be Very useful in certain cases. Suppose a rising main placed in a deep bote hole in which there is a considerable depth of water. Air compressed to a sufficient pressure is con veyed by an air pipe and introduced at the lower end of the rising main. The air rising in the main diminishes the average density of the contents of the main, and their aggregate weight no longer balances the pres- sure at the lower end of the main due to its sub- mersion. An up- ward flow is set up, and if the air supply is suffi- cient the water in the rising main is lifted to any Wg$0&g&$Pj required height. The higher the lift above the level in the bore hole the deeper must be the point at which air is injected. Fig. 212 shows an air- lift pump con- structed for W. H. Maxwell at the Tunbridge Wells water- works. There is a two-stage steam air compressor, compressing air to from 90 to 100 lb

per sq. in. The bore hole is 3 50 ft. deep, lined with steel pipes 1 5 inˆ” diameter for 200 ft. and with perforated pipes i3j.in. diameter for the lower 150 ft. The rest level of the water is 96 ft. from the ground-level, and the level when pumping 32,000 gallons per hour is 1 20 ft. from the ground-level. The rising main is 7 in. diameter, and is carried nearly to the bottom of the bore hole and to 20 ft. above the ground-level. The air pipe is 25 in. diameter, In a trial run 31,402 gallons per hour were raised 133 ft. above the level in the well. Trials of the efficiency of the system made at San Francisco with varying conditions will be found in a paper by E. A. Rix (Journ. Amer. Assoc. Eng. Soc. vol. 25,

I iffttSi

U-Steel Tubes IS’piam. Main 7Diam.

rfrrfi jilj

Rising

Air Pip* 2i’ Dlam

Fig. 212.

no

HYDRAZINE;

1 900) . Maxwell found the best results when the ratio of immersion to lift was 3 to i at the start and 2-2 to 1 at the end of the trial. In these conditions the efficiency was 37% calculated Ori the indicated h.p. of the steam-engine, and 46% calculated on the indicated work of the compressor. 2-7 volumes of free air were used to 1 of water lifted. The system is suitable for temporary purposes, especially as the quantity of water raised is much greater than could be pumped by any other system in a bore hole of a given size. It is useful for clearing a boring of sand and may be advantageously used permanently when a boring is in sand or gravel which cannot be kept out of the bore hole. The initial cost is small.

§ 213. Centrifugal Fans. — Centrifugal fans are constructed similarly ta centrifugal pumps, and are used for compressing air to pressures not exceeding 10 to 15 in. of water-column. With this small variation of pressure the variation of volume and density of the air may be neglected without sensible error. The conditions of pressure and discharge for fans are gener- ally less accurately known than in the case of pumps, and the design of fans is generally somewhat crude. They seldom have whirlpool chambers, though a large expanding outlet is pro- vided in the case of the important Guibal fans used in mine ventilation.

It is usual to reckon the difference of pressure at the inlet and outlet of a fan in inches of water-column. One inch of water- column =64-4 ft. of air at average atmospheric pressure = 5-2lb per sq. ft.

Roughly the pressure-head produced in a fan without means of utilizing the kinetic energy of discharge would be i s /2g ft. of air, or 0-00024 u ! in. of water, where v is the velocity of the tips of thefan blades in feet per second. If d is the diameter of the fan and t the width at the external circumference, then ndt is the discharge area of the fan disk. If Q is the discharge in cub. ft. per sec, u =Q/xdi is the radial velocity of discharge which is numerically equal to the discharge per square foot of outlet in cubic feet per second. As both the losses in the fan and the work done are roughly proportional to m 2 in fans of the same type, and are also proportional to the gauge pressure p, then if the losses are to be a constant percentage of the work done u may be taken proportional to V P- In ordinary cases « = about 22V p. The width t of the fan is generally from 0-35 to o-45<2. Hence if Q is given, the diameter of the fan should be: —

For/ = o-35d, d = o-2oV(Q/V/ >)

For < = o-45

If p is the pressure difference in the fan in inches of water, and N the revolutions of fan,

u = 7r < 2N/6o ft. per sec.

N = i23oVf > / < 2 <•■ revs, per n > in. As the pressure difference is small, the work done in compressing the air is almost exactly $-2pQ foot-pounds per second. Usually, however, the kinetic energy of the air in the discharge pipe is not inconsiderable compared with the work done in compression. If w is the velocity of the air where the discharge pressure is measured, the air carries away w t /2g foot-pounds per lb of air as kinetic energy. In Q cubic feet or o-o8o7QIb the kinetic energy is 0-00125 Qw 2 foot-pounds per second.

The efficiency of fans is reckoned in two ways. If B.H.P, is the effective horse-power applied at the fan shaft, then the efficiency reckoned on the work of compression is

> > = 5-2pQ/55oB.H.P. On the other hand, if the kinetic energy in the delivery pipe is taken as part of the useful work the efficiency is

ˆ = (5-2£Q + a-ooi25Qa > 2)/55oB.H.P. Although the theory above is a rough one it agrees sufficiently with experiment, with some merely numerical modifications.

An extremely interesting experimental investigation of the action of centrifugal fans has been made by H. Heenan and W. Gilbert (Proc. Inst. Civ. Eng. vol. 123, p. 272). The fans delivered through an air trunk in which different resistances could be obtained by intro- ducing diaphragms with circular apertures of different sizes. Suppose a fan run at constant speed with different resistances and the com- pression pressure, discharge and brake horse-power measured. The results plot in such a diagram as is shown in fig. 213. The less the resistance to discharge, that is the larger the opening in the air trunk, the greater the quantity of air discharged at the given speed of the fan. On the other hand the compression pressure diminishes. The c*rve marked total gauge is the compression' pressure -(the velocity head in the discharge pipe, both in inches of water,. This curve falls, but not nearly so much as the compression curve, when the resist ance 13 the air trunk is diminished. The brake horse-power increases as tne resistance is diminished because the volume of discharge in- crease* very much. The curve marked efficiency is tile efficiency

calculated on the work of compression only. It is zero for no discharge, and zero also when there is no resistance and all the energy given to the air is carried away as kinetic energy. There is a discharge for which this efficiency is a maximum ; it is about half the discharge which there is when there is no resistance and the delivery pipe is full open. The conditions of speed and discharge corresponding to the greatest efficiency of compression are those ordinarily taken as the best normal conditions of working. The curve marked

«o

*•

ta-

to

e

il-

J

i

c

•

£

•

1

1

V

J;

.6

1

«5» y*

l-

1

«•

J .

0!

3P00 Discharge – C ‘.ft per min.

Tip Speed * 100 ft. per sec.

Fig. 213. •

total efficiency gives the efficiency calculated on the work of compression and kinetic energy of discharge. Messrs Gilbert and Heenan found the efficiencies of ordinary fans calculated on the compression to be 40 to 60% when working at about normal conditions.

Taking some, of Messrs Heenan and Gilbert’s results for ordinary fans in normal conditions, they have been found to agree fairly with the following approximate rules. Let p c be the compression pressure and 5 the volume discharged per second per square foot of outlet area .of fan. . Then the total gauge pressure due to pressure of compression and velocity of discharge is approximately: p = p e + o-ooo ± q 2 in. of water, so that if p c is given, p can be found approximately. The pressure p depends on the circumferential speed * of the fan disk —

/► = 0-0O025f 2 in. oi water

v = 63V P ft. per sec. The discharge per square foot of outlet of fan is —

2 = 15 to i8Vp cub. ft. per sec. The total discharge is

Q—Tdtq = 47 to 56 dHp For • ‘ = -35ˆ. d = o-22 to o-25V(Q/V£) ft.

/ = -45

These approximate equations, which are derived purely from experiment, do not differ greatly from those obtained by the rough theory given above. The theory helps to explain the reason for the form of the empirical results. (W. C. U.)

HYDRAZINE (Diamidogen) , N 2 H 4 or H 2 N-NH 2 , a compound of hydrogen and nitrogen, first prepared by Th. Curtius in 1887 from diazo-acetic ester, N 2 CH-C0 2 C 2 H 5 . This ester, which is obtained

by the action of potassium nitrate on the hydrochloride of amidoacetic ester, yields on hydrolysis with hot concentrated potassium hydroxide an acid, which Curtius regarded as CsH 3 N

KSO,

KSO

™’ > N-NOˆˆyf > N-NH 2 ˆK 2 SO < + N,H 4 .

HYDRAZONEˆHYERQOBPHALUS

in

P. J. Schestakov (/. Smss. Phys. Chem. Sec.; 190$, 37, p. 1) obtained hydrazine by oxidizing urea with sodium hypochlorite in the presence of benzaldehyde, which, by combining with the hydrazine, protected it from oxidation. F. Raschig (German Patent 198307, 1908) obtained good yields by oxidizing ammonia with sodium hypochlorite in solutions made viscous with glue. Free hydrazine is a colourless liquid which boils at 113-5° C, and solidifies about o° C. to colourless crystals; it is heavier than water, in which it dissolves with’ rise of temperature. It is rapidly oxidized on exposure, is a strong reducing agent, and reacts vigorously with the halogens. Under certain conditions it may be oxidized to azoimide (A. W, Browne and F. F. Shetterly, /. Amer. C.S., 1908, p. cˆf By fractional distilla- tion of its aqueous solution hydrazine hydrate N2HVH2O (or perhaps H 2 N-NH»OH), a ‘strong base, is obtained, which precipitates the metals from solutions of copper and silver salts at ordinary temperatures. It dissociates completely in a vacuum at 143°, and when heated under atmospheric pressure to 183 it decomposes into ammonia and nitrogen (A. Scott, /. Chem. Soc, 1904, 85, p. 913). The sulphate N2H < -H 2 S04, crystallizes in tables which are slightly soluble in cold water and readily soluble in hot water; it is decomposed by heating above 250 C. with explosive evolution of gas and liberation of sulphur. By the addition of barium chloride to the sulphate, a solution of the hydrochloride is obtained, from which the crystallized salt may be obtained on evaporation.

Many organic derivatives of “hydrazine are known, the most important being phenylhydrazineˆ which was discovered by Emil Fischer in 1877. It can be best prepared by V. Meyer and Lecco’s method (Ber., 1883, 16, p. 2976), which consists in reducing phenyl-diazonium chloride in concentrated.hydrochloric acid, solution With stannous chloride also dissolved in, concentrated hydrochloric acid.

Phenylhydrazine is liberated from the hydrochloride so obtained by adding sodium hydroxide, the solution being then extracted With ether, the ether distilled off, and the residual oil purified by distillation under reduced pressure. Another method is, due to 13, Bamberger. The diazonium chloride, by the addition of an alkaline sulphite, is converted into a diazosulphonate, which is then reduced by zinc dust and acetic acid to phenylhydrazine potassium sulphite. This salt is then hydrolysed by heating it with hydrochloric acid —

C 6 H 5 XjCl + K 2 SO s = KC1 + C 6 H 6 NrSO s K, C 6 H 5 N,-S0 3 K + 2H = C 6 H 5 -NH-NH-S0 3 K, • C,H S NH-NHS0 3 K+HC1+ H20 = C,,H s -NHNHˆHa-f KHSOˆ.

Phenylhydrazine is a colourless oily liquid which turns brown On exposure. It boils at 241 ° C, and melts at I7-5″ G. It is slightly soluble in water, and is strongly basic, forming well-defined salts with acids. For the detection of substances containing- the carbonyl group (such for example as aldehydes and ketones) phenylhydrazine is a very important reagent, since it combines with them with elimination of water and the formation of well-defined hydrazines (see Aldehydes, Ketones and Sugars). It is a strong reducing agent; it precipitates cuprous oxide when heated , with FefUing's solution, nitrogen and benzene beiiig formed at the same time — C 6 H,NH-NH 2 + 2CuO ˆCujO+Nj+riiO+CsIV By energetic re- duction of phenylhydrazine {e.g. by use of zisc dust ahd hydrochloric acid), ammonia and aniline are produced— C 6 H5NH-MHi + 2H * CjHjNHj + NH». It is also a most Important synthetic reagent, 1 1 combines with aceto-acetic ester to form phfenylrnethyilpyrazolone' from which antipyrine {q.v.) may be obtained. Indoles (q.v.) are formed by heating certain hydrazones with anhydrous zinc chloride; while semicarbazides, pyrrols (q.v.) and many other types of organic compounds may be synthesized by the use of suitable phenylhydrazine derivatives.

HYDRAZONE, in chemistry, a compound formed by the con- densation of a hydrazine with a cafbonyl group (see Alde- hydes ; Ketones).

HYDROCARBON, in chemistry, a compound of carbon and hydrogen. Many occur in nature in the free state: for example, natural gas, petroleum and paraffin are entirely composed of such bodies; other natural sources are india-rubber, turpentine and certain essential oils. They are also revealed by the spectro- scope in stars, comets and the sun. Of artificial productions the most fruitful and important is prpvided by the destructive or dry distillation of many organic substances; familiar examples are the distillation of coal, which yields ordinary lighting gas, composed of gaseous hydrocarbofis, ' and also

coal tar, which; on subsequent fractional distillations, yields many liquid and

solid hydrocarbons, all of high industrial value. For details reference should be made to the articles wherein the above subjects- are treated. From the chemical point of view the hydrocarbons are of fundamental importance, and, on account of their great number, and still greater number of derivatives, they are studied as a separate branch of the science, namely, organic chemistry.

See Chemistry for an account of their classification, &c. HYDROCELE (Gr. i&sop, water, and kˆXjj, tumour), the medical term for arty collection of fluid other than pus or blood in the neighbourhood of the testis or cord. The fluid is usually serous. ” Hydrocele may be congenital or arise in the middle-aged withdut apparent cause, but it is usually associated with chronic orchitis or with tertiary syphilitic enlargements. The hydrocele appears as a. rbunded, fluctuating translucent swelling in the scrotum, and wheri greatly distended causes a dragging pain; Palliative treatment consists in tapping aseptically and remov- ing the ‘ fluid, the patient afterwards wearing a suspenderi The condition frequently recurs and necessitates radical treatment. Various substances may be injected; or the hydrocele is incised,’ the tunica partly removed and the cavity drained. ‘■

HYDROCEPHALUS (Gr. iiBwp, water, and KG/poKr/, head), a term applied to disease of the brain which is attended with excessive effusion of fluid into its cavities. It exists in two forms— acute and chronic hydrocephalus. Acute hydro- cephalus is another- name for tuberculous meningitis (see Meningitis).

Chronic hydrocephalus, or “water on the brain,” consists in an effusion of fluid into the lateral ventricles of the brain. It is not preceded by tuberculous deposit or acute inflammation, but depends upon congenital malformation or upon chronic inflammatory changes affecting the membranes. When the disease is congenital, its presence in the foetus isapt to be a source of difficulty ‘ in parturition. It is however more commonly developed in” the first six months of life; but it occaskmally arises in older children, or even in adults. The chief symptom is the gradual increase in size of the upper part of the head out of all proportion to the face or the rest of the body. Occurring at an age when as yet the txjnes of the skull have not; become welded together, the enla*gement may go on to an enormous extent, the Spaces betweek -the bones becoming more and more expanded.’ In a well-marked’ case the deformity is very striking; the tippet part of the forehead projects abnormally, and the orbital plates of the frontal

bone being inclined forwards give a dd torn ward- tilt to the eyes, which have also peculiar rolling movements. The face is small, and this, with the enlarged head, gives' a- remarkable aged expression to the child. The body is illinoufisried; the bones are thin, the hair is scanty and fine and the teeth 'carious or absent. . ;

The average circumference of* the adult head' is 22 in v – and in the normal child it is of course much less. In chronic hydro- cephalus the'head of an infant three months old has measured 29 in.; and in the* case of the man Cardinal, who died in Guy's Hospital'/the head measured 33 in. In such cases the head cannot be supported by the neck, and the patient has to keep mostly in the recumbent posture. The expansibility of the skull prevents destructive pressure on the brain, yet this organ is materially affected by the presence of the fluid. The cerebral ventricles are distended, and the convolutions are flattened, OCcasidnally the fluid escapes into the cavity of the cranium, which it fills, pressing down the brain to the base of the skull. ~ As a consequence, the functions of the brain are interfered with, and the 1 inefital condition is impaired. The child is dull, listless arid irritable, and sometimes imbecile. The special senses bfecbme affected as the disease advances; sight is often lost, as is also hearing. Hydrocephalic children generally sink in a few years;' nevertheless there have been instances of persons with this disease living to old age. There are, of course, grades of the affection; and children may present many of the symptoms of it in a slight degree, and yet recover, the head ceasing to expand, and becoming in due course" firmly ossified.

Various methods of treatment have been employed, but the results are unsatisfactory. Compression of the head by bandages, and the administration of mercury with the view of promoting absorption of the fluid, are now little resorted to. Tapping the fluid from time to time through one of the spaces between the bones, drawing off a little, and thereafter employing gentle pressure, has been tried, but rarely with benefit. Attempts have also been made to establish a permanent drainage between the interior of the lateral ventricle and the sub-dura! space, tod between the lumbar region of the spine and the abdomen, but without satisfactory results. On the whole, the plan Of treatment which aims at maintaining the patient's nutrition by appropriate food and tonics is the most rational and successful. (E. O.*)

HYDROCHARIDEAE, in botany, a natural order of Mono- cotyledons, belonging to the series Helobieae. They are water- plants, represented in Britain by frog-bit {Hydrocharis Morsus- ranae) and water-soldier (Stratiotes alotdes). The order contains about fifty species in fifteen genera, twelve of which occur in fresh water while three are marine: and includes both floating

and submerged forms. Hydrocharis floats on the surface of still water, andh*s rosettes of kidney-shaped leaves, from among which spring the flower-stalks; stolons bearing new leaf- rosettes are sent out on all sides, the plant thus propagating itself in the same way as the strawberry. Stratiotes alotdes has a rosette of stiff sword- like leaves, which when the plant is in flower project above the surface; it is also stoloniferous, the young rosettes sinking to the bottom at the beginning of winter and rising again to the surface in the spring. Vallisneria (eel-grass) contains two species, one native of tropical Asia, the other, in- habiting the wanner parts of both hemi- spheres and reaching as far north as south Europe. It grows in the mud at the bottom of fresh water, and the short stem bears a cluster of long, narrow grass-like leaves; new plants are formed at

Morsus-ranae —

Fig. i. — Hydrocharis Frog-bit — male plant.

1, Female flower.

2, Stamens, enlarged.

3, Barren pistil of male flower, enlarged.

4, Pistil of female flower.

5, Fruit.

6, Fruit cut transversely.

I) 9. Floral diagrams of male and female * he end f Iwfkontai flowers respectively. runners. Another type

s, Rudimentary stamens. is represented by

Elodea canadensis or water-thyme, which has been introduced into the British Isles from North America. It is a small, submerged plant with long, slender branching stems bearing whorls of narrow toothed leaves; the flowers appear at the surface when mature. Halophila,

Enhalus and Thalassia are submerged maritime plants found on trppical coasts, mainly in the Indian and Pacific oceans; Halophila has an elongated stem rooting at the nodes; Enhalus a short, thick rhizome, clothed with black threads resembling horse-hair, the

persistent hard-bast strands of the leaves; Thalassia has a creeping rooting stem with upright branches bearing crowded strap-shaped leaves in two rows. The flowers spring from, or are enclosed in, a spathe, and are unisexual and regular, with generally a calyx and corolla, each of three members; the stamens are in whorls of three, the inner whorls are often barren; the two to fifteen carpels form an inferior ovary containing generally numerous ovules on often large, produced, parietal placentas. The fruit is leathery or fleshy, opening irregularly. The seeds contain a large embryo and no endosperm. In Hydrocharis (fig. i), which is dioe- cious, the flowers are borne above the surface of the water, have con- spicuous white petals, contain honey and are pollinated by in- sects. Stratiotes has similar flowers which come above | the surface only for pollination, becoming sub- merged again during ripening of the fruit. In Val- lisneria (fig. 2), which is also dioe- cious, the small male flowers are borne in large numbers in short- stalked spathes; the petals are minute and scale- like, and only two of the three stamens are fer-

Fig.

spiralis — Eel grass — A, Female plant; B,

_ _ 2. — Vallisneria

tile; the flowers ˆ bo . ut \ natural size – , ‘ , . , , Male plant,

become detached r

before opening and rise to the surface, where the sepals expand and form a float bearing the two projecting semi-erect stamens. The female flowers are solitary and are raised to the surface on a long, spiral stall:; the ovary bears three broad styles, on* which some of the large, sticky pollen-grains from the floating male flowers get de- posited (fig. 3). After pollination the female flower becomes drawn below the surface by the spiral con- traction of the long stalk, and the fruit ripens near the bottom. Elodea has poly- gamous flowers

Fig. 3.

(that is, male, female and hermaphrodite), solitary, in slender, tubular spathes; the male flowers become detached and rise to the surface; the

females are raised to the surface when mature, and receive the floating pollen from the male. The flowers of Halophila are submerged and apetalous.

The order is a widely distributed one; the marine forms are tropical or subtropical, but the fresh- water genera occur also in the temperate zones.

HYDROCHLORIC ACID, also known in commerce as ” spirits of salts ” and ” muriatic acid,” a compound of hydrogen and chlorine. Its chemistry is discussed under Chlorine, and its manufacture under Alkali Manufacture.

HYDRODYNAMICS (Gr. vScop, water, dvuatus, strength), the branch of hydromechanics which discusses the motion of fluids (see Hydromechanics).

HYDROGEN [symbol H, atomic weight 1-008 (0=16)], one of the chemical elements. Its name is derived from Gr. vdup, water, and yevvauv, to produce, in allusion to the fact that water is produced when the gas burns in air. Hydrogen appears to have been recognized by Paracelsus in the 16th century; the combustibility of the gas was noticed by Turquet de Mayenne in the 17th century, whilst in 1700 N. Lemery showed that a mixture of hydrogen and air detonated on the application of a light. The first definite experiments concerning the nature of hydrogen were made in 1766 by H. Cavendish, who showed that it was formed when various metals were acted upon by dilute sulphuric or hydrochloric acids. Cavendish called it ” in- flammable air,” and for some time it was confused with other inflammable gases, all of which were supposed to contain the same inflammable principle, ” phlogiston,” in combination with varying amounts of other substances. In 1781 Cavendish showed that water was the only substance produced when hydrogen was burned in air or oxygen, it having been thought previously to this date that other substances were formed during the reaction, A. L. Lavoisier making many experiments with the object of finding an acid among the products of combustion.

Hydrogen is found in the free state in some volcanic gases, in fumaroles, in the carnallite of the Stassfurt potash mines (H. Precht, Ber., 1886, 19, p. 2326), in some meteorites, in certain stars and

nebulae, and also in the envelopes of the sun. In combination it is found as a constituent of water, of the gases from certain mineral springs, in many minerals, and in most animal and vegetable tissues. It may be prepared by the electro- lysis of acidulated water, by the decomposition of water by various metals or metallic hydrides, and by the action of many metals on acids or on bases. The alkali metals and alkaline earth metals decompose water at ordinary temperatures; magnesium begins to react above 70° C, and zinc at a dull red heat. The decomposition of steam by red hot iron has been studied by H. Sainte-Claire Deville (Comptes renins, 1870, 70, p. 1105) and by H. Debray (ibid., 1879, 88, p. 1341), who found that at about 1500 C. a condition of equilibrium is reached. H. Moissan (Bull. soc. chim., 1902, 27, p. 1 141) has shown that potassium hydride decomposes cold water, with evolution of hydrogen, $KH + H_2 = KOH + H_2$. Calcium hydride or by drolite, prepared by passing hydrogen over heated calcium, decomposes water similarly, 1 gram giving 1 litre of gas; it has been proposed as a commercial source (Prats Aymerich, Abst. J.C.S., 1907, ii. p. 543), as has also aluminium turnings moistened with potassium cyanide and mercuric chloride, which decomposes water regularly at 70 , 1 gram giving 1-3 litres of gas (Mauricheau-Beaupre, Comptes rendus, 1908, 147, p. 310). Strontium hydride behaves similarly. In preparing the gas by the action of metals on acids, dilute sulphuric or hydrochloric acid is taken, and the metals commonly used are zinc or iron. So obtained, it contains many impurities, such as carbon dioxide, nitrogen, oxides of nitrogen, phosphoretted hydrogen, arseniuretted hydrogen, &c, the removal of which is a matter of great difficulty (see E. W. Morley, Amcr. Chem. Journ., 1890, 12,‘p. 460). When prepared by the action of metals on bases, zinc or aluminium and caustic soda or caustic potash are used. Hydrogen may also be obtained by the action of zinc on ammonium salts (the nitrate excepted) (Lorin, Comptes rendus, 1865, 60, p. 745) and by heating the alkali formates or oxalates with caustic potash or soda, $Na J C_2 0\text{-}4\text{-}r\text{-}2NaOH = H_2 + 2Na_2 C0_3$. Technically it is prepared by the action of superheated steam on incandescent coke (see F. Hembert and Henry, Comptes rendus, 1885, 101, p. 797; A. Naumann and C. Pistor, Ber., 1885, 18, p. 1647), or by the electrolysis of a dilute solution of caustic soda (C. Winssinger,

Chem. Zeit., 1898, 22, p. 609; ” Die Elektrizitats-Aktiengesell- schaft,” Zeit. f. Elektrochem., 1901, 7, p. 857). In the latter method a 15 % solution of caustic soda is used, and the electrodes are made of iron; the cell is packed in a wooden box , surrounded with sand, so that the temperature is kept at about 70 C; the solution is replenished, when necessary, with distilled water. The purity of the gas obtained is about

97 %

Pure hydrogen is a tasteless, colourless and odourless gas of specific gravity 0-06947 (air = 1) (Lord Rayleigh, Proc. Roy. Soc., 1893, p. 319). It may be liquefied, the liquid boiling at -252-68° C. to -252-84°C, and it has also been solidified, the solid melting at -264° C. (J. Dewar, Comptes rendus, 1899, 129, p. 451; Chem. News, 1901, 84, p. 49; see also Liquid Gases). The specific heat of gaseous hydrogen (at constant pressure) is 3.4041 (water = i), and the ratio of the specific heat at constant pressure to the specific heat at constant volume is 1-3852 (W. C. Rontgen, Pogg. Ann., 1873, 148, p. 580). On the spectrum see Spectroscopy. Hydrogen is only very slightly soluble in water. It diffuses very rapidly through a porous membrane, and through some metals at a red heat (T. Graham, Proc. Roy. Soc, 1867, 15, p. 223; H. Sainte-Claire Deville and L. Troost, Comptes rendus, 1863, 56, p. 977). Palladium and some other metals are capable of absorbing large volumes of hydrogen (especially when the metal is used as a cathode in a water electrolysis apparatus). L. Troost and P. Hautefeuille (Ann. chim. phys., 1874, (5) 2, p. 279) considered that a palladium hydride of composition Pd 2 H was formed, but the investigations of C. Hoitsema (Zeit. phys. Chem., 1895, 17, p. 1), from the standpoint of the phase rule, do not favour this view, Hoitsema being of the opinion that the occlusion of hydrogen by palladium is a process of continuous absorption. Hydrogen burns with a pale blue non-luminous flame, but will not support the combustion of ordinary combustibles. It forms a highly explosive mixture with air or oxygen, especially when in the proportion of two volumes of hydrogen to one volume of oxygen. H. B. Baker (Proc. Chem. Soc, 1902, 18, p. 40) has shown that perfectly dry hydrogen will not unite with perfectly dry oxygen. Hydrogen combines with fluorine, even at very low temperatures, with great violence; it also combines with carbon, at the temperature of the electric arc. The alkali metals when warmed in a current of hydrogen, at about 360° C, form hydrides of composition RH(R = Na, K, Rb, Cs), (H. Moissan, Bull. soc. chim., 1902, 27, p. 1 141); calcium and strontium similarly form hydrides CaH 2 , SrH 2 at a dull red heat (A. Guntz, Comptes rendus, 1901, 133, p. 1209). Hydrogen is a very powerful re- ducing agent; the gas occluded by palladium being very active in this respect, readily reducing ferric salts to ferrous salts, nitrates to nitrites and ammonia, chlorates to chlorides, &c.

For determinations of the volume ratio with which hydrogen and oxygen combine, see J. B. Dumas, Ann. chim. phys., 1843 (3), 8, p. 189; O. Erdmann [and R. F. Marchand, ibid. p. 212; E. H. Keiser, Ber., 1887, 20, p. 2323; J. P. Cooke and T. W. Richards, Amer. Chem.

Journ., 1888, 10, p. 191; Lord Rayleigh, Chem. News, 1889, 59, p. 147; E. W. Morley, Zeit. phys. Chem., 1890, 20, p. 417; and S. A. Leduc, Comptes rendus, 1899, 128, p. 1158.

Hydrogen combines with oxygen to form two definite com- pounds, namely, water (q.v.), H 2 0, and hydrogen peroxide, H 2 2 , whilst the existence of a third oxide, ozonic acid, has been indicated.

Hydrogen peroxide, H2O2, was discovered by L. J. Thenard in 187.8 (Ann. chim. phys., 8, p. 306). It occurs in small quantities in the atmosphere. It may be prepared by passing a currentof carbon dioxide through ice-cold water, to which small quantities of barium peroxide are added from time to time (F. Duprey, Comptes rendus, 1862, 55, p. 736; A. J. Balard, ibid., p. 758), Ba0 2 fC0 2 +H 2 = H 2 2 +BaC0 3 . E. Merck (Abst. J.C.S., 1907, ii., p. 859) showed that barium percarbonate, BaC0 4 , is formed when the gas is in excess; this substance readily yields the peroxide with an acid. Or barium peroxide may be decom posed by hydrochloric, hydrofluoric, sulphuric or silicofluoric acids (L. Crismer, Bull. soc. chim., 1891 (3), 6, p. 24; Hanriot, Comptes rendus, 1885, 100, pp. 56, 172), the peroxide being added

in small quantities to a cold dilute solution of the acid. It is necessary that it should be as pure as possible since the commercial product usually contains traces of ferric, manganic and aluminium oxides, together tvith some silica. To purify the oxide, it is dissolved in dilute hydrochloric acid until the acid is neatly neutralized, the solution is cooled, filtered, and baryta water is added until a faint permanent white precipitate of hydrated barium peroxide appears; the solution is now filtered, and a concentrated solution of baryta water is added to the filtrate, when a crystalline precipitate of hydrated barium peroxide, Ba0 2 8-H 2 0, is thrown down. This is filtered off and well washed with water. The above methods give a dilute aqueous solution of hydrogen peroxide, which may be concentrated somewhat by evaporation over sulphuric acid in vacuo. H. P. Talbot and H. R. Moody (Jour. Anal. Chem., 1892, 6, p. 650) prepared a more concentrated solution from the commercial product, by the addition of a 10% solution of alcohol and baryta water. The solution is filtered, and the barium precipitated by sulphuric acid. The alcohol is removed by distillation in vacuo, and by further concentration in vacuo a solution may be obtained which evolves 580 volumes of oxygen. R.

Wolffenstein (Ber., 1804, 27, p. 2307) prepared practically anhydrous hydrogen peroxide (containing 99-x% H 2 2) by first removing all traces of dust, heavy metals and alkali from the commercial 3 % solution. The solution is then concentrated in an open basis on the water- bath until it contains 48% H2O2. The liquid so obtained is extracted with ether and the ethereal solution distilled under diminished pressure, and finally purified by repeated distillations. W. Staedel (Zeit. f. angew* Chem., 1902, 15, p. 642) has described solid hydrogen peroxide, obtained by freezing concentrated solutions.

Hydrogen peroxide is also found as a product in many chemical actions, being formed when carbon monoxide and cyanogen burn in air (H. B. Dixon); by passing air through solutions of strong bases in the presence of such metals as do not react with the bases to liberate hydrogen; by shaking zinc amalgam with alcoholic sulphuric acid and air (M. Traube, Ber., ‘ t$82, 15, p. 659); in the oxidation of zinc, lead and copper 5 in presence of water, and in the electrolysis of sulphuric acid of such strength that it contains two molecules of water to one molecule of sulphuric acid (M. Berthelot, Comptcs rendus, 1878s 86, p. 71). ■ ■ ■

The anhydrous hydrogen peroxide obtained by Wolffenstein boils at 84-8 5°C. (68 mm.); its specific gravity is 1-4996 (1-5° C). It is very explosive (W. Spring, Zeit. anmg. Chem.j 1895, 8, p. 424). The explosion risk seems to be most marked in the preparations which have been extracted with ether previous to distillation, and J. W. Bruhl (Ber., 1895, 28, p. 2847) is of opinion that a very unstable, more highly oxidized product is produced in small quantity in the process. The solid variety prepared by Staedel forms colourless, prismatic crystals which melt at -2° C; it is decomposed with explosive violence by platinum sponge, and traces of manganese dioxide. , The dilute aqueous solution is very unstable, giving up oxygen readily, and decomposing with explosive violence at 100° C. An aqueous solution containing more than 1-5% hydrogen peroxide reacts slightly acid. Towards lupetidin [aa’ dimethyl piperidine, C 5 H 9 N(CHa)2l hydrogen peroxide acts as a dibasic acid (A. Marcuse and R. Wolffenstein, Ber., 1901, 34, p. 2430; see also G. Bredig, Zeit. Electrochem., 1 901, 7, p. 622). Cryoscopic determinations of its molecular weight show that it is H2O2. [G. Carrara, Rend, delta Accad. dei Lincei, 1892 (5), 1, ii. p; 19; W. R. Orndorff and J. White, Amer. Chem. Journ., 1893, 15, p. 347.] Hydrogen peroxide behaves very frequently as a powerful oxidizing agent; thus lead sulphide is converted into lead sulphate in presence of a dilute aqueous solution of the peroxide, the hydroxides of the alkaline earth metals are converted into peroxides of the type MCV8H2O, titanium, dioxide is converted into the trioxide, iodiae is

liberated from potassium iodide, and nitrites (in alkaline solution) are converted into acid-amides (B. Radziszewski,Ber., 1884, .iii, p: 355). In many cases it is found that hydrogen peroxide will ‘only act as an oxidant when in the presence of a

catalyst; for example, formic, glygollic, lactic, tartaric, malic, benzoic and other organic acids are readily oxidized in the presence of ferrous sulphate (H. J. H. Fenton, Jour. Chem. Soc, 1900, 77, p. 69), and sugars are readily oxidized in the presence of ferric chloride (O. Fischer and M. Busch, Ber., 1891, 24, p. 187 1). It is sought to explain these oxidation processes by assuming that the hydrogen peroxide unites with the compound undergoing oxidation to form an addition compound, which subsequently decomposes (J. H. Kastle and A. S. Loevenhart, Amer. Chem. Journ., 1903, 29, pp. 397, 517). Hydrogen peroxide can also react as a reducing agent, thus silver oxide is reduced with a rapid evolution of oxygen. The course of this reaction can scarcely be considered as definitely settled; M. Berthelot considers that a higher oxide of silver is formed, whilst A. Baeyer and V. Villiger are of opinion that reduced silver is obtained [see Comptes rendus, 1001, 133, p. 555; Ann. Chim. Phys., 1897 (7), 11, p. 217, and Ber., 1901, 34, p. 2769]. Potassium- permanganate, in the presence of dilute sulphuric acid, is rapidly reduced by hydrogen peroxide, oxygen being given off, 2KM„0 4 + 3H 2 S04+5Hj>0 2 = KoS04-f-2MhS04+8H 2 0+502. Lead peroxide is reduced to the monoxide. Hypochlorous acid and its salts, together with the corresponding bromine and iodine compounds, liberate oxygen violently from hydrogen peroxide, giving hydro- chloric, hydrobromic and hydriodic acids (S. Tanatar, Ber., 1899, 32, p. 1013).

On the constitution of hydrogen peroxide see C. F. Schonbein, Jour, pritk. Chem., 1858-1868; M. Traube, Ber., 1882-1889; J. W. Bruhl, Ber<; 1895, 28, p. 2847; 1900, 33, p. 1709; S. Tanatar, Ber.,

1903, 36. P- I893-. . . .

Hydrogen peroxide finds application as a bleaching agent, as an antiseptic, for the removal of tne last traces of chlorine and sulphur dioxide employed in bleaching, and for various quantitative separations in analytical chemistry. (P. Jannasch, Ber., 1893, 26, p. 2908). It may be estimated. by titration with potassium permanganate in acid solution; wjth potassium ferricyanide. in alkaline solution, 2K 3 Fe(CN) 6 -|-2KOH-l-H 2 02=2K4Fe(CN)6-(2H20+0 2 ;or by oxidiz ing arsenious acid in alkaline solution with the peroxide and back-titration of the excess of arsenious acid with standard iodine (B. Grutzner, Arch, der Pharm., 1899, 237, pˆ 705). It may be recognized

by the violet coloration it gives when added to a very dilute solution of potassium bichromate in the presence of hydro- chloric acid; by the orange-red colour it gives with a solution of titanium dioxide in concentrated sulphuric acid ; and by the pre- cipitate of Prussian blue formed when it is added to a solution containing ferric chloride and potassium ferricyanide.

Ozonic Acid, H2O4. By the action of ozone on a 40% solution of potassium hydroxide, placed in a freezing mixture, an orange- brown substance is obtained, probably K2O4, which A. Baeyer and V. Villiger [Ber., 1902, 35, p. 3038) think is derived from ozonic acid, produced according to the reaction O3 + H2O = H 2 4 .

HYDROGRAPHY (Gr. vSup, water, and ypdˆeip, to write), the science dealing with all the waters of the earth's surface, including the description of their physical features and con ditions; the preparation of charts andmaps showing the position of lakes, rivers, seas and oceans, the contour of the sea-bottom, the position of shallows, deeps, reefs and the direction and volume of currents; a scientific description of the position, volume, configuration, motion and condition of all the waters of the earth. See also Surveying (Nautical) and Ocean and Oceanography. The Hydrographic Department of the British Admiralty, established in 1795, undertakes the making of charts for the admiralty, and is under the charge of the hydrographer to the admiralty (see Chart).

HYDROLYSIS (Gr. tiBoip, water, \vei.v, to loosen), in chemistry, a decomposition brought about by water after the manner shown in the equation R-X+H'OH = R-H+X-OH. Modern research has proved that such reactions are not occasioned by water acting as H 2 0, but really by its ions (hydrions and hydroxidions), for the velocity is proportional (in accordance with the law of chemical mass action) to the concentration of these ions. This fact explains the so-called " catalytic " action of acids and bases in decomposing such compounds as the esters. The term " saponification " (Lat. sapo, soap) has the same meaning, but it is more properly restricted to the hydrolysis of the fats, i.e. glyceryl esters of organic acids, into glycerin and a soap (see Chemical Action).

HYDROMECHANICS (Gr. v5poy.rixa.VLKa.), the science of the mechanics of water and fluids in general, including hydrostatics or the

mathematical theory of fluids in equilibrium, and hydro- mechanics, the theory of fluids in motion. The practical applica- tion of hydromechanics forms the province of hydraulics (q.v.).

Historical. — The fundamental principles of hydrostatics were first given by Archimedes in his work Ilepi w oxovixivuv, or De iis quae vehuntur in humido, about 250 B.C., and were afterwards applied to experiments by Marino Ghetaldi (1566-1627) in his Promotus Archimedes (1603). Archimedes maintained that each particle of a fluid mass, when in equilibrium, is equally pressed in every direc- tion ; and he inquired into the conditions according to which a solid body floating in a fluid should assume and preserve a position of equilibrium.

In the Greek school at Alexandria, which flourished under the auspices of the Ptolemies, the first attempts were made at the construction of hydraulic machinery, and about 120 B.C. the fountain of compression, the siphon, and the forcing-pump were invented by Ctesibius and Hero. The siphon is a simple instrument; but the forcing-pump is a complicated invention, which could scarcely have been expected in the infancy of hydraulics. It was probably suggested to Ctesibius by the Egyptian Wheel or Noria, which was common at that time, and which was a kind of chain pump, con- sisting of a number of earthen pots carried' round by a wheel. In some of these machines the pots have a valve in the bottom which enables them to descend without much resistance, and diminishes greatly the load upon the wheel ; and, if we suppose that this valve was introduced so early as the time of Ctesibius, it is not difficult to perceive how such a machine might have led to the invention of the forcing-pump.

Notwithstanding these inventions of the Alexandrian school, its attention does not seem to have been directed to the motion of fluids; and the first attempt to investigate this subject was made by Sextus Julius Frontinus, inspector of the public fountains at Rome in the reigns of Nerva and Trajan. In his work De aquae- ductibus urbis Romae commentarius , he considers the methods which were at that time employed for ascertaining the quantity of water discharged from ajutages, and the mode of distributing the waters of an aqueduct or a fountain. He remarked that the flow of water from an orifice depends not only on the magnitude of the orifice itself, but also on the height of the water in the reservoir; and that a pipe employed to carry off a portion of water from an aqueduct should, as circumstances required, have a position more or less inclined to the original direction of the current. But as he was unacquainted with the law of the velocities of running water as depending upon the depth of the orifice, the want of

precision which appears in his results is not surprising.

Benedetto Castelli (1577-1644), and Evangelista Torricelli (1608-1647), two of the disciples of Galileo, applied the discoveries of their master to the science of hydrodynamics. In 1628 Castelli published a small work, Delia misura dell' acque correnti, in which he satisfactorily explained several phenomena in the motion of fluids in rivers and canals; but he committed a great paralogism in sup- posing the velocity of the water proportional to the depth of the orifice below the surface of the vessel. Torricelli, observing that in a jet where the water rushed through a small ajutage it rose to nearly the same height with the reservoir from which it was supplied, imagined that it ought to move with the same velocity as if it had fallen through that height by the force of gravity, and hence he deduced the proposition that the velocities of liquids are as the square root of the head, apart from the resistance of the air and the friction of the orifice. This theorem was published in 1643, at the end of his treatise De motu gravium projectorum, and it was con- firmed by the experiments of Raffaello Magiotti on the quantities of water discharged from different ajutages under different pressures

(1648).

In the hands of Blaise Pascal (1623-1662) hydrostatics assumed the dignity of a science, and in a treatise on the equilibrium of liquids (Sur t'equilibre des liqueurs), found among his manuscripts after his death and published in 1663, the laws of the equilibrium of liquids were demonstrated in the most simple manner, and amply confirmed by experiments.

The theorem of Torricelli was employed by many succeeding writers, but particularly by Edme Mariotte (1620-1684), whose Traiti du mouvement des eaux, published after his death in the year 1686, is founded on a great variety of well-conducted experiments on the motion of fluids, performed at Versailles and Chantilly. In the discussion of some points he committed considerable mistakes. Others he treated very superficially, and in none of his experiments apparently did he attend to the diminution of efflux arising from the contraction of the liquid vein, when the orifice is merely a perforation in a thin plate ; but he appears to have been the first who attempted to ascribe the discrepancy between theory and experiment to the retardation of the water's velocity through friction. His contemporary Domenico Guglielmini (1655-1710), who was inspector of the rivers and canals at Bologna, had ascribed this diminution of velocity in rivers to transverse motions arising from inequalities in their

bottom. But as Mariotte observed similar obstructions even in glass pi[)es where no transverse currents could exist, the cause

assigned by Guglielmini seemed destitute of foundation. The French philosopher, therefore, regarded these obstructions as the effects of friction. He supposed that the filaments of water which graze along the sides of the pipe lose a portion of their velocity; that the contiguous filaments, having on this account a greater velocity, rub upon the former, and suffer a diminution of their celerity; and that the other filaments are affected with similar retardations proportional to their distance from the axis of the pipe. In this way the medium velocity of the current may be diminished, and consequently the quantity of water discharged in a given time must, from the effects of friction, be considerably less than that which is computed from theory.

The effects of friction and viscosity in diminishing the velocity of running water were noticed in the Principia of Sir Isaac Newton, who threw much light upon several branches of hydromechanics. At a time when the Cartesian system of vortices universally pre- vailed, he found it necessary to investigate that hypothesis, and in the course of his investigations he showed that the velocity of any stratum of the vortex is an arithmetical mean between the velocities of the strata which enclose it; and from this it evidently follows that the velocity of a filament of water moving in a pipe is an arith- metical mean between the velocities of the filaments which surround it. Taking advantage of these results, Henri Pitot (1695-1771) afterwards showed that the retardations arising from friction are inversely as the diameters of the pipes in which the fluid moves. The attention of Newton was also directed to the discharge of water from orifices in the bottom of vessels. He supposed a cylindrical vessel full of water to be perforated in its bottom with a small hole by which the water escaped, and the vessel to be supplied with water in such a manner that it always remained full at the same height. He then supposed this cylindrical column of water to be divided into two parts,— the first, which he called the ” cataract,” being an hyperboloid generated by the revolution of an hyperbola of the fifth degree around the axis of the cylinder which should pass through the orifice, and the second the remainder of the water in the cylindrical vessel. He considered the horizontal strata of this hyperboloid as always in motion, while the remainder of the water was in a state of rest, and imagined that there was a kind of cataract in the middle of the fluid. When the results of this theory were compared with the quantity of water actually discharged, Newton concluded that the velocity with which the water issued from the orifice was equal to that which a falling body would

receive by descending through half the height of water in the reservoir. This conclusion, however, is absolutely irreconcilable with the known fact that jets of water rise nearly to the same height as their reservoirs, and Newton seems to have been aware of this objection. Accord- ingly, in the second edition of his Principia, which appeared in 1713, he reconsidered his theory. He had discovered a contraction in the vein of fluid {vena contractu) which issued from the orifice, and found that, at the distance of about a diameter of the aperture, the section of the vein was contracted in the subduplicate ratio of two to one. He regarded, therefore, the section of the contracted vein as the true orifice from which the discharge of water ought to be deduced, and the velocity of the effluent water as due to the whole height of water in the reservoir; and by this means his theory became more conformable to the results of experience, though still open to serious objections. Newton was also the first to investigate the difficult subject of the motion of waves (q.v.).

In 1738 Daniel Bernoulli (1700-1782) published his Hydrodynamica seu de viribus et motibus fluidorum commentarii. His theory of the motion of fluids, the germ of which was first published in his memoir entitled Theoria nova de motu aquarum per canales quocun- que fluentes, communicated to the Academy of St Petersburg as early as 1726, was founded on two suppositions, which appeared to him conformable to experience. He supposed that the surface of the fluid, contained in a vessel which is emptying itself by an orifice, remains always horizontal; and, if the fluid mass is conceived to be divided into an infinite number of horizontal strata of the same bulk, that these strata remain contiguous to each other, and that all their points descend vertically, with velocities inversely pro- portional to their breadth, or to the horizontal sections of the reservoir. In order to determine the motion of each stratum, he employed the principle of the conservatio virium vivarum, and obtained very elegant solutions. But in the absence of a general demonstration of that principle, his results did not command the • confidence which they would otherwise have deserved, and it became desirable to have a theory more certain, and depending solely on the fundamental laws of mechanics. Colin Maclaurin (1698- 1746) and John Bernoulli (1667-1748), who were of this opinionˆ resolved the problem by more direct methods, the one in his Fluxions, published in 1 742, and the other in his Hydraulica nunc primum detecta, et demonstrata direcle ex fundamentis pure mechanicis, which forms the fourth volume of his works. The method employed by Maclaurin has been thought not sufficiently rigorous; and that of John Bernoulli is, in the opinion of Lagrange, defective in clearness and precision. The theory of Daniel Bernoulli was opposed

also by Jean le Rond d'Alembert. When generalizing the theory of pendu- lums of Jacob Bernoulli (1654-1705) he discovered a principle of dynamics so simple and general that it reduced the laws of the motions of bodies to that of their equilibrium. He applied this

principle to the motion of fluids, and gave a specimen of its application at the end of his Dynamics in 1743. It was more fully developed in his Traite des fluides, published in 1744, in which he gave simple and elegant solutions of problems relating to the equilibrium and motion of fluids. He made use of the same suppositions as Daniel Bernoulli, though his calculus was established in a very different manner. He considered, at every instant, the actual motion of a stratum as composed of a motion which it had in the preceding instant and of a motion which it had lost; and the laws of equili- brium between the motions lost furnished him with equations re- presenting the motion of the fluid. It remained a desideratum to express by equations the motion of a particle of the fluid in any assigned direction. These equations were found by d'Alembert from two principles — that a rectangular canal, taken in a mass of fluid in equilibrium, is itself in equilibrium, and that a portion of the fluid, in passing from one place to another, preserves the same volume when the fluid is incompressible, or dilates itself according to a given law when the fluid is elastic. His ingenious method, published in 1752, in his Essai sur la resistance des fluides, was brought to per- fection in his Opuscules mathematiques , and was adopted by Leonhard Euler.

The resolution of the questions concerning the motion of fluids was effected by means of Euler's partial differential coefficients. This calculus was first applied to the motion of water by d'Alembert, md enabled both him and Euler to represent the theory of fluids in formulae restricted by no particular hypothesis.

One of the most successful labourers in the science of hydro- dynamics at this period was Pierre Louis Georges Dubuat (1734- 1809). Following in the steps of the Abb6 Charles Bossut (Nouvelles Experiences sur la resistance des fluides, 1777), he published, in 1786, a revised edition of his Principes d'hydraulique, which contains a satisfactory theory of the motion of fluids, founded solely upon experiments. Dubuat considered that if water were a perfect fluid, and

the channels in which it flowed infinitely smooth, its motion would be continually accelerated, like that of bodies descend- ing in an inclined plane. But as the motion of rivers is not continually accelerated, and soon arrives at a state of uniformity, it is evident that the viscosity of the water, and the friction of the channel in which it descends, must equal the accelerating force. Dubuat, therefore, assumed it as a proposition of fundamental importance that, when water flows in any channel or bed, the accelerating force which obliges it to move is equal to the sum of all the resistances which it meets with, whether they arise from its own viscosity or from the friction of its bed. This principle was employed by him in the first edition of his work, which appeared in 1779. The theory contained in that edition was founded on the experiments of others, but he soon saw that a theory so new, and leading to results so different from the ordinary theory, should be founded on new experiments more direct than the former, and he was employed in the performance of these from 1780 to 1783. The experiments of Bossut were made only on pipes of a moderate declivity, but Dubuat used declivities of every kind, and made his experiments upon channels of various sizes.

The theory of running water was greatly advanced by the re- searches of Gaspard Riche de Prony (t 755-1839). From a collection of the best experiments by previous workers he selected eighty-two (fifty-one on the velocity of water in conduit pipes, and thirty-one on its velocity in open canals) ; and, discussing these on physical and mechanical principles, he succeeded in drawing up general formulae, which afforded a simple expression for the velocity of running water.

J. A. Eytelwein (1764-1848) of Berlin, who published in 1801 a valuable compendium of hydraulics entitled Handbuch der Mechanik und der Hydraulik, investigated the subject of the discharge of water by compound pipes, the motions of jets and their impulses against plane and oblique surfaces; and he showed theoretically that a water-wheel will have its maximum effect when its circumference moves with half the velocity of the stream.

J. N. P. Hachette (1769-1834) in 1816-1817 published memoirs containing the results of experiments on the spouting of fluids and the discharge of vessels. His object was to measure the contracted part of a fluid vein, to examine the phenomena attendant on additional tubes, and to investigate the form of the fluid vein and the results obtained when different forms of orifices are employed. Extensive experiments on the discharge of water from orifices (Experiences hydrauliques, Paris, 1832) were conducted under the direction of the French government by J. V. Poncelet (1788-1867) and J. A. Lesbros

(1790-1860). P. P. Boileau (1811-1891) discussed their results and added experiments of his own [Traite de la tnesure des eaux courantes, Paris, 1854). K. R. Bornemann re-examined all these results with great care, and gave formulae expressing the variation of the co-efficients of discharge in different conditions (Civil lngtnieur, 1880). Julius Weisbach (1806-1 871) also made many experimental in-vestigations on the discharge of fluids. The experiments of J. B. Francis (Lowell Hydraulic Experiments, Boston, Mass., 1855) led him to propose variations in the accepted formulae for the discharge over weirs, and a generation later a very complete investigation of this subject was carried out by H. Bazin. An elaborate inquiry on the flow of water in pipes and channels was conducted by H. G. P. Darcy (1803-1858) and continued by H. Bazin, at the expense of the French government (Recherches hydrauliques, Paris, 1866). German

engineers have also devoted special attention to the measurement of the flow in rivers; the Beitrdge zur Hydrographie des Konig- reiches Bbhmen (Prague, 1872-1875) of A. R. Harlacher (1842-1890) contained valuable measurements of this kind, together with a com-parison of the experimental results with the formulae of flow that had been proposed up to the date of its publication, and important data were yielded by the gaugings of the Mississippi made for the United States government by A. A. Humphreys and H. L. Abbot, by Robert Gordon's gaugings of the Irrawaddy, and by Allen J. C. Cunningham's experiments on the Ganges canal. The friction of water, investigated for slow speeds by Coulomb, was measured for higher speeds by William Froude (1810-1879), whose work is of great value in the theory of ship resistance (Brit. Assoc. Report., 1869), and stream line motion was studied by Professor Osborne Reynolds and by Professor H. S. Hele Shaw. (X.)

Hydrostatics Hydrostatics is a science which grew originally out of a number of isolated practical problems; but it satisfies the requirement of perfect accuracy in its application to phenomena, the largest and smallest, of the behaviour of a fluid. At the same time, it delights the pure theorist by the simplicity of the logic with which the fundamental theorems may be established, and by the elegance of its mathematical operations, insomuch that hydro- statics may be considered as the Euclidean pure geometry of mechanical science.

1 . The Different Slates of a Substance or Matter. — All substance in nature falls into one of the two classes, solid and fluid; a solid substance, the land, for instance, as contrasted with a fluid, like water, being a substance which does not flow of itself.

A fluid, as the name implies, is a substance which flows, or is capable of flowing; water and air are the two fluids distributed most universally over the surface of the earth.

Fluids again are divided into two classes, termed a liquid and a gas, of which water and air are the chief examples.

A liquid is a fluid which is incompressible or practically so, i.e. it does not change in volume sensibly with change of pressure.

A gas is a compressible fluid, and the change in volume is considerable with moderate variation of pressure.

Liquids, again, can be poured from one open vessel into another, and can be kept in an uncovered vessel, but a gas tends to diffuse itself indefinitely and must be preserved in a closed reservoir.

The distinguishing characteristics of the three kinds of sub- stance or states of matter, the solid, liquid and gas, are summarized thus in 0. Lodge's Mechanics: —

A solid has both size and shape. A liquid has size but not shape. A 1 gas has neither size nor shape.

2. The Change of State of Matter. — By a change of temperature and pressure combined, a substance can in general be made to pass from one state into another; thus by gradually increasing the temperature a solid piece of ice can be melted into the liquid state of water, and the water again can be boiled off into the gaseous state as steam. Again, by raising the temperature, a metal in the solid state can be melted and liquefied, and poured into a mould to assume any form desired, which is retained when the metal cools and solidifies again; the gaseous state of a metal is revealed by the spectroscope. Conversely, a combination of increased pressure and lowering of temperature will, if carried far enough, reduce a gas to a liquid, and afterwards to the solid state; and nearly every gaseous substance has now undergone this operation.

A certain critical temperature is observed in a gas, above which the liquefaction is impossible; so that the gaseous state has two subdivisions into (i.)a true gas, which cannot be liquefied, because its temperature is above the critical temperature, (ii.) a vapour, where the temperature is below the critical, and which can ultimately be liquefied by further lowering of temperature or increase of pressure.

3. Plasticity and Viscosity. — Every solid substance is found to be

plastic more or less, as exemplified by punching, shearing and cutting; but the plastic solid is distinguished from the viscous fluid in that a plastic solid requires a certain magnitude of stress to be exceeded to make it flow, whereas the viscous liquid will yield to the slightest stress, but requires a certain length of time for the effect to be appreciable.

According to Maxwell (Theory of Heat) ” When a continuous alteration of form is produced only by a stress exceeding a certain value, the substance is called a solid, however soft and plastic it may be. But when the smallest stress, if only continued long enough, will cause a perceptible and increasing change of form, the substance must be regarded as a viscous fluid, however hard it may be.” Maxwell illustrates the difference between a soft solid and a hard liquid by a jelly and a block of pitch; also by the experiment of supporting a candle and a stick of sealing- wax; after a considerable time the sealing-wax will be found bent and so is a fluid, but the candle remains straight as a solid.

4. Definition of a Fluid. — A fluid is a substance which yields continually to the slightest tangential stress in its interior; that is, it can be divided very easily along any plane (given plenty of time if the fluid is viscous) . It follows that when the fluid has come to rest, the tangential stress in any plane in its interior must vanish, and the stress must be entirely normal to the plane. This mechanical axiom of the normality oj fluid pressure is the foundation of the mathematical theory of hydrostatics.

The theorems of hydrostatics are thus true for all stationary fluids, however, viscous they may be; it is only when we come to hydrodynamics, the science of the motion of a fluid, that viscosity will make itself felt and modify the theory; unless we begin by postulating the perfect fluid, devoid of viscosity, so that the principle of the normality of fluid pressure is taken to hold when the fluid is in movement.

5. The Measurement of Fluid Pressure. — The pressure at any point of a plane in the interior of a fluid is the intensity of the normal thrust estimated per unit area of the plane.

Thus, if a thrust of P lb is distributed uniformly over a plane area of A sq. ft., as on the horizontal bottom of the sea or any reservoir, the pressure at any point of the plane is P/A lb per sq. ft., or P/144A lb per sq. in. (lb/ft. 2 and lb/in. 2 , in the Hospitalier notation, to be employed in the sequel). If the distribution of the thrust is not uniform, as, for instance, on a vertical or inclined face or wall of a reservoir, then P/A represents the average pressure over the area ; and the actual pressure at any point is the average pressure over a small area enclosing the point. Thus, if a thrust AP lb acts on a small plane area AA ft. 2 enclosing a point B, the pressure p at B is the limit of AP/AA ; and

/> =lt(AP/AA)=

in the notation of the differential calculus.

6. The Equality of Fluid Pressure in all Directions. — This fundamental principle of hydrostatics follows at once from the principle of the normality of fluid pressure implied in the definition of a fluid in § 4. Take any two arbitrary directions in the plane of the paper, and draw a small isosceles triangle abc, whose sides are perpendicular to the two directions, and consider the equilibrium of a small triangular prism of fluid, of which the triangle is the cross section. Let P, Q denote the normal thrust across the sides be, ca, and R the normal thrust across the base ab. Then, since these three forces main- tain equilibrium, and R makes equal angles with P and Q, therefore P and Q must be equal. But the faces be, ca, over which P and Q act, are also equal, so that the pressure on each face is equal. A

scalene triangle abc might also be employed, or a tetrahedron.

It follows that the pressure of a fluid requires to be calculated in one direction only, chosen as the simplest direction for convenience.

7. The Transmissibility of Fluid Pressure. — Any _ _ additional pressure applied to the fluid will be

2 – — = — transmitted equally to every point in the case of J2-EZE-. a liquid; this principle of the transmissibility of pressure was enunciated by Pascal, 1653, and applied by him to the invention of the hydraulic press. This machine consists essentially of two communicating cylinders (fig. la), filled with liquid and closed by pistons. If a thrust P lb is applied to one piston of area A ft. s , it will be balanced by a thrust W lb applied to the other piston of area B ft. 8 , where

level, and considering the equilibrium of a thin prism of liquid AB, bounded by planes at A and B perpendicular to AB. As gravity and the fluid pressure on the sides of the prism act at right angles to AB, the equilibrium requires the equality of thrust on the ends A and B ; and as the areas are equal, the pressure must be equal at A and B ; and so the pressure is the same at all points in the same horizontal plane. If the fluid is a liquid, it ■ ■, can have a free surface without diffusing itself, as a gas would; and this free surface, being a surface of zero pressure, or more generally of uniform atmospheric pressure, will also be a surface of equal pressure, and therefore a horizontal plane.

Hence the theorem. — The free surface of a liquid at rest under gravity is a horizontal plane. This is the characteristic distinguish- ing between a solid and a liquid; as, for in- stance, between land and water. The land has hills and valleys, but the surface of water at rest is a horizontal plane; and if disturbed the surface moves in waves.

9. Theorem. — In a homogeneous liquid at rest under gravity the pressure increases uniformly with the depth.

This is proved by taking the two points A and B in the same vertical line, and considering the equilibrium of the prism by resolving vertically. In this case the thrust at the lower end B must exceed the thrust at A, the upper end, by the weight of the prism of liquid; so that, denoting the cross section of the prism by a ft. 2 , the pressure at A and By by pa and p lb/ft. 2 , and by w the density of the liquid estimated in lb/ft. 3 ,

Fig. 10.

/> = P/A = W/B,

(1)

the pressure p of the liquid being supposed uniform; and, by making the ratio B/A sufficiently large, the mechanical advantage can be increased to any desired amount, and in the simplest manner possible, without the intervention of levers and machinery.

Fig. lb shows also a modern form of the hydraulic press, applied to the operation of covering an electric’cable with a lead coating.

8. Theorem. — In a fluid at rest under gravity the pressure is the same at any two points in the same horizontal plane; in other words, a

surface of equal pressure is a horizontal plane.

This is proved by taking any two points A and B at the same

pa— poa—wa. AB, p = a.kB + p .

(I)

(2)

Thus in water, where w = 62-4lb/ft. s , the pressure increases 62-4 lb/ft. 1 , or 62-44- 144 = 0-433 lb/in. 2 for every additional foot of depth.

10. Theorem. — If two liquids of different density are resting in vessels in communication, the height of the free surface of such liquid above the surface of separation is inversely as the density.

For if the liquid of density a rises to the height h and of density p to the height fe^and po denotes the atmospheric pressure, the pressure in the liquid at the level of the surface of separation will be ah + pt and pk + po, and these being equal we have

oh = pk.

(1)

The principle is illustrated in the article Barometer, where a column of mercury of density a and height h, rising in the tube to the Torricellian vacuum, is balanced by a column of air of density p, which may be supposed to rise as a homogeneous fluid to a height k, called the height of the homogeneous atmosphere. Thus water Deing about 800 times denser than air and mercury 13-6 times denser than water,

£/fc = (r/p = 8ooXi3-6 = io,88o; (2)

and with an average barometer height of 30 in. this makes k 27,200 ft., about 8300 metres.

1 1 . The Head of Water or a Liquid. — The pressure ah at a depth h ft. in liquid of density a is called the pressure due to a head of h ft. of the liquid. The atmospheric pressure is thus due to an average head of 30 in. of mercury, or 30X13-6-7-12 = 34 ft. of water, or 27,200 ft. of air. The pressure of the air is a convenient unit to employ in practical work, where it is called an ” atmosphere “; it is made the equivalent of

a pressure of one kg/cm 2 ; and one ton/inch 2 , employed as the unit with high pressure as in artillery, may be taken as 150 atmospheres.

12. Theorem. — A body immersed in a fluid is buoyed up by a force equal to the weight of the liquid displaced, acting vertically upward through the centre of gravity of the displaced liquid.

For if the body is removed, and replaced by the fluid as at first, this fluid is in equilibrium under its own weight and the thrust of the surrounding fluid, which must be equal and opposite, and the surrounding fluid acts in the same manner when the body replaces the displaced fluid again; so that the resultant thrust of the fluid a”cts vertically upward through the centre of gravity of the fluid displaced,- and is equal to the weight.

When the body is floating freely like a ship, the equilibrium of this liquid thrust with the weight of the ship requires that the weight of water displaced is equal to the weight of the ship and the two centres of gravity are in the same vertical line. So also a balloon begins to rise when the weight of air displaced is greater than the weight of the balloon, and it is in equilibrium when the weights are equal. This theorem is called generally the principle of Archimedes.

It is used to determine the density of a body experimentally; for if W is the weight of a body weighed in a balance in air (strictly in vacuo), and if W’ is the weight required to balance when the body is suspended in water, then the upward thrust of the liquid

or weight of liquid displaced is W-W, so that the specific gravity (S.G.) r i defined 1 as the ratio of the weight of a body to the weight of an equal volume of water 1 , is W/(W-W).

As stated first by Archimedes, the principle asserts the obvious fact that a body displaces its own vorume of water; and he utilized it in the problem of the determination of the adulteration of the crown of Hiero. He weighed out a lump of gold and of silver of the same weight *s the clown; and, immersing the three in succession in water, he found they spilt over measures of water in the ratio t 1 ? -A;i& or 33: 24: 44; thence it follows that the gold : silver alloy of tfiefiorown was as 1 1 : 9 by weight.

13. Theorem. — The resultant vertical thrust on any portion of a curyed suffice exposed to the pressure of a fluid at rest under gravity is the weifrht of fluid cut out by vertical lines drawn round the .boundary of the curved surface.

TTieorent.—ˆ-The resultant horizontal thrust in any direction is obtilned by\ dr$t\fShg parallel horizontal lines round the boundary, and- intejfsecting i plane perpendicular to their direction in a plane curve; and then investigating the thrust on this plane area, which will, be tfce same as on the curved surface.

The iSe&of of these theorems proceeds as before, employing the normality principle; they are required, for instance, in the determinatidn of the liquid thrust on any portion of the bottom of a ship. In casting a thin hollow object like a bell, it will be seen that the resultant upward thrust on the mould may be many times greater than the weight of metal; many a curious' experiment has been devised to illustrate this property and classed 3s a hydrostatic paradox (Boyle,' Hydrostatical Paradoxes, 1666).

Consider,, for instance, the operation of casting a hemispherical bell, in fig. 2. As the molten metal is run in, the upward thrust on-

the outside mould, when

K' *i •" – - ■ K j the level has Teached

PP', is the weight of metal in the volume gen- erated by the revolution of APQ; and this, by a theorem of, Archimedes, has the same volume as the cone ORR', or iirˆ*, where y is the depth of metal, the horizontal sections being equal so long as y is less than the radius of the outside hemisphere. Af terwai 'd s » , when the metal has risen

above B, to the level KK', the additional thrust is the weight of the cylinder of diameter KK' and height BH. The upward thrust is the same, however thin the metal may be in the interspace between the outer mould and the core inside; and this was formerly considered paradoxical.

A nalytical Equations of Equilibrium of a Fluid at rest under any System of Force. ■..'.',

14. Referred to three fixed coordinate axes, a fluid, in which the pressure is p, the density p, and X, Y, Z the components of impressed force per unit mass, requires for the equilibrium of the part filling a fixed surface S, on resolving parallel to Ox,

JJlpdS =jjfp^dxdydz,

where I, m, n denote the direction cosines of the normal outward of the surface Si •

But by Green's transformation

fJlpdS=Jff d £dxdydz, thus leading to the differential relation at every point

The three equations of equilibrium obtained by taking moments round the axes are then found to be satisfied identically.

Hence the space variation of the pressure in any direction, or the pressure-gradient, is the resolved force per unit volume in that direction. : The resultant force is therefore in the direction of the steepest pressure-gradient, and this is normal to the surface of equal pressure; for equilibrium to exist in a fluid the lines of force must therefore be capable of being cut orthogonally by a system of surfaces, which will be surfaces of equal pressure.

Ignoring temperature effect, and taking the density as a function of the pressure, surfaces of equal pressure are also of equal density, and the fluid is stratified by surfaces orthogonal to the lines of force;

\%-\%'\%^>l "■■;. (4)

are the partial differential coefficients of some function ¥,=*fdplp, of *, y, z; so that X, Y, Z must be the partial differential coefficients of * potential V, such that the force in any direction is the down ward gradient of V ; and then

./ i . ZF+ar*" ' orP,+V=»constant, (S)

Fig. 2.

= pZ.

(1)

drawn

(2)

(3)

in which P may be 'called the hydrostatic head and V the head of

potential. •

With variation of temperature, the surfaces of equal pressure and density need not coincide; but, taking the pressure, density and temperature as connected by some relationˆ such as the gas-equation, the surfaces of equal density and temperature must intersect in lines lying on a surface of equal pressure.

15. As an. .example, of the general equations, take the simplest case of a uniform field of gravity, with Oz directed vertically down- ward ; employing the gravitation unit of force,

I dp_ 1 dp _ 1 dp pdx~°’ P~d~y” > J* 1 ‘

(1)

P ay • p dz P = J

When the density p is uniform, this becomes, as before in (2) § 9

p = pz + p«. (3)

Suppose the density p varies as some nth power of the depth below 0, then

dp/dz-p — ptz” (4)

P-IK

‘n + l W

(5)

££_. n + l n + l~ supposing p and p to vanish together.

These equations can be’ made to represent the state of convective equilibrium of the atmosphere, depending on the gas-equation

/> = p£ = Rp0, (6)

where denotes the absolute temperature ; and then

r,d»_d (p\ i_

(7)

so that the temperature-gradient dd/dz is constant, as in convective

equilibrium in (11).

From the gas-equation, in general, in the atmosphere

1 dp_i,d£^_i d$_p_i

pdz~p dz~B dz~p 6

which is positive, and the density p diminishes with the ascent, provided the temperature-gradient de/dz does not exceed 9/k.

With uniform temperature, taking h constant in the gas-equation, dpfdz=-p~p/k, p = poe' lh ,, (9)

so that in ascending in the atmosphere of thermal equilibrium the pressure and density diminish at compound discount, and for pressures pi arid pi at heights zi arid z 2

(zi-Z2)/*=log,(£ 2 /£i)=2.3logio(/>2/£i). (10)

In the convective equilibrium of the atmosphere, the air is sup- posed to change in density and pressure without exchange of heat by conduction ; and then

p/po = (9/eo) n , ^o = (9/9o)» +1 , (II)

dz \ dp . ,. .* , . ._ ,1

d8 = p-m = (n+I) pi=(n + I)R ' 7=I +»-

where y is the ratio of the specific heat at constant pressure and constant volume.

In the mqre gerteral case of the convective equilibrium of a spherical atmosphere surrounding the earth, of radius a,

P, ■(•■+»>S5— r**'

(12)

gravity varying inversely as the square of the distance r from the centre; so that, A=*po/.pa, denoting the height of the homogeneous atmosphere at the surface,:^ is given by

(«+i>ft(i-tf/9o)=o(i-o/r), (13).

or if c denotes the distance where 9 = o,

(14);

0o~r ‘ c — a’

When the compressibility of water is taken into account in: a deep ocean, an experimental law must be employed, such as ! •

p— p„ = k(j>— po), or pfp -i + (p— po)!K X = *po, .(15) so that X is the pressure due to a head k of the liquid’ at density po under atmospheric pressure po\ and it is the gauge pressure required on this law to double the density. Then

dp/dz = kdpldz** P , p = poe*’*, p-po = kpt,(.e’”’-i); (16) and if the liquid Was incompressible, the depth at pressure p would be (p—po)/ po, so that the lowering of the surface due tocompressionTs

ke’l k — k—z = %z?lk, when k is large. (17)

For sea water, X is about 25,000 atmospheres, and k is then 25,000 times the height of the water barometer, about 250,000 metres, so that in an ocean 10 kilometres deep the level is lowered about 200 metres by the compressibility of the water; and the density at the bottom is increased 4 %.

On another physical assumption of constant cubical elasticity A. &p*>\dplp, (/>’~fc»)/X=log(p/po), (18)

z3 “/t ai = * p ‘ \pt pi ‘ p k’

**kpt, (19)

HYPfcOSXATie?}

r.

HlCDRQAifEGHftNIGS

■J 19

and the lowering of the surface is

~2 = Alog-z«-Mog(i-!) r-.zft;^ (20)

(3) (4) (5)

: (6) (7) (8) (9) :

Po °ft ” ”°" ft/ ”*B

as before in 17).

16. Centre of Pressure. — A plane area exposed to fluid pressure on one side experiences a, single resultant thrust, the integrated pressure over the area, acting through a definite point called the centre of pressure (C.P.) of the area. Thus if the plane is normal to Ox, the resultant.thrust

Rˆjfpdxdy, . .. , ‘ (1).

and the co-ordinates x, y of the C.P. are given by

xR = ffxpdXdy, yR = ffypdxdy. – (2)

The C.P. is thus the C.G. of a plane lamina bounded by the area, in which the surface density is p.

If p is uniform, the C.P. and C.G. of the area coincide. For a homogeneous liquid at rest under gravity, p is proportional . to the depth below the surface, i.e. to the perpendicular distance from the line of intersection of the plane of the area with the free surface of the liquid.

If the equation of this line, referred to new coordinate axes in the plane area, is written

x cos a -+• y sin a — h — O,

R = ffp(h—xcos a— y sin a)dxdy,

iR = fjpx(h-+x cos o— ysin w)dxdy,

yR = fjpy(h — xcosa — y sin a)dxdy.

Placing the new origin at the C.G. of the area A,

ffxdxdy = o, fjydxdyˆo,

R = P«A,;

xhA = —cos affx 2 dA— sin affxydA, yh A = — cos affxydA — sin a ffy*dA . Turning the axes to make them coincide with the pr’yiqipal axes of the area A, thus making JfxydA = o, \

xh = — a’coso, yft = — ft’sinoi (to)

where

f(x*dAˆAa*. //y’dA = A6’, . (n)

a and b denoting the semi-axes of the momental ellipse of the area.

This shows that the C.P. is the antipole ofthejineof intersection of its plane with the free surface with respect to the momehtal ellipse at the C.G. of the area.

Thus the C.P. of a rectangle or parallelogram with a side in the surface is at § of the depth of the tower side; of a triangle with a vertex in the surface and base horizontal is J of the depth of the base ; but if the base is in the surface, the C.P. is at half the depth of the vertex; as on the faces of a tetrahedron’, with one edge in the surface.

The core of an area is the name giver) tp the limited area round its C.G. within which the C.P. must He when the area is immersed completely; the boundary of the core is therefore the locus of the antipodes with respect to the momental ellipse of water lines which touch the boundary of_ the area. Thus the core of a circle or an ellipse is a concentric circle or ellipse of one quarter the size ;

The C.P. of water lines passing through a fixed point lies ona straight line, the antipolar of the point; and thus the core of a tri- angle is a similar triangle of one quarter the size, and the core of a parallelogram is another parallelogram, the diagonals of which are the middle third of the median lines.

In the design of a structure such as a tall reservoir dam it is important that the line of thrUst in the material should pass inside the core of a section, so that’ the material should not be in a state of tension anywhere and so liable to open and admit the water.

17. Equilibrium and Stability of a Ship or Floating Body. The Metacenlre.—-The principle of Archimedes, in § 12 leads

immediately . to the conditions of equili- brium of a body sup- ported freely in fluid, like a fish in water or a balloon in the air, or like a ship (fig, 3) floating partly im- mersed in water and the rest in air. The body is in equili- brium under two forces: — (i.) its weight W acting vertically . downward through G, the C.G. of the body, and (ii.) the buoyancy of the fluid, equal to the weight of the displaced fluid, and acting vertically upward through B, the C.G. of the displaced fluid;

I”’’

r*

M

L

G

F

iGt

2*

V

B,

J

s ± ~r

for equilibriufii these two forces must be equal and opposite in the same line.

The conditions of equilibrium of a body, floating like a ship on the surface of a liquid, are therefore: —

(i.) the weight of the body must be less than the weight of the total volume of liquid it can displace; or else the body will sink to the bottom of the liquid; the difference of the weights is called the "reserve of buoyancy."

(ii.) the weight of liquid which the body displaces in the position of equilibrium is equal to. the weight W of the body; and

(iii.) the C.G.j B, of the liquid displaced and G of the body, must lie in the same vertical line GB.

18. In addition to . satisfying these conditions of equilibrium, a ship must fulfil the further condition of stability, so as to keep upright; if displaced slightly from this position, the forces called into play must be such as to restore the ship to the upright again. The stability of a ship, is investigated practically by inclining it; a weight is moved across the deck and the angle is observed of the heel produced.

Suppose P tons is moved c ft. across the deck of a ship of W tons

displacement! the C.G. Will move from G to Gi the reduced distance GiCa = c (P/W); and if B, called the centre of buoyancy, moves to Bi, along the curye of buoyancy BBi, the normal of this curve at Bi will be the new vertical B.1G1, meeting the old vertical in a point Kl, the centre of curvature of BBi, called the metacentre. • If the ‘ ship heels J through an angle or a slope of r in m,

GM = GGic6t9=mc(P/W), (1)

and GM is called the metacentric height; and the ship must be Joallasted, so that G lies below M. If G was above M, the tangent drawn from G to the evolute of B, and normal to the curve of buoyancy, would: give the vertical, in a new position of equilibrium. Thus in H.M.S. “Achilles” of. 9000 tons displacement it was found that moving 20 tons’ across the deck, a distance of 42 ft., caused the bob of a pendulum 20! ft. long to move through ro in., so that ‘

K

Fig. 3.

GM,

24°\>.„. 20 r

= -iF* 42X 9 -5oo^ 2 ‘ 2 4 f t.;.

..(*>

also

potfl-24, 0=2° 24’. (3),.

In.a diagram it is_CQnducive.to clearness to draw the ship in on* position, and to incline the water-line; and the p^ge can be turned if it is desired to bring the new water-line horizontal.

Suppose the ship turns about an axis through F in the water-line area, perpendicular to the plane of the paper; denoting by y the distance of an element dA if the water-line area from the axis of rotation; the change of displacement is XydA tan 0, so that there is ho change of displacement if 2ydA=o, that is, if the qxi^ passes through the C.G. of the water-line area, which we denote by F and call the centre of flotation.

The righting couple of the wedges of immersion and emersion will be

XwydA tiin&.y = w tan 6ifdA = w tan 0.A& 2 ft. tons, (4)

■w denoting the density of water in tons/ft. 3 , and W=k»V, for a displacement of V ft. 3

This couple, combined with the original buoyancy W through B, is equivalent to the new buoyancy through B, so that

W.BBjˆwAˆtanfl, (5)

• BM=BB 1 cot0 = Aˆ/V, (6)

giving the radius of curvature BM of the curve of buoyancy B, in terms of the displacement V, and Ak 2 the moment of inertia of the water-line area about /an axis through F, perpendicular to the- plane of displacement, , .

An inclining couple due to moving a weight about in a ship will heel the, ship about an axis perpendicular to the plane of the couple* only when this axis is a principal axis at F of the momental ellipse of the water-line area A. For if the ship turns through a small angle; about the line FF.', then bi, 62, the C.G. qf the wedge of imwerslion and emersion, w)ll be the C.P. with respect to FF' of the two parts of the water-line area, so that JA will be conjugate to FF' with respect to the momental ellipse at F. . ' * ;

The naval architect distinguishes between the stability of, form, represented by the righting couple W.BM, and the stability ' oj ' baUast- ing, represented by W.BG. Ballasted with G at B, the righting couple when the ship is heeled through 0is given by W.BM. tan0; but if weights inside the ship are raised to bring G above B, the righting couple is diminished. b_y, W.BG. tan 0, so that the resultant righting couple is W,GM/ tan '0. Provided the ship is designed to 'float upright at the smallest draft with no load on board, the stability at any other draft of water can be arranged by the stowage of the weight, high or low.

19. Proceeding as in § 16 for the determination of the C.P. of an area, the same argument will show that an inclining couple due to

the movement of a weight P through a distance c will cause the ship to heel through an angle about an axis FF' through F, which is conjugate to the direction of the movement of P with respect to an ellipse, not the mdmental ellipse of the water-line area A, but a confocal to it, of squared semi-axes

a J -W/A, P-AV/A, (i)

h denoting the vertical height BG between C.G. and centre of buoyancy. The varying direction of the inclining couple Pc may be realized by swinging the weight P from a crane on the ship, in a circle of radius c. But if the weight P was lowered on the ship from a crane on shore, the vessel would sink bodily a distance P/wA if P was deposited over F; but deposited anywhere else, say over Q on the water-line area, the ship would turn about a line the antipolar of Q with respect to the confocal ellipse, parallel to FF', at a distance FK from F

FK = (#-W/A)/FQsinQFF' (2)

through an angle $ or a slope of one in m, given by

sin9= i?A = W-ApIV F Q sin 2 FF " (3>

where k denotes the radius of gyration about FF' of the water-line area. Burning the coal on a voyage has the reverse effect on a steamer.

Hydrodynamics 20. In considering the motion of a fluid we shall suppose it non-viscous, so that whatever the state of motion the stress across any section is normal, and the principle of the normality and thence of the equality of fluid pressure can be employed, as in hydrostatics. The practical problems of fluid motion, which are amenable to mathematical analysis when viscosity is taken into account, are excluded from treatment here, as constituting a separate branch called "hydraulics" (q.v.). Two methods are employed in hydrodynamics, called the Eulerian and Lagrangian, although both are due originally to Leonhard Euler. In the Eulerian method the attention is fixed on a particular point of space, and the change is observed there of pressure, density and velocity, which takes place during the motion; but in the Lagrangian method we follow up a particle of fluid and observe how it changes. The first may be called the statistical method; and the second the historical, according to J. C. Maxwell. The Lagrangian method being employed rarely, we shall confine ourselves to the Eulerian treatment.

The Eulerian Form of the Equations of Motion.

21. The first equation to be established is the equation of continuity, which expresses the fact that the increase of matter within a fixed surface is due to the flow of fluid across the surface into its interior.

In a straight uniform current of fluid of density p, flowing with velocity q, the flow in units of mass per second across a plane area A, placed in the current with the normal of the plane making an angle 8 with the velocity, is oAq cos 0, the product of the density p, the area A, and q cos the component velocity normal to the plane.

Generally if S denotes any closed surface, fixed in the fluid, M the mass of the fluid inside it at any time t, and 9 the angle which the outward-drawn normal makes with the velocity q at that point,

d”Stl/dt =rate of increase of fluid inside the surface, (1)

= flux across the surface into the interior ■ = ~JJpq cos 0

In the Eulerian notation u, v, w denote the components of the velocity q parallel to the coordinate axes at any point (x, y, z) at the time t; u, v, w are functions of x, y, 2, /, the independent variables; and d is used here to denote partial differentiation with respect to any one of these four independent variables, all capable of varying one at a time.

To transfer the integral equation into the differential equation of continuity, Green’s transformation is required again, namely,

/// CS+S+S) dxdydz =//^+ M “+«f)«, (2)

or individually

which becomes by Green’s transformation

leading to the differential equation of continuity when the integration is removed.

22. The equations of motion can be established in a similar way by considering the rate of increase of momentum in a fixed direction of the fluid inside the surface, and equating it to the momentum generated by the force acting throughout the space S, and by the pressure acting over the surface S.

Taking the fixed direction parallel to the axis of x, the time-rate of increase of momentum, due to the fluid which crosses the surface, is

-f fpuq cos 9dS = -ff{lpu i +mpuv+npuiv)dS, (1)

which by Green's transformation is

The rate of generation of momentum in the interior of S by the component of force; X per unit mass, is

fffpXdxdydz, (3)

and by the pressure at the surface S is

-JJlpdS = -fjj d £lxdydz, (4)

by Green's transformation. ....

The time rate of increase of momentum of the fluid inside S is

w

' d(pu) dt

■dxdydz ;

and (5) is the sum of (1), (2), (3), (4), so that

leading to the differential equation of motion

dpu , dpu* , dpuv . dpuw _ \r_d] > Sy

dpuw v

dx'

(5)

(6)

(7)

with two similar equations.

The absolute unit of force is employed here, and not the gravitation unit of hydrostatics; in a numerical application it is assumed that C.G.S. units are intended.

These equations may be simplified slightly, using the equation of continuity (5) §21; for

dpu It'

dpu* , dpuv , dpuw r_ d7 + dy +

dz

(du . du . du . du\ = p Xdi + u Tx + v dy- + w Tz) j... (dp .dpu dpv dpw\ + u \dt + -d-x- + -% + -dT)'

(8)

reducing to the first ljne, the second line vanishing in consequence of the equation of continuity; and so the equation of motion may be written in the more usual form

du , du , du , du -v idp /„%

3r + «s + B 3y + u, ar" x "7S' (9)

with the two others

dv

+ «;

d7 T "3x

dv , dv . dv v I dp

dy dw

dz dw

(io)

ffff/xdydz-ffWS

(3)

where the integrations extend throughout the volume and over the surface of a closed space S; I, m, n denoting the direction cosines of the outward-drawn normal at the surface element < 2S, and £, ij, f any continuous functions of x, y, 2.

The integral equation of continuity (1) may now be written

! z£dxdydz + ff(lpu + mpv + npw)dS = o, (4)

fffi

pdy’ dw , dw , dw , dw 1 1 dp H+ u Tx v dy- w dz- =Z pTz

23. As a rule these equations are established immediately by determining the component acceleration of the fluid particle which is passing through (x, y, z) at the instant t of tiwie con- sidered, and saying that the reversed acceleration or kinetic reaction, combined with the impressed force per unit of mass and pressure-gradient, will according to d’Alembert’s principle form a system in equilibrium.

To determine the_ component acceleration of a particle, suppose’E, to denote any function of x, y, z, t, and investigate the time rate of F for a moving particle ; denoting the change by DF /dt,

DF = , F(x+uSl, y+vM, z+wSt, t+St)-¥(x, y, 2, t) IT it

dF

dF . dF .

(I?

,,.”, dF, ~ˆi+ u dx +v ly- +w dz-‘

and D/dt is called particle differentiation, because it follows the rate of change of a particle as it leaves the point x, y, 2; but

dF/dt, dF/dx, dF/dy, dF/dz (2)

represent the rate of change of F at the time t, at the point, *, y, z, fixed in space.

HYDRODYNAMICS]

HYDROMECHANICS

121

The components of acceleration of a particle of fluid are conse- quently

Dm du . du . du . du

dv

(3) (4)

(5)

dt ~ dt “di‘dy Dr dv , dv , dv ,

-dT = Ji + u dH v dˆ w ˆ

Dw dw , dw , dw , dw

-dT = W + u -dH + v -dy + w Tz leading to the equations of motion above.

If F (x, y, z, /) = o represents the equation of a surface containing always the same particles of fluid,

DF dF , dF . dF . dF ,,,

It = °’ 0T dt + u di + v ly + W &~ < (6 >

which is called the differential equation of the bounding surface. A bounding surface is such that there is no flow’of fluid across it, as expressed by equation (6). The surface always contains the same fluid inside it, and condition (6) is satisfied over the complete surface, as well as any part of it.

But turbulence in the motion will vitiate the principle that a bounding surface will always consist of the same fluid particles, as we see on the surface of turbulent water.

24. To integrate the equations of motion, suppose the impressed force is due to a potential V, such that the force in any direction is the rate of diminution of V, or its downward gradient ; and then

iVldz; (1)

Putting

x =

= -dV/dx, Y

= -dM/dy, Z

and putting

dw dy

dv t -dz = 2 Z<

du

dz

dw dx’

= 2V,

dv

2*

if. dx

, dv ,<*{-. r 2y + dz~

=0,

dy 2f>

the equations of motion may be written

du _ , ,dH

- Tt 2vi+2wn+ˆ=o,

dv t , _

dw . „ . dH

W -2UV + 2Vt + lr = 0,

where

H=fdp/ P +V+h+v 1 +w*,

(2) (3)

(4) (5) (6)

(7) (8)

JLu dv J.w . . /du . dv . dw\ . .

ˆdx’ˆdx’ˆdx+ˆdx+dˆ+Tz)” ‘ ®>

(10)

(U)

(12)

and the three terms in H may be called the pressure head, potential head, and head of velocity, when the gravitation unit is employed and \q % is replaced by hq'/g.

Eliminating H between (5) and (6)

21

dt *dx "dx "dx~ r ' i \dx~ r dy and combining this with the equation of continuity 1 Dp du . dv . dw p dt + dx + dy + dz~ '

we have g (?)- *^-2 * ?^ = 0>

dt \p/ pdx pdx p dx '

with two similar equations. Putting

a vortex line is defined to be such that the tangent is in the direction of u, the resultant of £, v, f, called the components of molecular rotation. A small sphere of the fluid, if frozen suddenly, would retain this angular velocity.

If w vanishes throughout the fluid at any instant, equation (11) shows that it will always be zero, and the fluid motion is then called irrotalional; and a function exists, called the velocity function, such that

udx--vdy+wdz = -d, (13)

and then the velocity in any direction is the space-decrease or downward gradient of (j>.

25. But in the most general case it is possible to have three functions <£, \[<, m of x, y, 2, such that

udx+vdy+wdz = -d4>-md\f', (1)

as A. Clebsch has shown, from purely analytical considerations {Crelle, lvi.) ; and then

and

H-

d$

m lt= K >

(4)

dK

■fa-2U$+2Wr,-

■ =0, .

, rf(«A, m) 1 d(ˆ,m) „ i d(f,m) „

- _i (J(y, Z)’ ~»**d(.)’ f- ‘,y)’ {)**

d

so that, at any instant, the surfaces over which i// and m are constant intersect in the vortex lines.

=0, .

(5)

(6)

(7)

(8)

the equations of motion (4), (5), (6) § 24 can be written

d{

d(x,t) ‘ and therefore

Equation (5) becomes, by a rearrangement,

**dK._d\p/dm, dm. dm dm **

dx dH\dt +u dx + v dy +uh dT}

, dm /dif/ , dii . dib , d\L

+ d X -{M+ u -dx+ v d y : +w Tz)

dKjfy Dm dm Dip _

{ dx dx dt + dx dt _0 ‘ • • •’

and as we prove subsequently (§ 37) that the vortex lines are composed

of the same fluid particles throughout the motion, the surface m and

if/ satisfies the condition of (6) § 23 ; so that K is uniform throughout

the fluid at any instant, and changes with the time only, and so

may be replaced by F(/).

26. When the motion is steady, that is, when the velocity at any

point of space does not change with the time,

dK , . , N

-^-2t)f + 2«l7, = 0 (1)

JK . dK , JK dK . dK. dK , ,

‘33r i ‘ = 0 ‘ u dx + s !y- + w dz = ‘ < 3 >

and

rW + V + k 2 = H (3)

is constant along a vortex line, and a stream line, the path of a fluid particle, so that the fluid is traversed by a series of H surfaces, each covered by a network of stream lines and vortex lines; and if the motion is irrotational H is a constant throughout the fluid.

Taking the axis of x for an instant in the normal through a point on the surface H = constant, this makes u = o, { = ; and in steady motion the equations reduce to

dH/dv = 2vt;—2wv — 2qws [nS, (4)

where 6 is the angte between the stream line and vortex line ; and this holds for their projection on any plane to which dv is drawn perpendicular.

In plane motion (4) reduces to

*&+?)■ (5)

if r denotes the radius of curvature of the stream line, so that

Idp dvmdw = g\ \ 6)

p dv dv dv dv r K ‘

the normal acceleration.

The osculating plane of a stream line in steady motion contains the resultant acceleration, the direction ratios of which are

dH d7 = 2(X

du , du , du d\q* ^ , dhq* dH

u -Sx+ v J y + W -d-z = dx 2V > +™ r > =-Ix-Tx<

(7)

and when q is stationary, the acceleration is normal to the surface H = constant, and the stream line is a geodesic.

Calling the sum of the pressure and potential head the statical head, surfaces of constant statical and dynamical head intersect in lines on H, and the three surfaces touch where the velocity is stationary.

Equation (3) is called Bernoulli’s equation, and may be interpreted as the balance-sheet of the energy which enters and leaves a given tube of flow.

If homogeneous liquid is drawn off from a vessel so large that the motion at the free surface at a distance may be neglected, then Bernoulli’s equation may be written

H=p!p+z+qV2g = Plp+h, (8)

where P denotes the atmospheric pressure and h the height of the free surface, a fundamental equation in hydraulics; a return has been made here to the gravitation unit of hydrostatics, and Oz is taken vertically upward.

In particular, for a jet issuing into the atmosphere, where /> =

P,

g 2 /2g = /i-z, (9)

or the velocity of the jet is due to the head k—z of the still free surface above the orifice; this is Torricelli's theorem (1643), the foundation of the science of hydrodynamics.

27. Uniplanar Motion. — In the uniplanar motion of a homogeneous liquid the equation of continuity reduces to du , dv

so that we can put

dx + -dy- = ° < u = — dˆldy , v = dt/dx,

(1) (2)

where ˆ is ? Junction of x, y, called the stream- or current-function ; interpreted physically, ˆ-ˆo. the difference of the value of ˆ at a fixed point A and a variable point P is theflow, in ft. 3 / second, across any curved line AP from A to P, this being the same for all lines in accordance with the continuity.

Thus if = vdx; and similarly di- = ~udy with PP' parallel to Oy; and generally dˆfds is the velocity across ds, in a direction turned through a right angle forward, against the clock.

In the equations of uniplanar motion

rf£_i« _ dty , dfy 2f dx dy ~ dxˆdp

-VV > suppose,

so that in steady motion

and vV must be a function of i£. If the motion is irrotational,

d H , _, , dty

3?

+vV = o,

dx dy' d~y dx'

(3)

(4)

(5)

so that 4> and <£ are conjugate functions of * and, y,

+*i=*f(x+yi), vV=o. v**=«o; (6)

or putting

+\j/i=w, x+yi-z, w=f{z).

The curves = constant and 4> — constant form an orthogonal system; and the interchange of (j> and

For instance, in a uniplanar flow, radially inward towards O, the flow across any circle of radius r being the same and denoted by 2ittn, the velocity must be m/r, and

tf> =mlogr, 4i=m$, ^--^i~m log re' 9 , vi—m log s. (7)

Interchanging these values

^ = mlcgr, = m6, i=m log re* e (8)

gives a state of vortex motion, circulating round Oz, called a straight or columnar vortex.

A single vortex will remain at rest, and Cause a velocity at any point inversely as the distance from the axis and perpendicular to Its direc- tion i analogous to the magnetic field of a straight electric, curneat.

If other vortices are present, any one may be supposed to move with the velocity due to the others, the resultant streaniifiHvction being

i£=fc2»z log r=log Mm; (9)

the path of a vortex is obtained by equating the value of $ at the vortex to a constant, omitting the rm of the vortex itself.

When the liquid is bounded by a cylindrical surface, the motion of a vortex inside may be determined as due to a series of vortex-images, so arranged as to make the flow zero across the boundary.

For a plane boundary the image is the optical reflection of the vortex. For example, a pair of equal opposite' vortices, moving on a line parallel to a plane boundary, will have a corresponding pair of images, forming a rectangle of vortices, and the path of a vortex will be the Cotes spiral

r sin 20 = 2

this is therefore the path of a single vortex in a right-angled' corner; and generally, if the angle of the corner is ir/n, the path 19 the Cotes*

a spiral

r sin n$ = na.

(»i

and -f-Uy*‘ is the stream function of the relative motion of the liquid past the cylinder, and similarly 4>~Vx for the component velocity V along Oy; and generally

<-/ = vfr+Uy-V* (4)

is the relative stream-function, constant over a solid boundary moVing with components U and V of velocity.

If the liquid is stirred up by the rotation R of a cylindrical body,

dˆtds <= normal velocity reversed

= -Rx'

dx ds

*y%

(5)

•A-HRˆ-hy'W, (6)

a constant over the boundary; and 4 1 ‘ is the current-function of

the relative motion past the cylinder, but now

W' + 2R = o, (7)

throughput thejliquid.

Inside an equilateral triangle, for instance, of height h,

+' = – 2Rapy!h, ' (8)

where a, 0, y are the perpendiculars on the sides of the triangle.

In the general ease '=-f-Uy- Vjc + JROtf-f-y 2) is the relative stream function for velocity components, U, V, R.

39. Example 1. — Liquid motion past a circular cylinder. Consider the motion given by

w = U(z + a«/z), (1)

A single vortex in a circular cylinder of radius a at a distance c from the centre will move with the velocity due to an equal opposite image at a distance a 2 lc, and so describe a circle with velocity

mcl(a*-r?)in the periodic time 2*(a*-c 2) [m. (12)

Conjugate functions can be employed also' for the motion of tiquicf in a thin sheet between two concentric spherical surfaces; the com- ponents of velocity along the meridian and parallel in colatitude 8 and longitude X can be written

d4 = i_ d$ 1 djj > _ djj fiii

de = sin 8 d' sin d\ " d6′ { 3;

and then

4 > + ˆ i = F (tan \8. «*•') . (14)

28. Uniplanar Motion of a Liquid due to the Passage of a Cylinder through it. — A stream-function

VV = o, throughout the liquid; ■ (1)

4 > -constant, over any fixed boundary ; (2)

d^/ds =• normal velocity reversed over a solid boundary, (3)

so that, if the solid is moving with velocity U in the direction Ox, di>lds— — Vdy/ds, or ^+U> = constant over the moving cylinder;

so that

^ = u(r+7)cos9=u(i+^)*, ^Tj(,-f)sin0 = u(i-g)y.

(2)

Then 4/ = over the cylinder r = a, which may be considered a fixed post; and a stream line past it along which ^ = Uc, a constant, is the curve

■ \ (3)

a cubic curve (C3).

Over a concentric cylinder, external or internal, of radius r = b,

I r – —) sin 6 =>c, (* 5 +y 2)(y-c) -o 2 y = o,

.).

ric cylinder, 1

*W+U,y-lu(i-g|)+Ui] y,

(4)

and $' is zero if

Ui/U = (a 2 -frW; (5)

so that the cylinder may swim for an instant in the liquid without distortion, with tb,is velocity Ui; and w in (1) will give the liquid motion in the, interspace between the fixed cylinder r = o and the concentric cylinder r = 6, moving with velocity Ui.

When 6 = 0, Ui=oo; and when 6 = 00, Uj=>-U, so that at infinity the liquid is streaming in the direction *0 with velocity U.

If the liquid is reduced to rest at infinity by the superposition of an opposite stream given by 10= — Uz, we are left with

. «- = Ua 2 /z, (6)

= U(a 2 /r) cos 8 = Ua'x/(x* + f), i*** -U(a 2 /r) sin = -Va'y/ ix' + f),

(7) (8)

giving the motion due to the passage of the Cylinder r = a with velocity U through the origin O in the direction Ox. If the direction of motion makes an angle 8′ with 0#,

d(j > jd4 > _2xy

tan9 ‘ = Ty/^=^

f

= tan 28, 8 = is',

and the Velocity is Ua J /r 2 . . Along the path of a particle, defined by the C 3 of (3),

_ y(y-c)

x i + y i o 2 •

sin 2 \8′ =

. . .,d0′ iy -cdv

(9)

(JO)

(»)

on the radius of curvature is Ja 2 /(y — %c), which shows that the curve is an Elastica or Lintearia. (J. C. Maxwell, Collected Works, ii. 208.) If

«fr = -Ui*, (12)

and over the separating surface r = b

a? + V

• _ U / , , o 2 \

.¥’

(13)

and this, by § 36, is also the ratio of the kinetic energy in the annular interspace between the two cylinders to the kinetic energy of the liquid moving bodily inside r = b.

Consequently the inertia tc overcome in moving the cylinder r — b, solid or liquid, is its own inertia, increased by the inertia of liquid (a 2 +S 2)/(a’~6 2) times the volume of the cylinder r — b; this total inertia, is called the effective inertia of the cylinder rˆb, at the instant the two cylinders are concentric.

HYDRODYNAMICS]

HYDROMECHANICS

123

(14)

With liquid of density p, this gives rise to a kinetic reaction to acceleration dV/dt, given by

..a’+WdU a?+b.,dV Tpb aˆWdT = “aˆ¥ M Si’

if M’ denotes the mass of liquid displaced by unit length of the cylinder r = b. In particular, when o = 00 , the extra inertia is M’.

When the cylinder r = a is moved with velocity U and r = 6 with velocity U, along Ox,

= U

a 2 /6 s \ b f I a*\

jˆ(7 + r)cos9-U 1 rrˆ(r + 7 jcos< >, (»5)

r~{j~r) s ine-\J l¥ ˆ(r-f)sin$-, (t6)

and similarly, with velocity components V and Vi along Oy

V

<(•—

Vrj^^ + ^sino-v,^

Isin8-Vn

*K)

sinfi,

• V^(£-r)co.« + V^(r-£)coB»;

(17)

(IS)

and then for the resultant motion

w = (U 2 + V*)j

-(Ui» + Vi»)j:

+

a* U + Vi

6 2 a 2 2 a‘6′ U1 + V1*

; 6 2 -a 2 U + Vi

&’ S ”””” “ITVH , Irv s

The resultant impulse of the liquid on the cylinder is given by the component, over r = a (§ 36),

t 6 2 + a 2 TT 2b 2

-U,

2 b 2 V

! – aV ‘•

-U

X = fp cos 6. add = irpa 2 (u 55-

and over r = 5

X, = ffxt > cosB.bdd = xpb 2 /u 5^

and the difference X-Xi is the component momentum of the liquid in the interspace ; with similar expressions for Y and Yi. Then, if the outside cylinder is free to move

Y V, 2a 2 Y ,„V ” 2

Ai = o, Tr = M_L.„2′ -X. = 7rpa-U

-a 2)’

(20)

(21)

U P-fa 2 ‘ “”” ■ “& + &•

But if the outside cylinder is moved with velocity Ui, inside cylinder is solid or filled with liquid of density a,

2pV >

X =

-TrirafV, -ft

p(6 2 + a 2) + o’(6 s -a s U-U. ._ (p-g)(y-a’) Ui -p(V + a*)’ + <,{&-a?) >

(22)

and the

(23)

to space filled with liquid, and at rest at infinity, the cylinder will experience components of force per unit length (i.) — 2TpmV, 2irpwU, due to the vortex motion ;

(ii.) — irpa 2 T7, —xpo?-37, due to the kinetic reaction of the liquid;

(iii.) o, —r(

and the inside cylinder starts forward or backward with respect to the outside cylinder, according as p > or < <7.

30. The expression for w in (1) § 29 may be increased by the

addition of the term

i'm log z = ~mB -f im log r, (1)

representing vortex motion circulating round the annulus of liquid.

Considered by itself, with the cylinders held fixed, the vortex sets up a circumferential velocity m/r on a radius r, so that the angular momentum of a circular filament of annular cross section dA. is pmd.\, and of the whole vortex is pmr(b 2 — a?).

Any circular filament can be started from rest by the application of a circumferential impulse rpmdr at each end of a diameter; so that a mechanism attached to the cylinders, which can set up a uniform distributed impulse irpm across the two parts of a diameter in the liquid, will generate the vortex motion, and react on the cylinder with an impulse couple— pmira 2 and pmjri 2 , having re- sultant pm7r(6 2 — a 2), and this couple is infinite when b = 00 , as the angular momentum of the vortex is infinite. Round the cylinder r = 0 held fixed in the U current the liquid streams past with velocity

}' = 2U s'me + m/a; (2)

and the loss of head due to this increase of velocity from U to q' is

1*~ U " _ < 2lJ sin e + m l a) i – U 8

2g 2g

so that cavitation will take place, unless the head at a great distance exceeds this loss.

The resultant hydrostatic thrust across any diametral plane of the cylinder will be modified, but the only term in the loss of head which exerts a resultant thrust on the whole cylinder,, is 2mU sin 6/ga, and its thrust is 2xpmU absolute units in the direction Cy, to be counteracted by a support at, the centre C; the liquid is streaming past r = a with velocity U reversed, and the cylinder is surrounded by a vortex. Similarly, the streaming velocity V reversed will give rise to a thrust 2xp»»V in the direction xC.

Now if the cylinder is released, and the components U and V are reversed so as to become the velocity of the cylinder with respect

(3)

jrfU

1 dt

= – irpa’

„dV_ dt

2-rpmV,

JV 2 iV . .. . ■ . ,

(4) (5)

or, putting jm =

(

(a + p)dV/dt-2pwU + (

Thus with g = o, the cylinder will describe a circle with angular velocity 2p«/(ffrt-p) 1 so that the radius is (a + p)v/2pa, if the velocity is v. With o-* = o, the angular velocity of the cylinder is 2a >; in this way the velocity may be calculated of the propagation of ripples and waves on the surface of a vertical whirlpool in a sink.

Restoring a will make the path of the cylinder a trochoid; and so the swerve can be explained of the ball in tennis, cricket, base-ball, or golf.

Another explanation may be given of the sidelong force, arising from the velocity of liquid past a cylinder, which is encircled by a vortex. Taking two planes x — =* = b, and considering the increase of momentum in the liquid between’ them, due to the entry and exit of liquid momentum, the increase across dy in the direction Oy, due to elements at P and P’ at opposite ends of the diameter PP’, is pdy (U ■ — UaV -2 cos 2 0 + mr _1 sin ˆ(UoV -2 sin 2 e + mr~ l cosfl)

-f pdy (— U + UaV -2 cos2 0 + «r~ 1 sin0)(UaV~ 2 sin20 — mr~ l cosS)

= 2pdymtJr- l (.cos6— a, 2 rˆ cos 30), ‘(&)”

and with y = b tan 6, r = b sec 9, this is

2pmVd$(i— a'b-ˆcoB 36 cos 6), (9)

and integrating between the limits 6= ± 5T, the resultant, as before, is Ijrpmtj.

31. Example 2. — Confocal Elliptic Cylinders. — Employ the elliptic coordinates n, |, and f = i;+|t, such that

2=cchf, x = ccht) cos f, y — cshti sin£; (1)

then the curves for which i\ and { are constant are confocal ellipses and hyperbolas, and

= §c 2 (ch2i) — cos2£)=rir 2 = OD 2 , (2)

if OD is the semi-diameter conjugate to OP, and n, r% the focal distances,

n,r 2 = c(ch)j±cos£); (3)

r* = x 2 +y- = c 1 (ch ! 7j – sin 2 ?)

(4)

= sC ! (ch2»;+cbS2j). Consider the streaming motion given by

w = mch(f—y), 7 = a+/3i, (jj)

Then ˆ = over the ellipse i) = o, and the hyperbola £ = /S, so that these may be taken as fixed boundaries ; and ˆ is a constant on a C4. Over any ellipse ij, moving with components U and V of velocity, ' ˆ'=ˆ4-Uy-V»f = [wsh(ij-a)cos/3-fUcshii] sm£

— [msh(ri — o) sin/3+Vcch7j] cos £; (7) so that \j/' = o. if

tt— m shQ? – a)

sh 1

cos V= -~

m sh(7) – a)

ch 1

sin/3,

(8)

having a resultant in the direction PO, where P is the intersection of an ellipse r> with the hyperbola /3; and with this velocity the ellipse ij can be swimming in the liquid, without distortion for an instant. At infinity

Tj = —e “cos /S = -ˆTTjCOS /3,

V =

e _<, sin /3 = ■

a + b

sin (S,

(9)

a and 6 denoting the semi-axes of the ellipse o; so that the liquid is streaming at infinity with velocity Q=m/(a+b) in the direction of the asymptote of the hyperbola /3.

Art ellipse interior to r/ = a will move in a direction opposite to the exterior current ; and when 17 = o, U = 00 , but V = (m/c) 1 sh a sin 0.

Negative values of ri must be interpreted by a streaming motion on a parallel plane at a level slightly different, as oil a double Riemann sheet, the ‘Stream passing from 6ne: sheet to the other across a cut SS’ joining the foci S, S’. A diagram has been drawn by Col. P.. L. Hippisley.

The components of the liquid velocity q, in the direction of the normal of the ellipse ij and hyperbola £ , are

wJ 1 sh(o)cos(t-(S),wJ-»ch(-o)sin(ˆ). do)

The velocity q is zero in a corner where the hyperbola /S cuts the

ellipse a; and round the ellipse a the velocity g reaches a maximum when the tangent has turned through a right angle, and then

„ V (ch 2a-cos 20)

s = Q ea sFiˆ — •

(II)

and the condition can be inferred when cavitation begins. With = o, the stream is parallel to *o, and <£ = »»cb(T*a)cos£ = – Uc ch (ij-a) sh ij cos £/sh (17-0) (12)

over the cylinder ij, and as in (12) § 29,

for liquid filling the cylinder; and

• = tni >

(H)

th (,-<.)•

over the surface of 1;; so that parallel to Ox, the effective inertia of the cylinder 7/, displacing M' liquid, is increased by M'thi>/ th(t)«a), reducing when = 00 to M' thij = M'(fr/o).

Similarly, parallel to Oy, the increase of effective inertia is M'/th 17 th(i7-o), reducing to M'/th ij = M'(a/&), when = 00 , and the liquid extends to infinity.

32. Next consider the motion given by

= wch 2(j)-a)sin2{, ˆ = -w sh 2(i»-a)cos 2£; (1)

in which ˆ=0 over the ellipse a, and fa= + +hR(x 2 +?)

= [-j»sh2(ij-a)+JRc 2] cos2{+|Rc ! ch2rj, (2) which is constant over the ellipse tj if

iRc 2 = msh 2(1,-0); (3)

so that this ellipse can be rotating with this angular velocity R for an instant without distortion, the ellipse o being fixed.

For the liquid filling the interior of a rotating elliptic cylinder of cross section

x* la* +?l& = i, (4)

fa'=miWa*+y*/b') (5)

with vVi'=-2R=-2Wi(i/o 2 +i/& 2 ;,

i =m(x'/a+y'lb*) – iR(x 2 +f)

^~iR(x 2 -y 2)(a 2 -b 2)/(a 2 +b 2), (6)

fa = Rxy(a 2 -o 2)l(a 2 +b 2), Wi=fa+fai = – hiR(x+yi)*(a 2 -P)/(a 1 +b i). The velocity of a liquid particle is thus (a 2 — £> 2)/(a 2 +6 2) of what it would be if the liquid was frozen and rotating bodily with the ellipse; and so the effective angular inertia of the liquid is (a 2 — fc 2) 2 /(a 2 +6 2)' of the solid; and the effective radius of gyration, solid and liquid, is given by

- 2 = i(a 2 +& 2),andK<* 2 -& J)7(a 2 +* 2). (7)

For the liquid in the interspace between o and tj,

_ m ch 2fa-a) sin 2f

fa ~ JRc 2 sh 2r, sin 2^(0? – b 2)!(a 2 +b 2)

= i/th2(jra)th2i;; (8)

and the effective k 2 of the liquid is reduced to

!c 2 /th2(>j-a)sh2i|, (9)

which becomes }c 2 /sh 2ij = J(o*-6*)/a6, when = 00, and the liquid surrounds the ellipse ij to infinity.

An angular velocity R, which gives components — Ry, Rx of velocity to a body, can be resolved into two shearing velocities, — R parallel to Ox, and R parallel to 0> ; and then \p > s resolved into ^1+^2, such that ^-1 + jRc 2 and fa+^Ry 2 is constant over the boundary.

Inside a cylinder

fa+fai = – JiR(*+yi) 2

«+ **» = iiR(x+yi) 2 b 2 l(a 2 +b 2), (11)*

and for the interspace, the ellipse o being fixed, and 01 revolving with angular velocity R

fa+fai = -|i'Rc 2 sh2(»j-a+Jj)(ch2o+l)/sh2(ai-o), (12)

^+£R 2 = iRc 2 (ch 20.1 + 1), (14)*

^+|Ry 2 = iRc 2 (ch2a 1 -i), (15)

constant values.

In a similar way the more general state of motion may be analysed, given by

W = wch2(f— 7), 7 = a+/3i, (16)

as giving a homogeneous strain velocity to the confocal system; to which may be added a circulation, represented by an additional term i»f in v>.

Similarly, with the function

X+yi=H[sin(£+mi)]

(17)

**=QcshlO,a)sini(£<8) (18)*

will give motion streaming past the fixed cylinder ij = a, and dividing along 4 = /S; and then

x 2 — y 2 =c t sinjchij, 2ry = e 2 cos£ shij. (19)

In particular, with sh o = I , the cross-section of 7; = o is

x+6× 2 y i +y*=2c i , or x i +y 4 =c* (20)*

when the axes are turned through 45°.

33. Example 3. — Analysing in this way the rotation of a rectangle filled with liquid into the two components of shear, the stream function fa is to be made to satisfy the conditions

(i.)vVi=o,

(ii.) fa--$Rx 2 = iRa 2 , or f =owhenj= ==a,*

(iii.) fa + iRx 2 = hRa 2 , ˆ 1 = |R(a 2 -x 2), when y= ±6

Expanded in a Fourier series,

a , . 32 ,-Sp cos(2n+i)Wa , .

° * 7T 3 ° Z~i (2M + I) 3 ‘ u >

so that

. _ p l6 ,X~* C0 s(2«+l)ˆ7rx/q . ch(2»+i)|iry/a ‘ 1-K 7r 3a 2~ (2n +i) 3 .ch(2n+i)ˆ7rfe/a ‘ x , , . .,,16 ,T . cos(2n+i)j7rz/a_ wˆfa+fa —iRˆa 2ˆ(2»+i) 3 ch(2» + l)ix6/a’

(2)

an elliptic-function Fourier series; with a similar expression for ˆ2 with x and y, a and 6 interchanged; and thence

Example 4. — Parabolic cylinder, axial advance, and liquid streaming past.

The polar equation of the cross-section being

rlcos §0 = ah, orr + x=2a, (3)

the conditions are satisfied by

fa = Vr sin 6 -2\JaM sin J9 =2tM sin §e(ri cos \B – ah), (4) * = 2Uairisinit? = UV[2a(r*)], (5)

w=-2Ua5zJ, (6)

and the resistance of the liquid is 2xpoV 2 /2g.

A relative stream line, along which fa = Vc, is the quartic curve 4 a , y 2 -(y-cy ,,_ 4aV+(y-c) i 4o(y-<;) 2 '

y-c = V[2o(r-*)],

\ayy-cy ‘ ” and in the absolute space curve given by fa.

dy_ˆ (y – c) 2 dx 2ay ‘

(7)

2ac . , .. ˆ=— — -2alog(y-c).

34. Motion symmetrical about an Axis. — When the motion of a liquid is the same for any plane passing through Ox, and lies in the plane, a function ˆ can be found analogous to that employed in plane motion, such that the flux across the surface generated by the revolution of any curve AP from A to P is the same, and represented by 27r(ˆ— ˆ0); and, as before, if dip is the increase in ˆ due to a displacement of P to P', then k the component of velocity normal to the surface swept out by PP' is such that 27r

u = — dfalydy, v = d-ˆlydx, (1)

and f is called after the inventor, "Stokes's stream or current function," as it is constant along a stream line (Trans. Camb. Phil. Soc, 1842; "Stokes's Current Function," R. A. Sampson, Phil. Trans., 1892); and d

,. d (ld$\ , d(ldˆ\ £ = 0, , = 0, Jf-jjˆjj) +fi{- Ty)

= l(i± dˆˆdfa, 1 y\dx 2 ˆdy i ydy) y v ˆ'

suppose; and in steady motion,

dH , 1 dfaˆ,, rfH ,1 dfa..

dl+y-*lx v ˆ = °' ■Sy- + 5 2 3y v ˆ =0 ' so that

2f/y=- yˆvV = dH/dip is a function of fa. say /' (fa, and constant along a stream line;

dH/dt> = 2qt, H-/(ˆ)= constant, throughout the liquid.

When the motion is irrotational,

dQˆldj, dy y dx'

d 1 &p f =0 – u= Tx = —yTy "=

V**«

dV , d 2 ˆ 1 df

°' or oV+3?

y dy'

(2)

(3)-

(4)

(5)

(6) (7)

HYDRODYNAMICS]

HYDROMECHANICS

*Changing to polar coordinates, * = r cos 6, y = r sin ft, the equation (2) becomes, with cos ft=/i,*

!25

*‘■fgH-cl-rtg-‘i**’*

(8)

of which a solution, when f = 0, is

- (“+5) d-ˆ-(Aˆ+ˆ) /£, (9)*

<ˆ = [(n + i)Ar»-nBr-»- 1 lP n , (10)

where P„ denotes the zonal harmonic of the nth order; also, in the exceptional case of

ˆ = A cos ft, = A /r;

t = B r, = – B log tan %0

= JB sh 1 x/y. (11)

Thus cos 8 is the Stokes’ function of a point source at O, and PA- PB of a line source AB.

The stream function tp of the liquid motion set up by the passage of a solid of revolution, moving with axial velocity U, is such that

*yTs = -V% * + * U ?’ constant, (12)*

over the surface of the solid ; and ˆ must be replaced byˆ-‘ = 2 in the general equations of steady motion above to obtain the steady

relative motion of the liquid past the solid.

For instance, with n = i in equation (9), the relative stream function is obtained for a sphere of radius a, by making it

'= + iUy = |U(r 2 -o 3 /r)sin 2 e, + = -iUa> sin 2 ft/r; (13) and then

0' = U(i+§a 3 /r 2), <*> = JUa 3 cosft/r 2 , (14)*

d IT 1 * a dd> nid 1 . „*

(15)

so that, if the direction of motion makes an angle ˆ with O,*

tan W—£)=Jtanfl, tan ˆ = 3 tan ft/(2 -tan 2 ft). (16)

Along the path of a liquid particle

_(r 2 -a J /V) sin 2 ft=c 2 , sin 2 9=c 2 r/(r 3 -

the polar equation; or

y = c 2 r 3 /(r 3 -a 3), r' = a 3 y i l{f-c 1), (18)

*a curve of the 10th degree (C10). In the absolute path in space cos ˆ = (2-3sin 2 0)/V(4-sin s «),andsin , « = (y»-c*y)/o>, (19) which leads to no simple relation.*

The velocity past the surface of the sphere is

1 <¥' itt/', ,a 3 \sin 2 ft , TT . „ . , .

so that the loss of head is

(J sin 2 ft — i)U 2 /2g, having a maximum |U 2 /2g, (21) which must be less than the head at infinite distance to avoid cavitation at the surface of the sphere.

With n — 2, a state of motion is given by

ˆ-JU/aV/r 4 , ˆ' = |Uy 2 (i-aV 4), (22)

' = Ux+, <>=-£U(aV 3)P2, P. = fAi'-i, (23)*

representing a stream past the surface r = a*p.*

35. A circular vortex, such as a smoke ring, will set up motion symmetrical about an axis, and provide an illustration; a half vortex ring can be generated in water by drawing a semicircular blade a short distance forward, the tip of a spoon for instance. The vortex advances with a certain velocity; and if an equal circular vortex is generated coaxially with the first, the mutual influence can be observed. The first vortex dilates and moves slower, while the second contracts and shoots through the first; after which the motion is reversed periodically, as if in a game of leap-frog. Projected perpendicularly against a plane boundary, the motion is determined by an equal opposite vortex ring, the optical image; the vortex ring spreads out and moves more slowly as it approaches the wall; at the same time the molecular rotation, inversely as the cross-section of the vortex, is seen to increase. The analytical treatment of such vortex rings is the same as for the electro-magnetic effect of a current circulating in each ring.

36. Irrotational Motion in General. — Liquid originally at rest in a singly-connected space cannot be set in motion by a field of force due to a single- valued potential function; any motion set up in the liquid must be due to a movement of the boundary, and the motion will be irrotational ; for any small spherical element of the liquid may be considered a smooth solid sphere for a moment, and the normal pressure of the surrounding liquid cannot impart to it anv rotation.

The kinetic energy of the liquid inside a surface S due to the velocity function is given by

(1)

by Green's transformation, dv denoting an elementary step along the normal to the exterior of the surface ; so that d$jdv = o over the surface makes T = o, and then

[Tx) + W +U> °' Tx =0 ' Ty=°' Tz =0 – V If the actual motion at any instant is supposed to be generated instantaneously from rest by the application of pressure impulse over the surface, or suddenly reduced to rest again, then, since no natural forces can act impulsively throughout the liquid, the pressure impulse a satisfies the equations

1 da

pdx

= -u,

-os,

(3)

1 da_ _ 1 da P dy ‘ ~ p ~dz’ c = pˆ> +a constant, (4)

and the constant may be ignored; and Green’s transformation of the energy T amounts to the theorem that the work done by an impulse is the product of the impulse and average velocity, or half the velocity from rest.

In a multiply connected space, like a ring, with a multiply valued velocity function

= m6 = m ta.n~ l y/x (5)

will give motion to the liquid, circulating in any ring-shaped figure of revolution round Oz.

To find the kinetic energy of such motion in a multiply connected space, the channels must be supposed barred, and the space made acyclic by; a membrane, moving with the velocity of the liquid; and then if k denotes the cyclic constant of in any circuit, or the value by which has increased in completing the circuit, the values of on the two sides of the membrane are taken as differing by k, so that the integral over the membrane

ff&->ff&>-

(6)

and this term is to be added to the terms in (1) to obtain the additional part in the kinetic energy; the continuity shows that the integral is independent of the shape of the barrier membrane, and its position. Thus, in (5), the cyclic constant k = 2Trm.

In plane motion the kinetic energy per unit length parallel to Oz

-Itfifc-bftgi,. (7)

For example, in the equilateral triangle of (8) § 28, referred to coordinate axes made by the base and height,

r = -2RaPy/h = – iRyl(h-y)-3x*]lh (8)*

-mW + iWy+h-yˆ-yc’y+yyh (9)

and over the base y = o,

dx\dv = -dx/dy = iR(ih?-3x)/h, = – \R(\W--x*). (10)*

Integrating over the base, to obtain one-third of the kinetic energy T,

= P IW/i35V3 (11)

*so that the effective k? of the liquid filling the triangle is given bv * 2 =T/J P R 2 A = 2ˆ/45 * b s X*

= | (radius of the inscribed circle) 2 , (12)

or two-fifths of the A 2 for the solid triangle. Again, since

d4ldv = dˆjis, djds= -d, (13)

T = Ipftdf = – \ptyd4. (14)

With the Stokes' function ˆ for motion symmetrical about an axis.

T = ipj4> -ˆfiryds = rpffrlf. \i 5)

37. Flow, Circulation, and VorUx Motion.— -The line integral of the tangential velocity along a curve from one point to another, defined by

i (u Ts+ v 27+ w dl) ds-fiudx+vdy+zdz), (1)

is called the " flux " along the curve from the first to the second point ; and if the curve closes in on itself the line integral round the curve is called the " circulation " in the curve. With a velocity function , the flow

-fd4> = l -4, 2 , (2)

so that the flow is independent of the curve for all curves mutually reconcilable ; and the circulation round a closed curve is zero, if the curve can be reduced to a point without leaving a region for which is

single valued.

If through every point of a small closed curve the vortex lines are drawn, a tube is obtained, and the fluid contained is called a vortex filament.

By analogy with the spin of a rigid body, the component spin of the fluid in any plane at a point is defined as the circulation round a small area in the plane enclosing the point, divided by twice the area. For in a rigid body, rotating about Oz with angular velocity j", the circulation round a curve in the plane xy is

f f (x P 3ˆ) ds = J times twice the

In a fluid, the circulation round an elementary area dxdy is equal to

" dx + (v a% dx) dy ~ { u % dy) dx ~ vd y- (f x -%) dx ˆ fc> '

so that the component spin is

_(£-g)-r. <»>*

in the previous notation of § 24; so also for the other two components £ and i;.

Since the circulation round any triangular area of given aspect is the sum of the circulation round the projections of the area on the coordinate planes, the composition of the components of spin, £, 7;. f, is according to the vector law. Hence in any infinitesimal part of the fluid the circulation is zero round every small plane curve passing through the vortex line; and consequently the cir- culation round any curve drawn on the surface of a vortex filament is zero.

If at any two points of a vortex line the cross-section ABC, A'B'C is drawn of the vortex filament, joined by the vortex line AA', then, since the flow in AA' is taken in opposite directions in the complete circuit ABC AA'B'C A'A, the resultant flow in AA' cancels, and the circulation in ABC, A'B'C is the same; this is expressed by saying that at all points of a vortex filament «o is constant where a is the cross-section of the filament and w the resultant spin (W. K. Clifford, Kinematic, book iii.).

So far these theorems on vortex motion are kinematical ; but introducing the equations of motion of § 22,

*D? + ˆS =0 5?! + « = o ˆ+ < *2 = o (6)*

dtˆdx °’ dtˆdy °’ dtˆdz °’ K)

Q=fdph+V, (7)

and taking dx, dy, dz in the direction of u, v, w, and dx: dy: dz — u: v: w.

ˆ(udx + vdy + wdz’j ˆdx+u- s f +

dt

(8)

(9)

origin are denoted by U, V, W, and the components of angular velocity of the frame of reference by P, Q, R; and then if «, v, w denote the components of fluid velocity in space, and u’, v’, w’ the components relative to the axes at a point (x, y, 2) fixed to the frame of reference, we have

« = U +u’-yK +zQ, (1)

» = V +v’ -sP +xK, w = W +iv’— xQ +yP. Now if k denotes the component of absolute velocity in a direction fixed in space whose direction cosines are /, m, n,

k — lu--mv--nw; (2)

and in the infinitesimal element of time dt, the coordinates of the fluid particle at (, y, 2) will have changed by («’, v’, w’)dt; so that Dk dl , dm , dn W~dt u+ lt v +Ji w*

= -dQ + W. and integrating round a closed curve

-r I (udx+vdy+wdz) =0,

and the circulation in any circuit composed of the same fluid particles is constant; and if the motion is differential irrotational and due to a velocity function, the circulation is zero round all reconcilable paths. Interpreted dynamically the normal pressure of the’ sur- rounding fluid on a tube cannot create any circulation in the tube.

The circulation being always zero round a small plane curve passing through the axis of spin in vortical motion, it follows con- versely that a vortex filament is composed always of the same fluid particles;

and since the circulation round a cross-section of a vortex filament is constant, not changing with the time, it follows from the previous kinematical theorem that aw is constant for all time, and the same for every cross-section of the vortex filament.

A vortex filament must close on itself, or end on a bounding surface, as seen when the tip of a spoon is drawn through the surface of water.

Denoting the cross-section a of a filament by dS and its mass by dm, the quantity udS/dm is called the vorticity; this is the same at all points of a filament, and it does not change during the motion; and the vorticity is given by u cos edS/dm, if dS is the oblique section of which the normal makes an angle e with the filament, while the aggregate vorticity of a mass M inside a surface S is M~ l fo> cos edS.

Employing the equation of continuity when the liquid is homogeneous,

2 \dy ~dz) V " V dx- df di" K '>

which is expressed by '

V«(tt,ti,w)-2 curl (£, n, D, (e.iJ. ?)=• J c« rI («.'»■ w). (11)

38. Moving Axes in Hydrodynamics. — In many problems, such as the motion of a solid in liquid, it is convenient to take ceordinate axes fixed to the solid and moving with it as the movable! trihedron frame of reference. The components of velocity of the moving

, , Idu , ,du , ,du , ,du

/ {Tt U dx- +V r y +W dz-) ,

, /dv . ,dv , ,dv , dv \ + tK {di +u Tx v dy w dz)

. (dv> . ,dw . ,dw . ,dw\ +n Kdi +u dx +v Ty +w lz-)-

(3)

But as/, m, n are the direction cosines of a line fixed in space,

- *= «R-«Q,f5-»P-/R*f-JQ-«P; (4)*

so that

-K x -?2) + “(Y -ig) + »(z -ˆ’ (5) .

for all values of /, m, n, leading to the equations of motion with

lotion is such that

dA dip dl> dS d)b

~—m-f-. = — -. — «jt— . w = — ˆ—m-f-.

moving axes.

When the motion is such that

u =-dx- m dx’ v = dT m dy’ w ‘

dz “‘dz’

(6)

as in § 25 (1), a first integral of the equations in (5) may be written + C-O@+-ˆ)+(«-0(S+ˆ)-F«. (7)

in which

64.

dt

3-(.«’>g<-»'>g-<.--'>2

dd

dy

*=ˆ~(U-yR+ 2 Q)g~(V-2P+*R)g-(W-*Q+?P)g (8)*

is the time-rate of change of at a point fixed in space, which is left behind with velocity components u — u’, v—v’, w—w’.

In the case of a steady motion of homogeneous liquid symmetrical about Ox, where O is advancing with velocity U, the equation (5) of § 34

£/p+V-H

becomes transformed into

P – + V + W'-fr + iU 2 -M +hW) =constant, (10) /» yay

fW + HV, (u)

subject to the condition, from (4) § 34,

yvY' —/'(>'), r 2 vv=-/'(+iu). (12)

Thus, for example, with

*+' = lU?(r**

for the space inside the sphere r — a, compared with the value of 4' in § 34 (13) for the space outside, there is no discontinuity of the velocity in crossing the surface. Inside the sphere*

_ d fidt'\ ,d /id+'_i5 XJ y , ,

" 2 ^TxKyfx) + Ty\y-,ry) -T^lv ('4)

so that § 34 (4) is satisfied, with

f(')~!5Uar,fW) = J Su'a", (15).*

and (10) reduces to

!+ v ! u i g') 5 ®)'! = constant; (I6)*

this gives the state of motion in M. J. M. Hill's spherical vortex, advancing through the surrounding liquid with uniform velocity.

391 As an application of moving axes, consider the motion of liquid filling the ellipsoidal case

(1)

and first suppose the liquid to be frozen, and the ellipsoid to be

HYDRODYNAMICS]

HYDROMECHANICS

127

rotating about the centre with components of angular velocity {, it, f ; then

«»= yf+zij, !> = *• z£+ *f. rope »«, +y|. (2)

Now suppose the liquid to be melted, and additional component* of angular' velocity fit, O2, £2j communicated to the ellipsoidal case; the additional velocity communicated to the liquid, will be due to a velocity-function '

V-c* „e 2 -a 2 „a 2 -& J , x

as may be verified by considering one term at a time.

If «', v', w' denote the components of the velocity of the liquid relative to the axes,

(4) (5)

2a-

■HP

Thus

26 s 26*

v' =v+zP – xR =ˆrpˆ«i«-ˆfˆ n »*'

w'=ui+Aˆ-3'P=ˆˆa2*-pˆa 1 y 1 (6)

P=a+f,Q=fis+i7, R=n»+r. (7)

"'|+4 2 +"F,= ' {8)

and then

so that a liquid particle remains always on a similar ellipsoid.

The hydrodynamkal equations with moving axes, taking into account the mutual gravitation of the liquid, become

lg + 4xpAx + g-,R + .Q + uˆ| +W ˆ=o,..,..,(o)

where

. n r _ f» abcdk

A ' H,C '_ Jo (a> +X,6 2 +\,c 2 +).)P

(jo)

(12) (13)

P 2 = 4 (a 2 -|-X)(J 2 +X)(c 2 +X). With the values above of u, v, w, «', »', w', the equations become of the form

ˆ d £.+4irpAx + a.x+hy+gz = o, (11)

and integrating

ˆ-» + 2rp(A s + B/ + Gg 2)*

+J(

so that the surfaces of equal pressure are similar quadric surfaces, which, symmetry and dynamical considerations show, must be coaxial surfaces; and/, g, h vanisl>, as follows also by algebraical reduction; and

4c 2 (<: 2 a 2) „, (c'-a\ V

4 6(a'-& 8) r*

/a J -6.*

:«»

-'):

(15)

4£i

*ˆˆp[(?+V) (0! +0S) – <«tt+i*i}«J*

'7

[-NˆfJˆ-Ml-Nˆ},

_ˆ+ˆH9ˆ-£) 1 i6c(a 2 -e*) * J*

(23)

where Z is a quadratic in f 4 , so that f is an elliptic function of./, except when e = a, or 3a.

*Put Oi = il cos 4>, Ch= —Q sin *,' ,*

(a 2 +6 2) 2 "' n » U'+fi 2 ' with similar equations for /3 and y. If

we can make

(4T P A+a) J = (4l rpB+/3)6 2 = (4 7rpC+7)c 3 , (16) the surfaces of equal pressure are similar to the external case, which can then be removed Without' affecting the motion, provided a, 0, 7 remain constant.*

This is so when the axis of revolution is a principal axis, say Dz; when

S2i = o, 122 = 0, { = 0, ij = o. (17)

If ftj = o or 03 = f in addition, we obtain the solution of Jacobi's ellipsoid of liquid of three unequal axes, rotating bodily about the least axis; and putting -a = 6, Maclaurin's solution is obtained of the rotating spheroid.

In the general motion again of the liquid filling a case, when a = b, Qt may be replaced by zero, and the equations, hydrodynamical and dynamical, reduce to

dj 2C

*dC W+c**

dn,

d v _

dr

& fi 3r = £«+? Qi f"s

a?+c'

iQ&'-Oiiv) (18)

a+c*

dOt

-jr=^s+^—^i^ ir= -«>f

dt 3/ which three integrals are

„1 _ ,-2?S .

(19)

(20)

(21)

(22)

ddQi n n dik a '+ c V nir i_n %>

*d*_*

a'—c

a'-fe 2 . N+ 4c 1

M+ 2c 2 (a 2 -e 2) r '

(24)

(45)

a 2 +c 2

N+^-F

.#f.

M+ 2C 2 (0 2 -C i) f (26)

which, as Z is a quadratic function of f 2 . ar e non-elliptic integrals; sff also for ^, where I = w cos i?-, 1; =— u sin ^; In a state of steady motion

#.

fli Q2

, "2i 'J r q

I-

dt~ s a 2 -c 2 a =

a 2 +cV

-c 2 Q :

of-

2a 2 Q

*a?+c*a*

I.

2a 2 $2

a?+c'u'

(u . a' – c 2 Y 3 (a 8 – c 2) (9a 2 – c 2) \5 %2 +c2/ ; = 4 (a 2 -fc 2) •

and a state of steady motion is impossible when $a> c >a.

(27) (28)

:(29) (30)

(31)

(32)

(33)

An experiment was davised by Lprd Kelvin for demonstrating this, in which the difference of steadiness was shown of a copper shell filled with liquid and spun gyroscopically, according as the shell was slightly oblate or prolate. According to the theory above the stability is regained when the length is more than three diameters, so that a modern projectile with a cavity more than three diameters long should fly steadily when filled with water; While the' old-fashioned type, not so elongated, would he highly unsteady; and for the same reason the gas bags of a dirigible balloon should be over rather than under three diameters long.

40. A Liquid Jet.— By the use of the complex variable and its conjugate functions, an, attempt can be made to give a mathematical interpretation of problems such as the efflux of water in a jet or of smoke from a chimney, the discharge through a weir, the flow of water through the piers of a bridge, or past the side of a ship, the wind blowing on a sail or aeroplane, or against a wall, or impinging jets of gas or water; cases where a surface of discontinuity is observable, more or less distinct, which separates the running stream from the dead water or air.

Uniplanar motion alone is so far amenable to analysis; the velocity function and stream function $ are given as conjugate functions of the coordinates x, yby

iv =/(2)i where 2 = x yi, w = ˆi, (1)

and then

Tz = dH +t dH = – u + n ‘ W

so that, with « = 3 cos 6,v = q sin 9, the function

f=-Qs=5As=|(“+ˆ“f(cos e+isiao), (3)

gives f as a vector representing the reciprocal of the velocity 2 m direction and magnitude, in terms of some standard velocity Q.

To determine the motion of a jet which issues from a vessel with plane walls, the vector f must be Constructed so as to have a constant

direction 8 along a plane boundary, and to give a constant skin velocity over the surface of a jet, where the pressure is constant. It is convenient to introduce the function

Q = logf = log(Q/g)+« (4)

so that the polygon representing £2 conformally has a boundary given by straight lines parallel to the coordinate axes; a.id then to determine £2 and w as functions of a variable u (not to be confused

. with the velocity component of c),

‘J . such that in the conformal repre-

”’ sentation the boundary of the

and w polygon is made to coincide

with the real axis of «.

It will be sufficient to give a few illustrations.

Consider the motion where the liquid is coming from an infinite distance between two parallel walls at a distance xx' (fig. 4), and issues in a jet between two edges A and A' ; the wall xA being bent at a corner B, with the external angle $ — \vln.

The theory of conformal representation shows that the motion is given by

*where « = a, a' at the edge A, A 1 ; u = b at a corner B; w = o across **' where 4> = oo;and tt = oo, = oo across the end J J' of the jet, bounded by the curved lines APJ, A'P'J', over which the skin velocity is Q. The stream lines *BAJ, xA J' are given by ^=0, m; so that if c denotes the ultimate breadth J J' of the jet, where the velocity may be supposed uniform and equal to the skin velocity Q,*

m = Qc, c — m[Q.

*If there are more B corners than one, either on *A or x'A', the expression for f is the product of corresponding factors, such as in (5). Restricting the attention to a single corner B,*

*. /Q\ \ „ ! • • m V (&-a'.«-a) + V (b-o.u-a') cos nd + i sh log *j-j*

If 9 = across the end JJ' of the jet, where « = 00 , q = Q,

chnG = cos»a = \/— -7, sh nQ — i sin na. = i-r — -,, (19)

a — b.b—a' , . „ a— a'

Then

cos 2rt«— cos 2118 = 2 -7— 1 — 2 = >»”” ■”” 1*

a—a.u — o ‘ u — b

= 3 sin 2 2tia-

V (a — 6.6— a')V (u—a.u — b') , . sm2»9 = 2-i „’»,:_ h l (20)

= sin 2«o

a—a'.u — b V(«—a.«— a') u-b ‘•

2rt e

(b y(a-b.b-a')

chn« =

H» j (cos n8 + i sin nff) = : ! = chlog(2)'

= «r + r») = V^\fe»

1 !°g (g) cos n8 + i ch log {)*

_ q— a' + (o + a') cos 2Wa — [a-rV-Ha — a') cos 2na]cos 2nd (0— 0') sin 2 2na

cos 2no — cos 2nd

Along the wall AB, cos »0 = o, sin 116 = 1, a > u > b,

sin 2nd

(6)

sin «0

sh n£2 = sh 1

sin tiB

and then

oo > a > b > o > a' > -co ;

(7)

(8) (9)

(10)

12 polygon has a right angle at u = a, a', and a zero angle at •re 9 changes from o to jx/w and 12 increases by \iirfn; so

dU 1 V (b—a.b—a') dw _m

du ~ 2it(u — 6)V (u—a.u—a'y du ~ ru' the formulas by which the conformal representation is obtained.

For the u = b, where that

da A , . j(b-a.b-o')

Tu = (u-b)j(u-a.u-a>y Where A = 5S

*And the w polygon has a zero angle at « = o, 06, where ˆ changes from otom and back again, so that w changes by im, and dw d~u Along the stream line *BAPJ,*

ˆ = 0, u=atr$l"", and over the jet surface J PA, where the skin velocity is Q,*

3F—2--Q.

denoting the arc AP by 5, starting at u = a;

-6)V(w-a ,) + V(6-s')V(a-«)] ' ""du

u •

•]"

(22) (23)

(24) (25)

(26)

(27) (28)

(29) (30)

-—, where B = .

U V

±ae" s Q.l m =ae m t c ,

'-. (n)

(12)

(13)

(14)

ch,, n =cos«=V;rˆ\fe.*

. .. la — b . u—a' infl=, \aˆa 7 \ˆF'

sh »£2=t sin 1

(15)

(16) (17)

>u = ae w,, '>a,

and this gives the intrinsic equation of the jet, and then the radius of curvature

ds _idj>_idw_idw JdQ

p ~ dd~Qde~Qla~Q~duld~u

_c u — b V(m— a.u — a') ~x- 2B u V(o-6.ft-o')' not requiring the integration of (11) and (12)

.(18)

chˆshlogˆˆVS

sh„a = ,-chlo g (2)"Vˆ'

d±_d±d$_ ™ c Q

*du" ' d dt ~ %qu ~~w qu AB_ f'Qdu * c 'J „q u*

_f[±l2 .

J l~ V(a-o')V(«-6')

Along the wall Bx, cos n$ = 1 , sin nS = o,

6>«>o

chn« = chlo g (2)" = Vaˆ VS

sh„ˆshlo g (2)" = ˆVS' At x where 4> = 00 , u =0, and q =qo.

*In crossing to the line of flow x' A'P'J', \f/ changes from o to m, so that with g = Q across JJ', while across **' the velocity is go, so that m=qo.xx' = Q.jy (31)*

giving the contraction of the jet compared with the initial breadth of the stream.

*Along the line of flow *'A'P'J', f = m, u = a' 'e-*4> I" , and from x' to A', cos M0 = i, sin n&=o,*

ch„«=chlog(2)=V^‘VS 03)*

sh^shloglf)”^^^’ (34)

o>u>a’. (35)

Along the jet surface A’J’, q = Q,

. ch ” n = cosne = \a^ 7 \S (3°)

shnQ=isinne=»- N /^i S /|£^, (37)

a’ >u = a’e” ”’>-», (38)

giving the intrinsic equation.

41. The first problem of this kind, worked out by H. v. Helnr- holtz, of the efflux of a jet between two edges A and Ai in an infinite wall, is obtained by the symmetrical duplication of the above, with » = I, 6=^0, a’ = — 00, as in fig. 5,

chn= \ ! ir’ shn= \ir :

and along the jet APJ, >u=ae”’ ,: >a,

sh 0=t sin B=i^ = ie-^”’, I PM=I sin$ds=Je ^“‘C”

= 7— sin 8,

(0 (2)

(3)

HYDRODYNAMICS]

HYDROMECHANICS

so that PT = c/fr, and the curve AP is the tractrix; and the co-efficient of contraction, or

breadth of the jet it

breadth of the orifice ~r+2′

(4)

A change of fi and into »fi an d „g w ;fl g-, ve t jj e solution for two walls converging symmetrically to the orifice AAi at an angle »•/«.

*With * = i, the re-entrant walls are given of Borda's mouthpiece, and the coefficient of contraction becomes J. Generally, by making a'=—°o, the line x'A' may be taken as a straight stream line of infinite length, forming an axis of symmetry; and then by duplication the result can be ob-*

5 -j. tained, with assigned n, a,

A and b, of the efflux from a symmetrical converging

f,

Fig. 5.

Fig. 6.

mouthpiece, or of the flow of_ water through the arches of a bridge, with wedge-shaped piers to divide the stream.

42 Other arrangements of the constants n, a, b, a' will give the results of special problems considered by J. M. Michell, Phil. Trans. 1890.

Thus with a'=o, a stream is split symmetrically by a wedge of angle x/n as in Bobyleff's problem; and, by making a = », the wedge extends to infinity ; then

chnQ= Vft^ ,shnn= V^hi-

a)

Over the jet surface ^ = m, g = Q,

u = -r»tf" = ~be"'l t*

ch n = cos ne = yjp^+i sh ° = * sin " =«' /jST? (2)*

eW=tan«0,^r-

(3)

c de sin 27ifl"

*For a jet impinging normally on an infinite plane, as in fig. 6, n = i, *JW« = tan 9i c h (i^i/c) s i n 2 = i, (4)*

sh j7r/c=cot9, sh £jry/c = tan0, sh \vx\c sh 5iry/c = i, el' r < I*

+ i'>/ c =eJ»*/«4- e J>rW«4- I . (5)

With n = i, the jet is reversed in direction, and the profile is the catenary of equal strength.

In Bobyleff's problem of the wedge of finite breadth,

-sW. **-^^' (6)

cos na = yj-, sin na = yj^—, (7)

and along the free surface APJ, g = Q, ^ = 0, u = e-*$l m z=ag*'l e , cos n0=cos nai

£1" /c =

1 \eir'/ e — cos'no' cos*mo sin*n0

= sin"n0-siri»»a' ^

the intrinsic equation, the other free surface A'P'J' being given by

cos'tta sin*M0

«T« I' =

sin'no — sin 2 nfl'

(9)

Putting n = 1 gives the case of a stream of finite breadth disturbed by a transverse plane, a particular case of Fig. 7.

When a = h, a=o, and the stream is very broad compared with the wedge or lamina; so, putting w = w' (a — b)/a in the penultimate case, and

M = oe~"^ia — (a— b)w',

.. /5l±i •w'

ch na = V^ 1 sh *" = V v^"

(10)

• («)

in which we. may write

ai'=tf>-hW. (12)

Along the stream line xABPJ, ˆ=0; and along the jet surface APJ, — 1>4>>— °o; and putting $= —rs/c — 1, the intrinsic equation is

ts/c =cot 2 «0, (13)

which for n = I is' the evolute of a catenary, xrv. s

129

43. When the barrier AA' is held oblique to the current, the stream line xE is curved to the branch point B on AA' (fig. 7), and so must be excluded from the boundary of u; the conformal re- presentation is made now with

dil

V(6-

■a.b-a')

du

(«-6)V

u—a.u —

a')

dw

'_ m 1 ~ x u—j

m' 1

Xtt-j'

m+m'

u-b

x u

-j-u-j'

6 =

mj'+m'j m-tm' '

taking « = co at the source where Fig. 7.

<> = ao , u = 6 at the branch point B, u=j, j' at the end of the two diverging streams where tf> =— 00; while ˆ=0 along the stream hne which divides at B and passes through A, A'; and \fr = j», -m'*

stream. Then

along the outside boundaries, so that m/Q, m'/Q is the final breadth of the jets,and (m+m')/Q is the initial breadth, c, of the impinging Then

- *" V^\fe- ** *«- \fe> V= =& (3)*

chn =

2b— a— a'

N "u-b'

Aa-VN V(u "',"- , ') ,

u—b '

N=2 :

a—b.b—a' a-a> •

Along a jet surface, a = Q, and

*cha = cos0=cosa — |sin*a((f— o')/(«— b), (5)*

*if = a at the source x of the jet *B, where « = «> ; and supposing =0, P' at the end of the streams where u =j,f,*

i — 1 „:„ s cos 9— cos

u-b a— a'

u-f

sin 1

" cos a -cos 8' a-a! ' sin a (cos a-cosfl) (cos a -cos 0)'

(6)

j cos 0— COS 0′

(cos a— cos 0’) (coso— COS0)’

and ˆ being constant along a stream line dcj>_dw rAl_d4; _dw du du~ du’ˆd6~d8 ~ du d»’ tQ ds vds _ (cos a— cos /3) (cos a— cos/S’) sin 6 m+m’ de c dH (cos o -cos 8) (cos -cos /S) (cos -cos 4‘

sin

cos a— cos 0”“““cos (3- cos a— cos /S

cos a— cos p’ sin

-cos /3“cos 0— cos /S sin

cos/S— cos |3′ cos 0— cos p”

(7)

giving the intrinsic, equation of the surface of a jet, with proper attention to the sign.

From A to B, a>u>b, 0=o,

chQ = chlogˆ=cos a — \ sin 2 a” a*

a aˆF

shlog Q = l(£ ....

shn

Q_ (m— 6) cos a

u.u — a’)

-\{a—a’) sinˆa+V (a— u.u— a’)sin a

(8)

fidj_ftds d$_ _Qdtp ˆdu ˆd du~ q du

m-t-m’ (« — 6)cosa — |(q— qQsin’a-fy (a — w.u — aQsina x j — u.u—j’

(9)

AB

/ a (2!>-a-a')(u-!>)-2(a-6)(i)-a')4-2V(a-6.5-a'.a-M.«-a') j 1[. . a —a'.j—u .u—j f ' \ 10 /

with a similar expression for BA'.

The motion of a jet impinging on an infinite barrier is obtained by putting j = a, j' = a'\ duplicated on the other side of the barrier, the motion reversed will represent the direct collision of two jets of unequal breadth and equal velocity. When the barrier is small compared with the jet, a=/9=/3', and G. Kirchhoff's solution is obtained of a barrier placed obliquely in an infinite stream.

Two corners Bi a«d Bj in the wall xA, with a' = — « , and n — \, will give the solution, by duplication, of a jet issuing by a reentrant mouthpiece placed symmetrically in the end wall of the channel ; or else of the channel blocked partially by a diaphragm across the middle, with edges turned back symmetrically, problems discussed by J. H. Michell, A. E. H. Love and M. Rethy.

11

i30

HYDROMECHANICS

[HYDRODYNAMICS

*When the polygon is closed by the walls joining, instead of reach- ing back to infinity at **', the liquid motion must be' due |tO a source, and this modification has beeriworked out by B, Hepkiftson in the Proc. Lond. Math. Soc, 1898.'*

Mkhell has discussed also the hollow vortex Stationary iflside a polygon (Phil. Trans., 1890); the solution is given by '■■'

chnQ-sniv,shnQ=icnm (11)

so that, round trfe' boundary of the polygpn, ,ˆ = K', sin «9=-o; and on the surface of the vortex ˆ = 0, 2 = Q, and

cos«0 = sn#, «0 = |ir — atn.sjc, (12)

the intrinsic equation of the curve.

This is a closed Sumner line for n — l, when the boundary consists of

two parallel walls; and n = J gives an Elastica.

44. The Motion of a Solid through a Liquid.— An important problem in the motion of a liquid is the determination of the state of velocity set up by the passage of a solid through it; and thence of the pressure and reaction of the liquid on' trie surface of the solid) by which its motion is influenced when it is free. '

Beginning with a single body in liquid extending to infinity-;' and denoting 'by U, V, W, P, Q, ft the components of linear and angular wtocity with respect to axes fixed in the body, the velocity function takes the form

-ˆUfc + V-fc + Wˆ + Pxi + QjO + Rxs, (1)

where the 0's ajid x's are functions oi/x, y, z/depending on the shape of the body; interpreted dynamically, C— p represents the impulsive pressure required to stop the motion, or C + p to start it again from rest.

The terms of 4 > may be determined one at a time, and this problem is purely kinematicat; thus to determine u the component U alone is taken to exist, and then /, m, n, denoting the direction cosines of the normal of the surface drawn into the exterior liquid, the function £1 must be determined to satisfy the conditions

(i.) V s «fo = o, throughout the liquid;

ellipsoid; and the liquid flows over an ellipsoid along a line of slope with respect to O, treated as the vertical. Along the normal itself*

g-j + i(rf + X#jl.*

(10)

so that over the surface of an ellipsoid where X : and . are constant, the normal velocity.is the same as that of the ellipsoid itself, moving as a solid with velocity parallel to Ox

' U = .-ˆ-2(o 2 + X)ˆ, vu). ;

and so the boundary condition is satisfied; moreover, any ellipsoidal surface X may be supposed moving as if rigid with the velocity in (1 1), without disturbing the liquid motion for the moment.

'The continuity is secured if the liquid between two ellipsoids X and

Xi,, moving with the velocity U and Ui of equation (11), is squeezed 'out or sucked in across the plane x = o at a rate equal to the integral 4°w of the velocity tp across the annular area 01 — o of the two ellipsoids, madeby x = o ; or if

aU-ˆUˆJˆVˆX, j (12)

I a = W(& 2 + X.C 2 + X). (13)

(ii.)

d(j>i dv

= — /, the gradient of 4> down the normaTat the surface

of the moving solid ; (iii.) tp=o, over a fixed boundary, or at infinity;

similarly for ife and <£ s . To determine xi the angular velocity P alone is introduced, and the conditions to be satisfied are

(i.) V s Xi = o, throughout the liquid;

(ij.) <£! = mz-ny, at the surface of, the moving body, but zero over av*

a fixed surface, and at Infinity ; the same for xs and xs-

For a cavity filled with liquid in the interior of the body, since the

liqukfinside moves bodily for a motion of translation only,

*-y, *»=-»;■ (2)*

but a rotation will stir up the liquid in the cavity, so that the x's depend on the shape of the surface.

The ellipsoid was the shape first worked Out, by George Green, in his Research on the Vibration of a Pendulum in a Fluid Meaiutk (1833) ; the extension to any other surface will form an important strep in this subject.

*A system of confocal ellipsoids is taken X? , y , z**

and a velocity function of the form

- *= **• . . (4) .*

where ˆ is a function of Xohly,' so that

Over the ellipsoid, p denoting the length of the perpendicular from the centre on a tangent plane,

*+ c 2 +X -1 **

(3)

o 2 +X'

pz n= /, ■ ■ c 2 +X

*px 1 , p*y* _. p*z**

*,2_L. \ '\2~W;*2_L\ , l2 -r "/'~2_L V*

1 (a 2 X) 2 ' {V\f ' (c 2 +X) 2 '

pt = (a ! + X)/2+(t«+X) OT !+(C !-(-X)n J ,

=a 2 / 2 +i 2 m 2 +c 2 n 2 +X, Jp d

Thence

'#&*

d\f> 3T

dx , . .

■jˆ+X;

= g+ 2 (a 2 +X)g*

(5)

(6) (7)

(8)

(9)

Expressed as a differential relation, with the value of .U from (11),

34+ 2 <°ˆJx(4!H

(14) (15)

and integrating

so that we may put

(a'+xyvJ^^a constant, , f Md

(16)

(17) (18)

P 2 =4ta 2 +X)(J 2 +X)(c»+X), where M denotes a constant ; so that ^ is an elliptic integral of the second kind.

The quiescent ellipsoidal surface, over which the motion is entirely tangential,- is the one for which

2(« 2 X)g = d,*

(19)

and this is the infinite boundary ellipsoid if we make the

upper limit

Xi = » .

The velocity of the ellipsoid defined by X = is then

11—$-,**

M f° Md\ , abc, X (a 2 +x)P

..Ta&U-A.).

(20)

with the notation

?

*. af , ... r abc < *X AorA A Jk (a 2 +X)P*

, d r°d

(21)

so that in (4)

*M . U*A ‘ * a a*

- *= S&* A = f^A? * l -T=T2*

(22)

in (1) for an ellipsoid. ,

The impulse required to set up the motion in liquid of density p is the resultant of an impulsive pressure p over the surface S of the ellipsoid, and is therefore

ffpldS = p

= P (volume of the ellipsoid) =*W, (23) where W denotes the weight of liquid displaced.*

Denoting the effective inertia of the liquid parallel to 0 by aW\ the momentum*

*oW’U=*W (24)*

lo_ Ao

= TT =

(25)

10 tHaf the velocity of the liquid may be resolved Into a’ cdtnpdflent — rfr parallel to Ox, and -2(a 2 +\)lail>fd\ along the notmar of the

U T=AV

in this way the air drag was calculated by Green for an ellipsoidal pendulum.

Similarly, the inertia parallel to Oy and Oz is

B A” G X’

and

W, yW = iT(P

i-G abcd

W,

For a sphere

(26)

(27)

(28) (20)

HYDRODYNAMICS]

HYDROMB£HANJ€S

■-3**

so that the effective inertia of a sphere is increased by half the weight of liquid displaced; and in frictionless air or liquid the _sphere, of weight W, will describe a parabola with vertical acceleration

W-W ,,„..

wnw (30)*

Thus a spherical air bubble, in which W/W' is insensible, will begin to rise in water with acceleration 2g.

45. When the liquid is bounded externally by the fixed ellipsoid X = Xi, a slight extension will give the velocity function of the liquid in the interspace as the ellipsoid X=o is passing with velocity ; U through the confocal position; mu6t now take the form(^+N) and will satisfy the conditions in the shape*

abc . f ai abcd\ 4 = Ux-A+lh+C^ = U.t aiblCl J (<' + MP

K Bo+Co-B,-Ci"

_ abc aibiCi

/

X] abed X

(1)

„ (a 2 + X)P

and any confocal ellipsoid defined by \ internal or external to X = X,, may be supposed to swim with the liquid for an instant, without distortion or rotation, with velocity along 0 tt Ba+Ca-Bi-Ci Bb + Co-Bi-C/*

Since – U is the velocity function for the liquid W' filling the ellipsoid X=o, and moving bodily with it, the effective inertia of the ■ liquid in the interspace is*

Ao+B.-fC

is it cos PS, and of the source H and line sink OH is tt(ajf). cos PH* and – (M /o)(PO-PH); so that .*

/ nc , " du PO-PH\ . .

^ = m (cosPSx+ jcosPHa:-'-— — 1, (4)

and if— ~M> a constant, over the surface of the sphere, so that there is no flow across.

When the source S is inside the sphere and H outside, the line sink must extend from H to infinity in the image system ; to realize physically the condition of zero flow across the sphere, an equal sink must be introduced at some other internal point S'.

When S and S' lie pn the same radius, taken along O, the Stokes' function can be written down ; and when S and S' coalesce a doublet is produced, with a doublet image at H. '*

For a doublet at S, of moment m, the Stokes' function is

m

dj

cos PS =*

*r ■. *PSj;*

and for its image at H the Stokes' function is

jC0sPH=m*

*a' y**

/ 3 PH 3

(5)

(6)

*'Vppip-ps 5) ~ m f (w«*ff)' (7)*

*Bo-hOi — Bi — Ci If the ellipsoid is of revolution, with 6**

*. i TT A + 2B, * = iU5C B7^Bl'*

W'.

—C

(2)

(3)

(4)

(5)

and the Stokes' current function \f/ can be written down

reducing, when the liquid extends to infinity and Bi =0, to

so that in the relative motion past the body, as when fixed in the current U parallel to xO,

**'-iVx(i+£), + >-iV?(iS). (6)*

*Changing the origin from the centre to the focus of a prolate spheroid, then putting V=pa, X= *X'a, and proceeding to the limit where a = 00 , we find for a paraboloid of revolution*

m 2J so that for the combination

and this vanishes over- the surface of the sphere.

There is ao Stokes' function when the axis of the doublet at S does not pass Jhrough O; the image system will consist of an inclined doublet at H, making an equal angle with OS as the doublet S, and of a parallel negative line doublet, extending from H to O, of moment varying as the distance from 0-

A distribution of sources and doublets over a moving surface will enable an expression to be obtained for the velocity function of a

body moving in the presence of a fixed sphere, or inside it.

The method of electrical images will enable the stream function ^' to be inferred from a distribution of doublets, finite in number when the surface is composed of two spheres intersecting at an angle ir/m, where m is an integer (R. A. Herman, Quart. Jour, of Math. xxii.).

Thus for m = 2, the spheres are orthogonal, and it can be verified that ■'•■'■

&?{$-$+$).

(8)

B;

b» -p+y

**P+"*

(7)

(8)

with X'=o over the surface of the paraboloid; and then ' = \V>\f-p V (^-f-y) +£ ; iUp[V(2 +;«];*

♦— iu/> log w<«f+y B)+ *]<*

The relative path of a liquid particle is along a stream line

$' = §Uc 2 , a constant, (12)

2K/-C 2) -w^y) my 1 -)*

(9)

do) do

(13)

where ai,

The corresponding expression for two orthogonal cylinders will be

With 0j= 00, these reduce to- -,-■'•.

"'J (IP)*

for a sphere or cylinder, and a diametral plane

Two equal spheres, intersecting' at 1 20, will require*

:ylinder, and a diametral plane, heres, intersecting – at 1 20, will requi*

- *= * U La" + 2ft* + 27? iKˆJ'*

(n)

a C«; while the absolute path of a particle in space" will be given by

dy r – x _ y i –

dx~ y ~ 2fy ' y-c t —a 2 er x i'>. 1 46. Between two concentric spheres, with*

(14) (15)

■

a'+X = r 2 , rf 2 +Xi = a 1 s ;

A = B=C=0 9 /3r',

a 3 .■ a 3 i !

J~ 3+2 a?

*i-a'/ai**

■W+-

£1

a, 3

i-cFJa?' and the effective inertia of the liquid in the interspace is

Ao+aAi. .,,,, _ 1 oi 3 _+2o 3 ,

2A0

-2Al W ' = ˆ

rW.

(1)

(2)

(3)

When the spheres arenot concentric, ah expression for the effective inertia can be found by the method ©f images

*The image of a source of strength ft at S outside a sphere of radius a is a source of strength)*a]f-a.t H, Awhere 0S=/, 0H=a 2 //, and a line sink reaching from the image H to the centre O of line strength –fi/a ; this combination will be found to produce no flow across the surface of the sphere.*

Taking Ox along OS, the Stokes' function at P for the source S

*with < a similar expression for cylinders; so that the plane *=o may be introduced as a boundary, cutting the surface at 60 °.' The motion of these cylinders across the line, of centres is the equivalent of a line doublet along each axis.*

47. The extension of Green's solution to a rotation of the ellipsoid was made by A. Clebsch, by taking a velocity function

=xyx (1)

for a rotation R about Oz; and a similar procedure shows, that an ellipsoidal surface X may be in rotation about Oz without disturbing the motion if

dx

R<

*/ 1 1 \ 3-^*

W+\+&+\) x+2 d\ iy(6»+X)-i/(a+X) ' and that the continuity of the liquid is secured if*

(a 2 +X) 3 / 2 (& 2 +X) 3 / ! (c 2 +X)^=constant,

_ f° N

X ~J\ (o 2 +X)(6 2 +X)P _ oJe- a 2 -b 2 ' and at the surface X = o, -,

N B r A» ‘,;^; J ,

N , ab~c

; I aW

1/6 2 – i/o 8 . ~

i/y- 1/^ ; .

1 \ Bo – Ao

(&+fc.

r

V

(2)

(3) (4)

(5)

(F

(a 2 -& 2) 2 /(a 2 +6 2) •i>) /(«» + &«) -(Bo -A,)’

132

HYDROMECHANICS

[HYDRODYNAMICS

The velocity function of the liquid inside the ellipsoid X=o due to the same angular velocity will be

i«R)r(«-a»)/(a>+i»), (7)*

and on the surface outside

N Bq-Aq , q .

so that the ratio of the exterior and interior value of 4> at the surface is ‘

(9)

■ *(a»-*»)/(o»+6») -(Bo-Ao)'*

and this is the ratio of the effective angular inertia of the liquid, ouiside and inside the ellipsoid X = o.

The extension to the case where the liquid is bounded externally by a fixed ellipsoid X = Xi is made in a similar manner, by putting = xy(x +M), _ (io)

and the ratio of the effective angular inertia in (9) is changed to i-a k \ ra w . •Oi s -6i abc*

Make c = 00 for confocal elliptic cylinders ; and then

A x = /"°° ab ab (L /b+\ \ ,*

J (o'X)V ti.a.b*+\) -tf^& V V?+X/ ,U2 >*

Ba= A(\/S+x- 1) Ca=o:*

and then as above in § 31, with

a=cch o, 6«=csh a, 01 = V (o+X) =cch 01, i^csh ai (13) the ratio in (11) agrees with § 31 (6).*

As before in § 31, the rotation may be resolved into a shear-pair, in planes perpendicular to O and Oy.*

A torsion of the ellipsoidal surface will give rise to a velocity function of the form . 4> = xyzU, where SI can be expressed by the

elliptic integrals A k , B K

C K , in a similar manner, since

Q

dX/P 3 .

48. The determination of the 's and x's is a kinematical problem, solved as yet only for a few cases, such as those discussed above.

But supposing them determined for the moti6n of a body through a liquid, the kinetic energy T of the system, liquid and body, is expressible as a quadratic function of the components U, V, W, P, Q, R. The partial differential coefficient of T with respect to a component of velocity, linear or angular, will be the component of

momentum, linear or angular, which corresponds.

*Conversely, if the kinetic energy T is expressed as a quadratic function of *i, *j, x s , yi, yt, ya, the components of momentum, the partial differential coefficient with respect to a momentum component will give the component of velocity to correspond. >*

These theorems, which hold for the motion of a single rigid body, are true generally for a flexible system, such asPconsidered here for a liquid, with one or more rigid bodies swimming in it; and they express the statement that the work done by an impulse is the product of the impulse and the arithmetic mean of the initial and final velocity; so that the kinetic energy is the work done by the impulse in starting the motion from rest.

Thus if T is expressed as a quadratic function of U, V, W, P, Q, R) the components of momentum corresponding are

dT

it dT dT

y. =jp y 2 =^y=M ;*

but when it is expressed. as a quadratic function of x u Xt, x 3 , y t

yj. y>.

dT] dT

*x *~dV' x '~dW*

(1)

dxi dxi

dT Q _dT

-£■

(2)

d~y? ^~"dyj' d~y 3 '

R =

dT

The second system of expression was chosen by Clebsch and adopted by Halphen in his Fonctions elliptiques; aid thence the dynamical equations follow

„ dx\ dT . dT, v „ . .

*x= dr*w> +Xl W* '*-•••. z----. (3)*

, .-■ , dy, dT , dT dT , dT -, – T . ,

*-' L= ~d7-yw> +y >d7r x *dT i +x '3z M= • • •• * – • • •• (4>*

where X, Y, Z, L, M, N denote components of external applied force on the body.

= /Q-mP.

These equations are proved by taking a line fixed in space, whose direction cosines are /, m, n, then

j r mR~nQ, ^-»P-/R, |? =

If P denotes the resultant linear impulse or momentum in this direction

P = Ixi+mxi +nx s , dP _dl .dm ,dn

'dJ-de Cl+ <'dJ X2+ 'dl X3

(5)

(6)

+£

dxt . dxi

+m- 3F +n

dt

for all values of I, m, n. Next, taking a fixed

='fd7-' R+ ' Q) +«(^- 1 p+«r)*

=K+wY+nZ,

(7)

origin SI and axes parallel to Ox, by, Oz through O, and denoting by x, y, z the coordinates of O, and by G the component angular momentum about Si in the direction (/, /», n)

G = l(yi-x,z+x 3 y) +m(y 2 -X)X+Xiz)

*»(yr-*iy*2*). (8)*

Differentiating with respect to t, and afterwards moving the fixed origin up to the moving origin O, so that

**- y -.-o.b™t§-U.3-V.g-W.*

w= l {dT-y> R y& -«w,v)*

+m (^-y,P+y,R-,U+ * 1 w)*

*+« (^-yiQ+y a P-*iV+ *ju)*

"IL+mM+nN, (9)

for all values of /, m, n.

*When no external force acts, the case which we shall consider, there are three integrals of the equations of motion (i.) T= constant, (ii.) aci , +*j 2 *j s =F 5 , a constant, (iii.) *iyi*jyj-r-Xiyj = n = GF, a constant; and the dynamical equations in (3) express the fact that x x , &>, x 3 are the components of a constant vector having a fixed direction ; whije (4) shows that the vector resultant of y u y 2 , y 3 moves as if subject to a couple of components*

*iW- 3 V, * 3 U-*iW, iV-,U, (10)*

and the resultant couple is therefore perpendicular to F, the resultant of i, a, x 3 , so that the component along OF is constant, as expressed by (iii).

If a fourth integral is obtainable, the solution is reducible to a quadrature, but this is not possible except in a limited series of cases, investigated by H. Weber, F. Kotter, R. Liouville, Caspary, Jukovsky, Liapounoff, Kolosoff and others, chiefly Russian mathe- maticians; and the general solution requires the double-theta hyperelliptic function.

49, In the motion which can be solved by the elliptic function, the most general expression of the kinetic energy was shown by A. Clebsch to take the form

T-fc>(i J +') +/>'*,» +?(iyi +xiyz) +q'x,y s +ir(yi+y*)+ir'yf (1)*

so that a fourth integral is given by

dy 3 /dt = o, yj = constant ; (2)

*•^= *i(2*s+rys)-*j(g*i+ryi) =K*iyj-xjyi)i (3)*

I (dx, r* Kdi) '*

*W+ *2 2)(yi 2 +y2 J) – {xiyi+x^y*

in which

so that

= (i«+^)(y.«+y4 l)-(FG-,y,)»

= W-i-x i >)(yi> +yt+yi>G*)(GxrFy ll y,*

*Xi'x t i ~'F , x, i , *iyi*sy2=FG* s y», r (yi J yj J) ~2T-p(xS xf)-p' Xs **

-2q(.x 1 y l +x i y 1)-2q'x 3 yr-r'ys **fr-p')x>*->r2(.q-q.')xiyi +mu Wi «=2T-pF 1 -asFG-r,y 3 2*

dx 3 \ i It)

= X S

(4) (5)

(7)

W

where Xs is a quartic function of x 3 , and thus / is given by an elliptic

HYDRODYNAMICS]

HYDROMECHANICS

133

integral of the first kind ; and by inversion x 3 is in elliptic function of the time /. Now

(xi—x 3 i)(y l +yti)=Xiyi+xty t +i(xiyt—x i yi) = FG-* 3 y3+iVXj, yi +y*i _ FG — y 3 y 3 +tV X 3 xi+Xii i 2 + 2 2 ‘

(9) (10)

2j(*i+ *i») = -»[(s’ -Q)xs+r’y 3]+irxa(yi+y2i), (11)

& 1 / 1 -\ / 1 •, c 1 FG— x 3 y 3 +i’VX 3 . . 3jjlog(i+w) = -(g’-2) 3 -r’y 3 +rx 3 p±^2 . (12)

d , / xi+xji , , . , , . _ Fy 3 — Gx 3 ,

requiring the elliptic integral of the third kind; thence the expression of xi+x 2 i and yi+y 2 t.

Introducing Euler’s angles 8, , ^,

Xi=F sin 8 sin , * 2 = F sin 8 cos , i+ 2 i = JF sinfle – *’, * 3 = Fcos9;

sin 8jt = P sin <£+Q cos ,

„ . ,M dT , oT

Fslaie di = dJ l Xi +dJ 1 x ‘

= (qxi+ryi)xi + (gxi+ry,)x t = c(xi 2 +x 2 2) +r(x l yi+x i y i) = gF 2 sin a e+r(FG-* 3 y 3), 1 „t?/ fFG-^syj Frixs

(14) (15)

(16) (17)

elliptic integrals of the third kind.

Employing G. Kirchhoff’s expressions for X, Y, Z, the coordinates of the centre of the body,

FX =yi cos *Y+y 2 cos y¥+y 3 cos zY, (18)

FY = – yi cos *X+y 2 cos yX+y 3 cos 2X, (19)

G=y t cos *Z+y 2 cos yZ+y 3 cos zZ, (20)

FHX’Y^^+-G 2 , (2I)

F(X+Y«)- Fy 7gl+g X V i. (22)

Suppose X3—F is a repeated factor of X 3 , then y 3 = G, and

X 3 = (3 -F)'[^(3+F)'+2^G(3 F)-G 2], (23) and putting x 3 - F=y, (g)Wy 2 [4 ^F' 4 ^FG-G 2*

+2(2^F+tpG)y+^f], (24) so that the stability of this axial movement is secured if

A= 4 ^F'+ 4 2-^FG-G'

(25)

is negative, and then the axis makes rV (— A)/ir nutations per second. Otherwise, if A is positive

-/:

dy

yV(A + 2By+Cy 2) ^sh" 1 VAV = VAch-» yV (B 2 ~AC) =

_l_ch-> A + By = VAsh-'yV(B 2 ~AC)'

(26)

weight W, and under no force the C.G. proceeds in a straight line, and the axis of rotation through the C.G. preserves its original direction, if a principal axis of the body; otherwise the axis describes a cone, right circular if the body has uniaxial symmetry, and a Poinsot cone in the general case.

But the presence of the medium makes the effective inertia depend on the direction of motion with respect to the external shape of the body, and on W the weight of fluid medium displaced.

Consider, for example, a submarine boat under water; the inertia is different for axial and broadside motion, and may be represented

Ci = W+W'a, <:, =W+W'& (1)

where 0, j3 are numerical factors depending on the external shape ; and if the C.G is moving with velocity V at an angle with the axis, so that the axial and broadside component of velocity is « = V cos (j>, u = V sin , the total momentum F of the medium, represented by the vector OF at an angle 8 with the axis, will have components, expressed in sec. lb,

Fcose = c 1 j = (W+W'o)ˆcos<ˆ, Fsin9 = c 2 |=(W+W'/3)ˆsinˆ.. (2)

Suppose the body is kept from turning as it advances; after t seconds the C.G. will have moved from O to O', where 00′ = V/; and at O' the momentum is the same in magnitude as before, but its vector is displaced from OF to O'F'.

For the body alone the resultant of the components of momentum

V V V

W— cos 4> andW— sin tj> is W— sec. lb, (3)

acting along 00', and so is unaltered.

But the change of the resultant momentum F of the medium as well as of the body from the vector OF to O'F' requires an impulse couple, tending to increase the angle FOO', of magnitude, in sec' foot-pounds

F.OO'.sin FOO' = FV/ sin (0-), (4)

equivalent to an incessant couple N=FVsin (B-)

= (F sin 6 cos 0— F cos 8 sin)V

= (C2— Ci)(V 2 /g) sin cos

= W'03-aWg. (5)

This N is the couple in foot-pounds changing the .momentum of the medium, the momentum of the body alone remaining the same; the medium reacts on the body with the same couple N in the opposite direction, tending when c 2 -ci is positive to set the body broadside to the advance.

An oblate flattened body, like a disk or plate, has Cr-Ci negative, so that the medium steers the body axially ; this may be verified by a plate dropped in water, and a leaf or disk or rocket-stick or piece of paper falling in air. A card will show the influence of the couple N if projected with a spin in its plane, when it will be found to change its aspect in the air.

An elongated body like a ship has Ci-ci positive, and the couple N tends to disturb the axial movement and makes it unstable, so that a steamer requires to be steered by constant attention at the helm.

Consider a submarine boat or airship moving freely with the direction of the resultant momentum horizontal, and the axis at a slight inclination 8. With no reserve of buoyancy W = W, and the couple N, tending to increase 8, has the effect of diminishing the metacentric height by h ft. vertical, where

and the axis falls away ultimately from its original direction.

A number of cases are worked out in the American Journal of Mathematics (1907), in which the motion is made algebraical by the use of the pseudo-elliptic integral. To give a simple instance, changing to the stereographic projection by putting tan \8 = x,

(Nw+0" 2 = (+i)VX 1 +i(^-i)VX 2 , (27)*

x '= =fcOX«+203C 3 ±3(0 + 6)^+26 ±6, (28)*

N 3 =-8(a+6), (29)

will give a possible state of motion of the axis of the body; and the motion of the centre may then be inferred from (22).

50. The theory preceding is of practical application in the investigation of the stability of the axial motion of a submarine boat, of the elongated gas bag of an airship, or of a spinning rifled projectile. In the steady motion under no force of such a body in a medium, the centre of gravity describes a helix, while the axis describes a cone round the direction of motion of the centre of gravity, and the couple causing precession is due to the dis- placement of the medium.

In the absence of a medium the inertia of the body to trans- lation is the same in all directions, and is measured by the

W&tan0 = N:

-(c i —ci)——tan8,

, c 2 — Cl C\ u' ,. .1+0 « 2

(6) (7)

W (id ^ — J l+$ g-

51. An elongated shot is made to preserve its axial flight through the air by giving it the spin sufficient for stability, without which it would turn broadside to its advance; a top in the same way is made

to stand upright on the point in the position of equilibrium, unstable statically but dynamically stable if the spin is sufficient; and the investigation proceeds in the same way for the two problems (see Gyroscope).

The effective angular inertia of the body in the medium is now required ; denote it by Q about the axis of the figure, and by Q about a diameter of the mean section. A rotation about the axis of a figure of revolution does not set the medium in motion, so that Cj is the moment of inertia of the body about the axis, denoted by Wfcjf. But if W&! is the moment of inertia of the body about a mean diameter, and a the angular velocity about it generated by animpluse couple M,and M' is the couple required to set the surrounding medium in motion, supposed of effective radius of gyration k',

*"W*fo> = M-M', W'£' ! a. = M', (1)*

(WH+W'£' 2)w = M, (2)

C 2 i"W£§+W'£' 2 = (W+W' e)fci, – -(3)

in which we have put k' 2 = ek 2 , where e is a numerical factor depend- ing on the shape.

134

HYDROMECHANICS

ˆHYDRODYNAMICS

If the shot is spinning about its axis with angular velocity p, and is precessing steadily at a rate m about a line parallel to the resultant momentum F at an angle 0, the velocity of the vector of angular momentum, as in the case of a top, is

Cxpn sin 8 – C 2J u 2 sin 8 cos 8 ; (4)

and equating this to the impressed couple (multiplied by g), that is, to

**N = (£,-£,)£« tan 9, (5)*

Ci

and dividing out sin 8, which equated to zero would imply perfect centring, we obtain

C2M 2 cos0-CipM + {Ci-Cifj-u 1 sec 8 = 0. (6)

Cz

The least admissible value of p is that which makes the roots equal

of this quadratic in p, and then

u = \r-p sec 6*

V-2

(7)

the roots would be imaginary for a value of p smaller than given by

(8)

- *'*q- (9)*

If the shot is moving as if fired from a gun of calibre d inches, in which the rifling makes one turn in a pitch of n calibres or nd inches, so that the angle S of the rifling is given by

tan 8 = itdjnd = $dp/u, (10)

C^> 2 -4(C2-Ci)- i C 2 M 2 = 0,*

3-4W-Ci)-fr r

If

WW WW

W = lird 3 x(l-f)

If p denotes the density of the air or medium W' i_p

d 2 10 1 -p' k? 2 ' tan 2 5 =g(g-a) 1 Jc2 + I

(20)

(21)

(22)

(23) (24)

(25)

(26)

i(i-; 6)'

in which

From this formula (26) the table following has been calculated by A. G. Hadcock, and the results are in agreement with practical experience.

Table of Rifling for Stability of an Elongated Projectile, x Calibres long, giving 8 the Angle of Rifling, and n the Pitch of Rifling in Calibres.

Cast-iron Common Shell

Palliser Shell

Solid Steel Bullet

Solid Lead Bullet

/ = }, S.G. 7-2.

J ~ 21

S.G. 8.

/ = o,S.G. 8.

/ = o,S.G. 10-9.

X

/3-a

8

n

8

n

8

n

8

«

10

o-oooo

o° 0′

Infinity

0° 0′

Infinity

o° 0′

Infinity

o° 0′

Infinity

2-0

0-4942

2 49

63-87

2 32

71-08

2 29

72-21

2 08

84-29

2-5

0-6056

3 46

47-91

3 23

53-32

3 19

54-17

2 51

63-24

3-0

0-6819

4 41

38-45

4 13

42-79

4 09

43-47

3 38

50-74

3-5

07370

5 35

32-13

5 02

35-75

4 58

3^-33

4 15

42-40

40

0-7782

6 30

27-60

5 51

30-72

5 45

31-21

4 56

36-43

4-5

o-8ioo

7 24

24-20

6 40

26-93

6 32

27-36

5 37

31-94

50

0-8351

8 16

21-56

7 28

23-98

7 21

24-36

6 18

28-44

6-0

0-8721

10 05

17-67

9 04

19-67

8 56

19-98

7 40

23-33

IO'O

o ; 9395

16 57

10-31

15 19

u-47'

15 05

11-65

13 00 13-60

Infinity

i-oooo

90 00

o-oo

90 00

o-oo

90 00

0-00

90 00 ! 0-00

which is the ratio of the linear velocity of rotation \dp to «, the velocity of advance,

1? dtp , ,c,C 2 d 2*

tan 2 8 =

4« z

W

1 +

W W

*'< * C1 2*

14-^fl

- (J +Xh

HW

W

(11)

For a shot in air the ratio W'/W is so small that the square may be neglected, and formula (11) can be replaced for practical purpose in artillery by

_9 117/ /L \ 9/ /U \ A

(12)

ˆ,, 2S - 2 w',,, Jh,yi ik,

if then we can calculate 0, a, or |3-a for the external shape of the shot, this equation "will give the value of 8 and n required for stability of flight in the air.

The ellipsoid is the only shape for which o and (3 have so far been determined analytically, as shown already in § 44, so we must restrict our calculation to an egg-shaped bullet, bounded by a prolate ellipsoid of revolution, in which, with b = c,

. _ f°° aVd \ _ (> o& 2 dX – .*

Ao Jo (a 2 +X)Vt4(a 2 +X)'(S 2 +Xj 2]-J r ^^vu.fˆivl'J)

2 +X)Vt4(a 2 +X)(S 2 +Xj 2] _

Ac+2Bo = l,

2(a 2 + X) 3/2 (6 a +X)'

52. In the steady motion the centre of the shot describes a helix, with axial velocity

«cos8+»sin8 — (l H — 'tan 2 0j « cos SazusecS,

and transverse velocity

u sin 0-»cos8. = (1 -)u sin 8 As O3-a)wsin0;

and the time of completing a turn of the spiral is 2t//j, When p. has

the critical value in (7),

(1)

(2)

2tt Att V_ 2 n 2lT/ 9 1 \ ,

— = – r 7=-cos0 =— (x 2 -r-i)cos6 M p Li p

(3)

which makes the circumference of the cylinder on which the helix is "wrapped

— (Msin0-DCOS0)=2l^(/3-a)(z 2 +l)sin 2 0cos0 = «d(/3-a)(x 2 + l) sin0ebs«,

and the length of one turn of the helix

— {ucos9--v sin0) =

■nd(,x + i);*

(4)

(5)

a=^-V, =

Bo

I – Ao = l+Ao"

(H)

(15)

1-A0' ^ I -Bo I+Ao l+2a' The length of the shot being denoted by / and the calibre by d, and the length in calibres by x

lJd-2aJ2b = x, (16)

x . . . 1

Ao

(2 -i) 3 / 2*

r ,»ch- > ^—

(17)

v(J_ l) log[a; + V(: c 2 -i)]. (19)

*thus for * = 3, the length is 10 times the pitch of the rifling.*

53. The Motion of a Perforated Solid in Liquid. — In the preceding investigation, the liquid stops dead when the body is brought to rest ; and when the body is in motion the surrounding liquid moves in a uniform manner with respect to axes fixed in the body, and the force experienced by the body from the pressure of the liquid on its surface is the opposite of that required to change the motion of the liquid ; this has been expressed by the dynamical equations given ' above. But if the body is perforated, the liquid can circulate through a hole, in reentrant stream lines linked with the body, even while the body is at rest; and no reaction from the surface can influence this circulation, which may be supposed started in the ideal manner described in § 29, by the application of impulsive pressure across an ideal membrane closing the hole, by means of ideal mechanism connected with the body. The body is held fixed, and the reaction of the mechanism and the resultant of the impulsive pressure on the surface are a measure of the impulse, linear J, ij, f, and angular X, fi, v, required to start the circulation.

HYDROMEDUSM

i35

This impulse will remain of constant magnitude, and fixed relatively to the body, which thus experiences an additional reaction from the circulation which is the opposite of the force required to change the position in space of the circulation impulse; and these extra forces must be taken into account in the dynamical equations.

An article may be consulted in the Phil. Mag., April 1893, by G. H. Bryan, in which the analytical equations of motion are deduced of a perforated solid in liquid, from considerations purely hydrodynamical.

The effect of an external circulation of vortex motion on the motion of a cylinder has been investigated in § 29; a similar pro- cedure will show the influence of circulation through a hole in a solid, taking as the simplest illustration a ring-shaped figure, with uni- planar motion, and denoting by { the resultant axial linear momentum of

the circulation.

As the ring is moved from O to O' in time t, with velocity Q, and angular velocity R, the components of liquid momentum change from

oM'U -H and /SM'V along Ox and Oy to aM'U'-K and /SM'V along OV and O'y', (1)

the axis of the ring changing from Ox to OV; and U =Qcos0, V=fQsin0, U' = Q cos (6-Rl), V' = Q sin (0-Ri), (2)

so that the increase of the components of momentum, Xi, Yi, and Ni, linear and angular, are

X, = (aM'U'-R) cos Rt-aM'U-Z-pM'V sin Rt

= (o-/8)M'Qsin (9-R/) sinR/-{verR< (3)

Y, = (aM'U'-H) sin Rt+HMV cos R-0M'V*

= (a-/S)M'Qcos(0-ROsinR/-KsinRT, (4)

Ni = [-(eM'U'-K) sin (e-RO-HSM'V' cos (0-Rt)\OO'

= [-(a-£)M'Qcos(0-Ri)sin(0-Ri)-{sin(0-Rt)]Q/. (5)

The components of force, X, Y, and N, acting on the liquid at 0, and reacting on the body, are then

X = lt. X,/<=-(a-j3)M'QRsine = (o-/3)M'VR, (6)

Y = lt. Yi/(= (o-,8)M'QRcos9-|-{R = (a-^)M'UR+jR, (7) Z = lt. Zi/^-Ca-^M'O/sinflcose-fQsinfl

= (a/?)M'U-K]V. \8)

Now suppose the cylinder is free ; the additional forces acting on the body are the components of kinetic reaction of the liquid

-M'(f-VR),^M'(g + UR), – 6 C'f, (9 , so that its equations of motion are

M (r-VR) = -aM' (-VR) (aM'VR, (to) M(+ UR) ^-^M'^+ Ur) M'UR{R,(ii)

(12)

"

-€C^+(a-S)M'VV+iV;

and putting as before

M+aM' = c, IyH-/3M' = C2, C+«C' = C S ,

ci-fif— c 2 VR = o,

C2 5+(c 1 U+f)R = o,

Cs

dR

dt '

■(c,U+|-c 2 U)V = 0;

(13) (14)

(15) (16)

showing the modification of the equations of plane motion, due to the component £ of the circulation.

The integral of (14) and (15) may be written

CiU+£ = Fcos9, c 2 V=— Fsinfl,

dx

2r = Ucos0-Vsin« =

^=Usin04-Vcos0

Fcos 2 , Fsin 2

- — 1 ;

rcosO,

(!-I) si

C W= (") sm0c OS 9—*sm0 = F^,*

sinflcosS — -sinfl,

(17) (18)

(19)

(20)

■ˆ+ a ?co.'. + H];(„,

so that cos and y is an elliptic function of the time.

When £ is absent, dx/dt is always positive, and the centre of the body cannot describe loops; but with £, the influence may be great enough to make dx/dt change sign, and so loops occur, as shown in A. B. Basset's Hydrodynamics, i. 192, resembling the trochoidal curves, which can be looped, investigated in § 39 for the motion of a cylinder under gravity, when surrounded by a vortex.

c4S-',V[SL

*cos*0*

The branch of hydrodynamics which discusses Wave motion in; a liquid or gas is given now in the articles Sound and Wˆlve.; while the influence of viscosity is considered under Hydraulics.

References. — For the history and references to the original memoirs see Report to the British Association, by G. G. Stokes (1846), and W. M, Hicks {-1882). See also the. Fortschritte der Mathemdtik, and A. E. H. Love, " Hydrodynamik " in the Encyhlopadie der malhematischen Wissenschaften (1901). (A. G. G.)

HYDROMEDUSAE, a group of marine animals, recognized as belonging to the Hydrozoa (q.v.) by the following characters.

(1) The polyp (hydropolyp) is of simple structure, typically much longer than broad, without ectodermal oesophagus or mesenteries, such as are seen in the anthopolyp (see article Anthozoa); the mouth is usually raised above the peristome on a short conical elevation or hypostome; the ectoderm is without cilia.

(2) With very few exceptions, the polyp is not the only type of individual that occurs, but alternates in the life-cycle of a giveW species, with a distinct type, the medusa {q.v.), while in other cases the polyp-stage may be absent altogether, so that only medusa-individuals occur in the life-cycle.

The Hydromedusae represent, therefore, a sub-class of the Hydrozoa. The only other sub-class is the Seyphomedusae (q.v.). The

Hydromedusae contrast with the Seyphomedusae in the following points. (1) The polyp, when present, is without the strongly developed longitudinal retractor muscles, forming ridges (taeniolae) projecting into the digestive cavity, seen in the scyphistoma or scyphopolyp. (2) The medusa, when present, has a velum and is hence said to be craspedote; the nervous system forms two continuous rings running above and below the velum; the margin of the umbrella is ‘ not lobed (except in Narcomedusae) but entire; there are characteristic differences in the sense-organs (see below, and Scyphomedusae) ; and gastral filaments (phacellae), subgenital pits, &c, are absent.

(3) The gonads, whether formed in the polyp or the medusa, are developed in the ectoderm.

The Hydromedusae form a widespread, dominant and-4>ighly differentiated group of animals, typically marine, and. ‘found in all seas and in all zones of marine life. Fte|h-wˆter forms, however, are also known, very few as regards specifs or genera, but often extremely abundant as individuals. ˆ Iif- the British fresh-water fauna only two genera, Hydra a»4 Cordylophora, are found; in America occurs an additional getn|sy Microhydra. The paucity of fresh-water forms contrasts sharply; with the great abundance of marine genera common in all seafe- and on every shore. The species of Hydra, however, are extremely common and familiar inhabitants of ponds and ditches. \ : ~*

In fresh- water Hydromedusae the life-cycle fejusually second- arily simplified, but in marine forms the lif&icycle may be extremely Complicated, and a given species ortfcn passes in the course of its history through widely different /orms. adapted, to different habitats and modes of life. Apart ffftm-Wmil or embryonic forms there are found typically two tyjws of person, as already stated, the polyp and the medusa, each of which may vary independently of the other, since their enviroii’meht and life-conditions are usually quite different. Hence both polyp, and medusa present characters for classification, and a given species, genus or other taxonomic category may be defined by polyp-characters or medusa-characters or by both combined. If our knowledge of the life-histories of these organisms were perfect, their polymorphism would present no difficulties to classification; but unfortunately this is far from being the case. In the majority of cases we do not know the polyp corresponding to a given medusa, or the medusa that arises from a given polyp. 1 Even when a medusa is seen to be budded from a polyp under observation in an aquarium, the difficulty is not always

solved,; since the freshly-liberated, immature medusa may differ greatly from the full-grown, sexually-mature medusa after several months of life on the high seas (see figs. 11, B,C, and 59, a, b, c): To establish the exact relationship it is necessary not only to breed but to rear the medusa, whiph cannot always be done in

1 In some cases hydroids have been reared in aquaria from ova of medusae, but these hydroids have not yet been found in the sea (Browne [10 a]).

confinement. The alternative is to fish all stages of the medusa in its growth in the open sea, a slow and laborious method in which the chance of error is very great, unless the series of stages is very complete.

At present, therefore, classifications of the Hydromedusae have a more or less tentative character, and are liable to revision with increased knowledge of the life-histories of these organisms. Many groups bear at present two names, the one representing the group as defined by polyp-characters, the other as defined by medusa-characters. It is not even possible in all cases to be certain that the polyp-group corresponds exactly to the medusa- group, especially in minor systematic categories, such as families.

The following is the main outline of the classification that is Adopted in the present article. Groups founded on polyp- characters are printed in ordinary type, those founded on medusa- characters in italics. For definitions of the groups see below. Sub-class Hydromedusae (Hydrozoa Craspedota).

Order I. Eleutheroblastea.

,, II. Hydroidea (Leptolinae) .

Sub-order 1. Gymnoblastea (Anthomedusae). „ 2. Calyptoblastea (Leplomedusae). Order III. Hydrocorallinae. „ IV. Graptolitoidea. „ V. Trachylinae.

Sub-order 1. Trachomedusae. ,, 2. Narcomedusae. Order VI. Siphonophora.

Sub-order 1. Chondrophorida. „ 2. Calycophorida. „ 3. Physophorida.

„ 4. Cystophorida.

Organization and Morphology of the Hydromedusae. As already stated, there occur in the Hydromedusae two distinct types of person, the polyp and the medusa; and either of them is capable of non-sexual reproduction by budding, a

process which may lead to the formation of colonies, composed ,_j of more or fewer individuals com- bined and connected together. The morphology of the group

,A.f thus falls naturally into four

sections — (1) the hydropolyp, (2) the polyp-colony, (3) the hydro-medusa, (4) the medusa-colonies. Since, however, medusa-colonies occur only in one group, the Siph- onophora, and divergent- views are held with regard to the morphological interpretation of the members of a siphonophore, only the first three of the above sub-divisions of hydromedusa morphology will be dealt with here in a general way, and the morphology of the Siphonophora will be considered under the head- ing of the group itself.

1. The Hydropolyp (fig. 1)— The general characters of this organism

a, b,

c> t, ps

Fig. 1. — Diagram of a typical Hydropolyp. Hydranth ; Hydrocaulus ; Hydrorhiza; Tentacle ;

Perisarc, forming in the _ region of the hydranth ar e described above and in the acuporhydrotheca(A,<), snides Hydrozoa and Polyp. It — which, however.is only | s rarely free, but usually fixed and found in polyps of the incapable of locomotion. The foot order Calyptoblastea. by which it is attached often sends out root-like processes — the hydro- rkita ©. The column (b) is generally long, slender and stalk- like (hydrocaulus). Just below the crown of tentacles, however, the body widens out to form a " head," termed the hydranth (a), containing a stomach-like dilatation of the digestive cavity. On the upper face of the hydranth the crown of tentacles (/) surrounds the peristome, from which rises the conical hypostome, bearing the mouth at its extremity. The general ectoderm covering

the surface of the body has entirely lost the cilia present in the earlier larval stages (plariula), and may be naked, or clothed in a cuticle or exo- skeleton, the perisarc (ps), which in its simplest condition is a chitinous membrane secreted by the ectoderm. The perisarc when present invests the hydrorhiza and hydrocaulus; it may stop short

below the hydranth, or it may extend farther. In general there are two types of exoskeleton, characteristic of the two principal divisions of the Hydroidea. In the Gymnoblastea the perisarc either stops below the hydranth, or, if continued on to it, forms a closely-fitting investment extending as a thin cuticle as far as the bases of the tentacles (e.g. Bimeria, see G. J. Allman [i], 1 pi. xii. figs. 1 and 3). In the Calyptoblastea the pensarc is always continued above the

From Allman's Gymnobleslic Bydroiis, by permission of the Council of the Ray Society.

Fig. 2. — Stauridium productum, portion of the colony magnified; p, polyp ; rh, hydrorhiza.

hydrocaulus, and forms a cup, the hydrangium or hydrotheca (h, t), standing off from the body, into which the hydranth can be retracted for shelter and protection.

The architecture of the hydropolyp, simple though it be, furnishes a long series of variations affecting each part of the body. The greatest variation, however, is seen in the tentacles. As regards number, we find in the aberrant forms Protohydra and Microhydra tentacles entirely absent. In the curious hydroid Monobrachium a single tentacle is present, and the same is the case in Clathrozoon; in Amphibrachium and in Lar (fig. 11, A) the polyp bears two tentacles only. The reduction of the tentacles in all these forms may be correlated with their mode of life, and especially with living in a constant current of water, which brings food- particles always from one direction and renders a complete whorl or circle of tentacles unnecessary. Thus Microhydra lives amongst Bryozoa, and appears to utilize the currents produced by these animals. Protohydra occurs in oyster- banks and Monobrachium also grows on the shells of bivalves, and both these hydroids probably fish in the currents produced by the lamellibranchs. Am- phibrachium grows in the tissues of a sponge, Euplectella, and protrudes its hydranth into the canal-system of the sponge; and Lar grows on the tubes of the worm Sabella. With the exception of these forms, reduced for the most part in correlation with a semi-parasitic mode of life, the tentacles are

usually numerous. It is rare to find in the polyp a regular, symmetrical disposition of the tentacles as in the medusa. The primitive number of four in a whorl is seen, however, in Stauridium (fig. 2ˆ and Cladonema (Allman [1], pi. xvii.), and in Clavatella each whorl consists regularly of eight (Allman, loc. cit. pi. xviii.). As a rule, however, the number in a whorl is irregular. The tentacles may form a single whorl, or more than one; thus in Corymorpha (fig. 3) and Tubularia (fig. 4) there are two circlets; in Staur- idium (fig. 2) several; in Coryne and Cordylophora the tentacles are scattered irregularly over the elongated hydranth.

As regards form, the tentacles show a number of types, of which the most important are (1) filiform, i.e. cylindrical or tapering from

1 The numbers in square brackets [ ] refer to the bibliography at the end of this article; but when the number is preceded by the word Hydrozoa, it refers to the bibliography at the end of the article Hydrozoa.

Fig. 3. — Diagram of Corymorpha. A, A hydri- form person giving rise to medusiform persons by budding from the margin of the disk; B, free swimming medusa (Steenstrupia of Forbes) detached from the same, with manubrial genitalia,. (Anthomedusae) and only one tentacle. (After All- man).

base to extremity, as in Clava (fig. 5); (2) capitate, i.e. knobbed at the extremity, as in Coryne (see Allman, loc. cit. pi. iv.) ; (3) branched, a rare form in the polyp, but seen in Cladocoryne (see Allman, loc. cit. p. 380, fig. 82). Sometimes more than one type of

form is found in the same polyp; in Pennaria and Stauridium (fig. 2) the upper whorls are capitate, the lower filiform. Finally, as regards structure, the tentacles may retain their primitive hollow nature, or become solid by obliteration of the axial cavity.

The hypostome of the hydropolyp may be small, or, on the other hand, as in Eudendrium (Allman, loc. cit. pis. xiii., xiv.), large and trumpet- shaped. In the curious polyp Myriothela the body of the polyp is differ- 4. — Diagram of Tubularia entiated into nutritive and

Fig.

indivisa. A single hydriform person reproductive portions a bearing a stalk carrying numerous Histology. — The ectoderm degenerate medusiform persons or of the hydropolyp is chiefly sporosacs b. (After Allman.) sensory, contractile and pro-

tective in function. It may also be glandular in places. It consists of two regions, an external epithelial layer, and a more internal sub-epithelial layer.

The epithelial layer consists of (1) so-called " indifferent " cells secreting the perisarc or cuticle and modified to form glandular cells in places; for example, the adhesive cells in the foot. (2) Sensory cells, which may be fairly numerous in places, especially on the tentacles, but which occur always scattered and isolated, never aggregated to form sense-organs as in the medusa. (3) Contractile

stitial cells, lodged between the narrowed basal portions of the epithelial cells. From them are developed two distinct types of histological elements ; the genital cells and the cnidoblasts or mother- cells of the nematocysts. The sub-epithelial layer thus primarily constituted may be recruited by immigration from without of other

From Allman's CynmoUastic Hydroids, by permission of the Council of the Ray Society.

Fig. 5. — Colonies of Clava. A, Clava squamata, magnified. B, C. multicornis, natural size; p, polyp; gon, gonophores; rh, hydrorhiza.

or myo-epithelial cells, with the cell prolonged at the base into a contractile muscle-fibre (fig. 6, B). In the hydropolyp the ectodermal muscle-fibres are always directed longitudinally. Belonging primarily to the epithelial layer, the muscular cells may become secondarily sub-epithelial.

The sub-epithelial layer consists primarily of the so-called inter-

Fig. 6 A. — Portion of the body-wall of Hydra, showing ecto- derm cells above, separated by " structureless lamella " from three flagellate endoderm cells below. The latter are vacuolated, and contain each a nucleus and several dark granules. In the middle ectoderm cell are seen a nucle'us and three nematocystˆ with trigger hairs projecting beyond the cuticle. A large nematocyst, with everted thread, is seen in the right-hand ectodermal cell. (After F. E.

Schulze.)

elements, more especially by nervous (ganglion) cells and nitiscle-cells derived from the epithelial layer. In its fullest development, therefore, the sub-epithelial layer consists of four classes of cell-elements.

The genital cells are simple wandering cells (archaeocytes), at first minute and without any specially distinctive features, until they begin to develop into germ-cells. According to Wulfert [60] the primitive germ-cells of Gonothyraea can be distinguished soon after the fixation of the planula, appearing amongst the interstitial cells of the ectoderm. The germ-cells are capable of extensive migrations, not only in the body of the same polyp, but also from parent to bud through many non-sexual generations of polyps in a colony (A. Weismann [58]).

The cnidoblasts are the mother-cells of the nematocysts, each' cell producing one nematocyst in its interior. The complete nemato- cyst (fig. 7) is a spherical or oval capsule containing a hollow thread, usually barbed, coiled in its interior. The capsule has a double wall, an outer one (o.c), tough and rigid _ in nature, and an inner one (i.e.) " of more flexible consistence. The outer wall of the capsule is in- complete at one pole, leaving an aperture through which the thread is discharged. The inner mem- brane is continuous with the wall Fi G . 6 B.— Epidermo-muscular of the hollow thread at a spot im- cells of Hydra, m, muscular-fibre mediately belowtheaperturein the processes. (After Kleinenberg, outer wall, so that the thread itself from Gegenbaur.) (/) is simply a hollow prolongation

of the wall of the inner capsule inverted and pushed into its cavity. The entire nematocyst is enclosed in the cnidoblast which fornjfed it. When the nematocyst is completely developed, the cnidobUjst passes outwards so as to occupy a superficial position in the ectodertn, and a delicate protoplasmic process of sensory nature, termed tjhe cnidocil (en) projects from the cnidoblast like a fine hair or ciliufrn. Many points in the development and mechanism of the nematocyst are disputed, but it is tolerably certain (1) that the cnidocil is of sensory nature, and that stimulation, by contact with prey or in other ways, causes a reflex discharge of the nematocyst ; (2) that the dis- charge is an explosive change whereby the in-turned thread is suddenly everted and turned inside out, being thus shot throughthe opening in the outer wall of the capsule, and forced violently into the tissues of the prey, or, it may be, of an enemy ; (3) that the thrdad inflicts not merely a mechanical wound, but instils an irritant

poison, numbing and paralysing in its action. The points most in dispute are, first, how the explosive discharge is brought about, whether by pressure exerted external to the capsule (i.e. by contraction of the cnidoblast) or by internal pressure. N. Iwanzov [27] has brought forward strong grounds for the latter view, pointing out that the cnidoblast has no contractile mechanism and that measurements show discharged capsules to be on the average slightly larger than undischarged ones. He believes that the capsule contains a sub- stance which swells very rapidly when brought into contact with water, and that in the undischarged condition the capsule has its opening closed by a plug of protoplasm (x, fig. 7) which prevents

access of water to the contents; when the cnidocil isistimulated it sets in action a mechanism or perhaps a series of chemical changes by which the plug is dissolved or removed; as a result water pene- trates into the capsule and causes its contents to swell, with the

result that the thread is everted violently. A second point of dispute concerns the spot at which thepoison is lodged. Iwanzov believes it to be contained within the thread itself before dis charge, and to. be intro- duced into the tissues of the prey by' the eversion of the thread. A third point of dispute is whether the nematocysts are formed in situ, or whether the cnidoblastr migrate with them to the region where they' are most needed; the fact that in Hydra, for example, there are no interstitial cells in the tentacles, where nema- tocysts are very abundant, is certainly in favour of the view that the cnido- blasts migrate on to the tentacles from the body, and that like the genital cells the cnidoblasts are wandering cells.

The muscular tissue consists primarily of pro- cesses from the bases of the epithelial cells, pro- cesses which are contrac- tile in nature and may be distinctly striated. A

Fig.

a

b, c, en,

N, o.c, x,

i.c,

7.— Diagrams to show the struc- further stage in evolution

ture of Nematocysts and their mode of is that the muscle-cells working. (After Iwanzov.) lose their connexion with

Undischarged nematocyst. the epithelium and come

Commencing discharge. to He entirely beneath it,

Discharge complete. forming a Sub-epithelial

Cnidocil. contractile layer, de-

Nucleus of cnidoblast. veloped chiefly in the ten-

Outer capsule. tacles of the' polyp. The

Plug closing the opening of the evolution of the ganglion- outer capsule, cells, is probably similar; Inner capsule, continuous with the a n epithelial cell develops wall of the filament, /. processes of nervous nature b, Barbs. from the base, which come , ■ , . into connexion with the bases of the sensory cells, with the muscular cells, and with the similar processes of other nerve-cells ; next the nerve-cell loses its connexion with the outer epithelium and becomes a sub-epithelial ganglion-cell which is closely connected with the muscular layer, conveying stimuli from the sensory c£lls to the contractile elements. The ganglion-cells of Hydromedusae are generally very small.

In the polyp the nervous tissue is always in the form ' of a scattered plexus, never con- centrated to form a : definite nervous system! as in the medusa. The endoderm of the polyp is typically a flagellated epithelium of large cells (fig. 6), from the bases of which arise contractile muscular processes lying in the plane of the transverse section of the body. In different parts of the coelen- teron the endoderm 1 may be of three principal tvpes — (1) digestive endoderm, "the primi- . ., ., , tive type, with cells of large

size and considerably vacuolated, found in the hydranth; sorrte of these cells may become special glandular cells, without tlagella or contractile processes; (2) circulatory endoderm, without vacuoles and without basal contractile processes, found in the hydro- rhiza and hydrocaulus; (3) supporting endoderm (fig. 8), seen in solid tentacles as a row of cubical vacuolated cells, occupying the axis ot

the tentacle, greatly resembling notochordal tissue, particularly that of Atnphtoxus at a certain, stage of development; as a fourth variety of endodermal cells excretory cells should perhaps be reckoned as seen to the pores in the foot of Hydra and elsewhere (cf. C Chun' H.YDROZfM It], pp. 314, 315). The mesogloea in the hydropolyp is a thin elastic layer, in which

From Gegenbaur's Elements of Com- parative Anatomy.

Fig. 8. — Vacuolated Endo- derm Cells of cartilaginous consistence from the axis of the tentacle of a Medusa (Cunina).

may be lodged the muscular fibres and ganglion cells mentioned above but which never contains any connective tissue or skeletogenous cells or any other kind of special mesogloeal corpuscles.*

■2. The Polyp-colony. — All known hydropolyps possess the power of reproduction by budding, and the buds produced may become either polyps or medusae. The buds may all be- come detached after a time and give rise to separate and in- dependent indi- viduals, as in the common Hydra, in which only polyp-individuals are produced and

sexual elements From Allman's Gymnoblaslic Bydroiis, by permission ot arede veloped the Council of the Ray Society.

upon the polyps Fig. 9 — Colony of Hydractinia echinata grow- themselves; or, i ng – on the Shell of a Whelk. Natural size on the other

hand, the polyp individuals produced by budding may remain permanently in connexion with the parent polyp, in which case sexual elements are never developed on polyp-individuals but only on medusa-individuals, and a true colony is formed. Thus the typical hydroid colony starts from a " founder polyp, which in the vast majority of cases is fixed, but which may be floating, as in Nemopsis, Pelagohydra, &c. The founder-polyp usually produces by budding polyp-individuals, and these in thj;ir turn produce other buds. The polyps are all non-sexual individuals whose function is purely nutritive. After a time the polyps, or certain of them, produce by budding medusa-individuals, which sooner or later develop sexual elements; in some cases, however, the found r~ polyp remains solitary, that is ' to say, does not produce polyp- buds, but only medusa-buds, from the first (Corymorpha, fig. 3, Myriothela, &c). In*

primitive forms the medusa-individuals are set free before reaching sexual maturity'and do hot con- tribute anything to the colony. In other cases, however, the medusa-indiyiduals become sexual}y mature while still at- tached to the parent polyp, and are then not set free at all, but become appanages of the hydroid colony and undergo degenerative changes leading to reduction and even to complete obliteration of their original medusan structure. In this way the hydroid colony becomes composed of two por- tions of different function, the nutritive "trophosome," com- posed of non-sexual polyps, and the reproductive " gonosome," composed of sexual medusa- individuals, which never exercise a nutritive function while at- tached to the colony. As a general rule polyp-buds are pro- duced from the hydrorhiza and hydrocaulus, while medusa-buds are formed on the hydranth. In some cases, however, medusa- buds are formed on the hydro- rhiza, as in Hydrocorallines.

In such a colony of connected individuals, the exact limits of the separate " persons " are not always clearly marked out. Hence it is necessary to distin- guish between .first , the " zooids

*99*1*

From Allman's Gymnoblastic by permission of the Council of Society.

Bydroids, the Ray

r ,. , Fig. 10. — Polyps from a Colony

indicated in the case of the polyps of Hydractinia, magnified, dz, by the hydranths, each with dactylozoid; gz, gastrozoid; b, mouth and, tentacles; and, blastostyle; gon, gonophores; secondly, the "coenosarc," or rh, hydrorhiza. common flesh, which cannot

be assigned more to one individual than another, but consists of a more or less complicated network of tubes, corresponding to the hydrocaulus and hydrorhiza of the primitive independent polyp- lndividual. The coenosarc constitutes a system by which the digestive Cavity of any one polyp is put into communication with that of any other individual either of the trophosome or gonosome. In this manner the food absorbed by one individual contributes to the welfare of the whole colony, and the coenosarc has the

AND MORPHOLOGY]

HYDROMEDOSAE

function of circulating and distributing nutriment through the colony.

The hydroid colony shows many variations in form and architecture which depend simply upon differences in the methods in which

polyps are budded.

In the first place, buds may be produced only from the hydro- rhiza, which grows out and branches to form a basal stolon, typically net-like spreading over the substratum to which the founder- polyp attached itself. From the stolon the daughter-polyps grow up vertically. The re- sult is a spreading or creeping colony, with the coenosarc in the form of a root-like horizontal network (fig. 5, B; ii, A). Such a colony may undergo two principal modifica- tions. The meshes of the basal network may become very small or virtually obliterated, so that the coenosarc be- comes a crust of tubes tendingtofusetogether, and covered over by a common perisarc. Encrusting colonies of this kind are seen in Clava squamata (fig. 5, A) and Hydractinia (figs. 9, io), the latter having the perisarc calcified. A further very important modifi- cation is seen when the tubes of the basal perisarc do not remain spread out in one plane, but grow in all planes forming a felt-work ; the result is a massive colony, such as is seen in the so-called Hydrocorallines (fig. 6o), where the interspaces between the coenosarcal tubes are filled Up with calcareous matter, or coenosteum, replacing; the chitinous perisarc. The result is a stony, solid mass, which contributes to the building up of coral reefs. In massive colonies of this kind no sharp distinction can be drawn between hydrorhiza and hydro-*

-,.caulus in the ooeaosarc; it "\ is practically all hydrorhiza. ' Massive colonies may assume various forms and are often branching or tree-like. A fur- ther peculiarity of this type of colony is that the entire coeno- sarcal complex is covered ex- ternally by a common layer of ectoderm; it is not clear how this covering layer is developed.

In the second place, the buds may be produced from the hydrocaulus, growing out laterally from it; the result is an arborescent, tree-like colony (figs. 12, 13). Budding from the hydrocaulus may be combined with budding from the hydrorhiza, so that numer- ous branching colonies arise from a common basal stolon. In the formation of arbores- cent colonies, two sharply distinct types of

budding are found, which are best de- scribed in botanical terminology as the monopodial or racemose, and the sympodial or cymose types respectively; each is characteristic of one of the two sub-orders of the Hydroidea, the Gymnoblastea and Calypto- blastea. ■

In the- monopodial medhod (figs.'j 12, 14) the founder-polyp is,

After Hincks, Forbes, and Browne. A and B modified from Hincks; C modified from Forbes's Brit, Naked- eyed Medusae.

Fig. 1 1 .—Lar sabellarum and two stages of its Medusa, Willia stellata. A, colony of Lar;B and C, young and adult medusae.

theoretically, of unlimited growth in a vertical direction, and as it grows up it throws out buds right and left alternately, so that the first bud produced by it is the lowest down, 1 he second bud is above the first, the third above this again, and so on. Each bud produced

Fig. 12. — Colony of Bougninvillea fruticosa, natural size, attached to the underside of a piece of floating tim- ber. (After Allman.)

Fig. 13. — Portion of colony of Bougainvillea fruticosa (Anthomedusae-Gymnoblastea) more magnified. (From Lubbock, after Allman.)

by the founder proceeds to grow and to bud in the same way as the founder did, producing a side branch of the main stem. Hence, in a colony of gymnoblastic hydroids, the oldest polyp of each system, that is to say, of the main stem or of a branch, is the topmost polyp ;

Fig. 14. — Diagrams of the monopodial method of budding, shown in five stages (1-5). F, the founder-polyp; 1, 2, 3, 4, the succession of polyps budded from the fou nder- polyp ; a', b , c' , the succession of polyps budded from t; a-, b-, polyps budded from 2; O'V polyp budded from 3.

the youngest polyp of the system is the one nearest to the topmost polyp ; and the axis of the system is a true axis.

In the sympodial method of budding, on the other hand, the founder-polyp is of limited growth, and forms a bud from its sidp , which is also of limited growth, and forms a bud in its turn, and so on (figs. 15, 16). Hence, in a colony of calyptoblastic hydroids, the oldest polyp of a system is the lowest ; the youngest polyp is the top-

most one; and the axis of the system is a false axis composed of portions of each of the consecutive polyps. In this method of budding

there are two types. In one, the biserial type (fig. 15), the polyps produce buds right and left alter- nately, so that the hydranths are arranged in a zig- zag fashion, form- ing a " scorpioid cyme," as in Obelia and Sertularia. In the other, the uni- serial type (fig. 16), the b uds are formed always on •5 -L 5 the same side,

- *forming a " heii-*

Fig. 15. — Diagram of sympodial budding, coid cyme," as in biserial type, shown in five stages (1-5). F, Hydrallmania, founder-polyp; I, 2, 3, 4, 5, 6, succession of according to H. polyps budded from the founder; a, b, c, Driesch, in which, second series of polyps budded from the founder; however, the a', b 3 , series budded from 3. .primitively uni-

serial arrange- ment becomes masked later by secondary torsions of the hydranths. In a colony formed by sympodial budding, a polyp always produces first a bud, which contributes to the system to which it belongs, i.e. continues the stem or branch of which its parent forms a part. The F polyp may then form a second

14 bud, which becomes the starting

^\ point of a new system, the 1 , \ beginning, that is, of a new

**\ a) branch; and even a third bud,*

starting yet another system, may be produced from the same polyp. Hence the colonies of Calyptoblastea may be com- plexly branched, and the bud- ding may be biserial through- out, uniserial ..throughout, or partly one, partly the other. _ Thus in Plumttlaridae (figs. 17,

x- , t^. . T. , 18) there is formed a main stem

Fig. 1 6.— Diagram of sympodial b y biserial budding; each polyp budding uniserial type shown £ the main st £ m forms a in four

stages (1-4). F, founder- second bud, which usually P° l L P i. V 2 ‘ 3. succession of polyps forms a side branch or pi nnu i e budded from the founder. by uniserial budding. In this

way are formed the familiar feathery colonies of Plumularia, in which the pinnules are all in one plane, while in the allied Anlen-nularia the pinnules are arranged in whorls round the main biserial stem. The pinnules never branch again, since in the uniserial mode

of budding a polyp never forms a second polyp-bud. On the other hand, a polyp on the main stem may form a second bud which, instead of form- ing a pinnule by uni- serial budding, pro- duces by biserial bud- ding a branch, from which pinnules arise as from the main stem (fig. 18—3, 6). Or a polyp on the main stem, after having budded a second time to form a pinnule, may give rise to a third bud, which starts a new biserial system, from which uniserial pinnules arise as from the main stem -type of Aglaoplienia (fig. 19). The laws of budding in hydroids have been worked out in an interesting manner by H. Driesch [13], to whose memoirs the reader must be referred for further details.

Individualization of Polyp-Colonies. — As in other cases where animal colonies are formed by organic union of separate individuals, there is ever a tendency for the polyp-colony as a whole to act as a

Fig. 17. — Diagram’of sympodial budding, simple unbranched Plumularia-type. F, founder; 1-8, main axis formed by biserial budding from founder; a-e, pinnule formed by uniserial budding from founder; a l d l , branch formed by similar budding from 1 ; a’

single individual, and for the members to become subordinated to the needs of the colony and to undergo specialization for particular functions, with the result that they simulate organs and their in-dividuality becomes masked to a greater or less degree. Perhaps the earliest of such specializations is connected with the reproductive function. Whereas primitively any polyp in a colony may produce medusa-buds, in many hydroid colonies medusae are budded only by certain polyps termed blastoslyles (fig. 10, ft). At first not differing in any way from other polyps (fig. 5), the blasto- styles gradually lose their nutritive function and the organs connected with it; the mouth and tentacles disappear, and the blasto- style obtains the nutriment necessary for its activity by way of the coenosarc. In the Calyptoblastea, where the polyps are protected by special capsules of the perisarc, the gonothecae en- closing the blastostyles differ from

the hydro- thecae protecting the hy- dranths (fig. 54).

In other colonies the two functions of the nutritive polyp, namely, capture and digestion of food, may be

shared between different „ „ _. , . , ,

polyps (fig. 10). One class t F , IG – 18.— Diagram showing method of polyps, the dactylozoids of branching in the Plumularta-type; (dz), lose their mouth and compare with fig.,17- Polyps 3 and 6, stomach, and become elon- instead of producing unisena pinnules, gated and tentacle-like, have produced biserial branches (3 1 , 3 2 , showing great activity of 3 3 > 3 4 ; 6 1 -6 3), which give off uniserial movement. Another class, branches in their turn, the gastrozoids (gz), have the tentacles reduced or absent, but have the mouth and stomach enlarged. The dactylozoids capture food and pass it on to the gastrozoids, which swallow and digest it.

Besides the three types of individual above mentioned, there are other appendages of hydroid colonies, of which the individuality is doubtful. Such are the ” guard-polyps ” (machopolyps) of Plumularidae, which are often regarded as individuals of the nature of dactylozoids, but from a study of the mode of budding in this hydroid family Driesch concluded that the guard-polyps were not true polyp-individuals, although each is enclosed in a small protecting cup of the perisarc, known as a nematophore. Again, the spines arising from the basal crust of Podocoryne have been interpreted by some authors as reduced polyps.

3. The Medusa. — In the Hydro- medusae the medusa-individual occurs, as already stated, in one of two conditions, either as an independent organism leading a true life in the open seas, or as a subordinate individuality in the hydroid colony, from which it is never set free ; it then becomes a mere reproductive appendage or gono- phore, losing sue Fig. 19. — Diagram showing method of branch- cessively its organs ing in the Aglaophenia-type. Polyp 7 has pro- of sense, loco- duced as its first bud, 8; as its second bud, a f , motion and nutri- which starts a uniserial pinnule ; and as a third tion, until its bud I 7 , which starts a biserial branch (IP-VI 7) medusoid nature that repeats the structure of the main stem and and organization gives off pinnules. The main stem is indicated

become scarcely by , the new stem by .

recognizable.

Hence it is convenient to consider the morphology of the medusa

from these two aspects.

(a) The Medusa as an Independent Organism. — The general structure and characteristics of the medusa are described elsewhere (see articles Hydrozoa and Medusa), and it is only necessary here to deal with the peculiarities of the Hydromedusa.

As regards habit of life the vast majority of Hydromedusae are

pelagic organisms, floating on the surface of the open sea, propelling I themselves feebly by the pumping movements of the umbrella produced by contraction of the sub-umbral musculature, and capturing their prey with their tentacles. The genera Cladonema

(fig. 20) and Clava- teila (fig. 21), how- ever.are ambulatory, creeping forms.living in rock-pools and walking, as it were, on the tips of the proximal branches of each of the tentacles, while the remaining branches serve for capture of food. Cladonema still has the typical medusan structure, and is able toswim about, but in Clavatella the um- brella is so much re- duced that swimming is no longer possible. The remarkable medusa Mnestra parasites is ecto- para- sitic throughout life From Allman's Gymnoblastk Bydroids, by permission of on the pelagic mollusc the Council of the Ray Society. Phyihrrhoe, attached

Fig. 20. — Cladonema radiatum, the medusa to i °y the sub- walking on the basal branches of its tentacles umbral surface, and (<). which are turned up over the body. lts tentacles have*

become rudimentary or absent. It is inter- esting to note that Mnestra has been shown by J. W. Fewkes [15] and R. T. Gunther [19] to belong to the same family (Cladone- midae) as Cladonema and Clavatella, and it is reasonable to suppose that the non-parasitic ancestor of Mnestra was, like the other two

genera, an ambu- latory medusa which acquired louse-like habits. In some species of the genus Cunina (Narcomedu- sae) the youngest individuals (actinu- lae) are parasitic on other medusae (see below),

but in later life the parasitic habit is abandoned. No other instances are known of sessile habit in Hydro- medusae.

The external form of the Hydromedusae varies from that of a deep bell or thimble, characteristic of the Anthomedusae, to the shallow saucer-like form characteristic of the Leptomedusae. It is usual for the umbrella to have an even, circular, uninterrupted margin; but in the order Narcomedusae secondary down-growths between the tentacles produce a lobed, indented margin to the umbrella. The marginal tentacles are rarely absent in non-parasitic forms, and are typically four in number, cor- responding to the four perradii marked by the radial canals. Interradial ten- tacles may be also developed, so that the total number present may be in- creased to eight or to an indefinitely large number. In Willia, Geryonia, &c, however, the tentacles and radir.l canals are on the plan of six instead of four (figs. 11 and 26). On the other hand, in some cases the tentacles are less in number than the perradii; in Corymorpha (figs. 3 and 22) there is but a single tentacle, while two are found in Amphinema and Gemmaria (An- thomedusae), and in Solmundella bitentaculata (fig. 67) and Aeginopsis hensenii (fig. 23) (Narcomedusae). The tentacles also vary considerably in other ways than in number: first, in being usually simple, with a basal bulb, but in Cladonem-

From Allman's Gymnotlastic Bydroids, by permission of the Council of the Ray Society.

Fig. 21. — Clavatella prolifera, ambulatory medusa. /, tentacles; oc, ocelli.

After E. T, Browne, from Proc. Zod. Soc. of London.

Fig. 22. — Corymorpha nutans, adult female Medusa. Magnified 10 diameters.

form,

thirdly, in position and origin, being usually implanted on the extreme edge of the umbrella, but in Narcomedusae they become secondarily shifted and are given off high up on the ex-umbrella (figs. 23 and 25); and, fourthly, in structure, being hollow or solid, as in the polyp. In some medusae, for instance, the remarkable deep-sea family Pectyllidae, the tentacles may bear suckers, by which the animal may attach itself temporarily. It should be mentioned finally that the tentacles are very contractile and extensible, and may therefore present themselves, in one and the same individual, as

long, drawn-out threads, or in the form of short corkscrew – like ringlets ; they may stream downwards from the sub-umbrella, or be held out horizontally, or be directed upwards over the ex-umbrella (fig. 23). Each species of

After O, Maas, Die

craspedoten Medusen der

Plankton Expedition, by

permission of Lipsius and Tischer.

Fig. 23. — Aegin- opsis hensenii, slightly magnified, showing the manner in which the ten- tacles are carried in life.

After O. Maas, Craspedoten Medusen der Siboga~ Expedition, by permission of E. S. Brill & Co.

Fig. 24. — Rathkea octonemalis.

idae they are branched, often in complicated fashion; secondly, in grouping, being usually given off singly, and at regular intervals from the margin of the umbrella, but in Margelidae and in some Trachomedusae {hey are given off in tufts or bunches (fig. 24) ;

medusa usually has a characteristic method of carrying its tentacles.

The sub-umbrella invariably shows a velum as an inwardly projecting ridge or rim at its margin, within the circle of tentacles; hence the medusae of this sub-class are termed craspedote. The manubrium is absent altogether in the fresh-water medusa Limno-cnida, in which the diameter of the mouth exceeds half that of the umbrella; on the other hand, the manubrium may attain a great length, owing to the centre of the sub-umbrella with the stomach being drawn into it, as it were, to form a long proboscis, as in Geryonia. The mouth may be a simple, circular pore at the extremity of the manubrium, or by folding of the edges it may become square or shaped like a Maltese cross, with four corners and four lips. The corners of the mouth may then be drawn out into lobes or lappets, which may have a branched or fringed outline (fig. 27), and in Margelidae the subdivisions of the fringe simulate tentacles (fig. 24).

The internal anatomy of the Hydromedusae shows numer- ous variations. The stomach may be altogether lodged in the manubrium, from which the radial canals then take origin directly as in Geryonia

(Trachomedusae) ; it may be with or without gastric pouches. The radial canals may be simple or branched, primarily four, rarely six in number. The ring-canal is drawn out in Narcomedusae into festoons corresponding with the lobes of the margin, and may be obliterated altogether (Solmaris) . I n this order the radial canals are represented only^ by wide gastric pouches, and in the family Solmaridae are suppressed altogether, so that the tentacles and the festoons of the ring-canal arise directly from the stomach. In Geryonia, centripetal canals, ending blindly, arise from the ring-canal and run in a radial direction towards the centre of the umbrella (fig. 26).

Histology of the Hydromedusa. — The histology described above for the polyp may be taken as the primitive type, from which that

After O. Maas, Medusae, in Prinloe of

Monaco's series.

Fig. 25. — Aeginura grimaldii.

I + 2

HYDROMEDUSAE

[ORGANIZATION

of the medusa differs only in greater elaboration and differentiation of the cell-elements, which are also more concentrated to form distinct tissues.

The ectoderm furnishes the general epithelial covering of the body, and the muscular tissue, nervous system and sense-organs. The

Fig. 26. — Carmarina (Gervonia) (After

Nerve ring. ', Radial nerve.

Tentaculocyst.

Circular canal.

Radiating canal. ", Ovary.

Peronia or cartilaginous pro- cess ascending from the cartilaginous margin of the disk centripetally in the outer surface of the jelly- like disk; six of these are perradial, six interradial, corresponding to the

twelve

hastata, one of the Trachomedusae. Haeckel.)

solid larval tentacles, re- sembling those of Cunina.

k, Dilatation (stomach) of the manubrium.

I, Jelly of the disk.

p, Manubrium.

/, Tentacle (hollow and tertiary, i.e. preceded by six per- radial and six interradial solid larval tentacles).

u, Cartilaginous margin of the disk covered by thread- cells.

**, Velum.*

After 0. Maas in Rtsulls oj

the " Alhalross " Expedition, Museum of Comparative £oobgy, Cambridge, Mass., U.S.A.

Fig. 27. — Stomoloca divisa, one of the Tiaridae (Anthomedusae) .

external epithelium is flat on the ex-timbral surface, more columnar)n the sub-umbral surface, where it forms the muscular tissue of the sub-umbrella and the velum. The nematocysts of the ectoderm may be grouped to form batteries on the tentacles, umbrellar margin and oral lappets. In places the nematocysts may be crowded so thickly as to form a tough, supporting, " chondral " tissue, resembling cartilage, chiefly developed at the margin of the umbrella and forming streaks or bars supporting the tentacles (" Tentakelspangeri, ' peronia) or the ten- taculocysts (Gehorspangen," otoporpae). The muscular tissue of the Hydro- medusae is entirely ectodermal. The muscle-fibres arise as processes from the bases of the epithelial cells; such cells may individually become sub-epithelial in position, as in the polyp; or, in places where muscular tissue is greatly de- veloped, as in the velum or sub-umbrella, the entire muscular epithelium may be thrown into folds in order to increase its surface, so that a deeper sub-epithelial muscular layer becomes separated com- pletely from a more superficial body- epithelium.

In its arrangement the muscular tissue forms two systems: the one composed of striated fibres arranged circularly, that is to say,

concentrically round the central axis of the umbrella; the other of non- striated fibres running longitudinally, that is to say, in a radial direction from, or (in the manubrium) parallel to, the same ideal axis. The circular system is developed continuously over the entire sub- umbral surf ace, and the velum represents a special local develop- ment of this system, at a region where it is able to act at the greatest mechanical advantage in producing the contractions of the umbrella

by which the animal progresses. The longitudinal system is dis- continuous, and is subdivided into proximal, medial and distal portions. The proximal portion forms the retractor muscles of the manubrium, or proboscis, well developed, for example, in Geryonia. The medial portion forms radiating tracts of fibres, the so-called " bell-muscles " running underneath, and parallel to, the radial canals; when greatly developed, as in Tiaridae, they form ridges, so-called mesenteries, projecting into the sub-umbral cavity. The distal portions form the muscles of the tentacles. In con- trast with the polyp, the longitudinal muscle-system is entirely ectodermal, there being no endodermal muscles in '«aspedote medusae.

The nervous system of the medusa consists of sub-epithelial ganglion- cells, which form, in the first place, a diffuse plexus of nervous tissue, as in the polyp, but developed chiefly on the sub- umbral surface; and which are concen- trated, in the second place, to form a definite central ner- vous system, never found in the polyp. In Hydromedusae the central nervous system forms two Fig. 28.— Muscular Cells of Medusae concentric nerve- (Lizzia). The uppermost is a purely muscular rings at the margin ce ii f rom tne sub-umbrella ; the two lower are of the umbrella, near epidermo-muscular cells from the base of a thebaseof the velum, tentacle; the upstanding nucleated portion One, the upper forms part of the epidermal mosaic on the or ex-umbral nerve- f ree surface of the body. (After Hertwig.) ring, is derived from

the ectoderm on the ex-umbral side of the velum; it is the larger of the two rings, containing more numerous but smaller ganglion- cells, and innervates the tentacles. The other, the " lower ' or sub- umbral nerve-ring, is derived from the ectoderm on the sub-umbral side of the velum; it Contains fewer but larger ganglion-cells and innervates the muscles of the velum (see diagram in article Medusae). The two nerve-rings are connected by fibres passing from one to the other.

The sensory cells are slender epithelial cells, often with a cilium or stiff protoplasmic process, and should perhaps be regarded as the

only ectoderm-cells which retain the primitive ciliation of the larval ectoderm, otherwise lost in all Hydrozoa. The sense-cells form, in the first place, a diffuse system of scattered sensory cells, as in the polyp, developed chiefly on the manubrium, the tentacles and the margin of the umbrella, where they form a sensory ciliated epithelium covering the nerve-centres; in the second place, the sense-cells are concentrated to form definite sense-organs, situated always at the margin of the umbrella, hence often termed "marginal bodies." The posses- sion of definite sense- organs at once dis- tinguishes the medusa from the polyp, in which they are never found.

The sense-organs of medusae are of two kinds — first, organs sensitive to light, usually termed ocelli (fig. 29) ; secondly, organs commonly termed otocysts, on account of their re- semblance to the audi- tory vesicles of higher Mt£T Q M Craspedoten Medusa dcr Siboga animals, but serving Expedition, by permission of E. S. Brill & Co.

*for the sense of Fig. 29— TVaropw rosea (Ag. and Mayer) balance and orienta- s h ow ; ng the eight adradial Statocysts, each ti.on, * nd therefore close t0 6 an Ocellus. Cf. fig. 30. given the special name*

of statocysts (fig. 30). The sense-organs may be tentaculocysts, i.e. modifications of a tentacle, as in Trachylinae, or developed from the margin of the umbrella, in no connexion with a tentacle (or, if so connected, not producing any modification in the tentacle), as in Leptolinae. In Hydromedusae the sense-organs are always exposed at the umbrellar margin (hence Gymnophthalmata), while in Scypho-medusae they are covered over by flaps of the umbrellar margin (hence Steganophthalmata).

The statocysts present in general the structure of either a knob or a closed vesicle, composed of (1) indifferent supporting epithelium : (2) sensory, so-called auditory epithelium of slender cells, each

AND MORPHOLOGY]

H¥DR0METCJSA1

M-S

ex’

bearing at its free upper end a stiff bristle and running out at its base into a nerve-fibre; (3) concrement-cells, which produce intercellular cc concretion’s, So-called oto-

/’ liths. By means of

vibrations or shocks transmitted through the ?Sub water, or by displace- ments in the balance or position of the animal, the otoliths are caused to impinge against the bristles of the sensory cells, now on one side, now on the other, causing shocks or stimuli which are transmitted by the basal nerve-fibre to the central nervous system. Two stages in the de- velopment of the otocyst can be recognized, the first that of an open pit Pig. 30.— -Section of a Statocyst and on a freely – projecting Ocellus of Tiaropsis diademata ; cf. fig. 29. knob, in which the oto-

Modified after Linko, Travaux Soc. Imp. Nat., St. Petersbourg, xsix.

ex, Ex-umbral ectoderm.

sub, Sub-umbral ectoderm.

cc. Circular canal.

!’, Velum.

st.c, Cavity of statocyst.

con, Concrement-cell with otolith.

Ikhs are exposed, the second that of a closed vesicle, in which the oto- liths are covered over. Further, two distinct types of otocyst can be recognized in the Hydro- which the entire organ is

mtb”

medusae; that of the Leptolinae _ __ o

ectodermal, concrement-cells and all, and the organ is not a tenta culocyst; and that of the Trachylinae, in which the organ is a

tentaculocyst, and the con- crement-cells are endodermal, derived from the endoderm of the modified tentacle, while the rest of the organ is ecto- dermal.

In the Leptolinae the oto- cysts are seen in their first stage in Mitrocoma annae (fig. 31) and Tiaropsis (figs. 29, 30) as an open. pit at the base of the velum, on its sub- umbral side. The pit has its opening turned towards the sub-umbral cavity, while its base or fundus forms a bulge, more or less pronounced, on the ex-umbral side of the velum. At the fundus are placed the concrement-cells

Modified after O. and R. Hertwig, Nerven- system a und Sinnesorgane der Medusen, permission of F. C. W. Xog-A.

by

sub,

Fig. 31. — Section of a Statocyst of with their conspicuous oto- liths (con) and the inconspicu- ous auditory cells, which are connected with . the sub- umbral nerve- ring. From the open condition arises the closed condition very simply by closing up of the aperture of the pit. We then find the typical otocyst of the Leptomedusae, a vesicle bulging on the ex-umbral side of the velum (.figs. 32, 33). The otocysts are s placed on the outer wall of the

Sub

Mitrocoma annae Sub-umbral ectoderm cc, Circular canal. r. Velum.

st.c. Cavity of statocyst. con, Concrement-cell with otolith

. — ex.

con

Modified after 0. and R. Hertwig, Nerven- system und Sinnesorgane der Medusen, by permission of F. C. W. Vogel. Fig. 32. — Section of a Statocyst

of Phialidium. ex, Ex-umbral ectoderm. sub, Sub-umbral ectoderm. v, Velum.

st.c, Cavity of statocyst. con. Concrement-cell with otolith.

con

st.c

Modified after 0. and R. Hertwig, Xervensystem -und Sinnesorgane der Medusen, by permission of F. C. W. Vogel.

Fig. 33. — Optical Section of a Statocyst of Ociorchis.

con, Concrement – cell with

otolith. st.c, Cavity of statocyst.

vesicle (the fundus of the original pit) or on its sides ; their arrangement and number vary greatly and furnish useful characters for distinguishing genera. The sense-cells are innervated, as before, from the sub-umbral nerve-ring. The inner wall of the vesicle

con

end.

n.c.

(region of closure) is frequently thickened to form a so-called " sense; cushion," apparently a ganglionic offshoot from the sub-umbral nerve nng. In many Leptomedusae the oto cysts are very small, in- conspicuous and em- bedded completely in the tissues; hence they may be easily overlooked in badly-preserved material, and perhaps are present in many cases where they have been said to have been wanting.

In the Trachylinae the simplest condition of the otocyst is a freely pro- jecting club, a so-called statorhabd (figs. 34, 35), representing a tentacle greatly reduced in size, covered with sensory ectodermal epithelium (ect.), and containing an endodermal core (end.), which is at first continu- ous with the endoderm of the ring-canal, but later becomes separated from it. In the endoderm large concretions are formed (con.)

After 0. and R. Hertwig, Nenensyslem und Sinnes- organe der Medusen, by permission of F. C. W. Vogel.

Fig. 34. — Tentaculocyst (statorhabd) of Cunina solmaris. n.c, Nerve-cushion; end, endodermal concrement-cells; con, otolith.

. Other sensory cells with long

cilia cover a sort of cushion (n.c.) at the base of the club ; the club may be long and the cushion small, or the cushion large and the club small. The whole structure is innervated, like the tentacles, from the. ex-umbral nerve-ring. An advance towards the second stage is seen in such a form as Rhopalo- nema (fig. 36), where the ectoderm of'

the cushion rises up in a double fold to enclose the club in a protective covering form- ing a cup or vesicle, at first open distally ; finally the opening closes and the closed vesicle may sink inwards and be found: far removed from After O. and R. Hertwig, Nervensystem und Sinnes- the surface, as in Geryonia °n

The ocelli are seen in Fig. 35. — Tentaculocyst of Cunina, lati- their simplest form as a ventris.

pigmented patch of ecto- ect, Ectoderm, derm, which consists of n.c, Nerve-cushion, two kinds of cells — (1) end, Endodermal concrement-cells. pigment-cells, which are con, Otolith, ordinary indifferent cells

of the epithelium containing pigment-granules, and (2) visual cells, slender sensory epithelial cells of the usual type, which may develop visual cones or rods at: their free extremity. The ocelli occur usually either on the inner or outer sides of the ten- tacles; if on the inner side, the tentacle is turned upwards and carried over the ex – umbrella, so as to expose the ocellus to the

light; if the Fig. 36.— Simple tentaculocyst of Rhopalo- ocellus be on the nema velatum. The process carrying the otolith outer side of a or concretion hk, formed by endoderm cells, is tentacle, two enclosed by an upgrowth. forming the " vesicle," nerves run round which is not yet quite closed in at the top. the base of the (After Hertwig.) tentacle to it. In other cases ocelli may occur between tentacles, as in Tiaropsis (fig. 29).

The simple form of ocellus described in the foregoing paragraph may become folded into a pit or cup, the interior of which becomes filled with a clear gelatinous secretion forming a sort of vitreous

body. The distal portion of the vitreous body may project from the cavity of the cup, forming a non-cellular lens as in Lizzia (fig. 28). Beyond this simple condition the visual organs of the Hydromedusae do not advance, and are far from reaching the wonderful develop- ment of the eyes of Scyphomedusae (Charybdaea).

Besides the ordinary type of ocellus just described, there is found in

one genus(Tiaropsis) a type of ocellus in which the visual elements

are inverted, and

have their cones

—.a N^^^oa^Siifi^s^X . turned away from

^”- ^0&&r r – ‘ – .-• the light ‘ as in the

Cr ^^^^^SvlL--- = ^’ » ‘ ‘• “”’- Jfo human retina (fig.

the pigment-cells r ■&tuT’j«2hii^ ^) r ? .-...:. > :».i. H jL ev are endodermal,*

£. ^^^^B^ft^^^T’ ~J$w3$ forming a cup _ of

pigment in which the visual cones are embedded. A

/ /

nr,

After 0. and R. Hertwig, Nervensyslem und Sinnesorgane ier Aledusen, by permission of F. C. W. Vogel.

Fig. 37. — Section of statocyst of (Carmarina hastata).

Statocyst containing the minute tentaculo- cyst.

Ex-umbral nerve-ring.

Sub-umbral nerve-ring.

Ex-umbral ectoderm. sub, Sub-umbral ectoderm. c.c, Circular canal. v, Velum.

similar formed

among the Scypho- • .v.).

ocellus is in Aurelia

st.c, ex.

,-t

medusae (

Other sense organs of Hydro- Gerycnia medusae are the so-called sense- clubs or cordyli found in a few Leptomedusae, especially in those genera in which otocysts are incon- spicuous or absent (fig. 39). Each cordylus is a ten- tacle-like structure with an endodermal axis containing, an axial cavity which may be continuous with the ring-canal, or may be partially occluded. Externally the cordylus is covered by very flattened ectoderm, and bears no otoliths or sense-cells, but the base of the club rests upon the ex-umbral nerve-ring. Brooks regards these organs as sensory, serving for the sense of balance, and representing a primitive stage of the tentaculocysts of Trachylinae; Linko, on the other hand, finding no nerve-elements connected with them, regards them as digestive (?) in function.

The sense-organs of the two fresh-water medusae Limnocodium and Limnocnida are peculiar and of rather doubtful nature (see E. T. Browne [10]).

The endoderm of the medusa shows the same general types of structure as in the polyp, described above. We can distinguish (1) digestive endoderm, in the stomach, often with special glandular elements; (2) circu- latory endoderm, in the radial and ring- canals; (3) supporting endoderm in the axes of the tentacles and in the endoderm- lamella; the latter is primitively a double layer of cells, produced by concrescence of the ex-umbral and sub-umbral layers of the coelenteron, but it is usually found as a single layer of flattened cells (fig. 40) ; in Geryonia, however, it remains double, and the centripetal canals arise by parting of the two layers; (4) excretory endoderm, lining pores at the margin of the umbrella, occurring in certain Leptomedusae as so- called " marginal tubercles," opening, on the one hand, into the ring-canal and, on the other hand, to the exterior by " marginal funnels," which debouch into the sub-umbral cavity above the velum. As has been de- Fig. 38. — Ocellus of scribed above, the endoderm may also con- Lizzia koellikeri. oc, tribute to the sense-organs, but such Pigmented ectodermal contributions are always of an accessory cells; /, lens. (After nature, for instance, concrement-cells in Hertwig.) the otocysts, pigment in the ocelli, and

never of sensory nature, sense-cells being in all cases ectodermal.

The reproductive cells may be regarded as belonging primarily to neither ectoderm nor endoderm, though lodged in the ectoderm in all Hydromedusae. As described for the polyp, they are wandering cells capable of extensive migrations before reaching the particular spot at which they ripen. In the Hydromedusae they usually, if not invariably, ripen in the ectoderm, but in the neighbourhood of the

main sources of nutriment, that is to say, not far from the stomach. Hence the gonads are found on the manubrium in Anthomedusae generally; on the base of the manubrium, or under the gastral pouches, or in both these situations (Octorchidae) , or under the radial canals, in Trachomedusae ; under the gastral pouches or radial canals, in Narcomedusae. When ripe, the germ-cells are dehisced directly to the exterior..

Hydromedusae are of separate sexes, the only known exception being Amphogona apsleini, one of the Trachomedusae (Browne [91). Moreover, all the medusae budded from a given hydroid colony are either male or female, so that even the non-sexual polyp must be considered to have a latent sex. (In Hydra, on the other hand, the individual is usually hermaphrodite.) The medusa always reproduces itself sexually, and in some cases non-sexually also. The non-sexual reproduction takes the form of fission, budding or sporogony, the details of which are described below. Buds may be pro- duced from the manu- brium, radial canals, ring-canal, or tentacle- bases, or from an aboral stolon (Narcomedusae). In all cases only medusa-buds are produced, never polyp-buds.

The mesogloea of the medusa is largely de- veloped and of great thickness in the umbrella. The sub-epithelial tissues, i.e. the nervous and mus- cular cells, are lodged in the mesogloea, but in Hydromedusae it never contains tissue-cells or mesogloeal corpuscles.

(6) The Medusae as a Subordinate Individuality. — It has been shown above that polyps are budded only from polyps and that the medusae may be budded either from polyps or from medusae. In any case the

daughter-individuals produced from the buds may be imagined as remaining attached to the parent and forming a colony of individuals in organic connexion with one another, and thus three possible cases arise. The first case gives a colony entirely composed of polyps, as in many Hydroidea. The second case gives a colony partly composed of polyp-individuals, partly of medusa-individuals, a possibility also realized in many colonies of H ydroidea. The third case gives a colony entirely composed of medusa-individuals, a possibility perhaps realized in the Siphonophora, which will be discussed in dealing with this group.

The first step towards the formation of a mixed hydroid colony is undoubtedly a hastening of the sexual maturity of the medusa-

individual. Normally the medusae are liberated in quite an immature state; they swim

After W. IK. Brooks, Journal of Morphology, by permission of Ginn & Co. Fig. 39. — Section of a Laodice. Circular canal. Velum. Tentacle.

Cordylus, composed ectoderm ec covering a large-celled endodermal axis en.

v, t, c,

Cordylus of

of flattened

away, feed, grow and become adult mature individuals. From the bionomical point of view, the medusa is to be considered as a means of spreading the species, supplementing the deficiencies of the sessile polyp. It may be, however, that in- creased reproductive- ness becomes of greater importance to the species than wide diffu- sion; such a condition Fig. 40. — Portions of will be brought about if the Disk of Medusae— the medusae mature Lizzia, the lower of quickly and are either Hertwig.) set free in a mature d Endoderm lamella, condition or remain in the shelter of the polyp- ‘ colony, protected from j risks of a free life in the ‘ open sea. In this way ‘ the medusa sinks from ‘ independent per-

Sections through

■*the upper one of*

Aurelia. (After

Muscular processes of the ectoderm-cells

in cross section. Ectoderm. _ _ .

Endoderm lining the enteric cavity. Wandering endoderm cells of the

gelatinous substance.

sonality to an organ of the polyp-colony, becoming a so-called medusoid gonophore, or bearer of the reproductive organs, and losing gradually all organs necessary for an independent existence, namely those of sense, locomotion ˆind nutrition.

In some cases both free medusae and gonophores may be produced from the same hydroid colony. This is the case in Syncoryne tnirabilis (Allman [lj, p. 278) and in Campanularia volubilis; in the latter, free medusae are produced in summer, gonophores in winter (Duplessis [14]). Again in Pennaria, the male medusae are set free

in a state of maturity, and have ocelli ; the female medusae remain attached and have no sense organs.

The gonophores of different hydroids differ greatly in structure from one another, and form a series showing degeneration of the medusa-individual, which is gradually stripped, as it were, of its characteristic features of medusan organization and finally reduced to the simplest structure. A very early stage in the degeneration is well exemplified by the so-called " meconidium " of Gonothyraea (fig. 41, A). Here the medusoid, attached by the centre of its ex-umbral surface, has lost its velum and sub-umbral muscles, its sense organs and mouth, though still retaining rudimentary tentacles. The gonads (g) are produced on the manubrium, which has a hollow endodermal axis, termed the spadix (sp.), in open communication with the coenosarc of the polyp-colony and serving for the nutrition of the generative cells. A very similar condition is seen in Tubularia (fig. 41, B), where, however, the tentacles have quite disappeared, and the circular rim formed by the margin of the umbrella has nearly closed over the manubrium leaving only a small aperture through which the embryos emerge. The next step is illustrated by the female gonophores of Cladocoryne, where the radial and ring-canals

Modified from Weismaan, Entstehung der Sexualzellen bei den Hydromedusen.

Fig. 41.— Diagrams of the Structure of the Gonophores of various Hydromedusae, based on the figures of G. J. Allman and A. Weismann.

A, B, C, D, E, F, F, G,

"Meconidium" of Gonothyraea. H, Type of Tubularia.

Type of Garoeia, &c. [&c. s.c,

Type of Plumularia, Agalma, t,

Tvpe of Coryne, Forskalia, &c. c.c, G, H, Sporosacs.

With simple spadix.

With spadix prolonged

(Eudendrium).

sp, c.l, ex, ect,

With spadix branched (Cordy-

lophora). Sub-umbral cavity. Tentacles. Circular canal. Gonads. Spadix.

Endoderm-lamella. Ex-umbral ectoderm. Ectotheca.

have become obliterated by coalescence of their walls, so that the entire endoderm of the umbrella is in the condition of the endoderm-lamella. Next the opening of the umbrella closes up completely and disappears, so that the sub-umbral cavity forms a closed space surrounding the manubrium, on which the gonads are developed; such a condition is seen in the male gonophore of Cladocoryne and in Garveia (fig. 41, C), where, however, there is a further complication in the form of an adventitious envelope or ectotheca {ect.) split off from the gonophore as a protective covering, and not present in Clado- coryne. The sub-umbral cavity (s.c.) functions as a brood-space for the developing embryos, which are set free by rupture of the wall. It is evident that the outer envelope of the gonophore represents the ex-umbral ectoderm (ex.), and that the inner ectoderm lining the cavity represents the sub-umbral ectoderm of the free medusa. The next step is the gradual obliteration of the sub-umbral cavity

(s.c.) by disappearance of which the sub-umbral ectoderm comes into contact with the ectoderm of the manubrium. Such a type is found in Plumularia and also in Agalma (fig. 41, D) ; centrally is seen the spadix (sp.), bearing the generative cells (g), and external to these (1) a layer of ectoderm representing the epithelium of the manubrium ; (2) the layer of sub-umbral ectoderm; (3) the endoderm-lamella (e.l.) ; (4) the ex-umbral ectoderm (ex.) ; and (5) there may or may not be present also an ectotheca. Thus the gonads are covered over by at least four" layers of epithelium, and since these are unnecessary, presenting merely obstacles to the dehiscence

of the gonads, they gradually undergo reduction. The sub-umbral ectoderm and that covering the manubrium undergo concrescence to form a single layer (fig. 41, E), which finally disappears altogether, and the endoderm- lamella disappears. The gonophore is now reduced to its simplest condition, known as the sporosac (fig. 41, F, G, H), and consists of the spadix bearing the gonads covered by a single layer of ectoderm (ex.), with or without the addition of an ectotheca. It cannot be too strongly emphasized, however, that the sporosac should not be com- pared simply with the manubrium of the medusa, as is sometimes done. The endodermal spadix (sp) of the sporosac represents the endoderm of the manubrium ; the ectodermal lining of the sporosac (ex.) represents the ex-umbral ectoderm of the medusa; and the intervening layers, together with the sub-umbral cavity, have disappeared. The spadix, as the organ of nutrition for the gonads, may be developed in various ways, being simple (fig. 41 , F) or branched (fig. 41, H); in Eudendrium (fig. 41, G) it curls round the single large ovum.

The hydroid Dicoryne is re- markable for the possession of gono- phores, which are ciliate and become detached and swim away by means of their cilia. Each such sporosac has two long tentacle-like processes thickly ciliated.

It has been maintained that the gonads of Hydra represent sporosacs or gono- phores greatly re- duced, with the last traces of medusoid struc- ture completely obliterated. There is, however, no evidence whatever for this, the gonads of Hydra being

After Allman, Gymnoblastic Hydroidt, by permission of the Council of the Ray Society.

Fig. 42. — Gonophores of Dicoryne conferta. A, A male gonophore still enclosed in its ecto- theca. [liberation. B and C, Two views of a female gonophore after _ t, Tentacles, purely ectodermal m , Ova, two carried on each female gonophore. structures, while s p t Testis, all medusoid gono- phores have an endodermal portion. Hydra is, moreover, bisexual, in contrast with what is known of hydroid colonies.

In some Leptomedusae the gonads are formed on the radial canals and form protruding masses resembling sporosacs super- ficially, but not in structure. Allman, however, regarded this type of gonad as equivalent to a sporosac, and considered the medusa bearing them as a non-sexual organism, a ” blastocheme ” a’sjie termed it, producing by budding medusoid gonophores. As medusae are known to bud

medusae from the radial canals there is nothing impossible in Allman's theory, but it cannot be said to have received satisfactory proof.

Reproduction and Ontogeny of the Hydromedusae.

Nearly every possible method of reproduction occurs amongst the Hydromedusae. In classifying methods of generation it is usual to make use of the sexual or non-sexual nature of the reproduction as a primary difference, but a more scientific classification is afforded by the distinction between tissue-cells

HVimGMEBUSAE

[REPRODUCTION

(bistocytes) and genninal cells, actual or potential (archaeo- cytes), amongst the constituent cells of the animal body. In this way we may distinguish, first, vegetative reproduction, the result of discontinuous growth of the tissues and cell-layers of the body as a whole, leading to (i) fission, (2) autotomy, or (3) vegetative budding; secondly, germinal reproduction, the result of the reproductive activity of the archaeocytes or germinal tissue. In germinal reproduction the proliferating cells may be undifferentiated, so-called primitive germ-cells, or they may be differentiated as sexual cells, male or female, i.e. spermatozoa and ova. If the germ-cells are undifferentiated, the offspring may arise from many cells or from a single cell; the first type is (4) germinal budding, the second is (5) sporogony. If the germ- cells are differentiated, the offspring arises by syngamy or sexual union of the ordinary type between an ovum and spermatozoon, so-called fertilization, of the ovum, or by parthenogenesis, i.e. development of an ovum without fertilization. The only one of these possible modes of reproduction not known to occur in Hydromedusae is parthenogenesis.

(1) True fission or longitudinal division of an individual into two equal and similar daughter-individuals is not common but occurs in Gastroblasta, where it has been described in detail by Arnold Lang {30]. '

(2) Autotomy, sometimes termed transverse fission,, is the name given to a process of unequal fission in which a portion of the body separates off with subsequent regeneration. In Tubularia by a process of decapitation the. hydranths may separate off and give rise to a separate individual, while the remainder of the body grows a new

hydranth. Similarly in Schizoeladium portions of the hydrocaulus are cut off to form so-called " spores,"

which grow into new individuals (see Allman [1]).

(3) Vegetative bud- ding is almost uni- versal in the Hydro- medusae. By budding is understood the formation of a new in- dividual from a fresh growth of undiffer- entiated material. It is convenient to dis- tinguish buds that give rise to polyps from those that form medusa.e.

(a). The Polyp.— The buds that form polyps are very simple in mode of formation. Four stages may be distinguished; the first is a simple outgrowth of both layers, ecto- derm and endoderm, containing a prolonga- tion of the coelenteric cavity; in the second stage the tentacles grow out as secondary diverticula from the side of the first out- growth; in the third stage the mouth is formed as a perfora- tion of the two layers; and, lastly, if the bud is to be separated, it becomes nipped off from the parent polyp and begins a free existence.

(6) The Medusae. — Two types of budding must be distinguished — the direct, so-called palingienetic type, and the indirect, so-called coanogenatic type.

The direct type of budding is rare, but is seen in Cunina and Millepora. In Cunina there arises, first, a simple outgrowth of both layers, as in a polyp-bud (fig. 43, A) ; in this the mouth is formed fffetally as a perforation (B); next the sides of the tube so formed

bulge out laterally near the attachment to form the umbrella, while

the distal undilated portion of the tube represents the manubrium

(C); the umbrella

now grows out as ts^^c.

into a number of

lobes or lappets,

and the tentacles

and tentaculocysts

grow out, the

former in a notch

between two

lappets, the latter

on the apex of each

lappet (D, E);

finally, the velum

arises as a growth

of the ectoderm

alonei the whole

bud shapes itself,

so to speak, and

the little medusa is

separated off by

rupture of the thin

stalk connecting it

with the parent (F).

The direct method

of medusa-budding

only differs from

the polyp-bud by

its greater com- plexity of parts and

organs.

The indirect

mode of budding

(figs. 44, 45) is the

commonest method

by which medusa- buds are formed.

It is marked by the

formation in the

bud of a character-

istic structure

termed the ento-

codon (Knospen-

kern, Glockenkern). The first stage is

a simple hollow

outgrowth of both

body-layers (fig. 44,

A); at the tip of

this is formed a

thickening of the

ectoderm, arising

primitively as a

hollow ingrowth (fig. 44, B), but

more usually as a

solid mass of ecto- derm-cells (fig. 45,

A). The ectodermal

ingrowth is the

entocodon (Gc); it

bulges into, and pushes down, the endoderm at the apex of the bud, and if solid it soon acquires a cavity (fig. 44, C

Much modified

from C.

Chun

, " Coelenterata," in

Broon's Ticrrtich.

Fig. 43 —

Direct Budding of Cunina.

A,

B,C, E,F,

In ver-

/,

Tentacle.

tical section.

s.o,

Sense organ.

Sketch of

exter-

v,

Velum.

na\ view

s.c,

Sub-um bral

st,

Stomach.

cavity.

m

Manubriu

m.

n.s,

Nervous system

Fig. 44. — Diagrams of Medusa budding with the formation of an entocodon. The endoderm is shaded, the ectoderm left clear.

A, B, C, D, F, Succes- sive stages in ver- tical section. E, Transverse sec- tion of a stage similar to D. Entocodon. Cavity of ento- codon, forming the future

Gc,

s.c.

St,

r.c. c.c,

e.l, m,

v, t,

sub-u mbral

cavity. Stomach. Radial canal. Circular canal. Endoderm lamella. Manubrium. Velum. Tentacle.

,y

s.c). The cavity of the entocodon increases continuallyln size, while the endoderm pushes up at the sides of it to form a cup with hollow walls, enclosing but not quite surrounding the _

*entocodon, which ** c –*

remains in contact at its outer side with the ectoderm covering the bud (fig. 44, D,»). The next changes that take place are chiefly in the endo- d«rm-cup (fig. 44, D, E); the cavity between the two walls of

the cup becomes reduced by concrescence to form the radial canals (r.c), ring-canal (c.c), and endoderm-lamella (e.l., fig. 44, E), and at the same time the base of the cup is thrust upwards to form the manubrium (m), converting the cavity of the entocodon into a

A B C

Fig. 45. — Modifications of the method of budding shown in fig, 44, with solid Ento- codon (Gc.) and formation of an ectotheca (ect.).

space which is crescentic or horse-shoe-like in section. Next tentacles (t, fig. 44, F) grow out from the ring-canal, and the double plate of ectoderm on the distal side of the entocodon becomes perforated, leaving a circular rim composed of two layers of ectoderm, the velum (v) of the medusa. Finally, a mouth is formed by breaking through at the apex of the manubrium, and the now fully-formed

medusa becomes separated by rup- ture of the stalk of the bud and swims away.

If the bud, how- ever, is destined to give rise not to a free medusa, but to a gonophore, the development is similar but be- comes arrested at various points, ac- cording to the degree to which the gonophore is degenerate. The entocodon is usually formed, proving the medu- soid nature of the bud, but in sporo sacs the entocodon may be rudimentary or absent altogether. The process of budding as above described may be varied or complicated in various Ways; thus a secondary, amnion-like, ecto- dermal covering or ectotheca (fig. 45, C, ect.) may be formed over all, as in Garveia, &c. ; or the entocodon may remain solid and without cavity until after the formation of the manubrium, or may never acquire a cavity at all, as described above for the gono- phores.

Phylogenetic Sig-

Fig. 46.-Diagra.ns to show the significance "UtocMon ~l 'is of the Entocodon in Medusa-buds. (Modified f!',, fr ' m fll ' from a diagram given by A. Weismann.) fcegoxng amount

I, Ideally primitive method of budding, in of medusa – bud- which the mouth is formed first (la), ding that the ento- next the tentacles (16), and lastly the codon is a very umbrella. . important consti-

Method of Cunina; (a) the mouth arises, tuent of the bud, next the umbrella (6), and lastly the ten- furnishing some of tacles ©. _ the most essential

Hypothetical transition from II to the in- portions of the direct method with an entocodon; the medusa; its cavity formation of the manubrium is retarded, becomes the sub- that of the umbrella hastened (Ilia, b). umbral cavity, a, b, c, budding with an entocodon (cf. and its lining fur- fig- 44)- nishea the ecto- V , Budding with a solid entocodon (cf. fig. 45). dermal epithelium

of the manubrium and of the sub-umbral cavity as far as the edge of the velum. Hence the entocodon represents a precocious formation of the sub-umbral surface, equivalent to the peristome of the polyp, differentiated in the bud prior to other portions of the organism which must be regarded as antecedent to it in phylogeny.

If the three principal organ-systems of the medusa, namely mouth, tentacles and umbrella, be considered in the light of phylogeny, it is evident that the manubrium bearing, the mouth must be the oldest, as representing a common property of all the Coelentera, even of the gastrula embryo of all Enterozoa. Next in order come the tentacles, common to all Cnidaria. The special property of the medusa is the umbrella, distinguishing the medusa at once from other morphological types among the Coelentera. If, therefore, the formation of these three systems of organs took place according to

II

III

IV

a strictly phylogenetic sequence, we should expect them to appear in the order set forth above (fig. 46, la, b, c). The nearest approach to the phylogenetic sequence is seen in the budding of Cunina, where the manubrium and mouth appear first, but the umbrella is formed before the tentacles (fig. 46, Ha, b, c). In the indirect or coeno-genetic method of budding, the first two members of the sequence exhibited by Cunina change places, and the umbrella is formed first, the manubrium next, and then the tentacles; the actual mouth-perforation being delayed to the very last (fig. 46, IVa, b, c). Hence

the budding of medusae exemplifies very clearly a common phenomenon in development, a phylogenetic series of events completely dislocated in the ontogenetic time-sequence.

The entocodon is to be regarded, therefore, not as primarily an ingrowth of ectoderm, but rather as an upgrowth of both body-layers, in the form of a circular rim (IVa), representing the umbrellar margin; it is comparable to the bulging that forms the umbrella in the direct method of budding, but takes place before a manubrium is formed, and is greatly reduced in size, so as to become a little pit. By a simple modification, the open pit becomes a solid ectodermal ingrowth, just as in Teleostean fishes the hollow medullary tube, or the auditory pit of other vertebrate embryos, is formed at first as a solid cord of cells, which acquires a cavity secondarily. Moreover, the entocodon, however developed, gives rise at first to a closed cavity, representing a closing over of the umbrella, temporary in the bud destined to be a free medusa, but usually permanent in the sessile gonophore. As has been shown above, the closing up of the sub-umbral cavity is one of the earliest degenerative changes in the evolution of the gonophore, and we may regard it as the umbrellar fold taking on a protective function, either temporarily for the bud or permanently for the gonophore.

To sum up, the entocodon is a precocious formation of the umbrella, closing over to protect the organs in the umbrellar cavity. The possession of an entocodon proves the medusa-nature of the bud, and can only be explained on the theory that gonophores are de- generate medusae, and is inexplicable on the opposed view that medusae are derived from gonophores secondarily set free. In the sporosac, however, the medusa-individual has become so degenerate that even the documentary proof, so to speak, of its medusoid nature may have been destroyed, and only circumstantial evidence of its nature can be produced.

4. Germinal Budding. — This method of budding is commonly described as budding from a single body-layer, instead of from both layers. The layer that produces the bud is invariably the ectoderm, i.e. the layer in which, in Hydromedusae, the generative cells are lodged; and in some cases the buds are produced in the exact spot in which later the gonads appear. From these facts, and fiom those of the sporogony, to be described below, we. may regard budding to this type as taking place from the germinal epithelium rather than from ordinary ectoderm.

(a) The Polyp. — Budding from the ectoderm alone has been

described by A. Lang [29] in Hydra and other polyps. The tissues of the bud become differentiated into ectoderm and endoderm, and the endoderm of the bud becomes secondarily continuous with that of the parent, but no part of the parental endoderm contributes to the building up of the daughter-polyp. Lang regarded this method of budding as universal in polyps, a notion disproved by O. Seeliger [52] who went to the opposite extreme and regarded the type of budding described by Lang as non-existent. In view, however, both of the statements and figures of Lang and of the facts to be described presently for medusae (Margellium), it is at least theoretically possible that both germinal and vegetative budding may occur in polyps as well as in medusae.

(b) The Medusa. — The clearest instance of germinal budding is furnished by Margellium (Rathkea) oclopunctatitm, one of the Margelidae. The budding of this medusa has been worked out in detail by Chun (Hydrozoa, [1]), to whom the reader must be referred for the interesting laws of budding regulating the sequence and order of formation of the buds.

The buds of Margellium are produced on the manubrium ineach of the four interradii, and they arise from the ectoderm, that is to say, the germinal epithelium, which later gives rise to the gonads. The buds do not appear. simultaneously but successively on each of the

1

four sides of the manubrium, thus: 3 4 and secondary "buds

2

may be produced on the medusa-buds before the latter are set free as medusae. Each bud arises as a thickening of the epithelium, which first forms two or three layers (fig. 47, A), and becomes separated into a superficial layer, future ectoderm, surrounding a central mass, future endoderm (fig. 47, B). The ectodermal epithelium on the distal side of the bud becomes thickened, grows inwards, and forms a typical entocodon (fig. 37, D, E, F). The remaining development of the bud is just as described above for the indirect method of medusa-budding (fig. 47, G, H). When the bud is nearly complete, the body-wall of the parent immediately below it becomes perforated, placing the coelenteric cavity of the parent in secondary communication with that of the bud (H), doubtless for the better nutrition of the latter.

[REPRODUCTION

Especially noteworthy in the germinal budding of Margellium is the formation of the entocodon, as in the vegetative budding of the indirect type.

5. Sporogony. — This method of reproduction has been described by E. Metchnikoff in Cunina and allied genera. In individuals either of the male or female sex, germ-cells which are quite un- differentiated and neutral in character, become amoeboid, and wander into the endoderm. They divide each into two sister- cells, one of which — the spore — becomes enveloped by the other. The spore-cell multiplies by division, while the enveloping cell is nutrient and protective. The spore cell gives rise to a " spore- larva," which is set free in the coelenteron and grows into a medusa. Whether sporogony occurs also in the polyp or not remains to be proved.

6. Sexual Reproduction and Embryology. — The ovum of Hydro-medusae is usually one of a large number of oogonia, and grows at the expense of its sister-cells. No regular follicle is formed, but the oocyte absorbs nutriment from the remaining oogonia. In Hydra the oocyte is a large amoeboid cell, which sends out pseudopodia amongst the oogonia and absorbs nutriment from them. When the oocyte is full grown, the residual oogonia die off and disintegrate.

The spermatogenesis and maturation and fertilization of the germ-cells present nothing out of the common and need not be

Fig. 47. — Budding from the Ectoderm (germinal epithelium) in Margellium. (After C. Chun.)

A, The epithelium becomes two- the bud forms an entocodon

layered. (Gc).

B, The lower layer forms a solid G,H, Formation of the medusae.

mass of cells, which © s.c, Sub-umbral cavity,

becomes a vesicle, the future r.c, Radial canal,

endoderm, containing the st, Stomach, which in H ac- coelenteric cavity (coel), quires a secondary com-

while the outer layer munication with the diges-

furnishes the future ecto- tive cavity of the mother,

derm. c.c, Circular canal.

D, E, F, a thickening of the ecto- v, Velum,

derm on the distal side of /, Tentacle.

described here. These processes have been studied in detail by A. Brauer [2] for Hydra.

The general course of the development is described in the article Hydrozoa. We may distinguish the following series of stages: (1) ovum; (2) cleavage, leading to formation of a blastula; (3) formation of an inner mass or parenchyma, the future endoderm, by immigration or delamination, leading to the so-called parenchy-mula-stage; (4) formation of an archenteric cavity, the future coelenteron, by a splitting of the internal parenchyma, and of a blastopore, the future mouth, by perforation at one pole, leading to the gastrula-stage ; (5) the outgrowth of tentacles round the mouth (blastopore), leading to the actinula-stage; and (6) the actinula becomes the polyp or medusa in the manner described elsewhere (see articles Hydrozoa, Polyp and Medusa). This is the full, ideal development, which is always contracted or shortened to a greater or less extent. If the embryo is set free as a free-swimming, so-called planula-larva, in the blastula, parenchymula, or gastrula stage, then a free actinula stage is not found; if, on the other hand, a free actinula occurs, then there is no free planula stage.

The cleavage of the ovum follows two types, both seen in Tubularia (Brauer [3]). In the first, a cleavage follows each nuclear division; in the second, the nuclei multiply by division a number of times, and then the ovum divides into as many blastomeres as there are nuclei present. The result of cleavage in all cases is a typical blastula, which when set free becomes oval and develops a flagellum to each cell, but when not set free, it remains spherical in form and has no flagella.

The germ-layer formation is always by immigration or delamina-tion, never by invagination. When the blastula is oval and free-swimming the inner mass is formed by unipolar immigration from the hinder pole. When the blastula is spherical and not set free, the germ-layer formation is always multipolar, either by immigration or by delamination, i.e. by tangential division of the cells of the

blastoderm, as in Geryonia, or by a mixture of immigration and delamination, as in Hydra, Tubularia, &c. The blastopore is formed as a secondary perforation at one spot, in free-swimming forms at the hinder pole. Formation of archenteron and blastopore may, however, be deferred till a later stage (actinula or after).

The actinula stage is usually suppressed or not set free, but it is seen in Tubularia (fig. 48), where it is ambulatory, in Gonionemus (Trachomedusae), and in Cunina (Narco- medusae), where it is parasitic.

In Leptolinae the embryonic develop- ment culminates in a polyp, which is usually formed by fixation of a planula (parenchymula), rarely by fixation of an actinula. The planula may fix itself (1) by one end, and then becomes the hydro- caulus and hydranth, while the hydro- rhiza grows out from the base; or (2) partly by one side and then gives rise to Modified from a plate by L. the hydrorhiza as well as to the other Agassis Gmfrj&Btfras to Nat. parts of the polyp; or (3) entirely by its H,si – Vbl lv-

side, and then forms a recumbent hydro- pi G . ˆfj – . Free Actinula

rhiza from which a polyp appears to be f Tubularia.

budded as an upgrowth.

In Trachylinae the development produces always a medusa, and there is no polyp-stage. The medusa arises direct from the actinula-stage and there is no entocodon formed, as in the budding described above.

Life-cycles of the Hydromedusae. — The life-cycle of the Leptolinae consists of an alternation of generations in which non-sexual individuals, polyps, produce by budding sexual individuals, medusae, which give rise by the sexual process to the non-sexual polyps again, so completing the cycle. Hence the alternation is of the type termed ■metagenesis. The Leptolinae are chiefly forms belonging to the in-shore fauna. The Trachylinae, on the other hand, are above all oceanic forms, and have no polyp-stage, and hence there is typically no alternation in their life-cycle. It is commonly assumed that the Trachylinae are forms which have lost the alternation of generations possessed by them ancestrally, through secondary simplification of the life-cycle. Hence the Trachylinae are termed " hypogenetic " medusae to contrast them with the metagenetic Leptolinae. The whole question has, however, been argued at length by W. K. Brooks

14], who adduces strong evidence for a contrary view, that is to say, for regarding the direct type of development seen in Trachylinae as more primitive, and the metagenesis seen in Leptolinae as a secondary complication introduced into the life-cycle by the acquisition of larval budding. The polyp is regarded, on this view, as a form phylogenetically older than the medusa, in short, as nothing more than a sessile actinula. In Trachylinae the polyp-stage is passed over, and is represented only by the actinula as a transitory embryonic stage. In Leptolinae the actinula becomes the sessile polyp which has acquired the power of budding and producing individuals either of its own or of a higher rank ; it represents a persistent larval stage and remains in a sexually immature condition as a neutral individual, sex being an attribute only of the final stage in the development, namely the medusa. The polyp of the Leptolinae has reached the limit of its individual development and is incapable of becoming itself a medusa, but only produces medusa-buds; hence a true alternation of generations is produced. In Trachylinae also the beginnings of a similar metagenesis can be found. Thus in Cunina oclonaria, the ovum develops into an actinula which buds daughter-actinulae; all of them, both parent and offspring, develop into medusae, so that there is no alternation of generations, but only larval multiplication. In Cunina parasitica, however, the ovum develops into an actinula, which buds actinulae as before, but only the daughter-actinulae develop into medusae, while the original, parent-actinula dies off; here, therefore, larval budding has led to a true alternation of generations. In Gonionemus the actinula becomes fixed and polyp-like, and reproduces by budding, so that here also an alternation of generations may occur. In the Leptolinae we must first substitute polyp for actinula, and then a condition is found which can be compared to the case of Cunina parasitica or Gonionemus, if we suppose that neither the parent-actinula {i.e. founder-polyp) nor its offspring by budding (polyps of the colony) have the power of becoming medusae, but only of producing medusae by budding. For further arguments and illustrations the reader must be referred to Brooks's most interesting memoir. The whole theory is one most

intimately connected with the question of the relation between polyp and medusa, to be discussed presently. It will be seen elsewhere, however, that whatever view may be held as to the origin of meta-

genesis in Hydromedusae, in the case of Scyphomedusae (q.v.) no other view is possible than that the alternation of generations is the direct result of larval proliferation.

To complete our survey of life-cycles in the Hydromedusae it is necessary to add a few words about the position of Hydra and its allies. If we accept the view that Hydra is a true sexual polyp, and that its gonads are not gonophores (i.e. medusa-buds) in the extreme of degeneration, then it follows from Brooks's theory that Hydra must be descended from an archaic form in which the medusan type of organization had not yet been evolved. Hydra must, in short, be a living representative of the ancestor of which the actinula-stage is a transient reminiscence in the development of higher forms. It may be pointed out in this connexion that the fixation of Hydra is only temporary, and that the animal is able at all times to detach itself, to move to a new situation, and to fix itself again. There is no difficulty whatever in regarding Hydra as bearing the same relation to the actinula-stage of other Hydromedusae that a Rotifer bears to a trochophore-larva or a fish to a tadpole.

The Relation of Polyp and Medusa. — Many views have been put forward as to the morphological relationship between the two types of person in the Hydromedusae. For the most part, polyp and medusa have been regarded as modifications of a common type, a view supported by the existence, among Scypho- medusae (q.v.), of sessile polyp-like medusae (Lucernaria, &c). R. Leuckart in 1848 compared medusae in general terms to flattened polyps. G. J. Allman [1] put forward a more detailed view, which was as follows. In some polyps the tentacles are webbed at the base, and it was supposed that a medusa was a polyp of this kind set free, the umbrella being a greatly developed web or membrane extending between the tentacles. A very different theory was enunciated by E. Metchfiikoff. In some hydroids the founder-polyp, developed from a planula after fixa- tion, throws out numerous outgrowths from the base to form the hydrorhiza; these outgrowths may be radially arranged so as to form by contact or coalescence a flat plate. Mechnikov considered the plate thus formed at the base of the polyp as equivalent to the umbrella, and the body of the polyp as equivalent to the manubrium, of the medusa; on this view the marginal tentacles almost invariably present in medusae are new formations, and the tentacles of the polyp are represented in the medusa by the oral arms which may occur round the mouth, and which some- times, e.g. in Margelidae, have the appearance and structure of tentacles. Apart from the weighty arguments which the develop- ment furnishes against the theories of Allman and Mechnikov, it may be pointed out that neither hypothesis gives a

satisfactory explanation of a structure universally present in medusae of whatever class, namely the endoderm-lamella, discovered by the brothers O. and R. Hertwig. It would be necessary to regard this structure as a secondary extension of the endoderm in the tentacle-web, on Allman's theory, or between the outgrowths of the hydrorhiza, on Mechnikov's hypothesis. The develop- ment, on the contrary, shows unequivocally that the endoderm- lamella arises as a local coalescence of the endodermal linings of a primitively extensive gastral space.

The question is one intimately connected with the view taken as to the nature and individuality of polyp, medusa and gono- phore respectively. On this point the following theories have been put forward.

1. The theory that the medusa is simply an organ, which has become detached and has acquired a certain degree of independence, like the well-known instance of the hectocotyle of the cuttle-fish. On this view, put forward by E. van Beneden and T. H. Huxley, the sporosac is the starting-point of an evolution leading up through the various types of gonophores to the free medusa as the culminating point of a phyletic scries. The evidence against this view may be classed under two heads: first, comparative evidence; hydroids very different in their structural characters and widely separate in the systematic classification of these organisms may produce medusae very similar, at least so far as the essential features of medusan organization are concerned; on the other hydroids closely allied, perhaps almost indistinguishable, may produce gonophores in the one case, medusae in the other; for example, Hydractinia (gonophores) and Podocoryne (medusae), Tubidaria (gonophores) and Ectopleura (medusae), Coryne (gonephores) and Syncoryne (medusae), and so on. If it is assumed that all these genera bore gonophores ancestrally, then medusa of similar type must have been evolved quite inde-

pendently in a great number of cases. Secondly, there is the evidence from the development, namely, the presence of the entocodon in the medusa-bud, a structure which, as explained above, can only be accounted for satisfactorily by derivation from a medusan type of organization. Hence it may be concluded that the gonophores are degenerate medusae, and not that the medusae are highly elaborated gonophores, as the organ-theory requires.

2. The theory that the medusa is an independent individual, fully equivalent to the polyp in this respect, is now universally accepted as being supported by all the facts of comparative morphology and

development. The question still remains open, however, which of the two types of person may be regarded as the most primitive, the most ancient in the race-history of the Hydromedusae. F. M. Balfour put forward the view that the polyp was the more primitive type, and that the medusa is a special modification of the polyp for reproductive purposes, the result of division of labour in a polyp-colony, whereby special reproductive persons become detached and acquire organs of locomotion for spreading the species. W. K. Brooks, on the Other hand, as stated above, regards the medusa as the older type and looks upon both polyp and medusa, in the Hydromedusae, as derived from a free-swimming or floating actinula, the polyp being thus merely a fixed nutritive stage, possessing secondarily acquired powers of multiplication by budding.

The Hertwigs when they discovered the endoderm-lamella showed on morphological grounds that polyp and medusa are independent types, each produced by modification in different directions of a more primitive type represented in development by the actinula-stage. If a polyp, such as Hydra, be regarded simply as a sessile actinula, we must certainly consider the polyp to be the older type, and it may be pointed out that in the Anthozoa only polyp-individuals occur. This must not be taken to mean, however, that the medusa is derived from a sessile polyp; it must be regarded as a direct modification of the more ancient free actinula form, without primitively any intervening polyp-stage, such as has been introduced secondarily into the development of the Leptolinae and represents a revival, so to speak, of an ancestral form or larval stage, which has taken on a special role in the economy of the species.

Systematic Review of the Hydromedusae

Order I. Eleutheroblastea — Simple polyps which become sexually mature and which also reproduce non-sexually, but without any medusoid stage in the life-cycle.

The sub-order includes the family Hydridae, containing the common fresh-water polyps of the genus Hydra. Certain other forms of doubtful affinities have also been referred provisionally to this section.

Hydra. — This genus comprises fresh-water polyps of simple structure. The body bears tentacles, but shows no division into hydrorhiza, hydrocaulus or hydranth ; it is temporarily fixed and has no perisarc. The polyp is usually hermaphrodite, developing both ovaries and testes in the same individual. There is no free-swimming

planula larva, but the stage corresponding to it is passed over in an envelop- ing cyst, which is secreted round the embryo by its own ectodermal layer, shortly after the germ-layer formation is complete, i.e. in the parenchymula-stage. The envelope is double, consisting of an ex- ternal chitinous stratified shell, and an internal thin elastic membrane. Protected by the double envelope, the embryo is set free as a so-called " e SS" an d m Europe it passes the winter in this condition. In the spring the embryo bursts its shell and is set free as a minute actinula which becomes a Hydra.

Many species are known, of which three are common in European waters. It has been shown by C. F. Jickeli (28) that the species are distinguishable by the characters of their nematocysts. They also show characteristic differences in the egg (Brauer [2]). In Hydra viridis the polyp is of a green colour and produces a spherical egg with a smooth shell which is dropped into the mud. H. grisea is greyish in tint and produces a spherical egg with a spiky shell, which also is dropped into the mud. H.fusca (=H. vulgaris) is brown in colour, and produces a bun-shaped egg, spiky on the convex surface, and attached to a water-weed or some object by its flattened side. Brauer found a fourth species, similar in appearance to H. fusca, but differing from the three other species in being of separate sexes, and in producing a spherical egg with a knobby shell, which is attached like that of H. fusca.

The fact already noted that the species of Hydra can be dis- tinguished by the characters of their nematocysts is a point of great interest. In each species, two or three kinds of nematocysts occur, some large, some small, and for specific identification the nemato- cysts must be studied collectively in each species. It is very re- markable that this method of characterizing and diagnozing species has never been extended to the marine hydroids. It is quite possible that the characters of the nematocysts might afford data as useful to the systematist in this group as do the spicules of sponges, for instance. It would be particularly interesting to ascertain how the nematocysts of a polyp are related to those possessed by the medusa budded from it, and it is possible that in this manner obscure questions of relationship might be cleared up.

Protohydra is a marine genus characterized by the absence of tentacles, by a great similarity to Hydra in histological structure, and by reproduction by transverse fission. It was found originally in an oyster-farm at Ostend. The sexual reproduction is unknown. For further information see C. Chun (Hydrozoa [1].P1. I.).

Polypodium hydriforme Ussow is a fresh-water form parasitic on the eggs of the sterlet. A " stolon " of unknown origin produces thirty-two buds, which become as many Polypodia; each has twenty-four tentacles and divides by fission repeated twice into four individuals, each with six tentacles. The daughter-individuals grow,

form the full number of twenty-f ou r tentacles and divide again. The polyps arefree and walk on their tentacles. See Ussow [54].

Tetraplatia volitans Viguier is a remarkable floating marine form. See C. Viguier [56] and Delage and Herouard (Hydrozoa [2]).

Haleremita Schau- dinn. SeeF.Schaudinn [50] and Delage and Herouard (Hydrozoa [2]).

In all the above- mentioned genera, with the exception of Hydra, the life-cycle is so im- perfectly known that their true position can- not be determined in the present state of our knowledge. They may prove eventually to belong to other orders. Hence only the genus Hydra can be considered as truly re- presenting the order Eleutheroblastea. The phylogenetic position of this genus has been discussed above.

Order II. Hy- droidea seu Lep- tolinae. — Hydro- medusae with alter- nation of generations (metagenesis)in which a non-sexual polyp-generation (tropho- some) produces by budding a sexual medusa-generation (gonosome). The polyp may be solitary, but more usually pro- duces polyps by budding and forms a polyp-colony. The polyp usually has the body distinctly divisible into hydranth, hydrocaulus and hydrorhiza, and is usually clothed in a perisarc. The medusae may be set free or may remain attached to the polyp-colony and degenerate into a gonophore. When fully developed the medusa is characterized by the sense organs being composed entirely of ectoderm, developed independently of the tentacles, and innervated from the sub-umbral nerve-ring.

The two kinds of persons present in the typical Hydroidea make the classification of the group extremely difficult, for reasons ex- plained above. Hence the systematic arrangement that follows must be considered purely provisional. A natural classification of the

Hydroidea has yet to be put forward. Many genera and families are separated by purely artificial characters, mere shelf- and-bottle groupings devisad for ths convenience of the museum curator and the collector. Thus many subdivisions are diagnosed by setting free medusae in one case, or producing gonophores in another, although it is very obvious, as pointed out above, that a genus pro- ducing medusae may be far more closely allied to one producing gonophores than to another producing medusae, or vice versa, and

b

Fig. 49. — Diagram showing possible modifications of persons of a gymnoblastic Hydromedusa. (After Allman.) Hydrocaulus (stem). Hydrorhiza (root). Enteric cavity. Endoderm. Ectoderm.

Perisarc, (horny case). Hydranth (hydriform person)expanded. Hydranth (hydriform person) con- tracted.

Hypostome, bearing mouth at its extremity.

k, Sporosac springing from the hydro- caulus. k', Sporosac springing from m, a modified hydriform person (blastostyle) : the genitalia are seen surrounding the spadix or manubrium. /, Medusiform person or medusa. m, Blastostyle.

A,

that in some cases the production of medusae or gonophores varies with the season or the sex. Moreover, P. Hallez [22] has recently shown that hydroids hitherto regarded as distinct species are only forms of.the same species grown under different conditions.

Sub-Order i. Hydroidea Gymnoblastea (Anthomedusae). — Trophosome without hydrothecae or gonothecae, with mono- podial type of budding. Gonosome with free medusae or gonophores; medusae usually with ocelli, never with otocysts. The gymnoblastic polyp usually has a distinct perisarc investing the hydrorhiza and the hydrocaulus, sometimes also the hydranth as far as the bases of the tentacles (Bimeria) ; but in such cases the perisarc forms a closely-fitting investment or cuticule on the hydranth,, never a hydrotheca standing off from it, as in the next sub-order. The polyps may be solitary, or form colonies, which may be of the spreading or encrusting type, or arborescent, and then always of monopodial growth and budding. In some cases, any polyp of the colony may bud medusae; in other cases, only certain polyps, the blastostyles, have this power. When blastostyles are present, however, they are never

enclosed

Fig. 50. — Sarsia (Dipurena) gemnifera. b, The long manu- brium, bearing medusi- form buds; a, mouth.

Fig. 51. — Sarsia prolifera. Ocelli are seen at the base of the tentacles, and also (as an ex- ception) groups of medusiform buds.

in special gonothecae as in the next sub-order. In this sub-order the characters of the hydranth are very variable, probably owing to the fact that it is exposed and not protected by a hydrotheca, as in Calyptoblastea.

Speaking generally, three principal types of hydranth can be distinguished, each with subordinate varieties of form.

1. Club-shaped hydranths with numerous tentacles, generally scattered irregularly, sometimes with a spiral arrangement, or in whorls (" verticillate ").

(a) Tentacles filiform; type of Clava (fig. 5), Cordylophora, &c. (i) Tentacles capitate, simple; type of Coryne and Syncoryne;

Myriothela is an aberrant form with some of the tentacles

modified as " claspers " to hold the ova.

(c) Tentacles capitate, branched, wholly or in part; type of

Cladocoryne.

(d) Tentacles filiform or capitate, tending to be arranged in definite whorls; type of Stauridium (fig. 2), Cladonema and Pennaria.

2. Hydranth more shortened, daisy-like in form, with two whorls of tentacles, oral and aboral. v ,

(a) Tentacles filiform, simple, radially arranged or scattered

irregularly; type of Tttbularia (fig. 4), Corymorpha (fig. 3), Netnopsis, Pelagohydra-, &c.

(b) Tentacles with a bilateral arrangement, branched tentacles

in addition to simple filiform ones; type of Branchio- cerianthus.

3. Hydranth with a single circlet of tentacles.

(a) With filiform tentacles; the commonest type, seen in Bougainvillea (fig. 13), Eudendrium, &c.

(b) With capitate tentacles ; type of Clavatella.

4. Hydranth with tentacles reduced below four; type of Lar (fig. 11), Monobrachium, &c.

The Anthomedusa in form is generally deep, bell-shaped: The sense organs are typically ocelli, never otocysts. The gonads are borne on the manubrium, either forming a continuous ring (Codonid type), or four masses or pairs of masses (Oceanid type). The tentacles may be scattered singly round the margin of the umbrella (" monerenematous ") or arranged in tufts ("lophone- matous"); in form they may be simple or branched (Cladonemid type) ; in structure they may be hollow (" coelomerinthous ") ; or solid (" pycnomerinthous "). When sessile gonophores are produced, they may show all stages of degeneration.

Classification. — Until quite recently the hydroids (Gymnoblastea) and the medusae (Anthomedusae) have been classified separately, since the connexion between them was insufficiently known. Delage and Herouard (Hydrozoa [2]) were the first to make an heroic attempt to unite the two classifications into one, to which Hickson (Hydrozoa [4]) has made some additions and slight modifications. The classification given here is for the most part that of Delage and Herouard. It is certain, however, that no such classification can be considered final at present, but must undergo continual revision in the future. With this reservation we may recognize fifteen well-characterized families and others of more doubtful nature. Certain discrepancies must also be noted.

1. Margelidae (= medusa-family Margelidae . Tropho some arborescent, with hydranths of Bougainvillea-type ; gonosome free medusae or gonophores, the medusae with solid tentacles in tufts (lophonematous). Common genera are the hydroid Bougain- villea (figs. 12, 13), and the medusae Hippocrene (budded from Bougainvillea), Margelis, Rathkea (fig. 24), and Margellium. Other hydroids are Garveia, Bimeria, Eudendrium and Heterocordyle, with gonophores, and Dicoryne with peculiar sporosacs.

2. Podocorynidae(= medusa-families Thamnostomidae and Cytaeidae + hydroid families Podocorynidae and Hydractiniidae) . Trophosome encrusting with hydranths of Bougainvillea-type, polyps differenti- ated into blastostyles, gastrozoids and dactylozoids ; gonosome free medusae or gonophores. The typical genus is the wellrknown

hydroid Podo- coryne, budding the medusa known as Dysmorphosa; Thamnostylus, Cylaeis, &c, are other medusae with unknown hydroids. Hydr ac- tinia (figs. 9, 10) is a familiar hydroid genus, bearing gono- phores.

3. Cladonemidae. — Trophoso m e, polyps with two w h o rl s of t e n- tacles; the lower filiform, the upper capitate; gono- some, free med : usae, with ten- tacles solid and branched. The type-genus Cladd- nema (fig. 20) is a common British form.

4. Clavatellidae. — Trophosome, polyps with a single whorl of capitate tentacles; gonosome, free medusae, with ten- tacles branched, solid. Clavatella (fig. 21), with a peculiar ambula- tory medusa is a British form. . 5. Pennariidae. — T r o p h o s o me, polyps with an

upper circlet of numerous capitate tentacles, and a loner circlet of fili- form tentacles. Pennaria, with a free medusa known as Globiceps, is a common Mediterranean form. Stauridium (fig. 2) is a British hydroid. 6. Tubulariidae. — Trophosome, polyps with two whorls of ten-

After Haeckel, System der Medusen, by permission of Gustav Fischer.

Fig. 52. — Tiara pileala, L. Agassiz.

After Haeckel, System der Medusen, by permission of Gustav Fischer.

tacles, both filiform, bears gonophores.

Tubularia (fig. 4), a well-known British hydFoid,

7. Corymorphidae (includingthe medusa-family Hybocbdonidae) .—• Trophosome solitary polyps, with two whorls of tentacles; gono- some, free medusae or gonophores. Corymorpha (fig. 3), a well- known British genus, sets free a medusa known as Steenstrupia (fig. 22): Here belorig the deep-sea genera Monocaulus and Branchioceri- anthus, including the largest hydroid polyps known, both genera producing sessile gono- phores.

8. Dendrocla.vidae. — Troph o- some, polyp with filiform tentacles in three or four whorls. Dendro- clava, a hydroid, produces the medusa known as Turritopsis.

9. Clavidae (including the medusa-family Tiaridae (figs. 27 and 51). Trophosome, polyps with scattered filiform tentacles; gonosome, medusae or gono- phores, the medusae with hollow tentacles. Clava (fig. 5), a common British hydroid, pro- duces gonophores; so also does Cordylophora, a form inhabiting fresh or brackish water. Tunis produces free medusae. Amphi- nema is a medusan genus of un- known hydroid.

10. Bythotiaridae. — Tropho- some unknown; gonosome, free medusae, with deep, bell-shaped umbrella, with interradial gonads on the base of the stomach, with branched radial canals, and corre- spondingly numerous hollow ten- tacles. Bythotiara, Sibogita.

1 1 . Corynidae(= hydroid families Corynjdae, Syncarynidae and Cladocorynidae +medusa.n family Sdrsiidae). — Trophosome polyps

with capitate tentacles, simple or _ ....

branched, scattered or verticillate ; ^,, FlG – 53-— Pteronema darvnnu. gonosome, free medusae or gono- /he apex of the stomach is pro- phores. Coryne, a common British longed into a brood pouch con- hydrOid, produces gonophores ; taming embryos. Syncoryne,- indistinguishable from

it, produces medusae known as Sdrsia (fig. 51). Cladocoryne is another hydroid genus ; Codonium and Dipurena (fig. 50) are medusan genera.

12. Myriothelidae. — The genus Myriothela is a solitary polyp with scattered capitate tentacles, producing sporosacs.

13. Hydroloridae. — Trophosome (only known in one genus), polyps with two tentacles forming a creeping colony ; gonosome, free medusae with four, six or more radial canals, giving off one or more lateral branches which run to the margin of the umbrella, with the stomach produced into four, six or more lobes, upon which the gonads are developed; the mouth with four lips or with a folded margin; the tentacles simple, arranged evenly round the margin of the umbrella. The remarkable hydroid Lar (fig. 11) grows upon the tubes of the worm Sabetta and produces a medusa known as Willia. Another medusan genus is Proboscidactyla.

14. Mcnobrachiidae. — The genus Monobrachium is a colony-forming hydroid which grows upon the shells of bivalve molluscs, each polyp having but a single tentacle, ft buds medusae, which, however, are as yet only known in an immature condition (C. Mereschkowsky [41]).

15. Ceratellidae. — Trophosome polyps forming branching colonies of which the stem and main branches are thick and composed of a network of anastomosing coenosarcal tubes covered by a common ectoderm and supported by a thick chitinous perisarc; hydranths similar to those of Coryne; gonosome, sessile gonophores. • Ceratella, an exotic genus from the coast of East Africa, New South Wales and Japan, The genera Dehitella Gray and Dendrocoryne Inaba should perhaps be referred to this. family; the last-named is regarded by S. Goto [16] as the type of a distinct family, Dendrocorynidae.

Doubtful families, or forms difficult to classify, are: Pteronemidae, Medusae of Cladonemid type, with hydroids for the most part un-known. The British genus Gemmaria, however, is budded from a hydroid referable to the family Corynidae. Pteronema (fig. 53).

Nemopsidae, for the floating polyp Nemopsis, very similar to Tubularia in character; the medusa, on the other hand, is very similar to Hippocrene (Margelidae). See C. Chun (Hydrozoa1).

Pelagohydridae, for the floating polyp Pelagohydra, Dendy, from New Zealand. The animal is a solitary polyp bearing a great number of medusa-buds. The body, representing the hydranth of an ordinary hydroid, has the aboral portion modified into a float, from which hangs down a proboscis bearing the mouth. The float is covered with long tentacles and bears the medusa-buds. The proboscis bears at its extremity a circlet of smaller oral tentacles. Thus the affinities of the hydranth are clearly, as Dendy points out,

with a form such as Corymorpha, which also is not fixed but only-rooted in the mud. The medusae, on the other hand, have the tentacles in four tufts of (in the buds) five each, and thus resemble

the medusae of the' family Margelidae. See A. Dendy [121.

Perigonimus. — This common British hy- droid belongs by its characters to the family Bougainvil- lidae; it produces, however, a medusa of the genus7Vara (fig. 52), referable to the family Clavidae ; a fact sufficient to indi- cate the tentative character of even the most modern classifi- cations of this order.

Sub-order II. Hydroidea Calyp- toblastea (lepto- medusae). — Tropho- some with polyps always differentiated into nutritive and reproductive indi- viduals(blastostyles) enclosed in hydro- thecae and gono- thecae respectively; with sympodial type Fig. 54. — Diagram showing possible modi- of budding. Gono- fications of the persons of a Calyptoblastic some with free med- Hydrornedusa Letters a to h same as in or gonophores .

fig. 49. 1, The horny cup or hydrotheca of , ■? . .

the hydriform persons ; I, medusiform person tne medusae typi- springing from tn, a modified hydriform cally with otocysts, person (blastostyle) ; n, the horny case or sometimes with cor-

gonangium enclosing the blastostyle and its buds. This and the hydrotheca i give

origin to the name Calyptoblaslea Allman.)

dyli or ocelli (figs.

Kf'ter 54, 55)-

The calyptoblastic polyp of the nutritive type is very uniform in character, its tendency to variation being limited, as it were, by the enclosing hydrotheca. The hydranth almost always has a single circlet of tentacles, like the Bougainvillea-type in the preceding sub-order; an excep- tion is the curious genus Clathrozoon, in which the hydranth has

a single tentacle. The characteristic hydrotheca is formed by the bud at an early stage (fig. 56); when complete it is an open cup, in which the hydranth develops and can be protruded from the opening for the capture of food, or is withdrawn into it for protection. Solitary polyps are un- known in this sub-order; the colony may be creep- ing or arborescent in form ;

Fig. 55.— View of the Oral Surface of if tn e latter, the budding one of the Leptomedusae (Irene pellu- of the polyps, as already cida, Haeckel), to show the numerous stated, is of the sym- tentacles and

the otocysts dial and either

*ge, Genital glands, re, The four radi- k;„„ • 1 *„’,•„_ <. t „™,. M, Manubrium. ating canals. bisen u f' forming stems*

ot, Otocysts. Ve, The velum. capable of further branch-

ing, or uniserial, forming pinnules not capable of further branching. In the biserial type the polyps on the two sides of the stem have primitively an alternating, zigzag arrangement; but, by a process of differential growth, quickened in the 1st, 3rd, 5th, &c, members of the stem, and retarded in the 2nd, 4th, 6th, &c, members, the polyps

may assume secondarily positions opposite to one another on the two sides of the stem. Other variations in the mode of growth or budding bring about further differences in the building up of the colony, which are not in all cases properly understood and cannot be described in detail here. The stem may contain a single coenosarcal tube (” monosiphonic “) or several united in a common perisarc (” polysiphonic “) . An important variation is seen, in the form of the hydrotheca itself, which may come off from the main stem by a stalk, as in Obelia, or may be sessile, without a stalk, as in Sertularia.

In many Calyptoblastea there occur also reduced defensive polyps or dactylozoids, which in this sub-order have received the special name of sarcostylcs. Such are the ” snake-like zoids ” of Ophiodes and other genera, and as such are generally inter- preted the ” macho-polyps” of the P lumul arida e. These organs are supported by cup-like structures of the perisarc, termed nematophores, re- garded as modified hydrothecae sup- porting the special- ized polyp-indi-viduals. They are specially character- istic of the family Plumularidae.

The medusa-buds, as already stated, are always produced from blastostyles, reduced non-nutri- tive polyps without mouth or tentacles. An apparent, but not real, exception is Halecium halecinum, in which the blastostyle is pro- duced from the side of a nutritive polyp, and both are en- closed in a common theca without a partition between them (AUman [1] p. 50, fig. 24). The

gonotheca is formed in its early stage in the same way as the hydrotheca, but the remains of the hydranth persists as an operculum closing the capsule, to be withdrawn when the medusae or genital products are set free (fig. 56).

The blastostyles, gonophores and gonothecae f urnlshaseries of varia-

tions which can best be considered as so many stages of evolution.

Stage 1 , seen in Obelia. Numerous medusae are budded successively within the gonotheca and set free ; they swim off and mature in the open sea (AUman [1], p. 48, figs. 18, 19).

Stage 2, seen in Gonothyraea. Medusae, so-called ” meconidia,” are budded but not liberated; each in turn, when it reaches sexual maturity, is protruded from the gonotheca by elongation of the stalk, and sets free the embryos, after which it withers and is re placed by another (Allman [1], p. 57, fig. 28).

Stage 3, seen in Sertularia. — The gonophores are reduced in varying degree, it may be to sporosacs; they are budded successively from the blastostyle, and each in turn, when ripe, protrudes the spadix through the gonotheca (fig. 57, A, B). The spadix forms a gelatinous cyst, the so-called acrocyst (ac), external to the gonotheca {gth), enclosing and protecting the embryos. Then the spadix withers, leaving the embryos in the acrocyst, which may be further protected by a so-called marsupium, a structure formed by tentacle-like processes growing out from the blastostyle to enclose the acrocyst, each such process being covered by perisarc like a glove-finger secreted by it (fig. 57, C). (Allman [1], pp. 50, 51, figs., 21-24; Weismann [58], p. 170, pi. ix., figs. 7, 8.)

After AUman, Gytnnablastic Hydroids, by permission of the council of the Ray Society .

Fig. 56. — Diagrams to show the mode of formation of the Hydrotheca and Gonotheca in Calyptoblastic Hydroids. A-Dare stages common to both ; from D arises the hydro- theca (E) or the gonotheca (F) ; th, theca ; st, stomach; t, tentacles; m, mouth; mb, medusa-buds.

Stage 4, seen in Plumularidae. — The generative elements are produced in structures termed corbulae, formed by reduction and modification of branches of the colony. Each corbula contains a central row of blastostyles enclosed and protected by lateral rows of branches representing stunted buds (Allman [1], p. 60, fig. 30).

The Leptomedttsa in form is generally shallow, more or less saucer-like, with velum less developed than in Anthomedusae (fig. 55). The characteristic sense-organs are ectodermal oto- cysts, absent, however, in some genera, in which case cordyli may replace them. When otocysts are present, they are at least eight in number, situated adradially, but are often very numerous. The cordyli are scattered on the ring-canal. Ocelli, if present, are borne on the "tentacle-bulbs. The tentacles are usually hollow, rarely solid (Obelia). In number they are rarely less than four, but in Dissonema there are only two. Primitively there are four perradial tentacles, to which may be added four inter- radial, or they may become very numerous and are then scattered evenly round the margin, never arranged in tufts or clusters.

In addition to tentacles, there may be marginal cirri {Laodice) with a solid endodermal axis, spirally coiled, very contractile, and bearing a terminal battery of nematocysts. The gonads are de- veloped typically beneath the radial canals or below the stomach or its pouches, often stretching as long bands on to the base of the man-ubrium. In Octor- chidae (fig. 58) each such band is interrupted, forming one mass at the base of the manubrium and another below the radial canal in each radius, in all as the name implies. In some Leptomedusae excretory " marginal tubercles " are developed on the ring-canal.

■ *Classification.- — As in the Gymnoblastea, the difficulty of uniting the hydroid and mcdusan systems into one scheme of classification is very great in the present state of our knowledge. In a great many Leptomedusae the hydroid stage is as yet unknown, and it is by no means certain even that they possess one. It is quite possible that some of these medusae will be found to be truly hypogenetic, that is to say, with a life-cycle secondarily simplified by suppression of metagenesis. At present, ten recent and one extinct family of Calyptoblastea (Leptomedusae) may be recognized provisionally:*

1. Eucopidae (figs. 55, 59). — Trophosome with stalked hydro-thecae; gonosome, free medusae with otocysts and four, rarely six or eight, unbranched radial canals. Two of the commonest British hydroids belong to this family, Obelia and Clytia. Obelia forms numerous polyserial stems of the characteristic zigzag pattern grow-ing up from a creeping basal stolon, and buds the medusa of the same name. In Clytia the polyps arise singly from the stolon, and the medusa is known as Phialidium (fig. 59).

2. Aequoridae._ — Trophosome only known in one genus (Poly-

canna), and similar to the preceding; gonosome, free medusae with otocysts and with at least eight radial canals, often a hundred or more, simple or branched. Aequorea is a common medusa.

3. Thaumantidae. — Trophosome only known in one genus (Thaumantias), similar to that of the Eucopidae; gonosome, free medusae with otocysts inconspicuous or absent, with usually four, sometimes eight, rarely more than eight, radial canals, simple and unbranched, along which the gonads are developed, with numerous tentacles

After Allman, Gymnoblastic Bydroids, by permission of the council of the Ray Society.

Fig. 57. — Diagrams to show the mode of formation of an Acrocyst and a Marsupium. In A two medusa-buds are seen within thegonotheca iglh), the upper more advanced than the lower one. In B the spadix of the upper bud has protruded itself through the top of the gono- theca and the acrocyst (ac) is secreted round it. In C the marsupium (m) is formed as finger-like process from the summit of the blastostyle, en- closing the acrocyst; b, medusa-buds on the blastostyle.

eight separate gonad-masses

bearing ocelli and with marginal sense-clubs. Laodice and Thaumantids are representative genera.

4. Berenicidae. — Trophosome unknown; gonosome, free medusae, with four or six radial canals, bearing the gonads, with numerous tentacles, between which occur sense-clubs, without otocysts. Berenice, Staurodiscus, &c.

5, Polyorchidae. — Trophosome unknown ; gonosome, free medusae of deep form, with radial canals branched in a feathery manner, and

After Haeckel, System der Medusen, by permission of Gustav Fischer. Fig. 58. — Octorchandra canariensis, from life.

bearing gonads on the main canal, but not on the branches, with numerous hollow tentacles bearing ocelli, and without otocysts. Polyorchism Spirocodoh.

6. Campanularidae. — Trophosome as in Eucopidae; gonosome, sessile gonophores. Many common or well-known genera belong here, such as Halecium, Campanularia, Gonothyraea, &c.

7. Lafoeidae. — Trophosome as in the preceding; gonosome, free medusae or gonophores, the medusae with large open otocysts. The hydroid genus Lafoea is remarkable for producing gonothecae on the hydrorhiza, each containing a blastostyle which bears a single gonophore; this portion of the colony was formerly regarded as an independent parasitic hydroid, and was named Coppinia. Medusan genera are Mitrocotna, Halopsis, Tiaropsis (fig. 29, &c).

(So far as the characters of the trophosome are concerned, the seven preceding families, are scarcely distinguishable, and they form

After E. T. Browne, Proc. Zoot. Soc. oj London, z8o6.

Fig. 59. — Three stages in the development of Phialidium temporarium. a, The youngest stage, is magnified about 22 diam. ; 0, older, is magnified about 8 diam. ; c, the adult medusa, is magnified.

a section apart, contrasting sharply with the families next to be mentioned, in none of which are free medusae liberated from the colony, so that only the characters of the trophosome need be considered.)

8. Sertularidae. — Hydrothecae sessile, biserial, alternating or opposite on the stem. Sertularia and Sertularella are two very common genera of this family.

9. Plumularidae. — Hydrothecae sessile, biserial on the main stem, uniserial on the lateral branches or pinnules, which give the colony its characteristic feathery form; with nematophores. A very abundant and prolific family; well-known British genera are Plumularia, Antennularia and Aglaophenia.

10. Hydroceratinidae. — This family contains the single Australian species Clathrozoon wilsoni Spencer, in which a massive hydrorhiza

bears sessile hydrothecae, containing hydranths each with a single tentacle, and numerous nematophores. See W. B. Spencer [S3].

II. Dendrograptidae, containing fossil (Silurian) genera, such as Dendrograptus and Thamnograptus, of doubtful affinities.

Order III. Hydrocorallinae.—Metagenetic colony-forming Hydromedusae, in which the polyp-colony forms a massive, calcareous eorallum into which the polyps can be retracted; polyp-individuals always of two kinds, gastrozoids and dactylo- zoids; gonosome either free medusae or sessile gonophores.

The trophosorrie consists of a mass of coenosarcal tubes anastomosing in all planes. The interspaces between the tubes are filled up by a solid mass of lime, consist- ing chiefly of calcium carbonate, which replaces the chitinous peri- sarc of ordinary hydroids and forms a stony eorallum or coenosteum (fig. 60). The surface of the coenosteum is covered by a layer of common ectoderm, containing large nematocysts, and js per- forated by pores of two kinds, gastropores and dactylopores, giving exit :o gastrozoids and dactylozoids respectively, which

Fig. 60. — Portion of the calcareous eorallum of Mille- pora nodosa, showing the cyclical arrangement of the

pores occupied by the .per- j d d . er ,- cal ˆ K . z ˆ\s

sons or hvdranths. About … … ., ,

twice the natural size. (From Moseley.)

of wider calibre than the coeno- sarcal canals of the general net- work. The coenosteum increases in size by new growth at the surface; and in the deeper, older portions of massive forms the tissues die off after a certain time, only the superficial region retaining its vitality down to a certain depth. The living tissues at the surface are cut off from the underlying dead portions by horizontal partitions termed tabulae, which are formed successively as the coenosteum' increases in age and size. If the coenosteum of Millepora be broken across, each pore-canal (perhaps better termed a polyp- canal) is seen to be interrupted by a series of transverse partitions, representing successive periods of growth with separation from the underlying dead portions.

Besides the wider vertical pore-canals and the narrower,

Fig. 62. — Diagrams illustrating the suc- cessive stages in the development of the cyclosystems of the Styldsleridae. . (After

Moseley.)

1, Sporadopora dicho- toma.

2, 3, Allopora nobilis.

4, Allopora profunda.

5, Allopora miniacea. ,

6, Astylus subviridis.

7, Distichopora coccinea.

s, Style.

dp, Dactylopore.

gp, Gastropore.

b, In fig. 6, inner horseshoe- shaped mouth of gastropore.

Fig. 61. — Enlarged view of the surface of a living Millepora, showing five dactylozooids surrounding a central gastrozooid. (From Moseley.)

irregular coenosarcal canals, the coenosteum may contain, in its superficial portion, chambers or ampullae, in which the reproductive zoids (medusae or gonophores) are budded from the coenosarc.

The gastropores and dactylopores are arranged in various ways at the surface, a common pattern being the formation of a cy&bsystern (fig. 60), in which a central gastrozoid is surrounded

by a ring of dactylozoids (fig. 61). In such a system the dactylopores may be confluent with the gastropore, so that the entire cyclpsystem presehts itself as a single aperture subdivided by radiating partitions, thus having a super- ficial resemblance to a madreporarian coral with its radiat- ing septa (figs. 62 and 63).

The gastrozoids usually bear short capitate tentacles, four, six or twelve in number; but in Astylus (fig. 63) they have no tentacles. The dactylozoids have no mouth ; 1 in Milkporidae they have short capitate tentacles, but lack tentacles in Styla- steridae.

Thegonosome con- sists of free medusae in ■ Milleporidae, which are budded from the apex of a dactylozoid in Mille- pora murrayi, but in other species from the coenosarcal canals. The medusae are produced by direct budding, without an entoeodon in the bud. They are liberated in a mature condition, and probably live but a short

time, merely sufficient to spread the species. The manubrium bearing the gonads is mouthless, and the umbrella is without tentacles, sense-organs, velum or radial canals. In the Stylasteridae sessile gonophores are formed, always by budding from the coenosarc. In Distichopora the gonophores have radial canals, but in other genera they are sporosacs with no trace of medusoid structure.

Classification.' — Two families are known : — ■

1. Milleporidae.— Coenosteum massive, irregular in form; pores scattered irregu larly or in cyclosystems, without styles, with transverse tabulae; free medusae. A single genus, Millepora (figs. 60, 61).

2. Stylasteridae.: — Coenosteum arbor- escent, sometimes fanlike, with pores only on one face, or on the lateral margins of the branches; gastropores with tabulae only in two genera, but with (except in Astylus) a style, i.e. a conical, thorn-like projection from t)ie base of the pore, sometimes found also in dactylopores; sessile gonophores. Sporadopora has the pores scattered irregu- larly. Distichopora has the pores arranged in rovvs. Stylaster has cyclosystems. In Allopora the cyclostems resemble the calyces of Anthozoan corals. In Cryptohelia the cyclosystem is. covered by a cap or oper- culum. In Astylus (fig. 63) styles are absent, ,,,.,-,,.

Affinities of the Hydrocorallinae.—There Stylasteridae) , showing can be no doubt that the forms comprised cyclosystems placed at in this order bear a close relationship to the intervals on _ the Hydroidea, especially the sub-order Gymno- branches, each with a blastea, with which they should perhaps be central gastropore and classed in a natural classification. A hydro- zone 01 sht-hke aac- coralline may be regarded as a form of tylopores. (After hydroid colony in which the coenosarc Moseley.) forms a felt-work ramifying in all planes, and in which the chitinous perisarc is replaced by a massive calcareous skeleton. So far as the trophosome is concerned, the step from an encrusting

Fig. 63. — Portion of" the eorallum of Astylus', subviridis (one of the.

hydroid such as Hydractinia to the hydrocoralline Mittepora is not great.

Hickson considers that the families Milleporidae and Stylasteridae should stand quite apart from one another and should not be united in one order. The nearest approach to the Stylasteridae is perhaps to be found in Ceratella, with its arborescent trophpsome formed of anastomosing coenosarcal tubes supported by a thick perisarc and covered by a common ectoderm. Ceratella stands in much the same relation to the Stylasteridae that Hydractinia does to the Mille- poridae, in both cases the chitinous perisarc being replaced by the solid coenosteum to which the hydrocorallines owe the second half of their name.

Order IV. Qraptolitoidea (Rhabdophora, Allman) ,— This order has been constituted for a peculiar group of palaeozoic fossils, which have been interpreted as the remains of the skeletons of Hydrozoa of an extinct type.

A typical graptolite consists of an axis bearing a series of tooth-like projections, like a saw. Each such projection is re- garded as representing a cup or hydrotheca, similar to those borne by a calyptoblastic hydroid, such as Sertidaria. The supposed hydrothecae may be present on one side of the axis only (mono- prionid) or on both sides (diprionid); the first case may be conjectured to be the result of uniserial (helicoid) budding, the second to be produced by biserial (scorpipid) budding. In one division (Retiolitidae). the axis is reticulate. In addition to the stems bearing cups, there are found vesicles associated with them, which have been interpreted as gonothecae or as floats, that is to say, air-bladders, acting as hydrostatic organs for a floating polyp-colony.

Since no graptolites are known living, or, indeed, since palaeo- zoic times, the interpretation of their structure and affinities must of necessity be extremely conjectural, and it is by no means certain that they are Hydrozoa at all. It can only be said that their organization, so far as the state of their preservation permits it to be ascertained, offers closer analogies with the Hydrozoa, especially, the Calyptoblastea, than with any other existing group of the animal kingdom.

See the treatise of Delage and Herouard (Hydrozoa, [4]), and the article Graptolites.

Order V. Trachylinea. — Hydromedusae without alterna- tion of

generations, i.e. without a hydroid phase; the medusa develops directly from the actinula larva, which may, however, multiply by budding. Medusae with sense-organs represented by otocysts derived from modified tentacles (tentaculocysts) , containing otoliths of endodermal origin, and innervated from the ex-umbral nerve-ring.

This order, containing the typical oceanic medusae, is divided into two sub-orders.

Sub-order i. Trachomedusae. — Tentacles given off from the margin of the umbrella, which is entire, i.e. not lobed or indented; tentaculocysts usually enclosed in vesicles; gonads on the radial canals. The medusae of this order are characterized by the tough, rigid consistence of the umbrella, due partly to the dense nature of the mesogloea, partly to the presence of a marginal rim of chondral tissue, consisting of thickened ectoderm containing great numbers of nematocysts, and forming, as it were, a cushion-tyre supporting the edge of the umbrella. Pro- longations from the rim of chondral tissue may form clasps or peronia supporting the tentacles. The tentacles are primarily four in number, perradial, alternating with four interradial tentaculocysts, but both tentacles and sense-organs may be multiplied and the primary perradii may be six instead of four (fig. 26). The tentacles are always solid, containing an axis of endoderm-cells resembling notochordal tissue or plant- parenchyma, and are but moderately flexible. The sense-organs are tentaculocysts which are usually enclosed in vesicles and may be sunk far below the surface. The gonads are on the radial canals or on the stomach (Ptychogaslridae), and each gonad may be divided into two by a longitudinal sub-umbral muscle-tract. The radial canals are four, six, eight or more, and in some genera blindly-ending centripetal canals are present (fig. 26). The stomach may be drawn out into the manubrium, forming a proboscis (" Magenstiel ") of considerable length.

The development of the Trachomedusae, so far as it is known,

shows an actinula-stage which is either free (larval) or passed over in the egg (foetal) as in Geryonia; in no case does there appear to be a free planula-stage. The actinula, when free, may multiply by larval budding, but in all cases both the original actinula and all its descendants become converted into medusae, so that there is no alter- nation of generations. In Gonionemus the acti- nula becomes attached and polyp-like and repro- duces by budding.

The Trachomedusae are divided into the following families:

i. Petasidae (Petachni- dae). — Four radial Canals, four gonads; stomach not

Crolonged into the manu- rium, which is relatively short ; tentaculocysts free. Petasus and other genera make up this family, founded by Haeckel, but no other naturalist has ever seen them, and it is probable that they are simply immature forms of other genera.

2. Olindiadae, with four radial canals and four gonads; manubrium short; ring-canals giving off blind centripetal canals; tentaculocysts enclosed. Olindias miilleri (fig. 64) is a common Mediterranean species. Other genera are Aglau- ropsis, Gossea and Goni- onemus; the last named bears adhesive suckers on the tentacles. Some doubt attaches to the position of this family. It has been asserted that the tentaculocysts are entirely ectodermal and that either the family should be placed amongst the Lepto- medusae, or should form,

together with certain Leptomedusae, an entirely distinct order. In Gonionemus, however, the concremerit-cells are endodermal.

3. Trachynemidae. — Eight radial canals, eight gonads, stomach not prolonged into manubrium; tenta- culocysts enclosed. Rhopalonema,Trachy- nema, &c.

4. Ptychogastridae {Pectyllidae).—\s in the preceding, but with suckers on the tentacles. Ptychogastria Allman { = Pectyllis), a deep-sea form.

5. Aglauridae.— Eight radial canals, two, four or eight gonads; tentacles numerous; tentaculocysts free ; stomach prolonged into manubrium. Aglaura, Aglantha (fig. 65), &c, with eight gonads; Stauraglaura with four ; Persa with two. Amphogona, hermaphrodite, with male and female gonads on alternating radial canals.

*6. Geryonidae. — Four or six radial canals; gonads band-like; stomach prolonged into a manubrium of great length ; tentaculocysts enclosed. Liriope, Sec, with four radial canals; Geryonia, Carmarina (fig 26), &c., with six. After E .T. Browne, .P**.'z«.i.*

7. Hahcreidae. — Eight very broad Soc. of London.

radial canals; ex-umbrella often pro- pi G . gg. Aglantha

vided with lateral outgrowths; tentacles rosea (Forbes), a British

differing in size, but ,in a single row. medusa.

Halicreas.

Sub-order 2. Narcomedosab.— 'Margta. of the umbrella- lobed, tentacles arising from the ex-umbrella at some distance from the margin; tentaculocysts exposed, not enclosed in vesicles; gonads on the sub-umbral floor of the stomach or of the gastric pouches.

After Haeckel, System der Medusen, by per- mission of Gustav Fischer.

Fig. 64. — Olindias miilleri.

The Narcomedusae exhibit peculiarities of form and structure which distinguish them at once from all other Hydromedusae. The umbrella is shallow and has the margin supported by a rim of thickened ectoderm, as in the Trachomedusae, but not so strongly developed. The tentacles are not inserted on the margin of the umbrella, but arise high up on the ex-umbral surface, and the umbrella is prolonged into lobes corresponding to the interspaces between the tentacles. The condition of things can be imagined by supposing that in a medusa primitively of normal build, with tentacles at the margin, the umbrella has grown down past the insertion of the tentacles. As a result of this extension of the umbrellar margin, all structures belonging to this region, namely, the ring-canal, the nerve-rings, and the

rim of thickened ectoderm, do not run an even course, but are thrown into fes- toons, caught up under the insertion of each ten- tacle in such a way that the ring-canal and its ac- companiments form in each notch of the umbrellar margin an inverted V, the apex qf which corresponds to the insertion of the tentacle; in some cases the limbs of the V may run for some distance parallel to one another, and may be fused into one, giving a figure better compared to an inverted Y. Thus the ectodermal rim runs round the edge of each passes upwards towards

Fig. 66. — Cunina rhododactyla, one of the Narcomedusae. (After Haeckel.) c, Circular canal.

h, " Otoporpae " orccntripetal process of the marginal cartilaginous ring connected with tentaculocyst. Stomach. Jelly of the disk.

Radiati ng canal (pouch of stomach) . Tentacles. tw. Tentacle root.

k, I,

r, it,

lobe of the umbrella and then the base of the tentacle from the re-entering angle between two adjacent lobes, to form with its fellow of the next lobe a tentacle-clasp or peronium, i.e. a streak of thickened ectoderm supporting the tentacle. Similarly the ring-canal runs round the edge of the lobe as the so-called festoon-canal, and then runs upwards under the peronium to the base of the tentacle as one of a pair of peronial canals, the limbs of the V-like figure already mentioned. The nerve-rings have a similar course. The tentaculocysts are implanted round the margins of the lobes of the umbrella and may be supported by prolonga- tions of the ectodermal rim termed otoporpae {Gehdrspangen) . The radial canals are represented by wide gastric pouches, and may be absent, so that the tentacles arise directly from the stomach {Solmaridae). The tentacles are always solid, as in Trachomedusae.

The development of the Narcomedusae is in the main similar to that of the Trachomedusae, but shows some remarkable features. In Aeginopsis a planula is formed by multipolar immigration. The two ends of the planula become greatly lengthened and give rise to the two primary tentacles of the actinula, of which the mouth arises from one side of the planula. Hence the principal axis of the future medusa corresponds, not to the longitudinal axis of the planula, but to a transverse axis. This is in some degree parallel to the cases described above, in which a planula gives rise to the hydrorhiza, and buds a polyp laterally.

In Cunina and allied genera the actinula, formed in the manner described, has a hypostome of great length, quite disproportionate to the size of the body, and is further endowed with the power of producing buds from a stolon arising from the aboral side of the body. In these species the actinula is parasitic upon another medusa; for instance, Cunoctantha pctonaria upon Turritopds, C. proboscidca upon Liriope or Geryonia. The parasite effects a lodgment in the host either by invading it as a free-swimming planula, or, apparently, in other cases, as a spore-embryo which is captured and swallowed as food by the host. The parasitic actinula is found attached to the

proboscis of the medusa; it thrusts its

greatly elongated hypostome into the mouth of the medusa and nourishes itself upon the food in the digestive cavity of its host. At the same time it produces buds from an aboral stolon. The buds become medusae by the direct method of budding described above. In some cases the buds do not become detached at once, but the stolon continues to grow and to produce more buds, forming a "bud-spike"^ {Knospenahre) , which consists of the axial stolon bearing medusa-buds in all stages of development. In such cases the original parent-actinula does not itself become a medusa, but remains arrested in develop- ment and ultimately dies off, so that a true alternation of genera- tions is brought about. It is in these parasitic forms that we meet with the method of reproduction by sporogony described above.

In other Narcomedusae, e.g. Cunoctantha fowleri Browne, buds are formed from the sub-umbrella on the under side of the stomach pouches, where later the gonads are developed.

Classification. — Three families of Narcomedusae are recognized (see O. Maas [40]) :

i. Cunanthidae. — With broad gastric pouches which are simple, i.e. undivided, and " pernemal," i.e. correspond in position with the tentacles. Cunina (fig. 66) with more than eight ten- tacles; Cunoctantha with eight tentacles, four perradial, four interradial.

2. Aeginidae. — Radii a mul- tiple of four, with radial gastric pouches bifurcated or sub- divided; the tentacles are implanted in the notch between the two subdivisions of each (primary) gastric pouch, hence the (secondary) gastric pouches appear to be " internemal " in position, i.e. to alternate in position with the tentacles. Aegina, with four tentacles and eight pouches; Aeginura (fig. 25), with eight tentacles and sixteen pouches ; Solmundella (fig. 67) , with two tentacles and eight pouches; Aeginopsis (fig. 23), with two or four tentacles and sixteen pouches.

3. Solmaridae. — No gastric pouches; the numerous ten- tacles arise direct from the stomach, into which also the peronial canals open, so that the ring-canal is cut up into separate festoons. Solmaris, Pegantha, Polyxenia, &c. To this family should be referred, probably, the genus Hydroctena, described by C. Dawydov [11a] and regarded by him as intermediate between Hydromedusae and Ctenophora. See O. Maas [35].

Appendix to the Trachylinae.

Of doubtful position, but commonly referred to the Trachylinae, are the two genera of fresh-water medusae, Limnocodium and Limnocnida.

Limnocodium sowerbyi was first discovered in the Victoria regia tank in the Botanic Gardens, Regent's Park, London. Since then it has been discovered in other botanic gardens in various parts of Europe, its two most recent appearances being at Lyons (1901) and Munich (1905), occurring always in tanks in which the Victoria regia is cultivated, a fact which indicates that tropical South America is its original habitat. In the same tanks a small hydroid, very similar to Microhydra, has been found, which bears medusa-buds and is probably the stock from which the medusa is budded. It is a remarkable fact that ail specimens of Limnocodium hitherto seen have been males; it may be inferred from this cither that only one polyp-stock has been introduced into Europe, from which all the medusae . seen hitherto have been budded, or perhaps that the female medusa is a sessile gonophore, as in Pennaria. The male gonads are carried on the radial canals.

Limnocnida tanganyicae was discovered first in Lake Tanganyika, but has since been discovered also in Lake Victoria and in the river Niger. It differs from Limnocodium in having practically no manubrium but a wide mouth two-thirds the diameter of the umbrella across. . It buds medusae from the margin of the mouth in May and June, and in August and September the gonads are formed in the place where the buds arose. The hydroid phase, if any, is not known.

Both these medusae have sense-organs of a peculiar type, which are said to contain an endodermal axis like the sense-organs of Trachylinae, but the fact has recently been called in question for

After O. Maas, Craspedoten Medusen dtr Siboga Expedition, by permission of E. S. Brill & Co.

Fig. 67 ■.-— Solmundella bitentaculata (Quoy and Gaimard).

limnocodium by S. Goto, who considers the genus to be allied to

dlindias. Allman, on the other hand, referred Limnocodium to the Leptomedusae.

In this connexion must be mentioned, finally, the medusae budded from the fresh-water polyp Microhydra. The polyp-stages of Limnocodium and Microhydra are extremely similar in character. In both cases the hydranth is extremely reduced and has no tentacles, and the polyp forms a colony by budding from the base. In Limnocodium the body secretes a gelatinous mucus to which adhere particles of mud, &c, forming a protective covering. In Microhydra no such protecting case is formed. In view of the great resemblance between Microhydra and the polyp of Limnocodium, it might be expected that the medusae to which they give origin would also be similar. As yet, however, the medusa of Microhydra has only been seen in an immature condition, but it shows some well-marked differences from Limnocodium, especially in the structure of the tentacles, which furnish useful characters for distinguishing species amongst medusae. The possession of a polyp-stage by Limnocodium and Microhydra furnishes an argument against placing them in the Trachylinae. Their sense-organs require renewed investigations. (Browne [10] and [10a].)

Order VI. Siphonophora — Pelagic floating Hydrozoa with great differentiation of parts, each performing a special function; generally regarded as colonies showing differentiation of in- dividuals in correspondence with a physiological division of labour.

A typical Siphonophore is a stock or cormus consisting of a number of appendages placed in organic connexion with one another by means of a coenosarc. The coenosarc does not differ in structure from that already described in colonial Hydrozoa. It consists of a hollow tube, or tubes, of which the wall is made up of the two body-layers, ectoderm and endoderm,

and the cavity is a continua- tion of the digestive cavities of the nutritive and other appendages, i.e. of the coel- enteron. The coenosarc may consist of a single elon- gated tube or stolon, forming the stem or axis of the cormus on which, usually, the appendages are arranged in groups termed cormidia; or it may take the form of a compact mass of ramifying, anastomosing tubes, in which case the cormus as a whole has a compact form and cor- midia are not distinguish- able. In the Disconectae the coenosarc forms a spongy mass, the " centradenia," which is partly hepatic in function, forming the so- called liver, and partly ex- cretory.

The appendages show various types of form and structure corresponding to different functions. The cor- mus is always differentiated into two parts; an upper portion termed the nectosome, in which the appendages are locomotor or hydrostatic in function, that is to say, serve for swimming or floating; and a lower portion termed the siphosome, bearing ap

Fig. 68. '—Diagram showing pos- sible modifications of medusiform and hydriform persons of a colony of Siphonophora. The thick black line represents endoderm, the thinner line ectoderm. (After Allman.) n, Pneumatocyst.

Nectocalyces (swimming bells).

Hydrophyllium (covering-piece).

Generative medusiform person.

Palpon with attached palpacle, h.

Siphon with branched grappling tentacle, /.

Stem.

k, I, i,

g. e,

pendages which are nutritive, reproductive or simply protective in function.

Divergent views have been held by different authors both as regards the nature of the cormus as a whole, and as regards the homologies of the different types of appendages borne by it.

The general theories of Siphonophoran morphology are discussed

below, but in enumerating the various types of appendages it is convenient to discuss their morphological interpretation at the same time.

In the nectosome one or more of the following types of appendage occur: —

1. Swimming-bells, termed nectocalyces or nectophores (fig. 68, k), absent in Chondrophorida and Cystophorida; they are contractile and resemble, both in appearance, structure and function, the

umbrella of a medusa, with radial canals, ring-canal and velum; but they are without manubrium, tentacles or sense-organs, and are always bilaterally symmetrical, a peculiarity of form related with the fact that they are attached on one side to the stem. A given cormus may bear one or several necto- calyces, and by their con- tractions they propel the colony slowly along, like so many medusae harnessed together. In cases where the cormus has no pneumatophore the top- most swimming bell may contain an oil-reservoir or oleocyst.

2. The pneumatophore

or air-bladder (fig. 68, w), After A . Agassiz, from Lankester's Treatise on ior passive locomotion, Zoology.

forming a float which Fig. 69. — Porpita, seen from above, keeps the cormus at or showing the pneumatophore and ex- near the surface of the panded palpons. water. The pneumato- phore arises from the ectoderm as a pit or invagination, part of which forms a gas-secreting gland, while the rest gives rise to an air-sack lined bya chitinous cuticle. The orifice of invagination forms a pore which may be closed up or may form a protruding duct or funnel. As in the analogous swim-bladder of fishes, the gas in the pneumatophore can be secreted or absorbed, whereby the specific gravity of the body can be diminished or increased, so as to cause it to float nearer the surface or at a deeper level. Never more than one pneumatophore is found in a cormus, and when present it is always situated at the highest point above the swimming bells, if these are present also. In Velella the pneumato- phore becomes of complex structure and sends air-tubes, lined by a chitin and resembling tracheae, down into the compact coenosarc, thus evidently serving a respiratory as well as a hydrostatic function.

_ Divergent views have been held as to the morphological significance of the pneumatophore. E. Haeckel regarded the whole structure as a glandular ectodermal pit formed on the ex- umbral surface of a medusa-person. C. Chun and, more recently, R. Woltereck [59], on the other hand, have shown that the ectodermal pit which gives rise to the pneumatophore represents an entocodon. Hence the cavity of the air-sack is equivalent to a sub-umbral cavity in which no manubrium is formed, and the pore or orifice of invagination would represent the margin of the umbrella. In the wall of_ the sack is a double layer of endoderm, the space between which is a continuation of the coelenteron. By coalescence of the endoderm-layers, the Coelenteron may be reduced to vessels, usually eight in number, opening into a ring-sinus surrounding the pore. Thus the disposition

of the endoderm-cavities is roughly comparable to the gastrovascular system of a medusa.

The difference between the theories of Haeckel and Chun is connected with a further divergence in the interpretation of the stem or axis of the cormus. Haeckel regards it as the equivalent of the manubrium, and as it is implanted on the blind end of the pneumatophore, such a view leads necessarily to the air-sack and gland being a development on the ex-umbral surface of the medusa-person. Chun and Woltereck, on the other hand, regard the stem as a stolo prolifer arising from the aboral pole, that is to say, from the ex-umbrella, similar to that which grows out from the ex-umbral surface of the embryo of the Narcomedusae and produces buds, a view which is certainly supported by the embryological evidence to be adduced shortly.

In the siphosome the following types of appendages occur: —

1. Siphons or nutritive appendages, from which the order takes its name; never absent and usually present in great numbers (fig. 68, e). Each is a tube dilated at or towards the base and containing a mouth at its extremity, leading into a stomach placed in the dilatation already mentioned. The siphons have been compared to the manubrium of a medusa-individual, or to polyps, and hence are sometimes termed gastrozoids.

2. Palpons (fig. 68, g), present in some genera, especially in Physonectae; similar to the siphons but without a mouth, and purely tactile in function, hence sometimes termed dactylozoids. If a distal pore or aperture is present, it is excretory in function; such varieties have been, termed " cystons " by Haeckel.

3. Tentacles (" Fangfdden "), always present, and implanted one at the base of each siphon (fig. 68, /). The tentacles of siphonophores may reach a great length and have a complex structure. They may bear accessory filaments or tentilla (/'), covered thickly with batteries of nematocysts, to which these organisms owe their great powers of offence and defence.

4. Palpaclcs (" Tastfdden "), occurring together with palpons, one

implanted at the base of each palpon (fig. 68, h). Each palpacle is a tactile filament, very extensile, without accessory filaments or nematocysts.

5. Bracts (" hydrophyllia ") , occur in Calycophorida and some Physophorida as scale-like appendages protecting other parts (fig. 68, /). The mesogloea is greatly developed in them and they are

often of very tough consistency. By Haeckel they "-• are considered homologous with the umbrella of a

medusa.

6. Gonostyhs, appendages which produce by budding medusae or gonophores, like the blastostyles of a hydroid colony. In their most primitive form they are seen in Velella as " gonosiphons," which possess mouths like the ordinary sterile siphons and bud free medusae. In other forms they have no mouths. They may be branched, so-called " gonodendra," and amongst them may occur special forms of palpons, " gonopalpons." The gonostyles have been compared to the blastostyles of a hydroid colony, or to the manubrium of a medusa which produces free or sessile medusa-buds.

7. Gonophores, produced either on the gonostyles already mentioned or budded, as in hydrocorallines, from the coenosarc, i.e. the stem (fig. 68, 1'.). They show every transition between free medusae and sporosacs, as already described for hydroid colonies.

Thus in Velella free medusae are produced, which have been described as an inde- pendent genus of medusae, Chrysotnitra. In other types the medusae may be set

the appendages are arranged as regularly recurrent cormidia along it,

and the cormidia are then said to be " ordinate." In such cases the

oldest cormidia, that is to say, those furthest from the nectosome,

may become detached (like the segments

or proglottides of a tape-worm) and

swim off, each such detached cormidium

then becoming a small free cormus

which, in many cases, has been given an

independent generic name. A cormidium

may contain a single nutritive siphon

(" monogastric ") or several siphons

•(" polygastric "):

From G. H. Fowler, after G. The" following are some of the forms Cuvier . Lankester's Treatise

From G. H. Fowler, after A. Agassiz, Lankester's Treatise on Zoology. – ,

Fig. 70. — Diagram of the structure of Velella, showing the central and °S.- g u°T t , peripheral thirds of a half-section of the colony, the middle third being wni (cn Deo omitted. The ectoderm is indicated by close hatching, the endoderm by ˆ[light hatching, the mesogloea by thick black lines, the horny skeleton of j corn the pneumatophore and sail by dotting. enaocierm

BL, Blast ostyle. . M,

C, Centradenia. PN,

D, Palpon. EC, Edge of colony prolonged be-

yond the pneumatophore. G, Cavity of the large central siphon.

S,

Medusoid gonophores. planula

Primary central chamber, and t l ul ˆf s PN', concentric chamber of a n a the pneumatophore, showing an opening to the exterior and a " trachea." Sail.

of cormidia that occur: — ooogy.

1. The eudoxome (Calycophorida), con- Fig. 71. — Upper sur- sisting of a bract, siphon, tentacle and face of Velella, showing gonophore; when free it is known as pneumatophore and sail. Eudoxia.

2. The ersaeome (Calycophorida), made up of the same appendages as the preceding type but with the addition of a nectocalyx; when

free termed Ersaea.

3. The rhodalomepl some Rhodalidae, consisting of siphon, tentacle and one or more gonophores.

4. The athorome of Physophora, &c, consisting of siphon, tentacle, one or more palpons with palpacles, and one or more gonophores.

5. The crystallome of Anlhemodes, &c, similar to the athorome but with the addition of a

group of bracts.

Embryology of the Siphonophora. — The fer- tilized ovum gives rise to a parenchymula, with solid endoderm, which is set free as a free-swim- ming planula larva, in the manner already de- scribed (see Hydrozoa). The planula has its two extremities dissimilar

(Bipolaria-larva). The subsequent development is slightly different ac- cording as the future cormus is headed by a pneumatophore (Physo- phorida, Cystophonda) or by a nectocalyx (Caly- cophorida).

(i.) Physopho- rida, for example

Halistemma (C.

Chun, Hydrozoa 1]). The planula

becomes elongated

and broader

towards one pole,

at which a pit or

invagination of the

ectoderm arises.

Next the pit closes

up to form a

vesicle with a pore,

and so gives rise

to the pneumato- phore. From the

broader portion of

the planula an

arises

becomes the

first tentacle of 4 lu- ˆ ˆ „„

cormus. The g ; a group of appendages (cormidium) of of the the same Diphyes. (After C. Gegenbaur.)

Fig. 72. — A, Diphyes campanulata;

now ac- a cavity,

a, Axis of the colony. m, Nectocalyx.

0,

c,

Sub-umbral cavity of nectocalyx. Radial canals of nectocalyx.

Orifice of nectocalyx. Bract. Siphon. Gonophore. Tentacle;

free in a mature condition as the so-called ” genital swimming bells,” comparable to the Globiceps of Pennaria. The most usual condition, however, is that in which sessile medusoid gonophores or sporosacs are produced.

The various types of appendages described in the foregoing may be arranged in groups termed cormidia. In forms with a compact coenosarc such as Velella, Physalia, &c, the separate cormidia cannot be sharply distinguished, and such a condition is described technic- ally as one with ” scattered ” cormidia. In forms in which, on the other hand, the coenosarc forms an elongated, tubular axis or stem,

at the

narrower pole a

mouth is formed,

giving rise to the

primary siphon.

Thus from the original planula three appendages are, as it were, budded off, while the planula itself mostly gives rise to coenosarc, just as in some hydroids the planula is converted chiefly into hydrorhiza.

(ii.) Calycophorida, for example, M uggiaea. The planula develops, on the whole, in a similar manner, but the ectodermal invagi- nation arises, not at the pole of the planula, but on the side of its broader portion, and gives rise, not to a pneumatophore, but to a nectocalyx, the primary swimming bell or protocodon (" Fallschirm ") which is later thrown off and replaced by secondary swimming bells, metacodons, budded from the coenosarc.

From a comparison of the two embryological types there can be no doubt on two points; first, that the pneumatophore and the proto- codon are strictly homologous, and, therefore if the nectocalyx is comparable to the umbrella of a medusa, as seems obvious, the pneumatophore must be so too; secondly, that the coenosarcal axis arises from the ex-umbrella of the medusa and cannot be compared to a manubrium, but is strictly comparable to the " bud-spike ' of a Narcomedusan.

Theories of Siphonophore Morphology. — The many theories that have been put forward as to the interpretation of the cormus and the various parts are set forth and discussed in the treatise of Y. Delage and E. Herouard (Hydrozoa [4]) and' more recently by R. Woltereck [59], and only a brief analysis can be given here.

In the first place the cormus has been regarded as a single indi- vidual and its appendages as organs. This is the so-called " poly- organ " theory, especially con- nected with the name of Huxley; but it must be borne in mind that Huxley regarded all the forms produced, in any animal, between one egg-generation and the next, as constituting in the lump one single individual. Huxley, there- fore,

considered a hydroid colony, for example, as a single individual, and each separate polyp or medusa budded from it as having the value of an organ and not of an individual. Hence Huxley's view is not so different from those held by other authors as it seems to be at first sight.'

In more recent years Woltereck [59] has supported Huxley's view of individuality, at the same time drawing a fine distinction between " individual " and " person." The individual is the product of sexual reproduction ; a person is an indi- vidual of lower rank, which may be produced asexually. A Sipho- nophore is regarded as a single individual composed of numerous zoids, budded from the primary zoid (siphon) produced from the planula. Any given zoid is a person-zoid if equivalent to the primary zoid, an organ-zoid if equivalent only to a part of it. Woltereck considers the siphono- phores most nearly allied to the Narcomedusae, producing like the buds from an aboral stolon, the first bud being represented by the pneumatophore or pro- tocodon, in different cases.

Contrasting, in the second place, with the polyorgan theory are the various " polyperson " theories which interpret the Siphonophpre cormus as a colony composed of Fig. 73.— Physophorahydrostatica. more or f ewer individuals in or-

Aiter C. Gegenbaur.

Pneumatocyst.

Palpons.

Axis of the colony.

Nectocalyx.

Orifice of nectocalyx.

Siphon.

Gonophore.

Tentacle.

ganic union with one another. On this interpretation there is still room for considerable divergence of opinion as regards detail. To begin with, it is not necessary on the polyperson theory to regard each appendage as a distinct in- dividual; it is still possible to

compare appendages with parts of an individual which have become separated from one another by a process of " dislocation of organs." Thus a bract may be regarded, with Haeckel, as a modified umbrella of a medusa, a siphon as its manubrium, and a tentacle as representing a medusan tentacle shifted in attachment from the margin to the sub-umbrella; or a siphon may be compared with a polyp, of which the single tentacle has become shifted so as to be attached to the coenosarc and so on. Some authors prefer, on the other hand, to regard every appendage as a separate individual, or at least as a portion of an individual, of which other portions have been lost or obliterated.

A further divergence of opinion arises from differences in the interpretation of the persons composing the colony. It is possible to regard the cormus (1) as a colony of medusa-persons, (2) as a colony of polyp-persons, (3) as composed partly of one, partly of the other. It is sufficient here to mention briefly the views put forward on this point by C. Chun and E. Haeckel.

Chun (Hydrozoa |1]) maintains the older views of Leuckart and

Claus, according to which the cormus is to be compared to a floating hydroid colony. It may be regarded as derived from floating polyps similar to Nemopsis or Pelagohydra, which by budding produce a colony of polyps and also form medusa-buds. The polyp-indi- viduals form the nutritive siphosome or trophosome. The medusa- buds are either fertile or sterile. If fertile they become free medusae or sessile gonophores. If sterile they remain attached and loco- motor in function, forming the nectosome, the pneumatophore and swimming-bells.

Haeckel, on the other hand, is in accordance with Balfour ii regarding a Siphonophore as a medusome, that is to say, as a colony composed of medusoid persons or organs entirely. Haeckel con- siders that the Siphonophores have two distinct ancestral lines of evolution :*

1. In the Disconanthae, i.e. ill such forms as Velella, Porpita, &c, the ancestor was an eight-rayed medusa (Disconula) which acquired a pneumatophore as an ectodermal pit on the ex-umbrella, and in which the organs (manubrium, tentacles, &c.) became secondarily multiplied, just as they do in Gastroblasta as the result of incomplete fission. The nearest riving allies of the ancestral Disconula are to be sought in the Pectyllidae.

2. In the Siphonanthae, i.e. in all other Siphonophores, the ancestral form was a Siphonula, a bilaterally symmetrical Anthomedusa

After Haeckel, from L»nkester's Treatise on Zoology.

Fig. 74. — Stephalia corona, a young colony. p, Pneumatophore. I, Aurophore. s, Siphon.

n, Nectocalyx. lo, Orifice of the aurophore. /, Tentacle.

with a single long tentacle (cf. Corymorpha), which became displaced from the margin to the sub-umbrella. The Siphonula produced buds on the manubrium, as many Anthomedusae are known to do, and these by reduction or dislocation of parts gave rise to the various appendages of the colony. Thus the umbrella of the Siphonula became the protocodon, and its manubrium, the axis or stolon, which, by a process of dislocation of organs, escaped, as it were, from the sub-umbrella through a cleft and became secondarily attached to the ex-umbrella. It must be pointed out that, however probable Haeckel's theory may be in other respects, there is not the slightest evidence for any such cleft in the umbrella having been present at any time, and that the embryological evidence, as alteady pointed out, is all against any homology between the stem and a manubrium, since the primary siphon does not become the stem, which arises from the ex-umbral side of the protocodon and is strictly comparable to a stolon.

Classification. — The Siphonophora may be divided, following Delage and Herouard, into four sub-orders:

I. Chondrophorida (Disconeclae Haeckel, Tracheophysae Chun). With an apical chambered pneumatophore, from which tracheal tubes may take origin (fig. 70); no nectocalyces or brads; appendages all on the lower side of the pneumatophore arising from a compact coenosarc, and consisting of a central

principal siphon, surrounded by gonosiphons, and these again by tentacles.

Three families: (i) Discalidae, for Discalia and allied genera, deep-

sea forms not well known; (2) Porpitidae for the familiar genus Porpita (fig. 69) and its allies; and (3) Velellidae, represented by the well-known genus Velella (figs. 70, 71), common in the Mediterranean and other seas.

II. Calycophorida (Calycotiectae, Haeckel). Without pneumatophore, with one, two, rarely more nectocalyces.

Three families: (1) Monophyidae, with a single nectocalyx; examples Muggiaea, sometimes found in British seas, Sphaeronectes, &c. ; (2) Diphyidae, with two nectocalyces ; examples Diphyes (fig. 72), Praya, Abyla, &c. ; and (3) Polyphyidae, with numerous nectocalyces; example Hippopodius, Stephanophyes and other genera.

From G H. Fowler, modified after G. Cuvier and E. Haeckel, Lankester's Treatise on Zoology.

Fig. 75. — A. Physalia, general view, diagrammatic; B, cor-

midium of Physalia; D, palpon; T, palpacle; G, siphon; GP,

gonopalpon; M 3 , male gonophore; M ? , female gonophore, ultimately set free.

III. Physophorida {Physonectae + Auronectae, Haeckel). With an apical pneumatophore, not divided into chambers, followed by a series of nectocalyces or bracts.

A great number 1 of families and genera are referred to this group, amongst which may be mentioned specially — (1) Agalmidae, containing the genera Slephanomia, Agalma, Anthemodes, Halistemma, &c. ; (2) Apolemidae, with the genus Apolemia and its allies; (3) Forskalitdae, with Forskalia and allied forms; (4) Physophoridae, for Physophora (fig. 73) and other genera, (5) Anthophysidae, for Anlhophysa, Alhorybia, &c. ; and lastly the two families (6) Rhodalidae and (7) Stephalidae (fig. 74), constituting the group Auronectae of Haeckel. The Auronectae are peculiar deep-sea forms, little known except from Haeckel' s descriptions, in which the large pneumato- phore has a peculiar duct, termed the aurophore, placed on its lower side in the midst of a circle of swimming-bells.

IV. Cystophorida (Cystonectae, Haeckel). With a very large pneumatophore not divided into chambers, but without nectocalyces or bracts. Two sections can be distinguished, the

Rhizophysina, with long tubular coenosarc-bearing ordinate

cormidia, and Physalina, with compact coenosarc-bearing scattered cormidia.

A type of the Rhizophysina is the genus Rhizophysa. The Physalina comprise the families Physalidae and Epibulidae, of which the types are Physalia (figs. 74, 75) and Epibulia, respectively. Physalia, known commonly as the Portuguese man-of-war, is re- markable for its great size, its brilliant colours, and its terrible sting- ing powers.

Bibliography. — In addition to the works cited below, see the general works cited in the article Hydrozoa, in some of which very full bibliographies will be found.

1. G. J.Allman, " A Monograph of the Gymnoblastic or Tubularian Hydroids," Ray Society (1871-1872); 2. A. Brauer, "Uber die Entwickelung von Hydra," Zeitschr.f. wiss. Zool. Hi. (1891), pp. 169- 216, pis. ix.-xii. ; 3. " Uber die Entstehung dor Geschlechtsprodukte und die Entwickelung von Tubularia mesembryanthemum Allm.," Lc – PP- 551-579. Pis. xxxiii.xxxv.; 4. W. K. Brooks, "The Life History of the Hydromedusae: a discussion of the Origin of the Medusae, and of the significance of Metagenesis," Mem. Boston Soc. Nat. Hist. iii. (1886), pp. 259-430, pis. xxxvii.-xliv. ; 5. "The Sensory Clubs of Cordyli of Laodice," Journ. Morphology, x. (1895), pp. 287-304, pi. xvii. ; 6. E. T. Browne, " On British Hydroids and Medusae," Proc. Zool. Soc. (1896), pp. 459-500, pis. xvi., xvii., (1897), pp. 816-835, P' s – xlviii. xlix. 12 text-figs.; 7. " Biscayan Medusae," Trans. Linn. Soc. x. (1906), pp. 163-187, pi. xiii.; 8. " Medusae " in Herdman, Rep. Pearl Oyster Fisheries, Gulf of Manaar, iv. (1905), pp. 131-166, 4 pis.; 9. "Hydromedusae with a Revision of the Williadae and Petasidae," Fauna and Geogr. Maldive and Laccadive Archipelagos, ii. (1904), pp. 722-749, pis. liv.-lvii. ; 10. "On the Freshwater Medusa liberated by Microhydra ryderi, Potts, and a Comparison with Limnocodium," Quart. Journ. Micr, Set. I (1906), pp. 635, 645, pi. xxxvii.; 10a. " On the Freshwater Medusa Limnocnida tanganicae " Budgett Memorial Volume (Cambridge, 1908, pp. 471-482, pi. xxviii. ; 11. C. Claus, " Uber die Struktur der Muskelzellen und uber den Korperbau von Mnestra parasites Krohn," Verhandl. zool. bot. Ges. Wien, xxv. (1876), pp. 9-12, pi. i.; 11a. C. Dawydov, " Hydroctena salenskii," Mem. Acad. Imp. St. Petersbourg (viii.) xiv. No. 9 (1903), 17 pp., 1 pi.; 12. A. Dendy, " On a Free-swimming Hydroid, Pelagohydra mirabilis," n. gen. et sp.. Quart. Journ. Micr. Sci. xlvi. (1903), pp. 1-24, pis. i. ii. ; 13. H. Driesch, " Tektonische Studien an Hydroidpolypen," (1) Jen. Zeitschr., xxiv. (1890), pp. 189-226, 12 figs.; (2) t.c. pp. 657-688, 6 figs.; (3) ibid.

xxv. (1891), pp. 467-479, 3 figs.; 14. G. Duplessis, " On Campanularia volubilis,' Soc. Vaud. Bull. 13 (Lausanne, 1874-1875); 15. J. W. Fewkes, "On Mnestra," Amer. Natural., xviii. (1884), pp. 197-198, 3 figs.; 16. S. Goto, " Dendrocoryne Inaba, Vertreterin einer neuen Familie der Hydromedusen," Annot. Zool. Tokyo, i. (1897), pp. 93-104, pi. vi., figs. 106-113; 17- " The Craspe dote Medusa Olindias and some of its Natural Allies," Mark Anni- versary Volume (New York, 1903), pp. 1-22, 3 pis.; 18. H. Grenacher, " Uber die Nesselkapseln von Hydra," Zool. Anz. xviii. (1895), PP- 310-321- 7 figs.; 19. R. T. Gunther, "On the Structure and Affinities of Mnestra parasites Krohn ; with a revision of the Classi- fication of the Cladonemidae," Mitt. Slat. Neapel, xvi. (1903), pp. 35-62, pis. ii. iii.; 20. E. Haeckel, "Das System der Medusen," Denkschr. med.-nat.-wiss. Ges. (Jena, 1879-1881); 21. "Deep Sea Medusae," in Reports of the Challenger Expedition, Zool. iv. pt. 2 (London, 1882); 22. P. Hallez, " Bougainvillia fruticosa Allm. est le fades d'eau agitee du Bougainvillia ramosa Van Ben." C.-R. Acad. Sci. Paris, cxl. (1905), pp. 457-459; 23. O. & R. Hertwig, Der Organismus der Medusen (Jena, 1878), 70 pp., 3 pis. ; 24. Das Nervensystem und die Sinnesorgane der Medusen (Leipzig, 1878), 186 pp., 10 pis.; 25. S. J. Hickson, " The Medusae of Millepora," Proc. Roy. Soc. lxvi. (1899), pp. 6-10, 10 figs.; 26. T. Hincks, A History of British Hydroid Zoophytes (2 vols., London, 1868); 27. N. Iwanzov, " Uber den Bau, die Wirkungsweise und die Entwickelung der Nesselkapseln von Coelenteraten," Bull. Soc. Imp. Natural. Moscou (1896), pp. 323-355. 4 P's- ; 28. C. F. Jickeli, " Der Bau der Hydroid- polypen,' (1) Morph. Jahrbuch, viii. (1883), pp. 373-416, pis. xvi.- xviii. ; (2) t.c, pp. 580-680, pis. xxv.-xxviii. ; 29. Albert Lang, " Uber die Knospung bei Hydra und einigen Hydropolypen," Zeitschr. f. wiss. Zool. liv. (1892), pp. 365-384, pi. xvii.; 30. Arnold Lang, " Gastroblasta Raffaelei. Eine durch eine Art unvoll- standiger Theilung entstehende Medusen- Kolonie," Jena Zeitschr. . xix. (1886), pp. 735-762, pis. xx., xxi.; 31. A. Linko, " Observations sur les meduses de la mer Blanche," Trav. Soc. Imp. Nat. St Peters- bourg, xxix. (1899); 32. " Uber den Bau der Augen bei den Hydro- medusen," Zapiski Imp. Akad. Nauk (Mem. Acad. Imp. Set.) St Petersbourg (8) x. 3 (1900), 23 pp., 2 pis. ; 33. O. Maas, " Die craspe- doten Medusen," in Ergebn. Plankton Expedition, ii. (Kiel and Leipzig, 1893), 107 pp., 8 pis., 3 figs.; 34. "Die Medusen," Mem. Mus. Comp. Zool. Harvard, xxiii. (1897), i.; 35. "On Hydroctena," Zool. Centralbl. xi. (1904), pp. 240-243; 36. "Revision des meVluses appartenant aux families des Cunanthidae et des Aeginidae, et groupement nouveau des genres," Bull. Mus. Monaco, v. (1904), 8 pp.; 37. " Revision der Cannotiden Haeckels,"

SB. K. Bayer. Akad. xxxiv. (1904), pp. 421-445; 38. "Meduses," Result. Camp.

Sci. Monaco, xxviii. (1904), 71 pp., 6 pis.; 39. " Die craspedoten Medusen der Siboga-Expedition," Uitkomst. Siboga-Exped. x. (1905), 84 pp., 14 pis.; 40. " Die arktischen Medusen (ausschliesslich der Polypomedusen)," Fauna arctica, iv. (1906), pp. 479-526; 41. C. Mereschkowsky, " On a new Genus of Hydroids (Monobrachium) from the White Sea, with a short description of other new Hydroids," Ann. Mag. Nat. Hist. (4) xx. (1877), pp. 220-229, pis- v. vi.; 42.

E. Metchinkoft, " Studien iiber die Entwickelung der Medusen und Siphonophoren," Zeitschr. f. wiss. Zool. xxiv. (1874), pp. 15-83, pis. i.-xii. ; 43. " Vergleichend-embryologische Studien" (Geryoniden, Cunina), ibid, xxxvi. (1882), pp. 433-458, pi. xxviii.; 44. Embryologische Studien an Medusen (Vienna, 1886), 150 pp., 12 pis., 10 figs.; 45. " Medusologische Mittheilungen," Arb. zool. Inst. Wien, vi. (1886), pp. 237-266, pis. xxii. xxiii.; 46. L. Murbach, " Beitrage zur Kenntnis der Anatomie und Entwickelung der Nesselorgane der Hydroiden," Arch. f. Naturgesch. lx. i. (1894), pp. 217-254, pi. xii.; 47. " Preliminary Note on the Life-History of Gonionemus ," Journ. Morph. xi. (1895), pp. 493-496; 48. L. Murbach and C. Shearer, " On Medusae from the Coast of British Columbia and Alaska," Proc. Zool. Soc. (1903), ii. pp. 164-191, pis. xvii.-xxii. ; 49. H. F. Perkins, " The Development of Gonioncma murbachii," Proc. Acad. Nat. Sci. Philadelphia (1902), pp. 750-790, pis. xxxi-xxxiv. ; SO.

F. Schaudinn, " Uber Haleremita cumulans, n. g. n. sp., einen marinen Hydroidpolypen," SB. Ges. natforsch. Freunde Berlin (1894), pp. 226-234, 8 figs. ; 51. F. E. Schulze, " On the Structure and Arrangement of the Soft Parts in Euplectella aspergillum " (Amphi- brachium), Tr. R. Soc. Edinburgh, xxix. (1880), pp. 661-673, pi. xvii.; 52. O. Seeliger, " fiber das Verhalten der Keimblatter bei der Knospung der Colenteraten," Zeitschr. f. wiss. Zool. lviii. (1894), pp. 152-188, pis. vii.-ix.; 53. W. B. Spencer, "A new Family of Hydroidea (Clalhrozoon) , together with a description of the Structure of a new Species of Plumularia," Trans. Roy. Soc. Victoria (1890), pp. 121-140, 7 pis.; 54. M. Ussow, " A new Form of Fresh-water Coelenterate " (Poly podium), Ann. Mag. Nat. Hist. (5) xviii. (1886), pp. 1 10-124, pl- i y -; 55. E. Vanhoffen, " Versuch

einer natiirlichen Gruppierung der Anthomedusen," Zool. Anzeiger, xiv. (1891), pp. 439-446; 56. C. Viguier, " Etudes sur les animaux inferieurs de la baie d'Alger " (Tetraplatia) , Arch. Zool. Exp. Gen. viii. (1890), pp. 101-142, pis. vii.ix.; 57. J. Wagner, " Recherches sur l'oreanisa tion de Monobrachium parasiticum Merejk," Arch. biol. x. (1890), pp. 273-309, pis. viii. ix. ; 58. A. Weismann, Die Entstehung der Sexualzellen bei den Hydromedusen (Jena, 1883); 59. R. Woltereck, " Beitrage zur Ontogenie und Ableitungdes Siphonophorenstocks," Zeitschr. f. wiss. Zool. lxxxii. (1905), pp. 611-637, 21 text-figs.; 60. J. Wulfert, " Die Embryonalentwickelung von Gonothyraea lovem Allm.," Zeitschr. f. wiss. Zool. lxxi. (1902), pp. 296-326, pis. xvi. -xviii. (E. A. M.)

HYDROMETER (Gr. vSwp, water, and pirpov, a measure), an instrument for determining the density of bodies, generally of fluids, but in some cases of solids. When a body floats in a fluid under the action of gravity, the weight of the body is equal to that of the fluid which it displaces (see Hydromechanics). It is upon this principle that the hydrometer is constructed, and it obviously admits of two modes of application in the case of fluids: either we may compare the weights of floating bodies which are capable of displacing the same volume of different fluids, or we may compare the volumes of the different fluids which are dis- placed by the same weight. In the latter case, the densities of the fluids will be inversely proportional to the volumes thus displaced.

The hydrometer is said by Synesius Cyreneus in his fifth letter to have been invented by Hypatia at Alexandria, 1 but appears to have been neglected until it was reinvented by Robert Boyle, whose " New Essay Instrument," as described in the Phil. Trans. for June 1675, differs in no essential particular from Nicholson's hydrometer. This instrument was devised for the purpose of detecting counterfeit coin, especially guineas and half-guineas. In the first section of the paper (Phil. Trans. No. 115, p. 329) the author refers to a glass instrument exhibited by himself many years before, and " consisting of a bubble furnished with a long and slender stem, which was to be put into several liquors, to compare and estimate their specific gravities." This seems to be the first reference to the hydrometer in modern times.

In fig. 1 C represents the instrument used for guineas, the circular plates A representing plates of lead, which are used as ballast when lighter coins than guineas are examined. B

1 In Nicholson's Journal, iii. 80, Citizen Eusebe Salverte calls

attention to the poem " De Ponderibus et Mensuris " generally ascribed to Rhemnius Fannius Palaemon, and consequently 300 years older than Hypatia, in which the hydrometer is described and attributed to Archimedes. XIV. 6

Fig. 1. — Boyle's New Essay Instrument.

represents " a small glass instrument for estimating the specific gravities of liquors," an account of which was promised by Boyle in the following number of the Phil. Trans., but did not appear.

The instrument represented at B (fig. 1), which is copied from Robert Boyle's sketch in the Phil. Trans, for 1675, is generally known as the common hydrometer. It is usually made of glass, the lower bulb being loaded with mercury or small shot which serves as ballast, causing the instrument to float with the stem vertical. The quantity of mercury or shot inserted depends upon the density of the liquids for which the hydrometer is to be employed, it being essential that the whole of the bulb should be immersed in the heaviest liquid for which the instrument is used, while the length and diameter of the stem must be such that the hydro- meter will float in the lightest liquid for which it is required. The stem is usually divided into a number of equal parts, the divisions of the scale being varied in different instruments, accord- ing to the purposes for which they are employed.

Let V denote the volume of the in- strument immersed (i.e. of liquid dis- placed) when the surface of the liquid in which the hydro- meter floats coincides with the lowest division of the scale, A the area of the transverse section of the stem, / the length of a scale division, n the number of divisions on the stem, and W the weight of the instrument. Suppose the successive divisions of the scale to be numbered o, 1, 2 ... n starting with the lowest, and let w,,, W\ , o»2 . . . w n be the weights of unit volume of the liquids in which the hydrometer sinks to the divisions o, 1, 2... re respectively. Then, by the principle of Archimedes,

W = Vte ; or wo = W/ V. Also W = (V -WA)to, ; or a;, = W/ (V +/A) , w p = W/(V+plA),a.nd w» = W/(V+»/A),

or the densities of the several liquids vary inversely as the respective volumes of the instrument immersed in them; and, since the divisions of the scale correspond to equal increments of volume immersed, it follows that the densities of the several liquids in which the instrument sinks to the successive divisions form a harmonic series.

If V = N/A then N expresses the ratio of the volume of the instrument up to the zero of the scale to that of one of the scale-divisions. If we suppose the lower part of the instrument replaced by a uniform bar of the same sectional area as the stem and of volume V, the indications of the instrument will be in no respect altered, and the bottom of the bar will be at a distance of N scale-divisions below the zero of the scale.

In this case we have Wp = W/(N+p)lA; or the density of the liquid varies inversely as N+p, that is, as the whole number of scale-divisions between the bottom of the tube and the plane of flotation.

If we wish the successive divisions of the scale to correspond to equal increments in the density of the corresponding liquids, then the volumes of the instrument, measured up to the successive divisions of the scale, must form a series in harmonical progression, the lengths of the divisions increasing as we go up the stem.

The greatest density of the liquid for which the instrument described above can be employed is W/V, while the least density is W/(V+n/A), or W/(V+»), where v represents the volume of the stem between the extreme divisions of the scale. Now, by increasing », leaving W and V unchanged, we may increase the range of the instrument indefinitely. But it is clear that if we increase A, the sectional area of the stem, we shall diminish /, the length of a scale-division corresponding to a given variation of density, and thereby proportionately diminish the sensibility of the instrument, while diminishing the section A will increase / and proportionately increase the sensibility, but will diminish the range over which the instru- ment can be employed, unless we increase the length of the stem in the inverse ratio of the sectional area. Hence, to obtain great sensibility along with a considerable range, we require very long slender stems, and to these two objections apply in addition to the question of portability; for, in the first place, an instrument with a very long stem requires a very deep vessel of liquid for its complete immersion, and, in the second place, when most of the stem is above

the plane of flotation, the stability of the instrument when floating will be diminished or destroyed. The various devices which have been

adopted to overcome this difficulty will be described in the account given of the several hydrometers which have been hitherto generally employed.

The plan commonly adopted to obviate the necessity of inconveniently long stems is to construct a number of hydrometers as nearly alike as may be, but to load them differently, sd that the scale- divisions at the bottom of the stem of one hydrometer just overlap those at the top of the stem of the preceding. By this means a set of six hydrometers, each having a stem rather more than 5 in. long, will be equivalent to a single hydrometer with a stem of 30 in. But, instead of employing a number of instruments differing only in the weights with which they are loaded, we may employ the same instrument, and alter its weight either by adding mercury or shot to the interior (if it can be opened) or by attaching weights; to the exterior. These two operations are not quite equivalent, since a weight added to the interior does not affect the volume of liquid displaced when the instrument is immersed up to a given division of the scale, while the addition of weights to the exterior increases the displace ment. This difficulty may be met, as in Keene's hydrometer, by having all the weights of precisely the same volume but of different masses, and never using the instrument except with one of these weights attached.

The first hydrometer intended for the determination of the densities of liquids, and furnished with a set of weights to.be attached when necessary, was that con- structed by Mr Clarke (instrument-maker) and described by J. T. Desaguliers in the Philosophical Transactions for March and April 1730, No. 413, p. 278. The following is Desaguliers's account of the instrument (fig. a):—

" After having made several fruitless trials with ivory, because it imbibes spirituous liquors, and thereby alters its gravity, he (Mr Clarke) at last made a copper hydrometer, represented in fig. 2, having a brass wire of about 1 in. thick sfoing through, and soldered into the copper ball Bfc. The upper part of this wire is filed flat on one side, for the stem of the hydrometer, with a mark at m, to which it sinks exactly in proof spirits. There are two other marks, A and B, at top and bottom of the stem, to show whether the liquor be ˆth above proof (as when it sinks to A), or ˆth under proof (as when it emerges to B), when a brass weight such as C has been screwed on to the bottom at c. There are a great many such weights, of different sizes, and marked to be screwed on instead of C, for liquors that differ more than ˆth from proof, so as to serve for the specific gravities in all such propor tions as relate to the mixture of

spirituous liquors, in all the variety made use of in trade. There are also other balls for showing the specific gravities quite to common water, which make the instrument perfect in its kind."

Fig. 2. — Clarke's Hydrometer.

Fig. 3. — Nichol- son's Hydrometer.

Clarke's hydrometer, as afterwards constructed for the purposes of the excise, was provided with thirty-two weights to adapt it to spirits of different specific gravities, and eleven smaller weights, or " weather weights " as they were called, which were attached to the instrument in order to correct for variations of temperature. The weights were adjusted for successive intervals of 5° F., but for degrees intermediate between these no additional correction was applied. The correction for temperature thus afforded was not sufficiently accurate for excise purposes, and William Speer in his essay on the hydrometer (Tilloch's Phil. Mag., 1802, vol. xiv.) mentions cases in which this imperfect compensation led to the extra duty payable upon spirits which were more than 10% over proof being demanded on spirits which were purposely diluted to below 10% over proof in order to avoid the charge. Clarke's hydrometer, however, remained the standard instrument for excise purposes from 1787 until it was displaced by that of Sikes.

Desaguliers himself constructed a hydrometer of the ordinary type for comparing the specific gravities of different kinds of water (Desaguliers's Experimental Philosophy, ii. 234). In order to give great sensibility to the instrument, the large glass ball was made nearly 3 in. in diameter, while the stem consisted of a wire 10 in. in length and only ˆy in. in diameter. The instrument weighed 4000 grains, and the addition of a grain caused it to sink through itn inch. By altering the quantity of shot in the

small balls the instrument could be adapted for liquids other than water.

To an instrument constructed for the same purpose, but on a still larger scale than that of Desaguliers, A. Deparcieux added a small dish on the top of the stem for the reception of the weights necessary to sink the instrument to a convenient depth. The effect of weights placed in such a dish or pan is of course the same as if they were placed within the bulb of the instrument , since they do not alter the volume of that part which is immersed. The first important improvement in the hydrometer after its reinvention by Boyle w T as

introduced by G. D. Fahrenheit, who adopted the second mode of construction above referred to, arranging his instrument so as always to displace the same volume of liquid, its weight being varied accordingly. Instead of a scale, only a single mark is placed upon the stem, which is very slender, and bears at the top a small scale pan into which weights are placed until the instrument sinks to the mark upon its stem. The volume of the displaced liquid being then always the same, its density will be proportional to the whole weight supported, that is, to the weight of the instrument together with the weights required to be placed in the scale pan.

Nicholson's hydrometer (fig. 3) combines the characteristics of Fahrenheit's hydrometer and of Boyle's essay instrument. 1 The following is the description given of it by W. Nicholson in the Manchester Memoirs, ii. 374: —

" AA represents a small scale. It may be taken off at D. Dia- meter 1 j in., weight 44 grains.

" B a stem of hardened steel wire. Diameter ,Jo in. " E a hollow copper globe. Diameter 2f\> in. Weight with stem 369 grains. .,.:,.'

' FF' a stirrup of 'wire screwed to the globe at C. "G a small scale, serving likewise as a counterpoise. Diameter I J in. Weight with stirrup 1634 grains.

" The other dimensions may be had from the drawing, which is one-sixth of the linear magnitude of the instrument itself.

" In the construction it is assumed that the upper scale shall constantly carry 1000 grains when the lower scale is empty, and the instrument sunk in distilled water at the temperature of 60° Fafir. to the middleof the wire or stem. The length of the stem is arbitrary, as is likewise the distance of the lower scale from the surface of the globe. But, the length of the stem being settled, the lower scale may be made lighter, and, consequently, the globe less, the greater its distance is taken from the surface of the globe; and the contrary.

In comparing the densities of different liquids, it is clear that this instrument is precisely equivalent to that of Fahrenheit, and must be employed in the same manner, weights being placed in the top scale only until the hydrometer sinks to the mark on the wire, when the specific gravity of the liquid will be proportional to the weight of the instrument together with the weights in the scale.

In the subsequent portion of the paper above referred to, Nicholson

explains how the instrument may be employed as a thermometer, since, fluids generally expanding more than the solids of which the instrument is constructed, the instrument will sink as the temperature rises.

To determine the density of solids heavier than water with . this instrument, let the solid be placed in the upper scale pan, and let the weight now required to cau.se the instrument to sink in distilled water at standard temperature to the mark B be denoted by w, while W denotes the weight required when the solid is not present. Then W-w is the weight of the solid. Now let the solid be placed in the lower pan, care being taken that no bubbles of air remain attached to it, and let Wi be the weight now required in the scale pan?" This weight will exceed w in consequence of the water displaced by the solid, and the weight of the water thus displaced will be Wi-w, which is therefore the weight of a volume of water equal to that of the solid. Hence, since the weight of the solid itself is W-ui, its density must be (W-tt>)/(iUi-i£»).

The above example illustrates how Nicholson's or Fahrenheit's hydrometer may be employed as a weighing machine for small weights.

In all hydrometers in which a part only of the instrument 1 Nicholson's Journal, vol. i. p. m, footnote.

is immersed, there is a liability to error in consequence of the surface tension, or capillary action, as it is frequently called, along the line of contact of the instrument and the surface of the liquid (see Capillary Action). This error diminishes as the diameter of the stem is reduced, but is sensible in the case of the thinnest stem which can be employed, and is the chief source of error in the employment of Nicholson's hydrometer, which otherwise would be an instrument of extreme delicacy and precision. The following is Nicholson's statement on this point: —

" One of the greatest difficulties which attends hydrpstatical experiments arises from the attraction or repulsion that obtains at the surface of the water. After trying many experiments to obviate the irregularities arising from this cause, I find reason to prefer the simple one of carefully wiping the whole instrument, and especially the stem, with a clean cloth. The weights in the dish must not be esteemed accurate while there is either a cumulus or a cavity in the

water round the stem."

It is possible by applying a little oil to the upper part of the bulb of a common or of a Sikes's hydrometer, and carefully placing it in pure water, to cause it to float with the upper part of the bulb and the whole of the stem emerging as indicated in fig. 4, when it ought properly to sink almost to the top of the stem, the surface tension of the water around the circumference of the circle of contact, AA', providing the additional support required.

The universal hydrometer of G. Atkins, described in the Phil. Mag. for 1808, xxxi. 25ˆ, is merely Nicholson's hydro- meter with the screw at C projecting through the collar into which it is screwed, and terminating in a sharp point above the cup G. To this point soft bodies lighter than water (which would float if placed in the cup) could be attached, and thus com- pletely immersed. Atkins's instrument was constructed so as to weigh 700 grains, and when immersed to the mark on the stem in distilled water at 6o° F. it carried 300 grains in the upper dish. The hydrometer therefore displaced 1000 grains of distilled water at 6o c F.and hence the specific gravity of any other liquid was at once indicated by adding 700 to the number of grains in the pan required to make the instrument sink to the mark on the stem. The small divisions on the scale corresponded to differences of , l th of a grain in the weight of the instrument.

The " Gravimeter," constructed by Citizen Guyton and described in Nicholson's Journal, 4to, i. no, differs from Nicholson's instru- ment in being constructed of glass, and having a cylindrical bulb about 21 centimetres in length and 22 millimetres in diameter. Its weight is so adjusted that an additional weight of 5 grammes must be placed in the upper pan to cause the instrument to sink to the mark on the stem in distilled water at the standard temperature. The instrument Is provided with an additional piece, or " plongeur," the weight of which exceeds 5 grammes by the weight of water which it displaces ; that is to say, it is so constructed as to weigh 5 grammes in water, and consists of a glass envelope filled with mercury. It is clear that the effect of this " plongeur," when placed in the lower pan, is exactly the same as that of the 5 gramme weight in the upper pan. Without the extra 5 grammes the instrument weighs about 20 grammes, and therefore floats in a liquid of specific gravity -8. Thus deprived of its additional weight it may be used for spirits. To use the instrument for liquids of much greater density than water additional weights must be placed in the upper pan, and the " plongeur " is then placed in the lower pan for the purpose of giving to the instrument

the requisite stability.

Charles's balance areometer is similar to Nicholson's hydrometer, except that the lower basin admits of inversion, thus enabling the instrument to be employed for solids lighter than water, the inverted basin serving the same purpose as the pointed screw in Atkins's modification of the instrument.

Adie's sliding hydrometer is of the ordinary form, but can be adjusted for liquids of widely differing specific gravities by drawing out a sliding tube, thus changing the volume of the hydrometer while its weight remains constant.

The hydrometer of A. Baum6, which has been extensively used in France, consists of a common hydrometer graduated in the following manner. Certain fixed points were first detefmined upon the stem of the instrument. The first of these was found by immersing the hydrometer in pure water, and marking the stem at the level of the surface. This formed the zero of the scale. Fifteen standard solutions of pure common salt in water were then prepared, contain-

ing respectively 1, 2, 3, ... 15% (by weight) of dry salt. The hydrometer was plunged in these solutions in order, and the stem having been marked at the several surfaces, the degrees so obtained were numbered 1,2,3, ■ • • 15- Thesedegrees were, when necessary, repeated along the stem by the employment of a pair of compasses till 80 degrees were marked off. The instrument thus adapted to the determination of densities exceeding that of water was called the hydrometer for salts.

The hydrometer intended for densities less than that of water, or the hydrometer for spirits, is constructed on a similar principle. The instrument is so arranged that it floats in pure water with most of the stem above the surface. A solution containing 10% of pure salt is used to indicate the zero of the scale, and the point at which the instrument floats when immersed in distilled water at io° R. (54J F.) is numbered 10. Equal divisions are then marked off upwards along the stem as far as the 50th degree.

The densities corresponding to the several degrees of Baum6's hydrometer are given by Nicholson (Journal of Philosophy, i. 89) as follows :—

Baume's Hydrometer for Spirits. Temperature 10° R.

Fig. 4.

Degrees.

Density.

Degrees.

Density.

Degrees.

Density.

10

I -000

21

•922

31

■861

n

•990

22

•915

32

•856

12

•985

23

■909

33

•852

13

■977

24

•903

34

•847

14

■970

25

•897

35

•842

15

•963

26

■892

36

•837

16

•955

27

•886

37

•832 .

17

■949

28

•880

38

•827

18

•943

29

•874

39

•822

19

■935

30

•867

40

•817

20

■928

|

Baume's Hydrometer for Salts.

Degrees.

Density.

Degrees.

Density.

Degrees.

Density. ‘

I-OOO

27

1-230

5i

1-547

3

i- 020

30

1-261

54

t-594

6

1-040

33

1-295

57

1-659

9

1-064

36

1-333

60

1 717

12

1-089

39

1-373

63

1-779

15

1-114

42

1-414

66

1-848

18

1-140

45

1-455

69

1-920 1

21

1-170

48

1-500

72

2-000 1

24

1-200

]

Cartier's hydrometer was very similar to that of Baum6, Cartier having been employed by the latter to construct his instruments for the French revenue. The point at which the instrument floated in distilled water was marked 10° by Cartier, and 30 on Cartier's scale corresponded to 32 on Baume's.

Perhaps the main object for which hydrometers have been constructed is the determination of the value of spirituous liquors, chiefly for revenue purposes. To this end an immense variety of hydrometers have been devised, differing mainly in the character of their scales.

In Speer's hydrometer the stem has the form of an octagonal prism, and upon each of the eight faces a scale is engraved, indicating the percentage strength of the spirit corresponding to the several divisions of the scale, the eight ■ scales being adapted respectively to the temperature 35 °, 40 , 45 , 50 , 55 , 60°, 65° and 70° F. Four small pins, which can be inserted into the counterpoise of the instrument, serve to adapt the instrument to the temperatures intermediate between those for which the scales are constructed. William Speer was supervisor and chief assayer of spirits in the port of Dublin. For a more complete account of this instrument see Tilloch's Phil. Mag., xiv. 151.

The hydrometer constructed by Jones, of Hol- born, consists of a spheroidal bulb with a rec- tangular stem (fig. 5). Between the bulb and counterpoise is placed a thermometer, which serves to indicate the temperature of the liquid, and the instrument is provided with three weights which can be attached to the top of the stem. On the four sides of the stem AD are engraved four scales corresponding respectively to the unloaded Fig. 5. — Jones'; instrument, and to the instrument loaded with the Hydrometer, respective weights. The

instrument when unloaded serves for the range from 74 to 47 over proof ; when loaded with tht first weight it indicates from 46 to 13 over proof, with the second weight from 13 over proof to 29 under proof, and with the third

i

i

1

i

Fig. 6.

from 29 under proof to pure water, the graduation corresponding to which is marked W at the bottom of the fourth scale. One side of the stem AD is shown in fig. 5, the other three in fig. 6. The thermometer is also provided with four scales corresponding to the scales above mentioned. Each scale has its zero in the middle correspond-

®ˆ„ˆ ing to 6o c F. If the mercury in the thermo- ˆq\ (o\ meter stand above this zero the spirit must V J KZJ De reckoned weaker than the hydrometer in-

&■_ jbl dicates by the number on the thermometer

I i scale level with the top of the mercury, while

— Kl fcrtl ;f tne thermometer indicate a temperature

lower than the zero of the scale (60° F.) the spirit must be reckoned stronger by the scale reading. At the side of each of the four scales on the stem of the hydrometer is en- graved a set of small numbers indicating the contraction in volume which would be experi- enced if the requisite amount of water (or spirit) were added to bring the sample tested to the proof strength.

The hydrometer constructed by Dicas of Liverpool is provided with a sliding scale which can be adjusted for different temperatures, and . . , which also indicates the contraction in volume

incident on bringing the spirit to proof strength. It is provided with

thirty-six different weights which, with the ten divisions on the stem, form a scale from o to 370. The employment of so many weights renders the instrument ill-adapted for practical work where speed is an object.

This instrument was adopted by the United States in 1790, but was subsequently discarded by the Internal Revenue Service for another type. In this latter form the observations have to be made at the standard temperature of 6o° F., at which the graduation 100 corresponds to proof spirit and 200 to absolute alcohol. The need of adjustable weights is avoided by employing a set of five instru- ments, graduated respectively o°-loo°, 80-120°, ioo°-i4o°, i30°-i7o°, l6o°-200°. The reading gives the volume of proof spirit equivalent to the volume of liquor; thus the readings 8o° and 120° mean that 100 volumes of the test liquors contain the same amount of absolute alcohol as 80 and 120 volumes of proof spirit respectively. Proof spirit is defined in the United States as a mixture of alcohol and water which contains equal volumes of alcohol and water at 6o° F., the alcohol having a specific gravity of 0-7939 at 60° as compared with water at its maximum density. The specific gravity of proof spirit is 0- 93353 at 6o°; and 100 volumes oi the mixture is made from 50 volumes of absolute alcohol and 53-71 volumes of water.

Quin's universal hydrometer is described in the Transactions of the Society of Arts, viii. 98. It is provided with a sliding rule to adapt it to different temperatures, and has four scales, one of which is graduated for spirits and the other three serve to show the strengths of worts. The peculiarity of the instrument con- sists in the pyramidal form given to the stem, which renders the scale-divisions more nearly equal in length than they would be on a pris- matic stem.

Atkins's hydrometer, as originally constructed, is described in Nicholson's Journal, 8vo, ii. 276. It is made of brass, and is provided with a spheroidal bulb the axis of which is 2 in. in length, the conjugate diameter being 1 § in. The whole length of the instrument is 8 in., the stem square of about j-in. side, and the weight about 400 grains. It is provided with four weights, marked 1, 2, 3, 4, and weighing respectively 20, 40, 61 and 84 grains, which can be attached to the shank of the instrument at C (fig. 7) and retained there by the fixed weight B. The scale engraved upon one face of the stem contains fifty-five divisions, the top and bottom being marked o or zero and the alter- nate intermediate divisions (of which there are ;wenty-six) being marked with the letters of the alphabet in order. The four weights are so adjusted that, if the instrument floats with the stem emerging as far as the lower division o with one of the

weights attached, then replacing the weight by the next heavier causes the instrument to sink through the whole leneth of the scale to the upper division o, and the first weight produces the same effect when applied to the naked instrument. The stem is thus virtually extended to five times its length, and the number of divisions increased practically to 272. When no weight is attached the instrument indicates densities from -806 to -843; with No. 1 it registers from -843 to -S8o, with No. 2 from -88o to -918, with No. 3 from -918 to -958, and with No. 4 from -958 to i-ooo, the temperature being

C

Fig. 7. — Atkins's Hydrometer.

55° F. It will thus be seen that the whole length of the stem corresponds to a difference of density of about -04, and one division to about -00074, indicating a difference of little more than i % in the strength of any sample of spirits.

The instrument is provided with a sliding rule, with scales corresponding to the several weights, which indicate the specific gravity corresponding to the, several divisions of the hydrometer scale compared with water at 55° F. The slider upon the rule serves to adjust the scale for different temperatures, and then indicates the strength of the spirit in percentages over or under proof. The slider is also provided with scales, marked respectively Dicas and Clarke, which serve to show the readings which would have been obtained had the instruments of those makers been employed. The line on the scale marked " concentration " indicates the diminution in volume consequent upon reducing the sample to proof strength (if it is over proof, O.P.) or upon reducing proof spirit to the strength of the sample (if it is under proof, U.P.). By applying the several weights in succession in addition to No. 4 the instrument can be employed for liquids heavier than water; and graduations on the other three sides of the stem, together with an additional slide rule, adapt the instrument for the determination of the strength of worts.

Atkins subsequently modified the instrument {Nicholson's Journal, 8vo, iii. 50) by constructing the different weights of different shapes, viz. ciicular, square, triangular and pentagonal, instead of numbering them I, 2, 3 and 4 respectively, a figure of the weight being stamped on the sliding rule opposite to every letter in the series to which it belongs, thus diminishing the probability of mistakes. He also replaced the letters on the stem by the corre- sponding specific

gravities referred to water as unity. Further information concerning these instruments and the state of hydro metry in 1803 will be found in Atkins's pamphlet On the Relation between the Specific Gravities and the Strength of Spirituous Liquors (1803); or Phil. Mag. xvi. 26-33, 205-212, 305-312; xvii. 204-210 and 329-341.*

In Gay-Lussac's alcoholometer the scale is divided into 100 parts corresponding to the presence of I, 2, ... % by volume of alcohol at 15° C, the highest division of the scale corresponding to the purest alcohol he could obtain (density -7947) and the lowest division corresponding to pure water. A table provides the necessary corrections for other temperatures.

Tralles's hydrometer differs from Gay-Lussac's only in being graduated at 4 C. instead of 15° C, and taking alcohol of density •7939 at 15-5° C. for pure alcohol instead of -7947 as taken by Gay Lussac (Keene's Handbook of Hydrometry).

In Beck's hydrometer the zero of the scale corresponds to density i-ooo and the division 30 to density -850, and equal divisions oiv the scale are continued as far as is required in both directions.

In the centesimal hydrometer of Francoeur the volume of the stem between successive divisions of the scale is always j} B th of the whole volume immersed when the instrument floats in water at 4 C. In order to graduate the stem the instrument is first weighed, then immersed in distilled water at 4 C, and the line of flotation marked zero. The first degree is then found by placing on the top of the stem a weight equal to fjj,th of the weight of the instrument, which increases the volume immersed by t J th of the original volume. The addition to the top of the stem of successive weights, each jJoth of the weight of the instrument itself, serves to determine the successive degrees. The length of 100 divisions of the scale, or the length of the uniform stem the volume of which would be equal to that of the hydrometer up to the zero graduation, Francoeur called the "modulus " of the hydrometer. He constructed his instruments of glass, using different instruments for different portions of the scale (Francoeur, Traiti d'areometrie, Paris, 1842).

Dr Bories of Montpellier constructed a hydro- meter which was based upon the results of his experiments on mixtures of alcohol and water. The interval between the points corresponding to pure alcohol and to pure water Bories divided into 100 equal parts, though the stem was pro- Fig. 8. — Sikes's longed so as to contain only 10 of these divisions, Hydrometer, the other 90 being provided for by the

addition of 9 weights to the bottom of the instrument as in Clarke's hydrometer

The instrument which has now been exclusively used for revenue purposes for nearly a century is that associated with the name of Bartholomew Sikes, who was correspondent to the Board of Excise from 1774 to 1783, and for some time collector of excise for Hertford- shire.

Sikes's hydrometer, on account of its similarity to that of Bories, appears to have been borrowed from that instrument. It is made of gilded brass or silver, and consists of a spherical ball A (fig. 8), 1-5 in. in diameter, below which is a weight B connected with the ball by a short conical stem C. The stem D is rectangular in section and about 3! in. in length. This is divided into ten equal parts, each of which is subdivided into five. As in Bories's instrument, a series of 9 weights, each of the form shown at E, serves to extend the scale

ft

V

Ht

to 100 principal divisions. In the centre of each weight is a holt- capable of admitting the lowest and thickest end of the conical stem C, and a slot is cut into it just wide enough to allow the upper part of the cone to pass. Each weight can thus be dropped on to the lower stem so as to rest on the counterpoise B. The weights are marked 10, 20, ... 90; and in using the instrument that weight must be selected which will allow it to float in the liquid with a portion only of the stem submerged. Then the reading of the scale at the line of flotation, added to the number on the weight, gives the reading required. A small supernumerary weight F is added, which can be placed upon the top of the stem. F is so adjusted that when the 60 weight is placed on the lower stem the instrument sinks to the same point in distilled water when F is attached as in proof spirit when F is removed. The best instruments are now constructed tor revenue purposes of silver, heavily gilded, because it was found that saccharic acid contained in some spirits attacked brass behind the gilding.

The following table gives the specific gravities corresponding to the

principal graduations on Sikes's hydrometer at 60° F. and 62° F., together with the corresponding strengths of spirits. The latter are based upon the tables of Charles Gilpin, clerk to the Royal Society, for which the reader is referred to the Phil. Trans, for 1794. Gilpin's work is a model for its accuracy and thoroughness of detail, and his results have scarcely been improved upon by more recent workers. The merit of Sikes's system lies not so much in the hydrometer as in the complete system of tables by which the readings of the instrument are at once converted into percentage of proof-spirit.

Table showing the Densities corresponding to the Indications of Sikes's Hydrometer.

■*A*

00° F.

62° F.

60° F.

62° F.

V-

Proof

Proof

-“\2

Proof

Proof

J5 £ c

Density.

Spirit per cent.

Density.

Spirit per cent.

c/3’-3

Density.

Spirit per cent.

Density.

Spirit per cent.

815297

1670

■*815400*

1665

51

•905024

111-4

•905138

110-7

1

■810956

1661

■817059

165-6

52

•906869

110-0

■906983

109-3

2

■818«21

165-3

■818725

164-8

53

•908722

108-6

■908837

107-9

3

■820294

164-5

•820397

163-9

54

■910582

107-1

•910097

106-5

4

•821973

163-6

•822077

163-1

55

■912450

105-6

•912565

105-0

5

■823659

102-7

■823763

162-3

56

•914320

104-2

‘914441

103-5

tj

825352

161-8

■825457

161-4

57

•916209

102-7

•916323

1020

7

■827052

160-9

■827157

160-5

58

•918100

101-3

■918216

100-5

s

■*828759*

1600

■*828864*

159-0

59

■*919999*

99-7

■*920115*

98-9

9

■*830473*

1591

■*830578*

158-7

60

•*921906*

98-1

■*922022*

97-4

10

■*832195*

15S-2

832300

157-8

OOb

‘921884

98-1

■*922000*

97-4

11

•*S338SS*

157-3

■*833993*

156-S

61

•*923760*

96-6

■*923877*

95-9

12

•*835587*

156-4

■*835692*

155-9

62

■*925643*

950

‘925700

94-2

13

•837294

155-5

•837400

155-0

63

■927534

933

•927652

92-0

14

•839008

154-6

•839114

154-0

64

■929433

91-7

■929550

90-9

15

•840729

153-7

•840835

153-1

65

•931339

90-0

■931457

89-2

IB

•842458

152-7

•842504

152-1

66

■933254

88-3

■933372

87-5

17

•844193

151-7

•844299

151-1

67

■*935176*

86-5

■*935294*

85-8

IS

•*845930*

1.50-7

•*846042*

150-1

68

■*937107*

847

■*937225*

84-0

19

•*847685*

149-7

•*847792*

149-1

69

•*939045*

82-9

•*939163*

822

20

•849442

148-7

•849549

148-1

70

•940991

81-1

■941110

80-3

20b

•849393

148-7

•849500

148-1

70b

■940981

Sl'l

■941100

80-3

21

•851122

147-6

■851229

147-1

71

•942897

792

■943016

78-4

■ > 2

•852S57

146-6

•852964

146-1

72

■944819

77-3

■944938

76-5

33

•854599

145-6

•854707

145-1

73

■946749

75-3

■*946869*

74-5

24

■*S5634S*

144-6

•*856456*

1440

74

■*948087*

733

•*948807*

72-5

25

■*858105*

143-5

•*858213*

142-9

75

•*950634*

7P2

■*950753*

70-4

2(i

■*859869*

142-4

•859978

141-8

76

■952588

69-0

■952708

68-2

OV

■801640

141-3

■861749

140-8

77

■954550

66-8

■954670

66-0

2S

•863419

140-2

■S63528

139-7

78

-956520

644

■*956641*

63-5

29

■*835204*

1391

■*865313*

138 5

79

■*958498*

6P9

■*958619*

61-1

30

■*860998*

138-0

■*867107*

137-4

SO

•*960485*

59-4

■*960600*

58-5

30b

•866991

13S-0

•867100

137-4

80b

-960479

59-4

■960000

58-5

31

■8118755

136-9

-868865

136-2

81

•962433

56-7

■962555

55-8

32

■870526

135-7

•870636

1351

82

■*964395*

53-9

■*964517*

53-0

33

•*872305*

134-5

S72415

133-9

S3

•*966366*

50-9

•*966488*

50-0

34

■*874090*

133-4

•*874200*

132-8

84

■*968344*

47-8

•968466

47-0

35

■S75883

132-2

■875994

131-6

85

■970331

44-5

‘970453

43-8

36

■877681

1310

■S77995

130-4

86

■972325

4V0

‘972448

40-4

37

■879492

129-8

-879603

129-1

87

•974328

37-5

■974451

36-9

38

831307

128-5

■8S1419

127-9

88

•976340

34-0

■976463

33-5

39

■883129

127-3

■8S3241

126-7

89

■978359

30

•978482

30-1

40

‘884900

126-0

•885072

125-4

90

■980386

27-2

•980510

26-7

40b

■SS48S8

1260

■885000

125-4

90b

■980376

27-2

‘980500

20-7

41

■*S8S6S9*

124-8

•*88580 i*

124-2

91

■*982371*

23-9

‘982496

23-6

42

■*8SS497*

1235

•*888609*

122-9

92

•*984374*

20-8

‘984498

20-5

1 43

-S90312

122-2

■*S90425*

121-6

93

■*986385*

17-7

‘986510

17-4

: 44

■*892135*

120-9

•*892248*

1203

94

■*988404*

148

■*988529*

14-5

, 45

■*893965*

1196

•*S94078*

1190

95

•*990431*

12-0

■*990557*

11-7

i 4li

■*8.15803*

118-3

•*8ˆ5916*

117-6

96

•*992468*

93

•*992593*

90

47

■*897647*

1169

■*897761*

116-3

97

•*994512*

0-7

•*994637*

6-5

48

■*899500*

115-6

■*899614*

114-9

98

•*996565*

4-1

•*996691*

40

49

i -901360

114-2

■*901417*

113-5

99

■*998626*

1-8

•*998752*

1-6

50

■*903229*

112-8

■*903343*

1121

100

1 000691

00

1000822

00

50b

•903186

1128

■903300J112-1

In the above table for Sikes's hydrometer two densities are given corresponding to each of the degrees 20, 30, 40, 50, 60, 70, 80 and 00, Indicating that the successive weights belonging to the particular Instrument for which the table has been calculated do not quite agree. The discrepancy, however, does not produce any sensible error in the strength of the corresponding spirit.

A table which indicates the weight per gallon of spirituous liquors for every degree of Sikes's hydrometer is printed in 23 and 24 Vict. c. 114, schedule B. This table differs slightly from that given above, which has been abridged from the table given in Keene's Handbook of Hydrometry, apparently on account of the equal divisions on

Sikes's scale having been taken as corresponding to equal increments of density.

Sikes's hydrometer was established for the purpose of collecting the revenue of the United Kingdom by Act of Parliament, 56 Geo. III. c. 140, by which it was enacted that " all spirits shall be deemed and taken to be of the degree of strength which the said hydrometers called Sikes's hydrometers shall, upon trial by any officer or officers of the customs or excise, denote such spirits to be." This act came into force on January 5, 1817, and was to have remained in force until August 1, 1818, but was repealed by 58 Geo. II I.e. 28, which established Sikes's hydrometer on a permanent footing. By 3 and 4 Will. IV. c. 52, § 123, it was further enacted that the same instruments and methods should be employed in determining the duty upon im- ported spirits as should in virtue of any Act of Parliament be em- ployed in the determination of the duty upon spirits distilled at home. It is the practice of the officers of the inland revenue to

adjust Sikes's hydrometer at 62° F., that being the temperature at which the imperial gallon is defined as containing 10 lb avoirdupois of distilled water. The specific gravity of any sample of spirits thus determined, when multiplied by ten, gives the weight in pounds per imperial gallon, and the weight of any bulk of spirits divided by this number gives its volume at once in imperial gallons.

Mr (afterwards Colonel) J. B. Keene, of the Hydrometer Office, London, has constructed an instrument after the model of Sikes's, but provided with twelve weights of different masses but equal volumes, and the instrument is never used without having one of these attached. When loaded with either of the lightest two weights the instrument is specifically lighter than Sikes's hydrometer when unloaded, and it may thus be used for specific gravities as low as that of absolute alcohol. The volume of each weight being the same, the whole volume immersed is always the same when it floats at the same mark whatever weight may be attached.

Besides the above, many hydrometers have been employed for special purposes. Twaddell's hydrometer is adapted for densities greater than that of water. The scale is so arranged that the reading multiplied by 5 and added to 1000 gives the specific gravity with reference to water as 1000. To avoid an inconveniently long stem, different instruments are employed for different parts of the scale as mentioned above.

The lactometer constructed by Dicas of Liverpool is adapted for the determination of the quality of milk. It resembles Sikes's hydrometer in other respects, but is provided with eight weights. It is also provided with a thermometer and slide rule, to reduce the readings to the standard temperature of 55 ° F. Any determination of density can be taken only as affording prima facie evidence of the quality of milk, as the removal of cream and the addition of water are operations which tend to compensate each other in their influence on the density of the liquid, so that the lactometer cannot be regarded as a reliable instrument.

The marine hydrometers, as supplied by the British government to the royal navy and the merchant marine, are glass instruments with slender stems, and generally serve to indicate specific gravities from i-ooo to 1-040. Before being issued they are compared with a standard instrument, and their errors determined. They are employed for taking observations of the density of sea-water.

The sahnometer is a hydrometer originally intended to indicate the

strength of the brine in marine boilers in which sea-water is employed. Saunders's salinometer consists of a hydrometer which floats in a chamber through which the water from the boiler is allowed to flow in a gentle stream, at a temperature of 200° F. The peculiarity of the instrument consists in the stream of water, as it enters the hydrometer chamber, being made to impinge against a disk of metal, by which it is broken into drops, thus liberating the steam, which would otherwise disturb the instrument.

The use of Sikes's hydrometer necessitates the employment of a considerable quantity of spirit. For the testing of spirits in bulk Jio more convenient instrument has been devised, but where very small quantities are available more suitable laboratory methods must be adopted.

In England, the Finance Act 1907 (7 Ed. VII. c. 13), section 4, provides as follows: (1) The Commissioners of Customs and the Commissioners of Inland Revenue may jointly make regulations authorizing the use of any means described in the regulations for ascertaining for any purpose the strength or weight of spirits. (2) Where under any enactment Sykes's {sic) Hydrometer is directed to be used or may be used for the purpose of ascertaining the strength or weight of spirits, any means so authorized by regulations may be used instead of Sykes's, Hydrometer and reference's to Sykes's Hydro- meter in any enactment shall be construed accordingly. (3) Any regulations made under this section shall be published in the London, Edinburgh and Dublin Gazette, and shall take effect from the date of publication, or such later date as may be mentioned in the regulations for the purpose. (4) The expression " spirits " in this section has the same meaning as in the Spirits Act 1880. (W. G.)

HYDROPATHY, the name given, from the Greek, to the " water-cure," or the treatment of disease by water, used outwardly and inwardly. Like many descriptive names, the word " hydropathy " is defective and even misleading, the active agents in the treatment being heat and cold, of which water

is little more than the vehicle, and not the only one. Thermo-therapeutics (or thermotherapy) is a term less open to objection. Hydropathy, as a formal system, dates from about 1829, when Vincenz Priessnitz (1801-1851), a farmer of Grafenberg in Silesia,

Austria, began his public career in the paternal homestead, extended so as to accommodate the increasing numbers attracted by the fame of his cures. Two English works, however, on the medical uses of water had been translated into German in the century preceding the rise of the movement under Priessnitz. One of these was by Sir John Floyer (1649- 1734), a physician of Lichfield, who, struck by the remedial use of certain springs by the neighbouring peasantry, investigated the history of cold bathing, and published in 1702 his "tyvxpo- \ovcia, or the History of Cold Bathing, both Ancient and Modern." The book ran through six editions within a few years, and the translation was largely drawn upon by Dr J . S. Hahn of Silesia, in a work published in 1738, On the Healing Virtues of Cold Water, Inwardly and Outwardly applied, as proved by Experience. The other work was that of Dr James Currie (1756-1805) of Liverpool, entitled Medical Reports on the Effects of Water, Cold and Warm, as a remedy in Fevers and other Diseases, published in 1797, and soon after translated into German by Michaelis (1801) and Hegewisch (1807). It was highly popular, and first placed the subject on a scientific basis. Harm's writings had meanwhile created much enthusiasm among his countrymen, societies having been everywhere formed to promote the medicinal and dietetic use of water; and in 1804 Professor Ortel of Ansbach republished them and quickened the popular movement by unqualified commendation of water drinking as a remedy for all diseases. In him the rising Priessnitz found a zealous advocate, and doubtless an instructor also.

At Grafenberg, to which the fame of Priessnitz drew people of every rank and many countries, medical men were conspicuous by their numbers, some being attracted by curiosity, others by the desire of knowledge, but the majority by the hope of cure for ailments which had as yet proved incurable. Many records of experiences at Grafenberg were published, all more or less favourable to the claims of Priessnitz, and some enthusiastic in their estimate of his genius and penetration; Captain Claridge introduced hydropathy into England in 1840, his writings and lectures, and later those of Sir W. Erasmus Wilson (1809-1884), James Manby Gully (1808-1883) and Edward Johnson, making numerous converts, and filling the establishments opened soon after at Malvern and elsewhere. In Germany, France and America hydropathic establishments multiplied with great rapidity. Antagonism ran high between the old practice and the new. Unsparing condemnation was heaped by each on the other; and a legal prosecution, leading to a royal commission of inquiry, served but to make Priessnitz and his system stand higher in public estimation.

Increasing popularity diminished before long that timidity which had in great measure prevented trial of the new method from being made on the weaker and more serious class of cases, and had caused hydropathists to occupy themselves mainly with a sturdy order of chronic invalids well able to bear a rigorous regimen and the severities of unrestricted crisis. The need of a radical adaptation to the former class was first adequately recognized by John Smedley, a manufacturer of Derbyshire, who, impressed in his own person with the severities as well as the benefits of " the cold water cure," practised among his work- people a milder form of hydropathy, and began about 1852 a new era in its history, founding at Matlock a counterpart of the establishment at Grafenberg.

Ernst Brand (1826-1897) of Berlin, Raljen and Theodor von Jiirgensen of Kiel, and Karl Liebermeister (1833-1901) of Basel, between i860 and 1870, employed the cooling bath in abdominal typhus with striking results, and led to its introduc- tion to England by Dr Wilson Fox. In the Franco-German war the cooling bath was largely employed, in conjunction frequently with quinine; and it now holds a recognized position in the treatment of hyperpyrexia. The wet sheet pack has become part of medical practice; the Turkish bath, introduced

by David Urquhart (1805-1877) into England on his return from the East, and ardently adopted by Dr Richard Barter (1802- 1870) of Cork, has become a public institution, and, with the " morning tub " and the general practice of water drinking, is the most noteworthy of the many contributions by hydropathy to public health (see Baths, ad fin.).

The appliances and arrangements by means of which heat and cold are brought to bear on the economy are — (a) Packings, hot and cold, general and local, sweating and cooling; (b) hot air and steam baths;' (e) general baths, of hot water and cold; (d) sitz, spina!, head and foot baths; (e) bandages (or compresses), wet and dry; also (/) fomentations and poultices, hot and cold, sinapisms, stupes, rubbings and water potations, hot and cold.

(a) Packings. — The full pack consists of a wet sheet enveloping the body, with a number of dry blankets packed tightly over it, in- cluding a macintosh covering or not. In an hour or less these are removed and a general bath administered. The pack is a derivative, sedative, sudorific and stimulator of cutaneous excretion. There are numerous modifications of it, notably the cooling pack, where the wrappings are loose and scanty, permitting evaporation, and the

application of indefinite duration, the sheet being rewetted as it dries; this is of great value in protracted febrile conditions. There are also local packs, to trunk, limbs or head separately, which are derivative, soothing or stimulating, according to circumstance and detail.

(b) Hot air baths, the chief of which is the Turkish (properly, the Roman) bath, consisting of two or more chambers ranging in temperature from 120 to 212 or higher, but mainly used at 150 for curative purposes. Exposure is from twenty minutes up to two hours according to the effect sought, and is followed by a general bath, and occasionally by soaping and shampooing. It is stimulating, derivative, depurative, sudorific and alterative, powerfully promoting tissue change by increase of the natural waste and repair. It determines the blood to the surface, reducing internal congestions, is a potent diaphoretic, and, through the extremes of heat and cold, is an effective nervous and vascular stimulant and tonic. Morbid growths and secretions, as also the uraemic, gouty and rheumatic diathesis, are beneficially influenced by it. The full pack and Turkish bath have between them usurped the place and bettered the function of the once familiar hot bath. The Russian or steam bath and the lamp bath are primitive and inferior varieties of the modern Turkish bath, the atmosphere of which cannot be too dry and pure.

(c) General baths comprise the rain (or needle), spray (or rose), shower, shallow, plunge, douche, wave and common morning sponge baths, with the dripping sheet, and hot and cold spongings, and are combinations, as a rule, of hot and cold water. They are stimulating, tonic, derivative and detergent.

(d) Local baths comprise the sitz (or sitting), douche (or spouting), spinal, foot and head baths, of hot or cold water, singly or in combination, successive or alternate. The sitz, head and foot baths are used " flowing " on occasion. The application of cold by " Leiter's tubes " is effective for reducing inflammation (e.g. in meningitis and in sunstroke); in these a network of metal or indiarubber tubing is fitted to the part affected, and cold water kept con- tinuously flowing through them. Rapid alternations of hot and cold water have a powerful effect in vascular stasis and lethargy of the nervous system and absorbents, yielding valuable results in local congestions and chronic inflammations.

(e) Bandages (or compresses) are of two kinds, — cooling, of wet material left exposed for evaporation, used in local inflammations and fevers; and heating, of the same, covered with waterproof

material, used in congestion, external or internal, for short or long periods. Poultices, warm, of bread, linseed, bran, &c., changed but twice in twenty-four hours, are identical in action with the heating bandage, and superior only in the greater warmth and consequent vital activity their closer application to the skin ensures.

(f) Fomentations and poultices, hot or cold, sinapisms, stupes, rubefacients, irritants, frictions, kneadings, calisthenics, gymnastics, electricity, &c, are adjuncts largely employed.

Bibliography. — Among the numerous earlier works on hydro- pathy, the following are worth mention: Balbirnie, Water Cure in Consumption (1847), Hydropathic Aphorisms (1856) and A Plea for the Turkish Bath (1862) ; Beni-Barde, Traite d' hydrotherapy (1874); Claridge, Cold Water Cure, or Hydropathy (1841), Facts and Evidence in Support of Hydropathy (1843) and Cold Water, Tepid Water and Friction Cure (1849); Dunlop, Philosophy of the Bath (1873); Floyer, Psychrolousia, or the History of Cold-Bathing, &c. (1702) ; J. S. Hahn (Schweidnitz), Observations on the Healing Virtues of Cold Water (1738); Hunter, Hydropathy for Home t/se . (1879); E. W. Lane, Hydropathy, or the Natural System of Medical Treatment (1857); R. J. Lane, Life at the Water Cure (1851) ; Shew, Hydropathic Family Physician (1857) ; Smedley, Practical Hydropathy (1879) ; Smethurst, Hydrotherapia, or the Water Cure (1843); Wainwright, Inquiry into the Nature and Use of Baths (1737); Weiss, Handbook of Hydro- pathy (1844); Wilson Principles and Practice of the Cold Water Cure (1854.) and The Water Cure (1859). A useful recent work dealing comprehensively with the subject is Richard Metcalfe's Rise and Progress of Hydropathy (1906).

HYDROPHOBIA

167

HYDROPHOBIA (Gr. v8up, water, and 4>6f5os, fear; so called from the symptom of dread of water), or Rabies (Lat.for" mad- ness "), an acute disease, occurring chiefly in certain of the lower animals, particularly the canine species, and liable to be com- municated by them to other animals and to man.

In Dogs, &"e. — The occurrence of rabies in the fox, wolf, hyaena, jackal, raccoon, badger and skunk has been asserted; but there is every probability that it is originally a disease of the dog. It is communicated by inoculation to nearly all, if not all, warm- blooded

creatures. The transmission from one animal to another only certainly takes place through inoculation with viruliferous matters. The malady is generally characterized at a certain stage by an irrepressible desire in the animal to act offensively with its natural weapons — dogs and other carnivora attacking with their teeth, herbivora with their hoofs or horns, and birds with their beaks, when excited ever so slightly. In the absence of excitement the malady may run its course without any fit of fury or madness.

Symptoms.— The disease has been divided into three stages or periods, and has also been described as appearing in at least two ,'orras, according to the peculiarities of the symptoms. But, as a rule, one period of the disease does not pass suddenly into another, the transition being almost imperceptible; and the forms do not differ essentially from each other, but appear merely to constitute varieties of the same disease, due to the natural disposition of the animal, or other modifying circumstances. These forms have been designated true or furious rabies (Ft. rage vrai; Ger. rasende Wuth) and dumb rabies (Fr. rage mue\ Ger. stille Wuth).

The malady does not commence with fury and madness, but in a strange and anomalous change in the habits of the dog : it becomes dull, gloomy, and taciturn, and seeks to isolate itself in out-of-the-way places, retiring beneath chairs and to odd corners. But in its retire- ment it cannot rest: it is uneasy and fidgety, and no sooner has it lain down than suddenly it jumps up in an agitated manner, walks backwards and forwards several times, again lies down and assumes a sleeping attitude, but has only maintained it for a few minutes when it is once more moving about. Again it retires to its corner, to the farthest recess it can find, and huddles itself up into a heap, with its head concealed beneath its chest and fore-paws. This state of continual agitation and inquietude is in striking contrast with its ordinary habits, and should therefore receive attention. Not unfrequently there are a few moments when the creature appears more lively than usual, and displays an extraordinary amount of affection. Sometimes there is a disposition to gather up straw, thread, bits of wood, &c, which are industriously carried away; a tendeflcy to lick anything cold, as iron, stones, &c, is also observed in many instances; and there is also a desire evinced to lick other animals. Sexual excitement is also frequently an early symptom. At this period no disposition to bite is observed ; the animal is docile with its master and obeys his voice, though not so readily as before, nor with the same pleased countenance. There is something strange in the expression of its face, and the voice of its owner is scarcely able to make it change from a sudden gloominess to its usual

animated aspect. These symptoms gradually become more marked; the restlessness and agitation increase. If on straw the dog scatters and pulls it about with its paws, and if in a room it scratches and tumbles the cushions or rugs on which it usually lies. It is incessantly on the move, rambling about, scratching the ground, sniffing in corners and at the doors, as if on the scent or seeking for something. It indulges in strange movements, as if affected by some mental influences or a prey to hallucinations. When not excited by any external influence it will remain for a brief period perfectly still and attentive, as if watching something, or following the movements of some creature on the wall; then it will suddenly dart forward and snap at the vacant air, as if pursuing an annoying object, or endeavouring to seize a fly. At another time it throws itself, yelling and furious, against the wall, as if it heard threatening voices on the other side, or was bent on attac'king an enemy. Nevertheless, the animal is still docile and submissive, for its master's voice will bring it out of its frenzy. But the saliva is already virulent, and the excessive affection which it evinces at intervals, by licking the hands or face of those it loves, renders the danger very great should there be a wound or abrasion. Until a late period in the disease the master's voice has a powerful influence over the animal. When it has escaped from all control and wanders erratically abroad, ferocious and restless, and haunted by horrid phantoms, the familiar voice vet exerts its influence, and it is rare indeed that it attacks

its master.

There is no dread of water in the rabid dog; the animal is generally thirsty, and if water be offered will lap it with avidity, and swallow it at the commencement of the disease. And when, at a later period, the constriction about the throat — symptomatic of the disease — renders swallowing difficult, the dog will none the less endeavour to drink, and the lappings are as frequent and prolonged when deglutition becomes impossible. So little dread has the rabid dog of water

that it will ford streams and swim rivers ; and when in the ferocious stage it will even do this in order to attack other creatures on the opposite side.

At the commencement of the disease the dog does not usually refuse to eat, and some animals are voracious to an unusual degree. But in a short time it becomes fastidious, only eating what it usually has a special predilection for. Soon, however, this gives place to a most characteristic symptom — either the taste becomes extremely depraved or the dog has a fatal and imperious desire to bite and

ingest everything. The litter of its kennel, wool from cushions, carpets, stockings, slippers, wood, grass, earth, stones, glass, horse-dung, even its own faeces and urine, or whatever else may come in its way, are devoured. On examination of the body of a dog which has died of rabies it is so common to find in the stomach a quantity of dissimilar and strange matters on which the teeth have been exercised that, if there was nothing known of the animal's history, there would be strong evidence. of its having been affected with the disease. When a dog, then, is observed to gnaw and eat suchlike matters, though it exhibits no tendency to bite, it should be suspected. The mad dog does not usually foam at the mouth to any great extent at first. The mucus of the mouth is not much increased in quantity, but it soon becomes thicker, viscid, and glutinous, and adheres to the angles of the mouth, fauces and teeth. It is at this period that the thirst is most ardent, and the dog sometimes furiously attempts to detach the saliva with its paws; and if after a while it loses its balance in these attempts and tumbles over, there can no longer be any doubt as to the nature of the malady. There is another symptom connected with the mouth in that form of the disease named " dumb madness " which has frequently proved deceptive. The lower jaw drops in consequence of paralysis of its muscles, and the mouth remains open. The interior is dry from the air passing continually over it, and assumes a deep red tint, somewhat masked by patches of dust or earth, which more especially adhere to the upper surface of the tongue and to the lips. The strange alteration produced in the dog's physiognomy by its constantly open mouth and the dark colour of the interior is rendered still more characteristic by the dull, sad, or dead expression of the animal's eyes. In this condition the creature is not very dangerous, because generally it could not bite if it tried — indeed there does not appear to be much desire to bite in dumb madness; but the saliva is none the less virulent, and acci dental inoculations with it, through imprudent handling, will prove as fatal as in the furious form. The mouth should not be touched, — numerous deaths having occurred through people thinking the dog had some foreign substance lodged in its throat, and thrusting their fingers down to remove it. The sensation of tightness which seems to exist at the throat causes the dog to act as if a bone were fixed between its teeth or towards the back of its mouth, and to employ its fore-paws as if to dislodge it. This is a very deceptive symptom, and may prove equally dangerous if caution be not ob- served. Vomiting of blood or a chocolate-coloured fluid is witnessed in some cases, and has been supposed to be due to the foreign sub- stances in the stomach, which abrade the lining membrane; this, however, is not correct, as it has been observed in

man.

The voice of the rabid dog is very peculiar, and so characteristic that to those acquainted with it nothing more is needed to prove the presence of the disease. Those who have heard it once or twice never forget its signification. Owing to the alterations taking place in the larynx the voice becomes hoarse, cracked and stridulous, like that of a child affected with croup — the " voixducoq," as the French ha e it. A preliminary bark is made in a somewhat elevated tone and with open mouth; this is immediately succeeded by five, six or eight decreasing howls, emitted when the animal is sitting or standing, and always with the nose elevated, which seem to come from the depths of the throat, the jaws not coming together and closing the mouth during such emission, as in the healthy bark. This alteration in the voice is frequently the first observable indica- tion of the malady, and should at once attract attention. In dumb madness the voice is frequently lost from the very commencement — hence the designation.

The sensibility of the mad dog appears to be considerably diminished, and the animal appears to have lost the faculty of ex- pressing the sensations it experiences: it is mute under the infliction of pain, though there can be no doubt that it still has peripheral sensation to some extent. Burning, beating and wounding produce much less effect than in health, and the animal will even mutilate itself with its teeth. Suspicion, therefore, should always strongly attach to a dog which docs not manifest a certain susceptibility to painful impressions and receives punishment without any cry or complaint. There is also reason for apprehension when a dog bites itself persistently in any part of its body. A rabid dog is usually stirred to fury at the sight of one of its own species: this test has been resorted to by Henrie Marie Bouley (1814-1885) to dissipate doubts as to the existence of the disease when the diagnosis is other- wise uncertain. As soon as the suspected animal, if it is really rabid, finds itself in the presence of another of its species it at once assumes the aggressive, and, if allowed, will bite furiously. All rabid animals indeed become excited, exasperated, and furious at the sight of a dog, and attack it with their natural weapons, even the timid sheep when rabid butts furiously at the enemy before which in health it would have fled in terror. This inversion of sentiment is sometimes

valuable in diagnosing the malady; it is so common that it may be said to be present in every case of rabies. When, therefore, a dog, contrary to its habits and natural inclination, becomes suddenly aggressive to other dogs, it is time to take precautions.

In the large majority of instances the dog is inoffensive in the early period of the disease to those to whom it is familiar. It then flies from its home and either dies, is killed as " mad," or returns in a miserable plight, and in an advanced stage of the malady, when the desire to bite is irresistible. It is in the early stage that sequestra- tion and suppressive measures are most valuable. The dogs which propagate the disease are usually those that have escaped from their owners. After two or three days, frequently in about twelve hours, more serious and alarming symptoms appear, ferocious instincts are developed, and the desire to do injury is irrepressible. The animal has an indefinable expression of sombre melancholy and cruelty. The eyes have their pupils dilated, and emit flashes of light when they are not dull and heavy; they always appear so fierce as to produce terror in the beholder; they are red, and their sensibility to light is increased; and wrinkles, which sometimes appear on the forehead, add to the repulsive aspect of the animal. If caged it flies at the spectator, emitting its characteristic howl or bark, and seizing the iron bars with its teeth, and if a stick be thrust before it this is grasped and gnawed. This fury is soon succeeded by lassitude, when the animal remains insensible to every excitement. Then all at once it rouses up again, and another paroxysm of fury commences. The first paroxysm is usually the most intense, and the fits vary in duration from some hours to a day, and even longer; they are ordinarily briefer in trained and pet dogs than in those which are less domesticated, but in all the remission is so complete after the first paroxysm that the animals appear to be almost well, if not in perfect health. During the paroxysms respiration is hurried and laboured, but tranquil during the remissions. There is an increase of temperature, and the pulse is quick and hard. When the animal is kept in a dark place and not excited, the fits of fury are not observed. Sometimes it is agitated and restless in the manner already described. It never becomes really furious or aggressive unless excited by external objects — the most potent of these, as has been said, being another dog, which, however, if it be admitted to its cage, it may not at once attack. The attacked animal rarely retaliates, but usually responds to the bites by acute yells, which contrast strangely with the silent anger of the aggressor, and tries to hide its head with its paws or beneath the straw. These repeated paroxysms hurry the course of the disease. The secretion and flowing of a large quantity

of saliva from the mouth are usually only witnessed in cases in which swallowing has become impossible, the mouth being generally dry. At times the tongue, nose and whole head appear swollen. Other dogs frequently shun one which is rabid, as if aware of their danger.

The rabid dog, if lodged in a room or kept in a house, is continually endeavouring to escape ; and when it makes its escape it goes freely forward, as if impelled by some irresistible force. It travels considerable distances in a short time, perhaps attacking every living creature it meets — preferring dogs, however, to other animals, and these to mankind; cats, sheep, cattle and horses are particularly liable to be injured. It attacks in silence, and never utters a snarl or a cry of anger ; should it chance to be hurt in return it emits no cry or howl of pain. The degree of ferocity appears to be related to natural disposition and training. Some dogs, for instance, will only snap or give a slight bite in passing, while others will bite furiously, tearing the objects presented to them, or which they meet in their way, and sometimes with such violence as to injure their mouth and break their teeth, or even their jaws. If chained, they will in some cases gnaw the chain until their teeth are worn away and the bones laid bare. The rabid dog does not continue its progress very long. Exhausted by fatigue and the paroxysms of madness excited in it by the objects it meets, as well as by hunger, thirst, and also, no doubt, by the malady, its limbs soon become feeble; the rate of travelling is lessened and the walk is unsteady, while its drooping tail, head inclined towards the ground, open mouth, and protruded tongue (of a. leaden colour or covered with dust) give the distressed creature a very striking and characteristic physiognomy. In this condition, however, it is much less to be dreaded than in its early fits of fury, since it is no longer capable or desirous of altering its course or going out of its way to attack an animal or a man not immediately in the path. It is very probable that its fast-failing vision, deadened scent, and generally diminished perception prevent its being so readily impressed or excited by surrounding objects as it previously was. To each paroxysm, which is always of short duration, there succeeds a degree pf ex- haustion as great as^ the fits have been violent and oft repeated. This compels the animal to stop; then it shelters itself in obscure places — frequently in ditches by the roadside — and lies there in a somnolescent state for perhaps hours. There is great danger, never- theless, in disturbing the dog at this period ; for when roused from its torpor it has sometimes sufficient strength to inflict a bite. This period, which may be termed the second stage, is as variable in its duration as the first, but it rarely exceeds three or four days. The above-described phenomena gradually merge into those of

the third or last period, when symptoms of paralysis appear, which arc

speedily followed by death. During the remission in the paroxysms these paralytic symptoms are more particularly manifested in the hind limbs, which appear as if unable to support the animal's weight, and cause it to stagger about; or the lower jaw becomes more or less drooping, leaving the parched mouth partially open. Emaciation rapidly sets in, and the paroxysms diminish in intensity, while the remissions become less marked. The physiognomy assumes a still more sinister and repulsive aspect; the hair is dull and erect; the flanks are retracted; the eyes lose their lustre and are buried in the orbits, the pupil being dilated, and the cornea dull and semi- opaque; very often, even at an early period, the eyes squint, and this adds still more to the terrifying appearance of the poor dog. The voice, if at all heard, is husky, the breathing laborious, and the pulse hurried and irregular. Gradually the paralysis increases, and the posterior extremities are dragged as if the animal's back were broken, until at length it becomes general ; it is then the prelude to death. Or the dog remains lying in a state of stupor, and can only raise itself with difficulty on the fore-limbs when greatly excited. In this condition it may yet endeavour to bite at objects within its reach. At times convulsions of a tetanic character appear in certain muscles; at other times these are general. A comatose condition ensues, and the rabid dog, if permitted to die naturally, perishes, in the great majority of cases, from paralysis and asphyxia.

In dumb madness there is paralysis of the lower jaw, which im- parts a curious and very characteristic physiognomy to the dog; the voice is also lost, and the animal can neither eat nor drink. In this condition the creature remains with its jaw pendent and the mouth consequently wide open, showing the flaccid or swollen tongue covered with brownish matter, and a stringy gelatinous- looking saliva lying between it and the lower lip and coating the fauces, which sometimes appear to be inflamed. Though the animal is unable to swallow fluids, the desire to drink is neverthe- less intense; for the creature will thrust its face into the vessel of water in futile attempts to obtain relief, even until the approach of death. Water may be'poured down its throat without inducing a paroxysm. The general physiognomy and demeanour of the poor creature inspire the beholder with pity rather than fear. The symptoms due to cerebral excitement are less marked than in the furious form of the disease; the agitation is not so considerable, and the restlessness, tendency to run away, and desire to bite are nearly absent; generally the animal is quite passive. Not unfre- quently one or both eyes squint, and it is

only when very much excited that the dog may contrive to close its mouth. Sometimes there is swelling about the pharynx and the neck ; when the tongue shares in this complication it hangs out of the mouth. In certain cases there is a catarrhal condition of the membrane lining the nasal cavities, larynx, and bronchi; sometimes the animal testifies to the existence of abdominal pain, and the faeces are then soft or fluid. The other symptoms — such as the rapid exhaustion and emaciation, paralysis of the posterior limbs towards the termination of the disease, as well as the rapidity with which it runs its course — are the same as in the furious form.

The simultaneous occurrence of furious and dumb madness has frequently been observed in packs of fox-hounds. Dumb madness differs, then, from the furious type in the paralysis of the lower jaw, which hinders the dog from biting, save in very exceptional circumstances; the ferocious instincts are also in abeyance; and there is no tendency to aggression. It has been calculated that from 15 to 20% of rabid dogs have this particular form of the disease. Puppies and young dogs chiefly have furious rabies.

These are the symptoms of rabies in the dog; but it is not likely, nor is it necessary, that they will all be present in every case. In other species the symptoms differ more or less from those mani- fested by the dog, but they are generally marked by a change in the manner and habits of the creatures affected, with strong indica- tions of nervous disturbance, in the majority of species amounting to ferociousness and a desire to injure, timid creatures becoming bold and aggressive.

In Human Beings. — The disease of hydrophobia has been known from early times, and is alluded to in the works of Aristotle, Xenophon, Plutarch, Virgil, Horace, Ovid and many others, as well as in those of the early writers on medicine. Celsus gives detailed instructions respecting the treatment of men who have been bitten by rabid dogs, and dwells on the dangers attending such wounds. After recommending suction of the bitten pur.t by means of a dry cupping glass, and thereafter the application of the actual cautery or pf strong caustics, and the employment of baths and various internal remedies, he says: " Idque cum ita per triduum factum est, tutus esse homo a periculo videtur. Solet autem ex eo vulnere, ubi parum occursum est, aquae timor nasci, {iS/xxpojSiav Graeci appellant. Miserrimum genus morbi; in quo simul aeger et siti et aquae metu cruciatur; quo oppressis in angusto spes est." Subsequently Galen de- scribed minutely the phenomena of hydrophobia, and recom- mended the excision of the wounded part as a protection against

the disease. Throughout many succeeding centuries little or nothing was added to the facts which the early physicians had made known upon the subject. The malady was regarded with universal horror and dread, and the unfortunate sufferers were generally abandoned by all around them and left to their terrible fate. In later times the investigations of Boerhaave, Gerard van Swieten (1700-1772), John Hunter, Francois Magendie (1783-1855), Gilbert Breschet (1784-1845), Virchow, Albert Reder, as also of William Youatt (1776-1847), George Fleming, Meynell, Karl Hertwig (1798-1881), and others, have fur- nished important information; but all these were put into the shade by the researches of Pasteur.

The disease is communicated by the secretions of the mouth of the affected animal entering a wound or abrasion of the human skin or mucous membrane. In the great majority of cases (qo%) this is due to the bite of a rabid dog, but bites of rabid cats, wolves, foxes, jackals, &c. are occasionally the means of conveying the disease. Numerous popular fallacies still prevail on the subject of hydrophobia. Thus it is supposed that the bite of an angry dog may produce the disease, and all the more if the animal should subsequently develop symptoms of rabies. The ground for this erroneous notion is the fact, which is unquestion- able, that animals in whom rabies is in the stage of incubation, during which there are few if any symptoms, may by their bites convey the disease, though fortunately during this early stage they are little disposed to bite. The bite of a non-rabid animal, however enraged, cannot give rise to hydrophobia.

The period of incubation of the disease, or that time which elapses between the introduction of the virus and the develop- ment of the symptoms, appears to vary in a remarkable degree, being in some cases as short as a fortnight, and in others as long as several months or even years. On an average it seems to be from about six weeks to three months, but it mainly depends on the part bitten; bites on the head are the most dangerous. The incubation period is also said to be shorter in children. The rare instances of the appearance of hydrophobia many years after the introduction of the poison are always more or less open to question as to subsequent inoculation.

When the disease is about to declare itself it not unfrequently happens that the wound, which had quickly and entirely healed after

the bite, begins to exhibit evidence of irritation or in- flammatory action, or at least to be the seat of morbid sensations such as numbness, tingling or itching. The symptoms character- izing the premonitory stage are great mental depression and disquietude, together with restlessness and a kind of indefinite fear. There is an unusual tendency to talk, and the articulation is abrupt and rapid. Although in some instances the patients will not acknowledge that they have been previously bitten, and deny it with great obstinacy, yet generally they are well aware of the nature of their malady, and speak despairingly of its consequences. There is in this early stage a certain amount of constitutional disturbance showing itself by feverishness, loss of appetite, sleeplessness, headache, great nervous excitability, respiration of a peculiar sighing or sobbing character, and even occasionally a noticeable aversion to liquids. These symptoms — constituting what is termed the melancholic stage — continue in general for one or two days, when they are succeeded by the stage of excitement in which all the characteristic phenomena of the malady are fully developed. Sometimes the disease first shows itself in this stage, without antecedent symptoms.

The agitation of the sufferer now becomes greatly increased, and the countenance exhibits anxiety and terror. There is noticed a marked embarrassment of the breathing, but the most striking and terrible features of this stage are the effects pro- duced by attempts to swallow fluids. The patient suffers from thirst and desires eagerly to drink, but on making the effort is seized with a most violent suffocative paroxysm produced by spasm of the muscles of swallowing and breathing, which con- tinues for several seconds, and is succeeded by a feeling of intense alarm and distress. With great caution and determina- tion the attempt is renewed, but only to be followed with a repetition of the seizure, until the unhappy sufferer ceases from

sheer dread to try to quench the thirst which torments him. Indeed the very thought of doing so suffices to bring on a choking paroxysm, as does also the sound of the running of water. The patient is extremely sensitive to any kind of external impression; a bright light, a loud noise, a breath of cool air, contact with any one, are all apt to bring on one of these seizures. But besides these suffocative attacks there also occur general con- vulsions affecting the whole muscular system of the body, and occasionally a condition of tetanic spasm. These various paroxysms increase in frequency and severity with the advance of the disease, but alternate with intervals of comparative quiet, in which, however, there is intense anxiety and more or less constant difficulty of breathing, accompanied with a

peculiar sonorous expiration, which has suggested the notion that the patient barks like a dog. In many instances there is great mental disturbance, with fits of maniacal excitement, in which he strikes at every one about him, and accuses them of being the cause of his sufferings — these attacks being succeeded by calm intervals in which he expresses great regret for his violent behaviour. During all this stage of the disease the patient is tormented with a viscid secretion accumulating in his mouth, which from dread of swallowing he is constantly spitting about him. There may also be noticed snapping movements of the jaws as if he were attempting to bite, but these are in reality a manifestation of the spasmodic action which affects the muscles generally. There is no great amount of fever, but there is constipation, diminished flow of urine, and often sexual excitement.

After two or three days of suffering of the most terrible description the patient succumbs, death taking place either in a paroxysm of choking, or on the other hand in a tranquil manner from exhaustion, all the symptoms having abated, and the power of swallowing returned before the end. The duration of the disease from the first declaration of the symptoms is generally from three to five days.

Apart from the inoculation method (see below), the treatment of most avail is that which is directed towards preventing the absorption of the poison into the system. This may be accom- plished by excision of the part involved in the bite of the rabid animal, or, where this from its locality is impracticable, in the application to the wound of some chemical agent which will destroy the activity of the virus, such as potassa fusa, lunar caustic (nitrate of silver), or the actual cautery in the form of a red-hot wire. The part should be thoroughly acted on by these agents, no matter what amount of temporary suffering this may occasion. Such applications should be resorted to immediately after the bite has been inflicted, or as soon thereafter as possible. Further, even though many hours or days should elapse, these local remedies should still be applied ; for if, as appears probable, some at least of the virus remains for long at the injured part, the removal or effectual destruction of this may prevent the dread consequences of its absorption. Every effort should be made to tranquillize and reassure the patient.

Two special points of interest have arisen in recent years in connexion with this disease. One is the Pasteur treatment by inoculation with rabic virus (see also Parasitic Diseases), and the other was the attempt of the government to exterminate rabies in the British Isles by muzzling dogs.

The Pasteur treatment was first applied to human beings in 1885 after prolonged investigation and experimental trial on animals. It is based on the fact that a virus, capable of giving rabies by inoculation, can be extracted t rea t m eat. from the tissues of a rabid animal and then intensified or attenuated at pleasure. It appears that the strength of the rabic virus, as determined by inoculation, is constant in the same species of animal, but is modified by passing through another species. For instance, the natural virus of dogs is always of the same strength, but when inoculated into monkeys it becomes weakened, and the process of attenuation can be carried on by passing the virus through a succession of monkeys, until it loses the power of causing death. If this weakened virus is then passed back through guinea-pigs, dogs or rabbits, it regains

its former strength. Again, if it be passed through a succession of dogs it becomes intensified up to a maximum of strength which is called the virus fixe. Pasteur further discovered that the strength can be modified by temperature and by keeping the dried tissues of a rabid animal containing the virus. Thus, if the spinal cord of a rabid dog be preserved in a dry state, the virus loses strength day by day. The system of treatment consists in making an emulsion of the cord and graduating the strength of the dose by using a succession of cords, which have been kept for a progressively diminishing length of time. Those which have been kept for fourteen days are used as a starting- point, yielding virus of a minimum strength. They are followed by preparations of diminishing age and increasing strength, day by day, up to the maximum, which is three days old. These are successively injected into the circulatory system. The principle is the artificial acquisition by the patient of resistance to the rabic virus, which is presumed to be already in the system but has not yet become active, by accustoming him gradually to its toxic effect, beginning with a weak form and progressively increasing the dose. It is not exactly treatment of the disease, because it is useless or nearly so when the disease has commenced, nor is it exactly preventive, for the patient has already been bitten. It must be regarded as a kind of anticipatory cure. The cords are cut into sections and preserved dry in sterilized flasks plugged with cotton-wool. Another method of preparing the inoculatory virus, which has been devised by Guido Tizzoni and Eugenio Centanni, consists in subjecting the virus fixe to peptic digestion by diluted gastric juice for varying periods of time.

The first patient was treated by Pasteur's system in July 1885. He was successively inoculated with emulsions made from cords that had been kept fourteen and ten days, then eleven and eight days, then eight, seven, six days, and so on. Two forms of treatment are now used — (1) the " simple," in which the course from weak to strong virus is extended over nine days; (2) the " intensive," in which the maximum is reached in seven days. The latter is used in cases of very bad bites and those of some standing, in which it is desirable to lose no time. Two days are compressed into one at the commencement by making injections morning and evening instead of once a day, so that the fifth-day cord is reached in four days instead of six, as in the " simple " treatment. When the maximum — the third-day cord — is reached the injections are continued with fifth-, fourth-, and third-day cords. The whole course is fifteen days in the simple treatment and twenty-one in the intensive. The doses injected range from 1 to 3 cubic centimetres. Injections are made alternately into the right and left flanks. The following table shows the number treated from 1886 to 1905, with the mortality.

Year.

Patients Treated.

Deaths.

Mortality per cent.

1886

2671

25

•94

1887

1770

H

•79

1888

1622

9

•55

1889

1830

7

•38

1890

1540

5

•32

1891

1559

4

•25

1892

1790

4

•22

1893

1648

6

•36

1894

1387

7

•50

1895

1520

5

•33

1896

1308

4

•30

1897

1521

6

•39

1898

H65

3

•20

1899

1614

4

•25

1900

1419

10

·70

1901

1318

5

·37

1902

1 105

2

·18

1903

630

4

·65

1904

757

5

·66

1905

727

4

·54

These figures do not include cases which develop hydrophobia during treatment or within fifteen days after treatment is com-

pleted, for it is held that persons who die within that period have

their nervous centres invaded by virus before the cure has time to act. The true mortality should therefore be considerably higher. For instance, in 1898 three deaths came within this category, which just doubles the mortality; and in 1899 the additional deaths were six, bringing the mortality up to two-and- a-half times that indicated in the table. When, however, the additional deaths are included the results remain sufficiently striking, if two assumptions are granted — (1) that all the persons treated have been bitten by rabid animals; (2) that a large proportion of persons so bitten usually have hydrophobia. Unfortunately, both these assumptions lack proof, and therefore the evidence of the efficacy of the treatment cannot be said to satisfy a strictly scientific standard. With regard to the first point , the patients are divided into three categories— (1) those bitten by an animal the rabidity of which is proved by the development of rabies in other animals bitten by it or inoculated from its spinal cord; (2) those bitten by an animal pronounced rabid on a veterinary examination; (3) those bitten by an animal suspected of being rabid . The number of patients in each category in 1898 was (1) 141, (2) 855, (3) 469; and in 1899 it was (1) 152, (2) 1099, (3) 363. As might be expected, the vast majority came under the second and third heads, in which the evidence of rabidity is doubtful or altogether lacking. With regard to the second point, the proportion of persons bitten by rabid animals who ordinarily develop hydrophobia has only been " estimated " from very inadequate data. Otto Bollinger from a series of collected statistics states that before the introduction of the Pasteur treatment, of patients bitten by dogs undoubtedly rabid 47% died, the rate being 33% in those whose wounds had been cauterized and 83% when there had been no local treatment. If the number of rabid dogs be compared with the deaths from hydrophobia in any year or series of years, it can hardly be very high. For instance, in 1895, 668 dogs, besides other animals, were killed and certified to be rabid in England, and the deaths from hydrophobia were twenty. Of course this proves nothing, as the number of persons bitten is not known, but the difference between the amount of rabies and of hydrophobia is suggestively great in view of the marked propensity of rabid dogs to bite, nor is it accounted for by the fact that some of the persons bitten were treated at the Institut Pasteur. A comparison of the annual mortality from hydrophobia in France before and after the intro duction of the treatment would afford decisive evidence as to its efficacy; but unfortunately no such comparison can be made for lack of vital statistics in that country. The experience of the Paris hospitals, however, points to a decided diminution of mortality. On the whole it must be said, in the absence of further data, that the Pasteur treatment certainly diminishes the

danger of hydrophobia from the bites of rabid animals.

*More recently treatment with an anti-rabic serum has been suggested (see Parasitic Diseases). Victor Babes and Lepp and later Guido Tizzoni and Eugenio Centanni have worked out a method of serum treatment curative and protective. In this method not the rabic poison itself, as in the Pasteur treatment, but the protective substance formed is injected into the tissues. The serum of a vaccinated animal is capable of neutralizing the power of the virus of rabies not only when mixed with the virus before injection but even when injected simultaneously or within twenty-four hours after the introduction of the virus. These authors showed that the serum of a rabbit protects a rabbit better than does the serum of a dog, and vice versa. At the end of twenty days' injections they found they could obtain such*a large quantity of anti-rabic substance in the serum of an animal, that even 1 part of serum to 25,000 of the body weight would protect an animal. This process differs from that of Pasteur in so far as that in place of promoting the formation of the antidote within the body of the patient, by a process of vaccina- tion with progressively stronger and stronger virus, this part of the process is carried on in an animal, Babes using the dog and Centanni the sheep, the blood serum of which is injected. This method of vaccination is useful as a protective to those in charge of kennels.*

The attempt to stamp out rabies in Great Britain was an experiment undertaken by the government in the public interest. The principal means adopted were the muzzling of Muzzling ˆ g S j n i n f ec ted. areas, and prolonged quarantine for England, imported animals. The efficacy of dog-muzzling in checking the spread of rabies and diminishing its prevalence has been repeatedly proved in various countries. Liable as other animals may be to the disease, in England at least the dog is pre-eminently the vehicle of contagion and the great source of danger to human beings. There is a difference of opinion on the way in which muzzling acts, though there can be none as to the effect it produces in reducing rabies. Probably it acts rather by securing the destruction of ownerless and stray — which generally includes rabid — dogs than by preventing biting; for though it may prevent snapping, even the wire-cage muzzle does not prevent furious dogs from biting, and it is healthy, not rabid, dogs that wear the muzzle. It has therefore been suggested that a collar would have the same effect, if all collarless dogs were seized; but the evidence goes

to show that it has not, perhaps because rabid dogs are more likely to stray from home with their collars, which are constantly worn, than with muzzles which are not, and so escape seizure. Moreover, it is much easier for the police to see whether a dog is wearing a muzzle or not than it is to make sure about the collar. However this may be, the muzzle has proved more efficacious, but it was not applied systematically in England until a late date. Sometimes the regulations were in the hands of the government, and sometimes they were left to local authorities; in either case they were allowed to lapse as soon as rabies had died down. In April 1897 the Board of Agriculture entered on a systematic attempt to exterminate rabies by the means indicated. The plan was to enforce muzzling over large areas in which the disease existed, and to maintain it for six months after the occurrence of the last case. In spite of much opposition and criticism, this was resolutely carried out under Mr Walter Long, the responsible minister, and met with great success. By the spring of 1899 — that is, in two years — the disease had disappeared in Great Britain, except for one area in Wales; and, with this exception, muzzling was everywhere relaxed in October 1899. It was taken off in Wales also in the following May, no case having occurred since November 1899. Rabies was then pronounced extinct. During the summer of 1900, however, it reappeared in Wales, and several counties were again placed under the order. The year 1901 was the third in succession in which no death from hydro- phobia was registered in the United Kingdom. In the ten years preceding 1899, 104 deaths were registered, the death-rate reaching 30 in 1889 and averaging 29 annually. In 1902 two deaths from hydrophobia were registered. From that date to June 1909 (the latest available for the purpose of this article) no death from hydrophobia was notified in the United Kingdom. See Annates de llnstitut Pasteur, from 1886; Journal of the Board of Agriculture, 1899; Makins, " Hydrophobia," in Treves's System of Surgery; Woodhead, " Rabies," in Allbutt's System of Medicine.

HYDROSPHERE (Gr. v5cop, water, and acupa, sphere), in physical geography, a name given to the whole mass of the water of the oceans, which fills the depressions in the earth's crust, and covers nearly three-quarters of its surface. The name is used in distinction from the atmosphere, the earth's envelope of air, the lithosphere (Gr. \Wos, rock) or solid crust of the earth, and the centrosphere or interior mass within the crust. To these " spheres " some writers add, by figurative usage, the terms "biosphere,!' or life-sphere, to cover all living things, both animals and plants, and " psychosphere," or mind-sphere, covering all the products of human intelligence.

HYDROSTATICS (Gr. vdup, water, and the root ora-, to cause to stand), the branch of hydromechanics which discusses the equilibrium of fluids (see Hydromechanics).

HYDROXYLAMINE, NH 2 OH, or hydroxy-ammonia, a com- pound prepared in 1865 by W. C. Lossen by the reduction of ethyl nitrate with tin and hydrochloric acid. In 1870 E. Ludwig And T. H. Hein (Chem. Centralblatt, 1870, 1, p. 340) obtained it by passing nitric oxide through a series of bottles containing tin

and hydrochloric acid, to which a small quantity of platinum tetrachloride has been added; the acid liquid is poured ofl when the operation is completed, and sulphuretted hydrogen is passed in; the tin sulphide is filtered off and the filtrate evapor- ated. The residue is extracted by absolute alcohol, which dis- solves the hydroxylamine hydrochloride and a little ammonium chloride; this last substance is removed as ammonium platino- chloride, and the residual hydroxylamine hydrochloride is recrystallized. E. Divers obtains it by mixing cold saturated solutions containing one molecular proportion of sodium nitrate, and two molecular proportions of acid sodium sulphite, and then adding a saturated solution of potassium chloride to the mixture. After standing for twenty-four hours, hydroxylamine potassium disulphonate crystallizes out. This is boiled for some hours with water and the solution cooled, when potassium sulphate separates first, and then hydroxylamine sulphate. E. Tafel (Zeit. anorg. Chem., 1902, 31, p. 289) patented an electro- lytic process, wherein 50% sulphuric acid is treated in a divided cell provided with a cathode of amalgamated lead, 50% nitric acid being gradually run into the cathode compartment. Pure anhydrous hydroxylamine has been obtained by C. A. Lobry de Bruyn from the hydrochloride, by dissolving it in absolute methyl alcohol and then adding sodium methylate. The pre- cipitated sodium chloride is filtered, and the solution of hydroxyl- amine distilled in order to remove methyl alcohol, and finally fractionated under reduced pressure. The free base is a colourless, odourless, crystalline solid, melting at about 30 C, and boiling at 58° C. (under a pressure of 22 mm.). It deliquesces and oxidizes on exposure, inflames in dry chlorine and is reduced to ammonia by zinc dust. Its aqueous solution is strongly alkaline, and with acids it forms well-defined stable salts. E. Ebler and E. Schott (/. pr. Chem., 1908, 78, p. 289) regard it as acting with the formula NH 2 'OH towards bases, and as NHs:0 towards acids, the salts in the latter case being of the oxonium type. It is a strong reducing agent, giving a precipitate of cuprous oxide from alkaline copper solutions at ordinary temperature, con- verting mercuric chloride to mercurous chloride, and pre- cipitating

metallic silver from solutions of silver salts. With aldehydes and ketones it forms oximes (q.v.). W. R. Dunstan (Jour. Chem. Soc, 1899, 75, p. 792) found that the addition of methyl iodide to a methyl alcohol solution of hydroxylamine resulted in the formation of trimethyloxamine, N(CH 3)30.

Many substituted hydroxylamines are known, substitution taking

P a place either in the o or /S position (NH2-OH). /3-phenylhydroxyl-

amine, C«H 5 NH-OH-, is obtained in the reduction of nitrobenzene

in neutral solution (e.g. by the action of the aluminium-mercury

couple and water), but better, according to C. Goldschmidt (Ber.,

1896, 29, p. 2307) by dissolving nitrobenzene in ten times its weight

of ether containing a few cubic centimetres of water, and heating

with excess of zinc dust and anhydrous calcium chloride for three

hours on a water bath. It also appears as an intermediate product

in the electrolytic reduction of nitrobenzene in sulphuric acid

solution. By gentle oxidation it yields nitrosobenzene. Derivatives

of the type RzN-OH result in the action of the Grignard reagent on

amyl nitrite. Dihydroxy-ammonia or nitroxyl, NH(OHV a very

unstable and highly reactive substance, has been especially studied

by A. Angeli (see A. W. Stewart, Recent Advances in Physical and

Inorganic Chemistry, 1909).

HYDROZOA, one of the most widely spread and prolific groups of aquatic animals. They are for the most part marine in habitat, but a familiar fresh-water form is the common Hydra of ponds and ditches, which gives origin to the name of the class. The Hydrozoa comprise the hydroids, so abundant on all shores, most of which resemble vegetable organisms to the unassisted eye; the hydrocorallines, which, as their name implies, have a massive stony skeleton and resemble corals; the jelly-fishes so called; and the

Siphonophora, of which the species best known by repute is the so-called " Portuguese man-of-war " (Physaiia), dreaded by sailors on account of its terrible stinging powers.

In external form and appearance the Hydrozoa exhibit such striking differences that there would seem at first sight to be little in common between the more divergent members of the group. Nevertheless there is no other class in the animal king- dom with better marked characteristics, or with more uniform

morphological peculiarities underlying the utmost diversity of superficial characters.

All Hydrozoa, in the first place, exhibit the three structural features distinctive of the Coelentera (q.v.). (1) The body is built up of two layers only, an external protective and sensory layer, the ectoderm, and an internal digestive layer, the endoderm.

(2) The body contains but a single internal cavity, the coelenteron or gastrovascular space, which may be greatly ramified, but is not shut off into cavities distinct from the central digestive space.

(3) The generative cells are produced in either the ectoderm or endoderm, and not in a third layer arising in the embryo, distinct from the two primary layers; in other words, there is no mesoderm or coelom.

To these three characters the Hydrozoa add a fourth which is distinctive of the subdivision of the Coelenterata termed the Cnidaria; that is to say, they always possess peculiar stinging organs known as nettle-cells, or nematocysts (Cnidae), each produced in a cell forming an integral part of the animal's tissues. The Hydrozoa are thus shown to belong to the group of Coelenterata Cnidaria, and it remains to consider more fully their distinctive features, and in particular those which mark them off from the other main division of the Cnidaria, the Anthozoa {q.v.), comprising the corals and sea-anemones.

The great diversity, to which reference has already been made, in the form and structure of the Hydrozoa is due to two principal causes. In the first place, we find in this group two distinct types of person or individual, the polyp and the medusa (qq.v.), each capable of a wide

range of variations; and when both polyp and medusa occur in the life-cycle of the same species, as is frequently the case, the result is an alternation of genera- tions of a type peculiarly characteristic of the class. In the second place, the power of non-sexual reproduction by budding is practically of universal occurrence among the Hydrozoa, and by the buds failing to separate from the parent stock, colonies are produced, more or less complicated in structure and often of great size. We find that polyps may either bud other polyps or may produce medusae, and that medusae may bud medusae, though never, apparently, polyps. Hence we have a primary subdivision of the colonies of Hydrozoa into those produced by budding of polyps and those produced by budding of medusae. The former may contain polyp-persons and medusa-persons, either one kind alone or both kinds combined; the latter will contain only medusa-persons variously modified.

The morphology of the Hydrozoa reduces itself, therefore, to a consideration of the morphology of the polyp, of the medusa and of the colony. Putting aside the last-named, for a detailed account of which see Hydromedusae, we can best deal with the peculiarities of the polyp and medusa from a developmental point of view.

In the development of the Hydrozoa, and indeed of the Cnidaria generally, the egg usually gives rise to an oval larva which swims about by means of a coating of cilia on the surface of the body. This very characteristic larva is termed a planula, but though very uniform externally, the planulae of different species, or of the same species at different periods, do not always represent the same stage of embryonic development internally. On examining more minutely the course of the development, it is found that the ovum goes through the usual process of cleavage, always total and regular in this group, and so gives rise to a hollow sphere or ovoid with the wall composed of a single layer of cells, and containing a spacious cavity, the blastocoele or segmentation-cavity. This is the blastula stage occurring universally in all Metazoa, probably representing an ancestral Protozoan colony in phylogeny. Next the blastula gives rise to an internal mass of cells (fig. I , hy) which come from the wall either by immigration (fig. I, A) or by splitting off (delamina- tion). The formation of an inner cell-mass converts the single- layered blastula (monoblastula) into a double-layered embryo (diblastula) which may be termed a parenchymula, since at first the inner cell-mass forms an irregular parenchyma which may entirely fill up and obliterate the segmentation cavity (fig. I, B). At a later stage, however, the cells of the inner mass arrange them- selves in a definite layer surrounding an internal cavity (fig. 1, C, al), which soon

acquires an opening to the exterior at one pole, and so forms the characteristic embryonic stage of all Enterozoa known as the gastrula (fig. 2). In this stage the body is composed of two layers, ectoderm (d) externally, and endoderm (e) internally, sur- rounding a central cavity, the archenteron (b), which communicates with the exterior by a pore (a), the blastopore,

Thus a planula larva may be a blastula, or but slightly advanced beyond this stage, or it may be (and most usually is) a parenchymula ; or in some cases (Scyphomedusae) it may be a gastrula. It should be added that the process of development, the gastrulation as it is termed, may be shortened by the immigration of cells taking place

From Balfour, after Kowalewsky.

Fig. I. — Formation of the Diblastula of Eucope (one of the Calyptoblastic Hydromedusae) by immigration. A, B, C, three suc- cessive stages, ep, Ectoderm ; hy, endoderm ; al, enteric cavity.

at one pole only, and in a connected layer with orderly arrangement, so that the gastrula stage is reached at once from the blastula without any intervening parenchymula stage. This is a process of gastrula- tion by invagination which is found in all animals above the Coelen- terata, but which is very rare in the Cnidaria, and is known only in the Scyphomedusae amongst the Hydrozoa.

After the gastrula stage, which is found as a developmental stage in all Enterozoa, the embryo of the Hydrozoa proceeds to develop characters which are peculiar to the Coelen- terata only. Round the blastopore hollow outgrowths, variable in number, arise by the evagination ot the entire body-wall, both • ectoderm and endoderm. Each outgrowth con- tains a prolongation of the archenteric cavity (compare figs. 2 and 3, A). In this way is formed a ring of tentacles, the most character- istic organs of the Cnidaria. They surround a region which is termed the peristome, and which contains in the centre the blastopore, which becomes the adult mouth. The arch- enteron becomes the gastrovascular system or coelenteron. Between the ectoderm and endoderm a gelatinous supporting layer, termed the mesogloea, makes its appearance. The gastrula has now become an actinula, which may be termed the distinctive larva of the Cnidaria, and doubtless represents in a transitory manner the common ancestor of the group. In no case known, however, does the actinula become the adult, sexually mature individual, but always undergoes further modifications, whereby it develops into either a polyp or a medusa.

To become a polyp, the actinula (fig. 3, A) becomes attached to some firm object by the pole farthest from the mouth, and its growth preponderates in the direction of the principal axis, that is to say, the axis passing through the mouth (fig. 3, a-b). As a result the body becomes columnar in form (fig. 3, B), and without further change passes into the characteristic polyp-form (see Polyp).

From Gegenbaur's Ele- ments of Comparative Anatomy.

Fig. 2. — Diagram ot a Diblastula.

a, Blastopore.

b, Archenteric cavity.

c, Endoderm.

d, Ectoderm.

Fig. 3. — Diagram showing the change of the Actinula (A) into a Polyp (B); a-b, principal (vertical) axis; c-d, horizontal axis. The endoderm is shaded, the ectoderm is left clear.

It is convenient to distinguish two types of polyp by the names hydro polyp and anthopolyp, characteristic of the Hydrozoa and

Anthozoa respectively. In the hydropolyp the body is typically elongated, the height of the column being far greater than the diameter. The peristome is relatively small and the mouth is generally raised on a projecting spout or hypostome. The ectoderm loses entirely the ciliation which it had in the planula and actinula stages and com- monly secretes on its external surface a protective or supporting in- vestment, the perisarc. Contrasting with this, the anthopolyp is generally of squat form, the diameter often exceeding the height; the peristome is wide, a hypostome is lacking, and the ectoderm, or so much of it as is exposed, i.e. not covered by secretion of skeletal or other investment, retains its ciliation throughout life. The internal structural differences are even more characteristic. In the hydropolyp the blastopore of the embryo forms the adult mouth situated at the extremity of the hypostome, and the ectoderm and

Fir.. 4. — Diagram showing the change of the Actinula into a Medusa. A, Vertical section of the actinula; a-b and c-d as in fig. 3, B, transitional stage, showing preponderating growth in the horizontal plane. (“,C, D,D’, two types of medusa organization; C and D are composite sections, showing a radius ® on one side, an interradius (IR1 on the other; C and D’ are plans; the mouth and manubrium are indicated at the centre, leading into the gastral cavity subdivided by the four areas of concrescence in each interradius (IR). t, tentacle; g.p, gastric pouch; r.c, radial canal not present in C and C; r.c, circular or ring-canal; e.l, endoderm-lamella formed bv concrescence. For a more detailed diagram of medusa-structure see article Medusa.

endoderm meet at this point. In the anthopolyp the blastopore is carried inwards by an in-pushing of the body-wall of the region of the peristome, so that the adult mouth is an opening leading into a short ectodermal oesophagus or stomodaeum, at the bottom of which is the blastopore. Further, in the hydropolyp the digestive cavity either remains simple and undivided and circular in transverse section, or may show ridges projecting internally, which in this case are formed of endoderm alona, without any participation of the mesogloea. In the anthopolyp, on the other hand, the digestive cavity is always subdivided by so-called mesenteries, in-growths of the endoderm containing vertical lamellae of mesogloea (see Anthozoa). In short, the hydropolyp is characterized by a more

simple type of organization than the anthopolyp, and is in most respects less modified from the actinula type of structure.

Returning now to the actinula, this form may, as already stated, develop into a medusa, a type of individual found only in the Hydrozoa, as here understood. To become a medusa, the actinula grows scarcely at all in the direction of the principal axis, but greatly along a plane at right angles to it. Thus the body becomes umbrella-shaped, the concave side representing the peristome, and the convex side the column, of the polyp. Hence the tentacles are found at the edge of the umbrella, and the hypostome forms usually a projecting tube, with the mouth at the extremity, forming the manubrium or handle of the umbrella. The medusa has a pronounced radial symmetry, and the positions of the primary tentacles, usually four in number, mark out the so-called radii, alternating with which are four interradii. The ectoderm retains its ciliation only in the sensory organs. The mesogloea becomes enormously increased in quantity

(hence the popular name " jelly-fish "), and in correlation with this the endoderm-layer lining the coelenteron becomes pressed together in the intermedial areas and undergoes concrescence, forming a more or less complicated gastrovascular system (see Medusa). It is sufficient to state here that the medusa is usually a free-swimming animal, floating mouth downwards on the open seas, but in some cases it may be attached by its aboral pole, like a polyp, to some firm basis, either temporarily or permanently.

Thus the development of the two types of individual seen in the Hydrozoa may be summarized as follows: —

Egg

Free

Planula " Stage

Blastula

Parenchymula

Gastrula

Actinula

Polyp Medusa

This development, though probably representing the primitive sequence of events, is never actually found in its full extent, but is always abbreviated by omission or elimination of one or more of the stages. We have already seen that the parenchymula stage is passed over when the gastrulation is of the invaginate type. On the other hand, the parenchymula may develop directly into the actinula or even into the polyp, with suppression of the intervening steps. Great apparent differences may also be brought about by variations in the period at which the embryo is set free as a larva, and since two free-swimming stages, planula and actinula, are unnecessary, one or other of them is always suppressed. A good example of this is seen in two common genera of British hydroids, Cordylophora and Tabularia. In Cordylophora the embryo is set free at the parenchymula stage as a planula which fixes itself and develops into a polyp, both gastrula and actinula stages being suppressed. In Tubularia, on the other hand, the parenchymula develops into an actinula within the maternal tissues, and is then set free, creeps about for a time, and after fixing itself, changes into a polyp; hence in this case the

planula-stage, as a free larva, is entirely suppressed.

The Hydrozoa may be defined, therefore, as Cnidaria in which two types of individual, the polyp and the medusa, may be present, each type developed along divergent lines from the primitive actinula form. The polyp (hydropolyp) is of simple structure and never has an ectodernal oesophagus or mesenteries. 1 The general ectoderm loses its cilia, which persist only in the sensory cells, and it frequently secretes external protective or supporting structures. An internal mesogloeal skeleton is not found.

The class is divisible into two main divisions or sub-classes, Hydromedusae and Scyphomedusae, of which definitions and detailed systematic accounts will be found under these headings.

General Works on Hydrozoa. — C. Chun, " Coelenterata (Hohlthiere)," Bronn's Klassen und Ordnungcn des Thier-Reichs ii. 2 (1889 et seq.); Y. Delage, and E. Herouard, Traite de zoologie concrete, ii. part 2, Les CoelentSres (1901); G. H. Fowler, "The Hydromedusae and Scyphomedusae " in E. R. Lankester's Treatise on Zoology, ii. chapters iv. and v. (1900) ; S. J. Hickson, " Coelenterata and Ctenophora," Cambridge Natural History, i. chapters x.-xv. (1906). (E. A. M.)

HYENA, a name applicable to all the representatives of the mammalian family Hyaenidae, a group of Camivora (q.v.) allied to the civets. From all other large Camivora except the African hunting-dog, hyenas are distinguished by having only four toes on each foot, and are further characterized by the length of the fore-legs as compared with the hind pair, the non-retractile claws, and the enormous strength of the jaws and teeth, which enables them to break the hardest bones and to retain what they have seized with unrelaxing grip.

1 See further under Scyphomedusae.

The striped hyena (Hyaena striata) is the most widely dis- tributed species, being found throughout India, Persia, Asia Minor, and North and East Africa, the East African form constituting a distinct,, race, H. striata schillingsi; while there are also several distinct Asiatic races. The species resembles a wolf in size, and is greyish-brown in colour, marked with indistinct longitudinal stripes of a darker hue,

while the legs are transversely striped. The hairs on the body are long, especially on the ridge of the neck and back, where they form a distinct mane, which is continued along the tail. Nocturnal in habits,

Fig. i. — The Striped Hyena {Hyaena striata).

it prefers by day the gloom of caves and ruins, or of the burrows which it occasionally forms, and issues forth at sunset, when it commences its unearthly howling. When the animal is excited, the howl changes into what has been compared to demoniac laughter, whence the name of " laughing-hyena." These creatures feed chiefly on carrion, and thus perform useful service by devouring remains which might otherwise pollute the air. Even human dead are not safe from their attacks, their powerful claws enabling them to gain access to newly interred bodies in cemeteries. Occasionally (writes Dr W. T. Blanford) sheep or

Fig. 2. — The Spotted Hyena (Hyaena crocuta).

goats, and more often dogs, are carried off, and the latter, at all events, are often taken alive to the animal's den. This species appears to be solitary in habits, and it is rare to meet with more than two together. The cowardice of this hyena is proverbial; despite its powerful teeth, it rarely attempts to defend itself. A very different animal is the spotted hyena, Hyaena {Crocuta) crocuta, which has the sectorial teeth 'of a more cat-like type, and is marked by dark-brown spots on a yellowish ground, while the mane is much less distinct. At the Cape it was formerly common, and occasionally committed great havoc among the cattle, while it did not hesitate to enter the Kaffir dwellings at

night and carry off children sleeping by their mothers. By persistent trapping and shooting, its numbers have now been considerably reduced, with the result, however, of making it exceedingly wary, so that it is not readily caught in any trap with which it has had an opportunity of becoming acquainted. Its range extends from Abyssinia to the Cape. The Abyssinian form has been regarded as a distinct species, under the name of H. liontiewi, but this, like various more southern forms, is but regarded as a local race. The brown hyena (Sf. brunnea) is South African, ranging to Angola on the west and Kilimanjaro on the east. In size it resembles the striped hyena, but differs in appearance, owing to the fringe of long hair covering the neck and fore part of the back. The general hue is ashy-brown, with the hair lighter on the neck (forming a collar), chest and belly; while the legs are banded with dark brown. This species is not often

seen, as it remains concealed during the day. Those frequenting the coast feed on dead fish, crabs and an occasional stranded whale, though they are also a danger to the sheep and cattle kraal. Strand-wolf is the local name at the Cape.

Although hyenas are now confined to the warmer regions of the Old World, fossil remains show that they had a more northerly range during Tertiary times; the European cave-hyena being a form of the spotted species, known as H. crocuta spelaea. Fossil hyenas occur in the Lower Pliocene of Greece, China, India, &c; while remains indistinguishable from those of the striped species have been found in the Upper Pliocene of England and Italy.

HYERES, a town in the department of the Var in S.E. France, ii m. by rail E. of Toulon. In 1906 the population of the com- mune was 17,790, of the town 10,464; the population of the former was more than doubled in the last decade of the 19th century. Hyeres is celebrated (as is also its fashionable suburb, Costebelle, nearer the seashore) as a winter health resort. The town proper is situated about. 25 m. from the seashore, and on the south- western slope of a steep hill (669 ft., belonging to the Maurettes chain, 961 ft.), which is one of the westernmost spurs of the thickly wooded Montagnes des Maures. It is sheltered from the north-east and east winds, but is exposed to the cold north-west wind or mistral. Towards the south and south-east a fertile plain, once famous for its orange groves, but now mainly covered by vineyards and farms, stretches to the sea, while to the south- west, across a narrow valley, rises a cluster of low hills, on which is the suburb of Costebelle. The older portion of the town is still surrounded, on the north and east, by its ancient, though dilapidated medieval walls, and is a labyrinth of steep and dirty streets. The more modern quarter which has grown up at the southern foot of the hill has handsome broad boulevards and villas, many of them with beautiful gardens, filled with semi- tropical plants. Among the objects of interest in the old town are: the house (Rue Rabaton, 7) where J. B. Massillon (1663- 1742), the famous pulpit orator, was born; the parish church of St Louis, built originally in the 13th century by the Cordelier or Franciscan friars, but completely restored in the earlier part of the 19th century; and the site of the old chateau, on the summit of the hill, now occupied by a villa. The plain between the new town and the sea is occupied by large nurseries, an excellent jardin d'acclimatation, and many market gardens, which supply Paris and London with early fruits and vegetables, especially artichokes, as well as with roses in winter. There are extensive salt beds (salines) both on the peninsula of Giens, S. of the town, and also E. of the town. To the east of the

Giens peninsula is the fine natural harbour of Hyeres, as well as" three thinly populated islands (the Stoechades of the ancients), Porquerolles, Port Cros and Le Levant, which are grouped together under the common name of lies d'Hyeres.

The town of Hyeres seems to have been founded in the 10th century, as a place of defence against pirates, and takes its name from the aires (hierbo in the Provencal dialect), or threshing- floors for corn, which then occupied its site. It passed from the possession of the viscounts of Marseilles to Charles of Anjou, count of Provence, and brother of St Louis (the latter landed here in 1254, on his return from Egypt). The chateau was

dismantled by Henri IV., but thanks to its walls, the town resisted in 1 707 an attack made by the duke of Savoy.

See Ch. Lentheric, La Provence Maritime ancienne et moderne (chap. 5) (Paris, 1880). (W. A. B. C.)

HYGIEIA, in Greek mythology, the goddess of health. It seems probable that she was originally an abstraction, subse- quently personified, rather than an independent divinity of very ancient date.. The question of the original home of her worship has been much discussed. The oldest traces of it, so far as is known at present, are to be found at Titane in the territory of Sicyon, where she was worshipped together with Asclepius, to whom she appears completely assimilated, not an independent personality. Her cult was not introduced at Epidaurus till a late date, and therefore, when in 420 B.C. the worship of Asclepius was introduced at Athens coupled with that of Hygieia, it is not to be inferred that she accompanied him from Epidaurus, or that she is a Peloponnesian importation at all. It is most probable that she was invented at the time of the introduction of Asclepius, after the sufferings caused by the plague had directed special attention to sanitary matters. The already existing worship of Athena Hygieia had nothing to do with Hygieia the goddess of health, but merely denoted the recognition of the power of healing as one of the attributes of Athena, which gradually became crystallized into a concrete personality. At first no special relationship existed between Asclepius and Hygieia, but gradually she came to be regarded as his daughter, the place of his wife being already secured by Epione. Later Orphic hymns, however, and Herodas iv. 1-9, make her the

wife of Asclepius. The cult of Hygieia then spread concurrently with that of Asclepius, and was introduced at Rome from Epidaurus in 293, by which time she may have been admitted (which was not the case before) into the Epidaurian family of the god. Her proper name as a Romanized Greek importation was Valetudo, but she was gradually identified with Salus, an older genuine Italian divinity, to whom a temple had already been erected in 302. While in classical times Asclepius and Hygieia are simply the god and goddess of health, in the declining years of paganism they are protecting divinities generally, who preserve mankind not only from sickness but from all dangers on land and sea. In works of art Hygieia is represented, together with Asclepius, as a maiden of benevolent appearance, wearing the chiton and giving food or drink to a serpent out of a dish.

See the article by H. Lechat in Daremberg and Saglio's Diction- naire des antiquitSs, with full references to authorities; and E. Thramer in Roscher's Lexikon der Mythologie, with a special section on the modern theories of Hygieia.

HYGIENE (Fr. hygiene, from Gr. vyiaivet.v, to be healthy), the science of preserving health, its practical aim being to render " growth more perfect, decay less rapid, life more vigorous, death more remote." The subject is thus a very wide one, embracing all the agencies which affect the physical and mental well-being of man, and it requires acquaintance with such diverse sciences as physics, chemistry, geology, engineering, architecture, meteorology, epidemiology, bacteriology and statistics. On the personal or individual side it involves con- sideration of the character and quality of food and of water and other beverages; of clothing; of work, exercise and sleep; of personal cleanliness, of special habits, such as the use of tobacco, narcotics, &c; and of control of sexual and other passions. In its more general and public aspects it must take cognizance of meteorological conditions, roughly included under the term climate; of the site or soil on which dwellings are placed; of the character, materials and arrangement of dwellings, whether regarded individually or in relation to other houses among which they stand; of their heating and ventilation; of the removal of excreta and other effete matters; of medical knowledge relating to the incidence and prevention of disease; and of the disposal of the dead.

These topics will be found treated in such articles as Dietetics, Food, Food-Preservation, Adulteration, Water, Heating, Ventilation, Sewerage, Bacteriology, Housing, Cremation, &c. For legal

enactments which concern the sanitary well-being of the community, see Public Health.

HYGINUS, eighth pope. It was during his pontificate (c. 137-140) that the gnostic heresies began to manifest themselves at Rome.

HYGINUS (surnamed Gromaticus, from gruma, a surveyor's measuring-rod), Latin writer on land-surveying, flourished in the reign of Trajan (a.d. 98-117). Fragments of a work on legal boundaries attributed to him will be found in C. F. Lach- mann, Gromatici Veteres, i. (1848).

A treatise on Castrametation (De Muniiiortibus Castrorum), also attributed to him, is probably of later date, about the 3rd century a.d. (ed. W. Gemoll, 1879; A. von Domaszewski, 1887).

HYGINUS, GAIUS JULIUS, Latin author, a native of Spain (or Alexandria), was a pupil of the famous Cornelius Alexander Polyhistor and a freedman of Augustus, by whom he was made superintendent of the Palatine library (Suetonius, De Gramma- ticis, 20). He is said to have fallen into great poverty in his old age, and to have been supported by the historian Clodius Licinus. He was a voluminous author, and his works included topographical and biographical treatises, commentaries on Helvius Cinna and the poems of Virgil, and disquisitions on agriculture and bee-keeping. All these are lost.

Under the name of Hyginus two school treatises on mythology are extant: (1) Fabularum Liber, some 300 mythological legends and celestial genealogies, valuable for the use made by the author of the works of Greek tragedians now lost; (2) De Astronomia, usually called Poetica Astronomica, containing an elementary treatise on astronomy and the myths connected with the stars, chiefly based on the KaTaorepiCTjuot of Eratosthenes. Both are abridgments and both are by the same hand ; but the style and Latinity and the elementary mistakes (especially in the rendering of the Greek originals) are held to prove that they cannot have been the work of so distinguished a scholar as C. Julius Hyginus. It is suggested that these treatises are an abridgment (made in the latter half of the 2nd century) of the Genealogiae of Hyginus by an unknown grammarian, who added a complete treatise on mythology.

Editions. — Fabulae, by M. Schmidt (1872); De Astronomia, by B. Bunte (1875) ; see also Bunte, De C. Julii Hygini, Augusti Liberti, Vita et Scriptis (1846).

HYGROMETER (Gr. vypds, moist, \ikrpov, a measure), an instrument for measuring the absolute or relative amount of moisture in the atmosphere; an instrument which only qualitatively determines changes in the humidity is termed a " hygroscope." The earlier instruments generally depended for their action on the contraction or extension of substances when exposed to varying degrees of moisture; catgut, hair, twisted cords and wooden laths, all of which contract with an increase in the humidity and vice versa, being the most favoured materials. The familiar " weather house " exemplifies this property. This toy consists of a house provided with two doors, through which either a man or woman appears according as the weather is about to be wet or fine. This action is effected by fixing a catgut thread to the base on which the figures are mounted, in such a manner that contraction of the thread rotates the figures so that the man appears and extension so that the woman appears. Many of the early forms are described in C. Hutton, Math, and Phil. Dictionary (1815). The modern instruments, which utilize other principles, are described in Meteorology: II. Methods and Apparatus.

HYKSOS, or " Shepherd Kings," the name of the earliest invaders of Egypt of whom we have definite evidence in tradition. Josephus (c. Apion. i. 14), who identifies the Hyksos with the Israelites, preserves a passage from the second book of Manetho giving an account of them. (It may be that Josephus had it, not direct from Manetho's writings, but through the garbled version of some Alexandrine compiler.) In outline it is as follows. In the days of a king of Egypt named Timaeus the land was suddenly invaded from the east by men of ignoble race, who conquered it without a struggle, destroyed cities and temples, and slew or enslaved the inhabitants. At length they elected a king named Salatis, who, residing at Memphis, made all Egypt tributary, and established garrisons in different parts, especially eastwards, fearing the Assyrians. He built also a great fortress at Avaris, in the Sethroite nome, east of the Bubastite branch of the Nile. Salatis was followed in succession by Beon, Apachnas, Apophis, Jannas and Asses. These six kings reigned 198 years and 10 months, and all aimed at extirpating the Egyptians. Their whole race was named Hyksos, i.e. "shepherd kings," and

some say they were Arabs (another explanation found by Josephus is " captive shepherds ")• When they and their successors had held Egypt for 511 years, the kings of the Thebais and other parts of

Egypt rebelled, and a long and mighty war began. Misphragmuthosis worsted the " Shepherds " and shut them up in Avaris; and his son Thutmosis, failing to capture the stronghold, allowed them to depart; whereupon they went forth, 240,000 in number, established themselves in Judea and built Jerusalem.

In Manetho's list of kings, the six above named (with many variations in detail) form the XVth dynasty, and are called " six foreign Phoenician kings." The XVIth dynasty is of thirty-two " Hellenic (sic?) shepherd kings," the seventeenth is of " shepherds and Theban kings " (reigning simultaneously). The lists vary greatly in different versions, but the above seems the most reasonable selection of readings to be made. For " Hellenic " see below. The supposed connexion with the Israelites has made the problem of the Hyksos attractive, but light is coming upon it very slowly. In 1847 E. de Rouge proved from a fragment of a story in the papyri of the British Museum, that Apopi was one of the latest of the Hyksos kings, corresponding to Aphobis; he was king of the " pest " and suppressed the worship of the Egyptian gods, and endeavoured to make the Egyptians worship his god Setekh or Seti; at the same time an Egyptian named Seqenenre reigned in Thebes, more or less subject to Aphobis. The city of Hawari (Avaris) was also mentioned in the fragment.

In 1850 a record of the capture of this city from the Hyksos by Ahmosi, the founder of the eighteenth dynasty, was discovered by the same scholar. A large class of monuments was afterwards attributed to the Hyksos, probably in error. Some statues and sphinxes, found in 1861 by Mariette at Tanis (in the north- east of the Delta), which had been usurped by later kings, had peculiar " un-Egyptian " features. One of these bore the name of Apopi engraved lightly on the shoulder; this was evidently a usurper's mark, but from the whole circumstances it was concluded that these, and others of the same type of features found elsewhere, must have belonged to the Hyksos. This view held the field until 1893, when Golenischeff produced an inferior example bearing its original name, which showed that in this case it represented Amenemhe III. In consequence it is now generally believed that they all belong to the twelfth dynasty. Meanwhile a headless statue of a king named Khyan, found at Bubastis, was attributed on various grounds to the Hyksos, the soundest arguments being his foreign name and the boastful un-Egyptian epithet " beloved of his ka," where " beloved of Ptah " or some other god was to be expected. His name was immediately afterwards recognized on a lion found as far away from Egypt as Bagdad. Flinders Petrie then pointed out a group of kings named on scarabs of peculiar type,

which, including Khyan, he attributed to the period between the Old Kingdom and the New, while others were in favour of assigning them all to the Hyksos, whose appellation seemed to be recognizable in the title Hek-khos, ‘ ‘ruler of the barbarians, ‘ ‘ borne by Khyan. The extraordinary importance of Khyan was further shown by the discovery of his name on a jar-lid at Cnossus in Crete. Semitic features were pointed out in the supposed Hyksos names, and Petrie was convinced of their date by his excavations of 1 905-1 906 in the eastern Delta. Avaris is generally assigned to the region towards Pelusium on the strength of its being located in the Sethroite nome by Josephus, but Petrie thinks it was at Tell el-Yahudiyeh (Yehudia), where Hyksos scarabs are common. From the remains of fortifications there he argues that the Hyksos were uncivilized desert people, skilled in the use of the bow, and must thus have destroyed by their archery the Egyptian armies trained to fight hand-to- hand; further., that their hordes were centered in Syria, but were driven thence by a superior force in the East to take refuge in the islands and became a sea-power— whence the strange description ” Hellenic ” in Manetho, which most editors have corrected to &XX01, “others.” Besides the statue of Khyan, blocks of granite with the name of Apopi have been found in

Upper Egypt at Gebelen and in Lower Egypt at Bubastis. The celebrated Rhind mathematical papyrus was copied in the reign of an Apopi from an original of the time of Amenemhe III. Large numbers of Hyksos scarabs are found in Upper and Lower Egypt, and they are not unknown in Palestine. Khyan ‘s monuments, inconspicuous as they are, actually extend over a wider area — from Bagdad to Cnossus — than those of any other Egyptian king.

It is certain that this mysterious people were Asiatic, for they are called so by the Egyptians. Though Seth was an Egyptian god, as god of the Hyksos he represents some Asiatic deity. The possibility of a connexion between the Hyksos and the Israelites is still admitted in some quarters. Hatred of these impious foreigners, of which there is some trace in more than one text, aroused amongst the Egyptians (as nothing ever did before or since) that martial spirit which carried the armies of Tethmosis to the Euphrates.

Besides the histories of Egypt, see J. H. Breasted, Ancient Records of Egypt; Historical Documents ii. 4, 125; G. Maspero, Contes populaires, 3me ed. p. 236; W. M. F. Petrie, Hyksos and Israelite Cities, p. 67; Golenischeff in Rectteil de travaux,xv. p. 131. (F. Ll. G.)

HYLAS, in Greek legend, son of Theiodamas, king of the Dryopians in Thessaly, the favourite of Heracles and his com- panion on the Argonautic expedition. Having gone ashore at Kios in Mysia to fetch water, he was carried off by the nymphs of the spring in which he dipped his pitcher. Heracles sought him in vain, and the answer of Hylas to his thrice-repeated cry was lost in the depths of the water. Ever afterwards, in memory of the threat of Heracles to ravage the land if Hylas were not found, the inhabitants of Kios every year on a stated day roamed the mountains, shouting aloud for Hylas (Apollonius Rhodius i. 1207; Theocritus xiii.; Strabo xii. 564; Propertius i. 20; Virgil, Eel. vi. 43). But, although the legend is first told in Alexandrian times, the " cry of Hylas " occurs long before as the " Mysian cry " in Aeschylus (Persae, 1054), and in Aristo- phanes {Plutus, 1 1 27) " to cry Hylas " is used proverbially of seeking something in vain. Hylas, like Adonis and Hyacinthus, represents the fresh vegetation of spring, or the water of a foun- tain, which dries up under the heat of summer. It is suggested that Hylas was a harvest deity and that the ceremony gone through by the Kians was a harvest festival, at which the figure of a boy was thrown into the water, signifying the dying vegeta- tion-spirit of the year.

See G. Turk in Breslauer Philologische Abhandlungen, vii. (1895) ; W. Mannhardt, Mythologische Forschungen (1884).

HYLOZOISM (Gr. vkq, matter, fwˆ, life), in philosophy, a term applied to any system which explains all life, whether physical or mental, as ultimately derived from matter (" cosmic matter," Weldstoff). Such a view of existence has been common throughout the history of thought, and especially among physical scientists. Thus the Ionian school of philosophy, which began with Thales, sought for the beginning of all things in various material substances, water, air, fire (see Ionian School). These substances were regarded as being in some sense alive, and taking some active part in the development of being. This primitive hylozoism reappeared in modified forms in medieval and Renaissance thought, and in modern times the doctrine of materialistic monism is its representative. Between modern materialism and hylozoism proper there is, however, the dis- tinction that the ancients, however vaguely, conceived the elemental matter as being in some sense animate if not actually conscious and conative.

HYMEN, or Hymenaeus, originally the nam of the song sung at marriages among the Greeks. As usual the name gradually produced the idea of an actual person whose adventures gave rise to the custom of this song. He occurs often in association with Linus and*

Ialemus, who represent similar personifications, and is generally called a son of Apollo and a Muse. As the son of Dionysus and Aphrodite, he was regarded as a god of fruitful- ness. In Attic legend he was a beautiful youth who, being in love with a girl, followed her in a procession to Eleusis disguised as a woman, and saved the whole band from pirates. As reward

he obtained the girl in marriage, and his happy married life caused him ever afterwards to be invoked in marriage songs (Servius on Virgil, Aen. i. 651). According to another story, he was a youth who was killed by the fall of his house on his wedding day; hence he was invoked to propitiate him and avert a similar fate from others (Servius, he. cit.). He is represented in works of art as an effeminate-looking, winged youth, carrying a bridal torch and wearing a nuptial veil. The marriage song was sung, with musical accompaniment, during the procession of the bride from her parents' house to that of the bridegroom, Hymenaeus being invoked at the end of each portion.

See R. Schmidt, De Hymenaeo el Talasio (1886), and J.A. Hildin Daremberg and Saglis's Dictionnaire des antiquites.

HYMENOPTERA (Gr. vfi-qv, a membrane, and irrtpov, a wing), a term used in zoological classification for one of the most im- portant orders of the class Hexapoda (

After C. L. Marlatt, Bur. Ent. Bull. 3, N.S., V.S. Depl. Agtk. Fig. i. — A, Front of head of Sawfly (Pachynematus) ; a, labrum; 6, clypeus; c, vertex; d, d, antennal cavities. C and D, Mandibles. E, First maxilla; a, cardo; b, stipes; c, galea; d, lacinia; e, palp. B, Second maxillae (Labium); o, mentum; b, ligula (between the two galeae) ; c, c, palps. Magnified.

all naturalists in the sense proposed by him, to include the sawilies, gall-flies, ichneumon-flies and their allies, ants, wasps and bees. The relationship of the Hymenoptera to other orders of insects is discussed in the article Hexapoda,

but it may be men- tioned here that in structure the highest members of the order are remarkably special- ized, and that in the perfection of their in- stincts they stand at the head of all insects and indeed of all inver- tebrate animals. About 30,ooospeciesof Hymen- optera are

now known. Characters. — 1 n all Hymenoptera the man- dibles (fig. 1, C, D) are well developed, being adapted, as in the more lowly winged in»ects,such as the Orthoptera, for biting. The more generalized Hymenoptera have the second maxillae but slightly modified, their inner lobes being fused to form a ligula (fig. I , B, b). I n the higher families this structure becomes elongated (fig. 2, g) so as to form an elaborate sucking-organ or " tongue." These insects are able, therefore, to bite as well as to suck, whereas most insects which have acquired the power of suction have lost that of biting. Both fore- and hind- wings are usually present, both pairs being membranous, the hind- wmgs small and not folded when at rest, each provided along the

Fig. 2. — Jaws of Hive-bee (Apis mellifica). Magni- fied about 6 j times. a, mandible; b, c, palp and lacinia the thoracic of first maxilla; ments; i., ii. d, e, g, h, mentum, palp, fused laciniae (ligula or "tongue") and galea of 2nd maxillae.

After C. Janet, Mem. Soc. Zool. France (i8g8).

Fig. 3. — Median section through mid- body of female Red Ant(Myrmica rubra). H, Head; 1, 2, 3, scg- the first and second abdominal segments ; i., being the pro- podeum.

costa with a row of curved hooks which catch on to a fold along the dorsum of the adjacent fore-wing during flight. A large number of Hymenoptera are, however, entirely wingless — at least as regards one sex or form of the species. One of the most remarkable features is the close union of the foremost abdominal segment (fig. 3, i.) with the metathorax, of which it often seems to form a part, the apparent first abdominal segment being, in such case, really the second (fig. 3, ii.). The true first segment, which undergoes a more or less complete fusion with the thorax is known as the " median segment " or prof odeum. In female Hymenoptera the typical insectan ovipositor with its three pairs of processes is well developed, and in the higher families this organ becomes functional as a sting (fig. 5) — used for offence and defence. As regards their life history, all Hymenoptera undergo a " complete " metamorphosis. The larva is soft-skinned (eruciform) , being either a caterpillar (fig. 6, b) or a leg- less grub (fig. 7, a), and the pupa is free (fig. 7, c), i.e. with the append- ages not fixed to the body, as is the case in the pupa of most moths. Structure. — The head of a hymenopterous insect bears three simple eyes (ocelli) on the front and vertex in addition to the large compound

Fig. 4. — Fore- Wings of Hymenoptera.

Tenthredinidae (Hylotoma) —

I, marginal; 2, appendicu- lar; 3, 4, 5, 6, radial or sub- marginal; 7, 8, 9, median or discoidal; 10, sub-costal;

II, 12, cubital or branchial; and 13, anal or lanceolate cellules; a, 6, c, submarginal nervures; d, basal nervures; e, /, recurrent nervures; st, stigma; co, costa.

2. Cynipidae (Cynips).

3. Chalcididae (Perilampus).

4. Proctotrypidae (Codrus).

5. Mymaridae (Mymar).

6. Braconidae (Bracon).

7. Ichneumonidae (Trogus).

8. Chrysididae (Cleptes).

9. Formicidae (Formica).

10. Vespidae (Vespa).

11. Apidae (Apathus).

eyes. The feelers are generally simple in type, rarely showing serra- tions or prominent appendages; but one or two basal segments are frequently differentiated to form an elongate " scape," the remaining segments— carried at an elbowed angle to the scape — making up the " fiagellum "; the segments of the flagellum- often bear somplex sensory organs. The general characters of the taws have been mentioned above, and in detail there is great variation in these organs among the different families. The sucking tongue of the Hymenoptera has often been compared with the hypopharynx of other insects. According to D. Sharp, however, the hypopharynx is present in all Hymenoptera as a distinct structure at the base of the_ "tongue," which must be regarded as representing the fused laciniae of the second maxillae. In the thorax the pronotum and prosternum are closely associated with the mesothorax, but the pleura of the prothorax are usually shifted far forwards, so that the forelegs are inserted just behind the head. A pair of small plates — the tegulae —

are very generally present at the bases of the fore-wings. The union of the first abdominal segment with the metathorax has been

already mentioned. The second (so-called " first ") abdominal segment is often very constricted, forming the " waist " so characteristic of wasps and ants for example. The constriction of this segment and its very perfect articulation with the propodeum give great mobility to the abdomen, so that the ovipositor or sting can be used with the greatest possible accuracy and effect.

Mention has already been made of the series of curved hooks along the costa of the hind- wing; by means of this arrangement the two wings of a side are firmly joined together during flight, which thus becomes particularly accurate. The wings in the Hymenoptera show a marked reduction in the number of nervures as compared with more primitive insects. The main median nervure, and usually also the sub-costal become united with the radial, while the branches of radial, median and cubital nervures pursuing a transverse or recurrent course across the wing, divide its area into a number of areolets or " cells," that are of importance in classification. Among many of the smaller Hymenoptera we find that the wings are almost destitute of nervures. In the hind-wings — on account of their reduced size — the nervures are even more reduced than in the fore-wings.

The legs of Hymenoptera are of the typical insectan form, and the foot is usually composed of five segments. In many families the trochanter appears to be represented by two small segments, there being thus an extra joint in the leg. It is almost certain that the distal of these two segments really belongs to the thigh, but the ordinary nomenclature will be used in the present article, as this character is of great importance in discriminating families, and the two segments in question are referred to the trochanter by most systematic writers.

The typical insectan ovipositor, so well developed among the Hymenoptera, consists of three pairs of processes (gonapophyses) two of which belong to the ninth abdominal segment and one to

After C. Janet, Aiguillun de la Myrmica rubra (Paris, 1898). Fig. 5. — Ovipositor or Sting of Red Ant (Myrmica rubra) Queen. Magnified. The right sheath C (outer process of the ninth abdominal

segment — 9) is shown in connexion with the guide B formed by the inner processes of the 9th segment. The stylet A (process of the 8th abdominal segment — 8) is turned over to show its groove a, which works along the tongue or rail b.

the eighth. The latter are the cutting or piercing stylets (fig. 5, A) of the ovipositor, while the two outer processes of the ninth segment are modified into sheaths or feelers (fig. 5, C) and the two inner processes form a guide (fig. §, B) on which the stylets work, tongues or rails on the " guide " fitting accurately into longitudinal grooves on the stylet. In the different families of the Hymenoptera, there are various modifications of the ovipositor, in accord with the habits of the insects and the purposes to which the organ is put. The sting of wasps, ants and bees is a modified ovipositor and is used for egg-laying by the fertile females, as well as for defence. Most male Hymenoptera have processes which form claspers or genital armature. These processes are not altogether homologous with those of the ovipositor, being formed by inner and outer lobes of a pair of structures on the ninth abdominal segment.

Many points of interest are to be noted in the internal structure of the Hymenoptera. The gullet leads into a moderate-sized crop, and several pairs of salivary glands open into the mouth. The crop is followed by a proventriculus which, in the higher Hymenoptera, forms the so-called " honey stomach," by the contraction of whose walls the solid and liquid food can be separated, passed on intothe digestive stomach, or held in the crop ready for regurgitation into the mouth. Behind the digestive stomach are situated, as usual, intestine and rectum, and the number of kidney (Malpighian) tubes varies from only six to over a hundred, being usually great.

In the female, each ovary consists of a large number of ovarian tubes, in which swollen chambers containing the egg-cells alternate with smaller chambers enclosing nutrient material. In connexion with the ovipositor are two poison-glands, one acid and the other alkaline in its secretion. The acid gland consists of one, two or more tubes, with a cellular coat of several layers, opening into a

reservoir whence the duct leads to the exterior. The alkaline gland is an irregular tube with a single cellular layer, its duct opening alongside that of the acid reservoir. These glands are most strongly developed when the ovipositor is modified into a sting.

Development. — Parthenogenesis is of normal occurrence in the life-cycle of many Hymenoptera. There are species of gall-fly in which

males are unknown, the unfertilized eggs always developing into females. On the other hand, in certain saw-flies and among the higher families, the unfertilized eggs, ca.pable of development, usually give rise to male insects (see Bee). The larvae of most saw-flies feeding on the leaves of plants are caterpillars (fig. 6, b) with numerous abdominal pro-legs, but in most families of Hymenoptera the egg is laid in such a situation that an abundant food-supply is assured without exertion on the part of the larva, which is consequently a legless grub, usually white in colour, and with soft flexible cuticle (fig. 7, a). The organs and instincts for egg-laying and food-providing are perhaps the most remarkable features in the economy of the Hymenoptera. Gall-fly grubs are provided with vegetable food through the eggs being laid by the mother insect within plant tissues. The ichneumon pierces the body of a caterpillar and lays her eggs where the grubs will find abundant animal food. A digging- wasp hunts for insect prey and buries it with the egg, while a true wasp feeds her brood with captured insects, as a bird her fledglings. Bees store honey and pollen to serve as food for their young. Thus we. find throughout the order a degree of care for offspring un- reached by other insects, and this family-life has, in the best known of the Hymenoptera — ants, wasps and bees — developed into an elaborate social organization.

Social Life.— The. development of a true insect society among the Hymenoptera is dependent on a differentiation among the females between individuals with well-developed ovaries (" queens ") whose special function is reproduction; and in- dividuals with reduced or aborted ovaries (" workers ") whose duty is to build the nest, to gather food and to tend and feed the larvae. Among the wasps the workers may only differ from the queens in size, and individuals intermediate between the two forms of female may be met with. Further, the queen wasp, and also the queen humble-bee, commences unaided the work of building and founding a new nest, being afterwards helped by her daughters (the workers) when these have been developed. In the hive-bee and among ants, on the other hand, there are constant structural distinctions between queen and worker, and the function of the queen bee in a hive is confined to egg-laying, the labour of the community being entirely done by the workers. Many ants possess several different forms of worker, adapted for special duties. Details of this fascinating subject are given in the special articles Ant, Bee and Wasp (q.v.).

Habits and Distribution. — Reference has been already made to the various methods of feeding practised by Hymenoptera in the larval stage, and the care taken of or for the young through- out the order

leads in many cases to the gathering of such food by the mother or nurse. Thus, wasps catch flies; worker ants make raids and carry off weak insects of many kinds; bees gather nectar from flowers and transform it into honey within their stomachs — largely for the sake of feeding the larvae in the nest. The feeding habits of the adult may agree with that of the larva, or differ, as in the case of wasps which feed their grubs on flies, but eat principally vegetable food themselves. The nest-building habit is similarly variable. Digging wasps make simple holes in the ground; many burrowing bees form branching tunnels; other bees excavate timber or make their brood-chambers in hollow plant-stems; wasps work up with their saliva vegetable fibres bitten off tree-bark to make paper; social bees produce from glands in their own bodies the wax whence their nest-chambers are built. The inquiline habit (" cuckoo-parasitism "), when one species makes use of the labour of another by invading the nest and laying her eggs there, is of frequent occurrence among Hymenoptera; and in some cases the larva of the intruder is not content with taking the store of food provided, but attacks and devours the larva of the host.

Most Hymenoptera are of moderate or small size, the giants of the order — certain saw-flies and tropical digging-wasos — never reach the bulk attained by the largest beetles, while the wing-spread is narrow compared with that of many dragon- flies and moths. On the other hand, there are thousands of very small species, and the tiny "fairy-flies" (Mymaridae), whose larvae live as parasites in the eggs of various insects, are

excessively minute for creatures of such complex organization. Hymenoptera are probably less widely distributed than Aptera, Coleoptera or Diptera, but they are to be found in all except the most inhospitable regions of the globe. The order is, with few exceptions, terrestrial or aerial in habit. Comparatively only a few species are, for part of their lives, denizens of fresh water; these, as larvae, are parasitic on the eggs or larvae of other aquatic insects, the little hymenopteron, Polynema natans, one of the " fairy-flies " — swims through the water by strokes of her delicate wings in search of a dragon-fly's egg in which to lay her own egg, while the rare Agriotypus dives after the case of a caddis-worm. It is of interest that the waters have been invaded by the parasitic group of the Hymenoptera, since in number of species this is by far the largest of

the order. No group of terrestrial insects escapes their attacks — even larvae boring in wood are detected by ichneumon flies with excessively long ovipositors. Not a few cases are known in which a parasitic larva is itself pierced by the ovipositor of a " hyperparasite," and even the offspring of the latter may itself fall a victim to the attack of a " tertiary parasite."

Fossil History. — Very little is known of the history of the Hymenoptera previous to the Tertiary epoch, early in which, as we know from the evidence of many Oligocene and Miocene fossils, all the more important families had been differentiated. Fragments of wings from the Lias and Oolitic beds have been referred to ants and bees, but the true nature of these remains is doubtful.

Classification. — Linnaeus divided the Hymenoptera into two sections — the Terebrantia, whose females possess a cutting or piercing ovipositor, and the Aculeata, in which the female organ is modified into a sting. This nomenclature was adopted by P. A. Latreille and has been in general use until the present day. A closely similar division of the order results from T. Hartig's character drawn from the trochanter — whether of two segments or undivided — the groups being termed respectively Ditrocha and Monotrocha. But the most natural division is obtained by the separation of the saw-flies as a primitive sub-order, char- acterized by the imperfect union of the first abdominal segment with the thorax, and by the broad base of the abdomen, so that there is no median constriction or " waist," and by the presence of thoracic legs — usually also of abdominal pro-legs — in the larva. All the other families of Hymenoptera, including the gall-flies, ichneumons and aculeates, have the first abdominal segment closely united with the thorax, the second abdominal segment constricted so as to form a narrow stalk or " waist," and legless larvae without a hinder outlet to the food-canal. These two sub- orders are usually known as the Sessilivenlra and Petioliventra respectively, but the names Symphyta and Apocrita proposed in 1867 by C. Gerstaecker have priority, and should not be replaced.

Symphyta. This sub-order, characterized by the " sessile," broad-based abdomen, whose fust segment is imperfectly united with the thorax, and by the usually caterpillar-like larvae with legs, includes the various groups of saw-flies. Three leading families may be mentioned. The Cephidae. or stem saw-flies, have an elongate pronotum, a compressed abdomen, and a single spine on the shin of the fore-leg. The soft, white larvae have the thoracic legs very small and feed in the stems of various plants. Cephus pygmaeus is a well-known enemy of corn crops. The Siricidae (" wood-wasps ") are

large elongate insects also with one spine on each fore-shin, but with the pronotum closely joined to the mesothorax. The ovipositor is long and prominent, enabling the female insect to lay her eggs in the wood of trees, where the white larvae, whose legs are excessively short, tunnel and feed. These insects are adorned with bands of black and yellow, or with bright metallic colours, and on account of their large size and formidable ovipositors they often cause needless alarm to persons unfamiliar with their habits. The Tenthredinidae , or true saw-flies, are distinguished by two spines on each fore-shin, while the larvae are usually caterpillars, with three

f>airs of thoracic legs, and from six to eight pairs of abdominal pro-egs, the latter not possessing the hooks found on the pro-legs of lepidopterous caterpillars. Most saw-fly larvae devour leaves, and the beautifully serrate processes of the ovipositor are well adapted for egg-laying in plant tissues. Some saw-fly larvae are protected by a slimy secretion (fig. 6, c) and a few live concealed in galls. In the form of the feelers, the wing-neuration and minor structural details there is much diversity among the saw-flies. They have boon usually regarded as a single family, but VV. II. Ashmcad has lately differentiated eleven families of them.

Apocrita. This sub-order includes the vast majority of the Hymenoptera, characterized by the narrowly constricted waist in the adult and by the legless condition of the larva. The trochanter is simple in some genera and divided in others. With regard to the minor divisions of this group, great difference of opinion has prevailed among students. _ In his recent classification Ashmead (1901) recognizes seventy-nine families arranged under eight " super-families." The number of _ species included in this division is enormous, and the multiplication of families is, to some extent, a natural result of increasingly close study. But the distinctions between many of these rest on comparatively slight characters, and it is likely that

TERtl.-.

After Marlatt, Enl. Circ. 26, U.S. Dept. Agric.

Fig. 6. — a, Pear Saw-fly {Eriocampoides limacina) ; b, larva with-out, and c, with its slimy protective coat ; e, cocoon ; /, larva before pupation; g, pupa, magnified; d, leaves with larvae.

the future discovery of new genera may abolish many among such distinctions as may now be drawn. It seems advisable, therefore, in

the present article to retain the wider conception of the family that has hitherto contented most writers on the Hymenoptera. Ashmead's " super-families " have, however, been adopted as — founded on definite structural characters — they probably indicate relationship more nearly than the older divisions founded mostly on habit. The Cynipoidea include the gall-flies and their parasitic relations. In the Chalcidoidea, Ichneumonoidea arid Proctotry- poidea will be found nearly all the " parasitic Hymenoptera " of older classifications. The Formicoidea are the ants. The group of Fossores, or " digging-wasps," is divided by Ashmead, one section forming the Sphecoidea, while the other, together with the Chrysidae

TEDZI

After Howard, Ent Tech. Bull, s U.S. Dept. Agric.

Fig. 7. — Chalcid (Dibrachys boucheanus), a hyper-parasite, a, Larva. b, Female fly.

d, Its head more highly magni- c, Pupa of male.

fied. e, Feeler,

and the true wasps, make up the Vespoidea. The Apoidea consists of the bees only.

Cynipoidea. — In this division the ovipositor issues fuom the ventral surface of the abdomen ; the pronotum reaches back to the tegulae ; the trochanter has two segments; the fore- wing (fig. 4, 2) has no stigma, but one or two areolets. The feelers with twelve to fifteen segments are thread-like and straight. All the insects included in this group are small and form two families — the Cynipidae and the Figitidae. They are the " gall-flies," many of the species laying eggs in various plant-tissues where the presence of the larva causes the formation of a pathological growth or gall, always of a definite form and characteristic of the species; the "oak-apple" and the

bedeguar of the rose are familiar examples. Other flies of this group have the inquiline habit, laying their eggs in the galls of other species, while others again pierce the cuticle of maggots or aphids, in whose bodies their larvae live as parasites.

Chalcidoidea. — This division resembles the Cynipoidea in the position of the ovipositor, and in the two segmented trochanters. The fore-wing also has no stigma, and the whole wing is almost destitute of nervurcs and areolets, while the pronotum does not reach back to the tegulae, and the feelers are elbowed (fig. 7). The vast majority of this group, including nearly 5000 known species, are usually reckoned as a single family, the ClwJcididae, comprising small insects, often of bright metallic colours, whose larvae are parasitic in insects of various orders. The " fig-insects," whose presence in ripening figs is believed essential to the proper develop- ment of the fruit, belong to Blastophaga and other genera of this family. They are remarkable in having wingless males and winged females. The " polyembryonic " development of an Encyrtus, as studied by P. Marchal, is highly remarkable. The female lays her egg in the egg of a small ermine moth (Hyponomettta) and the egg gives rise not to a single embryo but to a hundred, which develop as the host-caterpillar develops, being found at a later stage within the latter enveloped in a flexible tube.

The Mymaridae or " fairy-flies " are distinguished from the Chalcididae by their narrow fringed wings (figs. 4, 5) and by the situation of the ovipositor just in front of the tip of the abdomen. They arc among the most minute of all insects and their larvae are probably all parasitic in insects' eggs.

Ichneumonoidea. — The ten thousand known species included in this group agree with the Cynipoidea and Chalcidoidea in the iwsition of the ovipositor and in the jointed trochanters, but are distinguished by the fore-wing possessing a distinct stigma and usually a typical series of nervures and areolets (figs. 4, 8). Many of the species are of fair size. They lay their eggs (fig. 8) in the bodies of insects and their larvae belonging to various orders. A few small families such as the Evaniidae and the Stephanidae are in- cluded here, but the vast majority of the group fall into two large

families, the Ichneumoni- /^*_ _ dae and the Braconidae,

the former distinguished by the presence of two median (or discoidal) cells in the fore- wing (figs. 4, 7), while the latter has only one (figs. 4, 6). Not a few of these insects, however, are entirely wingless. On account of their work in destroying plant-eating insects, the ichneumon- flies are of great economic importance.

Proctotrypoidea. — This group may be distin- guished from the pre- ceding by the position of the ovipositor at the extreme apex of the

abdomen, and from the groups that follow (with very few exceptions) by the jointed trochanters of the legs. The pronotum reaches back to the tegulae. The Pelecinidae — included here by Ash- mead — are large insects with remarkably elongate abdomens and undivided trochanters. AH the other members of the group may be regarded as forming a single family — the Proctotrypidae, including an immense number of small parasitic Hymenoptcra, not a few of which are wingless. Of special interest are the transforma- tions of Platygaster, belonging' to this family, discovered by jVI. Ganift, and familiarized to English readers through the writings of Sir J. Lubbock (Lord Avebury). The first larva is broad in front and tapers behind to a " tail " provided with two divergent pro- cesses, so that it resembles a small crustacean. It lives in the grub of a gall-midge and it ultimately becomes changed into the usual white and fleshy hymenoptcrous larva. The four succeeding sections, in which the ovipositor is modified into a sting (always exserted from the tip of the abdomen) and the trochanters are with few exceptions simple, form the Aculeata of Linnaeus.

Formicoidea. — The ants which form this group are readily dis- tinguished by the differentiation of the females into winged " queens" and wingless " workers." The pronotum extends back to the wing- bases, and the " waist " is greatly constricted and marked by one or two " nodes." The differentiation of the females leads to a complex social life, the nesting habits of ants and the various industries that they pursue being of surpassing interest (see Ant).

Vespoidea. — This section includes a number of families char- acterized by the backward extension of the prothorax to the tegulae and distinguished from the ants by the absence of " nodes " at the base of the abdomen. The true wasps have the fore-wings folded lengthwise when at rest and the fore-legs of normal build — not specialized for digging. The Vespidae or social wasps have " queens " and " workers " like the ants, but both these forms of female are winged: the claws on their fret are simple. In the. Eumcvidar or solitarv wasps the female sex is undifferentiated, and the foot claws

After Riley and Howard, Insect Li/e,vol. i.

Fig. 8. — Ichneumon Fly (Rhyssa per- suasaria) ovipositing.

arc toothed. (For the habits of these insects see Wasp.) The Chrysididiie or ruby wasps are small insects with a very hard cuticle exhibiting brilliant metallic colours — blue, green and crimson. Only three or four abdominal segments are visible, the hinder seg- ments

being slender and retracted to form a telescope-like tube in which the ovipositor lies. When the ovipositor is brought into use this tube is thrust out. The eggs are laid in the nests of various bees and wasps, the chrysid larva living as a " cuckoo " parasite. The Trigonalidae, a small family whose larvae are parasitic in wasps' nests, also probably belong here.

The other families of the Vespoidea belong to the series of ' ' Fos-sores " or digging-wasps. In two of the families — the Mutillidae and Thynnidae — the females are wingless and the larvae live as parasites in the larvae of other insects; the female Mutilla enters humble-bees' nests and lays her eggs in the bee-grubs. In the other families both sexes arc winged, and the instinct and industry of the females are among the most wonderful in the Hymenoptcra. They make burrows wherein they place insects or spiders which they have caught and stung, laying their eggs beside the victim so that the young larvae find themselves in presence of an abundant and appropriate food-supply. Valuable observations on the habits of these insects are due to J. H. Fabre and G. W. and E. Peckham. The prey is sometimes stung in the neighbourhood of the nerve ganglia, so that it is paralysed but not killed, the grub of the fossorial wasp devouring its victim alive ; but this instinct varies in perfection, and in many cases the larva flourishes equally whether its prey be killed or not. The females have a wonderful power of finding their burrows on returning from their hunting expeditions. Among the Vespoid families of fossorial wasps, the Pompilidae are the most important. They are recognizable by their slender and elongate hind-legs; many of them provision their burrows with spiders. The Sapygidae are parasitic on bees, while the Scoliidae are large, robust and hairy insects, many of which prey upon the grubs of chafers.

Sphecoidea. — In this division are included the rest of the " digging-wasps," distinguished from the Vespoidea by the short pronotum not reaching backward to the tegulae. They have usually been reckoned as forming a single, very large family — the Sphegidae — but ten or twelve subdivisions of the group are regarded as distinct families by Ashmead and others. Great diversity is shown in the details of structure, habits and nature of the prey. Species of Sphex, studied by Fabre, provisioned their brood-chambers with crickets. Pelopoeus hunts spiders, while Ammophila catches cater- pillars for the benefit of her young. Fabre states that the last- rtamed insect uses a stone for the temporary closing of her burrow, and the Peckhams have seen a female Ammophila take a stone between her mandibles and use it as a hammer for pounding down the earth over her finished nest. The habits of Bembex are of especial interest. The female, instead of

provisioning her burrow with a supply of food that will suffice the larva for its whole life, brings fresh flies with which she regularly feeds her young. In this instinct we have a correspondence with the habits of social wasps and bees. Yet it may be thought that the usual instinct of the " digging- wasps " to capture and store up food in an underground burrow for the benefit of offspring which they will never see is even more sur- prising. The habit of some genera is to catch the prey before making their tunnel, but more frequently the insect digs her nest, and then hunts for prey to put into it.

Apoidea. — The bees which make up this group agree with the Sphecoidea in the short pronotum, but may be distinguished from all other Hymenoptcra by the widened first tarsal segment and the plumose hairs on head and body. They are usually regarded as forming a single family — the Apidae — but there is very great diversity in structural details, and Ashmead divides them into fourteen families. The " tongue," for example, is short and obtuse or emarginate in Colletes and Prosopis, while in all other bees it is pointed at the tip. But in Andrena and its allies it is comparatively short, while in the higher genera, such as Apis and Bombus, it is elongate and flexible, forming a most elaborate and perfect organ for taking liquid food. Bees feed on honey and pollen. Most of the genera are " solitary " in habit, the female sex being undifferenti- ated; but among the humble-bees and hive-bees we find, as in social wasps and ants, the occurrence of workers, and the consequent elaboration of a wonderful insect-society. (See Bee.)

Bibliography. — The literature of several special families of the Hymenoptcra will be found under the articles Ant, Bee, Ichneumon-Fly, Wasp, &c, referred to above. Among earlier students on. structure may be mentioned P. A. Latreille, Families naturelles du regne animal (Paris, 1825), who recognized the nature of the " median segment." C. Gerstaecker (Arclu f. Nalurg. xx., 1867) and F. Brauer (Sitzb. K. Altai. Wiss. Wim. lxxxv., 1883) should also be consultsid on this subject. Fcr internal anatomy, specially the digestive organs, see L. Dufour, MZm, savants Strangers, vii. (1841), and Ann. Sci. Nat. Zool. (4), i. 1854. For nervous system H. Viallanes, Ann. Sci. Nat. Zool. (7), ii. iv. 1886-1887, and F. C. Kenyon, Journ. Comp. Neurol, vi., 1896. For poison and other glands, see L. Bordas, Ann. Sci. Nat. Zool. (7) xix., 1 895. For the sting and ovipositor H. Dewitz, Zeits. vAss. Zool. xxv., 1874, xxviii., 1877, and K. Zander, ih. Ixvi., l8oq. For male gcnj|al armature S. A. Peytoureau, Morphologic de Tarmure gtnitale des

insectes (Bordeaux, 1895), and E. Zander, Zeits. wiss. Zool. lxvii., 1900. The systematic student of Hymenoptera is greatly helped by C. G. de Dalla Torre's Catalogus Hymenopterorum (10 vols., Leipzig, 1893-1902). For general classifications see F. W. Konow, Entom. Nachtr. (1897), and W. H. Ashmead, Proc. U.S. Nat. Mus. xxiii., 1901 ; the latter paper deals also especially with the Ichneu- monoidea of the globe. For habits and life histories of Hymenoptera see J. Lubbock (Lord Avebury), Ants, Bees and Wasps (9th ed., London, 1889); C. Janet, £tudes sur les fourmis, les gu&pes et les abeilles (Paris, &c, 1893 an d onwards); and G. W. and E. G. Peckham, Instincts and Habits of Solitary Wasps (Madison, Wis. U.S.A., 1898). Monographs of most of the families of British Hymenoptera have now been published. For saw-flies and gall- flies, see P. Cameron's British Phytophagous Hymenoptera (4 vols., London, Ray Soc, 1882-1893). For fchneumonoidea, C. Morley's Ichneumons of Great Britain (Plymouth, 1903, &c), and T. A. Marshall's " British Braconidae," Trans. Entom. Soc, 1885-1899. The smaller parasitic Hymenoptera have been neglected in this country since A. H. Hahday's classical papers Entom. Mag. i.-v., 1833-1838) but Ashmead's " North American Proctotrypidae " (Bull. U.S. Nat. Mus. xlv., 1893) is valuable for the European student. For the Fossores, wasps, ants and bees see E. Saunders, Hymenoptera Aculeata of the British Islands (London, 1896). Exhaustive refer- ences to general systematic works will be found inde Dalla Torre's Catalogue mentioned above. Of special value to English students are C. T. Bingham's Fauna of British India, " Hymenoptera " (London, 1897 and onwards), and P. Cameron's volumes on Hymenoptera in the Biologia Centrali- Americana. F. Smith's Catalogues of Hy- menoptera in the British Museum (London, J 853-1 859) are well worthy of study. (G. H. C.)

HYMETTUS (Ital. Monte Matto, hence the modern name Trello Vouni), a mountain in Attica, bounding the Athenian plain on the S.E. Height, 3370 ft. It was famous in ancient times for its bees, which gathered honey of peculiar flavour from its aromatic herbs; their fame still persists. The spring mentioned by Ovid (Ars Amat. iii. 687) is probably to be re- cognized near the monastery of Syriani or Kaesariani on the western slope. This may be identical with that known as TLvKkov Tlijpa, said to be a remedy for barrenness in women. The marble of Hymettus, which often has a bluish tinge, was used extensively for building in ancient Athens, and also, in early times, for sculpture; but the white marble of Pentelicus was preferred for both purposes.

See E. Dodwell, Classical and Topographical Tour (1819), i. 483.

HYMNS.— 1. Classical Hymnody.— The word " hymn " (vlu/os) was employed by the ancient Greeks 1 to signify a song or poem composed in honour of gods, heroes or famous men, or to be recited on some joyful, mournful or solemn occasion. Polymnia was the name of their lyric muse. Homer makes Alcinous entertain Odysseus with a " hymn " of the minstrel Demodocus, on the capture of Troy by the wooden horse. The Works and Days of Hesiod begins with an invocation to the Muses to address hymns to Zeus, and in his Theogonia he speaks of them as singing or inspiring " hymns " to all the divinities, and of the bard as " their servant, hymning the glories of men of old, and of the gods of Olympus." Pindar calls by this name odes, like his own, in praise of conquerors at the public games of Greece. The Athenian dramatists (Euripides most frequently) use the word and its cognate verbs in a similar manner; they also describe by them metrical oracles and apophthegms, martial, festal and hymeneal songs, dirges and lamentations or incanta- tions of woe.

Hellenic hymns, according to this conception of them, have come down to us, some from a very early and others from a late period of Greek classical literature. Those which passed by the name of Homer 2 were already old in the time of Thucydides. They are mythological poems (several of them long), in hexa- meter verse — some very interesting. That to Apollo contains a traditionary history of the origin and progress of the Delphic worship; those on Hermes and on Dionysus are marked by much liveliness and poetical fancy. Hymns of a like general character, but of less interest (though these also embody some fine poetical traditions of the Greek mythology, such as the story

'The history of the " hymn " naturally begins with Greece, but it may be found in some form much earlier; Assyria and Egypt have left specimens, while India has the Vedic hymns, and Confucius collected " praise songs " in China.

2 See Greek Literature.

of Teiresias, and that of the wanderings of Leto), were written in the 3rd century before Christ, by Callimachus of Cyrene. Cleanthes, the successor of Zeno, composed (also in hexameters) an " excellent and devout hymn " (as it is justly called by Cudworth, in his Intellectual System) to Zeus, which is preserved in the Eclogae of Stobaeus, and from which Aratus borrowed the words, " For we are also His

offspring," quoted by St Paul at Athens. The so-called Orphic hymns, in hexameter verse, styled TtKeral, or hymns of initiation into the " mysteries " of the Hellenic religion, are productions of the Alexandrian school, — as to which learned men are not agreed whether they are earlier or later than the Christian era.

The Romans did not adopt the word " hymn "; nor have we many Latin poems of the classical age to which it can properly be applied. There are, however, a few — such as the simple and graceful " Dianae sumus in fide " (" Dian's votaries are we ") of Catullus, and " Dianam tenerae dicite virgines " (" Sing to Dian, gentle maidens ") of Horace-r— which approach much more nearly than anything Hellenic to the form and character of modern hymnody.

2. Hebrew Hymnody. — For the origin and idea of Christian hymnody we must look, not to Gentile, but to Hebrew sources. St Augustine's definition of a hymn, generally accepted by Christian antiquity, may be summed up in the words, " praise to God with song " ("cum cantico"); Bede understood the " canticum " as properly requiring metre; though he thought that what in its original language was a true hymn might retain that character in an unmetrical translation. Modern use has enlarged the definition; Roman Catholic writers extend it to the praises of saints; and the word now comprehends rhythmical prose as well as verse, and prayer and spiritual meditation as well as praise.

The modern distinction between psalms and hymns is arbitrary (see Psalms). The former word was used by the LXX. as a generic designation, probably because it implied an accompani- ment by the psaltery (said by Eusebius to have been of very ancient use in the East) or other instruments. The cognate verb " psallere " has been constantly applied to hymns, both in the Eastern and in the Western Church; and the same com- positions which they described generically as " psalms " were also called by the LXX. "odes" (i.e. songs) and "hymns." The latter word occurs, e.g. in Ps. lxxii. 20 ("the hymns of David the son of Jesse "), in Ps. lxv. 1, and also in the Greek titles of the 6th, 54th, 55th, 67th and 76th (this numbering of the psalms being that of the English version, not of the LXX.). The 44th chapter of Ecclesiasticus, " Let us now praise famous men," &c, is entitled in the Greek irarkpuv vlivos, " The Fathers' Hymn." Bede speaks of the whole book of Psalms as called " liber hymnorum," by the universal consent of Hebrews, Greeks and Latins.

In the New Testament we find our Lord and His apostles singing a

hymn (vixviiaavTes eˆffKdov), after the institution of the Lord's Supper; St Paul and Silas doing the same {ynvovv rdv Otbv) in their prison at Philippi; St James recommending psalm-singing (aXXeno), and St Paul " psalms and hymns and spiritual songs " (\pa\ixols /cat vfivois (cot (jiSatj irvevixa.TiKo.li) St Paul also, in the 14th chapter of the first epistle to the Corin thians, speaks of singing (ij/akui) and of every man's psalm (e/cacrros vy £iv \f/a\iibv m a context which plainly has refer- ence to the assemblies of the Corinthian Christians for common worship. All the words thus used were applied by the LXX. to the Davidical psalms; it is therefore possible that these only may be intended, in the different places to which we have referred. But there are in St Paul's epistles several passages (Eph. v. 14; 1 Tim. iii. 16; 1 Tim. vi. 15, 16; 2 Tim. ii. 11,12) which have so much of the form and character of later Oriental hymnody as to have been supposed by Michaelis and others to be extracts from original hymns of the Apostolic age. Two of them are apparently introduced as quotations, though not found elsewhere in the Scriptures. A third has not only rhythm, but rhyme. The thanksgiving prayer of the assembled disciples, recorded in Acts iv., is both in substance and in manner poetical;

Then- peutae

phonal Hinging.

and in the canticles, " Magnificat," "Benedictus,". &c, which manifestly followed the form and style of Hebrew poetry, hymns or songs, proper for liturgical use, have always been recognized by the church.

3. Eastern Church Hymnody. — The hymn of our Lord, the precepts of the apostles, the angelic song at the nativity, and " Benedicite omnia opera " are referred to in a curious metrical prologue to the hymnary of the Mozarabic Breviary as preced- ents for the practice of the Western Church. In this respect, however, the Western Church followed the Eastern, in which hymnody prevailed frem the earliest times.

Philo describes the Theraputae (q.v.) of the neighbourhood of Alexandria as composers of original hymns, which (as well as old) were sung at their great religious festivals — the people listening in silence till they came to the closing strains, or refrains, at the end of a hymn or stanza (the " acroteleutia " and " ephymnia "), in which

all, women as well as men, heartily joined. These songs, he says, were in various metres (for which he uses a number of technical terms) ; some were choral, some not; and they were divided into variously constructed strophes or stanzas. Eusebius, who thought that the Theraputae were communities of Christians, says that the Christian practice of his own day was in exact accordance with this description.

The practice, not only of singing hymns, but of singing them antiphonally, appears, from the well-known letter of Pliny to Trajan, to have been established in the Bithynian Anti- churches at the beginning of the 2nd century. They

*were accustomed ” stato die ante lucem convenire, carmenque Christo, quasi Deo, dicere secum invicem.” This agrees well, in point of time, with the tradition recorded by the historian Socrates, that Ignatius (who suffered martyr- dom about a.d. 107) wast led by a vision or dream of angels singing hymns in that manner to the Holy Trinity to introduce antiphonal singing into the church of Antioch, from which it quickly spread to other churches. There seems to be an allusion to choral singing in the epistle of Ignatius himself to the Romans, where he exhorts them,” xopˆs7«>ˆM«*t ” (” having formed them- selves into a choir “), to ” sing praise to the Father in Christ Jesus.” A statement of Theodoret has sometimes been supposed to refer the origin of antiphonal singing to a much later date; but this seems to relate only to the singing of Old Testament Psalms (rr\v AavtSmiiv nt*

Other evidence of the use of hymns in the 2nd century is contained in a fragment of Caius, preserved by Eusebius, which refers to ” all the psalms and odes written by faithful brethren from the beginning,” as ” hymning Christ, the Word of God, as God.” Tertullian also, in his descrip- tion of the ” Agapae,” or love-feasts, of his day, says that, after washing hands and bringing in lights, each man was invited to come forward and sing to God’s praise something either taken from the Scriptures or of his own composition (” ut quisque de Sacris Scripturis vel proprio ingenio potest”). George Bull, bishop of St David’s, believed one of those primitive compositions to be the hymn appended by Clement of Alexandria to his Paedagogus; and Archbishop Ussher considered the ancient morning and evening hymns, of which the use was enjoined by the Apostolical Constitutions, and which are also mentioned in the ” Tract on Virginity ” printed with the works of St Athan- asius, and in St Basil’s treatise upon the Holy Spirit, to belong to the same family. Clement’s hymn, in a short anapaestic metre, beginning mbptav TRdXcov teawv (or, according to some editions, f5acn\ev ay’uav, \6ye vavBan&rup — translated by the Rev. A. Chatfield, ” Thou, the King of Saints, all-conquering Word “), is rapid, spirited and well-adapted for singing. The Greek ” Morning Hymn ” (which, as divided into verses by Archbishop Ussher in his treatise De Symbolis, has a majestic rhythm, resembling a choric or dithyrambic strophe) is the

2nd century.

3rd century.

original form of “Gloria in Excelsis,” still said or sung, with some

variations, in all branches of the church which have not relinquished the use of liturgies. The Latin form of this hymn (of which that in the English communion office is an exact translation) is said, by Bede and other ancient writers, to have been brought into use at Rome by Pope Telesphorus, as early as the time of the emperor Hadrian. A third, the Vesper or " Lamp- lighting " hymn (" 4>w IXapov ayias 56£tjs " — translated by Canon Bright " Light of Gladness, Beam Divine "), holds its place to this day in the services of the Greek rite. In the 3rd century Origen seems to have had in his mind the words of some other hymns or hymn of like character, when he says (in his treatise Against Celsus): "We glorify in hymns God and His only begotten Son; as do also the Sun, the Moon, the Stars and all the host of heaven. All these, in one Divine chorus, with the just among men, glorify in hymns God who is over all, and His only begotten Son." So highly were these compositions esteemed in the Syrian churches that the council which deposed Paul of Samosata from the see of Antioch in the time of Aurelian justified that act, in its synodical letter to the bishops of Rome and Alexandria, on this ground (among others) that he had prohibited the use of hymns of that kind, by uninspired writers, addressed to Christ.

After the conversion of Constantine, the progress of hymnody became closely connected with church controversies. There had been in Edessa, at the end of the 2nd or early in the 3rd century, a Gnostic writer of conspicuous ability, named Barde- sanes, who was succeeded, as the head of his sect or school, by his son Harmonius. Both father and son wrote hymns, and set them to agreeable melodies, which acquired, and in the 4th century still retained, much local popularity. Ephraem Syrus, the first voluminous hymn-writer whose works remain to us, thinking that the same melodies might be made useful to the faith, if adapted to more orthodox words, composed to them a large number of hymns in the Syriac language, principally in tetrasyllabic, pentasyllabic and heptasyllabic metres, divided into strophes of from 4 to 12,16 and even 20 lines each. When a strophe contained five lines, the fifth was generally an " ephymnium," detached in sense, and consisting of a prayer, invocation, doxology or the like, to be sung antiphonally, either in full chorus or by a separate part of the choir. The Syriac Chrestomathy of August Hahn (Leipzig, 1825), and the third volume of H. A. Daniel's Thesaurus Hymnologicus (Leipzig, 1841-1856), contain specimens of these hymns. Some of them have been translated into (unmetrical) English by the Rev. Henry Burgess {Select Metrical Hymns of Ephrem Syrus, &c, 1853). A considerable number of those so translated are on subjects connected with death,

resurrection, judgment, &c, and display not only Christian faith and hope, but much sim- plicity and tenderness of natural feeling. Theodoret speaks of the spiritual songs of Ephraem as very sweet and profitable, and as adding much, in his (Theodoret's) time, to the brightness of the commemorations of martyrs in the Syrian Church.

The Greek hymnody contemporary with Ephraem followed, with some licence, classical models. One of its favourite metres was the Anacreontic; but it also made use of the short anapaestic, Ionic, iambic and other lyrical measures, as well as the hexameter and pentameter. Its principal authors were Methodius, bishop of Olympus, who died about a.d. 311, Synesius, who became bishop of Ptolemais in Cyrenaica in 410, and Gregory Nazianzen, for a short time (380-381) patriarch of Constantinople. The merits of these writers have been perhaps, too much depreciated by the admirers of the later Greek " Melodists." They have found an able English translator in the Rev. Allen Chatfield (Songs and Hymns of Earliest Greek Christian Poets, London, 1876). Among the most striking of their works are nv&eo Xpicrk ("Lord Jesus, think of me"), by Synesius; olrbv a.diTOv ixovapxyv (" Thou, the One Supreme") andrio-oi 0e\£« yev'todat. ("0 soul of mine, repining"), byGregory; also Avwdtv irapOkvoi (" The Bridegroom cometh "), by Methodius. There continued to be Greek metrical hymn- writers, in a similar style, till a much later date. Sophronius, patriarch of Jerusalem

coatro' versy.

in tbe 7th century, wrote seven Anacreontic hymns; and St John Damascene, one of the most copious of the second school of " Melodists," was also the author of some long compositions in trimeter iambics.

An important development of hymnody at Constantinople arose out of the Arian controversy. Early in the 4th century Period Athanasius had rebuked, not only the doctrine of Alius, at Arian but the light character of certain hymns by which he endeavoured to make that doctrine popular. When, towards the close of that century (398), St John Chrysostom was raised to the metropolitan see, the Arians, who were still numerous at Constantinople, had no places of worship within the walls; but they were in the habit of coming into the city at sunset on Saturdays, Sundays and the greater festivals, and

congregating in the porticoes and other places of public resort, where they sung, all night through, antiphonal songs, with " acroteleutia " (closing strains, or refrains), ex- pressive of Arian doctrine, often accompanied by taunts and insults to the orthodox. Chrysostom was apprehensive that this music might draw some of the simpler church people to the Arian side; he therefore organized, in opposition to it, under the patronage and at the cost of Eudoxia, the empress of Arcadius (then his friend), a system of nightly processional hymn-singing, with silver crosses, wax-lights and other circumstances of ceremonial pomp. Riots followed, with bloodshed on both sides, and with some personal injury to the empress's chief eunuch, who seems to have officiated as conductor or director of the church musicians. This led to the suppression, by an imperial edict, of all public Arian singing; while in the church the practice of nocturnal hymn-singing on certain solemn occasions, thus first introduced, remained an established institution.

It is not improbable that some rudiments of the peculiar system of hymnody which now prevails throughout the Greek communion, and whose affinities are rather to the 0nek Hebrew and Syriac than to the classical forms, may hymnody. have existed in the church of Constantinople, even at that time. Anatolius, patriarch of Constantinople in the middle of the 5th century, was the precursor of that system; but the reputation of being its proper founder belongs to Romanos, of whom little more is known than that he wrote hymns still extant, and lived towards the end of that century. The importance of that system in the services of the Greek church may be understood from the fact that Dr J. M. Neale computed four-fifths of the whole space (about 5000 pages) contained in the different service-books of that church to be occupied by hymnody, all in a language or dialect which has ceased to be anywhere spoken.

The system has a peculiar technical terminology, in which the words " troparion," " ode," " canon " and " hirmus " («Ip/n,s) chiefly require explanation.

The troparion is the unit of the system, being a strophe or stanza, seen, when analysed, to be divisible into verses or clauses, with regulated caesuras, but printed in the books as a single prose sentence, without marking any divisions. The following (turned into English, from a " canon ' by John Mauropus) may be taken as an example: " The never-sleeping Guardian, | the patron of my soul, | the guide of my life, | allotted me by God, | I hymn thee, Divine Angel | of Almighty God." Dr Neale and most other writers regard all these " troparia " as rhythmical or modulated prose. Cardinal J. B.

Pitra, on the other hand, who in 1867 and 1876 published two learned works on this subject, maintains that they are really metrical, and governed by definite rules of prosody, of which he lays down sixteen. According to him, each " troparion " contains from three to thirty-three verses; each verse varies from two to thirteen syllables, often in a continuous series, uniform, alternate or reciprocal, the metre being always syllabic, and depending, not on the quantity of vowels or the position of consonants, but on an harmonic series of accents.

In various parts of the services solitary troparia are sung, under various names, " contacion," " oecos," " cathisma," &c, which mark distinctions either in their character or in their use.

An ode is a song or hymn compounded of several similar "troparia," — usually three, four or five. To these is always prefixed a typical or standard " troparion," called the hirmus, by which the syllabic measure, the periodic series of accents, and in fact the whole structure and rhythm of the stanzas which follow it are regulated. Each succeeding " troparion " in the same " ode " contains the same number of verses, and of syllables in each verse, and similar accents

on the same or equivalent syllables. The " hirmus " may either form the first stanza of the " ode " itself, or (as is more frequently the case) may be taken from some other piece; and, when so taken, it is often indicated by initial words only, without being printed at length. It is generally printed within commas, after the proper rubric of the " ode." A hymn in irregular " stichera " or stanzas, without a " hirmus," is called " idiomelon." A system of three or four odes is " triodion " or " tetraodion."

A canon is a system of eight (theoretically nine) connected odes, the second being always suppressed. Various pauses, relieved by the interposition of other short chants or readings, occur during the singing of a whole "canon." The final "troparion" in each ode of the series is not unfrequently detached in sense (like the " ephymnia " of Ephraem Syrus), particularly when it is in the (very common) form of a " theotokion," or ascription of praise to the mother of our Lord, and when it is a recurring refrain or burden.

There were two principal periods of Greek hymnography constructed on these principles— the first that of Romanos and his followers, extending over the 6th and 7th centuries, the second that of the schools which arose during the Iconoclastic controversy in the 8th century, and which continued for some centuries afterwards, until

the art itself died out.

The works of the writers of the former period were collected in Tropologia, or church hymn-books, which were held in high esteem till the 10th century, when they ceased to be regarded as church-books, and so fell into neglect. ij m aDOS , They are now preserved only in a very small number of manuscripts. From three of these, belonging to public libraries at Moscow, Turin and Rome, Cardinal Pitra has printed, in his Analecta, a number of interesting examples, the existence of which appears to have been unknown to Dr Neale, and which, in the cardinal's estimation, are in many respects superior to the " canons," &c, of the modern Greek service-books, from which all Neale's translations (except some from Anatolius) are taken. Cardinal Pitra's selections include twenty-nine works by Romanos, and some by Sergius, and nine other known, as well as some unknown, authors. He describes them as having generally a more dramatic character than the " melodies " of the later period, and a much more animated style; and he supposes that they may have been originally sung with dramatic accompaniments, by way of substitution for the theatrical performances of Pagan times. As an instance of their peculiar character, he mentions a Christmas or Epiphany hymn by Romanos, in twentyrfive long strophes, in which there is, first, an account of the Nativity and its accompanying wonders, and then a dialogue between the wise men, the Virgin mother and Joseph. The magi arrive, are admitted; describe the moral and religious condition of Persia and the East, and the cause and adventures of their journey, and then offer their gifts. The Virgin intercedes for them with her Son, instructs them in some parts of Jewish history, and ends with a prayer for the salvation of the world.

The controversies and persecutions of the 8th and succeeding centuries turned the thoughts of the " melodists " of the great monasteries of the Studium at Constantinople and M . .. . St Saba in Palestine and their followers, and those of the adherents of the Greek rite in Sicily and South Italy (who suffered much from the Saracens and the Normans), into a less picturesque but more strictly theological course; and the influence of those controversies, in which the final success of the cause of " Icons " was largely due to the hymns, as well as to the courage and sufferings, of these confessors, was probably the cause of their supplanting, as they did, the works of the older school. Cardinal Pitra gives them the praise of having discovered a graver and more solemn style of chant, and of having 'done much to fix the dogmatic theology of their church upon its present lines of near approach to the Roman.

Among the " melodists " of this latter Greek school there were many saints of the Greek church, several patriarchs and two emperors — Leo the Philosopher, and Constantine Porphyrogenitus, his son. Their greatest poets were Theodore and Joseph of the Studium, and Cosmas and John (called Damascene) of St Saba. Neale translated into English verse several selected portions, or centoes, from the works of these and others, together with four selections from earlier works bv

Anatolius. Some of his translations — particularly " The day is past and over," from Anatolius, and " Christian, dost thou see them," from Andrew of Crete — have been adopted into hymn- books used in many English churches; and the hymn " Art thou weary," which is rather founded upon than translated from one by Stephen the Sabaite, has obtained still more general popularity.

4. Western Church Hymnody. — It was not till the 4th century that Greek hymnody was imitated in the West, where its intro- duction was due to two great lights of the Latin Church — St Hilary of Poitiers and St Ambrose of Milan.

Hilary was banished from his see of Poitiers in 356, and was absent from it for about four years, which he spent in Asia Minor, taking part during that time in one of the councils of the Eastern Church. He thus had full opportunity of becoming acquainted with the Greek church music of that day; and he wrote (as St Jerome, who was thirty years old when Hilary died, and who was well acquainted with his acts and writings, and spent some time in or near his diocese, informs us) a " book of hymns," to one of which Jerome particularly refers, in the preface to the second book of his own commentary on the epistle to the Galatians. Isidore, archbishop of Seville, who presided over the fourth council of Toledo, in his book on the offices of the church, speaks of Hilary as the first Latin hymn- writer; that council itself, in its 13th canon, and the prologue to the Mozarabic hymnary (which is little more than a versification of the canon), associate his name, in this respect, with that of Ambrose. A tradition, ancient and widely spread, ascribed to him the authorship of the remarkable " Hymnum dicat turba fratrum, hymnum cantus personet " (" Band of brethren, raise the hymn, let your song the hymn resound "), which is a succinct narrative, in hymnal form, of the whole gospel history; and is perhaps the earliest example of a strictly

didactic hymn. Both Bede and Hincmar much admired this composition, though the former does not mention, in connexion with it, the name of Hilary. The private use of hymns of such a character by Christians in the West may probably have preceded their ecclesiastical use; for Jerome says that in his day those who went into the fields might hear " the ploughman at his hallelujahs, the mower at his hymns, and the vine-dresser singing David's psakns." Besides this, seven shorter metrical hymns attributed to Hilary are still extant. Of the part taken by Ambrose, not long after Hilary's death, in bringing the use of hymns into the church of Milan, we have a contemporary account from his convert, St Augustine. Justina, mother of the emperor Valentinian, favoured the Arians, and desired to remove Ambrose from his see. The " devout people," of whom Augustine's mother, Monica, was one, combined to protect him, and kept guard in the church. " Then," says Augustine, " it was first appointed that, after the manner of the Eastern churches, hymns and psalms should be sung, lest the people should grow weary and faint through sorrow; which custom has ever since been retained, and has been followed by almost all congregations in other parts of the world." He describes himself as moved to tears by the sweetness of these "hymns and canticles": — "The voices flowed into my ears; the truth distilled into my heart; I overflowed with devout affections, and was happy." To this time, according to an uncertain but not improbable tradition which ascribed the composition of the " Te Deum " to Ambrose, and connected it with the conversion of Augustine, is to be referred the com- mencement of the use in the church of that sublime" unmetrical hymn.

It is not, however, to be assumed that the hymnody "thus introduced by Ambrose was from the first used according to the precise order and method of the later Western ritual. To bring it into (substantially) that order and method appears to have been the work of St Benedict. Walafrid Strabo, the earliest ecclesi- astical writer on this subject (who lived at the beginning of the 9th century), says that Benedict, on the constitution of the religious order known by his name (about 530), appointed the Ambrosian hymns to be regularly sung in his offices for the

canonical hours. Hence probably originated the practice of the Italian churches, and of others which followed their example, to sing certain hymns (Ambrosian, or by the early successors of the Ambrosian school) daily throughout the week, at " Vespers," " Lauds " and " Nocturns," and on some days at " Compline " also — varying them with the different ecclesiastical seasons and festivals, commemorations of saints and martyrs and other special offices.

Different dioceses and religious houses had their own peculiarities of ritual, including such hymns as were approved by their several bishops or ecclesiastical superiors, varying in detail, but all following the same general method. The national rituals, which were first reduced into a form substantially like that which has since prevailed, were probably those of Lom- bardy and of Spain, now known as the " Ambrosian " and the "Mozarabic." The age and origin of the Spanish ritual are uncertain, but it is mentioned in the 7th century by Isidore, bishop of Seville. It contained a copious hymnary, the original form of which may be regarded as canonically approved by the fourth council of Toledo (633). By the 13th canon of that council, an opinion (which even then found advocates) against the use in churches of any hymns not taken from the Scriptures — apparently the same opinion which had been held by Paul of Samosata — was censured; and it was ordered that such hymns should be used in the Spanish as well as in the Gallican churches, the penalty of excommunication being denounced against all who might presume to reject them.

The hymns of which the use was thus established and authorized were those which entered into the daily and other offices of the church, afterwards collected in the " Breviaries "; in which the hymns " proper " for " the week," and for "the season," continued for many centuries, with very few exceptions, to be derived from the earliest epoch of Latin Church poetry — reckoning that epoch as extending from Hilary and Ambrose to the end of the pontificate of Gregory the Great. The " Ambrosian " music, to which those hymns were generally sung down to the time of Gregory, was more popular and con- gregational than the " Gregorian," which then came into use, and afterwards prevailed. In the service of the mass it was not the general practice, before the invention of sequences in the 9th century, to sing any hymns, except some from the Scriptures esteemed canonical, such as the " Song of the Three Children " (" Benedicite omnia opera "). But to this rule there were, according to Walafrid Strabo, some occasional exceptions; particularly in the case of Paulinus, patriarch of Aquileia under Charlemagne, himself a hymn-writer, who frequently used hymns, composed by himself or others, in the eucharistic office, especially in private masses.

Some of the hymns called " Ambrosian " (nearly 100 in number) are beyond all question by Ambrose himself, and the rest probably belong to his time or to the following century. Four, those beginning " Aeterne rerum conditor " (" Dread Framer of the earth and sky "), " Deus Creator omnium " (" Maker of all things, glorious God "), " Veni Re'demptor Gentium " (" Redeemer of the nations, come ") and

” Jam surgit hora tertia ” (” Christ at this hour was crucified “), are quoted as works of Ambrose by Augustine. These, and others by the hand of the same master, have the qualities most valuable in hymns intended for congregational use. They are short and complete in themselves; easy, and at the same time elevated in their expression and rhythm; terse and masculine in thought and language; and (though sometimes criticized as deficient in theological precision) simple, pure and not technical in their, rendering of the great facts and doctrines of Christianity, which they present in an objective and not a subjective manner. They have exercised a powerful influence, direct or indirect, upon many of the best works of the same kind in all succeeding generations. With the Ambrosian hymns are properly classed those of Hilary, and the contemporary works of Pope Damasus I. (who wrote two hymns in commemoration of saints), and of Prudentius, from whose Caihc-merina (” Daily Devotions “) and Peristephana (” Crown-songs for Martyrs “), all poems of considerable, some of great length — about twenty-eight hymns.

*found in various Breviaries, were derived. Prudentius was a layman, a native of Saragossa, and it was in the Spanish ritual that his hymns were most largely used. In the Mozarabic Breviary almost the whole of one of his finest poems (from which most churches took one part only, beginning ” Corde natus ex parentis “) was appointed to be sung between Easter and Ascension-Day, being divided into eight or nine hymns; and on some of the commemorations of Spanish saints long poems from his Peristephana were recited or sung at large. He is entitled *o a high rank among Christian poets, many of the hymns taken from his works being full of fervour and sweetness, and by no means deficient in dignity or strength.*

These writers were followed in the 5th and early in the 6th century by the priest Sedulius, whose reputation perhaps exceeded his merit; Elpis, a noble Roman lady 5

The poets of this primitive epoch, which closed with the 6th century, wrote in the old classical metres, and made use of a con- siderable variety of them — anapaestic, anacreontic, hendecasyllabic, asclepiad, hexameters and pentameters and others. Gregory and some of the Ambrosian authors occasionally wrote in sapphics; but the most frequent measure was the iambic dimeter, and, next to that, the trochaic. The full alcaic stanza does not appear to have been

used for church purposes before the 16th century, though some of its elements were. In the greater number of these works, a general intention to conform to the rules of Roman prosody is manifest; but even those writers (like Prudentius) in whom that conformity was most decided allowed themselves much liberty of deviation from it. Other works, including some of the very earliest, and some of conspicuous merit, were of the kind described by Bede as not metrical but " rhythmical " — i.e. (as he explains the term " rhythm '), " modulated to the car in imitation of different metres." It would be more correct to call them metrical — (e.g. still trochaic or iambic, &c., but, according to new laws of syllabic quantity, de- pending entirely on accent, and not on the power of vowels or the position of consonants) — laws by which the future prosody of all modern European nations was to be governed. There are also, in the hymns of the primitive period (even in those of Ambrose), anticipations — irregular indeed and inconstant, but certainly not accidental — of another great innovation, destined to receive im- portant developments, that of assonance or rhyme, in the final i.tters or syllables of verses. Archbishop Trench, in the intro- duction to his Sacred Latin Poetry, has traced the whole course of the transition from the ancient to the modern forms of versification, ascribing it to natural and necessary causes, which made such changes needful for the due development of the new forms of spiritual and intellectual life, consequent upon the conversion of the Latin- speaking nations to Christianity.

From the 6th century downwards we see this transformation making continual progress, each nation of Western Christendom 6th adding, from time to time, to the earlier hymns in its

*century service-books others of more recent and frequently down- f i oca i origin. For these additions, the commemora- wa s * tions of saints, &c, as to which the devotion of one place often differed from that of another, offered especial op- portunities. This process, while it promoted the development of a medieval as distinct from the primitive style, led also to much*

deterioration in the quality of hymns, of which, perhaps, some of the strongest examples may be found in a volume published in 1865 by the Irish Archaeological Society from a manuscript in the library of Trinity College, Dublin. It contains a number of hymns by Irish saints of the 6th, 7th and 8th centuries — in several instances fully rhymed, and in one mixing Erse and Latin barbarously together, as was not uncommon, at a much later date, in semi-vernacular hymns of other countries. The Mozarabic Breviary, and the collection of

hymns used in the Anglo-Saxon churches, published in 1851 by the Surtees Sotiety (chiefly from a Benedictine MS. in the college library of Durham, supplemented by other MSS. in the British Museum), supply many further illus- trations of the same decline of taste: — such sapphics, e.g., as the " Festum insigne prodiit coruscum " of Isidore, and the " O veneranda Trinitas laudanda " of the Anglo-Saxon books. The early medieval period, however, from the time of Gregory the Great to that of Hildebrand, was far from deficient in the pro- duction of good hymns, wherever learning flourished. Bede in England, and Paul " the Deacon " — the author of a fairly classical sapphic ode on St John the Baptist — in Italy, were successful followers of the Ambrosian and Gregorian styles. Eleven metrical hymns are attributed to Bede by Cassander; and there are also in one of Bede's works (Collectanea et flores) two rhythmical hymns of considerable length on the Day of Judgment, with the refrains " In tremendo die " and " Attende homo," both irregularly rhymed, and, in parts, not unworthy of comparison with the " Dies Irae." Paulinus, patriarch of Aquileia, contemporary with Paul, wrote rhythmical trimeter iambics in a manner peculiar to himself. Theodulph, bishop of Orleans (793-835), author of the famous processional hymn for Palm Sunday in hexameters and pentameters, " Gloria, laus, et honor tibi sit, Rex Christe Redemptor " (" Glory and honour and laud be to Thee, King Christ the Redeemer "), and Hrabanus Maurus, archbishop of Mainz, the pupil of Alcuin, and the most learned theologian of his day, enriched the church with some excellent works. Among the anonymous hymns of the same period there are three of great beauty, of which the influence may be traced in most, if not all, of the " New Jerusalem " hymns of later generations,including those of Germany and Great Britain : — " Urbs beata Hierusalem " (" Blessed city, heavenly Salem "); " Alleluia piis edite laudibus " (" Alleluias sound ye in strains of holy praise " — called, from its burden, " Alleluia perenne "); and " Alleluia dulce carmen " (" Alleluia, song of sweetness "), which, being found in Anglo-Saxon hymnaries certainly older than the Conquest, cannot be of the late date assigned to it, in his Mediaeval Hymns and Sequences, by Neale. These were followed by the " Chorus novae Hierusalem " (" Ye Choirs of New Jerusalem ") of Fulbert, bishop of Chartres. This group of hymns is remarkable for an attractive union of melody, imagina- tion, poetical colouring and faith. It represents, perhaps, the best and highest type of the middle school, between the severe Ambrosian simplicity and the florid luxuriance of later times.

Another celebrated hymn, which belongs to the first medieval period, is the " Veni Creator Spiritus " (" Come, Holy Ghost, our souls

inspire "). The earliest recorded occasion of its use is that of a translation (898) of the relics of St ˆna'tor Marcellus, mentioned in the Annals of the Benedictine order. It has since been constantly sung throughout Western Christendom (as versions of it still are in the Church of England), as part of the appointed offices for the coronation of kings, the consecration and ordination of bishops and priests, the assembling of synods and other great ecclesiastical solemnities. It has been attributed — probably in consequence of certain corruptions in the text of Ekkehard's Life oj 'A 'other (a work of the 13th century) —to Charlemagne. Ekkehard wrote in the Benedictine monastery of St Gall, to which Notker belonged, with full access to its records; and an ignorant interpolator, regardless of chronology, added, at some later date, the word " Great " to the name of " the emperor Charles," wherever it was mentioned in that work. The biographer relates that Notker — a man of a gentle, contemplative nature, observant of all around him, and accustomed to find spiritual and poetical suggestions in common

sights and sounds — was moved by the sound of a mill-wheel to compose his " sequence " on the Holy Spirit, " Sancti Spiritus adsit nobis gratia " (" Present with us ever be the Holy Spirit's grace"); and that, when finished, he sent it as a present to " the emperor Charles," who in return sent him back, " by the same messenger," the hymn " Veni Creator," which (says Ekke- hard) the same " Spirit had inspired him to write " (" Sibi idem Spiritus inspiraverat "). If this story is to be credited — and, from its circumstantial and almost dramatic character, it has an air of truth — the author of " Veni Creator " was not Charlemagne, but his grandson the emperor Charles the Bald. Notker himself long survived that emperor, and died in 912.

The invention of " sequences " by Notker may be regarded as the beginning of the later medieval epoch of Latin hymnody. In the eucharistic service, in which (as has been stated) hymns were not generally used, it had been the practice, except at certain seasons, to sing " laud," or " Alleluia," between the epistle and the gospel, and to fill up what would otherwise have been a long pause, by extending the cadence upon the two final vowels of the " Alleluia " into a protracted strain of music. It occurred to Notker that, while

preserving the spirit of that part of the service, the monotony of the interval might be relieved by introducing at that point a chant of praise specially composed for the purpose. With that view he produced the peculiar species of rhythmical composition which obtained the name of " sequentia " (probably from following after the close of the " Alleluia "), and also that of " prosa," because its structure was originally irregular and unmetrical, resembling in this respect the Greek " troparia," and the " Te Deum," " Bene- dicite " and canticles. That it was in some measure suggested by the forms of the later Greek hymnody seems probable, both from the intercourse (at that time frequent) between the Eastern and Western churches, and from the application by Ekkehard, in his biography and elsewhere (e.g. in Lyndwood's Provinciate) , of some technical terms, borrowed from the Greek terminology, to works of Notker and his school and to books containing them. Dr Neale, in a learned dissertation prefixed to his collection of sequences from medieval Missals, and enlarged in a Latin letter to H. A. Daniel (printed in the fifth volume of Daniel's Thesaurus hymnologicus), investigated the laws of caesura and modulation which are discoverable in these works. Those first brought into use were sent by their author to Pope Nicholas I., who authorized their use, and that of others composed after the same model by other brethren of St Gall, in all churches of the West.

Although the sequences of Notker and his school, which then rapidly passed into most German, French and British Missals, were not metrical, the art of " assonance " was much practised in them. Many of those in the Sarum and French Missals have every verse, and even every clause or division of a verse, ending with the same vowel " a " — perhaps with some reference to the terminal letter of " Alleluia." Artifices such as these naturally led the way to the adaptation of the same kind of composition to regular metre and fully developed rhyme. Neale's full and large collection, and the second volume of Daniel's Thesaurus, contain numerous examples, both of the " proses," properly so called, of the Notkerian type, and of those of the later school, which (from the religious house to which its chief writer belonged) has been called " Victorine." Most Missals appear to have contained some of both kinds. In the majority of those from which Neale's specimens are taken, the metrical kind largely prevailed; but in some (e.g. those of Sarum and Li6ge) the greater number were Notkerian.

Of the sequence on the Holy Ghost, sent by Notker (according to Ekkehard) to Charles the Bald, Neale says that it " was in use all over Europe, even in those countries, like Italy and Spain, which

usually rejected sequences"; and that, "in the Missal of Palencia, the priest was ordered to hold a white dove in his hands, while intoning the first syllables, and then to let it go." Another of the most remarkable of Notker's sequences, beginning " Media in vita " (" In the midst of life we are in death "), is said to have been suggested to him while observing some workmen engaged in the construction of a bridge over a torrent near his monastery. Catherine Winkworth (Christian Singers of Germany, 1869) states that this was long used as a battle-song, until the custom was forbidden, on account of its being supposed to exercise a magical influence. A translation of it (" Mitten wir im Leben sind ") is one of Luther's funeral hymns; and all but the opening sentence of that part of the burial service

Stabat Mater.

of the Church of England which is directed to be " said or sung " at the grave, " while the corpse is made ready to be laid into the earth," is taken from it.

The " Golden Sequence," " Veni, sancte Spiritus " (" Holy Spirit, Lord of Light "), is an early example of the transition of sequences from a simply rhythmical to a metrical form. Arch- bishop Trench, who esteemed it " the loveliest of all the hymns in the whole circle of Latin sacred poetry," inclined to give credit to a tradition which ascribes its authorship to Robert II., king of France, son of Hugh Capet. Others have assigned to it a later date — some attributing it to Pope Innocent III., and some to Stephen Langton, archbishop of Canterbury. Many translations, in German, English and other languages, attest its merit. Berengarius of Tours, St Bernard of Clairvaux and Abelard, in the nth century and early in the 12th, followed in the same track; and the art of the Victorine school was carried to its greatest perfection by Adam of St Victor (who died between 1173 and 1194) — " the most fertile, and " (in the concurrent judgment of Archbishop Trench and Neale) " the greatest of the Latin hymnographers of the Middle Ages." The archbishop's selection contains many excellent specimens of his works. •

But the two most widely celebrated of all this class of com- positions — works which have exercised the talents of the greatest musical composers, and of innumerable translators in almost all languages — are the " Dies Irae " (" That day of wrath, that dreadful day "), by Thomas of Celano, the companion and biographer of St Francis of Assisi, and the " Stabat Mater dolorosa " (" By the cross sad vigil keeping ") of Jacopone, or Jacobus de Benedictis, a Franciscan humorist and reformer, who was persecuted by Pope Boniface VIII.

for his satires on the prelacy of the time, and died in 1306. Besides these, the 13th century produced the famous sequence " Lauda Sion salvatorem " (" Sion, lift thy voice and sing "), and the four other well-known sacramental hymns of St Thomas Aquinas, viz. " Pange lingua gloriosi corporis mysterium " (" Sing, my tongue, the Saviour's glory "), " Verbum supernum prodiens " « uflas – (" The Word, descending from above " — not to be confounded with the Ambrosian hymn from which it borrowed the first line), " Sacris solemniis juncta sint gaudia " ("Let us with hearts renewed our grateful homage pay "), and " Adoro Te devote, latens Deitas " (" O Godhead hid, devoutly I adore Thee ") — a group of remarkable compositions, written by him for the then new festival of Corpus Christi, of which he induced Pope Urban IV. (1 261-1265) to decree the observance. In these (of which all but " Adoro Te devote " passed rapidly into breviaries and missals) the doctrine of transubstantiation is set forth with a wonderful degree of scholastic precision; and they exercised, probably, a not unimportant influence upon the general reception of that dogma. They are undoubtedly works of genius, powerful in thought, feeling and expression.

These and other medieval hymn-writers of the 12th and 13th centuries may be described, generally, as poet-schoolmen. Their tone is contemplative, didactic, theological; they are especially fertile and ingenious in the field hymns of mystical interpretation. Two great monasteries in the East had, in the 8th and 9th centuries, been the principal centres of Greek hymnology; and, in the West, three monasteries — St Gall, near Constance (which was long the especial seat of German religious literature), Cluny in Burgundy and St Victor, near Paris — obtained a similar distinction. St Gall produced,, besides Notker, several distinguished sequence writers, probably his pupils — Hartmann, Hermann and Gottschalk — to the last of whom Neale ascribes the " Alleluiatic Sequence " (" Cantemus cuncti melodum nunc Alleluia "), well known in England through his translation, " The strain upraise of joy and praise." The chief poets of Cluny were two of its abbots, Odo and Peter the Venerable (1122-1156), and one of Peter's monks, Bernard of Morlaix, who wrote the remarkable poem on " Contempt of the World " in about 3000 long rolling " leonine-dactylic " verses, from parts of which Neale's popular hymns, " Jerusalem*

the golden," &c, are taken. The abbey of St Victor, besides Adam and

his follower Pistor, was destined afterwards to produce the most popular church poet of the 17th century.

*There were other distinguished Latin hymn-writers of the later medieval period besides those already mentioned. The name of St Bernard of Clairvaux cannot be passed B *™ a r d over with the mere mention of the fact that he was the vaux. author of some metrical sequences. He was, in truth,*

the father, in Latin hymnody, of that warm and passionate form of devotion which some may consider to apply too freely to Divine Objects the language of human affection, but which has, nevertheless, been popular with many devout persons, in Protestant as well as Roman Catholic churches. F. von Spee, " Angelus Silesius," Madame Guyon, Bishop Ken, Count Zinzendorf and Frederick William Faber may be regarded as disciples in this school. Many hymns, in various languages, have been founded upon St Bernard's " Jesu dulcis memoria " (" Jesu, the very thought of Thee "), " Jesu dulcedo cordium " (" Jesu, Thou joy of loving hearts ") and " Jesu Rex admirabilis " (" O Jesu, King most wonderful ") — three portions of one poem, nearly 200 lines long. Pietro Damiani, the friend of Pope Gregory VII., Marbode, bishop of Rennes, in the nth, Hildebert, archbishop of Tours, in the 12th, and St Bonaventura in the 13th centuries, are other eminent men who added poetical fame as hymnographers to high public distinction.

Before the time of the Reformation, the multiplication of sequences (often as unedifying in matter as unpoetical in style) had done much to degrade the common conception of hymnody. In some parts of France, Portugal, Sardinia and Bohemia, their use in the vernacular language had been allowed. In Germany also there were vernacular sequences as early as the 1 2th century, specimens of which may be seen in the third chapter of C. Winkworth's Christian Singers of Germany. Scoffing parodies upon sequences are said to have been among the means used in Scotland to discredit the old church services. After the 15th century they were discouraged at Rome. They retained for a time some of their old popularity among German Protestants, and were only gradually relinquished in France. A new " prose," in honour of St Maxentia, is among the composi- tions of Jean Baptiste Santeul; and Dr Daniel's second volume closes with one written in 1855 upon the dogma of the Immaculate Conception.

The taste of the Renaissance was offended by all deviations from classical prosody and Latinity. Pope Leo X. directed the whole body of the hymns in use at Rome to be reformed; and the Hymni novi

ecclesiastici juxta veram metri et Latinitatis normam, prepared by Zacharie Ferreri (1479-153-), a Benedictine of Monte Cassino, afterwards a Carthusian and bishop of Guardia, to whom Leo had committed that task, appeared at Rome in 1525, with the sanction of a later pope, Clement VII. The next step was to revise the whole Roman Breviary. That undertaking, after passing through several stages under different popes (particularly Pius V. and Clement VIII.), was at last brought to a conclusion by Urban VIII., in 1631. From this revised Breviary a large number of medieval hymns, both of the earlier and the later periods, were excluded; and in their places many new hymns, including some by Pope Urban himself, and some by Cardinal Bellarmine and another cardinal (Silvius Antonianus) were intro- duced. The hymns of the primitive epoch, from Hilary to Gregory the Great, for the most part retained their places (especially in the offices for every day of the week) ; and there remained altogether from seventy to eighty of earlier date than the nth century. Those, however, which were so retained were freely altered, and by no means generally improved. The revisers appointed by Pope Urban (three learned Jesuits — Strada, Gallucci and Petrucci) professed to have made " as few changes as possible " in the works of Ambrose, Gregory, Prudentius, Sedulius, Fortunatus and other " poets of great name." But some changes, even in those works, were made with considerable boldness; and the pope, in the " con- stitution " by which his new book was promulgated, boasted that, " with the exception of a very small number (' perpaucis '), which were either prose or merely rhythmical, all the hymns had been made conformable to the laws of prosody and Latinity, those which could not be corrected by any milder method being entirely rewritten." The latter fate befel, among others, the beautiful "'Urbs beata Hierusalem," which now assumed the form (to many, perhaps, better known), of " Caelestis urbs Jerusalem." Of the " very few " which were spared, the chief were " Ave maris stella " (" Gentle star of ocean "), " Dies Irae," " Stabat Mater dolorosa," the hymns of

Roman re- vision of hymns.

Thomas Aquinas, two of St Bernard and one Ambrosian hymn, "Jesu nostra Redemptio" (" O Jesu, our Redemption"), which approaches nearer than others to the tone of St Bernard. A then recent hymn of St Francis Xavier, with scarcely enough merit of any kind to atone for its neglect of prosody, " O Deus, egqamo Te" (" O God, I love Thee, not because "), was at the same time intro- duced without change. This hymnary of Pope Urban VIII. is now in general use throughout the Roman Communion.

The Parisian hymnary underwent three revisions — the first in 1527, when a new " Psaltery with hymns " was issued. In this such changes only were made as the revisers thought „ . . justifiable upon the principle of correcting supposed a . . a " corruptions of the original text. Of these, the transposi- rev s oas ' tion, " Urbs Jerusalem beata," instead of " Urbs beata Hierusalem," may be taken as a typical example. The next revision was in 1670- 1680, under Cardinal Perefixe, preceptor of Louis XIV., and Francis Harlay, successively archbishops of Paris, who employed for this purpose Claude Santeul, of the monastery of St Magloire, and, through him, obtained the assistance of other French scholars, in- cluding his more celebrated brother, Jean Baptiste Santeul, of the abbey of St Victor — better known as " Santolius Victorinus." The third and final revision was completed in 1735, under the primacy of Cardinal Archbishop de Vintimille, who engaged for it the services of Charles Coffin, then rector of the university of Paris. Many old hymns were omitted in Archbishop Harlay's Breviary, and a large number of new compositions, by the Santeuls and others, was introduced. It still, however, retained in their old places (without further changes than had been made in 1527) about seventy of earlier date than the nth century — including thirty-one Ambrosian, one by Hilary, eight by Prudentius, seven by Fortunatus, three by Paul the Deacon, two each by Sedulius, Elpis, Gregory and Hrabanus Maurus, " Veni Creator " and "Urbs Jerusalem beata." Most of these disappeared in 1735, although Cardinal Vintimille, in his preface, professed to have still admitted the old hymns, except when the new were belter — (" veteribus hymnis locus datus est, nisi quibus, ob sententiarum vim, elegantiam verborum, et teneriores pietatis sensus, recentiores anteponi satius visum est "). The number of the new was, at the same time, very largely increased. Only twenty-one more ancient than the 1 6th century remained, of which those belonging to the primitive epoch were but eight, viz. four Ambrosian, two by Fortunatus and one each by Prudentius and Gregory. The number of Jean Baptiste Santeul's hymns rose to eighty-nine; those by Coffin — including some old hymns, e.g. " Jam lucis orto sidere " (" Once more the sun is beaming bright "), which he substantially re-wrote — were eighty-three; those of other modern French writers, ninety-seven. Whatever opinion may be entertained of the principles on which these Roman and Parisian revisions proceeded, it would be unjust to deny very high praise as hymn-writers to several of their poets, especially to Coffin and Jean Baptiste Santeul. The noble hymn by Coffin, beginning —

" O luce qui mortalibus " O Thou who in the light dost dwell,

Lutes inaccessa, Deus, To mortals unapproachable,

Praesente quo sancti tremunt Where angels veil them from Thy rays,

Nubuntque vultus angeli," And tremble as they gaze,"

and several others of his works, breathe the true Ambrosian spirit; and though Santeul (generally esteemed the better poet of the two) delighted in alcaics, and did not greatly affect the primitive manner, there can be no question as to the excellence of such hymns as his " Fumant Sabaeis templa vaporibus " (" Sweet incense breathes around "), " Stupete gentes, fit Deus hostia " (" Tremble, ye Gentile lands "), " Hymnis dum resonat curia caelitum " (" Ye in the house of heavenly morn "), and " Templi sacratas pande, Sion, fores " (" O Sion, open wide thy gates "). It is a striking testimony to the merits of those writers that such accomplished translators as the Rev. Isaac Williams and the Rev. John Chandler appear (from the title-page of the latter, and the prefaces of both) to have supposed their hymns to be " ancient " and " primitive." Among the other authors associated with them, perhaps the first place is due to the Abb6 Besnault, of Sens, who contributed to the book of 1735 the " Urbs beata vera pacis Visio Jerusalem," in the opinion of Neale " much superior " to the " Caelestis urbs Jerusalem " of the Roman Breviary. This stood side by side with the " Urbs Jerusalem beata " of 1527 (in the office for the dedication of churches) till 1822, when the older form was at last finally excluded by Archbishop de Quelen.

The Parisian Breviary of 1735 remained in use till the national French service-books were superseded (as they have lately been, generally, if not universally) by the Roman. Almost all French dioceses followed, not indeed the Breviary, but the example, of Paris; and before the end of the 18th century the ancient Latin hymnody was all but banished from France.

In some parts of Germany, after the Reformation, Latin hymns continued to be used even by Protestants. This was the case at Halberstadt until quite a recent date. In England, a few are „ . still occasionally used in the older universities and colleges. iˆtin" Some, also, have been composed in both countries since Hymns the Reformation. The " Carmina lyrica " of Johann _ y Jakob Balde, a native of Alsace, and a Jesuit priest in Bavaria, have received high commendation from very eminent German critics, particularly Herder and Augustus Schlegel. Some of the Latin hymns of William Alard (1572-1645), a Protestant refugee from

Luther.

Bt-lgiuni, and pastor in Holstein, have been thought worthy of a place in Archbishop Trench's selection. Two by W. Petersen (printed at the end of Haberkbrn's supplement to Jacobi's Psalmodia Cermanica) are good in different ways — one, " Jesu dulcis amor meus " (" Jesus, Thee my soul doth love '), being a gentle melody of spiritual devotion, and the other, entitled Spes Sionis, violently controversial against Rome. An English hymn of the 17th century, in the Ambrosian style, " Te Deum Patrem colimus " (" Almighty Father, just and good "), is sung on every May-Day morning by the choristers of Magdalen College, Oxford, from the top of the tower of their chapel ; and another In the style of the Renaissance, of about the same date, " Te de profundis, summe Rex " (" Thee from the depths, Almighty King), long formed part of a grace formerly sung by the scholars of Winchester College.

5. German Hymnody. — Luther was a proficient in and a lover of music. He desired (as he says in the preface to his hymn-book of 1545) that this " beautiful ornament " might " in a right manner serve the great Creator and His Christian people." The persecuted Bohemian or Hussite Church, then settled on the borders of Moravia under the name of " United Brethren," had sent to him, on a mission in 1522, Michael Weiss, who not long afterwards published a number of German trans- lations from old Bohemian hymns (known as those of the " Bohemian Brethren "), with some of his own. These Luther highly approved and recommended. He himself, in 1522,. published a small volume of eight hymns, which was enlarged to 63 in 1527, and to 125 in 1545. He had formed what he called a " house choir " of musical friends, to select such old and popular tunes (whether secular or ecclesiastical) as might be found suitable, and to compose new melodies, for church use. His fellow labourers in this field (besides Weiss) were Justus Jonas, his own especial colleague; Paul Eber, the disciple and friend of Melanchthon; John Walt her, choirmaster successively to several German princes, and professor of arts, &c, at Witten- berg; Nicholas Decius, who from a monk became a Protestant teacher in Brunswick, and translated the " Gloria in Excelsis," &c; and Paul Speratus, chaplain to Duke Albert of Prussia in 1525. Some of their works are still popular in Germany. Weiss's " Funeral Hymn," " Nun lasst uns den Leib begraben " ("Now lay we calmly in the grave"); Eber's " Herr Jesu Christ, wahr Mensch und

Gott " (" Lord Jesus Christ, true Man and God "), and " Wenn wir in hochsten Nothen sein " (" When in the hour of utmost need ") ; Walther's " New Heavens and new Earth" ("Now fain my joyous heart would sing"); Decius's " To God on high be thanks and praise "; and Speratus's " Salvation now has come for all," are among those which at the time produced the greatest effect, and are still best remembered.

Luther's own hymns, thirty-seven in number (of which about twelve are translations or adaptations from Latin originals), are for the principal Christian seasons; on the sacraments, the church, grace, death, &c; and paraphrases of seven psalms, of a passage in Isaiah, and of the Lord's Prayer, Ten Command- ments, Creed, Litany and " Te Deum." There is also a very touching and stirring song on the martyrdom of two youths by fire at Brussels, in 15 23-1 5 24. Homely and sometimes rugged in form, and for the most part objective in tone, they are full of fire, manly simplicity and strong faith. Three rise above the rest. One for Christmas, " Vom Himmel hoch da komm ich her " (" From Heaven above to earth I come "), has a reverent tenderness, the influence of which may be traced in many later productions on the same subject. That on salvation through Christ, of a didactic character, " Nun freuet euch, lieben Christen g'mein " (" Dear Christian people, now rejoice "), is said to have made many conversions, and to have been once taken up by a large congregation to silence a Roman Catholic preacher in the cathedral of Frankfort. Pre-eminent above all is the celebrated paraphrase of the 46th Psalm: " Ein' feste Burg ist unser Gott " (" A sure stronghold our God is He ") — " the production " (as Ranke says) " of the moment in which Luther, engaged in a conflict with a world of foes, sought strength in the consciousness that he was defending a divine cause which could never perish." Carlyle compares it to " a sound of Alpine avalanches, or the first murmur of earthquakes." Heine called it " the Marseillaise of the Reformation."

Luther spent several years in teaching his people at Wittenberg to sing these hymns, which soon spread over Germany. Without adopting the hyperbolical saying of Coleridge, that " Luther did as much for the Reformation by his hymns as by his transla- tion of the Bible," it may truly be affirmed that, among the secondary means by which the success of the Reformation was promoted, none was more powerful. They were sung every- where — in the streets and fields as well as the churches, in the workshop and the palace, " by children in the cottage and by martyrs on the scaffold." It was by them that a congregational character was given to the new Protestant worship. This success they owed partly to their metrical structure, which,

though sometimes complex, was recommended to the people by its ease and variety; and partly to the tunes and melodies (many of them already well known and popular) to which they were set. They were used as direct instruments of teaching, and were therefore, in a large measure, didactic and theological; and it may be partly owing to this cause that German hymnody came to deviate, so soon and so generally as it did, from the simple idea expressed in the ancient Augustinian definition, and to comprehend large classes of compositions which, in most other countries, would be thought hardly suitable for church use.

The principal hymn-writers of the Lutheran school, in the latter part of the 16th century, were Nikolaus Selnecker, Herman and Hans Sachs, the shoemaker of Nuremberg, also known in other branches of literature. All these

Followers of Luther.

wrote some good hymns. They were succeeded by men of another sort, to whom F. A. Cunz gives the name of " master-singers," as having raised both the poetical and the musical standard of German hymnody: — Bartholomaus Ringwaldt,LudwigHelmbold, Johannes Pappus, Martin Schalling, Rutilius and Sigismund Weingartner. The principal topics of their hymns (as if with some foretaste of the calamities which were soon to follow) were the vanity of earthly things, resignation to the Divine will, and preparation for death and judgment. The well-known English hymn, " Great God, what do I see and hear," is founded upon one by Ringwaldt. Of a quite different character were two of great beauty and universal popularity, composed by Philip Nicolai, a Westphalian pastor, during a pestilence in 1597, and published by him, with fine chorales, two years afterwards. One of these (the " Sleepers wake! a voice is calling," of Mendelssohn's oratorio, St Paul) belongs to the family of Advent or New Jerusalem hymns. The other, a " Song of the believing soul concerning the Heavenly Bridegroom " (" Wie schon leucht't uns der Morgen- stern " — " morning Star, how fair and bright "), became the favourite marriage hymn of Germany.

The hymns produced during the Thirty Years' War are char- acteristic of that unhappy time, which (as Miss Winkworth says) " caused religious men to look away from this world," ^^4 „/ and made their songs more and more expressive of Thirty personal feelings. In point of refinement and graces Years' of style, the hymn-writers of this period excelled their predecessors. Their taste was chiefly formed by the in- fluence of Martin Opitz, the founder of what has

been called the " first Silesian school " of German poetry, who died com- paratively young in 1639, and who, though not of any great original genius, exercised much power as a critic. Some of the best of these works were by men who wrote little. In the famous battle-song of Gustavus Adolphus, published (163 1) after the victory of Breitenfeld, for the use of his army, " Verzage nicht du Hauflein klein " (" Fear not, O little flock, the foe "), we have" almost certainly a composition of the hero-king himself, the versification corrected by his chaplain Jakob Fabricius (1593- 1654) and the music composed by Michael Altenburg, whose name has been given to the hymn. This, with Luther's para- phrase of the 67th Psalm, was sung by Gustavus and his soldiers before the battle of Liitzen in 1632. Two very fine hymns, one of prayer for deliverance and peace, the other of trust in God under calamities, were written about the same time by Matthaus Lowenstern, a saddler's son, poet, musician and statesman, who was ennobled after the peace by the emperor

Ferdinand III. Martin Rinckhart, in 1636, wrote the " Chorus of God's faithful children " (" Nun danket alle Gott "— " Now thank we all our God "), introduced by Mendelssohn in his " Lobgesang," which has been called the " Te Deum " of Germany, being usually sung on occasions of public thanksgiving. Weissel, in 1635, composed a beautiful Advent hymn (" Lift up your heads, ye mighty gates "), and J. M. Meyfart, professor of theology at Erfurt, in 1642, a fine adaptation of the ancient " Urbs beata Hierusalem." The hymn of trust in Providence by George Neumark, librarian to that duke of Weimar (" Wer nur den lieben Gott lasst walten " — " Leave God to order all thy ways "), is scarcely, if at all, inferior to that of Paul Gerhardt on the same theme. Paul Flemming, a great traveller and lover of nature, who died in 1639, also wrote excellent compositions, coloured by the same tone of feeling; and some, of great merit, were composed, soon after the close of the war, by Louisa Henrietta, clectress of Brandenburg, granddaughter of the famous admiral Coligny, and mother of the first king of Prussia. With these may be classed (though of later date) a few striking hymns of faith and prayer under mental anxiety, by Anton Ulrich, duke of Brunswick.

The most copious, and in their day most esteemed, hymn- writers of the first half of the 17th century, were Johann Heer- DM mann and Johann Rist. Heermann, a pastor in Silesia,

the theatre (in a peculiar degree) of war and persecu- tion, experienced in his own person a very large share of the miseries of the time, and several times narrowly escaped a violent death. His Devoti musica cordis, published in 1630, reflects the feelings natural under such circumstances. With a correct style and good versification, his tone is subjective, and the burden of his hymns is not praise, but prayer. Among his works (which enter largely into most German hymn-books), two of the best are the " Song of Tears " and the " Song of Comfort," translated by Miss Winkworth in her Christian Singers of Germany. Rist published about 600 hymns, " pressed out of him," as he said, " by the cross." He was a pastor, and son of a pastor, in Holstein, and lived after the peace to enjoy many years of prosperity, being appointed poet-laureate to the emperor and finally ennobled. The bulk of his hymns, like those of other copious writers, are of inferior quality; but some, particularly those for Advent, Epiphany, Easter Eve and on Angels, are very good. They are more objective than those of Heermann, and written, upon the whole, in a more manly spirit. Dach Next to Heermann and Rist in fertility of production,

and above them in poetical genius, was Simon Dach, professor of poetry at Konigsberg, who died in 1659. Miss Winkworth ranks him high among German poets, " for the sweetness of form and depth of tender contemplative emotion to be found in his verses."

The fame of all these writers was eclipsed in the latter part of the same century by three of the greatest hymnographers whom Gerhardt. Germany has produced — Paul Gerhardt (1604-1676), Johann Franck (1618-1677) and Johann Scheffler (1624-1677), the founder of the " second Silesian school," who assumed the name of " Angelus Silesius." Gerhardt is by uni- versal consent the prince of Lutheran poets. His compositions, which may be compared, in many respects, to those of the Christian Year, are lyric poems, of considerable length, rather than hymns, though many hymns have been taken from them. They arc, with few exceptions, subjective, and speak the language of individual experience. They occupy a middle ground between the masculine simplicity of the old Lutheran style and the highly wrought religious emotion of the later pietists, towards whom they on the whole incline. Being nearly all excellent, it is not easy to distinguish among the 123 those which are entitled to the highest praise. Two, which were written one during the war and the other after the conclusion of peace, " Zeuch ein 2u deinen Thoren " (" Come to Thy temple here on earth "), and " Gottlob, nun ist erschollen " (" Thank God, it hath re- sounded "), are historically interesting. Of the rest, one is well known and highly appreciated in

English through Wesley's translation, "Commit thou all thy ways "; and the evening

Franck.

Pietists.

and spring- tide hymns (" Now all the woods are sleeping " and " Go forth, my heart, and seek delight ") show an exquisite feeling for nature; while nothing can be more tender and pathetic than " Du bist zwar mein und bleibest mein " (" Thou'rt mine, yes, still thou art mine own "), on the death of his son. Franck, who was burgomaster of Guben in Lusatia, has been considered by some second only to Gerhardt. If so, it is with a great distance between them. His approach to the later pietists is closer than that of Gerhardt. His hymns were published, under the title of Geistliche und weltliche Gedichte, in 1674, some of them being founded on Ambrosian and other Latin originals. Miss Winkworth gives them the praise of a condensed and polished style and fervid and impassioned thought. It was after his conversion to Roman Catholicism that schemer. Scheffler adopted the name of " Angelus Silesius," and published in 1657 his hymns, under a fantastic title, and with a still more fantastic preface. Their keynote is divine love; they are enthusiastic, intense, exuberant in their sweetness, like those of St Bernard among medieval poets. An adaptation of one of them, by Wesley, "Thee will I love, my Strength, my Tower," is familiar to English readers. Those for the first Sunday after Epiphany, for Sexagesima Sunday and for Trinity Sunday, in Lyra Germanica, are good examples of his excellences, with few of his defects. His hymns are generally so free from the expression, or even the indirect suggestion, of Roman Catholic doctrine, that it has been supposed they were written before his conversion, though published afterwards. The evan- gelical churches of Germany found no difficulty in admitting them to that prominent place in their services which they have ever since retained.

Towards the end of the 17th century, a new religious school arose, to which the name of " Pietists " was given, and of which Philipp Jakob Spener was esteemed the founder. He and his pupils and successors, August Hermann Francke and Anastasius Freylinghausen, all wrote hymns. Spener's hymns are not remarkable, and Franckc's are not numerous. Freylinghausen was their chief singer; his rhythm is lively, his music florid; but, though his book attained ex- traordinary popularity, he was surpassed in solid merit by other less fertile writers of the same school. The " Auf hinauf zu deiner Freude " (" Up, yes, upward to thy gladness ") of Schade may recall to an

English reader a hymn by Seagrave, and more than one by Lyte; the "Malabarian hymn"(as it was called by Jacobi) of Johann Schutz, " All glory to the Sovereign Good," has been popular in England as well as Germany; and one of the most exquisite strains of pious resignation ever written is " Whate'er my God ordains is right," by Samuel Rodigast.

Joachim Neander, a schoolmaster at Dusseldorf, and a friend of Spener and Schutz (who died before the full development of the " Pietistic " school), was the first man of eminence seaader. in the" Reformed " or Calvinistic Church who imitated Lutheran hymnody. This he did, while suffering persecution from the elders of his own church for some other religious practices, which he had also learnt from Spener's example. As a poet, he is sometimes deficient in. art; but there is feeling, warmth and sweetness in many of his " Bundeslieder " or " Songs of the Covenant," and they obtained general favour, both in the Reformed and in Lutheran congregations. The Summer Hymn (" O Thou true God alone ") and that on the glory of God in creation (" Lo, heaven and earth and sea and air ") are instances of his best style.

With the " Pietists " may be classed Benjamin Schmolke and Dessler, representatives of the " Orthodox " division of Spener's school; Philipp Friedrich Hiller, their leading poet in schmolke. South Germany; Gottfried Arnold and Gerhard Tersteegen, who were practically independent of ecclesiastical organization, though connected, one with the " Orthodox " and the other with the " Reformed " churches; and Nikolaus Ludwig, Graf von Zinzendorf. Schmolke, a pastor in Silesia, called the Silesian Rist (1672-1737), was perhaps the most voluminous of all German hymn-writers. He wrote 1188 religious poems and hymns, a large proportion of which do not

rise above mediocrity. His style, if less refined, is also less subjective and more simple than that of most of his con- temporaries. Among his best and most attractive works, which indeed, it would be difficult to praise too highly, are the "Hosianna David's Sohn," for

*Palm Sunday — much resembling a shorter hymn by Jeremy Taylor; and the Ascension, Whit- suntide and Sabbath hymns — " Heavenward doth our journey tend," "Come deck our feast to-day," and "Light of light, Dessler enlighten me." Dessler was a greater poet than Schmolke. Few hymns, of the subjective kind, are better than his " I will not let Thee go, Thou Help in time of need," '" O Friend of souls, how well is me," and " Now, the pearly gates unfold." Hiller (1699-1769), was a pastor in Wiirttemberg who, falling into ill-health during the latter part of his ministry, published a Geistliche Liederhostlein in a didactic vein, with more taste than power, but(as Miss Winkworth says) in a tone of "deep, thoughtful, practical piety." They were so well adapted to the wants of his people that to this day Hiller's Casket is prized, next to their Bibles, by the peasantry of Wiirttemberg; and the numerous emigrants from that part of Germany to America and other foreign countries generally Arnold. *^ a ' ce ^ w ' tn tnem wherever they go. Arnold, a professor at Giessen, and afterwards a pastor in Brandenburg, was a man of strong will, uncompromising character and austere views of life, intolerant and controversial towards those whose doctrine or practice he disapproved, and more indifferent to separatism and sectarianism than the " orthodox " generally thought right. His hymns, like those of Augustus M. Toplady, whom in these respects he resembled, unite with considerable strength more gentleness and breadth of sympathy than might be expected from a man of such a character. Tersteegen (1697-1769)^110 neverformally separated himself from the " Reformed " communion, in which he was brought up, but whose sympathies were with the Moravians and with Zinzendorf , was, of all the more copious German hymn-writers after Luther, perhaps the most remarkable man. Pietist, mystic and missionary, he was also a great religious poet. His in hymns were published in 1731, in a volume called Geistlicher Blumengdrtlein inniger Seelen. They are intensely individual, meditative and subjective. Wesley's adaptations of two — " Lo! God is here; let us adore," and " Thou hidden Love of God, whose source " — are well known. Among those translated by Miss Winkworth, " God, O Spirit, Light of all that live," and " Come, brethren, let us go," are specimens which exhibit favourably his manner and power. Miss Cox speaks of him as " a gentle heaven-inspired soul, whose hymns are the reflection of a heavenly, happy life, his mind being full of a child-like simplicity"; and his own poem on the child-character, which Miss Winkworth has appropriately connected with Innocents' day (" Dear Soul, couldst thou become a child ") — one of his best compositions, exquisitely conceived and expressed — shows that this was in truth the ideal which he sought to realize. The hymns of*

Zinzendorf are often disfigured by excess in the application of the language and imagery of human affections to divine objects; and this blemish is also found in many later Moravian hymns. But one hymn, at least, of Zinzendorf may be mentioned with unqualified praise, as uniting the merits of force, simplicity and brevity — " Jesu, geh voran " (" Jesus, lead the way "), which is taught to most children of religious parents in Germany. Wesley's "Jesus, Thy blood and righteous- ness " is a translation from Zinzendorf.

The transition from Tersteegen and Zinzendorf to Gellert and Klopstock marks strongly the reaction against Pietism Qeliert which took place towards the middle of the 1 8th century. The Geistlichen Oden und Lieder of Christian F. Gellert were published in 1757, and are said to have been received with an enthusiasm almost like that which " greeted Luther's hymns on their first appearance." It is a proof of the moderation both of the author and of his times that they were largely used, not only by Protestant congregations, but in those German Roman Catholic churches in which vernacular

Zinzen- dorf.

services had been established through the influence of the emperor Joseph II. They became the model which was followed by most succeeding hymn-writers, and exceeded all others in popularity till the close of the century, when a new wave of thought was generated by the movement which produced the French Revolution. Since that time they have been, perhaps, too much depreciated. They are, indeed, cold and didactic, as compared with Scheffler or Tersteegen; but there is nevertheless in them a spirit of genuine practical piety; and, if not marked by genius, they are pure in taste, and often terse, vigorous and graceful.

Klopstock, the author of the Messiah, cannot be considered great as a hymn-writer, though his " Sabbath Hymn " (of which there is a version in Hymns from the Land ja opstock of Luther) is simple and good. Generally his hymns (ten of which are translated in Sheppard's Foreign Sacred Lyre) are artificial and much too elaborate.

Of the " romantic " school, which came in with the French Revolution, the two leading writers are Friedrich Leopold von Hardenberg, called " Novalis," and Friedrich de la Motte Fouque, the celebrated author of Undine and Sintram — both romance-writers, as well as poets. The genius of Novalis was early lost to the world; he died in 1801, not thirty years old. Some of his hymns are very beautiful; but even in such works as " Though all to Thee were

faithless," and " If only He is mine," there is a feeling of insulation and of despondency as to good in the actual world, which was perhaps inseparable from his ecclesiastical idealism. Fouque survived till 1843. p In his hymns there is the same deep flow of feeling, richness of imagery and charm of expression which distinguishes his prose works. The two missionary hymns — " Thou, solemn Ocean, rollest to the strand," and " In our sails all soft and sweetly " — -and the exquisite composition which finds its motive in the gospel narrative of blind Bartimeus, " Was du vor tausend Jahren " (finely translated both by Miss Winkworth and by Miss Cox), are among the best examples.

The later German hymn- writers of the 19th century belong, generally, to the revived " Pietistic " school. Some of the best, Johann Baptist von Albertini, Friedrich Adolf soitta Krummacher, and especially Karl Johann Philipp Spitta (1801-1859) have produced works not unworthy of the fame of their nation. Mr Massie, the able translator of Spitta's Psalter und Harfe (Leipzig, 1833), speaks of it as having " obtained for him in Germany a popularity only second to that of Paul Ger- hardt." In Spitta's poems (for such they generally are, rather than hymns) the subjective and meditative tone is tempered, not ungracefully, with a didactic element; and they are not disfigured by exaggerated sentiment, or by a too florid and rhetorical style.

6. British Hymnody. — After the Reformation, the develop- ment of hymnody was retarded, in both parts of Great Britain, by the example and influence of Geneva. Archbishop Cranmer appears at one time to have been disposed to follow Luther's course, and to present to the people, in an English dress, some at least of the hymns of the ancient church. In a letter to King Henry VIII. (October 7, 1544), among some new " processions " which he had himself translated into English, he mentions the Easter hymn, " Salve, festa dies, toto memorabilis aevo " (" Hail, glad day, to be joyfully kept through all generations "), of Fortunatus. In the " Primer " of 1535 (by Marshall) and the one of 1539 (by Bishop Hilsey of Rochester, published by order of the vicar-general Cromwell) there had been several rude' English hymns, none of them taken from ancient sources. King Henry's " Primer " of 1545 (commanded by his injunction of the 6th of May 1 545 to be used throughout his dominions) was formed on the model of the daily offices of the Breviary; and it contains English metrical translations from some of the best-known Ambrosian and other early hymns. But in the succeeding reign different views prevailed. A new direction had been given to the taste of the " Reformed " congregations in France and

Switzerland by the French metrical translation of the Old Testament Psalms, which appeared about 1540. This was the joint work of Clement

Marot, .valet or groom of the chamber to Francis I., and Theodore Beza, then a mere youth, fresh from his studies at Orleans.

Marot 's psalms were dedicated to the French king and the ladies of France, and, being set to popular airs, became fashion- f able. They were sung by Francis himself, the queen, Psalms tne P rmce sses and the courtiers, upon all sorts of secular occasions, and also, more seriously and religiously, by the citizens and the common people. They were soon perceived to be a power on the side of the Reformation. Calvin, who had settled at Geneva in the year of Marot's return to Paris, was then organizing his ecclesiastical system. He rejected the hymnody of the breviaries and missals, and fell back upon the idea, anciently held by Paul of Samosata, and condemned by the fourth council of Toledo, that whatever was sung in churches ought to be taken out of the Scriptures. Marot's Psalter, appear- ing thus opportunely, was introduced into his new system of worship, and appended to his catechism. On the other hand, it was interdicted by the Roman Catholic priesthood. Thus it became a badge to the one party of the " reformed " profession, and to the other of heresy.

The example thus set produced in England the translation commonly known as the " Old Version " of the Psalms. It was begun by Thomas Sternhold, whose position in the bold'and h° use h°ld of Henry VIII., and afterwards of Edward Hopkins. VI., was similar to that of Marot with Francis I., and whose services to the former of those kings were re- warded by a substantial legacy under his will. Sternhold pub- lished versions of nineteen Psalms, with a dedication to King Edward, and died soon afterwards. A second edition appeared in 1551, with eighteen more Psalms added, of Sternhold's trans- lating, and seven others by John Hopkins, a Suffolk clergyman. The work was continued during Queen Mary's reign by British refugees at Geneva, the chief of whom were William Whitting- ham, afterwards dean of Durham, who succeeded John Knox as minister of the English congregation there, and William Kethe or Keith, said by Strype to have been a Scotsman. They published at Geneva in 1556 a service-book, containing fifty-one English metrical psalms, which

number was increased, in later editions, to eighty-seven. On the accession of Queen Elizabeth, this Genevan Psalmody was at once brought into use in England — first (according to a letter of Bishop Jewell to Peter Martyr, dated 5th March 1560) in one London church, from which it quickly spread to others both in London and in other cities. Jewell describes the effect produced by large congregations, of as many as 6000 persons, young and old, women and children, singing it after the sermons at St Paul's Cross — adding, " Id sacrificos et diabolum aegre habet; vident enim sacras conciones hoc pacto profundius descendere in hominum animos." The first edition of the completed " Old Version " (containing forty Psalms by Sternhold, sixty-seven by Hopkins, fifteen by Whit-tingham, six by Kethe and the rest by Thomas Norton the dramatist, Robert Wisdom, John Marckant and Thomas Church- yard) appeared in 1562.

In the meantime, the Books of Common Prayer, of 1549, 1552 and 1559, had been successively established as law by the acts of uniformity of Edward VI. and Queen Elizabeth. In these no provision was made for the use of any metrical psalm or hymn on any occasion whatever, except at the consecration of bishops and the ordination of priests, in which offices (first added in 1552) an English version of " Veni Creator " (the longer of the two now in use) was appointed to be " said or sung." The canticles, " Te Deum," " Benedicite," the Nicene and Athanasian Creeds, the " Gloria in Excelsis," and some other parts of the communion and other special offices were also directed to be " said or sung "; and, by general rubrics, the chanting of the whole service was allowed.

The silence, however, of the rubrics in these books as to any other singing was not meant to exclude the use of psalms not expressly appointed, when they could be used without interfering with the prescribed order of any service. It was expressly provided by King Edward's first act of uniformity (by later acts made applicable to the later books) that it should be lawful " for all men, as well in churches, chapels, oratories or other places, to use openly any psalms or prayers taken out of the Bible, at any due time, not letting or omitting thereby the service, or any part thereof, mentioned in the book." And Queen Elizabeth, by one of the injunctions issued in the first year of her reign, declared her desire that the provision

made, " in divers collegiate and also some parish churches, for singing in the church, so as to promote the laudable service of music," should continue. After allowing the use of " a modest and distinct song in all parts of the common prayers of the church, so

that the same may be as plainly understanded as if it were read without singing," the injunction proceeded thus—" And yet, nevertheless, for the comforting of such that delight in music, it may be permitted that in the beginning or in the end of the Common Prayer, either at morning or evening, there may be sung an hymn, or such like song to the praise of Almighty God, in the best sort of melody and music that may be conveniently devised, having respect that the sentence " (i.e. sense) " of hymn may be understanded and perceived."

The " Old Version," when published (by John Daye, for the Stationers' Company, " cum gratia et privilegio Regiae Majestatis "), bore upon the face of it that it was " newly set forth, and allowed to be sung of the people in churches, before and after morning and evening prayer, as also before and after the sermon." The question of its authority has been at different times much debated, chiefly by Peter Heylyn and Thomas Warton on one side (both of whom disliked and disparaged it), and by William Beveridge, bishop of St Asaph, and the Rev. H. J. Todd on the other. Heylyn says, it was " per- mitted rather than allowed," which seems to be a distinction without much difference. "Allowance," which is all that the book claimed for itself, is authorization by way of permission, not of command- ment. Its publication in that form could hardly have been licensed, nor could it have passed into use as it did without question, through- out the churches of England, unless it had been " allowed " by some authority then esteemed to be sufficient. Whether that authority was royal or ecclesiastical does not appear, nor (considering the proviso in King Edward's act of uniformity, and Queen Elizabeth's injunctions) is it very important. No inference can justly be drawn from the inability of inquirers, in Heylyn's time or since, to discover any public record bearing upon this subject, many public documents of that period having been lost.

In this book, as published in 1562, and for many years after- wards, there were (besides the versified Psalms) eleven metrical versions of the " Te Deum," canticles, Lord's Prayer (the best of which is that of the " Benedicite ") ; and also " Da pacem, Domine," a hymn suitable to the times, rendered into English from Luther; two original hymns of praise, to be sung before morning and evening prayer; two penitential hymns (one of them the "humble lamentation of a sinner"); and a hymn of faith, beginning, " Lord, in Thee is all my trust." In these respects, and also in the tunes which accompanied the words (stated by Dr Charles Burney, in his History of Music, to be German, and not French), there was a departure from the Genevan platform. Some of these hymns, and some of the psalms

also (e.g. those by Robert Wisdom, being alternative versions), were omitted at a later period; and many alterations and supposed amendments were from time to time made by un- known hands in the psalms which remained, so that the text, as now printed, is in many places different from that of 1562.

In Scotland, the General Assembly of the kirk caused to be printed at Edinburgh in 1564, and enjoined the use of, a book entitled The Form of Prayers and Ministry of the Sacraments used in the English Church at Geneva, £ f cb approved and received by the Church of Scotland; whereto, besides that was in the former books, are also added sundry other prayers, with the whole Psalms of David in English metre. This contained, from the " Old Version," translations of forty Psalms by Sternhold, fifteen by Whittingham, twenty-six by Kethe and thirty-five by Hopkins. Of the remainder two were by John Pulleyn (one of the Genevan refugees, who became archdeacon of Colchester); six by Robert Pont, Knox's son-in- law, who was a minister of the kirk, and also a lord of session; and fourteen signed with the initials I. C, supposed to be John Craig; one was anonymous, eight were attributed to N., two to M. and one to T. N. respectively.

So matters continued in both churches until the Civil War. During the interval, King James I. conceived the project of himself making a new version of the Psalms, and appears to have translated thirty-one of them— the correction of which, together with the translation of the rest, he entrusted to Sir William Alexander, afterwards earl of Stirling. Sir William having completed his task, King Charles I. had it examined and approved by several archbishops and bishops of England, Scotland and Ireland, and caused it to be printed in 1631 at the Oxford Uni- versity Press, as the work of King James; and, by an order

under the royal sign manual, recommended its use in all churches of his dominions. In 1634 he enjoined the Privy Council of Scotland not to suffer any other psalms, " of any edition what- ever," to be printed in or imported into that kingdom. In 1636 it was republished, and was attached to the famous Scottish service-book, with which the troubles began in 1637. It need hardly be added that the king did not succeed in bringing this Psalter into use in either kingdom.

When the Long Parliament undertook, in 1642, the task of altering the liturgy, its attention was at the same time directed to psalmody. It had to judge between two rival translations of the Psalms — one by Francis Rouse, a member of the House of Commons, afterwards one of Cromwell's councillors and finally provost of Eton; the other by William Barton, a clergy- man of Leicester. The House of Lords favoured Barton, the House of Commons Rouse, who had made much use of the labours of Sir William Alexander. Both versions were printed by order of parliament, and were referred for consideration to the West- minster Assembly. They decided in favour of Rouse. His version, as finally amended, was published in 1646, under an order of the House of Commons dated 14th November 1645. In the following year it was recommended by the parliament to the General Assembly at Edinburgh, who appointed a com- mittee, with large powers, to prepare a revised Psalter, recom- mending to their consideration not only Rouse's book but that of 1564, and two other versions (by Zachary Boyd and Sir William Mure of Rowallan), then lately executed in Scotland. The result of the labours of this committee was the " Paraphrase " of the Psalms, which, in 1649-16 50, by the concurrent authority of the General Assembly and the committee of estates, was ordered to be exclusively used throughout the church of Scotland. Some use was made in the preparation of this book of the versions to which the attention of the revisers had been directed, and also of Barton's; but its basis was that of Rouse. It was received in Scotland with great favour, which it has ever since retained; and it is fairly entitled to the praise of striking a tolerable medium between the rude homeliness of the " Old," and the artificial modernism of the " New " English versions — perhaps as great a success as was possible for such an undertaking. Sir Walter Scott is said to have dissuaded any attempt to alter it, and to have pronounced it, " with all its acknowledged occasional harshness, so beautiful, that any alterations must eventually prove only so many blemishes." No further step towards any authorized hymnody was taken by the kirk of Scotland till the following century.

In England, two changes bearing on church hymnody were made upon the revision of the prayer-book after the Restoration, in 1661-1662. One was the addition, in the offices for con- secrating bishops and ordaining priests, of the shorter version of "Veni Creator" ("Come, Holy Ghost, our souls inspire"), as an alternative form. The other, and more important, was the insertion of the rubric after the third collect, at morning and evening prayer: " In quires and places where they sing, here followeth the anthem." By this rubric synodical and parliamentary authority was given for the

interruption, at that point, of the prescribed order of the service by singing an anthem, the choice of which was left to the discretion of the minister. Those actually used, under this authority, were for some time only unmetrical passages of scripture, set to music by Blow, Purcell and other composers, of the same kind with the anthems still generally sung in cathedral and collegiate churches. But the word " anthem " had no technical significa- tion which could be an obstacle to the use under this rubric of metrical hymns.

The " New Version " of the Psalms, by Dr Nicholas Brady and the poet-laureate Nahum Tate (both Irishmen), appeared in 1696, under the sanction of an order in council of William Brady. HI; " allowing and permitting "its use " in all such churches, chapels and congregations as should think fit to receive it." Dr Compton, bishop of London, recommended it to his diocese. No hymns were then appended to it; but the authors added a "supplement" in 1703, which received an

exactly similar sanction from an order in council of. Queen Anne. In that supplement there were several new versions of the canticles, and of the " Veni Creator "; a variation of the old " humble lamentation of a sinner "; six hymns for Christmas, Easter and Holy Communion (all versions or paraphrases of scripture), which are still usually printed at the end of the prayer-books containing the new version; and a hymn " on the divine use of music " — all accompanied by tunes. The authors also reprinted, with very good taste, the excellent version of the " Benedicite " which appeared in the book of 1562. Of the hymns in this "supplement," one ("While shepherds watched their flocks by night ") greatly exceeded the rest in merit. It has been ascribed to Tate, but it has a character of simplicity unlike the rest of his works.

The relative merits of the " Old " and " New " versions have been very variously estimated. Competent judges have given the old the praise, which certainly cannot be old and accorded to the new, of fidelity to the Hebrew. In new both, it must be admitted, that those parts which versions have poetical merit are few and far between; bat com i' ared – a reverent taste is likely to be more offended by the frequent sacrifice, in the new, of depth of tone and accuracy of sense to a fluent commonplace correctness of versification and diction, than by any excessive homeliness in the old. In both, however, some psalms, or portions of psalms, are well enough rendered to entitle them to a permanent place in the hymn-books — Especially the 8th, and parts of the 18th Psalm, by Sternhold; the 57th, 84th and 100th, by Hopkins; the 23rd, 34th and 36th, and part of the 148th, by Tate

and Brady.

The judgment which a fastidious critic might be disposed to pass upon both these books may perhaps be considerably mitigated by comparing them with the works of other labourers in the same field, of whom Holland, in his interesting volumes entitled Psalmists of Great Britain, enumerates above 150. Some of them have been real poets — the celebrated earl of Surrey, Sir Philip Sidney and his sister the countess of Pembroke, George Sandys, George Wither, John Milton and John Keble. In their versions, as might be expected, there are occasional gleams of power and beauty, exceeding anything to be found in Sternhold and Hopkins, or Tate and Brady; but even in the best these are rare, and chiefly occur where the strict idea of translation has been most widely departed from. In all of them, as a rule, the life and spirit, which in prose versions of the psalms are so wonderfully preserved, have disappeared. The conclusion practically suggested by so many failures is that the difficulties of metrical translation, always great, are in this case insuperable; and that, while the psalms like other parts of scripture are abundantly suggestive of motive and material for hymhographers, it is by assimilation and adaptation, and not by any attempt to transform their exact sense into modern poetry, that they may be best used for this purpose.

The order in council of 1703 is the latest act of any public authority by which an express sanction has been given to the use of psalms or hymns in the Church of England. At the end, indeed, of many Prayer-books, till about the middle of the 19th century, there were commonly found, besides some of the hymns sanctioned by that order in council, or of those contained in the book of 1562, a sacramental and a Christmas hymn by Doddridge; a Christmas hymn (varied by Martin Madan) from Charles Wesley; an Easter hymn of the 1 8th century, beginning "Jesus Christ has risen to-day " ; and abridgments of Bishop Ken's Morning and Evening Hymnsi These additions first began to be made in or about 1791, in London editions of the Prayer-book and Psalter, at the mere will and pleasure (so far as appears) of the printers. They had no sort of authority.

*In the state of authority, opinion and practice disclosed by the preceding narrative may be found the true explanation of the fact that, in the country of Chaucer, Spenser, Bnr n 8n Shakespeare and Milton, and notwithstanding the eoagre- example of Germany, no native congregational gationai hymnody worthy of the name arose till after the com- *^m/,0< v- mencement of the 18th century. Yet*

there was no want of

HYMNS

J 93

Wedder- bum.

appreciation of the power and value of congregational church music. Milton could write, before 1645: —

" There let the pealing organ blow To the full-voiced quire below In service high, and anthems clear, As may with sweetness through mine ear Dissolve me into ecstasies, And bring all Heaven before mine eyes." Thomas Mace, in his Music's Monument (1676), thus described the effect of psalm-singing before sermons by the congregation in York Minster on Sundays, during the siege of 1644: " When that vast concording unity of the whole congregational chorus came thundering in, even so as it made the very ground shake under us, oh, the unutteiable ravishing soul's delight! in the which I was so transported and wrapt up in high contemplations that there was no room left in my whole man, body, soul and spirit, for anything below divine and heavenly raptures; nor could there possibly be anything to which that very singing might be truly compared, except the right apprehension or conceiving of that glorious and miraculous quire, recorded in the scriptures at the dedication of the temple." Nor was there any want of men well qualified, and by the turn of their minds predisposed, to shine in this branch of literature. Some (like Sandys, Boyd and Barton) devoted themselves altogether to paraphrases of other scriptures as well as the psalms. Others (like George Herbert, and Francis and John Quarks) moralized, meditated, soliloquized and allegorized in verse. Without reckoning these, there were a few, even before the Restoration, who came very near to the ideal of hymnody.

First in time is the Scottish poet John Wedderburn, who translated several of Luther's hymns, and in his Compendious Book of Godly and Spiritual Songs added others of his own (or his brothers') composition. Some of these poems, published before 1560, are of uncommon excellence, uniting ease and melody of rhythm, and structural skill, with grace of expression, and simplicity, warmth and reality of religious feeling. Those entitled " Give me thy heart," " Go, heart," and " Leave me not," which will be found in a collection of i860 called Sacred Songs of Scotland, require little, beyond the change of some archaisms of language, to adapt them for church or

domestic use at the present day.

Next come the two hymns of " The new Jerusalem," by an English Roman Catholic priest signing himself F. B. P. (supposed to be " Francis Baker, Presbyter "), and by another Scottish poet, David Dickson, of which the history is given by Dr Bonar in his edition of Dickson's work. This (Dickson's), which begins " O mother dear, Jerusalem," and has long been popular in Scotland, is a variation and amplification by the addition of a large number of new stanzas of the English original, beginning " Jerusalem, my happy home," written in Queen Elizabeth's time, and printed (as appears by a copy in the British Museum) about 1016, when Dickson was still young. Both have an easy natural flow, and a simple happy rendering of the beautiful scriptural imagery upon the subject, with a spirit of primitive devotion uncorrupted by medieval peculiarities. The English hymn of which some stanzas are now often sung in churches is the true parent of the several shorter forms, — all of more than common merit, — which, in modern hymn- books, begin with the same first line, but afterwards deviate from the original. Kindred to these is the very fine and faithful translation, by Dickson's contemporary Drummond of Haw- thornden of the ancient " Urbs beata Hierusalem " ("Jerusalem, that place divine "). Other ancient hymns (two of Thomas Aquinas, and the " Dies Irae ") were also well translated, in 1646, by Richard Crashaw, after he had become a Roman Catholic and had been deprived by the parliament of his fellow- ship at Cambridge.

Conspicuous among the sacred poets of the first two Stuart reigns in England was George Wither. His Hymnes and Songs of the Church appeared in 1622-1623, under a patent of King James I., by which they were declared " worthy and profitable to be inserted, in convenient manner and due place, into every English Psalm-book to metre." His Hallelujah

Dickson.

Cosin.

Milton.

Wither.

(in which some of the former Hymnes and Songs were repeated) followed in 1641. Some of the Hymnes and Songs were set to music by Orlando Gibbons, and those in both books were written to be

sung, though there is no evidence that the author con- templated the use of-any of them in churches. They included hymns for every day in the week (founded, as those contributed nearly a century afterwards by Charles Coffin to the Parisian Breviary also were, upon the successive works of the days of creation) ; hymns for all the church seasons and festivals, including saints' days; hymns for various public occasions; and hymns > of prayer, meditation and instruction, for all sorts and conditions of men, under a great variety of circumstances — being at once a " Christian Year " and a manual of practical piety. Many of them rise to a very' high point of excellence, — particularly the " general invitation to praise God " (" Come, O come, in pious lays "), with which Hallelujah opens; the thanksgivings for peace and for victory, the 'Coronation Hymn, a Christmas, an Epiphany, and an Easter Hymn, and one for St Bartholomew's day (Hymns 1, 74, 75, and 84 in part i., and 26, 29, 36 and 54 in part ii. of Hallelujah).

John Cosin, afterwards bishop of Durham, published in 1627 a volume of " Private Devotions," for the canonical hours and other occasions. In this there are seven or eight hymns of considerable merit, — among them a very good version of the Ambrosian " Jam lucis orto sidere," and the shorter version of the " Veni Creator," which was introduced after the Restoration into the consecration and ordination services of the Church of England.

The hymns of Milton (on the Nativity, Passion, Circumcision and " at a Solemn Music "), written about 1629, in his early manhood, were probably not intended for singing; but they are odes full of characteristic beauty and power.

During the Commonwealth, in 1654, Jeremy Taylor published at the end of his Golden Grove, twenty—one hymns, described by himself as " celebrating the mysteries and chief festivals of the year, according io the manner of the J ' re 'P y ancient church, fitted to the fancy and devotion of ay "'*

the younger and pious persons, apt for memory, and to be joined to their other prayers." Of these, his accomplished editor, Bishop Heber, justly says: —

" They are in themselves, and on their own account, very interest- ing compositions. Their metre, indeed, which is that species of spurious Pindaric which was fashionable with his contemporaries, is an obstacle, and must always have been one, to their introduction into public or private psalmody; and the mixture of that alloy of

conceits and quibbles which was an equally frequent and still greater defilement of some of the finest poetry of the 17th century will materially diminish their effect as devotional or descriptive odes. Yet, with all these faults, they are powerful, affecting, and often harmonious; there are many passages of which Cowley need not have been ashamed, and some which remind us, not disadvantage- ousˆ, of the corresponding productions of Milton."

He mentions particularly the advent hymn (" Lord, come away "), part of the hymn " On heaven," and (as " more regular in metre, and in words more applicable to public devotion") the " Prayer for Charity " (" Full of mercy, full of love ").

The epoch of the Restoration produced in 1664 Samuel Crossman's Young Man's Calling, with a few " Divine Medita- tions " in verse attached to it; in 1668 John Austin's Devotions in the ancient way of offices, with psalms, R estora ' hymns and prayers for every day in the week and every period. holyday in the year; and in 1681 Richard Baxter's – x Poetical Fragments. In these books there are altogether seven or eight hymns, the whole or parts of which are extremely good : Crossman's " New Jerusalem " (" Sweet place, sweet place alone "), one of the best of that class, and " My life's a shade, my days "; Austin's " Hark, my soul, how everything," " Fain would my thoughts fly up to Thee," " Lord, now the time returns," " Wake all my hopes, lift up your eyes "; and Baxter's " My whole, though broken heart, O Lord," and " Ye holy angels bright." Austin's Offices (he was a Roman Catholic) seem to have attracted much attention. Theophilus Dorrington, in 1686, published variations of them under the title of Reformed

Drydea, Ken.

Devotions; George Hickes, the non- juror, wrote one of his numerous recommendatory prefaces to S. Hopton's edition; and the Wesleys, in their earliest hymn-book, adopted hymns from them, with little alteration. These writers were followed by John Mason in 1683, and Thomas Shepherd in 1692, — the former, a country clergyman, much esteemed by Baxter and other Nonconformists; the latter himself a Nonconformist, who finally emigrated to America. Between these two men there was a close alliance, Shepherd's Penitential Cries being published as an addition to the Spiritual Songs of Mason.

Their hymns came into early use in several Nonconformist congregations; but, with the exception of one by Mason (" There is a stream which issues forth "), they are not suitable for public singing. In those of Mason there is often a very fine vein of poetry; and later authors have, by extracts or centoes from different parts of his works (where they were not disfigured by his general quaintness), constructed several hymns of more than average excellence.

Three other eminent names of the 17th century remain to be mentioned, John Dryden, Bishop Ken and Bishop Simon Patrick; with which may be associated that of Addison, though he wrote in the 18th century.

Dryden's translation of " Veni Creator " a cold and laboured performance, is to be met with in many hymn-books. Abridg- ments of Ken's morning and evening hymns are in all. These, with the midnight hymn, which is not inferior to them, first appeared in 1697, appended to the third edition of the author's Manual of Prayers for Winchester Scholars. Between these and a large number of other hymns (on the attributes of God, and for the festivals of the church) published by Bishop Ken after 1703 the contrast is remarkable. The universal acceptance of the morning and evening hymns is due to their transparent simplicity, warm but not overstrained devotion, and extremely popular style. Those afterwards published have no such qualities. They are mystical, florid, stiff, didactic and seldom poetical, and deserve the neglect into which they have fallen. Bishop Patrick's hymns were chiefly translations from the Latin, most of them from Prudentius. The best is a version of " Alleluia dulce carmen." Of the five attributed to Addison, not more than three are adapted to public singing; one (" The spacious firmament on high ") is a very perfect and finished composition, taking rank among the best hymns in the English language. 1

From the preface to Simon Browne's hymns, published in 1720, we learn that down to the time of Dr Watts the only hymns known to be " in common use, either in private families or in Christian assemblies," were those of Barton, Mason and Shepherd, together with " an attempt to turn some of George Herbert's poems into common metre," and a few sacramental hymns by authors now forgotten, named Joseph Boyse (1660- 1728) and Joseph Stennett. Of the 1410 authors of original British hymns enumerated in Daniel Sedgwick's catalogue, published in 1863, 1213 are of later date than 1707; and, if any correct enumeration could be made of the total number of hymns of all kinds published in Great Britain before and after that date, the proportion subsequent to 1707 would be very

much larger.

1 The authorship of this and of one other, " When all thy mercies, O my God," has been made a subject of controversy, — being claimed for Andrew Marvell (who died in 1678), in the preface to Captain E. Thompson's edition (1776) of Marvell's Works. But this claim does not appear to be substantiated. The editor did not give his readers the means of judging as to the real age, character or value of a manuscript to which he referred ; he did not say that these portions of it were in Marvell's handwriting; he did not even himself include them among Marvell's poems, as published in the body of his edition ; and he advanced a like claim on like grounds to two other poems, in very different styles, which had been published as their own by Tickell and Mallet. It is certain that all the five hymns were first made public in 1 7 1 2 , in papers contributed by Addison to the Spectator (Nos. 441, 453, 465, 489, 513), in which they were introduced in a way which might have been expected if they were by the hand which wrote those papers, but which would have been improbable, and unworthy of Addison, if they were unpublished works of a writer of so much genius, and such note in his day, as Marvell. They are all printed as Addison's in Dr Johnson's British Poets.

Patrick.

Addtsoa.

Watts.

The English Independents, as represented by Dr Isaac Watts, have a just claim to be considered the real founders of modern English hymnody. Watts was the first to understand the nature of the want, and, by the publication of his Hymns in 1 707-1 709, and Psalms (not translations, but hymns founded on psalms) in 1709, he led the way in providing for it. His immediate followers were Simon Browne and Philip Doddridge. Later in the 18th century, Joseph Hart, Thomas Gibbons, Miss Anne Steele, Samuel Medley, Samuel Stennett, John Ryland, Benjamin Beddome and Joseph Swain succeeded to them.

Among these writers, most of whom produced some hymns of merit, and several are extremely voluminous, Isaac Watts and Philip Doddridge are pre-eminent. It has been the fashion with some to disparage Watts, as if he had never risen above the level of his Hymns for Little Children. No doubt his taste is often faulty, and his style very unequal, but, looking to the good, and disregarding the

large quantity of inferior matter, it is probable that more hymns which approach to a very high standard of excellence, and are at the same time suitable for congregational use, may be found in his works than in those of any other English writer. Such are " When I survey the wondrous cross," "Jesus shall reign where'er the sun" (and also another adaptation of the same 72nd Psalm), " Before Jehovah's awful throne " (first line of which, however, is not his, but Wesley's), " Joy to the world, the Lord is come," " My soul, repeat His praise," " Why do we mourn departing friends," " There is a land of pure delight," " Our God, our help in ages past," " Up to the hills I lift mine eyes," and many more. It is true that in some of these cases dross is found in the original poems mixed with gold; but the process of separation, by selec- tion without change, is not difficult. As long as pure nervous English, unaffected fervour, strong simplicity and liquid yet manly sweetness are admitted to be characteristics of a good hymn, works such as these must command admiration.

Doddridge is, generally, much more laboured and artificial; but his place also as a hymn-writer ought to be determined, not by his failures, but by his successes, of which the D .. number is not inconsiderable. In his better works he is distinguished by a graceful and pointed, sometimes even a noble style. His " Hark, the glad sound, the Saviour comes " (which is, indeed, his masterpiece), is as sweet, vigorous and perfect a composition as can anywhere be found. Two other hymns, " How gentle God's commands," and that which, in a form slightly varied, became the " O God of Bethel, by whose hand," of the Scottish " Paraphrases," well represent his softer manner.

Of the other followers in the school of Watts, Miss Anne Steele (1717-1778) is the most popular and perhaps the best. Her hymn beginning " Far from these narrow scenes of night " deserves high praise, even by the side of other good performances on the same subject.

The influence of Watts was felt in Scotland, and among the first whom it reached there was Ralph Erskine. This seems to have been after the publication of Erskine's Gospel Sonnets, which appeared in 1732, five years before he joined his brother Ebenezer in the Secession Church. The Gospel Sonnets became, as some have said, a " people's classic "; but there is in them very little which belongs to the category of hymnody. More than nineteen-twentieths of this very curious book are occupied with what are, in fact, theological treatises and catechisms, mystical meditations on Christ as a bridegroom or husband," and spiritual enigmas, paradoxes, and

antithetical conceits, versified, it is true, but of a quality of which such lines as — " Faith's certain by fiducial acts, Sense by its evidential facts,"

may be taken as a sample. The grains of poetry scattered through this large mass of Calvinistic divinity are very few; yet in one short passage of seven stanzas (" O send me down a draught of love "), the fire burns with a brightness so remarkable as to justify a strong feeling of regret that the gift which this writer evidently had in him was not more often cultivated. Another passage, not so well sustained, but of considerable

HYMNS

**95*

beauty (part of the last piece under the title " The believer's soliloquy "), became afterwards, in the hands of John Berridge, the foundation of a very striking hymn (" O happy saints, who walk in light ").

After his secession, Ralph Erskine published two paraphrases of the " Song of Solomon," and a number of other " Scripture songs," paraphrased, in like manner, from the Old and New Testaments. In these the influence of Watts became very apparent, not only by a change in the writer's general style, but by the direct appropriation of no small quantity of matter from Dr Watts's hymns, with variations which were not always improvements. His paraphrases of 1 Cor. i. 24; Gal. vi. 14; Heb. vi. 17-19; Rev. v. 11, 12, vii. 10-17, an d xii. 7-12 are little else than Watts transformed. One of these (Rev. vii. 10-17) is interesting as a variation and improvement, intermediate between the original and the form which it ultimately assumed as the 66th " Paraphrase " of the Church of Scotland, of Watts's " What happy men or angels these," and " These glorious minds, how bright they shine." No one can compare it with its ultimate product, " How bright these glorious spirits shine," without perceiving that William Cameron followed Erskine, and only added finish and grace to his work, — both excelling Watts, in this instance, in simplicity as well as in conciseness.

Of the contributions to the authorized " Paraphrases " (with the settlement of which committees of the General Assembly of the Church of Scotland were occupied from 1745, or Scottish ear ii er! t jii I7 8i), the most noteworthy, besides the phrases. tw0 already mentioned, were those of John Morrison and those claimed for Michael Bruce. The obligations of these " Paraphrases " to English

hymnody, already traced in some instances (to which may be added the adoption from Addison of three out of the five " hymns " appended to them), are perceptible in the vividness and force with which these writers, while adhering with a severe simplicity to the sense of the passages of Scripture which they undertook to render, fulfilled the conception of a good original hymn. Morrison's " The race that long in darkness pined " and " Come, let us to the Lord our God," and Bruce's " Where high the heavenly temple stands " (if this was really his), are well entitled to that praise. The advocates of Bruce in the controversy, not yet closed, as to the poems said to have been entrusted by him to John Logan, and published by Logan in his own name, also claim for him the credit of having varied the paraphrase " Behold, the mountain of the Lord," from its original form, as printed by the committee of the General Assembly in 1745, by some excellent touches.

*Attention must now be directed to the hymns produced by the "Methodist" movement, which began about 1738, and which afterwards became divided, between those hymas. * esteemed Arminian, under John Wesley, those who adhered to the Moravians, when the original alliance between that body and the founders of Methodism was dissolved, and the Calvinists, of whom Whitfield was the leader, and Selina, countess of Huntingdon, the patroness. Each of these sections had its own hymn-writers, some of whom did, and others did not, secede from the Church of England. The Wesleyans had Charles Wesley, Robert Seagrave and Thomas Olivers; the Moravians, John Cennick, with whom, perhaps, may be classed John Byrom, who imbibed the mystical ideas of some of the German schools; the Calvinists, Augustus Montague Toplady, John Berridge, William Williams, Martin Madan, Thomas Haweis, Rowland Hill, John Newton and William Cowper.*

Among all these writers, the palm undoubtedly belongs to Charles Wesley. In the first volume of hymns published by the two brothers are several good translations from the German, believed to be by John Wesley, who, although he translated and adapted, is not supposed to have written any original hymns; and the influence of German hymnody, particularly of the works of Paul Gerhardt, Scheffler, Tersteegen and Zinzendorf, may be traced in a large proportion of Charles Wesley's works. He is more subjective and meditative than Watts and his school; there is a didactic turn, even in his

Charles Wesley.

Olivers.

most objective pieces, as, for example, in his Christmas and Easter hymns; most of his works are supplicatory, and his faults are connected with the same habit of mind. He is apt to repeat the same thoughts, and to lose force by redundancy — he runs sometimes even to a tedious length; his hymns are not always symmetrically constructed, or well balanced and finished off. But he has great truth, depth and variety of feeling; his diction is manly and always to the point; never florid, though sometimes passionate and riot free from exaggeration ; often vivid and picturesque. Of his spirited style there are few better examples than " O for a thousand tongues to sing," " Blow ye the trumpet, blow," " Rejoice, the Lord is King " and " Come, let us join our friends above "; of his more tender vein, " Happy soul, thy days are ended "; and of his fervid contemplative style (without going beyond hymns fit for general use), " Thou who earnest from above," " Forth in Thy name, O Lord, I go " and " Eternal beam of light divine." With those whose taste is for hymns in which warm religious feelings are warmly and demonstratively ex- pressed, " Jesus, lover of my soul," is as popular as any of these.

Of the other Wesleyan hymn-writers, Olivers, originally a Welsh shoemaker and afterwards a preacher, is the most re- markable. He is the author of only two works, both odes, in a stately metre, and from their length unfit for congregational singing, but one of them, " The God of Abraham praise," an ode of singular power and beauty.

The Moravian Methodists produced few hymns now available for general use. The best are Cennick's " Children of the heavenly King " and Hammond's " Awake and sing the song of ceaalck Moses and the Lamb," the former of which (abridged), Ham- and the latter as varied by Madan, are found in many mood, hymn-books, and are deservedly esteemed. John By""""- Byrom, whose name we have thought it convenient to connect with these, though he did not belong to the Moravian community, was the author of a Christmas hymn (" Christians awake, salute the happy morn ") which enjoys: great popularity; and also of a short subjective hymn, very fine both in feeling and in expression, " My spirit longeth for Thee within my troubled breast."

The contributions of the Calvinistic Methodists to English hymnody are of greater extent and value. Few writers of hymns had higher gifts than Toplady, author of " Rock of ages," by some esteemed the finest in the English language. He was a man of ardent temperament, enthusiastic zeal, strong convictions and great energy of character. "

He had," says one of his biographers, " the courage of a lion, but his frame was brittle as glass." Between him and John Wesley there was a violent opposition of opinion, and much acrimonious controversy; but the same fervour and zeal which made him an intemperate theologian gave warmth, richness and spirituality to his hymns. In some of them, particularly those which, like " Deathless principle, arise," are meditations after the German manner, and not without direct obligation to German originals, the setting is somewhat too artificial; but his art is never in- consistent with a genuine flow of real feeling. Others (e.g. " When languor and disease invade " and " Your harps, ye trembling saints ") fail to sustain to the end the beauty with which they began, and would have been better for abridgment. But in all these, and in most of his other works, there is great force and sweetness, both of thought and language, and an easy and harmonious versification.

Berridge, William Williams (1717-1791) and Rowland Hill, all men remarkable for eccentricity, activity and the devotion t>f their lives to the special work of missionary preaching, Berridge, though not the authors of jnany good hymns, composed, Williams or adapted from earlier compositions, some of great a " a merit. One of Berridge, adapted from Erskine, has "' been already mentioned; another, adapted from Watts, is " Jesus, cast a look on me." Williams, a Welshman, who wrote " Guide me, O Thou great Jehovah," was especially an apostle of Calvinistic Methodism in his own country, and his hymns are still much used in the principality. Rowland Hill wrote the popular hymn beginning " Exalted high at God's right hand."

Toplady.

ig6

HYMNS

If, however, the number as well as the quality of good hymns available for general use is to be regarded, the authors of the

Olney Hymns are entitled to be placed at the head of aad Per a ˆ *■ e w " ters °f this Calvinistic school. The greater Newton. number of the Olney Hymns are, no doubt, homely

and didactic; but to the best of them, and they are no inconsiderable proportion, the tenderness of Cowper and the manliness of John Newton (1725-1807) give the interest of contrast, as well as that of

sustained reality. If Newton carried to some excess the sound principle laid down by him, that " perspicuity, simplicity and ease should be chiefly attended to, and the imagery and colouring of poetry, if admitted at all, should be indulged very sparingly and with great judgment," if he is often dry and colloquial, he rises at other times into " soul-animating strains," such as " Glorious things of thee are spoken, Zion, city of our God ; '; and sometimes (as in " Approach, my soul, the mercy seat ") rivals Cowper himself in depth of feeling. Cowper's hymns in this book are, almost without exception, worthy of his name. Among them are " Hark, my soul, it is the Lord," " There is a fountain filled with blood," " Far from the world, O Lord, I flee," " God moves in a mys- terious way " and " Sometimes a light surprises." Some, perhaps, even of these, and others of equal excellence (such as "O for a closer walk with God"), speak the language of a special experience, which, in Cowper's case, was only too real, but which could not, without a degree of unreality not desirable in exercises of public worship, be applied to themselves by all ordinary Christians.

During the first quarter of the 19th century there were not many indications of the tendency, which afterwards became

manifest, to enlarge the boundaries of British hymnody . wth- The Remains of Henry Kirke White, published by

hymas. Southey in 1807, contained a series of hymns, some of

which are still in use ; and a few of Bishop Heber's hymns and those of Sir Robert Grant, which, though offending rather „ _ . too much against John Newton's canon, are well

R. Grant. ,, n joˆ

known and popular, appeared between 181 1 and 18 10, in the Christian Observer. In John Bowdlei's Remains, published soon after his death in 181 5, there are a few more of the same, perhaps too scholarlike, character. But the chief hymn-writers of that period were two clergymen of the Established Church — one in Ireland, Thomas Kelly, and the other in England, William Hum — who both became Non- conformists, and the Moravian poet, James Montgomery (1771- 1854), a native of Scotland.

Kelly was the son of an Irish judge, and in 1804 published a small volume of ninety-six hymns, which grew in successive „ .. editions till, in the last before his death in 1854, they

amounted to 765. There is, as might be expected, in this great number a large preponderance of the didactic and commonplace. But not a few very excellent 'hymns may be gathered from them. Simple and natural, without the vivacity and terseness of Watts or the severity of Newton, Kelly has some points in common with both those writers, and he is less subjective than most of the " Methodist " school. His hymns beginning " Lo ! He comes, let all adore Him," and " Through the day Thy love hath spared us," have a rich, melodious move- ment; and another, " We sing the praise of Him who died," is distinguished by a calm , subdued power, rising gradually from a rather low to a very high key.

Hum published in 1813 a volume of 370 hymns, which were afterwards increased to 420. There is little in them which deserves to be saved from oblivion; but one at least, " There is a river deep and broad," may bear com- parison with the best of those which have been produced upon the same, and it is rather a favourite, theme.

The Psalms and Hymns of James Montgomery were published in 1822 and 1825, though written earlier. More cultivated and artistic than Kelly, he is less simple and natural. His " Hail to the Lord's Anointed, " " Songs of praise the angels sang " and " Mercy alone can meet my case " are among his most successful efforts.

Mant.

Bowdler.

Hum.

Mont- gomery.

During this period, the collections of miscellaneous hymns for congregational use, of which the example was set by the Wesleys, Whitfield, Toplady and Lady Huntingdon, had greatly multiplied; and with them the practice ~? ' (for which, indeed, too many precedents existed in hymns- the history of Latin and German hymnody) of every collector altering the compositions of other men without scruple, to suit his own doctrine or taste; with the effect, too generally, of patching and disfiguring, spoiling and emasculating the works so altered, substituting neutral tints for natural colouring, and a dead for a living sense. In the Church of England the use of these collections had become frequent in churches and chapels, principally in cities and towns, where the sentiments of the clergy approximated to those of the Nonconformists. In rural parishes, when the clergy

were not of the " Evangelical " school, they were generally held in disfavour; for which, even if doctrinal prepossessions had not entered into the question, the great want of taste and judgment often manifested in their compilation, and perhaps also the prevailing mediocrity of the bulk of the original compositions from which most of them were derive'd, would be enough to account. In addition to this, the idea that no hymns ought to be used in any services of the Church of England, except prose anthems after the third collect, without express royal or ecclesiastical authority, continued down to that time largely to prevail among high churchmen.

Two publications, which appeared almost simultaneously in 1827 — Bishop Heber's Hymns, with a few added by Dean Milman, and John Keble's Christian Year (not a hymn- book, but one from which several admirable hymns „„ er '

ii ii 11 milman,

have been taken, and the well-spring of many streams Kebie. of thought and feeling by which good hymns have since been produced) — introduced a new epoch, breaking down the barrier as to hymnody which had till then existed between the different theological schools of the Church of England. In this movement Richard Mant, bishop of Down, was also one of the first to co-operate. It soon received a great additional impulse from the increased attention which, about the same time, began to be paid to ancient hymnody, and from the publication in 1833 of Bunsen's Gesangbuch. Among its earliest fruits was the Lyra apostolica, containing hymns, sonnets and other devotional poems, most of them originally contributed by some of the leading authors of the Tracts for the Times to the British Magazine; the finest of which is the pathetic " Lead, kindly Light, amid th' en-circling gloom," by Cardinal Newman — well known, and uni-versally admired. From that time hymns and hymn- „ writers rapidly multiplied in the Church of England, and in Scotland also. Nearly 600 authors whose publications were later than 1827 are enumerated in Sedgwick's catalogue of 1863, and about half a million hymns are now in existence. Works, critical and historical, upon the subject of hymns, have also multiplied; and collections for church use have become innumerable— several of the various religious denominations, and many of the leading ecclesiastical and religious societies, having issued hymn-books of their own, in addition to those compiled for particular dioceses, churches and chapels, and to books (like Hymns Ancient and Modern, published 1861, supple- mented 1889, revised edition, 1905) which have become popular without any sanction from authority. To mention all

the authors of good hymns since the commencement of this new ppoch would be impossible; but probably no names could be chosen more fairly representative of its characteristic merits, and perhaps also of some of its defects, than those of Josiah Conder and James Edmeston among English Nonconformists; Henry Francis Lyte and Charlotte Elliott among evangelicals in the Church of England; John Mason Neale and Christopher Wordsworth, bishop of Lincoln, among English churchmen of the higher school; Arthur Penrhyn Stanley, Edward H. Plumptre, Frances Ridley Havergal; and in Scotland, Dr Horatius Bonar, Dr Norman Macleod and Dr George Mathesoii. American hymn-writers belong to the same schools, and have been affected by the same influences. Some of them have

enjoyed a just reputation on both sides of the Atlantic. Among those best known are John Greenleaf Whittier, Bishop Doane, Dr W. A. Muhlenberg and Thomas Hastings; and it is difficult to praise too highly such works as the Christmas hymn, " It came upon the midnight clear," by Edmund H. Sears; the Ascension hymn, " Thou, who didst stoop below," by Mrs S. E. Miles; two by Dr Ray Palmer, " My faith looks up to Thee, Thou Lamb of Calvary," and "Jesus, Thou joy of loving hearts," the latter of which is the best among several good English versions of "Jesu, dulcedo, cordium"; and "Lord of all being, throned afar," by Oliver Wendell Holmes.

The more modern " Moody and Sankey " hymns (see Moody, D. L.) popularized a new Evangelical type, and the Salvation Army has carried this still farther.

7. Conclusion. — The object aimed at in this article has been to trace the general history of the principal schools of ancient and modern hymnody, and especially the history of its use in the Christian church. For this purpose it has not been thought necessary to give any account of the hymns of Racine, Madame Guyon and others, who can hardly be classed with any school, nor of the 'works of Caesar Malan of Geneva (1787-1864) and other quite modern hymn-writers of the Reformed churches in Switzerland and France.

On a general view of the whole subject, hymnody is seen to have been a not inconsiderable factor in religious worship. It has been sometimes employed to disseminate and popularize particular views, but its spirit and influence has been, on the whole, catholic. It has

embodied the faith, trust and hope, and no small part of the inward experience, of generation after genera- tion of men, in many different countries and climates, of many different nations, and in many varieties of circumstances and condition. Coloured, indeed, by these differences, and also by the various modes in which the same truths have been apprehended by different minds and sometimes reflecting partial and imperfect conceptions of them, and errors with which they have been associated in particular churches, times and places, its testimony is, nevertheless, generally the same. It has upon it a stamp of genuineness which cannot be mistaken. It bears witness to the force of a central attraction more powerful than all causes of difference, which binds together times ancient and modern, nations of various race and language, churchmen and nonconformists, churches reformed and unre- formed-; to a true fundamental unity among good Christians; and to a substantial identity in their moral and spiritual experience. (S.)

The regular practice of hymnody in English musical history dates from the beginning of the 16th century. Luther's verses were adapted sometimes to ancient church melodies, sometimes to tunes of secular songs, and sometimes had music composed for them by himself and others. Many rhyming Latin hymns are of earlier date whose tunes are identified with them, some of which tunes, with the subject of their Latin text, are among the Reformer's appropriations; but it was he who put the words of praise and prayer into the popular mouth, associated with rhythmical music which aided to imprint the words upon the memory and to enforce their enunciation. In conjunction with his friend Johann Walther, Luther issued a collection of poems for choral singing in 1524, which was followed by many others in North Germany. The English versions of the Psalms by Sternhold and Hopkins and their prede- cessors, and the French version by Clement Marot and Theodore Beza, were written with the same purpose of fitting sacred minstrelsy to the voice of the multitude. Goudimel in 1566 and Claudin lc Jeune in 1607 printed harmonizations of tunes that had then become standard for the Psalms, and in England several such publications appeared, culminating in Thomas Ravenscroft's famous collection, The Whole Book of Psalms (1621); in all of these the arrangements of the tunes were by various masters. The English practice of hymn-singing was much strengthened on the return of the exiled reformers from Frankfort and Geneva, when it became so general that, according to Bishop Jewell, thousands of the populace who assembled at Paul's Cross to hear the preaching would join in the singing of psalms before and after the sermon.

The placing of the choral song of the church within the lips of the

people had great religious and moral influence; it has had also its great effect upon art, shown in the productions of the North German musicians ever since the first days of the Reformation, which abound in exercises of scholarship and imagination wrought upon the tunes of established acceptance. Some of these are accom- paniments to the tunes with interludes between the several strains,

and some are compositions for the organ or for orchestral instru- ments that consist of such elaboration of the themes as is displayed in accompaniments to voices, but of far more complicated and ex- tended character. A special art-form that was developed to a very high degree, but has passed into comparative disuse, was the structure of all varieties of counterpoint extemporaneously upon the known hymn-tunes (chorals), and several masters acquired great fame by success in its practice, of whom J. A. Reinken (1623- 1722), Johann Pachelbel (1653-1706), Georg Boehm and the great J. S. Bach are specially memorable. The hymnody of North Germany has for artistic treatment a strong advantage which is unpossessed by that of England, in that for the most part the same verses are associated with the same tunes, so that, whenever the text or the music is heard, either prompts recollection of the other, whereas in England tunes were always and are now often composed to metres and not to poems; any tune in a given metre is available for every poem in the same, and hence there are various tunes to one poem, and various poems to one tune. 1 In England a tune is named generally after some place — as " York," " Windsor," " Dundee," — or by some other unsignifying word; in North Ger- many a tune is mostly named by the initial words of the verses to which it is allied, and consequently, whenever it is heard, whether with words or without, it necessarily suggests to the hearer the whole subject of that hymn of which it is the musical moiety un- divorceable from the literary half. Manifold as they are, knowledge of the choral tunes is included in the earliest schooling of every Lutheran and every Calvinist in Germany, which thus enables all to take part in performance of the tunes, and. hence expressly the definition of " choral." Compositions grounded on the standard tune are then not merely school exercises, but works of art which link the sympathies of the writer and the listener, and aim at ex- pressing the feeling prompted by the hymn under treatment.

Bibliography: I. Ancient. — George Cassander, Hymni ecclesi astics (Cologne, 1556); Georgius Fabricius, Poetarum veterum ecclesiasticorum (Frankfort, 1578); Cardinal J. M. Thomasius, Hymnarium in Opera, ii. 351 seq. (Rome, 1747); A. J. Ram- bach, Anthologie christlicher Gesange (Altona, 1817); H. A. Daniel,

Thesaurus hymnologicus (Leipzig, 5 vols., 1841-1856); J. M. Nealq, Hymni ecclesiae et sequentiae (London, 1851-1852); and Hymns of the Eastern Church (1863). The dissertation prefixed to the second volume of the Acta sanctorum of the Bollandists; Cardinal J. B. Pitra, Hymnographie de I'eglise grecque (1867), Analecta sacra (1876); W. Christ and M. Paranikas, Anthologist Graeca carminum Christianorum (Leipzig, 1871) ; F. A. March, Latin Hymns with English Notes (New York, 1875) ; R. C. Trench, Sacred Latin Poetry (London, 4th ed., 1874); J. Pauly, Hymni breviarii Romani (Aix-la-Chapelle, 3 vols., 1868-1870); Pimont, Les Hymnes du breviaire romain (vols. 1-3, 1874-1884, unfinished); A. W. F. Fischer, Kirchenlieder- Lexicon (Gotha, 1878-1879) ; J. Kayser, Beitrage zur Geschichte der dltesten Kirchenhymnen (1881); M. Manitius, Geschichte der christ- lichen lateinischen Poesie (Stuttgart, 1891); John Julian, Dictionary of Hymnology (1892, new ed. 1907). For criticisms of metre, see alsp Huemer, Untersuchungen iiber die dltesten christlichen Rhythmen (1879); E. Bouvy, Poetes et melodes (Nimes, 1886); C. Krumbacher, Geschichte der byzantinischen Literatur (Munich, 1897, p. 700 seq.); J. M. Neale, Latin dissertation prefixed to Daniel's Thesaurus, vol. 5; and D. J. Donahoe, Early Christian Hymns (London, 1909).

II. Medieval. — Walafrid Strabo's treatise, ch. 25, De hymnis, &c; Radulph of Tongres, De psaltario observando (14th, century); Clichtavaens, Elucidatorium ecclesiasticum (Paris, 1556); Faustinus Arevalus, Hymnodia Hispanica (Rome, 1786); E. du Meril, Poesies populaires latines anterieures au XIII' siecte(Paris, 1 843) ; J . Stevenson, Latin Hymns of the Anglo-Saxon Church (Surtees Society, Durham, 1851); Norman, Hymnarium Sarisburiense (London, 1851); J. D. Chambers, Psalter, &c, according to the Sarum use (1852); F. J. Mone, Lateinische Hymnen des Mittelalters (Freiburg, 3 vols., 1853- 1855); Ph. Wackernagel, Das deutsche Kirchenlied von der dltesten Zeit bis zum Anfang des 17. Jahrhunderts, vol. i. (Leipzig, 1864); E. Dummlcr, Po'etae latini aevi Carolini (1881-1890); the Hymnolo- gische Beitrage: Quellen und Forschungen zur Geschichte der lateini- schen Hymnendichtung, edited by C. Blume and G. M. Dreves (Leip- zig, 1897); G. C. F. Mohnike, Hymnologische Forschungen; Klem- ming, Hymni et sequentiae in regno Sueciae (Stockholm, 4 vols., 1 885-1 887); Das katholische deutsche Kirchenlied (vol. i. by K. Severin Meister, 1862, vol. ii. by W. Baumker, 1883) ; the " Hym- nodia Hiberica," Spanische Hymnen des Mittelalters, vol. xvi. (1894); the "Hymnodia Gotica," Mozarabische Hymnen -des altspanischen Ritus, vol. xxvii. (1897); J. Danko, Vetus hymnaritifn ecclesiasticae Hungariae

(Budapest, 1893); J. H. Bernard and R. Atkinson, The Irish Liber Hymnorum (2 vols., London, 1898); C. A. J. Chevalier, Poesie liturgique du moyen Age (Paris, 1893).

III. Modern. — J. C. Jacobi, Psalmodia Germanica (1722-1725 and 1732, with supplement added by J. Haberkorn, 1765); F- A. Cunz, Geschichte des deutschen Kirchenliedes (Leipzig, 1855); Baron von Bunsen, Versuch eines allgemeinen Gesang- und Gebetbuches

1 The old tune for the 100th Psalm and Croft's tune for the 104th are almost the only exceptions, unless " God save the King " may be classed under " hymnody." In Scotland also the tune for the 124th Psalm is associated with its proper text.

(1833) and Allgenteines evangelisches Gesang- und Gebetbuch (1846); Catherine Winkworth, Christian Singers of Germany (1869) and Lyra Germanica (1855) ; Catherine H. Dunn, Hymns from the German (1857); Frances E. Cox, Sacred Hymns from the German (London, 1841); Massie, Lyra domestica (i860); Appendix on Scottish Psalmody in D. Laing's edition of Baillie's Letters and Journals (1841-1842); J. and C. Wesley, Collection of Psalms and Hymns (1741); Josiah Miller, Our Hymns, their Authors and Origin (1866); John Gadsby, Memoirs of the Principal Hymn-writers (3rd ed., 1861); L. C. Biggs, Annotations to Hymns Ancient and Modern (1867); Daniel Sedgwick, Comprehensive Index of Names of Original Authors of Hymns (2nd ed., 1863); R. E. Prothero, The Psalms in Human Life (1907); C. J. Brandt and L. Helweg\ Den danske Psalmedigtning (Copenhagen, 1846-1847); J. N. Skaar, Norsk Salmehistorie (Bergen, 1879-1880); H. Schiick, Svensk Literaturhistoria (Stockholm, 1890); Rudolf Wolkan, Geschichte der deutschen Literatur in Bohmen, 246-256, and Das deutsche Kirchenlied der bohm. Bruder (Prague, 1891); Zahn, Die geistlichen Lieder der Briider in Bohmen, Mdhren u. Polen (Nuremberg, 1875); and J. Muller, " Bohemian Brethren's Hymnody," in J. Julian's Dictionary of Hymnology.

For account of hymn-tunes, &c, see W. Cowan and James Love, Music of the Church Hymnody and the Psalter in Metre (London, 1901); and Dickinson, Music in the History of the Western Church (New York, 1902); S. Kummerle, Encyklopddie der evangelischen Kirchenmusik (4 vols., 1888-1895); Chr. Palmer, Evangelische

Hymnologie (Stuttgart, 1865); and P. Utto Kornmuller, Lexikon der kirchlichen Tonkunst (1891).

HYPAETHROS (Gr. vwaiBpos, beneath the sky, in the open air, wo, beneath, and aidrip, air), the Greek term quoted by Vitruvius (iii. 2) for the opening in the middle of the roof of decastyle temples, of which " there was no example in Rome, but one in Athens in the temple of Jupiter Olympius, which is octastyle." But at the time he wrote (c. 25 B.C.) the cella of this temple was unroofed, because the columns which had been pro- vided to carry, at all events, part of the ceiling and roof had been taken away by Sulla in 80 B.C. The decastyle temple of Apollo Didymaeus near Miletus was, according to Strabo (c. 50 B.C.), unroofed, on account of the vastness of its cella, in which precious groves of laurel bushes were planted. Apart from these two examples, the references in various writers to an opening of some kind in the roofs of temples dedicated to particular deities, and the statement of Vitruvius, which was doubtless based on the writings of Greek authors, that in decastyle or large temples the centre was open to the sky and without a roof (medium autem sub divo est sine tecto), render the existence of the hypaethros probable in some cases; and therefore C. R. Cockerell's discovery in the temple at Aegina of two fragments of a coping-stone, in which there were sinkings on one side to receive the tiles and covering tiles, has been of great importance in the discussion of this subject. In the conjectural restoration of the opaion or opening in the roof shown in Cockerell's drawing, it has been made needlessly large, having an area of about one quarter of the superficial area of the cella between the columns, and since in the Pantheon at Rome the relative proportions of the central opening in the dome and the area of the Rotunda are 1: 22, and the light there is ample, in the clearer atmosphere of Greece it might have been less. The larger the opening the more con- spicuous would be the notch in the roof which is so greatly objected to; in this respect T. J. Hittorff would seem to be nearer the truth when, in his conjectural restoration of Temple R. at Selinus, he shows an opaion about half the relative size shown in Cockerell's of that at Aegina. the coping on the side elevation being much less noticeable. The problem was apparently solved in another way at Bassae, where, in the excavations of the temple of Apollo by Cockerell and Baron Haller von Hallerstein, three marble tiles were found with pierced openings in them about 18 in. by 10 in. ; five of these pierced tiles on either side would have amply lighted the interior of the cella, and the amount of rain passing through (a serious element to be considered in a country where torrential rains occasionally fall) would not be very great or more than could be

retained to dry up in the cella sunk pavement. In favour of both these methods of lighting the interior of the cella, the sarcophagus tomb at Cyrene, about 20 ft. long, carved in imitation of a temple, has been adduced, because, on the top of the roof and in its centre, there is a raised coping, and a similar feature is found on a tomb found near Delos; an examfAt from

Crete now in the British Museum shows a pierced tile on each side of the roof, and a large number of pierced tiles have been found in Pompeii, some of them surrounded with a rim identical with that of the marble tiles at Bassae. On the other hand, there are many authorities, among them Dr W. Dorpfeld, who have adhered to their original opinion that it was only through the open doorway that light was ever admitted into the cella, and with the clear atmosphere of Greece and the reflections from the marble pavement such lighting would be quite sufficient. There remains still another source of light to be considered, that passing through the Parian marble tiles of the roof; the superior translucency of Parian to any other marble may have suggested its employment for the roofs of temples, and if, in the framed ceilings carried over the cella, openings were left, some light from the Parian tile roof might have been obtained. It is possibly to this that Plutarch refers when describing the ceiling and roof of the temple of Demeter at Eleusis, where the columns in the interior of the temple carried a ceiling, probably constructed of timbers crossing one another at right angles, and one or more of the spaces was left open, which Xenocles surmounted by a roof formed of tiles.

James Fergusson put forward many years ago a conjectural restoration in which he adopted a clerestory above the super-imposed columns inside the cella; in order to provide the light for these windows he indicated two trenches in the roof, one on each side, and pointed out that the great Hall of Columns at Karnak was lighted in this way with clerestory windows; but in the first place the light in the latter was obtained over the flat roofs covering lower portions of the hall, and in the second place, as it rarely rains in Thebes, there could be no difficulty about the drainage, while in Greece, with the torrential rains and snow, these trenches would be deluged with water, and with all the appliances of the present day it would be impossible to keep these clerestory windows water- tight. There is, however, still another objection to Fergusson's theory; the water collecting in these trenches on the roof would have to be discharged, for which Fergusson's suggestions are quite inadequate, and the gargoyles shown in the cella wall would make the peristyle insupportable just at the time when it was required for shelter. No drainage otherwise of any kind has ever been found in any Greek

temple, which is fatal to Fergusson's view. Nor is it in accordance with the definition " open to the sky." English cathedrals and churches are all lighted by clerestory windows, but no one has described them as open to the sky, and although Vitru- vius's statements are sometimes confusing, his description is far too clear to leave any misunderstanding as to the lighting of temples (where it was necessary on account of great length) through an opening in the roof.

There is one other theory which has been put forward, but which can only apply to non-peristylar temples, — that light and air was admitted through the metopes, the apertures between the beams crossing the cella, — and it has been assumed that because Orestes was advised in one of the Greek plays to climb up and look through the metopes of the temple, these were left open ; but if Orestes could look in, so could the birds, and the statue of the god would be defiled. The metopes were probably filled in with shutters of some kind which Orestes knew how to open. (R.P.S.)

HYPALLAGE (Gr. vwaWayi], interchange or exchange), a rhetorical figure, in which the proper relation between two words according to the rules of syntax are inverted. The stock instance is that in Virgil, Aen. iii. 61, where dare dassibus austros, to give winds to the fleet, is put for dare classes austris, to give the fleet to the winds. The term is also loosely applied to figures of speech properly known as " metonymy " and, generally, to any striking turn of expression.

HYPATIA ('T7rorta) (c. a.d. 370-415) mathematician and philosopher, born in Alexandria, was the daughter of Theon, also a mathematician and philosopher, author of scholia on Euclid and a commentary on the Almagest, in which it is suggested … that he was assisted by Hypatia (on the 3rd book). After lecturing in her native city, Hypatia ultimately became the recognized head of the Neopla tonic school there (c. 400). Her great eloquence and rare modesty and beauty, combined with her remarkable intellectual gifts, attracted to her class-room a large number of pupils. Among these was Synesius, afterwards (c. 410) bishop of Ptolema'is, several of whose letters to her, full of chivalrous admiration and reverence, are still extarit. Suidas, misled by an incomplete excerpt in Photius from the life of Isidorus (the Neoplatonist) by Damascius. states that Hypatia

was the wife of Isidorus; but this is chronologically impossible, since Isidorus could not have been born before 434 (see Hoche in Philologus) . Shortly after the accession of Cyril to the patriarch- ate of Alexandria in 412, owing to her intimacy with Orestes, the pagan prefect of the city, Hypatia was barbarously murdered by the Nitrian monks and the fanatical Christian mob (March 415). Socrates has related how she was torn from her chariot, dragged to the Caesareum (then a Christian church), stripped naked, done to death with oyster-shells (oorpdjcois avuKov, perhaps " cut her throat ") and finally burnt piecemeal. Most prominent among the actual perpetrators of the crime was one Peter, a reader; but there seems little reason to doubt Cyril's complicity (see Cyril of Alexandria).

Hypatia, according to Suidas, was the author of commentaries on the Arithmetica of Diophantus of Alexandria, on the Conies of Apollonius of Perga and on the astronomical canon (of Ptolemy). These works are lost; but their titles, combined with expressions in the letters of Synesius, who consulted her about the construction of an astrolabe and a hydroscope, indicate that she devoted herself specially to astronomy and mathematics. Little is known of her philosophical opinions, but she appears to have embraced the intellectual rather than the mystical side of Neoplatonism, and to have been a follower of Plotinus rather than of Porphyry and Iamblichus. Zeller, however, in his Outlines of Greek Philosophy (1886, Eng. trans, p. 347), states that " she appears to have taught the Neoplatonic doctrine in the form in which Iamblichus had stated it." A Latin letter to Cyril on behalf of Nestorius, printed in the Collectio nova con- ciliorum, i. (1623), by Stephanus Baluzius (Etienne Baluze, q.v.), and sometimes attributed to her, is undoubtedly spurious. The story of Hypatia appears in a considerably disguised yet still recognizable form in the legend of St Catherine as recorded in the Roman Breviary (November 25), and still more fully in the Martyr ologies (see A.B. Jameson, Sacred and Legendary Art (1867) ii. 467.

The chief source for the little we know about Hypatia is the account given by Socrates (Hist, ecclesiastica, vii. 15). She is the subject of an epigram by Palladas in the Greek Anthology (ix. 400). See Pabricius, Bibliotheca Graeca (ed. Harles), ix. 187; John Toland, Tetradymus (1720); R. Hoche in Philologus (i860), xv. 435; monographs by Stephan Wolf (Czernowitz, 1879), H. Ligier (Dijon, 1880) and W. A. Meyer (Heidelberg, 1885), who devotes attention to the relation of Hypatia to the chief representatives of Neoplatonism; J. B. Bury, Hist, of the Later Roman Empire (1889), i. 2o8,3i7;A.Guldenpenning, Geschichte des ostromischen Reiches

unter A rcadius und Theodosius II. (Halle, 1885), p. 230; Wetzer and Welte, Kirchenlexikon, vi. (1889), from a Catholic standpoint. The story of Hypatia also forms the basis of the well-known historical romance by Charles Kingsley («853)-

HYPERBATON (Gr. forkpfiarov, a stepping over), the name of a figure of speech, consisting of a transposition of words from their natural order, such as the placing of the object before instead of after the verb. It is a common method of securing emphasis.

HYPERBOLA, a conic section, consisting of two open branches, each extending to infinity. It may be defined in several ways. The in solido definition as the section of a cone by a plane at a less inclination to the axis than the generator brings out the existence of the two infinite branches if we imagine the cone to be double and to extend to infinity. The in piano definition, i.e. as the conic having an eccentricity greater than unity, is a convenient starting-point for the Euclidian investigation. In projective geometry it may be defined as the conic which inter- sects the line at infinity in two real points, or to which it is possible to draw two real tangents from the centre. Analytically, it is defined by an equation of the second degree, of which the highest terms have real roots (see Conic Section) .

While resembling the parabola in extending to infinity, the curve has closest affinities to the ellipse. Thus it has a real centre, two foci, two directrices and two vertices; the transverse axis, joining the vertices, corresponds to the major axis of the ellipse, and the line through the centre and perpendicular to this axis is called the conjugate axis, and corresponds to the minor axis of the ellipse; about these axes the curve is symmetrical. The curve does not appear to intersect the conjugate axis, but the introduction of imaginaries permits us to regard it as cutting this axis in two unreal points. Calling the foci S, S', the real vertices A, A', the extremities

of the conjugate axis B, B' and the centre C, the positions of B, B' are given by AB = AB' = CS. If a rectangle be constructed about AA' and BB', the diagonals of this figure are the " asymptotes " of the curve; they are the tangents from the centre, and hence touch the curve at infinity. These two lines may be pictured in the in solido definition as the section of a cone by a plane through its vertex and parallel to the plane generating the hyperbola. If the asymptotes be perpendicular, or, in other words, the principal axes be equal, the curve is called the rectangular hyperbola. The hyper- bola which has for its transverse and conjugate axes the transverse and conjugate axes of another hyperbola is said to be the conjugate hyperbola.

Some properties of the curve will be briefly stated; If PN be the ordinate of the point P on the curve, AA' the vertices, X the meet of the directrix and axis and C the centre, then PN 2 : AN.NA': : SX 2 :

AX.AX, i.e. PN 2 is to AN.NA' in a constant ratio. The circle on AA' as diameter is called the auxiliarly circle; obviously AN.NA' equals the square of the tangent to this circle from N, and hence the ratio of PN to the tangent to the auxiliarly circle from N equals the ratio of the conjugate axis to the transverse. We may observe that the asymptotes intersect this circle in the same points as the directrices. An important property is: the difference of the focal distances of any point on the curve equals the transverse axis. The tangent at any point bisects the angle between the focal dis- tances of the point, and the normal is equally inclined to the focal distances. Also the auxiliarly circle is the locus of the feet of the per- pendiculars from the foci on any tangent. Two tangents from any point are equ»lly inclined to the focal distance of the point. If the tangent at P meet the conjugate axis in t, and the transverse in N, then Ct. PN = BC 2 ; similarly if g and G be the corresponding inter- sections of the normal, PG : Pg : : BC 2 : AC 2 . A diameter is a line through the centre and terminated by the curve : it bisects all chords parallel to the tangents at its extremities; the diameter parallel to these chords is its conjugate diameter. Any diameter is a mean proportional between the transverse axis and the focal chord parallel to the diameter. Any line cuts off equal distances between the curve and the asymptotes. If the tangent at P meets the asymptotes in R, R', then CR.CR' = CS 2 . The geometry of the rectangular hyper- bola is simplified by the fact that its principal axes are equal.

Analytically the hyperbola is given by ax 1 -)-2hxy-$-by 1 +2gx-- 2/ y+c = o wherein ab>h 2 . Referred to the centre this becomes Ax 2 t;2Hry+B;y 2 -|-C=o; and if the axes of coordinates be the principal axes of the curve, the equation is further simplified to Ax 2 -By 2 = C, or if the semi-transverse axis be a, and the semi- conjugate b, x? jo?-y i lb i = l. This is the most commonly used form. In the rectangular hyperbola a = b; hence its equation is* 2 y 2 = o. The equations to the asymptotes are x/a= ˆyjb and x= =fcy respec tively. Referred to the asymptotes as axes the general equation becomes #y = £ 2 ; obviously the axes are oblique in the general hyperbola and rectangular in the rectangular hyperbola. The values

and

respectively. (See

of the constant k 2 are j(o 2 +fc 2) Geometry: Analytical; Projective.)

HYPERBOLE (from Gr. wrep/3dXW, to throw beyond), a figure of

rhetoric whereby the speaker expresses more than the truth, in order to produce a vivid impression; hence, an exaggeration.

HYPERBOREANS (‘TirepjSopcoi, ‘TmpPdpeioi.) , a mythical people intimately connected with the worship of Apollo. Their name does not occur in the Iliad or the Odyssey, but Herodotus (iv. 32) states that they were mentioned in Hesiod and in the Epigoni, an epic of the Theban cycle. According to Herodotus, two maidens, Opis and Arge, and later two others, Hyperoche and Laodice, escorted by five men, called by the Delians Per- pherees, were sent by the Hyperboreans with certain offerings to Delos. Finding that their messengers did not return, the Hyperboreans adopted the plan of wrapping the offerings in wheat-straw and requested their neighbours to hand them on to the next nation, and so on, till they finally reached Delos. The theory of H. L. Ahrens, that Hyperboreans and Perpherees are identical, is now widely accepted. In some of the dialects of northern Greece (especially Macedonia and Delphi) <£ had a tendency to become /3. The original form of Ilep

the mountains,” that is, in heaven. Under the influence of the derivation from Popias, the home of the Hyperboreans was placed in a region beyond the north wind, a paradise like the Elysian plains, inaccessible by land or sea, whither Apollo could remove those mortals who had lived a life of piety. It was a land of perpetual sunshine and great fertility; its inhabitants were free from disease and war. The duration of their life was iooo years, but if any desired to shorten it, he decked himself with garlands and threw himself from a rock into the sea. The close connexion of the Hyperboreans with the cult of Apollo may be seen by comparing the Hyperborean myths, the characters of which by their names mostly recall Apollo or Artemis (Agyieus, Opis, Hecaergos, Loxo), with the ceremonial of the Apolline worship. No meat was eaten at the Pyanepsia; the Hyper- boreans were vegetarians. At the festival of Apollo at Leucas a victim flung himself from a rock into the sea, like the Hyper- borean who was tired of life. According to an Athenian decree (380 B.C.) asses were sacrificed to Apollo at Delphi, and Pindar (Pythia, x. 33) speaks of ” hecatombs of asses ” being offered to him by the Hyperboreans. As the latter conveyed sacrificial gifts to Delos hidden in wheat-straw, so at the Thargelia a sheaf of corn was carried round in procession, concealing a symbol of the god (for other resemblances see Crusius’s article). Although the Hyperborean

legends are mainly connected with Delphi and Delos, traces of them are found in Argos (the stories of Heracles, Perseus, Io), Attica, Macedonia, Thrace, Sicily and Italy (which Niebuhr indeed considers their original home). In modern times the name has been applied to a group of races, which includes the Chukchis, Koryaks, Yukaghirs, Ainus, Gilyaks and Kamcha- dales, inhabiting the arctic regions of Asia and America. But if ever ethnically one, the Asiatic and American branches are now as far apart from each other as they both are from the Mongolo- Tatar stock.

See O. Crusius in Roscher's Lexikon der Mythologie; O. Schroder in Archiv fiir Religionswissenschaft (1904), viii. 69; W. Mann- hardt, Wald- und Feldkulte (1905) ; L. R. Farnell, Cults of the Greek States (1907), iv. 100.

HYPEREIDES (c. 390-322 B.C.), one of the ten Attic orators, was the son of Glaucippus, of the deme of Collytus. Having studied under Isocrates, he began life as a writer of speeches for the courts, and in 360 he prosecuted Autocles, a general charged with treason in Thrace (frags. 55-65, Blass). At the time of the so-called " Social War " (358-355) he accused Aristophon, then one of the most influential men at Athens, of malpractices (frags. 40-44, Blass), and impeached Philocrates (343) for high treason. From the peace of 346 to 324 Hypereides supported Demosthenes in the struggle against Macedon; but in the affair of Harpalus he was one of the ten public prosecutors of Demosthenes, and on the exile of his former leader he became the head of the patriotic party (324). After the death of Alexander, he was the chief promoter of the Lamian war against Antipater and Craterus. After the decisive defeat at Crannon (322), Hypereides and the other orators, whose surrender was demanded by Antipater, were condemned to death by the Athenian partisans of Macedonia. Hypereides fled to Aegina, but Antipater's emissaries dragged him from the temple of Aeacus, where he had taken refuge, and put him to death; according to others, he was taken before Antipater at Athens or Cleonae. His body was afterwards removed to Athens for burial.

Hypereides was an ardent pursuer of " the beautiful," which in his time generally meant pleasure and luxury. His temper was easy-going and humorous; and hence, though in his develop- ment of the periodic sentence he followed Isocrates, the essential tendencies of his style are those of Lysias, whom he surpassed, however, in the richness of his vocabulary and in the variety of his powers. His diction was plain and forcible, though he occasionally indulged in long compound words probably borrowed from the Middle Comedy,

with which, and with the everyday life of his time, he was in full sympathy. His composition was simple. He was specially distinguished for subtlety of expression, grace and wit, as well as for tact in approaching his case and

handling his subject matter. Sir R. C. Jebb sums up the criticism of pseudo-Longinus (De sublimitate, 34) in the phrase — " Hypereides was the Sheridan of Athens."

*Seventy-seven speeches were attributed to Hypereides, of which twenty-five were regarded as spurious even by ancient critics. It is said that a MS. of most of the speeches was in existence in the 16th century in the library of Matthias Corvinus, king of Hungary, at Ofen, but was destroyed at the capture of the city by the Turks in 1526. Only a few fragments were known until comparatively recent times. In 1847 large fragments of his speeches Against Demosthenes (see above) and For Lycophron (incidentally interesting as elucidating the order of marriage processions and other details of Athenian life, and the Athenian government of Lemnos), and the whole of the For Euxenippus (c. 330, a locus classicus on elaayyekiai, or state prosecutions), were found in a tomb at Thebes in Egypt, and in 1856 a considerable portion of a \byos *irird<£ios, a Funeral Oration over Leosthenes and his comrades who had fallen in the Lamian war, the best extant specimen of epideictic oratory (see Babington, Churchill). Towards the end of the century further discoveries were made of the conclusion of the speech Against Philippides (dealing with a ypari irapanojuwi', or indictment for the proposal of an unconstitutional measure, arising out of the disputes of the Macedonian and anti-Macedonian parties at Athens), and of the whole of the Against Athenogenes (a perfumer accused of fraud in the sale of his business). These have been edited by F. G. Kenyon (1893). An important speech that is lost is the Deliacus (frags. 67-75, Blass) on the presidency of the Delian temple claimed by both Athens and Delos, which was adjudged by the Amphictyons to Athens.*

On Hypereides generally see pseudo-Plutarch, Decern oratorum vitae; F. Blass, Attische Beredsamkeit, iii.; R. C. Jebb, Attic Orators, ii. 381. A full list of editions and articles is given in F. Blass, Hyperidis orationes sex cum ceterarum fragmentis (1894, Teubner series), to which may be added I. Bassi, Le Quattro Orazioni di Iperide (introduction and notes, 1888), and J. E. Sandys in Classical Review (January 1895) (a review of the editions of Kenyon and Blass). For the discourse against Athenogenes see H. Weil, Etudes sur Vanliquiie grecque (1900).

HYPERION, in Greek mythology, one of the Titans, son of Uranus and Gaea and father of Helios, the sun-god (Hesiod, Theog. 134, 371; Apollodorus i. 1. 2). In the well-known passage in Shakespeare {Hamlet, i. 2: " Hyperion to a satyr," where as in other poets the vowel t though really long, is shortened for metrical reasons) Hyperion is used for Apollo as expressive of the idea of beauty. The name is often used as an epithet of Helios, who is himself sometimes called simply Hyperion. It is explained as (t) he who moves above (xmtp-uav) , but the quantity of the vowel is against this; (2) he who is above (wrepi-cw). Others take it to be a patronymic in form, like ~Kpovlcov, MoKlcov.

HYPERSTHENE, a rock-forming mineral belonging to the group of orthorhombic pyroxenes. It differs from the other members (enstatite [q.v.] and bronzite) of this group in containing a considerable amount of iron replacing magnesium: the chemical formula is (Mg,Fe)Si0 3 . Distinctly developed crystals are rare, the mineral being usually found as foliated masses embedded in those igneous rocks— norite, hypersthene-andesite, &c— of which it forms an essential constituent. The coarsely grained labradorite-hypersthene-rock (norite) of the island of St Paul off the coast of Labrador has furnished the most typical material; and for this reason the mineral has been known as " Labrador hornblende " or paulite. The colour is brownish- black, and the pleochrism strong; the hardness is 6, and the specific gravity 3-4-3-5. On certain surfaces it displays a brilliant copper-red metallic sheen or schiller, which has the same origin as the bronzy sheen of bronzite (q.v.), but is even more pronounced. Like bronzite, it is sometimes cut and polished for ornamental purposes. ˆ (L. J. S.) " .

HYPERTROPHY (Gr. inrtp, over, and rpodA\, nourishment), a term in medicine employed to designate an abnormal increase in bulk of one or more of the organs or component tissues of the body (see Pathology). In its strict sense this term can only be applied where the increase affects the natural textures of a part, and is not applicable where the enlargement is due to the presence of some extraneous morbid formation. Hypertrophy of a part may manifest itself either by simply an increase in the size of its constituents, or by this combined with an increase in their number (hyperplasia). In many instances both are associated.

HYPNOTISM

The conditions giving rise to hypertrophy are the reverse of those described as producing Atrophy (q.v.). They are concisely stated by Sir James Paget as being chiefly or only three, namely: (i) the increased exercise of a part in its healthy functions; (2) an increased accumulation in the blood of the particular materials which a part appropriates to its nutrition or in secretion; and (3) an increased afflux of healthy blood.

Illustrations are furnished of the first of these conditions by the high development of muscular tissue under habitual active exercise; of the second in the case of obesity, which is an hyper- trophy of the fatty tissues, the elements of which are furnished by the blood; and of the third in the occasional overgrowth of hair in the neighbourhood of parts which are the seat of inflam- mation. Obviously therefore, in many instances, hypertrophy cannot be regarded as a deviation from health, but rather on the contrary as indicative of a high degree of nutrition and physical power. Even in those cases where it is found associated with disease, it is often produced as a salutary effort of nature to compensate for obstructions or other difficulties which have arisen in the system, and thus to ward oft evil consequences. No better example of this can be seen than in the case of certain forms of heart disease, where from defect at some of the natural orifices of that organ the onward flow of the blood is interfered with, and would soon give rise to serious embarrassment to the circulation, were it not that behind the seat of obstruction the heart gradually becomes hypertrophied, and thus acquires greater propelling power to overcome the resistance in front. Again, it has been noticed, in the case of certain double organs such as the kidneys, that when one has been destroyed by disease the other has become hypertrophied to such a degree as enables it to discharge the functions of both.

Hypertrophy may, however, in certain circumstances con- stitute a disease, as in goitre and elephantiasis (q.v.), and also in the case of certain tumours and growths (such as cutaneous excrescences, fatty tumours, mucous polypi, &c), which are simply enlargements of normal textures. Hypertrophy does not in all cases involve an increase in bulk; for, just as in atrophy there may be no diminution in the size of the affected organ, so in hypertrophy there may be no increase. This is apt to be the case where certain only of the elements of an organ undergo increase, while the others remain unaffected or are actually atrophied by the pressure of the hypertrophied tissue, as is seen in the disease known as cirrhosis of the liver.

A spurious hypertrophy is observed in the rare disease to which G. B. Duchenne applied the name of pseudo-hypertropkic paralysis. This

ailment, which appears to be confined to children, consists essentially of a progressive loss of power accompanied with a remarkable enlargement of certain muscles or groups of muscles, more rarely of the whole muscular system. This increase of bulk is, however, not a true hypertrophy, but rather an excessive development of connective tissue in the substance of the muscles, the proper texture of which tends in consequence to undergo atrophy or degeneration. The appearance presented by a child suffering from this disease is striking. The attitude and gait are remarkably altered, the child standing with shoulders thrown back, small of the back deeply curved inwards, and legs wide apart, while walking is accompanied with a peculiar swinging or rocking movement. The calves of the legs, the buttocks, the muscles of the back, and occasionally other muscles, are seen to be unduly enlarged, and contrast strangely with the general feebleness. The progress of the disease is marked by increasing failure of locomotory power, and ultimately by com- plete paralysis of the limbs. The malady is little amenable to treatment, and, although often prolonged for years, generally proves fatal before the period of maturity.

HYPNOTISM, a term now in general use as covering all that pertains to the art of inducing the hypnotic state, or hypnosis, and to the study of that state, its conditions, peculiarities and effects. Hypnosis is a condition, allied to normal sleep (Gr. vttvos), which can be induced in a large majority of normal persons. Its most characteristic and constant symptom is the increased suggestibility of the subject (see Suggestion).

Other symptoms are very varied and differ widely in different subjects and in the same subject at different times. There can be no doubt that the increased suggestibility and all the other symptoms of hypnosis imply some abnormal condition of the brain of a temporary and harmless nature. It would seem that in all ages and in almost all countries individuals have occasionally fallen into abnormal states of mind more or less closely resembling the hypnotic state, and have thereby excited the superstitious wonder of their fellows. In some cases the state has been deliberately induced, in others it has appeared spontaneously, generally under the influence of some emotional excitement. The most familiar of these allied states is the somnambulism or sleep-walking to which some persons seem to be hereditarily disposed. Of a rather different type are the states of ecstasy into which religious enthusiasts have occasion- ally fallen and which were especially frequent among the peoples of Europe during the middle ages. While in this condition individuals have appeared to be insensitive to all impressions made on their sense-

organs, even to such as would excite acute pain in normal persons, have been capable of maintaining rigid postures for long periods of time, have experienced vivid hallucinations, and have produced, through the power of the imagination, extraordinary organic changes in the body, such as the bloody stigmata on the hands and feet in several well- attested instances. It has been proved in , recent years that effects of all these kinds may be produced by hypnotic suggestion. Different again, but closely paralleled by some subjects in hyp- nosis, is the state of latah into which a certain proportion of persons of the Malay race are liable to fall. These persons, if their attention is suddenly and forcibly drawn to any other person, will begin to imitate his every action and attitude, and may do so in spite of their best efforts to restrain their imitative movements. Among the half-bred French-Canadians of the forest regions of Canada occur individuals, known as " jumpers," who are liable to fall suddenly into a similar state of abject imitativeness, and the same peculiar behaviour has been observed among some of the remote tribes of Siberia.

The deliberate induction of states identical with, or closely allied to, hypnosis is practised by many barbarous and savage peoples, generally for ceremonial purposes. Thus, certain dervishes of Algiers are said to induce in themselves, by the aid of the sound of drums, monotonous songs and movements, a state in which they are insensitive to pain, and a similar practice of religious devotees is reported from Tibet. Perhaps the most marvellous achievement among well-attested cases of this sort is that of certain yogis of Hindustan; by long training and practice they seem to acquire the power of arresting almost completely all their vital functions. An intense effort of abstrac- tion from the impressions of the outer world, a prolonged fixation of the eyes upon the nose or in some other strained position and a power of greatly slowing the respiration, these seem to be important features of their procedure for the attainment of their abnormal states.

In spite of the wide distribution in time and space, and the not very infrequent occurrence, of these instances of states identical with or allied to hypnosis, some three centuries of enthusiastic investigation and of bitter controversy were required to establish the occurrence of the hypnotic state among the facts accepted by the world of European science. Scientific interest in them may be traced back at least as far as the end of the 16th century. Paracelsus had founded the " sympathetic system " of medicine, according to which the stars and other bodiet, especially magnets, influence men by means of a subtle emanation or fluid that pervades all space. J. B. van Helmont,

a dis- tinguished man of science of the latter part of the 16th century, extended this doctrine by teaching that a similar magnetic fluid radiates from men, and that it can be guided by their wills to influence directly the minds and bodies of others. In the middle of the 17th century there appeared in England several persons who claimed to have the power of curing diseases by stroking with the hand. Notable amongst these was Valentine Greatrakes, of Affane, in the county of Waterford, Ireland, who was born in

February 1628, and who attracted great attention in England by his supposed power of curing the king's evil, or scrofula. Many of the most distinguished scientific and theological men of the day, such as Robert Boyle and R. Cudworth, witnessed and attested the cures supposed to be effected by Greatrakes, and thousands of sufferers crowded to him from all parts of the kingdom. About the middle of the 18th century John Joseph Gassner, a Roman Catholic priest in Swabia, took up the notion that the majority of diseases arose from demoniacal possession, and could only be cured by exorcism. His method was un- doubtedly similar to that afterwards followed by Mesmer and others, and he had an extraordinary influence over the nervous systems of his patients. Gassner, however, believed his power to be altogether supernatural.

But it was not until the latter part of the 18th century that the doctrine of a magnetic fluid excited great popular interest and became the subject of fierce controversy in the scientific world. F. A. Mesmer (q.v.), a physician of Vienna, was largely instrumental in bringing the doctrine into prominence. He developed it by postulating a specialized variety of magnetic fluid which he called animal magnetism; and he claimed to be able to cure many diseases by means of this animal magnetism, teaching, also, that it may be imparted to and stored up in inert objects, which are thereby rendered potent to cure disease.

It would seem that Mesmer himself was not acquainted with the artificial somnambulism which for nearly a century was called mesmeric or magnetic sleep, and which is now familiar as hypnosis of a well-marked degree. It was observed and described about the year 1780 by the marquis de Puysegur, a disciple of Mesmer, who showed that, while subjects were in this state, not only could some of their diseases be cured, but also their movements could be controlled

by the " magnetizer," and that they usually remembered nothing of the events of the period of sleep when restored to normal consciousness. These are three of the most important features of hypnosis, and the modern study of hypnot- ism may therefore be said to have been initiated at this date by Puysegur. For, though it is probable that this state had often been induced by the earlier magnetists, they had not recognized that the peculiar behaviour of their patients resulted from their being plunged into this artificial sleep, but had attributed all the symptoms they observed to the direct physical action of external agents upon the patients.

The success of Mesmer and his disciples, especially great in the fashionable world, led to the appointment in Paris of a royal commission for the investigation of their claims. The commission, which included men of great eminence, notably A. L. Lavoisier and Benjamin Franklin, reported in the year 1784 that it could not accept the evidence for the existence of the magnetic fluid; but it did not express an opinion as to the reality of the cures said to be effected by its means, nor as to the nature of the magnetic sleep. This report and the social up- heavals of the following years seem to have abolished the public interest in " animal magnetism " for the space of one generation; after which Alexandre Bertrand, a Parisian physician, revived it by his acute investigations and interpretations of the pheno- mena. Bertrand was the first to give an explanation of the facts of the kind that is now generally accepted. He exhibited the affinity of the " magnetic sleep " to ordinary somnambulism, and he taught that the peculiar effects are to be regarded as due to the suggestions of the operator working themselves out in the mind and body of the " magnetized " subject, i.e. he regarded the influence of the magnetizer as exerted in the first instance on the mind of the subject and only indirectly through the mind upon the body. Shortly after this revival of public interest, namely in the year 1831, a committee of the Academy of Medicine of Paris reported favourably upon " magnetism " as s thera- peutic agency, and before many years had elapsed it was extensively practised by the physicians of all European countries, with few exceptions, of which England was the most notable. Most of the practitioners of this period adhered to the doctrine of the magnetic fluid emanating from the operator to his patient, and the acceptance of this doctrine was commonly combined

with belief in phrenology, astrology and the influence of metals and magnets, externally applied, in curing disease and in pro- ducing a variety of strange sensations and other affections of the mind. These beliefs, claiming to rest upon carefully observed facts, were given a new elaboration and a more imposing claim to be scientifically

established by the doctrine of odylic force propounded by Baron Karl Von Reichenbach. In this mass of ill-based assertion and belief the valuable truths of " animal magnetism " and the psychological explanations of them given by Bertrand were swamped and well-nigh lost sight of. For it was this seemingly inseparable association between the facts of hypnotism and these bizarre practices and baseless beliefs that blinded the larger and more sober part of the scientific world, and led them persistently to assert that all this group of alleged phenomena was a mass of quackery, fraud and superstition. And the fact that magnetism was practised for pecuniary gain, often in a shameless manner, by exponents who claimed to cure by its means every conceivable ill, rendered this attitude on the part of the medical profession inevitable and perhaps excusable, though not justifiable. It was owing to this baleful association that John Elliotson, one of the leading London physicians of that time, who became an ardent advocate of " magnetism " and who founded and edited the Zoist in the interests of the subject, was driven out of the profession. This association may perhaps be held, also, to excuse the hostile attitude of the medical profession towards James Esdaile, a surgeon, who, practising in a government hospital in Calcutta among the natives of India, performed many major operations, such as the amputation of limbs, painlessly and with the most excellent results by aid of the " magnetic " sleep. For both Elliotson and Esdaile, though honourable practitioners, accepted the doctrine of the " magnetic" fluid and many of the erroneous beliefs that commonly were bound up with it.

In 1841 James Braid, a surgeon of Manchester, rediscovered independently Bertrand's physiological and psychological ex- planations of the facts, carried them further, and placed " hypnotism," as he named the study, on a sound basis. Braid showed that subjects in " magnetic " sleep, far from being in a profoundly insensitive condition, are often abnormally susceptible to impressions on the senses, and showed that many of the peculiarities of their behaviour were due to suggestions, made verbally or otherwise, but unintentionally, by the operator or by onlookers.

It seems, on looking back on the history of hypnotism, that at this time it was in a fair way to secure general recognition as a most interesting subject of psychological study and a valuable addition to the resources of the physician. But it was destined once more to be denied its rights by official science and to fall back into disrepute. This was due to the coincidence about the year 1848 of two events of some importance, namely — the dis- covery of the anaesthetic properties of chloroform and the sudden rise of modern spiritualism.

The former afforded a very con- venient substitute for the most obvious practical application of hypnotism, the production of anaesthesia during surgical operations; the latter involved it once more in a mass of fraud and superstition, and, for the popular mind, drove it back to the region of the marvellous, the supernatural and the dangerous, made it, in fact, once more a branch of the black art.

From this time onward there took place a gradual differentia- tion of the " animal magnetism " of the 18th century into two diverging branches, hypnotism and spiritualism, two branches which, however, are not yet entirely separated and, perhaps, never will be. At the same time the original system of " animal magnetism " has lived on in an enfeebled condition and is now very nearly, though not quite, extinct.*

In the development of hypnotism since the time of Braid we may distinguish three lines, the physiological, the psychological and the pathological. The last may be dismissed in a few words. Its principal representative was J. M. Charcot, who taught at the Salpetriere in Paris that hypnosis is essentially a symptom of a morbid condition of hysteria or hystero-epilepsy. This doctrine, which, owing to the great repute enjoyed by Charcot,

has done much to retard the application of hypnotism, is now completely discredited. The workers of the physiological party attached special importance to the fixation of the eyes, or to other forms of long continued and monotonous, or violent, sensory stimulation in the induction of hypnosis. They believed that by acting on the senses in these ways they induced a peculiar con- dition of the nervous system, which consisted in the temporary abolition of the cerebral functions and the consequent reduction of the subject to machine-like unconscious automatism. The leading exponent of this view was R. Heidenhain, professor of physiology at Breslau, whose experimental investigations played a large part in convincing the scientific world of the genuineness of the leading symptoms of hypnosis. The purely psychological doctrine of hypnosis puts aside all physical and physiological in- fluences and effects as of but little or no importance, and seeks a psychological explanation of the induction of hypnosis and of all the phenomena. This dates from 1884, when H. Bernheim, professor of medicine at Nancy, published his work De la Sugges- tion (republished in 1887 with a second part

on the therapeutics of hypnotism). Bernheim was led to the study of hypnotism by A. A. Liebeault, who for twenty years had used it very largely and successfully in his general practice among the poor of Nancy. Liebeault rediscovered independently, and Bernheim made known to the world the truths, twice previously discovered and twice lost sight of, that expectation is a most important factor in the induction of hypnosis, that increased suggestibility is its essential symptom, and that in general the operator works upon his patient by mental influences. Although they went too far in the direction of ignoring the peculiarity of the state of the brain in hypnosis and the predisposing effect of monotonous sensory stimulation, and in seeking to identify hypnosis with normal sleep, the views of the Nancy investigators have prevailed, and are now in the main generally accepted. Their methods of verbal suggestion have been adopted by leading physicians in almost all civilized countries and have been proved to be efficacious in the relief of many disorders ; and as a method of psychological investigation hypnotism has proved, especially in the hands of the late Ed. Gurney, of Dr Pierre Janet and of other investigators, capable of throwing much light on the constitution of the mind, has opened up a number of problems of the deepest interest, and has done more than any other of the many branches of modern psychology to show the limitations and comparative barrenness of the old psychology that relied on introspection alone and figured as a department of general philosophy. In England, " always the last to enter into the general movement of the European mind," the prejudice, incredulity and ignorant misrepresentation with which hypnotism has everywhere been received have resisted its progress more stubbornly than elsewhere; but even in England its reality and its value as a therapeutic agent have at last been officially recognized. In 1892, just fifty years after Braid clearly demonstrated the facts and published explanations of them almost identical with those now accepted, a committee of the British Medical Association reported favourably upon hypnotism after a searching investiga- tion; it is now regularly employed by a number of physicians of high standing, and the formation in 1907 of "The Medical Society for the Study of Suggestive Therapeutics " shows that the footing it has gained is likely to be made good.

Induction of Hypnosis. — It has now been abundantly proved that hypnosis can be induced in the great majority of normal persons, provided that they willingly submit themselves to the process. Several of the most experienced operators have suc- ceeded in hypnotizing more than 90% of the cases they have attempted, and most of them

are agreed that failure to induce hypnosis in any case is due either to lack of skill and tact on the part of the operator, or to some unfavourable mental con- dition of the subject. It has often been said that some races or peoples are by nature more readily hypnotizable than others; of the French people especially this has been maintained. But there is no sufficient ground for this statement. The differences that undoubtedly obtain between populations of different regions in respect to the case or difficulty with which a large

proportion of all persons can be hypnotized are sufficiently explained by the differences of the attitude of the public towards hypnotism; in France, e.g., and especially in Nancy, hypnotism has been made known to the public chiefly as a recognized auxiliary to the better known methods of medical treatment, whereas in England the medical profession has allowed the public to make acquaintance with hypnotism through the medium of disgusting stage-performances whose only object was to raise a laugh, and has, with few exceptions, joined in the general chorus of condemnation and mistrust. Hence in France patients submit themselves with confidence and goodwill to hypnotic treatment, whereas in England it is still necessary in most cases to remove an ill-based prejudice .before the treatment can be undertaken with hope of success. For the confidence and good- will of the patient are almost essential to success, and even after hypnosis has been induced on several occasions a patient may be so influenced by injudicious friends that he cannot again be hypnotized or, if hypnotized, is much less amenable to the power of suggestion. Various methods of hypnotization are current, but most practitioners combine the methods of Braid and of Bernheim. After asking the patient to resign himself passively into their hands, and after seating him in a comfort- able arm-chair, they direct him to fix his eyes upon some small object held generally in such a position that some slight muscular strain is involved in maintaining the fixation; they then suggest to him verbally the idea or expectation of sleep and the sensa- tions that normally accompany the oncoming of sleep, the heavi- ness of the eyes, the slackness of the limbs and so forth; and when the eyes show signs of fatigue, they either close them by gentle pressure or tell the subject to close them. Many also pass their hands slowly and regularly over the face, with or without contact. The old magnetizers attached great importance to such " passes," believing that by them the " magnetic fluid " was imparted to the patient; but it seems clear that, in so far as they contribute to induce hypnosis, it is in their character merely of gentle, monotonous, sensory stimulations. A well- disposed subject soon falls into a drowsy state and tends to pass into natural sleep; but by speech, by passes, or by

manipulating his limbs the operator keeps in touch with him, keeps his waning attention open to the impressions he himself makes. Most sub- jects then find it difficult or impossible to open their eyes or to make any other movement which is forbidden or said to be impossible by the operator, although they may be fully conscious of all that goes on about them and may have the conviction that if they did but make an effort they could break the spell. This is a light stage of hypnosis beyond which some subjects can hardly be induced to pass and beyond which few pass at the first attempt. But on successive occasions, or even on the first occasion, a favourable subject passes into deeper stages of hypnosis. Many attempts have been made to distinguish clearly marked and constantly occurring stages. But it seems now clear that the complex of symptoms displayed varies in all cases with the idiosyncrasies of the subject and with the methods adopted by the operator. In many subjects a waxy rigidity of the limbs appears spontaneously or can be induced by suggestion; the limbs then retain for long periods without fatigue any position given them by the operator. The most susceptible subjects pass into the stage known as artificial somnambulism. In this condition they continue to respond to all suggestions made by the operator, but seem as insensitive to all other impressions as a person in profound sleep or in coma; and on awaking from this condition they are usually oblivious of all that they have heaid^ said or done during the somnambulistic period. When in this last condition patients are usually more profoundly influenced by suggestions, especially post-hypnotic suggestions, than when in the lighter stages; but the lighter stages suffice for the pro- duction of many therapeutic effects. When a patient is com- pletely hypnotized, his movements, his senses, his ideas and, to some extent, even the organic processes over which he has no voluntary control become more or less completely subject to the suggestions of (he operator; and usually he is responsive to the operator alone (rapport) unless he is instructed by the

latter to respond also to the suggestions of other persons. If left to himself the hypnotized subject will usually awake to his normal state after a period which is longer in proportion to the depth of hypnosis; and the deeper stages seem to pass over into normal sleep. The subject can in almost every case be brought quickly back to the normal state by the verbal command of the operator.

The Principal Effects produced by Suggestion during Hypnosis. — The subject may not only be rendered incapable of contracting any of the muscles of the voluntary system, but may also be made to use them with extraordinarily great or sustained force (though by no means in all cases). He can with difficulty refrain from performing any action commanded by the operator, and usually carries out any simple command without hesitation. Any one of the sense-organs, or any sensory region such as the skin or deep tissues of one limb may be rendered anaesthetic by verbal suggestion, aided perhaps by some gentle manipulation of the part. On this fact depends the surgical application of hypnotism. Sceptical observers are always inclined to doubt the genuineness of the anaesthesia produced by a mere word of command, but the number of surgical operations performed under hypnotic anaesthesia suffices to put its reality beyond all ques- tion. A convincing experiment may, however, be made on almost any good subject. Anaesthesia of one eye may be suggested and its reality tested in the following way. Anaesthesia of the left eye may be suggested, and the subject be instructed to fix his gaze on a distant point and to give some signal as soon as he sees the operator's finger in the peripheral field of view. The operator then brings his finger slowly from behind and to the right forwards towards the subject's line of sight. The subject signals as soon as it crosses the normal temporal boundary of the field of view of the right eye. The operator then brings his finger forward from a point behind and to the left of the subject's head. The subject allows it to cross the monocular field of the left eye and signals only when the finger enters the field of vision of the right eye across its nasal boundary. Since few persons, other than physiologists or medical men, are aware of the relations of the boundaries of the monocular and binocular fields of vision, the success of this experiment affords proof that the finger remains invisible to the subject during its passage across the monocular field of the left eye. The abolition of pain, especially of neuralgias, the pain of rheumatic and other in- flammations, which is one of the most valuable applications of hypnotism, is an effect closely allied to the production of such anaesthesia.

It has often been stated that in hypnosis the senses may be rendered extraordinarily acute or hyperaesthetic, so that im- pressions too faint to affect the senses of the normal person may be perceived by the hypnotized subject; but in view of the fact that most observers are ignorant of the normal limits of sensitivity and discrimination, all such statements must be received with caution, until we have more convincing evidence than has yet been brought forward.

Positive and Negative Hallucinations are among the most striking

effects of hypnotic suggestion. A good subject may be made to experience an hallucinatory perception of almost any object, the more easily the less unusual and out of harmony with the surroundings is the suggested object. He may, e.g., be given a blank card and asked if he thinks it a good photograph of himself. He may then assent and describe the photograph in some detail, and, what is more astonishing, he may pick out the card as the one bearing the photograph, after it has been mixed with other similar blank cards. This seems to be due to the part played by points de rep'ere, insignificant details of surface or texture, which serve as an objective basis around which the hallucinatory image is constructed by the pictorial imagination of the subject. A negative hallucination may be induced by telling the subject that a certain object or person is no longer present, when he ignores in every way that object or person. This is more puzzling than the positive hallucination and will be referred to again in discussing the theory of hypnosis. Both kinds of hallucination tend to be systematically and logically

developed; if, e.g., the subject is told that a certain person is no longer visible, he may become insensitive to impressions made on any sense by that person.

Delusions, or false beliefs as to their present situation or past experiences may be induced in many subjects. On being assured that he is some other person, or that he is in some strange situation, the subject may accept the suggestion and adapt his behaviour with great histrionic skill to the induced delusion. It is probable that, many, perhaps all, subjects are vaguely aware, as we sometimes are in dreams, that the delusions and hallucinations they experience are of an unreal nature. In the lighter stages of hypnosis a subject usually remembers the events of his waking life, but in the deeper stages he is apt, while remembering the events of previous hypnotic periods, to be incapable of recalling his normal life; but in this respect, as also in respect to the extent to which on awaking he remembers the events of the hypnotic period, the suggestions of the operator usually play a determining part.

Among the organic changes that have been produced by hypnotic suggestion are slowing or acceleration of the cardiac and respiratory rhythms; rise and fall of body-temperature through two or three degrees; local erythema and even inflammation of the skin with vesication or exudation of small drops of blood; evacuation of the bowel and vomiting; modifications of the secretory activity of glands, especially of the sweat-glands.

Post-hypnotic Effects. — Most subjects in whom any appreciable degree of hypnosis can be induced show some susceptibility to post-hypnotic suggestion, i.e.ihty may continue to be influenced, when restored to the fully waking state, by suggestions made during hypnosis, more especially if the operator suggests that this shall be the case; as a rule, the deeper the stage of hypnosis reached, the more effective are post -hypnotic suggestions. The therapeutic applications of hypnotism depend in the main upon this post-hypnotic continuance of the working of suggestions. If a subject is told that on awaking, or on a certain signal, or after the lapse of a given interval of time from the moment of awaking, he will perform a certain action, he usually feels some inclination to carry out the suggestion at the appropriate moment. If he remembers that the action has been suggested to him he may refuse to perform it, and if it is one repugnant to his moral nature, or merely one that would make him appear ridiculous, he may persist in his refusal. But if the action is of a simple and ordinary nature he will usually perform it, remarking that he cannot be comfortable till it is done. If the subject was deeply hypnotized and remembers nothing of the hypnotic period, he will carry out the post-hypnotic suggestion in almost every case, no matter how complicated or absurd it may be, so long as it is not one from which his normal self would be extremely averse; and he will respond appropriately to the suggested signals, although he is not conscious of their having been named; he will often perform the action in a very natural way, and will, if questioned, give some more or less adequate reason for it. Such actions, determined by post-hypnotic suggestions of which no conscious memory remains, may be carried out even after the lapse of many weeks or even months. Inhibitions of movement, anaesthesia, positive and negative hallucinations, and delusions may also be made to persist for brief periods after the termination of hypnosis; and organic effects, such as the action of the bowels, the oncoming of sleep and the cessation of pain, may be determined by post-hypnotic suggestion. In short, it may be said that in a good subject all the kinds of suggestion which will take effect during hypnosis will also be effective if given as post-hypnotic suggestions.

Theory of the Hypnotic State. — Very many so called theories of hypnosis have been propounded, but few of them demand serious consideration. One author ascribes all the symptoms to cerebral anaemia, another to cerebral congestion, a third to temporary suppression of the functions of the cerebrum, a fourth to abnormal cerebral excitability, a fifth to the independent functioning of one hemisphere. Another seeks to explain all the facts by saying that in

hypnosis our normal consciousness dis- appears and is replaced by a dream-consciousness; and yet

another by the assumption that every human organism com- prises two mental selves or personalities, a normal one and one which only comes into activity during sleep and hypnosis. Most of these "theories" would, even if true, carry us but a little way towards a complete understanding of the facts. There is, however, one theory or principle of explanation which is now gradually taking shape under the hands of a number of the more penetrating workers in this field, and which does seem to render intelligible many of the principle facts. This is the theory of mental dissociation.

It is clear that a theory of hypnosis must attempt to give some account of the peculiar condition of the brain which is undoubtedly present as an essential feature of the state. It is therefore not enough to say with Bernheim that hypnosis is a state of abnormally increased suggestibility produced by sugges- tion; nor is it enough, though it is partially true, to say that it is a state of mono-ideism or one of abnormally great concentra- tion of attention. Any theory must be stated in terms of physiological psychology, it must take account of both the psychical and the nervous peculiarities of the hypnotic state; it must exhibit the physiological condition as in some degree similar to that obtaining in normal sleep; but principally it must account for that abnormally great receptivity for ideas, and that abnormally int nse and effective operation of ideas so received, which constitui e abnormally great suggestibility.

The theory of mental dissociation may be stated in purely mental terms, or primarily in terms of nervous structure and function, and the latter mode of statement is probably the more profitable at the present time. The increased effectiveness of ideas might be due to one of two conditions: (1) it might be t hat certain tracts of the brain or the whole brain were in a condition of abnormally great excitability; or (2) an idea might operate more effectively in the mind and on the body, not because it, or the underlying brain-process was more intense than normally, but because it worked out its effects free from the interference of contrary or irrelevant ideas that might weaken its force. It is along this second line that the theory of mental dissociation attempts to explain the increased suggest- ibility of hypnosis. To understand the theory we must bear in mind the nature

of mental process in general and of its nervous concomitants. Mental process consists in the interplay, not merely of ideas, but rather of complex dispositions which are the more or less enduring conditions of the rise of ideas to con- sciousness. Each such disposition seems capable of remaining inactive or quiescent for long periods, and of being excited in various degrees, either by impressions made upon the sense- organs or by the spread of excitement from other dispositions. When its excitement rises above a certain pitch of intensity, the corresponding idea rises to the focus of consciousness. These dispositions are essential factors of all mental process, the essential conditions of all mental retention. They may be called simply mental dispositions, their nature being left un- defined; but for our present purpose it is advantageous to regard them as neural dispositions, complex functional groups of nervous elements or neurones. The neurones of each such group must be conceived as being so intimately connected with one another that the excitement of any part of the group at once spreads through the whole group or disposition, so that it always functions as a unit. The whole cerebrum must be conceived as consisting of a great number of such dispositions, inextricably interwoven, but interconnected in orderly fashion with very various degrees of intimacy; groups of dispositions are very intimately connected to form neural systems, so that the excitement of any one member of such a system tends to spread in succession to all the other members. On the other hand, it is a peculiarity of the reciprocal relations of all such dispositions and systems that the excitement of any one to such a degree that the corresponding idea rises to consciousness prevents or inhibits the excitement of others, i.e. all of them are in relations of reciprocal inhibition with one another (see Muscle and Nerve). The excitement of dis- positions associated together to form a system tends towards some end which, either immediately or remotely, is an action,

a bodily movement, in many cases a movement of the organs of speech only. Now we know from many exact experiments that the neural dispositions act and react upon one another to some extent, even when they are excited only in so feeble a degree that the corresponding ideas do not rise to consciousness. In the normal state of the brain, then, when any idea is present to consciousness, the corresponding neural disposition is in a state of dominant excitement, but the intensity of that excite- ment is moderated, depressed or partially inhibited by the sub-excitement of many rival or competing dispositions of other systems with which it is connected. Suppose now that all the nervous connexions between the multitudinous dis- positions of the cerebrum are by some means

rendered less effective, that the association-paths are partially blocked or functionally depressed; the result will be that, while the most intimate connexions, those between dispositions of any one system remain functional or permeable, the weaker less intimate connexions, those between dispositions belonging to different systems will be practically abolished for the time being; each system of dispositions will then function more or less as an isolated system, and its activity will no longer be subject to the depressing or inhibiting influence of other systems; therefore each system, on being excited in any way, will tend to its end with more than normal force, being freed from all interferences; that is to say, each idea or system of ideas will tend to work itself out and to realize itself in action immediately, without suffering the opposition of antagonistic ideas which, in the normal state of the brain, might altogether prevent its realiza- tion in action.

The theory of mental dissociation assumes that the abnormal state of the brain that obtains during hypnosis is of this kind, a temporary functional depression of all, or of many of the associations or nervous links between the neural dispositions; that is, it regards hypnosis as a state of relative dissociation. The lighter the stage of hypnosis the slighter is the degree of dissociation, the deeper the stage the more nearly complete is the dissociation.

It is not essential that the theory should explain in what change this stage of dissociation consists, but a view compatible with all that we know of the functions of the central nervous system may be suggested. The connexions between neural dispositions involve synapses or cell-junctions, and these seem to be the places of variable resistance which demarcate the dis- positions and systems; and there is good reason to think that their resistances vary with the state of the neurones which they connect, being lowered when these are excited and raised when their excitement ebbs. Now, in the waking state, the varied stimuli, which constantly rain upon all the sense-organs, maintain the whole cerebrum in a state of sub-excitement, keep all the cerebral neurones partially charged with free nervous energy. When the subject lies down to sleep or submits himself to the hypnotizer he arrests as far as possible the flow of his thoughts, and the sensory stimuli are diminished in number and intensity. Under these conditions the general cerebral activity tends to subside, the free energy with which the cerebral neurones are charged ebbs away, and the synaptic resistances rise propor- tionally; then the effect of sensory impressions tends to be confined to the lower nervous level, and the brain tends to come to rest. If this takes place the condition of normal sleep is realized. But in inducing hypnosis the operator, by

means of his words and manipulations, keeps one system of ideas and the corresponding neural system in activity, namely, the ideas connected with himself; thus he keeps open one channel of entry to the brain and mind, and through this one open channel he can introduce whatever ideas he pleases; and the ideas so introduced then operate with abnormally great effect because they work in a free field, unchecked by rival ideas and tendencies.

This theory of relative dissociation has two great merits: in the first place it goes far towards enabling us to understand in some degree most of the phenomena of hypnosis; secondly, we have good evidence that dissociation really occurs in deep

hypnosis and in some allied states. Any one may readily work out for himself the application of the theory to the explanation of the power of the operator's suggestions to control movement, to induce anaesthesia, hallucinations and delusions, and to exert on the organic processes an influence greater than can be exerted by mental processes in the normal state of the brain. But the positive evidence of the occurrence of dissociation is a matter of great psychological interest and its nature must be briefly indicated. The phenomena of automatic speech and writing afford the best evidence of cerebral dissociation. Many persons can, while in an apparently normal or but very slightly abnormal condition, produce automatic writing, i.e. intelligibly written sentences, in some cases long connected passages, of whose import they have no knowledge, their self- conscious intelligence being continuously directed to some other task. The carrying out of post-hypnotic suggestions affords in many cases similar evidence. Thus a subject may be told that after waking he will perform some action when a given signal, such as a cough, is repeated for the fifth time. In the post-hypnotic state he remains unaware of his instructions, is not conscious of noting the signals, and yet carries out the suggestion at the fifth signal, thereby proving that the signals have been in some sense noted and counted. Many interesting varieties of this experiment have been made, some of much greater complexity; but all agreeing in indicating that the suggested action is prepared for and determined by cerebral processes that do not affect the consciousness of the subject, but seem to occur as a system of processes detached from the main stream of cerebral activity; that is to say, they imply the operation of relatively dissociated neural systems.

Many authorities go further than this; they argue that, since actions of the kind described are determined by processes which involve operations, such as counting, that we are accustomed to regard as distinctly mental in character and that normally involve conscious activity, we must believe that in these cases also consciousness or psychical activity is involved, but that it remains as a separate system or stream of conscious- ness concurrent with the normal or personal consciousness.

In recent years the study of various abnormal mental states, especially the investigations by French physicians of severe forms of hysteria, have brought to light many facts which seem to justify this assumption of a secondary stream of consciousness, a co- or sub-consciousness coexistent with the personal conscious- ness; although, from the nature of the case, an absolute proof of such co-consciousness can hardly be obtained. The co- consciousness seems to vary in degree of complexity and coherence from a mere succession of fragmentary sensations' to an organized stream of mental activity, which may rival in all respects the primary consciousness; and in cases of the latter type it is usual to speak of the presence of a secondary personality. The co- consciousness seems in the simpler cases, e.g. in cases of hysterical or hypnotic anaesthesia, to consist of elements split off from the normal primary consciousness, which remains correspondingly poorer; and the assumption is usually made that such a stream of co-consciousness is the psychical correlate of groups and systems of neurones dissociated from the main mass of cerebral neurones. If, in spite of serious objections, we entertain this conception, we find that it helps us to give some account of various hypnotic phenomena that otherwise remain quite inexplicable; some such conception seems to be required more particularly by the facts of negative hallucination and the execution of post-hypnotic suggestions involving such operations as counting and exact discrimination without primary consciousness.

Supernormal Hypnotic Phenomena. — The facts hitherto con- sidered, strange and perplexing as many of them are, do not seem to demand for their explanation any principles of action fundamentally different from those operative in the normal human mind. But much of the interest that has centred in hypnotism in recent years has been due to the fact that some of its manifestations seem to go beyond all such principles of explanation, and to suggest the reality of modes of influence and action that science has not hitherto recognized. Of these

by far the best attested are the post-hypnotic unconscious reckoning

of time and telepathy or " thought-transference " (for the latter see Telepathy). The post-hypnotic reckoning and noting of the lapse of time seems in some instances to have been carried out, in the absence of all extraneous aids and with complete unconsciousness on the part of the normal personality, with such extreme precision that the achievement cannot be accounted for by any intensification of any faculty that we at present recognize or understand. Thus, Dr Milne Bramwell has reported the case of a patient who, when commanded in hypnosis to perform some simple action after the lapse of many thousands of minutes, would carry out the suggestion punctually to the minute, without any means of knowing the exact time of day at which the suggestion was given or the time of day at the moment its performance fell due; more recently a similar case, even more striking in some respects, has been carefully observed and described by Dr T. W. Mitchell. Other reported phenomena, such as telaesthesia or clairvoyance, and telekinesia, are hardly sufficiently well attested to demand serious considera- tion in this place.

Medical Applications of Hypnotism. — The study and practice of hypnotism is not yet, and probably never will be, regarded as a normal part of the work of the general practitioner. Its successful application demands so much time, tact, and special experience, that it will probably remain, as it is now, and as it is perhaps desirable that it should remain, a specialized branch of medical practice. In England it is only in recent years that it has been possible for a medical man to apply it in his practice without incurring professional odium and some risk of loss of reputation. That, in certain classes of cases, it may effect a cure or bring relief when all other modes of treatment are of no avail is now rapidly becoming recognized; but it is less generally recognized that it may be used with great advantage as a supple- ment to other modes of treatment in relieving symptoms that are accentuated by nervous irritability or mental disturbance. A third wide field of usefulness lies before it in the cure of un- desirable habits of many kinds. Under the first heading may be put insomnia, neuralgia, neurasthenia, hysteria in almost all its many forms; under the second, inflammations such as that of chronic rheumatism, contractures and paralyses resulting from gross lesion of the brain, epilepsy, dyspepsia, menstrual ir- regularities, sea-sickness; under the third, inebriety, the morphia and other drug habits, nail-biting, enuresis noctuma, masturba- tion, constipation, facial and other twitchings. In pronounced mental diseases hypnotism seems to be almost useless; for in general terms it may be said that it can be applied most effectively where the brain, the instrument through which it works, is sound and vigorous. The widespread prejudice

against the use of hypnotism is no doubt largely due to the marvellous and (to most minds) mysterious character of the effects producible by its means; and this prejudice may be expected to diminish as our insight into the mode of its operation deepens. The more purely bodily results achieved by hypnotic suggestion become in some degree intelligible if we regard it as a powerful means of diverting nervous energy from one channel or organ to others, so as to give physiological rest to an overworked organ or tissue, or so as to lead to the atrophy of one nervous habit and the re- placement of it by a more desirable habit. And in the cure of those disorders which involve a large mental element the essential part played by it is to drive out some habitually recurrent idea and to replace it by some idea, exDectation or conviction of healthy tendency.

It seems clear that the various systems of "mind-curing" in the hands of persons lacking all medical training, which are now so frequently the cause of distressing and needless disasters, owe their rapid spread to the fact that the medical profession has hitherto neglected to attach sufficient importance to the mental factor in the causation and cure of disease; and it seems clear, too, that a more general and more intelligent appreciation of the possibilities of hypnotic treatment would constitute the best means at the disposal of the profession for combating this growing evil.

HYPOCAUST— HYPOSTASIS

207

The Dangers of Hypnotism. — Much has been written on this head of late years, and some of the enthusiastic advocates of hypnotic treatment have done harm to their cause by ignoring or denying in a too thoroughgoing manner the possibility of undesirable results of the spread of the knowledge and practice of hypnotism. Like all powerful agencies, chloroform or morphia, dynamite or strong electric currents, hypnotic suggestion can only be safely used by those who have special knowledge and experience, and, like them, it is liable to abuse. There is little doubt that, if a subject is repeatedly hypnotized and made to entertain all kinds of absurd delusions and to carry out very frequently posthypnotic suggestions, he may be liable to some ill-defined harm; also, that an unprincipled hypnotizer might secure an undue influence over a naturally weak subject.

But there is no ground for the belief that hypnotic treatment, applied with good intentions and reasonable care and judgment, does or can produce deleterious effects, such as weakening of the will or liability

to fall spontaneously into hypnosis. All physicians of large experience in hypnotic practice are in agreement in respect to this point. But some difference of opinion exists as to the possibility of deliberately inducing a subject to commit improper or criminal actions during hypnosis or by posthypnotic sugges- tion. There is, however, no doubt that subjects retain even in deep hypnosis a very considerable power of resistance to any suggestion that is repugnant to their moral nature; and it has been shown that, on some cases in which a subject in hypnosis is made to perform some ostensibly criminal action, such as firing an unloaded pistol at a bystander or putting poison into a cup for him to drink, he is aware, however obscurely, of the unreal nature of the situation. Nevertheless it must be admitted that a person lacking in moral sentiments might be induced to commit actions from which in the normal state he would abstain, if only from fear of punishment; and it is probable that a skilful and evil-intentioned operator could in some cases so deceive a well- disposed subject as to lead him into wrong-doing. The proper precaution against such dangers is legislative regulation of the practice of hypnotism such as is already enforced in some countries.

Bibliography. — The literature of hypnotism has increased in volume at a rapid rate during recent years. Of recent writings the following may be mentioned as among the most important : — Treat- ment by Hypnotism and Suggestion by C. Lloyd Tuckey,M.D.(5th ed., London, 1907) ; Hypnotism, its History, Practice and Theory, by J. Milne Bramwell, M.B. (2nd ed., London, 1906); Hypnotism, by AlbertMoll (5th ed., London, 1901). All these three books give good general accounts of hypnotism, the first being the most strictly medical, the last the most general in its treatment. See also Hypnot- ism: or Suggestion in Psycho-Therapy, by August Forel (translated from the 5th German ed. by G. H. W. Armit, London, 1906); a number of papers by Ed. Gurney, and by Ed. Gurney and F.W.H. Myers in Proc. of the Soc. for Psychical Research, especially " The Stages of Hypnotism," in vol. ii. ; also some more recent papers in the same journal by other hands; chapter on Hypnotism in Human Personality and its Survival of bodily Death, by F. W. H. Myers (London, 1903); The Psychology of Suggestion, by Boris Sidis, Ph.D.. (New York, 1898); " Zur Psychologie der Suggestion," by Prof. Th. Lipp, and other papers in the Zeitschrift filr Hypnotismus. Of special historical interest are the following: — Etude sur le zoo- magnetisme, par A. A. Liebeault (Paris, 1883) ; Hypnotisme, sugges- tion, psycho-therapie, par Prof. Bernheim (Paris, 1891); Braid on Hypnotism (a new issue of James Braid's Neurypnology), edited by A. E. Waite (London, 1899); Traite du somnambulisme, by A. Bertrand (Paris,

1826). A full bibliography is appended to Dr Milne Bramwell's Hypnotism. (W. McD.)

HYPOCAUST (Gr. wrbKavorov : inrb, beneath, and navtlv, to burn), the term given to the chamber formed under the floors of the Roman baths, through which the hot air from the furnace passed, sometimes to a single flue, as in the case of the tepidarium, but in the calidarium and sweating-room to a series of flues placed side by side forming the lining of the walls. The floor of the hot-air chamber consisted of tiles, 2 ft. square, laid on a bed of concrete; on this a series of dwarf piers 2 ft. high were built of 8-in. square tiles placed about 16 in. apart, which carried the floor of the hall or room; this floor was formed of a bed of concrete covered with layers of pounded bricks and marble cement, on which the marble pavement in slabs or tesserae was laid. In colder countries, as for instance in Germany and

*England, the living *ooms were all heated in a similar way, and round Treves (Trier) both systems have been found in two or three Roman villas, with the one flue for the ordinary rooms and several wall flues for the hot baths. In England these hypo- causts are found in every Roman settlement, and the chief interest in these is centred in the magnificent mosaic pavements with which the principal rooms were laid. Many of the pave- ments found in London and elsewhere have been preserved in the British or the Guildhall museums; and in some of the provincial towns, such as Leicester and Lincoln, they remain in situ many feet below the present level of the town.*

HYPOCHONDRIASIS (synonyms— "the spleen," "the vapours "), a medical term (from to wroxbvbpujv, to. imoxbvb'pi.a., the soft part of the body immediately under the xbvdpos or cartilage of the breast-bone) given by the ancients, and indeed by physicians down to the time of William Cullen, to diseases or derangements of one or more of the abdominal viscera. Cullen (Clinical Lectures, 1777) classified it amongst nervous diseases, and Jean Pierre Falret (1 794-1870) more fully described it as a morbid condition of the nervous system characterized by depression of feeling and false beliefs as to an impaired state of the health. The subjects of hypochondriasis are for the most part members of families in which hereditary predisposition to degradation of the nervous system is strong, or those who have suffered from morbid influences affecting this system during the earlier years of life. It may be dependent on depressing disease affecting the general system, but under such circumstances it is generally so complicated with the symptoms of hysteria as to render differentiation difficult (see Hysteria). Hypochondriasis is often

handed down from one generation to another in its in- dividual form, but it is also not unfrequently to be met with in an individual as the sole manifestation in him of a family tendency to insanity. In its most common form it is manifested by simple false belief as to the state of the health, the intellect being other- wise unaffected. We may instance the " vapourish " woman or the " splenetic " as terms society has applied to its milder manifestations. Such persons are constantly asserting a weak state of health although no palpable cause can be discovered. In its more definite phases pain or uneasy sensations are referred by the patient to some particular region, generally the abdomen, the heart or the head. That these are subjective is apparent from the fact that the general health is good: all the functions of the various systems are duly performed; the patient eats and sleeps well; and, when any circumstance temporarily overrides the false belief, he is happy and comfortable. No appeal to the reason is of any avail, and the hypochondriac idea so dominates his existence as to render him unable to perform the ordinary duties of life. In its most aggravated form hypochondriasis amounts to actual insanity, delusions arising as to the existence of living creatures in the intestines or brain, or to the effect that the body is materially changed; e.g. into glass, wood, &c. The symptoms of this condition may be remittent; they may even disappear for years, and only return on the advent of some exciting cause. Suicide is occasionally committed in order to escape from the constant misery. Recovery can only be looked for by placing the patient under such morally hygienic con- ditions as may help to turn his mind to other matters. (See also Neuropathology.)

HYPOCRISY, pretence, or false assumption of a high character, especially in regard to religious belief or practice. The Greek moKpuns, from which the word is derived through the Old French, meant primarily the acting of a part on the stage, from viroKpiveo- dai, to give an answer, to speak dialogue, play a part on the stage, hence to practice dissimulation.

HYPOSTASIS, in theology, a term frequently occurring in the Trinitarian controversies of the 4th and 5th centuries. According to Irenaeus (i. 5, 4) it was introduced into theology by Gnostic writers, and in earliest ecclesiastical usage appears, as among the Stoics, to have been synonymous with ovaia. Thus Dionysius of Rome (cf. Routh, Rel. Sacr. iii. 373) condemns the attempt to sever the Godhead into three separate hypostases and three deities, and the Nicene Creed in the anathemas speaks of

*4 ertpas vTcovTaceus V oixrlas. Alongside, however, of this persistent interchange there was a desire to distinguish between the terms, and to confine wrooracris to the Divine persons. This tendency arose in Alexandria, and its progress may be seen in comparing the early and later writings of Athanasius. That writer, in view of the Arian trouble, felt that it was better to speak of oxjala as " the common undifferentiated substance of Deity," and wr6oT

The results arrived at by these Cappadocian fathers were stated in a later age by John of Damascus (De orlh. fid. iii. 6), quoted in R. L. Ottley, The Doctrine of the Incarnation, ii. 257.

HYPOSTYLE, in architecture, the term applied to a hall, the flat ceiling of which is supported by columns, as in the Hall of Columns at Karnak. In this ease the columns flanking the central avenue are of greater height than those of the side aisles, and this admits of openings in the wall above the smaller columns, through which light is admitted over the aisle roof, through clerestory windows.

HYPOSULPHITE OF SODA, the name originally given to the substance known in chemistry as sodium thiosulphate, NajS 2 3 ; the earlier name is still commonly used, especially by photographers, who employ this chemical as a fixer. In system- atic chemistry, sodium hyposulphite is a salt of hyposulphurous acid, to which Schutzenberger gave the formula H 2 S0 2 , but which Bernthsen showed to be H2S2O4. (See Sulphur.)

HYPOTHEC (Lat. hypotheca, Gr. vrodriKri) , in Roman law, the most advanced form of the contract of pledge. A specific thing may be given absolutely to a creditor on the understanding that it is to be given back when the creditor's debt is paid; or the property in the thing may be assigned to the creditor while the debtor is allowed to remain in possession, the creditor as owner being able to take possession if his debt is not dis- charged. Here we have the kind of security known as pledge and mortgage respectively. In the hypotheca, the property does not pass to the creditor, nor does he get possession, but he acquires a preferential right to have his debt paid out of the hypothecated property; that is, he can sell it and pay himself out of the proceeds, or in default of a purchaser he can become the owner himself. The name and the principle have passed into the law of Scotland, which distinguishes between conventional hypothecs, as bottomry and respondentia, and tacit hypothecs established by law. Of the latter the most important is the landlord's

hypothec for rent (corresponding to distress in the law of England), which extends over the produce of the land and the cattle and sheep fed on it, and over stock and horses used in husbandry. The law of agricultural hypothec long caused much discontent in Scotland; its operation was restricted by the Hypothec Amendment (Scotland) Act 1867, and finally by the Hypothec Abolition (Scotland) Act 1880 it was enacted that the " landlord's right of hypothec for the rent of land, including the rent of any buildings thereon, exceeding two acres in extent, let for agriculture or pasture, shall cease and determine." By the same act and by the Agricultural Holdings (Scotland) Act 1883 other rights and remedies for rent, where the right of hypothec had ceased, were given to the landlord.

HYPOTHESIS (from Gr. inroriBkvai, to put under; cf. Lat. suppositio, from sub-ponere), in ordinary language, an explanation, supposition or assumption, which is put forward in the absence of ascertained facts or causes. Both in ordinary life and in the acquisition of scientific knowledge hypothesis is all-important. A detective's work consists largely in forming and testing hypothesis. If an astronomer is confronted by some phenomenon which has no obvious explanation he may postulate some set of conditions which from his general knowledge of the subject would or might give rise to the phenomenon in question; he then tests his hypothesis until he discovers whether it docs

or does not conflict with the facts. An example of this process is that of the discovery of the planet Neptune: certain perturba- tions of the orbit of Uranus had been observed, and it was seen that these could be explained on the hypothesis of the existence of a then unknown planet, and this hypothesis was verified by actual observation. The progress of inductive knowledge is by the formation of successive hypotheses, and it frequently happens that the demolition of one or even many hypotheses is the direct road to a new and accurate hypothesis, i.e. to fresh knowledge. A hypothesis may, therefore, turn out to be entirely wrong, yet it may be of the greatest practical use.

The recognition of the importance of hypotheses has led to various attempts at drawing up exact rules for their formation, but logicians are generally agreed that only very elementary principles can be laid down. Thus a hypothesis must contain nothing which is at variance with known facts or principles: it should not postulate conditions which cannot be verified empirically. J. S. Mill (Logic III. xiv. 4) laid down the principle that a hypothesis is not " genuinely scientific " if it is " destined always to remain a hypothesis ": it must " be of such a nature as to be either proved or disproved by comparison with

observed facts": in the same spirit Bacon said that in searching for causes in nature " Deum semper excipimus." Mill's principle, though sound in the abstract, has, except in a few cases, little practical value in determining the admissibility of hypotheses, and in practice any rule which tends to discourage hypothesis is in general undesirable. The most satisfactory check on hypothesis is expert knowledge in the particular field of research by which rigorous tests may be applied. This test is roughly of two kinds, first by the ultimate principles or presuppositions on which a particular branch of knowledge rests, and second by the comparison of correlative facts. Useful light is shed on this distinction by Lotze, who contrasts (Logic, § 273) postulates (" absolutely necessary assumptions without which the content of the observation with which we are dealing would contradict the laws of our thought ") with hypotheses, which he defines as conjectures, which seek " to fill up the postulate thus abstractly stated by specifying the concrete causes, forces or processes, out of which the given phenomenon really arose in this particular case, while in other cases maybe the same postulate is to be satisfied by utterly different though equivalent combina- tions of forces or active elements." Thus a hypothesis may be ruled out by principles or postulates without any reference to the concrete facts which belong to that division of the subject to explain which the hypothesis is formulated. A true hypothesis, therefore, seeks not merely to connect or colligate two separate facts, but to do this in the light of and subject to certain funda- mental principles. Various attempts have been made to classify hypotheses and to distinguish " hypothesis " from a " theory " or a mere " conjecture ": none of these have any great practical importance, the differences being only in degree, not in kind.

The adjective " hypothetical " is used, in the same sense, both loosely in contradistinction to " real " or " actual," and technically in the phrases " hypothetical judgment " and " hypothetical syllogism." (See Logic and Syllogism.)

See Naville, La Logique de I'hypothhse (1880), and textbooks of logic, e.g. those of Jevons, Bosanquet, Joseph; Liebmann, Der Klimax d. Theorien.

HYPOTRACHELIUM (Gr. wot paxqKiov , the lower part of the neck, rpa.xvKos), in classical architecture, the space between the annulet of the echinus and the upper bed of the shafts, including, according to C. R. Cockerell, the three grooves or sinkings found in some of the older examples, as in the temple of Neptune at Paestum and the temple of Aphaea at Aegina; there being only one groove in the

Parthenon, the Theseum and later examples. In the temple of Ceres and the so-called Basilica at Paestum the hypotrachelium consists of a concave sinking carved with vertical lines suggestive of leaves, the tops of which project forward. A similar decoration is found in the capital of the columns flanking the tomb of Agamemnon at Mycenae, but here the hypotrachelium projects forward with a cavetto moulding, and is carved with triple leaves like the buds of a

rose. In the Roman Doric Order the term was sometimes applied to that which is generally known as the " necking," the space between the fillet and the annulet.

HYPSOMETER (Gr. bpos, height, pkrpov, a measure), an instrument for measuring heights which employs the principles that the boiling-point of a liquid is lowered by diminishing the pressure, and that the barometric pressure varies with the height of the point of observation. The instrument consists of a cylindrical vessel in which the liquid, usually water, is boiled, surmounted by a jacketed column, in the outer partitions of which the vapour circulates, while in the central one a ther- mometer is placed. To deduce the height of the station from the observed boiling-point, it is necessary to know the relation existing between the boiling-point and pressure, and also between the pressure and height of the atmosphere.

HYRACOIDEA, a suborder of ungulate mammals represented at the present day only by the Syrian hyrax (Procavia syriaca), the " coney " of the Bible, and its numerous African relatives, all of which may be included in the single genus Procavia (or Hyrax), and consequently in the family Procaviidae. These creatures have no proper English name, and are generally known as hyraxes, from the scientific term (Hyrax) by which they were for many years designated — a term which has unfortunately had to give place to the earlier Procavia. In size these animals may be compared roughly to rabbits and hares; and they have rodent-like habits, hunching up their backs after the fashion of some foreign members of the hare-family, more especially the Liu-Kiu rabbit. In the matter of nomenclature these animals have been singularly unfortunate. In the title " hyrax " they have, for instance, usurped the Greek name for the shrew-mouse; while in the Bible they have been given the old English name for the rabbit. Perhaps rock-rabbit would be the best name. At the Cape they are known to the Dutch as dass (badger),

which has been anglicized into " dassie."

As regards the recent forms, the dentition in the fully adult animal consists only of incisors and cheek-teeth, the formula being i. \, c. Jj, p. J, m. %. There is, however, a minute upper canine developed at first, which is early shed; and in extinct forms this tooth was

fcVˆ

Fig. 1. — The Cape Hyrax (Procavia capensis).

functional and molar-like. The upper incisors have persistent pulps, and are curved longitudinally, forming a semicircle as in rodents; they are, however, not flattened from before backwards as in that order, but prismatic, with an antero-external, an antero- internal and a posterior surface, the first two only being covered with enamel; their tips are consequently not chisel-shaped, but sharp-pointed. They are preceded by functional, rooted milk-teeth. The lower incisors have long tapering roots, but not of persistent growth; and are straight, directed somewhat forwards, with awl- shaped, tri-lobed crowns. Behind the incisors is a considerable gap, followed by the cheek-teeth, which are all contiguous, and formed almost exactly on the pattern of some of the perissodactyle un- gulates. The milk-dentition includes three pairs of incisors and one of canines in each jaw. The hyoid arch is unlike that of any Known mammai. The dnrsal and lumbar vertebrae are very numer- ous, 28 to 30, of which 21 or 2? bear ribs. The tail is extremely short. There are no clavicles. In the fore foot, the three middle toes are subequally developed, the fifth is present, but smaller, and the first is rudimentary, although, in one species at least, all its

normal bones are present. The terminal phalanges of the four outer digits are small, somewhat conical and flattened in form. The carpus has a distinct os centrale. There is a slight ridge on the femur in the place of a third trochanter. The fibula is complete, thickest at its upper end, where it generally unites with the tibia. The articulation between the tibia and astragalus is more complex than in other mammals, the end of the malleolus entering into it. The hind-foot is very like that of a rhinoceros, having three well- developed toes. There is no trace of a first toe, and the fifth meta- tarsal is represented by a small nodule. The terminal phalange of the inner (or second) digit is deeply cleft, and has a peculiar long curved claw, the others having short broad nails. The stomach is formed upon much the same principle as that of the horse or rhino- ceros, but is more elongated transversely and divided by a constriction into two

cavities — a large left cul de sac, lined by a very dense white epithelium, and a right pyloric cavity, with a thick, soft, vascular lining. The intestinal canal is long, and has, in addition to the ordinary short, but capacious and sacculated caecum at the commencement of the colon, lower down, a pair of large, conical, pointed caeca. The liver is much subdivided, and there is no gall-bladder. The brain resembles that of typical ungulates far more than that of rodents. The testes are permanently abdominal. The ureters open into the fundus of the bladder as in some Rodents. The

Fig. 2. — Skull and Dentition of Tree-Hyrax(Prt>cot)i'o dorsalis)

female has six teats, of which four are inguinal and two axillary, and the placenta is zonary and deciduous. There is a gland on the back.

The more typical members of the genus are terrestrial in their habits, and their cheek-teeth have nearly the same pattern as in rhinoceroses; while the interval between the upper incisors is less than the width of the teeth ; and the lower incisors are only slightly notched at the cutting edge. Vertebrae: C. 7, D. 22, L. 8, S. 6, C. 6. Of this form the earliest known species, P. capensis, is the type; but there are many other species, as P. syriaca, and P. brucei from Syria and eastern Africa. They inhabit mountainous and rocky regions, and live on the ground. In a second section the molar teeth have the same pattern as in Palaeotherium (except that the third lower molar has but two lobes) ; the interval between the upper incisors exceeds the width of the teeth : and the lower incisors have distinctly trilobed crowns. Vertebrae: C. 7, D. 21, L. 7, S. 5, C. 10. The members of this section frequent the trunks and large branches of trees, sleeping in holes. There are several species from Western and South Africa, as P. arboreus and P. dorsalis. The members of both groups appear to have a power like that possessed by geckos of clinging to vertical surfaces of rocks and trees by the soles of their feet.

Extinct Hyracoids. — For many years extinct representative.' of the Hyracoidea were unknown, partly owing to the fact that certain fossils were not recognized as really belonging to that group The longest known of these was originally named Leptodon graecus, but, on account of the preoccupation of the generic title, the designa- tion has been changed to Pliohyrax graecus. This animal, whose remains occur in the Lower Pliocene of both Attica and Samos, was about the size of a donkey, and possessed three pairs of upper incisot teeth, of which the innermost were large and trihedral, recalling those of the existing genus. On the other hand, the two outer pairs of incisors

were in contact with one another and with the canines, so as to form on each side a series continuous with the cheek-teeth.

The next representatives of the group occur in the Upper Eocene beds of the Fayum district of Egypt, where the genera Saghatherium and Megalohyrax occur. These are regarded as representing a distinct family, the Saghatheriidae, characterized by the possession of the full series of twenty-two teeth in the upper jaw, among which the first pair of incisors was modified to form trihedral rootless tusks, while the two remaining pairs were separated from one another and from the teeth in front by gaps. The canine was like a premolar, and in contact with the first tooth of that series; and the cheek-teeth were short -crowned, with the premolar simpler than the molars, and a third lobe to the last lower tooth of the latter

series. The members of this genus were small or medium-sized ungulates with single-rooted incisors. On the other hand, the representatives of the contemporary genus Megalohyrax were approximately as large as Pliohyrax, and in some instances had double roots to the second and third incisors.

It is now possible to define the suborder Hyracoidea as including ungulates with a centrale in the carpus, plantigrade feet, in which the first and fifth toes are reduced in greater or less degree, and clavicles and a foramen in the lower end of the humerus are absent. The femur has a small third trochanter, the radius and ulna and tibia and fibula are respectively separate, at least in the young, and the fibula articulates with the astragalus. The earlier forms had the full series of 44 teeth, with the premolars simpler than the molars; but in the later types the canines and some of the incisors disappear, and at least the hinder premolars become molar-like. In all cases the first upper incisors are large and rootless.

That the group originated in Africa there can be no reasonable doubt ; and it is remarkable that so early as the Upper Eocene the types in existence differed comparatively little in structure from the modern forms. .In fact the hyraxes were then almost as distinct from other mammals as they are at the present day.

See also C. W. Andrews, Descriptive Catalogue of the Tertiary Vertebrate of the Fayum, British Museum (1906). (R. L.)*

HYRCANIA. (1) An ancient district of Asia, south of the Caspian Sea, and bounded on the E. by the river Oxus, called Virkana, or " Wolf's Land," in Old Persian. It was a wide and indefinite tract. Its chief city is called Tape by Strabo, Zadra- carta by Arrian (probably the modern Astarabad). The latter is evidently the same as Carta, mentioned by Strabo as an important city. Little is known of the history of the country. Xenophon says it was subdued by the Assyrians; Curtius that 6000 Hyrcanians were in the army of Darius III. (2) Two towns named Hyrcania are mentioned, one in Hyrcania, the other in Lydia. The latter is said to have derived its name from a colony of Hyrcanians, transported thither by the Persians.

HYRCANUS ("Tpxavos), a Greek surname, of unknown origin, borne by several Jews of the Maccabaean period.

John Hyrcanus I., high priest of the Jews from 135 to 105 B.C., was the youngest son of Simon Maccabaeus. In 137 B.C. he, along with his brother Judas, commanded the force which repelled the invasion of Judaea led by Cendebeus, the general of Antiochus VII. Sidetes. On the assassination of his father and two elder brothers by Ptolemy, governor of Jericho, his brother-in-law, in February 135, he succeeded to the high priest- hood and the supreme authority in Judaea. While still engaged in the struggle with Ptolemy, he was attacked by Antiochus with a large army (134), and compelled to shut himself up in Jerusalem; after a severe siege peace was at last secured only on condition of a Jewish disarmament, and the payment of an indemnity and an annual tribute, for which hostages were taken. In 129 he accompanied Antiochus as a vassal prince on his ill-fated Parthian expedition; returning, however, to Judaea before winter, he escaped the final disaster. By the judicious mission of an embassy to Rome he now obtained confirmation of the alliance which his father had previously made with the growing western power; at the same time he availed himself of the weakened state of the Syrian monarchy under Demetrius II. to overrun Samaria, and also to invade Idumaea, which he completely subdued, compelling its inhabitants to receive circumcision and accept the Jewish faith. After a long period of rest he directed his arms against the town of Samaria, which, in spite of the intervention of Antiochus, his sons Antigonus and Aristobulus ultimately took, and by his orders razed to the ground (r. 100 B.C.). He died in 105, and was succeeded by Aristobulus, the eldest of his five sons. The external policy of Hyrcanus was marked by considerable energy and tact, and, aided as it was by favouring circumstances, was so successful as to leave the Jewish nation in a position of independence and of influence such as it had not known since the days of Solomon. During its later years

his reign was much distrubed, however, by the con- tentions for ascendancy which arose between the Pharisees and Sadducees, the two rival sects or parties which then for the first time (under those names at least) came into prominence. Josephus has related the curious circumstances under which he ultimately transferred his personal support from the former to the latter.

John Hyrcanus II., high priest from 78 to 40 B.C., was the eldest son of Alexander Jannaeus by his wife Alexandra, and was thus a grandson of the preceding. When his father died in 78, he was by his mother forthwith appointed high priest, and on her death in 69 he claimed the succession to the supreme civil authority also; but, after a brief and troubled reign of three months, he was compelled to abdicate both kingly and priestly dignities in favour of his more energetic and ambitious younger brother Aristobulus II. In 63 it suited the policy of Pompey that he should be restored to the high priesthood, with some semblance of supreme command, but of much of this semblance even he was soon again deprived by the arrangement of the pro-consul Gabinius, according to which Palestine was in 57 B.C. divided into five separate circles (owoSoi, aweSpia) . For services rendered to Caesar after the battle of Pharsalia, he was again rewarded with the sovereignty (irpoo-racrla. tov fflvovs, Jos. Ant. xx. 10) in 47 B.C., Antipater of Idumaea, however, being at the same time made procurator of Judaea. In 41 B.C. he was practically superseded by Antony's appointment of Herod and Phasael to be tetrarchs of Judaea; and in the following year he was taken prisoner by the Parthians, deprived of his ears that he might be permanently disqualified for priestly office, and carried to Babylon. He was permitted in 33 B.C. to return to Jerusalem, where on a charge of treasonable correspondence with Malchus, king of Arabia, he was put to death in 30 B.C.

See Josephus {Ant. xiii. 8-10; xiv. 5-13; Bell. Jud. i. 2; i. 8-13). Also Maccabees, History. (J. H. A. H.)

HYSSOP (Hyssopus officinalis) , a garden herb belonging to the natural order Labiatae, formerly cultivated for use in domestic medicine. It is a small perennial plant about 2 ft. high, with slender, quadrangular, woody stems; narrowly elliptical, pointed, entire, dotted leaves, about 1 in. long and J in. wide, growing in pairs on the stem; and long terminal, erect, half- whorled, leafy spikes of small violet-blue flowers, which are in blossom from June to September. Varieties of the plant occur in gardens with red and white flowers, also one having variegated leaves. The leaves have a warm, aromatic, bitter taste, and are believed to owe their properties to a

volatile oil which is present in the proportion of J to § %. Hyssop is a native of the south of Europe, its range extending eastward to central Asia. A strong tea made of the leaves, and sweetened with honey, was formerly used in pulmonary and catarrhal affections, and externally as an application to bruises and indolent swellings.

The hedge hyssop (Gratiola officinalis) belongs to the natural order Scrophulariaceae, and is a native of marshy lands in the south of Europe, whence it was introduced into Britain more than 300 years ago. Like Hyssopus officinalis, it has smooth opposite entire leaves, but the stems are cylindrical, the leaves twice the size, and the flowers solitary in the axils of the leaves and having a yellowish-red veined tube and bluish- white limb, while the capsules are oval and many-seeded. The herb has a bitter, nauseous taste, but is almost odourless. In small quantities it acts as a purgative, diuretic and emetic when taken internally. It was formerly official in the Edinburgh Pharma- copoeia, being esteemed as a remedy for dropsy. It is said to have formed the basis of a celebrated nostrum for gout, called Eau mfdicinale, and in former times was called Gratia Dei. When growing in abundance, as it does in some damp pastures in Switzerland, it becomes dangerous to cattle. G. peruviana is known to possess similar properties.

The hyssop {'ezob) of Scripture (Ex. xii. 22; Lev. xiv. 4, 6; Numb. xix. 6, 18; I Kings v. 13 (iv. 33); Ps. li. 9 (7); John mxˆ 29), a wall-growing plant adapted for sprinkling purposes, has long been the subject of learned disputation, the only point on which all have agreed being that it is not to be identified with the Hys- sopus officinalis, which is not a native of Palestine. No fewer than eighteen plants have been supposed by various authors to answer the conditions, and Celsius has devoted more than forty pages to the discussion of their several claims. By Tristram {Oxford Bible for Teachers, 1880) and others the caper plant (Capparis spinosa) is supposed to be meant; but, apart from other difficulties, this identification is open to the objection that the caper seems to be, at least in one passage (Eccl. xii. 5), otherwise designated Cabiy- ydnah). Thenius (on 1 Kings v. 13) suggests Orthotrichum saxatile.

The most probable opinion would seem to be that found in Maimo- nides and many later writers, according to which the Hebrew 'ezob is to be identified with the Arabic sa'atar, now understood to be

Satureja Thymus, a plant of very frequent occurrence in Syria and Palestine, with which Thymus Serpyllum, or wild thyme, and Satureja Thymbra are closely allied. Its smell, taste and medicinal properties are similar to those of H. officinalis. In Morocco the sa'atar of the Arabs is Origanum compactum ; and it appears probable that several plants of the genera Thymus, Origanum and others nearly allied in form and habit, and found in similar localities, were used under the name of hyssop.

HYSTASPES (the Greek form of the Persian Vishtaspa). (i) A semi-legendary king (kava), praised by Zoroaster as his protector and a true believer, son of Aurvataspa (Lohrasp). The later tradition and the Shahname of Firdousi makes him (in the modern form Kai Gushtasp) king of Iran. As Zoroaster probably preached his religion in eastern Iran, Vishtaspa must have been a dynast in Bactria or Sogdiana. The Zoroastrian religion was already dominant in Media in the time of the Assyrian king Sargon (c. 715 B.C.), and had been propagated here probably in much earlier times (cf. Persia); the time of Zoroaster and Vishtaspa may therefore be put at c. 1000 B.C. (2) A Persian, father of Darius I., under whose reign he was governor of Parthia, as Darius himself mentions in the Behistun inscription (2. 65). By Ammianus Marcellinus, xxiii. 6. 32, and by many modern authors he has been identified with the protector of Zoroaster, which is equally impossible for chronological and historical reasons, andfrom the evidence of the development of Zoroastrianism itself (see Persia: Ancient History). (Ed. M.)

HYSTERESIS (Gr. WTepr?<7ts, from mripeiv, to lag behind), a term added to the vocabulary of physical science by J. A. Ewing, who defines it as follows: When there are two qualities M and N such that cyclic variations of N cause cyclic variations of M, then if the changes of M lag behind those of N, we may say that there is hysteresis in the relation of M to N (Phil. Trans., 1885, 176, p. 524). The phenomenon is best known in connexion with magnetism. If an iron bar is subjected to a magnetic force which is first gradually increased to a maximum and then gradually diminished, the resulting magnetization of the bar for any given value of the magnetic force will be greater when the force is decreasing than when it is increasing; the iron always tends to retain the magnetic condition which it has previously acquired, and changes of its magnetization conse- quently lag behind changes of the magnetic force. Thus there is hysteresis in the relation of magnetization to magnetic force. In consequence of hysteresis the process of magnetizing a piece of iron to a certain intensity and then restoring it to its original condition, or of effecting a double reversal of its

magnetization, involves the expenditure of energy, which is dissipated as heat in the iron. Electrical generators and transformers often contain pieces of iron the magnetization of which is reversed many times in a second, and in order to economize power and to avoid undue heating it is essential that hysteresis should in such cases be as small as possible. Iron and mild steels showing remarkably little hysteresis are now specially manu- factured for use in the construction of electrical machinery. (See Magnetism.)

HYSTERIA, a term applied to an affection which may manifest itself by a variety of symptoms, and which depends upon a disordered condition of the highest nervous centres. It is charac- terized by psychical peculiarities, while in addition there is often derangement of the functions subserved by the lower cerebral and spinal centres. Histological examination of the nervous system has failed to disclose associated structural alterations.

By the ancients and by modern physicians down to the time of Sydenham the symptoms of hysteria were supposed to be directly due to disturbances of the uterus (Gr. borkpa, whence the name). This view is now universally recognized to be erroneous. The term " functional " is often used by English neurologists as synonymous with hysterical, a nomenclature which is tenta- tively advantageous since it is at least non-committal. P. J. Mobius has defined hysteria as " a state in which ideas control the body and produce morbid changes in its functions." P. Janet, who has done much to popularize the psychical origin

of the affection, holds that there is " a limitation of the field of consciousness " comparable to the contraction of the visual fields met with in the disease. The hysterical subject, according to this view, is incapable of taking into the field of consciousness all the impressions of which the normal individual is conscious. Strong momentary impressions are no longer controlled so efficiently because of the defective simultaneous impressions of previous memories. Hence the readiness with which the im- pulse of the moment is obeyed, the loss of emotional control and the increased susceptibility to external suggestion, which are so characteristic. A secondary subconscious mental state is engendered by the relegation of less prominent impressions to a lower sphere'. The dual personality which is typically ex- emplified in somnambulism and in the hypnotic state is thus induced. The explanation of hysterical symptoms which are independent of the will, and of the existence of which the indi- vidual may be unaware, is to be found in a relative preponder- ance of this secondary subconscious state as compared

with the primary conscious personality. An elaboration of this theory affords an explanation of hysterical symptoms dependent upon a " fixed idea." The following definition of hysteria has recently been advanced by J. F. F. Babinski: " Hysteria is a psychical condition manifesting itself principally by signs that may be termed primary, and in an accessory sense others that we may call secondary. The characteristic of the primary signs is that they may be exactly reproduced in certain subjects by suggestion and dispelled by persuasion. The characteristic of the secondary signs is that they are closely related to the primary phenomena."

The causes of hysteria may be divided into (a) the predisposing, such as hereditary predisposition to nervous disease, sex, age and national idiosyncrasy; and (b) the immediate, such as mental and physical exhaustion, fright and other emotional influences, pregnancy, the puerperal condition, diseases of the uterus and its appendages, and the depressing influence of injury or general disease. Perhaps, taken over all, hereditary pre- disposition to nerve-instability may be asserted as the most prolific cause. There is frequently direct inheritance, and cases of epilepsy and insanity or other form of nervous disease are rarely wanting when the family history is carefully enquired into. As regards age, the condition is apt. to appear at the evolution periods of life — puberty, pregnancy and the climacteric — without any further assignable cause except that first spoken of. It is rare in young children, but very frequent in girls between the ages of fifteen and twenty-five, while it sometimes manifests itself in women at the menopause. It is much more common in the female, than in the male — in the proportion of 20 to 1. Certain races are more liable to the disease than others; thus the Latin races are much more prone to hysteria than are those who come of a Teutonic stock, and in more aggravated and complex forms. In England it has been asserted that an undue proportion of cases occur among Jews. Occupation, or be it rather said want of occupation, Is a prolific cause. This is noticeable more especially in the higher classes of society. An hysterical attack may occur as an immediate sequel to an epileptic fit. If the patient suffers only from petit mal (see Epilepsy), unaccompanied by true epileptic fits, the significance of the hysterical seizure, which is really a post-epileptic pheno- menon, may remain unrecognized.

It is convenient to group the very varied symptoms of hysteria into paroxysmal and chronic. The popular term " hysterics " is applied to an explosion of emotionalism, generally the result of mental excitement, on which convulsive fits may supervene. The characters of these vary, and may closely resemble epilepsy. The hysterical fit is

generally preceded by an aura or warning. This sometimes takes the form of a sensation as of a lump in the throat (globus hystericus). The patient may fall, but very rarely is injured in so doing. The eyes are often tightly closed, the body and limbs become rigid, and the back may become so arched that the patient rests on her heels and head (opisthotonos). This stage is usually followed by violent struggling movements. There is no loss of consciousness. The attack may last for half-an-hour

or even longer. Hysterical fits in their fully-developed form are rarely seen in England, though common in France. In the chronic condition we find an extraordinary complexity of symp- toms, both physical and mental. The physical symptoms are extremely diverse. There may be a paralysis of one or more limbs associated with rigidity, which may persist for weeks, months or years. In some cases, the patient is unable to walk; in others there are peculiarities of the gait quite unlike anything met with in organic disease. Perversions of sensation are usually present; a common instance is the sensation of a nail being driven through the vertex of the head (clavus hystericus). The region of the spine is a very frequent seat of hysterical pain. Loss of sensation (anaesthesia), of which the patient may be un- aware, is of common occurrence. Very often this sensory loss is limited exactly to one-half of the body, including the leg, arm and face on that side (hemianaesthesia). Sensation to touch, pain, heat and cold, and electrical stimuli may have completely dis- appeared in the anaesthetic region. In other cases, the anaes- thesia is relative or it may be partial, certain forms of sensation remaining intact. Anaesthesia is almost always accompanied by an inability to recognize the exact position of the affected limb when the eyes are closed. When hemianaesthesia is present, sight, hearing, taste and smell are usually impaired on that side of the body. Often there is loss of voice (hysterical aphonia). It is to such cases of hysterical paralysis and sensory disturbance that the wonderful cures effected by quacks and charlatans may be referred. The mental symptoms have not the same tendency to pass away suddenly. They may be spoken of as inter- paroxysmal and paroxysmal. The chief characteristics of the former are extreme emotionalism combined with obstructiveness, a desire to be an object of interest and a constant craving for sympathy which is often procured at an immense sacrifice of personal comfort. Obstructiveness is the invariable symptom. Hysteria may pass into absolute insanity.

The treatment of hysteria demands great tact and firmness on the part of the physician. The affection is a definite entity and has to be clearly distinguished from malingering, with which it is so often erroneously regarded as synonymous. Drugs are of little value. The moral treatment is all-important. In severe cases, removal from home surroundings and isolation, either in a hospital ward or -nursing home, are essential, in order that full benefit may be derived from psychotherapeutic measures.

Bibliography. — Charcot, Lecons sur les maladies du systeme nerveuse (1877) ; S. Weir Mitchell, Lectures on Diseases of the Nervous System especially in Women (1885) ; Buzzard, Simulation of Hysteria by Organic Nervous Disease (1891); Pitres, Lecons cliniques sur I'hysterie et Vhypnotisme (1891); Richer, Etudes cliniques sur la grande hysterie (1891); Gilles de la Tourette, Traite clinique et therapeutique de I'hysterie (1891); Bastian, Hysterical or Functional Paralysis (1893); Ormerod, Art. "Hysteria," in Clifford Allbutt's System of Medicine (1899); Camus and Pagnez, Isolement et Psy- chotherapie (1904). (J- B. T. ; E. Bra.)

HYSTERON-PROTERON (Gr. wrepov, latter, and Tportpov, former), a figure of speech, in which the order of words or phrases is inverted, and that which should logically or naturally come last is put first, to secure emphasis for the principal idea; the classical example is Virgil's " moriamur et in media arma ruamus," " let us die and charge into the thick of the fight " (Aen. ii. 358). The term is also applied to any inversion in order of events, arguments, &c.

HYTHE, a market town and watering-place, one of the Cinque Ports, and a municipal and parliamentary borough of Kent, England, 67 m. S.E. by E. of London on a branch of the South Eastern & Chatham railway. Pop. (1901) 5557. It is beauti- fully situated at the foot of a steep hill near the eastern extremity of Romney Marsh, about half a mile from the sea, and consists principally of one long street running parallel with the shore, with which it is connected by a straight avenue of wych elms. On account of its fine situation and picturesque and interesting neighbourhood, it is a favourite watering-place. A sea-wall and parade extend eastward to Sandgate, a distance of 3 m. There is communication with Sandgate by means of a tramway along the front. On the slope of the hill above the town stands

the fine church of St Leonard, partly Late Norman, with a very beautiful Early English chancel. The tower was rebuilt about 1750. In a vault under the chancel there is a collection of human skulls and

bones supposed to be the remains of men killed in a battle near Hythe in 456. Lionel Lukin (1742-1834), inventor of the life-boat, is buried in the churchyard. Hythe possesses a guildhall founded in 1794 and two hospitals, that of St Bartholomew founded by Haimo, bishop of Rochester, in 1336, and that of St John (rebuilt in 1802), of still greater antiquity but unknown date, founded originally for the reception of lepers. A government school of musketry, in which instructors for the army are trained, was established in 1854, and has been extended since, and the Shorncliffe military camp is within 2 1 m. of the town.

Lympne, which is now 3 m. inland, is thought to have been the original harbour which gave Hythe a place among the Cinque Ports. The course of the ancient estuary may be distinctly traced from here along the road to Hythe, the sea-sand lying on the surface and colouring the soil. Here are remains of a Roman fortress, and excavations have brought to light many remains of the Roman Partus Lemanis. Large portions of the fortress walls are standing. At the south-west corner is one of the circular towers which occurred along the line of wall. The site is now occupied by the fine old castellated mansion of Studfall castle, formerly a residence of the archdeacons of Canterbury. The name denotes a fallen place, and is not infrequently thus applied to ancient remains. The church at Lympne is Early English, with a Norman tower built by Arch- bishop Lanfranc, and Roman material may be traced in the walls. A short distance east is Shipway or Shepway Cross, where some of the great assemblies relating to the Cinque Ports were held. A mile north from Hythe is Saltwood Castle, of very ancient origin, but rebuilt in the time of Richard II. The castle was granted to the see of Canterbury in 1026, but escheated to the crown in the time of Henry II., when the murder of Thomas a Beckett is said to have been concerted here, and having been restored to the archbishops by King John remained a residence of theirs until the time of Henry VIII. It was restored as a residence in 1882. About 2 m. N.W. of Saltwood are remains of the fortified 14th-century manor-house of Westenhanger. It is quadrangular and surrounded by a moat, and of the nine towers (alternately square and round) by which the walls were defended, three remain.

The parliamentary borough of Hythe, which includes Folke- stone, Sandgate and a number of neighbouring villages, returns one member. The town is governed by a mayor, 4 aldermen and 12 councillors. Area 2617 acres.

Hythe (Heda, Heya, Hethe, Hithe, i.e. landing-place) was known as a

port in Saxon times, and was granted by Half den, a Saxon thegn, to Christ Church, Canterbury. In the Domesday Survey the borough is entered among the archbishop's lands as appurtenant to his manor of Saltwood, and the bailiff of the town was appointed by the archbishop. Hythe was evidently a Cinque Port before the Conquest, as King John in 1205 confirmed the liberties, viz. freedom from toll, the right to be impleaded only at the Shepway court, &c, which the townsmen had under Edward the Confessor. The liberties of the Cinque Ports were confirmed in Magna Carta and later by Edward I. in a general charter, which was confirmed, often with additions, by subsequent kings down to James II. John's charter to Hythe was confirmed by Henry IV., Henry V. and Henry VI. These charters were granted to the Cinque Ports in return for Ihe fifty-seven ships which they supplied for the royal service, of which five were contributed by Hythe. The ports were first represented in the parliament of 1363, to which they each sent four members.

Hythe was governed by twelve jurats until 1574, when it was incorporated by Elizabeth under the title of the mayor, jurats and commonalty of Hythe; a fair for the sale of fish, &c, was also granted, to be held on the feast of St Peter and St Paul. As the sea gradually retreated from Hythe and the harbour became choked up with sand, the town suffered the fate of other places near it, and lost its old importance.

I— IAMBLICHUS

213

I the ninth letter of the English and Latin alphabet, the tenth in the Greek and Phoenician, because in these the symbol Teth (the Greek 0) preceded it. Teth was not included in the Latin alphabet because that language had no sound corresponding to the Greek d, but the symbol was metamorphosed and utilized as the numeral C = 100, which took this form through the influence of the initial letter of the Latin centum. The name of I in the Phoenician alphabet was Yod. Though in form it seems the simplest of letters it was originally much more complex. In Phoenician it takes the form ˆ,, which is found also in the earliest Syriac and Palestinian inscriptions with little modifica- tion. Ultimately in Hebrew it became reduced to a very small symbol, whence comes its use as a term of contempt for things of no importance as in " not one jot or tittle " (Matthew v. 18). The name passed from Phoenician to Greek, and thence to the Latin of the vulgate as iota, and from the Latin the English word is derived. Amongst the Greeks of Asia it appears only as the simple upright I,

but in some of the oldest alphabets elsewhere, as Crete, Thera, Attica, Achaia and its colonies in lower Italy, it takes the form f or S, while at Corinth and Corcyra it appears first in a form closely resembling the later Greek sigma 2. It had originally no cross-stroke at top and bottom, I being not i but z. The Phoenician alphabet having no vowel symbols, the value of yod was that of the English y. In Greek, where the consonant sound had disappeared or been converted into h, I is regularly used as a vowel. Occasionally, as in Pamphylian, it is used dialectically as a glide between i and another vowel, as in the proper name Aaixhrpavs. In Latin I was used alike for both vowel and consonant, as in iugum (yoke). The sound represented by it was approximately that still assigned to ;' on the continent. Neither Greek nor Latin made any distinction in writing between short and long i, though in the Latin of the Empire the long sound was occasionally represented by a longer form of the symbol I. The dot over the i begins in the 5th or 6th century a.d. In pronunciation the English short i is a more open sound than that of most languages, and does not correspond to the Greek and Latin sound. Nor are the English short and long i of the same quality. The short i in Sweet's terminology is a high-front-wide vowel, the long i, in English often spelt ee in words like seed, is diphthonged, beginning like the short vowel but becoming higher as it proceeds. The Latin short i, however, in final syllables was open and ultimately became r, e.g. in the neuter of i-stems as utile from utUi-s. Medially both the short and the long sounds are very common in syllables which were originally unaccented, because in such positions many other sounds passed into /: officio but facio, red into but emo, quidlibet but lubel (libet is later) ; collido but lacdo, f'ldo from an older feido, istis (dative plural) from an earlier istois. (P. Gl.)

IAMBIC, the term employed in prosody to denote a succession of verses, each consisting of a foot or metre called an iambus ii'a/ u/3os). formed of two syllables, of which the first is short and the second long (—). After the dactylic hexameter, the iambic trimeter was the most popular metre of ancient Greece. Archi- lochus is said to have been the inventor of this iambic verse, the rpifiirpos consisting of three iambic feet. In the Greek tragedians an iambic line is formed of six feet arranged in obedience to the following scheme: —

Much of the beauty of the verse depends on the caesura, which is usually in the middle of the third foot, and far less frequently in the middle of the fourth. The English language runs more naturally in the iambic metre than in any other. The normal

blank verse in English is founded upon an iambic basis, and Milton's line —

And swims | or sinks | or wades | or creeps | or flies] — exhibits it in its primitive form. The ordinary alexandrine of French literature is a hexapod iambic, but in all questions of quantity in modern prosody great care has to be exercised to recollect that all ascriptions of classic names to modern forms of rhymed or blank verse are merely approximate. The octosyllabic, or four-foot iambic metre, has found great favour in English verse founded on old romances. Decasyllabic iambic lines rhyming together form an " heroic " metre.

IAMBLICHUS (d. c. a.d. 330), the chief representative of Syrian Neoplatonism, is only imperfectly known to us in the events of his life and the details of his creed. We learn, however, from Suidas, and from his biographer Eunapius, that he was born at Chalcis in Coele-Syria, the scion of a rich and illustrious family, that he studied under Anatolius and afterwards under Porphyry, the pupil of Plotinus, that he himself gathered together a large number of disciples of different nations with whom he lived on terms of genial friendship, that he wrote " various philosophical books," and that he died during the reign of Constantine, — according to Fabricius, before a.d. m. His residence (probably) at his native town of Chalcis was varied by a yearly visit with his pupils to the baths of Gadara. Of the books referred to by Suidas only a fraction has been preserved. His commentaries on Plato and Aristotle, and works on the Chaldaean theology and on the soul, are lost. For our knowledge of his system we are indebted partly to the fragments of these writings preserved by Stobaeus and others, and to the notices of his successors, especially Proclus, partly to his five extant books, the sections of a great work on the Pythagorean philosophy. Besides these, Proclus (412-485) seems to have ascribed to him 1 the authorship of the celebrated book On the Egyptian Mysteries (so-called), and although its differences in style and in some points of doctrine from the writings just mentioned make it improbable that the work was by Iamblichus himself, it certainly emanated from his school, and in its systematic attempt to give a speculative justification of the polytheistic cultus of the day, marks the turning-point in the history of thought at which Iamblichus stood.

As a speculative theory Neoplatonism (q.v.) had received its highest development from Plotinus. The modifications intro- duced by Iamblichus were the elaboration in greater detail of its formal divisions, the more systematic application of the Pythagorean number-symbolism, and chiefly, under the influence of Oriental

systems, the thorough-going mythic interpretation of what the previous philosophy had still regarded as notional. It is on the last account, probably, that Iamblichus was looked upon with such extravagant veneration. As a philosopher he had learning indeed, but little originality. His aim was to give a philosophical rendering of the popular religion. By his con- temporaries he was accredited with miraculous powers (which he, however, disclaimed), and by his followers in the decline of Greek philosophy, and his admirers on its revival in the 15th and 16th centuries, his name was scarcely mentioned without the epithet " divine " or " most divine," while, not content with the more modest eulogy of Eunapius that he was inferior to Porphyry only in style, the emperor Julian regarded him as not even second to Plato, and said that he would give all the gold of Lydia for one epistle of Iamblichus.

Theoretically, the philosophy of Plotinus was an attempt to harmonize the principles of the various Greek schools. At the head of his system he placed the transcendent incommunicable one (tv bfiedeKTov) , whose first-begotten is intellect (vovs), from which proceeds soul (ipvxy), which in turn gives birth to <£i>crts, the

1 Besides the anonymous testimony prefixed to an ancient MS. of Proclus, De Myst. viii. 3 seems to be quoted by the latter as Iambli- i-bus's. (.'!. Meincrs, "Judicium de Hiiro qui de Myst. Acs;, in-scribitur," in Comment. Soc. Reg. Sci. Goit., vol. iv., 1781, p. 77.

realm of nature. Immediately after the absolute one, Iamblichus introduced a second superexistent unity to stand between it and the many as the producer of intellect, and made the three succeed- ing moments of the development (intellect, soul and nature) undergo various modifications. He speaks of them as in- tellectual (dtoi voepoi), supramundane (fore pKoa/xioi), and mun- dane gods (kyKoctiiOL). The first of these — which Plotinus represented under the three stages of (objective) being (6V), (subjective) life (fojij), and (realized) intellect (vovs) — is distin- guished by him into spheres of intelligible gods (deol voryroi) and of intellectual gods (deol voepoi), each subdivided into triads, the latter sphere being the place of ideas, the former of the archetypes of these ideas. Between these two worlds, at once separat- ing and uniting them, some scholars think there was inserted by Iamblichus, as afterwards by Proclus, a third sphere partaking of the nature of both (deol votyrol koX voepol). But

this sup- position depends on a merely conjectural emendation of the text. We read, however, that " in the intellectual hebdomad he assigned the third rank among the fathers to the Demiurge." The Demiurge, Zeus, or world-creating potency, is thus identified with the perfected vovs, the intellectual triad being increased to a hebdomad, probably (as Zeller supposes) through the sub- division of its first two members. As in Plotinus vovs produced nature by mediation of \pvxq, so here the intelligible gods are followed by a triad of psychic gods. The first of these is incom- municable and supramundane, while the other two seem to be mundane though rational. In the third class, or mundane gods (deol kyicoaiAtoi), there is a still greater wealth of divinities, of various local position, function, and rank. We read of gods, angels, demons and heroes, of twelve heavenly gods whose number is increased to thirty-six or three hundred and sixty, and of seventy-two other gods proceeding from them, of twenty- one chiefs (riyepbves) and forty-two nature-gods (deol yeveciovp- yoi), besides guardian divinities, of particular individuals and nations. The world is thus peopled by a crowd of superhuman beings influencing natural events, possessing and communicating knowledge of the future, and not inaccessible to prayers and offerings.

The whole of this complex theory is ruled by a mathematical formulism of triad, hebdomad, &c, while the first principle is identified with the monad, vovs with the dyad, and ipvxh with the triad, symbolic meanings being also assigned to the other numbers. " The theorems of mathematics," he says, " apply absolutely to all things," from things divine to original matter (DXrj). But though he thus subjects all things to number, he holds elsewhere that numbers are independent existences, and occupy a middle place between the limited and unlimited.

Another difficulty of the system is the account given of nature. It is said to be "bound by the indissoluble chains of necessity which men call fate," as distinguished from divine things which are not subject to fate. Yet, being itself the result of higher powers becoming corporeal, a continual stream of elevating influence flows from them to it, interfering with its necessary laws and turning to good ends the imperfect and evil. Of evil no satisfactory account is given; it is said to have been generated accidentally.

In his doctrine of man Iamblichus retains for the soul the middle place between intellect and nature which it occupies in the universal order. He rejects the passionless and purely intellectual character ascribed to the human soul by Plotinus, distinguishing it sharply both from those above and those below it. He maintains that it moves

between the higher and lower spheres, that it descends by a necessary law (not solely for trial or punishment) into the body, and, passing perhaps from one human body to another, returns again to the supersensible. This return is effected by the virtuous activities which the soul performs through its own power of free will, and by the assistance of the gods. These virtues were classified by Porphyry as political, purifying (/caflapriKtu), theoretical, and paradigmatic; and to these Iamblichus adds a fifth class of priestly virtues (lepa.Ti.Kal aptrai), in which the divinest part of the soul raises itself above intellect to absolute being.

Iamblichus does not seem ever to have attained to that ecstatic communion with and absorption in deity which was the aim of earlier Neoplatonism, and which Plotinus enjoyed four times in his life, Porphyry once. Indeed his tendency was not so much to raise man to God as to bring the gods down to men— a tendency shown still more plainly in the " Answer of Abamon the master to Porphyry's letter to Anebo and solutions of the doubts therein expressed," afterwards entitled the Liber de mysteriis, and ascribed to Iamblichus.

In answer to questions raised and doubts expressed by Porphyry, the writer of this treatise appeals to the innate idea all men have of the gods as testifying to the existence of divinities countless in number and various in rank (to the correct arrange- ment of which he, like Iamblichus, attaches the greatest import- ance). He holds with the latter that above all principles of being and intelligence stands the absolute one, from whom the first god and king spontaneously proceeds; while after these follow the ethereal, empyrean, and heavenly gods, and the various orders of archangels, angels, demons, and heroes dis- tinguished in nature, power, and activity, and in greater pro- fusion than even the imagination of Iamblichus had conceived. He says that all the gods are good (though he in another place admits the existence of evil demons who must be propitiated), and traces the source of evil to matter; rebuts the objection that their answering prayer implies passivity on the part of gods or demons; defends divination, soothsaying, and theurgic practices as manifestations of the divine activity; describes the appearances of the different sorts of divinities; discusses the various kinds of sacrifice, which he says must be suitable to the different natures of the gods, material and immaterial, and to the double condition of the sacrificer as bound to the body or free from it (differing thus in his psychology from Iamblichus) ; and, in conclusion, states that the only way to happiness is through knowledge of and union with the gods, and that theurgic practices alone prepare the mind for this

union — again going beyond his master, who held assiduous contemplation of divine things to be sufficient. It is the passionless nature of the soul which permits it to be thus united to divine beings, — knowledge of this mystic union and of the worship associated with it having been derived from the Egyptian priests, who learnt it from Hermes.

On one point only does the author of the De mysteriis seem not to go so far as Iamblichus in thus making philosophy sub- servient to priestcraft. He condemns as folly and impiety the worship of images of the gods, though his master held that these simulacra were filled with divine power, whether made by the hand of man or (as he believed) fallen from heaven. But images could easily be dispensed with from the point of view of the writer, who not only held that all things were full of gods (iravra r\rjpr] dedv, as Thales said), but thought that each man had a special divinity of his own — an t5tps Sal/xcov — as his guard and companion.

The following are the extant works of Iamblichus: (l) On the Pythagorean (Life Tlepl rod TTWayopiKov 0iov), ed. T. Kiessling (1815), A. Nauck (St Petersburg, 1884); for a discussion of the authorities used see-E. Rohde in Rheinisches Museum, xxvi., xxvii. (1871, 1872) ; Eng/trans. by Thomas Taylor (1818). (2) The Exhorta- tion to Philosophy (A670S TrporptTrrucos eU t-\oiav) , ed. T. Kiessling (1813); H. Piselli (1888). (3) The treatise On the General Science of Mathematics (Tlepl rrjs kolvtjs p.adr]p.aTLKijs eTuaTijp.r]s) , ed. J. G. Friis (Copenhagen, 1790), N. Festa (Leipzig, 1891). (4) The book On the Arithmetic of Nicomachus (Tlepl rijs NiKOjudxou Apiffyiip-urijs elffayosyfjs) , along with fragments on fate (Tlepl dy.a.pp.evT)s) and prayer Jjlepl ci>xvs), ed. S. Tennulius (1688), the Arithmetic by H. Pistelli (1894). (5) The Theological Principles of Arithmetic (Qeo\oyointva rijs b.ptOin \Ti>iTg)~ the seventh book of the series — by F. Ast (Leipzig, 1 8 1 7). Two lost books, treating of the physical and ethical significa tion of numbers, stood fifth and sixth, while books on music, geometry and astronomy followed. The emperor Julian had a great admiration for Iamblichus, whom he considered " intellectually not inferior to Plato "; but the Letters to Iamblicus the Philosopher which bear his name are now generally considered spurious.

The so-called Liber de mvsteriis was first edited, with Latin translation and notes, bv T. Gale (Oxford, 1678), and more recently by G. rarthey (Berlin, 1857); Eng. trans, by Thomas Taylor (1821).

There is a monograph on Iamblichus by G. E. Hebenstreit (De Iamblichi, philosophi Syri, doctrina, Leipzig, 1764), and one of the De myst. by Harless (Das Buck v. d. agypt. Myst., Munich, 1858). The best accounts of Iamblichus are those of Zeller, Phil. d. Griechen, iii. 2, pp. 613 sq., 2nd ed. ; E. Vacherot, Hist, de I'ecole d'Alexandrie (1846), ii. 57 sq. ; J. Simon, Hist, de I'ecole d'Alexandrie (1845) ; A. E. Chaignet, Hisloire de la psychologie des Grecs (Paris, 1893) v. 67-108 ; T. Whittaker, The Neo-Plalonists (Cambridge, 1901). (W. R. So.)

IAMBLICHUS, of Syria, the earliest of the Greek romance writers, flourished in the 2nd century a.d. He was the author of BajSuXcoj'iatti, the loves of Rhodanes and Sinonis, of which an epitome is preserved in Photius (cod. 94). Garmus, a legendary king of Babylon, forces Sinonis to marry him and throws Rhodanes into prison. The lovers manage to escape, and after many singular adventures, in which magic plays a considerable part, Garmus is overthrown by Rhodanes, who becomes king of Babylon. According to Suidas, Iamblichus was a freedman, and a scholiast's note on Photius further informs us that he was a native Syrian (not descended from Greek settlers) ; that he borrowed the material for his romance from a love story told him by his Babylonian tutor, and that he subsequently applied himself with great success to the study of Greek. A MS. of the original in the library of the Escorial is said to have been destroyed by fire in 1670. Only a few fragments have been preserved, in addition to Photius's epitome.

See Scrip/ores erotici, ed. A. Hirschig (1856) and R. Hercher (1858); A. Mai, Scriptorum veterum nova collectio, ii.; E. Rohde, Der griechische Roman (1900).

IANNINA {i.e. " the city of St John "; Gr. Ioannina; Turk Yanid; also written Janina, Jannina, and, according to its Albanian pronunciation, Yanina), the capital of the vilayet of Iannina, Albania, European Turkey. Pop. (1905) about 22,000. The largest ethnical groups in the population are the Albanian and Greek; the purest form of colloquial Greek is spoken here among the wealthy and highly educated merchant families. The position of Iannina is strikingly picturesque. At the foot of the grey limestone mass of Mount Mitzekeli (1500 ft.), which forms part of the fine range of hills running north from the Gulf of Arta, there lies a valley (the Hellopia of antiquity) partly occupied by a lake; and the city is built on the slopes of a slight eminence, stretching down to the western

shore. It has greatly declined from the state of barbaric prosperity which it enjoyed from 1788 to 1822, when it was the seat of Ali Pasha (q.v.), and was estimated to have from 30,000 to 50,000 inhabitants. The fortress — Demir Kule or Iron Castle, which, like the principal seraglio, was built on a promontory jutting into the lake — is now in ruins. Biltlhe city is the seat of a Greek archbishop, and still possesses many mosques and churches, besides synagogues, a Greek college (gymnasium), a library and a hospital. Sayades (opposite Corfu) and Arta are the places through which it receives its imports. The rich gold and silver embroidery for which the city has long been famous is still one of the notable articles in its bazaar; but the commercial importance of Iannina has notably declined since the cession of Arta and Thessaly to Greece in 1881. Iannina had previously been one of the chief centres of the Thessalian grain trade; it now exports little except cheese, hides, bitumen and sheepskins to the annual value of about £120,000; the imports, which supply only the local demand for provisions, textile goods, hardware, &c, are worth about double that sum.

The lake of Iannina (perhaps to be identified with the Pambotus or Pambotisof antiquity) is 6 m. long, and has an area of 24 sq.m., with an extreme depth of less than 35 ft. In time of flood it is united with the smaller lake of Labchistas to the north. There are no affluents of any considerable size, and the only outlets are underground passages or katavothra extending for many miles through the calcareous rocks.

The theory supported by W. M. Leake (Northern Greece, London, 1835) that the citadel of Iannina is to be identified with Dodona, is now generally abandoned in favour of the claims of a more southern site. As Anna Comnena, in describing the capture of the town (ret 'loavvwa) by Bohemond in 1082, speaks of the walls as being dilapidated, it may be supposed that the place existed before the nth century. It is mentioned from time to time in the Byzantine annals, and on the establishment of the

lordship of Epirus by Michael Angelus Comnenus Ducas, it became his capital. In the middle ages it was successively attacked by Serbs, Macedonians and Albanians; but it was in possession of the successors of Michael when the forces of the Sultan Murad appeared before it in 1430 (cf. Hahn, Alban. Studien, Jena [1854], pp. 319-322). Since 143 1 it has continued under Turkish rule.

Descriptions of Iannina will be found in Holland's Travels (1815) ; Hughes, Travels in Greece, &c. (1830); H. F. Tozer, Researches in

the Highlands of Turkey (London, 1869). See also Albania and the authorities there cited.

IAPETUS, in Greek mythology, son of Uranus and Gaea, one of the Titans, father of Atlas, Prometheus, Epimetheus and Menoetius, the personifications of certain human qualities (Hesiod, Thcog. 507). As a punishment for having revolted against Zeus, he was imprisoned in Tartarus (Homer, Iliad, viii. 479) or underneath the island of Inarime off the coast of Cam- pania (Silius Italicus xii. 148). Hyginus makes him the son of Tartarus and Gaea, and one of the giants. Iapetus was con- sidered the original ancestor of the human race, as the father of Prometheus and grandfather of Deucalion. The name is probably identical with Japhet (Japheth), and the son of Noah in the Greek legend of the flood becomes the ancestor of (Noah) Deu- calion. Iapetus as the representative of an obsolete order of things is described as warring against the new order under Zeus, and is naturally relegated to Tartarus.

See F. G. Welcker, Griechische Gotterlehre, i. (1857) ; C. H. Volcker, Die Mythologie des Iapetiscken Geschlechtes (1824); M. Mayer, Giganten und Titanen (1887).

IAPYDES, or Iapodes, one of the three chief peoples of Roman Illyria. They occupied the interior of the country on the north between the Arsia (Arsa) and Tedanius (perhaps the Zermanja), which separated them from the Liburnians. Their territory formed part of the modern Croatia. They are described by Strabo as a mixed race of Celts and lllyrians, who used Celtic weapons, tattooed themselves, and lived chiefly on spelt and millet. They were a warlike race, addicted to plundering expeditions. In 129 B.C. C. Sempronius Tuditanus celebrated a triumph over them, and in 34 B.C. they were finally crushed by Augustus. They appear to have had a foedus with Rome, but subsequently rebelled.

See Strabo iv. 207, vii. 313-315; Dio Cassius xlix. 35; Appian, Illyrica, 10, 14, 16; Livy, Epit.Mx. 131; Tibullus iv. I. 108; Cicero, Pro Balbo, 14.

IATROCHEMISTRY (coined from Gr. larpds, a physician, and " chemistry "), a stage in the history of chemistry, during which the object of this science was held to be " not to make gold but to prepare medicines." This doctrine dominated chemical thought during the 16th century, its foremost sup- porters being Paracelsus, van Helmont and de la Boe Sylvius. But it gave way to the new definition formulated by Boyle, viz. that the proper domain of chemistry was "

to determine the composition of substances." (See Chemistry: I. History; Medicine.)

IAZYGES, a tribe of Sarmatians first heard of on the Maeotis, where they were among the allies of Mithradates the Great. Moving westward across Scythia, and hence called Metanastae, they were on the lower Danube by the time of Ovid, and about a.d. 50 occupied the plains east of the Theiss. Here, under the general name of Sarmatae, they were a perpetual trouble to the Roman province of Dacia. They were divided into freemen and serfs (Sarmatae Limigantes), the latter of whom had a- different manner of life and were probably an older settled population enslaved by nomad masters. They rose against them in a.d. 334, but w r ere repressed by foreign aid. Nothing is heard of Iazyges or Sarmatae after the Hunnish invasions. Graves at Keszthely and elsewhere in the Theiss valley, shown by their contents to belong to nomads of the first centuries a.d., are referred to the Iazyges. (E. H. M.)

IBADAN, a town of British West Africa, in Yorubaland, Southern Nigeria, 123 m. by rail N.E. of Lagos, and about 50 m. N.E. of Abeokuta. Pop. (1910 estimated at 150,000. The town occupies the slope of a hill, and stretches into the valley

through which the river Ona flows. It is enclosed by mud walls, which have a circuit of 18 m., and is encompassed by cultivated land 5 or 6 m. in breadth. The native houses are all low, thatched structures, enclosing a square court, and the only break in the mud wall is the door. There are numerous mosques, orishaS (idol-houses) and open spaces shaded with trees. There are a few buildings in the European style. Most of the inhabitants are engaged in agriculture ; but a great variety of handicrafts is also carried on. Ibadan is the capital of one of the Yoruba states and enjoys a large measure of autonomy. Nominally the state is subject to the alafin (ruler) of Oyo; but it is virtually independent. The administration is in the hands of two chiefs, a civil and a military, the bale and the balogun; these together form the highest court of appeal. There is also an iyaloda or mother of the town, to whom are submitted all the disputes of the women. Ibadan long had a feud with Abeokuta, but on the establishment of the British protectorate the intertribal wars were stopped. In 1862 the people of Ibadan destroyed ljaya, a neighbouring town of 60,000 inhabitants. A British resident and a

detachment of Hausa troops are stationed at Ibadan.

See also Yorubas, Abeokuta and Lagos.

IBAGUE, or San Bonifacio de Ibague, a city of Colombia, and capital of the department of Tolima, about 60 m.W. of Bogota and 18 m. N.W. of the Nevado de Tolima. Pop. (1900, estimate) 13,000. Ibague is built on a beautiful plain between the Chipalo and Combeima, small affluents of the Cuello, a western tributary of the Magdalena. Its elevation, 4300 ft. above the sea, gives it a mild, subtropical climate. The plain and the neighbouring valleys produce cacao, tobacco, rice and sugar-cane. There are two thermal springs in the vicinity, and undeveloped mines of sulphur and silver. The city has an endowed college. It is an important commercial centre, being on the road which crosses' the Quindio pass, or paramo, into the Cauca valley. Ibague was founded in 1550 and was the capital of the republic for a short time in 1854.

IBARRA, a city of Ecuador and capital of the province of Imbabura, about 50 m. N.N.E. of Quito, on a small fertile plain at the northern foot of Imbabura volcano, 7300 ft. above sea- level. Pop. (1900, estimate) 5000. It stands on the left bank of the Tahuando, a small stream whose waters flowˆnorth and west to the Pacific through the Mira, and is separated from the higher plateau of Quito by an elevated transverse ridge of which the Imbabura and Mojanda volcanoes form a part. The surrounding country is mountainous, the valleys being very fertile. Ibarra itself has a mild, humid climate, and is set in the midst of orchards and gardens. It is the see of a bishop and has a large number of churches and convents, and many substantial residences. Ibarra has manufactures of cotton and woollen fabrics, hats, sandals (alpargates), sacks and rope from cabulla fibre, laces, sugar and various kinds of distilled spirits and cordials made from the sugar-cane grown in the vicinity. Mules are bred for the Colombian markets of Pasto and Popayan. Ibarra was founded in 1597 by Alvaro de Ibarra, the president of Quito. It has suffered from the eruptions of Imbabura, and more severely from earthquakes, that of 1859 causing great damage to its public buildings, and the greater one of the 16th of August 1868 almost completely destroyed the town and killed a large number of its inhabitants. The village of Carranqui, 1 1 m. from Ibarra, is the birthplace of Atahualpa, the Inca sovereign executed by Pizarro, and close by is the small lake called Yaguarcocha where the army of Huaynacapac, the father of Atahualpa, inflicted a bloody defeat on the Carranquis. Another aboriginal battle-field is that of Hatuntaqui, near Ibarra, where Huaynacapac won a decisive victory and added

the greater part of Ecuador to his realm. The whole region is full of tolas, or Indian burial mounds.

IBERIANS (Iberi, T0ijpes), an ancient people inhabiting parts of the Spanish peninsula. Their ethnic affinities are not known, and our knowledge of their history is comparatively slight. It is almost impossible to make any statement in regard to them which will meet with general agreement. At the same

time, the general lines of Iberian controversy are clear enough The principal sources of information about the Iberians are (1) historical, (2) numismatic, (3) linguistic, (4) anthropological.

1. Historical.— The name seems to have been applied by the earlier Greek navigators to the peoples who inhabited the eastern coast of Spain; probably it originally meant those who dwelt by the river Iberus (mod. Ebro). It is possible (Boudard. Etudes sur V alphabet ibirien (Paris, 1852) that the river-name itself represents the Basque phrase ibay-erri " the country of the river." On the other hand, even in older Greek usage (as in Thuc. vi. 1) the term Iberia is said to have embraced the country as far east as the Rhone (see Herodorus of Heraclea, Fragm. Hist. Gr. ii. 34), and by the time of Strabo it was the common Greek name for the Spanish peninsula. Iberians thus meant sometimes the population of the peninsula in general and sometimes, it would appear, the peoples of some definite race (ykvos) which formed one element in that population. Of the tribal distribution of this race, of its linguistic, social and political characteristics, and of the history of its relation to the other peoples of Spain, we have only the most general, fragmentary and contradictory accounts. On the whole, the historical evidence indicates that in Spain, when it first became known to the Greeks and Romans there existed many separate and variously civilized tribes connected by at least apparent identity of race, and by similarity (but not identity) of language, and sufficiently distinguished by their general characteristics from Phoenicians, Romans and Celts. The statement of Diodorus Siculus that the mingling of these Iberians with the immigrant Celts gave rise to the Celtiberians is in itself probable. Varro and Dionysius Afer proposed to identify the Iberians of Spain with the Iberians of the Caucasus, the one regarding the eastern, and other the western, settlements as the earlier.

2. Numismatic. — Knowledge of ancient Iberian language and history is mainly derived from a variety of coins, found widely distributed in the peninsula, 1 and also in the neighbourhood of

Narbonne. They are inscribed in an alphabet which has many points of similarity with the western Greek alphabets, and some with the Punic alphabet; but which seems to retain a few characters from an older script akin to those of Minoan Crete and Roman Libya. 2 The same Iberian alphabet is found also rarely in inscriptions. The coinage began before the Roman conquest was completed; the monetary system resembles that of the Roman republic, with values analogous to denarii and quinarii. The coin inscriptions usually give only the name of the town, e.g. plplis (Bilbilis), klaqriqs (Calagurris), seqbrics (Segobriga),TMANiAv(Dumania). The types show late Greekand perhaps also late Punic influence, but approximate later to Roman models. The commonest reverse type, a charging horseman, reappears on the Roman coins of Bilbilis, Osca, Segobriga and other places. Another common type is one man leading two horses or brandishing a sword or a bow. The obverse has usually a male head, sometimes inscribed with what appears to be a native name.

3. Linguistic. — The survival of the non-Aryan language among the Basques around the west Pyrenees has suggested the attempt to interpret by its means a large class of similar- sounding place-names of ancient Spain, some of which are authenticated by their occurrence on the inscribed coins, and to link it with other traces of non-Aryan speech round the shores of the Western Mediterranean and on the Atlantic seaboard of Europe. This phase of Iberian theory opens with K v W. Humboldt (Prufung der Untersuchungen iiber die Urbewohn'er Hispaniens vermittelst der waskischzn Sprache, Berlin, 1821),

1 For the prehistoric civilization of the peninsula as a whole see Spain.

2 P. A. Boudard's Etudes sur Valphabet iberien (Paris, 1852). and Numismatique ibirienne (Beziers, 1859); Aloiss Heiss, Notes sur les monnaies celtiberiennes (Paris, 1865), and Description generate des monnaies antiques de I'Espagne (Paris, 1870) ; Phillips, Uber das iberische Alphabet (Vienna, 1870), Die Einwanderung der Iberer in die pyren. Halbinsel (Vienna, 1870); W. M. Flinders Petrie, Journ. Anthr. Inst. xxix. (1899) 204, and above all E. Hiibner, Monumenta linguae Ibericae.

who contended that there existed once a single great Iberian people, speaking a distinct language of their own; that an essentially " Iberian " population was to be found in Sicily, Sardinia and Corsica, in southern France, and even in the British Isles; and that the Basques of the present day were remnants of this race, which had elsewhere been expelled or absorbed. This last was the central and the seminal idea of the work, and it has been the point round which the battle of scholarship has mainly raged. The principal evidence which Humboldt adduced in its support was the possibility of explaining a vast number of the ancient topographical names of Spain, and of other asserted Iberian districts, by the forms and significations of Basque. In reply, Graslin {De I'Iberie, Paris, 1839), maintained that the name Iberia was nothing but a Greek misnomer of Spain, and that there was no proof that the Basque people had ever occupied a wider area than at present; and Blade (Origine des Basques, Paris, 1869) took the same line of argument, holding that Iberia is a purely geographical term, that there was no proper Iberian race, that the Basques were always shut in by alien races, that their affinity is still to seek, and that the whole Basque-Iberian theory is afigment. His main contention has met with some acceptance, 1 but the great current of ethnographical speculation still flows in the direction indicated by Humboldt.

4. Anthropological. — Humboldt's " Iberian theory " depended partly on linguistic comparisons, but partly on his observation of widespread similarity of physical type among the population of south-western Europe. Since his time the anthropological researches of Broca, Thurnam and Davis, Huxley, Busk, Beddoe, Virchow, Tubino and others have proved the existence in Europe, from Neolithic times, of a race, small of stature, with long or oval skulls, and accustomed to bury their dead in tombs. Their remains have been found in Belgium and France, in Britain, Germany and Denmark, as well as in Spain; and they bear a close resemblancfcto a type which is common among the Basques as well as all over the Iberian peninsula. This Neolithic race has consequently been nicknamed " Iberians," and it is now common to speak of the " Iberian " ancestry of the people of Britain, recognizing the racial characteristics of " Iberians " in the" small swarthy Welshman, "the" small dark Highlander," and the " Black Celts to the west of the Shannon," as well as in the typical inhabitants of Aquitania and Brittany. 2 Later investigators went further. M. d'Arbois de Jubainville, for example (Les Premiers habitants de I' Europe, Paris, 1877), maintained that besides possessing Spain, Gaul, Italy and the

British Isles, " Iberian " peoples penetrated into the Balkan peninsula, and occupied a part of northern Africa, Corsica and Sardinia; and it is now generally accepted that a race with fairly uniform characteristics was at one time in possession of the south of France (or at least of Aquitania), the whole of Spain from the Pyrenees to the straits, the Canary Islands (the Guanches) a part of northern Africa and Corsica. Whether this type is more conveniently designated by the word Iberian, or by some other name (" Eur-african," " Mediterranean," &c.) is a matter of comparative indifference, provided that there is no misunderstanding as to the steps by which the term Iberian attained its meaning in modern anthropology.

Authorities. — K. W. von Humboldt, " Uber die cantabrische oder baskische Sprache " in Adelung, Mithridates iv. (1817), and Prufung d. Untersuchungen ii. die Urbewohner Hispaniens vermittelst der waskischen Sprache (Berlin, 1821); L. F. Graslin, De VIberie (Paris, 1838) ; T. B. G. M. Bory dc St Vincent, Essai geologique sur le genre humain (1838); G. Lagneau, " Sur l'cthnologie des peuples iberiens," in Bull. soc. anthrop. (1867), pp. 146-161 ; J. F. Blade, £tudes sur V origine des Basques (Paris, 1869), Defense des etudes, &c. (Paris, 1870); Phillips, Die Einwanderung der Iberer in die pyren. Halbinsel (Vienna, 1870). Uber das iberische Alphabet (Vienna, 1870) ; W. Boyd Dawkins, " The Northern Range of the Basques," in

1 W. van Eys, for example, " La Langue iberienne et la langue basque," in Revue de linguistique, goes against Humboldt; but Prince Napoleon and to a considerable extent A. Luchaire maintain the justice of his method and the value of many of his results. See Luchaire, Les Origines linguistiques de I'Aquitaine (Paris, 1877).

2 Compare the interesting resumeˆ of the whole question in Boyd Dawkins's Early Man in Britain (London, 1880).

Fortnightly Rev. N.S. xvi. 323-337 (1874); W. T. van Eys, "La Langue iberienne et la langue basque," in Revue de linguistique, PP-3- J 5 (!874) ; W. Webster, " The Basque and the Kelt," in Journ. Anthrop. Inst. v. 5-29 (1875); F. M. Tubino, Los Aborigines ibericos los Berber os en la peninsula (Madrid, 1876); A. Luchaire, Les Origines linguistiques de I'Aquitaine (Paris, 1877) ! W. Boyd Dawkins, Early Man in Britain (London, 1880); A. Castaing, " Les Origines des Aquitains," Mtm. Soc. Eth. N.S. 1, pp. 183-328 (1884) ; G. C. C. Gerland, " Die Basken und die Iberer " in Grober, Grundriss d. roman. Philologie, 1, pp. 313-334 (1888); M. H. d'Arbois de Jubainville, Les Premiers habitants de VEurope

(1889-1894); J. F. Blade, Les Vascons avant leur etablissement en Novempopulanie, Agen. (1891); W. Webster, " The Celt-iberians," Academy xl. 268-269 (and con- sequent correspondence) (1891); J. Rhys, "The Inscriptions and Language of the Northern Picts," Proc. Soc. Ant. Scot. xxvi. 263-351 (1892); F. Fita, "El Vascuence en las inscripciones ogmicas," Bol. Real. Acad. Hist. Madrid (June 1893), xxii. 579-587; G. v. d. Gabelentz, " Baskisch u. Berberisch," Sitz. k. preuss. Akad. Wiss. 593-613 (Berlin, 1893), Die Verwandtschaft der Baskischen mil der Berber -Sprache Nordafrikas nachgewiesen (Braunschweig, 1894); M. H. d'Arbois de Jubainville, " Les Celtes en Espagne," Rev. cellique, xiv. 357-395 (1894) ; G. Buschan, " Uber die iberische Rasse," Ausland, lxvi. 342-344 (1894); F. Oloriz y Aguilera, Dis- tribution geografica del indice cefalico en Espana (Madrid, 1894), " La Talk humana en Espana " in Discursos R. Acad. Medicina xxxvi. 389 (Madrid, 1896); R. Collignon, "La Race basque," V Anthropologic, v. 276-287 (1894); T. de Aranzadi, " Le Peuple basque, resume " Bull. soc. d'anth. 510-520 (1894), " Consideraciones acerca de la raza basca " Euskel-Erria xxxy. 33, 65, 97, 129 (1896) ; H. Schuchhardt, Baskische Studien, i. " Uber die Entstehung der Bezugsformen des baskischen Zeitworts"; Denkschriften der K. Akad. der Wiss., Phil.-Hist,, Classe, Bd. 42, Abh. 3. (Wien, 1893); Ph. Salmon, Rev. mens. Ec. d'anthr. v. 155-181, 214-220(1895); R. Collignon, " Anthr. du S.-O. de la France," Mem. Soc. Anthr. § 3. 1. 4. p. 1-129 (1895), Ann. de giogr. v. 156-166 (1896), and with J. Deniker, " Les Maures de Senegal," V Anthr. vii. 57-69 (1897); G. Herve, Rev. mens. 'Ec. d'anthr. vi. 97-109 (1896); G. Sergi, Africa: Anthropologia della stirpe Camitica (Turin, 1897), Arii ed Italici (1898); L. de Hoyos Sainz, " L'Anthropologie et la pre- historique en Espagne et en Portugal en 1897," L' Anthropologic, rx. 37-5 1 (1898) ; J. Deniker (see Collignon) " Les Races de l'Europe," V Anthropologic, ix. 113-133 (1898) ; M. Geze, " De quelques rapports entre les langues berbere et basque," Mem. soc. arch, du Midi de la France, xiii. See also the works quoted in the footnotes; and the bibliography under Basques. (J. L. M.)

IBEX, one of the names of the Alpine wild goat, otherwise known as the steinbok and bouquetin, and scientifically as Capra ibex. Formerly the ibex was common on the mountain-ranges of Germany, Switzerland and Tirol, but is now confined to the Alps which separate Valais from Piedmont, and to the lofty

peaks of Savoy, where its existence is mainly due to game-laws. The ibex is a handsome animal, measuring about 4! ft. in length and standing about 40 in. at the shoulder. The skin is covered in summer with a short fur of an ashy-grey colour, and in winter with much longer yellowish-brown hair concealing a dense fur beneath. The horns of the male rise from the crest of the skull, and after bending gradually backwards terminate in smooth tips; the front surface of the remainder carrying bold transverse ridges or knots. About 1 yd. is the maximum recorded length of ibex-horns. The fact that the fore-legs are somewhat shorter than those behind enables the ibex to ascend mountain slopes with more facility than it can descend, while its hoofs are as hard as steel, rough underneath and when walking over a flat

surface capable of being spread out. These, together with its powerful sinews, enable it to take prodigious leaps, to balance itself on the smallest foothold and to scale almost perpendicular rocks. Ibex live habitually at a greater height than chamois or any other Alpine mammals, their vertical limit being the line of perpetual snow. There they rest in sunny nooks duringthe day, descending at night to the highest woods to graze. Ibex are gregarious, feeding in herds of ten to fifteen individuals; but the old males generally live apart from, and usually at greater elevations than, the females and young. They utter a sharp whistling sound not unlike that of the chamois, but when greatly irritated or frightened make a peculiar snorting noise. The period of gestation in the female is ninety days, after which she produces — usually at the end of June — a single young one which is able at once to follow its mother. Kids when caught young and fed on goat's milk can be readily tamed; and in the 1 6th century young tamed ibex were frequently driven to the

mountains along with the goats, in whose company they would afterwards return. Even wild ibex have been known to stray among the herds of goats, although they shun the society of chamois. Its flesh is said to resemble mutton, but has a flavour of game.

By naturalists the name " ibex " has been extended to embrace all the kindred species of wild goats, while by sportsmen it is used in a still more elastic sense, to include not only the true wild goat (known in India as the Sind ibex) but even the short-horned Hemitragus

hylocrius of the Nilgiris. Dealing only with species zoologically known as ibex, the one nearest akin to the European kind is the Asiatic or Siberian ibex (Capra

The Ibex {Capra ibex).

sibirica), which, with several local phases, extends from the northern side of Kashmir over an enormous area in Central Asia. These ibex, especially the race from the Thian Shan, are incomparably finer than the European species, their bold knotted horns sometimes attaining a length of close on 60 in. The Arabian, or Nubian, ibex (C. nubiana) is characterized by the more slender type of horn, in which the front edge is much narrower; while the Simien ibex (C. vali) of Central Abyssinia is a very large and dark-coloured animal, with the horns black instead of brownish, and bearing only slightly marked front ridges. The Caucasian ibex (C. caucasica), or tur, is a wholly fox-coloured animal, in which the horns are still flatter in front, and thus depart yet further from the ibex type. In the Spanish ibex (C. pyrenaica) the horns [are flattened, with ill-defined knobs, and a spiral twist. (See Goat.) (W. H. F.; R. L.)*

IBIS, one of the sacred birds of the ancient Egyptians. James Bruce identified this bird with the Abu-Hannes or " Father John " of the Abyssinians, and in 1790 it received from Latham (Index ornithologicus, p. 706) the name of Tantalus aethiopicus. This determination was placed beyond question by Cuvier (Ann. du Mustum, iv. 116-135) and Savigny (Hist. nat. et mythol. de I'ibis) in 1805. They, however, removed it from the Linnaean genus Tantalus and, Lac6pede having some years before founded a genus Ibis, it was transferred thither, and is now generally known as /. aethiopica, though some speak of it as /. religiosa. No attempt can here be made to treat the ibis from a mythological or antiquarian point of view. Savigny's memoir contains a great deal of matter on the subject. Wilkinson (.4 ncient Egyptians, ser. 2, vol. ii. pp. 217-224) added some of the results of later research, and Renouf in his Hibbert Lectures explains the origin of the myth.

The ibis is chiefly an inhabitant of the Nile basin from Dongola southward, as well as of Kordofan and Sennar; whence about

midsummer it moves northwards to Egypt. 5 In Lower Egypt it bears the name of Abu-mengel, or " father of the sickle," from the form of its bill, but it does not stay long in that country, disappearing when the Nile has subsided. Hence most travellers have failed to meet with it there 2 (since their acquaintance with the birds of Egypt is limited

to those which frequent the country in winter), and writers have denied generally to this species a place in its modern fauna (cf. Shelley, Birds of Egypt, p. 261). However, in 1864, von Heuglin (Journ. fiir Ornithologie, 1865, p. 100) saw a young bird which had been shot in the Delta, and E. C. Taylor (Ibis, 1878, p. 372) saw an adult which had been killed near Lake Menzal in 1877. The story told to Herodotus of its destroying snakes is, according to Savigny, devoid of truth, but Cuvier states that he discovered partly digested remains of a snake in the stomach of a mummied ibis.

The ibis is somewhat larger than a curlew, Numenius arquata, which bird it resembles, with a much stouter bill and stouter legs. The head and greater part of the neck are bare and black. The plumage is white, except the primaries, which are black, and a black plume, formed by the secondaries, tertials and lower scapulars, and richly glossed with bronze, blue and green, which curves gracefully over the hind-quarters. The bill and feet are also black. The young lack the ornamental plume, and in them the head and neck are clothed with short black feathers, while the bill is yellow. The nest is placed in bushes or high trees, the bird generally building in companies, and in the middle of August von Heuglin (Orn. Nord-Ost-Afrikas, p. 1138) found that it had from two to four young or much incubated eggs. 3 These are of a dingy white, splashed, spotted and speckled with reddish-brown.

Congeneric with the typical ibis are two or three other species, the /. melanocephala of India, the /. molucca or /. striclipennis, of Australia, and the J. bernieri of Madagascar,' all of which closely resemble /. aethiopica; while many other forms not very far removed from it, though placed by authors in distinct genera, 4 are known. Among these are several beautiful species such as the Japanese Geronticus nippon, the Lophotibis cristata of Madagascar, and the scarlet ibis, 5 Eudocimus ruber, of America. The glossy ibis, Plegadis falcinellus, found throughout the West Indies, Central and the south-eastern part of North America, as well as in many parts of Europe (whence it not unfrequently strays to the British Islands), Africa, Asia and Australia. This bird, believed to be the second kind of ibis spoken of by Hero- dotus, is rather smaller than the sacred ibis, and mostly of a dark chestnut colour with brilliant green and purple reflections on the upper parts, exhibiting, however, when young none of the rufous hue. This species lays eggs of a deep sea-green colour, having wholly the character of heron's eggs, and it often breeds in company with herons, while the eggs of all other ibises whose eggs are known resemble those of the sacred ibis. Though ibises resemble the curlews externally, there is no affinity between them. The

Ibididae are more nearly related to the storks, Ciconiidae, and still more to the spoonbills, Plataleidae, with which latter many systematists consider them to form one group, the Hemiglottides of Nitzsch. Together these groups form the sub-order Ciconiae of the order Ciconiiformes. The true ibises are also to be clearly separated from the wood-ibises, Tantalidae, of which there are four or five species, by several not unimportant structural characters. Fossil remains of a true

1 It has been said to occur occasionally in Europe (Greece and southern Russia). "v.

2 E. C. Taylor remarked (Ibis, 1859, P- 5 1). that the buff-backed heron, Ardea bubulcus, was made by the tourists' dragomans to do duty for the "sacred ibis," and this seems to be no novel practice, since by it, or something like it, Hasselqvist was misled, and through him Linnaeus.

3 The ibis has more than once nested in the gardens of the Zoological Society in London, and even reared its young there.

4 For some account of these may be consulted Dr Reichenow's paper in Journ. fiir Ornithologie (1877), pp. 143-156; Elliot's in Proc. Zool. Society (1877), pp. 477-510; and that of Oustalet in Nouv. Arch, du Museum, ser. 2, vols. 1. pp. 167-184.

5 It is a popular error — especially among painters — that this bird was the sacred ibis of the Egyptians.

ibis, /. pagana, have been found in considerable numbers in the middle Tertiary beds of France. 1 (A. N.)

IBLIS, or Eblis, in Moslem mythology the counterpart of the Christian and Jewish devil. He figures oftener in the Koran under the name Shaitan, Iblis being mentioned n times, whereas Shaitan appears in 87 passages. He is chief of the spirits of evil, and his personality is adapted to that of his Jewish prototype. Iblis rebelled against Allah and was expelled from Paradise. The Koranic legend is that his fall was a punishment for his refusal to worship Adam. Condemned to death he was afterwards respited till the judgment day (Koran vii. 13).

See Gustav Weil, The Bible, the Koran and the Talmud (London,

1846).

*IBN 'ABD RABBIHI [Abu *Umar Ahmad ibn Mahommed ibn 'Abd Rabbihi] (860-940), Arabian poet, was born in Cordova and descended from a freed slave of Hisham, the second Spanish Omayyad caliph. He enjoyed a great reputation for learning and eloquence. No diwan of his is extant, but many selections from his poems are given in the Yatimat ud-Dahr, i. 41 2-436 (Damascus, 1887). More widely known than his poetry is his great anthology, the 'Iqd ul-Fartd (" The Precious Neck- lace "), a work divided into twenty-five sections, the thirteenth being named the middle jewel of the necklace, the chapters on either side of this being named after other jewels. It is an adab book (see Arabia: Literature, section " Belles Lettres ") resem- bling Ibn Qutaiba's 'Uyiln ul-Akhbdr, from which it borrows largely. It has been printed several times in Cairo (1876, 1886, &c). (G. W.T.)*

IBN ARABI [Muhyiuddln Abu 'Abdallah ibn ul-'Arabl] (1165-1240), Moslem theologian and mystic, was born in Murcia and educated in Seville. When thirty-eight he travelled in Egypt, Arabia, Bagdad, Mosul and Asia Minor, after which he lived in Damascus for the rest of his life. In law he was a Zahirite, in theology-ˆa mystic of the extreme order, though professing orthodox Ash'arite theology and combating in many points the Indo-Persian mysticism (pantheism). He claims to have had conversations with all the prophets past and future, and reports conversations with God himself. Of his numerous works about 150 still exist. The most extensive is the twelve- volume Futuhat ul-Makklyal (" Meccan Revelations "), a general encyclopaedia of Sufic beliefs and doctrines. Numerous extracts from this work are contained in Sha' rani's (d. 1565) manual of Sufic dogma (Yawdqll) published several times in Cairo. A short account of these works is given in A. von Kremer's Geschichte der herrschenden Ideen des Islatns, pp. 102-109 (Leipzig, 1868). Another characteristic and more accessible work of Ibn 'Arabi is the Fusils ul-Hikam, on the nature and importance of the twenty-seven chief prophets, written in 1230 (ed. Bulaq, 1837) and with the Commentary (Cairo, 1891) of Qjtshani (d. 1350); cf. analysis by M. Schreiner in Journal of German Oriental Society, lii. 516-525.

Of some 289 works said to have been written by Ibn 'Arabi 150 are mentioned in C. Brockelmann's Gesch. der arabischen Litteratur, vol. i. (Weimar, 1898), pp. 441-448. See also R. A. Nicholson, A Literary History of the Arabs, pp. 399-404 (London, 1907).

(G. W. T.)

IBN ATHlR, the family name of three brothers, all famous in Arabian literature, born at Jazlrat ibn 'Umar in Kurdistan. The eldest brother, known as Majd ud-Din (1149-1210), was long in the service of the amir of Mosul, and was an earnest student of tradition and language. His dictionary of traditions (Kitdb un-Nihaya) was published at Cairo (1893), and his dictionary of family names {Kitdb ul-Murassa K) has been edited by Seybold (Weimar, 1896). The youngest brother, known as Diya ud-DL\ (1163-1239), served Saladin from 1191 on, then his son, al-Malik ul-Afdal, and was afterwards in Egypt, Samosata, Aleppo, Mosul and Bagdad. He was one of the most famous aesthetic and stylistic critics in Arabian literature. His Kitdb td-Mathal, published in Bulaq in 1865 (cf. Journal of the German Oriental Society, xxxv. 148, and Goldziher's

1 The name " I Ins ' was selected as the title of an ornithological magazine, frequently referred to in this and other articles, which made its first appearance in 1859.

Abhandlungen, i. 161 sqq.), contains some very independent criticism of ancient and modern Arabic verse. Some of his letters have been published by D. S. Margoliouth " On the Royal Correspondence of Diya ed-Din el-Jazari " in the Actes du dixiime congrhs international des orientalistes, sect. 3, pp. 7-21. The brother best known by the simple name of Ibn Athir was Abu-l-Hasan Tzzuddin Mahommed Ibn ul-Athir (1160- 1234), who devoted himself to the study of history and tradition. At the age of twenty-one he settled with his father in Mosul and continued his studies there. In the service of the amir for many years, he visited Bagdad and Jerusalem and later Aleppo and Damascus. He died in Mosul. His great history, the Kdmil, extends to the year 1231; it has been edited by C. J. Tornberg, Ibn al-Athiri Chronicon quod perfectissimum inscribitur (14 vols., Leiden, 1851-1876), and has been published in 12 vols, in Cairo (1873 and 1886). The first part of this work up to a.h. 310 (a.d. 923) is an abbreviation of the work of Tabari (q.v.) with additions. Ibn Athir also wrote a history of the Atabegs of Mosul, published in the Recueil des historiens des croisades (vol. ii., Paris); a work (Usd ul-Ghdba), giving an account of 7500 companions of Mahomet (5 vols., Cairo, 1863), and a compendium (the Lubdb) of Sam'ani's Kitdb ul-Ansdb (cf. F. Wustenfeld's Specimen el-Lobabi, Gottingen, 1835). (G. W. T.)

IBN BATUTA, i.e. Abu Abdullah Mahommed, surnamed Ibn Batuta (1304-1378), the greatest of Moslem travellers, was born at Tangier

in 1304. He entered on his travels at twenty-one (1325) and closed them in 1355. He began by traversing the coast of the Mediterranean from Tangier to Alexandria, finding time to marry two wives on the road. After some stay at Cairo, then probably the greatest city in the world (excluding China), and an unsuccessful attempt to reach Mecca from Aidhab on the west coast of the Red Sea, he visited Palestine, Aleppo and Damascus. He then made the pilgrimage to Mecca and Medina, and visited the shrine of Ali at Mashhad-Ali, travelling thence to Basra, and across the mountains of Khuzistan to Isfahan, thence to Shiraz and back to Kufa and Bagdad. After an excursion to Mosul and Diarbekr, he made the haj a second time, staying at Mecca three years. He next sailed down the Red Sea to Aden (then a place of great trade), the singular position of which he describes, noticing its dependence for water-supply upon the great cisterns restored in modern times. He continued his voyage down the African coast, visiting, among other places, Mombasa and Quiloa (Kilwa). Returning north he passed by the chief cities of Oman to New Ormuz (Hurmuz), which had about 15 years before, c. 13 15, been transferred to its famous island-site from the mainland (Old Ormuz) . After visiting other parts of the gulf he crossed the breadth of Arabia to Mecca, making the haj for the third time. Crossing the Red Sea, he made a journey of great hardship to Syene, and thence along the Nile to Cairo. After this, travelling through Syria, he made a circuit among the petty Turkish states into which Asia Minor was divided after the fall of the kingdom of Rum (Iconium). He now crossed the Black Sea to Kaffa, then mainly occupied by the Genoese, and apparently the first Christian city he had seen, for he was much perturbed by the bell-ringing. He next travelled into Kipchak (the Mongol khanate of Russia), and joined the camp of the reigning khan Mahommed Uzbeg, from whom the great and heterogeneous Uzbeg race is perhaps named. Among other places in this empire he travelled to Bolghar (54 54′ N.) in order to witness the shortness of the summer night, and desired to continue his travels north into the " Land of Darkness " (in the extreme north of Russia), of which wonder- ful things were told, but was obliged to forego this. Returning to the khan's camp he joined the cortege of one of the Khatuns, who was a Greek princess by birth (probably illegitimate) and in her train travelled to Constantinople, where he had an interview with the emperor Andronikos III. the Younger (1328-1341). He tells how, as he passed the city gates, he heard the guards muttering Sarakinu. Returning to the court of Uzbeg, at Sarai on the Volga, he crossed the steppes to Khwarizm and Bokhara; thence through Khorasan and Kabul, and over the Hindu Kush 1 (to which he gives that name, its first occurrence). He reached

the Indus, on his own statement, in September, 1333. This closes the first part of his narrative.

From Sind, which he traversed to the sea and back again, he proceeded to Multan, and eventually, on the invitation of Mahommed Tughlak, the reigningsovereign.toDelhi. Mahommed was a singular character, full of pretence at least to many accomplishments and virtues, the founder of public charities, and a profuse patron of scholars, but a parricide, a fratricide, and as madly capricious, bloodthirsty and unjust as Caligula. " No day did his palace gate fail to witness the elevation of some abject to affluence and the torture and murder of some living soul." He appointed the traveller to be kazi of Delhi, with a present of 12,000 silver dinars (rupees), and an annual salary of the same amount, besides an assignment of village lands. In the sultan's service Ibn Batuta remained eight years; but his good fortune stimulated his natural extravagance, and his debts soon amounted to four or five times his salary. At last he fell into disfavour and retired from court, only to be summoned again on a congenial duty. The emperor of China, last of the Mongol dynasty, had sent a mission to Delhi, and the Moor was to accompany the return embassy (1342). The party travelled through central India to Cambay and thence sailed to Calicut, classed by the traveller with the neighbouring Kaulam (Quilon), Alexandria, Sudak in the Crimea, and Zayton (Amoy harbour) in China, as one of the greatest trading havens in the world — an interesting enumeration from one who had seen them all. The mission party was to embark in Chinese junks (the word used) and smaller vessels, but that carrying the other envoys and the presents, which started before Ibn Batuta was ready, was wrecked totally; the vessel that he had engaged went off with his property, and he was left on the beach of Calicut. Not daring to return to Delhi, he remained about Honore and other cities of the western coast, taking part in various adventures, among others the capture of Sindabur (Goa), and visiting the Maldive Islands, where he became kazi, and married four wives, and of which he has left the best medieval account, hardly surpassed by any modern. In August 1344 he left the Maldives for Ceylon; here he made the pilgrimage to the " Footmark of our Father Adam." Thence he betook himself to Maabar (the Coromandel coast), where he joined a Mussulman adventurer, residing at Madura, who had made himself master of much of that region. After once more visiting Malabar, Canara and the Maldives,

he departed for Bengal, a voyage of forty-three days, landing at Sadkawan (Chittagong). In Bengal he visited the famous Moslem saint Shaykh Jalaluddin, whose shrine (Shah Jalal at Silhet) is still maintained. Returning to the delta, he took ship at Sunarganw (near Dacca) on a junk bound for Java (i.e. Java Minor of Marco Polo, or Sumatra). Touching the coast of Arakan or Burma, he reached Sumatra in forty days, and was provided with a junk for China by Malik al Dhahir, a zealous disciple of Islam, which had recently spread among the states on the northern coast of that island. Calling (apparently) at Cambodia on his way, Ibn Batuta reached China at Zayton (Amoy harbour), famous from Marco Polo; he also visited Sin Kalan or Canton, and professes lo have been in Khansa (Kinsay of Marco Polo, i.e. Hangchau), and Khanbalik (Cambaluc or Peking). The truth of his visit to these two cities, and especially to the last, has been questioned. The traveller's history, not least in China, singularly illustrates the free masonry of Islam, and its power of carrying a Moslem doctor over the known world of Asia and Africa. On his way home he saw the great bird Rukh (evidently, from his description, an island lifted by refraction); revisited Sumatra, Malabar, Oman, Persia, Bagdad, and crossed the great desert to Palmyra and Damascus, where he got his first news of home, and heard of his father's death fifteen years before. Diverging to Hamath and Aleppo, on his return to Damascus, he found the Black Death raging, so that two thousand four hundred died in one day. Revisiting Jerusalem and Cairo he made the haj a fourth time, and finally reappeared at Fez (visiting Sardinia en route) on the 8th of November 1349, after twenty-four years' absence. Morocco, he felt, was, after all. the best of countries. "The dirhems of the West are but little; but then you get more for

them." After going home to Tangier, Ibn Batuta crossed into Spain and made the round of Andalusia, including Gibraltar, which had just then stood a siege from the " Roman tyrant Adfunus " (Alphonso XL of Castile, 1312-1350). In 1352 the restless man started for Central Africa, passing by the oases of the Sahara (where the houses were built of rock-salt, as Herodotus tells, and roofed with camel skins) to Timbuktu and Gogo on the Niger, a river which he calls the Nile, believing it to flow down into Egypt, an opinion maintained by some up to the date of Lander's discovery. Being then recalled by his own king, he returned to Fez (early in 1354) via Takadda, Haggar and Tuat. Thus ended his twenty-eight years ' wanderings which in their main lines alone exceeded 75,000 m. By royal order he dictated his narrative to Mahommed Ibn Juzai, who concludes the work, 13th of December 1355 (a.d.) with the declaration: " This

Shaykh is the traveller of our age; and he who should call him the traveller of the whole body of Islam would not exceed the truth." Ibn Batuta djed in 1378, aged seventy-three.

Ibn Batuta's travels have only been known in Europe during the 19th century; at first merely by Arabic abridgments in the Gotha and Cambridge libraries. Notices or extracts had been published by Seetzen (c. 1808), Kosegarten (1818), Apetz (1819), and Burckhardt (1819), when in 1829 Dr S. Lee published for the Oriental Translation Fund a version from the abridged MSS. at Cambridge, which attracted much interest. The French capture of Constantina afforded MSS. of the complete work, one of them the autograph of Ibn Juzai. And from these, after versions of fragments by various French scholars, was derived at last (1 858-1 859) the standard edition and translation of the whole by M. Defremery and Dr Sanguinetti, in 4 vols. See also Sir Henry Yule, Cathay, ii. 397-526 ; C. Raymond Beazley, Dawn of Modern Geography, iii. 535-538. Though there are some singular chronological difficulties in the narrative, and a good many cursory inaccuracies and exaggerations, there is no part of it except, perhaps, certain portions of the journeys in north China, which is open to doubt. The accounts of the Maldive Islands, and of the Negro countries on the Niger, are replete with interesting and accurate particulars. The former agrees surprisingly with that given by the only other foreign resident we know of, Pyrard de la Val, two hundred and fifty years later. Ibn Batuta's statements and anecdotes regarding the showy virtues and solid vices of Sultan Muhammad Tughlak are in entire agreement with Indian historians, and add many fresh details. (H. Y. ; C. R. B.)

IBN DURAID [Abu Bakr Mahommed ibn ul-Hasan ibn Duraid ul-Azdi] (837-934), Arabian poet and philologist, was born at Basra of south Arabian stock. At- his native place he was trained under various teachers, but fled in 871 to Oman at the time Basra was attacked by the negroes, known as the Zanj, under Muhallabl. After living twelve years in Oman he went to Persia, and, under the protection of the governor, 'Abdallah ibn Mahommed ibn Mikal, and his son, Isma'il, wrote his chief works. In 920 he went to Bagdad, where he received a pension from the caliph Moqtadir.

The Maqsura, a poem in praise of Ibn Mikal and his son, has been edited by A. Haitsma (1773) E. Scheidius (1786) and N. Boyesen (1828). Various commentaries on the poem exist in MS. (cf. C. Brockelmann, Gesch. der ar. Lit., i. 21 1 ft'., Weimar, 1898). The Jamhara fi-l-Lugha is a large dictionary written in Persian but not printed. Another work is the Kitab ul-Ishtiqaq (" Book of

Etymology"), edited by F. Wiistenfeld (Gottingen, 1854); it was written in opposition to the anti-Arabian party to show the etymological connexion of the Arabian tribal names. (G. W. T.)

IBN FARADl [Abu-l-Walld 'Abdallah ibn ul-Faradi] (962- 1012), Arabian historian, was born at Cordova and studied law and tradition. In 992 he made the pilgrimage and proceeded to Egypt and Kairawan, studying in these places. After his return in 1009 he became cadi in Valencia, and was killed at Cordova when the Berbers took the city.

His chief work is the History of the Learned Men of Andalusia, edited by F. Codera (Madrid, 1891-1892). He wrote alsoahistory of the poets of Andalusia. (G. W. T.)

IBN FARID [Abu-1-Qasim "Umar ibn ul-Farid] (1181-1235), Arabian poet, was born in Cairo, lived for some time in Mecca and died in Cairo. His poetry is entirely Sufic, and he was esteemed the greatest mystic poet of the Arabs. Some of his poems are said to have been written in ecstasies. His diwan has been published with commentary at Beirut, 1887, &c; with the commentaries of BurlnT (d. 161 5) and 'Abdul-GhanI (d. 1730) at Marseilles, 1853, and at Cairo; and with the commentary of Rushayyid Ghalib

(19th century) at Cairo, 1803. One of the separate poems was edited by J. von Hammer Purgstall as Das arabische hohe Lied der Liebe (Vienna, 1854).

See R. A. Nicholson, A Literary History of the Arabs (London, 1907), pp. 394-398- (G. W. T.)

IBN GABIROL [Solomon ben Judah], Jewish poet and philosopher, was born at Malaga, probably about 1021. The early part of his troublous life was spent at Saragossa, but few personal details of it are recorded. His parents died while he was a child and he was under the protection first of a certain Jekuthiel, who died in 1039, and afterwards of Samuel ha-Nagid, the well-known patron of learning. His passionate disposition, however, embittered no doubt by his misfortunes, involved him in frequent difficulties and led to his quarrelling with Samuel. It is generally agreed that he died young, although the date is uncertain. Al Harizi 1 says at the age of twenty-nine, and Moses b. Ezra 2 about thirty, but Abraham Zaccuto 3

*states that he died (at Valencia) in 1070. M. Steinschneider * accepts the date 1058.*

His literary activity began early. He is said to have composed poems at the age of sixteen, and elegies by him are extant on Hai Gaon (died in 1038) and Jekuthiel (died in 1039), each of which was written probably soon after the death of the person commemorated. About the same time he also wrote his 'Anaq, a poem on grammar, of which only 97 lines out of 400 are pre- served. Moses ben Ezra says of him that he imitated Moslem models, and was the first to open to Jewish poets the door of versification, 5 meaning that he first popularized the use of Arabic metres in Hebrew. It is as a poet that he has been known to the Jews to the present day, and admired for the youthful freshness and beauty of his work, in which he may be compared to the romantic school in France and England in the early 19th century. Besides his lyrical and satirical poems, he contributed many of the finest compositions to the liturgy (some of them with the acrostic " Shelomoh ha-qaton "), which are widely different from the artificial manner of the earlier payyetanim. The best known of his longer liturgical compositions are the philosophical Kether Malkitth (for the Day of Atonement) and the Azharoth, on the 613 precepts (for Shebhuoth). Owing to his pure biblical style he had an abiding influence on subsequent liturgical writers.

Outside the Jewish community he was known as the philo- sopher Avicebron (Avencebrol, Avicebrol, &c.) The credit of identifying this name as a medieval corruption of Ibn Gabirol is due to S. Munk, who showed that selections made by Shem Tobh Palqera (or Falqera) from the Meqor rjayylm (the Hebrew translation of an Arabic original) by Ibn Gabirol, corresponded to the Latin Pons Vitae of Avicebron. The Latin version, made by Johannes Hispalensis and Gundisalvi about one hundred years after the author's death, had at once become known among the Schoolmen of the 12th century and exerted a powerful influence upon them, although so little was known of the author that it was doubted whether he was a Christian or a Moslem. The teaching of the Fans Vitae was entirely new to the country of its origin, and being drawn largely from Neoplatonic sources could not be expected to find favour with Jewish thinkers. Its distinctive doctrines are: (1) that all created beings, spiritual or corporeal, are composed of matter and form, the various species of matter being but varieties of the universal matter, and similarly all forms being contained in one universal form; (2) that between the primal One and the intellect (the j'oCs of Plotinus) there is interposed the divine Will, which is itself divine and above the distinction of form and matter, but is the cause of their union in the

being next to itself, the intellect, in which Avicebron holds that the distinction docs exist. The

1 Jud. Har. Macamm, ed. Lagarde (Gottingen, 1883), p. 89, 1. 61.

2 See the passage quoted by Munk, Melanges de philosophic arabe et juive (Paris, 1859), pp. 264 and 517.

3 Liber Juchassin, en. Filipowski (London, 1857), p. 217.

4 Hebr. Ubersetzungen (Berlin, 1893), § 219, note 70; cf. Kaufmann, Studien uber Sal.-ibn Gabirol (Budapest, 1899), p. 79, note 2.

6 See Munk, op. cit. pp. 515-516, transl. on pp. 263-264. Metre had been alreadv used bv Dunash.

doctrine that there is a material, as well as a formal, element in all created beings was explicitly adopted from Avicebron by Duns Scotus (as against the view of Albertus Magnus and Thomas Aquinas), and perhaps his exaltation of the will above the intellect is due to the same influence. Avicebron develops his philosophical system throughout quite independently of his religious views — a practice wholly foreign to Jewish teachers, and one which could not be acceptable to them. Indeed, this charge is expressly brought against him by Abraham ben David of Toledo (died in 11 80). It is doubtless this non-religious attitude which accounts for the small attention paid to the Fons Vitae by the Jews, as compared with the wide influence of the philosophy of Maimonides.

The other important work of Ibn Gabirol is Islah al-akhlaq (the improvement of character), a popular work in Arabic, translated into Hebrew (Tiqqun middoth ha-nephesh) by Judah ibn Tibbon. It is widely different in treatment from the Fons, being intended as a practical not a speculative work.

The collection of moral maxims, compiled in Arabic but best known (in the Hebrew translation of Judah ibn Tibbon) as Mibhar ha-peninim, is generally ascribed to Ibn Gabirol, though on less certain grounds.

'_ Bibliography. — Texts of the liturgical poems are to be found in the prayer-books: others in Dukes and Edelmann, Treasures of Oxford (Oxford, 1850); Dukes, Shire Shelomoh (Hanover, 1858); S. Sachs, Shir ha-shirim asher li- Shelomoh (Paris, 1868, incomplete); Brody, Die weltlichen Gedichte des . . . Gabirol (Berlin, 1897, &c).

" Avencebrolis Fons Vitae" (Latin text) in Clemens Baumker's Beitrage zur Gesch. d- Philosophic, Bd. i. Hefte 2-4 (Mtinster, 1892) ; The Improvement of the Moral Qualities [Arabic and English] ed. by S. S._ Wise (New York, 1901); A Choice of Pearls [Hebrew and English] ed. by Ascher (London, 1859).

On the philosophy in general : S. Munk, Melanges (quoted above) ; Guttmann, Die Philosophie des Sal.-ibn Gabirol (Gottingen, 1889); D. Kaufmann, Studien uber Sal.-ibn Gabirol (Budapest, 1899); S. Horovitz, " Die Psychologic Ibn Gabirols," in the Jahresbericht des jud. theol. Seminars FranckeV scher Stiftung (Breslau, 1900) ; Wittmann, " Zur Stellung Avencebrols ..." (in Baumker's Beitrage, Bd. v. Heft 1, Mtinster, 1905). (A. Cy.)

IBN HAUKAL, strictly Ibn Hauqal, a 10th century Arabian geographer. Nothing is known of his life. His work on geo- graphy, written in 977, is only a revision and extension of the Masdlik ul-Mamdlik of al-Istakhri, who wrote in 951. This itself was a revised edition of the Kildb ul-Ashkal or Suwar ul-Aqdlim of Abu Zaid ul-Balkhl, who wrote about 921.' Ibn Haukal's work was published by M. J. de Goeje (Leiden, 1873). An anonymous epitome of the book was written in 1233.

See M. J. de Goeje, " Die Istahri-Balhi Frage," in the Zei'schrift der deutschen Morgenldndischen Gesellschaft, xxv. 42 sqq.

IBN HAZM [Abu Mahommed 'All ibn Ahmad ibn Hazm] (994-1064), Moslem theologian, was born in a suburb of Cordova. He studied history, law and theology, and became a vizier as his father had been before him, but was deposed for heresy, and spent the rest of his life quietly in the country. In legal matters he belonged first to the Shafi'ite school, but came to adopt the views of the Zahirites, who admitted only the external sense of the Koran and tradition, disallowing the use of analogy (Qiyas) and Taqlid (appeal to the authority of an imam), and objecting altogether to the use of individual opinion (Ra'y). Every sentence of the Koran was to be interpreted in a general and universal sense; the special application to the circumstances of the time it was written was denied. Every word of the Koran was to be taken in a literal sense, but that sense was to be learned from other uses in the Koran itself, not from the meaning in other literature of the time. The special feature of Ibn Hazrn's teaching was that he extended the application of these principles from the study of law to that of dogmatic theology. He thus found himself in opposition at one time to the Mo'tazilites, at another to the Ash'arites. He did not, however succeed in forming a

school. His chief work is the Kitdb ul-Milal wan- Nihal, or " Book of Sects " (published in Cairo, 1899).

For his teaching cf. I. Goldziher, Die Zahiriten, pp. 1 16-172 (Leipzig, (1884), and M. Schrciner in the Journal of the German Oriental Society, Hi. 464-486. For a list of his other works see C. Brockelmann's Geschichte der arabischen Literatur, vol. i. (Weimar, 1898), p. 400. (G. W. T.)

IBN HISHAM [Abu Mahommed 'Abdulmalik ibn Hisham ibn Ayyub ul-Himyari] (d. 834), Arabian biographer, studied in Kufa but lived afterwards in Fostat (old Cairo), where he gained a name as a grammarian and student of language and history. His chief work is his edition of Ibn Ishaq's (q.v.) Life of the Apostle of God, which has been edited by F. Wiistenfeld (Got- tingen, 1858-1860). An abridged German translation has been made by G. Weil (Stuttgart, 1864; cf. P. Bronnle, Die Commentatoren des Ibn Ishaq und ihre Scholien, Halle, 1895), Ibn Hisham is said to have written a work explaining the difficult words which occur in poems on the life of the Apostle, and another on the genealogies of the Himyarites and their princes. (G. W. T.)

IBN ISHAQ [Mahommed ibn Ishaq Abu 'Abdallah] (d. 768), Arabic historian, lived in Medina, where he interested himself to such an extent in the details of the Prophet's life that he was attacked by those to whom his work seemed to have a rational- istic tendency. He consequently left Medina in 733, and went to Alexandria, then to Kufa and Hira, and finally to Bagdad, where the caliph Mansur provided him with the means of writing his great work. This was the Life of the Apostle of God, which is now lost and is known to us only in the recension of Ibn Hisham (q.v.). The work has been attacked by Arabian writers (as in the Fihrist) as untrustworthy, and it seems clear that he introduced forged verses (cf. Journal of the German Oriental Society, xiv. 288 sqq.). It remains, however, one of the most important works of the age. (G. W. T.)

IBN JUBAIR [Abu-1 Husain Mahommed ibn Ahmad ibn Jubair] (1 145-12 17), Arabian geographer, was born in Valencia. At Granada he studied the Koran, tradition, law and literature, and later became secretary to the Mohad governor of that city. During this time he composed many poems. In 1183 he left the court and travelled to

Alexandria, Jerusalem, Medina, Mecca, Damascus, Mosul and Bagdad, returning in 1185 by way of Sicily.

The Travels of Ibn Jubair were edited by W. Wright (Leiden, 1852); and a new edition of this text, revised by M. J. de Goeje, was published by the Gibb Trustees (London, 1907). The part relating to Sicily was published, with French translation and notes, by M. Amari in the Journal asiatique (1845-1846) and a French translation alone of the same part by G. Crolla in Museon, vi. 123-132. (G.W.T.)

IBN KHALDON [Abu Zaid ibn Mahommed ibn Mahommed ibn Khaldun] (1332-1406), Arabic historian, was born at Tunis. He st udied the various branches of Arabic learning with great success. In 1352 he obtained employment under the Marlnid sultan Abu Inan (Faris I.) at Fez. In the beginning of 1356, his integrity having been suspected, he was thrown into prison until the death of Abu Inan in 1358, when the vizier al-Hasan ibn Omar set him at liberty and reinstated him in his rank and offices. He here continued to render great service to Abu Salem (Ibrahim III.), Abu Inan's successor, but, having offended the prime minister, he obtained permission to emigrate to Spain, where, at Granada, he was received with great cordiality by Ibn al Ahmar, who had been greatly indebted to his good offices when an exile at the court of Abu Salem. The favours he received from the sovereign excited the jealousy of the vizier, and he was driven back to Africa (1364), where he was received with great cordiality by the sultan of Bougie, Abu Abdallah, who had been formerly his companion in prison. On the fall of Abu Abdallah Ibn Khaldun raised a large force amongst the desert Arabs, and entered the service of the sultan of Tlemgen. A few years later he was taken prisoner by Abdalaziz ("Abd ul "Aziz), who had defeated the sultan of Tlemcen and seized the throne. He then entered a monastic establishment, and occupied himself with scholastic duties, until in 1370 he was sent for to Tlemcen by the new sultan. After the death of 'Abd ul 'Aziz he resided at Fez, enjoying the patronage and confidence of the regent. After some further vicissitudes in 1378 he entered the service of the sultan of his native town of Tunis, where he devoted himself almost exclusively to his studies and wrote his history of the Berbers. Having received permission to make the pilgrimage to Mecca, he reached Cairo, where he was presented to the sultan,

al-Malik udh-DhahirBarkuk, who insisted on his remaining there, and in the year 1384 made him grand cadi of the Malikite rite for Cairo. This office he filled with great prudence and probity, removing many abuses in the administration of justice in Egypt. At this time

the ship in which his wife and family, with all his property, were coming to join him, was wrecked, and every one on board lost. He endeavoured to find consolation in the completion of his history of the Arabs of Spain. At the same time he was removed from his office of cadi, which gave him more leisure for his work. Three years later he made the pilgrim- age to Mecca, and on his return lived in retirement in the Fayum until 1399, when he was again called upon to resume his functions as cadi. He was removed and reinstated in the office no fewer than five times.

In 1400 he was sent to Damascus, in connexion with the expedition intended to oppose Timur or Tamerlane. When Timur had become master of the situation, Ibn Khaldun let himself down from the walls of the city by a rope, and presented himself before the conqueror, who permitted him to return to Egypt. Ibn Khaldun died on the 16th of March 1406, at the age of sixty-four.

The great work by which he is known is a " Universal History," but it deals more particularly with the history of the Arabs of Spain and Africa. Its Arabic title is Kitab ul'Ibar, wa dvwan el Mubtada wa'l Khobar, ft ayyamuV 'Arab wa'l'Ajam wa 'I Berber ; that is, " The Book of Examples and the Collection of Origins and Information respecting the History of the Arabs, Foreigners and Berbers." It consists of three books, an introduction and an autobiography. Book i. treats of the influence of civilization upon man ; book ii. of the history of the Arabs and other peoples from the remotest antiquity until the author's own times; book iii. of the history of the Berber tribes and of the kingdoms founded by that race in North Africa. The introduction is an elaborate treatise on the science of history and the development of society, and the autobiography contains the history, not only of the author himself, but of his family and of the dynasties which ruled in Fez, Tunis and Tlemgen during his lifetime. An edition of the Arabic text has been printed at Bulaq, (7 vols., 1867) and a part of the work has been translated by the late Baron McG. de Slane under the title of Histoire des Berberes (Algiers, 1852-1856); it contains an admirable account of the author and analysis of his work. Vol. i. , the Muqaddama (preface) , was published by M. Quatremere (3 vols., Paris, 1858), often republished in the East, and a French translation was made by McG. de Slane (3 vols., Paris, 1862-1868). The parts of the history referring to the expedi- tions of the Franks into Moslem lands were edited by C. J. Tornberg (Upsala, 1840), and the parts treating of the Banu-1 Ahmar kings of Granada were translated into French by M. Gaudefroy-Demom- bynes in the Journal asiatique, ser. 9, vol. xiii. The Autobiography of Ibn Khaldun was translated into French by de Slane in the Journal

asiatique, ser. 4, vol. iii. For an English appreciation of the philosophical spirit of Ibn Khaldun see R. Flint's History of the Philosophy of History (Edinburgh, 1893), PP- ˆSJˆl –

(E. H. P.-.G.W.T.) IBN KHALLIKAN [Abu-1 'Abbas Ahmad ibn Khailikan] (1211-1282), Arabian biographer, was born at Arbela, the son of a professor reputed to be ascended from the Barmecides of the court of Harun al-Rashid. When eighteen he went to Aleppo, where he studied for six years, then to Damascus, and in 1238 to Alexandria and Cairo. In 1252 he married and became chief cadi of Syria in Damascus in 1261. Having held this office for ten years, he was professor in Cairo until 1278, when he again took office in Damascus for three years. In 1281 he accepted a professorship in the same city, but died in the following year. His great work is the Kitab Wafayat ul-A'yan," The Obituaries of Eminent Men." It contains in alphabetical order the lives of the most celebrated persons of Moslem history and literature, except those of Mahomet, the four caliphs and the companions of Mahomet and their followers (the Tabiun). The work is anecdotal and con- tains many brief extracts from the poetry of the writers. It was. published by F. Wiistenfeld (Gottingen, 1835-1843), in part by McG. de Slane (Paris, 1838-1842), and also in Cairo (1859 ar »d 1882). An English translation by McG. de Slane was published for the Oriental Translation Fund in 4 vols. (London, 1842-1871). Thirteen extra biographies from a manuscript in Amsterdam were published by Pijnappel (Amsterdam, 1845). A Persian translation exists in manuscript, and various extracts from the work are known. Several supplements to the book have been written, the best known being that of Mahommed ibn Shakir (d. 1362), published at Cairo 1882. A collection of poems By Ibn Khailikan is also extant. (G. W. T.)

IBN QUTAIBA, or Kotaiea [Abu Mahommed ibn Muslim ibn Qutaiba] (828-889), Arabian writer, was born at Bagdad or

Kufa, and was of Iranian, descent, his father belonging to Merv. Having studied tradition and philology he became cadi in Dinawar and afterwards teacher in Bagdad, where he died. He was the first representative of the eclectic school of Bagdad philologists that succeeded the schools of Kufa and Basra (see Arabia: Literature, section " Grammar "). Although engaged also in theological polemic (cf. I. Goldziher, Muhammedanische Studien, ii. 136, Halle, 1890),'

his chief works were directed to the training of the ideal secretary. Of these five may be said to form a series. The Adab ul-Kdtib (" Training of the Secretary ") contains instruction in writing and is a compendium of Arabic style. It has been edited by Max Griinert (Leiden, 1000). The Kitdb ush-Shardb is still in manuscript. The Kitdb ul- Ma'drif has been edited by F. Wiistenfeld as the Handbuch der Geschichte 1 (Gottingen, 1850) ; the Kitdb ush-Shi'r wash- Shu ardi ("Book of Poetry and Poets ") edited by M. J. de Goeje (Leiden, 1004). 2 The fifth and most important is the 'Uyun ul- Akhbar, which deals in ten books with lordship, war, nobility, character, science and eloquence, asceticism, friendship, requests, foods and women, with many illustrations from history, poetry and proverb (ed. C. Brockelmann, Leiden, 1000 sqq.).

For other works (which were much quoted by later Arabian writers) see C. Brockelmann, Gesch. der arabischen Literatur, vol. i. (Weimar, 1898), pp. 120-122. (G. W. T.)

IBN SA'D [Abu 'Abdallah Mahommed ibn Sa'd ibn Mani' uz-Zuhri, often called Katib ul-Waqidi (" secretary of Waqidi ") of Basra] (d. 845), Arabian biographer, received his training in tradition from Waqidi and other celebrated teachers. He lived for the most part in Bagdad, and had the reputation of being both trustworthy and accurate in his writings, which, in consequence, were much used by later writers. His work, the Kitdb ul-Tabaqdt ul-Kabir (15 vols.) contains the lives of Mahomet, his Companions and Helpers (including those who fought at Badr as a special class) and of the following generation (the Followers) who received their traditions from the personal friends of the Prophet.

This work has been edited under the superintendence of E. Sachau (Leiden, 1904 sqq.) ; cf. O. Loth, Das Classenbuch des Ibn Sa-d (Leipzig, 1869). (G. W. T.)

IBN TIBBON, a family of Jewish translators, who flourished in Provence in the 12th and 13th centuries. They all made original contributions to philosophical and scientific literature, but their permanent fame is based on their translations. Between them they rendered into Hebrew all the chief Jewish writings of the middle ages. These Hebrew translations were, in their turn, rendered into Latin (by Buxtorf and others) and in this form the works of Jewish authors found their way into the learned circles of Europe. The chief members of the Ibn Tibbon family were (1) Judah Ben Saul (11 20-1 190), who was born in Spain but settled in Lunel. He translated the works of Bahya, Halevi, Saadiah and the grammatical treatises of

Janah. (2) His son, Samuel (1150-1230), translated the Guide of the Perplexed by Maimonides. He justly termed his father " the father of the Translators," but Samuel's own method surpassed his father's in lucidity and fidelity to the original. (3) Son of Samuel, Moses (died 1283). He translated into Hebrew a large number of Arabic books (including the Arabic form of Euclid). The Ibn Tibbon family thus rendered conspicuous services to European culture, and did much to further among Jews who did not understand Arabic the study of science and philosophy. (I. A.)

IBN TUFAIL, or Tofail [Abu Bakr Mahommed ibn 'Abd-ul- Malik ibn Tufail ul-Qaisi] (d. 1185), Moslem philosopher, was born at Guadix near Granada. There he received a good training in philosophy and medicine, and is said to have been a pupil of Avempace (q.v.). He became secretary to the governor of Granada, and later physician and vizier to the. Mohad caliph, Abu Ya'qub Yusuf. He died at Morocco.

1 Summary in E. G. Browne, A Literary History of Persia (London, 1902), pp. 387 f.

2 The preface was translated into German by Theodor Noldeke in his Beitrdge (Hanover, 1864), pp. 1-51.

His chief work is a philosophical romance, in which he describes the awakening and growth of intellect in a child removed from the influences of ordinary life. Its Arabic title is Risalat Hayy ibn Yaqzan ; it was edited by E. Pococke as Philosophus autodidactus (Oxford, 1671 ; 2nd ed., 1700), and with a French translation by L. Gauthier (Algiers, 1900). An English translation by S. Ockley was published in 1708 and has been reprinted since. A Spanish translation by F. Pons Boigues was published at Saragossa (1900). Another work of Ibn Tufail, the Kitab A srar ul-Hikma ul-mashraqiyya ("Secrets of Eastern Science"), was published at Bulaq (1882) ; cf. S. Munk, Melanges (1859), pp. 410 sqq., and T. J. de Boer, Geschichte der Philo- sophieim Islam (Stuttgart, 1901), pp. 160 sqq. (also an English transla- tion). (G. W. T.)

IBN USAIBI'A [Muwaffaquddln Abu-1-' Abbas Ahmad ibn ul-Qasim ibn Abl Usaibi'a] (1203-1270), Arabian physician, was born at Damascus, the son of an oculist, and studied medicine at Damascus and Cairo. In 1236 he was appointed by Saladin physician to a new hospital in Cairo, but surrendered the ap- pointment the following year to take up a post given him by the amir of Damascus in Salkhad near that city. There he lived and died. He wrote 'Uyiln ul-Anbdfi

Tabaqat ul-Atibba or "Lives of the Physicians," which in its first edition (1245-1 246) was dedicated to the vizier of Damascus. This he enlarged, though it is uncertain whether the new edition was made public in the lifetime of the author.

Edition by A. Miiller (Konigsberg, 1884). (G. W. T.)

IBO, a district of British West Africa, on the lower Niger immediately above the delta, and mainly on the eastern bank of the river. The chief town, frequently called by the same name (more correctly Abo or Aboh), lies on a creek which falls into the main stream about 150 m. from its mouth and contains from 6000 to 8000 inhabitants. The Ibo are a strong well-built Negro race. Their women are distinguished by their embon- point. The language of the Ibo is one of the most widely spoken on the lower Niger. The Rev. J. F. Schon began its reduction in 1841, and in 1861 he published a grammar {Oku Ibo Gram- matical Elements, London, Church Miss. Soc). {See Nigeria.)

IBRAHIM AL-MAUSILI (742-804), Arabian singer, was born of Persian parents settled in Kufa. In his early years his parents died and he was trained by an uncle. Singing, not study, attracted him, and at the age of twenty-three he fled to Mosul, where he joined a band of wild youths. After a year he went to Rai (Rei, Rhagae), where he met an ambassador of the caliph Mansur, who enabled him to come to Basra and take singing lessons. His fame as a singer spread, and the caliph Mahdl brought him to the court. There he remained a favourite under Hadi, while Harun al-Rashid kept him always with him until his death, when he ordered his son (Ma'mun) to say the prayer over his corpse. Ibrahim, as might be expected, was no strict Moslem. Two or three times he was knouted and imprisoned for excess in wine-drinking, but was always taken into favour again. His powers of song were far beyond anything else known at the time. Two of his pupils, his son Ishaq and Muhariq, attained celebrity after him.

See the Preface to W. Ahlwardt's Abu Nowas (Greifswald, 1861), pp. 13-18, and the many stories of his life in the Kitdb ul-Aghani, v. 2-49. (G. W. T.)

IBRAHIM PASHA (1789-1848), Egyptian general, is some- times spoken of as the adopted son of Mehemet Ali, pasha of Egypt. He is also and more commonly called his son. He was born in his father's native town, Kavala in Thrace. During his father's struggle to establish himself in Egypt, Ibrahim, then sixteen years of age, was sent as a hostage to the Ottoman capitan pasha (admiral), but when

Mehemet Ali -was recognized as pasha, and had defeated the English expedition under General A. M. Fraser, he was allowed to return to Egypt. When Mehemet Ali went to Arabia to prosecute the war against the Wahhabis in 1813, Ibrahim was left in command in Upper Egypt. He continued the war with the broken power of the Mamelukes, whom he suppressed. In 1816 he succeeded his brother Tusun in command of the Egyptian forces in Arabia. Mehemet Ali had already begun to introduce European discipline into his army, and Ibrahim had probably received some training, but his first campaign was conducted more in the old Asiatic

style than his later operations. The campaign lasted two years, and terminated in the destruction of the Wahhabis as a political power. Ibrahim landed at Yembo, the port of Medina, on the 30th of September 1816. The holy cities had been recovered from the Wahhabis, and Ibrahim's task was to follow them into the desert of Nejd and destroy their fortresses. Such training as the Egyptian troops had received, and their artillery, gave t hem a marked superiority in the open field. But the difficulty of crossing the desert to the Wahhabi stronghold of Deraiya, some 400 m. east of Medina, and the courage of their opponents, made the conquest a very arduous one. Ibrahim displayed great energy and tenacity, sharing all the hardships of his army, and never allowing himself to be discouraged by failure. By the end of September 1818 he had forced the Wahhabi leader to surrender, and had taken Deraiya, which he ruined. On the nth of December 1819 he made a triumphal entry into Cairo. After his return he gave effective support to the Frenchman, Colonel Seve (Suleiman Pasha), who was employed to drill the army on the European model. Ibrahim set an example by submitting to be drilled as a recruit. When in 1824 Mehemet Ali was appointed governor of the Morea by the sultan, who desired his help against the insurgent Greeks, he sent Ibrahim with a squadron and an army of 17,000 men. The expedition sailed on the 10th of July 1824, but was for some months unable to do more than come and go between Rhodes and Crete. The fear of the Greek fire ships stopped his way to the Morea. When the Greek sailors mutinied from want of pay, he was able to land at Modon on the 26th of February 1825. He remained in the Morea till the capitulation of the 1st of October 1828 was forced on him by the intervention of the Western powers. Ibrahim's operations in the Morea were energetic and ferocious. He easily defeated the Greeks in the open field, and though the siege of

Missolonghi proved costly to his own troops and to the Turks who operated with him, he brought it to a successful termination on the 24th of April 1ˆ26. The Greek guerrilla bands harassed his army, and in revenge he desolated the country and sent thousands of the inhabitants into slavery in Egypt. These measures of repression aroused great indignation in Europe, and led first to the intervention of the English, French and Russian squadrons (see Navarixo, Battle of), and then to the landing of a French expeditionary force. By the feerms of the capitulation of the 1st of October 1828, Ibrahim evacuated the country. It is fairly certain that the Turkish government, jealous of his power, had laid a plot to prevent him and his troops from returning to Egypt. English officers who saw him at Navarino describe him as short, grossly fat and deeply marked with smallpox. His obesity did not cause any abatement of activity when next he took the field. In 1831, his father's quarrel with the Porte having become flagrant, Ibrahim was sent to conquer Syria. He carried out his task with truly remark- able energy. He took Acre after a severe siege on the 27th of May 1S32, occupied Damascus, defeated a Turkish army at Horns on the 8th of July, defeated another Turkish army at Beilan on the 20th of July, invaded Asia Minor, and finally routed the grand vizier at Konia on the 21st of December. The convention of Kutaiah on the 6th of May left Syria for a time in the hands of Mehemet Ali. Ibrahim was undoubtedly helped by Colonel Seve and the European officers in his army, but his intelligent docility to their advice, as well as his personal hardi- hood and energy, compare most favourably with the sloth, ignorance and arrogant conceit of the Turkish generals opposed to him. He is entitled to full credit for the diplomatic judgment and tact he showed in securing the support of the inhabitants, whom he protected and whose rivalries he utilized. After the campaign of 1S32 and 1833 Ibrahim remained as governor in Syria. He might perhaps have administered successfully, but the exactions he was compelled to enforce by his father soon r uined the popularity of his government and provoked revolts. In 1838 the Porte felt strong enough to renew the struggle, and war broke out once more. Ibrahim won his last victory for his father at Nezib on the 24th of June 1839. But Great Britain and Austria intervened to preserve the integrity of Turkey.

Their squadrons cut his communications by sea with Egypt, a general revolt isolated him in Syria, and he was finally compelled to evacuate the country in February 1841. Ibrahim spent the rest of his life in peace, but his health was ruined. In 1846 he paid a visit to western Europe, where he was received with some respect and a great deal of curiosity. When his father became imbecile in 1848 he held

the regency till his own death on the 10th of November 1848.

See Edouard Gouin, L'£.gypte auXIX" siicle (Paris, 1847); Aime Vingtrinier, Soliman- Pasha {Colonel Seve) (Paris, 1886). A great deal of unpublished material of the highest interest with regard to Ibrahim's personality and his system in Syria is preserved in the British Foreign Office archives; for references to these see Cambridge Mod. Hist. x. 852, bibliography to chap. xvii.

IBSEN, HENRIK (1828-1906), Norwegian dramatic and lyric poet, eldest son of Knud Henriksen Ibsen, a merchant, and of his wife Marichen Cornelia Altenburg, was born at Skien on the 20th of March 1828. For five generations the family had consisted on the father's side of a blending of the Danish, German and Scottish races, with no intermixture of pure Norwegian. In 1836 Knud Ibsen became insolvent, and the family withdrew, in great poverty, to a cottage in the outskirts of the town. After brief schooling at Skien, Ibsen was, towards the close of 1843, apprenticed to an apothecary in Grimstad; here he remained through seven dreary years of drudgery, which set their mark upon his spirit. In 1847, in his nineteenth year, he began to write poetry. He made a gloomy and almost sinister impression upon persons who met him at this time, and one of his associates of those days has recorded that Ibsen " walked about Grimstad like a mystery sealed with seven seals." He had continued, by assiduous reading, his self-education, and in 1850 he contrived to come up as a student to Christiania. In the same year he published his first work, the blank-verse tragedy of Catilina, under the pseudonym Brynjolf Bjarme. A second drama, The Viking's Barrow, was acted (but not printed) a few months later; Ibsen was at this time entirely under the influence of the Danish poet Oehlenschlager. During the next year or two he made a very precarious livelihood in Christiania as a journalist, but in November 185 1 he had the good fortune to be appointed " stage-poet " at the little theatre of Bergen, with a small but regular salary. He was practically manager at this house, and he also received a travelling stipend. In 1852, therefore, he went for five months to study the stage, to Copenhagen and to Dresden. Among many dramatic experiments which Ibsen made in Bergen, the most considerable and most satisfactory is the saga-drama of Mistress Inger at Ostraat, which was produced in 1855; and printed at Christiania in 1857; here are already perceptible some qualities of his mature character. Much less significant, although at the time more successful, is The Feast at Solhaug, a tragedy produced in Bergen in 1856; here for a moment Ibsen abandoned his own nascent manner for an imitation of the popular romantic dramatist of Denmark, Henrik Hertz. It is noticeable that

Ibsen, by far the most original of modern writers for the stage, was remarkably slow in discovering the true bent of his genius. His next dramatic work was the romantic tragedy of Olaf Lttjekrans, performed in 1857, but unprinted until 1898. This was the last play Ibsen wrote in Bergen. In the summer of the former year his five years' appointment came to an end, and he returned to Christiania. Almost immediately he began the composition of a work which showed an extraordinary advance on all that he had written before, the beautiful saga-drama of The Warriors in Helgeland, in which he threw off completely the influence of the Danish- romantic tragedians, and took his material directly from the ancient Icelandic sources. This play marks an epoch in the development of Norwegian literature. It was received by the managers, both in Christiania and Copenhagen, with con- temptuous disapproval, and in the autumn of 1857 Ibsen could not contrive to produce it even at the new theatre of which he was now the manager. The Warriors was printed at Christiania in 1858, but was not acted anywhere until 1861. During these years Ibsen suffered many reverses and humiliations, but he persisted in his own line in art. Some of his finest short poems,

among others the admirable seafaring romance, Terje Vigen, belong to the year i860. The annoyances which Ibsen suffered, and the retrograde and ignorant conditions which he felt around him in Norway, developed the ironic qualities in his genius, and he became an acid satirist. The brilliant rhymed drama, Love's Comedy, a masterpiece of lyric wit and incisive vivacity, was published in 1862. This was a protest against the convention- ality which deadens the beauty of all the formal relations between men and women, and against the pettiness, the publicity, and the prosiness of betrothed and married life among the middle classes in Norway; it showed how society murders the poetry of love. For some time past Ibsen had been meditating another saga-drama in prose, and in 1864 this appeared, Kongsemneme (The Pretenders). These works, however, now so universally admired, contained an element of strangeness which was not welcome when they were new. Ibsen's position in Christiania grew more and more disagreeable, and he had positive misfortunes which added to his embarrassment. In 1862 his theatre became bankrupt, and he was glad to accept the poorly-paid post of " aesthetic adviser " at the other house. An attempt to obtain a poet's pension {digtergage) was unsuccessful; the Storthing, which had just voted one to Bjornson, refused to do the same for Ibsen. His cup was

full of disillusion and bitterness, and in April 1864 he started, by Berlin and Trieste, ultimately to settle in Rome. His anger and scorn gave point to the satirical arrows which he shot back to his thankless fatherland from Italy in the splendid poem of Brand, published in Copenhagen in 1866, a fierce attack on the Laodicean state of religious and moral sentiment in the Norway of that day; the central figure, the stern priest Brand, who attempts to live like Christ and is snubbed and hounded away by his latitudinarian companions, is one of the finest conceptions of a modern poet. Ibsen had scarcely closed Brand before he started a third lyrico-dramatic satire. Peer Gynt (1867), which remains, in a technical sense, the most highly finished of all his metrical works. In Brand the hero had denounced certain weaknesses which Ibsen saw in the Norwegian character, but these and other faults are personified in the hero of Peer Gynt; or rather, in this figure the poet pictured, in a type, the Norwegian nation in all the egotism, vacillation, and lukewarmness w-hich he believed to be character- istic of it. Ibsen, however, acted better than he preached, and he soon forgot his abstraction in the portrait of Peer Gynt as a human individual. In this magnificent work modern Nor- wegian literature first rises to a level with the finest European poetry of the century. In 1869 Ibsen wrote the earliest of his prose dramas, the political comedy, The Young Men's League, in which for the first time he exercised his extraordinary gift for perfectly natural and yet pregnant dialogue. Ibsen was in Egypt, in October 1869, when his comedy was put on the stage in Christiania, amid violent expressions of hostility; on hearing the news, he wrote his brilliant little poem of defiance, called .1 1 Port Said. By this time, however, he had become a successful author; Brand sold largely, and has continued to be the most popular of Ibsen's writings. In 1866, moreover, the Storthing had been persuaded to vote him a " poet's pension," and there was now an end of Ibsen's long struggle with poverty. In 1868 he left Rome, and settled in Dresden until 1874, when he returned to Norway. But after a short visit he went back to Germany, and lived first at Dresden, afterwards at Munich, and did not finally settle in Christiania until 1891. His shorter lyrical poems were collected in 1871, and in that year his name and certain of his writings were for the first time mentioned to the English public. At this time he was revising his old works, which were out of print, and which he would not resign again to the reading world until he had subjected them to what in some instances (for example, Mistress Inger at Oslraat) amounted to practical recomposition. In 1873 he published a double drama, each part of which was of unusual bulk, the whole forming the tragedy of Emperor and Galilean; this, Ibsen's latest historical play, has for subject the unsuccessful struggle of Julian the Apostate

to hold the world against the rising tide of Christianity. The work is of an experimental kind, and takes its place between the early xiv. 8

poetry and the later prose of the author. Compared with the series of plays which Ibsen had already inaugurated with The Young Men's League, Emperor and Galilean preserves a colour of idealism and even of mysticism which was for many years to be absent from Ibsen's writings, but to reappear in his old age with The Master-builder. There is some foundation for the charge that Ibsen has made his romantic Greek emperor need- lessly squalid, and that he has robbed him, at last, too roughly of all that made him a sympathetic exponent of Hellenism. Ibsen was how greatly occupied by the political spectacle of Germany at war first in Denmark, then in France, and he believed that all things were conspiring to start a new epoch of individu- alism. He was therefore deeply disgusted by the Paris com- mune, and disappointed by the conservative reaction which succeeded it. This disillusion in political matters had a very direct influence upon Ibsen's literary work. It persuaded him that nothing could be expected in the way of reform from democracies, from large blind masses of men moved capriciously in any direction, but that the sole hope for the future must lie in the study of personality, in the development of individual character. He set himself to diagnose the conditions of society, which he had convinced himself lay sick unto death. Hitherto Ibsen had usually employed rhymed verse for his dramatic compositions, or, in the case of his saga-plays, a studied and artificial prose. Now, in spite of the surprising achievements of his poetry, he determined to abandon versification, and to write only in the language of everyday conversation. In the first drama of this his new period, The Pillars of Society (1877), he dealt with the problem of hypocrisy in a small commercial centre of industry, and he drew in the Bernick family a marvellous picture of social egotism in a prosperous seaport town. There was a certain similarity between this piece and A Doll's House (1879), although the latter was much the more successful in .awakening curiosity. Indeed, no production of Ibsen's has been so widely discussed as this, which is nevertheless not the most coherently conceived of his plays. Here also, social hypocrisy, was the object of the playwright's satire, but this time mainly in relation to marriage. In A Doll's House Ibsen first developed his views with regard to the individualism of woman. In his previous writings he had depicted woman as a devoted and willing sacrifice to man; here he begins to explain that she has no less a duty to herself, and must keep alive her own con- ception of honour and of responsibility. The conclusion of A Doll's House was violently and continuously

discussed through the length and breadth of Europe, and to the situation of Nora Helmer is probably due more than to anything else the long tradition that Ibsen is " immoral." He braved convention still more audaciously in Ghosts (1881), perhaps the most powerful of the series of plays in which Ibsen diagnoses the diseases of modern society. It was received in Norway with a tumult of ill-will, and the author was attacked no less venomously than he had been twenty years before. Ibsen was astonished and indignant at the reception given to Ghosts, and at the insolent indifferentism of the majority to all ideas of social reform. He wrote, more as a pamphlet than as a play, what is yet one of the most effective of his comedies, An Enemy of the People (1882). Dr Stockmann, the hero of that piece, discovers that the drainage system of the bathing-station on which the little town depends is faulty, and the water impure and dangerous. He supposes that the corporation will be grateful to have these deficiencies pointed out; on the contrary, they hound him out of their midst as an " enemy of the people." In this play occurs- Ibsen's famous and typical saying, " a minority may be right — a majority is always wrong." This polemical comedy seemed at first to be somewhat weakened by the personal indignation which runs through it, but it has held the stage. Ibsen's next drama, The Wild Duck (1884), was written in singular contrast with the zest and fire which had inspired An Enemy of the People. Here he is squalid and pessimistic to a degree elsewhere unparalleled in his writings; it is not quite certain that he is not here guilty of a touch of parody of himself. The main figure of the play is an unhealthy, unlucky enthusiast, who goes

about making hopeless mischief by exposing weak places in the sordid subterfuges of others. This drama contains a figure, Hjalmar Ekdal, who claims the bad pre-eminence of being the meanest scoundrel in all drama. The Wild Duck is the darkest, the least relieved, of Ibsen's studies of social life, and his object in composing it is not obvious. With Rosmersholm (1886) he rose to the height of his genius again; this is a mournful, but neither a pessimistic nor a cynical play. The fates which hang round the contrasted lives of Rosmer and Rebecca, the weak- willed scrupulous man and the strong-willed unshrinking woman, the old culture and the new, the sickly conscience and the robust one, create a splendid dramatic antithesis. Ibsen then began to compose a series of dramas, of a more and more symbolical and poetic character; the earliest of these was

the mystical The Lady from the Sea (1888). At Christmas 1890 he brought out Hedda Gabler; two years later The Master-builder (Bygmester Solnaes), in which many critics see the highest attainment of his genius; at the close of 1894 Little Eyolf; in 1896 John Gabriel Borkman; and in 1900 When We Dead Awaken. On the occasion of his seventieth birthday (1898) Ibsen was the recipient of the highest honours from his own country and of congratulations and gifts from all parts of the world. A colossal bronze statue of him was erected outside the new National Theatre, Christiania, in September 1899. In 1901 his health began to decline, and he was ordered by the physician to abandon every species of mental effort. The evil advanced, and he became unconscious of the passage of events. After lingering in this sad condition he died, without suffering, on the 23rd of May 1906, and was accorded a public funeral, with the highest national honours.

No recent writer belonging to the smaller countries of Europe has had so widely spread a fame as that of Ibsen, and although the value of his dramatic work is still contested, it has received the compliment of vivacious discussion in every part of the world. There would, perhaps, have been less violence in this discussion if it had been perceived that the author does not pose as a moral teacher, but as an imaginative investigator. He often and with much heat insisted that he was not called upon as a poet to suggest a remedy for the diseases of society, but to diagnose them. In this he was diametrically opposed to Tolstoi, who admitted that he wrote his books for the healing of the nations. If the subjects which Ibsen treats, or some of them, are open to controversy, we are at least on firm ground in doing homage to the splendour of his art as a playwright. He reintroduced into modern dramatic literature something of the velocity and inevitability of Greek tragic intrigue. It is very rarely that any technical fault can be found with the archi- tecture of his plots, and his dialogue is the most lifelike that the modern stage has seen. His long apprenticeship to the theatre was of immense service to him in this respect. In every country, though least perhaps in England, the influence of Ibsen has been marked in the theatrical productions of the younger school. Even in England, on the rare occasions when his dramas are acted, they awaken great interest among intelligent playgoers.

The editions of Ibsen's works are numerous, but the final text is included in the Samlede Vaerker, with a bibliography by J. B. Halvorsen, published in Copenhagen, in 10 vols. (1898-1902). They have been translated into the principal European languages, and into Japanese. The study of Ibsen in English was begun by Mr Gosse in

1872, and continued by Mr William Archer, whose version of Ibsen's prose dramas appeared in 5 vols. (1890, 1891; new and revised edition, 1906). Other translators have been Mr C. Herford, Mr R. A. Streatfield, Miss Frances Lord and Mr Adie. His Corre- spondence was edited, in 2 vols., under the supervision of his son, Sigurd Ibsen, in 1904 (Eng. trans., 1905). Critical studies on the writings and position of Ibsen are innumerable, and only those which were influential in guiding opinion, during the early part of his career, in the various countries, can be mentioned here: Georg Brandes Asthetiske Studier (Copenhagen, 1868) ; LesQuesnel, Poesie scandinave (Paris 1874); Valfrid Valsenius, Henrik Ibsen (Helsingfors, 1879); Edmund Gosse, Studies in Northern Literature (London, 1879); L. Passarge, Henrik Ibsen (Leipzig, 1883); G. Brandes, Bjornson och Ibsen (Stockholm, 1882) ; Henrik Jaeger, Henrik Ibsen 1828-1888 (Copenhagen, 1888; Eng. trans., 1890); T. Terwey, Henrik Ibsen (Amsterdam, 1882); G. Bernard Shaw, The Quintessence of Ibsen (London, 1893). In France Count Moritz

Prozor carried on an ardent propaganda in favour of Ibsen from 1885, and Jules Lemaitre's articles in his Les Contemporains and Impressions de thedtre did much to encourage discussion. W. Archer forwarded the cause in England from 1878 onwards. In Germany Ibsen began to be known in 1866, when John Grieg, P. F. Siebold and Adolf Strodtmann successively drew attention to his early dramas; but his real popularity among the Germans dates from 1880. (E. G.)

IBYCUS, of Rhegium in Italy, Greek lyric poet, contemporary of Anacreon, flourished in the 6th century B.C. Notwithstanding his good position at home, he lived a wandering life, and spent a considerable time at the court of Polycrates, tyrant of Samos. The story of his death is thus related: While in the neighbour- hood of Corinth, the poet was mortally wounded by robbers. As he lay dying he saw a flock of cranes flying overhead, and called upon them to avenge his death. The murderers betook themselves to Corinth, and soon after, while sitting in the theatre, saw the cranes hovering above. One of them, either in alarm or jest, ejaculated, "Behold the avengers of Ibycus," and thus gave the clue to the detection of the crime (Plutarch, De Garru- litate, xiv.). The phrase, " the cranes of Ibycus," passed into a proverb among the Greeks for the discovery of crime through divine intervention. According to Suidas, Ibycus wrote seven books of lyrics, to some extent mythical and heroic, but mainly erotic (Cicero, Tusc. Disp. iv. 33), celebrating the charms of beautiful youths and girls. F. G. Welcker suggests that they were sung by choruses of boys at the " beauty com- petitions " held at Lesbos.

Although the metre and dialect are Dorian, the poems breathe the spirit of Aeolian melic poetry.

The best editions of the fragments are by F. W. Schneidewin (1833) and Bergk, Poetae lyrici Graeci.

ICA (Yca, or Ecca), a city of southern Peru and the capital of a department of the same name, 170 m. S.S.E. of Lima, and 46 m. by rail S.E. of Pisco; its port on the Pacific coast. Pop. (1906, official estimate) 6000. It lies in a valley of the foothills of the Cordillera Occidental, which is watered by the Rio de lea, is made highly fertile by irrigation, and is filled with vine- yards and cotton fields; between this valley and the coast is a desert. The original town was founded in 1563, 4 m. E. of its present site, but it was destroyed by the earthquake of 1571, and again by that of 1664, after which the present town was laid out near the ruins. In 1882 a Chilean marauding expedition inflicted great damage to private property in the town and vicinity. These repeated disasters give the place a partially ruined appearance, but it has considerable commercial and industrial prosperity. It has' a large cotton factory and there are some smaller industries. Wine-making is one of the principal industries of the valley, and much brandy, called pisco, is exported from Pisco. A new industry is that of drying the fruits for which this region is celebrated. Ica is the seat of a national college.

The department of Ica lies between the Western Cordillera and the Pacific coast, and extends from the department of Lima S.E. to that of Arequipa. Pop. (1906, official estimate) 68,220; area 8721 sq. m. Ica is in the rainless region of Peru, and the greater part of its surface is barren. It is crossed by the rivers Pisco, Ica and Grande, whose tributaries drain the western slope of the Cordillera, and whose valleys are fertile and highly cultivated. The valley of the Nasca, a tributary of the Grande, is celebrated for an extensive irrigating system constructed by the natives before the discovery of America. The principal products of the department are cotton, grapes, wine, spirits, sugar and fruit. These are two good ports on the northern coast, Tambo de Mora and Pisco, the latter being connected with the capital by a railway across the desert, 46 m. long.

ICE (a word common to Teutonic languages; cf. Ger. Eis), the solid crystalline form which water assumes when exposed to a sufficiently low temperature. It is a colourless crystalline substance, assuming forms belonging to the hexagonal system, and distinguished by a well-marked habit of twinning, which occasions the beautiful "ice flowers" displayed by hoar-frost. It is frequently precipitated as

hoar-frost, snow or hail; and in the glaciers and snows of lofty mountain systems or of regions

of high latitude it exists on a gigantic scale, being especially characteristic of the seas and lands around the poles. In various regions, especially in France and Italy, great quantities of ice form in caves, which, in virtue of their depth below the earth's surface, their height above the sea-level, or their exposure to suitable winds, or to two or more of these conditions in com- bination, are unaffected by ordinary climatic changes, so that the mean annual temperature is sufficiently low to ensure the permanency of the ice. The temperature at which water freezes, and also at which ice melts, is so readily determined that it is employed as one of the standard temperatures in the graduation of ordinary thermometer scales, this temperature being the zero of the Centigrade and Reaumur scales, and 32° of the Fahrenheit (see Thermometry). In the act of freezing, water, though its temperature remains unchanged, undergoes a remarkable expansion so that ice at o° C. is less dense than water — a fact demonstrated by its power of floating. The sub-aqueous retention of " ground-ice " or " anchor-ice," which forms in certain circumstances at the bottom of streams or pools in which there are many eddies, is due to the cohesion between it and the stones or rocks which compose the bed of the streams or pools. As water expands on freezing, so con- versely ice contracts on melting; and the ice-cold water thus formed continues to contract when heated until it has reached its point of maximum density, the temperature at which this occurs being about 39 Fahr. or 4° C. Above this point water continuously expands, and at no temperature is it less dense than ice as is shown by the following table: —

Density of ice at o°C. = -9175

„ water at o°C. = -99988

„ ,, 4°C. = 1-00000

,, ,, io°C. = -99976

ioo°C. = -95866

Under the influence of heat, ice itself behaves as most solids do, contracting when cooled, expanding when heated. Accord- ing to

Plucker, the coefficient of cubical dilatation at moderately low temperatures is 0-0001585. From a series of elaborate experiments, Person deduced 0-505 as the specific heat of ice, or about half that of water.

Though no rise of temperature accompanies the melting of ice, there is yet a definite quantity of heat absorbed, namely, about 80 calories per gram; this is called the latent heat of fusion of water (see Fusion). The same amount of heat is evolved when water becomes ice. That ice can be melted by increase of pressure was first pointed out by James Thomson in 1849. He showed that, since water expands on freezing, the laws of thermodynamics require that its freezing-point must be lowered by increase of pressure; and he calculated that for every additional atmosphere of pressure the freezing- point of water was lowered by 0-0075°. This result was verified by his brother, Sir William Thomson (Lord Kelvin), in 1850. The Thomsons and H. L. F. Helmholtz successfully applied this behaviour of ice under pressure to the explanation of many properties of the substance. When two blocks of ice at o° C. are pressed together or even simply laid in contact, they gradually unite along their touching surfaces till they form one block. This " regelation " is due to the increased pressure at the various points of contact causing the ice there to melt and cool. The water so formed tends to escape, thus relieving the pressure for an instant, refreezing and returning to the original tempera- ture. This succession of melting and freezing, with their accom- panying thermal effects, goes on until the two blocks are cemented into one.

Ice forms over fresh water if the temperature of the air has been for a sufficient time at or below the freezing-point; but not until the whole mass of water has been cooled down to its point of maximum density, so that the subsequent cooling of the surface can give rise to no convection currents, is freezing possible. Sea-water, in the most favourable circumstances, does not freeze till its temperature is reduced to about -2° C; and the ice, when formed, is found to have rejected four-fifths of the salt which was originally present. In the upper provinces

of India water is made to freeze during cold clear nights by leaving it overnight in porous vessels, or in bottles which are enwrapped in moistened cloth. The water then freezes in virtue of the cold produced by its own evaporation or by the drying of the moistened wrapper. In Bengal the natives resort to a still more elaborate forcing of the conditions. Pits are dug about 2 ft. deep and filled three-quarters full with dry straw, on which are set flat porous pans

containing the water to be frozen. Exposed overnight to a cool dry gentle wind from the north-west, the water evaporates at the expense of its own heat, and the consequent cooling takes place with sufficient rapidity to overbalance the slow influx of heat from above through the cooled dense air or from below through the badly-conducting straw.

See Water, and for the manufacture of ice see Refrigerating.

ICEBERG (from ice and Berg, Ger. for hill, mountain), a floating mass of ice broken from the end of a glacier or from an ice-sheet. The word is sometimes, but rarely, applied to the arch of an Arctic glacier viewed from the sea. It is more com- monly used to describe huge floating masses of ice that drift from polar regions into navigable waters. They are occasionally encountered far beyond the polar regions, rising into beautiful forms with breakers roaring into their caves and streams of water pouring from their pinnacles in the warmer air. W T hen, however, they rest in comparatively warm water, melting takes place, most rapidly at the base and they frequently overturn. Only one-ninth of the mass of ice is seen above water. When a glacier descends to the sea, as in Alaska, and " advances into water, the depth of which approaches its thickness, the ends are broken off and the detached masses float away as icebergs. Many of the bergs are overturned, or at least tilted, as they set sail. If this does not happen at once it is likely to occur later as the result of the wave-cutting and melting which disturb their equilibrium " (T. C. Chamberlin and R. D. Salisbury, Geology: Processes and their Results, 1905). These bergs carry a load of debris from the glacier and gradually strew their load upon the sea floor. They do not travel far before losing all stony and earthy debris, but glacial material found in dredgings shows that icebergs occasionally carry their load far from land. The structure of the iceberg varies with its origin and is always that of the glacier or ice-sheet from which it was broken. The breaking off of the ice-sheet from a Greenland glacier is called locally the " calving " of the glacier. The constantly renewed material from which the icebergs are formed is brought down by the motion of the glacier. The ice-sheet cracks at the end, and masses break off, owing to the upward pressure of the water upon the lighter ice which is pushed into it. This is accomplished with considerable violence. The disintegration of an Arctic ice- sheet is a simpler matter, as the ice is already floating.

ICELAND (Dan. Island), an island in the North Atlantic Ocean, belonging to Denmark. Its extreme northerly point is touched by the Arctic Circle; it lies between 13° 22′ and 24 35′ W., and bptween 63

12′ and 66° 33′ N., and has an area of 40,437 sq. m Its length is 298 m. and its breadth 194 m., the shape being a rough oval, broken at the north-west, where a peninsula, diversified by a great number of fjords, projects from the main portion of the island. The total length of the coast-line is about 3730 m., of which approximately one-third belongs to the north-western peninsula. Iceland is a plateau or tableland, built up of volcanic rocks of older and younger formation, and pierced on all sides by fjords and valleys. Com- pared with the tableland, the lowlands have a relatively small " area, namely, one-fourteenth of the whole; but these lowlands are almost the only parts of the island which are inhabited. In consequence of the rigour of its climate, the central tableland is absolutely uninhabitable. At the outside, not more than one- fourth of the area of Iceland is inhabited; the rest consists of elevated deserts, lava streams and glaciers. The north-west peninsula is separated from the main mass of the island by the bays Hunafloi and BreiSifjorSr, so that there are really two tablelands, a larger and a smaller. The isthmus which connects the two is only 4ˆ m. across, but has an altitude of 748 ft. The

mean elevation of the north-west peninsula is 2000 ft. The fjords and glens which cut into it are shut in by precipitous walls of basalt, which plainly shows that they have been formed by erosion through the mass of the plateau. The surface of this tableland is also bare and desolate, being covered with gravel and fragments of rock. Here and there are large straggling snowfields, the largest being Glamu and Drangajokull, 1 on the culminating points of the plateau. The only inhabited districts are the shores of the fjords, where grass grows capable of support- ing sheep; but a large proportion of the population gain their livelihood by fishing. The other and larger tableland, which constitutes the substantial part of Iceland, reaches its culminating point in the south-east, in the gigantic snowfield of Vatnajokull, which covers 3300 sq. m. The axis of highest elevation of Iceland stretches from north-west to south-east, from the head of Hvammsf jfirflr to HornafjorSr, and from this water-parting the

separated from one another by rocky promontories, appear to owe their origin to subsidences of the surface; whereas the fjords of the north-west peninsula, which make excellent harbours, and those of the east coast seem to be the result chiefly of erosion. Glaciers.— An area of 5170 sq. m. is covered with snowfields and glaciers. This

extraordinary development of ice and snow is due to the raw, moist climate, the large rainfall and the low summer temperature. The suow-line varies greatly in different parts of the island, its range being from 1300 to 4250 ft. It is highest on the tableland, on the north side of Vatnajokull, and lowest on the north-west peninsula, to the south of North Cape. Without exception the great neves of Iceland belong to the interior tableland. They consist of slightly rounded domes or billowy snowfields of vast thickness. In external appearance they bear a closer resemblance to the glaciers of the Polar regions than to those of the Alps. The largest snowfields are Vatnajokull

rivers descend on both sides. The crest of the water-parting ! (3280 sq. m.), Hofsjokull (520) Langjokull (500) and Myrdals is crowned by a chain of snow-capped mountains, separated by broad patches of lower ground. They are really a chain of minor plateaus which rise 4500 to 6250 ft. above sea-level and 2000 to 3000 ft. above the tableland itself. In the extreme east is Vatnajokull, which is separated from Tungna- fellsjokull by Vonarskard (3300 ft.). Between Tungnafellsjokull and Hofsjokull lies the broad depression of Sprengisandr (2130 ft.). Continu- ing north-west, between Hofsjokull and the next snow-capped mountain, Langjokull, lies Kjolur (2000 ft.) ; and between Langjokull and Eiriksjokull, Flosaskard (2630 ft.). ‘ To the’ north of the joklar last mentioned there are a number of lakes, all well stocked with fish. Numerous valleys or glens penetrate into the tableland, especially on the north and east, and between them long mountain spurs, sections of the tableland which have resisted the action of erosion, thrust themselves towards the sea. Of these the most considerable is the mass crowned by Myrdalsjokull, which stretches towards the south. The interior of the table- land consists for the most part of barren,

grassless deserts, the surface being covered Emery wits «s

by gravel, loose fragments of rock, lava, driftsand, volcanic } jokull (390). The glaciers which stream off from these snowfields ashes and glacial detritus.

Save the lower parts of the larger glens, there are no lowlands on the north and east. The south coast is flat next the sea; hut immediately underneath Vatnajokull there is a strip of gravel and sand, brought down and deposited by the glacial streams. The largest low-lying plain of Iceland, lying between Myrdalsjokull and Reykjanes, has an area of about 1550 sq. m. In its lowest parts this plain barely keeps above sea-level, but it rises gradually towards the interior,

terminating in a ramification of valleys. Its maximum altitude is attained at 381 ft. near Geysir. On the west of Mount Hekla this plain connects by a regular slope directly with the tableland, to the great injury of its inhabited districts, which are thus exposed to the clouds of pumice dust and driftsand that cover large areas of the interior. Nevertheless the greater part of this lowland plain produces good grass, and is relatively well inhabited. The plain is drained by three rivers — Markarfljot, Thjorsa and Oelfusa — all of large volume, and numerous smaller streams. Towards the west there exist a number of warm springs. There is another kwland plain around the head of Faxafloi, nearly 400 sq. m. in extent. As a rule the surface of this second plain is very marshy. Several dales or glens penetrate the central tableland; the eastern part of this lowland is called Borgar- fjorflr, the western part Myrar.

The great bays on the west of the island (Faxafloi and BreiSi-fj6r5r), J as well as the many bays on the north, which are

1 Jiikutt, plural joklar, Icel. snowfield, glacier. 5 Floi, bay ; fjorfr, fjord.

are often of vast extent, e.g. the largest glacier of Vatnajokull has an area of 150 to 200 sq. m., but the greater number are small. Altogether, more than 120 glaciers are known in Iceland. It is on the south side of Vatnajokull that they descend lowest; the lower end of Breidamerkurjokull was in the year 1894 only 30 ft. above sea-level. The glaciers of the north-west peninsula also descend nearly to sea-level. The great number of streams of large volume is due to the moist climate and the abundance of glaciers, and the milky white or yellowish-brown colour of their waters (whence the common name Hvita, white) is due to the glacial clays. The majority of them change their courses very often, and vary greatly in volume; frequently they are impetuous torrents, forming numerous waterfalls. Iceland also possesses a great number of lakes, the largest being Thing- vallavatn 3 and Thorisvatn, each about 27 sq. m. in area. Myvatn, in the north, is well known from the natural beauty of its surroundings. Above its surface tower a great numbes»of volcanoes and several craters, and its waters are alive with water-fowl, a multitude of ducks of various species breeding on its islands. The lakes of Iceland owe their origin to different causes, some being due to glacial erosion, others to volcanic subsidence. Myvatn fills a depression between lava streams, and has a depth of not more than 8f ft. The group of lakes called Fiskivotn (or Veidivotn), which lie in a desolate region to the west of Vatnajokull, consist for the most part of crater lakes. The groups of lakes which lie north-west from Langjokull

occupy basins formed between ridges of glacial gravel; and in 3 Vatn, lake.

the valleys numerous lakes are found at the backs of the old moraines.

Volcanoes. — Iceland is one of the most volcanic regions of the earth; volcanic activity has gone on continuously from ihe formation of the island in the Tertiary period down to the present time. So far as is known, there have in historic times been eruptions from twenty-five volcanic vents. Altogether 107 volcanoes are known to exist in Iceland, with thousands of craters, great and small. The lava-streams which have flowed from them since the Glacial epoch now cover an area of 4650 sq. m. They are grouped in dense masses round the volcanoes from which they have flowed, the bulk of the lava dating from outbreaks which occurred in prehistoric times. The largest volume of lava which has issued at one outflow within historic times is the stream which came from the craters of Laki at Skapta. This belongs to the year 1783, and covers an area of 218 sq. m., and amounts to a volume represented by a cube each of whose sides measures 75 m. The largest unbroken lava-field in Iceland is OdaSahraun (Lava of Evil Deeds), upon the table- land north from Vatnajbkull (2000 to 4000 ft. above sea-level). It is the accretion of countless eruptions from over twenty volcanoes, and covers an area of 1300 sq.m. (or, including all its ramifications and minor detached streams, 1700 sq. m.), and its volume would fill a cube measuring 13-4 m. in every direction. As regards their superficies, the lava-streams differ greatly. Sometimes they are very uneven and jagged (apalhraun), con- sisting of blocks of lava loosely flung together in the utmost confusion. The great lava-fields, however, are composed of vast sheets of lava, ruptured and riven in divers ways (hellu-hraun). The smooth surface of the viscous billowy lava is further diversified by long twisted " ropes," curving backwards and forwards up and down the undulations. Moreover, there are gigantic fissures, running for several miles, caused by subsidences of the underlying sections. The best-known fissure of this character is Almannagja at Thingvellir. On the occasion of outbreaks the fine ashes are scattered over a large portion of t he island, and sometimes carried far across the Atlantic. After the eruption of Katla in 1625 the ashes were blown as far as Bergen in Norway, and when Askja was in eruption in 1875 a rain of ashes fell on the west coast of Norway 11 hours 40

minutes, and at Stockholm 15 hours, afterwards. The volcanic ash frequently proves extremely harmful, destroying the pastures so that the sheep and cattle die of hunger and disease. The outbreak of Laki in 1783 occasioned the loss of 11,500 cattle, 28,000 horses and 190,500 sheep — that is to say, 53% of the cattle in the island, 77% of the horses and 82% of the sheep. After that the island was visited by a famine, which destroyed 0500 people, or one-fifth of the total population.

The Icelandic volcanoes may be divided into three classes: (1) cone-shaped, like Vesuvius, built up of alternate layers of ashes, scoriae and lava; (2) cupola-shaped, with an easy slope and a vast crater opening at the top — these shield-shaped cupolas are composed entirely of layers of lava, and their inclina- tion is seldom steeper than 7°-8° ; (3) chains of craters running close alongside a fissure in the ground. For the most part the individual craters are low, generally not exceeding 300 to 500 ft. These crater chains are both very common and often very long. The chain of Laki, which was formed in 1783, extends 20 m., and embraces about one hundred separate craters. Sometimes, however, the lava-streams are vomited straight out of gigantic fissures in the earth without any crater being formed. Many of the Icelandic volcanoes during their periods of quiescence are covered with snow and ice. Then when an outbreak occurs the snow and ice melt, and in that way they sometimes give rise to ierious catastrophes (j bkulhlaup) , through large areas being suddenly inundated by great floods of water, which bear masses of ice floating on their surface. Katla caused very serious destruction in this way by converting several cultivated districts into barren wastes. In the same way in the year 1362 Oeraefajokull, the loftiest mountain in Iceland (6424 ft.), swept forty farms, together with their inhabitants and live stock, bodily into the ocean. The best-known volcano is Hekla

(5108 ft.), which was in eruption eighteen times within the historic period down to 1845. Katla during the same period was active thirteen times down to i860. The largest volcano is Askja, situated in the middle of the lava-field of OdaSahraun. Its crater measures 34 sq. m. in area. At Myvatn there are several volcanoes, which were particularly active in the years 1 7 24-1 730. On several occasions there have been volcanic out- breaks under the sea outside the peninsula of Reykjanes, islands appearing and afterwards disappearing again. The crater chain of Laki has only been in eruption once in historic times, namely, the violent and disastrous outbreak of 1783. Iceland, however, possesses no constantly active volcano. There are often long intervals between the successive

outbreaks, and many of the volcanoes (and this is especially true of the chains of craters) have only vented themselves in a solitary outburst.

Earthquakes are frequent, especially in the districts which are peculiarly volcanic. Historical evidence goes to show that they are closely associated with three naturally defined regions: (1) the region between Skjalfandi and AxarfjorSr in the north, where violent earth tremblings are extremely common; (2) at Faxafloi, where minor vibrations are frequent; (3) the southern lowlands, between Reykjanes and Myrdals- jokull, have frequently been devastated by violent earthquake shocks, with great loss of property and life, e.g. on the 14th- 16th of August 1784, when 92 farmsteads were totally destroyed, and 372 farmsteads and n. churches were seriously damaged; and again in August and September 1896, when another terrible earthquake destroyed 161 farmsteads and damaged 155 others. Hot springs are found in every part of Iceland, both singly and in groups; they are particularly numerous in the western portion of the southern lowlands, where amongst others is the famous Geyser (q.v.). Sulphur springs and boiling. mud lakes are also general in the volcanic districts; and in places there are carbonic acid springs, these more especially on the peninsula of Snaefellsnes, north of Faxafloi.

Geology. — Iceland is built up almost entirely of volcanic rocks, none of them older, however, than the middle of the Tertiary period. The earlier flows were probably contemporaneous with those of Green- land, the Faeroes, the western islands of Scotland and the north-east of Ireland. The principal varieties are basalt and palagonitic breccias, the former covering two-thirds of the entire area, the latter the remaining one-third. Compared with these two systems, all other formations have an insignificant development. The palagonitic breccias, which stretch in an irregular belt across the island, are younger than the basalt. In the north-west, north and east the coasts are formed of basalt, and rise in steep, gloomy walls of rock to alti- tudes of 3000 ft. and more above sea-level. Deposits of. clay, with remains of plants of the Tertiary period, lignite and tree-trunks pressed flat, which the Icelanders call surtarbrandur , occur in places in the heart of the basalt formation. These fossiliferous strata are developed in greatest thickness in the north-west peninsula. Indeed, in some few places well-marked impressions of leaves and fruit have been discovered, proving that in Tertiary times Iceland possessed extensive forests, and its annual mean temperature must have been at least 48° Fahr., whereas the present mean is 35-6°. The palagonitic breccias, which attain their greatest development in the south of the island and on the tableland, consist of reddish,

brown or yellowish rocks, tuffs and breccias, belonging to several different groups or divisions, the youngest of which seems to be of a date subsequent to the Glacial epoch. All over Iceland, in both the basalt and breccia formations, there occur small intrusive beds and dikes of liparite, and as this rock is of a lighter colour than the basalt, it is visible from a distance. In the south-east of the island, in the parish of L6n, there exist a few mountains of gabbro, a rock which does not occur in any other part of Iceland. Near Husavik in the north there have been found marine deposits containing a number of marine shells; they belong to the Red Crag division of the Pliocene. In the middle of Iceland, where the geological foundation is tuff a.nd breccias, large areas are buried under ancient outflows of lava, whic"h bear evidences of glacial scratching. These lava streams, which are of a doleritic character, flowed before the Glacial age, or during its continuance, out of lava cones with gigantic crater openings, such as may be seen at the present day. During the Glacial epoch the whole' of Iceland was covered by a vast sheet of inland ice, except for a few small isolated peaks rising along its outer margins. This ice-cap had on the tableland a thickness of 2300 to 2600 ft. Rocks scored by glacial ice and showing plain indications of striation, together with thousands of erratic blocks, are found scattered all over Iceland. Signs of elevation subsequent to the Glacial epoch are common all round the island, especially on the north-west peninsula. There are found strikingly developed marine terraces of gravel, shore lines and

surf beaches marked on the solid rock. In several places there are traces of shells; and sometimes skeletal remains of whales and walruses, as well as ancient driftwood, have been discovered at tolerable distances from the present coast. The ancient shore-lines occur at two different altitudes. Along the higher, 230 to 260 ft. above the existing sea-level, shells have been found which are character- istic of high Arctic latitudes and no longer exist in Iceland; whereas on the lower shore-line, 100 to 130 ft., the shells belong to species which occur amongst the coast fauna of the present day.

The geysers and other hot springs are due to the same-causes as the active volcanoes, and the earthquakes are probably manifesta- tions of the same forces. A feature of special interest to geologists in the present conditions of the island is the great power of the wind both as

a transporting and denuding agent. The rock sculpture is often very similar to that of a tropical desert. 1

Climate. — Considering its high latitude and situation, Iceland has a relatively mild climate. The meteorological conditions vary greatly, however, in different parts of the island. In the south and east the weather is generally changeable, stormy and moist; whilst on the north the rainfall is' less. The climate of the interior tableland approximates to the continental type and is often extremely cold. The mean annual temperature is 37-2° F. in Stykkisholmr on BreiSifjorSr, 38-3° at Eyrarbakki in the south of Iceland, 41° at Vestmannaeyjar, 36 at Akureyri in the north, 36-7° on BerufjorSr in the east, and 30-6° at Modrudalr on the central tableland. The range is great not only from year to year, but also from month to month. For instance, at Stykkisholmr the highest annual mean for March was 39-7°, and the lowest 8°, during a period of thirty-eight years. Iceland lies contiguous to that part of the north Atlantic in which the shifting areas of low pressure prevail, so that storms are frequent and the barometer is seldom firm. The barometric pressure at sea-level in the south-west of Iceland during the period 1878- 1900 varied between 30-8 and 27-1 in. The climate of the coasts is relatively mild in summer, but tolerably cold in winter, The winter means of the north and east coasts average 31-7° and 31-3° F. respectively; the summer means, 42-8° and 44-6°; and the means of the year, 33-1° and 35-6°, The winter means of the south and west coasts average 32 and 31 '7° respectively; the summer means, 48-2° and 50 ; the annual means, 37-4° and 39-2°. The rainfall on the south and east coasts is considerable, e.g. at Vestmannaeyjar, 49-4 in. in the year; at BerufjorSr, 43-6 in. On the west coast it is less, e.g. 24-3 in. at Stykkisholmr; but least of all on the north coast, being only 14-6 in. on the island of Grimsey, which lies off that coast. Mist is commonly prevalent on the east coast; at BerufjorSr there is mist on no fewer than 212 days in the year. The south and west coasts are washed by the Gulf Stream, and the north coast by an Arctic current, which frequently brings with it a quantity of drift-ice, and thus exercises a considerable effect upon the climate of the island; sometimes it blocks the north coast in the summer months. On the whole, during the 19th century, the north coast was free from ice on an average of one year in evefy four or five. The clearness of the atmosphere has been frequently remarked. Thunderstorms occur mostly in winter.

Flora. — The vegetation presents the characteristics of an Arctic European type, and is tolerably uniform throughout the island, the differences even on the tableland being slight. At present 435 species

of phanerogams and vascular cryptogams are known; the lower orders have been little investigated. The grasses are of the greatest importance to the inhabitants, for upon them they are dependent for the keep of their live stock. Heather covers large tracts, and also affords pasture for sheep. The development of forest trees is insignificant. Birch woods exist in a good many places, especially in the warmer valleys; but the trees are very short, scarcely attaining more than 3 to 10 ft. in height. In a few places, however, they reach 13 to 20 ft. and occasionally more. A few mountain ash or rowan trees {Sorbus aucuparia) are found singly here and there, and attain to 30 ft. in height. Willows are also pretty general, the highest in growth being Salix phyllicifolia, 7 to 10 ft. The wild flora of Iceland is small and delicate, with bright bloom, the heaths being especially admired. Wild crowberries and bilberries are the only fruit found in the island.

Fauna. — The Icelandic fauna is of a sub-Arctic type. But while the species are few, the individuals are often numerous. The land

1 See Th. Thoroddsen, " Explorations in Iceland during the years 1881-1898," Geographical Journal, vol. xiii. (1899), pp. 251-274, 480-513, with map.

mammals are very poorly represented ; and it is doubtful whether any species is indigenous. The polar bear is an occasional visitant, being brought to the coast by the Greenland drift-ice. Foxes are common, both the white and the blue occurring ; mice and the brown rat have been introduced, though one variety of mouse is possibly indigenous. Reindeer were introduced in 1770. The marine mammalia are numerous. The walrus is now seldom seen, although in prehistoric times it was common. There are numerous species of seals; and the seas abound in whales. Of birds there are over 100 species, more than one-half being aquatic. In the interior the whistling swan is common, and numerous varieties of ducks are found in the lakes. The eider duck, which breeds on the islands of BreM- fjorSr, is a source of livelihood to the inhabitants, as are also the many kinds of sea-fowl which breed on the sea-cliffs. Iceland possesses neither reptiles nor batrachians. The fish fauna is abundant in individuals, some sixty-eight species being found off the coasts. The cod fisheries are amongst the most important in the world. Large quantities of herring, plaice and halibut are also taken. Many of the rivers abound in salmon, and trout are plentiful in the lakes and streams.

Population and Towns. — The census of 1890 gave a total

population of 70,927, and this number had increased by 1901 to 78,489. The increase during the 19th century was 27,000, while at least 15,600 Icelanders emigrated to America, chiefly to Manitoba, from 1872 to the close of the century. The largest town is Reykjavik on Faxafloi, with 6700 inhabitants, the capital of the island, and the place of residence of the governor- general and the bishop. Here the Althing meets; and here, further, are the principal public institutions of the island (library, schools, &c). The town possesses a statue to Thorvaldsen, the famous sculptor, who was of Icelandic descent. The re- maining towns include IsafjorSr (pop. 1000) on the north-west peninsula, Akureyri (1000) on the north and SeydisfjdrSr (8oot in the east.

Industries. — The principal occupation of the Icelanders is cattle-breeding, and more particularly sheep-breeding, although the fishing industries have come rapidly to the front in modern times. In 1850, 82% of the population were dependent upon cattle-breeding and 7% upon fishing; in 1890 the numbers were 64% and 18% respectively. The culture of grain is not practised in Iceland; all bread-stuffs are imported. In ancient times barley was grown in some places, but it never paid for the cost of cultivation. Cattle-breeding has declined in importance, while the number of sheep has increased. Formerly gardening was of no importance, but considerable progress has been made in this branch in modern times, as also in the cultivation of potatoes and turnips. Fruit-trees will not thrive; but black and red currants and rhubarb are grown, the last-named doing excellently. Iceland possesses four agricultural schools, one agricultural society, and small agricultural associations in nearly every district. The fisheries give employment to about 12,000 people. For the most part the fishing is carried on from open boats, notwithstanding the dangers of so stormy a coast. But larger decked vessels have come into increasing use. In summer the waters are visited by a great number of foreign fishermen, inclusive of about 300 fishing-boats from French ports, as well as by fishing-boats from the Faeroes and Norway, and steam trawlers from England. Excellent profit is made in certain parts of the island from the herring fishery; this is especially the case on the east coast. There are marine insurance societies and a school of navigation at Reykjavik. The export of fish and fish products has greatly increased. In 1849 to 1855 the annual average exported was 1480 tons; whereas at the close of the century (in 1899) it amounted to 11,339 tor >s and 68,079 barrels of oil, valued at £276,596.

Commerce. — From the first colonization of the island down to the 14th century the trade was in the hands of native Icelanders and

Norsemen; in the 15th century it was chiefly in the hands of the English, in the 16th of Germans from the Hange towns. From 1602 to 1786 commerce was a monopoly of the Danish government; in the latter year it was declared free to all Danish subjects and in 1854 free to all nations. Since 1874, when Iceland obtained her own administration, commerce has increased considerably. Thus the total value of the imports and exports together in 1849 did not exceed £170,000; while in 1891-1895 the imports averaged £356,000 and the exports £340,000. In

1902 imports were valued at £596,193 and exports at £511,083. Trade is almost entirely with Denmark, the United Kingdom, and Norway and Sweden, in this order according to value. The principal native products exported are live sheep, horses, salt meat, wool and hides, to which must be added the fish products — ■ cod, train-oil, herring and salmon — eiderdown and woollen wares. The spinning, weaving and knitting of wool is a wide- spread industry, and the native tweed (vaftmal) is the principal material for the clothing of the inhabitants. The imports consist principally of cereals and flour, coffee, sugar, ale, wines and spirits, tobacco, manufactured wares, iron and metal wares, timber, salt, coal, &c. The money, weights and measures in use are the same as in Denmark. The Islands Bank in Reyk- javik (1904) is authorized to issue bank-notes up to £133,900 in total value.

Communications. — All land journeys are made on horseback, and in the remoter parts all goods have to be transported by the same means. Throughout the greater part of the island there exist no proper roads even in the inhabited districts, but only bridle-paths, and in the uninhabited districts not even these. Nevertheless much has been done to improve such paths as there are, and several miles of driving roads have been made, more particularly in the south. Since 1888 many bridges have been built; previous to that year there was none. The larger rivers have been spanned by iron swing-bridges, and the Blanda is crossed by a fixed iron bridge. Postal connexion is maintained with Denmark by steamers, which sail from Copenhagen and call at Leith. Besides, steamers go round the island, touching at nearly every port.

Religion. — The Icelanders are Lutherans. For ecclesiastical purposes the island is divided into 20 deaneries and 142 parishes, and the

affairs of each ecclesiastical parish are administered by a parish council, and in each deanery by a district (hjeraS) council. When a living falls vacant, the governor-general of the island, after consultation with the bishop, selects three candidates, and from these the congregation chooses one, the election being subsequently confirmed by the governor-general. In the case of certain livings, however, the election requires confirmation by the crown. In 1847 a theological seminary was founded at Reykjavik, and there the majority of the Ice- landic ministry are educated; some, however, are graduates of the university of Copenhagen.

Health. — The public health has greatly improved in modern times; the death-rate of young children has especially diminished. This improvement is due to greater cleanliness, better dwellings, better nourishment, and the increase in the number of doctors. There are now doctors in all parts of the country, whereas formerly there were hardly any in the island. There is a modern asylum for leprosy at Laugarnes near Reykjavik, and a medical school at Reykjavik, opened in 1876. The general sanitary affairs of the island are under the control of a chief surgeon (national physician) who lives in Reykjavik, and has super- intendence over the doctors and the medical school.

Government. — According to the constitution granted to Iceland in 1874, the king of Denmark shares the legislative power with the Althing, an assembly of 36 members, 30 of whom are elected by household suffrage, and 6 nominated by the king. The Althing meets every second year, and sits in two divisions, the upper and the lower. The upper division consists of the 6 members nominated by the king and 6 elected by the repre- sentatives of the people out of their own body. The lower division consists of the remaining 24 representative members. The minister for Iceland, who resided in Copenhagen until 1903, when his office was transferred to Reykjavik, is responsible to the king and the Althing for the maintenance of the constitu- tion, and he submits to the king for confirmation the legislative measures proposed by the Althing. The king appoints a gover- nor-general (landshofttingi) who is resident in the island and carries on the government on the responsibility of the minister. Formerly Iceland was divided into four quarters, the east, the south, the west and north. Now the north and the east are united under one governor, and the south and the west under

another. The island is further divided into 18 syslur (counties), and these again into 169 hreppur (rapes) or poor-law districts. Responsible to the governors are the sheriffs (syslumenn) , who act

as tax gatherers, notaries public and judges of first instance ; the sheriff has in every hreppur an assistant, called hreppstjdri. In every hreppur there is also a representative committee, who administer the poor laws, and look after the general concerns of the hreppur. These committees are controlled by the com- mittees of the syslur (county boards), and these again are under the control of the amtsrdS (quarter board), consisting of three members. From the sheriff courts appeals lie to the superior court at Reykjavik, consisting of three judges. Appeals may be taken in all criminal cases and most civil cases to the supreme court at Copenhagen.

Iceland has her own budget, the Althing having, by the con- stitution of 1874, the right to vote its own supplies. As the Althing only meets every other year, the budget is passed for two years at once. The total income and expenditure are each about £70,000 per financial period. There is a national reserve fund of about £60,000, but no public debt; nor is there any contribu- tion for either military or naval purposes. Iceland has her own customs service, but the only import duties levied are upon spirits, tobacco, coffee and sugar, and in each case the duties are fairly low.

Education.— Education is pretty widespread amongst the people. In the towns and fishing villages there are a few ele- mentary schools, but often the children are instructed at home; in some places by peripatetic teachers. It is incumbent upon the clergy to see that all children are taught reading, writing and arithmetic; The people are great readers; considering the number of the inhabitants, books and periodicals have a very extensive circulation. Eighteen newspapers are issued (once and twice a week) , besides several journals, and Iceland has always been distinguished for her native literature. At Reykjavik there are a Latin school, a medical school and a theological school; at M6druvellir and Hafnarfjoror, modern high schools (Realschulen) ; and in addition to these there are four agricultural schools, a school of navigation, and three girls' schools. The national library at Reykjavik contains some 40,000 volumes and 3006 MSS. At the same place there is also a valuable archaeological collection. Amongst the learned societies are the Icelandic Literary Society (Bokmentafjelag), the society of the Friends of the People, and the Archaeological Society of Reykjavik.

Authorities. — Among numerous works of Dr Thorvald Thoroddsen, see Geschichte der Islands Geographie (Leipzig, 1898); and the following articles in Geografisk Tidskrift (Copenhagen) : " Om Islands geografiske og geologiske Undersogelse " (1893) '< " IslandbKe Fjorde og Bugter " (1901); " Geog. og geol. Unders. ved

den sydlige Del af Faxafloi paa Island " (1903); " Lavaorkener og Vulkaner paa Islands Hojland " (1905). See also C. S. Forbes, Iceland (London, i860); S. Baring-Gould, Iceland, its Scenes and Sagas (London, 1863); Sir R. F. Burton, Ultima Thule (Edinburgh, l %75)'< W. T. McCormick, A Ride across Iceland (London, 1892);

J. Coles, Summer Travelling in Iceland (London, 1882); H. J. ohnston Lavis, "Notes on the Geography, Geology, Agriculture and Economics of Iceland," Scott. Geog. Mag. xi. (1895); W. Bisiker, Across ■ Iceland (London, 1902); J. Hann, "Die Anomalien der Witterung auf Island in dem Zeitraume 1851-1900, &c," Sitzungs-berichte, Vienna Acad. Sci. (1904) ; P. Hermann, Island in Vergangen- heit und Gegenivart (Leipzig, 1907). Also Geografisk Tidskrift, and the Geographical Journal (London), passim. (Th. T.)

History

Shortly after the discovery of Iceland by the Scandinavian, c. 850 (it had long been inhabited by a small colony of Irish Culdees), a stream of immigration set in towards it, which lasted for sixty years, and resulted in the establishment of some 4000 homesteads. In this immigration three distinct streams can be traced. (1) About 870-890 four great noblemen from Norway, Ingolf, Ketil Hasng, Skalla-Grim and Thorolf, settled with their dependants in the south-west of the new found land. (2) In 890-900 there came from the western Islands Queen Aud, widow of Olaf the White, king of Dublin, preceded and followed by a number of her kinsmen and relations (many like herself being

Table of Icelandic Literature and History.

Heroic Age.

Saga Telling.

The Literary Age.

Continental Influence chiefly Norse. Dark Age.

Reformation. Renaissance.

Gradual Decay.

] Recovery of i Iceland.

j 870- 930 s 930 980 L 980-1030

1030-1100

[1100-1150 J 1 150-1220] 1220-1248 Li 248- 1 284

[“1284-1320

< 1320-1390

L1390-1413

1413-1530

1530-1575

t 1575-1640

(1 640-1 700

1700-1730 1 730-1 768

1 768-1800

ˆ1800-1850

r 1850-1874

1 1874

I. The Commonwealth, Poetry of Western Islands. Early Icelandic poets, chiefly abroad. Icelandic poets abroad. First era of phonetic change.

Ari and his school — Thorodd — Vernacular writing begins. Saga-Writers — Second generation of historians. SnorrI and his school — Biographers. Storla — Second era oj phonetic cliange.

400 years. Settlement by colonists from Western Isles and Norway. Constitution worked out — Events of earlier sagas take place. Christianity comes in — Events of later sagas take place. Peace — Ecclesiastical organization.

Collecting and editing — Foreign romances. Annalists — Copyists — New .Medieval poetry begins. Death of old traditions, &c. Only

Medieval poetry flourishes.

*First civil wars — 1208-22 — Rise of Sturlungs. Second civil wars, 1226-58 — Fall of Great Houses. Change of law, 1271 — Submission to Norwegian kings. II. Medievalism. 250 years**

Foreign influence through Norway.

Great eruptions, 1362 and 1389 — Epidemics — Danish rule, 1380. Epidemics — -Norse trade — -Close of intercourse with Norway. Isolation from Continent — English trade.

III. Reformation — Absolute Rule — Decay. 320 years.

Odd — Printing — Third era o) phonetic change.

First antiquarians.

Hallgrim — Paper copies taken.

Jon Vidaltn — Ami Magnusson — MSS. taken abroad.

Eggert Olafsson.

Finn J onsson— Icelandic scholars abroad. Rationalistic movement— European influences first felt.

Modern thought and learning — Icelandic scholars abroad.

Religious struggle — New organization- Danish monopoly — Pirates' ravages.

-Hanse trade.

"Smallpox kills one-third population, 1707. Great famine, 10,000 die, 1759 — Sheep plague, 1762 — Eruption,

1765-

Great eruption, 1783. Beginnings of recovery — Travellers make known island to Europe

— Free constitution in Denmark, 1848.

IV.

Modern Iceland.

I Increasing wealth and population- home rule struggle. Home rule granted.

■Free trade, 1854 — Jon Sigurdsson and

Christians) , Helgi Biolan, Biorn the Eastern, Helgi the Lean, Ketil the Foolish, &c, who settled the best land in the island (west, north-west and north), and founded families who long swayed its destinies. There also came from the Western Islands'a fellowship of vikings seeking a free home in the north. They had colonized the west in the viking times; they had " fought at Hafursfirth," helping their stay-at-home kinsmen against the centralization of the great head-king, who, when he had crushed opposition in Norway, followed up his victory by com- pelling them to flee or bow to his rule. Such were Ingimund the Old, Geirmund Hellskin, Thord Beardie (who had wed St Edmund's granddaughter,) Audun Shackle, Bryniulf the Old, Uni, to whom Harold promised the earldom of the new land if he could make the settlers acknowledge him as king (a hopeless project), and others by whom the north-west, north and east were almost completely " claimed." (3) In 900-930 a few more incomers direct from Norway completed the settle- ment of the south, north-east and south-east. Among them were Earl Krollaug (half-brother of Hrolf Ganger and of the first earl of Orkney), Hialti, Hrafnkell Frey's priest, and the sons of Asbiorn. Fully three-quarters of the land was settled from the west, and among these immigrants there was no small proportion of Irish blood. In 1100 there were 4500 franklins, i.e. about 50,000 souls.

The unit of Icelandic politics was the homestead with its franklin-owner (buendi), its primal organization the hundred- moot {thing), its tie the go5or5(go'dar) or chieftainship. tioa." Z ' The chief who had led a band of kinsmen and depend- ants to the new land, taken a " claim " there, and parcelled it out among them, naturally became their leader, presiding as priest at the temple feasts and sacrifices of heathen times, acting as speaker of their moot, and as their representative towards the neighbouring chiefs. He was not a feudal, lord nor a local sheriff, for any franklin could change his goobr® when he would, and the rights of "judgment by peers" were in full use; moreover, the office could be bequeathed, sold, divided or pledged by the possessor; still the goSi had considerable power as long as the commonwealth lasted.

Disputes between neighbouring chiefs and their clients, and uncertainty as to the law, brought about the Constitution of Ulfliot (c. 930), which appointed a central moot for the whole island, the

Althing, and a speaker to speak a single " law " (principally that followed by the Gula-moot in Norway) ; the Reforms of Thord Gellir (964), settling a fixed number of moots and chieftaincies, dividing the island into four quarters (thus characterized by Ari: north, thickest settled, most famous; east, first completely settled; south, best land and greatest chiefs; west, remarkable for noble families), to each of which a head-court, the " quarter-court," was assigned; and the Innovations of Skapli (ascribed in the saga to Nial) the Law-

Speaker (d. 1030), who set up a "fifth court " as the ultimate tribunal in criminal matters, and strengthened the community against the chiefs. But here constitutional growth ceased: the law-making body made few and unimportant modifications of custom; the courts were too weak for the chiefs who misused and defied them; the speaker's power was not sufficiently sup- ported; even the ecclesiastical innovations, while they secured peace for a time, provoked in the end the struggles which put an end to the commonwealth.

Christianity was introduced c. 1000 from Norway. Tithes- were established in 1096, and an ecclesiastical code made c. 1125. The first disputes about the jurisdiction of the clergy were moved by Gudmund in the 13th century, bringing on a civil war, while the questions of patronage and rights over glebe and mortmainland occupied Bishop Ami and his adversaries fifty years afterwards, when the land was under Norwegian viceroys and Norwegian law. For the civil wars broke down the great houses who had monopolized the chieftaincies; and after violent struggles (in which the Sturlungs of the first generation perished at Orlygstad, 1238, and Reykiaholt, 1241, while of the second generation Thord Kakali was called away by the king in 1250, and Thorgils Skardi slain in 1258) the submission of the island to Norway quarter after quarter took place in 1262-1264, under Gizur's auspices, and the old Common Law was replaced by the New Norse Code " Ironside " in 1271.

The political life and law of the old days is abundantly illus- trated in the sagas (especially Eyrbyggia, Hensa-Thori, Reyk- da?la, Hrafnkell and Niala), the two collections of law-scrolls {Codex Regius, c. 1235, and Stadarhol's Booh, c. 1271), the Libellus, the Liberfragments, and the Landnamabok of Ari, and the Diplomatarium. K. Maurer has made the subject his own in his Beitrdge, Island, Grdgds, &c.

The medieval Icelandic church had two bishoprics, Skalholt (S., W. and E.) 1056, and Holar (N.) 1106, and about 175 parishes (two-

thirds of which belonged to the southern bishopric). They belonged to the metropolitan see of Bremen, then to Lund, lastly to Nidaros, 1237. There were several religious founda- tions: Thingore (founded 1133), Thwera (1155), Hitardale {c. 1166), Kirkby Nunnery (1184), Stad Nunnery (1296) and Saurby {c. 1200) were Benedictine, while Ver (1168), Flatey after Holyfell (1172), Videy (1226), Madderfield Priory (1296) and Skrid Priory (14th century) were Augustinian. The bishops, elected by the people at the Althing till 1237, enjoyed con- siderable power; two, Thorlak of Skalholt and John of Holar, were publicly voted saints at the Althing, and one, Gudmund, received the title of " Good " by decree of the bishop and chapter. Full details as to ecclesiastical history will be found in the Biskupasogur (edited by Dr. Vigfusson).

Iceland was not agricultural but pastoral, depending upon flocks and herds for subsistence, for, though rye and other grain

Mode of life.

would grow in favoured localities, the hay, self-sown, was the only regular crop. In some districts the fisheries and fowling were of importance, but nine-tenths of the population lived by their sheep and cattle. Life on each home- stead was regularly portioned out: out door occu- pations — fishing, shepherding, fowling, and the hay-making and fuel-gathering — occupying the summer; while indoor business — weaving, tool-making, &c. — filled up the long winter. The year was broken by the spring feasts and moots, the great Althing meeting at midsummer, the marriage and arval gather- ings after the summer, and the long yule feasts at midwinter. There were but two degrees of men, free and unfree, though only the franklins had any political power; and, from the nature of the life, social intercourse was unrestrained and unfettered; goSi and thrall lived the same lives, ate the same food, spoke the same tongue, and differed little in clothing or habits. The thrall had a house of his own and was rather villein or serf than slave, having rights and a legal price by law. During the heathen days many great chiefs passed part of their lives in Norway at the king's court, but after the establishment of Chris- tianity in Iceland they kept more at home, visiting the continent, however, for purposes of state, suits with clergy, &c. Trade was from the first almost entirely in foreign (Norse) hands.

The introduction of a church system brought little change. The great families put their members into orders, and so continued to enjoy the profits of the land which they had given to the church; the priests married and otherwise behaved like the franklins around them in everyday matters, farming, trading, going to law like laymen.

Life in the commonwealth was turbulent and anarchic, but free and varied; it produced men of mark, and fostered bravery, adventure and progress. But on the union with of the Norway all this ceased, and there was left but a low

Union. dead level of poor peasant proprietors careless of all save how to live by as little labour as possible, and pay as few taxes as they could to their foreign rulers. The island received a foreign governor {Earl, Hirdstjori or Stiptamts- madr as he was successively called), and was parcelled out into counties (syslur). administered by sheriffs (syslumadr) appointed by the king. A royal court took the place of the Althing courts; the local business of the local things was carried out by the (hreppstjori) bailiff, a subordinate of the sheriff; and the goobrS, things, quarter-courts, trial by jury, &c, were swept away by these innovations. The power of the crown was increased by the confiscation of the great Sturlung estates, which were under-leased to farmers, while the early falling off of the Norse trade threatened to deprive the island of the means of existence; for the great epidemics and eruptions of the r4th century had gravely attacked its pastoral wealth and ruined much of its pasture and fishery.

The union of the Three Crowns transferred the practical rule of Iceland to Denmark in r28o, and the old Treaty of Union, by which the island had reserved its essential rights, was dis- regarded by the absolute Danish monarchs; but, though new taxation was imposed, it was rather their careless neglect than their too active interference that damaged Iceland's interests. But for an English trade, which sprang up out of the half- smuggling, half-buccaneering enterprise of the Bristol merchants, the island would have fared badly, for during the whole of the 1 5th century their trade with England, exporting sulphur, eiderdown (of which the English taught them the value), wool, and salt stock-fish, and importing as before wood, iron, honey, wine, grain and flax goods, was their only link with the outer world. This period of Iceland's existence is eventless: she had got peace but with few of its blessings; all spirit seemed to have died with the commonwealth; even shepherding and such agriculture as there had been sank to a lower stage; wagons, ploughs and carts went out of use and knowledge; architecture in timber became a lost art, and the

fine carved and painted halls of the heathen days were replaced by turf- walled barns half sunk in the earth; the large decked luggers of the old davs gave way to small undecked fishing-boats.

The Reformation in Iceland wakened men's minds, but it left their circumstances little changed. Though the fires of martyrdom were never lighted in Iceland, the story of the easily accepted Reformation is not altogether f ormat i on . a pleasant one. When it was accomplished, the little knot of able men who came to the front did much in preserving the records of the past, while Odd and Hallgrim exhibit the noblest impulses of their time. While there was this revolution in religion a social and political revolution never came to Iceland. The Hanse trade replaced the English for the worse; and the Danish monopoly which succeeded it when the Danish kings began to act again with vigour was still less profitable. The glebes and hospital lands were a fresh power in the hands of the crown, and the subservient Lutheran clergy became the most powerful class in the island, while the system of under-leasing at rackrent and short lease with unsecured tenant right extended over at least a quarter of the better land.

A new plague, that of the English, Gascon and Algerine pirates, marked the close of the 16th century and opening of the 17th, causing widespread panic and some devasta- tion in 1570, 1613-1616 and 1627. Nothing points ence.' more to the helplessness of the natives' condition than their powerlessness against these foes. But the i8th century is the most gloomy in Iceland's annals. Smallpox, famine, sheep disease, and the eruptions of 1765 and 1783 follow each other in terrible succession. Against such visitations, which reduced the population by about a fourth, little could be done. The few literary men, whose work was done and whose books were published abroad, were only concerned with the past, and Jon Vidalin is the one man of mark, beside Eggert Olafsson, who worked and wrote for his own generation. 1

Gradually the ideas which were agitating Europe spread through Scandinavia into Iceland, and its claims were more respectfully listened to. The continental system, which, by its leading to' the blockade of Denmark, times™ threatened to starve Iceland, was neutralized by special action of the British government. Trade and fishery grew a little brisker, and at length the turn came.

The rationalistic movement, headed by Magnus Stephenson, a patriotic, narrow-minded lawyer, did little good as far as church reform went, but was accompanied by a more successful effort to

educate the people. A Useful Knowledge Society was formed and did some honest work. Newspapers and periodicals were published, and the very stir which the ecclesi- astical disputes encouraged did good. When free trade came, and when the free constitution of Denmark had produced its legitimate effects, the endeavours of a few patriots such as Jon Sigurdsson were able to push on the next generation a step further. Questions of a modern political complexion arose; the cattle export controversy and the great home rule struggle began. After thirty years' agitation home rule was conceded in 1874 (see above, Government). (F. Y. P.)

Ancient Literature

Poetry. — Iceland has always borne a high renown for song, but has never produced a poet of the highest order, the qualities which in other lands were most sought for and admired in poetry being in Iceland lavished on the saga, a prose epic, while Icelandic poetry is to be rated very high for the one quality which its authors have ever aimed at — melody of sound. "To these generalizations there are few exceptions, though Icelandic literature includes a group of poems which possess qualities of high imagination, deep pathos, fresh love of nature, passionate dramatic power, and noble simplicity of language which Ice- landic poetry lacks. The solution is that these poems do not belong to Iceland at all. They are the poetry of the " Western Islands."

It was among the Scandinavian colonists of the British coasts that in the first generations after the colonization of Iceland

1 For the periods succeeding the union, Danish state papers and the History of Finn Jonsson are the best authority.

therefrom a magnificent school of poetry arose, to which we owe works that for power and beauty can be paralleled in no Teutonic language till centuries after their date. To this school, which is totally distinct from the Icelandic, ran its own course apart and perished before the 13th century, the following works belong (of their authors we have scarcely a name or two; their dates can be rarely exactly fixed, but they lie between the beginning of the 9th and the end of the 10th centuries), classified into groups: —

(a) The Helgi trilogy (last third lost save a few verses, but pre- served

in prose in Hromund Gripsson's Saga), the Raising of Anganty and Death of Hialmar (in Hervarar Saga), the fragments of a Volsung Lay (VolsungakiraSa) (part interpolated in earlier poems, part under- lying the prose in Volsunga Saga), all by one poet, to whom Dr Vigfusson would also ascribe Vtiluspa, VegtamskviiSa, \)rymskviSa, Grotta Song and Volundarkvifia.

(b) The Dramatic Poems: — Flyting of Loki, the For Skirnis, the HarbartSslioS and several fragments, all one man's work, to whose school belong, probably, the Lay underlying the story of Ivar's death in Skioldunga Saga.

(c) The Didactic Poetry : — Grimnismdl, VafpruiSnismdl, Alvissmal, &c.

(d) The Genealogical and Mythological Poems: — Hyndluljofi, written for one of the Haurda-Kari family, so famous in the Orkneys ; Ynglingatal and Hausilong, by Thiodolf of Hvin; Rig's Thul, &c. .

(e) The Dirges and Battle Songs— such as that on Hafur-nrth Battle Hrafnsmal, by Thiodolf of Hvin or Thorbjorn Hornklofi, shortly after 870; Eirik's Dirge (Eiriksmdl) between 950 and 969; the Dart- Lay on Clontarf Battle (1014) ; Biarka-mal (fragments of which we have, and paraphrase of more is found in Hrolf Kraki's Saga and in Saxo).

There are also fragments of poems in Half's Saga, Asmund Kappa-Bana's Saga, in the Latin verses of Saxo, and the Shield Lays (Ragnarsdrapa) by Bragi, &c, of this school, which closes with the Sun-Song, a powerful Christian Dantesque poem, recalling some of the early compositions of the Irish Church, and with the 12th-century Lay of Ragnar, Lay of Starkad, The Proverb Song (Havamal) and Krakumal, to which we may add those singular Gloss-poems, the J)ulur, which also belong to the Western Isles.

To Greenland, Iceland's farthest colony, founded in the 10th "entury, we owe the two Lays of Atli, and probably Hymishrifta, which, though of a weirder, harsher cast, yet belong to the Western Isles school and not to Iceland.

In form all these poems belong to two or three classes: — kvtSa, an epic " cantilena "; tdl, a genealogical poem; drapa, songs of praise, &c, written in modifications of the old Teutonic metre which we know in Beowulf; galdr and lokkr, spell and charm songs in a more lyric measure; and mdl, a dialogue poem, and liod, a lay, in elegiac measure suited to the subject.

The characteristics of this Western school are no doubt the result of the contact of Scandinavian colonists of the viking-tide, living fives of the wildest adventure, with an imaginative and civilized race, that exercised upon them a very strong and lasting influence (the effects of which were also felt in Iceland, but in a different way). The frequent intermarriages which mingled the best families of either race are sufficient proof of the close communion of Northmen and Celts in the 9th and 10th centuries, while there are in the poems themselves traces of Celtic mythology, language and manners. 1

When one turns to the early poetry of the Scandinavian continent, preserved in the rune-staves on the memorial stones of Sweden, Norway and Denmark, in the didactic Havamal, the Great Volsung Lay (i.e. Sigurd II., Fafnis's Lay, Sigrdrifa's Lay) and Hamdismal, all continental, and all entirely consonant to the remains of Old English poetry in metre, feeling and treat- ment, one can see that it is with this school that the Icelandic " makers " are in sympathy, and that from it their verse naturally descends. While shrewdness, plain straightforwardness, and a certain stern way of looking at life are common to both, the Icelandic school adds a complexity of structure and orna- ment, an elaborate mythological and enigmatical phraseology, and a regularity of rhyme, assonance, luxuriance, quantity

1 Many of these poems were Englished in prose by the translator of Mallet, by B. Thorpe in his Scemund's Edda, and two or three by Messrs Morris and Magnussen, as appendices to their translation of Volsunga Saga. Earlier translations in verse are those in Dryden's Miscellany (vol. vi), A. Cottle's Edda, Mathias's Translations, and W. Herbert's Old Icelandic Poetry. Gray's versions of Darradar-liod and Veglamskvifia are well known.

and syllabification, which it caught from the Latin and Celtic poets, and adapted with exquisite ingenuity to its own main object, that of securing the greatest possible beauty of sound.

The first generations of Icelandic poets resemble in many ways the later troubadours; the books of the kings and the sagas are full of their strange lives. Men of good birth (nearly always, too, of Celtic blood on one side at least), they leave Iceland young and attach themselves to the kings and earls of the north, living in their courts as their henchmen, sharing their adventures in weal and woe, praising their victories, and hymning their deaths if they did not fall by their sides — men of quick passion, unhappy in their loves, jealous of rival poets and of their own fame, ever ready to answer

criticism with a satire or with a sword-thrust, but clinging through all to their art, in which they attained most marvellous skill.

Such men were Egil, the foe of Eirik Bloodaxe and the friend of jEthelstan; Kormak, the hot-headed champion; Eyvind, King Haakon's poet, called Skaldaspillir, because he copied in his dirge over that king the older and finer Eiriks- mal; Gunnlaug, who sang at ˆEthelred's court, and fell at the hands of, a brother bard, Hrafn; Hallfred, Olaf Tryggvason's poet, who lies in lona by the side of Macbeth; Sigh vat, Saint Olaf's henchman, most prolific of all his comrades; Thormod, Cpalbrow's poet, who died singing after Sticklestad battle; Ref, Ottar the Black, Amor the earls' poet, and, of those whose poetry was almost confined to Iceland, Gretti, Biorn the Hitdale champion, and the two model Icelandic masters, Einar Skulason and Markus the Lawman, both of the 12th century.

It is impossible to do more here than mention the names of the most famous of the long roll of poets which are noted in the works of Snorri and in the two Skalda-tal. They range from the rough and noble pathos of Egil, the mystic obscurity of Kormak, the pride and grief of Hallfred, and the marvellous fluency of Sighvat, to the florid intricacy of Einar and Markus.

The art of poetry stood to the Icelanders in lieu of music; scarcely any prominent man but knew how to turn a mocking or laudatory stanza, and down to the fall of the commonwealth the accomplishment was in high request. In the literary age the chief poets belong to the great Sturlung family, Snorri and his two nephews, Sturla and Olaf, the White Poet, being the most famous "makers " of their day. Indeed, it is in Snorri's Edda, a poetic grammar of a very perfect kind, that the best examples of the whole of northern poetry are to be found. The last part, Hattatal, a treatise on metre, was written for Earl Skuli about 1222, in imitation of Earl Rognvald and Hall's Haitalykill (Clavis metrica) of 1150. The second part, Skald- skapar-mal, a gradus of synonyms and epithets, which contains over 240 quotations from 65 poets, and 10 anonymous lays — a treasury of verse— was composed c. 1230. The first part, an exquisite sketch of northern mythology, Gylfa-ginning, was probably prefixed to the whole later. There is some of Sturla's poetry in his Islendinga Saga, and verses of Snorri occur in the Grammatical Treatise on figures of speech, &c, of Olaf, which contains about one hundred and forty quotations from various authors, and was written about 1250.

Besides those sources, the Kings' Lives of Snorri and later authors

contain a great deal of verse by Icelandic poets. King Harold Sigurdsson, who fell at Stamford Bridge 1066, was both a good critic and composed himself. Many tales are told of him and his poet visitors and henchmen. The Icelandic sagas also comprise much verse which is partly genuine, partly the work of the 12th and 13th century editors. Thus there are genuifle pieces in Nial's Saga (chaps. 34, 78, 103, 126, 146), in Eyrbyggia, Laxdcela, Egil's Saga (part only), Grettla (two and a half stanzas, cf. Landndmabok), Biorn' s Saga, Gunnlaug' s Saga, Havard's Saga, Kormak's Saga, Viga-Glum's Saga, Erik the Red's Saga and Fostbrnedra Saga. In Nial's, Gisli's and Droplaug's Sons' Sagas there is good verse of a later poet, and in many sagas worthless rubbish foisted in as ornamental.

To these may be added two or three works of a semi-literary kind, composed by learned men, not by heroes and warriors. Such are Konunga-tdl, Hugsvinnsmal (a paraphrase Of Cato's

Distichs), Merlin's Prophecy (paraphrased from Geoffrey of Monmouth by Gunnlaug the monk), Jomsvikinga-drapa (by Bishop Ketil), and the Islendinga-drapa, which has preserved brief notices of several lost sagas concerning Icelandic worthies, with which Gudmundar-drapa, though of the 14th century, may be also placed.

Just as the change of law gave the death-blow to an already perishing commonwealth, so the rush of medieval influence, which followed the union with Norway, completed a process which had been in force since the end of the 1 rth century, when it overthrew the old Icelandic poetry in favour of the rimur.

The introduction of the danz, ballads (or fornkvcedi, as they are now called) for singing, with a burden, usually relating to a love-tale, which were immensely popular with the people and performed by whole companies at weddings, yule feasts and the like, had relegated the regular Icelandic poetry to more serious events or to the more cultivated of the chiefs. But these " jigs," as the Elizabethans would have called them, dissatisfied the popular ear in one way: they were, like old English ballads, which they closely resembled, in rhyme, but void of alliteration, and accordingly they were modified and replaced by the " rimur," the staple literary product of the 15th century. These were rhymed but also alliterative, in regular form, with prologue or mansong (often the prettiest part of the whole),

main portion telling the tale (mostly derived in early days from the French romances of the Carlovingian, Arthurian or Alexandrian cycles, or from the mythic or skrok-sogur), and epilogue. Their chief value to us lies in their having preserved versions of several French poems now lost, and in their evidence as to the feelings and bent of Icelanders in the " Dark Age " of the island's history. The ring and melody which they all possess is their chief beauty.

Of the earliest, Olafsrima, by Einar Gilsson (c. 1350), and the best, the Aristophanic Skida-rima (c. 1430), by Einar Fostri, the names may be given. Rimur on sacred subjects was called " diktur "; of these, on the legends of the saints' lives, many remain. The most notable of its class is the Lilia of Eystein Asgrimsson, a monk of Holyfell (c. 1350), a most " sweet sound- ing song." Later the poems of the famous Jon Arason (b. 1484), last Catholic bishop of Holar (c. 1530), Liomr (" gleam ") and Pislargrdtr (" passion-tears "), deserve mention. Arason is also celebrated as having introduced printing into Iceland.

Taste has sunk since the old days; but still this rimur poetry is popular and genuine. Moreover, the very prosaic and artificial verse of Sturla and the last of the old school deserved the oblivion which came over them, as a casual perusal of the stanzas scattered through Islendinga will prove. It is interesting to notice that a certain number of kenningar (poetical paraphrases) have survived from the old school even to the present day, though the mass of them have happily perished. The change in the phonesis of the language is well illustrated by the new metres as compared with the old Icelandic drott-biadi in its varied forms. Most of the older rimur and diktur are as yet unprinted. Many of the fornkvadi are printed in a volume of theold Nordiske Litter alur-Samfund.

The effects of the Reformation was deeply felt in Icelandic literature, both prose and verse. The name of Hallgrim Petursson, whose Passion-hymns, "the flower of all Icelandic poetry," have been the most popular composition in the language, is foremost of all writers since the second change of faith. The gentle sweetness of thought, and the exquisite harmony of word- ing in his poems, more than justify the popular verdict. His Hymns were finished in 1660 and published in 1666, twc great Protestant poets thus being contemporaries. A collection of Reformation hymns, adapted, many of them, from the German, the Holar-book, had preceded them in 1619. There was a good deal of verse- writing of a secular kind, far inferior in every way, during this period. In spite of the many physical distresses that weighed upon the island, ballads (fornkvcedi)

were still written, ceasing about 1750, rimur composed, and more elaborate compositions published.

The most notable names are those of the improvisatore

Stephen the Blind; Thorlak Gudbrandsson, author of Ulfar~ Rimur, d. 1707; John Magnusson, who wrote Hristafla, a didactic poem; Stefan Olafsson, composer of psalms, rimur, &c, d. 1688; Gunnar Palsson, the author of Gunnarslag, often printed with the Eddie poems, c. 1791; and Eggert Olafsson, traveller, naturalist and patriot, whose untimely death in 1768 was a great loss to his country. His Bunadar-balkr, a Georgic written, like Tusser's Points, with a practical view of raising the state of agriculture, has always been much prized. Paul Vidalin's ditties are very naiive and clever.

Of later poets, down to more recent times, perhaps the best was Sigurd of Broadfirth, many of whose prettiest poems were composed in Greenland like those of Jon Biarnisson before him, c. 1750; John Thorlaksson's translation of Milton's great epic into Eddie verse is praiseworthy in intention, but, as may be imagined, falls far short of its aim. He also turned Pope's Essay on Man and Klopstock's Messiah into Icelandic. Benedikt Grondal tried the same experiment with Homer in his Ilion's Kvtedi, c. 1825. There is a fine prose translation of the Odyssey by Sweinbjorn Egillson, the lexicographer, both faithful and poetic- in high degree.

Sagas. — The real strength of ancient Icelandic literature is shown in its most indigenous growth, the " Saga " (see also Saga). This is, in its purest form, the life of a hero, composed in regular form, governed by fixed rules, and intended for oral recitation. It bears the strongest likeness to the epic in all save its unversified form; in both are found, as fixed essentials, simplicity of plot, chronological order of events, set phrases used even in describing the restless play of emotion or the changeful fortunes of a fight or a storm, while in both the absence of digres- sion, comment or intrusion of the narrator's person is invariably maintained. The saga grew up in the.quieter days which followed the change of faith (1002), when the deeds of the great families' heroes were still cherished by their descendants, and the exploits of the great kings of Norway and Denmark handed down with reverence. Telling of stories was a recognized form of entertain- ment at all feasts and gatherings, and it was the necessity of the reciter which gradually worked them into a regular form, by which the memory was relieved and the artistic features of the story allowed to be more carefully elaborated. That this form was so perfect must be attributed to Irish influence, without which indeed

there would have been a saga, but not the same saga. It is to the west that the best Sagas belong; it is to the west that nearly every classic writer whose name we know belongs; and it is precisely in the west that the ad- mixture of Irish blood is greatest. In comparing the Irish tales with the saga, there will be felt deep divergencies in matter, style and taste, the richness of one contrasting with the chastened simplicity of the other; the one's half-comic, half-earnest bombast is wholly unlike the other's grim humour; the marvel- lous, so unearthly in the one, is almost credible in the other; but in both are the keen grasp of character, the biting phrase, the love of action and the delight in blood which almost assumes the garb of a religious passion.

When the saga had been fixed by a generation or two of oral reciters, it was written down; and this stereotyped the form, so that afterwards when literary works were composed by learned men (such as Abbot Karl's Swerri's Saga and Sturla's Islendinga) the same style was adopted.

Taking first the sagas relating to Icelanders, of which some thirty-five or forty remain out of thrice that number, they were first written down between 1140 and 1220, in the generation which succeeded Ari and felt the

Icelandic sagas.

impulse his books had given to writing, on separate scrolls, no doubt mainly for the reciter's convenience; they then went through the different phases which such popular com- positions have to pass in all lands— -editing and compounding (1220-1260), padding and amplifying (1 260-1300), and finally collection in large MSS. (14th century). Sagas exist showing all these phases, some primitive and rough, some refined and beautified, some diluted and weakened, according as their copyists have been faithful, artistic or foolish; for the first generation

of MSS. have all perished. We have also complex sagas put together in the 13th century out of the scrolls relating to a given locality, such a group as still exists untouched in Vapnfirdinga being fused into such a saga as Niala or Laxdcela. Of the authors nothing is known; we can only guess that some belong to the Stuclung school. According

to subject they fall into two classes, those relating to the older generation before Christianity and those telling of St Olaf's contemporaries; only two fall into a third generation.

Beginning with the sagas of the west, most perfect in style and form, the earliest in subject is that of Gold-Thori (c. 930), whose adventurous career it relates; Hensa-])orissaga tells of the burning of Blund-Ketil, a noble chief, an event which led to Thord GelH's reforms next year (c. 964); Gislasaga (960-980) tells of the career and death of that ill-fated outlaw; it is beauti- fully written, and the verses by the editor (13th century) are good and appropriate; Hord's Saga (980) is the life of a band of outlaws on Whalesfirth, and especially of their leader Hord. Of later subject are the sagas of Havard and his revenge for his son, murdered by a neighbouring chief (997-1002); of the Heifiarirgasaga (990-1014), a typical tale of a great blood feud, written in the most primitive prose; of Gunnjaug and Hrafn (Gunnlaugssaga Ormstungu, 980-1008), the rival poets and their ill-starred love. The verse in this saga is important and interest- ing. To the west also belong the three great complex sagas Egla, Eyrbyggia and Laxdcela. The first (870-980), after noticing the migration of the father and grandfather of the hero poet Egil, and the origin of the feud between them and the kings of Norway, treats fully of Egil's career, his enmity with Eirik Bloodaxe, his service with iEthelstan, and finally, after many adventures abroad, of his latter days in Iceland at Borg, illustrat- ing very clearly what manner of men those great settlers and their descendants were, and the feelings of pride and freedom which led them to Iceland. The style is that of Snorri, who had himself dwelt at Borg. Eyrbyggia (890-1031) is the saga of politics, the most loosely woven of all the compound stories. It includes a mass of information on the law, religion, traditions, &c, of the heathen days in Iceland, and the lives of Eric, the real discoverer of Greenland, Biorn of Broadwick, a famous chief, and Snorri, the greatest statesman of his day. Dr Vigfusson would ascribe its editing and completion to Sturla the Lawman, c. 1250. Laxdala (910-1026) is the saga of Romance. Its heroine Gudrun is the most famous of all Icelandic ladies. Her love for Kiartan the poet, and his career abroad, his betrayal by his friend Bolli, the sad death of Kiartan at his hands, the revenge taken for him on Bolli, whose slayers are themselves afterwards put to death, and the end of Gudrun, who becomes an anchorite after her stormy life, make up the pith of the story. The contrast of the characters, the rich style and fine dialogue which are so remarkable in this saga, have much in common with the best works of the Sturlung school.

Of the north there are the sagas of Kormak (930-960), most primitive of all, a tale of a wild poet's love and feuds, containing many notices of the heathen times; of V atzdeelasaga (890-980), relating to the settlement and the chief family in Waterdale; of Hallfred the poet (996-1014), narrating his fortune at King Olaf's court, his love affairs in Iceland, and finally his death and burial at Iona; of Reyk-dmla (990), which preserves the lives of Askell and his son Viga-Skuti; of Svarf-dcela (980-990), a cruel, coarse story of the old days, with some good scenes in it, unfortunately imperfect, chapters 1-10 being. forged; of Viga- Glum (970-990), a fine story of a heathen hero, brave, crafty and cruel. To the north also belong the sagas of Gretli the Strong (1010-1031), the life and death of the most famous of Icelandic outlaws, the real story of whose career is mixed up with the mythical adventures of Beowulf, here put down to Gretti, and with late romantic episodes and fabulous folk-tales (Dr Vigfusson would ascribe the best parts of this saga to Sturla; its last editor, whose additions would be better away, must have touched it up about 1300), and the stories of the Ljosvetnin- gasaga (1009-1060). Gudmund the Mighty and his family and neighbours are the heroes of these tales, which form a little

cycle. The Banda-manna saga (1050-1060), the only comedy among the sagas, is also a northern tale; it relates the struggles of a plebeian who gets a chieftancy against the old families of the neighbourhood, whom he successfully outwits; Ol-kofra pattr is a later imitation of it in the same humorous strain. The sagas of the north are rougher and coarser than those of the west, but have a good deal of individual character.

Of tales relating to the east there survive the Weapon-firth cycle — the tales of Thorstein the White (c. 900), of Thar stein the Staf smitten {c. 985), of Gunnar Thidrand's Bane (1000-1008) and of the Weapon-firth Men (975-990), all relating to the family of Hof and their friends and kin for several generations — and the story of Hrafnkell Prey's Priest (c. 960), the most idyllic of sagas and best of the eastern tales. Of later times there are Droplaug's Sons' Saga (997-1007), written probably about mo, and preserved in the uncouth style of the original (a brother's revenge for his brother's death is the substance of it; Brand- krossa])attr is an appendix to it), and the tales of Thorstein Hall of Side's Son (c. 1014) and his brother Thidrandi (c. 996), which belong to the cycle of Hall 0′ Side's Saga, unhappily lost; they are weird tales of bloodshed and magic, with idyllic and pathetic episodes.

The sagas of the south are either lost or absorbed in that of Nial

(970-1014), a long and complex story into which are woven the tales of Gunnar Nial, and parts of others, as Brian Boroimhe, Hall 0' Side, &c. It is, whether we look at style, contents or legal and historical weight, the foremost of all sagas. It deals especially with law, and contains the pith and the moral of all early Icelandic history. Its hero Nial, type of the good lawyer, is contrasted with its villain Mord, the ensample of cunning, chicane, and legal wrong doing; and a great part of the saga is taken up with the three cases and suits of the divorce, the death of Hoskuld and the burning of Nial, which are given with great minuteness. The number and variety of its dramatis personae give it the liveliest interest throughout. The women Hallgerda, Bergthora and Ragnhild are as sharply contrasted as the men Gunnar, Skarphedin, Flosi and Kari. The pathos of such tragedies as the death of Gunnar and Hoskuld and the burning is interrupted by the humour of the Althing scenes and the intellectual interest of the legal proceedings. The plot dealing first with the life and death of Gunnar, type of the chivalry of his day, then with the burning of Nial by Flosi, and how it came about, and lastly with Kari's revenge on the burners, is the ideal saga-plot. The author must have been of the east, a good lawyer and genealogist, and have composed it about 1250, to judge from internal evidence. It has been overworked by a later editor, c. 1300, who inserted many spurious verses.

Relating partly to Iceland, but mostly to Greenland and Vinland (N. America), are the Floamannasaga (985-990), a good story of the adventures of Thorgils and of the otQreen- struggles of shipwrecked colonists in Greenland, a land and graphic and terrible picture; and Eirikssaga raufta Nortn (990-1000), two versions, one northern (Flatey-book), merca – one western, the better (in Hawk's Book, and AM. 557), the story of the discovery of Greenland and Vinland (America) by the Icelanders at the end of the 9th century. Later is the Fostbm- drasaga (1015-1030), a very interesting story, told in a quaint romantic style, of Thorgeir, the reckless henchman of King Olaf , and how his death was revenged in Greenland by his sworn brother the true-hearted Thormod Coalbrow's poet, who after- ward dies at Sticklestad. The tale of Einar Sookisson (c. 1 1 25) may also be noticed. The lost saga of Poet Helgi, of which only fragments remain, was also laid in Greenland.

Besides complete sagas there are embedded in the Heims- kringla numerous small Tpcettir or episodes, small tales of Ice- landers' adventures, often relating to poets and their lives at the kings' courts; one or two of these seem to be fragments of sagas now lost. Among the more notable are those of Orm Storolfsson, Ogntund Dijtt,

Halldor Snorrason, Thorstein Oxfoot, Hromund Halt, Thorwald Tasaldi, Svadi and Amor Herlingar-nef, Audunn of Westfirth, Sneglu-Halli, Hrafn of Hrutfiord, Hreidar

Heimski. Gisli Illugison, Ivar the poet, Gull-Msu Thord, Einar Skulason the poet, Mani the poet, &c.

The forged Icelandic sagas appear as early as the 13th century. They are very poor, and either worked up on hints given in genuine stories or altogether apocryphal.

History. — About the year of the battle of Hastings was born Ari FroSi Thorgilsson (1067-1148), one of the blood of Queen Aud, who founded the famous historical school of Iceland, and himself produced its greatest monument in a work which can be compared for value with the English Domesday Book. Nearly all that we know of the heathen commonwealth may be traced to the collections of Ari. It was he too that fixed l he style in which history should be composed in Iceland. It was he that secured and put into order the vast mass of frag- mentary tradition that was already dying out in his day. And perhaps it is the highest praise of all to him that he wrote in his own " Danish tongue," and so ensured the use of that tongue by the cultured of after generations. Ari's great works are Konungabdk, or The Book of Kings, relating the history of the kings of Norway from the rise of the Yngling dynasty down to the death of Harald Sigurdsson in the year of his own birth. This book he composed from the dictation of old men such as Odd Kolsson, from the genealogical poems, and from the various dirges, battle-songs and eulogia of the poets. It is most probable that he also compiled shorter Kings' Books relating to Denmark and perhaps to England. The Konungabdk is preserved under the Heimskringla of Snorri Sturloson, parts of it almost as they came from Ari's hands, for example Ynglinga and Harald Fairhair s Saga, and the prefaces stating the plan and critical foundations of the work, parts of it only used as a framework for the magnificent superstructure of the lives of the two Olafs, and of Harald Hardrada and his nephew Magnus the Good. The best text of Ari's Konungabdk (Ynglinga, and the sagas down to but not including Olaf Tryggvason's) is that of Frisbdk.

The Book of Settlements (Landnamabdk) is a wonderful per-

formance, both in its scheme and carrying out. It is divided into five parts, the first of which contains a brief account of the discovery of the island; the other four, one by one taking a quarter of the land, describe the name, pedigree and history of each settler in geographical order, notice the most important facts in the history of his descendants, the names of their home- steads, their courts and temples, thus including mention of 4000 persons, one-third of whom are women, and 2000 places. The mass of information contained in so small a space, the clearness and accuracy of the details, the immense amount of life which is breathed into the whole, astonish the reader, when he reflects 1 hat this colossal task was accomplished by one man, for his collaborator Kolsegg merely filled up his plan with regard to part of the east coast, a district with which Ari in his western home at Stad was little familiar. Landnamabdk has reached us in two complete editions, one edited by Sturla, who brought down the genealogies to his own grandfather and grandmother, Sturla and Gudny, and one by Hawk, who traces the pedigrees still later to himself.

Ari also wrote a Book of Icelanders (Islendingabdk, c. 1127), which has perished as a whole, but fragments of it are embedded in many sagas and Kings' Lives; it seems to have been a com- plete epitome of his earlier works, together with an account of the constitutional history, ecclesiastical and civil, of Iceland. An abridgment of the latter part of it, the little Libellus Islan- dorum (to which the title of the bigger Liber — Islendingabdk — is often given) , was made by the historian for his friends Bishops Ketil and Thorlak, for whom he wrote the Liber (c. 1137). This (harming little book is, with the much later collections of laws, our sole authority for the Icelandic constitution of the common- wealth, but, " much as it tells, the lost Liber would have been of still greater importance." Kristni-Saga, the story of the christening of Iceland, is also a work of Ari's, " overlaid " by a later editor, but often preserving Ari's very words. This saga, together with several scattered tales of early Christians in Iceland before the change of faith (1002), may have made up

a section of the lost Liber. Of the author of these works little is known. He lived in quiet days a quiet life; but he shows himself in his works, as Snorri describes him, " a man wise, of good memory and a speaker of the truth." If Thucydides is justly accounted the first political historian, Ari may be fitly styled the first of scientific historians.

A famous contemporary and friend of Ari is Saemund (1056- 1131), a great churchman, whose learning so impressed his age that he got

the reputation of a magician. He was the friend of Bishop John, the founder of the great Odd-Verjar family, and the author of a Book of Kings from Harald Fairhair to Magnus the Good, in which he seems to have fixed the exact chronology of each reign. It is most probable that he wrote in Latin. The idea that he had anything to do with the poetic Edda in general, or the Sun's Song in particular, is unfounded.

The flame which Ari had kindled was fed by his successors in the 12th century. Eirik Oddsson (c. 115°) wrote the lives of Sigurd Evil-deacon and the sons of Harold Gille, in his Hryggiar-Stykki (Sheldrake), of which parts remain in the MSS. collections of Kings' Lives, Morkin-skinna, &c. Karl Jonsson, abbot of Thingore, the Benedictine minister, wrote (c. n 84) Sverrissaga from the lips of that great king, a fine racy biography, with a style and spirit of its own. Bbglunga-Sogur tell the story of the civil wars which followed Sverri's death. They are probably by a contemporary.

The Latin Lives of St Olaf, Odd's in Latin (c. n 75), compiled from original authorities, and the Legendary Life, by another monk whose name is 'lost, are of the medieval Latin school of Sffimund to which Gunnlaug belonged.

Snorri Sturlason (q.v.) was known to his contemporaries as a statesman and poet; to us he is above all an historian. Snorri (n 79-1 241) wrote the Lives of the Kings (Heimskringla), from Olaf Tryggvason to Sigurd the Crusader inclusive; and we have them substantially as they came from his hand in the Great King Olafs Saga; St Olafs Saga, as in Heimskringla and the Stockholm MS.; and the succeeding Kings' Lives, as in Hulda and Hrokkinskinna, in which, however, a few episodes have been inserted.

These works were indebted for their facts to Ari's labours, and to sagas written since Ari's death; but the style and treatment of them are Snorri's own. The fine Thucydidean speeches, the dramatic power of grasping character, and the pathos and poetry that run through the stories, along with a humour such as is shown in the Edda, and a varied grace of style that never flags or palls, make Snorri one of the greatest of historians.

Here it should be noticed that Heimskringla and its class of MSS. (Eirspennil, Jofraskinna, Gullinskinna, Fris-bok and Kringla) do not give the full text of Snorri's works. They are abridgments made in Norway by Icelanders for their Norwegian patrons, the Life of St Olaf alone being preserved intact, for the great interest of the Norwegians lay in him, but all the other Kings' Lives being more or

less mutilated, so that they cannot be trusted for historic purposes; nor do they give a fair idea of Snorri's style.

A grip is a 12th-century compendium of the Kings' Lives from Harald Fairhair to Sverri, by a scholastic writer of the school of Sasmund. As the only Icelandic abridgment of Norwegian history taken not from Snorri but sources now lost, it is of worth. Its real title is Konunga-tal.

Noregs Konunga-tal, now called Fagrskinna, is a Norse compendium of the Kings' Lives from Halfdan the Black to Sverri's accession, probably written for King Haakon, to whom it was read on his death-bed. It is an original work, and contains much not found elsewhere. As non-Icelandic it is only noticed here for completeness.

Styrmi Karason, a contemporary of Snorri's, dying in 1245, was a distinguished churchman (lawman twice) and scholar. He wrote a Life of St Olaf, now lost; his authority is cited. He also copied out Landnamabdk and Sverri's Life from his MSS., of which surviving copies were taken.

Sturla, Snorri's nephew, wrote the Hakonssaga midMagnussaga at the request of King Magnus, finishing the first c. 1265, the

latter c. 1280. King Haakon's Life is preserved in full; of the other only fragments remain. These are the last of the series of historic works which Ari's labours began, from which the history of Norway for 500 years must be gathered.

A few books relating the history of other Scandinavian realms will complete this survey. In Skioldunga-bok was told the history of the early kings of Denmark, perhaps derived from Ari's collections, and running parallel to Ynglinga. The earlier part of it has perished save a fragment Sogu-brot, and citations and paraphrases in Saxo, and the mythical Ragnar Lodbrok's and Gongu-Hrolf's Sagas; the latter part, Lives of Harold Blue- tooth and the Kings down to Sveyn II., is still in existence and known as Skioldunga.

The Knutssaga is of later origin and separate authorships, parallel to Snorri's Heimskringla, but earlier in date. The Lives of King Valdemar and his Son, written c. 11 85, by a contemporary of Abbot

Karl's, are the last of this series. The whole were edited and compiled into one book, often quoted as Skioldunga, by a 13th-century editor, possibly Olaf, the White Poet, Sturla's brother, guest and friend of King Valdemar II. Jomsvikinga Saga, the history of the pirates of Jom, down to Knut the Great's days, also relates to Danish history.

The complex work now known as Orkneyinga is made up of the Earls' Saga, lives of the first great earls, Turf-Einar, Thor- finn, &c; the Life of St Magnus, founded partly on Abbot Robert's Latin life of him (c. 1150) an Orkney work, partly on Norse or Icelandic biographies; a Mir ode-book of the same saint; the Lives of Earl Rognwald and Sveyn, the last of the vikings, and a few episodes such as the Burning of Bishop Adam. A scholastic sketch of the rise of the Scandinavian empire, the Foundation of Norway, dating c. 11 20, is prefixed to the whole.

Fozreyinga tells the tale of the conversion of the Fsereys or Faroes, and the lives of its chiefs Sigmund and Leif> com- posed in the 13th century from their separate sagas by an Icelander of the Sturlung school.

Biographies. — The saga has already been shown in two forms, its original epic shape and its later development applied to the lives of Norwegian and Danish kings and earls, as heroic but deeper and broader subjects than before. In the 13th century it is put to a third use, to tell the plain story of men's lives for their contemporaries, after satisfying which demand it dies away for ever.

These biographies are more literary and medieval and less poetic than the Icelandic sagas and king's lives; their simplicity, truth, realism and purity of style are the same. They run in two parallel streams, some being concerned with chiefs and champions, some with bishops. The former are mostly found embedded in the complex mass of stories known as Sturlunga, from which Dr Vigfusson has extricated them, and for the first time set them in order. Among them are the sagas of Thorgils &nd Haflidi (1118-1121), the feud and peacemaking of two great chiefs, contemporaries of Ari; of Sturla (1150-1183), the founder of the great Sturlung family, down to the settlement of his great lawsuit by Jon Loptsson, who thereupon took his son Snorri the historian to fosterage,— a humorous story but with traces of the decadence about it, and glimpses of the evil days that were to come; of the Onundar-brennusaga (1185-ˆ1200), a tale of feud and fire-raising in the north of the island, the hero of which, Gudmund Dyri, goes at last into a cloister; of Hrafn Sveinbiornsson (1190-1213), the noblest Icelander of his day, warrior, leech,

seaman, craftsman, poet and chief, whose life at home, travels and pilgrimages abroad (Hrafn was one of the first to visit Becket's shrine), and death at the hands of a foe whom he had twice spared, are recounted by a loving friend in pious memory of his virtues, c. 1220; of Aron Hiorleifsson (1200-12 5 5), a man whose strength, courage and adventures befit rather a henchman of Olaf Tryggvason than one of King Haakon's thanes (the beginning of the feuds that rise round Bishop Gudmund are told here), of the Svinefell-men (1248- 1252), a pitiful story of a family feud in the far east of Iceland. But the most important works of this class are the Islendinga Saga and Thorgils Saga of Lawman Sturla. Sturla and his

brother Olaf were the sons of Thord Sturlason and his mistress Thora. Sturla was born and brought up in prosperous times, but his manhood was passed in the midst of strife, in which his family fell one by one, and he himself, though a peaceful man who cared little for politics, was more than once forced to fly for his life. While in refuge with King Magnus, in Norway, he wrote his two sagas of that king and his father. After his first stay in Norway he came back in 1271, with the new Norse law-book, and served a second time as lawman. The Islendinga must have been the work of his later years, composed at Fairey in Broadfirth, where he died, 30th July 1284, aged about seventy years. The saga of Thorgils Skardi (1252-1261) seems to have been the first of his works on Icelandic contemporary history; it deals with the life of his own nephew, especially his career in Iceland from 1252 to 1258. The second part of Islendinga (1 242-1 262), which relates to the second part of the civil war, telling of the careers of Thord Kakali, Kolbein the Young, Earl Gizur and Hrafn Oddsson. The end is imperfect, there being a blank of some years before the fragmentary ending to which an editor has affixed a notice of the author's death. The first part of Islendinga (1202-1242) tells of the beginning and first part of the civil wars, the lives of Snorri and Sighvat, Sturla's uncles, of his cousin and namesake Sturla Sighvatsson, of Bishop Gudmund, and Thorwald Gizursson, — the fall of the Sturlungs, and with them the last hopes of the great houses to maintain the commonwealth, being the climax of the story.

Sturla's power lies in his faithfulness to nature, minute observance of detail and purity of style. The great extent of his subject, and the difficulty of dealing with it in the saga form, are most skilfully overcome; nor does he allow prejudice or favour to stand in the way of the truth. He ranks below Ari in value and below Snorri in power; but no one else can dispute his place in the first rank of Icelandic writers.

Of the ecclesiastical biographers, an anonymous Skalholt clerk is the best. He wrote Hungrvaka, lives of the first five bishops of Skalholt, and biographies of his patron Bishop Paul (Pdlssaga) and also of St Thorlak (Thorlakssaga). They are full of interesting notices of social and church life. Thorlak was a learned man, and had studied at Paris and Lincoln, which he left in 1161. These lives cover the years 1056-1103. The life of St John, a great reformer, a contemporary of Thorodd, whom he employed to build a church for him, is by another author (1052-1121). The life of Gudmund (Gudmundar Saga Goda), as priest, recounts the early life of this Icelandic Becket till his election as bishop (1160-1202); his after career must be sought out in Islendinga. It is written by a friend and contemporary. A later life by Arngrim, abbot of Thingore, written c. 1350, as evidence of his subject's sanctity, tells a good deal about Icelandic life, &c. The lives of Bishops Ami and Lawrence bring down our knowledge of Icelandic history into the 14th century. The former work, Arna Saga Biskups, is imperfect; it is the record of the struggles of church and state over patronage rights and glebes, written c. 131 5; it now covers only the years 1260-1291; a great many documents are given in it, after the modern fashion. The latter, Laurentius Saga Biskups, by his disciple, priest Einar Haflidason, is a charming biography of a good and pious man, whose chequered career in Norway and Iceland is picturesquely told (1324-1331). It is the last of the sagas. Bishop Jon's Table-Talk (1325-1339) is also worth noticing; it contains many popular stories which the good bishop, who had studied at Bologna and Paris, was wont to tell to his friends. ˆ

Annals. — The Annals are now almost the sole material for Icelandic history; they had begun earlier, but after 1331 they got fuller and richer, till they end in 1430. The best are Annates Regii, ending 1306, Einar Haflidason 's Annals, known as " Law- man's Annals," reaching to 1392, and preserved with others in Flatey-book, and the New Annals, last of all. The Diploma- tarium Islandicum, edited by Jon Sigurdsson, contains what remains of deeds, inventories, letters, &c, from the old days, completing our scanty material for this dark period of the island's history.

Literature of Foreign Origin. — After the union with Norway and change of law genuine tradition died out with the great houses. The ordinary medieval literature reached Iceland through Norway, and every one began to put it into a vernacular dress, so neglecting their

own classics that but for a few collectors like Lawman Hauk they would have perished entirely.

The Norwegian kings, Haakon Haakonson(c. 1225), and Haakon V. (c. 1305), employed Icelanders at their courts in translating the French romances of the Alexander, Arthur and Charlemagne cycles. Some forty or fifty of these Riddara-Sogur (Romances of Chivalry) remain. They reached Iceland and were eagerly read, many Rimur being founded on them. Norse versions of Mary of Brittany's Lays, the stories of Brutus and of Troy, and part of the Pharsalia translated are also found. The Speculum Regale, with its interesting geographical and social information, is also Norse, written c. 1240, by a Halogalander. The com- putistic and arithmetical treatises of Stiorn-Odd, Biarni the Number-skilled (d. n 73), and Hauk Erlendsson the Lawman (d. 1334), and the geography of Ivar Bardsson, a Norwegian (c. 1340), areof courseof foreign origin. A few tracts on geography, &c, in Hauk's book, and a Guide to the Holy Land, by Nicholas, abbot of Thwera (d. 1158), complete the list of scientific works. The stories which contain the last lees of the old mythology and pre-history seem to be also non-Icelandic, but amplified by Icelandic editors, who probably got the plots from the Western Islands. Volsunga Saga and Hervarar Saga contain quotations and paraphrases of lays by the Helgi poet, and Half's, Ragnar's and Asmund Kappabana's Sagas all have bits of Western poetry in them. Hrolf Kraki's Saga paraphrases part of Biarkamal ; Hromund Gripsson's gives the story of Helgi and Kara (the lost third of the Helgi trilogy); Gautreh's Arrow Odd's, Frithiof's Sagas, &c, contain shreds of true tradition amidst a mass of later fictitious matter of no worth. With the Riddara-Sogur they enjoyed great popularity in the 15th century, and gave matter for many Rimur. Thidrek's Saga, a late version of the Volsung story, is of Norse composition (c. 1230), from North German sources.

The medieval religious literature of Western Europe also influenced Iceland, and the Homilies (like the Laws) were, according to Thorodd, the earliest books written in the vernacu- lar, antedating even Ari's histories. The lives of the Virgin, the Apostles and the Saints fill many MSS. (edited in four large volumes by Professor Unger) , and are the works of many authors, chiefly of the 13th and 14th centuries; amongst them are the lives of SS. Edward the Confessor, Oswald of Northumbria, Dunstan and Thomas of Canterbury. Of the authors we know Priest Berg Gunsteinsson (d. 1 211); Kygri-Biorn, bishop-elect (d. 1237); Bishop Brand (d. 1264); Abbot Runolf (d. 1307); Bishop Lawrence's son Ami (c. 1330); Abbot Berg (c. 1340), &c. A paraphrase of the historical books of the

Bible was made by Bishop Brand (d. 1264), called Gydinga Sogur. About 1310 King Haakon V. ordered a commentary on the Bible to be made, which was completed down to Exodus xix. To this Brand's work was afterwards affixed, and the whole is known as Sliorn. The Norse version of the famous Barlaam and Josaphat, made for Prince Haakon (c. 1240), must not be forgotten.

Post-classical Literature. — The post-classical literature falls chiefly under three heads — religious, literary and scientific. Under the first comes foremost the noble translation of the New Testament by Odd Gottskalksson, son of the bishop of H61ar. Brought up in Norway, he travelled in Denmark and Germany, and took upon him the new faith before he returned to Iceland, where he became secretary to Bishop Ogmund of Skalholt. Here he began by translating the Gospel of Matthew into his mother- tongue in secret. Having finished the remainder of the New Testament at his own house at Olves, he took it to Denmark, where it was printed at Roskild in 1540. Odd afterwards translated the Psalms, and several devotional works of the day, Corvinus's Epistles, &c. He was made lawman of the north and west, and died from a fall in the Laxa in Kios, June 1556. Three years after his death the first press was set upˆin Iceland by John Matthewson, at Breidabolstad, in Hunafloe, and a

Gospel and Epistle Book, according to Odd's version, issued from it in 1562. In 1584 Bishop Gudbrand, who had brought over a splendid fount of type from Denmark in 1575 (which he com- pleted with his own hands), printed a translation of the whole Bible at Holar, incorporating Odd's versions and some books (Proverbs and the Son of Sirach, 1580) translated by Bishop Gizar, but supplying most of the Old Testament himself. This fine volume was the basis of every Bible issued for Iceland till 1826, when it was replaced by a bad modern version. For beauty of language and faithful simplicity of style the finer parts of this version, especially the New Testament, have never been surpassed.

The most notable theological work Iceland ever produced is the Postill-Book of Bishop John Vidalin (1666-1720), whose bold homely style and stirring eloquence made " John's Book," as it is lovingly called, a favourite in every household, till in the 19th century it was replaced for the worse by 'the more senti- mental and polished Danish tracts and sermons. Theological literature is very popular, and many works on this subject, chiefly translations, will be found in the lists of Icelandic biblio- graphers.

The first modern scientific work is the Iter per patriam of Eggert

Olafsson and Biarni Paulsson, which gives an account of the physical peculiarities — fauna, flora, &c. — of the island as far as could be done at the date of its appearance, 1772. The island was first made known to " the world " by this book and by the sketch of Unno von Troil, a Swede, who accompanied Sir Joseph Banks to Iceland in 1772, and afterwards wrote a series of " letters " on the land and its literature, &c. This tour was the forerunner of[an endless series of " travels," of which those of Sir W. J. Hooker, Sir G. S. Mackenzie (1810), Ebenezer Henderson (1818), Joseph Paul Gaimard (1838-1843), Paijkull (1867) and, lastly, that of Sir Richard Burton, an excellent account of the land and people, crammed with information of every kind (1875), are the best.

Iceland is emphatically a land of proverbs, while of folk-tales, those other keys to the poeple's heart, there is plentiful store. Early work in this direction was done by Jon Gudmundsson, Olaf the Old and John Olafsson in the 17th century, who all put traditions on paper, and their labours were completed by the magnificent collection of Jon Arnason (1862-1864), who was inspired by the example of the Grimms. Many tales are but weak echoes of the sagas; many were family legends, many are old fairy tales in a garb suited to their new northern home; but, besides all these, there are a number of traditions and superstitions of indigenous origin.

The Renaissance of Iceland dates from the beginning of the 17th century, when a school of antiquaries arose. Arngrim Jonsson's Brevis Commentarius (1593), and Crymogaea (1609), were the first-fruits of this movement, of which Bishops Odd, Thorlak and Bryniulf (worthy parallels to Parker and Laud) were the wise and earnest supporters. Thefirst (d. 1630) collected much material for church history. The second (d. 1656) saved Sturlunga and the Bishops' Lives, encouraged John Egilsson to write his New Hungerwaker, lives of the bishops of the Dark Ages and Reformation, and helped Biorn of Skardsa (d. 1655), a bold and patriotic antiquary (whose Annals continue Einar's), in his researches. The last (d. 1675) collected a fine library of MSS., and employed the famous copyist John Erlendsson, to whom and the bishop's brother, John Gizurarsson (d. 1648), we are indebted for transcripts of many lost MSS.

Torfaeus (1636-1719) and Bartholin, a Dane (d. 1600), roused the taste for northern literature in Europe, a taste which has never since flagged; and soon after them Arni Magnusson (1663-1730) transferred all that remained of vellum and good paper MSS. in Iceland to Denmark, and laid the foundations of the famous library and bequest, for which all Icelandic students are so much beholden.

For over forty years Ami stuck to his task, rescuing every scrap he could lay hands on from the risks of the Icelandic climate and carelessness, and when he died only one good MSS. remained in the island. Besides his magnificent collection, there are a few MSS. of great value at

Upsala, at Stockholm, and in the old royal collection at Copen- hagen. Those in the university library in the latter city perished in the fire of 1728. Sagas were printed at Upsala and Copenhagen in the 17th century, and the Arna-Magnaean fund has been work- ing since 1772. In that year appeared also the first volume of Bishop Finn Jonsson's Historia Ecclesiastica Islandiae, a work of high value and much erudition, containing not only ecclesi- astical but civil and literary history, illustrated by a well-chosen mass of documents, 870-1740. It has been continued by Bishop P. Peterson to modern times, 1 740-1840. The results, however, of modern observers and scholars must be sought for in the periodicals, Safn, Felagsrit, Ny Felagsrit and others. John Espolin's Arboskr is very good up to its date, 1821.

A brilliant sketch of Icelandic classic literature is given by Dr Gudbrandr Vigfusson in the Prolegomena to Sturlunga Saga (Oxford, 1879). It replaces much earlier work, especially the Sciagraphia of Halfdan Einarsson (1777), and the Saga-Bibliotek of Jyliiller. The numerous editions of the classics by the Icelandic societies, the Danish Soci6t6 des Antiquit6s, Nordiske Litteratur Sanlfund, and the new Gammel Nordisk Litteratur Samfund, the splendid Norwegian editions of Unger, the labours of the Icelanders Sigurdsson and Gislason, and of those foreign scholars in Scandinavia and Germany who have thrown themselves into the work of illustrating, publishing and editing the sagas and poems (men like P. A. Munch, S. Bugge, F. W. Bergmann, Th. Mobiusand K. von Maurer, to name only a few), can only be referred to here. See also Finnur J6nsson, Den Oldnerske og Oldislanske Litteraturs Historic (Copenhagen, 1893-1900); R. B. Anderson's translation (Chicago, 1884) of Winkel Horn's History of the Literature of the Scandinavian North; and W. Morris and E. Magnusson's Saga Library. (F. V. P.)

Recent Literature

The recent literature of Iceland has been in a more flourishing

state than ever before since the 13th century.' Lyrical poetry is by far the largest and the most interesting portion of it. The great influence of J6nas Hallgrimsson (1807-1845) is still felt, and his school was the reigning one up to the end of the 19th century, although then a change seemed to be in sight. The most successful poet of this school is Steingrimr Thorsteinsson (b. 1830). He is specially famous for his splendid descriptions of scenery (The Song of Gilsbakki), his love-song's and his sarcastic epigrams. As a translator he has enriched the literature with The Arabian Nights, Sakuntala, King Lear and several other masterpieces of foreign literature. Equal in fame is Matthias Jochumsson (b. 1835), who, following another of Jonas Hallgrimsson's many ways, has successfully revived the old metres of the classical Icelandic poets, whom he resembles in his majestic, but sometimes too gorgeous, language. He is as an artist inferior to Steingrimr Thorsteinsson, but surpasses him in bold flight of imagination. He has successfully treated subjects from Icelandic history Greltisljoft, a series of poems about the famous outlaw Grettir). His chief fault is a certain carelessness in writing; he can never write a bad poem, but rarely a poem absolutely flawless. He has translated Tegner's Frithiofs Saga, several plays of Shakespeare and some other foreign masterpieces. The great religious poet of Iceland, Hallgrimr Petursson, has found a worthy successor in Valdemar

Briem (b. 1848), whose Songs of the Bible are deservedly popular. He is like Matthias Jochumsson in the copious flow of his rhetoric; some of his poems are perfect both as regards form and contents, but he sometimes neglects the latter while polishing the former. An interesting position is occupied by Benedict Grdndal (b. 1826), whose travesties of the old romantic stories, 1 and his Aristophanic drama GandreiSin (" The Magic Ride ") about contemporary events, are among the best satirical and humorous productions of Icelandic literature.

Influenced by Jonas Hallgrimsson with regard to language and poetic diction, but keeping unbroken the traditions of Icelandic medieval poetry maintained by SigUrSr BreiSfjorS (1798-1846), is another school of poets, very unlike the first. In the middle of the 19th century this school was best represented by Hjalmar Jonsson from Bola (1796-1875), a poor farmer 1 E.g. " The Battle of the Plains of Death," a burlesque on the battle of Solferino.

with little education, but endowed with great poetical talents, and the author of satirical verses not inferior to those of Juvenal both in force and coarseness. In the last decades of the 19th century this school produced two poets of a very high order, both distinctly original and Icelandic. One is Pall Olafsson (b. 1827). His songs are mostly written in the medieval quatrains (Jerskeytla) , and are generally of a humorous and satirical character; his convivial songs are known by heart by every modern Icelander; and although some of the poets of the present day are more admired, there is none who is more loved by the people. The other is porsteinn Erlingsson (b. 1858). His exquisite satirical songs, in an easy and elegant but still manly and splendid language, have raised much dis- cussion. Of his poems may be mentioned The Oath, a series of most beautiful ballads, with a tragical love-story of the 17th century as their base, but with many and happy satirical allusions to modern life; Jbrundr, a long poem about the convict king, the Danish pirate Jorgensen, who nearly succeeded in making himself the master of Iceland, and The Fate of the Gods and The Men of the West (the Americans), two

poems which, with their anti-clerical and half-socialistic tendencies, have caused strong protests from orthodox Lutheran clergy. Near to this school, but still standing apart, is Grimur Thomson (b. 1820).

In the beginning of the 'eighties a new school arose — having its origin in the colony of Icelandic students at the University of Copenhagen. They had all attended the lectures of Georg Brandes, the great reformer of Scandinavian literature, and, influenced by his literary theories, they chose their models in the realistic school. This school is very dissimilar from the half- romantic school of J6nas Hallgrimsson;. it is nearer the national Icelandic school represented by Pall Olafsson and Porsteinn Erlingsson, but differs from those writers by intro- ducing foreign elements hitherto unknown in Icelandic literature, and^-especially in the case of the prose-writers — by imitating closely the style and manner of some of the great Norwegian novelists. Their influence brought the Icelandic literature into new roads, and it is interesting to see how the tough Icelandic element gradually assimilates the foreign. Of the lyrical poets, Hannes Hafsteinn (b. 1861) is by far the most important. In his splendid ballad, The Death of Skarphedinn, and in his beautiful series of songs describing a voyage through some of the most picturesque parts of Iceland, he is entirely original; but in his love-songs, beautiful as many of them are, a strong foreign influence can be observed. Among the innovations of this poet we may note a predilection for new metres, sometimes adopted from foreign languages, sometimes invented by himself, a thing practised rarely and generally with small success by the Icelandic poets.

No Icelandic novelist has as yet equalled Jon Thoroddsen (181 9-1868). The influence of the realistic school has of late been predominant. The most distinguished writer of that school has been Gestur Palsson (1852-1891), whose short stories with their sharp and biting satire have produced many imitations in Iceland. The best are A Home of Love and Captain Sigurd. J6nas J6nasson (b. 1856), a clergyman of northern Iceland, has, in a series of novels and short stories, given accurate, but somewhat dry, descriptions of the more gloomy sides of Icelandic country life. His best novel is RandiSr from Hvassafell, an historical novel of the middle ages. Besides these we may mention Torfhildur Holm, one of the few women who have distinguished themselves in Icelandic literature. Her novels are mostly historical. The last decade of the 19th century saw the establishment of a permanent theatre at Reykjavik. The poet Matthias Jochumsson has written several dramas, but their chief merits are lyrical. The most successful of Icelandic dramatists as yet is IndriSi Einarsson, whose plays, chiefly historical, in spite of

excessive rhetoric, are very interesting and possess a true dramatic spirit.

In geography and geology porvaldr Thoroddsen has acquired a European fame for his researches and travels in Iceland, especially in the rarely-visited interior. Of his numerous writings in Icelandic, Danish and German, the History of

Icelandic Geography is a monumental work. In history Pali MelsteS's (b. 181 2) chief work, the large History of the World, belongs to this period, and its pure style has had a beneficial influence upon modern Icelandic prose.

Of the younger historians we may mention porkell Bjarnason (History of the Reformation in Iceland). Jon porkelsson (b. 1822), inspector of the archives of Iceland, has rendered great services to the study of Icelandic history and literature by his editions of the Diplomatarium Islandicum and Obituarium Islandicum, and by his Icelandic Poetry in the 15th and 16th Century, written in Danish, an indispensable work for any student of that period. A leading position among Icelandic lexicographers is occupied by Jon Porkelsson, formerly head of the Latin school at Reykjavik, whose Supplement til islandske Ordbfger, an Icelandic-Danish vocabulary (three separate collections), has hardly been equalled in learning and accuracy. Other dis- tinguished philologists are his successor as head of the Latin school, Bjorn Magnusson Olsen (Researches on Sturlunga, Ari the Wise, The Runes in the Old Icelandic Literature — the last two works in Danish); Finnur Jonsson, professor at the Uni- versity of Copenhagen (History of the Old Norwegian and Ice- landic Literature, in Danish, and excellent editions of many old Icelandic classical works); and Valtyr GuSmundsson, lecturer at the University of Copenhagen (several works on the old archi- tecture of Scandinavia) and editor of the influential Icelandic literary and political review, EimreiSin (" The Locomotive ")•

See J. C. Poestion, Islandische Dichter der Neuzeit (Leipzig, 1897) ; C. Kiichler, Geschichte der islandischen Dichtung der Neuzeit (Leipzig, 1896); Ph. Schweitzer, Island; Land und Leute (Leipzig, 1885); Alexander Baumgartner, Islandund die Faroer (Freiburg im Breisgau, 1889). (S. Bl.)

ICELAND MOSS, a lichen (Cetraria islandica) whose erect or ascending foliaceous habit gives it something of the appearance of a moss, whence probably the name. It is often of a pale chestnut colour, but varies considerably, being sometimes almost entirely greyish white; and grows to a height of from 3 to 4 in., the branches being channelled or rolled into tubes, which terminate in flattened lobes with fringed edges. It grows abundantly in the mountainous regions of northern countries, and it is specially characteristic of the lava slopes and plains of the west and north of Iceland. It is found on the mountains of north Wales, north England, Scotland and south-west Ireland. As met with in commerce it is a light-grey harsh cartilaginous body, almost destitute of colour, and having a slightly bitter taste. It contains about 70% of lichenin or lichen-starch, a body isomeric with common starch, but wanting any appearance of structure. It also yields a peculiar modifica- tion of chlorophyll, called thallochlor, fumaric acid, licheno- stearic acid and cetraric acid, to which last it owes its bitter taste, It forms a nutritious and easily digested amylaceous food, being used in place of starch in some preparations of cocoa. It is not, however, in great request, and even in Iceland it is only habitually resorted to in seasons of scarcity. Cetraric acid or cetrarin, a white micro-crystalline powder with a bitter taste, is readily soluble in alcohol, and slightly soluble in water and ether. It has been recommended for medicinal use, in doses of 2 to 4 grains, as a bitter tonic and aperient.

ICE-PLANT, the popular name for Mesembryanthemum cryslallinum, a hardy annual most effective for rockwork. It is a low-growing spreading herbaceous plant with the fleshy stem and leaves covered with large glittering papillae which give it the appearance of being coated with ice. It is a dry- country plant, a native of Greece and other parts of the Mediter- ranean region, the Canary Islands, South Africa and California. Mesembryanthemum is a large genus (containing about 300 species) of erect or prostrate fleshy herbs or low shrubs, mostly natives of South Africa, and rarely hardy in the British Isles where they are mostly grown as greenhouse plants. They bear conspicuous white, yellow or red flowers with many petals inserted in the calyx-tube. The thick fleshy leaves are very variable in shape, and often have spiny rigid hairs on the margin. They are essentially sun-loving plants. The best-known member of the genus is M. cordifolium, var. variegatum, with heart-shaped

green and silvery leaves and bright rosy-purple flowers. It is extensively used for edging flower-beds and borders during the summer months.

ICE-YACHTING, the sport of sailing and racing ice-boats. It is practised in Great Britain, Norway and Sweden, to some extent, and is very popular in Holland and on the Gulf of Finland, but its highest development is in the United States and Canada. The Dutch ice-yacht is a flat-bottomed boat resting crossways upon a planking about three feet wide and sixteen long, to which are affixed four steel runners, one each at bow, stern and each end of the planking. The rudder is a fifth runner fixed to a tiller. Heavy mainsails and jibs are generally used and the boat is built more for safety than for speed. The ice-boat of the Gulf of Finland is a V-shaped frame with a heavy plank running from bow to stern, in which the mast is stepped. The stern or steering runner is worked by a tiller or wheel. The sail is a large lug and the boom and gaff are attached to the mast by travellers. The passengers sit upon planks or rope netting. The Russian boats are faster than the Dutch.

In 1790 ice-yachting was in vogue on the Hudson river, its headquarters being at Poughkeepsie, New York. The type was a square box on three runners, the two forward ones being nailed to the box and the third acting as a rudder operated by a tiller. The sail was a flatheaded sprit. This primitive style generally obtained until 1853, when triangular frames with " boxes " for the crew aft and jib and mainsail rig were introduced. A heavy, hard-riding type soon developed, with short gaffs, low sails, large jibs and booms extending far over the stern. It was over- canvassed and the mast was stepped directly over the runner- plank, bringing the centre of sail-balance so far aft that the boats were apt to run away, and the over-canvassing frequently caused the windward runner to swing up into the air to a dangerous height. The largest and fastest example of this type, which prevailed until 1879, was Commodore J. A. Roosevelt's first " Icicle," which measured 69 ft. over all and carried 1070 sq. ft. of canvas. In 1879 Mr H. Relyea built the " Robert Scott, " which had a single backbone and wire guy-ropes, and it became the model for all Hudson river ice-yachts. Masts were now stepped farther forward, jibs were shortened, booms cut down, and the centre of sail-balance was brought more inboard and higher up, causing the centres of effort and resistance to come more in harmony. The shallow steering-box became elliptical. In 1 88 1 occurred the first race for the American Challenge Pennant,which represents the championship of the Hudson river, the clubs competing including the Hudson river, North Shrews- bury, Orange lake, Newburgh and Carthage Ice-Yacht Clubs. The races are usually sailed five times round a triangle of which each leg measures one mile, at least two of the legs being to windward. Ice-yachts are divided into four classes, carrying

respectively 600 sq. ft. of canvas or more, between 450 and 600, between 300 and 450, and less than 300 sq. ft. Ice-yachting is very popular on the Great Lakes, both in the United States and Canada, the Kingston (Ontario) Club having a fleet of over 25 sail. Other important centres of the sport are Lakes Minne- tonka and White Bear in Minnesota, Lakes Winnebago and Pepin in Wisconsin, Bar Harbor lake in Maine, the St Lawrence river, Quinte Bay and Lake Champlain.

A modern ice-yacht is made of a single-piece backbone the entire length of the boat, and a runner-plank upon which it rests at right angles, the two forming a kite-shaped frame. The best woods for these pieces are basswood, butternut and pine. They are cut from the log in such a way that the heart of the timber expands, giving the planks a permanent curve, which, in the finished boat, is turned upward. The two forward runners, usually made of soft cast iron and about 2 ft. 7 in. long and 2ˆ- in. high, are set into oak frames a little over 5 ft. long and 5 in. high. The runners have a cutting edge of 90%, though a V-shaped edge is often preferred for racing. The rudder is a runner about 3 ft. 7 in. long, worked by a tiller, sometimes made very long, 75 ft. not being uncommon. This enables the helms- man to lie in the box at full length and steer with his feet, leaving his hands free to tend the sheet. Masts and spars are

generally made hollow for racing-yachts and the rigging is pliable steel wire. The sails are of io-oz. duck for a boat carrying 400 sq. ft. of canvas. They have very high peaks, short hoists and long booms. The mainsail and jib rig is general, but a double-masted lateen rig has been found advantageous. The foremost ice-yacht builder of America is G. E. Buckhout of Poughkeepsie.

An ice-yacht about 40 ft. in length will carry 6 or 7 passengers or crew, who are distributed in such a manner as to preserve the balance of the boat. In a good breeze the crew lie out on the windward side of the runner-plank to balance the boat and reduce the pressure on the leeward runner. A course of 20 m. with many turns has been sailed on the Hudson in less than 48 minutes, the record for a measured mile with flying start being at the rate of about 72 m. an hour. In a high wind, however, ice-yachts often move at the rate of 85 and even 90 m. an hour.

Several of the laws of ice navigation seem marvellous to the uninitiated. Commodore Irving Grinnell, who has made a scientific study of the sport, says: " The two marked pecu- liarities of ice-yachting which cause it to differ materially from yachting on the sea are: (1) Sailing faster than the wind. (2) Sheets flat aft under all circumstances." Mr H. A. Buck, in the " Badminton Library," Skating, Curling, Tobogganing, &c, thus explains these paradoxes. An ice-boat sails faster than the wind because she invariably sails at some angle to it. The momentum is increased by every puff of wind striking the sails obliquely, until it is finally equalled by the increase of friction engendered. Thus the continued bursts of wind against the sails cause a greater accumulation of speed in the ice-yacht than is possessed by the wind itself. When the boat sails directly before the wind she is, like a balloon, at its mercy, and thus does not sail faster than the wind. The ice-yacht always sails with its sheets flat aft, because the greater speed of the boat changes the angle at which the wind strikes the sail from that at which it would strike if the yacht were stationary to such a degree that, in whatever direction the yacht is sailing, the result is always the same as if the yacht were close-hauled to the wind. It follows that the yacht is actually overhauling the wind, and her canvas shivers as if in the wind's eye. When eased off her momentum becomes less and less until it drops to the velocity of the wind, when she can readily be stopped by being spun round and brought head to the wind. The latter method is one way of " coming to," instead of luffing up in the usual way from a beam wind. In beating to windward an ice-boat is handled like a water yacht, though she points more closely.

On the bays near New York a peculiar kind of ice-boat has developed, called scooter, which may be described as a toboggan with a sail. A typical scooter is about 15 ft. long with an extreme beam of 5 ft., perfectly oval in form and flat. It has mainsail and jib carried on a mast or 10 ft. long and set well aft, and is provided with two long parallel metal runners. There is no rudder, the scooter being steered entirely by trimming the sails, particularly the jib. As the craft is flat and buoyant it sails well in water, and can thus be used on very thin ice without danger. A speed of 50 m. an hour has been attained by a scooter (see Outing for March 1905).

See Ice Sports, in the "Isthmian Library"; Skating, Curling, Tobogganing, &c. in the " Badminton Library."

I-CH'ANG (Yi-ch'ang, anciently known as Yi-ling), a town of China in the province of Hu-peh, one of the four ports opened to foreign trade by treaty in 1877. It is situated in 30° 42′ N. and

(approximately) 1 1 1° 20′ E., on the Yangtsze-Kiang, 1000 m. from Shanghai. Built on the left bank of the river where it escapes from the ravines and gorges which for 350 m. have imprisoned its channel, I-ch'ang is exposed to considerable risk of floods; in 1870 the waters rose 20 ft. in one day, and the town had many of its houses and about half of its wall swept away. The first English vessels to ascend the river as far as I-ch'ang were those of Admiral Sir James Hope's expedition in 1861. All cargo to or from Szech'uen is here transhipped

from steamer to junk, or vice versa. About 10 m. above I-ch'ang the famed scenery of the Yangtsze gorges begins. Through these the great river runs in a series of rapids, which make navigation by vessels of any size extremely difficult. A very large trade, nevertheless, is carried on by this route between Chungk'ing and I-ch'ang. As a local centre of distribution this port is of no great consequence, the transhipment trade with Szech'uen being almost its sole business. The population is estimated at 35,000. The number of foreign residents is very small, trade being carried on by Chinese agents. Before the anti-opium campaign of 1906 (see China) opium was much grown. The trade of the port amounted in 1899 to £531,229, and in 1904 to £424,442, the principal import being cotton yarn and the principal export opium.

ICHNEUMON (Gr. ixveviucv, from ixvtvtiv, to track out), the common name of the North African representative of a number of small weasel-shaped mammals belonging to the carnivorous family Viverriaae; the Indian representatives of the group being known as mongooses. A large number of species of the type genus are known, and range over southern Asia and all Africa, the typical Herpestes ichneumon also occurring in the south of Spain. The latter is an inhabitant of Egypt and the north of Africa, where it is known to foreign residents as " Pharaoh's rat." It is covered with long harsh fur of a tawny- grey colour, darker on the head and along the middle of the back, its legs reddish and its feet and tail black. It lives largely on rats and mice, birds and reptiles, and for this reason it is domesticated. It is, however, fond of poultry and their eggs, and its depredations among fowls detract from its merits as a vermin-killer. During the inundations of the Nile it is said to approach the habitations of man, but at other seasons it keeps to the fields and to the banks of the river. The Indian mongoose (H. mungo) is considerably smaller than the Egyptian animal, with fur of a pak'grey colour, the hairs being largely white ringed, while the cheeks and throat are more or lps^i rpddmh T ikp the former it is fre E g>'P tian Ichneumon {Herpestes ichneumon) .

quently domesticated. It is especially serviceable in India as a serpent-killer, destroying not only the eggs and young of these creatures, but. killing the most venomous adult snakes. The fact that it survives those encounters has led to the belief that it either enjoys immunity from the effects of snake poison, or that after being bitten it has recourse, as the Hindus maintain, to the root of a plant as an antidote. It has been found, however, that when actually bitten it falls a victim to the poison as rapidly as other mammals, while there is no evidence of its seeking a vegetable antidote. The truth seems to be that the mongoose, by its exceeding agility and quickness of eye, avoids the fangs of the snake while fixing its own teeth in the back of the reptile's neck. Moreover, when excited, the mongoose erects its long stiff hair, and it must be very difficult for a snake to drive its fangs through this and the thick skin which all the members of the genus possess. The mongoose never hesitates to attack a snake; the moment he sees his enemy, " his whole nature," writes a spectator of one of those fights, " appears to be changed. His fur stands on end, and he presents the incarnation of intense rage. The snajte invariably attempts to escape, but, finding it impossible to evade" the rapid onslaught of the mongoose, raises his crest and lashes out fiercely at his little persecutor, who seems to delight in dodg- ing out of the way just in time. This goes on until the mongoose sees his opportunity, when like lightning he rushes in and seizes the snake with his teeth by the back of the neck close to the head, shaking him as a terrier does a rat. These tactics are repeated until the snake is killed." The mongoose is equally dexterous in killing rats and other four-footed vermin.

ICHNEUMON-FLY, a general name applied to parasitic insects of the section Ichneumonoidea (or Entomophaga) , order

Hymenoptera, from the typical genus Ichneumon, belonging to the chief family of that section — itself fancifully so called after the Egyptian mammal {Herpestes). The species of the families (Ichneumonidae, Braconidae, Evaniidae, Proctotrypidae, and Ckakididae are often indiscriminately called " Ichneumons. " but the " super-family " of the Ichneumonoidea in the classifica- tion of W. H. Ashmead contains only the Evaniidae, the Steph- anidae, and the large assemblage of insects usually included in the two families of the Ichneumonidae and the Braconidae, which are respectively equivalent to the Ichneumones geiiuini and /. adsciti of older

naturalists, chiefly differing in the former having two recurrent nerves to the anterior wing,whiist the latter has only one such nerve. The Ichneumonidae proper are one of the most extensive groups of insects. Gravenhorst described some 1650 European species, to which considerable subsequent additions have been made. There are 6 sub-families of the Ichneumonidae, viz. the Ichncummiinae, Cryptinae, Agriotypinac, Ophioninae, Tryphoninae and Pimplinae, differing considerably in size and facies, but united in the common attribute of being, in their earlier stages, parasitic upon other insects. They have all long narrow bodies; a small free head with long filiform or setaceous antennae, which are never elbowed, and have always more than sixteen joints; the abdomen attached to the thorax at its hinder extremity between the base of the posterior coxae, and provided in the female with a straight ovipositor often exserted and very long; and the wings veined, with perfect cells on the disk of the front pair. Ashmead proposes to separate the Agriotypidae (which are remarkable for their aquatic habit, being parasitic on caddis-worms) from the Ichneumonidae on account of their firm ventral abdominal segments and spined scutellum. He also separates from the Braconidae the Alysiidae as a distinct family; they have peculiar mandibles with out- turned tips.

Their parasitic habits render these flies of great importance in the economy of nature, as they serve to check any inordinate increase in the numbers of injurious insects. Without their aid it would in many cases be impossible for the agriculturist to hold his own against the ravages of his minute insect foes, whose habits are not sufficiently known to render artificial checks or destroying agents available. The females of all the species are constantly on the alert to discover the proper living food for their own larvae, which are hatched from the eggs they deposit in or on the eggs, larvae or pupae of other insects of all orders, chiefly Lcpidoplcra, the caterpillars of butterflies and moths being specially attacked (as also are spiders). Any one who has watched insect life during the summer can hardly have failed to notice the busy way in which the parent ichneumon, a small four-winged fly, with constantly vibrating antennae, searches for her prey; and the clusters of minute cocoons round the remains of some cabbage-butterfly caterpillar must also have been observed b.y many. This is the work of Apanteles (or Microgasler) glomeratus, one of the Braconidae, which in days past was a source of disquietude to naturalists, who believed that the life of the one defunct larva had transmigrated into l lie numerous smaller flies reared from it. Ichneumon-flies which attack external feeders have a short ovipositor, but those attached to wood-feeding insects have that

organ of great length, for the purpose of reaching the haunts of their concealed prey. Thus a species from Japan (Bracon penclrator) has its ovipositor nine times the length of the body; and the large species of Rhyssa and Ephiallcs, parasitic on Sirex and large wood-boring beetles in temperate Europe, have very long instruments (with which when handled they will endeavour to sting, sometimes penetrating the skin), in order to get at their secreted victims. A common reddish-coloured species of Ophion (O. obscurum), with a sabre-shaped abdomen, is noteworthy from the fact of its eggs being attached by stalks outside the body of the caterpillar of the puss-moth {Centra vinula). Lepidopterists wishing to breed the latter cut off the eggs of the parasite with scissors.

The larvae of the ichneumon-flics are white, fleshy, cylindrical, footless grubs; the majority of them spin silk cocoons before

pupating, often in a mass (sometimes almost geometrically), and sometimes in layers of different colours and texture.

Authorities. — Among the older works on Ichneumonoidea may be specially mentioned J. L. K. Gravenhorst, Ichneumonologia Europaea (Breslau, 1829); A. H. Haliday (Enlom. Mag. i.v., 1833 1838), and A. Forster (Verhandt. Naturhist. Ver. Rheinl. u. Westph. xix., xxv., 1862, 1868). Full reference to the systematic literature of the group will be found in C. G. de Dalla Torre's Catalogus hynienopterorum, vols, hi., iv. (Leipzig, 1898-1902), and a compre- hensive summary in W. H. Ashmead's recent memoir (Proc. U.S. Nat. Mus. xxiii., 1901). For the British species consult C. Morley, Ichneumons of Great Britain (Plymouth, 1903), and T. A. Marshall {Trans. Entom. Soc, 1885-1899). (G. H. C.)

ICHNOGRAPHY (Gr. I'xws, a trace, and jpa

ICHTHYOLOGY (from Gr. ixObs, fish, and X670S, doctrine or treatise), the branch of zoology which treats of the internal and external structure of fishes, their mode of life, and their distribution in space and time. According to the views now gener- ally adopted, all those vertebrate animals are referred to the class of fishes which combine the following characteristics: they live in water, and by means of gills or branchiae breathe air dissolved in water; the heart consists of a single ventricle and single atrium; the limbs, if present, are modified into fins, supplemented by unpaired median fins; and the skin is either naked or covered with scales or with osseous plates or bucklers. With few exceptions fishes are oviparous. There are, however, not a few members of this class which show a modification

of one or more of these characteristics, and which, nevertheless, cannot be separated from it.

I. History and Literature down to 1880

The commencement of the history of ichthyology coincides with that of zoology generally. Aristotle (384-322 B.C.) had a perfect knowledge of the general structure of fishes, which he clearly discriminates both from the aquatic animals with lungs and mammae, i.e. Cetaceans, and from the various groups of aquatic invertebrates. According to him: " the special charac- teristics of the true fishes consist in the branchiae and fins, the [majority having four fins, but those of an elongate form, as the eels, having two only. Some, as the Muraena, lack the fins altogether. The rays swim with their whole body, which is spread out. The branchiae are sometimes furnished with an operculum, sometimes they are without one, as in the cartila- ginous fishes. . . . No fish has hairs or feathers; most are covered with scales, but some have only a rough or a smooth skin. The tongue is hard, often toothed, and sometimes so much adherent that it seems to be wanting. The eyes have no lids, nor are any ears or nostrils visible, for what takes the place of nostrils is a blind cavity; nevertheless they have the senses of tasting, smelling and hearing. All have blood. All scaly fishes are oviparous, but the cartilaginous fishes (with the excep- tion of the sea-devil, which Aristotle places along with them) are viviparous. AH have a heart, liver and gall-bladder; but kidneys and urinary bladder are absent. They vary much in the structure of their intestines: for, whilst the mullet has a fleshy stomach like a bird, others have no stomachic dilatation. Pyloric caeca are close to the stomach, and vary in nurrfber; there are even some, like the majority of the cartilaginous fishes, which have none whatever. Two bodies are situated along the spine, which have the function of testicles; they open towards the vent, and are much enlarged in the spawning season. The scales become harder with age. Not being pro- vided with lungs, fishes have no voice, but several can emit grunting sounds. They sleep like other animals. In most cases the females exceed the males in size; and in the rays and sharks the male is distinguished by an appendage on each side of the vent."

authors from personal examination— a comparatively small proportion, but descriptions and figures still formed in great measure the substitute for our modern collections and museums. With the increasing accumulation of forms, the want of a fixed nomenclature had become more and more felt.

Peter Artedi (1705-1734) would have been a great ichthyologist if Ray or Willughby had not preceded him. But he was fully Art dl conscious of the fact that hoth had prepared the way

‘ ‘ for him, and therefore he did not fail to reap every possible advantage from their labours. His work, edited by Linnaeus, is divided as follows: —

*(1) In the Bibiiotkeca ichthyologica Artedi gives a very complete list of all preceding authors who had written on fishes, with a critical analysis of their works. (2) The Philosophia ichthyologica is devoted to a description of the external and internal parts of fishes; Artedi fixes a precise terminology for all the various modifications of the organs, distinguishing between those characters which determine a genus and such as’ indicate a species or merely a variety; in fact he establishes the method and principles which subsequently have guided every systematic ichthyologist. (3) The Genera prsctum contains well-defined diagnoses of forty-five genera, for which he has fixed an unchangeable nomenclature. (4) In the Species pisctum descriptions of seventy-two species, examined by himself.are given-descriptions which even now are models of exactitude and method. (5) Finally, in the Synonymia piscium references to all previous authors are arranged for every species * very much in the manner which is adopted’in the systematic works of the present day.*

Artedi has been justly called the father of ichthyology. So admirable was his treatment of ‘the subject, that even Linnaeus ,. could only modify and add to it. Indeed, so far as

ichthyology is concerned, Linnaeus has scarcely done anything beyond applying binominal terms to the species properly described and classified by Artedii His classification of the genera appears in the 12th edition of the Systema thus: ; —

A. Amphibia nantia. — Spiractdis compositis. — Petromyzon, Raia, Squalus, Chimaera. Spiraculis sclUariis. — Lophius, Acipenser, Cyclopterus, Baiistes, Ostracion, Tetrodon, Diodon, Centriscus, Syngnathus, Pegasus.

B. Pisces aAodes.— Muraena.Gymnotus, Trichiurus, Anarrhichas, Ammodytes, Ophidium, Stromateus, Xiphias.

C. Pisces jugulares. — Callionymus, Uranoscopus, Trachinus, Gadus, Blennius.

D. Pisces ttioracici. — Cepola, Echeneis, Coryphaena, Gobiiis, Cottus, Scorpaena, Zeus, Pleuronectes, Chaetodort, Sparus, Labrus, Sciaena, , Perca, Gasterosteus, Scomber, Mullus, Trigla.

E.. Pisces abdominales. — Cobitis, Amia, Silurus, Teuthis, Lorir caria, Salmo, Fistularia, Esox, Elops, Argentina,, Atherina, Mugil, Mormyrus, Exocoetus, Polynemus, Clupea, Cyprinus.

Two. contemporaries of Linnaeus, L. T. Gronow and J. T. Klein, attempted a systematic arrangement of fishes.

The works of Artedi and Linnaeus led to an activity of research, especially in Scandinavia, Holland, Germany and England, such as has never been equalled in the history of biological science. Whilst some of the pupils and followers of Linnaeus devoted themselves to the examination and study of the fauna of their native countries,others proceeded on voyages of discovery to foreign and distant lands. Of these latter the following may be especially mentioned: O. Fabricius worked out the fauna of Greenland; Peter Kalm collected hi North America, F. Hasselquist in Egypt and Palestine, M. T. Briinnich in the Mediterranean, Osbeck in Java and China, K. P. Thunberg in Japan; Forskal examined and described the fishes of the Red Sea; G. W. Steller, P. S. Pallas, S. G. Gmelin, and A. J. Guldenstadt traversed nearly the whole of the Russian empire in Europe and Asia. Others attached themselves as naturalists to celebrated navigators, such as the two Forsters (father and son) and Solander, who accompanied Cook; P. Commerson, who travelled with Bougainville; and Pierre Sonnerat. Of those who studied the fishes of their native countries, the most celebrated were Pennant(Great Britain), 0. F. Miiller (Denmark), Puhamel du Monceau (France), C. von Meidinger (Austria), J. Cornide (Spain), and A. Parra (Cuba).

The mass of materials brought together was so great that, not long after tha death of Linnaeus, the necessity made itself felt for collecting them in a compendious form. Several compilers undertook this task; they embodied the recent discoveries in new editions of the classical works of Artedi and Linnaeus, but,

they only succeeded in burying those noble monuments under a Chaotic mass of rubbish. For ichthyology it was fortunate that two men at least, Bloch and Lacepede, made it a subject of prolonged original research.

Mark Eliezer Bloch (1723-1799), a physician of Berlin, had reached the age of fifty-six when he began to write on ichthyo- logical subjects. His work consists of two divisions:— Bloch. (1) Oconomische Naturgeschichte der Fische Deutsch- Iqnds (Berl., 1782-1784); (2) Naturgeschichte der ausl&ndischen Fische (Berl., 1785-1795). The first division, which is devoted to a description of the fishes of Germany, is entirely original. His descriptions as well as figures were made from nature, and are, with few exceptions, still serviceable; indeed many continue to be the best existing in literature. Bloch was less fortunate, and is much less trustworthy, in his natural history of foreign fishes. For many of the species he had to trust to more or less incorrect drawings and descriptions by travellers; frequently, also, he was deceived as to the origin of specimens which he purchased. Hence his accounts contain numerous errors, which it would have been difficult to correct had not nearly the whole of the materials on which his work is based been preserved in the collections at Berlin.

After the completion of his great work Bloch prepared a general system of fishes, in which he arranged not only those previously described, but also those with which he had afterwards become acquainted. The work was ably edited and published after Bloch's death by a. philologist, J. G. Schneider, under the title M. E. Blochii Systema ichlkyologiae iconibus ex. illuslratum (Berl., 1801). The number of species enumerated amounts to 1 519. The system is based upon the number of the fins, the various orders being termed Hemdecapterygii, Decapterygii, &c. An artificial method like this led to the most unnatural combinations and distinctions.

Bloch's Naturgeschichte remained for many years the standard work. But as regards originality of thought Bloch was far surpassed by his contemporary, B. G. E. de Lacepede, born at Agen, in France, in 1756, who became professor at the museum of natural history in Paris, where he died in 1825.

Lacepede had to contend with great difficulties^ the prepara- tions of his Histoire des poissons (Paris, 1798-1803, 5 vols.), which was written during the most disturbed period Lacep i de . of the French Revolution. A great part of it was composed whilst the author was separated from collections and books, and had to rely on his notes

and manuscripts only. Even the works of Bloch and other contemporaneous authors remained unknown or inaccessible to him for a long time. His work, therefore, abounds in the kind of errors into which a compiler is liable to fall. Thus the influence of Lacepede on the progress of ichthyology was vastly less than that of his fellow-labourer; and the labour laid on his successors in correcting numerous errors probably outweighed the assistance which they derived from his work.

The work of the principal students of ichthyology in the period between Ray and LacepMe was chiefly systematizing and describing; but the internal organization of fishes also received attention from more than one great anatomist. Albrecht von Haller, Peter Camper and John Hunter, examined the nervous system and the organs of sense; and Alexander Monro, secundus, published a classical work, The Structure and Physiology of Fishes Explained and Compared with those of Man and other Animals (Edin., 1785). The electric organs of fishes (Torpedo and Gymnotus) were examined by Rfiaumur, J. N. S. Allamand, E. Bancroft, John Walsh, and still more exactly by J. Hunter. The mystery of the propagation of the eel called forth a large number of essays, and even the artificial propagation of Sal- monidae-wns known and practised by J. G. Gleditsch (1764).

Bloch and Lacepede's works were almost immediately suc- ceeded by the labours of Cuvier, but his early publications were tentative, preliminary and fragmentary, so that some little time elapsed before the spirit infused into ichthyology by this great anatomist could exercise its influence on all the workers in this field.

Belon.

Aristotle's information on the habits of fishes, their migrations, mode and time of propagation, and economic uses is, so far as it has been tested, surprisingly correct. Unfortunately, we too often lack the means of recognizing the species of which he gives a description. His ideas of specific distinction were as vague as those of the fishermen whose nomenclature he adopted; it never occurred to him that vernacular names are subject to change, or may' be entirely lost in

course of time, and the difficulty of identifying his species is further increased by the circumstance that sometimes several popular names are applied by him to the same fish, or different stages of growth are designated by distinct names. The number of fishes known to Aristotle seems to have been about one hundred and fifteen, all of which are inhabitants of the Aegean Sea.

That one man should have laid so sure a basis for future progress in zoology is less surprising than that for about eighteen centuries a science which seemed to offer particular attractions to men gifted with power of observation was no further advanced. Yet such is the case. Aristotle's successors remained satisfied to be his copiers or commentators, and to collect fabulous stories or vague notions. With few exceptions (such as Ausonius, who wrote a small poem, in which he describes from his own observations the fishes of the Moselle) authors abstained from original research; and it was not until about the middle of the 1 6th century that ichthyology made a new step in advance by the appearance of Belon, Rondelet and Salviani, who almost simultaneously published their great works, by which the idea of species was established.

P. Belon travelled in the countries bordering on the eastern part of the Mediterranean in the years 1547-1550; he collected rich stores of positive knowledge, which he embodied in several works. The one most important for the progress of ichthyology is that entitled De aquatilibus libri duo (Paris, 1553). Belon knew about one hundred and ten fishes, of which he gives rude but generally recognizable figures. Although Belon rarely gives definitions of the terms used by him, it is not generally very difficult to ascertain the limits which he intended to assign to each division of aquatic animals. He very properly divides them into such as are provided with blood and those without it — two divisions corresponding in modern language to vertebrate and invertebrate aquatic animals. The former are classified by him according to size, the further sub- divisions being based on the structure of the skeleton, mode of propagation, number of limbs, form of the body and physical character of the habitat.

The work of the Roman ichthyologist H. Salviani (1514-1572), bears evidence of the high social position which the author held as physician to three popes. Its title is Aquatilium animalium historia (Rome, 1554-1557, fol.). It treats exclusively of the fishes of Italy. Ninety-two species are figured on seventy-six plates, which, as regards artistic execution, are masterpieces of that period, although those specific characteristics which nowadays constitute the value of a zoological drawing were overlooked by the author or artist. No attempt is made at a natural classification, but the allied forms are generally placed in close proximity. The descriptions are equal to those given by Belon, entering much into the details of the economy and uses of the several species, and were evidently composed with the view of collecting in a readable form all that might prove of interest to the class of society in which the author moved. Salviani's

work is of a high order. It could not fail to render ichthyology popular in the country to the fauna of which it was devoted, but it was not fitted to advance ichthy- ology as a science generally; in this respect Salviani is not to be compared with Rondelet or Belon.

G. Rondelet (1 507-1 557) had the great advantage over Belon of having received a medical education at Paris, and especially Rondelet. ot having g one through a complete-course of instruction in anatomy as a pupil cf Guentherus of Andernach. This is conspicuous throughout his works — Libri de piscibus marinis (Lyons, 1554); and Universac aquatilium historiac pars altera (Lyons, 1555). Nevertheless they cannot be regarded

Salviani.

as more than considerably enlarged editions of Belon's work. For, although he worked independently of the latter, the system adopted by him is characterized by the same absence of the true principles of classification. His work is almost entirely limited to European and chiefly to Mediterranean forms, and comprises no fewer than one hundred and ninety-seven marine and forty- seven fresh-water fishes. His descriptions are more complete and his figures much more accurate than those of Belon; and the specific account is preceded by introductory chapters, in which he treats in a general manner of the distinctions, the external and internal parts, and the economy of fishes. Like Belon, he had no conception of the various categories of classification — con- founding throughout his work the terms " genus " and " species," but he had an intuitive notion of what his successors called a " species," and his principal object was to give as much informa- tion as possible regarding such species.

For nearly a century the works of Belon and Rondelet con- tinued to be the standard works on ichthyology; but the science did not remain stationary during that period. The attention of naturalists was now directed to the fauna of foreign countries, especially of the Spanish and Dutch possessions in the New World; and in Europe the establishment of anatomical schools and academies led to careful investigation of the internal anatomy of the most remarkable European forms. Limited as these efforts were as to their scope, they were sufficiently numerous to enlarge the views of naturalists, and to destroy that fatal dependence on preceding authorities which had kept in bonds even Rondelet and Belon. The most noteworthy of those engaged in these inquiries in tropical countries were W. Piso and G. Marcgrave, who accompanied as physicians the Dutch governor, Count Maurice of Nassau, to Brazil (1630-1644).

Of the men who left records of their anatomical researches, we may mention Borelli (1608-1679), who wrote a work De motu animalium (Rome, 1680, 4to), in which he explained the mechan- ism of swimming and the function of the air-bladder; M. Malpighi (1628-1604), who examined the optic nerve of the sword-fish; the celebrated J. Swammerdam (163 7-1 680), who described the intestines of numerous fishes; and J. Duverney (1648-1730), who investigated in detail the organs of respiration. A new era in the history of ichthyology commences with Ray, Willughby and Artedi, who were the first to recognize the true principles by which the natural affinities of animals should be determined. Their labours stand in so intimate a connexion with each other that they represent but one great step in the progress of this science.

J. Ray (1628-1705) was the friend and guide of F. Willughby (1635-1672). They found that a thorough reform in the method of treating the vegetable and animal kingdoms had become necessary; that the only way of bringing uSL order into the existing chaos was by arranging the lughby. various forms according to their structure. They therefore substituted facts for speculation, and one of the first results of this change, perhaps the most important, was that, having recognized "species" as such, they defined the term and fixed it as the starting-point of all sound zoological knowledge.*

Although they had divided their work so that Ray attended to the plants principally, and Willughby to the animals, the Historia piscium (Oxf., 1686), which bears Willughby's name on the title-page and was edited by Ray, is their joint production. A great part of the observations contained in it were collected during the journeys they made together in Great Britain and in the various countries of Europe.

By the definition of fishes as animals with blood, breathing by gills, provided with a single ventricle of the heart, and either covered with scales or naked, the Cetaceans are excluded. The fishes proper are arranged primarily according to the cartilaginous or the osseous nature of the skeleton, and then subdivided according to the general form of the body, the presence or the absence of ventral fins, the soft or the spinous structure of the dorsal rays, the number of dorsal fins, &c. No fewer than four hundred and twenty species are thus arranged and described, of which about one hundred and eighty were known to the

Cavler.

The Descriptions and Figures of Two Hundred Fishes collected at Vieagapatam on the Coast of Coromandel (Lond., 1803, 2 vols.) by Patrick Russel, and An Account of the Fishes found in the River Ganges and its Branches (Edin., 1822, 2 vols.) by F. Hamilton (formerly Buchanan), were works distinguished by greater accuracy of the drawings (especially the latter) than was eyer attained before. A Natural History of British Fishes was published by E. Donovan (Lond., 1802-1808) ; and the Mediterranean fauna formed the study of the lifetime of A. Riseo, Ichthyologie de Nice (Paris, 1 810); and Histoire naturelle de I'Europe meridionale (Paris, 1827). A slight beginning in the description of the fishes of the United States was made by Samuel Latham Mitchell (1764-1831), who published, besides various papers, a Memoir on the Ichthyology .of New York, in 1815.

G. Cuvier (1769-1832) devoted himself to the study of fishes with particular predilection. The investigation of their anatomy,

and especially of their skeleton, was continued until

he had succeeded in completing so perfect a frame- work of the system of the whole class that his immediate successors required only to fill up those details for which their master had had no leisure. He ascertained the natural affinities of the infinite variety of forms, and accurately defined the divisions, orders, families and genera of the class, as they appear in the various editions of the Rigne Animal. His industry equalled his genius; he formed ■ connections with almost every accessible part of the globe; and for many years the museum of the Jardin des Plantes was the centre where all ichthyological treasures were deposited. Thus Cuvier brought together a collection which, as it contains all the materials on which his labours were based, must still be considered as the most important. Soon after the year 1820, Cuvier, assisted

by one of his pupils, A. Valenciennes, commenced cleanls. n * s g rea t work on fishes, Historie naturelle des Poissons,

of which the first volume appeared in 1828. After Cuvier's death in 1832 the work was left entirely in the hands of Valenciennes, whose energy and interest gradually slackened, rising to their former pitch

in some parts only, as, for instance, in the treatise, on the herring. He left the work unfinished with the twenty-second volume (1848), which treats of the Salmonoids. Yet, incomplete as it is, it is indispensable to the student.

The system finally adopted by Cuvier is the following: —

A. POISSONS OSSEUX. I. A Branchies en Peignes ou en Lames. I . A Mdchoire Superieure, Libre.

a. Acanthopterygiens. Sparoides. Branchies labyrinthiques.

Chetodonoides. Lophioi'des.

Scomberoi'des. Gobioi'des.

Muges. Labroides.

Percoides.

Polynemes.

Mulles.

Joues cuirassees

Scieno'ides.

A bdominaux.

b. Malacopterygiens. Subbrachiens. A podes.

Gadoides.

Pleuronectes.

Discoboles.

Mur^noides.

Cyprinoides.

Siluro'ides.

Salmonoi'des.

Clupeoi'des,

Lucioi'des.

2. A M&choire Superieure Fixte. Selerodermes. Gymnodontes.

II. A Branchies en Forme de Houppes. Lophobranches. B. CARTILAGINEUX OU CHONDROPTERYGIENS.

Sturioniens. Plagiostomes. Cyclostomes.

We have only to compare this system with that of Linnaeus if we wish to measure the gigantic stride made by ichthyology during the intervening period of seventy years. The various characters employed for classification have been examined throughout the whole class, and their relative importance has been duly weighed and understood. The important category of " family " appears now in Cuvier's system fully estab- lished as intermediate between genus and order. Important changes in Cuvier's system have been made and propoped by his successors, but in the main it is still that of the present day.

Cuvier had extended his researches beyond the living forms, into the field of palaeontology; he was the first to observe the close resemblance of the scales of the fossil Palaeoniscus to those

Agassi.*

of the living Polypterus and Lepidosteus, the prolongation and identity of structure of the upper caudal lobe in Palaeoniscus and the sturgeons, the presence of peculiar " fulcra " on the anterior margin of the dorsal fin in Palaeoniscus and Lepidosteus, and inferred from these facts that the fossil genus was allied either to the sturgeons or to Lepidosteus. But it did not occur to him that there was a close relationship between those recent fishes. Lepidosteus and, with it, the fossil genus remained in- his system a member of the order of Malacoplerygii abdominales.

It was left to L. Agassiz (1807-1873) to point out the importance of the structure of the scales as a characteristic, and to open a path towards the knowledge of a whole new subclass of fishes, the Ganoidei. Impressed with the fact that the peculiar scales of Polypterus and Lepidosteus are common to all fossil osseous fishes down to the Chalk, he takes the structure of the scales generally as the base for an ichthyological system, and distinguishes four orders: —

1. ' Placoids. — Without scales proper, but with scales of enamel sometimes large, sometimes small, and reduced to mere points (Rays,*

Sharks and Cyclostomi, ; with the fossil Hybodontes). 2. Ganoids. — With angular bony scales, covered with a thick stratum of enamel: to this order belong the fossil Lepidoides, Sauroides, Pycr.odontes and Coelacanthi; the recent Polypterus, Lepidosteus, Sclerodermi, Gymnodontes, Lophobranches and Siluroides; also the Sturgeons. 3. Ctenoids. — With rough scales, which have their free margins denticulated: Chaetodontjdae, Pleuronectidae, Percidae, Poly-acanthi, Sciaenidae, Sparidae, Scorpaenidae, Aulostomi. 4. Cycloids. — With smooth scales, the hind margin of which lacks denticulation : Labridae, Mugilidae, Scombridae, Gadoidei, Gobiidae, Muraenidae, Lucioidei, Salmonidae, Clupeidae, Cyprinidae.

If Agassiz had had an opportunity of acquiring a more extensive and intimate knowledge of existing fishes before his energies were absorbed in the study of fossil remains, he would doubtless have recognized the artificial character of his classi- fication. ‘ The distinctions between cycloid and ctenoid scales, between placoid and ganoid fishes, are vague, and can hardly be maintained. So far as the living and post-Cretacean forms are concerned, he abandoned the vantage-ground gained by Cuvier; and therefore his system could never supersede that of his predecessor, and finally shared the fate of every classifica- tion based on the modifications of one organ only. But Agassiz opened an immense new field of research by his study of the infinite variety of fossil forms. In his principal work, Recherches sur les poissons fossilcs, Neuchatel, 1833-1843, 4to, atlas in fol., he placed them before the world arranged in a methodical manner, with excellent descriptions and illustrations. His , power of discernment and penetration in determining even the most fragmentary remains is astonishing; and, if his order of Ganoids is an assemblage of forms very different from what is now understood by that term, he was the first who recognized that such an order of fishes exists.

The discoverer of the Ganoidei was succeeded by their explorer Johannes Miiller (1801-1858). In his classical memoir liber den Ban und die Grenzen der Ganoiden (Berl., 1846) he showed that the Ganoids differ from all the other osseous fishes, and. agree with the Plagiostomes, in the structure of the heart. By this primary character, all heterogeneous elements, as Siluroids, Osteoglossidae, &c, were eliminated from the order as understood’ by Agassiz. On the other hand, he did not recognize the affinity of Lepidosiren to the Ganoids, but established for it a distinct subclass, Dipnoi, which he placed at the opposite end of the system. By his researches into the anatomy of the lampreys and Amphioxus, their typical distinctness from other carti- laginous fishes was proved; they became the types

of two other subclasses, Cyclostomi and Leptocardii.

Miiller proposed several other modifications of the Cuvierian system; and, although all cannot be maintained as the most; natural arrangements, yet his researches have given us a much more complete knowledge of the organization of the Teleostean fishes, and later inquiries have shown that, on the whole, the combinations proposed by him require only some further' modification and another definition to render them perfectly natural.

The discovery (in the year 1871) of a living representative of a genus hitherto believed to be long extinct, Ceratodus, threw a new light on the affinities of fishes. The writer of the present article, who had the good fortune to examine this fish, Was enabled to show that, on the one hand, it was a form most closely allied to Lepidosiren, and, on the other, that it could not be separated from the Ganoid fishes, and therefore that Lepidosiren also was a Ganoid, — a relation already indicated by Huxley in a previous paper on " Devonian Fishes."

Having followed the development of the ichthyological system down to this period, we now enumerate the most important contributions to ichthyology which appeared contem- poraneously with or subsequently to. the publication of the great work of Cuvier and Valenciennes. For the sake of convenience we may arrange these works under two heads.

I. Voyages, containing general accounts of Zoological Collections

A. French. — 1. Voyage autour du monde sitr les corvettes de S. M. V Uranie et la Physicienne, sous U commandement de M. Freycinet , " Zoologie — Poissons," par Quoy et Gaimard (Paris, 1824). 2. Voyage de la Coquille, " Zoologie," par Lesson (Paris, 1826-1830). 3. Voyage de I' Astrolabe, sous le commandement de M. J. Dumont d'Urville, "Poissons," par Quoy et Gaimard (Paris, 1834). 4. Voyage au Pole Sud par M. J. Dumont d'Urville, " Poissons," par Hombron et Jacquinot (Paris, 1853-1854).

B. English.— 1. Voyage of H.M.S. Sulphur, " Fishes," by J. Richardson (Lond., 1844-1845). 2. Voyage of H.M.SS. Erebus and Terror, "Fishes," by J. Richardson (Lond., 1846). 3. Voyage of

H.M.S. Beagle, " Fishes," by L. Jenyns (Lond., 1842).

C. German. — 1. Reise der osterreichischen Fregatte Novara, " Fische," von R. Kner (Vienna, 1865).

II. Faunae

A. Great Britain. — 1. R. Parnell, The Natural History of the Fishes of the Firth of Forth (Edih.',, 1838). 2. W. Yarrell, A History of British Fishes (3rd ed., 'Lond., 1859). 3. J. Couch, History of the Fishes of the British Islands (Lond., 1 862-1865).

B. Denmark and Scandinavia. — I. H. Kroyer, Danmark's Fiske (Copenhagen, 1838-1853). 2. S. Nilsson, Sttandinam.sk Fauna, vol. iv. " Fiskarna " (Lund, 1855). 3. Fries och Ekstrom, Skandi- naviens Fiskar (Stockh., 1836).

C. Russia. — 1. Nordmann, " Ichthyologie pontique," in Demi- doff's Voyage dans la Russie meridionale, tome iii. (Paris, 1840).

D. Germany — I. Heckel und Kner, Die Siisswasserfische der osterreichischen Monarchic (Leipz., J858). "2. C. T. E. Siebold, Die Siisswasserfische von Mitteleuropa (Leipz., 1863).'

E. Italy and Mediterranean. — I. Bonaparte, Iconografia delta fauna italica, torn iii., " Pesci " (Rome, 1832-1841). 2. Costa, Fauna del regno di Napoli, " Pesci " (Naples, about 1850).

F. France. — 1. E. Blanchard, Les Poissons des eaux douces de la France (Paris, 1866).

G. Spanish Peninsula. — The fresh-water fish fauna of Spain and Portugal was almost unknown, until F. Steindachner paid some visits to those countries for the purpose of exploring the principal rivers. His discoveries are described in several papers in the Sitzungs- berichte der Akademie zu Wien. B. du Bocage and F. de B. Capello made contributions to our knowledge of the marine fishes on the coast of Portugal (Jorn. Scienc. Acad. Lisb.).

H. North America. — I. T. Richardson, Fauna Bareali-Americana, part iii., " Fishes " (LondL, 1S36). The species described in this work are nearly all from the British possessions in the north. 2. Dekay, Zoology of New York, part iv., " Fishes " (New York, l8

I. Japan. — 1. Fauna Japonica, " Poissons,' par H. Schlegel, (Leiden, 1850).*

J. East Indies; Tropical parts of the Indian and Pacific Oceans. — •

1. E. Riippell, Atlas zu der Reise imnordlichen Afrika (Frankf., 1828),

2. E. Riippell, Neue Wirbelthiere, " Fische " (Frankf., 1837). 3. R. L. Play fair and A. Giinther, The Fishes of Zanzibar (Lond., 1876). 4. C. B. Klunzinger, Synopsis der Fische des Rothen Meers (Vienna, 1870-1871). 5. F. Day, The Fishes of India (Lond., 1865, 4to) contains an account of the fresh-water and marine species. 6. A. Giinther, Die Fische der SUdsee (Hamburg, 4to), from 1873 (i n progress). 7. Unsurpassed in activity, as regards the exploration of the fish fauna of the East Indian archipelago, is P. Bleeker (1819-1878), a surgeon in the service of the Dutch East Indian Government, who, from the year, 1840, for nearly thirty years, amassed immense collections of the fishes of the various islands, and described them in extremely numerous papers, published chiefly

in the journals of the Batavian Society. Soon after his return to Europe (i860) Bleeker commenced to collect the final results of his labours in a grand work, illustrated by coloured plates, Atlas ich- thyologique des Indes Orientales Neerlandaises (Amsterd., fol., 1862), the publication of which was interrupted by the author's death in 1878.

K. Africa. — 1. A. Giinther, " The Fishes of the Nile," in Pethe- rick's Travels in Central Africa (Lond., 1869). 2. W. Peters, Naturwissenschaftliche Reise nach Mossambique, iv., " Flussfische " (Berl., 1868, 4to).

L. West Indies and South America.-ˆ-i. L. Agassiz, Selecta genera et species piscium, quae in itinere per Brasiliam collegit J. B. de Spix (Munich, 1829, fol.). 2. F. de Castelnau, Animaux nouveaux ou rares, recueillis pendant V expedition dans les parties centrales de V Amerique du Sud, '■' Poissons " (Paris, 1855). 3. L. Vaillant and F. Bocourt, Mission scientifique • au Mexique et dans V Amerique centrale, " Poissons " (Paris, 1874). 4. F. Poey, the celebrated naturalist of Havana, devoted many years of study to the fishes of Cuba. His papers and memoirs are published p'artly in two periodicals, issued by himself, under the title of Memorias sobre la historia natural de la isla de Cuba (from 1851), and Repertorio fisico-natural de la isla de Cuba (from 1865), partly in North American scientific journals. And, finally, F. Steindachner and A. Giinther have pub- lished many contributions, accompanied by excellent figures, to our knowledge of the fishes of Central and South

America.

M. New Zealand. — 1. F. W. Hutton and J. Hector, Fishes of Nevj Zealand (Wellington, 1872).

N. Arctic Regions.—-!. C. Liitken, " A Revised Catalogue of the Fishes of Greenland," in Manual of the Natural History, Geology and Physics of Greenland (Lond., 1875, 8vo). 2. The fishes of Spitzbergen were examined by A. J. Malmgren (1865). (A. C. G.)*

II. History and Literature from 1880 In the systematic account which followed the above chapter in the 9th edition of the Encyclopaedia Britannica, the following classification, which is the same as that given in the author's Introduction to the Study of Fishes (London, 1880) was adopted by Albert Giinther: —

Subclass I. : Palaeichthyes. Order I. : Chondropterygii.

With two suborders : Plagiostomata and Holocephala. Order II. : Ganoidei.

With eight suborders : Placodermi, Acanthodini, Dipnoi, Chondrostei, Polypteroidei, Pycnodontoidei, Lepido- steoidei, Amioidei. Subclass II. : Teleostei. Order I. : Acanthopterygii.

With the divisions Perciformes, Beryciformes, Kurtiformes, Polynemiformes, Sciaeniformes, Xiphiiformes, Trichiuri- formes, Cotto-Scombriformes, Gobiiformes, Blenniformes, M ugilif ormes, Gastrosteif ormes, Centriscif ormes, Gobiesoci- formes, Channiformes, Labyrinthibranchii, Lophotiformes, Taeniiiormes and Notacanthiformes. Order II. : Acanthopterygii Pharyngognathi. Order III. : Anacanthini.

With two divisions : Gadoidei and Pleuronectoidei. Order IV. : Physostomi. Order V. : Lophobranchii. Order VI. : Plectognathi. Subclass III. : Cyclostomata. Subclass IV. : Leptocardii.

It was an artificial system, in which the most obvious relation- ships of the higher groups were lost sight of, and the results of the already fairly advanced study of the fossil forms to a great extent discarded. This system gave rise to much adverse criticism; as T. H. Huxley forcibly put it in a paper published soon after (1883), opposing the division of the main groups into Palaeichthyes and Teleostei: "Assuredly, if there is any such distinction to be drawn on the basis of our present knowledge among the higher fishes, it is between the Ganoids and the Piagiostom.es, and not between the Ganoids and the

Teleos-" teans "; at the same .time expressing his conviction, "first, that there are no two large groups of animals for which the evidence of a direct genetic connexion is better than in the case of the Ganoids and the Teleosteans; and secondly, that the proposal to separate the Elasmobranchii (Chondropterygii of Giinther) , Ganoidei and Dipnoi of Miiller into a group apart from, and equivalent to, the Teleostei appears to be inconsistent with the plainest relations of these fishes." This verdict has been endorsed by all subsequent workers at the classification of fishes.

Giinther's classification would have been vastly improved

had he made use of a contribution published as early as 1871, but not referred to by him. As not even a passing allusion is made to it in the previous chapter, we must retrace our steps to make good this striking omission. Edward Drinker Cope (1840-1897) was a worker of great originality and relentless energy, who, in the sixties of the last century, inspired by the doctrine of evolution, was one of the first to apply its, principles to the classification of vertebrates. Equally versed in recent and fossil zoology, and endowed with a marvellous gift, or " instinct " for perceiving the relationship of animals, he has done a great deal for the advance of our knowledge of mammals, reptiles and fishes. Although often careless in the working out of details and occasionally a little too bold in his deductions, Cope occupies a high rank among the zoologists of the 19th century, and much of his work has stood the test of time.

The following was Cope's classification, 1871 (TV. Amer. Philos. Soc. xiv. 449).

Subclass I. Holocephali. ,, II. Selachii. ,, III. Dipnoi. ,, IV. Crossopterygia, with two orders:

Haplistia and Cladistia. ,, V. Actinopteri. The latter is subdivided in the following manner : — Tribe I. : Chondrostei.

Two orders : Selachostomi and Glaniostomi. Tribe II.: Physostomi.

Twelve orders: Ginglymodi, Halecomorphi, Nematognathi, Scyphophori, Plectospondyli, Isospondyli, Haplomi, Glanen-

cheli,Icnthyocephali,Holostomi,Enchelycephali,Colocephah.

Tribe III. : Physoclysti.

Ten orders : Opisthomi, Percesoces, Synentognathi, Hemi- branchii, Lophobranchii, Pediculati, Heterosomata, Plecto- gnathi, Percomorphi, Pharyngognathi.

Alongside with so much that is good in this classification, there are many suggestions which cannot be regarded as im- provements on the views of previous workers. Attaching too great an importance to the mode of suspension of the mandible, Cope separated the Holocephali from the Selachii and the Dipnoi from the Crossopterygii, thus obscuring the general agreement which binds these groups to each other, whilst there is an evident want of proportion in the five subclasses. The exclusion from the class Pisces of the Leptocardii, or lancelets, as first advocated by E. Haeckel, was a step in the right direction, whilst that of the Cyclostomes does not seem called for to such an authority as R. H. Traquair, with whom the writer of this review entirely concurs.

The group of Crossopterygians, first separated as a family from the other Ganoids by Huxley, constituted a fortunate innovation, and so was its division into two minor groups, by which the existing forms (Polypteroidei) were separated as Cladistia. The divisions of the Actinopteri, which includes all Teleostomes other than the Dipneusti and Crossopterygii also showed, on the whole, a correct appreciation of their relation- ships, the Chondrostei being well separated from the other Ganoids with which they were generally associated. In the groupings of the minor divisions, which Cope termed orders, we had a decided improvement on the Cuvierian-Miillerian classification, the author having utilized many suggestions of his fellow countrymen Theodore Gill, who has done much towards a better understanding of their relationships. In the association of the Characinids with the Cyprinids (Plectospondyli) in the separation of the flat-fishes from the Ganoids, in the ap- proximation of the Lophobranchs to the sticklebacks and of the Plectognaths to the Acanthopterygians, and in many other points, Cope was in advance of his time, and it is to be regretted that his contemporaries did not more readily take up many of his excellent suggestions for the improvement of their systems.

In the subsequent period of his very active scientific life, Cope made many alterations to his system, the latest scheme published by him being the following (" Synopsis of the families of Vertebrata," Amer. Natur., 1889, p. 849): —

Class : Agnatha.

I. Subclass : Ostracodermi.

Orders : Arrhina, Diplorrhina. II. Subclass : Marsipobranchii.

Orders : Hyperotreti, Hyperoarti. Class : Pisces.

I. Subclass : Holocephali. II. Subclass : Dipnoi. HI. Subclass : Elasmobranchii.

Orders : Ichthyotomi, Selachii. IV. Subclass : Teleostomi.

(i.) Superorder: Rhipidopterygia.

Orders : Rhipidistia, Actinistia. (ii.) Superorder : Crossopterygia.

Orders : Placodermi, Haplistia, Taxistia, Cladistia. (iii.) Superorder : Podopterygia (Chondrostei). (iv.) Superorder : Actinopterygia.

Orders : Physostomi, Physoclysti.

This classification is that followed, with many emendations, by A. S. Woodward in his epoch-making Catalogue of Fossil Fishes (4 vols., London, 1889-1901), and in his most useful Outlines of Vertebrate Paleontology (Cambridge, 1898), and was adopted by Giinther in the 10th edition of the Encyclopaedia Britannica : —

Class : Agnatha.

I. Subclass : Cyclostomi.

With three orders : (a) Hyperoartia (Lampreys) ; (b) Hyperotreti (Myxinoids) ; (c) Cycliae (Palaeospondylus). II. Subclass : Ostracodermi.

With four orders : (a) Heterostraci (Coelolepidae, Psam- mosteidae, Drepanaspidae, Pteraspidae) ; (b) Osteostraci (Cephalaspidae, Ateleaspidae, &c); (c) Antiarchi (As- terolepidae, Pterichthys, Bothrolepis, &c.) ; (d) Anaspida (Birkeniidae). Class : Pisces. I. Subclass : Elasmobranchii.

With four orders : (a) Pleuropterygii (Cladoselache) ; (b) Ichthyotomi (Pleuracanthidae) ; (c) Acanthodii (Diplacan- thidae, and Acanthodidae) ; (d) Selachii (divided from the structure of the vertebral centres into AsterospondyF and Tectospondyli). II. Subclass : Holocephali.

With one order : Chimaeroidei. III. Subclass : Dipnoi.

With two orders : (a) Sirenoidei (Lepidosiren, Ceratodus, Uronemidae, Ctenodontidae) ; {b) Arthrodira (Homosteus, Coccosteus, Dinichthys). IV. Subclass : Teleostomi.

A. Order : Crossopterygii.

With four suborders: (1) Haplistia (Tarassius) ; (2) Rhipidistia (Holoptychidae, Rhizodontidae, Osteo- lepidae); (3) Actinistia (Coelacanthidae) ; (4) Clad- istia (Polypterus).

B. Order : Actinopterygii.

With about twenty suborders: (1) Chondrostei (Palae- oniscidae, Platysomidae, Chondrosteidae, Sturgeons) ; (2) Protospondyli (Semionotidae, Macrosemiidae, Pycnodontidae, Eugnathidae, Amiidae, Pachy- cormidae) ; (3) Aetheospondyli (Aspidorhynchidae, Lepidosteidae) ; (4) Isospondyli (Pholidophoridae, Osteoglossidae, Clupeidae, Leptolepidae, &c.) ; (5) Plectospondyli (Cy pnnidae, Characinidae) ; (6) Nemato- gnathi; (7) Apodes; and the other Teleosteans.

There are, however, grave objections to this system, which cannot be said to reflect the present state of our knowledge. In his masterly paper on the evolution of the Dipneusti, L. Dollo has conclusively shown that the importance of the autostyly on which the definition of the Holocephali from the Elasmo- branchii or Selachii and of the Dipneusti from the Teleostomi rested, had been exaggerated, and that therefore the position assigned to these two groups in Gunther's classification of 1880 still commended itself. Recent work on Palaeospondylus, on the Ostracoderms, and on the Arthrodira, throws great doubt on the propriety of the positions given to them in the above classification, and the rank assigned to the main divisions of the Teleostomi do not commend themselves to the writer of the present article, who would divide the fishes into three sub classes : —

I. Cyclostomi II. Selachii III. Teleostomi, the characters and contents of which will be found in separate

articles; in the present state of uncertainty as to their position, Palaeospondylus and the Ostracodermi are best placed hors cadre and will be dealt with under these names.

The three subclasses here adopted correspond exactly with those proposed in Theo. Gill's classification of the recent fishes (" Families and Subfamilies of Fishes," Mem. Nat. Ac. Sci. vi. 1803), except that they are regarded by that authority as classes.

The period dealt with in this chapter, ushered in by the publica- tion of Gunther's Introduction to the Study of Fishes, has been one of extraordinary activity in every branch of ichthyology, recent and fossil. A glance at the Zoological Record, published by the Zoological Society of London, will show the ever-increasing number of monographs, morphological papers and systematic contributions, which appear year after year. The number of new genera and species which are being proposed is amazing, but it is difficult to tell how many of them will simply go to swell the already overburdened synonymy. Perhaps a reasonable estimate of the living species known at the present day would assess their number at about 13,000.

It is much to be regretted that there is not a single general modern systematic work on fishes. The most important treatises, the 7th volume of the Cambridge Natural History, by T. W. Bridge and G. A. Boulenger, and D. S. Jordan's Guide to the Study of Fishes, only profess to give definitions of the families with enumerations of the principal genera. Gunther's Catalogue of the Fishes in the British Museum therefore remains the only general descriptive treatise, but its last volume dates from 1870, and the work is practically obsolete. A second edition of it was begun in 1894, but only one volume, by Boulenger, has appeared, and the subject is so vast that it seems doubtful now whether any one will ever have the time and energy to repeat Gunther's achievement. The fish fauna of the different parts of the world will have to be dealt with separately, and it is in this direction that descriptive ichthyology is most likely to progress.

North America, the fishes of which were imperfectly known in 1880, now possesses a Descriptive Catalogue in 4 stout volumes, by D. S. Jordan and B. W. Evermann, replacing the synopsis brought out in 1882 by D. S. Jordan and C. H. Gilbert. A similar treatise should embrace all the fresh- water species of Africa, the fishes of the two principal river systems, the Nile and the Congo, having recently been worked out by G. A. Boulenger. Japanese ichthyology has been taken in hand by D. S. Jordan and his pupils.

The fishes of the deep sea have been the subject of extensive monographs by L. Vaillant (Travailleur and Talisman), A. Giinther (Challenger), A. Alcock (Investigator), R. Collett (Hirondelle), S. Garman (Albatross) and a general resume up 10 1895 was provided in G. B. Goode's and T. H. Bean's Oceanic Ichthyology. More than 600 true bathybial fishes are known from depths of 1000 fathoms and more, and a great deal of evidence has been accumulated to show the general transition of the surface fauna into the bathybial.

A recent departure has been the exploration of the Antarctic fauna. Three general reports, on the results of the Southern Cross, the Belgica and the Swedish South Polar expeditions, had already been published in 1907, and others on the Scotia and Discovery were in preparation. No very striking new types of fishes have been discovered, but the results obtained are sufficient to entirely disprove the theory of bipolarity which some naturalists had advocated. Much has been done towards ascertaining the life-histories of the fishes of economic im- portance, both in Europe and in North America, and our knowledge of the larval and post-larval forms has made great progress.

Wonderful activity has been displayed in the field of palae- ontology, and the careful working out of the morphology of the archaic types has led to a better understanding of the general lines of evolution; but it is to be regretted that very little light on the relationships of the living groups of Telcostcans has been thrown by the discoveries of palaeontologists.

Among the most remarkable additions made in recent years, the work of R. H. Traquair on the problematic fishes Palaeo- spondylus, Thelodus, Drepanaspis, Lanarkia, Ateleaspis, Birkenia and Lanasius, ranks foremost; next to it must be placed the iesearches of A. S. Woodward and Bashford Dean on the primitive shark Cladoselachc, and of the same authors, J. S. Newberry, C. R. Eastman, E. W. Claypole and L. Hussakof, on the Arthrodira, a group the affinities of which have been much discussed.

Authorities. — The following selection from the extremely ex- tensive ichthyological literature which has appeared during the period 1 880-1 906 will supplement the bibliographical notice appended to section I. I. The General Subject: A. Giinther, Introduction to the Study of Fishes (Edinburgh, 1880); B. Dean, Fishes Living and Fossil (New York, 1895); T. W. Bridge and G. A. Boulenger, "Fishes," Cambridge Natural History, vii. (1904); D. S. Jordan, Guide to the Study of Fishes (2 vols., New York, 1905). II. Palaeonto- logical : A.

Fritsch, Fauna der Gaskohle und der Kalksteine der Perm- formation Bohmens (vols, i.-iii., Prague, 1879-1894); K. A. von Zittel, Handbuch der paldontologie, vol. iii. (Munich, 1887); A. Smith Woodward, Catalogue of Fossil Fishes in the British Museum, vols, i.-iii. (London, 1889-1895); A. Smith Woodward, Outlines of Vertebrate Palaeontology for Students of Zoology (Cambridge, 1ˆ98) ; J. S. Newberry, " The Palaeozoic Fishes of North America," Mon. U.S. Geol. Surv. vol. xvi. (1889); J. V. Rohon, "Die obersilurischen Fische von Osel, Thyestidae und Trematastpidae," Mem. Ac. Imp. Sc. St-Petersb. xxxviii. (1892); O. Jaekel, Die Selachier von Bolca, ein Beitrag zur Morphogenie der M'irbeltiere (Berlin, 1894); B. Dean, " Contributions to the Morphology of Cladoselachc," Journ. Morphol. ix. (1894); R. H. Traquair, "The Asterolepidae," Mon. Palaeont. Soc. (1894-1904, in progress); " Report on Fossil Fishes collected by the Geological Survey of Scotland in the Silurian Rocks of the South of Scotland," Trans. Roy Soc. Edin. xxxix. (1899); L. Dollo, " Sur la phylogenie des Dipneustes," Bull. Soc. Beige Geol. vol. ix. (1895); E. W. Claypole, "The Ancestry of the Upper Devonian Placoderms of Ohio," Amer. Geol. xvii. (1896) ; B. Dean, " Palaeonto- logical Notes," Mem. N.Y. Ac. ii. (1901); A. Stewart and S. W. Williston, " Cretaceous Fishes of Kansas," Univ. Geol. Surv. Kansas, vi. (Topeka, 1901); A. S. Woodward, " Fossil Fishes of the English Chalk," Palaeontogr. Soc._ (1902-1903, etc.); R. H. Tra- quair, " The Lower Devonian Fishes of Gemunden," Roy. Soc. Edin. Trans. 40 (1903); W. J. and I. B. J. Sollas, " Account of the Devonian Fish Palaeospondylus," Phil. Trans. 196 (1903); C. T. Regan, " Phylogeny of the Teleostomi," Ann. & Mag. N.H. (7) J 3 (I 9°4); C. R. Eastman, "Fishes of Monte Bolca," Bull. Mus. C.Z. 46 (1904); "Structure and Relations of Mylostoma," Op. cit. 2 (1906); O. Abel, " Fossile Flugfische," Jahrb. Geol. Reichsanst. 56 (Wien, 1906); L. Hussakof. " Studies on the Arthro- dira," Mem. Amer. Mus. N.H. ix. (1906). III. Faunistic (recent fishes): (A) Europe: E. Bade, Die mitteteuropdischen Susswasser- fische (2 vols., Berlin, 1901-1902). Great Britain: F. Day, The Fishes of Great Britain and Ireland (2 vols., London, 1 880-1884) ; J. T. Cunningham, The Natural History of the Marketable Marine Fishes of the British Islands (London, 1896); W. C. M'Intosh and A. T. Masterman, The Life-Histories of the British Marine Food- Fishes (London, 1897); Sir H. Maxwell, British Fresh-water Fish (London, 1904) ; F. G. Aflalo, British Salt-water Fish (London, 1904). Numerous important researches into the development, life-conditions and distributions, carried out at the Biological Laboratories at Plymouth and St Andrews and during the survey of the fishing grounds of Ireland, have been published by W. L. Calderwood, J. T. Cunningham, E. W. L. Holt, W. C. M'Intosh, J.

W. Fulton, W. Garstang and Prince in the Journ. Mar. Biolog. Assoc, The Reports of the Fishery Board of Scotland, Scient. Trans. R. Dublin Soc. and other periodicals. (B) Denmark and Scandinavia: W. Lilljeborg, Sveriges och Norges Fiskar (3 vols., Upsala, 1881-1891); F. A. Smith, A History of Scandinavian Fishes by B. Fries, C. U. Ekstrom and C.Sundevall, with Plates by W. von Wright (second edition, revised and completed by F."A. S., Stockholm, 1892); A. Stuxberg, Sveriges och Norges Fiskar (Goteborg, 1895); C. G. J. Petersen, Report of the Danish Biological Station (Copenhagen, 1802-1900) (annual reports containing much information on fishes of and fishing in the Danish seas). (C) Finland: G. Sundman and A. J. Mela, Finland's Fiskar (Helsingfors, 1883-1891). (D) Germany :K. Mobius and F. Heincke, " Die Fische der Ostsee," Bericht CommWS. Untersuch. deutsch. Meere (Kiel, 1883); F. Heincke, E. Ehrenbaum and G. Duncker have published their investigations into the life history and development of the fishes of Heligoland in Wissenschaftl. Meeresuntersuchungen (Kiel and Leipzig, 1894-1899); (E) Switzer- land: V. Fatio, Faune des vertebres de la Suisse: Poissons (2 vols., Geneva and Basel, 1882-1890). (F) France: E. Moreau, Histoire naturelle des poissons de la France (3 vols., Paris, 1881); Supplement (Paris, 1 891). (G) Pyrenean Peninsula: D. Carlos de Braganca, Resultados das Investigates scientificas feitas a bordo do yacht "Amelia." Pescas maritimas, i. and ii. (Lisbon, 1899-1904). (H) Italy and Mediterranean: P. Doderlein, Manuale ittiologiro del Meditcrranco (Palermo, 1881-1891, not completed; interrupted

by the death of the author); E. W. L. Holt, " Recherches sur la reproduction des poissons osseux, principalement dans le golfe de Marseille," Ann. Mus. Mars. v. (Marseilles, 1899); (I) Western and Central Asia: L. Lortet, " Poissons et reptiles du lac de Tiberiade," Arch. Mus. d'Hist. Nat. Lyon, iii. (1883); S. Herzen- stein, Wissenschaftliche Resultate der von N. M. Przewalski nach Central Asien unternommenen Reisen: Fische (St Petersburg, 1 888-1891); L. Berg, Fishes of Turkestan (Russian text, St Peters- burg, 1905)'; G. Radde, S. Kamensky and F. F. Kawraisky have worked out the Cyprinids and Salmonids of the Caucasus (Tiflis, 1 896-1899). (J) Japan: F. Steindachner and L. Doderlein, " Beitrage zur Kenntniss der Fische Japans," Denkschr. Ak. Wien, (vols. 67 and 68, 1883); K. Otaki, T. Fujita and T. Higurashi, Fishes of Japan (in Japanese) (Tokyo, 1903, in progress). Numerous papers by D. S. Jordan, in

collaboration with J. O. Snyder, E. C. Starks, H. W Fowler and N. Sindo. (K) East Indies: F. Day, The Fauna of British India: Fishes (2 vols., London, 1889) (chiefly an abridgment of the author's Fishes of India); M. Weber, " Die Siisswasserfische des Indischen Archipels," Zool. Ergebnisse e. Reise in Niederl. Ostind. iii. (Leiden, 1894). Numerous contributions to the fauna of the Malay Peninsula and Archipelago by G. A. Boulenger, L. Vaillant, F. Steindachner, G. Duncker, W. Volz and C. L. Popta. (L) Africa: G. A. Boulenger, Materiaux pour la faane du Congo: poissons nouveaux (Brussels, 1898-1902, in progress); and Poissons du bassin du Congo (Brussels, 1901); G. Pfeffer, Die Thierwelt Ostafrikas: Fische (Berlin, 1896); A. Gunther, G. A. Boulenger, G. Pfeffer, F. Steindachner, D. Vinciguerra, j. Pellegrin and E. Lonnbergj have published numerous contributions to the fish-fauna of tropical Africa in various periodicals. The marine fishes of South Africa have received special attention on the part of J. D. F. Gilchrist, Marine Investigations in South Africa. i. and ii. (1898-1904), and new species have been described by G. A. Boulenger and C. T. Regan. (M) North America: D. S. Jordan and B. W. Evermann, The Fishes of North and Middle America^ vols., Washington, 1896-1900); D. S. Jordan and B. W. Evermann, American Food and Game Fishes (New York, 1902); D. S. Jordan and C. H. Gilbert " The Fishes of Bering Sea," in Fur-Seals and Fur-Seal Islands (Washington, 1899); The U.S. Bureau of Fisheries (since 1903) has published annually a Report and a Bulletin, contain- ing a vast amount of information on North American fishes and every subject having a bearing on the fisheries of the United States; S. E. Meek, " Fresh-water Fishes of Mexico," Field Columb. Mus. Zool. v. (1904). (N) South America: C. H. and R. S. Eigenmann, " A Catalogue of the Fresh-water Fishes of South America," Proc. U.S. Nat. Mus. 14 (Washington, 1891); the same authors, F. Steindachner, G. A. Boulenger, C. Berg and C. T. Regan have published contributions in periodicals on this fauna. (O) Aus- tralia: J. E. Tenison-Woods, Fish and Fisheries of New South Wales (Sydney, 1882); J. Douglas Ogilby, Edible Fishes and Crus- taceans of New South Wales (Sydney, 1893); J- Douglas Ogilby and E. R. Waite are authors of numerous papers on Australian fishes in Proc. Linn. Soc. N.S. Wales and Rec. Austral. Mus. (P) South Pacific: D S. Jordan and B. W. Evermann, "Shore Fishes of the Hawaiian Islands," Bull. U.S. Fish. Comm. 23 (1905). (Q) Madagascar: H. E. Sauvage, Histoire physique, naturelle et politique de Madagascar, par A. Grandidier. xvi. ; Poissons (Paris, 189 1). (R) Oceanic Fishes: G. B. Goode a.id T. H. Bean, Oceanic Ichthy- ology (Washington, 1895); A. Gunther, Deep-sea Fishes of the " Challenger " Expedition (London, 1887); C. H. Gilbert, " Deep-sea Fishes of the Hawaiian

*Islands," Bull. U.S. Fish. Comm. 23 (1905) ; R. Collett, Norske Nordhavs Expedition: Fiske (Christiania, 1880); C. F. Lutken, Dijmphna-Togtets Zoologisk-botaniske Udbytte: Kara- Havets Fiske (Copenhagen, 1886); L. Vaillant, Expeditions scienti- fiques du "TravatUeur" et du "Talisman": Poissons (Paris, 1888); A. Agassiz, Three Cruises of the U.S. Coast and Geodetic Survey Steamer " Blake " (Boston and New York, 1888); A. Alcock, Illustrations of the Zoology of II. M.S. "Investigator": Fishes (Calcutta, 1892- 1899, in progress); A. Alcock, Descriptive Catalogue of the Indian Deep-sea Fishes in the Indian Museum (Calcutta, 1899, contains references to all the previous papers of the author on the subject); R. Collett, Resultats des campagnes scientifiques accomplies par Albert I 1 * prince de Monaco: poissons provenant des campagnes du yacht " VHirondelle," (Monaco, 1896); R. Koehler, Resultats scien- tifiques de la campagne'du " Caudan," (Paris, 1896); C. H. Gilbert and F. Cramer, " Report on the Fishes dredged in Deep Water near the Hawaiian Islands," Proc. U.S. Nat. Mus. xix. (Washington, 1896); C. Lutken, " Spolia Atlantica," Vidensk. Selsk. Skr. vii. and ix. (Copenhagen, 1892-1898); C. Lutken, Danish Ingolf Expedi- tion, ii. : Ichthyological Results (Copenhagen, 1898); S. Garman, " Reports on an Exploration off the West Coast of Mexico, Central and South America, and off the Galapagos Islands in charge oi Alexander Agassiz, by the U.S. Fish Commission Steamer "Albatross," during 1891," Mem. Mus. Comp. Zool. vol. xxiv. (Cambridge, U,S.A., 1899). (S) Antarctic Fishes: G. A. Boulenger, Report on the Collections made during the voyage of the " Southern Cross ": Fishes (London, 1902); L. Dollo, Expedition Antarctique Beige (S.Y. " Bel- gica "). Poissons (Antwerp, 1904); E. Lonnberg, Swedish South Polar Expedition: Fishes (Stockholm, 1905); G. A. Boulenger, Fishes of the " Discovery " Antarctic Expedition (London, 1906).*

(G. A. B.)

III. Definition of the Class Pisces. Divisions

[ANATOMY Its Principal

Fishes, constituting the class Pisces, may be defined as Craniate Vertebrata, or Chordata, in which the anterior portion of the central nervous system is expanded into a brain surrounded by an unsegmented portion of the axial skeleton; which are provided with a heart, breathing through gills; and in which the limbs, if present, are in the form of fins, as opposed to the pentadactyle, structure common to the other Vertebrata. With the exception of a few forms in which lungs are present in addition to the gills, thus enabling the

animal to breathe atmospheric air for more or less considerable periods (Dipneusti), all fishes are aquatic throughout their existence.

In addition to the paired limbs, median fins are usually present, consisting of dermal rays borne by endoskeletal supports, which in the more primitive forms are strikingly similar in structure to the paired fins that are assumed to have arisen from the break- ing up of a lateral fold similar to the vertical folds out of which the dorsal, anal and caudal fins have been evolved. The body is naked, or scaly, or covered with bony shields or hard spines.

Leaving aside the Ostracophori, which are dealt with in a separate article, the fishes may be divided into three subclasses-

I. Cyclostomi or Marsipobranchii, with the skull imperfectly developed, without jaws, with a single nasal aperture, without paired fins, and with an unpaired fin without dermal rays. Lampreys and hag-fishes.

II. Selachii or Chondropterygii, with the skull well developed but without membrane bones, with paired nasal apertures, with median and paired fins, the ventrals bearing prehensile organs (claspers) in the males. Sharks, skates and chimaeras.

III. Teleostomi, with the skull well developed and with membrane bones, with paired nasal apertures, primarily with median and paired fins, including all other fishes. (G. A. B.)

IV. Anatomy 1

The special importance of a study of the anatomy of fishes lies in the fact that fishes are on the whole undoubtedly the most archaic of existing craniates, and it is therefore to them especially that we must look for evidence as to the evolutionary history of morphological features occurring in the higher groups of vertebrates.

In making a general survey of the morphology of fishes it is essential to take into consideration the structure of the young developing individual (embryology) as well as that of the adult (comparative anatomy in the narrow sense). Palaeontology is practically dumb excepting as regards external form and skeletal features, and even of these our knowledge must for long be in a hopelessly imperfect state. While it is of the utmost importance to pay due attention to embryological data it is equally important to consider them 'critically and in conjunction with broad morphological considerations. Taken by themselves they are apt to be extremely

misleading.

External Features. — The external features of a typical fish are intimately associated with its mode of life. Its shape is more or less that of a spindle; its surface is covered with a highly glandular epidermis, which is constantly producing lubricating mucus through the agency of which skin-friction is reduced to an extraordinary degree; and finally it possesses a set of remarkable propelling organs or fins.

The exact shape varies greatly from the typical spindle shape with variations in the mode of life; e.g. bottom-living fishes may be much flattened from above downwards as in the rays, or from side to side in the Pleuronectids such as flounder, plaice or sole, or the shape may be much elongated as in the eels.

Head, Trunk and Tail. — In the body of the fish we may recog- nize the three main subdivisions of the body — head, trunk and tail — as in the higher vertebrates, but there is no definite narrowing of the anterior region to form a neck such as occurs in the higher groups, though a suspicion of such a narrowing occurs in the young Lepidosiren.

1 For general anatomy of fishes, see T. W. Bridge, Cambridge Natural History, and R. Wiedersheim, Vergl. Anal, der Wirbeltiefe. The latter contains an excellent bibliography.

The tail, or postanal region, is probably a secondary develop- ment — a prolongation of the hinder end of the body for motor purposes. This is indicated by the fact that it frequently develops late in ontogeny.

The vertebrate, in correlation perhaps with its extreme cephaliza- tion, develops from before backwards (except the alimentary canal, which develops more en bloc), there remaining at the hind end for a prolonged period a mass of undifferentiated embryonic tissue from the anterior side of which the definitive tissues are constantly being developed. After development has reached the level of the anus it still continues backwards and the tail region is formed, showing a continuation of the same tissues as in front, notochord, nerve cord,

gut, myotomes. Of these the (postanal) gut soon undergoes atrophy.

Fins. — The fins are extensions of the body surface which serve for propulsion. To give the necessary rigidity they are provided with special skeletal elements, while to give mobility they are provided with special muscles. These muscles, like the other voluntary muscles of the body, are derived from the primitive myotomes and are therefore segmental in origin. The fins are divisible into two main categories — the median or unpaired fins and the paired fins.

The median fins are to be regarded as the more primitive. The fundamental structure of the vertebrate, with its median

Fig. i. — Heterocercal Tail of Acipenser. a, Modified median scales (" fulcra ") ; b, bony plates.

skeletal axis and its great muscular mass divided into segments along each side of the body, indicates that its primitive method of movement was by waves of lateral flexure, as seen in an Amphioxus. a cyclostome or an eel. The system of median fins consists in the first instance of a continuous fin-fold extend- ing round the posterior end of the body — as persists even in the adult in the existing Dipneusti. A continuous median fin-fold occurs also in various Teleosts (many deep-sea Teleosts, eels,

From "Challenger" Reports Zool., published by H.M. Stationery Office.

Fig. 3. — Chlamydoselachus . (After Giinther.)

there is a greatly increased size of the fin-fold — both dorsally and ventrally. There is further developed a highly character- istic asymmetry. In the original symmetrical or protocercal (= diphycercal) type of tail (as seen in a cyclostome, a Dipnoan and in most fish embryos) the skeletal axis of the body runs straight out to its tip — the tail fold being equally developed above and below the axis. In the highly de- veloped caudal fin of the majority of fishes, however, the fin-fold is developed to a much greater extent on the ventral side, and corre- lated with this the skeletal axis is turned upwards as in the heterocercal tail of sharks and sturgeons. The highest stage in this evolution of the caudal fin is seen in the Teleostean fishes, where the ventral tail-fold becomes developed to such an extent as to produce a secondarily symmetrical appearance (komocercal tail, fig. 4).

The sharks have been referred to as possessing heterocercal tails, but,

though this is true of the majority, within the limits of the group all three types of tail-fin occur, from the protocercal tail of the fossil Pleuracanthids and the living Chlamydoselachus to the highly developed, practically homocercal tail of the ancient Cladoselaclie (fig- 2).

The praecaudal portion of the fin-fold on the dorsal side of the body becomes broken into numerous finlets in living Crosso- pterygians, while in other fishes it disappears throughout part of its length, leaving only one, two or three enlarged portions — the dorsal fins (fig. 4, d.f.). Similarly the praecaudal part of the fin-fold ventrally becomes reduced to a single anal fin (a.f.), occasionally continued backwards by a series of finlets (Scom- bridae). In. the sucker-fishes (Remora, Echeneis) the anterior dorsal fin is metamorphosed into a sucker by which the creature attaches itself to larger fishes, turtles, &c.

The paired fins — though more recent developments than the median — are yet of very great morphological interest,

From Cambridge Natural History, vol. vii., " Fishes, &c," by permission of Messrs. Macmillan & Co., Ltd.

Fig. 2.—Cladoselache. (After Dean.)

&c), though the highly specialized features in other respects make it probable that we have here to do with a secondary return to a condition like the primitive one. In the process of segmentation of the originally continuous fin-fold we notice first of all a separation of and an increase in size of that portion of the fin which from its position at the tip of the tail region is in the most advantageous position for producing movements of the body. There is thus formed the caudal fin. In this region

From Cambridge Natural History, vol. vii. Macmillan & Co., Ltd.

Fig.

" Fishes, &c," by permission of Messrs,

4. — Tilapia dolloi, a teleostean fish, to illustrate external

features. (After Boulenger.)

A, Side view. g.r, Gill rakers.

B, First branchial arch. l.l, Lateral line organs. a.f, Anal fin. n, Nasal opening. c.f, Caudal fin. p.f, Pelvic fin.

Dorsal fin. p-op, Preoperculum. ” ,

Gill lamellae. pt.f. Pectoral fin.

l.f, l-f.

as in them we are compelled to recognize the homologues of the paired limbs of the higher vertebrates. We accordingly distinguish the two pairs of fins as pectoral or anterior and pelvic (= ” ventral”) or posterior. There are two main types of paired fin — the archiptcrygial type, a paddle-like structure supported by a jointed axis which bears lateral rays and exists in an unmodified form in Neoceratodus alone amongst living fishes, and the actinopterygial type, supported by fine raylike structures as seen in the fins of any ordinary fish. The relatively

less efficiency of the archipterygi’dm and its predominance amongst the more ancient forms of fishes point to its being the more archaic of these two types.

In the less highly specialized groups of fishes the pectoral fins are close behind the head, the pelvic fins in the region of the cloacal opening. In the more specialized forms the pelvic fins frequently show a more or less extensive shifting towards the head, so that their position is described as thoracic (fig. 4) 01 jugular (Gadus — cod, haddock, &c, fig. 5).

Fig. 5. — Burbot (Lota vulgaris), with jugular ventral fins.

The median fin, especially in its caudal section, is the main propelling organ: the paired fins in the majority of fishes serve for balancing. In the Dipneusti the paired fins are used for clambering about amidst vegetation, much in the same fashion as the limbs of Urodcles. In Ceratodus they also function as paddles. In various Teleosts the pectoral fins have acquired secondarily a leg-like function, being used for creeping or skipping over the mud {Periophthalmus ; cf. also Trigloids, Scorpaenids and Pediculati). In

the " flying " fishes the pectoral fins are greatly enlarged and are used as aeroplanes, their quivering movements frequently giving a (probably erroneous) impression of voluntary flapping movements. In the gobies and lumpsuckers (Cyclopteridae) the pelvic fins are fused to form an adhesive sucker; in the Gobiesocidae they take part in the formation of a somewhat similar sucker.

The evolutionary history of the paired limbs forms a fascinating chapter in vertebrate morphology. As regards their origin two hypotheses have attracted special attention: (1) that enunciated by Gegenbaur, according to which the limb is a modified gill septum, and (2) that supported by James K. Thacher, F. M. Balfour, St George Mivart and others, that the paired fins are persisting and modified portions of a once continuous fin-fold on each side of the body. The majority of morphologists are now inclined to accept the second of these views. Each has been supported by plausible arguments, for which reference must be made to the literature of the subject. 1 Both views rest upon the assumed occurrence of stages for the existence of which there is no direct evidence, viz. in the case of (1) transitional stages between gill septum and limb, and in the case of (2) a continuous lateral fin-fold. (There is no evidence that the lateral row of spines in the acanthodian Climatius has any other than a defensive significance.) In the opinion of the writer of this article, such assumptions are without justification, now that our knowledge of Dipnoan and Crossopterygian and Urodele embryology points towards the former possession by the primitive vertebrate of a series of projecting, voluntarily movable, and hence potentially motor structure on each side of the body. It must be emphasized that these — the true external gills — are the only organs known actually to exist in vertebrates which might readily be transformed into limbs. When insuperable objections are adduced to this having actually taken place in the course of evolution, it will be time enough to fall back upon purely hypothetical ancestral structures on which to base the evolutionary history of the limbs.

The ectoderm covering the general surface is highly glandular. In the case of the Dipneusti, flask-shaped multicellular glands like those of Amphibians occur in addition to the scattered gland cells.

A characteristic feature of glandular activity is the production of a slight electrical disturbance. In the case of Maloptcrurus this elsewhere subsidiary function of the skin has become so exaggerated as to lead to the conversion of the skin of each side of the body into a powerful electrical organ. 2 Each of these consists of some two million small chambers, each containing an electric disk and all

deriving their nerve supply from the branches of a single enormous axis cylinder. This takes its origin from a gigantic ganglion cell situated latero-dorsally in the spinal cord between the levels of the first and second spinal nerves.

Cement Organs. — The larvae of certain Teleostomes and Dipnoans possess special glandular organs in the head region for the secretion of a sticky cement by which the young fish is able to attach itself to water-plants or other objects. As a rule these are ectodermal in origin; e.g. in Lepidosiren and Proto- pterus z the crescentic cement organ lying ventrally behind the

1 Cf. J. Graham Kerr, Proc. Camb. Phil. Sor. x. 227.

2 For electric organs see W. Biedermann, Electro-Physiology.

3 J . Graham Kerr, Quart. Journ. Micr. Sci. vol. xlvi.

mouth consists of a glandular thickening of the deep layer of the ectoderm. In young ganoid fishes preoral cement organs occur. In Crossopterygians there is one cup-shaped structure on each side immediately in front of the mouth. Here the glandular epithelium is endodermal, developed 4 as an outgrowth from the wall of the alimentary canal, closely resembling a gill pouch. In Amia 5 the same appears to be the case. In a few Teleosts similar organs occur, e.g. Sarcodaces, Hyperopisus, 6 where so far as is known they are ectodermal.

Photogenic Organs.— The slimy secretion produced by the epidermal glands of fishes contains in some cases substances which apparently readily undergo a slow process of oxidation, giving out light of low wave-length in the process and so giving rise to a phosphorescent appearance. In many deep-sea fishes this property of producing light-emitting secretion has under- gone great development, leading to the existence of definite photogenic organs. These vary much in character, and much remains to be done in working out their minute structure. Good examples are seen in the Teleostean family Scopelidae, where they form brightly shining eye-like spots scattered about the surface of the body, especially towards the ventral side.

External Gills. — In young Crossopterygians and in the young Protopterus and Lepidosiren true external gills occur of the same morphological nature as those of Urodele amphibians. In Crossopterygians a single one is present on each side on the hyoid arch; in the two Dipnoans mentioned four are present

From Trans. Zool. Soc. of London.

Fig. 6. — Larva of Polypterus. (After Budgett.)

on each side — on visceral arches III., IV., V. and VI. (It may be recalled that in Urodeles they occur on arches III., IV. and V., with vestiges 7 on arches I. and II.). Each external gill develops as a projection of ectoderm with mesodermal core near the upper end of its visceral arch; the main aortic arch is prolonged into it as a loop. When fully developed it is pinnate, and is provided with voluntary muscles by which it can be moved freely to renew the water in contact with its respiratory surface. In the case of Polypterus a short rod of cartilage projects from the

From Phil. Transactions, Royal Society of London. Fig. 7. — Thirty Days' Larval Lepidosiren. (After Graham Kerr.)

hyoid arch into the base of the external gill. Their occurrence with identical main features in the three groups mentioned indicates that the external gills are important and archaic organs of the vertebrata. Their non-occurrence in at least some, of the groups where they are absent is to be explained by tlfe presence of a large vascular yolk sac, which necessarily fulfils in a very efficient way the respiratory function.

Alimentary Canal. — The alimentary canal forms a tube tra- versing the body from mouth to cloacal opening. Corresponding with structural and functional differences it is for descriptive

4 J. Graham Kerr, The Budgett Memorial Volume.

5 J. Phelps, Science, vol. N.S. ix. p. 366; J. Eycleshymer and Wilson, Amer. Journ. Anat. v. (1906) p. 154.

6 J. S. Budgett, Trans. Zool. Soc. Lond. xvi., 1901, p. 130.

7 L. Drtiner, Zool. Jahrbiicher Anat. Band xix. (1904), S. 434.

purposes divided into the following regions — (1) Buccal cavity or mouth cavity, (2) Pharynx, (3) Oesophagus or gullet, (4) Stomach,

(5) Intestine, and (6) Cloaca. The buccal cavity or mouth cavity is morphologically a stomodaeum, i.e. it represents an inpushing of the external surface. Its opening to the exterior is wide and gaping in the embryo in certain groups (Selachians and Crossopterygians), and even in the adult among the Cyclo- stomata, but in the adult Gnathostome it can be voluntarily

opened and shut in correlation with the presence of a hinged jaw apparatus. ‘ The mouth opening is less or more ventral in position in Cyclostomes and Selachians, while in Dipnoans and Teleostomes it is usually terminal.

In certain cases {e.g. Lepido- siren) 1 the buccal cavity arises by secondary excavation with- out any actual pushing in of ectoderm.

It is highly characteristic of the vertebrata that the pharynx — the portion of the alimentary canal immediately behind the buccal cavity — communicates with the ex- terior by a series of paired clefts associated with the function of respiration and known as the visceral clefts. It is especially characteristic of fishes that a number of these clefts remain open as functional breathing organs in the adult.

The visceral clefts arise as

hollow pouches (or at first solid

of the endoderm.

Each pouch fuses with the

ectoderm at its outer end and

e.ba

From Bridge, Cambridge Natural Tlislmy, „ rr . 1 v_t:„ T , c vol. vii., “Fishes, Ix.” (by permission of projection!) Macmillan & Co., Ltd.). After Boas, Lehr- bucli der Zoologie (by permission of Gustav Fischer).

Fig. 8. — Diagrams to illustrate then becomes perforated so as the relations of branchial clefts and to form a free communication pharynx in an Elasmobranch (A) between pharynx and exterior, and aleleost (B); 1, 2, &c., Bran- „,, , 1

The mesenchymatous pack- ing tissue between consecu-

chial septa. b.c, Opercular cavity. b.l, Respiratory lamellae. c, Coelom.

Opercular opening. Hyoid arch. Hyobranchial cleft.

e.b.a,

hy.a,

hv.r,

~l.s,

tive clefts forms the visceral arches, and local condensation within each gives rise to im- portant skeletal elements — to

Valvular outer edge of gill which the name visceral arches

septum. n, Nasal aperture. oes, Oesophagus. Operculum.

Palato quadrate cartilage. Ph, Pharynx. sp, Spiracle.

P-q,

is often restricted. From the particular skeletal structures which develop in the visceral arches bounding it the anterior cleft is known as the hyoman- dibular cleft, the next one as hyobranchial. In common usage the hyomandibular cleft is called the spiracle, and the series of clefts behind it the branchial clefts.

The typical functional gill cleft forms a vertical slit, having on each side a gill septum which separates it from its neighbours in the series. The lining of the gill cleft possesses over a less or greater extent of its areau richly developed network of capillary blood-vessels, through the thin covering of which the respiratory exchange takes place between the blood and the water which washes through the gill cleft. The area of respiratory surface tends to become increased by the development of outgrowths. Frequently these take the form of regular plate-like structures known as gill lamellae. In the Selachians these lamellae are strap-like structures {Elasmobranch) attached along nearly their

1)- Graham Kerr, Quart. Journ. Micr. Set. xlvi. 423.

whole length to the gill septum as shown in fig. 8, A. In the Holocephali and in the sturgeon the outer portions of the gill septa have disappeared and this leads to the condition seen in the higher

Teleostomes (fig. 8, B), where the whole of the septum has disappeared except its thick inner edge containing the skeletal arch. It follows that in these higher Teleostomes — including the ordinary Teleosts — the gill lamellae are attached only at their extreme inner end.

In the young of Selachians and certain Teleosts {e.g. Gymnarchus and Hete.rotis)- the gill lamellae are prolonged as filaments which project freely to the exterior. These must not be confused with true external gills.

The partial atrophy of the gill septa in the Teleostomes pro- duces an important change in their appearance. Whereas in the Selachian a series of separate gill clefts is seen in external view each covered by a soft valvular backgrowth of its anterior lip, in the Teleostean fish, on the other hand, a single large opening is seen on each side (opercular opening) covered over by the enormously enlarged valvular flap belonging to the an terior lip of the hyobranchial cleft. This flap, an outgrowth of the hyoid arch, is known as the operculum.

In the Teleostomi there are usually five functional clefts, but these are the survivors of a formerly greater number. Evidence of reduction is seen at both ends of the series. In front of the first functional cleft (the hyobranchial) there is laid down in the embryo the rudiment of a spiracular cleft. In the less highly organized fishes this survives in many cases as an open cleft.

In many sharks and in sturgeons the spiracle forms a conspicuous opening just behind the eye. In rays and skates, which are modified in correlation with their ground feeding habit, the spiracle is a large opening which during the great widening out of the body during development comes to be situated on the dorsal side, while the branchial clefts come to be ventral in position. In existing Crosso- pterygians the spiracle is a slit-like opening on the dorsal side of the head which can be opened or closed at will. In Dipneusti.as in the higher Teleostomes, the spiracle is found as an embryonic rudiment, but in this case it gives rise in the adult to a remarkable sense organ of problematical function. 3

Traces of what appear to be pre-spiracular clefts exist in the embryos of various forms. Perhaps the most remarkable of these is to be found in the larval Crossopterygian, 4 and ap- parently also in Amia b at least, amongst the other ganoids, where a pair of entodermal pouches become cut off from the main entoderm and, establishing an opening to the exterior, give rise to the lining of the cement organs of the

larva. Posteriorily there is evidence that the extension backwards of the series of gill clefts was much greater in the primitive fishes. In the surviving sharks (Chlamydoselachus and Nolidanus cinereus), there still exist in the adult respectively six and seven branchial clefts, while in embryonic Selachians there are frequently to be seen pouch-like outgrowths of entoderm apparently repre- senting rudimentary gill pouches but which never develop. Further evidence of the progressive reduction in the series of clefts is seen in the reduction of their functional activity at the two ends of the series. The spiracle, even where persisting in the adult, has lost its gill lamellae either entirely or excepting a few vestigial lamellae forming a " pseudobranch " oh its anterior wall (Selachians, sturgeons). A similar reduction affects the lamellae on the anterior wall of the hyobranchial cleft (except in Selachians) and on the posterior wall of the last branchial cleft.

A pseudobranch is frequently present in Teleostomes on theantcr- ior wall of the hyobranchial cleft, i.e. on the inner or posterior-face of the operculum. It is believed by some morphologists to belong really to the cleft in front. 6

Phytogeny. — The phylogeny of the gill clefts or pouches is un- certain. The only organs of vertebrates comparable with them morphologically are the enterocoelic pouches of the entoderm which

2 J. S. Budgett, op. eit.

3 W. E. Agar, Anat. Anz., 1905, S. 298.

4 J. Graham Kerr, The Budgetl Memorial Volume.

5 J. Phelps, Science, vol. N.S. ix. p. 366; J. Eycleshymer and Wilson, Amer. Journ. Anat., v. 1906, p. 154.

6 F. Maurer, Morphol. Jahrb. ix., 1884, S. 229, and xiv., 1888, S. 175.

if%

(0

,jif

j

give rise to the mesoderm. It is possible that the respiratory significance of the wall of the gill cleft has been secondarily acquired. This is indicated by the fact that they appear in some cases to be lined by an ingrowth of ectoderm. This suggests that there may have been a spreading inwards of respiratory surface from the external gills. It is conceivable that before their walls became directly respiratory the gill clefts served for the pumping of fresh water over the external gills at the bases of which they lie.

Lung. — As in the higher vertebrates, there develops in all the main groups of gnathostomatous fishes, except the Selachians, t _ an outgrowth of the pharyngeal

wall intimately associated with gaseous interchange. In the Crossopterygians and Dipnoans this pharyngeal outgrowth agrees exactly in its midventral origin and in its blood-supply with the lungs of the higher vertebrates, and there can be no question about its being morphologically the same structure as it is also in INi\ iK— ^L — j\ function.*

pJv/X In the Crossopterygian the ven-

f- -* trally placed slit-like glottis leads into a common chamber produced anteriorly into two horns and continued backwards into two " lungs." These are smooth, thin- walled, saccular structures, the right one small, the left very large and extending to the hind end of the splanchnocoele. In the Dip- noans the lung has taken a dorsal position close under the vertebral column and above the splanchno-coele. Its walls are sacculated, almost spongy in Lepidosiren and Protopterus, so as to give increase to the respiratory surface. In Nexeratodus (fig. 9) an indication of division into two halves is seen in the presence of two prominent longitudinal ridges, one dorsal and one ventral. In Lepidosiren and Protopterus the organ is completely divided except at its anterior end into a right and a left lung. The anterior portion of the lung or lungs is connected with the median ven- tral glottis by a short wide vesti- bule which lies on the right side of the oesophagus, j*

In the Teleostei the repre- sentative of the lung, here termed the swimbladder, has for its predominant function a hydro- static one; it acts as a float. It arises as a diverticulum of the gut-wall which may

retain a tubular connexion with the gut (physostomatous condition) or may in the adult completely lose such connexion (physoclislic). It shows two conspicuous differ- ences from the lung of other forms: (1) it arises in the young fish as a dorsal instead of as a ventral diverticulum, and (2) it derives its blood-supply not from the sixth aortic arch but from branches of the dorsal aorta.

These differences are held by many to be sufficient to invalidate the homologizing of the swim- bladder with the lung. The follow- ing facts, however, appear to do contention. (1) In the Dipneusti (r.g. Ncacerntndus) the lung apparatus has acquired a dorsal posi- tion, but its oinncxion with the mid-ventral glottis is asymmetrical, passing round the right side of the gut. Were the predominant

I

Fig. 9. — Lung utNeoceraiodus, opened in its lower half to show its cellular pouches, a, Right half; b, Left half; c, Cellular pouches; e, Pulmonary vein; /, Arterial blood-vessel; oe, Oesophagus, opened to show glottis (g/.)

awav with the force of such a

function of the lung in such a form to become hydrostatic we might expect the course of evolution to lead to a shifting of the glottis dorsalwards so as to bring it nearer to the definitive situation of the lung. (2) In Erythrinus and other Characinids the glottis is not mid-ventral but decidedly lateral in position, suggesting either a retention of, or a return to, ancestral stages in the dorsalward migration of the glottis. (3) The blood-supply of the Teleostean swimbladder is from branches of the dorsal aorta, which may be distributed over a long anteroposterior extent of that vessel. Embryology, however, shows that the swimbladder arises as a local- ized diverticulum. It follows that the blood-supply from a long stretch of the aorta can hardly be primitive. We should rather expect the primitive blood-supply to be from the main arteries of the pharyngeal wall, i.e. from the hinder aortic arch as is the case with the lungs of other forms. Now in Amia at least we actually find such a blood- supply, there being here a pulmonary artery corresponding with that in lung-possessing forms. Taking these points into consideration there seems no valid reason for doubting that in lung and swim- bladder we are dealing with the same morphological structure.

Function. — In the Crossopterygians and Dipnoans the lung is used for respiration, while at the same time fulfilling a hydro- static

function. Amongst the Actinopterygians a few forms still use it for respiration, but its main function is that of a float. In connexion with this function there exists an interesting compensatory mechanism whereby the amount of gas in the swimbladder may be diminished (by absorption), or, on the other hand, increased, so as to counteract alterations in specific gravity produced, e.g. by change of pressure with' change of depth. This mechanism is specially developed in physoclistic forms,where there occur certain. glandular patches (" red glands ") in the lining epithelium of the swimbladder richly stuffed with capillary blood-vessels and serving apparently to secrete gas into the swimbladder. That the gas in the swimbladder is produced by some vital process, such as secretion, is already indicated by its composition, as it may contain nearly 90% of oxygen in deep-sea forms or a similar proportion of nitrogen in fishes from deep lakes, i.e.. its composition is quite different from what it would be were it accumulated within the swimbladder by mere ordinary diffusion processes. Further, the formation of gas is shown by experiment to be controlled by branches of the vagus and sympathetic nerves in an exactly similar fashion to the secretion of saliva in a salivary gland. (See below for relations of swimbladder to ear).

Of the important non-respiratory derivatives of the pharyn- geal wall (thyroid, thymus, postbranchial bodies, &c), only the thyroid calls for special mention, as important clues to its evolutionary history are afforded by the lampreys. In the larval lamprey the thyroid develops as a longitudinal groove on the pharyngeal floor. From the anterior end of this groove there pass a pair of peripharyngeal ciliated tracts to the dorsal side of the pharynx where they pass backwards to the hind end of the pharynx. Morphologically the whole apparatus corresponds closely with the endostyle and peripharyngeal and dorsal ciliated tracts of the pharynx of Amphioxus. The corre- spondence extends to function, as the open thyroid ' groove secretes a sticky mucus which passes into the pharyngeal' cavity for the entanglement of food particles exactly as in Amphioxus. Later on the thyroid groove becomes shut off from the pharynx; its secretion now accumulates in the lumina of its interior and it functions as a ductless gland as in the Gnathostomata. The only conceivable explanation of this developmental history of the thyroid in the lamprey is that it is a repetition of phylo- genetic history.

Behind the pharynx comes the main portion of the alimentary canal concerned with the digestion and absorption of the foocVi, This forms a tube varying greatly in length, more elongated and coiled in the higher Teleostomes, shorter and straighter in the Selachians,

Dipnoans and lower Teleostomes. The oesophagus or gullet, usually forming a short, wide tube, leads into the glandular, more or less dilated stomach. This is frequently in the form of a letter J, the longer limb being con- tinuous with the gullet, the shorter with the intestine. The curve of the J may be as in Polypterus and the perch produced backwards into a large pocket. The intestine is usually marked off from the stomach by a ring-like sphincter muscle forming the

pyloric valve. In the lower gnathostomatous fishes (Selachians, Crossopterygians, Dipnoans, sturgeons) the intestine possesses the highly characteristic spiral valve, a shelf-like projection into its lumen which pursues a spiral course, and along the turns of which the food passes during the course of digestion. From its universal occurrence in the groups mentioned we conclude that it is a structure of a very archaic type, once characteristic of ancestral Gnathostomata; a hint as to its morphological signifi- cance is given by its method of development. 1 In an early stage of development the intestinal rudiment is coiled into a spiral and it is by the fusion together of the turns that the spiral valve arises. The only feasible explanation of this peculiar method of development seems to lie in the assumption that the ancestral gnathostome possessed an elongated coiled intestine which subsequently became shortened with a fusion of its coils. In the higher fishes the spiral valve has disappeared — b-'ng still found, however, in a reduced condition in Amia and)-pi- dosteus, and possibly as a faint vestige in one or two Teleosts (certain Clupeidae 2 and Salmonidae 3). In the majority of the Teleosts the absence of spiral valves is coupled with a secondary elongation of the intestinal region, which in extreme cases (Loricariidae) may be accompanied by a secondary spiral coiling. The terminal part of the alimentary canal— the cloaca — is characterized by the fact that into it open the two kidney ducts. In Teleostomes the cloaca is commonly flattened out, so that the kidney ducts and the alimentary canal come to open in- dependently on the outer surface.*

The lining of the alimentary canal is throughout the greater part of its extent richly glandular. And at certain points local enlargements of the secretory surface take place so as to form glandular

diverticula. The most ancient of these as indicated by its occurrence even in Amphioxus appears to be the liver, which, originally — as we may assume — mainly a digestive gland, has in the existing Craniates developed important excretory and glycogen-storing functions. Arising in the embryo as a simple caecum, the liver becomes in the adult a compact gland of very large size, usually bi-lobed in shape and lying in the front portion of the splanchnocoele. The stalk of the liver rudiment becomes drawn out into a tubular bile duct, which may become subdivided into branches, and as a rule develops on its course a pocket-like expansion, the gall-bladder. This may hang freely in the splanchnocoele or may be, as in many Selachians, imbedded in the liver substance.

The pancreas also arises by localized bulging outwards of the intestinal lining— there being commonly three distinct rudiments in the embryo. In the Selachians the whitish compact pancreas of the adult opens into the intestine some little distance behind the opening of the bile duct, but in the Teleostomes it becomes involved in the liver outgrowth and mixed with its tissue, being frequently recognizable only by the study of microscopic sections. In the Dipnoans the pancreatic rudiment remains imbedded in the wall of the intestine: its duct is united with that of the liver.

Pyloric Caeca. — In the Teleostomi one or more glandular diverticula commonly occur at the commencement of the intestine and are known as the pyloric caeca. There may be a single caecum (crossopterygians, Ammodytes amongst Teleosts) or there may be nearly two hundred (mackerel). In the sturgeons the numerous caeca form a compact gland. In several families of Teleosts, on the other hand, there is no trace of these pyloric caeca.

In Selachians a small glandular diverticulum known as the rectal gland opens into the terminal part of the intestine on its dorsal side.

Coelomic Organs. — The development of the mesoderm in the restricted sense (mesothelium) as seen in the fishes (lamprey, Lepidosiren, Protopterus, Polypter-us) appears to indicate beyond

1 J. Ruckert, Arch. Entwickelungsmech. Band iv., 1897, S. 298; J. Graham Kerr, Phil. Trans. B. 192, 1900, p. 325, and The Budgett Memorial Volume.

1 Cuvier et Valenciennes, Hist. nat. des poiss. xix., 1846, p. 151.

» J. Rathke, Ub. d. Darmkanal u.s.w. d. Fische, Halle, 1824, S. 62.

doubt that the mesoderm segments of vertebrates are really enterocoelic pouches in which the development of the lumen is delayed. Either the inner, or both inner and outer (e.g. Lepidosiren) walls of the mesoderm segment pass through a myoepithelial condition and give rise eventually to the great muscle segments (myomeres, or myotomes) which lie in series on each side of the trunk. In the fishes these remain distinct throughout life. The fins, both median and paired, obtain their musculature by the ingrowth into them of muscle buds from the adjoining myotomes.

Electrical Organs. 4 — It is characteristic of muscle that at the moment of contraction it produces a slight electrical disturbance. In certain fishes definite tracts of the musculature show a reduc- tion of their previ- ously predominant I function of contrac- ; p ae tion and an increase °-r

of their previously /^^^^I^A^^^^H:'^-/'

subsidiary function of i—.y^^s»^Ml^Wkm'X-x'.—fi^---t

producing electrical disturbance; so that the latter function is now predominant.

In the skates (Rata) the electrical organ is a fusiform structure derived from the lateral musculature of the tail; in Gymnotus — the electric eel — and in Mormyrus it forms an enormous structure occupying the place of the ventral halves of the myotomes along nearly the whole length of the body; in Tor- pedo it forms a large, somewhat kidney- shaped structure as

Viewed trom above Anal, der Wirbeltiere, by permission of Wilhelin

lying on each side of the Engelmann.

head and derived from FlG I0 ._ V i ew of Torpedo from the dorsal

the musculature of the side . the electric organs are exposed.

anterior visceral arches. T _ , .

In Torpedo the nerve- T }> Forebram

supply is derived from "> Mesencephalon.

cranial nerves VII. IX. l }}< Cerebellum.

and the anterior bran- IV, Electric lobe.

rhiai branches of X.

The electric organ is composed of pris- matic columns each

built up of a row of °- e < Electric organ, on the left side the

nerve-supply is shown. 0, Eye. t, Sensory tubes of lateral line system,

From Gegenbaur, Untersuch-ungen zur vergleuh.

br, Common muscular sheath covering branchial clefts (on the left side this has been removed so as to expose the series of branchial sacs). /, Spiracle.

compartments. Each compartment contains a lamellated electric disc representing the shortened-up and otherwise metamor- phosed muscle fibre. On one face (ventral in Torpedo, anterior in Rata) of the electric disc is a gigantic end-plate supplied by a beautiful, dichotomously branched, terminal nervous arborization.

The development of the mesoderm of the head region is too obscure for treatment here. 5 The ventral portion of the trunk mesoderm gives rise to the splanchnocoel or general coelom. Except in the Myxinoids the anterior part of the splanchnocoel becomes separated off as a pericardiac cavity, though in adult Selachians the separation becomes incomplete, the two cavities being in communication by a pericardio-peritoneal canal.

Nephridial System.— The kidney system in fishes consists of segmentally arranged tubes leading from the coelom into a longitudinal duct which opens within the hinder end of the enteron — the whole forming what is known as the archinephros (Lankester) or holonephros (Price). Like the other segmented

4 Cf . W. Biedermann, Electro-Physiology.

6 Literature in N. K. Koltzoff, Bull. Soc. Nat. Moscou, 190, P. 259-*

organs of the vertebrate the archinephros develops from before backwards. The sequence is, however, not regular. A small number of tubules at the head end of the series become specially enlarged

and are able to meet the excretory needs during larval existence (Pronephros) : the immediately succeeding tubules remain undeveloped, and then come the tubules of the rest of the series which form the functional kidney of the adult (Mesonepkros).

The kidney tubules subserve the excretory function in two different ways. The wall of the tubule, bathed in blood from the posterior cardinal vein, serves to extract nitrogenous pro- ducts of excretion from the blood and pass them into the lumen of the tubule. The open ciliated funnel or nephrostome at the coelomic end of the tubule serves for the passage outwards of coelomic fluid to flush the cavity of the tubule. The secretory activity of the coelomic lining is specially concentrated in certain limited areas in the neighbourhood of the nephrostomes, each such area ensheathing a rounded mass depending into the coelom and formed of a blood-vessel coiled into a kind of skein — a glomerulus. In the case of the pronephros the glomeruli are as a rule fused together into a single glomus. In the mesonephros they remain separate and in this case the portion of coelom surrounding the glomerulus tends to be nipped off from the general coelom — to form a Malpighian body. The separation may be incomplete — the Malpighian coelom remaining in connexion with the general coelom by a narrow peritoneal canal. The splanchnocoelic end of this is usually ciliated and is termed a peritoneal funnel: it is frequently confused with the nephrostome.

Mesonephros. — The kidney of the adult fish is usually a compact gland extending over a considerable distance in an anteroposterior direction and lying immediately dorsal to the coelomic cavity.

Peritoneal funnels are present in the adult of certain Selachians (e.g. Acanthias, Squatina), though apparently in at least some of these forms they no longer communicate with the Malpighian bodies or tubules. The kidneys of the two sides become fused together posteriorly in Protopterus and in some Teleosts. The mesonephric ducts undergo fusion posteriorly in many cases to form a median urinary or urinogenital sinus. In the Selachians this median sinus is prolonged forwards into a pair of horn-like continuations — the sperm sacs. In Dipnoans the sinus becomes greatly dilated and forms a large, rounded, dorsally placed cloacal caecum. In Actinopterygians a urinary bladder of similar morphological import is commonly present.

Gonads. — The portion of coelomic lining which gives rise to the reproductive cells retains its primitive relations most nearly in the female, where, as a rule, the genital cells are still shed into the

splanchnocoele. Only in Teleostomes (Lepidosteus and most Teleosts) the modification occurs that the ovary is shut off from the splanchnocoele as a closed cavity continuous with its duct.

In a few Teleosts (Salmonidae, Muraenidae, Colitis) the ovary is not a closed sac, its eggs being shed into the coelom as in other groups.

The appearance of the ovary naturally varies greatly with the character of the eggs.

The portion of coelomic lining which gives rise to the male genital cells (testis) is in nearly, if not quite, all cases, shut off from the splanchnocoele. The testes are commonly elongated in form. In Dipneusti 1 (Lepidosiren and Protopterus) the hinder portion of the elongated testis has lost its sperm-producing function, though the spermatozoa produced in the anterior portion have to traverse it in order to reach the kidney. In Polypterus 2 the testis is continued backwards as a " testis ridge," which appears to correspond with the posterior vesicular region of the testis in Lepidosiren and Protopterus. Here also the spermatozoa pass back through the cavities of the testis ridge to reach the kidney duct. In the young Teleost 3 the rud'ment of the duct forms a backward continuation of the

1 J. Graham Kerr, Proc. Zool. Soc. Lond. (1901), p. 484.

2 J. S. Budgett, Trans. Zool. Soc. Lond. xv. (1901), vol. p. 324.

8 H. F. Jungersen, Arb. zool. soot. Inst. Wiirzburg, Band ix., 1889.

m. n.u

testis containing a network of cavities and opening as a rule posteriorly into the kidney duct. It is difficult to avoid the conclusion that the testis duct of the Teleost is for the most part the equivalent morphologically of the posterior vesicular region of the testis of Polypterus and the Dipneusti.

Relations of Renal and Reproductive Organs. (1) Female. — In the Selachians and Dipnoans the oviduct is of the type (Mullerian duct) present in the higher vertebrates and apparently repre- senting a split-off portion of the archinephric duct. At its anterior end is a wide funnel-like coelomic opening. Its walls are glandular and secrete accessory coverings for the eggs. In the great majority of Teleosts and in Lepidosteus the oviduct possesses no coelomic funnel, its walls being in structural con- tinuity with the wall of the ovary. In

most of the more primitive Teleostomes (Crossopterygians, sturgeons, Amid) the oviduct has at its front end an open coelomic funnel, and it is difficult to find adequate reason for refusing to regard such oviducts as true Mullerian ducts. On this interpretation the condition characteristic of Teleosts would be due to the lips of the oviduct becoming fused with the ovarian wall, and the duct itself would be a Mullerian duct as elsewhere.

A departure from the normal arrangement is found in those Teleosts which shed their eggs into the splanchnocoele, e.g. amongst Salmonidae, the smelt (Osmerus) and capelin (Mallotus) possess a pair of oviducts resembling Mullerian ducts while the salmon possesses merely a pair of genital pores opening together behind the anus. It seems most probable that the latter condition has been derived from the former by reduction of the Mullerian ducts, though it has been argued that the con- verse process has taken place. The genital pores mentioned must not be confused with the ab- dominal pores, which in many adult fishes, par- ticularly inthose without open peritoneal funnels, lead from coelom directly to the exterior in the region of the cloacal opening. These appear to be recent develop- ments, and to have nothing to do morpho- logically with the genito-urinary system. 4

(2) Male. — It seems that primitively the male reproductive ele- ments like the female were shed into the coelom and passed thence through the nephridial tubules. In correlation probably with the greatly re- duced size of these elements they are com- monly no longer shed intothesplanchnocoele,

m.n.z.

From Arch. zool. Schleicher Frerea.

experimenlaU, by permission of

Fig. 11. — Urino-Genital Organs of the right side in a male Scyllium. (After Borcea.)

m.n. I, Anterior (genital) portion of meso- nephros with its coiled duct. m.n. 2, Posterior (renal) portion of meso- nephros. s.s, Sperm sac. T, Testis.

u, " Ureter " formed by fusion of collecting tubes of renal portion of mesonephros. u.g.s, Urino-genital sinus; v.s, Vesicula seminalis. but ate conveyed from

the testis through covered-in canals to the Malpighian bodies or kidney tubules. The system of covered-in canals forms the testicular network, the individual canals being termed vasa efferentia. In all probability the series of vasa efferentia was originally spread over the whole length of the elongated testis (cf. Lepidosteus), but in existing fishes the series is as a rule 4 E. J. Bles, Proc. Roy. Soc. 62, 1897, p. 232.

restricted to a comparatively short anteroposterior extent. In Selachians the vasa efferentia are restricted to the anterior end of testis and kidney, and are connected by a longitudinal canal ending blindly in front and behind. The number of vasa efferentia varies and in the rays (Rata, Torpedo) may be reduced to a single one opening directly into the front end of the meso- nephric duct. The anterior portion of the mesonephros is much reduced in size in correlation with the fact that it has lost its renal function. The hinder part, which is the functional kidney, is considerably enlarged. The primary tubules of this region of the kidney have undergone, a modification of high morphological interest. Their distal portions have become much elongated, they are more or less fused, and their openings into the mesonephric duct have undergone backward migration until they open together either into the mesonephric duct at its posterior end or into the urinogenital sinus independently of the mesonephric duct. The mesonephric duct is now connected only with the anterior part of the kidney, and serves merely as a vas deferens or sperm duct. In correlation with this it is somewhat enlarged, especially in its posterior portion, to form a vesicula seminalis.

The morphological interest of these features lies in the fact that they represent a stage in evolution which carried a little farther would lead to a complete separation of the definitive kidney (meta-nephros) from the purely genital anterior section of the mesonephros {epididymis), as occurs so characteristically in the Amniota.

Dipneusti. — In Lepidosiren 1 a small number (about half a dozen) of vasa efferentia occur towards the hind end of the vesicular part of the testis and open into Malpighian bodies. In Protopterus the vasa efferentia are reduced to a single one on each side at the extreme hind end of the testis.

Teleostomi. — In the actinopterygian Ganoids a well-developed testicular network is present; e.g. in Lepidosteus 2 numerous vasa efferentia arise from the testis along nearly its whole length and pass to a longitudinal canal lying on the surface of the

A ef / B

Graham Kerr, Proc. Zool. Sac. London.

Fig. 12. — Diagram illustrating Connexion between Kidney and Testis in Various Groups of Fishes.

A, Distributed condition of vasa D, Direct communication be-

efferentia (Acipenser, Lepi- dosteus).

B, Vasa efferentia reduced to a

few at the hind end (Lepi- dosiren).

C, Reduction of vasa efferentia

to a single one posteriorly (Protopterus).

tween testis and kidney duct (Polypterus,Te\eosts) . c.f, Nephrostome leading from Malpighian coelom into kidney tubule. Ti, Functional region of testis. T2, Vesicular region of testis. WD, Mesonephric duct.

kidney, from which in turn transverse canals lead to the Mal- pighian bodies. (In the case of Amia they open into the tubules or even directly into the mesonephric duct.) In the Teleosts and in Polypterus there is no obvious connexion between testis and kidney, the wall of the testis being continuous with that of its duct, much as is the case with the ovary and its duct in the female. In all probability this peculiar condition is to be

1 J. Graham Kerr, Proc. Zool. Soc. Lond. (1901) p. 484.

2 F. M. Balfour and W. N. Parker, Phil. Trans. (1882).

explained 3 by the reduction of the testicular network to a single vas efferens (much as in Protopterus or as in Raia and various anurous Amphibians at the front end of the series) which has come to open directly into the mesonephric duct (cf. fig. 12).

Organs of the Mesenchyme. — In vertebrates as in all other Metazoa,

except the very lowest, there are numerous cell elements which no longer form part of the regularly arranged epithelial layers, but which take part in the formation of the packing tissue of the body. Much of this forms the various kinds of connective tissue which fill up many of the spaces between the various epithelial layers; other and very important parts of the general mesenchyme become specialized in two definite directions and give rise to two special systems of organs. One of these is characterized by the fact that the intercellular substance or matrix assumes a more or less rigid character — it may be infiltrated with salts of lime — giving rise to the supporting tissues of the skeletal system. The other is characterized by the inter- cellular matrix becoming fluid, and by the cell elements losing their connexion with one another and forming the characteristic fluid tissue, the blood, which with its well-marked containing walls forms the blood vascular system.

Skeletal System. — The skeletal system may be considered under three headings — (1) the chordal skeleton, (2) the carti- laginous skeleton and (3) the osseous skeleton.

1. Chordal Skeleton. — The most ancient element of the skeleton appears to be the notochord — a cylindrical rod composed of highly vacuolated cells lying ventral to the central nervous system and dorsal to the gut. Except in Amphioxus — where the condi- tion may probably be secondary, due to degenerative shortening of the central nervous system — the notochord extends from a point just behind the infundibulum of the brain (see below) to nearly the tip of the tail. In ontogeny the notochord is a derivative of the dorsal wall of the archenteron. The outer layer of cells, which are commonly less vacuolated and form a " chordal epithelium," soon secretes a thin cuticle which ensheaths the notochord and is known as the primary sheath. Within this there is formed later a secondary sheath, like the primary, cuticular in nature. This secondary sheath attains a considerable thickness and plays an important part in strengthen- ing the notochord. The notochord with its sheaths is in existing fishes essentially the skeleton of early life (embryonic or larval). In the adult it may, in the more primitive forms (Cyclostomata, Dipneusti), persist as an important part of the skeleton, but as a rule it merely forms the foundation on which the cartilaginous or bony vertebral column is laid down.

2. Cartilaginous or Chondral Skeleton. — (A) Vertebral column. 4 In the embryonic connective tissue or mesenchyme lying just outside the primary sheath of the notochord there are developed a dorsal and a ventral series of paired nodules of cartilage known as arcualia (fig.

13, d.a, v.a). The dorsal arcualia are commonly prolonged upwards by supradorsal cartilages which complete the neural arches and serve to protect the spinal cord. The ventral arcualia become, in the tail region only, also incorporated in complete arches — the haemal arches. In correlation with the flattening of the body of the fish from side to side the arches are commonly prolonged into elongated neural or haemal spines.

The relations of the arcualia to the segmentation of the body, as shown by myotomes and spinal nerves, is somewhat obscure. The mesenchyme in which they arise is segmental in origin (sclerotom, which suggests that they too may have been primitively segmental, but in existing fishes there are commonly two sets of arcualia to each body segment.

In gnathostomatous fishes the arcualia play a most important part in that cartilaginous tissue derived from them comes into special relationships with the notochord and gives rise to the vertebral column which functionally replaces this notochord in most of the fishes. This replacement occurs according to two different methods, giving rise to the different types of vertebral column known as chordacentrous and arcicentrous.

s J. Graham Kerr, Proc. Zool. Soc. Lond. (1901), p. 495.

4 H. Gadow and E. C. Abbott, Phil. Trans. 186 (1895), p. 163.

(a) Chordacentrous type. An incipient stage in the evolution of a chordacentrous vertebral column occurs in the Dipneusti, where cartilage cells from the arcualia become amoeboid and migrate into the substance of the secondary sheath, boring their way through the primary sheath (fig. 13, C). They wander throughout the whole extent of the secondary sheath, colonizing it as it were, and settle down as typical stationary cartilage cells. The secondary sheath is thus converted into a cylinder of cartilage. In Selachians; exactly the same thing takes place, but in recent forms development goes a step further, as the cartilage cylinder becomes broken into a series of segments, known as vertebral centra. The wall of each segment becomes much thickened in the middle so that the notochord becomes constricted within each centrum and the space Occupied by it

n.sp, Neural spine. sh.i, Primary sheath. sh. 2, Secondary sheath. sk.l, Connective tissue. tr.p , Transverse process. v.a, Ventral arcualia.

From Wiedersheim, Grundriss der vergleichendm Anatomic, by permission Gustav Fischer.

Fig. 13.' — Diagrammatic transverse sections to illustrate the morphology of the vertebral column.

A, Primitive conditions as seen c, Centrum.

in any young embryo. _ d.a, Dorsal arcualia.

B, Condition as it occurs in n'.a, Neural arch.

Cyclostomata, sturgeons, nc, Notochord. embryos of bony Actino- nc.ep, ChQrdal epithelium pterygians.

C, Condition found in Sela-

chians and Dipnoans. D and E, Illustrating the de- velopmental process in bony Actinopterygians and higher vertebrates.

is shaped like the cavity of a dice-box. When free from noto- chord and surrounding tissues such a cartilaginous centrum presents a deep conical cavity at each end (ampMcoelous).

A secondary modification of the centrum consists in the calcifica- tion of certain zones of the cartilaginous matrix. The precise arrangement of these "calcified zones varies in different families and affords characters whichjare of taxonomic importance in palaeont- ology where only skeletal structures are available (see Selachians).

(b) Arcicentrous type. Already in the Selachians the verte- bral column is to a certain extent strengthened by the broadening of the basis of the arcualia so as partially to surround the centra. In the Teleostomes, with the exceptions of those ganoids mentioned, the expanded bases of the arcualia undergo complete fusion to form cartilaginous centra which, unlike the chorda- centrous centra, He outside the primary sheath (figs. 13, P and E). In these forms no invasion of the secondary sheath by cartilage cells takes place. ■ The composition of the groups of arcualia which give rise to the individual centrum is different in different groups. The end result is an amphicoelouSor bicon-

cave centrum in general appearance much like that of the Selachian.

In Lepidosteus the spaces between adjacent centra become filled by a secondary development of intervertebral cartilage which then splits in such a way that the definitive vertebrae are opislhocoelous, i.e. concave behind, convex in front.

Ribs, — In the Crossopterygians a double set of " ribs " is present on each side of the vertebral column, a ventral set lying immediately outside the splanchnocoelic lining and apparently serially homologous with the haemal arches of the caudal region, and a second set passing outwards in the thickness of the body wall at a more dorsal level. In the Teleostomes and Dipnoans only the first type is present; in the Selachians only the second. It would appear that it is the latter which is homologous with the ribs of vertebrates above fishes.

Median Fin Skeleton. .—The foundation of the skeleton of the median fins consists of a series of rod-like elements, the radialia, each of which frequently is segmented into three portions. In a few cases the radialia correspond segmehtally with the neural and haemal arches (living Dipnoans, Pleur acanthus tail region) and this suggests that they represent morphologically pro- longations of the neural and haemal spines. That this is sq is rendered probable by the fact that we must regard the evolution of the system of median fins as commencing with a simple flattening of the posterior part of the body. It is only natural to suppose that the edges of the flattened region would be at first supported merely by prolongations of the already existing spinous processes. In the Cyclostomes (where they are branched) and in the Selachians, the radialia form the main supports of the fin, though already in the latter they are reinforced by a new set of fin rays apparently related morphologically to the osseous or placoid skeleton (see below).

The series of radialia tends to undergo the same process of local concentration which characterizes the fin-fold as a whole. In its extreme form this leads to complete fusion of the basal portions of a nurrtber of radialia (dorsal fins of Holoptychius and various Selachians, and anal fin of Pleuracanthus) . In view of the identity in function it is not surprising that a remarkable resemblance exists between the mechanical arrangements (of skeleton, muscles, &c), of the paired and unpaired fins. The resemblance to paired fins becomes very striking in some of the cases where the basal fusion mentioned above takes place {Pleitracanihus).

(B) Chondrocraniunt 1 . — In front of the vertebral column lies' the cartilaginous trough, the chondrocraniitm, which pro- tects the brain. This consists of a praechofdal 'portion——

Ot.

Trans. Roy. Soc. Edinburgh.

Fig. 14. — Chondrocranium of a young Lepidosiren, showing the suspension of the lower jaw by the upper portion of the mandibular arch. (After Agar.)

H, Hyoid arch. g, Quadrate = upper end of mandibular

M, Mandibular arch. arch.

o.a, Occipital arch. tr, Trabecula.

ot, Auditory capsule, '<.■■.

The palato-pterygoid bar (p. pt) is represented by a faint vestige which disappears before the stage figured.

developed put of a pair of lateral cartilaginous rods — the tra- becidae cranii—und a parachordal portion lying on either side of the anterior end of the notochord. This arises in development

1 For development cf i Gaupp in Hertwig's Handbuch der Entviicke- lungsUhre.

ANATOMY]

ICHTHYOLOGY

259

from a cartilaginous rod (parachordal cartilage) lying on each side of the notochord and possibly representing a fused row of dorsal arcualia. The originally separate parachordals and trabeculae become connected to form a trough-like, primitive cranium, complete or nearly so laterally and ventrally but open dorsally. With the primitive cranium there are also connected cartilaginous capsules developed round the olfactory and auditory organs. There also become fused with the hinder

ˆ- M. c.h.

Aftti W. K. Parker, Trans. Zool. Sac. London.

B.

After Gegenbaur, Untersuchungen zur verg. Anal, der WirbelUereˆ of Wilhelm Engelmann.

.c.

After Hubrecht, Brown's Tierrcich, by permission of Gustav Fischer.
Fig. 15. — Chondrocranium, &c. of Scyllium (A), Notidanus cinereus (B) and Chimaera ©

Br. A , Branchial arches. olf,

c.h, Ceratohyal. ot,

e.p.l, Ethmopalatine ligament. P-pt>

Hm, Hyomandibular. p.s.l,

M, Meckel's cartilage. r 0, Orbit.

Olfactory capsule. Auditory capsule. Palato-pterygoid bar. Prespiracular ligament. Rostrum.

end of the cranium a varying number of originally distinct neural arches.

(C) Visceral Arches

The skeleton of the visceral arches con- sists essentially of a series of half-hoops of cartilage, each divided in the adult into a number of segments and connected with its ."ellow by a median ventral cartilage. The skeleton of arches I. and II. (mandibular and hyoidean) undergoes modifications of special interest (figs. 14 and 15), Th£ lower portion of the mandibular arch becomes greatly thickened to support the lower or hinder edge of the mouth. It forms the primitive lower jaw or " Meckel's cartilage." Dorsal to this an outgrowth arises from the anterior face of the arch which supports the upper

or anterior margin of the mouth: it is the primitive upper jaw or palato-pterygoquadrate cartilage. The portion of the arch dorsal to the palato-pterygo-quadrate outgrowth may form the suspensorial apparatus of the lower jaw, being fused with the cranium at its upper end. This relatively primitive con-arrange- ment (protostylic, as it

may be termed) occurs in Dipneusti among fishes (cf. fig. 14). More usually this dorsal part of the mandibular arch becomes reduced, its place being occupied by a ligament (pre- spiracular) uniting the jaw apparatus to the chondrocranium, the upper jaw being also attached to the chondrocranium by the ethmopalatine ligament situated more anteriorly. The main attachment, how- ever, of the jaws to the chondrocranium in such a case, as holds for the majority of fishes, is through the enlarged dorsal segment of the hyoid arch (hyomandibular) which articulates at its dorsal end with the chondrocranium, while its ventral end is attached to the hinge region of the jaw by stout ligamentous bands. A skull in which the jaws are suspended in this manner is termed a hyostylic skull (e.g. Scyllium in fig. 15).

In Notidanus (fig. 15, B) there is a large direct articulation of the upper jaw to the chondrocranium in addition to the indirect one through the hyomandibular: such a skull is amphistylic. In Heterodontus the upper jaw is firmly bound to the cranium throughout its length, while in Holocephali (fig. 15, C) complete fusion has taken place, so that the lower jaw appears to articulate directly with the cranium {" auto stylic " condition). In Dipneusti h . (Lepidosir en and Protopterus) the cartilaginous upper jaw never develops (except in its hinder quadrate por- tion) beyond the condition of a faint rudi- ment, owing doubtless to its being replaced functionally by precociously developed bone. (D) Appendicular Skeleton. — The skeleton of the free part of the limb is attached to the limb girdle which lies embedded in the musculature of the body. Each limb girdle is probably to be looked upon as consisting, like the skeleton of the visceral arches, of a pair of lateral half -hoops of cartilage. While in Fleur acanthus the lateral halves are distinct (and segmented like the branchial arches), in living Selachians generally the two halves are completely fused ventrally with one another. The part, of the girdle lying dorsal to the articulation of the limb is termed scapular in the case of the pectoral limb, iliac in the case of the pelvic, while the a 5

ventral portions are known respectively as coracoid and ischio-pubic.

In most Teleostomes the primitive pelvic girdle does not develop; in the Dipneusti it is represented by a median un- paired cartilage.

The skeleton of the free limb is probably seen in its most archaic form amongst

existing fishes in the ; biserial Fig. 17.0, Skeleton of pec

archipterygium of Ceratedus toraXlimbot Pleuracanthus. (From (fig. 16). This is indicated by Gegenbaur, after Fritsch.) 6,

Fig. 16. — Fore-limb of Ceratodus.

the

of

Skeleton

of pectoral limb of (After Gegenbaur.)

_ relative, predominance . Acanthias _ tins type of fin amongst the geologically more ancient fishes. The biserial archipterygium consists of a segmented axial rod, bearing a praeaxial and a postaxial series of jointed rays.

In Protopterus and Lepidosiren the limbs are reduced and the lateral rays have less {Protopterus) or more (Lepidosiren) completely disappeared.

l Cf. W. E. Agar, Trans. Roy. Soc. Edin. xlv. (1906), 49.

In such an archaic Selachian as Plewr acanthus the fin is clearly of the biserial archipterygial type, but the lateral rays are reduced (pectoral) or absent (pelvic) (fig. 17, a) on one side of the axis. In a typical adult Selachian the pectoral fin skeleton

From Budgett, TVaws, Zool. Soc. London, xvi, part vii. From Wiedersheim's Verg. Anal, der Wirbeltiere, by permission of Gustav Fischer.

Fig. 18. — Skeleton of Pectoral Limb of Polypterus. a, 30 mm. larva, b, Adult.

has little apparent resemblance to the biserial archipterygium — the numerous outwardly directed rays springing from a series of large basal cartilages (pro-, meso- and meta-pterygium). The condition in the young (e.g. fig. 17, b, Acanthias) hints strongly, however, at the possibility of the fin skeleton being really a modified biserial

archiptery- gium, and that the basal cartilages represent the greatly enlarged axis which has become fixed back along the side of the body. In Crossopterygians (Polypterus) the highly From Wiedersheim's peculiar fin skeleton (fig. 18) while still in tiZS: by a 'pe™issto If the embryonic cartilaginous stage is clearly Gustkv Fischer. referable to a similar condition. In the

■piG.ig. Skeleton Actinopterygians — with the increased de-

of Pectoral Fin of velopment of dermal fin rays — there comes Amia. about reduction of the primitive limb

skeleton. The axis becomes particularly reduced, and the fin comes to be attached directly to the pectoral girdle by a number of basal pieces (Teleosts) probably representing vestigial rays (cf. fig. 19).

Views on the general morphology of the fin skeleton are strongly affected by the view held as to the mode of evolution of the fins. By upholders of the lateral fold hypothesis the type of fin skeleton described for Cladoselache 1 is regarded as particularly primitive. It is, however, by no means clear that the obscure basal structures figured (Fig. 20) in this fin do not really represent the pressed back axis as in Pleur acanthus.

The pelvic fin skeleton, while built obviously on the same plan as the pectoral, is liable to much modification and frequently degeneration.

Osseous or Bony Skeleton. — The most ancient type of bony skeleton appears to be represented in the placoid elements such

as are seen in the skin of the Sela- chian (fig. 21). Each placoid element consists of a spine with a broadly expanded base embedded in the dermis. The base is composed of bone: the spine of the somewhat modified bone known as dentine. Ensheathing the tip of the spine is a layer of extremely hard enamel formed by the inner surface of the ectoderm which originally covered it. Such typical placoid

'Bashford Dean, Journ. Morph. ix. (1894) 87, and Trans. New York Acad. Set. xiii. (1894) 115.

*From Bashford Dean, Mem. *V.F. Acad, of Science.*

Fig. 20. — Skeleton of Pectoral Fin of Ciadose- lache.

Fig. 21. — Placoid elements of a male Thorn-back, Rata clavata.

scales are well seen on any ordinary skate. In the groups of fishes above the Selachians, the coating of placoid elements shows various modifications. The spines disappear, though they may be present for a time in early development. The bony basal plates tend to undergo fusion — in certain cases they form a continuous bony cuirass (various Siluroids, trunk-fishes) formed of large plates jointed together at their edges. More usually the plates are small and regular in size. In Crossopterygians and Lepidosteus and in many extinct forms the scales are of the ganoid type, being rhomboidal and having their outer layer composed of hard glistening ganoine. In other Teleostomes the scales are as a rule thin, rounded and overlapping — the so- called cycloid type (fig. 22, A); where the posterior edge shows toothlike projections the scale is termed ctenoid (fig. 22, B). In various Teleosts the scales are vestigial (eel); in others (as in most electric fishes) they have completely disappeared.

*Teeth. — Certain of the placoid elements belonging to that part of the skin which gives rise to the lining of the stomodaeum have their spines enlarged or otherwise modified to form teeth. In the majority of fishes these remain simple, conical structures : in some of the larger sharks (Carcharodon) they become flattened into trenchant blades with serrated edges; in certain rays (Myliobatis) they form a pavement of flattened plates suited for crushing molluscan shells. In the young Neoceratodus**

Fig. 22. — A, Cycloid Scale of Scopelus resplendens (magn.). Ctenoid Scale of Lethrinus (magn.).

B,

there are numerous small conical teeth, the bases of which become connected by a kind of spongework of bony trabeculae. As development goes on a large basal mass is formed which becomes the functional tooth plate of the adult, the Original separate denticles disappearing completely. In the other two surviving Dipnoans, similar large teeth exist, though here there is no longer trace in ontogeny of their formation by the basal fusion of originally separate denticles. In the Selachians the bony skeleton is restricted to the placoid elements. In the Teleostomes and the Dipnoans the original cartilaginous skeleton becomes to a great extent unsheathed or replaced by bony tissue. It seems highly probable that the more deeply seated osseous elements occurring in these as in the higher groups arose in the course of evolution by the spreading inwards of bony trabeculae from the bases of the placoid elements. Such a method has been demonstrated as occurring in individual

development in the case of certain of the more superficially placed bones. 3

The placoid element with its cap of enamel secreted by the ecto- derm is probably originally derived from a local thickening of the basement membrane which with the external cuticle may be looked on as the most ancient skeletal structure in the Metazoa. The basal plate appears to have been a later development than the spine; in the palaeozoic Coelolepidae 4 the basal plate is apparently not yet developed.

Only a brief summary can be given here of the leading features in the osteology of fishes. Care must be taken not to assume that bony elements bearing the same name in fishes and in other groups, or even in the various sub-divisions of the fishes, are necessarily strictly homologous. In all probability bony elements occupying similar positions and described by the same anatomical

2 R. Semon, Zool. Forschungsreisen, Band i. § 115.

s O. Hertwig, Arch. mikr. Anat. xi. (1874).

‘ R. H. Traquair, Trans. Roy. Soc. Edin. xxxix. (1899).

name have been evolved independently from the ancestral covering of placoid elements.

Teleostei. — It will be convenient to take as the basis of our description the bony skeleton of such a Teleostean fish as the salmon. In the vertebral column all the cartilaginous elements are replaced by bone. The haemal spines of the turned-up tip of the tail are flattened (hypural bones) and serve to support the caudal fin rays.

In Argyropelecus and in one or two deep-sea forms the vertebral column remains cartilaginous.

Apart from the ossification of the radialia which takes place in the adults of bony fishes there exist special supporting structures in the fins (paired as well as median) of all the gnathostomatous fishes and apparently in nature independent of the cartilaginous skeleton. These are known as dermal fin-rays. 1 Morphologically they are probably to be looked on (like placoid elements) as local exaggerations of the base- ment membrane.

In their detailed characters two main types of dermal fin-ray may be recognized. The first of these are horny unjointed rays and occur in the fins of Selachians and at the edge of the fins of Teleostomes (well seen in the small pos- terior dorsal or ” adipose ” fin, particularly in Siluroids). The second type of dermal fin-ray is originally arranged in pairs and forms the main supports of the fin in the adult Teleost . (fig. 23). The members of each pair are in Zoology, by permission c i ose contact except proximally where they of Messrs. Macrmlhm & sep ˆ te and embrace the tip of one of the radialia. The fin-rays of this second type are frequently branched and jointed : in other cases

they form unbranched rigid spines.

In the angler or fishing-frog (Lophius) the anterior rays of the dorsal fin become greatly elongated to form small fishing-rods, from which depend bait-like lures for the attraction of its prey.

In the skull of the adult salmon it is seen that certain parts of the chondrocranium (fig. 24) have been replaced by bone (" Cartilage bones ") while other more superficially placed bones ("membrane bones") cover its surface (fig. 25). Of cartilage bones four are developed round the foramen magnum — the basioccipital, supraoccipital and two exoccipitals. In front of

ekteth

I

From Parker & Has- lell's Text-book of

Co., Led.

Fig. 23. — One of the radialia of the salmon, consisting of three segments, pig 1 , ptg> pig 3 , and supporting a der- mal fin ray D.F.R.*

proof psph abph

From Wiedersheim, Verg. Anal, der Wirbeltiere, by permission of Gustav Fischer. Fig. 24. — -Chondrocranium of Salmon, seen from the right side.

alsph,

basocc,

ekteth,

epiot,

exocc,

opisth,

Alisphenoid.

Basioccipital.

Lateral ethmoid.

Epiotic.

Exoccipital.

Frontal.

Opisthotic.

orbsph, Orbit osphenoid.

proof,

psph,

ptero,

socc,

sphot,

vo,

Prootic.

Parasphenoid.

Pterotic.

Supra occipital.

Sphenotic.

Vomer.

the basioccipital is the basisphenoid with an alisphenoid on each side. The region (presphenoidal) immediately in front of the basisphenoid is unossified, but on each side of it an orbitosphenoid is developed, the two orbitosphenoids being closely approximated in the mesial plane and to a certain extent fused, forming the upper part of the interorbital septum. In the anterior or ethmoidal portion of the cranium the only cartilage bones arc a 1 Cf. E. S. Goodrich, Quart. Jourtt. Micr. Sci. xlvii. (1904), 465.

pair of lateral ethmoids lying at the anterior boundary of the orbit. A series of five distinct elements are ossified in the wall of the auditory

or otic capsule, the prootic and opisthotic more ventrally, and the sphenotic, pterotic and epiotic more dorsally. The roof of the cranium is covered in by the following dermal bones — parietals (on each side of the supraoccipital), frontals, dermal ethmoid and small nasals, one over each olfactory organ. The floor of the cranium on its oral aspect is ensheathed by the large parasphenoid and the smaller vomer in front of and over- lapping it. The cartilaginous lower jaw is ossified posteriorly to form the articular (fig. 25) with a small membrane bone, the angular, ventral to it, but the main part of the jaw is replaced functionally by a large membrane bone which ensheaths it — the dentary — evolved in all probability by the spreading out- wards of bony tissue from the bases of the placoid elements (teeth) which it bears. The original upper jaw (palato-pterygoid bar) is replaced by a chain of bones — palatine in front, then

sˆepiot

ZˆrTˆ branthiost

dent art J>rneop

From Wiedersheim, Verg. Anal, der Wirbelliere, by permission of Gustav Fischer,

Fig. 25. — Complete Skull of Salmon from left side.

art,

Articular.

op,

Opercular.

branchiost, Branchiostegal.

pal,

Palatine.

dent,

Dentary.

par,

Parietal.

epiot.

Epiotic.

pmx,

Premaxilla.

eth,

Dermal ethmoid.

preop,

Preopercular.

fr,

Frontal.

pt,

Pterygoid.

hyom,

Hyomandibular.

pier,

Pterotic.

intop,

Interopercular.

Quad,

Quadrate.

Jug,

Jugal.

socc,

Supraoccipital

mpt,

Mesopterygoid.

sphot,

Sphenotic.

mtpt,

Metapterygoid.

subop,

Subopercular.

mx,

Maxilla.

sympl,

Symplectic.

nas,

Nasal.

Zunge,

Tongue.

pterygoid and mesopterygoid, and posteriorly metapterygoid and quadrate, the latter giving articulation to the articular bone of the lower jaw. These representatives of the palatopterygoid bar no longer form the functional upper jaw. This function is performed by membrane bones which have appeared external to the palatopterygoid bar — the premaxilla and maxilla — which carry teeth — and the small scale-like jugal behind them. The quadrate is suspended from the skull as in the Selachians (hyo- stylic skull) by the upper portion of the hyoid arch — here represented by two bones — the hyomandibular and symplectic. The ventral portion of the hyoid arch is also represented by a chain of bones (stylohyal, epihyal, ceratohyal, hypohyal .and the ventral unpaired basihyal), as is also each of the five branchfal arches behind it. In addition to

the bony elements belonging to the hyoid arch proper a series of membrane bones support the opercular flap. Ventrally there project backwards from the ceratohyal a series of ten overlapping branchiostegal rays, while more dorsally are the broader interopercular, subopercular and opercular.

In addition to the bones already enumerated there is present a ring of circumorbital bones, a preopercular, behind and external to the hyomandibular and quadrate, and squamosal, external to the hinder end of the auditor)- capsule.

In the salmon, pike, and various other Teleosts, extensive regions of the chondrocranium persist in the adult, while in others (e.g. the cod) the replacement by bone is practically complete. Bony elements may be developed in addition to those noticed in the salmon.

In the sturgeon the chondrocranium is ensheathed by numerous membrane bones, but cartilage bones are absent. In the Crossopterygians ‘ the chondrocranium persists to a great extent in the adult, but portions of it are replaced by cartilage bones — the most interesting being a large sphenethmoid like that of the frog. Numerous membrane bones cover the chondrocranium externally. In the Dipneusti 2 the chondrocranium is strengthened in the adult by numerous bones. One of the most characteristic is the great palatopterygoid bone which develops very early by the spreading of ossification backwards from the tooth bases, and whose early development probably accounts for the non-development of the palatopterygoid cartilage.

Appendicular Skeleton. — The primitive pectoral girdle, which in the Dipneusti is strengthened by a sheath of bone, becomes in the Teleostomes reduced in size (small scapula and coracoid bones) and replaced functionally by a secondary shoulder girdle formed of superficially placed membrane bones (supraclavicular and cleithrum or ” clavicle,” with, in addition in certain cases, an infraclavicular and one or two postclavicular elements), and connected at its dorsal end with the skull by a post-temporal bone.

The pelvic girdle is in Teleostomes completely absent as a rule.

The skeleton of the free limb undergoes ossification to a less or greater extent in the Teleostomes.

In Polypterus the pectoral fin (fig. 18, B) shows three ossifications in the basal part of the fin — pro-, meso- and metapterygium. Of these the metapterygium probably represents the ossified skeletal axis: while the propterygium and also the numerous diverging radials probably represent the lateral rays of one side of the archi-pterygium.

In the Teleostomes the place of the pelvic girdle is taken functionally by an element apparently formed by the fusion of the basal portions of several radials.

Vascular System. — The main components of the blood vascular system in the lower vertebrates are the following: (1) a single or double dorsal aorta lying between the enteron and noto- chord; (2) a ventral vessel lying beneath the enteron; and (3) a series of paired hoop-like aortic arches connecting dorsal and ventral vessels round the sides of the pharynx. The blood- stream passes forwards towards the head in the ventral vessel, dorsalwards through the aortic arches, and tailwards in the dorsal aorta.

The dorsal aorta is single throughout the greater part of its extent, but for a greater or less extent at its anterior end (circulus cephalicus) it consists of two paired aortic roots. It is impossible to say whether the paired or the unpaired condition is the more primitive, general morphological conditions being in favour of the latter, while embryological evidence rather supports the former. The dorsal aorta, which receives its highly oxygenated blood from the aortic arches, is the main artery for the distribu- tion of this oxygenated blood. Anteriorly the aortic roots are continued forwards as the dorsal carotid arteries to supply the head region. A series of paired, segmentally-arranged arteries pass from the dorsal aorta to supply the muscular body wall, and the branches which supply the pectoral and pelvic fins (subclavian or brachial artery, and iliac artery) are probably specially enlarged members of this series of segmental vessels. Besides these paired vessels a varying number of unpaired branches pass from dorsal aorta to the wall of the alimentary canal with its glandular diverticula (coeliac, mesenteric, rectal).

The ventral vessel undergoes complicated changes and is represented in the adults of existing fishes by a series of important structures. Its post-anal portion comes with the atrophy of the post-anal gut to lie

close under the caudal portion of the dorsal aorta and is known as the caudal vein. This assumes a secondary connexion with, and drains its blood into, the posterior cardinal veins (see below). In the region between cloaca and liver the ventral vessel becomes much branched or even reticular and —

1 R. H. Traquair, Journ. Anat. Phys. v. (1871) 166; J. S.TBudgett, Trans. Zoo!. Soc. Land. xvi. 315.

2 T. W. Bridge, Trans. Zool. Soc. Lond. xiv. (1898) 350; W. K. Agar, op. oil.

serving to convey the food-laden blood from the wall of the enteron to the capillary network of the liver — is known as the hepatic portal vein. The short section in front of the liver is known as the hepatic vein and this conveys the blood, which has been treated by the liver, into a section of the ventral vessel, which has become highly muscular and is rhythmically contrac- tile. This enlarged muscular portion, in which the contractility — probably once common to the main vessels throughout their extent — has become concentrated, serves as a pump and is known as the heart. Finally the precardiac section of the ventral vessel— the ventral aorta — conveys the blood from heart to aortic arches.

In addition to the vessels mentioned a large paired vein is developed in close relation to the renal organ which it serves to drain. This is the posterior cardinal. An anterior prolongation (anterior cardinal) serves to drain the blood from the head region. From the point of junction of anterior and posterior cardinal a large transverse vessel leads to the heart (ductus Cuvieri).

Heart. — Originally a simple tube curved into a somewhat S-shape, the heart, by enlargements, constrictions and fusions of its parts, becomes converted into the complex, compact heart of the adult. In this we recognize the following portions — • (1) Sinus venosus, (2) Atrium, (3) Ventricle. A fourth chamber, the conus arteriosus, the enlarged and contractile hinder end of the ventral aorta, is also physiologically a part of the heart. The sinus venosus receives the blood from the great veins (ductus Cuvieri and hepatic veins). It — like the atrium which it enters by an opening guarded by two lateral valves — has thin though contractile walls. The atrium is as a rule single, but in the Dipnoans, in corre- lation with the' importance of their pulmonary breathing, it is incompletely divided into a right and a left auricle. In Neoceratodus the incomplete division is effected by the presence of a longitudinal shelf projecting into the atrial the

condition of the Conus Tn an

From Boas, Lehrbvch der Zoo\o%it, by per- mission of Gustav Fischer.

Fig. 26. — Diagram to illustrate

Elasmobranch (A), Amia (B) and a typical Teleost ©.

a, Atrium.

b.a, Bulbus aortae.

c.a, Conus arteriosus.

s.v, Sinus venosus.

v , v', Valves.

v.a, Ventral aorta.

vl, Ventricle.

cavity from its posterior wall. The opening of the sinus venosus is to the right of this shell, that of the pulmonary vein to the left. In Prototerus and Lepidosiren a nearly com- plete septum is formed by the fusion of trabeculae, there being only a minute opening in it posteriorly. The atrium opens by a wide opening guarded by two or more flap valves provided with chordae tendineae into the ventricle.

The ventricle, in correspondence with it being the main pumping apparatus, has its walls much thickened by the develop- ment of muscular trabeculae which, in the lower forms separated by wide spaces in which most of the blood is contained, become in the Teleostomes so enlarged as to give the wall a compact character, the spaces being reduced to small scattered openings on its inner surface. In the Dipnoans the ventricle, like the atrium, is incompletely divided into a right and left ventricle. In Ceratodus this is effected by an extension of the interauricular shelf into the ventricle. In Lepidosiren the separation of the two ventricles is complete but for a small perforation anteriorly, the heart in this respect showing a closer approximation to the condition in the higher vertebrates than is found in any Am- phibians or in any reptiles except the CrOcodilia. The conus arteriosus is of interest from the valvular arrangements in its interior to prevent regurgitation of blood from ventral aorta into ventricle. In their simplest condition, as seen e.g. in an embryonic*

Selachian, these arrangements consist of three, four or more prominent longitudinal ridges projecting into the lumen of the conus, and serving to obliterate the lumen when jammed

s.b.v

together by the systole of the conus. As development goes on each of these ridges becomes segmented into a row of pocket valves with their openings directed anteriorly so that regurgita- tion causes them to open out and occlude the lumen by their free edges meeting. Amongst the Teleostomes the lower ganoids show a similar development of longitudinal rows of valves in the conus. In Amia (fig.26> B), however, the conus is shoftened

and the number of valves in each longitudinal row is much reduced. This leads to the condition found in the Teleosts (fig. 26, O), where practically all trace of the conus has disappeared, a single circle of valves representing a last survivor of each rowˆsavein a few exceptional cases, e.g. -Albula, Tarpon, Ostebglossum, where two valves of each row are present).

In front of the conus vestige of the Teleost there is present a thick walled bulbus aortas differing from the conus in not being rhythmically contractile, its walls being on the contrary richly provided with elastic tissue.*

The Dipnoans l show an im- portant advance in the conus as in atrium: .&<&§. vedtricle. The conus has a d&racteristic spiral twist. Within' it fa iteoceratodus are a iiumber of longtitudinal rows of pocket valves. One of these rows is marked out by the very large size of its valves and by the fact c" r " that they are not distinct from one another but even in the adult form a continuous, spirally – running, longitudinal fold. This ridge pro- jecting into the lumen of. the conus divides it incompletely into two After Newton Parker, from Trans, channels, the one beginning {i.e. at

of the Royal Irish Academy, vol. xxx. •. , . , j\ ,i 7 r. ., -,

‘ r- , . • its hinder end) on the left side and

Fig. 27. — Venous System ,. . , ‘ ” . ,, ,, ,.

aw

of Protoplerus, as seen from

ventral side.

a. Atrium.

ac. Anterior cardinal.

an.v, Anastomotic vein.

c, Intestine.

c.v, Caudal vein.

/.!», Femoral vein.

f.b, Gall-bladder. .v, Hepatic vein. i.j.v. Inferior jugular vein. i.v.c, Posterior vena cava. k, Kidney. /, Liver. ov.v, Ovarian veins. p. Pericardium. p.c.v, Left posterior cardinal. p.v’, Parietal veins. r.p.v, Renal portal. s, Stomach. s.b.v, Subclavian.

ending in front ventrally, the other beginning on the right and ending dorsally. In Protopterus a similar condition occurs, only in. the front end of the conus a second spiral fold is present opposite the first and, meeting this, completes the division of the conus cavity into two separate parts. The rows of pocket valves which do not enter into the formation of the spiral folds are here greatly reduced.

These arrangements in the conus of the Dipnoans are of the highest morphological interest, pointing in an unmistakable way towards the condition found in the higher lung

breathing vertebrates. Of the two cavities into which the conus is partially divided in the Dipneusti the one which begins posteriorly on the right receives the (venous) blood from the right side of the heart,, and ending up anteriorly dorsal to the other cavity communicates only with aortic arches V. and VI. In the higher vertebrates this cavity has become completely split off to form the root of the pulmonary arteries, and a result of aortic arch V. receiving its blood along with the functionally much more im- portant VI. (the pulmonary arch) from this special part of the conus has been the almost complete disappearance of this arch (V.) in all the higher

vertebrates.

Arterial Systept. — There are normally six aortic arches laid down corresponding with the visceral arches, the first (mandi- 1 J. V. Boas, Morphol. Jahrb. vi. (1880).

bular) and second (hyoidean) undergoing atrophy to a less or greater extent in post-embryonic life. Where an external gill is present the aortic arch loops out into this, a kind of short- circuiting of the blood-stream taking place as the external gill atrophies. As the walls of the clefts assume their respiratory function the aortic arch becomes broken into a network of capillaries in its respiratory portion, and there is now distinguished a ventral afferent and a dorsal efferent portion of each arch. Complicated developmental changes, into which it is unnecessary to enter, 2 may lead to each efferent vessel draining the two sides of a single cleft instead of the adjacent walls of two clefts as it does primitively. In the Crossopterygians and Dipnoans as in the higher vertebrates the sixth aortic arch gives off the pulmonary artery to the lung. Among the Actino- pterygians this, probably primi- tive, blood-supply to the lung (swim-bladder) persists only in Amia.

Venous System. — The most interesting variations from the general plan outlined have to do with the arrangements of the posterior cardinals. In the Selachians these are in their anterior portion wide and sinus- like, while in the region of the kidney they become broken into a sinusoidal network supplied by the postrenal portion now known as the renal portal vein. In the Teleostomes the chief noteworthy feature is the ten- dency to asymmetry, the right posterior cardinal being fre- quently considerably larger than the left and connected with it by transverse anasto- motic vessels, the result being that most of the blood from the two kidneys passes forwards by the right posterior cardinal. The Dipnoans (fig. 27) show a similar asymmetry, but here the anterior end of the right pos- terior cardinal disappears, being replaced functionally by a new vessel which conveys the blood from the right posterior cardinal direct to the sinus venosus instead of to the outer end of the ductus Cuvieri. This new vessel is the posterior vena cava which thus in the series of vertebrates appears for the first time in the Dipneusti.

Pulmonary Veins. — In Polypterus (fig. 28) the blood is drained from the lungs by a pulmonary vein on each side which unites in front with its fellow and opens into the great hepatic vein behind the heart. In the Dipnoans the conjoined pulmonary veins open directly into the left section of the atrium as in higher forms. In the

Actinopterygians with their specialized air- bladder the blood passes to the heart via posterior cardinals, or hepatic portal, or — a probably more primitive condition — directly into the left ductus Cuvieri {Amia).

Lymphatics. — More or less irregular lymphatic spaces occur in the fishes as elsewhere and, as in the Amphibia, localized muscular developments are present forming lymph hearts. ■

Central Nervous System. — The neural tube shows in very early stages an anterior dilated portion which forms the rudiment of the brain in contradistinction to the hinder, narrower part which forms the spinal cord. This enlargement of the brain is correlated with the increasing predominance of the nerve

- *Cf. F. Hochstetter in O. Hertwig Handbuch der Entwickelungs-lehre.*

Fig. 28.- — Venous System of Polypterus 30mm. larva (dorsal view).

a.c.v, Anterior cardinal vein.

d.C, Ductus Cuvieri.

h.v. Hepatic vein.

i.j.v, Inferior jugular vein.

ir.v, Inter-renal vein.

l.v, Lateral cutaneous vein.

p.c.v, Posterior cardinal vein.

p.n, Pronephros.

Pulmonary vein.

Subclavian vein.

Sinus venosus.

Thyroid.

Vein from pharyngeal wall.

Anterior portion of left pos- terior cardinal vein.

p.v, s,

s.v, th,

centres at the anterior end of the body which tend to assume more and more complete 'control over those lying behind.

Spinal Cord. — A remarkable peculiarity occurs in the sun fishes (Molidae), where the body is greatly shortened and where the spinal cord undergoes a corresponding abbreviation so as to be actually shorter than the brain.

Brain.— It is customary to divide the brain into three main regions, fore-, mid-, and hind-brain, as in the most familiar vertebrates there is frequently seen in the embryo a division of the primitive brain dilatation into three vesicles lying one behind the other. A consideration of the development of the brain in the various main groups of vertebrates shows that these divisions are not of equal importance. In those archaic groups where the egg is not encumbered by the presence of a large mass of yolk it is usual for the brain to show in its early stages a division into two main regions which we may term the primitive fore-brain or cerebrum and the primitive hind-brain or rhombencephalon. Only later does the hinder part of the primitive fore-brain become marked off as mid-brain. In the fully developed brain it is customary to recognize the series of regions indicated below, though the boundaries between these regions are not mathematical lines or surfaces any more than are any other biological boundaries: —

_, . , , ,„. , fMyelencephalon (Medulla oblon-

Rhombencephalon (Hind-brain) -I gata).

[Metencephalon (Cerebellum). „ , ,„...._ [Mesencephalon (Mid-brain).

Cerebrum (Primitive Fore-brain W
Thalamencephalon(Diencephalon).

[[Hemispheres (Telencephalon).]

The myelencephalon or medulla oblongata calls for no special remark, except that in the case of Torpedo there is a special upward bulging of its floor on each side of the middle line forming the electric lobe and containing the nucleus of origin of the nerves to the electric organ.

The cerebellum occurs in its simplest form in lampreys and Dipnoans (fig. 29, C), where it forms a. simple band-like thickening of the anterior end of the roof of the hind-brain. In Selachians

A B

A and B from Wiedersheim, by permission of Gustav Fischer.

Fig. 29.— Brain of Scyllium (A), Salmo (B) and Lepidosiren ©. The three figures are not drawn to the same scale. cer, Cerebellum. c.h, Cerebral hemisphere. th, Thalamencephalon. f.b, Primitive fore-brain (in B the

line points to the thickened

wall of the fore-brain, the

so-called " basal ganglia "). G.p, Pineal body.

m.b, Roof of mid-brain, optic

lobes, tectum opticum. o.l, Olfactory lobe. IV.i>, Fourth ventricle.

it is very large and bulges upwards, forming a conspicuous organ in a dorsal view of the brain (fig. 29, A). In Teleosts (fig. 29, B) the cerebellum is also large. It projects back as a great tongue- like structure over the roof of the fourth ventricle, while in front it dips downwards and projects under the roof of the mid-brain forming a highly characteristic valmla cerebelli. A valmla cerebelli occurs also in ganoids, while in the Crossopterygians a similar extension of the cerebellum projects backwards into the IV. ventricle or cavity of the hind-brain (fig. 30).

The mesencephalon is a conspicuous structure in the fishes from its greatly developed roof {tectum opticum) which receives the end pencils of the optic nerve. Normally it projects upwards as a pair of large optic lobes, but in the Dipnoans (fig. 29, C) the lateral thickening is not sufficiently great to cause obvious lateral swellings

in external view.

The thalamencephalon is one of the most interesting parts of the brain from its remarkable uniformity throughout the Vertebrata. Even in Amphioxus the appearance of a sagittal section strongly suggests vestiges of a once present thalamen- cephalon. 1 The roof— like that of the myelencephalon — remains

eh. fa

C fcP)

Fig. 30.— Median Longitudinal Section through the brain of Lepidosiren and Polyplerus. In the upper figure (Lepidosiren) the habenular ganglion and hemisphere are shown in outline though not actually present in a median section.

a.c, Anterior commissure.

cer. Cerebellum.

d.s, Dorsal sac.

g.h, Habenular ganglion.

h.c, Habenular commissure.

i.g, Infundibular gland.

l.p, Lateral plexus. Optic chiasma.

par, Paraphysis. pin, Pineal body. p.c, Posterior commissure. s.v, Saccus vasculosus. t.o, Tectum opticum. f.III, Third ventricle. f.IV, Fourth ventricle. vel, Velum transversum.

pall, Pallium

to a great extent membranous, forming with the closely applied pia mater a vascular roof to the III. ventricle. Frequently a transverse fold of the roof dips down into the III. ventricle forming the velum transversum (fig. 30).

The side walls of the thalamencephalon are greatly thickened forming the thalamus (epithalamus and hypothalamus), while a ganglionic thickening of the roof posteriorly on each side forms the ganglia kabenulae which receive olfactory fibres from the base of the hemisphere. The habenular ganglia are unusually large in the

lampreys and are here strongly asymmetrical, the right being the larger.

The floor of the thalamencephalon projects downwards and backwards as the infundibulum. The side walls of this are thickened to form characteristic lobi inferiores, while the blind end develops glandular outgrowths (infundibular gland, fig. 30) overlaid by a rich development of blood sinuses and forming with them the saccus vasculosus. The optic chiasma, where present, is involved in the floor of the thalamencephalon and forms a large, upwardly-projecting ridge. Farther forwards on the floor or anterior wall is the anterior commissure (see below).

Passing forwards from the mid-brain (cf. fig. 30) a series of interesting structures are found connected with the roof of the primitive fore-brain, viz. — posterior commissure (intercalary region), pineal organ, habenular commissure with anterior parietal organ, dorsal sac (= pineal cushion), velum transversum, paraphysis. The posterior commissure is situated in the boundary between thalamencephalon and mid-brain. It is formed of

- *C. v. Kupffer, Studien 2. vergl. Entwickelunesgeschichte der Lranwten.*

fibres connecting up the right and left sides of the tectum opticum (?). The habenular or superior commissure situated farther forwards connects the two ganglia habenulae. In the immediate neighbourhood of these ganglia there project upwards two diverticula of the brain-roof known as the pineal organ and the parapineal (or anterior parietal) organ. The special interest of these organs 1 lies in the fact that in certain vertebrates one (parapineal in Sphenodon and in lizards) or both {Petromyzon) exhibit histological features which show that they must be looked on as visual organs or eyes. In gnathostomatous fishes they do not show any definite eye-like

structure, but in certain cases {Polyodon, Callichthys, &c.) the bony plates of the skull-roof are discontinuous over the pineal organ forming a definite parietal foramen such as exists in lizards where the eye-like structure is distinct. It is also usual to find in the epithelial wall of the pineal organ columnar cells which show club-shaped ends projecting into the lumen (exactly as in the young visual cells of the retina 2) and are prolonged into a root-like process at the other end. Definite nerve fibres pass down from these parietal organs to the brain. It is stated that the fibres from the pineal organ pass into the posterior commissure, those of the parapineal organ into the habenular commissure.

The facts mentioned render it difficult to avoid the conclusion that these organs either have been sensory or are sensory. Possibly they represent the degenerate and altered vestiges of eye-like organs present in archaic vertebrates, or it may be that they represent the remains of organs not eye-like in function but which for some other reason lay close under the surface of the body. It would seem natural that a diverticulum of brain- tissue exposed to the influence of light-rays should exhibit the same reaction as is shown frequently elsewhere in the animal kingdom and tend to assume secondarily the characters of a visual organ. The presence of the rod-like features in the epithelial cells is perhaps in favour of the latter view. In evolution we should expect these to appear before the camera-like structure of a highly developed eye, while in the process of degeneration we should expect these fine histological characters to go first.

Selachians. — No parapineal organ is present. The pineal body (except in Torpedo where it is absent) is in the form of a long slender tube ending in front in a dilated bulb lying near the front end of the brain in close contact with, or enclosed in, a definite foramen in the cranial roof.

Holocephali and Crossopterygii. — Here also the pineal body is long and tubular: at its origin it passes dorsalwards or slightly backwards behind the large dorsal sac.

Actinopterygian Ganoids resemble Selachians on the whole. In Amia a parapineal organ is present, and it is said to lie towards the left side and to be connected by a thick nerve with the left habenular ganglion (cf. Petromyzon, article Cyclostomata). This is adduced to support the view that the pineal and parapineal bodies represent originally paired structures.

Teleostei. — A parapineal rudiment appears in the embryo of some forms, but in the adult only the pineal organ is known to exist. This is usually short and club-shaped, its terminal part with much folded wall and glandular in character. In a lew cases a parietal foramen occurs (Callichthys, Loricaria, &c).

Dipneusti. — The pineal organ is short and simple. No parapineal organ is developed.

The dorsal sac is formed by that part of the roof of the thala-mencephalon lying between the habenular commissure and the region of the velum. In some cases a longitudinal groove is present in which the pineal organ lies (Dipneusti). In the Crossopterygians the dorsal sac is particularly large and was formerly mistaken for the pineal organ.

The velum transversam is a transverse, inwardly-projecting fold of the roof of the primitive fore-brain in front of the dorsal sac. To those morphologists who regard the hemisphere region or telencephalon as a primitively unpaired structure the velum is an important landmark indicating the posterior limit of the telencephalon. Those who hold the view taken in this article

1 Cf. F. K. Studnicka's excellent account of the parietal organs in A. Oppel's Lehrbuch vergl. mikr. Anatotnie, T. v. (1905).

- F. K. Studnicka, S.B. bohm. Gesell. (1901); J. Graham Kerr, Quart. Journ. Micr. Set. vol. xlvi., and The Budgett Memorial Volume.

that the hemispheres are to be regarded as paired outpushings of the side wall of the primitive fore-brain attribute less morpho- logical importance to the velum. Physiologically the velum is frequently important from the plexus of blood-vessels which passes with it into the III. ventricle.

In Petromyzon and Chimaera the velum is not developed. In Dipnoans there are present in its place paired transverse folds which are probably merely extensions backwards of the lateral plexuses.

The Paraphysis is a projection from the roof of the primitive fore-brain near its anterior end. It is well seen in Dipnoans 3 {Lepidosiren and Protopterus) where in the larva (exactly as in the urodele larva) it forms a blindly ending tube sloping upwards and forwards between the two hemispheres. In the adult it becomes mixed with the two lateral plexuses and is liable to be confused with them. In the other groups — except the Teleosts where it is small {Anguilla) or absent

(most Teleosts) — the paraphysis is by no means such a definite structure, but generally- there is present a more or less branched and divided diverticulum of the brain wall, frequently glandular, which is homologized with the paraphysis. The morphological signifi- cance of the paraphysis is uncertain. It may represent the remains of an ancient sense organ, or it may simply represent the last connexion between the brain and the external ectoderm from which it was derived.

An important derivative of the primitive fore-brain is seen in the pair of cerebral hemispheres which in the higher verte- brates become of such relatively gigantic dimensions. The hemispheres appear to be primitively associated with the special sense of smell, and they are prolonged anteriorly into a pair of olfactory lobes which come into close relation with the olfactory organ. From a consideration of their adult relations and of their development — particularly in those groups where there is no disturbing factor in the shape of a large yolk sac- it seems probable that the hemispheres are primitively paired outpushings of the lateral wall of the primitive fore-brain 4 — in order to give increased space for the increased mass of nervous matter associated with the olfactory sense. They are most highly developed in the Dipneusti amongst fishes. They are there (cf . fig. 29, C) of relatively enormous size with thick nervous floor (corpus striatum) and side walls and roof (pallium) surround- ing a central cavity (lateral ventricle) which opens into the third ventricle. At the posterior end of the hemisphere a small area of its wall remains thin and membranous, and this becomes pushed into the lateral ventricle by an ingrowth of blood-vessel to form the huge lateral plexus (= plexus hemisphaerium) . In this great size of the hemispheres 6 and also in the presence of a rudimentary cortex in the Dipnoi we see, as in many other features in these fishes, a distinct foreshadowing of conditions occurring in the higher groups of vertebrates. The Cyclostomes possess a distinct though small pair of hemispheres. In the Selachians the relatively archaic Notidanidae 6 possess a pair of thick-walled hemispheres, but in the majority of the members of the group the paired condition is obscured (fig. 29, A).

In the Teleostomes the mass of nervous matter which in other groups forms the hemispheres does not undergo any pushing outwards except as regards the small olfactory lobes. On the contrary, it remains as a great thickening of the lateral wall of the thalamencephalon (the so-called basal ganglia) , additional space for which, however, may be obtained by a considerable increase in length of the fore-brain region (cf. fig. 30, A) or- by actual involution into the third ventricle (Polypterus). 1 Tne great nervous

thickenings of the thalamencephalic wall bulge into its cavity and are covered over by the thin epithelial roof of the thalamencephalon which is as a consequence liable to be confused with the pallium or roof of the hemispheres with which it has nothing to do : the homologue of the pallium

3 J. Graham Kerr, Quart. Journ. Micr. Sci. vol. xlvi.

4 F. K. Studnicka, S.B. bohm. Gesell. (1901); J. Graham Kerr, Quart. Journ. Micr. Sci. vol. xlvi., and The Budgett Memorial Volume.

5 G. Elliot Smith, Anat. Am. (1907).

6 F. K. Studnicka, S.B. bohm. Gesell. (1896).

7 J. Graham Kerr. The Budgett Memorial Volume.

as of other parts of the hemisphere is contained within the lateral thickening of the thalamencephalic wall, not in its membranous roof. 1

Associated with the parts of the fore-brain devoted to the sense of smell (especially the corpora striata) is the important system of bridging fibres forming the anterior commissure which lies near the anterior end of the floor, or in the front wall of the primitive fore-brain. It is of great interest to note the appearance in the Dipnoans (Lepidosiren and Protopterus) of a corpus callosum (cf. fig. 30 B) lying dorsal to the anterior commissure and composed of fibres connected with the pallial region of the two hemispheres.

Sense Organs.— The olfactory organs are of special interest in the Selachians, where each remains through life as a widely- open, saccular involution of the ectoderm which may be pro- longed backwards to the margin of the buccal cavity by an open oronasal groove, thus retaining a condition familiar in the embryo of the higher vertebrates. In Dipnoans the olfactory organ communicates with the roof of the buccal cavity by definite posterior nares as in the higher forms— the communicat- ing passage being doubtless the morphological equivalent of the oronasal groove, although there is no direct embrvological evidence for this. In the Teleostomes the olfactory organ varies from a condition of great complexity in the

Crossopterygians down to a condition of almost complete atrophy in certain Teleosts (Plectognathi). 2

The eyes are usually of large size. The lens is large and spheri- cal and m the case of most Teleostomes accommodation for distant vision is effected by the lens being pulled bodily nearer the retina. This movement is brought about by the contraction of smooth muscle fibres contained in the processus falciformis a projection from the choroid which terminates in contact with the lens in a swelling, the campanula Halleri. In Amia and in Teleosts a network of capillaries forming the so-called choroid gland surrounds the optic nerve just outside the retina As a rule the eyes of fishes have a silvery, shining appearance due to the deposition of shining flakes of guanin in the outer layer of the choroid (Argentea) or, in the case of Selachians in the inner layers (tapetum). Fishes which inhabit dark recesses e.g. of caves or of the deep sea, show an enlargement, or more frequently, a reduction, of the eyes. Certain deep-sea Teleosts possess remarkable telescopic eyes with a curious asymmetrical development of the retina. 3

The otocyst or auditory organ agrees in its main features with that of other vertebrates. In Selachians the otocyst remains in the adult open to the exterior by the ductus endolym- phahcus. In Squatina this is unusually wide and correlated- with this the calcareous otoconia are replaced by sand-grains from the exterior. In Dipnoans (Lepidosiren and Protopterus) curious outgrowths arise from the ductus endolymphaticus and come to overlie the roof of the fourth ventricle, recalling the somewhat similar condition met with in certain Amphibians In various Teleosts the swim-bladder enters into intimate relations with the otocyst. In the simplest condition these relations consist in the prolongation forwards of the swim-bladder as a blindly ending tube on either side the blind end coming into direct contact either with the wall of the otocyst itself or with the fluid surrounding it (penlymphHhrough a gap in the rigid periotic capsule. A wave of compression causing a slight inward movement of the swim-bladder wall will bring about a greatly magnified movement of that part of the wall which is not in relation with the external medium, viz the part in relation with the interior of the auditory capsule In this way the perception of delicate sound waves may be rendered much more perfect In the Ostariophysi (Sagemehl), including the Cyprimdae, the Sdundae, the Charaanidae and the Gymnotidae, a physiologically similar connexion between swim-bladder andotocvst is brought about by the intervention of a chain of auditory ossicles (YVebenan ossicles) formed by modification of the anterior vertebrae. 6 *F. K. Studnicka, S.B. bohm. Gesell. (1901); T. Graham*

*VJtuJ Journ – Micr – Sci – xlvi – and ™ s « *^«*3*

(1887) Wiedersheim ‘ Kolliker’s Festschrift: cf. also Anat. Am.

‘ A. Brauer, Verhandl. deutsch. zool. Gesell. (1902)

*! -• = tewart – Journ. Linn. Soc. Zool. (1006), 4*0*

■T. W. Bridge and A. C. Haddon, Phil. TranI 184 (1893).

[ANATOMY

Lateral Line Organs— Epidermal sense buds are scattered about in the ectoderm of fishes. A special arrangement of these in lines along the sides of the body and on the head region form the highly characteristic sense organs of the lateral line system. In Lepidosiren these organs retain their superficial position; in other fishes they become sunk beneath the surface into a groove, which may remain open (some Selachians), but as a rule becomes closed into a tubular channel with openings at intervals. It has been suggested that the function of this system of sense organs is connected with the perception of vibratory disturbances of comparatively large wave length in the surrounding medium.*

Peripheral Nerves— -In the Cyclostomes the dorsal afferent and ventral efferent nerves are still, as in Amphioxus, independent, but in the gnathostomatous fishes they are, as in the higher vertebrates, combined together into typical spinal nerves.

As regards the cranial nerves the chief peculiarities of fishes relate to (1) the persistence of the branchial clefts and (2) the presence of an elaborate system of cutaneous sense organs supplied by a group of nerves {lateralis) connected with a centre in the brain which develops in continuity with that which receives the auditory nerve. These points may be exemplified by the arrangements in Selachians (see fig. 31). I., II., III., IV. and VI. call for no special remark.

Trigeminus (V.) .—The ophthalmicus profundus branch {op. p.)— which probably is morphologically a distinct cranial nerve—

op-f-VB 2VMVT

m 1 -m

From Bridge Cambridge Natural History, vol. vii. “Fishes” (bv Dermksion nf

1 FlG ,! 3{ —Diagram of Cranial nerves of a Fish. Cranial nerves and branchial clefts are numbered with Roman figures. Trigeminus black; Facialis dotted; Lateralis oblique shading; Glossopharyn geal cross-hatched ; Vagus white. bucc, Buccal. mx> Maxillary.

c, Commissure between pre- oc, Occipitospinal.

and postauditory parts of ol.o, Olfactory organ.

lateralis system. p.p, Ophthalmicus profundus.

d.r, Dorsal roots of spinal nerves, op.s, Ophthalmicus superficial g.g, Gassenan ganglion. p n , Palatine

gn.g, (Geniculate) ganglion of pa., Palatopterygo-quadrate 1. „ ,., , cartilage.

*hy, Hyomandibular. *, Spiracle.*

j.n.X, Lateralis vagi. stf Supra-temporal branch of

'a Motor branches of hy. lateralis system.

™^ Mandibukr. La , Lateralis centre in brain. ,

md.ex, External mandibular. v .n, Visceral nerve

mk.c, Meckel's cartilage. v .r, Ventral roots. "

passes forwards along the roof of the orbit to the skin of the snout. As it passes through the orbit it gives off the long ciliary nerves to the eyeball, and is connected with the small ciliary ganglion (also connected with III.) which in turn gives off the short ciliary nerves to the eyeball. The ophthalmicus superficiahs (cut short in the figure) branch passes from the root ganglion of V. (Gasserian ganglion), and passes also over the orbit to the skin of the snout. It lies close to, or completely fused with, the corresponding branch of the lateralis system. _ The mam trunk of V. branches over the edge of the mouth into the maxillary (mx.) and mandibular (md.) divisions, the former, like the two branches already mentioned, purely sensory the latter mixed— supplying the muscles of mastication as well as the teeth of the lower jaw and the lining of the buccal floor The main trunk of the Facialis (VII.) bifurcates over the J F (?l ˆ erature of kteral line organs see Cole, Trans. Linn. Soc.

VII. ˆIoˆoˆ.

spiracle into a prespiracular portion— the main portion of which passes to the mucous membrane of the palate as the palatine (pnWl.) — and a postspiracular portion, the hyomandibular {hy.) trunk which supplies the muscles of the hyoid arch and also sends a few sensory fibres to the lining of the spiracle, the floor of mouth and pharynx and the skin of the lower jaw. Combined with the main trunk of the facial are branches belong- ing to the lateralis system.

Lateralis Group of Nerves. — The lateralis group of nerves are charged with the innervation of the system of cutaneous sense organs and are all connected with the same central region in the medulla. A special sensory area of the ectoderm becomes involuted below the surface to form the otocyst, and the nerve fibres belonging to this form the auditory nerve (VIII.). Other portions of the lateralis group become mixed up with various other cranial nerves as follows:

(a) Facial portion.

(1) Ophthalmicus superficialis {op.s.Yll.): passes to lining of nose or to the lateral line organs of the dorsal part of snout.

(2) Buccal (bucc.VU.) : lies close to maxillary division of V. and passes to the sensory canals of the lower side of the snout.

(3) External mandibular (md.ex.): lies in close association with the mandibular division of V., supplies the sensory canals of the lower jaw and hyoid region.

Lateralis vagi (/.m.X.) becomes closely associated with the vagus. It supplies the lateral line organs of the trunk.

In the lamprey and in Dipnoans the lateralis vagi loses its superficial position in the adult and comes into close relation with the notochord.

In Actinopterygians and at least some Selachians a lateralis set of fibres is associated with IX., and in the former fishes a con- spicuous trunk of lateralis fibres passes to some or all (Gadus) of the fins. This has been called the lateralis accessorius and is apparently connected with V., VII., IX., X. and certain spinal nerves. 1

Vagus Group (IX., X., XI.). — The glossopharyngeus (IX.) forks over the first branchial cleft (pretrematic and post-trematic branches) and also gives off a palatine branch {pn.lX.). In some cases (various Selachians, Ganoids and Teleosts) it would seem that IX. includes a few fibres of the lateralis group.

Vagus (X.) is shown by its multiple roots arising from the medulla and also by the character of its peripheral distribution to be a compound structure formed by the fusion of a number of originally distinct nerves. It consists of (1) a number of branchial branches (X. 1 X. 2 &c), one of which forks over each gill cleft behind the hyobranchial and which may (Selachians) arise by separate roots from the medulla; (2) an intestinal branch (v.n.X.) arising behind the last branchial and innervating the vail of the oesophagus and stomach and it may be even the intestine throughout the greater part of its length (Myxine).

The accessorius (XI.) is not in fishes separated as a distinct nerve from the vagus.

With increased development of the brain its hinder portion, giving rise to the vagus system, has apparently come to encroach on the anterior portion of the spinal cord, with the result that a number of spinal nerves have become reduced to a less or more vestigial condition. The dorsal roots of these nerves disappear entirely in the adult, but the ventral roots persist and are, to be seen arising ventrally to the vagus roots. They supply certain muscles of the pectoral fins and of the visceral arches and are known as spino-occipital nerves. 2

These nerves are divisible into an anterior more ancient set — the occipital nerves — and a posterior set of more recent origin — (occipito- spina! nerves). In Selachians 1-5 pairs of occipital nerves alone are recognizable: in Dipnoans 2-3 pairs of occipital and 2-3 pairs of occipito-spinal: in Ganoids 1-2 pairs occipital and 1-5 pairs occipito- spinal ; in Teleosts finally the occipital nerves have entirely dis- appeared while there are 2 pairs of occipito-spinal. In Cyclostomes no special spino-occipital nerves have been described.

The fibres corresponding with those of the Hypoglossus (XII.) of higher vertebrates spring from the anterior spinal nerves,

1 For literature of lateral line organs see Cole, Trans. Linn. Soc, vii. (1898).

2 M. Fiirbringer in Gegenbaur's Festschrift (1S96).

which are here, as indeed in Amphibia, still free from the cranium.

Sympathetic. — The sympathetic portion of the nervous system does not in fishes attain the same degree of differentiation as in the higher groups. In Cyclostomes it is apparently re- presented by a fine plexus with small ganglia found in the neighbourhood of the dorsal aorta and on the surface of the heart and receiving branches from the spinal nerves. In Selachians also a plexus occurs in the neighbourhood of the cardinal veins and extends over the viscera: it receives visceral branches from the anterior spinal nerves. In Teleosts the plexus has become condensed to form a definite sympathetic trunk on each side, extending forwards into the head and communicating with the ganglia of certain of the cranial nerves. (J. G. K.)

V. Distribution in Time and Space

The origin of Vertebrates, and how far back in time they extend, is unknown. The earliest fishes were in all probability devoid of hard parts and traces of their existence can scarcely be expected to be found. The hypothesis that they may be derived from the early Crustaceans, or Arachnids, is chiefly based on the somewhat striking resemblance which the mailed fishes of the Silurian period (Ostracodermi) bear to the Arthropods of that remote time, a resemblance, however, very superficial and re- garded by most morphologists as an interesting example of mimetic resemblance — whatever this term may be taken to mean. The minute denticles known as conodonts, which first appear in the Ordovician, were once looked upon as teeth of Cyclostomes, but their histological structure does not afford any support to the identification and they are now generally dismissed altogether from the Vertebrates. As a compensation the Lower Silurian of Russia has yielded small teeth or spines which seem to have really belonged to fishes, although their exact affinities are not known (Palaeodus and Archodus of J. V. Rohon).

It is not until we reach the Upper Silurian that satisfactory remains of unquestionable fishes are f ound,and here they suddenly appear in a considerable variety of forms, very unlike modern fishes in every respect, but so highly developed as to convince us that we have to search in much earlier formations for their ancestors. These Upper Silurian fishes are the Coelolepidae, the Ateleaspidae, the Birkeniidae, the Pteraspidae, the Tremata- spidae and the

Cephalaspidae, all referred to the Ostracophori. The three last types persist in the Devonian, in the middle of which period the Osteolepid Crossopterygii, the Dipneusti and the Arthrodira suddenly appear. The most primitive Selachian (Cladoselache) , the Acanthodian Selachians (Diplacanthidae) , the Chimaerids (Ptyctodus) , and the Palaeoniscid ganoids (Chirolepis) appear in the Upper Devonian, along with the problematic Palaeospondylus.

In the Carboniferous period, the Ostracophori and Arthrodira have disappeared, the Crossopterygii and Dipneusti are still abun- dant, and theSeIachians(P/ewra<;aKˆw.s,Acanthodians,truesharks) and Chondrostean ganoids (Palaeoniscidae and Platysomidae) are predominant. In the Upper Permian the Holostean ganoids (Acantkophorus) make their appearance, and the group becomes dominant in the Jurassic and the Lower Cretaceous. In the Trias, the Crossopterygii and Dipneusti dwindle in variety and the Ceratodontidae appear; the Chondrostean and Holostean ganoids are about equally represented, and are supplemented in the Jurassic by the first, annectant representatives of the Teleostei {Pholidophoridae, Leptolepidae) . In the latter period, the Holostean ganoids are predominant, and with them we find numerous Cestraciont sharks, some primitive skates (Squatinidae and Rhinobatidae) , Chimaerids and numerous Coelacanthid crossopterygians.*

The fish-fauna of the Lower Cretaceous is similar to that of the Jurassic, whilst that of the Chalk and other Upper Cretace- ous formations is quite modern in aspect, with only a slight admixture of Coelacanthid crossopterygians and Holostean ganoids, the Teleosteans being abundantly represented by Elopidae, Albulidae, Halosauridae, Scopelidae and Berycidae,

many being close allies of the present inhabitants of the deep sea. At this period the spiny-rayed Teleosteans, dominant in the seas of the present day, made their first appearance.

With the Eocene, the fish-fauna has assumed the essential character which it now bears. A few Pycnodonts survive as the last representatives of typically Mesozoic ganoids, whilst in the marine

deposits of Monte Bolca (Upper Eocene) the principal families of living marine fishes are represented by genera identical with or more or less closely allied to those still exist- ing; it is highly remarkable that forms so highly specialized as the sucking-fish or remoras, the flat-fish {Pleuronectidae) , the Pediculati, the Plectognaths, &c, were in existence, whilst in the freshwater deposits of North America Osteoglossidae and Cichlidae were already represented. Very little is known of the freshwater fishes of the early Tertiaries. What has been pre- served of them from the Oligocene and Miocene shows that they differed very slightly from their modern representatives. We may conclude that from early Tertiary times fishes were practically as they are at present. The great hiatus in our know- ledge lies in the period between the Cretaceous and the Eocene. At the present day the Teleosteans are in immense pre- ponderance, Selachians are still well represented, the Chondro- stean ganoids are confined to the rivers and lakes of the temperate zone of the northern hemisphere (Acipenseridae, Polyodontidae), the Holostean ganoids are reduced to a few species {Lepidosteus, Amia) dwelling in the fresh waters of North America, Mexico and Cuba, the Crossopterygians are represented by the isolated group Polypteridae, widely different from any of the known fossil forms, with about ten species inhabiting the rivers and lakes of Africa, whilst the Dipneusti linger in Australia (Neocera- todus), in South America (Lepidosiren) , and in tropical Africa (Prolopterus). The imperfections of the geological record pre- clude any attempt to deal with the distribution in space as regards extinct forms, but several types, at present very re- stricted in their habitat, once had a very wide distribution. The Ceratodontidae, for instance, of which only one species is now living, confined to the rivers of Queensland, has left remains in Triassic, Rhaetic, Jurassic and Cretaceous rocks of Europe, North America, Patagonia, North and South Africa, India and Australia; the Amiidae and Lepidosteidae were abundant in Europe in Eocene and Miocene times; the Osteoglossidae, now living in Africa, S.E. Asia and South America, occurred in North America and Europe in the Eocene.

In treating of the geographical distribution of modern fishes, it is necessary to distinguish between fresh-water and marine forms. It is, however, not easy to draw a line between these categories, as a large number of forms are able to accommodate themselves to either fresh or salt water, whilst some periodically migrate from the one into the other. On the whole, fishes may be roughly divided into the following categories: —

I. Marine fishes. A. shore-fishes; B. pelagic fishes; C.

deep-sea fishes.

II. Brackish-water fishes.

III. Fresh-water fishes.

IV. Migratory fishes. A. anadromous (ascending fresh waters

to spawn); B. catadromous (descending to the sea to spawn).

About two-thirds of the known recent fishes are marine. Such are nearly all the Selachians, and, among the Teleosteans, all the Heteromi, Pediculati and the great majority of Apodes, Thoracoslei, Percesoces, Anacanthini, Acanthopterygii and Plecto- gnalhi. All the Crossopterygii, Dipneusti, Opisthomi, Sym- branchii, and nearly all the Ganoidei and Oslariophysi are con- fined to fresh-water.

The three categories of marine fishes have thus been defined by Gunther: —

" I. Shore Fishes — that is, fishes which chiefly inhabit parts of the sea in the immediate neighbourhood of land either actually raised above, or at least but little submerged below, the surface of the water. They do not descend to any great depth, — very few to 300 fathoms, and the majority live close to the surface. The distribution of thesr fishes is determined, not only by the temperature of the sur- face water, but also by the nature of the- adjacent land and its animal

and vegetable products, — some being confined to flat coasts with soft or sandy bottoms, others to rocky and fissured coasts, others to living coral formations. If it were not for the frequent mechanical and involuntary removals to which these fishes are exposed, their dis- tribution within certain limits, as it no doubt originally existed, would resemble still more that of freshwater fishes than we find it actually does at the present period.

2. Pelagic Fishes — that is, fishes which inhabit the surface and uppermost strata of the open ocean, and approach the shores only accidentally or occasionally (in search of prey), or periodically (for the purpose of spawning). The majority spawn in the open sea, their ova and young being always found at a great distance from the shore. With regard to their distribution, they are still subject to the influences of light and the temperature of the surface water; but they are independent of the variable local conditions which tie the shore fish to its original home, and therefore roam freely over a space

which would take a freshwater or shore fish thousands of years to cover in its gradual dispersal. Such as are devoid of rapidity of motion are dispersed over similarly large areas by the oceanic currents, more slowly than the strong swimmers, but not less surely. An accurate definition, therefore, of their distribution within certain areas equivalent to the terrestrial regions is much less feasible than in the case of shore fishes.

3. Deep-Sea Fishes — that is, fishes which inhabit such depths of the ocean that they are but little or not at all influenced by light or the surface temperature, and which, by their organization, are prevented from reaching the surface stratum in a healthy condition. Living almost under identical tellurian conditions, the same type, the same species, may inhabit an abyssal depth under the equator as well as one near the arctic or antarctic circle; and all that we know of these fishes points to the conclusion that no separate horizontal regions can be distinguished in the abyssal fauna, and that no division into bathymetrical strata can be attempted on the base of generic much less of family characters."

A division of the world into regions according to the distribu- tion of the shore-fishes is a much more difficult task than that of tracing continental areas. It is possible perhaps to dis- tinguish four great divisions: the Arctic region, the Atlantic region, the Indo-Pacific region and the Antarctic region. The second and third may be again subdivided into three zones: Northern, Tropical and Southern. This appears to be. a more satisfactory arrangement than that which has been proposed into three zones primarily, each again subdivided according to the different oceans. Perhaps a better division is that adopted by D. S. Jordan, who arranges the littoral fishes according to coast lines; we then have an East Atlantic area, a West Atlantic, an East Pacific and a West Pacific, the latter including the coasts of the Indian Ocean. The tropical zone, whatever be the ocean, is that in which fishes flourish in greatest abundance and where, especially about coral-reefs, they show the greatest variety of bizarre forms and the most gorgeous coloration. The fish-fauna of the Indo-Pacific is much richer than that of the Atlantic, both as regards genera and species.

As regards the Arctic and Antarctic regions, the continuity or circumpolar distribution of the shore fishes is well established. The former is chiefly characterized by its Cottids, Cyclopterids, Zoarcids and Gadids, the latter by its Nototheniids. The theory of bipolarity receives no support from the study of the fishes.

Pelagic fishes, among which we find the largest Selachians and Teleosteans, are far less limited in their distribution, which, for many species, is nearly world-wide. Some are dependent upon currents, but the great majority being rapid swimmers able to continue their course for weeks, apparently without the.necessity of rest (many sharks, scombrids, sword-fishes), pass from one ocean into the other. Most numerous between the tropics, many of these fishes occasionally wander far north and south of their habitual range, and there are few genera that are at all limited in their distribution.

Deep-sea fishes, of which between seven hundred and eight hundred species are known, belong to the most diverse groups and quite a number of families are exclusively bathybial (Chla- mydoselachidae, Stomiatidae, Alepocephaiidae, Nemichthyidae, Synaphobranchidae, Saccopharyngidae, Cetomimidae, Halosau- ridae, Lipogenyidae, Notacanthidae, Chiasmodontidae, Icosteidae, Muraenolepididae, Macruridae, Anomaiopidae, Podatelidae, Trachyptcridae, Lophotidae, Ceraliidae, Gigantactinidae). But they arc all comparatively slight modifications of the forms living on the surface of the sea or in the shallow parts, from

which they may be regarded as derived. In no instance do these types show a structure which may be termed archaic when compared with their surface allies. That these fishes are localized in their vertical distribution, between the 100-fathoms line, often taken as the arbitrary limit of the bathybial fauna, and the depth of 2750 fathoms, the lowest point whence fishes have been procured, there is little doubt. But our knowledge is still too fragmentary to allow of any general conclusions, and the same applies to the horizontal distribution. Yet the same species may occur at most distant points; as these fishes dwell beyond the influence of the sun's rays, they are not affected by temperature, and living in the Arctic zone or under the equator makes little difference to them. A great deal of evidence has been accumulated to show the gradual transition of the surface into the bathybial forms; a large number of surface fishes have been met with in deep water (from 100 to 500 falhoms), and these animals afford no support to Alexander Agassiz's supposi- tion of the existence of an azoic zone between the 200-fathoms line and the

bottom.

Brackish-water fishes occur also in salt and fresh water, in some localities at least, and belong to various groups of Teleo- steans. Sticklebacks, gobies, grey mullets, blennies are among the best-known examples. The facility with which they accom- modate themselves to changes in the medium in which they live has enabled them to spread readily over very large areas. The three-spined stickleback, for instance, occurs over nearly the wdiole of the cold and temperate parts of the northern hemisphere, whilst a grey mullet (Mugil capito) ranges without any appreciable difference in form from Scandinavia and the United States along all the Atlantic coasts to the Cape of Good Hope and Brazil. It would be hardly possible to base zoo-geographical divisions on the distribution of such forms.

The fresh-water fishes, however, invite to such attempts. How greatly their distribution differs from that of terrestrial animals has long ago been emphasized. The key to their mode of dispersal is, with few exceptions, to be found in the hydro- graphy of the continents, latitude and climate, excepting of course very great altitudes, being inconsiderable factors, the fish-fauna of a country deriving its character from the head- waters of the river-system which flows through it. The lower Nile, for instance, is inhabited by fishes bearing a close resem- blance to, or even specifically identical with, those of tropical Africa, thus strikingly contrasting with the land-fauna of its banks. The knowledge of the river-systems is, however, not sufficient for tracing areas of distribution, for we must bear in mind the movements which have taken place on the surface of the earth, owing to which present conditions may not have existed within comparatively recent times, geologically speaking; and this is where the systematic study of the aquatic animals affords scope for conclusions having a direct bearing on the physical geography of the near past. It is not possible here to enter into the discussion of the many problems which the dis- tribution of fresh-water fishes involves; we limit ourselves to an indication of the principal regions into which the world may be divided from this point of view. The main divisions proposed by Giinther in the oth edition of the Encyclopaedia Britaunica still appear the most satisfactory. They are as follows: —

I. The Northern Zone or Holarctic Region. — Characterized by Acipenseridae. Few Siluridae. Numerous Cyprinidae, Salmon- idae, Hsocidae, Percidae.

1. Europaeo- Asiatic or Palaearctic Region. Characterized by

absence of osseous Ganoidei ; Cobitinae and Barbus numerous.

2. North American or Nearctic Region. Characterized by osseous

Ganoidei and abundance of Catostominae; but no Cobitinae or Barbus. II. The Equatorial Zone. — Characterized by the development of Siluridae.

A. Cyprinoid Division. Characterized by presence of Cyprinidae, Mastacembelidae. Anabantidae, Ophiocephalidae.

t. Indian Region. Characterized by absence of Dipneusti, Polypteridae, Mormyridae and Characinidae. Cobi- tinae numerous. 2. African Region. Characterized by presence of Dipneusti, Polypterid and Mormyrid; Cichlid and Characinid numerous.

K. Acyprinoid Division. Characterized by absence of Cyprinidae and the other families mentioned above.

1 . Tropical American or Neotropical Region. Characterized

by presence of Dipneusti ; Cichlidae and Characinidae numerous; Gymnotidae and Loricariidae.

2. Tropical Pacific Region. Includes the Australian as

well as the Polynesian Region. Characterized by presence of Dipneusti. Cichlidae and Characinidae absent. III. The Southern Zone. — Characterized by absence of Cypri- nidae and scarcity of Siluridae. Haplochitonidae and Galaxiidae represent the Salmonids and Esoces of the northern zone. One region only.

1. Antarctic Region. Characterized by the small number of species; the fishes of

(a) The Tasmanian subregion ;

(b) The New Zealand subregion; and

(c) The Patagonian or Fuegian subregion

being almost identical.

Although, as expressed in the above synopsis, the resemblance between the Indian and African regions is far greater than exists between them and the other regions of the equatorial zone, attention must be drawn to the marked affinity which some of the fishes of

tropical Africa show to those of South America (Lepidosirenidae, Characinidae, Cichlidae, Nandidae), an affinity which favours the supposition of a connexion between these two parts of the world in early Tertiary times.

The boundaries of Gtinther's regions may thus be traced, beginning with the equatorial zone, this being the richest.

Equatorial Zone. — Roughly speaking, the borders of this zoological zone coincide with the geographical limits of the tropics of Cancer and Capricorn; its characteristic forms, however, extend in undulating lines several degrees both north- wards and southwards. Commencing from the west coast of Africa, the desert of the Sahara forms a boundary between the equatorial and northern zones; as the boundary approaches the Nile, it makes a sudden sweep towards the north as far as northern Syria, crosses through Persia and Afghanistan to the southern ranges of the Himalayas, and follows the course of the Yang-tse-Kiang, which receives its contingent of equatorial fishes through its southern tributaries. Its continuation through the North Pacific may be indicated by the tropic, which strikes the coast of Mexico at the southern end of the Gulf of California. Equatorial types of South America are known to extend so far northwards; and, by following the same line, the West India Islands are naturally included in this zone.

Towards the south the equatorial zone embraces the whole of Africa and Madagascar, and seems to extend still farther south in Australia, its boundary probably following the southern coast of that continent; the detailed distribution of the fresh- water fishes of south-western Australia has been little studied, but the tropical fishes of that region follow the principal water- course, the Murray river, far towards the south and probably to its mouth. The boundary-line then stretches to the north of Tasmania and New Zealand, coinciding with the tropic until it strikes the western slope of the Andes, on the South American continent, where it again bends southward to embrace the system of the Rio de la Plata.

The four regions into which the equatorial zone is divided arrange themselves into two well-marked divisions, one of which is characterized by the presence of Cyprinid fishes, combined with the development of Labyrinthic Percesoces {Anabantidae and Ophiocephalidae) and Mastacembelids, whilst in the other these types are absent. The boundary between the, Cyprinoid and Acyprinoid division seems to follow the now exploded Wallace's line — a line drawn from the south of the Philippines between Borneo

and Celebes, and farther south between Bali and Lombok. Borneo abounds in Cyprinids; from the Philippine Islands a few only are known, and in Bali two species have been found; but none are known from Celebes or Lombok, or from islands situated farther east.

The Indian region comprises Asia south of the Himalayas and the Yang-tse-Kiang, and includes the islands to the west of Celebes and Lombok. Towards the north-east the island of Formosa, which also by other parts of its fauna shows the

characters of the equatorial zone, has received some characteristic Japanese freshwater fishes. Within the geographical boundaries of China the freshwater fishes of the tropics pass gradually into those of the northern zone, both being separated by a broad, debateable ground. The affluents of the great river traversing this district are more numerous from the south than from the north, and carry the southern fishes far into the temperate zone. Scarcely better defined is the boundary of this region towards the north-west, in which fishes were very poorly re- presented by types common to India and Africa.

The African region comprises the whole of Africa south of the Sahara. It might have been conjectured that the more temperate climate of its southern extremity would have been accompanied by a conspicuous difference in the fish fauna. But this is not the case; the difference between the tropical and southern parts of Africa consists simply in the gradual dis- appearance of specifically tropical forms, whilst Silurids, Cyprinids and even Anabas penetrate to its southern coast; no new form, except a Galaxias at the Cape of Good Hope, has entered to impart to South Africa a character distinct from the central portion of the continent. In the north-east the African fauna passes the isthmus of Suez and penetrates into Syria; the system of the Jordan presents so many African types that it has to be included in a description of the African region as well as of the Europaeo-Asiatic.

The boundaries of the Neotropical or Tropical American region have been sufficiently indicated in the definition of the equatorial zone. A broad and most irregular band of country, in which the South and North American forms are mixed, exists in the north.

The Tropical Pacific region includes all the islands east of Wallace's

line, New Guinea, Australia (with the exception of its south-eastern portion), and all the islands of the tropical Pacific to the Sandwich group.

Northern Zone. — The boundaries of the northern zone coin- cide in the main with the northern limit of the equatorial zone; but they overlap the latter at different points. This happens in Syria, as well as east of it, where the mixed faunae of the Jordan and the rivers of Mesopotamia demand the inclusion of this territory in the northern zone as well as in the equatorial; in the island of Formosa, where a Salmonid and several Japanese Cyprinids flourish; and in Central America, where a Lepidostcus , a Cyprinid (Sclerognathus meridionalis), and an Amiurus (A. meridionalis) represent the North American fauna in the midst of a host of tropical forms.

There is no separate arctic zone for freshwater fishes; ichthyic life becomes extinct towards the pole wherever the fresh water remains frozen throughout the year, or thaws for a few weeks only; and the few fishes which extend into high latitudes belong to types in no wise differing from those of the more tem- perate south. The highest latitude at which fishes have been obtained is 82 N. lat., whence specimens of char {Salmo arcturus and Salmo naresii) have been brought back.

The Palaearctic or Europaeo-Asiatic Region. — The western and southern boundaries of this region coincide with those of the northern zone. Bering Strait and the Kamchatka Sea have been conventionally taken as the boundary in the north, but the fishes of both coasts, so far as they are known, are not sufficiently distinct to be referred to two different regions. The Japanese islands exhibit a decided Palaearctic fish fauna with a slight influx of tropical forms in the south. In the east, as well as in the west, the distinction between the Europaeo- Asiatic and the North American regions disappears almost entirely as we advance farther towards the north. Finally, the Europaeo-Asiatic fauna mingles with African and Indian forms in Syria, Persia and Afghanistan.

The boundaries of the North American or Nearctic region have been sufficiently indicated. The main features and the distribution of this fauna are identical with those of the preceding region.

Southern Zone. — The boundaries of this zone have been indicated in the description of the equatorial zone; they over-

lap the southern boundaries of the latter in South Australia and

South America, but we have not the means of defining the limits to which southern types extend northwards. This zone includes Tasmania, with at least a portion of south-eastern Australia (Tasmanian sub-region) , New Zealand and the Auckland Islands (New Zealand sub-region), and Chile, Patagonia, Tierra del Fuego and the Falkland Islands (Fuegian sub-region). No freshwater fishes are known from Kerguelen's Land, or from islands beyond 55° S. lat.

The Tropical American region is the richest (about 1300 species) ; next follow the African region (about 1000), the Indian region (about 800), the Europaeo-Asiatic region (about 500), the North American region (about 400), the Tropical Pacific region (about 60) ; whilst the Antarctic region is quite insignificant.

Of the migratory fishes, or fishes travelling regularly from the sea to fresh waters, most, if not all, were derived from marine forms. The anadromous forms, annually or periodically ascend- ing rivers for the purpose of spawning, such as several species of Acipenser, Salmo, Coregonus, Clupea (shads), and Petromyzon, are only known from the northern hemisphere, whilst the cata- dromous forms, spending most of their life in fresh water but resorting to the sea to breed, such as Anguilla, some species of Mugil, Galaxias and Pleuronectes, have representatives in both hemispheres. (G. A. B.)

ICHTHYOPHAGI (Gr. for "fish-eaters"), the name given by ancient geographers to several coast-dwelling peoples in different parts of the world and ethnically unrelated. Nearchus mentions such a race as inhabiting the barren shores of the Mekran on the Arabian Sea; Pausanias locates them on the western coast of the Red Sea. Ptolemy speaks of fish-eaters in Ethiopia, and on the west coast of Africa; while Pliny relates the existence of such tribes on the islands in the Persian Gulf. Herodotus (book i. c. 200) mentions three tribes of the Babylonians who were solely fish-eaters, and in book iii. c. 19 refers to Ichthyophagi in Egypt. The existence of such tribes was confirmed by Sir Richard F. Burton (El-Medinah, p. 144).

ICHTHYOSAURUS, a fish or porpoise-shaped marine reptile which characterized the Mesozoic period and became extinct immediately after the deposition of the Chalk. It was named Ichthyosaurus (Gr. fish-lizard) by C. Konig in 1818 in allusion to its outward form, and is best known by nearly complete skeletons from the Lias of England and Germany. The large head is produced into a slender, pointed snout; and the jaws are provided with a row of conical teeth nearly uniform in size and deeply implanted in a continuous groove. The eye is enormous, and is surrounded by a ring of overlapping "

sclerotic

From British Museum Guide to Fossil Reptiles and Fishes, by permission of the Trustees.

Skeleton of Ichthyosaurus communis, with outline of body and fins, from the Lower Lias of Lyme Regis, Dorset ; original nearly four metres in length.

plates," which would serve to protect the eye-ball during diving. The vertebrae are very numerous, short and deeply biconcave, imparting great flexibility to the backbone as in fishes. The neck is so short and thick that it is practically absent. There are always two pairs of paddle-like limbs, the hinder pair never disappearing as in porpoises and other Cetacea, though often much reduced in size. A few specimens from the Upper Lias of Wurttemberg (in the museums of Stuttgart, Tubingen, Budapest and Chicago) exhibit remains of the skin, which is quite smooth and forms two triangular median fins, one in the middle of the back, the other at the end of the tail. The dorsal fin consists merely of skin without any internal skeleton, while

the tail-fin is expanded in a vertical plane and has the lower lobe stiffened by the tapering end of the backbone, which is sharply bent downwards. Immature individuals are sometimes observ- able within the full-grown skeletons, suggesting that this reptile was viviparous.

The largest known species of Ichthyosaurus is /. trigonodon from the Upper Lias of Banz, Bavaria, with the head measuring about two metres in length and probably representing an animal not less than ten metres in total length. /. platyodon, from the English Lower Lias, seems to have been almost equally large. /. intermedins and /. communis, which are the commonest species in the English Lower Lias, rarely exceed a length of three or four metres. The species in rocks later than the Lias are known for the most part only by fragments, but the remains of Lower Cretaceous age are noteworthy for their very wide geo- graphical distribution, having been found in Europe, the East Indies, Australia, New Zealand and South America. Allied Ichthyosaurians named Ophthalmosaurus and Baptanodon, from the Upper Jurassic of England and North America, are nearly or quite toothless and have very flexible broad paddles. The earliest

known Ichthyosaurians (Mixosaurus), which occur in the Trias, are of diminutive size, with paddles which suggest that these marine reptiles were originally descended from land or marsh animals (see Reptiles).

Authorities. — R. Owen, A Monograph of the Fossil Reptilia of the Liassic Formations, part iii. (Mon. Palaeont. Soc., 1881); E. Fraas, Die Ichthyosaurier der siiddeutschen Trias- vnd Jura-Ablager- ungen (Tubingen, 1891). Also good figures in T. Hawkins, The Book of the Great Sea-dragons (London, 1840). (A. S. Wo.)

ICHTHYOSIS, or Xeroderma, a general thickening of the whole skin and marked accumulation of the epidermic elements, with atrophy of the sebaceous glands, giving rise to a hard, dry, scaly condition, whence the names, from Ixdvs, fish, and £i?pos, dry, bepixa., skin. This disease generally first appears in infancy, and is probably congenital. It differs in intensity and in distri- bution, and is generally little amenable to any but palliative remedies, such as the regular application of oily substances. Ichthyosis lingualis (" smokers' tongue "), a variety common in heavy smokers, occurs in opaque white patches on the tongue, gums and roof of the mouth. Cancer occasionally starts from the patches. The affection is obstinate, but may disappear spontaneously.

ICKNIELD STREET. (1) The Saxon name (earlier Icenhylt) of a prehistoric (not Roman) " Ridgeway " along the Berkshire downs and the Chilterns, which crossed the Thames neai Streatley and ended somewhere near Trihg or Dunstable. In some places there are traces of a double road, one line on the hills and one in the valley below, as if for summer and winter use. No modern highroad follows it for any distance. Antiquaries have supposed that it once ran on to Royston, Newmarket and Norfolk, and have connected its name with the Iceni, the Celtic tribe inhabiting East Anglia before the Roman conquest. But the name does not occur in early documents so far east, and it has certainly nothing to do with that of the Iceni (Haverfield, Victoria History of Norfolk, i. 286). See further Ermine Street. (2) A Roman road which ran through Derby, Lichfield, Birmingham and Alcester is sometimes called Icknield Street and sometimes Rycknield Street. The origin of this nomenclature is very obscure (Vict. Hist, of Warwick, i. 239).

(F. J H.) ICON (through the Latinized form, from Gr. einwv, portrait, image), generally any image or portrait-figure, but specially the term applied to the representations in the Eastern Church of sacred personages, whether in painting or sculpture, and particularly

to the small metal plaques in archaic Byzantine style, venerated by the adherents of the Greek Church. See Iconoclasts; Image-Worship; Byzantine Art. The term " iconography," once confined to the study of engravings (q.v.), is now applied to the history of portrait images in Christian art, though it is also used with a qualifying adjective of Greek, Roman and other art.

ICONIUM (mod. Konid), a city of Asia Minor, the last of the Phrygian land towards Lycaonia, was commonly reckoned to

Lycaonia in the Roman time, but retained its old Phrygian connexion and population to a comparatively late date. Its natural surroundings must have made it an important town from the beginning of organized society in this region. It lies in an excellently fertile plain, 6 m. from the Pisidian mountains on the west, with mountains more distant on the north and south, while to the east the dead level plain stretches away for hundreds of miles, though the distant view is interrupted by island-like mountains. Streams from the Pisidian mountains make the land on the south-west and south of the city a garden; but on the east and north-east a great part of the naturally fertile soil is uncultivated. Trees grow nowhere except in the gardens near the city. Irrigation is necessary for productiveness, and the water-supply is now deficient. A much greater supply was available for agriculture in ancient times and might be re-introduced.

Originally a Phrygian city, as almost every authority who has come into contact with the population calls it, and as is implied in Acts xiv. 6, it was in a political sense the chief city of the Lycaonian tetrarchy added to the Galatian country about 165 B.C., and it was part of the Roman province Galatia from 25 B.C. to about a.d. 295. Then it was included in the province Pisidia (as Ammianus Marcellinus describes it) til! 372, after which it formed part of the new province Lycaonia so long as the provincial division lasted. Later it was a principal city of the theme of Anatolia. It suffered much from the Arab raids in the three centuries following a.d. 660; its capture in 708 is mentioned, but it never was held as a city of the caliphs. In later Roman and Byzantine times it must have been a large and wealthy city. It was a metropolis and an archbishopric, and one of the earliest councils of the church was held there in a.d. 235. The ecclesiastical organization of Lycaonia and the country round Iconium on all sides was complete in the early 4th century, and monuments of later 3rd and 4th century Christianity are extremely numerous. The history of Christian Iconium is utterly obscure. The city was thrice visited by St Paul, probably in a.d. 47,

50 and 53; and it is the principal scene of the tale of Paul and Thecla (which though apocryphal has certainly some historical basis; see Thecla). There was a distinct Roman element in Iconium, arising doubtless from the presence of Roman traders. This was recognized by Claudius, who granted the honorary title Claudiconium, and by Hadrian, who elevated the city to the rank of a Roman colony about a.d. 130 under the name Colonia Aelia Hadriana Augusta Iconiensium. The period of its greatest splendour was after the conquest by the Seljuk Turks about 107 2-1074. It soon became the capital of the Seljuk state, and one of the most brilliant cities of the world. The palace of the sultans and the mosque of Ala ed-dln Kaikobad formerly covered great part of the Acropolis hill in the northern part of the city. Farther south there is still the great complex of buildings which form the chief seat of the Mevlevi dervishes, a sect widely spread over Anatolia. Many other splendid mosques and royal tombs adorned the city, and justified the Turkish proverb, " See all the world; but see Konia." The walls, about 2 m. in circumference, consisted of a core of rubble and concrete, coated with ancient stones, inscriptions, sculptures and architectural marbles, forming a striking sight, which no traveller ever examined in detail. Beyond the walls extended the gardens and villas of a prosperous Oriental population, especially on the south-west towards the suburb of Meram.

When the Seljuk state broke up, and the Osmanli or Ottoman sovereignty arose, Konia decayed, its population dwindled and the splendid early Turkish buildings were suffered to go to ruin. As trade and intercourse diminished Konia grew poorer and more ruinous. The walls and the palace, still perfect in the beginning of the 19th century, were gradually pulled down for building material, and in 1882 there remained only a small part of the walls, from which all the outer stones had been removed, while the palace was a ruin. At that time and for some years later a large part of Konia was like a city of the dead. But about 1895 the advent of the Anatolian railway began to restore its prosperity. A good supply of drinking water was

brought to the city by Ferid Pasha, who governed the vilayet ably for several years, till in 1903 he was appointed Grand Vizier. The sacred buildings, mosques, &c, were patched up (except a few which were quite ruinous) and the walls wholly removed, but an unsightly fragment of a palace-tower still remained in 1906. In 1904-1905 the

first two sections of the Bagdad railway, 117 m., to Karaman and Eregli, were built. In the city there is a branch of the Ottoman bank, a government technical school, a French Catholic mission and a school, an Armenian Protestant school for boys, an American mission school for girls, mainly Armenian, and other educational establishments.

The founder of the Mevlevi dancing dervishes, the poet Mahommed Jelal-ed-Din (Rumi), in 1307, though tempted to assume the inheritance along with the empire of the Seljuk sultan Ala ed-din Kaikobad III., who died without heirs, pre- ferred to pass on the power to Osman, son of Ertogrul, and with his own hands invested Osman and girt him with the sword: this investiture was the legitimate beginning of the Osmanli authority. The heirs of Jelal-ed-Din (Rumi) were favoured by the Osmanli sultans until 1516, when Selim was on the point of destroying the Mevlevi establishment as hostile to the Osmanli and the faith; and though he did not do so the Mevlevi and their chiefs were deprived of influence and dignity. In 1829 Mahmud II. restored their dignity in part, and in 1889 Abd-ul-Hamid II. confirmed their exemption from military duty. The head of the Mevlevi dervishes (Aziz-Effendi, Hazreti- Mevlana, Mollah-Unkiar, commonly styled simply Chelebi- Effendi) has the right to gird on the sultan's sword at his in- vestiture, and is master of the considerable revenues of the greatest religious establishment in the empire. He has also the privilege of corresponding direct with the caliph; but otherwise is regarded as rather opposed to the Osmanli adminis- tration, and has no real power.

Iconium is distant by rail 466 m. from the Bosporus at Haidar-Pasha, and 389 from Smyrna by way of Afium-Kara-Hissar. It has recently become the seat of a considerable manufacture of carpets, owing to the cheapness of labour. The population was estimated at 44,000 in 1890, and is now probably over 50,000. Mercury mines have begun to be worked; other minerals are known to exist. (W. M. Ra.)

ICONOCLASTS (Gr. dKovoKkaarris: eUoov, image, and nXaeiv, to break), the name applied particularly to the opponents in the 8th and 9th centuries of the use of images in Christian cult.

As regards the attitude towards religious images assumed by the primitive Christian Church, several questions have often been treated as one which cannot be too carefully kept apart. There can be no doubt that the early Christians were unanimous in condemning heathen image-worship and the various customs, some immoral, with

which it was associated. A form of icono- latry specially deprecated in the New Testament was the then prevalent adoration of the images of the reigning emperors (see Rev. xv. 2). It is also tolerably certain that, if for no other reasons besides the Judaism, obscurity, and poverty of the early converts to Christianity, the works of art seen in their meeting-houses cannot at first have been numerous. Along with these reasons would co-operate towards the exclusion of visible aids to devotion, not only the church's sacramental use of Christ's name as a name of power, and its living sense of his continued real though unseen presence, but also, during the first years, its constant expectation of his second advent as imminent. It was a common accusation brought against Jews and Christians that they had " no altars, no temples, no known images" (Min. Fel. Oct. c. 10), that " they set up no image or form of any god" (see Arnob. Adv. Gent. vi. 1; similarly Celsus); and this charge was never denied; on the contrary Origen gloried in it (c. Celsum, bk. 7, p. 386). At a comparatively early date, indeed, we read of various Gnostic sects calling in the fine arts to aid their worship; thus Irenaeus (Haer. i. 25. 6), speaking of the followers of Marcellina, says that " they possess images, some of them painted, and others formed from different kinds of material; and they maintain that a likeness of Christ

was made by Pilate at that time when Jesus lived among men. They crown these images, and set them up along with the images of the philosophers of the world; that is to say, with the images of Pythagoras and Plato and Aristotle and the rest. They have also other modes of honouring these images after the same manner as the Gentiles " (cf. Aug. De Haer. c. 7). It is also well known that the emperor Alexander Severus found a place for several Scripture characters and even for Christ in his lararium (Lamprid. Vit. Alex. Sev. c. 29). But there is no evidence that such a use of images extended at that period to orthodox Christian circles. The first unmistakable indication of the public use of the painter's art for directly religious ends does not occur until a.d. 306, when the synod of Elvira, Spain, decreed (can. 36) that " pictures ought not to be in a church, lest that which is worshipped and adored be painted on walls." 1 This canon is proof that the use of sacred pictures in public worship was not at the beginning of the 4th century a thing unknown within the church in Spain; and the presumption is that in other places, about the same period, the custom was looked upon with a more tolerant eye. Indications of the existence of allied forms of sacred Christian art prior to this period are not wholly wanting. It seems possible to trace some of the older and better frescos in the

catacombs to a very early age; and Bible manu- scripts were often copiously illuminated and illustrated even before the middle of the 4th century. An often-quoted passage from Tertullian {De Pudic. c. 10, cf. c. 7) shows that in his day the communion cup was wont to bear a representation of the Good Shepherd. Clement of Alexandria (Paedag. iii. n) mentions the dove, fish, ship, lyre, anchor, as suitable devices for Christian signet rings. Origen (c. Celsum, bk. 3) repudiates graven images as only fit for demons.

During the 4th and following centuries the tendency to enlist the fine arts in the service of the church steadily advanced; not, however, so far as appears, with the formal sanction of any regular ecclesiastical authority, and certainly not without strong protests raised by more than one powerful voice. From a passage in the writings of Gregory of Nyssa (Orat. de Laudibus Theodori Martyris, c. 2) it is easy to see how the stories of recent martyrs would offer themselves as tempting subjects for the painter, and at the same time be considered to have received from him their best and most permanent expression; that this feeling was widespread is shown in many places by Paulinus of Nola (ob. 431), from whom we gather that not only martyr- doms and Bible histories, but also symbols of the Trinity were in his day freely represented pictorially. Augustine (De Cons. Ev. i. 10) speaks less approvingly of those who look for Christ and his apostles " on painted walls " rather than in his written word. How far the Christian feeling of the 4th and 5th centuries was from being settled in favour of the employment of the fine arts is shown by such a case as that of Eusebius of Caesarea, who, in reply to a request of Constantia, sister of Constantine, for a picture of Christ, wrote that it was unlawful to possess images pretending to represent the Saviour either in his divine or in his human nature, and added that to avoid the reproach of idolatry he had actually taken away from a lady friend the pictures of Paul and of Christ which she had. 2 Similarly Epi- phanius in a letter to John, bishop of Jerusalem, tells how in a church at Anablatha near Bethel he had found a curtain painted with the image " of Christ or of some other saint," which he had torn down and ordered to be used for the burial of a pauper. The passage, however, reveals not only what Epiphanius thought on the subject, but also that such pictures must have been becoming frequent. Nilus, the disciple and defender of Chrysostom, permitted the symbol of the cross in churches and also pictorial delineations of Old and New Testament history, but deprecated other symbols, pictures of martyrs, and most of all the representation of Christ. In the time of Gregory the Great the Western Church obtained

1 " Placuit picturas in ecclesia esse non debere, ne quod colitur et

adoratur in parietibus depingatur. ‘ ‘ See Hefele, Conciliengesch. i. 1 70.

2 The letter, which is most probably, though not certainly, genuine, appears in the Acta of the second council of Nice.

something like an authoritative declaration on the question about images, but in a sense not quite the same as that of the synod of Elvira. Serenus of Marseilles had ordered the destruc- tion of all sacred images within his diocese; this action called forth several letters from Pope Gregory (viii. 2. in; ix. 4. n), in which he disapproved of that course, and, drawing the distinction which has since been authoritative for the Roman Church, pointed out that —

” It is one thing to worship a picture and another to learn from the language of a picture what that is which ought to be worshipped. What those who can read learn by means of writing, that do the uneducated learn by looking at a picture. . . . That, therefore, ought not to have been destroyed which had been placed in the churches, not for worship, but solely for instructing the minds of the ignorant.”

With regard to the symbol of the cross, its public use dates from the time of Constantine, though, according to many Christian archaeologists it had, prior to that date, a very im- portant place in the so-called ” disciplina arcani.” The intro- duction of the crucifix was later; originally the favourite com- bination was that of the figure of a lamb lying at the foot of the cross; the council of Constantinople, called ” in Trullo,” in 692 enjoined that this symbol should be discontinued, and that where Christ was shown in connexion with his cross he should be represented in his human nature. In the catacombs Christ is never represented hanging on the cross, and the cross itself is only portrayed in a veiled and hesitating manner. In the Egyptian churches the cross was a pagan symbol of life borrowed by the Christians and interpreted in the pagan manner. The cross of the early Christian emperors was a labarum or token of victory in war, a standard for use in battle. Religious feeling in the West recoiled from the crucifix as late as the 6th century, and it was equally abhorrent to the Monophysites of the East who regarded the human nature of Christ as swallowed up in the divine. Nevertheless it seems to have originated in the East, perhaps as a protest against the extreme Monophysites, who even denied the passibility of Christ.

Perhaps the Nestorians, who clung to the human aspect of Christ, introduced it about 550. From the East it soon passed to the West.

Not until the 8th century were the religious and theological questions which connect themselves with image-worship distinctly raised in the Eastern Church in their entirety. The controversy began with an address which Leo the Isaurian, in the tenth year of his reign (726), delivered in public " in favour of over- throwing the holy and venerable images," as says Theophanes (Chronogr., in Migne Patr. Gr. 108, 816). This emperor had, in the years 717 and 718, hurled back the tide of Arab conquest which threatened to engulf Byzantium, and had also shown himself an able statesman and legislator. Born at Germanicia in Syria, and, before he mounted the throne, captain-general of the Anatolian theme, he had come under the influence of the anti-idolatrous sects, such as the Jews, Montanists, Paulicians and Manicheans, which abounded in Asia Minor, but of which he was otherwise no friend. But his religious reform was un- popular, especially among the women, who killed an official who, by the emperor's command, was destroying an image of Christ in the vestibule of the imperial palace of Chalce. This etneulc provoked severe reprisals, and the partisans of the images were mutilated and killed, or beaten and exiled. A rival emperor even, Agallianus, was set up, who perished in his attempt to seize Constantinople. Italy also rose in arms, and Pope Gregory II. wrote to Leo blaming his interference in religious matters, though he dissuaded the rebels in Venetia, the Exarchate and the Pentapolis from electing a new emperor and marching against Leo. In 730 Germanus the patriarch resigned rather than subscribe to a decree condemning images; later he was strangled in exile and replaced by an iconoclast, Anastasius. Meanwhile, inside the Arab empire, John of Damascus wrote his three dogmatic discourses against the traducers of images, arguing that their use was not idolatry but only a relative worship (trpoffKvvTiais cxeriK^). The next pope, Gregory III. convoked a council of ninety-three bishops, which excommunicated the iconoclasts, and the fleet which Leo sent to retaliate

on the Latin peninsula was lost in a storm in the Adriatic. The most Leo was able to do was to double the tribute of Calabria and Sicily, confiscate the pope's revenues there, and impose on the bishops of south Italy a servitude to Byzantium which lasted for centuries.

Leo III. died in June 740, and then his son Constantine V. began a persecution of the image-worshippers in real earnest. In his eagerness to restore the simplicity of the primitive church he even assailed Mariolatry, intercession of saints, relics and perhaps infant baptism,

to the scandal even of the iconoclast bishops themselves. His reign began with the seizure for eighteen months of Constantinople by his brother-in-law Artavasdes, who temporarily restored the images. He was captured and beheaded with his accomplices in November 742, and in February 754 Constantine held in the palace of Hieria a council of 388 bishops, mostly of the East; the patriarchs of Rome, Antioch, Alexandria and Jerusalem refused to attend. In it images were condemned, but the other equally conservative leanings of the emperor found no favour. The chief upholders of images, the patriarch Germanus, George of Cyprus and John of Damascus, were anathematized, and Christians forbidden to adore or make images or even to hide them. These decrees were obstinately resisted, especially by the monks, large numbers of whom fled to Italy. In 765 the emperor demanded of his subjects al! over his empire an oath on the cross that they detested imager, and St Stephen the younger, the chief upholder of them, was murdered in the streets. A regular crusade now began against monks and nuns, and images and relics were destroyed on a great scale. In parts of Asia Minor (Lydia and Caria) the monks were even forced to marry the nuns. In 769 Pope Stephen III. condemned the council of Hieria, and in 775 Constantine V. died. His son Leo IV. died in 780, leaving a widow, Irene, of Athenian birth, who seized the opportunity presented by the minority of her ten-year-old son Constantine VI. to restore the images and dispersed relics. In 784 she invited Pope Adrian I. to come and preside over a fresh council, which was to reverse that of 754 and heal the schism with Rome. In August 786 the council met, but was broken up by the imperial guards, who were Easterns and sturdy iconoclasts. Irene replaced them by a more trustworthy force, and convoked a fresh council of three hundred bishops and monks innumerable in September 787, at Nicaea in the church of St Sophia. The cult of images was now solemnly restored, iconoclast bishops deposed or reconciled, the dogmatic theory of images defined, and church discipline re-established. The order thus imposed lasted twenty-four years, until a military revolution placed a soldier of fortune, half Armenian, half Persian, named Leo, on the throne; he, like his soldiers, was persuaded that the ill-success of the Roman arms against Bulgarians and other invaders was due to the idolatry rampant at court and elsewhere. The soldiers stoned the image of Christ which Irene had set up afresh in the palace of Chalce, and this provoked a counter-demonstration of the clergy. Leo feigned for a while to be on their side, but on the 2nd of February 815, in the sanctuary of St Sophia, publicly refused to prostrate himself before the images, with the approba- tion of the army and of many bishops who were iconoclasts at heart. Irene's patriarch Nicephorus was now

deposed and one Theodotus, a kinsman of Constantine Copronymus, consecrated in his place on the 1st of April 815. A fresh council was soon convoked, which cursed Irene and re-enacted the decrees of 754. This reaction lasted only for a generation under Leo the Armenian, who died 820, Michael II. 820-829, an d Theophilus 820-842; and was frustrated mainly by the exertions of Theodore of Studion and his monks, called the Studitae. Theodore refused to attend or recognize the new council, and was banished first to Bithynia and thence to Smyrna, whence he continued to address his appeals to the pope, to the eastern patriarchs and to his dispersed monks. He died in 826. Theophilus, the last of the iconoclast emperors, was a devoted Mariolater and con- troversialist who invited the monks to discuss the question of images with him, and whipped or branded them when he was out-argued; he at length banished them from the cities, and

branded on the hands a painter of holy pictures, Lazarus by name, who declined to secularize his art; he also raised to the patriarchal throne John Hylilas, chief instigator of the reaction of 815. In 842 Theophilus died, leaving his wife Theodora regent; she was, like Irene, addicted to images, and chose as patriarch a monk, Methodius, whom the emperor Michael had imprisoned for laying before him Pope Paschal I.'s letter of protest. John Hylilas was deposed and flogged in turn. A fresh council was now held which re-enacted the decrees of 787, and on the 20th of February 842 the new patriarch, the empress, clergy and court dignitaries assisted in the church of St Sophia at a solemn restoration of images which lasted until the advent of the Turks. The struggle had gone on for 116 years.

The iconoclastic movement is perhaps the most dramatic episode in Byzantine history, and the above outline of its external events must be completed by an appreciation of its deeper historical and religious significance and results. We can distinguish three parties among the combatants:—

1. The partisans of image worship. These were chiefly found in the Hellenic portions of the empire, where Greek art had once held sway. The monks were the chief champions of images, because they were illuminators and artists. Their doctors taught that the same grace of the Holy Spirit which imbued the living saint attaches after death to

his relics, name, image and picture. The latter are thus no mere representations, but as it were emanations from the archetype, vehicles of the supernatural personality represented, and possessed of an inherent sacramental value and power, such as the name of Jesus had for the earliest believers. Here Christian image- worship borders on the beliefs which underlie sympathetic magic (see Image Worship).

2. The iconoclasts proper, who not only condemned image worship in the sense just explained but rejected all religious art whatever. Fleeting matter to their mind was not worthy to embody or reflect heavenly supersensuous energies denoted by the names of Christ and the saints. For the same reason they rejected relics and, as a rule, the worship of the cross. Statues of Christ, especially of him hanging on the cross, inspired the greatest horror and indignation; and this is why none of the graven images of Christ, common before the outbreak of the movement, survive. More than this— although the synod of 692 specially allowed the crucifix, yet Greek churches have discarded it ever since the 8th century.

This idea that material representation involves a profanation of divine personages, while disallowing all religious art which goes beyond scroll-work, spirals, flourishes and geometrical designs, yet admits to the full of secular art; and accordingly the iconoclastic emperors replaced the holy pictures in churches with frescoes of hunting scenes, and covered their palaces with garden scenes where men were plucking fruit and birds singing amid the foliage. Contemporary Mahommedans did the same, for it is an error to suppose that this religion was from the first hostile to profane art. At one time the mosques were covered with mosaics, analogous to those of Ravenna, depicting scenes from the life of Mahomet and the prophets. The Arabs only forbade plastic art in the 9th century, nor were their essentially Semitic scruples ever shared by the Persians.

The prejudice we are considering is closely connected with the Manichaean view of matter, which in strict consistency rejected the belief that God was really made flesh, or really died on the cross. The Manichaeans were therefore, by reason of their dualism, arch-enemies no less of Christian art than of relics and cross- worship; the Monophysites were equally so by reason of their belief that the divine nature in Christ entirely absorbed and sublated the human; they shaded off into the party of the aphthartodoketes, who held that his human body was incorruptible and made of ethereal fire, and that his divine nature was impassible. Their belief made them, like the Mani- chaeans, hostile to material portraiture of Christ, especially of

his sufferings on the cross. All these nearly allied schools of Christian thought could, moreover, address, as against the image-

worshippers, a very effective appeal to the Bible and to Christian antiquity. Now Egypt, Asia Minor, Armenia, western Syria and the Hauran were almost wholly given up to these forms of opinion. Accordingly in all the remains of the Christian art of the Hauran one seeks in vain for any delineation of human face or figure. The art of these countries is mainly geometrical, and allows only of monograms crowned with laurels, of peacocks, of animals gambolling amid foliage, of fruit and flowers, of crosses which are either svastikas of Hindu and Mycenaean type, or so lost in enveloping arabesques as to be merely decorative. Such was the only religious art permitted by the Christian sentiment of these countries, and also of the large enclaves of semi-Manichaean belief formed in the Balkans by the transportation thither of Armenians and Paulicians. And it is important to remark that the protagonists of iconoclasm in Byzantium came from these lands where image cult offended the deepest religious instincts of the masses. Leo the Isaurian had all the scruples of a Paulician, even to the rejection of the cult of Virgin and saints; Constantihe V. was openly such. Michael Balbus was reared in Phrygia among Montanists. The soldiers and captains of the Byzantine garrisons were equally Armenians and Syrians, in whom the sight of a crucifix or image set up for worship in- spired nothing but horror.

The issue of the struggle was not a complete victory even in Byzantium for the partisans of image-worship. The icono- clasts left an indelible impress on the Christian art of the Greek Church, ia so far as they put an end to the use of graven images; for the Eastern icon is a flat picture, less easily regarded than would be a statue as a nidus within which a spirit can lurk. Half the realm of creative art, that of statuary, was thus sup- pressed at a blow; and the other half, painting, forfeited all the grace and freedom, all the capacity of new themes, forms and colours, all the development which we see in the Latin Church. The Greeks have produced rio Giotto, no' Fra Angelico, no Raphael.' Their artists have no choice of; subjects and no initiative. Colour, dress, attitude, grouping of figures are all dictated by traditional rules, set out in regular manuals. God the Father may not be depicted at all-— a restriction intelligible when we remember that the image in theory is fraught with the virtue of the archetype; but everywhere the utmost timidity is shown. What else could an artist do but make a slavish and exact copy of old pictures which worked miracles and perhaps had the reputation as well of having fallen from heaven?

3. Between these extreme parties the Roman Church took the middle way of common sense. The hair-splitting distinction of the Byzantine doctors between veneration due to images (irpcKTKvVT]

Two incidental results of the iconoclastic movement must be noticed, the one of less, the other of more importance. The lesser one was the flight of Greek iconolatrous monks from Asia Minor and the Levant to Sicily and Calabriaˆ where they established convents which for centuries were the western homes of Greek learning, and in which were written not a few of the oldest Greek MSS. found in our libraries. The greater event

was the scission between East and West. The fury of the West against the iconoclastic emperors was such that the whole of Italy clamoured for war. It is true that Pope Stephen II. applied in 753 to Constantine V., one of the worst destroyers of images, for aid against the Lombards, for the emperor of Byzantium was still regarded as the natural champion of the church. But Constantine refused aid, and the pope turned to the Frankish King Pippin. The die was cast. Henceforth Rome was linked with the Carolingian house in an alliance which culminated in the coronation of Charlemagne by the pope on the 25th of December 800.

In the crusading epoch the Cathars and Paulicians carried all over Europe the old iconoclastic spirit, and perhaps helped to transmit it to Wyclifie and Hus. Not the least racy clause in the document compiled about 1389 by the Wycliffites in defence of their defunct teacher is the following: " Hit semes that this offrynge ymages is a sotile cast of Antichriste and his clerkis for to drawe almes fro pore men . . . certis, these ymages of hemselfe may do nouther gode nor yvel to mennis soules, but thai myghtten warme a man's body in colde, if thai were sette upon a fire."

At the period of the Reformation it was unanimously felt by the reforming party that, with the invocation of saints and the practice of reverencing their relics, the adoration of images ought also to cease. The leaders of the movement were not, however, perfectly agreed on the question as to whether these might not in some circumstances be retained in churches. Luther had no sympathy with the iconoclastic outbreaks which then occurred; he classed images in themselves as among the " adiaphora," and condemned only their

cultus; so also the " Confessio Tetrapolitana " leaves Christians free to have them or not, if only due regard be had to what is expedient and edifying. The " Heidelberg Catechism," however, emphatically declares that images are not to be tolerated at, all in churches.

Sources. — " Acts of the Seventh Ecumenical Council held in Nicaea, 787," in Mansi's Concilia, vols. xii. and xiii. ; " Acts of the Iconoclast Council of 815," in a treatise of Nicephorus discovered by M . Serruys and printed in the Seances Acad, des Inscript. (May 1903) ; Theophanes, Chronographia, edit, de Boor (Leipzig, 1883-1885); and Patr. Gr. vol. 108. Also his " Continuators " in Patr. Gr. vol. 109; Nicephorus, Chronicon, edit, de Boor (Leipzig, 1880), and Patr. Gr. vol. 100; Georgius Monachus, Chronicon, edit. Muralt (Petersburg, 1859), and Patr. Gr. no; anonymous " Life of Leo the Armenian" in Patr. Gr. 108; The Book of the Kings, by Joseph Genesios, Patr. Gr. 109; " Life of S. Stephanus, Junior," Patr. Gr. 100; " St John of Damascus," three " Sermones " against the iconoclasts, Patr. Gr. 95; Nicephorus Patriarch, " Antithetic!," Patr. Gr: 100; Theodore Studita, " Antirrhetici," Patr. Gr.' 99. For bibliography of con- temporary hymns, letters, &c, bearing- on the controversy see K. Krumbacher's History of Byzantine Literature, 2nd ed. p. 674. Literature: Louis Brehier, La Querelle des images, and Les Origines du crucifix (Paris, 1964); Librairie Blond, in French, each volume 60 centimes (brief but admirable); Karl Schwartzlose, Der Bilderstreit (Gotha, 1890); Karl Schenk, "The Emperor Leo III.," in Byzant. Zeitschrift (1896, German); Th. Uspenskij, Skizzen zur Geschichte der byzanlinischen Kultur (St Petersburg, 1892, Russia n) ; Lombard ,Etudes d'histoire byzantine ■; Constantine V. (Paris, 1902, Biblioth. del 'univer site de Paris, xvi.) ; A.Tougard, La Persecution iconoclaste (Paris, 1897); and Rev. des questions hisloriques (1891); Marin, Les Moines de Constantinople (Paris, 1897, bk. iv. Les Moines et les empereurs iconoclastes); Alice Gardner, Theodore _ of Studium (London, 1905); Louis Maimbourg, Histoire de I'heresie des iconoclastes (Paris, 1679-1683); J. Daille (Dallaeus), De imagini- bus (Leiden, 1642, and in French, Geneva, 1641); Spanheim, Historia imaginum (Leiden, 1686). See also the account of this epoch in the Histories of Neander, Gibbon and Milman; Aug. Fr. Gfrorer, " Der Bildersturm " in Byzantinische Geschichte 2 (1873); C. J. von Hefele, Conciliengeschichte 3 (1877), 366 ff. (also in English translation; Karl Krumbacher. Byzant. Literatur- geschichte (2nd ed. p. 1090). (F. C. C.)

ICONOSTASIS, the screen in a Greek church which divides the altar and sanctuary from the rest of the church. It is gener- ally attached

to the first eastern pier or column and rises to the level of the springing of the vault. The iconostasis or image- bearer has generally three doors, one on each side of the central door, beyond which is the principal altar. The screen is sub- divided into four or five tiers, each tier decorated with a series of panels containing representations of the saints: of these

only the heads, hands and feet are painted, the bodies being covered with embossed metal work, richly gilded. There is a fine example in the Russo-Greek chapel, Welbeck Street, London, which was rebuilt in 1864-1865.

ICOSAHEDRON (Gr. eixoci, twenty, and t8pa, a face or base), in geometry, a solid enclosed by twenty faces. The " regular icosahedron " is one of the Platonic solids; the " great icosa- hedron " is a Kepler-Poinsot solid; and the " truncated icosa- hedron " is an Archimedean solid (see Polyhedron). In crystallography the icosahedron is a possible form, but it has not been observed; it is closely simulated by a combination of the octahedron and pentagonal dodecahedron, which has twenty triangular faces, but only eight are equilateral, the remaining twelve being isosceles (see Crystallography).

ICTERUS, a bird so called by classical authors, and supposed by Pliny to be the same as the Galgulus, which is generally identified with the golden oriole (Oriolus galbula). 1 It signified a bird in the plumage of which yellow or green predominated, and hence Brisson did not take an unhappy liberty when he applied it in a scientific sense to some birds of the New World of which the same could be said. These are now held to con- stitute a distinct family, Icteridae, intermediate it would seem between the Buntings (q.v.) and Starlings (q.v.); and, while many of them are called troopials (the English equivalent of the French Troupiales, first used by Brisson), others are known as the American Grackles (q.v.). The typical species of Icterus is the Oriolus icterus of Linnaeus, the Icterus vulgaris of Daudin and modern ornithologists, an inhabitant of northern Brazil, Guiana, Venezuela, occasionally visiting some of the Antilles and of the United States. Thirty-three species of the genus Icterus alone, and more than seventy others belonging to up- wards of a score of genera, are recognized by Sclater and Salvin (JVomenclalor, pp. 35-39) as belonging to the Neotropical Region, though a few of them emigrate to the northward in summer. Cassicus and Ostinops may perhaps be named as the most remark- able. They are nearly all gregarious birds, many of them with loud and in most cases, where they have been observed, with melodious notes, rendering them favourites in

captivity, for they readily learn to whistle simple tunes. Some have a plumage wholly black, others are richly clad, as is the well-known Balti- more oriole, golden robin or hangnest of the United States, Icterus baltimore, whose brightly contrasted black and orange have conferred upon it the name it most commonly bears in North Arnerica, those colours being, says Catesby (Birds of Carolina, i. 48), the tinctures of the armorial bearings of the Calverts, Lords Baltimore, the original grantees of Maryland, but probably more correctly those of their liveries. The most divergent form of Icteridae seems to be that known in the United States as the meadow-lark, Sturnella magna or 5. ludoviciana, a bird which in aspect and habits has considerable resemblance to the larks of the Old World, Alaudidae, to which, however, it has no near affinity, while Dolichonyx oryzivorus, the bobolink or rice-bird, with its very bunting-like bill, is not much less aberrant. (A.N.)

ICTINUS, the architect of the Parthenon at Athens, of the Hall of the Mysteries at Eleusis, and of the temple of Apollo at Bassae, near Phigalia. He was thus active about 450-430 B.C. We know little else about him; but the remains of his two great temples testify to his wonderful mastery of the principles of Greek architecture.

IDA (d. 559), king of Bernicia, became king in 547, soon after the foundation of the kingdom of Bernicia by the Angles.. He built the fortress of Bebbanburh, the modern Bamborough, and after his death his kingdom, which did not extend south of the Tees, passed in turn to six of his sons. The surname of

1 The number of names by which this species was known in ancient times— Chloris or Chlorion, Galbula (akin to Galgulus), Parra and Vireo — may be explained by its being a common and conspicuous bird, as well as one which varied in plumage according to age and sex (see Oriole). Owing to its general colour, Chloris was in time transferred to the Greenfinch (q.v.), while the names Galbula, Parra and Vireo have since been utilized by ornithologists (see Jacamar and Jacana).

" Flame-Bearer," sometimes applied to him, refers, however, not to Ida, but to his son Theodric (d. 587).

See J. R. Green, Making of England, vol. i. (London, 1897).

IDAHO, a western state of the United States of America, situated between 42 and 4c, N. lat. and 111° and 117 W. long. It is bounded N. by British Columbia and Montana, E. by Montana and Wyoming, S. by Utah and Nevada, and W. by Oregon and Washington. Its total area is 83,888 sq. m., of which 83,354 sc l- ni. are land surface, and of this 41,851.55 sq. m. were in July 1908 unappropriated and unreserved public lands of the United States, and 31,775-7 sq. m. were forest reserves, of which 15,153-5 sq. m. were reserved between the 1st of Julv 1906 and the 1st of July 1907.

Physical Features. — Idaho's elevation above sea-level varies from 738 ft. (at Lewiston, Nez Perce county) to 12,078 ft. (Hyndman Peak, on the boundary between Custer and Blaine counties), and its mean elevation is about 4500 ft. The S.E. corner of the wedge-shaped surface of the state is a part of the Great Basin region of the United States. The remainder of the state is divided by a line running S.E. and N.W., the smaller section, to the N. and E., belong- ing to the Rocky Mountain region, and the larger, S. and W. of this imaginary line, being a part of the Columbia Plateau region. The topography of the Great Basin region in Idaho is similar to that of the same region in other states (see Nevada) ; in Idaho it forms a very small part of the state; its mountains are practically a part of the Wasatch Range of Utah; and the southward drainage of the region (into Great Salt Lake, by Bear river) also separates it from the other parts of the state. The Rocky Mountain region of Idaho is bounded by most of the state's irregular E. boundary — the Bitter Root, the Cceur d'Alene and the Cabinet ranges being parts of the Rocky Mountain System. The Rocky Mountain region reaches across the N. part of the state (the Panhandle), and well into the middle of the state farther S., where the region is widest and where the Salmon River range is the principal one. The region is made up in general of high ranges deeply glaciated, preserving some remnants of ancient glaciers, and having fine " Alpine " scenery, with many sharp peaks and ridges, (J'shaped valleys, cirques, lakes and waterfalls. In the third physiographic region, the Columbia plateau, are the Saw Tooth, Boise, Owyhee and other rugged ranges, especially on the S. and W. borders of the region. The most prominent features of this part of the state are the arid Snake river plains and three mountain-like elevations — Big, Middle and East Buttes — that rise from their midst. The plains extend from near the S.E. corner of the state in a curved course to the W. and N.W. for about 350 m. over a belt 50 to 75 m. wide, and cover about 30,000 sq. m. Where they cross the W. border at Lewiston is the lowest elevation in the state, 738 ft. above the sea. Instead of being one plain formed by erosion, this region is

rather a series of plains built up with sheets of lava, several thousand feet deep, varying considerably in elevation and in smoothness of surface according to the nature of the lava, and being greater in area than any other lava beds in North America except those of the Columbia river, which are of similar formation and, with the Snake river plains, form the Columbia plateau. Many volcanic cones mark the surface, but by far the most prominent among them are Big Butte, which rises precipitously 2350 ft. above the plain (7659 ft. above the sea) in the E. part of Blaine county, and East Butte, 700 ft. above the plain, in the N.W. part of Bingham county. Middle Butte (400 ft. above the plain, also in Bingham county) is an upraised block of stratified basalt. The Snake river (which receives all the drainage of Idaho except small amounts taken by the Spokane, the Pend Oreille and the Kootenai in the N., all emptying directly into the Columbia, and by some minor streams of the S.E. that empty into Great Salt Lake, Utah) rises in Yellowstone National Park a few miles from the heads of the Madison fork of the Missouri, which flows to the Gulf of Mexico, and the Green fork of the Colorado, which flows to the Gulf of Cali- fornia. It flows S.W. and then W. for about 800 m. in a tremendous canon 'across southern Idaho; turns N. and runs for 200 m. as the bou ndary between Idaho and Oregon (and for a short distance between Idaho and Washington) ; turns again at Lewiston (where it ceases to be the boundary, and where the Clearwater empties into it) to the W. into a deep narrow valley, and joins the Columbia in S.E. Washington. Practically all the valley of the Snake from Idaho Falls in S.E. Idaho (Bingham county) to the mouth is of canon character, with walls from a few hundred to 6000 ft. in height (about 650 m. in Idaho). The finest parts are among the most magnificent in the west; among its falls are the American (Oneida and Blaine counties), and the Shoshone and the Salmon (Lincoln county). At the Shoshone Falls the river makes a sudden plunge of nearly 200 ft., and the Falls have been compared with the Niagara and Zambezi; a short distance back of the main fall is a cataract of 125 ft., the Bridal Veil. Between Henry's Fork and Malade (or Big Wood) river, a distance of 200 m., the river apparently has no northern tributaries; but several streams, as the Camas, Medicine Lodge and Birch creeks, and Big and Little Lost rivers, which fail to pene- trate the plain of the Snake-after reaching its border, are believed to

join it through subterranean channels. The more important affluents are the North Fork in the E., the Raft, Salmon Falls and the Bruneau in the S., the Owyhee and the Payette in the S.W., and the Salmon and Clearwater in the W. The scenery on some of these tributaries is

almost as beautiful as that of the Snake, though lacking the grandeur of its greater scale. In 1904 electricity, generated by water-power from the rivers, notably the Snake, began to be utilized in mining operations. Scattered among the mountains are numerous (glacial) lakes. In the N. are: Cceur d'Alene Lake, in Kootenai county, about 30 m. long and from 2 to 4 m. wide, drained by the Spokane river; Priest Lake, in Bonner county, 20 m. long and about 10 m. wide; and mostly in Bonner, but partly in Kootenai county, a widening of Clark Fork, Lake Pend Oreille, 60 m. long and from 3 to 15 m. wide, which is spanned by a trestle of the Northern Pacific 8400 ft. long. Bear Lake, in the extreme S.E., lies partly in Utah. Mineral springs and hot springs are also a notable feature of Idaho's physiography, being found in Washington, Ada, Blaine, Bannock, Cassia, Owyhee, Oneida, Nez Perce, Kootenai, Shoshone and Fremont counties. At Soda Springs in Bannock county are scores of springs whose waters, some ice cold and some warm, contain magnesia, soda, iron, sulphur, &c. ; near Hailey, Blaine county, water with a temperature of 144° F. is discharged from numerous springs; and at Boise\ water with a temperature of 165 is obtained from wells.

The fauna and flora of Idaho are similar in general to those of the other states in the north-western part of the United States.

Climate. — The mean annual temperature of Idaho from 1898 to 1903 was 45-5° F. There are several distinct climate zones within the state. North of Clearwater river the climate is comparatively mild, the maximum in 1902 (96 F.) being lower than the highest temperature in the state and the minimum (– 16°) higher than the lowest temperature registered. The mildest region of the state is the Snake river basin between Twin Falls* and Lewiston, and the valley of the Bois6, Payette and Weiser rivers; here the mean annual temperature in 1902 was 52° F., the maximum was 106 F., and the minimum was – 13 F. In the Upper Snake basin, in the Camas prairie and Lost river regions, the climate is much colder, the highest temperature in 1902 being 101 ° and the lowest – 35° F. The mean annual rainfall for the entire state in 1903 was 16-60 in. ; the highest amount recorded was at Murray, Shoshone county (37-70 in.) and the lowest was at Garnet, Elmore county (5-69 in.).

Agriculture. — The principal source of wealth in Idaho was in 1900 agriculture, but it had long been secondary to mining, and its development had been impeded by certain natural disadvantages. Except for the broad valleys of the Panhandle, where the soils are black in colour and rich in vegetable mould, the surface of the state is arid; the Snake river valley is a vast lava bed, covered with

deposits of salt and sand, or soils of volcanic origin. And, apart from this, the farming country was long without transport facilities. The fertile northern plateaus, the Camas and Nez Perce prairies and the Palouse country — a wonderful region for growing the durum or macaroni wheat — until 1898 had no market nearer than Lewiston, 50-70 m. away; and even in 1898, when the railway was built, large parts of the region were not tapped by it, and were as much as 30 m. from any shipping point, for the road had followed the Clear- water. In the arid southern region, also, there was no railway until 1885, when the Oregon Short Line was begun. Like limitations in N. and S. had like effects: for years the country was devoted to live-stock, which could be driven to a distant market. Timothy was grown in the northern, and alfalfa in the southern region as a forage crop. Even at this earliest period, irrigation, simple and individual, had begun in the southern section, the head waters of the few streams in this district being soon surrounded by farms. Co-operation and colonization followed, and more ditching was done, co-operative irrigation canals were constructed with some elaborate and large dams and head gates. The Carey Act (1894) and the Federal Reclamation Act (i902)introduced the most important period of irrigation. Under the Carey Act the Twin Falls project, deriving water from the Snake river near Twin Falls, and irrigating more than 200,000 acres, was completed in 1903-1905. The great projects undertaken with Federal aid were: the Minidoka, in Lincoln and Cassia counties, of which survey began in March 1903 and con- struction in December 1904, and which was completed in 1907, com- manding an irrigable area of 130,000-150,000 acres, 1 and has a diver- sion dam (rock-fill type) 600 ft. long, and 130 m. of canals and 1 10 m. of laterals; the larger Payette-Boise project in Ada, Canyon and Owyhee counties (372,000 acres irrigable; 300,000 now desert; 60% privately owned), whose principal features are the Payette dam (rock-fill), 100 ft. high and 400 ft. long, and the Bois6 dam (masonry), 33 ft. high and 400 ft. long, 200 m. of canals, 100 m. of laterals, a tunnel 1 100 ft. long and 12,500 h.p. transmitted 29 m., 3000 h.p. being necessary to pump to a height of 50-90 ft. water for the irrigation of 15,000 acres; and the Dubois project, the largest in the state, on which survey and reconnaissance work were done in 1903-1904, which requires storage sites on the North Fork of the

1 Of these 80,000 acres are reached directly — 72,000 N., and 8000 S. of the Snake river; and from 50,000 to 70,000 acres more are above the level of the canals and will have water pumped to them by the 11,000-30,000 h.p. developed.

Snake and on nearly all the important branches of the North Fork, and whose field is 200,000 — 250,000 acres, almost entirely Federal property, in the W. end of Fremont county between Mud Lake and the lower end of Big Lost river. A further step in irrigation is the utilization of underground waters: in the Big Camas Prairie region, Blaine county, water 10 ft. below the surface is tapped and pumped by electricity generated from the only surface water of the region, Camas Creek, fn 1899 the value of the crops and other agricultural products of the irrigated region amounted to more than seven-tenths of the total for the state. In 1907, according to the Report of the state commissioner of immigration, 1,559,915 irrigated acres were under cultivation, and 3,266,386 acres were " covered " by canals 3789 m. long and costing $11,257,023.

Up to 1900 the most prosperous period (absolutely) in the agricultural development of the state was the last decade of the 19th century; the relative increase, however, was greater between 1880 and 1890. The number of farms increased from 1885 in 1880 to 6603 in 1890 and to 17,471 in 1900; the farm acreage from 327,798 in 1880 to 1,302,256 in 1890 and to 3,204,903 acres in 1900; the irrigated area (exclusive of farms on Indian reservations) from 217,005 acres in 1889 to 602,568 acres in 1899; the value of products increased from 81,515,314 in 1879 to $3,848,930 in 1889, and to §18,051,625 in 1899; the value of farm land with improvements (including buildings) from $2,832,890 in 1880 to $17,431,580 in 1890 and 842,318,183 in 1900; the value of implements and machinery from 8363,930 in 1880 to $1,172,460 in 1890 and to $3,295,045 in 1900; and that of live-stock from $4,023,800 in 1880 to $7,253,490 in 1890 and to $21,657,974 in 1900. In 1900 the average size of farms was 183-4 acres. Cultivation by owners is the prevailing form of tenure, 91-3 % of the farms being so operated in 1900 (2-3 % by cash tenants and 6-4% by share tenants). As illustrative of agricultural conditions the contrast of the products of farms operated by Indians, Chinese and whites is of considerable interest, the value of products (not fed to live-stock) per acre of the 563 Indian farms being in 1899 $1-40, that of the 16,876 white farms $4-67, and that of the 23 Chinese farms intensively cultivated and devoted to market vegetables $69-83.

The income from agriculture in 1899 was almost equally divided

between crops ($8,951,440) and animal products ($8,784,364) — in that year forest products were valued at $315,821. Of the crops, hay and forage were the most valuable ($4,238,993), yielding 47-4% of the total value of crops, an increase of more than 200% over that of 1889, and in 1907, according to the Year-book of the Department of Agriculture, the crop was valued at $8,585,000. Wheat, which in 1899 ranked second (82,131,953), showed an increase of more than 400% in the decade, and the farm value of the crop of 1907, according to the Year-book of the United States Department of Agriculture, was $5,788,000; the value of the barley crop in 1899 ($312,730) also increased more than 400% over that. of 1889, and in 1907 the farm value of the product, according to the same authority, was $1,265,000; the value of the oat crop in 1899 (8702,955) showed an increase of more than 300% in the decade, and the value of the product in 1907, according to the United States Department of Agriculture, was $2,397,000.

More than one-half of the cereal crop in 1905 was produced in the prairie and plateau region of Nez Perce and Latah counties. The production of orchard fruits (apples, cherries, peaches, pears, plums and prunes) increased greatly from 1889 to 1899; the six counties of Ada, Canyon (probably the leading fruit county of the state), Latah (famous for apples), Washington, Owyhee and Nez Perce had in 1900 89% of the plum and prune trees, 85% of all pear trees, 78 ° of all cherry trees, and 74 % of all apple trees in the state, and in 1906 it was estimated by the State Commissioner of Immigra- tion that there were nearly 48,000 acres of land devoted to orchard fruits in Idaho. Viticulture is of importance, particularly in the Lcwiston valley. In 1906, 234,000 tons of sugar beets were raised, and fields in the Boise valley raised 30 tons per acre.

Of the animal products in 1899, the most valuable was live-stock sold during the year ($3,909,454) ; the stock-raising industry was carried on most extensively in the S.E. part of the state. Wool ranked second in value ($2,210,790), and according to the estimate of the National Association of Wool Manufactures for 1907, Idaho ranked fourth among the wool-producing states in number of sheep (2,500,000), third in wool, washed and unwashed (17,250,000 lb), and fourth in scoured wool (5,692,500 ft). In January 1908, accord- ing to the Year-book of the Department of Agriculture, the number and farm values of live-stock were: milch cows, 69,000, valued at $2,208,000, and other neat cattle, 344,000, valued at $5,848,000; horses, 150,000, $11,250,000; sheep, 3,575,000, $12,691,000; and swine, 130,000, $910,000. According to state reports for 1906, most of the neat cattle were then on ranges in

Lemhi, Idaho, Washington, Cassia and Owyhee counties; Nez Perce, Canyon, Fremont, Idaho, and Washington counties had the largest number of horses; Owyhee, Blaine and Canyon counties had the largest numbers of sheep, and Idaho and Nez Perce counties were the principal swine-raising regions. The pasture lands of the state have been greatly decreased by the increase of forest reserves, especially by the large reservations made in 1906-1907.

Mining. —The mineral resource- of Idaho are second onlv to the agricultural; indeed it was primarily the discuvery of the immense

value of the deposits of gold and silver about i860 that led to the settlement of Idaho Territory. In Idaho, as elsewhere, the first form of mining was a very lucrative working of placer deposits ; this gave way to vein mining and a greatly reduced production of gold and silver after 1878, on account of the exhaustion of the placers. Then came an adjustment to new conditions and a gradual increase of the product. The total mineral product in 1906, according to the State Mine Inspector, was valued at $24,138,317. The total gold production of Idaho from i860 to 1906 has been estimated at $250,000,000, of which a large part was produced in the Idaho Basin, the region lying between the N. fork of the Boise and the S. fork of the Payette rivers. In 1901-1902 rich gold deposits were discovered in the Thunder Mountain district in Idaho county. The counties with the largest production of gold in 1907 (state report) were Owyhee ($362,742), Boise ($282,444), Custer ($210,900) and Idaho; the total for the state was $1,075,618 in 1905; in 1906 it was $1,149,100; and in 1907, according to state reports, $1,373,031. The total of the state for silver in 1905 was $5,242,172; in 1906 it was $6,042,606; in 1907, according to state reports, it was $5,546,554. The richest deposits of silver are those of Wood river and of the Coeur d'Alene district in Shoshone county (opened up in 1886); the county's product in 1906 was valued at $5,322,706, an increase of $917,743 over the preceding year; in 1907 it was $4,780,093, according to state reports. The production of the next richest county, Owyhee, in 1907, was less than one tenth that of Shoshone county, which yields, besides, about one half of the lead mined in the United States, its product of lead being valued at $9,851,076 in 1904, at $14,365,265 in 1906, and at $12,232,233 (state report) in 1907. Idaho was the first of the states in its output of lead from 1896, when it first passed Colorado in rank, to 1906, excepting the year 1899, when Colorado again was first; the value of the lead mined in 1906 was S 14,535,823, and of that mined in 1907 (state report), $12,470,375. Fligh grade copper ores have been produced in the Seven Devils and Washington districts of Washington

county ; there are deposits, little developed up to 1906, in Lemhi county (which was almost in- accessible by railway) and in Bannock county; the copper mined in 1905 was valued at $1,134,846, and in 1907, according to state reports, at $2,241,177, of which about two-thirds was the output of the Cceur d'Alene district in Shoshone county. Zinc occurs in the Cceur d'Alene district, at Hailey, Blaine county and elsewhere ; according to the state reports, the state's output in 1906 was valued at $91,426 and in 1907 at $534,087. Other minerals of economic value are sandstone, quarried at Boise, Ada county, at Preston, Oneida county, and at Goshen, Prospect and Idaho Falls ; Bingham county, valued at $22,265 ln I9°5, and at $11,969 in 1906; limestone, valued at $14,105 in 1905 and at $12,600 in 1906, used entirely for the local manufacture of lime, part of which was used in the manu- facture of sugar; and coal, in the Horseshoe Bend and Jerusalem districts in Bois6 county, in Lemhi county near Salmon City, and in E. Bingham and Fremont counties, with an output in 1906 of 5365 tons, valued at $18,538 as compared with 20 and 10 tons respectively in 1899 and 1900. Minerals developed slightly, or not at all, are granite, valued at $1500 in 1905; surface salt, in the arid and semi- arid regions; nickel and cobalt, in Lemhi county; tungsten, near Murray, Shoshone county; monazite and zircon, in certain sands; and some pumice.

Manufactures. — The manufactures of Idaho in 1900 were relatively unimportant, the value of all products of establishments under the "factory system" being $3,001,442; in 1905 the value of such manufactured products had increased 192-2%, to $8,768,743. The manufacturing establishments were limited to the supply of local demands. The principal industries were devoted to lumber and timber products, valued at $908,670 in 1900, and in 1905 at $2,834,506, 211-9% more. In 1906 the Weyerhauser Syndicate built at Potlatch, a town built by the syndicate in Latah county, a lumber mill, supposed to be the largest in the United States, with a daily capacity of 750,000 ft. In Bonner county there are great mills at Sand Point and at Bonner's Ferry. In these and the other 93 saw-mills in the state in 1905 steam generated by the waste wood was the common power. The raw material for these products was secured from the 35,000 sq. m. of timber land in the state (6164 sq. m. having been reserved up to 1905, and 31,775-7 sq. m. up to April 1907 by the United States government) ; four-fifths of the cut in 1900 was yellow pine. Flour and grist mill products ranked second among the manufactures, being valued at $1,584,473 in 1905, an increase of nearly 116% over the product in 1900; and steam-car construction and repairs ranked third, with a value of $913,670 in 1905 and $523,631 in 1900. In 1903-1904 the cultivation of sugar beets and the manufacture of beet sugar were undertaken, and manufacturing establishments for that purpose were installed at Idaho Falls and Blackfoot (Bingham county), at Sugar, or Sugar City (Fremont county), a place built up about the sugar refineries, and at Nampa, Canyon county. In 1906 between 57,000,000 and 64,000,000 lb of beet sugar were refined in the state. Brick-making was of little more than local importance in 1906, the largest kilns being at Boise, Sand Point and Cceur d'Alene City. Lime is made at Orofino, Shoshone county, and at Hope, Bonner county.

i Communications. — The total railway mileage in January 1909 was 2,022-04 m., an increase from 206 m. in t88o and 946 m. in 1800. The Great Northern, the Northern Pacific, and the OregonRailway

& Navigation lines cross the N. part of the state; the Oregon Short Line crosses the S., and the Union Pacific, which owns the Oregon Railway & Navigation and the Oregon Short Line roads, crosses the

eastern part. The constitution declares that railways are public highways, that the legislature has authority to regulate rates, and that discrimination in toils shall not be allowed.

Population. — The population of Idaho in 1870 was 14,999; in 1880 it was 32,610, an increase of 117-4%; in 1800 it was 88,548, anincreaseof 158-8%; in 1900 161,772 (82-7% increase); andin 1910325,594 (101-3% increase). Of the inhabitants 15-2% were in 1900 foreign-born and 4-5% were coloured, the coloured population consisting of 293 negroes, 1291 Japanese, 1467 Chinese and 4226 Indians. The Indians lived principally in three reservations, the Fort Hall and Lemhi reservations (1350 sq. m. and 100 sq. m. respectively), in S.E. and E. Idaho, being occupied by the Shoshone, Bannock and Sheef-eater tribes, and the Cceur d'Alene reservation (632 sq. m.), in the N.W.,by the Cceur d'Alene and Spokane tribes. The former Nez Perce reservation, in the N.W. part of the state, was abolished in 1895, and the Nez Perces were put under the supervision of the superintendent of the Indian School at Fort Lapwai, about 12 m. E. of Lewiston, in Nez Perce county. Of these tribes, the Nez Perce and Cceur d'Alene were self-supporting; the other tribes were in 1900 dependent upon the United States government for 30% of their rations. Of the 24,604 foreign- born inhabitants of the state, 3943 were from England, 2974 were from Germany, 2528 were Canadian English, 2822 were from Sweden, and 1633 were from Ireland, various other countries being represented by smaller numbers. The urban population of Idaho in 1900 (i.e. the population of places having 4000 or more inhabitants) was 6-2% of the whole. There were thirty- three incorporated cities, towns and villages, but only five had a population exceeding 2000; these were Boise (5957), Pocatello (4046), Lewiston (2425), Moscow (2484) and Wallace (2265). In 1906 it was estimated that the total membership of all religious denominations was 74,578, and that there were 32,425 Latter-Day Saints or Mormons (266 of the Reorganized Church), 18,057 Roman Catholics, 5884 Methodist Episcopalians (5313 of the Northern Church), 3770 Presbyterians (3698 of the Northern Church), 3206 Disciples of Christ, and 2374 Baptists (2331 of the Northern Convention).

Government.— The present constitution of Idaho was adopted in 1 889. The government is similar in outline to that of the other states of the United States. The executive officials serve for a term of two years. Besides being citizens of the United States and residents of the state for two years preceding their election the governor, lieutenant-governor and attorney-general must each be at least thirty years of age, and the secretary of state, state auditor, treasurer and

superintendent of education must be at least twenty-five years old. The governor's veto may be overridden by a two-thirds vote of the legislature; the governor, secretary of state, and the attorney-general constitute a Board of Pardons and a Board of State Prison Commissioners. The legislature meets biennially; its members, who must be citizens of the United States and electors of the state for one year pre- ceding their election, are chosen biennially; the number of senators may never exceed twenty-four, that of representatives sixty; each county is entitled to at least one representative. : The judiciary consists of a supreme court of three judges, elected every six years, and circuit and probate courts, the five district judges being elected every four years. Suffrage requirements are citizenship in the United States, registration and residence : in the state for six months and in the county for thirty days immediately before election, but mental deficiency, conviction of infamous crimes (without restoration to rights of citizenship), bribery or attempt at bribery, bigamy, living in " what is known as patriarchal, plural or celestial marriage/' or teaching its '■ validity or belonging to any organization which teaches poly- gamy, 1 are disqualifications. Chinese or persons of Mongolian !

l This disqualification and much other legislation were due to the : large Mormon population in Idaho. In 1884-1885 all county and precinct officers were required to lake a lest oath abjuring bigamy, polygamy, or celestial marriage; and under this law in 1888 three

descent not born in the United States are also excluded from suffrage rights. Women, however, since 1897, have had the right to vote and to hold office, and they are subject to jury service. An Australian ballot law was passed in 1891. The constitution forbids the chartering of corporations except according to general laws. In 1909 a direct primary elections law was passed which required a majority of all votes to nominate, and, to make a majority possible,, provided for preferential (or second-choice) voting, such votes to be canvassed and added to the first-choice vote for each candidate if there be no majority by the first-choice vote. The right of eminent domain over all corporations is reserved to the state; and no corporation may issue stock except for labour, service rendered, or money paid in. The waters of the state are, by the constitution of the state, devoted to the public use, contrary to the common law theory of riparian rights. By statute (1891) it has been provided that in civil actions three-fourths of a jury may render a verdict, and in misdemeanour cases five-sixths may give a verdict. Life insurance agents not residents of Idaho cannot write policies in the state. Divorces may be obtained after residence of six months on the ground of adultery,

cruelty, desertion or neglect for one year, habitual drunkenness for the same period, felony or insanity. There are a state penitentiary at Boise, an Industrial Training School at St Anthony, an Insane Asylum at Blackfoot, and a North Idaho Insane Asylum at Orofino. The care of all defectives was let by contract to other states until 1906, when a state school for the deaf and blind was opened in Boise. No bureau of charities is in existence, but there is a Labor Commission, and a Commissioner of Immigration and a Commissioner of Public Lands to investigate the industrial resources. The offices of State Engineer and Inspector of Mines have been created.

Education. — The public schools in 1905-1906 had an enrolment of 62726, or 81-5% of the population between 5 and 21 years of age. The average length of school term was 6-8 months, the average expenditure (year ending Aug. 31, 1906) for instruction for each child was $19-29, and the expenditure for all school purposes was $1,008,481. There was a compulsory attendance law, which, however, was not enforced. Higher education is provided by the University of Idaho, established in 1899 at Moscow, Latah county, which confers degrees in arts, science, music and engineering, and offers free tuition. In 1907-1908 the institution had 41 instructors and 426 regular and 58 special students. In 1901 the Academy of Idaho, another state institution with industrial and technical courses and a preparatory department, was established at Pocatello, Bannock county ,_ to be a connecting link between the public schools and the university. There are two state normal schools, one at Lewiston and the other at Albion. The only private institution of college rank in 1908 was the College of Caldwell (Presbyterian, opened 1891) at Caldwell, Canyon county, with 65 students in 1906-1907. There are Catholic academies at Boise and Cceur d'Alene and a convent, Our Lady of Lourdes, at Wallace, Shoshone county, opened in 1905; Mormon schools at Paris (Bear Lake county), Preston (Oneida county), Rexburg (Fremont county), and Oakley (Cassia county) ; a Methodist Episcopal school (1906) at Weiser (Washington county); and a Protestant Episcopal school at Boise (1892). The Idaho Industrial Institute (non-denominational; incorporated in 1899) is at Weiser.

Finance. — The finances of Idaho are in excellent condition. The bonded debt on the 30th of September 1908 was $1,364,000. The revenue system is based on the general property tax and there is a State Board of Equalization. Each year $100,000 is set aside for the sinking fund for the payment of outstanding bonds as fast as they become due. The constitution provides that the rate of taxation shall

never exceed 10 mills for each dollar of assessed valua- tion, that when the taxable property amounts to $50,000,000 the

members of the territorial legislature were deprived of their seats .as ineligible. An act of 1889, when the Mormons constituted over 20% of the population, forbade in the case of any who had since the 1st of January 1888 practised, taught, aided or encouraged polygamy or bigamy, their registration or voting until two years after they had taken a test oath renouncing such practices, and until they had satisfied the District Court that in the two years preceding they had been guilty of no such practices. The Constitutional Convention which met at Boise in July-August 1889 was strongly anti-Mormon, and the Constitution it framed was approved by a popular vote of 12,398 out of 14,184. The United States Supreme Court decided the atiti- Mormon legislation case of Davis v. Beason in favour of the Idano legislature. In 1893 the disqualification was made no longer retroactive, the two-year clause was omitted, and the test oath covered only present renunciation of polygamy.

rate shall not exceed 5 mills, when it reaches $100,000,000, 3 mills shall be the limit, and when it reaches $300,000,000 the rate shall not exceed ij mills; but a greater rate may be established by a vote of the people. No public debt (exclusive of the debt of the Territory of Idaho at the date of its admission to the Union as a state) may be created that exceeds ij % of the assessed valuation (except in case of war, &c.) ; the state cannot lend its credit to any corpora- tion, municipality or individual; nor can any county, city or town lend its credit or become a stockholder in any company (except for municipal works).

History. — The first recorded exploration of Idaho by white men was made by Lewis and Clark, who passed along the Snake river to its junction with the Columbia; in 1805 the site of Fort Lemhi in Lemhi county was a rendezvous for two divisions of the Lewis and Clark expedition; later, the united divisions reached a village of the Nez Perce Indians near the south fork of the Clearwater river, where they found traces of visits by other white men. In 1810 Fort Henry, on the Snake river, was established by the Missouri Fur Company, and in the following year a party under the auspices of the Pacific Fur Company descended the Snake river to the Columbia. In 1834 Fort Hall in E. Idaho (Bingham county) was founded. It acquired

prominence as the meeting-point of a number of trails to the extreme western parts of North America. Missions to the Indians were also established, both by the Catholics and by the Protestants. But the permanent settlements date from the revelation of Idaho's mineral resources in i860, when the Cceur d'Alene, Palouses and Nez Perces were in the North, and the Blackfoots, Bannocks and Shoshones in the South. While trading with these Indians, Capt. Pierce learned in the summer of i860 that there was gold in Idaho. He found it on Orofino Creek, and a great influx followed — coming to Orofino, Newsome, Elk City, Florence, where the ore was especially rich, and Warren. The news of the discovery of the Boise Basin spread far and wide, and Idaho City, Placerville, Buena Vista, Centreville and Pioneerville grew up. The territory now constituting Idaho was comprised in the Territory of Oregon from 1848 to 1853; from 1853 to 1859 the southern portion of the present state was a part of Oregon, the northern a part of Washington Territory; from 1859 to 1863 the territory was within the bounds of Washington Territory. In 1863 the Territory of Idaho was organized; it included Montana until 1864, and a part of Wyoming until 1868, when the area of the Territory of Idaho was practically the same as that of the present state. Idaho was admitted into the Union as a state in 1890. There have been a few serious Indian outbreaks in Idaho. In 1856 the Cceur d'Alenes, Palouses and Spokanes went on the war-path; in April 1857 they put to flight a small force under Col. Edward Tenner Steptoe; but the punitive expedition led by Col. George Wright (1803-1865) was a success. In 1877 the Nez Perces, led by Chief Joseph, refused to go on the reservation set apart for them, defeated a small body of regulars, were pursued by Major-General O. O. Howard, reinforced by frontier volunteers, and in September ind October were defeated and retreated into Northern Montana, where they were captured by Major-General Nelson A. Miles. Occasional labour troubles have been very severe in the Cceur d'Alene region, where the attempt in 1892 of the Mine Owners' Association to discriminate in wages between miners and surfacemen brought on a union strike. Rioting followed the introduction of non-union men, the Frisco Mill was blown up, and many non-union miners were killed. The militia was called out and regular troops were hurried to Shoshone county from Fort Sherman, Idaho and Fort Missoula, Montana. These soon quieted the district. But the restlessness of the region caused more trouble in 1899. The famous Bunker Hill and Sullivan mines were wrecked, late in April, by union men. Federal troops, called for by Governor Frank Steunenberg, again took charge, and about 800 suspected men in the district were arrested and shut up in a stockade known as the " bull-pen." Ten prisoners,

convicted of destroying the property of the mine-owners, were sentenced to twenty-two months in jail. The feeling among the union men was bitter against Steunenberg, who was assassinated on the 30th of

December 1905. The trial in 1907 of Charles H. Haywood, secretary of the Western Federation of Miners, who was charged with conspiracy in connexion with the murder, attracted national attention; it resulted in Haywood's acquittal. Before 1897 the administration of the state was controlled by the Republican party; but in 1896 Democrats, Populists and those Republicans who believed in free coinage of silver united, and until 1902 elected a majority of all candidates for state offices. In 1902, 1904, 1906 and 1908 a Republican state ticket was elected.

Governors Territorial.

William H.Wallace .

W. B. Daniels, Secretary, Acting Governor Caleb Lyon

C. de Witt Smith, Secretary, Acting Governor Horace C. Gilson ,, .,

S. R. Howlett

David W. Ballard

E. J. Curtis, Acting Governor

Thomas W. Bennett

D. P. Thompson

Mason Brayman

John B. Neil

John N. Irwin

William M. Bunn .

Edward A. Stevenson . . . . . George L. Shoup

1863 1 863-1 864 1 864-1 865

1865 ' 1 865-1 866

1866 1866-1870

1870

1871-1875 1875-1876 1876-1880 1880-1883 1 883-1 884 1884-1885 1885-1889 1 889-1 890

State Governors George L. Shoup, 1 Republican .... 1890 Norman B. Wiley, Acting Governor . . . 1890-1892 William J. McConnell, Republican . . 1893-1897

Frank Steunenberg, Democrat Populist . 1 . 1897-1901 Frank W. Hunt, ,, ,, 1901-1903

John T. Morrison, Republican 1903-1905

Frank R. Gooding, ,, ... 1905-1909

James H. Brady, ,, ... 1909-

Bibliography. — The physical features and economic resources of Idaho are discussed in J. L. Onderdonk's Idaho: Facts and Statistics (San Francisco, 1885), Israel C. Russell's " Geology and Water Resources of the Snake River Plains of Idaho," U.S. Geologi- cal Survey, Bulletin 199 (Washington, 1902), The State of Idaho (a pamphlet issued by the State Commissioner of Immigration), Waldmor Lindgren's " Gold and Silver Veins of Silver City, De Lamar and other Mining Districts of Idaho," U.S. Geological Survey, 20th Annual Report (Washington, 1900), and " The Mining Districts of the Idaho Basin and the Bois6 Ridge, Idaho," U.S. Geological Survey, 18th Annual Report (Washington, 1898). These reports should be supplemented by the information contained elsewhere in the publications of the Geological Survey (see the Indexes of the survey) and in various volumes of the United States Census. W. B. Hepburn's Idaho Laws and Decisions, Annotated and Digested (Bois6, 1900), and H. H. Bancroft's Washington, Idaho, and Montana (San Francisco, 1890) are the principal authorities for administration and history. The reports of the state's various executive officers should be consulted also.

IDAR, or Edar, a native state of India, forming part of the Mahi Kantha agency, within the Gujarat division of Bombay. It has an area of 1669 sq. m., and a population (1901) of 168,557, showing a decrease of 44% in the decade as the result of famine. Estimated gross revenue, £29,000; tribute to the gaekwar of Baroda, £2000. In 1901 the raja and his posthumous son both died, and the succession

devolved upon Sir Pertab Singh (q.v.) of Jodhpur. The line of railway from Ahmedabad through Parantij runs mainly through this state. Much of the territory is held by kinsmen of the raja on feudal tenure. The products are grain, oil-seeds and sugar-cane. The town of Idar is 64 m. N.E. of Ahmedabad. Pop. (1901) 7085. It was formerly the capital, but Ahmednagar (pop. 3200) is the present capital.

IDAS, in Greek legend, son of Aphareus of the royal house of Messene, brother of Lynceus. He is only mentioned in a single passage in Homer (Iliad, ix. 556 sqq.), where he is called the strongest of men on earth. He carried off Marpessa, daughter of Evenus, as his wife and dared to bend his bow against Apollo, who was also her suitor. Zeus intervened, and left the choice to Marpessa, who declared in favour of Idas, fearing that the god might desert her when she grew old (Apollodorus i. 7). The Apharetidae are best known for their fight with the Dioscuri.

1 Governor Shoup resigned in December to take his seat in the U.S. Senate.

A quarrel had arisen about the division of a herd of cattle which the four had stolen. Idas claimed the whole of the booty as the victor in a contest of eating, and drove the cattle off to Messene. The Dioscuri overtook him and lay in wait in a hollow oak. But Lynceus, whose keenness of sight was proverbial, saw Castor through the trunk and warned his brother, who thereupon slew the mortal Castor; finally, Pollux slew Lynceus, and Idas was struck by lightning (Apollodorus hi. n; Pindar, Nem., x. 60; Pausanias iv. 3. 1). According to others, the Dioscuri had carried off the daughters of Leucippus, who had been betrothed to the Apharetidae (Ovid, Fasti, v. 699; Theocritus xxii. 137). The scene of the combat is placed near the grave of Aphareus at Messene, at Aphidna in Attica, or in Laconia; and there are other variations of detail in the accounts (see also Hyginus, Fab. 80). Idas and Lynceus were originally gods of light, probably the sun and moon, the herd of cattle (for the possession of which they strove with the Dioscuri) representing the heavenly bodies. The annihilation of the Apharetidae in the legend indicates the subordinate position held by the Messenians after the loss of their independ- ence and subjugation by Sparta, the Dioscuri being distinctly Spartan, as the Apharetidae were Messenian heroes. The grave of Idas and Lynceus was shown at Sparta, according to Pausanias (iii. 13. 1), whose own

opinion, however, is that they were buried in Messenia. On the chest of Cypselus, Marpessa is repre- sented as following Idas from the temple of Apollo (by whom, according to some, she had been carried off), and there was a painting by Polygnotus of the rape of the Leucippidae in the temple of the Dioscuri at Athens.

In the article Greek Art, fig. 66 (PI. iv.) represents Idas and the Dioscuri driving off cattle.

IDDESLEIGH, STAFFORD HENRY NORTHCOTE, isx Earl of (1818-1887), British statesman, was born in London, on the 27th of October 1818. His ancestors had long been settled in Devonshire, their pedigree, according to Burke, being traceable to the beginning of the 12th century. After a successful career at Balliol College, Oxford, he became in 1843 private secretary to Mr Gladstone at the board of trade. He was afterwards legal secretary to the board; and after acting as one of the secretaries to the Great Exhibition of 1851, co-operated with Sir Charles Trevelyan in framing the report which revolutionized the conditions of appointment to the Civil Service. He succeeded his grandfather, Sir Stafford Henry Northcote, as 8th baronet in 185 1. He entered Parliament in 1855 as Conservative M.P. for Dudley, and was elected for Stamford in 1858, a seat which he exchanged in 1866 for North Devon. Steadily supporting his party, he became president of the board of trade in 1866, secretary of state for India in 1867, and chancellor of the exchequer in 1874. In the interval between these last two appointments he had been one of the commissioners for the settlement of the " Alabama " difficulty with the United States, and on Mr Disraeli's elevation to the House of Lords in 1876 he became leader of the Conservative party in the Commons. As a finance minister he was largely dominated by the lines of policy laid down by Mr Gladstone; but he distinguished himself by his dealings with the Debt, especially his introduction of the New Sinking Fund (1876), by which he fixed the annual charge for the Debt in such a way as to provide for a regular series of payments off the capital. His temper as leader was, however, too gentle to satisfy the more ardent spirits among his own followers, and party cabals (in which Lord Randolph Churchill — who had made a dead set at the " old gang," and especially Sir Stafford Northcote — took a leading part) led to Sir Stafford's transfer to the Lords in 1885, when Lord Salisbury became prime minister. Taking the titles of earl of Iddesleigh and Viscount St Cyres, he was included in the cabinet as first lord of the treasury. In Lord Salisbury's 1886 ministry he became secretary of state for foreign affairs, but the arrange- ment was not a comfortable one, and his resignation had just been decided upon when on the 12th of January 1887 he died

very suddenly at Lord Salisbury's official residence in Downing Street. Lord Iddesleigh was elected lord rector of Edinburgh

University in 1883, in which capacity he addressed the students on the subject of " Desultory Reading." He had little leisure for letters, but amongst his works were Twenty Years of Financial Policy (1862), a valuable study of Gladstonian finance, and Lectures and Essays (1887). His Life by Andrew Lang appeared in 1890. Lord Iddesleigh married in 1843 Cecilia Frances Farrer (d. 1910) (sister of Thomas, 1st Lord Farrer), by whom he had seven sons and three daughters.

He was succeeded as 2nd earl by his eldest son, Walter Stafford Northcote (1845-), who for some years was his father's private secretary. He was' chairman of the Inland Revenue Board from 1877 to 1892; and is also known as a novelist. His eldest son Stafford Henry Northcote, Viscount St Cyres (1869-), was educated at Eton and Merton College Oxford. After taking a 1st class in History, he was elected a senior student of Christ Church, where he resided for a while as tutor and lecturer. His interest in the development of religious thought led him to devote himself specially to the history of the Roman Catholic Church in the 17th century, the first-fruits of which was his Frangois de Fenelon (London, 1901); eight years later he published his Pascal (ib. 1909).

The second son of the 1st earl of Iddesleigh, Stafford Henry Northcote, 1st Baron Northcote (b. 1846), was educated at Eton and at Merton College, Oxford. He became a clerk in the foreign office in 1868, acted as private secretary to Lord Salisbury, and was attached to the embassy at Constantinople from 1876 to 1877. From 1877 to 1880 he was secretary to the chancellor of the exchequer, was financial secretary to the war office from 1885 to 1886, surveyor-general of ordnance, 1886 to 1887, and charity commissioner, 1891 to 1892. In 1887 he was created a baronet. In 1880 he was elected M.P. for Exeter as a Conservative, and retained the seat until 1899, when he was appointed governor of Bombay (1899-1903), being created a peer in 1900. Lord Northcote was appointed governor-general of the Commonwealth of Australia in 1903, and held this post till 1908. He married in 1873 Alice, adopted daughter of the 1st Lord Mount Stephen.

IDEA (Gr. ISea, connected with Ukiv, to see; cf. Lat. species from specere, to look at), a term used both popularly and in philosophical terminology with the general sense of " mental picture." To have no idea how a thing happened is to be without a mental picture of an

occurrence. In this general sense it is synonymous with concept (q.v.) in its popular usage. In philosophy the term " idea " is common to all languages and periods, but there is scarcely any term which has been used with so many different shades of meaning. Plato used it in the sphere of metaphysics for the eternally existing reality, th« archetype, of which the objects of sense are more or less imperfect copies. Chairs may be of different forms, sizes, colours and so forth, but " laid up in the mind of God " there is the one per- manent idea or type, of which the many physical chairs are derived with various degrees of imperfection. From this doctrine it follows that these ideas are the sole reality (see further Idealism) ; in opposition to it are the empirical thinkers of all time who find reality in particular physical objects (see Hylozoism, Empiricism, &c). In striking contrast to Plato's use is that of John Locke, who defines " idea "- as " whatever is the object of understanding when a man thinks " (Essay on the Human Understanding (I.), vi. 8). Here the term is applied not to the mental process, but to anything whether physical or intellectual which is the object of it. Hume differs from Locke by limiting " idea " to the more or less vague mental reconstructions of perceptions, the perceptual process being described as an " impression." Wundt widens the term to include " conscious representation of some object or process of the external world." In so doing he includes not only ideas of memory and imagination, but also perceptual processes, whereas other psychologists confine the term to the first two groups. G. F. Stout and J. M. Baldwin, in the Dictionary of Philosophy and Psychology, i. 498, define " idea " as " the repro- duction with a more or less adequate image, of an object not actually present to the senses." They point out that an idea

and a perception are by various authorities contrasted in various ways. " Difference in degree of intensity," " comparative absence of bodily movement on the part of the subject," " com- parative dependence on mental activity," are suggested by psychologists as characteristic of an idea as compared with a perception.

It should be observed that an idea, in the narrower and generally accepted sense of a mental reproduction, is frequently composite. That is, as in the example given above of the idea of chair, a great many objects, differing materially in detail, all call a single idea. When a man, for example, has obtained an idea of chairs in general by comparison with which he can say " This is a chair, that is a

stool," he has what is known as an "abstract idea" distinct from the reproduction in his mind of any particular chair (see Abstraction). Furthermore a complex idea may not have any corresponding physical object, though its particular constituent elements may severally be the reproductions of actual perceptions. Thus the idea of a centaur is a complex mental picture composed of the ideas of man and horse, that of a mermaid of a woman and a fish.

See Psychology.

IDEALISM (from Gr. Idea, archetype or model, through Fr. idealisme), a term generally used for the attitude of mind which is prone to represent things in an imaginative light and to lay emphasis exclusively or primarily on abstract perfection (i.e. in " ideals "). With this meaning the philosophical use of the term has little in common.

To understand the philosophical theory that has come to be known under this title, we may ask (1) what in general it is and how it is differentiated from other theories of knowledge and reality, (2) how it has risen in the history of philosophy, (3) what position it occupies at present in the world of speculation. 1 . General Definition of Idealism. — Idealism as a philosophical doctrine conceives of knowledge or experience as a process in which the two factors of subject and object stand in a relation of entire interdependence on each other as warp and woof. Apart from the activity of the self or subject in sensory reaction, memory and association, imagination, judgment and inference, there can be no world of objects. A thing-in-itself which is not a thing to some consciousness is an entirely unrealizable, because self-contradictory, conception. But this is only one side of the truth. It is equally true that a subject apart from an object is unintelligible. As the object exists through the constructive activity of the subject, so the subject lives in the construction of the object. To seek for the true self in any region into which its opposite in the form of a not-self does not enter is to grasp a shadow. It is in seeking to realize its own ideas in the world of knowledge, feeling and action that the mind comes into possession of itself; it is in becoming permeated and transformed by the mind's ideas that the world develops the fullness of its reality as object.

Thus defined, idealism is opposed to ordinary common-sense dualism, which regards knowledge or experience as the result of the more or less accidental relation between two separate and independent entities — the mind and its ideas on one side, the thing with its attributes on the other — that serve to limit and condition

each other from without. It is equally opposed to the doctrine which represents the subject itself and its state and judgments as the single immediate datum of consciousness, and all else, whether the objects of an external world or person other than the individual subject whose states are known to itself, as having a merely problematic existence resting upon analogy or other process of indirect inference. This theory is sometimes known as idealism. But it falls short of idealism as above defined in that it recognizes only one side of the anti- thesis of subject and object, and so falls short of the doctrine which takes its stand on the complete correlativity of the two factors in experience. It is for this reason that it is sometimes known as subjective or incomplete idealism. Finally the theory defined is opposed to all forms of realism, whether in the older form which sought to reduce mind to a function of matter,

or in any of the newer forms which seek for the ultimate essence of both mind and matter in some unknown force or energy which, while in itself it is neither, yet contains the potentiality of both. It is true that in some modern developments of idealism the ultimate reality is conceived of in an impersonal way, but it is usually added that this ultimate or absolute being is not some- thing lower but higher than self-conscious personality, including it as a more fully developed form may be said to include a more elementary.

2. Origin and Development of Idealism. — In its self-conscious form idealism is a modern doctrine. In it the self or subject may be said to have come to its rights. This was possible in any complete sense only after the introspective movement represented by the middle ages had done its work, and the thought of the individual mind and will as possessed of relative independence had worked itself out into some degree of clearness. In this respect Descartes' dictum — cogito ergo sum — may be said to have struck the keynote of modern philosophy, and all subsequent speculation to have been merely a prolonged com- mentary upon it. While in its completer form it is thus a doctrine distinctive of modern times, idealism has its roots far back in the history of thought. One of the chief proofs that has been urged of the truth of its point of view is the persistency with which it has always asserted itself at a certain stage in philosophical reflection and as the solution of certain recurrent speculative difficulties. All thought starts from the ordinary dualism or pluralism which conceives of the world as consisting of the juxtaposition of mutually independent things and persons. The first movement is in the direction of dispelling this appear- ance of independence. They are seen to be united under the relation of cause and effect, determining and determined, which turns out to mean that they are merely passing

manifestations of some single entity or energy which constitutes the real un- known essence of the things that come before our knowledge. In the pantheism that thus takes the place of the old dualism there seems no place left for the individual. Mind and will in their individual manifestations fade into the general background of appearance without significance except as a link in a fated chain. Deliverance from the pantheistic conception of the universe comes through the recognition of the central place occupied by thought and purpose in the actual world, and, as a consequence of this, of the illegitimacy of the abstraction whereby material energy is taken for the ultimate reality.

The first illustration of this movement on a large scale was given in the Socratic reaction against the pantheistic conclusions of early Greek philosophy (see Ionian School). The whole movement of which Socrates was a part may be jf c 'f, at

. , . , .,,. . ,, ... idealism:

said to have been in the direction of the assertion of Socrates. the rights of the subject. Its keynote is to be found in the Protagorean " man is the measure." This seems to have been interpreted by its author and by the Sophists in general in a subjective sense, with the result that it became the motto of a sceptical and individualistic movement in contemporary philosophy and ethics. It was not less against this form of idealism than against the determinism of the early physicists that Socrates protested. Along two lines the thought of Socrates led to idealistic conclusions which may be said to have formed the basis of all subsequent advance. (1) He perceived the im- portance of the universal or conceptual element in knowledge, and thus at a single stroke broke through the hard realism of ordinary common sense, disproved all forms of naturalism that were founded on the denial of the reality of thought, and cut away the ground from a merely .sensational and subjective idealism. This is what Aristotle means by claiming for Socrates that he was the founder of definition. (2) He taught that life was explicable only as a system of ends. Goodness consists in the knowledge of what these are. It is by his hold upon them that the individual is able to give unity and reality to his will. In expounding these ideas Socrates limited himself to the sphere of practice. Moreover, the end or ideal of the practical life was conceived of in too vague a way to be of much practical use. His principle, however, was essentially sound, and led directly

Aristotle.

to the Platonic Idealism. Plato extended the Socratic discovery to the whole of reality and while seeking to see the pre-Socratics with the eyes of Socrates sought " to see Socrates with the eyes of the pre-Socratics." Not only were the virtues ato ' to be explained by their relation to a common or

universal good which only intelligence could apprehend, but there was nothing in all the furniture of heaven or earth which in like manner did not receive reality from the share it had in such an intelligible idea or essence. But these ideas are them- selves intelligible only in relation to one another and to the whole. Accordingly Plato conceived of them as forming a system and finding their reality in the degree in which they embody the one all-embracing idea and conceived of not under the form of an efficient but of a final cause, an inner principle of action or tendency in things to realize the fullness of their own nature which in the last resort was identical with the nature of the whole. This Plato expressed in the myth of the Sun, but the garment of mythology in which Plato clothed his idealism, beautiful as it is in itself and full of suggestion, covered an essential weakness. The more Plato dwelt upon his world of ideas, the more they seemed to recede from the world of reality, standing over against it as principles of condemnation instead of revealing themselves in it. In this way the Good was made to appear as an end imposed upon things from without by a creative intelligence instead of as an inner principle of adaptation.

On one side of his thought Aristotle represents a reaction against idealism and a return to the position of common-sense dualism, but on another, and this the deeper side, he represents the attempt to restore the theory in a more satisfactory form. His account of the process of know- ledge in his logical treatises exhibits the idealistic bent in its clearest form. This is as far removed as possible either from dualism or from empiricism. The universal is the real; it is that which gives coherence and individuality to the particulars of sense which apart from it are like the routed or disbanded units of an army. Still more manifestly in his Ethics and Politics Aristotle makes it clear that it is the common or universal will that gives substance and reality to the individual. In spite of these and other anticipations of a fuller idealism, the idea remains as a form imposed from without on a reality otherwise conceived of as independent of it. As

we advance from the logic to the metaphysics and from that to his ontology, it becomes clear that the concepts are only " categories " or predicates of a reality lying outside of them, and there is an ultimate division between the world as the object or matter of thought and the thinking or moving principle which gives its life. It is this that gives the Aristotelian doctrine in its more abstract state- ments an air of uncertainty. Yet besides the particular contri- bution that Aristotle made to idealistic philosophy in his logical and ethical interpretations, he advanced the case in two direc- tions, (a) He made it clear that no explanation of the world could be satisfactory that was not based on the notion of con- tinuity in the sense of an order of existence in which the reality of the lower was to be sought for in the extent to which it gave expression to the potentialities of its own nature — which were also the potentialities of the whole of which it was a part, (b) From this it followed that difficult as we might find it to explain the relation of terms so remote from each other as sense and thought, the particular and the universal, matter and mind, these oppositions cannot in their nature be absolute. These truths, however, were hidden from Aristotle's successors, who for the most part lost the thread which Socrates had put into their hand. When the authority of Aristotle was again invoked, it was its dualistic and formal, not its idealistic and metaphysical, side that was in harmony with the spirit of the age. Apart from one or two of the greatest minds, notably Dante, what appealed to the thinkers of the middle ages was not the idea of reality as a progressive self-revelation of an inner principle working through nature and human life, but the formal principles of classification which it seemed to offer for a material of thought and action given from another source.

Modern like ancient idealism came into being as a correction

of the view that threatened to resolve the world of matter and

mind alike into the changing manifestations of some

single non-spiritual force or substance. While, ia ea Usm.

however, ancient philosophy may be said to have

been unilinear, modern philosophy had a twofold origin,

and till the time of Kant may be said to have pursued two

independent courses.

All philosophy is the search for reality and rational certainty as

opposed to mere formalism on the one hand, to authority and dogmatism on the other. In this sense modern philosophy had a common root in revolt against medievalism, In England this revolt sought for the certainty and clearness that reason requires in the assurance of an outer world given to immediate sense experience; on the continent of Europe, in the assurance of an inner world given immediately in thought. Though starting from apparently opposite poles and following widely different courses the two movements led more or less directly to the same results. It is easy to understand how English empiricism issued at once in the trenchant naturalism of Hobbes. It is less comprehensible how the Cartesian philosophy from the starting-point of thought allied itself with a similar point of view. This can be understood only by a study of the details of Descartes' philosophy (see Cartesianism). Suffice it to say that in spite of its spiritualistic starting-point its general result was to give a stimulus to the prevailing scientific tendency as represented by Galileo, Kepler and Harvey to the principle of mechanical explanations of the phenomena of the universe. True it was precisely against this, that Descartes' immediate successors struggled, But the time-spirit was too strong for them. Determinism had other forms besides that of a crude materialism, and the direction that Malebranche succeeded in giving to speculation led only to the more complete denial of freedom and individuality in the all-devouring pantheism of Spinoza.

The foundations of idealism in the modern sense were laid by the thinkers who sought breathing room for mind and will in a deeper analysis of the relations of the subject to the world that it knows. From the outset English philosophy had a leaning to the psychological point of view, and Locke was only carrying on the tradition of his predecessors and particularly of Hobbes in definitely accepting it as the basis of his Essay. It was, however, Berkeley who first sought to utilize the conclusions that were implicit in Locke's starting-point to disprove " the systems of impious and profane persons which exclude all freeedom, intelligence, and design from the formation of things, and instead thereof make a self – existent, stupid, unthinking substance the root and qrigin of all beings." Berkeley's statement of the view that all knowledge is relative to the subject — that no object can be known except under the form which our powers of sense-perception, our memory and imagination, our notions and inference, give it — is still the most striking and convincing that we possess. To have established this position was a great step in speculation. Henceforth ordinary dogmatic dualism was excluded from philosophy; any attempt to revive it, whether with Dr Johnson by an appeal to common prejudice, or, in the more reflective

Johnsonianism of the 18th-century Scottish philosophers, must be an anachronism. Equally impossible was it thenceforth to assert the mediate or immediate certainty of material substance as the cause either of events in nature; or of sensations in our- selves. But with these advances came the danger of fatting into error from which common-sense dualism and naturalistic monism were free. From the point of view which Berkeley had inherited from Locke it seemed to follow that not only material substance, but the whole conception of a world of objects, is at most an inference from subjective modifications which are the only immediately certain objects of knowledge. The implications of such a view were first clearly apparent when Hume showed that en the basis of it there seemed to be nothing that we could confidently affirm except the order of our own impressions and ideas. This being so, not only were physics and mathematics impossible as sciences of necessary

Berkeley.

IDEALISM

283

Leibnitz.

•udjective truth, but our apparent consciousness of a permanent self and object alike must be delusive.

It was these paradoxes that Kant sought to rebut by a more thoroughgoing criticism of the basis of knowledge the sub- „ , stance of which is summed up in his celebrated Refuta-

tion of Idealism, 1 wherein he sought to undermine Hume's scepticism by carrying it one step further and demon- strating that not only is all knowledge of self or object excluded, but the consciousness of any series of impressions and ideas is itself impossible except in relation to some external per- manent and universally accepted world of objects.

But Kant's refutation of subjective idealism and his vindica- tion of the place of the object can be fully understood only when we take into account the other defect in the teaching of his predecessors that he sought in his Critique to correct. In continental philosophy the reaction against mechanical and pantheistic explanations of the universe found even more definite utterance than in English psychological empiricism in the metaphysical system of Leibnitz, whose theory of self-determined monads can be understood only

when taken in the light of the assertion of the rights of the subject against the substance of Spinoza and the atoms of the materialist. But Leibnitz also anticipated Kant in seeking to correct the empirical point of view of the English philosophers. True, sense-given material is necessary in order that we may have thought. " But by what means," he asks, " can experience and the senses give ideas ? Has the soul windows ? Is it like a writing tablet? Is it like wax? It is plain that all those who think thus of the soul make it at bottom corporeal. True, nothing is in the intellect which has not been in the senses, but we must add except the intellect itself. The soul contains the notions of being, substance, unity, identity, cause, perception, reasoning and many others which the senses cannot give " {Nouveaux essais, ii. 1). But Leibnitz's conception of the priority of spirit had too little foundation, and the different elements he sought to combine were too loosely related to one another to stand the strain of the two forces of empiricism and material- ism that were opposed to his idealism. More particularly by the confusion in which he left the relation between the two logical principles of identity and of sufficient reason underlying respectively analytic and synthetic, deductive and inductive thought, he may be said to have undermined in another way the idealism he strove to establish. It was in seeking to close up the fissure in his system represented by this dualism that his successors succeeded only in adding weakness to weakness by reducing the principle of sufficient reason to that of formal identity (see Wolff) and representing all thought as in essence analytic. From this it immediately followed that, so far as the connexion of our experiences of the external world does not show itself irreducible to that of formal identity, it must remain un- intelligible. As empiricism had foundered on the difficulty of showing how our thoughts could be an object of sense experience, so Leibnitzian formalism foundered on that of understanding how the material of sense could be an object of thought. On one view as on the other scientific demonstration was impossible. The extremity to which philosophy had been brought by empiricism on the one hand and formalism on the other was K . Kant's opportunity. Leibnitz's principle of the " nisi

intellectus ipse " was expanded by him into a demon- stration the completest yet effected by philosophy of the part played by the subject not merely in the manipulation of the material of experience but in the actual constitution of the object that is known. On the other hand he insisted on the synthetic character of this activity without which it was im- possible to get beyond the circle of our own thoughts. The parts of the Critique of Pure Reason, more particularly the " Deduction of the Categories " in which this theory is worked

out, may be said to have laid the foundation of modern idealism — " articulum stantis aut cadentis doctrinae." In spite of the defects of Kant's statement — to which it is necessary to return — the place of the concepts and ideals of the mind and the synthetic organizing 1 Kritik d. reinen Vernunft, p. 197 (ed. Hartenstein).

activity which these involve was established with a trenchancy which has been acknowledged by all schools alike. The " Copernican revolution " which he claimed to have effected may be said to have become the starting-point of all modern philosophy. Yet the divergent uses that have been made of it witness to the ambiguity of his statement which is traceable to the fact that Kant was himself too deeply rooted in the thought of his predecessors and carried with him too much of their spirit to be able entirely to free himself from their assump- tions and abstractions. His philosophy was more like Michael- angelo's famous sculpture of the Dawn, a spirit yet encumbered with the stubble of the material from which it was hewn, than a clear cut figure with unmistakable outlines. Chief among these encumbering presuppositions was that of a fundamental distinction between perception and conception and consequent upon it between the synthetic and the analytic use of thought. It is upon this in the last resort that the distinction between the phenomenal world of our experience and a nournenal world beyond it is founded. Kant perceives that " perception without conception is blind, conception without, perception is empty," but if he goes so far ought he not to have gone still further and inquired whether there can be any perception at all without a concept, any concept which does not presuppose a precept, and, if this is impossible, whether the distinction between a world of appearance which is known and a world of things-in-themselves which is not, is not illusory ?

It was by asking precisely these questions that Hegel gave the finishing strokes to the Kantian philosophy. The starting- point of all valid philosophy must be the perception that the essence of all conscious apprehension is the ege '

union of opposites— of which that of subject and object is the most fundamental and all-pervasive. True, before differences can be united they must have been separated, but this merely proves that differentiation or analysis is only one factor in a single process. Equally fundamental is the element of synthesis. Nor is it possible at any point in knowledge to prove the existence of a merely given in whose construction the thinking subject has played no part nor a merely thinking subject in whose structure the object is not an organic factor. In coming, as at a certain point in its development it

does, to the consciousness of an object, the mind does not find itself in the presence of an opponent, or of anything essentially alien to itself but of that which gives content and stability to its own existence. True, the stability it seems to find in it is incomplete. The object cannot rest in the form of its immediate appearance without involving us in contradiction. The sun does not " rise," the dew does not " fall." But this only means that the unity between subject and object to which the gift of consciousness commits us is incompletely realized in that appearance: the apparent truth has to submit to correction and supplementation before it can be accepted as real truth. It does not mean that there is anywhere a mere fact which is not also an interpretation nor an interpreting mind whose ideas have no hold upon fact. From this it follows that ultimate or absolute reality is to be sought not beyond the region of experience, but in the fullest and most harmonious statement of the facts of our experience. True a completely harmonious world whether of theory or of practice remains an ideal. But the fact that we have already in part realized the ideal and that the degree in which we have realized it is the degree in which we may regard our experience as trust- worthy, is proof that the ideal is no mere idea as Kant taught, but the very substance of reality.

Intelligible as this development of Kantian idealism seems in the light of subsequent philosophy, the first statement of it in Hegel was not free from obscurity. The unity of opposites translated into its most abstract terms i ag Mocks as the " identity of being and not-being," the principle in that the " real is the rational," the apparent sub-Hegelian stitution of " bloodless " categories for the substance s „? ents of concrete reality gave it an air of paradox in the eyes of metaphysicians while physicists were scandalized by the premature attempts at a complete philosophy of nature and

history. For this Hegel was doubtless partly to blame. But philosophical critics of his own and a later day are not hereby absolved from a certain perversity in interpreting these doctrines in a sense precisely opposite to that in which they were intended. The doctrine of the unity of contraries so far from being the denial of the law of non-contradiction is founded on an absolute reliance upon it. Freed from paradox it means that in every object of thought there are different aspects or elements each of which if brought separately into consciousness may be so emphasized as to appear to contradict

another. Unity may be made to contradict diversity, permanence change, the particular the universal, individuality relatedness. Ordinary conscious- ness ignores these "latent fires"; ordinary discussion brings them to light and divides men into factions and parties over them; philosophy not because it denies but because it acknow- ledges the law of non-contradiction as supreme is pledged to seek a point of view from which they may be seen to be in essential harmony with one another as different sides of the same truth. The " rationality of the real " has in like manner been interpreted as intended to sanctify the existing order. Hegel undoubtedly meant to affirm that the actual was rational in the face of the philosophy which set up subjective feeling and reason against it. But idealism has insisted from the time of Plato on the distinction between what is actual in time and space and the reality that can only partially be revealed in it. Hegel carried this principle further than had yet been done. His phrase does not therefore sanctify the established fact but, on the contrary, declares that it partakes of reality only so far as it embodies the ideal of a coherent and stable system which it is not. As little is idealism responsible for any attempt to pass off logical abstractions for concrete reality. The " Logic " of Hegel is merely the continuation of Kant's " Deduction " of the categories and ideas of the reason which has generally been recognized as the soberest of attempts to set forth the presup- positions which underlie all experience. " What Hegel attempts to show is just that the categories by which thought must determine its object are stages in a process that, beginning with the idea of ' Being,' the simplest of all determinations is driven on by its own dialectic till it reaches the ideaof self-consciousness. In other words the intelligence when it once begins to define an object for itself, finds itself launched on a movement of self- asserting synthesis in which it cannot stop until it had recognized that the unity of the object with itself involves its unity with all other objects and with the mind that knows it. Hence, whatever we begin by saying, we must ultimately say ' mind ' " (Caird, Kant, i. 443).

While the form in which these doctrines were stated proved fatal to them in the country of their birth, they took deep root in the next generation in English philosophy. Here the stone that the builders rejected was made the head of the corner. The influences which led to this result were manifold. From the side of literature the way was prepared for it by the genius of Coleridge, Wordsworth and Carlyle; from the side of morals and politics by the profound dis- content of the constructive spirit of the century with the disintegra- ting conceptions inherited from utilitarianism. In taking root in England

idealism had to contend against the traditional empiricism represented by Mill on the one hand and the pseudo- Kantianism which was rendered current by Mansel and Hamilton on the other. As contrasted with the first it stood for the necessity of recognizing a universal or ideal element as a constitutive factor in all experience whether cognitive or volitional; as contrasted with the latter for the ultimate unity of subject and object, knowledge and reality, and therefore for the denial of the existence of any thing-in-itself for ever outside the range of experience. Its polemic against the philosophy of experience has exposed it to general misunderstanding, as though it claimed some a priori path to truth. In reality it stands for a more thoroughgoing and consistent application of the test of experience. The defect of English empiricism from the outset had been the uncritical acceptance of the metaphysical dogma of a pure unadulterated sense-experience as the criterion of truth. This assumption idealism examines and rejects in the name of experience itself. Similarly it only carried the doctrine of relativity to its logical conclusion in denying that there could be any absolute relativity. Object stands in essential relation to subject, subject to object. This being so, it is wholly illogical to seek for any test of the truth and reality of cither except in the form which that relation itself talrrs. In its subsequent development idealism in England hsz passed through several clearry marked stages which may be

distinguished as (a) that of exploration and tentative exposition in the writings of J. F. Ferrier, 1 J. Hutchison Stirling, 2 Benjamin Jowett, 3 W. T. Harris; 4 (b) of confident application to the central problems of logic, ethics and politics, fine art and religion, and as a principle of constructive criticism and interpretation chiefly in T. H. Green, 6 E. Caird, 6 B. Bosanquet; 7 © of vigorous effort to develop on fresh lines its underlying metaphysics in F. H. Bradley, 8 J. M. E. McTaggart, 9 A. E. Taylor, 10 Josiah Royce 11 and others. Under the influence of these writers idealism, as above expounded though with difference of interpretation in individual writers, may be said towards the end of the 19th century to have been on its way to becoming the leading philosophy in the British Isles and America.

3. Reaction against Traditional Idealism. — But it was not to be expected that the position idealism had thus won for itself would remain long unchallenged. It had its roots in New a literature and in forms of thought remote from the Dualism common track; it had been formulated before the and Prag- great advances in psychology which marked the course ma sm ‘ of the century; its latest word seemed to involve conse- quences that brought it into conflict with the vital interest the human mind has in freedom and the possibility of real

initiation. It is not, therefore, surprising that there should have been a vigorous reaction. This has taken mainly two opposite forms. On the one hand the attack has come from the old ground of the danger that is threatened to the reality of the external world and may be said to be in the interest of the object. On the other hand the theory has been attacked in the interest of the subject on the ground that in the statuesque world of ideas into which it introduces us it leaves no room for the element of movement and process which recent psychology and metaphysic alike have taught us underlies all life. The conflict of idealism with these two lines of criticism — the accusa- tion of subjectivism on the one side of intellectualism and rigid objectivism on the other — may be said to have constituted the history of Anglo-Saxon philosophy during the first decade of the 20th century.

I. Whatever is to be said of ancient Idealism, the modern doctrine may be said notably in Kant to have been in the main a vindication of the subjective factor in knowledge. But that space and time, matter and cause should owe their origin to the action of the mind has always seemed paradoxical to common sense. Nor is the impression which its enunciation in Kant made, likely to have been lightened in this country by the connexion that was sure to be traced between Berkeleyanism and the new teaching or by the form which the doctrine received at the hands of T. H. Green, its leading English representative between 1870 and 1880. If what is real in things is ultimately nothing but their relations, and if relations are inconceivable apart from the relating mind, what is this but the dissolution of the solid ground of external reality which my consciousness seems to assure me underlies and eludes all the conceptual network by which I try to bring one part of my experience into connexion with another ? It is quite true that modern idealists like Berkeley himself have sought to save themselves from the gulf of sub- jectivism by calling in the aid of a universal or infinite mind or by an appeal to a total or absolute experience to which our own is relative. But the former device is too obviously a deus ex machina, the purpose of which would be equally well served by supposing with Fichte the individual self to be endowed with the power of subconsciously extraditing a world which returns to it in consciousness under the form of a foreign creation. The appeal to an Absolute on the other hand is only to sub- stitute one difficulty for another. For granting that it places the centre of reality outside the individual self it does so only at the price of reducing the reality of the latter to an appearance;

1 Institutes of Metaphysics (1854) ; Works (1866).

2 Secret of Hegel (1865).

3 Dialogues of Plato (1871).

4 Journal of Spec. Phil. (1867). 6 Hume's Phil. Works (1875).

6 Critical account of the Phil, of Kant (1877).

7 Knowledge and Reality (1885) ; Logic (1888).

8 Appearance and Reality (1893).

9 Studies in Hegelian Cosmology (1901).

10 Elements of Metaphysics (1903).

11 The World and the individual (1901).

and if only one thing is real what becomes of the many different things which again my consciousness assures me are the one world with which I can have any practical concern? To meet these difficulties and give back to us the assurance of the sub- stantiality of the world without us it has therefore been thought necessary to maintain two propositions which are taken to be the refutation of idealism. (1) There is given to us immediately in knowledge a world entirely independent of and different from our own impressions on the one hand and the conceptions by which we seek to establish relations between them upon the other. The relation of these impressions (and for the matter of that of their inter-relations among themselves) to our minds is only one out of many. As a leading writer puts it: " There is such a thing as greenness having various relations, among others that of being perceived." 1 (2) Things may be, and may be known to be simply different. They may exclude one another, exist so to speak in a condition of armed neutrality to one another, without being positively thereby related to one another or altered by any change taking place in any of them. As the same writer puts it: " There is such a thing as numerical difference, different from conceptual difference," 2 or expressing the same thing in other words " there are relations not grounded in the nature of the related terms."

In this double-barrelled criticism it is important to distinguish what is

really relevant. Whatever the shortcomings of individual writers may be, modern idealism differs, as we have seen, from the arrested idealism of Berkeley precisely in the point on which dualism insists. In all knowledge we are in touch not merely with the self and its passing states, but with a real object which is different from them. On this head there is no difference, and idealism need have no difficulty in accepting all that its opponents here contend. The difference between the two theories does not consist in any difference of emphasis on the objective side of knowledge, but in the standard by which the nature of the object is to be tested — the difference is logical not metaphysical — it concerns the definition of truth or falsity in the knowledge of the reality which both admit. To idealism there can be no ultimate test, but the possibility of giving any fact which claims to be true its place in a coherent system of mutually related truths. To this dualism opposes the doctrine that truth and falsehood are a matter of mere immediate intuition: " There is no problem at all in truth and falsehood, some propositions are true and some false just as some roses are red and some white." The issue between the two theories under this head may here be left with the remark that it is a curious comment on the logic of dualism that setting out to vindicate the reality of an objective standard of truth it should end in the most subjective of all the way a thing appears to the individual. The criticism that applies to the first of the above contentions applies mutatis mutandis to the second. As idealism diners from Berkeleyanism in asserting the reality of an " ex- ternal " world so it differs from Spinozism in asserting the reality of difference within it. Determination is not merely negation. On this head there need be no quarrel between it and dualism. Ours is a many-sided, a many-coloured world. The point of conflict again lies in the nature and ground of the assigned differences. Dualism meets the assertion of absolute unity by the counter assertion of mere difference. But if it is an error to treat the unity of the world as its only real aspect, it is equally an error to treat its differences as something ulti- mately irreducible. No philosophy founded on this assumption is likely to maintain itself against the twofold evidence of modern psychology and modern logic. According to the first the world, whether looked at from the side of our perception or from the side of the object perceived, can be made intelligible only when we accept it for what it is as a real continuity. Differ- ences, of course, there are; and, if we like to say so, every differ- ence is unique, but this does not mean that they are given in absolute independence of everything else, " fired at us out of*

1 See Mind, New Series, xii. p. 433 sqq.

2 Proceedings of the Aristotelian Society (1900-1901), p. no. 8 Mind, New Series, xiii. p. 523; cf. 204, 35c.

a cannon." They bear a definite relation to the structure of our physical and psychical nature, and correspond to definite needs of the subject that manifests itself therein. Similarly from the side of logic. It is not the teaching of idealism alone but of the facts which logical analysis has brought home to us that all difference in the last resort finds its ground in the quality or content of the things differentiated, and that this difference of content shows in turn a double strand, the strand of sameness and the strand of otherness — that in which and that by which they differ from one another. Idealism has, of course, no quarrel with numerical difference. All difference has its numerical aspect: two different things are always two both in knowledge and in reality. What it cannot accept is the doctrine that there are two things which are two in themselves apart from that which makes them two — which are not two of something. So far from establishing the truth for which dualism is itself con- cerned — the reality of all differences — such a theory can end only in a scepticism as to the reality of any difference. It is difficult to see what real difference there can be between things which are differences of nothing.

II. More widespread and of more serious import is the attack from the other side to which since the publication of A. Seth's Hegelianism and Personality (1887) and W. James's Will to Believe (1903) idealism has been subjected. Here also it is important to distinguish what is relevant from what is irrelevant in the line of criticism represented by these writers. There need be no contradiction between idealism and a reasonable pragmatism. In so far as the older doctrine is open to the charge of neglecting the conative and teleological side of experience it can afford to be grateful to its critics for recalling it to its own eponymous principle of the priority of the '\ideal " to the " idea," of needs to the conception of their object. The real issue comes into view in the attempt, under- taken in the interest of freedom, to substitute for the notion of the world as a cosmos pervaded by no discernible principle and in its essence indifferent to the form impressed upon it by its active parts.

To the older idealism as to the new the essence of mind or spirit is freedom. But the guarantee of freedom is to be sought for not in the denial of law, but in the whole nature of mind and its relation to the structure of experience. Without mind no orderly world : only through the action of the subject and its " ideas " are the con- fused and incoherent data of sense-perception (themselves shot through

with both strands) built up into that system of things we call Nature, and which stands out against the subject as the body stands out against the soul whose functioning may be said to have created it. On the other hand, without the world no mind: only through the action of the environment upon the subject is the idealizing activity in which it finds its being called into exist- ence. Herein lies the paradox which is also the deepest truth of our spiritual life. In interpreting its environment first as a world ot things that seem to stand in a relation of exclusion to one another and to itself, then as a natural system governed by rigid mechanical necessity, the mind can yet feel that in its very opposition the world is akin to it, bone of its bone and flesh of its flesh. What is true ot mind is true of will. Idealism starts from the relativity of the world to purposive consciousness. But this again may be so stated as to represent only one side of the truth. It is equally true that the will is relative to the world of objects and interests to which it is attached through instincts and feelings, habits and sentiments. In isolation from its object the will is as much an abstraction as thought apart from the world of percepts, memories and associations which give it content and stability. And just as mind does not lose but gain in individuality in proportion as it parts with any claim to the capricious determination of what its world shall be, and becomes dominated by the conception of an order which is immutable so the will becomes tree and " personal " in proportion as it identifies itself with objects and interests, and subordinates itself to laws and requirements which involve the suppression of all that is merely arbitrary and subjective. Here, too, subject and object grow together. The power and vitality of the one is the power and vitality of the other, and this is so because they are not two things with separate roots but are both rooted in a common reality which, while it includes, is more than either.

Passing by these contentions as unmeaning or irrelevant and seeing nothing but irreconcilable contradiction between the conceptions of the world as immutable law and a self-determining subject pragmatism (q.v.) seeks other means of vindicating the reality of freedom. It agrees with older forms of libertarianism in taking its stand on the fact of spontaneity as primary and self -evidencing,

but it is not content to assert its existence side by side with rigidly determined sequence. It carries the war into the camp of the enemy by seeking to demonstrate that the completely determined action

which is set over against freedom as the basis of explanation in the material world is merely a hypothesis which, while it serves sufficiently well the limited .purpose for which it is devised, is incapable of verification in the ultimate constituents of physical nature. There seems in fact nothing to prevent us from holding that while natural laws express the average tendencies of multitudes they give no clue to the movement of individuals. Some have gone farther and argued that from the nature of the case no causal explanation of any real change in the world of things is possible. A cause is that which contains the effect (" causa aequat effectum "), but this is precisely what can never be proved with respect to anything that is claimed as a real cause in the concrete world. Everywhere the effect reveals an element which is indiscoverable in the cause with the result that the identity we seek for ever eludes us. Even the resultant of mechanical forces refuses to resolve itself into its con- stituents. In the " resultant " there is a new direction, and with it a new quality the component forces of which no analysis can discover, 1

It is not here possible to do more than indicate what appear to be the valid elements in these two conflicting interpretations of the requirements of a true idealism. On behalf of the older it may be confidently affirmed that no solution is likely to find general acceptance which involves the rejection of the conception of unity and intelligible order as the primary principle of our world. The assertion of this principle by Kant was, we have seen, the cornerstone of idealistic philosophy in general, under- lying as it does the conception of a permanent subject not less than that of a permanent object. As little from the side of knowledge is it likely that any theory will find acceptance which reduces all thought to a process of analysis and the discovery of abstract identity. There is no logical principle which requires that we should derive qualitative change by logical analysis from quantitative difference. Everywhere experience is synthetic: it gives us multiplicity in unity. Explanation of it does not require the annihilation of all differences but the apprehension of them in organic relation to one another and to the whole to which they belong. It was, as we have seen, this conception of thought as essentially synthetic for which Kant paved the way in his polemic against the formalism of his continental predecessors. The revival as in the above argument of the idea that the function of thought is the elimination of difference, and that rational connexion must fail where absolute identity is indiscoverable merely shows how imperfectly Kant's lesson has been learned by some of those who prophesy in his name.

Finally, apart from these more academic arguments there is an

undoubted paradox in a theory which, at a moment when in whatever direction we look the best inspiration in poetry, sociology and physical science comes from the idea of the unity of the world, gives in its adhesion to pluralism on the ground of its preponderating practical value.

On the other hand, idealism would be false to itself if it inter- preted the unity which it thus seeks to establish in any sense that is incompatible with the validity of moral distinctions and human responsibility in the fullest sense of the term. It would on its side be, indeed, a paradox if at a time when the validity of human ideals and the responsibility of nations and individuals to realize them is more universally recognized than ever before on our planet, the philosophical theory which hitherto has been chiefly identified with their vindication should be turned against them. Yet the depth and extent of the dissatisfaction are sufficient evidence that the most recent developments are not free from ambiguity on this vital issue.

What is thus suggested is not a rash departure from the general point of view of idealism (by its achievements in every field to which it has been applied, " stat mole sua ") but a cautious inquiry into the possibility of reaching a conception of the world 1 The most striking statement of this argument is to be found in Boutroux's treatise De la contingence des lots de la nature, first published in 1874 and reprinted without alteration in 1905. The same general line of thought underlies James Ward's Naturalism and Agnosticism (2nd ed., 1903), and A. J. Balfour's Foundations of Belief (8th ed., 1901). H. Bergson's works on the other hand contain the elements of a reconstruction similar in spirit to the suggestions of the present article.

in which a place can be found at once for the idea of unity and determination and of movement and freedom. Any attempt here to anticipate what the course of an idealism inspired by such a spirit of caution and comprehension is likely to be cannot but appear dogmatic.

Yet it may be permitted to make a suggestion. Taking for granted the unity of the world idealism is committed to interpret it as spiritual as a unity of spirits. This is implied in the phrase by which it has sought to signalize its break with Spinozism : " from substance to subject." The universal or infinite is one that realizes itself in finite particular minds and wills, not as accidents or imperfec- tions of it, but as its essential form. These on their side, to be subject in the true sense must be conceived of as possessing a life which is truly their own, the

expression of their own nature as self-deter- minant. In saying subject We say self, in saying self we say free creator. No conception of the infinite can therefore be true which does not leave room for movement, process, free creation. Oldness, sameness, permanence of principle and direction, these must be, otherwise there is nothing; but newness of embodiment, existence, realization also, otherwise nothing is!.

Now it is just to these implications in the idea of spirit that some of the prominent recent expositions of Idealism seem to have failed to do justice. They have failed particularly when they have left the idea of " determination " unpurged of the suggestion of time succession. The very word lends itself to this mistake. Idealists have gone beyond others in asserting that the subject in the sense of a being which merely repeats what has gone before is timeless. This involves that its activity cannot be truly conceived of as included in an antecedent, as an effect in a cause or one term of an equation in the other. As the activity of a subject or spirit it is essentially a new birth. It is this failure that has led to the present revolt against a "block universe;" But the difficulty is not to be met by running to the, opposite extreme in the assertion of a loose and ramshackle one. This is merely another way of perpetuating the mistake of allowing the notion of determination by an other or a preceding to continue to dominate us in a region where we have in reality passed from it to the notion of determination by self or by self-acknowledged ideals. As the correction from the one side consists in a more whole-hearted acceptance of the conception of determination by an ideal as the essence of mind, so from the other side it must consist in the recognition of the valuelessness of a freedom which does not mean submission to a self-chosen, though not self- created, law.

The solution here suggested is probably more likely to meet with opposition from the side of Idealism than of Pragmatism. It involves, it will be said, the reality of time, the dependence of the Infinite in the finite, and therewith a departure from the whole line of Hegelian thought. (1) It does surely involve the reality of time in the sense that it involves the reality of existence, which it is agreed is process. Without process the eternal is not complete or, if eternity means completeness, is not truly eternal. Our mistake lies in abstrac- tion of the one from the other, which, as always, ends in. confusion of the one with the other. Truth lies in giving each its place. Not only does eternity assert the conception of the hour but the hour asserts the conception of eternity— with what adequacy is another question. (2) The second of the above objections takes its point from the contradiction to religious consciousness which seems to be involved.

This is certainly a mistake. Religious consciousness asserts, no doubt, that God is necessary to the soul : from . Him as its inspiration, to Him as its ideal are all things. But it asserts with equal emphasis that the soul is necessary to God. To declare itself an unnecessary creation is surely on the part of the individual soul the height of impiety. God lives in the soul as it in Him. He also might say, from it as His offspring, to it as the object of His outgoing love are all things. (3) It is a mistake to attribute to Hegelthe doctrine that time is an illusion. If in a Well-known passage {Logic § 212) he seems to countenance the Spinoxistic view he immediately corrects it by assigning an " actualizing force " to this illusion and making it a " necessary dynamic element of truth." Consistently with this we have the conclusion stated in the succeeding section on the Will. " Good, the final end of the world, has being only while it constantly produces itself. And the world of the spirit and the world of nature continue to have this distinction, that the latter moves only in a recurring cycle while the former certainly also makes progress." The mistake is not Hegel's but ours., ftˆ is to be remedied not by giving up the idea of the Infinite but by ceasing to think of the Infinite as of a being endowed with a static perfection which the finite will merely reproduces, and definitely recognizing the forward effort of the finite as an essential element in Its self-expression. If there be any truth in this suggestion it seems likely that the last word of idealism, like the first, will prove to be that the type of the highest reality is to be sought for not in any fixed Parmenidean circle of achieved being but in an ideal of good which while never fully expressed under the form of time can never become actual and so fulfil itself under any other.

Bibliography. — (A) General works besides those of the writers mentioned above : W. Wallace, Prolegomena to the Study of Hegel (1894), and Hegel's Philosophy of Mind (1894); A. Seth and R. B.

Haldane, Essays in Phil, Criticism (1883); John Watson, Kant and his English Critics (i88i) ; ; J. B. Baillie, Idealistic Construction of Experience (1906); J. S. Mackenzie, Outlines of Metaphysics (1902);

A. E. Taylor, Elements of Metaphysics (1903); R- L. Nettleship, Lectures and Remains (1897); D. G. Ritchie, Philosophical Studies

(i9°5)-

(B) Works on particular branches of philosophy: (a) Logic— F. H. Bradley, Principles of Logic (1883); B. Bosanquet, Logic (1888) and Essentials of Logic (1895). (b) Psychology — J. Dewey, Psychology (1886) ; G. F. Stout, Analytic Psychology (1896); B. Bosanquet, Psychology of the Moral Self (1897). (c) Ethics— F. H. Bradley, Ethical Studies (1876); J. Dewey, Ethics (1891); W. R. Sorley, "Ethics of Naturalism (2nd ed., 1904) ; J. S. Mackenzie, Manual of Ethics (4th ed., 1900) ; J. H. Muirhead, Elements of Ethics (3rd ed., 1910). (d) Politics and Economics — B. Bosanquet, Philosophical Theory of the State (1899), and Aspects of the Social Problem (1895) ;

B. Bonar, Philosophy and Political Economy in their historical Relations (1873); D. G. Ritchie, Natural Rights (189ˆ); J. S. Mackenzie, An Introd. to Social Phil. (1890); J. MacCunn, Six Radical Thinkers (1907). (e) Aesthetic — B. Bosanquet, History of Aesthetic (1892), and Introd. to Hegel's Phil, of the Fine Arts (1886); W. Hastie, Phil, of Art by Hegel and Michelet (1886). . (/) Religion — J. Royce, Religious Aspect of Philosophy (1885), and The Conception of God (1897); R. B. Haldane, The Pathway to Reality (1903);

E. Caird, Evolution of Religion (180)3); J. Caird, Introd. to the Phil, of Religion (1880); H; Jones, Idealism as a Practical Creed (1909).

(C) Recent Criticism. Besides works mentioned in the text: W. James, Pragmatism (1907), A Pluralistic Universe (1909), The Meaning of Truth (1909); H. Sturt , Personal Idealism (1902);

F. C. S. Schiller, Humanism (1903); G. E. Moore, Principia Ethica; H. Rashdall, The Theory of Good and Evil (1907).

See also Ethics and Metaphysics. (J. H. Mu.)

IDELER, CHRISTIAN LUDWIG (1766-1846), German chrono- logist and astronomer, was born near Perleberg on the 21st of September 1766. After holding various official posts under the Prussian government he became professor at the university of Berlin in 1821, and eighteen years later foreign member of the Institute of France. From 1816 to 1822 he was tutor to the young princes William Frederick and Charles. He died in Berlin on the 10th of August 1846. He devoted his life chiefly to the examination of ancient systems of chronology. In 1825-1826 he published his great work, Handbuch der mathematischen und technischen Chronologie (2 vols.; 2nd ed., 1883), re-edited as Lehrbuch der Chronologie (1831); a

supplementary volume, Die Zeitrechnung der Chinesen, appeared in 1839. Beside these important works he wrote also Untersuchungen iiher d. Ursprung und, d. Bedeutung d. Sternnamen (1809) and Uber d. Ursprung d. Thierkreises (1838). With Nolte he published handbooks on English and French language and literature. His son, Julius Ludwig Ideler (1800-1842), wrote Meteorologia veterum Graecorum et Romanorum (1832).

IDENTIFICATION (Lat. idem, the same), the process of proving any one's identity, i.e. that he is the man he purports to be, or — if he is pretending to be some one else — the man he really is; or in case of dispute, that he is the man he is alleged to be. As more strenuous efforts have been made for the pursuit of criminals, and more and more severe penalties are inflicted on old offenders means of identification have become essential, and various processes have been tried to secure that desirable end. For a long time they continued to be most im- perfect; nothing better was devised than rough and ready methods of recognition depending upon the memories of officers of the law or the personal impressions of witnesses concerned in the case, supplemented in more recent years by photographs, not always a safe and unerring guide. The machinery employed was cumbrous, wasteful of time and costly. Detective policemen were marched in a body to inspect arrested prisoners in the exercising yards of the prison. Accused persons were placed in the midst of a number of others of approximately like figure and appearance, and the prosecutor and witnesses were called in one by one to pick out the offender. Inquiries, with a detailed description of distinctive marks, and photographs were circu- lated far and wide to local police forces. Officers, police and prison wardens were despatched in person to give evidence of identity at distant courts. Mis-identification was by no means rare. Many remarkable cases may be quoted. One of the most notable was that of the Frenchman Lesurques, in the days of the Directory, who was positively identified as having robbed*

the Lyons mail and suffered death, protesting his innocence of the crime, which was afterwards brought home to another man, Duboscq, and this terrible judicial error proved to be the result of the extraordinary likeness between the two men. Another curious case is to be found in American records, when a man was indicted for bigamy as James Hoag, who averred that he was really Thomas Parker. There was a marvellous conflict of testimony, even wives and families and personal friends being misled, and there was a narrow escape of mis-identification. The leading modern case in England is that of Adolf Beck (1905). Beck (who eventually died at the end of

1909) was arrested on the complaint of a number of women who positively swore to his identity as Smith, a man who had defrauded them. An ex-policeman who had originally arrested Smith also swore that Beck was the same man. There was a grave miscarriage of justice. Beck was sentenced to penal servitude, and although a closer examination of the personal marks showed that Beck could not possibly be Smith, it was only after a scandalous delay, due to the obstinacy of responsible officials, that relief was afforded. It has to be admitted that evidence as to identity based on personal impressions is perhaps of all classes of evidence the least to be relied upon.

Such elements of uncertainty cannot easily be eliminated from any system of jurisprudence, but some improvements in the methods of identification have been introduced in recent years. The first was in the adoption of anthropometry {q.v.), which was invented by the French savant, A. Bertillon. The reasons that led to its general supersession may be summed up in its costliness, the demand for superior skill in subordinate agents and the liability to errors not easy to trace and correct, A still more potent reason remained, the comparative failure of results. It was found in the first four years of its use in England and Wales that an almost inappreciable number of identifications were effected by the anthropometric system; namely, 152 in 1898, 243 in 1899, 462 in 1900, and 503 in 1901, the year in which it was supplemented by the use of " finger prints " (q.v.). The figures soon increased by leaps and bounds. In 1902 the total number of searches among the records were 6826 and the identifications 1722 for London and the provinces; in 1903 the searches were 11,919, the identifications 3642; for the first half of 1904 the searches were 6697 and the identifications 2335. In India and some of the colonies the results were still more remarkable; the recognitions in 1903 were 9512, and 17,289 in 1904. Were returns available from other countries very similar figures would no doubt be shown. Among these countries are Ireland, Australasia, Ceylon, South Africa, and many great cities of the United States; and the system is extending to Germany, Austria-Hungary and other parts of Europe.

The record of finger prints in England and Wales is kept by the Metropolitan police at New Scotland Yard. They were at first limited to persons convicted at courts at quarter sessions and assizes and to all persons sentenced at minor courts to more than a month without option of fine for serious offences. The finger prints when taken by prison warders are forwarded to London 1 for registration and reference on demand. The total number of finger-print slips was

70,000 in 1904, and weekly additions were being made at the rate of 350 slips. The advantages of the record system need not be emphasized. By its means identification is prompt, inevitable and absolutely accurate. By forwarding the finger prints of all remanded prisoners to New Scotland Yard, their antecedents are established beyond all hesitation. "■■*

In past times identification of criminals who had passed through the hands of the law was compassed by branding, imprinting by a hot iron, or tattooing with an indelible sign, such as a crown, fleur de lys or initials upon the shoulder or other part of the body. This practice, long since abandoned, was in a measure continued in the British army, when offenders against military law were ordered by sentence of court-martial to be marked with " D " for deserter and " B.C." bad character; this ensured their recognition and prevented re-enlistment ; but all such penalties have now disappeared. (A. G.)

IDEOGRAPH (Gr. iSea, idea, and ypatt.v, to write), a symbol or character painted, written or inscribed, representing ideas and not sounds; such a form of writing is found in Chinese and in most of the Egyptian hieroglyphs (see **Writing**).

IDIOBLAST (Gr. ffitoJ, peculiar, and /3Xaor6s, a shoot), a botanical term for an individual cell which is distinguished by its shape, size or contents, such as the stone-cells in the soft tissue of a pear.

IDIOM (Gr. I8'ui>na, something peculiar and personal; ifitos, one's own, personal), a form of expression whether in words, grammatical construction, phraseology, &c, which is peculiar to a language; sometimes also a special variety of a particular language, a dialect.

IDIOSYNCRASY (Gr. IduxrvyKpaala, peculiar habit of body or temperament; tdios, one's own, and ovyKpaais, blending, tempering, from avyKepavvvadai, to put together, compound, mix), a physical or mental condition peculiar to an individual usually taking the form of a special susceptibility to particular stimuli; thus it is an idiosyncrasy of one individual that abnormal sensations of discomfort should be excited by certain odours or colours, by the presence in the room of a cat, &c; similarly certain persons are found to be peculiarly responsive or irresponsive to the action of particular

drugs. The word is also used, generally, of any eccentricity or peculiarity of character, appearance, &c.

IDOLATRY, the worship (Gr. Xarpeia) of idols (Gr. ei'ScoXop), i.e. images or other objects, believed to represent or be the abode of a superhuman personality. The term is often used generically to include such varied forms as litholatry, dendrolatry, pyrolatry, zoolatry and even necrolatry. In an age when the study of religion was practically confined to Judaism and Christianity, idolatry was regarded as a degeneration from an uncorrupt primeval faith, but the comparative and historical investigation of religion has shown it to be rather a stage of an upward movement, and that by no means the earliest. It is not found, for instance, among Bushmen, Fuegians, Eskimos, while it reached a high development among the great civiliza- tions of the ancient world in both hemispheres. 1 Its earliest stages are to be sought in naturism and animism. To give concreteness to the vague ideas thus worshipped the idol, at first rough and crude, comes to the help of the savage, and in course of time through inability to distinguish subjective and objective, comes to be identified with the idea it originally symbolized. The degraded form of animism known as fetichism is usually the direct antecedent of idolatry. A fetich is adored, not for itself, but for the spirit who dwells in it and works through it. Fetiches of stone or wood were at a very early age shaped and polished or coloured and ornamented. A new step was taken when the top of the log or stone was shaped like a human head; the rest of the body soon followed. The process can be followed with some distinctness in Greece. Sometimes, as in Babylonia and India, the representation combined human and animal forms, but the human figure is the predominant model; man makes God after his own image.

Idols may be private and personal like the teraphim of the Hebrews or the little figures found in early Egyptian tombs, or — a late development, public and tribal or national. Some, like the ancestral images among the Maoris, are the intermittent abodes of the spirits of the dead.

As the earlier stages in the development of the religious con- sciousness persist and are often manifest in idolatry, so in the higher stages, when men have attained loftier spiritual ideas, idolatry itself survives and is abundantly visible as a reactionary 1 According to Varro the Romans had no animal or human image of a god for 170 years after the founding of the city; Herodotus (i. 131) says the Persians had no temples or idols before Artaxerxesl. ; Lucian (De sacrif. 11) bears similar testimony for Greece and as to idols (Dea

Syr. 3) for Egypt. Eusebius (Praep. Evang. i. 9) sums up the theory of antiquity in his statement "the oldest peoples had no idols." Images of the gods indeed presuppose a definiteness of conception and powers of discrimination that could only be the result of history and reflection. The iconic age everywhere succeeded to an era in which the objects of worship were aniconic, e.g. wooden posts, stone steles, cones.

tendency. The history of the Jewish people whom the prophets sought, for long in vain, to wean from worshipping images is an illustration: so too the vulgarities of modern popular Hinduism contrasted with the lofty teaching of the Indian sacred books.

In the New Testament the word etSwXoXarpeia {idololatria, afterwards shortened occasionally to eiSoKarpfla, idolatria) occurs in all four times, viz. in 1 Cor. x. 14; Gal. v. 20; 1 Peter iv. 3; Col. iii. 5. In the last of these passages it is used to describe the sin of covetousness or " mammon-worship." In the other places it indicates with the utmost generality all the rites and practices of those special forms of paganism with which Christianity first came into collision. It can only be understood by reference to the LXX., where eldcJXov (like the word " idol " in A.V.) occasionally translates indifferently no fewer than sixteen words by which in the Old Testament the objects of what the later Jews called " strange worship " (ni; "lias) are denoted (see Encyclopaedia Biblica). In the widest acceptation of the word, idolatry in any form is absolutely forbidden in the second commandment, which runs " Thou shalt not make unto thee a graven image; [and] to no visible shape in heaven above, or in the earth beneath, or in the water under the earth, shalt thou bow down or render service " (see Deca- logue). For some account of the questions connected with the breaches of this law which are recorded in the history of the Israelites see the article Jews ; those differences as to the interpretation of the prohibition which have so seriously divided Christendom are discussed under the head of Iconoclasts.

In the ancient church, idolatry was naturally reckoned among those magna crimina or great crimes against the first and second commandments which involved the highest ecclesiastical censures. Not only were those who had gone openly to heathen temples and partaken in the sacrifices (sacrificati) or burnt incense (thurificati) held guilty of this crime; the same charge, in various degrees, was incurred by those whose renunciation of idolatry had been private merely, or who otherwise had used unworthy means to evade persecution, by those also who had feigned themselves mad to avoid sacrificing, by all promoters and encouragers of idolatrous rites, and

by idol makers, incense sellers and architects or builders of structures connected with idol worship. Idolatry was made a crime against the state by the laws of Constantius (Cod. Theod. xvi. 10. 4, 6), forbidding all sacrifices on pain of death, and still more by the statutes of Theodosius (Cod. Theod. xvi. 10. 12) enacted in 392, in which sacrifice and divination were declared treasonable and punish- able with death; the use of lights, incense, garlands and libations was to involve the forfeiture of house and land where they were used; and all who entered heathen temples were to be fined. See Bingham, Antiqq. bk. xvi. c. 4.

See also Image- worship; and on the whole question, Religion.

IDOMENEUS, in Greek legend, son of Deucalion, grandson of Minos and Pasiphae, and king of Crete. As a descendant of Zeus and famous for his beauty, he was one of the suitors of Helen; hence, after her abduction by Paris, he took part in the Trojan War, in which he distinguished himself by his bravery. He is mentioned as a special favourite of Agamemnon (Iliad, iv. 257). According to Homer (Odyssey, iii. 191), he returned home safely with all his countrymen who had survived the war, but later legend connects him with an incident similar to that of Jephtha's daughter. Having been overtaken by a violent storm, to ensure his safety he vowed to sacrifice to Poseidon the first living thing that met him when he landed on his native shore. This proved to be his son, whom he slew in accordance with his vow; whereupon a plague broke out in the island, and Idomeneus was driven out. He fled to the district of Sal- lentum in Calabria, and subsequently to Colophon in Asia Minor, where he settled near the temple of the Clarian Apollo and was buried on Mount Cercaphus (Virgil, Aeneid, iii. 121, 400, 531, and Servius on those passages). But the Cretans showed his grave at Cnossus, where he was worshipped as a hero with Meriones (Diod. Sic. v. 79).

IDRIA, a mining town in Carniola, Austria, 25 m. W. of Laibach. Pop. (1900) 5772. It is situated in a narrow Alpine valley, on the river Idria, an affluent of the Isonzo, and owes its prosperity to the rich mines of quicksilver which were accidentally discovered in 1497. Since 1580 they have been under the management of the government. The mercurial ore lies in a bed of clay slate, and is found both mingled with schist and in the form of cinnabar. A special excellence of the ore is the greatness of the yield of pure metal

compared with the amount of the refuse. As regards the quantity annually ex- tracted, the mines of Idria rank second to those of Almaden in Spain, which are the richest in the world.

IDRIALIN, a mineral wax accompanying the mercury ore in Idria. According to Goldschmidt it can be extracted by means of xylol, amyl alcohol or turpentine; also without decomposi- tion, by distillation in a current of hydrogen, or carbon dioxide. It is a white crystalline body, very difficultly fusible, boiling above 440 C. (824° F.), of the composition GioHmO. Its solution in glacial acetic acid, by oxidation with chromic acid, yielded a red powdery solid and a fatty acid fusing at 62 C, and exhibiting all the characters of a mixture of palmitic and stearic acids.

IDRISI, or Edrisi [Abu Abdallah Mahommed Ibn Mahommed Ibn Abdallah Ibn Idrisi, c. a.d. 1099-1154], Arabic geographer. Very little is known of his life. Having left Islamic lands and become the courtier and panegyrist of a Christian prince, though himself a descendant of the Prophet, he was probably regarded by strict Moslems as a scandal, whose name should not, if possible, be mentioned. His great-grandfather, Idrisi II., " Biamrillah," a member of the great princely house which had reigned for a time as caliphs in north-west Africa, was prince of Malaga, and likewise laid claim to the supreme title (Com- mander of the Faithful). After his death in 1055, Malaga was seized by Granada (1057), and the Idrisi family then probably migrated to Ceuta, where a freedman of theirs held power. Here the geographer appeals to have been born in a.h. 493 (a.d. 1099). He is said to have studied at Cordova, and this tradition is con- firmed by his elaborate and enthusiastic description of that city in his geography. From this work we know that he had visited, at some period of his life before a.d. 1154, both Lisbon and the mines of Andalusia. He had also once resided near Morocco city, and once was at (Algerian) Constantine. More precisely, he tells us that in a.d. i 117 he went to see the cave of the Seven Sleepers at Ephesus; he probably travelled ex tensively in Asia Minor. From doubtful readings in his text some have inferred that he had seen part of the coasts of France and England. We do not know when Roger II. of Sicily (1101- 1 1 54) invited him to his court, but it must have been between 1 1 25 and 1 1 50. Idrisi made for the Norman king a celestial sphere and a disk representing the known world of his day — both in silver. These only absorbed one-third of the metal that had been given him for the work, but Roger bestowed on him the remaining two-thirds as a present, adding to this 100,000 pieces of money and the cargo of a richly-laden ship from Barcelona. Roger next enlisted Idrisi's services in the compila- tion of a fresh

description of the " inhabited' earth " from observation, and not merely from books. The king and his geographer chose emissaries whom they sent out into various countries to observe, record and design; as they returned, Idrisi inserted in the new geography the information they brought. Thus was gradually completed (by the month of Shawwal, a.h. 548 = mid-January, a.d. 1154), the famous work, best known, from its patron and originator, as A! Rojari, but whose fullest title seems to have been, The going out of a Curious Man to explore the Regions of the Globe, its Provinces, Islands, Cities and their Dimensions and Situation. This has been abbreviated to The Amusement of him who desires to traverse the Earth, or The Relaxation of a Curious Mind. The title of Nubian Geography, based upon Sionita and Hezronita's mis- reading of a passage relating to Nubia and the Nile, is entirely unwarranted and misleading. The Rogerian Treatise contains a full description of the world as far as it was known to the

author. The " inhabited earth "is divided into seven" climates," beginning at the equinoctial line, and extending northwards to the limit at which the earth was supposed to be rendered uninhabitable by cold. Each climate is then divided by per- pendicular lines into eleven equal parts, beginning with the western coast of Africa and ending with the eastern coast of Asia. The whole world is thus formed into seventy-seven equal square compartments. The geographer begins with the first part of the first climate, including the westernmost part of the Sahara and a small (north-westerly) section of the Sudan (of which a vague knowledge had now been acquired by the Moslems of Barbary), and thence proceeds eastward through the different divisions of this climate till he finds its termination in the Sea of China. He then returns to the first part of the second climate, and so proceeds till he reaches the eleventh part of the seventh climate, which terminates in north-east Asia, as he conceives that continent. The inconveniences of the arrangement (ignoring all divisions, physical, political, linguistic or religious, which did not coincide with those of his "climates") are obvious.

Though Idrisi was in such close relations with one of the most civilized of Christian courts and states, we find few traces of his influence on European thought and knowledge. The chief exception is perhaps in the delineation of Africa in the world- maps of Marino Sanuto (q.v .) and Pietro Vesconte. His account of the voyage of the Maghrurin or " Deceived Men " of Lisbon in the Atlantic (a voyage on which they seem to have visited Madeira and one of the Canaries) may have had some effect in stimulating the later ocean enterprise of Christian mariners; but we have no direct evidence of this. Idrisi's

Ptolemaic leanings give a distinctly retrograde character to certain parts of his work, such as east Africa and south Asia; and, in spite of the record of the Lisbon Wanderers, he fully shares the common Moslem dread of the black, viscous, stormy and wind-swept waters of the western ocean, whose limits no one knew, and over which thick and perpetual darkness brooded. At the same time his breadth of view, his clear recognition of scientific truths (such as the roundness of the world) and his wide knowledge and intelligent application of preceding work (such as that of Ptolemy, Masudi and Al Jayhani) must not be forgotten. He also preserves and embodies a considerable amount of private and special information — especially as to Scandinavia (in whose delineation he far surpasses his predecessors), portions of the African coast, the river Niger (whose name is perhaps first to be found, after Ptolemy's doubtful Nigeir, in Idrisi), portions of the African coast, Egypt, Syria, Italy, France, the Adriatic shore-lands, Germany and the Atlantic islands. No other Arabic work contains a larger assortment of valuable geographical facts; unfortunately the place-names are often illegible or hope- lessly corrupted in the manuscripts. Idrisi's world-map, with all its shortcomings, is perhaps the best product of that strangely feeble thing — the Mahommedan cartography of the middle ages. Besides the Rojari, Idrisi wrote another work, largely geo- graphical, cited by Abulfida as The Book of Kingdoms, but apparently entitled by its author The Gardens of Humanity and the Amusement of the Soul. This was composed for William the Bad (1154-1166), son and successor of Roger II., but is now lost. He likewise wrote, according to Ibn Said, on Medica- ments, and composed verses, which are referred to by the Sicilian Mahommedan poet Ibn Bashrun.

Two manuscripts of Idrisi exist in the Bibliotheque Nationale, Paris, and other two in the Bodleian Library, Oxford. One of the English MSS., broughtfrom Egypt byGreaves, is illustrated by & map of the known world, and by thirty-three sectional maps (for each part of. the first three climates). The second manuscript, brought by Pococke from Syria, bears the date of a.h. 906, or A.D. 1500. It consists of 320 leaves, and is illustrated by one general and seventy- seven particular maps, the latter consequently including all the parts of every climate. The general map was published by Dr Vincent in his Periplus of the. Erythraean Sea. A copy of Idrisi's work in the Escorial was destroyed by the fire of 1671.

An- epitome of Idrisi's geography, in the original Arabic, was printed, with many errors, in 1592 at the Medicean press in Rome, from a MS. preserved in the Grand Ducal library at Florence (De geogrnphia vniversali. Horttdus rultissimus . . .). Even the

description of Mecca is here omitted. Pococke supplied it from

his MS. In many bibliographical works this impression has been wrongly characterized as one of the rarest of books. In 1619 two Maronite scholars, Gabriel Sionita, and Joannes Hezronita, published at Paris a Latin translation of this epitome (Geographia Nubiensis, id est, accuraiissima totins orbis in VII. climata divisi descriptio). Besides its many inaccuracies of detail, this edition, by its unlucky title of Nubian Geography, started a fresh and fundamental error as to Idrisi's origin; this was founded on a misreading of a passage where Idrisi describes the Nile passing into Egypt through Nubia— not " terram nostram," as this version gives, but " terram illius " is here the true translation. George Hicronymus Velschius, a German scholar, had prepared a copy of the Arabic original, with a Latin translation, which he purposed to have illustrated with notes; but death interrupted this design, and his manuscript remains in the university library of Jena. Casiri (Bib. Ar. Hisp. ii. 13) mentions that he had determined to re-edit this work, but he appears never to have executed his intention. The part relating to Africa was ably edited by Johann Melchior Hartmann (Commentatio de geo- graphia Africae Edrisiana, Gottingen, 1791, and Edrisii Africa, Gottingen, 1796). Here are collected the notices of each region in other Moslem writers, so as to form, for the time, a fairly complete body of Arabic geography as to Africa. Hartmann afterwards published Idrisi's Spain (Hispania, Marburg, 3 vols., 1802-1818).

An (indifferent) French translation of the whole of Idrisi's geography (the only complete version which has yet appeared), based on one of the MSS, of the Bibliotheque Nationale, Paris, was published by Amedee Jaubert in 1836-1840, and forms volumes v. and vi. of the Recueil de voyages issued by the Paris Societ6 de Geographic ; but a good and complete edition of the original text is still a desideratum. A number of Oriental scholars at Leiden deter- mined in 1 861 to undertake the task. Spain and western Europe were assigned to Dozy ; eastern Europe and western Asia to Engel- mann; central and eastern Asia to Defrernery; and Africa to de Goeje. The first portion of the work appeared in 1866, under the title of Description de V Afrique et de VEspagne par Edrisi, texte arabe, public avec une traduction, des notes et un glossaire par R. Dozy et M. J. de Goeje (Leiden, E. J. Brill, 1866); but the other collaborators did not

furnish their quota. Other parts of Idrisi's work have been separately edited; e.g. "Spain" (Descripcion de Espana de . . . Aledris), by J. A. Cond6, in Arabic and Spanish (Madrid, 1799); " Sicily " (Descrizione delta Sicilia . . . di Elidris), by P. D. Magri and F. Tardia (Palermo, 1764) ; " Italy " (Italia descritta nel " libro del Re Rugger -o," compilato da Edrisi), by M.Amari and C.Schiaparelli, in Arabic and Italian (Rome, 1883); "Syria" (Syria descripla a

. . . El Edrisio . . .), by E. F. C. Rosenmiiller, in Arabic and Latin, 1825, and (Idrisii . . . Syria), by I. Gildemeister (Bonn,. 1885) (the last a Beilage to vol. viii. of the Zeilschrift.d. deulsch. Palaslina-

Vereins). See also M. Casiri, Bibliotheca Arabico-Hispana Escurialensis (2 vols., Madrid, 1760-1770); V. Lagus, "idrisii notitiam terrarum Balticarum ex commerciis Scandinavorum et Italorum

. . . ortam esse " in Atti del IV° Congresso internaz. degli orientalisli

in Firenze, p. 395 (Florence, 1880); R. A. Brandel " Om och ur den arabiske geografen Idrisi," Akad. ajhand. (Upsala, 1894). (C. R. B.)

IDUMAEA ('ISou/jaio), the Greek equivalent of Edom (di><), a territory which, in the works of the Biblical writers, is considered to lie S.E. of the Dead Sea, between the land of Moab and the Gulf of Akaba. Its name, which is connected with the root meaning " red," is probably applied in reference to the red sandstone ranges of the mountains of Petra. 1 This etymology, however, is not certain. The apparently theophorous name Obed-Edom (2 Sam. vi. 10) shows that Edom is the name of a divinity. Of this there is other evidence; a Leiden papyrus names Etum as the wife of the Semitic fire-god Reshpu.

The early history of Edom is hidden in darkness. The Egyptian references to it are few, and do not give us much light regarding its early inhabitants. In the early records of the Pentateuch, the country is often referred to by the name of Seir, the general name for the whole range of mountains on the east side of the Jordan-Araba depression south of the Dead Sea. These mountains were occupied, so early as we can find any record, by a cave-dwelling aboriginal race known as Horites, who were smitten by the much-discussed king Chedorlaomer (Gen. xiv. 6) and according to Deut. ii. 22 were driven out by the Semitic tribes of Esau's descendants. The Horites are to us little more than a name, though the discovery of cave-dwellers of very early date at Gezer in the excavations of 1902-1905 has enabled us to form some idea as to their probable culture-status

and physical character.

The occupants of Edom during practically the whole period of Biblical history were the Bedouin tribes which claimed

1 A curious etymological speculation connects the name with the story of Esau's begging for Jacob's pottage, Gen. xxv. 30.

descent through Esau from Abraham, and were acknowledged by the Israelites (Deut. xxiii. 7) as kin. That they intermarried with the earlier stock is suggested by the passage in Gen. xxxvi. 2, naming, as one of the wives of Esau, Oholibamah, daughter of Zibeon the Horite (corrected by verse 20). Among the peculiarities of the Edomites was government by certain officials known as D'giˆx, 2 which the English versions (by too close a reminiscence of the Vulgate duces) translate " dukes." The now naturalized word " sheikhs " would be the exact render- ing. In addition to this Bedouin organization there was the curious institution of an elective monarchy, some of whose kings are catalogued in Gen. xxxvi. 31-39 and 1 Chron. i. 43-54. These kings reigned at some date anterior, to the time of Saul. No deductions as to their chronology can be based on the silence regarding them in Moses' song, Exodus xv. 15. There was a king in Edom (Num. xx. 14) who refused passage to the Israelites in their wanderings.

The history of the relations of the Edomites and Israelites may be briefly summarized. Saul, whose chief herdsman, Doeg, was an Edomite (1 Sam. xxi. 7), fought successfully against them (1 Sam. xiv. 47). Joab (1 Kings xi. 16) or Abishai, as his deputy (1 Chron. xviii. 11, 13), occupied Edom for six months and devastated it ; it was garrisoned and permanently held by David (2 Sam. viii. 14). But a refugee named Hadad, who escaped as a child to Egypt and grew up at the court of the Egyptian king, returned in Solomon's reign and made a series of reprisal raids on the Israelite territory (1 Kings xi. 14). This did not prevent Solomon introducing Edomites into his harem (1 Kings xi. 1) and maintaining a navy at Ezion-geber, at the head of the Gulf of Akaba (1 Kings ix. 26). Indeed, until the time of Jehoram, when the land revolted (2 Kings viii. 20, 22), Edom was a dependency of Judah, ruled by a viceroy (1 Kings xxii. 47). An attempt at recovering their independence was tempor- arily quelled in a campaign by Amaziah (2 Kings xiv. 7), and Azariah his successor was able to renew the sea trade of the Gulf of Akaba (2 Kings xiv. 22) which had probably languished since the wreck of Jehoshaphat's ships (1 Kings xxii, 48); but the ancient kingdom had been re-established by the time of Ahaz, and the king's name, Kaush-Malak, is recorded by Tiglath Pileser. He made raids on the territory

of Judah (2 Chron. xxviii. 17). The kingdom, however, was short-lived, and it was soon absorbed into the vassalage of Assyria.

The later history of Edom is curious. By the constant west- ward pressure of the eastern Arabs, which (after the restraining force of the great Mesopotamian kingdoms was weakened) assumed irresistible strength, the ancient Edomites were forced across the Jordan-Araba depression, and with their name migrated to the south of western Palestine. In 1 Maccabees v. 65 we find them at Hebron, and this is one of the first indica- tions that we discover of the cis-Jordanic Idumaea of Josephus and the Talmud.

Josephus used the name Idumaea as including not only Gobalitis, the original Mount Seir, but also Amalekitis, the land of Amalek, west of this, and Akrabatine, the ancient Acrabbim, S.W. of the Dead Sea. In War IV. viii. 1, he mentions two villages " in the very midst of Idumaea," named Betaris and Caphartobas. The first of these is the modern Beit Jibrin (see Eleutheropolis), the second is Tuffuh, near Hebron. Jerome describes Idumaea as extending from Beit Jibrin to Petra, and ascribes the great caves at the former place to cave-dwellers like the aboriginal Horites. Ptolemy's account presents us with the last stage, in which the name Idurnaea is entirely restricted to the cis-Jordanic district, and the old trans- Jordanic region is absorbed in Arabia.

The Idumaean Antipater was appointed by Julius Caesar procurator of Judaea, Samaria and Galilee, as a reward for services rendered against Pompey. He was the father of Herod the Great, whose family thus was Idumaean in origin. (See Palestine.) (R. A. S. M.)

2 The same word is used in the anonymous prophecy incorporated in the book of Zachariah (xii. 5), and in one or two other places as well, of Hebrew leaders.

IDUN, or Iduna, in Scandinavian mythology, the goddess of youth and spring. She was daughter of the dwarf Svald and wife of Bragi. She was keeper of the golden apples, the eating of which preserved to the gods their eternal youth. Loki, the evil spirit, kidnapped her and the apples, but was forced by the gods to restore her liberty. Idun personifies the year between March and September, and her myth represents the annual imprisonment of spring by winter.

IDYL, or Idyll (Gr. eldvWiov, a descriptive piece, from d8os, a shape or style; Lat. idyllium), a short poem of a pastoral or rural character, in which something of the element of land- scape is preserved or felt. The earliest commentators of anti- quity used the term to designate a great variety of brief and homely poems, in which the description of natural objects was introduced, but the pastoral idea came into existence in con- nexion with the Alexandrian school, and particularly with Theo- critus, Bion and Moschus, in the 3rd century before Christ. It appears, however, that eWvXKiov was not, even then, used consciously as the name of a form of verse, but as a diminutive of tlSos, and merely signified " a little piece in the style of " whatever adjective might follow. Thus the idyls of the pastoral poets were eiSvWia aiiroKiKa, little pieces in the goatherd style. We possess ten of the so-called " Idyls " of Theocritus, and these are the type from which the popular idea of this kind of poem is taken. But it is observable that there is nothing in the technical character of these ten very diverse pieces which leads us to suppose that the poet intended them to be regarded as typical. In fact, if he had been asked whether a poem was or was not an idyl he would doubtless have been unable to com- prehend the question. As a matter of fact, the first of his poems, the celebrated " Dirge for Daphnis, " has become the prototype, not of the modern idyl, but of the modern elegy, and the not less famous " Festival of Adonis " is a realistic mime. It was the six little epical romances, if they may be so called, which started the conception of the idyl of Theocritus. It must be remembered, however, that there is nothing in ancient literature which justifies the notion of a form of verse recognized as an " idyl." In the 4th century after Christ the word seems to have become accepted in Latin as covering short descriptive poems of very diverse characters, for the early MSS. of Ausonius contain a section of " Edyllia," which embraces some of the most admirable of the miscellaneous pieces of that writer. But that Ausonius himself called his poems " idyls " is highly doubtful. Indeed, it is not certain that the heading is not a mistake for " Epyllia." The word was revived at the Renaissance and applied rather vaguely to Latin and Greek imitations of Theocritus and of Virgil. It was also applied to modern poems of a romantic and pastoral characte-r published by such writers as Tasso in Italy, Monte- mayor in Portugal and Ronsard in French. In 1658 the English critic, Edward Phillips, defined an " idyl " as " a kind of eclogue," but it was seldom used to describe a modern poem. Mme Deshoulieres published a series of seven Idylles in 1675, and Boileau makes a vague reference to the form. The senti- mental German idyls of Salomon Gessner (in prose, 1758) and Voss (in hexameters, 1800) were modelled on Theocritus. Goethe's Alexis und Dora is an*

idyl. It appears that the very general use, or abuse, of the word in the second half of the igth century, both in English and French, arises from the popularity of two works, curiously enough almost identical in date, by two eminent and popular poets. The Idylles heroiques

(1858) of Victor de Laprade and the Idylls of the King

(1859) of Tennyson enjoyed a success in either country which led to a wide imitation of the title among those who had, perhaps, a very inexact idea of its meaning. Among modern Germans, Berthold Auerbach and Jeremias Gotthelf have been prominent as the composers of sentimental idyls founded on anecdotes of village-life. On the whole, it is impossible to admit that the idyl has a place among definite literary forms. Its character is vague and has often been purely sentimental, and our conception of it- is further obscured by the fact that though the noun carries no bucolic idea with it in English, the adjective

("idyllic ") has come to be synonymous with pastoral and rustic. (E. G.)

IFFLAND, AUGUST WILHELM (1759-1814), German actor and dramatic author, was born at Hanover on the 19th of April 1759. His father intended his son to be a clergyman, but the boy preferred the stage, and at eighteen ran away to Gotha in order to prepare himself for a theatrical career. He was fortunate enough to receive instruction from Hans Ekhof, and made such rapid progress that he was able in 1779 to accept an engagement at the theatre in Mannheim, then rising into prominence. He soon stood high in his profession, and extended his reputation by frequently playing in other towns. In 1796 he settled in Berlin, where he became director of the national theatre of Prussia; and in 1811 he was made general directoi of all representations before royalty. Iffland produced the classical works of Goethe and Schiller with conscientious care; but he had little understanding for the drama of the romantic writers. The form of play in which he was most at home, both as actor and playwright, was the domestic drama, the sentimental play of everyday life. His works are almost entirely destitute of imagination; but they display a thorough mastery of the technical necessities of the stage, and a remarkable power of devising effective situations. His best characters are simple and natural, fond of domestic life, but too much given to the utterance of sentimental commonplace. His best-known plays are Die Jdger, Dienstpflicht, Die Advokaten, Die Mundel and Die Hagestolzen. Iffland was also a dramatic critic, and German actors place high value on the reasonings and hints

respecting their art in his Almanack filr Theater und Theaterfreunde. In 1 798-1802 he issued his Dramatischen Werke in 16 volumes, to which he added an autobiography (Meine theatralische Laufbahn). In 1807-1809 Iffland brought out two volumes of Neue drama- tische Werke. Selections from his writings were afterwards published, one in n (Leipzig, 1827-1828), the other in 10 volumes (Leipzig, 1844, and again i860). As an actor, he was conspicuous for his brilliant portrayal of comedy parts. His fine gentlemen, polished men of the world, and distinguished princes were models of perfection, and showed none of the traces of elaborate study which were noticed in his interpretation of tragedy. He especially excelled in presenting those types of middle-class life which appear in his own comedies. Iffland died at Berlin on the 22nd of September 1814. A bronze portrait statue of him was erected in front of the Mannheim theatre in 1864.

See K. Duncker, Iffland in seinen Schriften als Kilnstler, Lehrer, und Direktor der Berliner Buhne (1859); W. Koffka, Iffland und Dalberg (1865); and Lampe, Studien iiber Iffland als Dramatiker (Celle, 1899). Inland's interesting autobiography, Meine theatra- lische Laufbahn, was republished by H. Holstein in 1885.

IGLAU (Czech Jihlava), a town of Austria, in Moravia, 56 m. N.W. of Briinn by rail. Pop. (1900) 24,387, of whom 4200 are Czechs and the remainder Germans. Iglau is situated on the Iglawa, close to the Bohemian frontier, and is one of the oldest towns in Moravia, being the centre of a German-speaking enclave. Among the principal buildings are the churches of St Jakob, St Ignatius, St John and St Paul, the town-hall, and the barracks formed from a monastery suppressed under the emperor Joseph II. There is also a fine cemetery, containing some remarkable monuments. It has the principal tobacco and cigar factory of the state monopoly, which employs about 2500 hands, and has besides a large and important textile and glass industry, corn and saw-mills, pottery and brewing. Fairs are periodically held in the town; and the trade in timber, cereals, and linen 2nd woollen goods is generally brisk.

Iglau is an old mining town where, according to legend, the silver mines were worked so early as 799. King Ottakar I. (1 198-1230) established here a mining-office and a mint. At a very early date it enjoyed exceptional privileges, which were confirmed by King Wenceslaus I. in the year 1250. The town- hall contains a collection of municipal and mining laws dating asfar back as 1389. At Iglau, on the 5th of July 1436, the treaty was made with the Hussites, by which the emperor Sigismund was acknowledged king of Bohemia. A

granite column near the

town marks the spot where Ferdinand I., in 1527, swore fidelity to the Bohemian states. During the Thirty Years' War Iglau was twice captured by the Swedes. In 1742 it fell into the hands of the Prussians, and in December 1805 the Bavarians under Wrede were defeated near the town.

IGLES1AS, a town and episcopal see of Sardinia in the province of Cagliari, from which it is 34 m. W.N.W. by rail, 620 ft. above sea-level. Pop. (1001) 10,436 (town), 20,874 (commune). It is finely situated among the mountains in the S.W. portion of the island, and is chiefly important as the centre of a mining district; it has a government school for mining engineers. The minerals are conveyed by a small railway via Monteponi (with its large lead and zinc mine) to Portovesme (15 m. S.W. of Iglesias in the sheltered gulf of Carloforte), near Portoscuso, where they are shipped. The total amount of the minerals extracted in Sardinia in 1905 was 170,236 tons and their value £765,054 (chiefly consisting of 99,749 tons of calamine zinc, 26,051 of blende zinc, 24,798 tons of lead and 15,429 tons of lignite): the greater part of them — 118,009 tons — was exported from Portoscuso by sea and most of the rest from Cagliari, the zinc going mainly to Antwerp, and in a less proportion to Bordeaux and Dunkirk, while the lead is sent to Pertusola near Spezia, to be smelted. At Portoscuso is also a tunny fishery.

The cathedral of Iglesias, built by the Pisans, has a good facade (restored); the interior is late Spanish Gothic. San Francesco is a fine Gothic church with a gallery over the entrance, while Sta Chiara and the church of the Capuchins (the former dating from 1285) show a transition between Romanesque and Gothic. The battlemented town walls are well preserved and picturesque; the castle, built in .1325, how contains a glass factory. The church of Nostra Signora del Buon Cammino above the town (1080 ft.) commands a fine view.

IGNATIEV, NICHOLAS PAVLOVICH, Count (1832-1908), Russian diplomatist, was born at St Petersburg on the 29th of January 1832. His father, Captain Paul Ignatiev, had been taken into favour by the tsar Nicholas I., owing to his fidelity on the occasion of the military conspiracy in 1825; and the grand duke Alexander (afterwards tsar) stood sponsor at the boy's baptism. At the age of seventeen he

became an officer of the Guards. His diplomatic career began at the congress of Paris, after the Crimean War, where he took an active part as military attache in the negotiations regarding the rectification of the Russian frontier on the Lower Danube. Two years later (1858) he was sent with a small escort on a dangerous mission to Khiva and Bokhara. The khan of Khiva laid a plan for detaining him as a hostage, but he eluded the danger and returned safely, after concluding with the khan of Bokhara a treaty of friendship. His next diplomatic exploit was in the Far East, as plenipotentiary to the court of Peking. When the Chinese government was terrified by the advance of the Anglo- French expedition of i860 and the burning of the Summer Palace, he worked on their fears so dexterously that he obtained for Russia not only the left bank of the Amur, the original object of the mission, but also a large extent of territory and sea-coast south of that river. This success was supposed to prove his capacity for dealing with Orientals, and paved his way to the post of ambassador at Constantinople, which he occupied from 1864 till 1877. Here his chief aim was to liberate from Turkish domination and bring under the influence of Russia the Christian nationalities in general and the Bulgarians in particular. His restless activity in this field, mostly of a semi- official and secret character, culminated in the Russo-Turkish war of 1877-1878, at the close of which he negotiated with the Turkish plenipotentiaries the treaty of San Stefano. As the war which he had done so much to bring about did not eventually secure for Russia advantages commensurate with the sacrifices involved, he fell into disfavour, and retired from active service. Shortly after the accession of Alexander III. in 1881, he was appointed minister of the interior on the understanding that he would carry out a nationalist, reactionary policy, but his shifty ways and his administrative incapacity so displeased his imperial

master that he was dismissed in the following year. After that time he exercised no important influence in public affairs. He died on the 3rd of July 1908.

IGNATIUS (‘lyvanos), bishop of Antioch, one of the ” Apos- tolic Fathers.” No one connected with the history of the early Christian Church is more famous than Ignatius, and yet among the leading churchmen of the time there is scarcely one about whose career we know so little. Our only trustworthy infor- mation is derived from the letters which he wrote to various churches on his last journey from Antioch to Rome, and from the short epistle of Polycarp to the Philippians. The earlier patristic writers seem to have known no more than we do. Irenaeus, for instance, gives a quotation from his Epistle to the Romans and does not appear to know (or if he knew he

has forgotten) the name of the author, since he describes him (Adv. haer. v. 28. 4) as " one of those belonging to us " (r« nSe finerepaiv). If Eusebius possessed any knowledge about Ignatius apart from the letters he never reveals it. The only shred of extra information which he gives us is the statement that Ignatius " was the second successor of Peter in the bishopric of Antioch " (Eccles. hist. iii. 36). Of course in later times a cloud of tradition arose, but none of it bears the least evidence of trustworthiness. The martyrologies, from which the account of his martyrdom that used to appear in uncritical church histories is taken, are full of anachronisms and impossibilities. There are two main types — the Roman and the Syrian — out of which the others are compounded. They contradict each other in many points and even their own statements in different places are sometimes quite irreconcilable. Any truth that the narrative may contain is hopelessly overlaid with fiction. We are therefore limited to the Epistles for our information, and before we can use even these we are confronted with a most complex critical problem, a problem which for ages aroused the most bitter controversy, but which happily now, thanks to the labours of Zahn, Lightfoot, Harnack and Funk, may be said to have reached a satisfactory solution.

I. The Problem of the Three Recensions. — The Ignatian problem arises from the fact that we possess three different recensions of the Epistles, (a) The short recension (often called the Vossian) contains the letters to the Ephesians, Magnesians, Trallians, Romans, Philadelphians, Smyrnaeans and to Poly- carp. This recension was derived in its Greek form from the famous Medicean MS. at Florence and first published by Vossius in 1646 (see Theol. Liter aturzeilung, 1906, 596 f., for an early papyrus fragment in the Berlin Museum, containing Ad Smyrn. iii. fin. xii. init.). In the Medicean MS. the Epistle to the Romans is missing, but a Greek version of this epistle was discovered by Ruinart, embedded in a martyrium, in the National Library at Paris and published in 1689. There are also (1) a Latin version made by Robert Grosseteste, bishop of Lincoln, about 1250, and published by Ussher in 1644 — two years before the Vossian edition appeared; (2) an Armenian version which was derived from a Syriac not earlier than the 5th century and published at Constantinople in 1783; (3) some fragments of a Syriac version published in Cure ton's edition of Ignatius; (4) fragments of a Coptic version first published in Lightfoot 's work (ii. 859-882). (b) The long recension contains the seven Epistles mentioned above in an expanded form and several additional letters besides. The Greek form of the recension, which has been preserved in ten MSS., has thirteen letters, the additional ones being to the Tarsians, the

Philippians, the Antiochians, to Hero, to Mary of Cassobola and a tetter of Mary to Ignatius. The Latin form, of which there are thirteen extant MSS., omits the letter of Mary of Cassobola, but adds to the list the Laus Heronis, two Epistles to the apostle John, one to the Virgin Mary and one from Mary to Ignatius, (c) The Syriac or Curetonian recension contains only three Epistles, viz. to Polycarp, to the Romans, and to the Ephesians, and these when compared with the same letters in the short and long recensions are found to be considerably abbreviated. The Syriac recension was made by William Cureton in 1845 from three Syriac MSS. which had recently been brought from the

Nitrian desert and deposited in the British Museum. One of these MSS. belongs to the 6th century, the other two are later. Summed up in a word, therefore, the Ignatian problem is this: which of these three recensions (if any) represents the actual work of Ignatius ?

II. History of the Controversy. — The history of the controversy may be divided into three periods: (a) up to the discovery of the short recension in 1646; (b) between 1646 and the dis- covery of the Syriac recension in 1845; (c) from 1845 to the present day. In the first stage the controversy was theological rather than critical. The Reformation raised the question as to the authority of the papacy and the hierarchy. Roman Catholic scholars used the interpolated Ignatian Epistles very freely in their defence and derived many of their arguments from them, while Protestant scholars threw discredit on these Epistles. The Magdeburg centuriators expressed the gravest doubts as to their genuineness, and Calvin declared that " nothing was more foul than those fairy tales (naeniis) published under the name of Ignatius!" It should be stated, however, that one Roman Catholic scholar, Denys Petau (Petavius), admitted that the letters were interpolated, while the Protestant Vedelius acknowledged the seven letters mentioned by Eusebius. In England the Ignatian Epistles took an important place in the episcopalian controversy in the 17th century. Their genuineness was defended by the leading Anglican writers, e.g. Whitgift, Hooker and Andrewes, and vigorously challenged by Dissenters, e.g. the five Presbyterian ministers who wrote under the name of Smectymnuus and John Milton. 1 The second period is marked by the recognition of the superiority of the Vossian recension. This was speedily demonstrated, though some attempts were made, notably by Jean Morin or Morinus (about

1656), Whiston (in 1711) and Meier (in 1836), to resuscitate the long recension. Many Protestants still maintained that the new recension, like the old, was a forgery. The chief attack came from Jean Daille, who in his famous work (1666) drew up no fewer than sixty-six objections to the genuineness of the Ignatian literature. He was answered by Pearson, who in his Vindiciae epistolarum S. Ignatii (1672) completely vindicated the authenticity of the Vossian Epistles. No further attack of any importance was made till the time of Baur, who like Daille rejected both recensions. In the third stage — inaugurated in 1845 by Cureton's work — the controversy has ranged round the relative claims of the Vossian and the Curetonian recensions. Scholars have been divided into three camps, viz. (1) those who followed Cureton 'in maintaining that the three Syriac Epistles alone were the genuine work of Ignatius. Among them may be mentioned the names of Bunsen, A. Ritschl, R. A. Lipsius, E. de Pressense, H. Ewald, Milman, Bohringer. (2) Those who accepted the genuineness of the Vossian recension and regarded the Curetonian as an abbreviation of it, e.g. Petermann, Denzinger, Uhlhorn, Merx, and in more recent times Th. Zahn, J. B. Lightfoot, Ad. Harnack and F. X. Funk. (3) Those who denied the authenticity of both recensions, e.g. Baur and Hilgenfeld and in recent times van Manen, 2 Volter 3 and van Loon. 4 The result of more than half a century's discussion has been to restore the Vossian recension to the premier position. III. The Origin of the Long Recension. — The arguments against the genuineness of the long recension are decisive. (1) It conflicts with the statement of Eusebius. (2) The first trace of its use occurs in Anastasius of Antioch (a.d. 598) and Stephen Gobarus (c. 575-600). (3) The ecclesiastical system of the letters implies a date not earlier than the 4th century. (4) The recension has been proved to be dependent on the Apostolical Constitutions. (5) The doctrinal atmosphere implies the existence of Arian and Apollinarian heresies. (6) The added passages reveal a difference in style which stamps them at once as interpolations. There are several different theories

1 In his short treatise " Of Prelatical Episcopacy," works iii. p. 72 (Pickering, 1851).

- *Theologisch. Tijdschrift (1892), 625-633.*

» lb. (1886) 1 14-136; Die Ignatianischen Briefe (1892).

- *lb. (1893) 275-316.*

with regard to the origin of the recension. Some, e.g. Leclerc, Newman and Zahn, think that the writer was an Arian and that the

additions were made in the interest of Arianism. Funk, en the other hand, regards the writer as an Apollinarian. Light- foot opposes both views and suggests that it is better " to con- ceive of him as writing with a conciliatory aim."

IV. The Objections to the Curetonian Recension.- — The objections to the Syriac recension, though not so decisive, are strong enough to carry conviction with them. (1) We have the express statement of Eusebius that Ignatius wrote seven Epistles. (2) There are statements in Polycarp's Epistle which cannot be explained from the three Syriac Epistles. (3) The omitted portions are proved by Lightfoot after an elaborate analysis to be written in the same style as the rest of the epistles and could not therefore have been later interpolations. (4) The Cure- tonian letters are often abrupt and broken and show signs of abridgment. (5) The discovery of the Armenian version proves the existence of an earlier Syriac recension corresponding to the Vossian of which the Curetonian may be an abbreviation. It seems impossible to account for the origin of the Curetonian recension on theological grounds. The theory that the abridg- ment was made in the interests of Eutychianism or Mono- physitism cannot be substantiated.

V. The Date and Genuineness of the Vossian Epistles. — We are left therefore' with the seven Epistles. Are they the genuine work of Ignatius, and, if so, at what date were they written? The main objections are as follows: (1) The conveyance of a condemned prisoner to Rome to be put to death in the amphi- theatre is unlikely on historical grounds, and the route taken" is improbable for geographical reasons. This objection has very little solid basis. (2) The heresies against which Ignatius contends imply the rise of the later Gnostic and Docetic sects. It is quite certain, however, that Docetism was in existence in the 1 st century (cf. 1 John), while many of the principles of Gnosticism were in vogue long before the great Gnostic sects arose (cf. the Pastoral Epistles). There is nothing in Ignatius which implies a knowledge of the teaching of Basilides or Valentinus. In fact, as Harnack says: " No Christian writer after 140 could have described the false teachers in the way that Ignatius does." (3) The ecclesiastical system of Ignatius is too developed to have arisen as early as the time of Trajan. At first sight this objection seems to be almost fatal. But we have to remember that the bishops of Ignatius are not bishops in the modern sense of the word at all, but simply pastors of churches. They are not mentioned at all in two Epistles, viz. Romans and Philippians, which seems to imply that this form of government was not universal. It is only when we read modern ecclesiastical ideas into Ignatius that the objection has much weight. To sum up, as Uhlhorn says: "The collective mass of

internal evidence against the genuineness of the letters ... is insufficient to counterbalance the testimony of the Epistle of Polycarp in their favour. He who would prove the Epistles of Ignatius to be spurious must begin by proving the Epistle of Polycarp to be spurious, and such an undertaking is not likely to succeed." This being so, there is no reason for rejecting the opinion of Eusebius that the Epistles were written in the reign of Trajan. Harnack, who formerly dated them about 140, now says that they were written in the latter years of Trajan, or possibly a little later (11 7-1 2 5). The majority of scholars place them a few years earlier (no-117). 6

The letters of Ignatius unfortunately, unlike the Epistles of St Paul, contain scant autobiographical material. We are told absolutely nothing about the history of his career. The fact that like St Paul he describes himself as an ear puna (Rom. 9), and that he speaks of himself as " the last of the Antiochene Christians" (Trail. 13; Smyrn. xi.), seems to suggest that he had been converted from paganism somewhat late in life and that the process of conversion had been abrupt and violent. He bore the surname of Theophorus, i.e. " God-clad " or " bearing

6 But there are still a few scholars, e.g. van Manen and Volter, who prefer a date about 150 or later; van Loon goes as late as 175. See article " Old-Christian Literature," Ency. Bib. iii. col. 3488.

God." Later tradition regarded the word as a passive form (" God-borne ") and explained it by the romantic theory that Ignatius was the child whom Christ took in his arms (Mark ix. 36-37). The date at which he became bishop of Antioch cannot be determined. At the time when the Epistles were written he had just been sentenced to death, and was being sent in charge of a band of soldiers to Rome to fight the beasts in the amphi- theatre. The fact that he was condemned to the amphitheatre proves that he could not have been a Roman citizen. We lose sight of him at Troas, but the presumption is that he was martyred at Rome, though we have no early evidence of this.

But if the Epistles tell us little of the life of Ignatius, they give us an excellent picture of the man himself, and are a mirror in which we see reflected certain ideals of the life and thought of the day. Ignatius, as Schaff says, " is the incarnation of three closely

connected ideas: the glory of martyrdom, the omni- potence of episcopacy, and the hatred of heresy and schism."

1. Zeal for martyrdom in later days became a disease in the Church, but in the case of Ignatius it is the mark of a hero. The heroic note runs through all the Epistles; thus he says:

" I bid all men know that of my own free will I die for God, unless ye should hinder me . . . Let me be given to the wild beasts, for through them I can attain unto God. I am God's wheat, and I am ground by the wild beasts that I may be found the pure bread of Christ. Entice the wild beasts that they may become my sepulchre . . . ; come fire and cross and grapplings with wild beasts, wrench- ing of bones, hacking of limbs, crushings of my whole body; only be it mine to attain unto Jesus Christ " {Rom. 4-5).

2. Ignatius constantly contends for the recognition of the authority of the ministers of the church. "Do nothing," he writes to the Magnesians, "without thebishopandthepresbyters." The " three orders " are essential to the church, without them no church is worthy of the name (cf? Trail. 3). " It is not lawful apart from the bishop either to baptize or to hold a love-feast " (Smyrn. 8). Respect is due to the bishop as to God, to the presbyters as the council of God and the college of apostles, to the deacons as to Jesus Christ (Trail. 3). These terms must not, of course, be taken in their developed modern sense. The " bishop " of Ignatius seems to represent the modern pastor of a church. As Zahn has shown, Ignatius is not striving to introduce a special form of ministry, nor is he endeavouring to substitute one form for another. His particular interest is not so much in the form of ministry as in the unity of the church. It is this that is his chief concern. Centrifugal forces were at work. Differences of theological opinion were arising. Churches had a tendency to split up into sections. The age of the apostles had passed away and their successors did not inherit their authority. The unity of the churches was in danger. Ignatius was resisting this fatal tendency which threatened ruin to the faith. The only remedy for it in those days was to exalt the authority of the ministry and make it the centre of church life. It should be noted that (1) there is no trace of the later doctrine of apostolical succession; (2) the ministry is never sacerdotal in the letters of Ignatius. As Lightfoot puts it: " The ecclesiastical order was enforced by him (Ignatius) almost solely as a security for doctrinal purity. The threefold ministry was the husk, the shell, which protected the precious kernel of the truth " (i. 40).

3. Ignatius fights most vehemently against the current forms of

heresy. The chief danger to the church came from the Docetists who denied the reality of the humanity of Christ and ascribed to him a phantom body. Hence we find Ignatius laying the utmost stress on the fact that Christ " was truly born and ate and drank, was truly persecuted under Pontius Pilate . . . was truly raised from the dead " (Trail, 0). " I know that He was in the flesh even after the resurrection, and when He came to Peter and his company, He said to them, 'Lay hold and handle me, and see that I am not an incorporeal spirit ' " (Smyrn. 3). Equally emphatic is Ignatius's protest against a return to Judaism. " It is monstrous to talk of Jesus Christ and to practise Judaism, for Christianity did not believe in Judaism but Judaism in Christianity " (Magn. 10).

Reference must also be made to a few of the more characteristic points in the theology of Ignatius. As far as Christology is

concerned, besides the insistence on the reality of the humanity of Christ already mentioned, there are two other points which call for notice. (1) Ignatius is the earliest writer outside the New Testament to describe Christ under the categories of current philosophy; cf. the famous passage in Eph. 7, " There is one only physician, of flesh and of spirit (crapKueds Kal Trvev ixanKos), generate and ingenerate (yevvrirbs /cat ayevvriros), God in man, true life in death, son of Mary and son of God, first passible and then impassible " (irpccrov vadrirbs Kal cnradris). (2) Ignatius is also the first writer outside the New Testament to mention the Virgin Birth, upon which he lays the utmost stress. " Hidden from the prince of this world were the virginity of Mary and her child-bearing and likewise also the death of the Lord, three mysteries to be cried aloud, the which were wrought in the silence of God " (Eph. 19). Here, it will be observed, we have the nucleus of the later doctrine of the deception of Satan. In regard to the Eucharist also later ideas occur in Ignatius. It is termed a fivo~Tr\pvov (Trail. 2), and the influence of the Greek mysteries is seen in such language as that used in Eph. 20, where Ignatius describes the Eucharistic bread as " the medicine of immortality and the antidote against death." When Ignatius says too that " the heretics abstain from Eucharist because they do not allow that the Eucharist is the flesh of Christ," the words seem to imply that materialistic ideas were beginning to find an entrance into the church (Smyr. 6). Other points that call for special notice are: (1) Ignatius's rather extravagant angelology. In one place for instance he speaks of himself as being able to comprehend heavenly things and " the arrays of angels and the musterings of principalities " (Trail. 5). (2) His view of the Old Testament. In one important passage Ignatius emphatically states his belief in the supremacy of Christ even over "

the archives " of the faith, i.e. the Old Testament: " As for me, my archives — my inviolable archives — are Jesus Christ, His cross, His death, His resurrection and faith through Him" (Philadel. 8).

Authorities. — T. Zahn, Ignatius von Antiochien (Gotha, 1873); J. B. Lightfoot, Apostolic Fathers, part ii. (London, 2nd ed., 1889); F. X. Funk, Die Echtheit der ignat. Brief e (Tubingen, 1892); A. Harnack, Chronologie der altchristlichen Litteralur (Leipzig, 1897). There is a good bibliography in G. Kriiger, Early Christian Literature (Eng. trans., 1897, pp. 28-29). See also Apostolic Fathers.

(H. T. A.)

IGNORAMUS (Latin for " we do not know," " we take no notice of "), properly an English law term for the endorsement on the bill of indictment made by a grand jury when they " throw out " the bill, i.e. when they do not consider that the case should go to a petty jury. The expression is now obsolete, " not a true bill," " no bill," being used. The expressions " ignoramus jury," " ignoramus Whig," &c, were common in the political satires and pamphlets of the years following on the throwing out of the bill for high treason against the 2nd earl of Shaftesbury in 1681. The application of the term to an ignorant person dates from the early part of the 17th century. The New English Dictionary quotes two examples illustrating the early connexion of the term with the law or lawyers. George Ruggle (1575-1622) in 1615 wrote a Latin play with the title Ignoramus, the name being also that of the chief character in it, intended for one Francis Brakin, the recorder of Cambridge. It is a satire against the ignorance and pettifogging of the common lawyers of the day. It was answered by a prose tract (not printed till 1648) by one Robert Callis, serjeant-at-law. This bore the title of The Case and Argument against Sir Ignoramus of Cambridge.

IGNORANCE (Lat. ignorantia, from ignorare, not to know); want of knowledge, a state of mind which in law has important consequences. A well-known legal maxim runs: ignorantia juris non excusat ("ignorance of the law does not excuse"). With this is sornetimes coupled another maxim: ignorantia facti excusat ("ignorance of the fact excuses"). That every one who has capacity to understand the law is presumed to know it is a very necessary principle, for otherwise the courts would be continually occupied in endeavouring to solve problems which by their very impracticability would render the administration of justice next to impossible. It would be necessary for the

court to engage in endless inquiries as to the true inwardness of a man's mind, whether his state of ignorance existed at the time of the commission of the offence, whether such a condition of mind was inevitable or brought about merely by indifference on his part. Therefore, in English, as in Roman law, ignorance of the law is no ground for avoiding the consequences of an act. So far as regards criminal offences, the maxim as to ignoranlia juris admits of no exception, even in the case of a foreigner temporarily in England, who is likely to be ignorant of English law. In Roman law the harshness of the rule was mitigated in the case of women, soldiers and persons under the age of twenty-five, unless they had good legal advice within reach {Dig. xxii. 6. 9). Ignorance of a matter of fact may in general be alleged in avoidance of the consequences of acts and agree- ments, but such ignorance cannot be pleaded where it is the duty of a person to know, or where, having the means of know- ledge at his disposal, he wilfully or negligently fails to avail himself of it (see Contract).

In logic, ignorance is that state of mind which for want of evidence is equally unable to affirm or deny one thing or another. Doubt, on the other hand, can neither affirm nor deny because the evidence seems equally strong for both. For Ignoratio Elenchi (ignorance of the refutation) see Fallacy.

IGNORANTINES {Freres I gnorantins) , a name given to the Brethren of the Christian Schools {Freres des Ecoles Chretiennes) , a religious fraternity founded at Reims in 1680, and formally organized in 1683, by the priest Jean Baptiste de la Salle, for the purpose of affording a free education, especially in religion, to the children of the poor. In addition to the three simple vows of chastity, poverty and obedience, the brothers were required to give their services without any remuneration and to wear a special habit of coarse black material, consisting of a cassock, a hooded cloak with hanging sleeves and a broad- brimmed hat. The name Ignorantine was given from a clause in the rules of the order forbidding the admission of priests with a theological education. Other popular names applied to the order are Freres de Saint-Yon, from the house at Rouen, which was their headquarters from 1705 till 1770, Freres a quatre bras, from their hanging sleeves, and Freres Fouetteurs, from their former use of the whip (Jouet) in punishments. The order, approved by Pope Benedict XIII. in 1724, rapidly spread over France, and although

dissolved by the National Assembly's decree in February 1790, was recalled by Napoleon I. in 1804, and formally recognized by the French government in 1808. Since then its members have penetrated into nearly every country of Europe, and into America, Asia and Africa. They number about 14,000 members and have over 2000 schools, and are the strongest Roman Catholic male order. Though not officially connected with the Jesuits, their organization and discipline are very similar.

See J. B. Blain, La Vie du venerable J. B. de la Salle (Versailles,

1887).

IGUALADA, a town of north-eastern Spain, in the province of Barcelona, on the left bank of the river Noya, a right-hand tributary of the Llobrcgat, and at the northern terminus of the Igualada-Martorell-Barcelona railway. Pop. (1900) 10,442. Igualada is the central market of a rich agricultural and wine- producing district. It consists of an old town with narrow and irregular streets and the remains of a fortress and ramparts, and a new town which possesses regular and spacious streets and many fine houses. The local industries, chiefly developed since 1880, include the manufacture of cotton, linen, wool, ribbons, cloth, chocolate, soap, brandies, leather, cards and nails. The famous mountain and convent of Montserrat or Monserrat {q.v.) is 12 m. E.

IGUANA, systematically Iguanidae (Spanish quivalent of Carib iivana), a family of pleurodont lizards, comprising about 50 genera and 300 species. With three exceptions, all the genera of this extensive family belong to the New World, being specially characteristic of the Neotropical region, where they occur as far south as Patagonia, while extending northward into the warmer parts of the Nearctic regions as far as California and

British Columbia. The exceptional genera are Brachylophus in the Fiji Islands, Hoplurus and Chalarodon in Madagascar. The iguanas are characterized by the peculiar form of their teeth, -these being round at the root and blade-like, with serrated edges towards the tip, resembling in this respect the gigantic extinct reptile Iguanodon. The typical forms belonging to this family are distinguished by the large dewlap or pouch situated beneath the head and neck, and by the crest, composed of slender elongated scales, which extends in gradually diminishing height from the nape of the neck to the extremity of the tail. The latter organ is very long, slender and compressed. The tongue is generally short and not deeply divided at

its extremity, nor is its base retracted into a sheath; it is always moist and covered with a glutinous secretion. The prevailing colour of the iguanas is green; and, as the majority of them are arboreal in their habits, such colouring is generally regarded as pro-

Fig. 1. — Iguana.

tective. Those on the other hand which reside on the ground have much duller, although as a rule equally protective hues. Some iguanas, however {e.g. Anolis cardinensis) , possess, to an extent only exceeded by the chameleon, the power of changing their colours, their brilliant green becoming transformed under the influence of fear or irritation, into more sombre hues and even into black. They differ greatly in size, from a few inches to several feet in length.

One of the largest and most widely distributed is the common iguana {Iguana tuber culata), which occurs in the tropical parts of Central and South America and the West Indies, with the closely allied I. rhinolophus. It attains a length of 6 ft., weigh- ing then perhaps 30 lb, and is of a greenish colour, occasionally mixed with brown, while the tail is surrounded with alternate rings of those colours. Its food consists of vegetable substances, mostly leaves, which it obtains from the forest trees among whose branches it lives and in the hollows of which it deposits its eggs. These are of an oblong shape about ij in. in length, and are said by travellers to be very pleasant eating, especially when taken raw, and mixed with farina. They are timid, defenceless animals, depending for safety on the comparative inaccessibility of their arboreal haunts, and their protective colouring, which is rendered even more effective by their remaining still on the approach of danger. But the favourite resorts of the iguana are trees which overhang tha

water, into which they let themselves fall with a splash, whatever the height of the tree, and then swim away, or hide at the bottom for many minutes. Otherwise they exhibit few signs of animal intelligence. " The iguana," says H. W. Bates (The Naturalist on the Amazons), " is one of the stupidest animals I ever met. The one I caught dropped helplessly from a tree just ahead of me; it turned round for a moment to have an idiotic stare at the intruder and then set off running along the path. I ran

Fig. 2. — Head of Iguana rhinolophus.

after it and it then stopped as a timid dog would do, crouching down and permitting me to seize it by the neck and carry it off." Along with several other species, notably Ctenosura acanthinura, which is omnivorous, likewise called iguana, the common iguana, is much sought after in tropical America; the natives esteem its flesh a delicacy, and capture it by slipping a noose round its neck as it sits in fancied security on the branch of a tree.

Although chiefly arboreal, many of the iguanas take readily to the water; and there is at least one species, Amblyrhynchus cristatus, which leads for the most part an aquatic life. These marine lizards occur only in the Galapagos Islands, where they are never seen more than 20 yds. inland, while they may often be observed in companies several hundreds of yards from the shore, swim- ming with great facility by means of their flattened tails. Their feet are all more or less webbed, but in swimming

they are said to keep these organs motionless by their sides. Their food consists of marine vegetation, to obtain which they dive beneath the water, where they are able to remain, without coming to the surface to breathe, for a very considerable time. Though they are thus the most aquatic of lizards, Darwin, who studied their habits during his visit to those islands, states that when frightened they will not enter the water. Driven along a narrow ledge of rock to the edge of the sea, they pre- ferred capture to escape by swimming, while if thrown into the water they immediately returned to the point from which they started. A land "species belonging to the allied genus Conolophus also occurs in the Galapagos, which differs from most of its kind in forming burrows in the ground.

IGUANODON, a large extinct herbivorous land reptile from the Wealden formation of western Europe, almost completely known by numerous skeletons from Bernissart, near Mons, Belgium. It is a typical representative of the ornithopodous (Gr. for bird-footed) Dinosauria. The head is large and laterally compressed with a blunt snout, nearly terminal nostrils and relatively small eyes. The sides of the jaws are provided with a close series of grinding teeth, which are often worn down to stumps; the front of the jaws forms a toothless beak, which would be encased originally in a horny sheath. When unworn the teeth are spatulate and crimped or serrated round the edge, closely resembling those of the existing Central American lizard, Iguana — hence the name Iguanodon (Gr. Iguana-tooth) proposed by Mantell, the discoverer of this reptile, in 1825. The

bodies of the vertebrae are solid; and they are convexo- concave {i.e. opisthocoelous) in the neck and anterior part of the back, where there must have been much freedom of motion. The hindquarters are comparatively large and heavy, while the tail is long, deep and more or less laterally compressed, evidently adapted for swimming. The small and mobile fore- limbs bear four complete fingers, with the thumb reduced to a bony spur. The pelvis and hind-limbs much resemble those of a running bird, such as those of an emu or the extinct moa; but the basal bones (metatarsals) of the three-toed foot remain separate throughout life, thus differing from those of the running birds, which are firmly fused together even in the young adult. No external armour has been found. The reptile doubtless frequented marshes, feeding on the succu- lent vegetation, and often swimming in the water. Footprints prove that when on land it walked habitually on its hind-limbs.

The earliest remains of Iguanodon were found by Dr G. A. Mantell in the Weal- den formation of Sussex, and a large part of the skeleton, lacking the head, was subsequently discovered in a block of ragstone in the Lower Greensand

Skeleton of Iguanodon bernissartensis. (After Dollo.)

Maidstone, Kent. These fossils, which are now in the British Museum, were interpreted by Dr Mantell, who made comparisons with the skeleton of Iguana, on the erroneous supposition that the resemblance in the teeth denoted some relationship to this existing lizard. Several of the bones, however, could not be understood until the much later discoveries of Mr S. H. Beckles in the Wealden cliffs near Hastings; and an accurate knowledge of the skeleton was only obtained when many complete speci- mens were disinterred by the Belgian government from the Wealden beds at Bernissart, near Mons, during the years 1877- 1880. These skeletons, which now form the most striking feature of the Brussels Museum, evidently represent a large troop of animals which were suddenly destroyed and buried in a deep

ravine or gully. The typical species, Iguanodon mantelli, measures 5 to 6 metres in length, while /. bernissartensis (see fig.) attains a length of 8 to 10 metres. They are found both at Bernissart and in the south of England, while other species are also known from

Sussex. Nearly complete skeletons of allied reptiles have been discovered in the Jurassic and Cretaceous rocks of North America.

References. — G. A. Mantell, Petrifactions and their Teaching (London, 1851); L. Dollo, papers in Bull. Mus. Roy. d'Hist. Nat. Belg., vols, i.-iii. (1882-1884). (A. S. Wo.)

IGUVIUM (mod. Gubbio, q.ii.), a town of Umbria, situated among the mountains, about 23 m. N.N.E. of Perasia and con- nected with it by a by-road, which joined the Via Flaminia near the temple of Jupiter Appenninus, at the modern Scheggia. It appears to have been an important place in pre-Roman times, both from its coins and from the celebrated tabulae Iguvinae (see below).

We find it in possession of a treaty with Rome, similar to that of the Camertes Umbri; and in 167 B.C. it was used as a place of safe custody for the Illyrian King Gentius and his sons (Livy xlv. 43). After the Social War, in which it took no part, it received Roman citizenship. At that epoch it must have received full citizen rights since it was included in the tribus Clustumina {C.I.L. xi. e.g. 5838). In 49 B.C. it was occupied by Minucius Thermus on behalf of Pompey, but he abandoned the town. Under the empire we hear almost nothing of it. Silius Italicus mentions it as subject to fogs. A bishop of Iguvium is mentioned as early as a.d. 413. It was taken and destroyed by the Goths in 552, but rebuilt with the help of Narses. The Umbrian town had three gates only, and probably lay on the steep mountain side as the present town does, while the Roman city lay in the lower ground. Here is the theatre, which, as an inscription records, was restored by Cn. Satrius Rufus in the time of Augustus. The diameter of the orchestra is 765 ft. and of the whole 230 ft., so that it is a building of considerable size ; the stage is well preserved and so are parts of the external arcades of the auditorium. Not far off are ruins probably of ancient baths, and the concrete core of a large tomb with a vaulted chamber within. (T.As.)

Of Latin inscriptions {C.I.L. xi. 5803-5926) found at Iguvium two or three are of Augustan date, but none seem to be earlier. A Latin inscription of Iguvium {C.I.L. xi. 5824) mentions a priest whose functions are characteristic of the place " L. Veturius Rufio avispex extispecus, sacerdos publicus etprivatus." The ancient town is chiefly celebrated for the famous Iguvinc (less correctly Eugnbine) Tables, which were discovered there in 1444, bought by the municipality in 1456, and are still pre- served in the town hall. A Dominican, Leandro Alberti {Dcscri- ziop.e d' Italia, 1550), states that they were originally nine in number, and an independent authority, Antonio

Concioli {Statuta civitatis Eiigubii, 1673), states that two of the nine were taken to Venice in 1540 and never reappeared. The existing seven were first published in a careful but largely mistaken transcript by Buonarotti in 1724, as an appendix to Dempster's De Etruria Regali}

The first real advance towards their interpretation was made by Otfried Muller {Die Etrusker, 1828), who pointed out that though their alphabet was akin to the Etruscan their language was Italic. Lepsius, in his essay De tabulis Eugubinis (1833), finally determined the value of the Umbrian signs and the received order of the Tables, pointing out that those in Latin alphabet were the latest. He subsequently published what may be called the cditio princeps in 1841. The first edition, with a full commentary based on scientific principles, was that of Aufrecht and Kirchhoff in 1849-1851, and on this all sub- sequent interpretations are based (Breal, Paris, 1875; Bucheler, Umbrica, Bonn, 1883, a reprint and enlargement of articles in Fleckeisen's Jahrbuch, 1875, pp. 127 and 313). The text is everywhere perfectly legible, and is excellently represented in photographs by the marquis Ranghiasci-Brancaleone, published with Breal's edition.

1 A portion of this article is taken by permission from R. S. Conway's Italic Dialects (Camb. Univ. Press, 1897).

Language.— The dialect in which this ancient set of liturgies is written is usually known as Umbrian, as it is the only monument we possess of any length of the tongue spoken in the Umbrian distrL t before it was latinized (see Umbria). The name, however, is certainly too wide, since an inscription from Tuder of, probably, the 3rd century B.C. (R. S. Conway, The Italic Dialects, 352) shows a final -s and a medial d, both apparently preserved from the changes which befell these sounds, as we shall see, in the dialect of Iguvium. On the other hand, inscriptions of Fulginia and Assisium {ibid. 354-355) agree very well, so far as they go, with Iguvine. It is especially necessary to make clear that the language known as Umbrian is that of a certain limited area, which cannot yet be shown to have extended very far beyond the eastern half of the Tiber valley (from Interamna Nahartium to Urvinum Mataurense), be- cause the term is often used by archaeologists with a far wider connotation to include all the Italic, pre-Etruscan inhabitants ot upper Italy; Professor Ridgeway, for instance, in his Early Age of Greece, frequently speaks of the " Umbrians " as the race to which belonged the Villanova culture of the Early Iron age. It is now one of the most urgent problems in the history of Italy to determine the actual historical

relation (see further Rome: History, ad. init.) between the 'On^pol of, say, Herodotus and the language of Iguvium, of which we may now offer some description, using the term Umbrian strictly in this sense.

Under the headings Latin Language and Osca Lingua there have been collected (1) the points which separate all the Italic languages from their nearest congeners, and (2) those which separate Osco-Umbrian from Latin. We have now to notice (3) the points in which Umbrian has diverged from Oscan. The first of them ante- dates by six or seven centuries the similar change in the Romance languages (see Romance Languages).

*(i) The palatalization of k and g before a following i or e, or consonant * as in licit {i.e. digit) =haX. decet; muieto past part, passive (pronounced as though the i were an English or French j) beside Umb. imperative mugatu, Lat. mugire.*

(2) The loss of final-<2, e.g. in the abl. sing. fem. Umb. tdta = Osc. toutad.

(3) The change of d between vowels to a sound akin to r, written by a special symbol q {d) > n Umbrian alphabet and by RS in Latin alphabet, e.g. leda in Umbrian alphabet = dirsa in Latin alphabet (see below), " let him give," exactly equivalent to Paelignian dida (see Paeligni).

(4) The change of 5 to r between vowels as in erom, " esse " = Osc. ezum, and the gen. plur. fem. ending in -aru = Lat. -arum, Osc. -azum.

To this there appear a long string of exceptions, e.g. asa = Lat. ara. These are generally regarded as mere archaisms, and unfortunately the majority of them are in words of whose origin and meaning very little is known, so that (for all we can tell) in many the s may represent 55 or ps as in osatu = hat. operato, cf. Osc. opsaom.

(5) The change of final -ns to -/ as in the ace. plur. masc. vMuf = Lat. vitulos.

(6) In the latest stage of the dialect (see below) the change of final -i to -r, as in abl. plur. arvcr, arviis, i.e. " arvorum frugibus."

*(7) The decay of all diphthongs; ai, oi, ei all become a monoph-thong variously written e and i (rarely ei), as in the dat. sing. fem. tote, "civitati"; dat. sing. masc. pople, "populo"; loc. sing, masc. onse (from *om{e)sei), " in umero." So au, eu, ou all become 0, as in*

ote = Osc. auti, Lat. aut.

(8) The change of initial / to v, as in vutu = Lat. lavito.

Owing to the peculiar character of the Tables no grammatical statement about Umbrian is free from difficulty; and these bare outlines of its phonology must be supplemented by reference to the lucid discussion in C. D. Buck's Oscan and Umbrian Grammar (Boston, 1904), or to the earlier and admirably complete Oskisch-umbrische Grammatik of R. von Planta (Strassburg, 1892-1897). Some of the most important questions are discussed by R. S. Conway in The Italic Dialects, vol. ii. p. 495 seq.

Save for the consequences of these phonetic changes, Umbrian morphology and syntax exhibit no divergence from Oscan that need be mentioned here, save perhaps two peculiar perfect-forma- tions with I and nci; as in ampelust, fut. perf. " impenderit," combifiangiust, " nuntiaverit " (or the like). Full accounts of the accidence and syntax, so far as it is represented in the inscriptions, will be found in the grammars of Buck and von Planta already mentioned, and in the second volume of Conway, op. cit.

Chronology. (I.) The Relative Dates of the Tables. — At least four periods in the history of the dialect can be distinguished in the records we have left to us, by the help of the successive changes (a) in alphabet and {b) in language, which the Tables exhibit. Of these only the outstanding features can be mentioned here; for a fuller discussion the reader must be referred to The Italic Dialects, pp. 400 sqq.

(a) Changes in Alphabet. — Observe first that Tables I., II., III. and IV., and the first two inscriptions of V. are in Umbrian character; the Latin alphabet is used in the Claverniur paragraph (V. iii.), and the whole of VI. {a and b) and VII. {a and b).

What we may call the normal Umbrian alphabet (in which e.g. Table I. a is written) consists of the following signs, the writing being always from right to left : R a, a 6, °l a (to. a sound akin to r derived from d), 3e, 7 v, i z, Q h, I i,H ft and g, 4 !, \M m, M a.*

1 p, r, 8 s, X t and d, V u and 0, 8 /, d s (i.e. a voiceless palatal consonant.)

In the Latin alphabet, in which Tables VI. and VII. and the third inscription of Table V. are written, d is represented by RS, g by G, but k by C, d by D, t by T, v and u by V but by O, $ by S, though the diacritic is often omitted. The interpunct is double with the Umbrian alphabet, single and medial with the Latin.

Tables VI. and VII., then, and V. iii., were written later than the rest. But even in the earlier group certain variations appear.

The latest form of the Umbrian alphabet is that of Table V. i. and ii., where the abbreviated form of m (A) and the angular and un-divided form of k (M noOl) are especially characteristic.

Nearest to this is that of Tables III. and IV., which form a single document; then that of I. (a) and (6); earliest would seem that of II. (a) and II. (6). In II. a, 18 and 24, we have the archaic letter san (M =s) of the abecedaria (E. S. Roberts, Int. Gr. Epig. pp. 17 ff.), which appears in no other Italic nor in any Chalcidian inscription, though it survived longer in Etruscan and Venetic use. Against this may be set the use of O for t in I. b I, but this appears also in IV. 20 and should be called rather Etruscan than archaic. These characteristics of II. a and 6 would be in themselves too slight to prove an earlier date, but they have perhaps some weight as con- firming the evidence of the language.

(6) Changes in Language. — The evidence of date derived from changes in the language is more difficult to formulate, and the inquiry calls for the most diligent use of scientific method and critical judgment. Its intricacy lies in the character of the documents before us — religious formularies consisting partly of matter estab-lished in usage long before they were written down in their present shape, partly of additions made at the time of writing. The best example of this is furnished by the expansion and modernisation of the subject-matter of Table I. into Tables VI. and VII. a. Hence we frequently meet with forms which had passed out of the language that was spoken at the time they were engraved, side by side with their equivalents in that language. We may distinguish four periods, as follows:

1. The first period is represented, not by any complete table, but by the old unmodernised forms of Tables III. and IV., which show the original guttural plosives unpalatalized, e.g. kebu = ha.t. cibum.

2. In the second period the gutturals have been palatalized, but there vet is no change of final 5 to r. This is represented by the rest of IIL

and IV. and by II. (a and b).

3. In the third period final s has everywhere become r. This appears in V. (i. and ii. and also iii.). Table I. is a copy or redraft made from older documents during this period. This is shown by the occasional appearance of r instead of final s.

4. Soon after the dialect had reached its latest form, the Latin alphabet was adopted. Tables VI. and VII. a contain an expanded form of the same liturgical direction as Table I.

It is probable that further research will amend this classification in detail, but its main lines are generally accepted.

(II.) Actual Date of the Tables.— Only the leading points can be mentioned here.

(i.) The Latin alphabet of the latest Tables resembles that of the Tabula Bantina, and might have been engraved at almost any time between 150 B.C. and 50 B.C. It is quite likely that the closer relations with Rome, which began after the Social War, led to the adoption of the Latin alphabet. Hence we should infer that the Tables in Umbrian alphabet were at all events older than 90 B.C.

(ii.) For an upper limit of date, in default of definite evidence, it seems imprudent to go back beyond the 5th]century B.C., since neither in Rome nor Campania have we any evidence of public written documents of any earlier century. When more is known of the earliest Etruscan inscriptions it may become possible to date the Iguvine Tables by their alphabetic peculiarities as compared with their mother-alphabet, the Etruscan. The " Tuscan name " is denounced in the comprehensive curse of Table VI. b, 53-60, and we may infer that the town of Iguvium was independent but in fear of the Etruscans at the time when the curse was first composed. The absence of all mention of either Gauls or Romans seems to prove that this time was at least earlier than 400 B.C.; and the curse may have been composed long before it was written down.

The chief sources in which further information may be sought have been already mentioned. (R. S. C.)

IJOLITE (derived from the first syllable of the Finnish words Jiwaru, Jijoki, &c, common as geographical names in the Kola peninsula, and the Gr. Xiflos, a stone), a rock consisting essentially of nepheline and augite, and of great rarity, but of considerable importance from a mineralogical and petrographical standpoint. It occurs in various

parts of the Kola peninsula in north Finland on the shores of the White Sea. The pyroxene is morphic, yellow or green, and is surrounded by formless areas of nepheline. The accessory minerals are apatite, cancrinite, calcite, titanite and jiwaarite, a dark-brown titaniferous variety of melanite-garnet. This rock is the plutonic and holo-

crystalline analogue of the nephelenites and nepheline-dolerites; it bears the same relation to them as the nepheline-syenites have to the phonolites. It is worth mentioning that a leucite- augite rock, resembling ijolite except in containing leucite in place of nepheline, is known to occur at Shonkin Creek, near Fort Benton, Montana, and has been called missourite.

IKI, an island belonging to Japan, lying off the north-western coast of Kiushiu, in 33° 45′ N. lat. and 129° 40′ E. long. It has a circumference of 86 m., an area of 51 sq. m., and a population °f 36,530. The island is, for the most part, a tableland about 500 ft. above sea-level. The anchorage is at Gonoura, on the south-west. A part of Kublai Khan's Mongols landed at Iki when about to invade Japan in the 13th century, for it lies in the direct route from Korea to Japan via Tsushima. In the immediate vicinity are several rocky islets.

ILAGAN, the capital of the province of Isabela, Luzon,Philip- pine Islands, on an elevated site at the confluence of the Pina- canauan river with the Grande de Cagayan, about 200 m. N.N.E. of Manila. Pop. (1903) 16,008. The neighbouring country is the largest tobacco-producing section in the Philippines.

ILCHESTER, a market town in the southern parliamentary division of Somersetshire, England, in the valley of the river Ivel or Yeo, 5 m. N.W. of Yeovil. It is connected by a stone bridge with the village of Northover on the other side of the river. Ilchester has lost the importance it once possessed, and had in 1901 a population of only 564, but its historical interest is considerable. The parish church of St Mary is Early English and Perpendicular, with a small octagonal tower, but has been largely restored in modern times. The town possesses almshouses founded in 1426, a picturesque cross, and a curious ancient mace of the former corporation.

Ilchester (Cair Pensavelcoii, Ischalis, Ivelcestre, Yevelchester) was a fortified British settlement, and subsequently a military station of the Romans, whose Fosse Way passed through it. Its importance continued in Saxon times, and in 1086 it was a royal borough with

107 burgesses. In 1180 a gild merchant was established, and the county gaol was completed in 1188. Henry II. granted a charter, confirmed by John in 1203, which gave Ilchester the same liberties as Winchester, with freedom from tolls and from being impleaded without the walls, the fee farm being fixed at £26, 10s. od. The bailiffs of Ilchester are mentioned before 1230. The borough was incorporated in 1556, the fee farm being reduced to £8. Ilchester was the centre of the county administration from the reign of Edward III. until the 19th century, when the change from road to rail travelling completed the decay of the town. Its place has been taken by Taunton. The corporation was abolished in 1886. Parliamentary representation began in 1298, and the town continued to return two members until 1832. A fair on the 29th of August was granted by the charter of 1203. Other fairs on the 27th of December, the 22nd of July, and the Monday before Palm Sunday, were held under a charter of 1289. The latter, fixed as the 25th of March, was still held at the end of the 18th century, but there is now no fair. The Wednesday market dates from before the Conquest. The manufacture of thread lace was replaced by silk weaving about 1750, but this has decayed.

ILE-DE-FRANCE, an old district of France, forming a kind of island, bounded by the Seine, the Marne, the Beuvronne, the Theve and the Oise. In this sense the name is not found in written documents before 1429; but in the second half of the 1 5th century it designated a wide military province t>f government, bounded N. by Picardy, W. by Normandy, S. by Orleanais and Nivernais, and E. by Champagne. Its capital was Paris. From the territory of lle-de-France were formed under the Revolution the department of the Seine, together with the greater part of Seine-et-Oise, Seine-et-Marne, Oise and Aisne, and a small part of Loiret and Nievre. (The term lle-de-France is also used for Mauritius, q.v.).

See A. Longnon, " L'Tle-de-France, son origine, ses limites, ses gouverneurs," in the Memoir es de la Societe de I'histoire de Paris et de I lle-de-France, vol. i. (1875).

fLETSK, formerly Fort Iletskaya Zashchila, a town of Russia, in the government of Orenburg, 48 m. S. of the town of Orenburg by the railway to Tashkent, near the Ilek river, a tributary of the Ural. Pop. 11,802 in 1897. A thick bed of excellent rock- salt is worked here to

the extent of about 100,000 tons annually. The place is resorted to for its salt, mud and brine baths, and its koumiss cures.

ILFELD, a town in Germany, in the Prussian province of Hanover, situated at the south foot of the Harz, at the entrance to the Bahrethal, 8 m. N. from Nordhausen by the railway to Wernigerode. Pop. 1600. It contains an Evangelical church, a celebrated gymnasium, once a monasterial school, with a fine library, and manufactures of parquet-flooring, paper and plaster of Paris, while another industry in the town is brewing. It is also of some repute as a health resort.

Ilfeld, as a town, dates from the 14th century, when it sprang up round a Benedictine monastery. Founded about 1190 this latter was reformed in 154s, and a year later converted into the school mentioned above, which under the rectorship of Michael Neander (1525-1595) enjoyed a reputation for scholarship which it has maintained until to-day.

See Forstemann, Monumenta rerum Ilfeldensium (Nordhausen, 1843); M. Neander, Bericht vom Kloster Ilfeld, edited by Bouterwek (Gottingen, 1873); and K. Meyer, Gesckichte des Klosters lljeld (Leipzig, 1897).

ILFORD [Great Ilford], an urban district in the Romford parliamentary division of Essex, England, on the Roding, 7 m. E.N.E. of London by the Great Eastern railway. Pop. (1891) 10,913, (1901) 41,234. A portion of Hainault Forest lies within the parish. The hospital of St Mary and St Thomas, founded in the 12th century as a leper hospital, now contains almshouses and a chapel, and belongs to the marquess of Salisbury, who as " Master " is required to maintain a chaplain and six aged inmates. The chapel appears to be of the date of this foundation. Claybury Hall is a lunatic asylum (1893) of the London County Council. There are large photographic material works and paper mills. Little Ilford is a parish on the opposite (west) side of the Roding. The church of St Mary retains Norman portions, and has a curious monumental brass commemorating a boy in school-going clothes (1517). Pop.

(1901) 17,915.

ILFRACOMBE, a seaport and watering-place in the Barnstaple parliamentary division of Devonshire, England, on the Bristol Channel, 225 m. W. by S. of London by the London & South- western railway. Pop. of urban district (1901) 8557. The picturesque old

town, built on the cliffs above its harbour, consists of one street stretching for about a mile through a net- work of lanes. Behind it rise the terraces of a more modern town, commanding a fine view across the Channel. With its beautiful scenery and temperate climate, Ilfracombe is frequented by visitors both in summer and winter. Grand rugged cliffs line the coast; while, inland, the country is celebrated for the rich colouring of its woods and glens. Wooded heights form a semicircle round the town, which is protected from sea winds by Capstone Hill. Along the inner face of this rock has been cut the Victoria Promenade, a long walk roofed with glass and used for concerts. The restored church of Holy Trinity datesoriginally from the 12th century. Sea-bathing is insecure, and is confined to a few small coves, approached by tunnels hewn through the rock. The harbour, a natural recess among the cliffs, is sheltered on the east by Hilsborough Head, where there are some alleged Celtic remains; on the west by Lantern Hill, where the ancient chapel of St Nicholas has been transformed into a lighthouse. In summer, passenger steamers run to and from Ilfracombe pier; but the shipping trade generally has declined, though herring fisheries are carried on with success. In the latter part of the 13th century Ilfracombe obtained a grant for holding a fair and market, and in the reign of Edward III. it was a place of such importance as to supply him with six ships and ninety- six men for his armament against Calais. During the Civil War, being garrisoned for the Roundheads, it. was in 1644 captured by the Royalists, but in 1646 it fell into the hands of Fairfax.

ILHAVO, a seaport in the district of Aveiro, formerly included in the province of Beira, Portugal, 3 m. S.W. of Aveiro (q.v.), on the lagoon of Aveiro, an inlet of the Atlantic Ocean. Pop. (1900) 12,617. Ilhavo is inhabited chiefly by fishermen, but has a celebrated manufactory of glass and porcelain, the Vista- Alegre, at which the art of glass-cutting has reached a high degree of perfection. Salt is largely exported. Ilhavo is cele- brated for the beauty of its women. It is said to have been founded by Greek colonists about 400 B.C., but this tradition is of doubtful validity.

ILI, one of the principal rivers of Central Asia, in the Russian province of Semiryechensk. The head-stream, called the Tekez, rises at an altitude of 11,600 ft. E. of Lake Issyk-kul, in 82 25′ E. and 43 23′ N. , on the W. slopes of mount Kash-katur. At first it flows eastward and north-eastward, until, after emerging from the mountains, it meets the Kungez, and then, assuming the name of Hi, it turns westwards and flows between the Trans-Hi Ala—tau mountains on the south and the Boro- khoro and Talki ranges on the

north for about 300 m. to Iliysk. The valley between 79 30′ and 82 E. is 50 m. wide, and the portion above the town of Kulja (Old Kulja) is fertile and populous, Taranchi villages following each other in rapid suc- cession, and the pastures being well stocked with sheep and cattle and horses. ‘At Iliysk the river turns north-west, and after traversing a region of desert and marsh falls by at least seven mouths into the Balkash Lake, the first bifurcation of the delta taking place about 115 m. up the river. But it is only the southern arm of the delta that permanently carries water. The total length of the river is over 900 m. From Old Kulja to New Kulja the Hi is navigable for at most only two and a half months in the year, and even then considerable difficulty is occasioned by the shoals and sandbanks. From New Kulja to Iliysk (280 m.) navigation is easy when the water is high, and practicable even at its lowest for small boats. At Iliysk there is a ferry on the road from Kopal to Vyernyi. The principal tributaries of the Hi are the Kash, Chilik and Charyn. A vast number of streams flow towards it from the mountains on both sides, but most of them are used up by the irrigation canals and never reach their goal. The wealth of coal in the valley is said to be great, and when the Chinese owned the country they worked gold and silver with profit. Fort Hi or Iliysk, a modern Russian establishment, must not be confounded with Hi, the old capital of the Chinese province of the same name. The latter, otherwise known as Hoi-yuan-chen, New Kulja (Gulja), or Manchu Kulja, was formerly a city of 70,000 in- habitants, but now lies completely deserted. Old Kulja, Tatar Kulja or Nin-yuan, is now the principal town of the district. The Chinese district of Hi formerly included the whole of the valley of the Hi river as far as Issyk-kul, but now only its upper part. Its present area is about 27,000 sq. m. and its population probably 70,000. It belongs administratively to the province of Sin-kiang or East Turkestan. (See Kulja.)

*ILION, a village of Herkimer county, New York, U.S.A., about 12 m. S.E. of Utica, on the S. bank of the Mohawk river. Pop. (1890) 4057; (1900) 5138 (755 foreign-born); (1905, state census) 5924; (1910) 6588. It is served by the New York Central & Hudson river, and the West Shore railways, by the Utica & Mohawk Valley Electric railroad, and by the Erie canal. It has a public library (1868) of about 13,500 volumes, a public hospital and a village hall. The village owns its water-works and its electric-lighting plant. Its principal manufactures a*e Remington typewriters and Remington fire-arms (notably the Remington rifle); other manufactures are filing cabinets and cases and library and office furniture (the Clark & Baker Co.), knit goods, carriages and harness, and store fixtures.*

In 1828 Eliphalet Remington (1793-1861) established here a small factory for the manufacture of rifles. He invented, and, with the assistance of his sons, Philo (1816-1889), Samuel and Eliphalet, improved the famous Remington rifle, which was adopted by several European governments, and was supplied in large numbers to the United States army. In 1856 the company added the manufacture of farming tools, in 1870 sewing-machines,

in 1874 typewriters. The last-named industry was sold to I of its dairy produce. There are also numerous collieries, produc- Wyckoff, Seamans & Benedict Company in 1886, and soon ing coal of superior quality, and iron ore, fireclay and freestone

are plentiful. The Illawarra Lake, a salt lagoon, 9 m. long and 3 m. wide, is encircled by hills and is connected with the sea. by a narrow channel; quantities of fish are caught in it and wild fowl are abundant along its shores. The chief towns in the district are Wollongong, Kiama, Clifton and Shellharbour.

ILLE-ET-VILAINE, a maritime department of north-western France, formed in 1790 out of the eastern part of the old province of Brittany. Pop. (1906) 611,805. Area 2699 sq. m. It is bounded N. by the English Channel, the Bay of St Michel and the department of Manche; E. by Mayenne; S. by Loire- Inferieure; and W. by Morbihan and C6tes-du-Nord. The territory of Ille-et-Vilaine constitutes a depression bordered by hills which reach their maximum altitudes (over 800 ft.) in the N.E. and W. of the department. The centre of this depression, which separates the hills of Brittany from those of Normandy, is occupied by Rennes, capital of the department and an important junction of roads, rivers and railways. The department takes its name from its two principal rivers, the Ille and the Vilaine. The former joins the Vilaine at Rennes after a course of 18 m. through the centre of the department; and the latter, which rises in Mayenne, flows westwards as far as Rennes, where it turns abruptly south. The stream is tidal up to the port of Redon, and is navigable for barges as far as Rennes. The Vilaine receives the Meu and the Seiche, which are both navigable. There are two other navigable streams, the Airon and the Ranee, the long estuary of which falls almost entirely within the department. The Ille-et-Rance canal con- nects the town of Rennes with those of Dinan and St Malo. The greater portion of the shore of the Bay of St

Michel is covered by the Marsh of Dol, valuable agricultural land,' which is protected from the inroads of the sea by dykes. Towards the open channel the coast is rocky. Small lakes are frequent in the interior of the department. The climate is temperate, humid and free from sudden changes. The south-west winds, while they keep the temperature mild, also bring frequent showers, and in spring and autumn thick fogs prevail. The soil is thin and not very fertile, but has been improved by the use of artificial manure. Cereals of all kinds are grown, but the principal are wheat, buckwheat, oats and barley. Potatoes, early vegetables, flax and hemp are also largely grown, and tobacco is cultivated in the arrondissement of St Malo. Apples and pears are the principal fruit, and the cider of the canton of Dol has a high reputation. Cheese is made in considerable quantities, and the butter of Rennes is amongst the best in France. Large numbers of horses and cattle are raised. Mines of iron, lead and zinc (Pont-Pean) and quarries of slate, granite, &c, are worked. There are flour and saw-mills, brick works, boat-building yards, iron and copper foundries and forges, dyeworks, and a widespread tanning industry. Sail-cloth, rope, pottery, boots and shoes (Fougeres), edge-tools, nails, farming implements, paper and furniture are also among the products of the department. The chief ports are St Malo and St Servan. Fishing is very active on the coast, and St Malo, St Servan and Cancale equip fleets for the Newfoundland cod- banks. There are also important oyster-fisheries in the Bay of St Michel, especially at Cancale. The little town of Dinard is well known as a fashionable bathing-resort. Exports include agricultural products, butter, mine-posts and dried fish; imports, live-stock, coal, timber, building materials and American whea),.. The department is served by the Western railway, and has over 130 m. of navigable waterway. The population is of less distinctively Celtic origin than the Bretons of Western Brittany, between whom and the Normans and Angevins it forms a transi- tional group. Ille-et-Vilaine is divided into the arrondissements of Fougeres, St Malo, Montfort-sur-Meu, Redon, Rennes and Vitre, with 43 cantons and 360 communes. The chief town is Rennes, which is the seat of an archbishop and of a court of appeal, headquarters of the X. army corps, and the centre of an academie (educational division).

In addition to the capital, Fougeres, St Malo, St Servan,

and the

afterwards, on the failure of the original Remington company, the fire-arms factory was bought by a New York City firm. A store was established on the present site of Ilion as early as 1816, but the

village really dates from the completion of the Erie canal in 1825. On the canal list it was called Steele's Creek, but it was also known as Morgan's Landing, and from 1830 to 1843 as Remington's Corners. The post-office, which was established in 1845, was named Remington, in honour of Eliphalet Remington; but later the present name was adopted. The village was incorporated in 1852. Ilion is a part of the township of German Flats (pop. in 1900, 8663.; in 1910, 10,160), settled by Palatinate Germans about 1725. The township was the scene of several Indian raids during the French and Indian War and the War of Independence. Here General Herkimer began his advance to raise the siege of Fort Schuyler (1777), and subsequently Ilion was the rendezvous of .Benedict Arnold's force during the same campaign.

ILKESTON, a market town and municipal borough, in the Ilkeston parliamentary division of Derbyshire, England, 9 m. E.N.E. of Derby, on the Midland and the Great Northern railways. Pop. (1891) 19,744, (1901) 25,384. It is situated on a hill commanding fine views of the Erewash valley. The church of St Mary is Norman and Early English, and has a fine chancel screen dating from the later part of the 13th century. The manufactures of the town are principally hosiery and lace, and various kinds of stoneware. Coal and iron are wrought in the neighbourhood. An alkaline mineral spring, resembling the seltzer water of Germany, was discovered in 1830, and baths were then erected, which, however, were subsequently closed. The town, which is very ancient, being mentioned in Domesday, obtained a grant for a market and fair in 1251, and received its charter of incorporation in 1887. It is governed by a mayor, 6 aldermen and 18 councillors. Area, 2526 acres.

ILKLEY, an urban district in the Otley parliamentary division of the West Riding of Yorkshire, England, 16 m. N.W. from Leeds, on the Midland and the North-Eastern railways. Pop. of urban

ILL, a river of Germany, entirely within the imperial territory of Alsace-Lorraine. It rises on a north foothill of the Jura, S.W. of Basel, and flows N.N.E. parallel with the Rhine, which it enters from the left, 9 m. below Strassburg. Its course lies for the most part through low meadowland; and the stream, which is 123 m. long, receives numerous small affluents, which pour out of the short narrow valleys of the Vosges. It is navigable from Ladhof near Colmar to its confluence with the Rhine, a distance of 59 m. It is on this river, and not on the Rhine, that the principal towns of Upper Alsace are situated, e.g. Mulhausen, Colmarl, Schlettstadt and

Strassburg. The 111 feeds two important canals, the Rhine-Marne canal and the Rhine-Rhone canal, both starting from the neighbourhood of Strassburg.

ILLAWARRA, a beautiful and fertile district of New South Wales, Australia, extending from a point 33 m. S. of Sydney, along the coast southwards for 40 m. to Shoalhaven. It is thickly populated, and supplies Sydney with the greater part

ILLEGITIMACY

301

Redon, Vitre, Dol, Dinard and Cancale are the towns of chief importance and are separately noticed. At Combourg there is a picturesque chateau of the 14th and 15th centuries where Chateaubriand passed a portion of his early life. St Aubin-du-Cormier has the ruins of an important feudal fort- ress of the 13th century built by the dukes of Brittany for the protection of their eastern frontier. Montfort- sur-Meu has a cylindrical keep of the 15th century which is a survival of its old ramparts.

ILLEGITIMACY (from " illegitimate," Lat. illegitimus, not in accordance with law, hence born out of lawful wedlock), the state of being of illegitimate birth. The law dealing with

Table II. — Illegitimate Births to 1000 Unmarried and Widowed Females, aged 15-49 years.

Country.

1846-55.

1856-65.

1866-75.

1876-85.

1886-95.

1 896- 1 905.

England and Wales .

17

18

16

13

10

8

Scotland ….

22

2 3

20

17

13

Ireland

5

4

5

3

Denmark

28

27

26

24

23

Sweden

20

22

23

22

22

Germany .

28

27

26

Netherlands

10

9

9

6

Belgium .

16

16

17

19

17

17

France

15

17

17

16

17

18

Italy

24

24

19

Table I.—

-Illegitimate

Births per

1000 Births

{excluding still-born).

1 876-1 880.

1881-1885.

1 886-1 890.

1891-1895.

1896-1900.

1901-1905.

England and Wales

48

48

46

42

4i

40

Scotland ….

85

83

81

74

68

64

Ireland

24

27

28

36

36

26

Denmark ….

IOI

100

95

94

96

101

Xonvav ….

84

81

75

71

74

Sweden ....

100

102

103

105

113

Finland ....

73

70

65

65

66

Russia ....

28

27

27

27

27

Austria ....

138

H5

147

146

141

Hungary ....

73

79

82

85

90

94

Switzerland

47

48

47

46

45

(>ermanv . ...

87

92

92

9i

90

84

Netherlands .

3 1

30

32

31

27

23

Belgium ....

74

82

87

88

80

68

France ....

72

78

83

87

. 88

88

Portugal ....

123

122

121

Spain ….

49

44

Italy

72

76

74

69

62

56

Xew South Wales

42

44

49

60

69

70

\ ictoria ….

43

46

49

60

69

70

Queensland

39

41

44

48

59

65

South Australia .

22

25

30

38

41

West Australia .

48

5i

42

Tasmania

44

38

46

57

Xew Zealand

23

29

32

38

44

45

the legitimation of children born out of wedlock will be found under Legitimacy and Legitimation. How far the prevalence of illegitimacy in any community can be taken as a guide to ihe morality of that community is a much disputed question. The phenomenon itself varies so much in different localities, even in localities where the same factors seem to prevail, that affirmative conclusions are for the most part impossible to draw. In the United Kingdom, where the figures differ considerably for the three countries — England, Scotland, Ireland — the reasons that might be assigned for the differences are negatived if applied on the same lines, as they might well be, to certain other countries. Then again, racial, climatic and social differences must be allowed for, and the influence of legislation is to be taken into account. The fact that in some countries marriage is forbidden until a man has completed his military service, in another, that consent of parents is requisite, in another, that " once a bastard always a bastard " is the rule, while in yet another that the merest of subsequent formalities will legitimize the offspring, must account in some degree for variations in figures.

Table I. gives the number of illegitimate births per 1000 births in various countries of the world for quinquennial periods. It is to be noted that still-born births are excluded, as in the United Kingdom (contrary to the practice prevailing in most European countries) registration of such births is not com- pulsory. The United States is omitted, as there is no national system oi registration of births.

This method of measuring illegitimacy by ascertaining the proportion of illegitimate births in every thousand births is a fairly accurate one, but there is another valuable one which is often applied, that of comparing the number of illegitimate births with each thousand unmarried females at the child- bearing age the " corrected " rate as opposed to the " crude,"

as it is usually termed. This is given for certain countries in

Table II.

The generally accepted idea that the inhabitants of the warmer

countries of the south of Europe are more ardent in tempera- ment has at least no support as shown in the figures in Table I., where we find a higher rate of illegitimacy in Sweden and Denmark than in Spain or Italy. Religion, however, must be taken into account as having a strong influ- ence in preventing unchastity, though it cannot be concluded that any par- ticular creed is more powerful in this direction than another; for example, the figures for Austria and Ireland are very different. It cannot be said, either, that figures bear out the state- ment that where there is a high rate of illegitimacy there is little prostitu- tion. It is more probable that in a country where the standard of living is low, and early marriages are the rule, the illegitimate birth-rate will be low. As regards England and Wales, the illegitimate birth-rate has been steadily declining for many years, not only in actual numbers, but also in proportion to the population.

Table III. — England and Wales.

Proportion

Illegitimate

Year.

Illegitimate

to 1000 of

Births in

Births.

population.

1000 Births.

i860

43.693

2-2

64

1865

46,585

2-2

62

1870

44.737

2-0

56

1875

40,813

i-7

48

1880

42,542

1-6

48

1885

42,793

16

48

1890

38,412

1-3

44

1895

38,836

1-3

42

1900

36,814

i-i

40

1905

37,315

i-i

40

1907

36,189

1-0

39

The corrected rate bears out the result shown in Table III as follows:

Table IV. — England and Wales. Illegitimate. Birth-rate calculated on the Unmarried and Widowed Female Popidation, aged 15-45 years.

Compared with

Rate per 1000.

rate in 1876-1880, taken as 100.

I 876-1 880

14-4

100-0

1881-1885

13-5

93-8

1886-1890

n-8

81-9

1891-1895

IO-I

70-1

1 896-1900

9-2

63-9

1901-1905

8-4

58-3

1906

8-1

56-3

1907

7-8

54-2

Table V. gives the illegitimate births to 1000 births in England and Wales for the ten years 1807-1006 and foi

302

ILLEGITIMACY

Table V.— England and Wales

Illegitimate Births to

1000 Births.

Ten

Ten

Ten

I

Ten

years

years

years

I

years

1 897-

1907.

1897-

1907.

1897-

I9°7-

1897-

1907.

1906.

1906.

1906.

1906.

Bedford . .

49

53

Hertford . .

40

42

Oxford . .

53

56

N. Riding .

53

45

Berks . . .

47

48

Huntingdon .

49

46

Rutland . .

46

70

W. „

43

41

Bucks .

40

44

Kent . . .

40

41

Shropshire

64

61

Cambridge

48

53

Lancashire

38

37

Somerset .

37

35

Anglesey .

81

75

Chester

41

39

Leicester-

Stafford . .

40

38

Brecon

44

40

Cornwall .

50

48

shire

40

39

Suffolk . .

56

62

Cardigan .

64

61

Cumberland .

61

58

Lincolnshire .

55

54

Surrey

38

37

Carmarthen .

37

41

Derby .

41

41

London

37

38

Sussex

52

52

Carnarvon

60

72

Devon

39

39

Middlesex

30

28

Warwick .

32

30

Denbigh

49

47

Dorset

40

37

Monmouth

29

27

Westmor-

Flint . . .

42

42

Durham .

34

37

Norfolk . .

62

65

land

61

62

Glamorgan

26

26

Essex .

28

27

Northampton

41

42

Wilts . . .

41

42

Merioneth

7i

77

Gloucester

36

36

Northumber-

Worcester

37

38

Montgomery .

76

73

Hants .

40

36

land .

39

38

Yorks —

Pembroke

52

47

Hereford .

.

66

66

Nottingham .

50

49

E. Riding .

52

49

Radnor

66

67

Table VI. — Annual Illegitimate Birth-rates in each Registration County of England and Wales, 18J0-1907.

Registration Counties.

Illegitimate Births to 1000 Unmarried and Widowed Females, aged 15-45 years.

Three-year Periods.

England and Wales

London .

Bedford .

Berks

Bucks

Cambridge

Chester

Cornwall

Cumberland

Derby

Devon

Dorset

Durham

Essex

Gloucester

Hants

Hereford

Hertford

Huntingdon

Kent .

Lancashire

Leicestershire

Lincolnshire

Middlesex

Monmouth

Norfolk .

Northampton

Northumberland

Nottingham

Oxford

Rutland

Salop

Somerset

Stafford

Suffolk

Surrey

Sussex

Warwick

Westmorland

Wilts

Worcester

Yorks — E. Riding N. Riding W. Riding

Anglesey

Brecon

Cardigan

Carmarthen

Carnarvon

Denbigh .

Flint . .

Glamorgan

Merioneth

Montgomery

Pembroke

Radnor .

17-0 10-3

21-1

16-8 19-0 19-3 17-5 16-5 29-2

22-5

I4-0 I4-2

24-0

162 12-9 13-6 21-4 18-4 19-8 14-7 16-2 19-9

22-3

9-4 18-6

27-3 18-7

2I-I

24-5 19-0 18-1

28-2

13-3

24-6

22-0

9-5

13-7

14-9

21-9

17-1 16-3

23-0 27-7 20-4 19-7 19-9 16-0

l8-2

18-3

2I-I

18-7 17-7 24-4 29-5

21-6

41-8

1870-1872. 1880-1882. 1890-1892. 1900-1902. 1903-1905

14-1 9-8 18-0 13-4 16-5 15-6 14-2 14-8

23-9 17-7

io-6

I3-I

18-0 12-7

n-6 n-8

19-0

15-3 14-0

I2-I

13-6 16-1 18-5 9.4 15-9

22-6

15-9 17-9

21-7

15-4 12-7

21-8

n-3

19-4 17-8 8-5

n-5

13-2 17-9 14-7 13-7

l8-2

20-2

l6l

16-7 18-0 14-8 13-9 13-9 17-6 18-4 13-5 19-5 24-3 15-9 33-2

iO‘5 8-i

1 1 -2

10-3

12-6

12-4 10-3

11-2

18-6

12-8

8-1

9-6

13-8

9-1

8-2

8-5

13-4

10-4

12-9

9-3

10-2

11-4 14-2 6-5

“•3

16-7

n-7

12-4

15-4 10-4

7-9 16-6

7-4

14-5

14-0

6-6

8-7

9-7

I3-I

10-3

9-2

14-3 15-4

n-4

15-7

I2‘5

n-8

9-4 12-7

13-4 13-1 10-3 16-4 16-7

I2‘4

20-1

8-5 6-9

8-4

8-7 9-1 9-6

7-7

8-6

12-3

IO-O

67 7-2

n-i

7-3 6-3 7-3

II-2

7-0 10-9 7-5 7-9 8-6

12-2

5-9

10-2 13-4

9-1

10-2

12-7 9-0

7 '2

12-8

6-o

1 1 -2 12-0

5-9 7-2 7-6 8-6 9-2 7-2

8-3 6-9 8-0 8-6 8-9

IO-I

7-3

8-1

12-3

io-o

6-5 7-2

II-I

7-1

6-i

7-1

n-5

7-2

9-7 7-6

7-8 7.9

I2-I

6-o

9-1

13-4

8-8

io-o

12-6

91

6-8

13-4

6-o

n-4

u-7

5-7 7-0

7-5 9-1

8-7 6-8

Years.

1906. 1907

8-1 6-8

8-2

7-3 9-7

7-2

7-5

12-3

io-o

6-7

8-i

io-8

6-7

6-8

6-9

10-3

6-6

9-7

. 7-5

7-5

7-5

12-7

6-i

9-6

12-5

9-0

10-4

12-0

9-3

9-0

13-0

5-4 10-9

I2‘4

5-9 6-5 6-6

8-5 8-6 6-6

7-8 6-4 8-7 8-4 8-8 10-4 6-9 7-5

II-O

9.4 6-1 6-4

n-6

6-4 5-8 6-4

II-O

7-5 9-7 7-2 7-2

7-3

n-9

5-7 9-3

12-8

7-7

9-3

n-9

9-2

n-4

1 1 -8

5-5

IO-I

12-5 5-7 6-4 6-8

7-8

9-3 6-6

Decrease per cent

in each County

between the period

1870-1872

and 1907.

12-2

n-7

12-2

io-6

12-1

II-6

II-9

10-2

9.4

9-2

8-8

8-i

l6l

14-9

13-3

12-9

IO-I

9-2

9-2

8-3

8-9

7-8

0-3

7-3

7-7

8-2

7-7

8-9

10-3

9-6

9-4

10-5

12-3

n-6

13-5

10-3

9-7

II-2

1 1 -9

II-O

8-5

9-1

8-9

8-4

13-5

13-4

13-2

12-7

I3-I

13-4

12-6

n-7

8-9

10-2

10-7

8-4

14-4

13-4

8-3

“■3

54-1 37-9 58-8 50-0

53-7 46-1

6o-6

54-5 62-3 58-2

5°-4

54-9

5i-7

60-5

55-o

52-9 48-6 59-2 51-0 51-0 55-6

63-3 46-6

39-4 50-0

53-1 58-8

55-9

5i-4

51-6

37-o

58-2 58-6 58-9 43-2 40-0

53-3 54-4 64-4 45-6 59-5

53-9 63-2 60-3 34-5 58-3 54-4

5i'i

42-6

51-2 41-2

52-5 48-0 60-3

6l-i

73-0

ILLEGITIMACY

303

Table VII.— Rate of Illegitimacy per 1000 Births.

Belfast. .31

Birmingham . . 35 Bradford ... 40 Bristol . . . .31 Cork .... 18 Dublin. ... 28 Edinburgh . . 69 Glasgow ... 63 Leeds 54

Table VIII.— Scotland 1906.

Liverpool

• 54

Manchester

. 28

Middlesboro'

• 25

Newcastle .

■ *36*

Nottingham

. 60

Portsmouth

• 33

Salford .

. 28

Sunderland

• 30

Total Births.

Legitimate.

Illegitimate.

Births per 1000 of pop.

Percentage of Illegitimate to Total Births.

132,005

122,699

9306

27-93

7-05

Illegitimate Births.

Percentage

of Illegitimate

to Total

Births.

Illegitimate Births.

Percentage

of

Illegitimate

to Total

Births.

i860

1865 1870

1875 1880 1885 1890

9.736 11,262 11,108 10,786 10,589 10,680

9.241

9-22 996 9-63

8-73 850 8-47 760

1895 1900 1901 1902 1903 1904 1905 1906

9204 8534 8359 8300

8295 9010 9082 9306

7-2.8 6-49 6-32 6-28

6-21

6-79 6-91

7-°5

Table IX. — Scotland 1906.

Districts:

Principal Tow- Large Town Small Town Mainland-rural Insular-rural

Illegitimate Births.

No.

Per 1000 of Pop.

Shetland

Orkney .

Caithness

Sutherland

Ross and Cromarty

Inverness

Nairn.

Elgin (or Moray

Banff . .

Aberdeen

Kincardine .

Forfar

Perth . .

Fife . . .

Kinross .

Clackmannan

Stirling .

Dumbarton .

Argyll

Bute .

Renfrew

Ayr .

Lanark

Linlithgow .

Edinburgh .

Haddington.

Berwick .

Peebles .

Selkirk . .

Roxburgh

Dumfries

Kirkcudbright

Wigtoun.

4318 1029 1724 2099 136

L

Scotland

31 29

84

28

74

145

18

169

202

1083

93 676

215

308

20

53

235

163

J 48

30

410

499

2872

99

930

66

60

21 46

83 218

92

I06

7-14 5-58 623 9-08 5-88

9306

5-30 5-99 9-96

6-8i

4-40

8-02

10-29 15-66 12-93 12-38 8-15 9-43 7-93 4-56 9-95 6-69 4-91 4-14 10-07 8-36 4-46 623 6-28 3-88 7-23 5-92 9-63

6-i8

9-13

8-67

12-51

10-71

12-79

Illegitimate Births

per 1000 of Un- married Women and Widows between 15 and 45.

7-05

7-0

7-7 19-4

IO-I

6-9

n-5

13-2 26-3

25-4 24-2 17-0 14-2

io-8

9-7

22-2

10-9

13-2

9-7 12-7

9-2

8-5

H-3

15-9 15-4

II-O

n-8

12-7

7-9

“•5

9-8 199

15-7 22-5

14-1

the year 1907. Table VI. gives the ” corrected ” rate for certain three-year periods. In connexion with these tables the following extract from the Registrar-General’s Report for 1907 (p. xxx.) is important.

” It is difficult to explain the variations in tne rates of illegitimacy in the several counties. It may be stated generally that the proportion of illegitimate children cannot alone serve as a standard of morality. Broadly speaking, however, the single and widowed women in London, in the counties south of the Thames, and in the south-western counties have comparatively few illegitimate children ; on the other hand, the number of illegitimate children is com- paratively high in Shropshire, in Herefordshire, in Staffordshire, in Nottinghamshire, in Cumberland, in North Wales, and also in

Table X. — Ireland. Proportion per cent of Illegitimate Births.

1903.

1904.

1905-

1906.

1907.

Ireland

Leinster . Munster . Ulster Connaught .

2-6

2-5

2-6

2-6

2-5

2-6

2-3 3-3

o-5

2-6

2-2

3-4 0-7

2-7 2-3 3-5 0-7

2-7

2-2

3-5 0-7

2-7

2-1

3-3

o-6

nearly all the counties on the eastern seaboard, viz. Suffolk, Norfolk Lincolnshire, the East and North Ridings of Yorkshire, and Durham. In the Registrar-General's Report for the year 1851 it was assumed that there was an indirect connexion between female illiteracy and illegitimacy. This may have been the case in the middle of the last century, but there is no conclusive evidence that such is the case at the present day. The proportions of illegitimacy and the proportions of married women who signed the marriage register*

Table XI. — Ireland 1907.

County.

Leinster — ■

Carlow

Dublin

Dublin Co. Borough

Kildare

Kilkenny

King's

Longford

Louth

Meath

Queen's

Westmeath

Wexford

Wicklow

Munster —

Clare

Cork Co. and Co. Borough

Kerry

Limerick Co. and Co. Borough

Tipperary N.R.

Tipperary S.R

Waterford Co. and Co. Borough Ulster —

Antrim

Armagh

Belfast Co. Borough

Cavan

Donegal

Fermanagh

Londonderry Co. and Borough

Monaghan

Tyrone

Connaught —

Galway

Leitrim

Mayo

Roscommon . . .

Sligo

Leinster

Munster

Ulster

Connaught .

No. of

Illegitimate

Births.

Per cent of Total Births.

27

34

3H

22

54 24 11 27 30 18

19

89

37

23 151

5i

107

19 66 68

230 99

355 27 54

4i

145 24

116

32

10

21

9

9

716

495

1272

81

2564

3-56

i-i5

3-29 1-46

3-29 2-07 1-23

2-01 2-27

I-70

1-57

4-u

2-91

1-04 1-69 1-34 3-14 1-49 3-32 3-69

5-08 3-49 3-13 1-54 1-36

3-15 4-35 1-55 3-80

•80 •77 ■45 •50

•52

2-67

2-II

3-32

•60

by mark are relatively high in Staffordshire, in North Wales, in Durham and in the North Riding of Yorkshire ; on the other hand, in Norfolk, in Suffolk and in Lincolnshire there is a compara- tively high proportion of illegitimacy and a low proportion of illiteracy."

This latter conclusion may be carried further by saying that in those European countries where elementary education is

;°4

ILLER— ILLINOIS

most common, the rate of illegitimacy is high, and that it is low in the more illiterate parts, e.g. Ireland and Brittany.

It has been said that one of the contributory causes of illegiti- macy is the contamination of great cities; statistics, however, disprove this, there being more illegitimacy in the rural districts. Table VII. gives the rate of illegitimacy in some of the principal towns of the United

Kingdom.

That poverty is a determining factor in causing illegitimacy the following figures, giving the rate of illegitimacy in the poorest parts of London and in certain well-to-do parts, clearly disprove : —

Rale of Illegitimacy per iooo Births.

London.

1901.

1903.

1905-

1907.

Stepnev

Bethnal Green .... Mile End Old Town Whitechapel ....

St George's, Hanover Sq. . Kensington ....

Fulham

Marylebone ....

12 13 15

22

9 15 13

24

18

13 16

:9

10 11

15 19

40 48

43 182

45

44

42

186

45

49

45

198

45

54

40

182

Tables VIII. and IX. give the rate of illegitimacy for the various counties of Scotland, and Table X. the rate for Ireland.

Bibliography. —The Annual Reports of the Registrars-General for England, Scotland and Ireland ; statistical returns of foreign countries; A. Leffingwell, Illegitimacy and the Influence of the Seasons upon Conduct (1892). (T. A. I.)

ILLER, a river of Bavaria, rising in the south-west extremity of the kingdom, among the Algauer Alps. Taking a northerly course, it quits the mountains at Immenstadt, and, flowing by Kempten, from which point it is navigable for rafts, forms for some distance the boundary between Bavaria and Wiirttem- berg, and eventually strikes the Danube (right bank) just above Ulm. Its total length is 103 m.

ILLINOIS, a North Central state of the United States of America, situated between 37 and 42 30′ N. lat. and 87 35′ and 91° 40′ W. long. It is bounded N. by Wisconsin, E. by Lake Michigan and Indiana, S.E. and S. by the Ohio river, which separates it from Kentucky, and S.W. and W. by the Mississippi river, which separates it from Missouri and Iowa. The Enabling Act of Congress, which

provided for the organiza- tion of Illinois Territory into a state, extended its jurisdiction to the middle of Lake Michigan and the Mississippi river; consequently the total area of the state is 58,329 sq. m., of which 2337 sq. m. are water surface, though the official figures of the United States Geological Survey, which does not take into account this extension of jurisdiction, are 56,665 sq. m.

Physiography. — Physiographically, the state (except the extreme southern point) lies wholly in the Prairie Plains region. The N.E. corner is by some placed in the " Great Lakes District." The southern point touches the Coastal Plain Belt at its northward extension called the " Mississippi Embayment." The surface of Illinois is an inclined plane, whose general slope is toward the S. and S.W. The average elevation above sea-level is about 600 ft. ; the highest elevation is Charles Mound (1257 ft.), on the Illinois- Wisconsin boundary line, one of a chain of hills that crosses Jo Daviess, Stephenson, Winnebago, Boone and McHenry counties. An elevation from 6 to 10 m. wide crosses the southern part of the state from Grand Tower, in Jackson county, on the Mississippi to Shawneetown, in Gallatin county, on the Ohio, the highest point being 1047 ft. above the sea; from Grand Tower N. along the Mississippi to the mouth of the Illinois there is a slight elevation and there is another elevation of minor importance along the Wabash. Many of the river bluffs rise to an unusual height, Starved Rock, near Ottawa, in La Salle county, being 150 ft. above the bed of the Illinois river. Cave in Rock, on the Ohio, in Hardin county, was once the resort of river pirates. The country S. of the elevation (mentioned above) between Grand Tower and Shawneetown was originally covered with forests.

The drainage of Illinois is far better than its low elevation and comparatively level surface would suggest. There are more than 275 streams in the state, grouped in two river systems, one having the Mississippi, which receives three-fourths of the waters of Illinois, as outlet, the other being tributary to the Wabash or Ohio rivers. The most important river is the Illinois, which, formed by the junction of the Des Plaines and the Kankakee, in the N.E. part of Grundy county, crosses the N. central and W. portions of

the state, draining 24,726 sq. m. At some points, notably at Lake Peoria, it broadens into vast expanses resembling lakes. The Kaskaskia, in the S., notable for its variations in volume, and the Rock, in the N., are the other important rivers emptying into the iVlississippi; the Embarrass and Little Wabash, the Saline and Cache in the E., are the important tributaries of the Wabash and Ohio rivers. The Chicago river, a short stream 1 m. long, formed by the

union of its N. and S. branches, naturally flowed into Lake Michigan, but by the construction of the Chicago Drainage Canal its waters were turned in 1900 so that they ultimately flow into the Mississippi.

The soil of Illinois is remarkable for its fertility. The surface soils are composed of drift deposits, varying from 10 to 200 ft. in depth; they are often overlaid with a black loam 10 to 15 in. deep, and in a large portion of the state there is a subsoil of yellow clay. The soil of the prairies is darker and coarser than that of the forests, but all differences disappear with cultivation. The soil of the river valleys is alluvial and especially fertile, the " American Bottom," extending along the Mississippi from Alton to Chester, having been in cultivation for more than 150 years. Along the river bluffs there is a silicious deposit called loess, which is well suited to the cultivation of fruits and vegetables. In general the N. part of the state is especially suited to the cultivation of hay, the N. and central parts to Indian corn, the E. to oats, and the S.W. to wheat.

Climate. — The climate of Illinois is notable for its extremes of temperature. The warm winds which sweep up the Mississippi Valley from the Gulf of Mexico are responsible for the extremes of heat, and the Arctic winds of the north, which find no mountain range to breaktheir strength, cause the extremes of cold. The mean annual temperature at Winnebago, near the N. border, is 47 F., and it increases to the southward at the rate of about 2° for every degree of latitude, being 52° F. at Springfield, and 58° F. in Cairo, at the S. extremity. The lowest temperature ever recorded in the state was 32° F., in February 1905, at Ashton in the N.W. and the highest was 115° F., in July 1901, at Centralia, in the S., making a maximum range of 147 ° F. The range of extremes is considerably greater in the N. than in the S. ; for example, at Winnebago ex tremes have ranged from -26 F. to no F. or 136 F., but at Cairo they have ranged only from 16° F. to 106° F. or 122 ° F. The mean annual precipitation is about 39 in. in the S. counties, but this decreases to the northward, being about 36 in. in the central counties and 34 in. along the N. border. The mean annual snow fall increases from 12 in. at the S. extremity to approximately 40 in. in the N. counties. In the N. the precipitation is 44-8 % greater in spring and summer than it is in autumn and winter, but in the S. only 26-17% greater. At Cairo the prevailing winds are southerly duringall months except February, and as far north as Springfield they are southerly from April to January; but throughout the N. half of the state, except along the shore of Lake Michigan, where they vary from N.E. to S.W., the winds are mostly from the W. or N.W. from October to March and

very variable for the remainder of the year. The dampness and miasma, to which so many of the early settlers' fatal " chills and fever " were due, have practically dis- appeared before modern methods of sanitary drainage.

Fauna and Flora. — The fauna and flora, which are similar to those of the other North Central States of North America, impressed the early explorers with their richness and variety. " We have seen nothing like this for the fertility of the land, its prairies, woods, and wild cattle," wrote PSre Jacques Marquette of the Illinois region, and later explorers also bore witness to the richness of the country. Many of the original wild animals, such as the bison, bear, beaver, deer and lynx, have disappeared; wolves, foxes and mink are rare ; but rabbits, squirrels and raccoons are still common. The fish are mainly the coarser species, such as carp, buffalo-fish and white perch ; of better food fish, the principal varieties are bass (black, striped and rock), crappie, pike, " jack salmon " or wall- eyed pike, and sun fish. The yield of the fisheries in 1900 was valued at $388,876. The most important fisheries on the Illinois river and its tributaries were at Havana, Pekin and Peoria, which in 1907- 190S were represented by a total catch of about 10,000,000 lb, out of a total for this river system of 17,570,000 lb. The flora is varied. Great numbers of grasses and flowering plants which once beautified the prairie landscape are still found on uncultivated lands, and there are about 80 species of trees, of which the oak, hickory, maple and ash are the most common. The cypress is found only in the S. and the tamarack only in the N. The forest area, estimated- at 10,200 sq. m. in 1900, is almost wholly in the southern counties, and nearly all the trees which the northern half of the state had before the coming of the whites were along the banks of streams. Among wild fruits are the cherry, plum, grape, strawberry, black- berry and raspberry.

Industry and Commerce. — The fertility of the soil, the mineral wealth and the transportation facilities have given Illinois a vast economic development. In 1900 more than seven-tenths of the inhabitants in gainful occupations were engaged in agriculture (25-6%), •manufactures and mechanical pursuits (267%), and trade and transportation (22%).

**«i J VT a) %ˆv \h«$n siiSsC T7m >l>7 ˆSfeassˆM'ˆeiu: i &&ghaM £»Kp°i4*

teˆjjlSAlhkribra dwardsvi

rni Tviventchlei/MascQUtah yDairfiansv'llw – »«••••-« — —J – « »*««*

*- -ygtovHP

Ashlgj

;Shobonier ˆ-> T . ciedeS*

iBiblciGfOve j

i -i I PMˆbeffW}rove (

— «— ˆk.? – &*• —* w Stnimboro

¨-OT-, rt ˆAgPˆfS™

1 luka,

Rjiwd, SSˆty ‘icartter. “3|i Johns/willeS & Emprise

„ JM „ , . Orcl&rdvillef °ft S£> Mt-ErieJ!,

Hill .... ;

irˆ‘Kgtoˆkˆ J x ˆ Elmbranch.- ~H Jeffers

” avajpˆf IjTexico 1 lW M V \ M E

Lirfieli

ˆfeˆ«2%;. ■ˆˆ•Cakdale tw ri&SS? Awaltonvii

tenant— „,.._ ~, ˆ-„

ˆptr J ¥>fc fcv f?unfielj

ej j —v.’.— i-, u – Lll- i|,

ˆ ZfeiglCi «-- r nia oravill

‘ * ˆJRiˆL «if?ˆ #£•%< "'* Jcaha

?’ ills’ J&.f I nf. PHicedoniivAK’n?!

.ulkay.tt

.an ton oAKin

ˆlakand

(ofris 1

*. i. . i— v—— aniwˆ ■ e*L ■ SG&mtxs sSmerset; oKedrt.. .»¥*(,,, 7ajf | (jjflaisprslb -ˆvˆ*

;“5ˆi n 3ˆ£obaefli „ :TicLTuaoe.lQlmOSirk; Jr \ mab.cha.m- H

*■dcngaJS ■ t l3ˆˆ 1 pra nt3bur SˆftvRenshSw iˆSolconda?ˆˆ **

*v *« a C ras Mi|SˆPˆlnˆ. i? « ; fe ayou ‘*

bund i ˆHollowax,

*C * b ‘ˆˆLwickHffe K*

“/Paducal

Q Xongitude West 89 of Greenwich

D<

E

Eme»y Walker sc.

ILLINOIS

305

Historically and comparatively, agriculture is the most important industry. In 1900 about nine-tenths of the total land area was inclosed in farms; the value of farm property ($2,004,316,897) was greater than that of any other state; as regards the total value of farm products in 1899 Illinois was surpassed only by Iowa; in the value of crops Illinois led all the states, and the values of property and of products were respectively 35-6% and 87-1% greater than at the end of the preceding decade. During the last half of the 19th century the number of farms increased rapidly, and the. average size declined from 158 acres in 1850 to 127-6 acres in 1870 and 124-2 acres in 1900. The prevailing form of tenure is that of owners, 60-7 % of the farms being so operated in 1900; but during the decade 1890-1900 the number of farms cultivated by cash tenants in-creased 30-8%, and the number by share tenants 24-5%, while the increase of cultivation by owners was only 1 . In proportion of farm land improved (84-5), Illinois was surpassed only by Iowa among the states. Cereals form the most important agri- cultural product (600,107,378 bushels in 1899 — in value about three- fourths of the

total agricultural products of the state). In the production of cereals Illinois surpassed the other states at the close of each decade during the last half of the 19th century except that ending in 1890, when Iowa was the leading state. Indian corn and oats are the most valuable crops. The rank of Illinois in the production of Indian corn was first in 1899 with about one- fifth of the total product of the United States, and first in 1907 l with nearly one-tenth of the total crop of the country (9,521,000 bushels out of 99,931,000). In 1879, in 1899 and in 1905 (when it produced 132,779,762 bushels out of 953,216,197 from the entire country) it was first among the states producing oats, but it was surpassed by Iowa in 1889, 1906 and 1907; in 1907 the Illinois crop was 101,675,000 bushels. From 1850 until 1879 Illinois also led in the production of wheat; the competition of the more western states, however, caused a great decline in both acreage and production of that cereal, the state's rank in the number of bushels produced declining to third in 1889 and to fourteenth in 1899, but the crop and yield per acre in 1902 was larger than any since 1894; in 1905 the state ranked ninth, in 1906 eighth and in 1907 fifth (the crop being 40,104,000 bushels) among the wheat-growing states of the country. The rank of the state in the growing of rye also declined from second in 1879 to eighth in 1899 and to ninth in 1907 (when the crop was 1,106,000 bushels), and the rank in the growing of barley from third in 1869 to sixteenth in 1899. In 1907 the barley crop was 600,000 bushels. Hay and forage are, after cereals, the most im- portant crops; in 1907 2,664,000 acres produced 3,730,000 tons of hay valued at 841,030,000. Potatoes and broom corn are other valuable products. The potato crop in 1907 was 13,398,000 bushels, valued at $9,647,000, and the sugar beet, first introduced during the last decade of the 19th century, gave promise of becoming one of the most important crops. From 1889 to 1899 there was a distinct decline in the production of apples and peaches, but there was a great increase in that of cherries, plums and pears. The large urban population of the state makes the animal products very valuable, Illinois ranking third in 1900 in the number of dairy cows, and in the farm value of dairy products; indeed, all classes of live stock, except sheep, increased in number from 1850 to 1900, and at the end of the latter year Illinois was surpassed only by Iowa in the number of horses and swine; in 1909 there were more horses in Illinois than in Iowa. Important influences in the agricultural development of the state have been the formation of Farmers' Institutes, organized in 1895, a Corn Breeders' Association in 1898, and the introduction of fertilizers, the use of which in 1899 was nearly seven times the amount in 1889, and the study of soils, carried on by the State

Department of Agriculture and the United States Department of Agriculture.

The growth of manufacturing in Illinois during the last half of the 19th century, due largely to the development of her exceptional transportation facilities, was the most rapid and remarkable in the industrial history of the United States. In 1850 the state ranked fifteenth, in i860 eighth, in 1870 sixth, in 1880 fourth, in 1890 and again in 1900 third, in the value of its manufactures. The average increases of invested capital and products for each decade from 1850-1900 were, respectively, 189-26% and 152-9%; in 1900 the capital invested (8776,829,598, of which $732,829,771 was in establishments under the " factory system "), and the product (81,259,730,168, of which $1,120,868,308 was from establishments under the " factory system "). showed unusually small percentages of increase over those for 1890 (54-7% and 38-6% respectively); and in 1905 the capital and product of establishments under the " factory system" were respectively $975,844,799 and $1,410,342,129, showing increases of 33-2% and 25-8% over the corresponding figures for 1900.

The most important industry was the wholesale slaughtering and packing of meats, which yielded 22-9% of the total manu- factured product of the state in 1900, and 22-5% of the total in

1 The statistics for years prior to 1900 are taken from reports of the U.S. Census, those for years after 1900 from the Year Books of the U.S. Department of Agriculture. It should be borne in mind that in census years, when comparison can be made, the two sets of statistics often vary considerably.

1905. From 1870 to 1905 Illinois surpassed the other states in this industry, yielding in 1900 and in 1905 more than one-third of the total product of the United States. The increase in the value of the product in this industry in Illinois between 1900 and 1905 was over 10%. An interesting phase of the industry is the secondary enterprises that have developed from it, nearly all portions of the slaughtered animal being finally put to use. The blood is converted into clarifying material, the entrails are used for sausage coverings, the hoofs and small bones furnish the raw material for the manu- facture of glue, the large bones are carved into knife handles, and the horns into combs, the fats are made to yield butterine, lard and soap, and the hides and hair are used in the manufacture of mat- tresses and felts.

The manufacture of iron and steel products, and of products depending upon iron and steel as raw material, is second in importance. The iron for these industries is secured from the Lake Superior region, the coal and limestone from mines within the state. Indeed, in the manufacture of iron and steel, Illinois was surpassed in 1900 only by Pennsylvania and Ohio, the 1900 product being valued at 860,303,144; but the value of foundry and machine shop products was even greater ($63,878,352). In 1905 the iron and steel product had increased in value since 1900 44-9%, to $87,352,761 ; the foundry and machine shop products 25-2%, to $79,961,482; and the wire product showed even greater increase, largely because of a difference of classification in the two censuses, the value in 1905 being $14,099,566, as against $2,879,188 in 1900, showing an increase of nearly 390%. The development of agriculture, by creating a demand for improved farm machinery, has stimulated the inventive genius; in many cases blacksmith shops have been transformed into machinery factories; also well- established companies of the eastern states have been induced to remove to Illinois by the low prices of iron and wood, due to cheap transportation rates on the Great Lakes. Consequently, in 1890, in 1900 and again in 1905, Illinois surpassed any one of the other states in the production of agricultural implements, the product in 1900 being valued at $42,033,796, or 4i'5% of the total output of agricultural machinery in the United States; and in 1905 with a value of $38,412,452 it represented 34-3% of the product of the entire country. In the building of railway cars by manufacturing corporations, Illinois also led the states in 1900 and in 1905, the product being valued at $24,845,606 in 1900 and at $30,926,464 (an increase of nearly one-fourth) in 1905; and in construction by railway companies was second in 1900, with a product valued at $16,580,424, which had increased 53-7% in 1905, when the product was valued at $25,491,209. The greatest increase of products between 1 890 and 1900 was in the manufacture of electrical apparatus (2400%), in which the increase in value of product was 37-2% between 1900 and 1905.

Another class of manufactures consists of those dependent upon agricultural products for raw material. Of these, the manufacture of distilled liquors was in 1900 and in 1905 the most important, Illinois leading the other states; the value of the 1900 product, which was nearly 12% less than that of 1890, was increased by 41-6%, to $54,101,805, in 1905. Pecria, the centre of the industry, is the largest producer of whisky and high-class wines of the cities in the United States. There were aiso, in 1900, 35 direct and other indirect

products made from Indian corn by glucose plants, which consumed one-fifth of the Indian corn product of the state, and the value of these products was 818,122,814; in 1905 it was only $14,532,180. Of other manufactures dependent upon agriculture, flour and grist mill products declined between 1890 and 1900, but between 1900 and 1905 increased 39-6% to a value of $39,892,127. The manufacture of cheese, butter and condensed milk increased 60 % between 1890 and 1900, but between 1900 and 1905 only 3- 1 %, the product in 1905 being valued at $13,276,533.

*Other prosperous industries are the manufacture of lumber and timber products (the raw material being floated down the Mississippi river from the forests of other states) , whose output increased from 1890 to 1900 nearly 50%, but declined slightly between 1900 and 1905; of furniture ($22,131,846 in 1905; $15,285,475 in 1900; snowing an increase of 44.8%), and of musical instruments (*I3,323>358 in 1905; 88,156,445 in 1900; an increase of 63-3% in the period), in both of which Illinois was second in 1900 and in 1905; book and job printing, in which the state ranked second in 1900 (828,293,684 in 1905; $19,761,780 in 1900; an increase of 43" 2)> newspaper and periodical printing ($28,644,981 in 1905; $19,404,955 in 1900; an increase of 47-6), in which it ranked " third in 1900; and the manufacture of clothing, boots and shoes. The value of the clothing manufactured in 1905 was $67,439,617 (men's $55,202,999; women's $12,236,618), an increase of 30-1% over 1900). The great manufacturing centre is Chicago, where more than seven-tenths of the manufactured products of the state were produced in 1900, and more than two-thirds in 1905.*

In this development of manufactures, the mineral resources have been an important influence, nearly one-fourth (23-6%) of the manufactured product in 1900 depending upon minerals for raw material. Although the iron ore, for the iron and steel industry, is furnished by the mines of the Lake Superior region, bituminous coal and limestone are supplied by the Illinois deposits. The great central coal field of North America extends into Illinois frnoe

Indiana as far N. as a line from the N. boundary of Grundy county to Rock Island, W. from Rock Island to Henderson county, then S.W. to the southern part of Jackson county, when it runs S. into Kentucky, thus including more than three-fourths (42,900 sq. m.) of

the land surface of the state. In 1679 Hennepin reported deposits of coal near what is now Ottawa on the Illinois; there was some mining in 1810 on the Big Muddy river in Jackson county; and in 1833, 6000 tons were mined. In 1907 (according to state authorities) coal was produced in 52 counties, Williamson, Sangamon, St Clair, Macoupin and Madison giving the largest yield. In that year the tonnage was 51,317,146, and the value of the total product $54,687,882; in 1908 the value of the state's product of coal was exceeded only by that of Pennsylvania (nearly six times as great). Nearly 30 % of all coal mined in the state was mined by machinery in 1907. The output of petroleum in Illinois was long unimportant. The first serious attempts to find oil and gas in the state were in the 'fifties of the 19th century. In 1889 the yield of petroleum was 1460 barrels. In 1902 it was only 200 barrels, nearly all of which came from Litchfield, Montgomery county (where oil had been found in commercial quantities in 1886), and Washington, Tazewell county, in the west central part of the state ; at this time it was used locally for lubricating purposes. There had been some drilling in Clark county in 1865, and in 1904 this field was again worked at Westfield. In 1905 the total output of the state was 181,084 barrels; in 1906 the amount increased to 4,397,050 barrels, valued at $3,274,818; and in 1907, according to state reports, the output was 24,281,973 barrels, being nearly as great as that of the Appalachian field. The petroleum-producing area of commercial importance is a strip of land about 80 m. long and 2 or 3 to 10 or 12 m. wide in the S.E. part of the state, centring about Crawford county. In April 1906 the first pipe lines for petroleum in Illinois were laid; before that time all shipments had been in tank cars. In connexion with petroleum, natural gas has been found, especially in Clark and Crawford counties; in 1906 the state's product of natural gas was valued at 887,211. Limestone is found in about 30 counties, principally Cook, Will and Kankakee; the value of the product in 1906 was §2,942,331. Clay and clay products of the state were valued in 1906 at 812,765,453. Deposits of lead and zinc have been discovered and worked in Jo Daviess county, near Galena and Elizabeth, in the N.W. part of the state. A southern district, including parts of Hardin, Pope and Saline counties, has produced, incidentally to fluorspar, some lead, the maximum amount being • 76,387 lb from the Fairview mine in 1866-1867. In 1905 the zinc from the entire state was valued at $5,499,508; the lead pro- duct in 1906 was valued at $65,208. Sandstone, quarried in 10 counties, was valued in 1905 at $29,115 and in 1906 at $19,125. Pope and Hardin counties were the only sources of fluorspar in the United States from 1842 until 1898, when fluorspar began to be mined in Kentucky; in 1906 the output was

28,268 tons, valued at $160,623, and in 1905 33,275 tons, valued at $220,206. The centre of the fluorspar district was Rosiclare in Hardin county. The cement deposits are also of value, natural cement being valued at $118,221 and Portland cement at $2,461,494 in 1906. Iron ore has been discovered. Glass sand is obtained from the Illinois river valley in La Salle county; in 1906 it was valued at $156,684, making the state in this product second only to Pennsylvania and West Virginia (in 1905 it was second only to Pennsylvania). The value of the total mineral product of the state in 1906 was estimated at $I2I,i88,3o6. 1

Communications. — Transportation facilities have been an important factor in the economic development of Illinois. The first European settlers, who were French, came by way of the Great Lakes, and established intimate relations with New Orleans by the Mississippi river. The American settlers came by way of the Ohio river, and the immigrants from the New England and Eastern states found their way to Illinois over the Erie Canal and the Great Lakes. The first transportation problem was to connect Lake Michigan and the Mississippi river; this was accomplished by building the Illinois & Michigan canal to La Salle, at the head of the navigation on the Illinois river, a work which was begun in 1836 and completed in 1848 under the auspices of the state. In 1890 the Sanitary District of Chicago undertook the construction of a canal from Chicago to Joliet, where the new canal joins the Illinois & Michigan canal; this canal is 24 ft. deep and 160 ft. wide. The Federal government completed in October 1907 the construction of a

1 According to the report of the State Geological Survey, the value of the total mineral product in the state for 1907 was $152,122,648, the values of the different minerals being as follows: coal, $54,687,382; pig iron, about $52,228,000; petroleum, $16,432,947; clay and clay products, $13,351,362; zinc, $6,614,608; limestone, $4,333,651; Portland cement, $2,632,576; sand and gravel, $1,367,653; natural slag, $174,282; fluorspar, $141,971; mineral waters, $91,700; lead ore, $45,760; sandstone, $14,996; and pyrite, $5700.

new canal, the Illinois & Mississippi, popularly known as the Hennepin, from Hennepin to Rock river (just above the mouth of Green river), 7 ft. deep, 52 ft. wide (at bottom), and 80 ft. wide at the water-line. This canal provides, with the Illinois & Michigan canal and the Illinois river, an improved waterway from Chicago to the Mississippi river, and greatly increases the commercial and industrial importance of the " twin cities " of Sterling and Rock

Falls, where the Rock river is dammed by a dam nearly 1 500 ft. long, making the main feeder for the canal. This feeder, formally opened in 1907, runs nearly due S. to a point on the canal N.W. of Sheffield and N.E. of Mineral; there are important locks on either side of this junction. At the general election in November 1908 the people of Illinois authorized the issue of bonds to the amount of $20,000,000 to provide for the canalizing of the Desplaines and Illinois rivers as far as the city of Utica, on the latter river, and connecting with the channel of the Chicago Sanitary District at Joliet. The situation of Illinois between the Great Lakes and the Appalachian Mountains has made it a natural gateway for railroads connecting the North Atlantic and the far Western states. The first railway constructed in the West was the Northern-Cross railroad from Meredosia on the Illinois river to Springfield, completed in 1842; during the last thirty years of the 19th century Illinois had a larger railway mileage than any of the American states, her mileage in January 1909 amounting to 12,215-63 m., second only to that of Texas. A Railway and Warehouse Commission has authority to fix freight and passenger rates for each road. It is the oldest commission with such power in the United States, and the litigation with railways which followed its establishment in 187 1 fully demonstrated the public character of the railway business and was the precedent for the policy of state control elsewhere. 2

Population. — In 1870 and 1880 Illinois was fourth among the states of the United States in population; but in 1890, in 1900, and in 1910, its rank was third, the figures for the last three years named being respectively 3,826,351, 4,821,550, and 5,638, 591. 3 The increase from 1880 to 1890 was 24-3%; from 1890 to 1900, 26%. Of the population in 1900, 98-2% was white, 79-9% was native-born, and 51-2% was of foreign parentage (either one or both parents foreign-born). The principal foreign element was German, the Teutonic immigration being especially large in the decade ending in i860; the immigrants from the United Kingdom were second in importance, those from the Scandinavian countries third, and those from southern Europe fourth. The urban population, on the basis of places having 4000 inhabitants or more, was 51% of the total; indeed the population of Cook county, in which the city of Chicago is situ- ated, was two-fifths of the total population of the state; during the decade of the Civil War (1860-1870) the population of the state increased only 48-4%, and that of Cook county about 140%, while from 1870 to 1900 the increase of all counties, excluding Cook, was about 36%, the increase in Chicago was about 468 %. Of the 930 incorporated cities, towns and villages, 614 had less than 1000

inhabitants, 27 more than 5000 and less than 10,000, 14 more than 10,000 and less than 20,000, 4 more than 20,000 and less than 25,000, and 7 more than 25,000. These seven were Chicago (1,698,575), the second city in popula- tion in the United States, Peoria (56,100), Quincy (36,252), Springfield (34,159), Rockford (31,051), East St Louis (29,655), and Joliet (29,353). In 1906 it was estimated that the total number of communicants of all denominations was 2,077,197, and that of this total 932,084 were Roman Catholics, 263,344 were Methodist (235,092 of the Northern Church, 7198 of the Southern Church, 9833 of the African Methodist Episcopal Church, 5512 of the Methodist Protestant Church, and 3597 of the Free Methodist Church of North America), 202,566 were Lutherans (113,527 of the Evangelical Lutheran Synddical 2 See the so-called McLean County Case (67 111. 11), the fieal Ruggles Case (91 111. 256), The People v. The Illinois Central Railroad- Co. (95 111. 313), and Munn v. III. (94 U.S. 113)-

8 The populations in other census years were: (1810), 12,282;

(1820), 55,211; (1830), 157,445; (1840), 476,183; (1850), 851,470;

(i860), 1,711,951; (1870), 2,539,891; (1880), 3,077,871.

Conference, 36,366 of the General Council of the Evangelical Lutheran Church, 14,768 of the General Synod of the Evan- gelical Lutheran Church, and 14,005 of the Evangelical Lutheran Synod of Iowa and other states), 152,870 were Baptists (118,884 of the Northern Convention, 16,081 of the National (Colored) Baptist Convention, 7755 Free Baptists, 6671 General Bap- tists, and 5163 Primitive Baptists), 115,602 were Presbyterian (86,251 of the Northern Church, 17,208 of the Cumberland Church (now a part of the Northern Church), and 9555 of the United Presbyterian Church), 101,516 were Disciples of Christ, 50,973 were members of the German Evangelical Synod of North America, 54,875 were Congregationalists, and 36,364 were Protestant Episcopalians.

Government. — Illinois has been governed under four con- stitutions, a Territorial constitution of 181 2, and three State constitutions of 1818, 1848 and 1870 (subsequently amended). Amendments may be made by a Constitutional Convention or a two-thirds vote of all the

members elected to the legislature, ratification by the people being required in either instance. To call a Constitutional Convention it is necessary that a majority popular vote concur in the demand therefor of two-thirds of the members of each house of the General Assembly. The executive officials hold office for four years, with the excep- tion of the treasurer, whose term of service is two years. The governor must be at least thirty years of age, and he must also have been a citizen of the United States and of Illinois for the five years preceding his election. His veto may be over-ridden by a two-thirds vote of all the members elected to the legislature. Members of the legislature, which meets biennially, are chosen by districts, three representatives and one senator from each of the 51 districts, 18 of which are in Cook county. The term of senators is four years, that of representatives two years; and in the election of representatives since 1870 there has been a provision for " minority " representation, under which by cumulative voting each voter may cast as many votes for one candidate as there are representatives to be chosen, or he may distribute his votes (giving three votes to one candidate, or 15 votes each to two candidates, or one vote each to three can- didates), the candidate or candidates receiving the highest number of votes being elected. A similar system of cumulative voting for aldermen may be provided for by ordinance of councils in cities organized under the general state law of 1872. Requisites for membership in the General Assembly are citizen- ship in the United States; residence in Illinois for five years, two of which must have been just preceding the candidate's election; and an age of 25 years for senators, and of 21 years for representatives. Conviction for bribery, perjury or other infamous crime, or failure (in the case of a collector or holder of public moneys) to account for and pay over all moneys due from him are disqualifications; and before entering upon the duties of his office each member of the legislature must take a prescribed oath that he has neither given nor promised any- thing to influence voters at the election, and that he will not accept, directly or indirectly, " money or other valuable thing from any corporation, company or person " for his vote or influence upon proposed legislation. Special legislation is pro- hibited when general laws are applicable, and special and local legislation is forbidden in any of twenty-three enumerated cases, among which are divorce, changing of an individual's name or the name of a place, and the grant to a corporation of the right to build railways or to exercise any exclusive franchise or privilege. The judiciary consists of a supreme court of 7 members elected for a term of 9 years; a circuit court of 54 judges, 3 for each of 18 judicial districts, elected for 6 years; and four appellate courts — one for Cook county (which has also a " branch

ap- pellate court," both the court and the branch court being pre- sided over by three circuit judges appointed by the Supreme Court) and three other districts, each with three judges ap- pointed in the same way. In Cook county a criminal court, and the supreme court of Cook county (originally the supreme court of Chicago), supplement the work of the circuit court. There are also county courts, consisting of one judge who serves

for four years; in some counties probate courts have been established, and in counties of more than 500,000 population juvenile courts for the trial and care of delinquent children are provided for.

The local government of Illinois includes both county and township systems. The earliest American settlers came from the Southern States and naturally introduced the county system; but the increase of population from the New England and Middle States led to a recognition of township organization in the con- stitution of 1848, and this form of government, at first prevalent only in the northern counties, is now found in most of the middle and southern counties. Cook county, although it has a town- ship system, is governed, like those counties in which townships are not found, by a Board of Commissioners, elected by the townships and the city of Chicago. A general law of 1872 pro- vides for the organization of municipalities, only cities and villages being recognized, though there are still some " towns " which have failed to reorganize under the new law. City charters are granted only to such municipalities as have a population of at least 1000.

Requirements for suffrage are age of 21 years or more, citizen- ship in the United States, and residence in the state for one year, in the county ninety days, and the election precinct thirty days preceding the exercise of suffrage. Women are permitted to vote for certain school officials and the trustees of the State University. Disfranchisement is brought about by conviction for bribery, felony or infamous crime, and an attempt to vote after such conviction is a felony.

The relation of the state to corporations and industrial pro- blems has been a subject of important legislation. The constitution declares that the state's rights of eminent domain shall never be so abridged as to prevent the legislature from taking the property and franchises of incorporated companies and sub- jecting them to the public necessity in a way similar to the treatment of individuals. In 1903 the legislature authorized the municipal ownership of public service

corporations, and in 1905 the city of Chicago took steps to acquire ownership of its street railways — a movement which seemed to have spent its force in 1907, when the municipal ownership candidates were defeated in the city's elections — and in 1902 the right of that city to regulate the price of gas was recognized by the United States Circuit Court of Appeals. Railways organized or doing business in the state are required by the constitution to have a public office where books for public inspection are kept, showing the amount of stock, its owners, and the amount of the road's liabilities and assets. No railway company may now issue stock except for money, labour, or property actually received and applied to purposes for which the corporation was organized. In 1907 a law went into effect making two cents a mile a maxi- mum railway fare. An anti-trust law of 1893 exempted from the definition of trust combinations those formed by producers of agricultural products and live stock, but the Un tied States Supreme Court in 1902 declared the statute unconstitutional as class legis- lation. According to a revised mining law of 1899 (subsequently amended), all mines are required to be in charge of certified mine managers, mine examiners, and hoisting engineers, when the services of the engineers are necessary; and every mine must have an escapement shaft distinct from the hoisting shaft. The number of men permitted to work in any mine not having an escapement shaft cannot, in any circumstances, exceed ten during the time in which the escapement or connexion is being completed. Economic conditions have also led to an increase of administra- tive boards. A State Civil Service Commission was created by an act of the General Assembly of 1905. A Bureau of Labor Statistics (1879), whose members are styled Commissioners of Labor, makes a study of economic and financial problems and publishes biennial reports; a Mining Board (1883) and an inspector of factories and workshops (since 1893) nave Ior their duty the enforcement of labour legislation. There are also a State Food Commission (1899) and a Live Stock Commission (1885). A Board of Arbitration (1805) has authority to make and publish investigations of all facts relating to strikes and

lock-outs, to issue subpoenas for the attendance and testifying of witnesses, and " to adjust strikes or lock-outs by mediation or conciliation, without a formal submission to arbitration."

The employment of children under 14 years of age in factories or

mines, and working employees under 16 years of age for more than 60 hours a week, are forbidden by statute. The state has an excellent " Juvenile Court Law," which came into force on the 1st of July 1899 and has done much good, especially in Chicago. The law recognized that a child should not be treated like a mature malefactor, and provided that there should be no criminal procedure, that the child should not be imprisoned or prosecuted, that his interests should be protected by a pro- bation officer, that he should be discharged unless found depend- ent, delinquent or truant, and in such case that he should be turned over to the care of an approved individual or charitable society. This law applies to counties having a minimum popula- tion of 500,000. The legal rate of interest is 5%, but this may be increased to 7 % by written contract. A homestead owned and occupied by a householder having a family is exempt (to the amount of $1000) from liability for debts, except taxes upon, and purchase money for, the same. Personal property to the value of $300 also is exempt from liability for debt. Grounds for divorce are impotence of either party at time of marriage, previous marriage, adultery, wilful desertion for two years, habitual drunkenness, attempt on life, extreme and repeated cruelty, and conviction of felony or other infamous crime. The marriage of cousins of the first degree is declared incestuous and void. In June 1907 the Supreme Court of Illinois declared I he sale of liquor not a common right and " sale without license a criminal offence," thus forcing clubs to close their bars or take out licences.

The charitable institutions of the state are under the management of local trustees appointed by the governor. They are under the supervision of the Board of State Commissioners of Public Charities (five non-salaried members appointed by the governor) ; in 1908 there were 18 institutions under its jurisdiction. Of these, seven were hospitals for the insane — six for specific parts of the state, viz. northern at Elgin, eastern at Kankakee, central at Jacksonville, southern at Anna, western at Watertown, and general at South Bartonville, and one at Chester for insane criminals. The others were the State Psychopathic Institute at Kankakee (established in 1907 as part of the insane service) for systematic study of mental and nervous diseases; one at Lincoln having charge of feeble- minded children ; two institutions for the blind — a school at Jacksonville and an industrial home at Marshall Boulevard and 19th Street, Chicago; a home for soldiers and sailors (Quincy), one for soldiers' orphans (Normal), and one for soldiers' widows (Wilmington); a school for the deaf (Jacksonville), and an eye and ear infirmary (Chicago). The Board of Charities also had super- vision of the State

Training School for (delinquent) Girls (1893) at Geneva, and of the St Charles School for (delinquent) Boys (1901) at St Charles.

The trustees of each penal institution are appointed by the governor, and the commissioners of the two penitentiaries and the managers of the state reformatory compose a Board of Prison Industries. There were in 1908 two penitentiaries, one at Joliet and one at Chester, and, in addition to the two reformatory institu- tions for young offenders under the supervision of the Board of Charities, there is a State Reformatory for boys at Pontiac. The indeterminate sentence and parole systems are important features of the treatment of criminals. All but two of the counties have almshouses. In 1908, in some counties, the care of paupers was still let by contract to the lowest bidder or the superintendent was paid between Si-oo and Si-8o — seldom more than $1-50 — a week for each patient, and he paid a small (or no) rent on the county farm. Complete state control of the insane and the introduction of modern hospital and curative treatment in the state asylums (or hospitals) are gradually taking the place of county care for the insane and of antiquated custodial treatment in and political control of the state asylums — changes largely due to the action of Governor Deneen, who appointed in 1906 a Board of Charities pledged to reform. By a law of 1905 all employed in such institutions were put on a civil service basis. In 1907ˆ1908, $1,500,000 was spent in rehabilitating old buildings and in buying new land and erecting buildings.

Education. — Public education in Illinois had its genesis in the land of the North-West Territory reserved for educational purposes by the Ordinance of 1787. The first state school law, which provided for state taxation for public schools, was enacted in 1825. The section providing for taxation, however, was

repealed, but free schools supported by the sale of land reserved for education and by local taxation were established as early as 1834. In 1855 a second school law providing for a state school tax was enacted, and this is the foundation of the existing public school system; the constitution of 1870 also requires the legislature to provide a thorough and efficient system of public schools. In 1907-1908 the total school revenue, nine- tenths of which was derived from local taxation and the remainder chiefly from a state appropriation (for the year in question, $r, 057,000) including the proceeds derived from permanent school funds secured by the gift and sale of public lands on the part of the United States Government, was $39,989,510-22. The attendance in some school of all children from 7 to 16 years of age is compulsory, and of the population of

school age (1,500,066) 988,078 were enrolled in public schools. The average length of the school term in 1908 was 7-8 months, and the average monthly salary of teachers was $82-12 for men and $60.76 for women.

The state provides for higher education in the University of Illinois, situated in the cities of Champaign and Urbana. It was founded in 1867, through the United States land grant of 1862, as the Illinois Industrial University, and received its present name in 1885; since 1870 it has been co-educational. Associated with the University are the State Laboratory of Natural History, the State Water Survey, the State Geological Survey, the State Entomologist's Office, and Agricultural and Engineering Experiment Stations. The University confers degrees in arts, science, engineering, agriculture, law, medicine, pharmacy, dentistry, music, and library science; besides the usual subjects, it has a course in ceramics. The University publishes Bulletins of the Agricultural and Engineering Experi- ment Stations; Reports of the State Water Survey, of the State Natural History Survey, of the State Geological Survey, and of the State Entomologist's Office; University Studies; and The Journal of English and Germanic Philology. The schools of medicine, pharmacy and dentistry are in Chicago. The faculty in 1907 numbered 408, and the total enrolment of students in 1907-1908 was 4743 (of whom 991 were women), distributed (with 13 duplicates in the classification) as follows: Graduate School, 203; Undergraduate Colleges, 2812; Summer Session, 367; College of Law, 186; College of Medicine, 476; College of Dentistry, 76; School of Pharmacy, 259; Academy, 377. In 1908 the University had a library of 103,000 volumes. The trustees of the institution, who have legislative power only, are the governor, the President of the Board of Agriculture, the State Superintendent of Public Instruction, and nine others elected by the people. There were in 1907 more than forty other universities and colleges in the state, the most important being the University of Chicago, North-western University at Evanston, Illinois Wesleyan University at Bloomington, Knox College, Galesburg, and Illinois College at Jacksonville. There were also six normal colleges, five of them public: the Southern Illinois State Normal College at Carbondale, the Eastern Illinois State Normal School at Charleston, the Western Illinois State Normal School at Macomb, the Chicago Normal School at Chicago, the Northern Illinois State Normal School at DeKalb, and the Illinois State Normal University at Normal.

Finance. — The total receipts for the biennial period ending the 30th of September 1908 were §19,588,842-06, and the disbursements were $21, 278, 805-27; and on the 1st of October 1908 there was a

balance in the treasury of $3,859,263-44. The bonded debt on the same date was $17,500; these bonds ceased to bear interest ill 1882, but although called in by the governor they have never been presented for payment. The system of revenue is based upon the general property tax; the local assessment of all real and personal property is required, with the aim of recording all kinds of property upon the assessment rolls. Boards of Revision and Boards of Supervision then equalize the assessments in the counties and townships, while a State Board of Equalization seeks to equalize the total valuation of the various counties. The tendency is for property valuations to decline, the estimated valuation from 1873 to 1893 decreasing 27% in Cook county and '39% in the other counties, while the assessments from 1888 to 1898 were in inverse ratio to the increase of wraith. There has also been great inequality in valuations, the increase of valuation in Cook county made in

compliance with the revenue law of 1898 being $200,000,000, while that for the rest of the state was only $4,000,000. Among other sources of revenue are an inheritance tax, which yields approximately $1,000,000 a year, and 7% of the annual gross earnings of the Illinois Central railway, given in return for the state aid in the construction of the road. The constitution prohibits the state from lending its credit or making appropriations in aid of any corporation, association or individual, and from constructing internal improve- ments, and the counties, townships, and other political units cannot incur indebtedness in excess of 5% of their assessed property valuation. The legislature may not contract a debt of more than £250,000 except to suppress treason, war or invasion, and no legislative appropriation may extend longer than the succeeding legislature. General banking laws must be submitted to the people for ratification.

History. — Illinois is the French form of Iliniwek, the name of a confederacy of Algonquian tribes. The first exploration by Europeans was that of the French. In 1659 Pierre Radis- son and Medard Chouart des Groseilliers seem to have reached the upper Mississippi. It is certain that in 1673 part of the region known as the Illinois country was explored to some extent by two Frenchmen, Louis Joliet and Jacques Mar- quette, a Jesuit father. Marquette, under orders to begin a mission to the Indians, who were known to the French by their visits to the French settlements in the Lake Superior region, and

Joliet, who acted under orders of Jean Talon, Intendant of Canada, ascended the Fox river, crossed the portage between it and the Wisconsin river, and followed that stream to the Mississippi, which they descended to a point below the mouth of the Arkansas. On their return journey they ascended the Illinois river as far as Lake Peoria; they then crossed the portage to Lake Michigan, and in 1675 Marquette founded a mission at the Indian town of Kaskaskia, near the present Utica, 111. In 1679 the explorer La Salic, desiring to find the mouth of the Mississippi and to extend the domain of France in America, ascended the St Joseph river, crossed the portage separating it from the Kankakee, which he descended to the Illinois, and built in the neighbourhood of Lake Peoria a fort which he called Fort Crevecoeur. The vicissitudes of the expedition, the necessity for him to return to Canada for tools to construct a large river-boat, and opposition in Canada to his plans, prevented him from reaching the mouth of the Illinois until the 6th of February 1682. After such preliminary explorations, the French made permanent settlements, which had their origin in the missions of the Jesuits and the bartering posts of the French traders. Chief of these were Kaskaskia, established near the mouth of the Kaskaskia river, about 1720; Cahokia, a little below the mouth of the Missouri river, founded at about the same time; and Fort Chartres, on the Mississippi between Cahokia and Kaskaskia, founded in 1720 to be a link in a chain of fortifications intended to extend from the St Lawrence to the Gulf of Mexico. A monument of the labours of the missionaries is a manuscript dictionary (c. 1720) of the language of the Illinois, with catechism and prayers, probably the work of Father Le Boulanger.

In 1 71 2 the Illinois river was made the N. boundary of the French province of Louisiana, which was granted to Antoine Crozat (1 655-1 738), and in 1721 the seventh civil and military district of that province was named Illinois, which included more than one-half of the present state, the country between the Arkansas river and the line 43 N. lat., as well as the country between the Rocky Mountains and the Mississippi; but in 1723 the region around the Wabash river was formed into a separate district. The trade of the Illinois country was now diverted to the settlements in the lower Mississippi river, but the French, although they were successful in gaining the confidence and friendship of the Indians, failed to develop the resources of the country. By the treaty of Paris, 1763, France ceded to Great Britain her claims to the country between the Ohio and Mississippi rivers, but on account of the resistance of Pontiac, a chief of the Ottawas who drew into conspiracy most of the tribes between the Ottawa river and the lower Mississippi, the English were not able to take

possession of the country until 1765, when the French flag was finally lowered at Fort Chartres.

The policy of the British government was not favourable to the economic development of the newly-acquired country, since it was feared that its prosperity might react against the trade and industry of 'Great Britain. But in 1769 and the suc- ceeding years of English control, this policy was relaxed, and immigration from the seaboard colonies, especially from Virginia, began. In 1771 the people of the Illinois country, through a meeting at Kaskaskia, demanded a form of self-government similar to that of Connecticut. The petition was rejected by General Thomas Gage; and Thomas Legge, earl of Dartmouth (1731-1801), Secretary of State for Plantations and President of the Board of Trade, drew up a plan of government for Illinois in which all officials were appointed by the crown. This, how- ever, was never operative, for in 1774, by the famous Quebec Act, the Illinois country was annexed to the province of Quebec, and at the same time the jurisdiction of the French civil law was recognized. These facts explain the considerable sympathy in Illinois for the colonial cause in the War of Independence. Most of the inhabitants, however, were French, and these were Loyalists. Consequently, the British government withdrew their troops from the Illinois country. The English authorities instigated the Indians to make attacks upon the frontiers of the American colonies, and this led to one of the most important events in the history of the Illinois country, the capture of the British posts of Cahokia and Kaskaskia in 1778, and in the following year of Vincennes (Indiana), by George Rogers Clark (q.v.), who acted under orders of Patrick Henry, Governor of Virginia. These conquests had much to do with the securing by the United States of the country W. of the Alleghanies and N. of the Ohio in the treaty of Paris, 1783.

The Virginia House of Delegates, in 1778, extended the civil jurisdiction of Virginia to the north-west, and appointed Captain John Todd (17 50-1 782), of Kentucky, governor of the entire territory north of the Ohio, organized as " The County of Illinois"; the judges of the courts at Cahokia, Kaskaskia, and Vincennes, who had been appointed under the British administration, were now chosen by election; but this govern- ment was confined to the old French settlements and was entirely inefficient. In 1787, Virginia and the other states having relinquished their claims to the country west of the Alleghanies, the North- West Territory was organized by Congress by the famous Ordinance of 1787. Two years later St Clair county was formed out of the S.W. part of the Illinois country, while the E. portion and the settlements around Vincennes (Indiana) were

united into the county of Knox, and in 1795 the S. part of St Clair county was organized into Randolph county, with Kaskaskia as the seat of administration. In 1800 the Illinois country was included in the Territory of Indiana, and in 1809 the W. part of Indiana from Vincennes N. to Canada was organized as the Territory of Illinois; it included, besides the present territory of the state, all of Wisconsin except the N. part of the Green Bay peninsula, a considerable part of Michigan, and all of Minnesota E. of the Mississippi. In 181 2, by permission of Congress, a representative assembly was chosen, a Territorial constitution was adopted, and the Territorial delegate in Con- gress was elected directly by the ppople.

In 1818 Illinois became a state of the American Union, the Enabling Act fixing the line 42 30′ as the N. boundary, instead of that provided by the Ordinance of 1787, which passed through the S. bend of Lake Michigan. The reason given for this change was that if the Mississippi and Ohio rivers were the only outlets of Illinois trade, the interests of the state would become identified with those of the southern states; but if an outlet by Lake Michigan were provided, closer relations would be established with the northern and middle states, and so ” additional security for the perpetuity of the Union ” would be afforded.

Among the first problems of the new state were those relating to lands and Indians. Throughout the Territorial period there was conflict between French and English land claims. In 1804 Congress established land offices at Kaskaskia and Vincennes to examine existing claims and to eliminate conflict with future grants; in 1812 new offices were established at

Shawneetown and Edwardsville for the sale of public lands; and in 1816 more than 500,000 acres were sold. In 1818, how- ever, many citizens were in debt for their lands, and ” squatters ” invaded the rights of settlers. Congress therefore reduced the price of lafid from $2 to $1-25 per acre, and adopted the policy of pre-emption, preference being given to the claims of existing settlers. The Indians, however, resisted measures looking toward the extinguishment of their claims to the country. Their dissatisfaction with the treaties signed in 1795 and 1804 caused them to espouse the British cause in the War of 1812, and in 181 2 they overpowered a body of soldiers and settlers who had abandoned Fort Dearborn (See Chicago). For a

number of years after the end of the conflict, the Indians were comparatively peaceful; but in 1831 the delay of the Sauk and Foxes in with- drawing from the lands in northern Illinois, caused Governor John Reynolds (1788-1865) to call out the militia. The follow- ing year Black Hawk, a Sauk leader, opened an unsuccessful war in northern Illinois and Wisconsin (the Black Hawk War); and by 1833 all Indians in Illinois had been removed from the state.

The financial and industrial policy of the state was unfortunate. Money being scarce, the legislature in 1810 chartered a state bank which was authorized to do business on the credit of the state. In a few years the bank failed, and the state in 183 1 borrowed money to redeem the depreciated notes issued by the bank. A second state bank was chartered in 1835; two years later it suspended payment, and in 1843 the legislature pro- vided for its liquidation. The state also undertook to establish a system of internal improvements, granting a loan for the construction of the Illinois and Michigan canal in 1836, and in 1837 appropriating $10,000,000 for the building of railroads and other improvements. The experiment proved unsuccessful; the state's credit declined and a heavy debt was incurred, and in 1840 the policy of aiding public improvements was abandoned. Through the efforts of Governor Thomas Ford (1800-1850) a movement to repudiate the state debt was defeated, and a plan was adopted by which the entire debt could be reduced without excessive taxation, and by 1&80 practically the entire debt was extinguished.

A notable incident in the history of the state was the im- migration of the Mormons from Missouri, about 1840. Their principal settlements were in Hancock county. They succeeded in securing favours from the legislature, and their city of Nauvoo had courts and a military organization that was independent of state control. Political intrigue, claims of independence from the state, as well as charges of polygam> and lawless conduct, aroused such intense opposition to the sect that in 1844 a civil war broke out in Hancock county which resulted in the murder of Joseph Smith and the removal of the Mormons from Illinois in 1846.

The slavery question, however, was the problem of lasting political importance. Slaves had been brought into the Illinois country by the French, and Governor Arthur St Clair (1734- 1818) interpreted the article of the Ordinance of 1787, which forbade slavery in the North-West Territory, as a prohibition of the introduction of slaves into the Territory, not an interference with existing conditions. The idea also arose that while negroes could not become slaves, they could be held as indentured servants, and such servitude was recognized in the

Indiana Code of 1803, the Illinois constitution of 1818, and Statutes of 1819; indeed there would probably have been a recognition of slavery in the constitution of 18 18 had it not been feared that such recognition would have prevented the admission of the state to the Union. In 1823 the legislature referred to the people a resolution for a constitutional convention to amend the constitution. The aim, not expressed, was the legalization of slavery. Although a majority of the public men of the state, indeed probably a majority of the entire population, was either born in the Southern states or descended from Southern people, the resolution of the legislature was rejected, the leader of the opposition being Governor Edward Coles (1786-1868), a Virginia slave-holder, who had freed his slaves on coming to

Illinois, and at least one half the votes against the proposed amendment of the constitution were cast by men of Southern birth. The opposition to slavery, however, was at first economic, not philanthropic. In 1837 there was only one abolition society in the state, but chiefly through the agitation of Elijah P. Lovejoy (see Alton), the abolition sentiment grew. In 1842 the moral issue had become political, and the Liberty Party was organized, which in 1848 united with the Free Soil Party; but as the Whig Party approved the policy of non-extension of slavery, these parties did not succeed so well united as under separate existence. In 1854, however, the Liberty and Free Soil parties, the Democrats opposed to the Kansas-Nebraska Bill, and some Whigs united, secured a majority in the legislature, and elected Lyman Trumbull United States senator. Two years later these elements formally organized as the Republican Party, though that name had been used locally in 1854, and elected their candidates for state offices. This was the first time that the Democratic Party had been defeated, its organiza- tion having been in control since the admission of Illinois to the Union. An important influence in this political revolution was a change in the character of the population. Until 1848 the Southern element predominated in the population, but after that year the immigration from the Northern states was greater than that from the South, and the foreign element also in- creased. 1 The opposition to slavery continued to be political and economic rather than philanthropic. The constitution of 1848, which abolished slavery, also forbade the immigration of slaves into the state. 2 In 1858 occurred the famous contest for the office of United States senator between Stephen A. Douglas (Democrat) and Abraham Lincoln (Republican). Douglas was elected, but the vote showed that Illinois was becoming more Northern in sympathy, and two years later Lincoln, then candidate for the presidency, carried the state.

The policy of Illinois in the early period of secession was one of marked loyalty to the Union; even in the S. part of the state, where there was a strong feeling against national interference with slavery, the majority of the people had no sympathy with the pro-slavery men in their efforts to dissolve the Union. The legislature of 1861 provided for a war fund of $2,000,000; and Capt. James H. Stokes (1814-1890) of Chicago transferred a large amount of munitions of war from St Louis, where the secession sentiment was strong, to Alton. The state contributed 255,092 men to the Federal armies. From 1862-1864, however, there was considerable opposition to a continuance of the war. This was at first political; the legislature of 1862 was Democratic, and for political purposes that body adopted resolutions against further conflict, and recommended an armistice, and a national convention to conclude peace. The same year a convention, whose duty was to revise the constitution, met. It declared that the law which called it into being was no longer binding, and that it was supreme in all matters incident to amending the constitution. Among its acts was the assumption of the right of ratifying a proposed amendment to the constitution of the United States which prohibited Congress from interfering with the institution of slavery within a state, although the right of ratification belonged to the legislature. The convention also inserted clauses preventing negroes and mulattoes from immigrat- ing into the state and from voting and holding office; and although the constitution as a whole was rejected by the people, these clauses were ratified. In 1863 more pronounced opposition to the policy of the National Government developed. A mass meeting, which met at Springfield in July, at the instance of –

'The influence of immigration and sectionalism upon Illinois politics is well illustrated by the fact that the first six governors (181 8-1 838) were born in the Southern states, six of the eight United States senators of that period were also Southern born, and all of the representatives, with one exception, also came to Illinois from the Southern states. After 1838 the Eastern states began to be represented among the governors, but until 1901 no governor was elected who was a native of Illinois. See E. B. Greene, Sectional Forces in the History of Illinois (Publications of the Historical Library of Illinois, No. 8, 1903).

2 In the slavery issue of 1848 the sentiment for abolition centred in the northern counties, the opposition in the southern.

ILLINOIS

the Democratic Party, adopted resolutions that condemned the suspension of the writ of Habeas Corpus, endorsed the doctrine of state sovereignty, demanded a national assembly to determine terms of peace, and asked President Lincoln to withdraw the proclamation that emancipated the slaves, and so to permit the people of Illinois to fight only for " Union, the Constitution and the enforcement of the laws." The Knights of the Golden Circle, and other secret societies, whose aims were the promulga- tion of state sovereignty and the extension of aid to the Con- federate states, began to flourish, and it is said that in 1864 there were 50,000 members of the Sons of Liberty in the state. Captain T. Henry Hines, of the Confederate army, was appointed by Jefferson Davis to co-operate with these societies. For a time his headquarters were in Cliicago, and an elaborate attempt to liberate Confederate prisoners in Chicago (known as the Camp Douglas Conspiracy) was thwarted by a discovery of the plans. In the elections of 1864 the Republicans and Union Democrats united, and after an exciting campaign they were successful. The new legislature was the first among the legislatures of the states to ratify (on the 1st of February 1865) the Thirteenth Amendment.

From the close of the Civil War until the end of the 19th century the Republican Party was generally dominant, but the trend of political development was not without interest. In 1872 many prominent men of the state joined the Liberal Republican Party, among them Governor John M. Palmer, Senator Lyman Trumbull and Gustavus Koerner (1809-1896), one of the most prominent representatives of the German element in Illinois. The organization united locally, as in national politics, with the Democratic Party, with equally ineffective results. Economic depression gave the Granger Movement considerable popularity, and an outgrowth of the Granger organization was the Independent Reform Party, of 1874, which advocated retrenchment of expenses, the state regulation of railways and a tariff for revenue only. A Democratic Libeial Party was organized in the same year, one of its leaders being Governor Palmer; consequently no party had a majority in the legislature elected in 1874. In 1S76 the Greenback Party, the successor in Illinois of the Independent Reform Party, secured a strong following; although its candidate for governor was endorsed by the Democrats, the Republicans regained control of the state administration.

The relations between capital and labour have resulted in serious conditions, the number of strikes from 1880-1901 having been 2640,

and the number of lock-outs 95. In 1885 the governor found it necessary to use the state militia to suppress riots in Will and Cook counties occasioned by the strikes of quarry- men, and the following year the militia was again called out to suppress riots in St Clair and Cook counties caused by the wide- spread strike of railway employees. The most noted instance of military interference was in 1894, when President Grover Cleveland sent United States troops to Chicago to prevent strikers and rioters from interfering with the transmission of the United States mails.

Municipal problems have also reacted upon state politics. From 1897 to 1903 the efforts of the Street Railway Companies of Chicago to extend their franchise, and of the city of Chicago to secure municipal control of its street railway system, resulted in the statute of 1903, which provided for municipal ownership. But the proposed issue under this law of bonds with which Chicago was to purchase or construct railways would have increased the city's bonded indebtedness beyond its constitu- tional limit, and was therefore declared unconstitutional in April 1907 by the supreme court of the state.

A law of 1901 provided for a system of initiative whereby any question of public policy might be submitted to popular vote upon the signature of a written petition therefor by one- tenth of the registered voters of the state; such a petition must be filed at least 60 days before the election day when it is to be voted upon, and not more than three questions by initiative may be voted on at the same election; to become operative a measure must receive a majority of all votes cast in the election.

Under this act, in 1902, there was a favourable vote (451,319 to 76,975) for the adoption of measures requisite to securing the election of United States senators by popular and direct vote, and in 1903 the legislature of the state (which in 1891 had asked Congress to submit such an amendment) adopted a joint resolution asking Congress to call a convention to propose such an amendment to the Federal Constitution; in 1904 there was a majority of all the votes cast in the election for an amendment to the primary laws providing that voters may vote at state primaries under the Australian ballot. The direct primary law, however, which was passed immediately afterwards by the legislature, was declared unconstitutional by the supreme court of the state, as were a second law of the same sort passed soon afterwards and a third law of 1908, which provided for direct nominations of all officers and an " advisory " nomination of United States senators.

American Governors of Illinois

Ninian Edwards

Shadrach Bond . Edward Coles Ninian Edwards . John Reynolds Wm. L. D. Ewing (acting) Joseph Duncan . Thomas Carlin Thomas Ford Augustus C. French . Joel A. Matteson William H. Bissell . . John Wood (acting) Richard Yates Richard J. Oglesby . John M. Palmer . . Richard J. Oglesby . John L. Beveridge (acting) Shelby M. Cullom . . John M. Hamilton (acting) Richard J. Oglesby . Joseph W. Fifer . John P. Altgeld . . . John R. Tanner . Richard Yates Charles S. Deneen

Territorial.

. .1809-1818

State. . 1818-1822 Democrat

1822-1826 ,,

1826-1830 „

1830-1834

1834

1 834-1 838

1838-1842

1 842- 1 846 „

1846-1853 1

1853-1857

1857-1860 Republican

1860-1861

1861-1865 „

1 865-1 869

1869-1873

1873

1 873-1 877

1 877-1 883

1883-1885

1 885-1 889

1889-1893

1 893-1 897 Democrat

1897-1901 Republican

1901-1905

1905-

Bibliography. — There is no complete bibliography of the varied and extensive literature relating to Illinois; but Richard Bowker's State Publications, part ii. (New York, 1902), and the chapters of E. B. Greene's The Government of Illinois (New York, 1904) contain useful lists of documents, monographs and books. Physiography is well described in The Illinois Glacial Lobe (U.S. Geological Survey, Monograph, xxxviii.) and The Water Resources of Illinois (U.S. Geological Survey, Annual Report, xviii.). The Illinois State Laboratory of Natural History, connected with the State University, has published S. A. Forbes and R. E. Richardson's Fishes of Illinois (Urbana, 1909). Information concerning economic conditions may be derived from the volumes of the Twelfth Census of the United States, which treat of Agriculture, Manufactures and Mines and Quarries: a summary of agricultural conditions may be found in Census Bulletin No. 213. Constitutional and administrative problems are discussed in Elliott Anthony's Constitutional History of Illinois; Greene's The Government of Illinois, and H. P. Judson's The Government of Illinois (New York, 1900). Among the reports of the state officials, those of the Railroad and Ware House Com- mission, of the Bureau of Labor Statistics, and of the Commissioners of Charity are especially valuable. There is an historical study of the problem of taxation, entitled, " History of the Struggle in Illinois to realize Equality in Taxation," by H. B. Hurd, in the Publications of the Michigan Political Science Association (1901). Local government is described by Albert Shaw, Local Governjnent in Illinois (Johns Hopkins University Studies, vol. i. No. 10). The Blue Book of the State of Illinois (Springfield, 1903) ; H. B. Hurd's Revised Statutes of Illinois (Chicago, 1903), and Starr and Curtis, Annotated Statutes of

the State of Illinois (Chicago, 1896), are alsoof value.

The standard histories of the state are J. Moses, Illinois, Historical and Statistical (2 vols., Chicago, 1889) ; and H. Davidson and B. Stuve, Complete History of Illinois (Springfield, 1874). Edward G. Mason's Chapters from Illinois History (Chicago, 1901) is of interest

1 Mr French's service of seven years is due to the fact that the Constitutional Convention of 1848 ordered a new election of state officials. French was re-elected Governor, beginning his new term in 1849.

for the French explorations and the colonial period. C. E. Boyd in " The County of Illinois " (American Hist. Rev. vol. iv.), " Record Book and Papers of John Todd " (Chicago Historical Society, Collections, iv.), C. E. Carter, Great Britain and the Illinois Country, s 1763-1774 (Washington, 1910), R. L. Schuyler, The Transition of Illinois to American Government (New York, 1909), and W. H. Smith in The St Clair Papers (Cincinnati, 1882), and the Territorial Records of Illinois (" Publications of the State Historical Library," No. 3) are important for the period until 1818. Governor Thomas Ford's History of Illinois (Chicago, 1854), and Governor John Reynolds's My Own Times (1855), are contemporary sources for 1818-1846 ; they should be supplemented by N. W. Edwards's History of Illinois (1778-1833) and Life of Ninian Edwards (Springfield, 1870), E. B. Washburne's Edwards Papers (Chicago, 1884), C. H. Garnett's State Banks of Issue in Illinois (Univ. of 111., 1898), and N. G. Harris's History of Negro Servitude in Illinois (Chicago, 1904). C. E. Carr's The Illini (Chicago, 1904) is a study of conditions in Illinois from T850-1860. \V. W. Lusk's Politics and Politicians of Illinois, (he Illinois Constitutional Convention (1862), the Granger Movement in Illinois, and Illinois Railway Legislation and Common Control (University of Illinois Studies), Street Railway Legislation in Illinois (Atlantic Monthly, vol. xciii.), are of value for conditions after i860. The publications of the Chicago Historical Society, of the " Fergus Historical " series, of the State Historical Library, of the Wisconsin Historical Society, also the Michigan Pioneer Collections, contain valuable documents and essays.

ILLORIN, a province of British West Africa in the pro- tectorate of Nigeria. It has an area of 6300 m., with an estimated population of

about 250,000. Its inhabitants are of various tribes, among which the Yoruba now predominate. There arc two minor emirates, Shonga and Lafiagi in this province, and a number of semi-independent towns of which the chief are Awton, Ajassa, Offa and Patiji. Under British administration the province is divided into three divisions, Illorin (central), Offa (southern) and Patiji (northern). The province is rich in agri- cultural and sylvan products. Among the former are tobacco, cotton, rice, peppers, ground-nuts and kolas. The latter include great quantities of shea as well as palm-oil and rubber. The capital is a town of the same name as the province. It is 160 m. in a direct line N.N.E. of Lagos, and 50 m. S.S.W. of Jebba, a port on the Niger, being connected with both places by railway. The town is surrounded by a mud wall partly in ruins, which has a circuit of some 10 m. Illorin is a great trading centre, Hausa caravans bringing goods from central Africa, and merchandise from the coasts of the Mediterranean, which is distributed from Illorin to Dahomey, Benin and the Lagos hinterland, while from the Guinea coast the trade is in the hands of the Yoruba and comes chiefly through Lagos. A variety of manufactures are carried on, including the making of leather goods, carved wooden vessels, finely plaited mats, embroidered work, shoes of yellow and red leather and pottery of various kinds. Before the establishment of British administration traders from the south, with a few selected exceptions, were prohibited from entering the city. Illorin middlemen trans- acted all business between the traders from the north, who were not allowed to pass to the south, and those from the south. Since the establishment of British authority the town has been thrown open, crowds of petty traders from Lagos have flocked into Illorin, and between 4000 and 5000 trade licences are issued yearly. The British resident estimated in 1904 that at least 3000 loads of British cotton goods, which he valued at £5 a load, were imported. The population of the town is estimated at from 60,000 to 70,000. The chief buildings are the palace of the emir and the houses of the baloguns (war chiefs). From the centre of the town roads radiate like spokes of a wheel to the various gates. Baobabs and other shade trees are numerous. There are a number of mosques in the town, and the Mahommedans are the dominant power, but the Yoruba, who constitute the bulk of the people, are pagans.

The town of Illorin was founded, towards the close of the 18th century, by Yoruba, and rose to be the capital of one of the Yoruba kingdoms. About 1825 the kingdom, which had come under Mahommedan influence, ceased its connexion with the Yoruba states and became an emirate of the Sokoto empire. The Fula, however, maintained the Yoruba system of government, which places the chief

power in a council of elders.

In 1897 Illorin was occupied by the forces of the Royal Niger Company, and the emir placed himself " entirely under the protection and power of the company." After the assumption ot authority by the British government in 1900, Illorin was organ- ized for administration on the same system as the remainder of northern Nigeria. The emir took the oath of allegiance to the sovereign of Great Britain. A resident was placed at his court. Courts of justice have been established and British garrisons quartered at various places in the province. (See also Nigeria and Lagos.)

ILLUMINATED MSS. — " Illumination," in art, is a term used to signify the embellishment of written or printed text or design with colours and gold, rarely also with silver. The old form of the verb " to illuminate " was " to enlumine " (O. Fr. enluminer; Lat. illuminare, " to throw light on," " to brighten "), as used by Chaucer (A. B.C., 73), " kalendres enlumyned ben they," and other medieval writers. Joinville likens the action of St Louis in adorning his kingdom with monastic foundations to a writer " qui a fait son livre qui l'enlumine d'or et d'azur "; while Dante (Purgat. xi. 79) alludes to this kind of decoration as " quell' arte che alluminare chiamata e in Parisi." But while the term should be strictly applied to the brilliant book-orna- mentation which was developed in the later middle ages, it has been extended, by usage, to the illustration and decoration of early MSS. in general.

From remote times the practice of illustrating texts by means of pictorial representations was in vogue. The survival of papyrus rolls containing the text of the Egyptian ritual known as The Book of the Dead, dating back fifteen centuries B.C., and accompanied with numerous scenes painted in brilliant colours, proves how ancient was this very natural method of elucidating a written text by means of pictures. There are many passages in the writings of Latin authors showing that illustrated books were not uncommon in Rome at least in the early period of the empire; and the oldest extant paintings in ancient classical MSS. may with little hesitation be accepted as representative of the style of illustration which was practised very much earlier. But such paintings are rather illustrative than decorative, and the only strictly ornamental adjuncts are the frames in which they are set. Yet independent decoration appears in a primitive form in the papyri and the earliest vellum MSS. At the head or at the end of the text designs composed of cross-hatchings, cables, dotted patterns and scrolls, sometimes with birds or simple domestic objects, are found. The early practice of writing the initial lines or

even the entire text of a volume in gold or coloured inks, and of staining with purple and of gilding the vellum, while it undoubtedly enhanced the decorative aspect, does not properly fall within the scope of this article; it concerns the material rather than the artistic element of the MS. (See Manuscripts, Palaeography.)

It will be seen, then, that in the earliest examples of book decorations we find the germs of the two lines on which that decoration was destined to develop in the illuminated MSS. of the middle ages: the illustrative picture was the precursor of the medieval miniature (the technical term for a picture in an illuminated MS.); and the independent simple ornament was to expand into the brilliant initial letters and borders of illumina- tion. And yet, while the miniature has a career of its own in artistic development which may be more conveniently dealt with under a separate heading (see Miniature), its decorative qualities are so closely bound up with those of the initial and border that an historical description of illumination must give full recognition to its prominent position in the general scheme of book-ornamentation of the middle ages.

The first examples to come under consideration are the few surviving MSS. of early origin which, preserving as they do the classical tradition, form the connecting link between the art of the Roman empire and that of the middle ages. The most ancient of these, it is now agreed, is the fragmentary copy of the Iliad, on vellum, in the Ambrosian Library of Milan, which consists of cuttings of the coloured drawings with which the volume was adorned in illustration of the various scenes of the

ILLUMINATED MSS.

THIC L1N01SPARNE GOSPELS.— ABOUT A.D. 700. (British Museum. Cotton MS., Nero D. iv. f. 211.)

ILLUMINATED MSS.

*£euoujfgel|UTn secuudunloTicoi**

wK ”

THIC L1NU1.SPARNE GOSPELS.— ABOUT A,D. 700. (British Museum. Cotton MS., Nero D. iv. f. 211.)

ILLUMINATED MSS.

Byzan- tine.

poem. The MS. may have been executed in Italy, and there is Rood reason to assign the fragments to the 3rd century. The character of the art is quite classical, bearing comparison with that of the wall-paintings of Pompeii and the catacombs. Equally classical in their style are the fifty illustrative pictures of the Vatican Virgil, known as the Schedae Vaticanae, of the 4th century; but in these we find an advance on the Homeric fragments in the direction of decoration, for gilt shading is here employed to heighten the lights, and the frames in which the pictures are set are ornamented with gilt lozenges. A second famous MS. of Virgil in the Vatican library is the Codex Romanus, a curious instance of rough and clumsy art, with its series of illustrations copied by an unskilful hand from earlier classical models. And a still later example of persistence of the classical tradition is seen in the long roll of the book of Joshua, also in the Vatican, perhaps of the 10th century, which is filled with a series of outline drawings of considerable merit, copied from an earlier MS. But all such MSS. exhibit little tendency to decora- tion, and if the book ornamentation of the early middle ages had been practised only in the western empire and not also at Con- stantinople, it is very doubtful if the brilliant illumination which was afterwards developed would have ever existed.

When the centre of government passed eastward, Roman art came under Oriental influence with its sense of splendour, and developed the style known as Byzantine which, in its earlier stages, and until it became stereotyped in character, was broad in its drawing, on classical lines, and brilliant in its colouring, and which introduced a profuse application of gold in the details of ornament. Reacting on the art of the west, the influence of the Byzantine or Greek school is not only prominent in such early works as the mosaics of Ravenna, but it has also left its mark in the peculiar character of Italian pictorial art of the middle ages.

Very few examples of early Byzantine work in MSS. have survived; but two fragmentary leaves (Brit. Mus., Add. MS. 5 1 1 1) of tables of the Eusebian canons, which must have stood at the beginning of a copy of the Gospels, executed no doubt in the Eastern capital in the 6th century, are sufficient to exemplify the splendour of ornament which might be lavished on book decoration at that date. The surface of the vellum is entirely gilt, and the ornamental designs are in classical style and painted in bright colours. Two well-known MSS., the Genesis of the Imperial Library of Vienna, of the latter part of the 6th century, and the Gospels of Rossano in southern Italy, of the

same period, both containing series of illustrative paint- ings of a semi-classical type, are very interesting specimens of Byzantine art; but they depend on their purple vellum and their silver-written texts to claim a place among highly orna- mented MSS., for the paintings themselves are devoid of gold. On the other hand, the Greek MS. of Genesis, of the 5th or 6th century, which once formed part of the Cottonian collection in the British Museum, but which was almost totally destroyed by fire, was of a more artistic character: the drawing of its minia- tures was of great merit and classical in style, and gold shading was largely employed in the details. The famous MS. of Dioscorides at Vienna, executed in the year 472, is another excellent example of the early Byzantine school, its series of paintings at the beginning of the volume well maintaining the classical sentiment.

From such early examples Byzantine art advanced to a maturer style in the Qth and 10th centuries, two MSS. in the Bibliotheque Nationale of Paris being types of the best work of this time. These are: the copy of the sermons of Gregory Nazianzen (MS. Grec. 510), executed about the year 880 and containing a scries of large miniatures, some being of the highest excellence; and a psalter of the 10th century (MS. Grec. 139), among whose miniatures are examples which still maintain the old sentiment of classical art in a remarkable degree, one in particular, representing David as the psalmist, being an adapted copy of a classical scene of Orpheus and the Muses. The same scene is repeated in a later Psalter in the Vatican: an instance of the repetition of favourite subjects from one century to

another which is common throughout the history of medieval art. At the period of the full maturity of the Byzantine school great skill is displayed in the best examples of figure-drawing, and a fine type of head and features is found in the miniatures of such MSS. as the Homilies of Chrysostom at Paris, which belonged to the emperor Nicephorus III., 1078-1081, and in the best copies of the Gospels and Saints' Lives of that period, some of them being of exquisite finish. By this time also the scheme of decoration was established. Brilliant gilded backgrounds, give lustre to the miniatures. Initial letters in gold and colours are in ordinary use; but, it is to be observed, they never become very florid, but are rather meagre in outline, nor do they develop the pendants and borders which are afterwards so characteristic of the illuminated MSS. of the west. By way of general decora- tion, the rectangular head-pieces, which are such prominent features in Greek MSS. from the 10th to the 13th centuries, flourish in flowered and tesselated and geometric patterns

in bright colours and gold. These are palpably of Oriental design, and may very well have been suggested by the woven fabrics of western Asia.

But Byzantine art was not destined to have a great history. Too self-contained and, under ecclesiastical influence, too much secluded from the contact with other ideas and other influences which are vitally necessary for healthy growth and expansion, it fell into stereotyped and formal convention and ran in narrow grooves. A general tendency was set up to paint the flesh tints in swarthy hues, to elongate and emaciate the limbs, to stiffen the gait, and generally to employ sombre colours in the miniatures, the depressing effect of which the artist seems to have felt himself compelled to relieve by rather startling contrasts of bright vermilion and lavish employment of gold. Still the initials and head-pieces continued to retain their brilliancy, of which they could scarcely be deprived without losing their raison d'etre as decorative adjuncts. But, with all faults, fine and delicate drawing, with technical finish in the applied colours, is still characteristic of the best Greek miniatures of the 10th to 12th centuries, and the fine type of head and features of the older time remains a tradition. For example, in the Gospel lectionary, Harleian MS. 1810, in the British Museum, of the 12th century, there is a series of scenes from the life of Christ which are more than usually free from the contemporary conventionalism and which contain many figures of noble design. After the 12th century there is little in the art of Greek MSS. to detain us. The later examples, as far as they exist, are decadent and are generally lifeless copies of the earlier MSS.

Byzantine art, as seen in Greek MSS., stands apart as a thing of itself. But we shall have to consider how far and in what manner it had an influence on western art. Its reaction and influence on Italian art have been mentioned. That that in- fluence was direct is manifest both in the style of such works as the mosaics of Italy and in the character of the paintings of the early Italian masters, and eventually in the earliest examples of the illuminated MSS. of central and southern Italy. But it is not so obvious how the influence which the eastern art of the Greek school undoubtedly exercised on the illuminated MSS. of the Frankish empire was conveyed. All things considered , however, it seems more probable that it passed westward through the medium of Italian art rather than by actual contact, except perhaps in accidental instances.

We turn to the west of Europe, and we shall see how in the elaborately ornamented Frankish MSS. of the Carolingian school was

combined the lingering tradition of the classical style with a new and independent element which had /, om – grown up spontaneously in the north. This new bardic factor was the Celtic art which had its origin and was brought to perfection in the illuminated MSS. of Ireland and afterwards of Britain. It will therefore be convenient to trace the history of that school of book ornamentation. But before doing so we must dispose, in few words, of the more primitive style which preceded the Carolingian development in western continental Europe. This primitive style, which we may caK. the native style, as distinguished from the more artificially

compounded art of the revival under Charlemagne, seems to have been widely extended throughout the Frankish empire and to have been common in Lombardy, and to some degree in Spain, as well as in France, and is known as Merovingian and Franco- Lombardic. This kind of ornamentation appears chiefly in the form of initial letters composed of birds, fishes and animals contorted into the shapes of the alphabetical letters; and in a less degree of head-pieces and borders filled with interfacings, or bands, or geometrical patterns, and even details of animal life. In these patterns, barbarous as they usually are, the in- fluence of such artistic objects as mosaics and enamels is evident. The prevailing colours are crude green, red, orange and yellow, which hold their place with persistence through successive generations of MSS. This native style also, in course of time, came under Celtic influence, and adopted into its scheme the interlaced designs of animal forms and other details of the ornament of the north. It is therefore necessary to bear in mind that, side by side with the great series of Carolingian MSS., executed with all possible magnificence, there was existent this native school producing its examples of a more rustic character, which must be taken into account when studying the development of the later national style in France, in the ioth and succeeding centuries.

To turn now to the Celtic style of ornament in MSS. This we find in full development in Ireland as early as the 7th century. Celtic. ˆ e Irish school of book ornamentation was essentially a native school working out its own ideas, created and fostered by the early civilization of the country and destined to have a profound influence on the art of Britain and eventually on that of the continent. It may be described as a mechanical art brought to the highest pitch of perfection by the most skilful and patient elaboration. Initials,

borders and full-page designs are made up of interlaced ribbons, interlaced and en- tangled zoomorphic creatures, intricate knots, spirals, zig-zag ornaments, and delicate interwoven patterns, together with all kinds of designs worked out in red dots — all arranged and combined together with mathematical accuracy and with ex- quisite precision of touch; and painted in harmonious colours in thick pigments, which lend to the whole design the appearance of enamel. Gold is never used. In the production of his designs the Irish artist evidently took for his models the objects of early metal work in which the Celtic race was so skilled, and probably, too, the classical enamels and mosaics and jewelry which had been imported and copied in the country. The finest example of early Celtic book ornamentation is the famous copy of the Gospels known as the Book of Kells, of the latter part of the 7th century, preserved in Trinity College, Dublin: a miracle of minute and accurate workmanship, combining in its brilliant pages an endless variety of design.

But, with all his artistic excellence, the Irish artist failed completely in figure drawing; in fact he can hardly be said to have seriously attempted it. When we contemplate, forexarhple, the rude figures intended to represent the evangelists in early copies of the Gospels, their limbs contorted and often composed of extraordinary interfacings and convolutions, we wonder that the sense of beauty which the Irish artist indubitably possessed in an eminent degree was not shocked by such barbarous pro- ductions. The explanation is probably to be found in tradition. These figures in course of time had come to be regarded rather as details to be worked into the general scheme of the ornament of the pages in which they occur than representations of. the human form, and were accordingly treated by the artist as subjects on which to exercise his ingenuity in knotting them into fantastic shapes.

Passing from Ireland, the Celtic style of book ornamentation was naturally practised in the monastic settlements of Scotland, and especially in St Columba's foundation in the tame' island of Iona. Thence it spread to other houses in Gospels. Britain. In the year 635, at the request of Oswald, king of Northumbria, Aid an, a monk of Iona, was sent to preach Christianity in that kingdom, and became the founder of the abbey and see of Lindisfarne in Holy Isle off the*

Northumbrian coast. Here was established by the brethren who accompanied the missionary the famous school of Lindis- farne, from which issued a wonderful series of finely written and finely ornamented MSS. in the Celtic style, some of which still survive. The

most perfect is the Lindisfarne Gospels or St Cuthbert's Gospels or the Durham Book, as it is mere commonly called from the fact of its having rested for some time at Durham after early wanderings. This MS., written in honour of St Cuthbert and completed early in the 8th century, is in the Cottonian collection in the British Museum — a beautiful example of writing, and of the Celtic style of ornament, and in perfect condition. The contact with foreign influences, unknown in Ireland, is manifested in this volume by the use of gold, but in very sparing quantity, in some of the details. An interesting point in the artistic treatment of the MS. is the style in which the figures of the four evangelists are portrayed. Here the conventional Irish method, noticed above, is abandoned; the figures are mechanical copies from Byzantine models. The artist was unskilled in such drawing and has indicated the folds of the draperies, not by shading, but by streaks of paint of con- trasting colours. Explanations of such instances of the unex- pected adoption of a foreign style are rarely forthcoming; but in. this case there is one. The sections of the text have been identified as following the Neapolitan use. The Greek Theodore, archbishop of Canterbury, arrived in Britain in the year 688 and was accompanied by Adrian, abbot of a monastery in the island of Nisita near Naples; and they both visited Lindisfarne. There can therefore be little doubt that the Neapolitan MS. from which the text of the Durham Book was derived, was one which Abbot Adrian had brought with him; and it may also be assumed that his MS. also contained paintings of the evange- lists in the Byzantine style, which served as models to the Northumbrian artist.

The Celtic style was thus established through the north of England, and thence it spread to the southern parts of the country. But, for the moment, the account of its further development in Britain must be suspended uagiaa. in order to resume the thread of the story of the later classical influence on the illumination of MSS. of the Frankish empire. Under Charlemagne, who became emperor of the West in the year 800, art revived in many branches, and particularly in that of the writing and the illumination of MSS. During the reigns of this monarch and his immediate successors was produced a series of magnificent volumes, mostly biblical and liturgical, made resplendent by a lavish use of gold. The character of the decoration runs still, as of old, in the two lines of illustration and of pure ornament. We find a certain amount of general illustration, usually of the biblical narrative, in pictorial scenes drawn in freehand in the later classical style, and undoubtedly inspired by the western art of Rome. But those illustrations are small in number compared with the

numerous examples of pure ornament. Such ornament was employed in the tables of the Eusebian canons, in the accessories of the traditional pictures of the evangelists, in the full-page designs which intro- duced the opening words of the several books of Bibles or Gospels, in the large initial letters profusely scattered through the volumes, in the infinite variety of borders which, in some MSS., adorned page after page. In all this ornament the debased classical element is prominently in evidence, Columns and arches of variegated marbles, and leaf mouldings and other architec- tural details are borrowed from the Roman basilicas, to serve as decorations for text and miniature. The conventional portrait-figures of the evangelists are modelled on the Byzantine pattern, but with differences which appear to indicate an inter- vening influence, such as would be exercised on the eastern art by its transmission through Italy. Such figures, which indeed become, in course of time, so formal as almost to be decorative details along with their settings, grew stereotyped and passed on monotonously from artist to artist, always subject to deteriora- tion, and were perpetuated especially in MSS. of German origin down to the nth and 12th centuries.

But it is not the debased classical decoration alone which

ILLUMINATED MANUSCRIPTS

Plate n,

PSALTER OF WESTMINSTER ABBEY.— LATE TWELFTH CENTURY. JU\: 3 n. (British Museum. Royal MS. 2A. xxii.)

Plate III.

ILLUMINATED MANUSCRIPTS

VtuciuamwflMta tunmsvcacttfuno

tuui

ccmcbacuumns

mtuta/cumUlaˆ

cumwdiflmltftt?/

nua/motuelrtUir

ctoPttU,jloitftc».

umiuˆaticciui

(ftaieadoicfcma, ItotdpfuflgeTtw ccrfitcicmrtnomw<

tUummam/fttfˆf rcpmaumtvomnes ttnimˆnagtufim DanrdmmiM«tee» ®w&$#atttap?

qw&i pletentluami

iat\ofti#

tamws Mxdw ma/ttcft/

mtCopa oo/aup ctarqw

tnitui ttngue

tecapti

USflUS

LECTIONARY, OF THE USE OF PARIS. LATE THIRTEENTH CENTURY. (British Museum. Add. M.S. 17,341.)

ILLUMINATED MSS.

3i5

marks the illumination of the Carolingian school. The influence of the Celtic art, which has been described, imposed itself and combined with it. This combination was due to the English- man, Alcuin of York, who became abbot of the Benedictine house of St Martin of Tours, and who did so much to aid Charle- magne in the revival of letters. Thus, in the finest examples of the Carolingian illuminated MSS., Celtic interlaced patterns stand side by side with the designs of classical origin; and, at the same time, it is interesting to observe that the older native Merovingian style of ornament makes its presence felt, now and again, in this or that detail. But with all the artistic effort bestowed upon it, it must be conceded that Carolingian illumina- tion, as presented in the MSS., is not always pleasing. Indeed, it is often coarse and monotonous, and there is a tendency to conceal inferiority under a dazzling abundance of gold. The leading idea of the ornament of the great MSS. was splendour. Gold was used in profusion even in the writing of the text, and silver also in a minor degree; and the vellum, stained or painted purple, enhanced the gorgeous effect of the illumination. But undoubtedly the purer style

of the Celtic school balanced and restrained the tendency to coarseness; and this foreign influence naturally was stronger in some centres than in others. For example, in the abbey of Saint-Denis, near Paris, if we may draw conclusions from surviving examples, the Celtic style was in great favour. Another peculiarity in the decoration of the Carolingian MSS. is the tendency of the artist to mix his styles, and to attach details on a small scale, such as delicate sprays and flourishes, and minute objects, to large-scale initial letters, as though he felt that grossness required a corrective contrast. The art became more refined under the immediate successors of Charlemagne, and under Charles the Bald it culminated. The most famous MSS. of the Carolingian school are the Evan- geliarium, written and illuminated by the scribe Godescalc for Charlemagne in the year 787; the Sacramentarium written for Drogon, son of Charlemagne and bishop of Metz; the Gospels of the emperor Lothair, once at Tours; the first Bible of Charles the Bald, presented by Count Vivien, abbot of St Martin of Tours; the second Bible, called the Bible of Saint Denis, in Franco-Saxon style; and the so-called Gospels of Francis II. There are also in the British Museum (Harleian MS. 2788) an Evangeliarium written in gold and known as the Codex aureus, of this school; and a Bible of Alcuin's recension, probably executed at Tours in the middle of the 9th century, with illustrative miniatures and initial letters, but of a less elaborate degree of ornament.

After this brilliant period decadence sets in; and in the course of the nth century Frankish illumination sinks to its lowest point, the miniatures being for the most part coarse and clumsy copies of earlier models. The colours become harsh, often assum- ing an unpleasant chalky appearance.

We have now to trace the development of another kind of book decoration, quite different from the florid style of gold and colours just now described, which had a lasting influence on the early art of England, where it was specially cultivated, and where it developed a character which at length became distinctively national. This is the style of outline drawing which fills so large a space in the Anglo-Saxon MSS. of the 10th and nth centuries.

We have already seen how the Celtic style of ornamentation was introduced into the north of England. Thence it appears to have spread rapidly southward. As early as the Saxon. beginning of the 8th century it was practised at Canterbury, as is testified by a famous psalter in the British Museum (Cott. MS. Vespasian A. 1), in which much of the ornament is of Celtic type. But the same MS. is

also witness to the presence of another influence in English art, that of the classical style of Rome, certain details of the ornament being of that character and a miniature in- the MS. being alto- gether of the classical type. With little hesitation this element may be ascribed to MSS. brought from Rome, in the first instance by St Augustine, and afterwards by the incoming missionaries who succeeded him, and deposited in such centres as Canterbury

and Winchester. But this importation of MSS. from Italy was not confined to the south. We have distinct evidence that they were brought into northern monasteries, such as those of Jarrow and Wearmouth and York. Thus the English artists of both south and north were in a position to take advantage of material from two sources; and they naturally did so. Thus we find that mingiing of the Celtic and classical styles just noticed. In this way, early grown accustomed to take classical models for their drawings, the Anglo-Saxon artists were the more Susceptible to the later development of the classical style of out- line drawing which was next introduced into the country from the continent. The earliest MS. in which this style of drawing is exhibited in fullest detail is the volume known as the Utrecht Psalter, once in the Cottonian Library, in which the text of the psalms is profusely illustrated with minute pen-sketches re-markably full of detail. The period of the MS. is about the year 800; and it was probably executed in the north or north-east of France. But the special interest of the drawings is that they are evidently copies of much older models and provide a valuable link with the late classical art of some two or three centuries earlier. The work is very sketchy, the movement of the draperies indicated by lightly scribbled strokes of the pen, the limbs elongated, the shoulders humped — all characteristic features which are repeated in the later Anglo-Saxon work. The drawings of the Utrecht Psalter are clearly typical examples of a style which, founded on Roman models, must at one time have been widely practised in western Europe. For instance, there are traces of it in such a centre as St Gallen in Switzerland, and there are extant MSS. of the Psychomachia of Prudentius (a favourite work) with drawings of this character which were executed in France in the 10th century. But the style does not appear to have taken much hold on the fancy of continental artists. It was reserved for England to welcome and to make this free drawing her own, and to develop it especially in the great school of illumination at Winchester. Introduced probably in such examples as the Utrecht Psalter and copies of the Psycho- machia, this free drawing of semi-classical origin had fully established itself here in the course of the 10th century, and by that time had assumed a national character. A

fair number of MSS of the 10th and nth centuries which issued from the Winchester school are still to be seen among the collections of the British museum, in most of which the light style of outline drawing with the characteristic fluttering drapery is more or less predominant, although body colours were also freely em- ployed in many examples. But the most elaborate specimen of Anglo-Saxon illumination of the 10th century is one belonging to the duke of Devonshire: the Benedictional of the see of Winchester, executed under the direction of ˆEthelwold, bishop from 963 to 984, which contains a series of miniatures, in this instance in body colours, but drawn in the unmistakable style of the new school. In the scheme of decoration, however, another influence is at work. As England had sent forth its early Celtic designs to modify the art of the Frankish empire, so the Carolingian' style of ornament now, in its turn, makes its way into this country, and appears in the purely ornamental details of the Anglo-Saxon illuminated volumes. The frames of the miniatures are chiefly composed of conventional foliage, and the same architectural leaf-mouldings of classical origin which are seen in the foreign MSS. are here repeated. Profuse gilding also, which is frequently applied, sometimes with silver, is due to foreign influence. But this character of decoration soon assumed a national cast. Under the hands of the Anglo- Saxon artist the conventional foliage flourished with greater freedom; and the colouring which he applied was generally softer and more harmonious than that which was employed abroad. Examples of outline drawing of the best type exist in the Harleian Psalter (No. 2904), of the same period as the ˆEthelwold Benedictional; in the register of New Minster (Stowe MS. 944), a.d. 1016-1020; and in the Prudentius (Cotton MS. Cleop. C. viii.), executed early in the nth century. With the Norman Conquest naturally great changes were effected in the illumination of English MSS., as in other

branches of art; no doubt to the ultimate improvement of

English draughtsmanship. Left to itself the outline drawing

„ of the Anglo-Saxons, inclining as it did to affectation,

Norman. ,,,, ,.,- •

would probably have sunk into fantastic exaggeration

and feebleness. Brought more directly under Norman domination it resulted in the fine, bold freehand style which is conspicuous in MSS. executed in England in the next three centuries. Then we come to the period when the art of illumination is brought into line in the countries of western Europe, in England and in France, in Flanders and in western Germany, by the splendid outburst of artistic sentiment of the 12th century. This century is the period of large folios providing ample space in their pages for the magnificent initial letters drawn on a grand scale which are to be seen in the great Bibles and psalters of the time. The leading feature is a wealth of foliage with twining and interlacing branches, among which human and animal life is freely intro- duced, the whole design being thrown into relief by brilliant colours and a generous use of gold. The figure drawing both in miniatures and initials is stiff, the figures elongated but bold, and with sweeping lines in the draperies; and a tendency to repre- sent the latter clinging closely to the limbs is a legacy of the tradition of the later classical style. In England the school of Winchester appears to have maintained the same excellence after the Norman Conquest as before it. A remarkable MS. (Cotton, Nero C. iv.), a psalter of about the year 1160, with a series of fine miniatures, is a good example of its work. In France, Flanders and western Germany we find the same energy in producing boldly ornamented volumes, as in England ; a certain heaviness of outline distinguishing the work of the Flemish and German artists from that of the English and French schools. Such MSS. as the Stavelot Bible (Brit. Mus., Add. MS. 28,107), of the close of the nth century, the Bible of Floreffe (Add. MS. 17,737-17,738), of about the year 1160, and the Worms Bible (Harl. MS. 2803-2804), of the same time, are fine specimens of Flemish and German work.

It is towards the close of the 1 2th century and in the beginning of the 13th century that the character of illumination settles down on more conventional lines. Hitherto gold had been applied in a liquid state; now it is laid on in leaf and is highly burnished, a process which lends a brilliant effect to initial and miniature. A great change passes over the face of things. The large, bold style gives place to the minute. Volumes decrease in size; the texts are written in close-packed characters; the large and simple is superseded by the small and decorated. The .period has arrived when book ornamentation becomes more settled and accurately defined within limits, and starts on the course of regulated expansion which was to run for three hundred years down to the close of the 15th century. In the 13th century the historiated or miniature initial, that is, the initial letter containing within its limits a miniature illustrat- ing the subject of

the immediate text, is established as a favourite detail of ornamentation, in addition to the regular independent miniature. Such initials form a prominent feature in the pretty little Bibles which were produced in hundreds at this period. But a still more interesting subject for study is the development of the border which was to have such a luxuriant growth in the 13th, 14th and 15th centuries. Commencing as a pendant from the initial, with terminal in form of bud or cusp, it gradually pushes its way along the margins, unfolding foliage as it pro- ceeds, and in course of time envelopes the entire page of text in a complete framework formulating in each country a national style.

In the miniatures of the 13th century the art of England, of France, and of the Low Countries runs very much in one channel. The Flemish art, however, may be generally distinguished from the others by the heavier outline already noticed. The French art is exquisitely exact and clean-cut, and in its best examples it is the perfection of neat-handedness. English art is perhaps less exact, but makes up for any deficiency in this direction by its gracefulness. However, there is often little to choose between the productions of the three countries, and they are hard to distinguish. As an aid for such distinction, among small

differences, we may notice the copper tone of French gold contrasting with the purer metal in English MSS.; and the favour shown to deep ultramarine appears to mark French work. But, besides actual illuminated miniature painting, there is also a not inconsiderable amount of freehand illustrative drawing in the MSS. In this particular the English artist main- tains the excellence of work which distinguished his ancestors. Such series of delicate drawings, slightly tinted, as those to be seen in the famous Queen Mary's Psalter (Royal MS. 2 B. vii.), and in other MSS. of the 13th and 14th centuries in the British Museum, are not surpassed by any similar drawings done at the same period in any other country. In the 13th century also comes into vogue the highly decorated diaper-work, generally of lozenges or chequered patterns in brilliant colours and brightly burnished gold. These fill the backgrounds of miniatures and initials, together with other forms of decoration, such as sheets of gold stippled or surface-drawn in various designs. Diapering continued to be practised in all three countries down into the 15th century; and in particular it is applied with exquisite effect in many of the highly-finished MSS. of the artists of Paris. To return to the growth of the borders: these continue to be generally of one style in both England

and France and in Flanders during the 13th century; but, when with the opening of the 14th century the conventional foliage begins to expand, a divergence ensues. In France and Flanders the three-pointed leaf, or ivy leaf, appears, which soon becomes fixed and flourishes as a typical detail of ornament in French illumination of the 14th and 15th centuries. In England there is less convention, and along with formal branches and leafage, natural growths, such as daisy-buds, acorns, oak leaves, nuts, &c, are also represented.

Meanwhile German illumination, which in the large MSS. of the 1 2th century had given high promise, in the following centuries falls away and becomes detached from the _ western schools, and is, as a general rule, of inferior quality, although in the 13th century fine examples are still to be met with. Dark outlines and backgrounds of highly-burnished gold are in favour. At present, however, there is not sufficient published material to enable us to pass a definite judgment on the value of German illumination in the later middle ages. But the researches of scholars are beginning to localize particular styles in certain centres. For example, in Bohemia there was a school of illumination of a higher class, which seems later to have had an influence on English art, as will be noticed presently.

We must now turn to Italy, which has been left on one side during our examination of the art of the more western countries. In attempting to bridge the gap which severs the later classical style of Rome from the medieval art of Italy, much must be left to conjecture. That a debased classical style of drawing was employed in the earlier centuries of the middle ages we cannot doubt. Such a MS. as the Ashburnham Genesis of the 7th century, which contains pictures of a some- what rude character but based apparently upon a recollection of the classical drawdng of earlier times, and which appears to be of Italian origin, serves as a link, however slight. Coming down to a later period, the primitive native art of the Frankish empire, as we have seen, extended into northern Italy under the name of Franco-Lombardic ornamentation; and we have also seen how the art of the Byzantine school reacted on the art of the southern portion of the country Hence, in the middle ages, the ornamentation of Italian MSS. appears to move "on two leading lines. The first, which we owe to the Byzantine influence, in which figure-drawing is the leading idea, follows the old classical method and, showing a distinctly Greek impress, leads to the style which we recognize as Italian par excellence, and which is seen most effectively manifested in the works of Cimabue and Giotto and of allied schools. In this style the colouring is generally opaque: the flesh tints being laid over a foundation of deep olive green, which imparts a swarthy com-

plexion to the features — a practice also common in Byzantine art. The other line is that of the Lombardic style which, like

Italian.

ILLUMINATED MANUSCRIPTS

**^S*

.none .umnfccne ftucalrnanm • ofculanturcocponeaplce bmcecr bines miftraopwcainmni t»icene cte inqtuciiq > tumti merouenne mate rnxbutcwmuiquiirjiuumrawp; ficur wacemi rainuit? ar»cpm.£ctbn nftcationc-i^ea-

[Oftairu oftulii .,. fcufacsHL accipicnM xenunu wicotut rimnbuui (hemm in ccnfaraln itqiiutpV cmpu6.tr [UmcnGWgric fpfeimm foctue crfc inc «inp fin came fine oancnto ticrccdwm.fmq&o:armcuhglio ..ircrftc cco,pcte regewpae tmfi,p ite tm-fipwuiie cmiommnmnr pumim cce.auooaur wieomKpr momtm rbuntnilum acapiruriccn ftt cpm ulfactoran mccilir inftro tr-qbfiftgncnolnmud inccnfnm ca notne effient dmnbtitnm tncairaa .16 tenerc octamio.nam fincfinc mcouauie tommc&To place n'opof mnrfjmvubumpmtmcmio ipme fiqm&fcncnnr ihoiimc aromas t acaptcntgrbunbiuum cnim libi'i acctpiturinauiutumnam fie ittni nbulo pan? fupia -i inftno: nu» a rtxnulie umuntur ita intpo tn» Air umemee qiutoommiae Inmumcr umuamr unto ennio aoamnuuni o-Diuiniauw jocnnc-4umoz > uum tane mafom- ftumun aurcm cnur tarn umonc afligiunr. uuxliccr mm ,, mono aocopoutum ccamma fimtil icuncuiiiqucQuntDunbuid qua cu« catlxnuUfrbn'r. Achcc rlninbu lomorfce mcnirofpauca-avaaron- coiiecbunbuuim*

«Boni

?. , jn¥ aram tcmpli-brio dnmbxilnm auit !• umuna-nuocftifcitfuiOTioarnc iMbui mpsratcan^cntai tignlnarr auncm abcnhi late miraanwiniioi aarotiicccm-CiipKum fraculcmi maualcm-fctmun itfut^cao fen mOTn'cSi.mi-b'rciirixnuLioixmd ftrat en cvquatuo: clcmcuj otarem i8iiurtimbJ.f.puttcna.fb:na«nnc. nuftinaTccoacmca qpcc&Tmmnr aiamrcfiepiatqiicrcamoac miuo. •nroiio fcpaiur.suie ncp br cutinu Lie figumt ata; enn'c i iibu -i una oucin: pfema-qtura queptcofepar totcrtae c qua aiam ma palmr penu buo fuifi^i uiu nit cattxnula mitt catUT^icfKnurqbfoiuoixmnjincjc ncraf qcqjfoluo c inr'mwnicp liba.. C irculuo au beta inccriinir caia' cj nutio fmmo cLiiisir^acnu b oia onnouiwoEanf'.pitrmilhcri cna: mncmcobtamccnfaraiouT.urcHe .\bco ncqtuoa tcmn cvtnac. t*

Sothxvp.fkinucncmoi'alco iccnfii anaalrana fcmr.aualrep: ul'fa .ocpoRiniuti itoatcnir f tanrtctennt. jhunfi rn. Icinoncp acuepe Ifeufaexof aorctcn -llcins enn fc tin Iftrr-ibiu liun'inu mrtnepla ucomnu •rtttTtcd'

*tctnq ftcra**

UURANDUS DE DIVINIS OFFICIIS. FOURTEENTH CENTURY. Italian School. (British Museum. Add. MS. 31,032.)

Plate V.

ILLUMINATED MANUSCRIPTS

VALERIUS MAXIM US. ABOUT A. D. 1475. Executed for Philippe de Comines. (British Museum. Harky M.S. 4374.)

14

ILLUMINATED MSS.

*3*7*

14th Century,

the Celtic school of the British Isles, was an art almost exclusively of pure ornament, of intricate interlacings of arabesques and animal forms, with bright colouring and ample use of gold. The Lombardic style was employed in certain centres, as, for example, at Monte Cassino, where in the nth, 12th and 13th centuries brilliant examples were produced. But it was not destined to stand before the other, stronger and inherently more artistic, style which was to become national. Still, its scheme of brighter colouring and of general ornament seems to have had an effect upon later productions, if we are not mistaken in recognizing something of its influence in such designs as the interlaced white vine-branch borders which are so conspicuous in Italian MSS. of the period of the Renaissance.

The progress of Italian illumination in the style influenced by the Byzantine element is of particular interest in the general history of art, on account of the rapidity with which it grew to maturity, and the splendour to which it attained in the 15th century. Of the earlier centuries the existing examples are not many. That Italian artists were capable of great things as far back as the 12th century is evident from their frescoes. We may notice the curious occurrence of two very masterly paintings, the death of the Virgin and the Virgin

enthroned, drawn with remarkable breadth in the Italian style, in the Winchester Psalter (Cottonian MS. Nero C. iv.) of the middle of that century, as a token of the possibilities of Italian illumination at that date; but generally there is little to show. Even at the beginning of the 14th century most of the specimens are of an ordinary character and betray a want of skill in striking contrast with the highly artistic productions of the Northern schools of England and France at the sam'e period . But, though inferior artistically, Italian book ornamenta- tion had by this time been so far influenced by the methods of those schools as to fall into line with them in the general system of decoration. The miniature, the initial, the miniature-initial and the border — all have their place and are subject to the same laws of development as in the other schools. But, once started, Italian illumination in the 14th century, especially in Florence, expanded with extraordinary energy. We may cite the Royal MS. 6, E. ix., containing an address to Robert of Anjou, king of Sicily, 1334-1342, and the Add. MS. 27,428 of legends of the saints, of about the year 1370, as instances of very line miniature-work of the Florentine type. As the century advances, Italian illumination becomes more prolific and is extended to all classes of MSS., the large volumes of the Decretals and other law books, and still more the great folio choral books, in particular affording ample space for the artist to exercise his fancy. As was natural from the contiguity of the two countries, as well as from political causes, France and Italy influenced each other in the art. In many MSS. of the Florentine school the French influence is very marked, and on the other hand, Italian influence is exercised especially in MSS. of the southern provinces of France. Italian art of this period also in some degree affected the illumination of southern German MSS.

We have also to note the occurrence in Italy in the 1 4th century of good illustrative outline drawings, generally tinted in light colours' and occasionally we meet with a wonderfully bright style of illumination of a lighter cast of colouring than usually prevails in Italian art: such as may be seen in a MS. of Durandus Dcdiviiii; oJUciis (Brit. Mus., Add. MS. 31,032) containing an exquisite series of initials and borders.

Taking a general view of the character of European illumina- tion in. the 14thcentury.it may be described as an art of great invention and flexibility. The rigid exactness of the 13th century is replaced by flowing lines, just as the stiff, formal strokes of the handwriting of that century was exchanged for a more cursive and easy style. The art of each individual country now developed a national type of its own, which again branched ofT into the different styles of provincial

schools. For example, in the eastern counties of England a very fine school of illumination, the East Anglian, was established in the first half of the century and produced a series of beautiful MSS., such as the Arundel Psalter (No. 83) in the British Museum.

Distinc- tive Borders.

By the end of the century the borders had developed on national lines so fully as to become, more than any other detail in the general scheme, the readiest means of identifying the country of origin. First as to the English border: the favour shown to the introduction of natural growths among the conventional foliage thrown out from the frame into which the border had by this time expanded has already been noticed. But now a new feature is introduced. The frame up to this time had consisted generally of conventional branches with bosses at the corners. Now it is divided more into compartments within which twining coils of ornament resembling cut feather- work are common details; and feathery scrolls fill the corner-bosses and are attached to other parts of the frame; while the foliage thrown out into the margin takes the form of sprays of curious lobe- or spoon-shaped and lozenge-shaped leaves or flowers, with others resembling curled feathers, and with cup- and trumpet-shaped flowers. This new style of border is contemporaneous with the appearance of a remarkably brilliant style in the miniatures, good in drawing and rich in colouring; and an explanation for the change has been sought in foreign influence. It has been suggested, with some plausibility, that this influence comes from the school of , Prague, through the marriage of Richard II. with Anne of Bohemia in 1382. However this may be, there certainly is a decidedly German sentiment in the feathery scrolls just described. Turning to the French border, we find towards the close of the 14th century that the early ivy-leaf pendant has now invaded all the margins and that the page is set in a conventional frame throwing off on every side sprigs and waving scrolls of the con- ventional ivy foliage, often also accompanied with very delicate compact tracery of minute flower-work filling the background of the frame. Nothing can be more charming than the effect of such borders, in which the general design is under perfect control. The character, too, of the French miniature of this period harmonizes thoroughly with the brilliant border, com- posed as it is very largely of decorative elements, such as diapered patterns and details of burnished gold. In the Low Countries, as was natural, the influence of French art continued to have great weight, at least in the western provinces where the style of illumination followed the French lead.

The Italian border in its ordinary form was of independent character, although following the methods of the West. Thrown out from the initial, it first took the form of pendants of a peculiarly heavy conventional curling foliage, associated, as progress was made, with slender rods jointed at intervals with bud-like ornaments and extending along the margins; at length expanding into a frame. The employment of gilt spots or pellets to fill spaces in the pendants and borders becomes very marked as the century advances. They are at first in a simple form, but they gradually throw out rays, and in the latter shape they become the chief constituents of one kind of border of the 15th century.

Illumination in the 15th century enters on a new phase. The balance is no longer evenly maintained between the relative values of the miniature and the border as factors in the general scheme of decoration. The influence of a new sentiment in art makes itself felt more and more; the flat treatment of the miniature gradually gives place to true laws of perspective and of figure-drawing, and to the depth and atmospheric effects of modern painting. Miniature painting in the decoration of MSS. now became more of a trade; what in old times had been done in the cloister was now dons in the shop; and the professional miniaturist, working for his own fame, took the place of the nameless monk who worked for the credit of his house. Henceforth the miniature occupies a more important place than ever in the illuminated MS.; while the border, with certain important exceptions, is apt to recede into an inferior position and to become rather an orna- mental adjunct to set off the miniature than a work of art claiming equality with it.

Continuing the survey of the several national styles, we shall have to witness the final supersession of the older styles of

England and France by the later developments of Italy and Flanders. We left English illumination at the close of the 14th century strengthened by a fresh infusion of apparently a foreign, perhaps Bohemian, source. The style thus evolved marks a brilliant but short-lived epoch in English art. It is not confined to MSS., but appears also in the paintings of the time, as, for example, in the portrait of Richard II. in Westminster Abbey and in that in the Wilton triptych

belonging to the earl of Pembroke. Delicate but brilliant colouring, gold worked in stippled patterns and a careful modelling of the human features are its characteristics. In MSS. also the decorative borders, of the new pattern already described, are of exceptional richness. Brilliant examples of the style, probably executed for Richard himself, may be seen in a magnificent Bible (Royal MS. I, E. ix.), and in a series of cuttings from a missal (Add. MS. 29,704-20,705) in the British Museum. But the promise of this new school was not to be fulfilled. The same style of border decoration was carried into the 15th century, and good examples are found down to the middle of it, but a general deterioration soon sets in. Two MSS. must, however, be specially mentioned as sur- viving instances of the fine type of work which could still be turned out early in the century; and, curiously, they are both the productions of one and the same illuminator, the Dominican, John Siferwas. The first is a fragmentary Lectionary (Brit. Mus., Harl. MS., 7026) executed for John, Lord Lovel of Tich- mersh, who died in 1408; the other is the famous Sherborne Missal, the property of the duke of Northumberland, a large volume completed about the same time for the Benedictine abbey of Sherborne in Dorsetshire. Certainly other MSS. of equal excellence must have existed; but they have now perished. After the middle of the 15th century English illumination may De said to have ceased, for the native style disappears before foreign imported art. This failure is sufficiently accounted for uy the political state of the country and the distractions of the iV r ar of the Roses.

In France the 15th century opened more auspiciously for the art of illumination. Brilliant colouring and the diapered back-, ground glittering with gold, the legacy of the previous century, scill continue in favour for some time; the border, too, of ivy- leaf tracery still holds'its own. But in actual, drawing there are signs, as time advances, of growing carelessness, and the artist appears to think more of the effect of colour than of draughts- manship. This was only natural at a time when the real land- scape began to replace the background of diaper and conventional rocks and trees. In the first quarter of the century the school of Pan's comes prominently to the front with such magnificent volumes as the Book of Hours of the regent, John Plantagenet, duke of Bedford, now in the British Museum; and the companion MS. known as the Sobieski Hours, at Windsor. In these examples, as is always the case with masterpieces, we see a great advance upon earlier methods. The miniatures are generally exquisitely painted in brilliant colours and the drawing is of a high standard; and in the borders now appear natural flowers

intermingled with the conventional tracery — a new idea which was to be tarried further as the century advanced. The Psalter executed at Paris for the boy-king Henry VI. (Cotton MS. Domitian A. xviii.) is another example of this school, rather of earlier type than the Bedford MS., but beautifully painted. In all three MSS. the borders show no lack of finish; they are of a high standard and are worthy of the miniatures. But perhaps the very finest miniature-work to be found in any MS. of French origin of this period is the breviary (Harl. MS. 2897) illuminated for John the Fearless, duke of Burgundy, who was assassinated in 1419. It could hardly be surpassed in refinement and minute- ness of detail.

Development towards the modern methods of painting moves on rapidly with the century. First, the border in the middle period grows florid; the simpler ivy-spray design, which had held its position so long, is gradually pushed away by a growth of flowering scrolls, with flowers, birds and animal and insect life introduced in more or less profusion. But hence- forward deterioratioi increases, and the border becomes sub-

sidiary. In the case of miniatures following the old patterns of the devotional and liturgical books, a certain restraint still prevails; but with those in other works, histories and romances and general literature, where the paintings are devised by the fancy of the artist, the advance is rapid. The recognition of the natural landscape, the perception of atmospheric effects now guide the artist's brush, and the modern French school of the second half of the 15th century is fairly established. The most celebrated leaders of this school were Jean Foucquet of Tours and his sons, many of whose works still bear witness to their skill. In the MSS. of this school the influence of the Flemish contemporary art is very obvious; and before the advance of that art French illumination receded. A certain hardness of surface and want of depth characterize the French work of this time, as well as the practice of employing gilt hatching to obtain the high lights. This practice is carried to excess in the latest examples of French illumination in the early part of the 16th century, when the art became mechanical and overloaded with ornament, and thus expired.

It has been seen that the Flemish school of illumination in the 13th and r4th centuries followed the French model. In the 15th century, while the old tradition continued in force for a while, the art developed on an independent line; and in the second half of the century it exercised a widespread influence on the neighbouring countries, on France, on Holland and on Germany. This development

was one of the results of the industrial and artistic activity of the Low Countries at this period, when the school of the Van Eycks and their followers, and of other artists of the great and wealthy cities, such as Bruges, Antwerp, Ghent, were so prolific. The Flemish miniatures naturally followed on the lines of painting. The new style was essentially modern, freeing itself from the traditions of medieval illumination and copying nature. Under the hand of the Flemish artist the landscape attained to great perfection, softness and depth of colouring, the leading attribute of the school, . lending a particular charm and sense of reality to his out-door scenes. His closer observation of nature is testified also in the purely decorative part of his work. Flowers, insects, birds and other natural objects now frequent the border, the origin of which is finally forgotten. It ceases to be a connected growth wandering round the page; it becomes a flat frame of dull gold or colour, over which isolated objects, flowers, fruits, insects, butterflies, are strewn, painted with naturalistic accuracy and often made, by means of strong shadows, to stand out in relief against the background. This practice was soon carried to florid excess, and all kinds of objects, including jewels and personal ornaments, were pressed into the service of the border, in addition to the details copied from nature. The soft beauty of the later Flemish style proved very attractive to the taste of the day, with the result that it maintained a high standard well on into the 16th century, the only rivals being the MSS. of Italian art. The names of celebrated miniaturists, such as Memlinc, Simon Bening of Ghent, Gerard of Bruges, are associated with its productions; and many famous extant examples bear witness to the excellence to which it attained. The Grimani Breviary at Venice is one of the best known MSS. of the school; but almost every national library has specimens to boast of. Among those in the British Museum may be mentioned the breviary of Queen Isabella of Spain (Add. MS. 18,851) ; the Book of Hours of Juanaof Castille (Add. MS. 18,852); a very beautiful Book of Hours executed at Bruges (Egerton MS. 2125); another exquisite but fragmentary MS. of the same type (Add. MS. 24,098) and cuttings from a calendar of the finest execution (Add. MS. 18,855) ascribed to Bening of Ghent; a series of large sheets of genealogies of the royal houses of Portugal and Spain (Add. MS. 12,531) by the same master and others; and late additions to the Sforza Book of Hours (Add. MS. 34,294).

But, besides the brilliantly coloured style of Flemish illumina- tion which has been described, there was another which was practised with great effect in the 15th century. This was the simpler style of drawing in white delicately shaded to indicate

the contour of figures and the folds of drapery, &c, known as grisaille or camdieu gris. It was not indeed confined to the Flemish schools, but was practised also to some extent and to good effect in northern France, and also in Holland and other countries; but the centre of its activity appears to have been in the Low Countries. The excellence to which it attained may be seen in the MSS. of the Miracles de Nostre Dame now in Paris and the Bodleian Library, which were executed for Philip the Good, duke of Burgundy, in the middle of the 15th century.

Of the Dutch school of illumination, which was connected with that of Flanders, there is little to be said. Judging from existing examples, the art was generally of a more rustic and coarser type. There are, however, exceptions. A MS. in the British Museum (King's MS. 5) of the beginning of the 15th century contains scenes from the life of Christ in which the features are carefully modelled, very much after the style of English work of the same time; and some of the specimens of Dutch work in camaieu gris are excellent.

German illumination in the 15th century appears to have largely copied the Flemish style; but it lost the finer qualities of its pattern, and in decoration it inclined to extravagance. Where the Flemish artist was content with single flowers grace- fully placed, the German filled his borders with straggling plants and foliage and with large flourished scrolls.

Italian illumination, which had developed so rapidly in the 14th century, now advanced with accelerated pace and expanded into a variety of styles, more or less local, culminating in the exquisite productions of the classical renaissance in the latter half of the 1 5th century. As in the other national styles of France and Flanders, , the Italian miniaturist quickly abandoned the conventional for the natural landscape; but with more character both in the figure-drawing and in the actual representation of scenery. The colouring is brilliant, not of the softness of the Flemish school, but of stronger and harder body; the outlines are firm and crisp and details well delineated. The Florentine, the Lombard, the Venetian, the Neapolitan and other schools flourished; and, though they borrowed details from each other, each had something distinctive in its scheme of colouring. The border developed on several lines. The rayed gold spots or studs or pellets, which were noticed in the 14th century, are

now grouped in profusion along the margins and in the interstices of delicate flowering and other designs. Another favourite detail in the composition of both initials and borders was the twining vine tendril, generally in white or gold upon a coloured ground, apparently a revival of the interlacing Lombardic work of the nth and 12th centuries. At first, restrained and not too complex, it fills the body of initials and short borders; then it rapidly expands, and the convolutions and interlacings become more and more elaborate. Lastly came the completed solid frame into which are introduced arabesques, vignettes, candela- bras, trophies, vases, medallions, antique gems, cupids, fawns, birds, &c, and all that the fancy led by the spirit of classical renaissance could suggest. Among the principal Italian MSS. of the 15th century in the British Museum there are: a copy of Plutarch's Lives, with miniatures in a remarkable style (Add. MS. 22,318); Aristotle's Ethics, translated into Spanish by Charles, prince of Viana, probably executed in Sicily about 1458 (Add. MS. 21,120); a breviary of Santa Croce at Florence, late in the century (Add. MS. 29,735); Livy's History of the Macedonian War, of the Neapolitan school, late in the century (Had. MS. 3694) ; and, above all, the remarkable Book of Hours of Bona Sforza of Savoy of about the year 1490 (Add. MS. 34,291); besides a fair number of MSS. exhibiting the rich colouring of the Venetian school.

Like that of the French and Flemish schools, Italian illumina- tion survived into the 16th century, and for a time showed vigour. Very elaborate borders of the classical type and of good design were still produced. But, as in other countries, it was then a dying art. The attempt to graft illumination on to books produced by the printing press, which wei'e now dis- placing the hand-written volumes with which the art had

always been associated, proved, except in a few rare instances, a failure. The experiment did not succeed; and the art was dead.

It remains to say a few words respecting the book ornamenta- tion of the Peninsula. In the earlier centuries of the middle ages there appears to have been scarcely anything worthy of note. The Mozarabic liturgies and biblical MSS. of the 9th to 1 2th centuries are adorned with initial let ters closely allied to the primitive specimens of the Merovingian and Franco-Lombardic pattern, and coloured with the same crude tints; the larger letters also being partly composed of interlaced designs. But the style is barbaric. Such illustrative drawings as are to be found are also of a most primitive

character. Moorish influence is apparent in the colours, particularly in the yellows, reds and blacks. In the later middle ages no national school of illumination was developed, owing to political condi- tions. When in the 15th century a demand arose for illuminated MSS., recourse was had to foreign artists. Flemish art naturally was imported, and French art on the one side and Italian art on the other accompanied it. In the breviary executed for Queen Isabella of Spain about the year 1497 (Brit. Mus., Add. MS. 18,851) we find a curious . random association of miniatures and borders in both the French and the Flemish styles, the national taste for black, however, asserting itself in the borders where, in many instances, the usual coloured designs are replaced by black-tinted foliage and scrolls.

In other outlying countries of Europe the art of illumination can scarcely be said to have existed. In Slavonic countries a recollection of the Byzantine school lingered in book ornamenta- tion, but chiefly in a degraded and extravagant system of fantastic interlacings. In the 16th century there was a revival in Russia of the Byzantine style, and the head-pieces and other ornamental details of the nth and 12th centuries were success- fully imitated.

The consideration of oriental art does not come within the scope of this article. It may, however, be noted that in Arabic and Persian MSS. of the 13th to 16th centuries there are many examples of exquisitely drawn title-pages and other ornament of intricate detail, resplendent with colour and gold, which may be ranked with western illuminations.

Authorities. — Medieval and later works dealing in part with the technicalities of illumination are collected by Mrs Merrifield, Original Treatises dating from the 12th to 1 8th Centuries on the Art of Painting (1849); see also Theophilus, De diversis Artibus, ed. R. Hendrie (1847). Text-books and collections of facsimiles are Count A. de Bastard, Peintures et ornaments des manuscrits, a magnificent series of facsimiles, chiefly from Carolingian MSS. (1832-1869); Shaw and Madden, Illuminated Ornaments from MSS. and early Printed Books (1833); Noel Humphreys c.nd Jones, The Illuminated Books of the Middle Ages (1849); H. Shaw, Handbook of Medieval Alphabets (1853), and The Art of Illumination (1870); Tymms and Digby Wyatt, The Art of Illumination (l85o) ; Birch and Jenner, Early Drawings and Illuminations, with a dictionary of subjects in MSS. in the British Museum (1879); J. H. Middleton, Illuminated MSS. in Classical and Medieval Times (1892) ; G. F. Warner, Illuminated MSS. in the British Museum (official publica- tion, 1903) ; H. Omont, Facsimiles des miniatures des plus anciens MSS.

grecs de la Bibl. Nationale (1902) ; V. de Boutovsky, Histoire de I'ornement russe du X' au XVI e siecle, including facsimiles from Byzantine MSS. (1870); J. O. Westwood, Facsimiles of Miniatures and Ornaments of Anglo-Saxon and Irish MSS. (1868); E. M. Thompson, English Illuminated MSS. (1895); Paleografia artistica di Montecassino (1876-1884); Le Miniature nei codici Cassinesi (1887); A. Haseloff, Eine thiiringisch-sachsische Malereischule des 13. Jahrhunderts (1897); G. Schwarzenski, Die Regensburger Buck-malerei des 10. und 11. Jahrhunderts (1901) ; Sauerland and Haseloff^ Der Psalter Erzbischof Egberts von Trier (1901).

Several of the most ancient illustrated or illuminated MSS. have been issued wholly or partially in facsimile, viz. The Ambrosiun Homer, by A. Ceriani ; the Schedae Vaticanae and the Codex Romanus of Virgil, by the Vatican Library; the Vienna Dioscorides, in the Leiden series of facsimiles; the Vienna Genesis, by Hartel and Wickhoff; the Greek Gospels of Rossano, by A. Haseloff: the Ashburnham Pentateuch, by B. von Gebhart ; the Utrecht Psalter, by the Palaeographical Society.

Facsimiles from illuminated MSS. are also included in large palaeographical works such as Silvestre, Universal Palaeography, ed. Madden (1850); the Facsimiles of the Palaeographical Society (1 873-1 894) and of the New Palaeographical Society (1903, &c);

;uid the Collezione paleografia Vaticana, the issue of which was commenced in 1905. Excellent photographic reproductions on a reduced scale are being issued by the British Museum and by the Bibliotheque Nationale in Paris. (E. M. T.)

ILLUMINATI (Lat. illuminare), a designation in use from the 15th century, and applied to, or assumed by, enthusiasts of types distinct from each other, according as the " light " claimed was viewed as directly communicated from a higher source, or as due to a clarified and exalted condition of the human intelligence. To the former class belong the alumbrados of Spain. Menendez Pelayo first finds the name about 1493 (in the form aluminados, 1498), but traces them back to a Gnostic origin, and thinks their views were promoted in Spain through influences from Italy. One of their earliest leaders, born in Salamanca, a labourer's daughter, known as La Beata de Piedrahita, came under the notice of the Inquisition in 1511, as

claiming to hold colloquies with our Lord and the Virgin; having high patrons, no decision was taken against her {Los Hcterodoxos Espaholes, 1881, lib. v.). Ignatius Loyola, while studying at Salamanca (1527) was brought before an ecclesiastical commission on a charge of sympathy with the alumbrados, but escaped with an admonition. Others were not so fortunate. In 1529 a congregation of unlettered adherents at Toledo was visited with scourging and imprison- ment. Greater rigours followed, and for about a century the alumbrados afforded many victims to the Inquisition, especially at Cordova. The movement (under the name of Illumines) seems to have reached France from Seville in 1623, and attained some proportions in Picardy when joined (1634) by Pierre Guerin, cure of Saint-Georges de Roye, whose followers, known as Guerinets, were suppressed in 1635 (Hermant, Hist, des heresies, 17 17). Another and obscure body of Illumines came to light in the south of France in 1722, and appears to have lingered till 1794, having affinities with those known contem- poraneously in this country as " French Prophets," an offshoot of the Camisards. Of different class were the so-called Illuminati, better known as Rosicrucians, who claimed to originate in 1422, but rose into notice in 1537; a secret society, combining with the mysteries of alchemy the possession of esoteric principles of religion. Their positions are embodied in three anonymous treatises of 1614 (Richard et Giraud, Did. de la thiol, cath.). A short-lived movement of republican freethought, to whose adherents the name Illuminati was given, was founded on May-day 1776 by Adam Weishaupt (d. 1830), professor of Canon Law at Ingolstadt, an ex-Jesuit. The chosen title of this Order or Society was Perfectibilists {Pcrfcklibilistcn). Its members, pledged to obedience to their superiors, were divided into three main classes; the first including ," novices," " mincrvals " and "lesser illuminati"; the second consisting of freemasons, " ordinary," " Scottish " and " Scottish knights " ; the third or " mystery " class comprising two grades of " priest " and " regent " and of " magus " and " king." Relations with masonic lodges were established at Munich and Freising in 1780. The order had its branches in most countries of the European continent, but its total numbers never seem to have exceeded two thousand. The scheme had its attraction for literary men, such as Goethe and Herder, and even for the reigning dukes of Gotha and Weimar. Internal rupture preceded its downfall, which was effected by an edict of the Bavarian government in 1785. Later, the title Illuminati was given to the French Martinists, founded in 1754 by Martinez Pasqualis, and to their imitators, the Russian Martinists, headed about 1 790 by Professor Schwartz of Moscow; both were Cabalists and allegorists, imbibing ideas from Jakob

Boehme and Emmanuel Swedcnborg (Bergier, Did. de thiol.).

See (especially for details of the movement of Weishaupt,) P. Tschackert, in Hauck's Realencyklopddie (1901). (A. Go.)*

ILLUMINATION, in optics, the intensity of the light falling upon a surface. The measurement of the illumination is termed photometry (q.v.). The fundamental law of illumination is that if the medium be transparent the intensity of illumination which a luminous point can produce on a surface directly exposed to it is inversely as the square of the distance. The word trans-

parent implies that no light is absorbed or stopped. Whatever, therefore, leaves the source of light must in succession pass through each of a series of spherical surfaces described round the source as centre. The same amount of light falls perpendicu- larly on all these surfaces in succession. The amount received in a given time by a unit of surface on each is therefore inversely as the number of such units in each. But the surfaces of spheres are as the squares of their radii, — whence the proposition. (We assume here that the velocity of light is constant, and that the source gives out its light uniformly.) When the rays fall otherwise than perpendicularly on the surface, the illumina- tion produced is proportional to the cosine of the angle of obliquity; for the area seen under a given spherical angle increases as the secant of the obliquity, the distance remain- ing the same.

As a corollary to this we have the further proposition that the apparent brightness of a luminous surface (seen through a transparent homogeneous medium) is the same at all distances. The word brightness is here taken as a measure of the amount of light falling on the pupil per unit of spherical angle subtended by the luminous surface. The spherical angle subtended by any small surface whose plane is at right angles to the line of sight is inversely as the square of the distance. So also is the light received from it. Hence the brightness is the same at all distances.

The word brightness is often used (even scientifically) in another sense from that just defined. Thus we speak of a bright star, of the question — When is Venus at its brightest? &c. Strictly, such expressions are not defensible except for sources of light which (like a star) have no apparent surface, so that we cannot tell from what amount of spherical angle their light appears to come. In that case the spherical angle is, for want of knowledge, assumed to be the same for all, and therefore the brightness of each is now estimated in terms of the whole quantity of light we receive from it.

The function of a telescope is to increase the " apparent magnitude " of distant objects; it does not increase the ■" ap- parent brightness." If we put out of account the loss of light by reflection at glass surfaces (or by imperfect reflection at metallic surfaces) and by absorption, and suppose that the magnifying power does not exceed the ratio of the aperture of the object-glass to that of the pupil, under which condition the pupil will be filled with light, we may say that the " apparent brightness " is absolutely unchanged by the use of a telescope. In this statement, however, two reservations must be admitted. If the object under examination, like a fixed star, have no sensible apparent magnitude, the conception of " apparent brightness " is altogether inapplicable, and we are concerned only with the total quantity of light reaching the eye. Again, it is found that the visibility of an object seen against a black background depends not only upon the " apparent brightness " but also upon the apparent magnitude. If two or three crosses of different sizes be cut out of the same piece of white paper, and be erected against a black background on the further side of a nearly dark room, the smaller ones become invisible in a light still sufficient to show the larger. Under these circumstances a suitable telescope may of course bring also the smaller objects into view. The explanation is probably to be sought in imperfect action of the lens of the eye when the pupil is dilated to the utmost. Lord Rayleigh found that in a nearly dark room he became distinctly short-sighted, a defect of which there is no trace whatever in a moderate light. If this view be correct, the brightness of the image on the retina is really less in the case of a small than in the case of a large object, although the so-called apparent brightnesses may be the same. However this may be, the utility of a night-glass is beyond dispute.

The general law that (apart from the accidental losses men- tioned above) the " apparent brightness " depends only upon the area of the pupil filled with light, though often ill under- stood, has been established for a long time, as the follow-ing quotation from Smith's Optics (Cambridge, 1738), p. 113, will show: —

ILLUSTRATION

321

" Since the magnitude of the pupil is subject to be varied by various degrees of light, let NO be its semi-diameter when the object PL is viewed by the naked eye from the distance OP ; and upon a plane that touches the eye at O, let OK be the semi-diameter of the greatest area, visible through all the glasses to another eye at P, to be found

as PL was; or, which is the same thing, let OK be the semi-diameter of the greatest area inlightened by a pencil of rays flowing from P through all the glasses; and when this area is not less than the area of the pupil, the point P will appear just as bright through all the glasses as it would do if they were removed ; but if the inlightened area be less than the area of the pupil, the point P will appear less bright through the glasses than if they were removed in the same proportion as the inlightened area is less than the pupil. And these proportions of apparent brightness would be accurate if all the incident rays were transmitted through the glasses to the eye, or if only an insensible part of them were stopt."

A very important fact connected with our present subject is: The brightness of a self-luminous surface does not depend upon its inclination to the line of sight. Thus a red-hot ball of iron, free from scales of oxide, &c, appears flat in the dark; so, also, the sun, seen through mist, appears as a flat disk. This fact, however, depends ultimately upon the second law of thermodynamics (see Radiation). It may be stated, however, in another form, in which its connexion with what precedes is more obvious — The amount of radiation, in any direction, from a luminous surface is proportional to the cosine of the obliquity.

The flow of light (if we may so call it) in straight lines from the luminous point, with constant velocity, leads, as we have seen, to the expression >ir _2 (where r is the distance from the luminous point) for the quantity of light which passes through unit of surface perpendicular to the ray in unit of time, p. being a quantity indicating the rate at which light is emitted by the source. This represents the illumination of the surface on which it falls. The flow through unit of surface whose normal is inclined at an angle to the ray is of course m'' -2 cos 8, again representing the illumination. These are precisely the expressions for the gravitation force exerted by a particle of mass m on a unit of matter at distance r, and for its resolved part in a given direction. Hence we may employ an expression V = 2/tr _1 , which is exactly analogous to the gravitation or electric potential, for the purpose of calculating the effect due to any number of separate sources of light.

And the fundamental proposition in potentials, viz. that, if n be the external normal at any point of a closed surface, the integral ff(d\/ dn)dS, taken over the whole surface, has the value — 4^0, where mo is the sum of the values of ju for each source lying within the surface, follows almost intuitively from the mere consideration of what it means as regards light. For every source external to the closed

surface sends in light which goes out again. But the light from an internal source goes wholly out; and the amount per second from each unit source is 471-, the total area of the unit sphere surrounding the source.

It is well to observe, however, that the analogy is not quite complete. To make it so, all the sources must lie on the same side of the surface whose illumination we are dealing with. This is due to the fact that, in order that a surface may be illuminated at all, it must be capable of scattering light, i.e. it must be to some extent opaque. Hence the illumination depends mainly upon those sources which are on the same side as that from which it is regarded.

Though this process bears some resemblance to the heat analogy employed by Lord Kelvin (Sir W. Thomson) for investigations in statical electricity and to Clerk Maxwell's device of an incompressible fluid without mass, it is by no means identical with them. Each method deals with a substance, real or imaginary, which flows in conical streams from a source so that the same amount of it passes per second through every section of the cone. But in the present process the velocity is constant and the density variable, while in the others the density is virtually constant and the velocity variable. There is a curious reciprocity in formulae such as we have just given. For instance, it is easily seen that the light received from a uniformly illuminated surface is represented by ffr~- cos 6dS.

As we have seen that this integral vanishes for a closed surface which has no source inside, its value is the same for all shells of equal uniform brightness whose edges lie on the same cone.

ILLUSTRATION. In a general sense, illustration (or the art of representing pictorially some idea which has been expressed in words) is as old as Art itself. There has never been a time since civilization began when artists were not prompted to pictorial themes from legendary, historical or literary sources. But the art of illustration, as now understood, is a comparatively modern product. The tendency of modern culture has been to make the interests of the different arts ovferlap. The theory of Wagner, as applied to opera, for making a combined appeal

to the artistic emotions, has been also the underlying principle in the development of that great body of artistic production which in painting gives us the picture containing " literary " elements, and, in actual association with literature in its printed form, becomes what we call " illustration." The illustrator's work is the complement of

expression in some other medium. A poem can hardly exist which does not awaken in the mind at some moment a suggestion either of picture or music. The sensitive temperament of the artist or the musician is able to realize out of words some parallel idea which can only be con- veyed, or can be best conveyed, through his own medium of music or painting. Similarly, music or painting may, and often does, suggest poetry. It is from this inter-relation of the emotions governing the different arts that illustration may be said to spring. The success of illustration lies, then, in the instinctive transference of an idea from one medium to another; the more spontaneous it be and the less laboured in application, the better. Leaving on one side the illuminated manuscripts of the middle ages (see Illuminated MSS.) we start with the fact that illustration was coincident with the invention of printing. Italian art produced many fine examples, notably the outline illustrations to the Poliphili Hypneratomachia, printed by Aldus at Venice in the last year of the 15th century. Other early works exist, the products of unnamed artists of the French, German, Spanish and Italian schools; while of more singular importance, though not then brought into book form, were the illustrations to Dante's Divine Comedy made by Botticelli at about the same period. The sudden development of engraving on metal and wood drew many painters of the Renaissance towards illustration as a further opportunity for the exercise of their powers; and the line- work, either original or engraved by others, of Pollajuolo, Mantegna, Michelangelo and Titian has its place in the gradual enlargement of illustrative art. The German school of the 16th century committed its energies even more vigorously to illustration; and many of its artists are now known chiefly through their engravings on wood or copper, a good proportion of which were done to the accompaniment of printed matter. The names of Diirer, Burgmair, Altdorfer and Holbein represent a school whose engraved illustrations possess qualities which have never been rivalled, and remain an invaluable aid to imitators of the present day.

Illustration has generally flourished in any particular age in proportion to the health and vigour of the artistic productions in other kinds. No evident revival in painting has come about, no great school has existed during the last four centuries, which has not set its mark upon the illustration of the period and quickened it into a medium for true artistic expression. The etchers of the Low Countries during the 17th century, with Rembrandt at their head, were to a great extent illustrators in their choice of subjects. In France the period of Watteau and Fragonard gave rise to a school of delicately engraved illustration, exquisite in detail and invention. In England

*Hogarth came to be the founder of many new conditions, both in painting and illustration, and was followed by men of genius so distinct as Reynolds on the one side and Bewick on the other. With Reynolds one connects the illustrators and engravers for whom now Bartolozzi supplies a surviving name and an embodiment in his graceful but never quite English art. But it is from Thomas Bewick that the wonderfully consistent development of English illustration begins to date. Bewick marks an important period in the technical history of wood- engraving as the practical inventor of the " tint " " _ and " white line " method of wood-cutting; but he y * ress also happened to be an artist. His artistic device England. was to give local colour and texture without shadow, securing thereby a precision of outline which allowed no form to be lost. And though, in consequence, many of his best designs have somewhat the air of a-specimen plate, he succeeded in bringing into black-and-white illustration an element of colour which had been wholly absent from it in the work of the 15th and 16th century German and Italian schools. Bewick's method started a new school; but the more racy qualities*

of his woodcuts were entirely dependent on the designer being his own cutter; and the same happy relationship gave distinct characteristics to the nearly contemporary work of William Blake and of Calvert. Blake's wonderful Illustrations to the Book of Job, while magnificent in their conventional rendering of light and shade, still retain the colourlessness of the old masters, as do also the more broadly handled designs to his own books of prophecy and verse; but in his woodcuts to Philips's Pastorals the modern tendency towards local colour makes itself strongly felt. So wonderfully, indeed, have colour and tone been expressed in these rough wood-blocks, that more vivid impressions of darkness and twilight falling across quiet landscape have never been produced through the same materials. The pastoral designs made by Edward Calvert on similar lines can hardly be over-praised. Technically these engravings are far more able than those from which they drew their inspiration. With the exception of the two artists named, and in a minor degree of Thomas Stothard and John Flaxman, who also pro- duced original illustrations, the period from the end of the 18th century till about the middle of the 19th was less notable for the work of the designer than of the engraver. The delicate plates to Rogers's Italy were done from drawings which Turner had not produced for purposes of illustration; and the admirable lithographs of Samuel Prout and Richard Bonington were merely studies of architecture and landscape made in a material that admitted of indefinite multiplication. It is true that Gericault came over to England about the year 1820 to draw the English race-horse and other studies of country life, which were published in London in 1821, and that other fine work in lithography was done by James Ward, G. Cattermole, and somewhat later by J. F. Lewis. But illustration proper, subject-illustration applied to literature, was mainly in the hands of the wood-engravers; and these, forming a really fine school founded on the lines which Bewick had laid down, had for about thirty years to content themselves with rendering the works of ephemeral artists, among whom Benjamin R. Haydon and John Martin stand out as the chief lights. It must not be forgotten, however, that while the day of a serious English school of illustration had not yet come, Great Britain possessed an indigenous tradition of gross and lively caricature; a tradition of such robust force and vulgarity that, by the side of some choicer specimens of James Gillray and Henry W. Bunbury, the art of Rowlandson appears almost refined. This was the school in which George Cruikshank, John Leech, and the Dickens illustrators had their training, from which they drew more and more away; until, with the help of Punch, just before the middle of the 19th century, English

*caricaturists had learned the secret of how to be apposite and amusing without scurrility and without libel. (See Caricature.) Under Newspapers will be found some account of the rise of illustrated journalism. It was in about the year 1832 that the illustrated weekly paper started on its career '"/u/lfd * n England, and almost by accident determined engraving. un der what form a great national art was to develop itself. While in France the illustrators were making their triumphs by means of lithography, English illustration was becoming more and more identified with wood-engraving. The demand for a method of illustration, easy to produce and easy to print, for books and magazines of large circulation and moderate price, forced the artist before long into drawing upon the wood itself; and so soon as the artist had asserted his pre- ference for facsimile over " tint," the school which came to be called " of the 'sixties " was in embryo, and waited only for artistic power to give it distinction. The engraver's translation of the artist's painting or wash-drawing into " tint " had largely exalted the individuality of the engraver at the expense of the artist. But from the moment when the designer began to put his own lines upon the wood, new conditions shaped themselves; and though the artist at times might make demands which the engraver could not follow, or the engraver inadequately fulfil the expectation of the artist, the general tendency was to bring designer and engraver into almo6t ideal relations — an ideal which nothing short of the artist being his own engraver could*

have equalled. Out of an alliance cemented by their common use and understanding of the material on which they worked came the school of facsimile or partial-facsimile engraving which flourished during the 'sixties, and lasted just so long as its conditions were unimpaired — losing its flavour only at the moment when " improved " mechanical appliances enabled the artist once more to dissociate himself from the conditions which bound the engraver in his craft.

Before the fortunate circumstances which governed the work of the 'sixties became decisive, illustrations of a transitional character, but tending to the same end, had been pˆ,. produced by John Tenniel, John Gilbert, Birket Raphaelite Foster, Harrison Weir, T. Creswick, W. Mulready move- and others; but their methods were too vague and men ' diffuse to bear as yet the mark of a school; no single influence gave a unity to their efforts. On some of them Adolf von Menzel's illustrations to Kiigler's Frederick the Great, published in England in 1844, may have left a mark; Gilbert certainly shows traces of the influence of Delacroix and Bonington in the free, loose method of his draughtsmanship, independent of accurate modelling, and with here and there a paint-like dab of black to relieve a

generally colourless effect; while Tenniel, with cold, precise lines of wire-drawn hardness, remained the representative of the past academic style, influencing others by the dignity of his fine technique, but with his own feeling quite untouched by the Pre-Raphaelite and romantic movement which was soon to occupy the world of illustration. In greater or less degree it may be said of the work of all these artists that, as it antedates, so to the end does it stand somewhat removed in character from, the school with which for a time it became contemporary. The year which decisively marked the beginning of new things in illustration was 1857, the year of the Moxon Tennyson and of Wilmott's Poets of the Nineteenth Century, with illustrations by Rossetti, Millais, Holman Hunt and Ford Madox Brown. In these artists we get the germ of the movement which afterwards came to have so wide a popularity. At the beginning, Pre- Raphaelite in name, poetic and literary in its choice of subjects, the school quickly expanded to an acceptance of those open-air and everyday subjects which one connects with the names of Frederick Walker, Arthur B. Houghton, G. F. Pinwell and M. North. The illustrations of the Pre-Raphaelites were eminently thoughtful, full of symbolism, and with a certain pressure of interest to which the epithet of " intense " came to be applied. As an example of their method of thought-transference from word to form, Madox Brown's drawing for the Dalziel Bible of " Elijah and the Widow's Son " may be taken. The restoration of life to a dead body, of a child to its mother, is there conveyed with many illustrative touches and asides, which become clumsy when stated in words. The hen bearing her chicken between her wings is a perfectly direct and appropriate pictorial symbol, but a far more imaginative stroke is the shadow on the wall of a swallow flying back to the clay bottle where it has made its nest. Here is illustration full of literary symbolism, yet wholly pictorial in its means; and in this it is entirely characteristic of Pre-Raphaelite feeling, with its method of suggesting, through externals, consideration as opposed to mere outlook. Of this phase Rossetti must be accounted the leader, but it was Millais who, by the sheer weight of his personality, carried English illustration along with him from Pre-Raphaelitism to the freer romanticism and naturalistic tendencies of the 'sixties. Rossetti, with his poetic enthusiasm, his strong personal magnetism and dramatic power of composition, may be said to have brought about the awakening; it was Millais who, by his rapid develop- ment of style, his original and daring technique, turned it into a movement. When he started, there ot jamais. were many influences behind him and his fellow- workers — among older foreign contemporaries, those of Menzel and Rethel; and behind these again something of the old masters. But through a transitional

period, represented by his twelve drawings of " The Parables," which appeared first in Good Words, Milla'is emerged in to the perfect independence of his illustrations to Trollope's novels, Framley Parsonage and ,T7»e

Smalt House at Allinglon, his own master and the master of a new school. Depicting the ugly fashions of his day with grave dignity and distinction, and with a broad power of rendering type in work which had the aspect of genre, he drew the picture of his age in a summary so embracing that his illustrations attain the rank almost of historical art. For art of this sort the symbolism of the Pre-Raphaelites lost its use: the realization in form of a character conveyed by an author's words, the happy suggestion of a locality helping to fix the writer's description, the verisimilitudes of ordinary life, even to trivial detail, carried out with real pictorial conviction, were the things most to be aimed at. Pictorial conviction was the great mark of the illustrative school of the 'sixties. The work of its artists has absorbed so completely the interest and reality of the letterpress that the results are a model of what faithful yet imaginative illustration should be. In the illustrated magazines of this period, Once a Week, Good Words, Cornhill, London Society, The Argosy, The Leisure Hour, Sunday at Home, The Quiver and The Churchman's Family Magazine, as well as others, is to be found the best work of this new school of illustrators; and with the greater number of them it cannot be mistaken that Millais is the prevailing force.

By their side other men were working, more deeply influenced by the old masters, and by the minuteness and hard, definite treatment of form which the Pre-Raphaelite school had inculcated. Foremost of these was Frederick Sandys. His illustrations, scattered through nearly all the magazines which have been named, show always a decorative power of design and are full of fine drawing and fine invention, but remain resolutely cold in handling and lacking in imaginative ardour. The few illus- trations done by Burne- Jones at this period show a whole- hearted following of Rossetti, but a somewhat struggling technique; and the same qualities are to be found in the work of Arthur Hughes, whose illustrations in Good Words for the Young (1869) have a charm of tender poetic invention showing through the faults and persistent uncertainty of his draughtsmanship. The illustrations of Frederick Shields to Defoe's

History of the Plague have a certain affinity to the work of Sandys; but, with less power over form, they show a more dramatic sense of light and shade, and at their best can claim reai and original beauty. The formality of feeling and composition, and the strained, stiff quality of line in Lord Leighton's designs to Ramola (1863), do a good deal to mar one's enjoyment of their admirable draughtsmanship. Many fine drawings done at this period by Leighton, Poynter, Henry Armstead and Burne- Jones did not appear until the year i$8o in the " Dalziel Bible Gallery," when the methods of which they were the outcome had fallen almost out of use.

Deeply influenced by the broad later phases of Millais's black- and-white work were those artists whose tendency lay in the „_. direction of idyllic naturalism and popular romance,

'sixties." tne men to whom more particularly is given the name of the period and school " the 'sixties," and whose more immediate leader, as far as popular estimation goes, was Frederick Walker. With his, one may roughly group the names of Pinwell, Houghton, North, Charles Keene, Lawless, Matthew J. Mahoney, Morten and, with a certain reservation, W. Small and G. du Maurier. In no very separate category stand two other artists whose contributions to illustration were but incidental, John Pettie and J. M'Neill Whistler. The broad characteristics of this variously related group were a loose, easy line suggestive of movement, a general fondness for white spaces and open-air effects, and in the best of them a thorough sense of the serious beauty of domestic and rural life. They treated the present with a feeling rather idyllic than realistic; when they touched the past it was with a courteous sort of realism, and a wonderful inventiveness of detail which carried with it a Charm of conviction. Walker's method shows a broad and vivid use of black and white, with a fine sense of balance, but very little preoccupation for decorative effect. Pinwell had a more delicate fancy, but less freedom in his technique — less ease, but more originality of composition. In Houghton's work one sees

a swift, masterful technique, full of audacity, noble in its economy of means, sometimes rough and careless. His temperament was dramatic, passionate, satiric and witty. Some of his best work, his " Scenes from American Life," appeared in the pages of the Graphic as late as the years 1873-1874. There are indications in the work of Lawless that he might have come close to Millais in his power of infusing distinction into the barest materials of everyday life, but he died too soon for his work to reach its full accomplishment. North was essentially a landscape illustrator. The delicate sense of beauty

in du Maimer's early work became lost in the formal but graceful conventions of his later Punch drawings. It was in the pages of Punch that Keene secured his chief triumphs. The two last-named artists outstayed the day which saw the break-up of the school of which these are the leading names. It ran its course through a period when illustrated magazines formed the staple of popular consumption, before the illustrated newspapers, with their hungry rush for the record of latest events, became a weekly feature. Its waning influence may be plainly traced through the early years of the Graphic, which started in 1869 with some really fine work, done under transitional conditions before the engraver's rendering of tone-drawings once more ousted facsimile from its high place in illustration.

In connexion with this transitional period, drawings for the Graphic by Houghton, Pinwell, Sir Hubert von Herkomer, E. J. Gregory, H. Woods, Charles Green, H. Paterson (Mrs Allingham) and William Small deserve honourable mention. Yet it was the last-named who was mainly instrumental in bring- ing about the change from line-work to pigment, which depressed the artistic value of illustration during the 'seventies and the 'eighties to almost absolute mediocrity. Several artists of great ability practised illustration during this period: in addition to those Graphic artists already mentioned there were Luke Fildes, Frank Holl, S- P. Hall, Paul Renouard and a few others of smaller merit. But the interest was for the time shifting from black- and-white work and turning to colour. Kate Greenaway began to produce her charming idyllic renderings of children in mob-caps and long skirts. Walter Crane on somewhat similar lines designed his illustrated nursery rhymes; while Randolph Caldecott took the field with his fresh and breezy scenes of hunting life and carousal in the times most typical of the English squirearchy. Working with a broad outline, suggestive of the brush by its easy freedom, and adding washes of conventional colour for embellishment, he was one of the first in England to show the beginnings of Japanese influence. Even more dependent upon colour were his illustrated books for children; while in black and white, in his illustrations to Bracebridge Hall (1876), for instance, pen and ink began to replace the pencil, and to produce a new and more independent style of draughts- manship. This style was taken up and followed by many artists of ability, by Harry Furniss, Hugh Thomson and others, till the influence of E. A. Abbey's more mobile and more elaborate penmanship came to produce a still further development in the direction of fineness and illusion, and that of Phil May, with Linley Sambourne for his teacher, to simplify and make broad for

those who aimed rather at a journalistic and shorthand method of illustration. (See also Caricature and Cartoon".)

Under the absolutely liberating conditions of " process repro* duction " (see Process) the latest developments in illustration on its lighter and more popular side are full of French influences, or ready to follow the wind in any fresh direction, whether to America or Japan; but on the graver side they show a strong leaning towards the older traditions of the 'sixties and of Pre-Raphaelitism. The founding by William Morris of the Kelmscott Press in 1891, through which were produced a series of decorated and illustrated books, aimed frankly at a revival of medieval taste. In Morris's books decorative effect and sense of material claimed mastery over the whole scheme, and subdued the illustrations to a sort of glorious captivity into which no breath of modern spirit could be breathed. The illustrations of Burne-Jones filled with a happy touch of archaism the decorative borders of William Morris ; and only a little less happy, apart from their imaginative inferiority, were the serious efforts of Walter Crane and one or two others. Directly under the Morris influence arose the " Birmingham school," with an entire devotion to decorative methods and still archaic effects which

tended sometimes to rather inane technical results. Among its leaders may be named Arthur Gaskin, C. M. Gere and E. H. New; while work not dissimilar but more independent in spirit had already been done by Selwyn Image and H. P. Home in the Century Guild Hobby-Horse. But far greater originality and force belonged to the work of a group, known for a time as the neo-Pre-Raphaelites, which joined to an earnest study of the past a scrupulously open mind towards more modern influences. Its earliest expression of existence was the publication of an occasional periodical, the Dial (1889-1897), but before long its influence became felt outside its first narrow limits. The technical influence of Abbey, but still more the emotional and intellectual teaching of Rossetti and Millais, together with side-influences from the few great French symbolists, were, apart from their own originality, the forces which gave dis- tinction to the work of C. S. Ricketts, C. H. Shannon, R. Savage and their immediate following. Beauty of line, languorous passion, symbolism full of literary allusions, and a fondness for the life of any age but the present, are the characteristics of the school. Their influence fell very much in the same quarters where Morris found a welcome; but an

affinity for the Italian rather than the German masters (shown especially in the " Vale Press " publications), and a studied note of world-weariness, kept them somewhat apart from the sturdy medievalism of Morris, and linked them intellectually with the decadent school initiated by the wayward genius of Aubrey Beardsley. But though broadly men may be classed in groups, no grouping will supply a formula for all the noteworthy work produced when men are drawn this way and that by current influences. Among artists resolutely independent of contemporary coteries may be named \V. Strang, whose grave, rugged work shows him a pupil, through Legros, of Diirer and others of the old masters; T. Sturgc Moore, an original engraver of designs which have an equal affinity for Blake, Calvert and Hokusai; W. Nicholson, whose style shows a dignified return to the best part of the Rowlandson tradition; and E. J. Sullivan. In the closing years of the 19th century Aubrey Beardsley became the creator of an entirely novel style of decorative illustration. Drawing inspiration from all sources of European and Japanese art, he produced, by the force of a vivid personality and extraordinary technical skill, a result which was highly original and impressive. To a genuine liking for analysis of repulsive and vicious types of. humanity he added an exquisite sense of line, balance and mass; and partly by succcs de scandale, partly by genuine artistic brilliance, he gathered round him a host of imitators, to whom, for the most part, he was able to impart only his more mediocre qualities.

In America, until a comparatively recent date, illustration bowed the knee to the superior excellence of the engraver over the artist. Not untd the brilliant pen-drawing of E. A. Abbey carried the day with the black-and-white artists of England did any work of real moment emanate from the United States, unless that of Elihu Vedder be regarded as an exception. Howard Pyle is a brilliant imitator of Diirer; -he has also the ability to adapt himself to draughtsmanship of a more modern tendency. C. S. Reinhart was an artist of directness and force, in a style based upon modern French and German examples; while of greater originality as a whole, though derivative in detail, is the fanciful penmanship of Alfred Brennan. Other artists who stand in the front rank of American illustrators, and whose works appear chiefly in the pages of Scribner's, Harper's and the Century Magazine, are W. T. Smedley, F. S. Church, R. Blum, Wenzell, A. B. Frost, and in particular C. Dana Gibson, the last of whom gained a reputation in England as an American du Maurier.

The record of modern French illustration goes back to the day when

political caricature and the Napoleonic legend divided be- tween them the triumphs of early lithography. The hrance. illustrators of France at that period were also her greatest artists. Of the historical and romantic school were D. Raffet, Nicholas J. Charlet, Gcricault, Delacroix, I. B. Isabey and Achille Deveria, many of whose works appeared in V Artiste, a paper founded in 1 831 as the official organ of the romanticists; while the realists were led in the direction of caricature by two artists of such enormous force as Gavarni and Honore Daumier, whose works, appearing in La Lithographie Mensuelle, Le Charivari and La Caricature, ran the gauntlet of political interference and suppression during a troubled period of French politics — which was the very cause of their prosperity. Behind these men lay the influence of the great Spanish realist Goya. Following upon the harsh satire and venomous realism of this famous school of pictorial invective, the influence of the Barbizon school came as a milder force; but the power of its artists did not show in the direction of original lithography, and far more value attaches to the few woodcuts of J. F. Millet's studies of peasant life. In these we see clearly the tendency of French illustrative art to keep as far as possible the authentic and sketch-like touch of the artist; and it was no doubt from this tendency that so many of the great French illustrators retained lithography rather than commit themselves to the middle- man engraver. Nevertheless, from about the year 1830 many French artists produced illustrations which were interpreted upon the wood for the most part by English engravers. Cunier's editions of Paid el Virginie and La Chaumlere Indienne, illustrated by Huet, Jacque, Isabey, Johannot and Meissonier, were followed by

United States.

Meissonier's more famous illustrations to Contes r&mois. Aftei Meissonier came J. B. E. Detaille and Alphonse M. de Neuville and, with a voluminous style of his own, L. A. G. Dore. By the majority of these artists the drawing for the engraver seems to have been done with the pen ; and the tendency to penmanship was still more accentuated when from Spain came the influence of M. J. Fortuny's brilliant technique; while after him, again, came Daniel Vierge, to make, as it were, the point of the pen still more pointed During the middle period of the 19th century the best French illustration was serious in character; but among the later men, when we have recognized the grave beauty of Grassct's Les Quatre Fils d'Aymon (in spite of his vicious treatment of the page by flooding washes of colour through the type itself), and the delicate grace of Boutet de Monvel's Jeanne d'Arc, also in colours, it is to the illustrators of the comic papers that we have to go for the most typical and most

audacious specimens of French art. In the pages of Gil Bias, Le Pierrot, L'Echo de Paris, Le Figaro Illustre, Le Courrier Francais, and similar publications, are to be found, reproduced with a dexterity of process unsurpassed in England, the designs of J. L. Forain, C. L. Leandre, L. A, Willette and T. A. Steinlen, the leaders of a school enterprising in technique, and with a mixture of subtlety and grossness in its humour. Caran d'Ache also became celebrated as a draughtsman of comic drama in outline.

Among illustrators of Teutonic race the one artist who seems worthy of comparison with the great Menzel is Hans Tegner, if, indeed, he be not in some respects his technical superior; but apart from these two, the illustrators respectively of aerma "y- Ktlgler's Frederick the Great and Holberg's Comedies, there is no German, Danish or Dutch illustrator who can lay claim to first rank. Max Klinger, A. Bocklin, W. Triibner, Franz Stuck and Hans Thoma are all symbolists who combine in a singular degree force with brutality; the imaginative quality in their work is for the most part ruined by the hard, braggart way in which it is driven home. The achievements and tendency of the later school of illustration in Germany are best seen in the weekly illustrated journal, Jugend, of Munich. Typical of an older German school is the work of Adolf Oberliinder, a solid, scientific sort of caricaturist, whose illustrations are at times so monumental that the humour in them seems crushed out of life. Others who command high qualities of technique are W. Dietz, L. von Nagel, Hermann Vogel, H. Lilders and Robert Haug. Behind all these men in greater or less degree lies the influence of Menzel's coldly balanced arid dry- lighted realism; but wherever the influence of Menzel ceases, the merit of German illustration for the most part tends to disappear or become mediocre.

Authorities. — W. J. Linton, The Masters of Wood Engraving (London, 1889); C. G. Harper, English Pen Artists of To-day (London, 1892) ; Joseph Pennell, Pen Drawing and Pen Draughtsmen (London, 1894), Modern Illustration (London, 1895); Walter Crane, The Decorative Illustration of Books (London, 1896) ; Gleeson White, English Illustration: "The 'Sixties": 1855-1870 (Westminster, 1897) ; W. A. Chatto, A Treatise on Wood Engraving (London, n.d.) ; Bar-le-Duc, Les Illustrations du XIX" Steele (Paris, 1882); T. Kutschmann, Geschichte der deutschen Illustration vom ersten Auftreten des Formschnittes bis auf die Gegenwart (Berlin, 1899). (L. Ho.)

Technical Developments.

The history of illustration, apart from the merits of individual artists, during the period since the year 1875, is mainly that of the development of what is called Process (q.v.), the term applied to methods of reproducing a drawing or photograph which depend on the use of some mechanical agency in the making of the block, as distinguished from such products of manual skill as steel or wood-engraving, lithography and the like. There is good reason to believe that the art of stereotyping — the multiplication of an already existing block by means of moulds and casts — is as old as the 15th century; and the early processes were, in a measure, a refinement upon this: with the difference that they aimed at the making of a metal block by means of a cast of the lines of the drawing itself, the background of which had been cut away so as to leave the design in a definite relief. Experi- ments of this nature may be said to have assumed practical- shape from the time of the invention of Palmer's process called at first Glyphography, about the year 1844; this was afterwards perfected and used to a considerable extent under the name of Dawson's Typographic Etching, and its results were in many cases quite admirable, and often appear in books and periodicals of the first part of the period with which we are now concerned. The Graphic, for instance, published its first process block in 1876, and the Illustrated London News also made similar experi- ments at about the same time.

From this time begins the gradual application of photography to the uses of illustration, the first successful line blocks made by

its help being probably those of Gillot, at Paris, in the early 'eighties. The next stage was to be the invention of some means of reproducing wash drawings. To do this it was necessary for the surface of the block to be so broken up that every tone of the drawing should be represented thereon by a grain holding ink enough to reproduce it. This was finally accomplished by the insertion of a screen, in the camera, between the lens and the plate — the effect of which was to break up the whole surface of the negative into dots, and so secure, when printed on a zinc plate and etched, an approximation to the desired result. Half-tone blocks (as they were called) of this nature (see Process) were used in the Graphic from 1884 and the Illustrated London News from 1885 onwards, the methods at first in favour being those of Meisenbach and Boussod Valadonand Co.'s phototype. Lemercier and Petit of Paris, Angerer and Goschl of Vienna, and F.

Ives of Philadelphia also perfected processes giving a similar result, a block by the latter appearing in the Century magazine as early as 1882. Processes of this description had, however, been used for some years before by Henry Blackburn in his Academy Notes.

During the decade 1875-1885, however, the main body of illustration was accomplished by wood-engraving, which a few years earlier had achieved such splendid results. Its artistic qualities were now at a rather low ebb, although good facsimile engravings of pen-drawings were not infrequent. The two great illustrated periodicals already referred to during that period relied more upon pictorial than journalistic work. An increasing tendency towards the illustration of the events of the day was certainly shown, but the whole purpose of the journal was not, as at present, subordinated thereto. The chief illustrated magazines of the time, Harper's, the Century, the English Illustrated, were also content with the older methods, and are filled with wood-engravings, in which, if the value of the simple line forming the chief quality of the earlier work has dis- appeared, a most astonishing delicacy and success were obtained in the reproduction of tone.

Perhaps the most notable and most characteristic production of the time in England was colour-printing. The Graphic and the Illustrated London News published full-page supplements of high technical merit printed from wood-blocks in conjunction with metal plates, the latter sometimes having a relief aquatint surface which produced an effect of stipple upon the shading; metal was also used in preference to wood for the printing of certain colours. The children's books illustrated by Randolph Caldecott, Walter Crane and Kate Greenaway at this time are among the finest specimens of colour-printing yet seen outside of Japan; in them the use of flat masses of pleasant colour in connexion with a bold and simple outline was carried to a very high pitch of excellence. These plates were generally printed by Edmund Evans. In 1887 the use of process was becoming still more general; but its future was by no means adequately foreseen, and the blocks of this and the next few years are anything but satisfactory. This, it soon appeared, was due to inefficient printing on the one hand, and, on the other, to a want of recognition by artistsof the special qualities of drawing most suitable for photographic reproduction. The publication of Quevedo's Pablo de Segovia with illustrations by Daniel Vierge in 1882, although hardly noticed at the time, was to be a revelation of the possibilities of the new development; and a serious study of pen-drawing from this point of view was soon inaugurated by the issue of Joseph Pennell's Pen Drawing and Pen Draughtsmen in 1889, followed in i8q2 by C. G.

Harper's English Pen Artists of To-day and in 1896 by Walter Crane's Decorative Illustration of Books'. At this time also the influence of Aubrey Beardsley made itself strongly felt, not merely as a matter of style, but, by the use of simple line or mass of solid black, as an almost perfect type of the work most suitable to the needs of process. Wider experience of printing requirements, and finer workmanship in the actual making of the blocks, in Paris, Vienna, New York and London, soon brought the half-tone process into great vogue. The spread of education has enormously increased the demand for ephemeral literature, more especially that which lends itself to pictorial illus- tration ; and the photograph or drawing in wash reproduced in half-tone has of late to a great extent ousted line work from the better class of both books and periodicals.

Improvements in machinery have made it possible to print illustrations at a very high speed; and the facility with which photographs can now be taken of scenes such as the public delight to see reproduced in pictures has brought about an almost complete change in pictorial journalism. In addition, reference must be made to an extraordinary increase in the numbers and circulation of cheap periodical publications depending to a very large extent for popularity on their illustrations. Several of these, printed on the coarsest paper, from rotary machines, sell to _ the _ extent of hundreds of thousands of copies per week. It was inevitable that this cheapening process should not be permitted to develop without opposition, and the Dial (1889-1897) must be looked on as a protest by the band of artists who promoted it against the unintelligent book-making now becoming prevalent. Much more effective and far-reaching in the same direction was the influence of William Morris, as shown in the publications of the Kelmscott Press (dating from 1891). In these volumes the aim was to produce illustrations and ornaments which were of their own nature akin to. and thus able to harmonize with the type, and to do this by pure handicraft

work. As a result, a distinct improvement is to be found in the mere book-making of Great Britain; and although the main force of the movement soon spent itself in somewhat uninspired imitations, there can be no doubt of the survival of a taste for well-produced volumes, in which the relationship of type, paper, illustration and binding has been a matter of careful and artistic consideration. Under this influence, a notable feature has been the re-issue, in an excellent form, of illustrated editions of the works of most of the famous writers.

In France the general movement has proceeded upon lines on the

whole very similar. Process — especially what was called " Gillotage " — was adopted earlier, and used at first with greater liberality than in England, although wood-engraving has persisted effectively even up to our own time. In the various types of periodicals of which the Revue Illustree, Figaro Illustre and Gil Bias Illustre may be taken as examples, the most noticeable feature is a use of colour-printing, which is far in advance of anything generally attempted in Great Britain. A favourite and effective process is that employed for the reproduction of chalk drawings (as by Steinlen), which consists of the application of a surface-tint of colour from a metal plate to a print from an ordinary process block.

In Germany, Jugend, Simplicissimus, and other publications devoted to humour and caricature, employ colour-printing to a great extent with success. The organ of the artists of the younger German schools, Pan (1895), makes use of every means of illustra- tion, and has especially cultivated lithography and wood-cuts, using these arts effectively but with some eccentricity. Holland has also employed coloured lithography for a remarkable series of children's books illustrated by van Hoytema and others. The Viennese Kunst und Kunslhandwerk is an art publication which is exceptionally well produced and printed.

Illustration in the United States has some few characteristics which differentiate it from that of other countries. The later school of fine wood-engraving is even yet in existence. American artists also introduced an effective use of the process block, namely, the engraving or working over of the whole or certain portions of it by hand. This is generally done by an engraver, but in certain cases it has been the work of the original draughtsman, and its possi- bilities have been foreseen by him in making his drawing. The only other variant of note is the use of half-tone blocks super- imposed for various colours. (E. F. S.)

ILLUSTRES, the Latin name given to the highest magistrates of the later Roman Empire. The designation was at first informal, and not strictly differentiated from other marks of honour. From the time of Valentinian I. it became an official title of the consuls, the chief praefecti or ministers, and of the commanders-in-chief of the army. Its usage was eventually extended to lower grades of the imperial service, and to pension- aries from the order of the spectabiles. The Illustres were privileged to be tried in criminal cases by none but the emperor or his deputy, and to delegate procuratores to represent them in the courts.

See O. Hirschfeld in Sitzungsberichte der Berliner Akademie (1901), p. 594 sqq. ; and T. Hodgkin, Italy and her Invaders (Oxford, 1892),

1. 603-617.

ILLYRIA, a name applied to part of the Balkan Peninsula extending along the eastern shore of the Adriatic from Fiume to Durazzo, and inland as far as the Danube and the Servian

Morava. This region comprises the modern provinces or states of Dalmatia, Bosnia and Herzegovina, and Montenegro, with the southern half of Croatia-Slavonia, part of western Servia, the sanjak of Novibazar, and the extreme north of Albania. As the inhabitants of Illyria never attained complete political unity its landward boundaries were never clearly defined. Indeed, the very name seems originally to have been an ethno- logical rather than a geographical term; the older Greek historians usually wrote of " the Illyrians " (ol TXXupiot), while the names Ulyris (TXXfpts) or less commonly Illyria (TXXupia) came subsequently to be used of the indeterminate area inhabited by the Illyrian tribes, i.e. a region extending eastward from the Adriatic between Liburnia on the N. and Epirus on the S., and gradually shading off into the territories of kindred peoples towards Thrace. The Latin name Illyricum was not, unless at a very early period, synonymous with Illyria; it also may originally have signified the land inhabited by the Illyrians, but it became a political expression, and was applied to various divisions of the Roman Empire, the boundaries of which were frequently changed and often included an area far larger than Illyria properly so called. Vienna and Athens at different times formed part of Illyricum. but no geographer would ever have included these cities in Illvria.

Ethnology. — Little can be learned from written sources of the origin and character of the Illyrians. The Greek legend that Cadmus and Harmonia settled in Illyria and became the parents of Illyrius, the eponymous ancestor of the whole Illyrian people, has been interpreted as an indication that the Greeks recognized some affinity between themselves and the Illyrians; but this inference is based on insufficient data. Herodotus and other Greek historians represent the Illyriaiss as a barbarous people, who resembled the ruder tribes of Thrace. Both are described as tattooing their persons and offering human sacrifices to their gods. The women of Illyria seem to have

occupied a high position socially and even to have exercised political power. Queens are mentioned among their rulers. Fuller and more trustworthy information can be obtained from archaeological evidence. In Bosnia the lake-dwellings at Butmir, the cemeteries of Jezerine and Glasinac and other sites have yielded numerous stone and horn implements, iron and bronze ornaments, weapons, &c, and objects of more recent date fashioned in silver, tin, amber and even glass. These illustrate various stages in the development of primitive Illyrian civilization, from the neolithic age onward. The Hallstatt and La Tene cultures are especially well represented. (See W. Ridgeway, The Early Age of Greece, 1901; R. Munro, Bosnia-Herzegovina and Dalmatia, Edinburgh, 1900; and W. Radimsky, Die neolithische Station von Butmir, Vienna, 1895-1898.) Similar discoveries have been made in Dalmatia, as among the tumuli on the Sabbioncello promontory, and in Croatia-SIavonia. H. Kiepert (" tJber den Volkstamm der Leleges," in Monatsber. Berl. Akad., 1861, p. 114) sougM to prove that the Illyrians were akin to the Leleges; his theory was supported by E. Schrader, but is not generally accepted. In Dalmatia there appears to have been a large Celtic element, and Celtic place-names are common. The ancient Illyrian languages fall into two groups, the northern, closely connected with Venetic, and the southern, perhaps allied to Messapian and now probably represented by Albanian.

See K. Brugmann, Kurze vergleichende Grammaiik der In&o-gcrmanischen Sprachen (Strassburg, 1904) ; and his larger Grundriss der vergleichenden Grammaiik (2nd ed., Strassburg, 1897), with the authorities there quoted, especially P. Kretschraer, Einleitung in die Geschichte der Griechischen Sprachen (Gottingen, 1896): see also Albania.

History. — Greek colonization on the Illyrian seaboard probably began late in the 7th century B.C. or early in the 6th century. The most important settlements appear to have been at Epidamnus (Durazzo), Tragurium (Trau), Rhizon (near Cattaro), Salona (near Spalato), Epidaurum (Ragusavecchia), Zara and on the islands of Curzola, Lesina and Lissa. There is a collection of Greek coins from Illyria in the museum at Agram, and the researches of Professor F. Bulie and others at Salona (see Spalato)

have brought to light Greek inscriptions, Greek pottery, &c. dating from 600 B.C. But Greek influence seems never to have penetrated far into the interior, and even on the coast it was rapidly superseded by Latin civilization after the 3rd century b.c. Until then the Illyrian tribes appear to have lived in. a state of intermittent warfare with their neighbours and one another. They are said by Herodotus (ix. 43) to have attacked the temple of Delphi. Brasidas with his small army of Spartans was assaulted by them on his march (424 B.C.) across Thessaly and Macedonia to attack the Athenian colonies in Thrace.

The earlier history of the Macedonian kings is one constant struggle against the Illyrian tribes. The migrations of the. Celts at the beginning of the 4th century disturbed the country between the Danube and the Adriatic. The Scordisci and other Celtic tribes settled there, and forced the Illyrians towards the south. The necessities of defence seem to have united the Illyrians under a chief Bardylis (about 383 B.C.) and his son Clitus. Bardylis nearly succeeded in destroying the rising kingdom of Macedonia; King Amyntas II. was defeated, and a few years later Perdiccas was defeated and slain (359). But the great Philip crushed the Illyrians completely, and annexed part of their country. During the next century we hear of them as pirates. Issuing from the secluded harbours of the coast, they ravaged the shores of Italy and Greece, and preyed on the

commerce of the Adriatic. The Greeks applied to Rome for help. Teuta, the Illyrian queen, rejected the Roman demands for redress, and murdered the ambassadors; but the two Illyrian Wars (229 and 219 b.c.) ended in the submission of the Illyrians, a considerable part of their territory being annexed by the conquerors. Illyria, however, remained a powerful kingdom with its capital at Scodra (Scutari in Albania), until 180 B.C., when the Dalmatians declared themselves independent of Gentius or Genthius, the king of Illyria, and founded a republic with its capital at Delminium (see Dalmatia: History, on the site of Delminium).. In 168 Gentius came into conflict with the Romans, who conquered and annexed his country. Dalmatia was invaded by a Roman army under Gaius Marcius Figulus in 156, but Figulus was driven back to the Roman frontier, and in Dalmatia the Illyrians were not finally subdued until 165 years afterwards. Publius Scipio Nasica, who succeeded Figulus, captured Delminium, and in 119 L. Caecilius Metellus overran the country and received a triumph and the surname Dalmaticus. But in 51 a Dalmatian raid on Liburnia led to a renewal of hostilities; the Roman armies were often worsted, and although in 39 Asinius Pollio gained some successes (see Horace, Odes ii. r. 1 5) these appear to have been exaggerated, and it was not until Octavian took the field in person that the Dalmatians submitted in S3- (For an account of the war see Appian, Illyrica, 24-28; Dio Cassius xlix. 38; Livy, Epit. 131, 132). They again revolted in 16 and n, and in a.d. 6-9 joined the rebel Pannonians. Suetonius (Tiberius, 16) declares that they were the most formidable enemies with whom the Romans had had to contend since the Punic Wars. In a.d. 9, however, Tiberius entirely subjugated them, for which he was awarded a triumph in 12 (Dioi Cass. Iv. 23-29, Ivi. n-17; Veil. Pat. ii. 110-115). Thence- forward Dalmatia, Iapydia and Liburnia were united as the province of' Illyricum.

Latin civilization spread rapidly, the cultivation of the vine was; introduced, gold-mining was carried on in Bosnia, and flourishing commercial cities arose along the coast. Illyria became one of the best recruiting grounds for the Roman legions; and in troubled times many Illyrian soldiers fought their way up from the ranks to the imperial purple. Claudius, Aurelian, Probus, Diocletian and Maximian were all sons of Illyrian peasants. It is probable, however, that most of the highland tribes now represented by the Albanians remained almost unaffected by Roman influence. The importance of Illyricum caused its name to be extended to many neighbouring districts; in the 2nd century a.d. the lllyricus Limes included Noricum, Pannonia, Moesia, Dacia and Thrace. In the

reorganization of the empire by Diocletian (285) the diocese of Illyricum was created; it comprised Pannonia, Noricum and Dalmatia, while Dacia and Macedonia, together called Eastern Illyricum, were added later. Either Diocletian or after him Constantine made Illyricum one of the four prefectures, each governed by a prae] 'ictus praetorio, into which the empire was divided. This prefecture included Pannonia, Noricum, Crete and the entire Balkan peninsula except Thrace, which was attached by Conˆ stantine to the prefecture of the East. From the partition of the empire in 285 until 379 Illyricum was included in the Western Empire, but thenceforward Eastern Illyricum was annexed to the Eastern Empire; its frontier was almost identical with the line of demarcation between Latin-speaking and Greek-speaking peoples, and roughly corresponded to the boundary which now severs Latin from Greek Christianity in the Balkan peninsuja. The whole peninsula except Thrace was still known as Illyricurn, but was subdivided into Illyris Barbara; or Romana and Illyris Graeca (Eastern Illyricum with Greece and Crete). The Via Egnatia, the great line of road which connected Rome with Constantinople and the East, led across Illyricum from. Dyr- rachium to Thessalonica.*

In the 5th, century began a series of invasions which profoundly modified the ethnical character and the civilization of the Illyrians. In 441 and 447 their country was ravaged by the Huns. In 481 Dalmatia was added to the Ostrogothic kingdom, which already included the more northerly parts of Illyricum,

«.«, Pannonia and Noricum. Dalmatia was partially reconquered by Justinian in 536, but after 565 it was devastated by the Avars, and throughout the century bands of Slavonic invaders had been gradually establishing themselves in Iliyria, where, unlike the earlier barbarian conquerors, they formed permanent settlements. Between 600 and 650 the main body of the im- migrants occupied Ulyria (see Servia: History; and Slavs). It consisted of Croats and Serbs, two groups of tribes who spoke a single language and were so closely related that the origin of the distinction between them is obscure. The Croats settled in the western half of Iliyria, the Serbs in the eastern; thus the former came gradually under the influence of Italy and Roman Catholicism, the latter under the influence of Byzantium and the Greek Church. Hence the distinction between them became a marked difference of civilization and creed, which has always tended

to keep the Illyrian Slavs politically disunited.

The Croats and Serbs rapidly absorbed most of the Latinized Illyrians. But the wealthy and powerful city-states on the coast were strong enough to maintain their independence and their distinctively Italian character. Other Roman provincials took refuge in the mountains of the interior; these Mavrovlachi, as they were called (see Dalmatia: Population; and Vlachs), preserved their language and nationality for many centuries. The Illyrian tribes which had withstood the attraction of Roman civilization remained unconquered among the mountains of Albania and were never Slavonized. With these exceptions Iliyria became entirely Serbo-Croatian in population, language and culture.

The name of Iliyria had by this time disappeared from history. In literature it was preserved, and the scene of Shakespeare's comedy, Twelfth Night, is laid in Iliyria. Politically the name was revived in 1809, when the name Illyrian Provinces was given to Carniola, Dalmatia, Istria, Fiume, Gorz and Gradisca, and Trieste, with parts of Carinthia and Croatia; these territories were ceded by Austria to Italy at the peace of Schonnbrum (14th Oct. 1809). The Illyrian Provinces were occupied by French troops and governed in the interest of Napoleon; the republic of Ragusa was annexed to them in 181 1, but about the end of 1813 the French occupation ceased to be effective and the provinces reverted to Austria. The kingdom of Iliyria, which was constituted in 1816 out of the crown-lands of Carinthia, Carniola, Istria, Gbrz and Gradisca, and Trieste, formed until 1849 a kingdom of the Austrian crown. For the political propaganda known as Illyrism, see Crqatia-Slavonia: History.

Bibliography. — In addition to the authorities quoted above, see G-Zippel, Die romische Herrschaft in Illyrien bis auf Augustus (Leipzig, 1877); P. O. Bahn, Der Ursprung der rdmischen Provinz Illyrien (Grimma, 1876); J. Marquardt, Romische Staatsvenbaltung, i. (1881), p. 295; E. A. Freeman, " The Illyrian Emperors and their Land" {Historical Essays, series 3, 1879); C. Patsch in Pauly-Wissowa's Realencyklopadie, iv. pt. 2 (1901); Th. Mommsen, The Provinces of the Roman Empire (ed. F. Haverfield, 1909).

ILMENAU, a town and summer resort of Germany, in the grand-duchy of Saxe-Weimar, at the north foot of the Thuringian Forest, on the river Ilm, 30 m. by rail south of Erfurt. Pop. (1905) 11,222. The town, which stands picturesquely among wooded hills, is much frequented by visitors in the summer. It was a favourite resort of Goethe, who wrote here his Iphigenie, and often stayed at Gabelbach

in the neighbourhood. It has a grand-ducal palace, a Roman Catholic and two Evan- gelical churches, a sanatorium for nervous disorders, and several educational establishments. Its chief manufactures are glass and porcelain, toys, gloves and chemicals, and the town has tanneries and saw-mills. Formerly a part of the county of Henneberg, Ilmenau came in 163 1 into the possession of electoral Saxony, afterwards passing to Saxe-Weimar.

See R. Springer, Die klassischen Statten von Jena und Ilmenau (Berlin, 1869); Pasig, Goethe und Ilmenau (2nd ed., Weimar, 1902); and Fils, Bad Ilmenau und seine f/mge6«»g(.Hildburghausen, 1886).

ILMENITE, a mineral known also as titanic iron, formerly regarded as an iron and titanium sesquioxide (Fe,Ti)20 a isomor.- phous with haematite (FeaOs), but now generally considered to be an iron titanate FeTi0 3 isomorphous with pyrophanite (MnTi0 3) and geikielite (MgTiOj) . It crystallizes in the parallel-

faced hemihedral class of the rhombohedral system, thus having the same degree of symmetry as phenacite and pyrophanite, but differing from that of haematite. The angles between the faces are very nearly the same as between the corresponding faces of haematite; but it is to be noted that the rhombohedral angle (94 29') of ilmenite is not intermediate between that of haematite (94 o') and of the artificially prepared crystals of titanium sesquioxide (92° 40'), which should be the case if the three substances were isomorphous. Analyses show wide variations in chemical composition, and there is a gradation from normal ilmen- ite FeTi0 3 (with titanium dioxide 52-7, and ferrous oxide 47-3%) to titaniferous haematite and titani- ferous magnetite. Frequently also,

magnesia and manganous oxide are present in small amounts, the former reaching 16%. The formula (Fe,Mg)Ti0 3 is then analogous to those of geikielite and pyrophanite. Many analyses show the presence of Ti0 2 and (Fe,Mg)0 in this ratio of 1:1, yet there is often an excess of ferric oxide to be accounted for; this may perhaps be explained by the regular intergrowth on a minute scale of. ilmenite with haematite, like the intergrowth. of such substances as calcite and sodium nitrate, which are similar crystallographically but not chemically.

In many of its external characters ilmenite is very similar to haematite; the crystals often have the same tabular 01 lamellar habit; the twin-laws are the same, giving rise to twin- lamellae and planes of parting parallel to the basal plane and the primitive

rhombohedron ; the colour is iron-black with a submetallic lustre; finally, the conchoidal fracture is the same in both minerals. Ilmenite has a black streak; it is opaque, but in very thin scales . sometimes transparent with a clove- brown colour. It is slightly magnetic, but without polarity. The hardness is 5ˆ, and the specific gravity varies with the chemical composition from 43 to 5-0.

*Owing to the wide variations in composition, which even yet are not properly understood, several varieties of the mineral have been distinguished by special names. Crichtonite occurs as small and brilliant crystals of acute rhombohedral habit on quartz at Le Bourg d'Oisans in Dauphine; it agrees closely in composition with the formula FeTi0 3 and has a specific gravity of 4*7. Manaccanite (or Menaccanite) is a black sandy material, first found in 1791 in a stream at Manaccan near Helston in Cornwall. Iserite, from Iserwiese in the Iser Mountains, Bohemia, is a similar sand, but containing some octahedral crystals, possibly of titaniferous magnetite. Washingtonite is found as large tabular crystals at Washington, Connecticut. Uddeval- lite is from Uddevalla in Sweden. Picrotitanite or picroilmenite (Gr. iriKpbs, " bitter ") is the name given to varieties con- taining a considerable amount of magnesia. Other varieties are kibdelophane, hystatite, &c. The name ilmenite, proposed by A. T. Kupffer in 1827, is after the Ilmen Mountains in the southern Urals, whence come the best crystals of the mineral. The largest crystals, sometimes as much as 16 lb in weight, are from Kragero and Arendal in Norway.*

Ilmenite occurs, often in association with magnetite, in gneisses and schists, sometimes forming beds of considerable extent, but of little or no economic value. It is a common accessory constituent of igneous rocks of all kinds, more especially basic rocks such as gabbro, diabase and basalt. I« these rocks it occurs as platy crystals, and is frequently re- " presented by a white, opaque alteration product known as leucoxene. (L. J. S.)

ILOILQ) a town, port of entry and the capital of the province of Iloilo, Panay, Philippine Islands, at the mouth of Iloilo river, on the S.E. coast. Pop. (1903) 19,054. In 1903, after the census had been taken, the population of the town was more than doubled by the addition of the municipalities of La Paz (pop. 5724), Mandurriao (pop. 4482), Molo (pop. 8551) and Jaro (pop. 10,681); in 1908 Jaro again became a separate town, The town is built on low sandy ground, is irregularly laid out,

and its streets are not paved. It has a good government house and a fine church. The harbour, suitable for ships of 15 ft. draught, is well protected by the island of Guimaras, and ocean- going vessels can lie in the channel. The surrounding country, which is traversed by gravel roads leading to the principal towns of the province, is fertile and well cultivated, producing sugar, tobacco and rice in abundance. In commercial importance Iloilo ranks next to Manila among Philippine cities; it has manu- factures of pina, jusi, coconut oil, lime, vinegar and various articles made from palm wood. Much of the town was burned by Filipino insurgents soon after its capture by American troops in February 1899.

ILSENBURG, a village and health resort of Germany, in Prussian Saxony, romantically situated under the north foot of the Harz Mountains, at the entrance to the Ilsethal, 6 m. N.W. from Wernigerode by the railway to Goslar. Pop. (1900) 3868. It has an Evangelical church, a modern chateau of the princes of Stolberg, with pretty grounds, and a high grade school, and manufactures metal wares, machines and iron screws and bolts.

Owing to its charming surroundings and its central position in the range, Ilsenburg is one of the most frequented tourist resorts in the Harz Mountains, being visited annually by some 6000 persons. The old castle, Schloss Ilsenburg, lying on a high crag above the town, was originally an imperial stronghold and was probably built by the German king Henry I. The emperor Otto III. resided here in 995, Henry II. bestowed it in 1003 upon the bishop of Halberstadt, who converted it into a Benedictine monastery, and the school attached to it enjoyed a great reputa- tion towards the end of the 1 ith century. After the Reformation the castle passed to the counts of Wernigerode, who restored it and made it their residence until 17 10. Higher still, on the edge of the plateau rises the Ilsenstein, a granite peak standing about 500 ft. above the valley, crowned by an iron cross erected by Count Anton von Stolberg- Wernigerode in memory of his friends who fell in the wars of 1813-1815. Around this rock cluster numerous legends.

See Jacobs, Urkundenbuch des Klosters Ilsenburg (Halle, 1875) ; Brandes, Ilsenburg als Sommeraufenthalt (Wernigerode, 1885); and H. Herre, Ilsenburger Annalen (Leipzig, 1890).

IMAGE (Lat. imago, perhaps from the same root as imitari, copy, imitate), in general, a copy, representation, exact counter- part of

something else. Thus the reflection of a person in a mirror is known as his " image " ; in popular usage one person is similarly described as " the very image " of another; so in entomology the term is applied in its Latin form imago to an insect which, having passed through its larval stages, has achieved its full typical development. The term is in fact susceptible of two opposite connotations; on the one hand, it implies that the thing to which it is applied is only a copy; oil the other that as a copy it is faithful and accurate.

Psychology (q.v.) recognizes two uses of the term. The simplest is for the impression made by an observed object on the retina, the eye; in this connexion the term "after-image" (better " after-sensation ") is used for an image which remains when the eye is withdrawn from a brilliantly lighted object; it is called positive when the colour remains the same, negative when the complementary colours are seen. The strict psychological use of the term " image " is by analogy from the physiological for a purely mental idea which is taken as being observed by the eye of the mind. These images are created or produced not by an external stimulus, such as is necessary for a visual image (even the after-image is due to the continued excitement of the same organ), but by a mental act of reproduction. The simplest ideational image, which has been described as the primary memory-image, is " the peculiarly vivid and definite ideal representation of an object which we can maintain or recall by a suitable effort of attention immediately 7 after perceiving it " (Stout). For this no external stimulus is required, and as com- pared with the after-image it represents the objects in perspective just as they might be seen in perception. This is characteristic of all mental images. The essential requisite for this primary

image is that the attention should have been fixed upon the impressions.

The relation between sense-impressions and mental images is a highly complicated one. Difference in intensity is not a wholly satisfactory ground of distinction; abnormal physical conditions apart, an image may have an intensity far greater than that of a sense-given impression. On the other hand, Hume is certainly right in holding that the distinctive character of a percept as compared with an image is in all ordinary cases the force and liveliness with which it strikes the mind— the distinction, therefore, being one of quality, not of degree. A distinction of some importance is found in the " superior steadiness " (Ward) of impressions; while looking at any set of surroundings, images of many different scenes may pass through the mind, each one of which is immediately distinguished from the

impression of the actual scene before the eyes. This arises partly, no doubt, from the fact that the perception has clear localization, which the image has not. In many cases indeed an image even of a most familiar scene is exceedingly vague and inaccurate.

In Art the term is used for a representation or likeness of an animate or inanimate object, particularly of the figure of a person in sculpture or painting. The most general application of the word is to such a representation when used as an object of religious worship or adoration, or as a decorative or architectural ornament in places of religious worship. The worship of images, or idolatry, from the point of view of comparative religion, is treated in the article Image-Worship, and the history of the attitude of the Christian church, outside the post-Reformation church of England, towards the use of images as objects of worship and religion in the article Iconoclasts. With regard to the Pre-Reformation period in England, it is of interest to note that by the constitutions of Archbishop Winchelsey, 1305, it was the duty of the parish to provide for the parish church, among other objects, the images of Christ on the Cross, of the saint to whom the church was dedicated, to be placed in the chancel, and of other saints. The injunctions of Edward VI., 1547, ordered the destruction of all images that had been the objects of superstitious use, and the act of 1549 (3 & 4 Edw. VI. c. 10) declared all such images illegal. This act, repealed in Mary's reign, was revived in 1604 (1 James I. c. 25) and is still in force. The present effect of this unrepealed act, as stated in Boyd v. Philpotts (L.R. 6 P.C. 449), is that it only referred to the images then subject to abuse, which had been ordered to be removed, and did not refer to the subsequent use or abuse of other images. In Article XXII. of the Articles of Religion it is laid down that " the Romish Doctrine concerning . . . Worshipping and Adoration as well of Images as of Reliques ... is a fond thing mainly invented and grounded on no warranty of Scripture, but rather repugnant to the Word of God." The law in regard to images, which in this connexion include pictures and stained-glass windows, but not sculptured effigies on monuments or merely ornamental work, is contained in various judicial decisions, and is not defined by statute. The effect of these decisions is thus summarized in the report of the Royal Commission on Ecclesiastical Discipline, 1906: " Such images are lawful as objects of decoration in a church, but are unlawful if they are made, or are in danger of being made, objects of superstitious reverence, contrary to Article XXII. against the worshipping and adoration of images. In accordance with this view, crosses, if not placed on the Holy Table, and also crucifixes, if part only of a sculptured design or architectural decoration, have been

declared lawful. The question whether a crucifix or rood standing alone or combined with figures of the Blessed Virgin and St John can, in any circumstances, be regarded as merely decorative, has given rise to a difference of judicial opinion and appears to be unsettled." Speaking generally, articles of decoration and embellishment not used in the services cannot lawfully be introduced into a church without the consent of the ordinary given by a faculty, the granting of which is subject to the judicial discretion of the chancellor or commissary, sitting as judge of the bishop's court.

By section 8 of the Public Worship Regulation Act 1874, com- plainants may take proceedings if it is considered that " any alteration in, or addition to, the fabric, ornaments or furniture has been made without legal authority, or that any decoration forbidden by law has been introduced into such church . . . provided that no proceedings shall be taken … if such altera- tion or addition has been completed five years before the com- mencement of such proceedings." The following are the principal cases on the subject: in Boyd v. Philpotts, 1874 (L.R., 4 Ad. cV Ec. 297; 6 P.C. 435), the Exeter reredos case, the privy council, reversing the bishop's judgment, allowed the structure, which contained sculptures in high relief of the Ascension, Trans- figuration and Descent of the Holy Ghost at Pentecost, together with a cross and angels; in R. v. the Bishop of London, 1889 (23 Q.B.D. 414, 24 Q.B.D. 213), the St Paul's reredos case, the bishop refused further proceedings against the legality of a structure containing sculptured figures of Christ on the Cross and the Virgin and Child. In Clifton v. Ridsdak, 1876 (1 P. &° D., 316), a metal crucifix on the centre of the chancel screen was declared illegal as being in danger of being used superstitiously, and in the same case pictures or rather coloured reliefs represent- ing the " Stations of the Cross " were ordered to be removed on the ground that they had been erected without a faculty, and were also considered unlawful by Lord Penzance as con- nected with certain superstitious devotion authorized by the Roman church.

IMAGE WORSHIP. It is obvious that two religious votaries kneeling together before a statue may entertain widely different conceptions of what the image is and signifies, although their outward attitude is the same. The one may regard it as a mere image, picture or representation of the higher being, void in itself of value or power. It is to him, like the photograph hung on a wall of one we love,

cherished as a picture and no more. But the other may regard it, as a little girl regards her doll, as an animated being, no mere picture, but as tenement and vehicle of the god and fraught with divine influence. The former is the attitude which the Latin Church officially inculcates towards sacred pictures and statues; they are intended to convey to the eyes of the faithful, especially to the illiterate among them, the history of Jesus, of the Virgin and of the saints. The other attitude, however, is that into which simple-minded Latin peasants actually lapse, as it is also that which characterizes other religions ancient or modern which use pictures or sculptures of gods, demons, men, brutes, or of particular parts and organs of the same. With the latter attitude alone does the present article deal, and it may conveniently be called idolatry or image worship. For the history of the use of images in Christian worship see Iconoclasts.

The image or idol differs from the fetish, charm, talisman, phylactery or miraculous relic, only in this, that either in the flat or the round it resembles the power adored; it has a prototype capable of being brought before the eye and visualized. This is not necessarily the case with the worshipper of aniconic or unshaped gods. The Semite or savage who sets up a sacred stone or Bethel believes indeed that a divine power or influence enters the stone and dwells in it, and he treats the stone as if it were the god, kisses it, anoints it with oil, feeds the god in it by pouring out over it the blood of victims slain. But he is not an idolater, for he has not " made unto himself any graven image, nor the likeness of anything that is in heaven above or in the water beneath or in the water under the earth."

The question arises: must the stage of aniconic gods historic- ally precede and lead up to that of pictures and images? Are the latter a development of the former? In the history of human religions can we trace, as it were, a law of transition from sacred stock and stone up to picture and image? Is it true to say that the latter is characteristic of a later and higher stage of religious development? It was perhaps the facility with which a pillar of stone or wood can be turned into an image by painting or sculpturing on it eyes, ears, mouth, marks of sex and so on, which led anthropologists of an earlier generation to postulate such a law of development; but facts do not bear it out. In the

first place, what we are accustomed to call higher religions deliberately attach greater sanctity to aniconic gods than to iconic ones, and that from no artistic incapacity. The Jews were as well able as their neighbours to fashion golden calves, snakes and the minor idols called teraphim, when their legislator, in the words we

have just cited, forbade the ancillary use of all plastic and pictorial art for religious purposes. And of our own Christianity, Robertson Smith remarks as follows: " The host in the Mass is artistically as much inferior to the Venus of Milo as a Semitic Masseba was, but no one will say that medieval Christianity is a lower form of religion than Aphrodite worship." Here then in the most marked manner the aniconic sacrament has ousted pictures and statues. It is the embodiment and home of divine personality and power, and not they. Equally contradictory of any such law of development is the circumstance that the Greeks of the 5th and 4th centuries B.C., although Pheidias and other artists were embodying their gods and goddesses in the most perfect of images, nevertheless continued to cherish the rude aniconic stocks and stones of their ancestors. If any such law ever operated in human religious development, how can we explain the following facts. In the shadowy age which preceded the Stone age and hardly ended later than 10,000 B.C., the cave-dwellers of the Dordogne could draw elks, bisons, elephants and other animals at rest or in movement, with a freshness and realism which to-day only a Landseer can rival. And yet in the European Stone age which followed, the age in which the great menhirs and cromlechs were erected, in which the domestication of animals began and the first corn was sown, we find in the strata no image of man or beast, big or little. Whence this seeming blight and decay of art? Salomon Reinach, guided by the analogy of similar practices among the aborigines of Australia, and noticing that these primitive pictures represent none but animals that formed the staple food, of the age and place, and that they are usually found in the deepest and darkest recesses of the caves where they could only be drawn and seen by torchlight, has argued that they were not intended for artistic gratification (a late motive in human art), but were magical representations destined to influence and perhaps attract the hunter's quarry. In a word this earliest art was ancillary to the chase. It is a common practice in the magic of all ages and countries to acquire control and influence over men and animals by making images of them. The prototype is believed to suffer whatever is done to the image. Reinach, therefore, supposes that in the Stone age which succeeded, pictorial art was banned because it had got into the hands of magicians and had come to be regarded as inevitably uncanny and malefic. This is certainly the secret of the ordinary Mahommedan prohibition of pictures and statues, which goes even to the length of denying to poor little Arab girls the enjoy- ment of having dolls. It is felt that if you have got a picture of any one, you have some power of harming him through it ; you can bind or loose him, just as you can a Djinn whose name you have somehow learned. It is as

dangerous for your enemy to have a picture of you as for him to know your name. The old Hebrew prohibition of graven images was surely based on a like superstition, so far as it was not merely due to the physical impossibility for nomads of heavy statues that do not admit of being carried from camp to camp and from pasture to pasture. Possessing no images of Yahweh the Jews were also not exposed to the same risk as were idolaters of having their gods stolen by their foes and used against them. Lastly, the restriction to aniconic worship saved them from much superstition, for there is nothing which so much stimulates the growth of a mythology as the manufacture of idols. The artist must indeed start with imaginative types, revealed to him in visions or borrowed from current myths. But the tendency of his art is to give rise to new tales of the gods. There is perpetual action and reaction between picture and myth; and a legislator desiring to purify and raise his countrymen's religion must devote no less attention to their plastic art than to their hymnology.

Motives drawn from homoeopathic magic may thus explain the occasional disuse and prohibition of pictorial and plastic

art in cult; they may equally explain its genesis and rise in certain ages and countries. Prayer is much more hopeful and efficacious for a worshipper who has means of bringing near to himself, and even coercing the god he worships. An image fashioned like a god, and which has this advantage over a mere stock and stone that it declares itself and reveals at a glance to what god it is sacred, must surely attract and influence the god to choose it as his home and tenement. And having the god thus at hand and imprisoned in matter, the simple-minded worshipper can punish him if his prayers are left unanswered. Dr E. B. Tylor accordingly (in his chapter on " Idolatry " in Primitive Culture, ii. 170), reminds us of " the negro who feeds ancestral images and brings them a share of his trade profits, but will beat an idol or fling it into the fire if it cannot give him luck or preserve him from sickness." So Augustus Caesar, having lost some ships in a storm, punished Neptune by forbid- ding his image to be carried in procession at the Circensian games (Sueton. Aug. 16).

In certain cases the wish to carry elsewhere the cult of a favourite or ancestral cult, may have dictated the manufacture of images that declare themselves and reveal at a glance whose they are. Thus a

Phoenician colonist might desire to carry abroad the cult of a certain Baal or Astarte who lived in a conical stone or pillar. Pilgrims visiting Paphos, the original home and temple of Astarte, could of course be in no doubt about which of the heavenly powers inhabited the cone of stone in which she was there held to be immanent ; nor was any Semite ever ignorant as to which Baal he stood before. It was neces- sarily the Baal or Lord of the region. But small portrait statues must surely have been made to be carried about or used in private worship. Meanwhile the shapeless cone remained the object of public adoration and pilgrimage.

The Egyptian writer Hermes Trismegistus (c. 250), in a work called Asclepius (cited by Augustine, De civit. Dei, viii. 26), claims that his ancestors discovered the art of making gods, and since they could not create souls, they called up the souls of demons or angels and introduced them into the holy images and divine mysteries, that through these souls the idols might possess powers of doing good and harm. This was the belief of the pagans' and the Christians for centuries shared it with them. Not a few Christian martyrs sought and won the palm by smashing the idols in order to dislodge the indwelling devil; occasionally their zeal was further gratified by beholding it. pass away like smoke from its ruined home.

Image worship then is a sort of animism. It is a continuance by adults of their childish games with dolls. In the Roman religion, on a feast of thanksgiving for a great victory, couches were spread in the temples for the gods, whose images were taken down from their pedestals and laid on the couches, and tables set before them loaded with delicate viands. This was called a Lectisternium. So Marco Polo (i. chap. 53) relates how theTatars had each a figure of Natigay, the god of the earth, who watched over their children, cattle and crops. The image was made of felt and cloth, and similar images of his wife and children were set on his left hand and in front of him. "And when they eat, they take the fat of the meat and grease the god's mouth withal, as well as the mouths of his wife and children." The old Greek statues moved of themselves, shook their spears, kneeled down, spoke, walked, wept, laughed, winked, and even bled and sweated, — a mighty portent. Images of Christ, of the Virgin and saints have achieved many a similar miraculous portent. A figure of Christ has been known even to give its shoes to a poor man, and a Virgin to drop a ring off her finger to a suppliant. In Umbrian villages on Easter Sunday the images of Jesus and His Mother are carried in rival processions from their respective chapels, and are made to bow when they meet face to face. The spectators applaud or hiss according as they make their bow well or ill. In antiquity it was

a common ceremony to arrange a holy marriage between male and female images, and such unions acted on the earth as a fertility charm. Much of a priest's time was given up to the toilet of the god or goddess. Thus Isis was dressed and coiffed every day by her special attendants

according to Apuleius {Met. xi. 9). Like the statue of St Agatha of Catania to-day, her image was loaded with jewels, and an inscription of Cadiz (C.I.L. ii. 3386) contains an inventory of the jewels with which Isis had been endowed by Spanish devotees.

Idolatrous cults repose so largely on make-believe and credulity that the priests who administered them, perhaps oftener than we know, fell into the kind of imposture and trickery of which the legend of Bel and the dragon represents a classical example. " Thinkest thou not," said King Astyages, " that Bel is a living god ? Or seest thou not how much he eateth and drinketh every day? Then Daniel laughed, and said, O King, be not deceived: for this is but clay within, and brass without, and did never eat or drink anything." In the sequel Daniel proves to the king that the priests with their wives and children came in through privy doors and consumed the viands set before the god; and the king, angered at their trickery, slew them all and gave Bel over to Daniel for destruc- tion.

The invectives against idolatry of the early Jewish and Christian apologists, of Philo, Minucius Felix, Tertullian, Arnobius, Lactantius and others, are very good reading and throw much light on the question how an ancient pagan con- ceived of his idols. One capital argument of the Christians was the absurdity of a man making an idol and then being afraid of or adoring the work of his own hands. Lactantius preserves the answer of the pagans so attacked (De origine Erroris, ii.2): We do not, they said, fear the images themselves, but those beings after whose likeness they were fashioned and by whose names they were consecrated. Few such rites of consecration remain, but they must have been similar to those used in India to-day. There the Brahmin invites the god to dwell within the image, specially made hollow to contain him, " performing the ceremony of adhivdsa or inhabitation, after which he puts in the eyes and the prdna, i.e. breath, life or soul." 1 Similarly Augustine (De civ. Dei, viii. 23) relates how, according to Hermes, the spirits entered by invitation (spiritus invitatos), so that the images became bodies of the gods (corpora deorum). Thus the invisible spirits by a certain art are so joined unto the visible objects of corporeal matter that the latter become as it were animated bodies, images dedicated to those spirits and controlled by them (see Consecration). Such

statues were animated with sense and full of spirit, they foresaw the future, and foretold it by lot, through their priests, in dreams and in other ways.

See E. B. Tylor, Primitive Culture, ed. 1903 (list of authorities and sources vol., p. 171); L. R. Farnell, The Evolution of Religion (London, 1905) ; Jacob Grimm, Teutonic Mythology, translation by J. S. Stallybrass. (F. C C.)

IMAGINATION, in general, the power or process of producing mental pictures or ideas. The term is technically used in psychology for the process of reviving in the mind percepts of objects formerly given in sense perception. Since this use of the term conflicts with that of ordinary language, some psychologists have preferred to describe this process as " imag ing " or " imagery " or to speak of it as " reproductive " as opposed to " productive " or " constructive " imagination (see Image and Psychology). The common use of the term is for the process of forming in the mind new images which have not been previously experienced, or at least only partially or in different combinations. Thus the image of a centaur is the result of combining the common percepts of man and horse: fairy tales and fiction generally are the result of this process of combination. Imagination in this sense, not being limited to the acquisition of exact knowledge by the requirements of practical necessity, is up to a certain point free from objective restraints. In various spheres, however, even imagination is in practice limited: thus a man whose imaginations do violence to the elementary laws of thought, or to the necessary principles of practical possibility, or to the reasonable prob- abilities of a given case is regarded as insane. The same limita- tions beset imagination in the field of scientific hypothesis. 1 Tylor, Prim. Culture, ii. 178.

Progress in scientific research is due largely to provisional explanations which are constructed by imagination, but such hypotheses must be framed in relation to previously ascertained facts and in accordance with the principles of the particular science. In spite, however, of these broad practical considera- tions, imagination differs fundamentally from belief in that the latter involves " objective control of subjective activity " (Stout). The play of imagination, apart from the obvious limitations (e.g. of avoiding explicit self-contradiction), is con- ditioned only by the general trend

of the mind at a given moment. Belief, on the other hand, is immediately related to practical activity: it is perfectly possible to imagine myself a millionaire, but unless I believe it I do not, therefore, act as such. Belief always endeavours to conform to objective conditions ; though it is from one point of view subjective it is also objectively conditioned, whereas imagination as such is specifically free. The dividing line between imagination and belief varies widely in different stages of mental development. Thus a savage who is ill frames an ideal reconstruction of the causes of his illness, and attributes it to the hostile magic of an enemy. In ignorance of pathology he is satisfied with this explanation, and actually believes in it, whereas such a hypothesis in the mind of civilized man w-juld be treated as a pure effort of imagination, or even as a hallucination. It follows that the distinction between imagination and belief depends in practice on knowledge, social environment, training and the like.

Although, however, the absence of objective restraint, i.e. a certain unreality, is characteristic of imagination, none the less it has great practical importance as a purely ideational activity. Its very freedom from objective limitation makes it a source of pleasure and pain. A person of vivid imagination suffers acutely from the imagination of perils besetting a friend. In fact in some cases the ideal construction is so " real " that specific physical manifestations occur, as though imagination had passed into belief or the events imagined were actually in progress.

IMAM, an Arabic word, meaning " leader " or " guide " in the sense of a "pattern whose example is followed, whether for good or bad." Thus it is applied to the Koran, to a builder's level and plumb-line,, to a road, to a school-boy's daily task, to a written record. It is used in several of these, senses in the Koran, but specifically several times of leaders and (ii. 118) of Abraham, "Lo, I make thee a pattern for mankind." Im&m thus became the name of the head of the Moslem community, whose leadership and patternhood, as in the case of Mahomet himself, is to be regarded as of the widest description. His duty is to be the lieutenant, the Caliph (q.v.) of the Prophet, to guard the faith and maintain the' government of the state. Round the origin and basis of his office all controversies as to the Moslem state centre. The Sunnites hold that it is for men to appoint and that the basis is obedience to the general usage of the Moslem peoples from the earliest times. The necessity for leaders has always been recognized, and a leader has always been appointed. The basis is thus agreement in the technical sense (see Mahommedan Law), not Koran nor tradition from Mahomet nor analogy. The ShI'ites in general hold

that the appointment lies with God, through the Prophet or otherwise, and that He always has appointed. The Kharijites theoretically recognize no absolute need of an Imam; he is convenient and allowable. The Motazilites held that reason, not agreement, dictated the appointment. Another distinction between the Sunnites and the ShI'ites is that the Sunnites regard the Imam as liable to err, and to be obeyed even though he personally sins, provided he maintains the ordinances of Islam. Effective leadership is the essential point. But the ShI'ites believe that the divinely appointed Imam is also divinely illumined and pre- served (ma' sum) from sin. The above is called the greater Imamate. The lesser Imamate is the leadership in the Friday prayers. This was originally performed by the Imam in the first sense, who not only led in prayers but delivered a sermon (khullxi); but with the growth of the Moslem empire and the retirement of the caliph from public life, it was necessarily given

over to a deputy — part of a gradual process of putting, the Imamate or caliphate into commission. These deputy Imams are, in Turkey, ministers of the state, each in charge of his own parish; they issue passports, &c, and perform the rites of circum- cision, marriage and burial. In Persia among ShI'ites their position is more purely spiritual, and they are independent of the state. A few of their leaders are called Mujtahids, i.e. capable of giving an independent opinion on questions of religion and canon law. A third use of the term Imam is as an honoiary title. It is thus applied to leading theologians, e.g. to Abu Hanlfa, ash-Shafi'I, Malik ibn Anas, Ahmad ibn ITanbal (these are called "the four Imams"), Ghazali.

See McG. de Slane's transl. of Ibn Khaldun's Prolegomenes , i. 384 seq., 402 seq., 426 seq., 445 ; iii. 35, 58 seq. ; Ostrorog's transl. of Mawardi's Ahkam i. 89 seq. ; Haarbriicker's transl. of Shahrastani by index; Juynboll's De Mohammedaanische Wet, 316 seq.; Sell's Faith of Islam, 95 seq.; Macdonald's Development of Muslim Theology, 56 seq. (D. B. Ma.)

IMBECILE (through the French from Lat. imbecillus or imbe- cillis, weak, feeble; of unknown origin), weak or feeble, particu- larly in mind. The term " imbecility " is used conventionally of a condition of mental degeneration less profound than " idiotcy " (see Insanity).

. IMBREX. (Latin for " tile "), in architecture the term given to the covering tile of the ancient roof: the plain tile is turned up on each side and the imbrex covers the joint. In the simpler type of roof the imbrex is semicircular, but in some of the Greek temples it has

vertical sides and an angular top. In the temple of Apollo at Bassae, where the tiles were in Parian marble, the imbrex on one side of the tile and the tile were worked in one piece out of the solid marble.

IMBROS, a Turkish island in the Aegean, at the southern end of the Thracian Chersonese peninsula. It forms with Samothrace, about 17 m. distant, a caza (or canton) in the sanjak of Lemnos and province of the Archipelago Isles. Herodotus (v. 26) mentions it as an abode of the historic Pelasgians (q.v.). It was, like Samothrace, a seat of the worship of the Cabeiri (q.v.). The island is now the seat of a Greek bishopric. There is communica- tion with the mainland by occasional vessels. The island is of great fertility — wheat, oats, barley, olives, sesame and valonia being the principal products, in addition to a variety of fruits. Pop. about 92,000, nearly all Turks.

IMERETIA, or Imeritia a district in Russian Transcaucasia, extends from the left bank of the riv«r Tskheniz-Tskhali to the Suram range, which separates it from Georgia on the east, and is bounded on the south by Akhaltsikh, and thus corresponds roughly to the eastern part of the modern government of Kutais. Anciently a part of Colchis, and included in Lazia during the Roman empire, Imeretia was nominally under the dominion of the Greek emperors. In the early part of the 6th century it became the theatre of wars between the Byzantine emperor Justinian and Chosroes, or Khosrau, king of Persia. Between 750 and 985 it was ruled by a dynasty (Apkhaz) of native princes, but was devastated by hostile incursions, reviving only after it became united to Georgia. It flourished until the reign of Queen Thamar, but after her death (12 12) the country became im- 1 poverished through strife and internal dissensions. It was reunited with Georgia from 1318 to 1346, and again in 1424. But the union only lasted forty-five years; from 1469 until 1810 it was governed by a Bagratid dynasty, closely akin to that which ruled over Georgia. In 162 1 it made the earliest appeal to Russia for aid; in 1650 it acknowledged Russian suzerainty and in 1769 a Russian force expelled the Turks. In 1803 the monarch declared himself a vassal of Russia, and in 1810 the little kingdom was definitively annexed to that empire. (See Georgia.)

IMIDAZOLES, or Glyoxalines, organic chemical compounds

CH = CH containing the ring system HN

*first prepared bv H. Debus(*4?m. 1858, 107, p. 254) by the action of ammonia on glyoxal, 2C 2 H 2 02+2NH 3 = C ! LI,,:N2+H:C0 2 -f-2H 2 0. The compounds of this series may be prepared by the con-*

R-C-N ˆ

RCOCOR+2NH 3 R'-CHO = 3H 2 0 II ˆC-R';

R-C-NH/ from thioimidazolones by oxidation with dilute nitric acid (W. Marckwald, Bcr., 1892, 25, p. 2361); by distillation of hydro-benzamide and similarly constituted bodies; and by the action of phosphorus pentachloride on symmetrical dimethyloxamide, a methylchlorglyoxaline being formed (O. Wallach, Ann., 1877, 184, p. 500).

The glyoxalines are basic in character, and the imide hydrogen is replaceable by metals and alkyl groups They are stable towards reducing agents, and acidyl groups are only introduced with difficulty.

Imidazole (glyoxaline), C3H4N2, crystallizes in thick prisms which melt at 88-89° C. and boil at 253° C, and are readily soluble in alcohol and in water. It is unaffected by chromic acid, but potassium pe-manganate oxidizes it to formic acid. It forms salts with acids.

Lophine (triphenylglyoxaline) ,

CeHs-C-N

C-CeHj, is formed

CH 5 -C-NH

by the dry distillation of hydrobenzamide, or by saturating an alcoholic solution of bcnzil and benzaldehyde (at a temperature of 40° C.) with ammonia. It crystallizes in needles which melt at 275° C. It is a weak base. When heated to 300° C. with hydriodic acid and hydrochloric acid, in the presence of some red phosphorus, it yields benzoic acid.

The keto-glyoxalines are known as imidasolones and are prepared by the action of acids on acetalyl thioureas (\V. Marckwald, Ber.,

1892, 25, p. 2357). Be.nzimidazole, C 6 H 4 \ irir /CH, is the simplest

representative of the benzoglyoxalines and is prepared by the condensation of formic acid with ortho-phenylene diamine. It forms rhombic crystals which melt at 170° C. It is basic in char- acter, and on oxidation with potassium permanganate yields a

HOOC-C-N.,. small amount of glyoxaline dicarboxylic acid, II /CH.

HOOC-C-NH' (E. Bamberger, Ann., 1893, 273, p. 338).

IMITATION (Lat. imitatio, from imitari, to imitate), the reproduction or repetition of an action or thought as observed in another person or in oneself, or the construction of one object in the likeness of another. By some writers {e.g. Preyer and Lloyd Morgan) the term " imitation " is limited to cases in which one person copies the action or thought of another; others have pre- ferred a wider use of the term {i.e. including " self-imitation "), and have attempted to classify imitative action into various groupings, e.g. as cases of "conscious imitation," "imitative suggestion," "plastic imitation" (as when the members of a crowd sub- consciously reproduce one another's modes of thought and action) , and the like. The main distinction is that which takes into account the question of attention {q.v.) . In conscious imitation, the attention is fixed on the act and its reproduction: in un- conscious imitation the reproduction is entirely mechanical and the agent does not " attend " to the action or thought which he is copying: in subconscious imitation the action is not deliberate, though the necessary train of thought would immediately follow if the attention were turned upon it under normal conditions. Imitation plays an extremely important part in human and animal development, and a clear understanding of its character is important both for the study of primitive peoples, and also in the theories of education, art and sociology. The child's early development is in large measure imitative: thus the first arti- culate sounds and the first movements are mainly reproductions of the words and actions of parents, and even in the later stages that teacher is likely to achieve the best results who himself gives examples of how a word should be pronounced or an action done. The impulse to imitate is, however, not confined to children: there is among the majority of adults a tendency to assimilate themselves either to their society or to those whom they especially admire or respect: this tendency to shun the eccentric is rooted deeply in human psychology. Moreover, even among highly developed persons the imitative impulse frequently overrides the reason, as when an audience, a crowd, or even practically a whole community is carried away by a panic for which no adequate ground has been given, or when a cough or a yawn is imitated by a company of people. , Such

cases may be compared

with those of persons in mesmeric trances who mechanically copy a series of movements made by the mesmerist. The uni- versality of the imitative impulse has led many psychologists to regard it as an instinct (so William James, Principles of Psy- chology, ii. 408; cf. Instinct), and in that large class of imitative actions which have no obvious ulterior purpose the impulse certainly appears to be instinctive in character. On the other hand where the imitator recognizes the particular effect of a process and imitates with the deliberate intention of producing the same effect, his action can scarcely be classed as instinctive. A considerable number of psychologists have distinguished imitative from instinctive actions (e.g. Baldwin, and Sully). According to Darwin the imitative impulse begins in infants at the age of four months. It is to be noted, however, that the child imitates, not every r action indiscriminately, but especially those towards which it has a congenital tendency. The same is true of animals: though different kinds of animals may live in close proximity, the young of each kind imitate primarily the actions of their own parents.

Among primitive man imitation plays a very important part. The savage believes that he can bring about events by imitating them. He makes, for instance, an image of his enemy and pierces it with darts or burns it, believing that by so doing he will cause his enemy's death: similarly sailors would whistle, or farmers would pour water on the ground, in the hope of producing wind or rain. This form of imitation is known as sympathetic magic (see Magic). The sociological importance of imitation is elaborately investigated by Gabriel Tarde {Les Lois del' imitation, 2nd ed., 1895), who bases all social evolution on the imitative impulse. He distinguishes " custom imitations," i.e. imitations of ancient or even forgotten actions, and " mode imitations," i.e. imitations of current fashions. New discoveries are, in his scheme, the product of the conflict of imitations. This theory, though of great value, seems to neglect original natural similarities which, by the law of causation, produce similar consequences, where.imitation is geographically or chronologically impossible.

The term " imitation " has also the following special uses: —

1. In Art-theory. — According to Plato all artistic production is a form of imitation {/ilˆrfaLs). That which really exists is the idea or type created by God; of this type all concrete objects are representations, while the painter, the tragedian, the musician are

merely imitators, thrice removed from the truth {Rep. x. 596 seq.). Such persons are represented by Plato as a menace to the moral fibre of the community {Rep. iii.), as performing no useful function, drawing men away from reality and pandering to the irrational side of the soul. All art should aim at moral improvement. Plato clearly intends by " imitation " more than is connotated by the modern word: though in general he associates with it all that is bad and second- rate, he in some passages admits the value of the imitation of that which is good, and thus assigns to it a certain symbolic significance. Aristotle, likewise regarding art as imitation, emphasizes its purely artistic value as purging the emotions (Kadapais), and producing beautiful things as such (see Aesthetics and Fine Arts).

2. In Biology, the term is sometimes applied to the assimila- tion by one species of certain external characteristics(especially colour) which enable them to escape the notice of other species which would otherwise prey upon them. It is a form of pro- tective resemblance and is generally known as mimicry {q.u.; see also Colours of Animals).

3. In Music, the term " imitation " is applied in contrapuntal composition to the repetition of a passage in one or more of the other voices or parts of a composition. When the repetition is note for note with all the intervals the same, the imitation is called "strict" and becomes a canon (q.v.); if not it is called " free," the latter being much the more common. There are many varieties of imitation, known as imitation " by inversion," " by inversion and reversion," " by augmentation," " by diminution " (see Grove's Dictionary of Music, s. v., and text- books of musical theory).

IMITATION OF CHRIST

333

IMITATION OF CHRIST, THE (Imitatio Christi), the title of a famous medieval Christian devotional work, much used still by both Catholics and Protestants and usually ascribed to Thomas a Kempis. The " Contestation " over the author of the Imitation of Christ is probably the most considerable and famous controversy that has ever been carried on concerning a purely literary question. It has been going on almost without flagging for three centuries, and nearly 200 combatants have entered the lists. In the present article nothing is said on the history of the controversy, but an attempt is made to summarize the results that may be looked on as definitely acquired.

Until quite recently there were three candidates in the field — Thomas a Kempis (1380-1471), a canon regular of Mount St Agnes in Zwolle, in the diocese of Utrecht, of the Windesheim Congregation of Augustinian Canons; John Gerson (1363-1429), chancellor of the University of Paris; and an abbot, John Gersen, said to have been abbot of a Benedictine monastery at Vercelli in the 12th century. Towards the end of the 15th century the Imitation circulated under the names of the first two; but Gerson is an impossible author, and his claims have never found defenders except in France, where they are no longer urged. The Benedictine abbot Gersen is an absolutely mythical personage, a mere " double " of the chancellor. Consequently at the present day the question is narrowed to the issue: Thomas a Kempis, or an unknown author.

The following is a statement of the facts that may be received as certain :-

1. The earliest-known dated MS. of the Imitation is of 1424 — it contains only Bk. I.; the earliest MSS. of the whole work of certain date are of 1427. Probably some of the undated MSS. are older; but it is the verdict of the most competent modern expert opinion that there is no palaeographical reason for sus- pecting that any known MS. is earlier than the first quarter of the 15th century.

2. A Latin letter of a Dutch canon regular, named Johann van Schoonhoven, exhibits such a close connexion with Bk. I. that plagiarism on the one side or the other is the only possible explanation. It is capable of demonstration that the author of the Imitation was the borrower, and that the opposite hypo- thesis is inadmissible. Now, this letter can be shown to have been written after 1382. Therefore Bk. I. was beyond contro- versy written between the years 1382 and 1424.

3. It is not here assumed that the four treatises formed a single work, or even that they are all by the same author; and the date of the other three books cannot be fixed with the same certainty. But, on the one hand, before the beginning of the 15th century there is no trace whatever of their existence — a strong argument that they did not yet exist; and on the other hand, after 1424 nearly each year produces its quota of MSS. and other signs of the existence of these books become frequent. Moreover, as a matter of fact, the four treatises did commonly circulate together. The presumption is strong that Bks. II., III., IV., like Bk. I., were composed shortly before they were put into circulation.

It may then be taken as proved that the Imitation was com- posed between 1380 and 1425, and probably towards the end rather than the beginning of that period. Having ascertained the date, we must consider the birthplace.

4. A number of idioms and turns of expression throughout the book show that its author belonged to some branch of the Teutonic race. Further than this the argument does not lead; for when the dialects of the early 15th century are considered it cannot be said that the expressions in question are Nether- landic rather than German — as a matter of fact, they have all been paralleled out of High German dialects.

5. Of the 400 MSS. of the Imitation 340 come from the Teutonic countries — another argument in favour of its Teutonic origin. Again, 100 of them, including the earliest, come from the Nether- lands. This number is quite disproportionate to the relative size of the Netherlands, and so points to Holland as the country in which the Imitation was first most widely circulated and presumably composed.

6. There is a considerable body of early evidence, traceable before 1450, that the author was a canon regular.

7. Several of the MSS. were written in houses belonging to the Windesheim Congregation of canons regular, or in close touch with it. Moreover there is a specially intimate literary and spiritual relationship between the Imitation and writings that emanated from what has been called the " Windesheim Circle."

To sum up: the indirect evidence points clearly to the con- clusion that the Imitation was written by a Teutonic canon regular, probably a Dutch canon regular of the Windesheim Congregation, in the first quarter of the 15th century. These data are satisfied by Thomas a. Kempis.

We pass to the direct evidence, neglecting that of witnesses who had no special sources of information.

8. There can be no question that in the Windesheim Congrega- tion itself there was already, during Thomas a Kempis's lifetime, a fixed tradition that he was the author of the Imitation. The most important witness to this tradition is Johann Busch. It is true that the crucial words are missing in one copy of his " Chronicle " ; but it is clear there were two redactions of the work, and there are no grounds

whatever for doubting that the second with its various enlargements came from the hands of Busch himself — a copy of it containing the passage exists written in 1464, while both Busch and Thomas a Kempis were still alive. Busch passed a great part of his life in Windesheim, only a few miles from Mount St Agnes where Thomas lived. It would be hard to find a more authentic witness. Another witness is Hermann Rhyd, a German member of the Windesheim Congregation, who also had personally known Thomas. Besides, two or three MSS. originating in the Windesheim Congregation state or imply the same tradition.

9. More than this: the tradition existed in Thomas a Kempis's own monastery shortly after his death. For John Mauburne became a canon in Mount St Agnes within a few years of Thomas's death, and he states more than once that Thomas wrote the Imitation.

10. The earliest biographer of Thomas a. Kempis was an anonymous contemporary: the Life was printed in 1494, but it exists in a MS. of 1488. The biographer says he got his infor- mation from the brethren at Mount St Agnes, and he states in passing that Bk. III. was written by Thomas. Moreover, he appends a list of Thomas's writings, 38 in number, and 5-8 are the four books of the Imitation.

It is needless to point out that such a list must be of vastly greater authority than those given by St Jerome or Gennadius in their De Viris Illustrious, and its rejection must, in consistency, involve methods of criticism that would work havoc in the history of early literature of what king soever. The domestic tradition in the Windesheim Congregation, and in Mount St Agnes itself, has a weight that cannot be legitimately avoided or evaded. Indeed the external authority for Thomas's author- ship is stronger than that for the authorship of most really anony- mous books — such, that is, as neither themselves claim to be by a given author, nor have been claimed by any one as his own. A large proportion of ancient writings, both ecclesiastical and secular, are unquestioningly assigned to writers on far less evidence than that for Thomas's authorship of the Imitation.

Internal arguments have been urged against Thomas's author- ship. It has been said that his certainly authentic writings are so inferior that the Imitation could not have been written by the same author. But only if they were of the most certain and peremptory nature could such internal arguments be allowed to weigh against the clear array of facts that make up the external argument in favour of a Kempis. And it cannot be said that the internal difficulties are such as this.

Let it be granted that Thomas was a prolific writer and that his writings vary very much in quality; let it be granted also that the Imitation surpasses all the rest, and that some are on a level very far below it; still, when at their best, some of the other works are not unworthy of the author of the Imitation.

In conclusion, it is the belief of the present writer that

the " Contestation " is over, and that Thomas a Kempis's claims to the authorship of the Imitation have been solidly established.

The best account in English of the Controversy is that given by F. R. Cruise in his Thomas A Kempis (1887). Works produced before 1880 are in general, with the exception of those of Eusebius Amort, superannuated, and deal in large measure with points no longer of any living interest. A pamphlet by Cruise, Who was the Author of the Imitation? (1898) contains sufficient informa- tion on the subject for all ordinary needs; it has been translated into French and German, and may be regarded as the standard handbook.

It has been said that the Imitation of Christ has had a wider religious influence than any book except the Bible, and if the statement be limited to Christendom, it is probably true. The Imitation has been translated into over fifty languages, and is said to have run through more than 6000 editions. The other statement, often made, that it sums up all that is best of earlier Western mysticism — that in it " was gathered and concentered all that was elevating, passionate, profoundly pious in all the older mystics" (Milman) is an exaggeration that is but partially true, for it de- preciates unduly the elder mystics and fails to do justice to the originality of the Imitation. For its spiritual teaching is something quite different from the mysticism of Augustine in the Confessions, or of Bernard in the Sermons on the Song of Songs; it is different from the scholastic mysticism of the St Victors or Bonaventure; above all, it is different from the obscure mysticism, saturated with the pseudo-Dionysian Neoplatonism of the German school of Eck- hart, Suso, Tauler and Ruysbroek. Again, it is quite different from the later school of St Teresa and St John of the Cross, and from the introspective methods of what may be called the modern school of spirituality. The Imitation stands apart, unique, as the principal and most representative utterance of a special phase of religious thought —

non-scholastic, non-platonic, positive and merely religious in its scope — herein reflecting faithfully the spirit of the movement initiated by Gerhard Groot (q.v.), and carried forward by the circles in which Thomas a Kempis lived. In contrast with more mystical writings it is of limpid clearness, every sentence being easily understandable by all whose spiritual sense is in any degree awakened. No doubt it owes its universal power to this simplicity, to its freedom from intellectualism and its direct appeal to the religious sense and to the extraordinary religious genius of its author. Professor Harnack in his book What is Christianity? counts the Imitation as one of the chief spiritual forces in Catholicism: it " kindles inde- pendent religious life, and a fire which burns with a flame of its own " (p. 266).

The best Latin edition of the Imitation is that of Hirsche (1874), which follows closely the autograph of 1441 and reproduces the rhythmical character of the book. Of English translations the most interesting is that by John Wesley, under the title The Christian' s Pattern (1735). (E. C. B.)

IMMACULATE CONCEPTION, THE. This dogma of the Roman Catholic Church was defined as " of faith " by Pope Pius IX. on the 8th of December 1854 in the following terms: " The doctrine which holds that the Blessed Virgin Mary, from the first instant of her conception, was, by a most singular grace and privilege of Almighty God, in view of the merits of Jesus Christ, the Redeemer of the human race, preserved from all stain of Original Sin, is a doctrine revealed by God, and there- fore to be firmly and steadfastly believed by all the faithful." 1 These words presuppose the distinction between original, or racial, and actual, or personally incurred sin. There is no dis- pute that the Church has always held the Blessed Virgin to be sinless, in the sense of actual or personal sin. The question of the Immaculate Conception regards original or racial sin only. It is admitted that the doctrine as defined by Pius IX. was not explicitly mooted before the 12th century. But it is claimed that it is implicitly contained in the teaching of the Fathers. Their expressions on the subject of the sinlessness of Mary are, it is pointed out, so ample and so absolute that they must be taken to include original sin as well as actual. Thus we have in the first five centuries such epithets applied to her as "in every respect holy," " in all things unstained," " super-innocent " and "singularly holy"; she is compared to Eve before the fall, as ancestress of a redeemed people; she is " the earth before it was accursed." 2 The well-known words of St Augustine (d. 430) may be cited: " As regards the mother of God," he says, "I will not allow any question whatever of sin." s

1 From the Bull Ineffabilis Deus.

2 See Passaglia's work, referred to below. ' De natura et gratia, cap. xxxvi.

It is true that he is here speaking directly of actual or personal sin. But his argument is that all men are sinners; that they are so through original depravity; that this original depravity may be overcome by the grace of God, and he adds that he does not know but that Mary may have had sufficient grace to over- come sin " of every sort " (omni ex parte).

It seems to have been St Bernard who, in the 12th century, explicitly raised the question of the Immaculate Conception. A feast of the Conception of the Blessed Virgin had already begun to be celebrated in some churches of the West. St Bernard blames the canons of the metropolitan church of Lyons for instituting such a festival without the permission of the Holy See. In doing so, he takes occasion to repudiate altogether the view that the Conception of Mary was sinless. It is doubtful, however, whether he was using the term " Conception " in the same sense in which it is used in the definition of Pius IX. In speaking of conception one of three things may be meant; (1) the mother's co-operation; (2) the formation of the body, or (3) the completion of the human being by the infusion of the rational or spiritual soul. In early times conception was very commonly used in the first sense — " active " conception as it was called. But it is in the second, or rather the third, sense that the word is employed in modern usage, and in the definition of Pope Pius IX. But St Bernard would seem to have been speaking of conception in the first sense, for in his argument he says, " How can there be absence of sin where there is concupiscence {libido)!" and stronger expressions follow, showing that he is speaking of the mother and not of the child. 4

St Thomas Aquinas, the greatest of the medieval scholastics, refused to admit the Immaculate Conception, on the ground that, unless the Blessed Virgin had at one time or other been one of the sinful, she could not justly be said to have been redeemed by Christ. 6 St Bonaventura (d. 1274), second only to St Thomas in his influence on the Christian schools of his age, hesitated to accept it for a similar reason. 6 The celebrated John Duns Scotus (d. 1308), a Franciscan like St Bonaventura, argued, on the contrary, that from a rational point of view it was certainly as little derogatory to the merits of Christ to assert that Mary was by him preserved from all taint of sin, as to say that she first contracted it and then was delivered. 7 His arguments, combined with a better acquaintance with the language

of the early Fathers, gradually prevailed in the schools of the Western Church. In 1387 the university of Paris strongly condemned the opposite view. In 1483 Pope Sixtus IV., who had already (1476) emphatically approved of the feast of the Conception, condemned those who ventured to assert that the doctrine of the Immaculate Conception was heretical, and forbade either side to claim a decisive victory until further action on the part of the Holy See. The council of Trent, after declaring that in its decrees on the subject of original sin it did not include ■" the blessed and immaculate Virgin Alary, Mother of God," renewed this prohibition. 8 Pope Paul V. (d. 1651) ordered that no one, under severe penalties, should dare to assent in public " acts " or disputations that the Blessed Virgin was conceived in original sin. Pope Gregory XV., shortly afterwards, extended this prohibition to private discussions, , allowing, however, the Dominicans to argue on the subjects among themselves. Clement XL, in 1708, extended the feast of the Conception to the whole Church as a holy day of obligation. Long before the middle of the 19th century the doctrine was universally taught in the Roman Catholic Church. During the reign of Gregory XVI. the bishops in various countries began to press for a definition. Pius IX., at the beginning of his pontificate, and again after 1851, appointed commissions to investigate the whole subject, and he was advised that the doctrine was one

. 4 S. Bernardi Epist. clxxiv. 7. 4 Summa theologia, part iii., quaest. 27, art. 3.

6 In librum III. sententiarum distinct. 3 quaest. i. art. 2.

7 In librum III. sententiarum dist. 3 quaest. i. n. 4; Cfr. Dis- tinct. 18 n. 15. Also the Summa theologia of Scotus (compiled by a disciple), part iii., quaest. 27, art. 2.

8 Sess. v. De peccato originate.

which could be defined and that the time for a definition was opportune. On the 8th of December 1854 in a great assembly of bishops, in the basilica of St Peter's at Rome, he promulgated the Bull Tneffabilis Deus, in which the history of the doctrine is summarily traced, and which contains the definition as given above.

The festival of the Conception of the Blessed Virgin, as distinct from

her Nativity, was certainly celebrated in the Greek Church in the 7th century, as we learn from one of the canons of St Andrew of Crete (or of Jerusalem) who died about a.d. 700. 1 There is some evidence that it was kept in Spain in the time of St Ildefonsus of Toledo (d. 667) and in southern Italy before a.d. 1000. In England it was known in the 12th century; a council of the province of Canterbury, in 1328, ascribes its introduction to St Anselm. It spread to France and Germany in the same century. It was extended to the whole church, as stated above, in 1708. It is kept, in the Western Church, on the 8th of December; the Greeks have always kept it one day later. The chief repertoire of Patristic passages, both on the doctrine and on the festival, is Father Charles Passaglia's great collection, entitled De immaculato Deiparae semper Virginis conceptu Caroli Passaglia sac. S.J. commenlarius (3 vols., Romae, 1854-1855).

A useful statement of the doctrine with numerous references to the Fathers and scholastics is found in Hiirter's Theologia Dogmatica (5th ed.), torn. i. tract, vii. cap. 6, p. 438.

The state of Catholic belief in the middle of the 19th century is well brought out in La Croyance generate el constante de VEglise touchant Fimmaculee conception de la bienheureuse Vierge Marie, published in 1855 by Thomas M. J. Gousset (1792-1866), professor of moral theology at the grand seminary of Besancon, and successively archbishop of Besangon and cardinal archbishop of Reims. For English readers the doctrine, and the history of its definition, is clearly stated by Archbishop Ullathorne in The Immaculate Conception of the Mother of God (2nd ed., London, 1904). Dr F. G. Lee, in The Sinless Conception of the Mother of God; a Theological Essay (London, 1891) argued that the doctrine of the Immaculate Conception is a legitimate development of early church teaching.

(*J. C. H.) IMMANENCE (from Lat. in-manere to dwell in, remain), in philosophy and theology a term applied in contradistinction to' " transcendence," to the fact or condition of being entirely within something. Its most important use is for the theological conception of God as existing in and throughout the created world, as opposed, for example, to Deism (.q.v.), which conceives Him as separate from and above the universe. This conception has been expressed in a great variety of forms (see Theism, Pantheism). It should be observed that the immanence doctrine need not preclude the belief in the transcendence of God: thus God may be regarded as above the world (tran- scendent) and at the same time as present in and pervading it (immanent). The immanence doctrine has arisen from two main causes, the one metaphysical, the other religious. Meta- physical

speculation on the relation of matter and mind has naturally led to a conviction of an underlying unity of all existence, and so to a metaphysical identification of God and the universe: when this identification proceeds to the length of expressing the universe as merely a mode or form of deity the result is pantheism (cf . the Eleatics) : when it regards the deity as simply the sum of the forces of nature (cf. John Toland) the result is naturalism. In either case, but especially in the former, it frequently becomes pure mysticism (q.v.). Religious thinkers are faced by the problem of the Creator and the created, and the necessity for formulating a close relationship between God and man, the Infinite and Perfect with the finite and imperfect. The conception of God as wholly external to man, a purely mechanical theory of the creation, is throughout Christendom regarded as false to the teaching of the New Testament as also to Christian experience. The contrary view has gained ground in some quarters (cf. the so-called " New Theology " of Rev. R. J. Campbell) so far as to postulate a divine element in human beings, so definitely bridging over the gap between finite and infinite which was to some extent admitted by the bulk of early Christian teachers. In support of such a view are adduced not only the metaphysical difficulty of postulating any relationship between the infinite and the purely finite, but also the ethical 1 P. G., torn, cxvii. p. 1305.

problems of the nature of human goodness — i.e. how a merely human being could appreciate the nature of or display divine goodness — and the epistemological problem of explaining how finite mind can cognize the infinite. The development of the immanence theory of God has coincided with the deeper recogni- tion of the essentially spiritual nature of deity as contrasted with the older semi-pagan conception found very largely in the Old Testament of God as primarily a mighty ruler, obedience to whom is comparable with that of a subject to an absolute monarch: the idea of the dignity of man in virtue of his immediate relation with God may be traced in great measure to the humanist movement of the 14th and 15th centuries (cf. the Inner Light doctrine of Johann Tauler). In later times the conception of conscience as an inward monitor is symptomatic of the same movement of thought. In pure metaphysics the term " imma-nence-philosophy " is given to a doctrine held largely by German philosophers (Rehmke, Leclair, Schuppe and others) according to which all reality is reduced to elements immanent in conscious- ness. This doctrine is derived from Berkeley and Hume on the one hand and from Kantianism on the other, and embodies the principle that nothing can exist for the mind save itself. The natural consequence of this theory is that the individual con- sciousness alone exists

(solipsism) : this position is, however, open to the obvious criticism that in some cases individual conscious- nesses agree in their content. Schuppe, therefore, postulates a general consciousness (Bewusstsein ilberhaupt).

IMMANUEL BEN SOLOMON (c. 1265-c. 1330), Hebrew poet, was born in Rome. He was a contemporary and friend of Dante, and his verse shows the influence of the " divine poet. " Im- manuel's early studies included science, mathematics and philosophy; and his commentaries on Proverbs, Psalms, Job and other Biblical books are good examples of the current symbolical methods which Dante so supremely used. Immanuel's fame chiefly rests on his poems, especially the collection (in the manner of Harizi, q.v.) entitled Mehabberoth, a series of 27 good- natured satires on Jewish life. Religious and secular topics are indiscriminately interwoven, and severe pietists were offended by Immanuel's erotic style. Most popular is an additional section numbered 28 (often printed by itself) called Hell and Paradise (ha-Tophet veha-Eden). The poet is conducted by a certain Daniel (doubtfully identified with Dante) through the realms of torture and bliss, and Immanuel's pictures and comments are at once vivid and witty.

See J. Chotzner, Hebrew Humour (Lond., 1905), pp. 82-102. (I. A.)

IMMERMANN, KARL LEBERECHT (1796-1840), German dramatist and novelist, was born on the 24th of April 1796 at Magdeburg, the son of a government official. In 1813 he went to study law at Halle, where he remained, after the suppression of the university by Napoleon in the same year, until King Frederick William's "Summons to my people " on March 17th. He responded with alacrity, but was prevented by illness from taking part in the earlier campaign; he fought, however, in 181 5 at Ligny and Waterloo, and marched into Paris with Bliicher. At the conclusion of the war he resumed his studies at Halle, and after being Referendar in Magdeburg, was ap- pointed in 1819 Assessor at Minister in Westphalia. Here he made the acquaintance of Elise von Ltitzow, Countess von Ahlefeldt, wife of the leader of the famous " free corps ." (see Lutzow). This lady first inspired his pen, and their relationship is reflected in several dramas written about this time. In 1823 Immermann was appointed judge at Magdeburg, and in 1827 was transferred to Dusseldorf as Landgerichlsrat or district judge. Thither the countess, whose marriage had in the mean- time been dissolved, followed him, and, though refusing his hand, shared his home until his marriage in 1839 with a granddaughter of August Hermann Niemeyer (1754-1828), chancellor and rector perpetuus of Halle university. In 1834

Immermann under- took the management of the Dusseldorf theatre, and, although his resources were small, succeeded for two years in raising it to a high level of excellence. The theatre, however, was insuf- ficiently endowed to allow of him carrying on the work, and

in 1836 he returned to his official duties and literary pursuits. He died at Diisseldorf on the 25th of August 1840.

Immermann had considerable aptitude for the drama, but it was long before he found a congenial field for his talents. His early plays are imitations, partly of Kotzebue's, partly of the Romantic dramas of Tieck and Milliner, and are now forgotten. In 1826, however, appeared Cardenio und Celinde, a love tragedy of more promise; this, as well as the earlier productions, awakened the ill-will of Platen, who made Immermann the subject of his wittiest satire, Der romanlische Oedipus. Between 1827 and 1832 Immermann redeemed his good name by a series of historical tragedies, Das Trauerspiel in Tirol (1827), Kaiser Friedrich II. (1828) and a trilogy from Russian history, Alexis (1832). His masterpiece is the poetic mystery, M erlin (1831), a noble poem, which, like its model, Faust, deals with the deeper problems of modern spiritual life. Immermann's important dramaturgic experiments in Diisseldorf are described in detail in Diisseldorf er Anfdnge (1840). More significant is his position as a novelist. Here he clearly stands on the boundary line between Romanticism and modern literature; his Epigonen (1836) might be described as one of the last Romantic imitations of Goethe's Wilhelm Meister, while the satire and realism of his second novel, Miinchhausen (1838), form a complete break with the older literature. As a prose-writer Immermann is perhaps best remembered to-day by the admirable story of village life, Der Oberhof, which is embedded in the formless mass of Miinch- hausen. His last work was an unfinished epic, Tristan und Isolde (1840).

Immermann's Gesammelte Schriften were published in 14 vols, in 1835-1843; a new edition, with biography and introduction by R. Boxberger, in 20 vols. (Berlin, 1883); selected works, edited by M. Koch. (4 vols., 1887-1888) and F. Muncker (6 vols., 1897). See G. zu Putlitz, Karl Immermann, sein Leben und seine Werke (2 vols., 1870); F. Freiligrath, Karl Immermann, Blatter der Erin- nerung an ihn (1842); W. Miiller, K. Immermann und sein Kreis (i860); R. Fellner, Geschichte einer deutschen Mttsterbiihne (1888); K.

Immermann: eine Geddchtnisschrift (1896).

IMMERSION (Lat. immersio, dipping), . the act of being plunged into a fluid, or being overwhelmed by anything; in astronomy, the disappearance of a heavenly body in the shadow of another, especially of a satellite in the shadow of its primary.

IMMIGRATION (from Lat. in, into, and migrare, to depart), the movement of population, other than that of casual visitors or travellers, into one country from another (see Migration).

IMMORTALITY (Lat. in-, not, morlalis, mortal, from mors, death), the condition or quality of being exempt from death or annihilation. This condition has been predicated of man, both body and soul, in many senses; and the term is used by analogy of those whose deeds or writings have made a lasting impression on the memory of man. The belief in human im- mortality in some form is almost universal; even in early animistic cults the germ of the idea is present, and in all the higher religions it is an important feature. This article is confined to summarizing the philosophical or scientific arguments for, and objections to, the doctrine of the persistence of the human soul after death. For the Christian doctrine, see Eschaiology; and for other religions see the separate articles. a

In the Orphic mysteries "the soul was regasˆp as a part of the divine, a particula aurae divinae, for which the body in its limited and perishable condition was no fit organ, but a grave or prison(ro ccojxa afj/xa). The existence of the soul in the body was its punishment for sins in a previous condition; and the doom of its sins in the body was its descent into other bodies, and the postponement of its deliverance " (Salmond's Christian Doctrine of Immortality, p. 109). This deliverance was what the mysteries promised. A remarkable passage in Pindar (Thren. 2) is thus rendered by J. W. Donaldson (Pindar's Epinician or Triumphal Odes, p. 372). " By a happy lot, all persons travel to an end free of toil. And the body, indeed, is subject to the powerful influence of death; but a shadow of vitality is still left alive, and this alone is of divine origin; while

our limbs are in activity it sleeps; but, when we sleep, it dis- closes to the mind in many dreams the future judgment with regard to happiness and misery."

The belief of Socrates is uncertain. In the Apology he is represented as sure that " no evil can happen to a good man, either in life or after death, " but as not knowing whether " death be a state of

nothingness and utter unconsciousness, or a change or migration of the soul from this world to the next " (i. 40, 41). In the Phaedo a confident expectation is ascribed to him. He is not the body to be buried; he will not remain with his friends after he has drunk the poison, but he will go away to the happiness of the blessed. The silence of the Memorabilia of Xenophon must be admitted as an argument to the contrary; but the probability seems to be that Plato did not in the Phaedo altogether misrepresent the Master. In Plato's thought the belief held a prominent position. " It is noteworthy," says Professor D. G. Ritchie, " that, in the various dialogues in which Plato speaks of immortality, the arguments seem to be of different kinds, and most of them quite unconnected with one another. In the Phaedrus (245 c) the argument is, that the soul is self-moving, and, therefore, immortal; and this argument is repeated in the Laws (x. 894, 895). It is an argu- ment that Plato probably inherited from Alcmaeon, the physician of Croton (Arist. De An. i. 2, § 17 405 a 29), whose views were closely connected with those of the Pythagoreans. In the Phaedo the main argument up to which all the others lead is that the soul participates in the idea of life. Recollection (anamnesis) alone would prove pre-existence, but not existence after death. In the tenth book of the Republic we find the curious argument that the soul does not perish like the body, because its characteristic evil, sin or wickedness does not kill it as the diseases of the body wear out the bodily life. In the Timaeus (41 a) the immortality even of the gods is made dependent on the will of the Supreme Creator; souls are not in their own nature indestructible, but persist because of His goodness. In the Laws (xii. 959 a) the notion of a future life seems to be treated as a salutary doctrine which is to be believed because the legislator enacts it (Plato, p. 146). The estimate to be formed of this reasoning has been well stated by Dr A. M. Fairbairn, " Plato's arguments for immortality, isolated, modernized, may be feeble, even valueless, but allowed to stand where and as he himself puts them, they have an altogether different worth. The ratiocinative parts of the Phaedo thrown into syllogisms may be easily demolished by a hostile logician; but in the dialogue as a whole there is a subtle spirit and cumula- tive force which logic can neither seize nor answer " (Studies in the Philosophy of Religion, p. 226, 1876).

Aristotle held that the vovs or active intelligence alone is immortal. The Stoics were not agreed upon the question. Cleanthes is said to have held that all survive to the great conflagration which closes the cycle, Chrysippus that only the wise will. Marcus Aurelius teaches that even if the spirit survive for a time it is at last "absorbed in the

generative principle of the universe." Epicureanism thought that " the wise man fears not death, before which most men tremble ; for, if we are, it is not; if it is, we are not." Death is extinction. Augustine adopts a Platonic thought when he teaches that the immortality of the soul follows from its participation in the eternal truths. The Apologists themselves welcomed, and commended to others, the Christian revelation as affording a certainty of immortality such as reason could not give. The Aristotelian school in Islam did not speak with one voice upon the question; Avicenna. declared the soul immortal, but Averroes assumes only the eternity of the universal intellect. Albertus Magnus argued that the soul is immortal, as ex se ipsi causa, and as independent of the body; Pietro Pomponazzi maintained that the soul's immortality could be neither proved nor disproved by any natural reasons. Spinoza, while consistently with his pantheism denying personal immortality, affirms that "the human mind cannot be absolutely destroyed with the body, but there remains of it something which is eternal " (Eth. v. prop, xxiii.). The reason he gives is that, as this something " appertains to the

essence of the mind," it is " conceived by. a certain eternal necessity through the very essence of God."

Leibnitz, in accord with the distinctive principle of his philosophy, affirmed the absolute independence of mind and body as distinct monads, the parallelism of their functions in life being due to the pre-established harmony. For the soul, by its nature as a single monad indestructible and, therefore, immortal, death meant only the loss of the monads constituting the body and its return to the pre-existent state. The argument of Ernst Platner {Philos. Aphor. i. 1174, n 78) is similar. " If the human soul is a force in the narrower sense, a substance, and not a combination of substances, then, as in the nature of things there is no transition from existence to non-existence, we cannot naturally conceive the end of its existence, any more than we can anticipate a gradual annihilation of its existence." He adds a reason that recalls one of Plato's, " As manifestly as the human soul is by means of the senses linked to the present life, so manifestly it attaches itself by reason, and the conceptions, conclusions, anticipations and efforts to which reason leads it, to God and eternity."

Against the first kind of argument, as formulated by Moses

Mendelssohn, Kant advances the objection that, although we may deny the soul extensive quantity, division into parts, yet we cannot refuse to it intensive quantity, degrees of reality; and consequently its existence may be terminated not by decomposition, but by gradual diminution of its powers (or to use the term he coined for the purpose, by elanguescence). This denial of any reasonable ground for belief in immortality in the Critique of Pure Reason {Transcendental Dialectic, bk. ii. ch. i.) is, however, not his last word on the subject. In the Critique of the Practical Reason {Dialectic, ch. i. sec. iv) the immortality of the soul is shown to be a postulate. Holiness, " the perfect accordance of the will with the moral law," demands an endless progress; and " this endless progress is only possible on the supposition of an endless duration of the existence and personality of the same rational being (which is called the immortality of the soul)." Not demonstrable as a theoretical proposition, the immortality of the soul " is an inseparable result of an uncon- ditional a priori practical law." The moral interest, which is so decisive on this question in the case of Kant, dominates Bishop Butler also. A future life for him is important, because our happiness in it may depend on our present conduct; and therefore our action here should take into account the reward or punishment that it may bring on us hereafter. As he main- tains that probability may and ought to be our guide in life, he is content with proving in the first chapter of the Analogy that " a future life is probable from similar changes (as death) already undergone in ourselves and in others, and from our present powers, which are likely to continue unless death destroy them." While we may fear this, " there is no proof that it will, either from the nature of death," of the effect of which on our powers we are altogether ignorant, " or from the analogy of nature, which shows only that the sensible proof of our powers (not the powers themselves) may be destroyed." The imagination that death will destroy these powers is unfounded, because (1) " this supposes we are compounded, and so discerptible, but the contrary is probable " on -metaphysical grounds (the indivisibility of the subject in which consciousness as indivisible inhales, and its distinction from the body) and also experimental^ persistence of the living being in spite of changes in the bodyor even losses of parts of the body); (2) this also assumes that " our present living powers of reflection " must be affected in the same way by death " as those of sensation," but this is disproved by their relative independence even in this life; (3) " even the suspension of our present powers of reflection " is not involved in " the idea of death, which is simply dissolution of the body," and which may even " be like birth, a continuation and perfecting of our powers." " Even if suspension were involved, we cannot infer

destruction from it " (analysis of chapter i. in Angus's edition). He recognizes that " reason did, as it well might, conclude that it should finally, and upon the whole, be well with the righteous and ill with the wicked," but only " revelation teaches us that

the next state of things after the present is appointed for the execution of this justice " (ch. ii. note 10). He does not use this general anticipation of future judgment, as he might have done, as a positive argument for immortality.

Adam Ferguson {Institutes of Moral Philosophy, p. 119, new ed., 1800) argues that " the desire for immortality is an instinct, and can reasonably be regarded as an indication of that which the author of this desire wills to do." From the standpoint of modern science John Fiske confirms the validity of such an argument; for what he affirms in regard to belief in the divine is equally applicable to this belief in a future life. " If the relation thus established in the morning twilight of man's existence between the human soul and a world invisible and immaterial is a relation of which only the subjective term is real and the objective term is non-existent; then I say it is something utterly without precedent in the whole history of creation " {Through Nature to God, 1899, p. 188, 189). Whatever may have been Hegel's own belief in regard to personal im- mortality, the logical issue of his absolute idealism has been well stated by W. Windelband {History of Philosophy, p. 633). " It became clear that in the system of perpetual Becoming and of the dialectical passing over of all forms into one another, the finite personality could scarcely raise a plausible claim to the character of a substance and to immortality in the religious sense." F. D. Schleiermacher applies the phrase "the immortality of religion " to the religious emotion of»oneness, amid finitude, with the infinite and, amid time, with the eternal; denies any necessary connexion between the belief in the continuance of personal existence and the consciousness of God; and rests his faith on immortality altogether on Christ's promise of living fellowship with His followers, as presupposing their as well as His personal immortality. A. Schopenhauer assigns immortality to the universal will to live; and Feuerbach declares spirit, consciousness eternal, but not any individual subject. R. H. Lotze for the decision of the question lays down the broad principle, " All that has once come to be will eternally continue so soon as for the organic unity of the world it has an unchange- able value, but it will obviously again cease to be, when that is not the case " {Gr. der Psy. p. 74).

Objections to the belief in immortality have been advanced from the standpoints of materialism, naturalism, pessimism and pantheism.

Materialism argues that, as life depends on a material organism, thought is a function of the brain, and the soul is but the sum of mental states, to which, according to the theory of psychophysical parallelism, physical changes always correspond; therefore, the dissolution of the body carries with it necessarily the cessation of consciousness. That, as now constituted, mind does depend on brain, life on body, must be conceded, but that this dependence is so absolute that the function must cease with the organ has not been scientifically demonstrated; the connexion of the soul with the body is as yet too obscure to justify any such dogmatism. But against this inference the following considerations may be advanced: (1) Man does distinguish himself from his body; (2) he is conscious of his personal identity through all the changes of his body; (3) in the exercise of his will he knows himself not controlled by but controlling his body; (4) his consciousness warrants his denying the absolute identification of himself and his body. It may further be added that materialism can be shown to be an inadequate philosophy in its attempts to account even for the physical universe, for this is inexplicable without the assump- tion of mind distinct from, and directive of, matter. The theory of psychophysical parallelism has been subjected to a rigorous examination in James Ward's Naturalism and Agnosticism, part iii., in which the argument that mind cannot be derived from matter is convincingly presented. Sir Oliver Lodge in his reply to E. Haeckel's Riddle of the Universe maintains that " life may be something not only ultra-terrestrial, but even immaterial, something outside our present categories of matter and energy; as real as they are, but different, and utilizing them for its own purpose " {Life and Matter, 1906, p. 198). He rejects the attempt to explain human personality as " generated by

the material molecular aggregate of itsown unaided latent power," and affirms that the " universe where the human spirit is more at home than it is among these temporary collocations of matter" is " a universe capable of infinite development, of noble contem- plation, and of lofty joy, long after this planet — nay the whole solar system — shall have fulfilled its present spire of destiny, and retired cold and lifeless upon its endless way " (pp. 109-200). In his lecture on Human Immortality (3rd ed., 1906), Professor William James deals with " two supposed objections to the doctrine." The first is " the law that thought is a function of the brain." Accepting the law he distinguishes productive from Permissive or transmissive function (p.

32), and, rejecting the view that brain produces thought, he recognizes that in our present condition brain transmits thought, thought needs brain for its organ of expression; but this does not exclude the possibility of a condition in which thought will be no longer so dependent on brain. He quotes (p. 57) with approval Kant's words, "The death of the body may indeed b'e the end of the sensational use of our mind, but only the beginning of the intellectual use. The body would thus be not the cause of our thinking, but merely a condition restrictive thereof, and, although essential to our sensuous and animal consciousness, it may be regarded as an impeder of our pure spiritual life " (Kritik der reinen Vernunft, 2nd ed., p. 809).

Further arguments in the same direction are derived from the modern school of psychical research (see especially F. W. H. Myers' Human Personality, 1903).

Another objection is advanced from the standpoint of naturalism, which, whether it issues in materialism or not, seeks to explain man as but a product of the process of nature. The universe is so immeasurably vast in extension and duration, and man is so small, his home but a speck in space, and his history a span in time that it seems an arrogant assumption for him to claim exemption from the universal law of evolution and dissolution. This view ignores that man has ideals of absolute value, truth, beauty, goodness, that he consciously communes with the God who is in all, and through all, and over all, that it is his mind which recognizes the vastness of the universe and thinks its universal law, and that the mind which perceives and conceives cannot be less, but must be greater than the object of its knowledge and thought.

Pessimism suggests a third objection. The present life is so little worth living that its continuance is not to be desired. James Thomson (" B.V.") speaks " of the restful rapture of the inviolate grave," and sings the praises of death and of oblivion. We cannot admit that the history of mankind justifies his conclusion ; for the great majority of men life is a good, and its continuance an object of hope.

For pantheism personal immortality appears a lesser good than reabsorption in the universal life; but against this objec- tion we may confidently maintain that worthier of God and more blessed for man is the hope of a conscious communion in an eternal life of the Father of all with His whole family.

Lastly positivism teaches a corporate instead of an individual immortality; man should desire to live on as a beneficent influence in the race. This conception is expressed in George Eliot's lines: A

*"0, may I join the choir invisible ^^*

Of those immortal dead who live again In minds made better by their presence: live In pulses stirred to generosity, In deeds of daring rectitude, in scorn For miserable aims that end with self, In thoughts sublime that pierce the night tike stars, . And with their mild persistence urge man's search To vaster issues."

But these possibilities are not mutually exclusive alternatives. A man may live on in the world by his teaching and example as a power for

good, a factor of human progress, and he may also be continuing and completing his course under conditions still more favourable to all most worthy in him. Consciously to participate as a person in the progress of the race is surely a worthier hope than unconsciously to contribute to it as an

influence; ultimately to share the triumph as well as the struggle is a more inspiring anticipation.

In stating constructively the doctrine of immortality we must assign altogether secondary importance to the metaphysical arguments from the nature of the soul. It is sufficient to show, as has already been done, that the soul is not so absolutely dependent on the body, that the dissolution of the one must necessarily involve the cessation of the other. Such arguments as the indivisibility of the soul and its persistence can at most indicate the possibility of immortality.

The juridical argument has some force; the present life does not show that harmony of condition and character which our sense of justice leads us to expect; the wicked prosper and the righteous suffer; there is ground for the expectation that in the future life the anomalies of this life will be corrected. Although this argument has the support of such great names as Butler and Kant, yet it will repel many minds as an appeal to the motive of self-interest.

The ethical argument has greater value. Man's life here is incomplete, and the more lofty his aims, the more worthy his labours, the more incomplete will it appear to be. The man who lives for fame, wealth, power, may be satisfied in this life; but he who lives for the ideals of truth, beauty, goodness, lives not for time but for eternity, for his ideals cannot be realized, and so his life fulfilled on this side of the grave. Unless these ideals are mocking visions, man has a right to expect the con- tinuance of his life for its completion. This is the line of argument developed by Professor Hugo Miinsterberg in his lecture on The Eternal Life (1905), although he states it in the terms peculiar to his psychology, in which personality is conceived as primarily will. " No endless duration is our goal, but complete repose in the perfect satisfaction which the will finds when it has reached the significance, the influence, and the value at which it is aiming " (p. 83).

More general in its appeal still is the argument from the affections, which has been beautifully developed in Tennyson's In Memoriam. The heart protests against the severance of death , and claims the continuance of love's communion after death; and as man feels that

love is what is most godlike in his nature, love's claim has supreme authority.

There is a religious argument for immortality. The saints of the Hebrew nation were sure that as God had entered into fellow- ship with them, death could not sever them from his presence. This is the argument in Psalms xvi. and xvii., if, as is probable, the closing verses do express the hope of a glorious and blessed immortality. This too is the proof Jesus himself offers when he declares God to be the God of the living and not of the dead (Matt. xxii. 32). God's companions cannot become death's victims.

Josiah Royce in his lecture on The Conception of Immortality (1900) combines this argument of the soul's union with God with the argument of the incompleteness of man's life here: —

" Just because God is One, all our lives have various and unique places in the harmony of the divine life. And just because God attains and wins and finds this uniqueness, all our lives win in our union with Him the individuality which is essential to their true meaning. And just because individuals whose lives have uniqueness of meaning are here only objects of pursuit, the attainment of this very individuality, since it is indeed real, occurs not in our present form of consciousness, but in a life that now we see not, yet in a life whose genuine meaning is continuous with our own human life, however far from our present flickering form of disappointed human consciousness that life of the final individuality may be. Of this our true individual life, our present life is a glimpse, a fragment; 3 hint, and in its best moments a visible beginning. That this in- dividual life of all of us is not something limited in its temporal expression to the life that now we experience, follows from the very fact that here nothing final or individual is found expressed " (pp. 144-H6).

R. W. Emerson declares that " the impulse to seek proof of immortality is itself the strongest proof of all." We expect immortality not merely because we desire it; but because the desire itself arises from all that is best and truest and worthiest in ourselves. The desire is reasonable, moral, social, religious; it has the same worth as the loftiest ideals, and worthiest aspirations

of the soul of man. The loss of the belief casts a dark shadow over

the present life. " No sooner do we try to get rid of the idea of Immortality — than Pessimism raises its head . . . Human griefs seem little worth assuaging; human happiness too paltry (at the best) to be worth increasing. The whole moral world is reduced to a point. Good and evil, right and wrong, become infinitesimal, ephemeral matters. The affections die away — die of their own conscious feebleness and uselessness. A moral paralysis creeps over us " {Natural Religion, Post- script). The belief exercises a potent moral influence. " The day," says Ernest Renan, " in which the belief in an after-life shall vanish from the earth will witness a terrific moral and spiritual decadence. Some of us perhaps might do without it, provided only that others held it fast. But there is no lever capable of raising an entire people if once they have lost their faith in the immortality of the soul " (quoted by A. W. Momerie, Immortality, p. 9). To this belief, many and good as are the arguments which can be advanced for it, a confident certainty is given by Christian faith in the Risen Lord, and the life and immortality which he has brought to light in his Gospel.

[n addition to the .works referred to above, see R. K. Gaye, The Platonic Conception of Immortality and its Connexion with the Theory of Ideas (1904); R. H. Charles, A Critical History of the Doctrine of a Future Life in Israel, in Judaism and in Christianity {1899) ; E. P6tavel, The Problem of Immortality (Eng. trans, by F. A. Freer, 1892); J. Fiske, The Destiny of Man, viewed in the Light of his Origin (1884) ; G. A. Gordon, Immortality and the New Theodicy (1897) ; Henry Buckle, The After Life (1907). (A. E. G.)*

IMMUNITY (from Lat. immunis, not subject to a munus or public service), a general term for exemption from liability, principally used in the legal sense discussed below, but also in recent times in pathology (for which see Bacteriology). In international law the term ("not serving," "not subject") implies exemption from the jurisdiction of the state which otherwise exercises jurisdiction where the immunity arises. It is thus applied to the exceptional position granted to sovereigns and chiefs of states generally, and their direct representatives in the states to which they are accredited.

Under Exterritoriality is treated the inviolability of embassies and legations and the application of the material side of the doctrine of immunity. As a right appertaining to the persons of those who enjoy it, the doctrine has grown out of the necessity for sovereigns of respecting each other's persons in their common interest. To be able to negotiate without danger of arrest or interference of any kind with their persons was the only condition upon which sovereigns would

have been ; able to meet and discuss their joint interests. With the develop- ment of states as independent entities and of intercourse between them and their " nationals," the work of diplomatic missions increased to such an extent that instead of having merely occasional ambassadors as at the beginning, states found it expedient to have resident representatives with a permanent residence. Hence the sovereign's inviolability becomes vested in the person of the sovereign's delegate, and with it as a necessary corollary the exterritoriality of his residence. Out of the further expansion of the work of diplomatic missions came duplication of the personnel and classes of diplomatic secretaries, who as forming part of the embassy or legation also had to be covered by the diplomatic immunity. &ˆ

In no branch of international intercourse n!rˆ states shown so laudable a respect for tradition as in the case of this immunity, and this in spite of the hardship which frequently arises for private citizens through unavoidable dealings with members of embassies and legations. The Institute of International Law (see Peace) at their Cambridge session in 1895 drew up the following rules, 1 which may be taken to be the only precise statement of theory on the subject, for the guidance of foreign offices in dealing with it: —

Art. i.— Public ministers are inviolable. They also enjoy " exterritoriality," in the sense and to the extent hereinafter mentioned and a certain number of immunities.

Art. 2. — The privilege of inviolability extends: (f) To all classes

1 The rules were drawn up in French. The author of this article is responsible for the translation of them.

of public ministers who regularly represent their sovereign or their country; (2) To all persons forming part of the official staff of a diplomatic mission ; (3) To all persons forming part of its non-official staff, under reserve, that if they belong to the country where the mission resides they only enjoy it within the official residence.

Art. 3. — The government to which the minister is accredited must abstain from all offence, insult or violence against the persons entitled to the privilege, must set an example in the respect which is due to them and protect them by specially rigorous penalties from all offence, insult or violence on the part of the inhabitants of the country, so that they may devote themselves to their duties in perfect freedom.

Art. 4. — Immunity applies to everything necessary for the fulfilment by ministers of their duties, especially to personal effects, papers, archives and correspondence.

Art. 5. — It lasts during the whole time which the minister or diplomatic official spends, in his official capacity, in the country to which he has been sent.

It continues even in time of war between the two powers during the period necessary to enable the minister to leave the country with his staff and effects.

Art. 6.- — Inviolability cannot be claimed : (1) In case of legitimate defence on the part of private persons against acts committed by the persons who enjoy the privilege; (2) In case of risks incurred by any of the persons in question voluntarily or needlessly; (3) In case of improper acts committed by them, provoking on the part of the state to which the minister is accredited measures of defence or precaution ; but, except in a case of extreme urgency, this state should confine itself to reporting the facts to the minister's govern- ment, requesting the punishment or the recall of the guilty agent and, if necessary, to surrounding the official residence to prevent unlawful communications or manifestations.

Immunity with Respect to Taxes.

Art. II. — A public minister in a foreign country, functionaries officially attached to his mission and the members of their families residing with them, are exempt from paying: (1) Personal direct taxes and sumptuary taxes; (2) General taxes on property, whether on capital or income; (3) War contributions; (4) Customs duties in respect of articles for their personal use.

Each government shall indicate the grounds {justifications) to which these exemptions from taxation shall be subordinated.

Immunity from Jurisdiction.

Art. 12. — A public minister in a foreign country, functionaries officially attached to his mission and the members of their families residing with them, are exempt from all jurisdiction, civil or criminal, of the state to which they are accredited ; in principle, they are only subject to the civil and criminal jurisdiction of their own country. A claimant may apply to the courts of the capital of the country of the minister, subject to the right of the minister to prove that he has a different domicile in his country.

Art. 13. — With respect to crimes, persons indicated in the preceding article remain subject to the penal laws of their own country, as if they had committed the acts in their own country.

Art. 14. — The immunity attaches to the function in respect of acts connected with the function. As regards acts done not in connexion with the function, immunity can only be claimed so long as the function lasts.

Art. 15. — Persons of the nationality of the country to the government of which they are accredited cannot claim the privilege of immunity.

Art. 16. — Immunity from jurisdiction cannot be invoked: (1) In case of proceedings taken by reason of engagements entered into by the exempt person, not in his official or private capacity, but in the exercise of a profession carried on by him in the country concurrently with his diplomatic functions; (2) In respect cf real actions, including possessory actions, relating to anything movable or immovable in the country.

It exists even in case of a breach of the law which may endanger public order or safety, or of crime against the safety of the state, without prejudice to such steps as the territorial government may take for its own protection.

Art. 17.— Persons entitled to immunity from jurisdiction may refuse to appear as witnesses before a territorial court on condition that, if required by diplomatic intervention, they shall give their testimony in the official residence to a magistrate of the country appointed for the purpose. ■»

Further questions connected with Immunity and Exterri- toriality {q.v.) arise out of the different industrial'enterprises undertaken by states, such as posts, telegraphs, telephones, railways, steamships, &c, which require regulation to prevent conflicts of interest between the state owners and the private interests involved in these enterprises. (T. Ba.)

IMOLA (anc. Forum Comdii), a town and episcopal see of Emilia, Italy, in the province of Bologna, from which it is 21 m. S.E. by rail, 140 ft. above sea-level. Pop. (1901) 12,058 (town); 33,144 (commune). The cathedral of S. Cassiano hap been

modernized; it possesses interesting reliquaries, and contains the tomb of Petrus Chrysologus, archbishop of Ravenna (d. 451), a native of Imola. S. Domenico has a fine Gothic portal and S. Maria in Regola an old campanile. The town also contains some fine palaces. The communal library has some MSS., including a psalter with miniatures, that once belonged to Sir Thomas More. The citadel is square with round towers at the angles; it dates from 1304, and is now used as a prison. Imola has a large lunatic asylum with over 1200 inmates. Innocenzo Francucci (Innocenzo da Imola), a painter of the Bolognese school (1494-1549), was a native of Imola, and two of his works are preserved in the Palazzo del Comune. The Madonna del Piratello, 2 m. outside the town to the N.W., is in the early Renaissance style (1488); the campanile was probably built from Bramante's plans in 1506.

The ancient Forum Cornelii, a station on the Via Aemilia, is said by Prudentius, writing in the 5th century a.d., to have been founded by Sulla; but the fact that it belonged to the Tribus Pollia shows that it already possessed Roman citizenship before the Social war. In later times we hear little of it; Martial published his third book of epigrams while he was there. In the Lombard period the name Imolas begins to appear. In 1480, after a chequered history, the town came into the possession of Girolamo Riario, lord of Forli, as the dowry of his wife Caterina Sforza, and was incorporated with the States of the Church by Caesar Borgia in 1500.

IMP (O. Eng. impa, a graft, shoot; the verb impian is cognate with Ger. impfen, to graft, inoculate, and the Fr. enter; the ultimate origin is probably the Gr. etufrveiv, to implant, cf. eixvros, engrafted), originally a slip or shoot of a plant or tree used for grafting. This use is seen in Chaucer (Prologue to the Monk's Tale, 68) " Of fieble trees ther comen wrecched ympes." The verb " to imp " in the sense of " to graft " was especially used of the grafting of feathers on to the wing of a falcon or hawk to replace broken or damaged plumage, and is frequently used metaphorically. Like " scion," " imp " was till the 17th century used of a member of a family, especially of high rank, hence often used as equivalent to " child." The New English Dictionary quotes an epitaph (1584) in the Beauchamp chapel at Warwick, " Heere resteth the body of the noble Impe Robert of Dudley . . . sonne of Robert Erie of Leycester." The current use of the word for a small devil or mischievous sprite is due to the expressions " imp of Satan, or of the devil or of hell," in the sense of " child of evil." It was thus particularly applied to the demons supposed to be

the " familiar " spirits of witches.

IMPATIENS, in botany, a genus of annual or biennial herbs, sometimes becoming shrubby, chiefly natives of the mountains of tropical Asia and Africa, but also found widely distributed in the north temperate zone and in South Africa. The flowers, which are purple, yellow, pink or white and often showy, are spurred and irregular in form and borne in the leaf-axils. The name is derived from the fact that the seed-pod when ripe discharges the seeds by the elastic separation and coiling of the valves. Impaliens Noli-me-tangere, toudˆne-not, an annual succulent herb with yellow flowers, is prcJProly wild in moist mountainous districts in north Wales, Lancashire and West- morland. /. Roylei, a tall hardy succulent annual with rose- purple flowers, a Himalayan species, is common in England as a self-sown garden plant or garden escape. /. Balsamina, the common balsam of gardens, a well-known annua], is a native of India; it is one of the showiest of summer and autumn flowers and of comparatively easy cultivation. /. Sultani, a handsome plant, with scarlet flowers, a native of Zanzibar, is easily grown in a greenhouse throughout the summer, but requires warmth in winter.

IMPEACHMENT (O. Fr. empechement, empeschement, from empccher or empescher, to hinder, Late Lat. impedicare, to entangle, pedica, fetter, pes, foot) , the English form of judicial parliamentary procedure against criminals, in which the House of Commons are the prosecutors and the House of Lords the judges. It differs from bills of attainder (q.v.) in being strictly judicial. When the House of Commons has accepted a motion for impeach-

ment, the mover is ordered to proceed to the bar of the House of Lords, and there impeach the accused " in the name of the House of Commons, and of all the Commons of the United Kingdom." The charges are formulated in articles, to each of which the accused may deliver a written answer. The prosecution must confine itself to the charges contained in the articles, though further articles may be adhibited from time to time. The Commons appoint managers to conduct the prosecution, but the whole House in committee attends the trial. The defendant may appear by counsel. The president of the House of Lords is the lord high steward, in the case of peers impeached for high treason; in other cases the lord chancellor. The hearing take? place as in an ordinary trial, the defence being allowed to call witnesses if necessary, and the prosecution having a right of reply. At the end of the case the president " puts to each peer, beginning with the junior baron, the questions upon the first article, whether the accused be guilty of the crimes charged therein.

Each peer in succession rises in his place when the question is put, and standing uncovered, and laying his right hand upon his breast, answers, ‘ Guilty ‘ or ‘ Not guilty,’ as the case may be, ‘ upon my honour.’ Each article is proceeded with separately in the same manner, the lord high steward giving his own opinion the last ” (May’s Parliamentary Practice, c. xxiii.). Should the accused be found guilty, judgment follows if the Commons move for it, but not otherwise. The Commons thus retain the power of pardon in their own hands, and this right they have in several cases expressly claimed by resolution, declaring that it is not parliamentary for their lordships to give judgment ” until the same be first demanded by this House.” Spiritual peers occupy an anomalous position in the trial of peers, as not being themselves ennobled in blood; on the im- peachment of Danby it was declared by the Lords that Spiritual peers have the right to stay and sit during proceedings for impeachment, but it is customary for them to withdraw before judgment is given, entering a protest ” saving to themselves and their successors all such rights in judicature as they have by law, and by right ought to have.” An impeachment, unlike other parliamentary proceedings, is not interrupted by proroga- tion, nor even by dissolution. Proceedings in the House of Commons preliminary to an impeachment are subject to the ordinary rules, and in the Warren Hastings case an act was passed to prevent the preliminary proceedings from discontinuance by prorogation and dissolution. A royal pardon cannot be pleaded in bar of an impeachment, though it is within the royal prerogative to pardon after the lords have pronounced judgment. The point was raised in the case of the earl of Danby in 1679, and the rule was finally settled by the Act of Settlement. Persons found guilty on impeachment may be reprieved or pardoned like other convicts. Impeachment will lie against all kinds of crimes and misdemeanours, and against offenders of all ranks. In the case of Simon de Beresford, tried before the House of Lords in 1330, the House declared ” that the judgment be not drawn into example or consequence in time to come, whereby the said peers may be charged hereafter to judge others than their peers,” from which Blackstone and others haveinferred that” a commoner cannot be impeached before the Lords for any capital offence, but only for high misdemeanours.” In the case of Edward Fitzharris in 1681, the House of Commons in answer to a resolu- tion of the Lords suspending the impeachment, declared it to be their undoubted right ” to impeach any peer or commoner for treason or any other crime or misdemeanour.” And the House of Lords has in practice recognized the right of tlje Commons to impeach whomsoever they will. The procedure has, however, been reserved for great political offenders whom the

ordinary powers of the law might fail to reach. It has now fallen into desuetude. The last impeachments were those of Warren Hastings (1788-1795) and Lord Melville (1806), but an unsuccessful attempt was made by Thomas C. Anstey to impeach Lord Palmerston in 1848. The earliest recorded instances of impeachment are those of Lord Latimer in 1376 and of Pole, earl of Suffolk, in 1386. From the time of Edward IV. to Elizabeth it fell into disuse, ‘ ‘ partly, “says Hallam, ” from the loss

of that control which the Commons had obtained under Richard II. and the Lancastrian kings, and partly from the preference the Tudor princes had given to bills of attainder or pains and penalties when they wished to turn the arm of parliament against an obnoxious subject.” Revived in the reign of James I., it became an instrument of parliamentary resistance to the crown, and it was not unfrequently resorted to in the first three reigns after the Revolution.

In the United States the procedure of impeachment both in the national and in almost all of the state governments is very similar to that described above. The national constitution prescribes that the House of Representatives ” shall have the sole power of impeachment ” and that ” the Senate shall have the sole power to try all impeachments.” The House appoints managers to conduct the prosecution at the bar of the Senate, and the vote of the Senate is taken by putting the question separately to each member, who, during the trial, must be on oath or affirma- tion. In ordinary cases the president or president pro tempore of the Senate presides, but when the president of the United States is on trial the presiding officer must be the chief justice of the United States Supreme Court. A two-thirds vote is necessary for conviction. The president, vice-president or any civil officer of the United States may be impeached for ” treason, bribery or other high crimes and misdemeanours,” and if convicted, is re- moved from office and may be disqualified for holding any office under the government in future. The officer after removal is also ” liable and subject to indictment, trial, judgment and punish- ment, according to law.” The term ” civil officeis of the United States ” has been construed as being inapplicable to members of the Senate and the House of Representatives. The president’s pardoning power does not extend to officers convicted, on im- peachment, of offences against the United States. Since the organization of the Federal government there have been only eight

impeachment trials before the United States Senate, and of these only two — the trials of Judge John Pickering, a Federal District judge for the Disttict of New Hampshire, in 1803, on a charge of making decisions contrary to law and of drunkenness and profanity on the bench, and of Judge W. H. Humphreys, Judge of the Federal District Court of Tennessee, in 1863, on a charge of making a secession speech and of accepting a judicial position under the Confederate Government — resulted in convic- tions. The two most famous cases are those of Justice Samuel Chase of the United States Supreme Court in 1805, and of Presi- dent Andrew Johnson, the only chief of the executive who has been impeached, in 1868. There is a conflict of opinion with re- gard to the power of the House to impeach a Federal officer who has resigned his office, and also with regard to the-kind of offences for which an officer can be impeached, some authorities maintain- ing that only indictable offences warrant impeachment, and others that impeachment is warranted by any act highly prejudicial to the public welfare or subversive of any essential principle of government. The latter view was adopted by the House of Representatives when it impeached President Johnson.

IMPERIAL CHAMBER {Reichskammergericht), the supreme judicial court of the Holy Roman Empire, during the period between 1405 and the dissolution of the Empire in i8c6. From the early middle ages there had been a supreme court of justice for the Empire — the Hofgcricht (or curia imperatoris, asitwere), in which the emperor himself presided. By his side sat a body of assessors (Urtheilsfinder) , who must be at least seven in number, and who might, in solemn cases, be far more numerous, 1 the assessors who acted varying from time to time and from case to case. The Hofgcricht was connected with the person of the emperor; it ceased to act when he was abroad; it died with his death. Upon him it depended for its efficiency; and when, in the 15th century, the emperor ceased to command respect, his court lost the confidence of his subjects. The dreary reign of Frederick III. administered its deathblow and after 1450 it ceased to sit. Its place was taken by the Kammergericht,

1 For instance, all the members of the diet might serve as Urtheils- finder in a case like the condemnation of Henry tne Lion, duke of Saxony, in the 12th ccnturv.

which appeared side by side with the Hofgericht from 1415, and after 1450 replaced it altogether. The king (or his deputy) still presided in the Kammergericht and it was still his personal court; but the members of the court were now officials — the consiliarii of the imperial aula (or Kammer, whence the name of the court). It was

generally the legal members of the council who sat in the Kammergericht (see under Aulic Council) ; and as they were generally doctors of civil law, the court which they composed tended to act according to that law, and thus contributed to the " Reception " of Roman law into Germany towards the end of the 15th century. The old Hofgericht had been filled, as it were, by amateurs (provided they knew some law, and were peers of the person under trial), and it had acted by old customary law; the Kammergericht, on the contraiy, was composed of lawyers, and it acted by the written law of Rome. Even the Kammergericht, however, fell into disuse in the later years of the reign of Frederick III.; and the creation of a new and efficient court became a matter of pressing necessity, and was one of the most urgent of the reforms which were mooted in the reign of Maximilian I.

This new court was eventually created in 1495; and it bore the name of Reichskammergericht, or Imperial Chamber. It was distinguished from the old Kammergericht by the essential fact that it was not the personal court of the emperor, but the official court of the Empire (or Reich — whence its name). This change was a natural result of the peculiar character of the move- ment of reform which was at this time attempted by the electors, under the guidance of Bertold, elector of Mainz. Their aim was to substitute for the old and personal council and court appointed and controlled by the emperor a new and official council, and a new and official court, appointed and controlled by the diet (or rather, in the ultimate resort, by the electors). The members of the Imperial Chamber, which was created by the diet in 1495 i n order to serve as such a court, 2 were therefore the agents of the Empire, and not of the emperor. The emperor appointed the president; the Empire nominated the assessors, or judges. 3 There were originally sixteen assessors (afterwards, as a rule, eighteen) : half of these were to be doctors of Roman law, while half were to be knights; but after 1555 it became necessary that the latter should be learned in Roman law, even if they had not actually taken their doctorate.

Thus the Empire at last was possessed of a court, a court resting on the enactment of the diet, and not on the emperor's will; a court paid by the Empire, and not by the emperor; a court resident in a fixed place (until 1693, Spires, and after- wards, from 1693 to 1806, Wetzlar), and not attached to the emperor's person. The original intention of the court was that it should repress private war (Fchde), and maintain the public peace (Laitdfriede) . The great result which in the issue it served to achieve was the final " Reception " of Roman law as the common law of Germany. That the Imperial Chamber

should itself administer Roman law was an inevitable result of its com- position; and it was equally inevitable that the composition and procedure of the supreme imperial court should be imitated in the various states which composed the Empire, and that Roman law should thus become the local, as it was already the central, law of the land.

The province of the Imperial Chamber, as it came to be gradually defined by statute and use, extended to breaches of the public peace, cases of arbitrary distraint or imprisonment, pleas which concerned the treasury, violations of the emperor's decrees or the laws passed by the diet, disputes about property between immediate tenants of the Empire or the subjects of different rulers, and finally suits against immediate tenants of the Empire (with the exception of criminal charges and matters relating to imperial fiefs, which went to the Aulic Council). It

2 The attempt to create a new arid official council ultimately failed.

3 More exactly, the emperor nominates, according to the regular usage of later times, a certain number of members, partly as emperor, and partly as the' sovereign of his hereditary estates ; while the rest, who form the majority, are nominated partly by the electors and partly by the six ancient circles.

had also cognizance in cases of refusal to do justice; and it acted as a court of appeal from territorial courts in civil and, to a small extent, in criminal cases, though it lost its competence as a court of appeal in all territories which enjoyed a privilegium de non appellando (such as, e.g. the territories of the electors). The business of the court was, however, badly done; the delay was interminable, thanks, in large measure, to the want of funds, which prevented the maintenance of the proper number of judges. In all its business it suffered from the competition of the Aulic Council (q.v) ; for that body, having lost all executive com- petence after the 16th century, had also devoted itself exclusively to judicial work. Composed of the personal advisers of the emperor, the Aulic Council did justice on his behalf (the erection of a court to do justice for the Empire having left the emperor still possessed of the right to do justice for himself through his consiliarii); and it may thus be said to be the descendant of the old Kammergericht. The competition between the Aulic

Council and the Imperial Chamber was finally regulated by the treaty of Westphalia, which laid it down that the court which first dealt with a case should alone have competence to pursue it.

See R. Schroder, Lehrbuch der deutschen Rechtsgeschichte (Leipzig, 1904); J. N. Harpprecht, Staatsarchiv des Reichskammergerichts (1757-1785); and G. Stobbe, Reichshofgericht und Reichskammer-gericht (Leipzig, 1878). (E. Br.)

IMPERIAL CITIES OR TOWNS, the usual English translation of Reichsstddte, an expression of frequent occurrence in German history. These were cities and towns subject to no authority except that of the emperor, or German king, in other words they were immediate; the earliest of them stood on the demesne land of their sovereign, and they often grew up around his palaces. A distinction was thus made between a Reichsstadt and a Landstadt, the latter being dependent upon some prince, not upon the emperor direct. The term Freie Reichsstadt, which is sometimes used in the same sense as Reichsstadt, is rightly only applicable to seven cities, Basel, Strassburg, Spires, Worms, Mainz, Cologne and Regensburg. Having freed themselves from the domination of their ecclesiastical lords these called themselves Freistddte and in practice their position was in- distinguishable from that of the Reichsstddte.

In the middle ages many other places won the coveted position of a Reichsstadt. Some gained it by gift and others by purchase; some won it by force of arms, others usurped it during times of anarchy, while a number secured it through the extinction of dominant families, like the Hohenstaufen. There were many more free towns in southern than in northern Germany, but their number was continually fluctuating, for their liberties were lost much more quickly than they were gained. Mainz was conquered and subjected to the archbishop in 1462. Some free towns fell into the hands of various princes of the Empire and others placed themselves voluntarily under such protection. Some, like Donauworth in 1607, were deprived of their privileges by the emperor on account of real, or supposed, offences, while others were separated from the Empire by conquest. In 1648 Besancon passed into the possession of Spain, Basel had already thrown in its lot with the Swiss confederation, while Strassburg, Colmar, Hagenau and others were seized by Louis XIV.

Meanwhile the free towns had been winning valuable privileges in addition to those which they already possessed, and the wealthier among them, like Liibeck and Augsburg, were practi- cally imperia in imptrio, waging war and making peace, and ruling their people

without any outside interference. But. they had also learned that union is strength. They formed alliances among themselves, both for offence and for defence, and these Stadtebiinde had an important influence on the course of German history in the 14th and 15th centuries. These leagues were frequently at war with the ecclesiastical and secular potentates of their district and in general they were quite able to hold their own in these quarrels. The right of the free (owns to be repre- sented in the imperial diet was formally recognized in 1480, and about the same time they divided themselves into two groups,

or benches, the Rhenish and the Swabian. By the peace of Westphalia in 1648 they were formally constituted as the third college of the diet. A list drawn up in 1422 mentions 75 free cities, another drawn up in 1521 mentions 84, but at the time of the French Revolution the number had decreased to 51. At this time the Rhenish free cities were: Cologne, Aix-la-Chapelle, Liibeck, Worms, Spires, Frankfort-on-the-Main, Goslar, Bremen, Hamburg, Muhlhausen, Nordhausen, Dortmund, Friedberg and Wetzlar. The Swabian free cities were: Regensburg, Augsburg, Nuremberg, Ulm, Esslingen, Reutlingen, Nordlingen, Rothen- burg-on-the-Tauber, Schwabisch-Hall, Rottweil, Ueberlingen, Heilbronn, Memmingen, Gmiind, Dinkelsbiihl, Lindau, Biberach, Ravensburg, Schweinfurt, Kempten, Windsheim, Kaufbeuern, Weil, Wangen, Isny, Pfullendorf , Offenburg, Leutkirch, Wimpfen, Weissenburg, Giengen, Gengenbach, Zell, Buchorn, Aalen, Buchau and Bopfmgen. But a large proportion of them had as little claim to their exceptional positions as the pocket boroughs of Great Britain and Ireland had before the passing of the Reform Bill of 1832.

By the peace of Luneville in 1801 Cologne, Aix-la-Chapelle, Worms and Spires were taken by France, and by the decision of the imperial deputation of 1803 six cities only: Hamburg, Liibeck, Bremen, Augsburg, Frankfort-on-Main and Nuremberg, were allowed to keep their Reichsfreiheit, or in other words to hold directly of the Empire. This number was soon further reduced. On the dissolution of the Empire in 1806 Augsburg and Nuremburg passed under the sovereignty of Bavaria, and Frankfort was made the seat of a duchy for Karl Theodor von Dalberg, elector and archbishop of Mainz, who was appointed prince primate of the Confederation of the Rhine. When the German Confederation was established in 1815 Hamburg, Liibeck, Bremen and Frankfort were recognized as free cities, and the first three hold that position in the modern German empire; but Frankfort, in consequence of the part it took in the war of 1866, lost its independence and was annexed by Prussia.

In the earlier years of their existence the free cities were under the jurisdiction of an imperial officer, who was called the Reichsvogt or imperial advocate, or sometimes the Reichsschult- heiss or imperial procurator. As time went on many of the cities purchased the right of filling these offices with their own nominees; and in several instances the imperial authority fell practically into desuetude except when it was stirred into action by peculiar circumstances. The internal constitution of the free cities was organized after no common model, although several of them had a constitution drawn up in imitation of that of Cologne, which was one of the first to assert its independence.

For the history of the free cities, see J. J. Moser, Reichsstddtisches Handbuch (Tubingen, 1732); D. Hanlein, Anmerkungen -iiber die Geschichte der Reichsstddte (Ulm, 1775); A. Wendt, Beschreibung der kaiserlichen freien Reichsstddte (Leipzig, 1804); G. W. Hugo, Die Mediatisirung der deutschen Reichsstddte (Carlsruhe, 1838) ; G. Waitz, Deutsche Verfassungs geschichte (Kiel, 1844 fol.) ; G. L. von Maurer, Geschichte der Stddteverfassung in Deutschland (Erlangen, 1869-1871); W. Arnold, Verfassungsgeschichte der deutschen Freistddte (Gotha, 1854) ; P. Briilcke, Die Entwickelung der Reichs-standschafl der Stddte (Hamburg, 1881); A. M. Ehrentraut, Unter-suchungen iiber die Frage der Frei- und Reichsstddte (Leipzig, 1902) ; and S. Rietschel, Untersuchungen zur Geschichte der deutschen Stadtver- fassung (Leipzig, 1905). See also the article Commune. (A. W. H.)*

IMPEY, SIR ELIJAH (1732-1809), chief justice of Bengal, was born on the 13 th of June 1732, and educated at West- minster with Warren Hastings, who was his intimate friend throughout life. In 1773 he was appointed the first chief justice of the new supreme court at Calcutta, and in 1775 presided at the trial of Nuncomar (q.v.) for forgery, with which his name has been chiefly connected in history. His impeachment was unsuccessfully attempted in the House of Commons in 1787, and he is accused by Macaulay of conspiring with Hastings to commit a judicial murder; but the whole question of the trial of Nuncomar ,_ >as been examined in detail by Sir James Fitzjames Stephen, who states that " no man ever had, or could have, a fairer trial than Nuncomar, and Impey in particular behaved

with absolute fairness and as much indulgence as was compatible with his duty."

See E. B. Impey, Sir Elijah Impey (1846) ; and Sir James Stephen, The Story of Nuncomar and the Impeachment of Sir Elijah Impey

(1885).

IMPHAL, the capital of the state of Manipur {q.v.) in eastern Bengal and Assam, on the north-east frontier of India, situated at the confluence of three rivers. Pop. (1901) 67,903. It is really only a collection of villages buried amid trees, with a clearing containing the palace of the raja, the cantonments, and the houses of the few European residents.

IMPLEMENT (Lat. implementum, a filling up, from implere, to fill), in ordinary usage, a tool, especially in the plural for the set of tools necessary for a particular trade or for completing a particular piece of work (see Tools). It is also the most general term applied to the weapons and tools that remain of those used by primitive man. The Late Lat. implementum, more usually in the plural, implementa, was used for all the objects necessary to stock or " fill up " a house, farm, &c. ; it was thus applied to furniture of a house, the vestments and sacred vessels of a church, and to articles of clothing, &c. The transition to the necessary outfit of a trade, &c, is easy. In its original Latin sense of " filling up," the term survives in Scots law, meaning full performance or " fulfilment " of a contract, agreement, &c; " to implement " is thus also used in Scots law for to carry out, perform.

IMPLUVIUM, the Latin term for the sunk part of the floor in the atrium of a Greek or Roman house, which was contrived to receive the water passing through the compluvium (q.v.) of the roof. The impluvium was generally in marble and sunk about a foot below the floor of the atrium.

IMPOSITION (from Lat. imponere, to place or lay UDon), in ecclesiastical usage, the " laying on " of hands by a bishop at the services of confirmation and ordination as a sign that some special spiritual gift is conferred, or that the recipient is set apart for some special service or work. The word is also used of the levying of a burdensome or unfair tax or duty, and of a penalty, and hence is applied to a punishment task given to a schoolboy. From " impose " in the sense of " to pass off " on some one, imposition means also a trick or deception. In the printing trade the term is used of the arrangement of pages of type in the " forme," being one of the stages between composing and printing.

IMPOST (through the O. Fr. from Lat. impositum, a thing laid upon another; the modern French is impSt), a tax or tribute, and particularly a duty levied on imported or exported mer- chandise (see Taxation, Customs Duties, Excise, &c). In architecture, " impost " (in German Kaempfer) is a term applied in Italian to the doorpost, but in English restricted to the upper member of the same, from which the arch springs. This may either be in the same plane as the arch mould or projecting and forming a plain band or elaborately moulded, in which case the mouldings are known as impost mouldings. Sometimes the complete entablature of a smaller order is employed, as in the case of the Venetian or Palladian window, where the central opening has an arch resting on the entablature of the pilasters which flank the smaller window on each side. In Romanesque and Gothic work the capitals with their abaci take the place of the impost mouldings.

IMPOTENCE (Lat. impolentia, want of power), the term used in law for the inability of a husband or wife to have marital intercourse. In English matrimonial law if impotence exists in either of the parties to a marriage at the time of its solemnization the marriage is voidable ab initio. A suit for nullity on the ground of impotence can only be brought by the party who suffers the injury. Third persons— however great their interest — cannot sue for a decree on this ground, nor can a marriage be impeached after the death of one of the parties. The old rule of the ecclesi- astical courts was to require a triennial cohabitation between the parties prior to the institution of the suit, but this has been practically abrogated (G. v. G., 1871, L.R. 2 P.C.D. 287). In suits for nullity on the ground of impotence, medical evidence

as to the condition of the parties is necessary and a commission of two medical inspectors is usually appointed by the registrar of the court for the purpose of examining the parties; such cases are heard in camera. In the United States impotence is a ground for nullity in most states. In Germany it is recognized as a ground for annulment, but not so in France.

IMPRESSIONISM. The word " Impressionist " has come to have a more general application in England than in France, where it took currency as the nickname of a definite group of painters exhibiting together, and was adopted by themselves during the conflict of opinion which the novelty of their art excited. The word therefore belongs to the class of nicknames or battle-names, like " Romanticist," " Naturalist," " Realist," which preceded it, words into which the acuteness of controversy infuses more of theoretical

purport than the work of the artists denoted suggests to later times. The painters included in such a " school " differ so much among themselves, and so little from their predecessors compared with the points of likeness, that we may well see in these recurring effervescences of official and popular distaste rather the shock of individual force in the artist measured against contemporary mediocrity than the disturbance of a new doctrine. The " Olympia " of Manet, hooted at the Salon of 1865 as subversive of all tradition, decency and beauty, strikes the visitor to the Luxembourg rather as the reversion to a theme of Titian by an artist of ruder vision than as the demonstration of a revolutionary in painting. Later developments of the school do appear to us revolutionary. With this warning in a matter still too near us for final judgment, we may give some account of the Impressionists proper, and then turn to the wider significance sometimes given to the name.

The words Impressioniste, Impressionisme, are said to have arisen from a phrase in the preface to Manet's catalogue of his pictures exhibited in 1867 during the Exposition Universelle, from which he was excluded. " It is the effect," he wrote, " of sincerity to give to a painter's works a character that makes them resemble a protest, whereas the painter has only thought of rendering his impression." An alternative origin is a catalogue in which Claude Monet entitled a picture of sunrise at sea " Une Impression." The word was probably much used in the discussions of the group, and was caught up by the critics as characteristic. 1 At the earlier date the only meaning of the word was a claim for individual liberty of subject and treatment. So far as subject went, most, though not all of Manet's pictures were modern and actual of his Paris, for his power lay in the representation of the thing before his eye, and not in fanciful invention. His simplicity in this respect brought him into collision with popular prejudice when, in the " Dejeuner sur l'herbe" (1863), he painted a modern fUe champetre. The actual characters of his painting at this period, so fancifully reproached and praised, may be grouped under two heads.

(1) The expression of the object by a few carefully chosen values in flattish patches. Those patches are placed side by side with little attenuation of their sharp collision. This simplification of colour and tone recalls by its broad effects of light and sil- houette on the one hand Velasquez, on the other the extreme simplification made by the Japanese for the purposes of colour- printing. Manet, like the other painters of his group, was influenced by these newly-discovered works of art. The image, thus treated, has remarkable hardiness and vigour, and also great decorative breadth. Its vivacity and intensity

of aspect is gained by the sacrifice of many minor gradations, and by tbe judgment with which the leading values have been determined. This matching of values produces, technically, a " solid " painting, without glazing or elaborate transparency in shadows.*

(2) During this period Manet makes constant progress towards a fair, clear colour. In his early work the patches of blond colour are relieved against black shadows; later these shadows clear up, and in place of an indeterminate brown sauce we find

1 Mr H. P. Hain Friswell has pointed out that the word "impres- sion " occurs frequently in Chevreul's book on colour; but it is also current among the critics. See Ruskin's chapter on Turner's com- position — " impression on the mind."

shadows that are colours. A typical picture of this period is the " Musique aux Tuileries," refused by the Salon of 1863. In this we have an actual out-of-doors scene rendered with a frankness and sharp taste of contemporary life surprising to contemporaries, with an elision of detail in the treatment of a crowd and a seizing on the chief colour note and patch that characterize each figure equally surprising, an effort finally to render the total high-pitched gaiety of the spectacle as a banquet of sunlight and colour rather than a collection of separate dramatic groups.

For life of Edouard Manet (1832-1883) see Edmond Bazire, Manet (Paris, 1884). An idea of the state of popular feeling may be gained by reading Zola's eloquent defence in Mon Salon, which appeared in L'Evenement (1866) and Edouard Manet (1867), both reprinted in Mes Haines (Paris, 1880). The same author has embodied many of the impressionist ideals in Claude Lantier, the fictitious hero of L'CEuvre. Other writers belonging to Manet's group are Theodore Duret, author of Les Peintres francais en 1867 and Critique d' avant garde, articles and catalogue-prefaces reprinted 1885. See also, for Manet and others, J. K. Huysman's V Art moderne (1883) and Certains. Summaries of the literature of the whole period will be found in R. Muthcr, The History of Modern Painting (tr. London, 1896), not always trustworthy in detail, and Miss R. G. Kingsley, A History of French Art (1899). For an interesting critical account see W. C. Brownell, French Art (1892).

The second period, to which the name is sometimes limited, is complicated by the emergence of new figures, and it is difficult as yet, and perhaps will always remain difficult, to say how- much of originality belongs to each artist in the group. The main features are an intenser study of illumination, a greater variety of illuminations, and a revolution in faclure with a view to pressing closer to a high pitch of light. Manet plays his part in this development, but we shall not be wrong probably in giving to Claude Monet (b. 1840) the chief role as the instinctive artist of the period, and to Camille. Pissarro (b. 1830) a very large part as a painter, curious in theory and experiment. Monet at the early date of 1866 had painted a picture as daring in its naive brutality of out-of-door illumination as the " Dejeuner sur l'herbe." But this picture has the breadth of patch, solidity and suavity of paste of Manet's practice. During the siege of Paris (1870-71) Monet and Pissarro were in London, and there the study of Turner's pictures enlarged their ideas of the pitch in lighting and range of effect possible in painting, and also suggested a new handling of colour, by small broken touches in place of the large flowing touches characteristic of Manet. This method of painting occupied much of the discussion of the group that centred round Manet at the Cafe Guerbois, in the Batignolles quarter (hence called L'Ecole de Batignolles). The ideas were: (1) Abolition of conventional brown tonality. But all browns, in the fervour of this revolt, went the way of con- ventional brown, and all ready-made mixtures like the umbers, ochres, siennas were banished from the palette. Black itself was condemned. (2) The idea of the spectrum, as exhibiting the series of '' primary " or " pure " colours, directed the reformed palette. Six colours, besides white, were admitted to represent the chief hues of the spectrum. (3) These colours were laid on the canvas with as little previous mixture on the palette as possible to maintain a maximum of luminosity, and were fused by touch on the canvas as little as possible, for the same reason. Hence the " broken " character of the touch in this painting, and the subordination of delicacies of form and suave continuity of texture to the one aim of glittering light-and-colour notation. Justification of these procedures was sought in occasional features of the practice of E. Delacroix, of Watteau, of J. B. Chardin, in the hatchings of pastel, the stipple of water-colour. With the ferment of theory went a parti pris for translating all effects into the upper registers of tone (cf. Ruskin's chapter on Turner's practice in Modern Painters), and for emphasizing the colour of shadows at the expense of their tone. The charac- teristic work of this period is landscape, as the subject of illumina- tion strictly observed and followed through the round of the day and of the seasons. Other pictorial motives were subordinated to

this research of effect, and Monet, with a haystack, group of poplars, or church front, has demonstrated the variety of lighting that the day and the season bring to a single scene. Besides

Pissarro, Alfred Sisley (1840-1890) is a member of the group, and Manet continues his progress, influenced by the new ideas in pictures like " Le Linge " and " Chez le Pere Lathuille."

Edmond Degas (b. 1834), a severe and learned draughtsman, is associated with this landscape group by his curiosity in the expression of momentary action and the effects of artificial illumination, and by his experiments in broken colour, more particularly in pastel. The novelty of his matter, taken from unexplored corners of modern life, still more the daring and irony of his observation and points of view, and the strangeness of his composition, strongly influenced by Japanese art, enriched the associations now gathering about the word " impressionist." Another name, that of Auguste Renoir (b. 1841), completes the leading figures of the group. Any " school " programme would be strained to breaking-point to admit this painter, unless on the very general grounds of love of bright colour, sunlit places and independence of vision. He has no science of drawing or of tone, but wins a precarious charm of colour and expression.

The landscape, out-of-doors line, which unites in this period with Manet's line, may be represented by these names: J. B. Corot, J. B. Jongkind, Boudin, Monet. Monet's real teacher was Eugene Boudin (1824-1898). (See Gustave Cahen's Eugene Boudin, Paris, 1900). They, and others of the group, worked together in a painters' colony at Saint Simeon, near Honfleur. It is usual to date the origin of plein-air painting, i.e. painting out-of-doors, in an out-of-doors key of tone, from a picture Manet painted in the garden of de Nittis, just before the outbreak of war in 1870. This dates only Manet's change to the lighter key and looser handling. It was Monet who carried the practice to a logical extreme, working on his canvas only during the effect and in its presence. The method of Degas is altogether different, viz., a combination in the studio from innumerable notes and observations. It will be evident from what has been said above that impressionistic painting is an artistic ferment, corresponding to the scientific research into the principles of light and colour, just as earlier movements in painting coincided with the scientific study of perspective and anatomy. Cnevreul's famous book, already referred to, De la loi du contrasts simultane des couleurs (1838), established certain laws of interaction for colours adjacent to one another. He still, however, referred the sensations of colour to the three im-

possible " primaries " of Brewster — red, blue and yellow. The Young-Helmholtz theory affected the palette of the Impressionists, and the work of Ogden Rood, Colour (Internat. Scientific Series, 1879-1881), published in English, French and German, furnished the theorists with formulae measuring the degradation of pitch suffered by pigments in mixture.

The Impressionist group (with the exception of Manet, who still fought for his place in the Salon) exhibited together for the first time as L'Exposition des Impressionistes at Nadar's, Boulevard des Capucines, in 1874. They were then taken up by the dealer Durand-Ruel.and the succeeding exhibitions in 1876, 1877, 1879, 1880, 1881, 1882 and 1886 were held by him in various galleries. The full history of these exhibitions, with the names of the painters, will be found in two works: F61ix-Fen6on, Les Impressionistes en 1886 (Paris, 1886), and G. Geffroy, La Vie artistique (" Histoire de l'impressionisme," in vol. for 1894). See also G. Lecomte, V Art impressioniste d'apres la collection privee de M. Durand-Ruel (Paris, 1892); Duranty, La Peinture nouvelle (1876). Besides the names already cited, some others may be added: Madame Berthe Morisot, sister-in-law of Manet ; Paul Cezanne, belonging to the Manet-Pissarro group ; and, later, Gauguin. J. F. Raffaelli applied a " characteristic " drawing, to use his word, to scenes in the dismal suburbs of Paris ; Forain, the satiric draughtsman, was a disciple of Degas, as also Zandomeneghi. Miss Mary Cassatt was his pupil. Caillebotte, who bequeathed the collection of Impressionist paintings now in the Luxembourg, was also an exhibitor; and Boudin, who linked the movement to the earlier schools.

The first exhibitions of the Impressionists in London were in 1882 and 1883, but their fortunes there cannot be pursued in the present article, nor the history of the movement beyond its originators. This excludes notable figures, of which M. Besnard may be chosen as a type. "" –

In Manet's painting, even in the final steps he took towards " la peinture claire," there is nothing of the " decomposition of tones " that logically followed from the theories of his followers. He recognized the existence in certain illuminations of the violet shadow, and he adopted in open-air work a looser and more broken touch. The nature of his subjects encouraged such a handling, for the painter who attempts to note from nature the colour values of an elusive effect must treat form in a summary fashion, still more so when the material is in constant movement like water. Moreover, in the river-side subjects

near Paris there was a great deal that was only pictorially tolerable when its tone was subtracted from the details of its form. Monet's painting carries ' the shorthand of form and broken colour to extremity; the flowing touch of Manet is chopped up into harsher, smaller notes of tone, and the pitch pushed up till all values approach the iridescent end of the register. It was in 1886 that the doctrinaire ferment came to a head, and what was supposed to be a scientific method of colour was formulated. This was pointillisme, the resolution of the colours of nature back into six bands of the rainbow or spectrum, and their representation on the canvas by dots of unmixed pigment. These dots, at a sufficient distance, combine their hues in the eye with the effect of a mixture of coloured lights, not of pigments, so that the result is an increase instead of a loss of luminosity. There are several fallacies, however, theoretical and practical, in this " spectral palette " and pointillist method. If we depart from the three primaries of the Helmholtz hypothesis, there is no reason why we should stop at six hues instead of six hundred. But pigments follow the spectrum series so imperfectly that the three primaries, even if we could exactly locate them, limit the palette considerably in its upper range. The sacrifice of black is quite illogical, and the lower ranges suffer accordingly. Moreover, it is doubtful whether many painters have followed the laws of mixture of lights in their dotting, e.g. dotting green and red together to produce yellow. It may be added that dotting with oil pigment is in practice too coarse and inaccurate a method. This innovation of pointillisme is generally ascribed to George Seurat (d. 1890), whose picture, " La Grande Jatte," was exhibited at the Rue Laffitte in 1886. Pissarro experimented in the new method, but abandoned it, and other names among the Pointillistes are Paul Signac, Vincent van Gogh, and van Rysselberghe. The theory opened the way for endless casuistries, and its extravagances died out in the later exhibition of the [ndependants or were domesticated in the Salon by painters like M. Henri Martin.

The first modern painter to concern himself scientifically with the reactions of complementary colours appears to have been Delacroix (J. Leonardo, it should be remembered, left some notes on the subject). It is claimed for Delacroix that as early as 1825 he observed and made use of these reactions, anticipating the complete exposition of Chevreul. He certainly studied the treatise, and his biographers describe a dial-face he constructed for reference. He had quantities of little wafers of each colour, with which he tried colour

effects, a curious anticipation of pointillist technique. The pointillists claim him as their grandfather. See Paul Signac, " D'EugSne Delacroix au N6o-Impressionnisme " (Revue Blanche, 1898). For a fuller discussion of the spectral palette see the Saturday Review, 2nd, 9th and 23rd February and 23rd March 1901.

In England the ideas connected with the word Impressionism have been refracted through the circumstances of the British schools. The questions of pitch of light and iridescent colour had already arisen over the work of Turner, of the Pre- Raphaelites, and also of G. F. Watts, but less isolated and narrowed, because the art of none of these limited itself to the pursuit of light. Pointillisme, after a fashion, existed in British water-colour practice. But the Pre-Raphaelite school had accustomed the English eye to extreme definition in painting and to elaboration of detail, and it happened that the painting of James M'Neill Whistler (Grosvenor Gallery, 1878) brought the battle-name Impressionism into England and gave it a different colour. Whistler's method of painting was in no way revolutionary, and he preferred to transpose values into a lower key rather than compete with natural pitch, but his vision, like that of Manet under the same influences, Spanish and Japanese, simplified tone and subordinated detail. These characteristics raised the whole question of the science and art of aspect in modern painting, and the field of controversy was extended backwards to Velasquez as the chief master of the moderns. " Impressionism " at first had meant individualism of vision, later the notation of fugitive aspects of light and of movement; now it came to mean breadth in pictorial vision, all the simplifications that arise from the modern analysis of aspect, and especially the effect produced upon the parts of a picture-field by attending to the impression of the whole. Ancient

painting analyses aspect into three separate acts as form, tone and colour. All forms are made out with equal clearness by a conventional outline; over this system of outlines a second system of light and shade is passed, and over this again a system of colours. Tone is conceived as a difference of black or white added to the tints, and the colours are the definite local tints of the objects (a blue, a red, a yellow, and so forth). In fully developed modern painting, instead of an object analysed into sharp outlines covered with a uniform colour darkened or lightened in places, we find an object analysed into a number of surfaces or planes set at different angles. On each of these facets the character of the object and of the illumination, with accidents of reflection, produces a patch called by modern painters a " value," because it is colour of a particular value or tone. (With each difference of tone, " value " implies a difference

of hue also, so that when we speak of a different tone of the same colour we are using the word " same " in a loose or approxi- mate sense.) These planes or facets define themselves one against another with greater or less sharpness. Modern technique follows this modern analysis of vision, and in one act instead of three renders by a " touch " of paint the shape and value of these facets, and instead of imposing a uniform ideal outline at all their junctions, allows these patches to define themselves against one another with variable sharpness.

Blurred definition, then, as it exists in our natural view of things, is admitted into painting; a blurring that may arise from distance, from vapour or smoke, from brilliant light, from obscurity, or simply from the nearness in value of adjacent objects. Similarly, much detail that in primitive art is elaborated is absorbed by rendering the aspect instead of the facts known to make up that aspect. Thus hair and fur, the texture of stuffs, the blades of grass at a little distance, become patches of tone showing only their larger constructive markings. But the blurring of definitions and the elimination of detail that we find in modern pictorial art are not all of this ready-made character. We have so far only the scientific analysis of a field of view. If the painter were a scientific reporter he would have to pursue the systems of planes, with their shapes and values, to infinity. Impressionism is the art that surveys the field and determines which of the shapes and tones are of chief importance to the interested eye, enforces these, and sacrifices the rest. Con- struction, the logic of the object rendered, determines partly this action of the eye, and also decoration, the effects of rhythm in line and harmony in fields of colour. These motives belong to all art, but the specially impressionist motive is the act of attention as it affects the aspect of the field. We are familiar, in the ordinary use of the eye, with two features of its structure that limit clearness of vision. There is, first, the spot of clear vision on the retina, outside of which all falls away into blur; there is, secondly, the action of focus. As the former limits clear definition to one spot in the field extended vertically and laterally, so focus limits clear definition to one plane in the third dimension, viz. depth. If three objects, A, B and C, stand at different depths before the eye, we can at will fix A, whereupon B and C must fall out of focus, or B, whereupon A and C must be blurred, or C, sacrificing the clearness of A and B. All this apparatus makes it impossible to see everything at once with equal clearness, enables us, and forces us for the uses of real life, to frame and limit our picture, according to the immediate interest of the eye, whatever it may be. The painter instinctively uses these means to arrive at the emphasis

and neglect that -his choice requires. If he is engaged on a face he will now screw his attention to a part and now relax it, distributing the attention over the whole so as to restore the bigger relations of aspect. Sir Joshua Reynolds describes this process as seeing the whole " with the dilated eye "; the commoner precept of the studios is " to look with the eyes half closed "; a third way is to throw the whole voluntarily out of focus. In any case the result is that minor planes are swamped in bigger, that smaller patches of colour are swept up into broader, that markings are blurred. The final result of these tentative reviews records, in what is blurred and what is clear, the attention that has been distributed

to different parts, and to. parts measured against the whole. The Impressionist painter does not allot so. much detail to a face in a full-length portrait as to a head alone, nor to twenty figures on a canvas as to one. Again, he indicates by his treatment of planes and definitions whether the main subject of his picture is in the foreground or the distance. He persuades the eye to slip over hosts of near objects so that, as in life, it may hit a distant target, or concentrate its attack on what is near, while the distance falls away into a dim curtain. All those devices by which attention is directed and distributed, and the importance in space of an object established, affect impressionistic composition.

It is an inevitable misunderstanding of painting which plays the game of art so closely up to the real aspects of nature that its aim is that of mere exact copying. Painting like Manet's, accused of being realistic in this sense, sufficiently disproves the accusation when examined. Never did painting show a parti pris more pronounced, even more violent. The elisions and assertions by which Manet selects what he finds significant and beautiful in the complete natural image are startling to the stupid realist, and the Impressionist may best be described as the painter who out of the completed contents of vision con- structs an image moulded upon his own interest in the thing seen and not on that of any imaginary schoolmaster. Accepting the most complex terms of nature with their special emotions, he uses the same freedom of sacrifice as the man who at the other end of the scale expresses his interest in things by a few scratches of outline. The perpetual enemy of bo,th is the eclectic, who works for possible interests not his own.

Some of the points touched on above will be found amplified in articles by the writer in The Albemarle (September 1892), the Fortnightly Review (June 1894), and The Artist (March-July 1896). An admirable exposition of Impressionism in this sense is R. A. M. Stevenson's The Art of Velasquez (1895). Mr Stevenson was trained in the school of Carolus Duran, where impressionist painting was reduced to a system. Mr Sargent's painting is a brilliant example of the system. (D. S. M.)

IMPRESSMENT, the name given in English to the exercise of the authority of the state to " press " 1 or compel the service of the subject for the defence of the realm. Every sovereign state must claim and at times exercise this power. The " draft- ing " of men for service in the American Civil War was a form of impressment. All the monarchical, or republican, govern- ments of Europe have employed the press at one time or another. All forms of conscription, including the English ballot for the militia, are but regulations of this sovereign right. In England impressment may be looked upon as an erratic, and often oppressive, way of enforcing the common obligation to serve in " the host " or in the posse comitatus (power of the county). In Scotland, where the feudal organization was very complete in the Lowlands, and the tribal organization no less complete in the Highlands, and where the state was weak, impressment was originally little known. After the union of the two parlia- ments in 1707, no distinction was made between the two divisions of Great Britain. In England the kings of the Plantagenet dynasty caused Welshmen to be pressed by the Lords Marchers, and Irish kerns to be pressed by the Lords Deputy, for their wars in France. Complaints were made by parliament of the oppressive use of this power as early as the reign of Edward III., but it continued to be exercised. Readers of Shakespeare will remember Sir John Falstaff's commission to press soldiers, and the manner, justified no doubt by many and familiar examples of the way in which the duty was performed. A small sum

1 It is now accepted generally that " to press " is a corruption of " prest," as " impress " is of " imprest," but the word was quite early connected with "press," to squeeze, crush, hence to compel or force. The " prest " was a sum of money advanced (O. Fr. prester, modern priter, to lend, Lat. praestare, to stand before, provide, become surety for, &c.) to a person to enable him to perform some under- taking, hence used of earnest money given to soldiers on enlistment, or as the " coat and conduct " money alluded to in this article. The methods of compulsion used to get men for military service naturally connected the word with " to press " (Lat. pressare, frequentative of premere)to force, and all reference to the money advanced was lost

(see Skeat, Etym. Diet., 1898, and the quotation from H. Wedgwood, Diet, of Eng. Etym.).

called imprest-money, or coat and conduct, money, was given id the men when pressed to enable them to reach the appointed rendezvous. Soldiers were secured in this way by Queen Eliza- beth, by King Charles I., and by the parliament itself in the Civil War. The famous New Model Army of Cromwell was largely raised by impressment. Parliament ordered the county committees: to select recruits of " years meet for their employ- ment and well clothed." After the Revolution of 1688 parlia- ment occasionally made use of this resource. In 1779 a general press of all rogues and vagabonds in London to be drafted into the regiments was ordered. It is said that all who were not too lame to run away or too destitute to bribe the parish constable were swept into the net. As they were encouraged to desert by the undisguised connivance of the officers and men who were disgusted with their company, no further attempt to use the press for the army was made.

A distinction between the liability of sailors and of other men dates from the 16th century. From an act of Philip and Mary (1556) it appears that the watermen of the Thames claimed exemption from the press as a privileged body. They were declared liable, and the liability was clearly meant to extend to service as a soldier on shore. In the fifth year of Queen Eliza- beth (1563) an act was passed to define the liability of the sailors. It is known as " an Act touching politick considerations for the maintenance of the Navy." By its term all fishermen and mariners were protected from being compelled " to serve as any soldiers upon the Land or upon the Sea, otherwise than as a mariner, except it shall be to serve under any Captain of some ship or vessel, for landing to do some special exploit which mariners have been used to do." The operation of the act was limited to ten years, but it was renewed repeatedly, and was at last indefinitely prolonged in the sixteenth year of the reign of Charles I. (1631). By the Vagrancy Act of the close of Queen Elizabeth's reign (1597), disorderly serving-men and other dis- reputable characters, of whom a formidable list is given, were declared to be liable to be impressed for service in the fleet. The " Takers," as they were called in early times, the Press Gang of later days, were ordered to present their commission to two justices of the peace, who were bound to pick out " such sufficient number of able men, as in the said commission shall be contained, to serve Her Majesty as aforesaid." The justices of the peace in the coast districts, who were often themselves concerned in the shipping trade, Were not always zealous in enforcing the press. The pressed sailors often deserted with the " imprest money " given

them. Loud complaints were made by the naval officers of the bad quality of the men sent up to serve in the king's ships, Qn the other hand, the Press Gangs were accused of extorting money, and of making illegal arrests. In the reign of Queen Anne (1703) an act was passed "for the increase of Seamen and the better encouragement of navigation, and the protection of the Coal Trade." The act which gave parish authorities power to apprentice boys to the sea exempted the apprentices from the press for three years, and until the age of eighteen. It especially reaffirmed the part of the Vagrancy Act of Elizabeth's reign which left rogues and vagabonds subject to be pressed for the sea service. By the act for the " Increase of Mariners and Seamen to navigate Merchant Ships andx>ther trading ships or vessels," passed in the reign of George II. (1740), all men over fifty-five were exempted from the press together with lads under eighteen, foreigners serving in British ships (always numerous in war time), and landsmen who had gqpe to sea during their first two years. The act for " the better supplying of the cities of London an,d Westminster with fish" gave exemption to all masters of fishing-boats, to four apprentices and one mariner to each boat, and all landsmen for two years, except in case of actual invasion. By the act for the encourage- ment of insurance passed in 1774, the fire insurance companies in London were entitled to secure exemption for thirty water- men each in their employment. Masters and mates of merchant vessels, and a proportion of men per ship in the colliers trading from the north to London, were also exempt.

Subject to such limitations as these, all seafaring men, and

watermen on rivers, were liable to be pressed between the ages of eighteen and fifty-five, and might be pressed repeatedly for so long as their liability lasted. The rogue and vagabond element were at the mercy of the justices of the peace. The frightful epidemics of fever which desolated the navy till late in the 18th century were largely due to the infection brought by the prisoners drafted from the ill-kept jails of the time. As service in the fleet was most unpopular with the sailors, the press could often only be enforced by making a parade of strength and employing troops. The men had many friends who were always willing to conceal them, and they themselves became expert in avoiding capture. There was, however, one way of procuring them which gave them no chance of evasion. The merchant ships were stopped at sea and the sailors taken out. This was done to a great

extent, more especially in the case of homeward-bound vessels. On one occasion, in 1802, an East Indiaman on her way home was deprived of so many of her crew by a man of war in the Bay of Biscay that she was unable to resist a small French privateer, and was carried off as a prize with a valuable cargo. The press and the jails failed to supply the number of men required. In 1793 it was found necessary to impose on the counties the obligation to provide " a quota " of men, at their own expense. The local authorities provided the recruits by offering high bounties, often to debtors confined in the prisons. These desperate men were a very bad element in the navy. In 1797 they combined with the United Irishmen, of whom large numbers had been drafted into the fleet as vaga- bonds, to give a very dangerous political character to the mutinies at the Nore and on the south of Ireland. After the conclusion of the great Napoleonic wars in 181 5 the power of the press was not again exercised. In 1835 an act was passed during Sir James Graham's tenure of office as first lord of the admiralty, by which men who had once been pressed and had served for a period of five years were to be exempt from impressment in future. Sir James, however, emphatically reaffirmed the right of the crown to enforce the service of the subject, and therefore to impress the seamen. The introduction of engagements for a term of five years in 1853, and then of long service, has produced so large a body of voluntary recruits, and service in the navy is so popular, that the question has no longer any interest save an historical one. If compulsory service in the fleet should again become necessary it will not be in the form of the old system of impressment, which left the sailor subject to compulsory service from the age of eighteen to fifty-five, and flooded the navy with the scum of the jails and the workhouse.

Authorities. — Grose's Military Antiquities, for the general subject of impressment, vol. ii. p. 73 et seq. S. R. Gardiner gives many details in his history of James I. and Charles I., and in The Civil War. The acts relating to the navy are quoted in A Collection of the Statutes relating ˆ to the Admiralty, &c, published in 1810. Some curious information is in the papers relating to the Brest Blockade edited by John Leyland for the Navy Record Society. Sir James Graham's speech is in Hansard for 1835. (D. H.)

IMPROMPTU (from in promptu, on the spur of the moment), a short literary composition which has not been, or is not supposed to have been, prepared beforehand, but owes its merit to the ready skill which produces it without premeditation. The word seems to have been introduced from the French language in the middle of the 1 7th century. Without question, the poets have, from earliest ages, made

impromptus, and the very art of poetry, in its lyric form, is of the nature of a modified improvisation. It is supposed that many of the epigrams of the Greeks, and still more probably those of the Roman satirists, particularly Martial, were delivered on the moment, and gained a great part, at least, of their success from the evidence which they gave of rapidity of invention. But it must have been difficult then, as it has been since, to be convinced of the value of that evidence. Who is to be sure that, like Mascarille in Les Prtcieuses ridicules, the impromptu-writer has not employed his leisure in sharpening his arrows? James Smith received the highest praise for his compliment to Miss Tree, the cantatrice: —

On this tree when a nightingale settles and sings, The Tree will return him as good as he brings.

This was extremely neat, but who is to say that James Smith had not polished it as he dressed for dinner? One writer owed all his fame, and a seat among the Forty Immortals of the French Academy, to the reputation of his impromptus. This was the Marquis Francois Joseph de St Aulaire (1643-1742). The piece which threw open the doors of the Academy to him in 1706 was composed at Sceaux, where he was staying with the duchess of Maine, who was guessing secrets, and who called him Apollo. St Aulaire instantly responded: —

La divmite qui s'amuse

A me demander mon secret, Si j'6tais Apollon, ne serait pas ma muse, Elle serait Thetis- — et le jour finirait.

This is undoubtedly as neat as it is impertinent, and if the duchess had given him no ground for preparation, this is typical of the impromptu at its best. Voltaire was celebrated for the savage wit of his impromptus, and was himself the subject of a famous one by Young. Less well known but more certainly extemporaneous is the couplet by the last-mentioned poet, who being asked to put something amusing in an album, and being obliged to borrow from Lord Chesterfield a pencil for the purpose, wrote: —

Accept a miracle instead of wit,—

See two dull lines with Stanhope's pencil writ.

The word " impromptu " is sometimes used to designate a short dramatic sketch, the type of which is Moliere's famous Impromptu du Versailles (1663), a miniature comedy in prose.

IMPROVISATORE, a word used to describe a poet who recites verses which he composes on the spur of the moment, without previous preparation. The term is purely Italian, although in that language it would be more correctly spelt improvoisatore. It became recognized as an English word in the middle of the eighteenth century, and is so used by Smollett in his Travels (1766); he defines an improvisatore as "an individual who has the surprising talent of reciting verses extempore, on any subˆ ject you propose." In speaking of a woman, the female form improvisatrice is sometimes used in English.

Improvisation is a , gift which properly belongs to those languages in which a great variety of grammatical inflections, wedded to simplicity of rhythm and abundance of rhyme, enable a poet to slur over difficulties in such a way as to satisfy the ear of his audience. In ancient times the greater part, of the popular poetry with which the leisure of listeners was beguiled was of this rhapsodical nature. But in modern Europe it was the troubadours, owing to the extreme flexibility of the languages of Provence, who distinguished themselves above ail others as improvisatores. It is difficult to believe, however, that the elaborate compositions of these poets, which have come down to us, in which every exquisite artifice of versification is taken advantage of, can have been poured forth without pre- meditation. These poets, we must rather suppose, took a pride in the ostentation of a prodigious memory, most carefully trained, and poured forth in public what they had laboriously learned by heart in private. The Italians, however, in the 16th century, cultivated what seems to have been a genuine improvisation, in which the bards rhapsodized, not as they themselves pleased, but on subjects which were unexpected by them, and which were chosen on the spot by their patrons. Of these, the most extraordinary is said to have been Silvio Antoniano (1540-1603), who from the age of ten was able to pour out melodious verse on any subject which was suggested to him. He was brought to.. Rome, where successive popes so delighted in his talent that in 1598 he was made a cardinal. In the 17th century thecelebrated Metastasio first attracted attention by his skill as an improvi- satore. But he was excelled by Bernardino Perfetti (1681-1747), who was perhaps the most extraordinary genius of this class who has ever lived. He was seized, in his moments of composi- tion, with a transport which transfigured his whole person, and under this excitement he poured forth verses in a miraculous flow. It was his custom to be attended by a guitarist, who played a recitative accompaniment. In this way Perfetti made a triumphal procession through the cities of Italy, ending

up with the Capitol of Rome, where Pope Benedict XIII. crowned him with laurel, and created him a Roman citizen. One of the most remarkable improvisatores of modern times appeared in Sweden, in the person of Karl Mikael Bellman(i740-i795), who used to take up a position in the public gardens and parks of Stockholm, accompanying himself on a guitar, and treating metre and rhythm with a virtuosity and originality which place him among the leading poets of Swedish literature. In England, somewhat later, Theodore Hook (1788-1841) developed a surpris- ing talent for this kind, but his verses- were rarely of the serious or sentimental character, of which we have hitherto spoken. Hook's animal spirits were unfortunately mingled with vulgarity, and his clever jeux d 'esprit had little but their smartness to recommend them. A similar talent, exercised in a somewhat more literary direction, made Joseph Mery (1798-1865) a delight- ful companion in the Parisian society of his day. It is rare indeed that the productions of the improvisatore, taken down in shorthand, and read in the cold light of criticism, are found to justify the impression which the author produced on his original audience. Imperfections of every kind become patent when we read these transcripts, and the reader cannot avoid perceiving weaknesses of style and grammar. The eye and voice of the improvisatore so hypnotize his auditors as to make them incapable of forming a sober judgment on matters of mere literature.

IN-ANTIS, the architectural term given to those temples the entrance part of which consisted of two columns placed between the antae or pilasters (see Temple).

INAUDI, JACQUES (1867-), Italian calculating prodigy, was born at Onorato, Piedmont, on the 15th of October 1867. When between seven and eight years old, at which time he was employed in herding sheep, he already exhibited an extraordinary aptitude for mental calculation. His powers attracted the notice of various showmen, and he commenced to give exhibitions. He was carefully examined by leading French scientists, including Charcot, from the physiological, psychological and mathematical point of view. The secret of his arithmetical powers appeared to reside in his extraordinary memory, improved by continuous practice. It appeared to depend upon hearing rather than sight, more remarkable results being achieved when figures were read out than when they were written.

INCANTATION, the use of words, spoken, sung or chanted, usually as a set formula, for the purpose of obtaining a result by their

supposed magical power. The word is derived from the Latin incantare, to chant a magical formula; cf. the use of carmen, for such a formula of words. The Latin use is very early; thus it appears in a fragment of the XII. Tables quoted in Pliny (N.H. xxviii. 2, 4, 17), " Qui malum carmen incantasset." From the O. Fr. derivative of incantare, enchanter, comes " enchant," " enchantment," &c, properly of the exercise of magical powers, hence to charm, to fascinate, words which also by origin are of magical significance. The early magi of Assyria and Babylonia were adepts at this art, as is evident from the examples of Akkadian spells that have been discovered. Daniel (v. n) is spoken of as " master of the enchanters " of Babylon. In Egypt and in India many formulas of religious magic were in use, witness especially the Vedic mantras, which are closely akin to the Maori karakias and the North American matamanik. Among the holy men presented by the king of Korea to the mikado of Japan in A.D. 577 was a reciter of mantras, who would find himself at home with the majinahi or incantation practised by the ancient Japanese for dissipating evil influences. One of the most common, widespread and persistent uses of incanta- tion was in healing wounds, instances of which are found in the Odyssey and the Kalcvala, and in the traditional folk-lore of almost every European country. Similar songs were sung to win back a faithless lover (cf. the second Idyll of Theocritus). See further Magic.

INCE, WILLIAM, English 18th century furniture designer and cabinetmaker. He was one of the most successful imitators of Chippendale, although his work was in many respects lighter. He helped, indeed, to build the bridge between the massive and

often florid style of Chippendale and the more boudoir-like forms of Hepplewhite. Although many of his designs were poor and extravagant, his best work was very good indeed. His chairs are sometimes mistaken for those of Chippendale, to which, however, they are much inferior. He greatly affected the Chinese and Gothic tastes of the second half of the 18th century. He was for many years in partnership in Broad Street, Golden Square, London, with Thomas Mayhew (q.v.), in collaboration with whom he published a folio volume of ninety-five plates, with letterpress in English and French under the title of The Universal System of Household Furniture (undated, but probably about 1762).

INCE-IN-MAKERFIELD, an urban district in the Ince parliamentary division of Lancashire, England, adjoining the borough of Wigan. Pop. (1001) 21,262. The Leeds and Liverpool Canal intersects the township. There are large collieries, iron- works, forges, railway

wagon works, and cotton mills. There is preserved here the Old Hall, a beautiful example of half- timbered architecture.

INCENDIARISM (Lat. incendere, to set on fire, burn), in law, the wilful or malicious burning of the house or property of another, and punishable as arson (q.v.). It may be noted that in North Carolina it is provided in case of fires that there is to be a pre- liminary investigation by local authorities; all towns and cities have to make an annual inspection of buildings and a quarterly inspection within fire limits and report to the state insurance commissioner; all expenses so incurred are met by a tax of \% on the gross receipts of the insurance companies (L. 1903, ch. 719).

INCENSE, 1 the perfume (fumigation) arising from certain resins and gum-resins, barks, woods, dried flowers, fruits and seeds, when burnt, and also the substances so burnt. In its literal meaning the word " incense " is one with the word " perfume," the aroma given off with the smoke (per fumum 2) of any odoriferous substance when burnt. But, in use, while the meaning of the word " perfume " has been extended so as to include everything sweet in smell, from smoking incense to the invisible fresh fragrance of fruits and exquisite scent of flowers, that of the word " incense," in all the languages of modern Europe in which it occurs, has, by an opposite process of limita- tion, been gradually restricted almost exclusively to frankincense (see Frankincense). Frankincense has always been obtainable in Europe in greater quantity than any other of the aromatics imported from the East; it has therefore gradually come to be the only incense used in the religious rites and domestic fumiga- tions of many countries of the West, and at last to be properly regarded as the only " true " or " genuine " (i.e. " franc") incense (see Littre's Fr. Diet, and Skeat's Etym. Diet, of Engl. Lang.). 3

The following is probably an exhaustive list of the substances available for incense or perfume mentioned in the Hebrew Scrip- tures: — Algum or almug wood (almug in 1 Kings x. 11, 12; algum

1 Incensum (or incensum thuris) from incendere; Ital. and Port. incenso; Span, incienso; Fr. encens. The substantive occurs in an inscription of the Arvalian brotherhood (Marini, Gli Atti e Monu- ments de' fratelli Arvali, p. 639), but is frequent only in ecclesiastical Latin. Compare the classical suffimentum and suffitus from suffio. For " incense " Ulfila (Luke i. 10, 11) has retained the Greek Oviiia/xa (thymiama) ; all the Teutonic names (Ger. Weihrauch ; Old Saxon Wiroc; I eel. Reykelsi; Dan. Rogelse) seem to belong to the Christian period (Grimm, Deutsche Mythologie, i. 50).

2 The etymological affinities of Siiw, Ovos, thus , fuffio , funus , and the Sans, dhuma are well known. See Max Miiller, Chips, i. 99.

3 Classical Latin has but one word (thus or tus) for all sorts ef incense. Libanus, for frankincense, occurs only in the Vulgate. Even the " ground frankincense " or " ground pine " (Ajuga chatnae-pitys) was known to the Romans as Tus terrae (Pliny), although they called some plant, from its smelling like frankincense, Libanotis, and a kind of Thasian wine, also from its fragrance, Libanios. The Latino-barbaric word Olibanum (quasi Oleum Libani), the common name for frankincense in modern commerce, is used in a bull of Pope Benedict IX. (1033). It may here be remarked that the name " European frankincense " is applied to Pinus Taeda, and to the resinous exudation (" Burgundy pitch ") of the Norwegian spruce firs (Abies excelsa). The " incense tree " of America is the Icica guinnensis, and the " incense wood " of the same continent I. hcptaphylla.

in 2 Chron. ii. 8, and ix. io, n), generally identified with sandal-wood (Savtalum album), a native of Malabar and Malaya; aloes, or lign aloes (Heb. ahalim, ahaloth), produced by the Aloexylon Agal-lochum (Loureiro), a native of Cochin-China, and Aquilaria Agallocha (Roxburgh), a native of India beyond the Ganges; balm (Heb. tsori), the oleo-resin of Balsamodendron opobalsamum and B. gileadense; bdellium (Heb. bdolah), the resin produced by Balsamodendron roxburghii, B. Mukul and B. pubescens, all natives of Upper India (Lassen, however, identifies bdolah with musk) ; calamus (Heb. kaneh; sweet calamus, keneh bosem, Ex. xxx. 23; Ezek. xxvii. 19; sweet cane, kaneh hattob, Jer. vi. 20; Isa. xliii. 24), identified by Royle with the Andropogon Calamus aromaticus or roosa grass of India; cassia (Heb. kiddah) the Cinnamomum Cassia of China; cinnamon (Heb. kinnamon), the Cinnamomum zeylanicum of the Somali country, but cultivated largely in Ceylon, where also it runs wild, and in Java; costus (Heb. ketzioth), the root of the Aucklandia Costus (Falconer), native of Kashmir; frankincense (Heb. lebonah), the gum-resin of Bosivellia Frereana and B. Bhau-Dajiana of the Somali country, and of B. Carterii of the Somali country and the opposite coast of Arabia (see " The Genus Boswellia " by Sir George Birdwood, Transactions of the Linnean Society, xxi. 1871); galbanum (Heb. helbenah), yielded by Opoidia galbanifera (Royle) of Khorassan, and Galbanum officinale (Don) of Syria and

other Ferulas; ladanum (Heb. lot, translated ” myrrh ” in Gen. xxxvii. 25, xliii. 11), the resinous exudation of Cistus creticus, C. ladaniferus and other species of ” rock rose ” or ” rose of Sharon “; myrrh (Heb. mor), the gum-resin of the Balsamodendron Myrrha of the Somali country and opposite shore of Arabia; onycha (Heb. sheheleth), the celebrated odoriferous shell of the ancients, the operculum or ” nail ” of a species of Strombus or ” wing shell,” formerly well known in Europe under the name of Blatta byzantina; it is still imported into Bombay to burn with frankincense and other incense to bring out their odours more strongly; saffron (Heb. karkom), the stigmata of Crocus sativus, a native originally of Kashmir; spikenard (Heb. nerd), the root of the Nardostachys Jatamansi of Nepal and Bhutan; stacte (Heb. nataf), generally referred to the Styrax officinalis of the Levant, but Hanbury has shown that no stacte or storax is now derived from S. officinalis, and that all that is found in modern commerce is the product of the Liquidambar orientalis of Cyprus and Anatolia.

Besides these aromatic substances named in the Bible, the following must also be enumerated on account of their common use as incense in the East; benzoin or gum benjamin, first mentioned among Western writers by Ibn Batuta (1325-1349) under the name of lubdn d’ Javi (i.e. olibanum of Java), corrupted in the parlance of Europe into benjamin and benzoin; camphor, produced by Cinna- momum Camphora, the ” camphor laurel ” of China and Japan, and by Dryobalanops aromatica, a native of the Indian Archipelago, and widely used as incense throughout the East, particularly in China; elemi, the resin of an unknown tree of the Philippine Islands, the elemi of old writers being the resin of Boswellia Frereana; gum-dragon or dragon’s blood, obtained from Calamus Draco, one of the ratan palms of the Indian Archipelago, Dracaena Draco, a liliaceous plant of the Canary Island, and Pterocarpus Draco, a leguminous tree of the island of Socotra; rose-malloes, a corruption of the Javanese rasamala, or liquid storax, the resinous exudation of Liquidambar Altingia, a native of the Indian Archipelago (an American Liquidambar also produces a rose-malloes-like exudation) ; star anise, the starlike fruit of the Illicum anisatum of Yunan and south-western China, burnt as incense in the temples of Japan; sweet flag, the root of Acorus Calamus, the bach of the Hindus, much used for incense in India. An aromatic earth, found on the coast of Cutch, is used as incense in the temples of western India. The animal excreta, musk and civet, also enter into the composition of modern European pastils and clous fumants. Balsam of Tolu, pro- duced by Myroxylon toluiferum, a native of Venezuela and New Granada;

balsam of Peru, derived from Myroxylon Pereirae, a native of San Salvador in Central America ; Mexican and Brazilian elemi, produced by various species of Icica or " incense trees," and the liquid exudation of an American species of Liquidambar, are all used as incense in America. Hanbury quotes a faculty granted by Pope Pius V. (August 2, 1571) to the bishops of the West Indies permitting the substitution of balsam of Peru for the balsam of the East in the preparation of the chrism to be used by the Catholic Church in America. The Sangre del drago of the Mexicans is a resin resembling dragon's blood obtained from a euphorbiaceous tree, Croton Draco.

Probably nowhere can the actual historical progress from the' primitive use of animal sacrifices to the later refinement of burning incense be more clearly traced than in the pages of the Old Testament, where no mention of the latter rite occurs before the period of the Mosaic legislation; but in the monuments of ancient Egypt the authentic traces of the use of incense that still exist carry us back to a much earlier date. From Meroe to Memphis the commonest subject carved or painted in the interiors of the temples is that of some contemporary Phrah or Pharaoh worshipping the presiding deity with oblations of

gold and silver vessels, rich vestments, gems, the firstlings of the flock and herd, cakes, fruits, flowers, wine, anointing oil and incense. Generally he holds in one hand the censer, and with the other casts the pastils or osselets of incense into it: some- times he offers incense in one hand and makes the libation of wine with the other. One of the best known of these representa- tions is that carved on the memorial stone placed by Tethmosis (Thothmes) IV. (1533 B.C.) on the breast of the Sphinx at Gizeh. 1 The tablet represents Tethmosis before his guardian deity, the sun-god Re, pouring a libation of wine on one side and offering incense on the other. The ancient Egyptians used various substances as incense. They worshipped Re at sunrise with resin, at mid-day with myrrh and at sunset with an elaborate confection called kuphi, compounded of no fewer than sixteen ingredients, among which were honey, wine, raisins, resin, myrrh and sweet calamus. While it was being mixed, holy writings were read to those engaged in the operation. According to Plutarch, apart from its mystic virtues arising from the magical combination of 4X4, its sweet odour had a benign physiological effect on those who offered it. 2 The censer used was a hemispherical cup or bowl of bronze, supported by a long handle, fashioned at one end like an open hand, in which the bowl was, as it were, held, while the other end within which the pastils of incense were kept was

shaped into the hawk's head crowned with a disk, as the symbol of Re. 3 In embalming their dead the Egyptians filled the cavity of the belly with every sort oi spicery except frankincense (Herod, ii. 86), for it was regarded as specially consecrated to the worship of the gods. In the burnt- offerings of male kine to Isis, the carcase of the steer, after evisceration, was filled with fine bread, honey, raisins, figs, frankincense, myrrh and other aromatics, and thus stuffed was roasted, being basted all the while by pouring over it large quantities of sweet oil, and then eaten with great festivity.

How important the consumption of frankincense in the worship of the gods became in Egypt is shown by two of its monuments, both of the greatest interest and value for the light they throw on the early history of the commerce of the Indian Ocean. One is an inscription in the rocky valley of Hammamat, through which the desert road from the Red Sea to the valley of Egypt opens on the green fields and palm groves of the river Nile neat Coptos. It was cut on the rocks by an Egyptian nobleman named Hannu, who states that he was sent by Pharaoh Sankhkere, Menthotp IV., with a force gathered out of the Thebaid, from Coptos to the Red Sea, there to take command of a naval expedi- tion to the Holy Land of Punt (Puoni), " to bring back odori- ferous gums." Punt is identified with the Somali country, now known to be the native country of the trees that yield the bulk of the frankincense of commerce. The other bears the record of a second expedition to the same land of Punt, under- taken by command of Queen Hatshepsut, 1600′ B.C. It is pre- served in the vividly chiselled and richly coloured decorations portraying the history of the reign of this famous Pharaoh on the walls of the " Stage Temple " at Thebes. The temple is now in ruins, but the entire series of gorgeous pictures recording the expedition to " the balsam land of Punt," from its leaving to its returning to Thebes, still remains intact and undefaced. 4 These are the only authenticated instances of the export of incense trees from the Somali country until Colonel Playfair, then political agent at Aden, in 1862-1864, collected and sent to Bombay the specimens from which Sir George Birdwood pre- pared his descriptions of them for the Linnean Society in 1868. King Antigonus is said to have had a branch of the true frank- incense tree sent to him.

Homer tells us that the Egyptians of his time were emphatic- ally a nation of druggists (Od. iv. 229, 230). This characteristic, in which, as in many others, they so remarkably resemble the

1 Brugsch, Egypt under the Pharaohs, i. 77-81, 414-419.

2 Plutarch, De Iside et Osiride, c. 52. In Parthey's edition (Berlin, 1850) other recipes for the manufacture of kuphi, by Galen and Dioscorides, are given; also some results of the editor's own experiments.

3 Wilkinson, Ancient Egyptians, i. 493; ii. 49, 398-400, 414-416.

4 Brugsch, Egypt under the Pharaohs, i. 303-312.

Hindus, the Egyptians have maintained to the present day; and, although they have changed their religion, the use of incense among them continues to be as familiar and formal as ever, The kohl or black powder with which the modern, like the ancient, Egyptian ladies paint their languishing eyelids, is nothing but the smeeth of charred frankincense, or other odoriferous resin brought with frankincense, and phials of water, from the well of Zem-zem, by the pilgrims returning from Mecca. They also melt frankincense as a depilatory, and smear their hands with a paste into the composition of which frankincense enters, for the purpose of communicating to them an attractive perfume. Herodotus (iv. 75) describes a similar artifice as practised by the women of Scythia (compare also Judith X. 3,4). In cold weather the Egyptians warm their rooms by placing in them a brazier, " chafing-dish," or " standing-dish," filled with charcoal, whereon incense is burnt; and in hot weather they refresh them by occasionally swinging a hand censer by a chain through them — frankincense, benzoin and aloe wood being chiefly used for the purpose. 1

In the authorized version of the Bible, the word " incense " translates two wholly distinct Hebrew words. In various passages in the latter portion of Isaiah (xl.-lxvi.), in Jeremiah and in Chronicles, it represents the Hebrew lebonah, more usually rendered "frankincense"; elsewhere the original word is ketoreth (Ex. xxx. 8, 9; Lev. x. 1; Num. vii. 14, &c), a derivative of the verb kilter (Pi.) or hiklir (Hiph.), which verb is used, not only in Ex. xxx. 7, but also in Lev. i. 9, iii. n, ix. 13, and many other passages, to denote the process by which the " savour of satisfaction" in any burnt-offering, whether of flesh or of incense, is produced. Sometimes in the authorized version (as in 1 Kings iii. 3; 1 Sam. ii. 28) it is made to mean explicitly the burning of incense with only doubtful propriety. The expression " in- cense {ketoreth) of rams " in Ps. lxvi. 15 and

the allusion in Ps. cxli. 2 ought both to be understood, most probably, of ordinary burnt-offerings. 2 The " incense " (ketoreth), or " incense of sweet scents " {ketoreth sammim), called, in Ex. xxx. 35, " a confection' after the art of the apothecary," or rather " a perfume after the art of the perfumer," which was to be regarded as most holy, and the imitation of which was prohibited under the severest penalties, was compounded of four " sweet scents " (sammim)? namely stacte (nataph), onycha (sheheleth), galbanum (helbehali) and " pure " or " fine " frankincense (lebonah zaccah), pounded together in equal proportions, with (perhaps) an admixture of salt (memullah) . 4 It was then to be " put before the testimony' ' in the " tent of meeting." It was burnt on the altar of incense by the priest every morning when the lamps were trimmed in the Holy Place, and every evening when they were lighted or " set up " (Ex. xxx. 7,8). A handful of it was also burnt once a year in the Holy of Holies by the high priest on a pan of burning coals taken from the altar of burnt-offering (Lev. xvi. 12, 13). Pure frankincense (lebonah) formed part of the meat-offering (Lev. ii. 16, vi. 15), and was also presented along with the shew bread (Lev. xxiv. 7) every Sabbath day (probably on two golden saucers; see Jos. Ant. iii. 10, 7). The religious significance of the use of incense, or at least of its use in the Holy of Holies, is distinctly set forth in Lev. Xvi. 12, 13.

The Jews were also in the habit of using odoriferous substances in connexion with the funeral obsequies of distinguished persons (see 2 Chron. xvi. 14, xxi. 19; Jer. xxxiv. 5). In Amos vi. 10 " he that burneth him " probably means " he that burns per- fumes in his honour." References to the domestic use of incense occur in Cant. iii. 6; Prov. xxvii. 9; cf. vii. 17.

The " marbles " of Nineveh furnish frequent examples of the offering of incense to the sun-god and his consort (2 Kings

1 See Lane, Mod. Egyptians, pp. 34, 41, 139. 187. 43 8 (ed. i860).

2 See Wellhausen, Gesch. Israels, i. 70 sqq., who_ from philological and other data infers the late date of the introduction of incense into the Jewish ritual.

' According to Philo (Opera, i. 504, ed. Mangey), they symbolized respectively water, earth, air and fire.

4 Other accounts of its composition, drawn from Rabbinical sources, will be found in various works on Jewish antiquities; see, for example, Reland, Antic/. Sacr. vet. Hebr. pp. 39-41 (1712).

xxiii. 5). The kings of Assyria united in themselves the royal and priestly offices, and on the monuments they erected they are generally represented as offering incense and pouring out wine to the Tree of Life. They probably carried the incense in the sacred bag so frequently seen in their hands and in those also of the common priests. According to Herodotus (i. 183), frankincense to the amount of 1000 talents' weight was offered every year, during the feast of Bel, on the great altar of his temple in Babylon.

The monuments of Persepolis and the coins of the Sassanians show that the religious use of incense was as common in ancient Persia as in Babylonia and Assyria. Five times a day the priests of the Persians (Zoroastrians) burnt incense on their sacred fire altars. In the Avesta (Vendidad, Fargard xix. 24, 40), the incense they used is named vohu gaono. It has been identified with benzoin, but was probably frankincense. Herodotus (iii. 97) states that the Arabs brought every year to Darius as tribute 1000 talents of frankincense. The Parsees still preserve in western India the pure tradition of the ritual of incense as followed by their race from probably the most ancient times. The Ramayana and Mahabharata afford evidence of the employment of incense by the Hindus, in the worship of the gods and the burning of the dead, from the remotest antiquity. Its use was obviously continued by the Buddhists during the prevalence of their religion in India, for it is still used by them in Nepal, Tibet, Ceylon, Burma, China and Japan. These countries all received Buddhism from India, and a large propor- tion of the porcelain and earthenware articles imported from China and Japan into Europe consists of innumerable forms of censers. The Jains all over India burn sticks of incense before their Jina. The commonest incense in ancient India was probably frankincense. The Indian frankincense tree, Boswellia thurifera, Colebrooke (which certainly includes B. glabra, Roxburgh), is a doubtful native of India. It is found chiefly where the Buddhist religion prevailed in ancient times, in Bihar and along the foot of the Himalayas and in western India, where it particularly flourishes in the neighbourhood of the Buddhist caves at Ajanta. It is quite possible therefore that, in the course of their widely extended commerce during the one thousand years of their ascendancy, the Buddhists imported the true frankincense trees from Africa and Arabia into India, and that the accepted Indian species are merely varieties of them. Now, however, the incense in commonest use in India is benzoin. But the consumption of all manner of odoriferous resins, gum resins, roots, woods, dried leaves, flowers, fruits and seeds in India, in social as well as religious observances, is enormous. The grateful perfumed powder abir or

randa is composed either of rice, flour, mango bark or deodar wood, camphor and aniseed, or of sandalwood or wood aloes, and zerumbet, zedoary, rose flowers, camphor and civet. The incense sticks and pastils known all over India under the names of ud-buti (" benzoin-light ") or aggar-ki-buli (" wood aloes light ") are composed of benzoin, wood aloes, sandal- wood, rock lichen, patchouli, rose-malloes, talispat (the leaf of Flacourtia Calaphracta of Roxburgh), mastic and sugar-candy or gum. The abir and aggir butis made at the Mahommedan city of Bijapur in the Mahratta country are celebrated all over western India. The Indian Mussulmans indeed were rapidly degenerating into a mere 3ect of Hindus before the Wahabi revival, and the more recent political propaganda in support of the false caliphate of the sultans of Turkey; and we therefore., find the religious use of incense among them more general than among the Mahommedans of any other country. They use it at the ceremonies of circufneision, bismillah (teaching the child " the name of God "), virginity and marriage. At marriage they burn benzoin with nim seeds (Melia Azadirachta, Roxburgh) to keep off evil spirits, and prepare the bride-cakes by putting a quantity of benzoin between layers of wheaten dough, closed all round, and frying them in clarified butter. For days the bride is fed on little else. In their funeral ceremonies, the moment the spirit has fled incense is burnt before the corpse until it is carried out to be buried. The begging fakirs also go

about with a lighted stick of incense in one hand, and holding out with the other an incense-holder (literally, "incense chariot "), into which the coins of the pious are thrown. Large " incense trees " resembling our Christmas trees, formed of incense-sticks and pastils and osselets, and alight all over, are borne by the Shiah Mussulmans in the solennial procession of the Mohurrum, in commemoration of the martyrdom of the sons of Ali. The worship of the tulsi plant, or holy basil (Ocymum sanctum, Don), by the Hindus is popularly explained by its consecration to Vishnu and Krishna. It grows on the four-horned altar before the house, or in a pot placed in one of the front windows, and is worshipped every morning by all the female members of every Hindu household. It is possible that its adoration has survived from the times when the Hindus buried their dead in their houses, beneath the family hearth. When they came into a hot climate the fire of the sacrifices and domestic cookery was removed out of the house; but the dead were probably still for a while buried

in or near it, and the tulsi was planted over their graves, at once for the salubrious fragrance it diffuses and to represent the burning of incense on the altar of the family Lar. The rich land round about the holy city of Pandharpur, sacred to Vithoba the national Mahratta form of (Krishna)- Vishnu, is wholly restricted to the cultivation of the tulsi plant. As to the 8vea mentioned in Homer (//. ix. 499, and elsewhere) and in Hesiod (Works and Days, 338), there is some uncertainty whether they were incense offerings at all, and if so, whether they were ever offered alone, and not always in conjunction with animal sacrifices. That the domestic use, however, of the fragrant wood Oixtv (the Arbor vitae or Callitris quadrivalvis of botanists, the source of the resin sandarach) was known in the Homeric age, is shown by the case of Calypso (Od. v. 60), and the very similarity of the word Ovov to Ovos may be taken as almost conclusively proving that by that time the same wood was also employed for religious purposes. It is not probable that the sweet-smelling gums and resins of the countries of the Indian Ocean began to be introduced into Greece before the 8th or 7th century B.C., and doubtless \iPavos or Xifiavuros first became an article of extensive commerce only after the Medi- terranean trade with the East had been opened up by the Egyptian king Psammetichus (c. 664-610 B.C.). The new Oriental word is frequently employed by Herodotus; and there are abundant references to the use of the thing among the writers of the golden age of Attic literature (see, for example, Aristo-phanes, Pint. 1114; Frogs, 871, 888; Clouds, 426; Wasps, 96, 861). Frankincense, however, though the most common, never became the only kind of incense offered to the gods among the Greeks. Thus the Orphic hymns are careful to specify, in connexion with the several deities celebrated, a great variety of substances appropriate to the service of each; in the case of many of these the selection seems to have been determined not at all by their fragrance but by some occult considerations which it is now difficult to divine.

Among the Romans the use of religious fumigations long preceded the introduction of foreign substances for the purpose (see, for example, Ovid, Fast. i. 337 seq., " Et non exiguo laurus adusta sono "). Latterly the use of frankincense (" mascuia thura," Virg. Eel. viii. 65) became very prevalent, not only in religious ceremonials, but also on various state occasions, such as in triumphs (Ovid, Trisl. iv. 2, 4), and also in connexion with certain occurrences of domestic life. In private it was daily offered by the devout to the Lar familiaris (Plaut. Aulul. pro!. 23); and in public sacrifices it was not only sprinkled on the head of the victim by the pontifex before its slaughter, and afterwards mingled with its blood, but was also

thrown upon the flames over which it was roasted.

No perfectly satisfactory traces can be found of the use of incense in the ritual of the Christian Church during the first four centuries. 1 It obviously was not contemplated by the

1 This guarded statement still holds good. Compare Duchesne, Christian Worship (Eng. trans., 1904), ch. ii., " The Mass in the East," v. " The Books of the Latin Rite," and xii. "The Dedica- tion of Churches."

author of the epistle to the Hebrews; its use was foreign to the synagogue services on which, and not on those of the temple, the worship of the primitive Christians is well known to have been originally modelled; and its associations with heathen solemni- ties, and with the evil repute of those who were known as " thurificati," would still further militate against its employment. Various authors of the ante-Nicene period have expressed them- selves as distinctly unfavourable to its religious, though not of course to its domestic, use. Thus Tertullian, while (De Cor. Mil. 10) ready to acknowledge its utility in counteracting unpleasant smells (" si me odor alicujus loci offenderit, Arabiae aliquid incendo "), is careful to say that he scorns to offer it as an accompaniment to his heartfelt prayers (Apol. 30; cf. 42). Athenagoras also (Legal. 13) gives distinct expression to his sense of the Heedlessness of any such ritual (" the Creator and Father of the universe does not require blood, nor smoke, nor even the sweet smell of flowers and incense "); and Arnobius (Adv. Gent. vii. 26) seeks to justify the Christian neglect of it by the fact, for which he vouches, that among the Romans them- selves incense was unknown in the time of Numa, while the Etruscans had always continued to be strangers to it. Cyril of Jerusalem, Augustine and the Apostolic Constitutions make no reference to any such feature either in the public or private worship of the Christians of that time. The earliest mention, it would seem, occurs in the Apostolic Canons (can. 3), where the dvfiiaiˆa is spoken of as one of the requisites of the euchar- istic service. It is easy to perceive how it should inevitably have come in along with the whole circle of ideas involved in such words as " temple," " altar," " priest," which about this time came to be so generally applied in ecclesiastical connexions. Evagrius (vi, 21) mentions the gift of ndvˆiaTripiov by the con- temporary Chosroes of Persia to the church of Jerusalem; and all the Oriental liturgies of this period provide special prayers for the thurification of the eucharistic elements. The oldest Ordo Romanus, which perhaps takes us back to within a century of Gregory the Great, enjoins that in pontifical masses a sub- deacon, with a golden censer, shall go before

the bishop as he leaves the secretarium for the choir, and two, with censers, before the deacon gospeller as he proceeds with the gospel to the ambo. And less than two centuries afterwards we read an order in one of the capitularies of Hincmar of Reims, to the effect that, every priest ought to be provided with a censer and incense. That in this portion of their ritual, however, the Christians of that period were not universally conscious of its direct descent from Mosaic institutions may be inferred perhaps from the " benediction of the incense " used in the days of Charlemagne, which runs as follows: " May the Lord bless this incense to the extinction of every noxious smell, and kindle it to the odour of its sweetness." Even Thomas Aquinas (p. iii. qu. 83, art. 5) gives prominence to this idea.

The character and order of these historical notices of incense would certainly, were there nothing else to be considered, justify the conclusion hitherto generally adopted, that its use was wholly unknown in the worship of the Christian Church before the 5th century. On the other hand, we know that in the first Christian services held in the catacombs under the city of Rome, incense was burnt as a sanitary fumigation at least. Tertullian also distinctly alludes to the use of aromatics in Christian burial: " the Sabaeans will testify that more of their merchandise, and that more costly, is lavished on the burial of Christians, than in burning incense to the gods." And the whole argument from analogy is in favour of the presumption of the ceremonial use of incense by the Christians from the first. It is natural that little should be said of so obvious a practice until the fuller development of ritual in a later age. The slighting references to it by the Christian fathers are no more an argument against its existence in the primitive church than the similar denuncia- tions by the Jewish prophets of burnt-offerings and sacrifices are any proof that there were no such rites as the offering of incense, and of the blood of bulls and fat of rams, in the worship of the temple at Jerusalem. There could be no real offence to Christians in the burning of incense. Malachi (i. n) had already

foretold the time when among the Gentiles, in every place, incense should be offered to God. Gold, with myrrh and frank- incense were offered by the Persian Magi to the infant Jesus at his birth; and in Revelation viii. 3, 4, the image of the offering of incense with the prayers of the saints, before the throne of God, is not without its significance. If also the passage in Ambrose of Milan (on Luke i. n),

where he speaks of " us " as " adolentes altaria " is to be translated " incensing the altars," and taken literally, it is a testimony to the use of incense by the Christian Church in, at least, the 4th century. But the earliest express mention of the censing of the altar by Christian priests is in " the works," first quoted in the 6th century, attributed to " Dionysius the Areopagite," the contemporary of St Paul (Acts xvii. 34).

The Missal of the Roman Church now enjoins incensation before the introit, at the gospel and again at the offertory, and at the elevation, in every high mass; the use of incense also occurs at the exposition of the sacrament, at consecrations of churches and the like, in processions, in the office for the burial of the dead and at the exhibition of relics. On high festivals the altar is censed at vespers and lauds.

In the Church of England the use of incense was gradually abandoned after the reign of Edward VI., until the ritualistic revival of the present day. Its use, however, has never been abolished by law. A " Form for the Consecration of a Censer " occurs in Sancroft's Form of Dedication and Consecration of a Church or Chapel (1685). In various works of reference (as, for example, in Notes and Queries, 3rd ser. vol. viii. p. 11) numerous sporadic cases are mentioned in which incense appears to have been burnt in churches; the evidence, however, does not go so far as to show that it was used during divine service, least of all that it was used during the communion office. At the corona- tion of George III., one of the king's grooms appeared "in a scarlet dress, holding a perfuming pan, burning perfumes, as at previous coronations."

In 1899, on the appeal of the Rev. H. Westall, St Cuthbert's, London, and the Rev. E. Ram, St John's, Norwich, against the use of incense in the Church of England, the archbishops of Canterbury (Dr Temple) and York (Dr Maclagan) supported the appeal. Their decision was reviewed by Chancellor L. T. Dibdin in the 10th edition of the Encyclopaedia Britannica, and the exposition given by Sir Lewis Dibdin of the whole question of the use of incense in the Church of England may here be interpolated. (G. B.)

Incense in the Church of England.— Mr Scudamore (Notitia Eucharislica, 2nd ed. pp. 141-142) thus describes the method and extent of the employment of incense at the mass prior to the Reformation: —

" According to the use of Sarum (and Bangor) the priest, after being

himself censed by the deacon, censed the altar before the Introit began. The York rubric directed him to do it immediately after the first saying of the Introit, which in England was thrice said. The Hereford missal gives no direction for censing the altar at that time. The middle of the altar was censed, according to Sarum, Bangor and Hereford, before the reading of the Gospel. According to Sarum and Bangor, the thurible, as well as the lights, attended the Gospel to the lectern. Perhaps the York rubric implies that this was done when it orders (which the others do not) the thurible to be carried round the choir with the Gospel while the Creed was being sung. In the Sarum and Bangor, the priest censed the oblations after offering them; then the space between himself and the altar. He was then, at Sarum, censed by the deacon, and an acolyte censed the choir; at Bangor the Sinistrum Cornu of the altar and the relics were censed instead. York and Hereford ordered no censing at the offertory. There is reason to think that, notwithstanding the order for the use of incense at every celebration, it was in practice burnt only on high festivals, and then only in rich churches, down to the period of the Reformation. In most parishes its costliness alone would preclude its daily use, while the want of an assistant minister would be a very common reason for omitting the rite almost every- where. Incense was not burnt in private masses, so that the clergy were accustomed to celebrations without it, and would naturally forego it on any plausible ground."

The ritual of the mass remained unchanged until the death of Henry VIII. (Jan. 28, 1547). In March 1548 the Order of the Communion was published and commanded to be used

by royal proclamation in the name of Edward VI. It was the precursor of the Prayer Book, and supplemented the accustomed Latin service by additions in English to provide for the com- munion of the people in both kinds. But it was expressly stated in a rubric that the old service of the mass was to proceed without variation of any rite or ceremony until after the priest had received the sacrament, that is, until long after the last of the three occasions for the use of incense explained above. But on Whitsunday 1549 the first Prayer Book of Edward VI. came into use under an Act of Parliament (2 and 3 Ed. VI. ch. 1, the first Act of Uniformity) which required its exclusive use in public worship so as to supersede all other forms of service. Another Act, 3 and 4 Ed. VI. ch. 10, required the old service books to be delivered up to be destroyed. The first Prayer Book does not contain any direction to use or any mention of incense. It has been and still is a keenly controverted question whether incense did or did not continue to be in ceremonial use under the first Prayer Book or during the rest of Edward VI. 's reign. No evidence has

hitherto been discovered which justifies us in answering this question in the affirmative. The second Prayer Book of Edward VI. (1552), published under the authority of the second Act of Uniformity (5 and 6 Ed. VI. ch. 1), contains no reference to incense. Edward VI. died on the 6th July 1 553- Queen Mary by statute (1 Mary, sess. 2, ch. 2) abolished the Prayer Book, repealed the Acts of Uniformity and restored " divine service and administration of sacraments as were most commonly used in England in the last year of Henry VIII." The ceremonial use of incense thus became again an undoubted part of the communion service in the Church of England. A proclamation issued (December 6, 1553) directed the church- wardens to obtain the proper ornaments for the churches; and the bishops (at any rate Bishop Bonner, see Visitation Articles 1554, Cardwell's Doc. Ann. i. 149-153) in their visitations inquired whether censers had been furnished for use. Mary died on the 1 7th of November 1558. On the 24th of June 1559 the second Prayer Book of Edward VI. (with a few alterations having no reference to incense) was again established, under the authority of the third Act of Uniformity (1 Eliz. ch. 2), as the exclusive service book for public service. There is no evidence of the ceremonial use of incense under Elizabeth's Prayer Book, or under the present Prayer Book of 1662 (established by the fourth Act of Uniformity, 13 and 14 Charles II. ch. 4) until the middle of the 19th century; and there is no doubt that as a ceremony of divine worship, whether at the Holy Communion or at other services, it was entirely disused. There are, however, a good many in- stances recorded of what has been called a fumigatory use of frankincense in churches, by which it was sought to purify the air, in times of public sickness, or to dispel the foulness caused by large congregations, or poisonous gases arising from ill-con- structed vaults under the church floor. It seems also to have been used for the purpose of creating an agreeable perfume on great occasions, e.g. the great ecclesiastical feasts. But this use of incense must be carefully distinguished from its ceremonial use. It was utilitarian and not symbolical, and from the nature of the purpose in view must have taken place before, rather than during, service. Of the same character is the use of incense carried in a perfuming pan before the sovereign at his coronation in the procession from Westminster Hall to the Abbey. This observance was maintained from James II. 's coronation to that of George III. In the general revival of church ceremonial which accompanied and followed the Oxford Movement incense was not forgotten, and its ceremonial use in the pre-Reformation method has been adopted in a few extreme churches since 1850. Its use has been condemned as an illegal ceremony by the ecclesiastical courts. In 1868 Sir Robert Phillimore (Dean of the

Arches) pronounced the ceremonial use of incense to be illegal in the suit of Martin v. Mackonochie (2 A. and E. L.R. 1 16). The case was carried to the Privy Council on appeal, but there was no appeal on the question of incense. Again, in 1870, the ceremonial use of incense was condemned by Sir Robert Phillimore in the suit of Sumner v. Wix (3 A. and E. L.R. 58).

Notwithstanding these decisions, it was insisted by those who defended the revival of the ceremonial use of incense that it was a legal custom of the Church of England. The question was once more elaborately argued in May 1899 before an informal tribunal consisting of the archbishop of Canterbury (Dr. Temple) and the archbishop of York (Dr. Maclagan), at Lambeth Palace. On the 31st of July 1899 the archbishops decided that the liturgi- cal use of incense was illegal. The Lambeth " opinion," as it was called, failed to convince the clergy against whom it was directed any better than the judgments of the ecclesiastical courts, but at first a considerable degree of obedience to the archbishops' view was shown. Various expedients were adopted, as, e.g., the use of incense just before the beginning of service, by which it was sought to retain incense without infringing the law as laid down by the archbishops. There remained, nevertheless, a tendency on the part of the clergy who used incense, or desired to do so, to revert to the position they occupied before the Lambeth hearing — that is, to insist on the ceremonial use of incense as a part of the Catholic practice of the Church of England which it is the duty of the clergy to maintain, notwithstanding the decisions of ecclesiastical judges or the opinions or arch- bishops to the contrary. (L. T. D.)

Manufacture. — For the manufacture of the incense now used in the Christian churches of Europe there is no fixed rule. The books of ritual are agreed that Ex. xxx. 34 should be taken as a guide as much as possible. It is recommended that frank- incense should enter as largely as possible into its composition, and that if inferior materials be employed at all they should not be allowed to preponderate. In Rome olibanum alone is employed; in other places benzoin, storax, lign, aloes, cascarilla bark, cinnamon, cloves and musk are all said to be occasionally used. In the Russian Church, benzoin is chiefly employed. The Armenian liturgy, in its benediction of the incense, speaks of " this perfume prepared from myrrh and cinnamon."

The preparation of pastils of incense has probably come down in a continuous tradition from ancient Egypt, Babylonia and Phoenicia. Cyprus was for centuries famous for their manu- facture, and they were still known in the middle ages by the i ames of pastils or osselets of Cyprus.

Maimonides, in his More Nevochim, states that the use of incense in the worship of the Jews originated as a corrective ol the disagreeable odours arising from the slaughter and burning of the animals offered in sacrifice. There can be no doubt that its use throughout the East is based on sanitary considerations; and in Europe even, in the time when the dead were buried in the churches, it was recognized that the burning of incense served essentially to preserve their salubrity. But evidently the idea that the odour of a burnt-offering (cf. the wicttjs r\bvs ai'Tjx-q of Odyss. xii. 369) is grateful to the deity, being indeed the most essential part of the sacrifice, or at least the vehicle by which alone it can successfully be conveyed to its destination, is also a very early one, if not absolutely primitive; and survivals of it are possibly to be met with even among the most highly cultured peoples where the purely symbolical nature of all religious ritual is most clearly understood and maintained. Some such idea plainly underlies the familiar phrase " a sweet savour," more literally "a savour of satisfaction," whereby an acceptable offering by fire is so often denoted in the Bible (Gen. viii. 21; Lev. i. 9, et passim; cf. Eph. v. 2). It is easy to imagine how, as men grew in sensuous appreciation of pleasant perfumes, and in empirical knowledge of the sources from which these could be derived, this advance would naturally express itself, not only in their domestic habits, but also in the details of their ,'eligious ceremonial, so that the custom of adding some kind of incense to their animal sacrifices, and at length that of offering ■,t pure and simple, would inevitably arise. Ultimately, with the development of the spiritual discernment of men, the " offering of incense " became a mere symbolical phrase for prayer (see Rev. v. 8, viii. 3, 4). Clement of Alexandria expresses this in his well-known words: " The true altar of incense is the just soul, and the perfume from it is holy prayer." (So also Origcn, Coil. Crls. viii. 17, 20.) The ancients were familiar with

the sanitary efficacy of fumigations. The energy with which Ulysses, after the slaughter of the suitors, calls to Euryclea for " fire and sulphur " to purge (literally " fumigate ") the dining- hall from the pollution of their blood (Od. xxii. 481, 482) would startle those who imagine that sanitation is a peculiarly modern science. There is not the slightest doubt that the censing of things and persons was first practised as an act of purification, and thus became symbolical of

consecration, and finally of the sanctification of the soul. The Egyptians understood the use of incense as symbolical of the purification of the soul by prayer. Catholic writers generally treat it as typifying contrition, the preaching of the Gospel, the prayers of the faithful and the virtues of the saints. (G. B.)-

INCEST (Lat. inceslus, unchaste), sexual intercourse between persons so related by kindred or affinity that legal marriage cannot take place between them (see Marriage, especially the section Canon Law). In England incest formerly was not generally treated as a crime, although, along with other offences against morals, it was made punishable by death in 1650. Since the Restoration it had, to use Blackstone's phrase, been left to the " feeble coercion of the spiritual courts," but bills to make it a criminal offence have at various times been unsuccess- fully introduced in Parliament. In 1908 however, an act (The Punishment of Incest Act 1908) was passed, under which sexual intercourse of a male with his grand-daughter, daughter, sister or mother is made punishable with penal servitude for not less than 3 or more than 7 years, or with imprisonment for not more than two years with or without hard labour. It is immaterial that the sexual intercourse was had with the consent of the female; indeed, by s. 2 a female who consents is on conviction liable to the same punishment as the male. The act also makes an attempt to commit the offence of incest a misdemeanour, punishable by imprisonment for not more than two years with or without hard labour. The terms " brother " and " sister " include half-brother and half-sister, whether the relationship is or is not traced through lawful wedlock. All proceedings under the act are held in camera (s. 5). The act does not apply to Scotland, incest being punishable in Scots law. Under the Matrimonial Causes Act 1857, s. 27, incestuous adultery is per se sufficient ground to entitle a wife to divorce her husband. The Deceased Wife's Sister's Marriage Act 1907, s. 3, retained wives' sisters in the class of persons with whom adultery is incestuous. In the law of Scotland, it was, until the Criminal Procedure (Scotland) Act 1887, a crime nominally punishable with death, but the penalty usually inflicted was penal servitude for life. This sentence was actually pronounced on a man in 1855. Ie the United States incest is not an indictable offence at common law, but, generally speaking, it has been made punishable by fine and imprisonment by state legislation. It is also a punish- able offence in some European countries, notably Germany, Austria and Italy.

INCH (O. Eng. ynce from Lat. uncia, a twelfthpart ; cf . " ounce," and see As), the twelfth part of a linear foot. As a measure of

rainfall an " inch of rain " is equivalent to a fall of a gallon of water spread over a surface of about 2 sq. ft., or 100 tons to an acre.

INCHBALD, MRS ELIZABETH (1753-1821), English novelist, playwright and actress, was born on the 15th of October 1753 at Standingfield, Suffolk, the daughter of John Simpson, a farmer. Her father died when she was eight years old. She and her sisters never enjoyed the advantages of school or of any- regular supervision in their studies, but they seem to have acquired refined and literary tastes at an early age. Ambitious to become an actress, a career for which an impediment in her speech hardly seemed to qualify her, she applied in vain for an engagement; and finally, in 1772, she abruptly left home to seek her fortune in London. Here she married Joseph Inchbald (d. 1779), an actor, and on the 4th of September made her debut in Bristol as Cordelia, to his Lear. For several years she continued to act with him in the provinces. Her r61es included Anne Boleyn, Jane Shore, Calista, Calpurnia, Lady Anne in Richard III., Lady Percy, Lady Elizabeth Grey, Fanny in

:t

The Clandestine Marriage, Desdemona, Aspasia in Tamerlane, Juliet and Imogen; but notwithstanding her great beauty and her natural aptitude for acting, her inability to acquire rapid and easy utterance prevented her from attaining to more than very moderate success. After the death of her husband she continued for some time on the stage; making her first London appearance at Covent Garden as Bellario in Philaster on the 3rd of October 1780. Her success, however, as an author led her to retire in 1789. She died at Kensington House on the 1st of August 1821.

Mrs. Inchbald wrote or adapted nineteen plays, and some of them, especially Wives as They Were and Maids as They Are (i797); were for a time very successful. Among the others may be mentioned I'll tell you What (translated into German, Leipzig, 1798); Such Things Are (1788); The Married Man; The Wedding Day; The Midnight Hour; Everyone has his Fault; and Lover's Vows. She also edited a collection of the British Theatre, with biographical and critical remarks (25 vols., 1806- 1809); a Collection of Farces (7 vols., 1809); and The Modern Theatre (10 vols., 1809). Her fame, however, rests chiefly on her two novels: A Simple Story (1791), and

Nature and Art (1796). These works possess many minor faults and inaccuracies, but on the whole their style is easy, natural and graceful; and if they are tainted in some degree by a morbid and exaggerated sentiment, and display none of that faculty of creation possessed by the best writers of fiction, the pathetic situations, and the deep and pure feeling pervading them, secured for them a wide popularity.

Mrs Inchbald destroyed an autobiography for which she had been offered £1000 by Phillips the publisher; but her Memoirs, compiled by J. Boaden, chiefly from her private journal, appeared in 1833 in two volumes. An interesting account of Mrs Inchbald is contained in Records of a Girlhood, by Frances Ann Kemble (1878). Her portrait was painted by Sir Thomas Lawrence.

INCHIQUIN, MURROUGH O'BRIEN, ist Earl of (c. 1614- 1674), Irish soldier and statesman, was the son of Dermod O'Brien, 5th Baron Inchiquin (d. 1624). He belonged to a great family which traced its descent to Brian Boroimhe, king of Ireland, and members of which were always to the forefront in Irish public life. The first'baron of Inchiquin was another Murrough O'Brien (d. 1551) who, after having made his submission to Henry VIII., was created baron of Inchiquin and earl of Thomond in 1543. When Murrough died in November 1551 by a curious arrangement his earldom passed to his nephew Donogh, son of Conor O'Brien (d. 1539), the last independent prince of Thomond (see Thomond, Earls or), leaving only his barony to be inherited by his son Dermod (d. 1557), the ancestor of the later barons of Inchiquin.

Murrough O'Brien, who became 6th baron of Inchiquin in 1624, gained some military experience in Italy, and then in 1640 was appointed vice-president of Munster. He took an active and leading part in suppressing the great Irish rebellion which broke out in the following year, and during the Civil War the English parliament made him president of Munster. Early in 1648, however, he declared for his former master Charles I., and for about two years he sought to uphold the royalist cause in Ireland. In 1654 Charles II. made him an earl. His later years were partly spent in France and in Spain, but he had returned to Ireland when he died on the 9th of September 1674.

His son William, the 2nd earl (c. 1638-1692), served under his father in France and Spain, and for six years was governor of Tangier. He was a partisan of William III. in Ireland, and in 1690 he became governor of Jamaica where he died in January 1692. In

1800 his descendant Murrough, the 5th earl (d. 1808), was created marquess of Thomond, but on the death of James, the 3rd marquess, in July 1855 both the marquessate and the earldom became extinct. The barony of Inchiquin, however, passed to a kinsman, Sir Lucius O'Brien, Bart. (1800-1872), a descendant of the first baron and a brother of William Smith O'Brien (q.v.).

INCLEDON, CHARLES BENJAMIN (1763-1826), English singer, son of a doctor in Cornwall, began as a choir-boy at Exeter, but then went into the navy. His fine tenor voice,

however, attracted general attention, and in 1783 he determined to seek his fortune on the stage. After various provincial appearances he made a great success in 1790 at Covent Garden, and thenceforth was the principal English tenor of his day. He sang both in opera and in oratorio, but his chief popularity lay in his delivery of ballads, such as " Sally in our Alley," " Black- eyed Susan," " The Arethusa," and anything of a bold and manly type. He toured in America in 181 7; and on retiring in 1822 from the operatic stage, he travelled through the provinces with an entertainment called " The Wandering Melodist." He died of paralysis at Worcester on the nth of February

1826.

INCLINOMETER (Dip Circle). Two distinct classes of instruments are used for measuring the dip (see Magnetism, Terrestrial) or inclination of the earth's magnetic field to the horizontal, namely (1) dip circles, and (2) induction inclino- meters or earth inductors.

Dip Circles. — In the case of the dip circle the direction 01 the earth's magnetic field is obtained by observing the position of the axis of a magnetized needle so supported as to be free to turn about a horizontal axis passing through its centre of

gravity. The needles now used consist of flat lozenge-shaped pieces of steel about 9 cm. long and' o-i cm. thick, and weigh about 4-1 grams. The axle, which is made of hard steel, projects on either side of the needle and has a diameter of about C05 cm. Needles considerably larger than the above have been used, but experience showed that the values for the dip observed with needles 23 cm. long, was about 1′ less than with the 9 cm. needles, and A. Schuster (Phil. Mag., 1891 [5], 31, p. 275) has shown that the difference is due to the appreciable bending of the longer needles owing to their weight.

When in use the dip needle is supported on two agate knife- edges, so

that its axle is on the axis of a vertical divided circle, on which the positions of the ends of the needle are either directly observed by means of two reading lenses, in which case the circle is generally divided into thirds of a degree so that it can by estimation be read to about two minutes, or a cross arm carries two small microscopes and two verniers, the cross wires of each microscope being adjusted so as to bisect the image of the corresponding end of the needle. Two V-shaped lifters actuated by a handle serve to raise the needle from the agates, and when lowered assure the axle being at the centre of the vertical circle.

INCLINOMETER

355

The supports for the needle, and a box to protect the needle from draughts, as well as the vertical circle, can be rotated about a vertical axis, and their azimuth read off on a horizontal divided circle. There are also two adjustable stops which can be set in any position, and allow the upper part of the instrument to be rotated through exactly 180 without the necessity of reading the horizontal circle.

When making a determination of the dip with the dip circle, a number of separate readings have to be made in order to eliminate various instrumental defects. Thus, that side of the needle on which the number is engraved being called the face of the needle, and that side of the protecting box next the vertical circle the face of the instrument, both ends of the needle are observed in the following relative positions, the instrument being in every case so adjusted in azimuth that the axle of the needle points magnetic east and west: —
■

i. Face of instrument east and face of needle next to face of

instrument; ii. Face of instrument west and face of needle next to face of

instrument; iii. Face of instrument west and face of needle away from face of

instrument; iv. Face of instrument east and face of needle away from face of instrument.

Next the direction of magnetization of the needle is reversed by stroking it a number of times with two strong permanent magnets,

when the other end of the needle dips and the above four sets of readings are repeated. The object in reading both ends of the needle is to avoid error if the prolongation of the axle of the needle does not pass through the centre of the vertical circle, as also to avoid error due to the eccentricity of the arm which carries the reading microscopes and verniers. The reversal of the instrument between (i.) and (ii.) and between (iii.) and (iv.) is to eliminate errors due to (a) the line joining the zeros of the vertical circle not being exactly horizontal, and (b) the agate knife-edges which support the needle not being exactly horizontal. The reversal of the needle between (ii.) and (iii.) is to eliminate errors due to (a) the magnetic axis of the needle not coinciding with the line joining the two points of the needle, and (b) to the centre of gravity of the needle being displaced from the centre of the axle in a direction at right angles to the length of the needle. The reversal of the poles of the needle is to counteract any error produced by the centre of gravity of the needle being displaced from the centre of the axle in a direction parallel to the length of the needle.

For use at sea the dip circle was modified by Robert Were Fox (Annals of Electricity, 1839, 3, p. 288), who used a needle having pointed axles, the points resting in jewelled holes carried by two uprights, so that the movement of the ship does not cause the axle of the needle to change its position with reference to the vertical divided circle. To counteract the tendency of the axle to stick in the bearings, the instrument is fitted with a knob on the top of the box protecting the needle, and when a reading is being taken this knob is rubbed with an ivory or horn disk, the surface of which is corrugated. In this way a tremor is caused which is found to assist the needle in overcoming the effects of friction, so that it takes up its true position. In the Creak modification of the Fox dip circle, the upper halves of the jewels which form the bearings are cut away so that the needle can be easily removed, and thus the reversals necessary when making a complete observation can be performed (see also Magneto-Meter).

Induction Inclinometers. — The principle on which induction inclinometers depend is that if a coil of insulated wire is spun about a diameter there will be an alternating current induced in the coil, unless the axis about which it turns is parallel to the lines of force of the earth's field. Hence if the axis about which such a coil spins is adjusted till a sensitive galvanometer connected to the coil through a commutator, by which the alternating current is converted into a direct current, is undeflected, then the axis must be parallel to the lines of force of the earth's field, and hence the inclination of the axis to the horizontal is the dip. The introduction and perfection of this type of inclinometer

is almost entirely due to H. Wild. His form of instrument for field observations 1 consists of a coil 10 cm. in diameter, containing about 1000 turns of silk-covered copper wire, the resistance being about 40 ohms, which is pivoted inside a metal ring. This ring can itself rotate about a horizontal axle in its own plane, this axle being at right angles to that about which the coil can rotate. Attached to the axle of the ring is a divided circle, by means of which and two reading microscopes the inclination of the axis of rotation of the coil to the horizontal can be read. The bearings which support the horizontal axle of the ring are mounted on a horizontal annulus which can be rotated in a groove attached to the base of the instrument, as so to allow the azimuth of the axle of the ring, and hence also that of the plane in which the axis of the coil can move, to be adjusted. The coil is rotated by means of a flexible shaft worked by a small cranked handle and a train of gear wheels. The terminals of the coil are taken to a two-part commutator of the ordinary pattern on which rest two copper brushes which are connected by flexible leads to a sensitive galvanometer. The inclination of the axis of the coil can be roughly adjusted by hand by rotating the supporting ring. The final adjustment is made by means of a micrometer screw attached to an arm which is clamped on the axle of the ring.

When making a measurement the azimuth circle is first set horizontal, a striding level placed on the trunnions which carry the ring being used to indicate when the adjustment is complete. The striding level is then placed on the axle which carries the coil, and when the bubble is at the centre of the scale the micro- scopes are adjusted to the zeros of the vertical circle. A box containing a long compass needle and having two feet with inverted V's is placed to rest on the axle of the coil, and the instrument is turned in azimuth till the compass needle points to a lubber line on the box. By this

means the axis of the coil is brought into the magnetic meridian. The commutator being connected to a sensitive galvanometer, the coil is rotated, and the ring adjusted till the galvanometer is undeflected. The reading on the vertical circle then gives the dip. By a system of reversals slight faults in the adjustment of the instrument can be eliminated as in the case of the dip circle. With such an instrument it is claimed that readings of dip can be made accurate to = *= o-i minutes of arc.

The form of Wild inductor for use in a fixed observatory differs from the above in that the coil consists of a drum- wound armature, but without iron, of which the length is about three times the diameter. This armature has its axle mounted in a frame attached to the sloping side of a stone pillar, so that the axis oi rotation is approximately parallel to the lines of force of the earth's field. By means of two micrometer screws the inclination of the axis to the magnetic meridian and to the horizontal can be adjusted. The armature is fitted with a com- mutator and a system of gear wheels by means of which it can be rapidly rotated. The upper end of the axle carries a plane mirror, the normal to which is adjusted parallel to the axis of rotation of the armature. A theodolite is placed on the top of the pillar and the telescope is turned so that the image of the cross- wires, seen by reflection in the mirror, coincides with the wires themselves. In this way the axis of the theodolite telescope is placed parallel to the axis of the armature, and hence the dip can be read off on the altitude circle of the theodolite.

Authorities. — In addition to the references already given the following papers may be consulted: (1) Admiralty Manual of Scientific Inquiry, which contains directions for making observations with a dip circle; (2) Stewart and Gee, Elementary Practical Physics, which contains a full description of the dip circle and instructions for making a set of observations ; (3) L. A. Bauer, Terrestrial Magnetism (1901), 6, p. 31, a memoir which contains the results of a comparison of the values for the dip obtained with a number of different circles ; (4) E. Leyst, Repertorium fur Meteorologie der kaiserl. Akad. der Wiss. (St Petersburg, 1887), 10, No. 5, containing a discussion of the errors of dip circles; (5) H. Wild, Bull, de I' Acad. Imp. des Sci. de St PUersbourg (March 1895), a paper which considers the accuracy obtainable with the earth inductor. (W. Wn.)

1 Repertorium fiir Meteorologie der kaiserl. Akad. der Wissensch. (St Petersburg, 1892), 16, No. 2, or Meteorolog. Zeits. (1895), 12, p. 41.

INCLOSURE, or Enclosure, in law, the fencing in of waste or common lands by the lord of the manor for the purpose of cultivation. For the history of the inclosure of such lands, and the legislation, dating from 1235, which deals with it, see Commons.

IN COENA DOMINI, a papal bull, so called from its opening words, formerly issued annually on Holy Thursday (in Holy Week), or later on Easter Monday. Its first publication was in 1363. It was a statement of ecclesiastical censure against heresies, schisms, sacrilege, infringement of papal and ecclesiasti- cal privileges, attacks on person and property, piracy, forgery and other crimes. For two orˆree hundred years it was varied from time to time, receiving its final form from Pope Urban VIII. in 1627. Owing to the opposition of the sovereigns of Europe both Protestant and Catholic, who regarded the bull as an infringement of their rights, its publication was discon- tinued by Pope Clement XIV. in 1770.

INCOME TAX, in the United Kingdom a general tax on income derived from every source. Although a graduated tax on income from certain fixed sources was levied in 1435 and again in 1450, it may be said that the income tax in its present form dates in England from its introduction by W. Pitt in 1798 “granting to His Majesty an aid and contribution for the prosecution of the war.” This act of 1798 merely increased the duties of certain assessed taxes, which were regulated by the amount of income of the person assessed, provided his income amounted to £60 or upwards. These duties were repealed by an act of 1799 (39 Geo. III. c. 13), which imposed a duty of 10% on all incomes from whatever sources derived, incomes under £60 a year being exempt, and reduced rates charged on incomes between that amount and £200 a year. The produce of this tax was £6,046,624 for the first year, as compared with £1,855,996, the produce of the earlier tax. This income tax was repealed after the peace of Amiens, but the renewal of the war in 1803 caused its revival. At the same time was introduced the principle of ” collection at the source ” (i.e. collection before the income reaches the person to whom it belongs), which is still retained in the English Revenue system, and which, it has been said, is mainly responsible for the present development of income tax and the ease with which it is collected. The act of 1803 (43 Geo. III. c. 122) distributed the various descriptions of in- come under different schedules, known as A, B, C, D and E. A rate of 5 % was imposed on all incomes of £1 50

a year and over, with graduation on incomes between £60 and £1 50. This income tax of 5 % collected at the source yielded almost as much as the previous tax of 10% collected direct from each taxpayer. The tax was continued from year to year with the principle unchanged but with variations in the rate until the close of the war in 1815, when it was repealed. It was, during its first imposition, regarded as essentially a war tax, and in later days, when it was reimposed, it was always considered as an emergency tax, to be levied only to relieve considerable financial strain, but it has now taken its place as a permanent source of national income, and is the most productive single tax in the British financial system. The income tax was revived in 1842 by Sir R. Peel, not as a war tax, but to enable him to effect important financial reforms (see Taxation). Variations both in the rate levied and the amount of income exempted have taken place from time to time, the most important, probably, being found in the Finance Acts of 1894, 1897, 1898, 1907 and 1909-1910.

It will be useful to review the income tax as it existed before the important changes introduced in 1909. It was, speaking broadly, a tax levied on all incomes derived from sources within the United Kingdom, or received by residents in the United Kingdom from other sources. Incomes under £160 were exempt ; an abatement allowed of £160 on those between £160 and £400; of £150 on those between £400 and £500; of £120 on those between £500 and £600, and of £70 on those between £600 and £700. An abatement was also allowed on account of any premiums paid for life insurance, provided they did not exceed one-sixth of the total income. The limit of total exemption was fixed in 1894, when it was raised from £150; and the scale of abatements was revised in 1898 by admitting incomes between £500 and £700 ; the Finance Act 1907 distinguished between " earned " and " unearned " income, granting relief to the former over the latter by 3d. in the pound, where the income from all

sources did not exceed £2000. The tax was assessed as mentioned above, under five different schedules, known as A, B, C, D and E. Under schedule A was charged the income derived from landed property, including houses, the annual value or rent being the basis of the assessment. The owner is the person taxed, whether he is or is not in occupation. In England the tax under this schedule is obtained from the occupier, who, if he is not the owner, recovers from the latter by deducting the tax from the rent. In Scotland this tax is usually paid by the owner as a matter of convenience, but in Ireland it is by law chargeable to him. All real property is subject to the

tax, with certain exceptions: — (a) crown property, such as public offices, prisons, &c. ; (b) certain properties belonging to charitable and educational bodies, as hospitals, public schools, colleges, alms-houses, &c. ; (c) public parks or recreation grounds ; (d) certain realities of companies such as mines, quarries, canals, &c, from which no profit is derived beyond the general profit of the concern to which they belong. Under schedule B were charged the profits arising from the occupation of land, the amount of such profits being assumed to be one-third of the annual value of the land as fixed for the purposes of schedule A. This applies principally to farmers who might, if they chose, be assessed on schedule D on their actual profits. Schedule C included income derived from interest, &c, payable out of the public funds of the United Kingdom or any other country. Schedule D, the most important branch of the income tax and the most difficult to assess, included profits arising from trade, from professional or other employment, and from foreign, property, the assessment in most cases being made on an average of the receipts for three years. Schedule E covered the salaries and pensions of persons in the employment of the state or of public bodies, and of the officials of public companies, &c. The method of assessment and collection of the tax is uniformly the same. Under schedules A, B and D it is in the hands of local authorities known as the General or District Commissioners of Taxes. They are appointed by the Land Tax Commissioners out of their own body, and, as regards assessment, are not in any way controlled by the executive government. They appoint a clerk, who is their principal officer and legal adviser, assessors for each parish and collectors. There is an appeal from their decisions to the High Court of Justice on points of law, but not on questions of fact. Assessments under schedules A and B are usually made every five years, and under schedule D every year. The interests of the revenue are looked after by officers of the Board of Inland Revenue, styled surveyors of taxes, who are stationed in different parts of the country. They are in constant communication with the Board, and with the public on all matters-relating to the assessment and collection of the tax; they attend the meetings of the local commissioners, examine the assessments and the taxpayers' returns, and watch the progress of the collection. There are also certain officers, known as special commissioners, who are appointed by the crown, and receive fixed salaries from public funds. For the purpose of schedule D, any taxpayer may elect to be assessed by them instead of by the local commissioners; and those who object to their affairs being disclosed to persons in their own neighbourhood may thus have their assessments made without any risk of publicity. The special commissioners also assess the profits of

railway companies under schedule D, and profits arising from foreign or colonial sources under schedules C and D. The greater part of the incomes under schedule E is assessed by the commis- sioners for public offices, appointed by the several departments of the government.

Previously to 1909 the rate of income tax has been as high as i6d. (in 1855-1857), and as low as 2d. (in 1874-1876). Each penny of the tax was estimated to produce in 1906-1907 a revenue of £2,666,867.!

It had long been felt that there were certain inequalities in the income tax which could be adjusted without any considerable difficulty, and from time to time committees have met and re- ported upon the subject. Select committees reported in 1851- 1852 and in 1861, and a Departmental Committee in 1905. In 1906 a select committee was appointed to inquire into and report upon the practicability of graduating the income tax, and of differentiating, for the purpose of the tax, between permanent and precarious incomes. The summary of the conclusions contained in their Report (365 of 1906) was: —

I. Graduation of the income tax by an extension of the existing system of abatements is practicable. But it could not be applied to all incomes from the highest to the lowest, with satisfactory results. The limits of prudent extension would be reached when a large in- crease in the rate of tax to be collected at the source was necessitated, and the total amount which was collected in excess of what was ultimately retained became so large as to cause serious inconvenience to trade and commerce and to individual taxpayers. Those limits

1 Full statistics of the yield of income tax and other information pertaining thereto will be found in the Reports of the Commissioners of His Majesty's Inland Revenue (published annually) ; those issued in 1870 and in 1885 are especially interesting.

would not be exceeded by raising the amount of income on which an abatement would be allowed to £1000 or even more.

2. Graduation by a super-tax is practicable. If it be desired to levy a much higher rate of tax upon large incomes (say of £5000 and

upwards) than has hitherto been charged, a super-tax based on personal declaration would be a practicable method.

3. Abandonment of the system of " collection at the source " and adoption of the principle of direct personal assessment of the whole of each person's income would be inexpedient.

4. Differentiation between earned and unearned incomes is practicable, especially if it be limited to earned incomes not exceeding £3000 a year, and effect be given to it by charging a lower rate of tax upon them.

5. A compulsory personal declaration from each individual of total net income in respect of which tax is payable is expedient, and would do much to prevent the evasion and avoidance of income tax which at present prevail.

Acting upon the report of this committee the Finance Bill of 1909 was framed to give effect to the principles of graduation and differentiation. The rate upon the earned portion of incomes of persons whose total income did not exceed £3000 was left unchanged, viz. 9d. in the pound up to £2000, and is. in the pound between £2000 and £3000. But the rate of is. in the pound on all unearned incomes and on the earned portion of incomes over £2000 from all sources was raised to is. 2d. In addition to the ordinary tax of is. 2d. in the pound, a super- tax of 6d. in the pound was levied on all incomes exceeding £5000 a year, the super-tax being paid upon the amount by which the incomes exceed £3000 a year. A special abatement of £10 a child for every child under the age of sixteen was allowed upon all incomes under £500 a year. No abatements or exemptions were allowed to persons not resident in the United Kingdom, except in the case of crown servants and persons residing abroad on account of their health. Certain abatements for improvements were also allowed to the owners of land or houses.

The estimated increased yield of the income tax for 1 909-1910 on these lines was £2,500,000, which excluded the abatements allowed for improvements. The super-tax was estimated to yield a sum of £500,000, which would be increased ultimately to £2,500,000, when all returns and assessments were made.

The following accounts show the operation of the same system of taxation in other countries: — l

Austria. — The income tax dates from 1849, but the existing tax,

which is arranged on a progressive system, came into force on the 1st of January 1898. The tax is levied on net income, deductions from the gross income being allowed for upkeep of business, houses and lands, for premiums paid for insurance against injuries, for interest on business and private debts, and for payment of taxes other than income tax. Incomes under £50 a year are exempt, the rate of taxation at the first stage (£52) being o-6 of the income; at the twelfth stage (£100) the rate is 1 %, at the twenty-seventh stage (£300) it rises to 2 %,at the forty-third stage (£1000) it is 3 %, and at the fifty-sixth (£2500) it is 3! ; an income of £4000 pays 4; from £4000 up to £8333 per annum progression rises at £166 a step, and for every step £8, 6s. 8d. taxation is assessed. Incomes between £8333 and £8750 pay £387, 10s. ; incomes over £8750 are taxed £20, 6s. 8d. at each successive stage of £417, 10s. Certain persons are exempt from the tax, viz. : — (a) the emperor; (b) members of the imperial family, as far as regards such sums as they receive as allow- ances; (c) the diplomatic corps, the consular corps who are not Austrian citizens, and the official staffs and foreign servants of the embassies, legations and consulates ; (d) such people as are exempted by treaty or by the law of nations; (e) people in possession of pensions from the Order of Maria Theresa, and those who receive pensions on account of wounds or the pension attached to the medal for bravery, are exempted as far as the pensions are concerned; (/) officers, chaplains and men of the army and navy have no tax levied on their pay ; (g) a H other military persons, and such people as are included in the scheme of mobilization are exempted from any tax on their pay. Special allowances are made for incomes derived from labour, either physical or mental, as well as for a family with several children. There are also special exemptions in certain cases where the annual income does not exceed £4167, 10s., viz. — (a) special charges for educating children who may be blind, deaf, dumb or crippled; (b) expense in maintaining poor relations; (c) perpetual illness; (d) debts; (e) special misfortunes caused by fire or floods; (/) being called out for military service. The tax is assessed usually on a direct return from the individual taxpayer, except in the cases of fixed

1 In Appendix No. 4 to the Report from the Select Committee on Income Tax (1906), will be found a valuable list (prepared in the Library of the London School of Economics) of references to the graduation of the income tax and the distribution of incomes both in the United Kingdom and in other countries.

salaries and wages, on which the tax is collected from the employer, who either deducts it from the salary of the employee or pays it out

of his own pocket. The tax, which is assessed on the income of the previous year, is paid direct to the collector's office in two instalments — one on the 1st of June and the other on the 1st of December. Belgium. — No income tax proper exists in Belgium, but there is a state tax of 2 % on the dividends of joint stock companies.

Denmark. — Income tax is levied under a law of the 15th of May 1903. Incomes under 2000 kroner pay a tax of 1-3 %; under 3000 kroner, 1-4 %; under 4000 kroner, 1-5 %; under 6000 kroner, 1-6 %; under 8000 kroner, 1-7 %; under 10,000 kroner, 1-8 %; under 15,000 kroner, 1-9 %; under 20,000 kroner, 2-0 % and for every additional 10,000 kroner up to 100,000 kroner 1 %, incomes of 100,000 kroner and upwards paying 2-5 %• Exempt from the duty are — the king, members of the royal family and the civil list ; the legations, staffs and consular officers of foreign powers (not being Danish subjects); foreigners temporarily resident in the country; mortgage societies, credit institutions, savings and loan banks. The increase in capital resulting from an increase in value of properties is not deemed income — on the other hand no deduction in income is made if such properties decrease in value — nor are daily payments and travelling expenses received for the transaction of business on public service, if the person has thereby been obliged to reside outside his own parish. Certain deductions can be made in calculating income — such as working expenses, office expenses, pensions and other burthens, amounts paid for direct taxation, dues to commune and church, tithe, tenant and farming charges, heirs' allowances and simitar burthens; interest on mortgages and other debts, and what has been spent for necessary maintenance or insurance of the property of the taxpayer. There are also certain exemptions With respect to companies not having an establishment in the country.

France. — There is no income tax in France corresponding exactly to that levied in the United Kingdom. There are certain direct taxes, such as the taxes on buildings, personnelle mobiliere, and doors and windows (impots de repartition) — the tax levied on income from land and from all trades and professions (impots de quotite) which bear a certain resemblance to portions of the British income tax (see France: Finance). From time to time a graduated income tax has been under discussion in the French Chambers, the proposal being to substitute such a tax for the existing (personnelle mobiliere) and doors and windows taxes, but no agreement on the matter has been reached. German Empire. — In Prussia the income tax is levied under a law of the 24th of June 1891. All persons with incomes of over £150 per annum are required to send in an annual declaration of their full income, divided according to four main sources — (a)

capital; (b) landed property; (c) trade and industry; (d) employment bringing gain, this latter including the salary or wages of workmen, servants and industrial assistants, military persons and officials; also the receipts of authors, artists, scientists, teachers and tutors. Liability for income tax, however, begins with an income of £45, and rises by a regular system of progression, the rate being about 3 % of the income. Thus an income of more than £45, but under £52, 10s. pays a tax of 6s. and so on up to £475, an income over that sum but under £525 paying a tax of 15s. Incomes over £525 rise by steps of £50 up to £1525, for every step £1, 10s. being paid. Incomes between £1526 and £1600 rise by steps of £75, £3 being paid for every step. Between £1601 and £3900, the steps are £100, and the tax £4 a step; from £3901 to £5000 the steps are the same (£100), but the tax is £5 a step. There is also a supplementary tax on property of about a'sth % of the assessed value. This supplementary tax is not levied on those whose taxable property does not exceed a total value of £300, nor on those whose annual income does not exceed £45, if the total value of their taxable property does not exceed £1000, nor on women who have members of their own family under age to maintain, nor on orphans under age, nor on persons incapable of earning incomes if their taxable property does not exceed £1000 nor their income £60. There are a number of exemptions from the income tax, some of the more important being — (a) the military incomes of non-commissioned officers and privates, also of all persons on the active list of the army or navy as long as they belong to a unit in war formation; (b) extraordinary receipts from inheritances, presents, insurances, from the sale of real estate not undertaken for purposes of industry or speculation, and similar profits (all of which are reckoned as increases of capital); (c) expenses incurred for the purpose of acquiring, assuring and maintaining income ; (d) interest on debts; (e) the regular annual depreciation arising from wear of buildings, machines, tools, &c, in so far as they are not included under working expenses; (/) the contributions which taxpayers are compelled by law or agreement to pay to invalid, accident, old age insurance, widow, orphan and pension funds; (g) insurance premiums. Moreover, persons liable to taxation with an income of not more than £150 may deduct from that income £2, 10s. for every member of their family under fourteen years of age, and abatement is also allowed to persons with incomes up to £475 whose solvency has been unfavourably affected by adverse economic circumstances. The income tax is both levied at the source (as in the case of com- panies) and assessed on a direct return by the taxpayer of his income from all sources. Salaries are not taxed before payment. Fixed receipts are assessed according to their

amount for the taxation year in which the assessment is made, and variable incomes on an

average of the three years immediately preceding the assessment. The income tax and the supplementary tax are collected in the first half of the second month of each quarter by the communities (Gemeinden) who bear the whole cost.

In Saxony a graduated tax is in force on all incomes of £20 per annum and upwards. All corporate bodies and individuals who derive their income or any portion of it from Saxony are liable to the extent of that income, except those serving religious, charitable or public purposes. Incomes between £20 and £5000 are divided into 118 classes, in which the rate rises progressively. From £500 to £5000 the classes rise by £50, and above £5000 by £100. The rate of income tax begins at i %, i.e. Is. on an income of £20. An abatement is allowed to those whose incomes do not exceed £155 of £2, 10s. for each child between the ages of six and fourteen years, provided such abatements do not reduce the income by more than one class. In the case of persons with incomes not exceeding £290 abatement (not exceeding three classes) is allowed— (a) when the support of children or indigent relations involves a burden of such a nature as to affect the general standard of living; (b) on account of long-continued illness, involving heavy expense? and, on restoration to health, temporary decrease of wage-earning power; (c) in the case of accidents which have had the same effect.

In Bavaria the existing system of income tax came into force on the 1st of January 1900. The rate on earned income varies according to a scale laid down in article 5 of the law, beginning at ■ 1 % for incomes up to £37, 10s. (is.), being -66 % (£2, 5s.) for incomes between £230 and £250 ; 1 -03 % (£4) for incomes between £350 and £375 ; 1-30% (£6, 16s.) for incomes between £475 and £500 and '1-38% (£10) for incomes between £650 and £700. Incomes exceeding £700 and not exceeding £1100 pay £1 on every £50; those between £1100 and £1700, £1, ios., on every £50, between £1700 and £2050, £2 on every £50; between £2050 and £2500, £2, ios. on every £50 and beyond £2500, 3 % on every £50. Exemptions from earned income tax are similar to those already mentioned in the case of Prussia. Special abatement in the case of incomes not exceeding £250 from all sources is given in consideration of

education of children, pro- tracted illness, maintenance of poor relations, serious accidents, &c. The tax on unearned income is at the rate of ii% on incomes from £3, ios. to £g; from £6 to £20, 2%; from £21 to £35, 2j%; from £36 to £50, 3%; from £51 to £150, 3f %; from £151 to £5000, 3i /„, and over £5000, 4 %. There is a differentiation in assessment on fluctuating and fixed incomes. Fluctuating incomes (e.g. those derived from literary, scientific or artistic work) are assessed at the average receipts of the two past years. Fixed income is returned at the actual amount at the time of assessment, and the assessment for earned income, both fixed and fluctuating, takes place every four years. Income tax is not levied at the source, but on a direct return by the taxpayer. In the case of unearned income, where a person's yearly unearned income does not exceed £100 and he has no other or only an insignificant additional income, he is required to pay only half the assessed tax. Also in the case where a total income, earned and unearned, does not exceed £250 it may, by claiming abatement on such grounds as the education of children, maintenance of indigent relations, &c, he assessed at the lowest rate but one, or be entirely exempt.

In Wurttemberg the General Income Tax Act came into force on the 1st of April 1905. Article 18 provides a graduated scale of rates on incomes from £25 upwards. Abatements are allowed for the edu- cation and support of children, support of indigent relatives, active service in the army and navy, protracted illness and severe accidents or reverses. There is a supplementary tax of 2 % on unearned income from certain kinds of property, such as interest or other income derived from invested capital, dividends, &c, from joint- stock companies and annuities of all kinds. The income tax is not levied at the source, but on a direct return by the ratepayers; assessments are made on the current year, except in the case of fluctuating incomes, when they are made on the income of the pre- ceding year.

Hungary. — There is no income tax in Hungary at all corresponding to that of the United Kingdom, although proposals for such a tax have from time to time been made.

Italy. — Graduated income tax in Italy dates from 1864. Incomes are classified according to their characters, and the rate of the tax varies accordingly. In class A 1 are placed incomes derived from interests on capital, and perpetual revenues owned by the state, interests and premiums on communal and provincial loans, dividends of shares issued by companies guaranteed or subsidized by the state lottery prizes. These incomes are assessed at their integral value and pay the full tax of 20 . In class A 2 are placed incomes derived from

capital alone and all perpetual revenues. The assessments on these are reduced to 3o/40ths of the actual income and taxed at a rate of 15. In class B are incomes derived from the co-operation of labour and capital, i.e. those produced by industries and commerce. The assessments of these are reduced to 2o/40ths and taxed at 10%. In class C are placed incomes derived from labour alone (private employment) and those represented by temporary revenues or life annuities. Assessments on these are reduced to 1 Sloths and taxed at a rate of 9%. In class D are placed incomes from salaries, pensions - and all personal allowances made by the state, the provinces and communes. Assessments on these are reduced to i5/40ths and taxed

at 7 5%. Certain abatements are allowed on small incomes in classes B, C and D. Incomes are assessed (1) on the average of the two preceding years in the case of private industries, professions or companies in which liability is unlimited ; (b) on the income of the current year in the case of incomes from dividends, salaries, pensions and fixed allowances, as well as in the case of incomes of communes, provinces and corporations; (c) on the basis of the account closed before the previous July of the current year in the case of incomes of limited liability companies, banks and savings banks.

Netherlands. — In the Netherlands there is a property tax imposed upon income derived from capital, as well as a tax on income earned by labour.

Norway.— In Norway under the state income tax incomes under 1000 kroner are exempt, those between 1000 and 4000 kroner pay 2 % on that part liable to taxation ; those between 4000 and 7000 kroner pay 3%; those between 7000 and 10,000 kroner pay 4%, and those above 10,000 kroner 5%. Persons liable to taxation are divided into (a) those who have no one to support, as companies and the like; (i) those who have from one to three persons to support; (c) those who have from four to six persons to support ; (d) those who have seven or more persons to support. Those who are counted as dependent upon the taxpayer are his children, own or adopted, his parents, brothers and sisters, and other relations and connexions by marriage who might have a reasonable claim to his support. A certain part of the income liable to taxation is abated by a graduated scale according to the class into which the ratepayer falls.

Spain. — In Spain the income tax is divided into (a) that de- rived from personal exertion and (b) that derived from property. Directors, managers and representatives of banks, companies and societies pay

10%; those employed in banks, &c, commercial houses, and those in private employment, as well as actors, bull- fighters, professional pelota-players, acrobats, conjurers, &c, pay 5%. Those employed by the day or those whose salary is under £45 are exempt, as are also masters in primary schools. Income derived from property is taxed according to the source from which the income is derived, e.g. income from shares in public works is rated at 20 %, income from shares in ordinary companies, railways, tramways or canals at 3 %, from dividends on bank shares at 5 %, from mining shares at only 2 %. There is also an industry tax, i.e. on the exercise of industrial, commercial and professional enter- prises, which tax is divided into five different tariffs, of which I. applies to commerce (vendors), II. also to commerce (middlemen), III. to industry (machinery), IV. to professions and V. to licences (retail and itinerant vendors). Tariff I. is differentiated according to the importance of the business and of the locality in which it is carried on, the rate being fixed by a consideration of the two com- bined. Tariff II. is differentiated according to the character of the enterprise, its importance and the importance of the locality. Tariff III. is differentiated according to either motive power, output, method, product or locality; Tariff IV. according to the character of the profession and the importance of the locality; Tariff V. is also differentiated according to the locality and the importance of the business.

Switzerland.— The system of income tax varies in the different cantons. Broadly speaking, these may be divided into four different kinds: (1) a graduated property tax, in which the rate applicable to each class of fortune is definitely fixed; (2) a propor- tional tax, under which property and income are chargeable, each at a fixed rate, while the total amount of the tax is liable to a pro- portionate increase according to scale if it exceeds certain specified amounts; (3) a system by which property and income are divided into three classes, the rate of the tax being increased by a graduated rise, according to the class to which the property or income belongs, and (4) a uniform rate of tax, with progression in the amount of income liable to taxation.

United States. — One of the means adopted by the Federal Govern- ment for meeting its expenses during the Civil War was the levying of an income tax. By the Act of Congress of the 5th of August 1861 a tax of 3 % was imposed on all incomes, with an exemption of $800, and was made payable on or before the 30th of June 1862. No tax; however, was assessed under the law. In March 1862 a new income tax bill was introduced into the House of Representatives. This act, which was signed on the 1st of July 1862, imposed a tax of 3% on

all incomes not over $10,000, and 5% on all incomes above that sum, with an exemption of $600. It was also provided that dividends of banks, insurance companies and railways should be assessed directly; but the bond-holder was allowed to deduct the dividentl^p assessed from his taxable income. In the case of government salaries, the tax was deducted before the salaries were paid. The income tax was first levied in 1863. The rate was changed by act of Congress in 1865, 1867 and 1870, and a joint resolution in 1864 imposed a special additional tax of 5 % for that year. The tax was finally abolished in 1872. The total amount produced by the tax from the beginning was $376,150,209. The constitutionality of the act was subse- quently brought into question, but was upheld by a unanimous decision of the Supreme Court in 1880, which held that the tax was not a direct tax but an excise tax, and that Congress had a right to impose it so long as it was made uniform throughout the United States. On the 27th of August 1894 an income tax act was passed as part of the Wilson Bill. By this act it was provided that a tax 6f

2 % on all incomes should be levied from the 1st of January 1895 to the 1st of January 1900, with an exemption of $4000. The legality of the tax was assailed, chiefly on the ground that it was a direct tax, and not apportioned among the several states in proportion to their population. On the 20th of May 1895 the Supreme Court, by a vote of five to four, declared the tax t;o be unconstitutional. Accordingly, ‘ before any federal income tax could be imposed, there was needed .an amendment of the constitution, and a movement in this direction gradually began. In the first year of the presidency of Mr W. H. Taft both Houses of Congress passed by the necessary two-thirds majority a resolution to submit the proposal to the 46 states, the wording of the amendment being ” That Congress shall have power to lay and collect taxes on incomes from whatever source derived, without apportionment among the several States, and without regard to any census enumeration.”

Cape Colony. — Cape Colony was the only South African colony which, prior to the Union in 1910, had a system of income tatf, whjch was first imposed by an act of the 31st of May 1904. Incomes not exceeding £1000 per annum were exempt from taxation; incomes exceeding £1000 but not exceeding £2000 were taxed 6d. in the pound on the excess beyond £1000; those between £2000 and £5000 were exempt for the first £1000, paid 6d. in the pound on the next £1000 and gd. in the pound on the remainder; those exceeding

£5000 paid 6d. in the pound on the second £1000, 9d. in the pound on the next £3000 and is. in the pound on the remainder.

New South Wales. — Income tax in New South Wales first came into operation on the 1st of January 1896. It is complementary with a land tax, assessed on the unimproved value of freehold lands (with certain exemptions and deductions). Incomes of £200 per annum and under are exempt, and all other incomes (except those of com- | panics) are entitled to a reduction of £200 in their assessments. The rate of tax is 6d. in the pound. There are certain incomes, revenues and funds which are exempt from taxation, such as those of municipal corporations or other local authorities, of mutual life insurance societies and of other companies or societies not carrying on business for purposes of profit or gain, and of educational, ecclesi- astical and charitable institutions of a public character, &c.

New Zealand.— In New Zealand the income tax is also comple mentary with a land tax. Incomes up to £300 per annurn are exempt; incomes up to £1000 per annum are taxed 6d. in the pound, with an exemption of £300 and life insurance premiums up to £50; incomes over £1300 pay is. in the pound, which is also the tax on the income – of trading companies, to whom no exemption is allowed. The income of friendly societies, savings banks, co-operative dairy companies, public societies not carrying on business for profit, &c, are exempt from income tax.

Queensland. — In Queensland income tax is levied on (a) income derived from property such as rents, interest, income from com- panies, royalties, &c, and (6) on income derived from personal exertion. On income derived front property all incomes not ex- ceeding £100 are exempt; incomes between £100 and £120 pay £1 tax; those over £120 but under £300 have £100 exempt and pay is. in each and every pound over £100, while incomes over £300 pay is. in each and every pound. Incomes from personal exertion pay 10s. between £100 and £125; £1 between £126 and £150; between £151 and £300 have £100 exempt and pay 6d. in each and every pound over £100; between £301 and £500 6d. in every pound; between £501 and £1000 6d. in every pound of the first £500 and 7d. in every pound over £500, between £1001 and £1500 yd. in every pound of the first £1000, and 8d. in every pound over £1000; incomes over £1500 pay 8d. in every pound; is. in every pound is charged on the incomes of all companies and of all absentees.

South Australia. — The income tax dates from 1884 and is lcvicdon all incomes arising, accruing in or derived from South Australia,

except municipal corporations, district councils, societies, &c, not carrying on business for the purpose ot gain, and all friendly societies. Where the income is derived from personal exertion the rate of tax is 4jd. in the pound up to £800, and 7d. in the pound over £800. For income derived from property the rate is 9d. in the pound up to £800, and is. ijd. in the pound over £800. There is an exemption ot £150 on incomes up to £400, but no exemption over that limit.

Tasmania. — In Tasmania there is (a) an income tax proper, and (b) a non-inquisitorial ability tax, one complementary to the other. The income tax proper is levied on all income of any company, at the rate of is. for every pound of the taxable amount; on all income of any person, at thg rate of is. for every pound of the taxable amount derived from property, and on every dividend at the same rate. Personal incomes of £400 and over are assessed at the full amount, but an abatement, of £10 for every £50 of income is allowed on incomes below £400 down to incomes of £150, which thus have £go deducted; incomes between £120 and £150 have £60 deducted; incomes between £1 10 and £120, £70, and incomes between £100 and £110, £80. The ability tax is paid by (a) occupiers and sub-occupiers of property and (b) by lodgers. The amount of tax paid by occupiers or sub-occupiers is calculated upon the assessed annual value of the property occupied, and that of lodgers from the assessed annual value of their board and lodging. A detailed account of both taxes will be found in House of Commons Papers, No. 282 of 1905.

Victoria. — -In Victoria the rate of income tax is fixed annually by act. The rate charged on income derived from property is exactly

double that charged on income derived from personal exertion, the rate for which for 1905 was: on the first £500 or fractional part thereof, 3d. in the pound; on the second £500 or fractional part thereof, 4d- in the pound; 1 on the third £500 or fractional part thereof, 5d. in the pound; on all incomes in excess of £1500, 6d. in the pound. All companies, except life insurance companies, were charged 7d. in the pound on their incomes; life insurance companies were charged 8d. in the pound.

Bibliography. — The Annual Reports of the Commissioners of Inland Revenue, the Reports of Committees and other references mentioned in the article, as well as Dowell's History of Taxation in England (1884); Dowell's Acts relating to the Income Tax (6th ed., 1908), and Robinson's Law relating to Income Tax (2nd ed., 1908).

INCORPORATION (from Lat. incorporare, to form into a body), in law, the embodying or formation of a legal corporation, brought about either by a general rule contained in such laws, e.g. as the Companies acts, and applicable wherever its con- ditions are satisfied; or by a special act of sovereign power, e.g. an incorporating statute or charter. The word is used also in the sense of uniting, e.g. a will may incorporate by reference other papers, which may be then taken as part of the will, as much as if they were set out at length in it.

INCUBATION and INCUBATORS. The subject of " in- cubation " (Lat. incubare, to brood; in-cumbere, to lie on), a term which, while strictly signifying the action of a hen in sitting on her eggs to hatch them, is also used in pathology for the development within the body of the germs of disease, is especially associated with the artificial means, Or " incubators," devised for hatching eggs, or for analogous purposes of an artificial foster-mother nature, or for use in bacteriological laboratories.

Life is dependent, alike for its awakening and its maintenance, upon the influence of certain physical and chemical factors, among which heat and moisture may be regarded as the chief. It is therefore obvious that any method of incubation must provide for a due degree of temperature and moisture. And this degree must be one within limits, for while all organisms are plastic and can attune themselves to a greater cr less range of variation in their physical environment, there is a given degree at which the processes of life in each species proceed most favourably. It is this particular degree, which differs for different species, which must be attained, if artificial incubation is to be successfully conducted. In other words, the degree of tempera- ture and moisture within the incubation drawer must remain uniform throughout the period of incubation if the best results are to be reached. It is not easy to attain these conditions, for there are many disturbing factors. We may therefore next consider the more important of them.

The chief causes which operate to make the temperature within the incubator drawer variable are the changes of the temperature of the outer air, fluctuations in the pressure of the gas when that is used as the source of heat, or the gradual diminution of the oxidizing power of the flame and wick when an oil lamp is substituted for gas. Also, the necessary opening of the incubator drawer, either for airing or for sprinkling the eggs with water when that is necessary, tends to reduce the temperature. But there is another equally important though less obvious source of disturbance, and this resides within the

organism undergoing incubation. In the case of the chick, at about the ninth or tenth days of incubation important changes are occurring. Between this period and the fourteenth day the chick becomes relatively large and bulky, and the temporary respiratory organ, the allantois, together with its veins, increases greatly in size and extent. As a consequence, the respiratory processes are enabled to proceed with greater activity, and the chemical processes of oxidation thus enhanced necessarily largely increase the amount of heat which the chick itself pro- duces. Thus an incubator, to be successful, must be capable of automatically adjusting itself to this heightened temperature. The drawer of an incubator is a confined space and is usually packed as closely as possible with the contained eggs. The eggs are living structures and consequently need air. This necessitates some method of direct ventilation, and this in its turn necessarily increases the evaporation of water vapour from the surface of the egg. Unless, therefore, this evaporation is checked, the eggs will be too dry at the period — from the tenth Bay onwards —

when moisture is more than ever an important factor. There is, according to some poultry authorities, reason to believe that the sitting hen secretes some oily substance which, becoming diffused over the surface of the egg, prevents or retards evapora- tion from within; presumably, this oil is permeable to oxygen. In nature, with the sitting hen, and in the " Mamal " artificial incubating establishments of the Egyptians, direct air currents do not exist, owing to the large size of the chambers, and con- sequently incubation can be successfully achieved without any special provision for the supply of moisture.

Artificial incubation has been known to the Egyptians and the Chinese from almost time immemorial. In Egypt, at Berme on the Delta, the trade of artificial hatching is traditionally transmitted from father to son, and is consequently confined to particular families. The secrets of the process are guarded with a religious zeal, and the individuals who practise it are held under plighted word not to divulge them. It is highly probable that the process of artificial incubation as practised by the Egyptians is not so simple as it is believed to be. But as far as the structures and processes involved have been ascertained by travellers, it appears that the " Mamal " is a brick building, consisting of four large ovens, each of such a size that several men could be contained within it. These ovens are in

pairs, in each pair one oven being above the other, on each side of a long passage, into which they open by a circular aperture, just large enough for a man to obtain access to each. The eggs are placed in the middle of the floor of the oven, and in the gutters round the sides the fire is lighted. The material for this latter, according to one account, consists of camels' dung and chopped hay, and according to another of horses' dung. The attainment of the right degree of heat is apparently reached wholly by the skill of the persons employed. When this has been attained, they plug the entrance hole with coarse tow. On the tenth to twelfth days they cease to light the fires.

Each " Mamal " may contain from 40,000 to 80,000 eggs. There are 386 " Mamals " in the country, which are only worked for six months of the year, and produce in that time eight broods. Many more than two-thirds of the eggs put in are successfully hatched. It is estimated that 90,000,000 eggs are annually hatched by the Bermeans.

A method of incubating that appears to have been altogether overlooked in England — or at least never to have been practised — is that carried on by the Couveurs or professional hatchers in France. They make use of hen-turkeys for the purpose, and each bird can be made to sit continuously for from three to six months. The modus operandi is as follows: a dark room which is kept at a constant temperature throughout the year contains a number of boxes, just large enough to accommodate a turkey. The bottom of the box is filled with some vegetable material, bracken, hay, heather, straw or cocoa-fibres. Each box is covered in with lattice-work wire, so arranged that the freedom of the sitting bird is limited and its escape prevented. Dummy eggs, made by emptying addled ones and filling with plaster of Paris, are then placed in the nest and a bird put in. At first it endeavours to escape, but after an interval of a few days it becomes quiet, and the dummy eggs being then removed, fresh ones are inserted. As soon as the chickens are hatched, they are withdrawn and fresh eggs substituted. The hen turkeys are also used successfully as foster-mothers. Each bird can adequately cover about two dozen eggs.

Incubation as an industry in Europe and America is of recent development. The growing scarcity of game birds of all kinds, coincident with the increase of population, and the introduction of the breech-loading gun, together with the marked revival of interest in fancy poultry about the year 1870, led, however, to the production of a great variety of appliances designed to render artificial incubation successful.

Previously to this, several interesting attempts had been made. As long ago as 1824, Walthew constructed an incubator designed to be used by farmers' wives with the aid of no more than ordinary household conditions. It consisted of a double-walled metal box, with several pipes opening into the walled space round the

sides, bottom and top of the incubator. These pipes were con- nected with an ordinary kitchen boiler. Walthew, however, constructed a fire grate, with a special boiler adapted to the requirements of the incubator. Into the walled space of the incubator, steam from the kitchen boiler passed; the excess steam escaped from an aperture in the roof, and the condensed steam through one in the floor. Ventilating holes and also plugs, into which thermometers were placed, pierced the door of the incubator. .

In 1827, J. H. Barlow successfully reared hens and other birds by means of steam at Drayton Green, Ealing. He con- structed very large rooms and rearing houses, expending many thousands of pounds upon the work. He reared some 64,000 game birds annually. The celebrated physician Harvey, and the famous anatomist Hunter were much interested in his results.

To John Champion, Berwick-on-Tweed, in 1870, belongs, how- ever, the credit of instituting a system which, when extended, may become the system of the future, and will rival the ancient " Mamals " in the success of the incubation and in the largeness of the numbers of eggs incubated. He used a large room through which passed two heated flues, the eggs being placed upon a table in the centre. The flues opened out into an adjoining space. The temperature of the room was adjusted by personal supervision of the fire. This system, more elaborated and refined, is now in use in some parts of America.

Bird Incubators.

Owing to the great variety in the details of construction, it is difficult to arrange a classification of incubators which- shall include them all. They may, however, be classified in one of two ways. We may either consider the method by which they are heated or the method by which their temperature is regulated.

In the former case we may divide them into " hot-air " incubators and into " hot-water " or " tank " incubators. In the latter case we may classify them according as their thermostat or temperature-regulator is actuated by a liquid expanding with rising temperature, or by solids, usually metals.

In America incubators of the hot-air type with solid and metallic thermostats are most used, while in Europe the " tank " type, with a thermostat of expansible liquid, prevails.

For the purpose of more adequately considering the various forms which have been in use, or are still used, we shall here divide them into the " hot-air " and " hot-water " (or " tank ") classes.

In the hot-air types the incubator chamber is heated by columns of hot air, while" in the tank system this chamber is heated by a tank of warmed water.

(a) Hot-Water Incubators. — In 1866 Colonel Stuart Wortley described in The Field an incubator constructed upon a novel principle, but which appears never to have been adopted by breeders. The descriptive article is illustrated with a sketch. Essentially the incubator consists of four pipes which extend across the egg chamber some little distance above the eggs. The pipes pass through holes in the side of the incubator, which are furnished with pads, so as to render their passage air-tight. Externally they are connected with a boiler. This is provided with a dome through which steam escapes, and also with a glass gauge to show the height of the water within the boiler. The water in the boiler is kept at the' boiling point, and the temperature of the incubator is regulated by adjustment of the length of the hot-water pipes within the egg chamber. To raise the temperature, a greater length of the pipes is pushed into the chamber, and to reduce it, more of their length is pulled outwards. It is claimed for this instrument that since the temperature of boiling water at any particular locality remains practically constant, the disadvantages due to fluctuations in the activity of a lamp flame or the size of a gas flame are obviated. But it has the serious dis- advantage that there is no automatic adjustment to compensate for fluctuations of atmospheric temperature. And experiments by C. Hearson have shown that even if the temperature of the tank or source of heat be constant, that of the incubator drawer will never- theless vary with fluctuations of external temperature. Probably if the mechanical difficulties of providing a self-regulator were over- come, it would prove an efficient and reliable incubator. The diffi- culties do not seem to be insuperable, and it appears possible that a thermostatic bar could be so arranged as to automatically increase or decrease the length of hot-water pipes within the incubator, and therefore the incubator temperature.

Another early form of incubator is Brindley's, which was first in

use about 1845, and in his hands it appeared occasionally to act successfully, but it never became generally used. The egg chamber was lined with felt, and was placed beneath a heated air chamber, the floor and roof of which were composed of glass. The air chamber was heated by a number of hot-water pipes which were connected with a copper boiler. This latter was heated by means of a lamp so constructed as to burn steadily. The temperature of the air chamber was regulated within certain limits by means of a balanced valve, which could be so adjusted that it would open at any desired temperature.

In. Colonel Stuart Wortley's incubator the hot-water tubes passed directly into the egg chamber, and in Brindley's into a chamber above it. But in other forms of incubators in which the principle of an external boiler connected with water tubes is adopted, the latter pass not into the egg chamber nor into an air chamber, but open into and from a tank of water. The floor of this tank forms the roof of the egg chamber, so that the eggs are heated from above. This device of warming the eggs from above was adopted in imitation of the processes that presumably occur with the sitting hen; for it is generally assumed that the surface of the eggs in contact with the hen is warmer than that in contact with the damp soil or with the material of the nest.

One of the earliest of this form of incubator is that invented by F. Schroder, manager of the now extinct British National Poultry Company. In this incubator the form is circular, and there are four egg drawers, so that each one occupied the quadrant of a circle, and the inner corner of each drawer meets in the middle of the incubator. From" the centre of the incubator a vertical chimney passes upwards and opens out from the inner corners of the four egg drawers. This chimney acts as a ventilator to the incubating chambers. These latter are open above, but their floors are made of perforated zinc, and when in use they are partially filled with chaff or similar material. Under them is a tank containing cold water and common to all four drawers; the slight vapour rising from the surface of the water diffuses through the egg drawers and thus insures a sufficient degree of humidity to the air within. Above the egg drawers is a circular tank containing warm water. The floor of this tank constitutes the roof of the egg drawers, while the roof forms the floor of a circular chamber above it, the side wall of which is composed of perforated

zinc. This upper chamber is used to dry the chicks when they are just hatched and to rear them until they are strong enough for removal. It is partially filled with sand, which serves the double purpose of retaining the heat in the warm-water tank beneath and of forming a bed for the chicks. The water in the warm-water tank is heated by means of a boiler which is external to the incubator, and in communication with the tank by means of an inlet and an outlet pipe. There is no valve to regulate the temperature, and the latter is measured by means of a thermometer, the bulb of which is situated not in the incubator drawers, but in the warm-water tank. This is a wrong position for the thermometer, since it is now known that the temperature of the water tank may be different by several degrees to that of the egg drawer; for with a fall of external temperature that of the latter necessarily tends to fall more rapidly than the former. But, none the less, in skilful hands this incubator gave good results.

T. Christy's incubator, which we shall describe next, has passed through several forms. We shall consider the most recent one (1894). The incubator (fig. 1) is double walled, and the space between the two walls is packed with a non-conducting material. In the upper

Fig. 1. — Christy's Improved Incubator.

part of the incubator there is a water tank (T) divided by a horizontal partition into two chambers, communicating with each other at the left-hand side. Below the tank is the incubation drawer (E), which contains the eggs and also a temperature regulator or thermostat ®. The tank is traversed by a ventilating shaft (V), and inserted into this is a smaller sliding tube passing up to it from a hole in the bottom of the incubator drawer. The floor of the incubator drawer is perforated, and beneath it is an enclosed air space which opens into the sliding air shaft just described. Fresh air is let into the incubator drawer from a few apertures (I) at its top. The

ventilating shaft (V) is closed externally by a cap ©, which can be raised from or lowered down upon its orifice by the horizontal arm (H) working upon pivot joints at (P). This arm is operated by the thermostat ®, through the agency of a vertical rod. The water in the tank is heated by an external boiler (B) through two pipes, one of which (T) serves as an inlet, and the other (L) as an outlet channel from the tank. These two pipes do not open directly into the tank, but into an outer vessel (O) communicating with it. Communication between this vessel and the tank may be made or broken by means of a sliding valve (S), which is pierced by an aperture that corresponds in position with the upper of the two in the wall of the tank when the

valve is up. When this valve is in its upper position, the tank (T) communicates with the outer vessel (O) by two apertures (A and A'), the top one being the inlet and the lower one the outlet. These coincide in position with the tubes from the boiler. This latter (B) is a conical vessel containing two spaces. The heated water is con- tained in the outer of these spaces, while the central space is an air shaft heated by a lamp flame. This particular form of the boiler results in the water at its top part being more heated than that in its lower. As a consequence of this, a continual circulation of water through the tank ensues. The more heated water, being specifically lighter, passes into the outer vessel, where it remains among the higher strata, and therefore enters the tank through the upper aperture. In passing along the upper division of the tank it becomes slightly cooled and sinks therefore into the lower compartment, passes along it, and out through the aperture A'. Hence it passes into the lower portion of the boiler, where it becomes warmed and specifically lighter; in consequence it becomes pushed upwards in the boiler by the cooler and heavier water coming in behind and below it.

Should the temperature in the incubator drawer rise, the bimetallic thermostat ® opens out its coil and pulls down the vertical rod. This simultaneously effects two things: it raises the cap © over the ventilating shaft and allows of a more rapid flow of fresh air through the incubator drawer, and it also lowers the slide-valve (S) so that the tank becomes cut off from communication with the outer vessel (O) and therefore with the boiler. The temperature thereupon begins to fall and the thermostat, coiling closer, raises the vertical rod, closes the ventilating shaft, and once more places the tank in com- munication with the boiler.

The structure of the thermostat is given below. The Chantry Incubator (Sheffield) is also an incubator with a hot- water tank, the circulation of which is maintained by an outside boiler. Its temperature is regulated by a metal regulator.

In Schroder's and Christy's incubators the hot-water pipes from the boiler simply entered the warm-water tank but did not traverse it. In the two incubators to be next described the hot-water pipes are made to pass through the water in the tank, and are so arranged as to minimize the possibility that the outside of the tank may become colder than the centre. Both of them are also fitted with an in- genious though slightly complex valve for maintaining an approxi- mately constant temperature.

Halsted's incubator was the earliest of this type. Since his original

form was constructed he has designed an improved one, and it is this latter which will be described.

The egg drawer (E, fig. 2) lies beneath the warm-water tank (T), and above this is a nursery (N). The egg drawer is ventilated by two tubular shafts (V), of which only one is represented in the illustration ; the tubes areabout 2J in. in diameter, and each one is fitted at its upper end, where it opens into the nursery, with a swing-valve (V) which turns upon a horizontal axis (A), in its turn connected, by means of cranks © and shafts (S), with the heat regulating apparatus ®. A space of about 2 in. between the top of the incubating drawer and the warm-water tank is neces- sary for the insertion of this apparatus. The water in the tank (T) is heated by means of the boiler (B); the tank and boiler are connected by the two pipes (I) and (0), of which one is the inlet and

the other the outlet channel.

The boiler consists of an p.,, „ h-w^',, t,,,,,,k,,j-,,, inner (I'_) and an outer (O). FlG 2 ~ Halsted s Incubator, division in communication with each other below. The latter is cylindrical in form, while the outer wall of the former is cylindrical and its inner wall conical. The conical wall of the inner boiler is the surface which is heated by the lamp (L). The arrangement of the inlet and outlet tubes is important. In the illustration, for the sake of clearness, they are represented as one above the other. In reality they lie in the same plane, and the fork (F) of the inlet pipe similarly lies in the horizontal plane and not vertically as repre sented. The inlet pipe not only differs from the outlet pipe in the

possession of a forked end, but it is carried to the farther end (not shown in the diagram) of the water tank, while the outlet pipe opens from about the middle of the tank. The inlet pipe is connected with the inner portion of the boiler and the outlet one with the outer portion. The result of this adjustment of the parts is that the warmer water of the inner boiler, being specifically lighter than the cooler water of the outer boiler, rises up and passes through the inlet pipe (I) and is discharged into the tank through the two divergent orifices of the fork (F). Here the water strikes the side wall of the farther end of the tank and is reflected back along the back and front walls towards the nearer side. Hence it is again reflected, but in the

opposite direction, and now forms a central current, which is directed towards. the centrally situated orifice of the outlet tube (O). Through this it passes to the outer boiler, and sinking towards the bottom, reaches the base of the inner boiler. Here it becomes heated and lighter and consequently rises to the top, and once more passes through the inlet pipe to the water tank. The warm water thus travels round the outer walls of the tank and the cooled water is conducted away along the middle portion. A more equable distribution of temperature over the roof of the incubating chamber is thus ensured than would be the case if the heated water were dis- charged either into the centre or at any other single point only of the tank.

To a very large extent, the efficiency of this apparatus depends upon the approximately perfect performance of the lamp. A good, steadily burning one should be employed, and only the best oil used; for, should the wick become fouled the flame cannot freely burn. For this reason it is better to use gas, whenever obtainable.

The maintenance of an approximately uniform temperature is obtained by allowing the heated air of the egg-drawer to escape through the two ventilating shafts (V). The swing-valves of these are opened or closed by means of the regulator ®. This latter consists of a glass bowl prolonged into a tube, about 8 in. long and three-eighths of an inch in diameter. The glass tube swings upon an axis (A) which is situated as near as possible to the bowl of the regulator. The axis is connected with a crank © which is disposed so as to act as a lever upon the vertical shaft (S), which in its turn is connected with the upper crank © ; this works the axis (A') of the swing-valves, and so can open or close the apertures of the ventilat- ing pipes. The bowl of the regulator is filled with mercury to such an extent that at the temperature of 100° F., and when the tube is slightly inclined upwards from the horizontal it just flows slightly into the tube from the bowl. On the lever-crank © a weight is slung by a sliding adjustment, and is so placed that when the tempera- ture of the egg-drawer is 103 it just balances the tube of the regu- lator when it is slightly inclined upwards. Should the temperature of the drawer now rise higher the mercury flows towards the distant end of the tube and, causing it to fall down, brings about a rotation of the regulator axis and as a consequence the opening of the ventilat- ing valves. A transverse stay prevents the limb of the regulator from quite reaching the horizontal when it falls. As the temperature cools down the mercury contracts and retraces to the nearer end of the tube and to the bowl, and consequently results in the upward inclination of the limb; the valves are thus closed again.

The egg-drawer (E) is specially constructed so as to imitate as nearly as possible the natural conditions that exist under a sitting hen. The drawer is of wood and contains a zinc tray (Z) into which cold water is placed. Fitting into the zinc tray is another zinc compartment, the floor of which is made of a number of zinc strips (X) transversely arranged and placed in relation to each other like the limbs of an inverted A. The limbs are so disposed that those of one scries do not touch the adjacent ones, and in fact a space is left between them. Thus a number of parallel troughs are formed, each of which opens below into the moist air chamber of the cold water tray beneath. In practice these troughs are covered with flannel which is allowed to dip into the water of the tray. Thus the eggs lie in a series of damp troughs and their lower surfaces are therefore damper and colder than their upper ones. This incubator, if carefully worked and the necessary practical details observed, has the reputation of being an efficient machine.

Somewhat similar to the Halsted incubator, but differing from it in the nature of the boiler and in the temperature regulator, is the Graves incubator, made in Boston, U.S.A. The incubator itself (fig. 3) consists of an incubating or egg-drawer (E) heated from above by a warm-water tank (T). Below the egg-drawer is a tank containing cold water, the vapour of which passes through the perforated floor of the former and keeps the air of the egg-chamber slightly humid. Above the warm-water tank is an air chamber (AC) to serve as a non-conducting medium and to prevent therefore undue loss of heat. Above this is a nursery or drying chamber (N), closed in, with a movable lid.

The warm-water tank is heated by means of a simple boiler (B) from which an inlet tube (I) carries heated water to the tank; the tube traverses the length of the tank and discharges at its farther end (not shown in the diagram). From the nearer end of the tank an outlet tube (O) passes out and opens into the boiler at a slightly higher level than the inlet one. The boiler is heated by an evenly burning lamp below, of special construction. The rectangular tube through which the wick passes is bevelled at its outer end, and upon this bevelled edge a metal flap (F) is allowed to rest more or less

closely, according as the flame is to be smaller or larger respectively.

The wick is, of course, bevelled to correspond to the form of its tube.

The metal flap is raised or depressed by means of levers connected

with the heat-regulator. When it is depressed upon the wick the flame is lessened; and it becomes proportionately bigger as the flap is raised more and more.

The heat-regulator consists of a glass tube (T) which runs the whole width of the incubation chamber and lies in contact with the floor of the warm- water tank; it is filled with alcohol. Exter- nally to the incubator this tube is connected with a U-shaped one containing mercury. The free limb of the U-tube contains a piston (P) which rests upon the surface of the mercury in that limb. From the piston a piston rod (PR) passes vertic- ally upwards and is connected with a lever (I .) which operates, through the agency of a second lever (L') the movements of the ventilating valve (V) in serted over the orifice of the ventilating shaft (A) which opens from the roof of the incubator drawer. The lever (L) is further connected with a spiral spring (S) which works the metal flap of the lamp already described. The height of the piston in the U tube can be so adjusted, by varying the quantity of mercury in the tube, that when the temperature of the incubation drawer is 103° F., the ventilating valves are closed and the wick is burning to its full extent. Should the temperature rise, the alcohol in the glass tube (T) expands and causes the mercury in the free limb of the U tube to rise. This carries with it the piston, and this movement brings about the opening of the ventilating valves, and at the same time, through the agency of the lever (L) and the spiral

spring (S) the metal flap is brought down upon the wick, cutting off more or less of the flame. Should the temperature then fall to 103 or lower, the contraction erf the alcohol reverses these movements, the valve closes, and the wick once more burns to its full extent.

In practice, the boiler and the temperature regulator are duplicated, there being a set on both sides of the incubator. Any slight irregularity on the one side may be thus compensated for by the other side, Graves's incubator has the reputation of being a good machine. Among the most recent type of incubators made in England is that of Charles Hearson. This differs from any of those described

Fig. 3. — Graves's Incubator.

Fig. 4. — Hcarson's Incubator.

in the simplicity and ingenuity of the heat regulator, and in that the tubes which traverse the water tank are hot-air flues, carrying the air heated by the_ flame and not warm water. Consequently a further simplification is introduced inasmuch as no boiler is required.

The essential features of this incubator are shown in fig. 4. The internal parts of the incubator are insulated by a double wall, the interspace being packed by a non-conducting material, which is not shown in the figure. The incubation or egg-drawer (E) is heated by the warm- water tank (T). Beneath the egg-drawer is a zinc tray (Z), so constructed that in the central part the floor is raised up into a short cylinder. Around the raised cylinder is a wide trough containing water and into this dips a canvas cloth which is stretched out over a perforated zinc support (F). By this means an extended moistened surface is produced which allows of a rapid evaporation.

The floor of the incubator, which is raised by short feet from the table on which it stands, is perforated in the central portion by a number of holes, and which are so situated that they lie beneath the raised cylinder of the cold-water tray (Z). The incubation-drawer is thus supplied continuously by a slow current of moistened air because the air in the upper part of the drawer, i.e. in contact with the floor of the warm-water tank, is the warmest and lightest. It therefore tends to diffuse or pass through the narrow slits between the drawer and the walls of the incubator, and also through the aperture in the front wall of the egg-drawer, through which a thermometer is placed. 1 o replace the air thus lost, fresh air passes in through the holes in the bottom of the incubator, and on its way must pass through the pores of the damp canvas which dips into the

water in the zinc tray (Z).

The warm-water tank is heated by an inlet (I) and outlet (0) flue which are, however, continuous. The inlet flue opens out from a vertical chimney ©, the air in which is heated either by a gas flame or that of an oil lamp. The outlet or return flue passes back through the width of the tank and opens independently to the exterior, lhe vertical chimney © is capped by a lid (L) capable of being raised or lowered upon its orifice by the lever (L'). When the cap is resting upon the chimney all the heated air from within the latter passes through the flues and heats the water in the tank. If the can is widely raised, practically all the heated air passes directly upwards through the chimney and none goes through the flues. If the cap be but slightly raised, part of the heated air goes through the flues and part directly escapes through the aperture of the chimney, lhe movement of the lever (L') which raises the cap (L) is deter- drawer thermostatic capsule (S), situated within the egg-

The principle upon which this capsule is designed is that the boiling point of a liquid depends not only upon temperature but also upon pressure. A given liquid at ordinary atmospheric pressure will boil at a certain degree of temperature, whiqh varies for different substances. But if the pressure be increased the boiling point of the liquid is raised to a higher degree of temperature. A liquid when it boils passes into a gaseous condition and in this state will occupy a very much larger volume— some two or three hundred times— than in the liquid condition If, therefore, a hermetically sealed capsule with flexible sides be filled with some liquid which boils at a given temperature, the sides of the capsule will distend when the temperature of the air round the capsule has been raised to the boiling point of the liquid within it. The distension of this capsule can be used to raise the ever (L'). The thermostatic capsule is p aced on a fixed cradle (F) and is filled with a mixture of ether and alcohol the proportions being such that the boiling point of the mixed hquid is 100° F Between the capsule and the lever (L') is a

rXˆ 7ˆ (V k artlCU – Iat , mi ? With – the lever as cIose as P° ssi Me to its f ulcrum (M). The articulation with the lever is by means of a screw,

wwl the necessary nice adjustment between the height of the rod (V), the thickness of the capsule and the position of rest of the damper (L) upon the chimney, can be accurately made. The & a f" re , a ' which it is desired that the liquid in the capsule shall boil can be determined by sliding the weight (W) nearer or farther to the fulcrum

of the lever (L'). The farther it is moved outwards the greater is the pressure upon the thermostatic capsule and conse- r r n t eL the f h t H gher -,T i !! ˆ ˆ bM[?S point of its Contained Kqu d. n,LT?nH ˆ mllle d:head screw (A), the height of the lever at its outer end can be so adjusted that when the liquid of the capsule is not boiling the damper (L) closes the chimney, fcut that when it does boil the damper will be raised sufficiently high from it. If the weight is pushed as far as it will go towards the fulcrum end of the lever the temperature of the egg-drawer will never rise more than ioo° F because at this temperature and under the pressure to which it is then subjected the liquid in the capsule boils, and consequently*

how g hi, a h thl fl He ™TI ° f thC 1 ampe u n lt ma » ers not – thffi£ how high the flame of the gas or lamp be turned, the temperature o

the egg-drawer will not increase, because the extra heat of the en-

arged flame is passing directly outwards through the chimney, and

is not going through the flues in the tank. In order to raise the

temperature within the incubation chamber to 102° or 103 , or any

*tneYever'nˆˆr 6 ˆˆ We / ght (W) T USt be moved outwards along H-irS tJ' 3 u° Ut * in '- for evel 7 de S ree of temperature increase desired. This thermostatic capsule works admirably, and the in-cubator will work for months at a time and requires no adjustment however much, within the limits of our climate, the external wh m ˆ r fh Ure ma y.ˆ, ar y- u The capsule, like all other thermostats fn which the expansible substance is a liquid, is, however, dependent*

boUs a e nd e tW P reS T e I? X } e P °' m } at Which its contained liquid ˆ1 in w e e ˆ 0re ' f0f M degree of temperature prevailing within*

' c " bator drawer – It » therefore responsive to variations in atmospheric pressure, and as the barometer may fall 1 or 2 in this may possibly make a difference of two or three degrees in the often fˆf temperature within the egg-drawer. It is not, of course, often that such large osallations of the barometer occur and as a matter of practical experience, under ordinary conditions thit incubator w,ll work for months together without attention wkh only half a degree variation round the point at which it was set. '

Greenwood s incubator (fig. 5), named the Bedford, resembles Hearsons in that hot-air flues (F and F') and not hot-watefplpes!

I _E

Fig. 5.— The Bedford (Greenwood's) Incubator.

traverse the water tank (T). And the method of regulation of the temperatures much the same, i.e. a thermostat (V) operating upon

fFˆndTn 11011 li alSeS Vt P P h ? m off the aperture of the main flue (F) and thus allows all the heat of the flame to pass directly outwards

traveTse "ˆS ˆ ˆ ° f flU6S (F) Which horizontalˆ tank. Fresh air enters through a wide circu- W lar aperture (A) which surrounds the main flue, and it thus becomes partially warmed before enter- ing the egg-chamber. The eggs are placed upon a perforated floor (E) lying over water baths (B). The water tank (T) lies in the centre of the incu- bation chamber and is traversed through its central axis by the main hot-air flue (F). From this, four horizontal flues pass outwards through the water and open into small vertical flues, which in their turn communicate with the exterior.

ThTil *>f rm , ost at (V) insists of a glass tube of peculiar form. This is closed at the end of its short limb and open at its other extremity on the long limb. The bent portion of the tube is filled with mercury and between the mercury column and the closed end is a small quantity of ether. The thermostat is lodged in a box (G) which forms part of the lever (L). At one end this lever is pivoted Ht-ˆ arm ' a ?A at t he u Other to the vertical rod .which operates the ventilating cap ©. If the temperature should rise, the ether in the thermostat expands and pushes the mercury column up along the inchned longjimb. This disturbs the equilibrium of the lever (L) and it descends downwards, pulling with it the vertical rod, and thus raising the cap over the main flue. If the temperature falls thl wilfhe rˆ' e H° f chan S e s occur. The temperature at which the cap wit Aaa Tu Hi ad i usted w 'thin limits by the position of the rhermoitet adjustment of the degree of inclination of the

The Proctor incubator, made at Otley, is apparently, in its main features, similar to the Greenwood.

Somewhat similar, in certain features, to the Greenwood is the Winchcpmbe. Its improved form, in which metal replaces the wood

casing, is named the Gladstone. In it there is a combination oT the

chaXr an Thi\ < ; n a f e ˆ tank fystems of warming the incubation chamber. The wall of the incubator is double, and the space between

The inr.nW- d ““if T” ! S Fˆl V th a “on-conducting material lhe incubation chamber is heated above by a water-tank (fig. 6 T)

Fig. 6. — The Winchcombe Incubator.

which is traversed by a main vertical flue (F) and four subsidiary horizontal ones which discharge externally. The main flue how^ ever, in passing up to enter the water tank traverses the egg-chamber and therefore serves to warm it, as in the hot-air type of incubaW by the heat of the flue itself. Around the lower half of the flue H water vessel consisting of two concentric containers ©, holding water. In the space between these concentric containers fresh £?

*SJ? • hr ° Ugh *£ e ap r tUre (A) ‘ and before ; t caches the egg-chamber it passes through coarse canvas which dips into the water in the containers and is therefore kept permanently moist The*

*Air ™*Z aT \ a Gd fr T a Water tank & °“tside the incuba or Air passes out from the egg-chamber through the aperture (0)*

IhfchTSe U s r t 1S r t gukted b y a bimetallic thermostat^ ˆelow),

ˆXXrˆZZˆˆ tˆFˆThTtˆeˆre at

ofthe adrusTalTeˆˆtˆr 1 ˆ’ ˆ “ˆ ˆˆ

Tomhnson’s incubator, designed in 1880, is novel in principle.

Fig.

-Hillier’s Incubator.

It possesses a very large water tank, holding 15 gallons for every hundred eggs. Through this tank there pass two hot-air horizontal flues, lying in the same plane. The novelty of the construction lies in the great volume of water used and in the disposition of the flues towards the top of the tank. It is said that very little circulation of water takes place beneath the flues, because warmed water rises

instead of falling. The great body of water below the flues will therefore only take up heat relatively slowly, and will, on account of its bulk and its physical properties, but slowly lose it. Should the flame fall in power, or even go out for ten or twelve hours, it is claimed that no serious loss of efficiency of the apparatus will result.

Regulation of the temperature is by means of an air tube, the air in which expanding bulges out an indiarubber diaphragm and this moves a lever. The lever operates a valve which allows more or less of the heated air to escape from the egg-drawer.

(b) Hot-air Incubators. — W. H. Hillier's Incubator (fig. 7) is circular in form and is constructed of a double-walled metal case. The space between the two walls is packed with a non-conducting material.

-d-sw ˆ ne incubation or

- – egg-chamber © is warmed by a circular heating box (H), and the air in this is heated by a lamp. The roof of this box forms part of the floor of the incuba- tion chamber and from it a main flue (F) and four smaller ones (F') pass upwards through the roof of the incu- bator and discharge to the exterior. Fresh air passes in to the incubator through two tubular channels (A and A') on either side of the heating box and escapes through a hole in the roof, which serves at the same time as a passage for one of the rods (D) in con- nexion with the temperature regulating apparatus.

This apparatus (T) consists of a glass tube of | in. bore, and which is bent into the form of a circle of 5 in. diameter. The tube is fastened to a wooden disk, which rotates upon a pivot and in so doing operates a vertical rod (D), which in its turn works the cap (V) which covers the orifice of the main flue. The tube is partly filled with mercury and is closed at one end. At this end there is contained some spirit. As the temperature rises, this expands and pushes the mercury column farther along the tube. The equilibrium of the position of rest is thus disturbed, and the wooden disk consequently rotates, carrying with it the vertical arm, the downward movement of which raises the cap (V) of the flue. The temperature at which it is desired that this valve shall uncover the flue, can be adjusted within the necessary limits by sliding the weight (W) along the horizontal arm and by the amount of mercury present in the bent tube. The air of the incubation chamber is rendered sufficiently moist by the evapora- tion of water in the vessel (G).

In the Cornell incubator (New York) more personal attention is required than in other forms, since the ventilation of the egg-chamber is not wholly automatic but is regulated according to the results of observation. The great difficulty in ventilation is the proper combination of fresh air and moisture. The Cornell Incubator Company has endeavoured to obviate this difficulty by carrying out a series of observations on the rate at which evaporation occurs in incubating eggs under natural conditions. The rate of evaporation is measured by the size of the air-space within the egg-shell at successive days. This they have ascertained, and with their incubators they furnish a book of instructions in which diagrams showing the size of the air space on the 1st, 5th, 10th, 14th and 1 8th days are given. Examination of the eggs should therefore be made every two or three days, and the result compared with the diagrams. The incubator. is provided with an adjustable ventilator and this should be so arranged that evaporation is neither too great nor too little. The ventilator should never be wholly closed, and if when closed to its minimum evaporation is still too great, then water should be placed in the moisture pans. In all cases lukewarm water should be placed in these on the 1 8th day and the ventilating slide opened wide.

It will thus be seen that in this machine there is an attempt to do away with the addition of water to the incubator drawer during the greater part of the period of incubation, and to rely upon the aqueous vapour naturally present in the atmosphere. This attempt is based upon the fact that water vapour is lighter than air, and will therefore rise to the top in any enclosed volume of air. If the direction of the ventilating current is downwards in the incubation chamber, and if it is slow enough, it is thought that the water vapour will be sifted out and tend to accumulate to a sufficient extent in the chamber. In the Cornell incubator consequently the ventilating current passes first upward through an external heater in order to warm it, whence it is then deflected downwards into the egg-chamber and diffuses through its perforated bottom. Then it passes along a space beneath the chamber into a space in the left-hand wall of the incubator and

out to the exterior through an adjustable and graduated ventilating slide.

These incubators are hot-air machines, and the hot-air chamber is situated above the egg-drawer and is traversed by several flues opening out from a main one. The temperature regulating apparatus appears to be similar to that of Hearson's machine and operates by a

thermostat, which through the agency of levers opens or closes a valve over the main flue.

The Westmeria incubators (Leighton Buzzard) are of two patterns. One type is built on the hot-air principle and the other on the hot-water system. In both forms the heated air from the heating surfaces is deflected down on the eggs and escapes through the perforated bottom of the egg-drawer. The inlet air is first warmed by contact with the main flue. The thermostat is similar to that in the Hillier machine (fig. 7) and consists of a coil mounted on an axis, round which it can rotate. The coil is filled with mercury and is closed at one end. Between this end and the mercury column is a short column of air. By expansion of the air under a rising temperature, the mercury column is displaced and brings about a rotation of the disk to which the coiled tube containing it is attached. This rotation raises the cap over the main flue.

All the incubators so far described have been constructed with the idea of obtaining as nearly as possible a uniform temperature. But in E. S. Renwick's incubator (America) no attempt is made to obtain uniformity in temperature. On the other hand, it is designed to give a periodical oscillation from one extreme to the other of a limited range, about 3°, of temperature. This is accomplished by means of a thermostatic bar made of plates of brass and vulcanite fastened together. This is connected with a clockwork and detent arrangement, which simultaneously opens a valve and actuates the lamp flame. The temperature falls to the lower limit of its range before the thermostatic bar is sufficiently bent to set the clockwork arrangement operating in the reverse direction, by which the valve is closed and the lamp flame increased. The temperature then rises to the higher limit, when the bending of the thermostatic bar again releases the detent and the clockwork opens the valve and reduces the flame.

The incubator is said to succeed well. It also possesses a mechanical arrangement by which all the eggs can be periodically turned on rollers at once.

Size. — The incubators which have been described are of relatively small size, and the numbers of eggs which they can incubate are strictly limited. For commercial purposes, however, operations of a much larger magnitude are desirable and necessary. ' And there can be no doubt that for these purposes the incubators of the future will be of great size and will contain from 15,000 to 30,000 eggs or more at a time. Already, at Aratoma Farm, Stamford, New York State,

there is established a large incubation room, containing several thousands of eggs, and in which the heat regulation 1 is controlled in part by the personal efforts of attendants. It constitutes almost a complete return, with added accessories, to the methods of the Egyptians, and to those of John Champion.

Bacteriological Incubators. These differ from bird incubators in that the heating surface of the incubation chamber generally surrounds all sides of it and there is, as a rule, no special arrangement for bringing about a more or less humid condition of the contained air. In some forms there is an arrangement to ensure a continuous supply of fresh and moist air, but in the majority the incubation chamber obtains its supply of fresh air vicariously. In some forms the chamber of the incubator is heated by a warm water tank of a simple kind, which extends round all its sides. But in other forms a series of tubes or flues passes through the water in this tank and thus simulates in principle the tube boiler. This latter form utilizes the heat of the flame to a greater degree than the former kind. In yet other forms the incubation chamber is heated by warm air chambers which surround : it or flues which traverse it. Most bacteriological incubators are square or rectangular in form, but some bacteriologists prefer cylindrical forms, presumably on account, of the ratio of volume to surface in connexion with the water tank.

One of the best known and most generally used of the cylindrical and water-tank kind is that of Dr d'Arsonval. It consists of two copper cylinders (fig. 8 C and C), each terminating in a cone below. Between the cylinders is a wide interspace, in order that a large volume of water may be contained. This interspace therefore constitutes the water-tank of the incubator. The upper orifice of the inner cylinder is closed by a movable double lid, which contains an interspace filled with water. The outer cylinder has an oblique form at its upper end and is permanently closed. The result attained by this slope of the lid of the outer cylinder is that the water tank, which is fed from the highest point, becomes completely filled. The aperture at the highest point of the outer cylinder is plugged with a caoutchouc plug and through a perforation in this a glass tube (T) is placed. In,

Fig. 8. — D'Arsonval Incubator.

the side of the outer cylinder below this, there is a wide and rimmed

aperture, to which a gas regulator of special construction is fixed.

This regulator was designed by Theophile Schloesing, and consists of a brass box, supplied with a rim (L) which fits on to the corre- sponding rim (L') on the aperture of the incubator. Stretching across the orifice thus connecting the brass box of the regulator with

the water-tank of the incubator is a thin india-rubber diaphragm (D). At its outer end a perfor- ated cap ® screws on to the brass box. Through the per- foration the inlet gas tube passes (I); the outlet gas tube (O) leaves the brass box below and passes direct to the gas burners. The inlet gas tube is fitted at its inner end with a sliding flanged collar (F), which is kept pressed against the rubber diaphragm by a spiral spring. Just behind the collar the inlet tube is perforated by a small hole, so that the gas supply is never wholly cut off, even though the rubber dia- phragm completely occludes the inner aperture of the pipe.

The mode of working of the regulator is as follows – when the water tank of the incubator is filled with distilled or rain water at the temperature required, it presses upon the india-rubber diaphragm with a certain degree of pressure. By screwing the inlet pipe in or out, as required, it can be so adjusted that the diaphragm does not occlude its inner aperture, and consequently the full volume of gas can pass through to the burners below. The temperature of the water in the water-tank therefore begins to rise, and in consequence the volume of the water to increase. This results in the water rising up into the tube (T), and therefore the dynamical pressure which is exercised by the water upon every part of the two cylinders of the incubator and consequently also upon the india-rubber diaphragm of the regulator is increased. As this pressure increases, the dia- phragm becomes bulged outwardly and reduces the volume of gas passing through the aperture of the inlet pipe. At a certain point, of course, the diaphragm completely occludes the aperture, and the gas supply is wholly cut off, except for the very small hole, forming a by-pass, in the pipe, behind the collar. This hole is just sufficiently big to allow the minimum amount of gas requisite to keep the flames burning to pass through. The temperature will, therefore, begin to fall, the volume of water to decrease with its resulting descent from the glass tube (T) and consequent decrease in the dynamical pressure of the water upon the diaphragm. The latter therefore retracts away from the aperture of the inlet tube, and more gas consequently passes through ; the flames again increase in size and the temperature rises once more. And as soon as the volume of water, owing to the rising temperature, has increased to the extent correlated with the

temperature at which the apparatus has been set to work, it. will have risen once more in the tube (T), and the gas will be again cut oft. The three burners are placed upon a support that can be moved vertically up or down along one of the legs of the incubator. The flames are protected from draughts by mica chimneys. Ventilation is provided by an adjustable valve (V) in the cylindrical termination of the incubator at its lower end, and by tubular orifices, also fitted with valves (V) in the lid above.

The incubator is very reliable and may be worked within very narrow limits of variation, provided that the gas-supply be regulated by a gas-pressure regulator, that the height of the water in the tube (T) is maintained by daily additions of a few drops of distilled water, and that the incubator itself be protected from draughts.

Another form of d'Arsonval incubator has a glass door in the side of it and a slightly modified form of the heat regulator.

Other cylindrical forms of incubators are made by Lequeux of Paris. In one of these the heat regulator is a bimetallic thermostat, the movements of which are enlarged by a simple series of levers, so that a valve can be automatically adjusted to allow more or less heat from the flame to pass through the heating flue.

In another form there is a movable interior, and an arrangement for keeping the air in the incubation chamber saturated. It is governed by a bimetallic thermostat of the Roux type.

In Dr Hiippe's improved form of his incubator, which is approximately square in form, the double-walled water tank is completely surrounded externally by an air chamber, which is heated by the passage through it of the products of combustion of the two flames. The heated gases escape through an adjustable aperture at the top. In the earlier form the water tank was traversed by a number of hot- air flues, and there was consequently no external hot-air chamber. There is an arrangement of tubes for ventilation, which allow fresh air to enter the lower part of the incubation chamber and to leave it at the top. The incoming air is warmed before it enters. The walls are made of lead-coated steel, and externally the incubator is covered

with linoleum. In the more expensive forms the inner chamber is of copper. The temperature may be controlled by any of the simpler mercury thermostats described below.

Dr Babes' incubator is somewhat similar, but the water tank is not

surrounded by a hot-air chamber. Instead it is traversed by a number of vertical flues through which the heated gases from the flames pass. Ventilation is provided for and there is an apparatus for controlling the humidity of the air in the incubation chamber. As in Hiippe's incubator, the bottom is conical in form. The walls of the incubator are of lead-coated steel, and externally they are covered with linoleum; there are two doors, an inner one of glass and an outer one of metal. The temperature may be controlled as in Hiippe's incubator.

Hearson has designed several forms of bacteriological (biological) incubators, made by Chas, Hearson & Co., Ltd. Some are heated by a petroleum lamp and others by a gas flame. In the form heated by a lamp, for which, however v gas can be substituted, the incubation chamber is surrounded by a water tank (fig. 9, A) and the lowest part

Fig. 9. — Hearson's Bacteriological Incubator. (Heated by a petroleum lamp.)

of this is traversed by an in-going (L) and an out-going flue. The mode of regulation of the temperature is by means of a thermostat which operates the movements of a cap (F) over the main flue (V), and it is identical in its chief features with the method employed in the chicken incubator. The thermostat (S) is situated in the upper part of the incubation chamber.

In the other form (fig. 10) for which gas is used exclusively, there are no flues traversing the water tank. This latter is heated from its conical floor by a burner beneath the incubator. The heat regulation is controlled by a thermostat of the same nature as in the form of incubator just described, but instead of operating by lowering or raising a cap over a main flue, so as to direct the heated gases either through the water tank if the temperature is falling, or through the main flue directly to the exterior if it is rising, it actuates a gas-governor, so that the flame itself is increased or diminished in size according to the needs of the incubator. The gas-governor (fig." 14) is fixed to the roof of the incubator. The horizontal arm (D) is the same that raises the cap (fig. 9, F) over the flue in the other form of incubator, but in this case it simply acts as the bearer of the sliding weight. Beyond its fulcrum (fig. 11, G) it is continued into a detent-like spur (B) which pushes down upon a button attached to a rubber diaphragm, when the thermostat within the incubator is expanded by a rise in temperature. The button thus forced down, more or less completely closes the inlet gas aperture, and so reduces or cuts off

the gas supply to the flame. There is a by-pass to prevent the flame from going out completely, and the size of this can be adjusted by the screw (S). Hearson's incubators have the reputation of very accurate performance and practically need no attention for months, or even years.

Schribaux's incubator is a hot-air form. Its walls are of metal,

but it is cased externally with wood, which serves as the insulating material. Against the inner metal wall of the incubator, and upon its internal surface, there are disposed a number of vertical tubes,

Fig. ii. — Gas-governor.

jacket of the incubator. If it poured into neither of these pipes it then simply passes out through the pipe (H) to the waste pipe (N). By this device the temperature of the incubator can be kept constant at any desired point, even though it may be some 30 to 40° C. below that of the external air.

Dr Roux has also designed an incubator which can be maintained at a constant temperature below that of the surrounding air. This also depends upon the principle of carrying water through an ice- safe, which then traverses a pipe within the incubator chamber before passing into the water-jacket of the machine. The heat- regulating apparatus is a bimetallic thermostat. The incubator is made by Lequeux of Paris.

The most recent forms of all kinds of incubators, made by Hearson of London, Lequeux of Paris and Lautenschlager of Berlin are both heated and regulated by electricity. The heating is accomplished by electric radiators.

In Hearson's machines the regulation of the temperature is brought about by the breaking or making of the electric current, through the

Fig. 10.— Hearson's Bacteriological Incubator (heated by a gas flame).

which open through the roof above into a common discharging funnel. Below, at the bottom of the incubator they receive the heated gases of several burners, which as they pass through them radiate

their heat evenly throughout the incubation chamber.

In each side wall, at the bottom of the cham- ber, is an adjustable ventilating valve.

Inside the incubation chamber, and situated against its left-hand wall, is a U-shaped bi-metallic thermostat of the Roux design, described below. This very accurately controls the temperature of the incubator.

(c) Cool Incubators. — In bacteriological laboratories there are two standards of temperature, one chiefly for the culture of non-pathogenic organisms and the other for the pathogenic forms. The first standard of temperature lies between 18 and 20° C, and the second between 35 and 38 C. But in hot countries, and ever in temperate regions during the summer, the external temperature is much higher than the former of these two standards, with the result that many cultures, especially the gelatine ones, are spoiled. The difficulty is often partially overcome by runrfing cold water through the incubator.

Hearson, however, has constructed a " cool biological incubator," in which by an ingenious device the expansion or contraction of the thermostatic capsule deflects a horizontal pipe © (fig. 12), through which cold water from an ordinary tap is kept running"; in one of two directions. If it is deflected so as to open into the tube (D), the cold water passes into the tank (F), where it is warmed by a gas flame, and thence it passes into the water-jacket of the incubator. If it is deflected so as to open into the pipe (E), it then runs through the ice tank (B), containing broken ice, before passing through the water-

FlG. 12. — Hearson's Cool Biological Incubator.

lifting or depression of a platinum contact, actuated by the expansion or contraction of the thermostatic capsule.

In Roux's apparatus, made by Lequeux, the make and break is attained by the movement of one limb of a bimetallic thermostat, and in some forms a resistance coil and rheostat are placed in the circuit.

At the Pasteur Institute in Paris, and at other large laboratories in France, the bacteriological incubator is raised to the dimensions of a room. In the centre of this room is a large boiler heated by gas-burners, the fumes from which pass through a large flue to the outside. The flame of the burners is regulated by a bimetallic

thermostat. The gas by-pass can be regulated by an attendant. The cultures are contained in vessels placed on shelves, which are ranged round the side of the room.

Human Incubators.

The first incubator designed for rearing children who are too weak to survive under normal conditions, or who are prematurely born, is that of Dr Tarnier. It was constructed in 1880 and was first used at the Paris Maternity Hospital. Its form is that of a rectangular box mea- suring 65X30X50 centi- f$H"f metres (fig. 13). It is divided into an upper and lower chamber; the former contains the infant, while the latter serves as a heating chamber, and in reality is simply a modified water-tank. The partition (P) which divides the in- cubator into two chambers does not extend the whole length of it, so that the upper and lower chambers are at one end of the apparatus in communication with each other. It is through this passage that the heated air from the lower chamber passes into the upper one containing the infant. The narrow bottom chamber C serves to prevent loss of heat from the base of the water-bottles. The

Fig. 13. — Tarnier's Incubator.

outside air is admitted into the lower chamber at the opposite end, through an aperture (A), and passing over a series of bottles (B) containing warm water, becomes heated. The air is rendered adequately moist by means of a wetted sponge (S) which is placed at the entrance of the lower chamber into the upper. The warmed and moistened air is determined in its direction by the position of the outlet aperture (0), which is situated above and just behind the head of the infant. It contains a helix valve (H) and the rotation of this is an indica- tion that the air is circulating within the incubator.

The child is kept under observation by means of a sliding glass door (G) situated in the upper or roof wall of the incubator. Immediately beneath this, and attached to one of the side walls, is a thermometer (T) which records the temperature of the air in the infant-chamber. The temperature should be maintained at 31 to 3 2 C. The precise limit of temperature must of course be determined by the condition of the child; the smaller and weaker it is, the higher the temperature must be.

The warm water vessels contain three-quarters of a pint of water and four of them are sufficient to maintain the required temperature, provided that the external air does not fall below 1 6° C. The vessels are withdrawn and replaced through an entrance to the lower chamber, and which can be opened or closed by a sliding door (D).

The walls of the incubator, with the exception of the glass sliding door, are made of wood 25 millimetres thick.

The apparatus appears to have been successful, if by success is understood the indiscriminate saving of life apart from all other considerations, since the mortality of infants under 2000 grammes has been reduced by about 30%, and about 45% of children who are prematurely born are saved.

Dr Tarnier's apparatus requires constant attention, and the water in the warm water vessels needs renewing sufficiently often. It is not provided with a temperature regulator and consequently fluctuations of internal temperature, due to external thermal variations, are liable to occur.

In Hearson's Thermostatic Nurse these drawbacks are to a large extent obviated. This " Nurse " consists fundamentally of an application of the arrangements for heating and moistening the air and for regulating the temperature of Hearson's chick incubator to Dr Tarnier's human incubator. As in this iatter form, there are two chambers (fig. 14), an upper (A) and alower (B), connected with each other in the same way as in Tarnier's

Fig. 14. — Hearson's " Thermostatic Nurse." apparatus. The upper chamber contains the infant, but the lower is not a heating but a moistening chamber. Through apertures (M) in the bottom of the lower chamber, the external air passes through, and as in the chick incubator it then passes through perforations in the inner cylinder of a water tray (0) and thence over the surface of the water in the tray, through a sheet of wet canvas, to the chamber itself. Hence it passes

to the infant chamber and ultimately leaves this through a series of perforations round the top. The air in both chambers is heated by a warm-water tank. This tank forms the partition which divides the incubator into upper and lower chambers and is made of metal. Through the water contained in it, an incoming (R) and an outgoing ® to the left flue, continuous with each other, pass. These two flues are related to each other as in the chick incubator (see above) and the inlet flue is heated in the same way and the outlet flue discharges

similarly. The heat- regulating apparatus is identical with that in the chick incubator, and the thermostatic capsule (S) is placed in the upper chamber, near the head of the infant.

The child is placed in a basket which has perforated walls, and is open above. The basket rests upon two shallow supports (D) situated on the upper surface of the water-tank partition. The child is kept under observation through a glass door in the upper or roof-wall of the incubator.

In Great Britain this apparatus is in use at various hospitals and workhouses throughout the country, and provided there is no great fluctuation of barometric pressure, it maintains a uniform temperature.

Thermo- Regulators or Thermostats..

Certain special forms of thermo-regulators, adapted to the requirements of the particular incubators to which they are attached, have already been described. It remains now to de- scribe other forms which are of more general application. Only those kinds will be described which are applicable to incubators. The special forms used for investigations in physical-chemistry are not described. There are various types of thermo-regulators, all of which fall into one of two classes. Either they act through the expansion of a solid, or through that of a liquid. They are so adjusted, that, at a certain temperature, the expansion of the material chosen causes the gas supply to be nearly completely cut off. The gas flame is prevented from being wholly ex- tinguished by means of a small by-pass.

We will first describe those which act through the expansion of a

liquid. A very efficient and cheap form is that described by F. J. M.

Page in the Journal of the Chemical Society for

1876. The regulator consists of a glass bulb

(fig. 15 B), continuous above with a tubular

limb (L). At the upper part of the limb is a

lateral tubular arm (A) which bends down- wards and constitutes the outlet pipe. At

the upper extremity of the limb there is a

short and much wider tube (T), the lower end

of which slides upwards or downwards along

it. The upper end of this wider tube is

closed by a cork and through a perforation

in this a very small glass tube (G) passes

downwards into the limb of the regulator to

a point a short distance below the exit of the

outlet tube. The exact height of the lower

aperture of the small tube can be varied by sliding the wider tube up or down along the limb. The by-pass (P) consists of a trans- verse connexion between the inlet and outlet gas pipes, and the amount of gas which travels through the short circuit thus formed is regulated by means of a stopcock. The by-pass, however, can be formed, as sug- gested by Schafer {Practical Histology, 1877, p. 80) , by making an extremely small hole in the small inlet tube, a little way above its lower extremity. But unless this hole be small enough, too much gas will be allowed to pass, and a sufficiently low temperature therefore unattainable. The regulator is filled with mercury until the top of the column reaches within 5 in. of the exit of the outlet tube, the bulb is placed in the incubator chamber, and gas is allowed to pass through it. By pushing down the inner inlet tube (G) until its aperture is immersed beneath the mercury, the gas supply is cut off, with the exception of that passing through the by-pass. The stopcock is now turned until only the smallest flame exists. The inlet pipe is then raised again above the mercury, and the flame consequently increases in size. The temperature of the incubator gradually rises, and when the desired degree is reached, the inlet tube is pushed down until the end is just beneath the surface of the mercury. The

-T

Nˆ

S

B

Fig. 15.— Page's Thermostat.

Fig. 16. — Reichert's Thermo- Regulator.

gas supply is thus cut off at the desired temperature. If the temperature of the incubator falls, the mercury contracts, the aperture of the inlet tube is uncovered, the gas supply is renewed and the flame increased. The temperature will then rise until the required point is reached, when the gas supply will again be cut off. A uniform temperature which oscillates within a range of half a degree is thus attained.

Reichert's Thermo-regulator (fig. 16) is another simple and also an earlier form. The stem (S) of the regulator is enlarged above and ^^__^ receives a hollow T-piece (P), the vertical

" I I ' ■ ^D limb of which fits accurately into the en-

„ _£ \ larged end of the stem, and one end of the

cross-limb receives the inlet gas pipe; the other end is closed. The vertical limb of the T-piece is narrowed down at its lower extremity and opens by a small aperture. Above this terminal aperture is a lateral one of the smallest size. From the enlarged end of the stem there passes out a lateral arm (A) which is connected with the outlet pipe to the burner, and lower down another arm (L), which is closed at its outer ex- tremity by a screw ®, is also attached. The stem and lower arm are filled with mercury and the bulb of the stem is placed in the incubator chamber, and gas allowed to pass. When the desired temperature is reached, the mercury in the stem is forced upwards until it closes the aperture of the T-piece, by screwing in the screw ® of the lower lateral arm (L).

There are several modifications of Reichert's original form. In one of these the screw arrangement in the lower arm is replaced by a piston rod working in a narrow bore of a vertically bent limb of the arm. In another form, the other end of the cross bar of the T-piece is open and leads through a stopcock to a third arm, which opens into the enlarged upper end of the stem opposite to the outlet arm (A) ; this modification acts as an adjustable by-pass and replaces the minute aperture in the side of the vertical limb of the T-piece.

In Babes' modification the gas supply is cut off, not by the occlusion by the rising mercury of the aperture of the T-piece, but by a floating

beaded wire-valve. The aperture of the vertical limb of the T-piece (P) is traversed by a fine wire which is enlarged at both ends into a bead-like knob. The wire fits loosely in the aperture and not only therefore works easily in it, but allows gas to freely pass. When the lower bead-like knob, however, is raised by the expansion of the mercury, the gas supply is cut off by the bead being carried up against the orifice.

Cuccatti's thermo-regulator (fig. 17) is an exceedingly simple and ingenious form. The stem (S) of the regulator is enlarged below

into a bulb, while above it divides into a V. The two limbs of the V are of course traversed by a canal and they are connected above by a tubular cross bar ©. In the middle of this there is a stopcock situated between the two points where the bar joins the limbs of the V. One end of the cross- tube serves as an inlet and the other as an outlet for the gas. The stop- cock serves as an adjustable by-pass. About an inch below the point where the two limbs of the V join the stem, the bore of the latter is enlarged, and

*Fig. 1 7 .Cuccatti's Thermo * – le . ads into a la ˆ ral a .™? 1 (A) ,' c °, n ' ' Regulator taming a screw ®, similar to the*

° " corresponding arm in Reichert's regu-

lator. When the mercury in the bulb and stem expands, it rises, and reaching the point when the two limbs of the V meet occludes the orifice to both and thus cuts off the gas supply, except that which is passing through the by-pass of the stopcock. The temperature at which this occlusion will take place can be determined by the screw in the lateral arm. The more this is screwed in, the lower will be the temperature at which the gas becomes cut off, and vice versa.

Bunsen's, Kemp's and Muenke's regulators are in reality of the nature of air-thermometers, and act by the expansion and contraction of air, which raises or lowers respectively a column of mercury ; this in its turn results in the occlusion or opening of the gas aperture. Such forms, however, are subject to the influence of barometric pressure and an alteration of 0ˆ5 in. of the barometer column may result in the variation of the temperature to as much as 2°.

Lothar Meyer's regulator is described in the Berichte of the German Chemictl Society, 1883, p. 1089. It is essentially a liquid ther-mometer, the mercury column being raised by the expansion of a

liquid of low boiling-point. The liquid replaces the air in Bunsen's and other similar forms. The boiling-point of this liquid must be below the temperature required as constant.

The solid forms of thermostats are constructed upon the same principle as the compensation balance of a watch or the compensation pendulum of a clock. This depends upon the fact that the

co-efficient of expansion is different for different metals. It therefore results that if two bars of different metals are fastened together along their lengths (fig. 18, Z and ST) with the same rise of tempera- ture one of these will expand or lengthen more than the other. And since both are fastened together and must therefore accommodate themselves within the same linear area, it follows that the compound rod must bend into a curved form, in order that the bar of greater expansion may ST occupy the surface of greater length, i.e. the convex one. Conversely, when the temperature falls, the greater degree of contraction will be in the same bar, and the surface occupied by it will tend to become the concave one. If, then, one end of this compound rod be fixed and the other free, the latter end will describe a backward and forward movement through an arc of a circle, which will correspond with the oscilla- tions of temperature. This movement can be utilized by means of simple mechanical arrangements, to open or close the stopcock of a gas supply pipe. In the construction of this type of thermostat it is obvious that the greater the difference in the co-efficient of expansion of the two metals used,

the larger will be the amplitude of the p l8 ._ Dr Roux – s Ther .

movement obtained. Steel and zinc are mostat (straight bar)

two metals which satisfy this condition. °

The co-efficient of steel is the lowest of all metals and is comparable

in its degree with that of glass. Substances which are not metals,

such as vulcanite and porcelain, are sometimes used to replace steel,

as the substance of low co-efficient of expansion.

The bimetallic thermostat most commonly employed is one of the

two forms designed by Dr Roux. In one of these forms the compound

bar is straight (fig. 18) and in the other it is U-shaped (fig. 19). In the former type the bar itself is enclosed in a tube (T) of metal, the wall of which is perforated. Towards the open end of this tube the gas box or case © is fixed. In the U-shape form it is attached to the outer surface (zinc) of one limb of the bar. The gas box is capable of adjustment with respect to its distance from the bar, by means of a screw (S) and a spiral spring (SP), which moves the box outwards orinwards along a rod ®. This adjustment enables the | degree of temperature at which it is desired that the gas shall be cut off to be fixed accurately, and within a certain more or less extended range. The inlet and the outlet pipe are discon- nected from each other in the gas box by means of a piston-like rod (P) and valve (V), which slides backwards and

forwards in the tubular

part (T) of the box,

from which the outlet

pipe emerges. When the

valve (V) rests upon the

edge of this box, the gas

is completely cut off

from passing through

the outlet pipe, with

the exception of that

which passes through an

exceedingly small aperture (B), serving as a by-pass. This is just

large enough to allow sufficient gas to pass to maintain a small flame.

The piston-like rod and valve, when free, is kept pressed outwards

by means of a spiral spring. This ensures that the valve shall

follow the movements of the compound bar. When this bar bends towards the gas box owing to a fall of temperature, the valve is pushed back away from the orifice and gas in increasing quantity passes through. The temperature of the incubator begins then to rise, and the zinc bar (Z) expanding more than the steel one (ST), the bar bends outwards and the valve once more cuts off the gas supply.

(d) Gas-Pressure Regulators. — The liquid form of thermo-regulators especially work with a greater degree of accuracy if they are combined with some apparatus which controls the variations in gas pressure. There are various forms of these regulators, most of which are figured and sometimes partially described in the catalogues of various

Fig. 19. — Dr Roux's Thermostat (U-shaped bar).

Fig. 20. — Buddicom's Gas Regulator.

makers of scientific instruments. It will suffice if we describe two forms, one of which (that of Buddicom) can be made by a laboratory attendant of average intelligence.

In R. A. Buddicom's gas regulator (fig. 20) the inlet (I) and outlet (0) gas pipe open into a metal bell (B), the lower and open end of which is immersed beneath water contained in a metal tray (T). The bell is suspended upon the arm of a balance (B) and the other arm is poised by a weight (W). This weight may be made of any convenient material. In the original apparatus a test-tube partially filled with mercury was used. The weight dips into one limb of a

U-shaped glass tube (U), which con- tains mercury. Into the other limb of this tube the gas from the meter enters through a glass tube (G) which is held in position by a well-fitting cork. The internal aperture of the tube (G) is very oblique, and it rests just above the level of the mercury when the instrument is finally adjusted. This adjustment is better made in the morning when the gas pressure in the main is at its lowest. Just above the internal aperture of the tube (G), a lateral tube (L) passes out from the limb of the U and is connected with the inlet pipe (I) of the bell. If the gas pressure rises, the bell (B) is raised and the counter-poising weight (W) is proportionately lowered. This forces the mercury up in the other limb of the U-tube and consequently diminishes the size of the oblique orifice in the tube (G). Some of the gas is thus cut off and the pressure maintained constant. Should the pressure fall, the re- verse processes occur, and more gas passes through the orifice of G and consequently to the burner by the outlet tube (O).

Moitessier's regulator (fig. 21) is more complex, and needs more skilled work in its construction. It consists of an outer and closed cylinder (O), which is filled about half-way up with a mixture of acid-free glycerine and distilled water in the proportion of two to one respectively. Within the cylinder is a bell (B), the lower and open end of which dips under the glycerine-water mixture. From the top of the bell a vertical rod ® passes up through an aperture in the cover of the outer cylinder, and supports the weighted dish (D). The inlet (I) and outlet (O) pipes enter the chamber of the bell above the level of the glycerine-water mixture. The out- let tube is a simple one; but the

inlet tube is enlarged into a relatively capa- cious cylinder ©, and its upper end is fitted with a cover which is perforated by an aperture having a smooth surface and concave form. Into this aperture an accurately fitting ball- or socket-valve (V) fits. The ball-valve is supported by a suspension thread (T) from the roof of the bell (B). The apparatus should be adjusted in the morning when the pressure is low, and the dish (D) weighted that the full amount of gas passes

Should

Tf

-\ <

•

?

• *■

Fig. 21. — Moitessier's Gas Regulator.

should be then

through. The size of the flame should then be adjusted.

the pressure increase, the bell (B) is raised and with it the ball-valve (V). The aperture in the cover of the inlet cylinder is consequently reduced and some of the gas cut off. When the pressure falls again, the ball-valve is lowered and more gas passes through. The relative pressure in the inlet and outlet pipes can be read off on the mano- meter (M) placed on each of these tubes.

Levelling screws allow of the apparatus being horizontally ad- justed. The friction engendered by the working of the vertical rod (R) through the aperture in the collar of the cylinder cover is reduced to a minimum by the rod being made to slide upwards or downwards on three vertical knife-edge ridges within the aperture of the collar.

Authorities. — Charles A. Cyphers, Incubation and its Natural Laws (1776); J. H. Barlow, The Art and Method of Hatching and Rearing all Kinds of Domestic Poultry and Game Birds by Steam (London, 1827); and Daily Progress of the Chick in the Egg during Hatching in Steam Apparatus (London, 1824) ; Walthew, Artificial Incubation (London, 1824); William Bucknell, The Eccaleobin. A Treatise on

Artificial Incubation, in 2 parts (published by the author, London, 1839); T. Christy, jun., Hydro-Incubation (London, 1877); L. Wright, The Book of Poultry (2nd ed. London, 1893) ; A. Forget, L' Aviculture et I'incubation artificielle (Paris, 1896); J. H. Sutcliffe, Incubators and their Management (Upcott Gill, London, 1896)' H. H. Stoddard, The New Egg Farm (Orange Judd Co.. New York! 1900); Edward Brown, Poultry Keeping as an Industry (5th ed., 1904); F. J. M. Page, " A Simple Form of Gas Regulator," Journ. Chem. Soc. 1. 24 (London, 1876) ; V. Babes, " Uber einige Apparate zur Bacterienuntersuchung," Centralblatt fur Bacteriologie, iv. (1888) ; T. Hiippe, Methoden der Bacterienforschungen (Berlin, 1889). For further details of bacteriological incubators and accessories see catalogues of Gallenkamp, Baird & Tatlock, Hearson of London,

and of the Cambridge Scientific Instrument Company, Cambridge; of P. Lequeux of Paris; and of F. & M. Lautenschlager of Berlin. That of Lequeux and of the Cambridge Company are particularly useful, as in many instances they give a scientific explanation of the principles upon which the construction of the various pieces of apparatus is based. (G. P. M.)

INCUBUS (a Late Latin form of the classical incubo, a night- mare, from incubare, to lie upon, weigh down, brood), the name given in the middle ages to a male demon which was supposed to haunt women in their sleep, and to whose visits the birth of witches and demons was attributed. The female counter- parts of these demons were called succubae. The word is also applied generally to an oppressive thing or person.

INCUMBENT (from Lat. incumbere, to lean, lie upon), a general term for the holder (rector, vicar, curate in charge) of an ecclesi- astical benefice (see Benefice) . In Scotland the title is generally confined to clergy of the Episcopal Church. The word in this application is peculiar to English. Du Cange (Glossarium, s.v. " Incumbens ") says that the Jurisconsulti use incumbere in the sense of obtinere, possidere, but the sense may be transferred from the general one of that which rests or is laid on one as a duty which is also found in post-classical Latin; to be "diligently resident " in a parish or benefice, has also been suggested as the source of the meaning.

INCUNABULA, a Latin neuter-plural meaning " swaddling- clothes," a "cradle," "birthplace," and so the beginning of anything, now curiously specialized to denote books printed in the 15th century. Its

use in this sense may have originated with the title of the first^eparately published list of 15th-century books, Cornelius a Beughem's Incunabula lypographiae (Amster- dam, 1688). The word is generally recognized all over Europe and has produced vernacular forms such as the French incunables, German Inkunabeln (Wiegendrucke) , Italian incunaboli, though the anglicized incunables is not yet fully accepted. If its original meaning had been regarded the application of the word would have been confined to books printed before a much earlier date, such as 1475, or to the first few printed in any country or town. By the end of the 15th century book-production in the great centres of the trade, such as Venice, Lyons, Paris and Cologne, had already lost much of its primitive character, and in many coun- tries there is no natural halting-place between 1490 and 1520 or later. The attractions of a round date have prevailed, however, over these considerations, and the year 1500 is taken as a halting- place, or more often a terminus, in all the chief works devoted to the registration and description of early printed books. The most important of these are (i.) Panzer's Annates typographici ab artis inventae origine ad annum MD., printed in five volumes at Nuremberg in 1793 and subsequently in 1803 carried on to 1536 by six additional volumes; (ii.) Hain's Repertorium bibliographicum in quo libri omnes ab arte typographica inventa usque ad annum MD. typis expressi ordine alphabetico vel simpli- citer enumerantur vel adcnratius, recensentur (Stuttgart, 1826- 1838). In Panzer's Annates the first principle of division is that of the alphabetical order of the Latin names of towns in which incunabula were printed, the books being arranged under the towns by the years of publication. In Hain's Repertorium the books are arranged under their authors' names, and it was only in 1891 that an index of printers was added by Dr Konrad Burger. In 1898 Robert Proctor published an Index to the Early Printed Books in the British Museum: from the invention' of printing to the year MD., with notes of those in the Bodleian Library. In this work the books were arranged as far as possible chrono- logically under their printers, the printers chronologically under the towns in which they worked, and the towns and countries chronologically in the order in which printing was introduced into them, the total number of books registered being nearly ten thousand. Between 1898 and 1902 Dr W. Copinger published a Supplement to Hain's Repertorium, described as a collection towards a new edition of that work, adding some seven thousand new entries to the sixteen thousand editions enumer- ated by Hain. From the total of about twenty-three thousand incunabula thus registered considerable deductions must be made for duplicate entries and undated editions which probably

belong to the 16th century. On the other hand Dr Copinger's Supplement had hardly appeared before additional lists began to be issued registering books unknown both to him and to Hain, and the new Repertorium, begun in 1905, under the auspices of the German government, seemed likely to register, on its completion, not fewer than thirty thousand different incunabula as extant either in complete copies or fragments.

In any attempt to estimate the extent to which the incunabula still in existence represent the total output of the 15th-century presses, a sharp distinction must be drawn between the weightier and the more ephemeral literature. Owing to the great religious and intellectual upheaval in the 16th century iinuch of < the literature previously current went out of date, •while the cum- brous early editions of books still read were superseded by handier ones. Before this happened the heavier works had found their way into countless libraries and here they reposed peacefully, only sharing the fate of the libraries themselves when these were pillaged, or by a happier fortune amalgamated with other collections in a larger library. The considerable number of copies of many books for whose preservation no special reason can be found encourages a belief that the proportion of serious works now completely lost is not very high, except in the case of books of devotion whose honourable destiny was to be worn to pieces by devout fingers. On the other hand, of the lighter literature in book-form, the cheap romances and catchpenny literature of all kinds, the destruction has been very great. Most of the broadsides and single sheets generally which have escaped have done so only by virtue of the 16th-century custom of using waste of this kind as a substitute for wooden boards to stiffen bindings. Excluding these broadsides, &c, the total output of the 15th-century presses in book form is not likely to have exceeded forty thousand editions. As to the size of the editions we know that the earliest printers at Rome favoured 225 copies, those at Venice 300. By the end of the century these numbers had increased, but the soft metal in use then for types probably wore badly enough to keep down the size of editions, and an average of .500 copies, giving a possible total of twenty million books put on the European market during the 15 th century is probably as near an estimate as can be made.

Very many incunabula contain no information as to when, where or by whom they were printed, but the individuality of most of the early

types as compared with modern ones has enabled typographical detectives (of whom Robert Proctor, who died in 1903, was by far the greatest) to track most of them down. To facilitate this work many volumes of facsimiles have been published, the most important being K. Burger's Monu- menta Germaniae et Italiae Typographic/! (1892, &c), J. W. Holtrop's Monuments typographiques des Pays~Bas (1868), O. Thierry-Poux's Premiers monuments de I'imprimerie en France au XV' siecle (1890), K. Haebler's Typographic iberique du quinzieme siecle (1901) and Gordon Duff's Early English Printing (1896), the publications of the Type Facsimile Society (1700, &c.)and the Woolley Facsimiles, a collection of five hundred photographs, privately printed.

In his Index to the Early Printed Books at the British Museum Proctor enumerated and described all the known types used by each printer, and his descriptions have been usefully extended and made more precise by Dr Haebler in his Typenrepertorium der.Wiegendrucke (1905, &c). With the aid of these descriptions and of the facsimiles already mentioned it is usually possible to assign a newly discovered book with some certainty to the press from which it was issued and often to specify within a few weeks, or even days, the date at which it was finished.

As a result of these researches it is literally true that the out- put of the 15th-century presses (excluding the ephemeral publica- tions which have very largely disappeared) is better known to students than that of any other period. Of original literature of any importance the half -century 14 50-1 500 was singularly barren, and the zeal with which 15th-century books have been collected and studied has been criticized as excessive and misplaced. No doubt the minuteness with which it is possible to make an

old book yield up its secrets has encouraged students to pursue the game for its own sake without any great consideration of practical utility, but the materials which have thus been made available for the student of European culture are far from insignificant. The competition among the 15th-century printers was very great and they clearly sent to press every book for which they could hope for a sale, undaunted by its bulk. Thus the great medieval encyclopaedia, the Specula (Speculum naturale, Speculum historiale, Speculum ifiorale, Speculum doctrinale) of Vincent de Beauvais went through two editions at S'trassbufg and found publishers and translators elsewhere, although it must have represented an outlay from which many modern firms would shrink. It would almost seem, indeed, as if, some publishers specially affected very bulky works which, while

they remained famous, had grown scarce because the ; scribes were afraid to attempt them. Hence, more especially in Germany, it was not merely the output of a single generation which, came to the press before 1500, but the whole of the medieval literature which remained alive, i.e. retained a reputation sufficient to attract buyers. A Study of lists of incunabula enables a student to see just what works this included, and the degree of their popularity. On the other hand in Italy the influence of the classical renaissance is reflected in the enormous output of Latin classics, and the progress of Greek studies can be'traced in the displacement of Latin translations by editions of the originals. The part which each country and city played in the struggle between the old ideals and the new can be determined in extra- ordinary detail by a study of the output of its presses, although some allowance must be made for the extent to which books were transported along the great trade routes. Thus the fact that the Venetian output nearly equalled that of the whole of the rest of Italy was no doubt mainly due to its export trade. Venetian books penetrated everywhere, arid the skill of Venetian printers in liturgical books procured them commissions to print whole editions for the English market. Fron| the almost complete absence of scholarly books in the lists of English incunabula it would be too much to concKicTe that tbjfre was no demand for such books in England, "fire demand; existed and was met by importation, which a statute of- Richard III.'s expressly facilitated. But that it was not commercially possible for a scholarly press to be worked in Englandj and that iio man of means was ready to finance one, tells its own tale. The total number of incunabula printed in England waspr»baftJy upwards of four hundred, of which Caxton produced fully one-fourth. Of the ten thousand different incunabula which the British Museum and Bodleian library possess between them, about 4100 are Italian, 3400 German, 1000 French, 700 from the Nether- lands, 400 from Switzerland, 150 from Spain and Portugal, 50 from other parts of the continent of Europe and 200 English, the proportion of these last being about doubled by the special zeal with which they have been collected. The celebration in 1640 of the second centenary (as it was considered) of the in- vention of printing may be 'taken as the date from which incunabula began to be collected for their own sake, apart from their literary interest, and the publication of Beughem,'s Incunabula typographiae in 1688 marks the increased attention paid to them. But up to the end of the 17th century Caxtons could still be bought for a few shillings. The third centenary of the invention of printing in 1740 again stimulated enthusiasm, and by the end of the 18th century the really early books were eagerly competed for. Interest in books of the last ten or

fifteen years of the century is a much more modern development", but with the considerable literature which has grown up round the subject is not likely to be easily checked.

The chief collections of incunabula are those of the Bibliothe-que Nationale at Paris, Royal library, Munich, and British Museum, London, the number of separate editions in each library exceeding nine thousand, with numerous duplicates. The number of separate editions at the Bodleian library is about five thousand. Other important collections are at the University library, Cambridge, and the John Rylands library, Manchester, the latter being based oin the famous Althorp library formed by Earl Spencer (see Book-Collecting). (A.-W. Po.)

INDABA, a Zulu-Bantu word, formed from the inflexional prefix in and daba, business, news, for an important conference held by the " indunas "or principal men of the Kaffir (Zulu-Xosa) tribes of South Africa. Such " indabas " may include only the " indunas " of a particular tribe, or may be held with the repre- sentatives of other tribes or peoples.

INDAZOLES (Benzopyrazoles), organic substances con- /\/CHv taining the ring system | | >NH. The parent substance

indazole, C 7 H 6 N 2 , was obtained by E. Fischer (Ann. 1883, 221, p. 280) by heating ortho-hydrazine cinnamic acid, CtH

-CH 3

= CvH7NH2+C,H,N 2 .

C « H < <_span>NNHC 7 H. It crystallizes in needles (fromhot water), which melt at 146-5° C. and boil at 26o -27o° C. It is readily soluble in hot water, alcohol and dilute hydrochloric acid. Nitrous acid converts it into nitrosoindazole; whilst on heating with the alkyl iodides it is converted into alkyl indazoles.

A series of compounds isomeric with these alkyl derivatives is known, and can be considered as derived from the ring system A/NH

I I ˆN. These isomers are called isindazoles, and may

be prepared by the reduction of the nitroso-ortho-alkylamino-acetophenones with zinc dust and water or acetic acid. ‘ The indazoles are weak bases, which crystallize readily. Phenyl indazole, on reduction with sodium and absolute alcohol, gives a dihydro derivative (K. L. Paal, Ber., 1891, 24, p. 963).

For other derivatives, see E. Fischer and J. Tafel, Ann. 1885, 227, P-314-

INDEMNITY (through Fr. indemnite, Lat. indemnis, free from damage or loss; in-, negative, and damnum, loss), in law, an undertaking, either express or implied, to compensate another for loss or damage, or for trouble or expense incurred; also the sum so paid (see Contract; and Insurance: Marine). An act of indemnity is a statute passed for the purpose either of relieving persons from disabilities and penalties to which they have rendered themselves liable or to make legal transactions which, when they took place, were illegal. An act or bill of indemnity used to be passed every session by the English par- liament for the relief of those who had unwittingly neglected to qualify themselves in certain respects for the holding of offices, &c, as, for example, justices, without taking the necessary oaths. The Promissory Oaths Act 1868 rendered this unnecessary.

INDENE, C 9 H 8 , a hydrocarbon found in the fraction of the coal tar distillate boiling between 176 and 18 2° C, and from which it may be extracted by means of its picrate (G. Kramer, A. Spilker, Ber., 1890, 23, p. 3276). It may also be obtained by distilling the calcium salt of hydrindene carboxylic acid, C 6 H 4 (CH 2) 2 CHCOOH. It is an oil which boils at 179-5°- 1 80-5°, and has a specific gravity 1 04 (1 5 C.) . Dilute nitric acid oxidizes it to phthalic acid, and sodium reduces it in alcoholic solu tion to hydrindene, C 9 Hi . A. v. Baeyer and W. H. Perkin [Ber., 1884, 17, p. 125) by the action of sodiomalonic ester on ortho- xylylene bromide obtained a hydrindene dicarboxylic ester,

C6H4, + 2CHNa(C0 2 C 2 H i) 2 = 2NaBr-T-CH 2 (C0 2 C 2 H 6) 2

+ CoH 4 :[CH 2] 2 :C(C0 2 C 2 H 6) 2 ;

this ester on hydrolysis yields the corresponding acid, which on heating loses carbon dioxide and gives the monocarboxylic acid of

hydrindene. The barium salt of this acid, when heated, yields indene and not hydrindene, hydrogen being liberated (W. H. Perkin, Jour. Chem. Soc, 1894, 65, p. 228). Indene vapour when passed through a red hot tube yields chrysene. It combines with nitrosyl chloride to form indene nitrosate (M. Dennstedt and C. Ahrens, Ber., 1895, 28, p. 133 1) and it reacts with benzaldehyde, oxalic ester and formic ester (J. Thiele, Ber., 1900, a, p. 3395)-

On the derivatives of indene see W. v. Miller, Ber., 1890, 23, p. 1883; Th. Zincke, Ber., 1887, 20, p. 2394, 1886, 19, p. 2493; and W. Roser and E. Haselhoff, Ann., 1888, 247, p.140.

INDENTURE (through 0. Fr. endenture from a legal Latin term indenhira, indentare, to cut into teeth, to give a jagged edge, in modum denlium, like teeth), a law term for a special form of deed executed between two or more parties, and having counterparts or copies equal to the number of parties. These copies were all drawn on one piece of vellum or paper divided by a toothed or "indented " line. The copies when separated along this waved line could then be identified as " tallies " when brought together. Deeds executed by one party only had a smooth or " polled " edge, whence the name " deed poll." By the Real Property Act 1845, § 5, all deeds purporting to be " indentures " have the effect of an " indenture," even though the indented line be absent. The name " chirograph " (Gr. x l P, hand, ypcufiew, to write) was also early applied to such a form of deed, and the word itself was often written along the indented line (see further Deed and Diplomatic) . The term "'indenture " is now used generally of any sealed agreement between two or more parties, and specifically of a contract of apprenticeship, whence the phrase " to take up one's indentures," on completion of the term, and also of a contract by labourers to serve in a foreign country or colony (see Coolie).*

INDEPENDENCE, a city and the county-seat of Jackson county, Missouri, U.S.A., 3 m. S. of the Missouri river and 10 m. E. of Kansas City. Pop. (1890) 6380, (1900) 6974 (937 negroes); (1910) 9859. The city is served by the Missouri Pacific, the Chicago & Alton, and the Kansas City Southern railways, and by an electric line and fine boulevard to Kansas City. It is situated about 1000 ft. above the sea, and is sur- rounded by a fertile agricultural district. The city has a small public square (surrounding the court-house) and a public library, and is the seat of St Mary's Academy, under the control of the Sisters of Mercy. Among its manufactures are farming imple- ments, flour and lumber. The municipality owns its electric lighting plant. Independence was laid out as a town and chosen as the

county-seat in 1827, first chartered as a city in 1849 and made a city of the third-class in 1889. About 1500 Mormons, attracted by the " revelation " that this was to be a Zion, settled in and about Independence in 1831 and 1832. They contemplated building their chief temple about 2 m. W. of the site of the present court house, but in 1833 (partly because they invited free negroes to join them) were expelled by the " gentile " inhabitants of Independence. In 1867 a settlement of about 150 Hedrickites, or members of the " Church of Jesus Christ " (organized in Illinois in 1835), came here and secretly bought up parts of the " Temple Lot." The heirs of the settlers of 1831-1832 conveyed the lot by deed to the Reorganized Church of Jesus Christ of Latter Day Saints (with headquarters at Lamoni, Iowa), which brought suit against the Hedrickites, but in 1894 the U.S. Circuit Court of Appeals decided the case on the ground of laches in favour of the Hedrickites, who fifteen years afterwards had nearly died out. In 1867-1869 a few families belonging to the Reorganized Church of Jesus Christ of Latter Day Saints (monogamists) settled in Independence, and in 1908 their church here had about 2000 members. Besides a large church building, they have here a printing establishment, from which is issued the weekly Zion's Ensign (founded in 189 1), and the " Independence Sanitarium " (completed in 1908). The faithful Mormons still look to Independence as the Zioa of the church. In 1907 a number of Mormons from Utah settled here, moving the headquarters of the " Central States' Mission " from Kansas City to Independence, and founded a periodical called Liahona, the Elder's Journal. From about 1831 to 1844, when its river landing was destroyed by flood, Independence was the headquarters and outfitting point of the extensive caravan trains for the Santa Fe, Oregon and Old Salt Lake trails. During the Civil War about 300 Federals under Lieut. -Colonel D.H.Buel, occupying the town, were captured on the 16th of August 1862 by Colonel Hughes in command of 1500 Confederates, and on the 22nd of October 1864 a part of General Sterling Price's

Confederate army was defeated a few miles E. of Independence by General Alfred Pleasonton.

INDEPENDENCE, DECLARATION OF, in United States history, the act (or document) by which the thirteen original states of the Union broke their colonial allegiance to Great Britain in 1776. The controversy preceding the war (see American Independence, War or)

gradually shifted from one primarily upon economic policy to one upon issues of pure politics and sovereignty, and the acts of Congress, as viewed to-day, seem to have been carrying it, from the beginning, inevitably into revolution; but there was apparently no general and conscious drift toward independence until near the close of 1775. The first colony to give official countenance to separation as a solution of colonial grievances was North Carolina, which, on the 12th of April 1776, authorized its delegates in Congress to join with others in a declaration to that end. The first colony to instruct its delegates to take the actual initiative was Virginia, in accordance with whose instructions — voted on the 15th of May — ■ Richard Henry Lee, on the 7th of June, moved a resolution " that these United Colonies are, and of right ought to be, free and independent States." John Adams of Massachusetts seconded the motion. The conservatives could only plead the unpreparedness of public opinion, and the radicals conceded delay on condition that a committee be meanwhile at work on a declaration " to the effect of the said . . . resolution," to serve as a preamble thereto when adopted. This committee consisted of Thomas Jefferson, John Adams, Benjamin Franklin, Roger Sherman and Robert R. Livingston. To Jefferson the committee entrusted the actual preparation of the paper. On the 2nd of July, by a vote of 12 states — 10 voting unanimously, New York not voting, and Pennsylvania and Delaware casting divided ballots (3 votes in the negative) — Congress adopted the resolution of independence; and on the 4th, Jefferson's " De- claration." The 4th has always been the day celebrated; 1 the decisive act of the 2nd being quite forgotten in the memory of the day on which that act was published to the world. It should also be noted that as Congress had already, on the 6th of December 1775, formally disavowed allegiance to parliament, the Declaration recites its array of grievances against the crown, and breaks allegiance to the crown. Moreover, on the 10th of May 1776, Congress had recommended to the people of the colonies that they form such new governments as their repre- sentatives should deem desirable; and in the accompanying statement of causes, formulated on the 15th of May, had declared it to be " absolutely irreconcilable to reason and good conscience for the people of these colonies now to take the oaths and affirma- tions necessary for the support of any government under the crown of Great Britain," whose authority ought to be " totally suppressed " and taken over by the people — a determination which, as John Adams said, inevitably involved a struggle for absolute independence, involving as it did the extinguishment of all authority, whether of crown, parliament or nation.

Though the Declaration reads as " In Congress, July 4, 1776. The unanimous Declaration of the thirteen united States of America," New York's adhesion was in fact not voted until the Oth, nor announced to Congress until the 15th — the Declaration being unanimous, however, when it was ordered, on the 19th, to be engrossed and signed under the above title. 2 Contrary to the inference naturally to be drawn from the form of the document, no signatures were attached on the 4th. As adopted by Con- gress, the Declaration differs only in details from the draft prepared by Jefferson; censures of the British people and a noble denunciation of slavery were omitted, appeals to Providence were inserted, and verbal improvements made in the interest of terseness and measured statement. The document is full of Jefferson's fervent spirit and personality, and its ideals were those to which his life was consecrated. It is the best known and the noblest of American state papers. Though open to

1 " Independence Day " is a holiday in all the states and territories of the United States.

2 As read before the army meanwhile, it was headed " In Congress, July 4, 1776. A Declaration by the representatives of the United States of America in General Congress assembled."

controversy on some issues of historical fact, not flawless in logic, necessarily partisan in tone and purpose, it is a justificatory preamble, a party manifesto and appeal, reasoned enough to carry conviction, fervent enough to inspire enthusiasm. It mingles — as in all the controversy of the time, but with a literary skill and political address elsewhere unrivalled— stale disputation with philosophy. The rights of man lend dignity to the rights of Englishmen, and the broad outlook of a world-wide appeal, and the elevation of noble principles, relieve minute criticisms of an administrative system.

Jefferson's political theory was that of Locke, whose words the Declaration echoes. Uncritical critics have repeated John Adams's assertion that its arguments were hackneyed: so they un- doubtedly were — in Congress, and probably little less so without, — but that is certainly pre-eminent among its great merits. As Madison said, " The object was to assert, not to discover truths." Others have echoed Rufus Choate's phrase, that the Declaration is made up of " glittering and sounding generalities of natural right." In truth, its long array of " facts . . . submitted to a candid world " had its basis in the whole develop- ment of the relations between England and the colonies; every charge had point in a definite reference to historical events,

and appealed primarily to men's reason; but the history is to-day forgotten, while the fanciful basis of the " compact " theory does not appeal to a later age. It should be judged, however, by its purpose and success in its own time. The " compact " theory was always primarily a theory of political ethics, a revolutionary theory, and from the early middle ages to the French Revolution it worked with revolutionary power. It held up an ideal. Its ideal of " equality " was not realized in America in 1776 — nor in England in 1688 — but no man knew this better than Jefferson. Locke disclaimed for him in 1690 3 the shallower misunderstandings still daily put upon his words. Both Locke and Jefferson wrote simply of political equality, political freedom. Even within this limitation, the idealistic formulas of both were at variance with the actual conditions of their time. The variance would have been greater had their phrases been applied as humanitarian formulas to industrial and social conditions. The Lockian theory fitted beautifully the question of colonial dependence, and was applied to that by America with inexorable logic; it fitted the question of individual political rights, and was applied to them in 1776, but not in 1690; it did not apply to non-political conditions of individual liberty, a fact realized by many at the time — and it is true that such an application would have been more incon- sistent in America in 1776 as regards the negroes than in England in 1690 as regarded freemen. Beyond this, there is no pertinence in the stricture that the Declaration is made up of glittering generalities of natural right. Its influence upon American legal and constitutional development has been profound. Locke, says Leslie Stephen, popularized " a convenient formula for enforcing the responsibility of governors " — but his theories were those of an individual philosopher — while by the Declaration a state, for the first time in history, founded its life on democratic idealism, pronouncing governments to exist for securing the happiness of the people, and to derive their just powers from the consent of the governed. It was a democratic instrument, and the revolution a democratic movement; in South Carolina and the Middle Colonies particularly, the cause of independence was bound up with popular movements against aristocratic elements. Congress was fond of appealing to " the purest maxims of representation "; it sedulously measured public opinion; took no great step without an explanatory address to the country; cast its influence with the people in local struggles as far as it could; appealed to them directly over the heads of conservative assemblies; and in general stirred up democracy. The Declaration gave the people recognition equivalent to promises, which, as fast as new governments were instituted, were converted by written constitutions into rights, which have since then steadily

extended.

3 Two Treatises of Government, No. ii. § 54, as to age, abilities, virtue, &c.

INDEPENDENTS— INDEX

The original parchment of the Declaration, preserved in the Department of State (from 1841 to 1877 in the Patent Office, once a part of the Department of State), was injured— the injury was almost wholly to the signatures— in 1823 by the preparation of a facsimile copper-plate, and since 1894, when it was already partly illegible, it has been jealously guarded from light and air. The signers were as follows: John Hancock (1737-1792), of Massachusetts, president; Button Gwinnett (c. 1732-1777), Lyman Hall (1725-1790), George Walton (1740-1804), of Georgia; William Hooper (1742-1790), Joseph Hewes (1730- 1779), John Perm (1741-1788), of North Carolina; Edward Rutledge (1749-1800), Thomas Heyward, Jr. (1746-1809), Thomas Lynch, Jr. (1749-1779), Arthur Middleton (1742-1787), of South Carolina; Samuel Chase (1741-1811), William Paca (1740-1799), Thomas Stone (1743-1787), Charles Carroll (1737- 1832) of Carrollton, of Maryland; George Wythe (1 726-1806), Richard Henry Lee ˆ732-1794), Thomas Jefferson (1743-1826X Benjamin Harrison (1740-1791), ThomasNelson, Jr.(i738-i78 9), Francis Lightfoot Lee (1734-1797), Carter Braxton (1736-1797)' of Virginia; Robert Morris (1734-1806), Benjamin Rush (1745- 1813), Benjamin Franklin (1706-1790), John Morton (1724-1777), George Clymer (1739-1813), James Smith (c. 1719-1806), George Taylor (1716-1781), James Wilson (1742-1798), George Ross (i73°-i779), of Pennsylvania; Caesar Rodney (1728-1784), George Read (1733-1798), Thomas McKean (1734-1817), of Delaware; William Floyd (1734-1821), Philip Livingston (1716-1778), Francis Lewis (1713-1803), Lewis Morris (1726- 1798), of New York; Richard Stockton (1730-1781), John Witherspoon (1722-1794), Francis Hopkinson (1737-1791), John Hart (1708-1780), Abraham Clark (1726-1794), of New Jersey; Josiah Bartlett (1729-1795), William Whipple (1730-1785)' Matthew Thornton (1714-1803), of New Hampshire; Samuel Adams (1722-1803), John Adams (1735-1826), Robert Treat Paine (1731-1814), Elbridge Gerry (1744-1814), of Massa- chusetts; Stephen Hopkins (1707-1785), William Ellery (1727- 1820), of Rhode Island; Roger Sherman (1721-1793), Samuel Huntington (1732-1796), William Williams (1731-1811), Oliver Wolcott (1726-1797), of Connecticut. Not all the men who rendered the greatest services to independence were in Congress in

July 1776; not all who voted for the Declaration ever signed it; not all who signed it were members when it was adopted. The greater part of the signatures were certainly attached on the 2nd of August; but at' least six were attached later. With one exception— that of Thomas McKean, present on the 4th of July but not on the 2nd of August, and permitted to sign in 1 781— all were added before printed copies with names attached were first authorized by Congress for public circulation in January 1777.

See H. Friedenwald, The Declaration of Independence, An Interpretation and an Analysis (New York, 1904); J. H. Hazleton, The Uectaratwn of Independence: its History (New York, 1906)- M I namberlain , John Adams ... with other Essays and Addresses (Boston, 1898), containing, " The Authentication of the Declaration ot Independence (same in Massachusetts Historical Society Proceedings, Nov. 1884) ; M. C. Tyler, Literary History of the American Revolution, vol. 1. (New York, 1897), or same material in North American Review vol. 163, 1896, p. 1; W. F. Dana in Harvard Law Review, vol. ,3 i 9 oo, p. 319; G. E. Ellis in J. Winsor, Narrative and Critical History of America, vol. vi. (Boston, 1888)' K. hrotningham, Rise of the Republic, ch. ii. (Boston, 1872). There are various collected editions of biographies of the signers; probably the best are John Sanderson's Biography of the Signers of the Declara- r" 1 ˆ Z % ,ld n nC i (7 /°, ls -' Philadelphia, 1823ˆ1827), and William Brotherhoods Book of the Signers (Philadelphia, i860, new ed 1875). . 1 he Declaration itself is available in the Revised Statutes of the United States (1878), and many other places. A facsimile of the original parchment in uninjured condition is inserted in P fa!ˆ S A ™ encan , Arch ™ "• 5th series, vol. i. at p. 1595 (Washington; I 4 } ' L ˆ he , read F W1 " find it interesting to compare a study of the rrench Declaration: G Jellinek, The Declaration of the Rights of Man and of Citizens (New York, 1901; German edition, Leipzig, 1895; trench translation preferable because of preface of Professor Larnande). (F S P 1

INDEPENDENTS, in religion, a name used in the 17th century for those holding to the autonomy of each several church or congregation, hence otherwise known as Congregationalists.

Down to the end of the 18th century the former title prevailed in England, though not in America; while since then " Congregationalist " has obtained generally in both. (See Congregationalism.)

INDEX, a word that may be understood either specially as a table of references to a book or, more generally, as an indicator of the position of required information on any given subject. According to classical usage, the Latin word index denoted a discoverer, discloser or informer; a catalogue or list; an inscription; the title of a book; and the fore or index-finger. Cicero also used the word to express the table of contents to a book, and explained his meaning by the Greek form syllabus. Shakespeare uses the word with the general meaning of a table of contents or preface— thus Nestor says (Troilus and Cressida, i-3):—

" And in such indexes, although small pricks

To their subsequent volumes, there is seen

The baby figure of the giant mass."

Table was the usual English word, and index was not thoroughly naturalized until the beginning of the 17th century, and even then it was usual to explain it as " index or table." By the present English usage, according to which the word " table " is reserved for the summary of the contents as they occur in a book, and the word " index " for the arranged analysis of the contents for the purpose of detailed reference, we obtain an advantage not enjoyed in other languages; for the French table is used for both kinds, as is indice in Italian and Spanish. There is a group of words each of which has its distinct meaning but finds its respective place under the general heading of index work; these are calendar, catalogue, digest, inventory, register, summary, syllabus and table. 1 The value of indexes was recognized in the earliest times, and many old books have full and admirably constructed ones, A good index has sometimes kept a dull book alive by reason of the value or amusing character of its contents. Carlyle referred to Prynne's Histrio-Mastix as " a book still extant, but never more to be read by mortal "; but the index must have given amusement to many from the curious character of its entries, and Attorney-General Noy particularly alluded to it in his speech at Prynne's trial. Indexes have sometimes been used as vehicles of satire, and the witty Dr William King was the first to use them as a weapon of attack. His earliest essay in this field was the index added to the second edition of the Hon. Charles Boyle's attack upon Bentley's Dissertation on the Epistles of Phalaris (1698). ^

To serve its purpose well, an index to a book must be compiled with care, the references being placed under the heading that the reader is

most likely to seek. An index should be one and indivisible, and not broken up into several alphabets; thus every work, whether in one or more volumes, ought to have its complete index. The mode of arrangement calls for special attention; this may be either chronological, alphabetical or according to classes, but great confusion will be caused by uniting the three systems. The alphabetical arrangement is so simple, convenient and easily understood that it has naturally super- seded the other forms, save in some exceptional cases. Much of the value of an index depends upon the mode in which it is printed, and every endeavour should be made to set it out with clearness. In old indexes the indexed word was not brought to the front, but was left in its place in the sentence, so that the alphabetical order was not made perceptible to the eye. There are few points in which the printer is more likely to go wrong than in the use of marks 'of repetition, and many otherwise good indexes are full of the most perplexing cases of misapplication in this respect. The oft-quoted instance,

Mill on Liberty

on the Floss

actually occurred in a catalogue. But in modern times there

u 1An ,? th .? r old word occasionally used in the sense of an index is pye. Sir T. Duff us Hardy, in some observations on the derivation ot the word Pye-Book " (which most probably comes from the Latin pica), remarks that the earliest use he had noted of pye in this sense is dated 1547—" a Pye of all the names of such Balives as been to accompte pro anno regni regis Edwardi Sexti primo."

has been a great advance in the art of indexing, especially since the foundation in 1877 in England of the Index Society; and the growth of great libraries has given a stimulus to this method of making it easy for readers and researchers to find a ready reference to the facts or discussions they require. Not only has it become almost a sine qua non that any good book must have its own index, but the art of indexing has been applied to those books which are really collections of books (such as the Encyclo- paedia Britannica) , to a great newspaper like the London Times, and to the cataloguing of great libraries themselves. The work in these more elaborate cases

has been enormously facilitated by the modern devices by means of which separate cards are used, arranged in drawers and cases, American enterprise in this direction having led the way. And the value of the work done in this respect by the Congressional Library at Washington, the British Museum and the London Library (notably by its Subject Index published in 1909) cannot well be exaggerated. (See also Bibliography).

There are numerous books on Indexing, but the best for any one who wants to get a general idea is H. B. Wheatley's How to make an Index (1902).

INDEX LIBRORUM PROHIBITORUM, the title of the official list of those books which on doctrinal or moral grounds the Roman Catholic Church authoritatively forbids the members of her communion to read or to possess, irrespective of works forbidden by the general rules on the subject. Most govern- ments, whether civil or ecclesiastical, have at all times in one way or another acted on the general principle that some control may and ought to be exercised over the literature circulated among those under their jurisdiction. If we set aside the heretical books condemned by the early councils, the earliest known instance of a list of proscribed books being issued with the authority of a bishop of Rome is the Notitia librorum apocry- pkorum qui non recipiuntur, the first redaction of which, by Pope Gelasius (494), was subsequently amplified on several occasions. The document is for the most part an enumeration of such apocryphal works as by their titles might be supposed to be part of Holy Scripture (the " Acts " of Philip, Thomas and Peter, and the Gospels of Thaddaeus, Matthias, Peter, James the Less and others). 1 Subsequent pontiffs continued to exhort the episcopate and the whole body of the faithful to be on their guard against heretical writings, whether old or new; and one of the functions of the Inquisition when it was estab- lished was to exercise a rigid censorship over books put in circula- tion. The majority of the condemnations were at that time of a specially theological character. With the discovery of the art of printing, and the wide and cheap diffusion of all sorts of books which ensued, the need for new precautions against heresy and immorality in literature made itself felt, and more than one pope (Sixtus IV. in 1479 and Alexander VI. in 1501) gave special directions to the archbishops of Cologne, Mainz, Trier and Magdeburg regarding the growing abuses of the printing press; in 1515 the Lateran council formulated the decree De Impressione Librorum, which required that no work should be printed without previous examination by the proper ecclesiastical authority, the penalty of unlicensed printing being excommunica- tion of the culprit, and confiscation and

destruction of the books. The council of Trent in its fourth session, 8th April 1546, forbade the sale or possession of any anonymous religious book which had not previously been seen and approved by the ordinary; in the same year the university of Louvain, at the command of Charles V., prepared an " Index " of'pernicious and forbidden books, a second edition of which appeared in 1550. In 1557, and again in 1559, Pope Paul IV., through the Inquisition at Rome, published what may be regarded as the first Roman Index in the modern ecclesiastical use of that term {Index auctorum et librorum qui tanquam haeretici aut suspecti out perversi ab Officio S. R. Inquisitionis reprobaniur et in universa Christiana republica inter dicuntur). In this we find the three

1 Hardouin, Cone. ii. 940; Labbe\ Cone. ii. 938-941. The whole document has also been reprinted in Smith's Diet, of Chr.Antiq., art. " Prohibited Books."

classes which were to be maintained in the Trent Index: authors condemned with all their writings; prohibited books, the authors of which are known; pernicious books by anonymous authors. An excessively severe general condemnation was applied to all anonymous books published since 1519; and a list of sixty-two printers of heretical books was appended. This excessive rigour was mitigated in 156 1. At the 18th session of the council of Trent (26th February 1562), in consideration of the great increase in the number of suspect and pernicious books,.and also of the inefficacy of the many previous " censures " which had proceeded from the provinces and from Rome itself, eighteen fathers with a certain number of theologians were appointed to inquire into these " censures," and to consider what ought to be done in the circumstances. At the 2 5th session (4th December 1563) this committee of the council was reported to have completed its work, but as the subject did not seem (on account of the great number and variety of the books) to admit of being properly discussed by the council, the result of its labours was handed over to the pope (Pius IV.) to deal with as he should think proper. In the following March accordingly were published, with papal approval, the Index librorum prohibi- torum, which continued to be reprinted and brought down to date, and the " Ten Rules " which, supplemented and explained by Clement VIII., Sixtus V., Alexander VII., and finally by Benedict XIV. (10th July 1753), regulated the matter until the pontificate of Leo XIII. The business of condemning pernicious books and of correcting the Index to date has been since the time of Pope Sixtus V. in the hands of the " Congregation of the Index," which consists of several cardinals, one of whom is the prefect, and more or less numerous " consultors " and

" examiners of books." An attempt has been made to publish separately the Index Librorum Expurgandorum or Expur- gatorius, a catalogue of the works which may be read after the deletion or amending of specified passages; but this was soon abandoned.

With the alteration of social conditions, however, the Rules of Trent ceased to be entirely applicable. Their application to publications which had no concern with morals or religior was no longer conceivable; and, finally, the penalties called for modification. Already, at the Vatican Council, several bishops had submitted requests for a reform of the Index, but the Council was not able to deal with the question. The reform was accom- plished by Leo XIII. , who, on the 25th of January 1897, published the constitution Officiorum, in 49 articles. In this constitution, although the writings of heretics in support of heresy are con- demned as before (No. 1), those of their books which contain nothing against Catholic doctrine or which treat other subjects are permitted (Nos. 2-3). Editions of the text of the Scriptures are permitted for purposes of study; translations of the Bible into the vulgar tongue have to be approved, while those published by non-Catholics are permitted for the use of scholars (Nos. 5-8). Obscene books are forbidden; the classics, however, are author- ized for educational purposes (Nos. 9-10). Articles n-14 forbid books which outrage God and sacred things, books which propagate magic and superstition, and books which are pernicious to society. The ecclesiastical laws relating to sacred images, to indulgences, and to liturgical books and books of devotion are maintained (Nos. 15-20). Articles 21-22 condemn immoral and irreligious newspapers, and forbid writers to contribute to them. Articles 23-26 deal with permissions to read prohibited books; these are given by the bishop in particular cases, and in the ordinary course by the Congregation of the Index. So the second part of the constitution the pope deals with the censorship of books. After indicating the official publications for which the authorization of the divers Roman congregations is required, he goes on to say that the others are amenable to the ordinary of the editor and, in the case of regulars, to their superior (Nos. 30-37). The examination of the books is entrusted to censors, who have to study them without prejudice; if their report is favourable, the bishop gives the imprimatur (Nos. 38-40). All books concerned with the religious sciences and with ethics are submitted to preliminary censorship, and in

PHYSICAL FEATURES!

INDIA

addition to this ecclesiastics have to obtain a personal authoriza- tion for all their books and for the acceptance of the editorship of a periodical (Nos. 41-42). The penalty of excommunication ipso facta is only maintained for reading books written by heretics or apostates in defence of heresy, or books condemned by name under pain of excommunication by pontifical letters (not by decrees of the Index). By the same constitu- tion Leo XIII. ordered the revision of the catalogue of the Index. The new Index, which omits works anterior to 1600 as well as a great number of others included in the old catalogue, appeared in 1900. The encyclical Pascendi of Pius X. (8th September 1907) made it obligatory for periodicals amenable to the ecclesiastical authority to be submitted to a censor, who sub- sequently makes useful observations. The legislation of Leo XIII. resulted in the better observance of the rules for the publi- cation of books, but apparently did not modify the practice as re- gards the reading of prohibited books. It is to be regretted that the catalogue does not discriminate among the prohibited works according to the motive of their condemnation and the danger ascribed to reading them. The tendency of the practice among Catholics at large is to reduce these condemnations to the proportions of the moral law.

See H. Reusch, Der Index der verbotenen Biicher (Bonn, 1883); A. Arndt, De Libris prohibitis commentarii (Ratisbon, 1895); A. Boudinhon, La Nouvelle Legislation de I'index (Paris, 1899); J. Hilgers, Der Index der verbotenen Biicher (Freiburg in B., 1904) ; A. Vermecrsch, De prohibitione et censura librorum (Tournai, 1907) ; T. Hurley, Commentary on the Present Index Legislation (Dublin, 1908). (A. Bo.*)

INDIA, 1 a great country and empire of Asia under British rule, inhabited by a congeries of different races, speaking upwards of fifty different languages. The whole Indian empire, includ- ing Burma, has an area of 1,766,000 sq. m., and a population of 294 million inhabitants, being about equal to the area and population of the whole of Europe without Russia. The population more than doubles Gibbon's estimate of 120 millions for all the races and nations which obeyed imperial Rome.

The natives of India can scarcely be said to have a word of their own by which to express their common country. In Sanskrit, it would be called " Bharata-varsha," from Bharata, a legendary monarch of the Lunar line; but Sanskrit is no more the vernacular of India than Latin is of Europe. The name " Hindustan," which was at one time

adopted by European geographers, is of Persian origin, meaning " the land of the Hindus," as Afghanistan means " the land of the Afghans." According to native usage, however, " Hindustan " is limited either to that portion of the peninsula lying north of the Vindhya mountains, or yet more strictly to the upper basin of the Ganges where Hindi is the spoken language. The " East Indies," as opposed to the " West Indies," is an old-fashioned and in- accurate phrase, dating from the dawn of maritime discovery, and still lingering in certain parliamentary papers. " India," the abstract form of a word derived through the Greeks from the Persicized form of the Sanskrit sindhu, a " river," pre- eminently the Indus, has become familiar since the British acquired the country, and is now officially recognized in the imperial title of the sovereign.

The Country

India, as thus defined, is the middle of the three irregularly shaped peninsulas which jut out southwards from the mainland

of Asia, thus corresponding roughly to the peninsula and ˚f I ta 'y m the map of Europe. Its form is that of a

shape. great triangle, with its base resting upon the Himalayan

range and its apex running far into the ocean. The chief part of its western side is washed by the Arabian Sea, and the chief part of its eastern side by the Bay of Bengal. It extends from the 8th to the 37th degree of north latitude, that is to say, from the hottest regions of the equator to far within the temperate

1 The spelling throughout all the articles dealing with India is that adopted by the government of India, modified in special instances with deference to long-established usage.

zone. The capital, Calcutta, lies in 88° E., so that when the sun sets at six o'clock there, it is just past mid-day in England and early morning in New York. The length of India from north to south, and its greatest breadth from east to west, are both about 1900 m.; but the triangle tapers with a pear-shaped curve to a point at Cape Comorin, its southern extremity. To this compact dominion the British have added Burma, the strip of country on the eastern shores of the Bay of Bengal. But on the other hand the adjacent island of Ceylon has been administratively severed and placed under the Colonial Office. Two groups of islands in the Bay of Bengal, the Andamans and the Nicobars; one group in the Arabian Sea, the

Laccadives; and the outlying station of Aden at the mouth of the Red Sea, with Perim, and protectorates over the island of Sokotra, along the southern coast of Arabia and in the Persian Gulf, are all politically included within the Indian empire; while on the coast of the peninsula itself, Portuguese and French settlements break at intervals the continuous line of British territory.

India is shut off from the rest of Asia on the north by a vast mountainous region, known in the aggregate as the Himalayas, amid which lie the independent states of Nepal and Bhutan, Bound- with the great table-land of Tibet behind. The native aries. principality of Kashmir occupies the north-western angle of India. At this north-western angle (in 35° N., 74 E.) the mountains curve southwards, and India is separated by the well-marked ranges of the Safed Koh and Suliman from Afghanistan ; and by a southern continuation of lower hills from Baluchistan. Still farther south- wards, India is bounded along the W. and S.W. by the Arabian Sea and Indian Ocean. Turning northwards from the southern ex- tremity at Cape Comorin (8° 4′ 20″ N., 77 _35′ 35″ E.), the long sea-line of the Bay of Bengal forms the main part of its eastern boundary. But on the north-east, as on the north-west, India has again a land frontier. The Himalayan ranges at the north-eastern angle (in about 28 N., 97° E.) throw off spurs and chains to the south-east, which separate Eastern Bengal from Assam and Burma. Stretching south-eastwards from the delta of the Irrawaddy, a con- fused succession of little explored ranges separates the Burmese division of Tenasserim from the native kingdom of Siam. The boundary line runs down to Point Victoria at the extremity of Tenasserim (9° 59′ N., 98 32′ E.), following in a somewhat rough manner the watershed between the rivers of the British territory on the west and of Siam on the east.

The empire included within these boundaries is rich in varieties of scenery and climate, from the highest mountains in the world to vast river deltas raised only a few inches above the level Three of the sea. It practically forms a continent rather than rezlons. a country. But if we could look down on the whole from a balloon, we should find that India (apart from Burma, for which see the separate article) consists of three separate and well-defined tracts.

The first of the three regions is the Himalaya (g.v.) mountains and their off-shoots to the southward, comprising a system of stupendous ranges, the loftiest in the world. They are the Emodus Hima-

of Ptolemy (among other names), and extend in the shape lavas.

of a scimitar, with its edge facing southwards, for a dis- tance of 1500 m. along the northern frontier of India. At the north- eastern angle of that frontier, the Dihang river, the connecting link between the Tsanpo of Tibet and the Brahmaputra of Assam, bursts through the main axis of the range. At the opposite or north- western angle, the Indus in like manner pierces the Himalayas, and turns southwards on its course through the Punjab. This wild region is in many parts impenetrable to man, and nowhere yields a passage for a modern army. Ancient and well-known trade routes exist, by means of which merchandise from the Punjab finds its way over heights of 18,000 ft. into Eastern Turkestan and Tibet. The Muztagh (Snowy Mountain), the Karakoram (Black Mountain), and the Changchenmo are the most famous of these passes.

The Himalayas not only form a double wall along the north of India, but at both their eastern and western extremities send out ranges to the south, which protect its north-eastern and north- western frontiers. On the north-east, those offshoots, under the name of the Naga and Patkoi mountains, &c, form a barrier between the civilized districts of Assam and the wild tribes of Upper Burma. On the opposite or north-western frontier of India, the mountainous offshoots run down the entire length of the British boundaries from the Himalayas to the sea. As they proceed southwards, theirbest marked ranges are in turn known as the Safed Koh, the SUliman and the Hala mountains. These massive barriers have peaks of great height, culminating in the Takht-i-Suliman or Throne of Solomon, 11,317 ft. above the level of the sea. But the mountain wall is pierced at the corner where it strikes southwards from the Himalayas by an opening through which the Kabul river flows into India. An adjacent opening, the Khyber Pass, the Kurram Pass to the south of it, the Gomal Pass near Dera Ismail Khan, the Tochi Pass between the two last-named, and the famous Bolan Pass

still farther south, furnish the gateways between India and Afghan- istan. The Hala, Brahui and Pab mountains, forming the southern hilly offshoots between India and Baluchistan, have a much less elevation.

The wide plains watered by the Himalayan rivers form the second of

the three regions into which we have divided India. They extend from the Bay of Bengal on the east to the Afghan frontier and the Arabian Sea on the west, and contain the richest

Northern table- land.

Hirer

plains. anf j most densely crowded provinces of the empire. One set of invaders after another has from prehistoric times entered by the passes at their eastern and north-western frontiers. They followed the courses of the rivers, and pushed the earlier comers southwards before them towards the sea. About 167 millions of people now live on and around these river plains, in the provinces known as the lieutenant-governorship of Bengal, Eastern Bengal and Assam, the United Provinces, the Punjab, Sind, Rajputana and other native states.

The vast level tract which thus covers northern India is watered by three distinct river systems. One of these systems takes its rise River ‘ n tne no ‘l° w trough beyond the Himalayas, and issues

systems through their western ranges upon the Punjab as the ‘ Sutlej and Indus. The second of the three river systems also takes its rise beyond the double wall of the Himalayas, not very far from the sources of the Indus and the Sutlej. It turns, however, almost due east instead of west, enters India at the eastern extremity of the Himalayas, and becomes the Brahmaputra of Eastern Bengal and Assam. These rivers collect the drainage of the northern slopes of the Himalayas, and convey it, by long and tortuous although opposite routes, into India. Indeed, the special feature of the Himalayas is that they send down the rainfall from their northern as well as from their southern slopes to the Indian plains. The third river system of northern India receives the drainage of their southern slopes, and eventually unites into the mighty stream of the Ganges. In this way the rainfall, alike from the northern and southern slopes of the Himalayas, pours down into the river plains of Bengal.

The third division of India comprises the three-sided table-land which covers the southern half or more strictly peninsular portion of India. This tract, known in ancient times as the Deccan (Dakshin), literally ” the right hand or south,” comprises the Central Provinces and Berar, the presidencies of Madras and Bombay, and the territories of Hyderabad, Mysore and other feudatory states. It had in 1901 an aggregate population of about 100 millions.

The northern side rests on confused ranges, running with a general direction of east to west, and known in the aggregate as the Vindhya mountains. The Vindhyas, however, are made up of several distinct hill systems. Two sacred peaks guard the flanks in the extreme east and west, with a succession of ranges stretching 800 m. between. At the western extremity, Mount Abu, famous for its exquisite Jain temples, rises, as a solitary outpost of the Aravalli hills 5650 ft. above the Rajputana plain, like an island out of the sea. On the extreme east, Mount Parasnath — like Mount Abu on the extreme west, sacred to Jain rites — rises to 4400 ft. above the level of the Gangetic plains. The various ranges of the Vindhyas, from 1500 to over 4000 ft. high, form, as it were, the northern wall and buttresses which support the central table-land. Though now pierced by road and railway, they stood in former times as a barrier of mountain and jungle between northern and southern India, and formed one of the main obstructions to welding the whole into an empire. They consist of vast masses of forests, ridges and peaks, broken by cultivated valleys and broad high-lying plains.

*The other two sides of the elevated southern triangle are known as the Eastern and Western Ghats. These start southwards from Ghats *-he eastern and western extremities of the Vindhya*

system, and run along the eastern and western coasts of India. The Eastern Ghats stretch in fragmentary spurs and ranges down the Madras presidency, here and there receding inland and leaving broad level tracts between their base and the coast. The Western Ghats form the great sea-wall of the Bombay presidency, with only a narrow strip between them and the shore. In many parts they rise in magnificent precipices and headlands out of the ocean, and truly look like colossal " passes or landing-stairs " (ghdts) from the sea. The Eastern Ghats have an average elevation of 1500 ft. The Western Ghats ascend more abruptly from the sea to an average height of about 3000 ft. with peaks up to 4700, along the Bombay coast, rising to 7000 and even 8760 in the upheaved angle which they unite to form with the Eastern Ghats, towards their southern extremity.

The inner triangular plateau thus enclosed lies from 1000 to 3000 ft. above the level of the sea. But it is dotted with peaks and seamed with ranges exceeding 4000 ft. in height. Its best known hills are the Nilgiris, with the summer capital of Madras, Ootaca- mund, 7000 ft. above the sea. The highest point is Dodabetta Peak (8760 ft.), at the upheaved southern angle.

On the eastern side of India, the Ghats form a series of spurs and buttresses for the elevated inner plateau, rather than a continuous mountain wall. They are traversed by a number of broad and easy passages from the Madras coast. Through these openings the rainfall of the southern half of the inner plateau reaches the sea. The drainage from the northern or Vindhyan

edge of the three-sided table-land falls into the Ganges. The Nerbudda and Tapti carry the rainfall of the southern slopes of the Vindhyas and of the Satpura hills, in almost parallel lines, into the Gulf of Cambay. But from Surat, in 21° 9', to Cape Comorin, in 8° 4', no large river succeeds in reaching the western coast from the interior table-land. The Western Ghats form, in fact, a lofty un-broken barrier between the waters of the central plateau and the Indian Ocean. The drainage has therefore to make its way across India to the eastwards, now turning sharply round projecting ranges, now tumbling down ravines, or rushing along the valleys, until the rain which the Bombay sea-breeze has dropped upon the Western Ghats finally falls into the Bay of Bengal. In this way the three great rivers of the Madras Presidency, viz., the Godavari, the Kistna and the Cauvery, rise in the mountains overhanging the western coast, and traverse the whole breadth of the central table-land before they reach the sea on the eastern shores of India.

Of the three regions of India thus briefly surveyed, the first, or the Himalayas, lies for the most part beyond the British frontier, but a knowledge of it supplies the key to the ethnology and history of India. The second region, or the great river plains in the north, formed the theatre of the ancient race-movements which shaped the civilization and the political destinies of the whole Indian peninsula. The third region, or the triangular table-land in the south, has a character quite distinct from either of the other two divisions, and a population which is now working out a separate development of its own. Broadly speaking, the Himalayas are peopled by Mongoloid tribes; the great river plains of Hindustan are still the home of the Aryan race; the triangular table-land has formed an arena for a long struggle between that gifted race from the north and what is known as the Dravidian stock in the south.

Eastern Ohats.

Geology.

Geologically, as well as physically, India consists of three distinct regions, the Himalayas, the Peninsula, and — between these two —

the Indo-Gangetic plain with its covering of alluvium and wind-blown sands. The contrast between the Himalayas and the Peninsula is one of fundamental importance. The former, from the Tertiary period even to the present day, nas been a region of com- pression; the latter, since the Carboniferous period at least, has been a region of equilibrium or of tension. In the former even the Pliocene beds are crumpled and folded, overfolded and overthrust in the most violent fashion; in the latter none but the oldest beds, certainly none so late as the Permian, have been crumpled or crushed — occasionally they are bent and frequently they ate faulted, but the faults, though sometimes of considerable magnitude, are simple dislocations, unaccompanied by any serious disturbance of the strata. The greater part of the Himalayan region lay beneath the sea from early' Palaeozoic times to the Eocene period, and the deposits are accordingly marine; the Peninsula, on the other hand, has been land since the Permian period at least — there is, indeed, no evidence that it was ever beneath the sea — only on its margins are any marine deposits to be found. It should, however, be men- tioned that in the eastern part of the Himalayas some of the beds resemble those of the Peninsula, and it appears that a part of the old Indian continent has here been involved in the folds of the mountain chain.

The geology of the Himalayas being described elsewhere (see Himalayas), the following account deals only with the Indo-Gangetic plain and the Peninsula.

The Indo-Gangetic Plain covers an area of about 300,000 sq. m., and varies in width from 90 to nearly 300 m. It rises very gradually from the sea at either end; the lowest point of the watershed between the Punjab rivers and the Ganges is about 924 ft. above the sea. This point, by a line measured down the valley, but not follow- ing the winding of the river, is about 1050 m. from the mouth of the Ganges and 850 m. from the mouth of the Indus, so that the average inclination of the plain, from the central watershed to the sea, is only about 1 ft. per mile. It is less near the sea, where for long distances there is no fall at all. Near the watershed it is generally more; but there is here no ridge of high ground between the Indus and the Ganges, and a very trifling change of level would often turn the upper waters of one river into the other. It is not unlikely that such changes have in past time occurred ; and if so an explanation is afforded of the occurrence of allied forms of freshwater dolphins (Platanista) and of many other animals in the two rivers and in the Brahmaputra.

The alluvial deposits of the plain, as made known by the boring at Calcutta, prove a gradual depression of the area in recent times. There are peat and forest beds, which must have grown quietly at the surface, alternating with deposits of gravel, sand and clay. The thickness of the delta deposit is unknown; 481 ft. was proved at the bore hole, but probably this represents only a small part of the deposit. Outside the delta, in the Bay of Bengal, is a deep depression known as the " swatch of no ground "; all around it the soundings are only of 5 to to fathoms, but they very rapidly deepen to over 300 fathoms. Mr J. Ferguson has shown that the sediment is carried away from this area by the set of the currents; probably then it has remained free from sediment whilst the neighbouring sea bottom has gradually been filled up. If so, the thickness of the alluvium is at least 1800 ft., and may be much more. At Lucknow

a boring was driven through the Gangetic alluvium to a depth of 1336 ft. from the surface, or nearly 1000 ft. below sea-level. Even at this depth there was no indication of an approach to the base of the alluvial deposits.

The deposits of the Indc-Gangetic plain are of modern date and the formation of the depression which they fill is almost certainly connected with the elevation of the Himalayas. Both movements are probably still going on. The alluvial deposits prove depression in quite recent geological times; and within the Himalayan region earthquakes are still common, whilst in Peninsular India they are rare.

Peninsular India. — The oldest rocks of this region consist of gneiss, granite and other crystalline rocks. They cover a large area in Bengal and Madras and extend into Ceylon ; and they are found

also in Bundelkhand and in Gujarat. Upon them rest the unfossil-iferous strata known to Indian geologists as the Transition and Vindhyan series. The Transition rocks are often violently folded and

are frequently converted into schists. In the south, where they are known as the Dharwar series, they form long and narrow bands running from north-north-west to south-south-east across the ancient gneiss; and it is interesting to note that all the quartz-reefs which contain gold in paying quantities occur in the Dharwar series. The Transition rocks are of great but unknown age. The Vindhyan rocks which succeed them are also of ancient date. But long before the earliest Vindhyan rocks were laid down the Transition rocks had been altered and contorted. Occasionally the Vindhyan beds themselves are strongly folded, as in the east of the Cuddapah basin; but this was the last folding of any violence which has occurred in the Peninsula. In more recent times there have been local disturbances, and large faults have in places been formed; but the greater part of the Peninsula rocks are only slightly disturbed. The Vindhyan scries is generally sharply marked off from older rocks; but in the Godavari valley there is no well-defined line between them and the Transition rocks. The Vindhyan beds are divided into two groups. The lower, with an estimated thickness of or.iy 2000 ft., or slightly more, cover a large area — extending, with but little change of character, from the Sope valley in one direction to Cuddapah, and in a diverging line to near Bijapur — in each case a distance of over 700 m. The upper Vindhyans cover a much smaller area, but attain a thickness of about 12,000 ft. The Vindhyans are weli-stratified beds of sandstone and shale, with some limestones. As yet they have yielded no trace of fossils, and their exact age is consequently unknown. They are however certainly Pre-Permian, and it is most probable that they belong to the early

part of the Palaeozoic era. The total absence of fossils is a remarkable fact, and one for which it is difficult to account, as the beds are for the most part quite unaltered. Even if they are entirely of freshwater origin, we should expect that some traces of life from the waters or neighbouring land would be found.

The Gondwana series is in many respects the most. interesting and important series of the Indian Peninsula. The beds are almost entirely of freshwater origin. Many subdivisions have been made, but here we need only note the main division into two great groups: Lower Gondwanas, 13,000 ft. thick; Upper Gond wanas, 1 1 ,000 f t. thick. The series is mainly confined to the area of country between the Nerbudda and the Sone on the north, and the Kistna on the south; but the western part of this region is in great part covered by newer beds. The lowest Gondwanas are very constant in char- acter, wherever they are found; the upper members of the lower division show more variation, and this divergence of character in different

districts becomes more marked in the Upper Gondwana series. Disturbances have occurred in the lower series before the formation of the upper.

The Gondwana beds contain fossils which are of very great interest. In large part these consist of plants which grew near the margins of the old rivers, and which were carried down by floods, and deposited in the alluvial plains, deltas and estuarine areas of the old Gondwana period. The plants of the Lower Gondwanas consist chiefly of acrogens(Equisetaceae and ferns)and gymnogens(cycads and conifers), the former being the more abundant. The same classes of plants occur in the Upper Gondwanas; but there the proportions are reversed, the conifers, and still more the cycads, being more numerous than the ferns, whilst the Equisetaceae are but sparingly found. But even within the limits of the Lower Gondwana series there are great diversities of vegetation, three distinct floras occurring in the three great divisions of that formation. In many respects the flora of the highest of these three divisions (the Panchet group) is more nearly related to that of the Upper Gondwanas than it is to the other Lower Gondwana floras. Although during the Gondwana period the flora of India differed greatly from that of Europe, it was strik- ingly similar to the contemporaneous floras of South America, South Africa and Australia. It is somewhat remarkable that this char- acteristically southern flora, known as the Glossopteris Flora (from the name of one of the most characteristic genera), has also been found in the north of Russia.

One of the most interesting facts in the history of the Gondwana series is the occurrence near the base (in the Talchir group) of large striated boulders in a fine mud or silt, the boulders in one place resting upon rock (of Vindhyan age) which is also striated. These beds are the result of ice-action, and it is interesting to note that a similar boulder bed is associated with the Glossopteris- bearing deposits of Australia, South Africa and probably South America.

The Damuda series, the middle division of the Lower Gondwanas, is the chief source of coal in Peninsular India, yielding more of that mineral than all other formations taken together. The Karharbari group is the only other coal-bearing formation of any value. The Damudas are 8400 ft. thick in the Raniganj coal-field, and about 1 0,000 ft. thick in the Satpura basin. The}' consist of three divisions ; coal occurs in the upper and lower, ironstone (without coal) in the middle division. The Raniganj coal-field is the most important in India. It covers an area of about 500 sq. m. and is traversed by the Damuda river, along which run the road from Calcutta to Benares

and the East Indian railway. From its situation and importance this coal-field is better known than any other in India. The upper or Raniganj series (stated by the Geological Survey to be 5000 ft. thick) contains eleven seams, having a total thickness of 120 ft., in the eastern district, and thirteen seams, 100 ft. thick, in the western district. The average thickness of the seams worked is from 12 to 18 ft., but occasionally a seam attains a great thickness —20 to 80 ft. The lower or Barakar series (2000 ft. thick) contains four seams, of a total thickness of 69 ft. Compared with English coals those of this coal-field are of but poor quality; they contain much ash, and are generally non-coking. The seams of the lower series are the best, and some of these at Sanktoria, near the Barakar river, are fairly good for coke and gas. The best coal in India is in the small coal-field at Karharbari. The beds there are lower in the series than those of the Raniganj field; they belong to the uppei part of the Talchir group, the lowest of the Gondwana series. Tlje coal-bearing beds cover an area of only about II sq. m. ; there are three seams, varying from 9 to 33 ft. thick. The lowest seam is the best, and this is as good as English steam coal. This coal-field, now largely worked, is the property of the East Indian railway, which is thus supplied with fuel at a cheaper rate than any other railway in the world. Indian coal usually contains phosphoric acid, which greatly lessens its value for iron-smelting.*

The Damuda scries, which, as we have seen, is the chief source of coal in India, is also one of the most important sources of iron. The ore occurs in the middle division, coal in the highest and lowest. The ore is partly a clay ironstone, like that occurring in the Coal-measures of England, partly an oxide of iron or haematite, and it generally contains phosphorus. Excellent iron-ore occurs in the crystalline rocks south of the Damuda river as also in many other parts of India. Laterite (see below) is sometimes used as ore. It

13 very earthy and of a low percentage; but it contains only a comparatively small proportion of phosphorus.

The want of limestone for flux, within easy reach, is generally a great drawback as regards iron-smelting in India. Kankar or ghutin (concretionary carbonate of lime) is collected for this purpose from

the river-beds and alluvial deposits. It sometimes contains as much as 70% of carbonate of lime; but generally the amount is much less and the fluxing value proportionally diminished. The real difficulty in India is to find the ore, the fuel, and the flux in sufficiently close proximity to yield a profit.

Contemporaneously with the formation of the upper part of the Gondwana series marine deposits of Jurassic age were laid down in Cutch. Cretaceous beds of marine origin are also found in Cutch, Kathiawar and the Nerbudda valley on the northern margin of the Peninsula, and near Pondicherry and Trichinopoly on its south-eastern margin. There is a striking difference between the Cretaceous faunas of the two areas, the fossils from the north being closely allied to those of Europe, while those of the south (Pondicherry and Trichinopoly) are very different and are much more nearly related to those from the Cretaceous of Natal. It is now very generally believed that in Jurassic and Cretaceous times a great land-mass stretched from South Africa through Madagascar to India, and that the Cretaceous deposits of Cutch, &c, were laid down upon its northern shore, and those of Pondicherry and Trichinopoly upon its southern shore. The land probably extended as far as Assam, for the Cretaceous fossils of Assam are similar to those of the south.

The enormous mass of basaltic rock known as the Deccan Trap is of great importance in the geological structure of the Indian Peninsula. It now covers about 200,000 sq. m., and formerly extended over a much wider area. Where thickest, the traps are at least 6000 ft. thick. They form some of the most striking physical features of the Peninsula, many of the most prominent hill ranges having been carved out of the basaltic flows. The great volcanic outbursts which produced this trap commenced in the Cretaceous period and lasted on into the Eocene period.

Laterite is a ferruginous and argillaceous rock, varying from 30 to 200 ft. thick, which often occurs over the trap area and also over the gneiss. As a rule it makes rather barren land ; it is highly porous, and the rain rapidly sinks into it. Laterite may be roughly divided into two kinds, high-level and low-level latentes. It has usually been formed by the decomposition in situ of the rock on which it rests, but it is often broken up and re-deposited elsewhere.

Meteorology. The great peninsula of India, with its lofty mountain ranges behind and its extensive seaboard exposed to the first violence of the winds of two oceans, forms an exceptionally valuable and interest- ing field for the study of meteorological phenomena.

From the gorge of the Indus to that of the Brahmaputra, a distance of 1400 m., the Himalayas form an unbroken watershed, the northern flank of which is drained by the upper valleys of these Himalayas. two r ; vers; w hile the Sutlej, starting from the southern foot of the Kailas Peak, breaks through the watershed, dividing it into two very unequal portions, that to the north-west being the smaller. The average elevation of the Himalaya crest may be taken at not less than 19,000 ft., and therefore equal to the height of the lower half of the atmosphere; and indeed few of the passes are under 16,000 or 17,000 ft. Across this mountain barrier there appears to be a constant flow of air, more active in the day-time than at night, northwards to the arid plateau of Tibet. There is no reason to believe that any transfer of air takes place across the Himalayas in a southerly direction, unless indeed in those most elevated regions of the atmosphere which lie beyond the range of observation; but a nocturnal flow of cooled air, from the southern slopes, is felt as a strong wind where the rivers debouch on the plains, more especially in the early morning hours; and this probably contributes in some degree to lower the mean temperature of that belt of the plains which fringes the mountain zone.

At the foot of the great mountain barrier, and separating it from the more ancient land which now forms the highlands of the peninsula, a broad plain, for the most part alluvial, stretches from iff 8 sea to sea ” ˆ n the west, in the dry region, this is occupied

plain. partly by the alluvial deposits of the Indus and its tribu-

taries and the saline swamps of Cutch, partly by the rolling sands and rocky surface of the desert of Jaisalmer and Bikaner, and the more fertile tracts to the eastward watered by the Luni. Over the greater part of this region rain is of rare occurrence; and not in-frequently more than a year passes without a drop falling on the parched surface. On its eastern margin, however, in the neighbour-hood of the Aravalli hills, and again in the northern Punjab, rain is more frequent, occurring both in the south-west monsoon and also at the opposite season in the cold weather. As far south as Sirsa and Multan the average rainfall does not much exceed 7 in.

The alluvial plain of the Punjab passes into that of the Gangetic valley without visible interruption. Up or down this plain, at opposite seasons, sweep the monsoon winds, in a direction f”. 8 ‘ at right angles to that of their nominal course ; and thus

plain. vapour which has been brought by winds from the Bay of

Bengal is discharged as snow and rain on the peaks and hillsides of the Western Himalayas. Nearly the whole surface is under cultiva-

table- laod.

tion, and it ranks among the most productive as well as the most densely populated regions of the world. The rainfall diminishes from 100 in. in the south-east corner of the Gangetic delta to less than 30 in. at Agra and Delhi, and there is an average difference of from 15 to 25 in. between the northern and southern borders of the plain.

Eastward from the Bengal delta, two alluvial plains stretch up between the hills which connect the Himalayan system with that of the Burmese peninsula. The first, or the valley of Assam and the Brahmaputra, is long and narrow, bordered on ■ Eastern the north by the Himalayas, on the south by the lower Bengal. plateau of the Garo, Khasi and Naga hills. The other, short and broad, and in great part occupied by swamps and jhils, separates the Garo, Khasi and Naga hills from those of Tippera and the Lushai country. The climate of these plains is damp and equable, and the rainfall is prolonged and generally heavy, especially on the southern slopes of the hills. A meteorological peculiarity of some interest has been noticed, more especially at the stations of Sibsagar and Silchar, viz. the great range of the diurnal variation of baro- metric pressure during the afternoon hours, — which is the more striking, since at Rurki, Lahore, and other stations near the foot of the Western Himalayas this range is less than in the open plains. The highlands of the peninsula, which are cut off from the encircling ranges by the broad Indo-Gangetic plain, are divided into two unequal parts by an almost continuous chain of hills running across the country from west by south to east by Central north, just south of the Tropic of Cancer. This chain may be regarded as a single geographical feature, forming one of the principal watersheds of the peninsula, the waters to the north draining chiefly into the Nerbudda and the Ganges, those to the south into the Tapti, the Mahanadi, the Godavari and some smaller streams. In a meteorolgical point of view it is of considerable importance. Together with the two parallel valleys of the Nerbudda and Tapti, which drain the flanks of its western half, it gives, at opposite seasons of the year, a decided easterly and westerly direction to the winds of this part of India, and condenses a tolerably copious rainfall during the south-west monsoon.

Separated from this chain by the valley of the Nerbudda on the west, and that of the Sone on the east, the plateau of Malwa and Baghelkhand occupies the space intervening between these valleys

and the Gangetic plain.. On the western edge of the plateau are the Aravalli hills, which run from near Ahmedabad up to the neighbour-hood of Delhi, and include one hill, Mount Abu, over 5000 ft. in height. This range exerts an important influence on the direction of the wind, and also on the rainfall. At Ajmer, an old meteoro- logical station at the eastern foot of the range, the wind is pre- dominantly south-west, and there and at Mount Abu the south-west monsoon rains are a regularly recurrent phenomenon, — which can hardly be said of the region of scanty and uncertain rainfall that extends from the western foot of the range and merges in the Bikaner desert.

The peninsula south of the Satpura range consists chiefly of the triangular plateau of the Deccan, terminating abruptly on the west in the Sahyadri range (Western Ghats), and shelving to the east (Eastern Ghats). This plateau is swept by the Southern south-west monsoon,, but not until it has surmounted the Plateau. western barrier of the Ghats; and hence the rainfall is, as a rule, light at Poona and places similarly situated under the lee of the range, and but moderate over the more easterly parts of the plateau. The rains, however, are prolonged some three or four weeks later than in tracts to the north of the Satpuras, since they are. also brought by the easterly winds which blow from the Bay of Bengal in October and the early part of November, when the recurved southerly wind ceases to blow up the Gangetic valley, and sets towards the south-east coast.

*At the junction of the Eastern and Western Ghats rises the bold triangular plateau of the Nilgiris, and to the south of them come the Anamalais, the Palnis, and the hills of Travancore. These ranges are separated from the Nilgiris by a broad Southern depression or pass known as the Palghat Gap, some 25 m. *""*■ wide, the highest point of which is only 1500 ft. above the sea. This gap affords a passage to the winds which elsewhere are barred by the hills of the Ghat chain. The country to. the east of the gap receives the rainfall of the south-west monsoon; and during the north-east monsoon ships passing Beypur meet with a stronger wind from the land than is felt elsewhere on the Malabar coast. In the strip of low country that fringes the peninsula below the Ghats the rainfall is heavy and the climate warm and damp, the vegetation being dense and characteristically tropical, and the steep slopes of the Ghats, where they have not been artificially cleared, thickly clothed with forest.*

In Lower Burma the western face of the Arakan Yoma hills, like that of the Western Ghats in India, is exposed to the full force of the south-western monsoon, and receives a very heavy rainfall. At Sandoway this amounts to an annual mean Burma. of 212 in. It

diminishes to the northwards, but even at Chittagong it is over 104 in. annually.

The country around Mandalay, as well as the hill country to the north, has suffered from severe earthquakes, one of which destroyed Ava in 1839. The general meridional direction of the ranges and

valleys determines the direction of the prevailing surface winds, this being, however, subject to many local modifications. But it would appear that throughout the year there is, with but slight interruption, a steady upper current from the south-west, such as has been already noticed over the Himalayas. The rainfall in the lower part of the Irrawaddy valley, viz. the delta and the neighbouring part of the province of Pegu, is very heavy; and the climate is mild and equable at all seasons. But higher up the valley, and especially north of Pegu, the country is drier, and is characterized by a less luxuriant vegetation and a retarded and more scanty rainfall.

Within the boundaries of India almost any extreme of climate that is known to the tropics or the temperate zone can be found. It is influenced from outside by two adjoining areas. On Climate. tne nort j]j t }, e Himalaya range and the plateau of Afghan- istan shut it off from the climate of central Asia, and give it a con- tinental climate, the characteristics of which are the prevalence of land winds, great dryness of the air, large diurnal range of tem- perature, and little or no precipitation. On the south the ocean gives it an oceanic climate, the chief features of which are great uniformity of temperature, small diurnal range of temperature, great dampness of the air, and more or less frequent rain. The continental type of weather prevails over almost the whole of India from December to May, and the oceanic type from June to November, thus giving rise to the two great divisions of the year, the dry season or north-east monsoon, and the rainy season or south-west monsoon. India thus becomes the type of a tropical monsoon climate. For the origin of the monsoon currents and their distribution see Monsoon.

The two monsoon periods are divided by the change of tempera- ture, due to solar action upon the earth's surface, into two separate seasons; and thus the Indian year may be divided into four seasons:

the cold season, including the months of January and February; the hot season, comprising the months of March, April and May ; the south-west monsoon period, including the months of June, July, August, September and October; and the retreating monsoon period, including the months of November and December. The temperature is nearly constant in southern India the whole year round, but in northern India, where the extremes of both heat and cold are greatest, the variation is very large.

In the cold season the mean temperature averages about 30 lower in the Punjab than in southern India. In the Punjab, the United Provinces, and northern India generally theclimate The cold resembles that of the Riviera, with a brilliant 'cloudless weather. s jcy and cool dry weather. This is the time for the tourist to visit India. In south India it is warmer on the west coast than on the east, and the maximum temperature is found round the head- waters of the Kistna. Calcutta, Bombay and Madras all possess the equable climate that is induced by proximity to the sea, but Calcutta enjoys a cold season which is not to be found in the other presidency towns, while the hot season is more unendurable there.

The hot season begins officially in the Punjab on the 15th of March, and from that date there is a steady rise ih the temperature, induced by the fiery rays of the sun upon the baking earth, until The hot |. jj e break of the rains in June. During this season the weather. interior of the peninsula and northern India is greatly heated ; and the contrast of temperature is not between northern and southern India, but between the interior of India and the coast districts and adjacent seas. The greater part of the Deccan and the Central Provinces are included within the hottest area, though in May the highest temperatures are found in Upper Sind, north-west Rajputana, and south-west Punjab. At Jacobabad the thermo- meter sometimes rises to 125° in the shade.

The south-west monsoon currents usually set in during the first fortnight of June on the Bombay and Bengal coasts, and give more or less general rain in every part of India during the next Tfte three months. But the distribution of the rainfall is

monsoon ver y uneven. On the face of the Western Ghats, and on period. t jj e pj nas j hills, overlooking the Bay of Bengal, where the mountains catch the masses of vapour as it rises off the sea, the rainfall is enormous. At Cherrapunji in the Khasi hills it averages upwards of 500 in. a year. The Bombay monsoon, after surmounting the Ghats, blows across the peninsula as a west and sometimes in

places a north-west wind ; but it leaves with very little rain a strip 1 00 to 200 m. in width in the western Deccan parallel with the Ghats, and it is this part of the Deccan, together with the Mysore table-land and the Carnatic, that is most subject to drought. Similarly the Bengal monsoon passes by the Coromandel coast and the Carnatic with an occasional shower, taking a larger volume to Masulipatam and Orissa, and abundant rain to Bengal, Assam and Cachar. The same current also supplies with rain the broad band across India, which includes the Satpura range, Chota Nagpur, the greater part of the Central Provinces and Central India, Orissa and Bengal. Rainfall rapidly diminishes to the north-west from that belt. A branch of the Bombay current blows pretty steadily through Rajputana to the Punjab, carrying some rain to the latter province. But the greater part of north-west India is served as a rule by cyclonic storms between the two currents. In September the force of the monsoon begins rapidly to decline, and after about the middle of the month it ceases to carry rain to the greater part of north-western India. In its rear springs up a gentle steady north-east wind, which

gradually extends over the Bay of Bengal, and is known as the north-east monsoon. A wind similar in character, but rather more easterly in direction, simultaneously takes possession of the Arabian Sea. The months of November and December form a transition period between the monsoon and the cold season. The most un- healthy period of the year follows immediately after the rains, when malaria is prevalent, especially in northern India.

Flora.

Unlike many other large geographical areas, India is remarkable for having no distinctive botanical features peculiar to itself. It differs conspicuously in this respect from such countries as Australia or South Africa. Its vegetation is in point of fact of a composite character, and is constituted by the meeting and more or less blending of adjoining floras,— those of Persia and the south-eastern Mediterranean area to the north-west, of Siberia to the north, of China to the east, and of Malaya to the south-east. Regarded broadly, four tolerably distinct types present themselves.

1. The upper levels of the Himalayas slope northwards gradually to the Tibetan uplands, over which the Siberian temperate vegetation ranges. This is part of the great temperate flora which, fj\ ma iayas. with locally individualized species, but often with identical

genera, ranges Over the whole of the temperate zone of the northern

hemisphere. In the western Himalayas this upland flora is marked by a strong admixture of European species, such as the columbine (Aquilegia) and hawthorn {Crataegus Oxydcaniha) . These disappear rapidly eastward, and are scarcely found beyond Kumaon. The base of the Himalayas is occupied by a narrow belt forming an extreme north-western extension of the Malayan type described below. Above that there is a rich temperate flora which in the eastern chain may be regarded as forming an extension of that of northern China, gradually assuming westwards more and more of a European type. Magnolia, Aucuba, Abelia and Skimmia may be mentioned as 'examples of Chinese genera found in the eastern Himalayas, and the tea-tree grows wild in Assam. The same coniferous trees are common to both parts of the • range. Pinus longifolia extends to the Hindu-Kush ; P. excelsa is found universally except in Sikkim, and has its European analogue in P. Peuce, found in the mountains of Greece. Abies smithiana extends into Afghan- istan; Abies webbiana forms dense forests at altitudes of 8000 to 12,000 ft., and ranges from Bhutan to Kashmir; several' junipers and the common yew {Taxus baccata) also occur. The deodar (Cedrus Deodara), which is indigenous to the mountains of Afghanistan and the north-west Himalaya, is nearly allied to the Atlantic cedar and to the cedar of Lebanon, a form of which is found in Cyprus. A notable further instance of the connexion of the western Himalayan flora with that of Europe is the holm oak (Quercus Ilex), which is characteristic of the Mediterranean region.

2. The north-western area is best marked in Sind and the Punjab, where the climate is very dry (the rainfall averaging less than 15 in.), and where the soil, though fertile, is wholly dependent on irrigation for its cultivation. The flora is a poor one in number of species, and is essentially identical with that of Persia, southern Arabia and Egypt. The low scattered jungle contains such characteristic species as Capparis aphylla, Acacia arabica (babul), Populus euphratica (the " willows " of Ps. exxxvii. 2), Salvadora persica (erroneously identified by Royle with the mustard of Matt. xiii. 31), tamarisk, Zizyphus, Lotus, &c. The dry flora extends somewhat in a south-east direction, and then blends in- sensibly with that of the western peninsula; some species repre- senting it are found in the upper Gangetic plain, and a few are widely distributed in dry parts of the country.

3. For the Malayan area, which Sir Joseph Hooker describes as forming " the bulk of the flora of the perennially humid ■■ ' ■ regions of India, as of the whole Malayan peninsula, Upper 7, ss , ain M Assam valley, the Khasi mountains, the forests of the base Mal

y a of the Himalaya from the Brahmaputra to Nepal, of the P”’’’’’’’’*’ Malabar coast, and of Ceylon,” see Assam, Ceylon and Malay Peninsula.*

4. The western India type is difficult to characterize, and is in many respects intermediate between the two just preceding. It occupies a comparatively dry area, with a rainfall under

North- west,

Western India.

75 in. In respect to positive affinities, Sir Joseph Hooker pointed out some relations with the flora of tropical Africa as evidenced by the prevalence of such genera as Grewia and 7m- patiens, and the absence, common to both countries, of oaks and pines which abound in the Malayan archipelago. The annual vegetation which springs up in the rainy season includes numerous genera, such as Sida and Indigofera, which are largely represented both in Africa and Hindustan. Palms also in both countries are scanty, the most notable in southern India being the wild date {Phoenix sylvestris) ; Borassus and the coco-nut are cultivated. The forests, though occasionally very dense, as in the Western Ghats, are usually drier and more open than those of the Malayan type, and are often scrubby. The most important timber trees are the (tin (Cedrela Toona), sal (Shorea robusta), the present area of which forms’ two belts separated by the Gangetic plain ; satin wood (Chloroxylon Swietenia) , common in the drier parts of the peninsula; sandalwood, especially characteristic of Mysore; iron- wood (Mesua ferrea), and teak (Tectona grandis).

Fauna.

Mammals. — First among the wild animals of India must be mentioned the lion (Felis leo), which is known to have been not , , uncommon within historical times in Hindustan proper

and the Punjab. At present the lion is confined to the Gir, or rocky hill-desert and forest of Kathiawar. A peculiar variety is there found, marked by the absence of a mane; but whether this variety deserves to be classed as a distinct species, naturalists have not yet

determined. These lions at one time were almost extinct, but after being preserved since about 1 890 by the Nawab of J unagarh, they have once more become comparatively plentiful. A good lion, measures from 9 to 9i ft. in length.

The characteristic beast of prey in India is the tiger (F. tigris), which is found in every part of the country, from the slopes of the _. Himalayas to the Sundarbans swamps. The average

- *' length of a tiger from nose to tip of tail is 9 ft. to 10 ft.*

for tigers, and 8 ft. to 9 ft. for tigresses, but a tiger of 12 ft. 4 in. has been shot. The advance of cultivation, even more than the incessant attacks of sportsmen, has gradually caused the tiger to become a rare animal in large tracts of country; but it is scarcely probable that he will ever be exterminated from India. The malarious tardi fringing the Himalayas, the uninhabitable swamps of the Gangetic delta, and the wide jungles of the central plateau are at present the chief home of the tiger. His favourite food appears to be deer, antelope and wild hog. When these abound he will disregard domestic cattle. Indeed, the natives are disposed to consider him as in some sort their protector, as he saves their crops from destruction by the wild animals on which he feeds. But when once he develops a taste for human blood, then the slaughter he works becomes truly formidable. The confirmed man-eater, which is generally an old beast, disabled from overtaking his usual prey, seems to accumulate his tale of victims in sheer cruelty rather than for food. A single tiger is known to have killed 108 people in the course of three years. Another killed an average of about 80 persons per annum. A third caused thirteen villages to be abandoned, and 250 sq. m. of land to be thrown out of cultivation. A fourth, in 1 869, killed 127 people, and stopped a public road for many weeks, until the opportune arrival of an English sportsman, who at last killed him. Such cases are, of course, exceptional, and generally refer to a period long past, but they explain and justify the superstitious awe with which the tiger is regarded by the natives. The favourite mode of shooting the tiger is from the back of elephants, or from elevated platforms (machdns) of boughs in the jungle. In Central India they are shot on foot. In Assam they are sometimes speared from boats, and in the Himalayas they are said to be ensnared by bird-lime. Rewards are given by government to native shikaris for the heads of tigers, varying in time and place according to the need. In 1903 the number of persons killed by tigers in the whole of India was 866, while forty years

previously 700 people were said to be killed annually in Bengal alone.

The leopard or panther (F. pardus) is far more common than the tiger in all parts of India, and at least equally destructive to life and property. The greatest length of the leopard is

Leopard.

about 7 ft. 6 in. A black variety, as beautiful as it is

rare, is sometimes found in the extreme south of the peninsula, and also in Java.

*The cheetah or hunting leopard (Cynaelurus jubatus) must be carefully distinguished from the leopard proper. This animal appears to be a native only of the Deccan, where it is trained for hunting the antelope. *In some respects it approaches the dog more nearly than the cat tribe. Its limbs are long, its hair rough, and its claws blunt and only partially retractile. The speed with which it bounds upon its prey, when loosed from the cart, exceeds the swift- ness of any other mammal. If it misses its first attack, it scarcely ever attempts to follow, but returns to its master. Among other species of the family Felidae found in India may be mentioned the ounce or snow leopard (F. uncia), the clouded leopard (F. nebulosa), the marbled cat (F. marmorata), the jungle cat (F. chaus), and the viverrine cat (F. viverrina).*

Wolves (Cams lupus) abound throughout the open country, but are rare in the wooded districts. Their favourite prey is sheep, but Wolf tribe they are also said to run down antelopes and hares, or rather catch them by lying in ambush. Instances of their attacking man are not uncommon, and the story of Romulus and Remus has had its counterpart in India within comparatively recent times. The Indian wolf has a dingy reddish-white fur, some of the hairs being tipped with black. By some naturalists it is regarded as a distinct species, under the name of Canis pallipes. Three distinct varieties, the white, the red and the black wolf, are found in the Tibetan Himalayas. The Indian fox (Vulpes bengalensis) is comparatively rare, but the jackal (C. aureus) abounds everywhere, making night hideous by its never-to-be-forgotten yells. The jackal, and not the fox, is usually the animal hunted by the packs of hounds occasionally kept by Europeans.

The wild dog, or dhole (Cyon), is found in all the wilder jungles of

India, including Assam and Lower Burma. Its characteristic is that it hunts in packs, sometimes containing thirty dogs, and does not give tongue. When once a pack of wild dogs

Dog.

has put up any animal, that animal's doom is sealed. They do not

leave it for days, and finally bring it to bay, or run it down exhausted. A peculiar variety of wild dog exists in the Karen hills of Burma, thus described from a specimen in confinement. It was black and white, as hairy as a skye-terrier, and as large as a medium-sized spaniel. It had an invariable habit of digging a hole in the ground, into which it crawled backwards, remaining there all day with only its nose and ferrety eyes visible. Among other dogs of India are the pariah, which is merely a mongrel, run wild and half starved; the poligar dog, an immense creature peculiar to the south; the grey-hound, used for coursing; and the mastiff of Tibet and Bhutan. The striped hyaena (Hyaena striata) is common, being found wherever the wolf is absent. Like the wolf, it is very destructive both to the flocks and to children.

Of bears, the common black or sloth bear (Melursus ur sinus) is common throughout India wherever rocky hills and forests occur. It is distinguished by a white horse-shoe mark on its Bear

breast. Its food consists of ants, honey and fruit. When disturbed it will attack man, and it is a dangerous antagonist, for it always strikes at the face. The Himalayan or Tibetan sun bear (Ursus torquatus) is found along the north, from the Punjab to Assam. During the summer it remains high up in the mountains, near the limit of snow, but in the winter it descends to 5000 ft. and even lower. Its congener, the Malayan sun bear (U. malayanus), is found in Lower Burma.

The elephant (Elephas indicus) is found in many parts of India, though not in the north-west. Contrary to what might be anticipated from its size and from the habits of its African cousin, m eBnaa t the Indian elephant is now, at any rate, an inhabitant, not of the plains, but of the hills; and even on the hills it is usually found among the higher ridges and plateaus, and not in the valleys. From the peninsula of India the elephant has been gradually exter- minated, being only found now in the primeval forests of Coorg, Mysore and Travancore, and in the tributary state of Orissa. It still exists in places along the tardi or submontane fringe of the Himalayas. The

main source of supply at the present time is the confused mass of hills which forms the north-east boundary of British India, from Assam to Burma. Two varieties are there distinguished, the gunda or tusker, and the makna or hine, which has no tusks. The reports of the height of the elephant, like those of its intelligence, seem to be exaggerated. The maximum is probably 12 ft. If hunted, the elephant must be attacked on foot, and the sport is therefore dangerous, especially as the animal has but few parts vulnerable to a bullet. The regular mode of catching elephants is by means of a keddah, or gigantic stockade, into which a wild herd is driven, then starved into submission, and tamed by animals already domesticated. The practice of capturing them in pitfalls is dis- couraged as cruel and wasteful. Elephants now form a government monopoly everywhere in India. The shooting of them is prohibited, except when they become dangerous to man or destructive to the crops; and the right of capturing them is only leased out upon conditions. A special law, under the title of " The Elephants Preservation Act " (No. VI. of 1879), regulates this licensing system. Whoever kills, captures or injures an elephant, or attempts to do so, without a licence, is punishable by a fine of 500 rupees for the first offence ; and a similar fine, together with six months' imprisonment, for a second offence. Though the supply is decreasing, elephants continue to be in great demand. Their chief use is in the timber trade and for government transport. They are also bought up by native chiefs at high prices for purposes of ostentation.

Of the rhinoceros, three distinct varieties are enumerated, two with a single and one with a double horn. The most familiar is the Rhinoceros unicornis, commonly found in the Brahmaputra valley. It has but one horn, and is covered with, massive folds of naked skin. It sometimes attains a height of 6 ft. ; its horn, which is much prized by the natives for medicinal purposes, seldom exceeds 14 in. in length. It frequents swampy, shady spots, and wallows in mud like a pig. The traditional antipathy of the rhinoceros to the elephant seems to be mythical. The Javan rhino- ceros (R. sondaicus) is found in the Sundarbans and also in Burma. It also has but one horn, and mainly differs from the foregoing in being smaller, and having less prominent " shields." The Sumatran rhinoceros (R. sumatrensis) is found from Chittagong southwards through Burma. It has two horns and a bristly coat.

The wild hog (Sus cristatus) is well known as affording the most exciting sport in the world — " pig-sticking." It frequents cultivated situations, and is the most mischievous enemy of the wild hog, villager. A rare animal, called the pigmy hog (S. sal- vanius), exists

in the tardi of Nepal and Sikkim, and has been shot in Assam. Its height is only 10 in., and its weight does not exceed 12 lb.

The wild ass (Equus hemionus) is confined to the sandy deserts of Sind and Cutch, where, from its speed and timidity, wild ass it is almost unapproachable.

Many wild species of the sheep and goat tribe are to be found in the Himalayan ranges. The Ovis amnion and 0. poli are Tibetan rather than Indian species. The urial and the shapu are gheeo and kindred species of wild sheep (Ovis vignei), found respec- eoa fg tively in Ladakh and the Suleiman range. The former ^^ comes down to 2000 ft. above the sea, the latter is never seen at altitudes lower than 12,000 ft. The barhal, or blue wild sheep

Rhino- ceros.

POLITICAL DIVISIONS]

INDIA

38i

(0. nahura), and the markhor and tahr (both wild goats), also inhabit the Himalayas. A variety of the ibex is also found there, as well as in the highest ranges of southern India. The sarau {Nemorhaedus bubalinus), allied to the chamois, has a wide range in the mountains of the north, from the Himalayas to Assam and Burma.

The antelope tribe is represented by comparatively few species, as compared with the great number peculiar to Africa. The antelope Antelopes. P ro P er (Antilope), the " black buck " of sportsmen, is very generally distributed. Its special habitat is salt plains, as on the coast-line of Gujarat and Orissa, where herds of fifty does may be seen, accompanied by a single buck. The doe is of a light fawn colour and has no horns. The colour of the buck is a deep brown-black above, sharply marked off from the white of the belly. His spiral horns, twisted for three or four turns like a corkscrew, often reach the length of 30 in. The flesh is dry and unsavoury, but is permitted meat for Hindus, even of the Brahman caste. The nilgai, or blue cow (Boselaephus tragocamelus) is also widely dis- tributed, but specially abounds in Hindustan Proper and Gujarat. As with the antelope, the male alone has the dark-blue colour. The nilgai is held peculiarly sacred by Hindus, from its fancied kinship to the cow, and on this account its destructive inroads upon the crops are tolerated. The

four-horned antelope (Tetracerus quadricornis) and the gazelle (Gazella bennetti), the chinkara or " ravine deer " of sportsmen, are also found in India.

The king of the deer tribe is the sdmbhar or jarau (Cervus unicolor), erroneously called " elk " by sportsmen. It is found on the forest-Dee,., c ' ac ^ m " s ' n a " P art s of the country. It is of a deep-brown colour, with hair on its neck almost like a mane; and it stands nearly 5 ft. high, with spreading antlers nearly 3 ft. in length. Next in size is the swamp deer or bara-singha, signifying " twelve points " (C. duvauceli) , which is common in Lower Bengal and Assam. The chitdl or spotted deer (C. axis) is generally admitted to be the most beautiful inhabitant of the Indian jungles. Other species include the hog deer (C. porcinus), the barking deer or muntjac (Cervulus muntjac), and the chevrotain or mouse deer (Tragulus meminna). The musk deer (Moschus moschiferus) is confined to Tibet.

The ox tribe is represented in India by some of its noblest species. The gaur (Bos gaurus), the " bison " of sportsmen, is found in all Bison. tne hi'l jungles of the country, in the Western Ghats, in

Central India, in Assam, and in Burma. This animal sometimes attains the height of 20 hands (close on 7 ft.), measuring from the hump above the shoulder. Its short curved horns and skull are enormously massive. Its colour is dark chestnut, or coffee-brown. From the difficult nature of its habitat, and from the ferocity with which it charges an enemy, the pursuit of the bison is no less danger-ous and no less exciting than that of the tiger or the elephant. Akin tothe gaur, though not identical, are the gaydl or mithun (B. frontalis), confined to the hills of the north-east frontier, where it is domesti- cated for sacrificial purposes by the aboriginal tribes, and the tsine or banting (B. sondaicus), found in Burma. The wild buffalo (Bos Buffalo bubalus) differs from the tame buffalo only in being larger and more fierce. The finest specimens come from Assam and Burma. The horns of the bull are thicker than those of the cow, but the horns of the cow are larger. A head has been known to measure 13 ft. 6 in. in circumference, and 6 ft. 6 in. between the tips. The greatest height is 6 ft. The colour is a slaty black; the hide is immensely thick, with scanty hairs. Alone perhaps of all wild animals in India, the buffalo will charge unprovoked. Even tame buffaloes seem to have an inveterate dislike to Europeans.

The rat and mouse family is only too numerous. Conspicuous in it is the loathsome bandicoot (Nesocia bandicota), which sometimes Rat tribe measures 2 ft. in length, including its tail, and weighs 3 lb. It

burrows under houses, and is very destructive to plants, fruit and even poultry. More interesting is the tree mouse (Vande- Icusia), about 7 in. long, which makes its nest in palms and bamboos. The field rats (Mus mettada) occasionally multiply so exceedingly as to diminish the out-turn of the local harvest, and to require special measures for their destruction.

Birds. — The ornithology of India, though it is not considered so rich in specimens of gorgeous and variegated plumage as that of Birds other tropical regions, contains many splendid and

curious varieties. Some arc clothed in nature's gay attire, others distinguished by strength, size and fierceness. The parrot tribe is the most remarkable for beauty. Among birds of prey, four vultures are found, including the common scavengers (Gyps indicus and G. bengalensis). The eagles comprise many species, but none to surpass the golden eagle of Europe. Of falcons, there arc the pere- grine (F. pcregrinus), the shain (F. peregrinator), and the lagar (F. juggcr), which are all trained by the natives for hawking; of hawks, the shikara (Astur badius), the goshawk (A. palumbarius) , and the sparrow-hawk (Accipiter nisus). Kingfishers of various kinds and herons are sought for their plumage. No bird is more popular with natives than the maina (Acridotheres tristis), a member of the starling family, which lives contentedly in a cage, and can be taught to pronounce words, especially the name of the god Rama. Water-fowl are especially numerous. Of game-birds, the floriken (Syplieotis aurila) is valued as much for its rarity as for the delicacy of its flesh. Snipe (Gallinago coelestis) abound at certain seasons, in sucb numbers that one gun has been known to make a bag of one

hundred brace in a day. Pigeons, partridges, quail, plover, duck, teal, sheldrake, widgeon — all of many varieties — complete the list of small game. The red jungle fowl (Gallus ferrugineus), supposed to be the ancestor of our own poultry, is not good eating; and the same may be said of the peacock (Pavo cristatus), except when young. The pheasant does not occur in India Proper, though a white variety is found in Burma.

Reptiles. — The serpent tribe in India is numerous; they swarm in all the gardens, and intrude into the dwellings of the inhabitants, especially in the rainy season. Most are comparatively Reptiles. harmless, but the bite of others is speedily fatal. The cobra di capello (Naia tripudians) — the name given to it by the Portuguese, from the appearance of a hood which it produces by the expanded skin about the neck — is the most dreaded. It seldom exceeds 3 or 4 ft. in

length, and is about I J in. thick, with a small head, covered on the forepart with large smooth scales; it is of a pale brown colour above, and the belly is of a bluish-white tinged with pale brown or yellow. The Russelian snake (Vipera russellii), about 4 ft. in length, is of a pale yellowish-brown, beautifully variegated with large oval spots of deep brown, with a white edging. Its bite is extremely fatal. Itinerant showmen carry about these serpents, and cause them to assume a dancing motion for the amuse- ment of the spectators. They also give out that they render snakes harmless by the use of charms or music, — in reality it is by extracting the venomous fangs. But, judging from the frequent accidents which occur, they sometimes dispense with this precaution. All the salt-water snakes in India are poisonous, while the fresh-water forms are wholly innocuous.

The other reptiles include two species of crocodile (C. porosus and C. palustris) and the ghariyal (Gavialis gangeticus). These are more ugly in appearance than destructive to human life. Scorpions also abound.

Fishes.— All the waters of India — the sea, the rivers and the tanks ■ — swarm with a great variety of fishes, which are caught in every conceivable way, and furnish a considerable proportion of pishes the food of the poorer classes. They are eater; fresh, or as nearly fresh as may be, for the art of curing them is not generally practised, owing to the exigencies of the salt monopoly. In Burma the favourite relish of nga-pi is prepared from fish ; and at Goalanda, at the junction of the Brahmaputra with the Ganges, and along the Madras coast many establishments exist for salting fish in bond. The indiscriminate slaughter of fry, and the obstacles opposed by irrigation dams to breeding fish, are said to be causing a sensible diminution in the supply in certain rivers. Measures of conservancy have been suggested, but their execution would be almost impractic- able. Among Indian fishes, the Cyprinidae or carp family and the Siluridae or cat-fishes are best represented. From the angler's point of view, by far the finest fish is the mahseer (Barbustor), found in all hill streams, whether in Assam, the Punjab or the South. One has been caught weighing 60 lb, which gave play for more than seven hours. Though called the salmon of India, the mahseer is really a species of barbel. One of the richest and most delicious of Indian fishes is the hilsa (Clupea ilisha), which tastes and looks like a fat white salmon. But the enhanced price of fish and the decreased supply throughout the country are matters of grave concern both to the government and the people.

Insects. — The insect tribes in India may be truly said to be in-

*numerable. The heat and the rains give incredible activity to noxious or troublesome insects, and to others of a more showy class, whose large wings surpass in brilliancy the most splendid colours of art. Mosquitoes are innumerable, and moths and ants of the most destructive kind, as well as others equally noxious and disagreeable. Amongst those which are useful are the bee, the silk-worm, and the insect that produces lac. Clouds of locusts occasionally appear, which leave no trace of green behind them, and give the country over which they pass *~he appearance of a desert. Their size is about that of a man's finger, and their colour reddish. They are swept north by the wind till they strike upon the outer ranges of the Himalayas.*

Political Divisions

India (including Burma) has a total area of 1,766,597 sq. m.j and a population (1901) of 294,361,056. Of this total, 1,087,204 sq. m., with a population of 231,899,515, consists of British territory, administered directly by British officers; while the remaining 679,303 sq. m., with a population of 62,461,549, is divided up among various native states, all of which acknowledge the suzerainty of the paramount power, but are directly adminis- tered by semi-independent rulers, usually assisted by a British resident.

The British possessions are distributed into thirteen provinces of varying size, each with a separate head, but all under the supreme control of the governor-general in council. These thirteen provinces or local governments are t ˆ ala s Ajmer-Merwara, Andaman and Nicobar Islands, British Baluchistan, Bengal, Bombay, Burma, Central Provinces

with Berar, Coorg, Eastern Bengal and Assam, Madras, North- West Frontier Province, Punjab, and the United Provinces of Agra and Oudh. Each of these provinces is described under its separate name.

The native states are governed, as a rule, by native princes with the help of a political officer appointed by the British government and residing at their courts. Some of nattn them administer the internal affairs of their states states. with almost complete independence; others require more assistance or a stricter control. These feudatory rulers possess revenues and armies of their own, and the more

important exercise the power of life and death over their subjects; but the authority of each is limited by treaties or engagements, or recognized practice by which their subordinate dependence on the British government is determined. That government, as suzerain in India, does not allow its feudatories to form alliances with each other or with foreign states. It interferes when any chief misgoverns his people; rebukes, and if needful removes, the oppressor; protects the weak; and firmly imposes peace upon all. There are in all nearly 700 distinct units, which may be divided into the following groups.

The most important states are Hyderabad, Mysore, Baroda, Kashmir and Jammu, the Rajputana Agency, and the Central India Agency. The first four of these are single units, states. eacn under its separate ruler; but Rajputana and Central India are political groups consisting of many states, enjoying different degrees of autonomy. Rajputana is the name of a great territorial circle, containing twenty states in all; while under the Central India Agency there are grouped 148 states and petty chiefs.

Amongst the minor states, subordinate to the various provincial governments, five are controlled by Madras; 354 by Bombay, many of them being quite petty; 26 by Bengal, of states. which Kuch Behar is the chief; 34 by the Punjab, amongst which the Phulkian Sikh states and Bhawalpur are the most important; 2 under Eastern Bengal and Assam; 15 under the Central Provinces; and 2 under the United Provinces. Burma contains a number of Shan states, which technically form part of British India, but are administered through their hereditary chiefs. All the most important of these native states are separately described.

In addition to the internal states, which have a fixed status, there are several frontier tracts of India, whose status is fluc- tuating or not strictly defined. In Baluchistan there states. are the native states of Kalat and Las Bela, and also tribal areas belonging to the Marri and Bugti tribes. On the north-west frontier, in addition to the chief ships of Chitral and Dir, there are a number of independent tribes which reside within the political frontier of British India, but over which effective control has never been exercised. The territory belong- ing to these tribes, of whom the chief are the Waziris, Afridis, Orakzais, Mohmands, Swatis and Bajouris, is attached to, but is not strictly within, the North-West Frontier Province. Kashmir possesses as feudatories Gilgit and a number of petty states, of which the most important are Hunza-Nagar and Chilas, but effective control over these outlying states has only been asserted in comparatively recent years for political reasons. Nepal and Bhutan, though independent,

are under various commercial and other agreements with the government of India. On the north-east frontier, as on the north-west, semi-inde- pendent tribes extend across the frontier into independent country. Similarly Karenni, on the Burmese border, is not included in British territory, but the superintendent of the Shan states exercises some judicial and other powers over it.

The People

According to the census of 1901 the population of India (including Burma) was 294,361,056. But this vast mass of people does not constitute a single nationality, neither is it divided into a number of different nations of distinct blood and distinct language. They are drawn, indeed, from four well- marked elements: the non- Aryan tribes or aborigines of the

country; the Aryan or Sanskrit-speaking race; the great mixed population which has grown out of a fusion of the two previous elements; and the Mahommedan invaders from the north-west. These four elements, however, have become inextricably mixed together, some predominating in one portion of the country, some in another, while all are found in every province and native state. The chief modern divisions of the population, therefore, do not follow the lines of blood and language, but of religion and caste.

Of the four elements already enumerated the oldest are the wild tribes of central India, such as the Bhils and Gonds, who probably represent the original inhabitants of the country. These number some 11,000,000. Second come the Dravidians of the south, amounting to about 54,000,000. Thirdly come the Aryans, inhabiting mainly that portion of India north of the Nerbudda which is known as Hindustan proper. Of these only the Brahmans and Rajputs, about 20,000,000, are of pure Aryan blood. The remaining 135,000,000 Hindus represent the fusion of Aryan and non-Aryan elements. Fourthly come the Mahom- medans, numbering some 62,000,000. Many of .them are the descerideents of Arab, Afghan, Mogul and Persian invaders, and the remainder are converts made to Islam in the course of the centuries of Mahommedan rule.

The census report of 1901 divided the population of India into seven distinct racial types: the Turko-Iranian type, represented by the Baluch, Brahui and Afghans of the Baluchistan _

Agency and the North-West Frontier Province; the types.

Indo-Aryan type, occupying the Punjab, Rajputana and Kashmir, and having as its characteristic members the Rajputs, Khatris and Jats; the Scytho-Dravidian type of western India, comprising the Mahrattas; the Kunbist and the Coorgs, probably formed by a mixture of Scythian and Dra vidian elements; the Aryo-Dravidian type found in the United Provinces, in parts of Rajputana, and in Behar, represented in its upper strata by the Hindustani Brahman, and in its lower by the Chamar. This type is probably the result of the intermixture, in varying proportions, of the Indo-Aryan and Dravidian types, the former element pre- dominating in the higher groups and the latter in the lower. The fifth type is the Mongolo-Dravidian of Bengal and Orissa, comprising the Bengal Brahmans and Kayasths, the Mahommedans of Eastern Bengal, and other groups peculiar to this part of India. It is pro- bably a blend of Dravidian and Mongoloid elements with a strain of Indo-Aryan blood in the higher groups. The sixth type is the Mongo- loid of the Himalayas, Nepal, Assam and Burma, represented by the Kanets of Lahoul and Kulu, the Lepchas of Darjeeling, the Limbus, Murmis and Gurungs of Nepal, the Bodo of Assam, and the Burmese. Seventh and last comes the Dravidian type, extending from Ceylon to the valley of the Ganges, and pervading the whole of Madras and Mysore and most of Hyderabad, the Central Provinces, Central India and Chota Nagpur. Its most characteristic repre- sentatives are the Paniyans of the south Indian hills and the Santals of Chota Nagpur. This is probably the original type of the popula- tion of India, now modified to a varying extent by the admixture of Aryan, Scythian and Mongoloid elements.

It is apparently from the differences in civilization and political power resulting from these successive strata of conquerors over the conquered that the Hindu system of caste arose. A Caste

caste is defined in the census report of 1901 as a collection of families or groups of families bearing a common name, which usually denotes or is associated with a specific occupation ; claiming common descent from a mythical ancestor, human or divine, pro- fessing to follow the same calling, and regarded by those who are competent to give an opinion as forming a single homogeneous community. A caste is almost invariably endogamous, in the sense that a member of the large circle denoted by the common name may not marry outside that circle, but within the circle there are usually a number of smaller circles, each of which is also endogamous. Thus it is not enough to say at the present day that a Brahman cannot marry any woman who is not a Brahman ; his wife must not only be a Brahman, but must also belong to the same endogamous division of

the Brahman caste. The origin of caste was described by Sir Denzil Ibbetson in the Punjab Census Report of 1881 in the following terms: " We have the following steps in the process by which caste has been evolved in the Punjab — (1) the tribal divisions common to all primitive societies; (2) the gilds based upon hereditary occupation common to the middle life of all communities; (3) the exaltation of the priestly office to a degree unexampled in other countries; (4) the exaltation of the Levitica'i blood by a special insistence upon the necessarily hereditary nature 01 occupation;

(5) the preservation and support of this principle by the elaboration from the theories of the Hindu creed or cosmogony of a purely artificial set of rules regulating marriage and intermarriage, declaring certain occupations and foods to be impure and polluting, and

prescribing the conditions and degree of social intercourse permitted between the several castes. Add to these the pride of social rank and the pride of blood, which are natural to man, and which alone could reconcile a nation to restrictions at once irksome from a domestic and burdensome from a material point of view, and it is hardly to be wondered at that caste should have assumed the rigidity which distinguishes it in India." Caste has, in fact, come to be the chief dominating factor in the life of the ordinary native of India. All a man's actions from the cradle to the grave are regulated by it ; and the tendency in modern India is for tribes to turn into castes. So widespread is its influence that, though originally a purely Hindu institution, it has come to exercise considerable influence over their Mahommcdan neighbours (see Caste).

The chief Indian religions with the numbers of their followers according (.0 the census of 1901 are: Hindu (207,147,026), Mahommedan (62,458,077), Buddhist (9,476,759), Sikh (2,195,339). Jain (i,334,i48), Christian (2,923,241), Parsee (94,190), and Auimist (8,584,148). The oldest of these religions is Animism (q.v.), which represents the beginnings of religion in India, and is still professed by the more primitive tribes, such as Santals,

Bhils and Gonds. The transition from this crude form of religion to popular Hinduism (q.v.) is compara- tively easy. The most obvious characteristics of the ordinary Hindu are that he worships a plurality of gods, looks upon the cow as a sacred animal, and accepts the Brahmanical supremacy (see Brahmanism) and the caste system ; and when it is a question whether one of the animistic tribes has or has not entered the fold of Hinduism, these two latter points seem to be the proper test to apply. On the other hand there are various offshoots from orthodox Hinduism, the distinguishing feature of which, in their earlier history at least, is the obliteration of caste distinctions and the rejection of the Brahmanical hierarchy. It is doubtful if Buddhism, and still more so if Jainism and Sikhism, all of which are commonly recognized as distinct religions, ever differed from Hinduism to a greater extent than did the tenets of the earlier followers of Chaitanya in Bengal or those of the Lingayats in Mysore; and yet these latter two are regarded only as sects of Hinduism. Considerations of their history and past political importance have led to the elevation of Buddhism, Jainism and Sikhism to the rank of independent religions, while the numerous other schismatic bodies are held to be only sects. But there is a marked tendency both on the part of the sects and of the distinct religions to lapse into the parent religion from which they sprang. In this way both Buddhism (q.v.) and Jains (q.v.) have almost been swallowed up by Hinduism; Sikhism (q.v.) is only preserved by the military requirements of the British, and even the antagonism between Hindu and Mahommedan is much less acute than it used to be. The bewildering diversity of religious beliefs collected under the name of Hinduism has no counterpart amongst the Mahom- medans (see Mahommedan Religion), who are limited as to their main tenets by the teaching of a single book, the Koran. The two main sects are the Sunnis and the Shiahs. In India the Sunnis greatly preponderate, but they usually share with the Shiahs their veneration for Hasan and Husain and strictly observe the Mohurrum.

The Mahommedans of India may be divided into two classes, pure Mahommedans from the Mogul and Pathan conquering races, and Mahommedan converts, who differ very little from the surrounding Hindu population from which they originally sprang. The pure Mahommedans may again be subdivided into four sections: Moguls, or the descendants of the last conquering race, including Persians; Afghans or Pathans, who from their prox- imity to the frontier are much more strongly represented, chiefly in the Punjab and in the Rohilkhand division of the United Provinces; Sayads, who claim to be lineally descended from the Prophet; and Sheikhs, which is a

name often adopted by con- verts. The remainder are unspecified, but the following tribes or classes among Indian Mussulmans are worthy of notice. In Bengal the vast majority of the Mahommedans manifestly belong to the same race as the lowest castes of Hindus. They are them- selves subdivided into many classes, which in their devotion to hereditary occupations are scarcely to be distinguished from Hindu castes. In the Punjab, besides the Pathan immigrants from across the frontier, Islam has taken a strong hold of the

native population. The census returned large numbers of Jats, Rajputs and Gujars among the Mussulmans. Here, again, the Mahommedans are not strongly distinguished from; their Hindu brethren. Bombay possesses three peculiar I classes of Mussulmans, each of which is specially devoted to maritime trader — the Memons, chiefly in Sind; the Borahs, mainly in Gujarat; and the Khojahs, of whom half live in the island of Bombay. In southern India the majority are known as Deccani Mussulmans, being descendants of the armies led by the' kings and nawabs of the Deccan. But the two peculiar races of the south are the Moplahs and the Labbays, both of which are seated along the coast and follow a seafaring life. They are descended from the Arab traders who settled there in very early times, and were recruited partly by voluntary adhesions and partly by forcible conversions during the persecutions of Hyder Ali and Tippoo Sultan. The Moplahs of Malabar are notorious for repeated outbreaks of bloody fanaticism. In proportion to the total population Islam is most strongly represented in the North- West Frontier Province, where it is the religion of 92% of the inhabitants; then follow Kashmir and Sind with about 75% each. Eastern Bengal and Assam with 58%, the Punjab with 49%, Bengal with 18%, and the United Provinces with r4%. In the great Mahommedan state of Hyderabad the proportion is only, 10%. It appears that the Mahommedans generally tend to increase at a faster rate than the Hindus.

The Sikh religion is almost entirely confined to the Punjab. Of the total number of 2,195,339 Sikhs all but 64,352 are found in the Punjab, and two-thirds of the remainder are in the United Provinces and Kashmir which adjoin it.

Buddhism had disappeared from India long before the East India Company gained a foothold in the country, and at the present day there are very few Buddhists in India proper. Of the 9,476,759 enumerated in the census of 1901 all but some three hundredthousand were in Burma. The greater part of the remainder are found in Bengal on the borders of Burma, on the borders of

Nepal, Tibet and Bhutan, and in the Spiti, Lahul and Kanawar districts of the Punjab Himalayas, where many of the inhabitants are of Tibetan origin.

More than two-fifths of the Jains in India are found in Bombay and its native states, including Baroda. They are proportionally most numerous in central and western Rajputana and in Gujarat and Central India.

The Parsees, though influential and wealthy, are a very small community, numbering only 94,000, of whom all but 7000 are found in Bombay. The remainder are scattered all over India, but are most numerous in Hyderabad, the Central India Agency, and the Central Provinces.

The Christian community numbers 2,923,241, of whom, 2,664,313 are natives and the remainder Europeans and Eurasians. Of the native Christians about two-fifths are Roman Catholics and one-eighth Uniat Syrians; one-ninth belong to the Anglican communion, one^eleventh are Jacobite Syrians, and one-twelfth are Baptists; while Lutherans, Methodists and Presbyterians are also represented. Nearly two-thirds of the total number are found in the Madras Presidency, including its native states. In Cochin and Travancore, where the Syrian church has most of its adherents, nearly a quarter of the entire population profess the Christian faith. More than four-fifths of the Christians in Madras proper are found in the eight southernmost districts, the scene of the labours of St Francis Xavier and the Protestant missionary Schwarz. The adherents of the Syrian church, known as " Christians of St Thomas," in Malabar, Travancore and Cochin are the most ancient Christian community in the south. After these come the Roman Catholics, who trace their origin to the teaching of St Francis Xavier and the Madura Jesuits, The Pro- testant churches date only from about the beginning of the 19th century, but their progress since that time has been considerable. As is to be expected in the case of a religion with a strong proselytizing agency, the growth of Christianity is far more rapid than; that of the general population. Taking native Christians alone, their numbers increased from 1,246,288 in 1872 to 2,664,313 in 1961, and the rate of increase in the thirty years was even greater 'than these figures would show, because they include the Syrian church, whose numbers are practically constant. The classes most receptive of Christianity are those who are outside the Hindu system, or whom Hinduism regards as degraded. Amongst the Hindu higher castes there are serious obstacles in the way of conversion, of which family influence and the caste system are the greatest.

Languages. — According to the linguistic survey of India no fewer than 147 distinct languages are recorded as verna- cular in India. These are grouped according to the following system:—

Vernaculars of India.

Number of languages spoken. Malayo-Polynesian Family —

Malay Group (7831) 2

Mon-Khmer Family (427,760) 4

Tibeto-Chinese Family —

Tibeto-Burman Sub-family (9,560,454) . . .79

Siamese-Chinese Sub-family (1,724,085) ... 9

Dravidian Family (56,514,524) 14

Munda Family (3,179.275) 10

Indo-European Family, Aryan Sub-family —

Iranian Branch (1,377,023) 3

Indo-Aryan Branch (219,780,650) 22

Semitic Family (42,881) I

Hamitic Family (5530) I

Unclassed Languages 2

Andamanese (1882)

Gipsy Languages (344,143)

Others (125)

Total Vernaculars of India 147

The only representatives of the Malayo-Polynesian group in India are the Selungs of the Mergui Archipelago and the Nicobarese. The Mon-Khmer family, which is most numerous in Indo-China, is here represented by the Talaings of southern Burma and the Khasis of Assam. Of the Tibeto-Chinese family, the Tibeto-Burman sub- family, as its name implies, is spoken from Tibet to Burma; while the Siamese-Chinese subfamily is represented by the Karens and Shans of Burma. The Munda or Kolarian family, which is now distinguished from the Dravidian, is almost confined to Chota Nagpur, its best-known tribe being the Santals. The Dravidian family includes the four literary languages of the south, as well as many dialects spoken by hill tribes in central India, and also the isolated Brahui in Baluchistan. Of the Indo-European family, the Iranian branch inhabits Persia, Afghanistan and Baluchistan; while the Indo-Aryan branch is spoken by the great mass of the people of northern India. The only Semitic language is Arabic, found at Aden, where also the Hamitic Somali was returned. Gipsy dialects are used by the nomadic tribes of India, while Andamanese has not been connected by philologists with any recognized family of speech.

All the chief languages of India are described under their separate names.

Education. — The existing system of education in India is mainly dependent upon the government, being directly organized by the state, at least in its higher departments, assisted through- out by grants-in-aid and under careful inspection. But at no period of its history has India been an altogether unenlightened country. The origin of the Deva-Nagari alphabet is lost in antiquity, though that is generally admitted not to be of indi- genous invention. Inscriptions on stone and copper, the palm- leaf records of the temples, and in later days the widespread manufacture of paper, all alike indicate, not only the general knowledge, but also the common use, of the art of writing. From the earliest times the caste of Brahmans has preserved, by oral tradition as well as in MSS., a literature unrivalled alike in its antiquity and in the intellectual subtlety of its contents. The Mahommedan invaders introduced the profession of the historian, which reached a high degree of excellence, even as compared with contemporary Europe. Through all changes of government vernacular instruction in its simplest form has always been given, at least to the children of respectable classes, in every large village. On the one hand, the tols or seminaries for teaching Sanskrit philosophy at Benares and Nadiya recall the schools of Athens and Alexandria; on the other, the importance attached to instruction in accounts reminds us of the picture which Horace has

left of a Roman education. Even at the present day knowledge of reading and writing is, owing to the teaching of Buddhist monks, as widely diffused throughout Burma as it is in some countries of Europe. English efforts to stimulate education have ever been most successful when based upon the existing indigenous institutions.

During the early days of the East India Company's rule the promotion of education was not recognized as a duty of government. The enlightened mind of Warren Hastings did indeed anticipate his age by founding the Calcutta madrasa for Mahommedan teaching, and by affording steady patronage alike to Hindu pundits and European students. But Wellesley 's schemes of imperial dominion did not extend beyond the establishment

of a college for English officials. Of the Calcutta colleges, that of Sanskrit was founded in 1824, when Lord Amherst was governor-general, the medical college by Lord William Bentinck in 1835, the Hooghly madrasa by a wealthy native gentleman in 1836. The Sanskrit college at Benares had been established in 1791, the Agra college in 1823. Meanwhile the missionaries made the field of vernacular education their own. Discouraged by the official authorities, and ever liable to banishment or deportation, they not only devoted themselves with courage to their special work of evangelization, but were also the first to study the vernacular dialects spoken by the common people. Just as two centuries earlier the Jesuits at Madura, in the extreme south, composed works in Tamil, which are still acknow- ledged as classical by native authors, so did the Baptist mission at Serampur, near Calcutta, first raise Bengali to the rank of a literary dialect. The interest of the missionaries in education, which has never ceased to the present day, though now compara- tively overshadowed by government activity, had two distinct aspects. They studied the vernacular, in order to reach the people by their preaching and to translate the Bible; and they taught English, as the channel of non-sectarian learning.

At last the government awoke to its own responsibility in the matter of education, after the long and acrimonious controversy between the advocates of English and vernacular teaching had worn itself out. The present system dates from 1854, being based upon a comprehensive despatch sent out by Sir C. Wood (afterwards Lord Halifax) in that year. At that time the three universities were founded at Calcutta, Madras and Bombay; English-teaching schools were established in every district; the benefit of grants-in-aid was extended to the lower vernacular institutions and to girls' schools; and public instruction was erected into a department of the

administration in every province, under a director, with a staff of inspectors. In some respects this scheme may have been in advance of the time; but it supplied a definite outline, which has gradually been filled up with each succeeding year of progress. A network of schools has now been spread over the country, graduated from the indigenous village institutions up to the highest colleges. All alike receive some measure of pecuniary support, which is justified by the guarantee of regular inspection; and a series of scholarships at once stimulates efficiency and opens a path to the university for children of the poor.

During Lord Curzon's term of office the whole system of education in India was examined, reported upon and improved. The five universities of Calcutta, Madras, Bombay, Allahabad and Lahore, which were formerly merely examining bodies, had their senates reformed by the introduction of experts; while hostels or boarding-houses for the college students were founded, so as to approach more nearly to the English ideal of residential institutions. The schools for secondary education were found to be fairly prosperous, owing to the increasing demand for English education; but more teachers and more inspectors were provided. In the primary schools, however, which provide vernacular teaching for the masses, there were only 45 million pupils to the 300 millions of India. In 1901 three out of every four country villages had no school, only 3,000,000 boys, or less than one-fifth of the total number of school-going age, were in receipt of primary education, and only one girl for every ten of the male sex, or 25% of the female population of school-going age. In order to remedy these defects primary education was made a first charge upon provincial revenues, and a permanent annual grant of £213,000 was made from the central government, with the result that thousands of new primary schools have since been opened. The technical schools may be divided into two classes, technical colleges and schools and industrial schools. The former include colleges of engineering and agriculture, veterinary colleges, schools of art and similar institutions. Several of these, such as the Rurki and Sibpur engineering colleges, the college of science at Poona, the Victoria Jubilee Institute at Bombay and some of the schools of art, have shown excellent results. The agricultural colleges have been less successful. The industrial schools were largely engaged in

1901 in teaching carpentry and smithy-work to boys who never intended to be carpenters or smiths; but this misdirection of industry has since been remedied, and the industrial schools have been made the first stepping-stone towards a professional career. In addition a number of technical scholarships of £150 each have been founded tenable in Europe or America.

Administration

By the act of parliament which transferred the government of India from the company to the crown, the administration in England is exercised by the sovereign through a secretary of st»te, who inherits all the powers formerly belonging to the Court of Directors and the Board of Control, and who, as a member of the cabinet, is responsible to parliament. In administrative details he is assisted by the Council of India, an advisory body, with special control over finance. This council consists of not more than fifteen and not fewer than ten members, appointed by the secretary of state for a term of seven years, of whom at least nine must have served or resided in India for ten years. A Hindu and a Mahommedan were for the first time appointed to the council in 1907.

At the head of the government in India is the governor- general, styled also viceroy, as representative of the sovereign. 77, e He is appointed by the crown, and his tenure of office

Supreme is five years. The supreme authority, civil and Govern- military, including control over all the local govern- ments, is vested in the governor-general in council, commonly known as " the Government of India," which has its seat at Calcutta during the cold season from November to April, and migrates to Simla in the Punjab hills for the rest of the year. The executive council of the governor-general is composed of six ordinary members, likewise appointed by the crown for a term of five years, of whom three must have served for ten years in India and one must be a barrister, together with the commander-in-chief as an extraordinary member. A Hindu barrister was first appointed a member of council in 1909. The several departments of administration — Foreign, Home, Finance, Legislative, Army, Revenue and Agriculture (with Public Works), Commerce and Industry, Education (added in 1910) — are distributed among the council after the fashion of a European cabinet, the foreign portfolio being reserved by the viceroy; but all orders and resolutions are issued in the name of the governor-general in council and must be signed by a secretary.

For legislative purposes the executive council is enlarged into a legislative council by the addition of other members, j he ex officio, nominated and elected. In accordance

Legisla- with regulations made under the Indian Councils Act t,ve 1909, these additional members number 61, making

uac ‘ 68 in all with the viceroy, so arranged as to give an official majority of three. The only ex-officio additional member is the lieutenant-governor of the province in which the legislative council may happen to meet; nominated members number 35, of whom not more than 28 may be officials; while 25 are elected, directly or indirectly, with special representation for Mahommedans and landholders. Apart from legislation, the members of the council enjoy the right to interpellate the government on all matters of public interest, including the putting of supplementary questions; the right to move and discuss general resolutions, which, if carried, have effect only as recommendations; and the right to discuss and criticize in detail the budget, or annual financial statement.

The local or provincial governments are fifteen in all, with varying degrees of responsibility. First stand the two presi- dencies of Madras (officially Fort St George) and Bombay, each of which is administered by a governor and council appointed by the crown. The governor is usually sent from England; the members of council may number four, of whom two must have served in India for ten years. Next follow the five lieutenant- governorships of Bengal, the United Provinces of Agra and Oudh, the Punjab, Burma, and Eastern Bengal and Assam, for each of which a council may be appointed, beginning with Xiv. 13

Districts.

Bengal. Last come the chief commissionerships, of which the Central Provinces (with Berar) rank scarcely below the lieutenant-governorships, while the rest — the North-West Frontier Province, British Baluchistan, Ajmer-Merwara, Coorg and the Andamans — are minor charges, generally associated with political supervision over native states or frontier tribes. The two presidencies and also the five lieutenant-governorships each possesses a legislative council, modelled on that of the governor-general, but so that in every case there shall be a majority of non-official members, varying from 13 to 3.

Within the separate provinces the administrative unit is the district,

of which there are 249 in India. In every province except Madras there are divisions, consisting of three or more districts under a commissioner. The title of the district officer varies according to whether the province is " regulation " or " non-regulation." This is an old dis- tinction, which now tends to become obsolete; but broadly speaking a larger measure of discretion is allowed in the non-regulation provinces, and the district officer may be a military officer, while in the regulation provinces he must be a member of the Indian civil service. In a regulation province the district officer is styled a collector, while in a non-regulation province he is called a deputy-commissioner. The chief non- regulation provinces are the Punjab, Central Provinces and Burma; but non-regulation districts are also to be found in Bengal, Eastern Bengal and Assam, the United Provinces and Sind.

The districts are partitioned out into lesser tracts, which are strictly units of administration, though subordinate ones. The system of partitioning, and also the nomenclature, vary in the different provinces ; but generally it may be said that the subdivision or tahsil is the ultimate unit of administration. The double name indicates the twofold principle of separation: the subdivision is properly the charge of an assistant magistrate or executive officer, the tahsil is the charge of a deputy-collector or fiscal officer; and these two offices may or may not be in the same hands. Broadly speaking, the subdivision is characteristic of Bengal, where revenue duties are in the background, and the tahsil of Madras, where the land settlement requires attention year by year. There is no administrative unit below the sub- division or tahsil. The thana, or police division, only exists for police purposes. The pargana, or fiscal division, under native rule, has now but an historical interest. The village still remains as the agricultural unit, and preserves its inde- pendence for revenue purposes in most parts of the country. The township is peculiar to Burma.

Bengal (including Eastern Bengal and Assam), Madras, Bombay and the old North- Western Provinces each has a high court, established by charter under an act of parliament, with judges appointed by the crown. Tbe Of the other provinces the Punjab and Lower Burma service have chief courts, and Oudh, the Central Provinces, Upper Burma, Sind and the North-West Frontier Province have judicial commissioners, all established by local legislation. From the high courts, chief courts and judicial commissioners an appeal lies to the judicial committee of the privy council in England. Below these courts come district and sessions judges, who perform the ordinary judicial work of the country, civil and criminal. Their jurisdictions

coincide for the most part with the magisterial and fiscal boundaries. But, except in Madras, where the districts are large, a single civil and sessions judge sometimes exercises jurisdiction over more than one district. In the non-regulation territory judicial and executive functions are to a large extent combined in the same hands.

The law administered in the Indian courts is described in the article Indian Law.

The chief of the Indian services is technically known as the Indian civil service. It is limited to about a thousand members, who are chosen by open competition in England between the ages of twenty-one and twenty-four, services. Nearly all the higher appointments, administrative and judicial, are appropriated by statute to this service, with

The Army.

the exception of a few held by military officers on civil duty in the non-regulation provinces. Other services mainly or entirely recruited in England are the education department, police, engineering, public works, telegraph and forest services. In addition to the British officials employed in these services, there is a host of natives of India holding superior or subordinate appointments in the government service. According to a calculation made in 1904, out of 1370 appointments with a salary of £800 a year and upwards, 1 263 were held by Europeans, 1 5 by Eurasians and 92 by natives of India. But below that line natives of India greatly preponderate; of 26,908 appointments ranging between £800 and £60 a year, only 5205 were held by Europeans, 5420 by Eurasians and 16,283 by natives.

These figures show that less than 6500 Englishmen are employed to rule over the 300 millions of India. On the other hand, natives manage the greater part of the administration of the revenue and land affairs and magisterial work. The subordinate courts throughout India are almost entirely manned by native judges, who sit also on the bench in each of the High Courts. Similarly in the other services. There are four engineer- ing colleges in India, which furnish to natives access to the higher grades of the public works department; and the pro- vincial education services are recruited

solely in India.

Though the total strength of the army in India has undergone little change, important reforms of organization have been effected in recent years which have greatly improved its efficiency. In 1895, after long discussion, the old presidency system was abolished and the whole army was placed under one commander-in-chief, though it was not till 1904 that the native regiments of cavalry and infantry were re-numbered consecutively, and the Hyderabad contingent and a few local battalions were incorporated with the rest of the army. About the same time (1903) the designa- tion of British officers serving with native troops was changed from "Indian Staff Corps " to "Indian Army." The entire force, British and native, is now subdivided into a Northern and a Southern Army, with Burma as an independent command attached to the latter. Each of these armies is organized in divisions, nine in number, based on the principles that the troops in peace should be trained in units of command similar to those in which they would take the field, and that much larger powers should be entrusted to the divisional commanders. At the same time large sums of money have been expended on strategic works along the north-west frontier, supply and transport has been reorganized, rifle, gun and ammunition factories have been established, and a Staff College at Quetta.

In 1907-1908 the actual strength of the army in India numbered 227,714 officers and men, of whom 73,947 were British troops; and the total military expenditure amounted to £17,625,000, of which £2,996,000 was for non-effective charges. In addition, the reserve of the native army numbered 34,846 men, the volunteers 34,962, the frontier militia (including the Khyber Rifles) about 6000, the levies (chiefly in Baluchistan) about 6000, and the military police (chiefly in Burma) about 22,000. These figures do not include the Imperial Service troops, consisting of cavalry, infantry and transport corps, about 18,000 in all, which are paid and officered by the native states furnishing them, though supervised by British inspectors. The military forces otherwise maintained by the several native states are estimated to number about 100,000 men, of varying degrees of efficiency.

The police, it is admitted, still form an unsatisfactory part of the administration, though important reforms have recently been introduced. The present system, which is modelled somewhat on that of the Irish constabulary, dates from shortly after the Mutiny, and is regulated for the greater part of the country by an act passed in 186 1. It provides a regular force in each district, under a superintendent

who is almost always a European, subordinate for general purposes to the district magistrate. For the preservation of order this force is by no means inefficient, but it fails as a detective agency and also in the prosecution of crime, being distrusted by the

Gaols.

people generally. As the result of a Commission appointed in 1902, a considerable addition has been made to the expenditure on police, which is being devoted to increasing the pay of all the lower grades and to augmenting the number of investigating officers. In 1901 the total strength of the civil police force was about 145,000 men, maintained at a total cost of about £2,200,000. In addition, the village watchmen or chaukidars, a primitive institution paid from local sources but to some extent incorporated in the general system, aggregated about 700,000; while a special force of military police, numbering about 20,000 under officers seconded from the army, is main- tained along the frontier, more especially in Burma. »

The administration of gaols in India can be described more favourably. As a rule, there is one gaol in each district, under the management of the civil surgeon. Discipline is well maintained, though separate confinement is practically unknown; and various industries (especially carpet-weaving) are profitably pursued wherever possible. So much attention has been directed to diet and sanitation that the death-rate compares well with that of the general working population: in 1907 it was as low as 18 per 1000. Convicts with more than six years to serve are transported to the Andaman Islands, where the penal settlement is organized on an elaborate system, permitting ultimately self-support on a ticket of leave and even marriage. In 1907 the daily average gaol population in India was 87,306, while the convicts in the Andamans numbered

14,235-

Local self-government, municipal and rural, in the form in which it now prevails in India, is essentially a product of British rule. Village communities and trade gilds in towns existed M fc . previously, but these were only rudimentary forms of mt

self-government. The beginnings of municipal govern- polities. ment occurred in the Presidency towns. Apart from these the act of 1850 respecting improvements in towns initiated consultative committees. In 1870 Lord Mayo delegated to local committees the control over these improvement funds. But the system at present in force is based

upon legislation by Lord Ripon in 1882, providing for the establishment of municipal committees and local boards, whose members should be chosen by election with a preponderance of non-official members. The large towns of Calcutta, Bombay and Madras have municipalities of this character, and there are large numbers of municipal committees and local boards all over the country. There are also Port Trusts in the great maritime cities of Calcutta, Bombay, Madras, Karachi and Rangoon.

As the land furnishes the main source of Indian revenue, so the assessment of the land tax is the main work of Indian administration. No technical term is more familiar to Anglo-Indians, and none more strange to the ˆ a ” _ English public, than that of land settlement. No ment. subject has given rise to more voluminous controversy. It will be enough in this place to explain the general principles upon which the system is based, and to indicate the chief differ-‘ ences of application in the several provinces. That the state should appropriate to itself a direct share in the produce of the soil is a fundamental maxim of Indian finance that has been recognized throughout the East from time immemorial. The germs of rival systems can be traced in the old military and other service tenures of Assam, and in the poll tax of Burma, &c. The exclusive development of the land system is due to two conditions, — a comparatively high state of agriculture and an organized plan of administration,- — both of which are supplied by the primitive village community. During the lapse of untold generations, despite domestic anarqhy and foreign conquest, the Hindu village has in many parts preserved its simple customs, written in the imperishable tablets of tradition The land was not held by private owners but by occupiers under the petty corporation; the revenue was not due from individuals, but from the community represented by its head-man. The aggregate harvest of the village fields was thrown into a common fund, and before the general distribution the head-man was bound to set aside the share of the state. No other system of taxation could be theoretically more just, or in practice less obnoxious to the people. Such is an outline of the land system as it may be found at the present day throughout large portions of India both under British and native rule; and such we may*

*fancy it to have been universally before the Mahommedan conquest. The Mussulmans brought with them the avarice of conquerors, and a stringent system of revenue collection. Under the Mogul empire, as organized by Akbar the Great, the share of the state was fixed at one-third of the gross produce of the soil; and a regular army of tax-collectors was permitted to intervene between the cultivator and the supreme government. The entire vocabulary of the present land system is borrowed from the Mogul administration. The zamindar himself is a creation of the Mahommedans, unknown to the early Hindu system. He was originally a mere tax-collector, or farmer of the land revenue, who agreed to furnish a lump sum from the tract of country assigned to him. If the Hindu village system may be praised for its justice, the Mogul farming system had at least the merit of efficiency. Shah Jahan and Aurangzeb extracted a larger land revenue than the British do. "When the government was first undertaken by the East India Company, no attempt was made to understand the social system upon which the land revenue was based. The zamindar was con- spicuous and useful; the village community and the cultivating ryot did not force themselves into notice. The zamindar seemed a solvent person, capable of keeping a contract; and his official position as tax-collector was confused with the proprietary rights of an English landlord. The superior stability of the village system was overlooked, and in the old provinces of Bengal and Madras the village organization has gradually been suffered to fall into decay. The consistent aim of the British authorities has been to establish private property in the soil, so far as is consistent with the punctual payment of the revenue. The annual government demand, like the succes- sion duty in England, is universally the first liability on the land; when that is satisfied, the registered landholder k*s powers of sale or mortgage scarcely more restricted than those of a tenant in fee-simple. At the same time the possible hardships, as regards the cultivator, of this absolute right of property vested in the owner have been anticipated by the recognition of occupancy rights or fixity of tenure, under certain conditions. Legal rights are everywhere taking the place of unwritten customs. Land, which was before merely a source of livelihood to the cultivator and of revenue to the state, has now become the subject of commercial speculation. The fixing of the revenue demand has conferred upon the owner a credit which he never before possessed, by allowing him a certain share of the unearned increment. This credit he may use improvidently, but none the less has the land system of India been raised from a lower to a higher stage of civilization.*

The means by which the land revenue is assessed is known as settlement, and the assessor is styled a settlement officer. In Bengal the assessment has been accomplished once and for all, but throughout the greater part of the rest of India the process is continually going on. The details vary in the different provinces; but, broadly speaking, a settlement may be described as the ascertainment of the agricultural capacity of the land. Prior to the settlement is the work of survey, which first determines the area of every village and frequently of every field also. Then comes the settlement officer, whose duty it is to estimate the character of the soil, the kind of crop, the opportunities for irrigation, the means of communication and their probable development in the future, and all other circumstances which tend to affect the value of the produce. With these facts before him, he proceeds to assess the government demand upon the land according to certain general principles, which may vary in the several provinces. The final result is a settlement report, which records, as in a Domesday Book, the entire mass of agricultural statistics concerning the district.

Lower Bengal and a few adjoining districts of the United Provinces and of Madras have a permanent settlement, i.e. the land revenue has been fixed in perpetuity. When the Company obtained the diwdni or financial administration of Bengal in 1765, the theory of a settlement, as described above, was unknown. The existing Mahommedan system was adopted in its entirety. Engagements, sometimes yearly, sometimes for a term of years, were entered into with the zamindars to pay a lump sum for the area over which they exercised control. If the offer of the zamindar was not deemed satisfactory, another contractor was substituted in his place. But no steps were

taken, and perhaps no steps were possible, to ascertain in detail the amount which the country could afford to pay. For more than twenty years these temporary engagements continued, and received the sanction of Warren Hastings, the first titular governor-general of India. Hasting's great rival, Francis, was among those who urged the superior advantages of a per- manent assessment. At last, in 1789, a more accurate investiga- tion into the agricultural resources of Bengal was commenced, and the settlement based upon this investigation was declared perpetual by Lord Cornwallis in 1793. The zamindars of that time were raised to the status of landlords, with rights of transfer and inheritance, subject always to the payment in perpetuity of a rent-charge. In default of due payment, their lands were liable to be sold to the highest bidder. The aggregate assess- ment was fixed at sikkd Rs. 26,800,989, equivalent to Co.'s

Rs. 28,587,722, or say 2} millions sterling. While the claim of Government against the zamindars was thus fixed for ever, it was intended that the rights of the zamindars over their own tenants should be equally restricted. But no detailed record of tenant-right was inserted in the settlement papers, and, as a matter of fact, the cultivators lost rather than gained in security of tenure. The same English prejudice which made a landlord of the zamindar could recognize nothing but a tenant- at-will in the ryot. By two stringent regulations of 1799 and 181 2 the tenant was practically put at the mercy of a rack- renting landlord. If he failed to pay his rent, however excessive, his property was rendered liable to distraint and his person to imprisonment. At the same time the operation of the revenue sale law had introduced a new race of zamindars, who were bound to ttfeir tenants by no traditions of hereditary sympathy, but whose sole object was to make a profit out of their newly purchased property. The rack-rented peasantry found no protection in the law courts until 1859, when an act was passed which restricted the landlord's powers of enhancement in certain specified cases. Later the Bengal Tenancy Act of 1885, since amended by an act of 1898, created various classes of privileged tenants, including one class known as " settled ryots," in which the qualifying condition is holding land, not necessarily the same land, for twelve years continuously in one village. Outside the privileged classes of tenants the act gives valuable protection to tenants-at-will. The progress in the acquisition of occupancy rights by tenants may be judged from the fact that, whereas in 1877 it was stated of the Champaran district that the culti- vator had hardly acquired any permanent interest in the soil, the settlement officer in 1900 reported that 87% of the occupied area was in the possession of tenants with occupancy rights or holding at fixed rates. It is believed that the ryots will eventu- ally be able to secure, and to hold against all comers, the strong legal position which the Bengal Tenancy Act has given them. The permanent settlement was confined to the three provinces of Bengal, Behar and Orissa, according to their boundaries at that time. Orissa proper, which was conquered from the Mahrattas in 1803, is subject to a temporary settlement, which expired in 1897 and a re-settlement was made in 1900. The enhancement in the revenue amounted to 52% of the previous demand ; but in estates in which the increase was specially large it was decided to introduce the new rates gradually.

The prevailing system throughout the Madras presidency is the ryotwari, which takes the cultivator or peasant proprietor as its rent-paying unit, somewhat as the Bengal system takes the zamindar. This

system cannot be called T, He rf indigenous to the country, any more than the zamin- system. dari of Bengal. If any system deserves that name, it is that of village assessment, which still lingers in the memories of the people in the south. When the British declared them- selves heir to the nawab of the Carnatic at the opening of the 19th century, they had no adequate experience of revenue management. The authorities in England favoured the zamin- dari system already at work in Bengal, which appeared at least calculated to secure punctual payment. The Madras Govern- ment was accordingly instructed to enter into permanent engagements with zamindars, and, where no zamindars could be

found, to create substitutes out of enterprising contractors. The attempt resulted in failure in every case, except where the zamindars happened to be the representatives of ancient lines of powerful chiefs. Several of such chiefs exist in the extreme south and in the north of the presidency. Their estates have been guaranteed to them on payment of a peshkash or permanent tribute, and are saved by the custom of primogeniture from the usual fate of subdivision. Throughout the rest of Madras there are no zamindars either in name or fact. The influence of Sir Thomas Munro afterwards led to the adoption of the ryotwari system, which will always be associated with his name. According to this system, an assessment is made with the cultivating proprietor upon the land taken up for cultivation year by year. Neither zamindar nor village officer intervenes between the cultivator and the state, which takes directly upon its own shoulders all a landlord's responsibility. The early ryotwari settlements in Madras were based upon insufficient experience. They were preceded by no survey, but adopted the crude estimates of native officials. Since 1858 a department of revenue survey has been organized, and the old assessments have been everywhere revised.

Nothing can be more complete in theory and more difficult of exposition than a Madras ryotwari settlement. First, the entire area of the district, whether cultivated or uncultivated, and of each field within the district is accurately measured. The next step is to calculate the estimated produce of each field, having regard to every kind of both natural and artificial advantage. Lastly, a rate is fixed upon every field, which may be regarded as roughly equal to one-

third of the gross and one-half of the net produce. The elaborate nature of these inquiries and calculations may be inferred from the fact that as many as thirty-five different rat^es are some- times struck for a single district, ranging from 6d. to £1 , 4s. per acre. The rates thus ascertained are fixed for a term of thirty years; but during that period the aggregate rent-roll of a district is liable to be affected by several considerations. New land may be taken up for cultivation, or old land may be abandoned; and occasional re- missions are permitted under no less than eighteen specified heads. Such matters are discussed and decided by the collector at the jamabandi or court held every year for definitely ascertaining the amount of revenue to be paid by each ryot for the current season. This annual inquiry has sometimes been mistaken by careless passers-by for an annual reassessment of each ryot's holding. It is not, however, a change in the rates for the land which he already holds, but an inquiry into and record of the changes in his former holding or of any new land which he may wish to take up.

In the early days of British rule no system whatever prevailed throughout the Bombay presidency; and even at the present time there are tracts where something of the old confusion survives. The modern " survey tenure," as it is called, dates from 1838, when it was first introduced into one of the tdlukas of Poona district, and it has since been gradually extended over the greater part of the presidency. As its name implies, the settlement is preceded by survey. Each field is measured, and an assessment placed upon it according to the quality of the soil without any attempt to fix the actual average produce. This assessment holds good, without any possibility of modifica- tion, for a term of thirty years. The Famine Commission of 1901 suggested the following measures with a view to improving the position of the Bombay ryot: (1) A tenancy law to protect expropriated ryots, (2) a bankruptcy law, (3) the limitation of the right of transfer, in the interests of ryots who are still in possession of their land.

In the other provinces variations of the zamindari and ryotwari systems are found. In the United Provinces and the Punjab the ascertainment of the actual rents paid is the Theother necessarv preliminary to the land revenue demand. viaces. I n the Central Provinces, where the landlords {mal- guzars) derive their title from the revenue settlements made under British rule, the rents are actually fixed by the settlement officer for varying periods. In addition nearly every province has its own laws regulating the subject of tenancy ; the tenancy laws of the United Provinces and of the Central Provinces were revised and amended during the decade

1891-

1901.

The principles of the land revenue settlement and administra- tion were reviewed by the government of India in a resolution

presented to parliament in 1902, in which its policy is sum- marised as follows : —

“In the review of their land revenue policy which has Tenures now been brought to a close, the Government of I ndia claim a£U f to have established the following propositions, which, for Settle- convenience’ sake, it may be desirable to summarize before meats. concluding this Resolution: —

(1) That a Permanent Settlement, whether in Bengal or elsewhere, is no protection against the incidence and consequences of famine.

(2) That in areas where the State receives its land revenue from

landlords, progressive moderation is the key-note of the policy of Government, and that the standard of 50 % of the assets is one which is almost uniformly observed in practice, and is more often departed from on the side of deficiency than of excess.

(3) That in the same areas the State has not objected, and does

not hesitate, to interfere by legislation to protect the interests of the tenants against oppression at the hands of the landlord.

(4) That in areas where the State takes the land revenue from the

cultivators, the proposal to fix the assessment at one-fifth of the gross produce would result in the imposition of a greatly increased burden upon the people.

(5) That the policy of long term settlements is gradually being

extended, the exceptions being justified by conditions of local development.

(6) That a simplification and cheapening of the proceedings connected with new settlements and an avoidance of the harassing invasion of an army of subordinate officials, are a part of the deliberate policy of Government.

(7) That the principle of exempting or allowing for improvements

is one of general acceptance, but may be capable of further extension.

(8) That assessments have ceased to be made upon prospective assets.

(9) That local taxation as a whole, though susceptible of some redistribution, is neither immoderate nor burdensome.

(10) That over-assessment is not, as alleged, a general or wide-spread source of poverty and indebtedness in India, and that it cannot fairly be regarded as a contributory cause of famine.

The Government of India have further laid down liberal principles for future guidance and will be prepared, where the necessity is established, to make further advance in respect of : —

(n) The progressive and graduated imposition of large enhance-ments.

(12) Greater elasticity in the revenue collection, facilitating its adjustment to the variations of the seasons, and the circumstances of the people.

(13) A more general resort to reduction of assessments in cases of local deterioration, where such reduction cannot be claimed under the terms of settlement."

In 1900-1901 the total land revenue realized from territory under British administration in India amounted to £17,325,000, the rate per cultivated acre varying from 3s. id. in Madras to iod. in the Central Provinces. The general conclusion of the Famine Commission of 1901 was that " except in Bombay, where it is full, the incidence of land revenue is low to moderate in ordinary years, and it should in no way per se be the cause of indebtedness."

Prior to the successive reductions of the salt duty in 1903, 1905 and 1907, next to land, salt contributed the largest share to the Indian

revenue; and, where salt is locally manu- factured, its supervision becomes an important part of fj . , administrative duty. Up to within quite recent times stratlon. the tax levied upon salt varied extremely in different parts of the country, and a strong preventive staff was required to be stationed along a continuous barrier hedge, which almost cut the peninsula into two fiscal sections. The reform of Sir J. Strachey in 1878, by which the higher rates were reduced and the lower rates raised, with a view to their ultimate equaliza- tion over the whole country, effectually abolished this old engine of oppression. Communication is now free; and it has been found that prices are absolutely lowered by thus bringing the consumer nearer to his market, even though the rate of taxation be increased. Broadly speaking the salt consumed in India is derived from four sources: (1) importation by sea, chiefly from England and the Red Sea and Aden; (2) solar evaporation in shallow tanks along the seaboard; (3) the salt lakes in Rajputana; (4) quarrying in the salt hills of the northern Punjab. The salt lakes in Rajputana have been leased by the government of India from the rulers of the native states in which they lie, and the huge salt deposits of the Salt Range

mines are worked under government control, as also are the brine works on the Runn of Cutch. At the Kohat mines, and in the salt evaporation works on the sea-coast, with the exception of a few of the Madras factories, the government does not come between the manufacturer and the merchant, except in so far as is necessary in order to levy the duty from the salt as it issues from the factory. The salt administration is in the hands of (1) the Northern India Salt Department, which is directly under the government of India, and controls the salt resources of Rajputana and the Punjab, and (2) the salt revenue authorities of Madras and Bombay.

The consumption of salt per head in India varies from 7 lb in Rajputana to 16-02 lb in Madras. The salt duty, which stood in 1888 at Rs. 25 per maund, was reduced in 1903 to Rs. 2, in 1905 to Rs. i| and in 1907 to R. 1 per maund, the rate being uniform all over India. In 1907-1908 the gross yield of the salt duty was £3,339,000, of which more than one-fourth was derived from imported salt.

The heading Opium in the finance accounts represents the duty on

the export of the drug. The duty on local consumption, Opium which is included under excise, yielded £981,000 in 1907-1908. The opium revenue proper is derived from two sources: (1) a monopoly of production in the valley of the Ganges, and (2) a transit duty levied on opium grown in the native states of western India, known as Malwa opium. Throughout British territory the growth of the poppy is almost universally prohibited, except in a certain tract of Bengal and the United Provinces, where it is grown with the help of advances from government and under strict supervision. The opium, known as " provision opium," is manufactured in government factories at Patna and Ghazipur, and sold by auction at Calcutta for export to China. The net opium revenue represents the difference between the sum realized at these sales and the cost of production. Malwa opium is exported from Bombay, the duty having previously been levied on its passage into British territory. In 1907-1908 the net opium revenue from both sources amounted to £3,576,000. The Chinese government having issued an edict that the growth and consumption of opium in China should be entirely suppressed within ten years, the government of India accordingly agreed in 1908 that the export of opum from India should be reduced year by year, so that the opium revenue would henceforth rapidly decline and might be expected to cease altogether. In 1908 an inter- national commission that met at Shanghai passed resolutions inviting all the states there represented to take measures for the gradual suppression of the manufacture, sale and distribution of opium, except for medicinal purposes.

Excise. — Excise, like salt, is not only a department of revenue collection, but also to a great extent a branch of the executive. In other words, excise duties in India are not a mere tax upon the consumer, levied for convenience through the manufacturer and retail dealer, but a species of government monopoly. The only excisable articles are intoxicants and drugs; and the avowed object of the state is to check consumption not less than to raise revenue. The limit of taxation and restriction is the point at which too great encouragement is given to smuggling. Details vary in the different provinces, but the general plan of administration is the same. The right to manufacture and the right to retail are both monopolies of government permitted to private individuals only upon terms. Distillation of country spirits is allowed according to two systems — either to the highest bidder under strict supervision, or only upon certain spots set apart for the purpose. The latter is known as the sadr or central distillery system. The right of sale is also usually farmed out to the highest bidder, subject to regulations fixing the

minimum quantity of liquor that may be sold at one time. The brewing of beer from rice and other grains, which is universal among the hill tribes and other aboriginal races, is practically untaxed and unrestrained. The European breweries at several hill stations pay the same tax as imported beer. Apart from spirits, excise duties are levied upon the sale of a number of intoxicating or stimulant drugs, of which the most important are opium, bhang, ganja and charas. Opium is issued for local consumption in India from the government manufactories at Ghazipur and Patna in the Behar and Benares Agencies, and sold through private retailers at a monopoly price. Bhang, ganja and charas are three different narcotic drugs

Prepared from the hemp plant (Cannabis sativa, var. indica). cientifically speaking, bhang consists of the dried leaves and small stalks, with a few fruits; ganja of the flowering and fruiting heads of

the female plant; while charas is the resin itself, collected in various ways as it naturally exudes. The plant grows wild in many parts of India; but the cultivation of it for ganja is practically confined to a limited area in the Rajshahi district of eastern Bengal, and charas is mainly imported from Central Asia. The use of bhang in modera- tion is comparatively harmless; ganja and charas when taken in excess are undoubtedly injurious, leading to crime and sometimes to insanity. In accordance with the recommendations of the Hemp Drugs Commission, the government of India passed an act in 1896 providing that, in regard to ganja and charas, cultivation of the plants should be restricted as much as possible, and that a direct quantita- tive duty should be levied on the drugs on issue from the warehouse in the province of consumption ; while as regards bhang, cultivation of the hemp for its production should be prohibited or taxed, and collection of the drug from wild plants permitted only under licence, a moderate quantitative duty being levied in addition to vend fees. No duty whatever is now levied upon tobacco in any part of India. The plant is universally grown by the cultivators for their own smoking, and, like everything else, was subject to taxation under native rule; but the impossibility of accurate excise supervision has caused the British government to abandon the impost. In 1907-1908 the total gross revenue from excise amounted to £6,214,000, of which more than two-thirds was derived from spirits and toddy.

Since 1894 a uniform customs duty of 5% ad valorem has been levied generally on imported goods, certain classes being placed on the free list, of which the most important are food-grains, machinery, railway material, coal, and cotton twist and yarn (exempted in

1896). Most classes of iron and steel are admitted at the lower rate of I %. Cotton goods are taxed at 35 %, whether imported or woven in Indian mills. Special duties are imposed on liquors, arms and ammunition and petroleum, while imported salt pays the same duty as salt manufactured locally. From 1899 to 1904 a counter- vailing duty was imposed on bounty-fed beet sugar. There is also a customs duty at the rate of about 3d. per 82 lb on exported rice. In 1907-1908 the total customs revenue amounted to £4,910,000, of which £664,000 was derived from the export duty on rice and £ 22 3>73° from the excise on cotton manufactures.

Since 1886 an assessed tax has been levied on all sources of income except that derived from land. The rate is a little more than 2J % on all incomes exceeding £133 a year, and a little more than 2 % on incomes exceeding £66, the minimum income liable to assessment having been raised in 1903 from £33. The total number of persons assessed is only about 260,000. In 1907-1908 the gross receipts from income tax amounted to £1,504,000.

Other sources of revenue are stamps, levied on judicial proceedings and commercial documents; registration of mortgages and other instruments; and provincial rates, chiefly in Bengal and the United Provinces for public works or rural police. The rates levied at a certain percentage of the land revenue for local purposes are now excluded from the finance accounts. In 1907-1908 the gross receipts amounted to: from stamps, £4,259,000, of which more than two-thirds was derived from the sale of court fee stamps; from registra- tion, £415,000; and from provincial rates, £526,000.

Commerce and Industries.

India may almost be said to be a country of a single industry, that industry being agriculture. According to the census of 1 901 two-thirds of the total population were employed in occupa- tions connected with the land, while not one-tenth of that proportion were supported by any other single industry. The prosperity of agriculture therefore is of overwhelming importance to the people of India, and all other industries are only sub- sidiary to this main occupation. This excessive dependence upon a single industry, which is in its turn dependent upon the accident of the seasons, upon a favourable or unfavourable monsoon, has been held to be one of the main causes of the frequent famines which ravage India.

Agriculture. — The cultivation of the soil is the occupation of the Indian people in a sense which is difficult to realize in England, and

which cannot be adequately expressed by figures. As the land tax forms the mainstay of the imperial revenue, so the ryot or cultivator constitutes the unit of the social system. The organized village community contains many other members besides the cultivators; but they all exist for his benefit, and all alike are directly maintained from the produce of the village fields. Even in considerable towns, the traders and handicraftsmen almost always possess plots of land of their own, on which they raise sufficient grain to supply their families with food. The operations of rural life are familiar to every class. They are enveloped in a cloud of religious sanctions, and serve to mark out by their recurring periods the annual round of common life.

But though agriculture thus forms the staple industry of the country, its practice is pursued in different provinces with infinite variety of detail. Everywhere the same perpetual assiduity is found, but the inherited experience of generations has taught the cultivators

to adapt their simple methods to differing circumstances. For irrigation, native patience and ingenuity have devised means which compare not unfavourably with the colossal projects of government. Manure is copiously applied to the more valuable crops whenever manure is available, its use being limited by poverty and not by ignorance. The rotation of crops is not adopted as a principle of cultivation; but in practice it is well known that a succession of exhausting crops cannot be taken in consecutive seasons from the same field, and the advantage of fallows is widely recognized. The periodicity of the seasons usually allows two, and sometimes three, harvests in the year, but not necessarily, nor indeed usually, from the same fields.. For inexhaustible fertility, and for retentiveness of moisture in a dry year, no soil in the world can surpass the " black cotton-soil " of the Deccan. In the broad river basins the inundations deposit annually a fresh top-dressing of silt, thus superseding the necessity of manures.

Wheat. — Within recent years wheat has become one of the most important crops in India, more especially for export. The canal colonies of the Punjab have turned northern India into one of the great grain-fields of the British empire; and in 1 904 India took the

first place in supplying wheat to the United Kingdom, sending nearly 25ˆ million cwts. out of a total of 97I millions. In 1905, however, it fell back again into the third place, being passed by Russia and Argentina. Wheat is grown chiefly in the Punjab, the United Provinces, and the Central Provinces. In 1905-1906 there were 23 million acres under wheat in the whole of India, of which 8| million were in the Punjab alone.

Rice. — The name of rice has from time immemorial been so closely associated with Indian agriculture that it is difficult to realize how comparatively small an area is planted with this crop. With the exception of the deltas of the great rivers and the long strip of land fringing the western coast, rice may be called an occasional crop throughout the remainder of the peninsula. But where it is grown it is grown to the exclusion of all other crops. The rice crop is most important in Burma, Bengal and Madras, and there is an average of 20 million acres under rice in the other provinces of British India. In Bengal the area varies from 36 to 40 million acres according to the season. In Burma, where the large waste area js being gradually brought under cultivation, there has been an almost uninterrupted increase in the area of the rice crop, and the rice export is one of the main industries of the province. In ordinary years most of this rice goes either to Europe or to the Farther East ; but in famine seasons a large part is diverted to peninsular India, and Burma is the most important of the outside sources from which the deficient crops are supplemented. In 1905-1906 the export of rice from India was valued at I2| millions sterling.

Millets. — Taking India as a whole, the staple food grain is neither rice nor wheat, but millets, which are probably the most prolific grain in the world, and the best adapted to the vicissitudes of a tropical" climate. Excluding the special rice-growing tracts, different kinds of millet are grown more extensively than any other crop from Madras in the south at least as far as Rajputana in the north. The sorghum or great millet, generally known as jowar or cholum, is the staple grain crop of southern India. The spiked millet, known as bajra or cumbu, which yields a poorer food, is grown on dry sandy soil in the Deccan and the Punjab. A third sort of millet, ragi or mania, is cultivated chiefly in Madras and Bengal. There are also other kinds, which are included as a rule under the general head of " other food grains." Millet crops are grown for the most part on unirrigated land. In the Bombay Deccan districts they cover generally upwards of 60% of the grain area, or an even larger proportion in years of drought. In Gujarat about half the grain area is under millets or maize in ordinary years. The grain is consumed

almost entirely in India, though a small amount is exported.

Pulses. — Among pulses gra^n covers in ordinary years more than 10 millions of acres, chiefly in the United Provinces, the Punjab and Bengal. Gram is largely eaten by the poorer classes, but it is also used as horse-food. Other pulses, lentils, &c, are extensively grown, but the area under these crops is liable to great contraction in years of drought, as it consists for the most part of unirrigated lands.

Oil-seeds. — Oil-seeds also form an important crop in all parts of the country, being perhaps more universally grown than any other, as oil is necessary, according to native custom, for application to the person, for food, and for burning in lamps. In recent years the cultivation of oil-seeds has received an extraordinary stimulus owing to the demand for export to Europe, especially to France; but as they can be grown after rice, &c, as a second crop, this increase has hardly at all tended to diminish the production of food grains. The four chief varieties grown are mustard or rape seed, linseed, til or gingelly (sesamum), and castor-oil. Bengal and the United Provinces are at present the chief sources of supply for the foreign demand, but gingelly is largely exported from Madras, and, to a smaller extent, from Burma. These seeds are for the most part pressed in India either in bullock presses or in oil-mills. The refuse or cake is of great value to agriculturists, as it forms a food for cattle, and in the case of sesamum it is eaten by the people. But a very large quantity of the seeds is exported. The total value of oils and oil-seeds exported in 1905— 1906 was over j\ millions sterling. Vegetables .—X e%eta.b \es are everywhere cultivated in garden plots

for household use, and also on a larger scale in the neighbourhood of great towns. Among favourite native vegetables, the following may be mentioned : — the egg-plant, called brinjal or baigan (Solatium Melongena), potatoes, cabbages, cauliflower, radishes, onions, garlic, turnips, yams, and a great variety of cucurbitaceous plants, including Cucumis sativus, Cucurbita maxima, Lagenaria vulgaris, Trichosanthes dioica, and Benincasa cerifera. Of these, potatoes, cabbages, and turnips are of comparatively recent introduction. Almost all English vegetables can be raised by a careful gardener. Potatoes thrive best on the higher elevations, such as the Khasi hills, the Nilgiris, the Mysore uplands, the Shan States, and the slopes of the Himalayas ; but they are also grown even in lowland districts.

Fruits. — Among cultivated fruits are the following: — Mango (Mangifera indica), plantain (Musa paradisiaca) , pine-apple (Ananassa sativa), pomegranate (Punica Granatum), guava (Psidium

pomiferum and P. pyriferum), tamarind (Tamarindus indica), jack (Artocarpus integrifolia) , custard-apple (Anona squamosa), papaw (Carica Papaya), shaddock (Citrus decumana), and several varieties of fig, melon, orange, lime and citron. According to the verdict of Europeans, no native fruits can compare with those of England. But the mangoes of Bombay, of Multan, and of Malda in Bengal, and the oranges of Nagpur and the Khasi hills, enjoy a high reputa- tion ; while the guavas of Madras are made into an excellent preserve.
Spices.— Among spices, for the preparation of curry and other hot dishes, turmeric and chillies hold the first place, being very generally cultivated. Next in importance come ginger, coriander, aniseed, black cummin, and fenugreek. Pepper proper is confined to the Malabar coast, from Kanara to Travancore. Cardamoms are a valuable crop in the same locality, and also in the Nepalese Himalayas. Pan or betel-leaf is grown by a special caste in most parts of the country. Its cultivation requires constant care, but is highly remunerative. The betel-nut or areca palm is chiefly grown in. certain favoured localities, such as the deltaic districts of Bengal and the highlands of southern India.

Palms. — Besides betel-nut (Areca Catechu), the palms of India include the coco-nut (Cocos nucifera), the bastard, date (Phoenix sylvestris) , the palmyra (Borassus flabellifer), and the true date (Phoenix dactylifera) . The coco-nut, which loves a sandy soil and a moist climate, is found in greatest perfection along the strip of coast-line that fringes the west of the peninsula, where it ranks next to rice as the staple product. The bastard date, grown chiefly in the country round Calcutta and in the north-east of the Madras presidency, supplies both the jaggery sugar of commerce and in- toxicating liquors for local consumption. Spirit is also distilled from the palmyra, especially in the neighbourhood of Bombay and in the south-east of Madras. The true date is almost confined to Sind.

Sugar. — Sugar is manufactured both from the sugar-cane and from the bastard date-palm, but the total production is inadequate to the local demand. The best cane is grown in the United Provinces, on irrigated land. It is an expensive crop, requiring much attention, and not yielding a return within the year; but the profits are pro- portionately large. The normal area under sugar-ca,ne in India is generally about 3 million acres, chiefly in the United Provinces, Ben- gal, and the Punjab. A large share of the produce is consumed in the form of gur or unrefined sugar, and the market for this prepara- tion is independent of foreign competition. The total import of sugar in 1905-1906 was valued at £5,182,000, chiefly from Java and Mauritius.

Indigo. — Owing to the manufacture of synthetic indigo by German chemists the export trade in indigo, which was formerly the most important business carried on by European capital in India, has been almost entirely ruined. In the early years of the 19th century there were colonies of English planters in many districts of Bengal, and it was calculated that the planters of North Behar alone had a turnover of a million sterling. The industry suffered depression owing to the indigo riots of i860 and the emancipation of the peasantry by the Land Act of 1859; but in the closing decade of the century it received a much more disastrous blow from the invention of the German chemists. In 1895-1896 the area under indigo was 1,570,000 acres, and the value of the exports £3,569,700, while in 1905-1906 the area had sunk to 383,000 acres, and the value of the exports to £390,879. The only hope of rescuing the industry from total disappearance lies in the fact that the natural indigo gives a faster dye than the manufactured product, while an effort has also been made to introduce the Java-Natal seed into India, which gives a much heavier yield, and so may be better able to compete in price with synthetic indigo.

Tea. — The cultivation of tea in India began within the memory of men still living, and now has replaced indigo as the chief article for European capital, more particularly in Assam. Unlike coffee-planting the enterprise owes its origin to the initiation of government, and has never attracted the attention of the natives. Early travellers reported that the tea-plant was indigenous to the southern valleys of the Himalayas; but they were mistaken in the identity of the shrub, which was the Osyris nepalensis. The real tea (Thea viridis), a plant akin to the camellia, grows wild in Assam, being commonly found throughout the hilly tract between the valleys of the Brahma- putra and the Barak. There it sometimes attains the dimensions of a large tree; and from that, as well as from other indications, it has been plausibly inferred that Assam is the original home of the plant,

which was thence introduced at a prehistoric date into China. The real progress of tea-planting in Assam dates from about 1851, and was greatly assisted by the promulgation of the Waste-land Rules of 1854. By 1859 there were already fifty-one gardens in existence, owned by private individuals; and the enterprise had extended from

its original headquarters in Lakhimpur and Sibsagar as far down the Brahmaputra as Kamrup. In 1856 the tea-plant was discovered wild in the district of Cachar in the Barak valley, and European capital was at once directed to that quarter. At about the same time tea-planting was introduced into the neighbourhood of the sanatorium of Darjeeling, among the Sikkim Himalayas. The success of these undertakings engendered a wild spirit of speculation in tea companies both in India and at home, which reached its climax in 1865. The industry recovered but slowly from the effects of this disastrous crisis, and did not again reach a stable position until 1869. Since that date it has rapidly but steadily progressed, and has been ever opening new fields of enterprise. At the head of the Bay of Bengal in Ghittagong district, side by side with coffee on the Nilgiri hills, on the forest-clad slopes of Kumaon and Kangra, amid the low-lying jungle of the Bhutan Dwars, and even in Arakan, the energetic pioneers of tea-planting have established their industry. Different degrees of success may have rewarded them, but in no case have they abandoned the struggle. The area under tea, of which nine-tenths lies in the new province of Eastern Bengal and Assam, expanded by 85% during the sixteen years from 1885 to 190a, while the production increased by 167 %. This great rise in the supply, unaccompanied by an equal expansion of the market for Indian tea, involved the industry in great difficulties, to meet which it became necessary to restrict the' area under tea as far as possible, and to reduce the quantity of leaf taken from the plant, thus at the same time improving the quality of the tea. The area under tea in 1885 was 283,925,acres and the yield 71,525,977 lb, while in 1905 the area had increased to 527,290 acres and the yield to 222,360,132 lb, while the export alone was 214,223,728 lb. As much as 92 % of the export goes to the United Kingdom, where China tea has been gradually ousted by tea from India and Ceylon. The other chief countries that afford a market for Indian tea are Canada, Russia, Australia, Turkey in Asia, Persia, and the United States. India's consumption of tea is computed to average 8i million pounds, of which 5i millions are Indian and the remainder Chinese. There should therefore be considerable room for expansion in the home market. In 1905 there were 134 tea-planting companies registered in India, about 80% of the capital being held by shareholders in London.

Coffee.— The cultivation of coffee is confined to southern India, though attempts have been made to introduce the plant both into Lower Burma and into the Eastern Bengal district of Chittagong. The coffee tract may be roughly defined as a section of the landward

slope of the Western Ghats, extending from Kanara in the north to Travancore in the extreme south. That tract includes almost the whole of Coorg, the districts of Kadur and Hassan in Mysore, the Nilgiri hills, and the Wynaad. The cultivation has also extended to the Shevaroy hills in Salem district and to the Palni hills in Madura.

Unlike tea, coffee was not introduced into India by European enterprise; and even to the present day its cultivation is largely followed by the natives. The Malabar coast has always enjoyed a direct commerce with Arabia, and at an early date gave many converts to Islam. One of these converts, Baba Budan by name, is said to have gone on a pilgrimage to Mecca and to have brought back with him the coffee berry, which he planted on the hill range in Mysore still called after him. According to local tradition this happened more than two centuries ago. The shrubs thus sown lived on, but the cultivation did not spread until the beginning of the 19th century. The state of Mysore and the Baba Budan range also witnessed the first opening of a coffee-garden by an English planter about 1840. The success of this experiment led to the extension of coffee cultivation into the neighbouring tract of Manjarabad, also in Mysore, and into the Wynaad subdivision of the Madras district of Malabar. From 1840 to i860 the enterprise made slow progress; but since the latter date it has spread with great rapidity along the whole line of the Western Ghats, clearing away the primeval forest, and opening a new era of prosperity to the labouring classes. The export of coffee in 1905 was 360,000 cwt., being the highest for sixteen years. The over-supply of .cheap Brazilian coffee in the consuming markets caused a heavy fall in prices at the beginning of the decade, the average price in London in 1901 being 47s. per cwt. compared with 101s. in 1894. The United Kingdom and France are the chief consumers. An agreement with France at the beginning of the decade secured to Indian produce imported into that country the benefits of the minimum tariff, thus protecting the coffee industry from taxation in French ports on a scale which would have seriously hampered the trade. There is practically no local market for coffee in India.

Cinchona. — The cultivation of cinchona was introduced into India in the year i860 under the auspices of government, owing to the efforts of Sir Clements Markham, and a stock of plants was prepared and distributed to planters in the Nilgiris and in Coorg. At the same time governmental plantations were established in the Nilgiri hills and at Darjeeling, and these have been continued up to the present time. A considerable amount of the bark from private plantations is bought by the government and treated at the government factories >

The sulphate of quinine and the cinchona febrifuge thus produced are issued for the most part to medical officers in the various provinces, to gaols, and to the authorities of native states; but a large and increasing amount is disposed of in the form of 5-grain packets, costing a farthing each, through the medium of the post-offices. This system brings the drug easily within the reach of the people.

Cattle.— Throughout the whole of India, except in Sind and the western districts of the Punjab, horned cattle are the only beasts used for ploughing. The well-known humped species of cattle predominates everywhere, being divided into many varieties. Owing partly to unfavourable conditions of climate and soil, partly to the insufficiency of grazing ground, and partly to the want of selection in breeding, the general condition of the cattle is miserably poor. As cultivation advances, the area of waste land available for grazing steadily diminishes,.and the prospects of the poor beasts are becoming worse rather than better. Their only hope lies in the introduction of fodder crops as a regular stage in the agricultural course. There are, however, some fine breeds in existence. In Mysore the amrit mqhal, a breed said to have been introduced by Hyder Ali for military purposes, is still kept up by the state. In the Madras districts of Nellpfle and Kurnool the indigenous breed has been greatly improved under the stimulus of cattle shows and prizes founded by British officials. In the Central Provinces there is a peculiar breed of trotting bullocks which is in great demand for wheeled carriages. The large and handsome oxen of Gujarat in Bombay and of Hariana in the Punjab are excellently adapted for drawing heavy loads in a sandy soil. The fodder famines that accompanied the great famines of 1897 and 1900 proved little short of disastrous to the cattle in the affected provinces. In Gujarat and the arid plains of the south-east Punjab the renowned herds almost disappeared. In the affected districts of the Punjab the loss of cattle averaged from 17 to 45 % of the whole. In Rajputana more than half of its thirteen or fourteen millions of stock is said to have perished in 1900 alone. In one state the loss amounted to 90%, and in four others to 70%. In Gujarat half of its 1 J million cattle perished in spite of the utmost efforts to obtain fodder. The worst cattle are to be found always in the deltaic tracts, but there their place is to a large extent taken by buffaloes. These last are more hardy than ordinary cattle; their character is maintained by crossing the cows with wild bulls, and their milk yields the best ghi or clarified butter. Along the valley of the Indus, and in the sandy desert which stretches into Rajputana, camels supersede cattle for agricultural operations. The breed of horses has generally deteriorated since the demand for

military purposes has declined with the establishment of British supremacy. In Bengal Proper, and also in Madras, it may be broadly said that horses are not bred. But horses are still required for the Indian army, the native cavalry, and the police; and in order to maintain the supply of remounts a civil veterinary department was founded in 1892, transferred in 1903 to the army remount department. Horse-breeding is carried on chiefly in the Punjab, the United Provinces, and Baluchistan, and government keep a number of stallions in the various provinces. Formerly Norfolk trotters held the first place in point of number, but their place has been taken in recent years by English thorough- breds, Arabs, and especially Australians. For the supply of ordnance, baggage, and transport mules a large number of donkey stallions have been imported by the government annually from various European and other sources. But the supply of suitable animals is not good, and their cost is large ; so the breeding of donkey stallions has been undertaken at the Hissar farm in the Punjab.

Forests. — The forests of India, both as a source of natural wealth and as a department of the administration, are beginning to receive their proper share of attention. Up to the middle of the 19th century the destruction of forests by timber-cutters, by charcoal-burners, and above all by shifting cultivation, was allowed to go on every- where unchecked. The extension of cultivation was considered as the chief care of government, and no regard was paid to the im- provident waste going on on all sides. But as the pressure of popula- tion on the soil became more dense, and the construction of railways increased the demand for fuel, the question of forest conservation forced itself into notice. It was recognized that the inheritance o£ future generations was being recklessly sacrificed to satisfy the im- moderate desire for profit. And at the same time the importance of forests as affecting the general meteorology of a country was being learned from bitter experience in Europe. On many grounds, therefore, it became necessary to preserve what remained of the forests in. India, and to repair the mischief of previous neglect even at considerable expense. In 1844 and 1847 the subject was actively taken up by the governments 6f Bombay and Madras. In 1864 Br Brandis was appointed inspector-general of forests to the government of India, and in the following year an act of the legislature was passed (No. VII. of 1865). The regular training of candidates for the Forest Department in the schools of France and Germany dates from 1867. In the interval that has since elapsed, sound principles of forest administration have been gradually extended. Indiscrimin- ate timber-cutting has been prohibited, the burning of the jungle by the

hill tribes has been confined within bounds, large areas have been surveyed and demarcated, plantations have been laid out,, arid, generally, forest conservation has become a reality. Systematic conservancy of the Indian forests received a great impetus from the passing of the Forest Law in 1878, which gave to the government

powers of dealing with private rights in the forests of which the chief proprietary right is vested in the state. The Famine Commission of 1878 urged the importance of forest conservancy as a safeguard to agriculture, pointing out that a supply of wood for fuel was necessary if cattle manure was to be used to any extent for the fields, and also that forest growth served to retain the moisture in the subsoil. They also advised the protection and extension – of communal rights of pasture, and the planting of the higher slopes with forest, with a view to the possible increase of the water-supply. These recommendations embody the principle upon which the management of the state forests is based. In 1894 the government divided forests into four classes: forests the preservation of which is essential on climatic or physical grounds, forests which supply valuable timber for commercial purposes, minor forests, and pasture lands. In the first class the special purpose of the forests, such as the protection of the plains from devastation by torrents, must come before any smaller interests. The second class includes tracts of teak, Sal or deodar timber and the like, where private or village rights of user are few. In these forests every reasonable facility is afforded to the people concerned for the full and easy satisfaction of their needs, which are generally for small timber for building or fuel, fodder and grazing for their cattle, and edible products for themselves; and considerations of forest income are subordinated to those purposes. Restrictionˆ necessary for the proper conservancy of the forests are, however, imposed, and the system of shifting cultivation, which denudes a large area of forest growth in order to place a small area under crops, is held to cost more to the community than it is worth, and is only permitted, under due regulation, where forest tribes depend on it for their sustenance. In the third place, there are minor forests, which produce inferior or smaller timber. These are managed mainly in the interests of the surrounding population, and supply grazing or fuel to them at moderate rates, higher charges being levied on consumers who are not inhabitants of the locality. The fourth

class includes pastures and grazing grounds. In these even more than in the third class the interests of the local community stand first. The state forests, which are under the control of the forest department, amounted in 1901-1902 to about 217,500 sq. m., or more than one-fifth of the total area of British India, varying from 61 % in Burma to 4 % in the United Provinces.

Timbers. — A large part of the reserved forests, where the control of the forest department is most complete, consists of valuable timber, in which the first place is held by teak, found at its best in Burma, especially in the upper division, and on the south-west coast of India, in Kanara and Malabar. It is also the most prevalent and valuable product of the forests at the foot of the Ghats in Bombay, and along the Satpura and Vindhya ranges, as far as the middle of the Central Provinces. Here it meets the sal, which however is more especially found in the sub-Himalayan tracts of the United Provinces and Eastern Bengal and Assam. In the Himalayas themselves the deodar and other conifers form the bulk of the timber, while in the lower ranges, such as the Khasi hills in Assam, and those of Burma, various pines are prominent. In the north-east of Assam and in the north of Upper Burma the Ficus elastica, a species of india-rubber tree, is found. The sandal-wood flourishes all along the southern portion of the Ghats, especially about Mysore and Coorg; and in the same regions, as well as in Upper India, the blackwood occurs. A valuable tree, known as the padouk, is at present restricted almost entirely to the Andaman Islands, with a scattering in Lower Burma. There are many other timber trees that are in general demand in different parts of India, but the above are the best known outside that country. There is also the universal bamboo, and in the north-western tracts the equally useful rattan. The annual timber yield of the Indian forests is about fifty millions of cubic feet, excluding what is used for local purposes. About half of this quantity comes from the forests of Burma, where large amounts of teak and other woods are annually extracted, chiefly through the agency of private firms. It is, how- ever, only the more valuable of the woods, such as teak, sandal-wood, ebony and the like, which find a market abroad. The total value of the export trade in forest produce averages between l\ and 2 millions annually.

Manufactures.

Manufacturing industries are being slowly developed in India, though their growth has not yet materially affected the pressure on the land. Next to agriculture, weaving is the most important industry in the country, the cotton-mills of Bombay and the jute mills of Bengal

having increased greatly of recent years. On the other hand, the old indigenous industries of India decayed greatly during the latter part of the 19th century. The colonies of hand-workers in silk, cotton, carpets, brass and silver ware, wood and ivory, and other skilled crafts- men, which formerly existed in various parts of India, have fallen off both in the extent of their output and in the artistic excellence of their work. An attempt has been made to remedy the evil by means of schools of art, but with little result.

Cotton. — Cotton is the staple article of clothing in Eastern countries, and Indian cotton and other piece goods used to find a ready market in Europe before the English cotton manufacturer had arisen. When European adventurers found the way to India, cotton and silk always formed part of the rich cargoes that they brought homej and the early settlers were always careful to fix their abode amid a weaving population, at Surat, Calicut, Masulipatam or Hugli. But now the larger part of the cotton goods used in India is manufactured in mills in that country or in England, and the handloom weavers' output is confined to the coarsest kinds of cloth, or to certain special kinds of goods, such as the turbans and " saris " of Bombay, or the muslins of Arni, Cuddapah, and Madura in Madras, and of Dacca in Bengal. The extent to which village industries still survive is shown by the fact that according to the census of 1901 there were 5,800,000 hand- loom weavers in India against only 350,000 workers in cotton mills.

The present importance of the cotton crop dates only from the crisis in Lancashire caused by the American War. Prior to i860 the exports of raw cotton from India used to average less than 3 millions sterling a year, mostly to China ; but after that date they rose by leaps, until in 1866 they reached the enormous total of 37 millions. Then came the crash, caused by the restoration of peace in the United States, and the exports fell, until they now average little more than 8 millions a year. The fact is that Indian cotton has a short staple, and cannot compete with the best American cotton for spinning? the finer qualities of yarn. But while the cotton famine was at its height, the cultivators were intelligent enough to make the most of their opportunity. The area under cotton increased enormously, and the growers managed to retain in their own hands a fair share of the profit. The principal cotton-growing tracts are the plains of Gujarat and Kathiawar, whence Indian cotton has received in the Liverpool market the historic name of " Surat "; the high- lands of the Deccan, and the valleys of the Central Provinces and Berar. The total area under cotton in 1905-1906 was 20§ million acres, and the export was 7,396,000 cwt.

It was estimated in 1905 that the world's output of cotton was 19,000,000 bales, of which 13! millions were produced in the United States, 3 millions in India, and nearly I J millions in Egypt, Japan and China being India's best customers for the raw article. At the same time the total number of spindles employed in working up the world's raw cotton was 116 millions, of which 48 millions were in the United Kingdom, 24 millions in the United States, and a little over 5 millions in India. There were 203 cotton mills in India, employing a daily average of 196,369 persons. The Bombay Presidency pos- sessed 70 % of the mills and much the same percentage of spindles and looms. The industry dates from 1851, when the first mill was started. But though India has special advantages in home-grown cotton and cheap labour, the labour is so inefficient as to make competition with Europe difficult. It is calculated that an Indian power-loom weaver working 72 hours a week can turn out 70 lb of cloth, while a European working 54 hours can turn out 468 ft, and that one Lan- cashire weaver can do the work of six Indian power-loom weavers and nine hand-loom weavers. While these figures hold good, India cannot be a serious competitor with Europe in the cotton industry.

Jute. — Next to cotton, jute is the most important and prosperous of Indian manufactures. With the advance of commerce it is more and more required for its best-known use, as sacking for produce. Australia and Argentina need it for wool and wheat, Chili and Brazil for nitrates and coffee, Asiatic countries for rice, and the world as a whole for its increased output of produce. The supply has not kept pace with the demand, and the consequence was a steady apprecia- tion in price from 1901 onwards. The cultivation of jute is confined to a comparatively restricted area, more than three-fourths of the total acreage being in eastern Bengal and Assam, while nearly the whole of the remaining fourth is in Bengal. In 1907, however, experiments were made towards growing it in other parts of India. I n Behar it has begun to replace indigo, and some success was achieved in Orissa, Assam and Madras; but jute is a very exhausting crop, and requires to be planted in lands fertilized with silt or else with manure. About half the total crop is exported, and the remainder used in the jute mills centred round Calcutta, which supply cloth and bags for the grain export trade. The number of jute mills in 1904 was 38, employing 124,000 hands, and since then the number has tended constantly upwards. The export of jute in 1905-1906 was 14,480,000 cwt. with a value of £12,350,000.

Silk. — The silk industry in India has experienced many vicissi- tudes. Under the East India Company large quantities of mulberry

silk were produced chiefly in Bengal, and exported to Europe; and Malda, Murshidabad, and other places in that province have long been famous for their silk manufactures. Other kinds of silk are native to certain parts of India, such as those produced by the " castor oil " and the muga silkworms of Assam; but the chief of the wild silks is the tussore silk, which is found in the jungles nearly throughout India. Large quantities of comparatively coarse silk are made from silk so produced. In Assam silk is still the national dress, and forms the common costume of the women, but the men are relinquishing it as an article of daily wear in. favour of cotton. Amongst the Burmese, however, silk still holds its own. Owing to disease among the silk-worms the industry has declineˆ of recent years; and in 1886 an inquiry was held, which resulted in putting the silk-rearing industry of Bengal on a better basis. The most hopeful

ground, however, for the industry is Kashmir, where Sir Thomas Wardle reported that the silk was of as high a quality as from any part of the world. The most important seat of the silk-weaving industry is Bengal, but there are few parts of India where some silk fabrics are not woven. The silk weavers of India possess the very highest skill in their craft, and with competent and energetic management and increased capital the industry could be revived and extended.

Other Manufactures. — The demand of the Indian population for woollen fabrics is very small in comparison with that for cotton, and although the manufacture of blankets is carried on in many parts of India, the chief part of the indigenous woollen industry was originally concerned with shawls. Kashmir shawls were at one time famous, but the industry is practically extinct. The chief seat of the woollen industry now is the Punjab, where a considerable number of weavers, thrown out of work by the decline of the shawl industry, have taken to carpet-making. The chief centre of this industry is Amritsar. The output of the woollen mills is chiefly used for the army and the police. In addition to these and the cotton and jute mills there are indigo factories, rice mills, timber mills, coffee works, oil mills, iron and brass foundries, tile factories, printing presses, lac factories, silk mills, and paper mills. There is a large trade in wood-carving, the material being generally Indian ebony in northern India,

sandal-wood in southern India, and teak in Burma and else- where.

From an artistic point of view the metal manufactures are one of the most important products of India.

Brass and Copper Work. — The village brazier, like the village smith, manufactures the necessary vessels for domestic use. Chief among these vessels is the lota, or globular bowl, universally used in ceremonial ablutions. The form of the lota, and even the style of ornamentation, has been handed down unaltered from the earliest times. Benares enjoys the first reputation for work in brass and copper. In the south, Madura and Tanjore have a similar fame; and in the west, Ahmedabad, Poona and Nasik. At Bombay itself large quantities of imported copper are wrought up by native braziers. The temple bells of India are well known for the depth and purity of their note. In many localities the braziers have a special repute either for a peculiar alloy or for a particular process of ornamenta- tion. Silver is sometimes mixed with the brass, and in rarer cases gold. The brass or rather bell-metal ware of Murshidabad, known as khagrai, has more than a local reputation, owing to the large ad- mixture of silver in it.

Pottery is made in almost every village, from the small vessels required in cooking to the large jars used for storing grain and p., occasionally as floats to ferry persons across a swollen

ery ‘ stream. But, though the industry is universal, it has hardly anywhere risen to the dignity of a fine art. Sind is the only province of India where the potter’s craft is pursued with any regard to artistic considerations; and there the industry is said to have been introduced by the Mahommedans. Sind pottery is of two kinds, encaustic tiles and vessels for domestic use. In both cases the colours are the same, — turquoise blue, copper green, dark purple or golden brown, under an exquisitely transparent glaze. The usual ornament is a conventional flower pattern, pricked in from paper and dusted along the pricking. The tiles, which are evidently of the same origin as those of Persia and Turkey, are chiefly to be found in the ruined mosques and tombs of the old Mussulman dynasties; but the industry still survives at the little towns of Saidpur and Bubri. Artistic pottery is made at Hyderabad, Karachi, Tatta and Hala, and also at Multan and Lahore in the Punjab. The Madura pottery deserves mention from the elegance of its form and the richness of its colour. The United Provinces have, among other specialties, an elegant black ware with designs in white metal worked into its surface.

Mineral Resources.

Putting aside salt, which has been already treated, the chief mining resources of India at the present day are the coal mines, the gold mines, the petroleum oil-fields, the ruby mines, man- ganese deposits, mica mines in Bengal, and the tin ores and jade of Burma. Other minerals which exist but have not yet been developed in paying quantities are copper ore, alum, gypsum and plumbago.

Coal. — Coal has been known to exist in India since 1774. The first mine at Raniganj dates from 1820, and has been regularly worked up to the present time. Coal of varying quality exists under a very extensive area in India, being found in almost every province and native state with the exception of Bombay and Mysore. In respect, however, of both the number and size of its mines Bengal comes easily first, with seven-eighths of the total output, the largest mines being those of Raniganj, Jherria, and Giridih, while the Singareni mine in Hyderabad comes next. Many of the Bengal mines, however, are very small. There are some important mines in Assam and the Central Provinces. The importance of the Indian coal production lies in the hope that it holds out for the development of Indian industries, especially in connexion with the nascent iron and steel industry. Coal and iron are found in conjunction in the Central Provinces, and the Tata Company has recently been formed

to work them on a large scale. The railways already use Indian coal almost exclusively, and Indian coal is being taken yearly in greater quantities by ships trading to Eastern ports. The total output in 1905-1906 was 8,417,739 tons', while there were 47 companies engaged in coal-mining, of which 46 were in Bengal.

Cold. — The production of gold in India is practically confined to the Kolar gold fields in Mysore. An uncertain but unimportant amount is annually procured by sand-washing in various tracts of northern India and Burma; and there have been many attempts, including the great boom of 1880, to work mines in the Wynaad district of the Madras Presidency. There are also mines in the Hyderabad state from which a small amount of gold is produced. But the output of gold in Mysore represents 99 % of the annual Indian yield. Modern mining at Kolar dates from 1881, but there are extensive old workings snowing that much gold had been ex- tracted under native rule. The mines are worked under leases from the Mysore government, which secure to the state a royalty of 5 % of the gold produced. Up to the end of 1903 the total output of the Kolar mines reached the value of £19,000,000.

Iron. — In purity of ore, and in antiquity of working, the iron deposits of India probably rank first in the world. They are to be found in every part of the country, from the northern mountains of Assam and Kumaun to the extreme south of the Madras Presidency. Wherever there are hills, iron is found and worked to a greater or less extent. The indigenous methods of smelting the ore, which are everywhere the same, and have been handed down unchanged through countless generations, yield a metal of the finest quality in a form well suited to native wants. But they require an extravagant supply of charcoal ; and even with the cheapness of native labour the pro- duct cannot compete in price with imported iron from England. European enterprise, attracted by the richness of the ore and the low rate of wages, has repeatedly tried to establish iron-works on a large scale; but hitherto every one of these attempts has ended in failure with the exception of the iron-works at Barrakur in Bengal, first started in 1865, which after many years of struggle seem to have turned the corner of success. The principal sources of iron-stone at present are the Madras ores, chiefly at Salem, the Chanda ores in the Central Provinces, and the ores obtained at and near Raniganj in Bengal.

Petroleum. — The great oilfields of the Indian empire are in Burma, which supplies 98 % of the total output. Of the remainder nearly all comes from Assam. In both provinces the growth of the yield has been very great, the total output in 1901 being six times as large as in 1892; but even so it has failed to. keep pace with the demand. A regular service of steamers carries oil in bulk from Rangoon to Calcutta, and now Burmese oil competes with the Russian product, which had already driven the dearer American oil from the market (see Burma).

Other Ores. — Manganese ore is .found in very large quantities on a tract on the Madras coast about midway between Calcutta and Madras. Most of the ore goes to Great Britain. There are also valuable deposits of manganese in the Central Provinces and, it is believed, in Burma. The export of manganese, which had been only about ten years in existence in 1 905-1906, amounted then to 316,694 tons, with a value of £250,000. Mica has long been obtained in Bengal, chiefly in the Hazaribagh district, and there is a ruby- coloured variety which is held in great estimation. In Madras also a mica industry has recently grown up. Tin is found in the Tavoy and Mergui districts of Lower Burma, and has for many years been worked in an unprogressive manner chiefly by Chinese labour. In 1900 tin of good quality was found in the Southern Shan States. Copper ore is found in many tracts throughout India, plumbago in

Madras, and corundum in southern India.

Precious Stones. — Despite its legendary wealth, which is really due to the accumulations of ages, India cannot be said to be naturally rich in precious stones. Under the Mahommedan rule diamonds were a distinct source of state revenue; and Akbar is said to have received a royalty of £80,000 a year from the mines of Panna. But at the present day the search for them, if carried on anywhere in British territory, is an insignificant occupation. The name of Golconda has passed into literature; but that city, once the Mussul- man capital of the Deccan, was rather the home of diamond-cutters than the source of supply. It is believed that the far-famed diamonds of Golconda actually came from the sandstone formation which extends across the south-east borders of the nizam's dominions into the Madras districts of Ganjam and Godavari. A few poor stones are still found in that region. Sambalpur, on the upper channel of the Mahanadi river in the Central Provinces, is another spot once famous for diamonds. So late as 181 8 a stone is said to have been found there weighing 84 grains and valued at £500. The river-valleys of Chota Nagpur are also known to have yielded a tribute of diamonds to their Mahommedan conquerors. At the present day the only p_lace where the search for diamonds is pursued as a regular industry is the native state of Panna in Bundelkhand The stones are found by digging down through several strata of gravelly soil and washing the earth. Even there, however, the pursuit is understood to be unremunerative, and has failed to attract European capital. At the present day the only important indus- tries are the rubies and jade of Burma. The former are worked by the Ruby Mines Company or by licensed native miners under the

company. The value of the rubies found has increased rapidly, and the company, which was for some time worked unprofitably under the lease granted in 1896, has now, with the aid of favourable treatment from the government, become more prosperous. Pearls are found off the southern coast of Madras and also in the Mergui archipelago.

Trade.

The trade of India with foreign countries is conducted partly by sea and partly across the land frontiers; but the frontier trade, though capable of much extension, is only a small fraction of the whole. The sea-borne trade is carried on chiefly through the four great ports of Calcutta, Bombay, Karachi, and Rangoon, of which Calcutta serves the fertile valley of the Ganges and Brahmaputra, Bombay serves the cotton-trade of western India, Karachi exports the wheat crop of the Punjab, and Rangoon the rice crop of Burma. Madras, which has been supplied with an artificial harbour, serves southern India, and Chittagong is rising into prominence as the point of departure for the tea and jute of eastern Bengal and Assam. The land trade is carried on with Persia, Afghanistan, Nepal, Tibet and western China. The new caravan route to Persia from Quetta by way of the Nushki railway offers facilities to traders, of which increasing advantage has been taken, but the trade is still small. Afghanistan under Abdur Rahman imposed prohibitive imposts upon trade, and the present amir followed his father's policy, but his visit to India in 1907 may result in improved relations. The trade with the tribes lying north of the Malakand Pass has improved considerably since the frontier war of 1897-98, but they are a poor community. Nepal takes the largest share of the frontier trade. The trade with Tibet has slightly improved since the treaty of Lhasa of 1904, but it still amounts to only £90,000 annually. The trade with western China is about half a million annually, and shows signs of development.

A review of Indian trade by the director-general of the statistical department in India is annually presented to parliament, and there-Exoorts ˆ ore lt xs on ' v necessary here to mention the main channels ' that it has taken of recent years. The chief exports are raw cotton, cotton goods and yarn, rice, wheat, oil-seeds, raw jute and jute-manufactures, hides and skins, tea, opium and lac. In 1905-1906 there was great activity in both the cotton and jute industries. In Bombay new cotton mills were erected, and old ones extended, high-speed machinery was widely introduced, and 12,000 new looms were set up. Similarly the jute trade far surpassed all records. The crop was a record one, but the demand far exceeded the supply, the cultivators reaped profits of eight millions more than the previous year, and 2000 new looms were set up in Calcutta. The tea outlook was good, and the coffee industry was recovering from the effects of plant disease and Brazilian competition. But both the indigo and opium trades are declining industries, which mean a serious loss to the Indian exchequer. Indigo fell to about one-tenth of its value in the previous decade ; and an agreement was come to with China in 1907, by which the area under opium is to be gradually reduced. The

total exports for 1905-1906 were valued at £1 12,000,000.

The chief articles of import are cotton goods, cotton yarn, metals, sugar, mineral oils, machinery and mill-work, woollen manufactures, Imports provisions, hardware and cutlery, silk, liquors, apparel, ‘ railway material and chemicals. Cotton manufactures and yarns are imported almost exclusively from the United Kingdom, and amount to about 40% of the total trade. Metals, including hardware and cutlery, railway material, &c, supply about a fifth. The only other important article of import is sugar, which came to about 5 millions in 1 905-1906. The balance of trade is always against India, because she is a debtor country, and has to pay interest on borrowed capital, and the ” home charges ” for the upkeep of the civil and military services and of the secretary of state’s establish- ment in London. The total imports for 1905-1906 were valued at 82$ millions sterling, including 14 millions of gold and silver, which are continually hoarded by the people of India.

Broadly speaking, the greater part of the internal trade remains in the hands of the natives. Europeans control the shipping business Tradlnv an< ˆ nave a share ' n the collection of some of the more - lasses. valuable staples of exports, such as cotton, jute, oil-seeds and wheat. But the work of distribution and the adaptation of the supply to the demand of the consumer naturally fall to those who are best acquainted with native wants. The Vaisya, Or trading caste of Manu, has no longer any separate existence ; but its place is occupied by several well-marked classes. On the western coast the Parsees, by the boldness and extent of their operations, tread close upon the heels of the most prosperous English houses. In the interior of the Bombay presidency, business is mainly divided between

two classes, the Bunniahs of Gujarat and the Marwaris from Rajputana. Each of these profess a peculiar form of religion, the former being Vishnuvites of the Vallabhachari sect, the latter Jains. In the Deccan their place is taken by Lingayats from the south, who again follow their own form of Hinduism, which is an heretical species of Siva worship. Throughout Mysore, and in the north of Madras, Lingayats are still found, but along the eastern sea-board the predominating classes of traders are those named Chetties and Komatis. In Bengal many of the upper castes of Sudras have devoted themselves to general trade; but there again the Jain Marwaris from Rajputana occupy the front rank. Their head- quarters are in Murshidabad district, and their agents are to be found throughout the valley of the Brahmaputra, as far up as the unexplored frontier of China.

*Local trade is conducted either at the permanent bazaars of great towns, at weekly markets held in certain villages, at annual gatherings primarily held for religious purposes, or by means of travelling brokers and agents. The cultivator himself, 7°^*

*who is the chief producer and also the chief customer, *”■*••*

knows little of the great towns, and expects the dealer to come to his own door. Each village has at least one resident trader, who usually combines in his own person the functions of money-lender, grain dealer and cloth seller. The simple system of rural economy is entirely based upon the dealings of this man, whom it is the fashion sometimes to decry as a usurer, but who is really the one thrifty person among an improvident population. Abolish the money- lender, and the general body of cultivators would have nothing to depend upon but the harvest of a single year. The money-lender deals chiefly in grain and in specie. In those districts where the staples of export are largely grown, the cultivators commonly sell their crops to travelling brokers, who re-sell to larger dealers, and so on until the commodities reach the hands of the agents of the great shipping houses. The wholesale trade thus rests ultimately with a comparatively small number of persons, who have agencies, or rather corresponding firms, at the great central marts. Buying and selling in their aspects most characteristic of India are to be seen, not at these great towns, nor even at the weekly markets, but at the fairs which are held periodically at certain spots in most districts. Re- ligion is always the original pretext of these gatherings or melds, at some of which nothing is done beyond bathing in the river, or per- forming various superstitious ceremonies. But in the majority of cases religion has become a mere excuse for secular business. Crowds of petty traders attend, bringing all those miscellaneous articles that can be packed into a pedlar’s wallet; and the neighbouring villagers look forward to the occasion to satisfy alike their curiosity and their household wants.

The control of the revenues of India-is vestt d by act of parliament in the secretary of state for India in council. Subject to his control the government of India enjoys a certain discretionary „.

Eower, but no new expenditure may be incurred without Flaance – is sanction. There is a special member for finance in the governor-general’s council, and all important matters are brought before the council. The central government keeps in its own hands certain revenues, such as salt, the post-office, telegraphs, railways, army and Indian Marine, in addition to the districts of Coorg, Ajmere and

the North-West Frontier province. The other provinces raise and administer their own revenues, subject to the central control; they are allowed a certain proportion of the revenue to meet their own administrative charges, and so have an interest in economical expenditure. The apportionment of the revenues is settled afresh every five years. In 1893 the Indian mints were closed to the free coinage of silver, and in 1899 the British sovereign was made legal tender at the rate of is. 4d. per rupee; so that since that year the finances of India have been practically upon a gold basis. The principal heads of revenue are land, opium, salt, stamps, excise, customs, assessed taxes, forests, registration and tributes from native states ; and the chief heads of expenditure are charges of collection, interest, post-office, telegraph and mint, civil departments, famine relief and insurance, railways, irrigation, other public works and army. The point most frequently criticized in the finances of India is the " home charges " which amount on an average to about 18J millions a year. Of this total about 9J millions are for interest on railways and other public works, 5 millions for pensions and furlough pay for civil and military officers, 2 f millions for stores and I i millions miscellaneous. These charges constitute the home expenditure on revenue account, but there are also other remittances from India on capital account which bring up the total disbursements in EnglanS to an annual average of about 2 1 j millions.

Public Works.

Public works in India fall under three categories — railways, irrigation, and roads and buildings. The railways are managed in various ways, the other two classes of works are carried out through the agency of separate departments in Madras and Bombay, and of officers of the government of India public works department, either under local or central control, in other provinces.

Railways in India serve different purposes — the ordinary purpose of trade and passenger communication, ai\d also the special purposes pf the safeguarding the internal and external peace of the country, and of protecting special districts against famine' by facilitating the movement of grain. For this reason the interest on capital expended on all the lines cannot be judged by a purely commercial standard.

They are administered in three separate ways — as guaranteed, state or assisted lines. In the early days of railway enterprise the agency of private companies guaranteed by the state was exclusively employed, and nearly all the great trunk lines were made under this system, but the leases of the last three of these lines, the Great Indian Peninsula, the Bombay Baroda and Central India, and the Madras companies, fell in respectively in 1900, 1905 and 1907. In 1870 a new policy of railway de- velopment by the direct agency of the state was inaugurated; and in 1880 the system of encouraging private enterprise by state assistance was again resorted to. Both agencies are now em- ployed side by side. The administration of railways was formerly under a secretary in the public works department; but since 1905 it has been placed in charge of a railway board, consisting of a president and two members, which is connected with, though not subordinate to, the department of commerce and industry. In 1908 the total length of railways open in India was 30,578, m., which carried 330 million passengers and 64 million tons of goods, and yielded a net profit exceeding 4%.

Facilities for irrigation (g.v.) vary widely, and irrigation works differ both in extent and in character. The main distinction arises from the fact that the rivers of northern India are fed by the Himalayan snows, and, therefore, afford a supply of water which surpasses in constancy and volume any of the rivers of the south. In Bombay and Madras almost all the irrigation systems, except in the deltas of the chief rivers, are dependent on reservoirs or " tanks," which collect the rainfall of the adjacent hills. In Sind and the Punjab there are many canals which act merely as distributaries of the overflow of the great rivers at the time of inundation; but where the utility of the canals has been increased by permanent head- works the supply of water is perennial and practically inex- haustible, thus contrasting favourably with the less certain protection given by tanks. The Irrigation Commission of 1901 advised an expenditure of 30 millions sterling, spread over a term of twenty years, and irrigating 65 million acres in addition to the 47 millions already irrigated at that time; but it was estimated that that programme would practically exhaust the irrigable land in India, and that some of the later works would be merely protective against the danger of famine, and would not be financially productive.

In addition to the provision and maintenance of roads and the construction of public buildings, the department of public works also provides all works of a public nature, such as water-supply, Buildings sanitation embankments, lighthouses, ferries and bridges, "' which require technical skill. Road-making is an ordinary

roads. form of relief work in times of famine. In the famine of

1896-1897, for instance, 579 m. of new roads were made in the Central Provinces alone, and 819 m. were repaired. One of the finest roads in the world is the Grand Trunk Road which stretches across India from Calcutta to Peshawar, and which is metalled most of the way with kankar, a hard limestone outgrowth. The great buildings of ancient India are described under the names of the different cities which contain them.

The post-office of India is under the control of a director-general, in subordination to the department of commerce and industry; and this officer has under him a postmaster-general or deputy post- master-general in each province. In 1906 thedistrict post, originally provided for local convenience and maintained by a local cess, was amalgamated with the imperial post. The mileage over which mails are carried by railway has been constantly increasing with the development of the railway system, but a far larger number are still carried by runners and boats. The total number of letters, &c, carried by the post exceeds 800 millions, and the service yields a small profit to the state. In connexion with the post-office there are inland money order and savings-bank businesses; and in addition the value-payable system, by which the post-office undertakes to recover from the addressee the value of an article sent by post and to remit the amount to the sender, has found great popularity. Excluding the Indo European telegraph wire, the whole telegraph

Post Office.

system of India forms an imperial charge, administered through a director-general. The total length of line is about 69,000 m., and the net profits of the service approximately pay h

for new expenditure on capital account. graphs.

Telegraphic communication with Europe is maintained by the cable of the Eastern Telegraph Company via Aden, and by the Indo-European system, of which the eastern portion from Teheran and Fao to Karachi belongs to the government of India. The adminis- tration of the Indo-European department is in London under the direct control of the secretary of state. The system comprises two sections. The first, called the Persian Gulf section, runs from Karachi to Bushire, from Jask to Muscat, and from Bushire to Fao, where a connexion is made with the Ottoman government line. It includes also the Makran coast lines, running from Jask to Guadur, and

thence to Karachi. The second section, known as the Persian section, consists of land lines running from Bushire to Teheran. These land lines, as well as the Makran coast lines, are worked under a treaty with the Persian government. A connexion for extending the system through Persia was signed in 1901, the route to be followed being from Kashan near Teheran to the Baluchistan frontier via Yezd and Kerman.

Bibliography. — Imperial Gazetteer of India (new edition, 1907-1909); Census of India (1901); Statistical Atlas of India (1895); G. A. Grierson, Linguistic Survey of India (1903); Sir Thomas Holdich, India (" Regions of the World " series) (1902); Sir John Strachey, India (1903) ; W. Crooke, Natives of Northern India (1907) ; W. S. Lilly, India and its Problems (1902) ; Sidney Low, A Vision of India (1906) ; R. D. Oldham, Geology of India (1893) ; W. T. Blanford, Geology of India (1880), and Fauna of British India (1888) ; R. Lydekker, Great and Small Game of India (1900); Sir J. D. Hooker, Flora of British India (1875); J- S. Gamble, Manual of Indian Timbers (1902) ; Indian Land Revenue Policy (Calcutta, 1902) ; B. H. Baden-Powell, The Indian Village Community (1896) ; Abdullah Yusuf Ali, Life and Labour of the People of India (1907); Theodore Morison, Industrial Organization of an Indian Province (1906) ; Professor Wyndham Dunstan, Coal Resources of India (Society of Arts, 1902) ; Sir George Watt, Dictionary of Economic Products of India (1908); Sir George Birdwood, Industrial Arts of India (1880); R. H. Manon, Iron and Steel in. India (1899); Lord Curzon in India (1906); India Office List; The Statesman's Year- Book; and the government of India's annual reports.

(W. W. H. ; J. S. Co.)

History

For an orthodox Hindu the history of India begins more than three thousand years before the Christian era with the events detailed in the great epic of the Mahabharata; but by the sober historian these can only be regarded as legends. See the article Inscriptions: section Indian, for a discussion of the scientific basis of the early history. It is needless to repeat here the analysis given in that article. The following account of the earlier period follows the main outlines of the traditional facts, corrected as far as possible by the inscriptional record; and further details will be found in the separate biographical, racial and linguistic articles, and those on the geographical areas into which India is administratively divided.

Our earliest glimpses of India disclose two races struggling for the soil, the Dravidians, a dark-skinned race of aborigines, and the Aryans, a fair-skinned people, descending from the north-western passes. Ultimately the Dravidians were driven back into the southern tableland, and the great plains of Hindustan were occupied by the Aryans, who dominated the history of India for many centuries thereafter.

The Rig-Veda forms the great literary memorial of the early Aryan settlements in the Punjab. The age of this primitive folk-song is unknown. The Hindus believe, without evidence, that it existed " from before all time," or at least 3001 years B.C. — nearly 5000 years ago. European scholars have inferred from astronomical dates that its composition was going on about 1400 B.C. But these dates are themselves given in writings of later origin, and might have been calculated backwards. We only know that the Vedic religion had been at work long before the rise of Buddhism in the 6th century B.C. Nevertheless, the antiquity of the Rig-Veda, although not to be expressed in figures, is abundantly established. The earlier hymns exhibit the Aryans on the north-western frontiers of India just starting on their long journey. They show us the Aryans on the banks of the Indus, divided into various tribes, sometimes at war with each other, sometimes united against the " black-skinned " aborigines. Caste, in its later sense, is unknown. Each father

Legends.

of a family is the priest of his own household. The chieftain acts as father and priest to the tribe; but at the greater festivals he chooses some one specially learned in holy offerings to conduct the sacrifice in the name of the people. The chief himself seems to have been elected. Women enjoyed a high position, and some of the most beautiful hymns were composed by ladies and queens. Marriage was held sacred. Husband and wife were both " rulers of the house " (dampati), and drew near to the gods together in prayer. The burning of widows on their husbands' funeral-pile w

The Aryan tribes in the Veda are acquainted with most of the metals. They have blacksmiths, coppersmiths and goldsmiths among them,

besides carpenters, barbers and other artisans. They fight from chariots, and freely use the horse, although not yet the elephant, in war. They have settled down as husband- men, till their fields with the plough, and live in villages or towns. But they also cling to their old wandering life, with their herds and " cattle-pens." Cattle, indeed, still form their chief wealth, the coin (Lat. pecunia) in which payments of fines are made; and one of their words for war literally means " a desire for cows." They have learned to build " ships," perhaps large river-boats, and seem to have heard something of the sea. Unlike the modern Hindus, the Aryans of the Veda ate beef, used a fermented liquor or beer made from the soma plant, and offered the same strong meat and drink to their gods. Thus the stout Aryans spread eastwards through northern India, pushed on from behind by later arrivals of their own stock, and driving before them, or reducing to bondage, the earlier " black-skinned " races. They marched in whole com- munities from one river-valley to another, each house-father a warrior, husbandman and priest, with his wife and his little ones, and cattle.

About the beginning of the 6th century B.C. the settled country between the Himalaya mountains and the Nerbudda river was divided into sixteen independent states, some monarchies and some tribal republics, the most important of which were the four monarchies of Kosala, Magadha, the Vamsas and Avanti. Kosala, the modern kingdom of Oudh, appears to have been the premier state of India in 600 B.C. Later the supremacy was reft from it by the kingdom of Magadha, the modern Behar (q.v.). South of Kosala lay the kingdom of the Vamsas, and south of that again the kingdom of Avanti. In the north-west was Gandhara, on the banks of the Indus, in the neighbourhood of Peshawar. The history of these early states is only a confused record of war and intermarriages, and is still semi-mythical. The list of the sixteen states ignores everything north of the Himalayas, south of the Vindhyas, and east of the Ganges where it turns south.

The principal cities of India at this date were Ayodhya, the capital of Kosala at the time of the Ramayana, though it after- wards gave place to Sravasti, which was one of the six great cities of India in the time of Buddha: archaeologists differ as to its position. Baranasi, the modern Benares, had in the time of Megasthenes a circuit of 25 m. Kosambi, the capital of the Vamsas, lay on the Jumna, 230 m. from Benares. Rajagriha (Rajgir), the capital of Magadha, was built by Bimbisara, the contemporary of Buddha. Roruka, the capital of Sovira, was an important centre of the coasting trade. Saketa was sometime the capital of Kosala. Ujjayini, the modern Ujjain, was the

capital of Avanti. None of these great cities has as yet been properly excavated.

In those early days the Aryan tribes were divided into four social grades on a basis of colour: the Kshatriyas or nobles, who claimed descent from the early leaders; the life. Brahmans or sacrificing priests; the Vaisyas, the

peasantry; and last of all the Sudras, the hewers of wood and drawers of water, of non-Aryan descent. Even below these there were low tribes and trades, aboriginal tribes and slaves. In later documents mention is made of eighteen gilds of «ork-people, whose names are nowhere given, but they

probably included workers in wood, workers in metal, workers in stone, .weavers, leather-workers, potters, ivory-workers, dyers, fisher-folk, butchers, hunters, cooks, barbers, flower- sellers, sailors, basket-makers and painters.

It is supposed that sea-going merchants, mostly Dravidians, and not Aryans, availing themselves of the monsoons, traded in the 7th century B.C. from the south-west ports of India to Babylon, and that there they became acquainted with a Semitic alphabet, which they brought back with them, and from which all the alphabets now used in India, Burma, Siam and Ceylon have been gradually evolved. For the early inscriptional re- mains, see Inscriptions: India. The earliest written records in India, however, are Buddhist. The earliest written books are in Pali and Buddhist Sanskrit.

Early states.

Capital cities.

The Buddhist Period. The systems called Jainism (see Jains) and Buddhism (q.v.) had their roots in prehistoric philosophies, but were founded respectively by Vardhamana Mahavira and Gotama Buddha, both of whom were preaching in Magadha during the reign of Bimbisara (c. 520 B.C.).

During the next two hundred years Buddhism spread over northern India, perhaps receiving a new impulse from the Greek kingdoms in the Punjab. About the middle of the 3rd century B.C. Asoka, the king of Magadha or Behar, who reigned from 264 B.C. to 227 B.C., became a zealous convert to Buddhism. He is said to have supported 64,000 Buddhist priests; he founded many religious houses, and his kingdom is 'called the Land of the Monasteries (Vihara or Behar) to

this day. He did for Buddhism what Constantine effected for Christianity; he organized it on the basis of a state religion. This he accomplished by five means — by a council to settle the faith, by edicts promulgating its principles, by a state department to watch over its purity, by missionaries to spread its doctrines, and by an authoritative collection of its sacred books. In 246 B.C. Asoka is said l to have convened at Pataliputra (Patna) the third Buddhist council of one thousand elders (the tradition that he actually convened it rests on no actual evidence that we possess). Evil men, taking on them the. yellow robe of the order, had given forth their own opinions as the teaching of Buddha. Such heresies were now corrected; and the Buddhism of southern Asia practically dates from Asoka's council. In a number of edicts, both before and after the synod, he published throughout India the grand principles of the faith. Such edicts are still found graven deep upon pillars, in caves and on rocks, from the Yusafzai valley beyond Peshawar on the north-western frontier, through the heart of Hindustan, to Kathiawar and Mysore on the south and Orissa in the east. Tradition states that Asoka set up 64,000 memorial columns; and the thirty-five inscriptions extant in our own day show how widely these royal sermons were spread over India. In the year of the council, the king also founded a state department to watch over the purity and to direct the spread of the faith. A minister of justice and religion (Dharma Mahamatra) directed its operations; and, one of its first duties being to proselytize, he was specially charged with the welfare of the aborigines among whom its missionaries were sent. Asoka did not think it enough to convert the inferior races without looking after their material interests. Wells were to be dug and trees planted along the roads; a system of medical aid was established throughout his kingdom and the conquered provinces, as far as Ceylon, for both man and beast. Officers were appointed to watch over domestic life and public morality, and to promote instruction among the women as well as the youth.

Asoka recognized proselytism by peaceful means as a state duty. The rock inscriptions record how he sent forth mission- aries " to the utmost limits of the barbarian countries," to intermingle among all unbelievers" for the spread of religion. They shall mix equally with Brahmans and beggars, with the

1 The historicity of this convention, not now usually admitted by scholars, is maintained by Bishop Copleston of Calcutta in his j Buddhism, Primitive and Present (1908).

dreaded and the despised, both within the kingdom ” and in foreign countries, teaching better things.” Conversion is to be effected by persuasion, not by the sword. This character of a proselytizing faith which wins its victories by peaceful means has remained a prominent feature of Buddhism to the present day. Asoka, however, not only took measures to spread the religion; he also endeavoured to secure its orthodoxy. He collected the body of doctrine into an authoritative version, in the Magadhi language or dialect of his central kingdom in Behar — a version which for two thousand years has formed the canon (pitakas) of the southern Buddhists.

The fourth and last of the great councils was held in Kashmir under the Kushan king Kanishka (see below). This council, which consisted of five hundred members, compiled three com- mentaries on the Buddhist faith. These commentaries supplied in part materials for the Tibetan or northern canon, drawn up at a subsequent period. The northern canon, or, as the Chinese proudly call it, the ” greater vehicle of the law,” includes many later corruptions or developments of the Indian faith as originally embodied by Asoka in the ” lesser vehicle,” or canon of the southern Buddhists.

The Kanishka commentaries were written in the Sanskrit language, perhaps because the Kashmir and northern priests who formed his council belonged to isolated Aryan colonies, which had been little influenced by the growth of the Indian vernacular dialects. In this way Kanishka and his Kashmir council became in some degree to the northern or Tibetan Buddhists what Asoka and his council had been to the Buddhists of Ceylon and the south. 1

Buddhism never ousted Brahmanism from any large part of India. The two systems co-existed as popular religions during more than a thousand years (250 B.C. to about a.d. Bu *** , ‘ s ” 1 800), and modern Hinduism is the joint product of maoism. ‘ both- Certain kings and certain eras were intensely Buddhistic; but the continuous existence of Brah- manism is abundantly proved from the time of Alexander (327 b.c.) downwards. The historians who chronicled his march, and the Greek ambassador Megasthenes, who succeeded them (300 B.C.) in their literary labours, bear witness to the pre- dominance of the old faith in the period immediately preceding Asoka. Inscriptions, local legends, Sanskrit literature, and the drama disclose the survival of Brahman influence during the next six

centuries (250 b.c.-a.d. 400). From a.d. 400 we have the evidence of the Chinese pilgrims, who toiled through Central Asia into India as the birthplace of their faith. Fa-Hien entered India from Afghanistan, and journeyed down the whole Gangetic valley to the Bay of Bengal in a.d. 399-413. He found Brahman priests equally honoured with Buddhist monks, and temples to the Indian gods side by side with the religious houses of his own faith. Hsiian Tsang also travelled to India from China by the Central Asia route, and has left a fuller record of the state of the two religions in the .7th century. His journey extended from a.d. 629 to 645, and everywhere throughout India he found the two faiths eagerly competing for the suffrages of the people. By that time, indeed, Brahmanism was beginning to assert itself at the expense of the other religion. The monuments of the great Buddhist monarchs, Asoka and Kanishka, confronted him from the time he neared the Punjab frontier; but so also did the temples of Siva and his " dread " queen Bhima. Through- out north-western India he found Buddhist convents and monks surrounded by " swarms of heretics." The political power was also divided, although Buddhist sovereigns predominated. A Buddhist monarch ruled over ten kingdoms in Afghanistan. At Peshawar the great monastery built by Kanishka was de- serted, but the populace remained faithful. In Kashmir king and people were devout Buddhists, under the teaching of five hundred monasteries and five thousand monks. In the country identified with Jaipur, on the other hand, the inhabitants were devoted to heresv and war.

1 In 1909 the excavation of a ruined stupa near Peshawar dis- closed a casket, with an inscription of Kanishka, and containing fragments of bones believed to be those of Buddha himself.

*During the next few centuries Brahmanism gradually became the ruling religion. There are legends of persecutions instigated by Brahman reformers, such as Kumarila Bhatta and Sankar-Acharjya. But the downfall of Buddhism „*b"X. seems to have resulted from natural decay, and from hism. new movements of religious thought, rather than from any general suppression by the sword. Its extinction is contemporaneous with the rise of Hinduism, and belongs to a subsequent part of this sketch. In the nth century, only outlying states, such as Kashmir and Orissa, remained faithful; and before the Mahommedans fairly came upon the scene Buddhism as a popular faith had disappeared from India. During the last ten centuries Buddhism has been a banished religion from its native home. But it has won greater triumphs in its exile than it could ever have achieved in the land of its birth. It has created a literature and a religion for more than a third of the human race, and has profoundly affected*

the beliefs of the rest. Five hundred millions of men, or 35% of the inhabitants of the world, still follow the teaching of Buddha. Afghanistan, Nepal, Eastern Turkestan, Tibet, Mongolia, Manchuria, China, Japan, the Eastern Archipelago, Siam, Burma, Ceylon and India at one time marked the magnificent circumference of its conquests. Its shrines and monasteries stretched in a continuous line from the Caspian to the Pacific, and still extend from the confines of the Russian empire to the equatorial archipelago. During twenty-four centuries Buddhism has encountered and outlived a series of powerful rivals. At this day it forms one of the three great religions of the world, and is more numerously followed than either Christianity or Islam. In India its influence has survived its separate existence: it supplied a basis upon which Brahmanism finally developed from the creed of a caste into the religion of the people. The noblest survivals of Buddhism in India are to be found, not among any peculiar body, but in the religion of the people; in that principle of the brotherhood of man, with the reassertion of which each new revival of Hinduism starts; in the asylum which the great Hindu sects afford to women who have fallen victims to caste rules, to the widow and the out-caste; in the gentleness and charity to all men, which takes the place of a poor-law in India, and gives a high significance to the half satirical epithet of the " mild " Hindu.

Hindu Period.

The external history of India may be considered to begin with the Greek invasion in 327 b.c. Some indirect trade be- tween India and the Levant seems to have existed from very ancient times. Homer was acquainted with tin and other articles of Indian merchandise by their Sanskrit names; and a long list has been made of Indian products mentioned in the Bible. In the time of Darius (see Persia) the valley of the Indus was a Persian satrapy. But the first Greek historian who speaks clearly of India was Hecataeus of Miletus (549-486 b.c); the knowledge of Herodotus (450 b.c.) ended at the Indus; and Ctesias, the physician (401 B.C.), brought back from his residence in Persia only a few facts about the products of India, its dyes and fabrics, its monkeys and parrots. India to the east of the Indus was first made known in Europe by the historians and men of science who accompanied Alexander the Great in 327 B.C. Their narratives, although now lost, are con- densed in Strabo, Pliny and Arrian. Soon afterwards Megas- thenes, as Greek ambassador resident at a court in Bengal (306-298 B.C.), had opportunities for the closest observation. The knowledge of the Greeks and Romans concerning India practically dates from his researches, 300 B.C.

Alexander the Great entered India early in 327 B.C. Crossing the lofty Khawak and Kaoshan passes of the Hindu Kush, he advanced by Alexandria, a city previously founded in the Koh-i-Daman, and Nicaea, another city to ad'r's the west of Jalalabad, on the road from Kabul to march, India. Thence he turned eastwards through the Kunar valley and Bajour, and crossed the Gouraios (Panjkora) river. Here he laid siege to Mount Aornos, which is identified

by some authorities with the modern Mahaban, though this identification was rejected by Dr Stein after an exhaustive survey of Mount Mahaban in 1904. Alexander crossed the Indus at Ohind, 16 m. above Attock, receiving there the sub- mission of the great city of Taxila, which is now represented by miles of ruins near the modern Rawalpindi. Crossing the Hydaspes (Jhelum) he defeated Porus in a great battle, and crossing the Acesines (Chenab) near the foot of the hills and the Hydraotes (Ravi), reached the Hyphasis (Beas). Here he was obliged by the temper of his army to retrace his steps, and retreat to the Jhelum, whence he sailed down the river to its confluence with the Indus, and thence to Patala, probably the modern Hyderabad. From Patala the admiral Nearchos was to sail round the coast to the Euphrates, while Alexander himself marched through the wilds of Gedrosia, or modern Makran. Ultimately, after suffering agonies of thirst in the desert, the army made its way back to the coast at the modern harbour of Pasin, whence the return to Susa in Persia was comparatively easy.

During his two years' campaign in the Punjab and Sind, Alexander captured no province, but he made alliances, founded cities and planted garrisons. He had transferred much territory to chiefs and confederacies devoted to his cause; every petty court had its Greek faction; and the detachments which he left behind at various positions, from the Afghan frontier to the Beas, and from near the base of the Himalaya to the Sind delta, were visible pledges of his return. At Taxila (Dehri- Shahan) and Nicaea (Mong) in the northern Punjab, at Alexandria (Uchch) in the southern Punjab, at Patala (Hyderabad) in Sind, and at other points along his route, he established military settle- ments of Greeks or allies. A large body of his troops remained in Bactria; and, in the partition of the empire which followed Alexander's death in 323 B.C., Bactria and India

eventually fell to Seleucus Nicator, the founder of the Syrian monarchy (see Seleucid).

Meanwhile a new power had arisen in India. Among the Indian adventurers who thronged Alexander's camp in the Punjab, each with his plot for winning a kingdom gvpta " or crushing a rival, Chandragupta Maurya; an exile Maury a. from the Gangetic valley, seems to have played a somewhat ignominious part. He tried to tempt the wearied Greeks on the banks of the Beas with schemes of conquest in the rich south-eastern provinces; but, having personally offended their leader, he had to fly the camp (326 B.C.). In the confused years which followed, he managed with the aid of plundering bands to form a kingdom on the ruins of the Nanda dynasty in Magadha or Behar (321 B.C.). He seized the capital, Pataliputra, the modern Patna, establishe.d himself firmly in the Gangetic valley, and compelled the north-western princi- palities, Greeks and natives alike, to acknowledge his suzerainty. While, therefore, Seleucus was winning his way to the Syrian monarchy during the eleven years which followed Alexander's death, Chandragupta was building up an empire in northern India. Seleucus reigned in Syria from 312 to 280 B.C., Chandra- gupta in the Gangetic valley from 321 to 296 B.C. In 312 B.C. the power of both had been consolidated, and the two new sovereignties were brought face to face. In that year Seleucus, having recovered Babylon, proceeded to re-establish his authority in Bactria (q.v.) and the Punjab. In the latter province he found the Greek influence decayed. Alexander had left behind a mixed force of Greeks and Indians at Taxila. No sooner was he gone than the Indians rose and slew the Greek governor; the Macedonians massacred the Indians; a new governor, sent by Alexander, murdered the friendly Punjab prince, Porus, and was himself driven out of the country by the advance of Chandragupta from the Gangetic valley. Seleucus, after a war with Chandragupta, determined to ally himself with the new power in India rather than to oppose it. In return for five hundred elephants, he ceded the Greek settlements in the Punjab and the Kabul valley, gave his daughter to Chandra- gupta in marriage, and stationed an ambassador, Megasthenes, at the Gangetic court (302 B.C.). Chandragupta became familiar

to the Greeks as Sandrocottus, king of the Prasii; his capital, Pataliputra was called by them Palimbothra. On the other hand, the names of Greeks and kings of Grecian dynasties appear in the rock inscriptions, under Indian forms.

Previous to the time of Megasthenes the Greek idea of India was a

very vague one. Their historians spoke of two classes of Indians- certain mountainous tribes who dwelt in northern Afghanistan under the Caucasus or Hindu Kush, and a maritime race living on the coast of Baluchistan. Of the India of modern geography lying beyond the Indus they practically knew nothing. It was this India to the east of the Indus that Megasthenes opened up to the western world. He describes the classification of the people, dividing them, however, into seven castes instead of four, namely, philosophers, husband- men, shepherds, artisans, soldiers, inspectors and the counsellors of the king. The philosophers were the Brahmans, and the pre- scribed stages of their life are indicated. Megasthenes draws a dis- tinction between the Brahmans (BpaxMa"«) and the Sarmanae (Sopnacai), from which some scholars have inferred that the Bud- dhist Sarmanas were a recognized class fifty years before the council of Asoka. But the Sarmanae also include Brahmans in the first and third stages of their life as students and forest recluses. The inspectors or sixth class of Megasthenes have been identified with Asoka's Mahamatra and his Buddhist inspectors of morals.

The Greek ambassador observed with admiration the absence of slavery in India, the chastity of the women, and the courage of the men. In valour they excelled all other Asiatics; they required no locks to their doors; above all, no Indian was ever known to tell a lie. Sober and industrious, good farmers and skilful artisans, they scarcely ever had recourse to a lawsuit, and lived peaceably under their native chiefs. The kingly government is portrayed almost as described in Manu, with its hereditary castes of councillors and soldiers. Megasthenes mentions that India was divided into one hundred and eighteen kingdoms; some of which, such as that of the Prasii under Chandragupta, exercised suzerain powers. The village system is well described, each little rural unit seeming to be an in- dependent republic. Megasthenes remarked the exemption of the husbandmen (Vaisyas) from war and public services, and enumer- ates the dyes, fibres, fabrics and products (animal, vegetable and mineral) of India. Husbandry depended on the periodical rains; and forecasts of the weather, with a view to " make adequate pro- vision against a coming deficiency," formed a special duty of the Brahmans. " The philosopher who errs in his predictions observes silence for the rest of his life."

Before the year 300 B.C. two powerful monarchies had thus begun to act upon the Brahmanism of northern India, from the east and from the west. On the east, in the Gangetic valley, Chandragupta (320-296 B.C.) firmly consolidated the dynasty which during the next century produced Asoka (264-228 or 227 B.C.), and

established Buddhism throughout India. On the west, the Seleucids diffused Greek influences, and sent forth Graeco-Bactrian expeditions to the Punjab. Antiochus Theos (grandson of Seleucus Nicator) and Asoka (grandson of Chandra- gupta), who ruled these two monarchies in the 3rd century B.C., made a treaty with each other (256). In the next century Eucratides, king of Bactria, conquered as far as Alexander's royal city of Patala, and possibly sent expeditions into Cutch and Gujarat, 181-161 B.C. Of the Graeco-Indian monarchs, Menander (q.v.) advanced farthest into north-western India, and his coins are found from Kabul, near which he probably had his capital, as far as Muttra on the Jumna. 1 The Buddhist dynasty of Chandragupta profoundly modified the religion of northern India from the east; the Seleucid empire, with its Bactrian and later offshoots, deeply influenced the science and art of Hindustan from the west.

Brahman astronomy owed much to the Greeks, and what the Buddhists were to the architecture of northern India, that the Greeks were to its sculpture. Greek faces and profiles constantly occur in ancient Buddhist statuary, intiue'bsB and enrich almost all the larger museums in India, oa art. The purest specimens have been found in the North- west frontier province (the ancient Gandhara) and the Punjab, where the Greeks settled in greatest force. As we proceed eastward from the Punjab, the Greek type begins to fade. Purity of outline gives place to lusciousness of form. In the

1 In 1909 an inscription in Brahmi characters was discovered near Bhilsa in Central India recording the name of a Greek, Heliodorus. He describes himself as a worshipper of Bhagavata (= Vishnu), and states that he had come from Taxila in the name of the great king Antialcidas, who is known from his coins to have lived c. 170 B.C.

female figures, the artists trust more and more to swelling breasts and towering chignons, and load the neck with con- stantly accumulating jewels. Nevertheless, the Grecian type of countenance long survived in Indian art. It is entirely unlike the present coarse conventional ideal of sculptured beauty, and may even be traced in

the delicate profiles on the so-called sun temple at Kanarak, built in the 12th century a.d. on the remote Orissa shore.

Chandragupta (q.v.) was one of the greatest of Indian kings. The dominions that he had won back from the Greeks he ad- ministered with equal power. He maintained an J" e army of 600,000 infantry, 30,000 horsemen, 36,000*

Dynasty. men w ith the elephants, and 24,000 men with the chariots, which was controlled by an elaborate war- office system. The account given of his reign by Megasthenes makes him better known to us than any other Indian monarch down to the time of Akbar. In 297 B.C. he was succeeded by his son, Bindusara, who is supposed to have extended his dominions down to Madras. In 272 B.C. he in turn was succeeded by Asoka, the Buddhist emperor, the religious side of whose reign has already been described. Asoka's empire included the greater part of Afghanistan, a large part of Baluchistan, Sind, Kashmir, Nepal, Bengal to the mouths of the Ganges, and peninsular India down to the Palar river. After Asoka the Mauryas dwindled away, and the last of them, Brihadratha, was treacherously assassinated in 184 B.C. by his commander-in-chief, Pushya- mitra Sunga, who founded the Sunga dynasty.

During the 2nd century B.C. north-western India was invaded and partially conquered by Antiochus III. the Great, Demetrius Sunxa (), Eucratides (q.v.) and Menander (q.v.). With Kama, the last of these Pushyamitra Sunga waged successful and war, driving him from the Gangetic valley and con

fining him to his conquests in the west. Pushyamitra established his own paramountcy over northern India; but his reign is mainly memorable as marking the beginning of the Brahmanical reaction against Buddhism, a reaction which Pushyamitra is said to have forwarded not only by the peaceful revival of Hindu rites but by a savage persecution of the Buddhist monks. The Sunga dynasty, after lasting 112 years, was succeeded by the Kanva dynasty, which lasted 45 years, i.e. until about 27 B.C., when it was overthrown by an unknown king of the Andhra dynasty of the Satavahanas, whose power, originating in the deltas of the Godavari and Kistna rivers, by a.d. 200 had spread across India to Nasik and gradu- ally pushed its way northwards.

About a.d. 100 there appeared in the west three foreign tribes from the north, who conquered the native population and established themselves in Malwa, Gujarat and Kathia- Satraps. war – These

tribes were the Sakas, a horde of pastoral nomads from Central Asia (see Saka), the Pahlavas, whose name is supposed to be a corruption of " Parthiva " (i.e. Parthians of Persia), and the Yavanas (Ionians), i.e. foreigners from the old Indo-Greek kingdoms of the north west frontier, all of whom had been driven southwards by the Yue-chi (q.v.). Their rulers, of whom the first to be mentioned is Bhumaka, of the Kshaharata family, took the Persian title of satrap (Kshatrapa). They were hated by the Hindus as bar- barians who disregarded the caste system and despised the holy law, and for centuries an intermittent struggle continued between the satraps and the Andhras, with varying fortune. Finally, however, about a.d. 236, the Andhra dynasty, after an existence of some 460 years, came to an end, under circum- stances of which no record remains, and their place in western India was taken by the Kshaharata satraps, until the last of them was overthrown by Chandragupta Vikramaditya at the close of the 4th century.

Meanwhile, the Yue-chi had themselves crossed the Hindu Kush to the invasion of north-western India (see Yue-Chi). They were originally divided into five tribes, which were united under the rule of Kadphises I. 1 (? a.d. 45-85), the founder of

1 This is the conventional European form of the name. For other forms see Yue-Chi.

the Kushan dynasty, who conquered the Kabul valley, annihilating what remained there of the Greek dominion, and swept away the petty Indo – Greek and Indo- The Parthian principalities on the Indus. His successors Kushan completed the conquest of north-western India from the Dynasty delta of the Indus eastwards probably as far as Benares. ^' D ' 4S ' One effect of the Yue-chi conquests was to open up a channel of commerce with the Roman empire by the northern trade routes; and the Indian embassy which, according to Dion. Cassius (ix. 58), visited Trajan after his arrival at Rome in a.d. 99, was probably • sent by Kadphises II. (Ooemokadphises) to announce his conquest of north-western India. The most celebrated of the Kushan kings, however, was Kanishka, whose date is still a matter of controversy. 3 From his capital at Purushapura (Peshawar) he not only maintained his hold on north-western India, but conquered Kashmir, attacked Patali- putra, carried on a successful war with the Parthians, and led an army across the appalling passes of the Taghdumbash Pamir to the conquest of Kashgar, Yarkand and Khotan. It is not, however, as a conqueror that Kanishka mainly lives on in tradition, but as a Buddhist monarch, second in reputation only to Asoka, and as the

convener of the celebrated council of Kashmir already mentioned.

The dynasties of the Andhras in the centre and south and of the Kushans in the north came to an end almost at the same time (c. a.d. 236-225 respectively). The history of India during the remainder of the 3rd century is all but a blank, a confused record of meaningless names and disconnected events; and it is not until the opening of the 4th century that the veil is lifted, with the rise to supreme power in Magadha (a.d. 320) of Chandragupta I., the founder of the Gupta dynasty and empire (see Gupta), the most extensive since the days of Asoka. He was succeeded by Chandragupta II. Vikramaditya, whose court and administration are described by the Chinese pilgrim Fa-hien, and who is supposed to have been the original of the mythical king Vikramaditya, who figures largely in Indian legends. The later Guptas were overwhelmed (c. 470) by the White Huns, or Ephthalites (q.v.), who after breaking the power of Persia and assailing the Kushan kingdom of Kabul, had poured into India, conquered Sind, and established their rule as far south as the Nerbudda. The dominion of the Huns in India, as elsewhere, was a mere organization for brigandage on an imperial scale and it did not long survive. It was shaken (c. 528) by the defeat, at the hands of tributary princes goaded to desperation, of Mihiragula, the most powerful and blood- thirsty of its rulers — the " Attila of India." It collapsed with the overthrow of the central power of the White Huns on the Oxus (c. 565) by the Turks. Though, however, this stopped the incursions of Asiatic hordes from the north-west, and India was to remain almost exempt from foreign invasion for some 500 years, the Ephthalite conquest added new and permanent elements to the Indian population. After the fall of the central power, the scattered Hunnish settlers, like so many before them, became rapidly Hinduized, and are probably the ancestors of some of the most famous Rajput clans. 4

The last native monarch, prior to the Mahommedan conquest, to establish and maintain paramount power in the north was Harsha, or Harshavardhana (also known as Siladitya), for whose reign (606-648) full and trustworthy materials exist in the book of travels written by the Chinese pilgrim Hsiian Tsang and the Harsha-charita (Deeds of Harsha) composed by Bana, a Brahman who lived at the royal court. Harsha was the younger son of the raja of Thanesar, and gained his first ex- perience of campaigning while still a boy in the successful wars

2 V. A. Smith, Early Hist, of India, p. 238.

3 Smith, op. cit. pp. 239, &c, says that he probably succeeded Kadphises II. about A.D. 120. Dr Fleet dates the beginning of Kanishka's reign 58 B.C. (see Inscriptions: Indian). Mr Vincent Smith (Imp. Gaz. of India, The Indian Empire, ed. 1908, vol. it. p. 289, note) dissents from this view, which is also held by Dr Otto Franke of Berlin, stating that Dr Stein's discoveries in Chinese Turkestan " strongly confirm the view " held by himself.

1 See V. A. Smith, op. cit. pp. 297, &c.

waged by his father and brother against the Huns on the north-western frontier. After the treacherous murder of his brother by Sasanka, king of Central Bengal, he was confirmed as raja, though still very young, by the nobles of Thanesar in 606, though it would appear that his effective rule did not begin till six years later. 1 His first care was to revenge his brother's death, and though it seems that Sasanka escaped destruction for a while (he was still ruling in 619), Harsha's experience of warfare encouraged him to make preparations for bringing all India under his sway. By the end of five and a half years he had actually conquered the north-western regions and also, probably, part of Bengal. After this he reigned for 345 years, devoting most of his energy to perfecting the administration of his vast dominions, which he did with such wisdom and liberality as to earn the commendation of Hsiian Tsang. In his campaigns he was almost uniformly successful; but in his attempt to conquer the Deccan he was repulsed (620) by the Chalukya king, Pulikesin II., who successfully prevented him from forcing the passes of the Nerbudda. Towards the end of his reign Harsha's empire embraced the whole basin of the Ganges from the Himalayas to the Nerbudda, including Nepal, 2 besides Malwa, Gujarat and Surashtra (Kathiawar) ; while even Assam (Kamarupa) was tributary to him. The empire, however, died with its founder. His benevolent despotism had healed the wounds inflicted by the barbarian invaders, and given to his subjects a false feeling of security. For he left no heir to carry on his work; his death " loosened the bonds which restrained the disruptive forces always ready to operate in India, and allowed tHem to produce their normal result, a medley of petty states, with ever-varying boundaries, and engaged in unceasing internecine war." s

In the Deccan the middle of the 6th century saw the rise of the Chalukya dynasty, founded by Pulikesin I. about a.d. 550. The most famous monarch of this line was Pulikesin oJˆan, H-, who repelled the inroads of Harsha (a.d. 620), and whose court was visited by Hsiian Tsang (a.d. 640); but in a.d. 642 he was defeated by the Pallavas of Con- jeeveram, and though his son Vikramaditya I. restored the fallen fortunes of his family, the Chalukyas were finally super- seded by the Rashtrakutas about a.d. 750. The Kailas temple at Ellora was built in the reign of Krishna I. (c. a.d. 760). The last of the Rashtrakutas was overthrown in a.d. 073 by Taila II., a scion of the old Chalukya stock, who founded a second dynasty known as the Chalukyas of Kalyani, which lasted like its pre- decessor for about two centuries and a quarter. About a.d. 1000 the Chalukya kingdom suffered severely from the invasion of the Chola king, Rajaraja the Great. Vikramanka, the hero of Bilhana's historical poem, came to the throne in a.d. 1076 and reigned for fifty years. After his death the Chalukya power declined. During the 12th and 13th centuries a family called Hoysala attained considerable prominence in the Mysore country, but they were overthrown by Malik Kafur in a.d. 13 10. The Yadava kings of Deogiri were descendants of feudatory nobles of the Chalukya kingdom, but they, like the Hoysalas, were overthrown by Malik Kafur, and Ramachandra, the last of the line, was the last independent Hindu sovereign of the Deccan.

According to ancient tradition the kingdoms of the south were three — Pandya, Chola and Chera. Pandya occupied the The extremity of the peninsula, south of Pudukottai,

Kingdoms Chola extended northwards to Nellore, and Chera of the l a y to the west, including Malabar, and is identified

South. w j (.j 1 ˆ ne K era i a f Asoka. All three kingdoms were occupied by races speaking Dravidian languages. The authentic history of the south does not begin until the 9th and 10th centuries a.d., though the kingdoms are known to have existed in Asoka's time.

The most ancient mention of the name Pandya occurs in the 4th century B.C., and in Asoka's time the kingdom was inde-

1 His era, however, is dated from 606.

2 So V. A. Smith, op. cit. p. 314, who on this point differs from Sylvain Levi and Ettinghausen.

3 For Harsha's reign see Smith, op. cit. xiii. 311-331.

pendent, but no early records survive, the inscriptions of the dynasty being of late date, while the long lists of kings in Tamil literature are untrustworthy. During the early centuries of the Christian era the Pandya and Chera T e kingdoms traded with Rome. The most ancient Kingdom. Pandya king to whom a definite date can be ascribed is Rajasimha (c. a.d. 920). Records begin towards the end of the 1 2th century, and the dynasty can be traced from then till the middle of the 16th century. The most conspicuous event in its history was the invasion by the Sinhalese armies of Parakrama- bahu, king of Ceylon (c. a.d. 1175). The early records of the Chera kingdom are still more meagre; and the authentic list of the rajas of Travancore does not begin till a.d. 1335, and the rajas of Cochin two centuries later.*

The Chola kingdom, like the Pandya, 4s mentioned by the Sanskrit grammarian Katyayana in the 4th century B.C., and was recognized by Asoka as independent. The dynastic history of the Cholas begins about A.D. 860, J/ 1 ". and is known from then until its decline in the middle Kingdom. of the 13th century. During those four centuries their history is intertwined with that of the Pallavas, Chalukyas, Rashtrakutas and other minor dynasties. In a.d. 640 the Chola country was visited by Hsiian Tsang, but the country at that time was desolate, and the dynasty of small importance. In a.d. 985 Rajaraja the Great came to the throne, and after a reign of twenty-seven years died the paramount ruler of southern India. He conquered and annexed the island of Ceylon, and was succeeded by four equally vigorous members of the dynasty; but after the time of Vikrama (a.d. 1120) the Chola power gradually declined, and was practically extinguished by Malik Kafur.

The name of the Pallavas appears to be identical with that of the Pahlavas, a foreign tribe, frequently mentioned in in- scriptions and Sanskrit literature. It is supposed, The therefore, that the Pallavas came from the north, Pailava and gradually worked their way down to Malabar Co " m and the Coromandel coast. When first heard of in ieierac y- the 2nd century a.d. they are a ruling race. The Pallavas appear, like the Mahrattas in later times, to have imposed tribute on the territorial governments of the country. The first Pailava king about whom anything substantial is known was Siva- skanda-varman (c. a.d. 150), whose capital was Kanchi (Con- jeeveram), his power extending into the Telugu country as far as the Kistna river. Two centuries later Samudragupta con- quered eleven kings of the south, of whom three were Pallavas. It appears that in the 4th century three Pailava chiefs were established at Kanchi, Vengi and Palakkada, the latter two being subordinate to the first, and that Pailava rule

extended from the Godavari on the north to the Southern Vellaru river on the south, and stretched across Mysore from sea to sea. About a.d. 609 Pulikesin II., the Chalukya king, defeated Mahendra-Varman, a Pailava chief, and drove him to take refuge behind the walls of Kanchi. About a.d. 620 a prince narned Vishnuvardhana founded the Eastern Chalukya line in the province of Vengi, which was taken from the Pallavas. Hsiian Tsang visited Kanchi, the Pailava capital, in the year a.d. 640; the country was, according to his account, 1000 m. in circumference, and the capital was a large city 5 or 6 m. in circumference. In a.d. 642 the Pallavas defeated in turn Pulikesin II. The conflict became perennial, and when the Rashtrakutas supplanted the Chalukyas in the middle of the 8th century, they took up the old quarrel w ; th the Pallavas. Towards the end of the 10th century the Pailava power, which had lasted for ten centuries, was destroyed by the Chola monarch, Rajaraja the Great. Pailava nobles existed to the end of the 17th century, and the raja of Pudukottai claims descent from the ancient royal family.

Mahommedan Period.

At the time that Buddhism was being crushed out of India by the Brahmanic reaction, a new faith was being born in Arabia, destined to supply a youthful fanaticism which should

sweep the country from the Himalayas to Cape Comorin, and from the western to the eastern sea. Mahomet, the founder of Islam, died at Medina in a.d. 632, while the Chinese pilgrim Hsiian Tsang was still on his travels. The first Mahommedan invasion of India is placed in 664, only thirty-two years after the death of the prophet. The Punjab is said to have been ravaged on this occasion with no permanent results. The first Mahommedan conquest was the outlying province of Sind. In 711, or seventy-nine years after the death of Mahomet, an Arab army under Mahommed b. Kasim invaded and conquered the Hindus of Sind in the name of Walid I., caliph of Damascus, of the Omayyad line. In the same year Roderic, the last of the Goths, fell before the victorious Saracens in Spain. But in India the bravery of the Rajputs and the devotion of the Brah- mans seem to have afforded a stronger national bulwark than existed in western Europe. In 750 the Hindus rose in rebellion and drove out the

Mussulman tyrant, and the land had rest for one hundred and fifty years.

The next Mahommedan invasion of India is associated with the name of Sultan Mahmud of Ghazni. Mahmud was the eldest son of Sabuktagin, surnamed Nasr-ud-din, in Mahmud or ;g m a Turkish slave, who had established his rule Qhami. over the greater part of modern Afghanistan and Khorassan, with Ghazni as his capital. In 977 Sabuktagin is said to have defeated Jaipal, the Hindu raja of Lahore, and to have rendered the Punjab tributary. But his son Mahmud was the first of the great Mussulman conquerors whose names still ring through Asia. Mahmud succeeded to the throne in 997. During his reign of thirty-three years he extended the limits of his father's kingdom from Persia on the east to the Ganges on the west; and it is related that he led his armies into the plains of India no fewer than seventeen times. In 1 00 1 he defeated Raja Jaipal a second time, and took him prisoner. But Anandpal, son of Jaipal, raised again the standard of national independence, and gathered an army of Rajput allies from the farthest corners of Hindustan. The decisive battle was fought in the valley of Peshawar. Mahmud won the day by the aid of his Turkish horsemen, and thenceforth the Punjab has been a Mahommedan province, except during the brief period of Sikh supremacy. The most famous of Mahmud's invasions of India was that undertaken in 1025-1026 against Gujarat. The goal of this expedition was the temple dedicated to Siva at Somnath, around which so many legends have gathered. It is reported that Mahmud marched through Ajmere to avoid the desert of Sind; that he found the Hindus gathered on the neck of the peninsula of Somnath in defence of their holy city; that the battle lasted for two days; that in the end the Rajput warriors fled to their boats, while the Brahman priests retired into the inmost shrine; that Mahmud, introduced into this shrine, rejected all entreaties by the Brahmans to spare their idol, and all offers of ransom; that he smote the image with his club, and forthwith a fountain of precious stones gushed out. Until the British invasion of Afghanistan in 1839, the club of Mahmud and the wood gates of Somnath were preserved at the tomb of the great conqueror near Ghazni. The club has now disappeared, and the gates brought back to India by Lord Ellenborough are recognized to be a clumsy forgery. To Mahommedans Mahmud is known, not only as a champion of the faith, but as a munificent patron of literature. The dynasty that he founded was not long-lived. Fourteen of his descendants occupied his throne within little more than a century, but none of them achieved greatness. A blood-feud arose between them and a line of Afghan princes who had established

themselves among the mountains of Ghor. In 1155 Bahram, the last of the Ghaznivide Turks, was overthrown by Ala-ud-din of Ghor, and the wealthy and populous city of Ghazni was razed to the ground. But even the Ghoride conqueror spared the tomb of Mahmud. Khusru, the son of Bahram, fled to Lahore, and there estab- lished the first Mahommedan dynasty within India. It speedily ended with his son, also called Khusru, whom Mahommed Ghori, the relentless enemy of the Ghaznivide house, carried away into captivity in 1186.

The Afghans of Ghor thus rose to power on the downfall of the Turks of Ghazni. The founder of the family is said to have been Izzud-din al Husain, whose son Ala-ud-din destroyed Ghazni, as already mentioned. Ala-ud-din had two nephews, Ghiyas-ud-din and Muiz-ud-din, the latter of whom, also called Shahab-ud-din by Mussulman chroniclers, and generally known in history as Mahommed Ghori, is the second of the great Mahom- medan conquerors of India. In 1 1 7 5 he took Multan and Uchch ; in 1186 Lahore fell into his hands; in 1191 he was repulsed before Delhi, but soon afterwards he redeemed this disaster. Hindustan proper was at that period divided between the two Rajput kingdoms of Kanauj and Delhi. Mahommed Ghori achieved his object by playing off the rival kings against each other. By 1193 he had extended his conquests as far east as Benares, and the defeated Rajputs migrated in a body to the hills and deserts now known as Rajputana. In 1199 one of his lieutenants, named Bakhtiyar, advanced into Bengal, and expelled by an audacious stratagem the last Hindu raja of Nadia. The entire northern plain, from the Indus to the Brahmaputra, thus lay under the Mahommedan yoke. But Mahommed Ghori never settled permanently in India. His favourite residence is said to have been the old capital of Ghazni, while he governed his Indian conquests through the agency of a favourite slave, Kutb-ud-din. Mahommed Ghori died in 1206, being assassinated by some Ghakkar tribesmen while sleeping in his tent by the bank of the Indus; on his death both Ghor and Ghazni drop out of history, and Delhi first appears as the Mahommedan capital of India.

On the death of Mahommed Ghori, Kutb-ud-din at once laid aside the title of viceroy, and proclaimed himself sultan of Delhi. He was the founder of what is known as the slave dynasty, which lasted for nearly a century i, (1 206-1 288). The name of Kutb is preserved in the Dynasty. minar, or pillar of victory, which still stands amid the ruins of ancient Delhi, towering high above all later struc- tures. Kutb himself is said to have been successful as a general and an administrator, but none of his successors has left a mark in history.

In 1294 Ala-ud-din Khilji, the third of the great Mahommedan conquerors of India, raised himself to the throne of Delhi by the treacherous assassination of his uncle Feroz II. who had himself supplanted the last of the slave dynasty. Ala-ud-din had already won military re- nown by his expeditions into the yet unsubdued south. He had plundered the temples at Bhilsa in central India, which are admired to the present day as the most interesting examples of Buddhist architecture in the country. At the head of a small ban of horsemen, he had ridden as far south as Deogiri (Daula- tabad) in the Deccan {q.v.), and plundered the Yadava capital. When once established as sultan, he planned more extensive schemes of conquest. One army was sent to Gujarat under Alaf Khan, who conquered and expelled the last Rajput king of Anhalwar or Patan. Another army, led by the sultan in person, marched into the heart of Rajputana, and stormed the rock-fortress of Chitor, where the Rajputs had taken refuge with their women and children. A third army, commanded by Malik Kafur, a Hindu renegade and favourite of Ala-ud-din, penetrated to the extreme south of the peninsula, scattering the unwarlike Dravidian races, and stripping every Hindu temple of its accumulations of gold and jewels. To this day the name of Malik Kafur is remembered in the remote district of Madura, in association with irresistible fate and every foftn of sacrilege.

Ala-ud-din died in 13 16, having subjected to Islam the Deccan and Gujarat. Three successors followed him upon the throne, but their united reigns extended over only five years. In 13 2 1 a successful revolt was headed by Ghiyas-ud-din ^^J°" Tughlak, governor of the Punjab, who is said to have Tughlak. been of Turkish origin. The Tughlak dynasty lasted for about seventy years, until it was swept away by the invasion of Timur, the fourth Mahommedan conqueror of India, in 1398. Tughlak's son and successor, Mahommed b. Tughlak, who reigned*

Ala-ud- din.

Tlmur's invasion.

from 1325 to 1351, is described by Elphinstone as " one of the most accomplished princes and one of the most furious tyrants that ever

adorned or disgraced human nature." He wasted the treasure accumulated by Ala-ud-din in purchasing the retire- ment of the Mogul hordes, who had already made their appearance in the Punjab. When the internal circulation failed, he issued a forced currency of copper, which is said to have deranged the whole commerce of the country. At one time he raised an army for the invasion of Persia. At another he actually despatched an expedition against China, which perished miserably in the Himalayan passes. When Hindustan was thus suffering from his misgovernment, he conceived the project of transferring the seat of empire to the Deccan, and compelled the inhabitants of Delhi to remove a distance of 700 m. to Deogiri or Daulatabad. And yet during the reign of this sultan both the Tughlak dynasty and the city of Delhi are said to have attained their utmost growth. Mahommed was succeeded by his cousin Feroz, who likewise was not content without a new capital, which he placed a few miles north of Delhi, and called after his own name. He was a kind-hearted and popular, but weak, ruler. Mean- while the remote provinces of the empire began to throw off their allegiance to the sultans of Delhi. The independence of the Afghan kings of Bengal is generally dated from 1336, when Mahommed Tughlak was yet on the throne. The com- mencement of the reign of Ala-ud-din, the founder of the Bah- mani dynasty in the Deccan, is assigned to 1347. Zafar Khan, the first of the Ahmedabad kings, acted as an independent ruler from the time of his first appointment as governor of Gujarat in 1391. These and other revolts prepared the way for the fourth great invasion of India under Timur (Tamerlane). Accordingly, when Timur invaded India in 1398, he en- countered but little organized resistance. Mahmud, the last of the Tughlak dynasty, being defeated in a battle out- side the walls of Delhi, fled into Gujarat. The city was sacked and the inhabitants massacred by the victorious Moguls. But the invasion of Timur left no permanent impress upon the history of India, except in so far as its memory fired the imagination of Baber, the founder of the Mogul dynasty. The details of the fighting and of the atrocities may be found related in cold blood by Timur himself in the Mdlfuzat-i-Timuri, which has been translated in Elliot's History of India as told by its own Historians, vol. iii. Timur marched back to Samarkand as he had come, by way of Kabul, and Mahmud Tughlak ven- tured to return to his desolate capital. He was succeeded by what is known as the Sayyid dynasty, which held Delhi and a few miles of surrounding country for about forty years. The Sayyids were in their turn expelled by Bahlol, an Afghan of the Lodi tribe, whose successors removed the seat of government to Agra, which thus for the first time became the imperial city. In 1526 Baber, the fifth in descent from

Timur, and also the fifth Mahommedan conqueror, invaded India at the instigation of the governor of the Punjab, won the victory of Panipat over Ibrahim, the last of the Lodi dynasty, and founded the Mogul empire, which lasted, at least in name, until 1857.

In southern India at this time authentic history begins with the Hindu empire of Vijayanagar, which' exercised an ill-defined sovereignty over the entire south from the 14th to the 16th century. The empire of Vijayanagar repre- sents the last stand made by the national faith in India against conquering Islam. For at least two centuries its sway over the south was undisputed, and its rajas waged wars and concluded treaties of peace with the sultans of the Deccan on equal terms.

The earliest of the Mahommedan dynasties in the Deccan was that founded by Ala-ud-din in 1347, which has received the name of the Bahmani dynasty. The capital Dynasty. was nrst at Gulbarga, and was afterwards removed to Bidar, both which places still possess magnificent palaces and mosques in ruins. Towards the close of the 14th century the Bahmani empire fell to pieces, and five independent kingdoms divided the Deccan among them. These

Vijaya- nagar.

founded in 1490 by a Turk; (2) the Kutb Shahi dynasty, with its capital at Golconda, founded in 151 2 by a Turkoman ad- venturer; (3) the Nizam Shahi dynasty, with its capital at Ahmednagar, founded in 1490 by a Brahman renegade; (4) the Imad Shahi dynasty of Berar, with its capital at Ellichpur, founded in 1484 also by a Hindu from Vijayanagar; (5) the Barid Shahi dynasty, with its capital at Bidar, founded about 1492 by one who is variously described as a Turk and a Georgian slave. It is, of course, impossible here to trace in detail the history of these several dynasties. In 1 565 they combined against the Hindu raja of Vijayanagar, who was defeated and slain in the decisive battle of Talikota. But, though the city was sacked and the supremacy of Vijayanagar for ever destroyed, the Mahommedan victors did not themselves advance far into the south. The Naiks or feudatories of Vijayanagar everywhere, asserted their independence. From them are descended the well-known Palegars of the south, and also the present raja of Mysore. One of the blood-royal of Vijayanagar fled to Chandra- giri, and founded a line which exercised a prerogative of its former sovereignty by granting the site of Madras to the English in 1639. Another scion claiming the same high descent lingers to the present day near the ruins of Vijayanagar, and is known as the raja of

Anagundi, a feudatory of the nizam of Hyderabad. Despite frequent internal strife, the sultans of the Deccan re- tained their independence until conquered by the Mogul emperor Aurangzeb in the latter half of the 17th century. To complete this sketch of India at the time of Baber's invasion it remains to say that an independent Mahommedan dynasty reigned at Ahmedabad in Gujarat for nearly two centuries (from 139 1 to 1573); until conquered by Akbar; and that Bengal was similarly independent, under a line of Afghan kings, with Gaur for their capital, from 1336 to 1573.

When, therefore, Baber invaded India in 1525, the greater part of the country was Mahommedan, but it did not recognize the authority of the Afghan sultan of the Lodi dynasty, who resided at Agra, and also ruled the historical Dy nas °ty, capital of Delhi. After having won the battle of Panipat (1526) Baber was no more acknowledged as emperor of India than his ancestor Timur had been. Baber, how- ever, unlike Timur, had resolved to settle in the plains of Hindustan, and carve out for himself a new empire with the help of his Mogul followers. His first task was to repel an attack by the Rajputs of Chitor, who seem to have attempted to re- establish at this time a Hindu empire. The battle was. fought at Sikri near Agra, and is memorable for the vow made by the easy-living Baber that he would never again touch wine. Baber was again victorious, but died shortly afterwards in 1530. He was succeeded by his son Humayun, who is chiefly known as being the father of Akbar. In Humayun's reign the subject Afghans rose in revolt under Sher Shah, a native of Bengal, who for a short time established his authority over all Hindustan. Humayun was driven as an exile into Persia; and, while be was flying through the desert of Sind, his son Akbar was born to him in the petty fortress of Umarkot. But Sher Shah was killed at the storming of the rock-fortress of Kalinjar, and Humayun, after many vicissitudes, succeeded in re-establishing his authority at Lahore and Delhi. '

Humayun died by an accident in 1556, leaving but a circum- scribed kingdom, surrounded on every side by active foes, to his son Akbar, then a boy of only fourteen years. Akbar the Great, the real founder of the Mogul empire as it existed for two centuries, was the contemporary of Queen' Elizabeth of England. He was born in 1542, and his reign lasted from 1556 to 1605. When his father died he was absent in the Punjab, fighting the revolted Afghans, under the guardianship of Bairam Khan, a native of Badakshan, whose military skill largely contributed to recover the throne for the Mogul line. For the first seven years of his reign Akbar was perpetually engaged in warfare. His first task was to establish his authority in

the Punjab, and in the country around Delhi and Agra. In 1567 he stormed the Rajput stronghold of Chitor, and conquered

Akbar.

were — (1) the Adil Shahi dynasty, with its capital at Bijapur, I Ajmere. In 1570 he obtained possession of Oudh and Gwalior,

In 1572 he marched in person into Gujarat, defeated the last of the independent sultans of Ahmedabad, and formed the pro- vince into a Mogul viceroyalty or subah. In the same year his generals drove out the Afghans from Bengal, and reunited the lower valley of the Ganges to Hindustan. Akbar was then the undisputed ruler of a larger portion of India than had ever before acknowledged the sway of one man. But he continued to extend his conquests throughout his lifetime. In 1578 Orissa was annexed to Bengal by his Hindu general Todar Mall, who forthwith organized a revenue survey of the whole province. Kabul submitted in 1581, Kashmir in 1587, Sind in 1592, and Kandahar in 1594. At last he turned his arms against the Mahommedan kings of the Deccan, and wrested from them Berar; but the permanent conquest of the south was reserved for Aurangzeb.

If the history of Akbar were confined to this long list of conquests, his name would on their account alone find a high place among those which mankind delights to remember. But it is as a civil administrator that his reputation is cherished in India to the present day. With regard to the land revenue, the essence of his procedure was to fix the amount which the cultivators should pay at one-third of the gross produce, leaving it to their option to pay in money or in kind. The total land revenue received by Akbar amounted to about 163 millions sterling. Comparing the area of his empire with the correspond- ing area now under the British, it has been calculated that Akbar, three hundred years ago, obtained 15ˆ millions where they obtain only 135 millions — an amount representing not more than one-half the purchasing power of Akbar's 155- millions. The distinction between khalsa land, or the imperial demesne, and jagir lands, granted revenue free or at quit rent in reward for services, also dates from the time of Akbar. As regards his military system, Akbar invented a sort of feudal organization, by which every

tributary raja took his place by the side of his own Mogul nobles. In theory it was an aristocracy based only upon military command; but practically it accomplished the object at which it aimed by incorporating the hereditary chief- ships of Rajputana among the mushroom creations of a Mahom- medan despotism. Mussulmans and Hindus were alike known only as mansabdars or commanders of so many horse, the highest title being that of amir, of which the plural is umrah ox omrah. The third and last of Akbar's characteristic measures were those connected with religious innovation, about which it is difficult to speak with precision. The necessity of conciliating the proud warriors of Rajputana had taught him toleration from his earliest days. His favourite wife was a Rajput princess, and another wife is said to have been a Christian. Out of four hundred and fifteen of his mansabdars whose names are recorded, as many as fifty-one were Hindus. Starting from the broad ground of general toleration, Akbar was gradually led on by the stimulus of cosmopolitan discussion to question the truth of his inherited faith. The counsels of his friend Abul Fazl, coinciding with that sense of superhuman omnipotence which is bred of despotic power, led him at last to promulgate a new state religion, based upon natural theology, and comprising the best practices of all known creeds. In this strange faith Akbar himself was the prophet, or rather the head of the church. Every morning he worshipped the sun in public, as being the representative of the divine soul that animates the universe, while he was himself worshipped by the ignorant multitude.

Akbar died in 1605, in his sixty-third year. He lies buried beneath a plain slab in the magnificent mausoleum which he had reared at Sikandra, near his capital of Agra. As his name is still cherished in India, so his tomb is still honoured, being covered by a cloth presented by Lord Northbrook when viceroy in 1873.

The reign of Jahangir, his son, extended from 1605 to 1627. It is chiefly remarkable for the influence exercised over the emperor Jahangir. ˆy his favourite wife, surnamed Nur Jahan. The currency was struck in her name, and in her hands centred all the intrigues that made up the work of administration. She lies buried by the side of her husband at Lahore, whither the

seat of government had been moved by Jahangir, just as Akbar had previously transferred it from Delhi to Agra. It was in the reign of Jahangir that the English first established themselves atSurat, and also sent their first embassy to the Mogul court.

Jahangir was succeeded by his son Shah Jahan, who had rebelled against his father, as Jahangir had rebelled against Akbar. Shah Jahan's reign is generally regarded as the period when the Mogul empire attained its greatest jahan magnificence, though not its greatest extent of territory. He founded the existing city of Delhi, which is still known to its Mahommedan inhabitants as Shahjahanabad. At Delhi also he erected the celebrated peacock throne; but his favourite place of residence was Agra, where his name will ever be associated with the marvel of Indian architecture, the Taj Mahal. That most chaste and most ornamental of buildings was erected by Shah Jahan as the mausoleum of his favourite wife Mumtaz Mahal, and he himself lies by her side (see Agra) . Shah Jahan had four sons, whose fratricidal wars for the suc- cession during their father's lifetime it would be tedious to dwell upon. Suffice it to say that Aurangzeb, by mingled treachery and violence, supplanted or overthrew his brothers and pro- claimed himself emperor in 1658, while Shah Jahan was yet alive.

Aurangzeb's long reign, from 1658 to 1707, may be regarded as representing both the culminating point of Mogul power and the beginning of its decay. Unattractive as his character was, it contained at least some elements s"™"" of greatness. None of his successors on the throne was any thing higher than a debauchee or a puppet. He was the first to conquer the independent sultans of the Deccan, and to extend his authority to the extreme south. But even during his lifetime two new Hindu nationalities were being formed in the Mahrattas and the Sikhs; while immediately after his death the nawabs of the Deccan, of Oudh, and of Bengal raised themselves to practical independence. Aurangzeb had indeed enlarged the empire, but he had not strengthened its foundations. During the reign of his father Shah Jahan he had been viceroy of the Deccan or rather of the northern portion only, which had been annexed to the Mogul empire since the reign of Akbar. His early ambition was to conquer the Mahom- medan kings of Bijapur and Golconda, who, since the down- fall of Vijayanagar, had been practically supreme over the south. This object was not accomplished without many tedious campaigns, in which Sivaji, the founder of the Mahratta con- federacy, first comes upon the scene. In name Sivaji was a feudatory of the house of Bijapur, on whose Mahratta behalf he held the rock-forts of his native Ghats; but power. in fact he found his opportunity in playing off the Mahommedan powers against one another, and in rivalling Aurangzeb himself in the art of treachery. In 1680 Sivaji died, and his son and successor, Sambhaji, was betrayed to Aurangzeb and put to death. The rising Mahratta power was thus for a time checked,*

and the Mogul armies were set free to operate in the eastern Deccan. In 1686 the city of Bijapur was taken by Aurangzeb in person, and in the following year Golconda also fell. No independent power then remained in the south, though the numerous local chieftains, known as palegars and naiks, never formally submitted to the Mogul empire. During the early years of his reign Aurangzeb had fixed his capital at Delhi, while he kept his dethroned father, Shah Jahan, in close confinement at Agra. In 1682 he set out with his army on his victorious march into the Deccan, and from that time until his. death in 1707 he never again returned to Delhi. In this camp life Aurangzeb may be taken as representative of one aspect of the Mogul rule, which has been picturesquely de- scribed by European travellers of that day. They agree in depicting the emperor as a peripatetic sovereign, and the empire as held together by its military highways no less than by the strength of its armies. The Grand Trunk road running across the north of the peninsula, is generally attributed to the Afghan usurper, Sher Shah: The other roads branching out south- ward from Agra, to Surat and Burhanpur and Golconda, were

undoubtedly the work of Mogul times. Each of these roads was laid out with avenues of trees, with wells of water, and with frequent sardis or rest-houses. Constant communication be- tween the capital and remote cities was maintained by a system of foot-runners, whose aggregate speed is said to have surpassed that of a horse. Commerce was conducted by means of a caste of bullock-drivers, whose occupation in India is hardly yet extinct.

On the death of Aurangzeb in 1707, the decline of the Mogul empire set in with extraordinary rapidity. Ten emperors after Aurangzeb are enumerated in the chronicles, but Decline of none f them has left any mark on history. His son Empire- an< * successor was Bahadur Shah, who reigned only five years. Then followed in order three sons of Bahadur Shah, whose united reigns occupy only five years more. In 1739 Nadir Shah of Persia, the sixth and last of the great Mahommedan conquerors of India, swept like a whirlwind over Hindustan, and sacked the imperial city of Delhi. Thenceforth the Great Mogul became a mere name, though the hereditary succession continued unbroken down to the time of the Mutiny. Real power had passed into the hands of Mahommedan courtiers and Mahratta generals, both of whom were then carving for themselves kingdoms out of the dismembered empire, until at last British authority placed itself supreme over all. From the time of Aurangzeb no Mussulman, however powerful, dared to assume the title of sultan or emperor, with the single exception of Tippoo's brief paroxysm of madness. The name of nawdb, corrupted by Europeans into " nabob," appears to be an in- vention of the Moguls to express delegated authority, and as such it is the highest title conferred upon Mahommedans at the present day, as maharaja is the highest title conferred upon Hindus. At first nawabs were only found in important cities, such as Surat and Dacca, with the special function of administer- ing civil justice; criminal justice was in the hands of the kotwdl. The corresponding officials at that time in a large tract of country were the subahdar and the faujdar. But the title of subahdar, or viceroy, gradually dropped into desuetude, as the paramount power was shaken off, and nawab became a territorial title with some distinguishing adjunct. During the troubled period of intrigue and assassination that followed on the death of Aurangzeb, two Mahommedan foreigners rose to high position as courtiers and generals, and succeeded in transmitting their power to their sons. The one was Chin Kulich Khan, also called Asaf Jah, and still more commonly Nizam-ul-Mulk, who was of Turkoman origin, and belonged to the

Sunni sect. His inde- pendence at Hyderabad in the Deccan dates from 1712. The other was Saadat Ali Khan, a Persian, and therefore a Shiah, who was appointed subahdar or nawab of Oudh about 1720. Thenceforth these two important provinces paid no more tribute to Delhi, though their hereditary rulers continued to seek formal recognition from the emperor on their succession. The Mahrattas were in possession of the entire west and great part of the centre of the peninsula; while the rich and un warlike province of Bengal, though governed by an hereditary line of nawabs founded by Murshid Kuli Khan in 1704, still continued to pour its wealth into the imperial treasury. The central authority never recovered from the invasion of Nadir Shah in 1739, who carried off plunder variously estimated at from 8 to 30 millions sterling. The Mahrattas closed round Delhi from the south, and the Afghans from the west. The victory of Panipat, won by Ahmad Shah Durani over the united Mahratta confederacy in 1761, gave the Mahommedans one more chance of rule. But Ahmad Shah had no ambition to found a dynasty of his own, nor were the British in Bengal yet ready for territorial conquest.

Shah Alam, the lineal heir of the Mogul line, was thus per- mitted to ascend the throne of Delhi, where he lived during the great part of a long life as a puppet in the hands of MoJai Mahadji Sindhia. He was succeeded by Akbar II., //ne. who lived similarly under the shadow of British

protection. Last of all came Bahadur Shah, who atoned for his association with the mutineers in 1857 by banish-

ment to Burma. Thus ended the Mogul line, after a history which covers three hundred and thirty years. Mahommedan rule remodelled the revenue system, and has left behind fifty millions of Mussulmans in British India.

Early European Settlements.

Mahommedan invaders have always entered India from the north-west. Her new conquerors approached from the sea and from the south. From the time of Alexander to that of Vaseo da Gama, Europe had enjoyed little direct intercourse with the East. An occasional traveller brought back stories of powerful kingdoms and of untold wealth; but the passage by sea was unthought of, and by land many wide deserts and warlike tribes lay between. Commerce, indeed, never ceased entirely, being carried on chiefly by the Italian cities on the Mediterranean, which traded to the ports of the Levant. But to

the Europeans of the 15th century India was practically an unknown land, which powerfully attracted the imagination of spirits stimulated by the Renaissance and ardent for discovery. In 1492 Christopher Columbus set sail under the Spanish flag to seek India beyond the Atlantic, bearing with him a letter to the great khan of Tartary. The expedition under Vasco da Gama started from Lisbon five years later, and, doubling the Cape of Good Hope, cast anchor off the city of Calicut on the 20th of May 1498, after a prolonged voyage of nearly eleven months. From the first da Gama encountered hostility from the " Moors," or rather Arabs, who monopolized the sea-borne trade; but he seems to have found favour with the zamorin, or Hindu raja of Malabar. It may be worth while to recall the contemporary condition of India at that epoch. An Afghan of the Lodi dynasty was on the throne of Delhi, and another Afghan king was ruling over Bengal. Ahmedabad in Gujarat, Gulbarga, Bijapur, Ahmednagar and Ellichpur in the Deccan were each the capital of an independent Mahommedan kingdom; while the Hindu raja of Vijayanagar was recognized as para- mount over the entire south. Neither Mogul nor Mahratta had yet appeared above the political horizon.

After staying nearly six months on the Malabar coast, da Gama returned to Europe by the same route as he had come, bearing with him the following letter from the zamorin Porta- to the king of Portugal: " Vasco da Gama, a noble- guese man of your household, has visited my kingdom and expedl- has given me great pleasure. In my kingdom there is abundance of cinnamon, cloves, ginger, pepper, and precious stones. What I seek from thy country is gold, silver, coral, and scarlet." The arrival of da Gama at Lisbon was celebrated with national rejoicings scarcely less enthusiastic than had greeted the return of Columbus. If the West Indies belonged to Spain by priority of discovery, Portugal might claim the East Indies by the same right. Territorial ambition combined with the spirit of proselytism and with the greed of commerce to fall all Portuguese minds with the dream of a mighty Oriental empire. The early Portuguese discoverers were not traders or private adventurers, but admirals with a royal commission to conquer territory and promote the spread of Christianity. A second expedition, consisting of thirteen ships and twelve hundred soldiers, under the command of Cabral, was despatched in 1 500. " The sum of his instructions was to begin with preach- ing, and, if that failed, to proceed to the sharp determination of the sword." On his outward voyage Cabral was driven by stress of weather to the coast of Brazil. Ultimately he reached Calicut, and established factories both there and at Cochin,

in the face of active hostility from the natives. In 1 502 the king of Portugal obtained from Pope Alexander VI. a bull constituting him " lord of the navigation, conquest, and trade of Ethiopia, Arabia, Persia, and India. 'V In that year Vasco da Gama sailed again to the East, with a fleet numbering twenty vessels. He formed an alliance with the rajas of Cochin and Cannanore against the zamorin of Calicut, and bombarded the latter in his palace. In 1 503 the great Alfonso d' Albuquerque is first heard of, as in command of one of three expeditions from Portugal. In 1505 a large fleet of twenty sail and fifteen hundred men was

sent under Francisco de Almeida, the first Portuguese viceroy of India. In 1 509 Albuquerque succeeded as governor, and widely extended the area of Portuguese influence. Having failed in an attack upon Calicut, he seized Goa, which from 1530 became the capital of Portuguese India. Then, sailing round Ceylon, he captured Malacca, the key of the navigation of the Indian archipelago, and opened a trade with Siam and the Spice Islands (Moluccas). Lastly, he sailed back westwards, and, after pene- trating into the Red Sea, and building a fortress at Ormuz in the Persian Gulf, returned to Goa only to die in 1515. In 1524 Vasco da Gama came out to the East for the third time, and he too died at Cochin.

For exactly a century, from 1500 to 1600, the Portuguese enjoyed a monopoly of Oriental trade.

Their three objects were conquest, commerce and conversion, and for all three their position on the Malabar coast strip was _.. remarkably well adapted. Shut off by the line of

of the the Ghats from Mahommedan India of that day, they Porta- were able to dominate the petty chiefs of Malabar, guest, ˆq welcomed maritime commerce, and allowed religious freedom in their domains. Their trade relations with Vijayanagar were very close, when that great empire was at the height of its power; but in 1564 Vijayanagar went down before the five Mahommedan states of southern India on the field of Talikota, and with its fall began the decline of Portugal. During the whole of the 16th century the Portuguese disputed with the Mahommedans'the supremacy of the

Indian seas, and the antagonism between Christianity and Islam became gradually more intense, until the Portuguese power assumed a purely religious aspect. In 1560 the Inquisition with all its horrors was introduced into Goa. But Portugal was too small a country to keep up the struggle for long. The drain of men told upon her vitality, their quality deteriorated, and their bigotry and intolerance raised even a fiercer opposition to them within the bounds of India; and as the Dutch and British came into prominence the Portuguese gradually faded away. In 1603 and 1639 the Dutch blockaded Goa; during the first half of the 17th century they routed the Portuguese everywhere in India; Ceylon and Java. Similarly in 161 1 the British defeated them off Cambay and in 1615 won a great victory at Swally. After the middle of the 17th century the Asiatic trade of Portugal practically disappeared, and now only Goa, Daman and Diu are left to her as relics of her former greatness.

The Dutch were the first European nation to break through the Portuguese monopoly. During the 16th century Bruges, Antwerp and Amsterdam became the great emporia Dutch whence Indian produce, imported by the Portuguese, was distributed to Germany and even to England. At first the Dutch, following in the track of the English, attempted to find their way to India by sailing round the north coasts of Europe and Asia. William Barents is honourably known as the leader of three of these arctic expeditions, in the last of which he perished. The first Dutchman to double the Cape of Good Hope was Cornelius Houtman, who reached Sumatra and Bantam in 1596. Forthwith private companies for trade with the East were formed in many parts of the United Provinces, but in 1602 they were all amalgamated by the states- general into " The United East India Company of the Nether- lands." Within a few years the Dutch had established factories on the continent of India, in Ceylon, in Sumatra, on the Persian Gulf and on the Red Sea, besides having obtained exclusive possession of the Moluccas. In 1618 they laid the foundation of the city of Batavia in Java, to be the seat of the supreme government of the Dutch possessions in the East Indies. At about the same time they discovered the coast of Australia, and in North America founded the city of New Amsterdam or Manhattan, now New York. During the 17th century the Dutch maritime power was the first in the world. The massacre of Amboyna in 1623 led the English East India Company to retire from the Eastern seas to the continent of India, and thus, though indirectly, contributed to the foundation of the British Indian empire. The long naval wars and bloody battles between

settle- meats.

the English and the Dutch within the narrow seas were not terminated until William of Orange united the two crowns in 1689. In the far East the Dutch ruled without a rival, and gradually expelled the Portuguese from almost all their territorial possessions. In 1635 they occupied Formosa; in 1641 they took Malacca, a blow from which the Portuguese never recovered; in 1652 they founded a colony at the Cape of Good Hope, as a half-way station to the East; in 1658 they captured Jaffna, the last stronghold of the Portuguese in Ceylon; by 1664 they had wrested from the Portuguese all their earlier settlements on the pepper-bearing coast of Malabar.

The. rapid and signal downfall of the Dutch colonial empire is to be explained by its short-sighted commercial policy. It was deliberately based upon a monopoly of the trade in spices, and remained from first to last destitute Decline of the true imperial spirit. Like the Phoenicians of Dutch. old, the Dutch stopped short of no acts of cruelty towards their rivals in commerce; but, unlike the Phoenicians, they failed to introduce a respect for their own higher civilization among the natives with whom they came in contact. The knell of Dutch supremacy was sounded by Clive, when in 1758 he attacked the Dutch at Chinsura both by land and water, and forced them to an ignominious capitulation. In the great French war from 1781 to 1811 England wrested from Holland every one of her colonies, though Java was restored in 1816 and Sumatra in exchange for Malacca in 1824. At the present time the Dutch flag flies nowhere on the mainland of India, though the quaint houses and regular canals at Chinsura, Negapatam, Jaffna, and many petty ports on the Coromandel and Malabar coasts remind the traveller of familiar scenes in the Netherlands.

The earliest English attempts to reach the East were the expeditions under John Cabot in 1497 and 1498. Their objective was not so much India as Japan (Cipangu), of which they only knew vaguely as a land of spices and silks, British and which they hoped to reach by sailing westward. «ons. ” They failed, but discovered Newfoundland, and sailed along the coast of America from Labrador to Virginia. In 1553 the ill-fated Sir Hugh Willoughby attempted to force a passage along the north of Europe and Asia. Sir Hugh himself perished miserably, but his second in command, Chancellor, reached a harbour on the White Sea, now Archangel. Thence he penetrated by land to the court of the grand-duke of Moscow, and laid the foundation of the Russia Company for carrying on the overland trade with India through Persia, Bokhara and Moscow. Many subsequent attempts were made at the North-West Passage from 1576 to 1616, which have left on our modern maps the imperishable

names of Frobisher, Davis, Hudson and Baffin. Meanwhile, in 1577, Sir Francis Drake had circumnavigated the globe, and on his way home had touched at Ternate, one of the Moluccas, the king of which island agreed to supply the English nation with all the cloves it produced. The first English- man who actually visited India was Thomas Stephens in 1579. He had been educated at Winchester, and became rector of the Jesuits' College in Goa. His letters to his father are said to have roused great enthusiasm in England to trade directly with India. In 1583 four English merchants, Ralph Fitch, John Newbery, William Leedes and James Story, went out to India overland as mercantile adventurers. The jealous Portuguese threw them into prison at Ormuz, and again at Goa. At length Story settled down as a shopkeeper at Goa, Leedes entered the service of the Great Mogul, Newbery died on his way home over- land, and Fitch, after a lengthened peregrination in.Bengal, Pegu, Siam and other parts of the East Indies, returned to England.

*The defeat of the "Invincible Armada" in 1588, at which time the crowns of Spain and Portugal were united, gave a fresh stimulus to maritime enterprise in England; and the successful voyage of Cornelius Houtman in *- ast 1596 showed the way round the Cape of Good Hope company. into waters hitherto monopolized by the Portuguese. The " Governor and Company of Merchants of London trading into the East Indies " was founded by Queen Elizabeth*

on the 31st of December 1600, and the first expedition of four ships under James Lancaster left Torbay towards the end of April 1601, and reached Achin in Sumatra on the 5th of June 1602, returning with a cargo of spices. Between 1600 and 1612 there were twelve separate voyages, but in the latter year a joint-stock system began involving continual communication with the Indies. At first the trade was mainly with the Indian archipelago, but soon the English began to feel their way towards the mainland of India itself. In 1608 Captain Hawkins visited Jahangir at Agra, and obtained permission to build a factory at Surat, which was subsequently revoked, and in 1609 some English merchants obtained an unstable footing at Surat. Wherever the English went they were met by the hostility of the Portuguese; and on the 29th of November 161 2 the Portuguese admiral with four ships attempted to capture the English vessels

under Captain Best at Swally, off the mouth of the Tapti river; but the Portuguese were severely defeated, to the great astonish- ment of the natives, and that action formed the beginning of British maritime supremacy in Indian seas. The first fruits of the victory were the foundation of a factory at Surat and at other places round the Gulf of Cambay and in the interior. From the imperial firman of December 161 2 dates the British settlement on the mainland of India. At this point begins the Indian history of the company/for the domestic history of which see East India Company.

The ten years that elapsed between the battle of Swally in 1612'and the British capture of Ormuz in 1622 sufficed to decide the issue in the struggle for supremacy between 1'u£ Uy the British and the Portuguese. The latter, un- Portugal. willingly linked to the dying power of Spain, were already decadent, and on the 20th of January 1615 a great Portuguese armada, consisting of six great galleons, three smaller ships; two galleys and sixty rowed barges, was defeated for the second time in Swally roads by Captain Nicholas Dowriton, in command of four British vessels. In 1618 the English opened trade between Surat and Jask in the Persian Gulf, and in 1620 gained a victory over the Portuguese fleet there. Early in 1622 the English fleet gained a> second decisive victory, and captured Ormuz, the pearl of the Portuguese possessions in Asia. From this date onwards India and the Persian Gulf lay open to the English as far as Portugal was concerned, and before Portugal broke loose from Spain in 1640 her supremacy in Asiatic seas was hopelessly lost. In 1642 she partially and in 1654 finally accepted the situation, and opened all her Eastern possessions to English trade.

*The struggle with the young and growing power of Holland was destined to be a much more serious affair than that with the exhausted power of Portugal. The Dutch had *;"hˆh J ust emer 8 e d victorious from the struggle with Spain, Dutch. an d were pulsing with national life. In 1602 the Dutch routed the Portuguese near Bantam, and opened the road to the Spice Islands. In 1603 they threatened Goa, in 1619 they fixed their capital at Batavia, in 1638 they drove the Portuguese from Ceylon and in 1641 from Malacca. When Portugal emerged in 1640 from her sixty years' captivity to Spain, she found that her power in the Eastern seas had passed to the Dutch, and thenceforward the struggle lay between the Dutch and the English. The Dutch were already too strongly entrenched in the Indian archipelago for English competition to avail there, and the intense rivalry between the two nations led to the tragedy of Amboyna in 1623, when Governor Van Speult put to torture and death nine Englishmen on a charge of conspiring to take the Dutch*

forts. This outrage was not avenged until the time of Cromwell (1654), and in the meantime the English abandoned the struggle for the Spice Islands, and turned their attention entirely to the mainland of India. In 1616 the Dutch began to compete with the English at Surat, and their piracies against native vessels led to the Mogul governor seizing English warehouses; but soon the native authorities learnt to discriminate between the different European nations, and the unscrupulous methods of the Dutch cast them into disfavour.

In 1 61 1 Captain Hippon in the seventh separate voyage essayed a landing at Pulicat, but was driven off by the Dutch, who were already settled there, and sailed farther up the coast to Pettapoli, where he founded the first ^? s English settlement in the Bay of Bengal, which meats. finally perished through pestilence in 1687. Captain Hippon, however, also touched at Masulipatam, the chief sea- port of the kings of Golconda. In 1628 the Dutch won over the native governor there, and the English were compelled to retreat to Armagon, where they built the first English fort in India. In 1639 Francis Day, the chief at Armagon, founded Madras, building Fort St George (1640), and transferring thither the chief factory from Masulipatam. Here the English obtained their first grant of Indian soil, apart from the plots on which their factories were built. In 1653 Madras was raised to an independent presidency, and in 1658 all the settlements in Bengal and on the Coromandel coast were made subordinate to Fort St George.*

In 1633 eight Englishmen from Masulipatam, under Ralph Cartwright, sailed northward to Harishpur near Cuttack on the mouth of the Mahanadi, and entered into negotiations to trade with the governor of Orissa; and' in June Bengal 1633 Cartwright founded a factory at Balasore, which meats. proved very unhealthy. In 1651 the English reached Hugh, which was at that time the chief port of Bengal; about that year Gabriel Boughton, a surgeon, obtained from the Mogul viceroy permission for the English to trade in Bengal. In 1657 Hugh became the head agency in Bengal, with Balasore and Cossimbazar in the Gangetic delta and Patna in Behar under its control. In that year the name of Job Charnock, the future founder of Calcutta, appeared in the lowest grade of the staff.

The company had long fixed ah eye on Bombay. Its position half way down the Indian seaboard gave it both strategic and commercial importance, while it lay beyond the –

authority of the Moguls, and so could be fortified Jon at without offending them. In 1626 the company Bombay. joined with the Dutch

under Van Speult in attacking Bombay, but could not retain possession. In 1661 Charles II. received Bombay from Portugal as part of the Infanta Catherine's dowry, but effective possession was not taken until 1665, and in 1668 Charles handed the island over to the com- pany. At first the loss of life, owing to the unhealthiness of the climate, was appalling; but in spite of that fact it gradually prospered, until it reached its present position as the second port and city of India. In 1670 Gerald Aungier fortified the island, and so became the true founder of its prosperity. In 1674 a treaty was entered into with Sivaji. In 1682 Sir Jo'siah Child at home and Sir John Child in India formed a combination, which recognized that in the struggle between the Mogul and the Mahrattas the English must meet force with force; and in 1687 Bombay supplanted Surat as the chief seat of the English in India.

*In 1664 Shaista Khan, the brother of the empress Nur Jahan, became viceroy of Bengal, and though a strong and just ruler from the native point of view, was not favourable xhe to the foreign traders. In 1677 the president of found- Madras had to warn him that unless his exactions ? 0/ ' ceased, the company would be obliged to withdraw cu *"■ from Bengal. In 1679 the English obtained from the Mogul emperor a firman exempting them from dues everywhere except at Surat; but Shaista Khan refused to recognize the document, and on the 14th of January 1686 the court of directors resolvM to have recourse to arms to effect what they could not obtain by treaty. This was the first formal repudiation of the doctrine of unarmed traffic laid down by Sir Thomas Roe in 1616. An expedition was despatched to India consisting of six companies of infantry and ten ships under Captain Nicholson. Two of the ships with 308 soldiers arrived at the Hugli river in the autumn of 1686. At this time Job Charnock was the chief of the Bengal council, and, owing to an affray with the Mogul troops at Hugli on the 28th of October 1686, he embarked the company's goods and servants on board light vessels and dropped down the*

river to Sutanati, the site of the modern Calcutta. At this place, about 70 m. from the sea and accessible at high tide to heavily armed ships, the stream had scooped for itself a long deep pool, now Calcutta harbour, while the position was well chosen to make a stand

against the Bengal viceroy. On the 20th of December 1686 Charnock first settled at Calcutta, but in the following February Shaista Khan despatched an army against him, and he was forced to drop farther down the river to Hijili. In June Charnock was obliged to make an honourable capitulation, and returned to Ulubaria, 16 m. below Calcutta, thence moving in September to Calcutta for the second time. On the 8th of November 1688 Captain Heath arrived with orders from England, and took away Charnock against his will; but after peace was restored between the Mogul emperor and the company in February 1690, Charnock returned to Calcutta for the third and last time on the 24th of August of that year. It was thus by his courage and persistence that the modern capital of India was eventually founded. As the result of the war with the Mogul empire, which lasted from 1686 to 1690, the company perceived that a land war was beyond their strength, but their sea-power could obtain them terms by blockading the customs ports and threatening the pilgrim route to Mecca. From this time onwards they saw that they could no longer trust to de- fenceless factories. During this first period of their dealings with India the aims of the British were purely those of traders, without any aspirations to military power or territorial aggrand- izement ; but in the period that followed, the gradual decay of the Mogul empire from within, and the consequent anarchy, forced the English to take up arms in their own defence, and triumphing over one enemy after another they found themselves at last in the place of the Moguls.

India under the Company.

The political history of the British in India begins in the i8ih century with the French wars in the Carnatic. The British at Fort St George and the French at Pondicherry for many years traded side by side without either active rivalry or territorial ambition. The British, especially, appear to have been sub- missive to the native powers at Madras no less than in Bengal. They paid their annual rent of 1200 pagodas (say £500) to the deputies of the Mogul empire when Aurangzeb annexed the south, and on two several occasions bought off a besieging army with a heavy bribe.

On the death of Aurangzeb in 1707, the whole of southern India became practically independent of Delhi. In the Deccan proper, the Nizam-ul-Mulk founded an independent dynasty, with Hyderabad for its capital, which exercised a nominal sovereignty over the entire south. The Carnatic, or the lowland tract between the central plateau and the eastern sea, was ruled by a deputy of the nizam, known as the nawab of Arcot, who in his turn asserted claims to hereditary

sovereignty. Farther south, Trichinopoly was the capital of a Hindu raja, and Tanjore formed another Hindu kingdom under a degenerate descendant of the line of Sivaji. Inland, Mysore was gradually growing into a third Hindu state, while everywhere local chieftains, called pakgars or naiks, were in semi-independent possession of citadels or hill-forts.

In -that condition of affairs the flame of war was kindled between the British and the French in Europe in 1745. Dupleix French was at that time governor of Pondicherry and Clive and was a young writer at Madras. A British fleet first

British appeared on the Coromandel coast, but Dupleix by wan ‘ a judicious present induced the nawab of Arcot to

interpose and prevent hostilities. In 1746 a French squadron arrived, under the command of La Bourdonnais. Madras surrendered almost without a blow, and the only settlement left to the British was Fort St David, a few miles south of Pondicherry, where Clive and a few other fugitives sought shelter. The nawab, faithful to his policy of impartiality, marched with 10,000 men to drive the French out of Madras, but he was signally defeated by a French force of only four hundred men and two guns. In 1748 a British fleet arrived

Clive.

under Admiral Boscawen and attempted the siege of Pondicherry, while a land force co-operated under Major Stringer Lawrence, whose name afterwards became associated with that of Clive. The French successfully repulsed all attacks, and at last peace was restored by the treaty of Aix-la-Chapelle, which gave back Madras to the British (1748).

The first war with the French was merely an incident in the greater contest in Europe. The second war had, its origin in Indian politics; while England and France were at peace. The easy success of the French arms had inspired Dupleix with the ambition of founding a French empire in India, under the shadow of the existing Mahommedan powers. Disputed successions at Hyderabad and at, Arcot supplied his opportunity. On both thrones he placed nominees of his own, and for a short time posed as the supreme arbiter of the entire; south. In boldness of conception, and in knowledge of Oriental diplomacy, Dupleix has had probably no rival. But,: he was no soldier, and he was destined in that sphere to; encounter the ” heaven-born genius ” of Clive. For the British qf Madras under the*

instinct of self-preservation., were compelled to maintain the cause of another candidate to the throne of Arcot in opposition to the nominee of Dupleix. This candidate was Mahommed Ali, afterwards known in history as Wala-jalu The war that then ensued between the. French and British, each with their native allies, has been exhaustively described in the pages of Orme. The one incident that stands out con- spicuously is the capture and subsequent defence of Arcot by Clive in 1 751. This heroic feat, even more than the battle of Plassey, established the reputation of the British for valour throughout India. Shortly afterwards Clive returned to England in ill-health, but the war continued fitfully for many years. On the whole, British influence predominated in the Carnatic, and their candidate; Mahommed Ali, maintained his position at Arcot. But the French were no less supreme iu the Deccan, whence they were able to take possession of the coast tract called " the Northern Circars." The final struggle was postponed untS 1760, when Colonel (afterwards Sir Eyre) Coote won the decisive victory of Wandiwash over the French general Lally, and proceeded to invest Pondicherry, which was starved into capitulation in January 1761. A few months later the hill- fortress of Gingee (Chenji) also surrendered. In the words of Orme, " That day terminated the long hostilities between the two rival European powers in Coromandel, and left not a single ensign of the French nation avowed by the authority of its Government in any part of India."

Meanwhile the interest of history shifts with Clive to Bengal At the time of Aurangzeb's death in 1707 the nawab or governor of Bengal was Murshid Kuli Khan, known also as Jafar Khan. By birth a Brahman, and brought up as a slave in Persia, he united the administrative H "' e ot ability of a Hindu to the fanaticism of a renegade. Calcutta. Hitherto the capital of Bengal had been at Dacca on the eastern frontier of the empire, whence the piratical attacks of the Portuguese and of the Arakanese or Mughs could be most easily checked. Murshid Kuli Khan transferred his residence to Murshidabad, in the neighbourhood of Cossimbazar, the river port of all the Ganges trade. The British, the French and the Dutch had each factories at Cossimbazar, as well as at Dacca, Patna and Malda. But Calcutta was the headquarters of the British, Chandernagore of the French, and Chinsura of the Dutch, all three towns being situated close to each other in the lower reaches of the Hugh, where the river is navigable for large ships. Murshid Kuli Khan ruled over Bengal prosper- ously for twenty-one years, and left his power to a son-in-law and a grandson. The hereditary succession was broken in 1740 by Ali Vardi Khan, who was the last of the great nawabs of Bengal.

In his days the Mahratta horsemen began to ravage the country, and the British at Calcutta obtained permission to erect an earth-work, which is known to the present day as. the Mahratta ditch. Ali Vardi Khan died in 1756, and was succeeded by his grandson, Suraj-ud-Dowlah, a youth of only nineteen years, whose ungovernable temper-led to a rupture

with the British within two months after his accession. In pursuit of one of his own family who had escaped from his vengeance, he marched upon Calcutta with a large army. Many of the British fled down the river in their ships. The remainder surrendered after a feeble resistance, and were thrown as prisoners into the " black hole " or military jail of Fort William, a room 18 ft. by 14 ft. 10 in. in size, with only two small windows barred with iron. It was the month of June, in which the tropical heat of Calcutta is most oppressive. When the door of the prison was opened in the morning, only twenty-three persons out of one hundred and forty-six were found alive.

The news of this disaster fortunately found Clive returned to Madras, where also was a squadron of king's ships under

Admiral Watson. Clive and Watson promptly sailed Piassey. " tne m outh of the Ganges with all the troops that

could be got together. Calcutta was recovered with little fighting, and the nawab consented to a peace which restored to the company all their privileges, and gave them compensation for their losses of property. It is possible that matters might have ended here if a fresh cause of hostilities had not suddenly arisen. War had just been declared between the British and French in Europe, and Clive, following the traditions of his early warfare in the Carnatic, attacked and captured Chander- nagore. Suraj-ud-Dowlah, exasperated by this breach of neutrality within his own dominions, took the side of the French. But Clive, again acting upon the policy he had learned from Dupleix, had provided himself with a rival candidate to the throne. Undaunted, he marched out to the battlefield of Piassey (Palasi), at the head of about 900 Europeans and 2000 sepoys, with 8 pieces of artillery. The Mahommedan army is said to have consisted of 35,000 foot, 15,000 horse and 50 pieces

of cannon. But there was a traitor in the Mahommedan camp in the person of Mir Jafar, who had married a sister of the late nawab, AH Vardi Khan. The battle was short but decisive. After a few rounds of artillery fire, Suraj-ud-Dowlah fled, and the road to Murshidabad was left open.

*The battle of Piassey was fought on the 23rd of June 1757, an anniversary afterwards remembered when the mutiny was at its height in 1857. History has agreed to adopt this date as the beginning of the British empire in the East; but the immediate results of the victory were comparatively small, and several more hard-won fights were fought before even the Bengalis would admit the superiority of the British arms. For the moment, however, all opposition was at an end. Clive, again following in the steps of Dupleix, placed his nominee, Mir Jafar> upon the masnad at Murshidabad, being careful to obtain a patent of investiture from the Mogul court. Enormous sums were exacted from Mir Jafar as the price of his elevation. The company claimed 10,000,000 rupees as compensation for losses; for the British, the Armenian and the Indian inhabitants of Calcutta there were demanded the sums of 5,000,000, 2,000,000 and 1,000,000 rupees; for the squadron 2,500,000 rupees, and an equal sum for the army. The members of the council received the following amounts: Mr Drake, the governor, and Colonel Clive 280,000 rupees each; and Mr Becher, Mr Watts and Major Kilpatrick 240,000 rupees each. The whole amounted to £2,340,000. The British, deluded by their avarice, still cherished extravagant ideas of Indian wealth; nor would they listen to the unwelcome truth. But it was found that there were no funds in the treasury to satisfy their inordinate demands, and they were obliged to be contented with one-half the stipulated sums, which, after many difficulties, were paid in specie and in jewels, with the exception of 584,905 rupees. The shares of the council were, however, paid in full. At the same time the nawab made a grant to the company of the zamindari rights over an extensive tract of country round Calcutta, now known as the district of the Twenty-four Parganas. The area of this tract was about 882 sq. m., and it paid a revenue or quit rent of about £23,000. The gross rental at first payable to the company w *s £53,000, but within a period of ten years it had risen to £146,000. Originally the company possessed only the zamindari rights, i.e. revenue jurisdiction. The superior lordship, or right*

to receive the quit rent, remained with the nawab; but in 1759 this also was parted with by the nawab in favour of Clive, who thus became the landlord of his own masters, the company. At that time also Clive was enrolled among the nobility of the Mogul empire, with

the rank of commander of 6000 foot and 5000 horsei Clive's jagir, as it was called, subsequently became a matter of inquiry in England, and on his death it passed to the company, thus merging the zamindari in the proprietary rights.

In 1758 Clive was appointed by the court of directors to be governor of all the company's settlements in Bengal. From two quarters troubles threatened, which perhaps Clive alone was capable of overcoming. On the west the shahzada or imperial prince, known afterwards as the emperor Shah Alam, with a mixed army of Afghans and Mahrattas, and supported by the nawab wazir of Oudh, was advancing his own claims to the province of Bengal. In the south the influence of the French under Lally and Bussy was overshadowing the British at Madras. But the name of Clive exercised a decisive effect in both directions. Mir Jafar was anxious to buy off the shahzada, who had already invested Patna. But Clive in person marched to the rescue, with an army of only 450 Europeans and 2500 sepoys, and the Mogul army dispersed without striking a blow. In the same year Clive despatched a force southwards under Colonel Forde, which captured Masulipatam from the French, and permanently established British influence throughout the Northern Circars, and at the court of Hyderabad. He next attacked the Dutch, the sole European nation that might yet be a formidable rival to the English. He defeated them by both land and water; and from that time their settlement at Chinsura existed only on sufferance.

From 1760 to 1765, while Clive was at home, the history of the British in Bengal contains little that is creditable. Clive had left behind him no system of government, but merely the tradition that unlimited sums of money otPatna. might be extracted from the natives by the mere terror of the British name. In 1761 it was found expedient and profit- able to dethrone Mir Jafar, the nawab of Murshidabad, and substitute his son-in-law, Mir Kasim, in his place. On that occasion, besides private donations, the British received a grant of the three districts of Burdwan, Midnapur and Chittagong, estimated to yield a net revenue of half a million sterling. But Mir Kasim proved to possess a will of his own, and to cherish dreams of independence. He retired from Murshidabad to Monghyr, a strong position on the Ganges, which commanded the only means of communication with Upper India. There he proceeded to organize an army, drilled and equipped after European models, and to carry on intrigues with the nawab wazir of Oudh. The company's servants claimed the privilege of carrying on private trade throughout Bengal, free from inland dues and all other imposts. The assertion of this

claim caused frequent affrays between the customs'officers of the nawab and those traders who, whether falsely or not, represented that they were acting on behalf of the servants of the company. The nawab alleged that his civil authority was everywhere being set at nought. The majority of the council at Calcutta would not listen to his statements. The governor, Mr Vansittart, and Warren Hastings, then a junior member of council, attempted to effect some compromise. But the controversy had become too hot. The nawab's officers fired upon a British boat, and forthwith all Bengal was in a blaze. A force of 2000 sepoys was cut to pieces at Patna, and about 200 Englishmen in various parts of the province fell into the hands of the Mahommedans, and were subsequently massacred. But as soon as regular warfare commenced Mir Kasim met with no more successes. His trained regiments were defeated in two pitched battles by Major Adams, at Gheria and at Udha-nala, and he himself took refuge with the nawab wazir of Oudh, who refused to deliver him up. This led to a prolongation of the war. Shah Alam, who had now succeeded his father as emperor, and Shuja-ud- Daula, the nawab wazir of Oudh, united their forces, and threatened Patna, which the British had recovered. A more

CHve's reforms.

formidable danger appeared in the British camp, in the form of the first sepoy mutiny. This was quelled by Major (afterwards Sir Hector) Munro, who ordered twenty-four of the ringleaders to be blown from guns, an old Mogul punishment. In 1764 Major Munro won the decisive battle of Buxar, which laid Oudh at the feet of the conquerors, and brought the Mogul emperor as a suppliant to the British camp.

Meanwhile the council at Calcutta had twice found the oppor- tunity they desired of selling the government of Bengal to a new nawab. But in 1765 Clive (now Baron Clive of Plassey, in the peerage of Ireland) arrived at Calcutta, as governor of Bengal for the second time, to settle the entire system of relations with the native powers. Two objects stand out conspicuously in his policy. First, he sought to acquire the substance, though not the name, of territorial power, by using the authority of the Mogul emperor for so much as he wished,

*and for no more; and, secondly, he desired to purify the company's service by prohibiting illicit gains, and at the same time guaranteeing a reasonable remuneration from honest sources. In neither respect were the details of his plans carried out by his successors. But the beginning of the British administration of India dates from this second governorship of Clive, just as the origin of the British empire in India dates from his victory at Plassey. Clive's first step was to hurry up from Calcutta to Allahabad, and there settle in person the fate of half northern India. Oudh was given back to the nawab wazir, on condition of his paying half a million sterling towards the expenses of the war. The provinces of Allahabad and Kora, forming the lower part of the Doab, were handed over to Shah Alam himself, who in his turn granted to the company the diwani or financial administration of Bengal, Behar and OrisSa, together with the Northern Circars. A puppet nawab was still maintained at Murshidabad, who received an annual allowance of about half a million sterling; and half that amount was paid to the emperor as tribute from Bengal, Thus was constituted the dual system of government, by which, the British received all the revenues and undertook to maintain an army for the defence of the frontier, while the criminal jurisdiction vested in the nawab. In Indian phraseology, the company was diwan and the nawab was nazim. As a matter of general administration, the actual collection of the revenues still ren&ained for some years in the hands of native officials. In attempting to reorganize and purify the company *s service, Clive undertook a task yet more difficult than to partition the valley of the Ganges. The officers, civil and military alike, were all tainted with the common corruption. Their legal salaries were absolutely insignificant, but they had been permitted to augment themten and a hundreds fold by means of private trade and gifts from the native powers. Despite the united resistance of the civil servants, and an actual mutiny of two hundred military officers, Clive carried through his reforms. Both private trade and the receipt of presents were absolutely prohibited for the future, while a substantial increase of pay was provided out of the monopoly of salt.*

Lord Clive quitted India for the third and last time in 1767. Between that date and the arrival of Warren Hastings in 1772 nothing of importance occurred in Bengal beyond Hastings. tne terr ible famine of 1770, which is officially reported to have swept away one-third of the inhabitants. The dual system of government, however, established by Clive, had proved a failure. Warren Hastings, a tried servant of the company, distinguished alike for intelligence, for probity and for knowledge of oriental manners, was nominated governor by the court

of directors, with express instructions to carry out a predetermined series of reforms. In their own words, the court had resolved to " stand forth as diwan, and to take upon them- selves, by the agency of their own servants, the entire care and administration of the revenues." In the execution of this plan, Hastings removed the exchequer from Murshidabad to Calcutta, and for the first time appointed European officers, under the now familiar title of collectors, to superintend the revenue collections and preside in the civil courts. The urgency of foreign affairs, and subsequently internal strife at the council table, hindered

Hastings from developing farther the system of civil ad- ministration, a task finally accomplished by Lord Cornwallis.

Though Hastings always prided himself specially upon that reform, as well as upon the improvements he introduced into the collection of the revenues from salt and opium, his name will be remembered in history for the boldness ˆj rst and success of his foreign policy. From 1772 to 1774 oeneral. he was governor of Bengal; from 1774 to 1785 he was the first titular governor-general of India, presiding over a council nominated, like himself, not by the company, but by an act of parliament, known as the Regulating Act. In his domestic policy he was greatly hampered by the opposition of Sir Philip Francis; but, so far as regards external relations with Oudh, with the Mahrattas, and with Hyder Ali, he was generally able to compel assent to his own measures. His treatment of Oudh may here be passed over as not being material to the general history of India, while the personal aspects of his rule are dis- cussed in a separate article (see Hastings, Warren) . To explain his Mahratta policy, it will be, necessary to give a short retro- spective sketch of the history of that people.

Sivaji the Great, as already mentioned, died in 1680, while Aurangzeb was still on the throne. The family of Sivaji pro- duced no great names, either among those who con- tinued to be the nominal chiefs of the Mahratta /f h confederacy, with their capital at Satara, or among Mahrattas. the rajas of Kolhapur and Tanjore. All real power passed into the hands of the peshwa, or Brahman minister, who founded in his turn an hereditary dynasty at Poona, dating from the beginning of the 18th century. Next rose several Mahratta generals, who, though recognizing the suzerainty of the peshwa, carved out for themselves independent kingdoms in different parts of India, sometimes far from the original home of the Mahratta race. Chief among these generals were the gaikwar.in Gujarat, Sindhia and Holkar in Malwa, and the Bhonsla raja of Berar and Nagpur. At one

time it seemed probable that the Mahratta confederacy would expel the Mahom- medans even from northern India; but the decisive battle of Panipat, won by the Afghans in 1761, gave a respite to the Delhi empire. The Mahratta chiefs never again united heartily for a common purpose, though they still continued to be the most formidable military power in India. In especial, they dominated over the British settlement of Bombay on the western coast, which was the last of the three presidencies to feel the lust of territorial ambition. For more than a hundred years, from its acquisition in 1661 to the outbreak of the first Mahratta war in 1775, the British on the west coast possessed no territory outside the island of Bombay and their fortified factory at Surat.

*The Bombay government was naturally emulous to follow the example of Madras and Bengal, and to establish its influence at the court of Poona by placing its own nominee upon the throne. The attempt took form in 1775 in the ˆ? r *' „ treaty of Surat, by which Raghunath Rao, one of the jvar. claimants to the throne of the peshwa, agreed to cede Sa'lsette and Bassein to the British, in consideration of being himself restored to Poona. The military operations that followed are known as the first Mahratta War. Warren Hastings, who in his capacity of governor-general claimed a right of control over the decisions of the Bombay government, strongly dis- approved of the treaty of Surat, but, when war once broke out, he threw the whole force of the Bengal army into the scale. One of his favourite officers, General Goddard, marched across the peninsula, and conquered the rich province of Gujarat almost without a blow. Another, Captain Popham, stormed the rock-fortress of Gwalior, which was regarded as the key of Hindustan. These brilliant successes atoned for the disgrace of the convention of Wargaon in 1779, when the Mahrattas dictated terms to a Bombay force, but the war was protracted until 1782. It was then closed by the treaty of Salbai, which practically restored the status quo. Raghunath Rao, the English claimant, was set aside; Gujarat was restored, and only Salsette and some othei small islands were retained by the English.*

Perma- nent settle- meat of Bengal.

Meanwhile Warren Hastings had to deal with a more formidable

enemy than the Mahratta confederacy. The reckless conduct

of the Madras government had roused the hostility

ˆf™' both of Hyder Ali of Mysore and of the nizam of the

Mysore ._ ~ J . r , . _ ..

w ar . Deccan, the two strongest Mussulman powers in India,

who attempted to draw the Mahrattas into an alliance against the British. The diplomacy of Hastings won over the nizam and the Mahratta raja of Nagpur, but the army of Hyder Ali fell like a thunderbolt upon the British possessions in the Carnatic. A strong detachment under Colonel Baillie was cut to pieces at Perambakam, and the Mysore cavalry ravaged the country unchecked up to the walls of Madras. For the second time the Bengal army, stimulated by the energy of Hastings, saved the honour of the British name. Sir Eyre Coote, the victor of Wandiwash, was sent by sea to relieve Madras with all the men and money available, while Colonel Pearse marched south overland to overawe the raja of Berar and the nizam. The war was hotly contested, for Sir Eyre Coote was now an old man, and the Mysore army was well- disciplined and equipped, and also skilfully handled by Hyder and hisˆson Tippoo. Hyder died in 1782, and peace was finally concluded with Tippoo in 1784, on the basis of a mutual restitu- tion of all conquests.

It was Warren Hastings's merit to organize the empire which Cliveiounded. He was governor or governor-general for thir- teen years, a longer period than any of his successors. During that time the British lost the American colonies, but in India their reputation steadily rose to its highest pitch. Within a year Hastings was succeeded by Lord Cornwallis, the first English nobleman of rank who undertook the office of governor-general. His rule lasted from 1786 to 1793, and is celebrated for two events — the introduction of the permanent settlement into Bengal and the second Mysore war. If the foundations of the system of civil administration were laid by Hastings, the superstructure was erected by Cornwallis. It was he who first entrusted criminal jurisdiction to Europeans, and established the Nizamat Sadr Adalat, or appellate court of criminal judicature, at Calcutta; and it was he who separated the functions of collector and judge. The system thus organized in Bengal was afterwards extended to Madras and Bombay, when those

presidencies also acquired territorial sovereignty. But the achievement most familiarly associated with the name of Cornwallis is the permanent settle- ment of the land revenue of Bengal. Up to this time the revenue had been collected pretty much according to the old Mogul system. Zamindars, or government farmers, whose office always tended to become hereditary, were recognized as having a right of some sort to collect the revenue from the actual cultivators. But no principle of assessment existed, and the amount actually realized varied greatly from year to year! Hastings had the reputation of bearing hard upon the zamindars, and was absorbed in other critical affairs of state or of war. On the "whole he seems to have looked to experience, as acquired from a succession of quinquennial settlements, to furnish the standard rate of the future. Francis, on the other hand, Hastings's great rival, deserves the credit of being among the first to advocate a limitation of the state demand in perpetuity. The same view recommended itself to the authorities at home, partly because it would place their finances on a more stable basis, partly because it seemed to identify the zamindar with the more familiar landlord. Accordingly, Cornwallis took out with him in 1787 instructions to introduce a permanent settle- ment. The process of assessment began in 1789 and terminated in 179L No attempt was made to measure the fields or calculate the out-turn, as had been done by Akbar, and is now done when occasion requires in the British provinces; but the amount payable was fixed by reference to what had been paid in the past. At first the settlement was called decennial, but in 1793 it was declared permanent for ever. The total assessment amounted to sikka Rs. 26,800,989, or about 2f millions sterling. Though Lord Cornwallis carried the scheme into execution, all praise or blame, so far as details are concerned, must belong to Sir

Second Mysore War.

Wellesley.

John Shore, afterwards Lord Teignmouth, whose knowledge of the country was unsurpassed by that of any civilian of his time. Shore would have proceeded more cautiously than Cornwallis's preconceived idea of a proprietary body and the court of directors' haste after fixity permitted.

The second Mysore War of 1790-92 is noteworthy on two accounts: Lord Cornwallis, the governor-general, led the British army in person, with a pomp and lavishness of supplies that recalled the campaigns of Aurangzeb; and the two great native powers, the nizam

of the Deccan and the Mahratta confederacy, co-operated as allies of the British. In the result, Tippoo Sultan submitted when Lord Cornwallis had commenced to beleaguer his capital. He agreed to yield one-half of his dominions to be divided among the allies, and to pay three millions sterling towards the cost of the war.- Those conditions he fulfilled, but ever afterwards he burned to be revenged upon his conquerors.

The period of Sir John Shore's rule as governor-general, from 1793 to 1798, was uneventful. In 1798 Lord Mornihgton, better known as the marquis Wellesley, arrived in India, already inspired with imperial projects that were destined to change the map of the country. Mornington was the friend and favourite of Pitt, from whom he is thought, to have derived the comprehensiveness of his political vision and his antipathyto the French name. From the first he laid down as his guiding principle that the British must be the one para-mount power in the peninsula, and that the native princes could only retain the insignia of sovereignty by surrendering the substance of independence. The subsequent political history of India has been but the gradual development of this policy, which received its finishing touch when Queen Victoria was proclaimed empress of India in 1877.

To frustrate the possibility of a French invasion of India, led by Napoleon in person, was the governing idea of Wellesley's foreign policy; for France at this time, and for many years later, filled the place afterwards occupied by p£ BC h Russia in the imagination of British statesmen. Nor menace. was the possibility so remote as might now be thought. French regiments guarded and overawed the nizam of Hyderabad. The soldiers of Sindhia, the military head of the Mahratta confederacy, were disciplined and led by French adventurers.- Tippoo Sultan carried On a secret correspondence with the French directorate, and allowed a tree of liberty to be planted in his dominions. The islands of Mauritius and Bourbon afforded a convenient half-way house both for French intrigue and for the assembling of a hostile expedition. Above all, Napoleon Buonaparte was then in Egypt, dreaming of the conquests of Alexander; and no man knew in what direction he might turn his hitherto unconquered legions. Wellesley first addressed himself to the nizam, where his policy prevailed without serious opposition. The French battalions at Hyderabad were disbanded and the nizam bound himself by treaty not to take any European into his service without the consent of the British government-— a clause since inserted in every engagement entered into with native powers. Next, the whole weight of Wellesley's resources was turned against Tippoo, whom Cornwallis

had defeated but not subdued. His intrigues with the French were laid bare, and he was given an opportunity of adhering to the new subsidiary system. On his refusal war was declared, and Wellesley came down in state to Madras to organize the expedition iri person and watch over the course of events. One British army marched into Mysore from Madras, accompanied by a contingent from the nizam. Another advanced from the western coast. Tippoo, after offering but a feeble resistance in the field, retired into Seringapatam, and, when his capital was stormed, died fighting bravely in the breach (1799). Since the battle of Plassey no event so greatly impressed the native imagination as the capture of Seringapatam, which won for General Harris a peerage and for Wellesley an Irish marquisate. In dealing with the territories of Tippoo, Wellesley acted with moderation. The central portion, forming the old state of Mysore, was restored to an infant representative of the Hindu rajas, whom Hyder Ali

had dethroned, while the rest was partitioned between the nizam and the British. At about the same time the province of the Carnatic, or all that large portion of southern India ruled by the nawab of Arcot, and also the principality of Tanjore, were placed under direct British administration, thus constituting the Madras presidency almost as it has existed to the present day.

The Mahrattas had been the nominal allies of the British in both their wars with Tippoo, but they had never given active Wars vHh assistance, nor were they secured to the British side siadhla as the nizam now was. The Mahratta powers at this aad time were five in number. The recognized head of

Holkar. ˆ con f e(ieracy was the peshwa of Poona, who ruled the hill country of the Western Ghats, the cradle of the Mahratta race. The fertile province of Gujarat was annually harried by the horsemen of the gaekwar of Baroda. In central India two military leaders, Sindhia of Gwalior and Holkar of Indore, alternately held the pre-eminency. Towards the east the Bhonsla raja of Nagpur reigned from Berar to the coast of Orissa. Wellesley tried assiduously to bring these several Mahratta powers within the net of his subsidiary system. At last, in 1802, the necessities of the peshwaˆ who had been defeated by Holkar, and driven as a fugitive into British territory,

induced him to sign the treaty of Bassein, by which he pledged himself to hold communications with no other power, European or native, and ceded territory for the maintenance of a subsidiary force. This greatly extended the British territorial influence in western India, but led directly to the second Mahratta war, for neither Sindhia nor the raja of Nagpur would tolerate this abandonment of Mahratta independence. The campaigns that followed are perhaps the most glorious in the history of the British arms in India. The general plan and the adequate provision of resources were due to the marquis Wellesley, as also the indomitable spirit that could not anticipate defeat. The armies were led by General Arthur Wellesley (afterwards duke of Wellington) and General (afterwards Lord) Lake. Wellesley operated in the Deccan, where, in a few short months, he won the decisive victories of Assaye and Argaum. Lake's campaign in Hindustan was no less brilliant, though it has received less notice from historians. He won pitched battles at Aligarh and Laswari, and captured the cities of Delhi and Agra, thus scattering the French troops of Sindhia, and at the same time coming forward as the champion of the Mogul emperor in his hereditary capital. Before the year 1803 was out, both Sindhia and the Bhonsla raja were glad to sue for peace. Sindhia ceded all claims to the territory north of the Jumna (and left the blind old emperor Shah Alam once more under British protection. The Bhonsla raja forfeited Orissa to the English, who had already occupied it with a flying column, and Berar to the nizam, who gained a fresh addition by every act of complais- ance to the British government. The freebooter, Jaswant Rao Holkar, alone remained in the field, supporting his troops by ravages through Malwa and Rajputana. The concluding years of Wellesley's rule were occupied with a series of operations against Holkar, which brought no credit to the British name. The disastrous retreat of Colonel Monson through Central India

(1804) recalled memories of the convention of Wargaum, and of the destruction of Colonel Baillie's force by Hyder Ali. The repulse of Lake in person at the siege of Bharatpur (Bhurtpore)

(1805) is memorable as an instance of a British army in India having to turn back with its object unaccomplished.

The ambitious policy and the continuous wars of Lord Wellesley exhausted the patience of the court of directors at home. In Barlow. J ^° 4 Lord Cornwallis was sent out as governor-general a second time, with instructions to bring about peace at any price, while Holkar was still unsubdued, and Sindhia was threatening a fresh war. But Cornwallis was now an old man and broken down in

health. Travelling up to the north' west during the rainy season, he sank and died at Ghazipur, before he had been ten weeks in the country. His immediate successor was Sir George Barlow, a civil servant of the company, who, as a locum tenens, had no alternative but to carry out

faithfully the orders of his employers. He is charged with being, under these orders, the only governor-general who diminished the area of British territory, and with violating engagements by abandoning the Rajput chiefs to the tender mercies of Holkar and Sindhia. During his administration also occurred the mutiny of the Madras sepoys at Vellore, which, though promptly suppressed, sent a shock of insecurity through the empire.

Lord Minto, governor-general from 1807 to 1813, consolidated the conquests which Wellesley had acquired. His only military exploits were the occupation of the island of Mauritius, and the conquest of Java by an expedition which he accompanied in person. The condition of central India continued to be disturbed, but Lord Minto succeeded in preventing any violent outbreaks without himself having recourse to the Sword. The company had ordered him to follow a policy of non-intervention, and he managed to obey his orders without injuring the prestige of the British name. In his time the Indian government first opened relations with a new set of foreign powers by sending embassies to the Punjab, to Afghanistan and to Persia. The ambassadors were all trained in the school of Wellesley, and formed perhaps the most illustrious trio of " politicals " that the Indian service has produced. Sir Charles Metcalfe was the envoy to the court of Ranjit Singh at Lahore; Mountstuart Elphinstone met the shah of Afghanistan at Peshawar; and Sir John Malcolm was despatched to Persia. If it cannot be said that any of these missions were fruitful in permanent results, at least they intro- duced the English to a new set of diplomatic relations, and widened the sphere of their influence.

*The successor of Lord Minto was Lord Moira, better- known as the marquis of Hastings, who governed India for the long period of nine years, from 1814 to 1823. This period was marked by two wars of the first magnitude, the Wari * campaigns against the Gurkhas of Nepal, and the third and last Mahratta War. The Gurkhas, the present ruling race in Nepal, are Hindu immigrants who claim a Rajput origin. Their sovereignty dates only from 1767, in which year they over- ran the valley of Katmandu, and gradually extended their power over all the hills and valleys of Nepal. Organized upon a sort of military and feudal basis, they soon became a terror to all their*

neighbours, marching east into Sikkim, west into Kumaon, and south into the Gahgetic plains. In the last quarter their victims were British subjects, and at last it became im- peratively necessary to check their advance. Sir George Barlow and Lord Minto had remonstrated in vain, and nothing was left to Lord Moira but to take up arms. The campaign of 1814 was little short of disastrous. After overcoming the natural difficulties of a malarious climate and precipitous hills, the sepoys were on several occasions fairly worsted by the unexpected bravery of the little Gurkhas, whose heavy knives or kukris dealt terrible execution. But in 1815 General Ochterloriy, who commanded the army operating by way of the Sutlej, stormed one by one the hill forts which still stud the Himalayan states now under the Punjab government, and compelled the Nepal darbar to sue for peace. In the following year the same general advanced from Patna into the valley of Katmandu, and finally dictated the terms which had before been rejected, within a few miles of the capital. By the treaty of Segauli, which defines the English relations with Nepal to the present day, the Gurkhas withdrew on the one hand from Sikkim, and on the other from those lower ranges of the western Himalayas which have supplied the health-giving stations of Naini Tal, Mussoorie and Simla.

Meanwhile the condition of central India was every year becoming more unsatisfactory. Though the great Mahratta chiefs were learning to live rather as peaceful princes than as leaders of predatory bands, the example of . ;

lawlessness they had set was being followed, and bettered in the following, by a new set of freebooters, known as the Pindaris. As opposed to the Mahrattas, who were at least a : nationality bound by some traditions of a united government, the Pindaris were merely irregular soldiers, corresponding most nearly to the free companies of medieval Europe. Of no common race and

\z

of no common religion, they welcomed to their ranks the outlaws and broken tribes of all India — Afghans, Mahrattas or Jats. Their headquarters were in Malwa, but their depredations were not confined to central India. In bands, sometimes numbering a few hundreds, sometimes many thousands, they rode out on their forays

as far as the Coromandel coast. The most powerful of the Pindari captains, Amir Khan, had an organized army of many regiments, and several batteries of cannon. Two other leaders, known as Chitu and Karim, at one time paid a ransom to Sindhia of £100,000. To suppress the Pindari hordes, who were supported by the sympathy, more or less open, of all the Mahratta chiefs, Lord Hastings (1817) collected the strongest British army that had been seen in India, numbering nearly 1 20,000 men, half to operate from the north, half from the south. Sindhia was overawed, and remained quiet. Amir Khan con- sented to disband his army, on condition of being guaranteed the possession of what is now the principality of Tonk. The remaining bodies of Pindaris were attacked in their homes, surrounded, and cut to pieces. Karim threw himself upon the mercy of the conquerors. Chitu fled to the jungles, and was killed by a tiger.

In the same year (1817) as that in which the Pindaris were crushed, and almost in the same month (November), the' three great Mahratta powers at Poona, Nagpur and Indore Mahratta rose a g amst the English. The peshwa; 1 Baji Rao, War. had long been chafing under the terms imposed by the treaty of Bassein (1802), and the subsequent treaty of Poona (1817), which riveted yet closer the chains of dependence upon the paramount power. Elphinstone, then resident at his court, foresaw what was coming and ordered up a European regiment from Bombay. The next day the residency was burned down, and Kirkee was attacked by the whole army of the peshwa. The attack was bravely repulsed, and the peshwa immediately fled from his capital. Almost the same plot Was enacted at Nagpur, where the honour of the British name was saved by the sepoys who defended the hill of Sitabaldi against enormous odds. The army of Holkar was defeated in the following month

at the pitched battle of Mehidpur, All open resistance was now at an end. Nothing remained but to follow up the fugitives, and determine the conditions of the general pacification. In both these duties Sir John Malcolm played a prominent part. The peshwa himself surrendered, and was permitted to reside at Bithur, near Cawnpore, on a pension of £80,000 a year. His adopted son was the infamous Nana Sahib. To fill the peshwa's place to some extent at the head of the Mahratta confederacy, the lineal descendant of Sivaji was brought forth from obscurity, and placed upon the throne of Satara. The greater part of the peshwa's dominions was ultimately incorporated in the Bombay presidency, while the nucleus of the Central Provinces was formed out of territory taken from the peshwa and the raja of Nagpur. An infant was recognized as the heir of Holkar, and a second infant was proclaimed raja of Nagpur under British guardianship. At the same time the several states of Rajputana accepted the position of feudatories of the paramount power. The map of India, as thus drawn by Lord Hastings, remained substantially unchanged until the time of Lord Dalhousie. But the proudest boast of Lord Hastings and Sir John Malcolm was, not that they had advanced the pomoerium, but that they had conferred the blessings of peace and good government upon millions who had suffered unutterable things from Mahratta and Pindari tyranny.

The marquis of Hastings was succeeded by Lord Amherst, after the interval of a few months, during which Mr Adam, a civil servant, acted as governor-general. Lord Burmese Amherst's administration lasted for five years, from War. 1823 to 1828. It is known in history by two prominent

events, the first Burmese War and the capture of Bharatpur. For some years past the north-east frontier had been disturbed by the restlessness of the Burmese. The suc- cessors of Alompra, after having subjugated all Burma, arid over- run Assam, which was then an independent kingdom, began a series of encroachments upon British territory in Bengal.

As all peaceful proposals were scornfully rejected, Lord Amherst was compelled to declare war in 1824. Little military glory could be gained by beating the Burmese, who were formidable only from the pestilential character of their country. One expedition with gunboats proceeded up the Brahmaputra into Assam; another marched by land through Chittagong into Arakan, for the Bengal sepoys refused to go by sea; a third, and the strongest, sailed from Madras direct to the mouth of the Irrawaddy. The war was protracted over two years. At last, after the loss of about 20,000 lives and an expenditure of £14,000,000, the king. of Ava consented to sign the treaty of Yandabu, by which he abandoned all claim to Assam, and ceded the provinces of Arakan and Tenasserim, which were already in the military occupation of the British. He retained all the valley of the Irrawaddy, down to the sea at Rangoon. The capture of Bharatpur in central India by Lord Combermere in 1826 wiped out the repulse which Lord Lake had received before that city in January 1805. A disputed succession necessi- tated British intervention. Artillery could make little impression upon the massive walls of mud, but at last a breach was effected by mining, and the city was taken by storm, thus losing its general reputation throughout India for impregnability, which had threatened to become a political danger.

The next governor-general was Lord William Bentinck, who had been governor of Madras twenty years earlier at the time of the mutiny of Vellore. His seven years' rule Bentinck, (from 1828 to 1835) is not signalized by any of those victories or extensions of territory by which chroniclers delight to measure the growth of empire. But it forms an epoch in administrative reform, and in the benign process by which the hearts of a subject population are won over to venerate as well as obey their alien rulers. The modern history of the British in India, as benevolent administrators ruling the country with an eye to the good of the natives, may be said to begin with Lord William

Bentinck. According to the inscription upon his statue at Calcutta, from the pen of Macaulay: " He abolished cruel rites; he effaced humiliating distinctions; he gave liberty to the expression of public opinion; his constant study it was to elevate the intellectual and moral character of the nations committed to his charge." His first care on arrival in India was to restore equilibrium to the finances, which were tottering under the burden imposed upon them by the Burmese War. This he effected by reductions in permanent expenditure, amounting in the aggregate to 15 millions sterling, as well as by augmenting the revenue from land that had escaped assessment, and from the opium of Malwa. He also widened the gates by which educated natives could enter the service of the company. Some of these reforms were distasteful to the covenanted service and to the officers of the army, but Lord William was always staunchly supported by the court of directors and by the Whig ministry at home.

His two most memorable acts are the abolition of suttee and the suppression of the Thugs. At this- distance of time it is difficult to realize the degree to which these Suttee two barbarous practices had corrupted the social system of the Hindus. European research has clearly proved that the text in the Vedas adduced to authorize the immolation of widows was a wilful mistranslation. But the practice had been engrained in Hindu opinion by the authority of centuries, 1 and had acquired the sanctity of a religious rite. The emperor Akbar is said to have prohibited it by law, but the early British rulers did not dare so far to violate the religious customs of the people. In the year 181 7 no fewer than seven hundred widows are said to have been burned alive in the Bengal presidency alone. To this day the most holy spots of Hindu pilgrimage are thickly dotted with little white pillars, each commemorating a suttee. In the teeth of strenuous opposition, from both Europeans and natives, Lord William carried the regulation in council on the 4th of December 1829, by which all who abetted suttee were declared guilty of " culpable homicide." The honour of suppressing Thuggism must be shared between Lord William and Captain Sleeman. Thuggism was an abnormal

excrescence upon Hinduism, in so far as the bands of secret assassins were sworn together by an oath based on the rites of the bloody goddess Kali. Between 1826 and 1835 as many as 1562 Thugs were apprehended in different parts of British India, and by the evidence of approvers the moral plague spot was gradually stamped out.

Two other historical events are connected with the admini- stration of Lord William Bentinck. In 1833 the charter of the East India Company was renewed for twenty years, but only upon the terms that it should abandon its trade and permit Europeans to settle freely in the country. At the same time a legal or fourth member was added to the governor-general's council, who might not be a servant of the company, and a commission was appointed to revise and codify the law. Macaulay was the first legal member of council, and the first president of the law commission. In 1830 it was found necessary to take the state of Mysore under British administration, where it continued until 1881, when it was restored to native rule; ana in 1834 the frantic misrule of the raja of Coorg brought on a short and sharp war. The raja was permitted to retire to Benares, and the brave and proud inhabitants of that mountainous little territory decided to place themselves under the rule of the company; so that the only annexation effected by Lord William Bentinck was " in consideration of the un- animous wish of the people."

Sir Charles (afterwards Lord) Metcalfe succeeded Lord William as senior member of ■council. His short term of office is memor- able for the measure which his predecessor had initiated, but which he willingly carried into 'execution, for giving entire liberty to the press. Public opinion in India, as well as the express wish of the court of directors at home, pointed to Metcalfe as the most fit person to carry out the policy of Bentinck, not provisionally, but as governor-general for a full term. Party exigencies, however, led to the appointment of Lord Auckland. From that date commences a new era of war and conquest, which may be said to have lasted for twenty years. All looked peaceful until Lord Auckland) prompted by his evil genius, attempted by force to place Shah Shuja upon the throne of Kabul, an attempt which ended in gross mis- management and the annihilation of the British garrison in that city. The disaster in Afghanistan was quickly followed by the conquest of Sind, the two wars in the Punjab, the second Burmese War, and last of all the Mutiny.

*The attention of the British government had been directed to Afghan affairs ever since the time of Sir John Shore, who feared that Zaman Shah, then holding his court at *am> Lahore, might follow in the path of Ahmed Shah,*

ˆ n ” and overrun Hindustan. The growth of the powerful Sikh kingdom of Ranjit Singh effectually dispelled any such alarms for the future. Subsequently, in 1809, while a French invasion of India was still a possibility to be guarded against, Mountstuart Elphinstone was sent by Lord Minto on a mission to Shah Shuja to form a defensive alliance. Before the year was out Shah Shuja had been driven into exile, and a third brother, Mahmud Shah, was on the throne. In 1837, when the curtain rises upon the drama of British interference in Afghanistan, the usurper, Dost Mahommed Barakzai, was firmly established at Kabul. His great ambition was to recover Peshawar from the Sikhs; and when Captain Alexander Burnes arrived on a mission from Lord Auckland, with the ostensible object of opening trade, the Dost was willing to promise every- thing, if only he could get Peshawar. But Lord Auckland had another and more important object in view. At this time the Russians were advancing rapidly in . Central Asia, and a Persian army, not without Russian support, was besieging Herat, the traditional bulwark of Afghanistan on the east. A Russian envoy was at Kabul at the same time as Burnes. The latter was unable to satisfy the demands of Dost Mahommed in the matter of Peshawar, and returned to India unsuccessful. Lord Auckland forthwith resolved upon the hazardous plan of placing a more subservient ruler upon the throne of Kabul. Shah Shuja, now in exile at Ludhiana, was selected for the

purpose. At this time both the Punjab and Sind were independent kingdoms. Sind was the less powerful of. the two, and, therefore, a British army escorting Shah Shuja made its way by that route to enter Afghanistan through the Bolan Pass. Kandahar surrendered, Ghazni was taken by storm, Dost Mahommed fled across the Hindu Kush, and Shah Shuja was triumphantly led into the Bala Hissar at Kabul in August 1839. During the two years that followed Afghanistan remained in the military occupation of the British. The catastrophe occurred in November 1841, when Sir Alexander Burnes was assassinated in the city of Kabul. The troops in the cantonments were then under the command of General Elphinstone (not to be confounded with the civilian Mountstuart Elphinstone), with Sir William Macnaghten as chief political adviser. Elphinstone was an old man, unequal to the responsibilities of the position. Macnaghten was treacherously murdered at an interview with the Afghan chief, Akbar Khan, eldest son of Dost Mahommed. After lingering in their cantonments for two months, the British army set off in the depth of winter to find its way back to India through the passes. When they started they numbered 4000 fighting men, with 12,000 camp followers. A single survivor, Dr Brydon, reached the friendly walls of

Jalalabad, where General Sale was gallantly holding out. The rest perished in the defiles of Khurd Kabul and Jagdalak, either from the knives and matchlocks of the Afghans or from the effects of cold. A few prisoners, mostly women, children and officers, were considerately treated by the orders of Akbar Khan. (See Afghanistan.)

Within a month after the news reached Calcutta, Lord Auckland had been superseded by Lord Ellenborough, whose first impulse was to be satisfied with drawing off in safety the garrisons from Kandahar and Jalalabad. But bolder counsels prevailed. General Pollock, who was marching straight through the Punjab to relieve General Sale, was ordered to penetrate to Kabul, while General Nott was only too glad not to be forbidden to retire from Kandahar through Kabul. After a good deal of fighting, the two British forces met at their common destination in September 1842. The great bazar at Kabul was, blown up with gunpowder to fix a stigma upon the city; the prisoners were recovered; and all marched back to India, leaving Dost Mahommed to take undisputed possession of his throne. The drama closed with a bombastic proclamation from Lord Ellen- borough, who had caused the gates from the tomb of Mahmud of Ghazni to be carried back as a memorial of " Somnath revenged/'

Lord Ellenborough, who loved military display, had his tastes gratified by two more wars. In 1843 the Mahommedan rulers of Sind, known as the " meers " or amirs, whose only fault was that they would not surrender their Aoaexa- independence, were crushed by Sir Charles Napier, siad. The victory of Meeanee, in which 3000 British troops defeated 20,000 Baluchis, is perhaps the most brilliant feat of arms in Indian history; but an honest excuse can scarcely be found for the annexation of the country. In the same year a disputed succession at Gwalior, fomented by feminine intrigue, resulted in an outbreak of the overgrown army which the Sindhia family had been allowed to maintain. Peace was restored by the battles of Maharajpur and Punniar, at the former of which Lord Ellenborough was present in person.

In 1844 Lord Ellenborough was recalled by the court of directors, who differed from him on many points of administra- tion, and distrusted his erratic genius. He was succeeded by Sir Henry (afterwards Lord) Hardinge, slkh Wan who had served through the Peninsular War and had lost a hand at Ligny. It was felt on all sides that a trial of strength between the British and the Sikhs was at hand. (For the origin of the Sikh power see Punjab.)

Ranjit Singh, the founder of the Sikh kingdom in the Punjab, had faithfully fulfilled all his obligations towards the British. But on his death in 1839 no successor was left to curb the ambition of the Sikh nationality.

In 1845 the khalsa, or Sikh army, numbering 60,000 men with

Dal- housie.

150 guns, crossed the Sutlej and invaded British territory. Sir Hugh Gough, the .commander-in-chief, together with the governor-general, hurried up to the frontier. Within three weeks four pitched battles were fought, at Mudki, Ferozeshah, Aliwal and Sobraon. The British loss on each occasion was heavy; but by the last victory the Sikhs were fairly driven into and across the Sutlej, and Lahore surrendered to the British. By the terms of peace then dictated the infant son of Ranjit, Dhuleep Singh, was recognized as raja; the Jullundur Doab, or tract between the Sutlej and the Ravi, was annexed; the Sikh army was limited to a specified number; Major Henry Lawrence was appointed to be resident at Lahore; and a British force was detailed to garrison the Punjab for a period of eight years.

Lord Dalhousie succeeded Lord Hardinge, and his eight years' administration (from 1848 to 1856) was more pregnant of results than that of any governor-general since Wellesley. Though professedly a man of peace, he was compelled to fight two wars, in the Punjab and in Burma. These both ended in large acquisitions of territory, while Nagpur, Oudh and several minor states also came under British rule. But Dalhousie's own special interest lay in the advancement of the moral and material condition of the country. The system of administration carried out in the conquered Punjab by the two Lawrences and their assistants is probably the most successful piece of difficult work ever accomplished by Englishmen. Lower Burma prospered under their rule scarcely less than the Punjab. In both cases Lord Dalhousie deserves a large share of the credit. No branch of the administration escaped his reforming hand. He founded the public works department, to pay special attention to roads and canals. He- opened the Ganges canal, still the largest work of the kind in the country, and he turned the sod of the first Indian

railway. He promoted steam com- munication with England via the Red Sea, and introduced cheap postage and the electric telegraph. It is Lord Dalhousie's misfortune that these benefits are too often forgotten in 1 the vivid recollections of the Mutiny, which avenged his policy of annexation.

Lord Dalhousie had not been six months in India before the second Sikh war broke out. Two British officers were treacher- ously assassinated at Multan. Unfortunately Henry sikhWar. Lawrence was at home on sick leave. The British ; army was not ready to act in the hot season, and, despite the single-handed exertions of Lieutenant (afterwards Sir Herbert) Edwardes, this outbreak of fanaticism led to a general rising. The khalsa army again came together, and more than once fought on even terms with the British. On the fatal field of Chillianwalla, which patriotism prefers to call a drawn battle, the British lost 2400 officers and men, besides four guns and the colours of three regiments. Before reinforcements could come out from England; with Sir Charles Napier as commander- in-chief, Lord Gough had restored his own reputation by the crowning victory of Gujrat, which absolutely destroyed the Sikh army. Multan had previously fallen; and the Afghan horse under Dost Mahommed, who had forgotten their hereditary anti- pathy to the Sikhs in their greater hatred of the British name, were chased back with ignominy to their native hills. The Punjab henceforth became a British province, supplying a virgin field for the administrative talents of Dalhousie and the two Lawrences. Raja Dhuleep Singh received an allowance of £50,000 a year, on which he retired as a country gentleman to . Norfolk in England. (See Punjab.)

*The second Burmese war of 1852 was caused by the ill-treat- ment of European merchants at Rangoon, and the insolence offered to the captain of a frigate who had been sent *■"""" to remonstrate. The whole valley of the Irrawaddy, War. from Rangoon to Prome, was occupied in a few*

months, and, as the king of Ava refused to treat, it was annexed, under the name of Pegu, to the provinces of Arakan and Tenasserim, which had been acquired in 1826.

Lord Dalhousie's dealings with the feudatory states of India, though actuated by the highest motives, seem now to have

proceeded upon mistaken lines. His policy of annexing each native state on the death of its ruler without natural heirs pro- duced a general feeling of insecurity of tenure among the princes, and gave

offence to the people of India. This I^ riBe policy was reversed when India was taken over by of lapse. the crown after the Mutiny; and its reversal has led to the native- princes being amongst the most loyal subjects of the British government. The first state to escheat to the British government was Satara, which had been reconstituted by Lord Hastings on the- downfall of the peshwa Baji Rao in 1 8 18. The last direct representative of Sivaji died without a male heir in 1848, and his deathbed adoption was set aside. In the same year the Rajput state of Karauli was saved by the interposition of the court of directors, who drew a fine distinction between a dependent principality and a protected ally. In 1853 Jhansi suffered the same fate as Satara. But the most con- spicuous application of the doctrine of lapse was the case of Nagpur. The last of the Bhonslas, a dynasty older than the British government itself, died without a son, natural or adopted, in 1853. That year also saw British administration extended to the Berars, or the assigned districts which the nizam of Hyderabad was induced to cede as a territorial guarantee for the subsidies which he perpetually kept in arrear. Three more distinguished names likewise passed away in 1853, though without any attendant accretion to British territory. In the extreme south the titular nawab of the Carnatic and the titular raja of Tanjore both died without heirs. Their rank and their pensions died with them, though compassionate allowances were continued to their families. In the north of India, Baji Rao, the ex-peshwa who had been dethroned in 1818, lived on till 1853 in the enjoyment of his annual pension of £80,000. His adopted son, Nana Sahib, inherited his accumulated savings, but could obtain no further recognition.

*The annexation of the province of Oudh was justifiable on the ground of morals, though not on that of policy. Ever since the nawab wazir, Shuja-ud-Dowlah, received back his forfeited territories from the hands of Lord Clive in A aaex * m 1765, the very existence of Oudh as an independent Oudh. state had depended only upon the protection of British bayonets. Thus, preserved alike from foreign invasion and from domestic rebellion, the long line of subsequent nawabs had given way to that neglect of public affairs and those private vices which naturally flow from irresponsible power. Their only redeeming virtue was steady loyalty to the British government. Warning after warning had been given to the nawabs, who had assumed the title of king since 1810, to put their house in order; but every warning was neglected, and Lord Dalhousie at last carried into effect what both the previous governors-general had threatened. In 1856, the last year of his rule, he issued orders to General (afterwards Sir James) Outram, then resident at the court of*

Lucknow, to assume the direct administration of Oudh, on the ground that " the British government would be guilty in the sight of God and man, if it were any longer to aid in sustaining by its countenance an administration fraught with suffering to millions." The king, Wajid Ali, bowed to irresistible force, though he ever refused to recognize the justice of his deposition. After a mission to England, by way of protest and appeal, he settled down in the pleasant suburb of Garden Reach near Calcutta, where he lived in the enjoyment of a pension of £120,000 a year. Oudh was thus annexed without a blow; but it may be doubted whether the one measure of Lord Dalhousie upon which he looked back himself with the clearest conscience was not the very one that most alarmed native public opinion..

Lord Dalhousie was succeeded by his friend, Lord Canning, who, at the farewell banquet in England given to him by the court of directors, uttered these prophetic words: " I wish for a peaceful term of office. But I cannot Mutiny. forget that in the sky of India, serene as it is, a small cloud may arise, no larger than a man's hand, but which, growing larger arid larger, may at last threaten to burst and overwhelm us with ruin." In the following year the sepoys of the Bengal

army mutinied, and all the valley of the Ganges from Patna to Delhi rose in open rebellion .

The various motives assigned for the Mutiny appear inadequate to the European mind. The truth seems to be that native opinion throughout India was in a ferment, predisposing men to believe the wildest stories, and to act precipitately upon their fears. The influence of panic in an Oriental population is greater than might be readily believed. In the first place the policy of Lord Dalhousie, exactly in proportion as it had been dictated by the most honourable considerations, was utterly distasteful to the native mind. Repeated annexations, the spread of education, the appearance of the steam engine and the telegraph wire, all alike revealed a consistent determination to substitute an English for an Indian civilization. The Bengal sepoys, especially, thought that they could see into the future farther than the rest of their countrymen. Nearly all men of high*

caste, and many of them recruited from Oudh, they dreaded tendencies which they deemed to be denationalizing, and they knew at first hand what annexation meant. They believed it was by their prowess that the Punjab had been conquered, and all India was held quiet. The numerous dethroned princes, their heirs and their widows, were the first to take advantage of the > spirit of disaffection that was abroad. They had heard of the Crimean War, and were told that Russia was the perpetual enemy of England. Owing to the silladar system, under which the native cavalry provided their own horses and accoutrements, many of the sowars were in debt, and were in favour of a change which would wipe out the existing regime and with it the money- lender.

But in addition to these general causes of unrest the condition of the native army had long given cause for uneasiness to acute observers. During the course of its history it had broken out into mutiny at recurrent intervals, the latest occasion being the winter of 1843-1844, when there were two separate mutinies in Sind and at Ferozepur. Moreover the spirit of the sepoys during the Sikh wars was unsatisfactory, and led to excessive casualties amongst the British officers and soldiers. Both General Jacob and Sir Charles Napier had prophesied that the Mutiny would take place. Sir Hugh Gough and other commanders-in- chief had petitioned for the removal of India's chief arsenal from Delhi to Umballa; and Lord Dalhousie himself had protested against the reduction of the British element in the army. But all these warnings were disregarded with a blindness as great as was the incapacity that allowed the Mutiny to gather head unchecked after its first outbreak at ! Meerut. Moreover the outbreak was immediately provoked by an unparalleled in- stance of carelessness. It has recently been proved by Mr G. W. Forrest's researches in the Government of India re- cords that the sepoys' belief that their cartridges were greased with the fat of cows and pigs had some foundation in fact. Such a gross violation of their caste prejudices would alone be sufficient to account for the outbreak that followed. (For the military incidents of the Mutiny see Indian Mutiny.)

*The Mutiny sealed the fate of the East India company, after a life of more than two and a half centuries. The Act for the Better Government of India (1858), which finally r™ft * ter trans ferred the entire administration from the company Crown. to the crown, was not passed without an eloquent protest from the directors, nor without acrimonious party discussion in parliament. It enacts that India shall be governed by, and in the name of, the sovereign of England through a principal secretary of state, assisted by a council.*

The governor-general received the new title of viceroy. The European troops of the company, numbering about 24,000 officers and men, were amalgamated with the royal service, and the Indian navy was abolished. By the Indian Councils Act 1 86 1 the governor-general's council and also the councils at Madras and Bombay were augmented by the addition of non-official members, either natives or Europeans, for legislative purposes only; and by another act passed in the same year high courts of judicature were constituted out of the existing

supreme courts and company's courts at the presidency towns. i

India under the Crown.

• It fell to the lot of Lord Canning both to suppress the Mutiny and to introduce the peaceful revolution that followed. As regards his execution of the former part of his duties, it is sufficient to say that he- preserved his equanimity undisturbed in the darkest hours of peril, and that the strict impartiality of his conduct incurred alternate praise and blame from the fanatics on either side. The epithet then scornfully applied to him of " Clemency " Canning is now remembered only to his honour. On November 1, 1858, at a grand durbar held at Allahabad the royal proclamation was published which announced that the queen had assumed the government of India. This document, which has been called the Magna Charta of the Indian people, went on to explain the policy of political justice and religious toleration which it was her royal pleasure to pursue, and granted an amnesty to all except those who had directly taken part in the murder of British subjects, Peace was pro- claimed throughout India on the 8th of July 1859; and in the following cold season Lord Canning made a viceregal progress through the upper provinces, to receive the homage of loyal princes and chiefs, and to guarantee to them the right of adoption. The suppression of the Mutiny increased the debt of India by about 40 millions sterling, and the military changes that ensued augmented the annual expenditure by about 10 millions. To grapple with this deficit, James Wilson was sent out from the treasury as financial member of council; He reorganized the customs system, imposed an income tax and licence duty and created a state paper currency. The penal code, originally drawn up by Macaulay in 1837, passed into law in 186©, .together with codes of civil and criminal procedure.

Lord Canning left India in March 1862, and died before he had been a month in England. His successor, Lord Elgin, only lived till November 1863, when he too fell a victim to the exces- sive work of

the governor-generalship, dying at the Himalayan station of Dharmsala, where he lies buried. He was succeeded by Sir John Lawrence, the saviour of the Punjab. The chief incidents of his administration were the Bhutan war and the terrible Orissa famine of 1866. Lord Mayo, who succeeded him in 1869, carried on the permanent British policy of moral and material progress with a special degree of personal energy. The Umballa durbar, at which Shere Ali was recognized as amir of Afghanistan, though in one sense the completion of What Lord Lawrence had begun, owed much of its success to the personal influence of Lord Mayo himself. The same quality, combined with sympathy and firmness, stood him in good stead in all; his dealings both with native chiefs and European officials. His example of hard work stimulated all to their best. While engaged in exploring with his own eyes the furthest corners of the empire, he fell by the hand of an assassin in the convict settlement of the Andaman islands' in 1872. His successor Was Lord Northbrook, whose ability showed itself chiefly in the department of finance. During the time of his administration a famine in Lower Bengal in 1874 was successfully obviated by government relief and public works, though at an enormous cost; the gaekwar of Baroda was dethroned in 1875 f° r m i s – government and disloyalty, while his dominions were continued to a nominated child of the family; and the prince of Wales (Edward VII.) visited the country in the cold season of i875 < -i8j6. Lord Lytton followed Lord Northbrook in 1876. On the 1st df January 1877 Queen Victoria was proclaimed empress of India at a durbar of great magnificence, held on the historic "Ridge" overlooking the Mogul capital Delhi. But, while the princes and high officials of the country were flocking to this gorgeous scene, the shadow of famine was already darkening over the south of India. Both the monsoons of 1876 had failed to bring their due supply of rain, and the season of 1877 was little better. The consequences of this prolonged drought, which extended from Cape Comorin to the Deccan, and subsequently invaded northern India, were more disastrous than any similar calamity

up to that time from the introduction of British rule. Despite unparalleled importations of grain by sea and rail, despite the most strenuous exertions of the government, which incurred a total expenditure on this account of 1 1 millions sterling, the loss of life

from actual starvation and its attendant train of diseases was lamentable. In the autumn of 1878 the affairs of Afghanistan again forced themselves into notice. Shere Ali, the amir, who had been hospitably entertained by Lord Mayo, was found to be favouring Russian intrigues. A British envoy was refused admittance to the country, while a Russian mission was received with honour. This led to a declaration of war. British armies advanced by three routes — the Khyber, the Kurram and the Bolan — and without much opposition occupied the inner entrances of the passes. Shere Ali fled to Afghan Turkestan, and there died. A treaty was entered into with his son, Yakub Khan, at Gandamak, by which the British frontier was advanced to the crests or farther sides of the passes and a British officer was admitted to reside at Kabul. Within a few months the British resident, Sir Louis Cavagnari, was treacherously attacked and massacred, together with his escort, and a second war became necessary. Yakub Khan abdicated, and was deported to India, while Kabul was occupied in force.

At this crisis of affairs a general election in England resulted

in a change of government. Lord Lytton resigned with the

Conservative ministry, and the marquis of Ripon was

Ripon.

nominated as his successor in 1880. Shortly after- wards a British brigade was defeated at Maiwand by the Herati army of Ayub Khan, a defeat promptly and com- pletely retrieved by the brilliant march of General Sir Frederick Roberts from Kabul to Kandahar, and by the total rout of Ayub Khan's army on the 1st of September 1880. Abdur Rahman Khan, the eldest male representative of the stock of Dost Mahommed, was then recognized as amir of Kabul. Lord Ripon was sent out to India by the Liberal ministry of 1880 for the purpose of reversing Lord Lytton's policy in Afghanistan, and of introducing a more sympathetic system into the adminis- tration of India. The disaster at Maiwand, and the Russian advance east of the Caspian, prevented the proposed withdrawal from Quetta; but Kandahar was evacuated, Abdur Rahman was left in complete control of his country and was given an annual subsidy of twelve lakhs of rupees in 1883. In the second purpose of his administration Lord Ripon's well-meant efforts only succeeded in setting Europeans and natives against each other. His term of office was chiefly notable for the agitation against the Ilbert Bill, which proposed to subject European offenders to trial by native magistrates. The measure aroused a

storm of indignation amongst the European community which finally resulted in the bill being shorn of its most objection- able features. Lord Ripon's good intentions and personal sympathy were recognized by the natives, and on leaving Bombay he received the greatest ovation ever accorded to an Indian viceroy.

After the arrival of Lord Dufferin as governor-general the incident known as the Panjdeh Scare brought Britain to the verge of war with Russia. During the preceding decades Russia had gradually advanced her power from the Caspian across the Turkoman steppes to the border of Afghanistan, and Russian intrigue was largely responsible for the second Afghan war. In February 1884 Russia annexed Merv. This action led to an arrangement in August of the same year for a joint Anglo-Russian commission to delimit the Afghan frontier. In March 1885, while the commisr sion was at work, Lord Dufferin was entertaining the amir Abdur Rahman at a durbar at Rawalpindi. The durbar was interrupted by the news that a Russian general had attacked and routed the Afghan force holding the bridge across the river Kushk, and the incident might possibly have resulted in war between Britain and Russia but for the slight importance that Abdur Rahman attributed to what he termed a border scuffle.

The incident, however, led to military measures being taken by the government of Lord Dufferin, which had far-reaching

The

Pan/rfeh

score.

effects on Indian finance. The total strength of the army was raised by 10,000 British and 20,000 native troops, at an annual cost of about two millions sterling; and the frontier post of Quetta, in the neighbourhood of Kandahar, increase was connected with the Indian railway system by Army^ a line that involved very expensive tunnelling.

The Panjdeh incident was likewise the cause of the establish- ment of Imperial Service troops in India. At the moment when war seemed imminent, the leading native princes made offers of pecuniary aid. These offers were imperial declined, but it was intimated to them at a later date troops: that, if they would place a small military force in each state at the disposal of the British government, to be commanded by state officers, but drilled, disciplined and armed

under the supervision of British officers and on British lines, the government would undertake to find the necessary supervising officer, arms and organization. The proposal was widely accepted, and the Imperial Service troops, as they are called, amount at present to some 20,000 cavalry, infantry and transport, whose efficiency is very highly thought of. They have rendered good service in the wars on the north-west frontier, and also in China and Somalilaad. Later in the same year (1885) occurred the third Burmese war. For the causes of the dispute with King Thebaw, and a description of the military operations which ensued before the country was finally pacified, see Burma.

From 1885 onwards the attention of the Indian government was increasingly devoted to the north-west frontier. Between the years 1885 and 1895 there were delimited at various times by joint commissions the Russo- Afghan frontier between the Oxus and Sarakhs on the Persian frontier, the Russo- Afghan frontier from Lake Victoria to the frontier of China and the Afghan- Indian frontier from the Kunar river to a point in the neighbour- hood of the Nawa Kotal. To the westward, after various disagreements and two military expeditions, the territories comprising the Zhob, Barhan and Bori valleys, Occupied by Pathan tribes, were in 1890 finally incorporated in the general system of the Trans-Indus protectorate. About the same time in the extreme north the post of British resident in Gilgit was re-established, and the supremacy of Kashmir over the adjoining petty chiefships of Hunza-Nagar was enforced (1891-1892). In 1893 the frontiers of Afghanistan and British India were defined by a joint agreement between the two governments, known as the Durand agreement. There followed on the part of the British authorities, interference in Chitral, ending in an expedition in' 1895 and'the ejection of the local chiefs in favour of candidates amenable to British influence. A more formidable hostile combination, however, awaited the government, of India. By the agreement of 1893 with the amir most of the Waziri clan and also the Afridis had been left outside the limits of the amir's influence and transferred to the British zone. Soon after that date the establishment by the British military authorities of posts within the Waziri country led to apprehension on the part of the local tribesmen. In 1895 the occupation of points within the Swat territory for the safety of the road from India to Chitral similarly roused the suspicion of the Swatis. The Waziris and Swatis successively rose in arms, in June and July 1897, and their example was followed by the Mohmands. Finally, in August the powerful Afridi tribe joined the combination and closed >the Khyber Pass, which runs through their territory,

and which was held by them, on conditions, in trust for the government of India. This led to the military operations known as the Tirah campaign, which proved very costly both in men and money.

Meanwhile considerable difficulties had been experienced with the Indian currency, which was on a purely silver basis. Before 1873 the fluctuations in the value of silver as compared with gold had been comparatively small, currency. and the exchange value, of the rupee was rarely less than two shillings. But after 1873, in consequence of changes in the monetary systems of France and Germany, and the increased production of silver, this stability of exchange no longer continued, and the rupee sank steadily in value, till it was worth

COSTUME]

INDIA

417

little more than half its face value. This great shrinkage in exchange caused considerable loss to the Indian government in remitting to Europe, and entailed hardship upon Anglo-Indians who received pensions or other payments in rupees, while on the other hand it supplied an artificial stimulus to the export trade by increasing the purchasing power of gold. This advantage, however, was outweighed by the uncertainty as to what the exchange value of the rupee might be at any particular date, which imported a gambling element into commerce. Accordingly in June 1893 an act was passed closing the Indian mints to the free coinage of silver. Six years later, in 1899, the change was completed by an act making gold legal tender at the rate of £1 for Rs.15, or at the rate of is. 4d. per rupee, and both the government and the individual now know exactly what their obligations will be.

When Lord Curzon became viceroy in 1898, he reversed the policy on the north-west frontier which had given rise to the Tirah campaign, withdrew outlying garrisons in tribal country, substituted for them tribal militia,

Lord

reforms. an d created the new North-West Frontier province, for the purpose of introducing consistency of policy and firmness of control upon that disturbed border. In addition, after making careful inquiry through various commissions, he reformed the systems of education and police, laid down a comprehensive scheme of irrigation,

improved the leave rules and the excessive report-writing of the civil service, encouraged the native princes by the formation of the Imperial Cadet Corps and introduced many other reforms. His term of office was also notable for the coronation durbar at Delhi in January 1903, the expedition to Lhasa in 1904, which first unveiled that forbidden city to European gaze, and the partition of Bengal in 1905. In December 1904 Lord Curzon entered upon a second term of office, which was unfortunately marred by a controversy with Lord Kitchener, the commander-in-chief, as to the position of the military member of council. Lord Curzon, finding himself at variance with the secretary of state, resigned before the end of the first year, and was succeeded by Lord Minto.

The new viceroy, who might have expected a tranquil time after the energetic reforms of his predecessor, soon found himself . face to face with the most serious troubles, euphemistic-

Mlnto. ally called the "unrest," that British rule has had The to encounter in India since the Mutiny. For many

unrest. y ears the educated class among the natives had been claiming for themselves a larger share in the administration, and had organized a political party under the name of the National Congress, which held annual meetings at Christmas in one or ether of the large cities of the peninsula. This class also exercised a wide influence through the press, printed both in the vernacular languages and in English, especially among young students. There is no doubt too that the adoption of Western civilization by the Japanese and their victorious war with Russia set in motion a current through all the peoples of the East. The .occasion though not the cause of trouble arose from the partition of Bengal, which was represented by Bengali agitators as an insult to their mother country. While the first riots occurred in the Punjab and Madras, it is only in Bengal and eastern Bengal that the unrest has been bitter and con- tinuous. This is the centre of the swadeshi movement for the boycott of English goods, of the most seditious speeches and writings and of conspiracies for the assassination of officials. At first the government attempted to quell the disaffection by means of the ordinary law, with fair success outside Bengal; but there, owing to the secret ramifications of the conspiracy, it has been found necessary to adopt special measures. Recourse has been had to a regulation of the year 1818, by which persons may be imprisoned or " deported " without reason assigned; and three acts of the legislature have been passed for dealing more directly with the prevalent classes of crime: (1) an Explosives Act, containing provisions similar to those in force in England; (2) a

Prevention of Seditious Meetings Act, which can only be applied specially by proclamation; and (3) a Criminal Law Amendment Act, of which the two chief provisions xiv 14

are— a magisterial inquiry in private (similar to the Scotch procedure) and a trial before three judges of the High Court without a jury.

While the law was thus sternly enforced, important acts of conciliation and measures of reform were carried out simultaneously. In 1907 two natives, a Hindu and a Mahom- medan, were appointed to the secretary of state's council; and in 1909 another native, a Hindu barrister, was for the first time appointed, as legal member, to the council of the viceroy. Occasion was taken of the fiftieth anniversary of the assumption by the crown of the government of India to address a message (on November 2, 1908) by the king-emperor to the princes and peoples, reviewing in stately language the later development, and containing these memorable words: —

" From the first, the principle of representative institutions began to be gradually introduced, and the time has come when, in the judgment of my viceroy and governor-general and others of my counsellors, that principle mgy be prudently extended. Important classes among you, representing ideas that have been fostered and encouraged by British rule, claim equality of citizenship, and a greater share in legislation and government. The politic satisfaction of such a claim will strengthen, not impair, existing authority and power. Administration will be all the more efficient if the officers who conduct it have greater opportunities of regular contact with those whom it affects and with those who influence and reflect common opinion about it."

The policy here adumbrated was (at least partly) carried into effect by parliament in the Indian Councils Act 1909, which reconstituted all the legislative councils by the addition of members directly elected, and conferred upon these councils wider powers of discussion. It further authorized the addition of two members to the executive councils at Madras and Bombay, and the creation of an executive council in Bengal and also (subject to conditions) in other provinces under a lieutenant- governor. Regulations for bringing the act into operation were issued by the governor-general in council, with the approval of the secretary of state, in November 1909. They provided {inter alia) for a non-official majority in all of the provincial councils, but not in that of the governor-general; for an

elaborate system of election of members by organized constituencies; for nomination where direct election is not appropriate; and for the separate representation of Mahommedans and other special interests. They also contain provisions authorizing the asking of supplementary questions, the moving and discussion of resolutions on any matter of public interest and the annual consideration of the contents of the budget. In brief, the legislative councils were not only enlarged, but transformed into debating bodies, with the power of criticizing the executive. The first elections took place during December 1909, with results that showed wide-spread interest and were generally accepted as satisfactory. The new council of the governor-general met in the following month.

Authorities. — Vincent A. Smith, The Early History of India (Oxford, 1904, 2nd ed., 1908) ; and Asoka (" Rulers of India series, Oxford, 1901); J. W. McCrindle, Ancient India (1901); T. W. Rhys Davids, Buddhist India (1903); Imperial Gazetteer of India (1907- 1909); Sir J. Campbell, Gazetteer of Bombay (1896); Stanley Lane- Poole, Medieval India (" Story of the Nations " series, 1903); The Mohammedan Dynasties (1894) and The Mogul Emperors (1892); H. C. Fanshawe, Delhi Past and Present (1902); Sir H. M. Elliot, History of India as told by its own Historians (1867). For the " un-rest," its causation and history, see the series of articles in The Times, beginning July 16, 1910. (W. W. H.; J. S. Co.)

Indian Costume

Personal attire in India so far resembles a uniform that a resident can tell from a garb alone the native place, religion and social standing of the wearer. This is still true, though the present facility of intercommunication has had its effect in tending to assimilate the appearance of natives. Together with costume it is necessary to study the methods of wearing the hair, for each race adopts a different method.

The population of India, of which the main divisions are religious, falls naturally into four groups, (1) Mahommedans, (2) Hindus, (3) Sikhs, (4) Parsees. To these may be added

aboriginal races ■> such as. Bhils, Sonthals, Gonds, &c, whose

costume is chiefly noticeable from its absence.

Maho-rnmedan Men. — Apart from the two sects, Sunnis and Shias, whose garb. differs in some respects, there are four families of Moslems, viz. Pathans, Moguls, Syeds and Sheiks. The first came to India with Sultan Mahmud Ghaznavi in a.d. 1002; the second are of Tatar origin and came to India with Baber; the Syeds claim descent from Mahomet, while Sheiks comprise all other Mussulmans, including converted Hindus. It is now no longer possible to distinguish these families by their turbans as was formerly the case.

Hair. — In the hadis, or traditional sayings of Mahomet other than those to be: found in the Koran, it is laid down that the head is to be shaved and the beard to be allowed to grow naturally to " a legal " length, i.e. 7 or 8 in. long. This is known as fitrah or the custom of prophets. The beard is frequently dyed with henna and indigo for much the same reasons as in Europe by elderly men ; this is entirely optional. The wearing of whiskers while shaving the chin was a Mogul fashion of the 17th and 18th centuries and is now seldom seen except among Deccani Mahommedans. The mustachios must not grow below the line of the upper lip, which must be clearly seen; a division or parting is made below the nose. The lower lip is also carefully kept clear. Hair under the arms or elsewhere on the body except the breast is always removed.

Mahommedan clothing for indoor wear consists of three pieces: (a} Head-dress, (b) body-covering, (c) covering for the legs.

Head-dress.— This is of two kinds: the turban and the cap. The former is chiefly worn in northern India, the latter in Oudh and the United Provinces. What is known in Europe as a turban (from the Persian sdrband, a binding for the head) is in India divided into two classes. The first, made of a single piece of cloth 20 to 30 in. wide and from 6 to yds. long, is bound round the head from right to left or from left to right indifferently and quite simply, so as to form narrow angles over the forehead and at the back. This form is called antdmdh (Arabic), dastdr (Persian), shimld or shamla, safd, lungi, sela, rumM, or do pattd. The terms amamah and dastdr are used chiefly with reference to the turbans of priests aiid ulema, that is learned and religious persons. They are usually white; formerly Syeds wore them of green colour. They are never of bright hue. The lungi is made of cloth of a Special kind manufactured mostly in Ludhiana. It is generally blue and has an Ornamented border. In the case of Pathans and sometimes of Punjabi Moslems it is bound round a tall red conical cap called a" kullah (Plate I. fig. 1): The ends are

frequently allowed to hang down Over the shoulders, and are called shimla or shamla, terms which also apply to the whole head-dress. The names safa, sela, lUtnal arid dopdtta are sometimes given to this ! form of turban. The sela is gaudier and hiore ornamental generally; it is worn- by the nobles and wealthier classes.

The second form of the turban is known as the pagri. 1 This head-dress is of Hindu origin but is much worn by Mahommedans. It is a single piece of cloth 6 to 8 in. wide, "and of any length from to to 50 yds. The methods of binding the pagri are innumerable, each method having a distinctive name as ardbi (Arab fashion); mansabi (official fashion, much used in the Deccan) ; mushakhi (sheik fashion); chakridar (worn by hadjis, that is those who have made the pilgrimage to Mecca) ; khirki-ddr (a fashion of piling the cloth high, adopted by retainers of great men) ; latuddr (top-shaped, worn by kdyaslhs or writers); joriddr (the. cloth twisted into rope shape) (Plate I. fig. 6); siparali (shield-shaped, worn by the Shia sect); murassa, or nasldlikh (ornately bound), lalpati (carelessly bound) (Plate I. fig. 4). Many other fashions which it would be difficult to describe can best be learned by studying pictures with the help of a competent teacher. The chird is a pagri of checked cloth. The tnandil is of gold or highly ornamented cloth; it is worn by nobles and persons of distinction.

The cap or topi is not bound round the head, but is placed

1 This has been English by Anglo-Indians into " puggaree " or " pugree " and applied to a scarf of whke cotton or silk wound round a hat or helmet as a protection against the sun.

upon it. It is made of cut and sewn cloth. Some varieties are dopallari, a skull-cap; kishtinumd, or boat-shaped cap; goltopi, a round cap of the kind known in England as " pork-pie "; bezwi, or egg-shaped cap; sigoshid, or three-cornered cap; chaugoshia, or four-cornered cap; tdjddr, or crown-shaped cap; &c. Many other caps are named after the locality of manufacture or some peculiarity of make, e.g. Kashmire-kitopi; jk&lardar, fringed cap, &c.

A form of cap much worn in Bengal and western India is known as Irani kulldh, or Persian cap. It is made of goatskin and is shaped like a tdrbush but has no tassel. The cap worn in cold weather is called top, topa, or kantop (ear-cover) (Plate I. fig. 2); these are sometimes padded with cotton. Caps are much worn by Mussulmans of Delhi, Agra, Lucknow and other cities of the United provinces.

The tdrbush or turki-topi was introduced into India by Sir Sayyid Ahmad (Plate I. fig. 3) . It must not be confused with the Moorish "fez," which is skull-shaped. The tdrbush is of Greek origin and was adopted by Sultan Mahmud of Turkey in the early part of the 19th century. To remove the head-dress of whatever kind is, in the East, an act of discourtesy; to strike it off is a deep insult.

Clothing. — The following rules from the hadith or traditional sayings of the prophet are noteworthy: — " Wear white garments, for verily they are full of cleanliness, and pleasant to the eye." " It is lawful for the: woman of my people to clothe herself in silken garments, and to wear ornaments of gold; but it is forbidden to man: any man who shall wear silken garments in this world, shall not wear them in the next." " God will not be merciful to him who through vanity wears long trousers " {i.e. reaching below the ankle). The foregoing rules are now only observed by the ultra-orthodox, : such as the Wahabl sect and by ulemas, or learned elderly men. The Mogul court of Delhi, especially during the reign of Mahommed Shah, nick- named Rangila or the " dandy," greatly influenced change in these matters. Coloured clothing, gold ornaments and silken raiment began to be wqrn commonly by Mussulman men in his reign.*

For the upper part of the body the principal article of clothing is the kurtd. The Persian name for this is pairahan and the Arabic kamis, whence " chemise." This kurtd is the equivalent for the shirt of Europe. It is usually of white cotton, and has the opening or gala in front, at the back, or on either side in- differently. It was formerly fastened with strings > but now with the ghundi (the old form of button) and tukmah or loop. In southern India, Gujarat and in the United Provinces the kHrtd is much the same as to length and fit as the English shirt ; as the traveller goes northward from Delhi to the Afghan border he sees the kurtd becoming longer and looser till he finds the Pathan wearing it almost to his ankles, with very full wide sleeves. The sleeves are everywhere long and are sometimes fastened with one or two buttons at the wrist.

Mussulmans always wear some form of trousers. They are known as izdr (Arabic) or pa'ejdma 2 (Persian). This article of clothing is sometimes loose, sometimes tight all the way, sometimes loose as far as the knee and tight below like Jodhpur riding breeches. They are fastened round the waist with a scarf or string called katnarband (waistband) or izdrband, and are usually of white cotton. The varieties of cut are sharai or canonical, orthodox, which reach to the ankles and fit as close to the leg as European trousers; rumi or

ghardreddr, which reach to the ankles but are much wider than European trousers (this pattern is much worn by the Shias); and tang or chust, reaching to the ankles, from which to the knee they fit quite close. When this last kind is " rucked " at the ankle it is called churiddr (Plate I. fig. 4). They are sometimes buttoned at the ankle, especially in the Meerut district. The shalwdr pattern,

2 Anglicized as "pyjamas" (in America "pajamas"), the term is used of a form of night-wear for men which has now generally superseded the night-shirt. This consists of a loose coat and trousers of silk, wool or other material; the trousers are fastened by a cord round the waist.

INDIA

Plate I.

, '

Hp%-v

*i f**

J :

'-■ v..

"\/'!V

Fig. i. — Punjabi Mahommedan wearing lungi Fig. 2. — Mahommedan Saint, pir, wearing FlG. 3. — Student of the Aligarh College

bound round a red or gold kullah. the kantop, ear-cap. wearing the tarbtish.

Fig. 4. — Punjabi Mahommedan wearing Fig. 5.— Bombay or Gujarati Bora wearing Fig. 5. — Mahommedan Jat cultivators. Wife:

pa«ri, with shimla, achkan tzar or white and gold turban with red top. —with izar, kurta, and orkni or chadar;

pae jamas.

husband ; — with majba, chadar, and joridar

pagri.

‘

‘$» -^ : m

\ i

.^1%

#r

1

“1

y’

\

/:

%

1-

s x ~ / !l

■ \

II

\ «

J

‘M-

ri

« ^

w*^s|

f

M

jv

1 ,

ˆH!

*rate**

Mm

Mr

Ik

3§

**)*

W ‘

Fig

The Parsi Mo&a, a tall hat of Fig. 8.— Parsi woman wear FlG. 9. — Parsi schoolgirl. FlG. 10.— Parsi pith hat with felt brim. glazed chintz ing Parsi sari and matha-

bana or white hair cover.

Frowi Pch flnc/ /»& Drawings by J Lackwook Kipling, CLE.

14

Plate II.

INDIA

frˆggppyvr jv – ‘ .V- ‘— m

ii 1 ‘ – ” Dec 9 an Brahman wearing pagrj, Fig. 2.— Brahman wearing dio/j and ja«eo or dhott or pitamber, angrl and dopalta. sacred thread. This is the dining and

sacrificial dress of most Hindus.

I fit

if

J

Hi

ill »

l-ˆp

11/

m

:/

r

t

ˆyˆf

Fig. 3- — Rajput wearing ckapkan, which is worn both by Mussulmans and Hindus, buttoning on different sides.

Fig. 4. — Hindu woman showin method of wearing the sari.

J

Fig. 5.— Bengali Babu wearing the most popular form of Fig. 6. — Sikh devotee, ATzali or

the embroidered cap. Nikung, vowed to the wearing

of blue and steel, &c. From Pen and Ink Drawings by J. Lockwood Kipling, CLE,

very large round the waist and hanging in folds, is worn by Pathans, Baluchis, Sindis, Multanis, &c.

The new fashion in vogue amongst the younger generation of Mussulman is called the ikbarah or patalunnumd, which is like the European trousers. They are usually made of calico; they have no buttons but are fastened with string (kamarband). Bathing drawers are called ghulannah and reach to the knee. The tight drawers worn

by wrestlers are called janghiah.

Garments for outdoor wear are the angd, or angarkhd, the ckapkan, the achkan or sherwdni; the angd, a coat with full sleeves, is made of any material, white or coloured. It is slit at the sides, has perpendicularly cut side-pockets, and is fastened with strings just below the breast. It is opened on the right or left side according to local custom. The angd is now considered old-fashioned, and is chiefly worn by elderly men or religious persons. It is still not uncommon in Delhi, Agra, Lucknow and at native courts, but is being superseded by the achkan (Plate I. fig. 4) , which is buttoned straight down the front. Both angd and achkan reach to a little below the knee, as also does the chapkan, a relic of Mogul court dress, best known as the shield-like and highly adorned coat worn by government chaprasis (Plate II. fig. 3). Over the angd is sometimes worn an overcoat called a chogd; this is made of any material, thick or thin, plain or orna- mented; it has one or two fastenings only, loops below the breast whence it hangs loosely to below the knees. The chogd is sometimes known by its Arabic names aba or kabd, terms applied to it when worn by priests or ulemas. In cold weather Pathans and other border residents wear posteens, sleeved coats made of sheepskin with the woolly side in. In India farther south in cold weather an overcoat called dagld is worn; this is an angd padded with cotton Wool. A padded chogd is called labddd; when very heavily padded farghill. Whereas the European wears his waistcoat under his coat, the Indian wears his over his angd or ckapkan (not over the achkan). A sleeveless waistcoat generally made of silk is called a sadari; when it has half sleeves it is called nimdstin; the full-sleeved waistcoat worn in winter padded with cotton is called mirzai. For ceremonial purposes a coat called jama is worn. This fits closely as to the upper part of the body, but flows loosely below the waist. It is generally white, and is fastened in front by strings.

In Gujarat and other parts of western India are to be found classes of Moslems who differ somewhat from ■ those met with elsewhere, such as Memans, Boras and Khojas. The first are Sunnis: the two last Shias. Memans wear (1) a gold embroidered skull-cap, (2) a long katnis fastened at the neck with 3 or 4 buttons on a gold chain, (3) sadariya, i.e. a tight waistcoat without sleeves, fastened in front with small silk buttons and loops, (4) an over-waistcoat called shdyd-sadriya instead of the angd, with sleeves, and slits at the sides (probably of Arab origin). When he does not wear a skull-cap his amdmdh is made after the arched Arab form, or is a Kashmir scarf wound round a skull-cap made of Java straw. The Bora adopts one

of four forms of pagri; the Ujjain, a small neatly bound one; the Ahmaddbdd, a loose high one; the Surat, fuller and higher than the Ujjain pattern (Plate I. fig. 5) ; or the Kathidwddd, a conical turban with a gold stripe in the middle of the cone. The Bora wears the angd, otherwise he resembles the Meman. The Khoja wears a pagri smaller than the Meman's, called a Moghaldi pkenla; this leaves a portion of the head bare at the back. The material is always of kashida, a kind of embroidered cloth. Amongst Mahommedans only Pathans wear ear-rings.

Mahommedan Women. Head-dress.— The rupatta (also called dopatla), or veil, is of various colours and materials. Its length is about 3 yds., its width about 1ˆ. It is worn over the head and thrown over the left shoulder. It is considered essential to modesty to cover the head. This head-dress is also known as orhna. orhni, pochan, pochni (Baluchistan and western India) chundri, reo (Sind), sipatta, takrai or chadar (Pathan). Among the poorer classes it is called pacholi. Farther south in India when of thicker material it is called chadar or chaddar. It is called pachedi, potra or maldyd by Meman, Bora and Khoja women. As a rule married women wear brighter colours than

unmarried ones. In Kashmir a small round cap, goltopi, is worn. The kassawa is a handkerchief bound over the head and tied at the back, and is worn by Mahommedan women indoors to keep the hair tidy; Mahommedan women plait their hair and let it hang down behind (Plate I. fig. 6).

Clothing.- — A short jacket fastened at the back arid with short sleeves is worn. It may be of any material. In Sind, Gujarat and other parts of western India it is called a choli. It is also very generally known as angiyd. Other common names are mahram and sinaband (breast-cover). The kurtd is a sort of sleeveless shirt, open in front and reaching to the waist. It may be of any material. When this is worn with the angiya it is worn over it. This combination of dress is worn only by young married women. In Kashmir and northern India, generally the angiya is not worn, and the kurtd is worn instead. This is like the kamis, of the man, already described; it has full sleeves, is open at the front, which is embroidered, and reaches to the knee or lower. Among Pathans there are two kinds of kurtd (kamis or khat) ; one worn by married women called girddand khat is dark red or blue, embroidered .with silk in front; the j aland .khat worn by unmarried women is less conspicuous for colour and ornament. A large pocket (jeb) is often sewn on in front like the Highlander's sporran.

The Pa'ejdmds, also called izdr, are cut like those of men, and known by the same names. They differ only in being of silk or other fine material and being coloured (Plate I. fig. 6). Among Pathans they are called partog or parlek (pardek), and those of unmarried girls are of white, while married women wear them of susi, a kind of coloured silk or cotton. As a general rule the wear- ing of paijdmds is the chief distinction between Mussulman and Hindu women. In the Shahpur and other districts, however, where Mahommedans have followed Hindu customs, Moslem women wear the mafia, a cloth about 3 yds. long by i-| wide tied tightly round the waist so as to fall in folds over the legs. Even Mahommedan men sometimes wear the majlava these districtˆ This form of dress is known among Moslems as tahband .[lower binding] (Plate I. fig. 6). In Rajputana, Gujarat and the southern Punjab, Mahommedan women sometimes wear a Ihenga or ghagra skirt without trousers; in the Sirsa district and parts of Gujarat the ghagra is worn over the trousers. The sadari or waistcoat is worn by women as well as men. The tillak or peshwaz Is a dress or robe the skirt and bodice of which are made in one piece, usually of red or other coloured material; it is common in Gujarat, Rajputana and the Sirsa district, and is the style usually adopted by nautch girls when dancing. Meman women wear also the aba, or overcoat, which differs from that worn by men, in that it has loose half sleeves, and fastens with two buttons at each side of the neck over the shoulders; it is embroidered on the breast, and adorned with gold lace on the skirts.

In Delhi, Lucknow, Agra and other towns in the Punjab and the United Provinces a special wedding dress is worn by the bride, called rit-kdjord, the "dress of custom." It is worn on the wedding night only; and it is a rule that no scissors are employed in making it. The trouser string of this dress is not the usual kamarband, but is made of untwisted cotton thread called kaldwd. Out of doors Mahommedan women wear the burke, a long loose white garment entirely covering the head and body. It has two holes for the eyes. Mahommedan women pencil the eyes with kohl or surma, use missi for the teeth and colour Uie palms and nails of the hand with henna. A nose-ring is a sign of marriage.

Hindus. — Caste does not influence dress amongst Hinda§ as much as might be expected. The garment distinctive of the Hindus of all castes, men and women, all over India, is the dhoti or loin cloth. It is a very ancient dress, and their gods are represented as clothed in it in old sculptures. ,. ,

The general term used for clothing is kaprd, lata or lugd. Under

Mahommedan influence Hindu clothing developed into " suits," consisting of five pieces for men, hence called pancho luk kapra — (1) head-dress, (2) dhoti, (3) coat,; (4) chaddar or sheet, (5) bathing cloth; and three for women, hence called tin tuk—(t) dhoti, (2) jacket, (3) shawl.

[COSTUME

Men. — The Hindu (except the Rajput) shaves his head, leaving only a top-knot on the point of the skull. He shaves the face (except the eye-brows) and his body. The Rajput wears a full beard and whiskers, usually parted in the middle. He sometimes draws the beard and whiskers to the side of the head, and to keep it tidy wraps round it a cloth called dhdtd or galmocha.

Head-dress. — Hindus wear sometimes turbans and sometimes caps. When the turban is worn it is always of the pagri form, never the amdmdh. Hindus wind the pagri in various ways as described for Mussulmans, but the angles are formed over the ears and not from front to back. Mahrattas wear flat red pagris, with a small conical peak variously shaped and placed. The pagri is known in different parts of India as pdg, phenld, phag, phagdi and many other names. In Bengal a sort of turban is worn which can be taken off like a hat. When Hindus wear caps or topis they resemble those worn by Mahommedans, but they never wear the fez, tdrbush or irdni topi. In Gaya a peculiar cap made of tdl leaves is worn in rainy weather, called ghungd. Bengalis, whether Brahmans or of other castes, frequently go bareheaded. ;

Body Clothing. — The dhoti is a simple piece of cloth (cotton), generally white. It is wound round the loins, the end passed between the legs from front to back and tucked in at the waist behind (Plate II. fig. 2) . The small form of dhoti worn by men of the lower class is called langoti. It does not fall below mid-thigh. A Brahman's dhoti, as also that of some other castes, reaches to a little below the knee; a Rajput's to his ankles. The dhoti is known under many names, dhutia, piiambar, lungi, &c. In some parts of India half the dhoti only is wound round the loins, the other half being thrown over the left shoulder. Some upper classes of Hindus wear for coat the kurtd; most wear the angharka (Plate II. fig. 1), a short angd reaching to the waist. It is also known as kamri, baktari, badan or bandi. Hindus

wear the ang- harkhd or angd as Mahommedans do, but whereas theMahommedan has the opening on the left the Hindu wears it on the right. When the kurtd is worn it is worn under the angd. The chaddar (chadar or dopatta) is of various kinds. It is a piece of cotton cloth 3 yds. long by 1 yd. wide. It is worn across the shoulders, or wrapped round the body, but when bathing, round the loins. Hindus, both men and women, wear ear-rings.

The Brakminical thread (janeo) (Plate II. fig. 2) is a cord made of twisted cotton prepared with many ceremonies. It is worn over the left shoulder and hangs down to the right hip. It is of three strands till the wearer is married, when it becomes six or nine. It is 96 handbreadths in length, and is knotted. Rajputs also wear this thread, similar in make and length, but the knots are different.

Caste and sect marks also distinguish Hindus from each other. Women. — The hair is sometimes worn plaited (choti), usually an odd number of thin plaits made into one large one, falling down the back and fastened at the end with ribbons. Another style is wearing it in a knot after the ancient Grecian fashion; it is always worn smooth in front and parted in the middle. Over the head is worn the orhna or veil. The end is thrown over the left shoulder in such a manner as to conceal the breast. On the upper part of the body the kurtd is sometimes worn. A bodice called angiyd is worn. This covers the breast and shoulder; it has half sleeves, is very short, and is fastened at the back with strings.

The skirt is called Ihenga or ghagra. It is worn mostly in Rajputana hanging in full flounces to the knee or a little below. In Bengal, Madras and Bombay Presidencies women do not wear a skirt, only a choli and sari. This last is a long piece of cotton or silk cloth. Half is draped round the waist and hangs to the feet in folds; the remainder is passed over the head and thrown over the left shoulder (Plate II. fig. 4).

Sikh. — The Sikh does not shave or cut his hair. The beard is parted in the middle and carried up each side of the face to the top of the head. A piece of cloth called dhdtd or galmocha is wound round the chin and head so as to keep the hair clean and tidy. The hair of the head is tied into a knot (kes) at the top of the head or at the back, a distinguishing mark of the

Sikh. His religion requires the Sikh to carry five articles — kes, the knot of hair on the head; the kanga, a comb; the kard, a knife; the kach, a pair of short trousers peculiar to the Sikh; and the khard, an

iron bangle on the wrist. It is de rigueur that he should carry some piece of iron on his person. His head- dress he calls a pdg; it is a turban of amdmdh shape but enorm- ously large. The Sikh nobility and gentry wear two turbans, either both of pagri form or one of pagri and one of amdmdh form. Each is of a different colour.

The Sikh calls his kurtd jhaggd; it is very large and loose, bound with a scarf round the waist. The kach is a sort of knicker- bockers reaching to just below the knee, which they encircle tightly. Over all the Sikh wears the choga. In outlying villages he wears instead of the kurtd a chadar or cloth, which he calls khes, on the upper part of his body. Some village Sikhs wear a tahband or waistcloth instead of the kach. Sikhs are fond of jewelry and wear ear-rings. The dress of Sikh women does not differ greatly from that of Hindu women; but in the Sirsa district and some other parts she wears the Mahommedan stitan or trousers, under the Ihenga or skirt. There is a small sect of Sikh known as Akdli or Nihang. Their dress is entirely of dark blue colour, the turban being also blue, high and pointed; on it are fastened three steel quoits. The quoit was the ancient weapon of the Sikh, who calls it chakar. Certain steel blades are stuck through the body of the turban. The Akalis also wear large flat iron rings round the neck and arms (Plate II. fig. 6).

Parsis. — When the Parsis were first admitted into India, certain conditions were imposed upon them by the Hindus; among others they were not to eat beef, and they were to follow the Hindu custom of wearing a top-knot of hair. Old-fashioned Parsis in country districts still follow these customs. To uncover the head is looked upon as a sin; hence Parsis of both sexes always wear some head covering whether indoors or out. In the house the man wears a skull cap; out of doors the older Parsis wear the khoka, a tall hat, higher in front than at the back, made of a stiff shiny material, with a diaper pattern (Plate I. fig. 7). The younger generation adopted a round pith hat with a rolled edge of felt, but, under the influence of the siˆadeshi movement, they have generally reverted to the older form (Plate I. fig. 10). Next to the skin the Parsi wears a sadra or sacred shirt, with a girdle called kasti. Over the sadra a white cotton coat is worn, reaching to a little below the waist. The Parsi wears loose cotton trousers like a Mussulman. In country districts he wears a jama, and over the jdmd a pechodi or shoulder cloth. The young Parsi in Bombay has adopted European dress to a great extent, except as to head-gear. The Parsi woman dresses her hair in the old Greek fashion with a knot behind. She also wears a sadra or sacred shirt. Country Parsis in villages wear a tight-fitting sleeveless bodice, and trousers of coloured cloth. Over all she winds a silken sari or

sheet round the body; it is then passed between the legs and the end thrown over the right shoulder. Out of doors she covers her head and right temple (Plate I. fig. 8). In towns the sari is not passed between the legs, but hangs in loose folds so as to hide the trousers. The upper classes wear a sleeved polka jacket instead of the bodice. Parsi children up to the age of seven wear cotton frocks called jabhlan. They wear long white trousers of early Victorian cut, with frills at the bottom. They wear a round cap like a smoking-cap. The little girls wear their hair flowing loose (Plate I. fig. 9).

Shoes. — There is no distinction between the shoes worri by Hindus, Moslems, Sikhs or Parsis, but Hindus will not wear them when made of cow's leather. Shoes are called juta, juti or jute by Mahommedans, and jore or zore by Hindus. Shoes are usually distinguished by the name of the material, as ndri kdjutd, leather shoes, banatijutd, felt shoes, and so on.

There are innumerable styles of cut of shoe, three being the commonest: (1) Salimshahi, these are shaped like English slippers, but are pointed at the toe, terminating in a thin wisp turned back and fastened to the instep. They are mostly made of thin red leather, plain in the case of poorer people and richly

embroidered in the case of rich people. This cut of shoe is most in vogue amongst Moslems. (2) Gol panje ki jiiii, like English slippers, but rounded at the toes. (3) Ghclld or ndgphani (snake's head) juld, the toe is turned up, while the back part is folded inwards and trodden under the heel. Ladies usually wear shoes of this fashion, known as phirijuti. Women's shoes differ only in size and in being made of finer material, and in being embroidered. Hindu women seldom wear shoes. On the northern frontier the pattern known as the kafshi is worn; this is a slipper having neither sides nor back; the sole towards the heel is narrow and raised by a small iron-shod heel. In the hills shoes resembling sandals, called chaplis, made of wood, straw or grass are worn. The soles are very thick, and are secured with straps; there is generally a loop for the big toe. They are known as phulkdrru in Kashmir, and pula in Kulu and Chamba.

Shoes are invariably removed on entering mosques or other holy places. It is also customary to remove them when entering a house. Orientals sit on the floor in preference to chairs; hence it is thought

very necessary' by them that the carpet should be kept clean, which could not be done were persons to keep their shoes on. While it would be considered a breach of good manners to enter a room with the shoes on, an exception has been made in favour of those natives who have adopted European boots or shoes. The babus of Bengal have taken to English-made shoes of patent leather worn over white socks or stockings.

Authorities. — The Indian section of the Victoria and Albert Museum (London) includes an exhibition of oriental dress; and the library of the India Office many prints and photographs. The following books may be consulted : Coloured Drawings illustrating the Manners and Customs of Natives of India (originally prepared by order of the marquess Wellesley, Governor-General; vide Council minute dated 16th August, 1866) (1 vol.); J. Forbes Watson and J. W. Kaye, The People of India; F. Baltazar Solvyns, Les Hindous (4 vols, illustrated, Paris, 1808); India Office Library, 3 small portfolios of pictures of Katch and Bombay men and women; Costume of Bala Ghat (Carnatic), S.E. India (large water-colours, India Office Library) ; Illustrations of various trades in Kashmir, by Indian artists (India Office Library); R. H. Thalbhoy, Portrait Gallery of Western India (1886) (chiefly portraits of Parsi notables); Edward Tuite Dalton, C.S.I. , Descriptive Ethnology of Bengal (1 vol., 1872); Talboys Wheeler, History of the Imperial Assembly at Delhi, 1st January 1877; Queen Victoria's Jubilee, 6th February 1887 (in Urdu, illustrated); T. H. Hendlcy, CLE., V.D., Rulers of India and Chiefs of Rajpulana (London, 1897) — the last three are useful for the study of ceremonial dress; G. A. Grierson, Bihar Peasant Life (Calcutta, 1885 ; this is a most valuable work of learning and research; in division 2, subdivision 3, chapter I, on clothes, will be found names and descriptions of every article of clothing used in south, central and eastern India); H. B. Baden-Powell, Handbook of Manufactures and Arts of the Punjab (Lahore, 1872) ; W. W. Hunter, Statistical Account of Bengal (1875); Hughes' Dictionary of Islam (London, 1895); Sir Denzil Ibbetson, Outlines of Punjab Ethno- graphy; E. Thurston, Castes and Tribes of Southern India. It is to be hoped that steps will shortly be taken to arrange articles of costume now displayed at the Indian Section, Victoria and Albert Museum, in some systematic order so as to assist students in arriving at a scientific knowledge of the subject. (C.G.)

INDIA, FRENCH, a general name for the French possessions in India — on the Coromandel coast, Pondicherry, Karikal and Yanaon; on the Malabar coast, Mahe; and in Bengal, Chander- nagore. In addition there are a few " lodges " elsewhere, but they are merely

nominal remnants of French factories. The total area amounts to 203 sq. m., of which 113 sq. m. belong to the territory of Pondicherry. In 1901 the total population amounted to 273,185. By decree of the 25th of January 1879 French India was provided with an elective general council and elective local councils. The results of this measure have not been very satisfactory, and the qualifications for and the classes of the franchise have been modified. The governor resides at Pondicherry, and is assisted by a council. There are two tribunals of first instance (at Pondicherry and Karikal), one court of appeal (at Pondicherry) and five justices of the peace. The agricultural produce consists of rice, earth-nuts, tobacco, betel nuts and vegetables.

History. — The first French expedition to India is believed to have taken place in the reign of Francis I., when two ships were fitted out by some merchants of Rouen to trade in eastern

seas; they sailed from Havre in that year and were never afterwards heard of. In 1604 a company was granted letters patent by Henry I.V., but the project failed. Fresh letters patent were issued in 1615, and two ships went to India, only one returning. La Compagnie des Indes was formed under the auspices of Richelieu (1642) and reconstructed under Colbert (1664), sending an expedition to Madagascar. In 1667 the French India Company sent out another expedition, which reached Surat in 1668, where the first French factory in India was established. In 1672 Saint Thome was taken, but the French were driven out by the Dutch and retired to Pondicherry (1674). In 1 741 Dupleix became governor of Pondicherry and in 1744 war broke out between France and England; for the remaining history of the French in India see India.

See Haurigot, French India (Paris, 1887); Henrique, Les Colonies francaises (Paris, 1889); Lee, French Colonies (Foreign Office Report, 1900); L'Annee coloniale (Paris, 1900); and F. C. Danvers, Records of the India Office (1887).

INDIANA, a north-central state of the United States of America, the second state to be erected from the old North- West Territory; popularly known as the " Hoosier State." It is located between latitudes 37 47′ and 41 50′ N. and longitudes 84° 49′ and 88° 2′ W. It is bounded on the N. by Michigan and Lake Michigan, on the E. by Ohio, on the S. by Kentucky from which it is separated by the Ohio river, and on the W. by Illinois. Its total area is 36,350 sq. m., of which 440 sq. m. are water surface.

Physiography. — Topographically, Indiana is similar to Ohio and Illinois, the greater part of its surface being undulating prairie land, with a range of sand-hills in the N. and a chain of picturesque and rocky hills, known as " Knobs," some of which rise to a height of 500 ft., in the southern counties along the Ohio river. This southern border of hills is the edge of the " Cumberland Plateau " physiographic province. In the northern portion of the state there are a number of lakes, of glacial origin, of which the largest are English Lake in Stark county, James Lake and Crooked Lake in Steuben county, Turkey Lake and Tippecanoe Lake in Kosciusko county and Lake Maxinkuckee in Marshall county. In the limestone region of the south there are numerous caves, the most notable being Wyandotte Cave in Crawford county, next to Mammoth Cave the largest in the United States. In the southern and south-central part of the state, particularly in Orange county, there are many mineral springs, of which the best known are those at French Lick and West Baden. The larger streams flow in a general south-westerly direction, and the greater part of the state is drained into the Ohio through the Wabash river and its tributaries. The Wabash, which has a total length of more than 500 m., has its headwaters in the western part of Ohio, and flows in a north-west, south-west, and south direction across the state, emptying into the Ohio river and forming for a considerable distance the boundary between Indiana and Illinois. It is navigable for river steamboats at high water for about 350 m. of its course. Its principal tributaries are the Salamanie, Mississinewa, Wild Cat, Tippecanoe and White rivers. Of these the White river is by far the most im- portant, being second only to the Wabash itself in extent of territory drained. It is formed by the confluence of its East and West Forks, almost 50 m. above its entrance into the Wabash, which it joins about 100 m. above the Ohio. Other portions of the state are drained by the Kankakee, a tributary of the Illinois, the St Joseph and its principal branch, the Elkhart, which flow north through the south-west corner of Michigan and empty into Lake Michigan; the St Mary's and another St Joseph, whose confluence forms the Maumee, which empties into Lake Erie; and the White Water, which drains a considerable portion of the south-west part of the state into the Ohio. Flora and Fauna. — The flora of the state is varied, between 1400 and 1500 species of flowering plants being found. Among its native fruits are the persimmon, the paw-paw, the goose plum and the fox grape. Cultivated fruits, such as apples, pears, peaches, plums, grapes and berries, are raised in large quantities for the market. The economic value of the forests was originally great, but there h#s been reckless cutting, and the timber-bearing forests are rapidly disappearing. As late as 1880 Indiana was an important timber-pro-

ducing state, but in 1900 less than 30 % of the total acreage of the state; — only about 10,800 sq. m. — was woodland, and on very little of this land were there forests of commercial importance. There are about 1 10 species of trees in the state, the commonest being the oak. The bald cypress, a southern tree, seems to be an anomalous growth. Blue grass is valuable for grazing and hay-making. The principal crops include Indian corn, wheat, oats, potatoes, buckwheat, rye and clover.

The fauna originally included buffalo, elk, deer, wolves, bear, lynx, beaver, otter, porcupine and puma, but civilization has driven them all out entirely. Rattlesnakes and copperheads were formerly common in the south. The game birds include quail (Bob White), ruffed

grouse and a few pinnated grouse (once very plentiful, then nearly exterminated, but now apparently reappearing under strict pro-tection), and such water birds as the mallard duck, wood duck, blue- and green-winged teals, Wilson's snipe, and greater and lesser yellow legs (snipe). The song birds and insectivorous birds include the cardinal grosbeak, scarlet and summer tanagers, meadow lark, song sparrow, catbird, brown thrasher, wood thrush, house wren, robin, blue bird, goldfinch, red-headed woodpecker, nicker (golden-winged woodpecker), and several species of warblers. The game fish include the bass (small-mouth and large-mouth), brook trout, pike, pickerel, and muskallonge, and there are many other large and small food fishes.

Climate. — The climate of Indiana is unusually equable. The mean annual temperature is about 52° F., ranging from 49°F. in the north to 54° in the south. The mean monthly temperature varies from 25 in the months of December and January to 77°- 79° in July and August. Cold winds from the Great Lakes region frequently cause a fall in tem- perature to an extreme of-25 F. in the north and north central parts of the state. The mean annual rainfall for the entire state is about 43 in., varying from 35 in. in the north to 46 in. in the Ohio Valley.

The soil of the greater part of the state consists of a drift deposit of loose calcareous loam, which extends to a considerable depth, and which is exceedingly fertile. In the Ohio and White Water river

valleys a sandstone and limestone formation predominates. The north and north central portions of the state, formerly rather swampy, have become since the clearing of the forests as productive as the south central. The most fertile part of the state is the Wabash valley; the least fertile the sandy region, of small extent, immediately south of Lake Michigan.

Industry and Manufact2tres. — Agriculture has always been and still is the chief industry of the state of Indiana. According to the census of 1900, 94-1 % of the land area was included in farms, and of this 77-2 % was improved. The proportion of farms rented comprised 28-6",, of the whole number, four-fifths of these being rented on a share basis. The average size of farms, which in 1850 was 136-2 acres, had decreased to 105-3 acres in 1880 and to 97-4 acres in 1900. The value of the farm property increased from $726,781,857 in 1880 to 8978,616,471 in 1900. The farms are commonly cultivated on the three-crop rotation system. The proximity of such good markets as Chicago, Cincinnati, St Louis and Louisville, in addition to the local markets, and the unusual opportunities afforded by the railways that traverse every portion of the state, have been im- portant factors in the rapid agricultural advance which has enabled Indiana to keep pace with the newly developed states farther west. Indiana was ninth in the value of its agricultural products in 1889, and retained the same relative rank in 1899, although the value had considerably more than doubled, increasing from $94,759,262 in 1889 to §204,450,196 in 1899. The principal crops in which the state has maintained a high relative rank are Indian corn, wheat and hay; the acreage devoted to each of these increased considerably in the decade 1890-1900. In 1907, according to the Department of Agriculture, the acreage of Indian corn was 4,690,000 acres (7th of the states), and the yield was 168,840,000 bushels (5th of the states) ; of wheat, 2,362,000 acres (6th of the states) was planted, and the crop was 34,013,000 bushels (7th of the states) ; and 2,328,000 acres of hay (the 8th largest acreage among the states of the United States) produced 3,143,000 tons (the 8th largest crop). Other im- portant staple crops are oats, rye and potatoes, of which the crops in 1907 were respectively 36,683,000 bushels, 961,000 bushels, and 7,308,000 bushels. There are no well-defined crop belts, the pro- duction of the various crops being general throughout the state, except in the case of potatoes, most of which are raised in the sandy regions of the north. The value of the orchard products is large, and is steadily increasing: in the decade 1890-1900 the number of pear trees increased from 204,579 to 868,184, and between 1889 and 1899 the crop increased from

157,707 to 231,713 bushels. Of apple trees, which surpass all other orchard trees in number, there were more than 8,600,000 in 1900. The total value of the state's orchard products in 1899 was 83,166,338, and the value of small fruits was $1,113,527. The canning industry both for fruits and small vegetables has become one of much importance since 1890.

Stock-raising is an industry of growing importance, the value of the live stock in the state increasing from $71,068,758 in 1880 to $93,361,422 in 1890 and $109,550,761 in 1900. Sheep-raising, how- ever, which is confined largely to the north and east portions of the state, decreased slightly in importance between 1890 and 1900. The value of the dairy products sold in 1899 (census of 1900) was 88,027,370, nearly one-half of which was represented by butter; and the total value of dairy products was $15,739,594-

In the value, extent and producing power of her manufacturing industries Indiana has made remarkable advance since 1880. This increase, which more than kept pace with that of the country as a whole, was due largely to local causes, among which may be mentioned the unusual shipping facilities afforded by the network of railways, the discovery and development of natural gas, and the proximity of coal fields, the gas and the coal together furnishing an ample supply of cheap fuel. The number of manufacturing establishments (under the " factory " system) within the state was 7128 in 1900, 7044 in 1905; their invested capital was $219,321,080 in 1900 and 8312,071,234 in 1905, an increase of 42-3%; and the value of their

total product was $337,071,630 in 1900 and $393,954,405 in 1905, an increase of 16-9%. The most important manufactured products in 1905 were flour and grist mill products, valued at $36,473,543; in 1900, when they were second in importance to slaughter-house products and packed meats, they were valued at $29,037,843. Next in importance in 1905 was the slaughtering and meat-packing industry, of which the total product was valued at $29,352,593; in 1900 it was valued at $43,862,273. Other important manufactured products were: those of machine shops and foundries, the value of which increased from $17,228,096 in 1900 to $23,108,516 in 1905, or 34- 1 % ; distilled liquors, the value of which had increased from $16,961,058 in 1900 to $20,520,261 in 1905, an increase of 21%; iron and steel, valued at $19,338,481 in 1900 and at $16,920,326 in 1905; carriages and wagons, valued at $12,661,217 in 1900 and at $15,228,337 lin 1905; lumber and timber products, valued at $19,979,971 in 1900 and at

$14,559,662 in 1905; and glass, valued at $14,757,883 in 1900 and at $14,706,929 in 1905 — this being 3-7% of the product value of all manufactures in the state in 1905, and 18-5% of the value of glass produced in the United States in that year. The growth in the preceding decade of the iron and steel industry, the products of which increased in value from $4,742,760 in 1890 to $19,338,481 in 1900 (307-7%), and of the manufacture of glass, the value of which increased from $2,995,409 in 1890 to $14,757,883 in 1900 (392-7%), is directly attributable to the de- velopment of natural gas as fuel ; the decrease in the value of the products of these same industries in 1900-1905 is partly due to the growing scarcity of the natural gas supply. As compared with the other states of the United States in value of manufactured products, Indiana ranked second in 1900 and in 1905 in carriages and wagons, glass and distilled liquors; was seventh in 1900 and fourth in 1905 in furniture; was fourth in 1900 and seventh in 1905 in wholesale slaughtering and meat-packing; was fifth in 1900 and sixth in 1905 in agricultural implements ; and in iron and steel and flour and grist mill products was fifth in 1900 and eighth in 1905. The most im- portant manufacturing centres are Indianapolis, Terrc Haute, Evansville, South Bend, Fort Wayne, Anderson, Hammond, Rich- mond, Muncic, Michigan City and Elwood, each having a gross annual product of more than $6,000,000.

According to the annual report on Mineral Resources of the United States for 1906, Indiana ranked fifth in the Union in the value of natural gas produced, sixth in petroleum, and sixth in coal. Natural gas was discovered in 1886 in the east-central part of the state, and its general application to manufacturing purposes caused an in- dustrial revolution in the immediate region. Pipe lines carried it to various manufacturing centres within the state and to Chicago, 111., and Dayton, Ohio. During the early years an enormous amount was wasted ; this was soon prohibited by law, and a realization that the supply was not unlimited resulted in a better appreciation of its great value. The gas, which is found in the Trenton limestone, had. an initial pressure at the point of discovery of 325 ft>; this pressure had decreased in the field centre by January 1896 to 230 lb, and by January 1901 to 115 lb, the general average of pressure at the latter date being 80 lb. The gas field extends over Hancock, Henry, Hamilton, Tipton, Madison, Grant and Delaware counties. The value of the output fell from $7,254,539 in 1900 to $1,750,715 in 1906, when the state's product was only 4-2 % of that of the entire country. On the 1st of January 1909 there were 3223 wells in operation, some of which were 1200 ft. deep. It has been found that

“dead ” gas wells, if drilled somewhat deeper, generally become active oil wells. The development of the petroleum field, which extends over Adams, Wells, Jay, Blackford and Grant counties, was rapid up to 1904. The annual output increased from 33,375 barrels in 1889 to 11,339,124 barrels in 1904, the latter amount being valued at $12,235,674 and being 12-09% of the value of the product of the entire country. In 1906 there was an output of only 7,673,477 barrels, valued at $6,770,066, being 7-3% of the product value of the entire country. The Indiana coal fields, which cover an area of between 7000 and 7500 sq. m. in the west and south-west, chiefly in Clay, Vigo, Sullivan, Vermilion and Greene counties, yielded in 1902 9,446,424 tons, valued at $10,399,660; in 1907, 13,985,713 tons, valued at $15,114,300; the production more than trebled since 1896, when it was 3,905,779 tons. The deposits consist of workable veins, 50 to 220 ft. in depth, and averaging 80 ft. below the surface. It is a high grade block, or ” splint ” coal, remarkably free from sulphur and rich in carbon, peculiarly adapted to blast furnace use. The quarries and clay beds of the state arc of great value. The quarries of sand- stone and limestone are chiefly in the south and south-central portions of the state. The value of the limestone quarried in 1908 was $3,643,261, as compared with $2,553,502 in 1902. The Bedford oolitic limestone quarries in Owen, Monroe, Lawrence, Washington and Crawford counties furnish one of the most valuable and widely used building stones in the United States, the value of the product in 1905 being $2,492,960, of which $2,393,475 was from Lawrence and Monroe counties and $1,550,076 from Lawrence county alone. Beds of brick-clays and potters’ clay are widely distributed throughout the state, the total value of pottery products in 1902 being $5,283,733 and in 1906 $7,158,234. Marls adapted to the manufacture of Port land cement are found along the Ohio river, and in the lake region in the north. In 1905 and 1906 Indiana ranked third among the states in the production of Portland cement, which in 1908 was 6,478,165

eS£ed!> «“lStar ; i “r,?~ i „ Wai

ˆrpulaski “Icity : Graˆscreek’< >ˆpui,ok-gVs JItasa«rid 8 e : ™± ˆ £J ,,,,,. C ,le° alc :

**ˆ?.°xs™jf…,.j. i %bs52SBˆ:5M t …..e.>.«3. \ j ˆMdii.*

t

\ jys#oˆ3iri’

Headlee: Aceiiter 1< : ^LucernH

1

llymers ,

^ss*«i”\ „

I I Creek;

C« ClapsShillV / >Manscn

lowers^ ■ – ■ –

,,MML

86 .

| Union o flji]

8s

ifieldMiils-V

«S/V~

!> S»thwesf IWaKrfW^&HJXjg^ &CJ

•yA’f vA”? “““a<^- . ? -^^'T^lfParis :• \s a . :

lymrjutl

iA Woodsy P^S^S. , JpLinkyille ?

:kee-

^ Ro&ie

F U L IfO s ^

_ .^ J-^ebster /S K 0\ ; HcclaO.

ksaw

ie S^SgSPS}> w^-

i Lemons tv^j »-“j#^’>HH>**i?Q?‘f”<;*

■”’’’’ J “’’’ ’’’’^ri»-^jy& \ N

int’fctwwrjEfj- ^T„J.* 1 I s HeIIers \

iest3r, •

^!^A i

Tf iJrfM^^fS J f?^^A,,I.U»<»^,

r u , /vytj^&gff, h I) N T I

jQjJ^* e: W!^aWSh \j

*%4 ve ‘ ^Treaty

lm , ji “V^Vt^K^ i Km “>”° “Silo Jf^Waml

‘i »f’ w r i?

Markle: . h*., S”]kingslana< lf , ^^-^- j.C«r.ryviJie .-, : S Barbers VJ l/ti^

E iJkTL u; ! ! ftMonroe £

>\eqiber 3 j^j. Un , on _ r^-fc^jM^ grove °

W^sA& R ^SD : ^ w “Pu, „™ KK – -K-— v, ^^.raa^OT^^ Wy^ \ d, 1W’^

Middiefbrk; TA : ••^■•>— 1 ?5— •^teSPX***”’’

^j^Sh^svill^f ; oLe tsurc symhiitvilk: C\

■(1 >T^:Normanda-c!!2jW$i ^ «

fiexanan*

—-Aflalital / Arcad;a^])!o

i mingo\ Cicer i * “!ortonv-jlIc

jebknon Rosstin 1.,.. jSMJ i^ U

Ns, t t VJoIictvUl

j,^.Wyt„ a mv,u« iy Monro J ia o/ Iwavcriyjp

i ^^w-‘ A) , ; “uttlepomt J Brooklyna,- ^r*~

alt.n\ I /(4” Bm ,,,,,,,°Hall”\ i,

tyerdalQˆ:

[%i„sville iljfC? 17 “ˆ?

Parap— ‘

ˆ.‘hijakei

Godseyˆˆntc,.;ˆ ˆ ‘iliˆV

‘fMS’$S: U V Ft M ft \ JˆC •ˆMˆIo’ss?”’ fˆT .Sherman : ,

wft j JEeAˆ. He. Ville Somingtottˆ f > ™ˆKeIp J ‘ *’— • ««——•--■■■

c * t l jj Cermet Kˆˆrp S

■ Zionsvtlle

“l ” *~ˆˆP ‘ ‘ Trad e rsj

k,n„ow3 W , B a .tAoro |ˆSSˆ»SW

JMprgamowi wille”

Cass ff ; v,t ¥» u TS „»jff B4, »\ffi7ˆ JBTOarfff <» lpafcfLSˆ MSB«iEiiVme

oomfieldC’no” 1

ˆˆ] oV~ˆT Pieasamville: 7 P 4 #/ Icarlisle (l J> ■»□(. J t jˆo I M arco0j

■-:%ˆ

ˆ1 ” MˆcsHil’omesteaWJˆprˆ

5ˆ

feCA

vr.friiCrJ vi nJi 1 „ . t. «*** :_. K…ˆ nc ,- \J.-P.Pnlprnnse

1 ˆLJBSSLj-JˆV4Hij_i.lYri,n3i1a r , r ilv. It B*-.«.«T.™1.

t-,RagIesv lie |” dry/ .ˆ:„j)l 1. ‘(India..-

feS Sprs. C* : Tririity-SpfS.V

IT'raci

[ontgomeryrfcciTMOPˆfe

rnjˆVIt 1 >; Hazleton

ˆ YlwensvilIei Kln S

ˆasiewansvillcjTcytUhfa

KiSflh. \ >w*«'

ˆyˆJG.eriDaiˆˆfˆ

?wˆ J5~3U/ > ■*: f ˆKcntfo

lLestervilJ,ˆ3rj – l .1 t>» ˆ . f-i

f rV9ˆJi 0x o. n i3ˆ-ˆ!lPhiladelp"'ajlˆ/ cl ""yr \ —_(,/ ˆ >

,, , \flGlezeni ˆ: W / gWˆ-vEHsworjh ,ˆo pˆCL, 1° 5oBacorr (.; ˆ-i v Palmyra o "

■„ T-*t«»ˆi ■„ , yaSaSˆJˆSSSftaslSvlft'" Uft B J JLrJrJ'S / frˆWicftffe \\ MartnioLA sj.if Hancock

_ ..i -VJ.I-0 1 sˆ \Augusuo \ˆiwiˆCRirirwˆ H. ˆ ,, -s : i a ˆ5 1 L?ˆA + TWf ! * MilUowrrt& + + ˆw-L. Hew J.,

4* Jl ... irrital«.« «1 >,,.a„Sˆ„y-Jl,o M .ˆ«-HˆgJˆ5g„gl'ish •■SˆRamse>»v.Saj! = ! > C "

JifWW ° ‘o#f cTrJ„da.V< ;?-A,baT51

-*{ >i, .SiSpurgfcV.O. „ \ Kill fl*«y JV. {£.. i 1 sbHaup tadt \Tˆv/ { ”

(Sta,)), Roberts\

E x fes>o Nˆ ,

.MadiSonV, Brooksburg < Milton

,r ˆCarrˆUtoi?ˆ

Lecport

‘ˆ‘V Owcnton

•ˆarmi – F = » ‘ˆˆ“JW’iˆHT 1 ˆ \W 1 1ˆ4 fVlTi “J

He- Donalds Ldg.

f Henderson S **sT —

A 88

ˆ C ?ˆ s l^^^^Ietoi™’ˆˆ\ˆ’ , % Hatfield ˆS ‘

I’* WˆS«rk <ˆ%.«? Rockpiw

‘Owensboroa

G

39

A

38

Emery Walker Sc!

INDIANA

423

barrels, valued at $5,386,563— an enormous advance over 1903, when the product was 1,077,137 barrels, valued at $1,347,797. The

production of natural rock cement, chiefly in Clark county, is one of the two oldest industries in the state, but in Indiana as elsewhere it is falling off — from an output in 1903 of about 1,350,000 barrels to 212,901 barrels (valued at $240,000) in 1908. There are many mineral springs in the state, and there are famous resorts at French Lick and West Baden in Orange county. A large part of the water bottled is medicinal: hence the high average price per gallon ($0-99 in 1907 when 514,366 gallons were sold, valued at $507,746, only 2 % being table waters). In 1907 19 springs were reported at which mineral waters were bottled and sold; they were in Allen, Hendricks, Pike, Bartholomew, Warren, Clark, Martin, Brown, Gibson, Wayne, Orange, Vigo and Dearborn counties. A law of 1909 prohibited the pumping of certain mineral waters if such pumping diminished the flow or injured the quality of the water of any spring.

Communications . — During the early period, the settlement of the northern and central portions of the state was greatly retarded by the lack of highways or navigable waterways. The Wabash and Erie canal (1843), which connected Lake Erie with the Ohio river, entering the state in Allen county, east of Fort Wayne, and following the Wa- bash river to Terre Haute and the western fork of the White river from Worthington, Greene county, to Petersburg, Pike county, whence it ran south-south-west to Evansville; and the White Water canal from Hagerstown, Wayne county, mostly along the course of the White Water river, to Lawrenceburg, on the Ohio river, in the south-eastern corner of the state, although now abandoned, served an important purpose in their day. The completion (about 1850) of the National Road, which traversed the state, still further aided the internal development. With the beginning of railway construction (about 1847), however, a new era was opened. Indiana is unusually well served with railways, which form a veritable network of track in every part of the state. It is traversed by nearly all the great transcontinental trunk line systems, and also by important north and south lines. The total railway mileage in January 1909 was 7286-20 m. There has been a great development also in interurban electric lines, which have been adapted both to passenger and to light freight and express traffic; in 1908 there were 31 interurban electric lines within the state with a mileage of 1500 m. Indianapolis is the centre of this interurban network. The first trolley sleeping cars were those used on the Ohio and Indiana interurban railways. The deepening of the channel of the Wabash river was begun in 1872. Below Vincennes before 1885 boats of 3-ft. draft could navigate the river, but after work was concentrated in 1885 on the lock at Grand Rapids, near Mt Carmel, 111., the channel was soon clogged again,

and in 1909 it was impossible for boats with a greater draft than 20 in. to go from Mt Carmel to Vincennes, although up to June 1909 about $810,000 had been spent by the Federal government on improving this river. In 1 879 an appropriation was made for the improvement of the channel of the White river, but no work was done here between 1895 and 1909, and although the lower 13 m. of the river was navigable for boats with a draft of 3 ft. or less, there was practically no traffic up to 1909 on the White, because there was no outlet for it by the W'abash river.

Population. — The population of Indiana, according to the Federal Census of 1910, was 2,700,876, and the rank of the state in the Union as regards population was ninth. In 1810, the year following the erection of the western part of Indiana into Illinois Territory, the population was 24,520, in 1820 it had in- creased to 147,1 78, in 185010988,416, in 1870101,680,637, in 1890 to 2,192,404, and in 1900 to 2,516,462. In 1900 34-3% was urban, i.e. lived in places of 2500 inhabitants and over. The foreign-born population in the same year amounted to 142,121, or 5-6% of the whole, and the negro population to 57,505, or 2-3%. There were in 1900 five cities with a population of more than 35,000, viz. Indianapolis (169,164), Evansville (59,007), Fort Wayne (45,115), Terre Haute (36,673), and South Bend (35,999). In the same year there were 14 cities with a population of less than 35,000 (all less than 21,000) and more than 10,000; and there were 21 places with a population of less than 10,000 and more than 5000. In 1906 it was estimated that there were 938,405 members of different religious denominations; of this total 2 33-443 w ere Methodists (210,593 of the Northern Church), 174,849 were Roman Catholics, 108,188 were Disciples of Christ (and 10,259 members of the Churches of Christ), 92,705 were Baptists (60,203 ˚f the Northern Convention, 13,526 of the National (Colored) Convention, 8132 Primitive Baptists, and 6671 General Baptists), 58,633 were Presbyterians (49,041 of the Northern Church, and 6376 of the Cumberland Church- since united with the Northern), 55,768 were Lutherans (34,028 of the Evangelical Lutheran Synodical Conference, 8310 of the

Evangelical Lutheran Joint Synod of Ohio and other states), 52,700 were United Brethren (48,059 of the Church of the United Brethren in Christ; the others of the " Old Constitution ") and 21,624 of the German Evangelical Synod.

Constitution. — Indiana is governed under a constitution adopted in 185 1, which superseded the original state constitution of 1816. An amendment to the constitution may be proposed by either branch of

the General Assembly; if a majority of both houses votes in favour of an amendment and it is favourably voted upon by the General Assembly chosen by the next general election, the amendment is submitted to popular vote and a majority vote is necessary for its ratification. The constitution of 1 8 16 had conferred the suffrage upon all " white male citizens of the United States of the age of twenty-one and upward," had prohibited slavery, and had provided that no alteration of the constitution should ever introduce it. The new constitution contained similar suffrage restrictions, and further by Article XIII., which was voted upon separately, prohibited the entrance of negroes or mulattoes into the state and made the encourage- ment of their immigration or employment an indictable offence. This prohibition was held by the United States Supreme Court in 1866 to be in conflict with the Federal Constitution and therefore null and void. It was not until 1881 that the restriction of the suffrage to " white " males, which was in conflict with the Fifteenth Amendment (1870) to the Federal Constitution, was removed by constitutional amendment. Since that date those who may vote have been all male citizens twenty-one years old and upward who have lived in Indiana six months immedi- ately preceding the election, and every foreign-born male of the requisite age who has lived in the United States one year and in Indiana six months immediately preceding the election, and who has declared his intention of becoming a citizen of the United States; but the General Assembly has the power to deprive of the suffrage any person convicted of an infamous crime. The Australian ballot was adopted in 1889. The general state election (up to 1881, held in October) takes place on the first Tuesday after the first Monday in November of even-numbered years. The governor and lieutenant-governor (minimum age, 30 years) and the clerk of the Supreme Court are chosen in presidential years for a term of four years, 1 the other state officers — secretary of state, attorney-general, auditor, treasurer and superintendent of public instruction — every two years. The state legislature, known as the General Assembly, which meets biennially in odd-numbered years and in special session summoned by the governor, consists of a Senate of fifty members (minimum age, 25 years) elected for four years, and a House of Representatives of one hundred members (minimum age, 21 years) elected for two years. Two-thirds of each house constitute a quorum to do business. The governor has the veto power, but the provision that a bill may be passed over his veto by a majority of all elected members renders it little more than an expression of opinion.

Law. — The judiciary consists of a Supreme Court of five members

elected for districts by the state at large for a term of six years, an appellate court (first constituted in 1891), and a system of circuit and minor criminal and county courts. The system of local government has undergone radical changes in recent years. A law of 1899, aimed to separate the legislative and executive functions, provided for the election of legislative bodies in every township and county. These bodies have control of the local expenditures and tax levies, and without their consent the local administrative officers cannot contract debts. In 1905 a new municipal code, probably the most elaborate and complete local government act in the United States, providing for a uniform system of government in all cities and towns, went into effect. It was constructed on the lines of the Indianapolis city charter, adopted in 1891, and repealed all individual charters and special corporation acts. Its controlling principle is the more complete separation of the executive, legislative and judicial powers. For this purpose all cities are divided into

1 No man can serve as governor for more than four years in any period of eight years.

five classes according to population, the powers being con- centrated and simplified by degrees in the case of the smaller cities, and reaching a maximum of separation and completeness in class i, i.e. cities of 100,000 and over, which includes only Indianapolis. In all classes the executive officer is a mayor elected for four years and ineligible to succeed himself. There are six administrative departments (the number is often less in cities of the lower classes, where several departments may be combined under one head) — departments of public works, public safety, public health and charities, law, finance, and collection and assessment. There is a city court with elected judge or judges, and an elected common council, which may authorize the municipal ownership of public utilities by ordinance, and can pass legislation over the mayor's veto by a two-thirds vote. Communities under 2500 in population are regarded as towns, and have a separate form of government by a board of trustees.

Until 1908 the state had a prohibition law " by remonstrance," under which if a majority of the legal voters of a township or city ward remonstrated against the granting of licences for the sale of liquor, no licence could be granted by the county com- missioners in

that township or ward. Under this system 800 out of 1016 townships and more than 30 entire counties were in 1908 without saloons. In 1908, when the Republican party had declared in favour of county option and the Democratic party favoured township and ward option, a special session of the legislature, called by the Republican governor, passed the Cox Bill for county options.

Education. — Indiana has a well-organized free public school system. Provision was made for such a system in the first state constitution, to utilize the school lands set aside in all the North-West Territory by the Ordinance of 1787, but the existing system is of late growth. The first step toward such a system was a law of 1824 which provided for the election of school trustees in every township and for the erection of school buildings, but made no provision for support. Therefore, before 1850 what schools there were were not free. The constitution of 1 85 1 made further and more complete provisions for a uniform system, and on that basis the general school law of 1852 erected the framework of the existing system. It provided for the organization of free schools, supported by a property tax, and for county and township control. The movement, however, was retarded in 1858 by a decision of the supreme court holding that under the law of 1852 the system was not " uniform " as provided for by the constitution. In 1865 a new and more satisfactory law was passed, which with supplemental legislation is still in force. Under the existing system supreme administra- tive control is vested in a state superintendent elected biennially. County superintendents, county boards, and township trustees are also chosen, the latter possessing the important power of issuing school bonds. Teachers' institutes are regularly held, and a state normal school, established in 1870, is maintained at Terre Haute. There are normal schools at Valparaiso, Angola, Marion and Danville, and a Teachers' College at Indian- apolis, which are on the state's " accredited " list and belong to the normal school system. In 1897 a compulsory education law was enacted. In 1906-1907 the state school tax was in- creased from n-6 cents per $100 to 13-6 cents per $100; an educational standard was provided, coming into effect in August 1908, for public school teachers, in addition to the previous requirement of a written test; a regular system of normal training was authorized; uniform courses were provided for the public high schools; and small township schools with twelve pupils or less were discontinued, and transportation supplied for pupils in such abandoned schools to central school houses. The proportion of illiterates is very small, in 1900, 95-4% of the population (of 10 years old or over) being able to read and write. The total school

revenue from state and local sources in 1905 amounted to $10,642,638, or $13-85 per capita of enumeration ($19-34 per capita of enrolment). In 1824 a state college was opened at Bloomington; it was re-chartered in 1838 as the State University. Purdue University (1874) at Lafayette,

maintained under state control, received the benefit of the Federal grant under the Morrill Act. Other educational institu- tions of college rank include Vincennes University (non-sectarian), at Vincennes; Hanover College (1833, Presbyterian), at Hanover; Wabash College (1832, non-sectarian), at Crawfordsville ; Franklin College (1837, Baptist), at Franklin; De Pauw University (1837, Methodist Episcopal), at Greencastle; Butler University (1855, Christian), at Indianapolis; Earlham College (1847, Friends), at Richmond; Notre Dame University (1842, Roman Catholic), at Notre Dame; Moore's Hill College (1856, Methodist Episcopal), at Moore's Hill; the University of Indianapolis (non- sectarian), a loosely affiliated series of schools at Indianapolis, centring around Butler University; and Rose Polytechnic Institute (1883, non-sectarian), at Terre Haute.

The charitable and correctional institutions of Indiana are well administered in accordance with the most improved modern methods, and form one of the most complete and adequate systems possessed by any state in the Union. The state was one of the first to establish schools for the deaf and the blind. Its Institution for the Education of the Deaf was established in 1844, and its Institution for the Educa- tion of the Blind in 1847, both being in Indianapolis. The first State Hospital for the Insane was opened in Indianapolis in 1848 and became the Central Indiana Hospital for the Insane in 1883; other similar institutions are the Northern Indiana Hospital at Logansport (1888), the Eastern at Richmond (1890), the Southern at Evansville (1890), and the South-eastern at North Madison (1905). There are a Soldiers' and Sailors' Orphans' Home at Knightstown (1868), and a State Soldiers' Home at Lafayette (1896); a School for Feeble- Minded Youth (1879), removed from Knightstown to Fort Wayne in 1890 ; a village for epileptics at New Castle (1907) ; and a hospital for the treatment of tuberculosis, authorized in 1907, for which a site at Rockville was purchased in 1908. There are five state penal and correctional institutions: the Indiana Boys' School (1868-1883, the House of Refuge; 1883-1903, the Reform School for Boys), at Plainfield; the Indiana Girls' School, established at Indianapolis (x 873), and removed to Clermont in 1907; a woman's prison (the first in the United States, authorized in 1869 and opened in 1873 at Indianapolis), which is entirely under the control of

women (as is also the Indiana Girls' School) and has a correctional department (1908), in reality a state workhouse for women, formed with a view to removing as far as possible sentenced women from the county jails; a reformatory (1897), at JefTersonville, conducted upon a modification of the " Elmira plan," formerly the State Prison (1822), later (i860) the State Prison South, so called to distinguish it from the State Prison North (i860) at Michigan City; and the prison at Michigan City, which became the Indiana State Prison in 1897. The old State Prison at JefTersonville was at first conducted on the lease system, but public opinion compelled the abandonment of that system some years before the Civil War. The prisoners of the reformatory work under a law providing for trade schools ; the product of the work is sold to the state institutions and to the civil and political divisions of the state, the surplus being disposed of on the market. At the State Prison practically one half the prisoners are employed on con- tracts. Not more than 100 may be employed on any one contract, and the day's work is limited to eight hours. The remainder of the population of the prison is employed on state account. The policy of indeterminate sentence and paroles was adopted in 1897 in the two prisons and the reformatory. Prisoners released upon parole are carefully supervised by state agents. Indiana has an habitual- criminal law, and a law providing for the sterilization of mental degenerates, confirmed criminals, and rapists. There are also an adult probation law and a juvenile court law, the latter applying to every county in the state. Each of the state institutions mentioned above is under the control of a separate bi-partisan board of four members. The whole system of public charities is under the super- vision of a bi-partisan Board of State Charities (1889), which is appointed by the governor, and to which the excellent condition of state institutions is largely due. In the counties there' are un- salaried boards of county charities and correction and county boards of children's guardians, appointed by the circuit judges. The town- ship trustees, 1016 in number, are ex-officio overseers of the poor. They dispense official outdoor relief. Nowhere else have the principles of organized charities in the administration of public outdoor relief been applied to an entire state. Each county provides for the indoor care of the poor in poor asylums and children's homes, and for local prisoners in county jails. Provision is made for truant, dependent, neglected and delinquent children. No child can be made a public ward except upon order of the juvenile court, and all such children may be placed in family homes by agents of the Board of State Charities.

Finance. — The total true value of taxable property in the state was,

according to the tax levy of 1907, §1,767,815,487, and the total taxes, including delinquencies, in the same year amounted _ to $38,880,257. The total net receipts for the fiscal year ending September 30, 1908, were $4,771,628, and the total net ex-penditure $5,259,002, the cash balance in the treasury for the year

ending September 30, 1907, amounted to $1,096,459, leaving a cash balance on September 30, 1908, of $609,085. The total.state debt on September 30, 1908, was $1,389,615.

History. — Of the prehistoric inhabitants of Indiana little is known, but extensive remains in the form of mounds and fortifications abound in every part of the state, being particularly numerous in Knox and Sullivan counties. Along the Ohio river are remnants of several interesting stone forts. Upon the earliest arrival of Europeans the state was inhabited chiefly by the various tribes of the Miami Confederacy, a league of Algonquian Indians formed to oppose the advance of the Iroquois. The first Europeans to visit the state were probably French coureurs des bois or Jesuit missionaries. La Salle, the explorer, it is contended, must have passed through parts of Indiana during his journeys of 1669 and the succeeding years. Apparently a French trading post was in existence on the St Joseph river of Michigan about 1672, but it was in no sense a permanent settlement and seems soon to have been abandoned. It seems probable that the Wabash-Maumee portage was known to Father Claude Jean Allouez as early as 1680. When, a few years later, this portage came to be generally used by traders, the necessity of establishing a base on the upper Wabash as a defence against the Carolina and Pennsylvania traders, who had already reached the lower Wabash and incited the Indians to hostility against the French, became evident; but it was not, apparently, until the second decade of the 18th century that any permanent settlement was made. About 1720 a French post was probably established at Ouiatenon (about 5 m. S.W. of the present city of Lafayette) , the headquarters of the Wea branch of the Miami, on the upper Wabash. The military post at Vincennes was founded about 1731 by Francois Margane, Sieur de Vincennes (or Vincent), but it was not until about 1735 that eight French families were settled there. Vincennes, which thus became the first actual white settlement in Indiana, remained the only one until after the War of Independence, although military posts were maintained at Ouiatenon and at the head of the Maumee, the site of the present Fort Wayne, where there was a French trading post (1680) and later Fort Miami. After the fall of Quebec the British

took possession of the other forts, but not at once of Vincennes, which remained for several years under the jurisdiction of New Orleans, both under French and Spanish rule. The British garrisons at Ouiatenon and Fort Miami (near the site of the later Fort Wayne) on the Maumee were captured by the Indians as a result of the Pontiac conspiracy. All Indiana was united with Canada by the Quebec Act (1774), but it was not until three years later that the forts and Vincennes were occupied by the British, who then realized the necessity of ensuring possession of the Mississippi Valley to prevent its falling into the hands of the rebellious colonies. Nevertheless, in 1778 Vincennes fell an easy prey to agents sent to occupy it by George Rogers Clark, and although again occupied a few months later by General Henry Hamilton, the lieutenant-governor at Detroit, it passed finally into American control in February 1779 as a result of Clark's remarkable march from Kaskaskia. Fort Miami remained in British hands until the close of the war.

The first American settlement was made at Clarksville, between the present cities of Jeffersonville and New Albany, at the Falls of the Ohio (opposite Louisville), in 1784. The decade following the close of the war was one of ceaseless Indian warfare. The disastrous defeats of General Josiah Harmar (1753-1813) in October 1790 on the Miami river in Ohio, and of Governor Arthur St Clair on the 4th of November 1791 near Fort Recovery, Ohio, were followed in 1792 by the appointment of General Anthony Wayne to the command of the frontier. By him the Indians were signally defeated in the Battle of Fallen Timbers (or Maumee Rapids) on the 20th of August 1794, and Fort Wayne, Indiana, was erected on the Maumee river. On the 3rd of August 1795, at Greenville, Ohio, a treaty was concluded between Wayne and twelve Indian tribes, and a narrow slice of the east-south-eastern part of the present state (the disputed lands in the valley of the Maumee) and various other small but not

unimportant tracts were ceded to the United States. Then came several years' respite from Indian war, and settlers began at once to pour into the region. The claims of Virginia (1784) and the other eastern states having been extinguished, a clear field existed for the establishment of Federal jurisdiction in the " Territory North- West of the Ohio," but it was not until 1787 that by the celebrated Ordinance of that year such jurisdiction became an actuality. The North- West Territory was governed by its first governor, Arthur St Clair, until 1799, when it was accorded a representative government.

In 1800 it was divided, and from its western part (including the present states of Indiana, Illinois and Wisconsin; the north-east part of Minnesota, and a large part — from 1803 to 1805 all — of the present state of Michigan) Indiana Territory was erected, with General William Henry Harrison — who had been secretary of the North-West Territory since 1798— as its first governor, and with Vincennes as the seat of government. Harrison made many treaties with the Indians, the most important being that signed at Fort Wayne on the 7th of June 1803, defining the Vincennes tract transferred to the United States by the Treaty of Greenville; those signed at Vincennes on the 18th and the 27th of August 1804, transferring to the United States a strip north of the Ohio river and south of the Vincennes tract; that concluded at Grouseland on the 21st of August 1805, procuring from the Delawares and others a tract along the Ohio river between the parcels of 1795 and 1804; and the treaties of Fort Wayne, signed on the 30th of September 1809, and securing one tract immediately west of that of 1795 and another north of the Vincennes tract defined in 1803. In January 1805 Michigan Territory was erected from the northern part of Indiana Territory, and in July following the first General Assembly of Indiana Territory met at Vincennes. In March 1809 the Territory was again divided, Illinois Territory being established from its western portion; Indiana was then reduced to its present limits. In 18 10 began the last great Indian war in Indiana, in which the confederated Indians were led by Tecumseh, the celebrated Shawnee chief; it terminated with their defeat at Tippecanoe (the present Battle Ground) by Governor Harrison on the 7th of November 1811. After the close of the second war with Great Britain, immigration began again to flow rapidly into the Territory, and, hav.ng attained a sufficient population, Indiana was admitted to the Union as a state by joint resolution of Congress on the nth of December 1816. The seat of government was established at Corydon, whither it had been removed from Vincennes in 1813. In 1820 the site of the present Indianapolis was selected for a new capital, but the seat of government was not removed thither until 1825. The first great political problem presenting itself was that of slavery, and for a decade or more the only party divisions were on pro-slavery and anti-slavery lines. Although the Ordin- ance of 1787 actually prohibited slavery, it did not abolish that already in existence. Slavery had been introduced by the French, and was readily accepted and perpetuated by the early American settlers, almost all of whom were natives of Virginia, Kentucky, Georgia or the Carolinas. According to the census of 1800 there were 175 slaves in the Territory. The population of settlers from slave states was considerably larger than in Illinois, the proportion being 20% as late

as 1850. It was but natural, therefore, that efforts should at once have been made to establish the institution of slavery on Indiana soil, and as early as 1802 a convention called to consider the expediency of slavery asked Congress to suspend the prohibitory clause of the Ordinance for ten years, but a committee of which John Randolph of Virginia was chairman reported against such action. Within the Territory there were several attempts to escape, by means of legislation, the effects of the Ordinance. These efforts consisted in (1) a law regulating the status of " servants," by which it was sought to establish a legal relation between master and slave; (2) a law by which it was sought to establish practical slavery by a system of indenture. By 1808 the opponents of slavery, found chiefly among the Quaker settlers in the' south-eastern counties, began to awake to the danger that confronted them, and in 1809 elected their candidate,

Jonathan Jennings (1776-1834) to Congress on an anti-slavery platform. In 1810, by which year the number of slaves had increased to 237, the anti-slavery party was strong enough to secure the repeal of the indenture law, which had received the unwilling acquiescence of Governor Harrison. Jennings was re-elected in 1811, and subsequently was chosen first governor of the state on the same issue, and the state constitution of 18 1 6 pronounced strongly against slavery. The liberation of most of the slaves in the eastern counties followed; and some slave-holders removed to Kentucky. In 1830 there were only three slaves in the state, and the danger of the establishment of slavery as an institution on a large scale was long past.

The problem of "internal improvements" came to be of paramount importance in the decade 1820-1830. In 1827 Congress granted land to aid in the construction of a canal to connect Lake Erie and the Ohio river. This canal was com- pleted from the St Joseph river to the Wabash in 1835, opened in 1843, and later abandoned. In 1836 the state legislature passed a law providing for an elaborate system of public improve- ments, consisting largely of canals and railways. The state issued bonds to the value of $10,000,000, a period of wild specula- tion followed, and the financial panic of 1837 forced the abandon- ment of the proposed plan and the sale to private persons of that part already completed. The legislature authorized the issue of $1,500,000 in treasury bonds, which by 1842 had fallen in value

to 40 or 50% of their face value. A new constitution was adopted in February 1851 by a vote of 109,319 against 26,755.

Despite its large Southern population, Indiana's answer to President Lincoln's first call for volunteers at the outbreak of the Civil War was prompt and spirited. From first to last the state furnished 208,000 officers and men for the Union armies ; besides a home legion of some 50,000, organized to protect the state against possible invasion. The efficiency of the state military organization, as well as that of the civil administration during the trying years of the war, was largely due to the extra- ordinary ability and energy of Governor Oliver P. Morton, one of the greatest of the " war governors " of the North. The problems met and solved by Governor Morton, however, were not only the comparatively simple ones of furnishing troops as required. The legislature of 1863 and the state officers were opposed to him politically, and did everything in their power to thwart him and deprive him of his control of the militia. The Republican members seceded, legislative appropriations were blocked, and Governor Morton was compelled to take the extraconstitutional step of arranging with a New York banking house for the payment of the interest on the state debt, of borrowing money for state expenditure on his own responsibility, and of constituting an unofficial financial bureau, which dis- bursed money in disregard of the state officers. Furthermore Indiana was the principal centre of activity of the disloyal association known as the Knights of the Golden Circle, or Sons of Liberty, which found a ready growth among the large Southern population. Prominent among Southern sympathisers was Senator Jesse D. Bright (1812-1875), who on the 5th of February 1862 was expelled from the United States Senate for writing a letter addressed to Jefferson Davis, as President of the Con- federacy, in which he recommended a friend who had an improve- ment in fire-arms to dispose of. The Knights of the Golden Circle at first confined their activities to the encouragement of desertion, and resistance to the draft, but in 1864 a plot to overthrow the state government was discovered, and Governor Morton's prompt action resulted in the seizure of a large quantity of arms and ammunition, and the arrest, trial and conviction of several of the leaders. In June 1863 the state was invaded by Confederate cavalry under General John H. Morgan, but most of his men were captured in Indiana and he was taken in Ohio. There were other attempts at invasion, but the expected rising, on which the invaders had counted, did not take place, and in every case the home legion was able to capture or drive out the hostile bands.

Politically Indiana has been rather evenly divided between the great

political parties. Before the Civil War, except when

William Henry Harrison was a candidate for the presidency, its electoral vote was generally given to the Democratic party, to which also most of its governors belonged. After the war the control of the state alternated with considerable regularity between the Republican and Democratic parties, until 1896, between which time and 1904 the former were continuously^ successful. In 1908 a Democratic governor was elected, but Republican presidential electors were chosen.

Governors of Indiana

Territorial.

Arthur St Clair (North- West Territory) . . 1787-1800

John Gibson, Territorial Secretary (acting) . 1800-1801

William Henry Harrison 1801-1812

John Gibson, Territorial Secretary (acting) 1812-1813

Thomas Posey 1813-1816

State. Jonathan Jennings .... 1816-1822 Democratic-

Republican Ratliff Boone (acting) . 1822 „

William Hendricks .... 1822-1825 ,,

James B. Ray, President of

Senate (acting) .... 1825 „

James B.Ray 1825-1831 ,,

Noah Noble 1831-1837 „

David Wallace 1837-1840 Whig

Samuel Bigger 1840-1843 „

James Whitcomb .... 1 843-1 848 Democrat Paris C. Dunning, Lt.-Gov.

(acting) 1 848-1 849 „

Joseph A. Wright .... 1849-1857 ,,

Ashbel P. Willard .... 1857-1860 Abram A. Hammond, Lt.-Gov.

(acting) 1860-1861 ,,

Henry S. Lane 1861 Republican

Oliver P. Morton, Lt.-Gov.

(acting) 1861-1865 ,,

Oliver P. Morton 1865-1867

Conrad Baker, Lt-Gov. (acting) 1867-1869 ,,

Conrad Baker 1869-1873 ,,

Thomas A. Hendricks . 1873-1877 Democrat

James D. Williams 1877-1880

Isaac P. Gray, Lt.-Gov. (acting) 1880-1881 ,,

Albert G. Porter 1881-1885 Republican

Isaac P. Gray 1885-1889 Democrat

Alvin P. Hovey 1889-189 1 Republican

Ira J. Chase, Lt.-Gov. (acting) . 1891-1893 ,,

Claude Matthews .... 1893-1897 Democrat

James A. Mount 1897-1901 Republican

Winfield T. Durbin .... 1901-1905 ,,

J. Frank Hanly .... 1905-1909 „

Thomas R. Marshall . 1909- Democrat

Bibliography. — There is a bibliography of Indiana history, by Isaac S. Bradley, in the Proceedings of the Wisconsin State Historical Society for 1 897. The History of Indiana by William Henry Smith (2 vols., Indianapolis, 1897) is the best general account of Indiana history and institutions. J. B. Dillon's History of Indiana (Indianapolis, 1859) is the most authoritative account of the early history to

1816. J. P. Dunn's Indiana, a Redemption from Slavery (Boston, 1888) in the " American Commonwealth " series, as its secondary title indicates, is devoted principally to the struggle over the provision in the Ordinance of 1787 prohibiting slavery. For the Civil War period consult J. A. Woodburn, " Party Politics in Indiana during the Civil War " in Annual Report of the American Historical Associa- tion (Washington, 1902); W. H. H. Terrell, " Indiana in the War of the Rebellion "(Official Report of the Adjutant-General Indianapolis, 1869) ; and E. B. Pitman, Trials for Treason at Indianapolis (Indiana- polis, 1865). See also De W. C. Goodrich and C. R. Tiittle, Illustrated History of the State of Indiana (Chicago, 1875) ; the same, revised and enlarged by W. S. Haymond (Indianapolis, 1879); O. H. Smith, Early Indiana Trials and Sketches (Indianapolis, 1858) ; and Nathaniel Bolton, " Early History of Indianapolis and Central Indiana," in Indiana Historical Society Publications, No. 5. " The Executive Journal of Indiana Territory " has been reprinted in the Indiana Historical Society's Publications, vol. iii., 1900. For government and administration seeE. L.Hendricks, History and Government of Indiana (New York, 1908), The Legislative and' State Manual of Indiana (Indianapolis, published biennially by the State librarian), Constitu- tions of 18 16 and 1851 of the State of Indiana with Amendments (Indianapolis, 1897), School Law of Indiana, with Annotations (Indianapolis, 1904), and Wm. A. Rawles, Centralizing Tendencies in the Administration of Indiana (New York and London, 1903) .Columbia Univ. Press. " The New Municipal Code of Indiana " is explained in an article by H. O. Stechhan in the Forum (October-December, 1905). For education see Fassett A. Cotton's Education in Indiana (Indiana- polis, 1905), and James A. Woodburn, Higher Education in Indiana (Washington, 1891), U.S.|Documents, Bureau of Education, Circulars

of Information, No. 1. For resources, industries, &c., consult the Reports of the Chief of the Bureau of Statistics of Indiana (biennial, Indianapolis, 1886 to date), Annual Report of the Department of Geology and Natural Resources (Indianapolis, 1869 to date), and Reports of the State Agricultural Society. See also the Reports of the Twelfth Federal Census for detailed statistical matter as to produc- tion, industries and population.

INDIANAPOLIS, the capital and largest city of Indiana, U.S.A.,

situated on the W. fork of the White river, in Marion county, of which it is the county-seat, and at almost the exact geographical centre of the state. It is 824 m. W. of New York by rail, and 183 m. S.E. of Chicago, and is about 710 ft. above sea-level, and about 138 ft. above Lake Erie. Its area is 30-77 sq. m., of which 29-95 S Q- m – is land. Pop. (1880) 75,074; (1890) 105,436; (1900) 169,164, of whom 17,122 were foreign- born (8362 being by birth German, 3765 Irish, and 11 54 English) and 15,931 were negroes; (1910 census) 233,650. Indiana- polis is near the centre of population of the United States. From 1847, when the first railway entered the city, Indianapolis has steadily grown in importance as a railway centre. It is served by the Chicago, Indianapolis & Louisville, the Cincinnati, Hamilton & Dayton, the Cleveland, Cincinnati, Chicago & St Louis (New York Central System), the Lake Erie & Western (New York Central System), the Pittsburg, Cincinnati, Chicago & St Louis (Pennsylvania System) and the Vandalia (Penn- sylvania System) railways. At the Union Station more than 150 trains enter and depart daily, carrying more than 30,000 passengers. Outside the city there is a " belt line," 155 m. long, connecting the several railways and carrying more than 1,000,000 freight cars annually; and an extensive electric street railway system, with more than 150 m. of track and with interurban connexions, serves every part of the city and its suburbs. The city has a large traction terminal station, and is the principal centre for the interurban electric lines of Indiana, which handle freight as well as passengers; in 1908 twenty -five interurban electric lines entered the city and operated about 400 cars every 24 hours.

Physically Indianapolis is one of the most attractive inland cities in America. It is built on a level plain surrounded by low, gently sloping and beautifully wooded hills. Four principal avenues radiate from points near a central circle to the four corners of the city. The other streets run at right angles to one another. Streets and avenues are 90 ft. wide, except Washington Street, which has a width of 120 ft. An excellent system of parks — 8 within the city with an aggregate area of 13 n acres, and 3 with an aggregate area of 310 acres just outside the city limits — adds to the beauty of the city, among the most attractive being the Riverside, the St Clair, the University, the Military, the Fair View, the Garfield and the Brookside. The city is lighted by gas and electricity, — it was one of the first cities in the United States to adopt electric lighting, — and has a good water-supply system, owned by a private corporation, with a 4! acre filter plant of 18,000,000 gallons per diem capacity and an additional supply of water pumped from deep wells outside the city. The public

buildings and business blocks are built mostly of Indiana building stone. The state capitol stands in a square 8 acres in extent, and has a central tower and dome 240 ft. high. It covers 2 acres of ground and cost $2,000,000. The Marion county court-house cost $1,750,000. Other noteworthy buildings are the Federal building (containing post-office, custom-house and Federal court-rooms; erected at a cost of $3,000,000); Tomlinson Hall, capable of seating 3000 persons, given to the city by Daniel Tomlinson; the Propylaeum, a club-house for women; the Commercial club; Das Deutsche Haus, belonging to a German social club; the Maennerchor club-house; the Union railway station; the traction terminal building; the city hall, and the public library. Near the city is the important United States army, post, Fort Benjamin Harrison, named in honour of President Benjamin Harrison, whose home was in Indianapolis. In or near the city are the Central Indiana Hospital for the Insane, the Indiana Institution for the Education of the Blind, the Indiana Institution for the Education of the Deaf, the Indiana Girls' School (included with

the Women's prison until 1899, and under the same management as the prison from 1899 to 1903, when it became a separate institution, — it was removed to Clermont, 10 m. from Indianapolis, in 1907), and a Women's prison (opened in 1873, the first in the United States), which is under female management. The public library, founded in 1871, contains more than 100,000 volumes. There are ten other libraries, the most important of which are the state law library (about 40,000 volumes) and the state library (about 46,000 volumes).

The city is an educational centre of considerable importance. The university of Indianapolis (1896) is a loose association of three really independent institutions — the Indiana Law School (1894), the Indiana Dental College (1879), and Butler University (chartered in 1849 and opened in 1855 as the North-western Christian University, and named Butler University in 1877 in honour of Ovid Butler, a benefactor). Other educational institutions are the Indianapolis College of Law (1897), the Indiana Medical College (the School of Medicine of Purdue University, formed in 1905 by the consolidation of the Medical College of Indiana, the Central College of Physicians and Surgeons and the Fort Wayne College of Medicine), the State College of Physicians and Surgeons (the medical school of Indiana Univer- sity), the Indiana Veterinary College (1892), the Indianapolis Normal School, the Indiana Kindergarten and Primary Normal Training School (private), and the Winona Technical Institute. The last named was opened in 1904, and is

controlled by the Winona Lake corporation, having official connexion with several national trade unions. It has departments of pharmacy, chemistry, electrical wiring, lithography, house-painting, printing, carpentry, moulding, tile-setting, bricklaying, machinery and applied science. The art association of Indianapolis was founded in 1883; and under its auspices is conducted an art school (1902) in accordance with the bequest of John Herron (181 7-1895), the school and museum of the association being housed in the John Herron Art Institute, dedicated in 1906.

The city has several fine monuments, among which are statues of Oliver P. Morton, George Rogers Clark, William Henry Harrison, Benjamin Harrison, Thomas A. Hendricks and Major-General Henry W. Lawton. The Soldiers' and Sailors' Monument, erected by the state, stands in the circle in the centre of the city, rises to a height of 284-5 ft- above the street level, and is surmounted by a statue of Victory 38 ft. high. On the east and west faces of the base are two great stone groups of Peace and War respectively. The monument was erected after designs by Bruno Schmidt of Berlin, with fountains at the base said to be among the largest in the world, their capacity being 20,000 gallons per minute.

The city's central geographical position, its extensive railway connexions, and its proximity to important coal-fields have combined to make it one of the principal industrial centres of the Middle West. The value of its " factory " products was 17-6% of the state's total in 1900 and 20-9% of the total in 1905. The increase in the value of the " factory " product between 1900 and 1905 was from $59,322,234 to $82,227,950, or 38-6%. Indianapolis is the principal live stock centre of the Ohio Valley, and has extensive stock-yards covering more than 100 acres. Slaughtering and meat-packing is the most important industry, the value of the product amounting to $24,458,810 in 1905; this industry dates from about 1835. Among other important manufactures are foundry and machine shop products ($6,944,392 in 1905); flour and grist-mill pro- ducts ($4,428,664); cars and shop construction and repairs by steam railways ($2,502,789); saws; waggons and carriages ($2,049,207); printing and publishing (book and job, $1,572,688; and newspapers and periodicals, $2,715,666); starch; cotton and woollen goods; furniture ($2,528,238); canned goods ($1,693,818); lumber and timber ($1,556,466); structural iron work ($1,541,732); beer ($1,300,764); and planing-mill products, sash, doors and blinds ($1,111,264).

Indianapolis is governed under a form of government adopted

originally in a special charter of 1891 and in 1905 incorporated in the new state municipal code, which was based upon it,

It provides for a mayor elected every four years, a single legisla- tive chamber, a common council, and various administrative departments — of public safety, public health, &c. The guiding principle of the charter, which is generally accepted as a model of its kind, is that of the complete separation of powers and the absolute placing of responsibility.

On the admission of Indiana as a state, Congress gave to it four sections of public land as a site on which to establish a state capital. This was located in 1820 in almost the exact geographi- cal centre of the state, where a small settlement had recently been made, and the town of Indianapolis was laid out in the following year. It was then in the midst of dense forests and was wholly unconnected by roads with other parts of the state. Upon its final acceptance as the capital, there was some activity in land speculation, but Indianapolis had only 600 inhabitants and a single street when the seat of government was removed thither in 1824. The legislature met here for the first time in 1825. Some impetus was given to the city's growth by the completion of the National Road, and later by the opening of railways, but until after the Civil War its advancement was slow. It was incorporated as a town in 1832, its population then being 1000. The first state capitol was completed in 1836. Indiana- polis suffered severely from the business panic of 1837, and ten years later, when it received its first city charter, it had only about 6000 inhabitants; in the same year a free public school system was inaugurated.

Authorities. — B. R. Sulgrove, History of Indianapolis and Marion County (Philadelphia, 1884) ; M. R. Hyman, Handbook of Indianapolis (Indianapolis, 1907) ; Nathaniel Bolton, " Early History of Indianapolis and Central Indiana " (Indiana Historical Society's Publications, So. 5, 1897); W. R. Holloway, Indianapolis, a Historical and Statistical Sketch (Indianapolis, 1870); the Indiana- polis Board of Trade's Report on the Industries of Indianapolis (1889) ; Civic Studies of Indianapolis (Indianapolis, 1907 seq.), edited by Arthur W. Dunne; and P. S. Heath's sketch of Indianapolis in L. P. Powell's Historic Towns of the Western States (New York, 1901). INDIAN ARCHITECTURE. The development of architectural art in India is of the highest interest for the history of the subject;

and whatever may be our estimate of its aesthetic qualities, we can hardly fail to realize that Indian builders attained with marked success the aims they had before them, though they employed arrangements and adopted forms and details very different from those of western builders in ancient and medieval times. These forms and adaptations, of course, require study properly to understand them, and to recognize the adjustment of the designs to their purposes. But besides the scientific advantages of such a study, it has been well remarked by Fergusson, to whose genius the history of Indian architecture is so specially due as its creator, that " it will undoubtedly be conceded by those who are familiar with the subject that, for certain qualities, the Indian buildings are unrivalled. They display an exuberance of fancy, a lavishness of labour, and an elaboration of detail to be found nowhere else." Besides, if anywhere the history of a country is imprinted in its architecture, it is in India that it throws the most continuous, distinct and varied light on that history.

In the early architecture of India, as in that of Burma, China and Japan till the present day, wood was solely or almost solely employed; and it was only about the 3rd century B.C. that stone became largely used as the material for important structures; if brick or stone were in use previously, it was only for foundations and engineering purposes. Even at the end of the 4th century b.c. Megasthenes states that Pataliputra, the capital of Chandragupta — the Sandrokottos of Greek writers — was " surrounded by a wooden wall pierced with loop-holes for the discharge of arrows." And if the capital were defended by such palisading, we may fairly infer that the architecture of the time was wholly wooden. On the Sanchi gateways, brick walls are indeed represented, but apparently only as fences or limits with serrated copings, but not in architectural structures. And at whatever date stone came to be introduced, the Hindus continued and repeated the forms they had employed in the earlier material, and preserved their own style, so that it bore witness to the general antecedent use of wood. Hence we are

able to trace its conversion into lithic forms until finally its origin disappears in its absorption in later styles.

India possesses no historical work to afford us a landmark previous to the invasion of Alexander the Great in the 4th century b.c, nor do we know of an architectural monument of earlier date. For later periods there are fortunately a few examples dated by inscriptions, and for others by applying the scientific principles developed by Thomas Rickman for the discrimination of other styles and the

relative ages of archi- tectural works, we are enabled to arrange the monuments of India approximately in chronological sequence or order of succession.

The invasion of Alexander and the westward spread of Bud- dhism brought India into contact with Persia, where the Achae- menian kings had hewn out mausolea in the rocks, and built palaces with stone basements, doorways and pillars, filling in the walls with bricks. These works would attract the attention of Indian visitors — ambassadors, missionaries and merchants; and the report of such magnificent works would lead to their imitation.

About the middle of the 3rd century B.C. we find the great Asoka, the grandson of Chandragupta, in communication with the contemporary kings of Syria, Egypt, Macedonia, Epirus and Cyrene; and to his reign belong the great stone pillars, with capitals of Persian type, that are engraved with his religious edicts. A convert to Buddhism, Asoka is credited with the construction all over the country of vast numbers of stupas — monumental structures enshrining relics of Sakyamuni Buddha or other Buddhist saints; and with them were erected monasteries and chapels for the monks.

On the monumental pillars, known as lats, set up by this emperor, besides the Persepolitan form of capital, we find the honeysuckle with the bead and reel and the cable ornaments that were employed in earlier Persian carvings; and though not continued later in India proper, these prevailed in use in Afghani- stan for some centuries after the Christian era. This seems to indi- cate that these forms first came from Persia along with the ideas that led to the change of wooden architecture for that of stone. The stupas were structures that may be regarded as con- ventional architectural substitutes for funeral tumuli, and were constructed to enshrine relics of Buddha or of his more notable disciples, or even to mark the scene of notable events in the tradi- tion of his life. How relic-worship originated and came to hold so large a place in the Buddhist cult we can hardly conjecture: the sentiment could not have arisen for the first time on the death of Gotama Buddha, when, we are told, eight stupas were built over his corporeal relics, a ninth over the vessel with which they were divided, and a tenth over the charcoal of the funeral pile.

These stupas, known as dagabas in Ceylon, and chaityas in Nepal, are called topes in the ordinary patois of upper India. They consisted of a low circular drum supporting a hemispherical dome of less diameter and leaving a ramp or berme round it of a few feet in width. Round the drum was an open passage for circumambulation,

and the whole was enclosed by a massive stone railing with lofty gates on four sides. These railings and gate- ways are their principal architectural features; the rails are constructed as closely as possible after wooden patterns, and examples are still found at Sanchi and Buddh-Gaya 1 ; what remained of the Bharahat stupa was transferred to the Calcutta Museum, and portions of the Amravati rail are now in the British and Madras museums. The uprights and cross bars of the rails were in many cases covered with elaborate carvings of scenes of the most varied kinds, and are illustrative of manners and customs as well as of the art of sculpture.

The great stupa at Sanchi in Bhopal is now the most entire of the class, as it still retains the gateways — styled torans — which must have been a feature of all stupas, though perhaps mostly

1 The restoration of the shrine at Buddh-Gaya was begun in 1908 under the auspices of the Buddhist Shrine Restoration Society, of which the Tashi Lama was first president and the eldest son of the maharaja of Sikkim vice-president.

INDIAN ARCHITECTURE

Plate I.

-SAN'CIII NORTH GATEWAY.

\ truh & Co.

Fig. 9— THE KUTB MINAR NEAR DELHI.

> "— ~Aiˆ,i

ˆˆIPˆIˆIfˆ

r%

fc:

JjO' l5$

I'll

Fig. io.— SHER SHAH'S MOSQUE AT DELHI.

Plate II.

INDIAN ARCHITECTURE

Fig. 12.— ROOF OF DOME OF VIMALA'S TEMPLE ON MOUNT ABU. (From Photographs kindly lent by the India OJJice.)

in wood (see Plate I. fig. 8). The whole of the superstructure of the Sanchi examples is essentially wooden in character, and we are astonished that it should have stood " for twenty centuries nearly uninjured." These torans reappear to this day in Japan as tori-i and in China as p'ai-lus or p'ai-fangs. The whole of the surfaces, inside and out, are carved with elaborate sculptures of much interest. A cast of the eastern toran from Sanchi is to be seen in the museums at S. Kensington, Edinburgh, Dublin, Paris and Berlin. On the southern one, an inscription appears to indicate that it was erected about 150 B.C.

The earlier cave temples are of about the same age as the stupas; some of those in Behar bear inscriptions of Asoka and of his successor in the 2nd century B.C. And the earlier cave facades in western India indicate the identity of style and construction in the patterns from which both must have been copied. These Buddhist rock excavations are of two types: the chaitya or chapel caves, with vaulted roofs of considerable height, the earliest with wooden fronts and later with a screen wall left in the rock, but in both forms with a large horse-shoe shaped window over the entrance. The interior usually consisted

Fig. 1. — Cave at Karli near Bombay. Section and plan.

of a nave, separated from the side aisles by pillars, and containing a chaitya or small stupa at the inner and circular end. The facades of these chaitya chapels were covered with sculpture — some of them very richly; and to protect them from the weather a screen was contrived and cut in the rock in front of the facade, with large windows in the upper half for the entrance of light. This mode of lighting by a great arch over the entrance has attracted considerable attention, as being admirably adapted for its purpose. As Fergusson remarked, " nothing invented before or since is lighted so perfectly, and the disposition of the parts or interior for an assembly of the faithful … is what the Christians nearly reached in after-times but never quite equalled."

The second type of rock excavations are known as viharas or

monasteries devoted to the residence of monks and ascetics. They usually consisted of a hall surrounded by a number of cells — the earliest with stone beds in them. In the later viharas there was a shrine in the centre of the back wall containing a large image of the Buddha. In the Orissa caves, near Cuttach, we have a series of excavations that do not conform to these arrangements: they are early, dating as far back as the 2nd century B.C., but they belong to the Jain sect, which dates from the same age as the Buddhist.

On the north-west frontiers of India, about the Swat and Viisufzai districts, anciently known as Gandhara, are found a remarkable class of remains, much ruined, but that must have abounded in sculptures belonging to the Buddhist cult. It is among these we find the first representations of Buddha and of the characters belonging to the Buddhist pantheon. The in-

fluence of classical art manifested in these images leaves no doubt that they were modelled after western patterns, carried thither by Greeks or brought from the Levant by Buddhist emissaries. The scenes depicted, however, have frequently an architectural setting in which we find represented facades with pillars fashioned with distinctly Corinthian capitals. These sculptures we can now assign with confidence, from dated epigraphs, to dates from the last years of the century B.C. till the 4th century a.d. One inscription of a.d. 47 is of a king Gondophernes, who is mentioned in the legend of the apostle Thomas.

In the time of the great Gupta dynasty, from about a.d. 320 to 500, the architectural forms developed in variety and richness of decoration. To the columns were given higher square bases than before, and sometimes a sur-base; the capitals, which previously had a vase as the chief member, were developed by a foliaged ornament, springing from the mouth of the vase and falling down upon it from the four corners, and so lending strength to the neck whilst converting the round capital into a square support for the abacus. Often, too, a similar arrange- ment of foliage was applied to the early bases; and this form quite superseded the Persepolitan pillar, with its bell-shaped capital, which now disappeared from Indian art. The shafts were round or of sixteen or more sides; pilasters were orna- mented on the shafts; and the spires of the temple were simple in outline and rose almost vertically at first and curving inwards towards the summit, which was always capped by a large circular fluted disk supporting a vase, whilst the surface of the- tower was covered with a peculiar sort of horse-shoe diaper. This style prevailed all over Hindustan, and was continued with modifications

varying with age and locality down almost to the Mahommedan conquest.

In Kashmir from the 8th century, if not earlier, till the Mahommedan conquest we find a style of architecture possessing a certain quasi-classical element which has little if any connexion with the art of the rest of India. The best-known example of this Kashmir style is the temple of Martand, about 3 m. east

from Islamabad or Anatnag, B

the old capital. It stands in tafl l BI| , JffHBfB a court 220 ft. long by 142 ■ ■" " " " ^ " y " ft. wide surrounded by the ruins of some eighty small cells, with a large entrance porch at the east end. The temple itself was 60 ft. long by 38 ft. wide, with two wings, and consisted of two apartments — a naos and cella. The trefoiled or cusped arch on the doors of the temple and cells is a strik- ing peculiarity of the style,- and may have been derived from the section of the Buddhist chaitya. It is used decoratively, however, rather than constructively. The pillars and pilasters of the portico and temple bear a close resemblance to some of the later forms of the Roman Doric, and have usually sixteen shallow flutes on the shafts, with numerous members in the base and capital. A triangular pediment surmounts the doorways, and on gable-ends or projecting faces are repre- sentations' of double sloping roofs, much in the style of modern Kashmir wooden roofs, of which also many of the temple-roofs in Nepal are exaggerated examples. The Martand temple was, in all probability, built in the 8th century, between a.d. 725 and 760, and was erected as a temple of the Sun, one of whose names is Martand. For, till the 12th century at least,' Sun-worship was quite prevalent in the north and west of India. At a remote village called Buniar is a much better preserved*

Fig. 2.-

-Plan of Temple of Martand.

specimen of the style: and at Avantipur, V&ngath, Payer and Pandrethan are other interesting examples of the style. That at Pandrethan about 3 m. from Srinagar is a well-preserved little temple, built between a.d. 906 and 921, and perhaps exhibits the most clearly the characteristics of the style.

In the Himalayas the architecture is still largely wooden, raised on stone basements and is often picturesque. In the Nepal valley we meet with hemispherical chaityas or stupas

on low bases with lofty brick spires, and some of them of great antiquity, along with temples having three o'r four storeys divided by sloping roofs, and others in the modern Hindu style of northern India.

In South Kanara, especially at Mudbi- dare (Mudbidri), there are also Jain temples and tombs with double and triple sloping roofs that resemble the native temples of Nepal, with which, however, they had no connexion. The whole style is closely in imitation of wooden originals, the forms of which have been derived from the local thatched dwellings of the district. The interiors of the Kanara temples are often very rich in carving, the massive pillars being carved like ivory or the precious metals. Associated with these and other temples are elegant, monolithic pillars placed on square bases, the shafts richly carved and the capitals wide- spreading, some of them supporting, on four very small colon- net tes, a square roof elaborately modelled. These stambhas or pillars are the representatives of the early Buddhist lots or columns raised at their temples, and bear emblems distinctive of the sects to which they respectively belong.

The southern portion of the peninsula is peopled by a race known as Dravidians, and to the style of architecture practised over most of this area we may conveniently apply the name of the race. This Dravidian architecture was essentially different from that of other regions of India and is of one type. One of the best-known groups of monuments in this style is that of the

Fig. 3. — Temple of Pandrethan.

Fig. 4. — Kail&s at EHora.

" Seven Pagodas " or the Mamallapuram raths, on the seashore, south from Madras. These raths are each hewn out of a block of granite, and are rather models of temples than such. They are the earliest forms of Dravidian architecture and belong to the 7 th century. To the same age belongs the temple of Kailasanath

at Conjeeveram, and to the following century some of the temples in the south of the Bombay Presidency, and the famous monolithic temple of the Kailas at Ellora near Aurangabad.

Buildings in the Dravidian style are very numerous in propor- tion to the extent of the area in which they are found. The temples generally consist of a square base, ornamented externally by thin tall pilasters, and containing the cell in which the image is kept. In front of this may be added a mantapam or hall, or even two such. Over the shrine rises the spire, of pyramidal form, but always divided into storeys and crowned by a small dome, either circular or polygonal in shape. The cornices are of double curvature, whilst in other Indian styles they are mostly straight with a downward slope. Another feature of these temples, especially those of later date, is the gopurams or great gateways, placed at the en- trances to the sur- rounding courts , and often on all four sides. In general design they are like the spires over the shrines, but about twice as wide as deep, and very fre- quently far more imposing than the temples them- selves.

The style is dis- tinctly of wooden origin, and of this the very attenu- ated pilasters on the outer walls and the square pillars of small section are evi- dences. As the contemporary northern styles are characterized by the prevalence of vertical lines, the

Dravidian is marked by horizontal mouldings and shadows, and the towers and gopurams are storeyed- The more important temples are also surrounded by courts enclosing great corridors and pillared halls.

One of the best examples of this style is the great temple at Tanjore. It would appear to have been begun on a definite plan, and not as a series of extensions of some small temple which, by accident, had grown famous and acquired wealth by which successively to enlarge its courts, as that at Tiruvallur seems to have grown by a series of accretions. The body of the Tanjore temple is of two storeys and fully 80 ft. high, whilst the sikhara or pyramidal tower rises in eleven storeys to a total height of 190 ft. This dominates the gopurams over the entrances to the court in which it stands, and to an outer court, added in front of the first, but which does not, as in other cases, surround it. The central shrine, so far as we know, was erected about a.d. 1025.

The Srirangam temple in Trichinopoly, the largest in Indlaj is architecturally the converse of this: it is one of the latest in date, the fifth court having been left unfinished in the middle of the 1 8th century. The shrine is quite insignificant and distinguished only by a gilt dome, whilst proceeding outwards, the gopurams to each court are each larger and more decorative than the preceding. The successive independent additions, however, proved incompatible with

any considered design or arrangement of parts.

Most of the Deccan was ruled by the Chalukya dynasty from early in the 6th century, and the style prevailing over this area,

Reproduced, by permission of Mr John Murray, from Dr Burgess's The Cave Temples of India.

Fig. 5. — Plan of Kailas at Ellora.

from the Tungabhadra and Krishna rivers to the Taptl and Mahanadi, may be styled, from them, as Chalukyan.

The earliest temples in this style, however, are not very clearly marked off from the Dravidian and the more northern styles. Some of them have distinctly northern spires, others are closely

Fig. 6. — Temple at Tanjore.

allied to the southern style; and it was perhaps only gradually that the type acquired its distinctive characteristics. Till a late date we find temples with towers differing so little in form from Dravidian vimdnas that, other details apart, they might readily be ascribed to that order.

Among Chalukyan temples a prevalent form is that of three shrines round one central hall. The support of the roofs of these halls is almost always after the Dravidian plan of four pillars,

Fig. 7. — Temple at Tiruvallur, near Tanjore.

or multiples of four, in squares, so that larger domes were never attempted. Both in Dravidian and northern temples the projections on the walls are generally formed by increments of slight thickness added flatly to their faces, and, however thick, they are so placed as to leave the true corners of the shrines, &c, more or less recessed. In the Chalukyan temples the sides are often made prominent by increments placed over them, or the whole plan is star-shaped, the projecting angles having equal adjacent faces lying in a circle, as in the temple of Belur in Mysore, built about a.d. 1120, and in others. The roofs are

stepped and more or less pyramidal in form, with breaks corre- sponding to the minor angles made on the walls.

Some of the details of this style are very elaborate; in fact, many of the finer temples were completely overlaid with sculp- tural ornament. The pillars are markedly different from the earlier Dravidian forms: they are massive, richly carved, often circular and highly polished. Their capitals are usually spread out, with a number of circular mouldings immediately below; and under these is a square block, while the middle section of the shaft is richly carved with mouldings in the round. In many cases the capitals and circular mouldings have been actually turned in a sort of lathe. They are almost always in pairs of the same design, the whole effect being singularly varied and elegant.

The great temple at Halebld (see Plate II. fig. 11), begun about a.d. 1250, was left unfinished at the Mahommedan conquest in 1310. It is a double temple, measuring 160 ft. by 122 ft., and is covered with an amazing amount of the richest sculpture. But the spires were never raised over the shrines. The Kedares- vara temple at Balagamvi is perhaps one of the oldest of the style in Mysore, and there are other good examples at Kubattfir, Harnhalli, Arsikere, Harihar, Koravangala and elsewhere; but their plans vary greatly.

Coming now to Northern India, we find the Hindu architectural style more widely spread and more varied than in the south, but wanting somewhat in individuality. Examples of the same order, however, are to be found also far to the south in the Chalukyan area. The characteristic that first appeals to our notice is the curvilinear spires of the temples, and the absence of that exuberance of sculpture seen in the great Chalukyan temples of the South; whilst in many cases, as in the Jain temples. a greater central area has been obtained in the halls by arranging twelve columns so as to support a dome on an octagonal disposi- tion of lintels. The shrines are square in plan and only slightly modified by additions to the walls of parallel projections; the walls were raised on a moulded plinth of some height, over which was a deep base, the two together rising, roughly, to about half the height of the walls. Over this is the panelled face devoted to figure sculptures in compartments, but the tall, thin pilasters of the southern style have disappeared. Above is the many-membered architrave and cornice supporting the roof and spire. The latter follow the vertical lines of the walls, presenting no trace of divisions into storeys or steps, but they vary in other details with the age.

In Rajputana and Western India a variety of this northern style has been known as the Jain order. Though used by the Hindus and Jains alike, it was employed in its most ornate form by the Jains in their famous temples on Mount Abu and else- where. A striking feature of this style is the elaborately carved roofs over their corridors and the domes of their porches and halls (see Plate II. fig. 12). Nothing can exceed the delicacy and elaboration of details in these sculptured roofs and vaults. Com- bined with the diversified arrangement of the variously spaced and highly sculptured pillars supporting them, these convey an impression of symmetry and beauty that is highly pleasing.

GujarSt must have been rich in splendid temples before the 1 2th century, but it was devastated so often by the Moslems that the more notable have all perished, though the once magnifi- cent Sun Temple at Mudhera still witnesses, in its ruins, to the architectural style and grandeur of the period — the early part of the nth century — when it was erected. A notable group of between thirty and forty temples in this style exists at Khajuraho in Bundelkhand. They belong to both the Hindu and the Jain cults, and mostly date from the 10th and nth centuries. Many of them are covered, inside and out, with the richest sculpture, and may be regarded architecturally as " the most beautiful in form as well as the most e/esant in detail " of the temples of Northern India. With these, tne temples at Bhuvaneswar in Orissa exhibit this style at its best. The latter have the earlier form of spire, nearly perpendicular below, but curving inwards near the summit.

The temple of Kanarak, known as the " Black Pagoda "

see Plate III. fig. 13), which for its size is, externally at least, the most richly ornamented building in the world. It has lately been filled up with stones and sand, as the only method the Archaeological Survey could devise to prevent its threatened collapse.

In the later examples of the style the spire is still a square curvilinear pyramid, to the faces of which are added smaller copies of the same form, carrying up the offsets of the walls; and in some examples these are multiplied to an extraordinary extent.

The Mahommedan architecture, also known as Indian Saracenic,

begins in India with the 13th century and varied much at different periods and under the various dynasties, imperial and local. The imperial rulers at Delhi, for the first three centuries, were Pathans, and were succeeded in 1526 by Baber, who founded the Mogul dynasty. Under the earlier Pathan emperors the style of building was massive but profusely ornamented and of extreme beauty in its details. Among the examples of this style may be instanced the Qutb Minar at Delhi (see Plate I. fig. 9), one of the finest pillars in the world, built in the first quarter of the 13th century. It is still 240 ft. high and ornamented by projecting balconies and richly carved belts between; the three lower storeys are cut up by projecting vertical ribs that add to its beauty. Beside it the tomb of Altamsh is also profusely sculptured and of extreme beauty of detail, and other examples are seen in the eastern portion of the adjoining mosque, the tomb of Ala-ud-dln Khilji, and the Alai Darwaza. After about 1320 the Pathan architecture is marked by a stern simplicity of design and a solemn gloom and nakedness, in marked contrast to the elaborate richness of ornamentation of the preceding period. The tomb of Ghiyas-ud din Tughlak at New Delhi, with its sloping walls and massive solidity, is a typical example of this period, as is also the Kalan mosque at Delhi completed in 1386.

Early in the 15th century, however, a reaction had set in, and the later style was hardly less rich and much more appropriate for its purposes than the earlier in the end of the 12th and early 13th century. The facades of the mosques became more orna- mental, were often encrusted with marble, and usually adorned with rich and beautiful sculpture. This was clearly a return to the elaborateness of the past, but with every detail fitted to its place and purpose and presenting one of the completest architectural styles of the world.

About the beginning of the 15th century several local dynasties arose, each of which developed a style more or less their own. Of the Sharki dynasty of Jaunpur only three great mosques in that city have come down to us, with several tombs. The cloisters surrounding the open courts of the mosques and the galleries within are closely allied to the Hindu style, being constructed with short square pillars having bracket capitals supporting lintels and roof of flat slabs. But the gateways and main features of the mosques are arched. The mosque itself consists of a central square hall covered by a lofty dome of the whole width of it, in front of which stands the great propylon or gate, of massive outline and rising to the full height of the central dome. This propylon had a large recessed arch between the two piers, in the lower portion of which was the entrance to the mosque, whilst the upper formed a pierced screen. On each side of the dome is a

compartment divided into two storeys by a stone floor supported on pillars, and beyond this, on each side, is a larger apartment covered by a pointed ribbed vault. The ornamental work is bold and striking rather than delicate, and the mihrabs or qiblas are marked by severe simplicity, and form a link in the evolution of the later form under Mogul rule. These buildings afford a marked expression of strength combined with a degree of refinement that is rare in other styles. Other examples of this style are met with at Benares, Kanauj and places within the Jaunpur kingdom.

In 1401 Dilawar Khan assumed independence in Malwa, of which Mandu became the capital, and his son Hoshang adorned it with important buildings. They are of a modified form of the Pathan style of the 14th century. Among them

the finest is the great Jama Masjid, which was finished by Mahmud Shah I. in 1454. It covers a nearly square area", 290 ft. from east to west by 275 ft. from north to south, exclusive of the porch on the east, which projects about 56 ft. Inside, the court is an almost exact square, surrounded by arches on each side, standing on plain square piers 10 ft. high, each of a single block of red sandstone; behind these are triple arcades on the north and south, a double one on the east, and on the west the mosque, having three great domes on its west side. This court, in its simple grandeur and expression of power r may be regarded as one of the very best specimens of this style to be found in India. The tombs and palaces of Mandu, mostly much ruined, it would occupy too much space to describe. But here, as elsewhere, the available materials have exercised a marked influence upon the architecture; the prevalence of a red sandstone is emphasized in the piers of the Jama Masjid, more than 300 of them being each of a single block of this material; and for more decorative purposes marble, both white and coloured, was freely used to revet the walls and piers. The style is strictly arcuate, without admixture of the general trabeate structural methods followed by the native Hindus; and while at Jaunpur and Ahmedabad, at the same period, we find the strong influence of native methods copied in the Mahommedan architecture, at Mandu the builders clung steadily to the pointed arch style, without any attempt, however, at groining.

The capital of the Bengal kingdom was at Gaur, which had been the metropolis of a native kingdom probably since the 9th century. As the country is practically without stone, the Hindu buildings would be chiefly of brick, but pillars, images and details were of hard potstone or hornblende; and these would afford materials for the Moslem conquerors. The construction of large buildings of brick

required heavy piers for the arches and thicker walls than those constructed of stone. Then such piers and walls, when enriched by a facing of moulded or glazed tiles, would appear still heavier; and sometimes for tiles a casing of carved stone was substituted. Hence this style is a purely local one with short, heavy pillars faced with stone and supporting pointed brick arches and vaults. The use of brick further forced the builders to employ an arched style of their own and a mode of roofing in which a curvilinear form was given to the eaves descending at the corners of the structures. This form spread later up through Hindustan as far as the Punjab.

The capital at one time was moved to Pandua, north of Gaur, and there was built (1358-1368) the great Adina mosque, 500 ft. in length by 285 in depth containing a large court surrounded by a thick wall of brick. The roof was supported by 266 stone pillars and covered by 378 domes, all of one form. Such a design has little architectural merit, but its size and the richness of its details make it an interesting study, and the same char- acter belongs to most of the works of the Bengal Moslem rulers.

The Bahmani dynasty, founded in 1347, had its capital at Gulbarga till 1428/ when it was moved to Bldar. During this period the city was adorned with important buildings of which the most notable now remaining is the great mosque, one of the most striking in India. It measures over all 216 ft. from east to west by 176 from north to south. It differs from all the great mosques in India in having the whole central area covered over as in the great mosque at Cordova — what in others would be an open court being roofed by sixty-three small domes. The light is admitted through the side-walls, which are pierced by great arches on all sides except the west. The study is plain and substantial, with but little ornament. The tombs of the kings are massive square-domed buildings, with handsome stone tracery on their outer walls, and are elaborately finished inside. At Bldar, mosques, palaces and tombs were also erected, but most of them have perished, the great mosque in the fort being the only one fairly entire. The ten tombs of the later Bahmani kings, 5 m. from the city, are of like pattern with those of Gulbarga and of considerable

INDIAN ARCHITECTURE

Plate 111.

MPLE OF SURYA, OR BLACK "ROM THE EAST.

Fig. 14.— TOMB OF MAHOMMED ADIL SHAH, BIJAPUR.

■*Th*

Fig. 15.— JAMA MASJID AT AHMF.DABAD.

Frgm Phctosraphs kindly lent by the India Oflhe.

Plate IV.

INDIAN ARCHITECTURE

Photo. F. Frith & Co

Fig. 16.— TOMB OF PRINCE ITIMAD-UD-DAULA, AGRA.

Photo, Johnston & Hoffmann.

Fig. 17.-THE TAJ MAHAL, AGRA.

INDIAN ARCHITECTURE

splendour. They are not much ornamented, but are structurally good and impressive by their massive proportions.

Of the various forms which the Moslem architecture assumed, " that of Ahmedabad," Fergusson has justly remarked, " may probably be considered as the most elegant, as it certainly is the most characteristic of all. No other form is so essentially Indian, and no one tells its tale with the same unmistakable distinctness." Under the Mahommedan rule the Hindu archi- tects employed introduced forms and ornaments into the works they constructed for their rulers, superior in elegance to any the latter knew or could have invented. Hence there arose a style combining all the beauty and finish of the previous native art with a certain magnificence of conception which is deficient in their own works. The elevations of the mosques huve usually been studiously arranged with a view to express at once the structural arrangements, and to avoid monotony of outline by the varied elevation of each division. The central portion of the fagade was raised by a storey over the roof of the wings, and to the front of this was attached the minarets, in the earliest mosques forming only small turrets over the facade, but soon after they became richly carved towers of considerable height. The upper storey formed a gallery under the central dome which was supported on pillars connected by open stone trellis work, admitting a subdued light, and providing perfect ventilation (see Plate III. fig. 15). At first the

facades were pierced by arched entrances, but at a later date a screen of columns formed an open front and the minarets were removed to the corners, no longer for the mu'azzin, but simply as architectural ornaments.

The tombs were pillared pavilions of varying dimensions, the central area over the grave covered by a dome standing on twelve pillars. These pillars connected by screens of stone trellis work carved in ever-varying patterns, and round this there might be a verandah with twenty pillars in the periphery, or a double aisle with thirty-two in the outer square. And as these were irregularly spaced in order to allow the inner twelve to support the lintels of a regular octagon for the dome, the monotony of equal spacing was avoided. For further details and examples of this style, however, we must refer the reader to the published volumes of the archaeological survey of Western India relating to Ahmedabad and Gujarat.

The Adil Shahi dynasty of Bijapur (i402-i686 , l was of foreign extraction and held the Shiah form of Islam, prevalent in Persia, whilst they largely employed Persian officers. This probably influenced their architecture and led to that large- ness of scale and grandeur which characterized the style, differing markedly from that of the buildings of Agra and Delhi, but scarcely, if at all, inferior in originality of design and boldness of execution. There is no trace of Hindu forms or details; the style was their own, and was worked out with striking boldness and marked success. The mode in which the thrusts are pro- vided for in the giant dome (see Plate III. fig. 14) of Mahommed Adil Shah's tomb (a.d. 1650), by the use of massive pendentives, hanging the weight inside, has drawn the admiration of European architects. And this dome, rising to about 175 ft. from the floor, roofs over an area 130 ft. square, or 2500 sq. ft. larger than the Pantheon at Rome, where stability is secured only by throwing a great mass of masonry on the haunches. The Jami masjid, begun by All Adil Shah, 1567, but never quite completed, is one of the finest mosques in India. The central area of the mosque proper is covered by a large dome, supported in the same way as that on Mahommed Shah's tomb. This dome, like all the earlier ones in India, perhaps wants in outside eleva- tion; but in the splendid Ibrahim Rauza and mosque we find the domes elevated above mere segments. In this latter group, erected about 1626, the domes are more elevated, and we have every detail of the structure covered with the most delicate and exquisitely elaborate carving, the windows filled with tracery, and the cornices supported by wonderfully rich brackets. In the tomb too — as if in defiance of constructional demands — the room, 40 ft. sq., is covered by a perfectly level stone roof, supported only by a

cove projecting on each side from the walls.

The Indian Saracenic style of the Mogul dynasty began under the emperor Baber, 1526; but one of the first and most character- istic examples that remain is the mosque of Sher Shah (iS4r) near Delhi (see Plate I. fig. 10), and others exist at Rohtas. These earlier structures are interesting as the initial forms of the style, but are little known to Europeans. The emperor Akbar (1 556-1605) built largely, and the style developed so vigorously during his reign that it would be difficult to enumerate the peculiarities of his numerous buildings. As in the Gujarat and other styles, there is a combination of Hindu and Mahom- medan features in his works which were never perfectly blended. Like their predecessors, the Pathans, the Moguls were a tomb- building race, and those of the latter are even more splendid than those of the former, more artistic in design, and more elaborately decorated. The fine tomb of Akbar's father, Humayun, and the numerous structures at Fatehpur Sikri best illustrate the style of his works, and the great mosque there is scarcely matched in elegance and architectural effect; the south gateway is well known, and from its size and structure excels any similar entrance in India. And his tomb at Sikandra, near Agra, is a unique structure of the kind and of great merit. Under Jahangir the Hindu features vanished from the style; his great mosque at Lahore is in the Persian style, covered with enamelled tiles; his tomb near by (1630-1640) was made a quarry of by the Sikhs from which to build their temple at Amritsar. At Agra,, the tomb of Itimad-ud-daula (see Plate IV. fig. 16), completed in 1628, built entirely of white marble and covered wholly by pietra dura mosaic, is one of the most splendid examples of that class of ornamentation anywhere to be found.

The force and originality of the style gave way under Shah Jahan (1627-1658) to a delicate elegance and refinement of detail, illustrated in the magnificent palaces erected in his reign at Agra and Delhi, the latter once the most exquisitely beautiful in India. The most splendid of the Mogul tombs, and the most renowned building in India, is the far-famed mausoleum, the Taj Mahal at Agra (see Plate IV. fig. 1 7) , the tomb of Mumtaz Mahal, the wife of Shah Jahan. It is surrounded by a garden, as were almost all Moslem tombs. The extreme delicacy of the Taj Mahal, the richness of its material, and the complexity of its magnificent design have been dwelt on by writers of all countries. So also of the surpassingly pure and elegant Moti Masjid in the Agra fort, all of white marble: these are among the gems of the style. The Jama Masjid at Delhi is an imposing building, and its position and architecture have been carefully considered so as to produce a pleasing effect and feeling of spacious

elegance and well-balanced proportion of parts. In his works Shah Jahan presents himself as the most magnificent builder of Indian sovereigns.

In Aurangzeb's reign squared stone and marble gave way to brick or rubble with stucco ornament, and the decline of taste rapidly set in.

The buildings at Seringapatam and Lucknow are of still later date, and though in certain respects they are imposing, they are too often tawdry in detail.

Bibliography. — J. Fergusson, History of Indian and Eastern Architecture (new ed., in press) ; Fergusson and Burgess, Cave Temples of India, 8vo (London, 1880); J. Burgess, Reports of the Archaeo- logical Survey of Western India (9 vols. 4to, London, 1874-1905); Rock-cut Temples of Elephanta (Bombay, 1871); Buddhist Stupas of Amaravati, &c. (4to, 1887); Ancient Monuments, Temples, Sculp- tures, &c, in India, 170 plates (fol. Griggs, London, 1897); Gen. Sir A. Cunningham, Archaeological Survey of India Reports 1862-1885 (23 vols. 8vo ; Calcutta, 1871-1886); H. Cole, Preservation of Ancient Monuments in India, 100 plates (fol. Griggs, London, 1896); G. le Bon, Les Monuments de I'lnde (fol. Paris, 1893); E. W. Smith, Mughal Architecture of Fathpur-Sikri (4 vols. 4to, Allahabad, 1894- 1898); Sir Lepel Griffin, Famous Monuments of Central India (fol. 1886); A. Rea, Chalukyan Architecture of Southern India (4to, Madras, 1896) ; A. Ffihrer, Monumental Antiquities, &c, in the N.W. Provinces and Oudh (4to, Allahabad, 1891); A. Foucher, L'Art grico-bouddhique du Gandhdra, 2 tomes (8vo, Paris, 1905-1908); Griinwedel, Buddhist Art in India (Eng. trans., 8vo, 1901); R. Phene Spiers, Architecture East and West (8vo, 1905); H. C. Fan- shawe, Delhi, Past and Present (8vo, 1902) ; J. H. Ravenshaw, Gaur: its Ruins and Inscriptions (4to, 1878); Sayyid Muhammad Latif, Lahore: its History, Architectural Remains, &c. (8vo, Lahore, 1892);

II. Cousens, Bijapur, the Old Capital of the Adil Shahi Kings (8vo, Poona, 1908) ; G. W. Forrest, Cities of India (8vo, 1903) ; Dr W. H. and Mrs Workman, Through Town and Jungle, among the Temples and People of the Indian Plains (8vo, 1904). (J. Bs.)

INDIAN LAW. — The law in force in British India may be

conveniently divided into five heads: (1) The law expressly made for India by the British parliament, or by the sovereign. (2) English law in force in India though not expressly made for India. (3) The law made by persons or bodies having legislative authority in India. (4) Hindu law. (5) Mahommedan law. The first three of these are frequently described as Anglo-Indian law. They are with rare exceptions territorial, i.e. they apply generally, either to the whole of India, or to a given area, and to all persons within those limits. The last two are personal, i.e. they apply only to persons who answer a given description.

1. The Law expressly made for India by the British Parliament or the Sovereign. — There are in existence about 120 acts of parliament containing provisions relating to India. The greater portion of these provisions relate to what may be called con- stitutional law, such as, the power of the East India company, the transfer of these powers to the crown, the powers of the secretary of state, of the Indian council, of the council of the governor- general, and of the other councils in India, and so forth. The law made by the sovereign consists mainly of charters granted to the four high courts of Bengal, Madras, Bombay and the North-West Provinces. A great many charters were granted to the East India Company, and some of the earlier ones contained very important provisions as to the legislative and judicial authority to be exercised in India, but these provisions are now obsolete.

2. The English Law in force in India though not made expressly for India. — A considerable portion of the law of England, both statute law and common law, was introduced into India by the assumption that when courts of justice were established in India, to be presided over by English judges, it followed that they were to administer English law as it stood at the time of the granting of the charter so far as it was applicable. There has been considerable doubt as to when this assumption ceased, but the date generally assigned for this purpose is 1726. It only applied, however, to courts established before this date under the direct authority of the crown, that is to the charter courts of Calcutta, Madras and Bombay, and at a very early date (21 Geo. III. c. 70) the jurisdiction of these courts was limited, practically, to the inhabitants of the presidency towns and to suitors of European origin residing elsewhere. Moreover, even in the presidency towns, these courts were directed to apply to Hindus and Mahommedans their own laws in regard to all matters of inheritance and succession, family law and matters relating to religion or caste. In the territories outside the presidency towns where courts of justice were established by the East India company, acting under the authority of the emperor of Delhi, the only assumption that could be

made as to the law to be administered was that it was the law already in existence. Acting on this assumption the company's courts ad- ministered the Mahommedan criminal law which was the general law of the subjects of the Mogul emperor: the revenue system remained, as did also the existing relations of zemindar and ryot, i.e. of the cultivator and of the persons intermediate between the state and the cultivator. In regard to matters of family law, inheritance and succession, religion and caste the company's courts were expressly enjoined to apply the Hindu law to the Hindus, and the Mahommedan law to the Mahommedans. Of course it was also the duty of these courts to recognize well- established local usages. Thus practically all the topics of litigation at that time likely to arise were provided for. It was as time went on, when by intercourse with Europeans new ideas, and with them new wants, sprang up in the native populations, that gaps came to be discovered in the law. To such cases the judges had been vaguely told that they were to apply " the rules of equity and good conscience," which they naturally sought in the English law. The matters in which the notions of English law have most affected India are the power of completely

separating the ownership of property from the enjoyment of it by means of trusts, the testamentary power, the creation of life estates, the substitution of one owner of property for another on the happening of some future event, the rules of evidence, criminal law, civil and criminal procedure and the subordination of the executive to the ordinary law. Upon all of these topics the law of India is mainly English. Not that the whole of it rests upon the slender authority above described. Much of it, as will appear presently, was introduced by the Indian legislatures; much of it also, although originally introduced by the courts, has since received legislative sanction.

3 . The Law made by Persons or Bodies in India having Legisla- tive Authority. — As a general proposition it would be true to say that wherever a British authority has legislated in India it has been largely influenced by the English law. The legislative authorities in India are very numerous. Those now existing are (1) the governor-general of India in council; (2) the governor of Madras in council; (3) the governor of Bombay in council; (4) the lieutenant-governor of Bengal in council; (5) the lieutenant-governor of the North-Western Provinces in council; (6) the lieutenant-governor of the Punjab in council; (7) the lieutenant-governor of Burma in council; (8) the lieutenant- governor of Eastern Bengal and Assam in council. No legislative enactments of any kind passed in India before 1793 are now in force. In Bengal in the year 1793 forty-eight regulations

(as they were then called) were passed in a single day, and it was assumed that all previous legislation in Bengal was thereby superseded. Similar regulations were passed about the same time, and the same assumption was made, in Madras and Bombay. As new territories were acquired by the government of India, the existing regulations were in some cases extended to them, but in other cases this was thought not to be convenient, and for these territories the governor – general in council issued general orders, not in the regular way of legislation but in exercise of his executive power. Hence the distinction between " regulation " and " non-regulation " provinces. Any doubt as to the validity of the orders so made was removed by the Indian Councils Act 1861. The term " regulations " was dropped after the passing of the 3 & 4 Will. IV. c. 85 (1833), and since that time the word " Acts " has been in use. Acts are referred to by the year of their enactment.

Several attempts at extensive legislation in India, intended apparently as a step towards a general codification of the law, have been made. The act of 1833 above mentioned directed the issue of a commission in India which was intended to survey the whole field of law and to suggest such alterations as appeared desirable. Of this commission Lord Macaulay was a member. It never attempted to perform the large task indicated in its appointment, but it produced a draft of the Penal Code (Act XIV. of i860). It was not, however, until 22 years after Lord Macaulay left India that the Penal Code became law, and in the meantime the draft had been a good deal altered. The Penal Code is, un- doubtedly, the most important, as it is also the most successful, effort of Indian legislation. It is to a large extent a reproduction of the English law of crimes. But there are some important differences; for whereas there are in English law no authoritative definitions of such important crimes as murder, manslaughter, assault and theft, and many kindred offences, the Penal Code seeks to define every crime with precision. Moreover, the Penal Code imports into the definition pf nearly every crime, and, therefore, into the charge on which the accused is tried, words the purport of which is to describe the state of mind of the accusedˆ at the time the alleged act was committed, thereby making it necessary to ascertain at the trial what that state of mind was. This in England is not necessary to anything like the same extent. For example in England, in order to charge a man with manslaughter all that is necessary to allege is that A killed B. But in order to charge a man with culpable homicide it is neces- sary to state with much particularity what the accused intended, or what he knew to be likely to happen when he did the act; and this condition of mind must be

proved at the trial. It is true that this proof is facilitated by certain presumptions,

but nevertheless it sometimes presents considerable difficulty. On the other hand, in dealing with offences against property the authors of the Penal Code have cleared away entirely the difficulties which have long beset the English law as to how to deal with a man who, having become possessed of property, dishonestly misappropriates it. English lawyers have tried to squeeze as many of these cases as they can into the crime of larceny. The Penal Code simply makes dishonest misappropria- tion a crime in itself. (See further Criminal Law.)

In 1853 and again in 1861 commissions were appointed in England to draw up a body of laws for India " in preparing which the English Jaw should be used as a basis," but the only direct result of these two commissions was the Indian Succession Act (Act X. of 1865). But as Hindus and Mahommedans are excluded from the operation of this act its application is limited. The wills of Hindus are provided for by Act XXI. of 1870. Two important acts, however, were passed in India shortly after the attempt to legislate for India through commissions sitting in England came to an end, namely the Evidence Act (Act I. of 1872) and the Contract Act (Act IX. of 1872). Both these acts have been a good deal criticized. Two other important acts passed somewhat later are the Transfer of Property Act (Act IV. of 1882) and the Trusts Act (Act IV. of 1882). These acts are all substantially reproductions of the English law.

The law relating to land revenue has been the subject of innumerable regulations and acts of the Indian legislature. A description of the revenue systems prevailing in India will be found in the article on India. The law which governs the relation of ryots (i.e. cultivators) to those who for want of a better term we must call landlords has grown to a considerable extent out of the revenue system. The view which was at first taken of this relation was unfortunately affected by English notions of the relation of landlord and tenant, but this view has been considerably modified in favour of the tenant by recent legislation.

Books ofReference on Anglo-Indian Law. — Morley , A nalytical Digest (1849); Stokes, Anglo-Indian Codes (1887); Ilbert, Govern- ment of India (1906), which contains a very useful Table of Acts of

Parliament and Digest of their contents; Strachey, India, its Administration and Progress (1903); Baden-Powell, Land Systems of British India (1892); Wigley, Chronological Tables of Indian Statutes (Calcutta, 1897).

4. Hindu Law. — The Hindu law is in theory of divine origin, and therefore unchangeable by human authority. Ask a Hindu

where his law is to be found, and he will reply " In ■S/Hˆrf theShasters." The Shasters are certain books supposed LaWi to be divinely inspired, and all of great antiquity.

They contemplate a state of society very unlike that of the present day, or that of many centuries back. It follows that these sacred writings, whilst they leave many of the legal requirements of the present day wholly unprovided for, contain many provisions which no Hindu even would now think of enforcing. Consequently, in spite of the theory, the law had to be changed. Legislation, which with us is the most potent as well as the most direct instrument of change, has had scarcely any effect on the Hindu law. Probably it never entered into the head of any Hindu before British rule was set up in India that any human agency could be entrusted with the power of making or changing the law; and although both the Indian legislatures and the British parliament have full power to legislate for Hindus upon all matters without any exception, they have, in fact, hardly ever exercised this power as regards the Hindu law. Custom is a less direct instrument of change than legislation, and operates more slowly and secretly, but its influence is very great. The custom which supplants the sacred law may indeed be as old or older than the sacred law, and its existence may be due to the divinely inspired law having failed to displace it; or the habits and necessities of the people may have engrafted the custom upon the sacred law itself. In either view there has been no difficulty in accepting custom where it varied from the sacred law. Indeed, the sacred books themselves recognize to some extent the operation of custom. Thus we

find it said in the Laws of Manu (viii. 4, 1), " the king who knows the sacred law must inquire into the laws of castes, of districts, of gilds and of families, and thus settle the peculiar law of each." It is to the influence of custom that the divergence between the Hindu law of to-day and that of the Shasters is largely due. Another method by which law is developed, and one more subtle still, is interpretation; and it is one which in skilful hands may be used with considerable effect. Without any dishonesty, people very often find in the language of the law words sufficiently vague and comprehensive to cover the sense which they are looking for. The action of interpretation upon Hindu law differs accordingly as it took place before or after the British occupation. Formerly the only persons whose interpretation was accepted as authoritative were the writers of commentaries. But the Indian courts are very sparing in accepting modern commentaries as authoritative, though nevertheless they carefully record their own interpretations of the law, and these are always treated as authoritative. It follows, from the very nature of the influences thus brought to bear upon law, that not only have the sacred books been departed from, but that different results have been arrived at in different parts of India. The differences have led recent

writers to speak of five schools of Hindu law, called respectively the Benares school, the Bengal or Gauriya school, the Bombay school or school of western India, the Dravida school or school of southern India and the Mithila school — the district last named being a very small one to the south of and adjoining Nepal. But it would be a great mistake to suppose that the differences between these so-called schools are compar- able to each other in importance. As will appear presently, it would be much more correct to speak of two schools, that of Benares and that of Bengal — the other three being subdivisions of the first.

It will be convenient to give a short description of those of the sacred books which are actually in use in the Indian courts when they desire to ascertain the Hindu law. Of these by far the first in importance, as well as the first in Books. date, is the one which we call the Laws of Manu. It has been translated by Professor Buhler, and forms vol. xxv. of the " Sacred Books of the East," edited by Professor Max Muller. If we examine it, we find that only about one- fourth of the book deals with matters which we should call legal, the rest being concerned with topics either purely religious or ceremonial. And of these topics only one, that relating to partition of family property, belongs to that portion of the Hindu law which is administered in the courts, and, as one would expect, what is said on this topic has been largely departed from under the influences above described. Very little is known as to the date of the Laws of Manu. They are probably much older than their present form, which Buhler places somewhere betwetn 200 B.C. and a.d. 200. Of more interest than the exact date is the state of society which they disclose. The tribal and nomadic stage had passed away. Society had so far settled down as to possess a regular form of government under a king. The people were divided into four great castes, representing religion, war,. commerce and agriculture and servitude. Justice is spoken of as administered by the king. Provision is made for the recovery of debts and the punishment of offences. There are rules relating to the pasture of cattle, trespass by cattle and the enclosure of cultivated fields. There was evidently considerable wealth in the shape of horses, carriages, clothes, jewelry and money. There is no mention of land in general as the subject of permanent private property, though no doubt the homestead and the pasture land immediately adjoining were permanently owned.

The (so-called) Smriti of Yajnavalkya was, no doubt, a work of considerable importance in its day, and is still some- times referred to. It shows a somewha-t more advanced state of society than the Laws of Manu. The occupier of land has a firmer hold upon it, and

there seems to be even a possibility of transferring land by sale. The date of it has not been fixed, but it is thought to be later than the Laws of Manu.

The Smriti of Narada belongs to a still later period, perhaps

to the sth or 6th century of our era. It goes more into detail than the other two books just mentioned.

But far more important for practical purposes than these sacred books are the commentaries. These are not sacred. The most important of them all is that known as the Mitacshara. The author of it was named Vijnaneswara. His work is a commentary on the Smriti of Yajnavalkya, and it is supposed to have been written in the latter half of the nth century. Only a portion of it is used by the law courts — that portion which relates to the partition of family property. The Mitacshara is an important authority for Hindus all over India, and in the greater part its authority is supreme. But there is one very important exception. In the district which is sometimes called Bengal Proper (from its correspondence with the ancient kingdom of Bengal, of which Gaur was the capital), and may be roughly described as the valley of the Ganges below Bhagalpur, the prevailing authority is a treatise called the Dayabhaga. It is, like the Mitacshara, as its name imports, a treatise on partition. The author of it was Jimutavahana. There does not appear to be any more distinct clue to its date than that this author wrote after the 12th century and before the 16th. The very important points of difference between the two commentaries will be stated hereafter. In western India there is a commentary of authority called the Vyavahara Mayukha. It belongs to the 16th century. Generally its authority is secondary to that of the Mitacshara, but in Gujrat its authority is to some extent preferred. In the south of India the Smriti Chandrika is a work of importance. It belongs to the 13th century. It generally follows the Mitacshara, but is fuller on some points. The Vivada Chintamani is used in the small district of Mithila. It is said to belong to the 15th century.

The joint family is by far the most important institution of Hindu society, and it is only through the joint family that we can form a proper conception of the Hindu law. It is the form in which the patriarchal system has survived in India. There is nowhere in Hindu

litera- ture, ancient or modern, a description of it as it has existed at any time. In its general features it has always been too universal and too well known to be described. In the Laws of Manu we find very little about it, but what we do find is of great interest. The subject is taken up with reference to a question which in every patriarchal system imperatively requires an answer. What is to be done when a break-up of the family is threatened by the death of the common ancestor ? Upon this subject the author of the Laws of Manu says in chap, ix. v. 104: " After the death of the father and the mother, the brothers being assembled, may divide among themselves in equal shares the paternal estate, for they have no power over it while the parents live." Then in v. 105, " or the eldest son alone may take the whole paternal estate; the others shall live under him just as they lived under the father." And in v. in, "Either let them thus live together, or apart if each desires to gain spiritual merit, for by their living separate merit increases, hence separation is meritorious."

We may put aside what is said about the mother which is probably a survival of polyandry, and is now obsolete, and fix our attention upon three important points: (1) Authority is attributed to the father during his life; (2) the same absolute authority is attributed to the eldest son upon the father's death, if the family remains undivided; (3) the sons are at liberty, are indeed recommended, to divide the property. Now, though there may be doubts as to how far this type of family was at any time the universal one, there carfhot be any doubt that in those early times it largely prevailed, and that the modern Hindu joint family is directly derived from it. Moreover, it must be remembered that what is here discussed is not owner- ship, but managership. If the family remained undivided, the eldest son did not take the family property as owner; he only became the uncontrolled manager of it. So far as there was any notion of ownership of the family property, and it was in those early times quite rudimentary, it was in the nature of what we call corporate ownership. The property belonged

The Mat family.

not to the individual members of the family collectively, but to the family as a whole; to use a modern illustration, not to the members of a family as partnership property belongs to partners, but as collegiate property belongs to fellows of a college. Probably, however, in early times it never occurred to any one to look very closely into the nature of ownership, for until the question of alienation arises the difference between managership and ownership is not of very great importance; and this question did not arise until

much later. When and under what circumstances Hindus first began to consider more carefully the nature of ownership we have no means of ascertain- ing. But we have very clear evidence that there was at one time a very warm controversy on the subject. Each of the two leading commentaries on Hindu law, the Mitacshara and the Dayabhaga, opens with a very long discussion as to when and how a son becomes entitled to be called an owner of the family property. Two conflicting theories are propounded. One is that the sons are joined with the father in the ownership in his lifetime; the other is that they only become owners when he dies, or relinquishes worldly affairs, which, according to Hindu ideas, like taking monastic vows, produces civil death. The author of the Mitacshara adopts the first of these views; the author of the Dayabhaga adopts the second; and this radical difference led to the great schism in the Hindu law. It follows that, according to the Dayabhaga view, the sons not being owners, the father is sole owner. He is both sole owner and uncontrolled manager. According to the Mitacshara view the father and the sons together are the owners, not as individuals, but as a corporation. But even this is not inconsistent with the father retaining his absolute control as manager. How far he has done so will be considered presently.

Hitherto, for the sake of simplicity, the position of father and son has alone been considered; but now take the case of several brothers living together with sons and grandsons. What is the nature of the ownership in this case, and in whom is it vested? Neither in the Dayabhaga nor in the Mitacshara is this question discussed directly, but each of these com- mentaries discloses the answer which its author would give to this question. According to the Mitacshara, of however many different branches, and of however many different members, a family may consist, they all form a single unity or corporation to which the family property belongs. Not that this is asserted in so many words; there is probably no Sanskrit word corre- sponding at all nearly to our word corporation. But this is the only language in which a modern lawyer can describe the situation. The members of the family are not partners; no one can separately dispose of anything, not even an undivided share. It is quite otherwise under the Dayabhaga. The property belongs to the members of the family, not as a corporation, but as joint owners or partners. Each is the owner of his undivided share; but not all the members of the Dayabhaga family have a share in the ownership; the sons whose fathers are alive are entirely excluded: the owners are those mem- bers of the family of any age who have no direct living ancestor. .

This was the nature of family ownership in its two principal forms, but the possibility that an individual member of the family could have something exclusively his own is clearly recognized in the Laws of Manu. Thus in chap. ix. v. 206, it is said, " Property acquired by learning belongs solely to him to whom it was given, likewise the gift of a friend, a present received in marriage, or with the honey mixture." And again in v. 208, " What the brother may acquire by his labour without using the patrimony, that acquisition made solely by his own effort he shall not share, unless by his own will, with his brothers "; and these texts, as we shall see presently, are still of practical application. Nowhere has a strict family system prevailed without some analogous measure of relief (see Sir H. Maine, Early History of Institutions, p. no).

The modern Hindu joint family is a community the members of which are all descended from a common ancestor, and the wives and unmarried daughters of those who are married.

Perhaps the wives and daughters might more correctly be said to belong to the family than to be members of it. In its complete form the family is said to be joint in food, worship and estate; and notwithstanding the divergence between the Mitacshara and Dayabhaga systems, the main external features of such a family are the same all over India. Every Hindu family has a common home. This does not mean that there is a single house in which all the members of the family con- tinuously reside, but there is one house where the family gods remain, where the wants of all the members of the family are provided for, where the family worship is conducted, and to which every member of the family is at any time at liberty to resort. This is the real home of a Hindu. Any other residence, however long it may last, is looked upon as temporary. Here also the wives and children remain whilst the men are employed at a distance. With regard to the enjoyment of the family property there is no distinction, except such as the members of the family themselves choose to make. Everything is enjoy- able in common. This is the same all over India. It is very necessary to distinguish between ownership and enjoyment. Although the ownership of the family property under the Mitacshara differs very materially (as explained above) from that under the Dayabhaga, the enjoyment in both cases is the same. There is one common fund out of which the wants of the family are supplied. No one is dependent upon his own

contribution to the family fund. No one member can say to another, " You have consumed more than your share, and you must make it good." On the other hand, whatever is earned goes into the common stock. Though separate acquisition is possible, it is exceptional, and there is always a presumption that the earnings of all the members belong to the common fund, so that if any member claims property as self-acquired he must establish his assertion by evidence as to how he ac- quired it, and that he did so " without using the patrimony." The accounts of the family are kept by the manager, who is usually the eldest male, and he also generally manages the property. But he is assisted and controlled by the other members of the family. No separate account is kept of what each member contributes or receives. The expenditure on behalf of the various members of the family is scarcely ever equal, but this inequality creates no debt between the members of the family. If any one is dissatisfied he can protest, and if his protest is not listened to, there is only one remedy — he can demand a partition. The powers of the manager are those of an agent: it is very rare to find them formally expressed, and they must be gathered from the usual course of dealing.either amongst Hindus generally, or in the particular family to which the manager belongs; and it is the custom for all the adult male members of the family to be consulted in matters of serious importance. The alienation of land is always looked upon as a matter of special importance, and, except in cases of urgent necessity, requires the express assent of all the members of the family.

If any member of a Hindu family who is one of the co-owners wishes for a partition, he can demand one, there never having Partition, been any compulsion on the members of a Hindu family to live in common. Of course in a Dayabhaga family there can only be a partition as between brothers, or the descendants of brothers; between a father and his sons there can be no partition, the sons not being owners. The father may, if he chooses to do so, distribute the property amongst his sons, and he sometimes does^so; but this is a distribution of his own property, and not a partition. The father can distribute the property as he pleases. But the absolute power of the father in this respect has only been recently established. It used to be thought that, if the father made a distribution, he must give to each of his sons an equal share. It is now settled that the father is absolute. Under the Mitac- shara, the ownership being vested in the father and sons, there can be a partition between father and sons, and the sons can always insist that, if a partition is made, their rights shall be respected. Whether, under the Mitacshara law, the sons have the right to demand a partition in opposition to their

father has been much disputed. It is now generally considered that the sons have such a right.

*In modern times if a partition takes place everything belonging to the family in common must be divided, even the idols. If there is only one idol, then each member of the family will be entitled to a " turn of worship," as it is called. It is, however, open to the members of the family to make any special arrange- ments either, for retaining any portion of the property as joint, or as to the mode of carrying out of the partition, provided they can all agree to it. It is remarkable that in the Laws of Manu no such complete partition as can new be required is prescribed. A list of articles is given of considerable importance of which no partition could be c aimed. In chap. ix. v. 219, it is said, " A dress, a vehicle, ornan ents, cooked food, water and female slaves, property destined fc * pious uses and sacrifices, and a pasture ground " are all declared to be indivisible. Land and the right of way to the family house were also at one time indivisible. These things, therefore, must have been used in common after partition had taken place, which looks as if the family were not entirely broken up; and it is possible that they inhabited several houses within the same enclosure, as is some- times seen at the present day. It is not always easy to sub- divide property amongst the sharers, especially where they are numerous; and cases occur where a better division could be made by selling the whole or a portion of the property, and dividing the proceeds. This could always be done with the consent of all the sharers; and now by Act IV. of 1893 of the governor-general in council it can be done with the consent of a moiety in value of the sharers.*

Rulers in India are apt to look upon their territories as private property, but there is no instance on record of the succession to the throne being considered as partible. On the contrary, in the families which now represent the small mediatized princes, the family property is frequently, by a special custom, considered to be impartible. The property descends to the eldest male, the younger members of the family getting allowances, generally in the form of temporary assignments of portions of the family property.

Of course only the family property can be divided, and if any of the members make a claim on the ground of self -acquisition to exclude anything from partition, this claim must be considered ; and if it is upheld, that portion of the property must be excluded from partition. These claims sometimes give rise to a good deal of litigation, and are not always easy to determine. It must be borne in mind, however, that self-acquired property becomes family property as soon as it has

once descended. Thus if a man by a separate trade earns Rs.10,000, and dies leaving two sons and the son of a third son, these persons form a joint family, and the Rs.10,000 is family property. So also family property which has been partitioned remains family property still. Thus if A, a bachelor, gets on partition a piece of land and afterwards marries and has sons, under the Mitacshara law the father and sons form a joint family as soon as the sons are born, and to this family the land belongs.

When we come to deal with the question of what shares are taken on partition, it is convenient to follow the example of the Hindu commentators, and to treat the subject of inheritance in conjunction with it. The relative ancei importance of these two subjects has not always been perceived, particularly by the early English writers on Hindu taw. H. T. Colebrooke, the learned and accomplished translator of the Mitacshara and the Dayabhaga, published the two treatises together in one volume which he called The Law of Inheritance. But these treatises, although they deal incidentally with inherit- ance, are both described by their authors as treatises on partition only; and this, no doubt, is because the subject of inheritance, apart from partition, is of comparatively small importance. Inheritance is the transfer of ownership which occurs at and in consequence of a death. It follows from this that in a Mitacshara joint family there is no inheritance. The death of a member of the family makes no change in the ownership; not any more than the death, of a fellow in the ownership of a college, or of

a shareholder in the ownership of a railway company. In a Dayabhaga family there is a case of inheritance whenever a member dies. The share of that member descends to his heir. But here, again, no perceptible change in the affairs of the family is occasioned thereby. The enjoyment of the family property is no more affected thereby than by a death in a Mitacshara family. It is only when a partition takes place that the devolu- tion of the sharesby inheritance has to be traced. Inheritance, therefore, apart from partition, has not to be considered when we are dealing with family property under either system.

Let us now consider partition in a Mitacshara family. Of course the only persons who can claim a share are the members of the family. These, as has been said, are the male descendants of a common

ancestor through males, their wives and daughters. But the females are entirely excluded from any share on a partition, and we have to consider the males only. The rule for ascertaining the share to which each member of the family is entitled can be best explained by the following diagram, which represents the male members of a Mitacshara family of whom A is the common ancestor: —

A

C

5T

■i H

TT

R

l—K L

I I

S T

M

■w

X Y Z

The whole family may be considered as forming one group, which may conveniently be called the group A; and it is evident on inspection that the family may be subdivided into a number of smaller groups each similarly organized, each group consisting of a man and his own male descendants. Thus besides the group A we have the group B, consisting of B and his descendants; the group C, consisting of C and his descendants; and so on. A group may die out altogether, as if U and W were to die childless, E and M being already dead. The rule of partition proceeds upon the supposition — not an unnatural one — that a family, when it breaks up, separates always into groups, and that the shares are moulded accordingly. For example, suppose that when the partition is made the surviving members of the family are N, O, S, T, X, Y, Z; then to find the shares we must go back to the common ancestor and reconstruct the pedigree. There were at first four groups, but at some time, it is

immaterial when, by the death of E and all his descendants the groups have been reduced to three; hence the first step is to divide the property into three equal parts, assigning one to each group. The group B was originally represented by three smaller groups, but now by only two, the groups F and G, and to each of these we assign | of J, or |. And, of the 5 assigned to the group F, N will get yj and O will get -fa. The other 5 is divided between the groups P and Q, each group getting ˆ. Then in the group P, X and Y will each get -fa, while Z, as the sole representative of the group Q, will get ˆj. It may be noted in passing that this principle of division survives in the succession per stirpes, of which we find so many examples in other systems of law which had their origin in the patriarchal system. 'ˆBy a similar process we should find that S and T each got ˆ of the property, they being the sole representatives of the groups C and D respectively. For the sake of simplicity we have taken a case where no example occurs of a father and son being both alive at the time of partition. But suppose P to be alive in addition to the persons mentioned above; then the group P gets tV> and that group consists of three persons, P, X and Y. There is no precise rule as to how the partition was to be made in such a case in the older Hindu law, and it is rarely that a partition takes place between father and sons, but if there should be one it is always assumed that the shares are equal, i.e. in the case under consideration each would take 3V.

Turning now to a Dayabhaga family, we find that the property is vested, not in the family as a whole, but in certain individual members of it — that is to say, in those male members of the

family who have no ancestor alive. And inasmuch as the undivided share of each member is his own, it follows that at his death inheritance will operate and it goes to his heirs. In order, therefore, to find what share each member takes on partition under the Dayabhaga, we must inquire into the history of the family and ascertain what share has become vested in each member of the family by the ordinary rules of inheritance. The rules of inheritance, as laid down in the Dayabhaga, are not very dissimilar to those which we find in other parts of the world. Everywhere we find that a man's property is taken by his nearest relatives, but there are differences in the way in which proximity is reckoned. Everywhere also there is a preference given to males and the relatives through males over females and the relatives through females, but there are differences in the extent to which this preference is carried. The relatives of a man through males are called his agnates; the relatives of a man through females are called his cognates. In the Hindu law as at present administered there is no primogeniture, and a decided

preference of males over females and of agnates over cognates. With regard to the question of proximity, the Daya- bhaga lawyers deal with the matter in a very curious way. All Hindus, as is well known, offer some sort of sacrifice to their deceased relatives, and the person by whom the sacrifice is to be offered as well as the nature of the offering are very carefully prescribed. These sacrifices are said to confer a " spiritual benefit " upon the deceased, and this spiritual benefit is greater or less according to the nature of the offering and the person who offers it. Now the Dayabhaga lawyers say that the person whose offering confers the greatest spiritual benefit is entitled to succeed as heir. This being the theory, we must see what rules govern in India the offering of sacrifices to the dead.

The most important offering is that of the pinda, or rice cake, and the persons who are entitled to make this offering to the deceased are called his sapindas. The offering next in importance is that of the lepa, or fragments of the cake, the crumbs as we might call them, and the persons who make this offering are called sakulyas. The offering of least importance is the simple libation of water, and persons connected by this offering are called samonadacas. But who are sapindas, sakulyas and samonadacas respectively, and of each class whose offering is most efficacious ? Practically we shall find that this question is solved by rules of consanguinity not unlike those which we meet with elsewhere. First of all come the sons; their offering is most efficacious, so that they are the nearest heirs and all take equally. Then come the sons' sons; then the sons' sons' sons. Here we break off . The line of inheritance is not continued beyond the great-grandsons. There are other cases in which, as we shall see, there is a similar break when we get three degrees away from the propositus: nor is this peculiarity confined to the Hindu law. We find traces of a similar break in the Roman and in the Teutonic law. After the great-grandson comes the widow. It is difficult to establish her claim on the ground of spiritual benefit, and it rests upon authority rather than principle. The opinions of ancient writers on the subject are very conflicting. They are set forth at great length in the Dayabhaga, with a conclusion in favour of the widow. Probably the intrusion of the widow is connected with the fact that she could in early times by cohabitation with a brother, and in later times by adoption, procure an heir to her sonless husband. Next to the widow come the daughters and then the daughters' sons. Their position, again, may be referred to the notion which prevailed la early times, that a Hindu who had no son of his own might take one of his daughters' sons and make him his own. Then comes the father, then the mother, then the brothers, then the brothers' sons, and then the

brothers' sons' sons. The sisters are excluded, but their sons succeed after the brothers' sons' sons; then come the brothers' daughters' sons. Then, leaving this generation, we go a step backward, and proceed to exhaust the previous generation in precisely the same way. It is only necessary to enumerate these in their order: father's father, father's mother, father's brothers, father's brothers' sons,

father's brothers' sons' sons, father's sisters' sons, father's brothers' daughters' sons. Then going another step backwards we get father's father's father, father's father's mother, father's father's brothers, father's father's brothers' sons, father's father's sisters' sons, father's father's brothers' daughters' sons. So far the line of succession is confined either strictly to male agnates, or to persons who may restore the broken line of male agnate relationship. But at this point, under the Dayabhaga, instead of exhausting the male agnates still further, as we might expect, we turn now to the cognates, i.e. the relatives of the deceased through the mother. It is said that these are also in some way sapindas. They are generally called bandhus. There is some difficulty in finding out the order in which they succeed, and since it is rare that an heir has to be sought outside the father's family, the question has not been much discussed. The question would have to be decided by the religious doctrine of spiritual benefit, and it is not improbable that Hindus who are accustomed to keep up sacrifices which confer the benefit would be able to say whose sacrifice was most efficacious. When all the sapindas both on the father's and mother's side are exhausted, we then go to the sakulyas, and practically these are found by continuing the enumeration of agnates upon the same principle as that already indicated through three generations lower and three generations higher. On failure of the sakulyas we should have to fall back upon the samonadacas, but probably all that can be said with certainty is that the sakulyas and samonadacas between them exhaust entirely the male agnates of the deceased. Where there are several persons whose offerings are equally efficacious, i.e. who stand in the same relationship to the deceased, they all take: the male descendants per stirpes, and the other relatives of the deceased per capita.

These, then, are the rules which govern the ascertainment of the shares of the members of a family on a partition. Neither in a Mitacshara family nor in a Dayabhaga family have they any effect so long as the family remains joint: it is partition, and partition only,

which brings them into play, and it is to this event rather than death that Hindu lawyers attach the greatest importance. Nevertheless all property in India is not joint property. Under the Mitacshara as well as under the Dayabhaga separate property may be acquired, and then, of course, we have true inheritance, for which the law must provide. So far as regards the Dayabhaga, the rules which govern the inheritance of separate property are (as we should expect) precisely the same as those which govern the inheritance of a share, and it is therefore unnecessary to restate them. But it remains to lay down the rules of inheritance for separate property under the Mitacshara law. They are not based by Mitacshara writers upon any religious principle, as under the Dayabhaga, yet the result is not widely different. First come the sons, then the sons' sons, and then the sons' sons' sons. Then the widow, whose right has been disputed, but was long ago established; then the daughters, and then the daughters' sons. After these come the parents, and it is peculiar that of these the mother comes before the father, then the father's sons and then the father's sons' sons. Then we go back to the preceding generation, and follow the same order — the father's mother, the father's father, the father's father's sons, the father's father's sons' sons. After this we go back another generation, and again follow the same order — father's father's mother, father's father's father, father's father's brother, father's father's brother's son. From this point the statements of Hindu lawyers as to the order of succession are very scanty and vague. One thing is certain, that under the Mitac- shara law no cognates (relations through females) are admitted until all the agnates (relations through males) are exhausted. So far we have considered intestate succession only, and the power of testamentary disposition is unknown to the true Hindu law. It was introduced by the decisions of the British courts of justice. By a will is meant a declara- tion by a man of his wishes as to the disposition of his property after his death, taking no effect during his-life. A will is therefore by its very nature revocable. The general question whether a

WTOs.

Hindu could dispose of his property by will arose in Bengal when Hindus began to attempt to dispose of their property after their death according to the English method. At that time there was a doubt whether the father was so completely absolute that he could dispose of his property to the exclusion of his sons, even in his lifetime. As soon as it was settled that he could do so, it was assumed that he could also make a will. It seems never to have been asked why it was that up to this time no Hindu had ever made a will, or to question the

radically false assumption that the power of alienation inter vivos and the power of testamentary alienation necessarily go together. A long series of decisions confirmed by the legislature has, however, established that a Hindu in modern times can dispose of any property of which he is the sole owner. In other words, a Hindu can dispose by will of his self-acquired property, and under the Dayabhaga a Hindu can dispose by will of his share in family property. But the courts which Created the testa- mentary power have also limited it to disposition in favour of persons living at the time of the testator's decease, thus avoiding many of the fanciful dispositions of property to which testators in all countries are so prone. But, curiously enough, this restriction, salutary as it is, has also been based on the notion that a testamentary disposition is a gift from the testator to the object of his bounty.

In almost all countries at an early stage of civilization some legal provision exists by which debtors can be compelled by their creditors to pay their debts, and by which, if they fail to do so, their property can be seized and applied to this purpose. But the extent to which this can be done varies very considerably. So long as the family system exists in its primitive vigour it acts as a protection to the family property against the extravagance of a single member, and we often find that even when the family system has almost, or completely disappeared, there is an unwillingness to deprive the future representatives of the family of their land and houses. Doubts, too, have arisen as to whether the same right which a creditor has against his living debtor can be exercised after the debtor's death against those who have succeeded to his property. In India these two considerations have been deeply affected by a principle enunciated by Hindu lawyers (traces of which we find in many Eastern countries), that a man who dies in debt suffers cruel tortures in a future state, and that it is the imperative duty of his own immediate dependants to deliver him from these tortures by discharging his liabilities. Whether this should be looked upon as a legal, or only as a purely religious duty, might be questionable : the courts have seized upon it as a basis for laying down in the broadest manner the just rule that those who take the benefit of succession must take the burdens also. The subject is one which has caused a great deal of litigation in India, and whilst some points have been clearly settled, others are still being slowly worked out. As the matter stands at present, it may be safely said that all separate property is liable for the debts of the owner, both in his lifetime and after his death in the hands of his heirs. The same may be said of the share in the family property of the member of a Dayabhaga family, of which share he is

the owner. So also the family property under both the Dayabhaga and Mitacshara is liable as a whole for the debts incurred on behalf of the family as a whole. As regards the question of the liability of the family property for the separate debts of the members of a Mitacshara family, the courts have held that the sons must pay their father's debts. Of course illegality would be an answer to the claims of the creditors against the heirs, just as it would be an answer to the claim against the original debtor; but there is some authority for saying that a debt contracted for an immoral though not an illegal purpose would not be enforced against the heir. According to modern decisions also, if judgment and execution on a separate debt are obtained against the member of a Mitacshara family, the share which would fall to him upon a partition may by process of law be set apart and sold for the benefit of the creditor. The doctrine of what is called maintenance plays an important

Malatea ante.

part in the Hindu law, and, as we shall see, it modifies con- siderably the rigour of the Hindu law in excluding from the succession females or persons suffering from mental or bodily infirmity. The right of maintenance under the Hindu law is the right which certain persons have to be maintained out of property which is not their own. The persons who in certain circumstances have this right are sons, widows, parents and unmarried daughters and sisters. The claim of the widow arises at the death of her husband; of a child at the death of its parent, and so forth. The claim is not for a bare subsistence only, but to such a provision as is suitable to the claimant having regard to his or her position in life. Of course the sons are generally heirs, and an heir can have no claim to maintenance; but a son excluded by any mental or bodily defect would have a right to maintenance. The girls are generally married in infancy, and after marriage they have no claim to maintenance from their own family. The most frequent claim is by the widow; and it is a very important one, because she can sometimes, through the assertion of this claim, put herself almost in the position of an heir. If a Hindu under the Dayabhaga dies leaving sons and a widow, .he widow is entitled to maintenance, and whilst the family remains joint she can claim to be suitably maintained, in the family if she remains in her husband's house, or out of it if she goes elsewhere. But if a partition takes place she is entitled to have a share equal to that of the sons set aside for

her use. She can even, if she thinks that the sons do not treat her properly, apply to the court to compel the sons to give her a separate share. This, of course, gives her a very strong position. Whether in a Mitacshara joint family the widow enjoying maintenance can in any case claim a share on partition is doubtful.

In some respects, and as regards some kinds of property, the ownership of women under the Hindu law differs from (that of men. These differences depend on the source property. irom which the property is derived. If a woman has inherited property from a male, or as a gift by her husband, or has obtained it as a share on partition, she does not own it in the same way as a man would do; she obtains only a kind of restricted ownership. She has the full enjoyment and management of it, but she cannot sell it, or give it away, or dispose of it by will; and at her death it goes not to her heirs but to the heirs of the person from whom she obtained it; her ownership simply comes to an end. If she obtained it by inheritance from a male, it will go on her death to the heirs of that male; if as a share on partition it will be divided amongst the other sharers; if as a gift from her husband, to the heirs of the husband. As regards property otherwise obtained she is in the same position as any other owner, but the rules of inheritance applicable to it are somewhat peculiar. It would be a mistake to look upon the restricted ownership of a woman as what the English lawyers call a life estate. There is no such thing as a remainder or reversion. The whole estate is vested in her. If we endeavoured to describe the position of affairs at her death in the technical language of the English law of real property, it would be more correct to say that there was a shifting use. The restriction of alienation is sometimes removed where there is a danger that the property might other- wise be lost, as for example when the property is likely to be sold for non-payment of government revenue, in which case a portion may, if necessary, be sold by the woman so as to save the remainder. So also a woman who has no other means of maintaining herself, or of providing for the performance of religious duties which are incumbent upon her, may sell so much of the property as will produce the necessary funds. It would be difficult for a purchaser to know whether he would be safe in purchasing from a widow selling under necessity, and more difficult still to preserve evidence of the necessity in case the necessity were disputed. Of course the woman herself could not dispute the validity of the sales, but those who take after her might do so. Consequently it is not unusual to obtain the concurrence of the person who at the time of the purchase is entitled to succeed if the widow were dead, and

it has been held that if this person concurs in the sale, no one else

can dispute it on the ground that it was unnecessary.

The subject of marriage is dealt with at considerable length in the Laws of Manu, and it is clear that, as originally conceived, marriage under the Hindu law consisted in nothing more than the mere possession of the woman, however agd wlfe _ obtained, by the man with the intention of making her his wife. Eight kinds of marriage are enumerated, and to each kind is assigned a separate name. The first four kinds are merely different forms of gift of the girl by her father to the husband. The other four kinds are — obtaining possession of a girl by purchase, fraud, ravishment or consent of the girl herself. But the simple gift of the girl by her father without any bargain or recompense was even then considered the most reputable form of marriage, and it is now the only one in common use amongst orthodox Hindus. The sale of the daughter was even in those early times stigmatized as disgraceful, but it was valid; and even now, if there were an actual transfer of the girl by the father, it is scarcely probable that the courts would inquire whether any inducement was given for the transfer. The trans- action takes place entirely between the father of the girl and the future husband; the girl has nothing to do but to obey. If the girl has no father, then it will be the duty of her nearest male relatives to dispose of her in marriage. If, however, the girl is not married when she attains puberty (which is very rare), then she may choose a husband for herself. The father cannot dispose of his son in marriage as he can of his daughter, nor is anything said about his consent in the matter; though in the case of a very young boy there can be no doubt that the consent of one or both parents is obtained. The marriage of very young boys is very common, and is certainly valid.

The ceremonies which precede and accompany a marriage are very numerous. 'By far the most important is that which consists in the bridegroom taking the bride's hand and walking seven steps. Amongst Hindus generally the performance of this ceremony following upon a betrothal would be treated as conclusive evidence of a marriage, whilst the omission of it would, amongst orthodox Hindus, be almost conclusive that no marriage had yet taken place. But still any particular customs of the tribe or caste to which the parties belonged would always be considered, and it cannot be said that the completion or non-completion of this ceremony is universally conclusive as to the existence of a marriage. There may be communities of Hindus which require something more than this; there are certainly some which require something less, and others which require something altogether different. There are lower castes in some parts of India calling themselves Hindus in which the only

ceremony accompanying a marriage is giving a feast to which the members of the two families are invited.

The marriage of Hindus is complete without consummation; and as girls are almost invariably married before the age of puberty, and sometimes long before, consummation is generally deferred, it may be, for several years. But all this time the parties are husband and wife, and if the husband dies the child becomes a widow. The condition of these child widows in India is certainly not an enviable one, for practically they can never hope to marry again. Whether the second marriage would be lawful was a disputed point in Hindu law until an act of the Indian Legislature (Act XV. of i860) declared in favour of the opinion that tjie widow might remarry. But the social prejudice against remarriage is still very strong, and such a marriage rarely takes place. If the widow has inherited" any property from her husband, she loses it by contracting a second marriage. There is no legal restraint upon the number of wives that a Hindu may marry, but polygamy is not practised so largely as is sometimes supposed.

Members of the three higher castes are forbidden to marry a woman of the same gotra as themselves. Literally a gotra means a cattle-yard, and the prohibition is considered to exclude marriage between all those who are descended from the same male ancestor through an uninterrupted line of males. This rule is said not to apply to Sudras. But there is another rule

which applies to all Hindus, and prohibits the marriage of a man with a girl descended from his paternal or maternal ancestors within the sixth degree. The working out of the rule is a little peculiar, but the result is to give a rather wide rule of exclusion of both agnates and cognates. There is, however, this important exception to these rules of exclusion — that if a fit match cannot otherwise be procured, a man may marry a girl within the fifth degree on the father's side and the third on the mother's. Practically this reduces the limit of exclusion to that last stated, because no one but the parties themselves with whom the choice rested could say whether or no any other suitable wife was available to the husband.

A Hindu must also marry within his caste: a Brahmin must marry a Brahmin, a Rajput must marry a Rajput, and a Sudra must marry a Sudra. Whether there are any other representa- tives of the four

original castes is very doubtful, and even the claim of the Rajputs to represent the military caste is disputed. Still the rule of prohibition is so far clear. But there are innumer- able subdivisions of Hindus which are also called castes, and as a matter of fact these minor castes do not intermarry. How far such marriages would be lawful it is difficult to say. The matter is entirely one of custom. The ancient Hindu law furnishes no guide on the subject, because under the ancient law the intermarriages of persons of different castes, even the highest, though they were considered undesirable, were recog- nized as legal. Modern Hindus seem disposed to deny the validity of marriages between persons of different castes in either sense of the term.

Divorce, in the sense of a rupture of the marriage tie, is not known to the true Hindu law. But unchastity deprives a wife of all her rights except to a bare maintenance, and this without any legal proof. She cannot succeed her husband as his heir, and of course she cannot remarry. A little confusion has been caused by the fact that a Hindu husband sometimes goes through a private ceremony which is erroneously called a divorce. But this is only done in order more effectually to bar an unchaste wife from succeeding to his property. Some very low castes are, however, said to allow a husband to divorce his wife, and even to allow the divorced wife to marry again. The single case in which a Hindu marriage can be dissolved by a court of law is by a proceeding under Act XXI. of i860, which was passed to meet the difficulties which arise when one of the parties to a Hindu marriage becomes a Christian. In this case, if the convert after deliberation during a prescribed time refuses to cohabit any longer with the other party, the court may declare the marriage tie to be dissolved, and a woman whose marriage has been thus dissolved is declared capable of marrying again.

An interesting chapter in the history of the modern develop- ment of Hindu law is that of the practice of what we call Suttee, _ though, properly speaking, the native term (Salt)

denotes, not a practice, but a person, i.e. a faithful wife. The practice in question is that of the widow burning herself with her husband when his body is burned after his death. This, according to Hindu ideas, is a laudable act of devotion on the part of the widow, and when Great Britain first began to administer the law in India it was not uncommon. The new- comers had not as yet taken upon themselves the responsibility of altering the law, but of course British officers did what they could to discourage the practice, and especially to prevent any pressure being put upon the widow to

perform the sacrifice. They could also take advantage of any circumstance which would render the case an improper one for the performance of the sacrifice, as, for example, that compulsion had been put upon the widow, or that the burning did not take place with the body of the husband. But if the proceedings were according to Hindu notions regular, it was contrary to the principles on which the governor-general then acted to interfere, and British officers had frequently to stand by, and, by not interfering, to give a sort of sanction to the sacrifice. When later the servants of the East India company began to assume a more direct responsi- bility for the government of the country, many suggestions were made for legislative interference. But, acting on the

Father and son.

salutary principle that it was unwise to interfere in any way with the religion of the people, the government abstained from doing so. In the meantime a considerable body of opinion against the practice had grown up amongst Hindus themselves, and at length the government thought it safe to interfere. By Regulation XVII. of 1829 widow-burning was declared to be a criminal offence. The measure produced no serious opposi- tion. There was hardly a single prosecution under this Regula- tion; and from this time the practice of widow-burning has entirely disappeared from that part of India which is under British rule.

There are certain peculiarities in the relation of father and son in India which have given rise to the suggestion that there is no relationship between sonship and marriage, and that the notion of sonship in India is founded entirely on that of ownership — ownership of the mother and a consequent ownership of the child. But the arguments by which this view is supported do not appear to be sufficient. The rights of a father over his son, and of a husband over his wife are, it is true, so far like the rights of ownership that both are in the nature of rights in rem. — that is, they are available against any person who infringes them; but it is contrary to established usage to speak of rights over a free person as rights of ownership, and no one is prepared to say that the wife or child are slaves of the father. There is no reason for abandoning in India the ordinary view, that sonship depends on marital cohabitation between the father and mother. There are undoubtedly in certain special and exceptional cases methods of acquiring sons otherwise than by marital cohabitation. But these contrivances can only be resorted to when there is no son by marriage, and the fiction which, as we shall see, is resorted to to conceal the true nature of these contrivances,

would be entirely meaningless, as would most of the rules which regulate them, if sonship in general was based entirely on ownership. There were at one time more contrivances than there are now for supplying the want of male issue by marriage. At one time a son could be begotten for a man who was dead by cohabitation of his widow with a member of his family or perhaps even with a stranger. This is generally looked upon as a survival of poly- andry. But this practice, though alluded to in the Laws of Manu as still subsisting, is now entirely obsolete. So there was a custom at one time by which a father could appoint a daughter to raise up male issue for him. The head of the family could also, if he had no son born in wedlock, accept as his own any child born in his house whose mother was not known or not married. So he could accept as his own the son of his wife born before marriage, or the son of his concubine. In the last three cases he may have been, and probably was, himself the father. But none of these contrivances for procuring a son is now in use. The only contrivance now employed for procuring a son, in the absence of one born in wedlock, is by taking into the family the, son of another man who is willing to part with him. This is called adoption. There are two kinds of adopted sons: one called dattaka and the other kritrima. The former is in use all over India; the latter only in Mithila. The following rules apply to the dattaka born of adoption: A man can only adopt who is without issue capable of inheriting his property, of performing the funeral ceremonies for himself, and of making the necessary offerings to his ancestors. A woman cannot adopt. But by the authority of her husband, and acting on his behalf, she may select a son and receive him into the family. A man can adopt a son without his wife's assent; nevertheless, the, son when adopted becomes the son of both parents.

Hindus consider it a grievous misfortune that the line of male descent should be broken. The due performance of the sacrificial offerings to the dead is thereby interrupted. Probably this explains the great latitude given in some parts of India to the widow to adopt a son on behalf of her husband in case he has died sonless. There is a text which says, " Nor let a woman give or accept a son unless with the assent of her lord." But the lawyers of western India do not consider that any express permission to adopt is necessary, and take it for granted that she

always has that permission. In Southern India, also, the widow may

adopt without express permission, but the sapindas must give their sanction to make the adoption valid. Elsewhere the words have received their natural interpretation, namely, that the husband must in some way indicate his intention that his widow should have authority to adopt. The only person to whom an authority to adopt can be given is the wife or widow; and no widow can be compelled to exercise her power to adopt if she does not wish to do so. The father has absolute power to give away his son in adoption even without the consent of his wife. But her consent is generally asked and obtained before the son is given. After the father's death the widow may give a son in adoption. The rule which in former times rendered it necessary that the nearest male sapinda should be adopted is obsolete, and the adoption of a stranger is valid, although nearer relatives otherwise suitable are in existence. A man may adopt any child whose mother he could have married if she had been single; if he could not have done so, then he cannot adopt her child. The reason given in the text is that the adopted son must bear the resemblance of a son. This recalls the dictum of the Roman law — adoptio naturam imitatur. The adopted son and the adopting father must be of the same caste. The period fixed for adoption by the three higher castes is before the cere- mony of upandyana, or investiture of the child with the thread which these castes always wear over the left shoulder. For Sudras, who have no thread, the period is prior to the marriage of the child. There has been much difference of opinion as to whether an only son can be given and received in adoption. It is now settled that the texts which discountenance this adoption do not constitute a prohibition which the law will enforce.

There is sometimes a difficulty in ascertaining whether or no an adoption has actually taken place. There must be a final giving and receiving of the child in adoption, and for Sudras nothing more is required. For the twice-born classes it is not finally settled whether any religious ceremony is actually necessary in order to render the adoption valid. But some religious ceremony in almost all cases accompanies the adoption, so that the absence of any such ceremony will always raise a suspicion that the adoption, though it may have been contem- plated and some steps taken towards it, had not been finally completed. If an adoption were in itself invalid, no acquiescence and no lapse of time could make it valid — just as an invalid marriage could not be similarly validated. But acquiescence by the family would be strong evidence of the validity of an adoption, and the rules of limitation by barring any suit in which the question could be raised might render the adoption practically unassailable.

The kritrima adoption is altogether different; although the adopted son performs the ceremonies for his adopting father's family, and has a right to succeed, he is nevertheless not cut off from his own family. A person of any age may be adopted, and he must be old enough to be able to consent to the adoption, as without this consent it cannot take place. In this form a female can adopt, and no ceremonies are required.

Authorities. — Hindu Law: J. D. Mayne, Hindu Law (London, 1892); Colebrooke's Treatises on the Hindu Law of Inheritance (Calcutta, 1810); Stokes's Hindu Law Books (Madras, 1865); West and Buhler, A Digest of the Hindu Law of Inheritance (Bombay, 1878); Jogendra Nath Bhattacharya, A Commentary on Hindu Law (Calcutta, 1894); Rajkumar Sarvadhikari, Principles of the Hindu Law of Inheritance (Calcutta, 1882); Gooroodass Banerjee, The Hindu Law of Marriage and Stridhana (Calcutta, 1896) ; Jogendra Chundar, Principles of Hindu Law (Calcutta, 1906).

5. Mahommedan Law. — The Mahommedan law is always spoken of by Mahommedans as a sacred law, and as contained in the Koran. But the Koran itself could not have supplied the wants even of the comparatively rude tribes to whom it was first addressed. Still less has it proved sufficient to satisfy the requirements of successive generations. No doubt the great veneration which Mahommedans have for the Koran ha6 caused them to be less progressive than members of other religious creeds. But in human affairs some change is inevitable, and

the law of the Koran, like other sacred laws, has had to undergo the supplementary and transforming influence of custom and interpretation, though not of legislation. This direct method of changing the law by human agency, natural and simple as it appears to us, is scarcely acknowledged by Orientals even in the present day, except in the rare instances in which it has been forced upon them by Western authority. But besides custom and interpretation, another influence of a special kind has been brought to bear upon Mahommedan law. Besides those utterances which the Prophet himself announced as the inspired message of God, whatever he was supposed to have said and whatever he was supposed to have done have been relied upon as furnishing a rule for guidance. This tradition (sunna) is only to be accepted if it can be traced up to a narrator at first hand, though it would be rash to say that the chain of evidence is always very strong. Mahommedans also, in support of a legal rule for which there is no direct authority, resort to the argument from analogy (kiyas) . The principle involved in a rule for

which authority can be quoted is extended so as to cover other analogous cases. There have also been accepted amongst Mahommedans, as authoritative, certain opinions on points of law delivered by those who were actual companions of the Prophet; these opinions are spoken of collectively under the name of ijma. Some of these methods of extending and modifying the law have produced changes which it would be very difficult to reconcile with a strict adherence to the language of the Koran (see the Introduction to the Corps de Droit Ottoman, by George Young; Oxford, 1905). The Mahommedans of India generally are Sunnites of the Hanafite school. The two principal authorities on Mahommedan law to which recourse is had by the courts in India are the Hedaya and the Futwa Alumgiri. The Hedaya was translated into English by Mr Hamilton. The Futwa Alumgiri was compiled under the orders of the emperor Aurungzib Alumgir. It is a collection of the opinions of learned Mahommedans on points of law. It has not been translated, but it forms the basis of the Digest of Mahommedan Law compiled by Neil Baillie. The Mahommedan law, like the Hindu law, is a personal law. It is essentially so in its nature. Persons of any other religion are to a large extent outside its pale. And in India, in civil matters, its application has been expressly limited to Mahommedans. At one time endeavour was made to administer the Mahommedan criminal law as the general territorial law of India, but it had constantly to be amended, and it was at length abolished and the penal code substituted. To be a Mahommedan, and so to claim to be governed by the Mahommedan law, it is necessary to profess the Mahommedan faith.

All that we find on the subject of intestate succession in the Koran are certain directions as to the shares which certain members of the family are to take in the estate of

Intestate succession.

their deceased relative. So far as they go, these are rules of distribution — that is to say, they depend, not on consanguinity only, but on certain equitable considerations, by which rules founded on consanguinity are modified. But these latter rules, though nowhere laid down in the Koran, still play a large part in Mahommedan law. There can be no doubt that they represent the pre-existing Arabian custom, which it was not the intention of the Prophet to displace, but only to modify. The claimants under these rules take whatever is left after the specific shares assigned by the Koran to individual members of the family have been satisfied; if in any case there are n_o such shares, they take the whole. The Arabic

term for this" class of heirs is asabah, which literally means persons connected by a ligament. The term used by English writers is " residuaries," but this description of them has the disadvantage that it entirely loses sight of the connexion on which the claim to succeed is based. They would be more correctly described as the " agnates " of the deceased, but the term "residuaries " is too firmly estab- lished to be displaced. Those persons who take a share of the property, under the specific rules laid down in the Koran, we call " sharers," and this word has acquired a technical meaning; it is not used to describe those who can claim a portion of the

estate in any other way. It is hardly likely that females, or relatives through females, had any claim to the succession under any Arabian custom, nor, except so far as they are made sharers, are they recognized by the Koran as having a title to succeed. The proper description of this class of persons is zavi-id-arham, i.e. " uterine kindred, and they have, in default of other heirs, established a claim to succeed. English writers have erroneously called them " distant kindred," but distance has nothing to do with the matter.

There is no right of primogeniture under Mahommedan law; there is a general preference of males over females, and if males and females take together as residuaries by an express provision of the Koran, each male takes as much as two females. Females are also expressly forbidden by the Koran to take more than two-thirds of the property; but in the application of these two rules the shares of the mother and the wife are not included. No person can claim to take any portion of the property who traces his relationship to the deceased through a living person, but this rule does not apply to brothers and sisters whose mother is alive. If several persons all stand in the same degree of relationship to the deceased, they take equally, per caput and not per stirpem.

It will now be convenient to state the rules for finding which of the agnates take as residuaries of the deceased. These are, in ordinary circumstances, the male agnates only, and the rule in question depends upon a classification of the male agnates which is common in other parts of the world. Every family consisting of several generations of male agnates may be broken up into groups, each of which has a separate common ancestor of its own. Thus, suppose A to be the person from whom the descent is to be traced. A belongs to

a large group of persons, all of whom are males descended from a common ancestor D. But A and his or her own male descendants form a smaller group, which we may call the group A. This is the first class of male agnates of A. Then suppose A to be the son or daughter of B, excluding those who are descendants of A, and as such included in the first class, the remaining male descendants of B will form the second class of male agnates of A. In like manner we get a third class of male agnates of A who are descendants of C, excluding those who are descendants of A or B; and a fourth class of male agnates of A who are descendants of D, excluding those who are descendants of A, B, or C. This classi- fication can obviously be carried through as many generations as we please. Mahommedan lawyers adopt this classification with only one difference. Between the first and second classes they interpose a class consisting entirely of the direct male ancestors, which they call the " root," so that the male descend- ants of A (the person whose heirs are in question) would be the first class of residuaries. B, C, D, &c, would be the second class of residuaries; the male descendants of B, other than the descendants of A, would be the third class of residuaries; the male descendants of C, other than the descendants of B and A, would be the fourth class of residuaries, and so on. In order to find the residuaries who are to succeed, we have only to take the classes in their order, and of the highest class which is represented to select the nearest to the deceased. If there are several who are equidistant, they will take equally per caput.

The sharers are, of course, those to whom a share is assigned by the Koran. They are (i) the father, (2) lineal male ancestors, whom Mahommedans call the " true grandfathers," (3) uterine half-brothers, i.e. the half-brothers by the mother, (4) daughters, (5) daughters of a son, or other direct male descendant, whom we call daughters of a son how low and soever, (6) the mother, (7) true grandmothers, i.e. female ancestors into whose line no male except a lineal male ancestor enters, (8) full sisters, (9) consanguine half-sisters,.c. half-sisters by the father, (10) uterine half-sisters, (11) the husband, (12) the wives. The right to a share and the amount of it depends upon the state of the family. Under Mahommedan law not only, as elsewhere, the nearer relative excludes the more remote, but there are special rules of total or partial exclusion arising out of the equitable considera- tions upon which all rules of distribution are based.*

These rules are best shown by taking the case of each member of the family in turn, and at the same time it will be useful to explain the general position of each member. First, the sons. They take no share,

but they are first in the first class of residu- aries, and their position is a very strong one; they exclude entirely sisters and daughters from a share, and they reduce considerably the shares of the husband, the widows, and the mother. The position of the other male descendants is very similar to that of the sons. They are not sharers; they are residuaries of the first class, and will take as such if the intermediate persons are dead. They reduce the shares of some of the sharers, but not to the same extent as the sons. The father is a residuary of the second class, and the first in that class. But he is also a sharer, and as such is entitled to a share of one- sixth. He can take in both capacities. The father's father is also a residuary of the second class, and he is a sharer, entitled to a share of one-sixth, but of course he cannot take either as sharer or residuary if the father is alive. The position of any true grandfather is analogous. An only daughter takes as sharer one-half of the property, two or more daughters take one-third between them. But sons exclude daughters from a share, and they would get nothing. Naturally this was considered unjust, and a remedy has been found by making the daughters what are called " residuaries in right of their brothers," each daughter taking half of what a son takes. The mother gets a share of one-sixth when there is a child of the deceased, or a child of any son how low and soever; also when there are two or more brothers or sisters. In any other case her share is one-third. If, however, the wife, or the husband (as the case may be), and the father are alive, the share of the mother is only one-third of what remains after deducting the share of the husband or the wife. The brother is. never a sharer. He is a residuary of the third class, and he excludes some sharers. The daughters of a son how low and soever get a share of two-thirds between them if there are several; if there is only one she gets one-half. But the daughters of a son are excluded by any direct male descendant who is nearer to the deceased than themselves, or at the same distance from him. If, however, they are excluded by a person who is at the same distance from the deceased as themselves, Mahommedan lawyers again say that they come in as residuaries in right of that person, each female as usual taking half as much as each male. Of course the daughters of a son may also be excluded by the daughters having exhausted the two-thirds allotted to females. A single sister takes a share of one-half; several sisters take two-thirds between them. Sisters are excluded from a share by any residuary of the first class, and their own brothers also exclude them, but in the latter case they take as residuaries in right of their brothers, each sister taking half what a brother takes. So, again, the sisters may be excluded from a share by the daughters or daughters of sons having exhausted the two-thirds allotted to females, and the

residue would go to the nearest male agnate — that is, the uncle or the nephew of the deceased, or some more distant relative. To prevent this Mahommedan lawyers say that in this case the sisters are residuaries, basing their assertion upon a somewhat vague tradition. The share of the husband in the property of the wife is one-fourth if there are surviving children, one-half if there are none. The share of the widow in the property of her deceased husband is one-eighth if there are surviving children, one-fourth if there are not. The nearest true grandmother takes a share of one-sixth. If there are several equidistant, they take one-sixth between them. . The uterine half-brothers take a share of one-third when there is only one, but they are excluded by any direct descendant and by any direct male ascendant. Uterine half-sisters are in the same position as uterine half-brothers. Consanguine half-brothers are residuaries of the same class as brothers, but only take in default of full brothers. Consanguine half-sisters take a share of two-thirds, or if there is only one she takes a share of one-half. But if there is a full sister also, the full sister takes one-half, and the consanguine sisters one-sixth between them. The consanguine half-sisters, like the full sisters, are excluded from a share by the children and the

father of the deceased, and also by full brothers and consanguine brothers; but in the last case they come in again as residuaries, taking half what a brother takes.

The sharers must of course, unless excluded, be all satisfied before anything is taken by the residuaries. But the sharers may not only exhaust the property ; there may not be enough to satisfy all the claimants. Thus, if a man died leaving a wife, a mother and two daughters, the shares are one-fourth, one- sixth and two-thirds, and the sum of the shares being greater than unity, they cannot all be satisfied. The difficulty is met by decreasing the shares rateably, in other words, by increasing the common denominator of the fractions so as to produce unity; hence the process is called the " increase." The converse case arises when the shares of the sharers do not exhaust the property, but there are no residuaries to take what remains. It has been doubted whether the residue does not fall to the government as bona vacantia. But it is now settled that the surplus is to be divided rateably amongst the sharers in proportion to their shares. The process is called the " return." The husband and the wife are excluded from the benefit of the return. If there are no sharers,

the whole estate will go to the residuaries. If there are neither sharers nor residuaries, it will go to the (so- called) distant kindred. Their claim is strong on equitable grounds, as some of them are very near relations; such, for example, as a daughter's children or a sister's children. Never- theless their claim has been doubted, and it must be admitted that there is no very clear ground upon which it can be based. They are not mentioned as sharers in the Koran, and it is not very clear how, as cognates, they could have been recognized by any ancient Arabian custom. However, their claim is now well established, and, in default of both sharers and residuaries, they succeed on a plan somewhat resembling that on which male agnates are classified as residuaries. If all the claimants fail the property goes to the government, but there is one peculiar case. Supposing a man dies leaving a widow, or a woman dies leaving a husband, and no other relative. There is then a residue and no one whatever to take it, as the husband and wife are excluded from the return. Strictly speaking, it would fall to the government as bona vacantia, but the claim is never made, and would now be considered as obsolete, the husband or wife being allowed to take the property.

Under Mahommedan law there are certain grounds upon which a person who would otherwise succeed as heir to a deceased person would be disqualified. These grounds are— -(i) that the claimant slew the deceased by an act which, under Mahommedan law, would entail expiation or retaliation, and this would include homicide by misadventure; (2) that the claimant is a slave; (3) that he is an infidel, i.e. not of the Mahommedan faith. The second impediment cannot now have any application in India; the third has been removed by Act 21 of 1850. There is a rule of Mahommedan law that if two persons die in circumstances, which render it impossible to determine which died first, as, for example, if both went down in the same ship, for the purposes of succession it is to be assumed that both died simultaneously.

Mahommedan lawyers appear always to have recognized the validity of wills, and they are said to be recognized by a Testa- passage in the Koran. But the power of testamentary mentary disposition is restricted within very narrow limits. It only extends to one-third of the property after the payment of debts and funeral expenses. There is no hint of this restriction in the Koran, and it rests upon tradition. If the one-third has been exceeded the legacies must be reduced rateably. The heirs, however, by assenting to the legacies, may render them valid even though they exceed the prescribed amount. There is no restriction as to the form of making a will; it may be either oral or written. A legacy cannot be given to an heir.

Mahommedan law contains some very simple and wise provisions for preventing the reckless and often unjust disposi- tions of property which persons are apt to make upon the approach of death. A man who is " sick," that is, who is suffering from illness which ends in death, can only give away

succes- sion.

one-third of his property; and if he has also made a will contain- ing legacies, the gifts and the legacies must be added together in the computation of the disposable one-third. So long as slaves had a money value, the value of the slaves liberated by a man on his deathbed was also included, which reminds us of the Lex Furia Caninia of the Roman law. Another transaction by which the restriction on the testamentary power might be eluded is that called mohabat. By this is meant a transaction in the form of a sale, but which, from the inadequacy of the price named, is obviously intended as a gift. If such a transaction is entered into during " sickness," the loss to the estate would have to be reckoned in computing the disposable one-third. But the mohabat transaction takes precedence of legacies. Another obvious mode of eluding the restriction on the testamentary power is the acknowledgment by a man on his deathbed of a fictitious debt; and it would seem that such acknowledgments ought to have been put under restriction. But Mahommedans, like other Orientals, have a useful, though possibly a superstitious, dread of leaving the debts of a deceased person unpaid, and it is this, no doubt, which has prevented their "questioning the deathbed acknowledgment of a debt, even though there is every reason to believe it to be fictitious. All that has been done is to prescribe that debts of health should be paid before debts of sickness, and that debts cannot be acknowledged by a sick man in favour of an heir.

When a Mahommedan dies, the funeral expenses and the creditors must first be paid; then the legatees, then the claims of the sharers, and, lastly, those of the residuaries; or, if there are neither sharers nor residuaries, those t ra """ a ^' of the (so-called) distant kindred. The administration of the estate need present no difficulties if there are no disputes, and if there is some one empowered to take possession of the property, to get in the debts, to satisfy the creditors, and distribute the assets amongst the various claimants; and such a person may be appointed by a Mahommedan in his will, who will perform these duties. He is called a wasi, and he is in a position very similar to an executor under English law. But if there is no wasi, even if there are no disputes, there may be a good deal of trouble. It

would have been in accordance with the spirit of Mahommedan law, and with general principles of equity, if an officer of the courts established under British rule had been regularly empowered to take possession of the property, and to take such measures as were necessary to ensure all the claimants being satisfied in their proper order. But this view of their powers has not been taken by the courts in India; recently, however, they have been enabled by legislation to grant the power of administering the estate to a single person.

There is scarcely any part of Europe or Asia where the creation of fictitious relationships is altogether unknown. In many cases the object of the creation is simply to obtain an heir. This is the object of adoption amongst modern Ph 1 }'" Hindus, and it is this, no doubt, which has led some ships. persons to speak of Hindu adoption as a rudimentary will. But adoption, as such, has never obtained a footing in Mahommedan law. The fictitious relationships which that law recognizes are based upon a different idea. There was in early times a widespread notion that every man must belong to some family either as a freeman or a slave. The family to which a slave belongs is always that of his owner, and that of a freeman is generally indicated by his birth. But a liberated slave has no family, at least no recognized family; and as he cannot stand alone, it was necessary to attach him to some family. Now, just as in Roman law the freedman became a member of his master's family under the relationship of patronus and cliens, so in Mahommedan law a liberated slave becomes a member of the master's family under the relationship called mawalat. The object, of course, was to make the master's family liable for the consequences of the wrongful acts of the freed slave. As a compensation for the liability undertaken by the master's family, in default of residuaries of the slave's own blood (who can only be his own direct descendants), the master's family are entitled to succeed as what are called " residuaries for special*

cause." Of course the relationship of master and slave cannot now be created, and it is scarcely probable that any case of inheritance could arise in which it came into question. The relationship of mawalat may, under Mahommedan law, also be created in a case where a freeman is converted to Islam. From a Mahommedan point of view he then stands alone, and would be required to attach himself to some Mahommedan family. The form of the transaction exactly indicates the nature of it. The party wishing to attach himself

says to the person ready to receive him, " Thou art my kinsman, and shalt be my successor after my death, paying for me any fine or ransom to which I may be liable." In this case also the family of the person who receives the convert is entitled, in default of other residuaries, to succeed to him as " residuaries for special cause." But this transaction can have no meaning under English law, which does not recognize the joint responsibility of the family, and it is therefore also obsolete. In the case of mawalat the rights of the persons concerned are not reciprocal. The person received gains no right of inheritance in the family into which he enters, and incurs no responsibility for their acts. An important part may still be played in Mahommedan law by the creation of relationships by acknowledgment. Any such relationship may be created, provided that the parentage of the person acknow- ledged is unknown; a person of known parentage cannot be acknowledged. The age, sex and condition of the person acknowledged must also be such that the relationship is not an impossible one; for, as was said in the Roman law, fictio naturam imitatur. The relationship thus constituted is, in the case of a father, mother, child, or wife, complete, and must be treated for all purposes as having a real existence. But in any other case the acknowledgment, although good as between the parties thereto, has no effect upon the rights of other parties. The acknowledgment which we have just been considering contem- plates the possibility at any rate, and in most cases the certainty, that the relationship is entirely fictitious, and has no connexion with any rule of evidence in whatever sense the term is understood. But there is a rule of Mahommedan law that, in cases where the paternity of a child is in dispute, the acknowledgment of the child by the father is conclusive. Whether this would now be main- tained in face of the Evidence Act 1870, which deals with cases of conclusive evidence, and expressly repeals all previously existing rules of evidence, may be doubtful.

Marriage is a transaction based upon consent between a man and a woman, or between persons entitled to represent them. The result of the transaction is that certain family relationships involving legal rights and duties are created by the law, and these are not wholly under the control of the parties. But as to some of them, to some extent they may be regulated by agreement, and it . is customary amongst Mahommedans at the time of a marriage to come to such an agreement. The only condition necessary to the con- stituting of a valid marriage between persons of full age is the consent of the parties. It is, however, the practice to conclude the transaction in the presence of two males, or one male and two female witnesses; and

the omission of this formality would always throw a doubt upon the intention of the parties finally to conclude a marriage. It is even said that the absence of such witnesses would justify a judge in annulling the marriage. Minors of either sex may be given in marriage by their guardian, and the transaction will be irrevocable if the guardian be the father or any direct male ascendant. In any other case the marriage may be repudiated when the minor arrives at the age of puberty, but the repudiation is not effectual until confirmed by a judge of the civil court. A marriage may be conducted through agents. A woman can have only one husband; a man can have four wives; if he married a fifth the marriage would be annulled by a judge on the application of the woman. Mahom- medans have a table of prohibited degrees within which parties cannot marry not very dissimilar to that in force in Great Britain. Nor can a man be married at the same time to two women nearly related to each other, as to two sisters. It is also considered that if a woman take a child to nurse she contracts

Marriage.

Divorce.

a sort of maternity towards it, and that if a boy and girl are nursed by the same woman they become brother and sister, and, in a general way, it is said " that whatever is prohibited in consanguinity is prohibited in fosterage "; but it is doubtful whether the law goes so far. The widow, or a divorced woman, is not allowed to marry again during her iddut. This is a period of chastity which a woman is bound to observe in order to avoid confusion of issue. If she is pregnant it lasts until the child is born; if not, then in case of divorce it lasts through three periods of menstruation; if she is a widow it lasts for four months and ten days. A Mahommedan man cannot marry an idolatress, but Jews and Christians are not thereby excluded, because, although infidels, they are not idolatresses. A woman is forbidden by Mahommedan law to marry any one who is not a Mahommedan; but if the marriage took place in conformity with the Act of 1872 it might be valid, if it amounted to a repudiation by the woman of her Mahommedanism. It is important to remember, when considering the validity of a Mahommedan marriage, that a distinction is drawn between marriages which are simply void (batil) and those which can only be annulled by judicial decision (farid), for such a decision has no retrospective effect, so that the children already born are legitimate; and if no step is taken to obtain such a decision during the existence of the marriage, it cannot be questioned afterwards. What marriages are absolutely

void, and what are only capable of being declared void, is not very clearly settled, but the evident leaning of Mahommedan law is against absolute invalidity, and there is strong authority for the opinion that no marriages are absolutely void except a marriage by a woman who has a husband living and such as are declared to be incestuous.

A Mahommedan has the absolute right to divorce his wife whenever he pleases without assigning any reason whatever for doing so. There are, however, very strong social reasons which have considerable influence in restraining the arbitrary exercise of the power. The power to divorce remains notwithstanding any formal promise by the husband not to exercise it, and it is even said that a divorce pronounced in a state of intoxication, or by a slip of the tongue, or under coercion, is valid. The divorce can, however, be revoked by the husband, but not after it has been three times pronounced, or after the iddut has been passed by the woman. Nor can the husband remarry his divorced wife unless she has been again married, and has been again divorced or become a widow, and the intermediate marriage must have been consummated. The power to divorce a wife may be entrusted by the husband to an agent acting on his behalf, and this contrivance is some- times made use of to enable a woman's friends to rid her of her 'husband if he ill-treats her. The husband may even empower the wife to divorce herself. If the husband or the wife should happen to die whilst the divorce is still revocable, he or she will inherit; and even a triple repudiation pronounced during " sickness," that is death-sickness, will not deprive the woman of her inheritance if the iddut has not been passed. Of course there is nothing to prevent the husband and the wife from agreeing to a divorce, and to the terms on which it is to take place, and such an arrangement is very common. The treatment of the wife by the husband is not a ground upon which the marriage can be dissolved, but the impotence of the husband is a ground of dissolution. The courts in India consider that they have the power under Mahommedan law to grant a decree for the restitution of conjugal rights.

Dower in Mahommedan law is in the nature of a gift from the husband to the wife on the marriage, like the donatio propter nuptias of the Roman law, or the morgengabe of Teutonic nations. It may be either " prompt," that is, payable at once, or the payment of it may be deferred, or it may be partly the one and partly the other. The amount of the dower and the time of payment ought to be settled by agreement before the marriage takes place; if this is not done there is some trouble in ascertaining the rights of the parties. It seems clear

that a woman is entitled as a matter of right to

Dower.

Pre- emption,

what is called a " proper " dower. If the dower is payable at once the woman may, before consummation, refuse herself to her husband unless it is paid; whether she can do so after consummation is doubtful. If the husband capriciously re- pudiates the wife before consummation, or the wife before consummation repudiates the husband for his misconduct, then half the dower agreed on must be paid. If it is her mis- conduct which has caused the repudiation, she is not entitled to anything. Deferred dower becomes payable on the dissolution of the marriage either by death or by divorce. Probably a judge, when called upon to dissolve or annul a marriage, could make reasonable stipulations as to the dower. The dower is the wife's own property, and, as the wife is entirely independent of the husband in regard to her property, she can sue him or his representatives for the dower like any other creditor. Mahom- medans generally before marriage enter into a formal contract which regulates not only the dower, but various other matters under the control of the parties, such as the visits the wife is to pay or receive, the amount of liberty which she is to have and so forth.

The right of pre-emption under Mahommedan law is the right of a third person, in certain circumstances, to step in and take the place of a buyer, at the same price and on the same conditions as the buyer has purchased. It applies only to the purchase of real property, and it can only be exercised upon one of the three following grounds: (i) That the claimant is owner of property contiguous to that sold; (2) that he is a co-sharer in the property of which a share is being sold; (3) that he is a participator in some right over the property, such, for example, as a right of way over it. The claimant must announce his claim as soon as he hears of the sale, and he must follow up this announcement by a further claim in the presence of witnesses and of the seller, or, if possession has been transferred, of the buyer.

Mahommedan law, so far as it is administered by the courts of British India for Sunnites of the Hanafite school— that is, for the great bulk of Mahommedans — has attained a fair degree of

*precision, owing to the care bestowed on their decisions by the judges of those courts, and the assistance derived from Mahommedan lawyers. But much difficulty is experienced as soon as we come to deal with Mahommedans of any other description. No doubt in India any clearly-established custom prevalent amongst a well-defined body of persons would be recognized, or any rule of law founded upon texts which they accepted as authoritative. But it is not always easy to deter- mine when these conditions have been satisfied. And to allow Mahommedans to set up a standard of rights and duties different from that of the bulk of their correligionists without this proof would lead not only to confusion but injustice. There is the further difficulty that Mahommedan law, as applied to any Mahommedans except those of the Hanafite school, has as yet been comparatively little studied by modern lawyers, so that very little that is certain can be said about it. The. * System 1S > however, a considerable body of Shiites in India whose legal system undoubtedly differs in some material particulars from that of the Sunnites. The Mahommedans of Oudh are generally Shiites, and Shiah families, mostly of Persian descent, are to be found in other parts of India. The following points seem clear. A marriage which the parties agree shall last for a fixed time, even for a few hours only, is a valid marriage, and at the expiration of the time agreed on the marriage ceases to exist. The relatives of the deceased, whether male or female, and whether tracing their connexion through males or females, may be sharers or residuaries. Both as sharers and residuaries the children can claim to take the place of their parents in the succession upon the principle of what we call representation. If there are parents or descendants of the deceased, and the sharers do not exhaust the property, the surplus is distributed amongst the sharers of that class in pro- portion to their shares. If the property is not sufficient to pay in full the shares of all the sharers, the shares do not abate rateably; e.g. as between daughters and the parents, or the*

husband, or the wife of the deceased the whole deduction is made from the daughters' share.

Authorities. — (Mahommedan Law), Neil Baillie, Digest of Mahommedan Law (London, 1865); Sir R. K. Wilson, Introduction to the Study of Mahommedan Law (London, 1894); Digest of Anglo-Mahommedan Law (London, 1895); Charles Hamilton, The Iledaya translated (London, 1791) ; Syed Ameer AH, Lectures on Mahommedan Law (2 vols., Calcutta, 1891, 1894); Mahomed Yusoof, Tagore Law Lectures (Calcutta 1895); Alfred v. Kremer, Culturgeschickte des Orients (2 vols., Vienna, 1875). (W. Ma.)

INDIAN MUTINY, THE, the great revolt of the Bengal native army in 1857, which led to the transference of Indian government from the East India company to the crown in 1858. The mediate cause of the Mutiny was the great disproportion between the numbers of British and native troops in India, which gave the sepoys an exaggerated notion of their power; its immediate causes were a series of circumstances which promoted active discontent with British rule.

During the century which elapsed between the victory of Plassey and the outbreak at Meerut, the East India company relied mainly on native troops with a stiffening of B i saffec ,. British soldiers — especially artillery — for the successful tlon in lite conduct of its wars. The warlike Hindu and Mahom- Native medan races supplied excellent fighting material, when Arn, Y- led by British officers, and the sepoy army took a distinguished part in every Indian battle, from Assaye to Gujarat. At the close of Lord Dalhousie's administration (1856) British India was held by some 233,000 native and some 45,000 British troops —roughly a proportion of 5 to 1. It was already clear to some of the men who knew India best that this was a dangerous state of things, though when the Mutiny broke out the relative numbers were 257,000 native to 36,000 British soldiers. It had long been a fundamental principle of Indian government that the sepoy would always be true to his salt — knowing, as Macaulay wrote in 1840, that there was not another state in India which would not, in spite of the most solemn promises, leave him to die of hunger in a ditch as soon as he had ceased to be useful. But the history of the sepoy army might have shown that this was an over-estimate of its loyalty. As early as 1 764 it was necessary to stamp out mutiny by blowing thirty sepoys away from guns. In 1806 the family of Tippoo Sultan produced a dangerous mutiny at Vellore, which was nipped in the bud by the prompt action of Gillespie and his dragoons. In 1824 the 47th Bengal infantry refused to march when it was ordered for service in Burma, and after being decimated by British artillery was struck out of the army list. In 1844, after the disasters of the Afghan war had shaken the prestige of British arms in India, no less than seven native regiments broke into open mutiny over grievances both real and fancied; and this time the old stern measures were not adopted to stamp out military dis- obedience. Lord Ellenborough often said that a general mutiny of the native army was the only real danger with which the British empire in India was threatened, and his warning was solemnly repeated by Sir Charles Napier. A still more explicit warning was uttered by General Jacob, who declared in 1853 that the normal state of the Bengal army was a state of mutiny, and wrote to The Times as follows: "

There is more danger to our Indian empire from the state of the Bengal army, from the feeling which there exists between the native and the Euro- pean, and thence spreads throughout the length and breadth of the land, than from all other causes combined. Let government look to this; it is a serious and most important truth."

The causes which, in the middle of the 19th century, were thus tending to sap the long-tried fidelity of the sepoy army were partly military and partly racial. The pro- fessional conditions of the sepoy's carets,, especially ,ts in Bengal, were no longer so tempting as they had ht'iisr. been in the first generations of the company's rule. The pay and privileges of the sepoy were steadily being diminished, and the increased demands made on the army by the great extension of the company's territory were by no means grateful to the average Bengal sepoy. Owing"to the silladar system, under which the Indian sowar provided his own horse and provender

in return for a monthly wage, the Indian cavalry were almost to a man in debt, and therefore favoured any attempt to upset the existing regime, and with it to wipe out the moneylender and his books; and the general enlistment order passed in July 1856, for the purposes of the war in Persia, made the Hindu sepoys afraid of losing caste by crossing the sea.

The Indian government failed to take sufficient account of the social and religious feelings of their native soldiers, whilst a rigid insistence on the principle of seniority had greatly diminished the efficiency of the British regimental officers. Out of 73 mutinous regiments, only four colonels were found worthy of other commands. At the same time, there were deeper reasons for discontent with British rule, which specially affected the classes from which the Bengal sepoys were drawn. Chief among these was Dalhousie's policy of annexation, which brought under British dominion such small states as Satara, Nagpur and Jhansi, and finally the kingdom of Oudh. The insistence on the right of lapse, i.e. the refusal to allow an adopted son to inherit a native throne, and the threat of annexation on purely humanitarian grounds seriously alarmed the native princes of India, besides creating a class of malcontents, among whom the Nana Sahib, the adopted heir of the peshwa, made himself most infamous. The annexation of Oudh, which was the chief recruiting ground of the Bengal army, probably caused wider disaffection in the ranks of

that army than any other act or omission of the government. There can also be little doubt that the social reforms of Lord Dalhousie and his pre- decessors had disturbed men's minds in Bengal. Thus the Brahmans were offended at the prohibition of suttee and female infanticide, the execution of Brahmans for capital offences, the re-marriage of widows, the spread of missionary effort and the extension of Western education. The Mahommedan zemindars were injured by the reassessment of the land revenue, which was carried through in the interests of the ryots, and the power of the zemindars was formidable, while that of the ryots was negligible; though it must be remembered that the peasantry as a whole gave no assistance to the mutineers. To all these causes must be added — not least important in dealing with orientals — the widespread feeling since the Afghan disaster that the star of the company was in the descendant, and that there was truth in the old prophecy that the British would rule in India for a bare century from Plassey (1757). Bazaar rumours of British reverses in the Crimea and in Persia in-creased the temptations for a general rising against the dominant race.

To this accumulation of inflammatory materials a spark was put in 1857 by an act of almost incredible folly on the part of the military authorities in India. The introduction The . of the Minie rifle, with its greased cartridges, was cartridges, accompanied by no consideration of the religious preju- dices of the Bengal sepoys, to whom, whether Hindus or Mahommedans, the fat of cows and pigs was anathema. It was easy for agitators to persuade the sepoys that the new cartridges were greased with the fat of animals sacred to one creed or forbidden to another, and that the British government was thus engaged in a deep-laid plot for forcing them to become Christians by first making them outcasts from their own religions. The growth of missionary enterprise in India lent colour to this theory, which was supported by the fact that no precaufltons had been taken to grease the Indian cartridges with a neutral fat, such as that of sheep and goats. The researches of Mr G. W. Forrest in the Indian government records have shown that the sepoys' fears of defilement by biting the new cartridges had a considerable foundation in fact. At a court-martial in 1857 Colonel Abbott, inspector general of ordnance, gave evidence that " the tallow might or might not have contained the fat of cows." No attempt, in fact, had been made to exclude the fat of cows and pigs, and apparently no one had realized that a gross outrage was thus being perpetrated on the religious feelings of both Hindu and Mahommedan sepoys. The low- caste natives employed in the arsenals knew what grease was actually being employed, and

taunted the Brahman sepoys

with the loss of caste that would follow their use of the new cartridges. Refusals to accept the suspected cartridges were soon heard in the Bengal army. The numerous agitators who had their own reasons for fomenting mutiny rose to the occasion, and in the first months of 1857 the greater part of the Bengal presidency was seething with sedition. At this time took place the mysterious distribution of chapatis, small cakes of unleavened bread, which had previously been known in connexion with the mutiny at Vellore (1806). "From village to village, from district to district, through hill-land and lowland, the signal — unexplained at the time, inexplicable still — sped; and in village after village, in district after district, the spreading of the signal was followed by the increased excitement of the people."

The first signs of the approaching trouble were displayed at the great military station of Barrackpur, 16 m. from Calcutta, in January 1857. The minds of the native regiments quartered there were maddened by rumours of the defilement which the new Minie cartridges would entail upon them, and incendiary fires broke out in the lines. The trouble was allayed by the tact of General Hearsey, who reported the incident to the Indian government on the 24th of January. A fortnight later he wrote, as the result of his inquiries, " We have at Barrackpur been dwelling upon a mine ready for explosion." At Berhampur, ioo m. to the north, on the 27th of February, the 19th Bengal infantry refused on parade to take their percussion caps, on the ground that to bite the new cartridges would defile them. The absence of any European troops made it impossible to deal with this act of mutiny on the spot. The defaulting regiment was marched down to Barrackpur for punishment. On the 29th of March, two days before its arrival, a sepoy named Manghal Pandi, from whom the mutineers afterwards came to be spoken of as " Pandies," drunk with bhang and enthusiasm, attempted to provoke a mutiny in the 34th Bengal infantry, and shot the adjutant, but Hearsey's personal courage suppressed the danger. Two days later the 19th were publicly disbanded, but no further punishment was attempted. This was partly due to Lord Canning's personal inclination to temper justice with mercy, but partly also to the fact that there was no adequate European force at hand to execute a severer sentence.' Bengal had been recklessly depleted of white troops, and there was only one European regiment between Calcutta and Dinapur, a distance of 400 m. Canning sent at once for more British troops from Burma. Meantime new accounts of refusals to use even the old cartridges came from distant parts of Hindostan, from

Umballa under the very eyes of- Anson, the commander-in-chief, and from Lucknow, the capital of the newly annexed kingdom of Oudh. Lord Canning, the governor-general, who had at first hoped that he had only to deal with isolated cases of disaffection, at last recognized that the plague was epidemic, and that only stern measures could stay it. But before he could take the necessarv steps, there reached Calcutta the news of the outbreak at Meerut and the capture of Delhi.

Meerut, 25 m. from Delhi, was an important military station, under the command of Colonel Archdale Wilson: the district was commanded by General Hewitt, one of the old and inefficient officers whom the rigid system of I 6 ?"'* seniority had placed in so many high commands. Meerut. At Meerut were quartered, besides one regiment of native cavalry and two of native infantry, a strong force of British troops, horse, foot and guns. Nevertheless, 85 men of the native cavalry regiment, driven to despair by the persistent rumours of the danger to their caste, refused on the 24th of April to accept their cartridges. For this offence they were condemned to ten years' imprisonment with hard labour on the roads, and on the 9th of May they were publicly stripped of their uniforms and marched off to gaol. The next day was a Sunday; and in the evening, whilst the British troops were parading for church, the native cavalry armed themselves, galloped to the gaol and released their comrades. Almost simultaneously the two infantry regiments shot down their officers and broke into open revolt. The badmashes, or criminal class, broke forth from their quarter and began to burn and*

plunder the dwellings of the British. A few of the mutineers took part in this work; but the great majority of them, fearing the vengeance of the British troops, hastened to move off, rather a mob than an army, upon the Delhi road. There is a general agreement that if a man like Gillespie or Nicholson had been in command of the station, the strong force at his disposal would have enabled him to strike such a deadly blow at the fleeing mutineers as might have stamped out the Mutiny. But Hewitt was too old and Wilson was lacking in initiative; the opportunity was lost, and no attempt was made to do more than clear the cantonments.

So many of the chief actors in the Mutiny on the native side carried their secrets into dishonoured graves that it is impossible to know

exactly what schemes the household of the Revoft ot king ˚f Delhi had concerted with the disaffected sepoys. Delhi. But when the mutineers reached Delhi they were at once joined by the city mob and the king's guards in proclaiming a revival of the Mogul empire. For a few hours the native troops of the British garrison awaited the turn of events; but when it became apparent that the British troops from Meerut were afraid to move, there was a general flame of revolt, and Delhi at once became the headquarters of the Mutiny. Most of the British officers and residents were massacred then or afterwards. The great magazine was gallantly defended for a time by nine Britons under Lieutenant Willoughby, and was blown up by them when all hope of relief had vanished. A young telegraph clerk sent the news to Umballa, continuing to signal until he was cut down at his post. Before the authorities in Calcutta and Lahore could take any steps to deal with the long-prophesied danger, the whole of the North- West Provinces were in revolt. Fortunately the two men on whom the chief responsibility fell in this great crisis were equal to their task. Canning in Calcutta, John Lawrence in the Punjab, were men indeed equal to any burden; and the stress of the Mutiny, ending once and forever the bad old system of seniority, brought to the front so many subordinates of dauntless gallantry and soldierly insight that a ring of steel was rapidly drawn round the vast territory affected. Lawrence saw that the surest way to prevent the Mutiny from spreading from the sepoy army of Bengal to the recently conquered fighting races of the Punjab was to hurl the Sikh at the Hindu; instead of taking measures for the defence of the Punjab, he acted on the old principle that the best defence is attack, and promptly organized a force for the reduction of Delhi, with the ardent co-operation of born leaders like John Nicholson, Neville Chamberlain and Herbert Edwardes. Anson, the commander-in-chief, died of cholera before he had had a chance to act on Lawrence's telegram, " Clubs, not spades, are trumps." He was succeeded by Sir Henry Barnard in command of the Delhi field force, then amounting to about 3000 British troops with 22 field guns, in addition to a few Gurkhas and Punjab native troops. The loyalty of the independent Sikh chiefs, headed by Patiala, and the stern measures which had been taken with the sepoy regiments enabled Lawrence to reinforce this little army with every available man and gun from the Punjab, in addition to Sikh and Pathan levies. It was to the insight of Lawrence and the splendid organization of the Punjab province — the spoilt child of the Indian government, as it had been called in allusion to the custom of sending thither the best of the Indian officials and soldiers — that the reduction of Delhi and the limitation of the outbreak were due. Meantime Canning was manfully playing his part

at Calcutta. In the hour of danger he was un- dismayed, as in the hour of victory he was just and merciful. He telegraphed for reliefs from every available quarter, fortunately being able to divert the troops then on their way to China. The native armies of Bombay and Madras remained loyal, and the former in particular — thanks to Lord Elphinstone— furnished valuable reinforcements. Sir Colin Campbell, a veteran soldier whose laurels had been won in many battles from the Peninsula to the Crimea, was despatched from England to take command of the army in India. But even before he could arrive, the out- spread of the Mutiny had already been checked by the gallantry

and skill of a mere handful of Britons and their faithful native allies.

Canning and Lawrence, at opposite ends of the disaffected districts, alike perceived that Delhi was the centre of peril, and that all other considerations "must be subordinated to striking a decisive blow at that historic city. Both siege ot flung to the winds the European rules of warfare, Delhi. which highly trained officers like Wilson had allowed to hamper their movements. " Make as short work as possible of the rebels," wrote Canning. " Where have we failed when we acted vigorously? " asked Lawrence. Though the nominal commanders of the army which captured Delhi were in turn Barnard, Reed and Wilson, the policy thus stated by Canning and Lawrence was really carried out by their subordinates — Baird Smith, Nicholson and Chamberlain. The Meerut troops, at last roused from their inaction, joined Barnard on the 7th of June, after a successful affair with the mutineers, and the next day the action of Badli-ki-Serai enabled the British force to occupy the famous Ridge, which they never abandoned till the final assault. At first the British troops, outnumbered by more than three to one by the mutinous regiments alone, were rather besieged than besiegers. Baird Smith indeed urged an immediate assault upon Delhi, on the ground that audacity is the best policy in Indian warfare; but it was not until the arrival of Nicholson on the 7th of August with the last Punjab reinforcements that the force was strong enough, in the opinion of its commander, to take offensive action. On the 14th of September, after three days of artillery preparation, the assault was delivered, under Nicholson's leadership. Two practicable breaches had been made by the siege guns, and a party of engineers under Home and Salkeld blew in the Kashmir gate. The assault was successful, in so far as a firm lodgment was made in the city, though the loss of Nicholson was a heavy price to pay for this success. Wilson actually thought of retreating; but Baird Smith and Chamberlain insisted on perseverance, and the city was captured after six days' hard fighting.

The mutineers were completely cowed; the king of Delhi was taken and reserved for trial; and his sons were shot by Catain Hodson, after unconditional surrender, an act which has since been the theme of much reprobation, but which commended itself at the time to Hodson's comrades as wise and justifiable. The siege of Delhi, which was the turning-point of the Mutiny, had lasted for more than three months, during which thirty minor actions had been fought in the almost intolerable heat of the Indian midsummer.

*The stern determination of the British troops, which alone made possible the reduction of Delhi with so inadequate a force, was intensified, if possible, by the ghastly story of Cawnpore. That important military station, lying acT * a(ass " on the Ganges on the confines of Oudh, was under Cawnpore. the command of Sir Hugh Wheeler, an old but still efficient and experienced officer. It was garrisoned by about 3000 native troops, with a mere handful of white soldiers. When the news of the Meerut outbreak reached Wheeler, who had already noted many symptoms of disaffection in his own station, he was placed in a very difficult position. Under his care was a large body of non-combatants — women and children in great numbers among them. To occupy the one defensible position in tile station, the magazine by the river with its vast military stores and its substantial masonry walls, would have involved steps which Wheeler regarded as certain to precipitate an out-. break. It was then thought that, if the sepoys mutinied, they would march off to Delhi, and Wheeler contented himself by throwing up a rude entrenchment round the hospital barracks, where he thought that the Europeans would be safe during the first tumult of a rising. All might have fallen out as he antici- pated, had it not been that the Nana Sahib, the adopted heir of the late peshwa, was rajah of Bithur in the neighbourhood. This young Mahratta, since known to universal execration as the arch-villain of the Mutiny, was secretly burning with a sense of injury received from the Indian government. He was also ambitious; and when, on the 4th of June, the Cawnpore garrison*

broke into open mutiny, he prevailed on them to stay and help him to carve a new kingdom out of the company's territory, instead of throwing in their lot with the Delhi empire. From the 6th to the 27th of June the handful of British soldiers, who composed the garrison of a fortification that could not have resisted a serious assault for. a single hour, held out with the greatest gallantry in hope of relief.

When this hope had died away, they surrendered to the Nana on his solemn promise that all their lives should be spared and that they should have a safe conduct to Allahabad. The Nana, partly urged by his native cruelty, partly, no doubt, by the wish to commit his followers beyond all possibility of composition, massacred the entire garrison in the boats which should have taken it down the river, reserving only some two hundred women and children for a later death. These poor victims were confined in a house known as the Bibigarh. On the 1 5th of July, when Havelock's avenging army was within a march of Cawnpore, they were all hacked to death and their bodies — some still faintly breathing — were thrown down the adjacent well which is to-day one of the most famous monuments of British rule in India. No single act of the Mutiny elicited such a storm of fierce anger among the British, both those who were fighting in India and those who supported them at home; for none was a more terrible vengeance taken, though the Nana himself escaped from his pursuers.

Meanwhile Lucknow, the capital of Oudh, was the scene of a historic defence. It was the headquarters of Sir Henry Lawrence, one of the most far-seeing of Indian states- V". men, who was well aware of the mutinous state of

Lucknow. tne native army. On the 18th of April he warned Lord Canning of some manifestations of discontent, and asked permission to transfer certain mutinous corps to another province. On the 1st of May the 7th Oudh infantry refused to bite the cartridge, but on the 3rd they were disarmed by other regiments. When the news of the outbreak at Meerut reached Lucknow, Sir Henry Lawrence recognized the gravity of the crisis and summoned from their homes two bodies of pensioners, one of sepoys and one of artillerymen, to whose loyalty, and to that of the Sikh sepoys, the successful defence of the residency was largely due. This position was immediately fortified. On the 30th of May the native troops broke into mutiny. On the 4th of June there was a mutiny at Sitapur, a large and important station 51 m. from Lucknow. This was followed by another at Fyzabad, one of the most important cities in the province, and outbreaks at Daryabad, Sultanpur and Salon. Thus in the course of ten days English authority in Oudh practically vanished. On the 30th of June Sir Henry Lawrence ordered a reconnaissance in force from Lucknow, which met the enemy at Chinhat; but the native sepoys and artillerymen turned traitors, and Sir Henry was forced to retreat to the residency, where the siege now began. The first attack was repulsed on the 1st of July, when the separate position of the Machchhi Bhawan was evacuated, and all the troops concentrated in

the residency. The entrenchments surrounding this building covered some 60 acres of ground, and included a number of detached houses and buildings, knit together by ditches and stockades. In a military sense the position was indefensible. The garrison consisted of 1720 fighting men, of whom 712 were native troops, 153 civilian volunteers, and the remainder were British officers and men. This small force had to defend 1280 non-combatants. At the very beginning of the siege Sir Henry Lawrence was fataljy wounded by a shell, and died on the 4th of July, thus depriving the defence of its guiding spirit. The command then developed upon General Inglis, who met the incessant attacks of the enemy with counter- sorties. On the 21st of July news was received that General Havelock was advancing, had defeated the Nana, and was master of Cawnpore; but it was still more than two months before even the first relief of Lucknow was achieved. During those two months every device was employed, by direct assault and by mining operations, to reduce the garrison, who held out nobly, meeting assault with 'sortie and mine with counter- mine. But the loyalty of the native troops began to waver

as the weeks dragged by and no sign of relief appeared. On the 23rd of September, however, the sound of distant guns in the direction of Cawnpore was heard, and on the 25th General Havelock's relieving force entered Lucknow. During the 87 days of the siege the strength of the garrison had diminished to 982, and many of these were sick and wounded. Against these were arrayed six thousand trained soldiers and a vast host of undisciplined rabble. For nearly three months their heavy guns and musketry had poured an unceasing fire into the residency entrenchment from a distance of only 50 yds. During the whole time the British flag flew defiantly on the roof of the residency. The history of the world's sieges contains no more brilliant episode.

On the 5th of June the troops at Benares mutinied, but were disarmed by Neill; and on the 6th of June the 6th native infantry at Allahabad mutinied and shot down their officers, but the fort was held until the arrival of R ,.: . . Neill, who promptly restored order. On the 30th of Lucknow. June Sir Henry Havelock, who had been appointed to the command of the relieving column, arrived at Allahabad from Calcutta, and on the 7th of July he set out for the relief of Lucknow. His force consisted of some two thousand men all told, of whom three-quarters were British. On the 12th of July he fought the action of Fatehpur, and gained his first victory, though the

irregular cavalry misbehaved and were subsequently disarmed. On the 15th the village of Aong was captured, and on the 16th the Nana's force was utterly shattered in the battle of Cawnpore. In nine days Havelock had marched 126 m. and fought three general actions under a broiling sun in the hottest season of the year; but the women and children whom it had been his object to save had already been massacred. Leaving Neill in command at Cawnpore, Havelock started out again on the 29th of July with ten light guns and 1500 men in the desperate attempt to relieve Lucknow, which was 53 m. away. On the 29th he gained two victories at Unao and Busherut-gunge, but considering himself too weak to advance, he fell back two marches upon Mangalwar. This decision was badly received by his troops, who were burning to avenge their country- women, and by General Neill, whom Havelock was obliged to reprimand for insubordination. Being slightly reinforced, he advanced on the 5th of August, and again turned the enemy out of Busherutgunge, but was again obliged by cholera to retreat to Mangalwar; and on receipt of news from Neill that the enemy were assembling at Bithur, he returned to Cawnpore, and abandoned for the time the attempt to relieve Lucknow. On the 16th of August he defeated the mutineers at Bithur. At this point General Havelock was joined by Sir James Outram, who /would have superseded him in the command had not Outram himself, with unequalled generosity, proposed to accompany Havelock only in his civil capacity as chief commissioner of Oudh and to serve under him as a volunteer. On the 21st of September Havelock started on his second attempt to relieve Lucknow, and won the victory of Mangalwar. On the 23rd another victory was gained at Alam Bagh, and news reached the force of the fall of Delhi. From Alam Bagh there were four possible routes of advance to the residency, and Outram con- sidered that the route chosen by Havelock, lying through the streets of Lucknow, involved unnecessary losses to the troops. Neill was killed in the streets, and the little force lost in all 535 officers and men; but on the 26th of September it entered the residency, and the first relief of Lucknow was accomplished. But the two thousand men who had thus entered the residency entrenchment under Havelock and Outram, though sufficient to reinforce the garrison and save it from destruction, were not strong enough to cut their way back to safety, ˆJjJ," , hampered with the women and children and wounded, Lucknow. amounting to 1500 souls, and the siege now recom- menced upon a larger scale. Havelock's task, however, was accomplished, and Outram now took command of the residency. A detachment had been left in the Alam Bagh, which was short of provisions; some attempts were made to open up com- munication with it, but without success. Subsequently*

it was

11

45°

INDIAN MUTINY

reinforced from Cawnpore. Upon the fall of Delhi the troops before that city were freed for the operations in Oudh, and on the 24th of September a column of 2790 men under Colonel Greathed left Delhi. On the 29th a successful action was fought at Bulandshahr, and on the 10th of October the column reached Agra. Here they were surprised by the enemy, but drove them off with considerable loss. On the 14th of October the column left Agra under Colonel Hope Grant, and on the 26th reached Cawnpore, where news was received that the commander-in- chief was coming to take command of the operations. Sir Colin Campbell had been sent out from England to suppress the Mutiny, and had assumed command of the Indian army on the 17th of August, but could not immediately proceed to the front. It was his first task to reorganize the administrative and transport departments; only on the 27th of October did he leave Calcutta. On the 3rd of November he reached Cawn- pore, and on the 12th marched upon Lucknow under the guidance of Thomas Henry Kavanagh, who had made his way from the residency disguised as a native for that purpose. Campbell had with him 4500 men with whom to raise a siege maintained by 60,000 trained soldiers occupying strong positions. On the 1 2th of November the force reached the Alam Bagh, and on the 14th advanced upon Lucknow, proceeding on this occasion across the open plain by the Dilkusha and Martiniere instead of through the narrow and tortuous streets of Lucknow. On the 1 6th the Sikandra Bagh was stormed; on the following day Campbell joined hands with Outram and Havelock, and the relief of Lucknow was finally accomplished.

*Sir Colin Campbell now decided to withdraw the garrison and women and children from the residency, and to hold Lucknow by a strong division operating outside the city. The * p are residency was evacuated on the night of the 22nd of Lucknow. November; but the success of the operations was marred by the death of Havelock. On his return to Cawnpore Campbell found that General Windham was being attacked at that place by the Gwalior contingent. On the 6th of December he defeated the Gwalior contingent in the battle of Cawnpore, though he had only 5000 men against the enemy's 25,000. His next task was to clear his line of communications with*

Delhi and the Punjab, and this he accordingly undertook. Lord Canning now decided that the next step should be the reduction of Lucknow, on the ground that it, like Delhi, was a rallying point of the Mutiny, and that its continuance in the hands of the enemy would mean a loss of prestige. General Franks' column advanced to Lucknow from the eastern frontier of Oudh, defeating the enemy in four actions. Meanwhile Outram had held his own at the Alam Bagh for over three months with only 4000 men against 120,000 rebels. An offer of help from Nepal had been accepted in July, and now Jung Bahadur, the prime minister of Nepal, was advancing with 10,000 Gurkhas to aid in the operations againt Lucknow; but the lateness of his arrival delayed the opening of the siege until the 2nd of March 1858. The Martiniere was captured on the 9th otMarch and the Begum Kothi on the nth. On the 14th the Imambara was stormed, and the Kaisar Bagh, and on the 16th the residency was once more in British possession. The enemy were thoroughly routed, but Campbell lost the opportunity of pushing the victory home by forbidding Outram to cross the bridge in pursuit if he thought he would lose a "single man,", and by sending the cavalry away from the environs of the city at the critical moment. Upon the fall of Lucknow Lord Canning's Oudh proclamation was issued, confiscating almost the entire lands of the province, and ensuring only their lives to those rebels who should submit at once. Outram considered the terms of this proclamation dangerously severe, and Lord Ellenborough, president of the board of control, thus criticized it in a hasty despatch, the publication of which necessitated his own resignation. It was afterwards acknowledged that the Oudh proclamation, inter- preted as Canning meant it should be, was a wise piece of states- manship. After the fall of Lucknow Canning insisted that Sir Colin Campbell should take immediate action against the rebels in Oudh and Rohilkhand, and a number of petty and harassing

Campaign.

operations were carried out by detached columns; but Campbell moved too slowly to bring his guerrilla opponents to book, and the rebellion was really brought to a conclusion by Sir Hugh Rose's brilliant campaign in Central India.

*Though the two great princes of Central India, Sindhia and Holkar, wisely and fortunately -remained true to the British, troops belonging to both of them joined the mutineers. The The Gwalior contingent of Sindhia's army mutinied in Central the middle of June, and on the 1st of July Holkar's J*_ troops revolted at Indore, and the resident,*

Henry Durand, was forced to leave the residency. The rani of Jhansi also rose in rebellion, to become known as " the best man upon the side of the enemy." The rising in this quarter received little attention until January 1858, when Sir Hugh Rose was given the command of two brigades, to act in concert with Sir Colin Campbell, and he immediately began a campaign which for celerity and effectiveness has rarely been equalled in India. His principle was to go straight for the enemy wherever he found him, and pursue him until he had exterminated him. He was hampered by none of that exaggerated respect for the rebels which earned Sir Colin Campbell the nickname of Old Khabardhar (Old Take-Care) ; but carried to an extreme the policy of audacity. Advancing from Bombay Sir Hugh Rose relieved Saugor on the 3rd of February, after it had been invested by the rebels for up- wards of seven months. On the 3rd of March he forced the pass of Madanpur, and took the whole of the enemy's defences in rear, throwing them into panic. On the 21st he began the siege of Jhansi, the stronghold of the mutineers in Central India, with a garrison of 11,000 men. During the course of the siege Tantia Topi, the most capable native leader of the Mutiny, arrived with a fresh force of 20,000 men, and threatened the British camp; but Sir Hugh Rose, with a boldness which only success could justify, divided his force, and while still maintaining the siege of the fort, attacked Tantia Topi with only 1500 men and com- pletely routed him. This victory was won on the 1st of April, and two days later Sir Hugh carried Jhansi by assault. On the 1st of May the battle of Kunch was fought and won in a tempera- ture of no in the shade, many of the combatants on both sides being struck down by heat apoplexy. On the 22nd of May the battle of Kalpi was won, though the European troops were hampered by defective ammunition and Sir Hugh himself here received his fifth sunstroke. In five months he had beaten the enemy in thirteen general actions and sieges, and had captured some of the strongest forts in India. News now arrived that the rebel army under Tantia Topi and the rani of Jhansi had attacked Sindhia, whose troops had gone over to the rebels and delivered Gwalior into their hands. Sir Hugh marched against Gwalior at once, captured the Morar cantonments on the 16th of June, and carried the whole of the Gwalior positions by assault on the 19th, thus restoring his state to Sindhia within ten days of taking the field. This was the crowning stroke of the Central India cam- paign, and practically put an end to the Mutiny, though the work of stamping out its embers went on for many months, and was only completed with the capture and execution of Tantia Topi in April 1859.

The Indian Mutiny was in no sense a national rising. The great mass

of the people in the affected districts either stood neutral, waiting with the immemorial patience of the East to accept the yoke of the conqueror, or helped the national British troops with food and service, in many cases rising. also sheltering British fugitives to the best of their ability. The attempt to throw off the British yoke was confined to a few disaffected ex-rulers and their heirs, with their numerous clansmen and hangers-on, besides the badmashes and highway- men who saw their way to profit by the removal of the British administration under which their peculiar talents found no safe outlet. The Bengal native army was their tool, which circum-stances put into their hands at the psychological moment when British power seemed to be at its lowest point. But the fighting races of the Punjab saw no reason for casting in their lot with the mutineers, and the great majority of the independent princes who had nothing of which to complain, like Patiala in the Punjab,

INDIAN OCEAN

45i

Holkar and Sindhia in central India, preserved a loyal or at least an interested friendship. The Sikhs showed their appreciation of Lawrence's admirable administration by keeping faith with their recent conquerors, and the Gurkhas of Nepal did yeoman service for their fathers' enemies. The lack of any central principle or common interest was shown in the divided counsels and sporadic action of the mutineers and their allies, which made them an easy prey to the solid and audacious British forces.

The chief result of the Indian Mutiny was to end the govern- ment of India by the East India company. It was felt that a system of administration which could permit such a otthe" catastrophe was no longer desirable. On the 2nd of Mutiny. August 1858 the queen signed the act which transferred the government of India to the crown. On the 1st of November Lord Canning, now viceroy of India, published the noble proclamation in which the change was announced, and a full amnesty was offered to all the rebels who had not been leaders in the revolt or were not guilty of the murder of British subjects. Even before the fall of Delhi, Canning had been adversely criticized — " Clemency Canning " he was scornfully called — for announcing his intention to discriminate between the guilt of various classes of mutineers. But a wiser view soon pre-vailed, and the natives of India at large gratefully accepted the queen's proclamation as the charter of their lives and liberties.*

See G. W. Forrest, History of the Indian Mutiny (1904), and Selections from State Papers (1897); T. R. E. Holmes, History of the Indian Mutiny (1898); Kaye and Malleson's History of the Indian Mutiny (1864-1888); R. S. Rait, Life of Lord Gough (1903); Sir VV. Lee-Warner, Life of Lord Dalhousie (1904); Sir H. Cunningham, Lord Canning (" Rulers of India " series), (1890); Sir Owen Tudor Burne, Clyde and Strathnairn (1895); Lord Roberts, Forty-One Years in India (1898) ; and Sir Evelyn Wood's articles in The Times in the autumn of 1907.

INDIAN OCEAN, the ocean bounded N. by India and Persia; W. by Arabia and Africa, and the meridian passing southwards from Cape Agulhas; and E. by Farther India, the Sunda Islands, West and South Australia, and the meridian passing through South Cape in Tasmania. As in the case of the Atlantic and Pacific Oceans, the southern boundary is taken at either 40 S., the line of separation from the great Southern Ocean, or, if the belt of this ocean between the two meridians named be included, at the Antarctic Circle. It attains its greatest breadth, more than 6000 m. between the south points of Africa and Australia, and becomes steadily narrower towards the north, until it is divided by the Indian peninsula into two arms, the Arabian Sea on the west and the Bay of Bengal on the east. Both branches meet the coast of Asia almost exactly on the Tropic of Cancer, but the Arabian Sea communicates with the Red Sea and the Persian Gulf by the Straits of Bab-el-Mandeb and Ormuz respectively. Both of these, again, extend in a north-westerly direction to 30 N. Murray gives the total area, reckoning to 40 S. and including the Red Sea and Persian Gulf, as 17,320,550 English square miles, equivalent to 13,042,000 geographical square miles. Karstens gives the area as 48,182,413 square kilometres, or 14,001,000 geographical square miles; of these 10,842,000 square kilometres, or 3,150,000 geographical square miles, about 22 % of the whole, lie north of the equator. For the area from 40 S. to the Antarctic Circle, Murray gives 9,372,600 English square miles, equivalent to 7,057,568 geographical square miles, and Karstens 24,718,000 square kilometres, equivalent to 7,182,474 geographical square miles. The Indian Ocean receives few large rivers, the chief being the Zambezi, the Shat-el-Arab, the Indus, the Ganges, the Brahmaputra and the Irawadi. Murray estimates the total land area draining to the Indian Ocean at 5,050,000 geographical square miles, almost the same as that draining to the Pacific. The annual rainfall draining from this area is estimated at 4380 cubic miles.

Relief. — Large portions of the bed still remain unexplored, but a fair knowledge of its general form has been gained from the sound-

ings of H.M.S. " Challenger," the German " Gazelle " Expedition, and various cable ships, and in 1898 information was greatly added to by the German " Valdivia " Expedition. A ridge, less than 2000 fathoms from the surface, extends south-eastwards from the Cape. This ridge, on which the Crozet Islands and Kerguelen are situated, is directly connected with the submarine plateau of the Antarctic.

From it the depth increases north-eastwards, and the greatest depression is found in the angle between Australia and the Sunda Islands, where " Wharton deep," below the 3000-fathom line, covers an area of nearly 50,000 sq. m. Immediately to the north of Wharton deep is the smaller " Maclear deep," and the long narrow " Jeffreys deep " off the south of Australia completes the list of depressions below 3000 fathoms in the Indian Ocean. The 2000-fathom line approaches close to the coast except (1) in the Bay of Bengal, which it does not enter; (2) to the south-west of India along a ridge on which are the Laccadive and Maldive Islands; and (3) in the Mozambique Channel, and on a bank north and east of Madagascar, on which are the Seychelles, Mascarene Islands and other groups.

Islands. — Like the Pacific, the Indian Ocean contains more islands in the western than in the eastern half. Towards the centre, the Maldive, Chagos and Cocos groups are of characteristic coral formation, and coral reefs occur on most parts of the tropical coasts. There are many volcanic islands, as Mauritius, the Crozet Islands, and St Paul's. The chief continental islands are Madagascar, Sokotra and Ceylon. Kerguelen, a desolate and uninhabited island near the centre of the Indian Ocean at its southern border, is note- worthy as providing a base station for Antarctic exploration.

Deposits. — The bottom of the Bay of Bengal, of the northern part of the Arabian Sea, of the Red Sea and the Persian Gulf, and of the narrow coastal strips on the east and west sides of the ocean, are chiefly covered by blue and green muds. Off the African coasts there are large deposits of Glauconitic sands and muds at depths down to 1000 fathoms, and on banks where coral formation occurs there are large deposits of coral muds and sands. In the deeper parts the bed of the ocean is covered on the west and south by Globigerina ooze except for an elongated patch of red clay extending most of the distance from Sokotra to the Maldives. The red clay covers a nearly square area in the eastern part of the basin bounded on two sides by the Sunda Islands and the west coast of Australia, as well as two strips extending east and west from the southern margin of the square along the south of Australia and nearly to Madagascar. In the

northern portion of the square, north and east of Wharton deep, the red clay is replaced over a large tract by Radiolarian ooze.

Temperature. — The mean temperature of the surface water is over 80° F. in all parts north of 13° S., except in the north-west of the Arabian Sea, where it is somewhat lower. South of 13 S. temperature falls uniformly and quickly to the Southern Ocean. Between the depths of 100 and 1000 fathoms temperature is high in the north-west, and in the south centre and south-west, and low in the north-east, the type of distribution remaining substantially the same. At 1500 fathoms temperature has become very uniform, ranging between 35° and 37 ° F., but still exhibiting the same type of distribution, though in a very degenerate form.

Salinity. — The saltest surface water is found in (a) the Arabian Sea and (&) along » belt extending from West Australia to South Africa, the highest salinity in this belt occurring at the Australian end. South of the belt salinity falls quickly as latitude increases, while to the north of it, in the monsoon region, the surface water is very fresh off the African coast and to the north-east. Little is known with certainty about the distribution of salinity in the depths, the number of trustworthy observations available being still very small. Probably the northern and north-eastern region, within the monsoon area, contains relatively fresh water down to very con- siderable depths.

Circulation. — 'North of the equator the surface circulation is under the control of the monsoons, and changes with them, the currents Consisting chiefly of north-east and south-west drifts in the open sea, and induced streams following the coasts. During the northern summer the south-west monsoon, which is sufficiently strong to bring navigation practically to a standstill except for powerful steamers, sets up a strong north-easterly drift in the Arabian Sea, and the water removed from the east African coast is replaced by the upwelling of cold water from below; this is one of the best illustrations of this action extant. Along the line of the equator the Indian counter-current flows eastwards all the year round, acting . as compensation to the great Equatorial current flowing westwards between the parallels of 7° and 20° S. The equatorial current, on meeting the northern extremity of Madagascar, sends a branch southwards along the east coast of that island, sometimes called the Masearene current. When the main equatorial current reaches-ihe African coast a minor stream is sent northwards to the source of the Indian counter-current, but the discharge is chiefly by the Mozambique current, which south of Cape Corrientes becomes the Agulhas current, one of the most powerful stream currents of the

globe. On the west coast of Madagascar and on the banks of the African coast south of 30° S., reaction currents or " back' drifts " move in the opposite direction along the flanks of the Agulhas current; these back-drifts are of great importance to navigation. On clearing the land south of the Cape the waters of the Agulhas current meet those of the west wind drift of the Southern Ocean, and mingle with them in such a manner as to produce, by interdigitation, alternate strips of warm and cold water, which are met with at great distances south-west and south

of the Cape. Between South Africa and Australia the waters form a part of the great west wind drift. The waters of this drift are, in general, of very low temperature, but it is remarkable that the interdigitation just mentioned continues far to the eastward, at least as far as Kerguelen. This fact is probably due partly to the actual intrusion of warm water from the Mascarene current east of Madagascar, and partly to the circumstance that the different temperatures of the waters are so compensated by their differences of salinity that they have almost precisely the same specific gravity in situ. The west wind drift sends a stream northwards along the west coast of Australia, the West Australia current, the homologue of the Benguela current in the South Atlantic. The principal feature in the circulation in the depths of the Indian Ocean is a slow move- ment of Antarctic water northwards along the bottom to take the place of that removed from the surface by evaporation, and by currents in the lower latitudes. Little is known beyond the bare fact that such movement does take place. (H. N. D.)

INDIANOLA, a city and the county-seat of Warren county, Iowa, U.S.A., about 18 m. S. by E. of Des Moines. Pop. (1890) 2254; (1900) 3261; (1905) 3396; (1910) 3283. It is served by the Chicago, Burlington & Quincy and the Chicago, Rock Island & Pacific railways. Indianola is the seat of Simpson College (coeducational, Methodist Episcopal, 1867), with a college of liberal arts, an academy, a school of education, a school of business, a school of shorthand and typewriting, a conservatory of music, a school of oratory, a school of art and a military academy. In 1908 the college had 32 instructors and 905 students. The city lies in a rich farming region, and has a considerable trade in butter and eggs, vegetables and fruits, and in coal, lumber and live stock from the surrounding country. Indianola was laid out and was selected as the

county- seat in 1849, and building began in the following year; it was incorporated as a town in 1864, and was chartered as a city of the second class in 1884.

INDIANS, NORTH AMERICAN. The name of "American Indians " for the aborigines of America had its origin in the The name use by Columbus, in a letter (February 1493) written "Ameri- soon after the discovery of the New World, of the can (f term Indios (i.e. natives of India) for the hitherto unknown human beings, some of whom he brought back to Europe with him. He believed, as did the people of his age in general, that the islands which he had discovered by sailing westward across the Atlantic were actually a part of India, a mistaken idea which later served to suggest many absurd theories of the origin of the aborigines, their customs, languages, culture, &c. From Spanish the word, with its in- correct connotation, passed into French (Indien), Italian and Portuguese (Indio), German (Indianer) , Dutch (Indiane), &c. When the New World came to be known as America, the natives received, in English especially, the name " American Indians," to distinguish them from the " Indians " of south-eastern Asia and the East Indies. The appellation " Americans " was for a long time used in English to designate, not the European colonists, but the aborigines, and when, in 1891, Dr D. G. Brinton published his notable monograph on the Indians he entitled it The American Race, recalling the early employment of the term. The awkwardness of such a term as " American Indian," both historically and linguistically, led Major J. W. Powell, the founder of the Bureau of American Ethnology, to , put forward as a substitute " Amerind," an arbitrary curtail- ment which had the advantage of lending itself easily to form words necessary and useful in ethnological writings, e.g. pre-Amerind, post-Amerind, pseudo-Amerind, Amerindish, Amerindize, &c. Purists have objected strenuously to " Amerind," but the word already has a certain vogue in both English and French. Indeed, Professor A. H. Keane does not hesitate, in The World's Peoples (London, 1908), to use "Amerinds" in lieu of "American Indians." Other popular terms for the American Indians, which have more or less currency, are " Red race," " Red men," " Redskins," the last not in such good repute as the corresponding German Rothaute, or French Peaux-rouges, which have scientific standing. The term " American Indians " covers all the aborigines of the New World past and present, so far as is known, although some European writers, especially in France, still seek to separate

from the " Redskins " the Aztecs, Mayas, Peruvians, &c, and some American authorities would (anatomically at least) rank the Eskimo as distinct from the Indian proper. When the name " Indian " came

to be used by the European colonists and their descendants, they did not confine it to ” wild men,” but applied it to many things that were wild, strange, non- European in the new environment (see Journ. Amer. Folk- Lore, 1902, pp. 107-116; Handbook of Amer. Inds., 1907, pt. i. pp. 605-607). Thus more than one hundred popular names of plants in use in American English (e.g. ” Indian corn,” ” Indian pink,” &c.) contain references to the Indian in this way; also many other things, such as ” Indian file,” ” Indian ladder,” ” Indian gift,” ” Indian pudding,” ” Indian summer.” The Canadian- French, who termed the Indian sauvage (i.e. “savage”), re-, membered him linguistically in bolle sauvage (moccasin), traine sauvage (toboggan). The term ” Si wash,” in use in the Chinook jargon of the North Pacific coast, and also in the English of that region, for ” Indian ” is merely a corruption of this Canadian- French appellation. In the literature relating to the Pacific coast there is mention even of ” Siwash Indians.” Throughout Canada and the United States the term ” Indian ” occurs in hundreds of place-names of all sorts (” Indian River,” ” Indian Head,” “Indian Bay,” “Indian Hill,” and the like). There are besides these Indiana and its capital Indianapolis. In Newfoundland ” Red Indian,” as the special term for the Beothuks, forms part of a number of place-names. Pope’s characterization of the American aborigine,

” Lo! the poor Indian, whose untutor’d mind Sees God in clouds, or hears Him in the wind,”

is responsible for the creation in the mind of the people of a ” Mr Lo,” who figures in newspaper lore, cartoons, &c. The reputations, deserved and undeserved, of certain Indian tribes north of Mexico have been such that their names have passed into English or into the languages of other civilized nations of Europe as synonyms for ” ruffian,” ” thug,” ” rowdy,” &c. Recently ” les Apaches ” have been the terror of certain districts of Paris, as were the ” Mohocks ” (Mohawks) for certain parts of London toward the close of the 18th century.

The North American Indians have been the subject of numerous popular fallacies, some of which have gained world-wide currency. Here belongs a mass of pseudo-scientific and thoroughly „ . unscientific literature embodying absurd and extravagant tafitaes theories and speculations as to the origin of the aborigines and their ” civilizations “which derive them (in most extraordinary ways sometimes), in recent or in remote antiquity, from all regions of the Old World — Egypt and Carthage, Phoenicia and Canaan, Asia Minor and the Caucasus, Assyria and Babylonia, Persia and India,

Central Asia and Siberia, China and Tibet, Korea, Japan, the East Indies, Polynesia, Greece and ancient Celtic Europe and even medieval Ireland and Wales. Favourite theories of this sort have made the North American aborigines the descendants of refugees from sunken Atlantis, Tatar warriors, Malayo-Polynesian sea-farers, Hittite immigrants from Syria, the " Lost Ten Tribes of Israel," &c, or attributed their social, religious and political ideas and institutions to the advent of stray junks from Japan, Buddhist votaries from south-eastern Asia, missionaries from early Christian Europe, Norse vikings, Basque fishermen and the like.

Particularly interesting are the theories of " Welsh (or white) Indians " and the " Lost Ten Tribes." The myth of the " Welsh Indians," reputed to be the descendants of a colony founded about A.D. 1 170 by Prince Madoc (well known from Southey's poem), has been studied by James Mooney (Amer. Anthrop. iv., 1891, 393-394), who traces its development from statements in an article in The Turkish Spy, published in London about 1730. At first these " Welsh Indians, ' who are subsequently described as speaking Welsh, possessing Welsh Bibles, beads, crucifixes, &c, are placed near the Atlantic coast and identified with the Tuscaroras, an Iroquoian tribe, but by 1776 they had retreated inland to the banks of the Missouri above St Louis. A few years later they were far up the Red river, continuing, as time went on, to recede farther and farther westward, being identified successively with the Mandans, in whose language Catlin thought he detected a Welsh element, the Moqui, a Pueblos tribe of north-eastern Arizona, and the Modocs (here the name was believed to re-echo Madoc) of south-western Oregon, until at last they vanished over the waters of the Pacific Ocean. The theory that the American Indians were the " Lost Ten Tribes of Israel " has not yet entirely disappeared from ethnological literature. Many of the identities and resemblances in ideas, customs and institutions between the American Indians and the ancient Hebrews, half-knowledge or distorted views of which

formed the basis of the theory, are discussed, and their real significance pointed out by Colonel Garrick Mallery in his valuable address on ' Israelite and Indian: A Parallel in Planes of Culture " {Proc. Amer. Assoc. Adv. Set. vol. xxxviii., 1889, pp. 287-331). The

whole subject has been discussed by Professor H. W. Henshaw in his " Popular Fallacies respecting the Indians " (Amer. Anthrop. vol. vii. n.s., 1905, pp. 104-113).

Of ways of classifying the races of mankind and their sub- divisions the number is great, but that which measures them by their speech is both ancient and convenient. The stocks multiplicity of languages among the American Indians was one of the first things that struck the earliest investigators of a scientific turn of mind, no less than the missionaries who preceded them. The Abbe Hervas, the first serious student of the primitive tongues of the New World, from the classificatory point of view, noted this multiplicity of languages in his Catalogo delle lingue conosciule e nolizia delta loro affinita e diversitd (Cesena, 1784); and after him Balbi, Adelung and others. About the same time in America Thomas Jefferson, who besides being a statesman was also a considerable naturalist (see Amer. Anthrop. ix. n.s., 1907, 499-509), was impressed by the same fact, and in his Notes on the Slate of Virginia observed that for one " radical language " in Asia there would be found probably twenty in America. Jefferson himself collected and arranged (the MSS. were afterwards lost) the vocabularies of about fifty Indian languages and dialects, and so deserves rank among the forerunners of the modern American school of comparative philologists. After Jefferson came Albert Gallatin, who had been his secretary of the treasury, as a student of American Indian languages in the larger sense. He had also himself collected a number of Indian vocabularies. Gallatin's work is embodied in the well-known " Synopsis of the Indian Tribes within the United States East of the Rocky Mountains, and in the British and Russian Possessions in North America," published in the Transactions and Collections of the American Antiquarian Society (ii. 1-422) for 1836. In this, really the first attempt in America to classify on a linguistic basis the chief Indian tribes of the better-known regions of North America, Gallatin enumerated the following twenty-nine separate divisions: Adaize, Algonkin-Lenape, Athapascas, Atnas, Attacapas, Blackfeet, Caddoes, Catawbas, Chahtas, Cherokees, Chetimachas, Chinooks, Eskimaux, Fall Indians, Iroquois, Kinai, Koulischen, Muskhogee, Natches, Pawnees, Queen Charlotte's Island, Salish, Salmon River (Friendly Village), Shoshonees, Sioux, Straits of Fuca, Utchees, Wakash, Woccons. These do not all represent distinct linguistic stocks, as may be seen by comparison with the list given below; such peoples as the Caddo and Pawnee are now known to belong together, the Blackfeet are Algonkian, the Catawba Siouan, the Adaize Caddoan, the Natchez Muskogian, &c. But the monograph is a very good first attempt at*

classifying North American Indian languages.

Gallatin's coloured map of the distribution of the Indian tribes in question is also a pioneer piece of work. In 1840 George Bancroft, in the third volume of his History of the Colonization of the United States, discussed the Indian tribes east of the Mississippi, listing the following eight families: Algonquin, Catawba, Cherokee, Huron-Iroquois, Mobilian (Choctaw and Muskhogee) , Natchez, Sioux or Dahcota, Uchee. He gives also a linguistic map, modified somewhat from that of Gallatin. The next work of great importance in American comparative phil- ology is Horatio Hale's monograph forming the sixth volume (Phila., 1846), Ethnography and Philology, of the publications of the " United States Exploring Expedition, during the years 1S38, 1839, 1840, 1842, under the Command of Charles Wilkes, U.S. Navy," which added much to our knowledge of the languages of the Indians of the Pacific coast regions. Two years later Gallatin published in the second volume of the Transactions of the American Ethnological Society (New York) a monograph entitled " Hale's Indians of North-west America, and Vocabularies of North America," in which he recognized the following additional groups: Arrapahoes, Jakon, Kalapuya, Kitunaha, Lutuami, Palainih, Sahaptin, Saste, Waiilatpu. In 1833 he contributed a

brief paper to the third volume of Schoolcraft's Information Respecting the History, Condition and Prospects of the Indian Tribes of the United States, adding to the "families" already recognized by him the following: Cumanches, Gros Ventres, Kaskaias, Kiaways, Natchitoches, Towiacks, Ugaljachmutzi. Some modifications in the original list were also made. During the period 1853-1877 many contributions to the classification of the Indian languages of North America, those of the west and the north-west in particular, were made by Gibbs, Latham, Turner, Buschmann, Hayden, Dall, Powers, Powell and Gatschet. The next important step, and the most scientific, was taken by Major J. W. Powell, who contributed to the Seventh Annual Report of the Bureau of Ethnology, 1885-1886 (Washington, 1891) his classic monograph (pp. 1-142) on " Indian Linguistic Families of America North of Mexico." In 1891 also appeared 'Dr D. G. Brinton's Hie American Race: A Linguistic Classification and Ethnographic Description of the Native Tribes of North and South America (New York, p. 392). With these two works the adoption of language as the means of distinction and classification of the American aborigines north of Mexico for scientific purposes became fixed. Powell, using the vocabulary as the test of relationship or difference, enumerated, in the area considered, 58 separate linguistic stocks, or families of speech, each " as distinct

from one another in their vocabularies and apparently in their origin as from the Aryan or the Scythian families " (p. 26).

The 58 distinct linguistic stocks of American Indians north of Mexico, recognized by Powell, were as follows: (1) Adaizan; (2) Algonquian; (3) Athapascan; (4) Attacapan; (5) Beothu- kan; (6) Caddoan; (7) Chimakuan; (8) Chimarikan; (9) Chim- mesyan; (10) Chinookan; (n) Chitimachan; (12) Chumashan; (13) Coahuiltecan; (14) Copehan; (15) Costanoan; (16) Eski- mauan; (17) Esselenian; (18) Iroquoian; (19) Kalapooian; (20) Karankawan; (21) Keresan; (22) Kiowan; (23) Kitunahan; (24) Koluschan; (25) Kulanapan; (26) Kusan; (27) Lutua- mian; (28) Mariposan; (29) Moquelumnan; (30) Muskhogean; (31) Natchesan; (32) Palaihnihan; (33) Piman; (34) Pujunan; (3S) Quoratean; (36) Salinan; (37) Salishan; (38) Sastean; (39) Shahaptian; (40) Shoshonean; (41) Siouan; (42) Skitta- getan; (43) Takilman; (44) TafLoan; (43) Timuquanan; (46) Tonikan; (47) Tonka wan; (48) Uchean; (49) Waiilatpuan; (50) Wakashan; (51) Washoan; (52) Weitspekan; (53) Wisho- skan; (54) Yakonan; (55) Yanan; (56) Yukian; (57) Yuman; (58) Zunian.

This has been the working-list of students of American Indian languages, but since its appearance the scientific investigations of Boas, Gatschet, Dorsey, Fletcher, Mooney, Hewitt, Hale, Morice, Henshaw, Hodge, Matthews, Kroeber, Dixon, Goddard, Swanton and others have added much to our knowledge, and not a few serious modifications of Powell's classification have resulted. With Powell's monograph was published a coloured map showing the distribution of all the linguistic stocks of Indians north of Mexico. Of this a revised edition accompanies the Handbook of American Indians North of Mexico, published by the Bureau of American Ethnology in 1907-1910, now the standard book of reference on the subject. The chief modifications made in Powell's list are as follows: The temporary presence in a portion of south-west Florida of a new stock, the Arawakan, is now proved. The Adaizan language has been shown to belong to the Caddoan family; the Natchez to the Muskogian; the Palaihnian to the Shastan; the Piman to the Shoshonian. The nomenclature of Powell's classification has never been completely satisfactory to American philologists, and a movement is now well under way (see Amer. Anthrop. vii. n.s., !9°5> 579-593) to improve it. In the present article the writer has adopted some of the suggestions made by a committee of the American Anthropological Society in 1907, covering several of the points in question.

In the light of the most recent and authoritative researches and

investigations the linguistic stocks of American aborigines north of Mexico, past and present, the areas occupied, earliest homes (or original habitats), number of tribes, subdivisions, &c, and population, may be given as follows : —

Stock.

Area. Earliest Home

Tribes, &c.

, — „ — — ,

Population.

Stock.

Area. Earliest Home.

Tribes, &c.

Population.

i. Algonkian.

Most of N. and E. N. of the St Some 50-60, About 90,000,

and from the

North America,

Lawren ce

with many

of which

Pacific Ocean to

between tat. 35

and E. of

minor

some 50,000

the San Joaquin

and 55 ; centred

Lake Ontario

groups.

in Canada.

river.

in the region of

(Br in ton);

the Great Lakes

N.W. of the

14. ESKIMOAN.

Oreenl and and som e

nterior of

? well- About 28,000,

and Hudson's

Great Lakes

of the Arctic

Alaska

marked

of which

Bay.

(Thomas).

islands, the whole northern coast N.

(Rink) ; in the region

groups, with 60-70

there are in Green-

2. Arawakax.

Within the terri-

Central South

Small colony

Extinct about

of the Algonkian

W. of Hud-

“se t tl e-

land 11,000

tory of the Calu-

America.

from Cuba.

end of 1 6 th

and Athabaskan,

son’s Bay

ments,”

A 1 a s k a

s a s in S.W.

century.

from the straits of

(Boas); pre-

&c.

13,000,

Florida.

Belle ls'e to the end of the Al eu tian

ferably the latter.

Canada 4500, and

3. Atakapan.

In part, of S.W. Lou i s i a n a and N.E. Texas.

Somewhe r e in E. or N.E. Texas.

2.

Practically extinct; in 18S5 4 indi- viduals liv- i n g in Louisiana,

Islands; also in extreme N.E. Asia W. to the Anadyr river; in E. North America in earlier times

Asia 1200.

and 5 in

possibly consider-

Texas.

ably farthersouth.

4-Athabaskan.

Interior of Alaska

Interior of

Some 50,

About 54,000, of which

15. ESSELEN1AN.

On the coast of W.

Somewhere in

Many small

Extinct; last

and Canada; W.

Alaska or

with numer-

California, S. of

W.or central

settlements.

speaker of

of Hudson's Bay

N.W. Can-

ous minor

some 20,000

Monterey, N. of

California.

language

and N. of the

ada.

groups.

in Canada.

the Salinan.

died about

Algonkian; also represented in Oregon, Cali- fornia, Arizona,

1890.

l6. HAIDAN'(Skit-

The Queen Char-

Interior of

2 dialects;

About 900,

tagetan).

lotte Islands, off

A 1 as ka or

about 25

of which

New Mexico,

the N.W. coast

N.W. Can-

chief

300 are in

Texas, and

of British Colum-

ada.

" towns,"

Alaska.

northern Mexico.

bia, and part of the Prince of

and many minor set-

5. Beothukan.

Newfoundland.

Some part of Newfound-

Local settle-

Extinct; last

Wales Archi-

tlements.

ments only.

representa-

pelago, Alaska.

land or Lab-

tive died in

rador.

1829.

17. Ikoquoian.

The region about Lakes Erie and

Somewhere be- tween the

Some 1 5 chief tribes with

About 40,000, of which

6. Caddoan.

Country between the Arkansas and Colorado rivers in Louisiana, Texas, &c, par- ticularly on the Red River and its affluents; later

also in Kansas, Nebraska, Da- kota, and Okla- homa.

On the lower Red River,

or, perhaps, somewhere to the S.W.

Some 12-15.

About 2000.

Ontario (Ontario, New York, Penn- sylvania, Ohio,

lower St L a w r e n ce and Hub-

many minor subdivisions.

1 0,000 are in Canada ; of those in

&c.),and on both

son's Bay

the United

banks of the St Lawrence, on the

(Brinton, Hale); in S.

States 28,000 are Chero-

N. to beyond the Saguenay, on the S. to Gasp£; also represented in the S.E.United States by the Tuscarora,

Ohio and Kentu cky (Boyle, Thomas).

kee.

Cherokee, &c.

1

(now chiefly in

7. Chemakuan.

On the N.W. shore

Some part of N.W. Wash-

2.

About 200.

Oklahoma).

of Puget Sound,

Washington; also

ington.

18. Kalapuvan.

In N.W. Oregon,

Somewhere in

About 15-18,

Only some

on Pacific coast,

in the valley of

N.W. Ore-

with minor

140 indi-

near Cape Flat-

the Willamette,

gon.

divisions.

viduals stili

tery.

above the Falls.

living.

8. Chimarikan.

In X. California,

Somewhere in

I.

Practical! y

19. Karankawan.

On the Texas coast,

Somewhere in

5-6» with

Extinct prob-

on Trinity river,

N.California.

extinct; in

from Galveston to

S. Texas.

minor divi-

ably in 1858;

N.W. of the

1903 only 9

Padre Island.

sions.

a few sur-

Copehan.

individuals r e p r t ed

vived later, possibly, in Mexico.

living.

9. Chinookan".

On the lower

N. of the Col-

Some io or

About 300.

20. Keresan.

In N. central New

Somewhere in

17 "villages"

3990, in 6

Columbia river.

umbia, in W.

1 2 with nu-

Mexico, on the

the New

(pueblos) ;

pueblos

from the Cascades

Washington.

merous vil-

Rio Grande and

Mexico-

curlier more.

(some 150

to the Pacific

lages.

its tributaries, the

Arizona

at Isleta).

Ocean; on the

Jemez, San Jose,

region.

coast, N. to Shoal-

&c.

water Bay and S.

to Tillamook

21. K.IOWAN.

On the upper Ark-

At the foot of

1.

i2 19 in Okla-

Head, in Washing-

ansas and Can-

the Rocky

homa.

ton and Oregon.

adian rivers, in Colorado, Kansas,

Mountains in S. W.

ig.Chitimachan.

Part of SE. Louisi- ana.

Region of Grand Lake and river, Louisiana .

1,

Nearly ex- u'nct;im88j only 50 indi- viduals sur-

Oklahoma, &c; formerly on the head-waters of the Platte, and

Montana.

/

viving.

still earlier on the upper Yellowstone

11. Chumashan.

In S.W- California,

Somewhere in

7 or more

Nearly ex-

and Missouri, in

S. of the Salinan

S.W. Cali-

dialects.

tinct; only

S.W. Montana.

and Mariposan;

fornia.

with many

15-20 indi-

j

in the basins of

small settle-

viduals still

I 22. KlTUNAHAN.

In S.E. British Col-

Somewhere E.

2 chief divi-

About 1 100 ;

the Sta Maria,

ments.

living.

umbia, N. Idaho,

of the Rocky

sions and 3

half in

Sta Inez, lower

and part of N.W.

Mountains in

others.

Canada and

Sta Clara, &c, on

Montana.

Montana or

half in the

the coast, and the

Alberta.

United

northern Sta.

States. 1

Barbara Islands.

1

23. KOLUSCHAN

On the coast anc

Somewhere in

Some 12-15.

About 2000.. 1

12. CoPEHAN

In central N. Cali-

Somewhere in

z chief di-

About 130 at

(Tlingit).

adjacent islands

the interior

(Wmtun).

fornia, W. of the

N.California.

visions,with

various vil-

of S.Alaska, from

of Alaska

Pujunan; W. ol

many small

lages, and

55 to 6o° N. lat.

r N. W

the Coast range,

settlements.

as many on

also some in

Canada.

from San Pablo

Round Val-

Canada.

and Suisun Bays

ley Reserva-

N. to Mount

tion.

24. K.ULANAPAN

On the coast in

Somewhere in

About 30

About 1000.

Shasta.

(Porno).

N.W. California (Sonoma, Lake

N.W. Cali fornia.

local divi- sions, &c.

IJ. CoSTANOAN,

In the coast region of central Cali-

Somewhere in

No true

Nearly ex-

and Mendocinc

no true

central Call

tribes, but

tinct ; only

counties), W.

tribes.

fornia, N. of the

fornia.

15-20 settle-

25 or 30 indi- viduals still

the Yukian,

Salinan ; from

ments.

about San Fran

living.

25. K.USAN.

On the coast

: Somewhere in

- 4, ear 1 iei

About 50.

cisco S. to Poin

central Oregon

land fron

1 more.

Sur and Big

on Coos Bay anc

Coos Bay

Panocbe Creek

Oregon.

LINGUISTIC STOCKS]

INDIANS, NORTH AMERICAN

455

Stock.

Area.

Earliest Home. 1

Tribes, &c.

Population.

Stock.

Area.

earliest Home.

Tribes, &c.

Population. ;

Coos and Coquille

36. Shastan.

n N. California

fn N. Cali-

5 or more

Cess than 40

rivers, S. of the

and S- Oregon, in

fornia or

linguistic

Shasta full-,

Yakonan; now

the basins of the

Oregon.

divisions.

bloods ;

mostly on Siletz

Pit and Klamath

some 1200

Reservation.

rivers, on Rogue river and to be-

Achomawi.

26. LUTUAMIAN

[n the region of the KJamath and Tule

fn S. Oregon,

2, with local

1034; of these

yond the Siskiyou

(Klamath).

N. of the

subdivisions.

755 Kla-

Mountains; S. of

lakes, Lost and

Klamath

math, and

the Lutuamian.

Sprague rivers,

lakes.

279 Modoc

&c, in Oregon

(56 in Okla-

37. Shoshonian.

'n the W. part of

Foot-hills and

Somei2-i5in

[n the United

(chiefly) and N.E.

homa).

the United States;

plains E. of

the United

States, some

California; now

most of the

the Rocky

States;

24,000.

on Klamath Re-

country between

Mountains in

many more

servation, Oregon,

l at – 35° and 45

N.W. United

in Mexico,

with a few also in

and long. 105 and

States or

ancient and

Oklahoma.

120 , with exten- sions N., S., and

Canada, but residence

modern.

27. Mariposan

In S. central Cali-

Somewhere in

30-40 groups

About 150, at

S.E. outside this

in P 1 a t e a u

(Yokuts).

fornia, in the

central Cali-

with special

Tule river

area; represented

region long-

valley of the San

fornia.

dialects.

reservation,

also in California,

continued.

Joaquin, on the

&c.

and in Mexico

Tule, Kaweah,

by the Piman,

King's riverSj&c. ; E. of the Salman,

Sonoran and Na-

huatlan tribes.

S. of the Moque-

1 unman.

38. SlOUAN.

In the basin of the Missouri and the

In the Caro- lina – Virginia

Some 20 large and

About 38,000; of which

28. MOQUELUMNAN

In central Cali-

Somewhere in

7 dialects, no

Several hun-

upper Mississippi ; from about N.

region.

many minor

some 1400

(Miwok).

fornia, in three

central Cali-

true tribes;

dred; much

ones.

in Canada.

sections: the main

fornia.

about 20

scattered.

lat. 33 to 53 and,

area on the W.

local groups

at the broadest,

slope of the Sier-

with numer-

from 89 to 110

ras, from the Cos-

ous minor

W. long.; also

umnes river on

ones.

represented in Wisconsin (Win-

the N. to the

Fresno on the S.;

nebago), Louisi-

a second on the

ana.the Carolmas,

N. shore of San

and V i rg i n i a

Francisco Bay,

(formerly).

and a third (small)

3

S. of Clear Lake

39. Takelman.

In S.W. Oregon,

In some part

2.

Practical! y »

on the head-waters

in the middle

of S. Oregon.

extinct;

of Putah Creek.

valley of Rogue river, on the upper

perhaps 6 speakers of

29- MtTSKOCIAN

In the Gulf States,

Somewhere

About 12,

About 40,000;

Rogue, and to

the language

(Muskhogean).

E. of the Missis-

W. of the

with many

of these

about the Cali-

alive;

sippi.most ofMis-

lower Missis-

minor divi-

38,000 in

fornia line or

sissippi, Alabama end Georgia, part

sippi.

sions.

Oklahoma,

beyond.

1 000 in Mis-

of Tennessee, S.

sissippi, 350 in Florida,

40. Tanoan.

In New Mexico, on

Some part of

Some 14-15

About 4200

Carolina, Florida

the Rio Grande,

New Mexico.

pueblos.

in 12 pueb-

and Louisiana ;

and a few in

&c, from lat. 33

los.

now mostly in

Louisiana.

to 36 ; also a

Oklahoma.

settlement with the Moqui in N.E.

30. Pakawan

On both banks of

Some part of N.E. Mexico.

20-25, some

Practically

Arizona, and

(Coahufttecan),

the Rio Grande

very small.

extinct; in

another on the

in Texas and

1886 cibout

Rio Grande at the

Mexico, from its

30 individu-

boundary line,

mouth to beyond

als still liv-

partly in Mexico.

Laredo; at one

ing, most! y

time possibly E.

on the

41. TlMUQUAN.

In Florida, from the

Some part of

Some 60 or

Extinct in

to Antonio, and

M ex i c an

N. border and the

Florida.

more settle-

1 8th cen-

W. to the Sierra

side of the

Ocilla river to

ments.

tury.

Madre.

Rio Grande,

Lake Okeecho- bee, pertiaps

$t. Pvjvnau

(Maidu).

In N.E. California,

N.E. Cali-

No true

About 250

farther N. and S.

E. of the Sacra-

fornia,

tribes;

full -bloods.

1

mento river, be-

several

42. Tonikan.

In part of E. Louisi-

Somewhere in

3-

Practicall y

tween the Shastan

larger and

ana and part of

the Louisi-

extinct; i n

and Moquel-

very many

Mississippi; in

ana – Missis-

1886 some

umnan.

smaller loc- al divisions, ” villages, ” &c.

Avoyelles parish, La., &c.

sippi region.

25 indivi- duals living

at Marks- vine, La.

32. QUOXATEAN

(Karok).

In extreme N.W.

Somewhere in

Many “vil-

In 18S9 some

California, on the

N. California.

lages,” &c.

600; much

43. TONKAWAN.

In S. E. Texas,

Somewhere in

1.

Nearly ex-

Klamath river,

r e d u c ed

N.W. of the

S. or W.

t i n c t ; in

&c; W. of the

since; pos-

Karanka wan;

Texas.

1884 only 78

Shastan.

sibly 300. I

remnants now in Oklahoma.

individuals living; in

3$. Sahaptian.

In the region of the Columbia and its tributaries, in parts of Washing- ton, Idaho and

Somewhere in the region of theColumbia, or farther N.

5-7-

About 4200. 1

1905 but 47, with Pon- k a s, in Oklahoma.

Oregon; between

44. Tsimshian

In N.W. British

On the head-

3 main and

About 3200

lat. 44° and 47°,

(Chimmesyan).

Columbia, on the

waters of the

several

in Canada,

and from the Cas-

Nass and Skeena

Skeena river.

minor divi-

and 950 in

cades to the Bitter

rivers, and the

sions.

Alaska.

Root Mountains.

adjacent islands and coast S. to

34. Salinas.

On the Pacific coast

Somewhere in

2 or 3 larger

Practically

Millbank Sound;

of S.W.California,

S. W. Cali-

divisions ;

extinct; in

also (since 1887)

- .

from above S.

fornia.

no true

1884 only

on Annette Island,

Antonio, to below

tribes.

10-12 indi-

Alaska.

S. Louis Obispo;

v i d u a 1 s

W. of the Mari-

living,

45. Wailatpuan.

A western section

In Oregon, S.

2.

Language

posan.

(Molala) in the Cascade region

of the Colum- bia river.

practically extinct; 405

35. Saushan.

A large part of S British Columbia

Central or N

Some 60-65,

About 15,000

between Mounts

Cayuse (in

British Col-

of which a

in Canada,

Hood and Scott,

1888 only 6

and Washington

umbia.

number are

and some

in Washingtor

spoke their

with parts oi

merelylocal

6300 in

and Oregon ; an

mother

Idaho and Mon-

divisions.

the United

eastern (Cay use)

tongue) are

tana; also part 0: Vancouver I si and

States.

on the head-

still living;

waters of the

in 1 8 8 1

and outliers in N

Wallawalla, Uma-

about 20

British Columbia

tilla and Grande

Molalas.

(Ii ilqu 1 a) , anc

Ronde rivers.

S.W. Oregon.

·„

,

**

45ˆ

INDIANS, NORTH AMERICAN

Stock.

46. Wakashan (Kwakiutl- Nootka).

47- Washoan.

48. Weitspekan (Yurok).

49- WlSHOSKAN

(Wiyot).

50. Yakonan-.

51. Yanan.

52. YUCHUN.

Area.

53- YUKIAN.

54- YCMAN.

55. ZUNIAN.

Most of Vancouver Island (except some J of the E. coast) and most of the coast of British Columbia from Gardner channel to Cape Mudge; also part of extreme N.W. Washington.

In E. central Cali- fornia and the ad- joining part of Nevada, in the region of Lake Tahoe and the lower Carson valley.

In N.W. California, W. of the Quo- ratean.

In N.W. California, in the coast region, S. of the Weitspekan.

In W. Oregon, in the coast region and on the rivers from the Yaquina to the Umpqua.

In central N. Cali- fornia in the region of Round Moun- tain, &c., S. of the Shastan.

In E. Georgia, on the Savanna h river from above Augusta down to the Ogeechee, and also on Chatahoo- chee river; rem- nants now in Oklahoma.

In N.W. California, E.of the Copehan, with a N. and a S. section; in the Round Valley region.

In the extreme S.W. of the United States (lower Colorado and Gila valley), part cf California, most of Lower Cali- fornia, and a small part of Mexico.

In N.W. New Mexico, on the Zulu river.

Earliest Home.

Somewhere in the interior of British Columbia.

In N.W. Ne vada.

In N. Cali- fornia or S. Oregon.

In N. Cali- fornia.

W. central Oregon.

Somewher e farther E.

Somewhere E, of the CSata- hoochee.

N. or central California.

Tribes, &c.

Population.

3 maradivi- 4765, of which sions, with more than

50" tribes.'

435 are m the United States.

N. W. Arizona.

6 divisions; no true tribes.

3-5 divisions; no true tribes.

4 chief divi- sions, with numerous villages.

5 divisions no true tribes.

Some part of the New Mexico – Ari- zona region.

About 2oo,in the region of Carson, Reno, &c.

A few hun- dreds; in 1870 esti- mated at 2000 or more.

Nearly ex- tinct.

About3oo,on the Siletz Reserva- tion.

Practically extinct; in 1 884 but 35

individuals living.

About 5oo ; with Creeks in Okla- homa.

About 250.

In the United States about

Of these 55 different linguistic stocks 5 (Arawakan, Beothu- kan, Lsseleman, Karankawan and Timuquan) are completely extinct the Arawakan, of course, in North America only 13 (Atakapan, Chimarikan, Chitimachan, Chumashan.Costanoan! Kusan Pakawan, Salinan, Takelman, Tonikan, Tonkawan Wishoskan, Yakonan) practically extinct; while the speakers ol a few other languages or the survivors of the people once speaking them (e.g. Chemakuan, Chinookan, Copehan, Kala- puyan, Manposan, Washoan, Yukian), number about 200 or 300 in some cases fewer. Of the Wailatpuans, although some in- dividuals belonging to the stock are still living, the language itself is practically extinct. The distribution of the various stocks reveals some interesting facts. Among these are the stretch of the Eskimoan along the whole Arctic coast and its extension into Asia; the immense areas occupied by the Atha- baskan and the Algonkian, and (less notably) the Shosho- nian and the Siouan; the existence of few stocks on the Atlantic slope (from Labrador to Florida, east of the Mississippi only 8 are represented); the great multiplicity of stocks in the Racine coast region, particularly in Oregon and California- the extension of the Shoshonian, Yuman and Athabaskan southward into Mtxico, the Shoshonian in ancient, the Athabaskan in

modern times; the existence of an Arawakan colony in south-western Florida, a 16th-century representative in North America of a South American linguistic stock. Some stocks, e.g. Atakapan Beothukan, Chemakuan, Chimarikan, Chitimachan, Kiowan'

Kitunahan, Lutuamian, Takelman, Tonkawan, Wailatpuan' Yanan, Yuchian, Zuiii, &c, were not split up into innumerable dialects, possessing at most but two, three or four, usually fewer Of the larger stocks, the Athabaskan, Algonkian, Shoshonian' biouan, Iroquoian, Salishan, &c, possess many dialects often mutually, unintelligible. In marked contrast with this is the case of the Eskimoan stock, where, in spite of the great distance over which it has extended, dialect variations are at a minimum and the people " have retained their language in all its minor features for centuries " (Boas). As to the reason for the abund- ance of linguistic stocks in the region of the Pacific (from Alaska to Lower California, west of long. 115°, there are 37: Eskimoan, Koluschan, Athabaskan, Haidan, Tsimshian, Wakashan, Sali- shan, Kitunahan, Chimakuan, Chinookan, Sahaptian, Wailat- puan, Shoshonian, Kalapuyan, Yakonan, Kusan, Takelman Lutuamian, Quoratean, Weitspekan, Wishoskan, Shastan Yanan, Chimarikan, Yukian, Copehan, Pujunan, Washoan, Kulanapan, Moquelumnan, Mariposan, Costanoan, Esselenian ' Salman, Chumashan, Yuman) there has been much discussion' Of these no fewer than 18 are confined practically to the limits of the present state of California. Dialects of Athabaskan, Shoshonian and Yuman also occur within the Californian areas thus making, in all, representatives of 21 linguistic stocks in a portion of the continent measuring less than 156,000 sq. m. In explanation of this great diversity of speech several theories have been put forward. One is to the effect that here, as in the region of the Caucasus in the Old World, the multiplicity of languages is due to the fact that tribe after tribe has been driven into the mountain valleys, &c, by the pressure of stronger and more aggressive peoples, who were setting forth on careers of migration and conquest. Another view, advocated by Horatio Hale in 1886 (Proc. Amer. Assoc. Adv. Sci.; also Proc. Canad Inst Toronto, 1888), is that this great diversity of human speech is due to the language-making instinct of children, being the result of " its exercise by young children accidentally isolated from the teachings and influence of grown companions." A pair of young human beings, separating thus from the parent tribe and starting social life in a new environment by themselves, would, according to Mr Hale, soon produce a new dialect or a new language. This theory was looked upon with favour by Romanes, Brinton and other psychologists and ethnologists. Dr R. B. Dixon (Congr intern, des. Amer., Quebec, 1906, pp. 255-263), discussing some aspects of this question, concludes " that the great linguistic and considerable cultural complexity of this whole California-Oregon region is due to progressive differentiation rather than to the crowding into this restricted area of remnants of originally discrete stocks." How far

two dialects of one stock can go-in the way of such differentiation without becoming absolutely distinct is illus- trated by the Achomawi branches of the Shastan family of speech which Dr Dixon has very carefully investigated. '

The test of vocabulary is not the only means by which the languages of the North American aborigines might be classified. I here are peculiarities of phonetics, morphology, grammar, sentence-structure, &c -.which suggest groupings of the linguistic stocks independent of their lexical content. Some languages are harsh and consonantal (e.g. the Kootenay and others of the North Pacific region) some melodious and vocalic, as are certain of the tongues of Ca hfornia and the south-eastern United States. Some employ reduplication with great frequency, like certain Shoshonian dialects » others, like Kootenay, but rarely. A few, like the Chinook, are ex-ceedingly onomatopoeic. Some, like the northern languages of California, have no proper plural forms. Of the Californian languages the Homo alone distinguishes gender in the pronoun, a feature common to other languages no farther off than Oregon. The high development .and syntactical use of demonstratives which char-acterize the Kwakiutl are not found among the Californian tongues. A few languages like the Chinook and the Tonika, possess real grammatical gender. Some languages are essentially prefix, others essentially suffix tongues; while yet others possess both prefixes and suffixes, or even infixes as well. In some languages vocalic changes, in others consonantal, have grammatical or semantic meaning. In certain languages tense, mood and voice are rather"

weakly developed. In some languages syntactical cases occur (e.g. in certain Californian tongues), while in many others they are quite unknown. Altogether the most recent investigations have evealed a much greater variety in morphological and in grammatical processes than was commonly believed to exist, so that the general statement that the American Indian tongues are all clearly and distinctly of the " incorporating " and " polysynthetic " types needs considerable modification. Using criteria of phonetics, morphology, grammar, &c, some of the best authorities have been able to suggest certain groups of North American Indian languages exhibiting peculiarities justifying the assumption of relationship together. Thus Dr Franz Boas (Mem. Intern. Congr. Anthrop., l8 93: PP 339-34°. and Ann. Archaeol. Rep. Ontario, 1905, pp. 88- 106) has grouped the

linguistic stocks of the North Pacific coast region as follows: (1) Tlingit (Koluschan) and Haida; (2) Tsim- shian; (3) Wakashan (Kwakiutl-Nootka), Salish, Chemakum; (4) Chinook. In the same region the present writer has suggested a possible relationship of the Kootenay with Shoshonian. In the Californian area Dr R. B. Dixon and Dr A. L. Kroeber have made out these probable groups among the numerous language stocks of that part of the United States: (1) Chumashan and Salinan; (2) \urok (Weitspekan), Wishoskan, Athabaskan, Karok (Quora- tean), Chimarikan; (3) Maidu (Pujunan), Lutuamian, Wintun (Copehan), Yukian, Pomo (Kulanapan), Costanoan, Esselenian, Vokuts (Mariposan), Shoshonian, Shastan, Moquelumnan and possibly Washoan; (4) Yanan; (5) Yuman. Suggestions of even larger groups than any of these have also been made. It may be that, judged by certain criteria, the Kootenay, Shoshonian, Iro- quoian and Siouan may belong together, but this is merely tentative. It. is also possible, from the consideration of morphological peculiari- ties, that some if not all of the languages of the so-called " Palaeo- Asiatic " peoples of Siberia, as Boas has suggested (Science, vol. xxui., n.s., 1906, p. 644), may be included within the American group of linguistic stocks. Indeed Sternberg (Intern. Amer.-Kongr. xiy., Stuttgart, 1904, pp. 137-140) has undertaken to show the relationship morphologically of one of these languages, the Giliak (of the island of Saghalin and the region about the mouth of the Amur), to the American tongues, and its divergence from the " Ural-Altaic " family of speech. Here, however, more detailed investigations are needed to settle the question.

At one time the opinion was widely prevalent that primitive languages changed very rapidly, sometimes even within a General generation, and the American Indian tongues were character rather freely used as typical examples of such extreme of Indian variation. The error of this view is now admitted anguages. everyw }j erej anc j for the speec }j f tne New World

aborigines Dr Franz Boas states (Hndb. Amer. Ind. pt. i., 1907, P-759): " There is, however, no historical proof of the change of any Indian language since the time of the discovery comparable with that of the language of England between the 10th and 13th centuries." Another statement that has obtained currency, appearing even in otherwise reputable quarters sometimes, is to the effect that some of the vocabularies of American Indian languages consist of but a few hundred words, one being indeed so scanty that its speakers could not converse by night, since darkness prevented resort to the use of gesture. This is absolutely contrary to fact, for the vocabularies of the languages of the American Indians are rich, and, according to the

best authority on the subject, " it is certain that in every one there are a couple of thousand of stem words and many thousand words, as that term is defined in English dictionaries " (Boas). The number of words in the vocabulary of the individual Indian is also much greater than is generally thought to be the case. It was long customary, even in " scientific " circles, to deny to American Indian tongues the possession of abstract terms, but here again the authority of the best recent investigators is conclusive, for " the power to form abstract ideas is, neverthe- less, not lacking, and the development of abstract thought would find in every one of the languages a ready means of expression " (Boas). In this connexion, however, it should be remembered that, in general, the languages of the American aborigines " are not so well adapted to generalized statements as to lively descriptions." The holophrastic terms characteristic of so many American Indian languages " are not due to a lack of power to classify, but are rather expressions of form of culture, single terms being intended for those ideas of prime importance to the people" (Boas). This consideration of American primitive tongues in their relation to culture-types opens up a comparatively new field of research, and one of much evolutional significance.

457

As a result of the most recent and authoritative philological in- vestigations, the following may be cited as some of the chief char- acteristics of many, and in some cases, of most of the languages of the aborigines north of Mexico.

1. Tendency to express ideas with great graphic detail as to place, form, &c.

2. " Polysynthesis," a device making possible, by the use of modifications of stems and radicals and the employment of prefixes, suffixes, and sometimes infixes, &c, the expression of a large number of special ideas. By such methods of composition (to cite two examples from Boas) the Eskimo can say at one breath, so to speak, " He only orders him to go and see," and the Tsimshian, " He went with him upward in the dark and came against an obstacle." The Eskimo Takusariartorumagaluarnerpd ? (" Do you think he really intends to go to look after it ? ") is made up from the following elements: Takusar(pa), "he looks after it"; iartor (poq), " he goes to "; uma (voq), " he intends to "; (g) aluar (poq), " he does so, but " ; nerpoq, " do you think he." The Cree " word " " kekawewechetushekamikowanowow " (" may it," i.e. the grace of Jesus Christ, "remain with you") is resolvable into: Kelaviow (here

split into ke at the beginning and -owow as terminal), " you " (pi.); to = sign of futurity (first and second persons); w = an optative particle; weche = " with " ; tusheka = verbal radical, "remain"; mik = pronominal particle showing that the subject of the verb is in the third person and the object in the second, "it : you"; owan = verbal possessive particle, indicating that the subject of the verb is something inanimate belonging to the animate third person, " his-it." The Carrier (Athabaskan) lekeenahweshcen- d&thancezkrok, " I usually recommence to walk to and fro on all fours while singing," which Morice calls " a simple word," is built up from the following elements: le = " prefix expressing reciprocity, which, when in connexion with a verb of locomotion, indicates that the movement is executed between two certain points without giving prominence to either"; koe = particle denoting direction toward these points; na = " iterative particle, suggesting that the action is repeated ' ' ; hwe = particle referring to the action as being in its incipient stage ; sheen = " song " (when incorporated in a verb it " indicates that singing accompanies the action expressed by the verbal root"); do? = " a particle called for by sheen, said particle always entering into the composition of verbs denoting reference to vocal sounds"; thee = " the secondary radical of the uncomposite verb thizkret inflected from thi for the sake of euphony with neez; mez = " the pronominal element of the whole compound " (the n is demanded by the previous hwe, ce marks the present tense, and z marks the first person singular of the third conjugation; krok = " the main radical, altered here by the usitative from the normal form kret, and is expressive of locomotion habitually executed on four feet or on all fours."

3. Incorporation of noun and adjectives in verb, or of pronouns in verb. From the Kootenay language of south-eastern British Columbia the following examples may be given: NatU/owkine = "He carries (the) head in (his) hand"; Howankoi/amkine = " I shake (the) head in (my) hand"; Witlwumine = " (His) belly is large"; Tlit£a/ine = " He has no tail"; MatlnaWeˆine = " He opens his eyes." In these expressions are incorporated, with certain abbreviations of form, the words aqktlam, "head"; aqkowum, "belly"; aqkat, "tail"; aqkaktletl, "eyes." In some languages the form for the noun incorporated in the verb is entirely different from that in independent use. Of pronominal incorporation these examples are from the Kootenay: Nupqanaˆine = " He sees me"; i/onupqam'jine = " / see you"; Tshatlipitlisine = " He will kill you " ; Tshatlitqanaaiasine = " He will bite us " ; Tshatltsukwatisine = " He is going to seize you; ffiratshatltlpatlnapine = " You will honour me." For incorporation of adjectives these examples will serve: Honitenttitik = " I paint (my face)," literally, " I make it red" (kanohos, "red"; the radical is nos or nus for nohos); Hom'rfkeine = " I shout," literally, "I talk big"; Howitlkaine = "I am tall (big)." In some languages the pronouns denoting subject, direct object and indirect object are all incorporated in the verb.

4. The formation of nouns of very composite character by the use of stems or radicals and prefixes, suffixes, &c, of various sorts, the intricacy of such formations exceeding often anything known in the Indo-European and Semitic languages. Often the component parts are " clipped," or changed by decapitation, decaudation, syncopation, &c, before being used in the compound. The following examples from various Indian languages will illustrate the process : — • Kootenay: Aqkinkanuktlamnam — " crown of head," from aq (prefix of uncertain meaning), kinkan = " top," tlam = " head," nam (suffix = " somebody's "). Tlingit : Kanyiqkuwate = " aurora," liter ally, " fire (kan)-like (yt'g)-out-of-doors (/b«)-colour (wate)."

5. The development of a great variety of forms for personal and demonstrative pronouns. In the latter, sometimes, the language distinguishes " visibility and invisibility, present and past, location to the right, left, front and back of, and above and below the speaker " (Boas). According to Morice (Trans. Canad. Inst., 1889- 1890, p. 187), the Carrier language of the Athabaskan stock has no fewer than seventeen possessive pronouns of the third person.

6. Indistinctness of demarcation between noun and verb; in some languages the transitive and in others the intransitive only is really verbal in form.

7. The use of the intransitive verb as a means of expressing ideas which in European tongues, e.g., would be carried by ad- jectives. In the Carrier language almost all adjectives are " genuine verbs " (Morice).

8. The expression of abstract nouns in a verbalized form. Thus Cree (Algonkian) generally says, in preference to using the abstract noun pimatisewin, " life," the periphrastic verb apimatisenanewuk, literally " that they (indefinite as to person) live." So far is this carried sometimes that Horden {Cree Grammar, London, 188 1, p. 5) says: " I have known an Indian speak a long sentence, on the duties of married persons to each other, without using a single noun."

As an interesting example of a long word in American-Indian languages may be mentioned the Iroquois

taontasakonatiatawitserak- ninonseronniontonhatieseke. This " word," which, as Forbes {Congr. intern, d. Amer., Quebec, 1906, p. 103) suggests, would serve well on the signboard of a dealer in novelties, is translated by him, " Que plusieurs personnes viennent acheter des habits pour d'autres personnes avec de quoi payer." Not so formidable is deyeknonhse- dehrihadasterasterahetakwa, a term for " stove polish," in use on the Mohawk Reservation near Brantford, Ontario.

The literature in the native languages of North America due to missionary efforts has now reached large proportions. Naturally Bible translations have been most important. According to Wilberforce Eames {Handbook of Amer. Inds., 1907, pt. i. pp. I 43~ I 45), " the Bible has been printed in part or in whole in 32 Indian languages north of Mexico. In 18 one or more portions have been printed; in 9 others the New Testament or more has appeared; and in 5 languages, namely, the Massachuset, Cree, Labrador Eskimo, Santee Dakota and Tukkuthkutchin, the whole Bible is in print." Of the 32 languages possessing Bible translations of some sort 3 are Eskimoan dialects, 4 Athabaskan, 13 Algonkian, 3 Iroquoian, 2 Muskogian, 2 Siouan, 1 Caddoan, 1 Sahaptian, 1 Wakashan, 1 Tsimshian, 1 Haidan. Translations of the Lord's Prayer, hymns, articles of faith and brief devotional compositions exist now in many more languages and dialects. A goodly number of other books have also been made accessible in Indian versions, e.g. Bunyan's Pilgrim's Progress (Dakota, 1857), Baxter's Call to the Unconverted (Massachuset, 1655), Goodrich's Child's Book of the Creation (Choctaw, 1839), Thomas, a Kempis's Imitation of Christ (Greenland Eskimo, 1787), Newton's The King's Highway (Dakota, 1879), & c – The " Five Civilized Tribes," who are now full-fledged citizens of the state of Oklahoma, possess a mass of literature (legal, religious, political, educational, &c.) published in the alphabet adapted from the " Cherokee Alphabet " invented by Sequoyah about 1821, "which at once raised them to the rank of a literary people."

Of periodicals in Indian languages there have been many published from time to time among the " Five Civilized Tribes." Of the Cherokee Advocate, Mooney said in 1897-1898, " It is still continued under the auspices of the Nation, printed in both languages {i.e. Cherokee and English), and distributed free at the expense of the Nation to those unable to read English— an example without parallel in any other government." More or less ephemeral periodicals (weekly, monthly, &c.) are on record in various Algonkian, Iroquoian, Siouan and other languages, and the Greenland Eskimo have one, published irregularly since 1861.

Wilberforce Eames {Handbook of Amer. Inds., 1907, pt. i. p. 389) chronicles 122 dictionaries (of which more than half are still in MSS.) of 63 North American-Indian languages, belonging to 19 different stocks.

The following linguistic stocks are represented by printed dictionaries (in one or more dialects) : Algonkian, Athabaskan, Chinookan, Eskimoan, Iroquoian, Lutuamian, Muskogian, Salishan, Shoshonian, Siouan. There exists a considerable number of texts (myths, legends, historical data, songs, grammatical material, &c.) in quite a number of Indian languages that have been published by scientific investigators. The Algonkian (e.g. Jones's Fox Texts, 1908), Athabaskan (e.g. Goddard's Ilupa Texts, 1904, Matthews's Navaho Legends, 1897, &c), Caddoan (e.g. Miss A. C. Fletcher's Hako Ceremony, 1900), Chinookan (Boas's Chinook Texts, 1904, and Kathlamet Texts, 1901), Eskimoan (texts in Boas's Eskimo of Baffin Land, &c, 1901, 1908; and Thalbitzer's Eskimo Language, 1904, Barnum's Innuit Grammar, 1901), Haidan (Swanton's Haida Texts, 1905, &c), Iroquoian (texts in Hale's Iroquois Book of Rites, 1883, and Hewitt's Iroquoian Cosmology, 1899), Lutuamian (texts in Gatschet's Klamath Indians, 1890), Muskogian (texts in Gatschet's Migration Legend of the Creeks, 1884-1888), Salishan (texts in various publications of Boas and Hill-Tout), Siouan (Riggs and Dorsey in various publica-

tions), Tsimshian (Boas's Tsimshian Texts, 1902), Wakashan (Boas's Kwakiutl Texts, 1902-1905), &c.

The question of the direction of migration of the principal aboriginal stocks north of Mexico has been reopened of late years. Not long ago there seemed to be practical agreement as to the following views. The Eskimo Migrations stock had reached its present habitats from a primitive "stocks? home somewhere in the interior of north-western Canada or Alaska; the general trend of the Athabaskan migra- tions, and those of the Shoshonian tribes had been south and south-east, the first from somewhere in the interior of north- western Canada, the second from about the latitude of southern British Columbia; the Algonkian tribes had moved south, east and west from a point somewhere between the Great Lakes and Hudson Bay; the Iroquoian stock had passed southward and westward from some spot to the north-east of the Great Lakes; the Siouan tribes, from their primitive home in the Carolinas, had migrated westward beyond the Mississippi; some stocks, like the Kitunahan, now found west of the Rocky Mountains, had dwelt formerly in the plains region to the east. Professor Cyrus Thomas, however, of the Bureau of American

Ethnology, discussing primary Indian migrations in North America {Congr. intern, d. Amer., Quebec, 1906, i. 189-204), rejects the theory that the Siouan stock originated in the Carolinas, and adopts for them an origin in the region north of Lake Superior, whence he also derives the Iroquoian stock, whose primitive home Dr David Boyle {Ann. Archaeol. Rep. Ontario, 1905, p. 154), the Canadian ethnologist, would place in Kentucky and southern Ohio. Another interesting contribution to this subject is made by Mr P. E. Goddard {Congr. intern, des. Amir., Quebec, 1906, i. 337-358). Contemplating the distribution of the tribes belonging to the Athabaskan stock in three divisions, viz. a northern (continuous and very extensive), a Pacific coast division (scattered through Washington, Oregon, California), and a southern division which occupies a large area in Arizona, New Mexico, Colorado, Kansas, Texas and Mexico, Mr Goddard suggests that the intrusion of non-Athabaskan peoples into a region once completely in the possession of the Athabaskan stock is the best explanation for the facts as now existing not explicable from assimilation to environment, which has here played a great role. It is possible also that a like explanation may hold for the conditions apparent in some other linguistic stocks. Many Indian tribes have been forcibly removed from their own habitats to reservations, or induced to move by missionary efforts, &c. Thus, in the state of Oklahoma are to be found representatives of the following tribes: Apache, Arapaho, Caddo, Cherokee, Cheyenne, Chickasaw, Choctaw, Comanche, Creek, Iowa, Kansa, Kickapoo, Kiowa, Miami, Missouri, Modoc, Osage, Oto, Ottawa, Pawnee, Peoria, Ponca, Potawatomi, Quapaw, Sac and Fox, Seminole, Seneca, Shawnee, Tonka wa, Wichita, Wyandot, &c; these belong to 10 different linguistic stocks, whose original habitats were widely distant from one another in many cases.

Some of the American-Indian linguistic stocks (those of California especially) hardly know real tribal divisions, but local groups or settlements only; others have many large and important tribes.

The tabular alphabetical list given in the following pages contains the names of the more important and more interesting tribes of American aborigines north of Mexico, and of the stocks to which they belong, their situation and population in 1909, the degree of intermixture with whites or negroes, their social, moral and religious condition, state of progress, &c, and also references to the best or the most recent literature concerning them.

Up to the date of their publication references to the literature concerning the tribes of the stocks treated will be found in Pilling's

bibliographies: Algonquian (1891), Athabascan (1892), Chinookan (1893), Eskimoan (1887), Iroquoian (1888), Muskhogean (1889), Salishan (1893), Siouan (1887) and Wakashan (1894). See also the Handbook of American Indians North of Mexico (Washington, 1907-1910); and the sumptuous monograph of E. S. Curtis, The North American Indian (N. Y., vols, i.-xx., 1908), with its remarkable reproduction of Indian types.

TRIBES]

INDIANS, NORTH AMERICAN

459

Abnaki.

ACNOMAWl

(Pit river Indians).

Amalecitfs (Maliseets).

Stock.

Arapaho.

RlI.yrLA (Bellacoola).

Black fkkt

(Siksika).

Bloods.

Caddo.

Cakiboo-Eater.s Carriers.

Cayuga.

Cayuse.

CHi;ilEHLt\ i.

ClfEROKEE.

Algonkian. Shastan.

Eskimoan.

Algonkian.

Athabaskan.

Algonkian.

Siouan.

Athabaskun.

Shoshonian.

Athabaskan, Salishan.

Algonkian.

AJgonkian.

Caddoan.

Athabaskan. Athabaskan.

Siouan. Iroquoian.

Waiiatpuan.

Salishan.

Shoshonian.

Iroquoian.

Situation, Population, &c.

At Becancour, Quebec, 27; at St Francois du Lac and Pierreville, 330. Decreasing.

N.E. California. About 1100 in the Pit river region; also 50 or 60 on the Klamath Reservation, Oregon.

Aleutian Islands and part of Alaska. About 1600. Decreasing.

106 at Viger (Cacouna, Quebec); 702 in various parts of W. New Brunswick. Apparently increas- ing.

In Arizona, 4879; New Mexico, 1244; Oklahoma, 453. Not rapidly

de- creasing as formerly thought.

358 at Ft. Belknap Reservation, Montana; 873 at Wind river Reservation, Wyoming; 885 in Oklahoma. Holding their own.

In Montana, 1248; Alberta, 971; Some little. Saskatchewan, 420.

Degree of Intermixture.

Probably no pure blood left.

About 50 % are mixed bloods.

Probably few pure bloods.

Considerable Span- ish blood due to captives, &c.

Some Spanish (Mexican) blood in places.

Condition, Progress, &c.

As civilized as the neighbouring whites. All Catholics.

Progress very slow ; influence of schools felt. Klamath Achomawi under Methodist influence.

"Decaying." Once converted to Greek Orthodox church. Metho- dist mission at Unalaska.

Fairly good. At Viger industrially unsettled. Catholics.

Marked improvement here and there, Catholic and Lutheran missions.

Oklahoma Arapaho American citi zens; progress elsewhere. Men nonite missions chiefly; also Dutch Reformed.

In Canada "steady advance," else where good. Alberta Assiniboms are Methodists; in Montana Catholic and Presbyterian mis- sions on reservations.

Authorities.

Muurault, Hist.des Abenaquis (Quebec, 1866); Jack, Trans. Canad. Inst.,

1892-1893.

‘owers, Contrib. N. Amer. Ethnol., vol. iii., 1877; various writings of Dr R. B. Dixon, American Anthro- pologist, 1905-1908, &rc.

Works (in Russian) of Veniaminov, 1840-1848; Golder, Journ. Amer.

Folk- Lore, 1905-1907; Chamberlain, Diet. Relig. and Ethics (Hastings, vol. i., 1908).

Writings of S. T. Rand; Chamberlain (M.), Maiiseet Vocabulary (Cam- bridge, 1S99).

Crcmony, Life among the Apaches (1868); Bourke, Qih Ann. Rep. Bur. Ethnol., 1887-1888, and Journ. Amer. Folk-Lore, 1890; Hrdlicka, Ameri- can Anthropologist, 1905.

Writings of Krocber and Dorsey, Bull. Amer. Mus. Nat. Hist., 1900-1907, and Publ. Field Columb. Mus., 1903; Scott, Amer. Anthrop., 1907.

Maclean, Canadian Savage Folk (Toronto, 1890); McGee, 15th Ann. Rep. Bur. Ethnol., 1893-1894.

;jo on Babine Lake, Bulkley river, &c, in central British Columbia.

About 500 at Ft. Hall, and 78 at Lemhi Agency, Idaho.

About 700 on Peace river, a western affluent cf Lake Athabaska.

287 on Dean Inlet, Bentinck Arm, Bellacoola rivet, &c, coast of central British Columbia. De- creasing.

About 824 in Alberta, Canada. De- creasing.

1168 near Ft. Macleod, Alberta. Probably decreasing somewhat.

ˆ50 in Oklahoma. Increasing slightly.

1 700 in the region E. of Lake Atha- baska, N.W. Canada.

970 between Tall a Lake and Ft. Alexandria, central British Col- umbia.

About 100 on the Catawba river York county, South Carolina. Decreasing.

Little, if any.

Little

Very little.

little.

Little.

Little

Considerable French !>lood.

Little, if any. Little.

Much mixed with white blood.

Conservative. Little progress. Morice, Aulhropos, 1906-1907, and Ann.

Reached by Catholic mission of Arch. Rep. Ontario, 1905, and other Stuart Lake, B.C. writings.

Considerable improvement morally and industrially.

Rather stationary.

Not very encouraging. Mission influence not yet strongly felt.

Steadily improving morally ˆ and financially. Anglicans, 237; Catholics, 260; pagans, 327.

All able-bodied Indians will soon be self-supporting. Presbyterians, 150; Catholics, 150; the rest pagan.

Citizens of United States. Catholic, Methodist and Presbyterian mis-

Little progress.

loffman, Proc. Amer. Philos. Soc, 1886; Mooney, 14th Ann. Rep. Bur. Ethnol., 1892-1893; Lowie, Anthrop. Pap. Amer. Mus. Nat. Hist.ˆ 1909.

See Babines.

Boas, Rep. Brit. Assoc. Adv. Sci '., 1891, and Mem. Amer. Mus. Nat. Hist.. 1898.

Maclean, Canadian Savage Folk (Toronto, 1S90), and other

writings; Grinnell, Blackjoot Lodge -Tales (N.Y., 1903), and other writings; Wissler, Ann. Arch. Rep. Ontario, 1905; Schultz, My Life as an Indian (N.Y., 1907); Wissler, Anthrop. Pap. Amer. Mus. Nat. Hist., 1908.

See Blackfeet.

Mooney, 14th Ann. Rep. Bur. Ethnol., 1892-1893; writings of Fletcher,

Dorsey, &c.

See Babines.

179 on tne Iroquois Reservations in New York State; 1044 with the Six Nations in Ontario; also some with the Seneca in Oklahoma and with Oneida in Wisconsin.

405 on Umatilla Reservation, Oregon.

182 on Puyallup Reservation, Wash- ington. Perhaps increasing slightly

Some English ad- mixture.

About { arc of mixed blood, c h i e II y French.

No data.

Semi-sedentary and naturally pro- gressive as Indians; improvements beginning to be marked % Under iniiuence of Catholic mission at Stuart Lake, B.C.

Slowly adopting while man's ways. Chiefly farmers.

Canadian Cayuga steadily improv- ing; they are "pagan."

About 300 oil Hit Colorado Rescrva- No data, tion; a few elsewhere in Arizona and California.

About 28,000, of which 1489 are in North Carolina and the rest in Oklahoma.

Not more than \ are of approxi- mately pure blood.

Conditions improving. of Catholic and missions.

Good work Presbyterian

Gradually improving and generally prosperous. Congregational mission.

Some improvement. Missions of the Presbyterians and of the Church of the Naˆarene.

Oklahoma Cherokee citizens of the United States, and making excellent progress. Various religious faiths.

Morice, Proc. Canad. hist., 1889, Trans. Canad. Inst., 1894, Hist, oj Northern- Inter, oj British Columbia (Toronto, 1904), and other writings. See Babines.

Mooney, Siouan Tribes of the East (Washington, 1894); Gatschet,

American Anthropologist, 1900; Harrington, ibid., 1908.

See Six Nations.

Mowry , Marcus Whitman (1 99 1) : Lewis, Mem. Amer. Anthrop. Assocˆ

1906.

ribbs, Contrib. ‘ N. Amer. Ethnol., vol. iii., 1877; Eells, Hist, of Ind. Missions on the Pacific Coast (N.Y., 1882), and other writings.

See Ute.

Rovce, jtk Ann. Rep. Bur. Ethnol.. 1S83-18S4; Mooney, 7th Rep., 1885- r886, and. especially igih Rep., 1897-

1898.

Tribe.

Cheyenne.

Chickahominy.

Chickasaw. Chilcotin,

Chilkat. Chinook. Chipewyan.

Chippewa (Ojibwa)

Stock.

Choctaw.

Clayoquot.

Clallam.

Colville. Comanche.

Cowichan. Cree.

Algonkiaa.

Algonkian.

Muskogian. Athabaskan.

Koluschan. Chinookan. Athabaskan.

Algonkian.

Crows

(Absaroka).

Dakota (Santee, Yankton, Teton — Sioux)

Muskogian.

Wakashan.

Salishan.

Salishan. Shoshonian.

Salishan. Algonkian.

Muskogian. Siouan.

Delaware.

Dog-Ribs.

Eskimo (Greenland).

HL&KTMO

(Labrador).

Algonkian.

Athabaskan.

Eskimoan.

Eskiraoan.

Situation, Population, &c.

1440 northern Cheyenne in Montana, 1894 southern Cheyenne in Okla- homa. Former increasing, latter decreasing.

Some 220 on Chickahominy river, Virginia.

5558 in Oklahoma.

About 450 on Chilcotin river, in S. central British Columbia.

About 700 at head of Lynn Canal, Alaska. Decreasing.

About 300 in Oregon. Decreasing.

About 3000 in the region S. of Lake Athabaska, N.VV. Canada.

About 18,000 in Ontario, Manitoba, &c. ; nearly the same number in the United States (Michigan, Wisconsin, Minnesota, N. Dakota).

17,529 in Oklahoma; 1356 in Missis- sippi and Louisiana.

224 in the region of Clayoquot Sound, Vancouver Island. Decreasing.

354 on Puyallup Reservation, Wash- ington.

316 at Colville Agency, Washington. Decreasing slightly.

Degree of Intermix tuie.

Some white blood, from captives, &c.

fo pi left. Consider- able negro ad- mixture.

Large admixture of white blood.

Little.

No data.

Some little.

Some Canadian- French admix- ture.

/

Much French and English admix- ture in various regions.

Large element of white and some negro blood.

Condition", Progress, &c.

Southern Cheyenne citizens of United States; Mennonite mission doing good work. Northern Cheyenne making progress as labourers, &c; Mennonite and Catholic missions.

Fishers and Farmers.

American citizens and progressing well. Various religious faiths.

Fairly laborious, but clinging to native customs, though making progress. Catholic mission influ- ence.

1408 in Oklahoma, their own.

Now holding

About 1000 on E. coast of Vancouver Island, and on islands in Gulf of Georgia.

About 12,000 in Manitoba, and some 5000 in Saskatchewan, Alberta Keewatin, &c.

11,000 in Oklahoma.

1S04 at Crow Agency, Montana.

About 18,000 in South and 4400 in North Dakota; 3200 in Montana; 900 in Minnesota. Seemingly decreasing.

In Oklahoma, 800 with Cherokee and 90 with Wichita; 164 with Six Nations in Ontario.

About 1000 in the region E. of the Hares, to Back river , N . W . Canada.

West coast, 10,500; East coast, 500. Slowly increasing.

About 1300.

No data.

Little.

Some Canadian- French, &c-

Some due to Spanish (Mexican) cap- tives, &c.

Little.

Large element of French, Scottish and English blood.

Large element of white blood; some negro.

Little.

Authorities.

Little progress.

Stationary or "worse."

Coming to be more influenced by the whites. Reached by Catholic missions.

Good progress. Many Indians quite equal to average whites of neigh- bourhood. Among the Canadian Chippewa the Methodists, Catho- lics and Anglicans are well repre- sented; among those in the United States the Catholics and Episco-

Ealians chiefly, also Methodists, .utherans, &c. A number of native ministers.

Citizens of United States, making good progress. Various religious faiths.

Rather stationary, but beginning to improve. Influence of Catholic

mission and industrial school .

Improving, but suffering from white contact. Congregationalist mis- sion.

Improving.

Good progress, in spite of white impositions.

Industrious; steady progress. Catho- lic and Methodist missions, chiefly former.

Slow but steady progress (except with a few bands) . Catholics, Methodists and Anglicans strongly represented by missions and church members; many Presbyterians also.

American citizens, making good progress. Various religious

faiths.

Improving industrially and financi- ally. Morals still bad.

Considerable white blood, varying with different sec- tions.

Considerable.

Capable of and making good pro- gress. Episcopal, Catholic, Con- gregational missions with good re- sults.

Little.

Large element of white blood, esti- mated already in

1855 at 30%.

Considerable < S.E. coast.

Oklahoma, Delaware, U.S. citizens, and progressing; Canadians making also good progress.

"Wild and indolent," not yet much under white influence.

More or less "civilized" and "Chris- tian" as result of Moravian mis- sions.

Much improvement due to Moravian and (later) other Protestant mis- si ona.

Mooney, 14th Ann. Rep. Bur. Ethnol., 1892-1893; Dorsey, Ptibl. Field Columb, Mus., 1905; Grinnell, Intern. Congr. Americanists, 1902- 1006; Journ. Amer. Folk-Lore, 1907- 1908; Amer. Anlhrop., 1902-1906; Mooney and Petter, Mem. A mer. Anlhrop. Assoc, 1907.

Tooker, Algonquian Series (N.Y., 1900); Mooney, Amer. Anlhrop.,

1907.

Speck, Journ. Amer. Folk-Lore, 1907, and Amer. Anlhrop., 1907.

Writings of Morice (see Carriers) ; Farrand, Mem. Amer. Mus. Nat. Hist., 1900.

Emmons and Boas, Mem. Amer. Mus. Nat. Hist., 1908.

Boas, Chinook Texts (Washington, 1894), an< I other writings; Sapir, Amer. Anlhrop., 1907.

Writings of Petitot, Legoff, Morice (see Babines), &c; Morice, Anthropos, 1906-1907, and Ann. Arch. Rep. Ontario, 1905.

Warren, Minn. Llist. Soc. Coll., 1885; Blackbird, Ottawa and Chippewa Indians (1887); W. Jones, Ann. Arch. Rep. Ontario, 1905; Hugolin, Congr. int. d. Amer. (Quebec, 1906); P. Jones, Hist. Ojebway Inds. (1861).

Gatschet, Migration Legend of Creeks (1884-1888); Speck, Amer. Anthrop.,

1907.

See Nootka.

Eells in Ann. Rep. Smiths. Inst., and other writings.

See Chehalis.

Mooney, 14th Ann. Rep. Bur. Ethnol.

1892-1893.

Hill-Tout, Rep. Brit. Assoc. Adv. Sci., 1902, and Trans, R. Anthrop. Inst., 1907; Boas, Rep. Brit. Assoc. Adv.

Sci., 1889.

Writings of Petitot, Lacombe, Horden, Bell, Watkins, Evans, Young, &c; Lacombe, Diet, de la langue des Cris (1876); Russell, Explor. in the Far North (1898); Stewart, Ann. Arch. Rep. Ontario, 1905; Maclean, Canad. Sav. Folk (1890).

Gatschet, Migration Legend of the Creeks (1884- 1 8S8) ; Speck, Mem . Amer. Anthrop. Assoc, 1907.

Simms, Publ. Field Columb. Mus., 1903; Schultz, My Life as an Indian (N.Y., 1907).

Writings of Dorsey, Riggs, Eastman, &c. Riggs, Contrib. N, Amer. Ethnol., vol. vii., 1890, and vol. ix., 1893; Wissler, Journ. Amer. Folk- Lore, 1907; Eastman, Indian Boy- hood (1902).

Brinton, Lenape and their Legends (Phila., 1885), and Essays of an Americanist (1890); Nelson, Indians

of New Jersey (1894)-

Sec Chipewyans, Carriers.

Writings of Ri n ˆj Holm, Nansen. Peary. Rink, Tales and Trad, oi the Eskimo (Lond., 1875) and Eskimo Tribes (1887); Nansen, Eskimo Life (1893); Thalbitzer, Eskimo Language

(1904)-

Packard, Amer. Naturalist, 1ˆ85: Turner, nth Ann. Rep. Bu; . Ethnol. 1889-1S90.

TRIBES]

INDIANS, NORTH AMERICAN

461

r

Tribe.

Stock.

Situation, Population, &c.

Degree of Intermixture.

Condition, Progress, &c.

Authorities.

Eskimo Eskimoan.

(central regions).

Eskimo (Mackenzie, &c).

Eskimo (Alaska).

Eskimo

(.E. Asia).

GOSIUTE.

GROS VENTRES

(Atsina).

Hankut'qin. Hares.

Havasupai.

Hurons OF

LORETTE.

Iroquois

(of Caughnawaga).

Iroquois

(of Lake of Two

Mountains).

Iroouois (of St Regis).

Iroquois (of W'atha).

Iroquois

(of St Albert).

JlCARILI.A

(Apache). Katbab.

Kaicani. “Kaiyuhkho’tenne

Kalapooia.

Kali-spel (Pend d’Oreille).

Eskimoan. Eskimoan.

Eskimoan.

Salishan.

Shoshonian. Algonkian.

Haidan.

Athabaskan. Athabaskan.

Yuman.

Siouan.

Athabaskan.

Iroquoian. Siouan.

Iroquoian.

Iroquoian.

Iroquoian. Iroquoian.

Iroquoian.

Athabaskan.

Shoshonian.

Haidan. Athabaskan.

Kalapuyan. Salishan

About 2500.

About 1500.

About 12,000, exclusive of Aleuts.

Little.

Little.

615 at Flathead Agency, Montana.

About 200 in Utah.

558 at Ft. Belknap Agency, Mon- tana.

About 600 on Queen Charlotte Is., and 300 in Alaska. Decreasing.

About 400 on the Yukon, above the Kotlo, in Alaska.

About 600 W. of Gt. Bear Lake to Eskimo country, in N.W. Canada.

166 N. of Prescott in N\W. Arizona. Decreasing.

467 near Ft. Berthold, N. Dakota.

420 in Hoopa Valley, N.E. Cali- fornia.

466 at Lorette, near the city of Quebec. Increasing, but losing somewhat by emigration.

246 in Kansas; 88 in Oklahoma. Holding their own.

2075 at Caughnawaga, in S-W. Quebec (largely Mohawk). In- creasing.

395 at Lake of Two Mountains, Quebec.

*1449 at St Re*gis, Quebec; 1208 at St Regis, New York.*

About 65 at Watha (formerly Gibson), near the southern end of Lake Muskoka, Ontario.

94 near St Albert, Alberta ("Michel's band").

784 in New Mexico. Decreasing.

About 100 in S.W. Utah. Decreas- ing.

About 300 in S. Alaska.

About 1500 on the Yukon (between the Anvik and Koyukuk) in W. Alaska.

About 125 at Grande Ronde, Oregon and a few also on the Siletz Reservation.

826 on the Flathead Reservation, Montana; 98 at Colville Agency, Washington.

Not much improvement except here and there. Some reached by Episcopalian mission.

Not much improvement. by Catholic missions.

Reached

Considerableon cer- tain parts of coast

Little.

Considerable.

Little. Little.

Some little.

Little, if any. Little.

Little.

Little.

Little.

No pure-bloodsleft Considerable.

Few, if any, pure- bloods left.

Few, if any, pure- bloods left.

Few pure-bloods left.

Considerable.

"Indians only in name," no pure- bloods left.

Little.

Much improvement in parts since introduction of reindeer in 1892. Presbyterian, Methodist, Catholic, Moravian, Baptist, Swedish Evangelical, Quaker, Congregational, Lutheran missions now at work.

Little improvement.

Continued Improvement, missions.

Catholic

Boas, 6th A nn. Rep. Bur. Elknct ., 1884-1885, and Bull. Amer. Nat. Hist., 1901 and 1908.

Petitot, Les Grands Esquimaux

(1887), Monographic des Esquimaux

Tchiglit (Paris, 1876) and other

writings ; Stefansson, Harper's Magazine, 1908-1909.

Dall, Contrib. N. Amer. Ethnol., vol. i., 1877; Murdoch, gth Ann. Rep. Bur. Ethnol., 1887-18S8; and Nelson, iSlh Rep., 1896-1897; Barnum, Innuit Gramm. and Did. (1901).

Hooper, Tents of the Tuski (1853); Dall, Amer. Naturalist (1881). See Eskimo (Alaska).

McDermott, Journ. Amer. Foik-Lore, 1901 ; Ronan, Flathead Indians

Little.

See Haida. Little.

Not much. Considerable.

Some improvement in last few years.

Law-abiding, industrious and fast

becoming more moral. Catholic,

chief mission influence, also Pres- byterian.

Now "gradually advancing along the lines of civilization." Mission influences Methodists and Angli- can, with much success, especially former.

Not yet much under white or mis- sionary influence.

'Wild and indolent," with little improvement. Reached by Catho- lic missions.

'Good workers"; not yet distinctly under mission influence.

Making good progress. Congrega- tional and Catholic missions. J

Self-supporting by agriculture and stock-raising, Presbyterian and Episcopal missions with good results.

Practically civilized. All Catholics, except one Anglican and six Pres- byterians.

In 1906 " accomplished more on their allotments than at any time heretofore." One regular mis- sionary.

Practically civilized and making fair progress. Chiefly Catholics, but there is a Methodist school.

Practically civilized and making fair progress. Catholics and Methodists represented.

Practically all civilized and making fair progress.

Industrious and progressive. In- fluence of Methodist mission.

Practically civilized; outlook promis- ing. Catholics.

Improvement during past few years. "Destitute," but gaining somewhat.

See Haida.

Up to the present influenced more by the Eskimo than by the whites.

Continued improvement.

Continued improvement. Catholic missions-

(1890).

Chamberlin, Phila., 19c

Proc. Acad. Nat. i. See Paiute, Ute.

Set.

Kroeber, Anthrop. Pap. Amer. Mus. Nat. Hist., 1907-1908.

Swanton, Contrib. to Ethnol. of the Haida (1905) and other writings; Boas, Rep. Brit. Assoc. Adv. Sci., 1889; Newcombe, Congr. intern, des Amer (Quebec, 1006).

See Babines.

See Babines, Carriers, Chipewyan.

James, Indians of the Painted Desert Region (Boston, 1903); Dorsey, Indians 0} the South-west (1903).

Matthews, Ethnogr. and Philol. of the Hidatsa (1877); McGee, jjth Ann. Rep. Bur. Ethnol., 1893-1894; Pepper and Wilson, Mem. Amer. Anthrop. Assoc., 1908.

Goddard, Life and Culture of the Hupa (1903), Hupa Texts (1904), and other writings.

Germ, Rep. Brit. Assoc. Adv. Set.

1900.

Dorsey, Trans. Anthrop. Soc. Wash., 1883, and ijth Ann. Rep. Bur. Ethnol., 1893-1894; also nth Rep.

Ann. Rep. Dcpt. Ind. Aff. Canada,

1907.

Cuoq, Lexique de la langue iroquoise (1882), and other writings.

Ann. Rep. Dept. Ind. Aff. Canada,

1907.

A nn. Rep. Dept. Ind. Aff. Canada,

1907.

Chamberlain, Amer. Anthrop., 1904.

Mooney, Amer. Anthrop. t 1898. Apache.

See Paiute, Ute.

See

See Haida.

See Babines, Carriers. Also Chapman, Congr. inter, d. Amer. (Quebec, 1906).

Powell, 7th Ann. Rep. Bur. Ethnol., 1885-1886; Gatschet, Journ. Amer. Folk-Lore, 1899; Lewi?, Mem. Amer. Anthrop. Assoc, 1906,

Giorda, Kalispel Dictionary (1877-1879). , See Chehalis. I

Kaxsa -f Kaw).

Kick a poo. Kawia (Cahuilla Kiowa.

KlTKSAN.

Kl.AMA! H.

Kon'kai' (Concow).

KmOTI.NAV-

KnYUKUKliO'TENNF.

LlI.T.OOF'I

(SiatliumrO.

Salishan.

Li/mmi.

Salishan.

Maiiji".

Pujunan.

Makah.

Wakashan

Mandan

Simian.

Maricopa.

Vuman.

M \^i:i;hn i,^H';im])

Cree).

Algonkian

M.wq'T.

Haicbn.

Mfsomini;

■:.

Algonkian

Stock.

Siouan.

Algonkian.

Shoshonian.

Kiowan.

Tsimshian.

Sahaptian.

Pujunan. Kituiiahan.

Wakashan.

Mission Indiana

Mississaciua.

Modoc.

Mohave.

Algonkian.

Algonkian.

Vuman: Sho shonian.

Algonkian.

Lutuamian.

Yuman,

Situation, Population, &c.

07 in Oklahoma

iSS in Kansas; 204 in Oklahoma; about 400 in Mexico.

About 150 in southern California.

Degree of

Intermixture.

1210 in Oklahoma.

About 1 100 on upper Skcena river in central British Columbia.

■*61 at Klamath Agency, Oregon.*

About 300 merged with Yakima and other tribes on Yakima Reservation, Washington.

171 at Round Valley, California.

In S.E. British Columbia; 220 at

St Mary's; 59 at Tobacco Plains: 82 at Columbia Lakes; 170, lower Kootenay. At Hal head Agency. Montana. 565. Holding their own, or increasing.

About too 011 the Koyukuk and Yukon above the 'Kaiyuhkho'tenne in Alaska.

About jooo in Vancouver Island and British Columbia. Decreasing.

About 000 in SAY. British Columbia, on I'Vaser river, Douglas and Lillooet Lakes, &c.

418 at Tulalip Agency, Washington.

in .K. California. About 2 ˆc

full-bloods.

400011 Makah, 25 on Ozctle Reserva- tion, Washington.

2(14 at Ft. Uerthold. X. Dakota. Beginning to increase again.

344 at Pima Agency Arizona. De- creasing slightly.

About 2=,oo in Manitoba, Kcewatin, Saskatchewan.

s6o at Massi-t, Q. Charlotte Is.

About 1600, of which 1.ˆ64 under siijx.'rinteudency of Green Bay, Wisconsin.

20 in Oklahoma. 240 in Indiana, a few elsewhere; total al>out 400.

114 in Xova Scotia. _>8S in Prince Edward Island. 1000 in Xew Brunswick, ~,<-)i in Quebec.

About ,-;ooo in S. California.

At Alnwick, 249; at the river Credit, 267; Rice Lake, 90; Mud Lake, ipo: Scugog. 35. Increasing slightly.

52 in Oklahoma, 329 on Klamath Reservation. Oregon. Apparently decreasing slowly, .or holding their own.

About 1000 in Ariaona.

About half are mixed blood.

Considerable.

Some white blood from captives, &C,

Little. Little.

Considerable.

A little French ar English.

Little, if any.

Considerable in places.

Considerable in places.

Considerable. \ot much.

Considerable.

Considerable.

Xo data.

Considerable in certain regions.

See Haida.

Considerable.

Considerable French blood, about 50 Vx .

Large element of French ; some Scottish and English blood.

Considerable some sections,

Considerable.

Little.

Little

Condition, Progress, &c.

American citizens, making fair progress.

Progress hampered by liquor, &c.

Progress good. Nominally Catholics, result of Californian missions.

Citizens of the U.S., making fair pro- gress. Catholic, Methodist, Pres- byterian, &ic, mission influences.

Making good ˆprogress.

Mostly self-supporting. Methodist mission, but poor work done.

Late reports indicate much bad influence of whites.

(Gradually improving.

Good, especially upper Kootenay; continued progress. Kootenay

in L'.S. not so progressive. Catholic missions with good re- sults.

Little progress noted.

Improvement recently. Anglican and Methodist missions— former counting 400; latter, 19 members; rest, "'pagans.'*

(Jetting along well generally

Catholic and Anglican missions.

Suffering from white contact. Few and scattered.

Progress good.

Making some progress. Catholic and Protestant mission influences.

Progress in 1906 excellent. Catholic mission school.

Generally law-abiding, but im- provident; some making good progress.

See Haida.

Making gradual progress, with noticeable improvement in many respects. Catholic church lias many members.

American citizens; intelligent, thrifty and progressive.

Authorities.

Dorsey, nth Ann. Rep. Bur. Etknol.,

1889-1890, and ijlh Rep., 1803-1894; Hay, Trans. Kant. State Hist. Soc,

1900.

Mooney, 14th Ann. Rep. Bur. Etknol. ,

1892-1893; LuU, Trans. Kansas Hist. Soc, 190O.

Barrows, Fdhnobotany of the Coahuilla Indians (1 900) ; Kroeber, Ethno- graphy oj the C ahull I a (xyo8).

Mooney, 14th Ann. Rep. Bur. Ethnol.. 1892-189,;, and jyth Rep., 1895-1896.

See Tsimshian.

Catschet, The Klamath Indians (Washington, 1890); Dorsey, Amer.

Anthrop., 1901.

Lyman, Proc. Amer. Antiq. Soc., 1904; Lewis, Mem. Amer. Anthrop. Soc. y

KJOt).

See Maidu.

Boas, Rep. Brit. Assoc. Adv. Set., 1889; Chamberlain, ibid., 1S92 (,and other writings), Ann. Anil. Rep. Ontario, 190s; Schultz, My IJ'je as an Indian (X.Y., 1907).

See Babines, Carriers, Chipewyan.

Boas, Rep. Brit. Assoc. Adv. Set., 1889, 1890, 1890, Rep. U.S. Nut. Mus.. 1895, and other writings; Boas and Hunt, Mem. Amer. Mus. A r at. Hist.,

1902.

Boas, Eihnogr. Album (X.Y., 1890); Hill-Tout, J oum. Anthr. Inst., 1905; Teit, Mem. Amer. Mus. Nat. Hist.,

1900.

See Chehalis.

Dixon, Bull. Amer. Mus. Nat. Hist., 1902-1905; J oum. Amer. Folk-Lore,

1900-1907.

Swan, The Indians oj Cape Flattery (Washington, 1870); Dorsey, Amer. Antiquarian, 1901.

Will and Spindle. The Mandans (1906); Dorsev in nth and ijth Reps.

Bur.

Ethnol

See Yuma.

Simms in J oum. Amer. Folk-Lore, 1906; Stewart in Ann. Arch. Rep.

Ontario, 1905.

See Haida.

Hoffman in 14th Ann. Rep. Bur.

Ethnol., 1892-1893.

Pilling, Bibl. of Algon. Lang. (1891).

Progress good; not degenerating Writings of Dr S. T. Rand, especially nor decreasing. All Catholics. Micmac Legends (1894); Pacifique

and Prince, Cotigr. intern, des Amir. Quebec, 1906; Leland Algonquin Legends (1885); Leland and Prince, Kuloskap (1902).

Self-supporting; some individuals remarkably able and industrious. Catholics nominally.

Fairly good generally; some at the Credit very successful farmers, competing with whites. Metho- dists chiefly.

Generally industrious and moral. Methodist mission.

Good; ind"strious but restless Presbyterian and Church of the Xa-carcne missions.

Writings of Miss C. G. du Bois, J oum. Amer. Folk-Lore and Amer. Anthrop., 1900-1908, &c. See Kawia.

Chamberlain, J oum. Amer. Folk-Lore,

1888, and Language oj theMississagas oj Skugog (Phila., 1892); Burnham, Ont. Hist. Soc. Pap. and Rec.,

1905,

Miller, My Life Among the Modocs (1873); Catschet, Amer. An-'hrop., 1894. Sec Klamath.

Bourke, J oum. Amer. Folk – Lore, 1889; Kroeber, Amer. Anthrop.. 1902. See Yuman.

TRIBES]

INDIANS, NORTH AMERICAN

463

Tribe.

Mohawk.

MONTAGNAIS.

Moqui (Hopi).

“Moravians.”

Ml.’N’SEE.

Xahane.

Xavaho.

Nespf.lim. Xez Perces.

O KAN AG AN.

Omaha.

Onondaga.

Osage.

Oto. Ottawa.

PAnm.

Stock.

NlPISSTNG.

Algonkian.

NlPISSING

(Algonquins).

Algonkian.

NlSKA (Nasqa).

Tsimshian.

NlSQUALLI.

Salishan.

NOOTKA.

Wakashan

Iroquoian.

Algonkian.

Shoshonian.

Algonkian. Algonkian.

Athabaskan.

Algonkian.

Athabaskan.

Salishan. Sahaptian.

Situation, Population, &c.

Salishan.

Siouan.

Iroquoian.

Iroquoian.

Siouan.

Siouan. Algonkian.

Shoshonian.

1762 with Six Nations, Grand river, Ont., 1320, Bay of Quinte, Ont., slight increase. The "Iroquois' at Caughnawaga, &c, are largely

Mohawks.

About 2000 in N.E. Quebec, N. shore of St Lawrence and St John, &c.

About 2000 in N.E. Arizona.

329 on river Thames, Ontario, Canada.

118 on river Thames, Ontario, Canada; also a few with the Stockbridges in Wisconsin and the Chippewa in Kansas.

About 1000 in N.W. British Col- umbia, N. and S. of Stikeen river, and E. to beyond the Rockies.

Some 2500 in N.E. Quebec, Lab- rador, &c.

About 29,000 in Arizona and New Mexico, about 8000 in the latter state. Increasing in number.

191 at Colville Agency, Washington.

S3 at Colville Agency, Washing- ton, 1534 under Ft. Lapwai superintendency, Idaho. De- creasing.

239 on Lake Nipissing, Ontario. Increasing.

About 60 at Lake of Two Moun- tains, Quebec.

About 800 in Nass river region in W. British Columbia. Decreasing.

Degree of Intermixture.

Condition, Progress, &c.

ConsiderabI e English and French.

Large element of French blood.

146 in W. Washington.

133 (including Ciayoquot") on Van- couver Island, B.C. Decreasing slowly.

Little.

Considerable. Considerable.

Not much.

Not very much.

Much Span! s h (Mexican) blood.

Considerable.

Amount uncertain

Little. Considerable.

Little.

Considerable.

Considerable places.

See Six Nation?.

Authorities.

Forbes, Congr. intern, d. A mir., Quebec, 1906; Brant-Sero, Man (London, 1901). See Six Nations.

At St John, "energetic, hard Chambers, The Ouananiche (1896); working and provident " ; others Chamberlain, Ann. A rch. Rep. suffering from liquor, &c. Gttholic Ontario, 1905; David, Congr. int.

missions.

Still "[Kigan," but "dry-farming" experts. At Oraib: two factions, progressives and conservatives. Mennonite mission.

Generally industrious and very law- abiding. All Methodists.

Fairly industrious; progress slow.

Have suffered much from white contact. Reached by Catholic missions from Stuart Lake.

Improvement not marked. Catholic mission influence.

Bourkc, Snake Dance A mong tht Moquis (1884) ; Hough, Amer. Anthrop., 1S98; Dcrsey and Yoih, Field Columb. Mm. Publ., 1901-1902. Alsothe numerous monographs of Dr. J. W. Fewkes in Rep. Bur. Ethnci. Amer. Anthrop., Journ. Amer. Folk-Lore, 1894-1908.

Ann. Rep. Dept. 2nd. Afj. Canada,

1907.

Ann. Rep. Dept. 2nd. Afj. Canada,

1907.

Writings of Petitot, Morice, &c, especially the latter in Trans. Canad. Inst., 1894, Proc. Canad. Inst., 1889. See Carriers.

Turner, nth Ann. Rep. Bur. Ethnol..

1889-1890; Chamberlain, Ann. Arch Rep. Ontario, 1905.

Writings of Dr. W. Matthews, especially Navaho Legends (Boston, 1897), The Night Chant (N.Y., 1902).

See Chehalis.

Have made remarkable progress racially and individually. Catho- lic, Presbyterian, &c, missions.

Suffering from liquor and white contact.

Of a high intellectual type (seen in Packard, Journ. Amer. Folk-Lore,

824 in the Kamloops-Okanagan Considerable Agency, British Columbia; 527 places, on Colville Reservation,

Washington.

1 1 28 in Nebraska.

777 on river Thames, Ontario, and 350 with Six Nations in Ontario; 215 1 in Wisconsin; 286 in New York. Increasing.

350 with the Six Nations, Ontario; 553 in New York.

1994 in Oklahoma.

About 300 with the Missouri in Oklahoma.

About 750 onManitoulinandCoburn Islands, Ontario; 2750 in Michi- gan; 197 in Oklahoma.

6500 to 7000 chiefly in Nevada (about 600 in Utah; 350 in Arizona).

Much white blood.

Large eiement of white blood.

Large element of white blood.

Very much white blood; half are mixed-bloods.

Considerable.

Consider abl v French and English blood.

No data.

children); suffering much from disease and white contact. About 60% Catholics and 15% Pres- byterians-

Improving.

Little marked progress; but fairly industrious. Catholics.

Making good progress.

Suffering from white contact, liquor,

Industrious and law-abiding; evil from white contact increasing. Catholic and Presbyterian missions.

Industrious and law-abiding. Catho- lic, and in Canada Catholic and Anglican churches largely repre- sented.

Good progress in many respects ; improvidence, &c, still causing trouble. Presbyterian mission.

Canadian Oncidas at Delaware full cit : zens. All progressing excel- lently and self-supporting. U.S. Oneidas citizens.

1891; McBeth, The Nez Perces since 2 J ewis and Clark (New York, 1908); Spinden, Mem. Amer. Anthrop. Assoc, 1908.

Ann. Rep. Dept. 2nd. Afj. Canada,

1907.

Writings of Rev. J. A. Cuoq, especi- ally Lexiqite algonquin (Montreal, 1886); Lemoine, Congr. inter, d. Amer., Quebec, 1906.

Boas, Rep. Brit. A ssoc. Adv. Set., 1895. 1896, and 2ndianische

Sagen (Berlin, 1895). See Tsimshian.

Gibbs, Contrib. N. Amer. Ethnol., vol. i., 1877, and Niskwalli Dictionary, ibzd.

Sproat, Scenes and Studies of Savage Life (1868); Boas, Rep. Brit. Assoc.

1890, and 2ndianische Sagen (1895).

Not so advanced

Tuscarora.

in U.S. as

Boas, Rep. Brit. Assoc, 1SS9; Mem. Amer. Mus. Nat. Hist.,

Teit,

1900.

Dorsey, 3rd Ann. Rep. Bur. Ethnol., 1881-1S82, and 13th Rep., 1891-1892, and other writings: Also writings of Miss A. C. Fletcher. See Ponca.

Bloomfield, The Oneidas (N.Y., 1907). See Six Nations.

Clark, Onondaga (Syracuse, 1849) ; writings of Beauchamp, de Cost Smiih, M. R. Harrington, &c See

Six Nations.

U.S. citizens and making good Dorsey (J. O.), 6lh Ann, Rep. Bur. progress. Baptists and Catholics Ethnol., 1884J1885; Brewster, Trans.

represented.

Making good progress.

Canadian Ottawa industrious rind law-abiding, and many in the U.S. as civilized as average whites about them. Catholic and Protestant missions.

Peaceable, moral and industrious; "have steadily resisted the vices of civilization." Catholic and Protestant missions.

Kans. Stale Hist. Soc, 1906; Dorsey (G. A.), Pitlil. Field Columb. J&us., 1904; Speck, Trans. Arch. D4pt. Univ. of Penn. (Phila., 1907).

See Osage.

Blackbird, Ottawa and Chippewa Indians (1887). See Pilling's Biblio- graphy oj the Algonkian Languages,

Mooney in 14th Ann. Rep. Bur. Ethnol., 1892-1893. See Ute.

464

INDIANS, NORTH AMERICAN

[TRIBES

Tribe.

Stock.

Situation, Population, &c.

Degree of Intermixture.

Condition, Progress, &c.

Authorities.

Pamunkey.

Panamint.

Papago.

Passamaquoddy. Pawnee.

Penobscot. Peoria.

PlEGAN.

Pima.

Pomo. Ponca.

POTAWATOMI.

Pueblos.

Pueblos. Pueblos.

Pueblos.

PUYALLTJP. QUAPAW.

QUILECTE. QUINAIELT.

Sacs and Foxes (Sauk, &c).

San spoil. Sarcee.

Sekane

(Sikani).

Algonkian.

Shoshonian. Piman.

Algonkian. Caddoan.

Algonkian. Algonkian.

Algonkian.

Shoshonian.

Kulanapan. Siouan.

Algonkian. Keresan.

Shoshonian. Tanoan.

Zuiiian.

Salishan. Siouan.

Chemakuan. Salishan.

Algonkian.

Salishan. Athabaskan.

About 140 in King William county, Virginia.

About 100 in the Panamint Valley, S.E. California.

4991 in Arizona; about 1000 in Mexico.

About 350 in Maine.

649 in Oklahoma. Decreasing.

About 410 in Maine.

192 with Kaskaskia, Wea and Pian- kaskaw in Oklahoma.

482 near Macleod, Alberta; 2072 at Blackfoot Agency, Montana.

3936 in Arizona; more in Mexico, increasing slightly.

About 1000 in N.E. California.

570 in Oklahoma.

179 on Walpole Island, Ontario; 1740 in Oklahoma.

3900 in 6 pueblos in N. central New Mexico.

See Moqui.

About 4200 in 12 pueblos in New Mexico.

1500 in Western New Mexico.

All mixed-bloods; some negro mix- ture.

No data.

Little

Considerabl t French and English.

Considerable.

Considerable.

No pure-bloods left.

Considerable.

Fishermen and small farmers.

Stationary.

Making very good progress recently. Catholic mission.

With Penobscots have representative in Maine legislature.

Citizens of U.S. Special progress recently in agriculture. Methodist mission.

Pollard, The Pamunkey Indians of Virginia (Washington, 1894).

Coville, Amer. Anthrop., 1892.

McGee in Coville and Macdougal, Des. hot. lab., 1903; Bandelier, Arch. Inst. Papers, 1890. See Pima.

Leland, Algonq, Leg. of New England (Boston, 1885); Brown, Trans. R. Soc. Canada, 1889; Prince, Proc. Amer. Philos. Soc, 1897; Leland and Prince, Kuloskap (Boston, 1902).

Writings of Dunbar, Grinnell, Dorsey, Flercher, &c. ; Grinnell , Pawnee Hero-Stories (1889) ; Dorsey, Tradi- tions 0} the Stttai Pawnee (Boston, 1904), and Pawnee Mythology (1906); Fletcher, 22nd Ann. Rep. Bur. Etnnol., 1900-1901.

See Passamaquoddy.

See Pilling, Bibliography of the Algon- quian Languages (1891).

See Blackfeet.

486 at the Puyallup Agency, Wash- ington.

292 in Oklahoma.

232 at Neah Bay Agency, N.W. Washington.

142 at Puyallup Agency in N.W. Washington.

343 in Iowa; 630 in Oklahoma; 90 in Kansas.

126 at Colvllle Agency, Washington. 205 SAV. of Calgary, Alberta.

About 450 on Finlay and Parsnip rivers and W. to forks of Tatla Lake in N. central British Columbia.

Considerable.

Little

Considerable,

Considerable.

Larger element of white blood than other Pueblos Indians, but not great.

See Moqui.

Have not favoured intermixture. Amount little.

Have not favoured white intermix- ture.

Considerable. Considerable.

Considerable. Considerable.

Considerable.

Considerable.

More than many other tribes of this stock.

Little.

See Passamaquoddy.

American citizens and progressing well.

Improvement slow in Montana; in Alberta, "noticeable advance along all lines." Methodist and Angli- can missions in Alberta.

Making good progress recently. Russel, Amer. Anthrop., 1903, Journ

Catholic and Protestant missions.

Progress good.

U.S. citizens, making good progress.

Canadian Potawatomi are law-abiding and industrious. American Pota- watomi citizens making pro- gress.

Majority nominally Catholics.

See Moqui.

Nominally Catholics for most part. At San Juan notable evidences of

thrift, less elsewhere.

Practically all are "pagans." Sub- stantial progress lately in several ways.

Suffering from white contact; future not bright.

Majority are intelligent, thrifty and progressive. Catholic missions.

Progress good.

See Nisqualli.

Continued improvement ; conserva- tive opposition less. Catholic missions.

Improving.

Making good material progress lately. Anglican mission.

Not so progressive as Carriers &c. Reached by Catholic mission from Stuart Lake.

A mer. Folk-Lore, 1 901 , and 26th Ann. Rep. Bur. Amer. Ethnol., 1904-1905; Dorsey, Indians of the South-west (1903); Hrdlicka, Amer. Anthrop., 1904; Kroeber, Univ. Calif. Publ., 1907

Barrett, Ethnography of the Porno

(1908).

Dorsey (J. O.), Cegiha Language (1890), Omaha and Potika Letters (1891), &c; Dorsey (G. A.), Field Column. Mus, Publ., 1905; Boas, Congr. int. d. Amer., Quebec, 1906.

See Pilling, BibliograpJty of the Algon- quian Languages (1891).

Writings of Bandelier, Hodge, Lummis, Stevenson, &c. Stevenson, nth Ann. Rep. Bur. Ethnol., 1889-1890; Dorsey, Indians of the South-west (1903); Bandelier, Archaeol. Inst. Papers, 18S1, 18S3, 1892.

See Moqui.

Writings of Bandelier, Lummis, Fewkes, &c. See Pueblos (Keresan) and Moqui.

Bandelier, Journ. Amer. Ethnol. and Archaeol., 1892; Fewkes, ibid.,

1891; Stevenson, 5th Ann. Rep. Bur. Ethnol., 1883-1884, and 23rd Rep., 1901-1902; Cushing, 2nd Rep., 1880- 1881, 4th Rep., 1882-18S3, 13th Rep., 1891-1892, and Zuni Folk-Tales (N.Y., 1901), and other writings.

See Chehalis.

Dorsey (J. O-), nth Ann. Rep. Bur Ethnol., 1889-1890, 13th Rep. 1891- 1892, and other writings.

See Clallam.

Farrand, Mem. Amer. Mus. Nat. Hist., 1902; Conard, Open Court,

1905-

Laslcy, Journ. Amer. Folk-Lore, 1902; Jones, ibid., 1901, and Fox Texts (1907); Owen, Folk-Lore of the

Musquaki (1904).

See Chehalis.

Maclean, Canad. Savage Folk (1890); Goddard, Congr. int. d. Amer., 1906; Morice, ibid, and Ann. Arch. Rep. Ontario, 1905; Simms, Journ. Amer. Folk-Lore, 1904.

Morice, Anthropos, 1906, 1907, and Ann. Arch. Rep. Ontario, 1905, and other writings. See Babines, Carriers.

TRIBES]

INDIANS, NORTH AMERICAN

465

Tribe.

Seminole.

Seneca.

Shawnee.

Shoshonee.

Shuswap

(Sequapamuq) .

Siletz.

Six Nations (Canada).

Six Nations (New York).

Stock.

Sk.qomic.

Slave.

Snaimuq. (Nanaimo).

Songish (Lkungen).

Spokan.

Tahltan.

Thompson Indian (Ntlakapamuk).

Tonka w a.

Tsimshian (Proper).

Tuscarora.

Tutchonekut'qin,

Uinta Ute. Umatilla.

Uncompaghre

Ute.

Ute.

Muskogian. Iroquoian.

Algonkian.

Shoshonian.

Salishan.

Indians of several stocks.

Iroquoian.

Iroquoian.

Salishan. Atkabaskan.

Salishan. Salishan.

Salishan. Athabaskan.

Athabaskan.

Salishan.

Koluschan.

Tonka wan. Tsimshian.

Iroquoian.

Athabaskan.

Shoshonian. Sahaptian.

Shoshonian.

Shoshonian.

Situation, Population, &c.

Degree of Intermixture.

2132 in Oklahoma; 350 in Florida.

383 in Oklahoma; 2742 in New York; 215 with Six Nations, on Grand river, Ontario.

574 in Oklahoma.

About 1000 in Idaho; 242 in Nevada 793 in Wyoming.

About 1000 in the S. interior of British Columbia; also 52 within the Kootenay area at the Columbia Lakes.

483 on Siletz Reservation, Oregon.

On Grand River Reservation, Ontario; Cayuga, 1044; Mohawk, 1 762 ; Oneida, 350; Onondaga, 3<;o; Seneca, 215; Tuscarora, 397. Total, 4118.

In New York State; Cayuga, 179; Oneida, 286; Onondaga, 553; Seneca, 2742 ; Tuscarora, 356. Total, 4116.

About 150 in the Howe Sd. and Burrard Inlet region of British Columbia.

About 1 100 in the region W. of Gt. Bear Lake, from Ft. Simpson to Ft. Norman in N.W. Canada

About 160 on reserve near Nanaimo Harbour, B.C.

About 200 in S.E. Vancouver Island, B.C.

91 in Idaho; 133 in Montana; 434 in Washington.

220 in the N. Interior of British Columbia, at mouth of Tahltan

About 2000 on the Yukon, between Tanara and Koserefsky in Alaska.

About 1770 in the Thompson river region, S. central British Columbia.

About 2000 in S. Alaska.

47 in Oklahoma.

About 2000 in northern British Columbia.

397 on Six Nation Reservation, Ontario; 356 with Six Nations, New York.

About 1000 on the Yukon from Deer river to Ft. Selkirk, in Alaska.

435 in Utah.

207 in Oregon.

493 in Utah.

845 in Colorado; 1245 in Utah.

Much white and some negro blood.

Considerable.

Considerable.

Amount of admix- ture not large.

Considerable in places.

Considerable.

Large admixture of white blood.

Large admixture of white blood.

Some Canadian- French ad- mixture.

Condition, Progress, &c.

Oklahoma Seminoles American citizens.

See Six Nations.

Progress good. Catholic and Protes- tant missions.

Progress good in the last few years. Catholic and Protestant Episcopal missions.

Industrious and law-abiding.

Catholic and Protestant missions.

Authorities.

Progress good.

Generally capable and industrious, and steadily improving ; many, both in U.S. and Canada, equal to whites. The Canadian Cayuga and Onondaga are ‘ ‘ pagans . ‘ ‘ Many Christian faiths represented.

Improvement varying with tribes ; Tuscarora said to be best. Various religious faiths.

‘Probably the most industrious and orderly band of Indians in the province.” Catholic mission.

No certain data ; No marked progress, but white

but some ad- influence being felt. Catholics and

mixture now Episcopal missions, going on.

No data. No data.

Considerable. Little.

Little.

Not very much.

Considerable places.

No data. Not targe.

Considerable.

Little.

Little. Some.

Little.

Not much.

Making good progress recently. Catholic mission.

Industrious and mostly well-off. Catholic mission.

Improving.

Making good progress.

Not yet much influenced by whites Catholic mission.

Making good progress, and Protestant missions.

Catholi

Not marked generally. Greek Orthodox and other missions.

" Contented and enjoying life."

Making good progress. Anglican and other missions.

Making good progress in both Canada and New York.

Little progress.

See Ute.

Making progress. Catholic and Presbyterian missions.

See Ute.

Some progress recently. Catholic and Protestant missions.

MacCauley, 5th Ann. Rep. Bur. Ethnol., 1887; Coe, Red Patriots (1898). See Creek.

Sanborn, Seneca Indians (1862); Hubbard, An Account oj Sa-go-ye-wat-ha, or Red Jacket and his People (Albany, 1886). See Six Nations.

See Pilling, Bibl. of Algon. Lang. (1891). Also Harvey, Shawnee Indians

(1855).

Culin, Bull. Free Mus. Set. and Art (Phila., 1901); Dorsey, Indians of the South-west (1903). See Ute.

Boas, Rep. Brit. Assoc. Adv. Sci., 1890, and Ethnogr. Album (N.Y., 1900); Dawson, Trans. Roy. Soc. Canada, 1S91; Boas, Indianische Sagen (1895).

Dorsey, Journ. Amer. Folk-Lore, 1890, and Amer. Anlhrop., 1889.

Boyle, Ann. Arch. Rep. Ontario, 1898 and 1905, and Journ. Anthr. Inst., 1900; Hale, Iroquois Book oj Rites (Phila., 1883); Wilson, Tram. Roy. Soc. Can., 1885. See also under tribal names.

Beauchamp, Bull. N.Y. State Mus., 1897-1907, The Iroquois Trail (1892), and other writings; Smith, 2nd Ann. Rep. Bur. Ethnol., 1880-1881; Hewitt, 21st Ann. Rep. Bur. Ethnol., 1899-1900, and other writings. See also under tribal names.

Hill-Tout, Rep. Brit. Assoc. Adv. Sci., 1900; Boas, ibid., 1894.

Various writings of Petitot and Morice; the latter in Anthropos, 1906-1907; Bompas, Mackenzie River (London, 1888); Bell, Journ. Amer. Folk- Lore, 1 901.

Boas, Rep. Brit. Assoc. Adv. Sci., 1889, and Amer. Anthrop., 1889.

Boas, Rep. Brit. Assoc, 1890; Hill- Tout, Journ. Roy. Anthrop. Inst.,

1907.

Writings of Rev. M. Eejls. See Chehalis.

Teit, Boas Anniv. Vol. (N.Y., 1906).

Jette, Congr. int. des Amir. 1906; Man, 1907; Journ. Anthr. Inst.,

1907.

Teit and Boas, Mem. Amer. Mus. Nat. Hist., 1900; Teit, Trad, oj Thompson Inds. (Boston, 1898) ; Hill- Tout, Salish and Dent (London,

1907).

Krause, Die Tlinkit Indianer (Berlin, 1885) ; Boas, Indianische Sagen (Berlin, 1905); Bogoras, Amer. Anthrop., 1902; Swanton, 26th Ann. Rep. Bur. Amer. Ethnol., 1904-1905; Emmons, Mem. Amer. Mus. Nat. Hist., 1903.

Mooney, Globus, 1902.

Boas, Rep. Brit. A ssoc. A dv. Sci., 1889, and Indianische Sagen (Berlin, 1895) ; von der Schulenburg, Die Sprache der Zimshian-Indianer (1894); Wellcome, Metlakatla (1887).

See Six Nations.

See Babines, Carriers, Chipewyan.

See Ute.

See Nez Perces.

See Ute.

Culin, Bull. Free Mus. Sci. and Art (Phila., 1901); Kroeber, Journ. Amer. Folk-Lore, 1901, and Amer. Anthrop., 1906.

Tribe.

Walapai. j W'ai.lawajxa. Wichita.

WlNN'KBAGO.

vvvandot.

Yakima. Vellowknives

YlMA.

Yurnan.

Sahaptian.

Caddoan.

Siouiin. Iroquoiaa.

Sahaptian.

Situation, Population, &c.

Degree of Intermixture.

Yuman.

Zufiian.

513 in Arizona. Decreasing. 579 in Oregon. 441 in Oklahoma.

1070 in Nebraska; 1285 in Wiscon- sin.

85 in Oklahoma; 1 at Anderdon, Ontario, Canada.

About 1500 in Washington.

About 500 X.K. of Great Slave Lake in WW. Canada.

807 at Fort Yuma Agency, California, and a few at San Carlos, Arizona.

Condition, Progress, &c.

Little. Some.

Probably consider- able.

Considerable.

No pure-bloodsleft,

hardly a half- blood.

Considerable.

Not much.

Some S panish (Mexican) blood.

See Pueblos.

Self -supporting, but poor morally.

Not so satisfactory recently, but progressing.

Citizens of U.S., making good pro- gress. Catholic and Protestant

missions.

Many good citizens of U.S. and pro- gressing. Suffering from liquor and the mescal bean to some ex- tent.

More white than Indian.

L;«le reports indicate bad influence of whites.

No practical advance as yet.

Progress good. Catholic and Pro- testant missions.

Authorities.

See Pueblos.

James, Indians of the Painted Desert Region (Boston, 190.$.

See Nez Perces.

Dorsey, Mythology o'l the Wichita (Washington, 1004) and other writ- ings.

Thwaites, Colt. State Hist. Soc. Wis- consin, 1892; Fletcher, Journ. Amer. Folk-Lore, 1890; McGee, ijth Ann. Rep. Bur. Kthnol., 1893-1894.

Powell, rst Ann. Rep. Bur. Ethnol., 1879-1880; Connelley, Ann. Arch. Rep. Ontario, 1905, and Wyandot Folk-Lore (Topeka, 1899);

Merwin, Trans. Kansas Stale Hist. Soc,

1906.

Pandosy, Gramm. and Diet, of Yakima (1862); Lewis, Mem. Amer. Anthrop. Assoc, 1906.

Writings of Petitot, Morice, &c. Peti- tot, Antour du Grand Lac des Es- claves (1891), and Monographic des Dene-Dindjie (1876). See Carriers, Chipewyan.

Gatschet, Ztschr. I. Ethnologic (1893) Trippell, Overland Monthly, 1889. Dorsey, Indians of the SotUh-wesi (1903). See Mission Indians.

See Pueblos (Zufiian).

From the tables it will be seen that the American Indians in some parts of North America are not decreasing, but either holding their own or even increasing; also that tuˆa&c. thousands of them are now to all intents and purposes the equals in wealth, thrift, industry and intelligence of the average white man and citizens with him in the same society. In certain regions of the continent small tribes have been annihilated in the course of wars with other Indians or with the whites, and others have been decimated by disease, famine, &c. ; and over large areas the aboriginal population, according to some authorities, has vastly diminished. Thus Morice estimates that the Athabaskan population at present in Canada (about 20,000) is less than one-seventh of what it was a century or more ago; Hill-Tout thinks the Salishan tribes (c. 15,000) number not one-fifth of their population a hundred years ago, and equally great reductions are claimed for some other peoples of the North Pacific region; Kroeber thinks probable an Indian population in California of 150,000 before the arrival of the whites, as compared with but 15,000 now; by some the arid regions of the south-west are supposed to have sustained a very large population in earlier times; certain of the Plains tribes are known to have lost much in population since contact with the whites. But under better care and more favourable conditions generally some tribes seem to be taking on a new lease of life and are apparently beginning to thrive again. A considerable portion of the ” disappearance ” of the Indian is through amalgamation with the whites. Undoubtedly, in some parts of the country, exaggerated ideas prevalent in the early colonial period as to the numbers of the native population have interfered with a correct estimate of the aborigines past and present. Mooney thinks

that the Cherokee " are probably about as numerous now as at any period in their history " (Hmlb. Amer. Inds., 1907, pt. i. p. 247), and this is perhaps true also of some other tribes east of the Mississippi. Major J. \V. Powell was of opinion that the Indian population north of Mexico is as large to-day as it was at the time of the discovery. This, however, is not the view of the majority of authorities. The total number of Indians in Canada (Ann. Rep. Dept, hid. Aff., 1907) for 1907 is given as 110,345, as compared with 109,394 for the previous year, not including the Micmac in Newfoundland and the Indians and Eskimo in that part of Labrador belonging to Newfoundland. In 1903 the figures were 108.233. The gain may be largely due to more careful enumeration of Indians in the less well-known parts of the country, but there is evidently no marked decrease going on, but rather a slight increase in

Ontario, Quebec, New Brunswick, &c. In the United States (exclusive of Alaska, which counts about 30,000) the Indian population (Ann. Rep. Ind. AJ"., 1906) is estimated at 197,289, no including the " Five Civilized Tribes," of whose numbers (94,292) some 65,000 can be reckoned as Indians — a total of 382,000. The figures of- 197,289, according to the report, show an increase in population " due mainly to increase in number of Indians reported from California."

The financial condition of the Indians of the Dominion of Canada for the year ending March 31, 1907, is indicated in the following table: —

Total Amount

of Real and

Total Income

Personal

for the

Property.

Year.

Ontario .

$7,566,125

$1,426,690

Quebec .

i,78i,330

915,783

N. Brunswick

189,701

109,892

N. Scotia

151,949

76,603

P. E. I. . . .

6,370

15,374

Manitoba

2,102,044

348,966

B. Columbia

7,475,719

1,501,456

Sask ....

7,721,532

548,533

Alberta . . Total

5,154,789

211,839

$30,129,659

$5,155,052

The total amounts earned during the year were: from agriculture, I-1 , 337,948; wages and miscellaneous industries, $714,125; fishing, $544,487; hunting and trapping, $630,633. Of these hunting and trapping show a decided decrease over 1906. The Indian Trust Fund amounts to $5,157,566-59. The total appropriation in con- nexion with the Indians of the Dominion for all purposes for the year 1906-1907 was $1,055,010 and the actual expenditure some $114,000 less. The total amount of sales of lands for the benefit of Indian tribes was $422,086-13. The balance to the credit of the Indian savings account for the funding of the annuities and earnings of . pupils at industrial schools, together with collections from Indians for purchase of cattle and for ranching expenses, was $51,708-92." . According to the Report of the Commissioner of Indian Affairs the total amount of trust funds held by the United States govern- ment for the Indians, in lieu of investment, amounted to $36,352,950-97, yielding for 1906 interest at 4 and 5% of $1,788,237-23. The total incomes oi the various tribes from all sources for the year ending June 30, 1906, was $6,557,554-39, including interest on trust funds, treaty agreement and obligations, gratuities, Indian money, proceeds of labour, &c.

While the general constitution of the American aoorigines

north of Mexico is such as to justify their designation as one

j " American race/' whose nearest congener is to be found in

RACE MIXTURE]

INDIANS, NORTH AMERICAN

467

the " Mongolian race " of eastern Asia, &c, there is a wide range in variation within the American tribes with respect to particular physical characteristics. Some authorities, char^lr. like Dr Hrdlicka (Handb. Amer. Inds. N. of Mex., istics. 1907, pt. i. p. 53), separate the Eskimo from the

" Indians," regarding them as " a distinct sub-race of the Mongolo-

Malay," but this is hardly necessary if, with Boas {Ann. Archaeol. Rep. Ontario, 1905, p. 85), we " consider the inhabitants of north-eastern Asia and of America as a unit divided into a great many distinct types but belonging to one and the same of the large divisions of mankind." Upon the basis of differences in stature and general bodily conformation, colour of skin, texture and form of hair, shape of nose, face and head, &c, some twenty-one different physical " types " north of Mexico have been recognized.

Although the variation in stature, from the short people of Harrison Lake (average 161 1 mm.) to the tall Sioux (average 1726 mm.), Eastern Chippewa (average 1723 mm.), Iroquois (average 1727 mm.), Omaha and Winnebago (average 1733 mm.) and other tribes of the Plains and the regions farther east, is considerable, the North American Indian, on the whole, may be termed a tall race. The stature of women averages among the tall tribes about 92%, and among the short tribes about 94% of that of the men.

Tl)e proportion of statures (adult males) above 1730 mm. in certain Indian tribes (Boas) is as follows: Apache and Navaho 25-3; Arapaho, 45-9; Arikara, 15-2; British Columbia (coast) 28-8; British Columbia (interior), 16-4; California (south), 32-7 Cherokee (eastern), 21 -o; Cherokee (western), 40-7; Cheyenne, 72-2 Chickasaw, 23-8; Chinook, 36-2; Choctaw, 32-6; Coahuila, 14-2 Comanche, 27-1; Cree, 33-4; Creek, 53-6; Crow, 51-3; Delaware 41-1; Eskimo (Alaska), 5-9; Eskimo (Labrador), 00; Flathead 18-9; Harrison Lake, B.C., i-o; Hupa, 18-7; Iroquois, 52-1; Kiowa 41-3; Klamath, 20-0; Kootenay, 26-0; Micmac and Abnaki, 45-7: Ojibwa (eastern), 42-7; Ojibwa (western), 42-7; Omaha and Winne bago, 54-9; Oregon (south), 5-1; Ottawa and Menominee, 30-6 Paiute, 22-1; Pawnee, 39-0; Puget Sound and Makah, 6-5; Round Valley, Cal., 3-3; Sahaptin, 28-2; Shuswap, 15-9; Sioux, 50-8 Taos, 18-5; Ute, 12-4; Zufii and Moqui, 1-9.

Very notable is the percentage of tall statures among the Cheyenne, Creek, Crow, Iroquois, &c. The form of the head (skull) varies considerably among the Indian tribes north of Mexico, running from the dolichocephalic eastern Eskimo with a cephalic index of 71-3 on the skull to the brachycephalic Aleuts with 84-8. Several tribes practising deformation of the skull (mound-builders, Klamath, &c.) show much higher brachycephaly.

The percentage of cephalic indices above 84 (on the heads of living individuals) among certain Indian tribes (Boas) is as follows: Apache, 87-6; Arapaho, 5-0; Arikara, 24-6; Blackfeet, 6-2; Caddo,

47-2; Cherokee, 20-0; Cheyenne, 10-4; Chickasaw, 14-4; Comanche, 653; Cree, 4-9; Creek, 25-0; Crow, 12-0; Delaware 12-0; Eskimo, (Alaska), io-6; Harrison Lake, B.C., 88-8; Iroquois, 15-4; Kiowa, 25-0; Kootenay, 19-1; Mandan, 4-5; Micmac and Abnaki, 7-0; Mohave, 86-5; Montagnais, 21-7; Moqui, 54-3; Navaho, 49-4; Ojibwa (eastern), 26-6; Ojibwa (western), 10-2; Omaha, 23-0; Oregon (south), 50-9; Osage, 79-1; Ottawa and Menominee, 24-7; Pawnee, 4-8; Pima, 96; Round Valley, Cal., 4-8; Sahaptin, 57-4; Shuswap, 59-9; Sioux, 9-6; Taos, 6-0 ; Ute, 8-9; Wichita, 96-0; Winnebago, 66-8; Zufii, 41-4.

The Apache, Mohave, Navaho, Osage, Sahaptin, Wichita and Winnebago practised skull-deformation, which accounts in part for their high figures. The brachycephalic tendency of the Caddo, Moqui, Shuswap and Zufii is marked; the Comanche, with an average cephalic index of 84-6 and the Harrison Lake people with one of 88-8, are noteworthy in this respect. As in the case of stature, so in the case of head-form, there seems to have been much mingling of types, especially in the Huron- Algonkian region, the Great Plains and the North Pacific coast.

The North American Indian may be described in general as brown-skinned (of various shades, with reddish tinge, some- times dark and chocolate or almost black in colour) with black hair and eyes varying from hazel brown to dark brown. Under good conditions of food, &c, the Indian tends to be tall and mesocephalic as to head-form, and well-proportioned and symmetrical in body. The ideal Indian type can be met with among the youth of several different tribes (Plains Indians, Algonkians, Iroquoians, Muskogians and some of the tribes of the south-western United States). Beauty among the aborigines of America north of Mexico has been the subject

of- brief studies by Dr R. W. Shufeldt and Dr A. Hrdlicka {Boas Anniv. Vol., New York, 1906, pp. 38-42).

The extent to which the red and white races have mixed their blood in various parts of North America is greater than is generally thought. The Eskimo of Greenland have intermarried with the Danes, and their kinsmen mixture. of Labrador with the English settlers and ‘ ‘ summerers. ‘ ‘ The eastern Algonkian Indians in New England and Acadia have now considerable French, English and Scottish blood. Many of the Canadian Iroquois are more than half French, many of the Iroquois of New York half English. The Cherokee, an Iroquoian people of the Carolinas, have some admixture of Scottish and German blood, to which Mooney would attribute some, at least, of

their remarkable progress. In the state of Oklahoma, which has absorbed the old " Indian Territory," the results of race-amalgamation are apparent in the large number of mixed bloods of all shades. In spite of the romance of Pocahontas, the intermarriages of the two races in the Virginian region seem not to have been very common or very important. Nor does there appear to have been much inter- marriage between Spaniards and Indians in the south Atlantic region, though in Texas, &c, there was a good deal. In New France, in spite of the efforts of some recent Canadian-French writers to minimize the fact, intermixture between whites, and Indians began early and continued to be extensive. In parts of New Brunswick, Quebec, Ontario, some of the northern American states and regions of the Canadian north-west, there are Indian villages and white settlements where hardly a single individual of absolutely pure blood can now be found. In the veins of some of the " Iroquois " of Caughnawaga and New York state to-day flows blood of the best colonial stock (Rice, Hill, Williams, Staccy, &c, captives adopted and married within the tribe). In the great Canadian north-west, and to a large extent also in the tier of American states to the south, the blood of the Indian, through the mingling of French, Scottish and English traders, trappers, employees of the great fur com- panies, pioneer settlers, &c, has entered largely and significantly into the life of the nation, the half-breed element playing a most important role in social, commercial and industrial development. In 1879, besides those whose mixed blood had not been remembered and those who wished to forget it, there were, according to Dr Havard {Rep. Smiths. Inst., 1879), at least 22,000 metis in the United States and 18,000 in Canada {i.e. in the north-west in each case). When the province of Manitoba entered the Canadian Confederation it numbered within the borders some 10,000 mixed-bloods, one of whom, John Norquay, afterwards became its premier. In the Columbia river region and British Columbia some intermixture has taken place, originat- ing in the conditions due to the establishment of trading-posts, the circumstances of the early settlement of the country, &c. — • this has been both French and English and Scottish. Farther north in Alaska the Russian occupation led to not a little inter- mixture, both with the Aleuts, &c, and the coast Indians. In some parts of the far north intermixture of the whites with the Athabaskans is just beginning. In Canada no prohibition of marriage between whites and Indians exists, but such unions are forbidden by law in the states of Arizona, Oregon, North Carolina and South Carolina.

A considerable number of the chiefs and able men of the various Indian tribes of certain regions in recent times have had more 01"

less white blood — Iroquois, Algonkian, Siouan, &c. — who have sometimes worked with and sometimes against the whites. In thf case of some tribes there have been " pure blood " and " mixed blood" factions. Some tribes have frowned upon miscegenation; even the Pueblos (except Laguna, which is Keresan) have never intermarried with the whites. Both in Canada and the United States strains of Indian blood run in the veins of prominent families. Some of the " first families of Virginia " are proud to descend from Pocahontas, the Algonkian " Princess," who married the Englishman Rolfe. In Maine may still be discovered perhaps those whose line of life goes back to the Baron de St Casteins and his Abnaki bride, while in Ontario and New York are to be met those who trace their ancestry back to the famous Iroquois Joseph Brant and his half- English wife. In the early history of Pennsylvania and Ohio were noted the Montotirs, descendants of a French nobleman who about

1665 had a son and two daughters by a Huron woman in Canada. In 1817 Captain John S. Pierce, U.S.A., brother of President Franklin Pierce, married the fair Josette la Framboise, who had at least a quarter Indian (Ottawa) blood. In the latter part of the 18th century a young Irish gentleman married Neengai, daughter of the Michigan Ojibwa chief Waubojeeg, and of the daughters born to them one married a Canadian Frenchman of reputation in the early development of the province of Ontario, another the Rev. Mr McMurray, afterwards Episcopal archdeacon of Niagara, and a third Henry R. Schoolcraft, the ethnologist.

Several Indians, some full-blood, others with more or less white blood in their veins, have rendered signal service to ethnological science. These deserve special mention : Francis la Flesche, an Omaha, a graduate of the National University Law School, D.C., holding a position in the Office of Indian Affairs; Dr William Jones, a Sac and Fox, in the service of the Field Museum, Chicago, a graduate of Harvard and of Columbia (Ph.D.); and J. N. B. Hewitt, a Tuscarora, ethnologist in the Bureau of American Ethno- logy, Washington, D.C. In some regions considerable intermixture between negroes and Indians {Science, New York, vol. xvii., 1891, PP- 85-90) has occurred, e.g. among the Mashpee and Gay Head Indians of Massachusetts, the remnants of the Pequots in Con- necticut, the

Shinnecocks and the Montauks, &c, of Long Island; the Pamunkeys, Mattaponies and some other small Virginian and Carolinian tribes. In earlier times some admixture of negro blood took place among the Seminoles, although now the remnants of that people still in Florida are much averse to miscegenation. Of the tribes of the Muskogian stock who kept large numbers of negro slaves the Creeks are said to have about one-third of their number of mixed Indian-negro blood. Sporadic intermixture of this sort is reported from the Shawnee, the Minnesota Chippewa, the Canadian Tuscarora, the Caddo, &c, in the case of the last the admixture may be considerable. It is also thought probable that many of the negroes of the whole lower Atlantic coast and Gulf region may have strains of Indian blood. The mythology and folk-lore of the negroes of this region may have borrowed not a little from the Indian, for as Mooney notes {iQth Rep. Bur. Amer. Ethnol., 1900, pp. 232-234), " in all the southern colonies Indian slaves were bought and sold and kept in servitude and worked in the fields side by side with negroes up to the time of the Revolution." When Dr John R. Swanton visited the Haida recently the richest man among the Skidegate tribe was a negro. Some of the Plains tribes and some Indians of the far west, however, have taken a dislike to the negro. The leader in the " Boston Massacre " of March 5, 1770, was Crispus Attucks, of Framingham, Mass., the son of a negro father and a Natick Indian mother. The physical anthropology of the white-Indian half-blood has been studied by Dr Franz Boas (Pop. Set. Monthly, New York, 1894).

*The culture, arts and industries of the American aborigines exhibit marked correspondence to and dependence upon environ- Culture, ment, varying with the natural conditions of land arts, in' and water, wealth or poverty of the soil, abundance dustries, or scarcity of plant and animal life subsidiary to human * fc existence, &c. Professor O. T. Mason (Handb. of Amer.*

Inds. N. of Mexico, 1907, pt. i. pp. 427-430; also Rep. Smiths. Inst., 1895, and Pop. Sci. Monthly, 1902) recognizes north of Mexico twelve " ethnic environments," in each of which there is " an ensemble of qualities that impressed themselves on their inhabitants and differentiated them."

These twelve " ethnic environments " are: — (1) Arctic (Eskimo); (2) Yukon-Mackenzie (practically Atha- baskan); (3) Great Lakes and St Lawrence (Algonkian-Iroquoian) ; (4) Atlantic Slope (Algonkian, Iroquoian, Siouan, &c); (5) Gulf Coast, embracing region from Georgia to Texas (Muskogian and a number of smaller stocks); (6) Mississippi Valley (largely Algonkian and "mound-builders"); (7)

Plains, including the country from the neighbourhood of the Rio Grande to beyond the Saskatchewan on the north, and from the Rocky Mountains to the fertile lands west of the Mississippi (Algonkian, Siouan, Shoshonian, Kiowan, Caddoan); (8) North Pacific Coast, from Mount St Elias to the mouth of the Columbia river (Koluschan, Haidan, Tsimshian, Wakashan, Salishan); (9) Columbia-Fraser region (Salishan, Sahaptian, Chinookan, &c); (10) Interior Basin between Rocky Mountains and Sierras (Shoshonian) ; (11) California-Oregon ("the Caucasus of North America," occupied by more than twenty- five linguistic stocks); (12) Pueblos region, basin of Rio Grande, Pecos, San Juan and Colorado (Pueblos-Keresan, Tanoan, Zunian, &c; on the outskirts predatory Shoshonian, Athabaskan tribes; to the south-west, Yuman, &c). In the Arctic environment the Eskimo have conquered a severe

and thankless climate by the invention and perfection of the snow-house, the dog-sled, the oil-lamp (creating and sustaining social life and making extensive migrations possible), the harpoon and the kayak or skin-boat (the acme of adaptation of individual skill to environmental demands). In the region of the Mackenzie especially the older and simpler culture of the Athabaskan stock has been much influenced by the European " civilization " of the Hudson's Bay Company, &c, and elsewhere also by contact with Indian tribes of other stocks, for the Athabaskans everywhere have shown them-selves very receptive and ready to adopt foreign elements of culture. The culture-type of the North Pacific coast, besides being unique in some respects, stands in certain relations to the culture of the Palaeo-Asiatic tribes of north-eastern Asia who belong properly with the American race. The culture of the Great Plains, which has been studied by Drs Wissler (Congr. intern, d. Amer., Quebec, 1906, vol. ii. pp. 39-52) and Kroeber (ibid. pp. 53-63), is marked by the presence of a decided uniformity in spite of the existence within this area of several physical types and a number of distinct linguistic stocks. Here the tipi and the camp-circle figure largely in material culture; innumerable ceremonies and religious practices (e.g. the " sun-dance ") occur and many societies and ceremonial organizations exist. The buffalo and later the horse have profoundly influenced the culture of this area, in which Athabaskan (Sarcee), Kitunahan, Algonkian, Siouan, Shoshonian, Kiowan tribes have shared. In some respects the Plains culture is quite recent and the result of " giving and taking " among the various peoples concerned. Some of them merely abandoned an earlier more sedentary life to hunt the buffalo on the great prairies.

The culture of the Mississippi valley region (including the Ohio, &c.)

is noteworthy in pre-Columbian and immediately post-Colum- bian times for the development of " mound-building," with ap- parently sedentary life to a large extent. In this Algonkian, Iroquoian and Siouan tribes have participated. In the regidn of the Great Lakes and on the Atlantic slope occurred the greatest development of the Algonkian and Iroquoian stocks, particularly in social and political activities, expressed both generally, as in the leagues and alliances (especially the famous " Iroquois League "), and individually in the appearance of great men like Hiawatha, Tecumseh, &c. The Gulf region is remarkable for the development in the southern United States of the Muskogian stock (Creek, Choctaw, Chickasaw, &c), to which belonged the " civilized tribes " now part of the state of Oklahoma. In this area also, toward the west, are to be met religious ideas and institutions (e.g. among the Natchez) suggestive of an early participation in or connexion with the beginnings of a culture common to the Pueblos tribes and perhaps also to the ancestors of the civilized peoples of ancient Mexico. In some other respects the culture of this area is note- worthy. In the east also there are evidences of the influence of Arawakan culture from the West Indies. The Pueblos region has been the scene of the development of sedentary " village " life on the largest scale known in North America north of Mexico, and of arts, industries and religious ideas (rain-cult especially) corresponding, as Professor J. W. Fewkes (Rep. Smiths. Inst., 1895, PP- 683-700) has shown, most remarkably to their environment. The arid in- terior basin is the characteristic area of the great Shoshonian stock, here seen at its lowest level, but advancing with the Piman and other Sonoran and Nahuatlan tribes till in ancient Mexico it attained the civilization of the Aztecs. The California-Oregon area is remarkable for the multiplicity of its linguistic stocks and also for the develop- ment of many local culture-types. Within the limits of California alone Dr Kroeber (Univ. of Calif. Publ. Amer. Arch, and Ethnol. vol. ii., 1904, pp. 81-103) distinguishes at least four types of native culture.

On account of climatic conditions, in part at least, the develop- ment of agriculture in North America has not reached with many Indian tribes a high state of development, although its diffusion is much greater than is generally believed. In the south-eastern part of the United States beans, squashes, pumpkins and some other gourds and melons, potatoes, Indian corn, tobacco, a variety of the sunflower, &c, were cultivated, the growing of beans, squashes and pumpkins extending as far north as Massachusetts and the Iroquois country, in which latter also tobacco was cultivated, as the tribal name (." Tobacco Nation ") of the Tionontati indicates. The cultivation of

Indian corn extended from Florida to beyond 50° N. and from the Atlantic to far beyond the Mississippi, and, to judge from the varieties found in existence, must have been known to the Indians for a very long period. In the arid region of Arizona and New Mexico a special development of agriculture occurred, made possible by the extensive use of irrigation in pre-Columbian and in more recent times. Here Indian corn, melons, beans, cotton, &c, were cultivated before the arrival of the Spaniards. For religious purposes the Zufii appear to have selectively produced a great variety of colours in the ears of corn. Where women had much to do with agricultural operations they greatly influenced society and religious and mythological ideas. Hunting and fishing, as might be expected in an extensive and varied environment like the North American continent, exhibit a great range from simple individual hand-capture to combined efforts with traps and nets, such as the communal nets of the Eskimo, the buffalo and deer " drives " of the Plains and other Indians, with which were often associated

brush-fences, corrals, " pounds," pitfalls, &c, advantage taken of a natural cul-de-sac, &c. A great variety of traps, snares, &c, was used (see Mason in Amer. Anthrop., 1899) and the dog was also of great service with certain tribes, although no special variety of hunting-dogs (except in a few cases) appears to have been developed. The accessory implements for the chase (spear, bow and arrow, harpoon, club, &c.) underwent great variation and specialization. The throwing-stick appears in the north among the Eskimo and in the south-west among the Pueblos. In the Muskogian area the blow-gun is found, and its use extended also to some of the Iroquoian tribes (Cherokee, &c). In part of this area vegetable poisons were used to capture fish. In the New England region torch-fishing at night was in vogue. With the tribes of the Great Plains in particular the hunt developed into a great social event, and often into a more or less marked ceremonial or religious institution, with its own appropriate preliminary and subsequential rites, songs, formulae, taboos and fetishes, &c, as seen e.g. among certain tribes of the Caddoan stock in very interesting fashion.

The art of transportation and navigation among the American aborigines north of Mexico has received special treatment from

Mason (Rep. U.S. Nat. Mus., 1894) an d Friederici, in his recent monograph Die Schijfahrt der Indianer (Stuttgart, 1907). On land some of the Indian tribes made use of the dog-sled and the toboggan in winter, while the dog-travois was early met with in the region of the Great Plains. The Eskimo made special use of the dog-sled, but never developed snow-shoes to the same extent as did the Athabaskan and Algonkian tribes; with the last and with the Iroquoian tribes came the perfection of the skin-shoe or moccasin. In the south and south-west appear sandals. In North America the cradle, as pointed out by Professor Mason (Rep. U.S. Nat. Mus., 1894), has undergone great variation in response to environmental suggestion. No wheeled vehicle and no use of an animal other than the dog for means of transportation is known among the aborigines north of Mexico, men, women and children, women especially, having been the chief burden-bearers. Among the types of boats in use are the seal-skin kayak and umiak (woman's boat) of the Eskimo ; the bull-boat or coracle (raw-hide over willow frame) of the Missouri and the buffalo-region; the dug-out of various forms and degrees of ornamentation in divers regions from Florida to the North Pacific coast; bark-canoes (birch, elm, pine, &c.) in the Algonkian, Iroquoian and Athabaskan areas, reaching a high development in the region of the Great Lakes; the peculiar bark- canoe of the Beothuks in the form of two half ellipses; the bark- canoe of the Kootenay (a similar type occurs on the Amur in north- eastern Asia), noteworthy as having both ends pointed under water ; the plank-canoes of the Santa Barbara region ; the basketry- boats (coritas) of the lower Colorado and in south central California ; the balsas of tule rushes, &c, in use on the lakes and streams of California and Nevada. In various parts of the country log-rafts of a more or less crude sort were in use. No regular sail is reported from North America, although from time to time skins, blankets, &c, were used by several tribes for such purposes.

Since the appearance of Morgan's monograph on the Houses and House-life of the American Aborigines (Washington, 1881) our knowledge of the subject has been materially increased by the studies and researches of Boas, Fewkes, Mindeleff, Dorsey, Matthews, Murdoch, Willoughby and others. The dwellings in use among the aborigines north of Mexico varied from the rude brush huts of the primitive Shoshonian tribes, and the still earlier caves, to the communal dwellings of the Iroquois and the Pueblos stocks of New Mexico and Arizona. The principal types are as follows:

Crude brush shelters and huts of the lowest Shoshonian tribes, the Apache (more elaborate), &c. ; the hogan or earth-lodge of the

Navaho, and the earth-lodges of certain Caddoan and Siouan tribes farther north, with similar structures even among the Aleuts of Alaska ; the grass-lodge of the Caddoan tribes, still in use among the Wichita ; the semi-subterranean earth-covered lodges of parts of California, &c. ; the roofed pits of various styles in use in the colder north, &c. ; the Eskimo snow-house and wooden karmak; the elaborately carved and painted wooden houses of Pacific coast region (Tlingit, Haida, Nootka, &c), some of which were originally built on platforms and entered by log-ladders; the simple wooden house of northern California ; the dome-shaped bark wigwams of the Winnebago and the conical ones of many of the Algonkian tribes; the skin tents or tipis of many of the Plains peoples; the mat tents of the Nez Perce, Kootenay, &c, and the mat houses of the South Atlantic region; the circular wigwam of bark or mats banked up at the base, of the Ohio-Mississippi valley; the palmetto- house of certain Louisiana Indians; the pile-dwellings of the ancient Floridians. Communal houses of divers types were found among the Mohegans, Iroquois, &c, but are especially illustrated by the so-called pueblos of the south-western United States, out of which grew probably the elaborate structures of ancient Mexico. Some tribes appear to have had simple and ruder summer dwellings and more elaborate or better constructed winter houses. The Eskimo have sometimes temporary hunting-lodges; the Comanches brush-shelters for summer and lodges of buffalo-skin for winter; with some tribes temporary dwellings were erected for the use of those cultivating the land. Many tribes had their " village-houses " for social purposes, like the kashim of the Eskimo. Special tipis or

houses for shamans, " medicine-men," &c, were common in many parts of North America. Secret societies had their own lodges and the so-called " men's-house." The houses of the North American Indians are the subject of a monograph by E. Sarfert (Arch. f. Anthr., 1908, pp. 119-215).

The art of fire-making was known to all the aborigines north of Mexico, two methods being widespread, that with flint and pyrites and that by reciprocating motion of wood on wood. For the latter several varieties of apparatus were in use, the simple two-stick apparatus was very common; the Eskimo have a four-part fire-drill and the Iroquois a weighted drill with spindle whorl. The skill displayed in fire-making by some Indians is very great, and the individual parts of the apparatus have in certain regions been highly specialized. The subject of fire-making apparatus and the kindred topic of illumination have been specially treated by Dr Walter Hough (Rep. U.S. Nat. Mus., 1890, pp. 531-587; Rep. Smiths. Inst.,

1901-1902). The camp-fire, the torch and the Eskimo lamp represent the employment of fire for artificial light among the aborigines. Fire and smoke were used for signalling by the Plains tribes, &c, and fire-ceremonies form an important part (" new- fire," " fire-dance ") of the ritual observances of not a few peoples, especially in the region from Florida to the Rio Grande. In metal- working there is up to the present no convincing evidence of the use of fire (heat only being employed to facilitate the cold-hammering processes by which the metals, copper, silver, gold and iron were manufactured into weapons, implements and ornaments) in metal- lurgy north of Mexico. The tools used were few and the processes simple, as Cushing (Amer. Anthrop., vol. vii., 1894) has proved by actual experiment. The only metal actually mined in large quanti- ties was copper in the region of Lake Superior, whence came most of that employed in the east and south. In Alaska was a source of copper for the North Pacific coast. No special process of hardening copper other than by hammering was known to the Indians. The gold objects of most interest come from mounds in Florida and a few also from those in the Ohio valley. Galena was used to make simple ceremonial objects by the Indians of the Mississippi valley and the " mound-builders."

The art of sculpture in wood, stone, bone and ivory is best re-presented by the wooden masks, utensils, house-carvings and totem-poles of the Indians of the North Pacific coast, the stone pipes, ornaments and images of various sorts of the " mound- builders " and other Indians of the Mississippi valley, the carvings of the people of the Floridian pile-dwellings, and the remarkable ivory carvings, sometimes minute, of the Eskimo. Noteworthy also are the slate-sculpture of the Haida, and the work in bone, ivory and deer and mountain goat horn of the British Columbian Indians. The Indians of the region south of the Great Lakes were expert in the manufacture of tobacco-pipes of great variety, among the most interesting being the Catlinite pipes of the Sioux of Minnesota, &c. Soapstone served some of the Eskimo to make lamps and some Indian tribes for other purposes. Pottery appears to have been unknown in certain regions, but flourished remarkably in the Mississippi valley and the Pueblos region of the south-west, where specialization in form and decoration occurred, and ceramic objects of all sorts were manufactured in abundance. The pottery of the Iroquoian and Algonkian tribes of the north-east was, as a rule, rather crude and undeveloped. In many places the relation of ceramic art to basketry is in evidence. Basketry, of which Professor O. T. Mason has recently made a detailed study in his Aboriginal American Basketry (Washington and

New York, 1902, 1904), and related arts were carried on (especially by women) with great variety of form, decoration, material, &c, over a large portion of the continent. In North America basketry is " the primitive art," and here " the Indian women have left the best witness of what they could do in handiwork and expression." The most exquisite and artistic basketry in the world comes from an utterly uncivilized tribe in California. The relation of basketry to symbolism and religion is best observable among the Hopi or Moqui of Arizona. The appreciation of white men for the products of Indian skill and genius in basketry finds full expression in G. W. James's Indian Basketry (1900). Weaving is exemplified in the goat's hair blanket of the Chilkat Indians (Koluschan) of Alaska, and similar products; also in the manufactures of buffalo-hair, &c, of the Indians of the Great Plains and Mississippi valley and the textile art of a higher type known to the Pueblos tribes and by some of them taught to the Navaho. Famous are the " Navaho blankets," less so the " Chilkat." Feather-work and the utilization of bird-skins and feathers for dresses, hats, ornaments, &c, are known from many parts of the continent. In the Arctic regions bird-skins with the feathers on were used to make dresses; the Algonkian tribes of Virginia, &c, had their bird-skin "blankets" and "turkey robes"; the tribes of the North Pacific coast used feathers for decorative purposes of many kinds, as did Indians in other regions also; feather head- dresses and ornaments were much in use among the Plains tribes, &c. ; with the Pueblos Indians eagle and turkey feathers were important in ritual and ceremony; some of the tribes of the south east made fans of turkey feathers. Beads made from various sorts of shell, rolled copper (" mound-builders," &c), seeds, ivory (Eskimo) and the teeth of various animals are pre-Columbian, like the tur- quoise-beads of the Pueblos, and they were put to a great variety

of uses. Wampum was manufactured by many Algonkian and Iroquoian tribes, who also later produced fine specimens of work with the glass beads introduced by the whites. These glass beads made their way over most of the continent, soon driving out in many sections the older art in shell, &c. European-made wampum- beads affected native art in the I7th century. In the regions where the porcupine abounded its quills were used for purposes of orna- mentation on articles of dress, objects of bark, &c, some of the

Algonkian and Iroquoian tribes producing beautiful work of this sort.

Besides face and body painting, employed for various purposes and widespread over the continent, particularly in ceremonial observances, during war-time, in courting, mourning, &c, painting found expression among the North American aborigines most fully in the products of the wood art of the Indians of the North Pacific coast (masks, utensils, houses, totem-poles, furniture, &c), in the more or less ceremonial and symbolic paintings on skins, tipi- covers and the like of some of the Plains tribes (e.g. Kiowa, Sioux) and in ceramic art, notably in the remarkable polychrome pottery of the Pueblos tribes. Among several Pueblos tribes of Arizona and New Mexico (also the Navaho and Apache and of a ruder sort among some of the Plains tribes, e.g. Cheyenne, Arapaho, Black- feet) " dry-painting," most highly developed in the sacred cere- monies of the Navaho, is practised and is evidently of great antiquity. The pictures of deities, natural phenomena, animals and plants are made of powdered sandstone of various colours, &c.

Pictography among the aborigines north of Mexico varied from the rude petroglyphs of some of the Shoshonian tribes to the incised work on ivory, &c, of the Eskimo and the paintings on buffalo and other animal skins by some of the Plains tribes, the work of the Pueblos Indians, &c, the nearest approach to hieroglyphics in North America outside of Mexico. Some Indian tribes (e.g. the Kootenay) seem not at all given to pictography, while many others have practised it to an almost limitless extent. The pictography and picture-writing of the North American Indians have been the subject of two detailed monographs by Mallery (4th Ann. Rep. Bur. Ethnol., 1882-1883, pp. 3-256; 10th Rep., 1888-1889, pp. 1-1290), and the graphic art of the Eskimo has received special treatment by Hoffman (Rep. U.S. Nat. Mus., 1895). Some have argued that this ivory pictography of the Eskimo is of recent origin and due practically to the introduction of iron by the whites, but Boas thinks such a theory refuted by the resemblance of the Eskimo graphic art in question to the birch-bark art of the neighbouring Indian tribes. No real " hieroglyphs," much less any system of writing of an alphabetic nature, have been discovered north of Mexico; the alleged specimens of such, turning up from time to time, are frauds of one sort or another.

The music and song of the American Indians north of Mexico have been studied since the time of Baker (Uber die Musik der Nordamerikanischen Wilden, Leipzig, 1882) by Boas, Fillmore, Curtis, Fletcher, Stumpf, Cringan (Ann. Arch. Rep. Ont., 1902, 1905), &c. According to Miss Fletcher (Indian Story and Song,

1900; also Publ. Peab. Mus., 1893), " among the Indians music envelops like an atmosphere every religious tribal and social ceremony, as well as every personal experience," and " there is not a phase of life that does not find expression in song " ; music, too, is " the medium through which man holds communion with his soul and with the unseen powers which control his destiny." Music, in fact, " is coextensive with tribal life," and " every public ceremony as well as each im- portant act in the career of an individual has its accompaniment of song." Moreover, " The music of each ceremony has its peculiar rhythm, so also have the classes of songs which pertain to individual acts: fasting and prayer, setting of traps, hunting, courtship, playing of games, facing and defying death." In structure the Indian song " follows the outline of the form which obtains in our own music," and " the compass of songs varies from I to 3 octaves." Among some of the tribes with highly developed ceremonial ob- servances " men and women, having clear resonant voices and good musical intonation, compose the choirs which lead the singing in ceremonies and are paid for the services." A peculiar development of music among the Eskimo is seen in the "nith-songs," by which controversies are settled, the parties to the dispute " singing at " each other till the public laughter, &c, proclaim one the victor. Among the American Indians songs belonging to individuals, societies, clans, &c, are met with, which have to be purchased by others from the owners, and even slight mistakes in the rendition of singing, dancing, &c, are heavily penalized. Musical contests were also known (e.g. among the Indians of the Pacific coast). The development of the " tribal song " among the Iroquoian peoples is seen in Hale's Iroquois Book of Rites (1881). Songs having no words, but merely changeless vocables, are common. As Dr Boas has pointed out, the genius of the American Indian has been devoted more to the productionof songs than to the invention of musical instruments. The musical instruments known to the aborigines north of Mexico, before contact with the whites, according to Miss Fletcher (Handb. of _ Amer. Inds., 1907, pt.i. p. 960), were drums of great variety in size and form, from the plank or box of some of the tribes of the North Pacific coast to the shaman's drums of the Algonkian and Iroquoian peoples; whistles of bone, wood, pottery, &c. ("often employed in ceremonies to imitate the voices of birds,

animals and spirits) ; flageolet or flute (widely distributed and used by young men in courtship among the Siouan tribes) ; the musical bow (found among the Maidu of California and important in religion and sorcery). Rattles of gourd, skin, shell, wood, &c, are universal, and among some of the tribes of the south-west " notched sticks are

rasped together or on gourds, bones or baskets to accentuate rhythm." From the rattle in the Pueblos region developed a sort of ball of clay or metal.

So far as is known, the primitive culture of the aborigines of North America is fundamentally indigenous, being the re- actions of the Indian to his environment, added to c ft whatever rude equipment of body and of mind was of Indians possessed by the human beings who at some remote essentially epoch reached the new world from the old, if, '"<"«"- indeed, America was not, as Ameghino, on the basis of the discoveries of fossil anthropoids and fossil man in southern South America, maintains, the scene of origin of man himself.*

Professor A.H. Keane (Internal. Monthly, vol. v., 1902, pp. 338-357), Stewart Culin (Proc. Amer. Assoc. Adv. Sci. vol. lii., 1903, pp. 495-500) and Dr Richard Andree (Stzgsb. d. anthrop. Ges. in Wien, 1906, pp. 87-98) all agree as to the general autochthony of aboriginal American culture. The day of the argument for borrowing on the ground of mere resemblances in beliefs, in- stitutions, implements, inventions, &c, is past. An admirable instance of the results of exact scientific research in this respect is to be found in Dr Franz Boas's discussion (Proc. U.S. Nat. Mus., 1908, pp. 321-344) of the needle-cases of the Alaskan Eskimo, which were at first supposed to be of foreign (Polynesian) origin. Other examples occur in Mr Culin's study of American Indian games, where, for the first time, the relation of certain of them in their origin and development, and sometimes also in their degeneration and decay, is made clear. The independent origin in America of many things which other races have again and again invented and re-invented in other parts of the world must now be conceded.

The extreme north-western region of North America has recently been shown to be of great importance to the ethnologists. The investigations in this part of America and among the more or less primitive peoples of north-eastern Asia, carried on by the Jesup North Pacific expedition in 1897-1902, have resulted in showing that within what may be called the " Bering Sea culture-area " transmissions of culture have taken place from north-eastern Siberia to north-western America and vice versa. The only known example, however, of the migration of any people one way or the other is the case of the Asiatic Eskimo, who are undoubtedly of American origin, and it seems probable, in the language of Dr Boas, the organizer of the Jesup expedition and the editor of its publica- tions, that " the Chukchee, Koryak, Kamchadal and Yukaghir must be classed with the American race rather than with the Asiatic race," and possibly

also some of the other isolated Siberian tribes; also that, " in a broad classification of languages, the languages of north-eastern Siberia should be classed with the languages of America " (Proc. Intern. Congr. Amer., New York, 1902, pp. 91-102). It appears, further, that the arrival of the Eskimo on the Pacific coast (this, although not recent, is comparatively late) from their home in the interior, near or east of the Mackenzie, " interrupted at an early period the communication between the Siberian and Indian tribes, which left its trace in many cultural traits common to the peoples on both sides of the Bering Sea."

This establishment of the essential unity of the culture-type (language, mythology, certain arts, customs, beliefs, &c.) of the " Palaeo- Asiatic " peoples of north-eastern Siberia and that of the American Indians of the North Pacific coast, as demonstrated especially by the investigations of Jochelson, Bogoras, &c, is one of the most notable results of recent organized ethnological research. No such clear proof has been afforded of the theory of Polynesian influence farther south on the Pacific coast of America, believed in, more or less, by certain ethnologists (Ratzel, Mason, &c). This theory rests largely upon resemblances in arts (clubs, masks and the like in particular), tattooing, mythic motifs, &c. But several things here involved, if not really American in origin, are so recent that they may perhaps be accounted for by such Hawaiian and other Polynesian contact as resulted from the establishment of the whale and seal-fisheries in the 18th century.

Between the Indians of North America and those of South America few instances of contact and intercommunication, or even of transference of material products and ideas, have been sub- stantiated. It is by way of the Antilles and the Bahamas that such contact as actually occurred took place. In 1894 (Amer. Anthrop. vol. vii. p. 71-79) Professor W. H. Holmes pointed out traces of Caribbean influences in the ceramic art of the Florida-Georgia • region belonging to the period just before the Columbian discovery.

RELIGION]

INDIANS, NORTH AMERICAN

The decorative designs in question, paddle-stamp patterns, &c, akin to the motives on the wooden and stone stools from the Carib- bean areas in the West Indies, have been found as far north as 36° in North Carolina and as far west as 84 in Tennessee and 89 ° in south- eastern Alabama. But the evidence does not prove the existence of

Carib colonies at any time in any part of this region, but simply the migration from the West Indies to the North American coast of certain art features adopted by the Indians of the Timuquan and Muskogian Indians and (later) in part by the Cherokee. More recently (1907) Dr F. G. Speck, in a discussion of the aboriginal culture of the south-eastern states (Amer. Antkrop. vol. ix., n.s., pp. 287-295), cites as proof of Antillean or Caribbean influence in addition to that indicated by Holmes, the following: employment of the blow-gun in hunting, use of hammock as baby-cradle, peculiar storage-scaffold in one corner of house, plastering houses with clay, poisoning fish with vegetable juices. It is possible also that the North American coast may have been visited from time to time by small bodies of natives from the West Indies in search of the mythic fountain of youth (Bimini), the position of which had shifted from the Bahamas to Florida in its movement westward. Indeed, just about the time of the advent of the Europeans in this part of the world a number of Indians from Cuba, on such a quest, landed on the south-western shore of Florida, where they were captured by the Calusas, among whom they seem to have maintained a separate existence down to 1570 or later. This Arawakan colony, indicated on the map of linguistic stocks of American Indians north of Mexico, published by the Bureau of American Ethnology in 1907, is the only one demonstrated to have existed, but there may have been others of a more temporary character. In the languages of this region there are to be detected perhaps a few loan-words from Arawakan or Cariban dialects. The exaggerated ideas entertained by some authorities concerning the " mound-builders " of the valley of the Ohio and Mississippi and their alleged " civilization " have led them to assume, without adequate proof, long-continued re- lations of the tribes inhabiting this part of the country in the past with the ancient peoples of Yucatan and Mexico, or even an origin of their culture from beyond the Gulf. But since these mounds were in all probability wholly the work of the modern Indians of this area or their immediate ancestors, and the greater part, if not all, of the art and industry represented therein lies easily within the capacity of the aborigines of North America, the " Mexican " theory in this form appears unnecessary to explain the facts. In its support stress has been laid upon the nature of some of the copper implements and ornaments, particularly the types of elaborate repousse work from Etowah, Georgia, &c. That the repousse work was not beyond the skill of the Indian was shown by dishing in his study of " Primitive Copper Working " (Amer. Antkrop. vol. vii. pp. 93-1 17), who did not consider the resemblance of these mound- specimens to the art of Mexico proof of extra-North American origin. Holmes {Handb. of

Inds. N. of Mex., 1907, pt. i. p. 343) points out that the great mass of the copper of mounds came from the region of Lake Superior, and that had extensive intercourse between Mexico or Central America and the mound-country existed, or colonies from those southern parts been present in the area in question, artifacts of undoubtedly Mexican origin would have been found in the mounds in considerable abundance, and methods of manipulation peculiar to the south would have been much in evidence. The facts indicate at most some exotic influence from Mexico, &c, but nothing far-reaching in its effects.

In the lower Mississippi valley the culture of certain peoples has been thought to contain elements (e.g. the temples and other religious institutions of the Natchez) suggestive of Mexican or Central American origin, either by inheritance from a common ancient source or by later borrowings. When one reaches the Pueblos region, with its present and its extinct " village culture," there is considerable evidence of contact and inter-influence, if not perhaps of common origin, of culture-factors. Dr J. Walter Fewkes, a chief authority on the ethnic history of Arizona, New Mexico and the outlying areas of " Pueblos culture," especially in its ceremonial aspects, has expressed the opinion (Amer. Anthrop. vol. vii. p. 51) that " it is not improbable that both Mexican and Pueblos cultures originated in a region in northern Mexico, developing as environment per- mitted in its northern and southern homes." Unfavourable milieu in the north prevented the culture of the Pueblos Indians and the Cliff-dwellers, their ancestors, reaching the height attained in Mexico and Central America, represented by temple-architecture, ornamentation of buildings, hieroglyphs, &c. Strong evidence of Pueblos-Mexican relationship Dr Fewkes sees (Proc. Wash. Acad. Sci., 1900) in the great serpent cult of Tusayan, the " New Fire " and other Pueblos ceremonials of importance; also in the mosaic objects (gorgets, ear-pendants, breast-ornaments, &c.) from Pueblos ruins in Arizona, some of the workmanship of which equals that of similar character in old Mexico. The arid region of the south- western United States and part of northern Mexico may well have been a centre for the dispersion of such primitive, institutions and ideas as reached their acme in the country of the Aztecs. But of the Pueblos languages, the Moqui or Hopi of north-eastern Arizona is the only one showing undoubted, though not intimate, relationship with the Nahuatl of ancient Mexico. The Shoshonian family, rep- resented in the United States by the Shoshonees, Utes, Comanches

and other tribes, besides the Moqui, includes also the numerous Sonoran tribes of north-western Mexico, as well as the Nahuatl-speaking peoples farther south, some of the outliers having wandered even to Costa Rica (and perhaps to Panama). This linguistic unity of the civilized Aztecs with the rude Utes and Shoshones of the north is one of the most interesting ethnological facts in primitive America. Change of environment may have had much to do with this higher development in the south. Besides the Shoshonian, the Coahuiltecan and the Athabaskan are or have been represented in northern Mexico, the last by the Apaches and Tobosos. From the period of the Spanish colonization of New Mexico down to about the last quarter of the 19th century (and sporadically later, e.g. the attack in 1900 on the Mormon settlement in Chihuahua), these Indians have hovered around the Mexican border, <&c, their pre- datory expeditions extending at one time as far south as Jalisco. In the far west the Yuman family of languages belongs on both sides of the border.

In the popular mind the religion of the North American Indian consists practically of belief in the " Great Spirit " and the " Happy Hunting Grounds." But while some tribes, e.g. of the Iroquoian and Caddoan stocks # e %°"> appear to have come reasonably near a pantheistic ˆ ° ogy ' conception tending toward monism and monotheism, not a little of present Indian beliefs as to the " Great Spirit," " God " and " Devil," " Good Spirit " and " Evil Spirit," &c, as well as concerning moral distinctions in the hereafter, can reasonably be considered the result of missionary and other influences coming directly or indirectly from the whites. The central idea in the religion and mythology of the aborigines north of Mexico is what Hewitt (Amer. Antkrop., 1902) has pro- posed to term orenda, from " the Iroquois name of the Active force, principle or magic power which was assumed by the inchoate reasoning of primitive man to be inherent in every body and being of nature and in every personified attribute, property or activity belonging to each of these and conceived to be the active cause or force or dynamic energy involved in every operation or phenomenon of nature, in any manner affecting or controlling the welfare of man." The orendas of the innumerable beings and objects, real and imagined, in the universe differed immensely in action, function, power, &c, and in like manner varied were the efforts of man by prayers, offerings and sacrifices, ceremonies and rites of a propitiatory or sympathetic nature to influence for his own welfare the possessor of this or that orenda, from the " high gods " to the least of all beings. Corresponding to the Iroquoian orenda is the wakanda of the Siouan

tribes, some aspects of which have been admirably treated by Miss Fletcher in her " Notes on Certain Beliefs concerning Will Power among the Siouan Tribes " (Science, vol. v., n.s., 1897). Other parallels of orenda are Algonkian manito, Shoshonian pokunt, Athabaskan coin. As Hewitt points out, these Indian terms are not to be simply translated into English by such expressions as " mystery," " magic," " immortal," " sorcery," " wonderful," &c. Man, indeed, " may sometimes possess weapons whose orenda is superior to that possessed by some of the primal beings of his cosmology."

The main topics of the mythology of the American Indians north of Mexico have been treated by Powell in his " Sketch of the Mythology of the North American Indians " (First Ann. Rep. Bur. Ethnol., 1879-1880), and Brinton in his American Hero Myths (1876), Myths of the New World (1896) and Religions of Primitive Peoples (1900). Widespread is the idea of a culture- hero or demi-god (sometimes one of twins or even quadruplets) who is born of a human 'virgin, often by divine secret fecundation, and, growing up, frees the earth from monsters and evil beings, or re-fashions it in various ways, improves the breed and perfects the institutions of mankind, then retires to watch over the world from some remote resting-place, or, angered at the wickedness of men and women, leaves them, promising to return at some future time. He often figures in the great deluge legend as the friend, helper and regenerator of the human race. A typical example of these culture-heroes is the Algonkian character who appears as Nanabozho among the Ojibwa, Wisaketchak among the Cree, Napiw among the Blackfeet, Wisaka among the Sacs and Foxes, Glooscap (Kuloskap) among the Micmac,

&c. (see Journ. Amer. Folk-Lore, 1891, and Handbook of Amer. Jnds., 1907), whose brother is sometimes represented as being after death the ruler of the spirit world. The Iroquoian corres- pondent of Nanabozho is Tehoronhiawakhon; the Siouan, in many respects, Ictinike. Among many tribes of the North Pacific coast region the culture-hero appears as the " transformer," demi-god, human or animal in form (coyote, blue-jay, raven, &c), the last often being tricksters and dupers of mankind and the rest of creation as well. This trickster and buffoon (also liar) element appears also in the

Iroquoian and Algonkian culture-heroes and has received special treatment by Brinton (Essays of an Americanist, 1890). On the whole, the Algonkian and Iroquoian culture-hero is mainly actuated by altruistic motives, while the "transformer " of the Indians of the North Pacific coast region is often credited with producing or shaping the world, mankind and their activities as they now exist for purely egotistic purposes. Other noteworthy heroes," reformers," &c, among the North American Indians are the subject of legends, like the Iroquoian " Good Mind and Bad Mind," the Algonkian (Musquaki) " Hot Hand and Cold Hand," the Zufiian " Right Hand and Left Hand "; and numerous others, including such conceptions as the antagonism and opposition of land and water (dry and wet), summer and winter, day and night, food and famine, giants and pigmies, &c. In the matter of the personification of natural phenomena, &c, there is con- siderable variation, even among tribes of approximately the same state of culture. Thus, e.g. as Hewitt notes (Handbook of Amer. Inds., 1907, pt. i. p. 970), while with the Iroquoian and eastern Algonkian tribes " the Thunder people, human in form and mind and usually four in number, are most important and staunch friends of man"; in the region of the Great Lakes and westward " this conception is replaced by that of the Thunder bird."

The Pawnee Indians of the Caddoan stock seem both individually and tribally to possess a deep religious sense expressing itself alike in moods of the person and in ceremonies of a general popular character. This is evident, alike from Miss Fletcher's description (Amer. Anthrop., 1899, pp. 83-85) of a venerable priest of that tribe, Tahiroossawichi, and from her detailed account of " The Hako: A Pawnee Ceremony " (Twenty-second Ann. Rep. Bur. Ethnol., 1900-1901, pp. 5-372). This Hako ceremony, the original stimulus for which was probably desire for offspring, and then to ensure friendship and peace between groups of persons belonging to different clans, gentes or tribes, had no fixed or stated time and " was not connected with planting or harvesting, hunting or war or any tribal festival," although the Indians take up the Hako, with its long series of observances and its hundred songs, " in the spring when the birds are mating, or in the summer when the birds are nesting and caring for their young, or in the fall when the birds are flocking, but not in the winter when all things are asleep; with the Hako we are praying for the gift of life, of strength, of plenty and of peace, so we must pray when life is stirring every- where," — these are the words of the Indian hieragogue.

In the arid region of the south-western United States there has grown up, especially among the Moqui, as may be read in the numer- ous

monographs of Dr J. Walter Fewkes (and briefly in the Report of the Smithsonian Institution for 1905), a system of religious ceremonials and sympathetic magic, the object of which is to ensure the necessary rainfall and through this the continued life and prosperity of the people. Here everything is conceived as really or symbolically related to sun, water, rain. The Moqui are essenti- ally a religious people, and their mythology, in which the central figures are the " earth mother " and the " sky father," has been described as " a polytheism largely tinged with ancestor-worship and permeated with fetishism." Part of their exceedingly intricate, complex and elaborate ritual is the so-called " snake dance," which has been written of by Bourke (The Snake Dance of the Moquis, 1884), Fewkes and others.

In the Gulf region east of the Mississippi, " sun worship," with primitive " temples," appears among some of the tribes with certain curious myths, beliefs, ceremonies, &c. The Natchez, e.g. according to Dr Swanton (Amer. Anthrop., 1907), were noteworthy on account of " their highly developed monarchical government and their possession of a national religion centring about a temple, which reminds one in many ways of the temples of Mexico and Central America." They seem to have had " an extreme form of sun- worship and a highly developed ritual." A simpler form of sun- worship is found among the Kootenay of British Columbia (Rep. Brit. Assoc, 1889, 1892). With the Yuchi occur some Algonkian- like myths of the deluge, &c.

The best data as to the religion and mythology of the Iroquoian

tribes are to be found in the writings of Hewitt, especially in his monograph on " Iroquoian Cosmology " (Twenty-first Ann. Rep. Bur. Ethnol., 1899-1900, pp. 127-339). In the creation-myths several instances of European influence are pointed out. Mother- earth and her life are the source, by transformation and evolution, of all things. The first beings of Iroquoian mythology (daylight, earthquake, winter, medicine, wind, life, flower, &c.) " were not beasts, but belonged to a rather vague class of which man was the characteristic type," — later come beast-gods. According to Hewitt the Iroquoian term rendered in English " god " signifies really " disposer, controller," for to these Indians " god " and " controller " are synonymous; and so " the reputed controller of the operations of nature received worship and prayers." Creation-legends in great variety exist among the North American aborigines, from simple fiat actions of single characters to complicated transformations accomplished with the aid of other beings. The specific creation legend often follows that of the deluge.

Perhaps the most remarkable of all North American creation stories is that of the Zufii as recorded by Cushing (Thirteenth Ann. Rep. Bur. Ethnol., 1891-1892) in his " Outlines of Zufii Creation Myths." Here the principal figure is " Awonawilona, the maker and container of all," and the growth-substance the " fogs of in- crease," which he evolved by his thinking in the pristine night. The long tale of the origin of the sun, the earth and the sky, and the taking form of " the seed of men and all creatures " in the lowest of the four caves or wombs of the world and their long journey to light and real life on the present earth is a wonderful story of evolution as conceived by the primitive mind, an aboriginal epic, in fact.

In the mythology and religion of the Algonkian tribes (particularly the Chippewa, &c.) is expressed " a firm belief in a cosmic mystery present throughout all nature, called manitou." This manitou " was identified with both animate and inanimate objects, and the impulse was strong to enter into personal relation with the mystic power; it was easy for an Ojibwa to associate the manitou with all forms of transcendent agencies, some of which assumed definite characters and played the r61e of deities " (Jones). There were innumerable manitous of high or low degree. The highest develop- ment of this conception was in Kitchi Manitou (Great Manitou), but whether this personification has not been considerably influenced by teachings of the whites is a question. The chief figure in the mythology of the Chippewa and related tribes is Nanabozho, who " while yet a youth became the creator of the world and everything it contained; the author of all the great institutions in Ojibwa society and the founder of the leading ceremonies " (Jones, Ann. Arch. Rep. Ontario, 1905; Journ. Amer. Folk-Lore, 1902, &c). It is to this character that some of the most human of all Indian myths are attached, e.g. the Micmac legend of the origin of the crowing of babies and the story of Nanabozho's attempt to stick his toe into his mouth after the manner of a little child. Nanabozho is also the central figure in the typical deluge legend of the Algonkian peoples of the Great Lakes (Journ. of American Folk-Lore, 1891), which, in some versions, is the most remarkable myth of its kind north of Mexico.

The best and most authoritative discussion of the religions and mythological ideas of the Eskimo is to be found in the article of Dr Franz Boas on "The Folk-Lore of the Eskimo " (Journ. Amer. Folk-Lore, 1904, pp. 1-13). The characteristic feature of Eskimo folk-lore is the hero-tales, treating of visits to fabulous tribes, en- counters with monsters, quarrels and " wars," shamanism, witch- craft, &c, and generally of " the events occurring in human society as it exists now," the supernatural playing a more or less important role, but the

mass of folk-lore being " thoroughly human in char- acter." In Eskimo myths there appears to be " a complete absence of the idea that transformations or creations were made for the benefit of man during a mythological period, and that these events changed the general aspect of the world," quite in contrast with the conceptions of many Indian tribes, particularly in the region of the North Pacific, where the " transformer " (sometimes trickster also), demi-god, human or animal (coyote, raven, blue-jay, &c), plays so important a part, as may be seen from the legends recorded in Dr Boas's Indianische Sagen der nord-pacifischen Kiiste Amerikas (Berlin, 1895) and other more recent monographs. In Eskimo folk- lore the field o f animal tales is quite limited, and Dr Boas is of opinion that the genuine animal myth " was originally foreign to Eskimo folk-lore," and has been borrowed from the Indians. Per- haps the most prominent character in Eskimo mythology is Sedna, the old woman, who is mistress of the lower world beneath the ocean (Amer. Anthrop., 1900). The highest being conceived of by the Athabaskans of Canada was, according to Morice (Ann. Arch. Rep. Ontario, 1905, p. 204), " a real entity, which they feared rather than loved or worshipped." The way of communicating with the unseen was through personal totems," revealed usually in dreams. The Hupa, an Athabaskan people of California, are reported by Goddard as possessing a deep religious sense. But the most re- markable mythology of any Athabaskan tribe is that of the Navaho, which has been studied in detail under some of its chief aspects by Dr Washington Matthews in his valuable monographs, Navaho Legends (1897) and The Night Chant (1902). According to Dr Matthews, the Navaho " are a highly religious people having many

well-defined divinities (nature gods, animal gods and local gods), a vast mythic and legendary lore and thousands of significant formulated songs and prayers, which must be learned and repeated in the most exact manner; they have also hundreds of musical compositions; the so-called dances are ceremonies which last for nine nights and parts of ten days, and the medicine-men spend many years of study in learning to conduct a single one properly." The most prominent and revered of the deities of the Navaho is Estsanatlehi, the " woman who rejuvenates herself," of whom it is believed that she grows old, and then, at will, becomes young again.

The numerous Indian tribes subjected to the environment of the Great Plains have developed in great detail some special religious observances, ceremonial institutions, secret societies, ritual observances, &c. The mental life of these Indians was profoundly influenced by the buffalo and later not a little by the horse. Various aspects of Plains culture have recently been discussed by Goddard, Kroeber, Wissler, Dorsey, Fletcher, Boas, &c, from whose investigations it would appear that much intertribal borrowing has taken place. Among some of the Algonkian (Arapaho, Blackfeet, Cheyenne, &c), Siouan (Ponka, e.g.) Caddoan, Shoshonian, Kiowan and perhaps Kitunahan stocks the " sun-dance " in some form or other prevailed at one time or another. According to Wissler (Amer. Anthrop., 1908, p. 205), this ceremony, as now practised by many tribes, " is the result of a gradual accumulation both of ceremonies and ideas," — the torture feature, e.g., " seems to have been a separate institution among the Missouri river tribes, later incorporated in their sun-dance and eventually passed on to other tribes." Some other complicated ceremonials have apparently grown up in like manner. As ceremonies that are quite modern, having been intro- duced during the historical period, Dr Wissler instances " the Ghost dance, Omaha dance, Woman's dance.Tea dance and Mescal eating," of which all, except the Ghost dance, "flourish in almost all parts of the area under various names, but with the same essential features and songs." Other interesting ceremonies of varying degrees of importance and extent of distribution are those of " the medicine-pipe, buffalo-medicine, sweat-lodge, puberty-rites, medicine-tipis, war-charms, &c." Interesting also are the " medicine bundles," or " arks " as they were once mistakenly called.

The " Ghost dance," the ceremonial religious dance of most notoriety to-day, " originated among the Paviotso (its prophet was a young Paiute medicine man, Wovoka or ' Jack Wilson) in Nevada about 1888, and spread rapidly among other tribes until it numbered among its adherents nearly all the Indians of the interior basin, from Missouri river to or beyond the Rockies " (Mooney). Wovoka's doctrine was that a new dispensation was at hand, and that " the Indians would be restored to their inheritance and united with their departed friends, and they must prepare for the event by practising the songs and dance ceremonies which the prophet gave them." East of the Rocky Mountains this dance soon came to be known as the "Ghost dance" and a common feature was hypnotic trances. The Sioux outbreak of 1890-1891 was in part due to the excitement of the " Ghost dance." According to Mooney, " in the Crow dance of the Cheyenne and Arapaho, a later development from the Ghost dance

proper, the drum is used, and many of the ordinary tribal dances have incorporated Ghost dance features, including even the hypnotic trances." The doctrine generally " has now faded out and the dance exists only as a social function." A full account of this " dance," its chief propagators, the modi operandi of its ceremonies and their transference, and the results of its prevalence among so many Indian tribes, is given in Mooney's detailed monograph on " The Ghost Dance Religion and the Sioux Outbreak of 1890 " (Fourteenth Ann. Rep. Bur. Ethnol.,

1892-1893).

In reference to " Messiah doctrines " among the aborigines of North America, Mooney calls attention to the fact that " within the United States every great tribal movement (e.g. the conspiracy of Pontiac, the combination of Tecumseh, &c.) originated in the teaching of some messianic prophet." In primitive America the dance has figured largely in social, religious and artistic activities of all kinds, and one of its most interesting developments has occurred among the Plains Indians, where " the Mandan and other Siouan tribes dance in an elaborate ceremony, called the Buffalo dance, to bring game when food is scarce, in accordance with a well-defined ritual" (Hewitt). Among other noteworthy dances of the North American aborigines may be mentioned the calumet dance of several tribes, the scalp dance, the " Green-corn dance " of the Iroquois, the busk (or puskitau) of the Creeks (in connexion with " new fire " and regeneration of all things), the " fire dance " of the Mississaguas, &c.

The Californian area, remarkable in respect to language and culture in general presents also some curious religious and mytho- logical phenomena. According to Kroeber, " the mythology of the Californians was characterized by unusually well-developed and consistent creation-myths, and by the complete lack not only of migration but of ancestor traditions." The ceremonies of the Californian Indians " were numerous and elaborate as compared with the prevailing simplicity of life, but they lacked almost totally the rigid ritualism and extensive symbolism that pervade the ceremonies of most America." The most authoritative discussions of the religion and mythology of the Californian Indians are those

of Dr Dixon and Dr Kroeber, the latter especially in the University of California Publications in American Archaeology and Ethnology for 1904-1907.

The shamans, "medicine-men," &c, of the American Indians are of

all degrees from the self-constituted angekok of the Eskimo to those among tribes of higher culture who are chosen from a special family or after undergoing elaborate preliminaries of selection and initiation. The " medicine-men " of several tribes have been described with considerable detail. This has been done for the " Midewiwin, or Grand Medicine Society of theOjibwa "by Hoffman (Seventh Ann. Rep. Bur. Ethnol. pp. 143-300); for the " Medicine- men of the Apache " by Bourke (Ninth Ann. Rep. pp. 443-603) and for those of the Cherokee by Mooney (Seventh Ann. Rep. pp. 301-397), while a number of the chief facts concerning American Indian shamans in general have been gathered in a recent article by Dr R. B. Dixon (Journ. Amer. Folk-Lore, 1908, pp. 1-12). In various parts of the continent and among diverse tribes the shaman exercises functions as " healer, sorcerer, seer, priest and educator." These functions among the tribes of lower culture are generally exercised by one and the same individual, but, with rise in civiliza- tion, the healer-sorcerer and shaman-sorcerer disappear or wane in power and influence as the true priest develops. The priestly character of the shaman appears among the Plains tribes in con- nexion with the custody of the " sacred bundles " and the keeping ot the ceremonial myths, &c, but is more marked among the Pueblos, Navaho, &c, of the south-west, while " a considerable development of the priestly function may also be seen among the Muskogi, particularly in the case of the Natchez, with their remarkable cult and so-called temple." The reverent character of the best " priests " or shamans among the Pawnee and Omaha has been emphasized by Miss A. C. Fletcher and Francis la Flesche. The class-organiza- tion of the shamans reaches its acme in the midi societies of the Chippewa and the priest-societies of the Pueblos Indians (Moqui, Zuni, &c).

The games of the American aborigines north of Mexico have been made the subject of a detailed monograph by Culin, " Games of the North American Indians " (Twenty- Q fourth Ann. Rep. Bur. Ethnol., 1902-1903, pp. 1-846), in which are treated the games of chance, games of dexterity and minor amusements of more than 200 tribes belonging to 34 different linguistic stocks. According to Culin, " games of pure skill and calculation, such as chess, are entirely absent." There are more variations in the materials employed than in the object or methods of play and in general the variations do not follow differences in language. The type known as " dice game " is reported here from among 130 tribes belonging to 30 stocks; the " hand-game " from 81 tribes belonging to 28 stocks. The centre of distribution of North American Indian games, which, with the exception of a few post-Columbian additions, are all autochthonous,

Culin finds in the south-west ■ — " there appears to be a progressive change from what appears to be the oldest forms of existing games from a centre in the south-western United States, along lines north, north-east and east." "Similar changes radiating southward from the same centre are likewise suggested. He is of opinion that, outside of children's games as such and the kinds of minor amusements common in all civilizations, the games of the North American Indians, as they now exist, " are either instruments of rites or have descended from ceremonial observances of a religious character," and that " while their common and secular object appears to be purely a manifestation of the desire for amusement or gain, they are performed also as religious cere- monies, as rites pleasing to the gods to secure their favour, or as processes of sympathetic magic, to drive away sickness, avert other evil, or produce rain and the fertilization and re- production of plants and animals or other beneficial results." He also believes that these games, " in what appears to be their oldest and most primitive manifestations are almost exclusively divinatory." This theory of the origin of games in divination, which receives considerable support from certain facts in primitive America, needs, however, further proof. So, too, with Mr Culin's further conclusion that " behind both ceremonies and games there existed some widespread myth from which both derived their impulse," that myth being the one which discloses the primal gamblers as those curious children, the divine Twins, the miraculous offspring of the sun, who are the principal personages in many Indian mythologies." These eternal con- tenders " are the original patrons of play, and their games are the games now played by men."

[SOCIAL ORGANIZATION

Social

orgxniza

lion,

customs,

Ac.

It was formerly thought that " totemism " and real " gentile organization " prevailed over all of North America. But it now

appears that in several sections of the country such beliefs and institutions were unknown, and that even within the limits of one and the same stock one tribe did, while another did not, possess them. Matri- archal ideas and the corresponding tribal institutions were also once regarded as the primal social condition of all Indian tribes, having been afterwards in many cases replaced by patriarchal ideas and institutions. Since the appearance of Morgan's famous monograph on Ancient Society (New York, 1878) and his Systems of Consanguinity and Affinity in the Human Family (Washington, 1871), the labours of American ethnologists have added much to our knowledge of the sociology of the American Indians. Forms of society among these Indians vary from the absolute democracy of the Athabaskan Ten'a of Alaska, among whom, according to Jette (Congr. int. d. Amer., Quebec, 1886), there exist "no chiefs, guides or masters," and public opinion dominates (" every one commands and all obey, if they see fit "), to the complicated systems of some of the tribes of the North Pacific coast regions, with threefold divisions of chiefs, " nobles," and " common people " (some- times also, in addition, slaves), secret and " totemic " organiza- tions, religious societies, sexual institutions (" men's houses," &c), and other like divisions; and beyond this to the develop- ment along political and larger social lines of alliances and con- federations of tribes (often speaking entirely different languages) which have played an important role in the diffusion of primitive culture, such as the Powhatan confederacy of Virginia and the Abnaki confederacy of the North Atlantic region; the con- federacy of the Chippewa, Ottawa and Potawatomi of the Great Lakes; the Huron confederacy of Ontario; the Dakota alliance of the north-west; the Blackfoot confederacy of the Canadian north-west; the Caddoan confederacy of the Arkansas region; the Creek confederacy of the South Atlantic country. The acme of federation was reached in the great "League of the Iroquois," whose further development and expansion were prevented by the coming of the Europeans and their conquest of primitive North America. According to Morgan (League of the Iroquois, New York, 1851) and Hale (Iroquois Book of Rites, 1881), who have written about this remarkable attempt, by federation of all tribes, to put an end to war and usher in the reign of universal peace, its formation under the inspiring genius of Hiawatha took place about 1459. But J. N. B. Hewitt, himself an Iroquois, offers reasons (Amer. Anthrop., 1892) for believing that the correct date of its founding lies between 1559 and 1570.

Tribes like the Kootenay (Rep. Brit. Assoc, 1892) have no totems and secret societies, nor do they seem to have ever possessed them.

This may also be said of some of the Salishan tribes, though others of the same stock have complicated systems. The Klamath Indians (Lutuamian stock) " are absolutely ignorant of the gentile or clan system as prevalent among the Haida, Tlingit and Eastern Indians of North America; matriarchate is also unknown among them; every one is free to marry within or without the tribe, and the children inherit from the father " (Gatschet). In all parts of Cali- fornia indeed, according to Kroeber (Handbook of Amer. Inds., 1907, pt. i. p. 191), " both totemism and a true gentile organization were totally lacking." Nor does it appear that either personal or communal totemism is a necessary attribute of clan and gentile organizations where such do exist. The Heiltsuk of British Columbia have animal totems, while the Kwakiutl do not, although both these tribes belong to the same Wakashan stock. Among the Iroquoian tribes, accord- ing to Hewitt (Handbook, p. 303), the primary unit of social and political organization, termed in Mohawk ohwachira, is " the family, comprising all the male and female progeny of a woman and of all her female descendants in the female line and of such other persons as may be adopted into the ohwachira." The head of the ohwachira is " usually the oldest woman in it," and it " never bears the name of a tutelary or other deity." The clan was composed of one or more of such ohwachiras, being " developed apparently through the coales- cence of two or more ohwachiras having a common abode." From the clan or gens developed the government of the tribe, and out of that the Iroquois confederation.

The power of the chief varied greatly among the North American aborigines, as well as the manner of his selection. Among the Eskimo, chiefs properly understood hardly have existed; nearly everywhere the power of all sorts of chiefs (both war and peace) was limited and modified by the restraints of councils and other advisers.

Age, wealth, ability, generosity, the favour of the shaman, &c, were qualifications for the chieftainship in various parts of the continent. Women generally seem to have had little or no direct voice in government, except that they could (even among some of the Athabaskan tribes) sometimes become chiefs, and, among the Iroquois, were represented in councils, had certain powers and pre- rogatives (including a sort of veto on war), &c. Many tribes had permanent peace-chiefs and temporary war-chiefs. According to Hewitt (Handb. of Amer. Inds., 1907, pt. i. p. 264), " In the Creek confederation and that of the Iroquois, the most complex aboriginal government north of Mexico, there was, in fact, no head chief. The first chief of the Onondaga federal roll acted as the chairman of the federal council, and by virtue of his office he called the federal

council together. With this all pre-eminence over the other chiefs ended, for the governing power of the confederation was lodged in the federal council. The federal council was composed of the federal chiefs of the several component tribes; the tribal council consisted of the federal chiefs and sub-chiefs of the tribe." The greatest development of the power of the chief and his tenure of office by heredity seems to have occurred among the Natchez and certain other tribes of the lower Mississippi and Gulf region. Among the Plains tribes, in general, non-inheritance prevailed, and " any ambitious and courageous warrior could apparently, in strict accordance with custom, make himself a chief by the acquisition of suitable property and through his own force of character " (Hewitt).

Among the North American aborigines the position of woman and her privileges and duties varied greatly from the usually narrow limits prescribed by the Athabaskans, according to Morice (Congr. int. d. Amer., Quebec, 1906), to the socially high status reached among some of the Iroquoian tribes in particular. In the North Pacific coast region the possession of slaves is said to have been a cause of a relatively higher position of woman there than obtained among neighbouring tribes. The custom of adoption both of children and captives also resulted advantageously to woman. The r61e and accomplishments of woman in primitive North America are treated with some detail in Mason's Woman's Share in Primitive Culture (1894). The form of the family and the nature of marriage varied considerably among the North American aborigines, as also did the ceremonies of courtship and the proceedings in divorce, &c. With some tribes apparently real purchase of brides occurred, but in many cases the seeming purchase turns out to be merely " a ratification of the marriage by means of gifts." Great differences in these matters are found within the limits of one and the same stock (e.g. Siouan). Female descent, e.g., prevailed among the Algonkian tribes of the south-east but not among those of the north and west; and the case of the Creeks (Muskogian) shows that female descent is not necessarily the concomitant of a high social status of woman. Among the Zufli, where the man is adopted as a son by the father of his wife, " she is thus mistress of the situation; the children are hers, and she can order the husband from the house should occasion arise " (Lowie and Farrand). With many tribes, however, the husband could divorce his wife at will, but Farrand and Lowie in their discussion of Indian marriage (Handb. of Amer. Inds., 1907, pt. i. p. 809) report on the other hand the curious fact that among the Wintun of California " men seldom expel their wives, but slink away from home, leaving their families behind." In the case of divorce, the children generally

go with the mother. From a survey of the available data Lowie and Farrand conclude that " monogamy is thus found to be the prevalent form of marriage throughout the continent," varied from to polygamy, where wealth and other circumstances dictated it. In California, e.g., polygamy is rare, while with some of the Plains tribes it was quite common. Here again differences of note occurred within the same stock, e.g. the Iroquois proper could not have more than one wife, but the Huron Indian could. The family itself varied from the group of parents and children to the larger ones dictated by social regulations among the eastern tribes with clan organizations, and the large " families " found by Swanton (Amer. Anthrop., 1905) among certain tribes of the North Pacific coast, where relations and " poor re- lations," servants and slaves entered to swell the aggregate. Exogamy was widely prevalent and incest rare. Cousin-marriages were frequently tabooed.

With many of the North American aborigines the giving of the name, its transference from one individual to another, its change by the individual in recognition of great events, achievements, &c, and other aspects of nominology are of significance in connexion with social life and religious ceremonies, rites and superstitions. The high level attained by some tribes in these matters can be seen from Miss Fletcher's description of " A Pawnee Ritual used when changing a Man's Name " (Amer. Anthrop., 1899). Names marked epochs in life and changed with new achievements, and they had often " so personal and sacred a meaning," that they were naturally enough rendered " unfit for the familiar purposes of ordinary address, to a people so reverently inclined as the Indians seem to have been." The period of puberty in boys and girls was often the occasion of elaborate " initiation " ceremonies and rites of various kinds, some of which were of a very trying and even cruel character. Ceremonial or symbolic " killings," " new-births," &c, were also in vogue; likewise ordeals of whipping, isolation and solitary con- finement, " medicine "-taking, physical torture, ritual bathings,

painting of face or body, scarification and the like. The initiations, ordeals, &c, gone through by the youth as a prelude to manhood and womanhood resembled in many respects those imposed upon individuals aspiring to be chiefs, shamans and " medicine-men."

Many facts concerning these rites and ceremonies will be found in G. Stanley Hall's Adolescence (1904) and in the articles on" Ordeals " and " Puberty Customs " in the Handbook of American Indians North of Mexico (1907-1910). In the method of approach to the supernatural and the superhuman among the North American aborigines there is great diversity, and the powers and capacities of the individual have often received greater recognition than is commonly believed Thus, as Kroeber (Amer. Anthrop., 1902, p. 285) has pointed out, the Mohave Indians of the Yuman stock have as a distinctive feature of their culture " the high degree to which they .have developed their system of dreaming and of in- dividual instead of traditional connexion with the supernatural." For the Omaha of the Siouan stock Miss A. C. Fletcher (Proc. Amer. Assoc. Adv. Sci., 1895, 1896; Journ. Anthr. Inst., 1898) has shown the appreciation of the individual in the lonely " totem " vigil and the acquisition of the personal genius.

From the Indians of North America the white man has borrowed not only hosts of geographical names and many

common terms of speech, but countless ideas and of races. methods as to food, medicines, clothes and other

items in the conduct of life. Even to-day, as G.W. James points out in his interesting little volume, What the White Race may learn from the Indian (Chicago, 1908), the end of the instruction of the " lower " race by the " higher " is not yet. The presence of the Indians and the existence of a " frontier " receding ever westward as the tide of immigration increased and the line of settlements advanced, have, as Prof. Turner has shown (Ann. Rep. Amer. Hist. Assoc, 1893), conditioned to a certain extent the development of civilization in North America. Had there been no aborigines here, the white race might have swarmed quickly over the whole continent, and the " typical " American would now be much different from what he is. The fact that the Indians were here in sufficient numbers to resist a too rapid advance on the part of the European settlers made necessary the numerous frontiers (really " successive Americas "), which began with Quebec, Virginia and Massa- chusetts and ended with California, Oregon, British Columbia, Yukon and Alaska. The Indians again are no exception to the rule that one of the fundamentally important contributions of a primitive people to the culture-factors in the life of the race dispossessing them consists of the trails and camping- places, water-ways and trade-routes which they have known and used from time immemorial. The great importance of these trails and sites of Indian camps and villages for

subsequent European development in North America has been emphasized by Prof. F. J. Turner (Proc. Wisconsin State Histor. Soc, 1889 and 1894) and A. B. Hulbert (Historic Highways of America, New- York, 1902-1005). It was over these old trails and through these water-ways that missionary, soldier, adventurer, trader, trapper, hunter, explorer and settler followed the Indian, with guides or without. The road followed the trail, and the railway the road.

The fur trade and traffic with the Indians in general were not without influence upon the social and political conditions of the European colonies. In the region beyond the Alleghanies the free hunter and the single trapper flourished; in the great north-west the fur companies. In the Mackenzie region and the Yukon country the " free hunter " is still to be met with, and he is, in some cases, practically the only representative of his race with whom some of the Indian tribes come into con- tact. J. M. Bell (Journ. Amer. Folk-Lore, xvi., 1903, 74), from personal observation, notes " the advance of the barbarous border civilization, — the civilization of the whaler on Hudson's Bay, of the free trader on the Athabasca Lake and river, of the ranchers and placer miners on the Peace and other mountain rivers," and observes further (p. 84) that " the influx of fur- traders into the Mackenzie River region, and even to Great Bear Lake within the last two years, since my return, has, I believe, very much altered the character of the Northern Indians." In many parts of North America the free trapper and solitary hunter were often factors in the extermination of the Indian, while the great fur companies were not infrequently powerful

agents in preserving him, since their aims of exploiting vast areas in a material way were best aided by alliance or even amalgamation. The early French fur companies, the Hudson's Bay Company, the North-West Company, the American Fur Company, the Missouri Fur Company, the Russian-American Company, the Alaska Commercial Company, &c, long stood with the Indians for the culture of the white man. For two centuries, indeed, the Hudson's Bay Company was ruler of a large portion of what is now the Dominion of Canada, and its trading-posts still dot the Indian country in the far north-west. The mingling of races in the region beyond the Great Lakes is largely due to the fact that the trading and fur companies brought thither employes and dependants, of French, Scottish and English stock, who intermarried more or less readily with the native population, thus producing the mixed-blood element which has played an important role in the development of the American north-west. The fur trade was a valuable source of revenue for the early colonists. During the colonial period furs were sometimes even legal tender, like the

wampum or shell-money of the eastern Indians, which, according to Mr Weeden (Econ. Hist, of New England) , the necessities of commerce made the European colonists of the 17 th century adopt as a substitute for currency of the Old World sort.

In their contact with the Indians the Europeans of the New World had many lessons in diplomacy and statecraft. Alliances entered upon chiefly for commercial reasons led sometimes to important national events. The adhesion of the Algonkian tribes so largely to the French, and of the Iroquoian peoples as extensively to the English, practically settled which was ultimately to win in the struggle for supremacy in North America. If we believe Lewis H. Morgan, " the Iroquois alliance with the English forms the chief fact in American history down to 1763."

The whites in their turn have influenced greatly the culture, institutions and ideas of the American aborigines. The early influence of the Scandinavians in Greenland has had its import- ance exaggerated by Dr Tylor (Journ. Anthrop. Inst., 1879). French influence in Canada and Acadia began early and was very marked, affecting the languages (several Algonkian dialects have numerous loan-words, as have the Iroquois tongues stilJ spoken in Quebec) and the customs of the Indians. French authorities, missionaries and traders seemed to get into more sympathetic relations with the Indians, and the intermarriage of the races met with practically no opposition. Hence the French influence upon many tribes can be traced from the Atlantic past the Great Lakes and over the Plains to the Rocky Mountains and even beyond, where the trappers, voyageurs, coureurs des bois and missionaries of French extraction have made their contribution to the modern tales and legends of the Canadian north-west and British Columbia. In one of the tales of the North Pacific coast appears Shishe Tie (i.e. Jesus Christ), and in another from the eastern slope of the Rockies Mani (i.e. Mary) . Another area of French influence occurs in Louisiana, &c. The English, as a rule, paid much less attention than did the French to the languages, manners and customs and institu- tions of the aborigines and were in general less given to inter- marriage with them (the classical example of Rolf e and Pocahontas notwithstanding), and less sympathetically minded towards them, although willing enough, as the numerous early educational foundations indicate, to improve them in both mind and body. The supremacy of the English-speaking people in North America made theirs the controlling influence upon the aborigines in all parts of the country, in the Pacific coast region to-day £s formerly in the eastern United States, where house-building, clothing and ornament, furniture, weapons and implements

have been modified or replaced. Beside the Atlantic, the Micmac of Nova Scotia now has its English loan-words, while among the Salishan tribes of British Columbia English is " very seriously affecting the purity of the native spech " (Hill-Tout), and even the Athabaskan Nahane are adding English words to their vocabulary (Morice).

The English influence on tribal government and land-tenure, culminating in the incorporation of so many of the aborigines

as citizens of Canada and the United States, began in 1641. The first royal grants both in New England and farther south made no mention of the native population of the country, and the early proprietors and settlers were largely left to their own devices in dealing with them, the policy of extinguishing their titles to land being adopted as needed. Later on, of course, due recognition was had of the fact that certain parts of America were inhabited by " heathen," " savages," &c, and the chiefs of many of the tribes were looked upon as rulers with preroga- tives of princes and royal personages (e.g. the " Emperor " Powhatan and the " Princess " Pocahontas, " King " Philip, the " Emperor " of the Creeks, &c). The method of dealing with the Indian " tribes " by the Federal government as auto- nomous groups through treaties, &c, lasted till 1871, when, by act of Congress, " simple agreements " were favoured in lieu of "solemn treaties."

Meanwhile no consistent purpose was shown in dealing with the Indian problem. At one time the American policy was to concentrate all the Indians on three great reservations, an expansion of the plan adopted early in the 19th century which set aside the former " Indian country" (afterwards restricted to the Indian Territory). The sentiment in regard to great reservations, however, gradually weakened, till in 1878 it was proposed to concentrate the Indians on smaller reservations; but the entire reservation system became increasingly unpopular, and finally in 1887 Congress enacted the Land Severalty Law, paving the way for abolition of the reservation and agency system; at the same time it emphasized the government policy of gradually (the reservation system was a preliminary step in the way of bringing the Indians more under government control)

bringing about the cessation of all " tribes " as indepen- dent communities and securing their ultimate entrance upon citizenship with the white population. This certainly was far removed from the declaration of the Virginia Assembly in 1702 that " no Indian could hold office, be a capable witness, or hunt over patented land "; and at this time also, " an Indian child was classed as a mulatto, and Indians, like slaves, were liable to be taken on execution for the payment of debt." As Miss Fletcher (Handb. of Amer. Inds., 1907, pt. i. p. 501) notes, the ordinance of Congress passed in 1787 respecting the duty of the United States to the Indian tribes, which was confirmed by the act of 1789, was reaffirmed in the organizing acts of Alabama, Colorado, Dakota, Idaho, Illinois, Iowa. Kansas, Michigan, Minnesota, Mississippi, Montana, Nebraska, Nevada, Oregon, Wisconsin and Wyoming.

The Land Severalty Law of 1887 (amended 1890) provided for the survey of reservations and the allotment to each person of a tract ranging from 40 to 160 acres, the remainder being sold to white settlers. The process of dividing the Indian lands into individual allotments and disposing of the remainder for the benefit of the tribe or the nation has been very successful in many cases. This policy has culminated in a recent decision of the United States Supreme Court, by virtue of which all Indians living upon their own allotments were declared to be citizens, on the same terms and subject to the same laws as the whites.

During the period 1609-1664, from the visit of Hudson to the surrender of New Amsterdam to the English, the Dutch exercised not a little influence upon the aborigines of the present state of New York and some of the regions adjoining. Hudson's harsh treatment of the natives caused the Dutch trouble later on. Through their trading-post of Fort Orange (now Albany) they came into contact with both Iroquoian and Algonkian tribes, carrying on an extensive trade in furs with some of them, including the New England Pequots. They sided with the Iroquois against the northern Algonkian tribes, but also aided the Mohegans against the Mohawks. Farther south they helped the Senecas against the Munsees. Their quarrels with the English involved many of the Indian tribes on one side or the other. They have been generally condemned for their readiness to furnish the Indians with firearms and intoxi- cating liquors, though some of these actions were doubtless per- formed by individual traders and settlers only and cannot be charged to a deliberate policy of the government. The modern title of Kora, given by the Canadian Iroquois to the governor-general (also to the king of England), is a corruption of Corlaer, the name of

a trusted Dutch manager of Rensselaerwyck (cf. the Iroquois name for the French governor, Onontio — Montmagny).

German influence among the American Indians north of Mexico has made itself felt among the Eskimo (particularly in Labrador), the Delawares and Mohegans, the Iroquois and the Cherokee, where the Moravian missionaries did much good work. They influenced the Indians for peace and good conduct during the great wars. In Labrador the dress, habitations and beliefs of the Eskimo have been considerably modified. It is said by some that Sequoyah, the inventor of the " Cherokee alphabet," had for father a German settler.

The great influence of the Spaniards upon the American Indians has been treated by Blackmar in his Spanish Institutions in the South-west, and by Lummis, Bourke, Hodge and other authorities. The results of Spanish contact and control are seen in the loan- words in the various languages of the region, the consequences of the introduction of domestic animals (horse, mule, sheep, goat, fowls), the perfection of the arts involved in the utilization of wool, the planting of wheat, the cultivation of peaches and other exotic fruits. The difference between the Navaho and their close kinsmen the Apache may be largely attributed to changes wrought by the coming of the Spaniards. The " Mission Indians " of California represent another great point of contact. In California thousands and thousands of Indians were converted and brought under the control of the able and devoted missionaries of the Catholic Church, only to become more or less utterly helpless when Spanish domina- tion ceased and the missions fell into decay. Traces of Spanish influence may be found as far north as the Saskatchewan, where personal names implying origin from a Mexican captive occur; and there is not a little Spanish blood in some of the tribes of the Great Plains, who often took with them from their border raids, or acquired from other tribes, many white prisoners from Mexico, &c. In Alaska the influence of Russian sailors, traders and settlers during the period of occupancy was considerable, as was also that of the priests and missionaries of the Greek Church, but much of what was thus imposed upon the aborigines has now been modified or is being submerged by the more recent influences of the English- speaking settlers, miners, &c, and the efforts of the American government to educate and improve them. The influence of the Russians extended even to California, as the name " Russian River " would indicate, and Friederici (Schiffahrt der Indianer, 1907, p. 46) even thinks that to them is due the sporadic occurrence in that region of skin-boats. It was through the Russians that the Alaskan Eskimo received tobacco. Some Russian words have crept into certain of the Indian languages.

It has been said that the Russian authorities from time to time transported a few Indians over-sea to Kamchatka, &c.

The general question of the relations of the Europeans in North America with the Indians has been treated by various authors, one of the most recent being Friederici, whose Indianer und Ameri- kaner (Brunswick, 1900) is perhaps a little too prejudiced.

The contact between the races in North America has had its darker side, seen in the numerous conflicts and that have marked the conquest of the continent by the whites and the resistance of the weaker people to the inevitable triumph of the stronger. The following sketch of the warlike relations of various Indian stocks with the European colonists and their descendants brings out the principal facts of historic interest.

Eskimoan. — The history of warfare between the European colonists (and their descendants) and the North American aborigines begins with the conflict of Eskimo and Northmen in Greenland, the last phase of which, in the first half of the 15th century, ended in the destruction of the European settlements and the loss of knowledge of the Eskimo to the Old World till they were rediscovered by Frobisher in 1576 and Davis in 1585. Then came a new series of small conflicts in which the whites have been the chief aggressors — whalers, sealers and other adventurers. In the extreme north-west the Aleuts were very harshly treated by the Russians, and one of the most recent deeds of brutality has been the reported extermina- tion, by irresponsible whalers, of the Eskimo of Southampton Island in Hudson's Bay.

■ *Algonkian and Iroquoian. — Southward, along the Atlantic coast, the period of actual settlement by the whites in large numbers Was, preceded by numerous conflicts with the Algonkian Indians in which all too often the whites (adventurers, fishermen, &c.) were princi- pally at fault, the natives being sometimes carried off as slaves to Spain and elsewhere in Europe. When Champlain, very shortly after the founding of Quebec, decided to help his Algonkian neigh- bours against their Iroquoian enemies, an alliance was entered upon which had much to do with the final defeat of France in North America. The battle fought and won by Champlain near Ticon- deroga in 1609 made the Iroquois the lasting antagonists of the French, and, since the former held a large portion of what is now the state of New York, the latter were effectually prevented from annihilating or destroying the English colonies to the south. The Iroquois alliance with the English in New York was preceded by*

one with the Dutch. Another result of the feud between the Iroquois and the French was the destruction of the confederacy of the Hurons, themselves a people of Iroquoian stock, established in the region between Lakes Ontario, Erie and Huron, over a large portion of what is now the province of Ontario, although the antagonism between Hurons and Iroquois had existed even before the coming of Cartier and the inevitable conflict had already begun. As an outcome of Champlain's visit to the country of the Hurons in 1615 the Jesuit missionaries had established themselves among these Indians and for thirty-five years laboured with a devotion and sacrifice almost unparalleled in the history of the continent. The struggle ended in the campaign of 1 648-1 649, in which the Iroquois destroyed the Huron settlements and practically exterminated the people, the French priests in many cases having suffered martyrdom in the most cruel fashion at the hands of the savage conquerors. Such of the Hurons as succeeded in escaping took refuge in some of the safer French settlements or found shelter among friendly Indian tribes farther west. Some of these refugees have their descendants among the Hurons of Lorette to-day and among the Wyandots of Oklahoma. The Tionontati (Tobacco Nation) Hurons continued the struggle for some time longer, a battle being fought in 1659 on the Ottawa above Montreal, in which the Iroquois were victorious and the Huron chief slain. As late as 1747-1748 some of the Hurons, who had taken refuge in the west, under Orontony, a wily and unscrupulous chief, who was offended at certain actions of the French, entered into a conspiracy with many Algonkian tribes of the region to destroy the French posts at Detroit, &c, which, however, proved unsuccessful, the plot being revealed through the treachery of a Huron woman. A notable event in the French- Iroquois wars was the attack on Montreal in 1689. After the coming of Frontenac as governor of Canada the wars between the French and English involved some of the Indian tribes more and more, on one side or the other, the Mohawks especially, who took part against the French, being famous for their raids from the region of Ohio to far into New Brunswick. During the French war and the American War of Independence the

Algonkian and Iroquoian Indians serving on both sides were in part or wholly responsible for numerous massacres and other acts of barbarity, though the whites sometimes showed themselves fully the equals of the savages they condemned.

In New England the most notable conflicts were " the Pequot war " of 1637-1638 and " King Philip's war " of 1675-1676, the latter resulting in the overthrow of a powerful confederacy, which at one time threatened the very existence of the colony, and the practical extermination of the Indians concerned, after great havoc had been wrought by them in the white settlements. New England also suffered much from Indian " wars " instigated by the French, and at Caughnawaga and other Iroquois settlements in French Canada there is much white blood resulting from the adoption of captives taken away (e.g. at Marlboro and Deerfield, Mass., in 1703-1704) in raids on New England villages. Celebrated in the annals of war are the Algonkian chiefs Tecumseh (Shawnee), who aided the British in the war of 1812, and Pontiac (Ottawa), whose remarkable conspiracy of 1763 has been studied by Parkman; of noted Iroquoian chiefs and warriors may be mentioned Joseph Brant, who fought for the British in the War of Independence, and Logan, ill-famed for his barbarities perpetrated against the border settlements on the Ohio, 1775-1780, &c.

In Virginia the future of the English colony was not absolutely assured much before 1620. From the founding of Jamestown in 1607 until about 1616 the colony was in more or less danger of extinction by starvation or destruction at the hands of the Indians. The most famous and romantic of the Indian wars of Virginia was that in which Captain John Smith was concerned in the days of Powhatan and Opechancanough, when his rescue by Pocahontas is said to have taken place. Under Opechancanough massacres of the English settlers took place in 1622 and 1644 in particular, while intermittent hostilities continued between these dates, many hundreds of whites being slain by the Powhatan Indians and their confederates of Algonkian stock. As a result of wars with the English and also with other Indian tribes, many of the Algonkian peoples of Virginia, like some of the Iroquoian peoples farther south, were by the end of the 17th century greatly reduced in numbers. In the Carolinian region the Iroquoian Cherokee warred against the English colonists from 1759 until the War of Inde- pendence, and continued their struggle then against the Americans until 1794. After their forcible removal west of the Mississippi in 1 838-1 839 no serious hostilities occurred, with the exception of a conflict between the whites and a portion of the Cherokee, who had earlier moved into eastern Texas while that

state was under the Mexican regime. The Tuscarora were in frequent conflict with the English, particularly in the " Tuscarora war " of 1713-14.

Of Algonkian tribes farther west the Cheyenne began conflicts with the whites about 1840, made their first incursion into Mexico in 1853, and between i860 and 1878-1879, according to Mooney, "they were prominent in border warfare . . . and have probably lost more in conflict with the whites than any other tribe of the plains in proportion to their number." They participated in the " Sitting Bull war " of 1876. The Chippewa of the north-western United States in the latter

half of the 18th century and till the close of the war of 1812 kept up warfare with the border settlements, but have been generally peaceful since 1815, when a treaty was made. The only serious outbreak among the Cree, who have been generally friendly to the whites from the period of first contact, occurred during the Riel " rebellion " of 1885, but was soon settled. In the latter part of the 18th century (up to the treaty of Greenville, 1795) the Delawares took a prominent part in opposing the advance of the whites. The Kickapoos were concerned in the Indian plot to destroy the fort at Detroit in 1712, and a hundred years later they aided the English against the Americans; in 1832 numbers of them helped Black Hawk in his war against the whites. The Micmac were long hostile to the English, being prominent as aids to the French in the New England wars, and it was not until about 1779 or long after the French cession that conflicts between these Indians and the whites came to an end. The Mississaguas fought with the Iroquois against the French about 1750, having soon become friendly with the English and remaining so. The Ottawa were prominent in the wars of the region about Detroit from 1750 till 1815. Pontiac, whose " con- spiracy " of 1763 is noted in American history, was an Ottawa chief. The Penobscot, as friends of the French, continued their attacks on the English settlements till about 1750. The Sacs and Foxes appear early in the 1 8th century as antagonists of the French (a rare thing among Algonkian peoples) and they were the instigators of the nearly successful attack on Detroit in 1712. In the war of 1812 most of these Indians sided with the British. Black Hawk, the chief figure in the " war " of 1831-1832, was a Sac and Fox chief, who endeavoured to engage all the Indian tribes of the region in a general alliance against the whites. The Shawnees were prominent in the border warfare of the Ohio region, and their famous chief Tecumseh fought for the British in the war of 1812.

Athabaskan. — -The Athabaskan tribes of the far north, with the exception of occasional disputes with the traders and settlers, have generally been of a peaceful disposition, and " wars " with the whites have not been recorded to any extent. The warlike members of this stock have been the Apache and the Navaho. The Apache from the middle of the 16th century have given evidence of their instinct for raids and depredations on the frontiers of civilization. In recent times the most noteworthy outbreaks were those under Cochise, Victorio, Geronimo, Nana, Nakaidoklini, &c, between 1870 and 1886, in which several hundred whites in Mexico and New Mexico were killed and much property destroyed. As late as 1900 some of the hostile Apaches, who had escaped to the mountains, made a raid on the Mormon settlers in Chihuahua, Mexico. The Navaho, when New Mexico passed into the possession of the United States in 1849, had long been in the habit of committing depredations upon the white settlements and the Pueblos. These " wars " continued till 1863, when " Kit " Carson completely defeated them and the greater part of the tribe were made prisoners. Since their release in 1867 they have thriven in peace, although occasionally serious trouble has threatened, as, e.g., in November 1905.

Caddoan.- — The Caddo proper were friendly to the French and helped them against the Spaniards in the wars of the 18th century. After the annexation of Texas the Indians were badly treated and some of them made answer in kind; in 1855 a massacre of the Indians was proposed by the whites. Since their forced march to Oklahoma in 1859 they have been at peace. The Ankara had a brief conflict with the United States authorities in 1823, as a result of the killing of some traders. In the wars of the 18th century the Kichai adhered to the cause of the French. The Pawnee seem never to have warred against the United States, in spite of much provocation at times.

Californian Stocks. — Such " wars " as are recorded, for the most part between the minor Californian stocks and the whites, have been largely directly or indirectly instigated by the latter for various purposes of gain. The Lutuamian stock is remarkable as furnishing both the Klamath, who have always kept peace with the whites, and the Modoc, who are well known through the " Modoc war " of 1872-73 under the leadership of their chief, Kintpuash or " Captain Jack."

Kiowan. — The Indians of the Kiowan stock joined with the Comanche, Apache, &c, in the border wars in Texas and Mexico, and, according to Mooney, " among all the prairie tribes they were

noted as the most predatory and bloodthirsty, and have probably killed more white men in proportion to their numbers than any other." They have been on their present reservation since 1868, and the only outbreak of importance latterly occurred in 1874-75, when they joined with the Comanche, Cheyenne, &c.

Muskogian. — This stock has furnished some of the most warlike Indians of the continent. The Chickasaw were friendly to the English, or rather hostile to the French, in the 18th century (war of 1736-40), and their action practically settled the question of the extension of French power in this region. The Choctaw aided the French in the wars of the 1 8th century, and a few Indians of this tribe participated in the " Creek War " of 1813-14. The Creeks or Muskogees are famous on account of the terrible war of 1813-14 in which they sustained overwhelming defeat. Earlier they were hostile to the Spaniards in Florida, and during the 18th century were generally friendly to the English, particularly in the " Apalachee war " of 1703-08, when they served under Governor Moore of

Carolina. Another Muskogian people, the Seminole, are remembered for the long and bloody " Seminole War " in Florida, 1835-45, in which many atrocities were committed.

Sahaptian. — The Indians of this stock have been generally very friendly to the whites, and the only notable " war " occurred in 1877, when the Nez Perce's, under their famous chief, Joseph, resisted being confined to their reservation in Idaho. Joseph displayed wonderful generalship; he defeated the American troops several times, and finally executed a most remarkable retreat, over 1000 m., in an attempt to reach Canadian territory. This was foiled within a short distance of the boundary, and the entire force surrendered to Colonel Miles on October 5, 1877.

Shoshonian. — North of Mexico this great stock has developed several warlike peoples. Trouble with the Bannock occurred in 1877-78, resulting from the encroachment of the whites at the time of the Nez Perces war, the killing of several settlers, scarcity of food, &c. The outbreak was ended by a campaign under General Howard in which many Indians, men, women and children, were killed and

some one thousand taken prisoners. The Comanche, through a long period of more than 150 years after the Spanish occupation, kept up a continual series of raids and depredations upon the settlements of the whites in Mexico, &c. Their general friendly attitude towards Americans in later years did not extend to the Texans, with whom for more than thirty years they indulged in savage warfare. They often entered into warlike alliance with the Apache, the Kiowa, &c. After the outbreak of 1874-75 they settled down for good. The leader in this " war " was Quana Parker, a half-blood Comanche, who, after the matter was settled, accepted broadly the new order of t hings and became "the most prominent and influential figure among the three confederated tribes " (Mooney). The Paiute, Shoshonees (Snakes) and Ules have figured in several more or less temporary outbreaks since 1865.

Siouan. — This great stock has had its celebrated antagonists of the whites as well as its famous combatants of other Indian tribes. The Dakota (or Sioux) were unfriendly to the French for aiding their enemies, the Chippewa, and after the fall of French power in America in 1763, they allied themselves with the English and assisted them in the War of Independence and the war of 1812, with few exceptions. After the treaty of peace in 1815 various minor troubles occurred, but in 1862 the Indians in Minnesota rose under Chief Little Crow and committed terrible barbarities against the settlers, some 800 whites being killed before the revolt was put down. The gold-fever of the whites in Dakota, where the Indians had settled down, pre- cipitated a formidable outbreak in 1876 under the leadership of Sitting Bull, Crazy Horse, Spotted Tail and other chiefs. The most notable event of this " war " was the so-called " massacre " (properly cutting-off) of General Custer and his cavalry at the battle of Little Bighorn on June 25, 1876. When the " GhostDance " was prevalent among so many Indian tribes of the Plains in 1890-1891 another serious rising of the Sioux took place, which was put down by General Miles. Sitting Bull was killed (December 15,1890) ;and resistance to an attempt to disarm a large party of Indians at Wounded Knee Creek, near the Pine Ridge Agency, resulted (December 29) in a deplorable massacre, in which many women and children were killed The story of these Sioux outbreaks and the guiltiness of the whites with respect to them has been told authoritatively by Mooney (14th Ann. Rep. Bur. Ethnol., 1892-1893). At one time these troubles threatened to involve the Canadian Indians of the region adjacent. The Catawba of South Carolina, in the wars of the 18th century, aided the English against the French, the Tuscaroras (war of 1713-14) and the Lake tribes.

They sided with the Americans during the War of Independence. The Osage were friendly with the French early in the 18th century and fought with them against the Sacs and Foxes at Detroit in 1714.

Pueblos. — After the Spanish conquest of the Pueblos Indians of Arizona and New Mexico the most remarkable effort of the natives to throw off the foreign yoke was in the general revolt of 1680 under the leadership of Pope of San Juan. At that time among the Moqui (Shoshonian) the missionaries were killed, the churches laid in ruins, &c, and similar events occurred elsewhere in the Pueblos region. For this the Spaniards subsequently took ample vengeance. The Pueblos Indians in general have never taken top kindly to the whites; and to-day at the Moqui pueblo of Oraibi there exist a " Hostile " and a " Friendly " faction, the first bitterly opposed to the Caucasian and all his ways, the latter more liberal-minded, but Indian none the less. An open rupture nearly took place in 1906.

In Canada, since the organization of the Dominion in 1867, Indian wars have been unknown, and Indian outbreaks of any sort rare. In 1890 an outbreak of the Kootcnays was threatened, but it amounted to nothing — the present writer traversed all parts of the Kootenay country in 1891 in perfect safety. Occasional " risings " have been reported from the Canadian North-West and British Columbia, but have amounted to little or nothing. In the matter of war it should be noted that some Indian stocks have been essenti- ally peaceful, and have resorted to force only when driven beyond endurance or treated with outrageous injustice. Again, within the same stock one tribe has shown itself peaceable, another quite war- like (e.g. Klamath and Modoc, both Lutuamian; the Hares and the Apache, both Athabaskan). Probably the amount and extent of wars existing north of Mexico in Pre-Columbian times were not as

large as is generally stated. The introduction of fire-arms, European-made weapons, the horse, &c, and the development of ideas of pro-perty made possible through these, doubtless stimulated intertribal disputes and increased the actual number of warlike enterprises. Over a large portion of the continent " wars " were nearly always initiated and carried out by a portion only of the tribe, which often had its permanent " peace party."

The missionary labours of the various Christian churches among the North American aborigines have been ably summarized by Mooney in the Handbook of American Indians North of Mexico (pt. i. 1907, pp. 874-909). Besides "f the famous Relation des Jesuites (ed. Thwaites, 1896- cation. 1901) there are now special mission

histories for the Baptists, Congregationalists, Episcopalians, Lutherans, Men- nonites, Methodists, Moravians, Mormons. Presbyterians, Quakers, Roman Catholics (also the various orders, &c), who have all paid much attention to Christianizing and civilizing the Indians. To-day " practically every tribe officially recognized within the United States is under the missionary influence of some religious denomination, workers of several denominations frequently labouring in the same tribe." Something of the same sort might be said of the Indians of Canada, whose religion (that of 76,319 out of 110,345 altogether reported, is known) is given as follows in the Report of the Department of Indian Affairs for 1907: Roman Catholics 35,682; Anglicans 15,380; Methodists 11,620; Presbyterians 1527; Baptists 1103; Congregationalists 18; and other denominations 597; besides 10,347 pagans. All the Indians of Nova Scotia, New Brunswick, and Prince Edward Island, are Catholics; in Quebec there are but 678 Protestants (mostly Methodist) ; in Ontario there are 6173 Catholics to 1030 Baptists, 4626 Methodists, 5306 Anglicans, 18 Congregationalists and 34 Presbyterians. The Indians of British Columbia number 11,529 Catholics, 4304 Anglicans, 3277 Methodists and 431 Presbyterians; those of Manitoba, 1780 Catholics, 1685 Methodists, 382 Presbyterians and 3103 Anglicans; those of Saskatchewan and Alberta 4249 Catholics, 1527 Methodists, 719 Presbyterians, 2549 Anglicans. In some of the tribes and settlements both in Canada and in the United States missionary activities, the influence of individual white men, &c, have led to a great diversity of religious faith, some- times within comparatively limited areas. Thus in the Mistawasis band of Crce, belonging to the Carlton Agency, province of Saskatchewan, numbering but 129, there are 6 Anglicans, 86 Presbyterians and 37 Catholics; in the Oak River band of Sioux in Manitoba there are 60 Anglicans, 1 Presbyterian, 13 Methodists, 4 Catholics and 195 pagans out of a total of 273. Among the " Six Nations " and the larger Indian peoples of Oklahoma all the leading Christian sects, besides the Salvation Army, the Christian Scientists, the Mormons and the " New Thought " movement are represented. There are also the " Navaho New Faith," the " Shaker Church " of Washington, &c. The history of missionary labours in North America among the aborigines contains stories of disappointment and disaster as well as chronicles of success. Some peoples, like the Timu- quans, the Apalachee, the Pakawan tribes, &c, have been con- verted only to disappear altogether; other great attempts at colonization or " reduction," like the missions of Huronia and California, succeeded for the time on a grand scale, but have fallen victims sooner or later to the fortunes of war, the changes of politics, or their own mechanism and its inherent

weaknesses and defects. But the thousands of good church-members, including many ministers of the Gospel, in Canada and the United States, coming from scores of different tribes and many distinct stocks, no , less than the general good conduct of so many Indian nations, are a remarkable tribute to the work done by Catholic and Protestant missionaries alike all over the broad continent from the Mexican border to the snows of Green- land and the islands of the Arctic. The martyrdom of the Jesuits among the fierce Iroquois, the zeal of Duncan at Metlakahtla, the fate of the Spanish friars in the Pueblos rebellion of 1680 under Pope, the destruction of the Huron missions in 1641-1649 and of those of the Apalachee in 1703, the death of Whitman at the hands of the Cayuse in 1847, are but a few of the notable events of mission history. The following

brief accounts of missionary labours among one or two of the chief Indian stocks and in a few of the chief areas of the continent will serve to indicate their general character.

Calif ornian Indians.— Beginning with the foundation by Father Junipero Serra in 1769 of San Diego de Alcala, and ending with that of San Francisco Solano in 1823, there were established, from beyond San Francisco Bay to the River Colorado, twenty-three missions of the Catholic faith among the Indians of California, whose direct influence lasted until the " secularization " of the missions and the expulsion of the friars by the Mexican government in 1834. In that year the missions counted 30,650 Indians and produced 122,500 bushels of wheat and corn. They possessed also 424,000 cattle, 62,500 horses and mules, 321,900 sheep, goats, hogs, &c. The mission-buildings of brick and stone contained besides religious houses and chapels, school-rooms and workshops for instruction in arts and industries, and were surrounded by orchards, vineyards and farms. Here Indians of diverse linguistic stocks were " reduced " and " civilized," and their labour fully utilized by the mission- fathers. But, in the words of Mooney (Handb. of Amer. Inds. pt. i., 1907, p. 895), " Despite regular life, abundance of food and proper clothing according to the season, the Indian withered away under the restrictions of civilization supplemented by epidemic diseases introduced by the military garrisons or the seal-hunters along the coast. The death-rate was so enormous, in spite of apparent material advancement, that it is probable that the former factor alone would have bitought about the extinction of the missions within a few

generations." Some of the missions had but a few hundred Indians, some, however, as high as three thousand. Kroeber thinks that their influence was " probably greater tempor- ally than spiritually." After the " secularization " of the missions decay soon set in, which the American occupation of California later on did nothing to remedy, and the native population rapidly decreased. When the supervision of the missionaries no longer sustained them the Indians fell to pieces and the practical results of seventy years of labour and devotion were lost. In 1908 there remained of the " Mission Indians " less than 3000 individuals (belonging to the Shoshonian and Yuman stocks), whose condition was none too satisfactory, the only human relics of the huge attempt at the " reduction " of the Indian that was planned and carried out in California.

Iroquoian. — The French missions among the Hurons began in 1615-1616 with Father le Caron of the Recollect order; those of the Jesuits with Father Brebaeuf in 1626. These missions flourished, in spite of wars and other adverse circumstances, till the invasion of the Huron country in Ontario by the Iroquois in 1 641 and again in 1649 Drought about their destruction and the dispersal of the Hurons who were not slain or carried off as prisoners by the victors. Some took refuge among neighbouring friendly tribes; others settled finally at Lorette near Quebec, &c. The Wyandots, now in Oklahoma, are another fragment of the scattered Hurons. The Hurons of Lorette numbered in 1908, 1 Anglican, 6 Presbyterians and 459 Catholics. The Wyandots of Oklahoma are largely Pro- testants. The mission among the Mohawks of New York was estab- lished in 1642 by Father Jogues(afterwards martyred by the Indians), and in 1653 the church at Onondaga was built, while during the next few years missions were organized among the Oneida, Cayuga and Seneca, to cease during the warlike times of 1658-66, after which they were again established among these tribes. The mission of St Francois Xavier des Pre (La Prairie), out of which came the modern Caughnawaga, was founded in 1669, and here gathered many Christian Iroquois of various tribes — Mohawk especially. About this time the Iroquois settlement on the Bay of Quinte, Ontario, was formed by Christian Mohawks, Cayugas, &c. The Lake of the Two Mountains mission dates from 1720, that of St Regis from 1756. Another mission at Oswegatchie, founded in 1748, was abandoned in 1807. The Episcopal missions among the Iroquois began early in the 18th century, the Mohawks being the first tribe influenced, about 1700. The extension of the work among the other Iroquoian tribes was aided by Sir William Johnson in the last half of the century and by Chief Joseph Brant, especially after the removal

of those of the Iroquois who favoured the British to Canada at the close of the War of Independence. In 1776 the Congregationalists established a mission among the New York Oneida, and later continued their labours also among the Oneida of Wisconsin. The Congregational mission among the New York Seneca began in 1831. In 1791-1798, at the request of Chief Cornplanter, the Pennsylvania Quakers established missions among the Oneida, Tuscarora and Seneca. The Moravian missions among the New York Onondaga were estab- lished under the Rev. David Zeisberger about 1745. The Methodist missions among the Ontario Iroquois date from 1820. Of the " Six Nations " Indians of the Grand river, Ontario, the Cayuga and Onondaga are still " pagan," the others being Anglican, Methodist and other denominations, including Seventh Day Adventists, Salva- tion Army, <&c. Among the New York Iroquois great variety of religious faith also exists, the Presbyterians (largest), Methodists, Episcopalians and Baptists being all represented. The Iroquois of Caughnawaga and St Regis are mainly Catholic; at Caughnawaga there is, however, a Methodist school.

479

Muskogian. — Several tribes of this stock came under the influence of the missions established by the Spanish friars along the Atlantic coast after the founding of St Augustine in 1565. The missionaries in this region were chiefly Franciscans, who succeeded the Jesuits. They were very successful among the Apalachee, but these Indians were constantly subject to attack by the Yamasi, Creek, Catawba and other savage peoples, and in 1 703-1 704 they were destroyed or taken captive, and the missions came to an end. A few of the survivors were gathered later at Pensacola for a time. In the early part of the 18th century French missions were established among the Choctaw, Natchez, &c, and the Jesuits laboured among the Alibamu from 1725 till their expulsion in 1764. From 1735 to 1739 the Moravians (beginning under Spangenberg) had a mission school among the Yamacraw, a Creek tribe near Savannah. In 1831 a Presbyterian mission was established among the Choctaw on the Yalabusha river in northern Mississippi, to which went in 1834 the Rev. Cyrus Byington, the Eliot mission over which he presided there and in the Indian Territory till 1868 being one of great importance. After the removal of the Indians to the Indian Territory more missions were established among the Choctaw, the Creek and the Seminole, &c. The work was much interfered with by the Civil War of 1861- 65, but the mission work was afterwards reorganized. The Baptist missions among the Choctaw began in 1832 and among the Creek in 1839. The " Choctaw Academy," a high school, at Great

Crossings, Kentucky, chiefly for young men of the Choctaw and Creek nations, was founded in 1819 and continued for twenty-four years. In 1835 a Methodist mission was established among the Creek, but soon abandoned, to be reorganized later on. Among the Indians of Oklahoma, the Catholic and Mormon churches and practically all the Protestant denominations, including the Salvation Army and the Christian Scientists, are now represented by churches, schools, missions, &c. The missionaries among the Muskogian tribes during the last half of the 1 8th century, as may be seen from Pilling's Bibliography of the Muskhogean Languages (1889), furnished many able students of Indian tongues, whose researches have been of great value in philology. This is true likewise of labourers in the mission- field among the Algonkian, Iroquoian, Athabaskan, Siouan and Salishan tribes and among the Eskimo. The celebrated " Eliot Bible," the translation (1663) of the scriptures into the language of the Algonkian Indians of Massachusetts, made by the Rev. John Eliot (q.v.), is a monument of missionary endeavour and prescientific study of the aboriginal tongues. In his work Eliot, like many other missionaries, had the assistance of several Indians. The names of such mission-workers as Egede, Kleinschmidt, Fabricius, Erdmann, Kohlmeister, Bruyas, Zeisberger, Dencke, Rasles, Gravier, Men- garini, Giorda, Worcester, Byington, Wright, Riggs, Dorsey .William- son, Voth, Eells, Pandosy, Veniaminov, Barnum, Andr6, Mathevet, Thavenet, Cuoq, Sagard, O'Meara, Jones, Wilson, Rand, Lacombe, Petitot, Maclean, Hunter, Horden, Kirkby, Watkins, Tims, Evans, Morice, Hall, Harrison, Legoff, Bompas, Peck, &c, are familiar to students of the aboriginal tongues of America.

When in 1900 the withdrawal by the United States of govern- ment aid to denominational schools occurred, it compelled some of the weaker churches to give up such work altogether, and interfered much with the activities of some of the stronger ones. According to the statistics given by Mooney (Handb. of Amer. Inds., 1907, pt. i. p. 897) the Catholic Church had in 1904 altogether, under the care of the Jesuits, Franciscans and Benedictines, &c, and the sisters of the orders of St Francis, St Anne, St Benedict, St Joseph, Mercy and Blessed Sacrament, "178 Indian churches and chapels served by 152 priests; 71 boarding and 26 day schools with 109 teaching priests, 384 sisters and 138 other religious or secular teachers and school assistants." The Catholic mission work is helped by " the Preservation Society, the Marquette League and by the liberality of Mother Katharine Drexel, founder of the order of the Blessed Sacrament for negro and Indian mission work." The corre- sponding statistics for the chief Protestant churches were as follows: —

Denomination.

Missions and Churches.

Missionaries.

Schools.

Baptist

Congregationalist Episcopalian . Friends Mennonite Methodist Moravian . Presbyterian .

14 10

14 10

5

3 101

15 12 28

15 6

40 3

69

4 5

17 1

1

32

Total . . .

157

188

60

This is exclusive of Alaska, where Greek Orthodox (18 ministers in

+ 8o

IQ02), Roman Catholics (12 Jesuits and lay brothers and 11 sisters of St Anne in 1903), Moravians (5 mission stations with 13 workers and 21 native assistants among the Eskimo in 1903), Episcopalians (31 workers, white and native, 13 churches, 1 boarding and 7 day schools in 1903), Presbyterians (a dozen stations and several schools), Baptists, Methodists (several stations), Swedish Evangelical (several stations), Friends (several missions), Congregationalists (mission school) and Lutherans (orphanage), all are labouring.

Before the advent of the whites the children of the North American aborigines " had their own systems of education, through which the young were instructed in their coming labours and obligations, embracing not only the whole round of economic pursuits — hunting, fishing, handicraft, agriculture and household work — but speech, fine art, customs, etiquette, social obligations and tribal lore " (Mason). Parents, grand- parents, the elders of the tribe, " priests," &c, were teachers, boys coming early under the instruction of their male relatives and girls under that of their female relatives. Among some tribes special " teachers " of some of the arts existed and with certain of the more developed peoples, such as some of the Iroquoian and Siouan tribes, both childhood and the period of puberty received special attention. Playthings, toys and children's games were widespread. Imitation of the arts and industries of their elders began early, and with not a few tribes there were " secret societies," &c, for children and fraternities of various sorts, which they were allowed to join, thus receiving early initiation into social and religious ideas and responsibility in the tribal unit. Corporal punishment was little in vogue, the Iroquois e.g. condemning it as bad for the soul as well as the body. Appeals to the feelings of pride, shame, self-esteem, &c, were commonly made. As the treatment of the youth at puberty by the Omaha e.g. indicates, there was among some tribes distinct recognition of individuality, and the young Indian acquired his so-called " totem " or " guardian spirit " individually and not tribally. In some tribes, however, the tribal conscious- ness overpowered altogether children and youth. With the Indian, as with all other young human beings, " unconscious absorption " played its important role. Parental affection among some of the peoples north of Mexico reached as high a degree as with the whites, and devices for aiding, improving and amusing infants and children were innumerable. Some of the " beauty makers," however, amounted to rather serious deformations, though often no worse than those due to

the corset, the use of uncouth foot-wear, premature factory labour, &c, in civilized countries.

Interesting details of Indian child-life and education are to be found in books like Eastman's Indian Boyhood (1902), Jenks' Child- hood of Jishib the Ojibwa (1900), Spencer's Education of the Pueblo Child (1889), La Flesche's The Middle Five (1901), Stevenson's Religious Education of the Zuni Child (1887), and in the writings of Miss A. C. Fletcher, J. O. Dorsey, J. Mooney, W. M. Beauchamp, &c, besides the accounts of missionaries and travellers of the better sort. Outside of missions proper there were many efforts made by the colonists to educate the Indians. It is an interesting fact, emphasized by James in his English Institutions and the American Indian (1894), that several institutions still existing, and now of large influence in the educational world of the United States and Canada, had their origin in whole or in part in the desire to Christianize and to educate the aborigines, which object was mentioned in charters (e.g. Virginia in 1606 and again in 1621), &c. Sums of money were also left for the purposes of educating Indian children and youth, many of whom were sent over to England for that purpose, by colonists who adopted them (one such was Sampson Occum, minister and author of the hymn, "Awaked by Sinai's Awful Sound"). In 1618 Henrico College in Virginia was founded, where Indian youth were taught religion, " civility " and a trade. It was succeeded by the College of William and Mary (founded in 1691 with the aid of a benefaction of Robert Boyle), where Indian youth were boarded and received their education for many years. The great university of Harvard has long outgrown " the Indian college at Cambridge," whose single graduate Cheeshateaumuck, took his degree in 1665, but died afterwards of consumption. But its original charter provided for all things " that may conduce to the education of the English and Indian youth of

this country in knowledge and godliness." Since Cheeshateau- muck's time, doubtless, there have been graduates of Harvard who could boast of Indian blood in their veins {e.g. recently William Jones, the ethnologist), but they have been few and far between. Dartmouth College, at Hanover, New Hampshire, founded in 1754, really grew out of Wheelock's Indian school at Lebanon, Connecticut — at this period there were several such schools in New England, &c. In the royal charter, granted to Dartmouth in 1769, is the provision " that there be a College erected in our said Province of New Hampshire, by the name of Dartmouth College, for the education and instruction of Youth of the Indian Tribes in this Land, in reading, writing and all parts of Learning which shall appear necessary and expedient for civilizing and christianizing children of pagans, as well as in all

liberal Arts and Sciences, and also of English Youth and any other." The college of New Jersey long served as one of the institutions for the education of Indian youth. A glimpse of Indians at Princeton is given by Collins {Princeton Univ. Bull., 1902) in his account of the attempt to confer an academic education, at the end of the 18th century, upon Thomas Killbuck and his cousin, George Bright-eyes, son of a Delaware chief, and a descendant of Taimenend, eponym of the political " Tammany." It would seem that at this period the states and Congress were in the habit of granting moneys for the education of individual Indians at various institutions.

At the present time the most noteworthy institutions for the education of the Indian in the United States are the Chilocco Indian Industrial school, under government auspices, in Kay county, Oklahoma, near Arkansas city, Kansas; the Carlisle school (government) at Carlisle, Pa. ; and the Hampton Normal and Agricultural Institute (private, but subsidized by the government), at Hampton, Va.

The Chilocco school is, in many respects, a model institution for Indian youth of both sexes, devoted to " agriculture and attendant industries." It was opened in 1884 with 186 pupils, and in 1906 the attendance was 685 out of an enrolment of 700. There are 35 buildings, and the corps of instruction, &c, consists of " a superintendent, 51 principal employes and 20 minor Indian assistants." The Carlisle school, " the first non-reservation school established by the government," whose origin is due to " the efforts of General R. H. Pratt, when a lieutenant in charge of Indian prisoners of war at St Augustine, Florida, from May 11, 1875, to April 14, 1878," was opened in November 1879 with 147 Indians, including n Florida prisoners; it had in 1906 an enrolment of over 1000 pupils of both sexes, under both white and Indian teachers, and an average attendance of 981. In 1906 there were in attendance members of 67 tribes, representing at least 22 distinct linguistic stocks. According to J. H. Dortch {Handb. of Amer. Inds., 1907, pt. i. p. 207), " since the foundation of the school nearly every tribe in the United States has had representatives on its rolls." The following statistics, cited by Mr Dortch, indicate both the success of the school in general and of the " outing system " (pupils are allowed to work in temporary homes, but keeping in close touch with the school), which " has come to be a distinctive feature not only of the Carlisle school but of the Indian school service generally ":

Admitted during 25 years 5, 170

Discharged during 25 years 4,210

On rolls during fiscal year 1904 1,087

Outings, fiscal year 1904 (girls 426, boys 498) . 924

Outings during 21 years (girls 3214, boys 5118). 8,332

Students' earnings 1904 $34,970

*Students' earnings during 15 years .... $352,951 The staff of the school consists of a superintendent, 75 instructors, clerks, &c. It has graduated " a large number of pupils, many of whom are filling responsible positions in the business world, and especially in the Indian service, in which, during the fiscal year 1903, 101 were employed in various capacities from teachers to labourers, drawing a total of £46,300 in salaries." The Carlisle football team competes with the chief white colleges and universities. "**

The Hampton Institute was established in 1868 by General S. C. Armstrong and trains both Negroes and Indians, having admitted the latter since 1878. It is partly supported by the government of Virginia and by the United States government, the latter paying $167 a year for 120 Indian pupils, boys and girls (in 1906 there were in attendance 112, of whom 57 were girls and 55 boys), belonging to 33 different tribes, representing 13 distinct linguistic stocks. The following extract from the report of the principal for 1905-1906 is of interest: " Fifteen catechists among the Sioux still hold their own. There are two field-matrons and seven camp-school teachers, all coming into close touch with the more ignorant of the people. Four are physicians getting their living from their white patients

and doing more or less missionary work among their own people. William Jones has his degrees of A.M. and Ph.D., and is doing valuable ethnological work for the Carnegie Institution, Columbia University and the American Museum of Natural History in New York. James Murie is assisting in similar work for the Field Museum in Chicago. Hampton has but one Indian lawyer. There are about 50 students holding positions pretty steadily in government schools. About 40 boys have employment at government agencies, 20 being employed as clerks and interpreters, either at the agencies or at the schools. Ten boys are working in machine shops at the north and

three are in the navy. A fair proportion are working on their farms; some have accumulated quite a little stock, and five are prosperous cattlemen, seven boys have stores of their own and make a good living from them." The Indian Department has now adopted the policy of giving industrial training and household economy the chief place in education, varying the instruction to suit the environment in which the boy or girl is to grow up and live and not mixing the needs of Alaska with those of California, or those of Dakota with those of Florida.

In Canada the most notable institutions for the education of the Indians are the Mohawk Institute at Brantford, Ontario; the Mount Elgin Institute at Muncey, Ontario; the Brandon Industrial school at Brandon, Manitoba; the Qu'Appelle Industrial school at Lebret, Saskatchewan.

The Mohawk Institute is the oldest, having been founded in 1831 by the " New England Company," which began its work among the Canadian Iroquois in 1822. It is undenominational, aided by a government grant, and had in 1907 an average attendance of 106 out of an enrolment of 1 1 1 of both sexes. The Mount Elgin Industrial Institute was founded by the Methodist Missionary Society in 1847, and had an attendance for 1907 of 104 of both sexes. The Brandon Industrial school, under Methodist auspices, had in 1907 an attend- ance of 104 of both sexes. The Qu'Appelle Industrial school, under Roman Catholic auspices, had an average attendance of 210 of both sexes. All these schools receive government aid. As in the United States, Indian teachers and assistants are often employed when fitted for such labours.

The first appropriation by the Congress of the United States for the general education of the Indians was made in 1819, when the sum of $10,000 was assigned for that and closely allied purposes, and by 1825 there were 38 schools among the Indians receiving government aid, but government schools proper date from 1873 (contract schools are four years older), the order of their institution being day schools, reservation boarding schools, then non-reservation boarding schools. In 1900 the contract schools were practically abandoned and the Indian appropriation devoted to government schools altogether. Latterly some departure from this policy has occurred, following a decision of the Supreme Court. In less than a century the expenditure for Indian education increased from an annual outlay of $10,000 to one of about $5,000,000, to which must be added the expenditures from private sources, which are considerable.

Exclusive of Alaska, there were in the United States in 1906, according to the report of the Commissioner of Indian Affairs, 324 Indian schools (government 261, mission 48, contract 15), with an enrolment of 30,929 and an average attendance of 25,492 pupils, costing the government annually $3,115,953. Of the government schools 25 were non-reservation and 90 reservation boarding schools, and 146 day schools; of the mission schools 45 boarding and 3 day; of the contract schools 8 boarding and 6 public. The schools of a denominational character belonged as follows: 29 to the Catholic Church, 5 to the Presbyterian, 4 to the Protestant Episcopal, 2 to the Congregational, 2 to the Lutheran, and 1 each to the Evangelical Lutheran, Reformed Presbyterian, Methodist, Christian Reformed and Baptist. Besides there were in all 446 public schools on or near reservations which Indians could attend.

In Canada, according to the report of the Department of Indian Affairs for 1907, there was a total of 303 Indian schools (day 226, boarding 55, industrial 22), of which 45 were unde- nominational, 91 Church of England, 106 Roman Catholic, 44 Methodist and 1 Salvation Army. The total enrolment of pupils was 9618, with an average attendance of 6138. In several cases Indians attend white schools, not being counted in these statistics. The total amount appropriated for Indian schools during the year 1906-1907 was $356,277. xiv. 16

*The intelligence of the American Indians north of Mexico ranges from a minimum with the lowest of the Athabaskan tribes of extreme north-western Canada and the lowest of the Shoshonian tribes of the south-western United ‘ n < Wa *» States to a maximum with the highest developed cˆp ac uy. members of the Muskogian and Iroquoian stocks (both the Cherokee branch and the Iroquois proper). It must be remembered, however, that the possibilities of improvement by change of environment are very great, as is shown by the fact that the Hupa of California and the Navaho of Arizona and New Mexico (also the cruel and cunning Apaches) belong to the Athabaskan family, while the Shoshonian includes many of the " civilized nations " of ancient Mexico and, in particular, the famous Aztecs. One way of judging of the intellectual character of the various stocks of North American aborigines is from the " great men " they have produced during the historical periods of contact with the whites. Many of these stocks have, of course, not had occasion for the development of great men, their small numbers, their isolation, their lack of historical experience, their long residence in an unfavourable environment, their perpetual and unrestricted democracy, &c, are some of the sufficient explanations for this state*

of affairs, as they would be in any other part of the world. The Eskimoan, Athabaskan, Koluschan, Wakashan (and other tribes of the North Pacific coast), Salishan and Shoshonian (except in Mexico) stocks, together with the numerous small or unimportant stocks of the Oregon-California and Gulf-Atlantic regions, have not pro- duced any great men, although members of many tribes have been individually of not a little service to the intruding race in pioneer times and since then, or have been highly esteemed by them on account of their abilities or character, &c. Here might be mentioned perhaps Sacajawea (see Out West, xxiii. 223), the Indian woman who acted as guide and helper of the Lewis and Clark expedition and saved the journals at the risk of her life (she has now a statue erected to her memory in Seattle); Louise Sighouin, the Sahaptian convert of whom the missionary de Smet thought so much; Catherine Tekata- witha, the " Iroquois saint," &c.

The following list will serve to indicate some of the ” great men ” of the Indian race north of Mexico and the stocks to which they have belonged; in it are included also some products of the contact of the two cultures: —

1. Algonkian. — In politics and in oratory, as well as in combat, this stock has produced notable characters, the conflict with the whites and the Iroquois doubtless serving to stimulate native genius. Among Algonkian notables may be mentioned ” King Philip” and Powhatan; Pontiac and Tecumseh; Black Hawk; Sampson Occum ; George Copway ; Francis Assickinack, &c.

2. Athabaskan. — The possibilities of this stock have been recently illustrated by the Apaches, who, on the one hand, have produced Geronimo, the chief who from 1877 to 1886 gave the United States authorities such trouble, and, on the other, Dr Carlos Montezuma, a full-blood Indian, who, after receiving a good education, served the government as physician at several Indian agencies, and in 1908 was practising his profession in Chicago and teaching in the College of Physicians and Surgeons and the Post-Graduate Medical School. From these southern Athabaskans much is to be expected under favouring conditions.

3. Iroquoian. — Here, as among the Algonkian tribes, circumstances favoured the development of men of great ability. Of these may be mentioned: Hiawatha, statesman and reformer (fl. c. 1450), the chief mover in the formation of the great ” League of the Iroquois ” ; Captain Joseph Brant; “Red Jacket”; Oronhyatekha (d. 1906), the head of the Independent Order of Foresters, an important secret

charitable society, a physician, and a man of remarkable power as an organizer.

4. Sahaptian. — A remarkable Indian character was Nez Perc6 Joseph, the leader of his people in the troubles of 1877. In 1905, at the general assembly of the Presbyterian Church, a delegate representing both whites and Indians was Mark Arthur (b. 1873), a full-blood Nez Perc6 and since 1900 the successful pastor (fully ordained) of the church at Lapwai, Idaho, the oldest Presbyterian church west of the Rocky Mountains.

5. Siouan. — The most famous Indian of Siouan stock is " Sitting Bull " (d. 1890), medicine-man and chief. Miss Angel de Cora, a Winnebago, was in 1908 instructor in art at the Carlisle school.

Another, not always just or fair, method of gauging the in- telligence of the North American Indians is by their ability to

assimilate the culture of the whites and to profit by the contact of the two races. Curiously enough, some of the tribes at one time considered lowest in point of general intellectual equipment have shown not a little of this ability, and there is a marked difference in this respect between tribes belonging to one and the same stock. The Athabaskan stock e.g. shows such varia- tions, or rather perhaps this stock in general exhibits a tendency to adopt the culture of other peoples, thus some of the Atha- baskan tribes in Alaska have acquired elements of culture from the Eskimo; the Takulli have been influenced by the Tsimshian, and Nahane by the Tlingit, the Chilcotin by the Salish, the Sarcee by the western Algonkian tribes, and in the extreme south the Navaho by the Pueblos Indians. The Salishan stock has largely this same characteristic. Of these two peoples Mr C. Hill-Tout (The Salish and Dent, London, 1907, p. 50) says: " It would be difficult indeed to find two peoples more susceptible to foreign influences, more receptive of new ideas and more ready and willing to adopt and carry them out." • In the relations established between them and the whites not enough advantage in the proper way has been taken of this " philoneism," which ought to have been the basis of their acquisition of our culture, or such aspects of it as suited them best. And perhaps there are other

stocks of which, if we knew them well, similar things might be said. Of the Indians of the Shoshonian stock the Paiutes of Nevada and Arizona have shown themselves capable of making themselves necessary to the whites (farmers, &c.) of that region, and not falling victims to the " vices of civilization." Although they still retain their primitive wickiups (or rush huts), they seem actually to have improved in health, wealth and character from association with the " superior " race, a rare thing in many respects among the lower Indian tribes of North America. This improvement of the Paiutes causes us not to be surprised when we find the more cultured Moquis and the " civilized " Aztecs of ancient Mexico to belong to the same Shoshonian stock. Acculturation by borrowing has played an important role in the development of North American Indian ideas and institutions. This is well illustrated by the history of the Plains Indians, with their numerous intertribal societies, their temporary and their permanent alliances, federations, &c. If ways and means for the transfer of elements of culture indicate intelligence, some of these tribes must rank rather high in the scale. The Algonkian, Iroquoian and Muskogian stocks, both in the case of individuals and in the case of whole tribes (or their remnants), have ex- hibited great ability in the directions indicated. Of the Caddoan stock the Pawnees seem gifted with considerable native ability expressing itself particularly in the matter of religion (the Hupas, of the Athabaskan stock, seem also to have " a religious sense "). Some tribes of the Siouan stock have, both in the case of individuals and as peoples, given evidence of marked intelligence, especially in relation to psychic phenomena and the treatment of adolescent youth. In their culture, their cere- monies and ritual proceedings, as well as in their material arts, the Pueblos Indians of the south-western United States show, in many ways, their mental kinship with the creators and sus- tained of the civilization of ancient Mexico and Central America. From the table of Indian tribes it will be seen that aborigines of the most diverse stocks have shown themselves capable of assimilating white culture and of adapting them- selves to the new set of circumstances. Progress and improve- ment are not at all confined to any one stock.

A very interesting fact in the history of the education of the aborigines north of Mexico is the success of the attempt to enable them to read and write their own language barhs. ˆy means of specially prepared syllabaries, " alpha- bets," &c. The first of these, the still existing " Micmac hieroglyphics," so-called, was the work of Father le Clercq in 1665, improved by Father Kauder in 1866; one of the most recent, the adaptation of the " Cree syllabary " of Evans by

Peck to the language of the Eskimo of Cumberland Sound. The basis of many of the existing syllabaries is " the Cree syllabary," or " Evans Syllabary," invented about 1841 by the Rev. Tames Evans, a Methodist missionary in the Hudson's

Bay region from the study of the shorthand systems current at that time. This syllabary and modifications of it are now in use (with much printed literature) for both writing and printing among many tribes of the Algonkian, Athabaskan (modified by Morice for the Carriers, by Kirkby and others for Chipewyan, Slave, &c), Eskimo (modified by Peck), Siouan (Cree syllabary used by Canadian Stonies) stocks. Among the Salishan tribes of the Thompson river region, the Shushwap, Okanagan, &c, a stenographic modification (reproduced by mimeograph) by Father le Jeune of the Duployan system of shorthand has been used with great success. But the most remarkable of all these syllabaries is one more of Indian than missionary origin, in its application at least, the well-known " Cherokee alphabet " of Sequoyah, an uneducated Cherokee half-blood, who got part of his idea from an old spelling-book though his characters did not at all correspond to English sounds — at first 82, later 86 syllables were represented. Invented about 1821 the " Cherokee alphabet " was first used for printing in 1827, and has been in constant use since then for correspondence and for various literary purposes. The effect of this invention is thus described by Mooney (Myths of the Cherokee, 1902): — •

" The invention of the alphabet had an immediate and wonderful effect on Cherokee development. An account of the remarkable adaptation of the syllabary to the language, it was only necessary to learn the characters to be able to read at once. No school-houses were built and no teachers hired, but the whole Nation became an academy for the study of the system, until, in the course of a few months, without school or expense of time or money, the Cherokee were able to read and write in their own language. An active correspondence began to be carried on between the Eastern and Western divisions, and plans were made for a national press, with a national library and museum to be established at the capital, New Echota. The missionaries, who had at first opposed the new alphabet on the ground of its Indian origin, now saw the advisability of using it to further their own work "

In spite of absurdities of form and position in the characters of this syllabary, it serves its purpose so well that, as Pilling informs us (Amer. Anthrop., 1893), " a few hours of instruction are sufficient for a Cherokee to learn to read his own language intelligibly," and in

two and a half months the Cherokee child " acquires the art of reading and writing fluently in these rude characters." The success of the "Cree syllabary" was also astonishing, and in 1890, according to Maclean (Canad. Sav. Folk, p. 283), " few Cree Indians can be found who are not able to read the literature printed in the syllabic characters." Here again, " an Indian with average intelligence can memorize the whole in a day, and in less than one week read fluently any book written upon this plan," and many Indians learn to read fluently " with no other teachers but the Indians around the camp-fires." Morice reports equal success with his syllabary: " Through it Indians of common intelligence have learnt to read in one week's leisurely study before they had any primer or printed matter of any kind to help them on. We even know of a young man who performed the feat in the, space of two evenings." Le Jeune's experience with the Shuswap and Thompson Indians is the same. The creation of a " literary " class among so many Indian tribes within a comparatively brief period is certainly a very interesting result, and one which gives evidence of native intelligence among children and adults alike (Amer. Joum. Psychol., 1905).

For a general list of authorities on the American aborigines, see bibliography under America, section 3, Ethnology. The literature on the subject, already vast, is continually increasing, and it is impossible to enumerate every contribution made by the large number of expert anthropologists working in this field. The chief works. of a special nature have already been cited in the text. (A. F. C.)

INDICATOR (from Lat. indicate, to point out), that which points out or records. In engineering, the word is specifically given to a mechanical device for registering the pressure of the working fluid in an engine cylinder during a stroke of the piston, the record so provided being termed the " indicator diagram " (see Steam-Engine). In chemistry, the word is generically applied to re-agents or chemicals which detect usually small quantities or traces of other substances; it is, however, more customarily restricted to re-agents which show whether a

substance or solution is acid, alkaline or neutral, the character being revealed in a definite colour change.

Here we shall only deal with indicators in this last restricted sense.

They were first systematically employed in analytical chemistry by Robert Boyle, who used the aqueous extracts of the coloured principles present in red-cabbage, violets and cornflowers. The indicator most in use to-day is litmus (q.v.), whose solution is turned red by an acid, and blue by an alkali. Several synthetic indicators are employed in acidimetry and alkalimetry. The choice is not altogether arbitrary, for experi- ments have shown that some are more suitable for acidimetry, while others are only applicable in alkalimetry; moreover, the strength of the acids and bases employed may exert a con- siderable influence on the behaviour of the indicator.

The following are well-known synthetic indicators: hacmoid, obtained from resorcin and sodium nitrite, resembles litmus, l'henolphthalein, obtained by condensing phenol with phthalic anhydride, is colourless both in acid and in neutral solution, but intensely red in the presence of alkali; the colour change is very sharp with strong bases, but tardy with weak ones, and consequently its use should be restricted to acidimetry when a strong base can be chosen, or to alkalimetry when a strong base is present. a-Naphtholphthalein has also been used (Biochem. Zeil., 1010, p. 381). Methyl orange, which is the sodium salt of the acid helianthin, obtained by diazotizing sulphanilic acid and coupling with dimethylaniline, is yellow in neutral and alkaline solutions, but red in acid; the change is only sharp with strong acids. I'ara-nitrophenol, obtained in the direct nitration of phenol, yields a colourless solution in the presence of acids, and an intense yellow with alkalis. Of more recent introduction are: alizarin red, I.W.S. (alizarin mono-sulphonic acid), claimed by G. E. Knowles (Abst. J.C.S., 1907, ii. 389) to be better than methyl orange in alkalimetry; 3-amino- 2-methylquinoline, used by O. Stark (ibid. 1907, i. 974) in ammonia estimations; para-nitrobenzeneazo-a-naphthol, shown by J. T. Hewitt (Analyst, 1908, 33, p. 85) to change from purple to yellow when alkalis are titrated with weak acids; para-dimethylaminoazobenzene-ortho-carboxylic acid, proposed by E. Rupp and R. Loose (Bit., 1908, 41, p. 3905) as very ser- viceable in the estimation of weak bases, such as the alkaloids or centinormal ammonia; the " resorubin " of M. Barberio (Gazzetta. 1907, ii. 577), obtained by acting with nitrous acid on resorcin, which forms a violet, blue or yellow coloration according as the solution is neutral, alkaline or acid. Mention may be made of E. Linder's (/. Soc. Chem. Ind., 1908, 27, p. 485) suggestion to employ metanil yellow, obtained by coupling diazotized meta-aminobenzenesulphonic acid with diphenylamine for distinguishing mineral from organic acids, a violet coloration being

produced in the presence of the former.

Theory of Indicators. — The ionic theory of solutions permitted the formulation of a logical conception of the action of indicators by W. Ostwald which for many years held its ground practically unchallenged; and even now the arguments originally advanced hold good, except for certain qualifications rendered necessary by more recent research. In the language of the ionic theory, an acid solution is one containing free hydrions, and an alkaline solution is one containing free hydroxidions. A neutral solution contains hydrions and hydroxidions in equal concentration; this is a conse- quence of the tact that pure water itself undergoes a certain dis- sociation, and several different methods show that in the purest water obtainable the concentration of the free hydrions and hydroxidions is 10 -7 at 24 . Moreover, the law of mass-action (see Chemical Action) demands that the product of the concentrations of the hydrions and hydroxidions in any solution is constant at a given temperature, and we see from the above values that this constant is io -14 . I-t follows, therefore, that the acidity or alkalinity of any solution can be expressed both in terms of hydrion or hydroxidion concentration. Many researches have been directed to classify acid and alkaline solutions according to the concentration of the hydrion. Conductivity determinations show that the maximum concentration of hydrion occurs in 3-8 – N nitric acid, where it has a value of about 2-N, and the minimum occurs in 6-7- N potassium hydroxide, where its value is 5Xl0~ 15 , that of the hydroxidion being about 2-N. These figures apply to a temperature of 24 . Bearing in mind the concentration of the ions in a neutral solution, it is seen that a scheme of seven grades of " neutrality," differing by successive powers of ten, mav be formulated. The concentration of hvdrion and hvdrox-

*idion in any solution may be determined by several independent methods, and it is therefore a simple matter to prepare solutions of definite ionic concentrations and to test these with the object of obtaining a list of indicators according to their sensitiveness. It is found that litmus responds to concentrations of io~*H' and lo _6 OH', a result which shows this dye to be the best indicator of true neutrality. Methyl orange responds to between io~ 4 H- and io 0 H; para-nitrophenol to between io 5 H and icr'H-; and phenolphthalein to between I0~ 5 0H' and io^OH' Salm (Zeit. Elektrochem., 1904, 10, p. 341) gives a list of twenty-seven indicators classified on this principle. Other papers bearing on this subject are Friedenthal, ibid., p. 113; Salessky, ibid., p. 204; Fcls, ibid., p. 208; Scholtz, ibid., p. 549; M. Handa, Ber., 1909, 42, p. 3179.*

The actual mechanism by which the indicator changes colour with varying concentrations of hydrion or hydroxidion is now to be considered. Ostwald formulated his ionization theory which assumes the change to be due to the transition of the non-dissociated indicator to the ionized condition, which are necessarily of different colours. On this theory, an indicator must be weakly basic or acid, for if it were a strong acid or base high dissociation would occur when it was in the free state, and there would be no change of colour when the solution was neutralized. Take the case of a weakly acid indicator such as phenolphthalein. The presence of an acid depresses the very slight dissociation of the indicator, and the colour of the solution is that of the non-dissociated molecule. The addition of an alkali, if it be strong, brings about the formation of a salt of phenolphthalein, which is readily ionized, and so reveals the intense red coloration of the anion; a weak base, however, fails to give free ions. An acid indicator of medium strength is methyl orange. When free this substance is ionized and the solution shows an orange colour, due to a mixing of the red of the non-dissociated molecule and the yellow of the ionized molecule. Addition of hydrions lessens the dissociation and the solution assumes the red colour, while a base increases the dissociation and so brings about the yellow colour. If the alkaline solution be titrated with a strong acid, the hydrions present in a very small amount of the acid suffices to reverse the colour; a weak acid, however, must be added inconsiderable excess of the quantity properly required to neutralize the solution, owing to its weak dissociation. This indicator is therefore only useful when strong acids are being dealt with, while its strongly acid nature renders it serviceable for both strong and weak bases.

It seems, however, that in addition to a change in the ionic condition of an indicator, there are cases where the coloration is associated with tautomeric change. For example, J. T. Hewitt (Analyst, 1908, 33, p. 85) regards phenolphthalein and similar indi- cators as obeying the following equilibrium in solution,

O: X„-HˆX„-0-HˆX„-0‘4-H-, X„ and Xt, being isomeric. This indicates the presence of two tautomeric forms, one being of a quinonoid structure, and an ionized molecule. A similar view is advanced by A. Hantzsch and F. Hilscher (Ber., 1908, 41, p. 1187) who find that helianthin is quin- onoid when solid, whilst in solution there is an equilibrium between an aminoazo- and sulphonic acid-form; on the other hand, the sodium salt, methyl orange, is a sulphonate under both conditions.

INDICTMENT (from Anglo-Fr. enditement, enditer, to charge; Lat.

in, against, dictare, declare), in English law, a formal accusa- tion in writing laid before a grand jury and by them presented on oath to a court of competent jurisdiction. The accusation is drawn up in the form of a " bill " of indictment, prepared by the officer of the court or the legal adviser of the prosecution, en- grossed on parchment, and sent before the grand jury. The grand jury hear in private the witnesses in support of the accusation (whose names are endorsed on the back of the bill), and, if satisfied that a prima facie case has been made out, find the bill to be a true bill and return it to the court as such. If otherwise, the jury ignore the bill and return to the court that they find " no true bill." Indictments differ from presentments, which are made by the grand jury on their own motion and their own knowledge; and from informations, which are instituted on the suggestion of a public officer without the intervention of a grand jury.

An indictment lies for " all treasons and felonies, for misprision of treasons and felonies and for all misdemeanours of a public nature at common law." And if a statute prohibit a matter of public grievance or command a matter of public convenience all acts or omissions in disobedience to the command or pro- hibition of the statute are treated as misdemeanours at common law, and unless the statute otherwise provides are punishable on indictment. In other words, the ordinary common law remedy in respect of criminal offences is by indictment of the accused and trial before a petty jury; and except in the case of informations for misdemeanour and summary proceedings

by a court of record for " contempt of court " it is the only remedy, except where a statute creates another remedy, e.g. by trial before a court of summary jurisdiction.

The form of an indictment is still in the main regulated by the old common law rules of pleading, which as to civil pleadings were often amended during the 19th century, and finally abolished under the Judicature Acts.

An indictment may consist of one or more counts charging different offences. Each count consists of three parts: (1) the commencement, (2) the statement, (3) the conclusion. The formal commencement runs thus: " Surrey to wit." The first count begins " The jurors for

our Lord the King (i.e. the grand jurors) upon their oath present that, &c"; and the sub- sequent counts begin, the " jurors aforesaid on their oath aforesaid do further present." The first words, which are placed in the margin of the document, are the " venue," i.e. the county or district over which extends the jurisdiction of the court before which the indictment is found. Subject to certain statutory exceptions it is necessary to prove that the acts or omissions alleged to constitute the offence occurred within that area. The conclusion consists of the words following: " against the form of the statute (or statutes) in that case made and pro- vided, and against the peace of our Lord the King, his crown and dignity." Where the offence is statutory the whole phrase is used; where it is at common law only the second part is used. A formal conclusion is not now essential to the validity of the indictment, but from inveterate habit is in continued use. The statement sets forth the circumstances alleged to constitute the offence, i.e. the accusation made. There are still in force a number of rules as to the proper elements in the statement; but in substance it is only necessary to set forth the facts alleged against the accused with accuracy and sufficient precision as to the time and place and circumstances of the alleged offence, and to indicate whether felony or misdemeanour are charged, and so to frame the statement as to indicate a definite offence for which a lawful sentence may be imposed. The following example illustrates the form of the statement : — " That A. B. on the first day of June in the year of our Lord 1906 one oak tree of the value of five pounds the property of C. D. then growing in a certain park of the said C. D. situate in the parish of E. in the county of F. feloniously did steal take and carry away contrary to the statute, &c."

Only one offence should be stated in one count; and separate and distinct felonies should not be charged in the same indict- ment. If they are, the court makes the prosecution choose one upon which to proceed. This rule is altered by statute in certain cases: e.g. by allowing a limited number of separate thefts, or receivings of stolen property to be included in the same indictment. Misdemeanours and felonies may not be included in the same indictment because of the difference of procedure on the trial; but any number of misdemeanours may be in- cluded in different counts of the same indictment, subject to the right of the court to order separate trials or to quash the indict- ment if it is rendered vexatious by the agglomeration of charges. There is no general limitation of the time within which in- dictments may lawfully be preferred; but various limitations have been fixed by statute for certain offences, e.g. in the case of certain forms of treason, of riot, of night poaching and of

corrupt and illegal practices at elections. In this respect English law differs from European law, in which limitations of time for prosecution are the rule and not the exception.

Until the mitigation of the draconic severity of the English law in the early part of the 19th century, little or no power existed of amending defective statements or indictments, and the courts in favorem vitae insisted strictly on accurate pleading and on proof of the offences exactly as charged. Since 1827 numerous enactments have been passed for getting rid of these technicalities, which led to undeserved acquittals, and since 1851 the courts have had power to disregard technical objections to the form of indictment and to amend in matters not essential in case of variance between the indictment and the evidence. These changes apply to ordinary offences; but for the most part do not touch charges of treason, as to which the old law

in the main still applies. At the present time the looseness ot pleading in criminal cases is carried almost too far; for while there is no danger in such looseness when times are quiet and when law is administered by the judges of the High Court in England, yet when crimes of a certain character are committed in times of great political excitement and the law is administered by an inferior judiciary, there may be some danger of injustice if the strictness of pleading and procedure is too much relaxed. In the Criminal Code drafted by Sir James Fitz James Stephen and revised by a judicial commission (Lord Blackburn and Lords Justices Lush and Barry), it was proposed to substitute for the old form of indictment a statement of the particulars of the offence with a reference to the section of the code defining the offence.

The law of Ireland as to indictments is in substance the same as that of England; but is to a certain extent expressed in different statutes.

In Scotland the terms indictment or criminal letters are used to express the acte d' accusation. But except in the case of high treason there is no grand jury, and the indictment is filed like an English criminal information by the lord advocate or one of his deputies: and it is only by order of the court of justiciary that a prosecution can be instituted without the general or particular assent of the lord advocate. By the Criminal Pro- cedure Scotland Act 1887 the form of Scots indictments is much simplified. They are drawn in the second and not in the third person.

In those of the British colonies in which by settlement or statute the English criminal law runs, the form of indictment is substantially the

same, and is found by a grand jury as in England. But in certain colonies, e.g. the Australian states, an indictment by a public officer without the intervention of a grand jury has been adopted. In India and British Asiatic possessions the procedure is regulated by the Indian Procedure Code or its adaptations. In South Africa indictments are framed under Roman Dutch law as modified by local legislation.

In the United States prosecution or indictment by a grand jury is the rule: the form of indictment is the same, substituting the state or commonwealth of the United States for references to the king, and the conclusions " against the form of the statute " and " against the peace " are still in use. (W. F. C.)

" INDIES, LAWS OF THE," in the colonial history of Spain, a general term designative either (1) of certain codifications of legislation for the colonies listed below, and especially the compilation of 1680; or (2) of the whole body of colonial law, of which those compilations were but a selection, and which was made up of a multitude of royal cedulas, orders, letters, ordinances, provisions, instructions, autos, dispatches, prag- matics and laws — all emanating from the crown (or crown and cortes) and all of equal force — that were passed through various departments of government to various officers and branches of the colonial administration, or between the different departments of government in Spain. The transfer of Spanish law to Ultramar began with the first days of the Conquest; and especially the civil law was translated with comparatively slight alteration. Many things, however, peculiar to colonial conditions — the special relations of the crown and the papacy in America, the repartimientos and encomiendas (" divisions of lands " and " commendations," a system of patronage, or modified slavery) of the Indians, the development of African slavery, questions of natural and international law, the spread of discovery and establishment of new settlements and admini- strative areas, the sales and grants of public lands, the working of the mines — necessitated the organization of a great mass of special law, made up of a body of general doctrine and a vast quantity of administrative applications, la materia de Indias — to which references are already found in the time of Ferdinand. The general doctrine was applicable everywhere in Ultramar, and the difficult and inconstant communication between the provinces, and other considerations, early counselled some work of codification. The first efforts to this end were begun in Mexico in 1525; a volume was published in 1563, and other

inadequate compilations in 1596 and 1628, and finally the great RecopilaciOn de Leyes de los Reinos de las Indias of 1680. This code has enjoyed great fame, and in some ways even extrava- gant praise. The greatest praise that has been given it is that its dominant spirit through and through is not the mercantile aim but the political aim — the principle of civilization ; and this praise it deserves. It had various defects, however, of an administrative nature; and as time passed its basic doctrines — especially its minute administrative strangulation of colonial political life, and its monopolistic economic principles — became fatally opposed to conditions and tendencies in the colonies. Two centuries in formation, the code of 1680— continually altered by supplementary interpretation and application — was only one century in effect; for in the seventeen-sixties Charles III. began, in a series of liberal decrees, to break down the monopolistic principles of colonial commerce. This change came too late to save the mainland colonies in America, but its remarkable effects were quickly seen in the aggrandizement of Cuba. It is in the history of this colony (as also in Porto Rico and the .Philippines) that one must follow the later history of the Laws of the Indies (see Cuba).

Of the Recopilacion of 1680, five editions were issued by the government, the last in 1841 (Madrid, 4 vols.); and there are later, private editions approved by the government. See also J. M. Zomora y Coronado, Biblioteca de legislation Ultramarina (Madrid, 1844-1849, 6 vols., with appendices often bound as vol. 7); J. Rodriguez San Pedro, Legislation Ultramarina concordada, covering 1837-1868 (12 vols., Madrid, 1865-1868, vols. 10-12 being a supple- ment) ; the Boletin oficial del Ministerio de Ultramar, covering 1869-1879; and M. Fernandez Martin, Compilation legislativa del gobiemo y administration civil ds Ultramar (Madrid, 1886-1894); the gap of 1879-1886 can be filled for Cuba by the series of Reales Ordenes . . . publicadas en la Gaceta de la Habana (annual, Havana, 1857-1898, covering 1854-1"

INDIGO (earlier indico, from Lat. indicum, the Indian sub- stance or dye; the Sans, name was niti, from nila, dark blue, and this through Arab, al-nil, annil, gives " aniline ") one of the most important and valuable of all dyestuffs. Until com- paratively recently it was obtained exclusively from the aqueous extract of certain plants, principally of the genus Indigofera which belongs to the natural order Leguminosae. Small quantities are also obtained from Lonchocarpus eyanescens (west coast of Africa), Polygonum iintorium (China) and

the woad plant Isatis tinctoria. The latter is of historical interest, since up to the middle of the 17th century it was the only blue dyestuff used by dyers in England and on the adjoining con- tinent ; at the present time woad is still cultivated in Europe, but serves merely as a ferment in the setting of the fermentation indigo vat or so-called " woad vat " used in wool dyeing.

The bulk of the natural indigo which is brought into the market comes from India, while smaller quantities are imported from Java, Guatemala and other places. The plant from which indigo is made in Bengal is the Indigofera sumatrana, which is reared from seed sown about the end of April or the beginning of March. By the middle of June the plant has attained a height of from 3 to 5 ft., and it is at this period that the first manufacturing begins, a second crop being obtained in August. The indigo is contained in the leaf of the plant in the form of 1 colourless glucoside, known as indican, Ci4Hi70 6 N-3H 2 0. This substance is soluble in water and by the joint action of

The plant is cut early in the morning and transported to the factory in bullock carts. Here it is steeped in water in steeping vats having a capacity of about 1000 cub. ft. for periods varying, according to circumstances, from nine to fourteen hours, when the liquid — the colour of which varies from a bright orange to an olive green — is run into the beating vats which lie at a lower level. The beating, the object of which is to bring the liquor as freely as possible into contact with the air, was formerly done by striking the surface with bamboo sticks, but is now effected either by means of a paddle wheel or by forcing a current of air from a steam blower or a compressor through the liquid.

When the beating is finished, the precipitated indigo is allowed to settle, the supernatant liquid being drawn off and run to waste. The indigo mud thus obtained, which is known as mal, is strained, boiled for a short period for the purpose of sterilizing, formed into bars, cut into blocks of about 3 in. cube and dried. 1 The actual amount of colouring matter yielded by the leaf is but small, averaging, according to Ch. Rawson, 05%, but the yield from the whole plant is considerably less, since the stalks and twigs contain practically no colour.

Since the introduction on a large scale of synthetic indigo efforts have been made in India and in Java to place the cultiva- tion of the plant and the manufacture of the natural product on a more scientific basis. But although many important improvements have

been achieved from the agricultural as well as from the manufacturing point of view, resulting no doubt in the retension of a portion of the industry, the synthetic product has gained the upper hand and is likely to retain it.

Natural indigoes vary considerably in composition, containing in some qualities as much as 90% and in others as little as 20% of colouring matter. The blue colouring matter which indigo contains is known as indigotine, but there are usually also present in small quantities other colouring matters such as indigo red or indirubrine, a yellow colour known as kaempferol, indigo green and indigo brown, as well as indigo gluten and more or less mineral matter.

The bulk of the indigo which now comes into the European market is prepared synthetically from coal tar. The following figures indicate the values of the imports into England of natural and synthetic indigo, and are taken from the official Board of Trade returns: —

Natural Indigo.

Synthetic Indigo.

1899

£986,090

1900

542.089

1901

788,820

1902

498.043

£143.613

1903

262,775

110,970

1904

316,070

83.397

1905

116,902

121,269

.1906

1 1 1.455

147.325

1907

151.297

158,481

1908

136,882

134.052

During the period 1899-1908, the average price of indigo had declined from a fraction under 3s. to about 2s. 2§d. per lb. At first sight it might appear that the use of indigo in England was rapidly declining, but this does not necessarily follow when it is borne in mind that London was formerly the distributing centre of natural indigo for the continent and America.

Chemistry. — Our knowledge of the chemistry of indigo is largely derived from the classical researches of A. von Baeyer and his collaborators. In 1841 Erdmann and Laurent observed that on oxidation indigo yielded isatin; and in 1 848 Fritzsche obtained aniline by distilling the dyestuff with potash. In 1870 A. v. Baeyer and Knop succeeded in preparing indigotine by heating isatin with phosphorus trichloride, acetyl chloride and phosphorus. In the same year, C. Engler and A. Emmerling obtained small quantities of the dyestuff by heating nitroacetophenone with soda-lime and zinc dust, while in 1875 M. v. Nencki prepared it by the oxidation of indol by ozone. Indol had been previously obtained from albumin- oids by means of the pancreas ferment. It was not, however, until 1880 that v. Baeyer, who had been at work on the subject since 1865, was able to obtain indigotine from more or less easily accessible coal tar derivatives of known constitution. The most important of these

synthetic processes due to the researches of v. Baeyer was the production of the dyestuff from ortho-nitrophenylpropiolic acid .(see Propiolic Acid), which yields indigotine on being treated with caustic soda and a reducing agent such as grape sugar or xanthate of soda. Although used in small quantities in calico printing, it never attained any commercial importance as a means of producing indigo, the cost of production being far too high.

Many synthetic processes of preparing indigotine have since been devised, but the one which stands out pre-eminently from a technical point of view and the one which ultimately led to the commercial success of the synthetic product is that of Heumann who showed in 1890 that indigotine can be prepared by melting phenylglycocoll

1 For a full account of the manufacture of indigo in northern Behar see Ch. Rawson, Journ. Soc. Dyers and Colourists (July 1899).

(phenylglycine), GsHrNH-CH 2 -COOH, with caustic alkalis. The yield was at first very unsatisfactory. It was subsequently found, however, that by starting with phenylglycocoll-ortho-carboxylic acid, the yield was sufficiently good to render the process a practical success. The starting-point for the manufacture of synthetic indigo is naphthalene, CioHg, which is oxidized, by heating with concentrated sulphuric acid in the presence of a little mercury, to phthalic anhydride, CeHˆCOˆO, which is then converted into ortho-aminobenzoic acid, CeH 4 (NH2)(C0 2 H), by treatment with an alkaline hypochlorite. This acid is then condensed with mono-chloracetic acid to form phenylglycocoll-ortho-carboxylic acid, C 6 H 4 (NH-CH 2 -C02H)(C0 2 H), which on being melted with caustic

alkaliyieldsindoxylicacid.CeHi-cˆ £Jjj “>C-C0 2 H,and thisreadily

losescarbondioxideandpassesoverintoindoxyl,CeH 4 <ˆjˆ ^^>CH.

By alkaline oxidation indoxyl is converted into indigotine.

The patent literature of processes for bringing about the conversion of the phenylglycine or its carboxylic acid into indoxylic acid, indoxyl and indigotine is enormous; a circumstance due to the fact that the efficiency of this operation controls the price of the synthetic dyestuff. Caustic soda has been practically given up, being replaced partly or wholly by caustic potash; in addition, alkaline earths,

sodamide, nitrides, alkali carbides, &c, have been used. In 1906, Meister, Lucius and Briining patented the addition of lead and sodium to a mixture of caustic potash and soda; the Basler Chemische Fabrik use a mixture of caustic potash and soda at 210 – 260 °; Leon Lilienf eld added slaked lime or magnesia to the fused alkali, with a subsequent heating in a current of ammonia at 150 – 300 . and in 1908 patented a process wherein the melt is heated under greatly reduced pressure; this gave a yield of 80-90%.

Synthetic indigo comes into the market chiefly in the form of a 20 % paste but is also sold in the solid state in the form of a powder.

Indigotine, C16H10N2O2, is a derivative of indol and its constitution is

A/CO.

/COx/x

\ / – ‘

‘vAnh/ \nh/v

It can be prepared in an almost pure state by extracting good qualities of Bengal or Java indigo or synthetic indigo with boiling nitrobenzene, from which it crystallizes on cooling in dark blue crystals having a metallic sheen. When heated in an open vessel it readily volatilizes, yielding a violet vapour which condenses on cooling in the form of crystals. Indigotine is also soluble in boiling aniline oil, quinoline, glacial acetic acid and chloroform, but is insoluble in water, dilute acids and alkalis and ordinary solvents like alcohol, ether, &c. By nitric acid and many other oxidizing agents it is readily converted into isatin, CsHjNOs. Heated with concen- trated sulphuric acid it yields a disulphonic acid, CkH8N 2 2 (SO s H)2, the sodium salt of which finds application as an acid colour in wool dyeing under the name of Indigo carmine. 1 By the action of reducing agents, indigotine is converted into indigo white, C16H12N2O2, which is readily soluble in alkalis or milk of lime with a yellow colour. On exposing the alkaline solution to the air the indigo white is rapidly oxidized back to indigotine, and on these two reactions the application of indigo in dyeing and printing is based. (See Dyeing and Textile Printing.)

Various halogen (chlorine and bromine) substitutive derivatives of indigotine have been introduced which, while not differing essentially from ordinary indigo in their properties, produce for the most part

redder shades in dyeing. They are claimed to be faster and brighter colours. It has been shown by Friedlandar (Ber.. 1909, 42, p. 765) that the reddish violet colouring matter obtained from the colour-yielding glands of the mollusc Murex brandaris, by means of which the famous Tyrian purple of the ancients was dyed, is a dibromindigo, CieHjBrsNjCˆ. A new departure in the synthetic dyestuffs belong- ing to the indigo group was inaugurated by the discovery in 1906 by P. Friedlander of thioindigo red, a derivative of thionaphthen, which is formed from phenylthioglycol-ortho-carboxylic acid,

CiHiˆc pa pn Ti This substance, on boiling with alkali and

then with dilute acid yields thioindoxyl, C 6 H 4 <ˆ g ˆ>CH 2 , which

is converted by alkaline oxidation into thioindigotin, having the

conotitution C 6 H 4 C:CC 6 H 4 . The new dye-stuff is

therefore analogous to indigotine, from which it differs by having the imino groups replaced by sulphur atoms. Thioindigo red can be readily crystallized from boiling benzene, and forms reddish brown crystals possessing a metallic reflex. Thioindigo scarlet,

C6H 4 <ˆ C s °ˆ>C = C«Cˆˆ (j I ˆ>NH, is also obtained synthetically.

Both products come into the market in the form of pastes and are used in dyeing like indigo (see Dyeing). (E. K.)

1 Although bright shades of blue are produced with this derivative, they are not fast.

INDIUM (symbol In, atomic weight 114-8), a metallic chemical element, included in the sub-group of the periodic classification of the elements containing aluminium, gallium and thallium. It was first discovered in 1863 by F. Reich and Th. Richter (Journ. jiir prak. Chem., 1863, 89, p. 444) by means of its spectrum. It occurs' naturally in very small quantities in zinc blende, and is best obtained from metallic zinc (which contains a small quantity of indium) by treating it with such an amount of hydrochloric acid that a little of the zinc remains undissolved; when on standing for some time the indium is precipitated on the undissolved zinc. The crude product is freed from basic zinc salts, dissolved in nitric acid and the nitric acid removed by evaporation with sulphuric acid, after which it is

precipitated by addition of ammonia. The precipitated indium hydroxide is converted into a basic sulphite by boiling with excess of sodium bisulphite, and then into the normal sulphite by dissolving in hot sulphurous acid. This salt on strong ignition leaves a residue of the trioxide, which can be converted into the metal by heating in a current of hydrogen, or by fusion with sodium (C. Winkler, Journ. fur prak. Chem., 1867, 102, p. 273). Indium is a soft malleable metal, melting at 155 C. Its specific gravity is 7-421. and its specific heat 0-05695 (R. Bunsen).

Indium oxide, ln 2 3 , is a yellow powder which is formed on ignition of the hydroxide. It is readily reduced on heating with carbon or hydrogen, and does not pass into an insoluble form when ignited. The hydroxide, In(QH) 3 , is prepared, as a gela- tinous precipitate, by adding ammonia to any soluble indium salt. It is readily soluble in caustic potash, but insoluble in ammonia.

Three chlorides of indium are known: the trichloride, InCl 3 , a deliquescent salt, formed by heating a mixture of the oxide and carbon in a current of chlorine; the dichloride, InCl 2 , obtained by heating the metal in hydrochloric acid gas; and t \iemonochloride,InCl, which is prepared by distilling the vapour of the dichloride over metallic indium. The mono- and di- chlorides are decomposed by water with the formation of the trichloride, and separation of metallic indium. Indium Sulphate, Ina(SQ)) 3 , is obtained as a white powder very soluble in water by evaporating the trioxide with sulphuric acid. Concentration of the aqueous solution in a desiccator gives a deposit of crystals of a very deliquescent salt, H 2 In 2 (S0 4) 4 '8H 2 0. An indium ammonium alum, In 2 (S0 4)3-(NH4) 2 S04-24H20 is known.

The atomic weight of indium has been determined by C. Winkler and by R. Bunsen by converting the metal into its oxide. Thiel {Ber., 1904, 37, p. 1135) obtained the values 115-08 and 114-81 from analyses of the chloride and bromide, whilst F. C. Mathers (Abst. J.C.S., 1907, ii. 352) obtained 114-88 and 114-86. Indium salts can be recognized by the dark blue colour they give in the flame of the Bunsen burner; and by the white beads of metal and the yellow incrustation formed when heated on charcoal with sodium carbonate.

INDIVIDUALISM (from Lat. individualis, that which is not divided, an individual), in political philosophy, the theory of government according to which the good of the state consists in the well-being and free initiative of the component members. From this standpoint,

as contrasted with that of the various forms of socialism (q.v.) which subordinate the individual to the community, the community as such is an artificial unity. Individualism is, however, by no means identical with egoism, though egoism is always individualistic. An individualist may also be a conscientious altruist: he is by no means hostile to or aloof from society (any more than the socialist is necessarily hostile to the individual) , but he is opposed to state interference with individual freedom wherever, in his opinion, it can be avoided. The practical distinction in modern society is necessarily one of degree, and both " individualism ." and " socialism " are very vaguely used, and generally as terms of reproach by opponents. Every practical politician of whatever party must necessarily combine inhis programme individualistic and socialist principles. Extreme individualism is pure anarchy: on the other hand Thomas Hobbes, a characteristic individualist, vigorously supported absolute government as necessary to the

well-being of individuals. Moreover it is conceivable under given circumstances that an individualist might logically advocate measures {e.g. compulsory military service) which conflict with individual freedom. In practice individualism is chiefly con- cerned to oppose the concentration of commercial and industrial enterprise in the hands of the state and the municipality. The principles on which this opposition is based are mainly two: that popularly elected representatives are not likely to have the qualifications or the sense of responsibility required for dealing with the multitudinous enterprises and the large sums of public money involved, and that the health of the state depends on the exertions of individuals for their personal benefit.

INDO-ARYAN LANGUAGES. " Indo-Aryan " is the name generally adopted for those Aryans who entered India and settled there in prehistoric times, and for their descendants. It dis- tinguishes them from the other Aryans who settled in Persia and elsewhere, just as the name " Aryo-Indian " signifies those inhabitants of India who are Aryans, as distinguished from other Indian races, Dravidians, Mundas and so on. A synonym of " Aryo-Indian " is " Gaudian " or " Gaurian," based on a Sanskrit word for the non-Dravidian parts of India proper. These two words refer to the people from the point of view of India, while " Indo-Aryan " looks at them from the wider aspect of Indo-European ethnology and philology. The general

history of the Aryan languages is treated in the articles Indo-European Languages and Aryan. Here we propose to offer a brief review of the special course of their development in India.

Most of the Indo-Aryans branched off from the common Aryan stock in the highlands of Khokand and Badakshan, and marched south into what is now eastern Afghanistan. Here some of them settled, while others entered the Punjab by the valley of the river Kabul. This last migration was a gradual process extending over several centuries, and at different epochs different tribes came in, speaking different dialects of the common language. The literary records of the latest times of this invasion show us one Indo-Aryan tribe complaining of the unintelligible speech of another, and even denying to it the right of common Aryan-hood.

The Pisaca Languages. — Before proceeding farther, it is advisable to discuss the fate of another small group of languages spoken in the extreme north-west of India. After the great fission which separated the main body of the Indo-Aryans from the Iranians, but before all the special phonetic characteristics of Iranian speech had developed, another horde of invaders crossed the Hindu Kush from the Pamirs, journeying directly south. They occupied the submontane tract, including the country round Chitral and Gilgit, Kashmir and Kafiristan. Some even followed the course of the Indus as far as Sind, and formed colonies there and in the western Punjab. Here they mingled with the Indo-Aryans who had come down the Kabul valley, and to a certain extent infected the local dialect with their idioms. How far their influence extended over the rest of India is undecided, and will probably never be known, but traces of it have been detected by some inquirers even in the

dialects of modern Marathi. Those who remained behind in the hill country, the whole of which is popularly known as Dardistan, were isolated by the inhospitable nature of their home and by their own savage character. They seem to have had customs allied to cannibalism, and in later Indian literature legends grew around them as a race of demons called Pisdcas, o>tioayoi, who spoke a barbaric tongue called Paisaci. This language appears now and then in the Sanskrit drama, and Sanskrit philologists wrote still-extant grammatical notices of its peculiarities. These show that it possessed an extremely archaic character, and the same fact is prominent in the Pisaca languages of the present day. Some words which were spoken in the oldest time are preserved with hardly a change of letter, while in India proper the corresponding forms have either disappeared altogether or have been so changed as to be hardly recognizable at first sight. The principal modern Pisaca languages are three or four spoken in Kafiristan, Khowar of Chitral, Shlna of Gilgit, Kashmiri, and Kohistanl. The last two are border tongues, much mixed with the neighbouring languages of India proper. The only one which has any literature is Kashmiri {q.v.). The rest are entirely uncultivated. Their general character may be described as partly Indian and partly Iranian, although they have in their isolated position developed some phonetic laws of their own.

Indo-Aryan Classification. — The oldest specimens of Indo- Aryan speech which we possess very closely resemble the oldest Iranian (see Persia: Language). There are passages in the Iranian Avesta which can be turned into good Vedic Sans- krit by the application of a few simple phonetic laws. It is sufficient for our present purposes to note

that after the separa- tion the development of the two old forms of speech went on independently and followed somewhat different lines. This is most marked in the treatment of a nexus of two consonants. While modern Iranian often retains the nexus with little or no alteration, modern Indo-Aryan prefers to simplify it. For instance, while the old Aryan slh becomes sH or ist in modern Persian, it becomes tth or th in modern Indo-Aryan. Similarly bhr becomes 6> in the former, but bbh or bit in the latter. Thus : — ■*

Old Indo-Aryan.

Old Iranian.

Modern Persian.

Hindi.

sthdna- bhratar-

stana- bratar-

s'lan or istdn b' radar

thana, a place. bhdi, a brother.

*The earliest extant literary record of Indo-Aryan languages is the collection of hymns known as the Rig- Veda. As we have it no w, we may take it as representing, on the whole, the particular vernacular dialect spoken in the east of the Punjab and in the upper portion of the Gangetic Doab where it was compiled. The tribe which spoke this dialect spread east and south, and their habitat, as so extended, between the Punjab and the modern Allahabad and reaching from the Himalaya to the Vindhya Hills in the south, became known to Sanskrit geographers as the Madhyadesa or "Midland," also called Arydvarta, or the " home of the Aryans." The language spoken here received constant literary culture, and a refined form of its archaic dialect became fixed by the labours of grammarians about the year 300 B.C., receiving the name of Samskrta (Sanskrit) or " purified," in contradistinction to the folk-speech of the same tract and to the many Indo-Aryan dialects of other parts of India, all of which were grouped together under the title of Prdkrta (Prakrit) or "natural," " unpurified." Sanskrit {q.v.) became the language of religion and polite literature, and thus the Midland, the native land of its mother dialect, became accepted as the true pure home of the Indo-Aryan people, the rest being, from the point of view of educated India, more *or less barbarous. In later times, the great lingua franca of India,*

Hindostani, also took its origin in this tract.

Round the Midland, on three sides — west, south and east — lay a country inhabited, even in Vedic times, by other Indo- Aryan tribes. This tract included the modern Punjab, Sind, Gujarat, Rajputana with the country to its east, Oudh and Behar. Rajputana belongs geographically to the Midland, but it was a late conquest, and for our present purposes may be considered as belonging to the Outer Band. The various Indo-Aryan dialects spoken over this band were all more closely related to each other than was any of them to the language of the Midland. In fact, at an early period of the linguistic history of India there must have been two sets of Indo-Aryan dialects, — one the language of the Midland and the other that of the Outer Band. 1 Hoernle was the first to suggest that the dialects of the Outer Band represent on the whole the language of the earlier Indo-Aryan immigrants, while the language of the Midland 1 Attempts have been made to discover dialectic variations in the Veda itself, and, as originally composed in various parts of the Punjab widely distant from each other, the hymns probably did contain many such. But they have been edited by compilers whose home was in the Midland, and now their language is fairly uniform throughout. In the time of Asoka (250 B.C.) there were at least two dialects, an eastern and a western, as well as another in the extreme north-west. The grammarian Patafijali (150 B.C.) mentions the I existence of several dialects.

was that of the latest comers, who entered the Punjab like a wedge and thrust the others outwards in three directions.

As time went on, the population of the Midland expanded and forced the Outer Band into a still wider circuit. The Midland conquered the eastern Punjab, Rajputana with Gujarat (where it reached the sea) and Oudh. With its armies and its settlers it carried its language, and hence in all these territories we now find mixed forms of speech. The basis of each is that of the Outer Band, but the body is that of the Midland. Moreover, as we leave the Midland and approach the external borders of this tract, the influence of the Midland language grows weaker and weaker, and traces of the original Outer language become more and more prominent. In the same way the languages of the Outer Band were forced farther and farther afield. There was no room for expansion to the west, but to the south it flowed over the

Maratha country, and to the east into Orissa, into Bengal and, last of all, into Assam.

The state of affairs at the present day is therefore as follows: There is a Midland Indo-Aryan language (Western Hindi) occupying the Gangetic Doab and the country immediately to its north and south. Round it, on three sides, is a band of mixed languages, Panjabi (of the central Punjab), Gujarati, Rajasthani (of Rajputana and its neighbourhood), and Eastern Hindi (of Oudh and the country to its south). Beyond these again, there is the band of Outer Languages (Kashmiri, with its Pisaca basis), Lahnda (of the western Punjab), Sindhi (here the band is broken by Gujarati), Marathi, Oriya (of Orissa), Bihari, Bengali and Assamese. There are also, at the present day, Indo-Aryan languages in the Himalaya, north of the Midland. These belong to the Intermediate Band, being recent importations from Rajputana. The Midland language is there- fore now enclosed within a ring fence of Intermediate forms of speech.

We have seen that the word " Prakrit " means " natural " or " vernacular, " as opposed to the " purified " literary Sanskrit. From this point of view every vernacular of India, from the earliest times, is a Prakrit. The Rig-Veda itself, composed long before the birth of " purified " Sanskrit, can only be con- sidered as written in an old vernacular, and its language, together with the other contemporary Indo-Aryan dialects which never attained to the honour of " purification," may be called the Primary Prakrits of India. If we compare literary Sanskrit with classical Latin (see Brandreth, " The Gaurian compared with the Romance Languages," Journal of the Royal Asiatic Society xi. (1870), 287; xii. (1880), 335), then these Primary Prakrits correspond to the old Italic dialects con- temporary with and related to the literary language of Rome. They were synthetic languages with fairly complicated grammars, no objection to harsh combinations of consonants, and several grammatical forms strange to the classical speech. In the course of centuries (while literary Sanskrit remained stereotyped) they decayed into Secondary Prakrits. These still remained synthetic, and still retained the non-classical forms of grammar, but diphthongs and harsh combinations of consonants were eschewed. They now corresponded to the post classical Italic dialects. Just as Sanskrit (and the Primary Prakrits) knew of a city called Kausambi, which was known as Kosambi to the Secondary Prakrits, so the real Umbrian name of the poet known to literature as Plautus was Plot(u)s. Again, as the Latin lactuca became lattuca, so the Primary Prakrit bhakta became the Secondary bhatta-. In India, the dislike to harsh consonantal sounds, a sort of glottic laziness, finally led to a condition of almost absolute fluidity,

each word of the Secondary Prakrits ultimately becoming an emasculated collection of vowels hanging on to an occasional consonant. This weakness brought its own Nemesis and from, say, a.d. iooo we find in existence the series of modern Indo-Aryan vernaculars, or, as they may be called, Tertiary Prakrits, closely corresponding to the modern Romance languages. Here we find the hiatus between contiguous vowels abolished by the creation of new diphthongs, declensional and conjugational terminations consisting merely of vowels becoming worn away, and new languages appearing, no longer synthetic,

but analytic, and again reverting to combinations of consonants under new forms, which had existed three thousand years ago, but which two thousand years of attrition had caused to vanish. It is impossible to fix any approximate date for the change from the Primary to the Secondary Prakrits. We see sporadic traces of the secondary stage already occurring in the Rig- Veda itself, of which the canon was closed about 1000 B.C. At any rate Secondary Prakrits were the current vernacular at the time of the emperor Asoka (250 B.C.). Their earliest stage was that of what is now called Pali, the sacred language of the Buddhists, which forms the subject of a separate article (see Pali). A still later and more abraded stage is also discussed under the head of Prakrit. This stage is known as that of the Prakrit par excellence. When we talk of Prakrit without any qualifying epithet, we usually mean this later stage of the Secondary Prakrits, when they had developed beyond the stage of Pali, but before they had reached the analytic stage of the modern Indo-Aryan vernaculars. The next, and final, stage of the Secondary Prakrits was that of the Apabhramias. The word ApabhramSa means " corrupt " or " decayed," and was applied to the vernaculars in contrast to the Prakrit par excellence, which had in its turn (like Sanskrit and Pali) become stereotyped by being employed for literature. It is these Apabhramias which are the direct parents of the modern vernacular. The following is a list of the Indo-Aryan vernaculars, showing, when known, the names of the Apabhramsas from which they are sprung, and the number of speakers of each in the year 1001: —

Apabhramsa.

Saurasena

Avanta

Gaurjara Saurasena . Ardhamagadha

Unknown . >.

Vracada

Maharast;ra

Magadha .

Modern Language.

Number of Speakers.

A. Language of the Midland. Western Hindi 40,714,925

B. Intermediate Languages. Rajasthani Pahari Languages Gujarati Panjabi Eastern Hindi

C. Outer Languages.

(a) North-Western Group. Kashmiri (with a Pisaca

basis) Kohistani (with a Pisaca

basis) Lahnda or Western Panjabi Sindhi

(b) Southern Language. Marathi

(c) Eastern Group. Bihari

Oriya

Bengali

Assamese

Total

More than

10,917,712 3,124,681

9.439.925 17,070,961 22,136,358

1.007,957

(unknown)

3.337.917 3,494,971

18,237,899

34,579,844 9,687,429

44,624,048 1,350,846

219,725,473

Of these, the Pahari languages are offshoots of Rajasthani imported into the Himalaya. Kohistani includes the mixed dialects of the Swat and Indus Kohistans. The census of 1901 did not extend to these tracts. A full account of the Apabh- ramias will be found in the article Prakrit.

Although the modern Indo-Aryan vernaculars are not derived from Sanskrit, and though all, or nearly all, are not derived from the language of the Rig- Veda, nevertheless, as these Sire almost the only sources of our information as to what the Primary Prakrits of India were, and as all Primary Prakrits were related to these two and were in approximately the same stage of phonetic development, they afford a convenient means for carrying out historical investigation into the origin of all the modern Indo- Aryan vernaculars to its legitimate conclusion. At the same time they are not always trustworthy guides, and sometimes fail to explain forms derived from other ancient contemporary dialects, the originals of which were unknown to the Vedic and classical literature. A striking example is the origin of the

very common locative suffix -e. This can be traced through the Apabhramsa -hi to the Pali -dhi. There all Indian clues cease, and it is not till we recognize its relationship to the Greek -di that we understand that it is an ancient Indo-European termination kept alive in India by some of the Primary Prakrits, but ignored both by the dialect of the Rig- Veda and by literary Sanskrit. With this reservation, a short comparison of Sanskrit with the Secondary and Tertiary Prakrit developments will be of interest. As the Pali and Prakrit stages are fully treated under their proper heads, very brief references to them will be sufficient.

A. Vocabulary. — The ground of all the vocabularies of the modern Indo- Aryan vernaculars is, of course, the vocabulary of Aryan India in the Vedic period. Thousands of words have descended from the

earliest times and are still in existence, after passing through certain changes subject to well-known phonetic laws. As many of these laws are the same for every language, it follows that a large stock of words, which principally differ in inflection, is common to all these modern forms of speech. These words, which natives believe to be derived from Sanskrit itself, are called by them tadbhava, i.e. " having ' that ' (sc. Sanskrit, or, more correctly, the Primary Prakrit) for its origin." As the language of the Midland is derived from the old dialect of which Sanskrit is the " polished " form, it is approximately true to say that it is derived from that form of speech, and its native vocabulary (allowing for phonetic development) may be said to be the same as that of Sanskrit. But the farther we go from the Midland, the more examples we meet of a new class of words which natives of India call desya or " country-born." Most of these are really also tadbhavas, descendants of the old Primary Prakrit dialects spoken outside the Midland, of whose existence native scholars took no account. Finally, owing to the ever-present influence of literary Sanskrit, words are, and have been for many generations, borrowed direct from that language. Some of these borrowed words are due to the existence of Sanskrit as the language of religion. Their use is paralleled by the employment of Greek and Latin words for religious technical terms in all the languages of Europe. Others are technical terms of arts and sciences, but most of those which we meet are simply employed for the sake of fine language, much as if some purist were to insist on employing hlaford instead of " lord " in writing English. These Sanskrit words are known as tatsama or " the same as ' that ' (sc. Sanskrit)." The number of tatsamas employed varies much. In languages such as Panjabi which have little or no litera- ture, and in the speech of the peasantry all over India, they are few in number. In the modern literary Bengali a false standard of literary taste has led to their employment in overwhelming numbers, and the homely vigorous home-speech, which is itself capable of expressing every idea that the mind of man can conceive, flounders about awkwardly enough under the weight of its borrowed plumes. The native vocabulary of the modern Indo-Aryan vernaculars is thus made up of tadbhavas, desyas and tatsamas.

The Dra vidian languages of southern India have also contributed a small quota to the Indo-Aryan vocabulary. Most of the words have been given a colour of contempt in the process of borrowing. Thus the word pilla, a cub, is really the Dravidian pillai, a son. But the most important accretion from outside comes from Persian, and (through Persian) from Arabic. This is due to Mahommedan influence. In the

Mogul courts Persian was for long the language of politeness and literature, and words belonging to it filtered into all stages of society. The proportion of these Persian words varies greatly in the different languages. In some forms of Western Hindi they have almost monopolized the vocabulary, while in others, such as Bengali and Marathi, the number is very few. Instances of borrowing from other languages are of small importance.

B. Phonetics. — The alphabet of the Indo-Aryan languages is, on the whole, the same as that of Sanskrit (q.v.), and the system of trans- literation adopted for that language is also followed for them. 1 Some new sounds have, however, developed in the Secondary and Tertiary Prakrits. New signs will be used for them, and will be explained in the proper places. Sanskrit knew only long e and o, but already in the Secondary Prakrits we find a corresponding short pair, e and 0. of which the use is considerably extended in the tertiary stage.

1 The Nagari (see Sanskrit) and allied alphabets, when employed for modern Indo-Aryan languages or for Prakrit, are transliterated in this work according to the following system: — aaiiuurreeaiaiooauaurh (anusvdra) °° (anundsika) h (visarga) . k kh g gh' re c (ts) ch (tsh) j (dz) jh (dzh) fi

t th d ® dh (rh) l lh n

t th d dh n p ph b bh m y r 1 v (w) s S s h.

Special sounds employed by particular languages are described in the articles in which reference is made to them. Here we may mention d, sounded like the aw in " law," and a, 6, u, pronounced as in German.

The Sanskrit diphthongs ai and au disappeared in the secondary stage, e and being substituted for them respectively. On the other hand, in the same stage, we frequently come across pairs of vowels, such as ai, au, with a hiatus between the two members. In the tertiary stage, these pairs have been combined into new diphthongs ai and au, shorter in pronunciation than ai and au. The pronuncia- tion of ai and ai may be compared with that of the English " aye " and " I " respectively. In the languages of the Outer Band, there is again a tendency to weaken this new ai to I, and the new au to 0. All the tertiary languages weaken a short final vowel. In most it is elided altogether in prose, but in some of those of the Outer Band (Kashmiri, Sindhi and Bihari) it is half pronounced. Some of the

Outer languages have also developed a new o-sound, corresponding to that of a in the German Mann. The stress-accent of classical Sanskrit has as a rule been preserved throughout. In the tertiary stage it generally resolves itself into falling on the ante-penultimate, if the penultimate is short. If the latter is long it takes the accent. In the eastern- languages there is a tendency to throw the accent even farther back. There is also everywhere a tendency to lighten the pronunciation of a short vowel after an accented syllable, so that it is barely audible. Thus, cdl"td for cdlata. In some dialects, e.g. the Urdu form of Western Hindi, this " imperfect " vowel has altogether disappeared, as in cdlta.

The tertiary languages have on the whole preserved the conson- antal system of the secondary stage, preferring, however, as a rule, to simplify double consonants, with compensatory lengthening of the preceding vowel. Thus, for Sanskrit hasta-, a hand, we have Secondary Prakrit hattha-, Tertiary hath. Some tertiary languages have both hatth and hath: others (like Gujarati) have only hath: while others (like Panjabi) have only hatth. In the extreme north-west, Sindhi and Lahnda, under the influence of the Pisaca languages, simplify the double consonant without compensatory lengthening, so that we have hath. Again, many languages of the Outer Band show a tendency to avoid aspiration, so that Kashmiri, Marathi, Bengali and others have hat. It is well known that the Iranian languages change s to h. The Tertiary Prakrits of the Outer Band find analogous difficulty in pronouncing a sibilant. The north-western languages change it to h as in Persian. Marathi changes ˆ to s before palatal sounds, and the same change occurs in Bengali in the case of every uncompounded sibilant. Eastern Bengali and Assamese go farther. Here s is again sounded almost like h. On the other hand, in the Midland, s rarely becomes h and then only when medial. In the Outer languages the palatal consonants are also liable to change ; j and jh approach the sound of 2, and c and ch often become ts, or, in the East, a simple s. Thus, the Midland cakar, a servant, is pronounced tsakar in Marathi, and the Midland mach, a fish, is sounded mas in Marathi, Bengali and Assamese.

C. Declension. — In the latest stage of the Secondary Prakrits the neuter gender begins to disappear, and in the tertiary stage, except in Gujarati and Marathi, it is nearly altogether wanting. Elsewhere we only come across occasional relics of its employment. In some of the tertiary languages grammatical gender, as distinct from sexual gender, has disappeared as entirely as it has in English. The dual number had already fallen into disuse in the Secondary Prakrits. In the secondary stage we see a gradual simplification of grammatical

form and a disappearance of case endings. The complicated Sanskrit system is more and more superseded by the simple uniformity of the declension of o-bases. One by one the case endings were discarded, and cases were confounded with one another till at length in Apabhramsa only one or two forms remained for each number. In the tertiary stage there remain in most languages only two cases, which we may call the nominative and the oblique. The latter can be employed for any case except the nominative, but the sense is usually defined by the aid of help-words called postpositions. 2 It is a linguistic rule that languages in which the genitive precedes the governing noun prefer suffixes to prefixes and vice versa; 3 and, as the genius of the Indo-Aryan languages does require the genitive to be prefixed, these help-words take the form of suffixes. In the Midland they are still separate words, but in the Outer Band each has in general become incorporated with the main word to which it is attached. Thus, the Midland ghdrd, a horse, has its oblique form ghore, genitive ghore ker, but Bengali has oblique form ghord, genitive gkordr contracted from ghord + (k)ar. The ground principles of declension in all tertiary languages are the same, but as each employs different postpositions the systems of declension vary considerably. Marathi is the only true Indo-Aryan language which has preserved anything more than sporadic relics of the old system of case termiffa- tions.

D. Conjugation. — Two tenses, the present and the imperative, of the old synthetic system of conjugation have survived in allthe Tertiary Prakrits, and in some of them we also find the ancient future. All other tenses are now made periphrastically, mostly with the aid of participles to which auxiliary verbs may or may not be added. The participles employed are all survivals of the old participles of the present, of the past and (in some languages) of the

2 The origin of the postpositions is discussed in the article Hindostani.

3 See P. W. Schmidt in Mitteilungen der Wiener Anthropologischen Gesettschaft, xxxiii. 381.

future. The past and future participles are passive in their origin, and hence tenses formed with these participles must be construed passively. Thus, instead of " I struck him " we must say, either he

was struck by me," or else (impersonally) " it was struck by me with reference to him." So, for an intransitive verb we have, either " I am gone," or " it is gone by me." In the language of the Midland this is quite simple and clear, but in those of the Outer Band the subject (in the instrumental, or as it is usually called " agent " case) is indicated by means of pronominal suffixes attached to the participle or auxiliary verb; thus (Bengali) marila + am, struck -fby-me, becomes mdrilam, I struck. In such cases all memory of the passive meaning of the participle is lost by the eastern languages, and it, together with the appropriate pronominal suffixes, becomes in appearance and in practical use an ordinary past tense conjugated as in Latin or in Sanskrit. It is an instance of reversion to the original type; first synthetic, then analytic, and then again a new synthetic conjugation. In the other languages of the Outer Band, the memory of the passive nature of the participle is retained, although the conjugation is as synthetic as in the East, and the subject has to be put into the "agent " case.

Authorities. — No work has yet been published dealing with Indo-Aryan subjects as a whole, although several have been written which treat of one or more stages of their development. For the general question of the Pisaca languages, the reader may consult G. A. Grierson's The Piidca Languages of North-Western India (London, 1906). For the different languages of this group, see G. W. Leitner, Dardistan (Lahore, 1877); J- Biddulph, Tribes of the Hindoo Koosh, (Calcutta, 1880) ; D. J. O Brien, Grammar arid Vocabulary of the Khowar Dialect (Lahore, 1895); J. Davidson, Notes on the Bashgali (Kafir) Language (Calcutta, 1901). For the linguistic conditions of Vedic times, the Introduction to J. Wackernagel's Altindische Grammatik (Gottingen, 1896) gives much useful information in a convenient form. For the literature concerning Pali and Prakrit, see under those heads. The following are the principal works dealing with the general question of the Tertiary Prakrits: J. Beames, Comparative Grammar of the Modern Aryan Languages of India (1872-1879); A. F. R. Hoernle, A Grammar of the Eastern Hindi compared with the other Gaudian Languages (1880) ; R. G. Bhandarkar, " The Phonology of the Prakrits of Northern India," in the Journal of the Royal Asiatic Society (Bombay Branch), vol. XVII., ii., 99-182 (see also the same author's series of papers on cognate subjects in vol. XVI. of the same Journal) ; and G. A. Grierson's essays " On the Phonology of the Modern Indo-Aryan Vernaculars " in the Zeitschrift der deutschen morgenldndischen Gesellschaft, vols, xlix., 1. (1895- 1 896), 393, I ; " On the Radical and Participial Tenses of the Modern Indo-Aryan Vernaculars " in the Journal of the

Asiatic Society of Bengal, vol. lxiv. (1895), part i., 352; and " On certain Suffixes in the Modern Indo-Aryan Vernaculars " in the Zeitschrift fur vergleichende Sprachforschung (1903), p. 473. The general subject of this article is discussed at greater length in chapter vii. of the Report on the Census of India, iqoi (Calcutta, 1903). The volumes of the Linguistic Survey of India also contain much detailed informa- tion, summed up at length in the introductory volume. (G. A. Gr.).

INDO-CHINA, FRENCH. 1 The geographical denomination of French Indo-China includes the protectorates of Annam, Tongking and Cambodia, the colony of Cochin-China and part of the Laos country. In 1900 the newly-acquired territory of Kwang-Chow Bay, on the coast of China, was placed under the authority of the governor-general of Indo-China. Cochin- China, a geographical definition which formerly included all the countries in the Annamese empire — Tongking, Annam and Cochin-China — now signifies only the French colony, con- sisting of the " southern provinces " originally conquered from Annam, having Saigon as its capital. In its entirety French Indo-China, the eastern portion of the Indo-Chinese peninsula, lies between 8° 30′ and 23 25′ N. and 100° and 109 20′ E. It is bounded N. by China, on which side the frontiers have been delimited; E. and S.E. by the Gulf of Tongking and the China Sea; W. by the Gulf of Siam and Siam, and N.W. by Burma. The area is estimated at about 290,000 sq. m., with a population of 17J millions, of whom 75 or 80% are Annamese. The French inhabitants number about 13,000.

The configuration of the country is determined by two rivers of unequal importance — the Mekong and the Song-Koi — and a continuous chain of mountains, an offshoot of the great Chinese group of Yun-nan, which, making a double curve, forms an immense S. South and west of this- mountain chain the country forms part of the Mekong basin. To the north and north-east of the chain the valley of the Song-Koi, or Red river,

1 See also Annam, Cambodia, Cochin-China, Kwang-Chow Bay, Laos, Tongking.

constitutes almost the whole of Tongking, of which its delta represents the most fertile and populous if not the largest portion. The small mountainous provinces of Lang-Son, That-Ke and Kao-Bang, however, belong geographically to the Si-Kiang basin. On the east the small province of Mon-Kay, on the borders of Kwang-Tung, forms a little basin enclosed between the mountains and the sea; on

the south the province of Thanh-Hoa, although crossed by the small river Song-Ma, forms the extremity of the Red river delta and belongs to it, the two rivers being united at some distance from the sea by a natural channel formed by the junction of a northern branch of the Song-Ma with a southern branch of the Song-Koi. The Red river descends from the mountains of Yun-nan, rising near Tali-fu between deep and inaccessible gorges, and becomes navigable only on its entry into Tongking. Means have been taken to render it available to steam launches, and in consequence of an agreement between the state and the Compagnie des Correspondances Fluviales a service of steamers is provided from its mouth to Lao-Kay. Near Hung-Hoa the Red river receives its two chief tributaries, the Black river from the plateaus of the west — the land pf the Muongs — and the Clear river, one of the largest of whose tributaries issues from the Ba-Be lakes. The Black river is navigable for a considerable distance, the Clear river only from Tuyen-Kwang. Between the basins of the Song-Koi and the Mekong the chain of mountains, crowned by tolerably extensive plateaus, covers, with its ramifications and transverse spurs, a vast extent of country little known, although several trade-routes traverse it, thus placing the Laos country in communication with Tongking and Annam. In about 19 N. the mountain-ridge approaches the sea and runs parallel to the coast, presenting on its eastern side a steep declivity which encloses a narrow littoral, in places only a mile or two broad, between the base of its cliffs and the shore. This coast-belt constitutes the habitable and cultivable portion of Annam proper, and consists of alluvial matter accumulated at the mouths of mountain streams, and marshes and swamps enclosed between land and sea by sand ridges heaped up by wind and tide. The high valleys and plateaus originally belonged to the empire, the limits of which, although invaded and occupied by Siamese, formerly extended to the banks of the Mekong. The western slopes form part of the French Laos possessions. The Mekong valley includes Laos, Cambodia and the greater part of Cochin-China. The Mekong (q.v.) is one of the largest rivers of south-eastern Asia, having a course 1900 m. in length. Its mouths, six in number, communicate by means of a navigable canal with the Saigon river (fed by the Don-Nai and the two Vaico rivers), which is navigable by the largest warships, render- ing Saigon the most important natural port of Indo-China.

Geology.— The deltaic tracts of the Mekong and Red river are composed of alluvium (generally silicious clay) deposited by the rivers. The mountains from which this soil is derived are granitic in formation, the framework being almost always schists of ancient

date, dislocated, folded and occasionally rounded into hills 1000 to 1300 ft. in height, belonging to the Devonian period. Above these schists lie— more especially in the north and south of Tongking — marbles and other highly crystalline limestones, upon which rest, uncon- formably in places (Nong-Son, Ke-Bao, Hon-Gay), Carboniferous formations. In the upper part of the Red river valley rich deposits of coal have been found between Yen-Bay and Hai-Duong, in a considerable tract of Tertiary rock. Limestone occurs also in the valley of the Mekong, forming an extensive massif in the district of Lakhon and in the basins of the Nam-Ka-Dinh and Nam-Hin-Bun. These limestones appear to be Carboniferous. In the region south of Lakhon the rock is Triassic, and gold has been found in several districts. The natives collect it in very small quantities by a washing process. In the lateral valleys of the Mekong copper and tin are found. On the course of the Nam-Paton, a tributary of the Nam-Hin-Bun, the natives work a moderately productive tin-mine. Layers of spicgeleisen, limonite and other iron ores are numerous in the Laos states, in which also antimony occurs.

*Climate. — The climate of Indo-China is that of an inter-tropical country, damp and hot. But the difference between the southern and northern regions is marked, as regards both temperature and meteorology. Cochin-China and Cambodia have very regular seasons, corresponding with the monsoons. The north-easterly monsoon blows from about the 15th of October to the 15th of April, within a day or so. The temperature remains almost steady during this time, varying but slightly from 78-8° to 8o-6° F. by day to 68**

by night. This is the dry season. From the 15th of April to the 15th of October the monsoon reverses, and blows from the south-west. The season of daily rains and tornadoes commences. The tempera- ture rises from 8o-6° to 84-2°, at which it remains day and night. April and May are the hottest months (from 86° to 93-2°). The damp unwholesome heat sometimes produces dysentery and cholera. The climate of Annam is less regular. The north-easterly monsoon, which is " the ocean-wind," brings the rains in September. The north-easterly gales lower the temperature below 59 . September is the month in which the typhoon blows. During the dry season — June, July and August — the thermometer oscillates between 86° and 95 . The nights, however, are comparatively cool. Tongking has a winter season — October to May. The temperature, lowered by fog and the

rains, does not rise above 75-2° and descends to 50° over the delta, and to 44-6° and even 42-8° in the highlands, where white frost is occasionally seen. The summer, on the other hand, is scorch- ing. The wind veers to the south-east and remains there until October. The temperature rises to over 83 °; often it reaches and continues for several days at 95 or even more. The nights are distressingly airless. The Laos country in the interior and lying at a high altitude is cooler and drier. Its deep valleys and high hills vary its climate.

Fauna and Flora.— From the populous cultivated districts wild animals, once plentiful, have retired towards the wooded and mountainous districts. The wild life of Laos includes fairly numerous herds of elephants, the rhinoceros (one- and two-horned ; rhinoceros horn is employed as a " medicine "), tiger, panther, brown bear, tree-bear, monkeys and rats, among which are the musk rat, the palm rat and the nu-khi, or rat found in the rice-fields of the highlands, in which its ravages are considerable. In mountain districts the leopard, wild boar and deer are found, and in the neighbourhood of habitations the tiger-cat and ichneumon. The buffalo is commonly found wild in Laos ; as a domesticated animal it also holds a prominent place. The zebu bull is used for transport purposes. Attempts to acclimatize the Arab horse and to introduce sheep from Aden and China have failed. There is, however, an indigenous race of horses, excellent in spite of their small size— the horses of Phu-Yen. Among birds the woodcock, peacock and numerous species of duck inhabit the woods and marshes. The goose and guinea-fowl appear, as also the turkey, to have become easily acclimatized. Reptiles (apart from the caimans of the Mekong, which attain a length of over 30 ft., and are much appreciated by the Annamese as food) are extremely numerous and varied in species. The rivers are rich in fish. The sole is found in the rivers of Tongking. The Mekong is fished for two species peculiar to it — the pa-beuk and the pa-leun, which attain a length of nearly 6 ft. All varieties of mosquitoes, ants and leeches combine to render the forests bordering the Mekong impracticable. Peculiar species of grubs and caterpillars destroy the cotton and coffee plantations of Cochin-China. The silkworm may be said to be indigenous in Tongking, where there are several thousand acres of mulberry trees.

The flora is inter-tropical, and comprises nearly all the trees known in China and Japan. The bamboo is utilized in building and a variety of other ways. Formerly the teak was believed not to exist in the forests of Indo-China, but it was found some years ago in considerable abundance, and plantations of it have been made. Certain hard woods are used for marqueterie and other ornamental

work. Rubber is also exploited. Cotton, previously cultivated in Cochin-China and Cambodia, gives excellent results in Laos. Tea, of which there are a certain number of plantations in the highlands of Tongking and Annam, grows wild in Upper Laos, and in quality closely resembles the Pou-eurl or Pueul variety noted in Yun-nan. Cocoa, coffee and cotton are cultivated in Tongking and Cambodia. Cinnamon and cardamoms are gathered in Laos and Annam. Ground nuts, sesame, sugar canes, pepper, jute, tobacco and indigo are also grown. The area under rice, which is incomparably the most im- portant crop, is approximately 1,750,000 acres. All European fruits and vegetables have been introduced into Tongking, and with certain exceptions — the grape, for example — succeed perfectly. Measures taken to secure the monopoly of opium have notably in- creased the cultivation of the poppy.

People. — The population of French Indo-China falls into five chief divisions — the Annamese, forming the bulk of the population in Annam, Tongking and Cochin-China and four- fifths of that of the whole country; the Khmers or Cambodians; the Charas of southern Annam; the Thais, including the Laotians; and the autochthonous tribes classed by the other inhabitants as Mois or Khas (" savages "). Driven into the interior by the now dominant races, these older people have mixed and blended with the peoples whom they found there, and new tribes have arisen, intermingled with fugitives from China, Annam and even Siam. In the north of Tongking people of Laos origin occur — the Thos round Kaobang, the Muongs in the mountains bordering the Red river. When mixed with Chinese the Muongs and the Thos are known as

the Hung-dans, Mans and Miens. The Muongs are bigger and stronger than the Annamese, their eyes often almost straight. They have square foreheads, large faces and prominent cheek- bones. In the centre and south of the Indo-Chinese mountain chain are found, under a multiplicity of names — Phon-tays, Souis, Bah-nan, Bolovens, Stiengs, Mors, Kongs, &c. — people of Malayan origin mixed with all the races of Indo-China. Laos is inhabited by an essentially miscellaneous population — falling into three main groups — the Thais; various aboriginal peoples classed as Khas; and the Moos and Yaos, tribes of Chinese origin.

Religions. — The Annamese religion is a somewhat vague and very tolerant Buddhism, which in practice resolves itself chiefly into the worship of ancestors. Certain ceremonies performed in Cambodia resemble distantly the Brahminical cult. The Roman Catholic religion has been introduced by missionaries. The course of its history has

not been free from catastrophes and accidents. There is an apostolical vicariate in Cochin- China, one in Cambodia and several mission stations in Tongking. Two of these missions are mainly conducted by Spanish priests. Administration. — Before taking its present form the govern- mental organization of Indo-China underwent many changes. Originally Cochin-China, the only French possession in the peninsula, was a colony directly administered, like other colonies, by the ministry of marine, and its earliest governors were admirals. Later, as further conquests were effected, Tong- king and Cambodia were subjected to the regime of a protect- orate somewhat ill-defined, and placed under the authority of residents-general. The seat of the resident-general of Tongking was at Hanoi; of Cambodia, at Pnom-Penh. The govern- ment of the colonies having been transferred (1889) from the ministry of marine to the ministry of commerce, and in 1894 to the newly created ministry of the colonies, the control of the residencies passed gradually into the hands of civil agents. Cochin-China, which already by the decree of the 8th of February 1880 had been endowed with a colonial council, had a municipality, a chamber of commerce, and even a deputy in the French parliament. There had thus been three distinct states, each with its own ruler and government. But by the decrees of the 17 th of October and the 3rd of November 1887 the unity of Indo-China was determined. By decree of October the post of director of the interior of Cochin-China was done away with and replaced by that of lieutenant-governor under the immediate authority of a governor-general. The functions and powers of the latter official were, however, but vaguely defined before the decree of the 21st of April i8gi, which con- ferred on M J. M. A. de Lanessan, appointed governor-general, the most extensive powers. The residents-general of Tongking, Annam and Cambodia, and the lieutenant-governor of Cochin- China, as well as the military authorities, were placed under him. But this change of policy, which put an end to the system of expeditions and minor military operations, and restricted the power of the residents whilst restoring to the mandarins a share of authority, was unwelcome to numerous interests, which, combining, secured the abrupt recall of M de Lanessan on the 29th of December 1894. The decree of the 21st of April 1891 was not, however, revoked, but the powers it conferred were restricted. After the appointment of M Doumer, successor to M Rousseau, who died on the 10th of December 1896, this decree was again put in force on the former scale, and in 1898 it was supplemented by the decrees of the 3rd and 3isfc-of July, which definitely established the political and financial unity of Indo-China. The governor-general is the sole inter- mediary between the Indo-Chinese Union and the home govern-

ment, the powers of which, with few restrictions, are delegated to him. As supreme administrative and military authority, he directly controls the civil services, and, though prohibited from commanding in the field, disposes of the land and sea forces in the country. His diplomatic negotiations with foreign powers must be carried on under the authorization and sur- veillance of the home authorities. The governor-general is assisted by the Superior Council of Indo-China, which meets

monthly, and as reorganized by the decree of the 8th of August 1898 is composed as follows: the governor-general (president); the general commanding as head of the troops; the rear-admiral commanding the naval squadron of the Far East; the lieutenant- governor of Cochin-China; the residents superior of Tongking, Annam, Cambodia and Laos'; the director-general of finances; the director of the conlrole financier; the head of the judicial service of Indo-China; the director-general of the customs and excise of Indo-China; the directors-general of agriculture, forests and commerce; of public works; of posts and telegraphs; of health; and of public instruction; the treasurer-general of Indo-China; the director of the school of medicine at Hanoi; the president of the colonial council of Cochin-China; the presidents of the chambers of commerce of Saigon, Hanoi and Hai-Phong; the presidents of the united chambers of commerce and agriculture of Annam and Cambodia; the presidents of the chambers of agriculture of Tongking and Cochin-China; four influential natives; the chief of the cabinet and the governor-general's secretary. This list sufficiently indicates the depart- mental services, by means of which the general government is carried on. The Superior Council meets not only at Hanoi, the seat of the government, but also at Saigon, Hue and Pnom- penh. It delegates its powers to a " permanent commission " consisting of thirteen of its members, and dispensing with the attendance of the local authorities of regions other than those in which the place of meeting is situated. The Superior Council meets annually to receive the general budget and the local budgets which " must be accepted by the governor-general at a session of the Superior Council." 1 It must also be consulted on the distribution of military credits, and on the credits to be devoted to public works. The contrdlc financier , which scrutinizes and sanctions all measures of the public services involving outlay of money, is dependent on the ministry of the colonies. Its returns have to be communicated to the governor-general.

The governor-general is also assisted by a " council of defence," comprising the chief military and naval authorities.

Justice. — The whole of Indo-China is, in principle, subject to French justice, represented by a court of appeal and a certain number of tribunals. Before 1898 the administration of justice was not centralized. There was a court of appeal at Hanoi, and another at Saigon. But the decree of the 8th of August 1898 established one court of appeal for French Indo-China : two chambers sitting at Saigon and the other two at Hanoi. Three tribunals of commerce are established at Saigon, Hanoi and Hai-Phong. There arc courts of first instance at Saigon, My-Tho, Vinh-Long, Ben-Tre, Chau-Doc, Kantho, Soc-Trang, Tra-vinh, Long-Xuyen for Cochin- China, at Pnom-Penh for Cambodia, and at Hanoi and Hai-Phong for Tongking. These courts are supplemented by juges de paix in Cochin-China, and there are juges de paix at Nam-Dinh (Tongking) and Tourane; elsewhere in the protectorates the residents perform judicial functions. There are criminal courts at Saigon, My-Tho, Vinh-Long and Long-Xuyen in Cochin-China, at Hanoi in Tongking and at Pnom-Penh in Cambodia. In Cochin-China Annamese law is administered in the French courts in suits between natives, but native tribunals have been superseded. In Annam-Tongking, out- side the sphere of the French tribunals, the natives are subject to Annamese justice, represented in each province by a mandarin, called the An Sat, and in Cambodia the natives are subject to the native tribunals. At the same time, whenever a French subject or European or other foreigner is a party in an affair, French justice only is competent.

Public Works. — The order of the 9th of September 1898 placed the public works of Indo-China under the " direct authority of the governor-general as regards works entered to the general budget account." There is a director of public works in Indo-China at Saigon, a director of engineering in the other countries. In 1895 a " special service " was created in Tongking to ˆconsider railway business.

Posts and Telegraphs. — The country is divided into two sections for the purposes of this service, the one comprising Annam, Tongking and Upper Laos, the other Cochin-China, Cambodia and Lower Laos. The post and telegraph offices in Indo-China number about three hundred. Tourane communicates by submarine cable with Amoy in China, thence with Vladivostok and Europe.

The Army — Land Force. — The military services are under the authority of a general of division commanding in chief. The

European troops in 1907 comprised four regiments of colonial

1 This does not apply to the budget of Cochin-China, which is voted by the colonial council and approved by the governor-general alone.

infantry with 22 batteries of artillery (10 in Tongking and 12 in Cochin-China). The native troops, numbering over 18,000, comprised four regiments of Tongkingese tirailleurs (sharp-shooters), two of Annamese, a battalion of Cambodian and a battalion of Chinese tirailleurs, a squadron of Annamese chasseurs or light horse and two companies of engineers.

Sea Force. — Indo-China is protected by the naval division of the Far East. In addition five gunboats are stationed at Saigon and a third-class cruiser and some minor vessels at Hai-Phong.

The Policing of the country is performed by natives (the garde indigene) under European officers and by the gendarmerie coloniale, which is reinforced by native auxiliaries.

Money, &fc. — The monetary unit is the piastre, which is of variable value, having fallen from 4-50 francs to 2-40 francs and fluctuating round that figure. The chief native coin is the sapek of zinc or tin, six hundred of which strung together form a ligature, a tenth of which is called a tien. The piastre is worth 2700 sapeks. The unit of weight, the picul, equals 60ˆ4 kilos, (about 133 lb) ; the tkuoc-moe equals -425 metre (about 17 in.).

Education. — The Annamese are intelligent and have old intellectual and artistic traditions. In consequence the promotion of education has been assigned to a special council (Conseil de perfectionnement de V enseignement) selected from Frenchmen and Asiatics particularly qualified for membership. Among its preoccupations are the reconstitution of the schools of Chinese characters in Cochin- China, the remodelling of the programmes of the triennial examina- tions in Annam and Tongking (see Annam) with a view to completing them with a summary knowledge of French and science, the im- provement of the teaching given in the pagodas in Cambodia and Laos, and the foundation of a university comprising classes for natives. In 1906, in Cochin-China, where the largest sum (£45,000 in 1906) is devoted to instruction, 22,500 children received a French education.

Finance. — The unification of the budget brought about by M Doumer (decree of the 31st of July 1898) specially contributed to

that of the government. The financial scheme is based on the political. Just as a single central government directs the various local governments, so in addition to the general budget, comprising the revenue and expenditure of the supreme government, there are several local budgets, including the revenue and expenditure incidental to the individual provinces.

The general budget in 1899 and 1904 is summarized below : — Receipts. Expenditure.

1899 .... £1,968,770 £1,639,800

1904 .... 2,809,851 2,797,031

While direct taxes, e.g. the poll-tax and land tax or (in Cambodia) the tax on products, are the main sources of revenue for the local budgets, those for the general budget are the indirect taxes: (1) customs (£619,616 in 1904); (2) "regies" and other indirect taxes (£1,733,836 in 1904), these including the excise on alcohol, the monopoly of the purchase and sale of salt, and the monopoly of the purchase, manufacture and sale of opium.

The chief items of expenditure in 1904 were the following: —

Public Works £385,680

Customs and " regies " .... 618,654 Naval and Military Services . . . 527,663 Loans 2 417,421

Shipping. — The following table shows the total tonnage of shipping entered and cleared at the ports of French Indo-China in 1905 and its distribution over the countries of the Union : —

Country.

Tonnage.

Entered.

Cleared.

Cochin-China . Tongking . . .

Annam

Cambodia ....

1,117,054

242,119

28,065

2,520

1,007,510

348,947

26,406

2,012

Total ....

1,389,758

U384,875

Over half the tonnage was French (698,178 tons entered); the

2 This does not include the expenditure on account of the 3 % loan of £8,000,000, which is inscribed in a special account. The debt of the government-general of Indo-China is composed ass follows : —

Nominal Capital.

Nominal Capital in circulation on Jan. 1, 1907.

25% Loan of 1896 (Annam- Tongking) ....

3!% Lean of £8,000,000 issued from 1899 to 1905

Total ....

£3,678,000

8,748,260

£3,342,800

8,640,060

£12,426,260

£11,982,860

INDO-CHINA, FRENCH

493

United Kingdom came second (284,277 tons) ; Germany, third (205,615 tons).

Commerce. — The value of the trade of French Indo-China increased from £6,796,000 in 1896 to £16,933,000 in 1905, its average annual value for thfe years 1896-1905 being £12,213,000.

The following table shows the movement of commerce in 1905 :

_ ·

Imports.

Exports.

Total.

France .... French colonies . Foreign countries

Total. . . .

£ 4.3H.586

163,568 5.704.257

£

1.233.295

76,855 5,440,156

£

5,547,881 240,423 11,144,413

10,182,411

6,750,306

16,932,717

In 1905 the principal foreign

countries from which goods were

imported were:

Hong Kong .

for

*£2,473,882**

Singapore

,,

598,449

China and Japan.

,,

1.473,704

Burma and Siam .

,,

289,542

The British Isles .

,,

141,381

The United States

.,

126,425

The principal countries to which goods

were

exported were:

Hong Kong .

for

£i,7o6,597 1

China and Japan .

”

497,288

Singapore

M

360,510

Burma and Siam .

M

80,071

The British Isles .

”

55,539

The principal imports were:

Wheat ....

for

£214,156

”

226,755

»»

271,582

”

167,020

»»

340,027

Pit coal ....

»»

206,221

,,

388,163

Gold '.

>t

203,369

Iron and steel

,,

353.2H

Tin ....

,,

526,428

Cotton thread

j»

672,040

Jute tissues .

»»

254,255

Cotton tissues

,,

922,250

Silk tissues .

»»

24i,“3

?»

344,633

Metal-work .

,,

1,170,576

Arms, powder and ammunition.

»i

170,882

The principal exports were:

Dried fish, salt and sm

jked

for

£151,415

Rice ....

2,848,389

Pepper ....

214,297

Pit coal ....

182,077

Tin ....

553,914

Cotton thread

421,162

The customs tariff is substantially the same as that of France, severe import duties being levied on foreign goods. French goods pay no import duty and goods exported thither are exempt from export duty, with the exception of sugar, which is regulated by special legislation, and of various other colonial products (e.g. coffee, cocoa, tea, vanilla, pepper) which pay half the duty applicable to similar foreign products according to the minimum tariff. Goods fro.n French colonies pay no import duty. About 53% of the imports, comprising nearly all manufactured goods of European origin, co'Tie from France. China, Japan and Singapore are the other chief sources of imports. The Bank of Indo-China (capital £1,440,000) besides receiving deposits and discounting bills, issues bank-notes and has, till 1920, the privilege of lending money on security.

Communications. — The railway communications of French Indo-China comprise lines from Hai – Phong to Lao – Kay, continued thence via the Nam-Te valley to Yun-nan; from Hanoi northward to Lang-Son and south to Vinh; from Tourane to Kwang-Tri via Hue and from Kan-Tho (Cochin-China) to Khanh-Hoa (Annam) via My-Tho, Saigon, Bien-Hoa and Jiring with branches to Phan-Tiet and Phan-Rang. The three last are the completed sections of a line which will unite Tongking with Cochin-China. The towns in the deltas of the Mekong and Red river are united by a network of canals. The mandarin road following the coast line of Annam connects Tongking with Cochin-China, but the easiest means of communication between these two territories is by sea, the voyage from Saigon to Tourane lasting three days, that from Tourane to Hai-Phong, thirty hours.

History — The beginning of French influence in Indo-China dates from 1787, when a treaty was concluded between Gia-

1 The transit trade between Hong Kong and Yun-nan via Tong- king is of considerable importance (sec Tongking).

long, king of Annam (q.v.), and the king of France, whereby Tourane and the island of Pulo-Condore were ceded to the latter. The successors of Gia-long were averse from French influence and instituted persecutions of the Christian missionaries and natives, which led, in the reign of Tu-duc in 1858, to the arrival at Tourane

of a French and Spanish fleet. The capture of that town was followed early in 1859 by the storming of Saigon, which Rigault de Genouilly, the French admiral, chose as his base of operations. The French and Spanish were, however, too few to take the offensive, and were forced to submit to a blockade, conducted by the Annamese general Nguyen Tri Phuong, at the head of 20,000 troops. It was not till February 1861 that reinforcements under Admiral Charner reached Saigon, and the Annamese were defeated and My-Tho taken. A revolt against Tu-duc in Tongking, and the stoppage of the rice supplies from Cochin-China, obliged the king to submit, in 1862, to a treaty by which three provinces of Cochin-China were ceded and other concessions accorded to France. However, it was only after further military operations that Tu-duc con- sented to the ratification of the treaty. In 1863 Admiral de la Grandiere was appointed governor of Cochin-China and in the same year France established her protectorate over Cam- bodia. It was under La Grandiere that the exploration of Mekong was undertaken (see Garniijr, M J. F.) and that in 1867 the three provinces of Cochin-China left to Annam were annexed. French intervention in Tongking, which began with the expedition of Francois Gamier to Hanoi in 1873, culminated after a costly and tedious war (see Tongking) in the treaties of 1883 and 1884, whereby Annam and Tongking passed under the protectorate of France. The latter treaty, though its provisions were subsequently much modified, remains theoretic- ally the basis of the present administration of Annam.

From 1884 onwards the history of Indo-China may be divided into two distinct periods, characteristic of the political conception and governmental system adopted by the French government. In the first period, 1884-1891, the French agents in Tongking and Indo-China generally proceeded under cover of the treaty of 1884 with the definite conquest and annexation of Tongking and also Annam. Cochin-China itself openly designed to seize the southern provinces of Annam, upon the borders of which it lay. This policy, momentarily checked by the war with China, was vigorously, even violently, resumed after the treaty of Tientsin (June 1885). The citadel of Hu6 was occupied in July 1885 by General de Courcy. The Annamese government forthwith decided upon rebellion. An improvised attack upon the French troops was led by the ministers Thu-yet and Thu-ong. The revolt was promptly suppressed. The regent Thu-yet and the king Ham-N'ghi (crowned in August 1884) fled. At this time the French government, following a very widespread error, regarded Tongking and Annam as two distinct countries, in- habited by populations hostile to each other, and considered the Tongkingese as

the oppressed vassals of the Annamese conqueror. To conquer Annam, it was said, would liberate Tongking. This misconception produced the worst consequences. With the flight of the king civil war commenced in Annam. The people of Tongking, whose submission the court of Hue had not dared to demand, began to rise. Taking advantage of this state of anarchy, pirates of the Black Flag, Chinese deserters and Tongkingese rebels devastated the country. The occupa- tion of Tongking became a prolonged warfare, in which 25,000 French, compelled to guard innumerable posts, had to oppose an intangible enemy, appearing by night, vanishing by day, and practising brigandage rather than war. The military expenditure, met neither by commerce, which had become impossible, nor taxation, which the Annamese could not pay nor the French receive, resulted in heavy deficits. The resident- general, Paul Bert, who hoped to gain the confidence of the mandarins by kindness and goodwill, did not succeed in pre- venting, or even moderating, the action of the military regime. Than-quan, Hon-Koi, Lao-Kay, Pak-Lun and Kao-Bang were occupied, but the troops were driven back to the delta and almost invested in the towns. Disappointed in his hopes and worn out

rather by anxiety than work, Paul Bert succumbed to his troubles in November 1886, seven months after his arrival in the country. His successors possessed neither the strength nor the insight necessary to grapple with the situation. M. Constans, however, appointed " provisional " governor-general after the death of M. Filippini, succeeded to a certain extent in reviving commerce in the towns of the delta. MM. Richaud, Bihourd and Piquet, successors of M. Constans, were all powerless to deal with the uninterrupted "bush-fighting" and' the aug- mentation of the deficit, for no sooner was the latter covered by grants from the mother country than it began to grow again. At the close of the financial year in 1890 France had paid 13,000,000 francs. In April 1891 the deficit again approached the sum of 1 2,000,000 francs. The.rebels held almost all the delta provinces, their capitals excepted, and from Hanoi itself the governor- general could see the smoke of burning villages at the very gates of his capital.

At this point a complete change of policy took place. M. de Lanessan, a Paris deputy sent on a mission in the course of 1887, made himself acquainted with the government and the court of Hue. He recognized the absolute falsity of the story which represented the Tongkingese as

the oppressed subjects of the Annamese. He demonstrated the consanguinity of the popula- tions, and after intercourse with the regents, or ministers, of Hue he realized that the pacification of the country depended upon harmonious relations being established between the general government and the court. Appointed governor-general with the fullest powers on the 21st of April 1801, he presented himself at Hue, concluded witn the comat an agreement based on the principle of a " loyal protectorate," and reassured the court, up to this point uneasy under menace of annexation. The comat shortly issued; a proclamation under the great royal seal, never hitherto attached to any of the public acts imposed upon the king by the governors, who had been unaware of its existence. In this proclamation the king ordered all his subjects to obey the governor-general and to respect him, and commanded rebels to lay down arms. The effect was immediate — disorders in the delta ceased. The pirates alone, in revolt against the king of Annam and all authority, continued their brigandage. But the governor-general instituted four " military districts," the commanders of which were commissioned to destroy the pirates. At the same time he placed a force of native police, the link co, at the disposal of the mandarins, hitherto regarded with suspicion and intentionally deprived of all means of action. Order was restored within the delta. In the mountainous districts infested by pirates roads were opened and posts established. The chief haunts of the pirates were demolished, and during 1893 the foremost pirate chiefs gave in their sub- mission. The Indo-Chinese budget regainedjits balance. On the Chinese frontier agreements were concluded with Marshal Sou, in command of the Chinese forces, regarding the simultaneous repression of piracy in both countries. But on the Mekong difficulties arose with the Siamese. For centuries Siam had occupied the right bank of the Mekong, and her troops had crossed the river and occupied the left bank. Luang-Prabang was in the hands of the Siamese, who had also established posts at Stung-treng and elsewhere. Friction occurred between the French agents and Siamese soldiery. After the death of Inspector Crosgurin on the 5th of June 1893 the French government occupied Stung-treng and Khong. France demanded explana- tions and redress at Bangkok, but the court refusing concessions, an ultimatum was presented to the king by M. Pavie, French minister to Siam. The terms of the ultimatum not having been complied with within the given time, the French flotilla, con- sisting of the gunboats " L'Inconstant " and " La Comete," crossed the^ bar of the Menam on 13th July 1803, forced the entrance of the channel, and anchored at Bangkok, before the French legation. A second ultimatum was then presented. It contained the following conditions: — First, the

occupation of Chantabun by the French until the Siamese should have entirely evacuated the left bank of the Mekong; secondly, the Siamese to be interdicted from maintaining military forces at Battambang,

Siem-Reap, and generally from establishing fortified positions within 15ˆ m. of the right bank of the Mekong; thirdly, Siam to be interdicted from having armed boats on the great lake Tonle-Sap. This agreement was executed immediately, the Laotians being eager parties to it. On the 29th of September 1893 the king of Luang-Prabang made his submission to the French government, and besought it to use its influence with the court of Siam for the return to their families of the sons of princes and mandarins then in schools at Bangkok. The Siamese evacuated the left bank of the Mekong, and France took possession of Laos, a treaty, on the basis of the ultimatum, being signed on the 1st of October 1893. The disputes to which this affair with Siam had given rise between France and Great Britain were amicably settled by an agreement concluded on the 15th of January 1896. This " declaration," virtually ratifying the treaty concluded in 1893 between France and Siam, settled the limits of the zones of influence of the two contracting powers in the north of the Mekong regions and on the frontiers of Siam and Burma. Great Britain resigned to France the regions of the Muong-Sing which she had previously occupied. The great part of Siam included in the Menam basin was declared neutral, so also the Me-ping basin in the north, Meklong Pechaburi and Bang Pa Kong rivers in the south. The neutral zone, 1 55 m. wide on the right bank of the Mekong, was formally recognized.

In 1904, by a new Franco-Siamese treaty setting aside that of 1893, Chantabun was evacuated and the neutral zone renounced in return for the cession of the provinces of Bassac and Melupre and the district of Dansai (comprising the portion of Luang Prabang on the right bank of the Mekong) and the maritime district of Krat. By a further convention in 1907 Siam ceded the provinces of Battambang, Siem-Reap and Sisophon, and received in return the maritime province of Krat and the district of Dansai ceded in 1904. At the same time France abandoned all designs on territory of Siam by giving up certain areas obtained for the purposes of railway building on the right bank of the Mekong.

After the recall of M. de Lanessan in 1894 (see above), and before his successor, M. Rousseau, was able to acquaint himself fully with the condition of the country, military expeditions began again and the deficit soon reappeared. Tranquillity, however, being restored,

attention was given to public works. On the 1 2th of October 1895 M. Rousseau left to ask parliament to vote a loan of 100,000,000 francs. On the 10th of February 1896 a law was passed authorizing a loan of 80,000,000 francs, and on the 14th of March 1896 an office for the financial control of the government-general of Indo-China was established. In the interval a French company had obtained from China a concession to prolong the railway from Langson to Lungchow on a tributary of the Canton river. M. Rousseau, who died on the 10th of December 1896, was replaced by M. Doumer, previously minister of finance, under whose government was realized, as has been before stated, the union of Indo-China. On the 20th of December 1898 M. Doumer obtained from parliament authorization to contract a loan of 200,000,000 francs, the proceeds of which were appropriated to the construc- tion of railway lines.

Authorities. — M. J. F. Gamier, Voyage d' 'exploration en Indo-Chine (Paris, 1873); J. M. A. de Lanessan, L'Indo-Chine francaise (Paris, 1889); P. Doumer, V Indo-Chine francaise (Souvenirs) (Paris, 1905) ; F. Bernard, Indo-Chine (Paris, 1901), L. Salaun, L' Indo-Chine (Paris, 1903) ; A. Girault, Principes de colonisation et de legislation coloniale (Paris, 1907) ; M. Petit, Les Colonies francaises (2 vols., Paris, 1902); J. C. Gervais Courtellemont, L'Indo-Chine (Paris, 1902); A. Neton, L'Indo-Chine et son avenir economique (Paris, 1904) ; A. Pavie, Mission Pavie Indo-Chine (1 879-1 895) ; Geographie et voyages (Paris, 1901-1906) ; H. Lorin, La France: puissance coloniale (Paris, 1906) ; M. Monnier, La Tour d'Asie: Cochinchine, Annam, Tonkin (Paris, 1899) ; E. Bonhoure, L'Indo-Chine (Paris, 1900); R. Castex, Les Rivages indo-chinois (Paris, 1904); L. de Reinach, Le Laos (Paris, 1902) (this work gives a very complete bibliography); Annuaire gknkral administrate, commercial et inditstriel de I Indo-Chine (Hanoi); Revue Indochinois (Hanoi) ; C. Madrolle, Guide-Books (Paris, 1904- 1907); Bulletin economique de VIndo-Chine (Saigon).

(J. M. A. DEL.; R. Tr.)

INDO-EUROPEAN LANGUAGES

495

INDO-EUROPEAN LANGUAGES. The Indo-European (I.E.) languages are a family of kindred dialects spread over a large part of Europe, and of Asia as far as India.

The main branches so far identified fall easily into two groups of four. These groups are distinguished from one another by the treatment of certain original guttural sounds, k©, g, kh, gh, which one group shows as consonants, while the other converts them into sibilants. The variation is well shown in the word for "hundred": Gr. l-Karbv, Lat. centum, Old Irish cet; Sanskrit Satant, Zend satdm, Lithuanian szimtas, Old Bulgarian (Old ecclesi- astical Slavonic) siito. In the first three the consonant is a hard guttural (the Romans said kentum, not senium), in the others it is a sibilant (the Lithuanian sz is the English sh).

The first group (generally known as the centum-group) is the Western and entirely European group, the second (generally known as the satem-group) with one exception lies to the east of the centum-group and much its largest part is situated in Asia. To the centum-group belong (i) Greek; (2) the Italic languages, including Latin, Oscan, Umbrian and various minor dialects of ancient Italy; (3) Celtic, including (a) the Q-Celtic languages, Irish, Manx and Scotch Gaelic, (b) the P-Celtic, including the language of ancient Gaul, Welsh, Cornish and Breton : the differentiation, which exists also in the Italic languages, turning upon the treatment of original kw sounds, which all the Italic languages save Latin and the little-known Faliscan and the (b) group of the Celtic languages change to p. With these go (4) the Germanic or Teutonic languages, including (a) Gothic, (b) the Scandinavian languages, Swedish, Danish, Norwegian, Icelandic — differentiated in historical times out of a single language, Old Norse, — (c) West Germanic, including English and Frisian, Low Frankish (from which spring modern Dutch and Flemish), Low and High German.

To the satem-group belongs (1) Aryan or Indo-Iranian, in- cluding (a) Sanskrit, with its descendants, (6) Zend, and © Old Persian, from which is ultimately descended Modern Persian, largely modified, however, by Arabic words. This group is often divided into two sub-groups, Indo-A ryan, including the languages of India, and Iranian, used as a general title for Zend and Old Persian as the languages of ancient Iran. Although the sounds of Indo-Aryan and Iranian differ considerably, phrases of the earliest form of the one can be transliterated into the other without change in vocabulary or syntax. (2) To the west of these lies Armenian, which is so full of borrowed Iranian words that only in 1875 was it successfully differentiated by Hubschmann as an independent language. It is probably related to, or the descend- ant of, the ancient Phrygian, which spread into Asia from Thrace by the migration of tribes across the Hellespont. Of ancient Thracian unfortunately we know very

little. (3) North of the Black Sea, and widening its borders in all directions, comes the great Balto-Slavonic group. In this there are two branches somewhat resembling the division between Indo-Aryan and Iranian. Here three small dialects on the south-east coast of the Baltic form the first group, Lithuanian, Lettish and Old Prussian, the last being extinct since the 17th century. The Slavonic languages proper themselves fall into two groups: (a) an Eastern and Southern group, including Old Bulgarian, the ecclesiastical language first known from the latter part of the 9th century a.d. ; Russian in its varieties of Great Russian, White Russian and Little Russian or Ruthenian; and Servian and Slovene, which extend to the Adriatic, (b) The western group includes Polish with minor dialects, Czech or Bohemian, also with minor languages in the group, and Sorb. In the satem division is also included (4) Albanian, which like Armenian is much mixed with foreign elements — Latin, Greek, Turkish and Slavonic. The relation between it and the ancient Illyrian is not clear.

Besides the languages mentioned there are many others now extinct or of which little is known — e.g. Venetic, found in clearly written inscriptions with a distinctive alphabet in north-eastern Italy; Messapian, in the heel of Italy, which is supposed to have been connected with the ancient Illyrian; and possibly also the unknown tongue which has been found recently on several inscriptions in Crete and seems to have been the language of the

pre-Hellenic population, the finds apparently confirming the statement of Herodotus (vii. 170) that the earlier population survived in later times only at Praesos and Polichne. Names of deities worshipped by the Aryan branch are reported to have been discovered in the German excavations at Boghaz-Keui (anc. Pteria, q.v.) in Cappadocia; names of kings appear in widely separated areas elsewhere in Asia, 1 and a language not hitherto known has recently been found in excavations in Turkestan and christened by its first investigators Tocharish. 2 So far as yet ascertained, Tocharish seems to be a mongrel dialect pro- duced by an intermixture of peoples speaking respectively an I.E. language and a language of an entirely different origin. The stems of the words are clearly in many cases I.E., but the terminations are no less clearly alien to this family of languages. It is remarkable that some of its words, like ku, " dog," have a hard k, while the other languages of this stock in Asia, so far as at present known, belong to the satem-group, and have in such words replaced the k by a sibilant.

Till the latter part of the 18th century it was the universal practice to

refer all languages ultimately to a Hebrew origin, because Hebrew, being the language of the Bible, was assumed, with reference to the early chapters of Genesis, to be the original language. Even on these premises the argument was unsound, for the same authority also recorded a confusion of tongues at Babel, so that it was unreasonable to expect that languages thus violently metamorphosed could be referred so easily at a later period to the same original. The first person to indicate very briefly the existence of the Indo-European family, though he gave it no distinctive name, was Sir William Jones in his address to the Bengal Oriental Society in 1786. Being a skilled linguist, he recognized that Sanskrit must be of the same origin as Greek, Latin, Teutonic (Germanic) and possibly Celtic {Asiatic Researches, i. p. 422; Works of Sir W. Jones, i. p. 26, London, 1799). Unfortunately Sir William Jones's views as to the relationship of the languages were not adopted for many years by later investigators. He had said quite definitely, " No philologer could examine them all three (Sanskrit, Greek and Latin) without believing them to have sprung from some common source, which perhaps no longer exists." Friedrich Schlegel, who learnt Sanskrit from Alexander Hamilton in Paris nearly twenty years later, started the view that Sanskrit, instead of being the sister, was the mother of the other languages, a mistake which, though long since refuted in all philological works, has been most persistent.

Curiously enough the history of the names given to the family is obscure. The earliest known occurrence of the word " Indo-European " is in an article in the Quarterly Review for 1813 3 by Dr Thomas Young. The term has been in use in English and in French almost continuously since that date. But a glance at Dr Young's article will show that he included under Indo- European many languages like Basque, Etruscan and Arabian (his term for Semitic), which certainly do not belong to this family of languages at all; and if the term is taken to mean, as it would seem to imply, all the languages spoken in India and Europe, it is undoubtedly a misnomer. There are many languages in India, as those of the Dravidians in Southern India and those of Northern Assam, which do not belong to this family. On the other hand there are many languages belonging to the family which exist outside both India and Europe — Zend, Old Persian, Armenian, Phrygian, to say nothing of language" recently dis- covered. The term most commonly used in Germany is " Indo-Germanic." This was employed by Klaproth as early as 1S23. It is said not to have been invented by him, but by whom and

1 E. Meyer, Sitzungsberichte der Berliner Ahademie (1908, pp. I4ff.), and more fully in Kuhn's Zeitschrift (xlii. pp. 17 ff.) ; also

Geschichte des Altertums (i. 2, 2nd ed. pp. 807 ff.).

2 Sieg und Siegling, " Tocharisch, die Sprache der Indoskythen " {Sitzb. d. Berl. Ak. 1908, pp. 915 ff.).

8 No. xix. p. 255, " Another ancient and extensive class of languages, united by a greater number of resemblances than can well be altogether accidental, may be denominated the Indo-Euro- pean, comprehending the Indian, the West Asiatic, and almost all the European languages."

when it was invented is not quite ascertained. 1 It is an attempt to name the family by its most easterly and most westerly links. At the time when it was invented it had not 3'et been settled whether Celtic was or was not a member of this family. But in any case the term would not have been wrong, for members of the Germanic stock have been settled for above a thousand years in Iceland, the most westerly land of Europe, and for the last four centuries have increasingly dominated the continent of America. As has been pointed out by Professor Buck of Chicago {Classical Review, xviii. p. 400), owing to the German method of pronouncing eu as oi, the word " Indo-Germanic " is easier for a German to pronounce than " Indo-European." Attempts to discover a more accurate and less ponderous term, such as " Indo-Celtic " or " Celtindic," have not met with popular favour. Aryan (q.v.) is conveniently brief, but is wanted as the proper term for the most easterly branch of the family. What is wanted is a term which does not confuse ethnological and linguistic ideas. Not all speakers of any given language are necessarily of the same stock. In ancient Rome Latin must have been spoken by many slaves or sons of slaves who had no Latin blood in their bodies, though a slave if manumitted by his master might be the father or grandfather of a Roman citizen with full rights. Plautus and Terence were both aliens, the one an Umbrian, the other an African. The speakers of modern English are even a more multifarious body. A possible name for the family, implying only the speaking of a language of the stock without any reference to racial or national characteristics, could be obtained from the name for man, so widely though perhaps not altogether universally diffused throughout the family — Sanskrit was, Lithuanian wyras, Lat. vir, Irish fer, Gothic wair, &c. If the speakers of these languages were called collec- tively Wiros, no confusion with ethnological theories need arise.

It is customary to talk of the roots, stems and suffixes of words in the Indo-European languages. These languages are distinguished from languages like Chinese by the fact that in the great majority of words suffixes can be separated from roots. But the distinction between them and the so-called agglutinative languages is one of degree rather than of kind. In the agglutinative languages, or at any rate in some of them, some of the post-fixed elements have still an independent value. In the Indo-Germanic languages no one can say what the meaning of the earliest suffixes was. Suffixes which have developed in individual languages or individual sections of this family of languages can often be traced, e.g. the often quoted -hood in English words Jike " manhood," or the English -ly in " manly," which has gradually extended till it is actually attached to its own parent like in " likely." But all recent investigation goes to show that before the Indo-European languages separated they possessed words w'th all the characteristics which we recognize in substantives like the Latin dominus or verbs like the Greek buuvvrai. Or, to put the same fact in another way, by the comparative method it is impossible to reach a period when the speakers of Indo-European languages spoke in roots. A " root " is only a convenient philological abstraction; it is merely the remnant which is left when all the elements that can be analysed are taken away; it is therefore only a kind of greatest common measure for a greater or smaller body of words expressing modifications of the same idea. Thus, though by

no means the earliest form of the word, the English man might be taken as the " root " from which are derived by various suffixes manhood, manly, mannish, manful, manned (past tense), manned (participle), unman, mannikin, &c. How far the suffixes which can be traced back to Indo-European times (i.e. to a time before the separation of the languages) had existence as separate entities it is impossible to say. From what we see of the later history of the languages it is much more probable that both forms and signification were very largely the result of analogy. For in the making of new words analogy plays a much larger part than any reference to general principles of formation or composition. New words are to a large extent, even in modern times, the invention of persons unskilled in the history of language.

The first to point out that the term Indo-European (or Indo-Germanic) was not used uniformly in one sense was Professor Kretschmer in his Einleitung in die Geschichte der griechischen Sprachs (Gottingen, 1896), pp. 9 ff. It is in fact used in three senses. (1) Indo-European is treated as preceding and different from all its descendants, a single uniform speech without dialects. But, strictly, no such language can exist, for even individual members of the same family differ from one another in pronunciation, vocabulary,

1 Leo Meyer, " Cbcr den Ursprung der Namen Indogermanen, Semiten und Ugrofinner," in the Gbllinger gelehrte Nachrichtcn, philo- logisch-historische Klasse, 1901, pp. 454 ff.

*sentence formation, etc. Thus it appears impossible to ascertain what the Indo-European term for the numeral I was, since different languages show at least four words for this, three of them presenting the same root with different suffixes: (a) Sanskrit eka (= *ot-quo-) ; (6) Zend aeva, Old Persian aiva, Greek of-(f)o-s (= *oi-uo-) ; (c) Greek oiv-q , " ace," Latin unus (older oenus), Old Irish oen, Gothic ains, Lithuanian venas (where the initial v has no more etymological*

*signification than the w which now begins the pronunciation of the English one), Old Bulgarian inu; (d) Greek eh, ev (= *sem-s). But the Indo-European community must have had a word for the numeral since the various languages agree in forms for the numerals 2 to 10, and the original Indo-European people seem to have been able to count at least as far as 100. On the other hand, if the Indo-European language must have had dialects, the line of differentiation between it and its descendants becomes obliterated. (2) But even when a word is found very widely diffused over the area of the Indo-European languages, it is not justifiable to conclude that therefore the word must have belonged to the original language. The dispersion of the Indo-European people over the areas they now inhabit, or inhabited in the earliest times known to history, must have been gradual, and commerce or communication between different branches must have always existed to some extent; the word might thus have been transmitted from one community to another. When a word is found in two branches which are geo- graphically remote from one another and is not found in the inter- mediate area, the probability that the word is original is somewhat stronger. But even in this case the originality of the word is by no means certain, for (a) the intervening branch or branches which do not possess the word may merely have dropped it and replaced it by another; (b) the geographical position which the branches occupy in historical times may not be their original position; the branches which do not possess the word may have forced themselves into the area they now occupy after they had dropped the word; (c) if the linguistic communities which possess the word have a seaboard and the intervening communities have not, the possibility of its transmission in connexion with early sea-borne commerce must be considered. At the dawn of European history the Phoe- nicians and the Etruscans are great seafarers ; at a later time the Varangians of the North penetrated to the Mediterranean and as far as Constantinople; in modern times sea-borne commerce brought to Europe words from the Caribbean Indians like potato and tobacco, and gave English a new word for man-eating savages — cannibal. Thus with Kretschmer we must distinguish between what is common Indo-European and what is original Indo-European in language. (3) A word may exist in several of the languages, and may have existed in them for a very long time, and yet not be Indo-European. Hehn (Das Sals, ed. 2, 1901) rejects salt as an Indo-European word because it is not found in the Aryan group, though in this case he is probably wrong, (a) because, as has been shown by Professor Johannes Schmidt, its irregular declension (sal-d, genitive sal-nes) possesses characteristics of the oldest Indo-European words; (b) because the great plains of*

Iran are characterized by their great saltness, so that the Aryan branch did not pass through a country where salt was unknown, although, according to Herodotus (i. 133), the Persian did not use salt to season his food. Since Kretschmer wrote, this argument has been used very extensively by Professor A. Meillet of Paris in his Dialectes indo-europeens (Paris, 1908). In this treatise he brings forward arguments from a great variety of facts to show that in the original Indo-European language there were dialects, the Aryan, Armenian, Balto-Slavonic and Albanian, as we have seen, forming an oriental group with novel characteristics developed in common, although in various other characteristics they do not agree. Similarly Italic, Celtic and Germanic form a Western group, while Greek agrees now with the one group now with the other, at some points being more intimately connected with Italic than with any other branch, at others inclining more towards the Aryan. This grouping, however, is by no means exclusive, members of either group having characteristics in common with individuals of the other group which they do not share with the other languages of their own group (Meillet, p. 131 ff.).

From all this it is clear that in many cases it must be extremely uncertain what is original Indo-European and what is not. Some general characteristics can, however, be predicated from what is handed down to us in the earliest forms of all or nearly all the existing languages. (1) The noun had certainly a large number of distinct cases in the singular: nominative, accusative, genitive, ablative,, locative, instrumental, dative. 1 In the plural, however, there was less variety, the forms for dative and ablative being from the earliest times identical. In the dual, the oblique cases cannot be restored with certainty, so little agreement is there between the languages. In the locative-singular the ending —i seems to have been of the nature of a post-position, because in various languages (notably in Sanskrit) forms appear without any suffix. In the locative plural also the difference between the -su of Sanskrit and early Lithuanian (Slavonic ~chu) on the one hand, and of -

1 The vocative is not strictly speaking a case at all, for it stands outside the syntax of the sentence. It was originally an exclamatory form consisting of the bare stem without case suffix. In the plural the nominative is used to supply the lacking vocative form.

seems to be best explained by supposing that the u and — i are post positions, a conclusion which is strengthened by the Greek rule that a between vowels disappears. In the instrumental singular and plura! it is noticeable that there are two suffixes — one, repre- sented in Germanic and Balto-Slavonic only, beginning with the sound -m, the other, surviving in most of the other languages for the plural, going back to an Indo-European form beginning with -bh. Professor Hirt of Leipzig has argued {Idg. Forschungen, v. pp. 251 ff.) that bh originally belonged to the instrumental plural (cf. the Lat. filiabus, omnibus, &c), and the forms with m to the dative and ablative. But this is merely a conjecture, which has no linguistic facts in its favour, for the -bi of the Latin dative tibi, which has parallel forms in many other languages, belongs to the pronouns, which show in their declension many differences from the declension of the noun (cf. also Brugmann, Grundriss (ed. 2), ii. 2, p. 120). (2) The adjective agrees with its noun in gender, number and case, thus introducing a superfluous element of agreement which is not found, e.g. in most of the agglutinative languages. Thus in phrases like the Greek 17 /ca \>) k6pt; or the Latin ilia pulchra puella the feminine gender is expressed three times, with no advantage, so far as can be detected, over the modern English, that fair maid, where it is not obviously expressed at all. In this respect and also in the employment of the same case endings for the plural as well as the singular, in the plural after a syllable expressing plurality, the agglutinative languages have a distinct superiority over the Indo-European languages in their earliest forms. Some languages, like English and Modern Persian, have practically got rid of inflexion altogether and the present difficulty with it; others, like modern German, as the result of phonetic and analogical changes have even intensified the difficulty. (3) In the personal pronouns, especially those of the first and second persons, there is widely spread agreement, but more in the singular than in the plural. Forms corresponding to the English / and thou, the Latin ego and tu, are practically universal. On the other hand the demonstrative pronouns vary very considerably. (4) The system of numerals (subject to slight discrepancies, as that regarding 1 mentioned above) is the same, at least up to 100. (5) In the verb there were at first two voices, the active and the middle, and three moods, the indicative, the subjunctive and the optative. It has been suggested by Professors Oertel and Morris in Harvard Studies, xvi. (p. 101, n. 3) that the simi- larity which exists between the earliest Greek and the earliest Aryan in the moods is the result of a longer common life between those two] branches. But of this there is no proof, and the great difference in I the treatment of the sounds by these two branches (see below) militates very strongly against the

supposition. The tense forms indicated originally not relations in time but different kinds of action. The distinctive forms are the present, the perfect, and the aorist. The present indicated that an action was in progress or continuous, the aorist on the other hand regarded the action as a whole and, as it were, summed it up. The aorist has sometimes been said to express instantaneous action, and so it does. But this is not the essence of the aorist; the aorist may be used also of a long continued action when it is regarded as a whole. Greek shows this very clearly. In Athenian official inscriptions it was usual to fix the date of the record by stating at the commencement who was the chief magistrate (archon) of the year. This was expressed by the imperfect rtpx<0- But when reference was made to a past archonship, that was expressed by the aorist (i)p£e). The same characteristic is evident also in prohibitions; thus, in Plato's Apology of Socrates, iiriSopvPrjiriTe is" Do not begin to make a disturbance," jji) OopvPeire is " Do not keep on making a disturbance." These points are most easily illustrated from Greek, because Greek, better than the other languages, has kept the distinctive usages of both moods and tenses. The perfect as distinguished from the other forms expresses either repetition of the action, emphasis, or the state which results from the action expressed by the verb. Different languages regard this last in different ways. Sometimes the state resulting from the action is so characteristic that the perfect is almost an independent verb. Thus in Greek kt6.o/io.i is " I acquire," but KtKTrmat (the perfect) is " I possess," the result of the action of acquiring. On the other hand the perfect may mean that the action has come to an end. This is specially common in Latin, as in Cicero's famous announcement of the execution of the Catilinarian conspira- tors, — Vixerunt ("They have lived " = " They are no more"). But it is by no means confined to Latin. The pluperfect, the past of the perfect, is a late development and can hardly be reckoned Indo-European. In Greek the forms clearly arise from adding aorist endings to a perfect stem. The forms of Latin are not yet com- pletely explained — but it is certain that the specially Latin meaning expressing something that was past at a time already past (relative time) is a late growth. When Homeric Greek wishes to express this meaning it uses most frequently the aorist, but also the imperfect as well as the pluperfect, the notion of relative time being derived from the context. In the earliest Latin the pluperfect is not un- commonly used with the value of the aorist perfect. As regards the future it is difficult to say how far it was an original form. Some languages, like Germanic, preserve no original form for the future. When the present is found not to be distinctive enough, periphrastic forms come in. In other languages, like Latin and Greek, there is

constant confusion between subjunctive and future

forms. It is impossible to distinguish by their form between Sef£a> (future) and 8ei£w (subjunctive), between regam (future) and regam (subjunctive). A special future with a suffix sip (syo) is found only with certainty in the Aryan group and the Baltic languages. The future perfect is, strictly speaking, only a future made from a perfect stem; in the Latin sense it is certainly a late development, and even in early Latin, videro has occasionally no different meaning from videbo. The imperative, which was originally an exclamatory form to the verb, of the same kind as the vocative was to the noun, and which consisted simply o(the verb stem without further suffixes, developed, partly on the analogy of the present and partly with the help of adverbs, a complete paradigm. The infinitives of all the languages are noun cases, generally stereotyped in form and no longer in touch with a noun system, though this, e.g. in early Sanskrit, is not always true. The participles differ only from other adjectives in governing the same case as their verb; and this is not an early distinction, for in the earliest Sanskrit all verbal nouns may govern the same case as their verb.

The system here sketched in the barest outline tended steadily to fall into decay. The case system was not extensive enough to express even the commonest relations. Thus there was no means of distinguishing by the cases between starting from outside and starting from inside, ideas which, e.g. Finnish regards as requiring separate cases ; without a preposition it was impossible to distinguish between on and in, though to the person concerned there is much difference, for example between being on a river and in a river. There are other difficulties of the same kind. These had to be got over by the use of adverbs. But no sooner had the adverbs become well established for the purpose of defining these local relations than the meaning was felt to exist more in the adverb than in the case ending. For this syntactical reason, as well as for mechanical reasons arising from accent (q.v.), the case system in some languages fell more and more into desuetude. In Sanskrit it has been kept entire, in Balto-Slavonic the only loss has been the disappearance of the original genitive and its replacement by the ablative. In Latin the locative has been confused with the genitive and the ablative, and the instrumental with the ablative. The loss of the locative as an independent case had not long preceded historical times, because it survives in Oscan, the kindred dialect of the neighbouring Cam- pania. Greek has confused ablative with genitive, except for one small relic recently discovered on an inscription at Delphi; in the consonant stems it has replaced the dative by the locative form and confused in it dative, locative

and instrumental meanings. In some other members of the family, e.g. Germanic, the confusion has gone still farther.

The fate of the verb is similar, though the two paradigms do not necessarily decay at the same rate. Thus Latin has modified its verb system much more than its noun system, and Greek, while reducing seriously its noun forms, shows a very elaborate verb system, which has no parallel except in the Aryan group. From the syntactical point of view, however, the Greek system is much superior to the Aryan, which has converted its perfect into a past tense in classical Sanskrit, and to a large extent lost grip of the moods. The decay in Aryan may be largely attributed to the power, which this group developed beyond any other, of making compounds which in practice took the place of subordinate sentences to a large extent. The causes for the modifications which the Latin verb system has undergone are more obscure, but they are shared not only by its immediate neighbours the other Italic dialects, but also to a great degree by the more remote Celtic dialects.

The origin and spread of the Indo-European languages has long been, and remains, a vexed question. No sooner had Bopp laid the foundation of Comparative Philology in his great work, the first edition of which appeared in 1833-1835, than this question began to be seriously considered. The earlier writers agreed in regarding Asia as the original home of the speakers of these languages. For this belief there were various grounds, — statements in the Biblical record, the greater originality (according to Schlegel) of Sanskrit, the absurd belief that the migrations of mankind always proceeded towards the west. The view propounded by an English philologist, Dr R. G. Latham, that the original home was in Europe, was scouted by one of the most eminent writers on the subject — Victor Hehn — as lunacy possible only to one who lived in a country of cranks. Latham's view was first put forward in 1851, and in half a century opinion had almost universally come over to his side. Max Muller indeed to the last held to the view that the home was " somewhere in Asia," and Professor Johannes Schmidt of Berlin, in a paper read before the Oriental Congress at Stock- holm in 1889, argued for a close contact between early Indo- European and Assyrian civilization, from the borrowing of one or two words and the existence of duodecimal elements in the Indo-European numeral system side by side with the prevalent decimal system — the dozen, the gross, the long hundred (120), &c.

At 60 the systems crossed, and 60 was a very characteristic element in Assyrian numeration, whence come our minutes and seconds and many other units. 1

Even before Latham a Belgian geologist, d'Omalius d'Halloy, in 1848 had raised objections to the theory of the Asiatic origin of the Indo-Europeans, but his views remained unheeded. In 1864 he brought three questions before the Socitti d' anthropologic of Paris: (1) VVhat are the proofs of the Asiatic origin of Europeans? (2) Have not inflectional languages passed from Europe to Asia rather than from Asia to Europe? (3) Are not the speakers of Celtic languages the descendants of the autochthonous peoples of Western Europe? (Reinach, op. cit. p. 38). Broca in replying to d'Omalius emphasized the fact which has been too often forgotten in this controversy, that race and language are not necessarily identical. In 1868 Professor Benfey of Gottingen argued for the south-east of Europe as the original home, while Ludwig Geiger in 1871 placed it in Germany, a view which in later times has had not a few supporters. Truth to tell, however, we are not yet ready to fix the site of the original home. Before this can be done, many factors as yet im- perfectly known must be more completely ascertained. The pre- historic conditions of Northern, Western, Central and South-eastern Europe have been carefully investigated, but important new dis- coveries are still continually being made. Investigation of other parts of Europe is less complete, and prehistoric conditions in Asia are at present very imperfectly known. In Western Europe two prehistoric races are known, the palaeolithic and the neolithic. The former, distinguished by their great skill in drawing figures of animals, especially the horse, the reindeer, and the mam- moth, preceded the period of the Great Ice Age which rendered Northern Europe to the latitude of London and Berlin uninhabitable for a period, the length of which, as of all geological ages, cannot definitely be ascertained. For the present purpose, however, this is of less importance, because it is not claimed that the Indo-European stock is of so great antiquity. But when the ice again retreated it must have been long before Northern Europe could have maintained a population of human beings. The disappearance of the surface ice must have been followed by a long period when ice still remained underground, and the surface was occupied by swamps and barren tundras, as Northern Siberia is now. Wnen a human population once more occupied Northern Europe it is impossible to estimate in years. The problem may be attacked from the opposite direction. How long would it have taken for the Indo-European stock to spread from its original home to its modern areas

of occupation? Some recent writers say that it is unnecessary to carry the stock back farther than 2500 B.C.— a period when the civilizations of Egypt and Meso- potamia were already ancient. Wherever the original home was situated, this date is probably fixed too low. The discussion, more- over, is in danger not only of moving in one vicious circle but in two. (a) The term " Indo-European stock " necessarily implies race, but why might not the language have been from the earliest times at which we can trace it the language of a mixed race? (ft) It is usual to assume that the Indo-European stock was tall and blond, in fact much as the classical writers describe the early Germans. But the truth of this hypothesis is much more difficult to demonstrate. In most countries known to the ancients where blond hair prevailed, at the present day dark or brown hair is much more in evidence. Moreover the colour of fair hair often varies from childhood to middle life, and the flaxen hair of youth is very frequently replaced by a much darker shade in the adult. It has been often pointed out that many of Homer's heroes are xanthoi, and it is frequently argued that {avflAs means blond. This, however, is anything but certain, even when Vacher de Lapouge has collected all the passages in ancient writers which bear upon the subject. When Diodorus (v. 32) wishes to describe the children of the Galatae, by whom apparently he means the Germans, he says that their hair as children is generally white, but as they grow up it is assimilated to the colour of their fathers. The ethnological argument as to long-headed and short-headed races (dolichocephalic and brachycephalic) seems untrustworthy, because in countries described as dolichocephalic short skulls abound and vice versa. Moreover this classification, to which much more attention has been devoted than its inventor Retzius ever intended, is in itself unsatisfactory. The relation between the length and breadth of the head without consideration of the total size is clearly an unsatisfactory criterion. It is true that to the mathematician J or | or t S are of identical value, but, if it be also generally true that mental and physical energy are dependent on the size and weight of the brain, then the mere mathematical relation between length and breadth is of less importance than the size of the quantities. Anthropologists appear now to recognize this themselves. The argument from physical geography seems more important. But here also no certain answer can be obtained till more is known of the conditions, in early times, of the eastern part of the area.

1 For the history of the controversy see the excellent summary in Salomon Reinach's L'Origine des Aryens: Historic d'une controverse (1892). Max Miiller's latest views are contained in his Biographies

of Words and the Home of the Aryas (1888). See Schmidt's Die Urheimat der Indogermanen und das europaische ZaMsystem (1890).

According to Ratzel 2 the Caspian was once very much larger thajs it is now, and to the north of it there extended a great area of swamp, which made it practically impossible for the Indo-European race to have crossed north of the Caspian from either continent to the other. At an early period the Caspian and Black Sea were con- nected, and the Sea of Marmora and the Dardanelles were repre- sented by a river which entered the Aegean at a point near the island of Andros. While the northern Aegean was still land divided only by a river, it is clear that migration from south-eastern Europe to Asia Minor, or reversely, might have taken place with ease. Even in much later times the Dardanelles have formed no serious barrier to migration in either direction. At the dawn of history, Thracian tribes crossed it and founded, it seems, the Phrygian and Armenian stock in Asia Minor; the Gauls at a iater time followed the same road, as did Alexander the Great a generation earlier. At the end of the middle ages, Asia sent by way of the Dardanelles the invading Turks into Europe. The Greeks, a nation of sea- farers, on the other hand reached Asia directly across the Aegean, using the islands, as it were, as stepping-stones.

*Though much more attention has been devoted to the subject by recent writers than was earlier the practice, it is doubtful whether migration by sea has even now been assigned its full importance. The most mysterious people of antiquity, the Pelasgians, do not seem to be in all cases the same stock, as their name appears merely to mean " the people of the sea," TltXaoyoi representing an earlier ireXa7s-Koi, where ireXays is the weak form of the stem of iri\ayos, " sea," and -/cot the ending so frequent in the names of peoples. A parallel to the sound changes may be seen in iiiayoi, for *niy~oKw, by the side of /ily-wm. As time goes on, evidence seems more and more to tend to confirm the truth of the great migrations by sea, recorded by Herodotus, of Lydians to Etruria, of Eteocretans both to east and west. An argument in favour of the original Indo- Europeans being seated in north-western Germany has been de- veloped by G. Kossinna (Zeitschriftfiir Etknologie, 1902, pp. 161-222) from the forms and ornamentation of ancient pottery. It has certainly not been generally received with favour, and as Kossinna himself affirms that the classification of prehistoric pottery is still an undeveloped science, his theory is clearly at present unequal to the weight of such a superstructure as he would build upon it. As the allied sciences are not prepared with an answer, it is necessary to fall back upon the*

Indo-European languages themselves. The attempt has often been made to ascertain both the position of the original home and the stage of civilization which the original com- munity had reached from a consideration of the vocabulary for plants and animals common to the various languages of the Indo- European family. But the experience of recent centuries warns us to be wary in the application of this argument. If we cut off all past history and regard the language of the present day as we have perforce to regard our earliest records, two of the words most widely disseminated amongst the Indo-European people of Europe are tobacco and potato. Without historical records it would be im- possible for us to discover that these words in their earliest European form had been borrowed from the Caribbean Indians. Most languages tend to adopt with an imported product the name given to it by its producers, though frequently misunderstanding arises, as in the case of the two words mentioned, the potato being properly the yam, and tobacco being properly the pipe, while petum or petun (cp. petunia) was the plant. 5

The first treatise in which an attempt was made to work out the primitive Indo-European civilisation in detail was Adolphe Pictet's Les Origines indo-europeennes ou les Aryas primitifs (1 859-1 863). The idyllic conditions in which, according to Pictet, early Indo-European man subsisted were accepted and extended by many enthusiastic successors. The father, the protector of the family (pater from pa, protect), and the mother (mater from ma, to produce) were surrounded by their children (Skt. putra), whose name implied that they kept everything clean and neat. The daughter was the milkmaid (Skt. duhitd from duh, milk), while the brother (Skt. bhratdr), derived from the root olferre, " bear," was the natural pro- tector of his sister, whose name, with some hesitation, is decided to mean " she who dwells with her brother," the notion of brother and sister marriage being, however, summarily rejected (ii. p. 365). The uncle and aunt are a second father and mother to the family, and for this reason nepos, Skt. napat, is both nephew and grandson. The life of such families was pastoral but not nomad ; there was a farmstead where the women were busied with housewifery and butter-making, while the men drove their flocks afield. The ox, the horse, the sheep, the goat and the pig were domesticated as well as the dog and the farmyard fowls, but it was in oxen that their chief wealth consisted. Hence a cow was offered to an honoured guest, cows were the object of armed raids upon their neighbours, and when a member of the family died, a cow was killed to accompany him in the next world. Even the phenomena of nature to their

2 " Geographische Prilfung der Tatsachen iiber den Ursprung der Volker Europas " (Berichte der k. sdchsischen Ges. d. Wissenschaften, 1900, pp. 34 ff.).

3 See the essay on " Evolution and the Science of Language," in Darwin and Modem Science (1909), p. 524 f.

A

t Dm

FRENCH

INDO-CHINA

& SIAM

Scale, t:8,ooo,ooo

English Mil

State Capitals

Provincial Capitals.. Railways..

I&3FT E "°8° F "°"

ⁱ#MWt A

— -K-w’a-ng-tu-|ng-

;

1

*i */. ., ■■Norway Is.*

fouths of Song-Koi(RedRwei

// of

C.Cam

T o n g h

*r , £= * – §ˆak-Nam-Po»Nakhon-SaWan->0. ; ˆ H, / f M.Iott-Sot*

Mui-Dong

.Buflg’Hwiua

ˆUng-stai

C.Basth

w

t V /M. N’ang-Ronci ˆ

ElijtKnstdne. \Mi

£> ”«»

j ‘M.Iott-SotonJ

SˆM’i

,M.Suren.

, ˆ!chim -ˆrˆ;.

Bang Plaso

■M-Kwei

.MelupreJ

W. Ufchon, Peng m^^T. ^ ,• gvj

.....Kukan -^7

r^fe^i "li"^K ~%Tf}?& C. Towane*

'ii/ao CJiam -FO

^Kwang-Ngai iHo-Duc

/Knongji

/"

Gulf

S i a

m

p/fnii/Samui

"/^W

X

*_ _ Teru tao I. ft *^*

C.St.Jacciites

futo Panjang

e Pulo 0bi 4 Kwafon i

(Cape Cambodi—i)'i ,Pulo Obi 'Hull

vGr.Catvik 'PulaSapat

yfPulo Condore

'DeuxFreres

H

t Perkent

naive imaginations could be represented by cows: the clouds of heaven were cows whose milk nourished the earth, the stars were a herd with the sun as the bull amongst them, the earth was a cow yielding her increase. Before the original community, which extended over a wide area with Bactria for its centre, had broken up, agriculture had begun, and barley, if not other cereals, and various leguminous plants were cultivated. Oxen drew the plough and the wagon. Industry also had developed with the introduction of agriculture ; the carpenter with a variety of tools appears to construct farm implements, buildings and furniture, and the smith is no less busy. Implements had begun with stone, but by this time were made of bronze if not of iron, for the metals gold, silver, copper, tin were certainly known. Spinning and weaving had also begun; pottery was well developed. The flocks and herds and agriculture supplied food with plenty of variety; fermented liquors, mead, probably wine and perhaps beer, were used, not always in moderation. A great variety of military weapons had been invented, but geo- graphical reasons prevented navigation from developing in Bactria. Towns existed and fortified places. The people were organized in clans, the clans in tribes. At the head of all, though not in the most primitive epoch, was the king, who reigned not by hereditary right, but by election. Though money had not yet been invented, exchange and barter flourished ; there were borrowers and lenders, and property passed from father to son. Though we have no definite information as to their laws, justice was administered; murder, theft and fraud were punished with death, imprisonment or fine (ResumG gineral at end of vol. ii.).

Further investigation, however, did not confirm this ideally happy form of primitive civilization. Many of Pictet's etymologies were erroneous, many of his deductions based on very uncertain evidence. No recent writer adopts Pictet's views of the Indo-European family. But his list of domesticated animals is approximately correct, if domestication is used loosely simply of animals that might be kept by the Indo-European man about his homestead. Even at the present day

domestication means different things in the case of different animals. A pig is not domesticated as a dog is; in areas like the Hebrides or western Ireland, where cattle and human beings share the two ends of the same building, domestication means some- thing very different from the treatment of large herds on a farm extending to many hundreds of acres. In other respects the height of the civilization was vastly exaggerated. That the Indo-European people were agricultural as well as pastoral seems highly probable. But as Heraclides says of the Athamanes (Fragmenta hist. Graec. ii. 219), the women were the agriculturists, while the men were shepherds. Agriculture begins on a very small scale with the dibbling by means of a pointed stick of a few seeds of some plant which the women recognize as useful either for food or medicine, and is possible only when the people have ceased to be absolutely nomad and have fixed settlements for continuous periods of some length. The pastoral habit is broken down in men only by starvation, if the pasture-lands become too cramped through an excessive increase of population or are seized by a conqueror. As has been well said, " of all the ordinary means of gaining a livelihood — with the ex- ception perhaps of mining — agriculture is the most laborious, and is never voluntarily adopted by men who have not been accustomed to it from their childhood " (Mackenzie Wallace, Russia, new ed. i. p. 266, in relating the conversion of the Bashkir Tatars to agri- culture). Even the plough, in the primitive form of a tree stump with two branches, one forming the handle, the other the pole, was developed, and to this period may belong the representations in rock carvings in Sweden and the Alps of a pair of oxen in the plough (S. Muller, Nordische Altertumskunde, i. 205; Dechelette, Manuel d'archeologie, ii. pp. 492 ff.). The Indo-European civilization in its beginnings apparently belongs to the chalcolithic period (sometimes described by the barbarous term of Italian origin eneolithic) when copper, if not bronze had come in, but the use of stone for many purposes had not yet gone out. While primitive Indo-European man apparently knew, as has been said, the horse, ox, sheep, goat, pig and dog, it is to be observed that in their wild state at least these animals do not all affect the same kind of area. The horse is an animal of the open plain; the foal always accompanies the mother, for at first its neck is too short to allow it to graze, and the mare, unlike the cow, has no large udder in which to carry a great supply of milk. The cow, on the other hand, hides her calf in a brake when she goes to graze, and is more a woodland animal. The pig's natural habitat is the forest where beech mast, acorns, or chestnuts are plentiful. The goat is a climber and affects the heights, while the sheep also prefers short grass to the richer pastures suited to kine. To collect and tame all those animals implies

control of an extensive and varied area.

What of the trees known to primitive Indo-European man? On this the greater part of the arguments regarding the original home have turned. The name for the beech extends through a considerable number of Indo-European languages, and it has generally been assumed that the beech must have been known from the first and therefore must have been a tree which flourished in the original home. Now the habitat of the beech is to the west of a line drawn from Konigsberg to the Crimea. The argument assumes that its distribution was always the same. But nothing is more certain than that in different ages "different trees succeed one another on

*the same soil. In the peat mosses of north-east Scotland are found the trunks of vast oaks which have no parallel among the trees which grow in the same district now, where the oak has a hard struggle to live at all, and where experience teaches the planter that coniferous trees will be more successful. On the coast of Denmark in the same way the conifer has replaced the beech since the days of the " kitchen middens," from which so much information as to the primitive inhabitants of that area has been obtained. But with regard to the names of trees there are two serious pitfalls which it is difficult to avoid, (a) It is common to give a tree the name of another which in habit it resembles. In England the oriental plane does not grow freely north of the Trent; accordingly, farther north the sycamore, which has a leaf that a casual observer might think similar, has usurped the name of the plane. (6) In the case of the beech (Lat. fagus), the corresponding Greek word ifaybs does not mean beech but oak, or possibly, if one may judge from the magnificent trees of north-west Greece, the chestnut. It has been suggested that the word is connected with the verb ay£v to eat, so that it was originally the tree with edible fruit and could thus be specialized in different senses in different areas. If, however, Bartholomae's connexion of the Kurd buz, " elm " (Idg. Forschungen, ix. 271) be correct, there can be no relation between aytiv and yy6s, but the latter comes from a root *bhdug, in which the g would become z among the satem languages. The birch is a more widely spread tree than the beech, growing as luxuriantly in the Himalayas as in western Europe, but notwithstanding, the Latin fraxinus, which is almost certainly of the same origin, means not birch but ash, while the word akin to ash (Gr. 6|4ij) appears in Latin without the k suffix as os- in Latin ornus, " mountain ash," for an earlier *osinos, cp. Old Bulgarian jasenil (the j has no etymological value), Welsh and Cornish onnen, from an original Celtic *onna from *os-na. One of the most widely spread tree names is the word tree itself, which appears in a variety*

of forms, Gr. SpOs, Goth triu; Skt. darn, Bopv, &c, which is sometimes as in Greek specially limited to the oak, while the Indian deodar' (deva-daru) is a conifer. O. Schrader, who in his remarkable book, Sprachvergleichung und Urgeschichte (1883, 3rd ed., 1906-1907), locates the original home in southern Russia, would allow the original community (ii. p. 178) to be partly within, partly without the beech line. The only other tree the name of which is widely spread is the willow: the English with, withy, Lat. vitex, Gr. Irka for Firea, Lithuanian wytis, Zend vaeti. Otherwise the words for trees are limited to a small number of languages, and the meaning in different languages is widely different, as Gr. iX&rji, " pine," Old High German linta, " linden," with which go the Latin linter, " boat," and Lithuanian lenti, " board." The lime tree and the birch do not exist in Greece, and the Latin betula is a borrowing from Gaulish (Irish belhe), the native word fraxinus, as we have seen, being used for the ash. The equation of the Latin taxus, " yew," with Gr. t6|

Some of the names for cultivated plants are widely spread, but like the names of trees do not always indicate the same thing. This is not surprising if we consider that the word corn, within the Teutonic languages alone, means wheat in England, oats in Scotland, rye in Germany, barley in Sweden, maize in the United States of America. Thus the Skt. ydva means corn or barley, in Zend corn (modern Persian jav, barley, but in the language of the Ossetes yeu, yau is millet), the Gk. fed is spelt, the Lithuanian jawal corn, the Irish eorna barley (Schrader, Sprachvergleichung, 3 ii. p. 188). The word bere or barley itself is widely spread in Europe — Latin far, spelt, Goth, barheins, " of barley," Old Norse ban. Old Slav, buru, a kind of millet (ibid.). But the original habitat of the cultivated grain plants has not yet been clearly established, and circumstances of many kinds may occasion a change in the kind of grain cultivated, provided another can be found suitable to the climate. In early England it is clear that the prevalent crop was barley, for barn is the bere-ern or barley-house.

The earliest tree-fruits found in Europe are apparently those discovered by Edouard Piette as Mas d'Azil in a stratum which he places between palaeolithic and neolithic. They included nuts, plums, birdcherry, sloe, &c, and along with them was a little heap of grains of wheat. If Piette's observations are correct, this find must go back to a date long preceding the fruits found by Heer in the pile-dwellings of Switzerland. Here also cherry-stones were found, though the modern cherry is said to have been imported first by Lucullus in the first century B.C. from Cerasus in Pontus, whence its name. In the pile-dwellings a considerable number of apples were found. They

were generally cut up into two or three pieces, apparently to be dried for winter use. In all probability they were wild apples of the variety Pirus silvatica, which is found across the whole of Central Europe from north to south (Buschan, Voreeschichtliche Botanik, p. 166). The original habitat of the apple is uncertain, but it is supposed to be indigenous at any rate south of the Black Sea(Schrader, Reallexikon, s. v. Apfelbaum). The history of the name is obscure; it is often connected with the Campanian town Abella, which Virgil 04 eneid, vii. 740) calls malifera.

"apple-bearing." Here also the material for fixingthe siteof the original habitat is untrustworthy.

*The attempt has been made to limit the possible area by a consideration of three animals which are said not to occur in certain parts of it — (a) the eel, which is said not to be found in the Black Sea ; (b) the honey bee, which is not found in that part of Central Asia drained by the Oxus and Jaxartes; (c) the tortoise, which is not found in northern areas. From evidence collected by Schrader from a specialist at Bucharest (Sprachvergleichung, 3 ii. p. 147) eels are found in the Black Sea. The argument, therefore, for excluding the area which drains into the Black Sea from the possible habitat of the primitive Indo-European community falls to the ground. Honey was certainly familiar at an early age, as is shown by the occurrence of the word *medhu, Skt. mddhu, Gr. yuHv (here the meaning has shifted from mead to wine), Irish mid, English mead. Old Slav, medu, Lithuanian medils honey, midds mead. Schrader, who is the first to utilize the name of the tortoise in this argument, points out (op. cil. p. 148) that forms from the same root occur in both a centum and a satem language — Gr. x £ Ms, xeMnri, Old Slav, zily, zeluvi — but that while it reaches far north in eastern Europe, it does not pass the 46th parallel of latitude in western Europe. This argument would make not only the German site for the original home which is supported by Kossinna and Hirt impossible, but also that of Scandinavia contended for by Penka.*

From the foregoing it will be seen that the arguments for any given area are not conclusive. In the great plain which extends across Europe north of the Alps and Carpathians and across Asia north of the Hindu Kush there are few geographical obstacles to prevent the rapid spread of peoples from any part of its area to any other, and,

as we have seen, the Celts and the Hungarians, &c, have, in the historical period, demonstrated the rapidity with which such migrations could be made. Such migration may possibly account for the ap- pearance of a people using a centum language so far east as Turkestan. But our information as to Tocharish is still too fragmentary to decide the question. It is impossible here to discuss at any length the relations between the separate Indo-European languages, a subject which has formed, from somewhat different points of view, the subject of Kretschmer's Einleitung in die Geschichte der griechischen Sprachc and Mcillet's Les Dialectes indo-europeennes.

Bibliography. — Besides the articles on the separate languages in this Encyclopaedia the following works are the most important for consultation: K. Brugmann (phonology and morphology) and B. Delbriick (syntax), Grundriss der vergleichenden Grammatik der indogermanischen Sprachen (1886-1900), ed. 2, vol. i. (1897); of vol. ii. two large parts, including the stem formation and in- flexion of the noun, the pronoun and the numerals, have been pub- lished in 1906 and 1909. A shorter work by Brugmann, Kurze vergleichende Grammatik der indogermanischen Sprachen, dealing mainly with Sanskrit, Greek, Latin, Germanic and Slavonic, appeared in three parts in 1902-1903. A good but less elaborate work is A. Meillet, Introduction a I'etude comparative des langues indo-europeennes (1903, 2nd ed. 1908). For the ethnological argument: VV. Z. Ripley, The Races of Europe (1900); G. Sergi, The Mediterranean Race (English edition, 1901). Other works, now largely superseded, which deal with this argument are K. Penka, Origines Ariacae (1883), and Die Herkunft der Arier (1886), and I. Taylor, The Origin of the Aryans , n.d. (1890). The ethnologists are no more in agreement than the philologists. For the arguments mainly trom the linguistic side see especially O. Schrader, Sprachvergleichung und Urgeschichte (3rd ed., 2 vols., 1906-1907) — the second edition was translated into English by Dr F. B. Jevons under the title Pre- historic Antiquities of the Aryan Peoples (1890); Reallexikon der indogermanischen Altertumskunde (1901); M. Much, Die Heimat der Indogermanen (1902, 2nd ed. 1904); E. de Michelis, VOrigine degli Indo-europei (1903); H. Hirt, Die Indogermanen (2 vols., 1905-1907); S. Feist, Europa im Lichte der V or geschichte und die Ergeb- nisse der vergleichenden indogermanischen Sprachwissenschaft, 1910, in W. Sieglin's Quellen und Forschungen zur alien Geschichte und Geographic. Important for special sections of this question are S. Muller, Nordische Altertumskunde (2 vols., 1 897-1 898), and Urge- schichte Europas (1905); V. Hehn, Kullurpflanzen und Haustiere

(1870), 7th ed. edited by O. Schrader, with contributions on botany by A. Engler (1902); J. Hoops, Waldbaume und Kullurpflanzen im germanischen Altertum (1905). Delbriick has devoted a special monograph to the I.-E. names of relationships, from which he shows that the I.-E. family was patriarchal, not matriarchal (Die idg. Verwandtschaftsnamen, 1889). E. Meyer, from Tocharish being a centum language, has revived with reserve the hypothesis of the Asiatic origin (Geschichte des Alterlums, 2 I. 2, p. 801) . (P. Gl.)

INDOLE, or Benzopyrrol, C 8 H 7 N, a substance first prepared by A. Baeyer in 1868. It may be synthetically obtained by distilling oxindole (CsHjNO) with zinc dust; by heating ortho- nitrocinnamic acid with potash and iron filings; by the reduction of indigo blue; by the action of sodium ethylate on ortho- aminochlorstyrene; by boiling aniline with dichloracetaldehyde; by the dry distillation of ortho-tolyloxamic acid; by heating aniline with dichloracetal; by distilling a mixture of calcium

formate and calcium anilidoacetate; and by heating pyruvic acid phenyl hydrazone with anhydrous zinc chloride. It is also formed in the pancreatic fermentation of albumen, and, in small quantities, by passing the vapours of mono- and dialkyl- anilines through a red-hot tube. It crystallizes in shining leaflets, which melt at 52 C. and boil at 245° C. (with decom- position), and is volatile in a current of steam. It is a feeble base, and gives a cherry-red coloration with a pine shaving. Many derivatives of indole are known. B-methyl indol or skatole occurs in human faeces.

INDONESIAN, a term invented by James Richardson Logan to describe the light-coloured non-Malay inhabitants of the Eastern Archipelago. It now denotes all those peoples of Malaysia and Polynesia who are not to be classified as Malays or Papuans, but are of Caucasic type. Among these are the Battaks of north Sumatra: many of the Bornean Dyaks and Philippine Islanders, and the large brown race of east Polynesia which includes Samoans, Maoris, Tongans, Tahitians, Marquesas Islanders and the Hawaiians.

See J. Richardson Logan, The Languages and Ethnology of the Indian Archipelago (1857).

INDORE, a native state of India in the central India agency, comprising the dominions of the Maharaja Holkar. Its area, exclusive of guaranteed holdings on which it has claims, is 9500 sq. m. and the population in 1901 was 850,690, showing a decrease of 23% in the decade, owing to the results of famine. As in the case of

most states in central India the territory is not homogeneous, but distributed over several political charges. It has portions in four out of the seven charges of central India, and in one small portion in the Rajputana agency. The Vindhya range traverses the S. division of the state in a direction from east to west, a small part of the territory lying to the north of the mountains, but by much the larger part to the south. The latter is a portion of the valley of the Nerbudda, and is bounded on the south by the Satpura hills. Basalt and other volcanic formations predominate in both ranges, although there is also much sandstone. The Nerbudda flows through the state; and the valley at Mandlesar, in the central part, is between 600 and 700 ft. above the sea. The revenue is estimated at £350,000. The metre gauge railway from Khandwa to Mhow and Indore city, continued to Neemuch and Ajmere, was constructed in 1876.

The state had its origin in an assignment of lands made early in the 18th century to Malhar Rao Holkar, who held a command in the army of the Mahratta Peshwa. Of the Dhangar or shepherd caste, he was born in 1694 at the village of Hoi near Poona, and from this circumstance the family derives its surname of Holkar. Before his death in 1766 Malhar Rao had added to his assignment large territorial possessions acquired by his armed power during the confusion of the period. By the end of that century the rulership had passed to another leader of the same clan, Tukoji Holkar, whose son, Jaswant Rao, took an important part in the contest for predominance in the Mahratta confederation. He did not, however, join the combined army of Sindha and the raja of Berar in their war against the British in 1803, though after its termination he provoked hostilities which led to his complete discomfiture. At first he defeated a British force that had marched against him under Colonel Monson; but when he made an inroad into British territory he was completely defeated by Lord Lake, and com- pelled to sign a treaty which deprived him of a large portion of his possessions. After his death his favourite mistress, Tulsi Bai, assumed the regency, until in 181 7 she was murdered by the military commanders of the Indore troops, who declared for the peshwa on his rupture with the British government. After their defeat at Mehidpur in 1818, the state submitted by treaty to the loss of more territory, transferred to the British government its suzerainty over a number of minor tributary states, and acknowledged the British protectorate. For many years afterwards the administration of the Holkar princes was troubled by intestine quarrels, misrule and dynastic contentions, necessitating the frequent interposition of ˆ British authority;

and in 1857 the army, breaking away from the chief's control, besieged the British residency, and took advantage of the mutiny of the Bengal sepoys to spread disorder over that part of central India. The country was pacified after some fighting. In 1899 a British resident was appointed to Indore, which had formerly been directly under the agent to the governor-general in central India. At the same time a change was made in the system of administration, which was from that date carried on by a council In 1903 the Maharaja, Shivaji Rao Holkar, G.C.S.I., abdicated in favour of his son Tukoji Rao, a boy of twelve, and died in 1908.

The City of Indore is situated 1738 ft. above the sea, on the river Saraswati, near its junction with the Khan. Pop. (1901) 86,686. These figures do not include the tract assigned to the resident, known as " the camp " (pop. 11,118), which is under British administration. The city is one of the most important trading centres in central India.

Indore Residency, a political charge in central India, is not co-extensive with the state, though it includes all of it except some outlying tracts. Area, 8960 sq. m.; pop. (1901) 833,410. (J. S. Co.)

INDORSEMENT, or Endorsement (from Med. Lat. indorsare, to write upon the dorsum, or back), anything written or printed upon the back of a document. In its technical sense, it is the writing upon a bill of exchange, cheque or other negotiable instrument, by one who has a right to the instrument and who thereby transmits the right and incurs certain liabilities. See Bill of Exchange.

INDO-SCYTHIANS, a name commonly given to various tribes from central Asia, who invaded northern India and founded kingdoms there. They comprise the Sakas, the Yue-Chi or Kushans and the Ephthalites or Hunas.

INDRA, in early Hindu mythology, god of the clear sky and greatest of the Vedic deities. The origin of the name is doubtful, but is by some connected with indu, drop. His importance is shown by the fact that about 250 hymns celebrate his greatness, nearly one-fourth of the total number in the Rig Veda. He is represented as specially lord of the elements, the thunder-god. But Indra was more than a great god in the ancient Vedic pantheon. He is the patron-deity of the invading Aryan race in India, the god of battle to whose help they look in their struggles with the dark aborigines. Indra is the child of

Dyaus, the Heaven. In Indian art he is repre- sented as a man with four arms and hands; in two he holds a lance and in the third a thunderbolt. He is often painted with eyes all over his body and then he is called Sahasraksha, " the thousand eyed." He lost much of his supremacy when the triad Brahma, Siva and Vishnu became predominant. He gradually became identified merely with the headship of Swarga, a local vice-regent of the abode of the gods.

See A. A. Macdoncll, Vedic Mythology (Strassburg, 1897).

INDRE, a department of central France, formed in 1790 from parts of the old provinces of Berry, Orl6anais, Marche and Touraine. Pop. (1906) 290,216, Area 2666 sq. m. It is bounded N. by the department of Loir-et-Cher, E. by Cher, S. by Creuse and Haute-Vienne, S.W. by Vienne and N.W. by Indre-et-Loire. It takes its name from the river Indre, which flows through it. The surface forms a vast plateau divided into three districts, the Boischaut, Champagne and Brenne. The Boischaut is a large well-wooded plain comprising seven-tenths of the entire area and covering the south, east and centre of the department. The Champagne, a monotonous but fertile district in the north, produces abundant cereal crops, and affords excellent pasturage for large numbers of sheep, celebrated for the fineness of their wool. The Brenne, which occupies the west of the department, was formerly marshy and unhealthy, but draining and afforesta- tion have brought about considerable improvement.

The department is divided into the arrondissements of Chateauroux, Le Blanc, La Chatre and Issoudun, with 23 cantons and 245 communes. At Neuvy-St-Sepulchre there is a circular church of the nth century, to which a nave was added

in the 12th century, and at Mezieres-en-Brenne there is an interesting church of the 14th century. At Levroux there is a fine church of the 13th century and the remains of a feudal fortress, and there is a magnificent chateau in the Renaissance style at Valencay.

INDRE-ET-LOIRE, a department of central France, consisting of nearly the whole of the old province of Touraine and of small portions of Orleanais, Anjou and Poitou. Pop. (1906) 337,916. Area 2377 sq. m. It is bounded N. by the departments of Sarthe and Loir-et-Cher, E. by Loir-et-Cher and Indre, S. and S.W. by Vienne and W. by Maine-et-Loire. It takes its name from the Loire and its tributary the Indre, which enter it on its eastern border and unite not far from its western border. The other chief affluents of the Loire in the department are the Cher, which joins it below Tours, and the Vienne,

which waters the department's southern region. Indre-et-Loire is generally level and comprises the following districts: the Gatine, a pebbly and sterile region to the north of the Loire, largely consisting of forests and heaths with numerous small lakes; the fertile Varenne or valley of the Loire; the Cham- peigne, a chain of vine-clad slopes, separating the valleys of the Cher and Indre; the Veron, a region of vines and orchards, in the angle formed by the Loire and Vienne; the plateau of Sainte-Maure, a hilly and unproductive district in the centre of which are found extensive deposits of shell-marl; and in the south the Brenne, traversed by the Claise and the Creuse and forming part of the marshy territory which extends under the same name into Indre.

Indre-et-Loire is divided into the arrondissements of Tours, Loches and Chinon. with 24 cantons and 282 communes. The chief town is Tours, which is the seat of an archbishopric; and Chinon, Loches, Amboise, Chenonceaux, Langeais and Azay- le-Rideau are also important places with chateaus. The Renaissance chateau of Usse, and those of Luynes (15th and 16th centuries) and Pressigny-le-Grand (17th century) are also of note. Montbazon possesses the imposing ruins of a square donjon of the nth and 12th centuries. Preuilly has the most beautiful Romanesque church in Touraine. The Sainte Chapelle (16th century) at Champigny is a survival of a chateau of the dukes of Bourbon- Montpensier. The church of Montresor (1532) with its mausoleum of the family of Montresor; that of St Denis-Hors (12th and 16th century) close to Amboise, with the curious mausoleum of Philibert Babou, minister of finance under Francis I. and Henry II.; and that of Ste Catherine de Fierbois, of the 15th century, are of architectural interest. The town of Richelieu, founded in 1631 by the famous minister of Louis XIII., preserves the enceinte and many of the buildings of the 17th century. Megalithic monuments are numerous in the department.

INDRI, a Malagasy word believed to mean " there it goes," but now accepted as the designation of the largest of the existing Malagasy (and indeed of all) lemurs. Belonging to the family Lemuridae (see Primates) it typifies the subfamily Indrisinae, which includes the avahi and the sifakas (g.v.). From both the latter it is distinguished by its rudimentary tail, measuring only a couple of inches in length, whence its name of Indris brevi- candatus. Measuring about 24 in. in length, exclusive of the tail, the indri varies considerably in colour, but is usually black, with a variable number of whitish patches, chiefly about the loins and on the fore-limbs. The forests of a comparatively small tract on the east coast of Madagascar form its home.. Shoots, flowers and berries form the food of the indri, which

was first discovered by the French traveller and naturalist Pierre Sonnerat in 1780. (R. L.)*

INDUCTION (from Lat. inducere, to lead into; cf. Gr. hrar/tayri), in logic, the term applied to the process of discovering principles by the observation and combination of particular instances. Aristotle, who did so much to establish the laws of deductive reasoning, neglected induction, which he identified with a com- plete enumeration of facts; and the schoolmen were wholly concerned with syllogistic logic. A new era opens with Bacon, whose writings all preach the principle of investigating the laws

of nature with the purpose of improving the conditions of human life. Unluckily his mind was still enslaved by the formulae of the quasi-mechanical scholastic logic. He supposed that natural laws would disclose themselves by the accumulation and due arrangement of instances without any need for original speculation on the part of the investigator. In his Novum Organum there are directions for drawing up the various kinds of lists of instances. For two hundred years after Bacon's death little was done towards the theory of induction; the reason being, probably, that the practical scientists knew no logic, while the university logicians, with their conservative devotion to the syllogism, knew no science. Whewell's Philosophy of the Inductive Sciences (1840), the work of a thoroughly equipped scientist, if not of a great philosopher, shows due appreciation of the cardinal point neglected by Bacon, the function of theorizing in inductive research. He saw that science advances only in so far as the mind of the inquirer is able to suggest organizing ideas whereby our observations and experiments are colligated into intelligible system. In this respect J. S. Mill is inferior to Whewell: throughout his System of Logic (1843) he ignores the constitutive work of the mind, and regards knowledge as the merely passive reception of sensuous impres- sions. His work was intended mainly to reduce the pro- cedure of induction to a regular demonstrative system like that of the syllogism ; and it was for this purpose that he formulated his famous Four Methods of Experimental Inquiry. His work has contributed greatly to the systematic treatment of induction. But it must be remarked that his Four Methods are not methods of formal proof, as their author supposed, but methods whereby hypotheses are suggested or tested. The .actual proof of an hypothesis is never formal, but always lies in the tests of experi- ment or observation to which it is subjected.

The current theory of induction as set forth in the standard works is so far satisfactory that it combines the merit of Whewell's treatment with that of Mill's; and yet it is plain that there is much for the logician of the future to accomplish. The most important faculty in scientific inquiry is the faculty of suggesting new and valuable hypotheses. But no one has ever given any explanation how the hypotheses arise in the mind: we attribute it to " genius," which, of course, is no explanation at all. The logic of discovery, in the higher sense of the term, simply has no existence. Another important but neglected province of the subject is the relation of scientific induction to the inductions of everyday life. There are some who think that a study of this relation would quite transform the accepted view of induc- tion. Consider such a piece of reasoning as may be heard any day in a court of justice, a detective who explains how in his opinion a certain burglary was effected. If all reasoning is either deductive or inductive, this must be induction. And yet it does not answer to the accepted definition of induction, " the process of discovering a general principle by observation of particular instances ": what the detective does is to reconstruct a particular crime; he evolves no general principle. Such reasoning is used by every man in every hour of his life: by it we understand what people are doing around us, and what is the meaning of the sense-impressions which we receive. In the logic of the future it will probably be recognized that scientific induction is only one form of this universal constructive or reconstructive faculty. Another most important question closely akin to that just mentioned is the true relation between these reasoning processes and our general life as active intelligent beings. How is it that the detective is able to understand the burglar's plan of action? — the military commander to forecast the enemy's plan of campaign? Primarily, because he himself is capable of making such plans. Men as active creatures co-operating with their fellow-men are incessantly engaged in forming plans and in apprehending the plans of those around them. Every plan may be viewed as a form of induction; it is a scheme invented to meet a given situation, an hypothesis which is put to the test of events, and is verified or refuted by practical success or failure. Such considerations widen still farther our view of scientific induction and help us to understand

its relation to ordinary human thought and activity. The scientific investigator in his inductive stage is endeavouring to make out the plan on which his material is constructed. The phenomena serve as indications to help him in framing his hypothesis, generally a guess at first, which he proceeds to verify by experiment and the collection of additional facts. In the deductive stage he assumes that he has

made out the plan and can apply it to the discovery of further detail. He has the capacity of detecting plans in nature because he is wont to form plans for practical purposes.

There are good recent accounts of induction in Welton's Manual of Logic, ii., in H. W. B. Joseph's Introduction to Logic, and in W. R. Boyce Gibson's Problem of Logic ; see also Logic. (H. St.)

INDUCTION COIL, an electrical instrument consisting of two coils of wire wound one over the other upon a core con- sisting of a bundle of iron wires. One of these circuits is called the primary circuit and the other the secondary circuit. If an alternating or intermittent continuous current is passed through the primary circuit, it creates an alternating or inter- mittent magnetization in the iron core, and this in turn creates in the secondary circuit a secondary current which is called the induced current. For most purposes an induction coil is required which is capable of giving in the secondary circuit intermittent currents of very high electromotive force, and to attain this result the secondary circuit must as a rule consist of a very large number of turns of wire. Induction coils are employed for physiological purposes and also in connexion with telephones, but their great use at the present time is in connexion with the production of high frequency electric currents, for Rontgen ray work and wireless telegraphy.

The instrument began to be developed soon after Faraday's discovery of induced currents in 1831, and the subsequent researches of Joseph Henry, C. G. Page and W. Sturgeon on the induction of a current. N. J. Callan history. described in 1836 the construction of an electro- magnet with two separate insulated wires, one thick and the other thin, wound on an iron core together. He provided the primary circuit of this instrument with an interrupter, and found that when the primary current was rapidly intermitted, a series of secondary currents was induced in the fine wire, of high electromotive force and considerable strength. Sturgeon in 1837 constructed a similar coil, and provided the primary circuit with a mercury interrupter operated by hand. Various other experimentalists took up the construction of the induction coil, and to G. H. Bachhoffner is due the suggestion of employing an iron core made of a bundle of fine iron wires. At a somewhat later date Callan constructed a very large induction coil contain- ing a secondary circuit of very great length of wire. C. G. Page and J. H. Abbot in the United States, between 1838 and 1840, also constructed some large induction coils. 1 In all these cases the primary circuit was interrupted by a mechanically worked interrupter. On the continent

of Europe the invention of the automatic primary circuit interrupter is generally attributed to C. E. Neeff and to J. P. Wagner, but it is probable that J. W. M'Gauley, of Dublin, independently invented the form of hammer break now employed. In this break the magnetiza- tion of the iron core by the primary current is made to attract an iron block fixed to the end of a spring, in such a way that two platinum points are separated and the primary circuit thus interrupted. It was not until 1853 that H. L. Fizeau added to the break the condenser which greatly improved the operation of the coil. It 1851 H.D.Ruhmkorff (1803-187 7), an instrument" maker in Paris, profiting by all previous experience, addressed himself to the problem of increasing the electromotive force in the secondary circuit, and induction coils with a secondary circuit of long fine wire have generally, but unnecessarily, been called

Riihmkorff coils. Ruhmkorff, however, greatly lengthened the secondary circuit, employing in some coils 5 or 6 m. of wire.

The secondary wire was insulated with silk and shellac varnish,

1 For a full history of the early development of the induction coil see J. A. Fleming, The Alternate Current Transformer, vol. ii., chap. i.

Construc- tion.

and each layer of wire was separated from the next by means of varnished silk or shellac paper; the secondary circuit was also carefully insulated from the primary circuit by a glass tube. Riihmkorff, by providing with his coil an automatic break of the hammer type, and equipping it with a condenser as suggested by Fizeau, arrived at the modern form of induction coil. J. N. Hearder in England and E. S. Ritchie in the United States began the construction of large coils, the last named constructing a specially large one to the order of J. P. Gassiot in 1858. In the following decade A. Apps devoted great attention to the produc- tion of large induction coils, constructing some of the most powerful coils in existence, and introduced the important improvement of making the secondary circuit of numerous flat coils of wire insulated by varnished or paraffined paper. In 1869 he built for the old Polytechnic Institution in London a coil having a secondary circuit 150 m. in length. The diameter of the wire was 0-014 in., and the

secondary bobbin when complete had an external diameter of 2 ft. and a length of 4 ft. 10 ins. The primary bobbin weighed 145 lb, and consisted of 6000 turns of copper wire 3770 yds. in length, the wire being 095 of an inch in diameter. Excited by the current from 40 large Bunsen cells, this coil could give secondary sparks 30 in. in length. Subsequently, in 1876, Apps con structed a still larger coil for William Spottiswoode, which is now in the possession of the Royal Institution. The secondary i circuit consisted of 280 m. of copper wire about o-oi of an inch in diameter, forming a cylinder 37 in. long and 20 in. in external diameter; it was wound in flat disks in a large number of separate sections, the total number of turns being 341,850. Various primary circuits were employed with this coil, which when at its best could give a spark of 42 in. in length.

A general description of the mode of constructing a modern induction coil, such as is used for wireless telegraphy or Rontgen ray apparatus, is as follows: The iron core consists of a bundle of soft iron wires inserted in the interior of an ebonite tube. On the outside of this tube is wound the primary circuit, which generally consists of several distinct wires capable of being joined either in series or parallel as required. Over the primary circuit is placed another thick ebonite tube, the thickness of the walls of which is proportional to the spark -producing power of the secondary circuit. The primary coil must be wholly enclosed in ebonite, and the tube containing it. is generally longer than the secondary bobbin. The second circuit consists of a number of flat coils wound up between paraffined or shellaced paper, much as a sailor coils a rope. It is essential that no joints in this wire shall occur in inaccessible places in the interior. A machine has been devised by Leslie Miller for winding secondary circuits in flat sections without any joints in the wire at all (British Patent, No. 5811, 1903). A coil intended to give a 10 or 12 in. spark is generally wound in this fashion in several hundred sections, the object of this mode of division being to prevent any two parts of the secondary circuit which are at great differences of potential from being near to one another, unless effectively insulated by a sufficient thickness of shellaced or paraffined paper. A 10-in. coil, a size very commonly used for Rontgen ray work or wireless telegraphy, has an iron core made of a bundle of soft iron wires No. 22 S.W.G., 2 in. in diameter and 18 in. in length. The primary coil wound over this core consists of No. 14 S.W.G. copper wire, insulated with white silk laid on in three layers and having a resistance of about half an ohm. The insulating ebonite tube for such a coil should not be less than J in. in thickness, and should have two ebonite cheeks on it placed 14 in. apart. This tube is supported on two hollow pedestals down which the

ends of the primary wire are brought. The secondary coil consists of No. 36 or No. 32 silk-covered copper wire, and each of the sections is prepared by winding, in a suitable winding machine, a flat coiled wire in such a way that the two ends of the coil are on the outside. The coil should not be wound in less than a hundred sections, and a larger number would be still better. The adjacent ends of consecutive sections are soldered together and insulated.

and the whole secondary coil should be immersed in paraffin wax. The completed coil (fig. 1) is covered with a sheet of ebonite and mounted on a base board which, in some cases, contains the primary condenser within it and carries on its upper surface a hammer break. For many purposes, however, it is better to separate the condenser and the break from the coil. Assuming that a hammer break is employed, it is generally of the Apps form. The interruption of the primary circuit is made between two contact studs which ought to be of massive platinum, and across the break points is joined the primary condenser. This consists of a number of sheets of paraffined paper interposed between sheets of tin foil, alternate sheets of the tin foil being joined together (see Leyden Jar). This condenser serves to quench the break spark. If the primary

Fig. 1.

condenser is not inserted, the arc or spark which takes place at the contact points prolongs the fall of magnetism in the core, and since the secondary electromotive force is proportional to the rate at which this magnetism changes, the secondary electromotive force is greatly reduced by the presence of an arc-spark at the contact points. The primary condenser there- fore serves to increase the suddenness with which the primary current is interrupted, and so greatly increases the electro- motive force in the secondary circuit. Lord Rayleigh showed (Phil. Mag., 1901, 581) that if the primary circuit is interrupted with sufficient suddenness, as for instance if it is severed by a bullet from a gun, then no condenser is needed. No current flows in the secondary circuit so long as a steady direct current is passing through the primary, but at the moments that the primary circuit is closed and opened two electromotive forces are set up in the secondary; these are opposite in direction, the one induced by the breaking of the primary circuit being by far the stronger. Hence the necessity for some form of circuit breaker, by the continuous action of which there results a series of discharges from one secondary terminal to the other in the form of sparks.

The hammer break is somewhat irregular in action and gives a good

*deal of trouble in prolonged use; hence many other forms of primary circuit interrupters have been devised. These may be classified as (1) hand- or motor-worked l" ter ' dipping interrupter j employing mercury or platinum Breaks. contacts; (2) turbine mercury interrupters; (3) electrolytic interrupters. In the first class a steel or platinum point, operated by hand or by a motor, is periodically immersed in mercury and so serves to close the primary circuit. To prevent oxidation of the mercury by the spark and break it must be covered with oil or alcohol. In some cases the interruption is caused by the continuous rotation of a motor either working an eccentric which op*rates the plunger, or, as in the Mackenzie- Davidson break, rotating a slate disk having a metal stud on its surface, which is thus periodically immersed in mercury in a vessel. A better class of interrupter is the mercury turbine interrupter. In this some form of rotating turbine pump pumps mercury from a vessel and squirts it in a jet against a copper plate. Either the copper plate or the jet is made to revolve rapidly by a motor, so that the jet by turns impinges against the plate and escapes it; the mercury and plate are both covered with a deep layer of alcohol or paraffin oil, so that*

the jet is immersed in an insulating fluid. In a recent form the chamber in which the jet works is filled with coal gas. The current supplied to the primary circuit of the coil travels from the mercury in the vessel through the jet to the copper plate, and hence is periodically interrupted when the jet does not impinge against the plate. Mercury turbine breaks are much employed in connexion with large induction coils used for wireless telegraphy on account of their regular action and the fact that the number of interruptions per second can be con- trolled easily by regulating the speed of the motor which rotates the jet. But all mercury breaks employing paraffin or alcohol as an insulating medium are somewhat troublesome to use because of the necessity of periodically cleaning the mercury. Electrolytic interrupters were first brought to notice by Dr A. R. B. Wehnelt in 1898 {Elektroiechnische Zeitschrift, January 20th, 1899). He showed that if a large lead plate was placed in dilute sulphuric acid as a cathode, and a thick platinum wire protruding for a distance of about one millimetre beyond a glass or porcelain tube into which it tightly fitted was used as an anode, such an arrangement when inserted in the circuit of a primary coil gave rise to a rapid intermittency in the primary current. It is essential that the platinum wire should be the anode or positive pole. The

frequency of the Wehnelt break can be adjusted by regulating the extent to which the platinum wire protrudes through the porcelain tube, and in modern electrolytic breaks several platinum anodes are employed. This break can be employed with any voltage between 30 and 250. The Caldwell interrupter, a modification of the Wehnelt break, consists of two electrodes immersed in dilute sulphuric acid, one of them being enclosed by a glass vessel which has a small hole in it capable of being more or less closed by a tapered glass plug. It differs from the Wehnelt break in that there is no platinum to wear away and it requires less current; hence finer regulation of the coil to the current can be obtained. It will also work with either direct or alternating currents. The hammer and mercury turbine breaks can be arranged to give interruptions from about 10 per second up to about 50 or 60. The electrolytic breaks are capable of working at a higher speed, and under some conditions will give interruptions up to a thousand per second. If the secondary terminals of the induction coils are connected to spark balls placed a short distance apart, then with an electrolytic break the discharge has a flame-like character resembling ah alternating current are. This type of break is therefore preferred for Rontgen ray work since it makes less flickering upon the screen, but its advantages in the case of wireless telegraphy are not so marked. In the Grisson interrupter the primary circuit of the induction coil is divided into two parts by a middle terminal, so that a current flowing in at this point and dividing equally between the two halves does not magnetize the iron. This terminal is connected to one pole of the battery, the other two terminals being connected alternately to the opposite pole by means of a revolving commutator which (1) passes a current through one half of the primary, thus magnetiz- ing the core; (2) passes a current through both halves in opposite directions, thus annulling the magnetization; (3) passes a current through the second half of the primary, thus reversing the magnetization of the core; and (4) passes a current in both halves through opposite directions, thus again annulling the magnetization. As this series of operations can be performed without interrupting a large current through the inductive circuit there is not much spark at the commutator, and the speed of commutation can be regulated so as to obtain th« best results due to a resonance between the primary and secondary circuits. Another device due to Grisson is the electrolytic condenser interrupter. If a plate of aluminium and one of carbon or iron is placed in an electrolyte yielding oxygen, this aluminium-carbon or aluminium-iron cell can pass current in one direction but not in the other. Much greater resistance is experienced by a current flowing from the aluminium to the iron than in the opposite direction, owing to the formation of a film of aluminic

hydroxide on the aluminium. If then a cell consisting of a number of aluminium plates alternating with

iron plates or carbon in alkaline solution is inserted in the primary circuit of an induction coil, the application of an electromotive force in the right direction will cause a transitory current to flow through the coil until the electrolytic condenser is charged. By the use of a proper commutator the position of the electrolytic cell in the circuit can be reversed and another transitory primary current created. This interrupted flow of electricity through the primary circuit provides the inter- mittent magnetization of the core necessary to produce the secondary electromotive force. This operation of commuta- tion can be conducted without much spark at the commutator because the circuit is interrupted at the time when there is no current in it. In the case of the electrolytic condenser no supplementary paraffined paper condenser is necessary as in the case of the hammer or mercury interrupters.

An induction coil for the transformation of alternating current is called a transformer (q.v.) . One type of high frequency current transformer is called an oscillation transformer or sometimes a Tesla coil. The construction of such pˆ qMncy a coil is based on different principles from that of . coils. the coil just described. If the secondary terminals of an ordinary induction coil or transformer are connected to a pair of spark balls (fig. 2), and if these are also connected to

Fig. 2. — Arrangements for producing High Frequency Currents.

T, Transformer or induction coil. L, Inductance.

Q, Q, Choking coils. P, Primary circuit of high

D, Spark balls. frequency coil.

C, Condenser. S, Secondary circuit.

a glass plate condenser or Leyden jar of ordinary type joined in series with a coil of wire of low resistance and few turns, then at each break of the primary circuit of the ordinary induction coil a secondary electromotive force is set up which charges the Leyden jar, and if the spark .balls are set at the proper distance, this charge is succeeded by a discharge consisting of a movement of electricity backwards and forwards across the spark gap, constituting an oscillatory electric discharge (see Electrokinetics). Each charge of the jar may produce from a dozen to a hundred electric oscillations

which are in fact brief electric currents of gradually decreasing strength. If the circuit of few turns and low resistance through which this discharge takes place is overlaid with another circuit well insulated from it consisting of a large number of turns of finer wire, the inductive action between the two circuits creates in the secondary a smaller series of electric oscillations of higher potential. Between the terminals of this last-named coil we can then produce a series of discharges each of which consists in an extremely rapid motion of electricity to and fro, the groups of oscillations being separated by intervals of time corresponding to the frequency of the break in the primary circuit of the ordinary induction coil charging the Leyden jar or condenser. These high frequency discharges differ altogether in character from the secondary discharges of the ordinary induction coil. – Theory shows that to produce the best results the primary-circuit of the oscillation transformer should consist of only orie thick turn of wire or, at most, but of a few turns. It is also necessary that the two circuits, primary and secondary, should be well insulated from one another, and for this purpose the oscillation transformer is immersed in a box or vessel full of highly insulating oil. For full details N. Tesla's original Papers must be consulted (see J own. Inst. Elect. Eng. 21, 62).

In some cases the two circuits of the Tesla coil, the primary and secondary, are sections of one single coil. In this form the

arrangement is called a resonator or auto transformer, and is much used for producing high frequency discharges for medical purposes. The construction of a resonator is as follows: A bare copper wire is wound upon an ebonite or wooden cylinder or frame, and one end of it is connected to the outside of a Leyden jar or battery of Leyden jars, the inner coating of which is con- nected to one spark ball of the ordinary induction coil. The other spark ball is connected to a point on the above-named copper wire not very far from the lower end. By adjusting this contact, which is movable, the electric oscillations created in the short section of the resonator coil produce by resonance oscillations in the longer free section, and a powerful high frequency electric brush or discharge is produced at the free end of the resonator spiral. An electrode or wire connected with this free end therefore furnishes a high frequency glow discharge which has been found to have valuable therapeutic powers.

The general theory of an oscillation transformer containing capacity and inductance in each circuit has been given by Oberbeck, Bjerknes and Drude. 1 Suppose there are two circuits, each consisting of a coil of wire, the two being super- and let each circuit contain

Theory of Oscillation

_ . imposed or adjacent, and let each circuit contain a formers condenser or Leyden jar in series with the circuit, and let one of these circuits contain a spark gap, the other being closed (fig. 3). If to the spark balls the secondary terminals of an ordinary induction coil are connected, and these spark

balls are adjusted near one C, another, then when the

ordinary coil is set in operation, sparks pass be- tween the balls and oscil- latory discharges take place in the circuit con- taining the spark gap. These oscillations induce other oscillations in the second circuit. The two circuits have a certain mutual inductance M, and each circuit has self in- ductance Li and L 2 . If then the capacities in the two circuits are denoted by Ci and C 2 the following simultaneous equations express the relation of the and i>2, in the primary and

Fig. 3. Condenser in primary circuit. Condenser in secondary circuit. Inductance in primary circuit. Inductance in secondary circuit.

currents, j'i and i 2 . and potentials, Vi secondary circuits respectively at any instant :

'■""l+M^+RA+n-o,

l dl

dt

u Tt +U Tt +Kiii+Vi=0 '

Ri and R 2 being the resistances of the two circuits. If for the moment we neglect the resistances of the two circuits, and consider that the oscillations in each circuit follow a simple harmonic law i = I sin pt we can transform the above equations into a biquadratic

, 1 2 L1C1 -r-L 2 C 2 , 1

P +p C,C 2 (L,L 2 – M 2) + CiC 2 (LiL 2 – M 2) _ a The capacity

and inductance in each circuit can be so adjusted that their products are the same number, that is GLi = C 2 L 2 = CL. The two circuits are then said to be in resonance or to be tuned together. In this particular and unique case the above biquadratic reduces to

P 2 =7±

I±fe

separated they are said to be isochronous. If n stands for the natural frequency of each circuit, where » = p/2ir the above equations show that when the two circuits are coupled together, oscillations set up in one circuit create oscillations of two frequencies in the secondary circuit. A mechanical analogue to the above electrical effect can be obtained as follows: Let a string be strung loosely between two fixed points, and from it let two other strings of equal length hang down at a certain distance apart, each of them having a weight at the bottom and forming a simple pendulum. If one pendulum is set in oscillation it will gradually impart this motion to the second, but in so doing it will bring itself to rest ; in like manner the second pendulum being set in oscillation gives back its motion to the first. The graphic representation, therefore, of the motion of each pendulum would be a line as in fig. 4. Such a curve

CL 1

where k is written for MV (LiL 2) and is called the coefficient of coupling. In this case of resonant circuits it can also be shown that the maxi- mum potential differences at the primary and secondary condenser terminals are determined by the rule V l /V 2 = 2VC 2 / VCi. Hence the transformation ratio is not determined by the relative number of turns on the primary and secondary circuits, as in the case of an ordinary alternating current transformer (see Transformers), but by the ratio of the capacity in the two oscillation circuits. For full proofs of the above the reader is referred to the original papers. Each of the two circuits constituting the oscillation transformer taken separately has a natural time period of oscillation ; that is to say, if the electric charge in it is disturbed, it oscillates to and fro in a certain constant period like a pendulum and therefore with a certain frequency. If the circuits have the same frequency when

1 See A. Oberbeck, Wied. Ann. (1895), 55, p. 623 ; V. F. R. Bjerknes, d- (1895), 55, p. 121, and (1891), 44, p. 74; and P. K. L. Drude, Ann. Phys. (1904), 13, p. 512.

Fig. 4. represents the effect in music known as beats, and can easily be shown to be due to the combined effect of two simple harmonic motions or simple periodic curves of different frequency super- imposed. Accordingly, the effect of inductively coupling together two electrical circuits, each having capacity and inductance, is that if oscillations are started in one circuit, oscillations of two frequencies are found in the secondary circuit, the frequencies differing from one another and differing from the natural frequency of each circuit taken alone. This matter is of importance in connexion with wireless telegraphy (see Telegraph), as in apparatus for conducting it, oscillation transformers as above described, having two circuits in resonance with one another, are employed.

References. — J. A. Fleming, The Alternate Current Transformer (2 vols., London, 1900), containing a full history of the induction coil; id., Electric Wave Telegraphy (London, 1906), dealing in chap, i., with the construction of the induction coil and various forms of interrupter as well as with the theory of oscillation transformers; A. T. Hare, The Construction of Large Induction Coils (London, 1900) ; J. Trowbridge, " On the Induction Coil," Phil. Mag. (1902), 3, p. 393 ; Lord Rayleigh, " On the Induction Coil," Phil. Mag. (1901), 2, p. 581 ; J. E. Ives, " Contributions to the Study of the Induction Coil," Physical Review (1902), vols. 14 and 15. (J. A. F.)

INDULGENCE (Lat. indulgentia, indulgere, to grant, concede), in theology, a term denned by the official catechism of the Roman Catholic Church in England as " the remission of the temporal punishment which often remains due to sin after its guilt has been forgiven." This remission may be either total {plenary) or partial, according to the terms of the Indulgence. Such remission was popularly called a pardon in the middle ages — a term which still survives, e.g. in Brittany.

The theory of Indulgences is based by theologians on the follow- ing texts: 2 Samuel (Vulgate, 2 Kings) xii. 14; Matt. xvi. 19 and xviii. 17, 18; 1 Cor. v. 4, 5; 2 Cor. ii. 6-1 1; but the practice itself is confessedly of later growth. As Bishop Fisher says in his Confutation of Luther, " in the early church, faith in Purgatory and in Indulgences was less necessary than now. . . . But in our days a great part of the people would rather cast off Christianity than submit to the rigour of the [ancient] canons: wherefore it is a most wholesome dispensation of the Holy Ghost that, after so great a lapse of time, the belief in purgatory and the practice of Indulgences have become generally received among the orthodox " (Confttatio, cap. xviii. ; cf . Cardinal Caietan, Tract. XV. de Indulg. cap. i.). The nearest

equivalent in the ancient Church was the local and temporary African practice of restoring lapsed Christians to communion at the intercession of confessors and prospective martyrs in prison. But such reconciliations differed from later Indulgences in at least one essential particular, since they brought no remission of ecclesiastical penance save in very exceptional cases. However, as the primitive practice of public penance for sins died out in the Church, there grew up a system of equivalent, or nominally equivalent, private penances. Just as many of the punishments enjoined by the Roman criminal code were gradually commuted by medieval legislators for pecuniary fines, so the years or months of fasting enjoined by the earlier ecclesiastical codes were commuted for proportionate fines, the recitation of a certain number of psalms, and the like. " Historically speaking, it is indisputable that the practice of Indulgences in the medieval

church arose out of the authoritative remission, in exceptional cases, of a certain proportion of this canonical penalty. At the same time, according to Catholic teaching, such Indulgence was not a mere permission to omit or postpone payment, but was in fact a discharge from the debt of temporal punishment which the sinner owed. The authority to grant such discharge was conceived to be included in the power of binding and loosing committed by Christ to His Church; and when in the course of time the vaguer theological conceptions of the first ages of Christianity assumed scientific form and shape at the hands of the Schoolmen, the doctrine came to prevail that this discharge of the sinner's debt was made through an application to the offender of what was called the " Treasure of, the Church " (Thurston, p. 315). " What, then, is meant by the ' Treasure of the Church ' ? . . . It consists primarily and completely of the merit and satisfaction of Christ our Saviour. It includes also the superfluous merit and satisfaction of the Blessed Virgin and the Saints. What do we mean by the word ' superfluous ' ? In one way, as I need not say, a saint has no superfluous merit. Whatever he has, he wants it all for himself, because, the more he merits on earth (by Christ's grace) the greater is his glory in heaven. But, speaking of mere satisfaction for punishment due, there cannot be a doubt that some of the Saints have done more than was needed in justice to expiate the punishment due to their own sins … It is this ' super- fluous ' expiation that accumulates in the Treasure of the Church " (Bp. of Newport, p. 166). It must be noted that this theory of the " Treasure " was not

formulated until some time after Indulgences in the modern sense had become established in practice. The doctrine first appeared with Alexander of Hales (c. 1230) and was at once adopted by the leading schoolmen. Clement VI. formally confirmed it in 1350, and Pius VI. still more definitely in 1794.

The first definite instance of a plenary Indulgence is that of Urban II. for the First Crusade (1095). A little earlier had begun the practice of partial Indulgences, which are always expressed in terms of days or years. However definite may have been the ideas originally conveyed by these notes of time, their first meaning has long since been lost. Eusebius Amort, in 1735, admits the gravest differences of opinion; and the Bishop of Newport writes (p. 163) " to receive an Indulgence of a year, for example, is to have remitted to one so much temporal punishment as was represented by a year's canonical penance. If you ask me to define the amount more accurately, I say that it cannot be done. No one knows how severe or how long a Purgatory was, or is, implied in a hundred days of canonical penance." The rapid extension of these time-Indulgences is one of the most remarkable facts in the history of the subject. Innocent II., dedicating the great church of Cluny in 1132, granted as a great favour a forty days' Indulgence for the anniversary. A hundred years later, all churches of any im- portance had similar indulgences; yet Englishmen were glad even then to earn a pardon of forty days by the laborious journey to the nearest cathedral, and by making an offering there on one of a few privileged feast-days. A century later again, Wycliffe complains of Indulgences of two thousand years for a single prayer (ed. Arnold, i. 137). In 1456, the recitation of a few prayers before a church crucifix earned a Pardon of 20,000 years for every such repetition (Glassberger in Analecta Franciscana, ii. 368) : " and at last Indulgences were so freely given that there is now scarcely a devotion or good work of any kind for which they cannot be obtained " (Arnold & Addis, Catholic Dictionary, s.v.). To quote again from Father Thurston (p. 318) : " In imitation of the prodigality of her Divine Master, the Church has deliberately faced the risk of depreciation to which her treasure was exposed . . . . The growing effeminacy and corruption of mankind has found her censures unendurable . . . and the Church, going out into the highways and the hedges, has tried to entice men with the offer of generous Indulgence." But it must be noted that, according to the orthodox doctrine, not only can an Indulgence not remit future sins, but even for the past it cannot take full effect unless the

subject be truly contrite and have confessed (or intend shortly to confess) his sins.

This salutary doctrine, however, has undoubtedly been obscured to some extent by the phrase a poena et a culpa, which, from the 13th century to the Reformation, was applied to Plenary Indulgences. The prima-facie meaning of the phrase is that the Indulgence itself frees the sinner not only from the temporal penalty {poena) but also from the guilt {culpa) of all his sins: and the fact that a phrase so misleading remained so long current shows the truth of Father Thurston's remark: " The laity cared little about the analysis of it, but they knew that the a culpa et poena was the name for the biggest thing in the nature of an Indulgence which it was possible to get " {Dublin Review, Jan. rQOo). The phrase, however, was far from being confined to the unlearned. Abbot Gilles li Muisis, for instance, records how, at the Jubilee of 1300, all the Papal Penitentiaries were in doubt about it, and appealed to the Pope. Boniface VIII. did indeed take the occasion of repeating (in the words of his Bull) that confession and contrition were necessary preliminaries; but he neither repudiated the misleading words nor vouchsafed any clear explanation of them. {Chron. Aegidii li Muisis ed. de Smet, p. 189.) His predecessor, Celestine V., had actually used them in a Bull.

The phrase exercised the minds of learned canonists all through the middle ages, but still held its ground. The most accepted modern theory is that it is merely a catchword surviving from a longer phrase which proclaimed how, during such Indulgences, ordinary confessors might absolve from sins usually " reserved " to the Bishop or the Pope. Nobody, however, has ventured exactly to reconstitute this hypothetical phrase; nor is the theory easy to reconcile with (i.) the uncertainty of canonists at the time when the locution was quite recent, (ii.) the fact that Clement V. and Cardinal Cusanus speak of absolution a poena et a culpa as a separate thing from (a) plenary absolution and {b) absolution from " reserved " sins (Clem. lib. v. tit. ix. c. 2, and Johann Busch (d. c. 1480) Chron. Windeshemense, cap. xxxvi.). But, however it originated, the phrase undoubtedly contributed to foster popular misconceptions as to the intrinsic value of Indulgences, apart from repentance and confession; though Dr Lea seems to press this point unduly (p. 54 ff.), and should be read in conjunction with Thurston (p. 324 ff.).

These misconceptions were certainly widespread from the 13th to the 16th century, and were often fostered by the " pardoners," or professional collectors of contributions for Indulgences. This can best be shown by a few quotations from eminent and orthodox churchmen during those centuries. Berthold of Regensburg {c. 1270) says, " Fie, penny-preacher! . . . thou dost promise so much remission of sins for a mere halfpenny or penny, that thousands now trust thereto, and

fondly dream to have atoned for all their sins with the halfpenny or penny, and thus go to hell'" (ed. Pfeiffer, i. 393) – 1 A century later, the author of Piers Plowman speaks of pardoners who " give pardon for pence poundmeal about " {i.e. whole- sale; B. ii. 222); and his contemporary, Pope Boniface IX., complained of their absolving even impenitent sinners for ridiculously small sums {pro qualibet parva pecuniarum summula, Raynaldus, Ann. Ecc. 1390). In 1450 Thomas Gascoigne, the great Oxford Chancellor, wrote: " Sinners say nowadays ' I care not how many or how great sins I commit before God, for I shall easily and quickly get plenary remission of any guilt and penalty whatsoever {cujusdam culpae et poenae) by absolu- ■ tion and indulgence granted to me from the Pope, whose writing and grant I have bought for 4d. or 6d. or for a game of tennis' " — or sometimes, he adds, by a still more disgraceful bargain {pro actu meretricio, Lib. Ver. p. 123, cf. 126). In 1523 the princes of Germany protested to the Pope in language almost equally strong (Browne, Fasciculus, i. 354). In 1562 the Council of Trent abolished the office of " pardoner."

The greatest of all Plenary Indulgences is of course the Roman

1 Equally strong assertions were made by the provincial council of Mainz in 1 261 ; and Lea (p. 287) quotes the complaints of 36 similar church councils before 1538.

Jubilee. This was instituted in 1300 by Boniface VIII., who pleaded a popular tradition for its celebration every hundredth year, though no written evidence could be found. Clement VI. shortened the period to 50 years (13S0): it was then further reduced to a, and again in 1475 to 2 S years.

See also the article on Luther. The latest and fullest authority on this subject is Dr H. C. Lea, Hist, of Auricular Confession and Indulgences in the Latin Church (Philadelphia, 1 896); his standpoint in frankly non-Catholic, but he gives ample materials for judgment. The greatest orthodox authority is Eusebius Amort, De Origine, fife, indulgenliarum (1735). More popular and more easily accessible are Father Thurston's The Holy Year of Jubilee (1900), and an article by the Bishop of Newport in the Nineteenth Century for January 1901, with a reply by Mr Herbert Paul in the next number. (G. G. Co.)

INDULINES, a series of dyestuffs of blue, bluish-red or black shades, formed by the interaction of para-amino azo compounds with primary monamines in the presence of a small quantity of a mineral acid. They were first discovered in 1863 (English patent 3307) by J. Dale and H. Caro, and since then have been examined by many chemists (see O.N. Witt, Ber., 1884, 17, p. 74; O. Fischer and E. Hepp, Ann., 1890, 256, pp. 233etseq.; F.Kehr- mann, Ber., 1891, 24, pp. 584, 2167 et seq.). They are derivatives of the eurhodines (aminophenazines, aminonaphthophenazines), and by means of their diazo derivatives can be de-amidated, yielding in this way azonium salts; consequently they may be considered as amidated azonium salts. The first reaction giving a clue to their constitution was the isolation of the intermediate azophenin by O. Witt {Jour. Chem. Soc, 1883, 43, p. 115), which was proved by Fischer and Hepp to be dianilidoquinone dianil, a similar intermediate compound being found shortly afterwards in the naphthalene series. Azophenin, C30H24N4, is prepared by warming quinone dianil with aniline; by melting together quinone, aniline and aniline hydrochloride; or by the action of aniline on para-nitrosophenol or para-nitrosodiphenylamine. The indulines are prepared as mentioned above from aminoazo compounds:

NH J -CeH4N s C,H 6 +C«H t NH,HN:C e H,<^>CeH 4>

(aposafranine) or by condensing oxy- and amido-quinones with phenylated ortho-diamines (F. Kehrmann, Ber., 1895, 28, p. 17 14):

>C 6 H 2 < OH + C6 2 H5NH >C e H 4 =

2H,Q+ H g>C,H i C i H,.

The indulines may be subdivided into the following groups:— (i) benzindulines, derivatives of phenazine; (2) isorosindulines; and (3) rosindulines, both derived from naphthophenazine; and (4) naphthindulines, derived from naphthazine.

»N-

NH :C 6 H 3 <£. C6H5 >CeH 4 NH : C«H,C,,H, I. Benzindulines. II. Isorosindulines.

NH : CioH,<5J^" 6 >C,H4 NH : C 10 H,<5J^]>C 10 H.

III. Rosindulines. IV. Naphthindulines.

The rosindulines and naphthindulines have a strongly basic character, and their salts possess a marked red colour and fluorescence. Benzinduline (aposafranine), CisHuNs, is a strong base, but cannot be diazotized, unless it be dissolved in concentrated mineral acids. When warmed with aniline it yields anilido-aposa- franine, which may also be obtained by the direct oxidation of ortho-aminodiphenylamine. Jsorosinduline is obtained from quinone dichlorimideand phenyl-/3-naphthylamine; rosinduline from benzene- azo-or-naphthylamine and aniline and naphthinduline from benzene- azo-a-naphthylamine and naphthylamine.

INDULT (Lat. indullum, from indulgere, grant, concede, allow), a, papal licence which authorizes the doing of something not sanctioned by the common law of the church; thus by an indult the pope authorizes a bishop to grant certain relaxations during the Lenten fast according to the necessities of the situation, climate, &c, of his diocese.

INDUNA, a Zulu-Bantu word for an officer or head of a regiment among the Kaffir (Zulu-Xosa) tribes of South Africa. It is formed from the inflexional prefix in and duna, a lord or master. Indunas originally obtained and retained their rank

and authority by personal bravery and skill in war, and often proved a menace to their nominal lord. Where, under British influence, the purely military system of government among the Kaffir tribes has broken down or been modified, indunas are now administrators rather than warriors. They sit in a consultative gathering known as an indaba, and discuss the civil and military affairs of their tribe.

INDUS, one of the three greatest rivers of northern India.

A considerable accession of exact geographical knowledge has been gained of the upper reaches of the river Indus and its tributaries during those military and political move- ments which have been so constant on the northern Himalaya. frontiers of India of recent years. The sources of the Indus are to be traced to the glaciers of the great Kailas group of peaks in 32 20′ N. and 8i° E., which overlook the Mansarowar lake and the sources of the Brahmaputra, the Sutlej and the Gogra to the south-east. Three great affluents, flowing north-west, unite in about 8o° E. to form the main stream, all of them, so far as we know at present, derived from the Kailas glaciers. Of these the northern tributary points the road from Ladakh to the Jhalung goldfields, and the southern, or Gar, forms a link in the great Janglam — the Tibetan trade route — which connects Ladakh with

Lhasa and Lhasa with China. Gartok (about 50 m. from the source of this southern head of the Indus) is an important point on this trade route, and is now made accessible to Indian traders by treaty with Tibet and China. At Leh, the Ladakh capital, the river has already pursued an almost even north-westerly course for 300 m., except for a remarkable divergence to the south-west which carries it across, or through, the Ladakh range to follow the same course on the southern side that had been maintained on the north. This very remarkable instance of transverse drainage across a main mountain axis occurs in 79 E., about 100 m, above Leh. For another 230 m., in a north-westerly direction, the Indus pursues a comparatively gentle and placid course over its sandy bed between the giant chains of Ladakh to the north and Zaskar (the main " snowy range " of the Himalaya) to the south, amidst an array of mountain scenery which, for the majesty of sheer altitude, is unmatched by any in the world. Then the river takes up the waters of the Shyok from the north (a tributary nearly as great as itself), having already captured the Zasvar from the south, together with innumerable minor glacier-fed streams. The Shyok is an important feature in Trans-Himalayan hydrography. Rising near the southern foot of the well-known Karakoram pass on a tttutut. the high road between Ladakh and Kashgar, it first drains the southern slopes of the Karakoram range, and then breaks across the axis of the Muztagh chain (of which the Karakoram is now recognized as a subsidiary extension northwards) ere bending north-westwards to run a parallel course to the Indus for 1 50 m. before its junction with that river. The combined streams still hold on their north-westerly trend for another 100 m., deep hidden under the shadow of a vast array of snow-crowned summits, until they arrive within sight of the Rakapushi peak which pierces the north-western sky midway between Gilgit and Hunza. Here the great change of direction to the south-west occurs, which is thereafter main- tained till the Indus reaches the ocean. At this point it receives the Gilgit river from the north-west, having dropped from 15,000 to 4000 ft. (at the junction of the rivers) mMt

after about 500 m. of mountain descent through the a tfltettt. independent provinces of northern Kashmir. (See Gilgit.) A few miles below the junction it passes Bunji, and from that point to a point beyond Chilas (50 m. below Bunji) it runs within the sphere of British interests. Then once again it resumes its " independent " course through the wild mountains of Kohistan and Hazara, receiving tribute from both sides (the Buner contribution being the most noteworthy) till it emerges into the plains of the Punjab below Darband, in 34 10′ N. All this part of the river has been mapped in

more or less detail of late years. The hidden strongholds of those Hindostani fanatics who had found a refuge on its banks since

Mutiny days have been swept clean, and many ancient mysteries have been solved in the course of its surveying.

From its entrance into the plains of India to its disappearance in the Indian Ocean, the Indus of to-day is the Indus of the 'fifties Indus of — modified only in some interesting particulars. It the plains. nas been bridged at several important points. There

are bridges even in its upper mountain courses. There is a wooden pier bridge at Leh of two spans, and there are native suspension bridges of cane or twig-made rope swaying uneasily across the stream at many points intervening between Leh and Bunji; but the first English-made iron sus- pension bridge is a little above Bunji, linking up the highroad between Kashmir and Gilgit. Next occurs the iron girder railway bridge at Attock, connecting Rawalpindi with Peshawar, at which point the river narrows almost to a gorge, only 900 ft. above sea-level. Twenty miles below Attock the river has carved out a central trough which is believed to be 180 ft. deep. Forty miles below Attock another great bridge has been con- structed at Kushalgarh, which carries the railway to Kohat and the Kurram valley. At Mari, beyond the series of gorges which continue from Kushalgarh to the borders of the Kohat district, on the Sind-Sagar line, a boat-bridge leads to Kalabagh (the Salt city) and northwards to Kohat. Another boat-bridge opposite Dera Ismail Khan connects that place with the railway; but there is nothing new in these southern sections of the Indus valley railway system except the extraordinary development of cultivation in their immediate neighbourhood. The Lans- downe bridge at Sukkur, whose huge cantilevers stand up as a monument of British enterprise visible over the flat plains for many miles around, is one of the greatest triumphs of Indian bridge-making.. Kotri has recently been connected with Hyderabad in Sind, and the Indus is now one of the best-bridged rivers in India. The intermittent navigation which was main- tained by the survivals of the Indus flotilla as far north as Dera Ismail Khan long after the establishment of the railway system has ceased to exist with the dissolution of the fleet, and the high-sterned flat Indus boats once again have the channels and sandbanks of the river all to themselves.

Within the limits of Sind the vagaries of the Indus channels have necessitated a fresh survey of the entire riverain. The

results, however, indicate not so much a marked faduYand de P art . ure in tn . e general course of the river as a great deUa. variation in the channel beds within what may be

termed its outside banks. Collaterally much new information has been obtained about the ancient beds of the river, the sites of ancient cities and the extraordinary develop- ments of the Indus delta. The changing channels of the main stream since those prehistoric days when a branch of it found its way to the Runn of Cutch, through successive stages of its gradual shift westwards — a process of displacement which marked the disappearance of many populous places which were more or less dependent on the river for their water supply — to the last and greatest change of all, when the stream burst its way through the limestone ridges of Sukkur and assumed a course which has been fairly constant for 150 years, have all been traced out with systematic care by modern surveyors till the medieval history of the great river has been fully gathered from the characters written on the delta surface. That such changes of river bed and channel should have occurred within a comparatively limited period of time is the less astonishing if we remember that the Indus, like many of the greatest rivers of the world, carries down sufficient detritus to raise its own bed above the general level of the surrounding plains in an appreciable and measurable degree. At the present time the bed of the Indus is stated to be 70 ft. above the plains of the Sind frontier, some 50 m. to the west of it.

The total length of the Indus, measured directly, is about 1500 m. \ ith its many curves and windings it stretches to about 2000 m., the Statistics. arc . a of its basin being computed at 372,000 sq. m. Even at its lowest in winter it is 500 ft. wide at Iskardo (near the Gilgit junction) and 9 or 10 ft. deep. The temperature of the surface water during the cold season in the plains is found to be 5° below that of the air (64 and 69 F.). At the beginning of the hot

season, when the river is bringing down snow water, the difference is 14 (87 and 101 June). At greater depths the difference is still greater. At Attock, where the river narrows between rocky banks, a height of 50 ft. in the flood season above lowest level is common, with a velocity of 13 m. per hour. The record rise (since British occupation of the Punjab) is 80 ft. At its junction with the Panjnad (the combined rivers of the Punjab east of the Indus) the Panjnad is twice the width of the Indus, but its mean depth is less, and its

velocity little more than one-third. This discharge of the Panjnad at ow season is 69,000 cubic ft. per second, that of the Indus 92,000. Below the junction the united discharge in flood season is 380,000 cubic ft., rising to 460,000 (the record in August). The Indus after receiving the other rivers carries down into Sind, in the high flood season, turbid water containing silt to the amount of „£■„ part by weight, or ,,}•„ by volume— equal to 6480 millions of cubic ft. in the three months of flood. This is rather less than the Ganges carries. The silt is very fine sand and clay. Unusual floods, owing to landslips or other exceptional causes, are not infrequent. The most disastrous flood of this nature occurred in 1858. It was then that the river rose 80 ft. at Attock. The most striking result of the rise was the reversal of the current of the Kabul river, which flowed backwards at the rate of 10 m. per hour, flooding Nowshera and causing immense damage to property. The prosperity of the province of Sind depends almost entirely on the waters of the Indus, as its various systems of canals command over nine million acres out of a cultivable area of twelve and a half million acres.

See Maclagan, Proceedings R.G.S., vol. iii.; Haig, The Indus Delta Country (London, 1894); Godwin- Austen, Proceedings RC S ■ vol – VI – (T. H. H.*)

INDUSTRIA (mod. Monteii da Po), an ancient town of Liguria, 20 m. N.E. of Augusta Taurinorum. Its original name was Bodincomagus, from the Ligurian name of the Padus (mod. Po), Bodincus, i.e. bottomless (Plin. Hist. Nat. iii. 122), and this still appears on inscriptions of the early imperial period. It stood on the right bank of the river, which has now changed its course over 1 m. to the north. It was a flourishing town, with municipal rights, as excavations (which have brought tc light the forum, theatre, baths, &c.) have shown, but appear? to have been deserted in the 4th century a.d.

See A. Fabietti in Atti delta Societa di Archeologia di Torino iii. 17 seq.; Th. Mommsen in Corp. Inscrip. Lat. v.-‘(Berlin, 1877), p. 845 ; E. Ferrero in Notizie degli Scavi (1903), p. 43.

INDUSTRIAL SCHOOL, in England a school, generally established by voluntary contributions, for the industrial training of children, in which children are lodged, clothed and fed, as well as taught. Industrial schools are chiefly for vagrant and neglected children and children not convicted of theft. Such schools are for children up to the age of fourteen, and the limit of detention is sixteen. They are regulated by the Children Act 1908, which repealed the Industrial

Schools Act 1866. as amended by Acts of 1872,1891 and 1901, and parallel legisla- tion in the various Elementary Education Acts, besides some few local acts. The home secretary exercises powers of super vision, &c. See Juvenile Offenders.

INDUSTRY (Lat. industria, from indu-, a form of the pre- position in, and either stare, to stand, or struere, to pile up), the quality of steady application to work, diligence; hence employment in some particular form of productive work, especially of manufacture; or a particular class of productive work itself, a trade or manufacture. See Labour Legisla- tion, &c.

INE, king of the West Saxons, succeeded Ceadwalla in 688, his title to the crown being derived from Ceawlin. In the earlier part of his reign he was at war with Kent, but peace was made in 694, when the men of Kent gave compensation for the death of Mul, brother of Ceadwalla, whom they had burned in 687. In 710 Ine was fighting in alliance with his kinsman . Nun, probably king of Sussex, against Gerent of West Wales and, according to Florence of Worcester, he was victorious. In 71 5 he fought a battle with Ceolred, king of Mercia, at Wood- borough in Wiltshire, but the result is not recorded. Shortly after this time a quarrel seems to have arisen in the royal family. In 721 Ine slew Cynewulf, and in 722 his queen Aethelburg destroyed Taunton, which her husband had built earlier in his reign. In 722 the South Saxons, previously subject to Ine, rose against him under the exile Aldbryht, who may have been a member of the West Saxon royal house. In 725 Ine fought with the South Saxons and slew Aldbryht. In 726 he resigned

the crown and went to Rome, being succeeded by Aethelheard in Wessex. Ine is said to have built the minster at Glastonbury. The date of his death is not recorded. He issued a written code of laws for Wessex, which is still preserved.

See Bede, Hist. Reel. (Plummer), iv. 15, v. 7; Saxon Chronicle (Earle and Plummer), s.a. 688e, 694, 710, 715, 721, 722, 725, 728; Thorpe, Ancient Laws, i. 2-25; Schmid, Gesetze der Angelsachsen (Leipzig, 1858) ; Liebermann, GesetzederAngelsachsen(Ha.lle, 1898-99).

INEBOLI, a town on the north coast of Asia Minor, 70 m. W. of

Sinub (Sinope). It is the first place of importance touched at by mercantile vessels plying eastwards from Constantinople, being the port for the districts of Changra and Kastamuni, and connected with the latter town by a carriage road (see Kastamuni). The roadstead is exposed, having no protection for shipping except a jetty 300 ft. long, so that in rough weather landing is impracticable. The exports (chiefly wool and mohair) ire about £248,000 annually and the imports £200,000. The population is about 9000 (Moslems 7000, Christians 2000) . Ineboli represents the ancient Abonou-leichos, famous as the birthplace of the false prophet Alexander, who established there (2nd century a.d.) an oracle of the snake-God Glycon-Asclepius. This impostor, immortalized by Lucian, obtained leave from the emperor Marcus Aurelius to change the name of the town to Ionopolis, whence the modern name is derived (see Alexander

THE PAPHtAGONIAN).

INEBRIETY, LAW OF. The legal relations to which inebriety (Lat. in, intensive, and ebrietas, drunkenness) gives rise are partly civil and partly criminal.

I. Civil Capacity. — The law of England as to the civil capacity of the drunkard is practically identified with, and has passed through substantially the same stages of development as the law in regard to the civil capacity of a person suffering from mental disease (see Insanity). Unless (see III. inf.) a modifica- tion is effected in hi" condition by the fact that he has been brought under some form of legal control, a man may, in spite of intoxication, enter into a valid marriage or make a valid will, or bind himself by a contract, if he is sober enough to know what he is doing, and no improper advantage of his condition is taken (cf. Matthews v. Baxter, 1873, L.R. 8 Ex. 132; Imperial Loan Co. v. Stone, 1S92, 1 Q.B. 599,1. The law is the same in Scotland and in Ireland; and the Sale of Goods Act 1893 (which applies to the whole United Kingdom) provides that where necessaries are sold and delivered to a person who by reason of drunkenness is incompetent to contract, he must pay a reasonable price for them; "necessaries" for the purposes of this provision mean goods suitable to the condition in life of such person and to his actual requirements at the time of the sale and delivery.

Under the Roman law, and under the Roman Dutch law as applied in South Africa, drunkenness, like insanity, appears to vitiate absolutely a contract made by a person under its in- fluence (Molynettx v. Natal Land and Colonization Co., 1905,

A.C.S55).

In the United States, as in England, intoxication does not vitiate contractual capacity unless it is of such a degree as to prevent the person labouring under it from understanding the nature of the transaction into which he is entering (Bouvier, Law Did., s.v. " Drunkenness "; and cf. Waldron v. Angleman, 1004. 58 Atl. 568; Fowler v. Meadow Brook Water Co., 1904, 57 Atl. 959; 208 Penn., 473). The same rule is by implication adopted in the Indian Contract Act (Act ix. of 1872), which provides (s. 12) that " a person is ... of sound mind for the purpose of making a contract if, at the time when he makes it, he is capable of understanding it and of forming a rational judgment as to its effect upon his interests." In some legal systems, however, habitual drunkenness is a ground for divorce or judicial separation (Sweden, Law of the 27th of April 1810; France, Code Civil, Art. 231, Hirt v. Hirt, Dalloz, 1898, pt. ii., p. 4, and n. 4).

II. Criminal Responsibility. — In English law, drunkenness, unlike insanity, was at one time regarded as in no way an excuse for crime. According to Coke (Co. Litt., 247) a drunkard, although he suffers from acquired insanity, dementia ajjeclala,

is volunlarius daemon, and therefore has no privilege in con- sequence of his state; " but what hurt or ill soever he doth, his drunkenness doth aggravate it." Sir Matthew Hale (P.C. 32) took a more moderate view, viz. that a person under the influence of this voluntarily contracted madness " shall have the same judgment as if he were in his right senses"; and admitted the existence of two " allays " or qualifying circum- stances: (1) temporary frenzy induced by the unskilfulness of physicians or by drugging; and (2) habitual or fixed frenzy. Those early authorities have, however, undergone considerable development and modification.

Although the general principle that drunkenness is not an excuse for crime is still steadily maintained (see Russell, Crimes, 6th ed., i. 144; Archbold, Cr. PL, 23rd ed., p. 29), it is settled law that where a particular intent is one of the constituent elements of an offence, the fact that a prisoner was intoxicated at the time of its commission is relevant evidence to show that he had not the capacity to form that intent. Drunkenness is also a circum- stance of which a jury may take account in considering whether an act was premeditated, or whether a prisoner acted in self- defence or under provocation, when the question is whether the danger apprehended or the provocation was sufficient to justify his conduct or to alter its legal character.

Moreover, delirium tremens, if it produce such a degree of madness as to render a person incapable of distinguishing right from wrong, relieves him from criminal responsibility for any act committed by him while under its influence; and in one case at nisi prius (R. v Baines, The Times, 25th Jan. 1886) this doctrine was extended by Mr Justice Day to temporary derangement occasioned by drink. The law of Scotland accepts, if it does, not go somewhat beyond, the later developments of that of England in regard to criminal responsibility in drunkenness. Indian law on the point is similar to the English (Indian Penal Code, Act. xlv. of i860, ss. 85, 86; Mayne, Crim. Law of India, ed. 1896, p. 391). In the United States the same view is the prevalent legal doctrine (see Bishop, Crim. Law, 8th ed., i, ss. 397-416). The Criminal Code of Queensland (No. 9 of 1899, Art. 28) provides that a person who becomes intoxicated intentionally is responsible for any crime that he commits while so intoxicated, whether his voluntary intoxication was induced so as to afford an excuse for the commission of an offence or not. As in England, however, when an intention to cause a specific result is an element of an offence, intoxication, whether complete or partial, and whether intentional or un- intentional, may be regarded for the purpose of ascertaining whether such intention existed or not. There is a similar provision in the Penal Code of Ceylon (No. 2 of 1883, Art. 79). The Criminal Codes of Canada (1892, c. 29, ss. 7 etseq.)'and New Zealand (No. 56 of 1893, ss. 21 et seq.) are silent on the subject of intoxication as an excuse for crime. The Criminal Code of Grenada (No. 2 of 1897, Art. 51) provides that " a person shall not, on the ground of intoxication, be deemed to have done any act involuntarily, or be exempt from any liability to punish- ment for any act: and a person who does an act while in a state of intoxication shall be deemed to have intended the natural and probable consequences of his act." There is a similar provision in the Criminal Code of the Gold Coast Colony (No. 12 of 1892, s. 54). Under the French Penal Code (Art. 64), il n'y a ni crime, ni delit, lorsque le prevenu etait en etat de demence au temps de faction ou lorsqu'il aura He contraint par une force alaquelleiln' a pu rSsister." Accordingto the balance of authority (Dalloz, Rep. tit., Peine, ss. 402 et seq.) intoxication is not assimilated to insanity, within the meaning of this article, but it may be and is taken account of by juries as an extenuating circumstance (Ortolan, Droit Penal i. s. 323: Chauveau et Helie i. s. 360). A provision in the German Penal Code (Art. 51) that an act is not punishable if its author, at the time of committing it, was in a condition of unconsciousness, or morbid disturbance of the activity of his mind which prevented the free exercise of his will, has been held not to extend to intoxica- tion

(Clunet, 1883, p. 311). But in Germany as in France, intoxication may apparently be an extenuating circumstance.

*5*o*

INEBRIETY, LAW OF

Under the Italian Penal Code (Arts. 46-49) intoxication — unless voluntarily induced so as to afford an excuse for crime — may exclude or modify responsibility.

So far only the question whether drunkenness is an excuse for offences committed under its influence has been dealt with. There remains the question how far drunkenness itself is a crime. Mere private intoxication is not, either in England or in the United States (Bishop, Crim. Law, 8th ed., i. s. 390) indictable as an offence at common law; but in all civilized countries public drunkenness is punishable when it amounts to a breach of the peace (see Liquor Laws) or contravention of public order; and modern legislation in many countries provides for deprivation of personal liberty for long periods in case of a frequent repetition of the offence. Reference may be made in this connexion to the Inebriates Acts 1898, 1899 and 1900 (see iii. inf.), and also to similar legislation in the British colonies and in foreign legal systems (e.g. Cape of Good Hope, No. 32 of 1896; Ceylon, Licensing Ordinance 1891, ss. 23, 24, 29; New South Wales, Vagrants Punishment Act 1866; Massa- chusetts, Acts of 1891, c. 427, 1893, cc. 414, 44; France, Law of 23rd of Jan. 1873, Art. 6).

III. State Action in Regard to Inebriety. — This assumes a variety of forms, (a) Measures regulating the punishment of occasional or habitual drunkenness by fines or short terms of imprisonment.

(b) Control in penal establishments for lengthened periods.

(c) Laws prohibiting the sale of liquor to persons who are known inebriates: e.g. in England (Licensing Act 1902); Ontario (Rev. Stats. 1897, c. 245, ss. 124, 125); New South Wales (Liquor Act 1898, ss. 52, 53); Cape of Good Hope (No. 28 of 1883, s. 89); New York (Rev. Stats. 1889-1892, c. 20, Title iv.) ; California (Act to prevent sale of liquor to drunkards, 1889) ; Massachusetts (Pub. Stats., ed. 1902, c. 100, s. 9). (d) Laws regulating the appointment of some person or persons to act as guardian or guardians, or who may be endowed with legal powers over the person and estate of an inebriate. Thus in France (Code Civil, Arts. 489 et seq.), Germany

(Civil Code, Art. 6 (39)) and Austria-Hungary (Biirgerliches Gesetz-Buch, ss. 21, 269, 270, 273), an inebriate may be judicially interdicted if he is squandering his property and thereby exposing his family to future destitution. Provision is also made for the interdiction of inebriates by the laws of Nova Scotia (Rev. Stats. 1900, c. 126, s. 2), Manitoba (Rev. Stat. 1902, c. 103, ss. 30 et seq.), British Columbia (Rev. Stat. 1897, c. 66), New South Wales (Inebriates Act 1900, s. 5), Tasmania (Inebriates Act 1885, No. 17, s. 23); Canton of Bale (Trustee Law of the 23rd of Feb. 1880, s. n), Orange River Colony (Code Laws, c. 108, s. 30), Maryland (Code General Laws, c. 474, s. 47). (e) Control for the purpose of reformation. Legislation of this character provides reformatory treatment: (1) for the inebriate who makes a voluntary application for admission; (2) by compulsory seclusion for the inebriate who refuses consent to treatment and yet manages to keep out of the reach of the law; (3) for the inebriate who is a police-court recidivist, or who has com- mitted crime, caused or contributed to by drink. The legisla- tion of the Cape of Good Hope (Inebriates Act 1896) and of North Dakota (Habitual Drunkards Act 1895) provides for the first of these methods of treatment alone. Compulsory detention for ordinary inebriates only is provided for by the laws of Delaware (Act of 1898), Massachusetts (Rev. Laws, c. 87), and of the Cantons of Berne (Law of the 24th of Nov. 1883) and Bale (Law of the 21st of Feb. 1901). All three methods of treatment are in force in New South Wales (Inebriates Act 1900), Queens- land (Inebriates Institutions Act 1896) and South Australia (Inebriates Act 1881). Provision is made only for voluntary application and compulsory detention of ordinary inebriates in Victoria (Inebriates Act 1890), Tasmania (Inebriates Act 1885; Inebriates Hospitals Act 1892) and New Zealand (Inebriates Institutions Act 1898). The legislation of the United Kingdom (Inebriates Acts 1879-1900) deals both with voluntary application and with the committal of criminal inebriates or of police-court recidivists. A brief sketch of the English system must suffice.

The Inebriates Acts of 1879-1900 deal in the first place with non-criminal, and in the second place with criminal, habitual drunkards.

For the purposes of the acts the term " habitual drunkard " means "a person who, not being amenable to any jurisdiction in lunacy, is notwithstanding, by reason of habitual intemperate drinking of intoxicating liquor, at times dangerous to himself or herself, or incapable of managing himself or herself and his or her affairs." A person would become amenable to the lunacy jurisdiction not only where habitual drunkenness made him a " lunatic " in the legal sense

of the term, but where it created such a state of disease and consequential " mental infirmity " as to bring his case within section 116 of the Lunacy Act 1890, the effect of which is explained in the article Insanity. Any " habitual drunkard " within the above definition may obtain admission to a "licensed retreat" on a written application to the licensee, stating the time (the maximum period is two years) that he undertakes to remain in the retreat. The application must be accompanied by the statutory declaration of two persons that the applicant is an habitual drunkard, and its signature must be attested by a justice of the peace who has satisfied himself as to the fact, and who is required to state that the applicant understood the nature and effect of his application. Licences (each of which is subject to a duty and is impressed with a stamp of £5, and 10s. for every patient above ten in number) are granted for retreats by the borough council and the town clerk in boroughs, and elsewhere by the county council and the clerk of the county council. The maximum period for which a licence may be granted is two years, but licences may be renewed by the licensing authority on payment of a stamp duty of the same amount as on the original grant. When an habitual drunkard has once been committed to a retreat, he must remain in the retreat for the time that he has fixed in his application, subject to certain statutory provisions similar to those prescribed by the Lunacy Acts for asylums as to leave of absence and discharge; and he may be retaken and brought back to the retreat Under a justice's warrant. The term of detention may be extended on its expiry, or an inebriate may be readmitted, on a fresh application, without any statutory declaration, and without the attesting justice being required to satisfy himself that the applicant is an habitual drunkard. Licensed retreats are subject to in- spection by an Inspector of Retreats appointed by the Home Secretary, to whom he makes an annual report. The Home Secretary is empowered to make rules and regulations for the management of retreats, and " regulations and orders," not inconsistent with such rules, are to be prepared by the licensee within a month after the granting of his licence, and submitted to the inspector for approval. The rules now in force are dated as regards (a) England, 28th Feb. 1902; (b) Scotland, 14th April 1902; (c) Ireland, 3rd Feb. 1903. There are also statutory provisions, similar to those of the Lunacy Acts, as to offences — (i.) by licensees failing to comply with the requirements of the acts; (ii) by persons ill-treating patients, or helping them to escape, or unlawfully supplying them with intoxicating liquor; (iii.) by patients refusing to comply with the rules. The Home Secretary may (i.) authorize the establishment of " State Inebriate Reformatories," to be paid for out of moneys provided by parliament;

and (ii.) sanction " Certified Inebriates' Re- formatories " on the application of any borough or county council, or any person whatever, if satisfied concerning the reformatory and the persons proposing to maintain it. An Inspector of Certified Inebriate Reformatories has been appointed. Regulations for State Inebriate Reformatories and. for Certified Inebriate Reformatories have been made, dated as follows: State Inebriate Reformatories :— England, 21st of June 1901, 29th of Dec. 1903, 29th of April 1904; Scotland, 9th of March 1900; Ireland, 16th of March 1899, 16th of April 1901, 10th of Feb. 1904. Certified Inebriate Reformatories : — England, Model Regulations, 17th of Dec. 1898; Scotland, Regulations, 14th of Feb. 1899; Ireland, Model Regulations, 29th of April 1899.

Any person convicted on indictment of an offence punishable with imprisonment or penal servitude (i.e. of any non-capital

INFALLIBILITY

felony and of most misdemeanours), if the court is satisfied from the evidence that the offence was committed under the influence of drink, or that drink was a contributing cause of the offence, may, if he admits that he is, or is found by the jury to be, an habitual drunkard, in addition to or in substitution for any other sentence, be ordered to be detained in a state or certified inebriate reformatory, the managers of which are willing to receive him. Again, any habitual drunkard who is found drunk in any public place, or who commits any other of a series of similar offences under various statutes, after having within twelve months been convicted at least three times of a similar offence, may, on conviction on indictment, or, if he con- sent, on summary conviction, be sent for detention in any certified inebriate reformatory. The expenses of prosecuting habitual drunkards under the above provisions are payable out of the local rates upon an order to that effect by the judge of assize or chairman of quarter-sessions if the prosecution be on indictment, or by a court of summary jurisdiction if the offence is dealt with summarily.

Authorities.— As to the history of legislation on the subject xe Pari. Paper No. 242 of 1872; 1893 C. 7008. See also Wyatt Fame, Inebriate Reformatories and Retreats (London, 1899) ; Blackwell Inebriates Acts 1879-1898 (London, 1899); Wood Renton, Lunacy (London and Edinburgh, 1896); Kerr, Inebriety (3rd ed., London, I894). An excellent account of the systems in force in other countries tor the treatment of inebriates will be found in Pari. Pap. (1902) cd

INFALLIBILITY (Fr. inJaillibUite and infallibilite, the latter now obsolete, Med. Lat. infallibilitas, infallibilis, formed from fallor, to make a mistake), the fact or quality of not being liable to err or fail. The word has thus the general senseof "certainty"; we may, e.g., speak of a drug as an infallible specific, or of a man's judgment as infallible. In these cases, however, the " infallibility " connotes certainty only in so far as anything human can be certain. In the language of the Christian Church the word " infallibility " is used in a more absolute sense, as the freedom from all possibility of error guaranteed by the direct action of the Spirit of God. This belief in the infallibility of revelation is involved in the very belief in revelation itself, and is common to all sections of Christians, who differ mainly as to the kind and measure of infallibility residing in the human instruments by which this revelation is interpreted to the world. Some see the guarantee, or at least the indication, of infallibility in the consensus of the Church (quod semper, ubique,et ab omnibus) expressed from time to time in general councils; others see it in the special grace conferred upon St Peter and his successors, the bishops of Rome, as heads of the Church; others again see it in the inspired Scriptures, God's Word. This last was the belief of the Protestant Reformers, for whom the Bible was in matters of doctrine the ultimate court of appeal. To the trans- lation and interpretation of the Scriptures men might bring a fallible judgment, but this would be assisted by the direct action of the Spirit of God in proportion to their faith. As for infallibility, this was a direct grace of God, given only to the few. " What ever was perfect under the sun," ask the translators of the Authorized Version (1611) in their preface, "where apostles and apostolick men, that is, men endued with an extraordinary measure of God's Spirit, and privileged with the privilege of infallibility, had not their hand?" In modern Protestantism, on the other hand, the idea of an infallible authority whether in the Church or the Bible has tended to disappear, religious truths being conceived as valuable only as they are apprehended and made real to the individual mind and soul by the grace of God, not by reason of any submission to an external authority. (See also Inspiration.)

At the present time, then, the idea of infallibility in religious matters is most commonly associated with the claim of the Roman Catholic Church, and more especially of the pope person- ally as head of that Church, to possess the privilege of infalli- bility, and it is with the meaning and limits of this claim that the present article deals.

The substance of the claim to infallibility made by the Roman Catholic Church is that the Church and the pope cannot err

when solemnly enunciating, as binding on all the faithful a decision on a question of faith or morale. The infallibility of the Church, thus limited, is a necessary outcome of the funda- mental conception of the Catholic Church and its mission. Every society of men must have a supreme authority , whether individual or collective, empowered to give a final decision in the controversies which concern it. A community whose mission it is to teach religious truth, which involves on the part of its members the obligation of belief in this truth, must, if it is not to fail of its object, possess an authority capable of maintaining the faith in its purity, and consequently capable of keeping it free from and condemning errors. To perform this function without fear of error, this authority must be infallible in its own sphere. The Christian Church has expressly claimed this infallibility for its formal dogmatic teaching. In the very earliest centuries we find the episcopate, united in council, drawing up symbols of faith, which every believer was bound to accept under pain of exclusion, condemning heresies, and casting out heretics. From Nicaea and Chalcedon to Florence and Trent, and to the present day, the Church has excluded from her communion all those who do not profess her own faith, i.e. all the religious truths which she represents and imposes as obligatory. This is infallibility put into practice by definite acts.

The infallibility of the pope was not defined until 1870 at the Vatican Council; this definition does not constitute, strictly speaking, a dogmatic innovation, as if the pope had not hitherto enjoyed this privilege, or as if the Church, as a whole, had admitted the contrary; it is the newly formulated definition of a dogma which, like all those defined by the Councils, continued to grow into an ever more definite form, ripening, as it were, in the always living community of the Church. The exact formula for the papal infallibility is given by the Vatican Council in the following terms (Constit. Pastor aeternus, cap. iv.) ; " we teach and define as a divinely revealed dogma, that the Roman Pontiff, when he speaks ex cathedra — i.e. when, in his character as Pastor and Doctor of all Christians, and in virtue of his supreme apostolic authority, he lays down that a certain doctrine concerning faith or morals is binding upon the universal Church, — possesses, by the Divine assistance which was promised to him in the person of the blessed Saint Peter, that same infalli- bility with which the Divine Redeemer thought fit to endow His Church, to define its

doctrine with regard to faith and morals; and, consequently, that these definitions of the Roman Pontiff are irreformable in themselves, and not in consequence of the consent of the Church." A few notes will suffice to elucidate this pronouncement.

(a) As the Council expressly says, the infallibility of the pope is not other than that of the Church; this is a point which is too often forgotten or misunderstood. The pope enjoys it m person, but solely qua head of the Church, and as the authorized organ of the ecclesiastical body. For this exercise of the primacy as for the others, we must conceive of the pope and the episcopate united to him as a continuation of the Apostolic College and its head Peter. The head of the College possesses and exercises by himself alone the same powers as the College which is united with him; not by delegation from his colleagues, but because he is their established chief. The pope when teaching ex cathedra acts as head of the whole episcopal body and of the whole Church.

(b) If the Divine constitution of the Church has not changed in its essential points since our Lord, the mode of exercise of the various powers of its head has varied; and that of the supreme teaching power as of the others. This explains the late date at which the dogma was defined, and the assertion that the dogma was already contained in that of the papal primacy established by our Lord himself in the person of St Peter. ˆ A certain dogmatic development is not denied, nor an evolution in the direction of a centralization in the hands of the pope of the exercise of his powers as primate; it is merely required that this evolution should be well understood and considered as legitimate.

*5*2*

INFAMY

(c) As a matter of fact the infallibility of the pope, when giving decisions in his character as head of the Church, was generally admitted before the Vatican Council. The only reservation which the most advanced Gallicans dared to formu- late, in the terms of the celebrated declaration of the clergy of France (1682), had as its object the irreformable character of the pontifical definitions, which, it was claimed, could only have been acquired by them through the assent of the Church. This doctrine, rather political than theological, was a survival of the errors which had come into being after the Great Schism, and especially at the council of Constance; its object was to put the Church above its head, as the council of Constance had put the ecumenical council above the pope, as though the council could be ecumenical without its head. In reality it was Gallican- ism alone which was condemned at the Vatican Council, and it is Gallicanism which is aimed at in the last phrase of the definition we have quoted.

(d) Infallibility is the guarantee against error, not in all matters, but only in the matter of dogma and morality; every- thing else is beyond its power, not only truths of another order, but even discipline and the ecclesiastical laws, government and administration, &c.

(e) Again, not all dogmatic teachings of the pope are under the guarantee of infallibility; neither his opinions as private instructor, nor his official allocutions, however authoritative they may be, are infallible; it is only his ex cathedra instruction which is guaranteed; this is admitted by everybody.

But when does the pope speak ex cathedra, and how is it to be distinguished when he is exercising his infallibility? As to this point there are two schools, or rather two tendencies, among Catholics: some extand the privilege of infallibility to all official exercise of the supreme magislerium, and declare infallible, e.g. the papal encyclicals. 1 Others, while recognizing the supreme authority of the papal magislerium in matters of doctrine, confine the infallibility to those cases alone in which the pope chooses to make use of it, and declares positively that he is imposing on all the faithful the obligation of belief in a certain definite proposition, under pain of heresy and exclusion from the Church; they do not insist on any special form, but only require that the pope should clearly manifest his will to the Church. This second point of view, as clearly expounded by Mgr Joseph Fessler (1813-1872), bishop of St Polten, wire was secretary to the Vatican Council, in his work Die wahre und die falsche Unfehl- barkeit der Pdpste (French trans. La vraie et

lafausse infaillibiliie, Paris, 1873), and by Cardinal Newman in his "Letter to the Duke of Norfolk," is the correct one, and this is clear from the fact that it has never been blamed by the ecclesiastical authority. Those who hold the latter opinion have been able to assert that since the Vatican Council no infallible definition had yet been formulated by the popes, while recognizing the supreme authority of the encyclicals of Leo XIII.

It is remarkable that the definition of the infallibility of the . pope did not appear among the projects {schemata) prepared for the deliberations of the Vatican Council (1869). It doubtless arose from the proposed forms for the definitions of the primacy and the pontifical magislerium. The chapter on the infallibility was only added at the request of the bishops and after long hesitation on the part of the cardinal presidents. The proposed form, first elaborated in the conciliary commission de fide, was the object of long public discussions from the 50th general congregation (May 13th, 1870) to the 85th (July 13th); the constitution as a whole was adopted at a public session, on the 18th, of the 535 bishops present, two only replied " Non placet "; but about 50 had preferred not to be present. The controversies

1 It was in this sense that it was understood by Dollinger, who pointed out that the definition of the dogma would commit the Church to all past official utterances of the popes, e.g. the Syllabus of 1864, and therefore to a war

occasioned by this question had started from the very beginning of the Council, and were carried on with great bitterness on both sides. The minority, among whom were prominent Cardinals Rauscher and Schwarzenberg, Hefele, bishop of Rotterdam (the historian of the councils) Cardinal Mathieu, Mgr Dupanloup, Mgr Maret, &c, &c, did not pretend to deny the papal infallibility; they pleaded the inopportuneness of the definition and brought forward difficulties mainly of an historical order, in particular the famous condemnation of Pope Honorius by the 6th ecume- nical council of Constantinople in 680. The majority, in which Cardinal Manning played a very active part, took their stand on theological reasons of the strongest kind; they invoked the promises of Our Lord to St Peter: " Thou art Peter, and upon this rock will I build my Church, and the gates of hell shall not prevail against her "; and again, " I have prayed for thee, Peter, that thy faith fail not; and do thou in thy turn confirm thy brethren "; they showed the popes, in the course of the ages, acting as the guardians and judges of the faith, arousing or welcoming dogmatic controversies and authoritatively settling them,

exercising the 'supreme direction in the councils and sanctioning their decisions; they explained that the few historical difficulties did hot involve any dogmatic defect in the teaching of the popes; they insisted upon the necessity of a supreme tribunal giving judgment in the name of the whole of the scattered Church; and finally, they considered that the definition had become opportune for the very reason that under the pretext of its inopportuneness the doctrine itself was being attacked.

The definition once proclaimed, controversies rapidly ceased; the bishops who were among the minority one after the other formulated their loyal adhesion to the Catholic dogma. The last to do so in Germany was Hefele, who published the decrees of the 10th of April 1871, thus breaking a long friendship with Dollinger; in Austria, where the government had thought good to revive for the occasion the royal placet, Mgr Haynald and Mgr Strossmayer delayed the publication, the former till the 15th of September 1871, the latter till the 26th of December 1872. In France the adhesion was rapid, and the publication was only delayed by some bishops in consequence of the disastrous war with Prussia. Though no bishops abandoned it, a few priests, such as Father Hyacinthe Loyson, and a few scholars at the Gerfnan universities refused their adhesion. The most distinguished among the latter was Dollinger, who resisted all the advances of Mgr Scherr, archbishop of Munich, was excommunicated on the 17th of April 1871, and died un- reconciled, though without joining any separate group. After him must be mentioned Friedrich of Munich, several professors of Bonn, and Reinkens of Breslau, who was the first bishop of the " Old Catholics." These professors formed the " Committee of Bonn," which organized the new Church. It was recog- nized and protected first in Bavaria, thanks to the minister Freiherr Johann von Lutz, then in Saxony, Baden, Wiirt- temberg, Prussia, where it was the pretext for, if not the cause of, the Kulturkampf, and finally in Switzerland, especially at Geneva. ,

For the theological aspects of the dogma ol infallibility, see, among many others, L. Billot, S.J., De Ecclesia Christi (3 vols., Rome, 1898-1900); or G. Wilmers, S.J., De Christi Ecclesia (Regensburg, 1897). The most accessible popular work is that of Mgr Fessler already mentioned. For the history of the definition see Vatican Council ; also Papacy, Gallicanism, Febronianism.Old Catholics, &c.

(A. Bo.)*

INFAMY (Lat. infamia), public disgrace or loss of character. Infamy

(infamia) occupied a prominent place in Roman law, and took the form of a censure on individuals pronounced by a competent authority in the state, which censure was the result either of certain actions which they had committed or of certain modes of life which they had pursued. Such a censure involved disqualification for certain rights both in public and in private law (see A. H. J. Greenidge, Infamia, its Place in Roman Public and Private Law, 1894). In English law infamy attached to a person in consequence of conviction of some crime. The effect of infamy was to render a person incompetent to give evidence

in any legal proceeding. Infamy as a cause of incompetency was abolished by an act of 1843 (6 & 7 Vict. c. 85).

The word " infamous " is used in a particular sense in the English Medical Act of 1858, which provides that if any registered medical practitioner is judged by the General Medical Council, after due inquiry, to have been guilty of infamous conduct in any professional respect, his name may be erased from the Medical Register. The General Medical Council are the sole judges of whether a practitioner has been guilty of conduct infamous in a professional respect, and they act in a judicial capacity, but an accused person is generally allowed to appear by counsel. Any action which is regarded as disgraceful or dishonourable by a man's professional brethren — such, for example, as issuing advertisements in order to induce people to consult him in preference to other practitioners — may be found infamous.

INFANCY, in medical practice, the nursing age, or the period during which the child is at the breast. As a matter of conveni- ence it is usual to include in it children up to the age of one year. The care of an infant begins with the preparations necessary for its birth and the endeavour to ensure that taking place under the best possible sanitary conditions. On being born the normal infant cries lustily, drawing air into its lungs. As soon as the umbilical cord which unites the child to the mother has ceased to pulsate, it is tied about 2 in. from the child's navel and is divided above the ligature. The cord is wrapped in a sterilized gauze pad and the dressing is not removed until the seventh to the tenth day, when the umbilicus is healed.

The baby is now a separate entity, and the first event in its life is the

first bath. The room ready to receive a new-born infant should be kept at a temperature of 70 F. The tempera- ture of the first bath should be 100° F. The child should be well supported in the bath by the left hand of the nurse, and care should be taken to avoid wetting the gauze pad covering the cord. In some cases infants are covered with a white substance termed " vernix caseosa," which may be carefully removed by a little olive oil. Sponges should never be used, as they tend to harbour bacteria. A soft pad of muslin or gauze which can be boiled should take its place. After the first ten days 04 F. is the most suitable temperature for a bath. When the baby has been well dried the skin may be dusted with pure starch powder to which a small quantity of boric acid has been added. The most important part of the toilet of a new-born infant is the care of the eyes, which should be carefully cleansed with gauze dipped in warm water and one drop of a 2% solution of nitrate of silver dropped into each eye. The clothes of a newly born child should consist exclusively of woollen undergarments, a soft flannel binder, which should be tied on, being placed next the skin, with a long-sleeved woven wool vest and over this a loose garment of flannel coming below the feet and long enough to tuck up. Diapers should .be made of soft absorbent material such as well-washed linen and should be about two yards square and folded in a three-cornered shape. An infant should always sleep in a bed or cot by itself. In 1907, of 749 deaths from violence in England and Wales of children under one month, 445 were due to suffocation in bed with adults. A healthy infant should spend most of its time asleep and should be laid into its cot immediately after feeding.

The normal infant at birth weighs about 7 lb. During the two or three days following birth a slight decrease in weight occurs, usually 5 to 6 oz. When nursing begins the child increases in weight up to the seventh day, when the infant will have regained its weight at birth. From the second to the fourth week after birth (according to Camerer) an infant should gain 1 oz. daily or 1ˆ to 2 lb monthly, from the fourth to the sixth month I to f of an oz. daily or 1 lb monthly, from the sixth to the twelfth month \ oz. daily or less than 1 lb monthly. At the sixth month it should be twice the weight at birth. The average weight at the twelfth month is -jo to 21 lb. The increase of weight in artificially fed is less regular than in breast-fed babies. Fnnd — There is but one proper food for an infant, and that s its mother's milk, unless when in exceptional circumstances

the mother is not allowed to nurse her child. Artificially fed children are much more liable to epidemic diseases. The child should be applied to the breast the first day to induce the flow of milk. The first

week the child should be fed at intervals of two hours, the second week eight to nine times, and the fourth week eight times at intervals of two and a half hours. At two months the child is being suckled six times daily at intervals of three hours, the last feed being at 1 1 p.m. Where a mother cannot nurse a child the child must be artificially fed. Cow's milk must be largely diluted to suit the new-born infant. Arm- strong gives the following table of dilution : —

1st week, milk 1 tablespoonful, water 2 tablespoonfuls at 3 months, „ 3I tablespoonfuls, ,,3 ,,] added

at 6 months, ,, 9 ,, „ 3 ,, i with

at 9 months, ,, 12 ,, ,, 3 ,, J sugar.

Koplik has drawn out a table of the amounts to be given as follows : —

1st day 3 feeds of 10 cc total 1 oz. in 24 hours

2nd day 8 ,, 20 cc ,, 5J ,,

3rd day 8 ,, 30 cc (1 oz.) ,, 8 ,,

7th day 9 „ 50 cc ,, 13! „

4th week 8 ,, 60 cc (2 oz.) ,, 16 ,,

3 months 7 ,, 4 oz. „ 28 „

6 months 6 „ 7 oz. ,, 42 „

9 months 6 ,, 85 oz. ,, 50 ,,

In cities it is advisable that milk should be either sterilized by boiling or pasteurized, i.e. subjected to a form of heating which, while destroying pathogenic bacteria, does not altei the taste. The milk in a suitable apparatus is subjected to a temperature of 65 C. (149 F.) for half an hour and is then rapidly cooled to 20° C. (68° F.). Children fed on pasteurized milk should be given a teaspoonful of fresh orange juice daily to supply the missing acid and salts.

Artificial feeding is given by means of a bottle. In France all bottles with rubber tubes have been made illegal. They are a fruitful source of infection, as it is impossible to keep them clean. The best bottle is the boat-shaped one, with a wide mouth at one end, to which is attached a rubber teat, while the other end has a screw stopper. This

is readily cleansed and a stream of water can be made to flow through it. All bottle teats should be boiled at least once a day for ten minutes with soda and kept in a glass-covered jar until required. A feed should be given at the temperature of 100° F.

At the ninth month a cereal may be added to the food. Before that the infant is unable to digest starchy foods. Much starch tends to constipation, and it is rarely wise to give starchy preparations in a proportion of more than 3% to children under a year old. A child who is carefully fed in a cleanly manner should not have diarrhoea, and its appearance indicates carelessness somewhere. The English registrar-general's returns for 1906 show that in the seventy-six largest towns in England and Wales 14,306 deaths of infants under one year from diarrhoea took place in July, August and September alone. These deaths are largely preventable; when Dr Budin of Paris established his " Consultations de Nourissons " the infant mortality of Paris amounted to 178 per 1000, but at the consultation the rate was 46 per 1000. At Varengeville-sur-mer a consultation for nurslings was instituted under Dr Poupalt of Dieppe in 1904. During the seven previous years the infant mortality had averaged 145 per 1000. In 1904-1905 not one infant at the consultation died, though it was a summer of extreme heat, and in 1898 when similar heat had prevailed the infant mortality was 285 per 1000. The deaths of infants under one year in England and Wales, taken from the registrar-general's returns for 1907, amounted to 117-62 per 1000 births, an alarming sacrifice of life. France has been turning her attention to the establishment of infant consultations on the lines of Dr Budin's, and similar dispensaries under the designation " Gouttes de lait " have been widely established in that country; gratifying results in the fall in infant mortality have followed. At the P'ecamp dispensary the mortality from diarrhoea has fallen to 2-8, while that in neighbouring towns is from 50 to 76 per 1000 (Sir A. Simpson). It has been left to private enterprise in England to deal with this problem. The St Pancras " School for Mothers " was

established in 1907 in north-west London. Though started by private persons it was in 1909 worked in connexion with the Health Department of the Borough Council, but was supported by charitable subscriptions and by a small contribution from the student mothers. There are classes for mothers on the care of their health during pregnancy, infant feeding, home nursing, cooking and needlework.

Poor mothers unable to contribute get free dinners for three months previous to the birth of their child and for nine months after if the child is breast-fed. Two doctors are in attendance, and mothers are encouraged to bring their children fortnightly to be weighed, and receive advice. The average attendance is ninety. A baby is said to have " graduated " when it is a year old. An interesting development in connexion with the scheme is a class for fathers at which the medical officer of health for the district lectures on the duties of fatherhood. Similar schools for mothers are now established in Fulham and Stepney. Weighing centres have been established at Dundee, Sheffield, Nottingham, Birmingham, Aberdeen, Bolton, Belfast, and Newcastle-on-Tyne. An infants' milk depot has been established at Pinsbury, and effort is being made to establish milk laboratories where separate nursing portions of sterile milk could be supplied to poor mothers. The Walker- Gordon milk laboratories in the United States are a step in this direction.

The average length of a child at birth is 195 in. and during the first year the average increase is 7! in. A new-born infant is deaf (Koplik). This is supposed to be due to the blocking of the eustachian tubes with mucus. On the fourth day there is some evidence of hearing, and at the fifth week noises in the room disturb it. A healthy infant may be taken out of doors when a fortnight old in summer, after which it should have a daily outing, the eyes being protected from the direct rays of the sun. On the second day the eyes are sensitive to light, in the second month the infant notices colours, at the sixth month it knows its parents, and should be able to hold its head up. At the sixth month the baby begins to cut its temporary teeth. After their appearance they should be cleaned once a day by a piece of gauze moistened in boric acid solution. Attempts to stand are made about the tenth month, and walking begins about the fourteenth month. By this time the intelligence should be developed and memory is observed. A child a year old should be able to articulate a few small words. With the advent of walking and speech the period of infancy may be said to end.

See Pierre Budin, The Nursling (1907) ; Henry Koplik, Disease of Infancy and Childhood (1906) ; Eric Pritchard, The Physiological Feeding of Infants (1904); Eric Pritchard, Infant Education (1907); John Grimshaw, Your Child's Health (1908). (H. L. H.)

INFANT (in early forms enfaunt, enfant, through the Fr. enfant, from Lat. infans, in, not, and fans, the present participle of fari, to speak), a child; in non-legal use, a very young child, a baby, or one of an age suitable to be taught in an " infant school "; in law, a

person under full age, and therefore subject to disabilities not affecting persons who have attained full age.

This article deals with " infants " in the last sense; for the more general sense see Infancy and Child. The period of full age varies widely in different systems, as do also the disabilities attaching to nonage (non-age) . In Roman law, the age of puberty, fixed at fourteen for males and twelve for females, was recognized as a dividing line. Under that age a child was under the guardian- ship of a tutor, but several degrees of infancy were recognized. The first was absolute infancy; after that, until the age of seven, a child was infantiae proximus; and from the eighth year to puberty he was pubertati proximus. An infant in the last stage could, with the assent of his tutor, act so as to bind himself by stipulations; in the earlier stages he could not, although binding stipulations could be made to him-in the second stage. After puberty, until the age of twenty-five years, a modified infancy was recognized, during which the minor's acts were not void altogether, but voidable, and a curator was appointed to manage his affairs. The difference between the tutor and the

curator in Roman law was marked by the saying that the former was appointed for the care of the person, the latter for the estate of the pupil. These principles apply only to children who are sui juris. The patria potestas, so long as it lasts, gives to the father the complete control of the son's actions. The right of the father to appoint tutors to his children by will (testa- mentarii) was recognized by the Twelve Tables, as was also the tutorship of the agnati (or legal as distinct from natural relations) in default of such an appointment. Tutors who held office in virtue of a general law were called legitimi. Besides and in default of these, tutors dativi were appointed by the magistrates. These terms are still used in much the same sense in modern systems founded on the Roman law, as may be seen in the case of Scotland, noticed below.

By the law of England full age is twenty-one, and all minors alike are subject to incapacities. The period of twenty-one years is regarded as complete at the beginning of the day before the birthday: for example, an infant born on the first day of January attains his majority at the first moment of the 31st of December. The incapacity of an infant is designed for his own protection, and its general effect is to prevent him from binding himself absolutely by obligations. Of the contracts of an infant which are binding ab initio, the most important are those relating to " necessaries." By the Sale of Goods Act 1893, an infant liable on a contract for necessaries can be sued

only for a reasonable price, not necessarily the price he agreed to pay. The same statute declares " necessaries " to mean " goods suitable to the condition in life of the infant, and to his actual requirements at the time of the sale and delivery." In the case of goods having a market price, the market price is reasonable. In all other cases the question is one of fact for the jury. The protection of infants extends sometimes to transactions com- pleted after full age; the relief of heirs who have been induced to barter away their expectations is an example. " Catching bargains," as they are called, throw on the persons claiming the benefit of them the burden of proving their substantial righteousness.

At common law a bargain made by an infant might be ratified by him after full age, and would then become binding. Lord Tenterden's act required the ratification to_ be in writing. But now, by the Infants' Relief Act 1874, " all contracts entered into by infants for the repayment of money lent or to be lent, or for goods supplied or to be supplied (other than contracts for neces- saries), and all accounts stated, shall be absolutely void," and " no action shall be brought whereby to charge any person upon any promise made after full age to pay any debt contracted during infancy, or upon any ratification made after full age of any promise or contract made during infancy, whether there shall or shall not be any new consideration for such promise or ratifica- tion after full age." For some years after the passage of this statute highly conflicting views were-held as to the meaning of the part of section 2 whereby it was enacted that " no action shall be brought whereby to charge any person . . . upon any ratifica- tion made after full age of any promise or contract made during infancy." Some authorities were of opinion that the section only applied to the three classes of contract made void by the previous section, viz. for goods supplied, money lent and on account stated. Others thought the effect to be that no contract, except for necessaries, made during infancy could be enforced after the infant came to full age. After several conflicting decisions it has been settled that both these views were wrong. Of the infant's contracts voidable at common law there were two- kinds. The first kind became void at full age, unless expressly ratified. The second kind were valid, unless repudiated within a – reasonable time after full age was attained by the infant. The Infants' Relief Act (section 2) strikes only at the first class and leaves the second untouched. Thus a promise of marriage made during infancy cannot be ratified so as to become actionable: but an infant's marriage settlement, being of the second class, is valid, unless it is repudiated within a reasonable time after the infant attains full age. What is a reasonable time depends on all

the circumstances of the case. In a case decided in 1893 a

INFANTE

*5*5*

settlement made by a female infant was allowed to be repudiated thirty years after she attained full age, but the circumstances were exceptional. A contract of marriage may be lawfully made by persons under age. Marriageable age is fourteen in males and twelve in females. So, generally, an infant may bind himself by contract of apprenticeship or service. Since the passing of the Wills Act, an infant, except he be a soldier in actual military service or a seaman at sea, is unable to make a will. Infancy is in general a disqualification for public offices and professions, e.g. to be a member of parliament or an elector, a mayor or burgess, a priest or deacon, a barrister or solicitor, &e.

Before 1 886 the custody of an infant belonged in the first place, and against all other persons, to the father, who was said to be " the guardian of his children by nature and nurture "; and the father might by deed or will dispose of the custody or tuition of his children until the age of twenty-one.

The Guardianship of Infants Act 1886 placed the mother almost on the same footing as the father as to guardianship of infants. On the death of the father the mother becomes guardian under the statute, either alone when no guardian has been ap- pointed by the father, or jointly with any guardian appointed by him under 12 Chas. II. c. 24. A change of the law even more important is that whereby the mother may by deed or will appoint a guardian or guardians of her infant children to act after her death. If the father survives the mother, the mother's guardian can only act if it be shown to the satisfaction of the court that the father is unfitted to be the sole guardian. On the death of the father, the guardian so appointed by the mother acts jointly with any guardian appointed by the father. The Guardianship of Infants Act 1886 also gives power to the high court and to county courts to make orders, upon the application of the mother, regarding the custody of an infant, and the right of access thereto of either parent. The court must take into consideration " the welfare of the infant, and . . . the conduct of the parents, and . . . the wishes as well of the mother as of the father." The same statute also empowers the high court of justice, " on being satisfied that it is for the welfare of the infant," to " remove from his office any testamentary guardian or any guardian appointed or acting by virtue of this act," and also

to appoint another in place of the guardian so removed.

The. same statute gives power to a court sitting in divorce practically to take away from a parent guilty of a matrimonial offence all rights of guardianship. When a decree for judicial separation or divorce is pronounced, the court pronouncing it may at the same time declare the parent found guilty of mis- conduct to be unfit to have the custody of the children of the marriage. " In such case the parent so declared to be unfit shall not, upon the death of the other parent, be entitled as of right to the custody or guardianship of such children." The court exercises this power very sparingly. When the declaration of unfitness is made, the practical effect is to give to the innocent parent the sole guardianship, as well as power to appoint a testamentary guardian to the exclusion of the guilty parent.

Another radical change has been made in the rights of parents as to guardianship of their children. In consequence of several cases where, after children had been rescued by philanthropic persons from squalid homes and improper surroundings, the courts had felt bound by law to redeliver them to their parents, the Custody of Children Act 1891 was passed. It provides that when the parent of a child applies to the court for a writ or order for the production of the child, and the court is of opinion that the parent has abandoned or deserted the child, or that he has otherwise so conducted himself that the court should refuse to enforce his right to the custody of the child, the court may, in its discretion, decline to issue the writ or make the order. If the . child, in respect of whom the application is made, is being brought up by another person (" person " includes " school or institu- tion "), or is being boarded out by poor-law guardians, the court may, if it orders the child to be given up to the parent, further order the parent to pay all or part of the cost incurred by such person or guardians in bringing up the child.

A parent who has abandoned or deserted his child is, prima facie, unfit to have the custody of the child. And before the court can make an order giving him the custody, the onus lies on him to prove that he is fit. The same rule applies where the child has been allowed by the parent "to be brought up by another person at that person's expense, or by the guardians of a poor- law union, for such a length of time and under such circumstances as to satisfy the court that the parent was unmindful of his parental duties."

The 4th section of the Custody of Children Act 1891 preserves the right of the parent to control the religious training of the infant. The father, however unfit he may be to have the custody of his child, has

the legal right to require the child to be brought up in his own religion. If the father is dead, and has left no directions on the point, the mother may assert a similar right. But the court may consult the wishes of the child; and when an infant has been allowed by the father to grow up in a faith different from his own, the court will not, as a rule, order any change in the character of religious instruction. This is especially the case where the infant appears to be settled in his convictions. In the same direction as the Custody of Children Act 1891 is the Children Act 1908, whereby considerable powers have been conferred on courts of summary jurisdiction (see Children, Law Relating to).

There is not at common law any corresponding obligation on the part of either parent to maintain or educate the children. The legal duties of parents in this respect are only those created by the poor laws, the Education Acts and the Children Act 1908. An infant is liable to a civil action for torts and wrongful acts committed by him. But, as it is possible so to shape the pleadings as to make what is in substance a right arising out of contract take the form of a right arising from civil injury, care is taken that an infant in such a case shall not be held liable. With respect to crime, mere infancy is not a defence, but a child under seven years of age is presumed to be incapable of committing a crime, and between seven and fourteen his capacity requires to be affirmatively proved. After fourteen an infant is dolt capax. ■

The law of Scotland follows the leading principles of the Roman law. The period of minority (which ends at twenty-one) is divided into two stages, that of absolute incapacity (until the age of fourteen in males, and twelve in females), during which the minor is in pupilarity, and that of partial incapacity (between fourteen and twenty-one), during which he is under curators. The guardians (or tutors) of the pupil are either tutors-nominate (appointed by the father in his will) ; tutors-at-law (being the next male agnate of twenty-five years of age), in default of tutors-nominate; or tutors-dative, appointed by royal warrant in default of the other two. No act done by the pupil, or action raised in his name, has any effect without the interposition of a guardian. After fourteen, all acts done by a minor having curators are void without their concurrence. Every deed in nonage, whether during pupilarity or minority, and whether authorized or not by tutors or curators, is liable to reduc- tion on proof of " lesion," i.e. of material injury, due to the fact of nonage, either through the weakness of the minor himself or the imprudence or negligence of his curators. Damage in fact arising on a contract in itself just and reasonable would not be lesion en- titling to

restitution. Deeds in nonage, other than those which are absolutely null ab initio, must be challenged within the quadriennium utile, or four years after majority.

The Guardianship of Infants Act 1886, the Custody of Children Act 1891 and the Children Act 1908, mentioned above, all apply to Scotland.

In the United States, the principles of the English common law as to infancy prevail, generally the most conspicuous variations being those affecting the age at which women attain majority. In many states this is fixed at eighteen. There is some diversity of practice as to the age at which a person can make a will of real or personal estate.

INFANTE (Spanish and Portuguese form of Lat. infans, young child), a title of the sons of the sovereign of Spain and Portugal, the corresponding infanta being given to the daughters. The title is not borne by the eldest son of the king of Spain, who is prince of Asturias, // principe de Asturias. Until the severance of Brazil from the Portuguese monarchy, the eldest son was prince of Brazil. While a son or daughter of the sovereign of Spain is by right infante or infanta of Spain, the title, alone, is granted to other members of the blood royal by the sovereign.

5 i6

INFANTICIDE

INFANTICIDE, the killing of a newly-born child or of the matured foetus. When practised by civilized peoples the subject of infanticide concerns the criminologist and the jurist; but its importance in anthropology, as it involves a widespread practice among primitive or savage nations, requires more detailed attention. J. F. McLennan (Studies in Ancient History, pp. 75 et seq.) suggests that the practice of female infanticide was once universal, and that in it is to be found the origin of exogamy. Much evidence, however, has been adduced against this hypothesis by Herbert Spencer and Edward Westermarck. Infanticide, both of males and females, is far less widespread among savage races than McLennan supposed. It certainly is common in many lands, and more females are killed than males; but among many fierce and savage peoples it is almost unknown. Thus among the Tuski, Ahts, Western Eskimo and the Botocudos new-born children are killed now and then, if they are weak and deformed, or for some other reason (such as the

superstition attaching to birth of twins) but without distinction of sex. Among the Dakota Indians and Crees female infanticide is rare. The Blackfoot Indians believe that a woman guilty of such an act will never reach " the Happy Mountain " after death, but will hover round the scene of her misdeed with branches of trees tied to her legs. The Aleutians hold- that child-murder brings misfortune on the whole village. Among the Abipones it is common, but the boys are usually the victims, because it is customary to buy a wife for a son, whereas a grown daughter will always command a price. In Africa, where a warm climate and abundance of food simplify the problem of existence, the crime is not common. Herr Valdau relates that a Bakundu woman, accused of it, was condemned to death. In Samoa, in the Mitchell and Hervey Islands, and in parts of New Guinea, it was unheard of; while among the cannibals, the Solomon Islanders, it occurred rarely. A theory has been advanced by L. Fison (Kamilaroi and Kumai, 1880) that female infanticide is far less common among the lower savages than among the more advanced tribes. Among some of the most degraded of human beings, such as the Yahgans of Tierra del Fuego, the crime was unknown, except when committed by the mother " from jealousy or hatred of her husband or because of desertion and wretchedness." It is said that certain Californian Indians were never guilty of child-murder before the arrival of the whites; while Wm. Ellis (Polynesian Researches, i. 249) thinks it most probable that the custom was less prevalent in earlier than later Polynesian history. The weight of evidence tends to support Darwin's theory that during the earliest period of human development man did not lose that strong instinct, the love of his young, and consequently did not practice infanticide; that, in short, the crime is not characteristic of primitive races.

Infanticide may be said to arise from four reasons. It may be (1) an act of callous brutality or to satisfy cannibalistic cravings. A Fuegian, Darwin relates, dashed his child's brains out for upsetting a basket of fish. An Australian, seeing his infant son ill, killed, roasted and ate him. In some parts of Africa the negroes bait lion-traps with their own children. Some South American Indians, such as the Moxos, abandon or kill them without reason; while African and Polynesian cannibals eat them without the excuse of the periodic famines which made the Tasmanians regard the birth of a child as a piece of good fortune.

2. Or infanticide may be the result of the struggle for existence. Thus in Polynesia, while the climate ensures food in plenty, the relative smallness of the islands imposed the custom on all families without distinction. In the Hawaiian Islands all children, after the third or

fourth, were strangled or buried alive. At Tahiti fathers had the right (and used it) of killing their newly- born children by suffocation. The chiefs were obliged by custom to kill all their daughters. The society of the Areois, famous in the Society Islands, imposed infanticide upon the women members by oath. In other islands all girl-children were spared, but only two boys in each family were reared. The difficulties of suckling partly explain the custom of killing twins. For the same reason the Eskimo and Red Indians used to bury the

infant with the mother who died in child-birth. Among warriol and hunter tribes, where women could not act as beasts of burden as in agricultural communities, and where a large number of girls were likely to attract the hostile attentions of neighbouring tribesmen, girl-babies were murdered. Arabs, in ancient times, buried alive the majority of female children. In many lands infanticide was regarded as a meritorious act on the part of a parent, done, as a precaution against famine, in the interests of the tribe. In other parts of the world, infanticide results from customs which impose heavy burdens on child-rearing. Of these artificial hardships the best example is afforded by India. There the practice, though forbidden by both the Vedas and the Koran, prevailed among the Rajputs and certain aboriginal tribes. Among the aristocratic Rajputs, it was thought dishonourable that a girl should remain unmarried. Moreover, a girl may not marry below her caste; she ought to marry her superior, or at least her equal. This reasoning was most powerful with the highest castes, in which the disproportion of the sexes was painfully apparent. But, assuming marriage to be possible, it was ruinously expensive to the bride's father, the cost in the case of some rajahs having been known to exceed £100,000. To avoid all this, the Rajput killed a proportion of his daughters — sometimes- in a very singular way. A pill of tobacco and bhang might be given to the new-born child; or it was drowned in milk; 1 or the mother's breast was smeared with opium or the juice of the poisonous datura. A common method was to cover the child's mouth with a plaster of cow-dung, before it drew breath. Infanticide was also practised to a small extent by some sects of the aboriginal Khonds and by the poorer hill-tribes of the Himalayas. Where infanticide occurs in India, though it really rests on the economic facts stated, there is usually some poetical tradition of its origin. Infanticide from motives of prudence was common among some American Indian tribes of the northwest, with whom the " potlatch " was an essential part of their daughter's marriage ceremonies.

3. Or infanticide may be in the nature of a religious observance. The gods must be appeased with blood, and it is believed that no sacrifice

can be so pleasing to them as the child of the worshipper. Such were the motives impelling parents to the burning of children in the worship of Moloch. In India children were thrown into the sacred river Ganges, and adoration paid to the alligators who fed on them. Where the custom prevails as a sacrifice the male child is usually the victim.

4. Or, finally, infanticide may have a social or political reason. Thus at Sparta (and in other places in early Greek and Roman history) weakly or deformed children were killed by order of the state, a custom approved in the ideal systems of Aristotle and Plato, and still observed among the Eskimo and the Kamchadales.

Authorities. — Herbert Spencer, Principles of Sociology, i. 614- 619; McLennan, Studies in Ancient History, pp. 75 et seq.; McLennan, " Exogamy and Endogamy " in the Fortnightly Review, xxi. 884 et seq.; Darwin, Descent of Man, ii. 400 et seq.; L. Fison, and A. W. Howitt, Kamilaroi and Kumai (1880); Westermarck, History of Human Marriage (1894); Browne, Infanticide: Its Origin, Progress and Suppression (London, 1857) ; Lord Avebury, Prehistoric Times (1900), and Origin of Civilization (1902).

Law. — The crime of infanticide among civilized nations is still frequent. It is however due in most cases to abnormal causes, such as a sudden access of insanity, privation, unreason- ing dislike to the child, &c. It is most closely connected with illegitimacy in the class of farm and domestic servants, the more common motive being the terror of the mother of incurring the disgrace with which society visits the more venial offence. Often, however, it is inspired by no better motive than the wish to escape the burden of the child's support. The granting of affiliation orders thus tends to save the lives of many children, though it provides a motive for the paramour sometimes to share in the crime. The laws of the European states differ widely on this subject — some of them treating infanticide as a special crime, others regarding it merely as a case of murder

1 In Baluchistan, where children are often drowned in milk, there is a euphemistic proverb : " The lady's daughter died drinking milk."

of unusually difficult proof. In the law of England infanticide is murder or manslaughter according to the presence or absence of

deliberation. The infant must be a human being in the legal sense; and " a child becomes a human being when it has com- pletely proceeded in a living state from the body of its mother, whether it has breathed or not, and whether it has an independent circulation or not, and whether the navel-string is severed or not; and the killing of such a child is homicide when it dies after birth in consequence of injuries received before, during or after birth." A child in the womb or in the act of birth, though it may have breathed, is therefore not a human being, the killing of which amounts to homicide. The older law of child murder under a statute of James I. consisted of cruel presumptions against the mother, and it was not till 1803 that trials for that offence were placed under the ordinary rules of evidence. The crown now takes upon itself the onus of proving in every case that the child has been alive. This is often a matter of difficulty, and hence a frequent alternative charge is that of concealment of birth (see Birth), or concealment of pregnancy in Scotland. It is the opinion of the most eminent of British medical jurists that this presumption has tended to increase infanticide. Apart from this, the technical definition of human life has excited a good deal of comment and some indignation. The definition allows many wicked acts to go unpunished. The experience of assizes in England shows that many children are killed when it is impossible to prove that they were wholly born. The distinction taken by the law was probably comprehended by the minds of the class to which most of the unhappy mothers belong. Partly to meet this complaint it was suggested to the Royal Commission of 1866 that killing during birth, or within seven days thereafter, should be an offence punishable with penal servitude. The second complaint is of an opposite character — partly that infanticide by mothers is not a fit subject for capital punishment, and partly that, whatever be the intrinsic character of the act, juries will not convict or the executive will not carry out the sentence. Earl Russell gave expression to this feeling when he proposed that no capital sentence should be pronounced upon mothers for the killing of children within six months after birth. When there has been a verdict of murder, sentence of death must be passed, but the practice of the Home Office, as laid down in 1908, is invariably to commute the death sentence to penal servitude for life. The circumstances of the case and the disposition and general progress of the prisoners under discipline in a convict prison are then determining factors in the length of subsequent detention, which rarely exceeds three years. After release, the prisoner's further progress is carefully watched, and if it is seen to be to her advantage the conditions of her release are cancelled and she is restored to complete freedom.

. In India measures against the practice were begun towards the end of the 18th century by Jonathan Duncan and Major Walker. They were continued by a series of able and earnest officers during the 19th century. One of its chief events, representing many minor occurrences, was the Amritsar durbar of 1853, which was arranged by Lord Lawrence. At that meeting the chiefs residing in the Punjab and the trans-Sutlej states signed an agreement engaging to expel from caste every one who committed infanticide, to adopt fixed and moderate rates of marriage expenses, and to exclude from these ceremonies the minstrels and beggars who had so greatly swollen the expense. According to the present law, if the female children fall below a certain percentage in any tract or among any tribe in northern India where infanticide formerly prevailed, the suspected village is placed under police supervision, the cost being charged to the locality. By these measures, together with a strictly enforced system of reporting births and deaths, infanticide has been almost trampled out; although some of the Rajput clans keep their female offspring suspiciously close to the lowest average which secures them from surveillance.

It is difficult to say to what extent infanticide prevails in the United Kingdom. At one time a large number of children were murdered in England for the purpose of obtaining the

burial money from a benefit club, 1 but protection against this risk has been provided for by the Friendly Societies Act 1896, and the Collecting Societies Act 1896. The neglect or killing of nurse-children is treated under Baby-farming, and Children, Law Relating to.

In the United States, the elements of this offence are practically the same as in England. The wilful killing of an unborn child is not manslaughter unless made so by statute. To constitute manslaughter under Laws N.Y. 1869, ch. 631, by attempts to produce miscarriage, the " quickening " of the child must be averred and proved (Evans v. People, 49 New York Rep. 86; see also Wallace v. Slate, 7 Texas app. 570).

INFANTRY, the collective name of soldiers who march and fight on foot and are armed with hand-weapons. The word is derived ultimately from Lat. infans, infant, but it is not clear how the word came to be used to mean soldiers. The suggestion that it comes from a guard or regiment of a Spanish infanta about the end of the 1 5th century cannot be maintained in view of the fact that Spanish foot-soldiers of the time were called soldados and contrasted with French fantassins and Italian fanleria. The New English Dictionary suggests

that a foot-soldier, being in feudal and early modern times the varlet or follower of a mounted noble, was called a boy (cf. Knabe, gargon, footman, &c, and see Valet).

Historical Sketch

The importance of the infantry arm, both in history and at the present time, cannot be summed up better and more con- cisely than in the phrase used by a brilliant general of the Napoleonic era, General Morand — " L'infanterie, c'est Varmte."

It may be confidently asserted that the original fighting man was a foot-soldier. But infantry was differentiated as an " arm " considerably later than cavalry; for when a new means of fighting (a chariot or a horse) presented itself, it was assimilated by relatively picked men, chiefs and noted warriors, who ipso facto separated themselves from the mass or reservoir of men. How this mass itself ceased to be a mere residue and developed special characteristics; how, instead of the cavalry being recruited from the best infantry, cavalry and infantry came to form two distinct services; and how the arm thus constituted organized itself, technically and tactically, for its own work — these are the main questions that constitute the historical side of the subject. It is obvious that as the " residue " was far the greatest part of the army, the history of the foot-soldier is practically identical with the history of soldiering.

It was only when a group of human beings became too large to be surprised and assassinated by a few lurking enemies, that proper fighting became the normal method of settling a quarrel or a rivalry. Two groups, neither of which had been able to surprise the other, had to meet face to face, and the instinct of self-preservation had to be reconciled with the necessity of victory. From this it was an easy step to the differentiation of the champion, the proved excellent fighting man, and to provid- ing this man, on whom everything depended, with all assistance that better arms, armour, horse or chariot could give him. But suppose our champion slain, how are we to make head against the opposing champion? For long ages, we may suppose, the latter, as in the Iliad, slaughtered the sheep who had lost their shepherd, but in the end the " residue " began to organize itself, and to oppose a united front to the enemy's champions — in which term we include all selected men, whether horsemen, charioteers or merely specially powerful axemen and swordsmen. But oncetrie individual had lost his commanding position, the problem presented itself in a new form — how to ensure that every member of the group did his duty by the others — and the solution of this problem for the

conditions of the ancient hand-to-hand struggle marks the historical beginning of infantry tactics.

Gallic warriors bound themselves together with chains. The Greeks organized the city state, which gave each small army

1 See Report on the Sanitary Condition of the Labouring Classes, " Supplementary Report on Interment in Towns," by Edwin Chadwick (Pari. Papers, 1843, xii. 395); and The Social Condition and Education of the People, by Joseph Kay (1850).

and the legion.

solidarity and the sense of duty to as ideal, and the phalanx, in which the file-leaders were in a sense champions yet were Xhe made so chiefly by the unity of the mass. But the

phalanx Romans went farther. Besides developing solidarity and a sense of duty, they improved on this conception of the battle to such a degree that as a nation they may be called the best tacticians who ever existed. Giving up the attempt to make all men fight equally well, they dislocated the mass of combatants into three bodies, of which the first, formed of the youngest and most impressionable men, was engaged at the outset, the rest, more experienced men, being kept out of the turmoil. This is the very opposite of the " champion " system. Those who would have fled after the fall of the champions are engaged and " fought out " before the champions enter the area of the contest, while the champions, who possess in themselves the greatest power of resisting and mastering the instinct of self-preservation, are kept back for the moment when ordinary men would lose heart.

It might be said with perfect justice that without infantry there would never have been discipline, for cavalry began and continued as a crowd of champions. Discipline, which created and maintained the intrinsic superiority of the Roman legion, de- pended first on the ideal of patriotism. This was ingrained into every man from his earliest years and expressed in a system of rewards and punishments which took effect from the same ideal, in that rewards were in the main honorary in character (mural crowns, &c), while no physical

punishment was too severe for the man who betrayed, by default or selfishness, the cause of Rome. Secondly, though every man knew his duty, not every man was equal to doing it, and in recognition of this fact the Romans evolved the system of three-line tactics in which the strong parts of the machine neutralized the weak. The first of these principles, being psychological in character, rose, flourished and decayed with the moral of the nation. The second, deduced from the first, varied with it, but as it was objectively expressed in a system of tactics, which had to be modified to suit each case, it varied also in proportion as the combat took more or less abnormal forms. So closely knit were the parts of the system that not only did the decadence of patriotism sap the legionary organization, but also the unsuitability of that organization to new conditions of warfare reacted unfavourably, even dis astrously, on the moral of the nation. Between them, the Roman infantry fell from its proud place, and whereas in the Republic it was familiarly called the " strength " (robur) } by the 4th century a.d. it had become merely the background for a variety of other arms and corps. Luxury produced " egoists," to whom the rewards meant nothing and the punishments were torture for the sake of torture. When therefore the Roman imperium extended far enough to bring in silks from China and ivory from the forests of central Africa, the citizen-army ceased to exist, and the mere necessity for garrisoning distant savage lands threw the burden of service upon the professional soldier.

The natural consequence of this last was the uniform training of every man. There were no longer any primary differences between one cohort and another, and though the value / rttd" °f tne three-line system in itself ensured its continuance, Army. any cohort, however constituted, might find itself serving in any one of the three lines, i.e. the moral of the last line was no better than that of the first. The best guarantee of success became uniform regimental excellence, and whereas Camillus or Scipio found useful employment in battle for every citizen, Caesar complained that a legion which had been sent him was too raw, though it had been embodied for nine years. The conditions which were so admirably met by the old system never reappeared; for before armies resumed a " citizen " character the invention of firearms had subjected all ranks and lines alike to the same ordeal of facing unseen death, and the old soldiers were better employed in standing shoulder to shoulder with the young. In brief, the old Roman organization was based on patriotism and experience, and when patriotism gave place to " egoism," and the experience of the citizen who spent every other summer in the field of war gave*

place to the formal training of the paid recruit, it died, un- regretted either by the citizen or by the military chieftain. The latter knew how to make the army his devoted servant, while the former disliked military service and failed to prepare himself for the day when the military chief and the mercenary overrode his rights and set up a tyranny, and ultimately the inner provinces of the empire came to be called inermes — unarmed, defenceless — in contrast to the borderland where the all-powerful professional legions lay in garrison.

In these same frontier provinces the tactical disintegration of the legion slowly accomplished itself. Originally designed for the exigencies of the normal pitched battle on firm open fields, and even after its professionalization retaining its character as a large battle unit, it was soon fragmented through the exigencies of border warfare into numerous detachments of greater or less size, and when the military frontier of the empire was established, the legion became an almost sedentary corps, finding the garrisons for the blockhouses on its own section of the line of defence. Further, the old heavy arms and armour which had given it the advantage in wars of conquest — in which the barbarians, gathering to defend their homes, offered a target for the blow of an army — were a great disadvantage when it became necessary to police the conquered territory, to pounce upon swiftly moving bodies of raiders before they could do any great harm. Thus gradually cavalry became more numerous, and light infantry of all sorts more useful, than the old-fashioned linesman. To these corps went the best recruits and the smartest officers, the opportunities for good service and the rewards for it. The legion became once more the " residue." Thus when the " champion " reappeared on the battlefield the solidarity that neutralized his power had ceased to exist.

The battle of Adrianople, the " last fight of the legion," illustrates this. The frontal battle was engaged in the ordinary way, and the cohorts of the first line of the imperial army were fighting man to man with the front ranks of the Gothic infantry (which had indeed a solidarity of its own, unlike the barbarians of the early empire, and was further guaranteed against moral over-pressure by a wagon laager), when suddenly the armoured heavy cavalry of the Goths burst upon their flank and rear. There were no longer Principes and Triarii of the old Republican calibre, but only average troops, in the second and third lines, and they were broken at once. The first line felt the battle in rear as well as in front and gave way. Thereafter the victors, horse and foot, slaughtered unresisting herds of men, not desperate soldiers, and on this day the infantry arm, as an arm,

ceased to exist.

Of course, not every soldier became a horseman, and still fewer could provide themselves with armour. Regular infantry, too, was still maintained for siege, mountain and forest warfare. But the robur, the kernel of the line ˆ es , of battle, was gone, and though a few of the peoples that fought their way into the area of civilization in the dark ages brought with them the natural and primitive method of fighting on foot, it was practically always a combination of mighty champions and ” residue,” even though the latter bound themselves together by locked shields, as the Gauls had bound themselves long before with chains, to prevent ” skulking,” These infantry nations, without any infantry system comparable to that of the Greeks and Romans, succumbed in turn to the crowd of mounted warriors — not like the Greeks and Romans for want of good military qualities, but for want of an organiza- tion which would have distributed their fighting powers to the best advantage. One has only to study the battle of Hastings to realize how completely the infantry masses of the English slipped from the control of their leaders directly the front ranks became seriously engaged. For many generations after Hastings there was no attempt to use infantry as the kernel of armies, still less to organize it as such beforehand. Indeed, except in the Crusades, where men of high and of low degree alike fought for their common faith, and in sieges, where cavalry was powerless and the services of archers and labourers were at a premium, it became quite unusual for infantry to appear on the field at all.

The tactics of feudal infantry at its best were conspicuously illus- trated in the battle of Bouvines, where besides the barons, knights _ and sergeants, the Brabancon mercenaries (heavy foot)

Bouv nes. an(j t j le French comm unal militia opposed one another. On the French right wing, the opportune arrival of a well-closed mass of cavalry and infantry in the flank of a loose crowd of men-at- arms which had already been thoroughly engaged, decided the fight. In the centre, the respective infantries were in first line, the nobles and knights, with their sovereigns, in second, yet it was a mixed mass of both that, after a period of confused fighting, focussed the battle in the persons of the emperor and the king of France, and if the

personal encounters of the two bodies of knights gave the crowded German infantry a momentary chance to strike down the king, the latter was soon rescued by a half-dozen of heavy cavalrymen. On the left wing, the count of Boulogne made a living castle of his Brabancon pikes, whence with his men-at-arms he sallied forth from time to time and played the champion. Lastly, the Constable Montmorency brought over what was still manageable of the corps that had defeated the cavalry on the right (nearly all mounted men) and gave the final push to the allied centre and right in succession. Then the imperial army fled and was slaughtered without offering much resistance. Of infantry in this battle there was enough and to spare, but its only opportunities for decisive action were those afforded by the exhaustion of the armoured men or by the latter becoming absorbed in their own single combats to the exclusion of their proper work in the line of battle. As usual the infantry suffered nine-tenths of the casualties. For all their numbers and apparent tactical distribution on this field, they were " residue," destitute of special organization, training or utility; and the only suggestion of " combined tactics " is the expedient adopted by the count of Boulogne, rings of spearmen to serve as pavilions served in the tournament — to secure a decorous setting for a display of knightly prowess.

In those days in truth the infantry was no more the army than to-day the shareholders of a limited company are the board of directors. They were deeply, sometimes vitally, interested in the result, but they contributed little or nothing to bringing it about, except when the opposing cavalries were in a state of moral equilibrium, and in these cases anything suffices — the appearance of camp followers on a " Gillies Hill," as at Bannock- burn or the sound of half-a-dozen trumpets — to turn the scale. Once it turned, the infantry of the beaten side was cut down unresistingly, while the more valuable prisoners were admitted to ransom. Thereafter, feudal tactics were based principally on the ideas of personal glory — won in single combat, champion against champion, and of personal profit — won by the knight in holding a wealthy and well-armed baron to ransom and by the foot-soldier in plundering while his masters were fighting. In the French army, the term bidaux, applied in the days of Bouvines to all the infantry other than archers and arblasters, came by a quite natural process to mean the laggards, malingerers and skulkers of the army.

But even this infantry contained within itself two half- smothered sparks of regeneration, the idea of archery and the idea of communal militia. Archery, in whatever infantry. f° rm practised, was the one

special form of military activity with which the heavy gendarme (whether he fought on horseback or dismounted) had no concern. Here therefore infantry had a special function, and in so far ceased to be " residue." The communal militia was an early and inadequate expression of the town-spirit that was soon to produce the solid burgher-militia of Flanders and Germany and after that the trained bands of the English cities and towns. It therefore represented the principles of solidarity, of combina- tion, of duty to one's comrade and to the common cause — prin- ciples which had disappeared from feudal warfare. 1 It was under the influence of these two ideas or forces that infantry as an arm began once again, though slowly and painfully, to differentiate itself from the mass of bidaux until in the end the latter practically contained only the worthless elements.

The first true infantry battle since Hastings was fought at Courtrai

in 1302, between the burghers of Bruges and a feudal army under

Courtrai Count Robert of Artois. The citizens, arrayed in heavy

masses, and still armed with miscellaneous weapons, were

careful to place themselves on ground difficult of access — dikes, pools

1 At Bouvines, it is recorded with special emphasis that Guillaume des Barres, when in the act of felling the emperor, heard the call to rescue King Philip Augustus and, forfeiting his rich prize, made his way back to help his own sovereign.

and marshes — and to fasten themselves together, like the Gauls of old. Their van was driven back by the French communal infantry and professional crossbowmen, whereupon Robert of Artois, true feudal leader as he was, ordered his infantry to clear the way for the cavalry and without even giving them time to do so pushed through their ranks with a formless mass of gendarmerie. This, in attempting to close with the enemy, plunged into the canals and swamped lands, and was soon immovably fastened in the mud. The citizens swarmed all round it and with spear, cleaver and flail destroyed it. Robert himself with a party of his gendarmerie strove to break through the solid wall of spears, but in vain. He was killed and his army perished with him, for the citizens did not regard war as a game and ransom as the loser's forfeit. As for the communal infantry which had won the first success, it had long since disappeared from the field, for when count Robert ordered his heavy cavalry forward, they had

thought themselves attacked in rear by a rush of hostile cavalry — as indeed they were, for the gendarmerie rode them down — and melted away.

Crecy (q.v.) was fought forty-four years after . Courtrai. Here the knights had open ground to fight on, and many boasted that they would revenge themselves. But they encountered not merely infantry, but infantry tactics, and were for the second, and not the last, time destroyed. The English army included a large feudal element, but the spirit of indiscipline had been crushed by a series of iron-handed kings, and for more than a century the nobles, in so far as they had been bad subjects, had been good Englishmen. The English yeomen had reached a level of self-discipline and self-respect which few even of the great continental cities had attained. They had, lastly, made the powerful long-bow (see Archery) their own, and Edward I. had combined the shock of the heavy cavalry with the slow searching preparatory rain of arrows (see Falkirk). That is, infantry tactics and cavalry tactics were co-ordinated by a general, and the special point of this for the present purpose is that instead of being, as in France, the unstable base of the so- called " feudal pyramid," infantry has become an arm, capable of offence and defence and having its own special organization, function in the line of battle and tactical method. This last, indeed, like every other tactical method, rested ultimately on the moral of the men who had to put it into execution. Archer tactics did not serve against the disciplined rush of Joan of Arc's gendarmerie, for the solidarity of the archer companies that tried to stop it had long been undermined.

Yet we cannot overrate the importance of the archer in this period of military history. In the city militias solidarity had been obtained through the close personal relationship of the trade gilds and by the elimination of the champion. V"ii u Therefore, as every offensive in war rests upon boldness, archer. these militias were essentially defensive, for they could only hope to ward off the feudal champion, not to outfight him (Battle of Legnano, 1176. See Oman, p. 442). England- however, had evolved a weapon which no armour could resist, and a race of men as fully trained to use it as the gendarme was to use the lance. 2 This weapon gave them the power of killing without being killed, which the citizens' spears and maces and voulges did not. But like all missiles, arrows were a poor stand-by in the last resort if determined cavalry crossed the " beaten zone " and closed in, and besides pa vises and pointed stakes the English archers were given the support of the knights, nobles and sergeants — the armoured champions — whose steady lances guaranteed their safety. Here was the real forward stride in infantry tactics. Archery had

existed from time immemorial, and a mere technical improvement in its weapon could hardly account for its suddenly becoming the queen of the battlefield. The defensive power of the " dark impenetrable wood " of spears had been demonstrated again and again, but when the cavalry had few or no preliminary difficulties to face, the chances of the infantry mass resisting long-continued pressure was small. It was the combination of the two elements that made possible a Crecy and a Poitiers, and this combination was the result of the English social system which produced the 2 Crossbows indeed were powerful, and also handled by professional soldiers (e.g. the Genoese at Crecy), but they were slow in action, six times as slow as the long bow, and the impatient gendarmerie gener- ally became tired of the delay and crowded out or rode over the crossbowmen.

camaraderie of knight and yeoman, champion and plain soldier. Fortified by the knight's unshakeable steadiness, the yeoman handled his bow and arrows with cool certainty and rapidity, and shot down every rush of the opposing champions. This was camaraderie de combat indeed, and in such conditions the offensive was possible and even easy. The English conquered whole countries while the Flemish and German spearmen and vougiers merely held their own. For them, decisive victories were only possible when the enemy played into their hands, but for the English the guarantee of such victories was the specific character of their army itself and the tactical methods resulting from and expressing that character.

But the war of conquest embodied in these decisive victories dwindled in its later stages to a war of raids. The feudal lord, The like the feudal vassal, returned home and gave place

Hundred to the professional man-at-arms and the professional Years' captain. Ransom became again the chief object, War ' and except where a great leader, such as Bertrand

Du Guesclin, compelled the mercenaries to follow him to death or victory, a battle usually became a melee of irregular duels between men-at-arms, with all the selfishness and little of the chivalry of the purely feudal encounter. The war went on and on, the gendarmes thickened their armour, and the archers found more difficulty in

penetrating it. Moreover, in raids for devastation and booty, the slow-moving infantryman was often a source of danger to his comrades. In this guerrilla the archer, though he kept his place, soon ceased to be the mainstay of battle. It had become customary since Crecy (where the English knights and sergeants were dismounted to protect the archers) for all mounted men to send away their horses before engaging. Here and there cavalry masses were used by such energetic leaders as the Black Prince and Du Guesclin, and more often a few men remained mounted for work requiring exceptional speed and courage, 1 but as a general rule the man-at-arms was practically a mounted infantryman, and when he dismounted he stood still. Thus two masses of dismounted lances, mixed with archers, would meet and engage, but the archers, the offensive element, were now far too few in proportion to the lances, the purely defensive element, and battles became in- decisive skirmishes instead of overwhelming victories.

Cavalry therefore became, in a very loose sense of the word, infantry. But we are tracing the history not of all troops that stood on their feet to fight, but of infantry and the special tactics of infantry, and the period before and after 1370, when the moral foundations of the new English tactics had disappeared, and the personality of Du Guesclin gave even the bandits of the " free companies " an intrinsic, if slight, superiority over the invaders, is a period of deadlock. Solidarity, such as it was, had gone over to the side of the heavy cavalry. But the latter had deliberately forfeited their power of forcing the decision by fighting on foot, and the English archer, the cadre of the English tactical system, though diminished in numbers, prestige and importance, held to existence and survived the deadlock. Infantry of that type indeed could never return to the " residue " state, and it only needed a fresh moral impetus, a Henry V., to set the old machinery to work again for a third great triumph. But again, after Agincourt, the long war lapsed into the hands of the soldiers of fortune, the basis of Edward's and Henry's tactics crumbled, and, led by a greater than Du Guesclin, the knights and the nobles of France, and the mercenary captains and men-at-arms as well, rode down the stationary masses of the English, lances and bowmen alike.

The net result of the Hundred Years' War therefore was to re-establish the two arms, cavalry and infantry, side by side, the one acting by shock, and the other by fire. The lesson of Crecy was " prepare your charge before delivering it," and for that purpose great bodies of infantry armed with bows, arblasts and handguns were brought into existence in France. When the French king in 1448 put

into force the " lessons of the war " and organized a permanent army, it consisted in the main of heavy

1 As for instance when thirty men-at-arms " cut out " the Captal de Buch from the midst of his army at Cocherel.

cavalry (knights and squires in the " ordonnance " companies, soldiers of fortune in the paid companies) and archers and arblasters (francs-archers recruited nationally, arblasters as a rule mercenaries, though largely recruited in Gascony). To these armes de jet were added, in ever-increasing numbers, hand firearms. Thus the " fire " principle of attack was established , and the defensive principle of " mass " relegated to the background. In such circumstances cavalry was of course the decisive arm, and the reputation of the French gendarmerie was such as to justify this bold elimination of the means of passive defence. 2 The foot-soldier of Germany and the Low Countries had followed a very different line of development. Here the rich commercial cities scarcely concerned themselves with the quarrels or revolts of neighbouring nobles, m «Swas' but they resolutely defended their own rights against 1 feudal interference, and enforced them by an organized militia, opposing the strict solidarity of their own institutions to the prowess of the champion who threatened them. The struggle was between " you shall " on the part of the baron and " we will not " on the part of the citizens, the offensive versus the defensive in the simplest and plainest form. The latter was a policy of unbreakable squares, and wherever possible, strong positions as well. Sometimes the citizens, sometimes the nobles gained the day, but the general result was that steady infantry in proper formation could not be ridden down, and as yeomen- archers of the English type to " prepare " the charge were not obtainable from amongst the serf populations of the countryside, the problem of the attack was, for Central Europe, insoluble.

The unbreakable square took two forms, the wagenburg with artillery, and the infantry mass with pikes. The first was no more, in the beginning, than an expedient for the safe and rapid crossing of wider stretches of open country ™ e than would have been possible for dismounted men, burg. whom the cavalry headed off as soon as they ventured far enough from the shelter of walls. The men rode not on horses but on carriages, and the carriages moved over the plains in laager formation, the infantrymen standing ready with halbert and voulge or short stabbing spear, and the gunners crouching around the long barrelled two-pounders and the " ribaudequins " — the early machine guns — which were mounted on the wagons. These wagenburgen combined in themselves the due proportions of mobility

and passive defence, and in the skilled hands cff Ziska they were capable of the boldest offensive. But such a tactical system depended first of all on drill, for the armoured cavalry would have crowded through the least gap in the wagon line, and the necessary degree of drill in those days could only be attained by an army which had both a permanent existence and some bond of solidarity more powerful than the incentive to plunder — that is, in practice, it was only attained in full by the Hussite insurgents. The cavalry, too, learned its lesson, and pitted mobile three-pounders against the foot-soldiers' one- and two-pounders, and the wagenburg became no more than a helpless target. Thus when, not many years after the end of the Hussite wars, the Wars of the Roses eliminated the English model and the English tactics from the military world of Europe, the French system of fire tactics— masses of archers, arblasters and handgun-men, with some spearmen and halberdiers to stiffen them — was left face to face with that of the Swiss and Landsknechts, the system of the " long pike."

A series of victories ranging from Morgarten (1315) to Nancy (1477) had made the Swiss the most renowned infantry in Europe. – Originally their struggles with would-be oppressors had Tfle Swlss taken the form, often seen elsewhere, of arraying solid masses of men, united in purpose and fidelity to one another rather than by any material or tactical cohesion. Like the men of Bruges at Courtrai, the Swiss had the advantage of broken ground, and the still greater advantage of being opposed by reckless feudal cavalry. Their armament at this stage was not peculiar — voulges, gisarmes, halberts and spears — though they were specially adept in the use of the two-handed sword. But as time went on the long pike (said to have originated in Savoy or the Milanese about 1330)

2 This tendency of the French military temperament reappears at almost every stage in the history of armies.

The long pike.

became more and more popular until at last on the verge of their brief ascendancy (about 1475-1515) the Swiss armed as much as one quarter of their troops with it. The use of firearms made little or

no progress amongst them, and the Swiss mercenaries of 1480, like their forerunners of Morgarten and Sempach, fought with the arme blanche alone. But in a very few years after the Swiss nation had become soldiers of fortune en masse, the more open lands of Swabia entered into serious and bitter competition with them. From these lands came the Landsknechts, whose order was as strong as, and far less unwieldy than, that of the Swiss, whose armament included a far greater proportion of firearms, and who established a regimental system that left a permanent mark on army organization. The Landsknecht was the prototype of the infantryman of the 16th and 17th centuries, but his right to indicate the line of evolution had to be wrung from many rivals.

The year 1480 indeed was a turning-point in military history. Within the three years preceding it the battles of Nancy and Guinegate had destroyed both the old feudalism of Charles the Bold and the new cavalry tactics of the French gendarmerie. The former was an anachronism, while the latter, when the great wars came to an end and there was no longer either a national impulse or a national leader, had lapsed into the old vices of ransom and plunder. With these, on the same fields, the franc-archer system of infantry tactics perished ignominious! y. It rested, as we know, on the principle that the fire of the infantry was to be combined with and completed by the shock of the gendarmerie, and when the latter were found wanting as at Guinegate, the masses of archers and arblasters, which were only feebly supported by a few handfuls of pikemen and halberdiers, were swept away by the charge of some heavy battalions of Swabian and Flemish pikes. Guinegate was the debut of the Landsknecht infantry as Nancy was that of the Swiss, and the lesson could not be misread. Louis XI. indeed hanged some of his franc-archers and dismissed the rest, and in their place raised " bands " of regular infantry, one of which bore for the first time the historic name of Picardie. But these " bands " were not self-contained. Armed for the most part with artnes de jet they centred on the 6000 Swiss pikemen whom Louis XL, in 1480, took into his service, and for nearly fifty years thereafter the French foot armies are always composed of two elements, the huge battalions of Swiss or Landsknechts, 1 armed exclusively with the long pike (except for an ever-decreasing proportion of halberts, and a few arquebuses) , and for their support and assistance, French and mercenary " bands."

The Italian wars of 1494-1544, in which the principles of fire and shock were readjusted to meet the conditions created by firearms, were the nursery of modern infantry. The combina- tions of Swiss, Landsknechts, Spanish " tercios " and French " bands " that figured

on the battlefields of the early 16th century were infinitely various. But it is not difficult to find a thread that runs through the whole.

The essence of the Swiss system was solidity. They arrayed themselves in huge oblongs of 5000 men and more, at the corners Tb of which, like the tower bastions of a 16th-century

Italian fortress, stood small groups of arquebusiers. The Wars, Landsknechts and the Romagnols of Italy, imitated

*1I2I" anc * r i va U e d them, though as a rule developing more*

front and less depth. At this stage solidity was every- thing and fire-power nothing. At Fornuovo (1495) the mass of arquebusiers and arblasters in the French army did little or nothing; it was the Swiss who were I'esperance de Vost. At Agnadello or Vaila in 1 509 the ground and the " encounter- battle " character of the engagement gave special chances of effective employment to the arquebusiers on either side. Along the front the Venetian marksmen, secure behind a bank, picked off the leaders of the enemy as they came near. On the outer flank of the battle the bands of Gascon arquebusiers, which would otherwise have been relegated to an unimportant place in the general line of battle, lapped round the enemy's flank

1 The term landsknecht, it appears, was not confined to the right bank of the Rhine. The French " lansquenets " came largely from Alsace, according to General Hardy de Perini. In the Italian wa r s Francis I. had in his service a famous corps cabled the " black bands " which was recruited in the lower Rhine countries.

in broken ground and produced great and almost decisive effect. But this was only an afterthought of the king of France and Bayard. In the rest of the battle the huge masses of Swiss pikes were thrown upon the enemy much as the old feudal cavalry had been, regardless of ditches, orchards and vineyards.

Then for a moment the problem was solved, or partially solved, by the artillery. From Germany the material, though not— at least to the same extent — the principle, of the wagenburg penetrated, in the first years of the 16th century, to Italy and thence to France. Thus by degrees a very numerous and exceedingly handy light artillery — " carts with gonnes," as they were called in England — came into play on the Italian battlefields, and took over from the dying franc-archer system the work of preparing the assault by fire. For mere skirmishing the Swiss and Landsknechts had arquebusiers enough,

without needing to call on the masses of Gascons, &c, and pari passu with the development of this artillery, the " bands," other than Swiss and Landsknechts, began to improve themselves into pikemen and halberdiers. At Ravenna (151 2) the bands of Gascony and Picardy, as well as the French aven- turiers (the " bands of Piedmont," afterwards the second senior regiment of the French line) fought in the line of battle shoulder to shoulder with the Landsknechts. On this day the fire action of the new artillery was extraordinarily murderous, ploughing lanes in the immobile masses of infantry. At Marignan the French gendarmerie and artillery, closely and skilfully combined, practically destroyed the huge masses of the Swiss, and so com- pletely had " infantry " and " fire " become separate ideas that on the third day of this tremendous battle we find even the " bands of Piedmont " cutting their way into the Swiss masses. But from this point the lead fell into the hands of the Spaniards. These were originally swift and handy light infantry, capable — like the Scottish Highlanders at Prestonpans and Falkirk long afterwards — of sliding Spanish under the forest of pikes and breaking into the close-infantry locked ranks with buckler and stabbing sword, and the For troops of this sort the arquebus was an ideal ar « ue4us – weapon, and the problem of self-contained infantry was solved by Gonsalvo de Cordoba, Pescara and the great Spanish captains of the day by intercalating small closed bodies of arquebusiers with rather larger, but not inordinately large, bodies of pikes. These arquebusiers formed separate, fully organized sections of the infantry regiment. In close defence they fought on the front and flanks of the pikes, but more usually they were pushed well to the front independently, their speed and ex- cellent fire discipline enabling them to do what was wholly beyond the power of the older type of firing infantry — to take advantage of ground, to run out and reopen fire during a momentary pause in the battle of lance and pike, and to run back to the shelter of their own closed masses when threatened by an oncoming charge. When this system of tactics was con- secrated by the glorious success of Pavia (1525), the " cart with gonnes " vanished and the system of fighting everywhere and always " at push of pike " fell into the background.

The lessons of Pavia can be read in Francis I.'s instructions to his newly formed Provincial (militia) Legions in 1534 and in the battle of Cerisolas ten years later. The " legion " was ordered /fi . to be composed of six "• bands " — battalions we should ce t call them now, but in those days the term " battalion " tactic^' was consecrated to a gigantic square of the Swiss type — each of 800 pikes (including a few halberts) and 200 arquebusiers. The pikes, 4800 strong, of

each legion were grouped in one large battalion, and covered on the front and flanks by the 1200 arque- buses, the latter working in small and handy squads. These ” legions ” did not of course count as good troops, but their organiza- tion and equipment, designed deliberately in peace time, and not affected by the coming and going of soldiers of fortune, represent therefore the theoretically perfect type for the 1 6th century. Cerisoles represents the system in practice, with veteran regular troops. On the side of the French most of the arquebuses were grouped on the right wing, in a long irregular line of companies or strong squads, supported at a moderate distance by companies or small battalions of ‘ ‘ corselets ‘ ‘ (pikes of the French bands of Picardy and Piedmont); the rest of the line of battle was composed of Landsknechts, &c, similarly arrayed, except that the arquebusiers were on the flanks and immediate front of the ” corselets ” and behind

ˆarquebuses and . corselets °’ the right wing came a Swiss monster a f ■• ˆ ■ ° n the lm P erial si de of the Landsknechts, Spanish and Italian infantry were drawn up in seven or eight battalions, each with its due proportion of pikes and ” shot.” The course of the battle demonstrated both the active tactical power of the new form of fire-action and the solidity of the pike nucleus, the former in the attack and defence of hills, woods and localities, the latter in an episode in which a Spanish battalion, after being ridden through from corner to corner by the French gendarmes, continued on its way almost unchecked and quite unbroken. This combination of arquebusiers supported by corselets in first line and corselets with a lew arquebusiers in second, reappeared at Renty (1554) and St Uuentm (1557), and was in fact the typical disposition of infantry Irom about 1530 to 1600. J

By 1550, then, infantry had entirely ceased to be an auxiliary arm. It contained within itself, and (what is more important) within its regimental units, the power of fighting effectively and decisively both at close quarters and at a distance— the principal characteristic of the arm to-day. It had, further developed a permanent regimental existence, both in Spain and in France, and in the former country it had progressed so far from the ” residue ” state that young nobles preferred to trail a pike in the ranks of the foot to service in the gendarmerie or light horse. The service battalions were kept up to war strength by the establishment of depots and the preliminary training there of recruits. In France, apart from Picardie and the other old regiments, every temporary regiment, on disbandment,

threw off a depot company of the best soldiers, on which nucleus the regiment was reconstituted for the next campaign. Moreover, the permanent establishment was aug- mented from time to time by the colonel-general of the foot " giving his white flag " to temporary regiments.

The organization of the French infantry in 1570 presents some points of interest. The former broad classification of au dela and The m "ff° d l s monts ° r " Picardie " and " Piedmont," repre-

French seating the home and Italian armies, had disappeared, and Infantry instead the whole of the infantry, under one colonel-general inlSTO. was divided into the regiments of Picardie, Piedmont 1 French Guards, each of which had its own colonel and

its own colours. Besides these, three newer corps were entretenus par le Koy— Champagne,' practically belonging to the Guise 1 family and two others formed out of the once^enormous regiment of Marshal de Cosse-Bnssac At the end of a campaign all temporary regiments were disbanded, but in imitation of the Spanish depot system, each on disbandment, threw off a depot company of picked men who tormed the nucleus for the next year's augmentation. The regiment consisted of 10-16 "ensigns" or companies, each of about I so pikemen and 50 arquebusiers. Each company had a proprietary captain, the owners of the first two companies being the colonel- g T!?L the colone . 1 (mestre de camp). The senior captain was called the sergeant-major, and performed the duties of a second in command and an adjutant or brigade-major. Unlike the regimental commander, the sergeant-major was always mounted, and it is recorded that one officer newly appointed to the post incurred the ridicule ol the army by dismounting to speak to the king ! " Some veteran officers, wrote a contemporary, " are inclined to think that the regimental commander should be mounted as well as the sergeant- major, rhe regiment was as a rule formed for parade and battle either in line 10 deep or in " battalion " (i.e. mass), Swiss fashion, the captain occupied the front, the ensigns with the company colours the centre, and the lieutenants the rear place in the file The sergeants, armed with the halbert, marched on each side of the battalion or company. Though the musket was gradually being introduced, and had powerful advocates in Marshal Strozzi and the duke of .Guise, the bulk of the " shot " still carried the arquebus, the calibre of which had been, thanks to Strozzi's efforts, standard- ized (see Caliver) so that all the arms took the same sizes of ball. 1 he pikeman had half-armour and a 14-ft. pike, the arquebusier beside the fire-arm a sword which he was trained to use in the manner of

the former Spanish light infantry. The arquebusiers were

fi rr nk m 3 ra ” m ° f the P ‘ keS ° r in I0 deep files on either

The wars in which this system was evolved were wars for prestige and aggrandizement. They were waged, therefore, by mercenary soldiers, whose main object was to live, and who were officered either by men of their own stamp, or by nobles eager to win military glory. But the Wars of Religion raised

\ T h is Practice of ” maintenance ” on a large scale continued to exist in V ranee long afterwards. As late as the battle of Lens (1 648) we find figuring in the king of France’s army three ” regiments of the House 01 Conde.

INFANTRY

[HISTORY

questions of life and death for the Frenchmen of either faith and such public opinion as there was influenced the method of operations so far that -a decision and not a prolongation of the struggle began to be the desired end of operations. Hence in those wars the relatively immobile “battalion” of pikes diminishes in importance and the arquebusiers and musketeers grow more and more efficient. Armies, too, became smaller, and marched more rapidly. Encounter-battles became more frequent than “pitched” battles, and in these the musketeer was at a great advantage. Thus by 1606 the proportions between pikes and musketeers in the French army had come to be 6 pikes to 4 muskets or arquebuses, and the bataillon de combat or brigade was normally no more than 1200 strong In the Netherlands, however, the war of consciences was fought out between the best regular army in the world and burgher militias. Even the French fantassins were second in L m , P J ° rt l . anCe t0 the S P anish soldados. The latter continued to hold the pre-eminent position they had gained at Pavia 2 They improved the arquebus into the musket, a heavier and much more powerful weapon (fired from a rest) which could disable a horse at 500 paces.

*At this moment the professional soldier was at the high-water mark of his supremacy. The musket was too complicated to be rapidly and efficiently used by any but a highly trained man; the pike, probably because it had now **””*

to protect two or three ranks of ” shot ” in front of the leading rank of pikemen, as well as the pikemen themselves, had grown longer_(up

to r8 ft.); and drill and manoeuvre had become more important than ever, for in the meantime cavalry had mostly abandoned the massive armour and the long lance in favour of half-armour and the pistol, and their new tactics made them both swifter to charge groups of musketeers and more deadly to the solid masses of pikemen. This superiority of the regular over the irregular was most conspicuously shown in Alva s war against the Netherlands patriots. Desperately as the latter fought, Spanish captains did not hesitate to attack patriot armies ten times their own strength. If once or twice this contempt led them to disaster, as at Heiligerlee in t S 68 (though here, after all, Louis of Nassau's army was chiefly composed of trained mercenaries), the normal battle was of the rebels 11 " 8611 type ~ S6Ven soldados dead and ˆven thousand

As regards battles in the open field, such results as these naturally confirmed the " Spanish system " of tactics The Dutch themselves, when they evolved reliable field armies copied it w.th few modifications, and by degrees it was spread over Europe by the professional soldiers on both sides. There was p enty of discussion and readjustment of details For example, the French, with their smaller battalions and more rapid movements were inclined to disparage both the cuirass and the pike, and only unwillingly hampered themselves with the long heavy Spanish musket, which had to be fired from a rest In 1600, nearly fifty years after the introduction of the musket this most progressive army still deliberately preferred the old light arquebus, and only armed a few selected men with the larger weapons. On the other hand, the Spaniards, though supreme m the open, had for the most part to deal with desperate men behind fortifications. Fighting, therefore, chiefly at close quarters with a fierce enemy, and not disposing either of the space or of the opportunity for » manceuvre-battles," they sacrificed all their former lightness and s P eed,and clungto armour, the long pike and the heavy 2 J oz . bullet. But the principle;, first put into practice by Gonsalvo de Cordoba, the combination, in the proportions required in each case, of fire and shock elements in every body of organized infantry however small were maintained m full vigour, and by now the superiority" of the infantry arm m method, discipline and technique, which had long before made the Spanish nobles proud to trail a pike in the ranks, began to impress itself on other nations. The relative value of horse and foot became a subject for expert

*a ^^^^^A^ f j&S^ d :«— ***

INFANTRY

Plate I,

LUTZEN— 1632.

INFANTRY

p

nun %

1 3

j

nisi

“HI

ii em

, III IE!.

ins

Q

O

z o

-1

o >

h,

\ \

v \

\ \ \

m’ \

Mi

HISTORY]

discussion instead of an axiom of class pride. The question of cavalry versus infantry, hotly disputed in all ages, is a matter affecting general tactics, and does not come within the scope of the present article (see further Cavalry). Expert opinion indeed was still on the side of the horsemen. It was on their cavalry, with its speed, its swords and its pistols that the armies of the 16th century relied in the main to produce the decision in battle. Sir Francis Vane, speaking of the battle of Nieupoort in 1600, says, " Whereas most commonly in battles infoWK tne success of the foot dependeth on that of the horse, here it was clean contrary, for so long as the foot held good the horse could not be beaten out of the field." The " success " of the foot in Vane's eyes is clearly resistance to disintegration rather than ability to strike a decisive blow.

It must be remembered, however, that Vane is speaking of the Low Countries, and that in France at any rate the solidity which saved the day at Nieupoort was less appreciated than the elan which had won so many smart engagements in the Wars of Religion. Moreover, it was the offensive, the decision-compelling faculty of the foot that steadily developed during the 17th century. To this, little by little, the powers of passive resistance to which Vane did homage, valuable as they were, were sacrificed, until at last the long pike disappeared altogether and the firearm, provided with a bayonet, was the uniform weapon of the foot- soldier. This stage of infantry history covers almost exactly a century. As far as France was concerned, it was a natural evolution. But the acceptance of the principle by the rest of the military world, imposed by the genius of Gustavus Adolphus, was rather revolution than evolution.

In the army which Louis XIII. led against his revolted barons of Anjou in 1620, the old regiments (Jesvieux — Picardie, Piedmont, &c.) seem to have marched in an open chequer-wise Adolphus. formation of companies which is interesting not only as a deliberate imitation of the Roman legion (all soldiers of that time, in the prevailing confusion of tactical ideas, sought guidance in the works of Xenophon, Aelian and Vegetius), but as showing that flexibility and handiness was not the monopoly of the Swedish system that was soon to captivate military Europe. The formations themselves are indeed found in the Spanish and Dutch armies, but the equipment of the men, and the general character of the operations in which they were engaged, probably failed to show off the advantages of this

articulation, for the generals of the Thirty Years' War, trained in this school, formed their infantry into large battalions (generally a single line of masses). Experience certainly gave the troops that used these unwieldy formations a relatively high manoeuvring capacity, for Tilly's army at Breitenfeld (1631) " changed front half-left " in the course of the battle itself. But the manceuvring power of the Swedes was higher still. Each party represented one side of the classical revival, the Swedes the Roman three-line manipular tactics, the Imperialists and Leaguers those of the Greek line of phalanxes. The former, depending as it did on high moral in the individual foot-soldier, was hardly suitable to such a congeries of mercenaries as those that Wallenstein commanded, and later in the Thirty Years' War, when the old native Swedish and Scottish brigades had been annihilated, the Swedish infantry was little if at all better than the rest.

But its tactical system, sanctified by victory, was eagerly caught up by military Europe. The musket, though it had finally driven out the arquebus, had been lightened by Gustavus Adolphus so far that it could be fired without a rest. Rapidity in loading had so far improved that a company could safely be formed six deep instead of ten, as in the Spanish and Dutch systems. Its fire power was further augmented by the addition of two very light field-guns to each battalion; these could inflict loss at twice the effective range of the shortened musket. Above all, Gustavus introduced into the military systems of Europe a new discipline basetf on the idea of exact performance of duty,, which made itself felt in every part of the service, and' was a welcome substitute for the former easy-going methods

of regimental existence. 1 The adoption of Swedish methods indeed was facilitated by the disrepute into which the older systems had fallen. Men were beginning to see that armies raised by contract for a few months' work possessed inherent vices that made it impossible to rely upon them in small things. Courage the mercenary certainly possessed, but his individual sense of honour, code of soldierly morals, and sometimes devotion to a particular leader did not compensate for the absence of a strong motive for victory and for his general refractoriness in matters of detail, such as march-discipline and punctuality, which had become essential since the great Swedish king had reintroduced order, method and definiteness of purpose into the conduct of military operations. In the old-fashioned masses, moreover, individual weaknesses, both moral and physical, counted for little or were suppressed in the general soldierly feeling of the whole body. But the six-deep line used by Gustavus demanded more

devotion and exact obedience in the individual and a more uniform method of drill and handling arms. So shallow an order was not strong enough, under any other condi- tions, to resist the shock of cavalry or even of pikemen. Indeed, had not the cavalry (who, after Gustavus's death, were uninspired mercenaries like the rest) ceased to charge home in the fashion that Gustavus exacted of them, it is possible that the new- fashioned line would not have stood the test, and that infantry would have reverted to the early 16th-century type.

The problem of combining the maximum of fire power with the maximum of control over the individual firer was not fully solved until 1740, but the necessity of attempting the problem was realised from the first. In the Swedish Rebellion. army, before it was corrupted by the atmosphere of the Thirty Years' War, duty to God and to country were the springs of the punctual discipline, in small things and in great, which made it the most formidable army, unit for unit, in the world. In the English Civil War (in which the adherents of the " Swedish system " from the first ousted those of the " Dutch ") the difficulty was more acute, for although the mainsprings of action were similar, the technical side of the soldier's business — the regimental organization, drill and handling of arms — had all to be improvised. Now in the beginning the Royalist cavalry was recruited from "gentlemen that have honour and courage and resolution "; later, Cromwell raised a cavalry force that was even more thoroughly imbued with the spirit of duty, " men who made some conscience of what they did," and throughout the Civil War, consequently, the mounted arm was the queen of the battlefield.

The Parliamentary foot too "made some conscience of what it did," more especially in the first years of the war. But its best elements — the drilled townsmen — were rather of a defensive than of an offensive character, and towards the close of the struggle, when the foot on both sides came to be formed of professional soldiers, the defensive element decreased, as it had decreased in France and elsewhere. The war was like Gustavus's German campaign, one of rapid and far-ranging marches, and the armoured pikeman had either to shorten his pike and to cast off his armour or to be left at home with the heavy artillery (see Firth's Cromwell's Army, ch. iv.). Fights " at push of pike " were rare enough to be specially mentioned in reports of battles. Sir. James Turner says that in 1657, when he was commissioned with others to raise regiments for the king of Denmark, " those of the Privy Council would not suffer one word to be mentioned of a pike in our Commissions." It was the same with armour. In 1658 Lockhart, the commander of the English contingent

in France, specially asked for a supply of cuirasses and headpieces for his pikemen in order to impress his allies. In 1671 Sir James Turner says, " When we see battalions of pikes, we see them everywhere naked unless it be in the Netherlands." But a small proportion of pikes was still held to be necessary by experienced soldiers, for as yet the socket bayonet had not been invented, and there was still cavalry in Europe that could be trusted to ride home.

1 In France it is recorded that the Gardes fran$aises, when warned for duty at the Louvre, used to stroll thither in twos-and threes.

While such cavalry existed, the development of fire power was everywhere hindered by the necessity of self-defence. On the other hand the hitherto accepted defensive means militated against efficiency in many ways, and about 1670, when Louis XIV. and Louvois were fashioning the new standing army that was for fifty years the model for Europe, the problem oMhe was h° w to improve the drill and efficiency of the

pike. musketeers so far that the pikes could be reduced to a

minimum. In 1680 the firelock was issued instead of the matchlock to all grenadiers and to the four best shots in each French Company. The bayonet — in its primitive form merely a dagger that was fixed into the muzzle of the musket — was also introduced, and the pike was shortened. The proportion of pikes to muskets in Henry IV. 's day, 2 to 1 or 3 to 2, and in Gustavus's 2 to 3, had now fallen to 1 to 3.

The day of great causes that could inspire the average man with the resolution to conquer or die was, however, past, and the " shallow order " {Vordre mince), with all its demands on the individual's sense of duty, had become an integral part of the military system. How then was the sense of duty to be created? Louis and Louvois and their contemporaries sought to create it by taking raw recruits in batches, giving them a consistent training, quartering them in barracks and uniforming them. Hence- forward the soldier was not a unit, self-taught and free to enter the service of any master. He had no existence as a soldier apart from his regiment, and within it he was taught that the regiment was everything and the individual

nothing. Thus by degrees the idea of implicit obedience to orders and of esprit de corps was absorbed. But the self-respecting Englishman or the quick ardent Frenchman was not the best raw material for quasi- automatic regiments, and it was not until an infinitely more rigorous system of discipline was applied to an unimaginative army that the full possibilities of this' enforced sense of duty were realized.

The method of delivering fire originally used by the Spaniards, in which each man in succession fired and fell back to the rear of the Methods ^' e to reloac ^' required for its continued and exact per- of fire formance a degree of coolness and individual smartness

before which was probably rarely attained in practice. This was

1740. not of serious moment when the "shot" were simple

auxiliaries, but when under Gustavus the offensive idea came to the front, and the bullets of the infantry were expected to do something more than merely annoy the hostile pikemen, a more effective method had to be devised. First, the handiness of the musket was so far improved that one man could reload while five, instead of as formerly ten, fired. Then, as the enhanced rate of fire made the file-firing still more disorderly than before, two ranks and threewerc set to fire " volews " or " salvces " together, and before 1640 it had become the general custom for the musketeers to fire one or two volleys and then, along with the pikemen, to " fall on." It was of course no mean task to charge even a disordered mass of pikes with a short sword or a clubbed musket, and usually after a few minutes the combatants would drift apart and the musketeers on either side would keep up an irregular fire until the officers urged the whole forward for a second attempt.

With the general disuse of the lance, the disappearance of the personal motives that formerly made the cavalryman charge home, The the adoption of the flintlock musket and the invention of

bayonet. t,ll r soc ' Ke .t bayonet (the fixing of which did not prevent fire being delivered), all reason for retaining the pike vanished, and from about 1700 to the present day, therefore, the invariable armament of infantry has been the musket (or rifle) and bayonet. The manner of employing the weapons, however, changed but slowly. In the French army in 1688, for instance (15 years before the abolition of the pike), the old file-fire was still officially recognized, though rarely employed, the more usual method being for the musketeers in groups of 12 to 30 men to advance to the front and

deliver their volleys in turn, these groups corresponding in size to one of the musketeer wings (manches) of a company or double company. But the fire and'shock'action of infantry were still distinct, the idea of " push of pike" remained, the bayonet (as at Marsaglia) taking the place of the pike, and musketry methods were still and throughout the War of the Spanish Succession somewhat half- hearted and tentative. Two generals so entirely different in genius and temperament as Saxc and Catinat could agree on this point, that attacking infantry ought to close with the enemy, bayonets fixed, without firing a shot. Catinat's orders to his arm'v in 1690, indeed, seem rather to indicate that he expected his troops to endure the enemy's first fire without replying in order that their own volley, when it was at last delivered at a few paces distance, should be as murderous as possible, while Saxc, who was a dreamer as well as a

practical commander of troops, advocated the pure bayonet charge. But the fact that is common to both is the relative ineffectiveness of musketry before the Prussian era, whether this musketry was de- livered by groups of men running forward and returning in line or even by companies in a long line of battle.

This ineffectiveness was due chiefly to the fact that fire and move- ment were separate matters. The enemy's volley, that Catinat and others ordered their troops to endure without flinching, was some- times (as at Fontenoy) absolutely crushing. But as a rule it in- flicted an amount of loss that was not sufficient to put the advancing troops out of action, and experienced officers were aware that to halt to reply gave the enemy time to reload, and that once the fight became an interchange of partial and occasional volleys or a general tiraillerie, there was an end to the attack.

Meanwhile, the tactics of armies had been steadily crystallizing into the so-called " linear " form, which, as far as concerns the infantry, is simply two long lines of battalions (three, four or five deep) and gave the utmost possible develop- tactic. ment to fire-power. The object of the " line " was to break or beat down the opposing line in the shortest possible time, whether by fire action or shock action, but fire action was only decisive at so short a range that the principal volley could be followed immediately by a charge over a few score paces at most and the crossing of bayonets. Fire was, however, effective at ranges outside charging distance, especially from the battalion guns, and however the decision was achieved in the end, it was necessary to cross the zone between about 300 yds. and 50 yds. range as quickly as possible. It was therefore the business of the regimental officer to force his men across this zone before fire was

opened. If, as Catinat recommended, decisive range was reached with every musket loaded and the troops well in hand, their fire when finally it was delivered might well be decisive. But in practice this rarely happened, and though here and there such expedients as a skirmishing line were employed to assist the advance by disturbing the enemy's fire the most that was hoped by the average colonel or captain was that in the advance fire should be opened as late as possible and that the officers should strive to keep in their hands the power of breaking off the fire-fight and pushing the troops forward again. Theorists were already proposing column formations for shock action, and initiating the long controversy between Vordre mince and Vordre profonde, but this was for the time being pure speculation. The linear system rested on the principle that the maximum weight of controlled fire at short range was decisive, and the practical problem of infantry tactics was how to obtain this. The question of fire versus shock had been answered in favour of the former, and henceforward for many years the question of fire versus movement held the first place. The purpose was settled, and it remained to discover the means.

This means was Prussian fire-discipline, which was elaborated by Leopold of Dessau and Frederick William I., and practically applied by Frederick the Great. It consisted first in the combina- tion, instead of the alternation, of fire and movement, and secondly in the thorough efficiency of the fire in itself. But both these demanded a more stringent and technically more perfect drill than had ever before been imagined, or, for that matter, has ever since been attained. A hundred years before the steady drill of the Spanish veterans at Rocroi, who at the word of command opened their ranks to let the cannon fire from the rear and again closed them, impressed every soldier in Europe. But such drill as this was child's play compared with the Old Dessauer's.

On approaching the enemy the marching columns of the Prussians, which were generally open columns of companies 4 deep, wheeled, in

and thus passed along the front of the enemy at a distance ?™ ss ' an of 800-1200 yds. until the rear company had wheeled, disciollne Then the whole together (or in the case of a deployment l74(f to the left, in succession) wheeled into line facing the enemy. These movements, if intervals and distances were preserved with proper precision, brought the infantry into two long well- closed lines, and parade-ground precision was actually attained, thanks to remorseless drilling and to the reintroduction of the march in step to music. Of course such movements were best executed on a firm plain, and as

far as possible the attack and defence of woods and villages was left to light infantry and grenadiers. But even in marshes and scrub, the line managed to manoeuvre with some

approach to the precision of the barrack square. 1 Now, this precision allowed Fiederick to take risks that no former commander would have dared to take. At Hohenfriedberg the infantry columns crossed a marshy stream almost within cannon shot of the enemy; at Kolin (though there this insolence was punished) the army filed past the Imperialist skirmishers within less than musket shot, and the climax of this daring was the " oblique order " attack of Leuthen. With this was bound up a fire discipline that was more extraordinary than any perfection of manoeuvre. Before Hohenfriedberg the king gave orders that " pelotonfeuer " was to be opened at 200 paces from the enemy and continued up to 30 paces, when the line was to fall on with the bayonet. The possibility of this combination of fire and movement was the work of Leopold, who gave the Prussian infantry iron ramrods, and by sheer drill made the soldier a machine capable of delivering (with the flintlock muzzle-loading muskets, be it observed) five volleys a minute. This pelotonfeuer or company volleys replaced the old fire by ranks practised in other armies. Fire began from the flanks of the battalion, which consisted of eight companies (for firing, 3 deep). When the right company commander gave " fire," the commander of No. 2 gave " ready," followed in turn by other companies up to the centre. The same process having been gone through on the left flank, by the time the two centre companies had fired the two flank companies were ready to recommence, and thus a continuous series of rolling volleys was delivered, at one or two seconds' interval only between companies. In attack this fire was combined with movement, each company in turn advancing a few paces after " making ready." In square, old-fashioned methods of fire were employed. Square was an indecisive and defensive formation, rarely used, and in the advance of the deployed line, the offensive and decision-seeking formation par excellence, the special Prussian fire-discipline gave Frederick an advantage of five shots to two against all opponents. The bayonet-attack, if the rolling volleys had done their work, was merely " presenting the cheque for payment " as a modern German writer puts it. The cheque had been drawn, the decision given, in the fire-fight.

For some years this method of infantry training gave the Prussians a decisive superiority in whatever order they fought. Leuthen. ˆ ut lne ‘ r enemies improved and also grew in numbers, while the Prussian army’s resources were strictly limited. Thus in the Seven Years’ War, after the two costly battles of Prague and Kolin (1757) especially, it became necessary to manoeuvre with the object of bringing the Prussian infantry into contact with an equal or if possible smaller portion of the enemy’s line. If this could be achieved, victory was as certain as ever, but the difficulties of bringing about a successful manoeuvre were such that the classical ” oblique order ” attack was only once completely executed. This was at Leuthen, December 5th, 1757, perhaps the greatest day in the history of the Prussian army. Here, in a rolling plain country occasionally broken by marshes and villages, the ” oblique order ” was executed at high speed and with clockwork precision. Frederick’s object was to destroy the left of the Austrian army (which far outnumbered his own) before the rest of their deployed line of battle could change front to intervene. His method was to place his own line, by a concealed flank march, opposite the point where he desired to strike, and then to advance, not in two long lines but in echelon of battalions from the right (see Leuthen). The echelon was not so deep but that each battalion was properly supported by the following one on its left (100 paces distance), and each, as it came within 200 yds. of the Austrian battalion facing it, opened its ” rolling volleys ” while continuing to advance; thus long before the left and most backward battalions were committed to the fight, the right battalions were crumbling the Austrian infantry units one by one from left to right. It was the same, without parade manoeuvres, when at last the Austrians managed to organize a line of defence about Leuthen village. Unable to make an elaborate change of front with the whole centre and right wing for want of time, they could do no more than crowd troops about Leuthen, on a short fighting front, and this crumbled in turn before the Prussian volleys.

One lesson of Leuthen that contemporary soldiers took to heart was that even a two-to-one superiority in numbers could not remedy want of manoeuvring capacity. It might be hoped

1 About this time there was introduced, for resisting cavalry, the well-known hollow battalion square, which, replacing the former masses of pikes, represented up to the most modern times the defensive, as the line or column represented the offensive formation of infantry.

that with training and drill an Austrian battalion could be made

equal to a Prussian one in the front-to-front fight, and in fact, as losses told more and more heavily on Frederick's army as years went on, the specific superiority of his infantry disappeared. From 1758 therefore, to the end of the war, there were no more Rossbachs and Leuthens. Superiority in efficiency through previous training having exhausted its influence, superiority in force through manoeuvre began to be the general's ideal, and as it was a more familiar notion to the average Prussian general, trained to manoeuvre, than to his opponent, whose idea of " manoeuvre " was to sidle carefully from one position to another, Prussian generalship maintained its superiority, in spite of many reverses, to the end. The last campaigns were indeed a war of positions, because Frederick had no longer the men available for forcing the Austrians out of them, and on many occasions he was so weak that the most passive defensive and the most elaborate entrenchments barely sufficed to save him. But whenever opportunity offered itself, the king sought a decisive success by bringing the whole of his infantry against part of the enemy's — the principle of Leuthen put in practice over a wider area and with more elastic manoeuvre methods. The Jong echelon of battalions directed against a part of the hostile line developed quite naturally into an irregular echelon of brigade columns directed against a part of the enemy's position. But the history of the " cordon system " which followed this development belongs rather to the subject of tactics in general than to that of infantry fighting methods. Within the unit the tactical method scarcely varied. In a battle each battalion or brigade fought as a unit in line, using company volleys and seeking the decision by fire.

In this, and in even the most minute details of drill and uni- form, military Europe slavishly copied Prussia for twenty years after the Seven Years' War. The services of ex- _ Prussian officers were at a premium just as those of V ersies and Gustavus's officers had been 1 50 years before. Military develop- missions from all countries went to Potsdam or to m / ats > the " Reviews " to study Prussian methods, with t79g ' as simple a faith in their adequacy as that shown to-day by small states and half-civilized kingdoms who send military representatives to serve in the great European armies. And withal, the period 1 763-1 792 is full of tactical and strategical controversies. The principal of these, as regards infantry, was that between "fire" and "shock" revived about 17 10 by Folard, and about 1780 the American War of Independence complicated it by introducing a fresh controversy between skirmishing and close order. As to the first, in Folard's day as in Frederick's, fire action at close range was the deciding factor in battle, but in Frederick's later

campaigns, wherein he no longer disposed of the old Prussian infantry and its swift mechanical fire-discipline, there sprang up a tendency to trust to the bayonet for the decision. If the (so-called) Prussian infantry of 1762 could be in any way brought to close with the enemy, it had a fair chance of victory owing to its leaders' previous dispositions, and then the advocates of " shock," who had temporarily been silenced by Mollwitz and Hohenfried- berg, again took courage. The ordinary line was primarily a formation for fire, and only secondarily or by the accident of circumstances for shock, and, chiefly perhaps under Saxe's influence, the French army had for many years been accustomed to differentiate between " linear " formations for fire and " columnar " for attack— thus reverting to 16th-century practice. While, therefore, the theoreticians pleaded for battalion columns and the bayonet or for line and the bullet, the practical soldier used both. Many forms of combined line and column were tried, but in France, where the question was most assiduously studied, no agreement had been arrived at when the advent of the skirmisher further complicated the issues.

In the early Silesian wars, when armies fought in open country in linear order, the outpost service scarcely concerned the line troops sufficiently to cause them to get under arms at the sound of firing on the sentry line. It was performed by irregular light troops, recruited from wild characters of all nations, who were also charged with the preliminary skirmishing necessary to clear up the situation before

the deployment of the battle-army, but once the line opened fire their work was done and they cleared away to the flanks (generally in search of plunder). Later, however, as the preliminary manoeuvring before the battle grew in importance and the ground taken into the manoeuvring zone was more varied and extended than formerly, light infantry was more and more in demand — in a " cordon " de- fensive for patrolling the intervals between the various detachments of line troops, in an attack for clearing the way for the deployment of each column. Yet in all this there was no suggestion that light troops or skirmishers were capable of bringing about the decision in an armed conflict. When Frederick gained a durable peace in 1763

he dismissed his " free battalions " without mercy, and by 1764 not more than one Prussian soldier in eleven was an " irregular," either of horse or foot. 1

But in the American War of Independence the line was pitted against light infantry in difficult country, and the British and French officers who served in it returned to Europe full of en- thusiasm for the latter. Nevertheless, their light infantry was, unlike Frederick's, selected line infantry. The light infantry duties — skirmishing, reconnaissance, outposts — were grafted on to a thorough close-order training. At first these duties fell to the grenadiers and light companies of each battalion, but during the struggle in the colonies, the light companies of a brigade were so frequently massed in one battalion that in the end whole regiments were converted into light infantry. This combination of " line " steadiness and " skirmisher " freedom was the keynote of Sir John Moore's training system fifteen years later, and Moore's regiments, above all the 52nd, 43rd (now combined as the Oxfordshire Light Infantry) and 95th Rifles (Rifle Brigade), were the backbone of the British Army throughout the Peninsular War. At Waterloo the 52nd, changing front in line at the double, flung itself on the head and flank of the Old Guard infantry, and with the " rolling volleys " inherited from the Seven Years' War, shattered it in a few minutes. Such an exploit would have been absolutely inconceivable in the case of one of the old " free battalions." But the light infantry had not merely been levelled up to the line, it had surpassed it, and in 1815 there were no troops in Europe, whether trained to fight in line or column or skirmishers, who could rival the three regiments named, the " Light Division " of Peninsular annals. For meantime the infantry organization and tactics of the old regime, elsewhere than in England, had been disintegrated by the flames of the French Revolution, and from their ashes a new system had arisen, which forms the real starting-point of the infantry tactics of to-day.

The controversialists of Louis XVI. 's time, foremost of whom were Guibert, Joly de Maizeroy and Menil Durand (see Max The Jahns, Gesch. d. Kriegswissenschaften, vol. iii.), were

French agreed that shock action should be the work of troops Revolu- formed in column, but as to the results to be expected from shock action, the extent to which it should be facilitated by a previous fire preparation, and the formations in which fire should be delivered (line, line with skirmishers or " swarms ") discussion was so warm that it sometimes led to wrangles in ladies' drawing-rooms and meetings in the duelling field. The drill-book for the French infantry

issued shortly before the Revolution was a common-sense compromise, which in the main adhered to the Frederician system as modified by Guibert, but gave an important place in infantry tactics to the battalion " columns of attack," that had hitherto appeared only spasmodically on the battlefields of the French army and never elsewhere. This, however, and the quick march (100 paces to the minute instead of the Frederician 75) were the only pre- scriptions in the drill-book that survived the test of a " national " war, to which within a few years it was subjected (see French Revolutionary Wars). The rest, like the "linear system" of organization and manoeuvre to which it belonged (see Army, §§ 3 -33; Conscription, &c.) was ignored, and circumstances and the practical troop-leaders evolved by circumstances fashioned the conjbination of close-order columns and loose-order skirmishers which constituted essentially the new tactics of the Revolutionary and Napoleonic infantry.

The process of evolution cannot be stated in exact terms, more especially as the officers, as they grew in wisdom through experience, learned to apply each form in accordance with ground and circumstances, and to reject, when unsuitable, not only the forms of the drill-book, but the forms proposed by themselves to replace those of the drill-book. But certain tendencies are easily discernible. The first tendency was towards the dissolu-

1 The Prussian Grenadier battalions in the Silesian and Seven Years' Wars were more and more confined strictly to line-of-battle duties as the irregular light infantry developed in numbers.

tion of all tactical links. The earlier battles were fought partly in line for fire action, partly in columns for the bayonet attack. Now the linear tactics depended on exact pre- tactical servation of dressing, intervals and distances, and evolution what required in the case of the Prussians years of 1" France steady drill at 76 paces to the minute was hardly J^' attainable with the newly levied ardent Frenchmen marching at 100 to 120. Once, therefore, the line moved, it broke up into an irregular swarm of excited firers, and experience soon proved that only the troops kept out of the turmoil, whether in line or in column, were susceptible of manoeuvre and united action. Thus from about 1795 onwards the forms of the old regime, with half the troops in front in line of battle (practically in dense hordes of firers) and the other half in rear in line or line of columns, give way to new ones in which the skirmishers are fewer and the closed troops more numerous, and the decision rests no longer with the fire of the leading units (which of course could not compare in effectiveness with the rolling volleys of the drilled line) but with the

bayonets of the second and third lines — the latter being sometimes in line but more often, owing to the want of preliminary drill, in columns. The skirmishers tended again to become pure light infantry, whose role was to prepare, not to give, the decision, and who fought in a thin line, taking every advantage of cover and marksmanship. In the Consulate and early Empire, indeed, we commonly find, in the closed troops destined for the attack, mixed line and column formations combining in themselves shock and controlled close-order fire — absolutely regardless of the skirmishers in front.

In sum, then, from 1792 to 1795 the fighting methods of the French infantry, of which so much has been written and said, are, as they have aptly been called, " horde-tactics." From 1796 onwards to the first campaigns of the Empire, on the other hand, there is an ever-growing tendency to combine skirmishers, properly so called, with controlled and well-closed bodies in rear, the first to prepare the attack to the best of their ability by individual courage and skill at arms, the second to deliver it at the right moment (thanks to their retention of manceuvre formations), and with all possible energy (thanks to the cohesion, moral and material, which carried forward even the laggards). Even when in the long wars of the Empire the quality of the troops progressively deteriorated, infantry tactics within the regiment or brigade underwent no radical alteration. The actual formations were most varied, but they always contained two of the three elements, column, line and skirmishers. Column (generally two lines of battalions in columns of double-companies) was for shock or attack, line for fire-effect, and skirmishers to screen the advance, to scout the ground and to disturb the enemy's aim. Of these, except on the defensive (which was rare in a Napoleonic battle), the " column " of attack was by far the most important. The line formations for fire, with which it was often combined, rarely accounted for more than one-quarter of the brigade or division, while the skirmishers were still less numerous. Withal, these formations in them- selves were merely fresh shapes for old ideas. The armament of Napoleon's troops was almost identical with that of Frederick's or Saxe's. Line, column and combinations of the two were as old as Fontenoy and were, moreover, destined to live for many years after Napoleon had fallen. " Horde-tactics " did not survive the earlier Revolutionary campaigns. Wherein then lies the change which makes 1792 rather than 1740 the starting-point of modern tactics?

*The answer, in so far as so comprehensive a question canˆhe answered from a purely infantry standpoint, is that whereas Frederick, disposing of a small and highly finished instrument, used its manceuvre power and regimental in *f°Ji~ s efficiency to destroy one part of his enemy so swiftly an a that the other had no time to intervene, Napoleon, artillery who had numbers rather than training on his side, only jgˆ s ' delivered his decisive blow after he had "fixed" all bodies t g ts , of the enemy which would interfere with his prepara- tions— -i.e. had set up a physical barrier against the threatened intervention. This new idea manifested itself in various forms.*

In strategy (q.v.) and combined tactics it is generally for convenience called " economy of force." In the domain of artillery (see Artillery) it marked a distinction, that has revived in the last twenty years, between slow disintegrating fire and sudden and overpowering " fire-preparation." As regards infantry the effect of it was revolutionary. Regiments and brigades were launched to the attack to compel the enemy to defend himself, and fought until completely dissolved to force him to use up his reserves. " On s'engage partout et puis Ton voit " is Napoleon's own description of his holding attack, which in no way resembled the " feints " of previous generations. The self-sacrifice of the men thus engaged enabled their commander to " see," and to mass his reserves opposite a selected point, while little by little the enemy was hypnotized by the fighting. Lastly, when " the battle was ripe " a hundred and more guns galloped into close range and practically annihilated a part of the defender's line. They were followed up by masses of reserve infantry, often more solidly formed at the outset than the old Swiss masses of the 1 6th century. 1 If the moment was rightly chosen these masses, dissolved though they soon were into dense formless crowds, penetrated the gap made by the guns (with their arms at the slope) and were quickly followed by cavalry divisions to complete the enemy's defeat. Here, too, it is to be observed there is no true shock. The infantry masses merely " present the cheque for payment," and apart from surprises, ambushes and fights in woods and villages there are few recorded cases of bayonets being crossed in these wars. Napoleon himself said " Le feu est tout, le reste peu de chose," and though a mere plan of his dispositions suggests that he was the disciple of Folard and Menil Durand, in reality he simply applied " fire-power " in the new and grander form which his own genius imagined.

The problem, then, was not what it had been one hundred and fifty years before. The business of the attack was not to break down the passive resistance of the defence, but to destroy or to evade its fire-power. No attack with the bayonet could suc- ceed if this remained effective and unbroken, and no resistance (in the open field at least) availed when it had been mastered or evaded. In Napoleon's army, the circumstance that the infantry was (after 1807) incapable of carrying out its own fire-preparation forced the task into the hands of the field artillery. In other armies the 18th-century system had

been discredited by repeated disasters, and the infantry, as it became " nationalized," was passing slowly through the successive phases of irregular lines, " swarms," skirmishers and line-and- column formations that the French Revolutionary armies had traversed before them — none of them methods that in themselves had given decisive results.

In all Europe the only infantry that represented the Frederician tradition and prepared its own charge by its own fire was the The British. Eye-witnesses who served in the ranks of

British the French have described the sensation of powerless- Penlnsular ness t j lat t j, e y f e }(- as their attacking column approached the line and watched it load and come to the present. The column stopped short, a few men cheered, others opened a ragged individual fire, and then came the volleys and the counter-attack that swept away the column. Sometimes this counter-stroke was made, as in the famous case of Busaco, from an apparently unoccupied ridge, for the British line, under Moore's guidance, had shaken off the Prussian stiffness, fought 1 deep instead of 3 and -was able to take advantage of cover. The " blankness of the battlefield " noted by so many observers to-day in the South African and Manchurian Wars was fully as characteristic of Wellington's battles from Vimeiro to Waterloo, in spite of close order and red uniforms. But these battles were of the offensive-defensive type in the main, and for various reasons this type could not be accepted as normal by the rest of Europe. Nonchalance was not characteristic of the eager national levies of 1813 and 1814, and the Wellington method of

1 Even when the hostile artillery was still capable of fire these masses were used, for in no other formation could the heterogeneous and ill-trained infantry of Napoleon's vassal states (which constituted half of his army) be brought up at all.

infantry tactics, though it had brought about the failure of Napoleon's last effort, was still generally regarded as an illustration of the already recognized fact that on the defensive the fire-power of the line, unless partly or wholly evaded by rapidity in the advance and manoeuvring power or mastered and extin- guished by the fire-power of the attack, made the front of the defence impregnable. There was indeed nothing in the English tactics at Waterloo that, standing out from the incidents of the battle, offered a new principle of winning battles.

Nor indeed did Europe at large desire a fresh era of warfare. Only

the French, and a few unofficial students of war elsewhere, realized the significance of the rejuvenated " line." For every one else, the later Napoleonic battle was the model, and as the great wars had ended before the " national " spirit had been exhausted or misused in wars of aggrandizement, infantry tactics retained, in Germany, Austria and Russia, the character- istic Napoleonic formations, lines of battalion or regimental columns, sometimes combined with linear formations for fire, and always covered by skirmishers. That these columns must in action dissolve sooner or later into dense irregular swarms was of course foreseen, but Napoleon had accustomed the world to long and costly fire-fighting as the preliminary to the attack of the massed reserves, and for the short remainder of the period of smooth-bore muskets, troops were always launched to the attack in columns covered by a thin line of picked shots as skirmishers. The moral power of the offensive " will to conquer " and the rapidity of the attack itself were relied upon to evade and disconcert the fire-power of the defence. If the attack failed to do so, the ranges at which infantry fire was really destructive were so small that it was easy for the columns to deploy or disperse and open a fire-fight to prepare the way for the next line of columns. And after a careful study of the battle of the Alma, in which the British line won its last great victory in the open field, Moltke himself only proposed such modifications in the accepted tactical system as would admit of the troops being deployed for defence instead of meeting attack, as the Russians met it, in solid and almost stationary columns. Fire in the attack, in fact, had come to be considered as chiefly the work of artillery, and as artillery, being an expensive arm, had been reduced during the period of military stagnation following Waterloo, and was no longer capable of Napoleonic feats, the attack was generally a bayonet attack pure and simple. Waterloo and the Alma were credited, not to fire- infantry power, but to English solidity, and as Ardant du methods, Picq observes, " All the peoples of Europe say '"' ' no one can resist our bayonet attack if it is made resolutely ' — and all are right. . . . Bayonet fixed or in the scabbard, it is all the same." Since the disappearance of the " dark impenetrable wood " of spears, the question has always turned on the word " resolute." If the defence cannot by any means succeed in mastering the resolution of the assailant, it is doomed. But the means (moral and material) at the disposal of the defence for the purpose of mastering this resolution were, within a few years of the Crimean War, revolutionized by the general adoption of the rifle, the introduction of the breech-loader and the revival of the " nation in arms."

Thirty years before the Crimea the flint-lock had given way to the

percussion lock (see Gun), which was more certain in its action and could be used in all weathers. But fitting a copper cap on the nipple was not so simple a matter for nervous fingers as priming with a pinch of powder, and the usual rate of fire had fallen from the five rounds a minute of Frederick's day to two or three at the most. " Fire-power " therefore was at a low level until the general introduction 2 of the rifled barrel, which while further diminishing the rate of fire, at any rate greatly increased the range at which volleys were thoroughly effective. Artillery (see Artillery, § 13), the fire- weapon of the 2 Rifles had, of course, been used by corps of light troops (both infantry and mounted) for many years. The British Rifle Brigade was formed in 1800, but even in the Seven Years' War there were rifle-corps or companies in the armies of Prussia and Austria. These older rifles could not compare in rapidity or volume of fire with the ordinary 'firelock.

attack, made no corresponding progress, and even as early as the Alma and Inkerman (where the British troops used the Minie rifle) the dense columns had suffered heavily without being able to retaliate by " crossing bayonets." Fire power, therefore, though still the -special prerogative of the defence, began to reassert its influence, and for a brief period the defensive was regarded as the best form of tactics. But the low rate of fire was still a serious objection. Many incidents in the American Civil War showed this, notably Fredericksburg, where the key of the Confederate position was held — against a simple frontal attack unsupported by effective artillery fire — by three brigades in line one behind the other, i.e. by a six-deep firing line. No less force could guarantee the " inviolability of the front," and even when, in this unnatural and uneconomical fashion, the rate of fire was augmented as well as the effective range, a properly massed and well-led attack in column (or in a rapid succession of deployed lines) generally reached the defender's position, though often in such disorder that a resolute counterstroke drove it back again. The American fought over more djfncult country and with less previous drill-training than the armies of the Old World. The fire-power of the defence, therefore, that even in America did not always prevail over the resolution of the attack, entirely failed in the Italian war of 1859 to stop the swiftly moving, well-drilled columns of the French professional army, in which the

nationals/an had not as yet been suppressed, as it was a few years later, by the doctrine that " the new arms found their greatest scope in the defence." The Austrians, who had pinned their faith to this doctrine, deserted their false gods, forbade any mention of the defensive in their drill-books, and brought back into honour the bayonet tactics of the old wars.

The need of artillery support for the attack was indeed felt (though the gunners had not as yet evolved any substitute for the case-shot preparation of Napoleon's time), but men remembered that artillery was used by the great captain, not so much to enable good troops to close with the enemy, as to win battles with masses of troops of an inferior stamp, and contemporary experience seemed to show that (if losses were accepted as inevitable) good and resolute troops could overpower the defence, even in face of the rifle and without the aid of case shot. But a revolution was at hand.

In 1861 Moltke, discussing the war in Italy, wrote, " General Niel attributes his victory (at Solferino) to the bayonet. But The that does not imply that the attack was often followed

breech- by a hand-to-hand fight. In principle, when one loading makes a bayonet charge, it is because one supposes r e " that the enemy will not await it. . . . To approach the

enemy closely, pouring an efficacious fire into him — as Frederick the Great's infantry did — is also a method of the offensive." This method was applicable at that time for the Prussians alone, for they alone possessed a breech-loading firearm. The needle-gun was a rudimentary weapon in many respects, but it allowed of maintaining more than twice the rate of fire that the muzzle- loader could give, and, moreover, it permitted the full use of cover, because the firer could lie down to fire without having to rise between every round to load. Further, he could load while actually running forward, whereas with the old arms loading not only required complete exposure but also checked movement. The advantages of the Prussian weapon were further enhanced, in the war against Austria, by the revulsion of feeling in the Imperial army in favour of the pure bayonet charge in masses that had followed upon Magenta and Solferino.

With the stiffly drilled professional soldier of England, Austria and Russia the handiness of the new weapon could hardly have been exploited, for (in Russia at any rate) even skirmishers had to march in step. The Prussians were drilled nominally in accordance with regulations dating from 181 2, and therefore suitable, if not to the

new weapon, at least to the " swarm " fighting of an enthusiastic national army, but upon these regula- tions a mass of peace-time amendments had been superposed, and in theory their drill was as stiff as that of the Russians. But, as in France in 1 793-1 796, the composition of their army — a true " nation in arms " — and the character of the officers

evolved by the universal service system saved them from their regulations. The offensive spirit was inculcated as thoroughly as elsewhere, and in a much more practical form. Dietrich von Bulow's predictions of the future battle of " skirmishers " (meaning thereby a dense but irregular firing line) had capti- vated the younger school of officers, while King William and the veterans of Napoleon's wars were careful to maintain small columns (sometimes company 1 columns of 240 rifles, but quite as often half-battalion and battalion columns) as a solid back- ground to the firing line. Thus in 1866 (see Seven Weeks' War), as Moltke had foreseen, the attacking infantry fought its way to close quarters by means of its own fire, and the bayonet charge again became, in his own words, " not the first, but the last, phase of the combat," immediately succeeding a last burst of rapid fire at short range and carried out by the company and battalion reserves in close order. Against the Austrians, whose tactics alternated between unprepared bayonet rushes by whole brigades and a passive slow-firing defensive, victory was easily achieved.

But immediately after Koniggratz the French army was served out with a breech-loading rifle greatly superior in every respect to the needle-gun, and after four years' tension infantry France pitted breech-loader against breech-loader, /o the In the first battles (see Worth, and Metz: Battles) war of the decision-seeking spirit of the " armed nation," the inferior range of the needle-gun as compared with that of the chassepot, and the recollections of easy triumphs in 1864 and 1866, all combined to drive the German infantry forward to within easy range before they began to make use of their weapons. Their powerful artillery would have sufficed of itself to enable them to do this (see Sedan), had they but waited for its fire to take effect. But they did not, and they suffered accordingly, for, owing to the ineffectiveness of their rifle between 1000 and 400 yds. range, they had to advance, as the Austrians and Russians had done in previous wars, without firing a shot. In these circumstances their formations, whether line or column, broke up, and the whole attacking force dissolved into long irregular swarms. These swarms were practically composed only of the brave men, while the rest huddled together in woods and valleys. When, therefore, at last the firing line came within 400 or 500 yds. of the French, it was both severely tried and

numerically weak, but the fact that it was composed of the best men only enabled it to open and to maintain an effective fire. Even then the French, highly disciplined professional soldiers that they were, repeatedly swept them back by counter- strokes, but these counterstrokes were subjected to the fire of the German guns and were never more than locally and moment- arily effective. More and more German infantry was pushed forward to support the firing line, and, like its predecessors; each reinforcement, losing most of its unwilling men as it advanced over the shot-swept ground, consisted on arrival of really determined men, and closing on the firing line pushed it forward, sometimes 20 yds., sometimes 100, until at last rapid fire at the closest ranges dislodged the stubborn defenders. Bayonets (as usual) were never actually used, save in sudden encounters in woods and villages. The decisive factors were, first the superiority of the Prussian guns, secondly, heavy and effective fire delivered at short range, and above all the high moral of a proportion of resolute soldiers who, after being sub- jected for hours to the most demoralizing influences, had still courage left for the final dash. These three factors, in spite ef changes in armament, rule the infantry attack of to-day.

Infantry Tactics since 1870

The net result of the Franco-German War on infantry tactics, as far as it can be summed up in a single phrase, was to transfer the fire-fight to the line of skirmishers. Henceforward the old and correct sense of the word " skirmishers " is lost. They have

1 The Prussian. company was about 250 strong (see below under " Organization "). This strength was adopted after 1870 by practically all nations which adopted universal service. The battalion had 4

companies.

Lessons of 1870.

nothing to do with a " skirmish," but are the actual organ of battle, and their old duties of feeling the way for the battle- formations have been taken over by " scouts." The last-named were not, however, fully recognized in Great Britain 1 till long after the war — not in

fact until the war in South Africa had shown that the " skirmisher " or firing line was too powerful an engine to be employed in mere " feeling." In most European armies " combat patrols," which work more freely, are preferred to scouts, but the idea is the same.

The fire-fight on the line of skirmishers, now styled the firing line, is the centre of gravity of the modern battle. In 1870, owing to the peculiar circumstances of unequal arma- ment, the " fire-fight " was insufficiently developed and uneconomically used, and after the war tacticians turned their attention to the evolution of better methods than those of Worth and Gravelotte, Europe in general following the lead of Prussia. Controversy, in the early stages, took the form of a contest between " drill " and " individualism," irre- spective of formations and technical details, for until about 1890 the material efficiency of the gun and the rifle remained very much what it had been in 1870, and the only new factor bearing on infantry tactics was the general adoption of a " national army " system similar to Prussia's and of rifles equal, and in some ways superior, to the chassepot. All European armies, therefore, had to consider equality in artillery power, equality in the ballistics of rifles, and equal intensity of fighting spirit as the normal conditions of the next battle of nations. Here, in fact, was an equilibrium, and in such conditions how was the attacking infantry to force its way forward, whether by fire or movement or by both? France sought the answer in the domain of artillery. Under the guidance of General Langlois, she re-created the Napoleonic hurricane of case-shot (represented in modern conditions by time shrapnel), while from the doctrine formed by Generals Maillard and Bonnal there came a system of infantry tactics derived fundamentally from the tactics of the Napoleonic era. This, however, came later; for the moment (viz. from 187 1 to about 1890) the lead in infantry training was admittedly in the hands of the Prussians. German officers who had fought through the war had seen the operations, generally speaking, either from the staff officer's or from the regimental officer's point of view. To the former and to many of the latter the most indelible impression of the battlefield was what they called Massen-Driickebergerlum or " wholesale skulking." The rest, who had perhaps in most cases led the brave remnant of their companies in the final assaults, believed that battles were won by the individual soldier and his rifle. The difference between the two may be said to lie in this, that the first sought a remedy, the second a method. The remedy was drill, the method extended order.

The extreme statement of the case in favour of drill pure and simple is to be found in Ahe famous anonymous pamphlet A Summer Night's Dream, in which a return to the " old Prussian fire-discipline " of

Frederick's day was offered as the solution of the problem, how to give " fire " its maximum efficacity. Volleys and absolutely mechanical obedience to word of command represent, of course, the most complete application of fire-power that can be conceived. But the proposals of the extreme close-order school were nevertheless merely pious aspirations, not so much because of the introduction of the breechloader as because the short-service " national " army can never be " drilled " in the Frederician sense. The proposals of the other school were, however, even more impracticable, in that they rested on the hypothesis that all men were brave, and that, consequently, all that was necessary was to teach the recruit how to shoot and to work with other individuals in the squad or company. Disorder of the firing line was accepted, not as an unavoidable evil, but as a condition in which individuality had full play, and

1 The 1902 edition of Infantry Training indeed treated the new scouts as a thin advanced firing line, but in 1907, at which date important modifications began to be made in the " doctrine " of the Pritish Army, the scouts were expressly restricted to the old-fashioned " skirmishing " duties.

as dense swarm formations were quite as vulnerable as an ordinary line, it was an easy step from a thick line of "individuals" to a thin one. The step was, in fact, made in the middle of the war of 1870, though it was hardly noticed that extension only became practicable in proportion as the quality of the enemy decreased and the Germans became acclimatized to fire.

Between these extremes, a moderate school, with the emperor William (who had more experience of the human being in battle than any of his officers) at its head, spent a few years in groping for close-order formations which admitted of control without vulnerability, then laid down the principle and studied the method of developing the greatest fire-power of which short- service infantry was supposed capable, ultimately combined the " drill " and teaching ideas in the German infantry regula- tions of 1888, which at last abolished those of 1812 with their multitudinous amendments.

The necessity for " teaching " arose partly out of the new conditions of service and the relative rarity of wars. The soldier could no longer learn the ordinary rules of conditions safety in action and comfort in bivouac by experience, of the and had to be taught. But it was still more the new modern conditions of fighting that demanded careful individual oattle – training. Of old, the professional soldier (other than the man belonging to light troops or the ground scout) was,

roughly speaking, either so far out of immediate danger as to preserve – his reasoning faculties, or so deep in battle that he became the unconscious agent of his inborn or acquired instincts. But the increased range of modern arms prolonged the time of danger, and although (judged by casualty returns) the losses to-day are far less than those which any regiment of Frederick's day was expected to face without flinching, and actual fighting is apparently spasmodic, the period in which the individual soldier is subjected to the fear of bullets is greatly increased. Zorndorf, the most severe of Frederick's battles, lasted seven hours, Vionville twelve and Worth eleven. The battle of the future in Europe, without being as prolonged as Liao-Yang, Shaho and Mukden, will still be undecided twenty-four hours after the advanced guards have taken contact. Now, for a great part of this time, the " old Prussian fire-discipline," which above all aims at a rapid decision, will be not only unnecessary, but actually hurtful to the progress of the battle as a whole. As in Napoleon's day (for reasons presently to be mentioned) the battle must resolve itself into a preparative and a decisive phase. 2 In the last no commander could desire a- better instru- ment (if such were attainable with the armies of to-day) than Frederick's forged steel machine, in which every company was ? human mitrailleuse. But the preparatory combat not only will be long, but also must be graduated in intensity at different times and places in accordance with the commander's will, and the Frederician battalion only attained its mechanical perfection by the absolute and permanent submergence of the individual qualities of each soldier, with the result that, although it furnished the maximum effort in the minimum time, it was useless once it fell apart into ragged groups. The individual spirit of earnestness and intelligence in the use of ground by small fractions, which in Napoleon's day made the combat d'usure possible, was necessarily unknown in Frederick's. On the other hand, graduation implies control on the part of the leaders, and this the method of irregular swarms of individual fighters imagined by the German progressives merely abdicates. At most such swarms — however close or extended — can only be tolerated as an evil that no human power can avert when the battle has reached a certain stage of intensity. Even the latest German Infantry Training (1906) is explicit on this point. " It must never be forgotten that the obligation of abandoning close order is an evil which can often be avoided when " &c. &c. (par. 342). The consequences of this evil, further, are actually less serious in proportion as the troops are well drilled — not to

2 This is no new thing, but belongs, irrespective of armament, to the " War of masses." The king of Prussia's fighting instructions of the

10th of August 1813 lay down the principle as clearly as any modern work.

an unnecessary and unattainable ideal of mechanical perfection, but to a state of instinctive self-control in danger. Drill, there- fore, carried to such a point that it has eliminated the bad habits of the recruit without detriment to his good habits, is still the true basis of all military training, whether training be required for the swift controlled movements of bodies of infantry in close order, for the cool and steady fire of scattered groups of skirmishers, or for the final act of the resolute will embodied in the " decisive attack." Unfortunately for the solution of infantry problems " drill " and " close order " are often confused, owing chiefly to the fact that in the 1870 battles the dissolution of close order formations practically meant the end of control as control was then understood. Both the material and objective, and the inward and spiritual significances of " drill " are, however, independent of " close order." In fact, in modern history, when a resolute general has made a true decisive attack with half-drilled troops, he has generally arrayed them in the closest possible formations.

Drill is the military form of education by repetition and association (see G. le Bon, Psychologie de I' education). Materially it consists in Drill. exercises frequently repeated by bodies of soldiers with

a view to ensuring the harmonious action of each indi- vidual in the work to be performed by the mass — in a word, re- hearsals. Physical " drill ' is based on physiology and gymnastics, and aims at the development of the physique and the individual will power. 1 But the psychological or moral is incomparably the most important side of drill. It is the method or art of discipline. Neither self-control nor devotion in the face of imminent danger can as a rule come from individual reasoning. A commander-in-chief keeps himself free from the contact with the turmoil of battle so long as he has to calculate, to study reports or to manoeuvre, ˆnd com- manders of lower grades, in proportion as their duty brings them into the midst of danger, are subjected to greater or less disturbing influences. The man in the fighting line where the danger is greatest is altogether the slave of the unconscious. Overtaxed infantry, whether defeated or successful,

have been observed to present an appearance of absolute insanity. It is true that in the special case of great war experience reason resumes part of its dominion in proportion as the fight becomes the soldier's habitual milieu. Thus towards the end of a long war men become skilful and cunning individual fighters; sometimes, too, feelings of respect for the enemy arise and lead to interchange of courtesies at the outposts, and it has also been noticed that in the last stage of a long war men are less inclined to sacrifice themselves. All this is " reason " as against inborn or inbred " instinct." But in the modern world, which is normally at peace, some method must be found of ensuring that the peace- trained soldier will carry out his duties when his reason is sub- merged. Now we know that the constant repetition of a certain act, whether on a given impulse or of the individual's own volition, will eventually make the performance of that act a reflex action. For this reason peace-drilled troops have often defeated a war- trained enemy, even when the motives for fighting were equally powerful on each side. The mechanical performance of movements, and loading and firing at the enemy, under the most disturbing conditions can be ensured by bringing the required self-control from the domain of reason into that of instinct. " L' education," says lc Bon, " est I'art de faire passer le conscient dans I'inconscient." Lastly, the instincts of the recruit being those special to his race or nation, which are the more powerful because they are operative through many generations, it is the drill sergeant's business to bring about, by disuse, atrophy of the instincts which militate against soldierly efficiency, and to develop, by constant repetition and special pre- paration, other useful instincts which the Englishman or Frenchman or German does not as such possess. In short, as regards infantry training, there is no real distinction between drill and education, save in so far as the latter term covers instruction in small details of field service which demand alertness, shrewdness and technical know- ledge (as distinct from technical training). As understood by the controversialists of the last generation, drill was the antithesis of education. To-day, however, the principle of education having prevailed against the old-fashioned notion of drill, it has been dis- covered that after all drill is merely an intensive form of education. This discovery (or rather definition and justification of an existing empirical rule) is attributable chiefly to a certain school of French officers, who seized more rapidly than civilians the significance of modern psycho-physiology. In their eyes, a military body possesses in a more marked degree than another, the primary requisite of the "psychological crowd," studied by Gustave le Bon, viz. the orienta- tion of the wills of each and all members of the crowd in a determined direction. Such a crowd generates a

collective" will that dominates the wills of the individuals composing it. It coheres and acts on the

1 In the British Service, men whose nerves betray them on the shooting range are ordered more gymnastics (Musketry Regulations,

1910).

common property of all the instincts and habits in which each shares. Further it tends to extremes of baseness and heroism — this being particularly marked in the military crowd — and lastly it reacts to a stimulus. The last is the keynote of the whole subject of infantry training as also, to a lesser degree, of that of the other arms. The officer can be regarded practically as a hypnotist playing upon the unconscious activities of his subject. In the lower grades, it is immaterial whether reason, caprice or a fresh set of instincts stimulated by an outside authority, set in motion the " suggestion." The true leader, whatever the provenance of his " suggestion," makes it effective by dominating the " psychological crowd " that he leads. On the other hand, if he fails to do so, he is himself dominated by the uncontrolled will of the crowd, and although leaderless mobs have at times shown extreme heroism, it is far more usual to find them reverting to the primitive instinct of brutality or panic fear. A mob, therefore, or a raw regiment, requires greater powers of suggestion in its leader, whereas a thorough course of drill tunes the " crowd " to respond to the stimulus that average officers can apply.

So far from diminishing, drill has increased in importance under modern conditions of recruiting. It has merely changed in form, and instead of being repressive it has become educative. The force of modern short-service troops, as troops, is far sooner spent than that of the old-fashioned automatic regiments, while the reserve force of its component parts, remaining after the dissolution, is far higher than of old. But this uncontrolled force is liable to panic as well as amenable to an impulse of self-sacrifice. In so far, then, it is necessary to adopt the catch- word of the Biilow school and to " organize disorder," and the only known method of doing so is drill. " Individualism " pure and simple had certainly a brief reign during and after the South African War, especially in Great Britain, and both France and Germany coquetted with " Boer tactics," until the Russo-Japanese war brought military Europe back to the old principles.

But the South African War came precisely at the point of time when the controversies of 1870 had crystallized into a form of tactics that

was not suitable to the conditions of that war, while about the same time the relations of infantry j[£/ c f^”

‘Doc- trine.

a decisive attack framed by the commander-in-chief after “engaging everywhere and then seeing” as Napoleon did. The 1905 regulations adhered to this theory of the attack in the main, only modifying a number of tactical prescriptions which Formula- na< l not P rove d satisfactory after their transplantation tion of the from South Africa to Europe, but after the Russo- British Japanese War a series of important amendments was issued which gave greater force and still greater elas- ticity to the attack procedure, and in 1909 the tactical " doctrine " of the British army was definitively formulated in Field Service Regulations, paragraph 102, of which after enumerat- ing the advantages and disadvantages of the " preconceived idea " system, laid it down, as the normal procedure of the British Army, that the general should " obtain the decision by manoeuvre on the battlefield with a large general reserve maintained in his own hand " and " strike ivith his reserve at the right place and time."

The rehabilitation of the Napoleonic attack idea thus frankly accepted in Great Britain had taken place in France several years before the South African War, and neither this war nor that in Manchuria effectively shook the faith of the French army in the principle, while on the other hand Germany remains faithful to the ” preconceived idea,” both in strategy and tactics. 1 This essential difference in the two rival ” doctrines ” is intimately connected with the revival of the Napoleonic artillery attack, in the form of concentrated time shrapnel.

The Napoleonic artillery preparation, it will be remembered, was a fire of overwhelming intensity delivered against the selected point of the enemy’s position, at the moment of the massed and decisive assault of the reserves. In Napoleon’s time the artillery went in to within 300 or 400 yds. range for this act, i.e. in front of the infantry, whereas now the guns fire over the heads of the infantry and con- centrate shells instead of guns on the vital point. The principle is, however, the same. A model infantry attack in the

Napoleonic manner was that of Okasaki's brigade on the Terayama hill at the battle of Shaho, described by Sir Ian Hamilton in his Staff Officer's Scrap-Book. The Japanese, methodical and cautious as they were, only sanctioned a pure open force assault as a last resort. Then the brigadier Okasaki, a peculiarly resolute leader, arrayed his brigade in a " schematic " attack formation of four lines, the first two in single rank, the third in line and the fourth in company columns. Covered by a powerful converging shrapnel fire, the brigade covered the first 900 yds. of open plain without firing a shot. Then, however, it disappeared from sight amongst the houses of a village, and the spectators watched the thousands of flashes fringing the further edge that indicated a fire-fight at decisive range (the Terayama was about 600 yds. beyond the houses). Forty minutes passed, and the army commander Kuroki said, " He cannot go forward. We are in check to-day all along the line." But at that moment Okasaki's men, no longer in a " schematic " formation but in many irregularly disposed groups — some of a dozen men and some of seventy, some widely extended and some practically in close order — rushed forward at full speed over 600 yds. of open ground, and stormed the Terayama with the bayonet.

Such an attack as that at the battle of Shaho is rare, but so it has always been with masterpieces of the art of war. We have only to multiply the front of attack by two and the The forces engaged by five — and to find the resolute

attack." general to lead them — to obtain the ideal decisive attack of a future European war. Instead of the bare open plain over which the advance to decisive range was made, a European general would in most cases dispose of an area of spinneys, farm-houses and undulating fields. The schematic approach-march would be replaced in France and England by a forward movement of bodies in close order, handy enough to utilize the smallest covered ways. Then the fire of both infantry and artillery would be augmented to its maximum intensity, overpowering that of the defence, and the whole of the troops opposite the point to be stormed would be thrown forward for the bayonet charge. The formation for 1 In 1870 the " preconceived idea " was practically confined to strategy, and the tactical improvisations of the Germans themselves deranged the execution of the plan quite as often as the act of the enemy. Of late years, therefore, the " preconceived idea " has been imposed on tactics also in that country. Special care and study is given to the once despised " early deployments " in cases where a fight is part of the " idea," and to the difficult problem of breaking off the action, when it takes a form that is incompatible with the development of the

main scheme.

this scarcely matters. What is important is speed and the will to conquer, and for this purpose small bodies (sections, half -companies or companies), not in the close order of the drill book but grouped closely about the leader who inspires and controls them, are as potent an instrument as a Frederician line or a Napoleonic column.

Controversy, in fact, does not turn altogether on the method of the assault, or even on the method of obtaining the fire- superiority of guns and rifles that justifies it. Although one nation may rely on its guns more than on the rifles, or vice versa, all are agreed that at decisive range the firing line should contain as many men as can use their rifles effectually. Perhaps the most disputed point is the form of the " approach-march," viz. the dispositions and movements of the attacking infantry between about 1400 and about 600 yds. from the position of the enemy.

The condition of the assailant's infantry when it reaches decisive ranges is largely governed by the efforts it has expended and the losses it has suffered in its progress. Some- times even after a firing line of some strength has been The established at decisive range, it may prove too difficult ^""a" or too costly for the supports (sent up from the rear to replace casualties and to augment fire-power) to make their way to the front. Often, again, it may be within the commander's intentions that his troops at some particular point in the line should not be committed to decisive action before a given time— perhaps not at all. It is obvious then that no " normal " attack procedure which can be laid down in a drill book (though from time to time the attempt has been made, as in the French regulations of 1875) can meet all cases. But here again, though all armies formally and explicitly condemn the normal attack, each has its own well-marked tendencies.

The German regulations of 1906 define the offensive as " transporting fire towards the enemy, if necessary to his immediate proximity"; the bayonet attack "con- current firms " the victory. Every attack begins with deploy- views ment into extended order, and the leading line on the advances as close to the enemy as possible before 'g/^k 7 opening fire. In ground offering cover, the firing line has practically its maximum density at the outset. In open ground, however, half-sections, groups and individuals, widely spaced out, advance stealthily one after the other till all are in position. It is on this position, called the " first fire position " and usually about 1000 yds. from the enemy, that the full force of the

attack is deployed, and from this position, as simultaneously as possible, it opens the fight for fire-superiority. Then, each unit covering the advance of its neighbours, the whole line fights its way by open force to within charging distance. If at any point a decision is not desired, it is deliberately made impossible by employing there such small forces as possess no offensive power. Where the attack is intended to be pushed home, the infantry units employed act as far as possible simultaneously, resolutely and in great force (see the German Infantry Regulations, 1906, §§ 324 et seq.).

While in Germany movement " transports the fire," in France fire is regarded as the way to make movement possible. It is considered (see Grandmaison, Dressage de I'infanterie) that a premature and excessive deployment enervates the attack, that the ground (i.e. covered ways of approach for small columns, not for troops showing a fire front) should be used as long_ as possible to march " en troupe " and that a firing line should only be formed when it is impossible to progress without acting upon the enemy's means of resistance. Thereafter each unit, in such order as its chief can keep, should fight its way forward, and help others to do so — like Okasaki's brigade in the last stage of its attack — utilizing bursts of fire or patches of wood or depres- sions in the ground, as each is profitable or available to assist the advance. " From the moment when a fighting unit is ' uncoupled,' its action must be ruled by two conditions, and by those only: the one material, an object to be reached; the other moral, the will to reach the object."

[ORGANIZATION

Defence.

The British Field Service Regulations of 1909 are in spirit more closely allied to the French than to the German. " The climax of the infantry attack is the assault, which is made possible by superiority of fire " is the principle (emphasized in the book itself by the use of conspicuous type), and a " gradual building up of the firing line within close range of the position," coupled with the closest artillery support, and the final blow of the reserves delivered " unexpectedly and in the greatest possible strength " are indicated as the means. 1

The defence, as it used to be understood, needs no description. To-

day in all armies the defence is looked upon not as a means of winning a battle, but as a means of temporizing and avoiding the decision until the commander of the defending party is enabled, by the general military situation or by the course and results of the defensive battle itself, to take the offensive. In the British Field Service Regulations it is laid down that when an army acts on the defensive no less than half of it should if possible be earmarked, suitably posted and placed under a single commander, for the purpose of deliver- ing a decisive counter-attack. The object of the purely defensive portion, too, is not merely to hold the enemy's firing line in check, but to drive it back so that the enemy may be forced to use up his local reserve resources to keep the fight alive. A firing line covered and steadied by entrenchments, and restless local reserves ever on the look-out for opportunities of partial counterstrokes, are the instruments of this policy.

A word must be added on the use of entrenchments by infantry, a subject the technical aspect of which is fully dealt with and illus- trated in Fortification and Siegecraft : Field Defences. Entrench- Entrenchments of greater or less strength by themselves men s. have always been used by infantry on the defensive, especially in the wars of position of the 17th and 18th centuries. In the Napoleonic and modern " wars of movement," they are re- garded, not as a passive defence — they have lortg ceased to present a physical barrier to assault — but as fire positions so prepared as to be defensible by relatively few men. Their purpose is, by econo- mizing force elsewhere, to give the maximum strength to the troops told off for the counter-offensive. In the later stages of the American Civil War, and also in the Russo-Japanese War of 1904-1905 — each in its way an example of a " war of positions " — the assailant has also made use of the methods of fortification to secure every suc- cessive step of progress in the attack. The usefulness and limitations of this procedure are defined in generally similar terms in the most recent training manuals of nearly every European army. Section 136, § 7 of the British Infantry Training (1905, amended 1907) says: "During the process of establishing a superiority of fire, successive fire positions will be occupied by the firing line. As a rule those affording natural cover will be chosen, but if none exist and the intensity of the hostile fire preclude any immediate further advance, it may be expedient for the firing line to create some. This hastily constructed protection will enable the attack to cope with the defender's fire and thus prepare the way for a farther advance. The construction of cover during an attack, however, will entail delay and a temporary loss of fire effect and should therefore be resorted to only when

absolutely necessary. ... As soon as possible the advance should be resumed, &c." The German regulations are as follows (Infantry Training, 1906, § 313): " In the offensive the entrenching tool may be used where it is desired, for the moment, to content one's self with maintaining the ground gained. . . . The entrenching tool is only to be used with the greatest circumspection, because of the great difficulty of getting an extended line to go forward under fire when it has expended much effort in digging cover for itself. The construction of trenches must never paralyze the desire for the irresistible advance, and above all must not hill the spirit of the offensive."

Organization and Equipment

The organization of infantry varies rather more than that of other arms in different countries. Taking the British system first, the battalion (and not as elsewhere the regiment of two, three or more battalions) is the administrative and manoeuvre unit. It is about 1000 strong, and is commanded by a lieutenant-colonel, who has a major and an adjutant (captain or lieutenant) to assist him, and an officer of lieutenant's or captain's rank (almost invariably promoted from the ranks), styled the quartermaster, to deal with supplies, clothing, &c. There are eight companies of a nominal strength of about 120 each. These are commanded by captains (or

1 In February 1910 a new Infantry Training was said to be in preparation. The I.T. of 1905 is in some degree incompatible with the later and ruling doctrine of the F.S. Regulations, and in the winter of 1909 the Army Council issued a memorandum drawing attention to the different conceptions of the decisive attack as embodied in the latter and as revealed in manoeuvre procedure.

by junior majors), and each captain has or should have two lieutenants or second lieutenants to assist him. Machine guns are in Great Britain distributed to the battalions and not massed in permanent batteries. In addition there are various regimental details, such as orderly-room staff, cooks, cyclists, signallers, band and ambulance men. The company is divided into four sections of thirty men each and commanded by sergeants. A half-company of two sections is under the control of a subaltern officer. A minor subdivision of the section into two " squads " is made unless the numbers are insufficient to warrant it. In administrative duties the captain's principal assistant is the colour-sergeant or pay- sergeant, who is not assigned to a section command. The lieutenant- colonel, the senior major and the adjutant are mounted. The commanding officer is assisted by a battalion staff, at the head of which is the

adjutant. The sergeant-major holds a " warrant " from the secretary of state for war, as does the bandmaster. Other members of the battalion staff are non-commissioned officers, appointed by the commanding officer. The most important of these is the quartermaster-sergeant, who is the assistant of the quarter- master. The two colours (" king's " and " regimental ") are in Great Britain carried by subalterns and escorted by colour-sergeants (see Colours).

The " tactical " unit of infantry is now the company, which varies very greatly in strength in the different armies. Elsewhere the company of 250 rifles is almost universal, but in Great Britain the company has about no men in the ranks, forming four sections. These sections, each of about 28 rifles, are the normal " fire-units," that is to say, the unit which delivers its fire at the orders of and with the elevation and direction given by its commander. This, it will be observed, gives little, actual executive work for the junior officers. But a more serious objection than this (which is modified in practice by arrangement and circumstances) is the fact that a small unit is more affected by detachments than a large one. In the home battalions of the Regular Army such detachments are very large, what with finding drafts for the foreign service battalions and for instructional courses, while in the Territorial Force, where it is so rarely possible to assemble all the men at once, the company as organized is often too small to drill as such. On the other hand, the full war-strength company is an admirable unit for control and manoeuvre in the field, owing to its rapidity of movement, handiness in using accidents of ground and cover, and susceptibility to the word of command of one man. But as soon as its strength falls below about 80 the advantages cease to counterbalance the defects. The sections become too small as fire-units to effect really useful results, and the battalion commander has to co-ordinate and to direct 8 comparatively ineffective units instead of 4 powerful ones. The British regular army, therefore, has since the South African War, adopted the double company as the unit of training. This gives at all times a substantial unit for fire and manoeuvre training, but the disadvantage of having a good many officers only half employed is accentu- ated. As to the tactical value of the large or double company, opinions differ. Some hold that as the small company is a survival from the days when the battalion was the tactical unit and the company was the unit of volley-fire, it is unsuited to the modern exigencies that have broken up the old rigid line into several independent and co-operating fractions. Others reply that the strong continental company of 250 rifles came into existence in Prussia in the years after Waterloo, not from tactical reaspns, but because the

state was too poor to maintain a large establishment of officers, and that in 1870, at any rate, there were many instances of its tactical unwieldiness. The point that is common to both organizations is the fact that there is theoretically one subaltern to every 50 or 60 rifles, and this reveals an essential difference between the British and the Continental systems, irrespective of the sizes or groupings of companies. The French or German subaltern effectively commands his 50 men as a unit, whereas the British subaltern supervises two groups of 25 to 30 men under responsible non-commissioned officers. That is to say, a British sergeant may find himself in such a position that he has to be as expert in controlling and obtaining good results from collective fire as a German lieutenant. For reasons mentioned in Army, § 40, non-commissioned officers, of the type called by Kipling the " backbone of the army," are almost unobtainable with the universal service system, and the lowest unit that possesses any independence is the lowest unit commanded by an officer. But apart from the rank of the fire-unit commander, it is questionable whether the section, as understood in England, is not too small a fire-unit, for European warfare at any rate. The regulations of the various European armies, framed for these conditions, practically agree that the fire-unit should be commanded by an officer and should be large enough to ensure good results from collective fire. The number of rifles meeting this second condition is 50 to 80 and their organization a " section " (corresponding to the British half-company) under a subaltern officer. The British army has, of course, to be organized and trained for an infinitely wider range of activity, and no one would suggest the abolition of the small section as a fire-unit. But in a great European battle it would be almost certainly better to group the two sections into a real unit for fire effect. (For questions of infantry fire tactics see Rifle: § Musketry.)

On the continent of Europe the " regiment," which is a unit, acting in peace and war as such, consists normally of three battalions, and

each battalion of four companies or iooo rifles. The company of 250 rifles is commanded by a captain, who is mounted. In France the company has four sections, commanded in war by the three subalterns and the " adjudant " (company sergeant-major); the sections are further grouped in pairs to constitute pelotons (platoons) or half-companies under the senior of the two section leaders. In peace there are two subalterns only, and the peloton is the normal

junior officer's command. The battalion is commanded by a major (commandant or strictly chef de bataiUon), the regiment (three or four battalions) by a colonel with a lieutenant-colonel as second. An organization of 3-battalion regiments and 3-company battalions was proposed in 1910.

In Germany, where what we have called the continental company originated, the regiment is of three battalions under majors, and the battalion of four companies commanded by captains. The company is divided into three Ziige (sections), each under a subaltern, who has as his second a sergeant-major, a" vice-sergeant-major "ora" sword-knot ensign " (aspirant officer). In war there is one additional officer for company. The Zug at war-strength has therefore about 80 rifles in the ranks, as compared with the French " section " of 50, and the British section of 30.

The system prevailing in the United States since the reorganization of 1901 is somewhat remarkable. The regiment, which is a tactical as well as an administrative unit, consists of three battalions. Each hattalion has four companies of (at war-strength) 3 officers and 150 rifles each. The regiment in war therefore consists of about 1800 rifles in three small and handy battalions of 600 each. The circumstances in which this army serves, and in particular the maintenance of small frontier posts, have always imposed upon subalterns the responsibilities of small independent commands, and it is fair to assume that the 75 rifles at a subaltern's disposal are regarded as a tactical unit.

In sum, then, the infantry battalion is in almost every country ahout 1000 rifles strong in four companies. In the United States it is 600 strong in four companies, and in Great Britain it is 1000 strong in eight. The captain's command is usually 200 to 250 men, in the United States 150, and in Great Britain 120. The lieutenant or second lieutenant commands in Germany 80 rifles, in France 50, in the United States 75, as a unit of fire and manoeuvre. In Great Britain he commands, with relatively restricted powers, 60.

A short account of the infantry equipments — knapsack or valise, belt, haversack, &c. — in use in various countries will be found in Uniforms, Naval and Military. The armament of infantry is, in all countries, the magazine rifle (sec Rifle) and bayonet (q.v.), for officers and for certain under-officers sword (q.v.) and pistol (q.v.). Ammunition (q.v.) in the British service is carried (a) by the individual soldier, (b) by the reserves (mules and carts) in regimental charge, some of which in action are assembled from the battalions of

a brigade to form a brigade reserve, and © by the ammunition columns.

Bibliography. — The following works are selected to show (1) the historical development of the arm, and (2) the different " doctrines " of to-day as to its training and functions: — Ardant du Picq, Etudes sur le combat; C. W. C Oman, The Art of War: Middle Ages; Biottot, Les Grands Inspires — Jeanne d'Arc; Hardy dc Perini, Batailles francaises; C. H. Firth, Cromwell's Army; German official history of Frederick the Great's wars, especially Erster Schlesische Krieg, vol. i. ; Susane, Histoire de I'infanterie francaise; French General Staff, La Tactique au X VI I I me — I'infanterie and La Tactique et la discipline dans les armies de la Revolution — General Schauenbourg; J. W. Fortescue, History of the British Army; Moor- som. History of the 52nd Regiment; de Grandmaison, Dressage de I'infanterie (Paris, 1908); works of W. v. Scherff; F. N. Maude, Evolution of Infantry Tactics and Attack and Defence; [Meckel] Ein Sommernachtstraum (Eng. trans, in United Service Magazine, 1890); J. Meckel, Taktik; Malachowski, Scharfe- und Revuetaktik; H. Langlois, Enseignements de deux guerres; F. Hoenig, Tactics of tlw Future and Twenty-four Hours of Moltke's Strategy (Eng. trans.); works of A. von Boguslowski ; British Officers' Reports on the Russo- Japanese War; H. VV. L. Himc, Stray Military Papers; Grange, " Les Realites du champ de bataille — Woerth" (Rev. d'infanterie, 1 908-1909) ; V. Lindenau, "' The Boer War and Infantry Attack " (Journal R. United Service Institution, 1902-1903); Janin, " Apcrcus sur la tactique — Mandchouric " (Rev. d'infanterie, 1909); Soloviev, " In- fantry-Combat in the Russo-Jap. War " (Eng. trans. Journal R. U.S. I., 1908); British Official Field Service Regulations, part i. (1909), and Infantry Training (1905); German drill regulations of 1906 (Fr. trans.); French drill regulations of 1904; Japanese regulations 1907 (Eng. trans.). The most important journals devoted to the infantry arm are the French official Revue d'infanterie (Paris and Limoges), and the Journal of the United Stales Infantry Association (Washington, D. €.). (C. F. A.)*

INFANT SCHOOLS. The provision in modern times of systematized training for children below the age when elementary education normally begins may be dated from the village school at Waldbach founded by Jean Frederic Oberlin in 1774. Robert Owen started an infant school at New Lanark in 1800, and great interest in the question was taken in Great Britain during

the early years of the 19th century, leading to the foundation in I is perhaps behind the

1836 of the Home and Colonial School Society for the training of teachers in infant schools; this in turn reacted upon other countries, especially Germany. Further impetus and a new direction were given to the movement by Friedrich W. A. Froebel, and the methods of training adopted for children between the ages of three and six have in most countries been influenced by, if not based on, that system of directed activities which was the foundation of the type of " play-school " called by him the Kinder Garten, or " children's garden." The growing tendency in England to lay stress on the mental training of very young children, and to use the " infant school " as preparatory to the elementary school, has led to a considerable reaction; medical officers of health have pointed out the dangers of infection to which children up to the age of five are specially liable when congregated together — also the physical effects of badly ventilated class-rooms, and there is a consensus of opinion that formal mental teaching is directly injurious before the age of six or even seven years. At the same time the increase in the industrial employment of married women, with the consequent difficulty of proper care of young children by the mother in the home, has somewhat shifted the ground from a purely educational to a social and physical aspect. While it is agreed that the ideal place for a young child is the home under the supervision of its mother, the present industrial conditions often compel a mother to go out to work, and leave her children either shut up alone, or free to play about the streets, or in the care of a neighbour or professional " minder." In each case the children must suffer. The provision by a public authority of opportunities for suitable training for such children seems therefore a necessity. The moral advantages gained by freeing the child from the streets, by the superintendence of a trained teacher over the games, by the early inculcation of habits of discipline and obedience; the physical advantages of cleanliness and tidiness, and the opportunity of disclosing incipient diseases and weaknesses, outweigh the disadvantages which the opponents of infant training adduce. It remains to give a brief account of what is done in Great Britain, the United States of America, and certain other countries. A valuable report was issued for the English Board of Education by a Consultative Committee upon the school attendance of children below the age of five (vol. 22 of the Special Reports, 1909), which also gives some account of the provision of day nurseries or creches for babies.

United Kingdom. — Up to 1905 it was the general English practice since the Education Act of 1870 for educational authorities to provide facilities for the teaching of children between three and five

years old whose parents desired it. In 1905, of an estimated 1,467,709 children between those ages, 583,268 were thus provided for in England and Wales. In 1905 the objections, medical and educational, already stated, coupled with the increasing financial strain on the local educational authorities, led to the insertion in the code of that year of Article 53, as follows: " Where the local education authority have so determined in the case of any school maintained by them, children who are under five years may be refused admission to that school." In consequence in 1907 the numbers were found to have fallen to 459,034 out of an estimated 1,480,550 children, from 39-74% in 1905 to 31%. In the older type of infant school stress was laid on the mental preparation of children for the elementary teaching which was to come later. This forcing on of young children was encouraged by the syste'm under which the government grant was allotted; children in the infant division earned an annual grant of 17s. per head, on promotion to the upper school this would be increased to 22s. In 1909 the system was altered; a rate of 21s. 4d. was fixed as the grant for all children above five, and the grant for those below the age was reduced to 13s. 4d. Different methods of training the teachers in these schools as well as the children themselves have been now generally adopted. These methods are largely based on the Froebelian plan, and greater attention is being paid to physical development. In one respect England

progressive of other European

countries, viz. in providing facilities for washing and attending to the personal needs of the younger children. There is no femme de service as in Belgium on the staff of English schools. While in Ireland the children below the age of five attend the elementary schools in much the same proportion as in England and Wales, in Scotland it has never been the general custom for such children to attend school.

United States of America. — In no country has the kinder- garten system taken such firm root, and the provision made for children below the compulsory age is based upon^tr In 1873 there were 42 kindergartens with 1252 pupils; in 1898 the numbers had risen to 2884 with 143,720 pupils; more than half these were private schools, managed by charitable institutions or by individuals for profit. In 1904-1905 there were 3176 public kindergartens with

205,118 pupils.

Austria Hungary.— Provision in Austria is made for children under six by two types of institution, the Day Nursery (Kinderbewahranstalten) and the Kindergarten. In 1872 as the result of a State Commission the Kindergarten was established in the state system of education. Its aim is to "confirm and complete the home education of children under school age, so that through regulated exercise of body and mind they may be prepared for institution in the primary school. No regular teaching in ordinary school subjects is allowedˆ games, singing and handwork, and training of speech and observation by objects, tales and gardening are the means adopted. The training for teachers in these schools is regulated by law. No children are to be received in a kindergarten till the beginning of the fourth and must leave at the end of the sixth year. In 1902-1903 there were 77,002 children in kindergartens and 74,110 in the day nurseries. In Hungary a law was passed in 1891 providing for the education and care of children between three and six, either by asyle or nurseries open all the year round in communes which contribute from £830 to £1250 in state taxation, or during the summer in those whose contribution is less. Communes above the higher sum must provide kindergartens. In 1904 there were over 233,000 children in such institutions.

Belgium.— For children between three and six education and training are provided by Ecoles gardiennes or Jardins d'enfanls. 1 hey are free but not compulsory, are provided and managed by the communes, receive a state grant, and are under government inspection. Schools provided by private individuals or institutions must conform to the conditions of the communal schools. There is a large amount of voluntary assistance especially in the provision of clothes and food for the poorer children. The state first recognized these schools in 1833. In 1881 there were 708 schools with accommodation for over 56,000 children; in 1907 there were 2837 and 264 845 children, approximately one-half of the total number of children in the country between the ages of three and six. In 1890 the minister of Public Instruction issued a code of rules on which is based the organization of the£co/« gardiennes throughout Belgium but some of the communes have regulations of their own. A special examination for teachers in the Ecoles gardiennes was started in 1898. All candidates must pass this examination before a certificat de capacite is granted. The training includes a course in Froebelian methods. While Iroebel's system underlies the training in these schools, the teaching is directed very much towards the practical education of the child, special stress being laid on manual dexterity

Reading, writing and arithmetic are also allowed in the classes for the older children. A marked feature of the Belgian schools is the close attention paid to health and personal cleanliness. In all schools there is a femme de service, not a teacher, but an attendant whose duty it is to see to the tidiness and cleanliness of the children' and to their physical requirements. '

France— The first regular infant school was established in Paris at the beginning of the 19th century and styled a Salle d'essai. In 1828 a model school, called a Salle d'asile, was started, followed shortly by similar institutions all over France. State recognition and inspection were granted, and by 1836 there were over 800 in fans and the provinces. In 1848, they became establishments of public instruction, and the name Ecole maternelle which they have since borne was given them. Every commune with 2000 inhabitants must have one of these schools or a Classe enfantine. Admission is tree, but not compulsory, for children between two and six. Food and clothes are provided in exceptional cases. Formal mental instruction is still given to a large extent, and the older children are taught reading writing and arithmetic. Though the staffs of the school include femmes de service, not so much attention is paid to cleanliness as in Belgium, nor is so much stress laid on hygiene In 1906-1907 there were 41 iv public and private Scales maternelies in France, with over 650,000 pupils. The closing of the clerical schools has led to some diminution in the numbers

Germany.— There are two classes of institution in Germany for children between the ages of 2 J or 3 and 6. These are the Klein-kinderbewahranstalten and Kindergarten. The first are primarily social in purpose, and afford a place for the children of mothers who

have to leave their homes for work. These institutions, principally conducted by religious or charitable societies, remain open all day and meals are provided. Many of them have a kindergarten attached, and others provide some training on Froebelian principles. The kindergartens proper are also principally in private hands, though most municipalities grant financial assistance. They are conducted on advanced Froebelian methods, and formal teaching in reading writing and arithmetic is excluded. In Cologne, Dusseldorf, Frank-fort and Munich there are municipal schools. The state gives no recognition to these institutions and they form no part of the public system of education.

Switzerland.— In the German speaking cantons the smaller towns and villages provide for the younger children by Bewahranstalten,

generally under private management with public financial help. 1 he larger towns provide kindergartens where the training is free but not compulsory for children from four to six. These are generally conducted on Froebel's system and there is no formal instruction. In the trench speaking cantons the Ecoles enfantines are recognized as the first stage of elementary education. They are free and not compulsory for children from three to six years of age. (C. We.)

INFINITE (from Lat. in, not, finis, end or limit; cf. finder e, to cleave), a term applied in common usage to anything of vast size. Strictly, however, the epithet implies the absence of all limitation. As such it is used specially in (1) theology and metaphysics, (2) mathematics.

1. Tracing the history of the world to the earliest date for which there is any kind of evidence, we are faced with the problem that for everything there is a prior something: the mind is unable to conceive an absolute beginning (" ex nihilo nihil "). Mundane distances become trivial when compared with the distance from the earth of the sun and still more of other heavenly bodies: hence we infer infinite space. Similarly by continual subdivision we reach the idea of the infinitely small. For these inferences there is indeed no actual physical evidence: infinity is a mental concept. As such the term has played an important part in the philosophical and theological speculation. In early Greek philosophy the attempt to arrive at a physical explanation of existence led the Ionian thinkers to postulate various primal elements (e.g. water, fire, air) or simply the infinite to amipov (see Ionian School). Both Plato and Aristotle devoted much thought to the discussion as to which is most truly real, the finite objects of sense, or the universal idea of each thing laid up in the mind of God; what is the nature of that unity which lies behind the multiplicity and difference of perceived objects ? The same problem, variously expressed, has engaged the attention of philosophers throughout the ages. In Christian theology God is conceived as infinite in power, knowledge and goodness, uncreated and immortal: in some Oriental systems the end of man is absorption into the infinite, his perfection the breaking down of his human limitations! The metaphysical and theological conception is open to the agnostic objection that the finite mind of man is by hypothesis unable to cognize or apprehend not only an infinite object, but even the very conception of infinity itself; from this stand- point the infinite is regarded as merely a postulate, as it were an unknown quantity (cf. V – 1 in mathematics). The same difficulty may be expressed in another way if we regard the infinite as unconditioned (cf. Sir William Hamilton's " philosophy of the unconditioned," and Herbert

Spencer's doctrine of the infinite "unknowable' –); if it is argued that knowledge of a thing arises only from the recognition of its differences from other things (i.e. from its limitations), it follows that knowledge of the infinite is impossible, for the infinite is by hypothesis unrelated.

With this conception of the infinite as absolutely unconditioned should be compared what may be described roughly as lesser infinities which can be philosophically conceived and mathematically demonstrated. Thus a point, which is by definition infinitely small, is as compared with a line a unit: the line is infinite, made up of an infinite number of points, any pair of which have an infinite number of points between them. The line itself, again, in relation to the plane is a unit, while the plane is infinite, i.e. made up of an infinite number of lines; hence the plane is described as doubly infinite in relation to the point, and a solid as trebly infinite. This is Spinoza's theory of the

" infinitely infinite," the limiting notion of infinity being of a numerical, quantitative series, each term of which is a qualitative determination itself quantitatively little, e.g. a line which is quantitatively unlimited (i.e. in length) is qualitatively limited when regarded as an infinitely small unit of a plane. A similar relation exists in thought between the various grades of species and genera; the highest genus is the "infinitely infinite," each subordinated genus being infinite in relation to the particulars which it denotes, and finite when regarded as a unit in a higher genus.

*2. In mathematics, the term " infinite " denotes the result of increasing a variable without limit; similarly, the term "infinitesimal," meaning indefinitely small, denotes the result of diminishing the value of a variable without limit, with the reservation that it never becomes actually zero. The application of these conceptions distinguishes ancient from modern mathe- matics. Analytical investigations revealed the existence of series or sequences which had no limit to the number of terms, as for example the fraction 1/(1— *) which on division gives the series. i+x+x 2 + ... ; the discussion of these so-called infinite sequences is given in the articles Series and Function. The doctrine of geometrical*

continuity (q.v.) and the application of algebra to geometry, developed in the 16th and 17th centuries mainly by Kepler and Descartes, led to the discovery of many properties which gave to the notion of infinity, as a localized space conception, a predominant importance. A line became continuous, returning into itself by way of infinity; two parallel lines intersect in a point at infinity; all circles pass through two fixed points at infinity (the circular points); two spheres intersect in a fixed circle at infinity; an asymptote became a tangent at infinity; the foci of a conic became the intersections of the tangents from the circular points at infinity; the centre of a conic the pole of the line at infinity, &c. In analytical geometry the line at infinity plays an important part in trilinear co-ordinates. These subjects are treated in Geometry. A notion related to that of infinitesimals is presented in the Greek " method of exhaustion "; the more perfect conception, however, only dates from the r7th century, when it led to the infinitesimal calculus. A curve came to be treated as a sequence of infini- tesimal straight lines; a tangent as the extension of an infini- tesimal chord; a surface or area as a sequence of infinitesimally narrow strips, and a solid as a collection of infinitesimally small cubes (see Infinitesimal Calculus).

INFINITESIMAL CALCULUS. 1. The infinitesimal calculus is the body of rules and processes by means of which continuously varying magnitudes are dealt with in mathematical analysis. The name " infinitesimal " has been applied to the calculus because most of the leading results were first obtained by means of arguments about " infinitely small " quantities; the " in- finitely small " or " infinitesimal " quantities were vaguely con- ceived as being neither zero nor finite but in some intermediate, nascent or evanescent, state. There was no necessity for this confused conception, and it came to be understood that it can be dispensed with; but the calculus was not developed by its first founders in accordance with logical principles from precisely defined notions, and it gained adherents rather through the impressiveness and variety of the results that could be obtained by using it than through the cogency of the arguments by which it was established. A similar statement might be made in regard to other theories included in mathematical analysis, such, for instance, as the theory of infinite series. Many, perhaps all, of the mathematical and physical theories which have survived have had a similar history — a history which may be divided roughly into two periods: a period of construction, in which results are obtained from partially formed notions, and a period of criticism, in which the fundamental notions become progres- sively more and more precise, and are shown to be adequate bases for the constructions previously

built upon them. These periods usually overlap. Critics of new theories are never lacking. On the other hand, as E. W. Hobson has well said, " pertinent criticism of fundamentals almost invariably gives rise to new construction." In the history of the infinitesimal calculus the

Geo- metrical represent- ation 0/ Variable Quantities.

17th and 18th centuries were mainly a period of construction, the 19th century mainly a period of criticism.

I. Nature of the Calculus. 2. The guise in which variable quantities presented themselves to the mathematicians of the 17th century was that of the lengths of variable lines. This method of representing variable quantities dates from the 14th century, when it was employed by Nicole Oresme, who studied and afterwards taught at the College de Navarre in Paris from 1348 to 1361. He represented one of two variable quantities, e.g. the time that has elapsed since some epoch, by a length, called the "longitude," measured along a particular line; and he represented the other of the two quantities, e.g. the temperature at the instant, by a length, called the " latitude," measured at right angles to this line. He recognized that the variation of the temperature with the time was represented by the line, straight or curved, which joined the ends of all the lines of " latitude." Oresme's longitude and latitude were what we should now call the abscissa and ordinate. The same method was used later by many writers, among whom Johannes Kepler and Galileo Galilei may be men- tioned. In Galileo's investigation of the motion of falling bodies (1638) the abscissa OA represents the time during which a body has been falling, and the ordinate AB represents the velocity acquired during that time (see fig. 1). The velocity being proportional to the time, the " curve " obtained is a straight line OB, and Galileo showed that the distance through which the body has fallen is repre- sented by the area of the triangle OAB.

The most prominent problems in regard to a curve were the problem of finding the points at which the ordinate is a maximum or a minimum, the problem of drawing a tangent to the curve at an assigned point, and the problem of determining the area of the curve. The relation of the problem of maxima and minima to the problem of tangents was understood in the sense that maxima or minima arise when a certain equation has equal roots, and, when this is the case, the curves by which the problem is to be solved touch each other. The reduction of problems of maxima and minima to problems of contact was known to Pappus. The problem of finding the area of a curve

was usually presented in a particular form in which it is called the " problem of quadratures." It was sought to determine the area contained between the curve, the axis of abscissae and two ordinates, of which one was regarded as fixed and the other as variable. Galileo's investigation may serve as an example. In that example the fixed ordinate vanishes. From this investiga- tion it may be seen that before the invention of the infinitesimal calculus the introduction of a curve into discussions of the course of any phenomenon, and the problem of quadratures for that curve, were not exclusively of geometrical import; the purpose for which the area of a curve was sought was often to find something which is not an area — for instance, a length, or a volume or a centre of gravity.

3. The Greek geometers made little progress with the problem of tangents, but they devised methods for investigating the problem of quadratures. One of these methods was afterwards called the " method of exhaustions," and methods. the principle on which it is based was laid down in the lemma prefixed to the 12th book of Euclid's Elements as follows: " If from the greater of two magnitudes there be taken more than its half, and from the remainder more than its half, and so on, there will at length remain a magnitude less than the smaller of the proposed magnitudes." The method adopted by Archi- medes was more general. It may be described as the enclosure of the magnitude to be evaluated between two others which can be brought by a definite process to differ from each other by less than any assigned magnitude. A simple example of its

The prob- lems of Maxima and

Minima, Tangents, and Quad- ratures.

application is the 6th proposition of Archimedes' treatise On the Sphere and Cylinder, in which it is proved that the area contained between a regular polygon inscribed in a circle and a similar polygon circumscribed to the same circle can be made less than any assigned area by increasing the number of sides of the polygon. The methods of Euclid and Archimedes were specimens of rigorous limiting processes (see Function). The new problems presented by the analytical geometry and natural philosophy of the 17 th century led to new limiting processes.

4. In the problem of tangents the new process may be described as follows. Let P, P' be two points of a curve (see fig. 2). Let x, y be the coordinates of P, and x+Ax, y+Ay those of P'. The symbol Ax means " the difference of two x's " and there is a like meaning for the symbol Ay. The fraction Ay/Ax is the trigonometrical tangent of the angle which the secant PP' makes with the axis of x. Now let Ax be continually diminished towards zero, so that P' con- tinually approaches P. If the curve has a tangent at P the secant P P' approaches a limiting position (see § 33 below). When this is the case the fraction Ay/Ax tends to a limit, and this limit is the trigo- nometrical tangent of the angle which the tangent at P to the curve makes with the axis of x. The limit is

Dlfferen llatlon.

Fig.

denoted by

dy ~d~x'

If the equation of the curve is of the form y=/(x) where/ is a func- tional symbol (see Function), then

Ay_ /(-fAx)-/(x)*

*Ax Ax **

and

dy,. f(x+Ax)-f{x)

^-nm. Ai=0 ^

abscissa of P, x+Ax that of Q might be written

lim

[NATURE that of P', the limit in question

2^/(x')Ax,

where the letters o, b written below and above the sign of summation 2 indicate the extreme values of x. This limit is called " the definite integral of /(x) between the limits o and b," and the notation for it is

The limit expressed by the right-hand member of this defining

equation is often written

/'(*),

and is called the " derived function " of /(x), sometimes the " derivative " or " derivate " of f(x). When the function /(x) is a rational integral function, the division by Ax can be performed, and the limit is found by substituting zero for Ax in the quotient. For example, if/ (x) = x 2 , we have

/(x + Ax)-/(x) = (x + Ax) ; -x' _ 2xAx + (Ax)2

A.v Ax Ax ' '

and /'(x) = 2x.

The process of forming the derived function of a given function is called differentiation. The fraction Ay/Ax is called the " quotient of differences," and its limit dy/dx is called the " differential coefficient of y with respect to x." The rules for forming differential coefficients constitute the differential calculus.

The problem of tangents is solved at one stroke by the formation of the differential coefficient; and the problem of maxima and minima is solved, apart from the discrimination of maxima from minima and some further refinements, by equating the differential coefficient to zero (see Maxima and Minima).

5. The problem of quadratures leads to a type of limiting process

which may be described as follows: Let y = /(x) be the equation of

a curve, and let AC and BD be the ordinates of the points

Integra- q an(j j-j ^ see ^ ^ L et ^ ^ ^ e tne abscissae of these

"' points. Let the segment AB be divided into a number

of segments by means of intermediate points such as M, and let MN be one such segment. Let PM and QN be those ordinates of the curve which have M and N as their feet. On MN as base describe two rectangles, of which the heights are the greatest and least values

of y which correspond to points on the arc PQ of the curve. In fig. 3 these are the rectangles RM, SN. Let the sum of the areas of such rectangles as RM be formed, and likewise the sum of the areas of such rectangles as SN. When the number of the points such as M is

increased without limit, and the lengths of all the segments such as MN are diminished without limit, these two sums of areas tend to limits. When they tend to the same limit the curvilinear figure ACDB has an area, and the limit is the measure of this area (see § 33 below). The limit in question is the same what- ever law may be adopted for inserting the points such as M between A and B, and for diminishing the lengths of the segments such as MN. Further, if P' is any point on the arc PQ, and P'M' is the ordinate of P', we may construct a rectangle of which the height is P'M' and the base is MN.and the limit of the sum of the areas of »ll such rectangles is the area of the figure as before. If x is the

Fig. 3.

Qf(x)dx.

The germs of this method of formulating the problem of quad- ratures are found in the writings of Archimedes. The method leads to a definition of a definite integral, but the direct application of it to the evaluation of integrals is in general difficult. Any process for evaluating a definite integral is a process of integration, and the rules for evaluating integrals constitute the integral calculus.

6. The chief of these rules is obtained by regarding the extreme ordinate BD as variable. Let £ now denote the abscissa of B. The area A of the figure ACDB is represented by the

integral (f(x)dx, and it is a function of £. Let BD of Inver-

*be displaced to B'D' so that £ becomes £+A£ (see * "" fig. 4). The area of the figure ACD'B' is represented by the*

integral I f(x)dx, and the increment AA of the area is given by

the formula

AA:

-ft

Af

•f[x)dx,

which represents the area BDD'B'. between those ot two rectangles, having as a common base the segment BB , and as heights the

greatest and least ordinates of points on the arc DD' of the curve. Let these heights be H and h. Then AA is intermediate be- tween HA| and hAZ, and the quotient of differences AA/A£ is intermediate be- tween H and h. If the function f(x) is continuous at B (see Function), then, as A£ is diminished without limit /(£), as a limit, and we have

dk

This area is intermediate

H

B B'

Fig. 4. and h tend to BD, or

di

-/(I).

The introduction of the process of differentiation, together with the theorem here proved, placed the solution of the problem of quadratures on a new basis. It appears that we can always find the area A if we know a function F (x) which has /(x) as its dif- ferential coefficient. If f(x) is continuous between a and b, we can prove that

A = £f(x)dx = F(b)—F(a).

When we recognize a function F(x) which has the property expressed by the equation

we are said to integrate the function /(x), and F(x) is called the indefinite integral of /(x) with respect to x, and is written

f(x)dx.

f >

Differ- entials.

7. In the" process of § 4 the increment Ay is not in general equal to the product of the increment Ax and the derived function /'(x). In general we can write down an equation of the form

Ay = /'(x)Ax + R, in which R is different from zero when Ax is different and then we have not only

from

lim.

but also

,R = o,

R

lim A,oˆ = °*

We may separate Ay into two parts: the part fix) Ax and the part R. The part/'(x) Ax alone is useful for forming the differential coefficient, and it is convenient to give it a name. It is calledthe differential of f(x), and is written df(x), or dy when y is written for / (x). When this notation is adopted dx is written instead of Ax, and is called the " differential of x," so that we have

df(x) = f'(x)dx. Thus the differential of an independent variable such as x is a finite difference; in other words it is any number we please. The differ- ential of a dependent variable such as y, or of a function of the independent variable x, is the product of the differential of x and the differential coefficient or derived function. It is important to observe that the differential coefficient is not to be defined as the ratio of differentials, but the ratio of differentials is to be defined as the previously introduced differential coefficient. The differentials

NATURE]

INFINITESIMAL CALCULUS

537

are either finite differences, or are so much of certain finite differences as are useful for forming differential coefficients.

Again let F(x) be the indefinite integral of a continuous function / (.v), so that we have

ˆT = /(), JV)d = F(»-F(o).*

When the points M of the process explained in § 5 are inserted be- tween the points whose abscissae are a and b, we may take them to be w — I in number, so that the segment AB is divided into n seg- ments. Let Xi, X2, . . . x n -i be the abscissae of the points in order. The integral is the limit of the sum f(a) {x l -a) + f(x t) {xn-Xi) + . .

.f(x r) (x r i-x r)

+ . . . +/(£„_i)(6-x„_i), every term of which is a differential of the form f(x)dx. Further the integral is equal to the sum of differences jF(.v,)-F(o)!jF(x !i)-F(* 1)) ... +{F(* r+1)-F(* r)j

+ ... +|F(i)-F(* ltJ)|, for this sum is F(6)— F(o). Now the difference FOxv+i) — F(* r) is not equal to the differential i{x r) (x T+ i— x r), but the sum of the differences is equal to the limit of the sum of these differentials. The differential may be regarded as so much of the difference as is required to form the integral. From this point of view a differential is called a differential element of an integral, and the integral is the limit of the sum of differential elements. In like manner the differ- ential element ydx of the area of a curve (§ 5) is not the area of the portion contained between two ordinates, however near together, but is so much of this area as need be retained for the purpose of finding the area of the curve by the limiting process described.

8. The notation of the infinitesimal calculus is intimately bound up with the notions of differentials and sums of elements. The letter N tail n " d " ' s the initial letter of the word differentia (difference)

and the symbol "/ " is a conventionally written " S," the initial letter of the word summa (sum or whole). The notation was introduced by Leibnitz (see §§ 25-27, below).

9. The fundamental artifice of the calculus is the artifice of forming differentials without first forming differential coefficients. From an F ada- equation containing x and y we can deduce a new equation, mental containing also Ax and Ay, by substituting x+Ax for x Artifice an ˆ yˆrˆy Ior V- I £ there is a differential coefficient of y

with respect to x, then Ay can be expressed in the form ˆ.Ax+R, where lim. A;l . = o(R/Ax)=o, as in § 7 above. The artifice consists in rejecting ab initio all terms of the equation which belong to R. We do not form R at all, but only 0.Ax, or <£. dx, which is the differential dy. In the same way, in all applications of the integral calculus to geometry or mechanics we form the element of an integral in the same way as the element of area y. dx is formed. In fig. 3 of § 5 the element of area y. dx is the area of the rectangle RM. The actual area of the curvilinear figure PQNM is greater than the area of this rectangle by the area of the curvilinear figure PQR ; but the excess is less than the area of the rectangle PRQS, which is measured by the product of the numerical measures of MN and QR,

and we have

MN.QR

-0

lim.

MN-0 MN

Thus the artifice by which differential elements of integrals are formed is in principle the same as that by which differentials are formed without first forming differential coefficients.

10. This principle is usually expressed by introducing the notion of orders of small quantities. If x, y are two variable numbers which are Onfers of connected together by any relation, and if when x tends to small zero y a ‘ s0 tends to zero, the fraction y/x may tend to a

finite limit. In this case x and y are said to be ” of the same order.” When this is not the case we may have

quantities,

either

Vim -x=0y =O <

lim. x=0 – = o.

(iii.) For a product uv

d{uv) dx

du

dx

+v Tx

I du dv\ I ,

= \ v dx~ u r x) r-

(iv.) For a quotient ujv

djulv) dx (v.) For a function of a function, that is to say, for a function y expressed in terms of a variable 2, which is itself

expressed as a function of x,

dy_dy dz_ dx~ dz' dx' In addition to these formal rules we have particular results as to the differentiation of simple functions. The most important results are written down in the following table: —

In the former case y is said to be " of a lower order " than x; in the latter case y is said to be " of a higher order " than x. In accordance with this notion we may say that the fundamental artifice of the infinitesimal calculus consists in the rejection of small quantities of an unnecessarily high order. This artifice is now merely an incident in the conduct of a limiting process, but in the 17th century, when limiting processes other than the Greek methods for quadratures were new, the introduction of the artifice was a great advance.

11. By the aid of this artifice, or directly by carrying out

Kales of the appropriate limiting processes, we may obtain the

Dltteren- rules by which differential coefficients are formed. These

tlatlon. rules may Declassified as " formal rules " and " particular

results." The formal rules may be stated as follows: —

(i.) The differential coefficient of a constant is zero.

(ii.) For a sum u--v+ . . . +2, where u, v, . . .are functions of x, d(u--v-- . . . +z) du dv dz

—+■■■ +2?

y

dy dx

x n

nx"' 1 for all values of n

\og a X

x~ l log a e

a x

a" log«a

sin x

cos X

cos X

— sin x

sin~ x £

*(1 *»)!*

*tan” 4 **

*(1 + * 2)- 1*

Each of the formal rules, and each of the particular results in the table, is a theorem of the differential calculus. All functions (or rather expressions) which can be made up from those in the table by a finite number of operations of addition, subtraction, multiplication or division can be differentiated by the formal rules. All such functions are called explicit functions. In addition to these we have implicit functions, or such as are determined by an equation containing two variables when the equation cannot be solved so as to exhibit the one variable expressed in terms of the other. We have also functions of several variables. Further, since the derived function of a given function is itself a function, we may seek to differentiate it, and thus there arise the second and higher differential coefficients. We postpone for the present the problems of differential calculus which arise from these considerations. Again, we may have explicit functions which are expressed as the results of limiting operations, or by the limits of the results obtained by performing an infinite number of algebraic operations upon the simple functions. For the problem of differentiating such functions reference may be made to Function.

The processes of the integral calculus consist largely in trans-

formations of the functions to be integrated into such forms that they can be recognized as differential co- efficients of functions which have previously been differ- entiated. Corresponding to the results in the table of have those in the following table : —

Indefinite Integrals.

I 11 we

/(*)

ff{x)dx

x n

x n+1

n-- 1

for all values of n except — 1

I

X

log e x

e" x

a -l e ax

cos x

sin x

sin x

—cos X

(cfi-x)- 1 **

*• -1**

sin '—

a

1

1 i 1 x – tan ' – a a

"37

dx~~dx*

The formal rules of § 11 give us means for the transformation of

integrals into recognizable forms. For example, the rule (ii.) for a sum leads to the result that the integral of a sum of a finite number of terms is the sum of the integrals of the several terms. The rule (iii.) for a product leads to the method of integration by parts. The rule (v.) for a function of a function leads to the method of substitution ("see § 48 helnwl

of Integra Hon.

Fig. 5.

II. History. 13. The new limiting processes which were introduced in the development of the higher analysis were in the first instance Kepler's related to problems of the integral calculus. Johannes methods Kepler in his Astronomia nova . . . de motibus stellae Martis (1609) stated his laws of planetary motion, to the effect that the orbits of the planets are ellipses with the sun at a focus, and that the radii vectores drawn from the sun to the planets describe equal areas in equal times. From these statements it is to be concluded that Kepler could measure the areas of focal sectors of an ellipse. When he made out these laws there was no method of evaluating areas except the Greek methods. These methods would have sufficed for the purpose, but Kepler invented his own method. He regarded the area as measured by the " sum of the radii " drawn from the focus, and he verified his laws of planetary motion by actually measuring a large number of radii of the orbit, spaced according to a rule, and adding their lengths.

He had observed that the focal radius vector SP (fig. 5) is equal to the perpendicular SZ drawn from S to the tangent at p to the auxiliary circle, and he had further established the theorem which we should now express in the form — the differential element of the area A&p as Sp turns about S, is equal to the product of SZ and the differential ad, where a is the radius of the auxiliary circle, and is the angle ACp, that is the eccentric angle of P on the ellipse. The area ASP bears to the area ASp the ratio of the minor to the major axis, a result known to Archimedes. Thus Kepler's radii are spaced according to the rule that the eccentric angles of their ends are equidifferent, and his " sum of radii " is proportional to the

expression which we should now write

) ffa + ae cos 4 >)d,

where e is the eccentricity. Kepler evaluated the sum as proportional to --e sin .

Kepler soon afterwards occupied himself with the volumes of solids. The vintage of the year 1612 was extraordinarily abundant, and the question of the cubic content of wine casks was brought under his notice. This fact accounts for the title of his work, Nova stereometria doliorum; accessit stereometriae Archimedeae supplementum (1615). In this treatise he regarded solid bodies as being made up, as it were {veluti), of " infinitely " many " infinitely " small cones or " infinitely " thin disks, and he used the notion of summing the areas of the disks in the way he had previously used the notion of summing the focal radii of an ellipse.

14. In connexion with the early history of the calculus it must not be forgotten that the method by which logarithms

were invented (1614) was effectively a method of infinitesimals. Natural logarithms were not invented as the indices of a certain base, and the notation e for the base was first introduced by Euler more than a century after the invention. Logarithms were introduced as numbers which increase in arithmetic progression when other related numbers increase in geometric progression. The two sets of numbers were supposed to increase together, one at a uniform rate, the other at a variable rate, and the increments were regarded for purposes of calculation as very small and as accruing discontinuously.

15. Kepler's methods of integration, for such they must be called, were the origin of Bonaventura Cavalieri's theory of Cava- the summation of indivisibles. The notion of a lierPs continuum, such as the area within a closed curve, '"" as being made up of indivisible parts, " atoms " of*

area, if the expression may be allowed, is traceable to the speculations of early Greek philosophers; and although the nature of continuity was better understood by Aristotle and many other ancient writers yet the unsound atomic concep- tion was revived in the 13th century and has not yet been finally uprooted. It is possible to contend that Cavalieri did not himself hold the unsound doctrine, but his writing on this point is rather obscure. In his treatise

Geometria indivisibilibus continuorutn nova quadam ratione promota (1635) he regarded

Logar- ithms.

J:

a plane figure as generated by a line moving so as to be always parallel to a fixed line, and a solid figure as generated by a plane moving so as to be always parallel to a fixed plane; and he compared the areas of two plane figures, or the volumes of two solids, by determining the ratios of the sums of all the indivisibles of which they are supposed to be made up, these indivisibles being segments of parallel lines equally spaced in the case of plane figures, and areas marked out upon parallel planes equally spaced in the case of solids. By this method Cavalieri was able to effect numerous integrations relating to the areas of portions of conic sections and the volumes generated by the revolution of these portions about various axes. At a later date, and partly in answer to an attack made upon him by Paul Guldin, Cavalieri published a treatise entitled Exercitationes geometricae sex (1647), in which he adapted his method to the determination of centres of gravity, in particular for solids of variable density.

Among the results which he obtained is that which we should now write

! X m+l

x m dx – — q— 1 {m integral) .

He regarded the problem thus solved as that of determining the sum of the flrth powers of all the lines drawn across a parallelogram parallel to one of its sides.

*At this period scientific investigators communicated their results to one another through one or more intermediate persons. Such intermediaries were Pierre de Carcavy and Pater Marin Mersenne; and among the writers thus so *ˆof in communication were Bonaventura Cavalieri, Cavalieri. Christiaan Huygens, Galileo Galilei, Giles Personnier de Roberval, Pierre de Fermat, Evangelista Torricelli, and a little later Blaise Pascal; but the letters of Carcavy or Mersenne would probably come into the hands of any man who was likely to be interested in the matters discussed. It often happened; that, when some new method was invented, or some new result obtained, the method or result was quickly known to a wide*

circle, although it might not be printed until after the lapse of a long time. When Cavalieri was printing his two treatises there was much discussion of the problem of quadratures. Roberval (1634) regarded an area as made up of " infinitely " many " infinitely " narrow strips, each of which may be con- sidered to be a rectangle, and he had similar ideas in regard to lengths and volumes. He knew how to approximate to the

quantity which we express by J x m dx by the process of forming

the sum

m + l m +2 m + ... (w-l) m

n m+1 '

and he claimed tobe able to prove that this sum tends to x/(m--i), as n increases for all positive integral values of m. The method of integrating x m by forming this sum was found also p e rmat's by Fermat (1636), who stated expressly that he method of arrived at it by generalizing a method employed by , 'j te x r * m Archimedes (for the cases m = 1 and m = 2) in his books on Conoids and Spheroids and on Spirals (see T. L. Heath, The Works of Archimedes, Cambridge, 1897). Fermat extended the result to the case where m is fractional (1644), and to the case where m is negative. This latte r extension and the proofs were given in his memoir, Proportionis geometricae in quadrandis parabolis et hyperbolis usus, which appears to have received a final form before 1659, although not published until 1679. Fermat did not use fractional or negative indices, but he regarded his problems as the quadratures of parabolas and hyperbolas of various orders. His method was to divide the interval of integration into parts by means of intermediate points the ab- scissae of which are in geometric progression. . In the process of § s above, the points M must be chosen according to this rule. This restrictive condition being understood, we may say that Fermat's formulation of the problem of quadratures is the same as our definition of a definite integral.

The result that the problem of quadratures could be solved for any curve whose equation could be expressed in the form

y — x m (m=E — i), or in the form

y = aiX m i+aix m 2-- ... +a„x m »,

HISTORY]

where none of the indices is equal to — i , was used by John Wallis in his Arithmetica inftnitorum (1655) as well as by Fermat (1659). The case in which m= — 1 was that of the Various ordinary rectangular hyperbola; and Gregory of tions. St Vincent in his Opus geometricum quadraturae

circuit et sectionum coni (1647) had proved by the method of exhaustions that the area contained between the curve, one asymptote, and two ordinates parallel to the other asymptote, increases in arithmetic progression as the distance between the ordinates (the one nearer to the centre being kept fixed) increases in geometric progression. Fermat described his method of integration as a logarithmic method, and thus it is clear that the relation between the quadrature of the hyperbola and logarithms was understood although it was not expressed analytically. It was not very long before the relation was used for the calculation of logarithms by Nicolaus Mercator in his Logarithmotechnia (1668). He began by writing the equation of the curve in the form $y=i/(i+x)$, expanded this expression in powers of x by the method of division, and integrated it term by term in accordance with the well-understood rule for finding the quadrature of a curve given by such an equation as that written at the foot of p. 325.

By the middle of the 17th century many mathematicians could perform integrations. Very many particular results had Integra- been obtained, and applications of them had been tiott before made to the quadrature of the circle and other conic the integral sections, and to various problems concerning the us ‘ lengths of curves, the areas they enclose, the volumes and superficial areas of solids, and centres of gravity. A systematic account of the methods then in use was given, along with much that was original on his part, by Blaise Pascal in his Leltres de A mos Deltonville sur quelques-unes de ses inventions en giometrie (1659).

16. The problem of maxima and minima and the problem of tangents had also by the same time been effectively solved. Fermat’ s Oresme in the 14th century knew that at a point where methods of the ordinate of a curve is a maximum or a minimum Dffieren- it s variation from point to point of the curve is slowest ; ind Kepler in the Stereometria doliorum remarked that at the places where the ordinate passes from a smaller value to the greatest value and then

again to a smaller value, its variation becomes insensible. Fermat in 1629 was in possession of a method which he then communicated to one Despagnet of Bordeaux, and which he referred to in a letter to Roberval of 1636. He communicated it to Rene Descartes early in 1638 on receiving a copy of Descartes's Gecmetrie (1637), and with it he sent to Descartes an account of his methods for solving the problem of tangents and for determining centres of gravity.

Fermat's method for maxima and minima is essentially our method. Expressed in a more modern notation, what he did was to begin by connecting the ordinate y and the abscissa x of a point of a curve by an equation which holds at all points of the curve, then to subtract the value of y in terms of x from the value ob- tained by substituting $x+E$ for x, then to divide the difference by E, to put $E=o$ in the quotient, and to equate the quotient to zero. Thus he differentiated with respect to x and equated the differential coefficient to zero.

Fermat's method for solving the problem of tangents may be explained as follows: — Let (x, y) be the coordinates of a point P of a curve, (x', y'), those of a neighbouring point P' on the tangent at P, and let $MM' = E$ (fig. 6). From the similarity of the triangles P'TM', PTM we have $y':A-E = y:A$, where A denotes the subtangent TM. The point P' being near the curve, we may substitute in the equation of the curve $x — E$ for x and $(yA — yE)/A$ for y. The equation of the curve is approximately satisfied. If it is taken to be satisfied exactly, the result is an equation of the form $tb(x, y. A, E)=o$, the left-hand member of which is divisible by E. Omitting the factor E, and putting $E=o$ in the remaining factor, we have an equation which gives A. In this problem of tangents also Fermat found the required result by a process equivalent to differentiation.

. Fermat gave several examples of the application of his method ;

among them was one in which he showed that he could differ- entiate very complicated irrational functions. For such functions his method was to begin by obtaining a rational equation. In rationalizing equations Fermat, in other writings, used the device of introducing new variables, but he did not use this device to simplify the process of differentiation. Some of his results were published by Pierre Herigone in his Supple- mentum cursus mathematici (1642). His communication to Descartes was not published in full until after his death (Fermat, Opera varia, 1679). Methods similar to Fermat's were devised by Ren6 de Sluse (1652) for tangents, and by Johannes Hudde (1658) for maxima and minima. Other methods for the solution of the problem of tangents were devised by Roberval and

Torricelli, and published almost simultaneously in 1644. These methods were founded upon the composition of motions, the theory of which had been taught by Galileo (1638), and, less completely, by Roberval (1636). Roberval and Torricelli could construct the tangents of many curves, but they did not arrive at Fermat's artifice. This artifice is that which we have noted in §10 as the fundamental artifice of the infinitesimal calculus.

17. Among the comparatively few mathematicians who before 1665 could perform differentiations was Isaac Barrow. In his book entitled Lectiones opticae et geometricae, Barrow's written apparently in 1663, 1664, and published in Differ- 1669, 1670, he gave a method of tangents like that ˆntiai of Roberval and Torricelli, compounding two velocities """xte- in the directions of the axes of x and y to obtain a resultant along the tangent to a curve. In an appendix to this book he gave another method which differs from Fermat's in the introduc- tion of a differential equivalent to our dy as well as dx. Two neighbouring ordinates PM and QN of a curve (fig. 7) are regarded as containing an inde- finitely small {indefinite parwm) arc, and PR is drawn parallel to the axis of x. The tangent PT at P is regarded as identical with the secant PQ, and the position of the tangent is determined by the similarity of the triangles PTM, PQR. The increments QR, PR of the ordinate and abscissa are denoted by a and e; and the ratio of a to e is determined by substituting x--e for x and y--a for y in the equation of the curve, rejecting all terms which are of order higher than the first in a and e, and omitting the terms which do not contain a or e. This process is equivalent to differentiation. Barrow appears to have invented it himself, but to have put it into his book at Newton's request. The triangle PQR is some- times called " Barrow's differential triangle."

The reciprocal relation between differentiation and integration (§6) was first observed explicitly by Barrow in the book cited above. If the quadrature of a curve y =/(*) is known, so that the „ ,

area up to the ordinate x is given by F(x), the curve y arrows ˆ y = F(x) can be drawn, and Barrow showed that the theorem' 7 subtangent of this curve is measured by the ratio of its ordinate to the ordinate of the original curve. The curve y = F(*) is often called the " quadratrix " of the original curve; and the result has been called " Barrow's inversion-theorem." He did not use it as we do for the determination of quadratures, or indefinite, integrals, but for the solution of problems of the kind which were then called " inverse problems of tangents." In these problems it was sought to determine a curve from some property of its tangent, e.g. the property that the

subtangent is proportional to the square of the abscissa. Such problems are now classed under "differentiaL equations." When Barrow wrote, quadratures were familiar and differentiation unfamiliar, just as hyperbolas were trusted while logarithms were strange. The functional notation was not invented till long afterwards (see Function), and the want of it is felt in read- ing all the mathematics of the 17th century.

18. The great secret which afterwards came to be called the " infinitesimal calculus " was almost discovered by Fermat, and still more nearly by Barrow. Barrow went farther than Fermat in the theory of differentiation, though not in the practice, for he compared two increments; he went farther in the theory of integration, for he obtained the inversion- theorem. The great discovery seems to consist partly in the

Fig. 7.

Nature of the dis- covery called the Infini- tesimal Calculus,

recognition of the fact that differentiation, known to be a useful process, could always be performed, at least for the functions then known, and partly in the recognition of the fact that the inversion- theorem could be applied to problems of quadrature. By these steps the problem of tangents could be solved once for all, and the operation of integration, as we call it, could be rendered systematic. A further step was necessary in order that the discovery, once made, should become accessible to mathematicians in general; and this step was the introduction of a suitable notation. The definite abandonment of the old tentative methods of in- tegration in favour of the method in which this operation is regarded as the inverse of differentiation was especi- ally the work of Isaac Newton; the precise formulation of simple rules for the process of differentiation in each special case, and the introduction of the notation which has proved to be the best, were especially the work of Gottfried Wilhelm Leibnitz. This statement remains true although Newton invented a systematic notation, and practised differentia- tion by rules equivalent to those of Leibnitz, before Leibnitz had begun to work upon the subject, and Leibnitz effected integrations by the method of

recognizing differential coefficients before he had had any opportunity of becoming acquainted with Newton's methods.

iq. Newton was Barrow's pupil, and he knew to start with in 1664 all that Barrow knew, and that was practically all that was known about the subject at that time. His lavesttea- 0Tl &nal thinking on the subject dates from the year tlons. of the great plague (1665-1666), and it issued in the

invention of the " Calculus of Fluxions," the principles and methods of which were developed by him in three tracts entitled De analysi per aequationes numero terminorum infinitas, Melhodus fluxionum el serierum infinitarum, and De quad- ratura curvarum. None of these was published until long after they were written. The Analysis per aequationes was composed in 1666, but not printed until 1711, when it was published by William Jones. The Methodus fluxionum was composed in 1671 but not printed till 1736, nine years after Newton's death, when an English translation was published by John Colson. In Horsley's edition of Newton's works it bears the title Geometria analytica. The Quadratura appears to have been composed in 1676, but was first printed in 1704 as an appendix to Newton's Opticks.

20. The tract De Analysi per aequationes . . . was sent by Newton to Barrow, who sent it to John Collins with a request that N , it might be made known. One way of making it known

method 0/ wou '3 have been to print it in the Philosophical Trans- _^ ri actions of the Royal Society, but this course was not

adopted. Collins made a copy of the tract and sent it to Lord Brouncker, but neither of them brought it before the Royal Society. The tract contains a general proof of Barrow's inversion-theorem which is the same in principle as that in § 6 above. In this proof and elsewhere in the tract a notation is introduced for the momentary increment (momentum) of the abscissa or area of a curve; this " moment " is evidently meant to represent a moment of time, the abscissa representing time, and it is effectively the same as our differential element — the thing that Fermat had denoted by E, and Barrow by e, in the case of the abscissa. Newton denoted the moment of the abscissa by o, that of the area z by ov. He used the letter v for the ordinate y, thus suggesting that his curve is a velocity- time graph such as Galileo had used. Newton gave the formula for the area of a curve u = x m (»t=t=-l) in the form z = x m+l j(m~-l). In the proof he transformed this formula to the form z" = c n x p , where n

and p are positive integers, substituted x + o for x and z + ov for z, and expanded by the binomial theorem for a positive integral exponent, thus obtaining the relation

z”-|-nz” -1 0i>f . . . = c n (x p +px p ~ 1 o-- . . .), from which he deduced the relation

by omitting the equal terms z> and c”x p and dividing the remaining terms by 0, tacitly putting = after division. This relation is the same as v = x m . Newton pointed out that, conversely, from the relation v = x m the relation z- = x m + l /(m + 1) follows. He applied his formula to the quadrature of curves whose ordinates can be expressed as the sum of a finite number of terms of the form ax m ; and gave examples of its application to curves in which the ordinate is expressed*

by an infinite series, using for this purpose the binomial theorem for negative and fractional exponents, that is to say, the expansion of (1 + x)” in an infinite series of powers of x. This theorem he had discovered; but he did not in this tract state it in a general form or give any proof of it. He pointed out, however, how it may be used for the solution of equations by means of infinite series. He observed also that all questions concerning lengths of curves, volumes enclosed by surfaces, and centres of gravity, can be formulated as problems of quadratures, and can thus be solved either in finite terms or by means of infinite series. In the Quadratura (1676) the method of integration which is founded upon the inversion- theorem was carried out systematically. Among other results there given is the quadrature of curves expressed by equations of the form y = x n (a + bx m)i’; this has passed into text-books under the title ” integration of binomial differentials ” (see § 49). Newton announced the result in letters to Collins and Oldenburg of 1676.

*21. In the Methodus fluxionum (1671) Newton introduced his characteristic notation. He regarded variable quantities as generated by the motion of a point, or line, or plane, and called N , the generated quantity a ” fluent ” and its rate of genera- ˆ/,˚do/ tion a “fluxion.” The fluxion of a fluent x is represented T. ,˚ by x, and its moment, or ” infinitely ” small increment accruing in an ” infinitely ” short time, is represented by vo. The problems of the calculus are stated to be (i.) to find the velocity at any time when the distance traversed is given; (ii.) to find the distance traversed when the velocity is given. The first of these leads to differentiation. In any rational equation containing x and y the expressions x + xo and y + yo are to be substituted for * and y, the resulting equation is to be*

divided by 0, and afterwards is to be omitted. In the case of irrational functions, or rational functions which are not integral, new variables are introduced in such a way as to make the equations contain rational integral terms only. Thus Newton's rules of differentiation would be in our notation the rules (i.), (ii.), (v.)of § 11, together with the particular result which we write

dx"

dx

= mx m ~ l , (m integral).

a result which Newton obtained by expanding {x--xo) m by the binomial theorem. The second problem is the problem of integra- tion, and Newton's method for solving it was the method of series founded upon the particular result which we write

(x m dx = – I 1

Publica- tion of the Fluxions! Notation.

may be

w + i"

Newton added applications of his methods to maxima and minima, tangents and curvature. In a letter to Collins of date 1672 Newton stated that he had certain methods, and he described certain results which he had found by using them. These methods and results are those which are to be found in the Methodus fluxionum; but the letter makes no mention of fluxions and fluents or of the character- istic notation. The rule for tangents is said in the letter to be analogous to de Sluse's, but to be applicable to equations that con- tain irrational terms.

22. Newton gave the fluxional notation also in the tract De Quadratura curvarum (1676), and he there added to it notation for the higher differential coefficients and for indefinite integrals, as we call them. Just as x, y, z, . . . are fluents of which x, y, z, '. . . are the fluxions, so X, y, z, . . . can be treated as fluents of which the fluxions may be denoted by X, y, S, . . . In like manner the fluxions of these may be denoted by x, y, 2, . . and so on. Again x, y, z, . .

regarded as fluxions of which the fluents may be denoted by x, j/ ; i,

and these again as fluxions of other quantities denoted by S, y", z, . . . and so on. No use was made of the notation x, x, . . . in the course of the tract. The first publication of the fluxional notation was made by Wallis in the second edition of his Algebra (1693) in the form of extracts from communications made to him by Newton in 1692. In this account of the method the symbols 0, x, x, . . . occur, but not the symbols x, x, . . . Wallis's treatise also contains Newton's formulation of the problems of the calculus in the words DaUi aequatione fluentes quotcumque quanlitates involvente fluxiones invenire el vice versa (" an equation containing any number of fluent quantities being given, to find their fluxions and vice versa "). In the Philosophiae naturalis principia mathematica (1687), commonly called the " Principia," the words " fluxion " and " moment " occur in a lemma in the second book ; but the notation which is characteristic of the calculus of fluxions is nowhere used.

23. It is difficult to account for the fragmentary manner of publication of the Fluxional Calculus and for the long delays which took place. At the time (167 1) when Newton composed the Methodus fluxionum he contemplated bringing out an edition of Gerhard Kinckhuysen's treatise on algebra and prefixing his tract to this treatise. In the same year his " Theory of Light and Colours " was published in the Philosophical Transactions, and the opposition which it excited led to the abandonment of

Retarded Publica- tion of the method ot Fluxions.

the project with regard to fluxions. In 1680 Collins sought the assistance of the Royal Society for the publication of the tract, and this was granted in 1682. Yet it remained unpublished. The reason is unknown; but it is known that about 1670, 1680, Newton took up again the studies in natural philosophy which he had intermitted for several years, and that in 1684 he wrote the tract De motu which was in some sense a first draft of the Principia, and it may be conjectured that the fluxions were held over until the Principia should be finished. There is also reason to think that Newton had become dissatisfied with the arguments about infinitesimals on which his calculus was based. In the preface to the De quadratura curvarum (1704), in which he describes this tract as something

which he once wrote (" olim scripsi ") he says that there is no necessity to intro- duce into the method of fluxions any argument about infinitely small quantities; and in the Principia (1687) he adopted instead of the method of fluxions a new method, that of " Prime and Ultimate Ratios." By the aid of this method it is possible, as Newton knew, and as was afterwards seen by others, to found the calculus of fluxions on an irreproachable method of limits. For the purpose of explaining his discoveries in dynamics and astronomy Newton used the method of limits only, without the notation of fluxions, and he presented all his results and demonstrations in a geometrical form. There is no doubt that he arrived at most of his theorems in the first instance by using the method of fluxions. Further evidence of Newton's dis- satisfaction with arguments about infinitely small quantities is furnished by his tract Methodus diferentialis, published in 17 1 1 by William Jones, in which he laid the foundations of the " Calculus of Finite Differences."

24. Leibnitz, unlike Newton, was practically a self-taught mathematician. He seems to have been first attracted to mathematics as a means of symbolical expression, and course of on tne occas i° n of his first visit to London, early in discovery, r 673, he learnt about the doctrine of infinite series which James Gregory, Nicolaus Mercator, Lord Brouncker and others, besides Newton, had used in their in- vestigations. It appears that he did not on this occasion become acquainted with Collins, or see Newton's Analysis per aequa- tiones, but he purchased Barrow's Lectiones. On returning to Paris he made the acquaintance of Huygens, who recommended him to read Descartes' Geometric He also read Pascal's Lettres de Dettonville, Gregory of St Vincent's Opus geomelricum, Cavalieri's Indivisibles and the Synopsis geometrica of Honore Fabri, a book which is practically a commentary on Cavalieri; it would never have had any importance but for the influence which it had on Leibnitz's thinking at this critical period. In August of this year (1673) he was at work upon the problem of tangents, and he appears to have made out the nature of the solution— the method involved in Barrow's differential triangle — for himself by the aid of a diagram drawn by Pascal in a demon- station of the formula for the area of a spherical surface. He saw that the problem of the relation between the differences of neighbouring ordinates and the ordinates themselves was the important problem, and then that the solution of this problem was to be effected by quadratures. Unlike Newton, who arrived at differentiation and tangents through integration and areas, Leibnitz proceeded from tangents to quadratures. When he turned his attention to quadratures and indivisibles, and realized the nature of

the process of finding areas by summing ‘ infinitesimal ” rectangles, he proposed to replace the rectangles by triangles having a common vertex, and obtained by this method the result which we write

t- = i-5 + {-*+ • • • In 1074 he sent an account of his method, called ” transmutation,” along with this result to Huygens, and early in 1675 he sent it to Henry Oldenburg, secretary of the Royal Society, with inquiries as to Newton’s discoveries in regard to quadratures. In October of 1675 he had begun to devise a symbolical notation for quadratures, starting from Cavalieri’s indivisibles. At first he proposed to use the word omnia as an abbreviation for Cavalieri’s “sum of all the lines,” thus writing omnia y for chat*

which we write ” fydx,” but within a day or two he wrote ” fy.” He regarded the symbol ” /” as representing an opera- tion which raises the dimensions of the subject of operation — a line becoming an area by the operation — and he devised his symbol ” d ” to represent the inverse operation, by which the dimensions are diminished. He observed that, whereas ” / ”

represents ” sum,” ” d ” represents ” difference.” His notation appears to have been practically settled before the end of 1675, for in November he wrote fydy = %y 2 , just as we do now.

*25. In July of 1676 Leibnitz received an answer to his inquiry in regard to Newton’s methods in a letter written by Newton to Oldenburg. In this letter Newton gave a general corres- statement of the binomial theorem and many results poadeace relating to series. He stated that by means of such otNew series he could find areas and lengths of curves, centres *?”.?”? of gravity and volumes and surfaces of solids, but, as this would take too long to describe, he would illustrate it by examples. He gave no proofs. Leibnitz replied in August, stating some results which he had obtained, and which, as it seemed, could not be obtained easily by the method of series, and he asked for further information. Newton replied in a long letter to Oldenburg of the 24th of October 1676. In this letter he gave a much fuller account of his binomial theorem and indicated a method of proof. Further he gave a number of results relating to quadratures; they were afterwards printed in the tract De quadratura curvarum. He gave many other results relating to the computation of natural logarithms and other calculations in which series could be used. He gave a general statement, similar to that in the letter to Collins, as to the kind of problems relating to tangents, maxima and minima, &c, which he could solve by his method, but he concealed his formulation of the calculus in an anagram of transposed letters. The solution of*

the anagram was given eleven years later in the Principia in the words we have quoted from Wallis's Algebra. In neither of the letters to Oldenburg does the characteristic notation of the fluxional calculus occur, and the words " fluxion " and " fluent " occur only in anagrams of transposed letters. The letter of October 1676 was not despatched until May 1677, and Leibnitz answered it in June of that year. In October 1676 Leibnitz was in London, where he made the acquaintance of Collins and read the Analysis per aequationes, and it seems to have been supposed afterwards that he then read Newton's letter of October 1676, but he left London before Oldenburg received this letter. In his answer of June 1677 Leibnitz gave Newton a candid account of his differential calculus, nearly in the form in which he afterwards published it, and explained how he used it for quadratures and inverse problems of tangents. Newton never replied.

26. In the Acta eruditorum of 1684 Leibnitz published a short memoir entitled Nova methodus pro maximis et minimis, itemque tangentibus, quae nee fractas nee irrationales Leibnitz's quantitates moratur, el singulare pro illis calculi genus. Differ- In this memoir the differential dx of a variable x, entiat considered as the abscissa of a point of a curve, is said Ca/cu/us – to be an arbitrary quantity, and the differential dy of a related variable y, considered as the ordinate of the point, is defined as a quantity which has to dx the ratio of the ordinate to the subtangent, and rules are given for operating with differentials. These are the rules for forming the differential of a constant, a sum (or difference), a product, a quotient, a power (or root). They are equivalent to our rules (i.)-(iv.) of § 1 1 and the particular result

$$d(x\ m\ ) = mx\ m \sim 1\ dx.$$

*The rule for a function of a function is not stated explicitly but is illustrated by examples in which new variables are intro- duced, in much the same way as in Newton's Methodus fluxionum. In connexion with the problem of maxima and minima, it is noted that the differential of y is positive or negative according as y increases or decreases when * increases, and the discrimina- tion of maxima from minima depends upon the sigh of ddy, the differential of dy. In connexion with the problem of tangents the differentials are said to be proportional to the momentary*

increments of the abscissa and ordinate. A tangent is defined as a line joining two ” infinitely ” near points of a curve, and the ” infinitely ” small distances (e.g., the distance between the feet of the ordinates of such points) are said to be expressible by means of thedifferentials(e.g.,

27. This memoir was followed in 1686 by a second, entitled De Geometria recondita el analyst indivisibilium atque infinitorum, Develop- ‘ n wmc ˆ Leibnitz described the method of using his meat new differential calculus for the problem of quadratures.

of the This was the first publication of the notation fydx. Calculus, - pjjg new jjigthoj was called calculus summatorius. The brothers Jacob (James) and Johann (John) Bernoulli were able by 1690 to begin to make substantial contributions to the development of the new calculus, and Leibnitz adopted their word ” integral ” in 1695, they at the same time adopting his symbol “/•” In 1696 the marquis de l’Hospital published the first treatise on the differential calculus with the title Analyse des infiniment petits pour V intelligence des lignes courbes. The few references to fluxions in Newton’s Principia (1687) must have been quite unintelligible to the mathematicians of the time, and the publication of the fluxional notation and calculus by Wallis in 1693 was too late to be effective. Fluxions had been supplanted before they were introduced.

The differential calculus and the integral calculus were rapidly developed in the writings of Leibnitz and the Bernoullis. Leibnitz (1 695) was the first to differentiate a logarithm and an exponential, and John Bernoulli was the first to recognize the property possessed by an exponential (a x) of becoming infinitely great in comparison with any power (x”) when * is increased indefinitely. Roger Cotes (1722) was the first to differentiate a trigonometrical function. A great development of infinitesimal methods took place through the founding in 1696-1697 of the ” Calculus of Variations ” by the brothers Bernoulli.

28. The famous dispute as to the priority of Newton and Leibnitz in the invention of the calculus began in 1699 through Dispute the publication by Nicolas Fatio de Duillier of a con- tract in which he stated that Newton was not only the

ceraing first, but by many years the first inventor, and insinu- Priority. ate(j tnat L e ibnitz had stolen it. Leibnitz in his reply (Acta

Eruditorum, 1700) cited Newton's letters and the testimony which Newton had rendered to him in the Principia as proofs of his independent authorship of the method. Leibnitz was especially hurt at what he understood to be an endorsement of Duillier's attack by the Royal Society, but it was explained to him that the apparent approval was an accident. The dispute was ended for a time. On the publication of Newton's tract De quadralura curvarum, an anonymous review of it, written, as has since been proved, by Leibnitz, appeared in the Acta Eruditorum, 1705. The anonymous reviewer said: "Instead of the Leibnitzian differences Newton uses and always has used fluxions . . . just as Honore Fabri in his Synopsis Geometrica substituted steps of movements for the method of Cavalieri." This passage, when it became known in England, was understood not merely as belittling Newton by comparing him with the

obscure Fabri, but also as implying that he had stolen his calculus of fluxions from Leibnitz. Great indignation was aroused; and John Keill took occasion, in a memoir on central forces which was printed in the Philosophical Transactions for 1708, to affirm that Newton was without doubt the first inventor of the calculus, and that Leibnitz had merely changed the name and mode of notation. The memoir was published in 17 10. Leibnitz wrote in 1711 to the secretary of the Royal Society (Hans Sloane) requiring Keill to retract his accusation. Leibnitz's letter was read at a meeting of the Royal Society, of which Newton was then president, and Newton made to the society a statement of the course of his invention of the fluxional calculus with the dates of particular discoveries. Keill was requested by the society " to draw up an account of the matter under dispute and set it in a just light." In his report Keill referred to Newton's letters of 1676, and said that Newton had there given so many indications of his method that it could have been understood by a person of ordinary intelligence. Leibnitz wrote to Sloane asking the society to stop these unjust attacks of Keill, asserting that in the review in the Acta Eruditorum no one had been injured but each had received his due, submitting the matter to the equity of the Royal Society, and stating that he was persuaded that Newton himself would do him justice. A committee was appointed by the society to examine the documents and furnish a report. Their report, presented in April 1 71 2, concluded as follows:

" The differential method is one and the same with the method of fluxions, excepting the name and mode of notation; Mr Leibnitz calling those quantities differences which Mr Newton calls moments or fluxions, and marking them with the letter d, a mark not used by

Mr Newton. And therefore we take the proper question to be, not who invented this or that method, but who was the first inventor of the method; and we believe that those who have reputed Mr Leibnitz the first inventor, knew little or nothing of his correspond- ence with Mr Collins and Mr Oldenburg long before; nor of Mr Newton's having that method above fifteen years before Mr. Leibnitz began to publish it in the Acta Eruditorum of Leipzig. For which reasons we reckon Mr Newton the first inventor, and are of opinion that Mr Keill, in asserting the same, has been no ways injurious to Mr Leibnitz."

The report with the letters and other documents was printed (1712) under the title Commercium Epistolicum D. Johannis Collins et aliorum de analysi promota, jussu Societatis Regiae in lucem editum, not at first for publication. An account of the contents of the Commercium Epistolicum was printed in the Philosophical Transactions for 1715. A second edition of the Commercium Epistolicum was published in 1722. The dispute was continued for many years after the death of Leibnitz in 1716. To translate the words of Moritz Cantor, it " redounded to the discredit of all concerned."

29. One lamentable consequence of the dispute was a severance of British methods from continental ones. In Great Britain it became a point of honour to use fluxions and other Newtonian methods, while on the continent the g B Jc!,a- notation of Leibnitz was universally adopted. This tiaenui severance did not at first prevent a great advance in Schools 0/ mathematics in Great Britain. So long as attention Mathe ~ was directed to problems in which there is but one independent variable (the time, or the abscissa of a point of a curve), and all the other variables depend upon this one, the fluxional notation could be used as well as the differential and integral notation, though perhaps not quite so easily. Up to about the middle of the 18th century important discoveries continued to be made by the use of the method of fluxion. It was the introduction of partial differentiation by Leonhard Euler (1734) and Alexis Claude Clairaut (1739), and the develop- ments which followed upon the systematic use of partial differ- ential coefficients, which led to Great Britain being left behind; and it was not until after the reintroduction of continental methods into England by Sir John Herschel, George Peacock and Charles Babbage in 1815 that British mathematics began to flourish again. The exclusion of continental mathematics from Great Britain was not accompanied by any exclusion of British mathematics from the continent. The discoveries*

tlon to the calculus.

of Brook Taylor and Colon Maclaurin were absorbed into the rapidly growing continental analysis, and the more precise conceptions reached through a critical scrutiny of the true nature of Newton's fluxions and moments stimulated a like scrutiny of the basis of the method of differentials.

30. This method had met with opposition from the first. Christiaan Huygens, whose opinion carried more weight than OpposI- ˆ nat °ˆ an y other scientific man of the day, declared that the employment of differentials was unnecessary, and that Leibnitz's second differential was meaningless (1691). A Dutch physician named Bernhard Nieuwentijt attacked the method on account of the use of quantities which are at one stage of the process treated as somethings and at a later stage as nothings, and he was especially severe in commenting upon the second and higher differentials (1694, 1695). Other attacks were made by Michel Rolle (1701), but they were directed rather against matters of detail than against the general principles. The fact is that, although Leibnitz in his answers to Nieuwentijt (1695), and to Rolle (1702), indicated that the processes of the calculus could be justified by the methods of the ancient geometry, he never expressed himself very clearly on the subject of differentials, and he conveyed, probably without intending it, the impression that the calculus leads to correct results by compensation of errors. In England the method of fluxions had to face similar attacks. George Berkeley, bishop and philosopher, wrote in 1734 a tract entitled The Analyst; or a Discourse addressed to an Infidel Mathematician, in which he proposed to destroy the presumption that the opinions of mathematicians in matters of faith are lyst" con- likely to be more trustworthy than those of divines, troversy. by contending that in the much vaunted fluxional calculus there are mysteries which are accepted unquestioningly by the mathematicians, but are incapable of logical demonstration. Berkeley's criticism was levelled against all infinitesimals, that is to say, all quantities vaguely conceived as in some intermediate state between nullity and finiteness, as he took Newton's moments to be conceived. The tract occasioned a controversy which had the important consequence of making it plain that all arguments about infinitesimals must be given up, and the calculus must be founded on the method of limits. During the controversy Benjamin Robins gave an exceedingly clear explanation of Newton's theories of fluxions and of prime and ultimate ratios regarded as theories of limits. In

this explanation he pointed out that Newton's moment (Leibnitz's " differential ") is to be regarded as so much of the actual difference between two neighbouring values of a variable as is needful for the formation of the fluxion (or differential coefficient) (see G. A. Gibson, " The Analyst Controversy," Proc. Math. Soc, Edinburgh, xvii., 1899). Colin Maclaurin published in 1742 a Treatise of Fluxions, in which he reduced the whole theory to a theory of limits, and demonstrated it by the method of Archimedes. This notion was gradually trans- ferred to the continental mathematicians. Leonhard Euler in his Institutiones Calculi diferentialis (1755) was reduced to the position of one who asserts that all differentials are zero, but, as the product of zero and any finite quantity is zero, the ratio of two zeros can be a finite quantity which it is the business of the calculus to determine. Jean le Rond d'Alembert in the Encyclopedic methodique (1755, 2nd ed. 1784) declared that differentials were unnecessary, and that Leibnitz's calculus was a calculus of mutually compensating errors, while Newton's method was entirely rigorous. D'Alembert's opinion of Leibnitz's calculus was expressed also by Lazare N. M. Carnot in his Reflexions sur la melaphysique du caicul infinitesimal (1799) and by Joseph Louis de la Grange (generally called Lagrange) in writings from 1760 onwards. Lagrange proposed in his Theorie des fonctions analyliques (1797) to found the whole of the calculus on the theory of series. It was not until 1823 that a treatise on the differential calculus founded upon the method of limits was published. The treatise was the Risume des lecons . . . sur le caicul infinitesimal of Augustin Louis Cauchy. Since that time it has been understood that the use of the

argument

metlcal basis of modern analysis.

phrase " infinitely small " in any mathematical

is a figurative mode of expression pointing to a

limiting process. In the opinion of many eminent Cau y'

*.1 *T- . 1 j r • method of*

mathematicians such modes of expression are /i m u Sm

confusing to students, but in treatises on the

calculus the traditional modes of expression are still largely

adopted.

3r. Defective modes of expression did not hinder constructive work. It was the great merit of Leibnitz's symbolism that a mathematician who used it knew what was to be Arith- done in order to formulate any problem analytically, even though he might not be absolutely clear as to the proper interpretation of the symbols, or able to render a satisfactory account of them. While new and varied results were promptly obtained by using them, a long time elapsed before the theory of them was placed on a sound basis. Even after Cauchy had formulated his theory much remained to be done, both in the rapidly growing department of complex variables, and in the regions opened up by the theory of expan- sions in trigonometric series. In both directions it was seen that rigorous demonstration demanded greater precision in regard to fundamental notions, and the requirement of precision led to a gradual shifting of the basis of analysis from geometrical intuition to arithmetical law. A sketch of the outcome of this movement — the " arithmetizatien of analysis," as it has been called — will be found in Function. Its general tendency has been to show that many theories and processes, at first accepted as of general validity, are liable to exceptions, and much of the work of the analysts of the latter half of the 19th century was directed to discovering the most general conditions in which particular processes, frequently but not universally applicable, can be used without scruple.

III. Outlines of the Infinitesimal Calculus.

32. The general notions of functionality, limits and continuity are explained in the article Function. Illustrations of the more immediate ways in which these notions present themselves in the development of the differential and integral calculus will be useful in what follows.

33. Let y be given as a function of x, or, more generally, let x and y be given as functions of a variable t. The first of these cases is included in the second by putting x = t. If certain conditions are satisfied the aggregate of the points de- eo ˆ H , termined by the functional relations form a curve. The ?. ,et " ca first condition is that the aggregate of the values of t to m which values of x and y correspond must be continuous, or, in other words, that these values must consist of all real numbers, or of all those real numbers which lie between assigned extreme numbers. When this condition is satisfied the points are " ordered," and their order is determined by

the order of the numbers /, supposed to be arranged in order of increasing or decreasing magnitude; also there are two senses of description of the curve, according as t is taken to increase or to diminish. The second condition is that the aggregate of the points which are determined by the functional relations must be " continuous." This condition means that, if any point P determined by a value of t is taken, and any distance 8, however small, is chosen, it is possible to find two points Q, Q' of the aggregate which are such that (i.) P is between Q and Q', (ii.) if

R, R are any points between Q and Q' the distance RR' is less than 5. The jneaning of the word " between " in this statement is fixed by the ordering of the points. Sometimes additional con- ditions are imposed upon the functional relations before they are

regarded as defining a curve. An aggregate of points which satisfies

the two conditions stated

above is sometimes called a

" Jordan curve." It by no

means follows that every

curve of this kind has a tan- gent. In order that the curve

may have a tangent T

at r it is necessary

that, if any angle a, however

small, is specified, a distance 8

can be found such that when

P is between Q and Q', and

PQ and PQ' are less than 8,

the angle RPR' is less than

a for all pairs of points R, R' which are between P and Q, or

between P and Q' (fig. 8). When this condition is satisfied y is a

function of x which has a differential coefficient.

The only way of

Progres slve and Regressive Differen- tial Co-

finding out whether this condition is satisfied or not is to attempt to form the differential coefficient. If the quotient of differences Ay I Ax has a limit when Ax tends to zero, y is a differentiable function of x, and the limit in question is the differential coefficient. The derived function, or differential coefficient, of a function /(*) is always defined by the formula

/M-fl-linJfeiˆ

Rules for the formation of differential coefficients in particular cases have been given in §11 above. The definition of a differential coefficient, and the rules of differentiation, are quite independent of any geometrical interpretation, such as that concerning tangents to a , cur y% and the tan gent to a curve is properly defined by means of the differential coefficient of a function, not the differential co- efficient by means of the tangent.

It may happen that the limit employed in defining the differential coefficient has one value when h approaches zero through positive values, and a different value when h approaches zero through negative values. The two limits are then called the ” progressive ” and ‘ regressive” differential co- efficients. In applications to dynamics, when x denotes a coordinate and t the time, dx/dt denotes a velocity. If efficients, the velocity is changed suddenly the progressive differ- ential coefficient measures the velocity just after the change, and the regressive differential coefficient measures the velocity just before the change. Variable velocities are properly defined by means of differential coefficients.

All geometrical limits may be specified in terms similar to those employed in specifying the tangent to a curve; in difficult cases Areas. they must be so specified. Geometrical intuition may fail

to answer the question of the existence or non-existence ot the appropriate limits. In the last resort the definitions of many quantities of geometrical import must be analytical, not geometrical

As illustrations of this statement we may take the definitions of the areas and lengths of curves. We may not assume that every curve has an area or a length. To find out whether a curve has an area ° r – ? 0t ‘ <ˆl mu , st pertain whether the limit expressed by fydx exists. When the limit exists the curve has an area. The definition ot the integral is quite independent of any geometrical interpretation. i 5 l" g A P f a curve a S aln is defined by means of a limiting process. Let P, Q be two points of a curve, and R,, R 2 , . . . R„_, a set of intermediate points of the curve, supposed to be described in the sense in which Q comes after P. The points R are supposed to be reached successively in the order of the suffixes when the curve is described in this sense. We form a sum of lengths of chords

*PR1 + R1R. + ■ • . + R„_iQ. If this sum has a limit when the number of the points R is increased indefinitely and the lengths of all the chords are diminished inde- Lengtbs nn’tely. this limit is the length of the arc PQ. The limit of Curves. ‘? the same whatever law may be adopted for inserting f *u u 1 interme diatc points R and diminishing the lengths ot the chords It appears from this statement that the differential clement cf the arc of a curve is the length of the chord joining two neighbouring points. In accordance with the fundamental artifice tor forming differentials (§§ 9, 10), the differential element of arc ds may be expressed by the formula*

*ds = V {(«**)«+ {dy)% of which the right-hand member is really the measure of the distance between two neighbouring points on the tangent. The square root must be taken to be positive. We may describe this differential clement as being so much of the actual arc between two neighbouring points as need.be retained for the purpose of forming the integral expression for an arc. This is a description, not a definition, because the length of the short arc itself is only definable by means of the integral expression. Similar considerations to those used in defining the areas of plane figures and the lengths of plane curves are ap- plicable to the formation of expressions for differential elements of volume or of the areas of curved surfaces.*

.u 34 ‘ •/”•. re § ard to differential coefficients it is an important theorem that, if the derived function /’(x) vanishes at all points of an interval, Constants ™ e fu !\ction f{x) is constant in the interval. It follows ..._. that, if two functions have the same derived function

they can only differ by a constant. Conversely, indefinite integrals are indeterminate to the extent of an additive constant.

„ 35- The differential coefficient dy/dx, or the derived function /

(x), is itself a function of x, and its differential coefficient is denoted Higher ytJS-' or fj'A** 2 – In the second of these notations d/dx is regarded as the symbol of an operation, that of differentiation with respect to x, and the index 2 means that the operation is repeated. In like manner we may «,w n ex Press the results of n successive differentiations by r j (x) or by d-yldx" When the second differential coefficient exists, or the first is differentiable, we have the relation*

oflnte gration.

Differen- tial Co- efficients

f"M = V. m ., J(x + h)-2f(x) + f(x-li)

(i.)

The limit expressed by the right-hand member of this equation may

[OUTLINES

exist in cases in which f{x) does not exist or is not differentiable 1 he result that, when the limit here expressed can be shown to vanish at all points of an interval, then/(x) must be a linear function ol x in the interval, is important.

The relation (i.) is a particular case of the more general relation

/ < " > (*) = lim.i_oA" n f/(a; + «fe) – n f{(x + (n- i)h

+

n (n- 1)

2!

f{x + (n-2)h

■■ + (-!

)"/(*)}

(ii.)

As in the case of relation (i.) the limit expressed by the right-hand m ,T r£ ? ay e x' s t although some or all of the derived functions

/ (*),/ 0) /"'-"(x) do not exist.

Corresponding to the rule iii. of § 1 1 we have the rule for forming the nth differential coefficient of a product in the form

ˆM = a ˆ!?L M ˆ dˆH |?ˆLZI) *v , , d”u

dx- dxˆ‘dx dx”’ˆ 1 . 2 dx 1 drˆ + • ‘ • + dxˆ’

where the coefficients are those of the expansion of (i-f-x)” m powers of x (n being a positive integer). The rule is due to Leibnitz

(1695).

Differentials of higher orders may be introduced in the same wav as the differential of the first order. In general when y = f(x) the nth differential d”y is defined by the equation

d”y=fˆ>{x)\dxY, in which dx is the (arbitrary) differential of x.

YVhen d/dx is regarded as a single symbol of operation the symbol J .dx represents the inverse operation. If the former is denoted “Y u > the latter may be denoted by D” 1 . D” means that the operation D is to be performed n times in succession • s y mboIs D » that the operation of forming the indefinite integral “f ODera – is to be performed n times in succession. Leibnitz’s course of thought (§ 24) naturally led him to inquire after an inter- pretation of D”. where n is not an integer. For an account of the researches to which this inquiry gave rise, reference may be made to the article by A. Voss in Ency. d. math. Wiss. Bd. ii. A, 2 (Leipzig \?°9>- The matter is referred to as ” fractional “or ” generalized” differentiation.

36. After the formation of differential coefficients the most im- portant theorem of the differential calculus is the theorem of inter- mediate value (” theorem of mean value,” ” theorem of finite incre- ments,” ” Rolle’s theorem,” are other names for it). This theorem may be explained as follows: Let A, B be two points of a curve }’=/ (x) (fig. 9)- Then there is a point P between A and B at which the tangent is parallel to the secant AB. This theorem is expressed analytically in the statement that if /’(*) is continuous between a and b, there is a value xi of x between a and b which has the pro- perty expressed by the equation

The value x, can be expressed in the form a+0(b — a) where is a number between o and 1.

A slightly more general theorem was given by Cauchy (1821) to the effect that, if /’(*) and F’(x) are continuous between x = a and x –

0, then there is a number 8 between o and 1 which has the property expressed by the equation

F(ft)-F(fl) _ F'!a+9(6-a)|

Kb) -/(a) f \a+B(b -a)] • The theorem expressed by the relation (i.) was first noted by Rolle (i 690) for the case where /(x) is a rational integral function which vanishes when x = a and also when x = b. The general theorem was given by Lagrange (1797). Its fundamental importance was first recognized by Cauchy (1823). It may be observed here that the theorem ot integral calculus expressed by the equation

Fig.

(i.)

F(6)-F(o)

= j F'(x)dx

follows at once from the definition of an integral and the theorem of intermediate value.

The theorem of intermediate value may be generalized in the statement that, if /(*) and all its differential coefficients up to the nth inclusive are continuous in the interval betweenx = a andx = 6 then there ts a number between o and 1 which has the property expressed by the equation H y

Kfi) = Ka) + (b-a)f'(a) +

(b

ˆf"(a) + ... +

a)»

T nl J

in -1) I a + 0(b-a)

-/(«-»( )

(i.)

37-. Tms theorem provides a means for computing the values of a function at points near to an assigned point when the value of the function and its differential coefficients at the assigned point are known. The function is expressed by a termin- Ta ˆ /or ' s ated series, and, when the remainder tends to zero as n Theorem ' increases it may be transformed into an infinite series. The theorem

OUTLINES]

INFINITESIMAL CALCULUS

545

was first given by Brook Taylor in his Methodus Incrementorum (17 17) as a corollary to a theorem concerning finite differences. Taylor gave the expression for f{x + z) in terms of f{x), f'(x), . . . as an infinite series proceeding by powers of z. His notation was that appropriate to the method of fluxions which he used. This rule for expressing a function as an infinite series is known as Taylor's

theorem. The relation (i.), in which the remainder after n terms is

fiut in evidence, was first obtained by Lagrange (1797)- Another orm of the remainder was given by Cauchy (1823) viz.,

£ˆ£(l-e)«-i»{a+8(b-a)}.

The conditions of validity of Taylor's expansion in an infinite series have been investigated very completely Dy A. Pringsheim (Math. Ann. Bd. xliv., 1894). It is not sufficient that the function and all its differential coefficients should be finite at x=a\ there must be a neighbourhood of a within which Cauchy's form of the remainder tends to zero as n increases (cf. Function).

An example of the necessity of this condition is afforded by the function f(x) which is given by the equation

flx) L_ + V n ˆiˆil: 1

The sum of the series

GO

/(o)+Jf/'(o)+|j/'(o)+..

(iiO

Bxpao' slons In power series.

is the same as that of the series

e~ l — x i e~' fl +x i e~ si — .. . It is easy to prove that this is less than e' 1 when x lies between o and I, and also that f(x) is greater than e~ l when x = l/V3- Hence the sum of the series (i.) is not equal to the sum of the series (ii.).

The particular case of Taylor's theorem in which 0=0 is often called Maclaurin's theorem, because it was first explicitly stated by Colin Maclaurin in his Treatise of Fluxions (1742). Maclaurin like Taylor worked exclusively with the fluxional calculus.

*Examples of expansions in series had been known for some time. The series for log (i+x) was obtained by Nicolaus Mercator (1668) by expanding (1 + x)~ L by the method of algebraic division, and integrating the series term by term. He regarded his result as a " quadrature of the hyperbola." Newton (1669) obtained the expansion of sin 1 * by ex panding (l-K 2)~» by the binomial*

theorem and integrat- ing the series term by term. James Gregory (1671) gave the series for tan _1 x. Newton also obtained the series for sin x, cos x, and e by reversion of series (1669). The symbol e for the base of the Napierian logarithms was introduced by Euler (1739). All these series can be obtained at once by Taylor's theorem. James Gregory found also the first few terms of the series for tan * and sec x; the terms of these series may be found successively by Taylor's theorem, but the numerical coefficient of the general term cannot be obtained in this way.*

Taylor's theorem for the expansion of a function in a power series was the basis of Lagrange's theory of functions, and it is fundamental also in the theory of analytic functions of a complex variable as developed later by Karl Weierstrass. It has also numerous applications to problems of maxima and minima and to analytical geometry. These matters are treated in the appropriate articles.

The forms of the coefficients in the series for tan x and sec x can be expressed most simply in terms of a set of numbers introduced by James Bernoulli in his treatise on probability entitled Ars Conjectandi (1713). These numbers Bi, B 2 , . . . called Bernoulli's numbers, are the coefficients so denoted in the formula

*To this problem is reducible that of expanding y in powers of x when * and y are connected by an equation of the form*

y = a+xf(y), for which problem Lagrange (1770) obtained the formula

For the history of the problem and the generalizations of Lagrange's result reference may be made to O. Stolz, Grundzilge d. Dijf. u. Int. Rechnung, T. 2 (Leipzig, 1896).

38. An important application of the theorem of intermediate value and its generalization can be made to the problem of evaluating certain limits. If two functions (x) and \p(x) both . . t vanish at x = a, the fraction (x)J\^(x) may have a finite mlaate limit at a. This limit is described as the limit of an forms. " indeterminate form." Such indeterminate forms were considered first by de l'Hospital (1696) to whom the problem of evaluating the limit presented itself in the form of tracing the curve y = (x)/\j/{x) near the ordinate x = a, when the curves y=(x) and y=, $, chosen so that P and Q have the same abscissa. The value of the ordinate of the corre- sponding point R of the compound curve is given by the ratio of the ordinates PM, QM. De l'Hospital treated PM and QM as " infinitesimal," so

that the equations PM :AM = *'(o) and QM :AM = ^'(a) could FlG – I0 –

be assumed to hold, and he arrived at the result that the " true value " of (a)/^(a) is $' '(a) jrj/' (a) . It can be proved rigorously that, if 4 > '(x) does not vanish at x = a, while tj > (a) = 0 and ^(a) = 0, then

Km '(q)

x = a t{x) ^»- It can be proved further if that m {x) and ^"(*) are the differential coefficients of lowest order of (x) andi/' (x) which do not vanish at x = a, and if m = n, then

— — \x 2

2 2!

R? r 4 I §3y6

-I 2 2! 4! 6!

and they are connected with the sums of powers of the reciprocals of the natural numbers by equations of the type

B,, =

(2n)!

The function

Gi

4-J- + JL4-

2 2!

iB, *™- 2 -.

/o(o)

+ Z* n = 2 L^T dy~ > \My)"h-

lim..

has been called Bernoulli's function of the rath order by J. L. Raabe (Crelle's J. f. Math. Bd. xlii., 1851). Bernoulli's numbers and

functions are of especial importance in the calculus of finite differences (see the article by D. Seliwanoff in Ency. d. math. Wiss. Bd. i., E., 1901). When x is given in terms of y by means of a power series of the form

*x=y(C +C 1 y+C 1 f+...) (C *o) =>/o(y), say,*

there arises the problem of expressing y as a power series in x. This problem is that of reversion of series. It can be shown that provided the absolute value of x is not too great,

4>(x) _ #(a)*

If m>n the limit is zero; but if m(x)/\l/(x) " becomes infinite " at x = a. If the value of the function at x =0 is not assigned by the definition of the function, the function does not exist at x — a, and the meaning of the statement that it " becomes infinite " is that it has no finite limit. The state- ment does not mean that the function has a value which we call infinity. There is no such value (see Function).

Such indeterminate forms as that described above are said to be of the form 0/0. Other indeterminate forms are presented in the form o X =0 , or i 00 , or °o /» , or 00 – 00 . The most notable of the forms i 00 is lim.x=o(i -hx) 1 /, which is e. The case in which (x) and f(x) both tend to become infinite at x = a is reducible to the case in which both the functions tend to become infinite when x is increased indefinitely. If 4>'(x) and \(/'(x) have determinate finite limits when x is increased indefinitely, while (x) and ˆ(.x) are determinately (positively or negatively) infinite, we have the result expressed by the equation*

Urn _ W – K-»»'W '-"> <)/{x) lim.ˆf ()'

For the meaning of the statement that (x) and \j/(x) are determinately infinite reference may be made to the article Function. The evalua- tion of forms of the type =0 /» leads to a scale of increasing " in- finities," each being infinite in comparison with the preceding. Such a scale is

log x, .. .x, x 2 , . . .x n ,. . .e x , .. .x"; each of the limits expressed by such forms as lim.x=» 4>(x)/il/(x), where (x) precedes ˆ(x) in the scale, is zero. The construction of such scales, along with the problem of constructing a complete scale, was discussed in numerous writings by Paul du Bois-Reymond (see in particular, Math. Ann. Bd. xi., 1877). For the general problem of indeterminate forms reference may be made to the article by A. Pringsheim in Ency. d. math. Wiss.

Bd. ii., A. 1 (1899”). Forms of the type 0/0 presented themselves to early writers on analytical geometry in connexion with the determination of the tangents at a double point of a curve; forms of the type 00/00 presented themselves in like manner in connexion with the deter- mination of asymptotes of curves. The evaluation of limits has innumerable applications in all parts of analysis. Cauchy’s Analyse algebrique (1821) was an epoch-making treatise on limits.

If a function (x) becomes infinite at x — a, and another function \l/{x) also becomes infinite at x = a in such a way that (x)li/(x) has a finite limit C, we say that 4 > (x) and (x) = C < (> (x) + ct > \(x), where \m.x-ai(x)l\l’(x) = o, and thus 4 > i(x) is of a lower order than 4 > {x)\ it may be finite or infinite at x = a. If it is finite, we describe C(x)

dlfferea tlatlon.

as the ” infinite part ” of 4 > (x). The resolution of a function which becomes infinite into an infinite part and a finite part can often be effected by taking the infinite part to be infinite of the same order as one of the functions in the scale written above, or in some more comprehensive scale. This resolution is the inverse of the process of evaluating an indeterminate form of the type oo — oo .

For example lim. I = 0 {(e* — 1) _1 — x -1 } is finite and equal to = J, and the function (e 1 — 1) _1 — XT 1 can be expanded in a power series in x.

39. The nature of a function of two or more variables, and the meaning, to be attached to continuity and limits in respect of such

functions, have been explained under FUNCTION. The

Functions theorems of differential calculus which relate to such

rt*M functions are in general the same whether the number

varuo es. Q ˆ yaj-jabJeg j s)- wo or anv g rea ter number, and it will

generally be convenient to state the theorems for two variables.

40. Let u or / (, y) denote a function of two variables x and y. If we regard y as constant, u or/becomes a function of one variable x,*

. and we may seek to differentiate it with respect to x.

Partial jf t ˆ e f unc t; on f x j s differentiable, the differential coefficient which is formed in . this way is called the " partial differential coefficient " of u or /with respect to

x, and is denoted by gj or «£. The symbol " d " was appropriated

for partial differentiation by C. G. J. Jacobi (1841). It had before been written indifferently with " d " as a symbol of differentiation.

Euler had written " (-f-j " for the partial differential coefficient of

f with respect to x. Sometimes it is desirable to put in evidence the variable which is treated as constant, and then the partial differential

coefficient is written " (-£■ j " or " Iqz.) "• This course is often

adopted by writers on Thermodynamics. Sometimes the symbols d or 3 are dropped, and the partial differential coefficient is denoted by Ui or f x . As a definition of the partial differential coefficient we have the formula

dx llm -h-0 h

In the same way we may form the partial differential coefficient with respect to y by treating xasa constant.

The introduction of partial differential coefficients enables us to solve at once for a surface a problem analogous to the problem of tangents for a curve; and it also enables us to take the first step in the solution of the problem of maxima and minima for a function of several variables. If the equation of a surface is expressed in the form z=f(x, y), the direction cosines of the normal to the surface

at any point are in the ratios g : ■?- : = 1. If / is a maximum or a

minimum at (x, y), then dfldx and df/dy vanish at that point.

In applications of the differential calculus to mathematical physics we are in general concerned with functions of three variables x, y, z, which represent the coordinates of a point; and then considerable importance attaches to partial differential coefficients which are

formed by a particular rule. Let F(x, y, z) be the function, P a point (x, y, 2), P' a neighbouring point (x+Ax, y+Ay, z+Az), and let As be the length of PP'. The value of F(x, y, 2) at P may be denoted shortly by F(P). A limit of the same nature as a partial differential coefficient is expressed by the formula

F(P')=F(P)

lim.

As-0

As

in which As is diminished indefinitely by bringing P' up to P, and P' is supposed to approach P along a straight line, for example, the tangent to a curve or the normal to a surface. The limit in question is denoted by dF/dh, in which it is understood that h indicates a direction, that of PP'. If /, m, n are the direction cosines of the limiting direction of the line PP', supposed drawn from P to P', then 3F ,3F , 3F . 3F dh dx dy dz The operation of forming dF/dh is called "differentiation with respect to an axis " or " vector differentiation."

41. The most important theorem in regard to partial differential coefficients is the theorem of the total differential. We may write down the equation

££j _ +/(«. b+k)-f(a, b).

Dlfferea- If /» > s a continuous function of x when x lies between a Hal. and a+h and y = b+k, and if further/, is a continuous

function of y when y lies between b and d+k, there exist values of and rj which lie between o and I and have the properties expressed by the equations

f(a+h, b+k) -f(a, b+k)=hf x {a+eh, b+k), f(a, b+k) -/(a, b)=kf y (a, b+r,k). Further, f z (a+eh, b+k) and f v (a, b+ijk) tend to the limits/, (0,6) ftnd /»(<% b) when h and h tend to zero, provided the differential

coefficients/,/,, are continuous at the point (a, b). Hence in this case the above equation can be written*

f{a+h, b+k)-f(a, b)=hMa, b)+kf a (a, b)+R, where

R R

Un H-o,

In accordance with the notation of differentials this equation gives

d f = Tx dx + % d y-

Just as in the case of functions of one variable, dx and dy are arbitrary finite differences, and df is not the difference of two values of /, but is so much of this difference as need be retained for the purpose of forming differential coefficients.

The theorem of the total differential is immediately applicable to the differentiation of implicit functions. When y is a function of x which is given by an equation of the form/(, y) = 0, and it is either impossible or inconvenient to solve this equation so as to express y as an explicit function of x, the differential coefficient dy/dx can be formed without solving the equation. We have at once*

dx dx I dy' This rule was known, in all essentials, to Fermat and de Sluse before the invention of the algorithm, of the differential calculus.

An important theorem, first proved by Euler, is immediately deducible from the theorem of the total differential. If f(x, y) is a homogeneous function of degree n then

**% + y% = n K x ' y > -*

*The theorem is applicable to functions of any number of variables and is generally known as Eider's theorem of homogeneous functions. 42. Many problems in which partial differential coefficients occur are simplified by the introduction of certain determinants called " Jacobians " or " functional determinants." They were introduced into Analysis by C. G.J. Jacobi Jacoblan *- {J. f. Math., Crelle, Bd. 22, 1841, p. 319). The Jacobian of «i, Ms, . . . u,, with respect to xi, xt, . . . x n is the determinant*

du\ dut dui

*3*i dxt ' ' ' dx n*

du2 dut dui

dx\ dxi " ' ' dx,,

*3w» 3*i*

dUn

dxi ‘ ‘

3k, ‘dx n

in which the constituents of the rth row are the n partial differential coefficients of u, with respect to the n variables x. This determinant is expressed shortly by

*3(«1, «2,. . ., «.) 3(*1, Xi,. . ., Xn)’*

Jacobians possess many properties analogous to those of ordinary differential coefficients, for example, the following: —

3 («i,

d(xi, Xi,. 3(«i, ui,.

Un) s , d(Xl, Xt, . .

u„)

X

3(«1, «2,

3 (yi, y 2 ,

*■ . *») . .*

«.)■

y») _. 3(mi, ui,.

«n)

**n)’*

x n) are

■ ■ U n)

*3(yi, y%, ■ ■ ■ 1 y n) *d(xi, x 2 , . . . ,‘lx„) 3(*i, xi,*

If n functions («i, u 2 , . . . «„) of n variables (xi, x it . . . , not

independent, but are connected by a relation /(«i, ui, . = 0, then

*3(ttl, «2,. ■ ., Mn) _ 3(*1, X 2 , . . ., X n) ‘*

and, conversely, when this condition is satisfied identically the functions U\, u%, . . . , u n are not independent.

*43. Partial differential coefficients of the second and higher orders can be formed in the same way as those of the first order. For example, when there are two variables x, y, the first partial derivatives dfldx and dfjdy are functions of * and y, which we may seek to differentiate partially with respect to x or y. The most important theorem in re- lation to partial differential coefficients of orders higher than the first is the theorem that the values of such coefficients do not depend upon the order in which the differentia- tions are performed. For example, we have the equation*

dx \dyj dy \dx) yu >

This theorem is not true without limitation. The conditions for its validity have been investigated very completely by H. A. Schwarz (see his Ges. math. Abhandlungen, Bd. 2, Berlin, 1890, p. 275). It is a sufficient, though not a necessary, condition that all the differ- ential coefficients concerned should be continuous functions of x, y. In consequence of the relation (i.) the differential coefficients ex- pressed in the two members of this relation are written

3/ ay*

*3*3y or 3y3;c-*

Inter- change ot order ot differen- tiations.

OUTLINES]

The differential coefficient

INFINITESIMAL CALCULUS

547

B”f

m which /> +g+r = n, is formed by differentiating p times with respect to x, q times with respect to y, r times with respect to z, the differentiations being performed in any order. Abbreviated nota- tions are sometimes used in such forms as

Differentials of higher orders are introduced by the defining equation

(d d \ n

dx-z — -dyˆ-\ is developed by the binomial

a d

theorem in the same way as if dxj- and dy-~- were numbers, and

[dxj \dy) / is replaced by- ^^^ – When there are more than

two variables the multinomial theorem must be used instead of the binomial theorem.

The problem of forming the second and higher differential co-efficients of implicit functions can be solved at once by means of partial differential coefficients, for example, if / (3c,y) = o is the equation denning jasa function of x, we have

**2.(&.X”\ m i *L- 2 *L. *L. *L + (*£\ , 2L.*

dx \dy/ I \dy) dx* dx dy dxdyˆ\dx) dy i S The differential expression Xdx + Ydy, in which both X and Y are functions of the two variables x and y, is a total differential if there exists a function /of * and y which is such that*

a//a = x, a//ay = Y.*

When this is the case we have the relation

dYjdx = dX!dy. (ii.)

Conversely, when this equation is satisfied there exists a function / which is such that

df = Xdx + Ydy. The expression XAt-f-YJy in which X and Y are connected by the relation (ii.) is often described as a ” perfect differential.” The theory of the perfect differential can be extended to functions of n variables, and in this case there are Jn(»-i) such relations as (ii.).

In the case of a function of two variables x, y an abbreviated notation is often adopted for differential coefficients. The function being denoted by z, we write

, , dz dz d 2 z SPz d 2 z

p, Q, r, S, I lor r> r— > t=> , ,) -r— ,. r * dx dy dx' dxdy dy 1

Partial differential coefficients of the second order are important in geometry as expressing the curvature of surfaces. When a surface is given by an equation of the formz=/(x, y), the lines of curvature are determined by the equation \(l+q 2)s-pqt\ (d y y+\(l+q*)r-(l +p*)t}dxdy

-{{i+p*)s-pqr}(dxy = o, and the principal radii of curvature are the values of R which satisfy the equation W(rt-s*) -R{ (i q*)r-2pqs(l +P"W (i +ˆ+8 2)

+ U+P 2 +q 2) 2 = 0. 44. The problem of change of variables was first considered by Brook Taylor in his Methodus incrementorum. In the case con- Chantt of s *dered by Taylor y is expressed as a function of z, and z variables as a f unct ' on °f x < ano " lt ls desired to express the differ- ential coefficients of y with respect to x without eliminating z. The result can be obtained at once by the rules for differentiating a product and a function of a function. We have dy dy dz_ dx dz dx'

d?y_ _ dy dh_ ,djy_ (dz\ 2 dx*~dz'dx* + dz?' \dx) ' dˆy_dy d 3 z , cPv dz_ dH.dQ (dz\ 3 dx' ~dz'd~P i dz 2 ' dx ' dx 2 dz i ' \d~x) '

The introduction of partial differential coefficients enables us to deal with more general cases of change of variables than that con- sidered above. If u, v are new variables, and x, y are connected with them by equations of the type

x=fi(u, v), y=Mu, v), (i.)

while y is either an explicit or an implicit function of x, we have the problem of expressing the differential coefficients of various orders of y with respect to x in terms of the differential coefficients of v with respect to u. We have

by the rule of the total differential. In the same way, by means of differentials of higher orders, we may express d 2 y/dx 2 , and so on.

Equations such as (i.) may be interpreted as effecting & transfor- mation by which a point (w, vj is made to correspond to a point (x, y). The whole theory of transformations, and of functions, or differential expressions, which remain invariant under groups of transformaˆ tions, has been studied exhaustively by Sophus Lie (see, in particular, his Theorie der Transformdtionsgruppen, Leipzig, 1888-1893). (See also Differential Equations and Groups).

A more general problem of change of variables is presented when it is desired to express the partial differential coefficients of a function V with respect to x, y, . . . in terms of those with respect to u,v, . . ., where u, v, . . . are connected with x, y, . . .by any functional relations. WHen there are two variables x, y, and u, v are given functions of x, y, we have

SVˆSVdu , aVcto ; dx du dx dv dx

dy

dVdu,dVdv t du dy dv dy

and the differential coefficients of higher orders are to be formed by repeated applications of the rule for differentiating a product and the rules of the type 1

d _du d , 5» 9

dx dxdu dxdv When x, y are given functions of «, v, . . . we have, instead of the above, such equations as

av = ava£ , avay.

du dx du dy du' and dVldx, dVjdy can be found by solving these equations, pro- vided the Jacobian d{x, y)ld(u, v) is not zero. The generalization of this method for the case of more than two variables need not detain us.

In cases like that here considered it is sometimes more convenient not to regard the equations connecting x, y with u, v as effecting a point transformation, but to consider the loci « = const., u = const. as two " families " of curves. Then in any region of the plane of (x, y) in which the Jacobian d(x, y)/d{u,v) does not vanish or become infinite, any point {x, y) is uniquely determined by the values of « and v which belong to the curves of the two families that pass through the point. Such variables as u, v are then described as "(curvilinear coordinates " of the point. This method is applicable to any number

of variables. When the loci «= const intersect each other at

right angles, the variables are " orthogonal " curvilinear coordinates. Three-dimensional systems of such coordinates have important applications in mathematical physics. Reference may be made to G. Lam6, Lecons sur les coordonni.es curvilignes (Paris, 1 859) , and to

G. Darboux, Lecons sur les coordonnees curvilignes et systimes orthogonaux (Paris, 1898).

When such a coordinate as u is connected with x and y by a functional relation of the form j{x,y,u) =0 the curves « = const, are a family of curves, and this family may be such that no two curves of the family have a common point. When this is not the case the points in which a curve f(x, y,u) =0 is intersected by a curve f(x,y,u+ Am) =0 tend to limiting positions as Am is diminished indefinitely. The locus of these limiting positions is the " envelope " of the family, and in general it touches all the curves of the family. It is easy to see that, if u,v are the parameters of two families of curves which have envelopes, the Jacobian d(x, y)/d(«,i>) vanishes at all points on these envelopes. _ It is easy to see also that at any point wheie the reciprocal Jacobian d(u;v)/d(x, y) vanishes, a curve of the family u touches a curve of the family v.

If three variables x, y, z are connected by a functional relation f(x, y, z) =0, one of them, z say, may be regarded as an implicit function of the other two, and the partial differential coefficients of z with respect to x and y can be formed by the rule of the total differ- ential. We have

dx dx/ dz' dy dyj dz' and there is no difficulty in proceeding to express the higher differ- ential coefficients. There arises the problem of expressing the partial differential coefficients of x with respect to y and z in terms of those of z with respect to x and y. The problem is known as that of " changing the dependent variable." It is solved by applying the rule of the total differential. Similar considerations are applicable to all cases in which n variables are connected by fewer than n equations.

45. Taylor's theorem can be extended to functions of several variables. In the case of two variables the general for- Extension mula, with a remainder after n terms, can be written / Taylor's most simply in the form theorem.

*f(a+h, b+k) =/(o, b)+df(a, b) + ±d*f(a, b)+ . .*

*41= l%i+ *k»!L\ I (tt+ttiL) dx Kduˆdvdu// \duˆdvdu)*

in which

*+ (ˆ~77! d "~ , /(°. b) + »f(a+0h,b+0k), d-/(a,6)=[(+ *|)7(x,,)]_ |*

*»-**

and

Wa+ek, b+6k) = [(h~+k§-ˆ “f(x, y)] ˆ

Plane curves.

The last expression is the remainder after n terms, and in it 9 denotes some particular number between o and I. The results for three or more variables can be written in the same form. The extension of Taylor’s theorem was given by Lagrange (1797); the form written above is due to Cauchy (1823). For the validity of the theorem in this form it is necessary that all the differential coefficients up to the nth should be continuous in a region bounded by x = aˆk, y = b=*k. When all the differential coefficients, no matter how high the order, are continuous in such a region, the theorem leads to an expansion of the function in a multiple power series. Such expansions are just as important in analysis, geometry ˆind mechanics as expansions of functions of one variable. Among the problems which are solved by means of such expansions are the problem of maxima and minima for functions of more than one variable (see Maxima and Minima).

46. In treatises on the differential calculus much space is usually

devoted to the differential geometry of curves and

surfaces. A few remarks and results relating to the

differential geometry of plane curves are set down here.

(i.) If 4 1 denotes the angle which the radius vector drawn from

the origin makes with the tangent to a curve at a point whose polar

coordinates are r, 6 and if p denotes the perpendicular from the

origin to the tangent, then

cos \j/ = dr/ds, sin ip = rd8lds = pjr, where ds denotes the element of arc. The curve may be determined by an equation connecting p with r.

(ii.) The locus of the foot of the perpendicular let fall from the origin upon the tangent to a curve at a point is called the pedal of the curve with respect to the origin. The angle 4> for the pedal is the same as the angle ˆ for the curve. Hence the (p, r) equation of the pedal can be deduced. If the pedal is regarded as the primary curve, the curve of which it is the pedal is the " negative pedal " of the primary. We may have pedals of pedals and so on, also negative pedals of negative pedals and so on. Negative pedals are usually determined as envelopes.

(iii.) If denotes the angle which the tangent at any point makes with a fixed line, we have

(iv.) The " average curvature " of the arc As of a curve between two points is measured by the quotient

(As I

where the upright lines denote, as usual, that the absolute value of the included expression is to be taken, and f is the angle which the tangent makes with a fixed line, so that Atj> is the angle between the tangents (or normals) at the points. As one of the points moves up to coincidence with the other this average curvature tends to a limit which is the " curvature " of the curve at the point. It is denoted

by

\d±

\ds

Sometimes the upright lines are omitted and a rule of signs is given : — Let the arc s of the curve be measured from some point along the curve in a chosen sense, and let the normal be drawn towards that side to which the curve is concave; if the normal is directed towards the left of an observer looking along the tangent in the chosen sense of description the curvature is reckoned positive, in the contrary case negative. The differential d is often called the " angle of contingence." In the 14th century the size of the angle between a curve and its tangent seems to have been seriously debated, and the name " angle of contingence " was then given to the supposed angle.

(v.) The curvature of a curve at a point is the same as that of a certain circle which touches the curve at the point, and the "radius

of curvature" p is the radius of this circle. We have – =-fi

p \ds

The centre of the circle is called the " centre of curvature "; it is the limiting position of the point of intersection of the normal at the point and the normal at a neighbouring point, when the second point moves up to coincidence with the first. If a circle is described to intersect the curve at the point P and at two other points, and one of these two points is moved up to coincidence with P, the circle touches the curve at the point P and meets it in another point ; the centre of the circle is then on the normal. As the third point now moves up to coincidence with P, the centre of the circle moves to the centre of curvature. The circle is then said to " osculate " the curve, or to have " contact of the second order " with it at P.

(vi.) The following are formulae for the radius of curvature

1 '. +

then, as Q moves up to coincidence with P, the distance from P to the point of intersection of the normals at P and Q becomes greater than any distance that can be assigned. The equation which gives the abscissae of the points in which a straight line meets the curve being expressed in the form /(x) =0, the function /(*) has a factor {x— xo) 3 , where xo is the abscissa of the point of inflection P, and the line is the tangent at P. When the factor (x—xa) occurs (n + i) times in/(x), the curve is said to have " contact of the rath order " with the line. There is an obvious modification when the line is parallel to the axis of y.

(viii.) The locus of the centres of curvature, or envelope of the normals, of a curve is called the " evolute." A curve which has a given curve as evolute is called an " involute " of the given curve. All the involutes are " parallel " curves, that is to say, they are such that one is derived from another by marking off a constant distance along the normal. The involutes are " orthogonal trajectories " of the tangents to the common evolute.

(ix.) The equation of an algebraic curve of the rath degree can be expressed in the form ao+«i + «j+... +k«=o, where « is a constant, and u, is a homogeneous rational integral function of x, y of the rth degree. When the origin is on the curve, tto vanishes, and #1=0 represents the tangent at the origin. If U\ also vanishes, the origin is a double point and u% = o represents the tangents at the origin. If ut has distinct factors, or is of the form a(y— pix){y — ptx); the value of y on either branch of the curve can be expressed (for points

sufficiently near the origin) in a power series, which is either

pix+\q i x i + . . . , or p 2 x+iq 2 x i + . . ., where qi, . . . and qt, . . . are determined without ambiguity. If pi and pi are real the two branches have radii of curvature pi, pj determined by the formulae

)" ? Si|, ^-|d+#i ,)" , 9.|

When pi and fa are imaginary the origin is the real point of intersection of two imaginary branches. In the real figure of the curve it is an isolated point. If « 2 is a square, a(y—px) % , the origin is a cusp, and in general there is not a series for y in integral powers of x, which is valid in the neighbourhood of the origin. The further investigation of cusps and multiple points belongs rather to analytical geometry and the theory of algebraic functions than to differential calculus.

(x.) When the equation of a curve is given in the form «o+«i + • • . +«n-i+Mn = o where the notation is the same as that in (ix.), the factors of #„ determine the directions of the asymptotes. If these factors are all real and distinct, there is an asymptote corresponding to each factor. If «„ = LiL 2 . . . L„, where Li, ... are linear in x, y, we may resolve u n -ilu„ into partial fractions according to the formula

(dyyi-idhA \dx) \ dx*\

Jr\ I . , (Pp

p=r rp\ = \f+d4?

(vii.) The points at which the curvature vanishes are " points of inflection." If P is a point of inflection and Q a neighbouring point,

± = P+ Pl

m„_i _Ai . A-2 .

U n Li Li

, An

■ + TZ'

and then L^Ai =0, L 2 +A2 = o, ... are the equations of the asymptotes. When a real factor of u n is repeated we may have two parallel asymptotes or we may have a " parabolic asymptote." Sometimes the

parallel asymptotes coincide, as in the curve x"^+y 2 — a 2) =a 4 , where x = o is the only real asymptote. The whole theory of asymptotes belongs properly to analytical geometry and the theory of algebraic functions.

47. The formal definition of an integral, the theorem of the existence of the integral for certain classes of functions, a list of classes of " integrable " functions, extensions of the notion integral of integration to functions which become infinite or in- calculus. determinate, and to cases in which the limits of integra- tion become infinite, the definitions of multiple integrals, and the possibility of defining functions by means of definite integrals — all these matters have been considered in Function. The definition of integration has been explained in § 5 above, and the results of some of the simplest integrations have been given in § 12. A few theorems relating to integrations have been noted in §§ 34, 35, 36 above.

48. The chief methods for the evaluation of indefinite m e t Boa – s „f integrals are the method of integration by parts, and the integration. introduction of new variables.

From the equation d(uv) =udv-fvdu we deduce the equation

/u^-dx=uv — (v-j- dx, dx J dx

or, as it may be written

I uwdx = u (wdx — j 7 j I wdx f dx.

This is the rule of " integration by parts." As an example we have

I xe" x dx=x I — dx— (— — 5) 1

J a J a \a a 2 /

When we introduce a new variable 2 in place of x, by means of an equation giving x in terms of z, we express f(x) in terms ol a. Let 4>(z) denote the function of z into which f(x) is transformed. Then from the equation

dx = -j-dz dz

OUTLINES]

we deduce the equation

INFINITESIMAL CALCULUS

fnx)dx-faz)$£dz.

Integra- tion to terms of element' ary func- tions.

As an example, in the integral

/V(i-* 2)<2x put x = sin z; the integral becomes

/cos z. cos zdz = j 5(1 +cos 2z)dz = j(s+§ sin 2z) = ^(z-f-sin z cos z). 49. The indefinite integrals of certain classes of functions can be expressed by means of a finite number of operations of addition or multiplication in terms of the so-called " elementary " functions. The elementary functions are rational alge- braic functions, implicit algebraic functions, exponentials and logarithms, trigonometrical and inverse circular functions. The following are among the classes of functions whose integrals involve the elementary functions only: (i.) all rational functions; (ii.) all irrational functions of the form / (x, y), where / denotes a rational algebraic function of x and y, and y is connected with x by an algebraic equation of the second degree; (hi.) all rational functions of sin x and cos x; (iv.) all rational functions of e x \ (v.) all rational integral functions of the variables x, e"', e 1 ", . . . sin mx, cos mx, sin nx, cos nx, ... in which a, b, . . . and m, n, . . . are any constants. The integration of a rational function is generally effected by resolving the function into partial fractions, the function being first expressed as the quotient of two rational integral functions. Corresponding to any simple root of the denominator there is a logarithmic term in the integral. If any of the roots of the denominator are repeated there are rational algebraic terms in the integral. The operation of re- solving a fraction into partial fractions requires a knowledge of the roots of the denominator, but the algebraic part of the integral can always be found without obtaining all the roots of the denominator. Reference may be made to C. Her'mite, Cours d'analyse, Paris, 1873. The integration of other functions, which can be integrated in terms of the elementary functions, can usually be effected by transforming the functions into rational functions, 'possibly after preliminary integrations by parts. In the case of rational functions of x and a radical of the form V (ax 2 +bx--c) the radical can be reduced by a linear substitution to one of the forms V (a 2 — x 2), V(x 2 — a 2), V (x 2 -|-a 2). The substitutions x — a sin 0, x — a sec 0, x = a tan 9 are then effective in the three cases. By these substitutions the subject of integration becomes a rational function of sin 8 and cos 0, and it can be reduced to a rational function of t by the substitution

Ian \f) = t. There are many other substitutions by which such integrals can be determined. Sometimes we may have information as to the functional character of the integral without being able to determine it. For example, when the subject of integration is of the form (ax 4 +6× 3 -|-cx 2 -f dx+e)~l the integral cannot be expressed explicitly in terms of elementary functions. Such integrals lead to new functions (see Function).

Methods of reduction and substitution for the evaluation of in- definite integrals occupy a considerable space in text-books of the integral calculus. In regard to the functional character of the integral reference may be made to G. H. Hardy's tract, The In- tegration of Functions of a Single Variable (Cambridge, 1905), and to the memoirs there quoted. A few results are added here (i.) f(x+a)-hdx = \og\x + (x*+a)l}.*

/dx r~_>ˆ 1 t,,~zj-ˆh—L.r\ can k e evaluated by the substitution*

{x—p)yj {ax—-2bx--c) x-p = l!z, andj , x _ p) »ˆ< ax ? +2bx+c)

entiating (11 — 1) times with respect to p. (Hx+K)

can be deduced by differ-

iiL) J(

can be reduced by the sub-

(ox 2 +2|3x+7)V (ax 2 +2bx+c) stitution y i = (ax 2 +2bx+c)! (ax 2 20x~r) to the form

•J V(Xi~>'V Jv(y 2 –

x 2)

where A and B are constants, and Xi and X 2 are the two values of X for which (a — \a)x-+2(b — \0)x+c — \y is a perfect square (see A. G. Greenhill, A Chapter in the Integral Calculus, London, 1888). (iv.) jx m {ax' lJ -V)'>dx, in which m, n, p are rational, can be reduced, by putting ax" = bt, to depend upon ff(.i+t)"dt. If p is an integer and q a fraction r!s, we put t = u. If q is an integer and p = r/s we put i--t = u s . If p+q is an integer and p = r/s we put i+t = tu\ These integrals, called " binomial integrals," were investigated by Newton (De quadratura curvarum).*

(v.) (ˆ— = log tan, (vi.) (— — =log (tan x+sec x). v ' J sin x s 2 x

‘ J cos x ”

(vii.) /e”sin (f>x + a)dx = (a 2 +6 2)- I e aI [asin ‘(bx + a) — bcos(bx + a).

(viii.) / sin m x cos” x dx can be reduced by differentiating a function

of the form sin p x cos« x ;

d_ sin x _ 1 , q sin 2 x _ 1 — q . q

e ‘ S ‘ dxcos x~ cos« _1 x cos’~cos«“‘i; cos”‘*

Hence

C dx _ cos” x (re — 1) cos

>s”~ l x n — 1 J c

dx

(ix.) P’ 7 sin 2 «xrfx= p”cos«fa:= ‘ ‘ 3 ‘ ‘ ‘ (2W-l) ■* (nan integer).*

Jo Jo 2.4...2W 2 X s ‘

(x.) I “‘sin 2n+1 xdx= (cos^xdx = — 2-4--- 2 w / n&n integer).

Jo Jo 2 c I^-L-tI s ‘

1 ■ \ C dx

(xi.) I 7 — ; rz

J (i+ecosx)”

~3-5---(2re + i) n ; can be reduced by one of the substitutions

„„o jl «+cos x , e+cos x

cos = — : , cosh u = — ■ ,

I +e cos x i--e cos x

of which the first or the second is to be employed according as

e < or > 1 .

50. Among the integrals of transcendental functions Newtrans-

which lead to new transcendental functions we may notice ceadents.

■*log .*

/x , Wog X z

logx°° r J _ K 2

called the " logarithmic integral," and denoted by " Li x," also the integrals

/ sin x x

dx and

called the " sine integral " and the " cosine integral," and denoted by " Si x " and " Ci x," also the integral

y

dx

called the " error-function integral," and denoted by " Erf x." All these f unctions havebeen tabulated (seeTABLEs, Mathematical). 51. New functions can be introduced also by means of the definite integrals of functions of two or more variables with re- £ / er / an spect to one of the variables, the limits of integration integrals. being fixed. Prominent among such functions are the Beta and Gamma functions expressed by the equations

B(l, m) = Cx'-Hi xpˆx,

T(n) = (er'r-M J

Hi.

When n is a positive integer T(n + i) = n ! . The Beta function (or " Eulerian integral of the first kind ") is expressible in terms of Gamma functions (or " Eulerian integrals of the second kind ") by the formula

B(l, m) .T{l + m) = T{l) .T{m).

The Gamma function satisfies the difference equation

r(x+i)=xr(x),

and also the equation

r(x).r(l — x) =71-/ sin (xx), with the particular result

r(i)=Vir. The number

-logrci+.or-r'Ci),

is called " Euler's constant," and is equal to the limit lim.,,, 00 [(i + i-H + .—+^) -logn];

its value to 15 decimal places is 0-577 2I 5 664 901 532. The function log r(i+x) can be expanded in the series

*iogr(i+x) = jiog(a ^L-)-liogf±|+|i+r'(i)}**

-KS 3 -i) 3 -j(S 5 i)*«...,*

where

1 , 1

S2r.fi — I f;

>2r+l ~T j 2r

:+•

and the series for log r(i +x) converges when x lies between — I and I.

52. Definite integrals can sometimes be evaluated when the limits of integration are some particular numbers, although the corresponding indefinite integrals cannot be found. Definite For example, we have the result Integrals.

((i — x 2)""J logx

although the indefinite integral of (1 — x 2)"5 log x cannot be found. Numbers of definite integrals are expressible in terms of the trans- cendental functions mentioned in § 50 or in terms of Gamma functions. For the calculation of definite integrals we have the following methods : —

(i.) Differentiation with respect to a parameter.

(ii.) Integration with respect to a parameter.

(iii.) Expansion in infinite series and integration term by term.

(iv.) Contour integration.

The first three methods involve an interchange of the order of two limiting operations, and they are valid only when the functions satisfy certain conditions of continuity, or, in case the limits of

integration arc infinite, when the functions tend to zero at infinite distances in a sufficiently high order (see Function). The method of contour integration involves the introduction of complex variables (see Function : § Complex Variables). A few results are added

dx-

*(ii.)/”^*

Jo I –

-^— , (i>o>o), 5inu?r v ”

dx = Tr(,cotaw — cotbw), (o

/■■■ \ C x”~ l log x , 7T 2

(in.) I a_(f = -^-3 — , (a>l),*

(iv.) (x 2 .cos 2x.e~ l2 d.v- = — jC -1 Vjt, ./ o

, \ f 1 1 — x 2 ax , T

\y-)\ — ; — ii =logtan7T,

(vii.) (log(l — 2acosx-)-a 2)a\x = oor27rlogaaccordingasa I,

*(viii.)f°5!!l**

J A.”

cos ax— cos 6x

dx = ˆjt(6 — a),

cos ax— cos bx

dx = \og-,

— dx = \ogm,

(x.) C

J

(xi.) r

J o (xii.) f ”

J

r”

*(xiii.) I e-‘-ˆˆAr = V *■ . e” 2 ,*

x~= sin xdx = | x~ cos xdx = V (§t) . o -ˆ o*

53. The meaning of integration of a function of n variables through a domain of the same number of dimensions is explained in the article Function. In the case of two variables x, y we Multiple integrate a function f(x,y) over an area ; in the case of Integrals. triree variables x, y, z we integrate a function /(x, y, z) through a volume. The integral of a function /(x, y) over an area in the plane of (x, y) is denoted by

Jff(x, y)dxdy. The notation refers to a method of evaluating the integral. We may suppose the area divided into a very large number of very small rectangles by lines parallel to the axes. Then we multiply the value of / at any point within a rectangle by the measure of the area of the rectangle, sum for all the rectangles, and pass to a limit by increasing the number of rectangles indefinitely and diminishing all their sides indefinitely. The process is usually effected by summing first for all the rectangles which lie in a strip between two lines parallel to one axis, say the axis of y, and afterwards for all the strips. This process is equivalent to integrating f(x, y) with respect to y, keeping x con- stant, and taking certain functions of x as the limits of integration for y, and then integrating the result with respect to x between constant limits. The integral

obtained in this way may be written in such a form as

>iO'^S'*

Line Integrals.

/(«

and is called a " repeated integral." The identification of a surface integral, such as fff(x, y)dxdy, with a repeated integral cannot always be made, but implies that the function satisfies certain conditions of continuity. In the same way volume integrals are usually evaluated by regarding them as repeated integrals, and a volume integral is written in the form

ffff(x, y, z)dxdydz. Integrals such as surface and volume integrals are usually called " multiple integrals." Thus we have " double " integrals, " triple " integrals, and so on. In contradistinction to multiple integrals the ordinary integral of a function of one variable with respect to that variable is called a " simple integral.

A more general type of surface integral may be defined by taking an arbitrary surface, with or without an edge. We suppose in the . first place that the surface is closed, or has no edge. We

u ace mav mar j c a l ar g e number of points on the surface, and n egra s. ^ Taw t h e tangent planes at all these points. These tangent planes form a polyhedron having a large number of faces, one to each marked point; and we may choose the marked points so that all the linear dimensions of any face are less than some

arbitrarily chosen length. We may devise a rule for increasing the number of marked points indefinitely and decreasing the lengths of all the edges of the polyhedra indefinitely. If the sum of the areas of the faces tends to a limit, this limit is the area of the surface. If we multiply the value of a function /at a point of the surface by the measure of the area of the corresponding face of the polyhedron, sum for all the faces, and pass to a limit as before, the result is a surface integral, and is written

ssm-

The extension to the case of an open surface bounded by an edge presents no difficulty. A line integral taken along a curve is defined in a similar way, and is written

ffds

where ds is the element of arc of the curve (§ 33). The direction cosines of the tangent of a curve are dx/ds, dy/ds, dz/ds, and line integrals usually present themselves in the form

u ds^ v ds^~ w ds) ds or S > (- w d xJ r l 'dy + u > dz). In like manner surface integrals usually present themselves in the form

_ Jfte + mv + nftdS where /, m, n are the direction cosines of the normal to the surface drawn in a specified sense.

The area of a bounded portion of the plane of (x, y) may be expressed either as

lf(xdy-ydx), or as

ffdxdy, the former integral being a line integral taken round the boundary of the portion, and the latter a surface integral taken over the area within this boundary. In forming the line integral the boundary is supposed to be described in the positive sense, so that the included area is on the left hand.

53a. We have two theorems of transformation connect- Theorems ing volume integrals with surface integrals and surface of Qreen integrals with line integrals. The first theorem, called and " Green's theorem," is expressed by the equation Stokes.

fJS (i + 8 + 8) ^3 = //(« + «i + »f)*

where the volume integral on the left is taken through the volume within a closed surface S, and the surface integral on the right is taken over S, and /, m, n denote the direction cosines of the normal to S drawn outwards. There is a corresponding theorem for a closed curve in two dimensions, viz.,

//ei + g)r'/(7©

the sense of description of s being the positive sense. This theorem is a particular case of a more general theorem called " Stokes's theorem." Let .s denote the edge of an open surface S, and let S be covered with a network of curves so that the meshes of the network are nearly plane, then we can choose a sense of description of the edge of any mesh, and a corresponding sense for the normal to S at any point within the mesh, so that these senses are related like the directions of rotation and translation in a right-handed screw. This

convention fixes the sense of the normal (I, m, n) at any point on S when the sense of description of s is chosen. If the axes of x, y, 2 are a right-handed system, we have Stokes's theorem in the form

;ˆ« -//i •&-%) fe

where the integral on the left is taken round the curve s in the chosen sense. When the axes are left-handed, we may either reverse the sense of I, m, n and maintain the formula, or retain the sense of I, m, n and change the sign of the right-hand member of the equation. For the validity of the theorems of Green and Stokes it is in general necessary that the functions involved should satisfy certain conditions of continuity. For example, in Green's theorem the differential coefficients d£/dx, dy/dy, df/dz must be continuous within S. Further, there are restrictions upon the nature of the curves or surfaces involved. For example, Green's theorem, as here stated, applies only to simply-connected regions of space. The correction for multiply-connected regions is important in several physical theories.

54. The process of changing the variables in a multiple integral, such as a surface or volume integral, is divisible into two stages. "Tt is necessary in the first place to determine the differential element expressed by the product of the differentials of the " a "# e of first set of variables in terms of the differentials of the J arlaoles second set of variables. It is necessary in the second place fj a ... to determine the limits of integration which must be em- , " t . ployed when the integral in terms of the new variables is " egra ' evaluated as a repeated integral. The first part of the problem is solved at once by the introduction of the Jacobian. If the variables of one set are denoted by x x 2 , . . ., x,,, and those of the other set by «i, Ui u,,, we have the relation

dx\dx%. . .dx,, =

d(xi,x 2 ,

,-%•,,)

d(u u u 2 ,. . . ,«,,)

diiidih. . .dun.

14

OUTLINES]

INFINITESIMAL CALCULUS

55i

In regard to the second stage of the process the limits of integration must be determined by the rule that the integration with respect to the second set of variables is to be taken through the same domain as the integration with respect to the first set.

For example, when we have to integrate a function f{x, y) over the area within a circle given by x 2 +y' = a 2 , and we introduce polar coordinates so that x = r cos 9, y = r sin 9, we find that r is the value of the Jacobian, and that all points within or on the circle are given by aˆrˆO, 2k>9ˆ o, and we have

(" dx (ˆ ˆ~ X2 \f(x,y)dy = | "drf "f(rcos$,rsm9)rd8.

J -a J -> \a2-x2) JO J

If we have to integrate over the area of a rectangle a ˆx 5s o, bˆyˆo, and we transform to polar coordinates, the integral becomes the sum of two integrals, as follows: —

f"

C Aa C b coscc 9 . , ˆ . _ T*

+ | d3 f (r cosfl, r sin 8)rdr.

J tan-iS/a J

55. A few additional results in relation to line integrals and multiple integrals are set down here.

(i.) Any simple integral Gan be regarded as a line-integral taken ,. along a portion of the axis of x. When a change of

. ' , variables is made, the limits of integration with respect rf" to the new variable must be such that the domain of "mm integration is the same as before. This condition may

Ittl rec l u ' re the replacing of the original integral by the sum " 5™ S ' °ˆ two or more simple integrals.

(ii.) The line integral of a perfect differential of a one-valued function, taken along any closed curve, is zero.

(iii.) The area within any plane closed curve can be expressed by either of the formulae

fir'dd or flpds, where r, 9 are polar coordinates, and p is the

perpendicular drawn from a fixed point to the tangent. The integrals are to he under- stood as line integrals taken along the curve. When the same integrals are taken between limits which correspond to two points of the curve, in the sense of line integrals along the arc between the points, they represent the area bounded by the arc and the terminal radii vectores.

*(iv.) The volume enclosed by a surface which is generated by the revolution of a curve about the axis of * is expressed by the formula*

nfy 2 dx, and the area of the surface is expressed by the formula

2-irfyds, where ds is the differential element of arc of the curve. When the former integral is taken between assigned limits it represents the volume contained between the surface and two planes which cut the axis of x at right angles. The latter integral is to be understood as a line integral taken along the curve, and it represents the area of the portion of the curved surface which is contained between two planes at right angles to the axis of x.

(v.) When we use curvilinear coordinates £, t\ which are conjugate functions of x, y, that is to say are such that

d^ldx = di)jdy and d£ldy = -drildx, the Jacobian 3(£, r\)ld(x, y) can be expressed in the form

(1)”+©’

2 dx,

functions of two parameters u, v, the area is expressed by the formula

f fR dCy, s))» {, d(z,x) \ 2 J J Lld(u,v)] + ld(u,v)] +

(d(x, y) I’ll. ,

When the surface is referred to three-dimensional polar coordinates r, 8, tj> given by the equations

x — r sin 8 cos <£, y=r sin 8 sin 4>, z = r cos 9, and the equation of the surface is of the form r =/(0,) , the area is expressed by the formula

The surface integral of a function of (9,) over the surface of a sphere r — const, can be expressed in the form

and in a number of equivalent forms. The area of any portion of the plane is represented by the double integral

where J denotes the above Jacobian, and the integration is taken through a suitable domain. When the boundary consists of portions of curves for which | =const., or r\ =const., the above is generally the simplest way of evaluating it.

(vi.) The problem of " rectifying " a plane curve, or finding its length, is solved by evaluating the integral

or, in polar coordinates, by evaluating the integral

In both cases the integrals are line integrals taken along the curve.

(vii.) When we use curvilinear coordinates {, 17 as in (v.) above, the length of any portion of a curve £ = const, is given by the integral

H-ldr,

taken between appropriate limits for 17. There is a similar formula for the arc of a curve tj = const.

(viii.) The area of a surface z=f(x, y) can be expressed by the formula

*/J>'(!)T^*

/>/;

F(0,

In every case the domain of integration must be chosen so as to include the whole surface.

(ix.) In three-dimensional polar coordinates the Jacobian d(x, y, z) ,
•

The volume integral of a function F (r, 9, (p) through the volume of a sphere r = a is

(a dr f 2 "dC w F(r, 8,)r 2 sin 0d8.

(x.) Integrations of rational functions through the volume of an ellipsoid x 2 /a 2 +y 2 /b 2 +z l /c 2 = i are often effected by means of a general theorem due to Lejeune Dirichlet (1839), which is as follows: when the domain of integration is that given by the

inequality

© ©'•- + ©)-*'■ where the o's and a's are positive, the value of the integral*

*//■■■ *i» 1-1 . Xi'-i' 1 . . . dxidxi . . .*

0102 .

r(S r (a-

:t(i+5!ˆ...)

\ aj a 2 /

by} When the coordinates of the points of a surface are expressed as

If, however, the object aimed at is an integration through the volume of an ellipsoid it is simpler to reduce the domain of integration to that within a sphere of radius unity by the transformation x = a£, y = bri, z = c{, and then to perform the integration through the sphere by transforming to polar coordinates as in (ix).

56. Methods of approximate integration began to be devised very early. Kepler's practical measurement of the focal sectors A OBrox i. of ellipses (1609) was an approximate integration, as also "f 1 . '. was the method for the quadrature of the hyperbola given jj haul' by James Gregory in the appendix to his Exercitationes e f. geometricae (1668). In Newton's Methodus differentialis " ' (171 1) the subject was taken up systematically. Newton's te ˆ at ' "' object was to effect the approximate quadrature of a given curve by making a curve of the type

y=0o+0ix+a.23c 2 + . . . +a« n pass through the vertices of (71 + 1) equidistant ordinates of the given curve, and by taking the area of the new curve so determined as an approximation to the area of the given curve. In 1743 Thomas Simpson in his Mathematical Dissertations published a very con- venient rule, obtained by taking the vertices of three consecutive equidistant ordinates to be points on the same parabola. The distance between the extreme ordinates corresponding to the abscissae x = a and x = 6 is divided into 2» equal segments by ordinates yi, ys, ■ . -Vin-i, and the extreme ordinates are denoted by yo, yzn- The vertices of the ordinates y , J"i, y% lie on a parabola with its axis parallel to the axis of y, so do the vertices of the ordinates yi, y 3 , yt, and so on. The area is expressed approximately by the formula*

{(b-a)/6n}[yo+yz„+2(y2+yi+ . . . +y 2n -2)+4(j'i+3'3+ • • • +yin-i)], which is known as Simpson's rule. Since all simple integrals can be represented as areas such rules are applicable to approximate in- tegration in general. For the recent developments reference may be made to the article by A. Voss in Ency. d. Math. Wiss., Bd. II., A. 2 (1899), and to a monograph by B. P. Moors, Valeur approximative d'une integrate definie (Paris, 1905).

Many instruments have been devised for registering mechanically the

areas of closed curves and the values of integrals. The best known are perhaps the " planimeter " of J. Amsler (1854) and the " integraph " of Abdank-Abakanowicz (1882).

Bibliography. — For historical questions relating to the subject th chief authority is M. Cantor, Geschichte d. Mathematik (3 Bde., Leipzig, 1894-1901). For particular matters, or special periods, the following may be mentioned: H. G. Zeuthen, Geschichte d. Math, im Altertum u. Miltelalter (Copenhagen, 1896) and Gesch. d. Math. im XVI. u. XVII. Jahrhundert (Leipzig, 1903); S. Horsley, Isaaci Newtoni opera quae exstant omnia (5 vols., London, 1779-1785); C. I. Gerhardt, Leibnizens math. Schriften (7 Bde., Leipzig, 1849-1863) ; Joh. Bernoulli, Opera omnia (4 Bde., Lausanne and Geneva, 1742). Other writings of importance in the history of the subject

are cited in the course of the article. A list of some of the more important treatises on the differential and integral calculus is appended. The list has no pretensions to completeness ; in particular, most of the recent books in which the subject is presented in an elementary way for beginners or engineers are omitted.ˆL. Euler, Institutiones calculi differ -entialis (Petrop., 1755) and Institutiones calculi integralis (3 Bde., Petrop., 1768-1770); J. L. Lagrange, Lecons sur le calcul des fonctions (Paris, 1806, CEuvres, t. x.), and, Theorie des fonctions analyliques (Paris, 1797, 2nded., 1813, CEuvres, t. ix.) ; S. P. Lacroix, Traite de calcul diff. et de calcul int. (3 tt., Paris, 1808-1819). There have been numerous later editions; a translation by Herschel, Peacock and Babbage of an abbreviated edition of Lacroix's treatise was published at Cambridge in 1816. G. Peacock, Examples of the Differential and Integral Calculus (Cambridge, 1820); A. L. Cauchy, Resume des lecons . . . sur le calcul infinitesimale (Paris, 1823), and Lecons sur le calcul differentiel (Paris, 1829; CEuvres, ser. 2, t. iv.) ; F. Minding, Handbuchd. Diff.-u. Int.-Rechnung (Berlin, 1836); F. Moigno, Lecons sur le calcul diff. (4 tt., Paris, 1840-1861) ; A. de Morgan, Diff. and Int. Calc. (London, 1842); D. Gregory, Examples on' the Diff. and Int. Calc. (2 vols., Cambridge, 1841-1846) ; I. Todhunter, Treatise on the Diff. Calc. and Treatise on the Int. Calc. (London, 1852), numerous later editions; B. Price, Treatise on the Infinitesimal Calculus (2 vols., Oxford, 1854), numerous later editions; D. Bierens de Haan, Tables d'integrales definies (Amsterdam, 1858); M. Stegemann, Crundriss d. Diff.- u. Int.-

Rechnung (2 Bde., Hanover, 1862) numerous later editions; J. Bertrand, Traite de calc. diff. et int. (2 tt., Paris, 1864-1870); J. A. Serret, Cours de calc. diff. et int. (2 tt., Paris, 1868, 2nd ed., 1880, German edition by Harnack, Leipzig, 1884-1886, later German editions by Bohlmann, 1896, and Scheffers,' 1906,1 incomplete) ; B.Williamson, Treatise on the Diff. Calc. (Dublin, 1872), and Treatise on the Int. Calc. (Dublin, 1874) numerous later editions of both; also the article " Infinitesimal Calculus " in the 9th ed. of the Ency. Brit.; C. Hermite, Cours d 'analyse (Paris, 1873); O. Schlomilch, Compendium d. hoheren Analysis (2 Bde., Leipzig, 1874) numerous later editions; J. Thomae, Einleitung in d. Theorie d. bestimmlen Integrate (Halle, 1875); R. Lipschitz, Lehrbuch d. Analysis (2 Bde., Bonn, 1877, 1880); A. Harnack, Elemente d. Diff.-u. Int.-Rechnung (Leipzig, 1882, Eng. trans, by Cathcart, London, 1891); M. Pasch, Einleitung in d. Diff.-u. Int.-Rechnung (Leipzig, 1882); Genocchi and Pcano, Calcolo differenziale (Turin, 1884, German edition by Bohlmann and Schepp, Leipzig, 1898, 1899); H. Laurent, Traite d 'analyse (7 tt., Paris, 1885-1891); J. Edwards, Elementary Treatise on the Diff. Calc. (London, 1886), several later editions; A. G. Greenhill, Diff. and Int. Calc. (London, 1886, 2nd ed., 1891); E. Picard, Traite d 'analyse (3 tt., Paris, 1891-1896); O. Stolz, Crund- zilge d. Diff.- u. Int.-Rechnung (3 Bde., Leipzig, 1893-1899); C. Jordan, Cours d'analyse (3 tt., Paris, 1893-1896); L. Kronecker, Vorlesungen ii. d. Theorie d. einfachen u. vielfachen Integrate (Leipzig, 1894); J. Perry, The Calculus for Engineers (London, 1897); H. Lamb, An Elementary Course of Infinitesimal Calculus (Cambridge, 1897) ; G. A. Gibson, An Elementary Treatise on the Calculus (London, 1901) ; E. Goursat, Cours d'analyse mathematique (2 tt., Paris, 1902- 1905) ; C.-J. de la Vallee Poussin, Cours d'analyse infinitesimale (2 tt., Louvain and Paris, 1903-1906) ; A. E. H. Love, Elements of the Diff. and Int. Calc. (Cambridge, 1909) ; W. H. Young, The Funda- mental Theorems of the Diff. Calc. (Cambridge, 1910). A resume' of the infinitesimal calculus is given in the articles "Diff.-u. Int-Rech- nung " by A. Voss, and " Bestimmte Integrale " by G. Brunei in Ency. d. math. Wiss. (Bde. ii. A. 2, and ii. A. 3, Leipzig, 1899, 1900). Many questions of principle are discussed exhaustively by E. W. Hobson, The Theory of Functions of a Real Variable (Cambridge, 1907). (A. E. H.L.)

INFINITIVE, a form of the verb, properly a noun with verbal functions, but usually taken as a mood (see Grammar). The Latin grammarians gave it the name of infinitus or infinilivus modus, i.e. indefinite, unlimited mood, as not having definite persons or numbers.

INFLEXION (from Lat. inflectere, to bend), the action of bending inwards, or turning towards oneself, or the condition of being bent or curved. In optics, the term " inflexion " was used by Newton for what is now known as " diffraction of light " (q.v.). For inflexion in geometry see Curve. Inflexion when used of the voice, in speaking or singing, indicates a change in tone, pitch or expression. In grammar (q.v.) inflexion indicates the changes which a word undergoes to bring it into correct relations with the other words with which it is used. In English grammar nouns, pronouns, adjectives (in their degrees of comparison), verbs and adverbs are inflected. Some grammarians, however, regard the inflexions of adverbs more as an actual change in word-formation.

INFLUENCE (Late Lat. influentia, from influere, to flow in),

word whose principal modern meaning is that of power, control

or action affecting others, exercised either covertly or without

visible means or direct physical agency. It is one of those numerous terms of astrology (q.v.) which have established themselves in current language. From the stars was supposed to flow an ethereal stream which affected the course of events on the earth and the fortunes and characters of men. For the law as to " undue influence " see Contract.

INFLUENZA (syn. "grip," la grippe), a term applied to an infectious febrile disorder due to a specific bacillus, characterized specially by catarrh of the respiratory passages and alimentary canal, and occurring mostly as an epidemic. The Italians in the 1 7th century ascribed it to the influence of the stars, and hence the name " influenza." The French name grippe came into use in 1743, and those of petite poste and petit courier in 1762, while general became another synonym in 1780. Apparently the scourge was common; in 1403 and 1557 the sittings of the Paris law courts had to be suspended through it, and in 1427 sermons had to be abandoned through the coughing and sneezing; in 1510 masses could not be sung. Epidemics occurred in 1580, 1676, 1703, 1732 and 1737, and their cessation was supposed to be connected with earthquakes and volcanic eruptions.

The disease is referred to in the works of the ancient physicians, and accurate descriptions of it have been given by medical writers during the last three centuries. These various accounts agree substantially in their narration of the phenomena and course of the disease, and

influenza has in all times been regarded as fulfilling all the conditions of an epidemic in its sudden invasion, and rapid and extensive spread. Among the chief epidemics were those of 1762, 1782, 1787, 1803, 1833, 1837 and 1847. It appeared in fleets at sea away from all communication with land, and to such an extent as to disable them temporarily for service. This happened in 1782 in the case of the squadron of Admiral Richard Kempenfelt (1718-1782), which had to return to England from the coast of France in consequence of influenza attacking his crews.

Like cholera and plague, influenza reappeared in the last quarter of the 19th century, after an interval of many years, in epidemic or rather pandemic form. After the year 1848, in which 7963 deaths were directly attributed to influenza in England and Wales, the disease continued prevalent until i860, with distinct but minor epidemic exacerbations in 1851, 1855 and 1858; during the next decade the mortality dropped rapidly though not steadily, and the diminution continued down to the year 1889, in which only 55 deaths were ascribed to this cause. It is not clear whether the disease ever disappears wholly, and the deaths registered in 1889 are the lowest recorded in any year since the registrar-general's returns began. Occasionally local outbreaks of illness resembling epidemic influenza have been observed during the period of abeyance, as in Norfolk in 1878 and in Yorkshire in 1887; but whether such outbreaks and the so-called " sporadic " cases are nosologically identical with epidemic influenza is open to doubt. The relation seems rather to be similar to that between Asiatic cholera and " cholera nostras." Individual cases may be indistinguishable, but as a factor in the public health the difference between sporadic and epidemic influenza is as great and unmistakable as that between the two forms of cholera. This fact, which had been forgotten by some since 1847 and never learnt by others, was brought home forcibly to all by the visitation of 1889.

According to the exhaustive report drawn up by Dr H. Franklin Parsons for the Local Government Board, the earliest appearances were observed in May 1889, and three localities are mentioned as affected at the same time, all widely separated from each other — namely, Bokhara in Central Asia, Athabasca in the north-west Territories of Canada and Greenland. About the middle of October it was reported at Tomsk in Siberia, and by the end of the month at St Petersburg. During November Russia became generally affected, and cases were noticed in Paris, Berlin, Vienna, London and Jamaica (?). In December epidemic influenza became established over the whole of Europe, along the Mediterranean, in Egypt and over a large

area in the United States. It appeared in several towns in England, beginning with Portsmouth, but did not become generally

epidemic until the commencement of the new year. In London the full onset of unmistakable influenza dated from the ist of January 1890. Everywhere it seems to have exhibited the same explosive character when once fully established. In St Petersburg, out of a government staff of 260 men, 220 were taken ill in one night, the 15th of November. During January 1890 the epidemic reached its height in London, and appeared in a large number of towns throughout the British Islands, though it was less prevalent in the north and north-west than in the south. January witnessed a great extension of the disease in Germany, Holland, Switzerland, Austria-Hungary, Italy, Spain and Portugal; but in Russia, Scandinavia and France it was already declining. The period of greatest activity in Europe was the latter half of December and the earlier half of January, with the change of the year for a central point. Other parts of the world affected in January 1890 were Cape Town, Canada, the United States generally, Algiers, Tunis, Cairo, Corsica, Sardinia, Sicily, Honolulu, Mexico, the West Indies and Montevideo. In February the provincial towns of England were most severely affected, the death-rate rising to 27-4, but in London it fell from 28-1 to 21-2, and for Europe generally the back of the

epidemic was broken. At the same time, however, it appeared in Ceylon, Penang, Japan, Hong Kong and India; also in West Africa, attacking Sierra Leone, and Gambia in the middle of the month; and finally in the west, where Newfoundland and Buenos Aires were invaded. In March influenza became widely epidemic in India, particularly in Bengal and Bombay, and made its appearance in Australia and New Zealand. In April and May it was epidemic all over Australasia, in Central America, Brazil, Peru, Arabia and Burma. During the summer and autumn it reached a number of isolated islands, such as Iceland, St Heiena, Mauritius and Reunion. Towards the close of the year it was reported from Yunnan in the interior of China, from the Shire Highlands in Central Africa, Shoa in Abyssinia, and Gilgit in Kashmir. In the course of fifteen months, beginning with its undoubted appearance in Siberia in October 1889, it had traversed the entire globe.

The localities attacked by influenza in 1889-1890 appear in no case to have suffered severely for more than a month or six weeks. Thus in Europe and North America generally the visita- tion had come to an end in the first quarter of 1890. The earliest signs of an epidemic revival on a large scale occurred in March i8gi, in the United States and the north of England. It was reported from Chicago and other large towns in the central states, whence it spread eastwards, reaching New York about the end of March. In England it began in the Yorkshire towns, particularly in Hull, and also independently in South Wales. In London influenza became epidemic for the second time about the end of April, and soon afterwards was widely distributed in England and Wales. The large towns in the north, together with London and Wales, suffered much more heavily in mortality than in the previous attack, but the south-west of England, Scotland and Ireland escaped with comparatively little sickness. The

same may be said of the European continent generally, except parts of Russia, Scandinavia and perhaps the north of Germany. This second epidemic coincided with the spring and early summer; it had subsided in London by the end of June. The experience of Sheffield is interesting. In 1890 the attack, contrary to general experience, had been undecided, lingering and mild; in 1891 it was very sudden and extremely severe, the death-rate rising to 73-4 during the month of April, and subsiding with equal rapidity. During the third quarter of the year, while Europe was free, the antipodes had their second attack, which was more severe than the first. As in England, it reversed the previous order of things, beginning in the provinces and spreading thence to the capital towns. The last quarter of the year was signalized by another recrudescence in Europe, which reached its height during the winter. All parts, including Great Britain, were severely affected. In England those parts which had borne the brunt of the epidemic in the early part of the year escaped. In fact, these two revivals may be regarded as one, temporarily interrupted by the summer quarter.

The recrudescence at the end of 1891 lasted through mid-winter, and in many places, notably in London, it only reached its height in January 1892, subsiding slowly and irregularly in February and March. Brighton suffered with exceptional severity. The continent of Europe seems to have been similarly affected. In Italy the notifications of influenza were as follow: 1891 — ■ January to October, o; November, 30; December, 6461: 1892— January, 84,543; February, 55,352; March, 28,046; April, 7962; May, 1468; June, 223. Other parts of the world affected were the West Indies, Tunis, Egypt, Sudan, Cape Town Teheran, Tongking and China. In August 1892 influenza was reported from Peru, and later in the year from various places in Europe.

A fourth recrudescence, but of a milder character, occurred in Great Britain in the spring of 1893, and a fifth in the following winter, but the year 1894 was freer from influenza than any since 1890. In 1895 another extensive epidemic took place. In 189O influenza seemed to have spent its strength, but there was an increased prevalence of the disease in 1897, which was repeated on a larger scale in 1898, and again in 1899, when 12,417 deaths were recorded in England and Wales. This was the highest death-rate since 1892. After this the death-rate declined to half that amount and remained there with the slight upward variations until 1907, in which the total death-rate was 9257. The experience of other countries has been very similar; they have all been subjected to periodical revivals of epidemic influenza at irregular intervals and of

varying intensity since its reappearance in 1889, but there has been a general though not a steady decline in its activity and potency. Its behaviour is, in short, quite in keeping with the experience of 1847-1860, though the later visitation appears to have been more violent and more fatal than the former. Its diffusion was also more rapid and probably more extensive.

The foregoing general summary may be supplemented by some further details of the incidence in Great Britain. The number of deaths directly attributed to influenza, and the death- rates per million in each year in England and Wales, are as follow: —

Death-rates

Year.

Deaths.

per million.

Year.

Deaths.

per million.

1890

4.523

157

1899

12,417

389

1891

16,686

574

1900

16,245

504

1892

15.737

534

1901

5,666

174

1893

9,669

325

1902

7.366

223

1894

6,625

220

1903

6,322

189

1895

12,880

424

1904

5.694

168

1896

3.753

122

1905

6,953

204

1897

6,088

196

1906

6,310

183

1898

10,405

33i

1907

9.257

265

It is interesting to compare these figures with the corresponding ones for the previous visitation: —

Year.

Deaths.

Death-rates | per million.

Year.

Deaths.

Death-rates per million.

1847 1848 1849 1850 1851

4,881

7.963 1,611 1,380 2,152

285

460 !

02

78 120

1852 1853 1854 1855

1.359 1,789 1,061 3.568

76

99

58

193

The two sets of figures are not strictly comparable, because, during the first period, notification of the cause of death was no£ compulsory; but it seems clear that the later wave was much the more deadly. The average annual death-rate for the nine years is 320 in the one case against 162 in the other, or as nearly as possible double. In both epidemic periods the second year was far more fatal than the first, and in both a marked revival took place in the ninth year; in both also an intermediate recrudescence occurred, in the fifth year in one case, in the sixth in the other. The chief point of difference is the sudden and marked drop in 1849-1850, against a persistent high mortality in 1892-1893, especially in 1892, which was nearly as fatal as

To make the significance of these epidemic figures clear, it should be added that in the intervening period 1861-1889 the average annual death-rate from influenza was only fifteen, and in the ten years immediately preceding the 1890 outbreak it was only three. Moreover, in epidemic influenza, the mortality directly attributed to that disease is only a fraction of that actually caused by it. For instance, in January 1890 the deaths from influenza in London were 304, while the excess of deaths from respiratory diseases was 1454 and from all causes 1958 above the average.

We have seen above that the mortality was far greater in the second epidemic year than in the first, and this applies to all parts of England, and to rural as well as to urban communities, as the following table shows: —

Deaths from Influenza.

1890.

1891.

24 Great Towns over 80,000 population . 35 Towns between 20,000 and 80,000 21 Towns between 10,000 and 20,000

85 Rural Sanitary Districts

624

439

186

46

62

317

2302 2417 765 196 196 841

In spite of these figures, it appears that the 1890 attack, which was in general much more sudden in its onset than that of 1891, also caused a great deal more sickness. More people were " down with influenza," though fewer died. For instance, the number of persons treated at the Middlesex Hospital in the two months' winter epidemic of 1890 was 1279; in the far more fatal three months' spring epidemic of 1891 it was only 726. One explanation of this

discrepancy between the incidence of sickness and mortality is that in the second attack, which was more protracted and more insidious, the stress of the disease -fell more upon the lungs. Another is that its comparative mildness, combined with the time of year, in itself proved dangerous, because it tempted people to disregard the illness, whereas in the first epidemic they were too ill to resist. On the whole, rural districts showed a higher death-rate than towns, and small towns a higher one than large ones in both years. This is explained by the age distribution in such localities; influenza being particu- larly fatal to aged people, though no age is exempt. Certain counties were much more severely affected than others. The eastern counties, namely, Essex, Suffolk and Norfolk, together with Hampshire and one or two others, escaped lightly in both years; the western counties, namely, North and South Wales, with the adjoining counties of Monmouth, Hereford and Shrop- shire, suffered heavily in both years.

It will be convenient to discuss seriatim the various points of interest on which light has been thrown by the experience described above.

The bacteriology of influenza is discussed in the article on Parasitic Diseases. The disease is often called " Russian " influenza, and its origin in 1889 suggests that the name may have some foundation in fact. A writer, who saw the epidemic break out in Bokhara, is quoted by him to the following effect: — " The summer of 1888 was exceptionally hot and dry, and was followed by a bitterly cold winter and a rainy spring. The dried- up earth was full of cracks and holes from drought and sub- sequent frost, so that the spring rains formed ponds in these holes, inundated the new railway cuttings, and turned the country into a perfect marsh. When the hot weather set in the water gave off poisonous exhalations, rendering malaria general." On account of the severe winter, the people were enfeebled from lack of nourishment, and when influenza broke out suddenly they died in large numbers. Europeans were very severely affected. Russians, hurrying home, carried the disease westwards, and caravans passing eastwards took it into Siberia. There is a striking similarity in the conditions described to those observed in connexion with outbreaks of other diseases, particularly typhoid fever and diphtheria, which have occurred on the super- vention of heavy rain after a dry period, causing cracks and fissures in the earth. Assuming the existence of a living poison

in the ground, we can easily understand that under certain conditions, such as an exceptionally dry season, it may develop exceptional properties and then be driven out by the subsequent

rains, causing a violent outbreak of illness. Some such explana- tion is required to account for the periodical occurrence of epidemic and pandemic diffusions starting from an endemic centre. We may suppose that a micro-organism of peculiar robustness and virulence is bred and brought into activity by a combination of favourable conditions, and is then disseminated more or less widely according to its " staying power," by human agency. Whether central Asia is an endemic centre for influenza or not there is no evidence, but the disease seems to be more often prevalent in the Russian Empire than elsewhere. Ex- tensive outbreaks occurred there in 1886 and 1887, and it is certain that the 1889 wave was active in Siberia at an earlier date than in Europe, and that it moved eastwards. The hypo- thesis that it originated in China is unsupported by evidence. But whatever may be the truth with regard to origin, the dis- semination of influenza by human agency must be held to be proved. This is the most important addition to our knowledge of the subject contributed by recent research. The upshot of the inquiry by Dr Parsons was to negative all theories of atmo- spheric influence, and to establish the conclusion that the disease was " propagated mainly, perhaps entirely, by human inter- course."

He found that it prevailed independently of climate, season and weather; that it moved in a contrary direction to the prevailing winds; that it travelled along the lines of human intercourse, and not faster than human beings can travel; that in 1889 it travelled much faster than in previous epidemics, when the means of loco- motion were very inferior; that it appeared first in capital towns, seaports and frontier towns, and only affected country district? later; that it never commenced suddenly with a large number of cases in a place previously free from disease, but that epidemic manifestations were generally preceded for some days or weeks by scattered cases ; that conveyance of infection by individuals and its introduction into fresh places had been observed in many instances; that persons brought much into contact with others were generally the first to suffer; that persons brought together in large numbers in enclosed spaces suffered more in proportion than others, and that the rapidity and extent of the outbreak in institutions corresponded with the massing together of the inmates.

These conclusions, based upon the 1889-1890 epidemic, have

been confirmed by subsequent experience, especially in regard

to the complete independence of season and weather shown

by influenza. It has appeared and disappeared at all seasons and in all weathers and only popular ignorance continues to ascribe its behaviour to atmospheric conditions. In Europe, however, it has prevailed more often in winter than in summer, which may be due to the greater susceptibility of persons in winter, or, more probably, to the fact that they congregate more in buildings and are less in the open air during that part of the year. No doubt is any longer entertained of its infectious character, though the degree of infectivity appears to vary considerably. Many cases have been recorded of individuals introducing it into houses, and of all or most of the other inmates then taking it from the first case. Difficulties in preventing the spread of infection are due to (1) the shortness of the period of incubation, (2) the disease being infectious in the earliest stages before the nature of the illness is recognized, (3) the milder varieties being equally infectious with the severe attacks, and the patient going to work and spreading the infection, (4) the diagnosis often being difficult, influenza being possibly confused with ordinary catarrhal attacks, typhoid fever and other diseases. Domestic animals seem to be free from any suspicion of being liable to human influenza. Sanitary conditions, other than overcrowding, do not appear to exercise any influence on the spread of influenza.

Influenza has been shown to be an acute specific fever having nothing whatever to do with a " bad cold." There may be some

inflammation of the respiratory passages, and then symptoms of catarrh are present, but that is not necessarily the case, and in some epidemics such symptoms are quite I exceptional. This had been recognized by various writers

before the 1889 visitation, but it had not been generally realized, as it has been since, and some medical authorities, who persisted in regarding influenza as essentially a " catarrhal " affection, were chiefly to blame for a widespread and tenacious popular fallacy.

Leichtenstern, in his masterly article in Nothnagel's Handbuch, divides the disease as follows: — (1) Epidemic influenza vera caused by Pfeiffer's bacillus; (2) Endemic-epidemic influenza vera, which occurs several years after a pandemic and is caused by the same bacillus; (3) Endemic influenza nostras or catarrhal fever, called la grippe, and bearing the same relation to true influenza as cholera nostras does to Asiatic cholera.

The " period of incubation " is one to four days. Susceptibility varies greatly, but the conditions that influence it are matters of conjecture only. It appears that the inhabitants of Great Britain are less susceptible than those of many other countries. Dr Parsons gives the following list, showing the proportion of the population estimated to have been attacked in the 1889- 1890 epidemic in different localities: —

Place.

Per cent.

Place.

Per cent.

St Petersburg .

Berlin

Nuremberg

Grand-Duchy of Hesse Grand-Duchy, other

Districts .... Heligoland .... Budapest ....

50

33

67

25-30

50-75 50 50

Portugal

Belgrade

Antwerp

Gaeta ....

Massachusetts .

Peking ....

St Louis (Mauritius)

90 30-40

33

33 50-77

39

50

67

In and about London he reckoned roughly from a number of returns that the proportion was about 12I % among those employed out of doors and 25% among those in offices, &c. The proportion among the troops in the Home District was 9'3%- The General Post Office made the highest return with 33 '6%, which is accounted for partly by the enormous number of persons massed together in the same room in more than one department, and partly by the facilities for obtaining medical advice, which would tend to bring very light cases, unnoticed elsewhere, upon the record. No public service was seriously disorganized in England by sickness in the same manner as on the continent of Europe. Some individuals appear to be totally

immune; others take the disease over and over again, deriving no immunity, but apparently greater susceptibility from previous attacks.

The symptoms were thus described by Dr Bruce Low from observations made in St Thomas's Hospital, London, in January 1890: —

The invasion is sudden; the patients can generally tell the time when they developed the disease; e.g. acute pains in the back and loins came on quite suddenly while they were at work or walking in the street, or in the case of a medical student, while playing cards, rendering him unable to continue the game. A workman wheeling a barrow had to put it down and leave it ; and an omnibus driver was unable to pull up his horses. This sudden onset is often accompanied by vertigo and nausea, and sometimes actual vomiting of bilious matter. There are pains in the limbs and general sense of aching all over; frontal headache of special severity; pains in the eyeballs, increased by the slightest movement of the eyes; shiver- ing; general feeling of misery and weakness, and great depression of spirits, many patients, both men and women, giving way to weeping; nervous restlessness; inability to sleep, and occasionally delirium. In some cases catarrhal symptoms develop, such as running at the eyes, which are sometimes injected on the second day ; sneezing and sore throat; and epistaxis, swelling of the parotid and submaxillary glands, tonsilitis, and spitting of bright blood from the pharynx may occur. There is a hard, dry cough of a paroxysmal kind, worst at night. There is often tenderness of the spleen, which is almost always found enlarged, and this persists after the acute symptoms have passed. The temperature is high at the onset of the disease. In the first twenty-four hours its range is from 100° F. in mild cases to 105° in severe cases.

Dr J. S. Bristowe gave the following description of the illness during the same epidemic: — The chief symptoms of influenza are, coldness along the back,

with shivering, which may continue off and on for two or three days ; severe pain in the head and eyes, often with tenderness in the eyes and pain in moving them; pains in the ears; pains in the small of the back; pains in the limbs, for the most part in the fleshy portions, but also in the bones and joints, and even in the fingers and toes; and febrile temperature,'which may in the early period rise to 104 or 105 F. At the same time the patient feels excessively ill and prostrate, is apt to suffer from nausea or sickness and diarrhoea, and is for the

most part restless, though often (and especially in the case of children and those advanced in age) drowsy. … In ordinary mild cases the above symptoms are the only important ones which present themselves, and the patient may recover in the course of three or four days. He may even have it so mildly that, although feeling very ill, he is able to go about his ordinary work. In some cases the patients have additionally some dryness or soreness of the throat, or some stiffness and discharge from the nose, which may be accompanied by slight bleeding. And in some cases, for the most part in the course of a few days, and at a time when the patient seems to be convalescent, he begins to suffer from wheezing in the chest, cough, and perhaps a little shortness of breath, and before long spits mucus in which are contained pellets streaked or tinged with blood. . . . Another complication is diarrhoea. Another is a roseolous spotty rash. . . . Influenza is by no means necessarily attended with the catarrhal symptoms which the general public have been taught to regard as its distinctive signs, and in a very large proportion of cases no catarrhal condition whatever becomes developed at any time.

Several writers have distinguished four main varieties of the disease — namely, (1) nervous, (2)gastro-intestinal, (3)respiratory, (4) febrile, a form chiefly found in children. Clifford Allbutt says, " Influenza simulates other diseases." Many forms are of typhoid or comatose types. Cardiac attacks are common, not from organic disease but from the direct poisoning of the heart muscle by influenza.

Perhaps the most marked feature of influenza, and certainly the one which victims have learned to dread most, is the prolonged debility and nervous depression that frequently follow an attack. It was remarked by Nothnagel that " Influenza produces a specific nervous toxin which by its action on the cortex produces psychoses." In the Paris epidemic of 1890 the suicides increased 25%, a large proportion of the excess being attributed to nervous prostration caused by the disease. Dr Rawes, medical superintendent of St Luke's hospital, says that of insanities traceable to influenza melancholia is twice as frequent as all other forms ˆf insanity put together. Other common after-effects are neuralgia, dyspepsia, insomnia, weakness or loss of the special senses, particularly taste and smell, abdominal pains, sore throat, rheumatism and muscular weakness. The feature most dangerous to life is the special liability of patients to inflammation of the lungs. This affection must be regarded as a complication rather than an integral part of the illness. The following diagram gives the annual death-rate per million in England and Wales, and is taken from an article by Dr Arthur Newsholme in The

Practitioner (January 1907).

The deaths directly attributed to influenza are few in propor- tion to the number of cases. In the milder forms it offers hardly any danger to life if reasonable care be taken, but in the severer forms it is a fairly fatal disease. In eight London hospitals the case-mortality among in-patients in the 1890 outbreak was 34-5 per 1000; among all patients treated it was i-6 per 1000. In the army it was rather less.

The infectious character of influenza having been determined, suggestions were made for its administrative control on the familiar lines of notification, isolation and disinfection, but this has not hitherto been found practicable. In March 1895, however, the Local Government Board issued a memorandum recommend- ing the adoption of the following precautions wherever they can be carried out: —

1 . The sick should be separated from the healthy. This is especially important in the case of first attacks in a locality or a household.

2. The sputa of the sick should, especially in the acute stage of the disease, be received into vessels containing disinfectants. Infected articles and rooms should be cleansed and disinfected.

3. When influenza threatens, unnecessary assemblages of persons should be avoided.

4. Buildings and rooms in which many people necessarily con- gregate should be efficiently aerated and cleansed during the intervals of occupation.

There is no routine treatment for influenza except bed. In all cases bed is advisable, because of the danger of lung complica- tions, and in mild ones it is sufficient. Severer ones must be treated according to the symptoms. Quinine has been much used. Modern ” anti-pyretic ” drugs have also been extensively employed, and when applied with discretion they may be useful, but patients are not advised to prescribe them for them- selves.

Sir Wm. Broadbent in a note on the prophylaxis of influenza recommends quinine in a dose of two grains every morning, and

remarks: " I have had opportunities of obtaining extraordinary evidence of its protective power. In a large public school it was ordered to be taken every morning. Some of the boys in the school were home boarders, and it was found that while

300

200

too

the boarders at the school took the quinine in the presence | of a master every morning, there were scarcely any cases of influenza among them, although the home boarders suffered nearly as much as before." He continues, " In a large girls' school near London the same thing was ordered, and the girls and mistresses took their morning dose but the servants were forgotten. The result was that scarcely any girl or mistress suffered while the servants were all down with influenza."

The liability to contract influenza, and the danger of an attack if contracted, are increased by depressing conditions, such as exposure to cold and to fatigue, whether mental or physical. Attention should, therefore, be paid to all measures tending to the maintenance of health. Persons who are attacked by influenza should at once seek rest, warmth and medical treatment, and they should bear in mind that the risk of relapse, with serious complications, constitutes a chief danger of the disease.

In addition to the ordinary text-books, see the series of articles by experts on different aspects in The Practitioner (London) for January 1907.

IN FORMA PAUPERIS (Latin, " in the character of pauper "), the legal phrase for a method of bringing or defending a case in court on the part of persons without means. By an English statute of 1495 (n Hen. VII. c. 12), any poor person having cause of action was entitled to have a writ according to the nature of the case, without paying the fees thereon. The statute of 1495 was repealed by the Statute Law Revision and Civil Procedure Act 1883, but its provisions, as well as the chancery

practice were incorporated into one code and embodied in the rules of the Supreme Court (O. xvi. rr. 22-31). Now any person may be admitted to sue as a pauper, on proof that he is not worth £25, his wearing apparel and the subject matter of the cause or matter

excepted. He must lay his case before counsel for opinion, and counsel's opinion thereon, with an affidavit of the party suing that the case contains a full and true statement of all the material facts to the best of his knowledge and belief, must be produced before the proper officers to whom the applica- tion is made. A person who desires to defend as a pauper must enter an appearance to a writ in the ordinary way and afterwards apply for an order to defend as a pauper. Where a person is admitted to sue or defend as a pauper, counsel and solicitor may be assigned to him, and such counsel and solicitor are not at liberty to refuse assistance unless there is some good reason for refusing. If any person admitted to sue or defend as a pauper agrees to pay fees to any person for the conduct of his business he will be dispaupered. Costs ordered to be paid to a pauper are taxed as in other cases. Appeals to the House of Lords in formd pauperis were regulated by the Appeal (Forma Pauperis) Act 1893, which gave the House of Lords power to refuse a petition for leave to sue.

INFORMATION (from Lat. informare, to give shape or form to, to represent, describe), the communication of knowledge; in English law, a proceeding on behalf of the crown against a subject otherwise than by indict- ment. A criminal information is a proceeding in the King's bench by the attorney-general without the intervention of a grand jury. The attorney-general, or, in his absence, the solicitor-general, has a right ex officio to file a criminal information in respect of any in- dictments, but not for treason, felonies or misprision of treason. It is, however, seldom exercised, except in cases which might be described as " enormous misdemeanours," such as those peculiarly tending to disturb or endanger the king's government, e.g. sedi- tions, obstructing the king's officers in the execution of their duties, &c. In the form of the proceedings the attorney-general is said to " come into the court of our lord the king before the king himself at Westminster, and gives the court there to under- stand and be informed that, &c." Then follows the statement of the offence as in an indictment. The information is filed in the crown office without the leave of the court. An information may also be filed at the instance of a private prosecutor for misdemeanours not affecting the government, but being peculiarly flagrant and pernicious. Thus criminal informations have been granted for bribing or attempting to bribe public functionaries, and for aggravated libels on public or private persons. Leave to file an information is obtained after an application to show cause, founded on a sworn statement of the material facts of the case.

Certain suits might also be filed in Chancery by way of informa- tion

in the name of the attorney-general, but this species of information was superseded by Order 1, rule 1 of the Rules of the Supreme Court, 1883, under which they are instituted in the ordinary way. Informations in the Court of Exchequer in revenue cases, also filed by the attorney-general, are still resorted to (see A.-G. v. Williamson, 1889, 60 L.T. 930).

INFORMER, in a general sense, one who communicates information. The term is applied to a person who prosecutes in any of the courts of law those who break any law or penal statute. Such a person is called a common informer when he furnishes evidence on criminal trials or prosecutes for breaches of penal laws solely for the purpose of obtaining the penalty I recovered, or a share of it. An action by a common informer

INFUSORIA

is termed a popular or qui tarn action, because it is brought by a person qui tarn pro domino rege quam pro se ipso sequitur. A suit by an informermust be brought within a year of the offence, unless a specific time is prescribed by the statute. The term informer is also used of an accomplice in crime who turns what is called " king's evidence " (see Accomplice). In Scotland, informer is the term applied to the party who. in criminal proceedings, sets the lord advocate in motion.

INFUSORIA, the name given by Biitschli (following O F Ledermiiller, 1763) to a group of Protozoa. The name arose

3

557

Fig. i. Ciliata

Opalinopsis sepiolae, Foett.: a parasitic i_i „i, ˆ„- 1 .11 ,—,-

Holotrichous mouthless Ciliate from the liver of the Squid, a, branched meganucleus; b, vacuoles (non-con- tractile).

2. A similar specimen treated with picro-

carmine, showing a remarkably branched and twisted meganucleus (a), in place of several nuclei.

3. Anoplophrya naidos, Duj.; a mouth-

less Holotrichous Ciliate parasitic in the worm Nais. a, the large axial meganucleus; b, contractile vacuoles.

4. Anoplophrya prolifera, C. and L.; from

the intestine of Clitellio. Remark- able for the adhesion of incomplete fission-products in a metameric series, a, meganucleus.

5. Amphileptus gigas, C. and L. (Gymno-

stomaceae). b, contractile vacuoles; c, trichocysts (see fig. 2); d, mega- nucleus; e. pharynx.

6. 7. Prorodon niveus, Ehr. (Gymno-

stomaceae). a, meganucleus; b, contractile vacuole; c, pharynx with horny cuticular lining. 6. The fasciculate cuticle of the pharynx isolated.

13-

14.

15- 16.

Trachelitis ovum, Ehr. (Gymnosto- maceae); showing the reticulate arrangement of the endosarc, b, contractile vacuoles; c, the cuticle-lined pharynx.

10,ˆ 11, 12. Icthyophthirius multifilius, Fouquet (Gymnostomaceae). Free individual and successive stages of division to form spores, a, mega- nucleus; b, contractile vacuoles. ” Didinium nasutum, Mull. (Gymno- stomaceae). The pharynx is everted and has seized a Paramecium as food, a, meganucleus; b, contrac- tile vacuole; c, everted pharynx.

Euplotes charon, Miill. (Mypotrich- aceae); lateral view of the animal when using its great cirrhi, x, as ambulatory organs.

Euplotes harpa, Stein (Hvpotrich- aceac); /;, mouth; x, cirrhi. ‘

Nyctotherus cordiformis, Stein (a Heterotriceae), parasitic in the intes- tine of the Frog; 0, meganucleus; b, contractile vacuole; c, food par- ticle; d, anus; e, heterotrichous band

of membranelles; /, pharynx; i, small cilia.

from the procedure adopted by the older microscopists to obtain animalcules. Infusions of most varied organic substances were prepared (hay and pepper being perhaps the favourite ones), the method of obtaining them including maceration and decoction, as well as infusion in the strict sense; they were then allowed to decompose in the air, so that various living beings developed therein. As classified by C. G. Ehrenberg m his monumema! f-.thsionstierrhen ais vnllkommmr Orcanis-

men, they included (1) Desmids, Diatoms and Schizomycetes now regarded as essentially Plant Protista or Protophytes; (2)ˆ Sarcodina (excluding Foraminifera, as well as Radiolaria' which were only as yet known by their skeletons, and termed Polycystina), and (3) Rotifers, as well as (4) Flagellates and Infusoria in our present sense. F. Dujardin in his Histoire des zoophytes (1841) gave nearly as liberal an interpretation to the name; while C. T. Van Siebold (1845) narrowed it to its present limits save for the admission of several Flagellate families. O. Biitschli limited the group by removing the Flagel- l lata, Dinoflagellata and Cystoflagellata (g.u.)under the name of " Mastigophora " proposed earlier by R. M. Diesing (1865). We now define it thus: — Protozoa bounded by a permanent plasmic pellicle and consequently of definite form, never using pseudopodia for locomotion or ingestion, provided (at least in the young state) with 'a numerous cilia or organs derived from cilia and equipped with a double nuclear apparatus: the larger (mega-) nucleus usually dividing by con- striction, and disappearing during conjugation: the smaller (micro-) nucleus (sometimes multiple) dividing by mitosis, and entering into conjugation and giving rise to the cycle of nuclei both large and small of the race succeeding conjugation.

Thus defined, the Infusoria fall into two groups: — (1) Ciliata, with cilia or organs derived from cilia throughout their lives, provided with a single permanent mouth (absent in the parasitic Opalinopsidae) flush with the body or at the base of an oral depression, and taking in food by active swallowing or by ciliary action: (2) Suc- toria, rarely ciliated except in the young state, if and taking in their food by suction through pro- ■y trusible hollow tentacles, usually numerous.

The pellicle of the Infusoria is stronger and more permanent than in many Protozoa, and sometimes assumes the character of a mail of hard plates, closely fitting ; but even in this case it undergoes solution soon after death. It is continuous with a firm ecto- sarc, highly differentiated in the Ciliata, and in both groups free from coarse movable granules. The endosarc is semifluid and rich in

granules mostly reserve ” in nature, often showing proteid or fat reactions. One or more contractile vacuoles are pre- sent in some of the marine and all the freshwater species, and open to the surface by pores of perma- nent position: a system of canals in the deeper layers of the ectoplasm is sometimes connected with the vacucle. The body is often provided with not- hing external formations ” stalk ” and ” theca ” (or lonca).

The character of the nuclear apparatus excludes two groups both parasitic and mouthless: (1) the I richonymphidae, with a single nucleus of Leidy parasitic in Insects, especially Termites; (2) the Upahmdae, with several (often numerous) uniform nuclei, parasitic in the gut of Batrachia, &c, and producing i-nuclear zoospores which conjugate. Both these families we unite into a group of Pseudo-cihata, which may be referred to the Flagellata (q.v.). Lankester in the last edition of this Encyclo- paedia called attention to the doubtful position of Upahna, and Delage and Herouard placed Tricho- nymphidae among Flagellates.

The theca_or shell is present in some pelagic species (fig. 111. 3, 5) and in many of the attached species, notably among the Peritricha (fig. iii. 21 22, 25, 26) and Suctoria (fig. viii. 11); and is found in some tree-swimming forms (fig. iii. 3, 5); it is usually chitinous, and forms a cup into which the animal protruded when at its utmost elongation, can retract itself In Metacmeta mystacina it has several distinct slits (pylomes) for the passage of tufts of tentacles. In Stentor it is ge atinous • and in the Dictyocystids it is beautifully latticed. ‘

in S.frW? ls T usu a U X s ?hd’ and expanded at the base into a disk in buctona. In Pentnchaceae fig. iii. 8-22, 25, 26), the onlv

itwJl™? W i th a Stalk ‘ i f, gr0W8 ?° r Some tim « after i?s formationˆ and on fission two new stalks continue the old one, so as to form a

tl’^‘tfn 1 C . 0l< T,, (fig – iH l I , 8) – - In V r ticdla < fi S- ;ii – »■ » ' Tc.) the stalk is hollow and elastic, and attached to it along a spiral is a

mouth ; h,

prolongation of the ectosarc containing a bundle of myonemes, so that by the contractions of the bundle the stalk is pulled down into a corkscrew spiral, and on the relaxation of the muscle the elasticity of the hollow stalk straightens it out.

On fission the stalk may become branched, as the solid one of Epistylis and Opercularia (fig. iii. 20) ; and the myoneme also in the tubular stem of Zoothaminum; or the branch-myoneme for the one offspring may be inserted laterally on that for the other in Carchesium (fig. iii. 18). In several tubicolous Peritrichaceae there is some arrangement for closing their tubes. In Thuricola (fig. iii. 25-26) there is a valve which opens by the pressure of the animal on its protrusion, and closes automatically by elasticity on retraction. In Lagenophrys the animal adheres to the cup a little below the opening, so that its withdrawal closes the cup : at the adherent part the body mass is hardened, and so differentiated as to suggest the frame of the mouth of a purse. In Pyxicola (fig. iii. 21-22) the animal bears some way down the body a hardened shield (" operculum ") which closes the mouth of the shell on retraction.

The cytoplasm of the Infusoria is very susceptible to injuries; and when cut or torn, unless the pellicle contracts rapidly to enclose the wounded surface, the substance of the body swells up, becoming frothy, with bubbles which rapidly enlarge and finally burst; the cell thus disintegrates, leaving only a few granules to mark where it was. This phenomenon, observed by Dujardin, is called " dif- fluence." The contractile vacuole appears to be one of the means by which diffluence is avoided in cells with no strong wall to resist the

L-JB

tf^i

Fig. ii.

•

Surface view of Paramecium, showing the disposition of the cilia in longitudinal rows.

a, mega-; b, micro-nucleus; c, junction of ecto- and en- dosarc; D, pellicle; E, endo- sarc ; /, cilia (much too numerous and crowded) ; g, trichocysts; g', same with thread; /z, discharged; i, pharynx, its undulating membrane not shown ; k,

food granules collecting into a bolus; /, m, n, o, food vacuoles, their

contents being digested as they pass in the endosarc along the path indicated by the arrows.

3, Outline showing contractile vacuoles in commencing diastole, surrounded by five afferent canals.

4-7 Successive stages of diastole of contractile vacuole.

absorption of water in excess: for after growing in size for some time, its walls contract suddenly, and its contents are expelled to the outside by a pore, which is, like the anus, usually invisible, but permanent in position. The contractile vacuole may be single or multiple; it may receive the contents of a canal, or of a system of canals, which only become visible at the moment of the contraction of the vacuole (fig. ii. 4-7), giving liquid time to accumulate in them, or when the vacuole is acting sluggishly or imperfectly, as in the approach of asphyxia (fig. ii. 3). Besides this function, since the system passes a large quantity of water from without through the substance of the cell, it must needs act as a means of respiration and excretion. In all Peritrichaceae it opens to the vestibule, and in some of them it discharges through an intervening reservoir, curiously recalling the arrangements in the Flagellate Euglenaceae.

The nuclear apparatus consists of two parts, the meganucleus, and themicronucleusormicronuclei (fig. iii. \j d, iv. 1). The meganucleus alone regarded and described as " the nucleus " by older observers is always single, subject to a few reservations. It is most frequently oval, .and then is indented by the micronucleus; but it may be lobed, the lobes lying far apart and connected by a slender bridge or monili form, or horseshoe-shaped (Peritrichaceae). It often contains darker inclusions, like nucleoles.

It has been shown, more especially by Gruber, that many Ciliata are multinucleate, and do not possess merely a single meganucleus and a micronucleus. In Oxytricha the nuclei are large and numerous (about forty), scattered through the protoplasm, whilst in other

cases the nucleus is so finely divided as to appear like a powder diffused uniformly through the medullary protoplasm (Trachelocerca) . Carmine staining, after treatment with absolute alcohol, has led to this remarkable discovery. The condition described by Foettinger in his Opalinopsis (fig. i. 1,2) is an example of this pulverization of the nucleus. The condition of pulverization had led in some cases to a total failure to detect any nucleus in the living animal, and it was only by the use of reagents that the actual

state of the case was revealed. Before fission, whatever be its habitual character, it condenses, becomes oval, and divides by constriction ; and though it usually is then fibrillated, only in a few cases does it approach the typical mitotic condition. The micronucleus described by older writers as the " nucleolus " or " paranucleus " (" endoplastule " of Huxley), may be single or multiple. When the meganucleus is bilobed there are always two micronuclei, and at least one is found next to every enlargement of the moniliform meganucleus. In the fission of the Infusoria, every micronucleus divides by a true mitotic process, during which, however, its wall remains intact. From their relative sizes the meganucleus would appear to discharge during cell-life, exclusively, the functions of the nucleus in ordinary cells. Since in conjugation, however, the meganucleus degenerates and is in great part either digested or excreted as waste matter, while the new nuclear apparatus in both exconjugates arises, as we shall see, from a conjugation-nucleus of exclusively micronuclear origin, we infer that the micronucleus has for its function the carrying on of the nuclear functions of the race from one fission cycle to the next from which the meganucleus is excluded.

Fission is the ordinary mode of reproduction in the Infusoria, and is usually transverse, but oblique in Stentor, &c, as in Flagellata, longitudinal in Peritrichaceae; in some cases it is always more or less unequal owing to the differentiation of the body, and conse- quently it must be followed by a regeneration of the missing organs in either daughter-cell. In some cases it becomes very uneven, affording every transition to budding, which process assumes especial importance in the Suctoria. Multiple fission (brood-formation or sporulation) is exceptional in Infusoria, and when it occurs the broods rarely exceed four or eight — another difference from Flagellata. The nuclear processes during conjugation suggest the phylogenetic loss of a process of multiple fission into active gametes. As noted, in_ fission the meganucleus divides by direct constriction; each micronucleus by a mode of mitosis. The process of fission is subject in its activity to the influences of nutrition and temperature, slacken- ing as the food supply becomes inadequate or as the temperature recedes from the optimum for the process. Moreover, if the descendants of a single animal be raised, it is found that the rapidity of fission, other conditions being the same, varies periodically, under- going periods of depression, which may be followed by either (1) spontaneous recovery, (2) recovery under stimulating food, (3) recovery through conjugation, or (4) the death of the cycle, which would have ensued if 2 or 3 had been omitted at an earlier stage, but which ultimately

seems inevitable, even the induction of conjugation failing to restore it. These physiological conditions were first studied by E. Maupas, librarian to the city of Algiers, in his pioneering work in the later 'eighties, and have been confirmed and extended by later observers, among whom we may especially cite G. N. Calkins.

Syngamy, usually termed conjugation or " karyogamy," is of exceptional character in the majority of this group — the Peri-trichaceae alone evincing an approximation to the usual typical process of the permanent fusion of two cells (pairing-cells or gametes), cytoplasm to cytoplasm, nucleus to nucleus, to form a new cell (coupled cell, zygote).

This process was elucidated by E. Maupas in 1889, and his results, eagerly questioned and repeatedly tested, have been confirmed in every fact and in every generalization of importance.

Previously all that had been definitely made out was that under certain undetermined conditions a fit of pairing two and two occurred among the animals of the same species in a culture or in a locality in the open; that after a union prolonged over hours, and sometimes even days, the mates separated; that during the union the mega- nucleus underwent changes of a degenerative character; and that the micronucleus underwent repeated divisions, and that from the offspring of the micronuclei the new nuclear apparatus was evolved for each mate. Maupas discovered the biological conditions leading to conjugation: (1) the presence of individuals belonging to distinct stocks; (2) their belonging to a generation sufficiently removed from previous conjugation, but not too far removed therefrom; ^3) a deficiency of food. He also showed that during conjugation a " migratory " nucleus, the offspring of the divisions of the micro- nucleus, passes from either mate to the other, while its sister nucleus remains ' stationary "; and that reciprocal fusion of the migratory nucleus of the one mate with the stationary nucleus of the other takes place to form a zygote nucleus in either mate ; and that from these zygote nuclei in each by division, at least two nuclei are formed, the one of which enlarges to form a meganucleus, while the other remains small as the first micronucleus of the new reorganized animal, which now separates as an " exconjugate " (fig. iv). More- over, if pairing be prevented, or be not induced, the individuals produced by successive fissions become gradually weaker, their nuclear apparatus degenerates, and finally they cannot be induced

INFUSORIA

under suitable conditions to pair normally, so that the cycle becomes extinct by senile decay. In Peritrichaceae the gametes are of unequal sizes (fig. iii. II, 12), the smaller being formed by brood fissions (4 or 8) ; syngamy is here permanent, not temporary, the smaller (male) being absorbed into the body of the larger (female) ; and there are only two nuclei that pair. Thus we have a derived binary sexual process, comparable to that of ordinary bisexual organisms

‘*.

Fig. iii. — Ciliata: 1, 2, Heterotrichaceae ; 3-7, 23-24, Oligotrichaceac ; 8-22, 25, 26, Peritrichaceae.

1 , Spirostomumambiguum,Ehr. ;

on its left side oral groove and wreath of membra nel- lae; a, moniliform mega- nucleus; b, position of con- tractile vacuole.

2, Group of Stentor polvmor-

plius, O. F. Muller; the twisted end of the peri- stome indicating the posi- tion of the mouth.

3, Tintinntis lagenula, CI. and

L., in free shell.

4, Strombidinm claparedii, S.

Kent.

5, Shell of Codonellacampanella,

Haeck.

6, 7, Torquatella typica, Lank.

(= Strombidium according to Batschli); p, oral tube seen through peristomial

wreath of apparently coal- escent membranellae. X, Basal, and 9. side (inverted) views of Trichodina pedi- cidus, Ehr. ; a, mega- nucleus; c, basal collar and ring of hooks; d, mouth; contractile vacuole and oral tube seen by transparency in 8.

10, Spirochona gatnmipara, Stein; a, meganuclcus; g, bud.

11, 12, Vorticella 'microstoma, Ehr.; d, formation of a brood of 8 microgametes c by multiple fission; 6, contr. vacuole.

Same sp. in binary fission;

a, meganucleus. V. nebulifera, Ehr.; bud

swimming away by

13.

14.

■

/m

\rth

rx

ˆ:r

uJ

V

V

Sxrnˆ

\ J

From Lankester's Treatise on Zoology.

Fig. iv.— Diagrammatic Sketch of Changes during Conjugation in Ciliata. (From Hickson after Delage and Maupas.)

mate, while the other 3 nuclei degenerate.

Migration of the migratory nuclei. 9, Fusion of the incoming migratory with the station- ary nucleus in either mate.

Fission of Zygote nucleus into two, the new mega- and micronucleus whose differentiation is shown in 11,12. The vertical dotted line indicates the separation of the mates.

10,

1, Two individuals at com-

mencement of conjugation showing meganucleus (dotted) and micronucleus; successive stages of the disintegration of the mega- nucleus shown in all figures up to 9.

2, 3, First mitotic division of

micronuclei.

4, 5, Second ditto.

6, One of the four nuclei result- ing from the second division again dividing to form the pairing-nuclei in either

Ciliata. — The dilate Infusoria represent the highest type of Protozoa. They are distinctly animal in function, and the Gymnostomaceae are active predaceous beings preying on other Infusoria or Flagellates. Some possess shells (fig. iii. 3, 5, 21, 22, 25, 26), most have a distinct swallowing apparatus, and in Dysteria there is a complex jaw — or tooth-apparatus, which needs new investigation. In the active Ciliata we find locomotive

posterior wreath, peristome contracted; e, peristomial disk;/, oral tube.

V. microstoma; b, contr. vacuole; c, d, two micro- gametes seeking to con- jugate.

V. nebulifera, contracted with body encysted. 17, Same sp. enlarged; c, myonemes converging posteriorly to muscle of stalk; d, micronucleus.

Carchesium spectabile, Ehr.

Nematocysts of Epistylis fia- vicans. Ehr. (after Greeff).

Opercularia stenosloma, St.; a small colony showing upstanding (“opercular”)

15

16,

18, 19-

peristomial disk, pro- truded oral undulating membrane and cilia in oral tube.

*21, 22, Pyxicola affinis, S.K.,with stalk and theca; *, chitin- ous disk, or true "oper-. culum" closing theca in retracted state.*

23, 24, Caenomorpha medusula, Perty, with spiral peri- stomial wreath.

25, 26. Thuricola valvata, Str. Wright, in sessile theca, with internal valve (») to close tube, as in gastropod Clausilia; owing to recent fission two animals occupy one tube.

D

organs of most varied kinds: tail-springs, cirrhi for crawling and darting, cilia and mernbranellae for continuous swimming in the open or gliding over surfaces or waltzing on the substratum (Trichodina, fig. iii. 8) or for eddying in wild turns through the water (Strombidium, T intimitis, Halleria). Their forms offer a most interesting variety, and the flexibility of many adds to their easy grace of movement, especially where the front of the body is produced and elongated like the neck of a swan {Amphileptus, fig. iii. 5; Lacrymaria).

The cytoplasm is very highly differentiated : especially the ectoplasm or ectosarc. This has always a distinct elastic " pellicle " or limiting layer, in a few cases hard, or even with local hardenings that affect the disposition of a coat of mail (Coleps) or a pair of valves {Dysieria) ; but is usually only marked into a rhomboidal network by intersecting depressions, with the cilia occupying the centres of the areas or meshes defined. The cytoplasm within is distinctly alveolated, and frequently contains tubular alveoli running along the length of the animal. Between these are dense fibrous thickenings, which from their double refraction, from their arrange- ment, and from their shortening in contracted animals are regarded as of muscular function and termed " myonemes." Other threads running alongside of these, and not shortening but becoming wavy in the general contraction have been described in a few species as " neuronemes " and as possessing a nervous, conducting character. On this level, too, lie the dot-like granules at the bases of the cilia, which form definite groups in the case of such organs as are composed of

fused cilia; in the deeper part of the ectoplasm the vacuoles or alveoli are more numerous, and reserve granules are also found ;

here too exist the canals, sometimes developed into a complex net-work, which open into the contractile vacuole.

The cilia themselves have a stiffer basal part, probably strengthened by an axial rod, and a distal flexible lash; when cilia are united by the outer plasmatic layer, they form (1) " Cirrhi," stiff and either hook-like and pointed at the end, or brush-like, with a frayed apex; (2) membranelles, flattened organs composed of a number of cilia fused side by side, sometimes on a single row, some- times on two rows approximated at either end so as to form a narrow oval, the membranelle thus being hollow; (3) the oral " undulating membrane," merely a very elongated membranelle whose base may extend over a length nearly equal to the length of the animal ; such mem- branes are present in the mouth oral depression and pharynx of all but Gymnostomaceae, and aid in in- gestion ; a second or third may be present, and behave like active lips; (4) in Peritrichaceae the cilia of the peristomial wreath are united below into a continuous undulating mem- brane, forming a spiral of more than one turn, and fray out distally into a fringe; (5) the dorsal cilia of Hypo-triehaceae are slender and motionless, probably sensory.

Embedded in the ectosarc of many Ciliates are trichocysts, little elon-gated sacs at right angles to the surface, with a fine hair-like process projecting. On irritation these elon- gate into strong prominent threads, often with a more or less barb-like head, and may be ejected altogether from the body. Those over the surface of the body appear to be protective; but in the Gymnostomaceae specially strong ones surround the mouth. They can be injected into the prey pursued, and appear to have a distinctly poisonous effect on it. Thev are combined also into defensive batteries in the Gymnostome Loxophylh.im. They are absent from most Heterotrichaceae and Hyporrichaceae, and from Peritrichaceae, except for a zone round the collar of the peristome.

The openings of the body are the mouth, absent in a few parasital species (Opalinopsis, fig. i. 1, 2), the anus and _ the pore of the contractile vacuole. The mouth is easily recognizable; in the most primitive forms of the Gymnostomaceae and some other groups, it is terminal, but it passes further and further back in more modified species, thereby defining a ventral, and correspondingly a dorsal surface; it usually lies on the left side. The anus is usually

From Lankester's Treatise on

Zoology.

Fig. v. — Diagram 1 illus- trating changes during con- j ligation of Colpidium colpoda. (From Hickson, after Maupas.) M, Old meganucleus under- going disintegration. m, Micronucleus. N, migratory, and S, Stationary pairing-

nucleus. M', M', the new meganuclei,

and m' , The new micronuclei in the products of the first fission of each of the ex- conjugates; the continu- ous vertical line in- dicates period of fusion, its cessation, separation; dotted lines indicate fission ; the spaces lettered 1-7 successive stages in the process; the clear circles indi- cate functionless nuclei which degenerate.

only visible during excretion, though its position is permanent; in a few genera it is always visible (e.g. Nyctotherus, fig. i. 16). The pore of the contractile vacuole might be described in the same terras.

The endoplasm has also an alveolar structure, and contains besides large food-vacuoles or digestive vacuoles, and shows movements of rotation within the ectoplasm, from which, however, it is not usually distinctly bounded. In Ophryoscolex and Vidinium (fig. i. 13) a permanent cavity traverses it from mouth to anus.

Ingestion of food is of the same character in all the Hymeno- stomata. The ciliary current drives a powerful stream into the mouth, which impinges against the endosarc, carrying with it the food particles; these adhere and accumulate to form a pellet, which ultimately is pushed by an apparently sudden action into the substance of the endosarc which closes behind it (fig. ii. 2). In some

d

« b c

From Calkins' Protozoa, by permission of the Macmillan Company, N.Y.

Fig. vi. — Diagrammatic view of behaviour of the motile reaction ot Paramecium after meeting a mechanical obstruction at A. (From G. N. Calkins after H. S. Jennings.) For clearness and simplicity the normal motion is supposed to be straight instead of spiral.

of the Aspirotrichaceae accessory undulating membranes play the part of lips, and there is a closer approximation to true deglutition. The mouth is rarely terminal, more frequently at the bottom of a depression, the " vestibule," which may be prolonged into a slender canal, sometimes called the " pharynx " or " oral tube," ciliated as well as provided with a membrane, and extending deep down into the body in many Peritrichaceae.

In Spirostomaceae the " adoral wreath " of membranelles encloses more or less completely an anterior part of the body, the " peri-stome," within which lies the vestibule. This area may be depressed, truncate, convex or produced into a short obcomcal disk or into one or more lobes, or finally form a funnel, or a twisted spiral like a paper cone. In most Peritrichaceae a collar-like rim surrounds the peristome, and marks out a gutter from which the vestibule opens; the peristome can be retracted, and the collar close over it. This rim forms a deep permanent spiral funnel in Spirochona (fig. iii. 10),

Movements of Ciliata. — H. S. Jennings has made a very detailed study of these movements, which resemble those of most minute free-swimming organisms. The following account applies practically to all active " Infusoria " in the widest sense.

The position of the free-swimming Infusoria, like that of Rotifers and other small swimming animals, is with the front end of the body inclined out- ward to the axis of advance, constantly changing its azi- muth while pre- serving its angle constant or nearly so; if advance were

ignored the body .. c

*would thus rotate ˆ IG – vn – — Diagram of a mode ot progression so as to trace out ˚f a Ciliate like Paramecium; m, mouth and a cone with the pharynx; the straight line A, B, represents the hinder end at the ax ' s ˚f progression described by the posterior apex and the front ena -> an d * ne spiral line the curve described by describing the base. ˆ e anterior end ; the clear circles are the On any irritation', contractile vacuoles on the dorsal side. (1) the motion is arrested, (2) the animal reverses its cilia and swims backwards, (3) it swerves outwards away from the axis so" as to make a larger angle with it, and (4) then swims forwards along a new axis of progression, to which it is inclined at the same angle as to the previous axis (figs, vi., vii.). In this way it alters its axis of progression when it finds itself under conditions of stirhulation. Thus a Paramecium coming into a region relatively too cold, too hot, or too poor in C0 2 or in*

nutriment, alters its direction of swimming; in this way individuals come to assemble in crowds where food is abundant, or even where there is a slight excess of C0 2 . This reaction may lead to fatal results ; if a solution of corrosive sublimate (Mercuric chloride) diffuses towards thehinder end of the animal faster than it progresses, the stimulus affecting the hinder end first, the axis of progression is altered so as to bring the

animal after a few changes into a region where the solution is strong enough to kill it. This " motile reaction," first noted by H. S. Jennings, is the explanation of the general reactions of minute swimming animals to most stimuli of whatever character, including light ; the practical working out is, as he terms it, a method of " trial and error." The action, however, of a current of electricity is distinctly and immediately directive; but such a stimulus is not to be found in nature. The motile reaction in the Hypotrichaceae which crawl or dart in a straight line is somewhat different, the swerve being a simple turn to the right hand — i.e. away from the mouth.

Parasitism in the Infusoria is by no means so important as among Flagellates. Ichthyophthirius alone causes epidemics among Fishes, and Balantidium coli has been observed in intestinal disease in Man. The Isotricheae, among Aspirotrichaceae and the Ophryoscolecidae among Heterotrichaceae are found in abundance in the stomachs of Ruminants, and are believed to play a part in the digestion of celluiose, and thus to be rather commensals than parasites. A large number of attached species are epizoic commensals, some very indifferent in choice of their host, others particular not only in the species they infest, but also in the special organs to which they adhere. This is notably the case with the shelled Peritrichaceae. Lichnophora and Trichodina (fig. iii. 8, 9) among Peritrichaceae are capable of locomotion by their permanent posterior wreath or of attaching themselves by the sucker which surrounds it; Kerona polyporum glides habitually over the body of Hydra, as does Trichodina pediculus.

Several Suctoria are endoparasitic in Ciliata, and their occurrence led to the view that they represented stages in the life-history of these. Again, we find in the endosarc of certain Ciliates green nucleated cells, which have a cellulose envelope and multiply by fission inside or outside the animal. They are symbiotic Algae, or

possibly the resting state of a Chlamydomonadine Flagellate (Carterial) , and have received the name Zoochlorella. They are of constant occurrence in Paramecium bursaria, frequent in Stentor polymorphus and S. igneus, and Ophrydium versatile, and a few other species, which become infected by swallowing them.

Classification. Order I. — Section A. — Gymnostomaceae. Mouth habitually closed ; swallowing an active process ; cilia (or membranelles) uniform, usually distributed evenly over the body; form variable, sometimes of circular transverse section.

Section B. — Trichostomata. Mouth permanently open against the endosarc, provided with I or 2 undulating membranes often prolonged into an inturned pharynx; ingestion by action of oral ciliary apparatus.

Order 2. — Subsection (a). — Aspirotrichaceae. Cilia nearly uniform, not associated with cirrhi or membranelles, nor forming a peristomial wreath. Form usually flattened, mouth unilateral. (N.B. — Orders 1, 2 are sometimes united into the single order Holotrichaceae.)

Subsection (b). — Spirotricha. Wreath of distinct mem- branelles — or of cilia fused at the base — enclosing a peristomial area and leading into the mouth. §§ i. — Wreath of separate membranelles.

Order 3. — Heterotrichaceae; body covered with fine uniform cilia, usually circular in transverse section.

Order 4. — Oligotrichaceae; body covering partial or wholly absent ; transverse section usually circular.

Drder 5. — Hypotrichaceae; body flattened; body cilia repre- sented chiefly by stiff cirrhi in ventral rows, and fine motion- less dorsal sensory hairs.

Order 6. — §§ ii. — Peritrichaceae. Peristomial ciliary wreath, spiral, of cilia united at the base; posterior wreath circular of long membranelles; body circular in section, cylindrical, taper, or bell-shaped.

Illustrative Genera (selected).

1. Gymnostomaceae. (a) Ciliation general or not confined to one surface. Coleps Ehr., with pellicle locclly hardened into mailed plates; Trachelocerca Ehr.; Prorodon Ehr. (fig. i. 6, 7); Trachelius

Ehr., with branching endosarc (fig. i. 8) ; Lacrymaria Ehr. (fig. i. 5), body produced into a long neck with terminal mouth surrounded by offensive trichocysts; DUeptus Duj., of similar form, but anterior process, blind, preoral; Ichthyophthirius Fouquet (fig. i. 9-12), cilia represented by two girdles of membranellae ; Didinium St. (fig. i. 13), cilia in tufts, surface with numerous tentacles each with a strong terminal trichocyst; Actinobolus Stein, body with one adoral tentacle; Ileonema Stokes, (b) Cilia confined to dorsal surface. Chilodon Ehr.; Loxodes Ehr., body flattened, ciliated on one side only, endosarc as in Trachelius; Dysteria Huxley, with the dorsal surface hardened and hinged along the median line into a bivalve shell, ciliated only on ventral surface, with a protrusible foot-like process, and a complex pharyngeal armature, (c) Cilia restricted to a single equatorial girdle, strong (probably membra- nelles) ; Mesodinium, mouth 4-lobed.

2. Aspirotrichaceae. Paramecium Hill (fig. ii. 1-3) ; Ophryoglena Ehr. ; Colpoda O. F. Muller; Colpidium St.; Lembus Cohn, with posterior strong cilium for springing; Leucophrys St.; Urocentrum Nitsch, bare, with polar and equatorial zones and a posterior tuft of

long cilia; Opalinopsis Foetlinger (fig. i. 1, 2); Anoplopkyra St. (fig. i. 3, 4). (The last two parasitic mouthless genera are placed here doubtfully.)

3. Heterotrichaceae. (a) Wreath spiral; Stentor Oken. (fig. iii. 2), oval when free, trumpet-shaped when attached by pseudopods at apex, and then often secreting a gelatinous tube; Blepharisma Pcrty, sometimes parasitic in Heliozoa; Spirostomum Ehr., cylindri- cal, up to 1″ in length; (b) Wreath straight, often oblique; Nycto- therus Leidy, parasitic anus always visible; Balantidium CI. and L., parasitic (B. coli in man) ; Bursaria, O.F.M., hollowed into an oval pouch, with the wreath inside.

4. Oligotrichaeceae. Tintinnus Schranck (fig. iii. 3) ; Trichodin- opsis CI. and L. ; . Codonella Haeck. (fig. iii. 5) ; Strombidium CI. and L. (fig. iii. 4), including Torquatella Lank. (fig. iii. 6, 7), according to Biitschli; Halteria Duj., with an equatorial girdle of stiff bristle-like cilia; Caenomorpha Perty (fig. iii. 23, 24); Ophryo- scolex St., with straight digestive cavity, and visible anus, parasitic in Ruminants.

5. Hypotrichaceae. Stylonychia Ehr.; Oxytricha Ehr.; Euplotes Ehr. (fig. i. 14, 15); Kerona Ehr. (epizoic on Hydra).

6. Peritrichaceae. I. Peristomial wreath projecting when ex- panded

above a circular contractile collar-like rim.

(a) Fam. Urceolaridae : posterior wreath permanently present around sucker-like base. Trichodina Ehr. (fig. iii. 8, 9), epizoic on Hydra; Lichnophora CI. and L. ; Cyclochaeta Hatchett Jackson; Cerda CI. and L. ; Scyphidia Duj.

(b) Fam. Vorticellidae = Bell Animalcules: posterior wreath temporarily present, shed after fixation.

Subfam. I. Vorticellinae animals naked, (i.) Solitary; Vorticella Linn. (fig. iii. 11-17), stalk hollow with spiral muscle; Pyxidiunt S. Kent, stalk non-contractile, (ii.) Forming colonies by budding on a branched stalk: Carchesium Ehr., hollow branches and muscles discontinuous; Zoothamnium. Ehr., branched hollow stem and muscle continuous through colony; Epislylis Ehr., stalk rigid — (the animal body in these three genera has the same characters as Vorticella) — Campanella Goldf., stalked like Epistylis, wreath of many turns (nematocysts sometimes present) (fig. iii. 19) ; Opercularia, stalk of Epistylis, disk supporting wreath obconical, collar very high (fig. iii. 20).

Subfam. 2. Vaginicolinae ; body enclosed in a firm theca: Vaginicola Lam., shell simple, sessile; Thuricola St. Wright, shell sessile, with a valve opening inwards (fig. iii. 25-26) ; Cothurnia Ehr., shell stalked, simple; Pyxicola S. Kent, shell stalked, closed by an infraperistomial opercular thickening on the body (fig. iii. 21-22).

Subfam. 3. Shells gelatinous; those of the colony aggregatec into a floating spheroidal mass several inches in diameter Ophrydium Bory, O. versatile contains Zoochlorella, which secretes oxygen, and the gas-bubbles float the colonies like green lumps o? jelly.

2. Peristomial wreath, not protrusible, surrounded by a very high usually spiral collar.

Fam. Spirochonina. Spirochona St. (fig. iii. 10) ; Kentrochona Rompel; both genera epizoic on gills, &c, of small Crustacea.

Suctoria. — These are distinguished from Ciliata by their possession of hollow tentacles (one only in Rhyncketa, fig. viii. 1, and Urnula) through which they ingest food, and by not possess- ing cilia, except in the young stage. Fission approximately equal is very rare. Usually it is unequal, or if nearly equal one of the halves remains attached, and the other, as an embryo or gemmule, develops cilia and swims off to attach itself else- where; Sphaerophrya (fig. viii. 2-6) alone,

often occurring as an endoparasite in Ciliata, may be free, tentaculate and unattached.

The ectosarc is usually provided with a firm pellicle which shows a peculiar radiate " milling " in optical section, so fine that its true nature is difficult to make out ; it may be due to radial rods, regularly imbedded, or may be the expression of radial vacuoles. The tentacles vary in many respects, but are always retractile. They are tubes covered by an extension of the pellicle; this is invaginated into the body round the base of the tentacle as a sheath, and then evaginated to form the outer layer of the tentacle itself, over which it is frequently raised into a spiral ridge, which may be traced down into the part sunk and ensheathed within the body: in Choanophrya, where the tentacles are largest, the pellicle is further continued into the interior of the tentacle. The tentacles are always pierced by a central canal opening at the apex, which may be (1) enlarged into a terrfiinal capitate sucker, (2) slightly flared, (3) truncate and closed in the resting state to become widely opened into a funnel, or (4) pointed. The tentacles are always capable of being waved from side to side, or turned in a definite direction for the reception or prehension of food; in Khyncheta, the movements of the long single tentacle recall those of an elephant's trunk, only they are more extensive and more varied. In the majority of cases the food consists of Ciliata : and the contents of the prey may be seen passing down the canal of the sucker beyond where it becomes free from the general surface. In Choanophrya the food appears to consist of the debris of the prey of the carnivorous host {Cyclops), which is sucked into the wide funnel-shaped mouths of the tentacles — by what mechanism is

Fig. viii. — Suctoria (in all a, meganucleus ; b, contractile vacuole).

1, Rhyncheta cyclopum, Zenker;

only a single tentacle and that suctorial; epizoic on Cyclops.

2, Sphaerophrya urostylae,MsLU-

pas; normal adult; para- sitic in Ciliate Urostyla.

3, The same dividing by trans-

verse fission, the anterior moiety with temporarily developed cilia. 4, 5, 6, Sphaerophrya stentorea, Maupas. Parasitic in Slentor, and at one time mistaken for its young. 7, Trichophrya epistylidis, CI.

and L. 8, Hemiophrya Hertwig. six buds, which a

gemmipara,

Example with

into each of

branch of the

meganucleus a is extended.

9, The same species, showing the two kinds of tentacles (the suctorial and the pointed), and two contrac- tile vacuoles b.

10, Ciliated embryo of Podophrya steinii, CI. and L.

1 1 , A cineta grandis, Saville Kent ; showing pedunculated cup, and animal with two bunches of entirely suc- torial tentacles.

12, Sphaerophrya magna, Mau- pas. It has seized with its tentacles, and is in the act of sucking out the

juices of six examples of the Ciliate Colpoda par- vifrons.

13, Podophrya elongata, CI. and

unknown. The endosarc is full of food-granules and reserve-granules (oil, colouring matter and proteid).

The meganucleus and the micronucleus are both usually single, but in Dendrosoma (fig. viii. 20), of which the body is branched, and the meganucleus with it, there are numerous micronuclei. In most cases the micronucleus has not been recorded, though from the similarity of conjugation, and its presence in most cases of fission and budding that have been accurately described, we may infer that it is always present. In unequal fission the meganucleus sends a process into the bud, while the micronucleus divides as in Ciliata. The bud may be nearly equal to the remains of the original animal, or much smaller, and in that case a depression surrounds it which may deepen so as to form a brood-cavity, either communicating by a mere " birth-pore " with the outside or entirely closed. In some cases the budding is multiple vfig- viii. 8), and a large number of buds are formed and

liberated at the same time. In all cases the bud escapes without tentacles, and possesses a characteristic supply of cilia, whose arrangement is constant for the species.

In some cases an adult may withdraw its tentacles, moult its pellicle and develop an equipment of cilia and swim away: this is the case with Dendrocometes, parasitic on Gammarus, when its host moults.

The numerous species of Suctoria, often so abundant on various species of Cyclops, are not found on the other fresh-water Copepoda, Diaptomus and Canthocamptus, belonging indeed to other families. Again, these Suctoria affect different positions, those found on the antennae not being present on the mouth parts; the ventral part of the thorax has another set ; and the inside of the pleural fold another. Rhyncheta occupies the front of the " couplers " or median down- growths uniting the coxopodites of the swimming legs, and Choano- phrya settles in the immediate neighbourhood of the mouth, preferably on the epistoma, labrum and metastomatic region, but also on the adoral appendages and in rare cases extends, when the settlement is extensive, to the bases of the two pairs of antennae; while distinct species of Podophrya settle on the antennae, the front of the thorax and the inside of the pleural folds. Dendrocometes is common on the gills of the freshwater shrimp (Amphipod) Gammarus and Stylocometes on the gills and gill-covers of the Isopod Asellus, the water-slater. The independence of the Acinetaria was threatened by the erroneous view of Stein that they were phases in the life-history of Vorticellidae. Small parasitic forms {Sphaerophrya) were also regarded erroneously as the " acinetiform young " of Ciliata. They now must be regarded as an extreme modification of the Protozoon series, in which the differentiation of organs in a unicellular animal reaches its highest point.

Principal Genera.

1. Unstalked simple forms. Urnula CI. and L., permanently ciliate ; Rhyncheta Zenker (fig. viii. 1) , on the limb couplers of Cyclops ; Sphaerophrya CI. and L. (fig. viii. 2-6, 12), endoparasitic in Ciliata and formerly taken for embryos thereof, never attached; Tricho-phrya CI. and L. (fig. viii. 7), of similar habits, but temporarily attached, sessile.

2. Stalked simple forms; Podophrya Ehr. (fig. viii. 10, 13, 16), tentacles all knobbed or flared; Ephelota Strethill Wright, tentacles all pointed; Hemiophrya S. Kent (fig. viii. 8, 9, 14), tentacles of both kinds; Choanophrya Hartog, tentacles thick, truncate, very retrac-

tile, when expanded opening into funnels for aspiration of floating prey, never for attachment — epizoic on antero-ventral parts of Cyclops.

3. Cupped forms; Solenophrya CI. and L., cup sessile; Acineta Ehr., cup stalked; Acinetopsis Butschli, like Acineta, but the cup flattened, closed distally with only slit-like apertures (" pylomes ") for the bundles of tentacles; Podocyathus, like Acineta, but with pointed as well as knobbed tentacles.

4. Tentacles in bundles at the tips of one or more processes or branches of the body. Ophryodendron CI. and L., tentaculiferous process single (fig. viii. 21); Dendrocometes Stein (fig. viii. 15), body rounded, processes repeatedly branched, epizoic on gills of Gammarus pulex; Dendrosoma Ehr. (fig. viii. 17-20), body freely branched from a basal attached stolon, meganucleus branching with the body.

Bibliography. — (a) Infusoria in the widest sense: C. E. Ehren- berg. Die Infusionstierchen als vollkommene Organismen (1838); F. Dujardin, Zoophytes infusoires (1841). (b) Infusoria, including Mastigophora : M. Perty, Zur Kenntniss Kleinster Lebensformen (1852); E. Claparede and J. Lachmann, Htudes sur les infusoires

14, Hemiophrya benedenii,

Fraip. ; the suctorial ten- tacles retracted.

15, Dendrocometes paradoxus,

Stein. Parasitic on Gam- marus pulex; captured prey.

16, A single tentacle of Podo-

phrya. R. Hertwig. 17-20, Dendrosoma radians, Ehr. : — 17, free-swimming cili- ated embryo. 1 8, Earliest

fixed condition of the embryo. 19, Later stage, a single tentaculiferous process now developed. 20, Adult colony; c, en-closed ciliated embryos; d, branching stolon; e, more minute reproductive (?) bodies. 21, Ophryodendron pedicettatum, Hincks.

**' les Rhitopodes (1858-1861); F. von Stein, Der Organismus der Infusionstiere (1 859-1 883) ; W. Saville Kent, A Manual of the Infusoria, including a description of all known Flagellate, Ciliate ind Tentaculiferous Protozoa (1880-1882). (c) Infusoria, as limited by Butschli. O. Biitschli, Bronn's Tierreich, vol. i. Protozoa, pt. 3 Infusoria (1887-1889), the most complete work existing, but without specific diagnoses; S. J. Hickson, " The Infusoria " in Lankester's Treatise on Zoology, vol. i. fasc. 2 (1903), a general account, well illustrated, with a diagnosis of all genera. See also Delage and Herouard, Traite de Zoologie concrete, vol. i. " La Cellule et les Protozoaires " (1896), with an illustrated conspectus of the genera; E. Maupas, " Recherches expenmentales sur la multiplication des Infusoires cilies," Arch. zool. exp. vi. (1888); and " Le Rajeunisse-ment karyogomique chez les Cilies," ib. vii. (1889); R. Sand, £tude monographique sur le groupe des Infusoires tentaculiferes (Suctoria), (1899), with diagnoses of species; A. Lang, Lehrb. der vergleich, Anatomie der wirbellosen Tiere, vol. i. " Protozoa " (1901) (a view of comparative anatomy, physiology and bionomics) ; Marcus Hartog, " Protozoa," in Cambridge Natural History, i. (1906) ; H. S. Jennings, Contributions to the Study of the Behaviour of Lower Organisms (1904) ; G. N. Calkins, " Studies on the Life History of Protozoa " (Life cycle of Paramecium), I. Arch. Entw. xv. (1902), II. Arch. Prot. i. (1902), III. Biol. Bull. iii. (1902), IV. /. Exp. Zool. i.*

(1904). Numerous papers dealing especially with advances in structural knowledge have appeared in the Archiv fur Protistenkunde, founded by F. Schaudinn in (902. (M. Ha.)

INGEBORG [Ingeburge, Ingelburge, Ingelborg, Isem- burge, Dan. Ingib/org] (c. 1176-1237 or 1238), queen of France, was the daughter of Valdemar I., king of Denmark. She married in 1 193 Philip II. Augustus, king of France, but on the day after his marriage the king took a sudden aversion to her, and wished to obtain a separation. During almost twenty years he strained every effort to obtain from the church the declaration of nullity of his marriage. The council of Compiegne acceded to his wish on the 5th of November 1193, but the popes Celestine III. and Innocent III. successively took up the defence of the unfortunate queen. Philip, having married Agnes of Meran in June 1 196, was excommunicated, and as he remained obdurate, the kingdom was placed under an interdict. Agnes was finally sent away, but Ingeborg, shut up in the chateau of Etampes, had to undergo all sorts of privations and vexations. The king attempted to. induce her to solicit a divorce herself, or to enter a convent. At last, however (1213), hoping perhaps to justify by his wife's claims his pretensions to England, Philip was reconciled with Ingeborg, whose life from henceforth was devoted to religion. She survived him more than fourteen years, passing the greater part of the time in the priory of St Jean at Corbeil, which she had founded.

See Robert Davidson, Philip II. August von Vranhreich und Ingeborg (Stuttgart, 1888); and E. Michael, " Zur Geschichte der Konigin Ingelborg " in the Zeitschrift fur Katholische Theologie (1890).

INGELHEIM (Ober-Ingelheim and Nieder-Ingelheim), the name of two contiguous market-towns of Germany, in the grand-duchy of Hesse-Darmstadt, on the Selz, near its confluence with the Rhine, 9 m.W.N.W. of Mainz on the railway to Coblenz. Ober-Ingelheim, formerly an imperial town, is still surrounded by walls. It has an Evangelical church with painted windows representing scenes in the life of Charlemagne, a Roman Catholic church and a synagogue. Its chief industry is the manufacture of red wine. Pop. (1900) 3402. Nieder-Ingelheim has an Evangelical and a Roman Catholic church, and, in addition to wine, manufactories of paper, chemicals, cement and malt. Pop.

3435-

Nieder-Ingelheim is, according to one tradition, the birthplace of Charlemagne, and it possesses the ruins of an old palace built by that

emperor between 768 and 774. The building contained one hundred marble pillars, and was also adorned with sculptures and mosaics sent from Ravenna by Pope Adrian I. It was extended by Frederick Barbarossa, and was burned down in 1 2 70, being restored by the emperor Charles IV. in 1354. Having passed into the possession of the elector palatine of the Rhine, the building suffered much damage during a war in 1462, the Thirty Years' War, and the French invasion in 1689. Only few remains of it are now standing; but of the pillars, several are in Paris, one is in the museum at Wiesbaden and another on the Schillerplatz in Mainz. Inside its boundaries there is

the restored Remigius Kirche, apparently dating from the time of Frederick I.

See Hilz, Der Reichspalast zu Ingelheim (Ober-Ingelheim, 1868); and Clemen, " Der Karolingische Kaiserpalast zu Ingelheim," in Westdeutsche Zeitschrift, Band ix. (Trier, 1890).

INGELOW, JEAN (1820-1897), English poet and novelist, was born at Boston, in Lincolnshire, on the 17th of March 1820. She was the daughter of William Ingelow, a banker of that town. As a girl she contributed verses and tales to the magazines under the pseudonym of " Orris," but her first (anonymous) volume, A Rhyming Chronicle of Incidents and Feelings, did not appear until her thirtieth year. This Tennyson said had " very charming things " in it, and he declared he should " like to know " the author, who was later admitted to his friendship. Miss Ingelow followed this book of verse in 1851 with a story, Allerton and Dreux, but it was the publication of her Poems in 1863 which suddenly raised her to the rank of a popular writer. They ran rapidly through numerous editions, were set to music, and sung in every drawing-room, and in America obtained an even greater hold upon public estimation. In 1867 she published The Story of Doom and other Poems, and then gave up verse for a while and became industrious as a novelist. Of the Skelligs appeared in 1872, Fated to be Free in 1873, Sarah de Berenger in 1880, and John Jerome in 1886. She also wrote Studies for Stories (1864), Stories told to a Child (1865), Mopsa the Fairy (1869), and other excellent stories for children. Her third series of Poems was published in 1885. She resided for the last years of her life in Kensington, and somewhat outlived her popularity as a poet. She died on the 20th of July 1S97. Her poems, which were collected in one volume in 1898, have often the genuine ballad note, and as a writer of songs she was exceed-ingly successful. " Sailing beyond Seas " and " When Sparrows build " in Supper at the Mill were deservedly among the most popular songs of the day; but they share, with the rest of her work, the faults

of affectation and stilted phraseology. Her best-known poem was the " High Tide on the Coast of Lincoln- shire," which reached the highest level of excellence. The blemishes of her style were cleverly indicated in a well-known parody of Calverley's; a false archaism and a deliberate assump- tion of unfamiliar and unnecessary synonyms for simple objects were among the most vicious of her mannerisms. She wrote, however, in verse with a sweetness which her sentiment and her hea r t inspired, and in prose she displayed feeling for character and the gift of narrative; while a delicate underlying tenderness is never wanting in either medium to her sometimes tortured expression. Miss Ingelow was a woman of frank and hospitable manners, with a look of the Lady Bountiful of a country parish. She had nothing of the professional authoress or the " literary lady" about her, and, as with characteristic simplicity she was accustomed to say, was no great reader. Her temperament was rather that of the improvisatore than of the professional author or artist.

INGEMANN, BERNHARD SEVERIN (1 789-1 862), Danish poet and novelist, was born at Torkildstrup, in the island of Falster, on the 28th of May 1789. He was educated at the grammar school at Slagelse, and entered the university of Copenhagen in 1806. His studies were interrupted by the English invasion, and or. the first night of the bombardment of the city Ingemann stood with the young poet Blicher on the walls, while the shells whistled past them, and comrades were killed on either side. All his early and unpublished writings were destroyed when the English burned the town. In i8fr he published his first volume of poems, and in 181 2 his second, followed in 1813 by a book of lyrics entitled Procne and in 1814 the verse romance, The Black Knights. In 181 5 he published two tragedies, Masaniello and Blanca, i'ollowed by The Voice in the Desert, The Shepherd of Tolosa, and other romantic plays. After a variety of publications, all very successful, he travelled in 1818 to Italy. At Rome he wrote The Liberation of Tasso, and returned in 1819 to Copenhagen. In 1820 he began to display his real power in a volume of delightful tales. In 1821 his dramatic career closed with the production of an unsuccessful

comedy, Magnetism in a Barber's Shop. In 1822 the poet was nominated lector in Danish language and literature at Soro College, and he now married. Valdemar the Great and his Men, an historical

epic, appeared in 1824. The next few years were occupied with his best and most durable work, his four great national and historical novels of Valdemar Seier, 1826; Erik Mcnvcd's Childhood, 1828; King Erik, 1833; and Prince Otto of Denmark, 1835. He then returned to epic poetry in Queen Margaret, 1836, and in a cycle of romances, Holger Danske, 1837. His later writings consist of religious and sentimental lyrics, epic poems, novels, short stories in prose, and fairy tales. His last publication was The Apple oj Gold, 1856. In 1846 Ingemann was nominated director of Sorb' College, a post from which he retired in 1849. He died on the 24th of February 1862. Inge- mann enjoyed during his lifetime a popularity unapproached even by that of Ohlenschlager. His boundless facility and fecundity, his sentimentality, his religious melancholy, his direct appeal to the domestic affections, gave him instant access to the ear of the public. His novels are better than his poems; of the former the best are those which are directly modelled on the manner of Sir Walter Scott. As a dramatist he outlived his reputation, and his unwieldy epics are now little read.

Ingemann's works were collected in 41 vols, at Copenhagen (1843-1865). His autobiography was edited by Galskjot in 1862; his correspondence by V. Heise (1879-1881); and his letters to Grundtvig by S. Grundtvig (1882). See also H. Schwanenfliigel, Ingemanns Liv og Digtning (1886); and Georg Brandes, Essays

(1889).

INGERSOLL, ROBERT GREEN (1833-1899), American lawyer and lecturer, was born in Dresden, New York, on the 1 ith of August 1833. His father was a Congregational minister, who removed to Wisconsin in 1843 and to Illinois in 1845. Robert, who had received a good common-school education, was admitted to the bar in 1854, and practised law with success in Illinois. Late in 1861, during the Civil War, he organized a cavalry regiment, of which he was colonel, until captured at Lexington, Tennessee, on the 18th of December 1862, by the Confederate cavalry under General N. B. Forrest. He was paroled, waited in vain to be exchanged, and in June 1863 resigned from the service. He was attorney-general of Illinois in 1867-1869, and in 1876 his speech in the Republican National Convention, naming James G. Blaine for the Presidential candidate, won him a national reputation as a public speaker. As a lawyer he distinguished himself particularly as counsel for the defendants in the " Star-Route Fraud " trials. He was most widely known, however, for his public lectures attacking the Bible, and his anti-Christian views were an obstacle to his political advancement. Ingersoll was an

eloquent rhetorician rather than a logical reasoner. He died at Dobbs Ferry, N.Y., on the 21st of July 1899.

His principal lectures and speeches were published under the titles: The Gods and Other Lectures (1876); Some Mistakes of Moses (1879); Prose Poems (1884); Great Speeches (1887). His lectures, entitled " The Bible," " Ghosts," and " Foundations of Faith," attracted particular attention. His complete works were published in 12 vols, in New York in 1900.

INGERSOLL, a town and port of entry of Oxford county, Ontario, Canada, 19 m. E. of London, on the river Thames and the Grand Trunk and Canadian Pacific railways. Pop. (1901) 4572. The principal manufactures are agricultural imple- ments, furniture, pianos and screws. There is a large export trade in cheese and farm produce.

INGHAM, CHARLES CROMWELL (1796-1863), American artist, was born in Dublin, Ireland. He was a pupil of the Dublin Academy, emigrated to the United States at the age of twenty- one, and immediately became identified with the art life of that country, being one of the founders of the National Academy of New York in 1826 and its vice-president from 1845 to 1850. He painted portraits of the reigning beauties of New York and acquired considerable reputation, continuing to practise his profession until his death, in New York, on the 10th of December 186 v

INGHIRAMI, the name of an Italian noble family of Volterra. The following are its most important members:

Tommaso Inghirami (1470-1516), a humanist, is best known for his Latin orations, seven of which were published in 1777. His success in the part of Phaedra in a presentation of Seneca's Hippolytus (or Phaedra) led to his being generally known as Fedra. He received high honours from Alexander VI., Leo X. and Maximilian I.

Francesco Inghirami (1772-1846), a distinguished archaeo- logist, fought in the French wars (1799), and afterwards devoted himself especially to the study of Etruscan antiquities. He founded a college at Fiesole and collected, though without critical insight, a mass of valuable material in his Monumenti etruschi (10 vols., 1820-1827), Galleria omerica (3 vols., 1829-1851), Pitture di vasifittili (1831-1837), Museo etrusco chiusino (2 vols., 1833), and the incomplete Sloria della Toscana (1841-1845): these works were elaborately illustrated.

His brother, Giovanni Inghirami (1779-1851), was an astronomer of repute. He was professor of astronomy at the Institute founded by Ximenes in Florence and published beside a number of text-books EJJemeridi dell' occultazione delle piccole slelle sotto la lima (1809-1830): EJfemeridi di Venese e Giove all' uso de' naviganti (1821-1824); Tavole astronomichi universali portatili (1 8 1 1) ; . Base trigonometrica m isurata in Toscana (1 8 1 8) ; Carta topografica e geometrica della Toscana (1830).

INGLEBY, CLEMENT MANSFIELD (1823-1886), English Shakespearian scholar, was born at Edgbaston, Birmingham, on the 29th of October 1823, the son of a solicitor. After taking his degree at Trinity College, Cambridge, he entered his father's office, eventually becoming a partner. In 1859 ne abandoned the law and left Birmingham to live near London. He contri- buted articles on literary, scientific and other subjects to various magazines, but from 1874 devoted himself almost entirely to Shakespearian literature. His first work in this field had been an exposure of the manipulations of John Payne Collier, entitled The Shakespeare Fabrications (1859); his work as a commentator began with The Still Lion (1874), enlarged in the following year into Shakespeare Hermeneutics. In this book many of the then existing difficulties of Shakespeare's text were explained. In the same year (1875) he published the Centurie of Prayse, a collection of references to Shakespeare and his works between 1592 and 1692. His Shakespeare: the Man and the Book was published in 1877-1881; he also wrote Shakespeare's Bones (1882), in which he suggested the disinterment of Shakespeare's bones and an examination of his skull. This suggestion, though not due to vulgar curiosity, was regarded, however, by public opinion as sacrilegious. He died on the 26th of September 1886, at Ilford, Essex. Although Ingleby's reputation now rests solely on his works on Shakespeare, he wrote on many other subjects. He was the author of hand-books on metaphysic and logic, and made some contributions to the study of natural science. He was at one time vice-president of the New Shakspere Society, and one of the original trustees of the " Birthplace."

INGLEFIELD, SIR EDWARD AUGUSTUS (1820-1894), British admiral and explorer, was born at Cheltenham, on the 27th of March 1820, and educated at the Royal Naval College, Portsmouth. His father was Rear-Admiral Samuel Hood Inglefield (1783-1848), and his grandfather Captain John Nicholson Inglefield (1748-1828), who served with Lord Hood against the French. The boy went to sea when fourteen, took part in the naval operations on the Syrian Coast in 1840, and in 1845 was promoted to the rank of commander for

gallant conduot at Obligado. In 1832 he commanded Lady Franklin's yacht " Isabel " on her cruise to Smith Sound, and his narrative of the expedition was published under the title of A Summer Search for Sir John Franklin (1853). He received the gold medal of the Royal Geographical Society on his return. and was given command of the " Phoenix," in which he made three trips to the Arctic, bringing home part of the Belcher Arctic expedition in 1834. In that year he was again sent out on the last attempt made by the Admiralty to find Sir John Franklin.

I11 the Crimean War Captain Inglefield took part in (he siege

of Sevastopol. He was knighted in 1877, and nominated a Knight Commander of the Bath ten years later. He was pro- moted admiral in 1879. Besides being an excellent marine artist, he was the inventor of the hydraulic steering gear and the Inglefield anchor. He died on the 5th of September 1894. His son, Captain Edward Fitzmaurice Inglefield (b. 1861), became secretary of Lloyds in 1906. Sir Edward Inglefield's brother, Rear-Admiral V. O. Inglefield, was the father of Rear-Admiral Frederick Samuel Inglefield (b. 1854), director of naval intelli- gence in 1902-1904, and of two other sons distinguished as soldiers.

INGLE-NOOK (from Lat. igniculus, dim. of ignis, fire), a corner or seat by the fireside, within the chimney-breast. The open Tudor or Jacobean fire-place was often wide enough to admit of a wooden settle being placed at each end of the embrasure of which it occupied the centre, and yet far enough away not to be inconveniently hot. This was one of the means by which the builder sought to avoid the draughts which must have been extremely frequent in old houses. English literature is full of references, appreciatory or regretful, to the cosy ingle-nook that was killed by the adoption of small grates. Modern English and American architects are, however, fond of devising them in houses designed on ancient models, and owners of old buildings frequently remove the modern grates and restore the original arrangement.

INGLIS, SIR JOHN EARDLEY WILMOT (1814-1862), British major-general, was born in Nova Scotia on the 15th of November 1814. His father was the third, and his grandfather the first, bishop of that colony. In 1833 he joined the 32nd Foot, in which all his regimental

service was passed. In 1837 he saw active service in Canada, and in 1848-1849 in the Punjab, being in command at the storming of Mooltan and at the battle of Gujrat. In 1857, on the outbreak of the Indian Mutiny, he was in command of his regiment at Lucknow. Sir Henry Lawrence being mortally wounded during the siege of the residency, Inglis took command of the garrison, and maintained a successful defence for 87 days against an overwhelming force. He was promoted to major-general and made K.C.B. After further active service in India, he was, in i860, given command of the British troops in the Ionian Islands. He died at Hamburg on the 27th of September 1862.

INGLIS, SIR WILLIAM (1764-1835), British soldier, was born in 1764, a member of an old Roxburghshire family. He entered the army in 1781. After ten years in America he served in Flanders, and in 1796 took part in the capture of St Lucia. In 1809 he commanded a brigade in the Peninsula, taking part in the battle of Busaco (1810) and the first siege of Badajoz. At Albuera his regiment, the 57th, occupied a most important position, and was exposed to a deadly fire. " Die hard! Fifty- Seventh," cried Inglis, '" Die hard ! " The regiment's answer has gone down to history. Out of a total strength of 579, 23 officers and 415 rank and file were killed and wounded. Inglis himself was wounded. On recovering, he saw further Peninsular service. In two engagements his horse was shot under him. His services were rewarded by the thanks of parliament and in 1825 he became lieutenant-general, and was made a K.C.B. After holding the governorships of Kinsale and Cork, he was, in 1830, appointed colonel of the 57th. He died at Ramsgate on the 29th of November 1835.

INGOLSTADT, a fortified town of Germany, in the kingdom of Bavaria, on the left bank of the Danube at its confluence with the Schutter, 52 m. north of Munich, at the junction of the main lines of railway, Munich, Bamberg and Regensburg- Augsburg. Pop. (1900) 22,207. The principal buildings are the old palace of the dukes of Bavaria-Ingolstadt, now used as an arsenal; the new palace on the Danube; the remains of the earliest Jesuits' college in Germany, founded in 1555; the former university buildings, now a school; the theatre; the large Gothic Frauenkirche, founded in 1425, with two massive towers, containing several interesting monuments, among them the tomb of Dr Eck, Luther's opponent; the Franciscan convent and nunnery; and several other churches and hospitals. Ingol-

stadt possesses several technical and other schools. In 1472 a university was founded in the town by the Bavarian duke, Louis the

Rich, which at the end of the 16th century was attended by 4000 students. In 1800 it was removed toLandshut, whence it was transferred to Munich in 1826. Its newer public buildings include an Evangelical church, a civil hospital, an arsenal and an orphanage. The industries are cannon-founding, manufacture of gunpowder and cloth, and brewing.

Ingolstadt, known as Aureatum or Chrysopolis, was a royal villa in the beginning of the 9th century, and received its charter of civic incorporation before 1255. After that date it grew in importance, and became the capital of a dukedom which merged in that of Bavaria-Munich. The fortifications, erected in 1539, were put to the test during the contests of the Reformation period and in the Thirty Years' War. Gustavus Adolphus vainly besieged Ingolstadt in 1632, when Tilly, to whom there is a monument in the Frauenkirche, lay mortally wounded within the walls. In the War of the Spanish Succession it was besieged by the margrave of Baden in 1704. In 1743 it was surrendered by the French to the Austrians, and in 1800, after three months' siege, the French, under General Moreau, took the town, and dis- mantled the fortifications. They were rebuilt on a much larger scale under King Louis I., and since 1870 Ingolstadt has ranked as a fortress of the first class. In 1872 even more important fortifications were constructed, which include tetes-de-pont with round towers of massive masonry, and the redoubt Tilly on the right bank of the river.

Sec Gerstner, Geschichte der Stadt Ingolstadt (Munich, 1853); and Prantl, Geschichte der Ludwig Maximilians Universitat (Munich,

1872).

INGOT, originally a mould for the casting of metals, but now a mass of metal cast in a mould, and particularly the small bars of the precious metals, cast in the shape of an oblong brick or wedge with slightly sloping sides, in which form gold and silver are handled as bullion at the Bank of England and the Mint. Ingots of varying sizes and shapes are cast of other metals, and " ingot-steel " and " ingot-iron " are technical terms in the manufacture of iron and steel (see Iron and Steel) . The word is obscure in origin. It occurs in Chaucer (" The Canon's Yeoman's Tale ") as a term of alchemy, in the original sense of a mould for casting metal, and, as the New English Dictionary points out, an English origin for such a term is unlikely. It may, however, be derived from in and the O. Eng. geotan to pour; cf. Ger. giessen and Einguss, a mould. The Fr. lingol, with the second English meaning only, has been taken as the origin of " ingot " and

derived from the Lat. lingua, tongue — with a supposed reference to the shape. This deriva- tion is wrong, and French etymologists have now accepted the English origin for the word, lingot having coalesced from V ingot. INGRAM, JAMES (1774-1850), English antiquarian and Anglo-Saxon scholar, was born near Salisbury on the 21st of December 1774. He was educated at Warminster and Winchester schools and at Trinity College, Oxford, of which he became a fellow in 1803. From 1803 to 1808 he was Rawlinsonian professor of Anglo-Saxon at Oxford, and in 1824 was made President of Trinity College and D.D. His time, however, was principally spent in antiquarian research, and especially in the study (' Anglo-Saxon, in which field he was the pre-eminent scholar of his time. He published in 1823 an edition of the Saxon Chronicle. His other works include admirable Memorials of Oxford (1832-1837), and The Church in the Middle Centuries (1842). He died on the 5th of September 1850.*

INGRAM, JOHN KELLS (1823-1907), Irish scholar and economist, was born in Co. Donegal, Ireland, on the 7th of July 1823. Educated at Newry School and Trinity College, Dublin, he was elected a fellow of his college in 184&. He held the professorship of Oratory and English Literature in Dublin University from 1852 to 1866, when he became regius professor of Greek. ' In 1879 he was appointed librarian. Ingram was remarkable for his versatility. In his undergraduate days he had written the well-known poem " Who fears to speak of Ninety- eight ? " and his Sonnets and other Poems (1900) reveal the

poetic sense. He contributed many important papers to mathe- matical societies on geometrical analysis, and did much useful work in advancing the science of classical etymology, notably in his Creek and Latin Etymology in England, The Etymology oj Liddell and Scott. His philosophical works include Outlines oj the History oj Religion (1900), Human Nature and Morals according to A. Comle (1901), Practical Morals (1904), and the Final Transition (1905). He contributed to the 9th edition of the Encyclopaedia Britannica an historical and biographical article on political economy, which was translated into nearly every European language. His History oj Slavery and Serjdom was also written for the 9th edition of the Encyclopaedia Britan- nica. He died in Dublin on the 18th of May 1907.

INGRES, JEAN AUGUSTE DOMINIQUE (1780-1867), French painter, was born at Montauban, on the 29th of August 1780. His father, for whom he entertained the most tender and respectful affection, has described himself as sculpteur en pldlre; he was, however, equally ready to execute every other kind of decorative work, and now and again eked out his living by taking portraits or obtained an engagement as a violin-player. He brought up his son to command the same varied resources, but in consequence of certain early successes — the lad's performance of a concerto of Viotti's was applauded at the theatre of Toulouse — his attention was directed chiefly to the study of music. At Toulouse, to which place his father had removed from Montauban in 1792, Ingres had, however, received lessons from Joseph Roques, a painter whom he quitted at the end of a few months to become a pupil of M. Vigan, professor at the academy of fine arts in the same town. From Vigan, Ingres, whose vocation became day by day more distinctly evident, passed to M. Briant, a landscape-painter who insisted that his pupil was specially gifted by nature to follow the same line as himself. For a while Ingres obeyed, but he had been thoroughly aroused and en-lightened as to his own objects and desires by the sight of a copy of Raphael's " Madonna della Sedia," and, having ended his con-nexion with Briant, he started for Paris, where he arrived about the close of 1 796. He was then admitted to the studio of David, for whose lofty standard and severe principles he always retained a profound appreciation. Ingres, after four years of devoted study, during which (1800) he obtained the second place in the yearly competition, finally carried off the Grand Prix (1801). The work thus rewarded — the " Ambassadors of Agamemnon in the Tent of Achilles " (Ecole des Beaux Arts) — was admired by Flaxman so much as to give umbrage to David, and was succeeded in the following year (1802) by the execution of a " Girl after Bathing," and a woman's portrait; in 1804 Ingres exhibited " Portrait of the First Consul " (Musee de Liege), and portraits of his father and himself; these were followed in 1806 by " Portrait of the Emperor " (luvalides), and portraits of M, Mme, and Mile Riviere (the first two now in the Louvre). These and various minor works were executed in Paris (for it was not until 1809 that the state of public affairs admitted of the re-establishment of the Academy of France at Rome), and they produced a disturbing impression on the public. It was clear that the artist was some one who must be counted with; his talent, the purity of his line, and his power of literal rendering were generally acknowledged; but he was reproached with a desire to be singular and extraordinary. " Ingres," writes Frau v. Hastfer (Leben und Kunst in Paris, 1806) " wird nach Italien gehen, und dort wird

er vielleicht vergessen dass er zu etwas Grossem geboren ist, und wird eben darum ein hohes Ziel erreichen." In this spirit, also, Chaussard violently attacked his " Portrait of the Emperor " {Pausanias Francais, 1806), nor did the portraits of the Riviere family escape. The points on which Chaussard justly lays stress are the strange discordances of colour — such as the blue of the cushion against which Mme Riviere leans, and the want of the relief and warmth of life, but he omits to touch on that grasp of his subject as a whole, shown in the portraits of both husband and wife, which already evidences the strength and sincerity of the passionless point of view which marks all Ingres's best productions. The very year after his arrival in Rome (1808) Ingres produced " Oedipus and

the Sphinx " (Louvre; lithographed by Sudre, engraved by Gaillard), a work which- proved him in the full possession of his mature powers, and began the" Venus Anadyomene " (Collection Rieset; engraving by Pollet), completed forty years later, and exhibited in 1855. These works were followed by some of his best portraits, that of M. Bochet (Louvre), and that of Mme la Comtesse de Tournon, mother of the prefect of the department of the Tiber; in 1811 he finished "Jupiter and Thetis," an immense canvas now in the Musee of Aix; in 1812 " Romulus and Acron " (Ecole des Beaux Arts), and " Virgil reading the Aeneid " — a composition very different from the version of it which has become popular through the engraving executed by Pradier in 1832. The original work, executed for a bedchamber in the Villa Aldobrandini-Miollis, contained neither the figures of Maecenas and Agrippa nor the statue of Marcellus; and Ingres, who had obtained possession of it during his second stay in Rome, intended to complete it with the additions made for engraving. But he never got beyond the stage of preparation, and the picture left by him, together with various other studies and sketches, to the Musee of his native town, remains half destroyed by the process meant for its regeneration. The " Virgil " was followed by the " Betrothal of Raphael," a small painting, now lost, executed for Queen Caroline of Naples; " Don Pedro of Toledo Kissing the Sword of Henry IV." (Collec- tion Deymie; Montauban), exhibited at the Salon of 1814, together with the " Chapelle Sistine " (Collection Legentil; lithographed by Sudre), and the " Grande Odalisque" (Collection Seilliere; lithographed by Sudre). In 18 15 Ingres executed " Raphael and the Fornarina " (Collection MmeN.de Rothschild; engraved by Pradier); in 1816 " Aretin " and the " Envoy of Charles V." (Collection Schroth), and " Aretin and Tintoret " (Collection Schroth); in 1817 the "Death of Leonardo" (engraved by Richomme) and " Henry IV. Playing with his Children " (engraved by

Richomme), both of which works were commissions from M. le Comte de Blacas, then ambassador of France at the Vatican. " Roger and Angelique " (Louvre; lithographed by Sudre), and " Francesca di Rimini " (Musee of Angers; lithographed by Aubry Lecomte), were completed in 1819, and followed in 1820 by " Christ giving the Keys to Peter " (Louvre). In 181 s, also, Ingres had made many projects for treating a subject from the life of the celebrated duke of Alva, a commission from the family, but a loathing for " cet horrible homme " grew upon him, and finally he abandoned the- task and entered in his diary — " J'etais force par la necessite de peindre un pareil tableau; Dieu a voulu qu'il restat en ebauche." During all these years Ingres's reputation in France did not increase. The interest which his " Chapelle Sistine " had aroused at the Salon of 18T4 soon died away; not only was the public indifferent, but amongst his brother artists Ingres found scant recognition. The strict classicists looked upon him as a renegade, and strangely enough Delacroix and other pupils of Guerin — the leaders of that romantic movement for which Ingres, throughout his long life, always expressed the deepest abhorrence — alone seem to have been sensible of his merits. The weight of poverty, too, was hard to bear. In 1813 Ingres had married; his marriage had been arranged for him with a young woman who came in a business-like way from Montauban, on the strength of the representations of her friends in Rome. Mme Ingres speedily acquired a faith in her husband which enabled her to combat with heroic courage and patience the difficulties which beset their common existence, and which were increased by their removal to Florence. There Bartolini, an old friend, had hoped that Ingres might have materially bettered his position, and that he might have aroused the Florentine school — a weak offshoot from that of David — to a sense of its own shortcomings. These expecta- tions were disappointed. The good offices of Bartolini, and of one or two other persons, could only alleviate the miseries of this stay in a town where Ingres was all but deprived of the means of gaining daily bread by the making of those small portraits for the execution of which, in Rome, his pencil had been constantly in request. Before his departure he had, however, been commissioned to paint for M. de Pastoret the " Entry of

Charles V. into Paris," and M. de Pastoret now obtained an order for Ingres from the Administration of Fine Arts; he was directed to treat the " Vceu de Louis XIII." for the cathedral of Montauban. This

work, exhibited at the Salon of 1824, met with universal approbation: even those sworn to observe the un- adulterated precepts of David found only admiration for the " Vceu de Louis XIII." On his return Ingres was received at Montauban with enthusiastic homage, and found himself celebrated throughout France. In the following year (1825) he was elected to the Institute, and his fame was further extended in 1826 by the publication of Sudre's lithograph of the " Grande Odalisque," which, having been scorned by artists and- critics alike in 1819, now became widely popular. A second commission from the government called forth the " Apotheosis of Homer," which, replaced by a copy in the decoration of the ceiling for which it was designed, now hangs in the galleries of the second storey of the Louvre. From this date up till 1834 the studio of Ingres was thronged, as once had been thronged the studio of David, and he was a recognized chef d'ecole. Whilst he taught with despotic authority and admirable wisdom, he steadily worked; and when in 1834 he produced his great canvas of the "Martyrdom of Saint Symphorien " (cathedral of Autun; lithographed by Trichot-Garneri), it was with angry disgust and resentment that he found his work received with the same doubt and indifference, if not the same hostility, as had met his earlier ventures. The suffrages of his pupils, and of one or two men — like Decamps — of undoubted ability, could not soften the sense of injury. Ingres resolved to work no longer for the public, and gladly availed himself of the opportunity to return to Rome, as director of the ficole de France, in the room of Horace Vernet. There he executed " La Vierge a 1'Hostie " (Imperial collections, St Petersburg), " Stratonice," " Portrait of Cherubini " (Louvre), and the " Petite Odalisque " for M. Marcotte, the faithful admirer for whom, in 1814, Ingres had painted the " Chapelle Sistine." The " Stratonice," executed for the duke of Orleans, had been exhibited at the Palais Royal for several days after its arrival in France, and the beauty of the composition produced so favourable an impression that, on his return to Paris in 1841, Ingres found himself received with all the deference that he felt to be his due. A portrait of the purchaser of " Stratonice " was one of the first works executed after his return; and Ingres shortly afterwards began the decora- tions of the great hall in the Chateau de Dampierre, which, unfortunately for the reputation of the painter, were begun with an ardour which gradually slackened, until in 1849 Ingres, having been further discouraged by the loss of his faithful and courageous wife, abandoned all hope of their completion, and the contract with the due de Luynes was finally cancelled. A minor work, " Jupiter and Antiope," marks the year 1851, but Ingres's next considerable undertaking (1853) was the " Apotheosis of Napoleon I.," painted

for the ceiling of a hall in the Hotel de Ville; " Jeanne d'Arc " (Louvre) appeared in 1854; and in 1855 Ingres consented to rescind the resolution, more or less strictly kept since i834,in favour of the International Exhibition, where a room was reserved for his works. Prince Napoleon, president of the jury, proposed an exceptional recom- pense for their author, and obtained from the emperor Ingres's nomination as grand officer of the Legion of Honour. With renewed confidence Ingres now took up and completed one of his most charming productions — "La Source" (Louvre), a figure of which he had painted the torso in 1823, and which seen with other works in London (1862) there renewed the general sentiment of admiration, and procured him, from the imperial government, the dignity of senator. After the completion of " La Source," the principal works produced by Ingres were with one or two exceptions (" Moliere " and " Louis XIV.," presented to the Theatre Francais, 1858; " Le Bain Turc," 1859), of a religious character; " La Vierge de 1'Adoption," 1858 (painted for Mile Roland-Gosselin), was followed by " La Vierge Couronnee " (painted for Mme la Baronne de Larinthie) and "La Vierge aux Enfans " (Collection Blanc); in 1859 these were followed by repetitions of " La Vierge a 1'Hostie "; and

in 1862 Ingres completed " Christ and the Doctors " (Musee Montauban), a work commissioned many years before by Queen Marie Amelie for the chapel of Bizy.

On the 17th of January 1867 Ingres died in his eighty-eighth year, having preserved his faculties in wonderful perfection to the last. For a moment only — at the time of the execution of the " Bain Turc," which Prince Napoleon was fain to exchange for an early portrait of the master by himself — Ingres's powers had seemed to fail, but he recovered, and showed in his last years the vigour which marked his early maturity. It is, however, to be noted that the " Saint Symphorien " exhibited in 1834 closes the list of the works on which his reputation wili chiefly rest; for " La Source," which at first sight seems to be an exception, was painted, all but the head and the extremities, in 182 1 ; and from those who knew the work well in its incomplete state we learn that the after-painting, necessary to fuse new and old, lacked the vigour, the precision, and the something like touch which distinguished the original execution of the torso. Touch was not, indeed, at any time a means of expression on which Ingres seriously calculated; his constant employment of local tint, in mass but faintly modelled in light by half tones, forbade recourse to the shifting effects of colour and light on which the Romantic school depended in indicating those fleeting aspects of things which they rejoiced to put on canvas; — their methods would have disturbed the

calculations of an art wholly based on form and line. Except in his " Sistine Chapel," and one or two slighter pieces, Ingres kept himself free from any preoccupation as to depth and force of colour and tone; driven, probably by the excesses of the Romantic movement into an attitude of stricter protest, " ce que Ton sait " he would repeat, " il faut le savoir l'epee a la main." Ingres left himself therefore, in dealing with crowded compositions, such as the " Apotheosis of Homer " and the " Martyrdom of Saint Symphorien," without the means of producing the necessary unity of effect which had been employed in due measure — as the Stanze of the Vatican bear witness — by the very master whom he most deeply reverr enced. Thus it came to pass that in subjects of one or two figures Ingres showed to the greatest advantage: in " Oedipus," in the " Girl after Bathing," the " Odalisque " and " La Source " — subjects only animated by the consciousness of perfect physical well-being — we find Ingres at his best. One hesitates to put " Roger and Angelique " upon this list, for though the female figure shows the finest qualities of Ingres's work, — deep study of nature in her purest forms, perfect sincerity of intention and power of mastering an ideal conception — yet side by side with these the effigy of Roger on his hippogriff bears witness that from the passionless point of view, which was Ingres's birthright, the weird creatures of the fancy cannot be seen.

A graphic account of " Ingres, sa vie et ses travaux," and a complete catalogue of his works, were published by M. Delaborde in 1870, and dedicated to Mme Ingres, nee Ramel, Ingres's devoted second wife, whom he married in 1852. Allusions to the painter's early days will be found in Delecluze's Louis David; and amongst less important notices may be cited that by Theophile Silvestre in his series of living artists. Most of Ingres's important works are engraved in the collection brought out by Magimel. (E. F. S. D.)

INGRESS (Lat. ingressus, going in), entrance as opposed to exit or egress; in astronomy, the apparent entrance of a smaller body upon the disk of a larger one, as it passes between the latter and the observer; in this sense it is applied especially to the beginning of a transit of a satellite of Jupiter over the disk of the planet.

INHAMBANE, a seaport of Portuguese East Africa in 23 50′ S., 35° 25′ E. The town, which enjoys a reputation for healthiness, is finely situated on the bank of a river of the same name which empties into a bay also called Inhambane. Next to Mozambique Inhambane, which dates from the middle of the 16th century, is architecturally the most important town in Portuguese East Africa. The chief buildings are the fort, churches and mosque. The principal church is

built with stone and marble brought from Portugal. The population, about 4000 in 1909, is of a motley character: Portuguese and other Europeans, Arabs, Banyans, half-castes and negroes. Its commerce was formerly

mostly in ivory and slaves. In 1834 Inhambane was taken and all its inhabitants save ten killed by a Zulu horde under Manikusa (see Gaz aland). It was not until towards the close of the 19th century that the trade of the town revived. The value of ex- ports and imports in 1907 was about £150,000. The chief exports are wax, rubber, mafureira and other nuts, mealies and sugar. Cotton goods and cheap wines (for consumption by natives) are the principal imports. The harbour, about 9 m. long by 5 wide, accommodates vessels drawing 10 to 12 ft. of water. The depth of water over the bar varies from 17 to 28 ft., and large vessels discharge into and load from lighters. Inhambane is the natural port for the extensive and fertile district between the Limpopo and Sabi rivers. This region is the best recruiting ground for labourers in the Rand gold mines. Mineral oils have been found within a short distance of the port.

INHERITANCE. In English law, inheritance, heir and other kindred words have a meaning very different from that of the Latin hacres, from which they are derived. In Roman law the heir or heirs represented the entire legal personality of the deceased — his universum jus. In English law the heir is simply the person on whom the real property of the deceased devolves by operation of law if he dies intestate. He has nothing to do as heir with the personal property; he is not appointed by will; and except in the case of coparceners he is a single individual. The Roman haeres takes the whole estate; his appointment may or may not be by testament; and more persons than one may be associated together as heirs.

The devolution of an inheritance in England is now regulated by the rules of descent, as altered by the Inheritance Act 1833, amended by the Law of Property Amendment Act 1859.

1. The first rule is that inheritance shall descend to the issue of the last " purchaser." A purchaser in law means one who acquires an estate otherwise than by descent, e.g. by will, by gratuitous gift, or by purchase in the ordinary meaning of the word. This rule is one of the changes introduced by the Inheritance Act, which further

provides that " the person last entitled to the land shall be considered the purchaser thereof unless it be proved that he inherited the same." Under the earlier law descent was traced from the last person who had " seisin " or feudal possession, and it was occasionally a troublesome question whether the heir or person entitled had ever, in fact, acquired such possession. Now the only inquiry is into title, and each person entitled is presumed to be in by purchase unless he is proved to be in by descent, so that the stock of descent is the last person entitled who cannot be shown to have inherited. 2. The male is admitted before the female. 3. Among males of equal degree in consanguinity to the purchaser, the elder excludes the younger; but females of the same degree take together as " coparceners." 4. Lineal descendants take the place of their ancestor. Thus an eldest son dying and leaving issue would be represented by such issue, who would exclude their father's brothers and sister's. 5. If there are no lineal descen- dants of the purchaser, the next to inherit is his nearest lineal ancestor. This is a rule introduced by the Inheritance Act. Under the former law inheritance never went to an ancestor — collaterals, however remote of the person last seized being pre- ferred even to his father. Various explanations have been given of this seemingly anomalous rule — Bracton and Blackstone being content to say that it rests on the law of nature, by which heavy bodies gravitate downwards. Another explanation is that estates were granted to be descendible in the same way as an ancient inheritance, which having passed from father to son ex necessitate went to collaterals on failure of issue of the person last seized. 6. The sixth rule is thus expressed by Joshua Williams in his treatise on The Law of Real Property: —

" The father and all the male paternal ancestors of the purchaser and their descendants shall be admitted before any of the female paternal ancestors or their heirs; all the female paternal ancestors and their heirs before the mother or any of the maternal ancestors or her or their descendants ; and the mother and all the male maternal ancestors and her and their descendants before any of the female maternal ancestors or their heirs."

7. Kinsmen of the half-blood may be heirs; such kinsmen shall inherit next after a kinsman in the same degree of the whole blood, and after the issue of such kinsman where the common ancestor is a male and next after the common ancestor where such ancestor is a female. The admission of kinsmen of the half- blood into the chain of descent is an alteration made by the Inheritance Act. Formerly a relative, however nearly connected in blood with the purchaser through one only and not both parents, could never inherit — a half-brother for

example.

8. In the admission of female paternal ancestors, the mother of the more remote male paternal ancestor and her heirs shall be preferred to the mother of the less remote male paternal and her heirs; and, in the case of female maternal ancestors, the mother of the more remote male maternal ancestor shall be preferred to the mother of a less remote male maternal ancestor. This rule, following the opinion of Blackstone, settles a point much disputed by text-writers, although its importance was little more than theoretical. 9. When there shall be a total failure of heirs of the purchaser, or when any lands shall be descendible as if an ancestor had been the purchaser thereof, and there shall be a total failure of the heirs of such ancestor, then and in every such case the descent shall be traced from the person last entitled to the land as if he had been the purchaser thereof. This rule is enacted by the Law of Property Amendment Act 1859. It would apply to such a case as the following: Purchaser dies intestate, leaving a son and no other relations, and the son in turn dies intestate; the son's relations through his mother are now admitted by this rule. If the purchaser is illegitimate, his only relations must necessarily be his own issue. Failing heirs of all kinds, the lands of an intestate purchaser, not alienated by him, would revert by " escheat " to the next immediate lord of the fee, who would generally be the crown. If an intermediate lordship could be proved to exist between the crown and the tenant in fee simple, such intermediate lord would have the escheat. But escheat is a matter of rare occurrence.

The above rules apply to all freehold land whether the estate therein of the intestate is legal or equitable. Before 1884, if a sole trustee had the legal estate in realty, and his cestui que trust died intestate and without heirs, the land escheated to the trustee. This distinction was abolished by the Intestate Estates Act 1884.

The descent of an estate in tail would be ascertained by such of the foregoing rules as are not inapplicable to it. By the form of the entail the estate descends to the "issue" of the person to whom the estate was given in tail — in other words, the last purchaser. The preceding rules after the fourth, being intended for the ascertainment of heirs other than those by lineal descent, would therefore not apply; and a special limitation in the entail, such as to heirs male or female only, would render unnecessary some of the others. When the entail has been barred, the estate descends according to these rules. In copyhold estates descent, like other incidents thereof, is regulated by the custom of each particular manor; e.g. the youngest son may

exclude the elder sons. How far the Inheritance Act applies to such estates has been seriously disputed. It has been held in one case (Muggleton v. Barnett) that the Inheritance Act, which orders descent to be traced from the last purchaser, does not override a manorial custom to trace descent from the person last seized, but this position has been -controverted on the ground that the act itself includes the case of customary holdings.

Husband and wife do not stand in the rank of heir to each othef . Their interests in each other's real property, are secured by courtesy and dower.

The personal property of a person dying intestate devolves according to an entirely different set of rules (see Intestacy).

In Scotland the rules of descent differ from the above in several particulars. Descent is traced, as in England before the Inheri- tance Act, to the person last seized. The first to succeed are the lineal descendants of the deceased, and the rules of primogeniture, preference of males to females, equal succession of females (heirs-portioners), and representation of ancestors are generally the same as in English law. Next to the lineal descendants, and failing them,

come the brothers and sisters, and their issue as collaterals. Failing collaterals, the inheritance ascends to the father and his relations, to the entire exclusion of the mother and her relations. Even when the estate has descended from mother to son, it can never revert to the maternal line. As to succession of brothers, a distinction must be taken between an estate of heritage and an estate of conquest. Conquest is where the deceased has acquired the land otherwise than as heir, and corresponds to the English term purchase in the technical sense explained. Heritage is land acquired by deceased as heir. The distinction is important only in the case when the heir of the deceased is to be sought among his brothers; when the descent is lineal, conquest and heritage go to the same person. And when the brothers are younger than the deceased, both conquest and heritage go to the brother (or his issue) next in order of age. But when the deceased leaves an elder and a younger brother (or their issues), the elder brother takes the conquest, the younger takes the heritage. Again, when there are several elder brothers, the one next in age to the deceased takes the conquest before the more remote, and when

there are several younger brothers, the one next to the deceased takes the heritage before the more remote. When heritage of the deceased goes to an elder brother (as might happen in certain eventualities), the younger of the elder brothers is preferred. The position of the father, after the brothers and sisters of the deceased, will be noticed as an important point of difference from the English axioms; so also is the total exclusion of the mother and the maternal line. As between brothers and sisters the half-blood only succeeds after the full blood. Half-blood is either consanguinean, as between children by the same father, or uterine, as between children having the same mother. The half-blood uterine is excluded altogether. Half-blood consanguinean succeeds thus: if the issue is by a former marriage, the youngest brother (being nearest to the deceased of the consan- guinean) succeeds first; if by a later marriage than that from which the deceased has sprung, the eldest succeeds first.

United Stales. — American law has borrowed its rules of descent considerably more from the civil law than the common law. "The 118 novel of Justinian has a striking resemblance to American law in giving the succession of estates to all legitimate children without distinction and disregarding all considerations of primogeniture. There is one particular in which the American law differs from that of Justinian, that while generally in this country lineal descendants if they stand in an equal degree from the common ancestor share equally per capita, under the Roman law regard was had to the right of representation, each lineal branch of descendants taking only the portion which their parent would have taken had he been living, the division being per stirpes and not per capita. But in some of the states the rule of the Roman law in this respect has been adopted and retained. Among these are Rhode Island, New Jersey, North and South Carolina, Alabama and Louisiana " (3 Washburn's Real Property, pp. 408, 409; 4 Kent's Cornm. p. 375). When such lineal descendants stand in unequal degrees of consanguinity the inheritance is per stirpes and not per capita {In re Prote, 1907; 104, X.Y. Supplement 581). This is the rule in practically all the states. But as in no two states or territories are the rules of descent identical, the only safe guides are the statutes and decisions of the particular state in which the land to be inherited is situated. The law of primogeniture as understood in England is generally abolished throughout the United States, and male and female relatives inherit equally. In some states, as in Massachusetts, relatives of the half-blood inherit equally with those of the whole-blood of the same degree; in others, like Maryland, they can inherit only in case none of whole-blood exist. In some of the states the English rule that

natural children have no inheritable blood has been greatly modified. In Louisiana, if duly acknowledged, they may inherit from both father and mother in the absence of lawful issue. Degrees of kindred in the United States generally are computed accord- ing to the civil law, i.e. by adding together the number of degrees between each of the two persons whose relationship is to be ascertained and the common ancestor. Thus, relation- ship between two brothers is in the second degree; between uncle and nephew in the third degree; between cousins, in the fourth, &c.

In a few states such degrees are computed according to the common law, i.e. by counting from the common ancestor to the most remote descendant of the two from him — thus, brothers would be related in the first degree, uncle and nephew in the second, &c. In most states representation amongst collaterals is restricted — in some to the descendants of brothers and sisters, in others to their children cnly.

In some states, e.g. in California, Louisiana and Texas, the law of " community property " of husband and wife prevails. This is derived from the French and Spanish law existing in the territories out of which those states were formed, as the result of theconquestof Mexico by Spain and the colonizing of Louisiana by France. The foundation idea is an equal division at death of either party of all property acquired during their marriage except by gift, devise or descent. In general the husband has the control and management thereof during the marriage, and either survivor has the administra- tion of the moiety of the one deceased. There is a conflict in the laws in such states as to the exact definition and as to whether or not the gains or profits of such property are to be deemed separate property or community property [Succession of Dielman (Louisiana, 1907), 43 Southern Rep. 972].

INHIBITION (from Lat. inhibere, to restrain, prevent), an act of restraint or prohibition, an English legal term, particularly used in ecclesiastical law, for a writ from a superior to an inferior court, suspending proceedings in a case under appeal, also for the suspension of a jurisdiction of a bishop's court on the visita- tion of an archbishop, and for that of an archdeacon on the visitation of a bishop. It is more particularly applied to a form of ecclesiastical censure, suspending an offending clergyman from the performance of any service of the Church, or other spiritual duty, for the purpose of enforcing obedience to a monition or order of the bishop or judge. Such inhibitions are at the discre- tion of the ordinary if he considers that scandal might arise from the performance of spiritual duties by the offender (Church Discipline Act i860, re-enacted by the Clergy

Discipline Act 1892, sect. 10). By the Sequestration Act 1871, sect. 5, similar powers of inhibition are given where a sequestration remains in force for more than six months, and also, by the Benefices Act 1898, in cases where a commission reports that the ecclesiastical duties of a benefice are inadequately performed through the negligence of the incumbent.

INISFAIL, a poetical name for Ireland. It is derived from Paul or Lia-fail, the celebrated stone, identified in Irish legend with the stone on which the patriarch Jacob slept when he dreamed of the heavenly ladder. The Lia-fail was supposed to have been brought to Ireland by the Dedannans and set up at Tara as the " inauguration stone " of the Irish kings; it was subsequently removed to Scone where it became the coronation stone of the Scottish kings, until it was taken by James VI. of Scotland to Westminster and placed under the coronation chair in the Abbey, where it has since remained. Inisfail was thus the island of the Fail, the island whose monarchs were crowned at Tara on the sacred inauguration stone.

INITIALS (Lat. initialis, of or belonging to a beginning, iniiium), the first letters of names. In legal and formal docu- ments it is usually the practice in appending a signature to write the name in full. But this is by no means necessary, even in cases where a signature is expressly required by statute. It has been held that it is sufficient if a person affixes to a document the usual form in which he signs his name, with the intent that it shall be treated as his signature. So, signature by initials is a good signature within the Statute of Frauds {Phillimore v. Barry, 1818, 1 Camp. 513), and also under the Wills Act 1837 {In re Blewitt, 1880, 5 P.D. 116).

INITIATION (Lat. initium, beginning, entrance, from inire, to go in), the process of formally entering, and especially the rite of admission into, some office, or religious or secret society, &c. Among nearly all primitive races initiatory rites of a bloody character were and are common. The savage pays homage to strength, and the purpose of his initiatory rites is to test physical vigour, self-control and the power of enduring pain. Initiation is sometimes religious, sometimes social, but in primitive society it has always the same character. Thus, in Whydah (West Africa) the young girls consecrated to the worship of the serpent, " the brides of the Serpent," had figures of flowers and animals burnt into their skins with hot irons; while in the neighbouring Yorubaland the power of enduring a sound thrashing is the qualification for the throne. In no country was the practice of initiatory rites more general than in the Americas. The Colombian Indians compelled their would-be chief to submit to terrible tests. He

had first to bear severe beatings without a murmur. Then, placed in a hammock with his hands tied,

venomous ants were placed on his naked body. Finally a fire was lit beneath him. All this he had to bear without flinching. In ancient Mexico there were several orders of chivalry, entry into which was only permitted after brutal initiation. The nose of the candidate was pierced with an eagle's talon or a pointed bene, and he was expected to dig knives into his body. In Peru the young Inca princes had to fast and live for weeks without sleep. Among the North American Indians initiatory rites were universal. The Mandans held a feast at which the young " braves " supported the weight of their bodies on pieces of wood skewered through the muscles of shoulders, breasts and arms. With the Sioux, to become a medicine-man, it was necessary to submit to the ordeal known as " looking at the sun." The sufferer, nearly naked, was bound on the earth by cords passed through holes made in the pectoral muscles. With bow and arrow in hand, he lay in this position all day gazing at the sun. Around him his friends gathered to applaud his courage. Religious brotherhoods of antiquity, too, were to be entered only after long and complicated initiation. But here the char- acter of the ordeal is rather moral than physical. Such were the rites of admission to the Mysteries of Isis and Eleusis. Secret societies of all ages have been characterized by more or less elaborate initiation. That of the Femgerichte, the famous medieval German secret tribunal, took place at night in a cave, the neophyte kneeling and making oath of blind obedience. Imitations of such tests are perpetuated to-day in freemasonry; while the Mafia, the Camorra, the Clan-na-Gael, the Molly Maguires, the Ku-Klux lUan, are among more recent secret associations which have maintained the old idea of initiation.

INJECTOR (from Lat. injicere, to throw in), an appliance for supplying steam-boilers with water, and especially used with locomotive boilers. It was invented by the French engineer H. V. Giffard in 1858, and presents the paradox that by the pressure of the steam in the boiler, or even, as in the case of the exhaust steam injector, by steam at a much lower pressure, water is forced into the boiler against that pressure. A dia- grammatic section illustrating its construc- tion is shown in figure. Steam enters at A and blows through the annular orifice C, the size of which can be regulated by a valve not shown in the figure. The feed water flows in at B and

meeting the steam at C causes it to condense. Hence a vacuum is produced at C, and consequently the water rushes in with great velocity and streams down the combining cone D, its velocity being augmented by the impact of steam on the back of the column. In the lower part of the nozzle E the stream expands; it therefore loses velocity and, by a well-known hydrodynamic principle, gains pressure, until at the bottom the pressure is so great that it is able to enter the boiler through a check valve which opens only in the direction of the stream. An overflow pipe F, by providing a channel through which steam and water may escape before the stream has acquired sufficient energy to force its way into the boiler, allows the injector to start into action. Means are also pro- vided for regulating the amount of water admitted between D and C. In the exhaust-steam injector, which works with steam from the exhaust of non-condensing engines, the steam orifice is larger in proportion to other parts than in injectors working with boiler steam, and the steam supply more liberal. In self-starting injectors an arrangement is provided which permits free overflow until the injector starts into action, when the openings are automatically adjusted to suit delivery into the boiler.

INJUNCTION (from Lat. injungere, to fasten, or attach to, to lay a burden or charge on, to enjoin), a term- meaning generally a command, and in English law the name for a judicial process whereby a party is required to refrain from doing a particular thing according to the exigency of the writ. Formerly it was a remedy peculiar to the court of chancery, and was one

of the instruments by which the jurisdiction of that court was established in cases over which the courts of common law were entitled to exercise control. The court of chancery did not presume to interfere with the action of the courts, but, by direct- ing an injunction to the person whom it wished to restrain from following a particular remedy at common law, it effected the same purpose indirectly. Under the present constitution of the judicature, the injunction is now equally available in all the divisions of the high court of justice, and it can no longer be used to prevent an action in any of them from proceeding in the ordinary course.

Although an injunction is properly a restraining order, there are instances in which, under the form of a prohibition, a positive order to do something is virtually expressed. Thus in a case of nuisance an injunction was obtained to restrain the defendant from preventing water from flowing in such regular quantities as it had ordinarily done before the day on which the nuisance commenced. But

generally, if the relief prayed for is to compel something to be done, it cannot be obtained by injunction, although it may be expressed in the form of a prohibition — as in the case in which it was sought to prevent a person from discontinuing to keep a house as an inn. The injunction was used to stay proceedings in other courts " wherever a party by fraud, accident, mistake or otherwise had obtained an advantage in proceeding in a court of ordinary jurisdiction, which must necessarily make that court an instrument of injustice." As the injunction operates personally on the defendant, it may be used to prevent applications to foreign judicatures; but it is not used to prevent applications to parliament, or tc the legis- lature of any foreign country, unless such applications be in breach of some agreement, and relate to matters of private interest. In so far as an injunction is used to prohibit acts, it may be founded either on an alleged contract or on a right independent of contract. The jurisdiction of the court to prevent breaches of contract has been described as supplemental to its power of compelling specific performance; i.e. if the court has power to compel a person to perform a contract, it will interfere to prevent him from doing anything in violation of it. But even when it is not within the power of the court to compel specific performance, it may interfere by injunction; thus, e.g. in the case of an agreement of a singer to perform at the plaintiff's theatre and at no other, the court, although it could not compel her to sing, could by injunction prevent her from singing elsewhere in breach of her agreement.

An injunction may as a general rule be obtained to prevent acts which are violations of legal rights, except when the same may be adequately remedied by an action for damages at law. Thus the court will interfere by injunction to prevent waste, or the destruction by a limited owner, such as a tenant for life, of things forming part of the inheritance. Injunctions may also be obtained to prevent the continuance of nuisances, public or private, the infringement of patents, copyrights and trade marks. Trespass might also in certain cases be prevented by injunction. Under the Common Law Procedure Act of 1854, and by other statutes in special cases, a limited power of injunc- tion was conferred on the courts of common law. But the Judicature Act, by which all the superior courts of common law and chancery were consolidated, enacts that an injunction may be granted by an interlocutory order of the court in all cases in which it shall appear to be just or convenient; . . . and, if an injunction is asked either before or at or after the hear- ing of any cause or matter, to prevent any threatened or appre- hended waste or trespass, such injunction may be granted whether the person against

whom it is sought is or is not in possession under any claim of title or otherwise, or if not in possession does or does not claim to do the act sought to be restrained under colour of any title, and whether the estates claimed are legal or equitable.

An injunction obtained on interlocutory application during the progress of an action is superseded by the trial. It may be continued either provisionally or permanently. In the latter case the injunction is said to be perpetual. The distinction

between " special " and " common " injunctions — the latter being obtained as of course — is now abolished in English law.

In the courts of the United States the writ of injunction remains purely an equitable remedy. It may be issued at the instance of the president to prevent any organized obstruction to inter-state commerce or to the passage of the mails (in re Debs, 158 United States Reports, 564). Temporary restraining orders may be issued, ex parte, pending an application for a temporary injunction. In the state courts temporary injunc- tions are often issued, ex parte, subject to the defendant's right to move immediately for their dissolution. Generally, however, notice of an application for a temporary injunction is required.

For the analogous practice in Scots law see Interdict.

INK (from Late Lat. encaustum, Gr. tyKamrov, the purple ink used by Greek and Roman emperors, from eyKalav, to burn in), in its widest signification, a substance employed for producing graphic tracings, inscriptions, or impressions on paper or similar materials. The term includes two distinct conditions of pigment or colouring matter: the one fluid, and prepared for use with a pen or brush, as writing ink; the other a glutinous adhesive mass, printing ink, used for transferring to paper impressions from types, engraved plates and similar surfaces.

The ancient Egyptians prepared and used inks (Flinders Petrie discovered a papyrus bearing written characters as old as 2500 B.C.), and in China the invention of an ink is assigned to Tien-Tcheu, who lived between 2697 B.C. and 2597 B.C. These early inks were prepared from charcoal or soot mixed with gum, glue or varnish. Sepia (q.v.), the black pigment secreted by the cuttle-fish,

was used as a writing fluid by the Romans. The iron-gall ink, i.e. an ink prepared from an iron salt and tannin, appears to have been first described by the monk Theophilus, who lived in the nth century a.d., although Pliny, in the 1st century a.d., was acquainted with the blackening of paper containing green vitrioi by immersion in an infusion of nut-galls. Iron-gall inks, prepared by mixing extracts of galls, barks, &c, with green vitriol, subsequently came into common use, and in the 16th century recipes for their preparation were given in domestic encyclopaedias. Their scientific investigation was first made by William Lewis in 1748. The earlier iron-inks were essentially a suspension of the pigment in water. In the early part of the 19th century the firm of Stephens introduced the first of the so-called blue-black inks under the name of " Stephens' writing fluid." Solutions of green vitriol and tannin, coloured by indigo and logwood, were prepared, which wrote with a blue tint and blackened on exposure, this change being due to the production of the pigment within the pores of the paper. The " alizarine " inks, patented by Leonhardi in 1856, are similar inks with the addition of a little madder. The application of aniline colours to ink manufacture in England dates from Croc's patent of 1861.

Writing Inks. — Writing inks are fluid substances which contain colouring matter either in solution or in suspension, and com- monly partly in both conditions. They may be prepared in all shades of colour, and contain almost every pigment which can be dissolved or suspended in a suitable medium. The most important of all varieties is black ink, after which red and blue are most commonly employed. Apart from colour there are special qualities which recommend certain inks for limited applications, such as marking inks, ineradicable ink, sympathetic ink, &c. A good writing ink for ordinary purposes should continue limpid, and flow freely and uniformly from the pen; it should not throw down a thick sludgy deposit on exposure to the air; nor should a coating of mould form on its surface. It should yield distinctly legible characters immediately on writing, not fading with age; and the fluid ought to penetrate into the paper without spreading, so that the characters will neither wash out nor be readily removed by erasure. Further, it is desirable that ink should be non-poisonous, that it should as little as possible corrode steel pens, that characters traced in it should dry readily on the application of blotting paper

without smearing, and that the writing should not present a glossy, varnished appearance.

Tannin Inks. — These inks are prepared from galls, or other sources

of tannin, and a salt of iron, with the addition of some agglutinant . in the case of the so-called oxidized inks, or a colouring matter in the case of unoxidized inks. Such mixtures form the staple black inks of commerce; they are essentially an insoluble iron gallate in extremely fine division held in suspension in water or a soluble compound dissolved in water.

On long exposure to air, as in inkstands, or otherwise, tannin inks gradually become thick and ropy, depositing a slimy sediment. This change on exposure is inevitable, resulting from the gradual oxidation of the ferrous compound, and it can only be retarded by permitting access of air to as small surfaces as possible. The inks also have a tendency to become mouldy, an evil which may be obviated by the use of a minute proportion of carbolic acid; or salicylic acid may be used.

The essential ingredients of ordinary black ink are — first, tannin-yielding bodies, for which Aleppo or Chinese galls are the most eligible materials; second, a salt of iron, ferrous sulphate (green vitriol) being alone employed; and third, a gummy or mucilaginous agent to keep in suspension the insoluble tinctorial matter of the ink. For ink-making the tannin has first to be transformed into gallic acid. In the case of Aleppo galls this change takes place by fermentation when the solution of the galls is exposed to the air, the tannin splitting up into gallic acid and sugar. Chinese galls do not contain the ferment necessary for inducing this change; and to induce the process yeast must be added to their solution. To prepare a solution of Aleppo galls for ink-making, the galls are coarsely powdered, and intimately mixed with chopped straw. This mixture is thrown into a narrow deep oak vat, provided with a perforated false bottom, and having a tap at the bottom for drawing off liquid. Over the mixture is poured lukewarm water, which, percolating down, extracts and carries with it the tannin of the galls. The solution is drawn off and repeatedly run through the mixture to extract the whole of the tannin, the water used being in such proportion to the galls as will produce as nearly as possible a solution having 5% of tannin. The object of using straw in the extraction process is to maintain the porosity of the mixture, as powdered galls treated alone become so slimy with mucilaginous extract that liquid fails to percolate the mass. For each litre of the 5 % solution about 45 grammes of the iron salt are used, or about 100 parts of tannin for 90 parts of crystallized green vitriol. These ingredients when first mixed form a clear solution, but on their exposure to the air oxidation occurs, and an insoluble blue-black ferrosoferric gallate in extremely fine division, suspended in a coloured solution of ferrous

gallate, is formed. To keep the insoluble portion suspended, a mucilaginous agent is employed, and those most available are gum Senegal and gum arabic. An ink so prepared develops its intensity of colour only after some exposure; and after it has partly sunk into the paper it becomes oxidized there, and so mordanted into the fibre. As the first faintness of the characters is a disadvantage, it is a common practice to add some adventitious colouring matter to give immediate distinctness, and for that purpose either extract of logwood or a solution of indigo is used. When logwood extract is employed, a smaller proportion of extract of galls is required, logwood itself containing a large percentage of tannin. For making an unoxidized or blue-black ink indigo is dissolved in strong sulphuric acid, and the ferrous sulphate, instead of being used direct, is prepared by placing in this indigo solution a proper quantity of scrap iron. To free the solution from excess of uncombined acid, chalk or powdered limestone is added, whereby the free acid is fixed and a deposit of sulphate of lime formed. A solution so prepared, mixed with a tannin solution, yields a very limpid sea-green writing fluid, and as all the constituents remain in solution, no gum or other suspending medium is necessary. In consequence the ink flows freely, is easily dried and is free from the glossy appearance which arises through the use of gum.

China ink or Indian ink is the form in which ink was earliest prepared, and in which it is still used in China and Japan for writing with small brushes instead of pens. It is extensively used by architects, engineers and artists generally, and for various special uses. China ink is prepared in the form of sticks and cakes, which are rubbed down in water for use. It consists essentially of lamp-black in very fine condition, baked up with a glutinous substance; and the finer Oriental kinds are delicately perfumed. The following description of the manufacture as conducted in Japan is from a native source: —

" The body of the ink is soot obtained from pine wood or rosin, and lamp-black from sesamum oil for the finest sort. This is mixed with liquid glue made of ox-skin. This operation is effected in a large round copper bowl, formed of two spherical vessels, placed I in. apart, so that the space between can be filled up with hot water to prevent the glue from hardening during the time it is being mixed by hand with the lamp-black. The cakes are formed in wooden moulds,

and dried between paper and ashes. Camphor, or a peculiar mixture of scents which comes from China, and a small quantity of carthamine (the red colouring substance of safflower), are added to the best kinds for improving the colour as well as for scenting the ink. There is a great difference both in price and in quality of the various kinds of ink, the finest article being rather costly."

It is said that the size used in Chinese kinds is of vegetable origin.

Logwood Ink. — Under the name of chrome ink a black ink was discovered by Runge, which held out the promise of cheap- ness combined with many excellent qualities. It is prepared by dissolving 15 parts of extract of logwood in 900 parts of water, to which 4 parts of crystallized sodium carbonate' are added. A further solution of 1 part of potassium chromate (not bichromate) in 100 parts of water is prepared, and is added very gradually to the other solution with constant agitation. The ink so obtained possesses an intense blue-black colour, flows freely and dries readily, is neutral in reaction and hence does not corrode steel pens, and adheres to and sinks into paper so that manuscripts written with it may be freely washed with a sponge without danger of smearing or spreading. It forms a good copying ink, and it possesses all the qualities essential to the best ink; but on exposure to air it very readily undergoes decomposition, the colouring matter separating in broad flakes, which swim in a clear menstruum. It is affirmed by Viedt that this drawback may be overcome by the use of soda, a method first suggested by Bottger.

Logwood forms the principal ingredient in various other black inks used, especially as copying ink. A very strong decoction of logwood or a strong solution of the extract with ammonium- alum yields a violet ink which darkens slowly on exposure. Such an ink is costly, on account of the concentrated condition in which the logwood must be used. If, however, a metallic salt is introduced, a serviceable ink is obtained with the expendi- ture of much less logwood. Either sulphate of copper or sulphate of iron may be used, but the former, which produces a pleasing blue-black colour, is to be preferred. The following is the formula most highly recommended for this ink. A clear solution of 20 kilos of extract of logwood in 200 litres of water is obtained, to which is added, with agitation, 10 kilos of ammonium-alum dissolved in 20 litres of boiling water. The solution is acidified with 0-2 kilo of sulphuric acid, which has the effect of preventing any deposit, and finally there is added a solution of 15 kilos of sulphate of copper dissolved in 20 litres of water. This compound is exposed to the air for a few days to allow the colour to

develop by oxidation, after which it is stored in well-corked bottles. The acid condition of this ink has a corrosive influence on steel pens; in all other respects it is a most valuable writing fluid.

Aniline Inks. — Solutions of aniline dye-stuffs in water are widely used as inks, especially coloured varieties. They are usually fugitive. Nigrosine is a black ink, which, although not producing a black so intense as common ink, possesses various advantages. Being perfectly neutral, it does not attack pens; it can easily be kept of a proper consistency by making up with water; and its colour is not injuriously affected by the

action of acids. Its ready flow from stylographic pens led to the name " stylographic ink." Other aniline inks are mentioned below.

Copying Ink. — Ink which yields by means of pressure an impression, on a sheet of damped tissue paper, of characters written in it is called copying ink. Any ink soluble in water, or which retains a certain degree of solubility, may be used as copying ink. Runge's chrome ink, being a soluble compound, is, therefore, so available; and the other logwood inks as well as the ordinary ferrous gallate inks contain also soluble con- stituents, and are essentially soluble till they are oxidized in and on the paper after exposure to the air. To render these available as copying inks it is necessary to add to them a sub- stance which will retard the oxidizing effect of the air for some time. For this purpose the bodies most serviceable are gum arabic or Senegal, with glycerin, dextrin or sugar, which last, however, renders the ink sticky. These substances act by forming a kind of glaze or varnish over the surface of the ink which excludes the air. At the same time when the damp sheet of tissue paper is applied to the writing, they dissolve and allow a portion of the yet soluble ink to be absorbed by the moistened tissue. As copying ink has to yield two or more impressions, it is necessary that it should be made stronger, i.e. that it should contain more pigment or body than common ink. It, therefore, is prepared with from 30 to 40% less of water than non-copying kinds; but otherwise, except in the presence of the ingredients above mentioned, the inks are the same. Copying ink pencils consist of a base of graphite and kaolin impregnated with a very strong solution of an aniline colour, pressed into sticks and dried.

Red Ink. — The pigment most commonly employed as the basis of red ink is Brazil-wood. Such an ink is prepared by adding to a strong decoction of the wood a proportion of stannous chloride (tin spirits), and thickening the resulting fluid with gum arabic. In some instances

alum and cream of tartar are used instead of the stannous chloride. Cochineal is also employed as the tinctorial basis of red ink; but, while the resulting fluid is much more brilliant than that obtained from Brazil- wood, it is not so permanent. A very brilliant red ink may be prepared by dissolving carmine in a solution of ammonia, but this preparation must be kept in closely stoppered bottles. A useful red ink may also be made by dissolving the rosein of Brook, Simpson and Spiller in water, in the proportion of 1 to from 1 50 to 200 parts.

Blue Ink. — For the production of blue ink the pigment principally used is Prussian blue. It is first digested for two or three days with either strong hydrochloric acid, sulphuric acid or nitric acid, the digested mass is next very largely diluted with water, and after settling the supernatant liquid is siphoned away from the sediment. This sediment is repeatedly washed, till all traces of iron and free acid disappear from the water used, after which it is dried and mixed with oxalic acid in the proportion of 8 parts of Prussian blue to 1 of the acid, and in this condition the material is ready for dissolving in water to the degree of colour intensity necessary. An aniline blue ink may be prepared by dissolving 1 part of bleu de Paris in from 200 to 250 parts of water.

Marking Ink. — The ink so called, used principally for marking linen, is composed of a salt of silver, usually the nitrate, dissolved in water and ammonia, with a little provisional colouring matter and gum for thickening. The colour resulting from the silver salt is developed by heat and light; and the stain it makes, although exceedingly obstinate, gradually becomes a faint brownish-yellow. The following yields a good marking ink. Equal parts of nitrate of silver and dry tartaric acid arc triturated in a mortar, and treated with water, when a reaction takes place, resulting in the formation of tartrate of silver and the liberation of nitric acid. The acid is neutralized, and at the same time the silver tartrate is dissolved by the addition of ammonia, and this solution with colouring matter and gum forms the ink, which may be used with an ordinary steel pen.

Many vegetable juices, e g. of Coriana thymifolia, Semecarpus

INKERMAN, BATTLE OF

ynacardinm. Anacardium occidentale (Cashew), are inks of this

type-

Gold and silver inks are writing fluids in which gold and silver, or imitations of these metals, are suspended in a state of fine division. In place of gold, Dutch leaf or mosaic gold is frequently substituted, and bronze powders are used for preparing a similar kind of ink. The metallic foil is first carefully triturated into a fine paste with honey, after which it is boiled in water containing a little alkali, and then repeatedly washed in hot water and dried at a gentle heat. A solution is prepared consisting of i part of pure gum arabic and i part of soluble potash glass in 4 parts of distilled water, into which the requisite quantity of the metallic powder prepared is introduced. Owing to the superior covering nature of pure gold, less of the metal is required than is necessary in the case of silver and other foils. In general 1 part of foil to 3 or 4 parts of solution is sufficient. The metallic lustre of writing done with this solution may be greatly heightened by gently polishing with a burnishing point. Another gold ink depends upon the formation of purple of Cassius; the linen is mordanted with stannous chloride, and the gold applied as a gummy solution of the chloride.

Indelible or incorrodible ink is the name given to various combinations of lamp-black or other carbonaceous material with resinous substances used for writing which is exposed to the weather or to the action of strong acids or alkaline solutions. An ink having great resisting powers may be conveniently prepared by rubbing down Indian ink in common ink till the mixture flows easily from the pen. Other combinations have more the character of coloured varnishes.

Sympathetic inks are preparations used for forming characters which only become visible on the application of heat or of some chemical reagent. Many chemicals which form in themselves colourless solutions, but which develop colour under the influence of reagents, may be used as sympathetic ink, but they are of little practical utility. Characters written in a weak solution of galls develop a dark colour on being treated with a solution of copperas; or, vice versa, the writing may be done in copperas and developed by the galls solution. Writing done in various preparations develops colour on heating which fades as the paper cools. Among such substances are solutions of the chlorides of cobalt and of nickel. Very dilute solutions of the mineral acids and of common salt and a solution of equal parts of sulphate of copper and sal-ammoniac act similarly.

Writing with rice water and developing with iodine was a device much used during the Indian Mutiny.

Printing Inks. — Printing inks are essentially mixtures of a pigment and a varnish. The varnish is prepared from linseed oil, rosin and soap; the oil must be as old as possible; the rosin may be black or amber; and the soap, which is indispensable since it causes the ink to adhere uniformly to the type and also to leave the type clean after taking an impression, is yellow, or turpentine soap for dark inks, and curd soap for light inks. The varnish is prepared as follows: The oil is carefully heated until it " strings " properly, i.e. a drop removed from the vessel on a rod, when placed upon a plate and the rod drawn away, forms a thread about •]. in. long. The rosin is carefully and slowly added and the mixture well stirred. The soap is then stirred in. The ink is prepared by mixing the varnish with the pigment, and grindingthe massto impalpablefinenesseither inalevigating mill or by a stone and muller. For black ink, lamp-black mixed with a little indigo or Prussian blue is the pigment employed; for wood engravings it may be mixed with ivory black, and for copper plates with ivory or Frankfurt black; for lithographic reproductions Taris black is used. Red inks are made with carmine or cochineal; red lead is used in cheap inks, but it rapidly blackens. Blue inks are made with indigo or Prussian blue; yellow with lead chromate or yellow ochre; green is made by mixing yellow and blue; and purple by mixing red and blue.*

Sec C. A. Mitchell and T. C. Hepworth, Inks, their Composition and Manufacture (1904); S. Lehncr, Ink Manufacture (190?); A. K. Gouilion, linrres et cirages (1906) ; L. E. Ande- Schr'ih-, Kopicr-Httd amlerc Tinlcn (1906).*

INKERMAN, BATTLE OF, fought on the 5th of November 1854 between a portion of the Allied English and French army besieging Sevastopol and a B ussian army under Prince Menshikov (see Crimean War). This battle derives its name from a ruin on the northern bank of the river Tchernaya near its mouth, but it was fought some distance away, on a nameless ridge (styled Mount Inkerman after the event) between the Tchernaya and the Careenage Ravine, which latter marked the right of the siege- works directed against Sevastopol itself. Part of this ridge, called Home Ridge and culminating in a knoll, was occupied by the British, while farther to the south, facing the battleground of Balaklava, a corps under General Bosquet was posted to cover the rear of the besiegers against attacks from the direction of Traktir Bridge. The Russians arranged for a combined attack on

ii|g-f INKERMAN

txv- —

■iST^fi. ■■■·

NVV.v'J ..... , . ,

camp-' \V.i l -k

LIQHVV"vX CAMRJ

m

-y Jim

, GUARDS Jh-f-A) BRIGADE CAMPf.'/Vr-i

Emeiy W«!kcr sc.

the ridge above-mentioned by part of Menshikov's army (i6,oco) and a corps (19,000) that was to issue from Sevastopol. This attack was to have, beside its own field artillery, the support of fifty-four heavy guns, and the Russian left wing on the Balaklava battleground was to keep Bosquet occupied. If successful, the attack on the ridge was to be the signal for a general attack all along the line. It was apparently intended by Menshikov t}jat the column from the field army should attack the position from the north, and that the Sevastopol column should ad vance along the west side of the Careenage Ravine.. But he only appointed a commander to take charge of both columns at the last moment, and the want of a clear understanding as to what was to be done militated against success from the first. General Soimonov, with the Sevastopol column, after assembling his troops before dawn on the 5th, led them on to the upland east of Careenage Ravine, while the field army column, under General Pavlov, crossed the Tchernaya near its mouth, almost at right angles to Soimonov's line of advance.

574

INLAYING

The British troops on or near the ground were the 2nd Division, 3000, encamped on the ridge; Codrington's brigade of the Light Division, 1400, on the slopes west of the Careenage Ravine; and the Guards' brigade, 1350, about f- m. in rear of the 2nd Division camp.

No other forces, French or British, were within 2 m. except another part of Sir George Brown's Light Division. A mist overhung the field and the hillsides were slippery with mud. Soimonov, with his whole force deployed in a normal attack formation (three lines of battalion columns covered by a few hundred skirmishers) pushed forward along the ridge (6 a.m.) without waiting for Pavlov or for Dannenberg, the officer appointed to command the whole force. Shell Hill, guarded only by a picquet, was seized at once. The heavy guns that had been brought from the fortress were placed in position on this hill, and opened fire (7 a.m.) on the knoll, 1400 yds. to the S., behind which the 2nd Division was encamped. The Russian infantry halted for the guns to prepare the way, and the heavy projectiles both swept the crest of the British knoll and destroyed the camp in rear. But already General Pennefather, commanding the division, had pushed forward one body of his infantry after another down the forward slope, near the foot of which they encountered the Russians in great force. On his side, Soimonov had been compelled to break up his regular lines of columns at the narrowest part of the ridge and to push his battalions forward a few at a time. This and the broken character of the ground made the battle even in the beginning a melee. The obscurity of the mist, which had at first allowed the big battalions to approach unobserved, now favoured the weaker side. Soimonov himself, however, formed up some qooo men, who drove back the British left wing — for the whole of Pennefather's force at the time was no more than 3600 men. But the right wing, not as yet attacked, either by Soimonov or by Pavlov, held on to its positions on the forward slope, and a column of Russian sailors and marines, who had been placed under Soimonov's command and had moved up the Careenage Ravine to turn the British left, were caught, just as they emerged on to the plateau in rear of Pennefather's line, between two bodies of British troops hurrying to the scene of action. On the front, too, the Russian attack came to a standstill and ebbed, for Soimonov's overcrowded battalions jostled one another and dissolved on the narrow and broken plateau. Soimonov himself was killed, and the disciplined confidence and steady volleys of the defenders dominated the chaotic elan of the Russians. Thus 3300 defenders were able to repulse and even to " expunge from the battlefield " the whole of the Sevastopol column, except that portion of it which drifted away to its left and joined Pavlov. This stage of the battle had lasted about forty minutes. But, brilliant as was this overture, it is the second stage of the battle that gives it its epic interest.

The first attack made by Pavlov's advanced guard, aided by parts of Soimonov's corps, was relatively slight, but General Dannenberg now

arrived on the field, and arranged for an assault on the British centre and right, to be delivered by 10,000 men (half his intact forces) chiefly by way of the Quarry Ravine, the attack to be prepared by the guns on Shell Hill. Pennefather had been reinforced by the Guards' brigade and a few smaller units. Not the least extraordinary feature of the battle that followed is the part played by a sangar of stones at the head of Quarry Ravine and a small battery, called the Sandbag Battery, made as a temporary emplacement for two heavy guns a few days before. The guns had done their work and been sent back whence they came. Nevertheless these two insignificant works, as points to hold and lines to defend on an otherwise featureless battlefield, became the centres of gravity of the battle.

The sangar at first fell into the hands of the Russians, but they were soon ejected, and small British detachments reoccupied and held it, while the various Russian attacks flowed up and past it and ebbed back into the Quarry Ravine. Possession of the Sandbag Battery was far more fiercely contested. The right wing was defended by some 700 men of the 2nd Division, who were reinforced by 1300 of the Guards. The line of defence adjacent

to the battery looked downhill for about 300 yds., giving a clear field of fire for the new Enfield rifle the English carried; but a sharp break in the slope beyond that range gave the assailants plenty of " dead ground " on which to form up. For a time, therefore, the battle was a series of attacks, delivered with great fierceness by the main body of Pavlov's corps, the repulse of each being followed by the disappearance of the assailants. But the arrival of part of the British 4th Division under Sir George Cathcart gave the impulse for a counter-attack. Most of the division indeed had to be used to patch up the weaker parts of the line, but Cathcart himself with about 400 men worked his way along the lower and steeper part of the eastern slope so as to take the assailants of the battery in flank. He had not proceeded far, however, when a body of Russians moving higher up descended upon the small British corps and scattered it, Cathcart himself being killed. Other counter-strokes that his arrival had inspired were at the same time made from different parts of the defensive front, and had the effect of breaking up what was a solid line into a number of disconnected bands, each fighting for its life in the midst of the enemy. The crest of the position was laid open and parts of the Russian right wing seized it. But they were flung back to the lower slopes of the Quarry Ravine by the leading French regiment sent by Bosquet. This regiment was quickly followed by others. The last great assault was delivered with more pre- cision, if with less fury than the others, and had Dannenberg chosen to employ the

*9000 bayonets of his reserve, who stood idle throughout the day, to support the 6000 half-spent troops who made the attack, it would probably have been successful. **

As it was, supported by the heavy guns on Shell Hill, the assailants, though no longer more than slightly superior in numbers, carried not only the sangar, but part of the crest line of the allied position. But they were driven back into the Quarry Ravine, and, relieving the exhausted British, the French took up the defence along the edge of the ravine, which, though still not without severe fighting, they maintained till the close of the battle. Inkerman, however, was not a drawn battle. The allied field artillery, reinforced by two long 18-pr. guns of the British siege train and assisted by the bold advance of two French "horse-artillery batteries which galloped down the forward slope and engaged the Russians at close range, gained the upper hand. Last of all, the dominant guns on Shell Hill thus silenced, the resolute advance of a handful of British infantry decided the day, and the Russians retreated. The final shots were fired about 1.30 p.m.

The total British force engaged was 8500, of whom 2357 were killed and wounded. The French lost 939 out of about 7000 who came on to the field, though not all these were engaged. The Russians are said to have lost 1 1 ,000 out of about 42,000 present. The percentage (27-7) of loss sustained by the British is sufficient evidence of the intensity of the conflict, and provides a convincing answer to certain writers who have represented the battle as chiefly a French affair. On the other hand, the reproaches addressed by some British writers to General Bosquet for not promptly supporting the troops at Inkerman with his whole strength are equally unjustifiable, for apparently Sir George Brown and Sir George Cathcart both declined his first offers of support, and he had Prince Gorchakov with at least 20,000 Russians in his own immediate front. He would therefore have risked the failure of his own mission in order to take part in a battle where his intervention was not, so far as he could tell, of vital importance. When Lord Raglan definitely asked him for support, he gave it willingly and eagerly, sending his troops up at the double, and it must be remembered that several British divisions took no part in the action for the same reason that actuated Bosquet. But, in spite of the seemingly inevitable controversies attendant on an " allied " battle, it is now generally admitted that, as a " soldiers' battle," Inkerman is scarcely to be surpassed in modern history.

INLAYING, a method of ornamentation, by incrusting or otherwise inserting in one material a substance or substances differing

therefrom in colour or nature. The art is practised in the fabrication of furniture and artistic objects in all varieties of wood, metal, shell, ivory and coloured and hard stone, and in compound substances; and the combinations, styles and varieties of effect a're exceedingly numerous. Several special classes of inlaying may be here enumerated and defined, details

regarding most of which will be found under their separate headings. In the ornamental treatment of metal surfaces Niello decoration, applied to silver and gold, is an ancient and much-practised species of inlaying. It consists in filling up engraved designs with a composition of silver, copper, lead and sulphur incorporated by heat. The composition is black, and the finished work has the appearance of a drawing in black on a metallic plate. An art, analogous in effect, called bidri, from Bider in the Deccan, is practised in India. In bidri work the ground is an alloy of zinc, with small proportions of copper and lead, in which shallow patterns and devices are traced, and filled up with thin plates of silver. When the surface has been evened and smoothed, the bidri ground is stained a permanent black by a paste the chief ingredients of which are sal-ammoniac and nitre, leaving a pleasing contrast of bright metallic silver in a dead black ground. The inlaying of gold wire in iron or steel is known as Damascening (q.v.). It has been very largely practised in Persia and India for the ornamentation of arms and armour, being known in the latter country as Kuft work or Kuftgari. In Kashmir, vessels of copper and brass are very effectively inlaid with tin — an art which, like many other decorative arts, appears to have originated in Persia. In the ornamental inlaying of metal surfaces the Japanese display the most extraordinary skill and perfection of workmanship. In the inlaying of their fine bronzes they use principally gold and silver, but for large articles and also for common cast hollow ware commoner metals and alloys are employed. In inlaying bronzes they generally hollow out and somewhat undercut the design, into which the ornamenting metal, usually in the form of wire, is laid and hammered over. Frequently the lacquer work of the Japanese is inlaid with mother-of-pearl and other substances, in the same manner as is practised in ornamenting lacquered papier-mach6 among Western communities. The Japanese also practise the various methods of inlaying referred to under Damascening. The term Mosaic (q.v.) is generally applied to inlaid work in hard stones, marble and glass, but the most important class of mosaics — those which consist

of innumer- able small separate pieces — do not properly come under the head of inlaying. Inlaid mosaics are those in which coloured designs are inserted in spaces cut in a solid ground or basis, such as the modern Florentine mosaic, which consists of thin veneers of precious coloured stones set in slabs of marble. The Taj Mahal at Agra is an example of inlaid mosaic in white marble, and the art, carried to that city by a French artist, is still practised by native workmen. Pietra dura is a fine variety of inlaid mosaic in which hard and expensive stones — agate, cornelian, amethyst and the like — are used in relief. Certain kinds of enamel might also be included among the varieties of inlaying. (See also Marquetry -and Bombay Furniture.)

INMAN, HENRY (1801-1846), American artist, was born in Utica, New York, on the 20th of October 1801. Apprenticed to the painter John W. Jarvis at the age of fourteen, he left him after seven years and set up for himself, painting portraits, genre and landscape. He was one of the organizers of the National Academy of Design in New York and its first vice- president (from 1826 until 1832). As a portrait painter he was highly successful both in New York and Philadelphia, and going to England in 1844, he had for sitters the Lord Chancellor (Cottenham), the poet Wordsworth, Doctor Chalmers, Lord Macaulay and others. His American sitters included President Van Buren and Chief Justice Marshall. He died in New York City on the 17th of January 1846.

INN, a river of Europe, an important right bank tributary of the Danube. It rises at an elevation of 7800 ft., in a small lake under the Piz Longhino, in the Swiss canton of the Grisons. After flowing for a distance of 55 m., through the Engadine it leaves Swiss territory at Martinsbruck and enters Austria. It next plunges through the deep ravine of Finstermiinz, and, continuing in the main a north-easterly direction, receives at Landeck the Rosanna. Hence its course becomes more rapid, until, after swirling through the narrow and romantic

Oberinnthal, it enters the broader and pastoral Unterinnthal. It next passes Innsbruck and from Hall, a few miles lower down, begins to be navigable for barges. At Kufstein, down to which point it has still pursued a north-easterly direction, it breaks through the north Tirol limestone formation, and, now keeping a northerly course, enters at Rosenheim the Bavarian high plateau. Its bed is now broad, studded with islands and enclosed by high banks. Its chief tributaries on this last portion of its course are the Alz and the Salzach, and at Passau, 309 m. from its source, it joins the Danube, which river down to that

point it equals in length and far exceeds in volume of water. Its rapid current does not permit of extensive navigation, but timber rafts are floated down from above Innsbruck.

See Greinz, Eine Wanderung dutch das Unterinntal (Stuttgart,

1902).

INN and INNKEEPER. An inn is a house where travellers are fed and lodged for reward. A distinction has been drawn between tavern, inn and hotel, the tavern supplying food and drink, the hotel lodging, the inn both; but this is fanciful. "Hotel" now means "inn," and "inn" is often applied to a mere public-house, whilst " tavern " is less used. " Inn," still the legal and best, as it is the oldest, is a form of the word " in " or " within." This sense is retained in the case of the English legal societies still known as Inns or Court (q.v.). In the Bible " inn " means " lodging-place for the night." Hospitality has always been a sacred duty in the East. The pilgrim or the traveller claims it as a right. But some routes were crowded, as that from Bagdad to Babylon. On these, khans (in or near a town) and caravanserais (in waste places) were erected at the expense of the benevolent. They consisted of a square building surrounded by a high wall; on the roof there was a terrace and over the gateway a tower; inside, was a large court surrounded by compartments in which was some rude provision for the animals and baggage of the traveller as well as for himself. The latter purchased his own food where he chose, and had to "do for himself." In some such place Jesus was born. Tavern is mentioned once in Scripture (Acts xxviii. 15) where it is said the brethren from Rome met Paul at "the Three Taverns." This was a station on the Appian Way, referred to also in Cicero's Letters (Ad Alt. ii. 12). So, in modern London, stations are called " Elephant and Castle," or " Bricklayers' Arms," from adjacent houses of entertainment. Among the Greeks inns and innkeepers were held in low repute. The houses were bad and those who kept them had a bad name. A self-respecting Greek entered them as seldom as possible; if he travelled he relied on the hospitality of friends. In Rome under the emperors some- thing akin to the modern inn grew up. There is, however, scarcely any mention of such institutions in the capital as distin- guished from mere wine-shops or eating-houses. Ambassadors were lodged in apartments at the expense of the state. But along the great roads that radiated from Rome there were inns. Horace's account of his journey to Brundisium (Sat. i. 5), that brilliant picture of contemporary travel, tells us of their existence, and the very name of the Three Taverns shows that there was sufficient custom to support a knot of these institutions at one place. Under the Roman law, the innkeeper

was answer- able for the property of his guests unless the damage was due to damnum fatale or vis major, in modern language the act of God or the king's enemies. He was also liable for damage done by his servant or his slave or other inhabitant of the house.

In the middle ages hospitality was still regarded as a duty, and provision for travellers was regularly made in the monasteries.' People of rank were admitted to the house itself, others sought the guest-chamber, which sometimes stood (as at Battle Abbey) outside the precincts. It consisted of a hall, round which were sleeping-rooms, though the floor of the hall itself was often utilized. Again, hospitality was rarely denied at the castle or country house. The knight supped with his host at the dais or upper part of the great hall, and retired with him into his own apartment. His followers, or the meaner strangers, sat lower down at meat, and after the tables had been removed stretched themselves to rest upon the floor. In desolate parts hospices

were erected for the accommodation of pilgrims. Such existed in the Alps and on all the great roads to the Holy Land or to famous shrines, notably to that of Canterbury. The still impres- sive remains of the Travellers' Hospital at Maidstone, founded by Archbishop Boniface in 1260, give an idea of the extent of such places. The mention of Canterbury recalls two inns celebrated by Chaucer. The pilgrims started from the" Tabard " at Southwark under the charge of Harry Baily the host, and they put up at the " Checquers of the Hope," in Mercery Lane, Canterbury. It is easy to infer that, as time went on, the meagre hospitality of the monastery or the hospice was not sufficient for an increasing middle class, and that the want was met by the development of the mere ale-house into the inn. The " ale-house," to give it the old English name, was always in evidence, and even in pre-Reformation days was a favourite subject for the satirist. In Langland's Piers the Plowman and in Skelton's Elynour Rummynge we have contemporary pictures of ale-houses of the 14th and 16th centuries, but the Tabard is quite a modern inn, with a table d'hote supper, a sign, a landlord (" right a mery man ") and a reckoning!

It has been conjectured (Larwood and Hotten, History of Signboards, 1874) that the inn sign was taken or imitated from that displayed on the town houses or inns of noblemen and prelates. The innkeeper

alone of tradesmen retains his individual sign. The inn shared with the tavern the long projecting pole garnished with branches. These poles had become of such inordinate length in London that in 1375 they were restricted to 7 ft. But the inn of those times was still a simple affair. In each room there were several beds, the price of which the prudent traveller inquired beforehand. Extortion was frequent, though it was forbidden by a statute of Edward III. The fare was simple ; bread, meat and beer, with fish on Fridays. The tavern senti- ment is strong in Elizabethan literature. The " Boar's Head " in Eastcheap is inseparably connected with Sir John Falstaff and Dame Quickly. " Shall I not take mine ease in mine Inn? " (1 Henry IV., Act iii. sc. 3) is well-nigh the most famous word of the famous knight. A passage in Holinshed's Chronicle (1587, i. 246) explains the inner meaning of this. He assures us that the inns of England are not as those of other lands. Abroad the guest is under the tyranny of the host, but in England your inn is as your own house; in your chamber you can do what you will, and the host is rather your servant than your master. The " Mermaid " in Bread Street is associated with the memory of many wits and poets — Raleigh, Shakespeare, Beaumont, Fletcher, Ben Jonson — who frequented it and praised it.

Shenstone's lines as to " the warmest welcome at an inn " vent a common but rather cheap cynicism. Doctor Johnson was a great frequenter of inns and was outspoken in praise and blame. In the time immediately preceding railways the inn, which was also a post-house where the public coach as well as that of the private traveller changed horses, was a place of much importance. We have it presented over and over again in the pages of Dickens. The " Maypole " in Barnaby Rudge may be singled out for mention; it survives at Chigwell, Essex, as the " King's Head."

The effect of railways was to multiply hotels in great centres and gradually increase their size till we have the huge structures so plentiful to-day. The bicycle and later the motor car, through the enormous traffic they caused on the country roads, have restored the old wayside inns to more than their former prosperity. In Scotland a statute (1424) of James I. ordained inns for man and beast, with food and drink at reasonable prices, in each borough, and a subsequent act prohibited lodging in privs'.e houses in places where there were inns, under a penalty of 40s. But for centuries the Scots inn was a poor affair. The Clachan of Aberfoyle in Rob Roy, kept by the widow MacAlpine, was probably typical. In St Ronan's Well Scott gives the more pleasing picture of the Cleikum Inn, kept by the delightful Meg Dods, and mention should be made of St Mary's

Cottage, with its hostess Tibby Shiels, the scene of one of the Nodes Ambro- sianae, with memories not merely of Scott but of Christopher

North and the Ettrick Shepherd. Burns had much to do with inns and taverns. If Poosie Nancie's, where the Jolly Beggars held wild revel, is long vanished, the Globe at Dumfries still exists, a fair sample of an inn of the period. As late as 184 1 Dickens, writing to John Foster during his first visit to Scotland, describes the Highland inns as very poor affairs, " a mere knot of little outhouses " he says of one; and even in Queen Victoria's Leaves from the Journal of Our Life in the Highlands the inn is described as invariably small and unassuming. Thus the development of hotels in Scotland did not begin much before the middle of the 19th century.

In America the first hotel mentioned in New York is " Kriger's Tavern " about 1642, replaced in 1703 by the " King's Arms." When the town came to be English a proclamation was issued regulating the inns. Meals were not to cost more than 8d. or beer 2d. per quart.

Law Relating to Innkeepers. — Whether any special building is an inn is a question of fact. A temperance hotel is an inn, but a mere public-house is not. An innkeeper is bound to receive, lodge and feed travellers if he has accommodation, if they are able and willing to pay, and are not obviously objection- able. If he refuse he is liable at common law to indictment, or an action will lie against him at the suit of the would-be guest. Under the Army Act soldiers of all kinds may be billeted on the innkeeper, even beyond his power to provide in his own house; he must find accommodation for them elsewhere. An innkeeper must keep the goods and chattels of his guest in safety, unless they are destroyed by the act of God or the king's enemies. Under this last the king's rebellious subjects are not included. He is not liable for goods stolen or destroyed by the companion of the guest or through the guest's own negligence. There are two theories as to the origin of this common law liability of the innkeeper: (1) it was a survival of the liability of the common trader, or (2) specially imposed from the nature of his calling. Old English law held him to some extent suspect. The traveller amongst strangers seemed forlorn and unprotected, and con- spiracy with thieves was dreaded. In modern times the landlord's responsibilities were cut down by the Innkeepers Liability Act 1 863 . He is not liable (save for horses and other live animals with their gear and carriages) to a greater extent than £30, unless the loss is caused by the default or neglect of himself or his servants, or the goods have been formally deposited with him. He must conspicuously exhibit a copy of the material parts of the act. The innkeeper may contract himself out of his common

law obligation, and, apart from negligence, he is not liable for injury to the person or clothes of his guest. In return for these responsibilities the law gives him a lien over his guest's goods till his bill be paid. This is a particular and not a general lien. It attaches only to the special goods brought by the guest to the inn, and housed by the innkeeper with him. When several guests go together, the lien extends to all their goods. The innkeeper is only bound to take ordinary care of goods thus held, but he cannot use them or charge for their house-room. By the custom of London and Exeter, " when a horse eats out the price of his head," namely, when the cost of keep exceeds value, the host may have him as his own. By the Innkeepers Act 1878, if goods have been kept for six weeks they may be advertised and then sold after the interval of a month. Although an advertisement in a London paper is directed, this act (it would seem) applies to Scotland (J.A.Fleming, in Green's Encyclopaedia of the Law of Scotland, vi. 363). In that country the law is. generally the same as in England, though it has been held that the innkeeper is not responsible for loss by accidental fire. Nor is his refusal to receive a guest a criminal offence. In the United States the common law follows that of England, though laws of the various states have diminished the liability of the innkeeper in much the same fashion as in England. Innkeepers as retailers of intoxicating liquors are subject to the provisions of the Licensing Laws.

See Angus, Bible Handbook (new ed., 1904) ; Beckmann's Inventions, tr. by Johnson (1846); Jusserand, Les Anglais au moyen Age (1884); Liebenau, Das Gasthof- und Wirtshauswesen der Schweie

in alterer Zeit (1891); Kempt, Convivial Caledonia (1893); F. W. Hackwood, Inns, Ales and Drinking Customs of Old England (1909) ; Jelf and Hurst, The Law of Innkeepers (1904). English and Roman law are compared in Pymar's Law of Innkeepers (1892). For Scots law, see Bell's Principles. An American treatise is S. H. Wandell, Law of Inns, Hotels and Boarding Houses (1888). (F. Wa.)

INNERLEITHEN, a police burgh and health resort of Peebles- shire, Scotland, on Leithen Water, near its junction with the Tweed, 65 m. S.E. of Peebles by the North British railway. Pop. (iqoi) 2181. In olden times it seems to have been known as Hornehuntersland, and to have been mentioned as early as 1 1 59, when a son of Malcolm

IV. (the Maiden) was drowned in i. pool of the Tweed, close to Leithenfoot. Its chief industry is the manufacture of tweeds and fine yarns, which, together with the fame of its medicinal springs, brought the burgh into promin- ence towards the end of the 18th century. The spa, alleged to be the St Ronan's well of Scott's novel of that name, has a pump-room, baths, &c. The saline waters are useful in minor cases of dyspepsia and liver complaints. The town is flanked on the W. by the hill fort of Caerlee (400 ft. long) and on the E. by that of the Pirn (350 ft. long). Farther E., close to the village of Walkerburn, are Purvis Hill terraces, a remarkable series of earthen banks, from 50 ft. to more than 100 ft. wide, and with a length varying up to 900 ft., the origin and purpose of which are unknown. Traquair House, or Palace, on the right bank of the Tweed, is believed to be the oldest inhabited house in Scotland, the most ancient portion dating from the 10th century, and including a remnant of the castle. It was largely added to by Sir John Stewart, first earl of Traquair (d. 1659) and is a good example of the Scottish Baronial mansion with high-pitched roof and turreted angles. To the west of the house was the arbour which formed the " bush aboon Traquair " of the songs by Robert Crawford (d. 1733) and John Campbell Shairp, its site being indicated by a few birch trees. James Nicol (1769-1819), the poet, was minister of Traquair, and his son James Nicol (1810-1879), the geologist and professor of natural history in Aberdeen University, was born in the manse.

INNESS, GEORGE (1825-1894), American landscape painter, was born near Newburgh, N.Y., on the 1st of May 1825. Before he was five years of age his parents had moved to New York and afterwards to Newark, N.J., in which latter city his boyhood was passed. He would not " take education " at the town academy, nor was he a success as a greengrocer's boy. He had a strong bent towards art, and his parents finally placed him with a drawing-master named Barker. At sixteen he went to New York to study engraving, but soon returned to Newark, where he continued sketching and painting after his own initiative. In 1843 he was again in New York, and is said to have passed

a month in Gignoux's studio. But he was too impetuous, too independent in thought, to accept teaching; and, besides, the knowledge of his teachers must have been limited. Practically he was self-taught, and always remained a student. In 1851 he went to Europe, and in Italy got his first glimpse of real art. He was there two years, and imbibed some traditions of the classic landscape. In 1854 he went to France, and there studied the Barbizon painters, whom he greatly admired, especially Daubigny and Rousseau. After his return to America he opened a studio in New York, then went to Medfield, Mass., where he resided for five years. A pastoral landscape near this town inspired the characteristic painting " The Medfield Meadows." Again he went abroad and spent six years in Europe. He came back to New York in 1876, and lived there, or near there, until the year of his death, which took place at Bridge of Allan on the 3rd of August 1894 while he was travelling in Scotland. He was a National Academician, a member of the Society of American Artists, and had received many honours at home and abroad. He was married twice, his son, George Inness (b. 1854), being also a painter. Inness was emphatically a man of temperament, of moods, enthusiasms, convictions. He was fond of speculation and experiment in metaphysics and religion, as in poetry and art. Swedenborgianism, symbolism, socialism, appealed to him as they might to a mystic or an idealist. He aspired to the perfect

unities, and was impatient of structural foundations. This was

his attitude towards painting. He sought the sentiment, the light, air, and colour of nature, but was put out by nature's forms. How to subordinate form without causing weakness was his problem, as it was Corot's. His early education gave him no great technical facility, so that he never was satisfied with his achievement. He worked over his pictures incessantly, retouching with paint, pencil, coal, ink — anything that would give the desired effect — yet never content with them. In his latter days it was almost impossible to get a picture away from him, and after his death his studio was found to be full of experi- mental canvases. He was a very uneven painter, and his experiments were not always successful. His was an original — a distinctly American — mind in art. . Most of his American subjects were taken from New York state, New Jersey and New England. His point of view was his own. At his best he was often excellent in poetic sentiment, and superb in light, air and colour. He had several styles: at first he was somewhat grandiloquent in Roman scenes, but sombre in colour; then under French influence his brush grew looser, as in the " Grey Lowering Day "; finally he broke out in full colour and light, as in the " Niagara " and the last " Delaware Water-Gap." Some of his pictures are in American museums, but most of them are in private hands. (J. C. Van D.)

INNOCENT (Innocentius), the name of thirteen popes and one anti-pope.

Innocent L, pope from 402 to 417, was the son of Pope Anastasius I. It was during his papacy that the siege of Rome by Alaric (408) took place, when, according to a doubtful anecdote of Zosimus, the ravages of plague and famine were so frightful, and help seemed so far off, that p

Innocent II. (Gregorio Paparesci dei Guidoni), pope from 1 130 to 1143, was originally a Benedictine monk. His ability, pure life and political connexions raised him rapidly to power. Made cardinal deacon of Sant Angelo in Pescheria by Paschal II. he was employed in various diplomatic missions. Calixtus II. appointed him one of the ambassadors who made peace with the Empire and drew up the Concordat of Worms (ii22),and in the following year, with his later enemy Cardinal Peter Pierleoni, he was papal legate in France. On the 13th of February 1130 Honorius II. died, and on that night a minority of the Sacred College elected Paparesci, who took the name

of Innocent" II. After a hasty consecration he was forced to take refuge with a friendly noble by the faction of Pierleoni, who was elected pope under the name of Anacletus II. by a majority of the cardinals. Declaring that the cardinals had been intimidated, Innocent refused to recognize their choice; by June, however, he was obliged to flee to France. Here his title was recognized by a synod called by Bernard of Clairvaux at fitampes. Similar action was taken in Germany by the synod of Wiirzburg. In January 1131 Innocent held a personal interview with King Henry I. of England at Chartres, and in March, at Liege, with

the German King Lothair, whom he induced to undertake a I His first acts were to restore the prestige of the Holy See in Italy,

campaign against Anacletus. The German army invaded Italy in August 1 132, and occupied Rome, all except St Peter's church and the castle of St Angelo which held out against them. Lothair was crowned emperor at the Lateran in June 1133, and as a further reward Innocent gave him the territories of the Countess Mathilda as a fief, but refused to surrender the right of investiture. Left to himself Innocent again had to flee, this time to Pisa. Here he called a council which condemned Anacletus. A second expedition of Lothair expelled Roger of Sicily (to whom Anacletus had given the title of king in return for his support) from southern Italy, but a quarrel with Innocent prevented the emperor attacking Rome. At this crisis, in January 1138, Anacletus died, and a successor elected by his faction, as Victor IV., resigned after two months. The Lateran council of 1139 restored peace to the Church, excommunicating Roger of Sicily, against whom Innocent undertook an expedition which proved unsuccessful. In matters of doctrine the pope supported Bernard of Clairvaux in his prosecution of Abelard and Arnold of Brescia, whom he condemned as heretics. The remaining years of Innocent's life were taken up by a quarrel with the Roman commune, which had set up an independent senate, and one with King Louis VII. of France, about an appointment. France was threatened with the interdict, but before matters came to a head Innocent died on the 22nd of September 1143.

See Herzog-Hauck, Realencyklopadie, " Innocenz II.," with full references. Gregorovius, History of Rome in the Middle Ages, trans, by Hamilton (London, 1896), vol. iv. part ii. pp. 420-453. (P. Sm.)

Innocent III. (Lando da Sezza), antipope (1179-1180), sprang from a noble Lombard family. Opponents of Alex- ander III. tried to make him pope in September n 79. Alexander, however, bribed his partisans to give him up, and imprisoned him in the cloister of La Cava in January n 80.

Innocent III. (Lotario de' Conti di Segni), pope from 1198 to 1 2 16, was the son of Trasimondo, count of Segni, and of Claricia, a Roman lady of the noble family of Scotti, and was born at Anagni about 11 60. His early education he received at Rome, whence he went to the university of Paris and sub- sequently to that of Bologna. At Paris, where he attended the lectures of Peter of Corbeil, he laid the foundations of his profound knowledge of the scholastic philosophy; at Bologna he acquired an equally profound knowledge of the canon and civil law. Thus distinguished by birth, intellect and attainments, on his return to Rome he rose rapidly in the church. He at once became a canon of St Peter's; he was made subdeacon of the Roman Church by Gregory VIII.; and in 1190 his uncle, Pope Clement III., created him cardinal-deacon of Santi Sergio e Baccho. The election of Celestine III. in the following year withdrew Lotario for a while from the active work of the Curia, the new pope belonging to the family of the Orsini, who were at feud with the Scotti. Lotario, however, employed his leisure in writing several works: Mysteriorum evangelicae legis ac sacramenti eucharistiae libri VI., De contemtu mundi, sive de miseria humanae conditionis, and De quadrapartita specie nuptiarum. Of these only the two first are extant; they are written in the scholastic style, a sea of quotations balanced and compared, and they witness at once to the writer's profound erudition and to the fact that his mind had not yet emancipated itself from the morbid tendencies characteristic of one aspect of medieval thought. Yet Lotario was destined to be above all things a man of action, and, though his activities to the end were inspired by impractic- able ideals, they were in their effects intensely practical; and Innocent III. is remembered, not as a great theologian, but as a great ruler and man of affairs.

On the 8th of January n 98 Celestine III. died, and on the same day Lotario, though not even a priest, was unanimously elected pope by the assembled cardinals. He took the name of Innocent III. On the 21st of February he was ordained priest, and on the 22nd consecrated bishop. Innocent was but thirty- seven years old at this time, and the vigour of youth, guided by a master mind, was soon apparent in the policy, of the papacy.

where it had been overshadowed by the power of the emperor Henry

VI. As pope it was his object to shake off the imperial yoke, as an Italian prince to clear the land of the hated Germans. The circumstances of the time were highly favourable to him. The early death of Henry VI. (September 1197) had left Germany divided between rival candidates for the crown, Sicily torn by warring factions of native and German barons. It was, then, easy for Innocent to depose the imperial prefect in Rome itself and to oust the German feudatories who held the great Italian fiefs for the Empire. Spoleto fell; Perugia surrendered; Tuscany acknowledged the leadership of the pope; papal rectores once more governed the patrimony of St Peter. Finally, Henry's widow, Constance, in despair, acknowledged the pope as overlord of the two Sicilies, and on her death (November 27, 1 1 98) appointed him guardian of her infant son Frederick. Thus in the first year of his pontificate Innocent had established himself as the protector of the Italian nation against foreign aggression, and had consolidated in the peninsula a secure basis on which to build up his world-power.

The effective assertion of this world-power is the characteristic feature of Innocent's pontificate. Other popes before him — from Gregory VII. onwards — had upheld the theory of the supremacy of the spiritual over the temporal authority, with various fortune; it was reserved for Innocent to make it a reality. The history of the processes by which he accomplished this is given elsewhere. Here it will suffice to deal with it in the broadest outline. In Germany his support of Otto IV. against Philip of Swabia, then of Philip against Otto and finally, after Philip's murder (June 21, j 208), of the young Frederick II. against Otto, effectually prevented the imperial power, during his pontificate, from again becoming a danger to that of the papacy in Italy. Conces- sions at the cost of the Empire in Italy were in every case the price of his support (see Germany: History). In his relations with the German emperors Innocent acted partly as pope, partly as an Italian prince; his victories over other and more distant potentates he won wholly in his spiritual capacity. Thus he forced the masterful Philip Augustus of France to put away Agnes of Meran and take back his Danish wife Ingeborg, whom he had wrongfully divorced; he compelled Peter of Aragon to forgo his intended marriage with Bianca of Navarre and ultimately (1204) to receive back his kingdom as a fief of the Holy See; he forced Alphonso IX. of Leon to put away his wife Berengaria of Castile, who was related to him within the pro- hibited degrees, though he pronounced their children legitimate. Sancho of Portugal was compelled to pay the tribute promised by his father to Rome, and Ladislaus of Poland to cease from infringing the rights of the church. Even the distant north

felt the weight of Innocent's power, and the archbishop of Trondhjem was called to order for daring to remove the ban of excommunication from the repentant King Haakon IV., as an infringement of the exclusive right of the pope to impose or remove the ban of the church in the case of sovereigns. So widespread was the prestige of the pope that Kaloyan, prince of Bulgaria, hoping to strengthen himself against internal foes and the aggressions of the Eastern Empire, submitted to Rome and, in November 1204, received the insignia of royalty from the hands of the papal legates as the vassal of the Holy See.

Meanwhile Innocent had been zealous in promoting the crusade which ultimately, under the Doge Dandolo, led to the Latin occupation of Constantinople (see Crusades). This diversion from its original object was at first severely censured by Innocent; but an event which seemed to put an end to the schism of East and West came to wear a different aspect; he was the first pope to nominate a patriarch of Constantinople, and he expressed the hope that henceforth the church would be " one fold under one shepherd." By a bull of October 12, 1204, moreover, Innocent proclaimed the same indulgences for a crusade to Livonia as the Holy Land. The result was the "conversion" of the Livonians (1206) and the Letts (1208) by the crusaders headed by the knights of the Teutonic Order. The organization of the new provinces thus won for the church

Innocent kept in his own hands, instituting the new archbishopric of Riga and defining the respective jurisdictions of the arch- bishops and the Teutonic Knights, a process which, owing to the ignorance at Rome of the local geography, led to curious confusion.

Another crusade, horrible in its incidents and momentous in its consequences, was that proclaimed by Innocent in 1207 against the Albigenses. In this connexion all that can be said in his favour is that he acted from supreme conviction; that the heresies against which he appealed to the sword were really subversive of Christian civilization; and that he did not use force until for ten years he had tried all the arts of persuasion in vain (see Albigenses).

Of all Innocent's triumphs, however, the greatest was his victory over King John of England. The quarrel between the pope and the English king arose out of a dispute as to the election to the vacant see of Canterbury, which Innocent had settled by nominating Stephen Langton over the heads of both candidates. John refusing to submit,

Innocent imposed an interdict on the kingdom and threatened him with a crusade; and, to avert a worse fate, the English king not only consented to recognize Langton but also to hold England and Ireland as fiefs of the Holy See, subject to an annual tribute (May 1213). The sub- mission was no idle form; for years the pope virtually ruled England through his legates (see English History and John, king of England). So great had the secular power of the papacy become that a Byzantine visitor to Rome declared Innocent to be " the successor not of Peter but of Constantine."

As in the affairs of the world at large, so also in those of the church itself, Innocent's authority exceeded that of all his predecessors. Under him the centralization of the ecclesiastical administration at Rome received a great impulse, and the independent jurisdiction of metropolitans and bishops was greatly curtailed. In carrying out this policy his unrivalled knowledge of the canon law gave him a great advantage. To his desire to organize the discipline of the church was due the most questionable of his expedients: the introduction of the system of provisions and reservations, by which he sought to bring the patronage of sees and benefices into his own hands — a system which led later to intolerable abuses.

The year before Innocent's death the twelfth ecumenical council assembled at the Lateran under his presidency. It was a wonderful proof at once of the world-power of the pope and of his undisputed personal ascendancy. It was attended by the plenipotentiaries of the emperor, of kings and of princes, and by some 1500 archbishops, bishops, abbots and other dignitaries. The business before it, the disciplining of heretics and Jews, and the proclamation of a new crusade, &c, vitally concerned the states represented; yet there was virtually no debate and the function of the great assembly was little more than to listen to and endorse the decretals read by the pope (see Lateran Councils). Shortly after this crowning exhibition of his power the great pope died on the 16th of July 1 2 16.

Innocent III. is one of the greatest historical figures, both in the grandeur of his aims and the force of character which brought him so near to their realization. An appreciation of his work and personality will be found in the article Papacy; here it will suffice to say that, whatever judgment posterity may have passed on his aims, opinion is united as to the purity of the motives that inspired them and the tireless self-devotion with which they were pursued. " I have no leisure," Innocent once sighed, " to meditate on supermundane things; scarce I can breathe. Yea, so much must I live for others, that almost I am a stranger to myself." Yet he preached frequently, both at Rome and on his journeys — many of his sermons, inspired by a high moral earnestness, have come down to us — and, towards the end of his life, he found time to write a pious exposition of the Psalms. His views on the papal supremacy are best explained in his own words. Writing to the patriarch of Constantinople {Inn. III., lib. ii. ep. 200) he says: " The Lord left to Peter the governance not of the church only but of the whole world; "

and again in his letter to King John of England {lib. xvi. ep. 131) : " The King of Kings … so established the kingship and the priesthood in the church, that the kingship should be priestly, and the priesthood royal {ut sacerdolale sit regnum et sacerdotium sit regale), as is evident from the epistle of Peter and the law of Moses, setting one over all, whom he appointed his vicar on earth." In his answer to the ambassadors of Philip Augustus he states the premises from which this stupendous claim is logically developed: —

"To princes power is given on earth, but to priests it is attributed also in heaven ; to the former only over bodies, to the latter also over souls. Whence it follows that by so much as the soul is superior to the body, the priesthood is superior to the kingship. . ." . Single rulers have single provinces, and single kings single kingdoms; but Peter, as in the plenitude, so in the extent of his power is pre-eminent over all, since he is the Vicar of Him whose is the earth and the fullness thereof, the whole wide world and all that dwell therein."

To the emperor of Constantinople, who quoted 1 Peter ii. 13, 14, to the contrary, he replied in perfect good faith that the apostle's admonition to obey " the king as supreme was addressed to lay folk and not to the clergy." The more intelligent laymen of the time were not convinced even when coerced. Even so pious a Catholic as the minnesinger Walther von der Vogelweide, giving voice to the indignation of German laymen, ascribed Innocent's claims, not to soundness of his scholastic logic, but to the fact that he was " too young " {owi der babest ist zejunc).

The literature on Innocent III. is very extensive; a carefully analysed bibliography will be found in Herzog-Hauck, Realencyklo- padie (3rd ed., 1901) s. " Innocenz III." In A. Potthast, Bibliotheca hist. med. aevi (2nd ed., Berlin, 1896), p. 650, is a bibliography of the literature on Innocent's writings. In the Corpus juris canonici, ed. Aemilius Friedberg (Leipzig, 1881), vol. ii., pp. xiv.-xvii., are lists of the official documents of Innocent III. excerpted in the Decretales Gregorii IX. The most important later works on Innocent III. are Achille Luchaire's Innocent III, Rome et V Italie (Paris, 1904), Innocent III, la croisade des Albigeois {ib. 1905), Innocent HI, la papaute et I'empire {ib. 1906), Innocent III, la question d'or'ten't {ib. 1906) ; Innocent III, les royautes vassales du Saint-Siege {ib. 1908) ; and Innocent III, la concile de latran et la reforme de Veglise (1908) ; Innocent the Great, by C. H. C. Pirie-Gordon (London, 1907) ; is the only English monograph on this pope and contains some useful documents, but is otherwise of little value. See also H. H. Milman, History of Latin Christianity, vol. v. ; F. Gregorovius, Rome

in the Middle Ages, translated by A. Hamilton (1896), vol. v. pp. 5-1 10; J. C. L. Gieseler, Ecclesiastical Hist., translated by J. W. Hull, vol. hi! (Edinburgh, 1853), which contains numerous excerpts from his letters, &c. Innocent's works are found in Migne, Patrologiae Cursus Completus, Series Latina, vols, ccxiv.ccxvii. For a translation of Innocent's answer to King John on the interdict, and John's sur render of England and Ireland to Innocent, see Gee and Hardy, Documents illustrative of Church History (London, 1896) pp 73 et se q- (W. A. P.)

Innocent IV. (Sinibaldo Fiesco), pope 1243-1254, belonged to the noble Genoese family of the counts of Lavagna. Born at Genoa, he was educated under the care of his uncle Opizo, bishop of Parma. After taking orders at Parma, when he was made canon of the cathedral, he studied jurisprudence at Bologna. His first recorded appearance in political affairs was in 1218- 1 2 19, when he was associated with Cardinal Hugolinus (afterwards Gregory IX.) in negotiating a peace between Genoa and Pisa. This led to his rapid promotion. In 1223 Pope Honorius III. gave him a benefice in Parma, and in 1226 he was established at the curia as auditor contradictarum literarum of the pope, a post he held also under Gregory IX., until promoted (1227) to be vice-chancellor of the Roman Church. In September of the same year he was created cardinal priest of San Lorenzo in Lucina. He was papal rector (governor) of the March of. Ancona from 1235 to 1240. On the 25th of June 1243 he was elected pope by the cardinals assembled at Anagni.

Innocent was raised to the Holy See when it was at deadly feud with the emperor Frederick II., who lay under excommuni- cation. Frederick at first greeted the elevation of a member of an imperialist family with joy; but it was soon clear that Innocent intended to carry on the traditions of his predecessors. Embassies and courtesies were, indeed, interchanged, and on the 31st of March 1244 a treaty was signed at Rome, whereby the emperor undertook to satisfy the pope's claims in return for his own absolution from the ban. Neither side, however,

was prepared to take the first steps to carry out the agreement, and Innocent, who had ventured back to Rome, began to feel unsafe in the city, where the imperial partisans had the ascend- ancy. Fearing

a plan to kidnap him, he left Rome, ostensibly to meet the emperor, and from Sutri fled by night on horseback, pursued by 300 of the emperor's cavalry, to Civitavecchia, whence he took ship for Genoa and thence proceeded across the Alps to Lyons, at that time a merely nominal dependence of the Empire. Thence he wrote to the French king, Louis IX., asking for an asylum in France; but this Louis cautiously refused. Innocent, therefore, remained at Lyons, whence he issued a summons to a general council, before which he cited Frederick to appear in person, or by deputy. The council, which met on the 5th of June 1245, was attended only by those prepared to support the pope's cause; and though Frederick condescended to be represented by his justiciar, Thaddeus of Suessa, the judgment was a foregone conclusion. On the 17th of July Innocent formally renewed the sentence of excommunication on the emperor, and declared him deposed from the imperial throne and that of Naples. Frederick retorted by announcing his intention of reducing " the clergy, especially the highest, to a state of apostolic poverty," and by ordaining the severest punishments for those priests who should obey the papal sentence. Innocent thereupon proclaimed a crusade against the emperor and armed his ubiquitous agents, the Franciscan and Dominican friars, with special indulgences for all those who should take up the cross against the imperial heretic. At the same time he did all in his power to undermine Frederick's authority in Germany and Italy. In Naples he fomented a conspiracy among the feudal lords, who were discontented with the centralized government established under the auspices of Frederick's chancellor, Piero della Vigna. In Germany, at his instigation, the archbishops with a few of the secular nobles in 1246 elected Henry Raspe, landgrave of Thuringia, German king; but the " priests' king," as he was contemptuously called, died in the following year, William II., count of Holland, being after some delay elected by the papal party in his stead.

Innocent's relentless war against Frederick was not supported by the lay opinion of his time. In Germany, where it wrought havoc and misery, it increased the already bitter resentment against the priests. From England the pope's legate was driven by threats of personal violence. In France not even the saintly King Louis IX., who made several vain attempts to mediate, approved the pope's attitude; and the failure of the crusade which, in 124S. he led against the Mussulmans in Egypt, was, with reason, ascribed to the deflection of money and arms from this purpose to the war against the emperor. Even the clergy were by no means altogether on Innocent's side; the council of Lyons was attended by but 150 bishops, mainly French

and Spanish, and the deputation from England, headed by Robert Grossetete of Lincoln and Roger Bigod, came mainly in order to obtain the canonization of Edmund of Canterbury and to protest against papal exactions. Yet, for better or for worse, Innocent triumphed. His financial position was from the outset strong, for not only had he the revenue from the accustomed papal dues but he had also the support of the powerful religious orders; e.g. in November 1245 he visited the abbey of Cluny and was presented by the abbot with gifts, the value of which surprised even the papal officials. At first the war went in Frederick's favour; then came the capture of the strategically important city of Parma by papal partisans ("June 16th, 1247). From this moment fortune changed. On tiie iSth of February T248 Frederick's camp before Parma (the temporary town of Vittoria) was laken and sacked, the imperial insignia — of vast significance in those days — being captured. From this blow the emperor never recovered; and when on the 13th of December 1250 he died Innocent greeted the news by quoting from Psalm xcvi. 11, "Let the heavens rejoice and let the earth be glad."

On the 19th of April 1251 Innocent left Lyons, which had suffered severely from his presence, and returned to Italy. He continued the struggle vigorously with Frederick's son and

successor, Conrad IV., who in 1252 descended into Italy, reduced the rebellious cities and claimed the imperial crown. Innocent, determined that the Hohenstaufen should not again dominate Italy, offered the crown of Sicily in turn to Richard of Cornwall, Charles of Anjou, and Henry III. of England, the last of whom accepted the doubtful gift for his son Edmund. P^ven aftef Conrad's capture of Naples Innocent remained inexorable; for he feared that Rome itself might fall into the hands of the German king. But fortune favoured him. On the 20th of May 1254 Conrad died, leaving his infant son Conradin, as Henry VI. had left Frederick II., under the pope's guardianship. Innocent accepted the charge and posed as the champion of the infant king. He held, indeed, to his bargain with Henry III. and, with all too characteristic nepotism, exercised his rights over the Sicilian kingdom by nominating his own relations to its most important offices. Finally, when Manfred, who by Frederick's will had been charged with the government of the two Sicilies, felt obliged to acknowledge the pope's suzerainty, Innocent threw off the mask, ignored Conradin's claims, and on the 24th of October formally asserted his own claims to Calabria and Sicily. He entered Naples on the 27th; but meanwhile Manfred had fled and had raised a considerable force; and the news of his initial successes against the papal troops reached Innocent as he lay sick and

hastened his end. He died on the 7 th of December 1254.

Innocent IV. is comparable to his greater predecessor Innocent III. mainly in the extreme assertion of the papal claims. " The emperor," he wrote, " doubts and denies that all men and all things are subject to the See of Rome. As if we w'ho are judges of angels are not to give sentence on earthly things. . . . The ignorant assert that Constantine first gave temporal power to the See of Rome; it was already bestowed by Christ Himself, the true King and Priest, as inalienable from its nature and absolutely unconditional. Christ established not only a pontifical but a royal sovereignty (principatus) and committed to blessed Peter and his successors the empire both of earth and heaven, as is sufficiently proved by the plurality of the keys " (Codex epist. Vatic. No. 4957, 49, quoted in Raumer, Hohenstaufen, iv. 78). But this language, which in the mouth of Innocent III. had been consecrated by the greatness of his character and aims, was less impressive when it served as a cloak for an unlimited personal ambition and a family pride which displayed itself in unblushing nepotism. Yet in some respects Innocent IV. carried on the high traditions of his great predecessors. Thus he admonished Sancho II. of Portugal to turn from his evil courses and, when the king disobeyed, absolved the Portuguese from their allegiance, bestowing the crown on his brother Alphonso. He also established an ecclesiastical organization in the newly converted provinces of Prussia, which he divided into four dioceses; but his attempt to govern the Baltic countries through a legate broke on the opposition of the Teutonic Order, whose rights in Prussia he had confirmed.

It was Innocent IV. who, at the council of Lyons, first bestowed the red hat on the Roman cardinals, as a symbol of their readiness to shed their blood in the cause of the church.

Innocent was a canon lawyer of some eminence. His small work De exceplionibus was probably written before he became pope; but the Apparatus in quinque libros decretalium, which displays both practical sense and a remarkable mastery of the available materials, was written at Lyons immediately after the council. His Apologeticus, a defence of the papal claims against the Empire, written — as is supposed — in refutation of Piero della Vigna's argument in favour of the independence of the Empire, has been lost. Innocent was also a notable patron of learning! he encouraged Alexander of Hales to write his Summa universae tlieologiac, did much for the universities, notably the Sorbonne, and founded law schools at Rome and Piacenza.

Innocent's letters, the chief source for his life, are collected by E. Berger in Les Registres d' Innocent IV (3 vols., Paris, 1884-1887). For English readers the account in Milman's Latin Christianity, vol. vi. (3rd ed., 1864) is still useful. Full references will be found in Herzog-Hauck, Realencyklopadic, vol. ix. (1901). (W. A. P.)

INNOCENT (POPES)

581

Innocent V. (Pierre de Champagni or de Tarentaise), pope from the 21st of January to the 22nd of June 1276, was born about 1225 in Savoy and entered the Dominican order at an early age. He studied theology under Thomas Aquinas, Albertus Magnus and Bonaventura, and in 1262 was elected provincial of his order in France. He was made archbishop of Lyons in 1 271; cardinal-bishop of Ostia and Velletri, and grand peni- tentiary in 1275; and, partly through the influence of Charles of Anjou, was elected to succeed Gregory X. As pope he estab- lished peace between the republics of Lucca and Pisa, and confirmed Charles of Anjou in his office of imperial vicar of Tuscany. He was seeking to carry out the Lyons agreement with the Eastern Church when he died. His successor was Adrian V. Innocent V., before he became pope, prepared, in conjunction with Albertus Magnus and Thomas Aquinas, a rule of studies for his order, which was accepted in June 1259. He was the author of several works in philosophy, theology and canon law, including commentaries on the Scriptures and on the Sentences of Peter Lombard, and is sometimes referred to as famosissimus doctor. He preached the funeral sermon at i>yons over St Bonaventura. His bulls are in the Turin collection

(:S 5 9).

See F. Gregorovius, Rome in the Middle Ages, vol. 5, trans, by Mrs G. \V. Hamilton (London, 1900-1902); A. Potthast, Regesta pontif. Roman, vol. ii. (Berlin, 1875); E. Bourgeois, Le Bienheureux Innocent V (Paris, 1899); J. E. Borel, Notice biogr. sur Pierre de Tarentaise (Chambery, 1890); P. J. Bethaz, Pierre des Cours de la Salle, pape sous le nom Innocent V (Augustae, 1891); L. Carboni, De Innoceniio V. Romano pontifice (1894). (C. H. Ha.)

Innocent VI. (Etienne Aubert), pope from the 18th of December 1352 to the 12th of September 1362, was born at Mons in Limousin. He became professor of civil law at Toulouse and subsequently chief judge of the city. Having taken orders, he was raised to the see of Noyon and translated in 1340 to that of Clermont. In 1342 he was

made cardinal-priest of Sti Giovanni e Paolo, and ten years later cardinal-bishop .of Ostia and Velletri, grand penitentiary, and administrator of the bishopric of Avignon. On the death of Clement VI., the cardinals made a solemn agreement imposing obligations, mainly in favour of the college as a whole, on whichever of their number should be elected pope. Aubert was one of the minority who signed the agreement with the reservation that in so doing he would not violate any law, and was elected pope on this understanding; not long after his accession he declared the agreement null and void, as infringing the divinely-bestowed power of the papacy. Innocent was one of the best Avignon popes and filled with reforming zeal; he revoked the reservations and commendations of his predecessor and prohibited pluralities; urged upon the higher clergy the duty of residence in their sees, and diminished the luxury of the papal court. Largely through the influence of Petrarch, whom he called to Avignon, he released Cola di Rienzo, who had been sent a prisoner in August 1352 from Prague to Avignon, and used the latter to assist Cardinal Albornoz, vicar- general of the States of the Church, in tranquillizing Italy and restoring the papal power at Rome. Innocent caused Charles IV. to be crowned emperor at Rome in 1355, but protested against the famous " Golden Bull " of the following year, which pro- hibited papal interference in German royal elections. He renewed the ban against Peter the Cruel of Castile, and interfered in vain against Peter IV. of Aragon. He made peace between Venice and Genoa, and in 1360 arranged the treaty of Bretigny between France and England. In the last years of his pontificate he was busied with preparations for a crusade and for the reunion of Christendom, and sent to Constantinople the celebrated Carmelite monk, Peter Thomas, to negotiate with the claimants to the Greek throne. He instituted in 1354 the festival of the Holy Lance. Innocent was a strong and earnest man of monastic temperament, but not altogether free from nepotism. He was succeeded by Urban V.

The chief sources for the life of Innocent VI. are in Baiuzius, Vila? } J np. Avenion. vol. i. (Paris, 1693); Magnum bullari't Komanum, vol. iv. (Turin, 1859); E. Werunsky, Excerpt a ex registris Clementis VI. et Innoceiitii VI. (Innsbruck, 1885). See also I.. Pa: lor History of Ike Popes, vol. i. trans, by F. I. Antrobus (London,

1899); F. Gregorovius, Rome in the Middle Ages, vol. 6, trans, by Mrs G. W. Hamilton (London, 1900-1902); D. Cerri, Innocenzo Papa VI (Turin, 1873); J. B. Christophe, Histoire de la papaule pendant le XIV" siecle, vol. 2 (Paris, 1853); M. Souchon, Die Papstwahlen (Brunswick, 1888); G. Daumet, Innocent VI et Blanche de Bourbon (Paris, 1899); E. Werunsky, Gesch. Kaiser Karls IV.

(Innsbruck, 1892). There is an excellent article by M. Naumann in Hauck's Realencyklopddie, 3rd ed. (C. H. Ha.)

Innocent VII. (Cosimo dei Migliorati), pope from the 17th of October 1404 to the 6th of November 1406, was born of middle- class parentage at Sulmona in the Abruzzi in 1339. On account of his knowledge of civil and canon law, he was made papal vice-chamberlain and archbishop of Ravenna by Urban VI., and appointed by Boniface IX. cardinal priest of Sta Croce in Gerusalemme, bishop of Bologna, and papal legate to England. He was unanimously chosen to succeed Boniface, after each of the cardinals had solemnly bound himself to employ all lawful means for the restoration of the church's unity in the event of his election, and even, if necessary, to resign the papal dignity. The election was opposed at Rome by a considerable party, but peace was maintained by the aid of Ladislaus of Naples, in return for which Innocent made a promise, inconsistent with his previous oath, not to come to terms with the antipope Benedict XIII. , except on condition that he should recognize the claims of Ladislaus to Naples. Innocent issued at the close of 1404 a summons for a general council to heal the schism, and it was not the pope's fault that the council never assembled, for the Romans rose in arms to secure an extension of their liberties, and finally maddened by the murder of some of their leaders by the pope's nephew, Ludovico dei Migliorati, they compelled Innocent to take refuge at Viterbo (6th of August 1405). The Romans, recognizing later the pope's innocence of the outrage, made their submission to him in January 1406. He returned to Rome in March, and, by bull of the 1st of September, restored the city's decayed university. Innocent was extolled by contemporaries as a lover of peace and honesty, but he was without energy, guilty of nepotism, and showed no favour to the proposal that he as well as the antipope should resign. He died on the 6th of November 1406 and was succeeded by Gregory XII.

See L. Pastor, History of the Popes, vol. i., trans, by F. I. Antrobus (London, 1899) ; M. Creighton, History of the Papacy, vol. i. (London, 1899); N. Valois, La France et le grand,, schisme d' Occident (Paris, 1896-1902); Louis Gayet, Le Grand Schisme d 'Occident (Paris, 1898); J. Loserth, Geschichte des spdteren Mittelalters (1903); Theodorici de Nyem, De schismate libri tres, ed. by G. Erler (Leipzig, 1890); K. J. von Hefele, Conciliengeschichte, Bd. 6, 2nd ed. ; J. von Haller, Papsttum m. Ktrchenreform (Berlin, 1903). (C. H. Ha.)

Innocent VIII. (Giovanni Battista Cibo), pope from the 29th of

August 1484 to the 25th of July 1492, successor of Sixtus IV., was born at Genoa (1432), the son of Arano Cibo, who under Calixtus III. had been a senator of Rome. His youth, spent at the Neapolitan court, was far from blameless, and it is not certain that he was married to the mother of his numerous family. He later took orders, and, through the favour of Cardinal Calandrini, half-brother of Nicholas V., obtained from Paul II. the bishopric of Savona. Sixtus IV. translated him to the see of Molfetta, and in T473 created him cardinal-priest of Sta Balbina, subsequently of Sta Cecilia. As pope, he addressed a fruitless summons to Christendom to unite in a crusade against the infidels, and concluded in 1489 a treaty with Bayezid II., agreeing in consideration of an annual payment of 40,000 ducats and the gift of the Holy Lance, to detain the sultan's fugitive brother Jem in close confinement in the Vatican. Innocent excommunicated and deposed Ferdinand, king of Naples, by bull of the nth of September 1489, for refusal to pay the papal dues, and gave his kingdom to Charles VIII. of France, but in 1492 restored Ferdinand to favour. He declared (i486) Henry VII. to be lawful king of England by the threefold right of conquest, inheritance and popular choice, and approved his marriage with Elizabeth, the daughter of Edward IV. Innocent, like his predecessor, hated heresy, and in the bull Snmmis desidcrantcs (5th of December 1484) he instigated very severe measures against magicians and witches in Germany; he

prohibited (i486) on pain of excommunication the reading of the propositions of Pico della Mirandola; he appointed (1487) T. Torquemada to be grand inquisitor of Spain; and he offered plenary indulgence to all who would engage in a crusade against the VValdenses. He took the first steps towards the canonization of Queen Margaret of Scotland, and sent missionaries under Portuguese auspices to the Congo. An important event of his pontificate was the capture of Granada (2nd of January 1492), which was celebrated at Rome with great rejoicing and for which Innocent gave to Ferdinand of Aragon the title of " Catholic Majesty." Innocent was genial, skilled in flattery, and popular with the Romans, but he lacked talent and relied on the stronger will of Cardinal della Rovere, afterwards Julius II. His Curia was notoriously corrupt, and he himself openly practised nepotism in favour of his children, concerning whom the epigram is quoted: " Octo nocens pueros genuit, totidemque puellas: — Hunc merito poterit dicere Roma patrem." Thus he gave to his un-

deserving son Franceschetto several towns near Rome and married him to the daughter of Lorenzo de' Medici. Innocent died on the 25th of July 1492, and was succeeded by Alexander VI.

The sources for the life of Innocent VIII. are to be found in L. Muratori, Rerum Italicarum Scriptores, vol. 3, and in Raynaldus, a. 1484-1492. See also L. Pastor, History of the Popes, vol. 5, trans, by F. I. Antrobus (London, 1898); M. Creighton, History of the Papacy, vol. 4 (London, 1901); F. Gregorovius, Rome in the Middle Ages, vol. 7, trans, by Mrs. G. W. Hamilton (London, 1900-1902); T. Hagen, Die Papstwahlen von 1484 u. 14Q2 (Brizen, 1885); S. Riezler, Die Hexenprozesse (1896); G. Viani, Memorie della famiglia Cybo (Pisa, 1808) ;F. Serdonati, Vitaefatti d'Innocenzo VIII. (Milan, 1829). (C. H. Ha.)

Innocent IX. (Giovanni Antonio Fachinetti) was born in 1 5 19. He filled the offices of apostolic vicar of Avignon, legate at the council of Trent, nuncio to Venice, and president of the Inquisition. He became cardinal in 1583; and under the invalid Gregory XIV. assumed almost the entire conduct of affairs. His election to the papacy, on the 29th of October 1 591. was brought about by Philip II., who profited little by it, however, inasmuch as Innocent soon succumbed to age and feebleness, dying on the 30th of December 1591.

See Ciaconius, Vitae et res gestae summorum Pontiff. Rom. (Rome, 1601-1602); Cicarella, continuator of Platina, De Vitis Pontiff. Row. (both contemporaries of Innocent) ; Ranke, Popes (Eng. trans., Austin), ii. 233 sq. (all brief accounts). (T. F. C.)

Innocent X. (Giovanni Battista Pamfili) was born in Rome on the 6th of May 1574, served successively as auditor of the Rota, nuncio to Naples, legate apostolic to Spain, was made cardinal in 1627, and succeeded Urban VIII. as pope on the 15th of September 1644. Throughout his pontificate Innocent was completely dominated by his sister-in-law, Donna Olimpia Maidalchini, a woman of masculine spirit. There is no reason to credit the scandalous reports of an illicit attachment. Never- theless, the influence of Donna Olimpia was baneful; and she made herself thoroughly detested for her inordinate ambition and rapacity. Urban VIII. had been French in his sympathies; but the papacy now shifted to the side of the Habsburgs, and there remained for nearly fifty years. Evidences of the change were numerous: Innocent promoted pro-Spanish cardinals; attacked the Barberini, proteges of Mazarin, and sequestered their possessions; aided in quieting an insurrection in Naples, fomented by

the duke of Guise; and refused to recognize the independence of Portugal, then at war with Spain. As a reward he obtained from Spain and Naples the recognition of ecclesi- astical immunity. In 1649 Castro, which Urban VIII. had failed to take, was wrested from the Farnese and annexed to the Papal States. The most worthy efforts of Innocent were directed to the reform of monastic discipline (1652). His condemnation of Jansenism (1653) was met with the denial of papal infallibility in matters of fact, and the controversy entered upon a new phase (see Jansenism) . Although the pontificate of Innocent witnessed the conversion of many Protestant princes, the most notable being Queen Christina of Sweden, the papacy had nevertheless suffered a perceptible decline in prestige; it counted for little in the negotiations at Munster, and its solemn protest against the peace of Westphalia was entirely ignored.

Innocent died on the 7th of January 1655, and was succeeded by Alexander VII.

For contemporary lives of Innocent see Oldoin, continuator of Ciaconius, Vitae et res gestae summorum Pontiff. Rom. ; and Palazzi, Gesta Pontiff. Rom. (Venice, 1687-1688) iv. 570 sqq. ; Ciampi's Innoc. X. Pamfili, et la sua Corte (Rome, 1878), gives a very full account of the period. Gualdus' (pseud, of Gregorio Leti ; v. bibliog. note, art. " Sixtus V.") Vita de Donna Olimpia Maidalchina (1666) is gossipy and untrustworthy; Capranica's Donna Olympia Pamfili (Milan, '875, 3rd ed.) is fanciful and historically of no value. See also Ranke, Popes (Eng. trans., Austin), iii. 40 sqq. ; v. Reumont, Gesch. der Stadt Rom. iii. 2, p. 623 sqq. ; Brosch, Gesch. des Kirchenstaaies (1880) i. 409 sqq.; and the extended bibliography in Herzog-Hauck, Realencyklopddie, s.v. " Innocenz X." (T. F. C.)

Innocent XI. (Benedetto Odescalchi), pope from 1676 to 1689, was born at Como on the 16th of May 161 1. He studied law in Rome and Naples, entered the Curia under Urban VIII. (his alleged military service seems to be questionable), and became successively protonotary, president of the Apostolic Chamber, governor of Macerate and commissary of Ancona. Innocent X. made him a cardinal (1647), legate to Ferrara, and, in 1650, bishop of Novara. His simple and blameless life, his conscientious discharge of duty, and his devotion to the needs of the poor had won for him such a name that, despite the opposition of France, he was chosen to succeed Clement X. on the 21st of September 1676. He at once applied himself to moral and administrative reform; declared against nepotism, intro- duced economy, abolished sinecures, wiped out the deficit (at the same time reducing rents), closed the gaming-houses,

and issued a number of sumptuary ordinances. He held monks strictly to the performance of their vows; took care to satisfy himself of the fitness of candidates for bishoprics; enjoined regular catechetical instruction, greater simplicity in preaching, and greater reverence in worship. The moral teaching of the Jesuits incurred his condemnation (1679) (see Liguori), an act which the society never forgave, and which it partially revenged by forcing, through the Inquisition, the condemnation of the quietistic doctrines of Molinos (1687), for which Innocent entertained some sympathy (see Molinos).

The pontificate of Innocent fell within an important period in European politics, and he himself played no insignificant role. His protest against Louis XIV.'s extended claim to regalian rights called forth the famous Declaration of Gallican Liberties by a subservient French synod under the lead of Bossuet (1682), which the pope met by refusing to confirm Louis's clerical appoint- ments. His determination to restrict the ambassadorial right of asylum, which had been grossly abused, was resented by Louis, who defied him in his own capital, seized the papal territory of Avignon, and talked loudly of a schism, without, however, shaking the pope in his resolution. The preponderance of France Innocent regarded as a menace to Europe. He opposed Louis's candidate for the electorate of Cologne (1688), approved the League of Augsburg, acquiesced in the designs of the Protestant William of Orange, even in his supplanting James II., whom, although a Roman Catholic, he distrusted as a tool of Louis. The great object of Innocent's desire was the repulse of the Turks, and his unwearying efforts to that end entitled him to share in the glory of relieving Vienna

(1683).

Innocent died on the 12th of August 1689, lamented by his subjects. His character and life were such as to suggest the propriety of canonization, but hostile influences have defeated every move in that direction.

The life of Innocent has been frequently written. See Guarnacci, Vitae et res gestae Pontiff. Rom. (Rome, 1751), i. 105 sqq.; Palazzi, Gesta Pontiff. Rom. (Venice, 1690) ; also the lives by Albrizzi (Rome, 1695); Buonamici (Rome, 1776); and Immich (Berlin, 1900). Particular phases of Innocent's activity have been treated by Michaud, Louis XIV. et J««oc.XT.(Paris,i882sqq.,4vols.); Dubruel, La Correspond. . . . du Card. Carlo Pio, &c. (see Rev. des quest, hist. lxxv. (1904) 602 sqq.); and Gerin, in Rev. des quest, hist., 1876,

1878, 1886. For correspondence of Innocent see Colombo, Notizie biogr. e lettere di P. Innoc. XI. (Turin, 1878); and Berthier, Innoc. PP. XI. Epp. ad Principes (Rome, 1890 sqq.). An extended bibliographv may be found in Herzog-Hauck, Realencyklopddie, s.v. " Innocenz XI." (T. F. C.)

Innocent XII. (Antonio Pignatelli), pope from 1691 to 1700 in succession to Alexander VIII., was born in Naples on the 13th of March 1615, was educated at the Jesuit College in Rome, entered upon his official career at the age of twenty, and became vice-Jegate of Urbino, governor of Perugia, and nuncio to Tuscany, to Poland and to Austria. He was made cardinal and archbishop of Naples by Innocent XI., whose pontificate he took as a model for his own, which began on the 12th of July 1691. Full of reforming zeal, he issued ordinances against begging, extravagance and gambling; forbade judges to accept presents from suitors; built new courts of justice; prohibited the sale of offices, maintaining the financial equilibrium by reducing expenses; and, an almost revolutionary step, struck at the root of nepotism, in a bull of 1692 ordaining that thenceforth no pope should grant estates, offices or revenues to any relative. Innocent likewise put an end to the strained relations that had existed between France and the Holy See for nearly fifty years. He adjusted the difficulties over the regalia, and obtained from the French bishops the virtual repudiation of the Declaration of Gallican Liberties. He confirmed the bull of Alexander VIII. against Jansenism (1696); and, in 1699, under pressure from Louis XIV., condemned certain of Fenelon's doctrines which Bossuet had denounced as quietistic (see Fenelon). When the question of the Spanish succession was being agitated he advised Charles II. to make his will in favour of the duke of Anjou. Innocent died, on the eve of the great conflict, on the 27th of September 1700. Moderate, benevolent, just, Innocent was one of the best popes of the modern age.

See Guarnacci, Vilae et res gestae Pontiff. Rom. (Rome, 1751), i. 389 sqq.; Ranke, Popes (Eng. trans., Austin), iii. 186 sqq.; v. Reumont, Gesch. der Stadt Rom. iii. 2, p. 640 sqq.; and the Bullarium Innoc. XII. (Rome, 1697). (T. F. C.)

Innocent XIII. (Michele Angelo Conti), pope from 1721 to 1724, was the son of the duke of Poli, and a member of a family that had produced several popes, among them Innocent III., was born in Rome

on the 13th of May 1655, served as nuncio in Switzerland, and, for a much longer time, in Portugal, was made cardinal and bishop of Osimo and Viterbo by Clement XL, whom he succeeded on the 8th of May 1721. One of his first acts was to invest the emperor Charles VI. with Naples (1722); but against the imperial investiture of Don Carlos with Parma and Piacenza he protested, albeit in vain. He recognized the Pretender, "James III.," and promised him subsidies conditional upon the re-establishment of Roman Catholicism in England. Moved by deep-seated distrust of the Jesuits and by their continued practice of " Accommodation," despite express papal prohibition (see Clement XL), Innocent forbade the Order to receive new members in China, and was said to have meditated its suppression. This encouraged the French Jansenist bishops to press for the revocation of the bull Unigenitus; but the pope commanded its unreserved acceptance. He weakly yielded to pressure and bestowed the cardinal's hat upon the corrupt and debauched Dubois. Innocent died on the 7th of March 1724, and was succeeded by Benedict XIII.

See Guarnacci, Vitae et res gestae Pontiff. Rom. (Rome, 1751), ii. 137 sqq., 381 sqq.; Sandini, Vitae Pontiff. Rom. (Padua, 1739); M. v. Mayer, Die Papstwahl Innocenz XIII. (Vienna, 1874); Michaud, "La Fin du Clement XI. et le commencement du pontificat d'Innocent XIII." in the Internal. Theol. Zeitschr. v. 42 sqq., 304 sqq.

(T. F. C.)

INNOCENTS' DAY, or Childermas, a festival celebrated in the Latin church on the 28th of December, and in the Greek church on the 29th (O.S.) in memory of the massacre of the children by Herod. The Church early regarded these little ones as the first martyrs. It is uncertain when the day was first kept as a saint's day. At first it seems to have been absorbed into the celebration of the Epiphany, but by the 5th century it was kept as a separate festival. In Rome it was a day of fasting and mourning. In the middle ages the festival was the occasion. for much indulgence to the children. The boy-bishop (q.v.), whose tenure of office lasted till Childermas, had his last exercise of authority then, the day being one of the series of days which were known as the Feast of Fools. Parents temporarily abdicated

authority, and in nunneries and monasteries the youngest nun and monk were for the twenty-four hours allowed to masquerade as abbess and abbot. These mockeries of religion were con- demned by the Council of Basel (1431); but though shorn of its extravagances the day is still observed as a feast day and merry- making for

children in Catholic countries, and particularly as an occasion for practical joking like an April Fool's Day. In Spanish-America when such a joke has been played, the phrase equivalent to "You April fool!" is Que la inocencia le valga! May your innocence protect you! The society of Lincoln's Inn specially celebrated Childermas, annually electing a " king of the Cockneys." Innocents' Day was ever accounted unlucky. Nothing was begun and no marriages took place then. Louis XL prohibited all state business. The coronation of Edward IV., fixed for a Sunday, was postponed till the Monday when it was found the Sunday fell on the 28th of December. In rural England it was deemed unlucky to do housework, put on new clothes or pare the nails. At various places in Gloucestershire, Somerset and Worcestershire muffled peals were rung (Notes and Queries, 1st series, vol. viii. p. 617). In Northampton the festival was called " Dyzemas Day" (possibly from Gr. Sw- " ill " and "mass "), and there is a proverb "What is begun on Dyzemas will never be finished." The Irish call the day La Croasta na bliana, " the cross day of the year," or Diar dasin darg, " blood Thursday," and many legends attach to it (Notes and Queries, 4th series, vol. xii. p. 185). In medieval England the children were reminded of the mournfulness of the day by being whipped in bed on Innocents' morning. This custom survived to the 17th century.

INNSBRUCK, the capital of the Austrian province of Tirol, and one of the most beautifully situated towns in Europe. In 1900 the population was 26,866 (with a garrison of about 2000 men), mainly German-speaking and Romanist. Built at a height of 1880 ft., in a wide plain formed by the middle valley of the Inn and on the right bank of that river, it is surrounded by lofty mountains that seem to overhang the town. It occupies a strong military position (its commercial and industrial import- ance is now but secondary) at the junction of the great highway from Germany to Italy over the Brenner Pass, by which it is by rail 1095 m. from Munich and 174I m. from Verona, with that from Bregenz in the Vorarlberg, distant 122 m., by rail under the Arlberg Pass. It takes its name from its position, close to the chief bridge over the Inn. It is the seat of the supreme judicial court of the Tirol, the Diet of which meets in the Landhaus. The streets are broad, there are several open places and the houses are handsome, many of those in the old town dating from the 17th and 18th centuries, and being adorned with frescoes, while the arcades beneath are used as shops.

The principal monument is the Franciscan or Court church (1553-1563). In it is the magnificent 16th-century cenotaph (his body is elsewhere) of the emperor Maximilian (d. 1519), who, as

count of the Tirol from 1490 onwards, was much beloved by his subjects. It represents the emperor kneeling in prayer on a gigantic marble sarcophagus, surrounded by twenty-eight colossal bronze statues of mourners, of which twenty-three figure ancestors, relatives or contemporaries of Maximilian, while five represent his favourite heroes of antiquity — among these five are the two finest statues (both by Peter Vischer of Nuremberg), those of King Arthur of Britain and of Theodoric, the Ostrogothic king. On the sides of the sarcophagus are twenty-four marble reliefs, depicting the principal events in the life of Maximilian, nearly all by Alexander Colin of Malines, while the general design of the whole monument is attributed to Gilg Sesselschreiber, the court painter. In one of the aisles of the same church is the Silver Chapel, so called from a silver Madonna and silver bas-reliefs on the altar; it contains the tombs of Archduke Ferdinand, count of the Tirol (d. 1595) and his non-royal wife, Philippine Welser of Augsburg (d. 1580), whose happy married life spent close by is one of the most romantic episodes in Tirolese history. In the other aisle are the tombs, with monuments, of the heroes of the War of Independence of 1809, Hofer, Haspinger and Speckbacher. It was in this church.

that Queen Christina of Sweden, daughter of Gustavus Adolphus, abjured Protestantism, in 1655. There are also several other churches and convents, among the latter the first founded (1593) in Germany by the Capuchins.

The university of Innsbruck was formally founded in 1677, and refounded (after two periods of suspension, 1 782-1 792 and 1810-1826) in 1826. It is attended by about 1000 students and has a large staff of professors, the theological faculty being controlled by the Jesuits. It has a library of 176,000 books, and 1049 MSS. The University or Jesuit church dates from the early 17th century. The Ferdinandeum is the provincial museum (founded in 1823, though the present building is later). The house known as the Goldne Dachl has its roof covered with gilded copper tiles; it was built about 1425, by Frederick, count of the Tirol, nicknamed " with the empty pockets," but the balcony and gilded roof were added in 1500 by the emperor Maximilian. Among the other monuments of Innsbruck may be mentioned the Pillar of St Anne, erected in 1706 to commemorate the repulse of the French and the Bavarians in 1703; the Triumphal Arch, built in 1765, on the occasion of the marriage of

the future emperor Leopold II. with the Infanta Maria Louisa of Spain; and a fountain, with a bronze statue of Archduke Leopold V., set up in 1863-1877, in memory of the five-hundredth anniversary of the union of the Tirol with Austria.

The Roman station of Veldidena was succeeded by the Pre-monstratensian abbey of Wilten, both serving to guard the important strategical bridge over the Inn. In 1180 the count of Andechs (the local lord) moved the market-place over to the right bank of the river (where is the convent), and in 1187 we first hear of the town by its present name. Between 1233 and 1235 it was fortified, and a castle built for the lord. But it was only about 1420 that Archduke Frederick IV. (" with the empty pockets ") built himself a new castle in Innsbruck, which then replaced Meran as the capital of Tirol. The county of Tirol was generally held by a cadet line of the Austrian house, the count being almost an independent ruler. But the last princeling of this kind died in 1665, since which date Innsbruck and Tirol have been governed from Vienna. In 1552 Maurice of Saxony surprised and nearly took Innsbruck, almost capturing the emperor Charles V. himself, who escaped owing to a mutiny among Maurice's troops. In the patriotic warof 1809, Innsbruck played a great part and suffered much, while in 1848, at the time of the revolution in Vienna, it joyfully received the emperor Ferdinand. ' (W. A. B. C.)

INNS OF COURT. The Inns of Court and Chancery are voluntary non-corporate legal societies seated in London, having their origin about the end of the 13th and the commencement of the 14th century.

Dugdale (Origines Juridiciales) states that the learned in English law were anciently persons in holy orders, the justices of the king's court being bishops, abbots and the like. But in 1 207 the clergy were prohibited by canon from acting in the temporal courts. The result proving prejudicial to the interests of the community, a commission of inquiry was issued by Edward I. (1290), and this was followed up (1292) by a second commission, which among other things directed that students " apt and eager" should be brought from the provinces and placed in proximity to the courts of law now fixed by Magna Carta at Westminster (see Inn). These' students were accordingly located in what became known as the Inns of Court and Chancery, the latter designated by Fortescue (De Laudibus) as " the earliest settled places for students of the law," the germ of what Sir Edward Coke subsequently spoke of as our English juridical university. In these Inns of Court and Chancery, thus con- stituted, and corresponding to the ordinary college, the students, according to

Fortescue, not only studied the laws and divinity, but further learned to dance, sing and play instrumental music, " so that these hostels, being nurseries or seminaries of the court, were therefore called Inns of Court."

Stow in his Survey (1598) says: "There is in and about this city a whole university, as it were, of students, practisers or pleaders and judges of the laws of this realm"; and he goes

on to enumerate the several societies, fourteen in number, then existing, corresponding nearly with those recognized in the present day, of which the Inns of Court, properly so-called, are and always have been four, namely Lincoln's Inn, the Inner Temple, the Middle Temple and Gray's Inn. To these were originally attached as subordinate Inns of Chancery, Furnival's Inn, Thavie's Inn (to Lincoln's Inn), Clifford's Inn, Clement's Inn (to the Inner Temple), New Inn (to the Middle Temple), Staple's Inn, Barnard's Inn (to Gray's Inn), but they were cut adrift by the older Inns and by the middle of the 18th century had ceased to have any legal character (vide infra) . In addition to these may be specified Serjeant's Inn, a society composed solely of serjeants-at-law, which ceased to exist in 1877. Besides the Inns of Chancery above enumerated, there were others, such as Lyon's Inn, which was pulled down in 1868, and Scrope's Inn and Chester or Strand Inn, spoken of by Stow, which have long been removed, and the societies to which they belonged have disappeared. The four Inns of Court stand on a footing of complete equality, no priority being conceded to or claimed by one inn over another. Their jurisdictions and privileges are equal, and upon affairs of common interest the benchers of the four inns meet in conference. From the earliest times there has been an interchange of fellowship between the four houses; nevertheless the Middle Temple and Lincoln's Inn, and the Inner Temple and Gray's Inn, have maintained a closer alliance. The members of an Inn of Court consist of benchers, barristers and students. The benchers are the senior members of the society, who are invested with the government of the body to which they belong. They are more formally designated " masters of the bench," are self-elected and unrestricted as to numbers. Usually a member of an inn, on attaining the rank of king's counsel, is invited to the bench. Other members of long standing are also occasionally chosen, but no member by becoming a king's counsel or by seniority of standing acquires the right of being nominated a bencher. The benchers vary in number from twenty in Gray's Inn to seventy and upwards in Lincoln's Inn and the Inner Temple. The powers of the benchers are practically without limit within their respective societies; their duties, however, are restricted

to the superintendence and management of the concerns of the inn, the admission of candi- dates as students, the calling of them to the bar and the exercise of discipline generally over the members. The meetings of the benchers are variously denominated a " parliament " in the Inner and Middle Temples, a " pension " in Gray's Inn and a " council " in Lincoln's Inn. The judges of the superior courts are the visitors of the inns, and to them alone can an appeal be had when either of the societies refuses to call a member to the bar, or to reinstate in his privileges a barrister who has been disbarred for misconduct. The presiding or chief officer is the treasurer, one of the benchers, who is elected annually to that dignity. Other benchers fulfil the duties of master of the library, master of the walks or gardens, dean of the chapel and so forth, while others are readers, whose functions are referred to below. The usages of the different inns varied somewhat formerly in regard both to the term of probationary studentship enforced and to the procedure involved in a " call " to the bar by which the student is converted into the barrister. In the present day the entrance examination, the course of study and the examina- tions to be passed on the completion of the curriculum are identical and common to all the inns (see English Law). When once called to the bar, no hindrance beyond professional etiquette limits a barrister's freedom of action; so also members may on application to the benchers, and on payment of arrears of dues (if any), leave the society to which they belong, and thus cease altogether to be members of the bar likewise. A member of an Inn of Court retains his name on the lists of his inn for life by means of a small annual payment varying from £1 to £5. which at one or two of the inns is compounded for by a fixed sum taken at the call to the bar.

The ceremony of the " call " varies in detail at the different inns. It takes place after dinner (before dinner at the Middle Temple, which is the only inn at which students are called in

their wigs and gowns), in the "parliament," "pension" or " council " chamber of the benchers. The benchers sit at a table round which are ranged the students to be called. Each candidate being provided with a glass of wine, the treasurer or senior bencher addresses them and the senior student briefly replies. " Call Parties " are also generally held by the new barristers; at the Middle Temple they are allowed in hall.

During the reign of Edward III. the Inns of Court and Chancery, based on the collegiate principle, prospered under the supervision and protection of the crown. In 1381 Wat Tyler invaded the Temple, and in the succeeding century (1450) Jack Cade meditated pulling down the Inns of Court and killing the lawyers. It would appear, moreover, that the inmates of the inns were themselves at times disorderly and in conflict with the citizens. Fortescue (c. 1464) describing these societies thus speaks of them: " There belong to the law ten lesser inns, which are called the Inns of Chancery, in each of which there are one hundred students at least, and in some a far greater number, though not constantly residing. After the students have made some progress here they are admitted to the Inns of Court. Of these there are four, in the least frequented of which there are about two hundred students. The discipline is excellent, and the mode of study well adapted for proficiency." This system had probably existed for two centuries before Fortescue wrote, and continued to be enforced down to the time of Sir Thomas More (1498), of Chief Justice Dyer (1537) and of Sir Edward Coke (1571). By the' time of Sir Matthew Hale (1629) the custom for law students to be first entered to an Inn of Chancery before being admitted to an Inn of Court had become obsolete, and thenceforth the Inns of Chancery have been abandoned to the attorneys. Stow in his Survey succinctly points out the course of reading enforced at the end of the 16th century. He says that the Inns of Court were replenished partly by students coming from the Inns of Chancery, who went thither from the universities and sometimes immediately from grammar schools; and, having spent some time in studying the first elements of the law, and having performed the exercises called " bolts," " moots " and " putting of cases," they proceeded to be admitted to, and become students in, one of the Inns of Court. Here continuing for the space of seven years or thereabouts, they frequented readings and other learned exercises, whereby, growing ripe in the knowledge of the laws, they were, by the general consent either of the benchers or of the readers, called to the degree of barrister, and so enabled to practise in chambers and at the bar. This ample provision for legal study continued with more or less vigour down to nearly the commencement of the 1 8th century. A languor similar to that which affected the church and the universities then gradually supervened, until the fulfilment of the merest forms sufficed to confer the dignity of advocate and pleader. This was maintained until about 1845, when steps were taken for reviving and extending the ancient discipline and course of study, bringing them into harmony with modern ideas and requirements.

The fees payable vary slightly at the different inns, but average about £150. This sum covers all expenses from admission to an inn to the call at the bar, but the addition of tutorial and other expenses may augment the cost of a barrister's legal education to £400 or £500. The period of study prior to call must not be less than twelve terms, equivalent to about three years. Solicitors, however, may be called without keeping any terms if they have been in practice for not fewer than five consecutive years.

It has been seen that the studies pursued in ancient times were conducted by means of " readings," " moots " and " bolts." The readings were deemed of vital importance, and were delivered in the halls with much ceremony; they were frequently regarded as authorities and cited as such at Westminster in argument. Some statute or section of a statute was selected for analysis and explanation, and its relation to the common law pointed out. Many of these readings, dating back to Edward I., are extant, and well illustrate the importance of the subjects and the exhaustive and learned manner in which they were treated. The function o(" reader " involved the holder in very weighty

expenses, chiefly by reason of the profuse hospitality dispensed — a constant and splendid table being kept during the three weeks and three days over which the readings extended, to which were invited the nobility, judges, bishops, the officers of state and sometimes the king himself. In 1688 the readers were paid £200 for their reading, but by that time the office had become a sinecure. In the present day the readership is purely honorary and without duties. The privilege formerly assumed by the reader of calling to the bar was taken away in 1664 by an order of the lord chancellor and the judges. Moots were exercises of the nature of formal arguments on points of law raised by the students and conducted under the supervision of a bencher and two barristers sitting as judges in the halls of the inns. Bolls were of an analogous character, though deemed inferior to moots.

In the early history of the inns discrimination was exercised in regard to the social status of candidates for admission to them. Sir John Feme, a writer of the 16th century, referred to by Dugdale, states that none were admitted into the houses of court except they were gentlemen of blood. So also Pliny, writing in the 1 st century of the Christian era (Letters, ii. 14) , says that before his day young men even of the highest families of Rome were not admitted to practice except upon the introduction of some man of consular rank. But he goes on to add that all barriers were then broken down,

everything being open to everybody — a remark applicable to the bar of England and elsewhere in the present day. It may here be noted that no dignity or title confers any rank at the bar. A privy councillor, a peer's son, a baronet, the speaker of the House of Commons or a knight — all rank at the bar merely according to their legal precedence. Formerly orders were frequently issued both by the benchers and by the crown on the subject of the dress, manners, morals and religious observances of students and members. Although some semblance of a collegiate discipline is still maintained, this is restricted to the dining in hall, where many ancient usages survive, and to the closing of the gates of the inns at night.

Each inn maintains a chapel, with the accompaniment of preachers and other clergy, the services being those of the Church of England. The Inner and the Middle Temple have joint use of the Temple church. The office of preacher is usually filled by an ecclesiastic chosen by the benchers. The principal ecclesiastic of the Temple church is, however, constituted by letters patent by the crown without episcopal institution or induction, enjoying, nevertheless, no authority independently of the benchers. He bears the title of Master of the Temple.

It has already been stated, on the authority of Fortescue, that the students of the Inns of Court learned to dance, sing and play instrumental music; and those accomplishments found expression in the " masques " and " revels " for which the societies formerly distinguished themselves, especially the Inner Temple and Gray's Inn. These entertainments were of great antiquity and much magnificence, involving very considerable expense. Evelyn (Diary) speaks of the revels at the Middle Temple as an old and riotous custom, having relation neither to virtue nor to policy. The last revel appears to have been held at the Inner Temple in 1734, to mark the occasion of the elevation of Lord Chancellor Talbot to the woolsack. The plays and masques performed were sometimes repeated elsewhere than in the hall of the inn, especially before the sovereign at court. A master of the revels was appointed, commonly designated Lord of Misrule. There is abundant information as to the scope and nature of these entertainments: one of the festivals is minutely described by Gerard Leigh in his Accedence of Armorie" 161 2; and a tradition ascribes the first performance of Shake- speare's Twelfth Night to a revel held in the Middle Temple hall in February 1601. The hospitality of the inns now finds expres- sion mainly in the " Grand Day," held once in each of the four terms, when it is customary for the judges and other distinguished visitors to dine with the benchers (who sit apart from the barristers and students on a

dais in some state), and " Readers' Feast," on both which occasions extra commons and wine are served to the members attending. But the old customs also found some renewal in the shape of balls, concerts, garden-parties

and other entertainments. In 1887 there was a revival (the first since the 17th century) of the Masque of Flowers at both the Inner Temple and Gray's Inn. The Royal Horticultural Society's annual exhibition of flowers and fruit is held in May in the Temple Gardens. Plays are also occasionally performed in the Temple, Robert Browning's Sordello being acted in 1902 by a company of amateurs, most of whom were either members of the bar or connected with the legal profession.

The Inner and the Middle Temple, so far as their history can be traced, have always been separate societies. Fortescue, writing between 1461 and 1470, makes no allusion to a previous junction of the two inns. Dugdale (1671) speaks of the Temple as having been one society, and states that the students so increased in number that at length they divided, becoming the Inner and Middle Temple respectively. He does not, however, give any authority for this statement, or furnish the date of the division. The first trustworthy mention of the Temple as an inn of court is found in the Paston Letters, where, under date November 1440, the Inner Temple is spoken of as a college, as is also subsequently the Middle Temple. The Temple had been the seat in England of the Knights Templars, on whose suppression in 1312 it passed with other of their possessions to the crown, and after an interval of some years to the Knights Hospitallers of St John of Jerusalem, who in the reign of Edward III. demised the mansion and its surroundings to certain professors of the common law who came from Thavie's Inn. Notwithstanding the destruction of the muniments of the Temple by fire or by popular commotion, sufficient testimony is attainable to show that in the reigns of Edward III. and Richard II. the Temple had become the residence of the legal communities which have since maintained there a permanent footing. The two societies continued as tenants to the Knights Hospitallers of St John until the dissolution of the order in 1539; they then became the lessees of the crown, and so remained until 1609, when James I. made a grant by letters patent of the premises in perpetuity to the benchers of the respective societies on a yearly payment by each of £10, a payment bought up in the reign of

Charles II. In this grant the two inns are described as " the Inner and the Middle Temple or New Temple," and as " being two out of those four colleges the most famous of all Europe " for the study of the law. Excepting the church, nothing remains of the edifices belonging to the Knights Templars, the present buildings having been almost wholly erected since the reign of Queen Elizabeth or since the Great Fire, in which the major part of the Inner Temple perished. The church has been in the joint occupation of the Inner and Middle Temple from time immemorial — the former taking the southern and the latter the northern half. The round portion of the church was consecrated in 1 185, the nave or choir in 1240. It is the largest and most complete of the four remaining round churches in England, and is built on the plan of the church of the Holy Sepulchre at Jerusalem. Narrowly escaping the ravages of the fire of 1666, this beautiful building is one of the most perfect specimens of early Gothic architecture in England. In former times the lawyers awaited their clients for consultation in the Round Church, as similarly the serjeants-at-Law were accustomed to resort to St Paul's Cathedral, where each Serjeant had a pillar assigned him. The Inner Temple, comprehending a hall, parliament chamber, library and other buildings, occupies the site of the ancient mansion of the Knights Templars, built about the year 1240, and has from time to time been more or less rebuilt and extended, the present handsome range of buildings, including a new dining hall, being completed in 1870. The library owes its existence to William Petyt, keeper of the Tower Records in the time of Queen Anne, who was also a benefactor to the library of the Middle Temple. The greatest addition by gift was made by the Baron F. Maseres in 1825. The number of volumes now in the library is 37,000. Of the Inns of Chancery belonging to the Inner Temple Clifford's Inn was anciently the town residence of the Barons Clifford, and was demised in 1345 to a body of students of the law. It was the most important of the Inns of Chancery, and numbered among its members Coke and Selden. At its dinners a table was specially set aside for the " Kentish Mess," though it is not clear what connexion there was between the Inn and the county of Kent. It was governed by a

Crincipal and twelve rulers. Clement's Inn was an Inn of Chancery efore the reign of Edward IV., taking its name from the parish church of St Clement Danes, to which it had formerly belonged. Clement's Inn was the inn of Shakespeare's Master Shallow, and was the Shepherd's Inn of Thackeray's Pendennis. The buildings of Clifford's Inn survive (1910), but of Clement's Inn there are left but a few fragments.

The Middle Temple possesses in its hall one of the most stately of existing Elizabethan buildings. Commenced in 1562, under the auspices of Edmund Plowden, then treasurer, it was not com- pleted until 1572, the richly carved screen at the east end in the style of the Renaissance being put up in 1575. The belief that the screen was constructed of timber taken from ships of the Spanish Armada (1588) is baseless. The hall, which has been preserved unaltered, has been the scene of numerous historic incidents, notably the enter- tainments given within its walls to regal and other personages from Queen Elizabeth downwards. The library, which contains about

28,000 volumes, dates from 1641, when Robert Ashley, a member of the society, bequeathed his collection of books in ail classes of literature to the inn, together with a large sum of money; other benefactors were Ashmole (the antiquary), William Petyt (a bene- factor of the Inner Temple) and Lord Stowell. From 1711 to 1826 the library was greatly neglected ; and many of the most scarce and valu- able books were lost. The present handsome library building, which stands apart from the hall, was completed in 1861, the prince of Wales (afterwards Edward VII.) attending the inauguration cere- mony on October 31st of that year, and becoming a member and bencher of the society on the occasion. He afterwards held the office of treasurer (1882). The MSS. in the collection are few and of no special value. In civil, canon and international law, as also in divinity and ecclesiastical history, the library is very rich; it contains also some curious works on witchcraft and demonology. There was but one Inn of Chancery connected with the Middle Temple, that of New Inn, which, according to Dugdale, was formed by a society of students previously settled at St George's Inn, situated near St Sepulchre s Church without Newgate; but the date of this transfer is not known. The buildings have now been pulled down.

Lincoln' slnn stands on the site partly of an episcopal palace erected in the time of Henry III. by Ralph Nevill, bishop of Chichester and chancellor of England, and partly of a religious house, called Black Friars House, in Holborn. In the reign of Edward II., Henry Lacy, earl of Lincoln, possessed the place, which from him acquired the name of Lincoln's Inn, probably becoming an Inn of Court soon after his death (in 13 10), though of its existence as a place of legal study there is little authentic record until the time of Henry VI. (1424), to which date the existing muniments reach back. The fee simple of the inn would appear to have remained vested in the see of Chichester; and it was not until 1580 that the society which for centuries had occupied the inn as tenants acquired the absolute ownership of it. The old hall, built about 1506, still remains, but has given place to a

modern structure designed by Philip Hardwick, R.A., which, along with the buildings containing the library, was completed in 1845, Queen Victoria attending the inauguration ceremony (October 13). The chapel, built after the designs of Inigo Jones, was consecrated in 1623. The library — as a collection of law books the most complete in the country — owes its foundation to a bequest of John Nethersale, a member of the society, in 1497, and is the oldest of the existing libraries in London. Various entries in the records of the inn relate to the library, and notably in 1608, when an effort was made to extend the collection, and the first appointment of a master of the library (an office now held in annual rotation by each bencher) was made. The library has been much enriched by donations and by the acquisition by purchase of collec- tion of books on special subjects. It includes also an extensive ana valuable series of MSS., the whole comprehending 50,000 volumes. The prince of Wales (George V.), a bencher of the society, filled the office of treasurer in 1904. The Inns of Chancery affiliated to Lincoln's Inn were Thavie's Inn and Furnival's Inn. Thavie's Inn was a residence of students of the law in the time of Edward III., and is mentioned by Fortescue as having been one of the lesser houses of Lincoln's Inn for some centuries. It thus continued down to 1769, when the inn was sold by the benchers, and thenceforth it ceased to have any character as a place of legal education. Furnival's Inn became the resort of students about the year 1406, and was pur- chased by the society of Lincoln's Inn in 1547. It was governed by a principal and twelve antients. In 1817 the Inn was rebuilt, but from that date it ceased to exist as a legal community and is now demolished.*

The exact date of Gray's Inn becoming the residence of lawyers is not known, though it was so occupied before the year 1370. The inn stands upon the site of the manor of Portpoole, belonging in ancient times to the dean and chapter of St Paul's, but subsequently the property of the family of Grey de Wilton and eventually of the crown, from which a grant of the manor or inn was obtained, many years since discharged from any rent or payment. The hall of the inn is of handsome design, similar to the Middle Temple hall in its general character and arrangements, and was completed about the year 1560. The chapel, of much earlier date than the hall, has, notwithstanding its antiquity, little to recommend it to notice, being small and insignificant, and lacking architectural features of any kind. The library, including about 13,000 volumes, contains a small but important collection of MSS. and missals, and also some valuable works on divinity. Little is known of the origin or early history of the library, though mention is incidentally made of it in

the society's records in the 16th and 17th centuries. The gardens, laid out about J597) it is believed under the auspices of the lord chancellor Bacon, at that time treasurer of the society, continue to this day as then planned, though with some curtailment owing to the erection of additional buildings. Among many curious customs maintained in this inn is that of drinking a toast on grand days " to the glorious, pious and immortal memory of Queen Elizabeth." Of the special circumstances originating this display of loyalty there is no record. The Inns of Chancery connected with Gray's Inn are Staple and Barnard's Inns. Staple Inn was an Inn of Chancery in the reign of Henry V., and is probably of yet earlier date. Readings and moots were observed here with regularity. Sir Simpnds d'Ewes mentions attending a moot in February 1624. The /nn, with its

picturesque Elizabethan front, faces Holborn. It was sold by the antients in 1884 for £68,000. It is in a very good state of preservation, and it is the intention of the purchasers, the Prudential Assurance Company, to preserve it as a memorial of vanishing London. Bar- nard's Inn, anciently designated Mackworth Inn, was an Inn of Chancery in the reign of Henry VI. It was bequeathed by him to the dean and chapter of Lincoln. It is now the property of the Mercer's Company and is used as a school.

The King's Inns, Dublin, the legal school in Ireland, corresponds closely to the English Inns of Court, and is in many respects in unison with them in its regulations with regard to the admission of students into the society, and to the degree of barrister-at-law, as also in the scope of the examinations enforced. Formerly it was necessary to keep a number of terms at one of the Inns in London — the stipulation dating as far back as 1542 (33 Henry VIII. c. 3). Down to 1866 the course of education pursued at the King's Inns differed from the English Inns of Court in that candidates for admission to the legal profession as attorneys and solicitors carried on their studies with those studying for the higher grade of the bar in the same building under a professor specially appointed for this purpose, — herein following the usage anciently prevailing in the Inns of Chancery in London. This arrangement was put an end to by the Attorneys and Solicitors Act (Ireland) 1866. The origin of the King's Inns may be traced to the reign of Edward I., when a legal society designated Collett's Inn was established without the walls of the city; it was destroyed by an insurrectionary band. In the reign of

Edward III. Sir Robert Preston, chief baron of the exchequer, gave up his resi- dence within the city to the legal body, which then took the name of Preston's Inn. In 1542 the land and buildings known as Preston's Inn were restored to the family of the original donor, and in the same year Henry VIII. granted the monastery of Friars Preachers for the use of the professors of the law in Ireland. The legal body removed to the new site, and thenceforward were known by the name of the King's Inns. Possession of this property having been resumed by the government in 1 742 , and the present Four Courts erected thereon, a plot of ground at the top of Henrietta Street was purchased by the society, and the existing hall built in'the year 1800. The library, numbering over 50,000 volumes, with a few MSS., is housed in build- ings specially provided in the year 1 831, and is open, not only to the members of the society, but also to strangers. The collection comprises all kinds of literature. It is based principally upon a purchase made in 1787 of the large and valuable library of Mr Justice Robinson, and is maintained chiefly by an annual payment made from the Consolidated Fund to the society in lieu of the right to receive copyright works which was conferred by an Act of 1801, but abrogated in 1836.

In discipline and professional etiquette the members of the bar in Ireland differ little from their English brethren. The same style of costume is enforced, the same gradations of rank — attorney-general, solicitor-general, king's counsel and ordinary barristers — being found. There are also serjeants-at-law limited, however, to three in number, and designated 1st, 2nd and 3rd Serjeant. The King's Inns do not provide chambers for business purposes; there is consequently no aggregation of counsel in certain localities, as is the case in London in the Inns of Court and their immediate vicinity.

The corporation known as the Faculty of Advocates in Edinburgh corresponds with the Inns of Court in London and the King's Inns in Dublin (see Advocates, Faculty of).

Authorities. — Fortescue, De laudibus legum Angliae, by A. Amos (1825); Dugdale, Origines juridicales (2nd ed., 1671); History and Antiquities of the Four Inns of Court, &c. (1780, 2nd ed.) ; Foss, Judges of F.ngland (1848-1864, 9 vols.); Herbert, Antiquities of the Inns of Court (1804); Pearce, History of the Inns of Court (1848); Report of the Commissioners appointed to inquire into the Inns of Court and Chancery, 1855; Ball, Student's Guide to the Bar (1878); Stow, Survey of London and Westminster, by Strype (1754- 1755) ; Nichols, Progresses of Elizabeth and James I. ; Lane, Student's Guide through Lincoln's Inn (2nd ed., 1805) ; Spilsbury, Lincoln's Inn, with

an Account of the Library (2nd ed., 1873); Douthwaite, Notes illustrative of the History and Antiquities of Gray's Inn (1876), and Gray's Inn, its History and Associations (1886); Paston Letters (1872); Law Magazine, 1859-1860; Quarterly Review, October, 187 1 ; Cowcl, Law Dictionary (1727); Duhigg, History of the King's Inns in Ireland (1806); Mackay, Practice of the Court of Session (1879); Bellot, The Inner and Middle Temple (1902); Inderwick, The King's Peace (1895); Fletcher, The Pension Book of Gray's Inn (1901); Loftie, The Inns of Court (1895); Hope, Chronicles of an Old Inn (Gray's Inn) (1887); A Calendar of the Inner Temple Records fed. F. A. Inderwick, 3 vols.). (J. C. W.)

INNUENDO (Latin for " by nodding," from innuere, to indicate by nodding), an insinuation, suggestion, in prima facie innocent words, of something defamatory or disparaging of a person. The word appears in legal documents in Medieval Latin, to explain, in parenthesis, that to which a preceding word refers; thus, " he, innuendo, the plaintiff, is a thief." The word is still found in pleadings in actions for libel and slander. The innuendo, in the plaintiffs statement of claim, is an averment that words

written or spoken by the defendant, though prima facie not actionable, have, in fact, a defamatory meaning, which is specifically set out (see Libel and Slander).

INOUYE, KAORU, Marquess (1835-), Japanese states- man, was born in 1835, a samurai of the Choshu fief. He was a bosom friend of his fellow-clansman Prince Ito, and the two youths visited England in 1863, serving as common sailors during the voyage. At that time all travel abroad was forbidden on pain of death, but the veto did not prove deterrent in the face of a rapidly growing conviction that, as a matter of self- protection, Japan must assimilate the essentials of Western civilization. Shortly after the departure of Inouye and Ito, the Choshu fief, having fired upon foreign vessels passing the strait of Shimonoseki, was menaced by war with the Yedo government or with the insulted powers, and Inouye and Ito, on receipt of this news, hastened home hoping to avert the catastrophe. They repaired to the British legation in Yedo and begged that the allied squadron, then about to sail for Shimonoseki to call Choshu to account, should be delayed that they might have an opportunity of advising the fief to make timely submission. Not only was this request complied with, but a British frigate was detailed to carry the two men to Shimonoseki, and, pending her departure, the British legation assisted them to lie perdu. Their mission proved futile, however, and Inouye was subse- quently waylaid by a party of conservative

samurai, who left him covered with wounds. This experience did not modify his liberal views, and, by the time of the Restoration in 1867, he had earned a high reputation as a leader of progress and an able statesman. Finance and foreign affairs were supposed to be the spheres specially suited to his genius, but his name is not associated with any signal practical success in either, though his counsels were always highly valued by his sovereign and his country alike. As minister of foreign affairs he conducted the long and abortive negotiations for treaty revision between 1883 and 1886, and in 1885 he was raised to the peerage with the title of count, being one of the first group of Meiji statesmen whose services were thus rewarded. Prior to his permanent retirement from office in 1898, he held the portfolios of foreign affairs, finance, home affairs, and agriculture and commerce, and throughout the war with Russia he attended all important state councils, by order of the emperor, being also specially designated adviser to the minister of finance. In 1907 he was raised to the rank of marquess. His name will go down in his country's history as one of the five Meiji statesmen, namely, Princes Ito and Yamagata, Marquesses Inouye and Matsukata and Count Okuma.

INOWRAZLAW, the Polish form of the German Jung-Breslau, by which the place was formerly known, a town in the Prussian province of Posen, situated on an eminence in the most ferule part of the province, 21 m. S.W. of Thorn. Pop. (1900) 26,141. Iron-founding, the manufacture of machinery and chemicals, and an active trade in cattle and country produce are carried on. In the vicinity are important salt works and a sulphur mine, and since 1876 a brine bath has been within the town. Inowrazlaw is mentioned as early as 1185, and in 1772 it passed to Prussia.

INQUEST (O. Fr. enqueste, modern enquete, from Lat.inquisitum, inquirere, to inquire), an inquiry, particularly a formal legal inquiry into facts. The word is now chiefly confined to the inquiry held by a coroner and jury into the causes of certain deaths, in matters of treasure trove, and, in the city of London, in cases of fires (see Coroner). Formerly the term was applie'd to many formal and official inquiries for fixing prices, &c.

INQUISITION, THE (Lat. inquisitio, an inquiry), the name

given to the atclesiastical jurisdiction dealing both in the middle

ages and in modern times with the detection and punl .

punishment of heretics and all persons guilty of any mea t „/

offence against Catholic orthodoxy. It is incorrect heresy

to say that the Inquisition made its appearance ia ihe

*in the isth century complete in all its principles and . * < " n f t^ til i* c t u . Empire.*

organs. It was the result 01, or rather one step in,

a process of evolution, the beginnings of which are to

be traced back to the origins of Christianity. St Paul (1 Tim

i. 20) " delivered unto Satan " Hymenaeus and Alexander, " that they might learn not to blaspheme." The penalty of death by stoning inflicted by the book of Deuteronomy upon those who deserted the true faith (Deut. xiii. 6-9, xvii. 1-6) is thus reduced to a purely spiritual excommunication. During the first three centuries of the Church there is no trace of any persecution, and the earlier Fathers, especially Origen and Lactantius, reject the idea of it. Constantine, by the edict of Milan (313), inaugurated an era of official tolerance, but from the time of Yalentinian I. and Theodosius I. onwards, laws against heretics began to appear, and increased with astonishing regularity and rapidity. We can count sixty-eight distributed over fifty-two years; heretics are subjected to exile or confiscation, disqualified from inheriting property, and even, in the case of a few groups of Manichaeans and Donatists, condemned to death; but it should be noticed that these penalties apply only to the outward manifestations of heresy, and not, as in the middle ages, to crimes of conscience. Within the Church, of the S St Optatus alone {De schismate Donalistarum, lib. iii. Fathers. cap. iii.) approved of this violent repression of the Donatist heresy; St Augustine only admitted a lemperata sever ilas, such as scourging, fines or exile, and at the end of the 4th century the condemnation of the Spanish heretic Priscillian, who was put to death in 385 by order of the emperor Maximus, gave rise to a keen controversy. St Martin of Tours, St Ambrose and St Leo vigorously attacked the Spanish bishops who had obtained the condemnation of Priscillian. St John Chrysostom considered that a heretic should be deprived of the liberty of speech and that assemblies organized by heretics should be dissolved, but

declared that " to put a heretic to death would be to introduce upon earth an inexpiable crime." From in the the 6th to the 9th century the heterodox, with the

early exception of the Manichaean sects in certain places,

Middle W ere hardly subjected to persecution. They were, ges ' moreover, rare and generally isolated, for groups

of sectaries only began to appear to any extent at the time of the earliest appearances of Catharism. However, at the end of the 10th century, the disciples of Vilgard, a heretic of Ravenna, were destroyed in Italy and Sardinia, according to Glaber, jcrro et incendio, probably by assimilation to the Manichaeans. Perhaps this was the precedent for the punish- ment of the thirteen Cathari who were burnt at Orleans in 1022 by order of King Robert, a sentence which has been commonly quoted as the first action of the " secular arm " (or lay power) against heresy in the West during the middle ages. However that may be. after 1022 there were numerous cases of the execu- tion of heretics, either by burning or strangling, in France, Italy, the Empire and England. Up till about 1200 it is not quite easy to determine what part w T as taken by the Church and its bishops and doctors in this series of executions. At Orleans the people, supported by the Crown, were responsible for the death of the heretics; the historians give only the faintest indica- tions of any direct intervention of the clergy, except perhaps for the examination of doctrine. At Goslar (1051-1052) the pro- ceedings were the same. At Asti (1034) the bishop's name appears side by side with those of the other lords who attacked the Cathari, but it seems clear that it was not he who hadthechief voice in their execution; at Milan, it was again the civil magis- trates, and this time against the wish of the archbishop — who gave the heretics the choice between the adoration of the cross and death. At Soissons (1114) the mob, distrusting the weakness of the clergy, took advantage of their bishop's absence to burn heretics at the stake. It was also the mob who, infuriated at seeing him destroy and burn crosses, burnt the heiresiarch Peter of Bruis (c. 1 140). At Liege (1144) the bishop saved from the flames certain persons whom the faithful were attempting to burn. At Cologne (1163) the archbishop was less successful, and the mob put the heretics to death Without even a trial. The condemnation of Arnold of Brescia was entirely political, though he was denounced as a heretic to the secular arm by Bernard of Clairvaux, and his execution was the act of I he prefect of Rome (1155). At Yczckiy, on the contrary (1167). the

heretics were burnt after ecclesiastical judgment had been pronounced by the abbot and several bishops. From n 83 to 1206 Hugh, bishop of Auxerre, took upon himself the discre- tionary power of exiling, dispossessing or burning heretics, while about the same time William of the White Hands, arch- bishop of Reims, in concert with Philip, count of Flanders, stamped out heresy from his diocese by fire. There was a similar unanimity between the lay and ecclesiastical authorities in the famous condemnation of the disciples of Amalric of Bena, who were burnt at Paris in 1209 by order of Philip Augustus after an ecclesiastical inquiry and judgment. The theory in these matters was at first as uncertain as the practice; in the nth century one bishop only, Theodwin of cnntll t- Liege (d. 1075), affirms the necessity for the punishment ingvlews of heretics by the secular arm (1050). His predecessor, as to the Wazo, bishop of Liege from 1041 to 1044, had expressly puoish- condemned any capital punishment and advised the meat

*IlCFCSV**

bishop of Chalons to resort to peaceful conversion. In the 1 2th century Peter the Cantor 1 protested against the death penalty, admitting at the most imprisonment. It was imprisonment again, or exile, but not death, which the German abbot Gerhoh of Reichersperg (1003-1169) demanded in the case of Arnold of Brescia, and in dealing with the heretics of Cologne, St Bernard, who cannot be accused of leniency where heterodoxy was concerned, recommended pacific refutation, followed by excommunication or prison, but never the death penalty (see Bernard, St, of Clairvaux) . In the councils, too, it is clear that the appeal to the secular arm was equally guarded: at Reims (1049) excommunication church alone is decreed against heretics; and when, as at Councils. Toulouse (1119) and the Lateran council (1139), it is laid down that heretics, in addition to excommunication, should be dealt with per poleslates extents, or when, as at the council. of Reims (1148), the secular princes are forbidden to support or harbour heretics, there is never any suggestion of capital punishment. But it must be noticed that from the opening years of the 12th century date the beginnings influence of a decided evolution in the canon law, continuing up of the to the time of Innocent III., which substituted for Caaon arbitrary decisions according to circumstances an Law. organized and particularized legislation, in which judgment was given secundum canonicas et legitimas sanctiones. Anselm of Lucca and the Panormia attributed to Ivo of Chartres reproduced word for word under the rubric De edicto imperatorum in dampna- lionem hoereticorum, law 5 of the title De hereticis of Justinian's code, which pronounces the sentence

of death against the Manichaeans; and we should remember that the Cathari, and in general all heretics in the West in the nth and 12th centuries were considered by contemporary theologians as Manichaeans. Gratian in the Dccretum proclaims the views of St Augustine (exile and fines). Certain of his commentators (2 pars Caus. xxiii.), and notably Rufinus Johannes Teutonicus, and the anonymous glossator (in Uguccio's Great Summa of The the Decretum) declare that impenitent heretics may, Council or even should, be punished by death. As early as of r °«", 1163, the council of Tours suggested to the ecclesiastical authorities definite penalties to be inflicted on heretics, namely, imprisonment and loss of all their property. Pope Alexander III., who had attended the council of Tours of 1 163, re- Definition newed at the Lateran council (1179) the decisions which of the had already been made with regard to the heterodox procedure in the south of France, and at Verona in ir84 uader Pope Lucius III., in concert with the emperor aadtne Frederick Barbarossa, took still more severe measures: Emperor obstinate heretics were to be excommunicated, and Frederick then handed over to the secular arm, which would '• inflict a suitable penalty. The emperor, on his side, laid them under the imperial ban (exile, confiscation, demolition of their houses, infamia, loss of civil rights, disqualification from*

1 Pierre de Beauvoisis (?), choir-master (grand-chantre) of the university of Paris (1184), bishop of Tournai (1191), of Paris (1196); 1 died a;, a Cistercian in 1107. He was beatified.

Innocent III.

tar In- quisition.

public offices, &c). The usage, then, was already quite clear;

but the death penalty had not as yet been demanded leaa1tr! h or inflated. Possibly it was Count Raymond V. of

Toulouse, in whose territories heretics abounded, who in 1 194 enacted a law threatening them with the penalty of death; but the authenticity of this act has been questioned. It was more probably Peter II. of Aragon who was the first to decree, in 1107, the punishment of death by burning against the heretics who should not have left his kingdom within a given time. But it was Innocent III.

who gave the

most powerful impetus to the anti-heretical movement

in the secular world by his frequent exhortations

(beginning in 1198) to the secular princes (letters of March 25th, 1199, and September 22nd, 1207). As a jurist he henceforward assimilated the crime of high treason against God to that of high treason against temporal rulers, and admitted all the terrible consequences of this assimilation.

It is therefore incorrect to believe that the Inquisition arose out of, and at the time of, the crusade against the Albigenses.

These executions en tnasse certainly created a definitive

ton"' precedent for violent repression, but there was still*

Crusade. no regular organization: the council of Toulouse,

Soregu- held in November 1229 by the Roman legate after the

treaty of peace, attempted to organize one, and

constituted itself the tribunal. But the procedure was still uncertain; in the north, from 1200 to 1222, at Paris (execu- tion of the disciples of Amalric of Bena), at Strassburg, Cambrai, Troyes and Besangon executions took place, after trials in which the bishops were the judges, the exercise of the secular power being based on vague phrases in the decrees of Louis VIII. (that heretics be punished animadversione debita), or in those of Louis IX., ordering his baillis or barons to do to them quod debebunt. The emperor Frederick II. denned his jurisprudence

more clearly: from 1220 to 1239, supported by Pope Emperor Honorius III., and above all by Gregory IX., he Frederick established against the heretics of the Empire in "• general a legislation in which the penalties of death,

banishment and confiscation of property were formulated so clearly as to be henceforth incontestable. Gregory IX. felt his

influence, and also that of the Dominican Guala,

Gregory ...

IX. creates bishop of Brescia, who had subjected his episcopal the moo- town to the full rigour of the imperial laws. The pope "I".'''' no longer hesitated as to the principle or the degree of repression; but introduced new methods of inquiry and judgment: he created out of the material furnished him by the mendicant orders, and especially the Dominicans, who were more disciplined than the rest and better theologians, the monastic inquisition, which was more elastic, more constant in its activities and more numerous than the inquisition by legate, and better disciplined than the episcopal inquisition. In November 1232 the Dominican Alberic went round Lombardy with the title of Inquisitor haerelicae pravitatis. In 1231 a similar commission was given to the Dominicans of Friesach and to the terrible Conrad of Marburg, whose zeal in Germany even exceeded the pope's wishes. In 1233 Gregory IX. addressed a letter to the bishops in the south of France, in which he announced his intention of employing the preaching friars in future for the discovery and repression of heresy.

The inquisition was now regularly instituted, but its juris- prudence was elaborated by successive additions or limitations, by the force of custom and the detailed prescriptions Beginnings ˆAded by the papal constitutions. The pope's com- auisttion rnissioners " in the matter of heresy " at first travelled from place to place. On arriving in a district they addressed its inhabitants, called upon them to confess, if they were heretics, or to denounce those whom they knew to be heretics: a " time of grace " was opened, during which those who freely confessed were dispensed from all penalties, or only given a secret and very light penance; while those whose heresy had been openly manifested were exempted from the penalties of death and perpetual imprisonment. But this time

The Domi- nicans.

could not exceed one month. After that began the inquisition. As soon as their mission was at an end, and heresy was considered to be stamped out, the inquisitors left the country. Later, inquisitorial districts were formed. The seat of the Inquisition in each district was the monastery of toi" 1 ˆ 1 ' the order (Dominican or Franciscan) to which the districts. inquisitors for that part belonged. There was never any special court or prison: the munis (prison) was lent to the Inquisition by the ecclesiastical or secular authorities. The maintenance of the prisoners and the duty of providing the prison fell in principle upon the bishops (council of Toulouse, 1229), but they tried to evade it. The kings of France, and in particular Louis VIII., granted subsidies to the _, i,, a ui- inquisitors. For each district the

inquisitors were sitorsand chosen by the provincials of their order, approved their or rejected by the pope, and removable by him only. «”’”” Their discretionary powers were absolute. They conducted their interrogations before two persons (laymen or ecclesiastics) and only pronounced their sentence after consulta- tion with leading men in the district {communicato bonorum virorum consilio). This was the only protection for the accused. It was in vain that the civil lawyers tried to proye that the secular authorities had a right to see the documents bearing on the case; the Inquisition always succeeded in setting aside these claims. The share taken in the proceedings by the bishops, the accused or their representatives, though admitted in principle, was as a rule merely illusory. The Inquisition had in addition to these boni viri certain other lay assistant officials, its sworn notaries, messengers and familiars, all of whom were closely bound to it.*

Bernard Guy (Bernardus Guidonis), 1 one of the earliest and most complete exponents of the theory of the Inquisition, admits distinctly that in its procedure multa sunt Ppocetfure specialia. The procedure was secret and in the of the highest degree arbitrary, proceeding sine strcpilu et Inqulsi- figiira judkii, its object being to ascertain not so t! oa ‘ much particular offences as tendencies: the murderers of the inquisitor Peter Martyr 2 were tried, not as assassins, but as guilty of heresy and adversaries of the Inquisition; and on the other hand, external acts of piety and verbal professions of faith were held of no value. Moreover the Inquisition was not bound by the ordinary rules of procedure in its inquiries: the accused was surprised by a sudden summons, and as a rule imprisoned on suspicion. All the accused were presumed to be guilty, the judge being at the same time the accuser. Absence was naturally considered as contumacy, and only increased the presumption of guilt by seeming to admit it. The accused had the right to demand a written account of the offences attributed to him (capitula accusationis) , but the names of the witnesses were withheld from him (Innocent IV.; bulls Cum negocium and Licet sicut accepimus) , he did not know who had denounced him, nor what weight was attached by the judges to the denunciations made against him. The utmost that was allowed him was the unsatisfactory privilege of the recusationes divinatrices, i.e. at his first examination he was asked for the names of any enemies of whom he knew, and the causes of their enmity. Heretics or persons deprived of civil rights (infames) were admitted as witnesses in cases of heresy. Women, children or slaves could be witnesses for the prosecution, but not for the defence, and cases are even to be found in which the witnesses were only ten years of age. Langhino Ugolini

states that a witness who should retract his hostile evidence should be punished for false witness; but that his evidence should be retained, and have its full effect on the sentence. No witness might refuse to give evidence, under pain of being considered guilty of heresy. The prosecution went on in the utmost secrecy. The accused swore that he would tell the whole truth, and was bound to denounce all those

1 He was born c. 1261, was a Dominican at Limoges in 1279, succes- sively prior of Albi (1294), Carcassonne (1297), Castres (1301) and Limoges (1305), inquisitor at Toulouse (1307), bishop of Tuy (1323) and of Lodeve (1325). He died in 1 33 1.

2 Peter, a Dominican, born at Verona, was murdered near Milan in 1252 and canonized in 1253.

Use of torture.

who were partners of his heresy, or whom he knew or suspected to be heretics. If he confessed, and denounced his accomplices, relatives or friends, he was " reconciled " with the Church, and had to suffer only the humiliating penalties prescribed by the canon law. If further examination proved necessary, it was continued by various methods. Bernardus Guidonis enumerates many ways of obtaining confessions, sometimes by means of moral subterfuges, but sometimes also by a process of weakening the physical strength. And as a last expedient torture was resorted to. The Church was originally opposed to torture, and the canon law did not admit confessions extorted by that means; but by the bull Ad extir- panda (1252) Innocent IV. approved its use for the discovery of heresy, and Urban IV. confirmed this usage, which had its origin in secular legislation (cf. the Veronese Code of 1228, and Sicilian Constitution of Frederick II. in 1231). In 1312 excessive cruelty had to be suppressed by the council of Vienna. Canonic- ally the torture could only be applied once, but it might be " continued." The next step was the torture of witnesses, a practice which was left to the discretion of the inquisitors. Moreover, all confessions or depositions extorted in the torture- cha-mber had subsequently to be " freely " confirmed. The confession was always considered as voluntary. The procedure was of course not litigious; any lawyer defending the accused would have been held guilty of heresy. The inquiry might last a long time, for it

was interrupted or resumed according to the discretion of the judges, who disposed matters so as to obtain as many confessions or denunciations as possible. After the different phases of the examination, the accused were divided into two categories: (1) those who had confessed and abjured, (2) those who had not confessed and were consequently convicted of heresy. There was a third class, by no means the least numerous, namely, those who having previously confessed and abjured had relapsed into error. Next came the moment of the sentence: " there was never any case of an acquittal pure and simple " (H. C. Lea). The formula for full and complete acquittal given by Bernardus Guidonis in his Practica, should, he says, never or very rarely be employed. The sentences were solemnly pronounced on a Sunday, in a church or public place, in the presence of the inquisitors, their auxiliaries, the meats.' bishops, the secular magistrates and the people. This was the sermo generalis (see Auto da rf). The accused who had confessed were reconciled, and the penalties were then pronounced; these were, in order of severity, penances, fasting, prayers, pilgrimages (Palestine, St James of Compostella, Canterbury, &c), public scourging, the compulsory wearing on the breast or back of crosses of yellow felt sewn on to the clothes or sometimes of tongues of red, letters, &c. These were the poenaeconfusibiles (humiliating). The inquisitors eventually acquired the right of inflicting fines at discretion. In 1244 and 1 25 1 Innocent IV. reproved them for their exactions. All these minor penalties could be commuted for payments in money in the same way as absolution from the crusader's vow, and the council of Vienna tried to put an end to these extortions. Beyond these minor penalties came the severer ones of imprison- ment for a period of time, perpetual imprisonment and imprison- ment of various degrees of severity (murus largus, murus strictus vel strictissimus) . The murus strictus consisted in the deepest dungeon, with single or double fetters, and " the bread and water of affliction "; but the severity of the prison regime varied very much. The murus largus, especially for a rich prisoner, amounted to a fairly mild imprisonment, but the mortality among those confined in the murus strictus became so high that Clement V. ordered an inquiry to be made into the prison regime in Langue- doc, in spite of Bernard Guy's protest against the investiga- tion as likely to diminish the prestige of the inquisitors. After the sentences had been pronounced, the obstinate heretics and renegades were for the last time called upon to submit and to confess and abjure. If they consented, they were received as penitents, and condemned on the spot to perpetual imprisonment; if they did not consent, they were handed over to the secular arm. When the heretic was handed over to the secular arm,

the agents of the secular power were recommended to punish him debita animadversione, and the form of recommending him to mercy was gone through. But, as M. Vacandard „„ says, "If the secular judges had thought fit to take lag over this formula literally, they would soon have been to the brought back to a recognition of the true state of secular affairs by excommunication." In effect, handing over to the secular arm was equivalent to a sentence of death, and of death by fire. The Dominican Jacob Sprenger, provincial of his order in Germany (1494) and inquisitor, does not hesitate to speak of the victims quas incincrari jecimus (" whom we [the inquisitors] caused to be burnt to ashes "). But we must accept the conclusions of H.C. Lea and Vacandard that compara- tively few people suffered at the stake in the medieval Inquisition. Between 1308 and 1323, Bernard Guy, who cannot be accused of inactivity, only handed over to the secular arm 42 persons, out of 930 who were convicted of heresy.

From the point of view of jurisprudence of the Inquisition, the confiscation of the condemned man's property by the ecclesiastical and secular powers is only the accompani- pj.„i s fc_ ment to the more severe penalties of perpetual im- mentby prisonment or death; but from the point of view of confisca- te economic history the importance of the confisca- tloD ' of tion is supreme. The practice originated in the Roman law, and all secular princes had already, in their own interest, recognized it as lawful (Frederick Barbarossa, Decree of Verona; Louis VIII., ordinances of 1226, 1229; Louis IX., ordinance of 1234; Raymond VII. of Toulouse, &c). In the kingdom of France there was a special official, the procureur des encours (confiscation in the matter of heresy), whose duty it was to collect the personal property of the heretics, and to incorporate their landed estates in the royal domain; in Languedoc crying abuses arose, especially under the reign of Alphonse of Poitiers. Soon the papacy managed to gain a share ˆ "® of the spoils, even outside the states of the Church, system. as is shown by the bulls ad extirpanda of Innocent IV. and Alexander IV., and henceforward the inquisitors had, in varying proportions, a direct interest in these spoliations. In Spain this division only applied to the property of the clergy and vassals of the Church, but in France, Italy and Germany, the property of all those convicted of heresy was shared between the lay and ecclesiastical authorities. Venice alone decided that all the receipts of the Holy Office should be handed over in full to the state. Clement V., in his attempted reform and regularization of inquisitorial procedure, endeavoured to reduce the confiscations to a fairly reasonable minimum, and in 1337- 1338 a series of papal inquiries was held into this financial aspect of the matter. The Assize*

*of Clarendon, the Constitutions of Frederick II. (1232) and of Count Raymond of Toulouse (1234) had also come to a joint decision with the councils on this question. King Charles V. of France prevailed upon the papacy to abolish this regulation (1378). Confiscation was, indeed, most profitable to the secular princes, and there is no doubt that the hope of considerable gain was what induced many princes to uphold the inquisitorial administration, especially in the days of the decay of faith. The an a po iui- resistance of the south of France to the Capetian calim- monarchs was to a large extent broken owing to the portance decimation of the bourgeoisie by the Inquisition s ystem , and their impoverishment by the extortions of the encours. The same was the case in certain of the Italian re- publics; while in districts such as the north of France, wHe*e heretics were both poor and few and far between, the Inquisition did not easily take root, nor did it prove very profitable. These confiscations, the importance of which in the political and economic history of the middle ages was first shown fully by H. C. Lea, were a constant source of uncertainty in transactions of all kinds; there was, for instance, always a risk in entering into a contract in a place where the existence of heretics was suspected, since any contract entered into with a heretic was void in itself. Nor was there any more security in the trans- mission of inheritances for posthumous trials were frequent;*

the Liber senlentiarum inquisitionis of Bernardus Guidonis (1307-1,323) records sentences pronounced after death against Sq persons during a period of 15 years. But not only was their property confiscated and their heirs disinherited; they were subject to still further penalties. Frederick II. extended to heresy the application of the Roman law disqualifying from holding office, and even included under its operation the children and grandchildren of the guilty man. Alexander IV. and Boniface VIII. lightened the severity of this law, and removed certain disqualifications, notably in the case of ecclesiastical offices and property.

Among other accessory penalties, we must notice the con- demnation of books. There were many precedents for this:

Constantine had had the Arian writings burnt, ˆationot Theodosius IL and Valentinian III. those of the books. Nestorians and Manichaeans, Justinian the Talmud.

In 1 2 10 were burnt the books of David of Dinant and the Periphyseon of Aristotle. In 1255 the De periculis novis- simorum temporum of William of St Amour 1 was burnt by order of Pope Alexander IV., and from 1248 to 13 19 was pronounced a series of condemnations of the Talmud. Nicholas Eymerich (c. 1320-1399), the Spanish inquisitor, demanded from Pope Gregory XI. the condemnation of Raymond Lully's books, and in 1376 obtained it, but before long the Lullists returned into favour with the pope and Eymerich was banished. This rebuff suffered by an inquisitor shows how uncertain the censure of books still was, even in a country where in less than two centuries' time it was to become one of the chief spheres of inquisitorial activity.

The definite object of the Inquisition was the prosecution of heresy; but its sphere of action was gradually extended by

the theologians and casuists until sorcery and magic

ranked with dogmatic heresy. The council of Valence

Sorcery and

magic (1248) dealt with sorcerers as well as sacrilegious per- sons, but did not treat them as heretics. Alexander IV. went further, declaring that divination and sorcery should only come within the competence of the inquisitor when they directly affected the unity or faith of the Church (9th December 1257; cf. bull Quod super nonnullis, 10th January 1260). Cases of simple sorcery were left to be dealt with by the ordinary judges. The distinction was very subtle, but it was not tampered with until 1451, at which date Nicholas V. gave the inquisitor Hugues Lenoir the cognizance of cases of divination, even when the crime did not savour of heresy. In dealing with such a subtle question, great variations had naturally arisen in practice, and the repression of sorcery was carried on jointly by the inquisitors, the bishops and the secular courts. John XXII., in consequence of a perfect epidemic of sorcery about 1320, handed over to the inquisitors for a time (1320-1333) all cases of crimes involving magic; but this measure was temporary and exceptional and only confirms the rule. There were various occasions during the middle ages when men's minds became infatuated, and it seemed as if the scourge of magic were likely entirely to destroy the Catholic faith; and during such times, morbidly infected with fear and the spirit of persecu- tion, the ecclesiastical judges regained all their prestige. One of these crises culminated in the affair of the "Vauderie" 2 of Arras (1459), in which twelve unfortunates perished

at the stake; and there were similar occurrences at the same period in Dauphine and Gascony; of this nature again was the violent persecution in the Germanic countries begun by the bull Summis desiderantes of Innocent VIII. (5th December 1484), in the course of which the two authors of the Malleus maieficorum, the inquisitors Sprenger and Institoris (Heinrich Kramer), distinguished themselves as much by their knowledge of theoreti- cal demonology as by their zeal as persecutors. In France

1 Guillaume de St Amour (d. 1272), named after his birthplace in the Jura, was canon of Beauvais and rector of the university of Paris. He was conspicuous as the mouthpiece of the secular clergy in their attacks on the mendicant orders, the Dominicans in particular.

2 The name of vauderie, i.e. the Vaudois or Waldensian heresy, had come to be used of witchcraft.

the secular authority was not long in claiming and obtaining jurisdiction over sorcerers (parlement of Paris, 1374), and as early as 1378 the university of Paris gave judgment in a case of demonology. Those unfortunates who were charged with sorcery gained, however, nothing by this change of jurisdiction, for they were invariably put to death.

*The inquisitors could not take proceedings against Jews as such. They might profess their religion and observe its rites without being in a state of heresy; they were only rheia- heretic when they attacked the Christian faith or quisHioa community, made proselytes, or returned to Judaism «»< * the after being converted. Further, those who practised Jews – usury were " suspected of not holding very orthodox doctrine as to theft " (Vacandard), and on this account the Inquisition gained a hold on them. Pope Martin V. (6th November 1419) authorized inquisitors to take proceedings against usurers.*

But these are merely extensions of competence resulting from the works of the casuists; the Inquisition was primarily the instrument for the repression of all kinds of breaches Treatment of orthodoxy. Its work in this capacity we will now of heresy describe in outline for each of the great countries of ’” the medieval Christendom. England, whether before or varlo ” s after the establishment of the Inquisition, had but few trials for heresy and, particularist in this as in all her religious activity, judged them according to her own discipline, without asking Rome for laws or special judges. In 1166, a Ensiand few heretics having been apprehended, Henry II. called a council at Oxford and summoned them to appear before it; they all confessed,

and were condemned to be scourged, branded on the face with the mark of a key, and expelled from the country, and by the 21st article of the Assize of Clarendon the king forbade any one to harbour on their lands or in the house any " of that sect of renegades who had been excommunicated at Oxford. " Any one offending against this law was to be " at the king's mercy " and his house was to be " carried outside the town and burnt." The sheriffs were obliged to swear observance of this law and to require a similar oath from all barons' stewards, knights and free tenants. This was the first civil law against heresy since the end of the Roman empire, and preceded the famous rescripts of Frederick II. against sectaries in the 13th century. It should, however, be noted that the political acts of Henry II. and Frederick II. drew down the most explicit condemnation of the church. Orthodoxy remained almost unimpaired in England up till the time of Wycliffe. Apparently neither the Catharist, Waldensian nor Pantheistic heresies gained any footing in Great Britain. The affair of the Templars in France, which was quite political, was repeated in England: Clement V. having ordered their arrest, Edward II. , after much hesitation, gave orders to the sheriffs to execute it and then decided that the ecclesiastical law should be applied. The papal inquisitors sent to England met with a bad reception, and the pope was obliged to forbid them to use torture, which was contrary to the laws of the kingdom. It was found impossible to establish the Templars' guilt and only canonical penalties were inflicted on them. The rising of the Lollards having alarmed both the church and the state, the article De haeretico comburendo was established by statute in 1401, and gained a melancholy notoriety during the religious struggles of the 16th century; it seems to have been not so much a measure for the safeguarding of dogma as a violent assertion of the secular absolutism. It was not till 1676 that Charles II. caused it to be abrogated, and obtained a decision that in cases of atheism, blasphemy, heresy, schism and other religious offences, the ecclesiastical courts should be confined to the penalties of excommunication, removal from office, degradation and other ecclesiastical means of censure, to the exclusion of the death penalty. Scotland was much later than England in giving up persecution and blood- Scotland shed; and so late as 1696 a student of medicine aged eighteen and named Aikenhead was accused of heresy and hanged at Edinburgh. In Ireland Richard de Lederede or Ledred, a Franciscan and bishop of Ossory, in 1324 prosecuted on suspicion of heresy and for sorcery a certain Dame Alice

Kettle or Kyteler and her accomplices, Petronilla of Meath and her daughter Bassilla, who were accused of holding " nightly Ireland. conference with a spirit called Robert Artisson, to whom she sacrificed in the high way nine red cocks and nine peacocks' eyes." The lady had powerful connexions, and her brother-in-law, Arnold le Powre, seneschal of Kilkenny, even went so far as to imprison the bishop. But in spite of the refusalof the secular authorities to co-operate with him, the bishop was strong enough to force them in 1325 to burn some of the accused. Dame Kettle herself, however, who had been cited to appear at Dublin before the dean of St Patrick's, escaped with the assistance of some of the nobles to England. Mean- while the bishop, who had attempted to involve Arnold le Powre in the same charge, became involved in a quarrel with the administrators of the English government in Ireland; counter charges were brought against him, he was excommunicated by his metropolitan, Alexander de Bicknor, archbishop of Dublin; and in defiance of the king's commands, after pub- lishing counter charges against the archbishop, he appealed to Rome and left the country. In 1335 Benedict XII. wrote to Edward III. deploring the absence of any inquisition in the king's dominions, and exhorting him to lend the aid of the secular arm in repressing heresy. Archbishop Alexander, who in 1347 was denounced as an abettor of heresy, died in 1349, and his successor was ordered to chastise those heretics who had taken refuge in the diocese from Richard de Lederede's violence, and whom his predecessor had protected. Finally, in 1354, Richard de Lederede himself was allowed to return to his diocese, where his zeal for persecution does not, however, seem to have found much further scope. He died in 1360. '"

The scene of the activities of the monastic Inquisition in France lay chiefly in the south. The repression of the Albigensian France. heresy (see Albigenses) went on even when its importance had quite disappeared. The chronicle of the inquisitor Guilhem Pelhisso (d. 1268) shows us the most tragic episodes of the reign of terror which wasted Languedoc for a century. Guillaume Arnaud, Peter Cella, Bernard of Caux. Jean de St Pierre, Nicholas of Abbeville, Foulques de St Georges, were the chief of the inquisitors who played the part of absolute dictators, burning at the stake, attacking both the living and the dead, confiscating their property and land, and enclosing the inhabitants both of the towns and the country in a network of suspicion and denunciation. The secular authorities were of the utmost assistance to them in this task; owing to the confiscations, the crown had too direct an interest in the success of the inquisitorial

trials not to connive at all their abuses. Under the regency of Alphonse of Poitiers Languedoc was regularly laid under contribution by the procureur des cncours. There were frequent attempts at retaliation, directed for the most part against the inquisitors, and isolated attacks were made on Dominicans. In 1234-123 5 there were regular risings of the people at Albi and Narbonne, which forced the inquisitors to retreat. In 1235 the inquisitors were driven out of Toulouse. These risings were followed by terrible measures of repression, which, in turn, led to violent outbreaks on the part of the relatives, friends or compatriots of the sufferers. During the night of the 28th or 29th of May 1242 the inquisitors and their agents were massacred at the castle of Avignonet. This massacre led to a persecution which went on without opposition and almost without a lull for nearly fifty years. At the beginning of the 14th century the terrified people found a defender in the heroic Franciscan Bernard Delicieux. For a moment King Philip the Fair and Pope Clement V. seemed to interest themselves in the misfortunes of Languedoc, and the king of France sent down reformers; but they had no effect, their activity being restrained by the king himself, who was alarmed at a separatist movement which was arising in Languedoc. The work of repression which followed this moment of hope was carried out, between 1308 and 1323, by the inquisitor Bernard Guy, and completed the destruction of the Catharist heresy, the appearances of which after the middle of the 14th century became less and less frequent. Other heretics, for a time at least,

took their place, namely the Spirituals, who had developed out of a branch of the Franciscans, and were remotely disciples of Joachim, abbot of Floris {q.v.), and whom their rigid rule of absolute poverty led, by a reaction against the cupidity of the ordinary ecclesiastics, to repudiate any hierarchy and to uphold the doctrines of Peter John de Oliva against the word of the pope. On the 17th of February 13 17 John XXII. con- demned all these irregular followers of St Francis, " jraticelli, fratres de paupere vita, bizochi or beghini," and the Inquisition of Languedoc was at once set in motion against them. Four spirituales were burnt at Marseilles in 1318, and soon the persecu- tion was extended to the Franciscan beguins or tcrtiarii, many people being burnt about 1320 at Narbonne, Lunel, Beziers, Carcassonne, &c. The persecution stopped for lack of an object, for the small groups of beguins were soon destroyed, and those of the Spirituales who were not sent to the stake or to prison were compelled by the papacy to enter other orders than the Franciscan. The Waldenses {q.v) were more difficult to destroy: originally less

dangerous to the church than the Cathari, they resisted longer, and their dispersal in scattered communities aided their long resistance.

In the north of France the workings of the Inquisition were very intermittent; for there were fewer heretics there than in the south, and as they were poorer, there was less zeal on the part of the secular arm to persecute them. At its outset, how- ever, the Inquisition in the north of France was marked by a series of melancholy events: the inquisitor Robert le Bougre, formerly a Catharist, spent six years (1 233-1 239) in going through the Nivernais, Burgundy, Flanders and Champagne, burning at the stake in every place unfortunates whom he condemned without a judgment, supported as he was by the ecclesiastical authorities and by princes such as Theobald of Champagne. The pope was forced to put a check on his zeal, and, after an inquiry, condemned him to imprisonment for life. We know that there were inquisitors settled in lie de France, Orleanais, Touraine, Lorraine and Burgundy during the 12th century, but we know next to nothing of what they did. In the 14th century, the Flemish and German heresies of the Free Spirit made their appearance in France; in 13 10 a heretic named Marguerite Porette was burnt at Paris, and in 1373 another named Jeanne Daubenton, both of whom seem to have professed a kind of rudimentary pantheism, the latter being the head of a sect called the Turlupins. The Turlupins reappeared in 142 1 at Arras and Douai and were persecuted in a similar way. But in the 15th century, with the exception of a few condemnations aimed against the Hussites, the Inquisition acted but feebly against heresy, which, as in the famous case of the " Vauderie " of Arras, was often nothing but fairly ordinary sorcery.

From the middle of the 14th century onward, the parlement had taken upon itself the right of hearing appeals from persons sentenced by the Inquisition. And the University again, by its faculty of theology, escaped the jurisdiction of the Inquisition. It was these two great bodies which at the time of the Re- formation took the place of the Inquisition in dealing with heresy.

In Italy heresy not infrequently took on a social or political character; it was sometimes almost indistinguishable from the opposition of the Ghibellines or the communalist Itgl

spirit of independence. Lombardy, besides a number of Cathari, contained a certain number of vaguely-defined sects against whom the efforts of the Apostolic Visitors sent by Innocent III. were not of much effect. From the very earliest days of the Inquisition, John of

Vicenza, Roland of Cremona and Rassiero Sacchoni directed their persecutions against Lombardy, and especially against Milan. St Peter Martyr, who was conspicuous for his bigoted violence, was assassinated in 1252. On the 20th of March 1236 Alexander IV. ordered the provincial of the friar preachers of Lombardy to increase the number of inquisitors in that province from four to eight. At Florence both heresy and Ghibellinism were alike crushed by the terrible severities of Fra Ruggieri, and indulgences were promised to all who should aid in the extinction of heresy in

Tuscany. Certain districts revolted against this violence, which threatened to devastate Italy as it had devastated Provence; in 1277 Fra Corrado Pagano was killed on an expedi- tion against the heretics of the Vattelline, and two years after the people of Parma rose against the inquisitors. Besides, this reign of terror only raised to a furious pitch the passionate and independent piety of the Italian peoples. The body of a heretic, Armanno Ponzilupo, who was killed at Ferrara in 1269, was venerated by the people, and his mediation was even invoked, until the Inquisition had to suppress this cult. But it had a harder struggle against the successes of Gerard Legarelli, and especially Dolcino (see Apostolici), which only came to an end after a long and difficult trial of the adepts of the Messianist sect of Guglielma, some of whom belonged to the noble families of Lombardy. Up till the beginning of the 14th century, how- ever, the power of the Inquisition steadily increased, and at this period Zanghino Ugolini appeared as the most skilful exponent of its theory and procedure. About the same time Charles of Anjou introduced the Inquisition into the Two Sicilies, but it could rarely effect anything there; the religious cohesion of the country was weak, and refugees were sure of safe hiding, both Waldenses and Fraticelli being frequently harboured there. When Sicily passed into the hands of Peter III. of Aragon, moreover, it came into a position of open hostility to the Hoby See and became a refuge for heretics.

Venice always preserved its autonomy as regards the repression of heresy; she was perfectly orthodox, but remained entirely independent of Rome; Innocent IV. sent inquisitors there, but the heretics continued actually to be subject to the secular tribunals. In 1288 a compromise was arrived at, and the papal Inquisition was admitted into the republic, but only on con- dition that it should remain under the control of the secular power; thus there was

established a mixed regime which sur- vived till the last days of the Venetian state. In Savoy the Inquisition constantly carried on severe measures against the Waldenses of the Alps. During the 14th and 15th centuries there was an uninterrupted succession of trials.

As regards the papal states, " it was in the nature of things that, by a confusion of the two personages, the pope should consider all opposition to him qua Italian prince as st f'" s resistance offered to the head of the church, i.e. to the Church. church " (Ch.V.Langlois). The Colonna had a personal animosity against the Gaetani ; therefore Boniface VIII., a Gaetauo, declared the Colonna to be heretics. Rienzi was accused of heresy for having questioned the temporal sovereignty of the pope at Rome. The Venetians, who in 1309 opposed the annexation of Ferrara by Clement V. to the detriment of the house of Este, were proclaimed heretics and placed under the ban of Christendom. Savonarola was attacked because he interfered with the policy of Alexander VI. at Florence. It was this same desire for the hegemony of Italy which inspired the attitude of the popes throughout the middle ages, causing them to excommunicate, apparently without reason so far as doctrine was concerned, the Visconti of Milan, the Delia Scala of Verona, the Maffredi of Faenza, &c, and prompting them to lay under an interdict or preach a crusade against certain rebellious great towns (Clement V. against Venice, John XXII. against Milan). Further, in each of the great cities of Lombardy and Tuscany, the papal party directed the local inquisition, and this power was rarely abused.

In Germany heresies, especially of a mystical character, were numerous in the middle ages; some of them affected the mass Germany ot tne P eo P' c > an d led lo religious and social movements t of no little importance. The repression of heresy went on by fits and starts, and the Inquisition was never exercised so regularly in the Germanic as in certain of the Latin countries. At the outset of the 13th century persecutions of the Waldenses and Ortlibarii (followers of Ortlieb of Strassburg, c. 1200) took place at Strassburg; measures were taken locally until, in 1 231, Gregory IX. issued definite instructions to the German prelates with a view to a regular repression of heresy, and gave full powers to execute them to Conrad of Marburg. Certain

nobles having offered him resistance, he preached a crusade against them, but died by the hand of an assassin. The council of Mainz (April 1234) dealt gently with Conrad's murderers, but severely with the false witnesses whom he had employed. Shortly before (February 1234), the diet of Frankfort had decided, in spite of the pope's

injunctions, that the destruction of heresy should be entrusted to the ordinary magistrates. And besides, thanks to the struggle between the Empire and the papacy, the German prelates always limited the prerogatives of the papal Inquisition. Again, by the municipal laws of the north (Sachsenspiegel) the ecclesiastical jurisdiction in the matter of heresy was very much limited, while the Sckwaben Spiegel (municipal laws for southern Germany) does not seem to be aware of the existence of any inquisitional jurisdiction or procedure. When in the 14th century communities of Beghards developed with extraordinary rapidity, it was the episcopal authority, both at Cologne and Strassburg, which undertook to deal with these groups of sectaries, and at the very height of the conflict between the Empire and the papacy. Marsilius of Padua, the theoretical exponent of the imperial rights, attributes to the secular judge the right atid obligation to punish heresy, the priest's role being merely advisory. In 1353 Innocent VI. tried to implant the papal Inquisition in Germany once for all; its success was but short, and Urban V.'s attempt in 1362 succeeded little better, in spite of the fact that Charles IV. (edicts of Lucca, June 1369) gave him the support of the secular power. Towards 1372, however, Gregory XI. succeeded in regularizing the exercise of the powers of the papal inquisitors on German soil; and the latter, notably Kerlinger, Hetstede, &c, set to work to destroy the communities of the Beghards, to burn their books, to close those beguinages which were under suspicion, and to check by more or less violent means mystical epidemics such as those of the " flagellants," " dancers," &c. But these measures provoked angry protests from the people, the secular magistrates and even the bishops, so that Gregory XL, perceiving that he was face to face with the popular party, invited the bishops to control the inquiries of his own envoys. At the end of the 15th century the two inquisitions were acting con- currently.

In Bohemia and the provinces subject to it the Waldenses had found their chosen country, and by the middle of the 13th century their propaganda was very flourishing. In Bohemia. 1245 Innocent IV. ordered the bishops to prosecute them with the aid of the secular arm, and in 1257, at the request of King Premysl Ottokar II., Alexander IV. introduced the Inquisition into Bohemia. But from this date till 133 5 inquisi- torial missions succeeded one another without effecting any sensible diminution in the material and moral strength of the heresy. The Waldenses had been joined by other sectaries, the Luciferani, and especially the Brethren of the Free Spirit. It was in vain that the bishops of Bohemia and Silesia carried on during the second half of the 14th century an active campaign against heresy;

the spirit of criticism which had arisen with regard to the morals, and even to the dogmas of the church, was already preparing the way for Hussitism. 1-‘

In the regions east of the Adriatic, Catharism, the first com- munities of which had very probably settled here, was supreme in the time of Innocent III. and Honorius III. The first Dominicans who established themselves in these parts £?. had much to suffer from the aggression of those very states. heretics whom they had come to convert. Gregory XI . , implacable in his persecution of Catharism, preached a crusade against them in 1234, and Bosnia was laid waste by fire and sword. But in spite of these violent measures Catharism only gained strength in the churches of Bulgaria, Rumania, Slavonia and Dalmatia. In 1298 Boniface VIII. tried to organize the Inquisition there, but the project remained fruitless. The attempt was revived in 1323 by John XXII. with doubtful success. The persecutions undertaken in the 14th and 15th centuries merely resulted in binding the Cathari to the invading Turks, with whom they found more tolerance than with the Slav princes converted to Roman orthodoxy.*

Spain.

In Spain the papal Inquisition could gain no solid footing in the middle ages. Spain had been, in turn or simultaneously, Arian under the Visigoths, Catholic under the Hispano- Romans, Mussulman by conquest, and under a regime of religious peace Judaism had developed there. After the reconquest, and even at the height of the influence of the Cathari its heresies had been of quite minor importance. At the end of the 1 2th century Alphonso II. and Peter II. had on principle promulgated cruel edicts against heresy, but the persecution seemed to be dormant. By the bull Declinante of the 26th of May 1232 inquisitors were sent to Aragon by Gregory IX. on the request of Raymond of Penaforte, and by 1237-1238 the Inquisition was practically founded. But as early as 1233 King James I. had promulgated an edict against the heretics which quite openly put the Inquisition in a subaltern position, and secularized a great part of its activities. The people, more- over, showed great hostility _ towards it. The inquisitor Fray Pedro de Cadrayta was murdered by the mob, and in 1235 the Cortes, with the consent of King James, prohibited the use of inquisitorial procedure and of the torture, as constituting a violation of the Fueros, though they made no attempt to give effect to

their prohibition. In Castile Alphonso the Wise had, by establishing in his Fuero Real and his Siete Partidas an entirely independent secular legislation with regard to heretics (r 2 5 5), removed his kingdom from all papal interference. At the opening of the 14th century Castile and Portugal had still no Inquisition. But at that time in Spain orthodoxy was generally threatened only by a few Fraticelli and Waldenses, who were not numerous enough to call for active repression. The Spanish inquisitor Nicholas Eymerich, the author of the famous Direc- torium Inquisitorum, had rarely to exercise his functions during the whole of his long career (end of 14th century). It was not against heresy that the church had to direct its vigilance. A mutual tolerance between the different religions had in fact sprung up, even after the conquest; the Christians in the north recognized the Mahommedan and Jewish religions, and Alphonso VI. of Castile took the title of imperador de losdoscultos. But for a long time past both the decisions of councils and papal briefs had proclaimed their surprise and indignation at this ominous indifference. As early as 1077 the third council of Rome, and in 1081 Gregory VII., protested against the admission of Jews to public offices in Spain. Clement IV., in a brief of 1266, exhorted James I. of Aragon to expel the Moors from his dominions. In 1278 Nicholas III. blamed Peter III. for having made a truce with them. One of the canons of the council of Vienne (1311-1312) denounces as intolerable the fact that Mahommedan prayers were still proclaimed from the top of the mosques, and under the influence of this council the Spanish councils of Zamora (1313) and Valladolid (1322) came to decisions which soon led to violent measures against the Mudegares (Mussulmans of the old Christian provinces). Already in 12 10 massacres of Jews had taken place under the inspiration of Arnold of Narbonne, the papal legate; in 1276 fresh disturbances took place as a result of James I.'s refusal to obey the order of Clement IV., who had called upon him to expel the Jews from his dominions. In 1278 Nicholas IV. commanded the general of the Dominicans to send friars into all parts of the kingdom to work for the conversion of the Jews, and draw up lists of those who should refuse to be baptized. It was in vain that a few princes such as Peter III. or Ferdinand of Castile interfered; the Spanish clergy directed the persecution with ever increasing zeal. In the 14th century the massacres increased, and during the year 1391 whole towns were destroyed by fire and sword, while at Valencia eleven thousand forced baptisms took place. In the 15th century the persecution continued in the same way; it can only be said that the years 1449, 1462, 1470, 1473 were marked by the greatest bloodshed. Moreover, the Mudegares were also subjected to these baptisms and massacres en masse. From those, or the children

of those who had escaped death by baptism, was formed the class of Conversos or Marranos, the latter name being confined to the converted Jews. This class was still further increased after the conquest of the kingdom of

Granada and the completion of the conquest by Ferdinand and Isabella, and after the pacification of the kingdoms of Aragon and Valencia by Charles V. The Mahommedans and Jews in these parts were given the choice between conversion and exile. Being of an active nature, and desiring some immediate powers as a recompense for their moral sufferings, the Jewish or Mussul- man Conversos soon became rich and powerful. In addition to the hatred of the church, which feared that it might quickly become Islamized or Judaized in this country which had so little love for theology, hatred and jealousy arose also among laymen and especially in the rich and noble classes. Limpieza, i.e. purity of blood, and the fact of being an " old Christian " were made the conditions of holding offices. It is true, this mistrust had assumed a theological form even before the Mahom- medan conquest. As early as 633 the council of Toledo had declared heretics such converts, forced or voluntary, as returned to their old religion. When this principle was revived and, whether through secular jealousy, religious dislike or national pride, was applied to the Conversos, an essentially national Inquisition, directed against local heretics, was founded in Spain, and founded without the help of the papacy. It was created in 1480 by Ferdinand and Isabella. Sixtus IV. had wished the papal Inquisition to be established after the form and spirit of the middle ages; but Ferdinand, in his desire for centralization (his efforts in this direction had already led to the creation of the Holy Hermandad and the extension of the royal jurisdiction) wished to establish an inquisition which should be entirely Spanish, and entirely royal. Rome resisted, but at last gave way. Sixtus IV., Alexander VI., Innocent VIII., Julius II. and after them all the popes of the 16th century, saw in this secular attempt a great power in favour of orthodoxy, and approved it when established, and on seeing its constant activity. The Inquisition took advantage of this to claim an almost complete autonomy. The decisions of the Roman Congregation of the Index were only valid for Spain if the Holy Office of Madrid thought good to countersign them; consequently there were some books approved at Rome and proscribed in the peninsula, such as the Historia pelagiana of Cardinal Nores, and some which were forbidden at Rome and approved in the peninsula, such as the writings of Fathers Mateo Moya and Juan Bautista Poza. The Spanish Holy Office perceived long before Rome the dangers of mysticism, and already persecuted

the mystics, the Alumbrados while Rome (impervious to Molinism) still favoured them. " During the last few centuries the church of Spain was at once the most orthodox and the most independent of the national churches " (Ch. V. Langlois). There was even a financial dispute between the Inquisition and the papacy, in which the Inquisition had the better of the argument; the Roman Penitentiary sold exemptions from penalties (involving loss of civil rights), such as prison, the galleys and wearing the sanbenito, and dispensations from the crime of Marrania (secret Judaism). The inquisitors tried to gain control of this sale, and at a much higher price, and were seconded in this by the kings of Spain, who saw that it was to their own interest. At first they tried a compromise; the unfortunate victims had to pay twice, to the pope and to the Inquisition. But the payment to the pope was held by the Inquisition to reduce too much its own share of the confiscated property, and the struggle continued throughout the first half of the 1 6th century, the Curia finally triumphing, thanks to the energy of Paul III. Since, however, the Inquisition continued to threaten the holders of papal dispensations, most of them found it prudent to demand a definite rehabilitation, in return for payments both to the king and the Inquisition. As a national institution the Inquisition had first of all the advantage of a very strong centralization and very rapid procedure, consisting as it did of an organization of local tribunals with a supreme council at Madrid, the Suprema. The grand inquisitor was ex officio president for life of the royal council of the Inquisition. It was the grand inquisitor, General Jimenez de Cisneros, who set in motion the inquisitorial tribunals of Seville, Cordova, Jaen, Toledo, Murcia, Valladolid and Calahorra. There was no such tribunal at Madrid till the time of Philip IV. The inquisitor-

general of Aragon established inquisitors at Saragossa, Barcelona, Valencia, Majorca, Sardinia, Sicily and Pampeluna (moved later to Calahorra) . From the very beginning.the papacy strengthened this organization by depriving the Spanish metropolitans, by the bull of the 25th of September 1487, of the right of receiving appeals from the decisions given jointly by the, bishops of the various dioceses, their suffragans and the apostolic inquisitors, and by investing the inquisitor-general with this right. And, more than this, Torquemada actually took proceedings against bishops, for example, the accusation of heresy against Don Pedro Aranda, bishop of Calahorra (1498); while the inquisitor Lucero prosecuted the first archbishop of

Granada, Don Ferdi- nando de Talavera. Further, when once the Inquisition was closely allied to the crown, no Spaniard, whether clerk or layman, could escape its power. Even the Jesuits, though not till after 1660, were put under the authority of the Suprema. The highest nobles were kept constantly under observation; during the reigns of Charles III. and Charles IV. the duke of Almodovar, the count of Aranda, the great writer Campomanes, and the two ministers Melchior de Jovellanos and the count of Florida-Alanca, were attacked by the Suprema. But the descendants of Moors and Jews, though they were good Christians, or even nobles, were most held in suspicion. Even during the middle ages the descendants of the Paterenes were known, observed and de- nounced. In the eyes of the Inquisition the taint of heresy was even more indelible. A family into which a forced conversion or a mixed marriage had introduced Moorish or Jewish blood was almost entirely deprived of any chance of public office, and was bound, in order to disarm suspicion, to furnish agents or spies to the Holy Office. The Spaniards were very quick to accept the idea of the Inquisition to such an extent as to look upon heresy as a national scourge to be destroyed at all costs, and they consequently considered the Inquisition as a powerful and indispensable agent of public protection; it would be going too far to state that this conception is unknown to orthodox present-day historians of the Inquisition, and especially certain Spanish historians (cf. the preface to Menendez y Pelayo's Heterodoxos espafwles). As had happened among the Albigenses, commerce and industry were rapidly paralysed in Spain by this odious regime of suspicion, especially as the Converses, who inherited the industrial and commercial capacity of the Moors and Jews, represented one of the most active elements of the population. Besides, this system of wholesale confiscations might reduce a family to beggary in a single day, so that all transactions were liable to extraordinary risks. It was in vain that the counsellors of Charles V., and on several occasions the Cortes, demanded that the inquisitors and their countless agents should be appointed on a fixed system by the state; the state, and above all the Inquisition, refused to make any such change. The Inquisition preferred to draw its revenues from heresy, and this is not surprising if we think of the economic aspect of the Albigensian Inquisition; the system of encours was simply made general in Spain, and managed to exist there for three centuries. In the case of the Inquisition in Languedoc, there still remained the possibility of an appeal to the king, the inquisitors, or more rarely the pope, against these extortions; but there was nothing of the kind in Spain. The Inquisition and the Crown could refuse each other nothing, and appeals to the pope met with their united resistance. As

early as the reign of Ferdinand certain rich Conversos who had bought letters of indulgence from the Holy See were nevertheless prosecuted by Ferdinand and Torquemadq, in spite of the protests of Sixtus IV. The papacy met with the most serious checks under the Bourbons. Philip V. forbade all his subjects to carry appeals to Rome, or to make public any papal briefs without the royal exequatur.

The political aspect of the work and character of the Inquisi- tion has been very diversely estimated; it is a serious error to attribute to it, as has too often been done, extreme ideas of equality, or even to represent it as having favoured centralization and a royal absolutism to the same extent as the Inquisition of the 13th and 14th centuries in Languedoc. " It was a mere

coincidence," says H. C. Lea," that the Inquisition and absolut- ism developed side by side in Spain." The Suprema did not attack all nobles as nobles; it attacked certain of them as Conversos, and the Spanish feudal nobles were sure enough of their limpieza to have nothing to fear from it. But it is undeni- able that it frequently tended to constitute a state within the state. At the time of their greatest power, the inquisitors paid no taxes, and gave no account of the confiscations which they effected; they claimed for themselves and their agents the right of bearing arms, and it is well known that their declared adversaries, or even those who blamed them in some respects, were without fail prosecuted for heresy. But that was not the limit to their pretensions. In 1574, under Philip II., there was an idea of instituting a military order, that of Santa Maria de la Espada Blanca, having as its head the grand inquisitor, and to him all the members of the order, i.e. all Spaniards distinguished by limpieza of blood, were to swear obedience in peace and in war. Moreover, they were to recognize his jurisdiction and give up to him the reversion of their property. Nine provinces had already consented, when Philip II. put a stop to this theocratic movement, which threatened his authority. It was, however, only the Bourbons, who had imbibed Gallican ideas, who by dint of perseverance managed to make the Inquisition subservient to the Crown, and Charles III., " the philosopher king," openly set limits to the privileges of the inquisitors. Napoleon, on his entry into Madrid (December 1808), at once suppressed the Inquisition, and the extraordinary general Cortes on the 12th of February 1813 declared it to be incompatible with the constitu- tion, in spite of the protests of Rome. Ferdinand VII. restored it (July 21, i8r4) on his return from exile, but it was impoverished and almost powerless. It was again abolished as a result of the Liberal revolution of 1820, was restored temporarily in

1823 after the French military intervention under the due d'Angouleme, and finally disappeared on the 15th of July 1834, when Queen Christina allied herself with the Liberals. " It was not, however, till the 8th of May 1869 that the principle of religious liberty was proclaimed in the peninsula; and even since then it has been limited by the constitution of 1876, which forbids the public celebration of dissident religions " (S. Reinach). In 1816 the pope abolished torture in all the tribunals of the Inquisition. It is a too frequent practice to represent as peculiar to the Spanish Inquisition modes of procedure in use for a long time in the inquisitorial tribunals of the rest of Europe. There are no special manuals, or practica, for the inquisitorial procedure in Spain; but the few distinctive characteristics of this procedure may be mentioned. The Suprema allowed the accused an advocate chosen from among the members or familiars of the Holy Office ; this privilege was obviously illusory, for the advocate was chosen and paid by the tribunal, and could only interview the accused in presence of an inquisitor and a secretary. The theological examination was a delicate and minute proceeding; the " quali- ficators of the Holy Office," special functionaries, whose equivalent can, however, easily be found in the medieval Inquisition, charged those books or speeches which had incurred " theological censures," with " slight, severe or violent " suspicion. There was no challenging of witnesses; on the contrary, witnesses who were objected to were allowed to give evidence on the most important points of the case. The torture, to the practice of which the Spanish Inquisition certainly added new refinements, was originally very much objected to by the Spaniards, and Alphonso X. prohibited it in Aragon; later, especially in the 15th, 16th and 17th centuries it was applied quite shamelessly on the least suspicion. But by the end of the 18th century, according to Llorente, it had not been employed for a long time; the fiscal, however, habitually demanded it, and the accused always went in dread of it. The punishment of death by burning was much more often employed by the Spanish than by the medieval Inquisition; about 2000 persons were burnt in Torquemada's day. Penitents were not always reconciled, as they were in the middle ages, but those condemned to be burnt were as a rule strangled previously.

With the extension of the Spanish colonial empire the

Inquisition spread throughout it almost contemporaneously with

Spanish

the Catholic faith. Ferdinand IV. decreed the estab-

Inquisl- tion.

and Portu- lishment of the Inquisition in America, and Jimenes in icese 1516 appointed Juan Quevedo, bishop of Cuba,

°" s ' inquisitor-general delegate with discretionary powers. Excesses having been committed by the agents of the Holy Office, Charles V. decreed (October 15, 1538) that only the European colonists should be subject to the jurisdiction of the Inquisition; but Philip II. increased the powers of the inquisitors' delegate and, in 1541, established on a permanent basis three new provinces of the Inquisition at Lima, Mexico and Cartagena. The first auto-da-fe took place at Mexico in 1574, the year in which Hernando Cortez died. The Inquisition of Portugal was no less careful to ensure the orthodoxy of the Portuguese colonies. An Inquisition of the East Indies was established at Goa, with jurisdiction over all the dominions of the king of Portugal beyond the Cape of Good Hope. Finally Philip II. even wished to establish an itinerant Inquisition, and at his request the pope created, by a brief of the 21st of July 1571, the " Inquisition of the galleys," or " of fleets and armies."

After the expulsion of the Jews under Isabella the Catholic (1492), followed under Philip III. by that of the Moriscoes (1609), the Inquisition attacked especially Catholics descended activities fr° m infidels, the Marrancs and Converses, who were, of the not without reason, suspected of often practising in Spanish secret the rites of their ancestral religions. As late as 1 71 5 a secret association was discovered at Madrid, consisting of twenty families, having a rabbi and a synagogue. In 1727 a whole community of Moriscoes was denounced at Granada, and prosecuted with the utmost rigour. Again, a great number of people were denounced, sent to the galleys, or burnt, for having returned to their ancestral religion, on the flimsiest of evidence, such as making ablutions during the day time, abstaining from swine's flesh or wine, using henna, singing Moorish songs, or possessing Arabic manu- scripts. During the 16th and 17th centuries the Inquisition in Spain was directe.d against Protestantism. The inquisitor- general, Fernando de Valdes, archbishop of Seville, asked the pope to condemn the Lutherans to be burnt even if they were not backsliders, or wished to be reconciled, while in 1560 three foreign Protestants, two Englishmen and a Frenchman were burnt in defiance of all international law. But the

Reformation never had enough supporters in Spain to occupy the attention of the Inquisition for long. After the Marrams the mystics of all kinds furnished the greatest number of victims to the terrible tribunal. Here again we should not lose sight of the tradition of the medieval Inquisition; the mysticism of the Beghards, the Brethren of the Free Spirit and the innumerable pantheist sects had been pitilessly persecuted by the inquisitors of Germany and France during the 14th and 15th centuries. The Illuminati (alumbrados), who were very much akin to the medieval sectaries, and the mystics of Castile and Aragon were ruthlessly examined, judged and executed. Not even the most famous persons could escape the suspicious zeal of the inquisitors Valdes and Melchior Cano. The writings of Luis de Granada were censured as containing cosas de alumbrados. St Ignatius de Loyola was twice imprisoned at the beginning of his career; St Theresa was accused of misconduct, and several times denounced; one of her works, Conceptos del amor divino, was prohibited by the Inquisition, and she was only saved by the personal influence of Philip II. Countless numbers of obscure visionaries, devotees both men and women, clerks and laymen, were accused of Illuminism and perished in the fires or the dungeons of the Inquisition. From its earliest appearance Molinosism was persecuted with almost equal rigour. Molinos himself was arrested and condemned to perpetual imprisonment (1685-1687), and during the 18th century, till 1781, several Molinosists were burnt. The Inquisition also attacked Jansenism, freemasonry (from 1738 onwards; cf. the bull In eminenti) and " philosophism," the learned naturalist Jose Clavigo y Faxarcho (1730-1806), the mathematician Benito Bails (1730-1797),

the poet Tomas de Iriarte, the ministers Clavigo Ricla, Arjinda and others being prosecuted as " philosophers." Subject also to the tribunal of the Holy Office were bigamists, blasphemers, usurers, sodomites, priests who had married or broken the secrecy of the confessional, laymen who assumed ecclesiastical costume, &c. " In all these matters, though the Inquisition may have been indiscreet in meddling with affairs which did not concern it, it must be confessed that it was not cruel, and that it was always preferable to fall into the hands of the Inquisition rather than those of the secular judges, or even the Roman inquisitors " (S. Reinach). Apart from certain exceptional cruelties such as those of the Inquisition of Calahorra, perhaps the greatest number of executions of sorcerers took place in the colonies, in the Philippines and Mexico. In Spain the persecution was only moderate; at certain times it disappeared almost completely, especially in the time of the clear-sighted inquisitor

Salazar.

Two features of the Spanish Inquisition are especially note- worthy: the prosecutions for " speeches suspected of heresy " and the censure of books. The great scholar Pedro de Lerma, who after fifty years at Paris (where he was dean of the faculty of theology) had returned to Spain as abbot of Compluto, was called upon in 1537 to abjure eleven " Erasmian " propositions, and was forced to return to Paris to die. Juan de Vergara and his brother were summoned before the Inquisition for favouring Erasmus and his writings, and detained several years before they were acquitted. Fray Alonso de Virues, chaplain to Charles V., was imprisoned on an absurd charge of depreciating the monastic state, and was only released by the pope at the instance of the emperor. Mateo Pascual, professor of theology at Alcala, who had in a public lecture expressed a doubt as to purgatory, suffered imprisonment and the confiscation of his goods. A similar fate befell Montemayor, Las Brozas and Luis de la Cadena.

The censure of books was established in 1502 by Ferdinand and Isabella as a state institution. All books had to pass through the hands of the bishops; in 1521 the Inquisition took upon itself the examination of books suspected of Lutheran heresy. In 1554 Charles V. divided the responsibility for the censorship between the Royal Council, whose duty it was to grant or refuse the imprimatur to manuscripts and the Inquisition, which retained the right of prohibiting books which it judged to be pernicious; but after 1527 it also gave the licence to print. In 1547 the Suprema produced an Index of prohibited books, drawn up in 1546 by the university of Louvain; it was completed especially as regards Spanish books, in 1551, and several later editions were published. Moreover, the revisores de libros might present themselves in the name of the Holy Office in any private library or bookshop and confiscate prohibited books. In 1558 the penalty of death and confiscation of property was decreed against any' bookseller or individual who should keep in his possession condemned books. The censure of books was eventually abolished in 181 2.

Bibliography. — A critical bibliography was drawn up by P. Fredericq in the preface to the French translation (1900) of H. C. Lea's important standard work : History of the Inquisition in the Middle Ages (3 vols., London, 1888). See also J. Havet, L'Heresie el le bras seculier au moyen age jusqu'au XIII" Steele in the CEuvres completes, vol. ii. (Paris, 1896) ; Ch. V. Langlois, L' Inquisition d'apris des travaux recents (Paris, 1901); Douais, V Inquisition (Paris, 1907); E. Vacandard, V Inquisition (Paris, 1907); Douais,

Documents pour servir a Vhistoire de V inquisition dans le Languedoc (2 vols., Paris, 1 900) ; Dollinger, Beitrdge zur Sektengeschichte des Mittelaltets (2 vols., Munich, 1890. The second volume is composed of docu- ments) ; Molinier, V Inquisition dans le midi de la France au XIII' zl au XIV' siecle. Etude sur les sources de son histoire (Paris, 1880); P. Fredericq, Corpus documentorum inquisitionis haereticae pravitatis neerlandicae (1205-1525) (4 vols., Ghent, 1889-1900); Tanon, Histoire des tribunaux de V inquisition en France (Paris, 1893); Hansen, Inquisition, Hexenwahn und Hexenverfolgung (Munich, 1900) ; Llorente, Histoire critique de V inquisition d'Espagne (4 vols., Paris, 1818); H. C. Lea, History of the Inquisition of Spain (5 vols., London, 1905-1908); S. Reinach, articles on Lea's History of the Inquisition of Spain in the Revue critique (1906, 1907, 1908) and Cultes, mythes et religions (Paris, 1908), tome iii. (P. A.)

INSANITY

597

Definition.

INSANITY (from Lat. in, not, and sanus, sound), a generic term applied to certain morbid mental conditions produced by defect or disease of the brain. The synonyms in more or less frequent use are lunacy (from a supposed influence of the moon), mental disease, alienation, derangement, aberration, madness, unsoundness of mind. The term Psychiatry (faxy, mind, and larptla, treatment) is applied to the study and treatment of the condition.

I. Medical and General

There are many diseases of the general system productive of disturbance of the mental faculties, which, either on account of their transient nature, from their being associated with the course of a particular disease, or from their slight intensity, are not included under the head of insanity proper. From a strictly scientific point of view it cannot be doubted that the fever patient in his delirium, or the drunkard in his excitement or stupor, is insane; the brain of either being under the influence of a morbific agent or of a poison, the mental faculties are deranged; yet such derangements are regarded as functional disturbances, i.e. disturbances pro- duced by agencies which experience tells will, in the majority of cases, pass off within a given period without permanent results on the tissues of the organ. The comprehensive scientific view of the position is that all

diseases of the nervous system, whether primary or secondary, congenital or acquired, should, in the words of Griesinger, be regarded as one inseparable whole, of which the so-called mental diseases comprise only a moderate proportion. However important it may be for the physician to keep this principle before him, it may be freely admitted that it cannot be carried out fully in practice, and that social considera- tions compel the medical profession and the public at large to draw an arbitrary line between such functional diseases of the nervous system as hysteria, hypochondriasis and delirium on the one hand, and such conditions as mania, melancholia, stupor and dementia on the other.

All attempts at a short definition of the term " insanity " have proved unsatisfactory; perhaps the nearest approach to accuracy is attained by the rough statement that it is a symptom of disease of the brain inducing disordered mental symptoms — the term disease being used in its widest acceptance. But even this definition is at once too comprehensive, as under it might be included certain of the functional disturbances alluded to, and too exclusive, as it does not comprehend certain rare transitory forms. Still, taken over all, this may be accepted as the least defective short definition; and moreover it possesses the great practical advantage of keeping before the student the primary fact that insanity is the result of disease of the brain (see Brain, and Neuropathology), and that it is not a mere immaterial disorder of the intellect. In the earliest epochs of medicine the corporeal character of insanity was generally admitted, and it was not until the superstitious ignorance of the middle ages had obliterated the scientific, though by no means always accurate, deductions of the early writers, that any theory of its purely psychical character arose. At the present day it is unnecessary to combat such a theory, as it is universally accepted that the brain is the organ through which mental phenomena are manifested, and therefore that it is impossible to conceive of the existence of an insane mind in a healthy brain. On this basis insanity may be defined as consisting in morbid conditions of the brain, the results of defective formation or altered nutrition of its substance induced by local or general morbid processes, and characterized especially by non-development, obliteration, im- pairment or perversion of one or more of its psychical functions. Thus insanity is not a simple condition; it comprises a large number of diseased states of the brain, gathered under one popular term, on account of mental defect or aberration being the predominant symptom.

The insanities are sharply divided into two great classes— the Congenital and the Acquired. Under the head of Congenital Insanity

must be considered all cases in which, from whatever cause, brain development lias been arrested, with consequent

Causation.

impotentiality of development of the mental faculties; under that of Acquired Insanity all those in which the brain has been born healthy but has suffered from morbid processes affect- ing it primarily, or from diseased states of the general tjoo _ ‘ system implicating it secondarily. In studying the causation of these two great classes, it will be found that certain remote influences exist which are believed to be commonly predisposing; these will be considered as such, leaving the proximate or exciting causes until each class with its subdivisions comes under review.

In most treatises on the subject will be found discussed the bearing which civilization, nationality, occupation, education, &c, have, or are supposed to have, on the production of insanity. Such discussions are as a rule eminently unsatisfactory, founded as they are on common observa- tion, broad generalizations, and very imperfect statistics. As they are for the most part negative in result, at the best almost entirely irrelevant to the present purpose, it is proposed merely to summarize shortly the general outcome of what has been arrived at by those authorities who have sought to assess the value to be attached to the influence exercised by such factors, without entering in any detail on the theories involved. The causes of insanity may be divided into (a) general, and (b) proximate.

(a) General Causes. — i. Civilization. — Although insanity is by no means unknown amongst savage races, there can be no reasonable doubt that it is much more frequently developed in civilized com- munities; also that, as the former come under the influence of civilization, the percentage of lunacy is increased. This is in con- sonance with the observation of disease of whatever nature, and is dependent in the case of insanity on the wear and tear of nerve tissue involved in the struggle for existence, the physically de- pressing effects of pauperism, and on the abuse of alcoholic stimu- lants; each of which morbid factors falls to be considered separately as a proximate cause. In considering the influence of civilization upon the production of insanity, regard must be had to the more evolved ethical attitude towards disease in general which exists in civilized communities as well as to the more perfect recognition and registration of insanity.

2. Nationality. — In the face of the imperfect social statistics

afforded by most European and American nations, and in their total absence or inaccessibility amongst the rest of mankind, it is impossible to adduce any trustworthy statement under this head.

3. Occupation. — There is nothing to prove that insanity is in any way connected with the prosecution of any trade or profession per se. Even if statistics existed (which they do not) showing the proportion of lunatics belonging to different occupations to the 1000 of the population, it is obvious that no accurate deduction quoad the influence of occupation could be drawn.

4. Education. — There is no evidence to show that education has any influence over either the production or the prevention of in- sanity. The general result of discussions on the above subjects has been the production of a series of arithmetical statements, which have either a misleading bearing or no bearing at all on the question. In the study of insanity statistics are of slight value from the scien- tific point of view, and are only valuable in its financial aspects.

5. Inheritance. — The hereditary transmission of a liability to mental disease must be reckoned as the most important among all predisposing causes of insanity. It is probably well within the mark to say that at least 50 % of the insane have a direct or colla- teral hereditary tendency towards insanity. The true significance of this factor cannot as yet be explained or described shortly and clearly, but it cannot be too definitely stated that it is not the insanity which is inherited, but only the predisposition to the manifestation of mental symptoms in the presence of a sufficient exciting cause. The most widely and generally accepted view of the exciting cause of insanity is that the predisposed brain readily breaks down under mental stress or bodily privations. There is, however, another view which has been recently advanced to the effect that the majority of mental diseases are secondary to bodily disorders, hereditary predisposition being the equally predisposing causal factor. There is probably truth in both these views, and such an admission accentuates the complexity of the factorship of heredity. If insanity can be induced by physical disorders, which must essentially be of the nature of toxic action or of mechanical agency which can alter or influence the functional powers of the brain, then it is probable that hereditary predisposition to insanity means, not only the transmission of an unstable nervous system, but also a constitution which is either peculiarly liable to the pro- duction of such toxic or poisonous substances, or incapable of effectively dealing with the toxins or poisonous substances normally formed during metabolic processes. Such a view broadens our conception of the factorship of

hereditary transmission and offers

explanation as to the manner in which insanity may appear in families previously free from the taint. Very frequently we find in the history of insane patients that although there may be no in- sanity in the family there are undoubted indications of nervous alongside of physical instability, the parental nervous defects taking the form of extreme nervousness, vagabondage, epilepsy, want of mental balance, inequality in mental development or endowment, extreme mental brilliancy in one direction associated with marked deficiency in others, the physical defects showing themselves in the form of insanity; liability to tubercular and rheumatic infections. The failure of constitutional power which allows of the invasion of the tubercle bacillus and the micrococcus rheumaticus in certain members of a family is apparently closely allied to that which favours the development of mental symptoms in others.

6. Consanguinity. — It has been strongly asserted that con- sanguineous marriage is a prolific source of nervous instability. There is considerable diversity of opinion on this subject; the genera! outcome of the investigations of many careful inquirers appears to be that the offspring of healthy cousins of a healthy stock is not more liable to nervous disease than that of unrelated parents, but that evil consequences follow where there is a strong tendency in the family to degeneration, not only in the direction of the original diathesis, but also towards instability of the nervous system. The objection to the marriage of blood relations does not arise from the bare fact of their relationship, but has its ground in the fear of their having a vicious variation of constitution, which, in their children, is prone to become intensified. There is sufficient evidence adducible to prove that close breeding is productive of degeneration ; and when the multiform functions of the nervous system are taken into account, it may almost be assumed, not only that it suffers concomitantly with other organs, but that it may also be the first to suffer independently.

7. Parental Weakness. — Of the other causes affecting the parents which appear to have an influence in engendering a predisposition to insanity in the offspring, the abuse of alcoholic stimulants and opiates, over-exertion of the mental faculties, advanced age and

weak health may be cited. Great stress has been laid on the in- fluence exercised by the first of these conditions, and many extreme statements have been made regarding it. Such statements must be accepted with reserve, for, although there is reason for attaching considerable weight to the history of ancestral intemperance as a probable causating influence, it has been generally assumed as the proved cause by those who have treated of the subject, without reference to other agencies which may have acted in common with it, or quite independently of it. However unsatisfactory from a scientific point of view it may appear, the general statement must stand that whatever tends to lower the nervous energy of a parent may modify the development of the progeny. Constitutional tendency to nervous instability once established in a family may make itself felt in various directions — epilepsy, hysteria, hypo- chondriasis, neuralgia, certain forms of paralysis, insanity, eccen- tricity. It is asserted that exceptional genius in an individual member is a phenomenal indication. Confined to the question of insanity, the morbid inheritance may manifest itself in two direc- tions — in defective brain organization manifest from birth, or from the age at which its faculties are potential, i.e. congenital insanity ; or in the neurotic diathesis, which may be present in a brain to all appearance congenitally perfect, and may present itself merely by a tendency to break down under circumstances which would not affect a person of originally healthy constitution.

8. Periodic Influence. — The evolutional periods of puberty, adolescence, utero-gestation, the climacteric period and old age exercise an effect upon the nervous system. It may be freely admitted that the nexus between physiological processes and mental disturbances is, as regards certain of the periods, obscure, and that the causal relation is dependent more on induction than on demonstration; but it may be pleaded that it is not more obscure in respect of insanity than of many other diseases. The pathological difficulty obtains mostly in the relation of the earlier evolutional periods, puberty and adolescence, to insanity; in the others a physiologico-pathological nexus may be traced; but in regard to the former there is nothing to take hold of except the purely physiological process of development of the sexual function, the expansion of the intellectual powers, and rapid increase of the bulk of the body. Although in thoroughly stable subjects due provision is made for these evolutional processes, it is not difficult to conceive that in the nervously unstable a considerable risk is run by the brain in consequence of the strain laid on it. Between the adolescent and climacteric periods the constitution of the nervous, as of the other systems, becomes established, and disturbance is not likely to occur, except from some accidental circumstances apart from evolution. In the most healthily constituted individuals the " change of life " expresses itself by some Joss of vigour. The nourishing (trophesial) function becomes less active, and either various degrees of wasting occur or there is a tendency towards restitution in bulk of tissues by a less highly organized material. The most important instance of the latter tendency is fatty de- generation of muscle, to which the arterial system is very liable. In the mass of mankind those changes assume no pathological

importance : the man or woman of middle life passes into advanced age without serious constitutional disturbance; on the other hand, there may be a break down of the system due to involutional changes in special organs, as, for instance, fatty degeneration of the heart. In all probability the insanity of. the climacteric period may be referred to two pathological conditions : it may depend on structural changes in the brain due to fatty degeneration of its arteries and cells, or it may be a secondary result of general systemic disturbance, as indicated by cessation of menstruation in the female and possibly by some analogous modification of the sexual function in men. The senile period brings with it further reduction of formative activity; all the tissues waste, and are liable to fatty and calcareous degeneration. Here again, the arteries of the brain are very generally implicated; atheroma in some degree is almost always present, but is

by no means necessarily followed by insanity.

The various and profound modifications of the system which attend the periods of utero-gestation, pregnancy and child-bearing do not leave the nervous centres unaffected. Most women are liable to slight changes of disposition and temper, morbid longings, strange likes and dislikes during pregnancy, more especially during the earlier months; but these are universally accepted as accompani- ments of the condition not involving any doubts as to sanity. But there are various factors at work in the system during pregnancy which have grave influence on the nervous system, more especially in those hereditarily predisposed, and in those gravid for the first time. There is modification of direction of the blood towards a new focus, and its quality is changed, as is shown by an increase of fibrin and water and a decrease of albumen. To such physical influences are superadded the discomfort and uneasiness of the situation, mental anxiety and anticipation of danger, and in the unmarried the horror of disgrace. In the puerperal (recently delivered) woman there are to be taken into pathological account, in addition to the dangers of sepsis, the various depressing influences of child-bed, its various accidents reducing vitality, the sudden return to ordinary physiological conditions, the rapid call for a new focus of nutrition, the translation as it were of the blood supply from the uterus to the mammae — all physical influences liable to affect the brain. These influences may act independently of moral shock; but, where this is coincident, there is a condition of the nervous system unprepared to resist its action.

(6) Proximate Causes. — The proximate causes of insanity may be divided into (1) toxic agents, (2) mechanical injury to the brain, including apoplexies and tumours, and (3) arterial degeneration.

1. Toxic Agents. — The definite nature of the symptoms in the majority of the forms of acute insanity leave little reason to doubt that they result from an invasion of the system by toxins of various kinds. The symptoms referred to may be briefly indicated as follows: (i.) Pyrexia, or fever generally of an irregular type; (ii.) Hyperleucocytosis, or an increase of the white blood corpuscles, which is the chief method by which the animal organism protects itself against the noxious influence of micro-organisms and their toxins. In such cases as typhoid fever, which is caused by a bacillus, or Malta fever which is caused by a coccus, it is found that if the blood serum of the patient is mixed in vitro with a broth culture of the infecting organism in a dilution of I in 50, that the bacilli or the cocci, as the case may be, when examined microscopically, are seen

to run into groups or clusters. The organisms are- said to be agglutinated, and the substance in the serum which produces this reaction is termed an agglutinine. In many of the forms of insanity which present the symptom of hyperleucocytosis there can also be demonstrated the fact that the blood serum of the patients contains agglutinines to certain members of a group of streptococci (so called on account of their tendency to grow in the form of a chain, (rTptirTos; (iii.) the rapid organic affection of the special nerve elements depending upon the virulence of the toxin, and the resist- ance of the individual to its influence; (iv.) the marked physical deterioration as indicated by emaciation and other changes in nutrition; (v.) the close analogy between the character of many of the mental symptoms, e.g. delirium, hallucinations or depression, and the symptoms produced artificially by the administration of certain poisonous drugs.

The toxic substances which are generally believed to be associated with the causation of mental disorders may be divided into three great classes: (a) those which arise from the morbific products of metabolism within the body itself " auto-intcxicants " ; (b) those due to the invasion of the blood or tissues by micro-organisms; (c) organic or inorganic poisons introduced into the system volun- tarily or accidentally.

(a) Auto-intoxication may be due to defective metabolism or to physiological instability, or to both combined. The results of defective metabolism are most clearly manifested in the mental symptoms which not infrequently accompany such diseases as gout, diabetes or obesity, all of which depend primarily upon a deficient chemical elaboration of the products of metabolism. The association of gout and rheumatism with nervous and mental diseases is historical, and the gravest forms of spinal and cerebral degeneration have been found in association with diabetes. Until the pathology of these affections is better understood we are not in a position to determine the nature of the toxins which appear to be the cause of these diseases and of their accompanying nervous

symptoms. Physiological instability is usually manifested by neurotic persons under the strain of any unusual change in their environment.

If, for instance, any material change in the food supply consisting either in a decrease of its quality or quantity, or in a failure to assimilate it properly, the nerve-cells become exhausted and irritable, sleep is diminished and a condition known as the delirium of collapse or exhaustion may supervene. An extreme instance of this condition is presented by the delirium occurring in shipwrecked persons, who having to take to the boats are suddenly deprived of food, water or both. Poisoning of the nervous system may also result from the defective action of special glands such as the thyroid, the liver or the kidneys. These conditions are specially exemplified in the mental disturbances which accompany exophthalmic goitre, uraemic poisoning, and the conditions of depression which are observed in jaundice and other forms of hepatic insufficiency.

The results of modern research point to a growing belief in the frequency of infection of the nervous system from the hosts of micro-organisms which infest the alimentary tract. No definite or substantiated discoveries have as yet been formulated which would justify us in treating this source of infection as more than a highly probable causative influence.

(6) When we turn, however, to the potentiality of infection by micro-organisms introduced from without into the system we are upon surer if not upon entirely definite ground. A special form of insanity called by Weber, who first described it, the delirium of collapse, was observed by him to follow certain infectious diseases such as typhus fever and pneumonia. In later years it has been frequently observed to follow attacks of influenza. Recently our views have broadened and we find that the delirium of collapse is an acute, confusional insanity which may arise without any previous febrile symptoms, and is in fact one of the common forms of acute insanity. The nature of the physical symptoms, the mental con- fusion and hallucinations which accompany it, as well as the fact that it frequently follows some other infective disease, leave no doubt as to its toxic origin. A similar and analogous condition is presented by incidence of general paralysis after a previous syphilitic infection. The symptoms of general paralysis coupled with the extensive and rapid degeneration of not only the nervous but of the whole of the body tissues point to a microbic disease of intense virulence which, though probably not syphilitic, is yet induced, and enhanced in its action by the previous devitalizing action of the syphilitic toxin. There is abundant evidence to show that emotions which powerfully affect the mind, if long continued, conduce towards a condition of metabolic change, which in its turn deleteriously affects the nervous system, and which may terminate in inducing a true toxic insanity.

One of the best examples of insanity arising from micro-organisms is that form which occurs after childbirth, and which is known as puerperal mania. Other insanities may, it is true, arise at this period, but those which occur within the first fourteen days after parturition are generally of infective origin. The confusional nature of the mental symptoms, the delirium and the physical symptoms are sufficient indications of the analogy of this form of mental aberration with such other toxic forms of insanity as we find arising from septic wounds and which sometimes accompany the early toxic stages of virulent infectious diseases such as typhus, diphtheria or malignant scarlet fever.

The infective origin of puerperal mania is undoubted, though, as yet, no special pathogenic organism has been isolated. Dr Douglas (Ed. Med. Journ., 1897, i. 413) found the staphylococcus pyogenes aureus present in the blood in one case; Jackman (quoted he. cit.) found the micrococcus pneumonial crouposae in one case; while Haultain (Ed. Med. Journ., 1897, ii. 131) found only the bacillus coli communis in the blood and secretions of several cases. From our experience of similar mental and physical symptoms produced as a result of septic wounds or which succeed surgical operations there seems to be no doubt that several forms of micro- cocci or streptococci of a virulent character are capable by means of the toxins they exude of causing acute delirium or mania of a confusional clinical type when introduced into the body.

(c) Accidental and voluntary poisonings of the system which result in insanity are illustrated by the forms of insanity which follow phosphorus or lead poisoning and by Pellagra. The voluntary intoxication of the system by such drugs as morphia and alcohol will be treated of below.

2 and 3. Mechanical injuries to the brain arise from direct violence to the skull, from apoplectic hemorrhage or embolism, or from rapidly growing tumours, or from arterial degeneration.

*The forms of insanity may be divided into (I.) Congenital Mental Defect and (II.) Acquired Insanity. Forms of *• Congenital Mental Defect. — The morbid mental lasaalty. conditions which fall to be considered under this head are Idiocy (with its modification, Imbecility) and Cretinism (q.v.).*

Idiocy (from Gr. tStcorrjs, in its secondary meaning of a deprived person). In treating of idiocy it must be carefully

borne in mind that we are dealing with mental phenomena dis- sociated for the most part from active bodily disease, and that, in whatever degree it may exist, we have to deal with Mfa _. a brain condition fixed by the pathological circum- ˆ cy ‘

stances under which its possessor came into the world or by such as had been present before full cerebral activity could be developed, and the symptoms of which are not dependent on the intervention of any subsequent morbid process. From the earliest ages the term Amentia has been applied to this condition, in contradistinction to Dementia, the mental weakness following on acquired insanity.

The causes of congenital idiocy may be divided into four classes: (1) hereditary predisposition, (2) constitutional con- ditions of one or both parents affecting the constitution of the infant, (3) injuries of the infant prior to or at birth, and (4) injuries or diseases affecting the infant head during infancy. All these classes of causes may act in two directions: they may produce either non-development or abnormal development of the cranial bones as evidenced by microcephalism, or by deformity of the head ; or they may induce a more subtle morbid condition of the constituent elements of the brain. As a rule, the pathological process is more easily traceable in the case of the last three classes than in the first. For instance, in the case of constitutional conditions of the parents we may have a history of syphilis, a disease which often leaves its traces on the bones of the skull; and in the third case congenital malformation of the brain may be produced by mechanical causes acting on the child in utero, such as an attempt to procure abortion, or deformities of the maternal pelvis rendering labour difficult and instrumental interference necessary. In such cases the bones of the skull may be injured; it is only fair, however, to say that more brains are saved than injured by instrumental interference. With regard to the fourth class, it is evident that the term congenital is not strictly applicable; but, as the period of life implicated is that prior to the potentiality of the manifestation of the in- tellectual powers, and as the result is identical with that of the other classes of causes, it is warrantable to connect it with them, on pathological principles more than as a mere matter of con- venience.

Dr Ireland, in his work On Idiocy and Imbecility (1877), classifies idiots from the standpoint of pathology as follows: (1) Genetous idiocy: in this form, which he holds to be complete before birth, he believes the presumption of heredity to be stronger than in other forms; the vitality of the general system is stated to be lower than normal; the palate is arched and narrow, the teeth misshapen,

irregular and prone to decay and the patient dwarfish in appearance; the head is generally unsym- metrical and the commissures occasionally atrophied; (2) Microcephalic idiocy, a term which explains itself; (3) Eclampsic idiocy, due to the effects of infantile convulsions; (4) Epileptic idiocy; (5) Hydrocephalic idiocy, a term which explains itself; (6) Paralytic idiocy, a rare form, due to the brain injury causing the paralysis; (7) Traumatic idiocy, a form produced by the third class of causes above mentioned; (8) Inflammatory idiocy; (9) Idiocy by deprivation of one or more of the special senses.

The general conformation of the idiot is generally imperfect; he is sometimes deformed, but more frequently the frame is merely awkwardly put together, and he is usually of short stature. Only about one-fourth of all idiots have heads smaller than the average. Many cases are on record in which the cranial measurements exceed the average. It is the irregularity of development of the bones of the skull, especially at the base, which marks the condition. Cases, however, often present themselves in which the skull is perfect in form and size. In such the mischief has begun in the brain matter. The palate is often highly arched; hare-lip is not uncommon; in fact congenital defect or malformation of other organs than the brain is more commonly met with among idiots than in the general community. Of the special senses, hearing is most frequently affected. Sight is good, although co-ordination may be defective. Many are mute. On account of the mental dullness it is difficult to determine whether the senses of touch, taste and smell suffer

impairment; but the impression is that their acuteness is below the average. It is needless to attempt a description of the mental phenomena of idiots, which range between utter want of intelligence and mere weakness of intellect.

The term Imbecility has been conventionally employed to indicate the less profound degrees of idiocy, but in point of fact no distinct line of demarcation can be drawn between the conditions. As the scale of imbeciles ascends it is found that the condition is evidenced not so much by obtuseness as by irregularity of intellectual development. This serves to mark the difference between the extreme stupidity of

the lowest of the healthy and the highest forms of the morbidly deprived type. The two conditions do not merge gradually one into the other. Absolute stupidity and sottishness mark many cases of idiocy, but only in the lowest type, where no dubiety of opinion can exist as to its nature, and in a manner which can never be mistaken for the dulness of the man who is less talented than the average of mankind. Where in theory the morbid (in the sense of deprivation) and the healthy types might be supposed to approach each other, in practice we find that, in fact, no debatable ground exists. The uniformity of dulness of the former stands in marked opposition to the irregularity of mental conformation in the latter. Comparatively speaking, there are few idiots or imbeciles who are uniformly deprived of mental power; some may be utterly sottish, living a mere vegetable existence, but every one must have heard of the quaint and crafty sayings of manifest idiots, indicating the presence of no mean power of applied observation. In institutions for the treatment of idiots and imbeciles, children are found not only able to read and write, but even capable of applying the simpler rules of arithmetic. A man may possess a very considerable meed of receptive faculty and yet be idiotic in respect of the power of application ; he may be physically disabled from relation, and so be manifestly a deprived person, unfit to take a position in the world on the same platform as his fellows.

Dr Ireland subdivides idiots, for the purpose of education, into five grades, the first comprising those who can neither speak nor understand speech, the second those who can understand a few easy words, the third those who can speak and can be taught to work, the fourth those who can be taught to read and write, and the fifth those who can read books for themselves. The treatment of idiocy and imbecility consists almost entirely of attention to hygiene and the building up of the enfeebled constitution, along with endeavours to develop what small amount of faculty exists by patiently applied educational in- fluences. The success which has attended this line of treatment in many public and private institutions has been very consider- able. It may be safely stated that most idiotic or imbecile children have a better chance of amelioration in asylums devoted to them than by any amount of care at home.

In the class of idiots just spoken of, imperfect development of the intellectual faculties is the prominent feature, so prominent that it masks the arrest of potentiality of development of the moral sense, the absence of which, even if noticed, is regarded as relatively unimportant; but, in conducting the practical study of congenital idiots, a class presents itself in which the moral sense is wanting or

deficient, whilst the intellectual powers are apparently up to the average. It is the custom of writers on the subject to speak of " intellectual " and " moral " idiots. The terms are convenient for clinical purposes, but the two conditions cannot be dissociated, and the terms therefore severally only imply a specially marked deprivation of intellect or of moral sense in a given case. The everyday observer has no difficulty in recognizing as a fact that deficiency in receptive capacity is evidence of imperfect cerebral development; but it is not so patent to him that the perception of right or wrong can be com- promised through the same cause, or to comprehend that loss of moral sense may result from disease. The same difficulty does not present itself to the pathologist; for, in the case of a child born under circumstances adverse to brain development, and in whom no process of education can develop an appreciation of what is right or wrong, although the intellectual faculties appear

to be but slightly blunted, or not blunted at all, he cannot avoid connecting the physical peculiarity with the pathological evidence. The world is apt enough to refer any fault in intel- lectual development, manifested by imperfect receptivity, to a definite physical cause, and is willing to base opinion on com- paratively slight data; but it is not so ready to accept the theory of a pathological implication of the intellectual attributes concerned in the perception of the difference between right and wrong. Were, however, two cases pitted one against another — the first one of so-called intellectual, the second one of so-called moral idiocy — it would be found that, except as regards the psychical manifestations, the cases might be identical. In both there might be a family history of tendency to degeneration, a peculiar cranial conformation, a history of previous symptoms during infancy, and of a series of indications of mental in- capacities during adolescence, differing only in this, that in the first the prominent indication of mental weakness was inability to add two and two together, in the second the prominent feature was incapacity to distinguish right from wrong. What compli- cates the question of moral idiocy is that many of its subjects can, when an abstract proposition is placed before them, answer according to the dictates of morality, which they may have learnt by rote. If asked whether it is right or wrong to lie or steal they will say it is wrong; still, when they themselves are detected in either offence, there is an evident non-recognition of its concrete nature. The question of moral idiocy will alwavs be a moot one between the casuist and the pathologist; but, when the whole natural history of such cases is studied, there are points of

differentiation between their morbid depravation and mere moral depravity. Family history, individual peculiarities, the general bizarre nature of the phenomena, remove such cases from the category of crime.

Statistics. — According to the census returns of iqoi the to-al number of persons described as idiots and imbeciles in England and. Wales was 48,882, the equality of the sexes being remarkabto, namely, 24,480 males and 24,402 females. Compared with the entire population the ratio is 1 idiot or imbecile to 665 persons, or 15 per 10,000 persons living. Whether the returns are defective, owing to the sensitiveness of persons who would desire to conceal the occurrence of idiocy in their families, we have no means of knowing; but such a feeling is no doubt likely to exist anions; those who look upon mental infirmity as humiliating, rather than, as one of the many physical evils which afflict humanity. Dr. Ire- land estimates that there is 1 idiot or imbecile to every 500 persons in countries that have a census. The following table shows the num- ber of idiots according to official retu r ns of the various countries : —*

Proportion

Males.

Females.

Total.

to 100,000 of Pop.

England and Wales

24,480

24,402

48,882

150

Scotland …

3.246

3.377

6,623

148

Ireland ....

2,946

2,270

5,216

117

France (including

. 1

cretins) (1872)

20,456

H.677

35.133

97

Germany (1871) .

—

—

33,739

82

Sweden (1870) . .

—

—

1,632

38

Norway (1891) . .

1,357

1,074

2,43i

121

Denmark (1888-89).

2, 1 06

1,751

3,857

200

For the United States there are no later census figures than 1890 when the feeble-minded or idiotic were recorded as 95,571 (52,940 males and 42,631 females). In 1904 (Special Report of Bureau of Census, 1906) the "feeble-minded" were estimated at 150,000.

The relative frequency of congenital and acquired insanity in various countries is shown in the following table, taken from Koch's statistics of insanity in Wurttemberg, which gives the number ol idiots to 100 lunatics: —

Prussia . Bavaria . Saxony

• 158 ■ 154

. 162

France .... Denmark . Sweden ....

66

58 22

Austria . Hungary . Canton of Bern . America .

• 53

. 140

• "7

Norway.

England and Wales

Scotland

Ireland ....

65 74 68

69

It is difficult to understand the wide divergence of these figures, except it be that in certain states, such as Prussia and Bavaria, dements have been taken along with aments and in others cretins.

MEDICAL AND GENERAL]

INSANITY

60 1

General symptoms.

This cannot, however, apply to the case of France, which is stated to have only 66 idiots to every 100 lunatics. In many_ districts of France cretinism is common; it is practically unknown in England, where the proportion of idiots is stated as higher than in France; and it is rare in Prussia, which stands at 158 idiots to 100 lunatics. Manifestly imperfect as this table is, it shows how important an element idiocy is in social statistics ; few are aware that the number of idiots and that of lunatics approach so nearly.

II. Acquired Insanity. — So far as the mental symptoms of acquired insanity are concerned, Pinel's ancient classification, into Mania, Melancholia and Dementia, is still applic- inˆntt a ˆ e t0 ever y case, and although numberless classifica- tions have been advanced they are for the most part merely terminological variations. Classifications of the insanities based on pathology and etiology have been held out as a solution of the difficulty, but, so far, pathological observations have failed to fulfil this ideal, and no thoroughly satisfactory pathological classification has emerged from them. Classifications are after all matters of convenience; the following system admittedly is so: — Melancholia. Mania.

Delusional Insanity. Katatonia. Hebephrenia. Traumatic Insanity.

Insanity following upon arterial degeneration. Insanities associated or caused by: General Paralysis; Epilepsy. Insanities associated with or caused by Alcoholic and Drug intoxi- cation: Delirium Tremens, Chronic Alcoholic Insanity, Dip- somania, Morphinism. Senile Insanity.

The general symptoms of acquired insanity group themselves naturally under two heads, the physical and the mental.

The physical symptoms of mental disease generally, if not invariably, precede the onset of the mental symptoms, and the patient may complain of indefinite symptoms of malaise for weeks and months before it is suspected that the disorder is about to terminate in mental symptoms. The most general physical disorder common to the onset of all the insanities is the failure of nutrition, i.e. the patient rapidly and apparently without any apparent cause loses weight. Associated with this nutritional failure it is usual to have disturbances of the alimentary tract, such as loss of appetite, dyspepsia and obstinate constipation. During the prodromal stage of such conditions as mania and melancholia the digestive functions of the stomach and intestine are almost or completely in abeyance. To this implication of other systems consequent on impairment of the trophesial (nourishment- regulating) function of the brain can be traced a large number of the errors which exist as to the causation of idiopathic melan- cholia and mania. Very frequently this secondary condition is set down as the primary cause; the insanity is referred to derangements of the stomach or bowels, when in fact these are, concomitantly with the mental disturbance, results of the cerebral mischief. Doubtless these functional derangements exercise considerable influence on the progress of the case by assisting to deprave the general economy, and by producing depressing sensations in the region of the stomach. To them may probably be attributed, together with the apprehension of impending insanity, that phase of the disease spoken of by the older writers as the stadium melancholicum, which so frequently presents itself in incipient cases.

The skin and its appendages — the hair and the nails — suffer in the general disorder of nutrition which accompanies all insanities. The skin may be abnormally dry and scurfy or moist and offensive. In acute insanities rashes are not uncommon, and in chronic conditions, especially conditions of depression, crops of papules occur on the face, chest and shoulders. The hair is generally dry,

loses its lustre and becomes brittle. The nails become deformed and may exhibit either excessive and irregular or diminished grov.'th.

Where there are grave nutritional disorders it is to be ex- pected that the chief excretions of the body should show de- partures from the state of health. In this article it is impossible

to treat this subject fully, but it may suffice to say that in many states of depression there is a great deficiency in the excretion of the solids of the urine, particularly the nitrogenous waste pro- ducts of the body; while in conditions of excitement there is an excessive output of the nitrogenous waste products. It has lately been pointed out that in many forms of insanity indoxyl is present in the urine, a substance only present when putrefactive processes are taking place in the intestinal tract.

The nervous system, both on the sensory and motor side, suffers very generally in all conditions of insanity. On the sensory side the special senses are most liable to disorder of their function, whereby false sense impressions arise which the patient from impairment of judgment is unable to correct, and hence arise the psychical symptoms known as hallucinations and delusions. Common sensibility is generally impaired.

On the motor side, impairment of the muscular power is present in many cases of depression and in all cases of dementia. The incontinence of urine so frequently seen in dementia and in acute insanity complicated with the mental symptom of con- fusion depends partly on impairment of muscular power and partly on disorder of the sensory apparatus of the brain and spinal cord.

The outstanding mental symptom in nearly all insanities, acute and recent or chronic, is the failure of the capacity of judgment and loss of self-control. In early acute insanities, however, the two chief symptoms which are most evident and easily noted are depression on the one hand and excitement or elevation on the other. Some distinction ought to be made between these two terms, excitement and elevation, which at present are used synonymously. Excitement is a mental state which may be and generally is associated with confusion and mental impair- ment, while elevation is an exaltation of the mental faculties, a condition in which there is no mental confusion, but rather an unrestrained and rapid succession of fleeting mental processes. The symptoms which most strongly appeal to the lay mind as conclusive evidence of mental disorder are hallucinations and delusions. Hallucinations are false sense

impressions which occur without normal stimuli. The presence of hallucinations certainly indicates some functional disorder of the higher brain centres, but is not an evidence of insanity so long as the sufferer recognizes that the hallucinations are false sense impressions. So soon, however, as conduct is influenced by hallucinations, then the boundary line between sanity on the one hand and insanity on the other has been crossed. The most common hallucinations are those of sight and hearing.

Delusions are not infrequently the result of hallucinations. If the hallucinations of a melancholic patient consist in hearing voices which make accusatory statements, delusions of sin and unworthiness frequently follow. Hallucinations of the senses of taste and smell are almost invariably associated with the delusion that the patient's food is being poisoned or that it consists of objectionable matter. On the other hand, many delusions are apparently the outcome of the patient's mental state. They may be pleasant or disagreeable according as the condition is one of elevation or depression. The intensity and quality of the delusions are largely influenced by the intelligence and education of the patient. An educated man, for instance, who suffers from sensory disturbances is much more ingenious in his explanations as to how these sensory disturbances result from electricity, marconigrams, X-rays, &c, which he believes are used by his enemies to annoy him, than an ignorant man suffering from the same abnormal sensations. Loss of self-control is char- acteristic of all forms of insanity. Normal self-control is so much a matter of race, age, the state of health, moral and physical up- bringing, that it is impossible to lay down any law whereby this mental quality can be gauged, or to determine when deficiency has passed from a normal to an abnormal state. In many cases of in- sanity there is no difficulty in appreciating the pathological nature of the deficiency, but there are others in which the conduct is other- – wise so rational that one is apt to attribute the deficiency to physio- logical rather than to pathological causes. Perversion of the moral sense is common to all the insanities, but is often the only symptom to be noticed in cases of imbecility and idiocy, and it as a rule may be the earliest symptom noticed in the early stages of the excitement of manic-depressive insanity and general paralysis.

The tendency to commit suicide, which is so common among the insane and those predisposed to insanity, is especially prevalent in patients who suffer from depression, sleeplessness and delusions of persecution. Suicidal acts may be divided into accidental, im- pulsive and premeditated. The accidental suicides occur in patients who are

partially or totally unconscious of their surroundings, and are generally the result of terrifying hallucinations, to escape

from which the patient jumps through a window or runs blindly into water or some other danger. Impulsive suicides may be prompted by suddenly presented opportunities or means of self- destruction, such as the sight of water, fire, a knife, cord or poison. Premeditated suicides most frequently occur in states of long continued depression. Such patients frequently devote their attention to only one method of destruction and fail to avail them- selves of others equally practicable. As a rule the more educated the patient, the more ingenious and varied are the methods adopted to attain the desired result.

The faculty of attention is variously affected in the subjects of insanity. In some the attention is entirely subjective, being occupied by sensations of misery, depression or sensory disturb- ances. In others the attention is objective, and attracted by every accidental sound or movement. In most of the early acute insanities the capacity of attention is wholly abolished, while in hebephrenia the stage of exhaustion which follows acute excitement, and the condition known as secondary dementia, loss of the power of at- tention is one of the most prominent symptoms. The memory for both recent and remote events is impaired or abolished in all acute insanities which are characterized by confusion and loss 01 impair- ment of consciousness. In the excited stage of manic-depressive insanity it is not uncommon tc find that the memory is abnormally active. Loss of memory for recent but net remote events is char- acteristic of chronic alcoholism and senility and even the early stage of general paralysis.

Of all the functions of the brain that of sleep is the most liable to disorder in the insane. Sleeplessness is the earliest symptom in the onset of insanity ; it is universally present in all the acute forms, and the return of natural sleep is generally the first symptom of recovery. The causes of sleeplessness are very numerous, but in the majority of acute cases the sleeplessness is due to a state of toxaemia. The toxins act either directly on the brain cells producing a state of irritability incompatible with sleep, or indirectly, producing physical symptoms

which of themselves alone are capable of preventing the condition of sleep These symptoms are high arterial tension and a rapid pulse-rate. The arterial tension of health ranges between no and 120 millimetres of mercury, and when sleep occurs the arterial tension falls and is rarely above 100 millimetres. In ob- servations conducted by Bruce (Scottish Medical and Surgical- Journal, August 1900) on cases of insanity suffering from sleepless- ness the arterial tension was found to be as high as 140 and 150 millimetres. When such sleep was obtained the tension always sank at once to no millimetres or even lower. In a few cases suffering from sleeplessness the arterial tension was found to be below 100 millimetres, accompanied by a rapid pulse-rate. When sleep set in, in these cases, no alteration was noted in the arterial tension, but the pulse was markedly diminished.

Melancholia. — Melancholia is a general term applied to all forms of insanity in which the prevailing mental symptom

is that of depression and dates back to the time of M f''''*
Hippocrates. Melancholic patients, however, differ

very widely from one another in their mental symptoms, and as a consequence a perfectly unwarrantable series of sub- divisions have been invented according to the prominence of one cr other mental symptoms. Such terms as delusional melancholia, resistive melancholia, stuporose melancholia, suicidal melancholia, religious melancholia, &c. have so arisen; they are, however, more descriptive of individual cases than indicative of types of disease.

So far as our present knowledge goes, at least three different and distinct disease conditions can be described under the general term melancholia. These are, acute melancholia, excited melancholia and the state of depression occurring in Folie circulaire or alternating insanity, a condition in which the patient is liable to suffer from alternating attacks of excite- ment and depression.

Acute Melancholia is a disease of adult life and the decline of life. Women appear to be more liable to be attacked than men. Hereditary predisposition, mental worry, exhausting occupations, such as the sick-nursing of relatives, are the chief predisposing causes, while the direct exciting cause of the condi- tion is due to the accumulation in the tissues of waste products, which so load the blood as to act in a toxic manner on the cells and fibres of the brain.

The onset of the disease is gradual and indefinite. The patient suffers from malaise, indigestion, constipation and irregular, rapid and

forcible action of the heart. The urine become scanty and high coloured. The nervous symptoms are irritability, sleeplessness and a feeling of mental confusion. The actual onset of the acute mental symptoms may be sudden,

and is not infrequently heralded by distressing hallucinations of hearing, together with a rise in the body temperature. In the fully developed disease the patient is flushed and the skin hot and dry; the temperature is usually raised 1° above the normal in the evening. The pulse is hard, rapid and often irregular. There is no desire for food, but dryness of the mouth and tongue promote a condition of thirst. The bowels are constipated. The urine is scanty and frequently contains large quantities of indoxyl. The blood shows no demonstrable de- parture from the normal. The patient is depressed, the face has a strained, anxious expression, while more or less mental confusion is always present. Typical cases suffer from dis- tressing aural hallucinations, and the function of sleep is in abeyance.

Acute melancholia may terminate in recovery either gradually or by crises, or the condition may pass into chronicity, while in a small proportion of cases death occurs early in the attack from exhaustion and toxaemia. The acute stage of onset generally lasts for from two to three weeks, and within that period the patient may make a rapid and sudden recovery. The skin becomes moist and perspiration is often profuse. Large quantities of urine are excreted, which are laden with waste products. The pulse becomes soft and compressible, sleep returns, and the depression, mental confusion and hallucinations pass away. In the majority of untreated cases, however, recovery is much more gradual. At the end of two or three weeks from the onset cf the attack the patient gradually passes into a condition of comparative tranquillity. The skin becomes moister, the pulse less rapid, and probably the earliest symptom of improvement is return of sleep. Hallucinations accompanied by delusions persist often for weeks and months, but as the patient improves I physically the mental symptoms become less and less prominent. If the patient does not recover, the physical symptoms are those of mal-nutrition, together with chronic gastric and intestinal disorder. The skin is dull and earthy in appearance, the hair dry, the nails brittle and the heart's action weak and feeble. Mentally there is profound depression with delusions, and persistent or recurring attacks of hallucinations of hearing. When death occurs, it is usually preceded by a condition known as the " typhoid state." The patient rapidly passes into a state of extreme exhaustion, the tongue is dry and cracked, sordes form upon the teeth and lips, diarrhoea and

congestion of the lungs rapidly supervene and terminate life.

Treatment, — The patient in the early stage of the disease must be confined to bed and nursed by night as well as day. The food to begin with should be milk, diluted with hot water or aerated water, given frequently and in small quantities. The large intestine should be thoroughly cleared out by large enemata and kept empty by large normal saline enemata administered every second day. Sleep may be secured by lowering the blood pressure with half-grain doses of erythrol-tetra-nitrate. If a hypnotic is necessary, as it will be if the patient has had no natural sleep for two nights in succession, then a full dose of paraldehyde or veronal may be given at bed-time. Under this treatment the majority of cases, if treated early, improve rapidly. As the appetite returns great care must be taken that the patient does not suddenly resume a full ordinary dietary. A sudden return to a full dietary invariably means a relapse, which is often less amenable to treatment than the original attack. Toast should first be added to the milk, and this may be followed by milk puddings and farinaceous foods in small quantities. Any rise of temperature or increase of pulse-rate or tendency to sleeplessness should be regarded as a threatened relapse and treated accordingly.

Excited Melancholia. — Excited melancholia is almost invariably a disease of old age or the decline of life, and it attacks men and women with equal frequency. Chronic gastric disorders, deficient food and sleep, unhealthy occupations and environments, together with worry and mental stress, are all more or less predisposing causes of the disease. The direct exciting cause or causes have not as yet been demonstrated, but there is no doubt that the disease is associated with, or caused by, a condition of bacterial toxaemia, analogous to the bacterial toxaemias of acute and chronic rheumatism.

The onset of the disease is always gradual and is associated with mal-nutrition, loss of body weight, nervousness, depres- sion, loss of the capacity for work, sleeplessness and attacks of

restlessness. These attacks of restlessness become more and more marked as self-control diminishes, and as the depression increases

the disease passes the borderland of sanity.

In the fully developed disease the appearance of the patient is typical. The expression is drawn, depressed, anxious or apprehensive. The skin is yellow and parchment like. The hair is often dry and stands out stiffly from the head. The hands are in constant movement, twisting and untwisting, picking the skin, pulling at the hair or tearing at the clothes. The patient moans continuously, or emits cries of grief and wanders aimlessly. Mentally the patient, although depressed, miserable and self- absorbed, is not confused. There is complete consciousness except during the height of a paroxysm of restlessness and de- pression, and the patient can talk and answer questions clearly and intelligently, but takes no interest in the environment. Some of the patients suffer from delusions, generally a sense of impending danger, but very few suffer from hallucinations.

Physically there is loss of appetite, constipation and rapid heart action, a great increase in the number of the white blood corpuscles, particularly of the multinucleated cells which are frequently increased in bacterial infections. In the blood serum also there can be demonstrated the presence of agglutinines to certain members of the streptococci group.

The course of the disease is prolonged and chronic. The acute symptoms tend to remit at regular intervals, the patient becoming more quiet and less demonstratively depressed; but as a rule these remissions are extremely temporary. Excited melancholia is a disease characterized by repeated relapses, and recoveries are rare in cases above the age of forty.

Treatment. — There is no curative treatment for excited melan- cholia. The patient must be carefully nursed ; kept in bed during the exacerbations of the disease and treated with graduated doses of nepenthe or tincture of opium, to secure some amelioration of the acute symptoms. Careful dieting, tonics and baths are of benefit during the remissions of the disease, and in a few cases seem to promote recovery.

Folle circulaire, or alternating insanity, was first described by Falret and Baillarger, and more recently Kraepelin has considerably widened the conception of this class of disease, which he describes under the term "manic-depressive insanity." Of the two terms (folie circulaire and manic-depressive insanity) the latter is the more correct. Folie circulaire implies that the disease invariably passes

through a complete cycle, which descrip- tion is only applicable to very few of the cases. Manic-depressive insanity implies that the patient may either suffer from excite- ment or depression which do not necessarily succeed one another in any fixed order. As a matter of fact, the majority of patients who suffer from the disease either have marked excited attacks with little or no subsequent depression, or marked attacks of de- pression with a subsequent period of such slight exaltation as hardly to be distinguished from a state of health.

Depression of the manic-depressive variety, therefore, may either precede or follow upon an attack of maniacal excitement, or it may be the chief and only obvious symptom of the disease and may recur again and again. The disease attacks men and women with equal frequency, and as a rule manifests itself either late in adolescence or during the decline of life. Hereditary predisposition has been proved to exist in over 50 % of cases, beyond which no definite predisposing cause is at present known. A considerable number of cases follow upon attacks of infective disease such as typhoid fever, scarlet fever or rheumatic fever. The actual exciting cause is probably an intestinal toxaemia of bacterial origin; at all events, mal-nutrition, gastric and intestinal symptoms not infrequently precede an attack, and the condition of the blood— the increase in number in the multinucleated white blood corpuscles and the presence of agglutinines to certain members of the streptococci group of bacteria — are symptoms which have been definitely demon- strated by Bruce in every case so far examined.

If the depression is the sequel to an attack of excitement, the onset may be very sudden or it may be gradual. If, on the othei hand, the depression is not the sequel of excitement, the onset i.s very gradual and the patient complains of lassitude,

incapacity for mental or physical work, loss of appetite, con- stipation and sleeplessness often for months before the case is recognized as one of insanity. In the fully developed disease the temperature is very rarely febrile, on the contrary it is rather subnormal in character. The stomach is disordered and the bowels confined. The urine is scanty, turbid and very liable to rapid decomposition. The heart's action is slow and feeble and the extremities become cold, blue and livid. In extreme cases gangrene of the lower extremities may occur, but in all there is a tendency to oedema of the extremities. The skin is greasy, often offensive, and the palms of the hands and the soles of the feet are sodden.

Mentally there is simple depression, without, in the majority of cases,

any implication of consciousness. Many patients pass through attack after attack without suffering from hallucinations or delusions, but in rare cases hallucinations of hearing and sight are present. Delusions of unworthiness and unpardonable sin are not uncommon, and if once expressed are liable to recur again during the course of each successive attack. The disease is prolonged and chronic in its course, and the condition of the patient varies but little from day to day. When the depression follows excitement, the patient as a rule becomes fat and flabby. On the other hand, if the illness commences with depression, the chief physical symptoms are mal-nutrition and loss of body weight, and the return to health is always preceded by a return of nutrition and a gain in body weight.

The attacks may last from six months to two or three years. The intervals between attacks may last for only a few weeks or months or may extend over several years. During the interval the patient is not only capable of good mental work but may show capacity of a high order. In other words this form of mental disorder does not tend to produce dementia; the explanation probably being that between the attacks there is no toxaemia.

Treatment. — There is no known curative treatment for the depression of manic-depressive insanity, but the depression, the sleeplessness and the gastric disorder are to some extent mitigated by common sense attention to the general health of the body. If the patient is thin and wasted, then treatment is best conducted in bed. The diet should be bland, consisting largely of milk, eggs and farinaceous food, given in small quantities and frequently. Defecation should be maintained by enemata, and the skin kept clean by daily warm baths. What is of much more importance is the fact that in some instances subsequent attacks can be prevented by impressing upon the patient the necessity for attending to the state of the bowels, and of discontinuing work when the slightest symptoms of an attack present themselves. If these symptoms are at all prominent, rest in bed is a wise precaution, butcher-meat should be discontinued from the dietary and a tonic of arsenic or quinine and acid prescribed.

Mania. — The term mania, meaning pathological elevation or excitement, has, like the term melancholia, been applied to

all varieties of morbid mental conditions in which M _„..

• – 1 Mania.

the prevailing mental symptom is excitement or eleva- tion. As in melancholia so in mania various subdivisions have been invented, such as delusional mania, religious mania, homi- cidal mania, according to the special mental characteristics of each case, but such varieties are of accidental origin and cannot be held to be subdivisions.

Under the term mania two distinct diseased conditions can be described, viz. acute mania, and the elevated stage of folie circu- laire or manic-depressive insanity.

Acute Mania. — Acute mania is a disease which attacks both sexes at all ages, but its onset is most prevalent during adoles- cence and early adult life. Hereditary predisposition, physical and mental exhaustion, epileptic seizures and childbirth are all predisposing causes. The direct exciting cause or causes are un- known, but the physical symptoms suggest that the condition is one of acute toxaemia or poisoning, and the changes in the blood are such as are consequent on bacterial toxaemia.

The onset is gradual in the large majority of cases. Histories of sudden outbursts of mania can rarely be relied on, as the illness is almost invariably preceded by loss of body weight, sleepless- ness, bad dreams, headaches and symptoms of general malaise, sometimes associated with depression. The actual onset of the mental symptoms themselves, however, are frequently sudden.

A typical case of the fully developed disease is not easily mistaken. | sound mental health. A few cases die, exhausted by the acute-

The patient is usually anaemic and thin, the expression of the face is unnatural, the eyes widely opened and bright; and there is great motor restlessness, the muscular movements being purposeless and inco-ordinate. This inco-ordination of movement affects not only the muscles of the limbs and trunk but also those of expression, so that the usual aspect of the face becomes entirely altered. The temperature is generally slightly febrile. The tongue and lips are cracked and dry through excessive shouting or speaking. There is often no desire for food or drink. The heart's action is rapid and forcible. The skin is soft and moist. The urine is scanty, turbid and

loaded with urates. The white blood corpuscles per cubic millimetre of blood are markedly increased, and the blood serum contains agglutinines to certain strains of streptococci which are not present in healthy persons. Sensibility to pain is lost or much impaired. Such patients will swing and jerk a broken limb apparently unaware that it is broken. Sleep is absent or obtained in short snatches, and even when asleep the patient is often restless and talkative as if the disease processes were still active.

Mentally the patient is excited, often wildly so, quite confused and unable to recognize time or place. Answers to questions may sometimes be elicited by repeated efforts to engage the attention of the patient. The speech is incoherent, and for all practical purposes the patient is mentally inaccessible. This state of acute excitement lasts usually for two or three weeks and gradually passes into a condition of chronic restlessness and noise, in which I the movements are more co-ordinate and purposeful. The con- fusion of the acute stage passes off and the attention can be more readily attracted but cannot be concentrated on any subject for any length of time. The patient will now recognize friends, but the affections are in abeyance and the memory is de- fective. The appetite becomes insatiable, but the patient does not necessarily gain in weight. This stage of subacute excitement may last for months, but as a rule favourable cases recover within six months from the onset of the disease. A recovering patient gradually gains weight, sleeps soundly at night and has periods of partial quiescence during the day, particularly in the morning after a good night's sleep. These lucid intervals become more and more prolonged and finally pass into a state of sanity. Some cases on the other hand, after the acute symptoms decline, remain confused, and this state of confusion may last for months; by some alienists it is described as secondary stupor.

The symptoms detailed above are those typical of an attack such as is most frequently met with in adult cases. Acute mania, however, is a disease which presents itself in various forms. Adolescent cases, for instance, very commonly suffer from re- current attacks, and the recurrent form of the disease is also to be met with in adults. The recurrent form at the onset does not differ in symptoms from that already described, but the course of the attack is shorter and more acute, so that the patient after .one or two weeks of acute excitement rapidly improves, the mental symptoms pass off and the patient is apparently perfectly recovered. An examination of the blood, however, reveals the fact that the patient is still suffering from some disorder of the system, inasmuch as the white blood corpuscles remain increased above the average of health. Subsequent attacks of

excitement come on without any obvious provocation. The pulse becomes fast and the face flushed. The patient frequently complains of fullness in the head, ringing in the ears and a loss of appetite. Sleeplessness is an invariable symptom. Self-control is generally lost suddenly, and the patient rapidly passes into a state of delirious excitement, to recover again, appar- ently, in the course of a few weeks. Recurrent mania might therefore be regarded as a prolonged toxaemia, complicated at intervals by outbursts of delirious excitement. Acute mania in the majority of cases ends in recovery. In the continuous attack the recovery is gradual. In the recurrent cases the intervals between attacks become longer and the attacks less severe until they finally cease. In such recovered cases very frequently a persistent increase in the number of the white blood corpuscles is found, persisting for a period of two or three years of apparently

ness of the excitement and inability to obtain rest by the natural process of sleep. When death does occur in this way the patient almost invariably passes into the typhoid state.

The residue of such cases become chronic, and chronicity almost invariably means subsequent dementia. The chronic stage of acute mania may be represented by a state of continuous subacute excitement in which the patient becomes dirty and destructive in habits and liable from time to time to exacerba- tions of the mental symptoms. Continuous observation of the blood made in such cases over a period extending for weeks reveals the fact that the leucocytosis, if represented in chart form, shows a regular sequence of events. Just prior to the onset of an exacerbation the leucocytosis is low. As the excitement increases in severity the leucocytosis curve rises, and just before improvement sets in there may be. a decided rise in the curve and then a subsequent fall; but this fall rarely reaches the normal line. In other cases, which pass into chronicity, a state of persistent delusion, rather than excitement, is the prevailing mental characteristic, and these cases may at recurrent intervals become noisy and dangerous.

Treatment. — Acute mania can only be treated on general lines. During the acute stage of onset the patient should be placed in bed. If there is difficulty in inducing the patient to take a sufficient quantity of food, this difficulty can be got over by giving food in liquid form, milk, milk-tea, eggs beaten up in milk, meat juice and thin gruel, and it is always better to feed such a patient with small quantities given frequently. Cases of mania following childbirth are those which most urgently demand careful and frequent feeding, artificially

administered if necessary. If there is any tendency to exhaustion, alcoholic stimulants are indicated, and in some cases strychnine, quinine and cardiac tonics are highly .beneficial. The bowels should be unloaded by large enemata or the use of saline purgatives. The continuous use of purgatives should as a rule be avoided, as they drain the system of fluids. On the other hand, trie administration of one large normal saline enema by supplying the tissues with fluids, and probably thereby diluting the toxins circulating in the system, gives considerable relief. A continuous warm bath frequently produces sleep and reduces excitement. The sleeplessness of acute mania is best treated bv warm baths wherever possible, and if a drug must be administered, then paraldehyde is the safest and most certain, unless the patient is also an alcoholic, when chloral and bromide is probably a better sedative.

The Elevated Stage of Foiie Circulaire or Manic Depressive Insanity. — As previously mentioned in the description of the depressed stage of this mental disorder, the disease is equally prone to attack men and women, generally during late adolescence or in early adult life, and in a few cases first appears during the decline of life. Hereditary predisposition undoubtedly plays a large part as a predisposing cause, and after that is said it is difficult to assign any other definite predisposing causes and certainly no exciting causes. As in the stage of depression, so in the stage of excitement the first attack may closely follow upon typhoid fever, erysipelas or rheumatic fever. On the other hand many cases occur without any such antecedent disease. Another fact which has been commented upon is that these patients at the onset of an attack of excitement often appear to be in excellent physical health.

The earliest symptoms of onset are moral rather than physical, The patient changes in character, generally for the worse. The sober man becomes intemperate. The steady man of business enters into foolish, reckless speculation. There is a tendency for the patient to seek the society of inferiors and to ignore the recognized conventionalities of life and decency. The dress becomes extravagant and vulgar and the speech loud, boastful and obscene. These symptoms may exist for a considerable period before some accidental circumstance or some more than usually extravagant departure from the laws and customs of civilization draws public attention to the condition of the patient. The symptoms of the fully developed disease differ in degree in different cases. The face is often flushed and the expression unnatural. There is constant restlessness, steady loss of body weight, and sleeplessness. In very acute attacks there are frequently symptoms of gastric disorder, while in other cases the appetite is

enormous, gross and perverted. The leucocytosis is above that usually met with in health, and the increase in the

early stages is due to the relative and absolute increase in the multinucleated or polymorphonuclear leucocytes. The hyper-leucocytosis is not, however, so high as it is in acute mania, and upon recovery taking place the leucocytosis always falls to normal. In the serum of over 80% of cases there are present agglutinines to certain strains of streptococci, which agglutinines are not present in the serum of healthy persons. The changes in the urine are those which one would expect to find in persons losing weight; the amount of nitrogenous output is in excess of the nitrogen ingested in the food.

Mentally there is always exaltation rather than excitement, and when excitement is present it is never of a delirious nature, that is to say, the patient is cognizant of the surroundings, and the special senses are abnormally acute, particularly those of sight and hearing. Hallucinations and delusion are sometimes present, but many cases pass through several attacks without exhibiting either of these classes of symptoms. The patient is always garrulous and delighted to make any chance acquaint- ance the confidant of his most private affairs. The mood is sometimes expansive and benevolent, interruption in the flow of talk may suddenly change the subject of the conversation or the patient may with equal suddenness fly into a violent rage, use foul and obscene language, ending with loud laughter and protestations of eternal friendship. In other words the mental processes are easily stimulated and as easily diverted into other channels. The train of thought is, as it were, constantly being changed by accidental associations. Although consciousness is not impaired, the power of work is abolished as the attention cannot be directed continuously to any subject, and yet the patient may be capable of writing letters in which facts and fiction are most ingeniously blended. A typical case will pass through the emotions of joy, sorrow and rage in the course of a. few minutes. The memory is not impaired and is often hyper- acute. The speech may be rambling but is rarely incoherent.

The course of the attack is in some cases short, lasting for from one

to three weeks, while in others the condition lasts for years. The patient remains in a state of constant restlessness, both of body and mind, untidy or absurd in dress, noisy, amorous, vindictive, boisterously happy or virulently abusive. As time passes a change sets in. The patient sleeps better, begins today on flesh, the sudden mental fluctuations become less marked and finally disappear. Many of these patients remember every detail of their lives during the state of elevation, and many are acutely ashamed of their actions during this period of their illness. As a sequel to the attack of elevation there is usually an attack of depression, but this is not a necessary sequel.

The majority of patients recover even after years. of illness, but the attacks are always liable to recur. Even recurrent attacks, however, leave behind them little if any mental impair- ment.

Treatment. — General attention to the health of the body, and an abundance of nourishing food, and, where necessary, the use of sedatives such as bromide and sulphonal, sum up the treatment of the elevated stage of manic-depressive insanity. In Germany it is the custom to treat such cases in continuous warm baths, extending sometimes for weeks. The use of warm baths of several hours' duration has not proved satisfactory.

Delusional Insanity. — Considerable confusion exists at the present day regarding the term delusional insanity. It is not correct to define the condition as a disease in which fixed delusions dominate the conduct and are the chief mental symptom present. Such a definition would include many chronic cases of melancholia and mania. All patients who suffer from attacks of acute insanity and who do not recover tend to become delusional, and any attempt to include and describe such cases in a group by them- selves and term them delusional insanity is inadmissible. The fact that delusional insanity has been described under such various terms as progressive systematized insanity, mania of persecution and grandeur, monomanias of persecution, unseen agency, grandeur and paranoia, indicates that the disease is obscure in its origin, probably passing through various stages, and in some instances having been confused with the terminal

stages of mania and melancholia. If this is admitted, then probably the best description of the disease is that given by V. Magnan under the term of "systematized delusional insanity," and it may be

accepted that many cases conform very closely to Magnan's description.

The disease occurs with equal frequency in men and women, and in the majority of cases commences during adolescence or early adult life. The universally accepted predisposing cause is hereditary predisposition. As to the exciting causes nothing is known beyond the fact that certain forms of disease, closely resembling delusional insanity, are apparently associated or caused by chronic alcoholism or occur as a sequel to syphilitic infection. In the vast majority of cases the onset is lost in obscurity, the patient only drawing attention to the diseased condition by insane conduct after the delusional state is definitely established. The friends of such persons frequently affirm that the patient has always been abnormal. However this may be, there is no doubt that in a few cases the onset is acute and closely resembles the onset of acute melancholia. The patient is depressed, confused, suffers from hallucinations of hearing and there are disturbances of the bodily health. There is generally mal-nutrition with dyspepsia and vague neuralgic pains, often referred to the heart and intestines. Even at this stage the patient may labour under delusions. These acute attacks are of short duration and the patient apparently recovers, but not uncommonly both hallucinations and delusions persist, although they may be concealed.

The second or delusional stage sets in very gradually. This is the stage in which the patient most frequently comes under medical examination. The appearance is always peculiar and unhealthy. The manner is unnatural and may suggest a state of suspicion. The nutrition of the body is below par, and the patient frequently complains of indefinite symptoms of malaise referred to the heart and abdomen. The heart's action is often weak and irregular, but beyond these symptoms there are no special characteristic symptoms.

Mentally there may be depression when the patient is sullen and uncommunicative. It will be found, however, that he always suffers from hallucinations. At first hallucinations of hearing are the most prominent, but later all the special senses may be implicated. These hallucinations constantly annoy the patient and are always more troublesome at night. Voices make accusa- tions through the walls, floors, roofs or door. Faces appear at the window and make grimaces. Poisonous gases are pumped into the room. Electricity, Rontgen rays and marconigrams play through the walls. The food is poisoned or consists of filth. In many cases symptoms of visceral discomfort are supposed to be the result of nightly surgical operations or sexual assaults. All these persecutions are ascribed to

unknown persons or to some known person, sect or class. Under the influence of these sensory disturbances the patient may present symptoms of angry excite- ment, impulsive violence or of carefully-thought-out schemes of revenge; but the self-control may be such that although the symptoms are concealed the behaviour is peculiar and unreason- able. It is not uncommon to find that such patients can converse rationally and take an intelligent interest in their environments, but the implication of the capacity of judgment is at once apparent whenever the subject of the persecutions is touched upon.

All cases of delusional insanity at this stage are dangerous and their actions are not to be depended upon. Assaults are common, houses are set on fire, threatening letters are written and accusa- tions are made which may lead to much worry and trouble before the true nature of the disease is realized.

This, the second or persecutory stage of delusional insanity, may persist through life. The patient becomes gradually accustomed to the sensory disturbances, or possibly a certain amount of mental enfeeblement sets in which reduces the mental vigour. In other cases, the disease goes on to what Magnan calls the third stage or stage of grandiose delusions. The onset of this stage is in some cases gradual. The patient, while inveighing against the persecu- tions, hints at a possible cause. One man is an inventor and his enemies desire to deprive him of the results of his inventions.

Another is the rightful heir to a peerage, of which he is to be deprived. Women frequently believe themselves to be abducted princesses or heirs to the throne. Others of both sexes, even more ambitious, assume divine attributes and proclaim them- selves Virgin Marys, Gabriels, Holy Ghosts and Messiahs. Cases are recorded in which the delusions of grandeur were of sudden onset, the patient going to bed persecuted and miserable and rising the following morning elated and grandiose. In this stage the hallucinations persist but appear to change in character and become pleasant. The king hears that arrangements are being made for his coronation and waits quietly for the event. The angel Gabriel sees visions in the heavens. The heirs and heiresses read of their prospective movements in the

court columns of the daily papers and are much soothed thereby. In short, no delusion is too grotesque and absurd for such patients to believe and express.

Cases of delusional insanity never become demented in the true sense of the word, but their mental state might be described as a dream in which an imaginary existence obliterates the experiences of their past lives.

Treatment. — No treatment influences the course of the disease. During the stage of persecution such patients are a danger to them- selves, as they not infrequently commit suicide, and to their supposed persecutors, whom they frequently assault or otherwise annoy.

Katatonia. — This disease, so called on account of the symptom of muscular spasm or rigidity which is present during certain of its stages, was first described and named by K. L. toaia. Kahlbaum in 1874. Many British alienists refuse to accept katatonia as a distinct disease, but as it has been accepted and further elaborated by such an authority as E. Kraepelin reference to it cannot be avoided.

Katatonia attacks women more frequently than men, and is essentially a disease of adolescence, but typical cases occasionally occur in adults. Hereditary predisposition is present in over 50% of the cases and is the chief predisposing cause. Childbirth, worry, physical strain and mental shocks are all advanced as secondary predisposing causes. The disease is one of gradual onset, with loss of physical and mental energy. Probably the earliest mental symptom is the onset of aural hallucinations. For convenience of description the disease may be divided into (1) the stage of onset; (2) the stage of stupor; (3) the stage of excitement.

The symptoms of the stage of onset are disorders of the alimentary tract, such as loss of appetite, vomiting after food and obstinate constipation. The pulse is rapid, irregular and intermittent. The skin varies between extreme dryness and drenching perspira- tions. In women the menstrual function is suppressed. At un- certain intervals the skeletal muscles are thrown into a condition of rigidity, but this symptom does not occur invariably. The instincts of cleanliness are in abeyance, owing to the mental state of the patient, and as a result these cases are inclined to be wet and dirty in their habits.

Mentally there is great confusion, vivid hallucinations, which • apparently come on at intervals and are of a terrifying nature, for the patient often becomes frightened, endeavours to hide in corners

or escape by a window or door. A very common history of such a case prior to admission is that the patient has attempted suicide by jumping out of a window, the attempt being in reality an un- conscious effort on the part of the patient to escape from some imaginary danger. During these attacks the skin pours with perspiration. The patient is oblivious to his surroundings and is mentally inaccessible. In the intervals between these attacks the patient may be conscious and capable of answering simple questions. This acute stage, in which sleep is abolished, lasts from a few days to four or six weeks and then, generally quite sud- denly, the patient passes into the state of stupor. In some cases a sharp febrile attack accompanies the onset of the stupor, while in others this symptom is absent; but in every case examined by Bruce during the acute stage there was an increase in the number of the white blood corpuscles, which, just prior to the onset of stupor, were sometimes enormously increased; the in- crease being entirely due to multiplication of the multinucleated or polymorphonuclear leucocytes.

In the second or stuporose stage of the disease the symptoms are characteristic. The patient lies in a state of apparent placidity, generally with the eyes shut. Consciousness is never entirely abolished, and many of the patients give unmistakable evidence that they understand what is being said in their presence. Any effort at passive movement of a limb immediately sets up muscular resistance, and throughout this stage the sternomastoid and the abdominal muscles are more or less in a state of over-tension, which is increased to a condition of rigidity if the patient is interfered with in any way. This symptom of restiveness or negativism is one of the characteristics of the disease. The patient resists while being fed, washed, dressed and undressed, and even the normal stimuli which in a healthy man indicate that the bladder or rectum require to be emptied are resisted, so that the bladder may become distended and the lower bowel has to be emptied by enemata. The temperature is low, often subnormal, the pulse is small and weak, and the extremities cold and livid. This symptom is probably due in some part to spasm of the terminal arterioles. Mentally the symptoms are negative. Though conscious, the patient cannot be got to speak and apparently is oblivious to what is passing around. Upon recovery, however, these cases can often recount incidents which occurred to them during their illness, and may also state that they laboured under some delusion. Coincidently with the onset of the stupor sleep returns, and many cases sleep for the greater part of the twenty-four hours. The duration of the stuporose state is very variable. In some cases it lasts for weeks, in others for months or years, and may be

the terminal stage of the disease, the patient gradually sinking into dementia or making a recovery. The third stage or stage of excitement comes on in many cases during the stage of stupor: the stages overlap; while in others a distinct interval of convalescence may intervene between the termination of the stupor and the onset of the excitement. The excitement is characterized by sudden impulsive actions, rhythmical repetition of words and sounds (verbigeration), and by rhythmical movements of the body or limbs, such as swaying the whole frame, nodding the head, swing- ing the arms, or walking in circles. The patient may be absolutely mute in this stage as in the stage of stupor. Others again are very noisy, singing, shouting or abusive. The speech is staccato in character and incoherent. Physically the patient, who often gains weight in the stage of stupor, again becomes thin and haggard in appearance owing to the incessant restlessness and sleeplessness which characterize the stage of excitement. The patient may, during the stage of onset, die through exhaustion, or accidentally and unconsciously commit suicide usually by leaping from a window. During the stuporose stage symptoms of tubercular disease of the lungs may commence. All the adolescent insane are peculiarly liable to contract and die from tubercular disease. Accidental suicide is also liable to occur during this stage. The stage of excitement, if at all prolonged, invariably ends in dementia. According to Kraepelin 13% of the cases recover, 27 make partial recoveries, and 60% become more or less demented.

Treatment. — No treatment arrests or diverts the course of katatonia, and the acute symptoms of the disease as they arise must be treated on hospital principles.

Hebephrenia. — This is a disease of adolescence (Gr. ˆ/Srjl which was first described by Hecker and Kahlbaum and more recently by Kraepelin and other foreign workers. Hebephrenia is not yet recognized by British alienists, phrenia. The descriptions ot the disease are indefinite and confusing, but there are some grounds for the belief that such an entity does exist, although it is probably more correct to say that as yet the symptoms are very imperfectly understood Hebephrenia is always a disease of adolescence and never occurs during adult life. It attacks women more frequently than men, and according to Kahlbaum hereditary predisposition to insanity is present in over 50% of the cases attacked. The onset of the disease is invariably associated with two symptoms. On the physical side an arrested or delayed development and on the mental a gradual failure of the power of attention and

Traumatic Insanity.

concentrated thought. The onset of the condition is always gradual and the symptoms which first attract attention are mental. The patient becomes restless, is unable to settle to work, becomes solitary and peculiar in habits and sometimes dissolute and mischievous. As the disease advances the patient becomes more and more enfeebled, laughs and mutters to himself and wanders aimlessly and without object. There is no natural curiosity, no interest in life and no desire for occupation. Later, delusions may appear and also hallucinations of hearing, and under their influence the patient may be impulsive and violent. Physically the subjects are always badly developed. The temperature is at times slightly elevated and at intervals the white blood corpuscles are markedly increased. The menstrual function in women is suppressed and both male and female cases are addicted to masturbation. According to Kraepelin 5% of the cases recover, 15% are so far relieved as to be able to live at home, but are mentally enfeebled, the remaining 80% become hopelessly demented. The patients who recover fre- quently show at the onset of their disease acute symptoms, such as mild excitement, slightly febrile temperature and quick pulse-rate. When recovery does take place there is marked improvement in development. The subjects of hebephrenia are peculiarly liable to tubercular infection and many die of phthisis.

There is no special treatment for hebephrenia beyond attention to the general health.

Insanity following upon Injuries to the Brain, or Apoplexies or Tumours or Arterial Degeneration, (a) Traumatic Insanity. — Insanity following blows on the head is divided into (1) the forms in which the insanity immedi- ately follows the accident ; (2) the form in which there is an intermediate prodromal stage characterized by strange conduct and alteration in disposition; and (3) in which the mental symptoms occur months or years after the accident, which can have at most but a remote pre- disposing causal relation to the insanity. The cases which immediately succeed injuries to the head are in all respects similar to confusional insanity after operations or after fevers. There is generally a noisy incoherent delirium, accompanied by hallucinations of sight or of hearing, and fleeting unsystematized delusions. The physical symptoms present all the

features of severe nervous shock.

In those cases in which there is an intervening prodromal condition, with altered character and disposition, there is usually a more or less severe accidental implication of the cortex cerebri, either by depression of bone or local hemorrhage, or meningitic sub-inflammatory local lesions. Most of the cases during the prodromal stage are sullen, morose or suspicious, and indifferent to their friends and surroundings. At the end of the prodromal stage there most usually occurs an attack of acute mania of a furious impulsive kind. The cases which for many years after injury are said to have remained sane will generally be found upon examination and inquiry to exhibit symptoms of hereditary degeneration or of acquired degeneracy, which may or may not be a consequence of the accident.

The most common site of vascular lesion is one of the branches of the middle cerebral artery within the sylvian fissure, or of one of the smaller branches of the same artery which go directly to supply the chief basal ganglia. When an artery like the middle cerebral or one of its branches becomes either through rupture or blocking of its lumen, incapable of performing its function qf supplying nutrition to important cerebral areas, there ensues devitality of the nervous tissues, frequently followed by softening and chronic inflammation. It is these secondary changes which give rise to and maintain those peculiar mental aberrations known as post-apoplectic insanity.

Various characteristic physical symptoms, depending upon the seat of the cerebral lesion, are met with in the course of this form of insanity. These consist of paraplegias, hemiplegias and muscular contractures. Speech defects are very common, being due either to the enfeebled mental condition, to paralysis of the nerve supplying the muscles of the face and tongue,

or to aphasia caused by implication of those parts of the cortex which are intimately associated with the faculty of speech. Mental symptoms vary considerably in different cases and in accordance with the seat and extent of the lesion. There is almost always present, however, a certain degree of mental enfeeblement, accompanied by loss of memory and of judgment, often by mental confusion. Another very general mental symptom is the presence of emotionalism which leads the patient to be affected either to tears or to laughter upon trifling and inadequate occasions.

Cerebral tumours do not necessarily produce insanity. Indeed it has been computed that not one half of the cases become insane. When

insanity appears it is met with in all degrees varying from slight mental dulness up to complete dementia, and from mere moral perversion up to the most intense form of maniacal excitement. On the physical side the various symptoms of cerebral tumour such as coma, ataxia, paralysis, headache, vomiting, optic neuritis and epileptiform convulsions are met with. All forms of so-called moral changes and of changes of disposition are met with as mental symptoms and all the ordinary forms of insanity may occur in varying in- tensity; but by far the most common mental change occurring in connexion with cerebral tumour is a progressive enfeeble- ment of the intelligence, unattended with any more harmful symptoms than mental deterioration which ends in complete dementia.

(b) Arterial Degeneration. — Arterial degeneration is a common cause of mental impairment, especially of that form j asan n y of mental affection known as " Early " dementia, due to It also predisposes to embolism and thrombosis, Arterial which often results in the paralytic and aphasic Degenera- groups of nerve disturbance, and which are always °°' accompanied by more or less marked interference with normal cerebral action.

The commonest seat for atheroma of the cerebral vessels is the arteries at the base of the brain and their main branches, especi- ally the middle cerebral. As a general rule the other arteries of the cerebrum are not implicated to the same extent, although in a not inconsiderable number of cases of the disease all the arteries of the brain may participate in the change. When this is so, we obtain those definite symptoms of slowly advancing dementia commencing in late middle life and ending in complete dementia before the usual period for the appearance of senile dementia. The same appearances are met with in certain patients who have attained the age in which senile changes in the arteries are not unexpected. As a rule atheroma in the cerebral vessels is but a part of a general atheroma of all the arteries of the body. Atheroma is common after middle life and increases in frequency with age. The chief causes are syphilis, alcoholism, the gouty and rheumatic diatheses and above all Bright's disease of the kidneys. Perhaps certain forms of Bright's disease, owing to the tendency to raise the blood pressure, are of all causes the most common.

It is not easy to say to what extent, alone, the arteriosclerosis is effectual in inducing the gradual failure of the mental powers, and to what extent it is assisted in its operation by the action on the brain-cells of the general toxic substances which give rise to the arterial

atheroma. In any case there can be no question that the gradual mechanical diminution of the blood-supply to the cortex caused by the occlusion of the lumen of the arteries is a factor of great importance in the production of mental incapacity.

General Paralysis of the Insane (syn. General Paralysis, dementia paralytica, progressive dementia) is a disease character- ized by symptoms of progressive degeneration of the central nervous system, more particularly of the motor p" er . a , centres. The disease is almost invariably fatal. Apparent recoveries do very occasionally occur, though this is denied by the majority of alienists. The disease is in every case associated with gradually advancing mental enfeeble- ment, and very frequently is complicated by attacks of mental disease.

General paralysis, which is a very common disease, was first recognized in France; it was identified by J. E. D. Esquirol, and further described and elaborated by A. L. J. Bayle, Delaye and J. L. Calmeil, the latter giving it the name of paralysie generate des alienes.

As first described by the earlier writers the disease was re- garded as being invariably associated with delusions of grandeur. At the present day this description does not apply to the majority of cases admitted into asylums. The change may be explained as being either due to an alteration in the type of the disease, or more probably the disease is better understood and more frequently diagnosed than formerly, the diagnosis being now entirely dependent on the physical and not on the mental symptoms. This latter may also be the explanation why general paralysis is much more common at the present day in British asylums than it was. The total death-rate from this disease in English and Scottish asylums rose from 1321 in 1894 to 1795 in

1904.

General paralysis attacks men much more frequently than women, and occurs between the ages of 35 and 50 years. It is essentially a disease of town life. In asylums which draw their patients from country districts in Scotland and Ireland, the disease is rare, whereas

in those which draw their population from large cities the disease is extremely common.

Considerable diversity of opinion exists at present regarding the causation of general paralysis. Hereditary predisposition admittedly plays a very small part in its causation. There is, however, an almost universal agreement that the disease is essentially the result of toxaemia or poisoning, and that acquired or inherited syphilitic infection is an important predisposing factor. A history of syphilitic infection occurs in from 70 to 90% ofthe patients affected. At first it was held that general paralysis was a late syphilitic manifestation, but as it was found that no benefit followed the use of anti-syphilitic remedies the theory was advanced that general paralysis was a secondary auto-intoxication following upon syphilitic infection. The latest view is that the disease is a bacterial invasion, to which syphilis, alcoholism, excessive mental and physical strain, and a too exclusively nitrogenous diet, only act as predisposing causes. This latter theory has been recently advanced and elaborated by Ford Robertson and McRae of Edinburgh.

Whatever the cause of general paralysis may be, the disease is essentially progressive in character, marked by frequent re- missions and so typical in its physical symptoms and pathology that we regard the bacterial theory with favour, although we are far from satisfied that the actual causative factor has as yet been discovered.

For descriptive purposes the disease is most conveniently divided into three stages,— called respectively the first, second and third,— but it must be understood that no clear line of demarcation divides these stages from one another.

The onset of general paralysis is slow and gradual, and the earliest symptoms may be either physical or mental. The disease may commence either in the brain itself or the spinal cord may be primarily the seat of lesion, the brain becoming affected secondarily. When the disease originates in the spinal cord the symptoms are similar to those of locomotor ataxia, and it is now, believed that general paralysis and locomotor ataxia are one and the same disease; in the one case the cord, in the other the brain, being the primary seat of lesion. The early physical symptoms are generally motor. The patient loses energy, readily becomes tired, and the capacity for finely co-ordinated motor acts, such as are required in playing games of skill, is impaired. Transient attacks of partial paralysis of a hand, arm, leg or one side of the body, or of the speech centre are not uncommon. In a few cases the special senses are

affected early and the patient may complain of attacks of dimness of vision or impairment of hearing. Or the symptoms may be purely mental and affect the highest and most recently acquired attributes of man, the moral sense and the faculty of self-control. The patient then becomes irritable, bursts into violent passions over trifles, changes in character and dibits, frequently takes alcohol to excess and behaves in an

extravagant, foolish manner. Theft is often committed in this stage and the thefts are characterized by an open, purposeless manner of commission. The memory is impaired and the patient is easily influenced by others, that is to say he becomes facile. In other cases a wild attack of sudden excitement, following upon a period of restlessness and sleeplessness may be the first symptom which attracts attention. Whatever the mode of onset the physical symptoms which characterize the disease come on sooner or later. The speech is slurred and the facial muscles lose their tone, giving the face a flattened expression. The muscular power is impaired, the gait is straddling and the patient sways on turning. All the muscles of the body, but particularly those of the tongue, upper lip and hands, which are most highly inner- vated, present the symptom of fine fibrillary tremors. The pupils become irregular in outline, often unequal in size and either one or both fail to react normally to the stimuli of light, or of accommodation for near or distant vision.

As the disease advances there is greater excitability and a tendency to emotionalism. In classical cases the 'general exaltation of ideas becomes so great as to lead the patient to the commission of insanely extravagant acts, such as purchases of large numbers of useless articles, or of lands and houses far beyond his means, numerous indiscriminate proposals of marriage, the suggestion of utterly absurd commerical schemes, or attempts at feats beyond his physical powers. The mental symptoms," in short, are very similar to those of the elevated stage of manic- depressive insanity.

Delusions of the wildest character may also be present. The patient may believe himself to be in possession of millions of money, to be unsurpassed in strength and agility, to be a great and overruling genius, and the recipient of the highest honours. This grandiose condition is by no means present in every case and is not in itself diagnostic of the disease. But mental facility, placid contentment, complete loss of judgment and affection for family and friends, with impaired memory, are symptoms universally present. As the disease advances the motor symptoms become more prominent. The patient has great' difficulty in writing, misses letters out of words, words out

of sentences, and writes in a large laboured hand. The expression becomes fatuous. The speech is difficult and the facial muscles are thrown into marked tremors whenever any attempt at speech is made. The voice changes in timbre and becomes high-pitched and monotonous. The gait is weak and uncertain and the re- flexes are exaggerated. In the first stage the patient, through restlessness and sleeplessness, becomes thin and haggard. As the second stage approaches sleep returns, the patient lays on flesh and becomes puffy and unhealthy in appearance. The mental symptoms are marked by greater facility and enfeeblement, while the paralysis of all the muscles steadily advances. The patient is now peculiarly liable to what are called congestive seizures or epileptiform attacks. The temperature rises, the face becomes flushed and the skin moist. Twitchings are noticed in a hand or arm. These twitchings gradually spread until they may involve the whole body. The patient is now unconscious, bathed in perspiration, which is offensive. The bowels and bladder empty themselves reflexly or become distended, and bedsores are very liable to form over the heels, elbows and back. Congestive seizures frequently last for days and may prove fatal or, on the other hand, the patient may have recurrent attacks and finally die of exhaustion or some accidental disease, such as pneumonia. Jn the second stage of the disease the patient eats greedily, and-as the food is frequently swallowed unmasticated, choking is not an uncommon accident. The special senses of taste and smell are also much disordered. We have seen a case of general paralysis, in the second stage drink a glass of quinine and water under the impression that he was drinking whisky.

The third stage of the disease is characterized by sleeplessness and rapid loss of body weight. Mentally the patient becomes quite demented. On the physical side the paralysis advances rapidly, so that the patient becomes bed-ridden and speechless. Death may occur as the result of exhaustion, or a congestive seizure, or of some intercurrent illness.

The duration of the disease is between eighteen months and three years, although it has been known to persist for seven.

No curative measures have so far proved of any avail in the

treatment of general paralysis.

Insanity associated with Epilepsy. — The term " epileptic insanity," which has for many years been in common use, is now regarded as a misnomer. There is in short no insanity. sucri disease as epileptic insanity. A brain, however, which is so unstable as to exhibit the sudden discharges of nervous energy which are known as epileptic seizures, is prone to be attacked by insanity also, but there is no form of mental disease exclusively associated with epilepsy. Many epileptics suffer from the disease for a lifetime and never exhibit symptoms of insanity. The majority of patients, however, who suffer from epilepsy are liable to exhibit certain mental symptoms which are regarded as characteristic of the disease. Some suffer from recurrent attacks of depression, ill-humour and irritability, which may readily pass into violence under provocation. Others are emotionally fervid in religious observances, though sadly deficient in the practice of the religious life. A third class are liable to attacks of semi-consciousness which may either follow upon or take the place of a seizure, and during these attacks actions are performed automatically and without consciousness on the part of the patient.

When epileptics do become insane the insanity is generally one of the forms of mania. Either the patient suffers from sudden furious attacks of excitement in which consciousness is entirely abolished, or the mania is of the type of the elevated stage of folie circulaire (manic-depressive insanity) and alternates with periods of deep depression. In the elevated period the patient shows exaggerated self-esteem, with passionate outbursts of anger, and periods of religious emotionalism. While in the stage of depression the patient is often actively suicidal.

Epileptic patients who suffer from recurrent attacks of delirious mania are liable to certain nervous symptoms which indicate that not only are the motor centres in the brain damaged, but that the motor tracts in the spinal cord are also affected. The gait becomes awkward and laboured, the feet being lifted high off the ground and the legs thrown forward with a jerk. The tendon reflexes are at the same time exaggerated. These symptoms indicate descending degeneration of the motor tracts of the cord.

If the mental attacks partake of the character of elevation or depression the mental functions suffer more than the motor. These patients, in course of time, become delusional, enfeebled and childish, and in some cases the enfeeblement ends in complete dementia of a very degraded type.

Where insanity is superadded to epilepsy the prognosis is unfavourable.

Insanity associated with or caused by Alcoholic and Drug Intoxication. — The true role of alcoholic indulgence in the production of insanity is at present very imperfectly insanity, understood. In many cases the alcoholism is merely a symptom of the mental disease — a result, not a cause. In others, alcohol seems to act purely as a predisposing factor, breaking down the resistance of the patient and disordering the metabolism to such an extent that bodily disorders are en- gendered which produce well-marked and easily recognized mental symptoms. In others, again, alcohol itself may possibly act as a direct toxin, disordering the functions of the brain. In the latter class may be included the nervous phenomena of drunkenness, which commence with excitement and confusion of ideas, and terminate in stupor with partial paralysis of all the muscles. Certain brains which, either through innate weakness or as the result of direct injury, have become peculiarly liable to toxic influences, under the influence of even moderate quan- tities of alcohol pass into a state closely resembling delirious mania, a state commonly spoken of as mania -a polu.

Delirium Tremens. — Delirium tremens is the form of mental

disorder most commonly associated with alcoholic indulgence

in the lay mind. Considerable doubt exists, however, as to

whether the disease is directly or secondarily the result of

My, 20

alcoholic poisoning. Much evidence exists in favour of the latter supposition. Delirium tremens may occur in persons who have never presented the symptom of drunkenness, or it may occur weeks after the patient has ceased to drink alcohol, and in such cases the actual exciting cause of the disease may be some accidental complication, such as a severe accident, a surgical operation, or an attack of pneumonia or erysipelas.

The early symptoms are always physical. The stomach is disordered. The desire for food is absent, and there may be abdominal pain and vomiting. The hands are tremulous, and the patient is unable to sleep. At this stage the disease may be checked by the administration of an aperient and some sedative such as bromide and chloral. The mental symptoms vary greatly in their severity. In a mild case one

may talk to the patient for some time before discovering any mental abnormality, and then it will be found that confusion exists regarding his position and the identity of those around him, while the memory is also impaired for recent events. Hallucinations of sight and hearing may be present. The hallucinations of sight may be readily induced by pressure upon the eyeballs. If the symptoms are more acute they usually come on suddenly, generally during the evening or night. The patient becomes excited, suffers from vivid hallucinations of sight and hearing which produce great fear, and these hallucinations may be so engrossing as to render him quite oblivious to the environment. The hallucinations of sight are characterized by the false sense impressions taking the forms of animals or insects which surround or menace the patient. Visions may also appear in the form of flames, goblins or fairies. The hallucinations of hearing rarely consist of voices, but are more of the nature of whistlings, and ringings in the ears, shouts, groans or screams which seem to fill the air, or emanate from the walls or floors of the room. All the special senses may be affected, but sight and hearing are always implicated. Delirium tremens is a short-lived-disease, generally running its course in from four to five days. Recovery is always preceded by the return of the power of sleep.

The patient must be carefully nursed and constantly watched, as homicidal and suicidal impulses are liable to occur under the terrifying influence of the hallucinations. The food should be concentrated and fluid, given frequently and in small quantities.

Chronic Alcoholic Insanity. — Almost any mental disorder may be associated with chronic alcoholism, but the most characteristic mental symptoms are delusions of suspicion and persecution which resemble very closely those of the persecution stage of systematized delusional insanity. The appearance of the patient is bloated and heavy; the tongue is furred and tremulous, and symptoms of gastric and intestinal disorder are usually present. The gait is awkward and dragging, owing to the partial paralysis of the extensor muscles of the lower limbs. All the skeletal muscles are tremulous, particularly those of the tongue, lips and hands. The common sensibility of the skin is disordered so that the patient complains of sensory disturbances, such as tinglings and prickings of the skin, which may be interpreted as electric shocks. In some cases the mental symptoms may be concealed, but delusions and hallucinations, particularly hallucinations of sight and hearing, are very commonly present. The delusions are often directly the outcome of the physical state; the disordered stomach suggesting poisoning, and the disturbances of the special senses being interpreted as various forms of persecution. The

patient hears voices shouting foul abuse at him; all his thoughts are read and repeated aloud; electric shocks are sent through him at night ; gases are pumped into his room. Sexual delusions are very common and frequently affect marital relations by arousing suspicions regarding the fidelity of wife or husband; or the delusions may be more gross and take the form of belief in actual attempts at sexual mutila- tions. The memory is always impaired.

Patients who in addition to chronic alcoholism are also insane are always dangerous and liable to sudden and apparently causeless outbursts of violence.

Dipsomania. — Dipsomania is a condition characterized by recurrent or periodic attacks of an irresistible cravine for

stimulants. The general bodily condition has a great deal to do with the onset of the attack, that is to say, the patient is more liable to an attack when the bodily condition is low than when the health is good. The attacks may be frequent or recur at very long intervals. They generally last for a few weeks, and may be complicated by symptoms of excitement, delusions or hallucinations.

Treatment consists in attention to the general health between attacks, with the use of such tonics as arsenic and strychnine. During the attack the patient should be confined to bed and treated with sedatives.

Morphinism.— The morphia habit is most commonly con tracted by persons of a neurotic constitution. The mental symptoms associated with the disease may arise either as the result of an overdose, when the patient suffers from hallucinations, confusion and mild delirium, frequently associated with vomiting. On the other hand, mental symptoms very similar to those of delirium tremens may occur as the result of suddenly cutting off the supply of morphia in a patient addicted to the habit. Finally, chronic morphia intoxication produces mental symptons very similar to those of chronic alcoholism. This latter condition, characterized by delusions of persecution, mental enfeeblement and loss of memory, is hopelessly incurable. The patient is always thin and anaemic on account of digestive disturbances. There is weakness or slight paralysis of the lower

limbs, and the skeletal muscles are tremulous.

Treatment. — The quantity of the drug used must be gradually reduced until it is finally discontinued, and during treatment the patient must be confined to bed.

Senile Insanity. — States of mental enfeeblement are always the result of failure of development or of structural changes in the cortical grey matter of the brain. If the enfeeble- lasaalty. me nt is due to failure of development or brain damage occurring in early life, it is spoken of as idiocy or imbecility. Every form of insanity which occurs after a certain period of life is apt to be regarded by some observers as senile, but although the failing mental power may colour the character of the symptoms it cannot be regarded as correct to designate, for instance, a recurrent form of mania as senile merely because it necessarily manifests itself in a subject who has lived into the senile period. On the other hand, many persons first suffer from mental derangement at an advanced period of life without at the same time manifesting any marked failure of mental power, while others only manifest their insanity as a result of the decay of their mental faculties.

From this statement it will be seen that senile insanity is a complex of different conditions, some of them accompanied by dementia, others without dementia.

Senile Dementia is distinguished occasionally Into " senile " properly so called, and " presenile " dementia, which supervenes at middle age or even- earlier.

The occurrence of dementia is sometimes preceded by an acute hallucinatory phase, accompanied by mania or melancholia; but as a general rule, in the presenile cases, by neurasthenia, indifference, and mental apathy which extends to a disregard for the ordinary conventions and the means of subsistence.

It has pithily been remarked that the age of a man is the age of his blood-vessels. The two conditions of senile and presenile dementia cannot therefore be separated scientifically. From a clinical point of view, however, the two are distinguishable in so far as their symptoms are concerned, for the presenile cases are more complete and the process of dementia achieves its consummation earlier and quicker, while in the senile the gradual disease of the arteries and the slow decay of the mental faculties offer a different background for the manifestation of mental symptoms. Moreover, the senile patients

more frequently present symptoms of recurrent attacks of acute insanity, a more pronounced emotionalism, and a greater tendency to restlessness at night. The presenile cases, on the other hand, except at the commencement of their malady, are usually free from acute and troublesome symptoms and present chiefly an apathetic indif- ference and irresponsiveness on the mental side, and on the

physical side a neurasthenic and enfeebled bodily state. In both conditions memory is greatly impaired.

Added to senile dementia there is often found a condition of mania or melancholia or even of systematized delusional insanity. The chief symptoms of the maniacal attacks are the great motor restlessness and excitement, which are worst during the night time. Sleep is almost always seriously disturbed, and the patients rapidly become exhausted unless carefully nursed and tended. The actions of senile maniacs are often puerile and foolish, and they may exhibit impulses of a homicidal, suicidal or sexual character. The melancholic cases are also extremely restless, and their emotion is loudly expressed in an uncontrollable manner. They often have delusions of persecution. Their cries and groans have an automatic character, as if the patient, though compelled to utter them, did not experience the mental pain which he expressed. They also, many of them, eat their food ravenously, although a few obstinately refuse it. The senile delusional cases may manifest any of the classical forms of paranoia described above, but their delusions are of a rudimentary and unfinished type. The most common of all senile delusions is that they are being robbed. They therefore often hide their small valuables in corners and out-of-the-way places, and as their memories are very defective they are afterwards unable to find them. Others, who live alone, barricade their doors and try to prevent any one entering for fear of thieves. Delusions of ambition in senile subjects are usually of a very improbable and childish character. Hallucinations are generally present in the senile delusional cases.

The treatment of senile insanity is from the medical point of view not hopeful; it resolves itself largely into instructions for careful nursing, suitable feeding, and the protection of the patient from all the physical dangers to which he may be exposed.

Statistics. — The statistics of lunacy are merely of interest from a sociological point of view; for under that term are comprised all forms of insanity. It is needless to produce tables illustrative of the relative numbers of lunatics in the various countries of Europe, the systems of registration being so unequal in their working as to afford

no trustworthy basis of comparison.

Even in Great Britain, where the systems are more perfect than in any other country, the tables published in the Blue Books of the three countries can only be regarded as approximately correct, the difficulty of registering all cases of lunacy being insuperable. On the 1st of January 1907, according to the returns made to the offices of the Commissioners in Lunacy, the numbers of lunatics stood thus on the registers : —

Males.

Females.

Totals.

England and Wales . Scotland

Gross total

57,176

8,594 12,254

66,812

8,999 11,300

123,988 17,593 23.554

78,024

87,111

165,135

These figures show the ratio of lunatics to 100,000 of the population to be 354 in England and Wales, 312 in Scotland, and 538 in Ireland.

Numbers of Lunatics on the 1st of January of the years 1857-IQ07 inclusive, according to Returns made to the Offices of the Commissioners in Lunacy for England and Wales, Scotland and Ireland.

England

Years.

and Wales.

Scotland.

Ireland.

1858

5,823

1859

36,762

6,072

i860

38,058

6,273

1861

39,647

6,327

1862

41,129

6,398

8,055

1863

43.118

6,386

7,862

1864

44.795

6,422

8,272

1865

45.950

6,533

8,845

1866

47,648

6,73°

8,964

1867

49,086

6,888

8,962

1868

51,000

7,055

9,086

1869

53,177

7,3io

9,454

1870

54,713

7,571

10,082

1871

56,755

7,729

10,257

1872

58,640

7,849

10,767

1873

60,296

7,982

10,958

LEGAL ASPECTS]

INSANITY

61 1

Years.

England

and Wales.

Scotland.

Ireland.

1874

60,027

8,069

11,326

1875

63.793

8,225

n,583

1876

64,916

8,509

n,777

1877

66,636

8,862

12,123

1878

68,538

9,097

12,380

1879

69,885

9,386

12.585

1880

7i,l9i

9,624

12,819

1881

73,H3

10,012

13,062

1882

74,842

io,355

13,444

1883

76,765

10,510

13,882

1884

78,528

io,739

14,088

1885

79,704

10,918

H,279

1886

80,156

11,187

14,590

1887

80,891

11,309

14,702

1888

82,643

11,609

15,263

1889

84,340

11,954

15,685

1890

86,067

12,302

16,159

1891

86,795

12,595

16,251

1892

87,848

12,799

16,688

1893

89,822

13,058

17,124

1894

92,067

13,300

17,276

1895

94,081

13,852

17,665

1896

96,446

, 14,093

18,357

1897

99,365

14,500

18,966

1898

101,972

14,906

19,590

1899

105,086

15,399

20,304

1900

106,611

15,663

20,863

1901

107,944

15,899

21,169

1902

110,713

16,288

21,630

1903

113,964

16,658

22,138

1904

“7,199

16,894

22,794

1905

119,829

17,241

22,996

1906

121,979

17,450

23,365

1907

123,988

17,593

23,554

There is thus an increased ratio in England and Wales of lunatics to the population (which in 1859 was 19,686,701, and in 1907 was estimated at 34,945,600) of 1 86-8 per 100,000 as against 354-8, and in Scotland of 15.7 as against 312 per 100,000. The Irish figures on the same basis have increased from 130-9 in 1862 to 538-1 in 1907. The publication of these figures has given rise to the question whether lunacy has actually become more prevalent during the last twenty years, whether there is real increase of the disease. There is a pretty general consent of all authorities that if there has been an increase it is very slight, and that the apparent increase is due, first to the improved systems of registration, and secondly (a far more powerful reason) to the increasing tendency among all classes, and especially among the poorer class, to recognize the less pro-nounced forms of mental disorder as being of the nature of insanity. Thirdly, the grant of four shillings per week which in 1876 was made by parliament from imperial sources for the maintenance of pauper lunatics has induced parochial authorities to regard as lunatics a large number of weak-minded paupers, and to force them into asylums in order to obtain the benefit of the grant and to relieve the rates. These views receive support from the fact that the increase of private patients, i.e. patients who are provided for out of their own funds or those of the family, has advanced in a vastly smaller ratio. In their case the increase, small as it is, can be accounted for by the growing disinclination on the part of the community to tolerate irregularities of conduct due to mental disease. And again, careful inquiry has failed to show a proportional increase of admissions into asylums of such well-marked forms as general paralysis, puerperal mania, &c. The main cause of the registered increase of lunatics is thus to be sought for in the improved registration, and parochial and family convenience. If there is an actual increase, and there is reason for believing that there is a slight actual increase, it is due to the tendency of the population to gravi- tate towards towns and cities, where the conditions of health are inferior to those of rural life, and where there is therefore a greater disposition to disease of all kinds.

The futility of seeking for accurate figures bearing on the relative

number of lunatics in other countries is illustrated by the tables set forth in a report by the United States Census Bureau. They show that the number of registered lunatics in 1903 was 150,151; in 1890, 74,028; and in 1880, 40,942. An attempt was made in 1890 to estimate the number of insane persons outside of hospitals, which was stated to be 32,457. In 1903 no such attempt was made, as it was admitted that so many sources of fallacy existed as to render it useless. Thus the mere statement that of every 100,000 of the population (calculated at 80,000,000) 186-2 were registered as insane is of no value.

Bibliography. — The following are systematic works: Bucknill and Tuke, Psychological Medicine (4th edition, 1879); Griesinger, On Menial Diseases (New Sydenham Society, 1867); Maudsley,

The Pathology of Mind (1895); Bevan Lewis, A Text-Book 0} Mental Diseases (1899); Clouston, Clinical Lectures on Mental Diseases (1892); Kraepelin, Psychiatrie (1893); Krafft-Ebing, Lehrbuch der Psychiatrie (J893); Regis, A Practical Manual oj Mental Medicine (London, 1895); Magnan, Lecons cliniques sur les maladies mentales (1897); Mendil, Leitfaden der Psychiatrie (1902); Mercier, A Text-Book of Insanity (1902) ; Lewis C. Bruce, Studies in Clinical Psychiatry (1906) ; Macpherson, Mental Affections (1899) ; Brower-Bannister, Practical Manual of Insanity (1902) ; Ford Robertson, Text-Book of Pathology in Relation to Mental Diseases (1900). (J. B. T.; J. Mn.; L. C. B.)

II. Legal Aspects

The effect of insanity upon responsibility and civil capacity has been recognized at an early period in every system of law.

Roman Law. — In the Roman jurisprudence its consequences were very fully developed, and the provisions and terminology of that system have largely affected the subsequent legal treat- ment of the subject. Its leading principles were simple and well marked. The insane person having no intelligent will, and being thus incapable of consent or voluntary action, could acquire no right and incur no responsibility by his own acts (see Sohm's Inst. Roman Law, 3rd ed. pp. 216, 217, 219); his person and property were placed after inquiry by the magistrate under the control of a curator, who was empowered and bound to manage the property of the lunatic on his behalf (Sohm, p. 513; Hunter, Roman Law, pp. 732-735). The different terms by which the insane were known, such as demens, furiosus, fatuus, although no doubt signifying different types of

insanity, did not in Roman law infer any difference of legal treatment. They were popular names, which all denoted the complete deprivation of reason.

Medieval Law. — During the middle ages the insane were little protected. Their legal acts were annulled, and their property placed under control, but little or no attempt was made to supervise their personal treatment. In England the wardship of idiots and lunatics, which was annexed before the reign of Edward II. to the king's prerogative, had regard chiefly to the control of their lands and estates, and was only gradually elaborated into the systematic control of their persons and property now exercised under the jurisdiction in lunacy. Those whose means were insignificant were left to the care of their relations or to charity. In criminal law the plea of insanity was unavailing except in extreme cases. About the beginning of the 19th century a very considerable change commenced. The public attention was strongly attracted to the miserable condition of the insane incarcerated in asylums without any efficient check or inspection; and at the same time the medical knowledge of insanity entered on a new phase. The possibility and advantages of a better treatment of insanity were illustrated by eminent physicians, Philippe Pinel in France, H. Tuke in England, Bond, B. Rush and I. Ray in the United States; its physical origin became generally accepted; its mental phenomena were more carefully observed, and its relation was established to other mental conditions.

Modern Law.— -From this period we date the commencement of legislation such as that known in England as the Lunacy Acts, which aimed at the regulation and control of all constraint applied to the insane. Hitherto, the criteria of insanity had been very rude, and the evidence was generally of a loose and popular character; but, whenever it was fully recognized that insanity was a disease with which physicians who had studied the subject were peculiarly conversant, expert evidence obtained increased importance, and from this time became prominent in every case. The newer medical views of insanity were thus brought intct contact with the old narrow conception of the law courts, and a controversy arose in the field of criminal law which in England, at least, still continues.

Relations between Insanity and Law. — The fact of insanity may operate in law — (1) by excluding responsibility for crime; (2) by invalidating legal acts; (3) by affording ground for depriv- ing the insane person by a legal process of the control of his person and property; or (4) by affording ground for putting him under restraint.

Legal Terminology. — Before proceeding, however, to deal with

these matters in succession, it may be desirable to say something with regard to the chief legal terms respecting persons suffering under mental disabilities. The subject is now of less importance than formerly, because the modern tendency of the law is to determine the capacity or responsibility of a person alleged to be insane by considering it with reference to the particular matter or class of matters which brings his mental condition sub judice. But the literature of the law of lunacy cannot be clearly understood unless the distinctions between the different terms employed to describe the insane are kept in view. The term non compos mentis is as old as the statute De praerogativa regis (1325), and is used sometimes, as in that statute, to indi- cate a species contrasted with idiot, sometimes (e.g. in Co. Litt. 246 (b)) as a genus, and afterwards, chiefly in statutes relating to the insane, in connexion with the terms " idiot " and " lunatic " as a word cjusdem generis. The word " idiot " (Gr. Ibios, a private person, one who does not hold any public office, and ISioiT-rjs, an ignorant and illiterate person) appears in the statute De praerogativa regis as fatuus naturalis, and it is placed in contradistinction to non compos mentis. The " idiot " is defined by Sir E. Coke (4 Rep. 124 (6)) as one who from his nativity, by a perpetual infirmity, is non compos mentis, and Sir M. Hale (Pleas of the Crown, i. 29) describes idiocy as " fatuity a nativitate vel dementia naturalis." In early times various artificial criteria of idiocy were suggested. Fitzherbert's test was the capacity of the alleged idiot to count twenty pence, or tell his age, or who were his father and mother (De natura brevium, 233). Swinburne proposed as a criterion of capacity, inter alia, to measure a yard of cloth or name the days in the week (Testaments, 42). Hale propounded the sounder view that " idiocy or not is a question of fact triable by jury and sometimes by inspection " (Pleas of the Crown, i. 29). The legal incidents of idiocy were at one time distinct in an important particular from those of lunacy. Under the statute De praerogativa regis the king was to have the rents and profits of an idiot's lands to his own use during the life of the idiot, subject merely to an obligation to provide him with necessaries. In the case of the lunatic the king was a trustee, holding his lands and tenements for his benefit and that of his family. It was on account of this difference in

the legal con- sequences of the two states that on inquisitions distinct writs, one de idiota inqidrendo, the other de lunatico inquirendo, were framed for each of them. But juries avoided finding a verdict of idiocy wherever they could, and the writ de idiota inquirendo fell into desuetude. A further blow was struck at the distinction when it came to be recognized even by the legislature (see the Idiots Act 1886) that idiots are capable of being educated and trained, and it was practically abolished when the Lunacy Regulation Act 1862, in a provision reproduced in substance in the Lunacy Act 1890, limited the evidence admissible in proof of unsoundness of mind on an inquisition (without special leave of the Master trying the case) to a period of two years before the date of the inquiry, and raised a uniform issue, viz. the state of mind of the alleged lunatic at the time when the inquisition is held.

The term " lunatic," derived from the Latin lima in con- sequence of the notion that the moon had an influence on mental disorders, 1 does not appear in the statute-book till the time of Henry VIII. (1541). Coke defines a lunatic as a " person who has sometimes his understanding and sometimes not, qui gaudet lueidis intcrvallis, and therefore he is called non compos mentis so long as he has not understanding " (Co. Litt. 247 (a), 4 Rep. 124 (h)). Hale defines " lunacy " as " interpolated " (i.e. inter- mittent) dementia accidentalis vel adventitia, whether total or (a description, it will be observed, of " partial insanity ") quoad hoc vel illud (Pleas of the Crown, i. 29). In modern times, the word " lunacy " has lost its former precise signification. It is employed sometimes in the strict sense, sometimes in contra- distinction to "idiocy" or "imbecility"; once at least — viz. in the Lunacy Act 1890 — as including " idiot "; and frequently

1 The word for " lunatic " in several other languages has a similar etymology. Cp. Ital. lunatico. Span, alunado, Gr. at\i)viaKos (epileptic) , Ger. mondsiichtig.

in conjunction with the vague terms " unsound mind " (non-sane memory) and " insane." Section 116 of the Lunacy Act 1890 has by implication extended the meaning of the term lunacy so as to include for certain purposes the incapacity of a person to manage his affairs through mental infirmity arising from disease or age. " Imbecility " is a state of mental weakness " between the limits of absolute idiocy on the one hand and of perfect capacity on the other " (see 1 Haggard, Eccles. Rep. p. 401).

1. The Criminal Responsibility of the Insane. — The law as to the

criminal responsibility of the insane has pursued in England a curious course of development. The views of Coke and Hale give the best exposition of it in the 17th century. Both were agreed that in criminal causes the act and wrong of a madman shall not be imputed to him; both distinguished, although in different language, between dementia naturalis (or a nativitate) and dementia accidentalis or adventitia; and the main points in which the writings of Hale mark an advance on those of Coke are in the elaboration by the former of the doctrine of " partial insanity," and his adoption of the level of understanding of a child of fourteen years of age as the test of responsibility in criminal cases (Pleas of the Crown, i. 29, 30; and see Co. 4 Rep. 124 (b)). In the 18th century a test, still more unsatisfactory than this " child of fourteen " theory, with its identification of " healthy immaturity " with " diseased maturity " (Steph. Hist. Crim. Law, ii. 15°), was prescribed. On the trial of Edward Arnold in 1723 for firing at and wounding Lord Onslow, Mr Justice Tracy told the jury that " a prisoner, in order to be acquitted on the ground of insanity, must be a man that is totally deprived of his understanding and memory, and doth not know what he is doing, no more than an infant, than a brute or wild beast." In the beginning of the 19th century a fresh statement of the test of criminal responsibility in mental disease was attempted. On the trial of Hadfield for shooting at George III. in Drury Lane Theatre on 15th May 1800, Lord Chief Justice Kenyon charged the jury in the following terms: " If a man is in a deranged state of mind at the time, he is not criminally answerable for his acts; but the material part of the case is whether at the very time when the act was committed the man's mind was sane." The practical effect of this ruling, had it been followed, would have been to make the question of the amen- ability of persons alleged to be insane to the criminal law very much one of fact, to be answered by juries according to the particular circumstances of each case, and without being aided or embarrassed by any rigid external standard. But in 181 2, on the trial of Bellingham for the murder of Mr Perceval, the First Lord of the Treasury, Sir James Mansfield propounded yet another criterion of criminal responsibility in mental disease, viz. whether a prisoner has, at the time of committing an offence, a sufficient degree of capacity to distinguish between good and evil. The objection to this doctrine consisted in the fact, to which- the writings of Continental and American jurists soon afterwards began to give prominence, that there are very many lunatics whose general ideas on the subject of right and wrong are quite unexceptionable, but who are yet unable, in con- sequence of delusions, to perceive the wrongness of particular acts. Sir James Mansfield's statement of the law was dis- credited in

the case (4 State Tri. (n.s.) 847; 10 CI. and Fin. 200) of Daniel Macnaughton, who was tried in f on ˆ s Case! March 1843, before Chief Justice Tindal, Mr Justice Williams and Mr Justice Coleridge, for the murder of Mr Drum- mond, the private secretary of Sir Robert Peel. Mr (afterwards Lord Chief Justice) Cockburn, who defended the prisoner, used Hale's doctrine of partial insanity as the foundation of the defence, and secured an acquittal, Chief Justice Tindal telling the jury that the question was whether Macnaughton was capable of distinguishing right from wrong with respect to the act with which he stood charged. This judicial approval of the doctrine of partial insanity formed the subject of an animated debate in the House of Lords, and in the end certain questions were put by that House to the judges, and answered by Chief Justice Tindal on behalf of all his colleagues except Mr Justice Maule, who gave

independent replies. The answers to those questions are com- monly called " The Rules in Macnaughton's case," and they still nominally contain the law of England as to the criminal responsi- bility of the insane. The points affirmed by the Rules that must be noted here are the propositions that knowledge of the nature and quality of the particular criminal act, at the time of its com- mission, is the test of criminal responsibility, and that delusion is a valid exculpatory plea, when, and only when, the fancies of the insane person, if they had been facts, would have been so. The Rules in Macnaughton's case are open to serious criticism. They ignore, at least on a literal interpretation, those forms of mental disease which may, for the present purpose, be roughly grouped under the heading " moral insanity," and in which the moral faculties are more obviously deranged than the mental — the affections and the will, rather than the reason, being appar- ently disordered. The test propounded with reference to delu- sions has also been strenuously attacked by medical writers, and especially by Dr Maudsley in his work on Responsibility in Mental Disease, on the ground that it first assumes a man to have a delusion in regard to a particular subject, and then expects and requires him to reason sanely upon it. It may be pointed out, however, that in thus localizing the range of the immunity which insane delusion confers, the criminal law is merely following the course which, mutatis mutandis, the civil law has, with general acceptance, adopted in questions as to the contractual and

testamentary capacity of the insane.

The Rules in Macnaughton's case have, as regards moral insanity, undergone considerable modification. Soon after they were laid down, Sir (then Mr) James Fitz- James Stephen, in an article in the Juridical Papers, i. 67, on the policy of maintaining the existing law as to the criminal responsibility of the insane, foreshadowed the view which he subsequently propounded in his History of the Criminal Law, ii. 163, that no man wh(J was deprived by mental disease of the power of passing a fairly rational judg- ment on the moral character of an act could be said to " know " its nature and quality within the meaning of the Rules; and it has in recent years been found possible in practice so to manipu- late the test of the criminal responsibility which they prescribed as to afford protection to the accused in the by no means infre- quent cases of insanity which in its literal interpretation it would leave without excuse.

In Scotland the Rules in Macnaughton's case are recognized, but, as in England, there is a tendency among judges to adopt a generous construction of them. Mental unsoundness in- sufficient to bar trial, or to exempt from punishment, may still, it is said, be present in a degree which is regarded as reducing the offence from a higher to a lower category, — a doctrine first practically applied in Scotland, it is believed, in 1867 by Lord Deas; and the fact that a prisoner is of weak or ill-regulated mind is often urged with success as a plea in mitigation of punish- ment. The Indian Penal Code (Act XLV. of i860, § 84) expressly adopts the English test of criminal responsibility, but the qualifi- cations noted in the case of Scotland have received some measure of judicial acceptance (see Mayne, Crim. Law Ind., 3rd ed., pp. 403-419; Nelson, Ind. Pen. Code, 3rd ed., pp. 135 et seq.). The Rules in Macnaughton's case have also been adopted in substance in those colonies which have codified the criminal law. The following typical references may be given: 55 and 56 Vict. (Can.) c. 29, § n; 57 Vict. (N.Z.), No. 56 of 1893, § 23; No. 101 of 1888 (St Lucia), § 50; No. 5 of 1876 (Gold Coast), § 49 (&); No. 2 of 1883, art. 77 (Ceylon); No. 4 of 1871, art. 84 (Straits Settlements). On the other hand, a departure towards a recogni- tion of " moral insanity " is made by the Queensland Criminal Code (No. 9 of 1899), § 27 of which provides that " a person is not criminally responsible for an act " if at the time of doing it " he is in such a state of mental disease … as to deprive him … of capacity to control his actions " : and the law has been defined in the same sense in the Cape of Good Hope in the case of Queen v. Hay (1899, 16 S.C.R. 290). The Rules were rapidly reproduced in the United States, but the modern trend of American judicial opinion is adverse to them

(see Clevenger, Med. Jur. of Ins. p. 125; Parsons v. State (1887) 81 Ala. 577).

On the Continent of Europe moral insanity and irresistible impulse are freely recognized as exculpatory pleas (see the French Code Penal, § 64; Belgian Code Penal, § 71; German Penal Code, § 51; Italian Penal Code, §§ 46, 47).

Not only is insanity at the time of the commission of an offence a valid exculpatory plea, but supervening insanity stays the action of the criminal law at every stage from arrest up to punish- ment. High treason was formerly an exception, but the statute making it so (33 Hen. VIII. c. 20) was repealed in the time of Philip and Mary. The Home Secretary has power, under the Criminal Lunatics Act 1884 to order by warrant the removal of a prisoner, certified to be insane, to a lunatic asylum, before l trial or after trial, whether under sentence of death or not. Prisoners dealt with under these provisions are styled " Secretary of State's lunatics." On the other hand, a prisoner who on arraignment appears, or is found by the jury to be unfit to plead, or who is found " guilty but insane " at the time of committing the offence — a verdict substituted by the Trial of Lunatics Act 1883 for the old verdict of " acquitted on the ground of insanity," in the hope that the formal conviction recorded in the new finding might have a deterrent effect on the mentally unstable — is committed to a criminal lunatic asylum by the order of the judge trying the case, to be detained there " during the king's pleasure." Lunatics of this class are called " king's pleasure lunatics." There was no doubt at common law as to the power of the courts to order the detention of criminal lunatics in safe custody, but, prior to 1800, the practice was varying and uncertain. On the acquittal of Hadfield, however, in that year for the attempted murder of George III., a question arose as to the provision which was to be made for his detention, and the Criminal Lunatics Act 1800, part of which is still in force, was passed to affirm the law on the subject.

The Criminal Lunatics Act contains provisions similar to those of the Lunacy Act 1890, as to the discharge (conditional or absolute) and transfer of criminal lunatics and the detention of persons becoming pauper lunatics. The expenses of the main- tenance of criminal lunatics are defrayed out of moneys provided by Parliament (Crim. Luns. Act 1884, and Hansard, 3rd series, vol. ccxc. p, 75; 139 Com. Jo. pp. 336, 340, 344). The Lunatics' Removal (India) Act 1851 provides for the removal to a criminal lunatic asylum in Great Britain of persons found guilty of crimes and offences in India, and acquitted on the ground of insanity. Similar provisions with regard to

colonial criminaj lunatics are contained in the Colonial Prisoners' Removal Act 1884; and the policy of this statute has been followed by No 5. of 1894 (New South Wales), and Ordin. No 2 of 1895 (Falkland Islands). Indian law (see Act V. of 1898, §§ 464-475) and the laws of the colonies (the Cape Act No. 1 of 1897 is a typical example) as to the trial of lunatics are similar to the English. In Scotland all the criminal lunatics, except those who may have been removed to the ordinary asylums or have been discharged, are confined in the Criminal Asylum established at Perth in connexion with H.M.'s General Prison, and regulated by special acts (23 & 24 Vict. c. 105, and 40 & 41 Vict. c. 53). Provision similar to the English has been made for prisoners found insane as a bar to trial, or acquitted on the ground of insanity or becoming insane in confinement. In New York, Michigan and other American states there are criminal lunatic asylums. Elsewhere insane criminals are apparently detained in state prisons, &c. The statutory rules as to the maintenance of criminal lunatic asylums, the treatment of the criminal insane, and the plea of insanity in criminal courts in America, closely resemble English practice.

1 It has sometimes been stated that this power, which ought clearly, in the interests alike of prisoners and of the public, to be exercised with caution, is in fact exerted in an unduly large number of cases. The following figures, taken from the respective volumes of the Criminal Judicial Statistics, show the number of criminal lunatics certified insane before trial. In 1884-1885, out of a total of 938 criminal lunatics, 169 were so certified; in 1885-1886, 149 out of 890; in 1889-1890, 108 out of 926; in 1S90-1891, 95 out of 900; in 1894, 78 out of 738; in 1895, 84 out of 757; in 1896, 88 out of 769; in 1897, 85 out of 764; in 1898, 17 out of 209; in 1899, 13 out of 159; in 1900, 12 out of 185; in 1901, 15 out of 205; in 1902, 7 out of 233; in 1903, II out of 229.

[LEGAL ASPECTS

The only special point In Continental law calling for notice is the system by which official experts report for the guidance of the tribunals on questions of alleged criminal irresponsibility (see, e.g., the German Code of Penal Procedure, § 293, and cp. § 81).

2. Insanity and Civil Capacity. — The law as to the civil capacity of

the insane was for some time influenced in Great Britain by the view propounded by Lord Brougham in 1848 in the case of Waring v. Waring, and by Sir J. P. Wilde in a later case, raising the question of the validity of a marriage, that, as the mind is one and indivisible, the least disorder of its faculties was fatal to civil capacity. In the leading case of Banks v. Good- fellow in 1870, the court of queen's bench, in an elaborate judgment delivered by Chief Justice Cockburn, disapproved of this doctrine, and in effect laid down the principle that the question of capacity must be considered with strict reference to the act which has to be or has been done. Thus a certain degree of unsoundness of mind is not now, in the absence of undue influence, a bar to the formation of a valid marriage, if the party whose capacity is in question knew at the time of the marriage the nature of the engagement entered into (but see 51 Geo. III. c. 3 7 as to the marriage of lunatics so found by inquisition) . Again, a man whose mind is affected may make a valid will, if he possesses at the time of executing it a memory sufficiently active to recall the nature and extent of his property, the persons who have claims upon his bounty, and a judgment and will sufficiently free from the influence of morbid ideas or external control to determine the relative strength of those claims. So far has this rule been carried, that in 1893 probate was granted of the will of a lady who was a Chancery lunatic at the date of its execution, and died without the inquisition having been superseded. (Roe v. Nix, 1893, p. 55.) It is also now settled that the simple con- tract of a lunatic is voidable and not void, and is binding upon him, unless he can show that at the time of making it he was, to the knowledge of the other party, so insane as not to know what he was about. (Imperial Loan Co. v. Stone, 1892, 1 Q.B. 599.) The test established by Banks v. Goodfettow is applied also in a number of minor points in which civil capacity comes into question, e.g. competency of the insane as witnesses. The law implies, on the part of a lunatic, whether so found or noˆ, an obligation to pay a reasonable price for " necessaries " supplied to him; and the term " necessaries " means goods suitable to his condition in life and to his actual requirements at the time of sale and delivery, (Sale of Goods Act 1893).

The question of the liability of an insane person for tort appears still to be undecided (see Pollock on Torts, 7th ed. p. 53 ; Clerk and Lindsell on Torts, 2nd ed. pp. 39, 40; Law Quart. Rev. vol. xiii. p. 325). Supervening insanity is no bar to proceedings by or against a lunatic husband or wife for divorce or separation for previous matrimonial offences. It does not avoid a marriage nor constitute per se a ground either for divorce or for judicial separation. But cruelty

does not cease to be a cause of suit if it proceeds from disorderly affections or want of moral control falling short of positive insanity; and possibly even cruelty springing from intermittent or recurrent insanity might be held a ground for judicial separation, since in such case the party offended against cannot obtain protection by securing the per- manent confinement of the offending spouse. Whether insanity at the time when an alleged matrimonial offence was committed is a bar to a suit for divorce or separation is an open question; and in any event, in order that it may be so, the insanity must be of such a character as to have prevented the insane party from knowing the nature and consequences of the act at the time of its commission. The laws of Scotland, Ireland, India (see, e.g., Act IX. of 1872, § 12), the colonies and the United Statesare substantially identical with English law on the subject of the civil capacity of the insane. The German Civil Code (§1569) recognizes the lunacy of a spouse as a ground for divorce, but only where the malady continues during at least three years of the union, and has reached such a pitch that intellectual inter- course between the spouses is impossible, and that every prospect of a restoration of - such association is excluded. If one of the spouses obtains a divorce on the ground of the lunacy of the other

the former has to allow alimony, just as a husband declared to be the sole guilty party in a divorce suit would have to do

(§§ 1S85, 1578)-

3. The Jurisdiction in Lunacy. — In order to effect a change in the status of persons alleged to be of unsound mind, and to bring their persons and property under control, the aid of the juris- diction in lunacy must be invoked. Under the unrepealed statute De Praerogativa Regis (1325) the care and custody of lunatics belong to the Crown. But the Crown has, at least since the 1 6th century, exercised this branch of the prerogative by dele- gates, and principally through the Lord Chancellor — not as head of the Court of Chancery, but as the representative and delegate of the sovereign. Under the Lunacy Acts 1890 and 1891, the jurisdiction in lunacy is exercised first by the Lord Chancellor and such of the Lords Justices and other judges as may be invested with it by the sign-manual; and, secondly, by the two Masters in Lunacy, appointed by the Lord Chancellor, from members of the bar of at least ten years'^standing, whose duties include the holding of inquisitions and summary inquiries, and the making of most of the consequential orders dealing with the persons and estates of lunatics. County court judges may also exercise a limited jurisdiction in lunacy in the case of lunatics

as to whom a reception order has been made, if their entire property is under £200 in value, and no relative or friend is willing to undertake the management of it; in partnership cases where the assets do not exceed £500; and upon application by the guardians of any union for payment of expenses incurred by them in relation to any lunatic.

Persons of unsound mind are brought under the jurisdiction in lunacy either by an inquisition de lunatico inquirendo, or, in certain cases which will be adverted to below, by proceedings instituted under §116 of the Lunacy Act 1890, which is now the great practice section in the Lunacy Office. Prior to 1853 a special commission was issued to the Masters in each alleged case of lunacy. But by the Lunacy Regulation Act of that year a general commission was directed to the Masters, empowering them to proceed in each case in which the Lord Chancellor by order required an inquisition to be held. This procedure is still in force. A special commission would now be issued only where both Masters were personally interested in th,e subject of the inquiry, or for some other similar reason. An inquisition is ordered by the judge in lunacy (a term which does not, for this purpose, at present include the Masters, although this is one of the points in regard to which a change in the law has been suggested, on the petition generally of a near relative of the alleged lunatic. The inquiry is held before one of the Masters, and a jury may be summoned if the alleged lunatic, being within the jurisdiction, demands it, unless the judge is satisfied that he is not competent to form and express such a wish; and even in that case the Master has power to direct trial by jury if he thinks fit on consideration of the evidence. Where the alleged lunatic is not within the jurisdiction the trial must be by jury; and the judge in lunacy may direct this mode of trial to be adopted in any case whatever.

A few points of general interest in connexion with inquisitions must be noted. In practice thirty-four jurors are summoned by the sheriff, and not more than twenty-four are empanelled. Twelve at least must concur in the verdict. Counsel for the petitioner ought to act in the judicial spirit expected from counsel for the prosecution in criminal cases. The issue to be determined on an inquisition is " whether or not the alleged lunatic is at the time of the inquisition of unsound mind, and incapable' of managing himself and his affairs " (a special verdict may, however, be found that the lunatic is capable of managing himself, although not his affairs, and that he is not dangerous to others) ; and without the direction of the person holding the inquisition, no evidence as to the lunatic's conduct at any time being more than two years before the inquisition is to be

receivable. This limitation, both of the issue and of the evidence, was imposed with a view to preventing the recurrence of such cases as that of Mr Windham in 1861-1862, when the inquiry ranged over the whole life of an alleged lunatic, forty-eight witnesses being

examined on behalf of the petitioners and ninety-one on behalf of the respondents, while the hearing lasted for thirty-four days. For the purpose of assisting the Master or jury in arriving at a decision, provision is made for the personal examination of the alleged lunatic by them on oath or otherwise, and either in open court or in private, as may be directed. The proceedings on inquisition are open to the public. When a person has been found lunatic by inquisition he becomes subject to the jurisdiction in lunacy, and remains so (unless he succeeds in setting aside the verdict by a " traverse " — a proceeding which ultimately comes before, and is determined by, the King's Bench Division in London or at the assizes) until his recovery, when the inquisition may be put an end to by a procedure technically known as " supersedeas," or by his death. The results of the inquisition are worked out in the Lunacy Office. The control of the estate, and, except where he was found incapable of managing his property only, of the person of the lunatic is entrusted to committees of the estate and person, who are appointed by, and accountable to, the Master in Lunacy, and whose legal position corresponds roughly with that of the tutors and curators of the civil law. The committee of the estate in particular exercises over the property of the lunatic, with the sanction or by the order of the Master, very wide powers of management and administra- tion, including the raising of money by sale, charge or otherwise, to pay the lunatic's debts, or provide for his past or future main- tenance, charges for permanent improvements, the sale of any property belonging to the lunatic, the execution of powers vested in him and the performance of contracts relating to property.

The alternative method of bringing a person of unsound mind under lunacy jurisdiction was created by §116 of the Lunacy Act 1890. The effect of that section briefly is to enable the Master, on a summons being taken out in his chambers and heard before him, to apply the powers of management and administration summarized in the last preceding paragraph, without any inquisition, to the

following classes of cases: lunatics not so found by inquisition, for the protection or admini- stration of whose property any order was made under earlier acts; every person lawfully detained, within the jurisdiction of the English courts, as a lunatic, though not so found by inquisition; persons not coming within the foregoing categories who are " through mental infirmity arising from disease or age" incapable of managing their affairs; persons of unsound mind whose property does not exceed £2000 in value, or does not yield an annual income of more than £100; and criminal lunatics continuing insane and under confinement.

In Scotland the insane are brought under the jurisdiction in lunacy by alternative methods, similar to the English inquisition and summary procedure, viz. " cognition," the trial taking place before the Lord President of the Court of Session, or any judge of that court to whom he may remit it, and a jury of twelve- see 31 & 32 Vict. c. 100, and Act of Sederunt of 3rd December 1868 — and an application to the Junior Lord Ordinary of the Court of Session or (43 & 44 Vict. c. 4, § 4) to the Sheriff Court, when the estate in question does not exceed £100 a year, for the appointment of a curator bonis or judicial factor.

The powers of the Lord Chancellor of Ireland with regard to lunatics are generally similar to those of the English Chancellor (see the Lunacy Regulations (Ireland) Act 1871, 34 & 35 Vict, c. 22, and the Lunacy (Ireland) Act 1901, 1 Ed. VII. c. 17; also Colleson The Lunacy Regulation (Ireland) Act).

The main feature of the French system is the provision made by the Civil Code (arts. 489-512) for the interdiction of an insane person by the Tribunal of First Instance, with a right of appeal to the Court of Appeal, after a preliminary inquiry and a report by a family council (arts. 407, 408), consisting of six blood relatives in as near a degree of relationship to the lunatic as possible, or, in default of such relatives, of six relatives by marriage. The family council is presided over by the Jvge de Paix of the district in which the lunatic is domiciled. This system is also in force in Mauritius.

There arc provisions, it may be noted, in Scots law for the interdiction of lunatics, either voluntarily or judicially (sec

Bell's Principles, § 2123). The German Civil Code provides for insane persons being made subject to guardianship (vormun- dung), on conditions similar to those of Scots and French law (see Civil Code, §§ 6, 104 (1896, 1906), 645-679). In the United States the

fundamental procedure is an inquisition conducted on practically the same lines as in England. (Cf. Indiana, Rev. Stats. (1894) §§ 2715 et seq.; Missouri, Annot. Code (1892) §§ 2835 et seq.; New Mexico, General Laws (1880) c. 74 §§ 1 et seq.). 4. Asylum Administration.-— Asylum administration in England is now regulated by the Lunacy Acts 1890 and 1891. Receptacles for the insane are divisible into the following classes: (i.) Institutions for lunatics, including asylums, registered hospitals and licensed houses. The asylums are provided by counties or boroughs, or by union of counties or boroughs. Registered hospitals are hospitals holding certificates of registration from the Commissioners in Lunacy, where lunatics are received and supported wholly or partially by voluntary contributions or charitable bequests, or by applying the excess of the payments of some patients towards the maintenance of others. Licensed houses are houses licensed by the Commissioners, or, beyond their immediate jurisdiction, by justices; (ii.) Workhouses — see article Poor Law; (iii.) Houses in which patients are boarded out; (iv.) Private houses (unlicensed) in which not more than a single patient may be received. A person, not being a pauper or a lunatic so found by inquisition, cannot, in ordinary cases, be received and detained as a lunatic in any institution for the insane, except under a " reception order " made by a county court judge or stipendiary magistrate or specially appointed justice of the peace. The order is made on a petition presented by a relative or friend of the alleged lunatic, and supported by two medical certificates, and after a private hearing by the judicial authority. The detention of a lunatic is, however, justifiable at common law, if necessary for his safety or that of others; and the Lunacy Act 1890, borrowing from the lunacy law of Scotland, provides for the reception of a lunatic not a pauper into an asylum, where it is expedient for his welfare or the public safety that he should be confined without delay, upon an " urgency order," made if possible by a near relative and accompanied by one medical certificate. The urgency order only justifies detention for seven days (the curtailment of this period to four days is proposed), and before the expiration of that period the ordinary procedure must be followed. " Summary reception orders" may be made by justices otherwise than on petition. There are four classes of cases in which such orders may be made, viz. : (i.) lunatics (not paupers and not wandering at large) who are not under proper care and control, or are cruelly treated or neglected; (ii.) resident pauper lunatics; (iii.) lunatics, whether pauper or not, wandering at large; (iv.) lunatics in workhouses. (As to pauper lunatics generally, see article Poor Law.) A lunatic may also be received into an institution under an order by the Commissioners in Lunacy; and a lunatic so found by inquisition

under an order signed by the committee of his person.

The chief features of English asylum administration requiring notice are these. Mechanical restraint is to be applied only when necessary for surgical or medical purposes, or in order to prevent the lunatic from injuring himself or others. The privacy of the correspondence of lunatics with the Lord Chancellor, the Commissioners in Lunacy, &c, is secured. Provision is made for regular visits to patients by their relatives and friends. The employment of males for the custody of females is, except on occasions of urgency, prohibited. Pauper lunatics may be boarded out with relatives and friends. Elaborate provision is made for the official visitation of every class of receptacle for the insane. The duties of visitation are divided between the Com- missioners in Lunacy, the Chancery Visitors and various other visitors and visiting committees. There are ten Commissioners in Lunacy — four unpaid and six paid, three of the latter being barristers of not less than five years' standing at the date of appointment, and three medical. The Commissioners in Lunacy, who are appointed by the Lord Chancellor, visit every class of lunatics except persons so found by inquisition. These are

visited by the Chancery Visitors. There are three Chancery Visitors, two medical and one legal (a barrister of at least five years' standing at the date of his appointment), who are appointed and removable by the Lord Chancellor. The Chancery Visitors (together with the Master in Lunacy) form a Board, and have offices in the Royal Courts of Justice. In addition to these two classes of visitors, every asylum has a Visiting Committee of not less than seven members, appointed by the local authority; and the justices of every county and quarter-sessions borough not within the immediate jurisdiction of the Commissioners in Lunacy annually appoint three or more of their number as visitors of licensed houses.

Provision is made for the discharge of lunatics from asylums, &c, on recovery, or by habeas corpus, or by the various visiting authorities. Any person who considers himself to have been unjustly detained is entitled on discharge to obtain, free of expense, from the secretary to the Lunacy Commissioners a copy of the documents under which he was confined.

The Irish [Lunacy Acts 1821-1890; Lunacy (Ireland) Act 1901] and Scottish [Lunacy Acts 1857 (20 & 21 Vict. c. 71), 1887 (50 & 51 Vict. c. 39)] asylum systems present no feature sufficiently different from the English to require separate notice, except that in Scotland " boarding out " is a regular, and not merely an incidental, part of asylum administration. The " boarding out " principle has, however, received its most extended and most successful application in the Gheel colony in Belgium. The patients, after a few days' preliminary observa- tion, are placed in families, and, except that they are under ultimate control by a superior commission, composed of the governor of the province, the Procureur du Roi and others, enjoy complete liberty indoors as well as out of doors. The patients are visited by nurses from the infirmary, to which they may be sent if they become seriously ill or unmanageable. They are encouraged to work. The accommodation provided for them is prescribed, and is to be of the same quality as that of the household in which they live. Clothing is provided by the administration.

In the French (see laws of 30th June 1838 and 18th December 1839) and German {see Journal of Comparative Legislation, n.s. vol. i. at pp. 271, 272) asylum systems the main features of English administration are also reproduced.

The lunacy laws of the British colonies have also closely followed English legislation (cf. Ontario, R.S. 1897, cc. 317, 318; Manitoba, R.S. 1902, c. 80; Victoria (No. 1113, 1890); New Zealand (No. 34 of 1882 and Amending Acts); Mauritius (No. 37 of 1858).'

In America the different states of the Union have each their own lunacy legislation. The national government provides only for the insane of the army and navy, and for those residing in the District of Columbia and in Alaska. The various laws as to the reception, &c, of the insane into asylums closely resemble English procedure. But in several states the verdict of a jury finding lunacy is a necessary preliminary to the commitment of private patients (Kentucky, Act of 1883, c. 900, § 14; Mary- land, R.S. 1878, c. 53, § 21; Illinois, R.S. 1874, c. 85, § 22).

Authorities. — The following works may be consulted: Collin- son on the Law of Lunatics and Idiots (2 vols., London, 1812); Shelford on the Law of Lunatics and Idiots (London, 1847). On all points relating to the history and development of the law these two treatises are invaluable. Pope on Lunacy (2nd ed., London, 1890); Archbold's Lunacy (4th ed., London, 1895); Elmer on Lunacy (7th ed., London, 1892); Wood Renton on Lunacy- (London and Edin- burgh, 1896);

Fry's Lunacy Laws (3rd ed., London, 1890); Pitt- Lewis, Smith and Hawke, The Insane and the Law (London, 1895); Hack-Tuke, Dictionary of Psychological Medicine (London, 1892), and the bibliographies attached to the various legal articles in that work; Clevenger, Medical Jurisprudence of Insanity (2 vols., New York, 1899); Semelaigne, Les Alienistes francais (Paris 1849); Bertrand. Loi sur les alienes (Paris, 1872), presents a comparative view of English and foreign legislations. In forensic medicine the works of Taylor, Medical Jurisprudence (5th ed., London, 1905); Dixon Mann, Foreign Medicine and Toxicology (3rd ed., London, 1902) ; and Wharton and Stille, A Treatise on Medical Jurisprudence (Philadelphia, 1873); Hamilton and Godkin, System of Legal Medicine (New York, 1895); are probably the English authorities in most common use. See also Casper and Liman, Praktisches Handbuch

der gerichtlichen Medicin (Berlin, 6th ed., 1876); Tardieu, Etude medico-legale sur la folie (Paris, 1872); Legrand du Saulle, La Folie devant les tribunaux (Paris, 1864) ; Dubrac, Traite de jurisprudence mkdicale (Paris, 1894); Tourdes, Traite de medecine legale (Paris, 1897) I and especially Krafft-Ebing, Lehrbuch der gerichtlichen Psycho- pathologie (Stuttgart, 1899). (A. W. R.)

III. Hospital Treatment

The era of real hospitals for the insane began in the 19th century. There had been established here and there in different parts of the world, it is true, certain asylums or places of restraint before the beginning of the 19th century. We find mention in history of such a place established by monks at Jerusalem in the latter part of the 5th century. There is evidence that even earlier than this in Egypt and Greece the insane were treated as individuals suffering from disease. Egyptian priests employed not only music and the beautiful in nature and art as remedial agents in insanity, but recreation and occupation as well. A Greek physician protested against mechanical restraint in the care of the insane, and advocated kindly treatment, the use of music, and of some sorts of manual labour. But these ancient beneficent teachings were lost sight of during succeeding centuries. The prevailing idea of the pathology of insanity in Europe during the middle ages was that of demoniacal possession. The insane were not sick, but possessed of devils, and these devils were only to be exorcised by moral or spiritual agencies. Medieval therapeutics in insanity adapted itself to the etiology indicated. Torture and the cruellest forms of punishment were employed. The insane were regarded with abhorrence, and were frequently cast into chains and dungeons. Milder forms of mental disease were treated by other

spiritual means — such as pilgrimages to the shrines of certain saints who were reputed to have particular skill and success in the exorcism of evil spirits. The shrine of St Dymphna at Gheel, in Belgium, was one of these, and seems to have originated in the 7th century, a shrine so famed that lunatics from all over Europe were brought thither for miraculous healing. The little town became a resort for hundreds of insane persons, and as long ago as the 17th century acquired the reputation, which still exists to this day, of a unique colony for the insane. At the present time the village of Gheel and its adjacent farming hamlets (with a population of some 13,000 souls) provides homes, board and care for nearly 2000 insane persons under medical and government supervision. Numerous other shrines and holy wells in various parts of Europe were resorted to by the mentally afflicted — such as Glen-na-Galt in Ireland, the well of St Winifred, St Nun's Pool, St Fillans, &c. At St Nun's the treatment consisted of plunging the patient backwards into the water and dragging him to and fro until mental excitement abated. Not only throughout the middle ages, but far down into the 17th century, demonology and witchcraft were regarded as the chief causes of insanity. And the insane were frequently tortured, scourged, and even burned to death.

Until as late as the middle of the 18th century, mildly insane persons were cared for at shrines, or wandered homeless about the country. Such as were deemed a menace to the community were sent to ordinary prisons or chained in dungeons. Thus large numbers of lunatics accumulated in the prisons, and slowly there grew up a sort of distinction between them and criminals, which at length resulted in a separation of the two classes. In time many of the insane were sent to cloisters and monasteries, especially after these began to be abandoned by their former occupants. Thus " Bedlam " (Bethlehem Royal Hospital) was originally founded in 1247 as a priory for the brethren and sisters of the Order of the Star of Bethlehem. It is not known exactly when lunatics were first received into Bedlam, but some were there in 1403. Bedlarh was rebuilt as an asylum for the insane in 1676. In 181 5 a committee of the House of Commons, upon investiga- tion, found it in a disgraceful condition, the medical treatment being of the most antiquated sort, and actual inhumanity practised upon the patients. Similarly the Charenton Asylum, just outside Paris, near the park of Vincennes, was an old monastery which had been given over to the insane. Numerous

like instances could be cited, but the interesting point to be borne in mind is, that with a general tendency to improvement in the condition of imbeciles upon public charge, idiots and insane persons came gradually to be separated from criminals and other paupers, and to be segregated. The process of segregation was, however, very slow. Even after it had been accomplished in the larger centres of civilization, the condition of these unfortunates in provincial districts remained the same. Furthermore, the transfer to asylums provided especially for them was not followed by any immediate improvement in the patients.

Twenty-five years after Pinel had, in 1792, struck the chains from the lunatics huddled in the Salpetriere and Bicetre of Paris, and called upon the world to realize the horrible injustice done to this wretched and suffering class of humanity, a pupil of Pinel, Esquirol, wrote of the insane in France and all Europe: " These unfortunate people are treated worse than criminals, reduced to a condition worse than that of animals. I have seen them naked, covered" with rags, and having only straw to protect them against the cold moisture and the hard stones they lie upon; deprived of air, of water to quench thirst, and all the necessaries of life; given up to mere gaolers and left to their surveillance. I have seen them in their narrow and filthy cells, without light and air, fastened with chains in these dens in which one would not keep wild beasts. This I have seen in France, and the insane are every- where in Europe treated in the same way." It was not until 1838 that the insane in France were all transferred from small houses of detention, workhouses and prisons to asylums specially con- structed for this purpose.

In Belgium, in the middle ages, the public executioner was ordered to expel from the towns, by flogging, the poor lunatics who were wandering about the streets. In 1804 the Code Napoleon " punished those who allowed the insane and mad criminals to run about free." In 1841 an investigation showed in Belgium thirty-seven establishments for the insane, only six of which were in good order. In fourteen of them chains and irons were still being used. In Germany, England and America, in 1 84 1, the condition of the insane was practically the same as in Belgium and France.

These facts show that no great advance in the humane and scientific care of the insane was made till towards the middle of the 19th century. Only then did the actual metamorphosis t.f asylums for detention into hospitals for treatment begin to take place. Hand in

hand with this progress there has grown, and still is growing, a tendency to subdivision and specialization of hospitals for this purpose. There are now hospitals for the acutely insane, others for the chronic insane, asylums for the criminal insane, institutions for the feeble-minded and idiots, and colonies for epileptics. There are public institutions for the poor, and well-appointed private retreats and homes for the rich. All these are presided over by the best of medical authorities, supervised by unsalaried boards of trustees or managers, and carefully inspected by Government lunacy commissioners, or boards of charities — a contrast, indeed, to the gaols, shrines, holy wells, chains, tortures, monkish exorcisms, &c, of the past!

The statistics of insanity have been fairly well established. The ratio of insane to normal population is about 1 to 300 among civilized peoples. This proportion varies within narrow limits in different races and countries. It is probable that intemperance in the use of alcohol and drugs, the spread of venereal diseases, and the over-stimulation in many directions induced by modern social conditions, have caused an increase of insanity in the 19th as compared with past centuries. The amount of such increase is probably very small, but on superficial examination might seem to be large, owing to the accumulation of the chronic insane and the constant upbuilding of asylums in new communities. The imperfections of census-taking in the past must also be taken into account.

The modern hospital for the insane does credit to latter-day civilization. Physical restraint is no longer practised. The day of chains — even of wristlets, covered cribs and strait-jackets — ■ is past. Neat dormitories, cosy single rooms, and sitting- and

dining-rooms please the eye. In the place of bare walls and floors and curtainless windows, are pictures, plants, rugs, birds, curtains, and in many asylums even the barred windows have been abolished. Some of the wards for milder patients have unlocked doors. Many patients are trusted alone about the grounds and on visits to neighbouring towns. An air of busy occupation is observed in sewing-rooms, schools, shops, in the fields and gardens, employment contributing not only to economy in administration, but to improvement in mental and physical conditions. The general progress of medical science in all directions has been manifested in the department of psychiatry by improved methods of treatment, in the way of sleep-producing and alleviating drugs, dietetics, physical culture, hydrotherapy and the like. There are few asylums now without pathological and clinical laboratories. While it is a far cry

from the prisons and monasteries of the past to the modern hospital for the insane, it is still possible to trace a resemblance in many of our older asylums to their ancient prototypes, particularly in those asylums built upon the so-called corridor plan. Though each generation contributed something new, antecedent models were more or less adhered to. Progress in asylum architecture has hence advanced more slowly in countries where monasteries and cloisters abounded than in countries where fixed models did not exist. Architects have had a freer hand in America, Australia and Germany, and even in Great Britain, than in the Catholic countries of Europe.

Germany approaches nearest to an ideal standard of provision for the insane. The highest and best idea which has yet been attained is that of small hospitals for the acutely insane in all cities of more than 50,000 inhabitants, and of colonies for the chronic insane in the rural districts adjacent to centres of population. The psychopathic hospital in the city gives easy and speedy access to persons taken suddenly ill with mental disease, aids in early diagnosis, places the patients within reach of the best specialists in all departments of medicine, and associated, as it should be, with a medical school or university, affords facilities not otherwise available for scientific research and for instruction in an important branch of medical learning. A feature of the psychopathic hospital should be the reception of patients for a reasonable period of time, as sufferers from disease, without the formality of legal commitment papers. Such papers are naturally required for the detention and restraint of the insane for long periods of time, but in the earlier stages they should be spared the stigma, delay and complicated procedure of commitment for at least ten days or two weeks, since in that time many may convalesce or recover, and in this way escape the public record of their infirmities, unavoidable by present judicial procedures.

There should be associated with such hospitals for the acutely insane in cities out-door departments or dispensaries, to which patients may be brought in still earlier stages of mental disorder, at a period when early diagnosis and preventive therapeutics may have their best opportunities to attain good results. In Germany a psychopathic hospital now exists in every university town, under the name of Psychiatrische ivlinik.

Colonies for the chronic insane are established in the country, but in the neighbourhood of the cities having psychopathic hospitals, to receive the overflow of the latter when the acute stage has passed.

The true colony is constructed on the principle of a farming hamlet, without barracks, corridored buildings, or pavilions. It is similar in most respects to any agricultural community. The question here is one of humane care and' economical administration. Humane care includes medical supervision, agreeable home-life, recreation, and, above all things, regular manual and out-of-door occupation in garden, farm and dairy, in the quarry, clay-pit or well-ventilated shop. Employment for the patients is of immense remedial importance, and of great value from the standpoint of economical administra- tion. In the colony system the small cottage homes of the patients are grouped about the centres of industry. The workers in the farmstead live in small families about the farmstead group of buildings; the tillers of the soil adjacent to the fields,

meadows and gardens; the . brickmakers, quarry men and artizans in still other cottages in the neighbourhood of the scenes of their activities. In addition to these groups of cottages, which constitute the majority of the buildings in the village, an infirmary for bedridden, excited and crippled patients is required, and a small hospital for the sick. All the inhabitants of the colony are under medical supervision. A laboratory for scientific researches forms a highly important part of the equip- ment. The colony is not looked upon as a refuge for the incurable ; it is still a hospital for the sick, where treatment is carried on under the most humane and most suitable conditions, and wherein the precentage of recoveries will be larger than in asylums and hospitals as now conducted. In respect of the establishment of colonies for the insane upon the plan outlined here, Germany has, as in the case of the psychopathic hospital, led the world. It has been less difficult for that country to set the example, because she had fewer of the conditions of the past to fight, and with her the progress of medical science and of methods of instruction in all departments of medicine has been more pronounced and rapid.

Among the German colonies for the insane, that at Alt- Scherbitz, near Leipzig, is the oldest and most successful, and is pre-eminent in its close approach to the ideal village or colony system. In 1899 Professor Kraeplin of Heidelberg stated (Psychialrie, 6th edition) that the effort was made everywhere in Germany to give the exterior of asylums, by segregation of the patients in separate home-like villas, rather the appearance of hamlets for working-people than

prisons for the insane, and he said, further, that the whole question of the care of the insane had found solution in the colony system, the best and cheapest method of support. " I have myself," he writes, " had oppor- tunity to see patients, who had lived for years in a large closed asylum, improve in the most extraordinary manner under the influence of the freer movement and more independent occupa- tion of colony life."

In America the colony scheme has been successfully adopted by the state of New York at the Craig Colony for Epileptics at Sonyea and elsewhere.

That the tendency nowadays, even outside of Germany, in the direction of the ideal standard of provision for the insane is a growing one is manifested in all countries by a gradual disintegration of the former huge cloister-like abodes. More asylums are built on the pavilion plan. Many asylums have, as it were, thrown off detached cottages for the better care of certain patients. Some asylums have even established small agricultural colonies a few miles away from the parent plant, like a vine throwing out feelers. What is called the boarding-out system is an effort in a similar direction. Patients suffering from mild forms of insanity are boarded out in families in the country, either upon public or private charge. Gheel is an example of the boarding-out system practised on a large scale. But the ideal system is that of the psychopathic hospital and the colony for the insane.

Authorities. — Sir J. B. Tuke, Dictionary of Psychological Medicine, (London and Philadelphia, 1892); W. P. Letchworth, The Insane in Foreign Countries (New York, 1889); Care and Treatment of Epileptics (New York, 1900); F. Peterson, Mental Diseases (Phila- delphia, 1899); " Annual Address to the American Medico-Psycho- logical Association," Proceedings (1899). (F. P.)*

INSCRIPTIONS (from Lat. inscribere, to write upon), the general term for writings cut on stone or metal, the subject matter of epigraphy. See generally Writing and Pai.aeo- graphv. Under this heading it is convenient here to deal more specifically with four groups of ancient inscriptions, Semitic, Indian, Greek and Latin, but further information will be found in numerous separate articles on philological subjects. See especially Cuneiform. Babylonia and Assyria, Sumer, Behistcn, Egypt (Language and Writing), Ethiopia, Phoe- nicia, Arabia, Hittites, Sabaeans, Minaeans, Etruria, Aegean Civilization, Crete, Cyprus, Britain, Scandinavian Languages, Teutonic Languages, Central America: Archae- ology, &c.

I. Semitic Inscriptions

Excluding cuneiform (q.v.), the inscriptions known as Semitic are usually classed under two main heads as North and South Semitic. The former class includes Hebrew (with Moabite), Phoenician (with Punic and neo-Punic), and Aramaic (with Nabataean and Palmyrene). The South Semitic class includes the Minaean and Sabaean inscriptions of South Arabia, In most of these departments there has been a very large increase of material during recent years, some of which is of the highest historical and palaeographical importance. The North Semitic monuments have received the greater share of attention because of their more general interest in connexion with the history of surrounding countries.

1. North Semitic. — The earliest authority for any North Semitic language is that of the Tel-el-Amarna tablets (15th century B.C.) which contain certain " Canaanite glosses," 1 i.e. North Semitic words written in cuneiform characters. From these to the first inscription found in the North Semitic alphabet, there is an interval of about six centuries. The stele of Mesha, commonly called the Moabite Stone, was set up in the gth century B.C. to commemorate the success of Moab in shaking off the Israelitish rule. It is of great value, both historically as relating to events indicated in 2 Kings i. 1, iii. 5, &c, and linguistic- ally as exhibiting a language almost identical with Hebrew — that is to say, another form of the same Canaanitish language. It was discovered in 1868 by the German missionary, Klein, on the site of Dibon, intact, but was afterwards broken up by the Arabs. The fragments, 2 collected with great difficulty by Cfermont-Ganneau and others, are now in the Louvre. Its genuineness was contested by A. Lowy (Scottish Review, 1887; republished, Berlin, 1903) and recently again by G. Jahn (ap- pendix to Das Buch Daniel, Leipzig, 1004), but, although there are many difficulties connected with the text, its authenticity is generally admitted.

Early Hebrew inscriptions are at present few and meagre, although it cannot be doubted that others would be found by excavating suitable sites. The most important is that discovered ih 1880 in the tunnel of the pool of Siloam, commemorating the piercing of the rock. It is generally believed to refer, to Hezekiah/s scheme for supplying Jerusalem with water (2 Kings xx. 20), and therefore to date from about 700 B.C. It consists of six lines in good Hebrew, and is the only early Hebrew inscrip- \ tion of any length. The character does not differ from that of the Moabite Stone, except in the slightly cursive tendency of its curved strokes, due no doubt to their having

been traced for the stone-cutter by a scribe who was used to writing on parchment. There are also a few inscribed seals dating from before the Exile, some factory marks and an engraved capital at al-Amwas, which : last may, however, be Samaritan. Otherwise this character is only found (as the result of an archaizing tendency) on coins of the Hasmoneans, and, still later, on those of the first and second (Bar Kokhba's) revolts.

The new Hebrew character, which developed into the modern square character, is first found in a name of five letters at "Araq- al-amtr, of the 2nd century B.C. Somewhat later, but probably of the 1st century B.C., is the tombstone of the B'ne Hezif (" Tomb of St James ") at Jerusalem. An inscription on a ruined synagogue at Kafr Bir'im, near Safed, perhaps of about a.d. 300, or earlier, shows the fully developed square character.

Since the publication of the Corpus I riser. Sem. it has been customary to treat papyri along with inscriptions, and for palaeographical reasons it is convenient to do so. Hebrew papyri are few, all in square character and not of great interest. The longest, and probably the earliest (6th century a.d.), is one now in the Bodleian Library at Oxford, containing a private

1 See Winckler in Schrader's Keilinschr. Bibl. v. (Berlin, &c,

1896).

2 A nearly complete text has been made from these with the help of a squeeze taken before its destruction. See the handbooks mentioned feelfc»w.

letter l written in a character closely resembling that of the Kair Bir'im inscription. Other fragments were published by Steinschneider 2 (perhaps 8th century), and by D. H. Miiller and Kaufmann.'

Hebrew inscriptions outside Palestine are the cursive graffiti in the catacombs at Venosa (2nd~sth century), the magical texts on Babylonian bowls (7th-8th century), and the numerous tomb- stones * in various parts of Europe, of all periods from the 6th century to the present time.

The few Samaritan inscriptions in existence are neither early nor interesting.

Closely related to the Hebrews, both politically and in language, were the Phoenicians in North Syria. Their monuments in Phoenicia itself are few and not earlier than the Persian period. The oldest yet found, dating probably from the 5th or 4th century B.C., is that of Yehaw-milk, king of Gebal (modern Jebel) or Byblus, where it was found. It records at some length the dedication of buildings, &c, to the goddess of Gebal. Of the 3rd century B.C. are the inscriptions on the sarcophagi of Tabnith and his son Eshmun'azar, kings of Sidon, and some records of other members of the same family, Bod-'ashtart and his son Yathan-milk, found in 1902 a short distance north of Sidon.

Outside Phoenicia the inscriptions are numerous and widely scattered round the Mediterranean coasts, following the course of Phoenician trade. The earliest is that on some fragments Of three bronze bowls, dedicated to Baal of Lebanon, found in Cyprus. The character is like that of the Moabite Stone, and the date is probably the 8th century B.C., though some scholars would put it nearer to 1000 B.C. In the latter case, the Hiram, king of Sidon, mentioned in the inscriptions would be the same as Hiram, king of Tyre, in Solomon's time. Similar bowls (of about 700 B.C.) found at Nimrud sometimes bear the maker's name in Phoenician characters.

Many monumental inscriptions have also been found in Cyprus, at Kition, Idalion, Tamassos, &c. They are chiefly votive, some dated in the 4th century, and some being perhaps as late as the 2nd century B.C., so that they afford valuable evidence as to the succession of the local kings. Several also are bilingual, and it was one of these which supplied George Smith with the clue to the Cypriote syllabic system of writing Greek. Similar memorials of Phoenician settlements were found at Athens (Piraeus), in Egypt, Sardinia, Malta and Gozo. Most interesting of all is the celebrated sacrificial tablet of Marseilles, giving an elaborate tariff of payments at or for the various offerings, and showing some striking analogies with the directions in the book of Leviticus. For the information it gives as to civil and priestly organization, it is the most important Phoenician text in exist- ence. It was probably brought from Carthage, where similar tariffs have been found. On the site of that important colony, and indeed throughout the parts of North Africa once subject to its rule, Punic inscriptions are, as might be expected, very numerous. By far the majority are votive tablets, probably belonging to the period between the 4th and the 2nd centuries B.C., many of them in a wonderfully

perfect state of preservation. One of the most interesting, recently discovered, mentions a high-priestess who was head of the college of priests, and whose husband's family had been sujfetes for four generations. Later inscriptions, called neo-Punic, dating from the fall of Carthage to about the 1st century a.d., are written in a debased character and language differing in several respects from the earlier Punic, and presenting many difficulties.

In Aramaic the earliest inscriptions are three found in 1890- 1891 at and near Zinjlrll in North-west Syria, dating from the 8th century B.C. Of these, one was set up by Panammu, king of Ya'dl, in honour of the god Hadad, and is inscribed on a

1 Published with other fragments in the Jew. Quart. Review, xvi. 1.

2 Zeitsch. f. Aegypt. Spr. (1879). These were the first specimens found. See also Erman and Krebs, Aus den Papyrus d. kgl. Mus. p. 290 (Berlin, 1899).

3 Mittheilungen . . . Rainer, i. 38 (Wien, 1886).

4 Those in France were collected by Schwab in Nouvelles archives, jrii. 3. See also Chwolson, Corpus Inscr. Hebr. (St Petersburg, 1882).

statue of him, the other two were set up by Bar-rekub, son of Panammu, one in honour of his father and on his statue, the second commemorating the erection of his new house. They are remarkable as being engraved in relief, a peculiarity which has been thought to be due to " Hittite " influence. Otherwise the character resembles that of the Moabite Stone. The texts consist of 77 lines (not all legible), giving a good deal of informa- tion about an obscure place and period hitherto known only from cuneiform sources. The ornamentation is Assyrian in style, as also is that of the inscriptions of Nerab (near Aleppo), commemorative texts engraved on statues of priests, of about the 7th century.

Of shorter inscriptions there is a long series from about the 8th century B.C., on bronze weights found at Nineveh (generally accompanied by an Assyrian version), and as "dockets" 6 to cuneiform contract-tablets, giving a brief indication of the contents. Aramaic, being the commercial language of the East, was naturally used for this purpose in business documents. For the same reason it is found in the 6th-4th centuries B.C. sporadic- ally in various regions, as in Cilicia, in Lycia 6 (with a Greek version), at Abydos (on a weight). At Taima also, in North Arabia, an important trading

centre, besides shorter texts, a very interesting inscription of twenty-three lines was found, recording the foundation and endowment of a new temple, probably in the 5th century b.c. But by far the most extensive collection of early Aramaic texts comes from Egypt, where the language was used not only for trade purposes, as elsewhere, but also officially under the Persian rule. From Memphis there is a funeral inscription dated in the fourth year of Xerxes (482 B.C.), and a dedication on a bowl of about the same date. A stele recently published by de Vogti6 7 is dated 458 B.C. Another which is now at Carpentras in France (place of origin unknown) is probably not much later. At Elephantine and Assuan in Upper Egypt, a number of ostraka have been dug up, dating from the 5th century B.C. and onward, all difficult to read and explain, but interesting for the popular character of their contents, style and writing. There was a Jewish (or Israelitish 8) settle- ment there in the 5th century from which emanated most, if not all, of the papyrus documents edited in the C.I.S. Since the appearance of this part of the' Corpus, more papyri have come to light. One published by Euting 9 is dated 411 B.C. and is of historical interest, eleven others, 10 containing legaldocuments, mostly dated, were written between 471 and 411 B.C.; another (408 B.C.) is a petition to the governor of Jerusalem. 11 The fragments in the C.I.S. are in the same character and clearly belong to the same period. The language continued to be used in Egypt even in Ptolemaic times, as shown by a papyrus 12 (accounts) and ostrakon 13 containing Greek names, and belonging, to judge from the style of the writing, to the 3rd century B.C. The latest fragments u are of the 6th-8th century a.d., written in a fully developed square character. They are Jewish private letters, and do not prove anything as to the use of Aramaic in Egypt at that time.

Nabataean inscriptions are very numerous. They are written in a peculiar, somewhat cursive character, derived from the square, and date from the 2nd century b.c. The earliest dated is of the year 40 B.C., the latest dated is of a.d. 95. The Nabataean kingdom proper had its centre at Petra (= Sela in 2 Kings xiv. 7), which attained great importance as the emporium on the trade route between Arabia and the Persian Gulf on the

5 These have been collected by J. H. Stevenson, Babyl. and Assyr.. Contracts (New York, 1902). A more complete collection has been prepared by Professor A. T. Clay.

6 For the literature see Kalinka, Tituli Lyciae, No. 152 (Vienna,

1901).

7 Repertoire d'epigr. sent., No. 438.

8 So Bacher in /. Q. R. xix. 441.

9 In Mem. Acad, inscr. i re ser. xi. 397. See also Rip. d'ipigr. sem., for some smaller fragments, Nos. 244-248.

10 Sayce and Cowley, Aramaic Papyri (London, 1906).

11 Sachau, " Drei aram. Papyrusurkunden " Abh. d. kgl. Preuss. Akad. (Berlin, 1907).

12 See P.S.B.A. (1907), p. 260. la Sp

one side and Syria and Egypt on the other. The commercial activity of the people, however, was widely extended, and their monuments are found not only round Petra and in N. Arabia, but as far north as Damascus, and even in Italy, where there was a trading settlement at Puteoli. The inscriptions are mostly votive or sepulchral, and are often dated, but give little historical information except in so far as they fix the dates of Nabataean kings.

A distinct subdivision of Nabataean is found in the Sinaitic peninsula, chiefly in the WadI Firan and WadI Mukattib, which lay on the caravan route. The inscriptions are rudely scratched or punched on the rough rock, without any sort of order, and some of them are accompanied by rude drawings. A few only are dated, but, as shown by de Vogue in the C.I.S. (ii. i, p. 353), they must all belong to the 2nd and 3rd centuries a.d. This accounts for the fact that already in the 6th century Cosmas Indicopleusf es 1 has no correct account of their origin, and ascribes them to the Israelites during their wanderings in the wilderness. 2 They were first correctly deciphered as Nabataean by Beer in 1848, when they proved to consist chiefly of proper names (many of them of Arabic formation), accompanied by ejaculations or blessings. It is clear that they are not the work of pilgrims either Jewish or Christian, 3 nor are they of a religious character. The frequent recurrence of certain names shows that only a few generations of a few families are represented, and these must have belonged to a small body of Nabataeans temporarily settled in the particular Wadis, no doubt for purposes connected with

the caravan-traffic. The form of the Nabataean character in which they are written is interesting as being the probable progenitor of the Kufic Arabic alphabet.

Another important trading centre was Tadmor or Palmyra in northern Syria. Numerous inscriptions found there, and hence called Palmyrene, were copied by Waddington in 1861 and published by de Vogue in his great work Syrie Centrale (1868, &.c), which is still the most extensive collection of them. The difficulties of exploration have hitherto prevented any further increase of the material, but much more would undoubtedly be found if excavation were possible. The texts are mostly sepulchral and dedicatory, some of them being accompanied by a Greek version. The language is a form of western Aramaic, and the character, which is derived from the Hebrew and Aramaic square, is closely related to the Syriac estrangelo alphabet. The inscriptions are mostly dated, and belong to the period between 9 B.C. and a.d. 271. The most important is the tariff of taxes on imports, dated a.d. 137. Nearly all were found on the surface at or round Palmyra and remain in situ. Of the very few in other places, one (with a Latin version) was found at South Shields, the tombstone of Regina liberta et conjux of a native of Palmyra.

Syriac inscriptions are few. The earliest is that on the sarco- phagus of Queen Saddan (in the Hebrew version, Sadda), perhaps of about a.d. 40, found at Jerusalem. Others were found by Sachau 4 at Edessa, of the 2nd and 3rd centuries, and by Pognon. 6 2. South Semitic. — The South Semitic class of inscriptions comprises the Minaean, Sabaean, Himyaritic and Lihyanitic in South Arabia, the Thamudic and Safaitic in the north and the Abyssinian. A great deal of material has been collected by Halevy, Glaser and Euting, and much valuable work has been done by them and by D. H. Miiller, Hcmmel and Littmann. Many of the texts, however, are still unpublished and the rest is not very accessible (except so far as it has appeared in the C.I.S.), so that South Semitic has been less widely studied than North Semitic.

The successive kingdoms of South Arabia (Yemen) were essenti- ally commercial. Their country was the natural intermediary

1 ed. E. O. Winstedt (Cambr. 1909), p. 154.

2 A view revived by C. Forster, even after Beer, in The Israelitish Authorship of the Sinaitic Inscriptions (London, 1856) and other works.

3 The cross and other Christian symbols often found with the inscriptions have been added later by pilgrims. — C.I.S. ii. I, p. 352.

- *Reise in Syrien (Leipzig, 1883).*

6 Inscriptions sem. de la Syrie, &c. i. (Paris, 1907).

between Asia (India), Africa and Syria, and this position, com- bined with its natural fertility, made the south far more prosper- ous than the north. In language, the two most important peoples, the Minaeans and Sabaeans, differ only dialectically, both writing forms of southern Arabic. The Minaean capital was at Ma'In, about 300 m. N. of Aden and 200 m. from the west coast. Here and in the neighbourhood numerous inscriptions were found, as well as in the north at al-'Ola. 6 Their chronology is much disputed. D. H. Miiller makes the Minaean power contemporary with the Sabaean, but Glaser (with whom Hommel and D. S. Margoliouth agree) contends that the Sabaeans followed the Minaeans, whom they conquered in 820 B.C. Mention is made in a cuneiform text (Annals of Sargon, 715 B.C.) of Ithamar the Sabaean, who must be identical with one (it is not certain which) of the kings of that name mentioned in the Sabaean inscriptions. Their capital was Marib, a little south of Ma'In, and here they appear to have flourished for about a thousand years. In the 1st century a.d., with the establishment of the Roman power in the north, their trade, and consequently their prosperity, began to decline. The rival kingdom of the Himyarites, with its capital at Zafar, then rose to importance, and this in turn was con- quered by the Abyssinians in the 6th century a.d. With the spread of Islam the old Arabic language was supplanted by the northern dialects from which classical Arabic was developed. A peculiarity of the South Arabian inscriptions is that many of them are engraved on bronze tablets. Besides being historically important, they are of great value for the study of early Semitic religion. The gods most often named in Sabaean are "Athtar Wadd and Nakrah, the first being the male counterpart of the Syrian Ashtoreth. The term denoting the priests and priestesses who are devoted to the temple-service is identified by Hommel and others with the Hebrew " Levite."

Closely connected wth South Arabia is Abyssinia. Indeed a considerable number of Sabaean inscriptions have been found at Yeha and Aksum, showing that merchants from Arabia must at some time have formed settlements there. D. H. Miiller 7 thinks that some of these belong to the earliest and others to the latest period of Sabaean power. The inscriptions hitherto found in Ethiopic (the alphabet of which is derived from the Sabaean) date from the 4th

century a.d. onward. They are few in number, but long and of great historical importance. There can be no doubt that exploration, if it were possible, would bring many more to light.

From time to time emigrants from the southern tribes settled in the north of Arabia. Mention has already been made of Minaean inscriptions found at al-'Ola, which is on the great pilgrim road, about 70 m. south of Taima. In recent years a number of others has been collected belonging to the people of Lihyan and dating from about a.d. 250. Nearly related to the Lihyanitic are the Thamudic (so called from the tribe of the Thamud mentioned in them), and the Safaitic, both of which, though found in the north, belong in character to south Arabia and no doubt owe their origin to emigrants from the south. The Thamudic inscriptions, collected by Euting (called Proto- Arabian by Halevy), 8 are carelessly scrawled graffiti very like those of the Sinai peninsula. Their date is uncertain, but they cannot be much earlier than the Safaitic, which resemble them in most respects. These last are called after the mountainous district about 20 m. S.E. of Damascus. The inscriptions are, however, found not in Mount Safa itself but in the desert of al-Harrah to the west and south and in the fertile plain jof ar-Ruhbah to the east. They were first deciphered by Halevy,' whose work has been carried on and completed by Littmann. 10 Their date is again uncertain, since graffiti of this kind give very few facts from which dates can be deduced. Littmann thinks that one of his inscriptions refers to Trajan's campaign of a.d. 106,

6 J. H. Mordtmann, " Beitr. zur Minaischen Epigraphik," in Semitistische Studien, 12 (Weimar, 1897).

7 In Bent's Sacred City of the Ethiopians (London, 1893).

8 Revue semitique (1901). Journ. As. x., xvii., xix. 10 Zw Entsifferung d. Safa-Inschr. (Leipzig, 1901).

Materials 00 which the In- scriptions were re- corded.

and that they all belong to the first three centuries. They are found together with the earlier Greek and Latin graffiti of Roman soldiers and with later Moslem remarks in Kufic. Many of them are not yet

published.

Bibliography — The best introductions are, for North Semitic, Lidzbarski's Handbuch d. nordsemitischen Epigraphik (Weimar, 1898); and G. A. Cooke's Text-book of North-Semitic Inscriptions (Oxford, 1903) ; for South Semitic, Hommel's Sud-arabische Chresto- mathie (Munich, 1893); Alphabets and facsimiles in Berger, Histoire de I'ecriture, 2nd ed. (Paris, 1892). The parts of the Corpus Inscr. Sem. published up to 1910 are: pars i., torn, i., and torn, ii., fascc. 1-3, 1 881-1908 (Phoenician); pars ii., torn, i., 1889-1902 (Aramaic with Nabataean), torn, ii., fasc. i., 1907 (Sinaitic) ; pars iv., torn i., fascc. 1-4, 1889-1908 (Himyaritic, including Minaean and Sabaean). In all these parts a full bibliography is given. For Palmyrene see de Vogue's Syrie Cenlrale (Paris, 1868-1877). Works on special departments of the subject have already been mentioned in the notes. (A. Cv.)

II. Indian Inscriptions The inscriptions of India are extremely numerous, and are found, on stone and other substances, in a great variety of circum- stances. They were mostly recorded by incision. But we have a few, referable to the 2nd or 3rd century B.C., which were written with ink on earthenware, and some others, of later times, recorded by paint, — one on a rock, the others on the walls of Buddhist cave- temples. Those, however, were exceptional methods; and equally so was the process of casting, with the result of bring- ing the letters out in relief, of which we know at present only one instance, — the Sohgaura plate, mentioned again below. The Mussulman inscriptions on stone were, it is believed, nearly always carved in relief ; and various Hindu inscriptions were done in the same way in the Mussulman period: but only one instance of a stone record prepared in that manner can as yet be cited for the earlier period; it is an inscription on the pedestal of an image of Buddha, of the Gupta period, found in excavations made not long ago at Sarnath.

Amongst the inscriptions on metal there is one that stands out by itself, in respect of the peculiarity of having been incised on iron: it is the short poem, constituting the epitaph of the Gupta king Chandragupta II., which was composed in or about A.D. 415, and was placed oh record on the iron column, measuring 23 ft. 8 in. in height, and estimated to weigh more than six tons, which stands at Meharauli near Delhi. We have a very small number of short Buddhist votive inscriptions on gold and silver, a larger number of records of various kinds on brass, and a larger number still on bronze. The last-mentioned consist chiefly of seals and stamps for

making seals. And one of these seal-stamps, belonging to about the commencement of the Christian era, is of particular interest in presenting its legend in Greek characters as well as in the two Indian alphabets which were then in use. For the period, indeed, to which it belongs, there is nothing peculiar in the use of the Greek characters; those characters were freely used on the coins of India and adjacent territories, sometimes along with the native characters, sometimes alone, from about 325 B.C. to the first quarter of the 2nd century A.D.: but this seal-stamp, and the coins of the Kshaharata king Nahapana (a.d. 78 to about 125), furnish the only citable good instances of the use of the three alphabets all together. For the most part, however, the known inscriptions on metal were placed on sheets of copper, ranging in size from about 25 in. by if in. in the case of the Sohgaura plate to as much as about 2 ft. 6 in. square in the case of a record of 46 B.C. obtained at Sue-Vihar in the neighbour- hood of Bahawalpur in the Punjab. Some of these records on copper were commemorative and dedicatory, and were deposited inside the erections — relic-mounds, and, in the case of the Su6- Yihar plate, a tower — to which they belonged. The usual copper record, however, was a donative charter, in fact a title- deed, and passed as soon as it was issued into private personal custody; and many of the known records of this class have come to notice through being produced by the modern possessors of them before official authorities, in the expectation of establishing privileges which (it is hardly necessary to say) have long since

ceased to exist through the lapse of time, the dying out of families of original holders, rights of conquest, and the many changes of government that have taken place: but others have been found buried in fields, and hidden in the walls and foundations of build- ings. The plates on which these inscriptions were incised vary greatly in the number of the leaves, in the size and shape of them, and in the arrangement of the records on them; partly, of course, according to the lengths of individual records, but also according to particular customs and fashions prevalent in different parts of the country and in different periods of time. In some cases a single plate was used ; and it was inscribed sometimes on only one side of it, sometimes on both. More often, however, more plates than one were used, and were connected together by soldered rings; and the number ranges up to as many as thirty-one in the case of a charter issued by the Choja king Rajendra Chola I. in the period a.d. ion to 1037. It was customary that such of the records on copper as were donative charters should be authenticated. This was sometimes done by incising on the plates what purports to be more or less an autograph

signature of the king or prince from whom a charter emanated. More usually, however, it was effected by attaching a copper or bronze reproduction of the royal seal to the ring or to one of the rings on which the plates were strung; and this practice has given us another large and highly interesting series of Indian seals, some of them of an extremely elaborate nature. In this class of records we have a real curiosity in a charter issued in a.d. 1272 by Ramachandra, one of the Yadava kings of Devagiri: this record is on three plates, each measuring about 1 ft. 3 in. in width by 1 ft. 85 in. in height, which are so massive as to weigh 59 lb. 2 oz.; and the weight of the ring on which they were strung, and of an image of Garuda which was secured to it by another ring, is n lb. 12 oz. : thus, the total weight of this title-deed, which conveyed a village to fifty-seven Brahmans, is no less than 70 lb. 14 oz.; appreciably more than half a hundredweight.

Amongst substances other than metal we can cite only one instance in which crystal was used; this material was evidently found too hard for any general use in the inscriptional line: the solitary instance is the case of a short record found in the remains of a Buddhist stupa or relic-mound at Bhattiprolu in the Kistna district, Madras. In various parts of India there are found in large numbers small tablets of clay prepared from stamps, sometimes baked into terfa-cotta, sometimes left to harden naturally. Objects of this class were largely used as votive tablets, especially by the Buddhists; and their tablets usually present the so-called Buddhist formula or creed: " Of those conditions which spring from a cause, Tathagata (Buddha) has declared the cause and the suppression of them; it is of such matters that he, the great ascetic, discourses ": but others, from Sunet in the Ludhiana district, Punjab, show by the legends on them that the Saivas and Vaishnavas also habitually made pious offerings of this kind on occasions of visiting sacred places. Recent explorations, however, in the Gorakhpur and Muzaffarpur districts have resulted in the discovery, in this class of records, of great numbers of clay seals bearing various inscriptions, which had been attached to documents sent to and fro between administrative offices, both royal and municipal, between religious establishments, and between private indi- viduals: and amongst these we have seals of the monastery at Kusinara, one of the places at which the eight original portions of the corporeal relics of Buddha were enshrined in relic-mounds, and also a seal-stamp used for making seals of the monastery at Vethadipa, another of those places. And from Kathiawar weˆ have a similar seal-stamp which describes itself as the property " of the prince and commander-in-chief Pushyena, son of

the illustrious prince Ahivarman, whose royal pedigree extends back unbroken to Jayadratha." There are no indications that the use of brick for inscriptional purposes was ever at all general in India, as it was in some other eastern lands: but there have been found in the Ghaztpur district numerous bricks bearing the inscription " the glorious Kumaragupta," with reference to either the first or the second Gupta king of that name, of the 5th I century a.d.; in the Gorakhpur district there have been found

so vala" able.

brick tablets bearing Buddhist texts, one of which is a version in Sanskrit of a short sermon preached by Buddha; and from the Jaunpur district we have a brick tablet bearing an inscription which registers a mortgage, made in A.d. 1217, of some lands as security for a loan. Inscribed earthenware relic-recsptacles have been found in the Bhopal state: donative earthenware jars, bearing inscriptions, have been obtained near Charsadda in the North-West Frontier province: and from KathiiLwar we have a piece of earthenware, apparently a fragment of a huge pot, bearing an inscription which presents a date in a.d. 566-67 and the name of "the glorious Guhasena," one of the Maitraka princes of ValabhI. For the great bulk of the inscriptions, however, stone was used: but limitation of space prevents us from entering into any details here, and only permits us to say that in this class the records are found all over India on rocks, on isolated monolith columns and pillars, of which some were erected simply to bear the records that were published on them, others were placed in front of temples as flagstaff s of the gods, and others were set up as pillars of victory in battle; on relic-receptacles hidden away in the interiors of Buddhist stupas; on external structural parts of stupas; on facades, walls, and other parts of caves; on pedestals and other parts of images and statues, sometimes of colossal size; on moulds for making seals; on walls, beams, pillars, pilasters, and other parts of temples; and on specially prepared slabs and tablets, sometimes built into the walls of temples and other erections, sometimes set up inside temples or in the courtyards of them, or in con- spicuous places in village-sites and fields, where they have occasionally in the course of time become buried.

The inscriptional records of India which have thus come down

Reasons to us ^° not » as ˆ ar as tnev are known at present, why the pretend to the antiquity of the Greek inscriptions of loscrip- the Hellenic world; much less to that of the inscrip- masare tions of Egypt and Assyria. But they are no less important; since we are dependent on them for almost all our knowledge of the ancient history of the country. The primary reason for this is that the ancient Hindus, though by no means altogether destitute of the historical instinct, were not writers of historical books. In some of the Puraifas, indeed, they have given us chapters which purport to present the succes- sion of their kings from the commencement of the present age, the Kaliyuga, in 3102 B;c: but the chronological details of those chapters disclose the fault of treating contemporaneous dynasties, belonging to different parts of India, as successive dynasties ruling over one and the same territory; with the result that they would place more than three centuries in the future from the present time the great Gupta kings who reigned in Northern India from a.d. 320 to about 530. They have given us, for Kashmir the Rajataramgim, the first eight cantos of which, written by Kalhana in a.d. 1148-49, purport to present the general history of that country, with occasional items relating to India itself, from 2448 B.C., and to give the exact length, even to months and days, of the reign of each king of Kashmir from 1×82 b.c: but, while we may accept Kalhana as fairly correct for his own time and for the preceding century or so, an examina- tion of the details of his work, quickly exposes its imaginative character and its unreliability for any earlier period: notably, he places towards the close of the period 2448 to 1182 B.C. the great Maurya king Asoka, whose real initial date was 264 B.C.; and he was obliged to allot to one king, Ranaditya I., a reign of three centuries (a.d. 222 to 522, as placed by him) simply in order to save his own chronology. They have given us historical romances, such as the Harshacharita of Bana, written in the 7th century, the Vikramaiikadewcharila of Bilhana, written about the beginning of the 1 2th century, and the Tamil poems, the Kalavali, the KaliiigaUu-Parayi, and the Vikrama- Cholan- Ul&, the first of which may be of somewhat earlier date than BSna's work, while the second and third are of much the same time with Bilhana's: but, while these present some charming reading in the poetical line, with much of interest, and certainly a fair amount of important matter, they give us no dates, and so no means without extraneous help of applying the

information that is deducible from them. Again, they have given us, especially in Southern India, a certain amount of historical details in

the introductions and colophons of their literary works; and here they have often furnished dates which give a practical shape to their statements: but we quickly find that the historical matter is introduced quite incidentally, to magnify the importance of the authors themselves rather than to teach us anything about their patrons, and is not handled with any particular care and fulness; and it would be but a sketchy and imperfect history, and one relating to only a limited and comparatively late period, that we could piece together even from these more precise sources. The ancient Hindus, in short, have not bequeathed to us anything that can in any way compare with the historical writings of their Greek and Roman contemporaries. They have not even given us anything like the Dipavamsa of Ceylon, which, while it contains a certain amount of fabulous matter, can be recognized as presenting a real and reliable historical account of that island, taken from records written up during the progress to the events themselves, from at any rate the time of Asoka to about a.d. 350; or like the Mahdvamsa, which, commenting on and amplifying the details of the Dipavamsa, takes up a similar account from the end of the period covered by that work. Even the Greek notices of India, commencing with the accounts of the Asiatic campaign of Alexander the Great, have told us more about its political history and geography during the earlier times than have the Hindus themselves: and in fact, in mentioning Sandrokottos, i.e. Chandragupta, the grandfather of Asoka, and in furnishing details which fix his initial date closely about 320 B.C., the Greeks gave us the first means of making a start towards arranging the chronology of India on accurate lines. It is in these circumstances, in the absence of any indigenous historical writings of a plain, straightforward, and authentic nature, that the inscriptions of India are of such great value. They are supplemented — and to an important extent for at any rate the period from the end of Asoka's reign in 227 B.C. to the com- mencement of the reign of Kanishka in 58 B.C., and again from about a century later to the rise of the Gupta dynasty in a.d. 320 — by the numismatic remains. But the coins of India present no dates until nearly the end of the 2nd century A.D.; the case of Parthia, which has yielded dated coins from only 38 B.C., illustrates well the difficulty of arranging undated coins in chronological order even when the assistance of historical books is available; and what we may deduce from the coins of India is still to be put into a final shape in accordance with what we can determine from the inscriptions. In short, the inscriptions of India are the only sure grounds of historical results in every line of research connected with its ancient past; they regulate everything that we can learn from coins, architecture, art, literature, tradition,

or any other source.

That is one reason why the inscriptions of India are so valu- able; 1 they fill the void caused by the absence of historical books. Another reason is found in the great number of them and the wide area that is covered by them. They come from all parts of the country: from Shahbazgarhi in the north, in the Yusufzai subdivision of the Peshawar district, to the ancient PSndya territory in the extreme south of the peninsula; and from Assam in the east to Kathiawar in the west. For the time anterior to about a.d. 400, we already have available in published form, more or less complete, the contents of between 1100 and 1200 records, large and small; and the explorations of the Archaeological Department are constantly bringing to light) particularly from underground sites, more materials for that period. For the time onwards from that point, we have similarly available the contents of some 10,000 or 11,000 records of Southern India, and of at any rate between 700 and 800 records of Northern India where racial antagonism came more into play and worked more destruction of Hindu remains than in the south.

Another reason is found in the fact that from the first century B.C. the inscriptions are for the most part specifically dated: some in various eras the nature and application of which are now thoroughly well understood, often with also a mention of the

year of the twelve-years or of the sixty-years cycle of the planet Jupiter; others in the regnal years of kings whose periods are now well fixed. And, in addition to usually stating the month and the day along with the year, the inscriptions sometimes give, under the influence of Hindu astrology, other details so exact that we can determine, even to the actual hour, the occurrence of the event registered by a particular record.

A final reason is found in the precise nature of the inscriptions. A certain proportion of them consists of plain statements of events, — recitals of the pedigrees and achievements of kings, records of the carrying out of public works, epitaphs of kings, heroes, and saints, compacts of political alliance, and so on; and some of these present,

in fact, short historical compositions which illustrate well what the ancient Hindus might have done if they had felt any special call to write plain and veracious chronicles on matter-of-fact lines. But we are indebted for the great bulk of the inscriptions, not to any historical instinct, but to the religious side of the Hindu character, and to the constant desire of the Hindus to make donations on every possible occasion. The inscriptions devoted simply to the propagation of morality and religion are not very numerous: the most notable ones in this class are the edicts of Asoka, which we shall notice again farther on. The general object of the inscriptions was to register gifts and endowments, made sometimes to private individuals but more usually to gods, to priests on behalf of temples and charitable institutions, and to religious communities. And, as the result of this, in the vast majority of the inscriptional remains we have a mass of title-deeds of real property, and of certificates of the right to duties, taxes, fees, perquisites, and other privileges. Now, the essential part of the records. was of course the speci- fication of the details of the donor, of the donee, and of the donation. And we have to bear in mind that not only are the donative records by far the most abundant of all, but also, among them, by far the most numerous are those which we may call the records of royal donations; by which we mean grants that were made either by the kings themselves, or by the great feudatory nobles, or by provincial governors and other high officials who had the royal authority to alienate state lands and to assign allotments from the state revenues: also, that many of them register, not simply the gift of small holdings, but grants of entire villages, and large and permanent assignments from the public revenues. It is to these facts that we are indebted for the great value of the records from the historical point of view. The donor of state lands or of an assignment from the public revenues must show his authority for his acts. A provincial governor or other high official must specify his own rank and territorial juris- diction, and name the king under whom he holds office. A great feudatory noble will often give a similar reference to his para- mount sovereign, in addition to making his own position clear. And it is neither inconsistent with the dignity of a king, nor unusual, for something to be stated about his pedigree in charters and patents issued by him or in his name. The records give from very early times a certain amount of genealogical informa- tion. More and more information of that kind was added as time went on. The recital of events was introduced, to magnify the glory and importance of the donors, and sometimes to com- memorate the achievements of recipients. And it was thus, not with the express object of recording history, but in order to intensify the importance of everything connected with religion and to secure grantees in the*

possession of properties conveyed to them, that there was gradually accumulated almost the whole of the great mass of inscriptional records upon which we are so dependent for our knowledge of the ancient history of India in all its branches.

Coming now to a survey of the inscriptions themselves, we must premise that India is divided, from the historical point of view, though not so markedly in some other respects, into the in" tw0 well-defined parts, Northern and Southern. A aaiptioas. classical name of Northern India is Aryavarta, " the abodeˆf the Aryas, the excellent or noble people," Another name, whkh figures both in literature and in the inscrip- tions, is Uttarapatha, " the path of the north, the northern road."*

And, as a classical name of Southern India answering to that we have Dakshinapatha, " the path of the south, the southern road," from the first component of which name comes our modern term Deccan, Dekkan, or Dekhart. Sanskrit literature names as the dividing-line between Aryavarta or the Uttara- patha and the Dakshinapatha, i.e. between Northern and Southern India, sometimes the Vindhya mountains, sometimes the river Nerbudda (Narmada, Narbada) which, flowing close along the south of the Vindhya range, empties itself into the gulf of Cambay near Broach, in Gujarat, Bombay. The river seems, on the whole, to furnish the better dividing- line of the two. But it does not reach, any more than the range exactly extends, right across India from sea to sea. And, to complete the dividing-line beyond the sources of the Narbada, which are in the Maikal range and close to the Amarkantak hill in the Rewa State, Baghelkhand, we have to follow some such course as first the Maniarl river, from its sources, which are in that same neighbourhood but on the south of the Maikal range, to the point where, after it has joined the Seonath, the united rivers flow into the Mahanadi, near Seori-Narayan in the Bilaspur. district, Central Provinces, and then the Mahanadi itself, which flows into the bay of Bengal near Cuttack in Orissa. Even so, however, we have only a somewhat rough dividing-line between the historical Northern and Southern India; and the distinction must not be understood too strictly in connexion with the territories lying close on the north and the south of the line sketched above. In Western India, Kathiawar and all the portions of Gujarat above Broach lie to the north of the Narbada; but from the palaeographic point of view, if not so much from the historical, they belong essentially to Southern India. Our modern Central India lies entirely in Northern India, but has various palaeographic connexions with Southern India. Our Central Provincc.3 extend in the Saugar district into Northern India; and

that portion of them presents in ancient times both northern and southern characteristics. Eastern India may be defined as consisting of Bengal, with Orissa and Assam: it belongs to Northern India.

The inscriptional remains of India, as known at present, practically begin with the records of Asoka, the great Maurya king of Northern India, — grandson of that king Chandragupta whose name was written by the Greeks as Sandrokottos, — who reigned 264 to 227 B.C. The state of the alphabets, indeed, in the time of Asoka renders it certain that the art of writing must have been practised in India for a long while before his period; and it gives ‘ us every reason to hope that systematic exploration, especially of buried sites, will eventually result in the discovery of records framed by some of his predecessors or by their subjects. But those discoveries have still to be made; and matters stand just now as follows. From before the time of Asoka we have an inscription on a relic-vase from a stiipa or relic-mound at Piprahwa in the north-east corner of the Basti district, United Provinces, which preserves the memory of the slaughtered kinsmen of Buddha, the Sakyas of Kapilavastu according to the subsequent traditional nomenclature. We may perhaps place before his time the record on the Sohgaura plate, from the Gorakhpur district, United Provinces, which notifies the establishment of two public storehouses at a junction of three great highways of vehicular traffic to meet any emergent needs of persons using these roads. And we may possibly decide hereafter to refer to the same period a few other records which are not at present regarded as being quite so early. But, practically, the known inscriptions of India begin with the records of that king who calls himself i» them ” the king Devanarhpiya-Piyadassi, the Beloved of the Gods, He of Gracious Mien,” but who is best known as Asoka by the name given to him in the literature of India and Ceylon and in an inscription of a.d. 150 at Junagadh (Junagarh) in Kathiawar. From his time onwards we have records from all parts in con- stantly increasing numbers, particularly during the earlier periods, from caves, rock-cut temples, and Buddhist stupas. Many of them, however, are of only a dedicatory nature, and, valuable as they are for purposes of religion, geography, and other miscellaneous lines of research, are not very helpful in the

historical line. We are interested here chiefly in the historical

records; and we can notice only the most prominent ones even among them.

Of this king Asoka we have now thirty-five different records, some of them in various recensions. Amongst them, the most famous ones are the seven pillar-edicts and the fourteen rock- edicts, found in various versions, and in a more or less complete state, at different places from Shahbazgarhi in the Yusufzai country in the extreme north-west, to Radhia, Mathia, and Rampurwa in the Champaran district, Bengal, at Dhauli in the Cuttack district of Orissa, at Jaugada in the Garijam district, Madras, at Girnar (Junagadh) in Kathiawar, and even at Sopara in the Thana district, Bombay. These edicts were thus published in conspicuous positions in or near towns, or close to highways frequented by travellers and traders, or in the neighbourhood of sacred places visited by pilgrims, so that they might be freely seen and perused. And the object of them was to proclaim the firm determination of Asoka to govern his realm righteously and kindly in accordance with the duty of pious kings, and with considerateness for even religious beliefs other than the Brahmani- cal faith which he himself at first professed, and to acquaint his subjects with certain measures that he had taken to that end, and to explain to them how they might co-operate with him in his objects. But, in addition to mentioning certain contem- poraneous foreign kings, Antiochus II. (Theos) of Syria, Ptolemy Philadelphus of Egypt, Antigonus Gonatas of Macedonia, Magas of Cyrene, and Alexander II. of Epirus, they yield items of internal history, in detailing some of Asoka's administrative arrangements; in locating the capital of his empire at Pataliputra (Patna), and seats of viceroys at Ujjeni (Ujjain) and Takhasila. (Taxila); in giving the names of some of the leading peoples of India, particularly the Cholas, the Pandyas, and the Andhras; and in recording the memorable conquest of the Kalinga country, the attendant miseries of which first directed the thoughts of the king to religion and to solicitude for the welfare of all his subjects. Another noteworthy record of Asoka is that notification, contain- ing his Last Edict, his dying speech, issued by local officials just after his death, which is extant in various recensions at Sahasrim, Rupnath, and Bairat in Northern India, and at Brahmagiri, Siddapura, and Jatinga-Ramesvara in Mysore. Some three years before the end of his long reign of thirty-seven years, Asoka became a convert to Buddhism, and was admitted as an Upasaka or lay-worshipper. Eventually, he formally joined the Buddhist order; and, following a not infrequent custom of ancient Indian kings, he abdicated, took the vows of a monk, and withdrew to spend his remaining days in religious retire- ment in a cave-

dwelling on Suvarnagiri (Songlr), one of the hills surrounding the ancient city of Girivraja, belowRajagriha (Rajglr), in the Patna district in Behar. And there, about a year later, in his last moments, he delivered the address incorpor- ated in this notification, proclaiming as the only true religion that which had been promulgated by Buddha, and expanding the topic of the last words of that great teacher: "Work out your salvation by diligence!" This record, it may be added, is also of interest because, whereas such of the other known records of Asoka as are dated at all are dated according to the number of years elapsed after his anointment to the sovereignty, it is dated 256 years after the death of Buddha, which event took place in 483 B.C..

For the two centuries or nearly so next after the end of the reign of Asoka, we have chiefly a large number of short inscrip- tions which are of much value in miscellaneous lines of research — palaeography, geography, religion, and so on. But historical records are by ho means wanting; and we may mention in particular the fallowing. From the caves in the Nagarjuni Hills in the Gaya district, Bengal, we have (along with three of the inscriptions of Asoka himself) three records of a king Dasaratha who, according to the Vishnu-Purdna, was a grandson of Asoka. From the stupa at Bharaut in the Nagod state, Central India, we have a record which proves the existence of the dynasty of the Sunga kings, for whom the Puranas, placing them next after the line of Chandragupta and Asoka, indicate

the period 183 to 71 B.C. Two of the records from the stupa at Bhattiprolu i n the Kistna district, Madras, give us a king of those parts, reigning about 200 B.C., whose name appears both as Kubiraka and as Khubiraka. From Besnagar in the Gwalior state we have an inscription, referable to the period 175 to 135 B.C., which mentions a king of Central India, by name Bhagab- hadra, and also mentions, as his contemporary, one of the Greek kings of the Punjab, Antalkidas, whose name is familiar from his coins in the form Antialkidas. From the Hathigumpha cave near Cuttack, in Orissa, we have a record, to be placed about 140 B.C., of king Kharavela, a member of a dynasty which reigned in that part of India. From a cave at Pabhosa in the Allahabad district, United Provinces, we have two records which make known to us a short succession of kings of Adhi- chatra, otherwise known as Ahichchhattra. From a cave at the Nanaghat Pass in the Poona district, Bombay, we have a record of queen Nayanika, wife of one of the great Satavahana- Satakanji kings of the Deccan. And from the stupa No. 1 at Safichi in the Bhopal state, Central India, we have a record of a king SrI-

Satakarrii, belonging to perhaps another branch of the same great stock.

The historical records become more numerous from the time of the Kushan king Kanishka or Kanishka, who began to reign in 58 B.C., and founded the so-called Vikrama era, the great historical era of Northern India, beginning in that year. 1 For the period of him and his immediate successors, Vasishka, Huvishka and Vasudeva, we have now between seventy and eighty inscriptions, ranging from 54 B.C. to a.d. 42, and disclosing a sway which reached at its height from Bengal to Kabul: we are indebted for some of these to the Buddhists, in connexion with whose faith the memory of Kanishka was preserved by tradition, but for most of them to the Jains, who seem to have been at that time the more numerous sect in the central part of his dominions.

The dynasty of Kanishka was succeeded by another foreign ruler, Gondophernes, popularly known as Gondophares, whose coins indicate that, in addition to a large part of north-western India and Sind, his dominions included Kabul, Kandahar, and Seistan. This king is well known to Christian tradition, in con- nexion with the mission of St Thomas the Apostle to the East. And the tradition is substantially supported by an inscription from Takht-i-Bahai in the Yusufzai country on the north-west frontier, which, like some of his coins, mentions him as Guduphara or Gunduphara, and proves that he was reigning there in a.d. 47. Gondophernes was followed by the Kadphises kings, belonging to another branch of the Kushan tribe, who perhaps extended their sway farther into India, as far at least as Mathura (Muttra), and reigned for about three-quarters of a century. For their period, and in fact for the whole time to the rise of the Guptas in a.d. 320 we have as yet but scanty help from the inscriptions in respect of the political history of Northern India: we are mostly dependent on the coins, which tend to indicate that that part of India was then broken up into a number of small sove- reignties and tribal governments. An inscription, however, from Panjtar in the Yusufzai territory mentions, without giving his name, a Kushan king whose dominion included that territory in a.d. 66. And an inscription of a.d. 242 from Mathura has been understood to indicate that some descendant of the same stock was then reigning there. The inscriptional records for that period belong chiefly to Southern India.

Meanwhile, however, in the south-west corner of Northern _ India, namely in Kathiawar, there arose another foreign king, apparently of Parthian extraction, by name Nahapana, described in his records,

whether by a family name or by a tribal appella- tion, as a Chhaharata or Kshaharata, in whom we have the

1 It may be remarked that there are about twelve different views regarding the date of Kanishka and the origin of the Vikrama era. Some writers hold that Kanishka began to reign in a.d. 78: one writer would place his initial date about A.D. 123: others would place it in A.D. 278. The view maintained by the present writer was held at one time by Sir A. Cunningham; and, as some others have already begun to recognize, evidence is now steadily accumula- ting in support of the correctness of it.

founder of the so-called Saka era, the principal era of Southern India, beginning in a.d. 78: in respect of him we learn from the Periplus of the Erythraean Sea that he was reigning between a.d. 80 and 89, and from inscriptions that he was still reigning in A.d. 120 and 124: at the latter time, his dominions included Nasik and other territories on the south of the Narbada; and the Periplus names as his capital a town which it calls Minnagar, and which Ptolemy would locate in such a manner as to suggest that it may be identified with the modern Dohad in the Pafich Mahals district of Gujarat, Bombay. Nahapana was over- thrown, and his family was entirely wiped out, soon after a.d. 125, by the great Satavahana king Gautamiputra-Sri-Satakarni, who thereby recovered the territories on the south of the Nar- bada. On the north of that river, however, he was followed by a line of kings founded by his viceroy Chashtana, son of Ghsamotika, to whom Ptolemy, mentioning him as TiastanSs, assigns Ujjain as his capital: these names, again, show a foreign origin; but, from the time of his son Jayadaman, the descend- ants of Chashtana became Hinduized, and mostly bore purely Indian appellations. The coins show that the descendants of Chashtana ruled till about a.d. 388, when they were overthrown by the great Gupta dynasty of Northern India. Only a few of their inscriptional records have been discovered: but amongst them a very noteworthy one is the Junagadh (Junagarh) in- scription of Chashtana's grandson, Rudradaman, bearing a date in a.d. 150; it is remarkable as being the earliest known long inscription written entirely in Sanskrit.

From Southern India we have, at Nasik, inscriptions of the

Satavahana king Gautamiputra-Sri-Satakarni, mentioned just above, and of his son Vasisthlputra-Sri-Pulumayi, and of another king of that line named Gautamlputra-Srl-Yajfia-Satakarrii; and other records of the last-mentioned king come from Kanheri near Bombay, and from the Kistna district, Madras, and testify to the wide extent of the dominions of the line to which he be- longed. The records of this king carry us on to the opening years of the 3rd century, soon after which time, in those parts at any rate, the power of the Satavahana kings came to an end. And we have next, also from Nasik, an inscription of an Abhira king named Isvarasena, son of Sivadatta; in this last-mentioned person we probably have the founder of the so-called Kalachuri or Chedi era, beginning in a.d. 248 or 249, which we trace in Western India for some centuries before the time when it was transferred to, or revived in, Central India, and was invested with its later appellation: we trace it notably in the records of a line of kings who called themselves Traikutakas, apparently from Trikuta as the ancient name of the great mountain Harischan- dragad in the Western Ghauts, in the Ahmadnagar district.

We can, of course, mention in this account only the most prominent of the inscriptional records. Keeping for the present to Southern India, we have from Banawasi in the North Kanara district, Bombay, and from Malavalji in the Shimoga district, Mysore, two inscriptions of a king Harit putra-Satakarni of the Vinhukadda-Chutu family, reigning at Vaijayanti, i.e. Banawasi, which disclose the existence there of another branch, apparently known as the Chutu family and having its origin at a place named Vishnugarta, of the great stock to which the Satavahana- Satakarnis belonged. And another Malavalli inscription, of a king Siva-Skandavarman, shows that the Satakarnis of that locality were followed by a line of kings known as the Kadambas, who left descendants who continued to rule until about a.d. 650. From the other side of Southern India, an inscription from the stiipa at Jaggayyapeta in the Kistna district, Madras, referable to the 3rd century a.d., gives us a king Madhariputra-Sri-Vlra-Purushadatta, of the race of Ikshvaku. And some Prakrit copperplate inscriptions from the same district, referable to the 4th century, disclose a line of Pallava kings at KanchI, the modern Conjeeveram near Madras, whose descendants, from about a.d. 550, are well known from the later records.

Reverting to Northern India, we have from the extreme north-west a few inscriptions dated in the era of 58 B.C. which carry us on to a.d. 322. The tale is then taken up chiefly by the records of the great Gupta kings of Pataliputra, i.e. Patna, who

rose to power in a.d. 320, and gradually extended their sway until it assumed dimensions almost commensurate with those of Asoka and Kanishka: the records of this series are somewhat numerous; and a very noteworthy one amongst them is the inscription of Samudragupta, incised at some time about a.d. 375 on one of the pillars of Asoka now standing at Allahabad, which gives us a wide insight into the political divisions, with their contemporaneous rulers, of both Northern and Southern India: it is also interesting because it, or another record of the same king at Eran in the Saugar district, Central Provinces, marks the commencement of the habitual use of Sanskrit for inscrip- tional purposes. The inscriptions of the Gupta series run on to about a.d. 530. But the power of the dynasty had by that time become much curtailed, largely owing to an irruption of the Huns under Toramana and Mihirakula, who established them- selves at Sialkot, the ancient Sakala, in the Punjab. We have inscriptional records of these two persons, not only from Kura in the Salt Range, not very far from Sialkot, but also from Eran. and from Gwalior. And next after these we have inscriptions from Mandasor in Malwa, notably on two great monolith pillars of victory, of a king Vishnuvardhana-Yasodharman, which show that he overthrew Mihirakula shortly before a.d. 532, and, describing him as subjugating territories to which not even the Guptas and the Huns had been able to penetrate, indicate that he in his turn established for a while another great para- mount sovereignty in Northern India.

We have thus brought our survey of the inscriptions of India down to the 6th century a.d. There then arose various dynasties in different parts of the country: in Northern India, i.i Kathi- awar, the Maitrakas of Valabhi; at Kanauj, the Maukharis, who, after no great lapse of time, were followed by the line to which belonged the great Harshavardhana, " the warlike lord (as the southern records style him) of all the region of the north;" and, in Behar, another line of Guptas, usually known as the Guptas of Magadha: in Southern India, the Chalukyas, who, holding about a.d. 625 the whole northern part of Southern India from sea to sea, then split up into two branches, the Western Chalukyas of Badami in the Bijapur district, Bombay, and the Eastern Chalukyas of Vengt in the Godavari district, Madras; and, below them, the successors of the original Pallavas of KanchI (Conjeeveram). These all had their time, and passed away. And they and their successors have left us so great a wealth of inscriptional records that no further detailed account can be attempted within the limits available here. We must pass on to a few brief remarks about the language of the records and the characters in which they were written.

The inscriptions of Asoka present two alphabets, which differ radically and widely: one of them is known as the Brahmi; the other, as the Kharoshthi or Kharoshtrl. For the decipher- . . .

ment of the Brahmi alphabet we are indebted to James bets' 1 " Prinsep, who determined the value of practically all the letters between 1834 and 1837. The decipherment of the Kharoshthi alphabet was a more difficult and a longer task: it was virtually finished, some twenty years later, by the united efforts of C. Masson, Prinsep, C. L. Lassen, H. H. Wilson, E. Norris, Sir A. Cunningham, and John Dowson ; but there are still a few points of detail in respect of which finality has not been attained.

The Kharoshthi script was written from right to left, and it undeniably of Semitic origin; and the theory about it, based on the known fact that the valley of the Indus was a Persian satrapy in the time of Darius (521-485 B.C.), is that the Aramaic script was then introduced into that territory, and that the Kharoshthi is an adaptation of it. Except in a few intrusive cases, the use of the Kharoshthi in India was limited to the valley of the Indus, and to the Punjab as defined on the south by the territory watered by the Bias (Beas) arid, the Satlaj (Sutlej) : and the eastern locality of the meeting of the two alphabets is marked by coins bearing Kharoshthi and Brahmi legends which come from the districts of the Jalandhar (Jullundhur) division, and by two short rock-cut records, each presented in both the alphabets, at Pathyar and Kanhiara in the Kangra valley. Outside India, this script was notably current in Afghanistan; and documents written in it have in recent years been found in Chinese Turkestan. In India it continued in use, as far as our present knowledge goes, down to A.D. 343.

The Brahmi alphabet, written from left to right, belonged to the remainder of India; but it must also have been current in learned circles even in the territory where popular usage favoured the other script. Various views about its origin have been advanced : amongst

them is the theory that it was derived from the oldest north-Semitic alphabet, which prevailed from Phoenicia to Mesopotamia, and may, it is held, have been introduced into India by traders at some time

about 800 B.C. It is, however, admitted that the earliest known form of the Brahml is a script framed by Brahmans for writing Sanskrit. Also, the theory is largely based on a coin from Eran, in the Saugar district, Central Provinces, presenting a Brahml legend running retrograde from right to left ; from which it is inferred that that was the original direction of this writing, and that the script eventually assumed the other direction, which alone it has in the inscriptions, after passing, like the Greek, through a stage in which the lines were written in both directions alternately. But we can cite many instances in which ancient die-sinkers were careless, wholly or partially, in the matter of reversing the legends on their dies, with the result that not only syllables frequently, but sometimes entire words, stand in reverse on the coins themselves; moreover, the Eran coin, being one of the earliest known Indian coins bearing a legend at all, may quite possibly belong to a period before the time when the desirability of working in reverse on the dies presented itself to the Indian die-sinkers. In all the circumstances, the evidence of the Eran coin cannot be regarded as conclusive; and we require some inscription on stone, or at least some longer record on metal than a brief legend of five syllables, to satisfy us that the Brahml writing ever had a direction different from that which it has in the inscriptions. Further, if there is any radical connexion between the Brahml and the Semitic alphabet indicated above, so many curious and apparently capricious changes must have been made, in adapting that alphabet, that it would seem more probable that the two scripts were derived from a joint original source. In view of the high state of civilization to which the Hindus had evidently attained even before the time of Chandragupta, the grandfather of Asoka, it must still be regarded as possible that they were the independent inventors of that which was emphatically their national alphabet. The Brahml alphabet is the parent of all the modern Hindu scripts, including on one side the Nagari or Devanagari, and on the other the widely dissimilar rounded forms of the Kanarese, Tamil, Telugu, and other southern alphabets; and the inscriptions enable us to trace clearly the gradual development of all the modern forms.

The great classical Indian language, Sanskrit, is not found in any inscriptional records of the earliest times. It is not, however, to be , supposed therefrom that the use and cultivation of

" Sanskrit ever lay dormant, and that there was a revival

of this language when it did eventually come to be used in the inscriptions; the case simply is that, during the earlier periods, Sanskrit was not known much, if at all, outside the Brahmanical and

other literary and priestly circles, and so was not recognized as a suitable medium for the notifications which were put on record in the inscriptions for the information of the people at large.

In Northern India, the inscriptions of the period before 58 B.C. present various early Prakrits, i.e. vernaculars more or less derived from Sanskrit or brought into a line with it. From 58 B.C., however, the influence of Sanskrit began to manifest itself in the inscriptions, with the result that the records present from that time a language which is conveniently known as the mixed dialect, meaning neither exactly Prakrit nor exactly Sanskrit, but Prakrit with an inter-mixture of Sanskrit terminations and some other features; and we have, in fact, from Mathura (Muttra), a locality which has yielded interesting remains in various directions, a short Brahmanical inscription of 33 B.C. which was written wholly in Sanskrit. The mixed dialect appears to have been the general one for inscriptional purposes in Northern India until about A.D. 320. But a remarkable exception is found in the inscription of Rudra- daman, dated in a.d. 150, at Junagadh in Kathiawar (mentioned on a preceding page), which is a somewhat lengthy record composed in thoroughly good literary Sanskrit prose. Also, the extant inscrip- tions of the descendants of Rudradaman — (but only four of their records, ranging from a.d. i8i to 205, are at present available for study) — are in almost quite correct Sanskrit ; and this suggests that, from his time, the language may have been habitually used for in- scriptional purposes in the dominions of his dynasty. That, however, is only a matter of conjecture; and elsewhere pure and good Sanskrit, without any Prakrit forms, appears next, and is found in verse as well as in prose, in the two inscriptions from Eran and Allahabad, referable to the period about A.D. 340 to 375, of the great Gupta king Samudragupta. From that time onwards, as far as our present knowledge goes, Sanskrit, with a very rare introduction of Prakrit or vernacular forms, was practically the only inscriptional language in the northern parts of India. We can, however, cite a record of A.D. 862 from the neighbourhood of Jodhpur in Rajputana, the body of which was written in Maharashtri Prakrit.

In Southern India we have an instance of the mixed dialect in the Nasik inscription, referable to a.d. 257 or 258, of the Abhira king Isvarasena, son of Sivadatta, which has been mentioned on a pre-ceding page. With the exception, however, of that record and of the few which are mentioned just below, the inscriptional language of Southern India appears to have been generally Prfikrit of one kind or another until about a.d. 400, or perhaps even somewhat later. Sankrit figures first in one of the records at Nasik of Rishabhadatta

(Ushavadata), son-in-law of the Kshaharata king NahapSna, which consequently gives it almost as early an appearance in the south

as that which is established for it in the north; but it is confined in this instance to a preamble which recites the previous donations and good works of Rishabhadatta ; the record passes into Prakrit for the practical purpose for which it was framed. Sanskrit figures next, in an almost correct form, in.the short inscription of not much later date at Kanheri, near Bombay, of the queen (her name is not extant) of Vasishthiputra-Sri-Satakarni. It next appears in certain formulae, and benedictive and imprecatory verses, which stand at the end of some of the Prakrit records of the Pallava series referable to the 4th century; but here we have quotations from books, not instances of original composition. We have a Sanskrit record, ob- tained in Khandesh but probably belonging to some part of Gujarat, of a king named Rudradasa, which is perhaps dated in A.D. 367. But the next southern inscription in Sanskrit, of undeniable date, is a record of a.d. 456, belonging to the Vyara subdivision of the Baroda state in Gujarat, of the Traikutaka king Dahrasena. The records of the early Kadamba kings of Banawasi in North Kanara, Bombay, exhibit the use of Sanskrit from an early period in the 6th century; and records of the Pallava kings show it from perhaps a somewhat earlier time on the other side of India. The records of the Chalukya kings present Sanskrit from A.D. 578 onwards. And from this latter date the language figures freely in the southern records. But some of the vernaculars, in their older forms, shortly begin to present them- selves alongside of it; and, without entirely superseding Sanskrit even to the latest times, the use of them for inscriptional purposes became rapidly more and more extensive. The vernacular that first makes its appearance is Kanarese, in a record of the Chalukya king Maiigalesa, of the period a.d. 597 to 608, at Badami in the Bijapur district, Bombay. Tamil, appears next, between about a.d. 610 and 675, in records of the Pallava king Mahendravarman I. at Vallam in the Chingalpat (Chingleput) district, Madras, and of his great- grandson Paramesvaravarman I. from Kuram in the same district. Telugu appears certainly in a.d. ion, in a record of the Eastern Chalukya king Vimaladitya; and it is perhaps given to us in A.D. 843 or 844 by a record of his ancestor Vishnuvardhana V.; in the latter case, however, the authenticity of the document is not certain. Malayalam appears about A.D. 1 150, in inscriptions of the rulers of Kerala from the Travancore state. And Qn the colossal image of Gommatesvara at Sravana-Belgola, in Mysore, there are two lines of Marathi, notifying for the benefit of pilgrims from the Maratha country the names of the persons who caused the image and the

enclosure to be made, which are attributed to the first quarter of the 1 2th century: this language, however, figures first for certain in a record of A.D. 1 207, of the time of the Devagiri- Yadava king Singhana, from Khandesh in the north of Bombay.

Bibliography. — The systematic publication of the Indian inscriptions has not gone far. Cunningham inaugurated a Corpus Inscriptionum Indicarum, by giving us in 1877 the first volume of it, dealing with the records of Asoka; but the only other volume which has been published is vol. iii., by Fleet, dealing with the records of the Gupta series. The other published materials are mostly to be found here and there in the Journals of the Royal Asiatic Society of London, its Bombay branch, and the Asiatic Society of Bengal, in the Reports of the various Archaeological Surveys, and in the Indian Antiquary, the Epigraphia Indica and the Epigraphia Carnatica; and much work has still to be done in bringing them together according to the periods and dynasties to which they relate, and in revising some of them in the light of new discoveries and the teachings of later research. The authority on Indian palaeography is Buhler's work, published in 1896 as part 2 of vol. i of the Grundriss der Indo-Arischen Philologie und Altertums- kunde; an English version of it was issued in 1904 as an appendix to the Indian Antiquary, vol. xxxiii. (J. F. F.)

III. Greek Inscriptions

Etymologically the term inscription (imypaˆ) would include much more than is commonly meant by it. It would include words engraved on rings, or stamped on coins, 1 vases, lamps, wine-jar handles, 2 &c. But Boeckh was clearly right in excluding this varia supellex from his Corpus Inscriptionum Graecarum, or only admitting it by way of appendix. Giving the term inscription a somewhat narrower sense, we still include within it a vast store of documents of the greatest value to the student of Greek civilization. It happens, moreover, that Greek in- scriptions yield the historian a richer harvest than those of Rome. Partly from fashion, but partly from the greater abundance

1 The legends on coins form part of numismatics, though closely connected with inscriptions.

2 The amphorae which conveyed the wine and other products of various localities have imprinted on their handles the name of the magistrate and other marks of the place and date. Large collections have been made of them, and they repay inquiry. See Dumont, Inscriptions ceramiques (1872); Paul Becker, Henkelinschriften (Leipzig, pt. i. 1862, pt. ii. 1863); Hiller v. Gaertringen, I.G. xii.

of the material, the Romans engraved their public documents (treaties, laws, &c.) to a large extent on bronze. These bronze tablets, chiefly set up in the Capitol, were melted in the various conflagrations, or were carried off to feed the mint of the con- queror. In Greece, on the contrary, the mountains everywhere afforded an inexhaustible supply of marble, and made it the natural material for inscriptions. Some Greek inscribed tablets of bronze have come down to us, 1 and many more must have perished in the sack of cities and burning of temples. A number of inscriptions on small thin plates of lead, rolled up, have sur- vived; these are chiefly imprecations on enemies 2 or questions asked of oracles. 3 An early inscription recently discovered (1905) at Ephesus is on a plate of silver. But as a rule the material employed was marble. These marble monuments are often found in situ; and, though more often they were used up as convenient stones for building purposes, yet they have

thus survived in a more or less perfect condition. 4

Inscriptions were usually set up in temples, theatres, at the side of streets and roads, iri Tiy.an\ or temple-precincts, and near public buildings generally. At Delphi and Olympia were immense numbers of inscriptions — not only those engraved upon the gifts of victorious kings and cities, but also many of a more public character. At Delphi were inscribed the decrees of the Amphictyonic assembly, at Olympia international docu- ments concerning the Peloponnesian cities; the Parthenon and Acropolis were crowded with treaties, laws and decrees concerning the Athenian confederation; the Heraeum at Samos, the Artemisium at Ephesus, and indeed every important sanctuary, abounded with inscriptions. It is a common thing for decrees {\p7ilo-fiaTa) to contain a clause specifying where they are to be set up, and what department of the sj;ate is to defray the cost of inscribing and erecting them. Sometimes duplicates are ordered to be set up in various places; and, in cases of treaties, arbitrations and other international documents, copies were always set up by each city concerned. Accordingly documents like the M armor Ancyranutn and the Edict of Dio- cletian have been restored by a comparison of the various frag- ments of copies set up in diverse quarters of the empire.

Greek inscribed marbles varied considerably in their external appearance. The usual form was the arrfKt], the normal type of which was a plain slab, from 3 to 4 or even 5 ft. high, 5 3 or 4 in. thick, tapering slightly upwards from about 2 ft. wide at bottom to about 18 in. at the top, where it was either left plain or often had a slight moulding, or still more commonly was adorned with a more or less elaborate pediment; the slab was otherwise usually plain. Another form was the /3a>ju6s or altar, sometimes square, oftener circular, and varying widely in size. Tombstones were either orijXai (often enriched beneath the pediment with simple groups in relief, commemorative of the deceased), or kiov&, pillars, of different size and design, or sarcophagi plain and ornamental. To these must be added statue-bases of every kind, often inscribed, not only with the names and honours of individuals, but also with decrees and other documents. All these forms were intended to stand by themselves in the open air. But it was also common to inscribe state docu- ments upon the surface of the walls of a temple, or other public building. Thus the antae and external face of the walls of the pronaos of the temple of Athena Polias at Priene were covered

1 e.g. Treaty between Elis and the Heraeans, about 550-500 B.C., from Olympia (Boeckh, C.I.G. it, Hicks, 29, and others in Ditten-

berger-Purgold, Inschr. v. Olympia, 1-43); a similar bronze treaty from the Locri Ozolae (Dittenberger, I.G. ix. 334) ; bronze plate from Dodona, recording the victory of Athens over the Lacedae- monians in a sea-fight, probably 429 B.C. (Dittenberger, Syll. 2. 30).

2 See Wiinsch I.G. iii., App. ; Audollent, Defixionum Tabellae

(1904).

3 See Karapanos, Dodone et ses mines ; Hoffman, Gr. Dial. Inschr. 1558-1598.

4 What was done by Themistocles under stress of public necessity (Thucyd. i. 93) was done by others with less justification elsewhere; and from Byzantine times onward Greek temples and inscriptions were found convenient quarries.

~° It appears from Cicero, De Lcgihus, ii. 26, 27, that the size of Athenian gravestones was limited by law.

with copies of the awards made concerning the lands disputed between Samos and Priene (see Gk. I riser, in Brit. Mus. iii. § 1); similarly the walls of the Artemisium at Ephesus contained a number of decrees {ibid. iii. § 2), and the proscenium of the Odeum was lined with crustae, or " marble-veneering," under 1 in. thick, inscribed with copies of letters from Hadrian, Anto- ninus and other emperors to the Ephesian people {ibid. p. 151). The workmanship and appearance of inscriptions varied considerably according to the period of artistic develop- ment. The letters incised with the chisel upon the wall or the otˆXj; were painted in with red or blue pigment, which is often traceable upon newly unearthed inscriptions. When Thucydides, in quoting the epigram of Peisistratus the younger (vi. 54), says " it may still be read a/ivSpois 7pctjujuacri," he must refer to the fading of the colour; for the inscription was brought to light in 1877 with the letters as fresh as when they were first chiselled (see Kumanudes in 'Adiivcuov, vi. 149; I.G. suppl. to vol. i. p. 41). The Greeks found no inconvenience, as we should, in the bulkiness of inscriptions as a means of keeping public records. On the contrary they made every temple a muni- ment room; and while the innumerable (TrrjXai, Hermae, bases and altars served to adorn the city, it must also have encouraged and educated the sense of patriotism for the citizen to move continually among the records of the past. The history of a Greek city was literally written upon her stones.

The primary value of an inscription lay in its documentary evidence (so Euripides, Suppl. 1202, fob). In this way they are continually cited and put in evidence by the orators {e.g. see Demosth. Fals. Leg. 428; Aeschin. In Ctes. § 75). But the Greek historians also were not slow to recognize their im- portance. Herodotus often cites them (iv. 88, 90, 91, v. 58 sq., vii. 228); and in his account of the victory of Plataea he had his eye upon the tripod-inscription (ix 81; cf. Thuc. i. 132). Thucydides's use of inscriptions is illustrated by v. 18 fob, 23, 47, 77, vi. 54, 59. Polybius used them still more. In later Greece, when men's thoughts were thrown back upon the past, regular collections of inscriptions began to be made by such writers as Philochorus (300 B.C.), Polemon (2nd century B.C., called arqKoKowas for his devotion to inscriptions), Aristo- demus, Craterus of Macedon, and many others.

At the revival of learning, the study of inscriptions revived with the renewed interest in Greek literature. Cyriac of Ancona, early in the 15th century, copied a vast number of inscriptions during his travels in Greece and Asia Minor; his MS. collections were deposited in the Barberini library at Rome, and have been used by other scholars. (See Bull. Corr. Hellen. i.; Larfeld in Muller's Handbuch i. 2 , p. 368 f.; Ziebarth, " de ant. Inscript. Syllogis " in Ephem. Epigr. ix.). Succeeding generations of travellers and scholars continued to collect and edit, and English- men in both capacities did much for this study.

Thus early in the 19th century the store of known Greek inscrip- tions had so far accumulated that the time had come for a compre- hensive survey of the whole subject. And it was the work of one great scholar, Augustus Boeckh, to raise Greek epigraphy into a science. At the request of the Academy of Berlin he undertook to arrange and edit all the known inscriptions in one systematic work, and vol. i. of the Corpus Inscriptionum Graecarum was published in 1828, vol. ii. in 1833. He lived to see the work completed, although other scholars were called in to help him to execute his great design ; vol. iii., by Franz, appeared in 1853; vol. iv., by Kirchhoff, in 1856. l The work is a masterpiece of lucid arrangement and profound learn- ing, of untiring industry and brilliant generalization. Out of the publication of the Corpus there grew up a new school of students, who devoted themselves to discovering and editing new texts, and working up epigraphical results into monographs upon the many-~ sided history of Greece. In the Corpus Boeckh had settled for ever the methods of Greek epigraphy; and in his Staalshaushaltung der Athener (3rd ed. of vols. i. ii. by Frankel, 1886; well known to English readers from Sir G. C. Lewis's translation, The Public Economy of Athens, 2nd ed.,

1842) he had given a palmary specimen of the application of epigraphy to historical studies. At the same time Franz drew up a valuable introduction to the study of inscrip- tions in his Elementa Epigraphices Graecae (1840).

Meanwhile the liberation of Greece and increasing facilities for

‘ An index to the four volumes was long wanting; it was at length completed and appeared in 1K77.

visiting the Levant combined to encourage the growth of the subject, which has been advanced by the labours of many scholars, and chiefly Ludwig Ross, Leake, Pittakys, Rangabe, Le Bas and later by Meier, Sauppe, Kirchhoff, Kumanudes, Waddington, Kohler, Dittenberger, Homolle, Haussoullier, Wilhelm and others. Together with the development of this school of writers, there has gone on a systematic exploration of some of the most famous sites of antiquity, with the result of exhuming vast numbers of inscriptions. To mention only some of the most important: Cyrene, Rhodes, Cos, Cnidus, Halicar- nassus, Miletus, Priene, Ephesus, Magnesia on the Maeander, Per- gamum, Delos, Thera, Athens, Eleusis, Epidaurus, Olympia, Delphi, Dodona, Sparta, have been explored or excavated by the Austrians, English, French, Germans and Greeks. German, French, British, Austrian and American institutes have been established at Athens, to a great extent engaged in the study of inscriptions. From every part of the Greek world copies of inscriptions are brought home by the students of these institutes and by other travellers. And still the work proceeds at a rapid rate. For indeed the yield of inscriptions is practically inexhaustible: each island, every city, was a separate centre of corporate life, and it is significant to note that in the island of Calymnos alone C. T. Newton collected over one hundred inscrip- tions, many of them of considerable interest.

The result of this has been that Boeckh’s great work, though it never can be superseded, yet has ceased to be what its name implies. The four volumes of the C.I.G. contain about 10,000 inscriptions. But the number of Greek inscriptions now known is probably more than three or four times as great. Many of these are only to be found published

in the scattered literature of dissertations, or in Greek, German and other periodicals. But several comprehensive collections have been attempted, among which (omitting those dealing with more limited districts of the Greek world) the following may be named : — Rangabe, Anliquites hellcniques (2 vols., 1842-1855); Le Bas-Waddington, Voyage archeologique, inscriptions (3 vols., 1847-1876, incomplete) ; Newton, Hicks and Hirschfeld, Greek Inscriptions in the British Museum (parts i.-iv.) ; and above all the Inscriptiones Graecae, a Corpus undertaken by the Berlin Academy (absorbing the Corpus hiscr. Attic, and other similar collections). Of this work six complete volumes and parts of others have appeared (by 1906) representing Attica, Argolis, Megaris, Boeotia, Phocis, Locris, Aetolia, Acarnania, Ionian Islands, Aegean Islands (exc. Delos), Sicily, Italy and western Furope; they are edited by Kirchhoff, Kohler, Dittenberger, Frankel, Hiller von Gaertringen, Kaibel and others. Of a similar Austrian publication dealing with Asia Minor (Tituli Asiae Minoris) only the first part (Lycian Inscriptions) has appeared. Of general selections of inscriptions on a smaller scale it is necessary to mention: Dittenberger, Sylloge In scriptionum Graec. (2nd ed., 1898-1901, 3 vols.) ; the same, Orientis Graeci Inscr. Selectae (2 vols., 1903-1905) ; Hicks, Greek Historical Inscriptions (1st ed., 1882; 2nd ed., 1901); Michel, Recveil d' inscriptions grecques (1900) ; Roberts and Gardner, Introd. to Gk. Epigraphy (2 vols., 1887-1905); Rohl, Inscr. gr. anliquissimae (1882), and Irflagines Inscriptionutn (2nd ed., 1

The oldest extant Greek inscriptions appear to date from the middle of the 7th century B.C. During the excavations at

*Olympia a number of fragments of very ancient in- r WC *-'; scriptions were found (see Olympia, Textband v.); and scriptioas. other very early inscriptions from various places, as*

Thera and Crete, have been published (see R6h\,dp. cil.). But what is wanted is a sufficient number of very early inscrip- tions of fixed date. One such exists upon the leg of a colossal Egyptian statue at Abu-Simbel on the upper Nile, where certain Creek mercenaries in the service of King Psammetichus recorded their names, as having explored the river up to the second cataract (C.I.G. 5126; Rohl, 482; Hicks', 2 , 3). Even if Psam- metichus II. is meant, the inscription dates between 594 and 589 B.C. Another, but later, instance is to be found in the frag- mentary inscriptions on the columns dedicated by Croesus in the Ephesian temple (c. 550 B.C.; Gk. Inscr. in the Brit. Mus. 518). Documents earlier than the Persian War are not very frequent; but after that period the stream of Greek inscriptions goes

on, generally increasing in volume, down to late Byzantine times.

Greek inscriptions may most conveniently be classified under the following heads: (1) those which illustrate political history; (2) those connected with religion; (3) those of a private char- acter.

1 Foremost among the inscriptions which illustrate Greek history and politics are the decrees of senate and people (}pr\4>i

have done service to the particular city, public honours (crowns, ntatues. citizenship and other privileges). One of these privileges

was the proxenia, an honour, which entailed on the recipient the burthen of protecting the citizens of the state which granted it when they came to his city. But the importance of an honorary decree depends upon the individual and the services to which it refers. And even the mere headings and datings of the decrees from various states afford curious and valuable information upon the names and titles of the local magistrates, the names of months and other details. On the formulae, see Swoboda, Die gr. Volksbeschlusse (1890). Droysen in his Hellenismus (1877-1878) has shown how the history of Alexander and his successors is illustrated by contemporary iˆ7i< £«r(iara. And when the student of Athenian politics of the 5th and 4th centuries turns to the 1st and 2nd volumes of the I.G., he may wonder at the abundance of material before him ; it is like turning over the minutes of the Athenian parliament. One example out of many must suffice — No. 17 in I.G. ii. pt. I (Hicks 2 , ioi) is the famous decree of the archonship of Nausinicus (378 B.C.) concerning the reconstruction of the Athenian confederacy. The terms of admission to the league occupy the face of the marble; at the bottom and on the left edge are inscribed the names of states which had already joined.

Inscribed laws (voiioC) occur with tolerable frequency. The following are examples: — A citation of a law of Draco's from the wparros a £oiv of Solon's laws {I.G. i. 61 ; cf. Dittenberger, Syll? 52) ; the Civil Codes of Gortyna (5th century, Dareste, &c, Inscr. jurid. gr. i. 352 ff.) ; a reassessment of the tribute payable by the Athenian allies in 425 B.C. (I.G. i. 37; Kohler Urkunden und Untersuchungen zur Geschichte des delis ch-attischen Bundes, 1870, p. 63; Hicks 2 , 64); a law passed by the Amphictyonic council at Delphi, 380 B.C. (Boeckh, C.I.G. 1688; I.G. ii. 545); law concerning Athenian weights and measures (Boeckh, Staatshaushaltung 3 , ii. 318; I.G. ii. 476); the futile sumptuary law of Diocletian concerning the maximum prices for all articles sold throughout the empire (Mommsen-

Blumner, Der Maximaltarif des Diocletian, 1893). For a collection of such legal documents, see Dareste, Haussoullier and Reinach, Recueil des inscr. juridiques gr. (1891-1898).

Besides the inscribed treaties previously referred to, we may instance the following: Between Athens and Chalcis in Euboea, 446 B.C. (I.G. suppl. to vol. i. 27A) ; between Athens and Rhegium, 433 B.C. (Hicks 2 , 51) ; between Athens and Leontini, dated the same day as the preceding (ibid. 52) ; between Athens and Boeotia, 395 B.C. (ibid. 84) ; between Athens and Chalcis, 377 B.C. (ibid. 102) ; between Athens and Sparta, 271 B.C. (I.G. ii. No. 332) ; between Hermias of Atarneus and the Ionian Erythrae, about 350 B.C. (Hicks 2 138) ; treaties in the local dialect between the Eleans and the Heraeans, 6th century (Olympia Inschr. 9), and between various cities of Crete, 3rd century B.C.J.C.I.G. 2554-2556 ; Griech. Dial. Inschr. 5039-5041, 5075). Egger's Etudes historiques sur les traites publics chez les Grecs et chezles Romains (Paris, 1866) embraces a good many of these documents; see also R. von Scala, Die Staatsvertrdge des Altertums, pt. i. (1898).

The international relation of Greek cities is further illustrated by awards of disputed lands, delivered by a third city called in (ˆmXtjtos iroXts) to arbitrate between the contending states, e.g. Rhodian award as between Samos and Priene (Gk. Inscr. in Brit. Mus. 405 ; Ditten- berger, Syll? 315); Milesian between Messanians and Spartans, discovered at Olympia (ibid. 314; see Tac. Ann. iv. 43); and many others. Akin to these are decrees in honour of judges called in from a neutral city to try suits between citizens which were complicated by political partisanship (see C.I.G. No. 2349B, with Boeckh's re- marks; I.G. xii. 722). On the general subject, E. Sonne, De arbitris extemis (1888).

Letters from kings are frequent; as from Darius I. to the satrap Gadates, with reference to the shrine of Apollo at Magnesia (Hicks 2 , 20); from Alexander the Great to the Chians (ibid. 158); from Lysimachus to the Samians (C.I.G. 2254; Hicks 1 , 152); from Antigonus I. directing the transfer of the population of Lebedus to Teos (Dittenberger, Syll? 177) ; from the same to the Scepsians (Dittenberger, Or. Gr. Inscr. Sel. 5). Letters from Roman emperors are commoner still; such as Dittenberger, Syll. 2 350, 356, 373,

384-388, 404.

The internal administration of Greek towns is illustrated by the minute and complete lists of the treasures in the Parthenon of the

time of the Pcloponnesian War (Boeckh, Staatshaush. 3 vol. ii.) ; public accounts of Athenian expenditure (ibid.) ; records of the Athenian navy in the 4th century, forming vol. iii. of the 1840 ed. of the same work. To the same category belong the so-called Athenian tribute-lists, which are really lists of the quota (of the tribute paid by the Athenian allies) which was due to the treasury^ of Athena (Airapxai rtj 0e£ /jlvo. aro TaXavrov). Being arranged according to the tributary cities, they throw much light on the constitution of the Athenian empire at the time (I.G. i. 226-273 and suppl. p. 71 f.; Kohler, Urkunden und Untersuchungen zur Gesch. des attisch-delischen Seebundes 1870; Boeckh, Staatshaush. 1 ii. 332-498). The manage- ment of public lands and mines is specially illustrated from inscriptions (Boeckh, op. cil. vol. i. passim); and the political constitution of different cities often receives light from inscriptions which cannot be gained elsewhere (e.g. see the document from Cyzicus, C.I.G. 3665, and Boeckh's note, or that from Mytilene, Dittenberger, Or. Gr. Inscr. 2, and the inswiptrons from Ephesus, Gk. Inscr. in Brit. Mus. pt. iii. § 2).

LATIN]

INSCRIPTIONS

629

Inscriptions in honour of kings and emperors are very common. The Marmor Ancyranum (ed. Mommsen, 2 1883) has already been mentioned; but an earlier example is the Monumentum Adulitanum (from Abyssinia, C.I.G. 5127A); Dittenberger, (Inscr. or. Gr. 54) reciting the achievements of Ptolemy III. Euergetes I.

Offerings in temples (&.vaBimaTa.) are often of great historical value, e.g. the dedications on the columns of Croesus at Ephesus mentioned above; Gelo's dedication at Delphi, 479 B.C. (Hicks 2 16); the helmet of Hiero, now in the British Museum, dedicated at Olympia after his victory over the Etruscans, 474 B.C. (C.I.G. 16; Hicks 2 22); and the bronze base of the golden tripod dedicated at Delphi after the victory of Plataea, and carried off to Constantinople by Constantine (Dethierand Mordtmann, Epigraphik von Byzantion, 1874; Hicks 2 19).

2. The religion of Greece in its external aspects is the subject of a great number of inscriptions (good selections in Dittenberger, Syll? 550-816, and Michel 669-1330). The following are a few Religious specimens. (1) Institution of festivals, with elaborate i " scrf ' > "

ritual directions: see Sauppe, Die Mysterieninschrift aus (tons. Andania (i860) ; Dittenberger, Syll? 653, and the singular

document from the Ephesian theatre in Gk. Inscr. in Brit. Mus. 481 ; the following also relate to festivals — C.I.G. 1845, 2360, 2715, 3059, 3599, 36416; Dittenberger, Sytt." 634 (the lesser Pan-athenaea) and Or. Gr. Inscr. 383 (law ofAntiochus I. of Commagene).

(2) Laws defining the appointment, duties or perquisites of the priest-liood : Dittenberger, Syll? 601 ; Boeckh, Staatshaush. ii. 109 seq.

(3) Curious calendar of sacrifices from Myconus: Dittenberger, Syll? 615. (4) Fragment of augury rules, Ephesus, 6th century B.C. : ibid. 801. (5) Leases of Tty.kvr\ and sacred lands (see Dareste, &c, Inscr. jut. Gr. ii. § 19 and commentary). (6) Imprecations written on lead, and placed in tombs or in temples: Wiinsch, I.G. iii. App.; Audol- lent Defixionum tahellae (1904). (7) Oracles are referred to I.G. xii. 248; Michel 840-856. (8) Among the inscriptions from Delphi few are more curious than those relating to the enfranchisement of slaves under the form of sale to a god (see Gr. dial. Inschr. nos. 1684-2342; for enfranchisement-inscriptions of various kinds, Dareste, &c, Inscr. jar. Gr § xxx. (9) Cures effected in the Asclepieum at Epidaurus (Dittenberger, Syll. 2 802-805). (I0) Inventories, &c, of treasures in temples: Michel 811-828, 832, 833, &c. (11) Inscriptions relating to dramatic representations at public festivals: A. Wilhelm, Urkunden dramatischer Auffiihrungen in Athen (Vienna, 1906). This catalogue might be enlarged indefinitely.

3. There remain a large number of inscriptions of a more strictly private character. The famous Parian marble (I.G. xii. 444) falls under this head; it was a system of chronology drawn Private U pˆ p er haps by a schoolmaster, in the 3rd century B.C. lascrlp- -p ne cxcess j ve devotion of the later Greeks to athletic and lions. other competitions at festivals is revealed by the numerous

dedications made by victorious competitors who record their suc-cesses (see Michel 915-960; Dittenberger, Syll? 683 f.). The dedications and honorary inscriptions relating to the Ephebi of later Athens (which occupy half of I.G. iii. pt. 1), dreary as they seem, have yet thrown a curious light upon the academic life of Roman Athens (see A. Dumont, Essai sur I'ephebie attique; Rei, ach, Traite. pp. 408-418; Roberts and Gardner ii. 145) ; and from these and similar late inscriptions the attempt has been made to construct Fasti of the later archons (von Schoffer in Pauly-Wissowa,

Realencyklopadie, s.v. "Archontes"; W. S. Ferguson in Cornell Studies, x). The sepulchral monuments have been beautifully illustrated in Stackelberg's Grdber der Hellencn; for the Attic stelae see Conze, Die attischen Grabreliefs (1893 ff.). Some of the most interesting epitaphs in the C.I.G. are from Aphrodisias and Smyrna. Kumanudes's collection of Attic epitaphs has been mentioned above ; see also Gutscher, Die attischen Grabschr. (1889); they yield a good deal of information about the Attic demes, and some of them are of high importance, e.g. the epitaph on the slain in the year 458 B.C. (Dittenberger, Syll. 1 9), and on those who fell in the Hellespont, c. 440 B.C. (Hicks 2 46). For the metrical inscriptions see Kaibel, Epigrammata Graeca (1878). Closely connected with sepulchral inscriptions is the famous " Will of Epicteta " (I.G. xii. 330). It was also customary at Athens for lands mortgaged to be indicated by boundary-stones inscribed with the names of mortgagor and mortgagee, and the amount (I.G. ii. 1103-1153; Dareste, &c, Inscr. jur. i. pp. 107-142) ; other Spot are common enough.

The names of sculptors inscribed on the bases of statues have been collected by E. Lowy (Inschriften gr. Bildhauer, 1885). In most cases the artists are unknown to fame. Among the exceptions are the names of Pythagoras of Rhegium, whom we now know to have been a native of Samos (Lowy 23, 24); Pyrrhus, who made the statue of Athena Hygieia dedicated by Pericles (Plut. Per. 13; Lowy 53); Polyclitus the younger (Lowy 90 f.), Paeonius of Mende, who sculptured the marble Nike at Olympia (Lowy 49); Praxiteles Lowy 76) . &c.

The bearing of inscriptions upon the study of dialects is very obvious. A handy selection has been made by Cauer (Delectus inscr. Gr. 2nd ed., Leipzig, 1883) of the principal inscriptions illustrating this subject, and a complete collection is in course of publication (Collitz and others, Sammlung der griechischen Dialekt-Inschriften, Gottingen, 1884 ff.). See also R. Meister, Die griech. Dialekte (1882-1889), and O. Hoffman, Die griech. Dialekte (1891-1898). The grammar of Attic inscriptions

by

Date of

Inscrip- tions.

Study

Dialects.

is treated by Meisterhans, Grammatik der att. Inschr. (3rd ed. Schwyzer, 1900).

The date of inscriptions is determined partly by the internal evidence of the subject, persons, and events treated of, and the character of the dialect and language. But the most im- portant evidence is the form of the letters and style of execution. For the Attic inscriptions the development from the earliest times to about a.d. 500 is elaborately treated by Larfeld, Handbuch der att. Inschr. (1902). bk. ii. Much of the evidence is of a kind difficult to appreciate from a mere description. Yet — besides the PovaTpcxjyrfibv writing of many early documents — we may mention the contrast between the stiff, angular characters which prevailed before 500 or 450 b.c. and the graceful yet simple forms of the Periclean age. This development was part of the general movement of the time. Inscriptions of this period are usually written oroixiSoc, i.e. the letters are in line vertically as well as horizontally. From the archonship of Eucleides (403 B.C.) onwards the Athenians officially adopted the fuller alphabet which had obtained in Ionia since the 6th century. Before 403 B.C. £ and ˆ were expressed in Attic inscriptions by X2 and <£2, while E did duty for i), t, and sometimes «, O for o, ov, and w — H being used only for the aspirate. There is, however, occasional use of the Ionic alphabet in Attica, even in official inscriptions, as early as the middle of the 5th century. The Macedonian period betrays a falling off in neatness and firmness of execution — the letters being usually small and scratchy, excepting in inscriptions relating to great personages, when the characters are often very large and handsome. In the 2nd century came in the regular use of apices as an ornament of letters. These tendencies increased during the period of Roman dominion in Greece, and#gradually, especially in Asia Minor, the iota adscriptum was dropped. The Greek characters of the Augustan age indicate a period of restoration; they are uniformly clear, handsome, and adorned with apices. The lunate epsilon and sigma (e, C) establish themselves in this period; so does the square form C, and the cursive CO is also occasionally found. The inscriptions of Hadrian's time show a tendency to eclectic imitation of the classical lettering. But from the period of the Antonines (when we find a good many pretty inscriptions) the writing grows more coarse and clumsy until Byzan- tine times, when the forms appear barbarous indeed beside an in- scription of the Augustan or even Antonine age.

The finest collections of inscribed Greek marbles are of course at Athens. There are also good collections, public and private, at

Smyrna and Constantinople. The British Museum con- tains the best collection out of Athens (see the publica- Z? eo ” t tion mentioned above) ; the Louvre contains a good many l? n JLZ (edited by Frohner, Les Inscriptions grecques du musee du MarbleSm Louvre, 1865); the Oxford collection is very valuable, and fairly large; and there are some valuable inscriptions also at Cambridge.

Bibliography. — The following essays give good outlines of the whole subject: — Boeckh, C.I.G., preface to voL i.; C. T. Newton, Essays on Art and Archaeology (1880), pp. 95, 209 ; S. Reinach, Traite d'epigraphie grecque (Paris, 1885). Besides the works already quoted the following should be mentioned: — Boeckh's Kleine Schriften; Michaelis, Der Parthenon; Waddington, Fastes des provinces asiatiques, part i. (1872), and MSmoire sur la chronologie de la vie du rheteur Aristide; Kirchhoff, Studien zur Geschichte des griechischen Alphabets (4th ed., 1887) ; Schubert, De proxenia (Leipzig, 1881); Monceaux, Les Proxenies gr. (Paris, 1886); Latyshev, Inscr. ant. orae septentr. Ponti Euxini Gr. et Lat. (2 vols. , St Petersburg, 1885-1890); Bechtel, Inschriften des ionischen Dialekts (Gottingen, 1887); Paton and Hicks, Inscriptions of Cos (Oxford, 1891); Frankel and others, Inschriften von Pergamon (2 vols., Berlin 1890- 1895); Comparetti, Le Leggi di Gortyna, &c. (Monum. antichi, iii., 1893); E. Hoffmann, Sylloge epigrammatum Grace. (Halle a. S., 1893); O. Kern, Inschriften von Magnesia am Maeander (Berlin, 1900) ; S. Chabert, Histoire sommaire des Uudes d'epigraphie grecque (Paris, 1906); Hackl, Mercantile Inschr. auf attischen Vasen (Munch, arch Stud., 1909); Wilhelm, Beitrdge zur griech. Inschriftenkunde (Vienna, 1909). (E. L. H.; G. F. H.)*

IV. Latin Inscriptions

I. Latin or Roman Inscriptions (by which gen-ral name are designated, in classical archaeology, all non-literary remains of the Latin language, with the exception of coins, letters and journals) fall into two distinct classes, viz. (1) those which were written upon other objects of various kinds, to denote their peculiar purpose, and in this way have been preserved along with them; and (2) those which themselves are the objects, written, to be durable, as a rule, on metal or stone. The first class is that of inscriptions in the stricter sense of the word (styled by the Romans tituli, by the Germans Auf schriften); the second is that of instruments or charters, public and private (styled by the Romans first leges, afterwards instrumenla or tabulae, and by the Germans Urkunden).

No ancient Latin authors have professedly collected and explained or

handed down to us Roman inscriptions. Some of

the orators and historians, such as Cicero, Livy, Pliny the elder, and Suetonius among the Latins, and Polybius, Dionysius of Halicarnassus and Josephus among the Greeks, occasionally mention inscriptions of high historical interest. A few gram- marians, as, for example, Varro, Verrius Flaccus and Valerius Probus of Berytus, quote ancient words or formulae from them, or explain the abbreviations used in them. Juridical instru- ments, laws, constitutions of emperors, senatus consulta and the like appear in the various collections of Roman jurisprudence.

Inscriptions (in the wider sense, as we shall henceforth call them without regard to the distinction which has been drawn) have been found in nearly every centre of ancient Roman life, but, like many other remains of antiquity, only seldom in their original sites. The great mass of them has to be Sought for in the large European museums of ancient art, and in the smaller local collections of ancient remains which occur nearly everywhere in the European provinces of the former Roman empire as well as in the north of Africa, and also here and there in Asia Minor.

Only those copies of inscriptions are to be received with full confidence which are furnished by experienced and well- equipped scholars, or which have been made with the help of mechanical methods (casts, photographs, moist and dry rubbings), not always applicable with equal success, but depending on the position and the state of preservation of the monuments. 1 firom the first revival of classical learning in the Carolingian age attention was paid anew, by pilgrims to Rome and other places worth visiting, to epigraphic monuments also. In the time of the Renaissance, from the end of the 14th century downwards, some of the leading Italian scholars, like Poggio and Signorili, and the antiquarian traveller Cyriacus of Ancona, collected inscriptions, Greek and Latin. 2 In the 15th century large collec- tions of the inscriptions of all countries, or of limited districts, were made by Giovanni Marcanova, Fra Felice Feliciano, Fra Michele Ferrarino, Fra Giocondo the architect of Verona, Marino Sanudo the Venetian polyhistor, and others. At the end of the 15th and the beginning of the 16th, the first printed

collections can be recorded (Spreti's for Ravenna, 1489; Peutinger's for Augsburg, 1508; Huttich's for Mainz, 1320; Francesco degli Albertini's for Rome, printed in 1521 by Jacopo Mazochi), while during the same century a long list of epigraphic travellers, like Pighius, Rambertus and Accursius, or antiquarian collectors, like Sigonius, Panvinius, Antonius Augustinus with his colla- borators Ursinus and Metellus, and many others, were busy in augmenting the stock of epigraphic monuments. The series of printed epigraphic Corpora begins with that of Apianus (Ingolstadt, 1534), the only one arranged in geographical order, and is continued in those of Smetius (1358, but edited only after the author's death by Justus Lipsius, 1588), Gruter (with Joseph Scaliger's Indices, 1603, and re-edited by Graevius, 1707), Gudius (about 1660, edited by Hessel, 1731), Reinesius (1682), Fabretti (1699), Gori (1726), Doni (1731), Muratori (1739), Maffei (1749)1 Donati (1765— 1775). These collections, manuscript and printed, will never altogether lose their value, as great numbers of in- scriptions known to the ancient collectors have since been lost or destroyed. But, inasmuch as even towards the beginning of the 15th century, as well as afterwards, especially from the 16th down to a very recent period, all sorts of inaccuracies, interpola- tions and even downright falsifications, found their way into the Corpora, these can be employed only with the greatest caution. Modern critical research in the field of epigraphy began with the detection of those forgeries (especially of the very extensive and skilful ones of Pirro Ligorio, the architect to the house of Este) by Maffei, Olivieri and Marini. The last-named scholar opens a new era of truly critical and scientific handling of Roman inscriptions (especially in his standard work on the Atti dei fratelli arvali, Rome, 1795); his disciple and successor, Count Bartolomeo Borghesi (who died at San Marino in i860), may be rightly called the founder of the modern science of Roman

1 See E. Htibner, tfber mechanische Copieen von Inschriflen (Berlin, 1881).

'Compare Do Rossi, Bullettino dell' institute archeologico (1871), p. I sq.

epigraphy.' Orelli's handy collection of Roman inscriptions (2 vols., Zurich, 1828) is a first attempt to make accessible to a larger scientific public the results of the researches of Marini and his successors; but it was not completed (and thoroughly corrected) until nearly thirty years later, by Henzen (Orelli, iii., with the indispensable Indices, Zurich, 1856), who, with Mommsen and De Rossi, carried out the plan of a universal Corpus inscriptionum

Latinarum, previously projected by Maffei (1732), by Kellermann and Sarti (1832), with Borghesi's help, and by Letronne and Egger (1843). After the appearance of Mommsen's Inscriptiones regni Neapolitani Latinae (Leipzig, 1852) and his Inscriptiones confoederationis Helveticae Latinae (vol. x. of the publications of the Zurich Antiquarian Society, 1854), the publication of the C.I.L., following the similar work of the Greek inscriptions, was undertaken by the Royal Academy of Sciences of Berlin.

This work, in which the previous literature is fully described and utilized, consists of the following parts: — vol. i., Inscriptiones antiquissimae ad C. Caesaris mortem (1863; 2nd ed., part i., 1893); Ritschl's Priscae Latinitatis monumenta epigraphica (Berlin, 1862, fol.) form the graphic illustration to vol. i., giving all extant monuments of the republican epoch (with five Supplementa, Bonn, 1862-1865; R. Garrucci's Sylloge inscriptionum Latinarum aevi Romanae reipublicae usque ad C. Iulium Caesarem plenissima, 2 vols., Turin, 1875-1877, must be used with caution); vol. ii., Inscr. Hispaniae (1869; with Supplement, 1892); vol. iii., Inscr. Asiae, provinciarum Europae Graecarunt, Illyrici (1873; with Supplements and Index, 1889-1902); vol. iv., Inscr. parietariae Pompeianae Herculanenses Stabianae (the scratched and painted inscriptions chiefly of Pompeii) (1871; with Supplement, part i., 1898; part ii., 1909); vol. v., Inscr. Galliae cisalpinae (1872-1877; with Suppl., Et. Pais, C.I.L. suppl. Italica); vol. vi., Inscr. urbis Romae (1876-1902; with Supplement, 1902); vol. vii., Inscr. Britanniae (1873); v °l- viii., Inscr. Africae (1881; with Supplement, 1891-1894, 1904); vol. ix., Inscr. Calabriae, Apuliae, Samnii, Sabinorum, Piceni (1883); vol. x., Inscr. Bruttio- rum, Lucaniae, Campaniae, Siciliae, Sardiniae (1883); vol. xi., Inscr. Aemiliae, Umbriae, Etruriae (1888; part ii., 1901 sqq.); vol. xii., Inscr. Galliae Narbonensis (1888); vol. xiii., Inscr. trium Galliarum et duarum Germaniarum (1899 sqq.; part ii., 1905 sqq.); vol. xiv., Inscr. Latii antiqui; vol. xv., Inscr. laterum (1891; part ii., i. [vasa, lucernae,fistulae], 1899). The arrangement observed in the Corpus is the geographical (as in Apianus) ; within the single towns the order of subjects (tituli sacri, magistratuum, privatorum, &c, as in Smetius) is followed, with some few exceptions, where the monuments are so numerous (as in the forum of Rome and at Pompeii and Lambaesis) that they can be assigned to their original places. Running supple- ments to the C.I.L. are given in the Ephemeris epigraphica, Corporis inscr. Latinarum supplementum (Berlin, 1872 sqq.) ; and the new discoveries of each year are recorded in Cagnat's L'A nnee epigraphique. The inscriptions in the other Italian dialects have been published by Conway, Italic Dialects

(Cambridge, 1897); cf. vol. ii. of von Planta, Grammatik der oskisch-umbrischen Dialekte (Strassburg, 1897). A Corpus of the Etruscan inscriptions was begun in 1893 by Pauli and is now nearly complete. The inscriptions of the Veneti, a N. Italian people of the Illyrian stock, will be found in vol. iii. of Pauli, Altitalische Forschungen (Leipzig, 1891). For the Christian in- scriptions see De Rossi's Inscr. Chris tianae urbis Romae septimo saeculo antiquiores, vol. i. (Rome, 1857), vol. ii. (1888); the Inscrip- tions chrttiennes de la Gaule of Le Blant (2 vols., Paris, 1857-1865; new edition, 1892) ; the Altchristliche Inschriften der Rheinlande of Kraus (1890); the Christliche Inschriften der Schweiz vom IV. -IX. Jahrhundert of Egli (1895) ; and the Inscr. Hispaniae Christianae and Inscr. Britanniae Christianae of Hubner (Berlin, 1871, 1876). As splendidly illustrated works on the Latin inscriptions of some districts Alphonse de Boissieu's Inscriptions antiques de Lyon (Lyons, 1846-1854), Ch. Robert's ftpigraphie romaine de la Moselle (Paris, 1875), and J. C. Bruce's Lapidarium seplentrionale (London and Newcastle, 1875) can be recommended. Besides the above- mentioned Orelli-Henzen collection, G. Wilmanns's Exempla in- scriptionum Latinarum (2 vols, Berlin, 1873, with copious indexes), and Dessau's Inscriptiones Latinae selectae (vol. i., 1892; vol. ii., 1903; ii., 1906) give a general synopsis of the materials. Inscriptions of interest to students of history are collected in Rushforth's Latin Historical Inscriptions (Oxford, 1893); Leroux, Revue des publica- tions ipigraphiques relatives a" I'antiquitS romaine, records those which bear on antiquities. Of other works may be mentioned Ruggiero, Dizionario epigrafico di antichita romane (1886); Olcott, Thesaurus linguae Latinae epigraphicae (1904 sqq.).

II. Information regarding the forms of letters used on Roman inscriptions will be found under the articles Latin Language, Palaeography and Writing (cf. Hubner, Exempla scripturae

3 His works have been published by the French government in several volumes 4to (Paris, 1862 sqq.).

epigraphicae Latinae, 1895). The forms of the single letters vary not inconsiderably according to the material of the monuments, their age and their origin. Carefully cut letters, especially when on a large

scale, naturally differ from those scratched or painted on walls by non-professional hands, or hewn on rocks by soldiers; and small incised (or dotted) letters on metal or ivory and bone, and those painted on earthenware, or impressed on it or on glass before burning, are also necessarily of a different character. The letters, ordinarily drawn with minium on the monument before being cut (and also often painted, after having been cut, with the same colour), sometimes have been painted with a brush, and thence receive a peculiar form. To save space, on coins first and afterwards in inscriptions also, two or three or even more letters were joined, especially at the end of the lines, to a nexus or a ligatura. This system of compendious writing, very rare in the republican epoch, and slowly extending itself during the 1st century, became rather frequent in the 2nd and 3rd, especially in Spain and Africa. There is no constant system in these nexus litterarum, but gener- ally the rule is observed that no substantial element of a single letter is to be counted for twice (thus e.g. "f is it or ti, not Titi). Numerals are usually distinguished from letters in the ancient period, down to the end of the republic, by a stroke drawn through them, as in + + VIR, duo(tn) vir{om) + + S duo semis (sestertius), -B 500; it was afterwards put above them, as in IIVIR, XVIR,II7Ti|VIR, duovir, decemvir, sevir. 1

The direction of the writing is in the very oldest inscriptions from right to left and from left to right in alternate lines, an arrangement technically called 0ovcrTpo>ri86v (D. Comparetti, Iscrizione arcaica del Foro Romano, Florence, 1900; H. Jordan, Hermes, vol. xv. p. 5, 1880), and in the Sabellic inscriptions similar arrangements are not infrequent. In all others it is from left to right. Each word is separated from the other by a sign of interpunction, which is not wanted, therefore, at the end of lines or of the whole text. Exceptions to this rule occur only in the later period (from the 2nd century downwards), and some- times under special conditions, as when abridged words form the end of the line. Here and there even the different syllables of each word are separated by interpunction. The interpunction' is formed by a single dot (except in some very ancient inscriptions, such as the recently found Forum inscription of the regal period and those of Pisaurum, where, as in Greek and other Italian monuments, three dots : are used. According to the technical skill of the different periods in stone-cutting this dot is in some very ancient inscriptions quadrangular, or similar to an oblique cross (X), or oblong (as a bold stroke), but, as a rule, triangular, and never circular. This triangular dot changes, by ornamenta- tion, into a hook (?) or a leaf (+); the ivy-leaf shaped dot is especially frequent

in inscriptions from about the 2nd century downwards. The dot is always placed at the middle height of the letters, not, as now, at the foot of the line. In large texts of instruments the interpunction is often omitted; in the later period it is often entirely wanting; and in short texts, in the disposition of the lines, in the varying sizes of the letters em ployed, in the division of words at the end of the lines, &c, certain rules are observed, which cannot be detailed here. In some instances older inscriptions have been cancelled and more recent ones substituted (e.g. on milestones), especially in the case of the damnalio memoriae (in cases of high treason), in conse- quence of which the names of consuls and emperors are often cancelled; but in modern times also inscriptions have been deliberately destroyed or lost ones restored.

For understanding the texts of the inscriptions an accurate knowledge of the system of abbreviations used in them is necessary (see Cagnat, Cours d'Spigraphie latine, 3rd ed., 1898). These are almost invariably litter ae singular es; that is to say, the initial letter is employed for the entire word (in all its gram- matical forms), or if one initial, as belonging to more than one word, is not sufficiently clear, the first two or even the first three letters are employed; rarely more than three. Abbrevia-

1 For other details of numerical notation, fractions, &c, see the manuals of metrology.

tions in the true sense of the word (by dropping some letters at the end) are to be found, in the older period, only at the end of lines, and not frequently. In the later period some instances of them have been observed. The litterae singulares, as Valerius Probus taught, are either generally employed (usus generalis) in all classes of written documents (and so in literature also), as, for instance, those of the individual names (the praenomina), the names of days and feasts (kal. for kalendae), and those of the chief magistrates (cos. for consul) and the like; or they belong chiefly (but not exclusively) to certain classes of documents, such as those used in juridical acts (/. for lex, h. for heres, s. d. m. for sine dolo malo, and so on), in sepulchral inscriptions (h. s. e., hie situs est) or in dedicatory inscriptions (v. s. I. m., votum solvit hbens merito), &c. 2

It may be observed here that the praenomina are, as a rule, always written in the universally known abbreviations (in the few instances where they are written in full it is a consequence of Greek influence or of peculiar circumstances). The gentilicia in -ius are abridged, in the republican period, in i (in the nomin ative, perhaps for -is). In

the always abbreviated indications of ancestors or patrons (in the case of slaves .and freedmen), as C.f., Gaifilius, M.I., Marci libertus (s. lor servus is not frequent), the feminine gender is sometimes indicated by inversion of the letters. Thus 0. 1. (or lib.) or W (an inverted M) I. designates a mtdieris libertus; 1 and H are used for fiha, pupilla. On the tribus and their abbreviations, and on the so-called military tribus (which are names of colonies collocated, tor the sake of symmetry, at the place usually occupied, in the nomenclature, by the tribus) , and on the other indications of origin used in the designation of individuals, the indexes to the above-named works give sufficient information; on the geographical distribution of the tribus see Grotefend's Imperium Romanum tributim de- scriptum (Hanover, 1863). For the abbreviations of official charges, urban and municipal, and, in the imperial period, civil and military (to which, beginning with the 4th century, some Christian designations are to be added), see also the explanations given in the indexes. Among these abbreviations the first instances are to be found of the indication of the plural number by doubling the last letter; thus Augg., Caess., coss., dd. nn. (domini nostri), are used from the 3rd century downwards (see De Rossi's preface to the Inscriptiones Christ, urbis Romae) to distinguish them from Aug., Caes., as designating the singular. In the later period, a dot or a stroke over the abridged word, like that upon numerals, here and there indicates the abbreviation.

III. — 1. Among the inscriptions in the stricter sense (the tituli), perhaps the oldest, and certainly the most frequent, are the sepulchral inscriptions (tituli sepulcrales). Of the different forms of Roman tombs, partly depending upon the difference between burial and cremation, which were in use side by side, a very complete account is given in Marquardt's Handbuch der romischen AltertUmer (vol. vii. part i., Leipzig, 1879, p. 330 seq.). The most ancient examples are those of a sepulctelum at Praeneste (C.I.L. i. 74, 165, 1501 a-d; Ephem. epigr. 1. 25-131 ; Wil. 153) ; the oldest of these contain nothing but the name of the deceased in the nominative ; those of more recent date give it in the genitive. The oldest and simplest form remained always in use down to Christian times- it is that used on the large tectonic monuments of the Augustan age (e.g. that of Caeciha Metella, C.I.L. vi. 1274) an d in the mausolea of most of the emperors, and is still frequent in the tituli of the large columbaria of the same age (C.I L. vi. part ii.). It was early succeeded by the lists of names, given also in the nominative, when more than one individual, either dead or alive, were to be indicated as sharers of a tomb. To distinguish the members still alive, a v

(vivit, vivos, vivi) was prefixed to their names (e.g. C.I.L. i. 1020, 1195, 1271); the deceased were sometimes marked by the Bijra nigrum (C.I.L. i. 1032; Wil. 158; see also C.I.L. vi. 10251 seq.). Only the names in the nominative are shown, too. on the sarcophagi of the Turpleii and Fourii at

2 On the system of Roman nomenclature and the abbreviations employed in it see Cagnat's textbook, and for more detail Mommsen in Rbmische Forschungen, i. 1 seq., and in Hermes, iii. (1869), p. 70, W. Schulze, Zur Geschichte lateinischen Eigennamen (Berlin, 1904); on the cognomina (but only those occurring in ancient literature), Ellendt, De cognomine et agnomine Romano (Konigsberg, 1 853), and on thelocal cognomina of the Roman patriciate, Mommsen, Rdm. Forsch. ii. 290 seq.; on the nomina gentilicia, Htibner (Ephem. epigr. ii. 25 seq.). The indexes to Orelli, Wilmanns, and the volumes of the Corpus may also be consulted.

Tusculum (C.I.L. i. 65-72 ; Wil. 152), and in the oldest inscriptions on those of the Scipiones, paintea with minium {C.I.L. i. 29; Wil. 537)i to which were added afterwards the insignia of the magistratus curules (C.I.L. i. 31; Wil. 538) and the poetical elogia. Of a some-what different kind are the inscriptions scratched without much care on very simple earthen vessels which belonged to a sepulcretum of the lower class, situated outside the porta Capena at Rome, on .the Appian road, near the old church of San Cesario (C.I.L. i. 882-1005, 1539, 1539 a-d — C.I.L. vi. 8211-8397; Wil. 176); they can be ascribed to the period of the Gracchi. On these ollae, besides the name of the deceased, also for the most part in the nominative, but on the more recent in the genitive, the date of a day, probably that of the death, is noted ; here and there obit (or 0.) is added. About the same epoch, at the beginning of the 6th century, along with the growing taste for tectonic ornamentation of the tombs in the Greek style, poetical epigrams were added to the simple sepulchral titulus, especially amongst the half-Greek middle class rapidly in- creasing in Rome and Italy; Saturnian (C.I.L. i. 1006), iambic (1007-1010) and dactylic (1011) verses become more and more frequent in epitaphs (see Buecheler, Anthologia Latina, ii.). In prose also short designations of the mental qualities of the deceased (homo bonus, misericors, amans pauperum, or uxor frugi, bona, pudica and the

like), short dialogues with the passer-by (originally borrowed from Greek poetry), as vale salve, salvus ire, vale et tu, te rogo prae-teriens dicas " sit tibi terra levis," &c. (Wil. 180), then indications of his condition in his lifetime, chiefly among the Greek tradesmen and workmen, e.g. lanius de colle Viminale (C.I.L. i. ion), margaritarius de sacra via (1027) and the like, and some formulae, such as ossa hie sita sunt, fieic cubat, heic situs est (in republican times mostly written in full, not abridged) were added (J. Church " Zur Phraseologie der lat. Grabinschriften " in Arch. lat. Lexikogr. 12. 215 sqq.). The habit of recording the measurement of the sepulchre, on the sepul- chral cippus, by such formulae as locus patet in fronte pedes tot, in agro (or in via, or retro) pedes tot, seems not to be older than the Augustan age (C.I.L. i. 1021, with Mommsen's note; Wil. 188). About the same time also the epitaphs more frequently state how long the deceased lived, which was formerly added only on certain occasions (e.g. in the case of a premature death), and mostly in poetical form. The worship of the dei Manes, though undoubtedly very ancient, is not alluded to in the sepulchral inscriptions themselves until the close of the republic. Here and there, in this period, the tomb is designated as a (locus) deum Maanium (e.g. at Hispellum, C.I.L. i. 1410) ; or, it is said, as on a cippus from Corduba in Spain (C.I.L. ii. 2255; Wil. 218), C. Sentio Sat(urnino) co(n)s(ule) — that is, in the year 19 B.C. — dei Manes receperunt Abulliam N(umerii) l(ibertam) Nigellam. In the Augustan age the titulus sepulcralis begins to be confounded with the titulus sacer; it adopts the form of a dedication deis Manibus, offered to the dei Manes (or dei inferi Manes, the dei parentum being the Manes of the parents) of the deceased (see Orel. 4351; Wil. 217-228). This formula, afterwards so common, is still very rare at the end of the republic, and is usually written in full, while in later times it is employed, both simply and in many varied forms (as dis manibus sacrum, or d. m. et memoriae, d. m. et genio, or memoriae aeternae, pad et quieti, quieti aeternae, somno aeternali and so on; Wil. 246), in thousands of monuments. By similar degrees the titulus sepulcralis adopts many of the elements of the titulus honorarius (the indication of the cursus honorum, of the military charges, &c, as e.g. in the inscription of Cn. Calpurnius Piso, C.I.L. i. 598 = vi. 1276, Wil. 1 105, on the pyramid of Cestius, C.I.L. vi. 1374, and on the monument at Ponte Lucano of Ti. Plautius Silvanus Aelianus, consul A.D. 74, Orel. 750, Wil. 1 145 and many others) , of the tituli operum publicorum (e.g. monumentum fecit, sibi et suis, &c), and of the instrumenta. Testaments (like those of Dasumius of the year A.D. 109.- — C.I.L. vi. 10229; Wil. 314; and T. Flavius Syntrophus — C.I.L. vi. 10239; Henz. 7321; Wil. 313), or

Earts of them (like that on the tomb of a Gaul of the tribe of the .ingones, belonging to Vespasian's time, Wil. 315), funeral orations (as those on Turia — C.I.L. vi. 1527 ; Notizie degli scavi (1898), p. 412 ; Hirschfeld, Wiener Studien Bormannlieft, p. 283; Fowler, Classical Review, xix. 261; on Murdia— C.I.L. vi. 10230; Orel. 4860; Rudorff, Abhandlungen der Kbnigl. Akademie der Wissenschaften zu Berlin (1868), p. 217 seq. ; and that of Hadrian on the elder Matidia, found at Tivoli — Mommsen in the same Abhandlungen (1863), p. 483 seq; Dehner, Laudatio Matidiae, Neuwied (1891), numerous state- ments relating to the conservation and the employment of the monu- ments (C.I.L. vi. 10249; Wil. 287-290), to their remaining within the family of the deceased — from which came the frequent formula " h(oc) m(onumentum) h(eredem) n(on) s(equetur) " and the like (Wil. 280; cf. Hor. Sat. i. 8. 13),— and relating to the annual celebration of parentalia (Wil. 305 seq.), down to the not uncommon prohibition of violation or profanation of the monument noli violare, &c, with many other particulars (on which the index of Wil. p. 678 seq. may be consulted), form the text of the sepulchral inscriptions of the later epoch from Augustus downwards. The thoroughly pagan sentiment non fui non sum non euro, or n. f. n. s. n. c, is common, apparently a translation of the Greek oin fiixi)v,h-ytvb)i-i]v' oba iao/iat' oi ni\ii mo'. Another type of epitaph, much affected by the poorer classes (like our " Affliction sore " &c), is: noli dolere mater eventum meum, Properavit aetas, hoc voluit fatus (sic) mihi ((Lier, " Topica carminum sepulcralium Latinorum " in Philologus, 62. 445 sqq.).

To these are to be added many local peculiarities of provinces (as Spain and Africa), districts (as the much-disputed sub ascia dedicare of the stones of Lyons and other parts of Gaul), and towns, of which a full account cannot be given here.

2. Of the dedicatory inscriptions (or tituli sacri), the oldest known are the short indications painted (along with representations of winged genii, in the latest style of Graeco-Italian vase painting), with white colour on black earthen vessels, by which those vessels (pocula) are declared to be destined for the worship, public or private, of a certain divinity (C.I.L. i. 43-50; Ephem. epigr. i. 5-6; Wil. 2827 a-i); they give the name of the god, as that of the possessor, in the genitive (e.g. Saeturni pocolom, Lavernai pocolom). The proper form of the dedication, the simple dative of the name of a divinity and often nothing else (as Apolenei, Fide, Junone, &c, which are all datives), is shown on the very primitive altars found in a sacred wood near Pisaurum (C.I.L. i. 167-180; Wil. 1-14); but also the name of the dedicants (matrona, matrona Pisaurese, which are

nomin. plur.) and the formulae of the offering (dono dedrot or dedro, donu dat, where dono and donu are accus.) are already added to them. This most simple form (the verb in the perfect or in the present) never disappeared entirely; it occurs not infrequently also in the later periods. Nor did the dative alone, without any verb or formula, go entirely out of use (see C.I.L. i. 630; Wil. 36; C.I.L. i. 814 = vi. 96; Orel. 1850; Wil. 32; C.I.L. i. 1153; Henz. 5789; Wil. 1775)- But at an early date the verb donum dare and some synonyms (like donum portare, ferre, mancupio dare, parare) were felt to be insufficient to express the dedicator's good- will and his sense of the justice of the dedication, which accordingly were indicated in the expanded formula dono dedet lub(e)s mereto (C.I.L. i. 183, cf. p. 555; Wil. 21; C.I.L. i. 190; Wil. 22), or, with omission of the verb, dono mere(to) lib(e)s (C.I.L. i. 182). The dative case and this formula, completely or partially employed (for merito alone is also used, as C.I.L. i. 562, cf. Ephem. epigr. ii. 353, Wil. 29), remained in solemn use. To lubens (or libens) was added laetus (so in Catullus 31. 4), and, if a vow preceded the dedication, votum solvit (or voto con- demnatus dedit; see C.I.L. i. 1 175; Henz. 5733; Wil. 142, and C.I.L. ii. 1044) ; so, but not before the time of Augustus (see C.I.L. i. 1462 =iii. 1772), the solemn formula of the dedicatory inscriptions of the later period, v. s. I. m. or v. s. 1. 1, m., arose. To the same effect, and of equally ancient origin with the solemn words dare and donum dare, the word sacrum (or other forms of it, as sacra [ara]), conjoined with the name of a divinity in the dative, indicates a gift to it (e.g. C.I.L. i. 814; Wil. 32; C.I.L. i. 1200-1201; Wil. 33 a, b); the same form is to be found also in the later period (e.g. C.I.L. i. 1124; Henz. 5624-5637), and gave the model for the numerous sepulchral in- scriptions with dis Manibus sacrum mentioned before. Sacrum combined with a genitive very seldom occurs (Orel. 1824; Wil. 34); ara is found more frequently (as ara Neptuni and ara Ventorum, Orel. 1340). Dedications were frequently the results of vows; so victori- ous soldiers (such as L. Mummius, the conqueror of Corinth — C.I.L. i. 541 seq.; Orel. 563; Wil. 27), and prosperous merchants (e.g. the brothers Vertuleii — C.I.L. i. 1175; Henz. 5733; Wil. 142) vow a tenth part of their booty (de praedad, as is said on the basis erected by one of the Fourii of Tusculum — C.I.L. i. 63, 64; Henz. 5674; Wil. 18) or gain, and out of this dedicate a gift to Hercules cr other divinities (see also C.I.L. i. 1503; Wil. 24; C.I.L. 1113; Wil. 43). Again, what one man had vowed, and had begun to erect, is, by his will, executed after his death by others (as the propylum Cereris et Proserpinae on the Eleusinian temple, which Appius Claudius Pulcher, Cicero's well-known predecessor in the Cilician proconsulate, began — C.I.L. i.

619 = iii. 347; Wil. 31); or the statue that an aedilis vowed is erected by himself as duovir (C.I.L. iii. 500; Henz. 5684); what slaves had promised they fulfil as freedmen (C.I.L. 1233, servos vovit liber solvit; C.I.L. 816, Wil. 51, " ser(vos) vov(it) leibert(us) solv(it)"), and so on. The different acts into which an offering, according to the circumstantially detailed Roman ritual, is to be divided (the consecratio being fulfilled only by the solemn dedicalio) are also specified on dedicatory inscriptions (see for instance, consacrare or consecrare, Orel. 2503, and Henz. 6124, 6128; for dedicare, C.I.L. i. 1159, Henz. 7024, Wil. 1782, and compare Catullus's hunc lucum tibi dedico consecroque Priape; for dicare see the aara leege Albana dicata to Vediovis by the genteiles luliei, C.I.L. i. 807, Orel. 1287, Wil. 101). Not exactly dedicatory, but only mentioning the origin of the gift, are the inscriptions on the pedestals of offerings (ivaBrnxaTa, donaria) out of the booty, like those of M. Claudius Marcellus from Enna (C.I.L. i. 530; Wil. 25, " Hinnad. cepit ") or of M. Fulvius Nobilior, the friend of the poet Ennius, from Aetolia (C.I.L. i. 534; Orel. 562; Wil. 26 a, and Bullettino del-I'lnstituto, 1869, p. 8; C.I.L. vi. 1307; Wil. 26 b, "Aetolia cepit" and " Ambracia cepit "); they contain only the name of the dedicator, not that of the divinity. Of the similar offerings of L. Mummius, already mentioned, two only are preserved in their original poetical form, the Roman in Saturnian verses of a carmen triumphale (C.I.L. i. 541; Orel. 563; Wil. 27 a) and that found at Reate in dactylic hexameters (C.I.L. i. 542; Wil. 27 b); the rest of them contain only the name of the dedicant and the dative of the community to which they were destined (C.I.L. i. and Wil. I.e.). Of a peculiar form is the very ancient inscription on a bronze tablet, now at Munich, probably from Rome, where two aidiles, whose names are given at the begin- ning as in the other donaria, " vicesma(m) parti(m) or [ex] vicesma

park Apolones (that is, Apollinis) dederi (that is, dedere) " (C.I.L. i. 187; Orel. 1433)- Many, but not substantial, varieties arise, when old offerings are restored (e.g. C.I.L. i. 638, 632 = Orel. 2135, and Wil. 48; C.I.L. i. 803; Henz. 5669, 6122); or the source of the offering (e.g. de stipe, C.I.L. i. 1 105; Henz. 5633 a; ex reditu pecuniae, ex patrimonio suo, ex ludis, de munere gladiatorio, and so on) ; or the motive {ex jusso, ex imperio, ex visu, ex oraculo, monitu, viso moniti, somnio admonitus and the like), or the person or object, for which the offering was made {C.I.L. i. 188, pro poplod; Ephem. epigr. ii. 208, pro trebibos, in the British Museum; pro se,

pro salute, in honorem domus divinae, &c), are indicated; or, as in the htuli operum publicorum, the order of a magistrate {de senati sententia, C.I.L. i. 56o=vi. 1306; .Orel. 5351; i. 632 = vi. no; Orel. 2135; Wil. 48; decurionum decreto, &c), and the magistrates or private persons executing or controlling the work, the place where and the time when it was erected, are added. On all these details the indexes, especially that of Wil. (ii. 675), give further information. The objects themselves which are offered or erected begin to be named only in the later period just as in the tituli operum publicorum (" basim donum dant," C.I.L. i. 1167; " signum basim, C.I.L. i. 1154; "' aram," C.I.L. i. 1468; Orel. 1466; Wil. 52; C.I.L. i. 1 109; Wil. 54); in the later period this custom becomes more frequent. It is hardly necessary to observe that all kinds of offerings have very frequently also been adorned with poetry ; these carmina dedicatoria are given by Buecheler, Anthologia Latina, ii.; cf. Wil

142-151-

3. Statues to mortals, whether living or after their death (but not on their tombs), with honorary inscriptions {tituli honorarii), were introduced into the Roman republic after the Greek model and only at a comparatively late date. One of the oldest inscriptions of this class comes from Greek soil and is itself Greek in form, with the name in the accusative governed by some (suppressed) verb like "honoured" {C.I.L. i. 533; Wil. 649), " Italicei L. Cornelium Scipionem {i.e. Asiagenum) honoris caussa," lost and of not quite certain reading, belonging to 561 A.u.c. (193 B.C.) ; the same form (in the accusative) appears in other (Latin or Latin and Greek) inscriptions from Greece {C.I.L. i. 596 = iii. 532; Wil. 1103; C.I.L. iii. 365, 7240; compare also C.I.L. i. 587, 588; Orel. 3036). The noble house of the Scipios introduced the use of poetical elogia in the ancient form of the carmina triumphalia in Saturnian verses (from the 6th century in elegiac distichs). They were added to the short tttuli, painted only with minium on the sarcophagi, giving the name of the deceased (in the nominative) and his curulian offices (ex-clusively), which were copied perhaps from the well-known imagines preserved in the atrium of the house {C.I.L. i. 29 sq ; Orel. 550 sq. ; Wil. 537 sq., and elsewhere). They hold, by their contents, an intermediate place between the sepulchral inscriptions, to which they belong properly, and the honorary ones, and therefore are rightly styled elogia. What the Scipios did thus privately for themselves was in other cases done publicly at a period nearly as early. The first instance preserved of such a usage, of which Pliny the elder speaks (Hist. nat. xxxiv. § 17 sq.), is the celebrated columna rostrata of C. Duilius, of which only a copy exists, made in or before the time of

the emperor Claudius (C.I.L. i. 195 =vi. 1300; Orel. 549; Wil. 609). Then follow the elogia inscribed at the base of public works like the Arcus Fabianus (C.I.L. i. 606, 607 and 278, elog. i.iii. =vi. 1303, 1304; Wil. 610), or of statues by their descendants, as those belong ing to a sacrarium domus Auguslae (C.I.L. i. elog. iv.-vi. = C.I.L. yi. 1310, 131 1) and others belonging to men celebrated in politics or in letters, as Scipio, Hortensius, Cicero, &c, and found in Rome either on marble tablets (C.I.L. i. vii.-xii. = C.I.L. vi. 1312, 1279, 1283, 1271, 1273; Wil. 611-613) or on busts (C.I.L. i. xv.-xix. = C.I.L. vi. 1327, 1295, 1320, 1309, 1325, 1326; Wil. 618-621; see also C.I.L. i. 40 = vi. 1280; Wil. 1101; and C.I.L. i. 631 =vi. 1278; i. 640 = vi. 1323, vi. 1321, 1322, where T. Quincti seems to be the nominative), and 111 divers other places (C.I.L. i. xiii., xiv. ; Wil. 614, 615). This custom seems to have been resumed by Augustus (Suet. Aug. 31) with a political and patriotic aim, praised by the poet Horace (Od. iv. 8. 13, " incisa notis marmora publicis, per quae spiritus et vita redit bonis post mortem ducibus ") ; for he adorned his forum with the statues of celebrated men from Aeneas and Romulus downwards (C.I.L. i. xxiv., xxv., xxvii., xxxii. = C.I.L. vi. 1272, 1308, 1315, 1318; Wil. 625, 626, 627, 632), and other towns followed his example (so Pompeii, C.I.L. i. xx., xxii. =WH. 622, 623; Lavinium, C.I.L. i. xxi. ; Wil. 617; Arretium, C.I.L. i. xxiii., xxviii., xxix., xxx., xxxi., xxxiii., xxxiv. =Wil. 624, 625, 629-633). All these elogia are written in the nominative. In the same way in the colonies statues seem to have been erected to their founders or other eminent men, as in Aquileia (C.I.L. i. 538= v. 873; Wil. 650; compare also C.I.L. v. 862; Orel. 3827) and Luna (C.I.L. i. 539= Wil. 651).

But along with this primitive and genuine form of the titulus honorarius another form of it, equivalent to the dedicatory inscrip- tion, with the name of the person honoured in the dative, begins to prevail from the age of Sulla onwards. For the oldest examples of this form seem to be the inscriptions on statues dedicated to the dictator at Rome (C.I.L. i. 584 = vi. 1297; Orel. 567; Wil. 1102a) and at other places (Caieta and Clusium, C.I.L. i. 585, 586; Wil. 1 102ft, c), in which the whole set of honours and offices 'is not enumer- ated as in the elogia, but only the honores praesentes ; compare also the inscription belonging to about the same date, of a quaestor urbanus

6 33

(C-I.L. 1. 636). Within the Greek provinces also, at the same period, • r^c- '? ad °Pt? d (C – LL – »• 595=iii- 531 ; Henz. 5294; Wil! 1

104). Similar dedications were offered to Pompey the Great (at Auxirnum and Clusium, C.I.L. i. 615, 616; Orel. 574; Wil. 1107) and to his legate L Aframus (at Bologna, but erected by the citizens of the Spanish colony Valentia, C.I.L. i. 601; Henz. 5127- Wil 1 106). rhey are succeeded by the statues raised to Caesar (at Bovianum, C.I.L. 1. 620; Orel. 582 ; Wil. 1108), and, after his death, tussu populi Romam, in virtue of a special law, at Rome (C I L i 6?6 vi. 872; Orel. 586; Wil. 877). With him, as is well known! divine honours begin to be paid to the princeps, even during life In this same form other historical persons of high merit also begin to be honoured by posterity, as, for example, Scipio the elder at Saguntum (C.I.L u. 3836; Wil. 653), Marius at Cereatae Marianae, the place which bears his name (C.I.L. x. 5782; Wil 654) Of statues erected by the community of a municipium to a private person, that of L Popilhus Flaccus at Ferentinum seems to be the oldest example (C.I.L. i. 1164; Wil. 655, and his note). In Rome, Augustus and his successors in this way permitted the erection of statues, especially to tnumphatores , in the new fora, including that of Augustus (C.IL. vi. 1386; Orel. 3187; Wil. 634; C.I.L. vi. 1444; He 1 Z iVt-t 8 ^' 1 – ^ 35) and that of Tra J an (C – LL – vi – 1377; HenI! ll' wn i 3 " V AA 549; HenZ – 5477; WiL 6 39! iv. 1549; Orel. 1386; Wil. 637; C./.L 1565, 1566; Wil. 640); and this custom lasted to a late period (C.I.L. vi. 1599; Henz. 3574; Wil. 638) as is shown by the statues of Symmachus the orator (C.I.L. vi 1608 1699; Orel 1186, 1187; Wil. 641), Claudian the poet (C.I.L. vi' 1710; Orel. 1 182; Wil. 642), Nicomachus Flavianus (C.I.L. vi. 1782, 1783; Orel. 1188; Henz. 5593; Wil. 645, 645a), and many other eminent men down to Stilicho (C.I.L. vi. 1730, I7 3 x; Orel 1 133. 1 134; Wil. 648, 648a), who died in the year 408. In similar forms are conceived the exceedingly numerous dedications to the emperors and their families, in which the names and titles, according to the different historical periods, are exhibited, in the main with the greatest regularity. They are specified in detailed indexes by Henzen and Wilmanns, as well as in each volume of the Corpus In the provinces of course, the usages of the capital were speedily imitated. Perhaps the oldest example of a titulus honorarius in the form of an elogtum (but in the dative), with the full cursus honorum l h .,P. er r son honoured, is a bilinguis from Athens, of the Augustan age (C.I.L. .111. 551; Henz. 6456 a; Wil. 1122); the honours are here enumerated in chronological order, beginning with the lowest- m other instances the highest is placed first, and the others follow in order. 1 In the older examples the formula " honoris causa " or virtutis ergo (Hermes, vi., 1871, p. 6), is added at the end, as in an inscription of Mytilene belonging to the consul of the year 723 a u c

*m 3I – B ; C '. { Fi: L b " L 455; 0reL 4III; WiL iio 4 J); the same! abbreviated (h.c), occurs on an inscription of about the same age from Cirta in Africa (C.I.L. viii. 7099; Wil. 2384). Shortly afterwards the honour of a statue became as common in the Koman mumcipia as it was in Athens and other Greek cities in the later period. Each province furnishes numerous examples, partly with

peculiar formulae, on which the indexes of Wilmanns (PP- 673, 696 sq.) may be consulted. Special mention may be made of the numerous honorary inscriptions belonging to aurigae histnones and gladiatores ; for those found in Rome see C I L vi

10,044-10,210.

He who erects a temple or a public building, or constructs a road a bridge, an aqueduct or the like, by inscribing his name on the work honours himself, and, as permission to do so has to be given by the public authorities, is also honoured by the community I hercfore the htuli operum publicorum, though in form only short official statements (at least in the older period) of the origin of the work, without any further indications as to its character and purpose partake of the style of the older honorary inscriptions. Of the ancient and almost universally employed method of erecting public buildings by means of the locaho censoria one monument has preserved some traces (Ephem. epigr. ii. 199). The oldest instance of this class is that commemorating the restoration of the temple of the Capitoline J u P'ter, begun, after its destruction by fire in the year 671 (83 B c) by Sulla and continued five years later by the well-known orator and poet Q. Lutatius Catulus, but completed only about twenty years afterwards. Here, after the name of Catulus in the nominative and the indication of the single parts of the building (as, for example substructionem et tabularium), follows the solemn formula de s(enati) s(entenha) faciundum coeravit eidemque probavit (C I L i 502 = vi. 1314; Orel. 31, 3267; Wil. 700). With the same formula the praetor Calpurnius Piso Frugi (of about the same period) dedicated an unknown building (C.I.L. i. 594 = vi. 1275), restored afterwards by /rajan. ° n a worlc executed by the collegium tribunorum plebis (C.I.L. 1. 593 =vi. 1299; Wil. 787), perhaps the public streets within the town, the sum employed for it is also inscribed. Precisely similar is the oldest inscription of one of the bridges of Rome, the ponte dei quattro capi, still preserved, though partly restored, on its original site, which commemorates its builder, the tribune of the year 692

_ This observation, applied to a large number of monuments, gave rise to many of the splendid epigraphical labours of Borghesi (see eˆg. his dissertation upon the inscription of the consul L. Burbuleius, CEuvres, iv. 103 sq.).

[LATIN

(62 B.c.)i L- Fabricius (C.I.L. i. 600 = vi. 1305; Qrel. 50; Wil. 788); it was restored by the consuls of the year 733 (21 B.C.). 1 On privately erected buildings the founder after his name puts a simple fecit (as also on sepulchral inscriptions) ; so, possibly, did Pompey. when he dedicated his theatre as a temple of Venus Victrix and, on Cicero's clever advice, as Varro and Tiro had it from Cicero himself, in- scribed on it cos-tert (not tertium or tertio) (see Gellius, Nod. Att. x. 1). So Agrippa, when he dedicated his Pantheon in the year 727 (27 B.C.), inscribed on it only the words M. Agrippa, L.f. cos. tertium fecit (C. I.L. vi. 896; Orel. 34; Wil. 731), as all who visit the Eternal City know. Of municipal examples it will be sufficient to name those of the majestic temple of Cora (C.I.L. i. 1149-1150; Wil. 722, 723), of Ferentinum, with the measurements of the foundation (C.I.L. i. 1161-1163; Wil. 708), of the walls and towers at Aeclanum (C.I.L. i. 1230; Orel. 566; Henz. 6583; Wil. 699), of the theatre, amphitheatre, baths and other structures at Pompeii (C.I.L. i. 1246, 1247, 1251, 1252; Orel. 2416, 3294; Henz. 6153; Will. 730, 1899-1901). At Aletrium a munificent citizen gives an enumeration of a number of works executed by him in the period of the Gracchi, in his native town (" haec quae infera scripta sunt de senatu sententia facienda coiravit," C.I.L. i. 1166; Orel. 3892; Wil. 706); and, more than a century later, the same is done at Cartima, a small Spanish town near Malaga, by a rich woman (C.I.L. ii. 1956; Wil. 746} Military works, executed by soldiers, especially frequent in the. Danubian provinces, Africa, Germany and Britain, give, in this wayj manifold and circumstantial information as to the military adminis- tration of the Romans. On a column found near the bridge over the Minho at Aquae Flaviae, the modern Chaves in northern Portugal, ten communities inscribed their names, probably as contributors to the work, with those of the emperors (Vespasian and his sons), the imperial legate of the province, the legate of the legion stationed in Spain, the imperial procurator, and the name of the legion itself (C.I.L. ii. 2477; Wil. 803); and similarly, with the name of Trajan, on the famous bridge over the Tagus at Alcantara, in Spanish Estremadura, the names of the municipia provinciae Lusitaniae stipe conlata quae opus pontis perfecerunt are inscribed (C.I.L. ii. 759-762; Orel. 161, 162; Wil. 804).*

As in some of the already-mentioned inscriptions of public works the measurements of the work to which they refer (especially, as may be supposed, in the case of works of great extent, such as walls of towns or lines of fortification, like the walls of Hadrian and Antoninus Pius in Britain) are indicated, so it early became a custom in the Roman

republic to note on milestones the name of the founder of the road and, especially at the extremities of it and near large towns, the distances. So in the val di Diana in Lucania P. Popillius Laenas, the consul of the year 622 (132 B.C.), at the end of a road built by him, set up the miliarium Popilianum (C.I.L. '• 55 1 ; Orel. 3308; Wil. 797), which is a general elogium to himself, in which he speaks in the first person (viamfecei ab Regio ad Capuam, &c). One of the single miliaria set up by him is also preserved (C.I.L. i. 550; Henz. 7174 d; Wil. 808), which contains only his name and the number of miles. In the same brief style are con- ceived the other not very frequent republican miliaria found in Italy (C.I.L. i. 535-537; Henz. 5348; Wil. 567; C.I.L. i. 540; Henz. 5350, 6226; Wil. 807; C.I.L. i. 558, 559; Henz. 5353; Wil. 808; C.I.L. i. 561; Henz. 5180; Wil. 811; C.I.L. i. 633; Wil. 812) down to the time of Augustus (C.I.L. x. 6895, 6897, 6899; Wil. 813), a nd also the even more rare specimens from the provinces (from Asia —C.I.L. i. 557=i". 479, Wil. 826, C.I.L. i. 622 =iii. 462, Wil. 827;. from Spain— C.I.L. i. 1484-1486 = 11. 4920-4925, 4956, Wil. 828, 829). Augustus inscribed on each milestone on his road across Spain " a Baete et Jano Augusto ad Oceanum " (e.g. C.I.L. ii. 4701 ; Wil. 832), Claudius on those of a road in Upper Italy founded by his father Drusus " viam Claudiam Augustam quam Drusus pater Alpibus hello palefaclis derexserat munit ab Altino (or aflumine Pado) ad flutnen Danuvium " (C.I.L. v. 8002, 8003; Orel. 648, 708; Henz, 5400; Wil. 818). The later milestones vary greatly in form, but all contain most precious materials for ancient geography and topo- graphy ; in the volumes of the Corpus they are taken together under the special head viae publicae (and here and there privalae) at the end of each chapter.

A similar character, resulting from the combination of a mere authentic record with the peculiar form of the honorary inscription, belongs to the kindred classes of inscriptions of the aqueducts and of the different boundary-stones. The large dedicatory inscriptions of the celebrated aqueducts 2 of Rome (as the Aquae Marcia, Tepula and Julia, C.I.L. vi. 1244-1246, Orel. 51-53, Wil. 765; the Virgo, C.I.L. vi. 1252, Orel. 703, Wil. 763; the Claudia, &c, C.I.L. vi.

1 The character of an elogium is assumed in a special way by the inscriptions on triumphal arches, such as that of Augustus on the arch of Susa in Piedmont, dating from the year 745 (9 B.C.) (C.I.L. v. 7231 ; Orel. 626), and the similar one on the tropaea Augusti (la Turbia) (C.I.L. v. 7817) of the year 747 (7 B.C.), which Pliny also (Hist. Nat. iii. § 136) records, and those of the other emperors at Rome, of which only that of Claudius, the conqueror of Britain

(C.I.L. vi. 920, 921 ; Orel. 715; Wil. 899), with the statues of himself and his family, need be mentioned.

2 See the important work of R. Lanciani, Commcntari di Frontino intorno Ic aequo c g/i acqucdotli, £fc. (Rome, 1880).

1256-1258, Orel. 54-56, Wil. 764) have quite the character of honorary inscriptions, while the various cippi terminates, which mark the ground belonging to the aqueduct, show the greatest analogy to the milestones (e.g. C.I.L. vi. 1243 a-g; Henz. 6635, 6636; Wil. 775- 779). The other Italian and provincial varieties cannot be specified here. Of boundary-stones, or cippi terminates, some very ancient specimens have been preserved. To the age preceding the Second Punic War belong two, found at Venusia and erected by municipal magistrates (C.I.L. i. 185, 186; Orel. 3527, 3528; Wil. 863); they give a short relation of a decree, by which certain localities were declared to be sacred or public (" aul sacrom aut poublicom locom ese "). Then follow the cippi Gracchani, by which Gaius Gracchus and his two colleagues, as tres viri agris iudicandis adsignandis, measured the ager Campanus, for its division among the plebs. They contain the names of the tres viri in the nominative, and in addition, on the top, the lines and angles of the cardo and decumanus, according to the rules of the agrimensores, or the boundary lines between the ager publicus and privatus (C.I.L. i. 552-556; Henz. 6464; Wil. 859-861). From the age of Sulla we still have various boundary- stones giving the line of demarcation between different communities (between Fanum and Pisaurum— C.I.L. i. 583, Orel. 570, Wil. 861 ; between Ateste, Vicetia and Patavium — C.I.L. i. 547-549, Orel. 31 10, Henz. 51 14, 51 15, Wil. 865, 866). To the town of Rome belong the termini ripae Tiberis (C.I.L. i. 608-614 = vi. 1234 a-l), beginning in the Augustan age, and the termini of the pomoerium of Claudius and Vespasian as censors, and of the collegium augurum under Hadrian (C.I.L. vi. 1231-1233; Orel. 710, 811; Wil. 843, 844), while others, of the consuls of the year A.D. 4 (C.I.L. vi. 1263; Orel. 3260; Wil. 856), of Augustus (C.I.L. vi. 1265; Henz. 6455; Wil. 852), &c, show the boundary between the ager publicus and privatus. With similar objects boundary-stones were erected by the emperors, or, under their authority, by magistrates, mostly military, in the rest of Italy also (as in Capua — C.I.L. x. 3825, Orel. 3683, Wil. 858; at Pompeii — C.I.L. x. 1018, Wil. 864) and in the provinces (as in Syria — C.I.L. iii. 183; and Macedonia — C.I.L. iii. 594; in Dalmatia — C.I.L. iii. 2883; in Africa— C.I.L. viii. 7084-7090, 821 1, 8268. 10,803, 10,838, Wil. 869, 870; in Spain — C.I.L. ii. 2349, 2916, Wil. 871 — where the pratum of a legion is divided from the

territory of a municipium ; in Gaul— Wil. 867 ; in Germany, in the column found at Miltenberg on the Main, Bonner Jahrbucher, vol. lxiv., 1878, p. 46, &c). Private grounds (pedaturae) were unfrequently marked off by terminal cippi. To this class of tituli must be added also the curious inscriptions incised upon the steps of Roman circuses, theatres and amphitheatres (see Hiibner, Annali dell' Institulo archeologico, vol. xxviii., 1856, p. 52 sq., and vol. xxxi., 1859, p. 122 sq.), as, for instance, upon those of the Coliseo at Rome (C.I.L. vi., 1796, 1-37; compare R. Lanciani, Bullettino archeologico munici- pal, 1881).

4. We now come to the last class of tituli, viz. those which in the Corpus are arranged, at the end of each volume, under the head of Instrumentum. By this very comprehensive term are designated objects which vary greatly among themselves, but which are of such a character as not to fall within any of the classes of tituli described before, or the class of the instrumenta in the proper sense of that word, — the laws, &c. The tituli of the instrumentum embrace movable objects, destined for public and private use, and illustrate almost every side of the life of the ancient Romans. As systematic treat- ment of them is hardly possible, a simple enumeration only of their different classes can be given, without citing special examples. The first species of them is metrological, comprehending the inscriptions on measures and weights. The gold and silver plate used in the best Roman houses was also always marked with a note of its weight, — as is seen, for instance, on the different objects belonging to the Hildesheim find (see Hermes, iii., 1868, p. 469 sq. ; Philologus, xxviii., 1869, p. 369), the Corbridge lanx in Northumberland House (C.I.L. vii. 1268) and many others. A second species is formed by the tesserae, tokens or marks, mostly in bronze, bone and ivory, but also earthen, of which the most interesting are the so-called tesserae gladiatoriae, little staves of bone with holes at the top, and with names of slaves or freedmen and consular dates upon them, the relation of which to the munera gladiatoria is by no means certain (see C.I.L. i. 717 sq., and Hermes, xxi. p. 266; Rhein. Mus. xli. p. 517; xlii. p. 122 ; Berl. phil. Woch., 1888, p. 24). The other circular tesserae (the so-called tesserae theatrales) of ivory or bone, with emblems and short inscriptions, partly Greek and Latin, used to be attributed to the ludi scaenici (see Henzen, Annali dell' Institute . archeologico, vol. xx., 1848, p. 273 sq., and vol. xxii., 1850, p. 357 sq.) and to other ludi; but this account has been questioned (Huelsen, Bullett. dell' Instituto, 1896, p. 227). A third species is that of inscriptions carved, inscribed, painted or stamped upon various materials, raw or manufactured, for trade or household

use. Such are, to begin with, the most solid and heavy, the inscriptions carved or painted on masses of stone, mostly columns, in the quarries, and preserved either on the rocks themselves in the quarries or on the roughly hewn blocks transported to the Roman emporium on the Tiber bank. Curious specimens of the first kind are preserved in Lebanon, and in the north of England, near Hadrian's Wall and elsewhere; on the second may be consulted a learned treatise by Padre L. Bruzza (" Iscrizioni dpi inarmi grrzzi." in the Annali del- l' 'Instituto archeologico, vol. xlii., 1870, pp. 106-204). Of a kindred

character are the inscriptions, mostly stamped or engraved in the mould, of pigs of silver, bronze and lead (and pewter), found in the Roman mines in Spain and England (see Hiibner, " Romische Bleigruben in Britannien," in Rheinisches Museum fur Philologie, vol. xi., 1857, p. 347 sq., and C.I.L. vii. 220 sq.', A. Way, Archaeo- logical Journal, vol. xvi., 1859, p. 23, and vol. xxiii., 1866, p. 63). ■■ *A fourth species of tituli of this class is strictly related to the military institutions of the Roman empire. Many of the weapons are marked with the names of the bearer and of the military corps to which he belonged, — so, for example, the buckles of their shields (see Hiibner, " Romische Schildbuckel," in Archaologisch- epigraphische Mittei- lungen a us Osterreich, vol. ii., 1878, p. 105 sq. ; by far the best extant specimen is the umbo of a legionary soldier of the eighth legion found in the Tyne near South Shields, C.I.L. vii. 495), and sometimes the swords, as that of Tiberius from Mainz (now in the British Museum, see Bonner Winckelmannsprogramm of 1848). The leaden glandes used by the funditores, the slingers, in the Roman army bear curious historical inscriptions (see C.I.L. i. 642 sq., Ephem. epigr. vi. and, on the question of the authenticity of many of them, Zange- meister, C.I.L. ix., 35* sqq.). Special mention must be made also of the leaden seals or marks (bullae), evidently of military origin (perhaps to be borne by the soldiers as a countersign), which have been found in many parts of England {C.I.L. vii. 1269; Ephem. epigr. iii. 144, 318, iv. 209, vii. 346). Of the highest interest are the manifold productions of the Roman tile and brick kilns (C.I.L. xv. Inscriptiones laterum ; cf . Descemet in the Bibliotheque des ecoles francaises, vol. xv.). Next to the tiles with consular dates made at Veleia (C.I.L. i. 777*

sqq.), those signed with the name of legions or other military corps, and employed in the various military buildings of these, are especially worthy of mention; they form an important chapter in every geographical part of the Corpus. But private persons, too, especially the rich landed proprietors, and afterwards the emperors and their kinsmen, kept large figulinae, and their manufactures — tiles of every description and other earthenware- were spread over the Roman empire (Dressel, Untersuchungen iiber die Chronologie der Ziegelstempel der Gens Domitia, 1888; C.I.L. xv.). The different sorts of earthen vessels and lamps, the fragments of which are found in great quantities wherever Roman settlements occurred, are arranged at the end of each volume of the Corpus and are collected in vol. xv part ii. p. i. On the maker's marks on earthen- ware, see Habert, La Po'erie antique parianle (1893); Dragendorf, " Terra Sigillata," in Bonn. Jahrbiich. xcvi. 18. On Roman lamps and their inscriptions the accurate catalogue of the Vienna collection by Kenner (" Dieantiken Thonlampendes K. K. Miinz- und Antiken-Cabinetes und der K. K. Ambraser Sammlung," in the Archiv fur Kunde ostcrreichischer Geschichtsquellen, vol. xx., Vienna, 1858) may be consulted with advantage. The chief deposit of earthenware fragments, the Monte testaccio in Rome, has been explored by Dressel (" Ricerche sul Monte testaccio," in the Annali dell' Instituto archeologico, vol. i., 1878, p. 1 18-192). Inscriptions are found on various classes of vessels, painted (as the consular dates on the large dolia for wine, oil, die., see Schone, C.I.L. iv. 171 sq., and Ephem. epigr. i. 160 sq.), stamped on the clay when still wet or in the mould, and scratched in the clay when dry, like those on the walls of ancient buildings in Pompeii, Rome and other places of antiquity. Like the corresponding Greek ware, they contain chiefly names of the makers or t he merchants or the owners, and can be treated in a satisfactory manner only when brought together in one large collection (C.I.L. xv. part ii.). inasmuch as, besides being made in many local potteries, they were exported principally from some places in Italy (e.g. Arezzo) and Spain, in nearly every direction throughout northern and western Europe, the countries outside the Roman frontiers not excluded. Vessels and utensils of glass and of metal (gold, silver and especially bronze) were also exported from Italy on a large scale, as is being more and more readily recognized even by those antiquaries who formerly were wont to assume a local origin for all bronze finds made in the north of Europe. These utensils, ornaments and other objects made of precious metals (such as cups, spoons, mirrors, fibulae, rings, gems), not unfrequently bear Latin inscriptions. On the very ancient silver and bronze caskets, for holding valuable articles of the female toilet, which have been found at Praeneste, are

inscribed, in addition to the names of the artist and of the donor, occurring once, the names of the persons in the mythical representations engraved upon them (C.I.L. i. 54-60, 1500, 1501; Jordan, Kritische Beitrage sur Geschichte der lateinischen Sprache, Berlin, 1879, p. 3 sq.). In the ancient well of the Aquae Apollinarcs, near Vicarello in Tuscany, three silver cups have been found with circumstantial itineraries " a Codes (sic) usque Romam " engraved upon them, evidently gifts to the divinity of the bath for recovered health presented by travellers from the remote city named (Henzen 5210). Similar is the Rudge Cup, found in Wiltshire and preserved at Alnwick Castle, which contains, engraved in bronze, an itinerary along some Roman stations in the north of England (C.I.L. vii. 1291). The inscriptions of the Hildesheim silver find and others of a similar character have been already mentioned; and many examples might be enumerated besides. On the ancient glass ware and the inscriptions on it the splendid works of Deville (Histoire de I'art de la verrerie dans Vantiquiti. Paris, 1873) and Froehner (La Verrerie antique, description de la collection Charvet, Paris, 1 879) may be consulted; on the Christian classes that of Garrucci (Vetri ornati ii figure in oro trovati

nei cimiteri dei cristiani primitivi di Roma, Rome, 1858) ; on the makers' marks on bronze objects, Mowat, Marques de bronziers sur objets trpuves ou rapportes en France (1884) (extracted from Bulletin epigraphique, 1883-1884). The last species of liluli is formed by the stamps themselves with which the inscriptions on many of the objects already named are produced. They are mostly of bronze, and con- tain names; but it is not easy to say what sort of objects were marked with them, as scarcely any article stamped with a still existing stamp has been found. Amongst the materials stamped leather also is to be mentioned. One class only of stamps differs widely from the rest, — the oculists' stamps, engraved mostly on steatite (or similar stones), and containing remedies against diseases of the eyes, to be stamped on the glass bowls in which such remedies were sold, or on the medicaments themselves (see Grotefend, Die Stempel der r&mischen Augendrzte gesammell und erkldrt (Gottingen, 1867); de Villefosse and Thedenat, Cachets d'oculistes romains (1882) ; Esperandieu, Recueil des cachets d'oculistes romains (1894).

IV. The other great class of inscriptions above referred to, the instrumenta or leges, the laws, deeds, &c, preserved generally on metal and stone from the nature of the case have to be considered chiefly with regard to their contents; their form is not regulated by such constant rules as that of the tituli, so far as may be inferred*

from the state of completeness in which they have been preserved. The rules for each special class therefore, though, generally speaking, maintained— as was to be expected of Roman institutions — with remarkable steadiness from the earliest times down to a late period, must be based upon a comprehensive view of all the examples, in- cluding those preserved by ancient writers, and not in the monu- mental form. These documents are, as a rule, incised on bronze plates (only some private acts are preserved on wood and lead), and therefore have their peculiar form of writing, abbreviation, interpunction, &c, as has been already explained. The older Roman laws are now collected, in trustworthy texts, in the Corpus, vol. i.; of the documents belonging to the later period a very comprehensive sylloge is given in C. G. Bruns's Fontes juris Romani antiqui.

I . Among the earliest occasions for committing to writing agree- ments, which may be supposed to have been originally verbal only, must certainly be reckoned international transactions (leges foederis or foedera). At the head of the prose records written in the Latin language we find the treaties of alliance of Tullus Hostilius with the Sabini (Dionysius Halic. iii. 33), of Servius Tullius with the Latini (Dionysius iv. 26; Festus p. 169; this was, partly, at the same time, as will afterwards appear, the oldest document of the sacred class), of the second Tarquinius with Gabii (Dionysius iv. 58; Festus, Epit. p. 56). They are followed, in the oldest republican period, by the celebrated foedera with Carthage; by the pacts of Sp. Cassius Vecellinus with the Latini of the year 261 (493 B.C.), which Cicero seems to have seen still in the forum behind the rostra, written on a bronze column (Pro Balbo, 23, 53 ; see also Livy ii. 33 ; Festus p. 166; and Mommsen's Romische Forschungen, ii. 153 sq.); and by the foedus Ardeatinum of 310 (444 B.C.) mentioned by Livy (iv. 7). Of all these documents nothing has been preserved in an authentic form, save some few words quoted from them by the ancient grammarians. Of one foedus only is there a fragment still in exist- ence, relating to the Oscan civitas libera Bantia (C.I.L. i. 197) ; it contains the clausula of the foedus, which was written in Latin and in Oscan (see Apulia). On account of this peculiar circumstance, the document gave occasion to Klenze, and afterwards to Mommsen, to resume (for the sake of Roman jurisprudence, in the first instance) inquiry into the Oscan and other Italian dialects. Some other Roman foedera ?lk preserved only in Greek, e.g. that with the Jews of the year 594 (160 B.C.) (Josephus, Ant. xii. 6. 10). Some others, made with the same nation between 610 and 615 (144 and 139 B.C.) (Jos. Ant. xiii. 5. 6 and 7. 8), are mentioned in an abridged form only, or given in that

of a senatus consultum, to which they must formally be ascribed. Amongst the foedera may be reckoned also the curious oath, sworn, perhaps, according to a general rule obtaining for all civitates foederatae, by the citizens of a Lusitanian oppidum, Aritium, to Gaius Caesar on his accession to the throne in a.d. 37 (C.I.L. ii. 172; Wil. 2839).

Closely related to the foedera are the pacts between communities and private individuals, respecting patronatus or hospitium (tabulae patronatus et hospitii, also, when in small portable form, tesserfie hospitales; cf. Plautus, Poen. 1047, of which many specimens from- the end of the republic down to a late period of the empire have been preserved (see Gazzera, Memorie delV Academic di Torino, vol. xxxv., 1831, p. I sq., and Mommsen, Romische Forschungen, i. 341 sq.). Of the numerous examples scattered through the different volumes of the Corpus may be quoted the tessera Fundana, containing the pact of hospitality between the community of Fundi and a certain Ti. Claudius (who cannot, with certainty, be identified), the oldest hitherto known, in the form of a bronze fish (C.I.L. i. 552; Henz. 7000; Wil. 2849); the tabula of the pagus Gurzensium in Africa, delivering the patronate to L. Domitius Ahenobarbus, Nero's grand- father, in 742 (12 B.C.), in the afterwards solemn form of a tabella fastigata, to be fixed in the atrium of the person honoured (Orel. 3693; Wil. 2850); that of the civitas Pailantina with a peregrinus named Acces Licirni of the year 752 (2 B.C.) (Ephem. epigr. i. 141;

Hermes, v., 1871, p. 371 seq.); that of LacUbula, in Spain, with one Q. Marius Balbus, of A.D. 5 (C.I.L. ii. 1393) ; that of the Bocchoritani on the island of Majorca, of A.D. 6 (C.I.L. ii. 3695; Wil. 2851); the four relating to C. Silius Aviola, dating from A.D. 27 to 28, all found at Brescia (C.I.L. v. 4919-4922); that of the colonia Julia Aug. legionis vii. Tupusuctu, in Africa, with the imperial legate Q. Julius Secundus, of A.D. 55 (C.I.L. viii. 8837; Wil. 2851); that of two gentilitates, the Desonci and Tridiavi, of the gens of the Zoelae, in Spain, now in the museum of Berlin, which contains an older act of the year 27, and another more recent of the year A.D. 127 (C.I.L. ii. 2633; Orel. 156); that of the respublica Pompelonensis (Pampeluna in Spain) of A.D. 185 (C.I.L. ii. 2960; Wil. 2854); that

of the Segisamonenses, in Spain, of A.D. 239, now in the museum at Burgos (Ephem. epigr. ii. 322) ; that of the fabri subidiani (i.e. subaediani, qui sub aede consistunt) of Cordova, of A.D. 348 (C.I.L. ii. 221 1; Wil. 2861); and, in addition to many others, those found together at Rome, on the site of the palace of Q. Aradius Valerius Proculus, and belonging to him and other members of his family, from divers African cities and executed in A.D. 321 and 322 (C.I.L. vi. 1684-1688; Orel. 1079, 3058).

2. Hardly inferior in antiquity, and of superior value, are the remains of laws in the stricter sense of the word (leges and plebiscita) , preserved to us in the originals, although unfortunately only in fragments more or less extensive. Of those laws the oldest and most important are the lex Acilia (for so it is in all probability to be styled) repelundarum of the year 631 (C.I.L. i. 198), which is incised on a bronze table about 2 metres broad, in 90 lines of about 200 to 240 letters each, and therefore extremely inconvenient to read, and the lex agraria of 643 (1 1 1 B.C.), written on the reverse of the table of the Acilia, abrogated shortly afterwards (C.I.L. i. 200); this is the third of the celebrated laws of C. Gracchus bearing upon the division of public lands. Then follow the lex Cornelia de viginli quaestoribus, a fragment of Sulla's legislation, the eighth table only, of the whole set, being preserved (C.I.L. i. 202) ; the plebiscitum de Thermensibus, on the autonomy of Termessus in Pisidia, proposed by the tribuni plebis, in 682 (72 B.C.), one of four or five large bronze plates (C.I.L. i. 204) ; the lex Rubria de civitate Galliae cisalpinae of 705 (49 B.C.), written in a new and more convenient form (belonging as it does to Caesar's legislation), in two columns, with numbered divisions, being the fourth out of an unknown number of plates (C.I.L. i. 205); the lex Julia municipal-is, or, from the place where it was found, the tabulae Heracleenses of 709 (45 B.C.), written on the reverse of the much older Greek law of that community, preserved partly at Naples, partly in the British Museum (C.I.L. i. 206), also a fragment of Caesar's general municipal institutions; it contains a curious passage relating to the public promulgation of laws (v. 15). These are the laws of the Roman republic preserved in important frag- ments; some minor ones (brought together in C.I.L. i. 207-211) may be left out of account here. In the imperial age, laws in general were replaced by senatus consulta or by imperial decrees. It was also in the form of a senatus consultum that the leges de imperio, on the accession of the emperors, seem to have been promulgated. An example of such a law, preserved in part on a bronze tablet found at Rome, is the lex de imperio Vespasiani (C.I.L. vi. 930; Orel. i. 567). There is, besides,

one special category of imperial constitutions which continued to be named leges, viz. the constitutions given by the emperors to the divers classes of civitates, based upon the ancient traditional rules of government applied to Rome itself as well as to the coloniae and municipia. Of this sort of leges some very valuable specimens have come from Spanish soil, viz. the lex coloniae Julia Genetivae Urbanorum sive Ursonis (now Osuna), given to that colony by Caesar in 710 (44 B.C.), but incised, with some alterations, in the time of Vespasian, of which three bronze tables out of a much larger number remain (Hiibner and Mommsen, Ephem. epigr. ii. 150 sq. and 221 sq.); the lex Salpensana and the lex Malacitana, given to these two municipia by Domitian, between A.D. 81 and 84, each on a large bronze plate, written respectively in two and in five columns, with the single chapters numbered and rubricated (C.I.L. ii. 1963, 1964 ; compare Mommsen, " Die Stadtrechte der lateinischen Gemein- den Salpensa und Malacca in der Provinz Baetica," in the Abhand- lungen der sachsischen Gesellschaft der Wissenschaften, philol.-histor. Classe, vol. iii., 1857, p. 363 sq.) ; the lex metalli Vipascensis, given, with all probability, by one of the three Flavii, as a constitution to a mining district of southern Portugal, one bronze plate numbered iii. — three or more, therefore, being lost (see Hiibner, Ephem. epigr. iii. 165 sq. and, for a popular account, the Deutsche Rundschau, August 1877, p. 196 sq.). The so-called military diplomas, although in certain respects nearly related to the leges of the later period, are better placed along with the imperial decrees.*

3. A third species of official documents is formed by decrees of the senate of Rome, of the analogous corporations in the coloniae and municipia, and of the divers collegia and sodalicia, constituted, as a rule, after a similar fashion and debating in nearly the same way as the Roman and the municipal senates. The oldest Roman senatus consulta are those translated into the Greek language and containing treaties of alliance, as already mentioned. They are preserved either on monuments or by ancient authors, as Josephus: e.g. the fragment found at Delphi, from the year 568 (186 B.C.), and the senatus corisultum Thisbaeum, from Thisbe in Boeotia, 584 (170 B.C.) (Ephem. epigr. i. 278 sq., ii. 102, and Joh. Schmidt, Zeti-

schrift der Savigny-Stiftung, vol. iii., 1881), those of 616, 619, 621, 649 (138-105 B.C.) (C. I. Graec. 2905, 2908, ii. 2485, 2737; Le Bas and Waddington iii. 195-198; Annali dell' Instituto, vol. xix. 1847, p. 113; Ephem. epigr. iv. 213 sq.), and those relating to the Jews, dating from 615, 621 and 710 (139, 133 and 44 B.C.) (Josephus, Ant. xiii. 9. 2, xiv. 8. 5 and 10. 9). The two oldest

senatus consulta written in Latin are also preserved in a more or less complete form only by ancient authors; they are the sc. de philosophis et rhetoribus of 593 (161 B.C.) (Gellius, Noel. Att. xv. 11. 1) and that de hastis Martiis of 655 (99 B.C.) (Gellius iv. 6. 2). The only one belonging to the oldest period preserved in the original Latin form, of which only a part exists, together with the Greek translation, is the sc. Luta- tianum, relating to Asclepiades of Clazomenae and his companions, dating from 676 (77 B.C.) (C.I.L. i. 203). The rest, belonging to the later epoch from Cicero downwards, about twenty in number, are mostly preserved only in an abridged form by ancient writers, — such as Cicero, Frontinus, Macrobius, — or in Justinian's Digesta (see Hiibner, De senatus populique Romani actis, Leipzig, 1859, p. 66 sq.) ; a few exist, however, in a monumental form, complete or in frag- ments — as the two sc. on the ludi saeculares, dating from 17 B.C. and a.d. 47, preserved on a marble slab found at Rome (C.I.L. vi. 877); the fragments of two sc. in honour of Germanicus and the younger Drusus, from Rome, on bronze tablets (C.I.L. vi. 911-912; Henz. 5381-5282); the two sc. Hosidianum and Volusianum, containing regulations for the demolition and rebuilding of houses in Rome, incised on the same bronze plate, found at Herculaneum, dating from Nero's time, between a.d. 41 and 46 and from 56 (Orel. 31 15; Mommsen, Berichte der sacks. Gesellschaft der Wissenschaften, philol.- histor. Classe, 1852, p. 272 sq.) ; and, of a later period, the sc. Cas- sianum or Nonianum of a.d. 138, containing a market regulation for the saltus Beguensis in Africa, where it has been found preserved in two examples on stone slabs (Ephem. epigr. ii. 271 sq., not complete in Wil. 2838), and the fragment of that for Cyzicus, belonging to the reign of Antoninus Pius (Ephem. epigr. iii. 156 sq.). There exists, besides, a chapter of a sc, relating to the collegia, inserted in the decree of a collegium at Lanuvium, to be mentioned below. Of the municipal decrees, of which a greater number is preserved (see Hiibner, De sen. populique Rom. actis, p. 71 sq.), only a few of the more important may be mentioned here: the lex Puteolana de parieti faciundo of 649 (105 B.C.) (C.I.L. i. 577; Orel. 3697; Wil. 697); the two decreta (or so-called cenotaphia) Pisana in honour of Lucius and Gaius Caesar, the grandsons of Augustus, of a.d. 3 (C.I.L. xi. 1420, 1421; Orel. 642, 643; Wil. 883); the decretum Lanuvinum of a.d. 133, containing the regulations of a collegium funeraticium, styled collegium salutare Dianae et Antinoi (Orel. 6086; Wil. 319); and the decretum Tergestinum, belonging to the time of Antoninus Pius (C.I.L. v. 532; Henz. 7167; Wil. 693). There are, however, more than thirty others preserved, some of them, such as those from Naples, written in the Greek language. Of the

third speciality, the decreta collegiorum, only the lex collegii aquae of the 1st century (Marini, Atti de' fratelli arvali, p. 70; Rudorff and Mommsen, Zeitschriftfur Rechtsgeschichte, vol. xv., 1850, pp. 203, 345 sq.), and the lex collegii Aesculapii et Hygiae, of 153 (C.I.L. vi. 10,234; Orel. 2417; Wil. 320) need be mentioned here; many more exist. One of them, the lex collegii Jovis Cerneni, dating from a.d. 167, found at Alburnus major in Dacia, is preserved on the original tabella cerata on which it was written (C.I.L. iii. 924; Henz. 6087; Wil. 321).

4. The fourth species of instrumenta are the decrees, sometimes in the form of letters, of Roman and municipal magistrates, and of the emperors and their functionaries, incised, as a rule, on bronze tablets. The oldest decree in the Latin language which has been preserved is that of L. Aemilius Paulus, when praetor in Hispania Baetica, dating from 189 B.C., for the Turris Lascutana in southern Spain (C.I.L. ii. 5041; Wil. 2837); of the same date is a Greek one of Cn. Manlius, consul of the year 565, for the Heracleenses Cariae (Le Bas and Waddington n. 588). Then follow the famous epistula consulum (falsely styled senatus consultum) ad Teuranos de bacchanalibus, dated 568 (186 B.C.) (C.I.L. i. 196); the sentence of the two Minucii, the delegates of the senate, on a dispute concerning the boundaries between the Genuates and Viturii, 117 B.C. (C.I.L. i. 199; Orel. 3121; Wil. 872); and the epistula of the praetor L. Cornelius (perhaps Sisenna), the praetor of 676 (78 B.C.) ad Tiburtes (C.I.L. i. 201). These belong to the republican age. From the imperial period a great many more have come down to us of varying quality. Some of them are decrees or constitutions of the emperors themselves. Such are the decree of Augustus on the aqueduct of Venafrum (C.I.L. x. 4842; Henz. 6428; Wil. 784); that of Claudius, found in the Val di Nona, belonging to A.D. 46 (C.I.L. v. 5050; Wil. 2842); of Vespasian for Sabora in Spain (C.I.L. ii. 1423), and for the Vanacini in Corsica (Orel. 4031); of Domitian for Falerii (Orel. 31 18); the epistles of Hadrian relating to Aezani in Phrygia, added to a Greek decree of Avidius Quietus (C.I.L. iii. 355; Henz. 6955), and relating to Smyrna, in Greek, with a short one of Antoninus Pius, in Latin (C.I.L. iii. 411; Orel. 3119); the decrees of Commodus relating to the saltus Burunitanus in Africa (C.I.L. viii. 10,570; cf. Eph. epigr. v. 471); of Severus and Caracalla for Tyra (Akkerman in Moesia), Latin and Greek (C.I.L. iii. 781 ; Henz. 6429) ; of Valerian and Gallienus for Smyrna, also Latin and Greek (C.I.L. iii. 412) ; of Diocletian de pretiis rerum venalium, containing a long list of prices for all kinds of merchandise,

preserved in divers copies more or less complete, in Latin and Greek (C.I.L. iii. 801 sq.; compare Ephem. epigr. iv. 180, and, as similar monuments, the lex portus of Cirta, of a.d. 202 Wil. 2738, and the fragment of a regulation for the importation of wines into Rome, Henz. 5089, Wil. 2739) ; and some of the age of Constantine, as that relating to Hispellum ˆn Umbria (Henz. 5580; Wil. 2843), that of Julian found at Amorgos {C.I.L. iii. 459; Henz. 6431), and some others, of which copies exist also in the juridical collections. Of two imperial rescripts of a still later age a.d. 413, fragments of the originals, written on papyri, have been found in Egypt (see Mommsen and Jaffe, Jahrbuch des gemeinen deutschen Rechts, vol. vi., 1861 , p. 398 ; Hand, Corpus legum, p. 281). Imperial decrees, granting divers privileges to soldiers, are the dipiomata militaria also, mentioned above, incised on two combined bronze tablets in the form of diptycha (L. Renier, ” Recueil de dipl&mes militaires”; C.I.L. iii. 842 sqq., 1955 sqq. ; Wil. 2862-2869), belonging to nearly all emperors from Claudius down to Diocletian. Though not a decree, yet as a publication going back directly to the emperor, and as being pre- served in the monumental form, the speech of the emperor Claudius, delivered in the senate, relating to the Roman citizenship of the Gauls, of which Tacitus gives an abstract (Ann. xi. 23), ought also to be mentioned here; it was engraved on large bronze slabs by the public authority of Lugudunum (Lyons), where a large fragment of it is still preserved (Boissieu, Inscriptions antiques de Lyon, p. 132 sq.). Another sort of decrees, relating to a great variety of subjects, has to be mentioned, emanating, not directly from the emperors, but from their functionaries. Such are the decree of the proconsul L. Helvius Agrippa, of the year a.d. 68, on the boundaries of some tribes on the island of Sardinia (C.I.L. x. 7852 ; Wil. 872 a) ; that of the prefect of Egypt, Tiberius Julius Alexander, written in Greek, the same year (C. I. Graec. 4957) ; that of C. Helvidius Priscus, on a similar question relating to Histonium, belonging perhaps to the end of the 1st century (Wil. 873); that of the legate of Trajan, C. Avidius Nigrinus, found at Delphi, in Greek and Latin (C.I.L. iii. 567; Orel. 3671; Wil. 874); a rescript of Claudius Quartinus, perhaps the imperial legate of the Tarraconensis, of the year A.D. 1 19, found at Pampluna (C.I.L. ii. 2959; Orel. 4032); the epistle of the praefecti praetorio to the magistrates of Saepinum, of about A.D. 166- 169 (C.I.L. ix. 2438; Wil. 2841); the decree of L. Novius Rufus, another legate of the Tarraconensis, who ex tilia recitavit, of a.d. 193 (C.I.L. ii. 4125; Orel. 897; Wil. 876); the sentence of Alfenius Senecio, then

subprefect of the classis praetoria Misenensis, belonging to the beginning of the 3rd century, formerly existing at Naples (C.I.L. x. 3334) ; and some others of the 4th and 5th centuries, not requiring specific mention here. Quite a collection of epistles of high Roman functionaries is found in the celebrated inscription of Thorigny (Mommsen, Berichte der sacks. GeseUschaft der Wissenschaflen, 1852, p. 235 sq.). The letter of a provincial functionary, a priest of Gallia Narbonensis, to the fabri subaediani of Narbonne, of the year 149, mav also be mentioned (Henz. 7215; Wil. 696 a). To these must be added the tabulae alimentariae, relating to the well-known provision made by Trajan for the relief of distress among his subjects, such as that of the Ligurcs Baebiani (C.I.L. ix. 1455; Wil. 2844) and that of Veleia near Parma (Wil. 2845) ; while evidence of similar institu- tions is furnished by inscriptions at Tarracina, at Sicca in Africa, and at Hispalis in Spain (Wil. 2846-2848; C.I.L. ii. 1174). At the close of this long list of official documents may be mentioned the Uhellus of the procurator operum publicorum a columna divi Marci of the year 193 (C.I.L. vi. 1585; Orel. 39; Wil. 2840) and the interlocutiones of the praefecti vigilum on a lawsuit of the fullones of Rome, of A.D. 244, inscribed on an altar of Hercules (C.I.L. vi. 266; Wil. 100). These documents form a most instructive class of instrumenla.

5. Many documents, as may be supposed, were connected with religious worship, public and private. The oldest lex templi, which continued in force until a comparatively late period, was the regu- lation given by Scrvius Tullius to the temple of Diana on the Aventine, after the conclusion of the federal pact with the Latini, noticed above. Mention is made of this ancient law as still in force in two later documents of a similar character, viz. the dedication of an altar to Augustus by the plebs of Narbo in southern France, of a.d. 764, but existing only, at Narbonne, in a copy, made perhaps in the 2nd century (C.I.L. xii. 4333; Orel. 2489; Wil. 104), and that of an altar of Jupiter, dedicated at Salonae in Dalmatia in A.D. 137, still existing in part at Padua (C.I.L. iii. 1933; Orel. 2490; Wil. 163). Another lex fani still existing is that of a temple of Jupiter Liber at Furfo, a vicus of southern Italy, of the year 696 (58 B.C.), but copied, in vernacular language, from an older original (C.I.L. i. 603; Orel. 2488; Wil. 105; compare Jordan in Hermes, vol. vii., 1872, pp. 201 sq.). The lists of objects belonging to some sanctuaries or to the ornaments of statues are curious, such as those of the Diana Nemorensis at Nemi (Henz. Hermes, vol. vi., 1871, pp. 8 sq.), and of a statue of Isis in Spain (Hiibner, Hermes, vol. i., 1866, pp. 345 sq.; compare C.I.L. ii. 2060, 3386, Orel. 2510, Wil. 210), ana two

synopses from a temple at Cirta in Africa (Wil. 2736, 2737). The sortes given by divinities may also be mentioned (see C.I.L. i. 267 sq.; Wil. 2822). To a temple also, though in itself of a secular character, belonged a monument of the highest historical import- ance, viz. the Index rerum a se grstarum, incised on bronze slabs, copies of which Aiuruslus ordered to be placed, in Latin and Greek.

where required, in the numerous Augustea erected to himself in company with the Dea Roma. This is known as the Monumentum Ancy'ranum, because it is at Angora in Asia Minor that the best preserved copy of it, in Greek and Latin, exists; but fragments remain of other copies from other localities (see C.I.L. iii. 779 sq., and the special editions of Mommsen, Berlin, 1865, and Bergk, Gottingen, 1873). Among the inscriptions relating to sacred build- ings must also be reckoned the numerous fragments of Roman calendars, or fasti anni Juliani, found at Rome and other places, which have been arranged and fully explained by Mommsen (C.I.L. i., 2nd ed., part ii. ; compare for those found in Rome, C.I.L. vi. 2294-2306). Local, provincial or municipal calendaria have likewise been found (as the feriale Cumanum, C.I.L. i. part ii. p. 229, and the Capuanum, C.I.L. x. 3792). Many other large monumental in- scriptions bear some relation, more or less strict, to sacred or public buildings. Along with the official calendar exhibited on the walls of the residence of the pontifex maximus, the list of the eponymous magistrates, inscribed by the order of Augustus on large marble slabs, was publicly shown — the fasti consulares, the reconstruction and illustration of which formed the life-work of Borghesi. These have been collected, down to the death of Augustus, by Henzen, and compared with the additional written testimonies, by Mommsen, in the Corpus (vol. i., 2nd ed., part ii.), along with the acta trium- phorum and other minor fragments of fasti found in various Italian communities, while the fasti sacerdotum publicorum populi Romani, together with the tabula feriarum Latinarum, are given in the volume devoted exclusively to the monuments of Rome (vol. vi. 441 sq. ; compare Hermes, vol. v., 1870, p. 379, and Ephem. epigr. ii. 93, iii. 74, 205 sq.). Documents of the same kind, as, for example, the album ordinis Thamugadensis from Africa (C.I.L. viii. 2403, 17903), and a considerable mass of military lists (latercula, of which those belonging to the garrison of the metropolis are brought together in C.I.L. vi. 651 sq.), are given on many dedicatory and honorary monuments, chiefly from Lambaesis in Africa (C.I.L. viii.). As those documents, though having only a partial claim to be ranked with the sacred ones, derive, like many other dedicatory monuments, their origin and form from that class, so also the protocols (acta), which, from Augustus downwards,

seem to have been preserved in the case of all important collegia magistratuum, now survive only from one of the largest and most distinguished collegia sacerdotum, in the acta collegiifratrum Arvalium, to which Marini first drew the attention of epigraphists ; they form one of the most important masses of epigraphic monuments preserved to us in the Latin language (see C.I.L. vi. 459 sq., Ephem. epigr. ii. 211 sq., and Henzen's Acta fratrum Arvalium, Berlin, 1874).

6. Another species of instruments is formed by private documents. They have been incidentally preserved (inserted, for instance, into sepulchral and honorary inscriptions), in the later period not un-frequently in monumental form, as the testaments, given partly or in full, mentioned above (viz. that of Dasumius and the Gaul, C.I.L. vi. 10229, Wil. 314, 315, and some capita testamentorum or codicilli, as that of M. Meconius Leo found at Poetelia — C.I.L. x. 113, 114; Orel. 3677, 3678; Wil. 696), and the donations, such as those of T. Flavius Syntrophus (C.I.L. vi. 10239; Wil. 313), of T. Flavius Artemidorus (Wil. 310), of Statia Irene and Julia Monime (C.I.L. vi. 10231, 10247; Wil. 311, 318). Of a peculiar description is the pactum fiduciae, found in Spain, engraved on a bronze tablet, and belonging, in all probability, to the 1st century (C.I.L. ii. 5042), which seems to be a formulary. Other documents relating to private affairs exist in their original form, written on tabellae ceratae. Those found together in a mining district of Dacia have been arranged and explained by Mommsen and Zangemeistcr (C.I.L. iii. 291 sq., with facsimiles); those found at Pompeii in 1875, containing receipts of the banker L. Caecilius Jucundus, have been published in C.I.L. iv. suppl.). These documents are written in cursive letters; and so mostly, too, are some ucher curious private monuments, belonging partly to the sacred inscriptions — the defixiones (cf. Tac. Ann. ii. 69), imprecations directed against persons suspected of theft or other offences, who, according to a very ancient superstition, were in this way believed to be delivered to punishment through the god to whom the defixio was directed. The numerous Greek and Latin (and even Oscan) examples of this usage have been brought together by Audollent, Defixionum tabellae quotquot innotuerunt tarn in Graecis Orientis quam in totius Occidentis partibus praeter A tticas (Paris, 1 904) ; compare C.I.L. i. 818-820, C.I.L. vii. 140). Only a few of them are incised on stone (as that to the Dea Ataecina from Spain, C/.L._ii. 462) ; for the most part they are written, in cursive letters, or in very debased capitals, on small bronze or lead tablets (so C.I.L. i. 818, 819; Henz. 6114, 6115; Wil. 2747, 2748), to be laid in the tombs of the " defixi," or deposited in the sanctuaries of some

divinity.

7. Many of the private documents just alluded to have not a monumental character similar to that of the other inscriptions in the wider sense of the word, as they are written on materials not very durable, such as wood and lead — in the majority of cases, in cursive characters; but, nevertheless, they cannot be classed as literature. As a last species, therefore, of instruments, there remain some documents, public and private, which similarly lack the strict monumental character, but still arc to be reckoned among inscrip tions. These are the inscriptions painted or scratched {graffiti) on

the walls of the buildings of ancient towns, like Pompeii, where, as was to be expected, most of them have been preserved, those from other ancient cities buried by the eruptions of Vesuvius and from Rome being very small in number. All the various classes of these inscriptions — public and private advertisements, citations for the municipal elections, and private scribblings of the most diverse (and sometimes most indecent) character, one partly collected by Chr. Wordsworth (Inscriptiones Pompeianae, &c, London, 1837, 1846)-— are now arranged by Zangemeister in the Corpus, vol. iv. with supple- ment (some specimens in Wil. 1951 sq.), whence their peculiar palaeographic and epigraphic rules may be learned. And, lastly, as related to some of these advertisements, though widely differing from them in age and character, may be mentioned the so-called diptycha consularia, monuments, in the first instance, of the still very respectable skill in this branch of sculpture to be found at this late period. They are carved-ivory tablets, in the form of pugillaria, and seem to have been invitations to the solemnities connected with the accession of high magistrates, especially to the spectacles of the circus and amphitheatre; for they contain, along with representa- tions of such spectacles, the names, and often the portraits, of high functionaries, mostly of the 5th and 6th centuries. Since Gori's well-known work on this class of monuments (Thesaurus veterum diptychorum, &c, 3 vols., Florence, 1759) no comprehensive collection of them has been published, but a full list is given by H. de Villefosse in the Gazette Archeologique of 1884; as specimens see C.I.L. ii. 2699, and v. 8120, 1-9.

Bibliography. — As a " Textbook " of Roman epigraphy R. Cagnat, Cows d'epigraphie latine (3rd ed., Paris, 1898, with supple- ment,

1904) can be heartily recommended. But students must be warned against Zell's Handbuch der romischen Epigraphik (2 vols., Heidelberg, 1850-1852), an unsatisfactory work which is open to serious criticism. J. C. Egbert's Introduction to the Study of Latin Inscriptions (1896) is designed for American and English students. For Christian inscriptions Le Blant's Manuel d'epigraphie chretiennc d'apres les marbres de la Gaule (Paris, 1869) may still be consulted with advantage. (E.Hij.; W. M. L.)

INSECT, the anglicized form of the Late Lat. insectum, used by Pliny in his Natural History as the equivalent of the Gr. ivronov. Aristotle had included in one class " Entoma" the six-legged arthropods which form the modern zoological class of the Hexapoda or Insecta, besides the Arachnida, the centipedes and the millipedes. The word was introduced to English readers in a translation (1601) of Pliny's Natural History by Philemon Holland, who defined " insects " as " little vermine or smal creatures which have (as it were) a cut or division betwene their heads and bodies, as pismires, flies, grashoppers, under which are comprehended earthworms, caterpilers, &c." Few zoological terms have been more loosely used both by scientific and popular writers. The definition just quoted might include all animals belonging to the groups of the Arthropoda and Annelida, and U. Aldrovandi in De animalibus insectis (1602) almost contem- poraneously distinguished between " terrestrial insects," includ- ing woodlice, earthworms and slugs, and " aquatic insects," comprising annelids and starfishes. Perhaps the widest meaning ever attached to the word was that of R.A.F. de Reaumur, who " would willingly refer to the class of insects all animals whose form would not allow them to be placed in the class of ordinary quadrupeds, in that of birds, or in that of fishes. The size of an animal should not suffice to exclude it from the number of insects. ... A crocodile would be a terrible insect; I should have no difficulty, however, in giving it that name. All reptiles belong to the class of insects, for the same reasons that earth- worms belong to it."

The class Insecta of Linnaeus (1758) was coextensive with the Arthropoda of modern zoologists. The general practice for many years past among naturalists has been to restrict the terms " Insecta " and " insect " to the class of Arthropods with three pairs of legs in the adult condition: bees, flies, moths, bugs, grasshoppers, springtails are " insects," but not spiders, centi- pedes nor crabs, far less earthworms, and still less slugs, star- fishes or coral polyps.

For a general account of the structure, development and relation- ships of insects, see Arthropoda and Hexapoda, while details of the

form, habits and classification of insects will be found in articles on the various orders or groups of orders (Aptera, COLEOPTERA, Dipteria,Hemiptera,Hymenoptera,Lepidoptera,N t europtera, Orthoptera, Thysanoptera), and in special articles on the more familiar divisions (Ant, Bee, Dragon-fly, Earwig, &c.). The history of the studv of insects is sketched under Entomology.

(G. H. C.)

INSECTIVORA, an order of non-volant placental mammals of small size, with a dentition adapted to an insect-diet. In nearly all cases these creatures are nocturnal, and the majority are terrestrial, many burrowing in the ground, although a few are arboreal and others aquatic. They have plantigrade or partially plantigrade feet, that is to say, they apply the whole or the greater portion of the soles to the ground when walking; and there are generally five toes, each terminating in a claw, and the first never being opposable to the others in either the fore or hind limb. A full series of differentiated teeth, including temporary or deciduous milk-molars, is developed, and the cheek-teeth have distinct roots and are crowned with sharp cusps, which in some instances are three in number and arranged in a triangle. Very frequently the number of the teeth is the typical forty-four, arranged as i. f , c. \ , p. \ -, m. f , but occasionally there is a fourth pair of molars, while the incisors may be reduced to two pairs above and one below, and the canine is frequently like an incisor or a premolar. The skull is of a primitive type, often with vacuities on the palate, as in marsupials, with a small brain-chamber, and the tympanic bone generally ring-like instead of forming a bladder-shaped bulla; except in the African Potamogale, clavicles, or collar-bones, are always present; the humerus generally has a perforation on the inner side of its lower extremity; and a centrale bone is usually present in the carpus. In the brain the smooth hemispheres are so short as to leave the cerebellum and sometimes even the corpora quadrige- mina exposed. The uterus is two-horned; the placenta, so far as known, is deciduate and discoidal; the testes are abdominal or inguinal; and the teats usually numerous. The body in several instances is covered with sharp spines in place of hair.

The great majority of the Insectivora are nocturnal in their habits, and their whole structure indicates an extremely low grade of organisation, fully as low as that of marsupials. It is noteworthy that the dentition in several of the groups approxi- mates to that of the extinct mammals of the Jurassic epoch (see Marsupialia), and exhibits more or less distinctly the primitive tritubercular type.

Although the past history of the group is very imperfectly known, it seems probable that the Insectivora are nearly related to the original primitive mammalian stock. Indeed, it has been stated that were it not for the apparently advanced type of placenta, they might easily be regarded as the little modified descendants of the ancestors of most other mammals. Probably they are in some way related to the creodont carnivores (see Creodonta), but if, as has been sug- gested, the latter are akin to the primitive ungulates, the con- nexion would seem to be less close than has been sometimes supposed.

Representatives of this order are found throughout the temperate and tropical parts of both hemispheres, with the exception of South America (where only a few shrews have effected an entrance from the north) and Australia, and exhibit much variety both in organization and in habit. The greater number are cursorial, but some (Talpa, Chrysochloris, Oryzorictes) are burrowing, others (Limnogale, Potamogale, Nectogale, Myogale) aquatic, and some {Tupaiidae) arboreal. To the great majority the term insectivorous is applicable, although Potamogale is said to feed on fish, and the moles live chiefly on worms. Not- withstanding the nature of their food, much variety prevails in the form and number of the teeth, and while in many cases the division into incisors, canines, premolars and molars may be readily traced, in others, forming the great majority of the species, such as the shrews, this is difficult.

In most cases the brain-cavity is of small relative capacity, and in no instance is the brain-case elevated to any considerable extent above the face-line. The facial part of the skull is gener- ally much produced, and the premaxillary and nasal bones well developed; but the cheek, or zygomatic arch, is usually slender or deficient, the latter being the case in most of the species, and post-orbital processes of the frontals are found only in the Tupaiidae and Macroscelididae. The number of dorsal vertebrae varies from 13 in Tupaia to 10 in Gentries, of lumbar from 3 in Chrysochloris to 6 in Talpa and Sorcx, and of caudal from

the rudimentary vertebrae of Centetes to the 40 or more well-developed ones of Microgale.

The breast-bone, or sternum, is variable, but generally narrow, bilobate in front and divided into segments. The shoulder- girdle

presents extreme adaptive modifications in the mole, in relation to the use of the fore-limbs in burrowing; but in the golden moles the fore-arm and fore-foot alone become specially modified. In Macroscelides the bones of the fore-arm are united at their lower ends, but in all other Insectivora the radius and ulna are distinct. The fore-foot has generally five digits; but in Rhynchocyon and in one species of Oryzorictes the first toe is absent, and in the moles it is extremely modified. The femur has, in most species, a prominent ridge below the greater tro- chanter presenting the characters of a third trochanter. In Tupaia, Centetes, Hemkentetes, Ericulus and Solenodon the tibia and fibula are distinct, but in most other genera united. The hind-foot consists usually of five digits (rarely four by reduction of the first) , and in some, as in the leaping species (Macroscelides, Rhynchocyon), the tarsal bones are elongated. The form of the pelvis, and especially of the symphysis pubis, varies within certain limits, so that while in the Tupaiidae and Macroscelididae there is a long symphysis, in the Erinaceidae, Centetidae and Potamogalidac it is short, and in the Soricidae, Talpidae and Chrysochloridae there is none. 1

Owing to the similarity in the character of the food, the truly insectivorous species, forming more than nine-tenths of the order, present little variety in the structure of the digestive organs. The stomach is a simple, thin- walled sac; sometimes as in Centetes, with the pyloric and oesophageal openings close together; the intestinal canal has much the same calibre throughout, and varies from three (in the shrews) to twelve times (in the hedgehogs) the length of the head and body. In the arboreal Tupaia and the allied Macroscelididae, which probably feed on vegetaDle substances as well as insects most of the species possess a caecum. The liver is deeply divided into lobes, the right and left lateral being cut off by deep fissures; both the caudate and Spigelian lobes are generally well developed, and the gall-bladder, usually large and globular, is placed on the middle of the posterior surface of the right central lobe.

All the members of the order appear to be highly prolific, the number of young varying from two to eight in the hedgehog, and from twelve to twenty-one in the tenrec. The position of the milk-glands and the number of teats vary greatly. In Solenodon there is a single pair of post-inguinal teats, but in most species these organs range from the thorax to the abdomen, varying from two pairs in Gymnura to twelve in the tenrec. In the golden moles the thoracic and inguinal teats are lodged in deep cut-shaped depressions.

Scent-glands exist in many species. In most shrews they occur on the

sides of the body at a short distance behind the axilla, and their exudation is probably protective, as few carni- vorous animals will eat their dead bodies. In both species of Gymnura and in Potamogale large pouches are situated on each side of the rectum, and discharge their secretions by ducts, opening in the first-named genus in front of and in the latter within the margin of the vent. In the tenrec similarly situated glands discharge by pores opening at the bottom of deep pits.

The skin is thin, but in many species lined with well-developed muscles, which are probably more developed in hedgehogs than in any other mammals. In this family and in the tenrec most of the species are protected by spines implanted in the skin-muscle, or panniculus carnosus.

The Insectivora may be divided into two groups, according to the degree of development of the union between the two halves of the _ pelvis. The first group is characterized by the full

Sh S ‘ s development of this union, . both pubis and ischium

nw ‘ entering into the symphysis. The tympanum remains as a ring within an auditory bulla; the orbit is either surrounded by bone, or separated from the hinder part’ of the skull by a post- orbital process of the frontal ; the upper molars have broad 5-cusped crowns with a W-shaped pattern; and the intestine is generally furnished with a caecum. The first family of this group is the Tupaiidae, represented by the tree-shrews, or tupaias,_ of the Indo- Malay countries, characterized by the complete bony ring round the

*eye-socket, the freedom of the fibula from the tibia in the hind-limb, and the absence of any marked elongation of the tarsus. The dental formula is *. .§, c. \,p. %, m. if, total 38. In appearance and habits tree-shrews are extremely like squirrels, although they differ, of course, in toto as regards their dentition. A large number of species are included as the typical genus Tupaia, which ranges from north-eastern India to the great Malay Islands. In these animals the tail has a fringe of long nairs on opposite sides throughout its length. In the pen-tailed tree-shrew (PtUocercus lowii), fig. 1, the only repre- sentative of its genus, and a native of Sumatra, Borneo and the Malay Peninsula, the fringes of long hair are confined to the terminal third of the tail. There are also differences in the skulls of the two genera. A third genus, Urogale, represented by U. cylindrura of the mountains of Mindanao, in the Philippines, and U. everetti, of Borneo, has been established for the round-tailed tupaias, in which the tail is uniformly short-haired, and the second upper incisor and*

the lower canines are unusually large, the third lower incisor being proportion- ately small, and also erect, while the second upper incisor resembles a canine. (See Tree-Shrew.)

In Africa the tupaias are apparently represented by the jumping-shrews, or elephant-shrews (so called from their elongated muzzles), constituting the family Macroscelididae. From the Tupaiidae the members of this family are readily distinguished by the fact that the socket of the eye, in place of having a complete bony ring, is separated from the hinder part of the skull merely by a post-orbital process of

M»*

Fig. I. — Pen-tailed Tree-Shrew (PtUocercus lowii).

the frontal bone, and also by the more or less marked elongation of the tarsus or lower portion of the hind-limb; another feature being the union of the lower ends of the tibia and fibula. As indicated by one of their names, the members of the group leap after the fashion of gerbils, or jerboas, and hence walk much more on their toes than the majority of the order. In the typical genus Macroscelides, which ranges all over Africa and has numerous specific representa- tives, the dental formula is i. f ,c.{, p. |, m. , total 40 or 42;

while there are five toes to each foot, and the lower ends of the radius and ulna are united. In Petrodromus (fig. 2) of East Africa, there are only four front-toes, and the hairs on the lower part of the tail form stiff bristles, with swollen tips; the dental formula being the same as that of those species of Macroscelides as have only two lower molars. A further reduction of the number of the digits takes place in the long-nosed jumping-shrews of the genus Rhynchocyon, wjjich are larger animals with a much longer snout, only four toes to each

foot, and a dental formula of i. — – — < c. {, p. |, m. § , total 36 or 34.

Some of the species, all of which are East African, differ from the members of the typical genus by the deep rufous brown instead of olive-grey colour of their coat. (See Tumping-Shrew.)

In the second group, which includes all the other members of the order, the pelvic symphysis is either lacking or formed merely by the epiphyses of the pubes; the orbit and temporal region of the skull are confluent; and, except in the Talpidae and Chrysochloridae, the

tympanum is ring-like, the tympanic cavity being formed by the alisphenoid and basisphenoid bones. The upper molars are trieonouont, being either of the typical or a modified

form of what is known as the tritubercular sectorial type. There is no caecum.

_ The first representatives of this group are the moles, or Talpidae, in which the lower ends of the tibia and fibula are united (fig 3, Moles. l ‘ J°J; t , here ‘ s , a de scent of the testes, the tympanum forms i.u u , a J blad . der -‘ 1 ke bulla, the zygomatic, or cheek-arch, although slender, is complete, there is no pelvic symphysis, the upper molars are five-cusped, and the first upper incisor is simple, and the lower vertical. In habits the majority of the family are burrowing but a few are aquatic; and all feed on animal substances. The distribution is limited to the temperate regions of Europe, Asia and North America.

Throughout the family the eyes are minute, and in some species are covered with skin; the ears are short and hidden in the fur; and , the fore-limbs are generally more or less modified for digging.

The true moles of the genus Talpa are the typical representatives of the first subfamily, or Talpinae, in which the clavicle (fig. 3, cl.) and humerus (h) are very short and broad, while there is an addi- tional sickle-like bone (fc) on the inner side of the fore-foot. In Talpa itself the first upper incisor is but little larger than the second,

the fore-foot is very broad, and the dental formula is i. jf, c. — ,

P- I. I, or I, m. f. There are about a dozen species, all confined to

Fig. 2. — Peter’s Jumping-Shrew (Petrodromus tetradactylus).

the Old World. The variation in the dental formula of some of the best known of these is as follows: —

‘.■ a, c. i, p. }, m. 1X2 (T. wogura, robusla).

»• a, c. {, p. J, m 3X2 (7\ europaea, caeca, romana, longiro- stris, micrura).

**’• h c. \, p. i, m. |X2 (T, leucura leptura).*

• h c- h P- h m. 1X2 (T. moschata). Except in T. europaea, the eyes are covered by a membrane. In T. micrura the short tail is concealed by the fur. T. europaea extends from England to Japan.

T. caeca and T. romana are found south of the Alps, the remaining species are all Asiatic, two only — T. micrura and T. leucura — occurring south of the Himalaya.

The genus may be split up into subgenera corresponding with the above table; these subdivisions being sometimes accorded full generic rank. For instance the Japanese T. wogura and the Siberian T. robusta are often referred to under the ill-sounding titles of Mogera wogura and M. robusta.

Referring more fully to the European species, it may be mentioned that the mole exhibits in its organization perfect adaptation to its mode of life. In the structure cf the skeleton striking departures from the typical mammalian forms are noticeable. The first sternal bone is so much produced as to extend forward as far as a vertical Iir.e from the second cervical vertebra, carrying with it the very short almost quadrate clavicles, which are articulated with its anterior extremity and externally with the humeri, being also connected ligamentously with the scapula. The fore-limbs are thus brought opposite the sides of the neck, and from this position a threefold advantage is derived: — in the first place, as this is the narrowest part of the body, they add little to the width, which, if increased, would lessen the power of movement in a confined space ; secondly this position allows of a longer fore-limb than would otherwise be

possible, and so increases its lever power; and, thirdly, although the entire limb is relatively short, its anterior position enables the animal, when burrowing, to thrust the claws so far forward as to be in a line with the end of the muzzle, the import- ance of which is evident. Posteriorly, we find the hind-limbs removed out of the way by approximation of the hip-joints to the centre line of the body. This is effected by inward curvature of the innomi- nate bones at the aceta- bulum to such an extent that they almost meet in the centre, while the pubic bones are widely separated behind. The shortness of the fore-limb is due to the humerus, which, like the clavicle, is so reduced in length as to present the appearance of a flattened X-shaped bone, with prominent ridges and deep depressions for the attach- ments of powerful muscles. Its upper extremity pre- sents two rounded promin- ences; the smaller, the true head of the bone, articu- lates as usual with the scapula ; the larger, which is the external tuberosity rounded off, forms a sepa- rate joint with the end

of the clavicle. This double articulation gives the rigidity necessary to sup- port the great lateral pressure sustained by the fore-limb in excavating. The bones of the fore-leg are normal, but those of the fore-foot are flattened and laterally expanded. Fig. 3. — Skeleton of Mole {Talpa The great width of the europaea) (lower jaw removed to show fore-foot is also partly due base of skull). to the presence of a peculiar c, Calcaneum.

bone on the inner side of c.h, Clavicular articulation of the

humerus.

the palm and articulating with the wrist. cl,

The muscles acting on ex, these modified limbs are /, homologous with those of fb, cursorial insectivora,differ- fc, ing only in their relative h, development. The tendon i.c, of the biceps traverses a il, long bony tunnel, formed i.p, by the expansion of the is, margin of the bicipital Id, groove for the insertion of the pectoralis major l.t, muscle; the anterior m, division of the latter o, muscle is unconnected with the sternum, extending ol, across as a band between p, the humeri, and co-ordi- nating the motions of the pa, fore-limbs. The teres major p.m. and latissimus dorsi muscles are of immense pt, size, inserted into the r, prominent ridge below the rb, pectoral attachment, and s, are the principal agents in the excavating action of the limb. The cervical sc, muscles connecting the s.h, slender scapulae, and through them the fore- /, limbs.with the centre line of u,

Clavicle.

External condyle of humerus.

Femur.

Fibula.

Falciform bone (radial sesamoid).

Humerus.

Internal condyle of humerus.

Left iliac bone.

Ramus of the ilium and pubis.

Ischium.

Ridge of insertion of latissimus dorsi muscle.

Lesser trochanter.

Manubrium sterni.

Fourth hypapophysial sesamoid ossicle.

Olecranon.

Pubic bone widely separated from that of the opposite side.

Patella.

Ridge for insertion of pectoralis major muscle.

Pectineal eminence.

Radius.

First rib.

Plantar sesamoid ossicle corre- sponding to the radial sesamoid (os falciform) in the manus.

Scapula.

Scapular articulation of the humerus.

Tibia.

Ulna.

the neck and with the occi- put are large, and the ligamentum nuchae between them is ossified. The latter condition appears to be due to the prolongation forwards of the sternum, preventing flexion of the head downwards; and accordingly, the normal office of the ligament being lost, it ossifies,

and affords a fixed point for the origins of the superficial cervical muscles.

The skull is long, with slender zygomatic arches; the nasal bones are strong and early become united, and in front of them the nostrils are continued forwards in tubes formed of thick cartilage, the septum between which becomes partially or wholly ossified beneath. There are 7 cervical, 13 dorsal, 6 lumbar, 6 sacral and 10-12 caudal vertebrae; of the dorsal and lumbar there may be one more or less. The sacral vertebrae are united by their expanded and compressed spinous processes, and all the others, with the exception of the cervical, are closely and solidly articulated together, so as to support the powerful propulsive and fossorial actions of the limbs. The upper incisors are simple chisel-edged teeth; the canine is long and two-rooted; then follow three subequal conical premolars, and a fourth, much larger, and like a canine; these are succeeded by three molars with W-shaped cusps. In the lower jaw the three incisors on each side are slightly smaller, and slant more forwards; close behind them is a tooth which, though like them, must, from its position in front of the upper canine, be considered as the canine; behind it, but separated by an interval, is a large double-rooted conical tooth, the first premolar; the three following premolars are like the corre- sponding teeth above, but smaller, and are succeeded, as above, by the three molars. See Mole.

In the other members of the Talpinae, which are North American, the first upper incisor is much taller than the second. They include the curious star-nosed mole (Condylura cristata), which has the typical series of 44 teeth and a series of fleshy appendages round the extremity of the snout; the species known as Scapanus townsendi

(h . APS. . ■. I, f*

J'vt

*Fig. 5. — Skull and Dentition of a Shrew-mouse (Sorex-verae- pacis) ; *, first incisors ; c in*

Fig. 4. — Russian Desman {Myogale moschata),

and Parascalops americanus, each representing a genus by itself, and characterized by the absence of nasal appendages and the presence of only two pairs of lower incisors; and, finally, Scalops aquaticus, in which the dentition is further reduced by the loss of the lower canine, the total number of teeth thus being forty.

Forming a transition to the subfamily Myogalinae, in which the clavicle and humerus are typically of normal form, and there is no sickle-shaped bone in the fore-foot, is the Chinese mole (Scaptonyx piscicauda), characterized by having the clavicle and humerus of the true mole-type, but the foot like that of the under-mentioned Urotrichus. The relative proportions of the first and second upper incisors are also as in Talpa, but there are only two pairs of lower incisors.

Among the more typical Myogalinae, mention may be made of Dymecodon pilirostris, from Japan, representing a genus by itself; nearly allied to which are the shrew-moles, as represented by the small and long-tailed Urotrichus of Japan, with incisors f and pre-molars i, and U. (Neurotrichus) gibbsi of North America, in which the premolars are J. A still more interesting form is the Tibetan Uropsilus soricipes, a non-burrowing species, with the external appearance of a shrew combined with the skull of a mole, the feet being much narrower than in Urotrichus, and the dental formula 1. f, c. \, p. I, m. |.

The typical representatives of the subfamily are the two European desmans, Myogale moschata and M. pyrenaica, which are aquatic in habits and have the feet webbed and the full series of 44 teeth. The former is by far the largest member of the whole family, its total length b p inp about 16 in. Its long proboscis-like snout projects far

beyond the margin of the upper lip ; the toes are webbed as far as the bases of the claws; and the long scaly tail is laterally flattened; forming a powerful instrument of propulsion when swimming. This species inhabits the banks of streams and lakes in south-east R ussia, where its food consists of various aquatic insects. M. pyrenaica, living in a similar manner in the Pyrenees, is much smaller, has a cylindrical tail, and a relatively long snout.

The Shrew-mice, or, shortly, shrews (Sortcidae), are closely related to the Talpidae, with which they are connected by means of some of the subfamily Myogalinae. They are, however, dis- shrews tinguished by the ring-like tympanic, the incompleteness of the zygomatic arch,

the tubercular-sectorial type of upper molar, the two-cusped first upper incisor, and the forward direction of the corresponding lower tooth. As a rule they are terrestrial, but a few are aquatic.

The dentition (fig. 5) is characteristic, and affords one of the chief means of classifying this exceedingly difficult group of mammals. There are no lower canines, and always six functional teeth on each side of the lower jaw, but in some j rare instances an additional rudi- \ mentary tooth is squeezed in be- tween two of the others. The first pair of teeth in each jaw differ from the rest; in the upper jaw they are hooked and have a more or less pronounced basal cusp; in the lower jaw they are long and pro- ject horizontally forwards, some- times with an upward curve at the tip. Behind the first upper incisor comes a variable number of small teeth, of which, when all are developed, the first two are in- cisors, the third the canine, and the next two premolars; behind

these, again, are four larger teeth, of the upper jaw is the canine; which the front one is the last and p-m the three premolars, premolar, while the other three are behind which are the three molars. Thus we have in the molars; in the lower jaw c is typical genus Sorex(fig. 5) the dental the second incisor, and p the formula i. f , c. \, p. f , m. |, total single premolar. 32, or twenty upper and twelve

lower teeth. The lower formula, as already stated, is constant, but the number of the upper series varies from the above maximum of twenty to a minimum of fourteen in Diplomesodon and Anurosorex, in which the formula is i. 2, c. I, p. 1, m. 3. From the relation of the fourth upper tooth to the premaxillo-maxillary suture it has been supposed that shrews, like many polyprotodont marsupials, have four pairs of upper incisors; but this is improbable, and the formula is accordingly here taken to follow the ordinary placental type.

Shrews may be divided into two sections, according as to whether the teeth are tipped with brownish or reddish or are wholly white, the former group constituting the Soricinae and the latter the Crocidurinae.

In the red-tipped group is the typical genus Sorex, which ranges over Europe and Asia north of the Himalaya Mountains to North America. There are twenty upper teeth with the formula given above, the ears are well developed, the tail is longand evenly haired, and the aperture of the generative organs in at least one of the sexes is distinct from the vent. The common shrew-mouse (Sorex araneus)

has a distribution co-extensive with that of the genus in the Old World, and the North American S. richafrdsoni can scarcely be regarded as more than a local race. A few species, such as Sorex hydrodomus of Alaska and S, palustris of the United States, have fringes of long hairs on the feet, and are aquatic in habit. The latter has been made the type of the genus Neosorex, but such a distinction, according to Dr J. E. Dobson, is unnecessary. The same authority likewise rejects the separation of the North American 5. bendirei as Atophyrax, remarking that this species is an inhabitant of marshy land, and appears to present many characters intermediate between S. palustris and the terrestrial species of the genus, differing from the former in the absence of well-defined fringes to the digits, but agreeing with it closely in dentition, in the large size of the infra-orbital foramen, and in the remarkable shortness of the angular process of the lower jaw. In India and Burma the place of Sorex is taken by Soriculus, in which the upper teeth are generally 18, although rarely 20, and the generative organs have an opening in common with the vent after the fashion of the monotreme mammals. The latter feature occurs in the North American Blarina, which is characterized by the truncation of the upper part of the ear and the short tail, the number of upper teeth being 20 or 18. Another American genus, Notiosorex, in which the ear is well developed and the tail medium, has only 16 upper teeth. From all the rest of the red-toothed group the water-shrew, Neomys (or Crossopus) fodiens, of Europe and northern Asia, differs by the fringe of long hairs on the lower surface of the tail; the number of upper teeth being 18.

In the white-toothed, or crocidurine, group, the small African genus Myosorex, which has either 18 or 20 upper teeth, includes long-tailed and large-eared species in which the aperture of the generative

organs and the vent, although close together, are yet distinct. In the musk-shrews (Crocidura), on the other hand, which are common to Europe, Asia and Africa, the reproductive organs and the alimentary canal discharge into a common cloaca, the long tail is sparsely covered with long and short hairs, there are anal glands secreting a strong musky fluid, and the number of upper teeth is 16 or 18. Diplomesodon pulchellus of the Kirghiz steppes, has, on the other hand, only 14 upper teeth, and is further characterized by the moderately long tail and the hairy soles of the hind-feet. Another genus is represented by the Tibetan Anurosorex squamipes, which

has the same dental formula, but a mole-like form, rudimentary tail and scaly hind-soles. Lastly, we have two Asiatic mountain aquatic species, Chimarrogale htmalayaca of the Himalayas and Nectogale ehgans of Tibet, which have fringed tails like the European water-shrew, and 16 upper teeth, the former characterized by the small but perfect external ears, and the latter (fig. 6) by the absence of the ears and presence of adhesive disks on the feet.

It will be seen that the red- and the white-toothed series have parallel representative forms, which may indicate that the division of the family into the two groups is one based rather on convenience than on essential differences. See Shrew.

From the shrews, the hedgehogs and gymnuras, or rat-shrews, collectively forming the family Erinaceidae, differ structurally by the broader ring made by the tympanic, the complete zygomatic arch, the five-cusped broad upper molars, and the presence of a short

Fig. 6.-

-The Tibetan Water-shrew (Nectogale ehgans).

pubic symphysis. At the present day they are an exclusively Old World group.

The typical group, or Erinaceinae, is represented only by the hedgehogs, with the one genus Erinaceus, easily recognized by their spiny coats, and further characterized by the rudimentary Hedge- ta ji f^e presence of vacuities in the palate, and the broad bogs. pelvis. Hedgehogs {Erinaceus) have the dental formula

i. I, c. \, p. |, m. |, and are represented by over a score of species, distributed throughout Europe, Africa and the greater part of Asia, but unknown in Madagascar, Ceylon, Burma, Siam, the Malay countries, and, of course' Australia. All the species resemble one another in the armour of spines covering the upper surface and sides of the body ; and all possess the power of rolling themselves up into the form of a ball protected on all sides by these spines, the skin of the back being brought downwards and inwards over the head and tail so as to include the limbs by the action of special muscles.

Curiously enough the European hedgehog (JS. europaeus) is the most aberrant species, differing from all the rest in the peculiarly-shaped and single-rooted third upper incisor and first premolar (fig. 7, A), and in its very coarse harsh fur. The dentition of the long-eared Indian E. grayi (fig. 7, B) may, on the other hand, be considered

characteristic of all the other species, the only important differences being found in the variable size and position of the second upper premolar, which is very small, external and deciduous in the Indian E. micropus and E. pictus. The former species, limited to South India, is further distinguished by the absence of the jugal bone. Of African species, E. diademalus, with long frontal spines, is pro- bably the commonest, and E. albiventris has been made the type of a separate genus on account of the total absence of the first front-toe. See Hedgehog.

*The members of the second subfamily, Gymnurinae, are more or less rat-like animals, confined to the Malay countries, and easily distinguished from the hedgehogs by the absence of spines *~" among the fur and the well-developed tail. They also lack*

threw. vacuities in the palate, and have a long and narrow pelvis. The typical representative of the family is the greater rat-shrew, or greater gymnura {Gymnura rafflesi) a creature which may be com-

pared to a giant shrew, and whose colour is partly black and partly white, although a uniformly pale-coloured race. (G. r. alba) inhabits Borneo. In common with the next genus, it has the full series of 44 teeth; and its range extends from Tenasserim and the Malay Peninsula to Sumatra and Borneo, the island individuals being stated to be considerably larger than those from the mainland. In this species the length of the tail is about three-fourths that of the head and body; but in the lesser rat-shrew {Hylomys suillus), ranging

Fig. 7. — Fore-part of Skulls of Common Hedgehog {Erinaceus europaeus), A, and Gray's Hedgehog {E. grayi), B, much enlarged.

from Burma and the Malay Peninsula to Java and Sumatra, the former dimension is only about one-sixth of the latter. In the Philippines the group is represented by Podogymnura truei, dis- tinguished from the other genera by the great elongation of the hind- foot, the tail being likewise long. There are only three pairs of pre- molars in each jaw.

In the remaining families of the Insectivora the tibia and fibula may be either separated or united at the lower end ; there is no descent of the testes, except in Solenodon; a short symphysis is formed by the junction of the pubic epi- physes; and the upper molars are generally small, and triangular, with three cusps arranged in a V. The first family, Potamogalidae, is represented by the otter-like Potamogalt velox of the rivers of West Africa (fig. 8), distinguished from all

other

Insecti- vorous Otter.

Fig. 8. — The Insectivorous Otter (Potamogale velox).

members of the order by the absence of clavicles. The tibia and fibula are united inferiorly, the skull has a ring-like tympanic, no zygomatic arch, and the vpper molars are of the tuberculo-sectorial type, with broader crowns than in the following families. The dental formula is i. j, c. \, p. f, m. |, total 40. This animal inhabits the banks of streams in west equatorial Africa, and its whole structure indicates an aquatic life. It is nearly 2 ft. in length, the tail measuring about half. The long cylindrical body is continued uninterruptedly into the thick laterally compressed tail, the legs are very short, and the toes are not webbed, progression through the water depending wholly on the action of the powerful tail, while the limbs are folded inwards and backwards. The muzzle is broad and flat. and the nostrils are protected by valves. The fur is dark brown

above, the extremities of the hairs on the back being of a metallic violet hue by reflected light, beneath whitish.

In the remaining groups the upper molars form narrow V's of the true tritubercular type. The family, Centetidae, represented by the Tenrec tenrec and a number of allied animals from Madagascar, is specially characterized by the ring-like tympanic, and the absence of a zygomatic arch and of any constriction of the skull behind the orbits, and the presence of teats on the breast as well as the abdomen. In the more typical members of the family the tibia and fibula are separate, and, as in hedgehogs, spines are mingled with the fur. The true or great tenrec {Centetes ecaudatus), alone repre- senting the typical genus, has the dental formula i.— – — , c. {, p. f,

m. 2-2LJ total 38, 40, 42 or 44. The fourth lower molar, when

3 or 4 ~

developed, does not appear till late in life. Of the long and sharp canines, the tips of the lower pair are received into pits in the upper jaw (fig. 9). The creature grows to a length of aoout a foot. The

Fig. 9. — Skull of the Tenrec {Centetes ecaudatus). somewhat reduced.

young have strong white spines arranged in longitudinal lines along the back, but these are lost in the adult which has only a crest of long rigid hairs on the nape of the neck. The lesser tenrecs, Hemu centetes semispinosus and H. nigriceps, are distinguished by the per- sistence of the third upper incisor and the form of the skull. The two species are much smaller than the great tenrec, and spines are retained in the adult on the body. The hedgehog-tenrec, Ericulus setosus, has the whole upper surface, and even the short tail, densely covered with close-set spines. The facial bones are much shorter than in the preceding genera, and the first upper incisors are elon- gated ; while there are only two pairs of incisors in each jaw. Judg- ing from the slight development of the cutaneous muscles compared with those of the hedgehog, it would seem that these creatures cannot roll themselves completely into balls in hedgehog-fashion. A second species of this genus, Ericulus (Echinops) telfairi, has two, in place of three, pairs of molars, thus reducing the total number of teeth to 32. Moreover, the zygomatic arches ofthe skull are reduced to mere threads. Here should perhaps be placed Geogale aurita, a small long-tailed Malagasy insectivore, with 34 teeth, and no spines ; the tibia and fibula being separate. It has been classed in the Potamogalidae, but from its habitat such a reference is improbable.

the same as in Oryzorictes. Finally, Limnogale mergulus, a creature about the size of a black rat, has webbed toes and a laterally com- pressed tail, evidently adapted for swimming. See Tenrec.

All the foregoing are natives of Madagascar. It has been suggested however, that two remarkable West Indian insectivores, namely Solenoion cubanus of Cuba (fig. 11) and 5. paradoxus of Hayti, should be regarded as representing merely a sub- family of Centetidae. It is true that the main features distinguishing these strange creatures from the Malagasy repre sentatives of that family are the constriction of the skull behind th<.

Solen

Fig. 10. — Skull of the Lesser Tenrec {Hemicentetes spinosus).

*The absence of spines may entitle it to separation from the Cente- tinae, so that it should perhaps be regarded as representing a sub- family, Geogalinae, by itself. **

The absence of spines coupled with the union of the tibia and fibula form the leading characteristics of the subfamily Oryzorictinae, typified by the rice-tenrecs Oryzorictes, of which there are several species. These creatures, which excavate burrows in the rice-fields of Madagascar, are somewhat mole-like in appearance, but have tails of considerable length. In the typical 0. hova the fore-feet are five-toed, but in 0. tetradactylus the number of front digits is reduced to four. The long-tailed tenrecs {Microgale) are represented by fully half-a-dozen species with tails of great length; that appendage in the typical M. longicaudata being more than double the length of the head and body, and containing no fewer than forty-seven vertebrae. The teeth are generally similar to those of Centetes, but are not spaced in front; their number being i. §, c. }, p. I, in. i, total 40, or

Fig. 11. — Solenoion cubanus.

orbits, the descent of the testes into the perineum, and the post-inguinal position of the teats, and that none of these are of very great importance. But the geographical positions of the two groups are so widely sundered that it seems preferable to await further evidence before definitely assigning the two to a single family ; and the family Solenodontidae may accordingly be retained for the West Indian animals. Solenodons, which look like huge long-nosed, parti-coloured rats, have the tibia and fibula separate, and the same dental formula as Microgale. Each of the two species (which differ in colour and the quality of the fur) has a long cylindrical snout, an elongated naked tail, feet formed for running, and the body clothed with long, coarse fur. The position of the teats on the buttocks is unique among Insectivora. The first upper incisors are much enlarged, and like the other incisors, canines and premolars, closely resemble the corresponding teeth of Myogale; the second lower incisors are much larger than the upper ones, and hollowed out on the inner side.

The last family, Chrysochloridae, is represented by the golden moles of South and East Africa, which differ from the Centetidae and Solenodontidae by the development of a bulla to the u

tympanic, and the presence of a zygomatic arch to the mib" skull; the tibia and fibula being separate, and the sym- _ " physis of the pelvis forfned merely by ligament. The skull is not constricted across the orbits. The teats, which are placed both on the

Fig. 12. — A Golden Mole (Chrysochloris obtusirostris) reduced.

breast and in the groin, are situated in shallow depressions. The ears

are buried in the fur, and the eyes concealed beneath the skin; the feet are four-toed and provided with powerful claws for burrowing

in the fashion of the mole, but it is interesting to note that the skeleton is modified for the same purpose in a manner quite different from that obtaining in the latter animal. These animals derive their name from the metallic iridescence of the fur of most of the species. In the more typical species the dental formula is the same as in Micrcgale, that is to say, there are 40 teeth. In other species, which it has been proposed to separate as Amblysomus, there are, however, only 36 teeth, owing to the absence of the last pair of molars. The group is evidently nearly related to the Centetidae — most nearly perhaps to the Oryzorictinae.

Fossil Insectivora. Some years ago Dr F. Ameghino, of Buenos Aires, described from the Tertiary formation of Santa Cruz, in Patagonia, the remains of an insectivore under the name of Necrolestes. The occurrence of a member of the Insectivora in these beds is remarkable, since this group is represented at the present day in South America only by a shrew or two which have wandered from the north. Dr Ameghino expressed his belief that the extinct Patagonian insectivore was nearly related to the golden moles, and although this opinion appears to have been withdrawn, Professor W. B. Scott states that he is con- vinced of the close affinity existing between Necrolestes and Chryso- chloris. Although this view may not be accepted, it must be re- membered that it represents the opinion of a palaeontologist who has had better opportunities than most of his fellow-workers of forming a trustworthy judgment. So convinced is Dr Scott of the closeness of the relationship between Necrolestes and the golden moles that he regards it as rendering probable the former existence of a direct land-connexion between Africa and South America. There is no reason, he says, to suppose that the track of migration could have been by way of Europe and North America, for no trace of the group has been found anywhere north of the equator. This supposed connexion between Africa and South America in Tertiary times has often been suggested, and is supported by many independent lines of evidence; and the presumed affinity between the two mammals here referred to adds to the weight of such evidence.

The discovery in the Oligocene Tertiary deposits of Dakota of the remains of a species of hedgehog is a fact of great interest, for the

hedgehog-tribe (Ermaceidae) is at the present day an exclusively Old World group. The discovery of the fossil American species, which has been made the type of a new genus under the name of Protherix, serves to strengthen the view that the northern countries of the Western and Eastern hemispheres form a single zoological region ; and that formerly there was comparatively free communica- tion between them in the neighbourhood of Bering Sea, under climatic conditions which permitted of temperate forms passing from one continent to the other. As might have been expected, remains of hedgehog-like mammals have been obtained in the Tertiary deposits of Europe. Among these, Palaeoerinaceus, from the Upper Oligocene of France, seems scarcely separable from the existing genus. Necrogymnurus {Neurogymnurus) from the Lower Oligocene, of the same country, appears to be allied to Hylomys, which is itself the most generalised of the family, so that the extinct genus, of which Caluxotkerium is a synonym, may represent the ancestral type of the Erinaceidae. The genus Galerix, or Lanthanotkerium, of the Oligocene, which has the typical series of 44 teeth, a bony ring round the orbit, and conjoint tibia and fibula, has been regarded as representing the T-upaiidae and Macroscelididae, but is more probably referable to the Erinaceidae, being apparently akin to Gymnura. The moles are represented in the French Oligocene by A mphidozotherium and in the Miocene by Talpa, while in the North American early Tertiary we have the primitive Talpavus. Shrews are also known from the Lower Oligocene upwards both in the eastern and western hemispheres. Of the Lower Eocene Adapisorex, with the typical 22 lower teeth, Adapisoriculus and Orthaspidotherium, all from France, the affinities are quite uncertain. The American Oligocene Leptictis, with i. 2, c. 1, p. 4, m. 3 in the upper jaw, and Ictops, with i. \,c. \, p. \, m. j}, may be insectivorous mammals, with affinities to the creodont Carnivora. It is, indeed, probable that not only is there a relationship between the Creodonta and the Insectivora, but also one between the latter and the Marsupialia, so that the marked similarity between the cheek-teeth of the insectivorous Chrysochloris and the Marsupial Notoryctes may be due to genetic relationship. That the bats and the flying-lemur are descendants of the Insectivora cannot be doubted.

Bibliography. — G. E. Dobson, " Monograph of the Insectivora" (London, 1883-1890); W. Leche, " Zur Morphologie des Zahn-systems der Insectivoren," Anatom. Anzeiger (xiii. 1 and 514, 1897) ; C. J. Forsyth-Major, " Diagnoses of New Mammals from Mada-gascar." Ann. Mae. Nat. Hist. ser. 6. vol. xviii. pp. 318 and 461 (1896) : A. A. Mearns, " Descriptions of New Mammals from the

Philippine Islands," Proc. U.S. Museum (xxviii. 425, 1905). (R. L.)

INSECTIVOROUS PLANTS. Insectivorous or, as they are sometimes more correctly termed, carnivorous plants are, like the parasites, the climbers, or the succulents, a physiological assemblage belonging to a number of distinct natural orders. They agree in the extraordinary habit of adding to the supplies of nitrogenous material afforded them in common with other

plants by the soil and atmosphere, by the capture and consump- tion of insects and other small animals. The curious and varied mechanical arrangements by which these supplies of animal food are obtained and utilized are described under the headings of the more important plants.

The best known and most important order of insectivorous plants — Droseraceae — includes six genera: Byblis, Roridula, Drosera, Drosophyllum, Aldrovanda and Dionaea, of which the last three are monotypic, i.e. include only one species. The Sarracenia- ceae contain the genera Sarracenia, Darlingtonia, Heliamphora, while the true pitcher plants or Ncpenthaceae consist of the single large genus Nepenthes. These three orders are closely allied and form the series Sarraceniales of the free-petalled section (Choripetalae) of Dicotyledons. The curious pitcher-plant, Cephalolusfollicularis, comprises a separate natural order Cephalo- taceae, closely allied to the Saxifragaceae. Finally the genera Pinguicida, Utricularia, Genlisea and Polypompholix belong to the gamopetalous order Lentibulariaceae.

While the large genus Drosera has an all but world-wide distribu- tion, its congeners are restricted to well-defined and usually com- paratively small areas. Thus Drosophyllum occurs only in Portugal and Morocco, Byblis in tropical Australia, and, although Aldrovanda is found in Queensland, in Bengal and in Europe, a wide distribution explained by its aquatic, habit, Dionaea is restricted to a few localities in North and South Carolina. Cephalotus occurs only near Albany in Western Australia, Heliamphora on the Roraima Mountains in Venezuela, Darlingtonia on the Sierra Nevada of California, and these three genera too are as yet monotypic; of Sarracenia, however, there are seven known species scattered over the eastern states of North America. The forty species of Nepenthes are mostly natives of the hotter parts of the Indian Archipelago, but a few range into Ceylon, Bengal, Cochin China, and some even occur in tropical Australia on the one hand, and in the Seychelles and Madagascar on the other. Pinguicida is abundant in the north

temperate zone, and ranges down the Andes as far as Patagonia ; the 250 species of Utricularia are mostly aquatic, and some are found in all save polar regions; their unimportant congeners, Genlisea and Polypompholix, occur in tropical America and south-western Australia respectively. It is remarkable that all the insectivorous plants agree in inhabiting damp heaths, bogs, marshes and similar situations where water is abundant, but where they are not brought into contact with the plenteous supply of inorganic nitrogenous food as are the roots of terrestrial plants.

INSEIN, a town of British India, in the Hanthawaddy district of Burma, 10 m. N.W. of Rangoon; pop. (1901) 5350. It is an important railway centre, containing the principal workshops of the Burma railway company, also a government engineer- ing school, a reformatory school and the largest gaol in the province.

INSOMNIA, or deprivation of sleep (Lat. somnus), a common and troublesome feature of most illnesses, both acute and chronic. It may be due to pain, fever or cerebral excitement, as in delirium tremens, or to organic changes in the brain. The treatment, when failure to sleep occurs in connexion with a definite illness, is part of the treatment of that illness. But there is a form of sleeplessness not occurring during illness to which the term " insomnia " is commonly and conveniently applied. It must not be confounded with occasional wakefulness caused by some minor discomfort, such as indigestion, nor with the " bad nights " of the valetudinarian. Real insomnia consists in the prolonged inability to obtain sleep sufficient in quantity and quality for the maintenance of health. It is a condition of modern urban life, and may be regarded as a malady in itself. It is a potent factor in causing those nervous breakdowns ascribed to " overwork." It may occur as a sequel to some exhausting illness, notably influenza, which affects the nervous system long after convalescence. But it very often occurs without any such cause. Professional and business men are the most frequent sufferers. Insomnia is comparatively rare among the poor, who do little or no brain work. It may be brought on by some exceptional strain, by long-continued worry, or by sheer overwork. The broad pathology is simple enough. It has been demonstrated by exact observations that in sleep the blood leaves the brain automatically. The function is rhythmical, like all the vital functions, and the mechanism by which it is I carried out is no doubt the vaso-motor system, which controls

the contraction and dilation of the blood-vessels. In sleep the vessels in the brain automatically contract, but when the brain is working actively a plentiful supply of blood is required, and the vessels are dilated. If the activity is carried to great excess the vessels become engorged, the mechanism does not act and sleep is banished. In insomnia this condition has become fixed.

When a breakdown has happened or is pending the only treatment is complete rest, combined, if possible, with change of air and scene; but if the mischief has gone far it will take 1 very long to repair, and may never be repaired at all. In no matter of health is the importance of " taking it early " more pronounced. Delay is the worst economy. A few days' holiday at the com- mencement of trouble may save months or years of enforced idleness. Sea-air sometimes acts like a charm. But if it is impossible to give up work and leave worry behind, even for a short time, sleep should be carefully wooed by every possible means. In the first place, plenty of time should be devoted to it, and no chance should be missed. That is to say, the night should not be curtailed at either end, and if sleepiness approaches in the daytime, as it often does, it should be encouraged. It is better to lie still at night and try to sleep than to give way to restlessness, and a few minutes snatched in the daytime, when somnolence offers the opportunity, has a restorative effect out of all proportion to the time occupied. Then all accidental causes of disturbance should be avoided. Lights and sounds should be excluded, comfort studied and digestion attended to. Fresh air is a great help. As much time should be spent out of doors as possible, and exercise, even to the point of fatigue, may be found helpful. But this requires watching: in some cases bodily exhaustion aggravates the malady. A little food (e.g. a glass of hot milk) immediately before going to bed is useful in inducing sleep, and persons who are apt to wake in the night and lie awake for hours may obtain relief by the same means. Hypnotic drugs, which have greatly multiplied of late years, should only be taken under medical advice. The real end to aim at is the restoration of the natural function, and the substitution of artificial sleep, which differs in character and effect; tends rather to prevent than to promote that end. It is often possible to induce sleep by rhythmic breathing.

INSPIRATION (Lat. inspirare, breathe upon or into), strictly the act of drawing physical breath into the lungs as opposed to " expiration." Metaphorically the term is used generally of analogous mental phenomena; thus we speak of a sudden spontaneous idea as an inspiration." The term is specially used in theology for the condition of being directly under divine influence, as the equivalent

of the Greek deoirvevaria (the adjec- tive Btbrvtvaros is used of the Holy Scriptures in 2 Timothy iii. 16). Similar in meaning is ivdovci.a(Tfws, enthusiasm (from tvOovoiafa from tvBeos). Possession by the divine spirit (wvtvua) was regarded as necessarily accompanied by intense stimulation of the emotions. The possibility of a human being becoming the habitation and organ of a divinity is generally assumed in the lower religions. In the popular religion of China some of the priests, the Wu, claim to be able to take up into their body a god or a spirit, and thereby to give t>racles. In wild frenzy they rush about half naked with hair hanging loose, wounding themselves with swords, knives, daggers, and uttering all kinds of sounds, which are then interpreted by people who claim to be able to understand such divine speech. The Maoris at the initiation of the young men into the tribal mysteries sing a song, called " breath," to the mystic wind by which they believe their god makes his presence known. An Australian woman claimed to have heard the descent of the god as a rushing wind. In some savage tribes blood is drunk to induce the frenzy of inspiration; music and dancing are widely employed for the same purpose. Dionysus, the god of wine in Greece, was also the god of inspiration; and in their orgies the worshippers believed themselves to enter into real union with the deity. In Dephi the Pythia, the priestess who delivered the oracles, was intoxicated by the vapour which rose from a well, through a small hole in the ground. As the oracles were often enigmatic, they were interpreted by a prophet. In Rome the inspiration of Numn.

was derived from the nymph Cgeria; and great value was attached to the books of the Cumaean Sibyl. In Arabia the kahin (priest) was recognized as the channel of divine com- munication. Inspiration may mean only possession by the deity, or it may mean further that the person so possessed becomes the channel through which the deity reveals his word and will. (See J. A. Macculloch's Comparative Theology, chap, xv., 1902). Prophecy in the Old Testament in its beginnings is similar to the phenomenon in other religions. Saul and his servant came to Samuel, the man of God, the seer, with a gift in their hands to inquire their way (1 Sam. ix. 8). The companies of prophets who went about the country in Samuel's time were enthusiasts for Yahweh and for Israel. When Saul found himself among them he was possessed by the same spirit (1 Sam. x. 10, n.) The prophesying in which he took part probably included violent movements of the body, inarticulate cries, a state of ecstasy or even frenzy. The phrase "holy spirit " in Acts, as applied to the Apostolic Church, probably indicates a similar state of religious exaltation; it was accompanied by speaking with tongues, inarticulate utterances,

which needed interpretation (1 Corinthians xiv. 27). In every religious revival, when the emotions are deeply stirred, similar phenomena are met with. Such a movement was Montanism in the 3rd century. At the Reformation, while Luther was at the Wartburg, fanaticism broke out, and spread from Wittenberg; prophets went about declar- ing the revelations which they had received. The Evangelical Revival in the 18th century also had its abnormal religious features. The Revival in Scotland in i860 was marked by one curious feature — the Gospel dance — when in their excitement men and women got up and spun round and round till they were exhausted. Spontaneous praise and prayer marked the revival in Wales in 1905-1906.

Prophecy, as represented by the writings of the prophets, arose out of this state of religious exaltation, but left behind many of its features. Yahweh was believed to guide and guard the history of His chosen people Israel; He controlled the action of the nations that came in contact with His people, so that, using them as His instruments, He might accomplish His purpose. The function of the prophets was to interpret the course of history so as to communicate God's Word and will in judgment or in mercy. They were divinely endowed for this function by their inspiration. While these prophets seem to have continued in the exercise of all their normal faculties, which were stimulated and not suppressed, yet they do claim a distinctive divine activity in their consciousness, and distinguish with confidence their own thoughts from the revealed word. That abnormal psychic states, such as visions and voices, were sometimes experienced is not improbable; but the usual prophetic state seems to have been one of withdrawal of attention from the outer world, absorption of interest in the inner life, devout communion and inte: cession with God, and the divine response in a moral or a spiritual intuition rather than an intellectual ratiocination. Possession by the Spirit in its external manifestations is ascribed to Gideon, Jephthah, Samson, Saul, Elijah; but even when the same language is used of the later prophets, it is probably such an inward state as has just been described which is to be assumed. A feature inseparable from this later phase of prophecy is pre- diction. For the warning or the encouragement of the people the prophet as Jehovah's messenger declares what He is about to do. Thus the fall of Samaria in 722 B.C., the deliverance of Jerusalem in 701, the overthrow of the kingdom of Judah in 586, the return from exile in 537 were all heralded by prophecy. This prediction was no shrewd political conjecture, but an application to existing conditions of the permanent laws of God's government. The abnormal phenomena of

inspiration, the presence and operation of the Holy Spirit, in the Apostolic Church, have already been noticed. While Paul does not deny nor depreciate these charisms, as tongues, miracles, &c, he represents as the more excellent way the Christian life in faith, hope and love (1 Cor. xii. 31). The New Testament represents the Christian life as an inspired life. It is living communion with Christ, and therefore constant possession of the Holy Spirit.

Every Christian in the measune in which he has become a new creature in Christ is a prophet, because he knows by the enlightening of God's Spirit " what is the good and acceptable and perfect will of God " (Romans xii. 2). An occasional state of divine possession in the other religions becomes in the prophets of Israel a permanent endowment for a few select agents of God's revelation; but when that revelation is consummated in Christ, inspiration becomes the universal privilege of all believers.

While there is much superstition in the view of inspiration found in many religions, and much imposture in the claims to the possession of it, yet it would be illogical to conclude that this feature of religion is altogether human error and not at all divine truth. Man's knowledge of God is conditional, and therefore limited by his knowledge of the world and himself, and has accordingly the same imperfection. The reality of a divine communion and communication with man is not to be denied because its nature has been imperfectly apprehended. We must estimate the worth of inspiration by the higher and not the lower stages, by the vision of an Isaiah or the consecration of a Paul; but at the same time we must be prepared to recognize its lowly beginnings.

In dealing with the inspiration of the Bible, to which the use of the term has in the Christian Church been largely restricted, it is important to remember that inspiration is primarily personal; and that it assumes varied forms and allows varying degrees.

Other religions besides Christianity possess their sacred scriptures. The value attached to the Sibylline writings in Rome has already been mentioned. In Greece, Homer and Hesiod were esteemed as authoritative exponents of the mythology; a distinction was made between the poet's own words and the divine element, and what was offensive to reason, conscience or taste was explained allegorically.

Hinduism distinguishes two classes of sacred writings, the S'ruti (hearing), which were believed to have been heard by inspired men from a divine source, and were endowed with supernatural powers, and the Stnrili (recollection) derived from tradition. While the poets of the Rig-Veda, the oldest of the holy writings, do not claim inspiration, it is ascribed to them in the highest degree. Some of the Hindu sects — Vaishnavist and Saivist — regard some of the later writings, as also divine revelation. In Zoroastrianism, the books of the Zend-Avesta were conceived by later generations at least as having been eternally formed by Ormuzd, and revealed at the creation to his prophet Zoroaster, who, however, guarded the communication carefully in his mind until a very much later date in the world's history. Ormuzd drove Ahriman back to hell by reciting one of the holy hymns. Buddhism has its Tripitaka (three baskets), and the reading, reciting and copying of the sacred scriptures is one of the surest means of acquiring merit. But as it ignores the gods, and places Buddha far above them, it does not claim divine inspiration for its writings. Buddha himself enlightens, but every man must save himself by walking in the true way which has been shown to him. Confucianism has its literature of absolute authority on manners, morals, rites and politics, but its claim does not rest on inspiration. These writings are revered as preserving the beliefs and customs of former ages, which are believed to have been more familiar than the present with the Way of Heaven. Tor the Koran very extravagant claims are made by orthodox Islam. Although Mahomet at first feared that his call to be a prophet was a deception of evil spirits, and wished to take his own life, yet afterwards he uttered his decisions on most trivial matters as divine oracles. God preserves the original text of the Koran in Heaven, and blots out what He wills and leaves what He wills. By the angel Gabriel God communicated this book word for word to the prophet, so that the Koran is a faithful copy of the heavenly book. The angels in heaven read the Koran. While the orthodox theology asserted the eternity of the Koran, the Mo'tazilite school denied this for the reason that the spoken sounds and the written signs in which alone a revelation could be given must have come to be i« time. As Islam was not altogether independent of Christianity and Judaism, this doctrine of the Koran was probably intended

as a reply to the claims of Jews and Christians for their holy writings.

The Pentateuch was accepted as authoritative law by the Jewish Church in 444 B.C. About two centuries later the Prophets (including the histories as well as the prophetic writings proper) were also

acknowledged as sacred scriptures, although of inferior authority to the Law. In the century before the Christian era the Writings, including Psalms and Proverbs, were included in the Canon. Palestinian and Hellenistic Judaism dis- agreed about the recognition of the books now known as the Apocrypha. The writers of the New Testament use the Old Testament as holy scriptures, as an authoritative declaration of the mind and will of God; but the inaccuracy of many of the quotations, together with the use of the Greek translation as well as the original Hebrew, forbid our ascribing to them any theory of verbal inspiration. By the middle of the 2nd century the four Gospels were probably accepted as trustworthy records of the life of Jesus. The Epistles were accepted as authoritative in virtue of apostolic authorship. By the end of the 3rd century the use and approval of the churches had established the present canon.

The doctrine of the inspiration of these writings in the Jewish and Christian Church now claims attention. Inspiration is first of all ascribed to persons to account for abnormal states, or exceptional powers and gifts; in this doctrine it is transferred to writings, and its effects in securing for these inerrancy, authority, &c, are discussed with little regard for the psychic state of the writers.

The New Testament affirms the inspiration of the Old Testa- ment. Jesus introduced a quotation from the 1 10th Psalm with the words " David himself by the Holy Spirit said " (Mark xii. 36), and in appealing to the law against tradition He used the phrase " God said " (Matt. xv. 4). The author of the first Gospel describes a prediction as that " which was spoken by the Lord through the prophet " (Matt. i. 22), and so Peter refers to " the scripture which the Holy Spirit spake before by the mouth of David " (Acts i. 16). For Paul as for Peter the utterances of the Old Testament are " the oracles of God" (Romans iii. 2; 1 Peter iv. n). The final appeal is to what is written. God spoke in the prophets (Romans ix. 25; Hebrews i. 1). The use of Be&irvevaTos in regard to the Scriptures in 2 Timothy iii. 16 has already been noted. The Spirit of Christ is said to have been in the prophets (1 Peter i. n); and it is affirmed that " no prophecy ever came by the will of man; but men spake from God, being moved by the Holy Spirit " (2 Peter i. 21). The constant use of the Old Testament in the New confirms this doctrine of inspiration. Contemporary Jewish thought was in agreement with this view of the Old Testament. Philo describes Moses as " that purest mind which received at once the gift of legislation and of prophecy with divinely inspired wisdom " (De congr. erud. c. 24). Josephus again and again expresses his deep reverence for the holy Scriptures, and his belief

that the authors wrote under the influence of the Spirit of God. Accord- ing to Weber the doctrine of the Talmud is that " the holy scripture came to be through the inspiration of the Holy Spirit, and has its origin in God Himself, who speaks in it." But the nature of this inspiration must be more closely defined, and hence have arisen a number of theories of inspiration.*

The first theory is that of mechanical dictation, or verbal inspiration. The writers of the books of the Bible were God's pens rather than His penmen; every word was given them by. God. Their faculties were suppressed that God alone might be active in them. This conception is found in Platp, " God has given the art of divination, not to the wisdom, but to the foolish- ness of man. No man, when in his wits, attains prophetic truth and inspiration; but when he receives the inspired word, either his intelligence is enthralled in sleep, or he is demented by some distemper or possession " {Timaeus, 71). Philo declares that " the understanding that dwells in us is ousted on the arrival of the Divine Spirit, but is restored to its own dwelling when that Spirit departs, for it is unlawful that mortal dwell with immortal " {Quit rer. div. haeres, c. 53). Athenagoras adopted this view

in regard to the prophets. " While entranced and deprived of their natural powers of reason by the influence of the Divine Spirit, they uttered that which was wrought in them, the spirit using them as its instrument, as a flute player might blow a flute." Other figures used are these; the inspired writer was the lyre, and the Holy Spirit the plectrum, or the writer was the vase, and the Holy Spirit filled it. The extravagances of Montanism threw some discredit on this conception, and we find Miltiades writing a treatise with the title That the Prophet ought not to speak in Ecstasy. But Gregory the Great called the writers of Scripture the calami of the Holy Spirit. After the Reforma- tion the Protestant Scholastics revived this view. Gerhard, Calovius and Quenstedt agree in ascribing to the Scriptures absolute infallibility in all matters, and describe the writers as " amanuenses of God, or Christ," " hands of the Spirit," " clerks," " secretaries," " manus et Spiritus sive." The Formula con- sensus Helvetica probably reaches the extreme statement, when it declares that the Old Testament was " turn quoad consonas, turn quoad vocalia, sive puncta ipsa, sive punctorum saltern potestatem, et turn quoad res, turn quoad verba ddnrvevoTOS." Seeing that the vowel-point system was introduced by Jewish scribes centuries after the

books were written, this statement shows how recklessly theory may override fact. Of this theory, which has now few advocates, it is sufficient to say that it ignores all the data the Bible itself offers. On the one hand it is im- possible to maintain the inerrancy of the Bible in matters of science, philosophy, history, and even in doctrine and morals there is progress; on the other hand the personal characteristics, the historical circumstances, the individual differences of the writers are so reproduced in the writings that the action of the human factor must be frankly and fully recognized as well as the divine activity.

The second theory is that of dynamic influence or degrees of inspiration. While the Spirit controls and directs, the human personality is not entirely suppressed. Even Philo recognized that all portions of Scripture were not equally inspired, and assigned to Moses the highest degree of inspiration. The Jewish rabbis placed the Law, the Prophets and the Writings on a descending scale of inspiration. " The schoolmen followed them, and some distinguished four degrees of influence: super- intendence, which saved from positive error; elevation, which imparted loftiness to the thought; direction, which prompted the writer what to insert and what to omit; and suggestion, which inspired both thoughts and words " (M. Dods, The Bible, its Origin and Nature, p. 118, 1905). The co-operation of the divine and the human factors is recognized in Augustine's saying about the authors: " Inspiratus a Deo, sed tamen homo." It is interesting to note that Plutarch had to account for the same human peculiarities and imperfections in the Pythian responses as the Christian apologist in the Bible, and he offers a similar explanation. " If she were obliged to write down, and not to utter the responses, we should not, I suppose, believe the hand- writing to be the god's, and find fault with it, because it is inferior in point of calligraphy to the imperial rescripts; for neither is the old woman's voice, nor her diction, nor her metre the god's; but it is the god alone who presents the visions to this woman, and kindles light in her soul regarding the future; for this is the inspiration " (op. cit. p. 119). While degrees of inspiration must be recognized, the distinction must be made objectively, and not subjectively. We may say that where the revelation is the clearest, there inspiration is the fullest, that nearness to the perfect fulfilment in Christ of God's progressive purpose deter- mines the degree of inspiration; but we cannot formulate any elaborate theory of the operation of the Spirit from the stand- point of the psychic states of the writers. While subjectively we cannot separate the divine and the human spirit in the process, so objectively we cannot distinguish the divine substance

and the human form in the product of inspiration. This theory neither helps us to explain the origin of the writings nor guides us in estimating the contents.

The third theory, which is a modification of the second, is that of essential inspiration, which distinguishes matters of

doctrine and conduct as closely related to God's purpose in the Scriptures from the remaining contents of the Scripture, and claims for the Bible only such inspiration as was necessary to secure accuracy in regard to these. The theology and the morality of the Bible are inspired, but not its history, science, philosophy. This distinction is already anticipated in Thomas Aquinas' theory of two kinds of inspiration, " the direct, which is to be found where doctrinal and moral truths are directly taught, and the indirect, which appears in historical passages, whence the doctrinal and moral can only be indirectly evolved by the use of allegorical interpretation." This view has the support of such names as Erasmus, Hugo Grotius, Richard Baxter, W. Paley and J. J. I. von Dollinger. It is to be observed that it lays emphasis on the necessity of correct views about doctrine and conduct; and this is an intellect ualist standpoint which is not in accord either with the character or the influence of the Bible. Further, it does not explain how the same human mind can by divine inspiration obtain infallible knowledge in some matters, and yet be left prone to err in others. Again it does not take account of the fact that the teaching of the Old Testament as regards belief and morals is progressive; and that the imperfections of the earlier stages of the development are corrected in the later. That it is an advance on the other theories must be acknowledged, as from this standpoint errors in history or science are no difficulties to the believer in the Bible as so inspired. It is necessary here to add that this emphasis on the infallibility of the knowledge of doctrine and morals communi- cated by the Scriptures had as its legitimate inference in the patristic and medieval period the claim that the Church alone was the infallible interpreter of the Scriptures.

The fourth theory — that of the Reformers (though not of their successors, the Protestant scholastics) — might be called that of vital inspiration, as its emphasis is on religious and moral life rather than on knowledge. While giving to the Scriptures supreme authority in all matters of faith and doctrine, the Reformers laid stress on the use of the Bible for edification; it was for them primarily a means of grace for awakening and nourishing the new life in the hearts of God's people. By the enlightening work of the Spirit of God the World of God is discovered in the Scriptures: it is the testimonium Spiritus

Sancti in the soul of the Christian that makes the Bible the power and wisdom of God unto salvation. By thus laying stress on this redemptive purpose of the divine revelation, the Reformers were delivered from the bondage of the letter of Scripture, and could face questions of date and authorship of the writings frankly and boldly. Hence a pioneer of the higher criticism in Great Britain, W. Robertson Smith, was able to appeal to this Reformation doctrine. " If I am asked why I receive Scripture as the Word of God, and as the only perfect rule of faith and fife, I answer with all the fathers of the Protestant Church, ' Because the Bible is the only record of the redeeming love of God, because in the Bible alone I find God drawing near to man in Christ Jesus, and declaring to us in Him His will for our salvation. And this record I know to be true by the witness of His Spirit in my heart, whereby I am assured that none other but God Himself is able to speak such words to my soul ' " (in Denney's Studies in Theology, p. 205). The Reformers' application of this theory to the Bible was necessarily conditioned by the knowledge of their age; but it is a theory wide enough to leave room for our growing modern knowledge of the Bible.

Briefly stated, these are the conclusions which our modern – knowledge allows. (1) Inspiration, or the presence and influence of the Divine Spirit in the soul of man, cannot be limited to the writers of the Scriptures; but, comparing the Bible with the other sacred literature of the world, its religious and moral superiority cannot be denied, and we may, therefore, claim for it as a whole a fuller inspiration. (2) As different writings in the Bible have more or less important functions in the progressive divine revelation, we may distinguish degrees of inspiration. (3) This inspiration is primarily personal, an inward enlightening and quickening, both religious and moral, of the writer, finding an expression conditioned by his individual characteristics in

his writing. (4) The purpose of inspiration is practical; the inspired men are used of God to give guidance in belief and duty by declaring the word and will of God as bearing on human life. (5) As revelation is progressive, inspiration does not exclude defects in doctrine and practice in the earlier stages and their correction in the later stages of development. (6) As the pro- gressive revelation culminates in Christ, so He possesses fullest inspiration; and it varies in others according to the closeness of their contact, and intimacy of their

communion with Him. (7) As the primary function of Christ is redemptive, so the inspiration of the Bible is directed to make men " wise unto salvation." (8) It is the presence and influence in the souls of men of the same Spirit of God as inspired the Scriptures which makes the Bible effective as a means of grace; and only those who yield themselves to the Spirit of God have the witness in themselves that the Bible conveys to them the truth and the grace of God.

In addition to the books mentioned, see: A. B. Bruce, The Chief End of Revelation (1881); C. A. Briggs, The Bible, the Church, and the Reason (1892); W. N. Clarke, The Use of the Scriptures in Theology (1906); H. E. Ryle, The Canon of the Old Testament (1892) ; B. F. Westcott, A General Survey of the History of the Canon of the New Testament (7th ed., 1896) ; W. Sanday, Inspiration (3rd ed., 1896) ; A. B. Davidson, article " Prophecy " in Hastings's Bible Dictionary, iv. ; A. E. Garvie, "Revelation" in Hastings's Bible Dictionary (extra volume). (A. E. G.)*

INSTALLATION, the action of installing or formally placing some one in occupation of an office or place. The med. Lat. installare meant literally " to place in a seat or stall " (stallum), and the word, as now, was particularly used of the ceremonial induction of an ecclesiastic, such as a canon or prebendary, to his stall in his cathedral choir. Similarly knights of an order of chivalry are ceremonially led to their stalls in the chapel of their order. The term is transferred to any formal establishment in office or position. From a French use of installer and installa- tion, the word is frequently applied in a transferred sense to the fixing in position and making ready for use of a mechanical, particularly electrical, apparatus or plant.

INSTALMENT (for earlier stallment or estallment, from Fr. estaler, to fix, arrange; the change is probably due to the influence of the verb " install "), the payment of a sum of money at stated intervals and in fixed portions instead of in a lump sum; hence the sums of money as they fall due at the periods agreed upon. For the system of purchase by deferred payments or instalments see Hire-Purchase Agreement.

INSTERBURG, a town in the kingdom of Prussia, situated at the point where the Angerapp and Inster join to form the Pregel, 57 m. E. of Konigsberg by the railway to Eydtkuhnen, and at the junction of lines to Memel and Allenstein. Pop. (1900) 27,787. It has four Evangelical churches, of which the town church is celebrated for its fine wood carvings, a Roman Catholic church, a synagogue, several

schools and a park. Besides flax-spinning and iron-founding, Insterburg has manu- factures of machinery, shoes, cement, leather and beer, along with a considerable trade in cereals, vegetables, flax, linseed and wood, while horse-breeding is extensively carried on in the neighbourhood. Close to the town lies the demesne of Georgen-burg, with an old castle which formerly belonged to the Teutonic order. Insterburg, the " burg " on the Inster, was founded in the 14th century by the knights of the Teutonic order. Having passed to the margraves of Brandenburg, the village which had sprung up round the castle received civic privileges in 1583. During the next century it made rapid advances in prosperity, partly owing to the settlement in it of several Scottish trading families. In 1679 it was besieged by the Swedes; in 1690 it suffered severely from a fire; and in 1710-1711 from pestilence.

See Tows, Urkunden zur Geschichte des Hauptamts Insterburg (Inst., 1 895-1 897, 3 parts); and Kurze Chronik der Stadt Insterburg (Konigsberg, 1883).

INSTINCT. It is in the first place desirable to distinguish bwˆiyeen the word " instinct " (Lat. instinctus, from instinguere, to incite, impel) as employed in general literature and the term

" instinct " as used in scientific discourse. The significance of the former is somewhat elastic, and is in large measure determined by the context. Thus in social relationships we speak of " in- stinctive " liking or distrust; we are told that the Greeks had " instinctive " appreciation of art; we hear of an instinct of reverence or " instinctive " beliefs. We understand what is meant and neither desire nor demand a strict definition. But in any scientific discussion the term instinct must be used within narrower limits, and hence it is necessary that the term should be defined. There are difficulties, however, in framing a satis- factory definition. That given by G. J. Romanes in the 9th edition of the Encyclopaedia Brilannica runs as follows: " Instinct is a generic term comprising all those faculties of mind which lead to the conscious performance of actions that are adaptive in character but pursued without necessary knowledge of the relation between the means employed and the ends attained." This has been criticized both from the biological and from the psychological standpoint. From the biological point of view the reference of certain modes of behaviour, termed instinctive, to faculties of mind for which " instinct " is the generic term is scarcely satisfactory; from the psycho- logical point of view the phrase " without necessary knowledge of the relation between the means employed and the end attained " is ambiguous. (See Intelligence of

Animals.) In recent scientific literature the term is more frequently used in its adjectival than in its substantive form; and the term " instinctive " is generally applied to certain hereditary modes of behaviour. Investigation thus becomes more objective, and this is a distinct advantage from the biological point of view. It is indeed sometimes urged that instinctive modes of behaviour should be so defined as to entirely exclude any reference to their psychological concomitants in consciousness, which are, it is said, entirely inferential. But as a matter of fact no small part of the interest and value of investigations in this field of inquiry lies in the relationships which may thereby be established between biological and psychological Conscious interpretations. Fully realizing, therefore, the difficulty tant of finding and applying a criterion of the presence or absence of consciousness, it is none the less desirable, in the interests of psychology, to state that truly instinctive acts (as defined) are accompanied by consciousness. This marks them off from such reflex acts as are unconsciously performed, and from the tropisms of plants and other lowly organisms. There remains, however, the difficulty of finding any satisfactory criterion of the presence of consciousness. We seem forced to accept a practical criterion for purposes of interpretation rather than one which can be theoretically defended against all adverse criticism. We have reason to believe that some organisms profit by experience and show that they do so by the modification of their behaviour in accordance with circumstances. Such modification is said to be individually acquired. To profit by individual experience is thus the only criterion we possess of the existence of the conscious experience itself. But if hereditary behaviour is unaccompanied by consciousness, it can in no wise contribute to experience, and can afford no data by which the organism can profit. Hence, for purposes of psychological interpretation it seems necessary to assume that instinctive behaviour, including the stimulation by which it is initiated and conditioned, affords that naive awareness which forms an integral part of what may be termed the primordial tissue of experience.

We are now in a position to give an expanded definition of instinctive behaviour as comprising those complex groups of co-ordinated acts which, though they contribute to experience, are, on their first occurrence, not determined by individual experience; which are adaptive and tend to the well-being of the individual and the preservation of the race; which are due to the co-operation of external and internal stimuli; which are similarly performed by all members of the same more or less restricted group of animals; but which are subject to variation, and to subsequent modification under

the guidance of individual experience.

INSTINCT

649

If a brief definition of instinct, from the purely biological point of view be required, that given in the Dictionary of Philo- sophy and Psychology may be accepted: " An inherited tioas.' reaction of the sensori-motor type, relatively complex and markedly adaptive in character, and common to a group of individuals." Instinctive behaviour thus depends solely on how the nervous system has been built through heredity; while intelligent behaviour depends also on those characters of the nervous system which have been acquired under the modifying influence of individual relation to the environment.

Such definitions, however, are not universally accepted. Wasmann, for example, divides instinctive actions under two groups: (1) those which immediately spring from the inherited dispositions; (2) those which indeed proceed from the same in- herited dispositions but through the medium of sense experience. The first group, which he regards as instinctive in the strict acceptance of the term, seem exactly to correspond to those which fall under the definition given above. The second group, which he regards as instinctive in the wider acceptance of the term, nearly, if not quite, correspond to those above spoken of as intelligent — though he regards this term as falsely applied (see Intelligence of Animals). By using the term instinctive in both its strict and its wider significance, Wasmann includes under it the whole range of animal behaviour.

It will be seen that from the biological standpoint there fall under the stricter definition those hereditary modes of behaviour which are analogous to hereditary forms of structure; and that a sharp line of distinction is drawn between the behaviour which is thus rendered definite through heredity, and the behaviour the distinguishing characteristics of which are acquired in the course of individual life. What in popular usage are spoken of »s the instincts of animals, for example, the hunting of prey by foxes and wolves, or the procedure of ants in their nests, are generally joint products of hereditary and acquired factors. Wasmann 's comprehensive definition so far accords with popular usage. But it tends to minimize the importance of the dis- tinction of that which is prior to individual experience and that which results therefrom. It is the business of scientific inter- pretation to disentangle the factors which contribute to the joint-

products. It is indeed by no means easy to distinguish between what is dependent on individual experience, and what is not. Only the careful observation of organisms throughout the earlier phases of their life-history can the closely related factors be distinguished with any approach to scientific accuracy. By the patient study of the behaviour of precocious young birds, such as chicks, pheasants, ducklings and moorhens, it can be readily ascertained that such modes of activity as Examples runnm g ; swimming, diving, preening the down, scratch- Ufe. ing the ground, pecking at small objects, with the

characteristic attitudes expressive of fear and anger, are so far instinctive as to be definite on their first occurrence — they do not require to be learnt. No doubt they are subsequently guided to higher excellence and effectiveness with the experience gained in their oft-repeated performance. Indeed it may be said that only on the occasion of their initial performance are they purely instinctive; all subsequent performance being in some degree modified by the experience afforded by previous behaviour of like nature and the results it affords. It should be remembered that such comparatively simple activities, though there is little about them to arrest popular attention, are just the raw material out of which the normal active life of such organisms is elaborated, and that for scientific treatment they are therefore not less important than those more conspicuous per- formances which seem at first sight to call for special treatment, or even to demand a supplementary explanation. The instincts of nest-building, incubation and the rearing of young, though they occur later in life than those concerned in locomotion and the obtaining of food, are none the less founded on a hereditary basis, and in some respects are less rather than more liable to modification by the experience gained by the carrying out of hereditarily definite modes of procedure. Here the instinctive factor probably predominates over that which is experiential.

But in the " homing " of pigeons there is little question that the experiential factor predominates. The habit results mainly from the modification of the higher nerve-centres through individual and intelligent use.. In the migration of birds we are still un- certain as to the exact nature and proportional value of the instinctive and intelligent factors. The impulse to migrate, that is to say, the calling forth of specific activities by climatal or other presentations, appears to be instinctive; whether the direction of migration is in like manner instinctive is a matter of uncertainty; and, if it be instinctive, the nature of the stimuli and the manner in which they are hereditarily linked with re- sponsive acts is unexplained. To say that it is due to

hereditary experience is generally regarded as inadmissible. For modern interpretation hereditary modes of behaviour afford experience; in no other sense can it be said that experience is inherited.

A good example of the methods of recent investigation is to be found in Dr G. W. and Mrs Peckham's minute observations on the habits and instincts of the solitary wasps. They enumerate the following primary types of instinctive ff f H' ples behaviour: the manner of attacking and capturing a insect lib. particular kind of prey which alone affords the requisite presentation to sense; the manner of conveying the prey to the nest; the general style and locality of the nest; the method and order of procedure in stocking the nest with food for the unseen young. It is noteworthy, however, that although the manner in which the prey is stung (for example) is on the whole similar in the case of the members of any given species — that is to say, all the wasps of the species behave in very much the same manner — yet there are minor variations in detail. This outcome of pro- longed and careful observation is of importance. It affords a point of departure for the interpretation of the genesis of existing instincts. Furthermore, the observations on American wasps render it probable that the earlier accounts of the instinctive behaviour of such wasps are exaggerated. Romanes thought that the manner of stinging and paralysing their prey might be justly deemed the most remarkable instinct in the world. Spiders, caterpillars and grasshoppers are, he said, stung in their chief nerve-centres, in consequence of which the victims are not killed outright, but rendered motionless and continue to live in this paralysed condition for several weeks, being thus available as food for the larvae when these are hatched. Of course, he adds, the extraordinary fact which stands to be explained is that of the precise anatomical, not to say the physiological, know- ledge which appears to be displayed by the insect in stinging only the nerve-centres of its prey. But the Peckhams' careful observations and experiments show that, with the American wasps, the victims stored in the nests are quite as often dead as alive; that those which are only paralysed live for a varying number of days, some more, some less; that wasp larvae thrive just as well on dead victims, sometimes dried up, sometimes undergoing decomposition, as on living and paralysed prey; that the nerve-centres are not stung with the supposed uni- formity; and that in some cases paralysis, in others death, follows when the victims are stung in parts far removed from any nerve-centre. It would seem then that by the stinging of insects or spiders their powers of resistance are overcome and their escape prevented; that some are killed

outright and some paralysed is merely an incidental result.

Granted that instinctive modes of behaviour are hereditary and definite within the limits of congenital variation, the question of their manner of genesis is narrowed to a clear issue. ■ .

Do they originate through the natural selection of origin". those variations which are the more adaptive; or do they originate through the inheritance of those acquired modifica- tions which are impressed on the nervous system in the course of individual and intelligent use ? Romanes, taking up the inquiry where Darwin left it, came to the conclusion that some instinctive modes of behaviour which he termed " primary " are due to the operation of natural selection alone; that others, which he termed " secondary," and of which he could give few examples, were due to the inheritance of acquired modifications from which, in the phrase of G. H. Lewes, the intelligence had

lapsed; while others, which he termed " blended," were partly due to natural selection and partly resulted from the inheritance of acquired habit. There has been a prolonged controversy between the school of interpretation, commonly spoken of as Lamarckian, which advocates a belief in the inheritance of acquired characters, and the school, with Weismann as their leader, which questions the evidence for, or the probability of, such inheritance. The trend of modern opinion appears to be in the direction of the Weismannian interpretation. And it must be regarded as questionable, if not improbable, that instinctive modes of behaviour are in any degree directly due to the inherit- ance of habits intelligently acquired. That intelligent habits may secure the survival of those organisms whose germ-plasm bears the seeds of favourable congenital variations is not im- probable. But in that case intelligent procedure only contributes to the survival and not to the origin of hereditary variations.

To test the hypothesis that natural selection is an essential condition to the genesis of instinctive behaviour it should be the ' aim of investigation to find crucial cases. This is,

o»serv«- however, no easy task. We ought to be able to adduce tions. cases in which, where the incidence of natural selection

is excluded, acquired habits do not become instinctive. But it is

difficult to do so. It seems, however, that in young chicks drinking from still water is a habit acquired through imitation of the acts of the hen-mother. The presentation of such water to sight does not evoke the appropriate instinctive response, while the presentation of water taken into the bill does at once evoke a characteristic response. Now it would seem that in the former case, since the hen " teaches " all her chicks to peck at the water, she shields them from the incidence of natural selection. But though the hen can lead her young to peck at the water, she cannot '" teach " them how to perform the complex movements of mouth, throat and head required for actual drinking. In this matter they are not shielded from the incidence of natural selection. Thus it would seem that, where natural selection is excluded, the habit has not become congenitally linked with a visual stimulus; but where natural selection is in operation, the response has been thus linked with the stimulus of water in the bill.

If this interpretation be correct we have here an example of the manner in which imitation plays an important part in the . h m formation of habits which though oft-repeated are tien. not transmitted as hereditary instincts. But the

imitative act is itself instinctive. The characteristic feature of the imitative act, at the instinctive level, is that the presentation to sight or hearing calls forth a mode of behaviour of like nature to, or producing like results to, that which affords the stimulus. The nature of instinctive imitation needs working out in further detail. But it is probable that what we speak of as the imitative tendency is, in any given species, the expression of a considerable number of particular responses each of which is congenitally linked with a particular presentation or stimulus. The group of instincts which we class as imitative (arid they afford only the foundations on which intelligent imitation is based) are of biological value chiefly, if not solely, in those species which form larger or smaller communities.

The study of instinct is in the genetic treatment of evolutionary science a study in heredity. The favouring bionomic conditions are those of a relatively constant environment under <0 e " which relatively stereotyped responses are advantage- hendtty. °us- If the environment be complex, there is a corre- sponding complexity in instinctive behaviour. But adjustment to a complex environment may be reached in two ways; by instinctive adaptation through initially stereotyped behaviour; or by plastic accommodation by acquired modifica- tions. The tendency of the evolution of intelligence is towards the disintegration of the stereotyped modes of response and

the dissolution of instinct. Natural selection which, under a uniform and constant environment, leads to the survival of relatively fixed and definite modes of response, under an environment presenting a wider range of varying possibilities leads to the survival of plastic accommodation through intelligence. This

plasticity is, however, itself hereditary. All intelligent procedure implies the inherited capacity of profiting by experience. In- stinctive in the popular sense, it does not fall within the narrower definition of the term; it is more conveniently described as innate. It is important to grasp clearly the distinction thus drawn. A duckling only a few hours old if placed in water swims with orderly strokes. The stimulus of water on the breast may be regarded as a sensory presentation which is followed by a definite and adaptive application of behaviour. But this specific application is dependent upon a prolonged racial preparation of the organism to respond in this particular way. Such response is instinctive. It is wholly due, as such, to racial preparation. Compare the case of a boy who learns to ride a bicycle. This is not wholly due, as such, to racial preparation, but is also partly due to individual preparation. The boy no doubt inherits a capacity for riding a bicycle, otherwise he could never do so. But he has to learn to ride none the less. Individual experience is a condition which without the innate capacity cannot take effect. Instinct involves inherited adaptation; intelligence, an inherited power, embodied in the higher nerve-centres, of accommodation to varying circumstances.

See C. Lloyd Morgan, Habit and Instinct (1896), and Animal Behaviour (1900); G. J, Romanes, Mental Evolution in Animals (1883), and Natural History of Instinct (1886); Lord Avebury, On the Instincts of Animals (1889) ; Marshall, Instinct and Reason (1898); Mills, Nature of Animal Intelligence (1898); St George Mivart, Nature and Thought (1882), and Origin of Human Reason (1899); E. Wasmann, Zur Entwickelung der Instincte (1897), Instinct und Intelligenz im Tierreich (1899, Eng. trans. 1903) ; G. and C. Peckham, Instincts and Habits of Solitary Wasps (1898) ; see also the bibliography (section " Instinct and Impulse ") in Baldwin's Diet, of Philosophy and Psychology. (C. Ll. M.)

INSTITUTE (from Lat. instituere, to establish or set up), something established, an institution, particularly any society established for an artistic, educational, scientific or social purpose. The word seems to have been first applied in English to such institutions for the advancement of science or art as were modelled on the great French society, the Institut National (see Academies). It is thus the name of

such societies as the Royal Institute of British Architects, the Imperial Institute and the like. It is extended to similar organizations, particularly to educational, on a smaller or local scale, such as Mechanics' or Workmen's Institutes, and is sometimes applied to charitable foundations. In the United States the word is, in a particular senses applied to periodic classes giving instruction in the principles of education to the teachers of elementary and district schools. The term " institute " is often used to translate the Lat. institutio, in the sense of a treatise on the elements of any subject, and particularly of law or jurisprudence; thus the compilation of the principles of Roman law, made by order of the emperor Justinian, is known as Justinian's Institutes, and hence Coke's treatise on English law, of which the first part is better known as Coke upon Littleton, is called The Institute. The same title is borne by Calvin's work on the elements of the Christian doctrine. In Scots law " institute " is the person named in a settlement or testament to whom an estate is first limited; those who follow, failing him, are termed " substitutes."

INSTITUTIONAL CHURCH, the name generally applied both in the British Isles and in America to a type of church which supplements its ordinary work by identifying itself in various ways with the secular interests of those whom it seeks to influence. The idea of such extension of function grew out of the recognition of the fact that the normal activities of church work entirely failed to retain the interest of a large class of the population to whom the ritual formality of ordinary services was unacceptable. Various attempts were made to overcome this deficiency, e.g. by modifying the form of service or of some services, by the addition to the ordinary services of more or less informal meetings (e.g. the Pleasant Sunday Afternoon services), by specially excusing persons from wearing the normal church-going attire in holiday resorts, and by holding services out of doors. The principle underlying all these changes is systematized in the Institutional Church which, in addition to its main building for

specifically religious services, provides other rooms or buildings which during the week are open for the use of members and friends. Lectures, concerts, debates and social gatherings are organized; there are reading rooms, gymnasiums and other recreations rooms; various clubs (cycling, cricket, football) are formed. The organization of the whole is subdivided into special departments managed by committees. By these various means many persons are attracted into

the atmosphere of the church's work who could not be induced to attend the formal services. This expansion of normal church work may be traced back in England to at least as early as 1840, but the full development of the Institutional Church belongs only to the latter' years of the 10th century. The chief example in England is Whitefield's Central Mission in Tottenham Court Road, London, a church which, in addition to an elaborate organization on the lines above described, has an official journal. In the United States the movement may be said to date from about 1880. The name " Institutional " was first applied to Berkeley Temple, Boston, by Dr William Jewett Tucker, then president of Dartmouth College. The obvious criticism that this epithet emphasizes the administrative and secular side to the exclusion of the spiritual led to the tentative adoption of other titles, e.g. the " Open Church," the " Free Church," the former of which is the more commonly used. In 1894 was formed the " Open and Institutional Church League " at New York, which held a number of conventions and served as a headquarters for the numerous separate churches. In connexion with this league was formed the " National Federation of Churches and Christian Workers," which held a convention in 1905. ,

See C. Silvester Home, The Institutional Church (London, 1906) ; G. Vv". Mead, Modern Methods in Church Work (New York, 1897); R. A. Woods, English Social Movements (New York, 1891),

INSTRUMENT (Lat. instrumentum, from instruere, to build up, furnish, arrange, prepare), that which can be used as a means to an end, hence a mechanical contrivance, implement or tool; the word is more particularly applied to the implements of applied science, in mathematics, surgery, surveying, &c, while those of the handicrafts are generally known as " tools." A specific use of the term is for the various contrivances used to produce musical sounds, " musical instruments."

In law an " instrument " is any formal or written document by which expression is given to a legal act or. agreement. This is a classical use of the Lat. instrumentum, a document, record. The term may be used in a wide sense, as a mere •writing, meant only to form a record, or in a particular sense with reference to certain statutes. For example, the Stamp Act 1891 defines an instrument as an expression including every written document; for the purposes of the Forgery Act 1861 a post-office telegram accepting a wager has been defined as an instrument. In expressions such as " deed, will, or other written instrument " the word means any written document under which a right or liability, legal or equitable, exists.

INSTRUMENTATION. ” Instrumentation ” is the best term that can be found for that aspect of musical art which is concerned with timbre. The narrower term “orchestration ” is applied to the instrumentation of orchestral music. Since the most obvious differences of timbre are in those of various instruments, the art which blends and contrasts timbre is most easily discussed as the treatment of instruments; but we must use this term with philosophic breadth and allow it to include voices. Instrumenta- tion is in all standard text-books treated as a technical subject, from the point of view of practical students desirous of writing for the modern orchestra. And as there is no branch of art in which mechanical improvements, and the consequent change in the nature of technical difficulties, bear so directly upon the possi- bilities and methods of external effect, it follows that an exclusive preponderance of this view is not without serious disadvantage from the standpoint of general musical culture. There is probably no other branch of art in which orthodox tradition is so entirely divorced from the historical sense, and the history, when studied at all, so little illuminated by the permanent artistic significance of its subjects. When improvements. in the

structure of an instrument remove from the modern composer’s memory an entire category of limitations which in classical music determined the very character of the instrument, the temptation is easy to regard the improvement as a kind of access of wisdomy in comparison with which not only the older form of the instrument, but the part that it plays in classical music, is crude and archaic. But we should do better justice to improvements in an instrument if we really understood how far they give it, not merely new resources, but a new nature. And, moreover, those composers who have done most to realize this new nature (as Wagner has done for the brass instruments) have also retained, to an extent unsuspected by their imitators, the definite character which the instrument had in its earlier form.

As it is with mechanical improvements, so is it to a still greater degree with changes in the function of timbre in art. Throughout the 19th century so fatal was the hold obtained on the popular mind by the technical expert’s view of instru- mentation, that it. was impossible to hear the works of Handel and Bach without ” additional accompaniments ” conceived in terms of art as irrelevant to those of 18th-century polyphony s as the terms of Turnerian landscape are irrelevant to the decora- tion of the outside walls of a cathedral. There is some reason to hope that the day of these misconceptions is passed; although there is also some reason to fear

that on other grounds the present era may be known to posterity as an era of instrumenta- tion comparable,: in its gorgeous chaos of experiment and its lack of consistent ideas of harmony and form, only to the monodic period at the beginning of the 17th century, in which no one had ears for anything but experiments in harmonic colour. We do not propose to concern ourselves here with those technical subjects which are the chief concern of standard treatises on instrumentation. Our task is simply to furnish the general reader with an account of the types of instrumentation prevalent at various musical periods, and their relation to other branches of the art.

The Vocal Style of the 16th Century. — In the 1 6th century instrumentation was, in its normal modern sense, non-existent; but in a special sense it was at an unsurpassable stage of per- fection, namely, in the treatment of pure vocal harmony. In every mature period of art it will be found that, however much the technical rules may be collected in one special category, every artistic category has a perfect interaction with all the others; and this is nowhere more perfectly shown than when the art is in its simplest possible form of maturity. Practically every law of harmony in 16th-century music may be equally well, regarded as a law of vocal effect. Discords must not be taken unprepared, because a singer can only find his note by a mental judgment, and in attacking a discord he has to find a note of which the harmonic meaning is at variance with that of other notes sung at the same time. Melody must not make more than one wide skip in the same direction, because by so doing it would cause an awkward change of vocal register. Two parts must not move in consecutive octaves or fifths, because by so doing they unaccountably reinforce each other by an amount by which they impoverish the rest of the harmony. Thus we justify, on grounds of instrumentation, laws usually known as laws of harmony and counterpoint. Apart from such considerations, 16th-century vocal harmony shows in the hands of its greatest masters ah inexhaustible variety of refinements of vocal colour. A volume might be written on Orlando di Lasso's art of so crossing the voices as to render possible successions of chords which, on a keyed instrument where such crossing cannot be expressed, would be a horrible series of consecutive fifths; the beauty of the device consisting in the extreme simplicity of the chords, combined with the novelty due to the fact that these chords cannot be produced by any ordinary means without incorrectness. • ”” – - ■

Decorative Instrumentation. — In the 17th century the use of instruments became a necessity; but there were at first no organized ideas for their treatment except those which were grounded on their

use as supporting and imitating the voice-

The early 17th-century attempts at their independent use and characterization are historically interesting, but artistically almost barbarous. Sometimes they achieve rare beauty by accident. Heinrich Schutz's Lamentatio Davidi is written for a bass voice accompanied by four trombones and organ. The trom- bone parts are on exactly the same material as the voice, which in fact forms with them a five-part fugue-texture. The effect is magnificent, and admirably suited to the dignity of the trombone. Moreover, the opening theme is formed of slow arpeggios; and the more modern harmonic elements, though technically chro- matic, consist, from the modern point of view, rather in swift changes between nearly related keys than in chromatic blurring of the main key. All this, especially in a writer like Schiitz, who is saturated with every progressive tendency of the time, seems to point to a deep sense of the appropriate style of trombone writing. Yet, so insensible is Schutz to the euphony of his own work, that he proposes, as an alternative for the first and second trombones, two violins an octave higher, the other parts remaining unaltered! Imagination boggles at the vileness of this effect.

The chief work done in instrumentation in the 17th century is undoubtedly that of the Italian writers for the violin, who developed the technique of that instrument until it proved not only more resourceful but more artistically organized than that of the solo voice, which by the time of Handel had become little better than an acrobatic monstrosity. In the art of Bach and Handel, instrumentation, as distinguished from choral writing, has attained a definite artistic coherence. Choral writing itself has become different from what it was in the 16th century. The free use of discords and of wider intervals, together with the influence of the florid elements of solo-singing, enlarged the bounds of choral expression almost beyond recognition, while they crowded into very narrow quarters the subtleties of 16th- century music. These, however, by no means disappeared; and such devices as the crossing of parts in the second Kyrie of Bach's B Minor Mass (bars 7, 8, 14, 15, 22, 23, 50) abundantly show that in the hands of the great masters artistic truths are not things which a change of date can make false.

But the treatment of instruments in Bach and Handel has a radical

difference from that of the art which was soon to succeed it. It has precisely the same limitation as the treatment of form and emotion; it cannot change as the work proceeds. Its contrasts are like those of an architectural scheme, not those of a landscape or a drama. It admits of the loveliest combina- tions of timbre, and it can alternate them in considerable variety. Modern composers have often produced their most characteristic orchestral effects with fewer contrasting elements than Bach uses in his Trauer-Ode, in the pastoral symphony in his Christmas Oratorio, in the first chorus of the cantata Liebsler Gott, wann •wera" ich sterben, and in many other cases; but the modern instrumental effects are as far outside Bach's scope as a long passage of preparation on the dominant leading to the return of a first subject is beyond the scope of a gigue in a suite. Bach's conception of the function of an instrument is that it holds a regular part in a polyphonic scheme; and his blending of tones is like the blending of colours in a purely decorative design. Those instruments of which the tones and compass are most suitable for polyphonic melody are for the most part high in pitch; a circumstance which, in conjunction with the practice (initiated by the monodists and ratified by science and common sense) of reckoning chords upwards from the bass, leads to the conclusion that the instruments which hold the main threads in the design shall be supported where necessary by a simple harmonic filling-out on some keyed instrument capable of forming an unobtrusive background. The chords necessary in this part, which with its supporting bass is called the continuo, were indicated by figures; and the evanescent and delicate tones of the harpsichord lent themselves admirably to this purpose where solo voices and instruments were concerned. For the support of the chorus the more powerful organ was necessary. It is in the attempt to supply the place of this continuo (or figured buss) by definite orchestral parts that modern per-

formances, until the most recent times, have shown so radical an incapacity to grasp the nature of 18th-century instrumentation. The whole point of this filling-out is that, the polyphonic design of the main instruments being complete in itself, there is no room for any such additional inner parts as can attract attention. In the interest of euphony some harmonious sound is needed to bridge the great gap which almost always exists between the bass and the upper instruments, but this filling out must be of the softest and most atmospheric kind. Bach himself is known to have executed it in a very polyphonic style, and this for the excellent reason that plain chords would have contrasted so strongly with the real instrumental parts that they could not fail to attract attention even in the softest

tones of the harpsichord or the organ, while light polyphony in these tones would elude the ear and at the same time perfectly bridge over the gap in the harmony. There seems no good reason why in modern performances the pianoforte should not be used for the purpose; if only accompanists can be trained to acquire the necessary delicacy of touch, and can be made to understand that, if they cannot extemporize the necessary polyphony, and so have to play something definitely written for them, it is not a mass of interesting detail which they are to bring to the public ear. A lamentable instance of the prevalent confusion of thought on this point is shown by the vocal scores of the Bach cantatas corre- sponding to the edition of the Bach Gesellsckaft (which must not be held responsible for them). In these Bach's polyphonic designs are often obliterated beneath a mass of editorial counter- point (even where Bach has carefully written the words " taslo solo," i.e. " no filling out "). The same comments apply to the attempts sometimes made to fill out the bare places in 18th-century clavier music. There is no doubt that such filling out was often done on a second harpsichord with stops of a very light tone; but, if it cannot be done on the modern pianoforte in a touch so light as to avoid confusion between it and the notes actually written as essential to the design, it certainly ought not to be done at all. The greater richness of tone of the modern pianoforte is a better compensation for any bareness that may be imputed to pure two-part or three-part writing than a filling out which deprives the listener of the power to follow the essential lines of the music. The same holds good, though in a lesser degree, of the resources of the harpsichord in respect of octave- strings. To sacrifice phrasing, and distinctness in real part- writing, to a crude imitation of the richness produced mechanic- ally on the harpsichord by drawing 4-ft. and 8-ft. registers, is artistically suicidal. The genius of the modern pianoforte is to produce richness by depth and variety of tone; and players who cannot find scope for such genius in the real part-writing of the 18th century will not get any nearer to the 18th-century spirit by sacrificing the essentials of its art to an attempt to imitate its mechanical resources by a modern tour de force.

Symphonic Instrumentation. — The difference between decora- tive and symphonic instrumentation is admirably shown by Gluck. In the famous dedicatory letter of his Alceste he mentions among other conceptions on which his reform of opera was to be based, that the co-operation of the instruments ought to be regulated in proportion to the interest and the passion, a doctrine of which the true significance lies in its connexion with other conditions of opera which are incompatible with the polyphonic treatment of instruments

as threads in a decorative scheme. The date of this famous letter was 1767, but after Alceste Gluck was still able to use material from earlier work; and the overture to Armide is adapted from that of Telemacco, written in the year of Bach's death (1750).

To write an account of symphonic instrumentation in any detail would be like attempting a history of emotional expression; and all that we can do here is to point out that the problem which was, so to speak, shelved by the polyphonic device of the continuo, was for a long time solved only by methods which, in any hands but those of the greatest masters, were very in- artistic conventions. In the new art the concentration of atten- tion upon form, as a more important source of dramatic interest and climax than texture, resulted in a neglect of polyphony which

seriously damaged even Gluck's work, and which always had the grave inconvenience that while the new methods of blending and contrasting instruments stimulated an increase in the variety, if not in the size of orchestras, there was at the same time extreme difficulty in finding occupation for the members of the lower middle class of the orchestra in ordinary passages. On the other hand, it is significant how everything in the development of new instruments seems to suggest, and be suggested by, the new methods of expression. The invention of the damper-pedal in the pianoforte epitomizes the difference between polyphony and symphonic art, for it is the earliest device by which sounds are produced and prolonged in a way contrary to the spirit of " real " part-writing. It is possible to conceive of any number of notes struck and sustained by the fingers as consisting of so many quasi-vocal parts; but when a series of single sounds is played and each sound continues to vibrate by means of a pedal which prevents the dampers from falling on the strings, then we are conscious that the sounds have been produced as from one part, and that they nevertheless combine to form a chord; and this is as remote from the spirit of polyphonic part-writing as modern English is from classical Greek.

The pianoforte trios of Haydn are perhaps the only works of first-rate artistic importance in which there is no doubt that the earlier stages of the new art do not admit of sufficient poly- phony to give the instruments fair play. Haydn finds the piano- forte so completely capable of expressing his meaning that he is at a loss to find

independent material for any accompanying instruments; and the violoncello in his trios has, except perhaps in four passages in the whole collection of thirty-three works, not a note to play that is not already in the bass of the pianoforte; while the melodies of the violin are, more often than not, doubled in the treble. Yet there is a certain difference between this and the work of a poor artist whose designs are threadbare. It would be impossible to add a note to Haydn's trio; the only question is how to account for the superfluity of much of the string parts and how to make the trios effective in performance. It is some- times suggested that the 'cello part is best omitted and these works played as violin sonatas. But experiment shows that in this condition much of the violin part sounds incomplete; and the truth appears to be that Haydn is thinking, like any modern composer, of the opposition of two solid bodies of tone — the pianoforte and the stringed instruments. And it will be found that the method of performance which most nearly justifies the instrumental effect of these otherwise beautiful works is that in which the pianoforte player regards himself as frequently doubling the stringed instruments, and not vice versa. He should therefore in all such passages play extremely lightly, so as to give the violin and 'cello the function of drawing the main outline. In the time of Bath such writing was beautifully suited to enliven the dry glitter of the harpsichord, and Bach's duets for clavier and violin seem to have been sometimes played as trios with a violoncello playing from the clavier bass. But this was ineffective with the pianoforte, and is only explicable in Haydn as a survival. His trios were, indeed, published under the title of " pianofoite sonatas with accompaniment of violin and violoncello "; but this in no way militates against the above remarks as to their proper method of performance nowadays, when we take into consideration the greater strength of tone of the modern pianoforte, especially in the bass, and the fact that in no case could a violinist consent to play as an accompaniment such melodies as that at the beginning of the G major trio known as No. 1.

For Mozart there never was any such embarras de richesse in any combination of instruments. His music is highly poly- phonic, and modern in its instrumental treatment throughout. It was lucky for the development of instrumentation (as in all branches of music during the change from polyphonic to formal design) that whenever the texture is not polyphonic the natural place for melody is on the surface: in other words, when the accompaniment is simple the tune is generally on the top. Haydn, when he was not tempted by the resources of an instru- ment so complete in itself as the pianoforte, soon learnt to write

artistically perfect string quartets in which the first violin, though overwhelmingly the most important part, is nevertheless in perfect balance with the other members of the scheme, inasmuch as they contribute exactly what their pitch and the little poly- phonic elaboration admissible by the style will enable them to give. In the treatment of the orchestra volumes might be written about Haydn's and Mozart's sense of fitness, as shown in Haydn's experiments and Mozart's settled methods. Where they con- sent to any practical custom from practical necessity they also consent because it is artistically right for them, and if it had not been artistically right they would have soon swept it away. For example, it has often been said that the extent to which their orchestral viola parts double the basses is due, partly to bad traditions of Italian opera, and partly to the fact that viola players were, more often than not, simply persons who had failed to play the violin. This was in many cases true, and it is equally true that Mozart and Haydn often had no scruple in following the customs of very bad composers. But, when we look at the many passages in which the violas double the basses, we shall do well to consider whether there is room in the harmonic scheme for the violas to do anything else, and whether the effect would not be thin without them. As music becomes more polyphonic the inner parts of the orchestra become more and more emancipated. Already Mozart divides his violas into two parts quite as often as he makes them play with the basses. In Beethoven's orchestra- tion there is almost always room for an independent viola part. There is not room for one together with an independent violon- cello part; the wonderful use of muted solo violoncellos in the slow movement of the Pastoral Symphony being a special effect, like the earlier instance in Haydn's 12th Salomon Symphony. Otherwise, when Beethoven has anything special for the violon- cellos to say, he invariably softens and deepens their singularly incisive cantabile tones by doubling them with the violas. In the orchestras of his day this was perhaps the only safe proceeding for players unaccustomed to such responsibilities, and that may have been one of Beethoven's reasons for it. But it is equally certain that the pure violoncello tone in large masses belongs to a distinctly different region of orchestral effect. Haydn's numer- ous examples of independent violoncello melodies are almost all either marked solo or written for such small orchestras that they would be played as solos.

Similar principles apply in infinite detail to the treatment of wind instruments, and we must never lose sight of them in speculating as to the reasons why the genius of Beethoven was able to carry instrumentation into worlds of which Haydn and Mozart never

dreamt, or why, having gone so far, it left any- thing unexplored. A subject so vast and so incapable of classifica- tion cannot be discussed here, but its aesthetic principles may be illustrated by the extreme case of the trumpets and horns, which in classical times had no scale except that of the natural harmonic series. This could be fixed, within certain limits, at whatever pitch suited the composition; but on the horn it could be only very partially filled out by notes of a muffled quality produced by inserting the hand into the bell of the instrument, a device impossible on the trumpet. These instruments thus produced, in Haydn's and Beethoven's times, a very remarkable but closely limited series of effects, which, as Sir George Macfarren pointed out in the article " Music " in the 9th edition of the Encyclopaedia Britannica, gave them a peculiar character and function in strongly asserting the main notes of the key. An instance of this characteristic function, specially remarkable because the composer has taken exceptional measures for it, is Beethoven's overture to Fidelio. It is in E major, while Beethoven chooses to use trumpets in C. The only note which these can play in E major is the tonic, to which they are accord- ingly confined until the recapitulation of the second subject. This is unexpectedly placed in C major, the remotest key reached in the overture, and one that had already appeared in an impres- sive passage in the introduction which foreshadows the reference in the first act to the hero in his dungeon (" Der kaum mehr lebt und wie ein Schatten schwebt "). In this key the trumpets blaze out with an effect which entirely depends upon their

restricted part hitherto. On a sufficient acquaintance with the (vork this would probably have revealed the essential nature of the instrument to a hearer unacquainted with technicalities, and revealed it rather as a characteristic than as a limitation. A still more remarkable instance will be found in the third statement of the theme of the finale of the 9th symphony: When the trumpets take it up they make a remarkable change at its nth bar, for no other reason than that one of the notes, though perfectly within their scale, and, indeed, already produced by them in the very same bar, is so harmonized as to suggest the freedom of an instrument with a complete scale. This passage shows that if Beethoven had had the modern trumpet at his disposal, while he would no doubt freely have used its resources, he would nevertheless have maintained its character as an instrument founded on the natural scale, and would

have agreed with Brahms that the nobility and purity of its tone depends upon its faithful adherence, at least within symphonic limits, to types of melody suggestive of that scale.

This brings us to the latest radical change effected in instrumentation, the change from symphonic to dramatic principles. It will be convenient to take one supreme composer as the artist who has dealt so consistently with the essentials of the new style that he may be conveniently regarded as its creator. Even with this limitation the subject is too vast for us to enter into details.

Dramatic Instrumentation. — There is hardly one of Wagner's orchestral innovations which is not inseparably connected with his adaptation of music to the requirements of drama; and modern conductors, in treating Wagner's orchestration, as the normal standard by which all previous and contemporary music must be judged, are doing their best to found a tradition which in another fifty years will be exploded as thoroughly as the tradition of symphonic additional accompaniments is now exploded in the performances of Bach and Handel. The main difference between symphonic and modern dramatic orchestration depends on this: that in a symphony any important incident will probably be heard again within five minutes, in every circumstance of formal symmetry and preparation that can attract the attention. This being so, it is absurd in a symphony to use only such orchestral colours as would be fit for dramatic moments which are not likely to recur for an hour or two, if they recur at all. Such a passage as bars 5 to 8 in the first movement of Beethoven's 8th symphony is as unintelligible from the point of view of Wagnerian opera as the opening of the Rheingold is unintelligible from the point of view of symphony. But both are quite right. The modern Wagnerian conductor is apt to complain that Beethoven, in his four-bar phrase, drowns a melody which lies in the weakest register of the clarinet by a crowd of superfluous notes in oboes, horns and flutes. The complainer entirely overlooks the fact that this is the kind of music in which such a phrase will certainly be heard again before we have time to forget it; and as a matter of fact the strings promptly repeat it fortissimo in a position which nothing can overpower. A crowd of instruments that seemed at first to overwhelm it in sympathetic comments is perfectly dramatic and appropriate on the symphonic scale. On the operatic scale established by Wagner such detail is simply lost. Far greater polyphonic detail of another kind is no doubt possible, but it requires far longer time for its expression. It cannot change so rapidly. It engages the ear more exclusively, and therefore it needs an accuracy and an elaboration of para- phernalia quite irrelevant to symphonic

art. The accuracy and the paraphernalia are equally exemplified in all Wagner's additions and alterations of the classical orchestral scheme, for these all consist in completing the families of instruments so that each timbre can be presented pure in complete harmony. But the greatness of Wagner is shown in the fact that with all the effect his additions have in revolutionizing the resources of orchestration, he never regards his novelties as substitutes for the natural principles of instrumental effect. His brass instruments have lost nothing of their ancient nobility. In his gigantic designs it inevitably happens that instrumental

resources are strained to their utmost, and there is, perhaps, hardly anything which the makers and players of instruments can be trained to do which is too remote to be demanded by some extreme dramatic necessity in Wagner's scheme. But it is always some such extreme necessity that demands it, and never an appetite too jaded for natural resources. The crucial example of this is what Richard Strauss has ingeniously called the "al fresco" treatment of instruments in large orchestral masses (Berlioz-Strauss, Inslrumentationslehre, edition Peters). Experience shows that in the modern orchestra there is safety in numbers, and that passages may with impunity be written for thirty-two violins which no single player can execute clearly. Whether this justifies Wagner's successors and . imitators in showing a constant preference for passages of which not even the general outline is practicable; whether it justifies a state of things in which the normal compass of every instrument in an advanced 20th-century score would appear to be about a fifth higher than any player of that instrument will admit; whether it proves that it is artistically desirable that when there are eight horns in the orchestra their material should be indistin- guishable from pianoforte writing, and that, in short, the part of every instrument should look exactly like the part of every other— such questions are for posterity to decide. At present we can only be certain that the criterion according to which Brahms, being a symphonic writer, has no mastery of orchestra- tion whatever, is not a criterion compatible with any sense of symphonic style. It is therefore not a criterion which can do justice to the principles of Wagner's non-symphonic art, for its appreciation thereof is inevitably one-sided. Least of all can it conduce to the formation of sound critical standards for the new instrumentation which is now in process of development for the future forms of instrumental music. These, we cannot doubt, will be as profoundly influenced by Wagner as the sonata 1 style was influenced by Gluck.

Finally it must be remembered that musical euphony and emotional

effect are inseparable from considerations of harmony and polyphony. Timbre itself is, as Helmholtz shows, a kind of harmony felt but not heard. Not even the imagination and skill of Berlioz could galvanize into permanent artistic life an instrumentation based exclusively upon instruments, however suggestive his wonderful orchestral effects may have been to contemporary and later artists, who realize that artistic effects must proceed from artistic causes.

Chamber-music — The instrumentation of solo combinations is one of the largest and most detailed subjects in the art of music. Something has been said above as to its earlier aspects in the time of Haydn. Before that time it was based ex- clusively on the use of the harpsichord either as a means of supporting the other instruments or a"s also contributing principal parts to the combination. Thus there were no string-quartets before Haydn— at least none that can be distinguished from symphonies for string-band.

Richard Strauss, in his edition of Berlioz's works on Instru- mentation, paradoxically characterizes the classical orchestral style as that which was derived from chamber-music. Now it is true that in Haydn's early days orchestras were small and generally private; and that the styles of orchestral and chamber- music were not distinct; but surely nothing is clearer than that the whole history of the rise of classical chamber-music lies in its rapid differentiation from the coarse-grained orchestral style with which it began. Orchestral wind- parts have been discovered belonging to Haydn's string-quartet Op. i,No. 5; his quartet in D minor, Op. 9, No. 4, is already in a style which not even the most casual listener could mistake for anything orchestral. On this differentiation of styles rests the whole aesthetics of chamber-music; but the subject is very subtle, and there is much, as for example in Schubert's quartets and his C major quintet, that is inspired by orchestral ideas without in the least vitiating the chamber-music style; though, judged by its appear- ance on paper, it seems as unorthodox as the notoriously orchestral beginnings of Mendelssohn's quartet in D and quintet in Bt>. The beginning of Mendelssohn's F minor quartet is,

again, a case usually, but perhaps wrongly, condemned for its orchestral appearance on paper. Such matters cannot be decided off- hand by the mere fact that tremolos are characteristic of orchestras: the question is whether in individual cases they have not a special

character when played by single players. Where this is so there need be no confusion of style; but the danger of such confusion is great, and with the rise of modern dramatic instrumentation it may be doubted whether there are any standards of criticism in current use for chamber-music of other than the sonata style. The development of pianoforte technique since Beethoven has been in some ways even more revolutionizing than that of the brass instruments; and piano-forte instrumentation, both in solo and in chamber-music, is a study for a lifetime.

Orchestral Schemes Typical of Different Periods.

1. 1 6th Century. — We, with our stereotyped modern notions of the grouping of voices, may get some idea of the freedom of the 16th-century composers' imagination by noting that the four- part move-ments for semi-chorus or solo voices in Palestrina's Masses present us with no fewer than seventeen different combinations of voices, and that of these the familiar group of soprano, alto, tenor and bass is not the most common, though it is invariable as that used for entire four-part Masses. In three-tpart movements Palestrina presents us with twelve combinations of voices. In his five-part Masses and single movements we find eight combinations, and his six-part Masses and single movements show eleven. And when he writes in eight parts for a double chorus the two groups are seldom identical.

2. iSth Century. — 17th-century instrumentation may be neglected here as having begun in chaos and ended in the schemes of the 18th-century decorative instrumentation. The following is Bach's fullest orchestra: the string-band, consisting (as at the present day) of violins in two parts, violas, violoncellos, doubled (where the contrary is not indicated) by double basses; the wind instruments (generally one to each part, as the string-band was never large) — 2 flutes, 2 or 3 oboes, or oboe a" amore (a lower-pitched and gentler type), taille or oboe da caccia (some kind of alto oboe corre- sponding to the cor anglais), bassoon, generally doubling' the string basses. 2 horns, with parts needing much greater practice in high notes than is customary to-day, 3 (occasionally 4) trumpets, of which at least the first 2 were played by players especially trained to produce much higher notes than are compatible with the power to produce the lower notes (the high players were called Clarin-Blaser ; and the others Principal-Blaser); a pair of kettle-drums, tuned to the tonic and dominant of the piece.

Handel's orchestra is less detailed. He does not seem to have found any English trumpeters capable of playing as high parts as those of

the German Clarin-Blaser, and his plan seems generally to get as many oboes and bassoons as could be procured to double the top and bottom of his string-band. But his definite orchestral effects in certain places (e.g. " He led them forth like sheep," in Israel in Egypt, and the music of the Witch of Endor, and the appearance of Samuel's spirit in Said) are as modern as Gluck's.

3. Symphonic Orchestration. — Mozart's full symphonic scheme requires the string-band, 1 flute (rarely 2), 2 oboes, 2 clarinets (when- ever he could obtain them, he being the first composer who really appreciated them, instead of regarding them either as cheap substi- tutes for the clarino or high trumpet of Bach, or, like Gluck and, with rare and late exceptions, Haydn, as merely adding to the force of tutti passages). Further, 2 horns, 2 bassoons, 2 trumpets and a pair of kettle-drums.

Mozart imports from church music 3 trombones for special passages in his operas.

Beethoven almost always has 2 flutes, and invariably 2 clarinets. In his 5th symphony he introduced 3 trombones and extended both the upper and lower extremes of ■ the wind- band by a piccolo and a double bassoon. " Turkish music," i.e. the big drum, cymbals and triangle, was used by Haydn in his Military Symphony, and Mozart in his Entfuhrung, for reasons of " local colour "; it appears as an extreme means of climax in the finale of Beethoven's 9th symphony.

4. Wagner's Orchestra: Tristan und Isolde. — (Families of instru- ments are connected by a brace.)

Strings: as usual, but subject to minutely complex grouping.

3 flutes (3rd to play piccoio when required). i 2 oboes.

\ 1 cor anglais. (3 bassoons. (2 clarinets. } I bass clarinet.

4 horns. (The mechanical improvements by which horns and

trumpets acquired a complete scale have revolutionized the nature of those instruments; and Wagner's orchestration, more than that of any other composer, nas profited by this. Yet, in the preface to the score Wagner speaks very strongly of the loss of the original character of the horn in the hands of

ordinary players ; and goes so far as to say that, if experience had not shown that they could be trained to play nearly as smoothly as

the classical players, he would have renounced all the advantages of the new mechanism.)

3 trumpets.

3 trombones.

1 tuba.

2 or, for safety in tuning, 3 kettle-drums. Triangle and cymbals.

1 harp (multiplied quant, suf.). In Der Ring des Nibelungen Wagner specifies the proportions of the string-band as 16 first and 16 second violins, 12 violas, 12 violon- cellos, 8 double basses. The rest of the orchestra consists of — Piccolo and 3 flutes. S 3 oboes and cor anglais, or 4th oboe. I 3 bassoons, or 2 and contra-fagotto.

3 clarinets and I bass clarinet.

8 horns, 4 of whom are also required to play 4 specially con- structed tenor and bass tubas.

1 ordinary (double-bass) tuba. S 3 trumpets.

(1 bass trumpet. (A project of Wagner's which instrument- makers found impracticable, so that Wagner had to con- tent himself with a kind of valve trombone shaped like a trumpet.) 3 trombones and 1 double-bass trombone.

2 pairs of kettle-drums.

{Triangle. Cymbals. Big drum. Gong. 6 harps. 5. Chamber-music. — Bach's and his contemporaries' combinations with the harpsichord show the natural fondness, in his day, for instruments of a tone too gentle for prominent use in large rooms, or indeed for survival in modern times. Thus there was quite as much important solo music for the flute as for the violin; and almost more music for the viola da gamba than for the violoncello. A frequent combination was flute, violin and harpsichord (very probably with a violoncello doubling the bass), and in more than one case the violin was partly tuned lower to soften its tone.

Classical and modern chamber-music in the sonata style consists mainly of string-quartets for 2 violins, viola and violoncello; string- trios (rare, because very difficult to write sonorously) ; piano- f orte- trioS (pianoforte, violin and violoncello) ; pianoforte-quartets

(pianoforte with string-trio); pianoforte-quintets (pianoforte with string-quartet) ; string-quintets (with 2 violas, very rarely with 2 violoncellos), and (in two important cases by Brahms) string-sextets. Larger combinations, being semi-orchestral, especially where the double-bass and wind instruments are used, lend them- selves to a somewhat lighter style; thus Beethoven's septet and Schubert's octet are both in the nature of a very large serenade.

Wind instruments produce very special effects in chamber-music, and need an exceedingly adroit technique on the part of the composer. Magnificent examples are Mozart's trio for pianoforte, clarinet and viola, his quintet for pianoforte, oboe, clarinet, horn and bassoon (imitated by Beethoven), his quintet for clarinet and strings, 1 Brahms' s clarinet-quintet for the same combination, and his trio for pianoforte, violin and horn. (D. F. T.)

INSTRUMENT OF GOVERNMENT, the name given to the decree, or written constitution, under which Oliver Cromwell as " lord protector of the commonwealth " governed England, Scotland and Ireland from December 1653 to May 1657.

The Long Parliament was expelled in April 1653 and the council of state dissolved; the Little, or Nominated, parliament which followed ended its existence by abdication; and Cromwell, officially lord general of the army, with a new council of state, remained the only recognized authority in the country. It was in these circumstances that the Instrument of Government, drawn up by some officers in the army, prominent among whom was John Lambert, was brought forward. The document appears to have been under consideration since the middle of October 1653, but Ludlow says it was " in a clandestine manner carried on and huddled up by two or three persons," a remark probably very near the truth. The nominated parliament abdicated on the 12th of December 1653, and after certain emendations the Instrument was accepted by Cromwell on the 1 6th. Consisting of forty-two articles, the Instrument placed the legislative power in the hands of " one person, and the people assembled in parliament "; the executive power was left to the lord protector, whose office was to be elective and not hereditary, and a council of state numbering from thirteen to twenty-one members. The councillors were appointed for life;

fifteen were named in the Instrument itself; and Cromwell and the council were empowered to add six. To fill vacancies parliament must name six persons, of whom the council would select two, the choice between these two being left to the pro- tector. A parliament was to meet on the 3rd of September 1654, and until that date the protector with the consent of the council could make ordinances which would have the force of laws. After the meeting of parliament, however, he had no power of legislation, nor had he any veto upon its acts, the utmost he could do being to delay new legislation for twenty days. A new parliament must be called "once in every third year," elaborate arrangements being made to prevent any failure in this respect, and for five months it could not be dissolved save with its own consent. The parliament, composed of a single chamber, was to consist of 460 members — 400 for England and Wales, and 30 each for Scotland and Ireland — and the representative system was entirely remodelled, growing towns sending members for the first time, and many small boroughs being disfranchised. A large majority of the English members, 265 out of 400, were to be elected by the counties, where voters must possess land or personal property of the value of £200, while in the boroughs the franchise remained unaltered. In Scotland and Ireland the arrangement of the representation was left to the protector and the council. Roman Catholics and all concerned in the Irish rebellion were permanently disfranchised and declared incapable of sitting in parliament, and those who had taken part in the war against the parliament were condemned to a similar dis- ability during the first four parliaments. The protector was empowered to raise a revenue of £200,000 in addition to a sum sufficient to maintain the navy and an army of 30,000 men, and religious liberty was granted " provided this liberty be not extended to Popery or Prelacy." The chief officers of state were to be chosen with the consent of parliament, and a parliament must be summoned at once in case of war. The practical effect of the Instrument was to entrust the government of the three countries to the parliament for five months out of every three years, and to the protector and the council for the remainder of the time. Although the Instrument bristled with possibilities of difference between parliament and protector, " it is impossible," as Gardiner says, " not to be struck with the ability of its framers."

Having issued many ordinances and governed in accordance with the terms of the Instrument, Cromwell duly met parliament on the 3rd of September, and on the following day he urged the members to give it the force of a parliamentary enactment. Many representatives objected to the provision placing the supreme power in the hands of a

single person and of parliament, a dis- cussion which was futile, as clause XII. of the Instrument declared that "the persons elected shall not have power to alter the government as it is hereby settled in one single person and a parliament." The proceedings were soon stopped by Cromwell, who on the 12 th of September explained that there was a differ- ence between " fundamentals " which they might not, and " circumstantials " which they might, alter. He concluded by stating that they would be excluded unless they subscribed a recognition to be true to the protector and the commonwealth, and to respect the terms of clause XII. Over three hundred members took the required step; but they proceeded to alter the Instrument in other ways, and over the question of the control of the army they were soon in sharp conflict with the protector. At length, on the 22nd of January 1655, Cromwell, counting twenty weeks as five months, dissolved parliament.

Regarding the Instrument as still in force the protector sought for a time to rule in accordance with its provisions; but new difficulties and growing discontent forced him to govern in a more arbitrary fashion. However, in July 1656 he issued, writs for a second parliament which met in the following September. Many members, men of advanced views, were excluded by the council of state, acting on the strength of clause XVII., which declared that those elected must be " persons of known integrity, fearing God, and of good conversation." The remainder dis- cussed the question of the future government of the country,

and in May 1657 Cromwell assented to the Humble Petition and Advice, which supplanted the Instrument of Government. Gardiner says the Instrument was " the first of hundreds of written constitutions which have since spread over the world, of which the American is the most conspicuous example, in which a barrier is set up against the entire predominance of any one set of official persons, by attributing strictly limited functions to each."

The text of the Instrument is printed in S. R. Gardiner's Consti- tutional Documents of the Puritan Revolution (Oxford, 1899). See also S. R. Gardiner, History of the Commonwealth and Protectorate, vols. ii. and iii. (London, 1897-1901); L. von Ranke, Englische Geschichte (1859-1868) ; and T. Carlyle, Cromwell' s Letters and Speeches (London, 1897-1901). (A. W. H.)*

INSUBRES (To-o/Lt(3pej, "Ivoovfipot.) , a Celtic people of upper Italy, the most powerful in Gallia Transpadana, inhabiting the country between the Adda, the Ticinus and the Alps. According to

Livy (v. 34) they appear to have been a branch of the Aedui in Gallia Transalpina, though others assume that they were Umbrians, a view to some extent supported by the form Is-ombr-es. Livy states that Bellovesus and his Gauls, having crossed the Alps and defeated the Etruscans near the Ticinus, found themselves in the territory of the Insubres (also the name of a pagus of the Aedui). Here they built a city and called it Mediolanum (Milan), after the name of a village in their home in Gallia Transalpina. The name Insubres thus appears applied to the inhabitants (1) of the Aeduan pagus, (2) of the territory in Gallia Transpadana occupied by Bellovesus, (3) to the founders of Mediolanum. From 222 to 195 B.C. the Insubres were frequently at war with the Romans. In 222 they were de- feated at Clastidium by M. Claudius Marcellus, who gained the spolia opima by slaying with his own hand their king Viridomarus (Virdumarus) , and in 194 they were finally sub- dued by L. Valerius Flaccus.

See H. Nissen, Italische Landeskunde (1902) ii. 179; A. Holder, Altkeltischer Sprachschatz, ii. (1904).

INSURANCE , a term meaning generally " making oneself safe against " something, but specially used in connexion with making financial provision against certain risks in the business of life. The terms Assurance and Insurance are in ordinary usage synonymous, but in the profession " assurance " is con- fined to the " life " business, and " insurance " to fire, marine and other miscellaneous risks. Assurance was the earlier term, and was used of all forms of insurance indiscriminately till the end of the 16th century. Insurance — in its earlier form, " ensur- ance " — -was first applied to fire risks (see note s.v. " Insurance " in the New English Dictionary).

I. General History

During the latter half of the 19th century the practice of insur- ance extended with unprecedented rapidity, partly in novel forms. While its several branches, such as life insurance, casualty insurance and others, have each had an independent and characteristic development, all these together form an institution peculiar to the modern world, the origin and growth of which attest a remarkable change in men's ideas and habits of thought.

The simplest and most general conception of insurance is a provision made by a group of persons, each singly in danger of some loss, the incidence of which cannot be foreseen, that when such loss shall occur to any of them it shall be distributed over the whole group. Its essential elements, therefore, are foresight and co-operation; the

former the special distinction of civilized man, the latter the means of social progress. But foresight is possible only in the degree in which the consequences of conduct are assured, i.e. it depends on an ascertained regularity in the forces of nature and the order of society. To the savage, life is a lottery. In hunting, rapine and war, all his interests are put at hazard. The hopes and fears of the gambler dominate his impulses. As nature is studied and subdued, and as society is developed, the element of chance is slowly eliminated from life. In a progressive society, education, science, invention, the arts of production, with regular government and civil order,

steadily work together to narrow the realm of chance and extend that of foresight. But there remain certain events which may disturb all anticipations, and in spite of any man's best wisdom and effort may deprive him of the fruits of his labour. These are mainly of two classes: (1) damage to property by the great forces of nature, such as lightning and hail, by the perils of the sea and by fire; (2) premature death. A useful life has an economical value. But no skill can make certain its continuance to its normal close. In the reasonable expectation that it will last until a competence is gained or the family ceases to be dependent, young men marry; but some will die too soon, and in the aggregate multitudes are left destitute. Both classes of loss are alike, in that they fall on individuals in the mass who are not known beforehand nor selected by any traceable law. But the sufferers are ruined, while the same pecuniary loss, if distributed over the whole number, would be little felt. Wherever the sense of community has existed this has been discerned, and some effort made to act upon it. Thus in feudal Europe it was customary for the houses of vassals to be restored after fire at the cost of the estate. In England in the 17th century the government practised a method of relief after accidental fires. When such a loss was proved to the king in council, the chancellor sent a king's brief to churches, sheriffs and justices, asking contributions, and trustees for the sufferers administered the funds collected. But under the last two Stuarts gross frauds resulted, and the system fell into disrepute and disuse. At best, the voluntary relief provided by charity after losses are incurred is but sporadic and irregular. Insurance begins when the liability to loss is recognized as common, and provision is made

beforehand to meet it from a common fund. The efficient organization of communities or groups for this purpose is an essentially modern achievement of social science. But the history of the conception in its formative stages is extremely obscure.

Its first appearance in business life is often sought in the marine loans of the ancient Greeks, fully described by Demosthenes. Money was advanced on a ship or cargo, to be repaid with large interest if the voyage prosper, but not repaid at all if the ship be lost, the rate of interest being made high enough to pay not only for the use of the capital, but for the risk of losing it. Loans of this character have ever since been common in maritime lands, under the name of bottomry and respondentia bonds. (See below, Marine Insurance.) But the direct insurance of sea- risks for a premium paid independently of loans began, as far as is known, in Belgium about A.D. 1300. During the next century the risks of insurance for the usual voyages between London and European ports were carefully considered, and customary rates became established. In his address in opening Elizabeth's first parliament in 1559, Sir Nicholas Bacon said, "Doth not the wise merchant in every adventure of danger give part to have the rest assured ?" In 1601 parliament created a commission to decide disputes under contracts for marine insurance, and the preamble of the act (43 Eliz. ch. 12) expresses the best thought of the British mind in that day upon the subject. Thus the business of marine insurance was intelli- gently and wisely practised three centuries ago. But the under- writers were private persons, acting independently, so that the insured lacked the benefit of large aggregations of capital to make his contract safe; while the insurer, who took one or a few risks, was without the security of large averages and might be crushed by an exceptional loss. A partial remedy was gradually reached in London. Men who had capital to employ in this hazardous business used to meet at fixed hours when shipowners and merchants could negotiate with them. The higgling of the open market, in view of all the circumstances of each risk — as the character and condition of the ship, its crew and cargo, the length and route of the voyage, the season, the current rate of interest and profits — determined the rate of premium; and when this obtained general assent, the written agreement was signed by each underwriter for that part of the risk which he assumed. Towards the end of the 17th century these meetings were held in Lloyd's coffee-house, and their simple practice gradually

grew into the complete and complicated system of marine insurance now general. The underwriters together evolved rules and improved methods, but continued for generations to insure severally, without

corporate powers or common responsibility, so that the name Lloyd's became throughout the commercial world the symbol of marine insurance. More re- cently the name has been adopted in the United States by associa- tions of private or individual underwriters as distinguished from insurance corporations.

Although the underwriters at Lloyd's often considered and assumed other than marine risks, and made contracts some of which were merely wagers on public or private events, there is no record of insurances by them against fire on land. But fire insurance, it is vaguely known, had previously been practised, in a crude form, in several European cities. In 1635, and again in 1638, citizens of London petitioned Charles I. for a patent of monopoly to insure houses at the rate of one shilling yearly for each £26 of rent, the association to repair or rebuild those burned, to maintain a perpetual fire-watch in the streets, and to pay £200 yearly towards rebuilding St Paul's cathedral until finished. The attorney-general approved the project, but in the disorders of the kingdom it was forgotten. The Great Fire of 1666 revived interest in the subject, and led to practical measures. In May 1680 a private fire office was opened "at the back side of the Royal Exchange" to insure houses in London, by assuming the risk of loss to a fixed amount for a fixed premium, namely, 25% of the yearly rent for brick houses and 5% for frame houses, the rent being always assumed to be one-tenth of the value of the fee. The estimates of the promoters are interest- ing. In the fourteen years since the Great Fire 750 houses had been burned in London, with an average loss of £200. A fund of £40,000 subscribed as guaranty was to be increased by £20,000 for every 10,000 houses insured, and the interest of the fund alone therefore might be expected to meet all losses and leave a surplus. Thus the security was perfect and the promise of profit great. Meagre as was the basis of facts for the calculations, and crude as was the statistical method employed, the insurance offered met a general want and the business grew rapidly. Within a year a strong demand was heard that the city of London should itself insure the houses of its citizens, and the common council voted to do so at lower rates than the fire office. But the courts put a speedy end to this movement, holding that the charter conferred on the city no power to transact such business. Thus the socialistic theory that insurance is properly a branch of government is almost as old as the business itself, though it has never found favour or been practically tested on a large scale in Great Britain or America.

The next notable step in the evolution of modern methods was the organization of mutual insurance associations. In 1684 the Friendly

Society was organized. Each member paid a small entrance fee for expenses, made a cash deposit as a reserve for emergencies, to be returned at the end of his term, and agreed to meet equitable assessments for current losses. Payments were computed on the assumption that one house in 200 is burned every fifteen years. The rivalry between the proprietary and the mutual systems began at once, and has continued till now. In 1686 "the Fire Office at the back side of the Royal Exchange" petitioned for a patent of the fire insurance policy and a mono- poly of its issue for thirty-one years. The Friendly Society opposed the grant. The most eminent lawyers for both were heard by the king in council, and on the 30th of Januaiy 1687 King James II. decided the case. No charter was granted", tut the Fire Office might continue its business, having a monopoly for one year. Thereafter the Friendly Society might for three months sell policies, but must then suspend for three months, and so on for alternate quarters. But the Fire Office must pay the ordinance service for its work in extinguishing fires, the amount to be fixed for each fire by the king. This was the first appearance of the plan, so widely prevalent in after years, of imposing on insurance companies the support of fire departments; that is, of taxing the prudent who insure to protect the reckless who do not.

After 1688 the atmosphere of England was freer, and under- writing was soon practised without special licence In 1704 the societies began to insure household goods and stocks in trade, and the insurance of personal property rapidly became as important as that of buildings. In 1706 the Sun Fire Office was founded, and began to issue policies on both real and personal property in all parts of England. Other associations arose in quick succession of which the Union Fire Office, dating from 1 7 14, and the Westminster from 171 7, still survive. Before 1 7 20 both fire and marine insurance had become general in all great centres of trade. But life insurance was as yet hardly conceived. Sporadic evidences that it was needed, and that men were feeling after it, occur in very early records. It was a medieval custom to advance to a mariner goods or money, to be restored with large additions, but only in case of safe return; or to contract, for a sum in hand, to ransom him if captured by pirates, or to pay a fixed amount to his family if he were lost. To evade the usury laws life an- nuities were often sold at a low rate, redeemable

for a stipulated sum Life estates were sold upon some guess at their probable duration; and leases, especially of church lands, were made for one, two or three, lives on rude and conventional estimates of the time they would run. Thus there was a commercial and social pressure for some intelligent method of valuing life con- tingencies. But the direct insurance ot life, as a means of reducing the element of chance in human affairs, was hardly thought of Indeed, such contracts were commonly regarded as mere forms of gambling, and were prohibited in France as against good morals

The earliest known policy of life insurance was made in the Royal Exchange, London, on the 18th of June 1583, for £383. 6s 8d. for twelve months, on the life of William Gibbons. Sixteen underwriters signed it, each severally for his own share, and the premium was 8 % The age of the insured is not referred to, nor was it then considered, except when far advanced, in fixing the premium, Gibbons died on the 29th of May 1584. The underwriters refused to pay, alleging that twelve months, in law, are. twelve times twenty-eight days, and that Gibbons had survived the term. The court, of course, enforced payment. A few instances of similar contracts are found, mostly in judicial records, during the 17th century; but every such transaction was justly regarded as a mere wager, at least on the part of the insurer It could not be otherwise until the principles of proba- bility and the uniformity of large averages were understood and trusted A few great thinkers were groping for principles which were profoundly to modify the practical reasoning of after- generations. But their work first obtained wide recognition upon the publication of the Ars Conjeciandi, the posthumous treatise of Jacques Bernoulli, in 1713. Meanwhile the social need for insurance continued to express itself in empirical efforts, which at least helped to make clearer the problems to be solved. Thus in 160c "The Society of Assurance for Widows and Orphans" was founded in London, a crude form of what is now called an assessment company. Each of 2000 healthy men under fifty-five years of age was to pay 5s. as entrance fee, is. quarterly for expenses, and 5s. at the death of another member; and at his own death his estate should receive £500, less 3%. On default in any payment his interest was forfeited. The society lasted about eleven years, and the accounts of its eighth year are preserved, showing the payment of £5200 upon twenty-four claims The economic significance of this society lies in its distinct recognition of the principle of association for the distribu- tion of losses. Together with the Friendly Society, it shows that this principle had now been so widely grasped by business men that, when embodied in a practical venture, it found substantial support.

The conception of a corporation as an artificial person to hold property and support obligations uninterrupted by the death of individuals was found in Roman law and custom. Its first use in modern business enterprise was perhaps the Bank of St George in Genoa, about a.d 1200, a joint-stock company with transferable shares, whose owners were liable only to the amount

of their shares. In England the crown, itself the chief and type of corporations sole, was the source of chartered rights, and from about 1600 the principle steadily gained recognition, the advantages of incorporation being attested by the successes of the great trading companies. Experience showed that the corporate form was the obvious remedy for the chief difficulties in the practice of insurance. Single risks were but speculative wagers; a great number must be taken together to obtain a trustworthy average. A larger capital than an average private fortune was demanded as a guaranty, and this capital must not be exposed to the dangers of trade, but set aside for the special purpose. Individual underwriters may die or fail; only a permanent institution can be trusted in long contracts Several projects were devised on this basis. Early in the 18th century, indeed, the English government refused a charter for marine insurance, declaring that corporate insurance was an untried and needless experiment, while private underwriting was satis- factory and sufficient But wi 1720, when two sets of promoters offered £300,000 each for a charter, exclusive of other associations though not of individuals, to insure marine risks, parliament chartered the Royal Exchange and the London Assurance Company with a monopoly to this extent. The business dis- appointed its projectors at first, and the government accepted half theprice rather than revoke the grant. In 1721 the companies extended their operations to fire insurance throughout England. Thus the principle of insurance had now become a distinct part of the common stock of thought in enlightened nations, and gradually, by association with successive new ideas, plant, and methods, was developed into a business or trade, which before the middle of the 18th century already formed an essential element of the social scheme. Most of the modern forms of insurance against the elements were known, and at least crudely practised. But there was no scientific basis for the business. Premiums were fixed, not by computation from known tacts or reasonable assumptions, but by guess and the higgling of the market. Only the competition of capital checked the extortionate demands of underwriters. The first important steps towards a scientific valuation of hazards were taken in dealing with the class of risks hitherto so much neglected, those which depend upon human mortality. Marine and fire insurance had

their origin in the pressure of need. The practice began before a theory existed. But life insurance had its origin in the scientific study of the facts of human mortality. Both marine and fire insurance became general before there was any intelligent study of the risks by statistical or mathematical methods, nor can it be said that much progress has since been made towards establishing a scientific basis for the valuation of risks in these classes. But life insurance may be said to have been impossible until the theory of probabilities had become a recognized part of the common stock of ideas.

The value of insurance as an institution cannot be measured by figures. No direct balance-sheet of profit and loss can exhibit its utility. The insurance contract produces no wealth. It represents only expenditure. If a thousand men insure themselves against any contingency, then, whether or not the dreaded event occurs to any, they will in the aggregate be poorer, as the direct result, by the exact cost of the machinery foi effecting it. The distribution of property is changed, its sum is not increased. But the results in the social economy, the substitution of reasonable foresight and confidence for apprehen- sion and the sense of hazard, the large elimination of chance from business and conduct, have a supreme value. The direct contribution of insurance to civilization is made, not in visible wealth, but in the intangible and immeasurable forces of character on which civilization itself is founded. It is pre-eminently a modern institution. Some two centuries ago it had begun to influence centres of trade, but the mass of civilized men had no conception of its meaning. Its general application and popular acceptance began within the first half of the 19th century, and its commercial and social importance have multiplied a hundred- fold within living memory. It has done more than all gifts of impulsive charity to foster a sense of human brotherhood and of

common interests. It has done rrfbre than all repressive legisla- tion to destroy the gambling spirit. It is impossible to conceive of our civilization in its full vigour and progressive power without this principle which unites the fundamental law of practical economy, that he best serves humanity who best serves himself, with the golden rule of religion, ” Bear ye one another’s burdens.”

II. Casualty and Miscellaneous Insurance

Before proceeding with an account of the standard institutions of fire and life insurance, it is proper to glance at the modern vast extension of casualty insurance, and to notice certain novel applications of the insurance principle to other special classes of events. The novelty of these enterprises, however, is not in the general idea underlying each of them. In almost every instance in which insurance has been extended, so as successfully to cover new kinds of risks, it will be found that the suggestion is nearly as old as the practice of life insurance. Many more kinds of insurance than are even now found useful were attempted more than a century ago. But no statistical basis then existed for determining the probability of loss from various casualties, nor had the methods of canvassing, accounting, proving and checking losses, reached the perfection now recognized as necessary for efficiency and safety. The various branches of business which, in distinction from the great standard institutions of life, fire and marine insurance, are commonly treated as miscellaneous insurance, differ widely in their subjects and methods. The most general of them, and that most widely known, is insurance against personal injury by accidents of every kind. Much has already been done by the companies in collecting and analysing facts, so as to determine the average risk of injury and disablement among different classes of men. But there is as yet no such union of effort among them to combine their resources for such purposes as among the life companies, nor does the subject admit of treatment so exact as that of human mortality. Hence it is impossible to speak of a theory of accident insurance in a scientific sense; and in its practice premiums and necessary reserves are determined by the trained business judgment of individual managers rather than by the calculations of actuaries from statistical collections of facts.

The insurance of railway travellers against injury upon trains was the first form of accident insurance which proved widely acceptable. This is still practised as a special business by several companies, tickets, entitling the purchaser or his family to a fixed compensation in case of his injury or death, being offered for sale with the railway tickets. But the development of insurance against personal injuries, which is most characteristic of the times, is the wholesale insurance of the employer against liability to the employed for accidental injuries sustained in his service. This was first undertaken on a large scale by the " Employers' Liability Assurance Corporation of London," founded for the purpose in 1880, immediately after the passage of the Employers' Liability Act by parliament, which made employers of labour liable for injuries sustained in their service to an

extent unknown to the common law. The Workmen's Compensation Act 1906 greatly extended the classes of employers liable for accidents to their servants, and the number of companies devoting themselves to accidents and workmen's compensation has greatly increased, while practically every fire insurance office has taken up the business. The policies are issued to employers of labour, agreeing to indemnify them for any loss to which they may be subjected, at common law or by statute, in consequence of bodily injuries suffered by any employee while engaged in their service. In some cases the insurance company undertakes the investigation and settlement of each claim within the limits prescribed by the policy, and conducts any litigation which may result. The adjustment of damages can be made with more economy and skill by the companies than is usually possible for the employer, and the danger of fraudulent claims is largely reduced by methods experience has taught them. The price charged for such insurance is either a small percentage of the aggregate wages paid during the term, or a standard rate for each particular class of employment,

or (in the case of large employers of labour) an " all-round " rate designed to cover every class of employee.

The most common form of accident insurance, however, is still represented by the policy which promises the assured a fixed sum in case of death by accident, and a weekly compensation during dis- ability from such a cause. Many policies also specify a sum to be paid for the loss or permanent damage of a member, as an eye, a hand or foot. Another extension of the personal accident policy is the addition of some form of health insurance, especially the grant of a weekly sum to the insured during incapacity for work caused by certain named diseases. Besides the ordinary joint stock com- panies which carry on this class of business with fixed premiums, many associations organize for insurance against personal injury by accident, relying upon the assessment of members to pay claims as they mature. Many of these are local and ephemeral ; but a number of them, formed by men engaged in common pursuits, for mutual protection, have attained importance. Such are especially some of the commercial travellers' and the railway employees' accident associations, and a few connected with the Masonic or similar beneficiary orders.

Another large class of casualty insurances applies to various forms of damage to property. The branch which seems most to have attracted promoters is the insurance of plate glass against fracture, which is carried on by a number of companies in Great Britain, and

is the only business of several of them. In the United States there are five corporations which insure plate glass alone, while many other casualty companies issue also policies on glass. This business is not conducted in any other country upon so large a scale as in the United States, but is attracting more attention than heretofore in Europe, and especially in Great Britain.

There are several companies in the United Kingdom and in America which make the insurance against damage by the explosion of steam boilers a special feature of their work, but by far the greater part of the business is transacted by one company in each country. The service rendered is one of special skill and vigilance, extending far beyond the contract for indemnity. The company, in fact, employs inspectors of the highest scientific qualifications, who assume constant supervision of the machinery, and require its structure and conduct to be freed from elements of danger. It is prevention rather than compensation that is sought, and the outlay made by the companies is mainly for inspection and control, not for losses. It is usual to promise in a policy upon a steam boiler some compensation also for any personal injury which may result from an explosion.

There are some companies in England having insurance against burglary for their principal purpose, while several of the British and American accident companies issue policies of this kind. It is somewhat of an experiment, and the risks taken are for moderate sums, at premiums determined in each case by an estimate of the danger founded on a study of all the circumstances. There is no information published concerning this branch of insurance in other countries, but the aggregate premiums paid are not at present very large. It is believed by many that there is an important future for burglary insurance, in connexion with improved methods of protection, by safes, automatic alarms and constant inspection, for dwelling-houses, shops and offices, which are often unoccupied.

Insurance against damage to growing crops by hail is practised in several parts of Europe and America, commonly by small local associations on the mutual plan or as an incident to the business of fire insurance. No statistics can be obtained of these operations. The same is true of the insurance against the ravages of tornadoes, and against sickness and accident in domestic animals.

A wholly distinct business, commonly classed as a branch of insurance, has now grown to great importance, that of guaranteeing the fulfilment of contracts and of indemnifying employers against defalcations in their service. The bond of a corporation of large

capital is widely taking the place which personal surety has filled in connexion with undertakings on contract, and with offices and occupations of trust, both in public and in private life. Fidelity insurance is carried on by a few of the general casualty companies, but as the practice of it extends it becomes more and more the work of special institutions organized for this purpose alone. In the United States there are many corporations of excellent standing, with aggregate paid-up capital of more than $15,000,000 and surplus funds of nearly $10,000,000 more, and collecting in premiums about $4,000,000 annually upon bonds and guaranties amounting to more than $1,250,000,000. The business practically only started at the close of the 19th century. It has had similar if not equal development in Great Britain and in several other countries, but it is only in the United States that the statistics of it are officially collected.

The insurance of titles to real property is also becoming widely extended. This business, however, has indemnity for losses as but an incidental purpose. The principal aim is to furnish a final and responsible assurance that the title is flawless. Several of the companies in the United States possess elaborate and expensive collec- " tions of records, covering the sources of title for cities or large districts; all of them employ expert ability of a high order; and I when they approve a title as perfect, the purchaser or lender of

money may receive, with the approval, a guaranty against loss in accepting it, which private examiners or counsel cannot give. Titles are insured also in other countries, but the business has nowhere else attained such importance, nor do the institutions transacting it make full and separate statements of their accounts. Other minor forms of insurance are against bad debts, bonds and securities in transit, earthquakes, failure of issue, loss on investment, leasehold redemption, non-renewal of licences, loss of or damage to luggage in transit, damage to pictures, loss of profits through fire, imperfect sanitation, birth of twins, &c.

III. Fire Insurance

The growth of the business of fire insurance since 1880 or thereabouts has been commensurate with the increase of wealth and

of commercial activity in the foremost nations, while the practice of it has also become general in countries in which it was formerly little known. The statistics of the subject have in recent years become far more full and more accessible than formerly; partly because many governments require detailed reports of resources, receipts and expenditures from all com- panies permitted to establish agencies within their jurisdiction, and periodically publish summaries of the returns; but also largely because the companies seek the widest publicity as their best means of advertising. It is to be regretted that there is as yet no uniformity of method in these returns; while some of the most important elements of the subject are not sufficiently illustrated for the student in the published statistics. Many companies of the United Kingdom transact business throughout a great part of the world, and there is no means of determining how much of their receipts or their losses must be referred to Great Britain. Further, they fail to give classified amounts at risk, so that it is impossible to estimate with any confidence the total sum for which any kind of property, such as dwellings, factories, household goods, stocks of merchandise or wares in transit, is insured. The returns of the London Fire Brigade, however, which is in part maintained by regular contributions from the fire underwriters at the rate of £35 for each £1,000,000 of risks assumed by them within the metropolitan district, continue to exhibit a regular growth. The aggregate amount insured in the metropolis was reported as follows: —

In 1882 £696,715,141

1886 741,109,316

1890 806,131,385

1895 858,899,409

1900 963,291,097

I9°5 1.034,819,587

It appears probable that the rate of increase here shown is not greater than the actual growth of insurable property during the same period, so that it may be reasonably supposed that the custom of protecting all exposed property by insurance was already general in London many years ago. But the transactions of the British fire offices have grown much more rapidly, and indicate that, outside of the metropolitan district, the practice of insurance has extended

greatly. The returns show that there is a tendency to concentrate the business in the control of large capital and experience, for practically all the premiums received and losses paid were shared by thirty-one companies, although there are at the same time a greater number of corporations of foreign countries with agencies for fire insurance in the United Kingdom; but many of these do but a nominal amount of business, and twenty-three of them are exclusively or chiefly engaged in re-insurance. This tendency has been a marked feature in the later history of fire insurance everywhere. The companies which are now in the field are the survivors of tenfold as many projected enterprises which have failed. The records of about two thousand organizations for the purpose, in America alone, which have undertaken the work and disappeared within fifty years, show the dangers to which inadequate skill and capital are exposed. But a small proportion of these failures were the direct result of sweeping disasters, though about seventy of them followed the memorable fires in Chicago and Boston in 1871 and 1872. Many more, nearly one-half of the whole, have followed a short career, in which the helplessness of inexperience to compete with long training and complete organization was

demonstrated. Many hundreds of these projects were mere speculations or even frauds from the beginning; and the better education of the community at large in the principles and methods of insurance has been the chief agent in checking such enterprises, aided by the stringent legislation of several countries and of the United States in America and by the criticism of the press.

The difficulty of establishing a new joint-stock fire insurance company is far greater in the present highly perfected state of the business than formerly, and constantly increases. The reports of the state insurance departments in America show that less than one-eighth of the premiums are now collected by companies founded since 1880; and, except in districts remote from the principal financial centres, or mutual associations for special classes of hazards, new companies are not often formed. In Great Britain a consider- able number of new corporations are registered every year, with fire insurance among their professed objects, but almost always in connexion with some forms of casualty insurance, which appear to be practically the purpose in view. The reports of the fire business in the United Kingdom for recent years, as collected in Bourne's Manual, show that less than one-fourteenth of it is done by companies organized since 1870. Though new companies have been registered, usually several every year, the number actually transacting successful business has not increased since 1 880. Of the

various British companies now recognized, the twelve smallest together collect but I % of the premiums received by one of the largest, and the tendency to concentrate the business seems progressive. These facts are ex- plained by the necessity of a vast basis of average and of a large capital for security, and still more by the increasing demand for a thoroughly trained and organized body of agents, able to protect their companies from fraud and imposition, and at the same time to compete for public patronage.

The Mutual principle has a strong attraction for many insurers and projectors. When a large number of pieces of property, so distributed that a single fire cannot destroy a considerable proportion of the whole, are yet owned system. and controlled by persons who can fully trust one another, both for financial responsibility and for good faith, there may be no need of a large capital in hand, nor of much of the costly machinery required for general competition. A contract for the assessment on all the property of losses as they occur, at rates fixed by the estimated exposure, may form a safe basis for an association. The fixed payments may be limited to necessary expenses, with a moderate reserve for emergencies, all excess of collections to be returned to the insured. This simple conception of an insurance association, with such modifications as experience indicates, has been accepted for a time as ideal in almost every civilized community, and attempts are continually made to realize it, but in the vast majority of instances with complete failure as the result. Like every other product of human skill, insurance is, for the most part, best supplied to the market by those who make it their calling to produce it for gain. But while the mutual plan, has proved poorly adapted to the general service of the commercial world, in some communities, and especially among the owners of certain classes of property, it has achieved great and apparently per- manent success. This is particularly true of manufacturing districts, in which numbers of mills and factories are exposed to peculiar danger of fire by the nature of their own operations. The best safeguard they can have is by employing great skill in the construction, arrangement and conduct of their works. A group of such properties, associated for the prevention of loss, is naturally stimulated to highest efficiency when the whole group undertakes to bear all losses which are not prevented, and thus every member has a strong interest in making the protection complete. It is in associations of this character that the mutual plan of fire insurance has rendered its greatest services. The mutual plan has been widely adopted also in local associations for the insurance of dwellings and farm improve- ments, where the individual risks are small, and where technical classification and

special safeguards against fraud are not considered necessary, often with the result of affording satis- factory protection at low rates. But the ratio of this part of the business to that conducted by joint-stock companies diminishes from year to year, even in the agricultural and rural districts of the United States. According to the reports of the insurance departments of the states, as summarized in the

Spectator Company's Year-Book, more than half of the cash premiums of mutual insurance companies are collected in the two manufacturing states of Massachusetts and Rhode Island.

It is, after all, only within a very limited field that the mutual principle can be adopted. The essential principle of fire insurance is the distribution of loss. It does not aim, directly at least, at the prevention and only in a secondary way even at the minimizing of loss; but what it seeks to accomplish is that such losses shall not fall exclusively, and possibly with overwhelming effect, on the owner of the property destroyed, but shall be borne in easy proportions by a large number of persons who are all alike exposed to the risk of a similar catastrophe. To work out the equitable solution of such a problem an amount of technical skill and extended experience is required which few bodies or communities possess. Certainly, experience in Great Britain has shown that the one system of fire insurance which has contributed most to the public benefit is that which is conducted by joint-stock companies, offering to the, insured the guarantee of their capital and other funds, and looking to make a profit by the business. In France, Belgium, Holland, Russia and Norway, also, the joint-stock plan is almost exclusively employed. Such an opinion must be qualified by observing that, under the fostering influence of the national and municipal governments, the mutual plan has reached an important development in Austria-Hungary, Germany, Switzerland and Sweden. In all these countries, indeed, corporate enterprise on a large scale, in every branch of business, is of comparatively late growth, and mutual fire insurance was a familiar practice long before joint-stock companies entered upon this field of activity. The tendency in the large cities and commercial centres is to throw new insurances into the business cor- porations, while the time-honoured mutual associations retain their standard character and customary clientage. But in these countries

the mutual plan has an established place in the confidence of the rural population, who are generally strongly prejudiced against moneyed corporations. This is especially true of the cantons in Switzerland and certain districts in Austria-Hungary, where fire insurance is administered by the local governments in connexion with a minute police supervision of the construction of buildings and of other con- ditions affecting the risk. From the published returns of the com- panies and the authorities, as collected for the Post Magazine Almanack (1900), it would appear that of all the fire insurance premiums paid in Switzerland nearly 54% is collected by the mutual associations and the cantonal authorities; while in Italy 37%, in Germany 27%, in Sweden 27% and in the Austro-Hungarian monarchy 20% go to mutual companies.

The earliest plan of insurance which was successful as a business was that practised at Lloyd's Coffee-house (see Lloyd's) , . ., in London, and there applied almost exclusively to marine risks. Although the association known as Lloyd's has been for generations a strong financial institution, with every modern safeguard, and since 1871 has been a chartered corporation with large funds, yet its name has become accepted as the symbol of the primitive practice of combined underwriting by individuals, each upon his own credit, for a share of the risk and without common liability.

A few associations on this general principle were known to exist in America, and to issue fire policies on a small scale, before 1892, but chiefly for mutual insurance. In that year, in a general revision of the insurance law of New York, such associations already in exist- ence were expressly exempted from all its provisions. Speculators at once discerned an opportunity. If a company by omitting to take corporate form could carry on the business free from all restrictions and burden of state supervision, it would compete at great advantage with the insurance corporations. While the new law was in prospect there was time to take action; and upon its passage there suddenly appeared a multitude of " organizations " claiming the exemption as Lloyd's, or associations of individual underwriters, and offering fire policies at rates materially lower than those of the joint-stock companies. Each of these was represented and managed by an attorney for the subscribers, supposed to have power to bind them severally to the amount of their subscriptions. The standard policy prescribed by law in New York was issued, with a clause making the liability several only, and fixing the amount. The Lloyd's entered the market with the zeal and prestige of a new idea and a great name, and they grew rapidly in number and in business, but made no reports. Extending their agencies into other states, they occasioned

much litigation concerning their legal existence and rights and some rash and inharmonious legislation. But several attempts to establish similar Lloyd's in other places failed. Experience soon showed that it was impossible to enforce claims in the courts, when the liability

was distributed among many, without excessive expense and delay, even when all the subscribers were solvent, while a few good names, however useful in canvassing, were no guarantee of the responsibility of unknown associates. In 1896 the executive and legal authorities of New York assumed a hostile attitude towards speculative schemes of this class, and indictments were found against a number of promoters for falsely antedating constituent agreements. The bubble burst suddenly, and within three years more than one hundred of the Lloyd's disappeared. A few reinsured their risks or were merged in permanent companies, but the mass of them proved to have no substance. Four or five only of the best Lloyd s continue to issue fire policies within a narrow and special circle, but as a group they no longer compete for general business.

The rate of premium varies with the supposed risk, but certain descriptions of property are specially and more elaborately rated. This has been done to a considerable extent by common agreement amongst the offices, and the arrangements are known as the " tariff system," which requires here a few words of explanation.

We may suppose the question to arise, What ought to be paid for insuring a cotton-mill, or a flax or woollen mill, or a weaving factory, or a wharf or warehouse in some large city? The experience of any one office scarcely affords adequate data, and a rate based on the combined experience of many offices has a greater chance of being at once safe and fair. The problem, indeed, is a more complicated one than what has been already said would indicate. The property to be insured may consist of several distinct buildings and the contents of them: one building may be devoted to operations involving in a high degree the risk of fire ; in another the processes carried on may be more simple and safe; a third may be used only for the storage of materials having little tendency to burn. Fairly to measure these various hazards it has been found necessary that the experience and skill at the command of many companies shall be combined, and that the rates shall be the result of consultation and a common understanding.

Now it is clear that no office will contribute its skill and experience to such a common stock if the effect is to be that other offices may avail themselves of the information in order to undersell it.

Consultation about rates and a common under- standing necessarily involve a reciprocal obligation to charge not less than the rates thus agreed on; in other words, a tariff of rates is developed to which each office binds itself to adhere. The system tends to restrain and moderate the competition for business which inevitably and to some extent properly exists among the companies, and its value to them is manifest. But it is also of service to the insuring public. At first sight it might seem that free competition would suit the public best, and that a combination among the offices must tend to keep up rates, and to secure for the companies excessive profits, but a little consideration will show that this is a mistake.

It is an unquestionable truth, though one often lost sight of, that all losses by fire must ultimately be borne by the public. The insurance companies are the machinery for distributing these losses, nothing more. If the losses fell on them, their funds, large as they are, would speedily be exhausted, and the service which they render to the public would come to an end. To those who require insurance against loss by fire it must be a manifest advantage that they should have many sound and prosperous offices ready to accept their business, and no less able than desirious to earn or to retain the public favour by fair and liberal conduct. A necessary condition of this state of things is that the rates of premium paid for insurance should be . remunerative to the offices, and the main object of the tariff system is to secure such remunerative rates.

This it endeavours to do by two methods — by an agreement as to what rates are to be charged, and by affixing such a penalty to dangerous constructions, substances and processes as to induce, if possible, a lessening of the danger. In other words, and reversing the order, it seeks to diminish the risk of fire, and to secure adequate payment for what risk remains. On the supposition that the offices are correct in their estimate 01 risks, the effect, and indeed the intention, of their rule is not so much to put money into their own coffers as to lessen the danger, and

to save themselves in the first instance, and the owners of property ultimately, from the consequences of preventible fires. These rules, as will readily be seen, must have powerful influences on trade and

manufactures. Many individual warehouses and mills are, with their contents, insured for very large sums, £10,000, £20,000, £50,000, £100,000 and more. An additional charge of 5s. or ios. % in respect of a supposed increase of risk may mean a payment by the owner of several hundred pounds a year, and may operate as a com- plete veto on some arrangement or some machine which it might otherwise be desirable to resort to. The occurrence of a few severe fires in one town, followed by an increase of insurance rates, may have, and indeed has had, the effect of driving some branch of trade to another locality, the seat of greater caution or better fortune. It is therefore obviously desirable that so important an influence should be exercised, not precariously or capriciously, but according to the combined wisdom and experience of those associations which may be supposed to understand the subject best, and which obtain their experience in the way that makes it perhaps of most value, by paying for it.

It is equally for the public benefit that rates of insurance should be fixed oh some common scale. Suppose the system of unrestricted competition to be tried, the first effect will be a general and great reduction in rates. But it may be said, " So much the better for the insured; if the offices can afford this reduction of rate, it will only be a fair result of competition; if they cannot afford it, they will be the losers, but the public will gain; will the effect not be simply to reduce the rates to the paying point and no further ? " This would be all very well if the paying point could be absolutely ascertained or determined in any way beforehand, but the rate comes first and the losses come afterwards. In other businesses prices are based on some certainty as to the cost of production, but in selling fire insurance the cost is not known till after it has been sold. In a free competition it is the sanguine man's views which regulate the market price, and the rates therefore cease to be remunerative. The consequences are that some offices disappear altogether, others take fright in time to avoid ruin, though not to escape serious loss, persons who might establish new offices are deterred from doing so, the business gets the character of being a highly speculative and hazardous one, re- quiring extravagant profits to induce men to carry it on at all, and the public have to bear the cost. Unrestricted competition therefore is not for their advantage.

The combination for uniform rates has another buneficial effect; it serves to distribute the burden of losses fairly. If it is a just thing that cotton-spinners should bear all the losses that arise m cotton- mills, and not leave them to be borne by the owners of private dwelling-houses, or vice versa, it is well that the loss by each class of risks

should be measured fairly. But, while the experience ot any one office, taken by itself, furnishes a very imperfect criterion, each contributes its quota of knowledge and experience to the common stock, and the public get the benefit both of broad and trustworthy data and of that peculiar and intimate acquaintance with each different class of property or process which the conductors of one company or another are sure to possess.

No conventional or excessive rates can, however, be maintained for any length of time. Some member of the union is sure to perceive that popularity and profit may be gained by introducing a lower rate, if a lower rate is manifestly sufficient, or a new company starts into existence to remedy the grievance. It is to be remembered, too, that the directors and shareholders who control the offices are likewise insurers, quick to raise the question of how far the rates they have to pay as individuals are justified by the risks run; and if it cannot be shown that these rates are a true measure of the risk, offices are soon constrained by a sense of justice or by self-interest or by pressure from without to mitigate them. In short, the association is a union bound together by necessity and tempered by competition.

Adequately to measure the risk of loss by fire demands not merely reference to an extended experience but a watchful regard to current changes. While the profits of fire insurance business fluctuate considerably from year to year, and seem even to follow cycles of elevation and depression, the tendency on the whole appears to be towards a growth of risk, although excessive competition among offices prevents the rates from rising in proportion.

The Tariff system has steadily developed in minuteness of classification and in adaptation to wider experience, as well as to the changes in the character of many classes of risks by improvements in building and by the intro- duction of new kinds of goods and machinery. The estimates of risk and the determination of premiums are largely governed by individual opinion and by competition, no amount of experience furnishing a statistical basis on which trustworthy predictions of average loss can be made. Hence it is only by constant co-operation among insuring institutions in the exchange and combination of their observations that justice can be done to them and to the public. The proper extent of this co-operation is easily attained where the business is free

Tariff difficul- ties.

from all restrictions except those of the common law, as in Great

Britain, and the competition of capital for profits is keen enough to keep the rates within reasonable limits. But in countries in which the government regulates the business in a more paternal spirit, and meddles with all its details for the avowed purpose of securing the safest and best public service, many difficulties arise. This is increasingly the case in several of the nations of Europe, notably in Austria, Switzerland and Germany.

But it is in the several states of the United States that the government supervision of insurance has most interfered with and modified the natural development of the business. In recent years, beginning with 1885, sixteen of these states have enacted legislation, dictated by the growing jealousy of corporate powers and privileges, forbidding fire insurance companies or their agents to combine in any form for the determination of rates. Companies have often been indicted, fined and deprived of authority to issue policies because of member- ship in associations for the purely scientific purpose of ascertaining ' their average experience. The courts have frequently narrowed in their interpretations the sweeping intent of such laws, but have generally sustained them- as within the power of the legislature, and at the present time there is an overwhelming public sentiment in large sections of the country arrayed against every semblance of union or consultation among the companies upon the basis of their business. In several instances all the important insurance com- panies have withdrawn their agencies at once from particular states, and the business community has been sorely distressed for want of their protection. But the popular prejudice has not yielded to its demand, and the companies have never been able to maintain their own position with unanimity, the temptation to secure a vast business upon any terms being always too strong for some of them to resist. This form of legislation has beyond dispute increased the cost of insurance to the people, while it has embarrassed and disturbed the regular work of the companies.

Another pernicious tendency of popular legislation in the United States is found in the Valued Policy laws, the first of which was adopted by Wisconsin in 1874, providing that when any insured building is wholly-destroyed by fire the amount of the policy shall be conclusively taken as the amount of the loss. This principle, with various modifications and extensions, has become law in some twenty states of the Union, though in many of them its enactment has been vigorously resisted by the executive government; several governors have vetoed such bills, while most of the supervising officers have had the intelligence to disapprove them. The provision is regarded by all insurance authorities as highly dangerous, inviting

over- insurance and incendiarism; and there is no doubt that it has this tendency in many instances. But the statistics available, while showing that in general the rate of loss has increased where such laws are in force, do not demonstrate any such wide and ruinous stimula- tion of fraudulent practices as has been apprehended by thoughtful critics. The actual result is commonly to throw upon the insurer the responsibility for providing in advance against over-insurance by minute surveys and, in special cases, for continual watchfulness against depreciation. Like all other interference of government with private contract, however, it has a marked effect in increasing the difficulty and expense of business transactions.

The direction in which fire insurance as a social institution calls most pressingly for improvement is the extension of the principle of co-insurance. The importance of this can only be understood by remembering that the i nsuraace ~ aggregate losses of the community by fire are chiefly made up of innumerable small fires and not of sweeping conflagrations. The experience of every company, confirms the general truth, that the number of fires in which a building is totally destroyed, or in which the loss amounts to the greater part of the property exposed under the same risk, is comparatively very small. It may be asserted with confidence that, in the grand aggregate of the business, much more than three-fourths of the loss occurs in fires in which less than one-tenth of the insurable value at risk is destroyed. The practical result is obvious. If fires destroy a million of dollars' worth in property insured for its full value, and a million's worth more in property insured for one-tenth of its value, the insurers will pay $1,000,000 upon the first group and more than $750,000 upon the second. But if all the insurance is taken at the same rate the insurers will have received premiums ten times as great on the former group as upon the latter. This rough illustration shows that in an equitable adjustment of rates the amount insured as compared with the value exposed is a prime element, and that premiums might justly form a scale, highest on the smallest fractious of

value, and diminishing rapidly as the percentage of insurance increases. Such a scale is, however, impracticable for many reasons, apart from the endless complications which, even if it could be

constructed, it would introduce into the classification of risks. Any scientific plan of insurance, therefore, must provide another method for maintaining the proportion between amounts of premiums paid and the share in its benefits obtained for them. This is the purpose of what are generally called average or co- insurance clauses. The principle is, that when a proper rate for a class of risks is found, then the insured may protect at that rate any percentage of such a risk, and in case of fire shall be indemnified for the same percentage of his loss. When once clearly grasped, this principle largely simplifies and rectifies the business. It is in universal use in marine insurance under the name of " average," and is there recognized as indispensable. It is embodied in all fire policies in France, Germany and several other countries of Europe, and in 1826 was made compulsory in Great Britain by law in all " floating policies," those, that is, which cover stocks of goods distributed in several places and in fluctuating amounts. But it has not yet become general in Great Britain or America, although every writer of authority on the subject, and every practical underwriter of large experience, approves it. Systematic attempts have been made since about 1892 to extend its application in the United States with much success, but they have been met by strong opposition, which shows a widespread misunderstanding of its true bearing.

The co-insurance clause, indeed, which has been generally approved by the American associations of underwriters, and applied in the great commercial cities, is less sweeping than the parallel agreements used in France and Germany. The latter regard the insured owner as self-insurer for the entire value at risk not covered by the policy, and grant indemnity only for that fraction of the loss which the amount insured bears to the whole amount exposed. The American clause is less logical, commonly providing that: " If at the time of fire the whole amount of insurance on the property covered by this policy shall be less than 80 % of the actual cash value thereof, this company shall … be liable only for such portion of such loss or damage as the amount insured by this policy shall bear to the said 80% of the actual cash Value of such property." But this limitation of the basis of co-insurance average to 80% of the total value is in perfect harmony with the conservative policy which seeks in all cases to prevent over-insurance. The most serious danger to which the entire system is open is that a fire may promise profit to the insured. To avoid this, it is a small enough margin to exclude from protection by the policy one-fifth of the estimated value, and to require the owner to assume that proportion of the risk. It is therefore reasonable not to require in any case a larger share than

four-fifths to be covered, and not to press the co-insurance principle so far as to offer a differential advantage to those who insure above this limit. Thus, for practical purposes, and in the general mass of business, the 80 % clause may be accepted as approximately the best application of the principle. It makes possible substantial equity in distributing the cost, while it does not interfere with proper safeguards against over-insurance. The cordial support of the mercantile community in the great cities, and of the most intelligent state officers, has been given to it.

A popular outcry has, however, arisen against all forms of co-insurance, on the superficial and mistaken assumption that in every case the principal sum named in the policy measures the insurance paid for by the premium ; and that any limitation upon it must be a wrong to the insured, for the emolument of the insurance corporation. No less than ten states have passed laws prohibiting the clause within their jurisdiction, though Maine in 1895, after a trial of two years, repealed the prohibition. The law of Tennessee, a typical form, is as follows: " Insurance companies shall pay their policy- holders the full amount of loss sustained upon property insured by them, provided said amount of loss does not exceed the amount of insurance expressed in the policy, and all stipulations in such policies to the contrary are and shall be null and void " (except in case of insurance upon cotton in bales). In several states the use of the co-insurance clause is made a penal offence. It is an interesting fact, however, that while this principle, whenever it has been generally applied, has led not only to a fairer equalization of premium rates, but, on the whole, to a marked reduction of them, the laws in question have deprived the people adopting them of the resulting benefit. In the year 1899 the average premium rate upon all fire risks written in the states in which co-insurance was wholly or partly prohibited was something more than $1-20 per Siooo, while in the rest of the country, where the clause was permitted and to a large extent used, the rate was but 96 cents per $1000. The marked difference, which tends to increase, is a perpetual object-lesson which must in the end appeal strongly to the popular intelligence.

The varying attitude of several civilized governments towards the institution of insurance has found significant expression in their tax laws. In Great Britain a stamp duty of 6d. was imposed in 1694 upon " every piece of vellum or T f xat,on parchment or sheet of paper upon which any policy insurance. of insurance should be engrossed or written," and was doubled in 1698. It was further increased (reaching 3s. iod. per policy in 17 13) and varied by many subsequent acts, under some of which the percentage duty on fire

insurance was also made payable by stamps upon policies. But in 1865 the stamp tax was finally reduced to the nominal sum of id. upon each policy. A far heavier burden, however, was imposed upon insurers by the measure of Lord North in 1782, charging all fire insurances in force with an annual duty of is. 6d. for every £100 insured. In 1815 the general rate was made 3s. per £100, but was collected once for all upon the policy when issued; and it so remained until reductions began in 1864. The duty was wholly abolished in 1869. The revenue from this source reached its highest point in 1863, when it was £1,714,622, presumably representing insurances effected in that year to the amount of £1,143,081,333. There are no data for determining the amount of premium receipts or of losses realized on the same volume of insurance; but the tax was recognized by economists as well as by all parties to the policy contracts as an excessive burden. In many instances it more than doubled the cost of insurance. Its effect in discouraging the prudent custom of insuring against fire was very serious, and after its abolition this custom extended so rapidly that it soon became, and continues, practically universal in Great Britain. Upon the continent of Europe fire insurance is generally taxed quite heavily; most so in France, where the direct duties on the premiums, together with the registry and stamp taxes paid by the companies, have been estimated to add one-fourth, or perhaps one-third, to the cost of insurance.

In the United States the companies are taxed, each by the state in which it is domiciled, upon their real estate, and often upon their capital, surplus ot profits, and are required in other states to pay fees to the insurance departments, and commonly an excise of from 1 to 25% of their premiums. An elaborate table is prepared each year by a committee of the National Board of Fire Underwriters, showing the aggregate amount of taxes paid by the companies operating in New York in comparison with their receipts and profits. The statement received and published by the board in 1000 contained the following: —

Premiums (fire and marine). Losses paid (fire and marine)

Expenses

Increase of liability (un- earned premiums, &c.) Net loss in the last year . Net profit in twelve years . Amount of taxes paid Taxes were of premiums Taxes were of premiums, less losses

For the Year

1899.

8134,450,639 91,031,677 52,849,129

8,998.526 18,428,693

4.495,332

3-34%

io-35 %

For Twelve Years

1888-1899.

$1,425,929,631 856,978,494 517,667,238

59,104,388

7,820,489 35,984,081

2- 52%

6-32 %

In qualification of this statement, it may be said that the reported expenses appear to include taxes, and that the additions charged to liability are to some extent theoretical and flexible. It also appears from the state reports that upon the entire capital and net surplus of $191,000,000 employed in the business in the United States by 316 joint-stock companies, dividends to the amount of $8,000,000, or 4-2 %, were paid in 1899 to shareholders. Nevertheless it is true that competition among the companies, together with unfriendly legislation, has reduced the profit upon their aggregate capital near the vanishing point, and that the taxes, the average rate of which increased 50 % within the period 1 89 1- 1 899, are heavier in many states than can be justified by public policy or by the analogy of other corporate interests. The true principle, doubtless, is that while the capital employed

in insurance for gain ought to contribute to the state the same share of its profits as other capital, yet the premiums, agencies, policies and entire machinery representing only losses, and providing for their distribution, should be exempted, as far as the necessities of the public treasury permit.

One aspect of the taxation of fire insurance is of especial interest, namely, the very general disposition of legislatures and municipal authorities to impose upon the underwriters the cost of fire depart- ments. The systematic prevention and extinguishment of fires are everywhere assumed to be proper work for the community at large. But the first license granted by the crown to issue in- surance policies in London in 1687 was conditioned" upon regular contributions by the authorities to support the king's gunners as a fire brigade, and in the public mind the privilege of insuring the prudent has ever since been vaguely associated with the duty of guarding the property of the whole community. The voluntary support of fire patrols by the companies in London, New York and other cities has done much to promote this view; and a substantial part of the taxes paid upon fire policies in the United States is levied for the support of fire departments, the pay and pensions of firemen and similar purposes. The tendency to increase such taxes, under the pretext that the protection afforded is for the special benefit of the companies, is strong in some of the states; though it would be equally rational to compel life insurance companies to maintain general hospitals for the sick.

The most complete statistics of the fire insurance business collected in any country are those Statistics, presented in the United States to the National Board of Fire Underwriters at each annual meeting. The following summary of part of the information submitted by the committee on statistics, 10th May 1900, giving the amount of fire risks insured in the United States, premiums received for them, and losses paid upon them, by all joint- stock fire insurance companies for the year 1899 will serve as an example: —

to over ten million pounds, and the prompt settlement of all claims strengthened considerably their position in the United States.

In the United Kingdom the statistics of fire insurance are less accessible and less complete, no official records being made of the local distribution of the property insured, while the pub- lished accounts of the companies are not sufficiently uniform and detailed to make a trustworthy summary of the entire business possible. Much of it is done by foreign companies, of whose British business we have

no separate statement. A statement of the revenue accounts of the various British companies insuring against fire will be found in the annual Insurance Blue Book and Guide.

In the Dominion of Canada the insurance companies make detailed reports to the government bureau, and the statistics of the business are full and accurate. The following table shows the aggregate business of five companies in the Dominion in 1869 and 1907: —

Companies.

Net Cash Premiums received.

Amount of Policies taken.

Amount at

Risk in

1869.

Amount at

Risk in

1907.

Losses paid.

Canadian Companies. British Companies American Companies . All Companies

$

54,849,706 159,372,986

32,449,482 246,672,174

$

5,663,696,931

14,745,342,255

2,801,078,045

23,210,117,231

$

59,340,916 115,222,003

13,796,890 188,359,809

%

412,019,532

937,240,828

265,401,198

1,614,661,558

$

36,073,543 105,203,259

20,129,323 161,406,125

Fire Insurance in

the United States. Joint-Stock Companies.

Companies.

Fire Risks assumed.

Fire Premiums received.

Fire

Losses

paid.

Premiums per $100 of Risk.

Loss per

$100

of Risk.

Loss per

$100 of

Premiums.

American . 218 Foreign . . 35

All . . . 253

$

12,251,299,499

6,087,570,275

18,338,869,774

S

93,577,169

42,958,472

136,535,641

$ 59,119,018 29,865,014 88,984,032

$

•7638 •7057 •7445

$

•4826 •4906

•4852

1

•6318 •6975 •6517

These returns do not include mutual companies. The com- pilers of the Insurance Year-Book, however, obtain from the several state departments of insurance the reports of all companies made to them of the business done within each state; and from these it appears that in 1899, for example, 160 mutual companies assumed fire risks to the amount of $1,119,772,848. Many small local associations have made no returns, but their operations are too limited to materially affect the aggregate. It is note- worthy that while mutual companies

transact less than 6% of the business of the whole country, yet in the state of Rhode Island, a densely peopled manufacturing community, they have more than 78%, and in Massachusetts nearly 24%; and that, while less than one-ninth of the insured property of the United States is situated in these two states, they contain nearly two- thirds of that which is insured by mutual associations.

The fire insurance business of foreign companies In the United States was comparatively small until 1870. Four strong British corporations were then in the field, and their transactions amounted to less than 9 % of the entire joint-stock business. But their success attracted others in rapid succession, especially from Great Britain and from Germany, and in 1880, 19 foreign companies assumed 23-770 of all the risks reported to the National Board; in 1889, 23 such companies took 30-3%; and in 1899, 35 such companies took 33-2 %. The distribution of the business among them is not given by the board tables, but can be gathered from the reports of the American branches to the insurance departments of the states, which are summarized in the Spectator Company's Year-Books. The total net payments of the British and colonial fire insurance companies in connexion with the disastrous fire in San Francisco in 1906 amounted

Upon the continent of Europe the fire insurance business is conducted partly by local companies in each country and partly by the great international offices of Great Britain and Germany. The local associations in Austria, Germany and Switzerland are of three classes — public assurance organizations connected with local governments, private mutual companies and joint- stock companies. It is impossible to obtain balance-sheets of all, nor is any information available concerning the local distribu- tion of the risks, or the whole amount of property insured. The

capital employed by stock cor- porations in this business in each country, and the aggregate pre- mium receipts and payments for losses in the last year of which a report is available will be found in the annual Post Magazine Almanack.

While most of the fire insur- ance business in the Australian colonies is in the hands of British companies, local institutions for the purpose have had a considerable development on the same general lines as in Great Britain and with similar freedom from interference by the governments. But no accounts of the receipts and losses are available, most of the companies conduct- ing a marine or life insurance business, or both, under the same general management.

Beyond the limits of the great commercial nations, no satis- factory information is accessible concerning the practice of fire insurance. Even in Spain and Portugal there is far less intelligent interest in the subject than in neighbouring countries, and the agencies of foreign companies transact much of the business in the large towns. Six Portuguese companies have maintained themselves for many years, a few of them for nearly a century, and have established agencies in the Spanish islands and in Madeira. For other nations than those mentioned, the only systematic effort to collect the facts is made by the compilers of the Year-Book, and the results are extremely meagre. The great British and German corporations . are zealous in extending their transactions to the commercial ports everywhere, and local companies are often formed in the British colonies. In addition to those in Canada and Australia some com- panies in South Africa have become financially important. Small native companies have been successful in establishing their credit in Japan, Brazil, the Argentine Republic, Chile and Peru. A consider- able business is done in insuring the property of foreign residents in the Levant, on the coasts of Asia, in South Africa and the Pacific Islands, but mostly by European companies, and as an incident to the more general practice of marine insurance. There are several successful fire companies among the Dutch in Java. The small business in Mexico appears to be wholly in the hands of foreign companies.

LIFE INSURANCE]

INSURANCE

665

History.

IV. Life Insurance

Guesses at the probable length of life for the purpose of valuing or commuting life-estates, leases or annuities were made even by the ancients, and crude estimates of the number of years' purchase such interests are worth occur in Roman law and in many medieval writings. In 1 540 the English parliament enacted that an estate for a single life should be valued as a lease of seven years, one for two lives as a lease of fourteen years, and for three lives as a lease of twenty-one years. More than a century later The Cambridge Tables for renewing of Leases and purchasing Liens, a standard work in England, with the certificate of Sir Isaac Newton to its accuracy, proposed, as a remedy for the inequity of this fanciful rule, to make

*the increase for each additional life less by one year, so that, valuing a single life at ten years, two lives shall be reckoned as nineteen years and three lives as twenty-seven years. No distinction of ages was recognized, and the results, tabulated to decimal parts of months, are worthless. Thus the foremost minds of the world had as yet no apprehension of a true method of reasoning on the subject. The first clear insight into the character of the problem appears in Natural and Political Observations on the Bills of Mortality, published in 1661 under the name of John Graunt, a haberdasher and train-band captain of London. Graunt recognized the principle of uniformity in large groups of vital and social facts, and actually prepared, from the mortality registers of London, what he calls a " Table showing of one hundred quick conceptions, how many die within six years, how many the next decade, and so for every decade till 76." This was the earliest crude suggestion of a table of mortality, and Graunt's interest in the inquiry was scientific, without definite practical purpose. But a little later the sale of annuities was pressed upon governments as a method of discounting future revenues. In 1671 John de Witt, grand pensionary of Holland, reported to the states general a plan for such sales upon a scientific method, the insight and skill of which, had he possessed proper statistical data, would have anticipated results only reached by later generations. The report, however, was buried in the Dutch archives and forgotten for nearly two centuries. It was unknown in England when, in 1692, the government undertook the sale of annuities. A loan of £1 ,000,000 was offered, each £100 paid in to purchase a life annuity of £14, without distinction of age. A table accompanied the offer, purporting to show how many of 10,000 persons now living, old and young taken together at random, are likely to die in each year from one to ninety-nine. The purchasers, though without clear understanding of the principle, were instinctively shrewd enough to select healthy young lives for annuitants, and the nation paid enormously for the error. This speculation of the public treasury led the eminent mathematician and astronomer, Dr Edmund Halley, to examine the subject. In 1693 he presented to the Royal Society a study of " The degrees of mortality of mankind." The parish registers of England took no note of age at death, and Halley, perceiving that the average duration of life in large groups of persons can only be determined Table. * when ages at death are known, sought in vain a statistical basis for such an inquiry in his own and in many other countries. But it happened that the city of Breslau in Silesia had kept such records, and he succeeded in obtaining the registers for five years, 1687-1691, including 6193 births and 5869 deaths. No census of the city having been taken, Halley made the best estimate*

he could of the popula- tion, and computed how many of a thousand children taken at the age of one year win die in each succeeding year. Arranging the results in three parallel columns, showing in successive lines the age, the number living at that age, and the number of deaths during the year, he formed the first mortality table. The arrangement was itself a discovery, exhibiting at a glance the essential data for valuing life-risks, and suggesting solutions for problems which had puzzled the ablest students. This general form of the mortality table remains in use as the natural and best for such collections of facts. The method of using such

a table in calculating the values of life contingencies was also discovered by Dr Halley. He showed that where' a payment is to be made at a future date, if a named person be then alive, its present value is the sum which compounded at interest during the interval will amount to that payment multiplied by the fraction representing the probability that the person will survive. These two elements, compound interest and the probability of life or death, are the foundations of the theory of life contingencies.

From Halley's time the progress of the theory has been in three directions : first, in accumulating facts from which averages are deduced, and analysing the data so as to eliminate disturbing influences, that is, in constructing trustworthy tables of mortality; secondly, in extending the inferences from such tables, and multiplying their applications to needs of practical life; and thirdly, in facilitating the calculations which these applications require. But while Halley thus firmly and lastingly drew, in outline, the theory of life contingencies, the numerical results attained by him were grossly imperfect. Forced by the lack of data to assume that the population was stationary, and to rely on a rude estimate of its numbers, he well knew that his conclusions were but provisional. Yet they were far in advance of the general mind of his time. As late as 1694, and even in 1703, parliament substantially re-enacted the old law for valuing leases at seven years for each life. The meagre Breslau Table long remained the only serious attempt to utilize actual observations of mortality for scientific purposes. In 1746 A. de Parcieux (1 703-1 768), a mathematician of Paris, published an Essaisurles probability de la dureede la vie humaine, in which he presented mortality tables formed by himself, one from the records of certain Tontine associations, and five others from those of several religious orders in Paris. The Tontine experience table was a much closer approximation to the true course of mortality, as shown by later investigations, than any of its predecessors, and indeed now appears, despite the crude manner in which the materials were treated, to

have been more accurate and more trustworthy than the Northampton or even the Carlisle Table of much later date. The essay of de Parcieux was an important source of information to advanced students in France and Germany, but attracted no general or popular interest, nor was it followed up by progressive researches of the same character in continental Europe, while it remained almost unnoticed in England.

Throughout the 18th century the customary treatment of life annuities was as chaotic and fanciful as before, though some writers of eminence, most notably Dr Thomas Simpson of London (1752), treated the theory of the subject with great intelligence, and in 1753 James Dodson of London (great-grandfather of Augustus de Morgan) projected a life insurance company in which the premiums should be accommodated justly to the ages of the insured. But life insurance as a business really began with the Equitable Society of London, founded in 1762. The associates petitioned for a charter, but the law officers of the crown refused it, saying that the scheme depended for success on the truth of certain tables of life and death, " Whereby the Chance of Mortality is attempted to be reduced to a certain standard. This is a mere speculation, never tried in practice." The society was organized as a voluntary association, and began business in 1 765. Its premiums were computed from the Breslau Table, with some corrections from the London Bills of Mortality, and were far higher than any now in use. But the managers, in face of actual business, needed more light. Dr Richard Price, a student of the new science of life contingencies, was consulted, and soon devised tests of the society's experience and measures of the financial results, which are in principle those still practised. He also aspired to construct a more accurate table of mortality, and discovered data in certain parish registers of Northampton which promised to represent the average of life in England. From these he formed in 1780 the Northampton Table of Mortality, and computed a new and largely reduced toa iabh. scale of premiums for the society. The historical importance of the Northampton Table lies in the profound impression it made on the general mass of intelligent persons.

Although mortality had long been recognized by special inquirers as a promising theme for statistical inquiry, its actual treatment, except

in the narrow school founded by Johanrt Sussmilch in Germany (1746), and in the isolated and almost prophetic work of de Parcieux in France, had been speculative and vague. Demoivre handled it with mathematical acuteness, but framed his scale of mortality (about 1750) on a hypothesis of his own, not on known facts. Out of each group of eighty-six deaths, according to this scale, one dies on the average each year till all are gone; so that x being the present age, the probability of death within a year is always i/(86-#). This conjecture, which, during middle life, served as a rough approximation to the truth, almost as well as some of the early tables of repute, long found remarkable acceptance among men of science. Dr Price's researches first brought to general apprehension the conviction that a large basis of observed facts is the only source of real knowledge. The government of the day felt the influence of the movement. In 1 786 Pitt, then chancellor of the exchequer, consulted Dr Price on plans for the conversion of debt, and in 1 789 the government first showed knowledge that in granting annuities ages must be distinguished, and that the prospective life at ninety and that at twenty-five are not to be estimated as equal. About 1808 a conversion of 3% into annuities was planned. The Northampton Table was adopted, and Morgan computed rates from it which were used for twenty years. It proved to represent a mortality far in excess of the average, and in 1821 John Finlaison, being made actuary to the debt com- missioners, protested against the rates in use. But not until 1828, when the treasury had lost two millions of pounds by selling annuities too cheap, was the law repealed. Finlaison then constructed a new and less wasteful scale for conversions, but singular results followed. At the age of ninety, for instance, £100 would purchase an annuity of £62. Combinations were formed to purchase annuities on the lives of old people selected for their vigour; 675 of these were taken, with a further loss of at least a million to the treasury. The Northampton Table, in fact, like the earlier Breslau Table, was formed without a census, and upon the false assumption that the population was stationary. Dr Price's estimate, founded on the recorded baptisms, was much too low, many of the people being of a sect which rejected infant baptism. His table represents an average life of twenty-four years, whilst subsequent inquiries indicate a true average of about thirty years at that time in the same parishes. The actual mortality in the Equitable Society proved to be less by one-third than that anticipated by the table. The error had consequences of vast moment. The immediate and dazzling prosperity of the societies founding rates on this sup- posed scientific basis excited the public imagination, stimulated the business exceedingly, and led to many extravagant projects, followed by

fluctuations and failures which impaired its healthy growth and usefulness.

In spite of gross defects, the Northampton Table remained for a century by far the most important table of mortality, employed as the basis of calculation by leading com- acfaariai P arues m Great Britain, and adopted by the courts progress, as practically a part of the common law. Parliament, followed by some state legislatures and many courts in America, even made it the authorized standard for valuing annuity charges and reversionary interests. But in life insurance practice it is now wholly antiquated. Like its most famous successor, the Carlisle Table of Joshua Milne, it rested upon observations of the population of a town. How far this limited and peculiar group represented the nation was still doubtful; no less so how far the rate of mortality among applicants for insurance, accepted by the offices, would correspond with that of the urban citizens or of the whole body. As soon as the companies had sufficient records of their own experience the work began of striving to construct, for business use, tables which should truly express it. This branch of research has ever since been prosecuted with all the resources they could command of industry, practical judgment and mathematical skill; and the successive achievements in it may be accepted as in general

the sum and measure of the progress of actuarial science. Now the recognition of an ascertainable uniformity in human mortality has become part of the general stock of thought. But actuarial science, which originated in Great Britain, was long the peculiar and almost exclusive possession of British students, and even till now has been practised most fruitfully in its first home, mainly by the actuaries of life insurance institutions, but with important contributions from other inquirers, especially those in the service of the registrar-general. The most complete storehouse of technical and practical learning on the general theory and on all its applications to life insurance practice is found in the successive volumes of the Journal of the Institute of Actuaries. The tables published by the Institute in 1872, founded on the experience to 1863 of twenty companies (see Annuity), Still remain the most authoritative expression of the mortality of insured lives, and have largely replaced all earlier standards in the valuations of the British companies, more than three-fourths of which, in their latest returns to the Board of Trade, compute their reinsurance reserves by the H m- and H m – 5 tables. But for several years a committee of the Institute and of the Scottish Faculty of Actuaries has been engaged in collecting and arranging for investigation the far vaster experience which has now

accumulated in the hands of sixty companies, including the records of more than a million policies. The large basis of facts thus obtained will be treated with special reference to different classes of risks, and will throw much light on difficult questions of selection, which have hitherto been treated specu- latively, or at least without the conclusive evidence of large averages, and are still more or less in controversy. Some of these will require more detailed notice hereafter.

It is only since the middle of the 19th century that actuarial science has rapidly advanced in other countries, chiefly under the stimulus of the extending practice of life insurance. Both in America and upon the continent of Europe the small business transacted by the pioneer companies was largely conducted on empirical and conjectural methods from year to year, English custom being consulted as a guide in fixing premiums. The Gotha Bank, the first institution to insure lives upon business principles in Germany, adopted at its foundation in 1827 a mortality table formed by Charles Babbage upon the basis of the Northampton Table, corrected from cursory notes upon the early experience of the Equit- able Society, which had been given by its actuary to a general meeting of its members in 1800. The French companies, and several in Germany of later origin than the Gotha, took as their standard the so-called Table of de Parcieux, previously described ; and this table, with modifications dictated by experience, continued until very recently in general use in France. The Seventeen Companies' Table of 1843 was adopted by the Insurance Commissioners of Massa- chusetts, who in 1859 introduced the methods of state supervision of insurance now generally practised in the United States. This table, though long superseded in the esteem of actuaries in their ordinary work, is still the standard for official valuations in most states of the union, a fact which has given it undue prominence. The so-called American Table, derived in 1868 from the limited experience of the largest American company during its earliest years, was the first important work of the kind done in America. In view of its narrow basis of facts, it has stood the test of time singularly well, and it is now in wider use than any other for computing the premiums of American companies. Its most marked difference from the standard British tables for insured lives is that it indicates a decidedly lower rate of mortality throughout the period of mature manhood, between the ages of thirty-five and seventy-five, though with a higher rate at the extremes of life; and this peculiarity is also found in American tables deduced from more recent and far larger experience.

Actuarial science has been widely cultivated in the United States of

late years, the numbers and zeal of its professional students having kept pace with the extraordinary growth of life insurance. The aggressive activity of the companies has brought the principles of the business home to the popular mind as in no other country,' and a large number of periodicals are devoted entirely to the subject. These tendencies have been strengthened by the system of super- vision practised by the states, which has also greatly influenced public opinion, directing attention in an extraordinary degree to certain special and technical features, to the neglect of more com- prehensive and more useful criticism. In the official work of the state departments the actuary's province appears substantially to begin and end with the valuation of liabilities upon the net premium basis, which is applied with increasing strictness as the sole and final standard of solvency, and the determination by it of the " legal surplus " of each company. But a considerable number of profes- sional actuaries have prosecuted their studies in a scientific spirit, and most of these since 1889 have been associated in the Actuarial

Society of America, which has established a high standard of pro- fessional competence in its examinations and transactions. The question how far the rate of mortality among insured lives in America is fairly represented by tables drawn from British experi- ence has attracted much inquiry; and many companies have made important contributions to it from their own records, in several instances in the finished form of carefully graduated tables, each with an individual character, but all with some features which distinguish them as a group. By far the most comprehensive effort to establish a standard table for America is that of a committee of actuaries, for which, in 1881, L. W. Meech published the classified experience of thirty offices to the end of 1874, including most of the large companies in the United States, and embracing more than a million policies. The observations collected in this work have furnished materials for many important investigations, but the finished tables have rarely been applied in practice, being drawn from an aggregation of largely incongruous experiences, the influ- ence of each of which upon the general average is indeterminate.

The business of life insurance upon the continent of Europe has given an extraordinary stimulus to actuarial studies. Before 1883 the

German companies computed their premiums and reserves by antiquated life tables. The most approved of these, as illustrating the duration of German life, was that prepared by Brune of Berlin in 1837 from the records for seventy years of an annuity society for widows, which practised careful medical selection of the husbands and kept exact mortality registers. In 1 883 was published an admirable table founded on the combined experience of twenty-three German companies, which has superseded all other standards for ordinary valuations within the German empire. The French companies generally continued to rely on the tables of de Parcieux, with modifications of their most glaring defects, until a still later date. In 1898 a committee of French actuaries published a new set of tables drawn from the experience of four of the principal offices in France, and these are now accepted as the best basis for life insurance practice by similar companies there. Schools of actuarial science have been opened in both Germany and France, and the professional actuaries of these countries, and of Austria and Belgium, have formed associa- tions for the promotion of their pursuits. Sessions of delegates from the several institutes and societies of actuaries throughout the world meet triennially in general congress in the various capitals. Such sessions do much to broaden and harmonize the scope and aims of the profession.

average duration of life, such as the extension and concentration of many industries, the vast growth of cities, the progress of medical and hygienic science, the increase of wealth, comfort and luxury, the changes in the frequency and destructiveness of war. It is plausibly maintained, on the one hand, that these and other causes have already added some years to the average lifetime of civilized man; and, on the other hand, that their combined effect has been to lessen the sharpness of the struggle for existence, to rescue the weaklings from destruction and enable them to multiply, and so to weaken society at large. The final decision of the question will be found in the gradual modifications of the true table of mortality through successive epochs.

For the purposes of life insurance the future of mortality tables looks to less ambitious problems. The business calls for exact equity in determining the value of all life contingencies, and therefore for the most precise forecast attainable of the dates at which the amounts assured must be paid. Some idea of the historical progress of this inquiry may be gathered from the accompanying table, which epitomizes the general characteristics of a number of typical tables of mortality, showing at ages which are multiples of five years the annual death-rate indicated by each of them. The comparison will be

found interesting in many ways, most strikingly, perhaps, as suggesting what is confirmed by a detailed examination of the facts, that insured life on the average in Great Britain is decidedly inferior to that in the United States, but superior to that upon the continent of Europe, and especially in Germany. From a careful investiga- tion of the published experience, Dr McClintock concludes: " It is an ascertained fact that after the first five years of insur- ance the probability of death," in Great Britain, " is fully one- fifth greater at any given age than the corresponding probability shown by American experience"; while "the average value of assured life in Germany is as much inferior to that shown in the H m – experience as that in America has been found to be

Elaborate efforts have been made by several governments to employ the machinery of census bureaus for determining the superior, general rate

Table showing the number of Persons who will die in a year out of 100,000 who have attained the given Age,

according to several Tables of Mortality.

Rates 0/ mortality.

of mortality,

and it has been the worthy ambi- tion of able actuaries to devise trustworthy methods of utilizing the census returns for this purpose. The British Statistical Office under Dr William Farr and his successors, and. later, the Swiss Federal Bureau of Statistics have accom- plished the best work in this direction, and the series of " English Life Tables," founded on successive de- cennial censuses, in- terpreted by the registered deaths during the intervals,

are the most useful data now available for the average value of civilized life. But all such general tables are as yet but tentative and provisional. The imperfections of mortuary registries and of census returns are great, and corrections are largely con- jectural. Until more complete methods of collecting the facts are practised, the experience erf life insurance companies promises to furnish the only mortality tables having claim to authority. It is already becoming evident that the general rate of mortality, and in particular the rate at each age of life, not only differs widely in different communities, but undergoes important changes in successive generations. A multitude of forces are at work in civilized society which must

influence the

North-

Seventeen

Institute

Institute

American

Thirty

Twenty- three Ger-

Four

ampton.

Carlisle.

Offices.

of _

of _

Experi-

American

man

French

Age.

Actuaries.

Actuaries.

ence.

Offices.

Offices.

Offices.

1780.

1815.

1843.

H m – 1869.

H m – 5 1869.

1868.

1881.

1883.

1895-

10

916

449

676

490

400

749

648

364

15

922

619

694

287

325

763

659

515

20

1403

706

729

633

833

780

676

919

690

25

1-575

731

777

663

1,050

806

703

854

628

30

1,710

1,010

842

772

- *920*

843

748

882

698

35

1,870

1,026

929

877

1,000

895

821

999

807

40

2,090

1,300

1,036

1,031

1,132

979

936

1,176

975

45

2,401

1,481

1,221

1,219

1,294

1,116

1,120

1,437

1,236

50

2,835

L342

1,594

1,595

1,712

1,378

i,4i7

‘ 1,814

1,638

55

3.35o

1,792

2,166

2,103

2,219

i,857

i,893

2,506

2,258

60

4,023

3,349

- 3,034

2,968

3.064

2,669

2,653

3,535

3,213

65

4,902

4,109

4,408

4,343

4,461

4,013

3,864

4,943

4,675

70

6.493

5.164

6,493

6,219

6,284

6,199

5,778

7,276

6,897

75

9,615

9,552

9,556

9,816

9,949

9,437

8,779

10,647

10,241

80

13.433

12,172

14,040

14,465

H,577

14,447

13,407

I5,5i6

I5,H9

85

22,043

17.528

20,509

20,988

21,010

33,555

20,363

22,211

22,332

90

26,087

26,056

32,373

27,945

28,244

1 45,455

32,815

32,356

32,225

No final explanation has been given, and there is no proof that the average" life in America is longer than in England or Germany/ Dr McClintock inclines to believe that one potent cause of the great difference in the insured experience P 7s/"f is that, while European offices have generally awaited (/„„. applications, which are commonly prompted by some sense of need for insurance, the custom of American companies is actively to solicit business through agents. On the average, lives which are only induced by persuasion to insure are better than those which voluntarily apply. That this suggestion points*

1 On the. Effects of Selection, by Emory McClintock (New York, 1892), p. 94.

out a real and perhaps an important differentiating influence upon groups of risks is not doubted, but the measure of its effects has not yet been determined. The question is one of many which yearly assume more prominence, and which, as a class, are conventionally termed problems of selection. Assuming that the general rate of mortality is precisely known, any devia- tion from it occurring in a special group of insured lives, as the result of some influence peculiar to that group, is called the effect of selection. If insurance were offered on equal terms to all, the feeble and dying would apply in disproportionate numbers, and the mortality would be excessive. To

avoid this danger careful medical examinations are required, excluding risks which appear to be impaired; and this selection by the insurer uniformly reduces the mortality below the general average during the earliest years of insurance. During these years large numbers of the insured withdraw, either from inability or from indisposition to pay their premiums, but the motive to do so is weakest with lives which have become impaired. The average vitality is lowered by the loss on the whole of a superior class, and the average mortality of those who persist rises. The extent of this influence varies widely with the proportionate number of lapses and the motives which induce them, increasing in a startling degree when lapses multiply in a discredited company, and remaining small, or even at times doubtful, under very favourable conditions; so that the ascertainment of its amount in different circumstances, and for different groups of the insured, is a problem of extreme complication. Its importance is in- creased by two tendencies which have grown stronger in the practice of recent years: first, to permit at all times the with- drawal by any policy-holder of a substantial part of the technical or average reserve upon his assurance, a privilege which legisla- tion and public opinion in the United States have extorted from the companies; and, secondly, the extensive introduction, under competition for public favour, of forms of policies which grant the option, at fixed dates in the future, between withdrawing the entire " accumulations," or technical reserve and surplus, and continuing the insurance. It is well known that at the maturity of these options the motive is strong for impaired lives to remain insured, and that the cash withdrawals are so largely of superior lives that the subsequent rate of mortality is much increased. Other problems in selection arise from varieties in the forms of policies. It is commonly recognized that there are general and marked differences between the mortality experienced upon assurances issued at low and those at high premium rates. Policies for short terms, on which the computed net rates are the lowest, have been found so unprofitable to the insurers that they are rarely granted, and only with a very heavy loading of the tabular value. Upon those insured for life, with annual premiums, there is a large and constant excess of death losses above the endowment assurances, while groups of policies with tontine or cumulative features or reserved bonuses, available only after surviving a term of years, uniformly experience a low mortality.

It is also to be remarked that it is found in general that the average amount of policies matured by death is higher than the average of all policies in force; and some actuaries incline to believe that tables of pecuniary loss might, for practical use, take the place of tables of

mortality, since the actual claims are in units of money, not of lives. The vast field of inquiry opened to actuaries by these and many more special questions of selection promises to engross more and more of their attention and labour. The technical methods of reducing and treating the data of mortality have been brought to a high degree of perfection, but the necessity for a better classification of the data themselves, with reference to special groups of lives or policies, differentiated by social or local circumstances, by business methods, by forms of contract, by race or personal characteristics, must assume ever greater prominence. It is conceivable that, at some period hereafter, the practical reliance of the offices will be more upon tables to be computed for such special groups, from select experience, than upon those drawn from vast aggregates without discriminating among their somewhat incongruous divisions.

The mortality tables in common use, however, have been

proved by a vast experience to furnish a safe and fairly equitable

basis for the business of assuring lives. Assuming

*that the table shows how many of a large group now ?"**" « i , , • ii- Interest*

assured may be expected to end in each succeeding factor.

year, the present value of the claims upon them depends exclusively upon the rate of interest at which funds will accu- mulate. Exact foresight of this rate being impossible, the insurer must assume a rate which can with certainty be realized. The difficult problem of determining the limits of safety in this assumption attracts the more attention now, because of the recent persistent decline in the average productiveness of invested capital. The actuary is forced to observe that the interest factor in his calculations is much less definitely fixed by known facts than the mortality factor. The longer a contract has to run, the greater the effect of the difference in rate. The value of a payment to be made in thirty years is greater by above one-half with interest taken at 3 % than at 4J , and one to be made in thirty-six years is more than twice as great. Hence the most careful study of the forces determining for long periods the average rate of interest is fundamental in life insurance. The tendency of opinion is to hold that a progressive lowering of interest rates must result from the accumulation of wealth. In support of this belief it is pointed out that from 1872 nearly to the present time there has been a general and somewhat uniform decline in the yield of invested capital, as

represented by government stocks, mortgage loans, savings bank deposits and discounts in all commercial nations. The movement has been disguised by wide fluctuations, temporary or local, but has been on the whole world-wide and continuous, when great masses of capital, such as the investments of life companies, are kept in view. The fall has been greatest, too, in countries where rates were formerly highest, suggesting that as the great financial markets of the world become more intimately connected the normal rate of interest assumes a more, cosmopolitan character, with an increasing tendency to equality among them. These considerations have had an important influence upon the com- putations of life insurance companies. In Great Britain, and commonly in continental Europe, the leading offices from the first assumed lower rates of interest than those in America, usually 35 or 3; and the reductions in their estimates have as yet been moderate, only thirty-one out of seventy-four British offices having lowered the interest basis in their valuations reported to the Board of Trade.

These returns show that of these companies only twenty-three now compute reserves upon a rate as high as 35 %, while forty-four assume 3 % and seven a still lower rate. But in America, when the business first became important 6% was a more frequent rate of investment than 5 %, and the laws of New York and of many other states countenanced the confident expectation of a permanent yield of at least 4 i %. The rate of 4 % adopted by the principal companies, and by the law of Massachusetts from 1861, was regarded as highly conservative. But as early as 1882 one important company began to reserve upon new business at 3 %, and since 1805 there has been a gradual change by the leading offices to 3 j %, and in a few instances to 3 %, as the basis of premiums and of reserves upon new policies. Serious efforts have been made to induce legislation which will gradually establish one of these rates as a test of technical solvency.

There are not wanting, however, indications that the pro- tracted decline in rates of interest in the world's markets may have been checked, and even that a reverse movement has begun. Rates of discount everywhere, interest on government loans except in America, and on mortgage loans in Europe, have on the whole advanced, the minimum average rates having been reached, after twenty-five years of gradual reduction, in 1897. These facts are entirely consistent with the conclusions suggested by the history of the subject. No uniform or secular tendency to reduction in the average rate of interest, which is the index of the average productiveness of capital, not of its amount, can be found to have

prevailed. Fluctuations in the average rate are found, quite independent of the local and temporary fluctuations, which are often extreme; and these long tidal waves of change have at times, for generations together, risen and fallen with some approach to periodicity. The prevailing rate has been a little

Assets

and

reserve.

lower on the average in the 19th century than in the 18th, but was lower through the middle decades of the 18th century than through those of the 19th. On the whole, it seems clear that the accumulation of wealth in itself has no necessary tendency to diminish the productiveness of capital; that this productiveness, on the general average, has not materially varied in many generations; but that the promise and expectation of productive- ness which prompt the demand for its use depend upon the activity of enterprise, growing out of the prevailing spirit of hope; upon the rapidity with which new inventions are made, industries extended, and floating or loanable capital expended in permanent works. These conditions are subject to fluctuations extending through considerable periods, so that for a number of years the rate may be higher, and then for a similar series of years lower than the normal rate, determined by average productive- ness, but always tending to return to this normal rate, as the tide- swept surface of the ocean to its normal level.

While the excess of the average yield of capital in America, above that of the older nations, is diminished as the facilities of transfer and exchange increase, there is no reason to conclude that it will disappear for generations to come. It seems, therefore, that the general assumption of 3% for the valuation of British offices, and that of 3J% which is becoming the accepted standard for the companies of the United States, should command unquestioned confidence.

The business of life insurance being founded on well-ascertained natural laws, and on principles of finance which in their broad

aspect are of the simplest description, there exists no necessity for frequent close scrutiny of the affairs of an insurance office, in so far as the maintenance of a mere standard of solvency is concerned. We have seen that the premiums charged for insurances are based on certain assumptions in regard to (1) the rate of mortality to be experi- enced, (2) the rate of interest to be earned by the office on its funds, and (3) the proportion of the premiums to be absorbed in expenses and in providing against unforeseen contingencies. If these assumptions are reasonably safe, an insurance office pro- ceeding upon them may be confidently regarded as solvent so long as there is no conspicuously unfavourable deviation from what has been anticipated and provided for, and so long as the funds are not impaired by imprudent investments or otherwise. The ascertainment and division of profits, however, require that the affairs should be looked into periodically; but the fluctuations to which the surplus funds are liable within limited periods of time are generally regarded as furnishing a sufficient reason why such investigations should not take place too frequently. Ac- cordingly in most offices the division of profits takes place only at stated intervals of years — usually five or seven years — when a complete survey is taken of the whole engagements present and future, and of the funds available to meet these. The mode in which the liability of an office under its current policies is esti- mated requires explanation.

All statistical observations on the duration of human life point to the conclusion that, after the period of extreme youth is past, the death-rate among any given body of persons increases gradually with advancing age. If, therefore, insurance premiums were annually adjusted according to the chances of death corresponding to the current age of the insured, their amount would be at first smaller, but ultimately larger, than the uniform annual payment required to insure a given sum whenever death may occur. This is illustrated by the following figures, calculated from the H™ mortality table at 3 % interest. In column 2 is the uniform annual premium at age thirty for a whole-term insurance of £100. In column 3 are shown the premiums which would be required at the successive ages stated in column 1 to insure £100 in the event of death taking place within a year. Column 4 shows the differences between the figures in column 2 and those in column 3.

From this table it appears that if a number of persons effect, at the age of thirty, whole-term insurances on their lives by annual premiums which are to remain of uniform amount during the subsistence of the insurances, each of them pays for the first year £1 • 130 more than is required for the risk of that year. The

second year the premiums are each £i-iii in excess of that year's risk. The third year the excess is only £1-093, and so it diminishes from year to year. By the time the individuals who survive have reached the age of fifty-four, their uniform annual premiums are

Age,

30+n.

(1)

P30.

(2)

|lA 3 (H-n.

(3)

P30-|lA3(4-n-

(4)

30 31 32

£i-88o i- 880 i-88o

£•750 •769

.787

+£1-130 + i-m

+ 1-093

53

54 55

i-88o i-88o i-88o

1-806 1-916 2-042

+ -074

- -036

— -162

95 96

97

i-88o i- 880 i-88o

61 -848 79-265 97-087

-59.968

-77-385 -95-207

no longer sufficient for the risk of the following year; and this annual deficiency goes on increasing until at the extreme age in the table it amounts to £95-207, the difference between the uni- form annual premium (£i-88o) and the present value (£97-087) of £100 certain to be paid at the end of a year. Now, since the uniform annual premiums are just sufficient to provide for the ultimate payment of the sums insured, it is obvious that the deficiencies of later years must be made up by the excess of the earlier payments; and, in order that the insurance office may be in a position to meet its engagements, these surplus payments must be kept in hand and accumulated at interest until they are required for the purpose indicated. It is, in effect, the accumu- lated excess here spoken of which constitutes the measure of the company's liability under its policies, or the sum which it ought to have in hand to be able to meet its engagements. In the individual case this sum is usually called the " reserve value " of a policy.

In another view the reserve value of a policy is the difference between the present value of the engagement undertaken by the office and the present value of the premiums to be paid in future by the insured. This view may be regarded as the counterpart of the other. For practical purposes it is to be preferred as it is independent of the variations of past experience, and requires only that a rate of mortality and a rate of interest be assumed for the future.

According to it, the reserve value G»Vx) of a policy for the sum of 1, effected at age x, and which has been in force for n years — the (» + i)th premium being just due and unpaid — may be expressed thus, in symbols with which we have already become familiar.

nV I = A x+ „-Px(i4-a I+ „) . . . (1).

If we substitute for A x+n its equivalent P x +n(l+a x+ n) this expres- sion becomes

»Vx = (P*H.-P*)(l+a I+ „) – - – (2); whence we see that the sum to be reserved under a policy after any number of years arises from the difference between the premium actually payable and the premium which would be required to assure the life afresh at the increased age attained. By substituting for

Px+„ and Pi their equivalents —7— (1 — v) and r-r— — (1— »),

1 -f-flx+n l”rtti

we obtain another useful form of the expression,

V.iˆ .... (3)-.

= a -T+ˆf • • • ■ • <4). The preceding formulae indicate clearly the nature of the calculations by which an insurance office is able to ascertain the amount of funds which ought to be kept in hand to provide for the liabilities to the assured. In cases liability. other than whole-term insurances by uniform annual premiums, the formulae are subject to appropriate modifications. When there are bonus additions to the sums insured, the value of these must be added, so that by the foregoing formula (i), for

example, the value of a policy for 1 with bonus additions B is (i +B)A I+n — P(i+0i+n). But the general principles of calcula- tion are the same in all cases. The present value of the whole sums undertaken to be paid by the office is ascertained on the one hand, and on the other hand the present value of the premiums to be received in future from the insured. The differ- ence between these (due provision being made for expenses and contingencies, as afterwards explained) represents the ” net liability ” of the office. Otherwise the net liability is arrived at by calculating separately the value of each policy by an adaptation of one or other of the above formulae. In either case, an adjustment of the annuity-values is made, in order to adapt these to the actual conditions of a valuation, when the next premiums on the various policies are not actually due, but are to become due at various intervals throughout the succeeding year.

So far in regard to the provision for payment of the sums con- tained

in the policies, with their additions. We now come to the provision for future expenses, and for contingencies not Provision emDracec j m the ordinary calculations. In what is called the " net-premium " method of valuation, this provision expenses, – ig mac j e by throwing off the whole " loading " in estimat- ing the value of the premiums to be received. That is to say, the premiums valued, in order to be set off against the value of the sums engaged to be paid by the office, are not the whole premiums actually receivable, but the net or pure premiums derived from the table employed in the valuation. The practical "'VoiT e ff ect OI this is that the amount brought out as the net m liability of the office is sufficient, together with the net-

premium portion of its future receipts from policyholders, to meet the sums assured under its policies as they mature, thus leaving free the remaining portion — the margin or loading — of each year's premium income to meet expenses and any extra demands. When the margin thus left proves more than sufficient for those purposes, as under ordinary circumstances it always ought to do, the excess falls year by year into the surplus funds of the office, to be dealt with as profit at the next periodical investigation.

There appears to be a decided preference among insurance companies for the net-premium method as that which on the whole is best suited for valuing the liabilities of an office trans- Negauve ac ting a profitable business at a moderate rate of expense, va ues. an(j ma ˆ ln g investigations with a view to ascertaining the amount of surplus divisible among its constituents. In certain circumstances it may be advisable to depart from a strict application of the characteristic feature of that method, but it must always be borne in mind that any encroachment made upon the " margin " in valuing the premiums is, so far, an anticipation of future profits. Any such encroachment is indeed inadmissible, unless the margin is at least more than sufficient to provide for future expenses, and in any case care must be taken to guard against what are called " negative values." These arise when the valuation of the future premiums is greater than the valuation of the sums engaged to be paid by the office, or when in the expression (P x+ „ — Pi)(i+Oi + „) the value of Pi is increased so as to be greater than that of Pz + ». It is evident that any valuation which includes " negative values " must be misleading,, as policies are thereby treated as assets instead of liabilities, and such fictitious assets may at any time be cut off by the assured electing to drop their policies.

In recognition of the fact that a large proportion of the first year's

premiums is in most offices absorbed by the expense of obtaining new business, it has been proposed by some actuaries to treat the first premium in each case as applicable entirely to the risk and ex- penses of the first year. At a period of valuation the policies are to be dealt with as if effected a year after their actual date, and at the increased age then attained.

Another modification of the net-premium method has been advocated for valuing policies entitled to bonus additions. It con- sists in estimating the value of future bonuses (at an Hypo- assumed rate) in addition to that of the sum assured and

existing bonuses, and valuing on the other hand so much of the office premiums as would have been required to provide the sum assured and bonuses at the time of effecting the insurance. This tends to secure, to some extent, the maintenance of a tolerably steady rate of bonus.

An essentially different method is employed by some offices, and is not without the support of actuaries whose judgment is entitled to every respect. It has been called the " hypothetical method." By it the office premiums are made the basis of valuation. Hypo- thetical annuity-values, smaller than those which would be employed in the net-premium method, are deduced from the office premiums

by means of the relation P' = rp-(i-r), and the policies are

valued according to the formula

»", = (PV,-P',)(i+oV.),

thetkal method.

where P' and P'i +n are the office premiums at ages x and x+n respectively, and a' x+ „is the hypothetical annuity-value at the latter age. Mr Sprague has shown {Ass. Mag. xi. 90) that the policy- values obtained by this method will be greater or less than, or equal to, those of the net-premium method according as the " loading " is a constant percentage of the net premium or an equal addition to it at all ages, or of an intermediate character, its elements being so adjusted as to balance each other.*

When the net-premium method is employed, it is important that the office premiums be not altogether left out of view, otherwise an imperfect idea will be formed as to the results of the valuation. Suppose two offices, in circumstances as nearly as possible similar,

estimate their liabilities by the net-premium method upon the same data, but office A charges premiums which contain a margin of 20 % above the net premiums, and office B charges premiums with a margin of 30%. Then, in so far as regards their net liabilities (always supposing the sum set aside in each case to be that required by the valuation), the reserves of those offices will be of equal strength, and if nothing further were taken into account they might be supposed to stand in the same financial position. But it is obvious that office B, which has a margin of income 50 % greater than that of office A, is so much better able to bear any unusual strain in addition to the ordinary expenditure, and is likely to realize a larger surplus on its transactions. Hence it appears that in order to obtain an adequate view of the financial position of any office it is necessary to consider, not only the basis upon which its reserves are calculated, but also the proportion of " loading " or " margin " contained in its premiums, and set aside for future expenses and profits.

Valuations may be made on different data as to mortality and interest, and the resulting net liability will be greater or less according to the nature of these. Under any given table of mortality a valuation at a low rate of Effects of interest will produce a larger net liability — will require a higher reserve to be made by the office against its future engagements to the insured— than a valuation at a higher rate. The effect of different assumptions in regard to the rates of mortality cannot be expressed in similar terms. A table of mortality showing a high death-rate, and requiring conse- quently large assurance premiums, does not necessarily produce large reserve values. The contrary, indeed, may be the case, as with the Northampton Table, which requires larger premiums than the more modern tables, but gives on the whole smaller reserve values. The amount of the net liability depends, not on the absolute magnitude of the rates of mortality indicated by the table, but on the ratio in which these increase from age to age.

If the values deduced by the net-premium method from any two tables be compared, it will be seen that

or <„V X

different data.

according as

V'x>, l+a'x+n

i+a' x

1 -t-Oi+n

> , = , or < I –

*i+a**

> , = , or <

or <

I+Oz 1 +g'l + n

i+a'x

i+a's + »

1 +a I+n

(1).

(2);

where the accented symbols throughout refer to one table and the unaccented symbols to the other.

We have thus the means of ascertaining whether the policy-values of any table will be greater or less than, or equal to, those of another, either (1) by calculating for each table separately the ratios of the annuity-values at successive ages, and comparing the results, or (2) by calculating at successive ages the ratios of the annuity-values of one table to those of another, and observing whether these ratios decrease or increase with advancing age or remain stationary through- out. The above relations will subsist whatever may be the differ- ences in the data employed, and whether or not the annuity-values by the different tables are calculated at the same rate of interest. When the same rate of interest is employed, any divergence in the ratios of the annuity-values will of necessity be due to differences in the rates of mortality.

A prevailing fallacy in the popular mind, which has grown out of the practice of net valuations, is the inference that the average technical reserve represents the value of the /j a /| a ™ of individual policy. Each risk is properly assumed at single- its probable or average value at the time. But from poiky that moment its circumstances are constantly changing teserve – in directions then unforeseen, and the

expectation that such changes will occur is the motive for insuring. To treat them singly as unchanged in value at any later time is as illogical as

it would be after some have matured. The actual value of any one risk borne by a company is indeterminate. It may become a claim to-morrow, or not for a generation to come. In the former case the company must now hold funds to pay in full; in the latter, the future premiums will perhaps more than suffice, so that no present reserve is needed. An entire reserve for the whole body of risks is essential, and its amount is definite, upon the reasonable assumption that the general average re- mains undisturbed by individual changes. A distinct reserve for a single policy is inconceivable. To recognize it is to deny the first principle of insurance. The average amount by which the reserve of a company must be increased, because of the existence of policies of a given class, is to the actuary an important fact, and is commonly accepted as his best guide in the distribution of surplus. But a popular theory has seized upon the assignment of this average sum to each policy, in the technical shorthand of the actuary, and holds that it is in each case the special property of the owner of that policy. The practical consequences are serious when, as often, many of the insured cease to pay premiums, and each demands the amount of the supposed individual reserve. His right to claim it is countenanced by a widespread public opinion, which has inspired statutes in Massachusetts and some other states, requiring companies to redeem all policies lapsing after the first two or three years of insurance at a price founded on the technical reserve. Yet, in by far the majority of instances, the lapse of policies is of itself a loss to the company. It is deprived of business secured at much expense before it has derived any of the advantage expected from the accession. It is compelled to pay numbers of its profit- able contributors for ceasing to contribute. The burden falls in a mutual company upon the insured who fulfil their contracts. Such laws favour those who withdraw after few payments at the cost of those who maintain their insurance to the end, or for many years. The American companies formerly yielded to the pressure of a mistaken public sentiment, and competed for favour by promising excessive values in case of surrender. 1 Similar conditions exist in Switzerland, Austria, and other countries in which the business is

minutely regulated by govern- ment bureaus. But in Great Britain the companies are largely free from such influences, while an open market exists for policies which have a commercial value, with results on the whole more satisfactory to all parties interested than any rule of compulsory purchase which could be enforced on the companies.

A special form of life insurance, which has wonderfully developed, is the family insurance of the labouring people by the so-called industrial companies. Until recently this insurance. d ass ˚f people had no satisfactory share in the benefits of insurance, although the friendly societies in Great Britain, and many forms of beneficial associations in the United States, were attempts, often in part successful, to provide for special wants, mainly for maintenance of the sick and for the costs of burial. Most of them, however, lacked a scientific basis and an efficient and permanent organization, while thousands of them were grossly mismanaged. In Germany an elaborate scheme of compulsory insurance for labourers was established by a law of the empire in 1883, and extended in subsequent years; and similar legislation has been enacted in several other countries, most thoroughly in Switzerland and Austria. The ultimate value of this great social experiment cannot 1 As a result of investigation into the affairs of various American insurance companies in 1905 by a committee appointed by the state legislature of New York, a new law regulating life insurance down to the minutest details was passed in 1906 (ch. 326). The surrender value oi a policy is to be the amount of insurance which the reserve, computed on the 4ˆ % mortality table, standing to its credit, will purchase as a single premium. Other important features of the legislation are that no New York company may hold a contingency reserve beyond a fixed proportion of the net value of its policies; the limiting of types of policies permitted, the defining of the nature of investments permitted, and provisions for state supervision, valua- tion, and annual division of profits.

yet be determined. That it relieves much want and does a great service in preventing pauperism is not disputed; but that it also undermines the independent spirit of the people, and that it imposes a burden upon the national industry, which not only hampers it in the world's competition, but reacts with special injury upon the class it aims to benefit, are criticisms not satisfactorily answered. No scheme of government insurance, certainly, is adapted to a people impatient of paternalism in its rulers and thoroughly habituated to voluntary association for all common interests. The solution of the great problem, how to apply the insurance principle to the most

pressing needs for protection of the class supported by the wages of labour, is now sought in Great Britain and America mainly in the universal offer to them of industrial insurance. The Prudential Assurance Company of London was the pioneer in this work, beginning it experimentally in 1848, but gradually adapting its methods to the new field, until a generation later they showed themselves so efficient that an extraordinary growth resulted, and has con- tinued without interruption. This company and others upon a similar plan insure whole households together for burial expenses in case of death, and a small provision for dependants or for old age,, charging as premiums small fractions of a day's wages, which must be collected weekly. The great difficulties en- countered were the cost of small and frequent collections, and the high rate of mortality, which is from 40 to 90% more than that in the experience of the older companies. This high death- rate is due not so much to the fact that life is shorter in the labouring class as to the lack of efficient medical selection, which would be too costly. The premiums, at best, must be made higher than in offices insuring for annual payments, but the demand for insurance extended as rapidly as the system could be explained, and the Prudential is said to have now in force some 12,000,000 policies, with an average premium of twopence a week, secured by an accumulated insurance fund of £17,000,000. It has superseded a host of petty assessment societies of various classes without scientific basis or business responsibility, which deluded and disappointed the poor. The British government in 1864 undertook to administer a plan for the insurance of work- ing men, but in thirty years accomplished less than the work of one private company in a year. In addition to the many insurance companies which transact industrial business in the United Kingdom, a large number of friendly societies have adopted similar plans.

The system of industrial insurance was introduced into the United States in 1876. Its growth, though much more rapid than in Great Britain, was at first slow compared with that of later years. The following table, condensed from the Insurance Year- Book for jqoo, is an interesting exhibit of the character as well as of the extent of this form of insurance among working men: —

Industrial Insurance

in the United States.

Year.

No. of Cos.

Insurance written.

Policies in force 31st December.

Insurance in force 31st December.

Premiums received.

Losses paid.

1876 1880 1884 1888 1892 1896 1899

1

3

3

7

11

11

16

$400,000 34,212,131 89,150,302 161,260,335 276,893,923 360,852,458 519,789,085

2,500 228,357 1,076,422 2,788,000 5,118,897 7,375,688 10,048,625

$248,342 19,590,780 108,451,099 302,033,066 582,710,309 886,484,869 1,292,805,402

$14,495

i,i55,36o

4,486,612

n,939,540

24-352,900 40,058,701 56,159,889

#1,958

430,631

1,499,432

4,i62,745

8,847,322

13,420,336

17,023,485

It is remarkable that the average weekly premium in the United States appears to be about 10 cents, or two and a half times as high as in Great Britain. The average policy is also proportionally larger, and the progressive increase in its amount deserves notice. At the rate at which the practice of insurance is extending among working men, it would require but few years for it to become as universal in these countries as any paternal government has aimed to make it by compulsion.

There are various sources from which a surplus of funds may arise in an insurance company: (1) from the rate of interest actually earned being higher than that anticipated in the calculations; (2) from the death-rate among the insured

Bonuses.

being lower than that provided for by the mortality tables;

(3) from the expenses and contingent outlay being

'of surplus. l ess tnan tne "loading" provided to meet them;

and (4) from miscellaneous sources, such as profitable

investments, the cancelment of policies, &c.

Supposing a valuation to have been made on sound data and by a proper method, and to have resulted in showing that the funds in hand exceed the liabilities, the surplus thus ascertained may be regarded as profit, and either its amount may be withdrawn from the assets of the office or the liabilities may be increased in a

corresponding degree.

Various methods are employed by insurance companies in distributing their surplus funds among the insured. In some offices the share or " bonus " falling to each policy- holder is paid to him in cash; in others it is applied in providing a reversionary sum which is added to the amount assured by the policy; in others it goes to reduce the annual contributions payable by the policyholder. A method of more recent introduction is to apply the earlier bonuses on a policy to limit the term for which premiums may be payable, thus relieving the policyholder of his annual payments after a certain period. Another method is to apply the bonuses towards making the sum insured payable in the lifetime of the policyholder. The plan of reversionary bonus additions is most common, and when it is followed the option is usually given of exchanging the bonuses for their value in cash or of having them applied in the reduction of premiums.

Not only are there different modes of applying surplus, but the basis on which it is divided among the insured also varies in different offices. In some the reversionary bonus is calculated as an equal percentage per annum of the sum insured, reckoning back either to the commencement of the policy in every case, or (more commonly) to the preceding division of profits. In others the rate is calculated, not only on the original sums insured, but also on previous bonus additions. In others the ratio of distribution is applied to the cash surplus, and the share allotted to each policy is dealt with in one or other of the ways above indicated. The following are some of the ratios employed by different offices in the allocation of profits: (1) in proportion to the amount of premiums paid (with or without accumulated interest) since the last preceding valuation; (2) in proportion to the accumulated " loading " of the premiums so paid; (3) in proportion to the reserve values of the policies; (4) in proportion to the difference between the accumulated premiums and the reserve value of the policy in each case.

Some offices have a special system of dealing with surplus, reserving it for those policyholders who survive the ordinary " expectation of life," or whose premiums paid, with accumulated interest, amount to the sums insured by their policies. This system is usually connected with specially low rates of premium. In the United States the so-called " contribution plan " has been accepted in theory by many companies, though carried out with many variations in detail by different actuaries. The principle is, that since each of the insured is charged in his premium a safe margin above all probable outlays,

when the necessary amount under each head becomes determinate the several excesses should be returned to him. It is therefore sought to calculate what each member would have been charged for net premium and loading had the mortality, rate of interest, and expenses been precisely known beforehand, and to credit him with the balance of his payments. As a corollary of the theory of net valuations, which regards every life insured as an average life until its end, and assumes the rigid ac- curacy and equity of all the formulas employed to represent business facts, it is consistent and complete. But many minds find it more curious than practical, and prefer to seek equity in faithfulness to contract rights rather than in adjustments which they deem too refined, if not fanciful: The plan has met with little favour in England, where surplus is more commonly distributed on general business principles. Enormous bonuses were saved by the British offices out of the excessive premiums at first collected, and by the American companies during the epoch of high interest rates. But the use of more accurate tables, the decline in interest, and the in- creased expenses of later years, have vastly reduced the apparent profits. Former methods of distributing surplus, when ascertained, have largely given way in America to novel and more complex plans. The Tontine idea, historically familiar, was for many years imitated by some offices in their insurance contracts. All premiums above

outlay, in a company or a class of policies, were accumulated, only stipulated amounts being paid on death claims meanwhile maturing, with no compensation to its members withdrawing, until the end of a fixed term, when the whole fund was apportioned to the survivors. Large returns were sometimes made, but many who could not maintain their policies were dissatisfied. " Semi-tontines " followed, partly meeting the difficulty by pooling only the surplus, and allow- ing some return in case of withdrawal. But these cruder forms of contract are now largely superseded by various " reserve-dividend," " accumulation," " bond," and " investment " policies, with options at stated periods between cash withdrawals and continued insur- ance, the simple inducement to provide against death being more or less merged in that of making a profitable investment of capital.

In those branches of insurance where the contract is one of indemnity against loss, the risk remaining the same from year to year — and where the consent of both parties, insurer and insured, is required at each periodical renewal — values. no question of allowance in respect of past payments can arise when one party or the other determines to drop the contract. It is quite recognized that the premiums are simply an eauivalent for the risk undertaken

during the period to which they apply, with a certain margin for expenses and for profit to the insurer, and that therefore a favourable issue of the particular contract supplies no argument for a return of any part of the sums paid. In life insurance, however, we have shown that the premiums contain a third element, namely, the portion that is set aside and accumulated to meet the risk of the insurance when the premium payable is no longer sufficient of itself for that purpose.

When a policyholder withdraws from his contract with a life insurance office, the provision made for the future in respect of his particular insurance is no longer required, and out of it a surrender value may be allowed him for giving up his right to the policy. If there were no reasons to the contrary, the office might hand over the whole of this provision, which is in fact the reserve value of the policy. No more could be given without encroaching upon the provision necessary for the remaining policies. But the policyholder in withdrawing is exercising a power which circumstances give to him only and not to the other party in the contract. The office is bound by the policy so long as the premiums are duly paid and the ether conditions of insurance are not infringed. It has no opportunity of review- ing its position and withdrawing from the bargain should that appear likely to be a losing one. The policyholder, however, is free to continue or to drop the insurance as he pleases, and it may fairly be presumed that he will take whichever course will best serve his own interest. The tendency obviously is that policies on deteriorated and unhealthy lives are kept in force, while those on lives having good prospects of longevity are more readily given up. Again, the retiring policyholder, by with- drawing his annual contribution, not only diminishes the fund from which expenses are met, but lessens the area over which these are spread, and so increases the burden for those who remain. Considerations like these point to the conclusion that, in fairness to the remaining constituents of the office, the sur- render value to be allowed for a policy which is to be given up should be less than the reserve value. The common practice is to allow a proportion only of the reserve value. Some offices have adopted the plan of allowing a specified proportion of the amount of premiums paid. This plan is not defended on any ground of principle, but is followed for its simplicity and as a concession to a popular demand for fixed surrender values.

Another mode of securing to retiring policyholders the benefit of the reserve values of their insurances is that known as the non-forfeiture system. This system was first introduced in America, whence it found its way to the United f°3'u _, Kingdom, where it was gradually

adopted by a large system. proportion of the insurance companies. In its original form it was known as the " ten years non-forfeiture plan." The policies were effected by premiums payable during ten years only, the rates being of course correspondingly high. If during those ten years the policyholder wished to discontinue his payments, he was entitled to a free " paid-up policy " for as many tenth parts of the original sum insured as he had paid premiums.

POST OFFICE INSURANCE]

INSURANCE

6 73

of Insur- ance,

The system, once introduced, was gradually extended first to insurances effected by premiums payable during longer fixed periods, and ultimately, by some offices, to insurances bearing annual premiums during the whole of life. The methods of fixing the amount of paid-up policy in the last-mentioned class of cases vary in different offices, but the principle underlying them all is that of applying the reserve value to the purchase of a new insurance of reduced amount.

An office, in entering on a contract of life insurance, does so in the faith that all circumstances material to be known in order to a proper estimate of the risk have been Conditions di sc i sed. These circumstances are beyond its own knowledge, and as the office for the most part (except as regards the result of the medical examination, which may reveal features of the case unknown to the proposer himself) is dependent on the information furnished by the party seeking to effect the insurance, it is proper that the latter be made responsible for the correctness of such information. Accordingly it is made a stipulation, preliminary to the issue of every policy, that all the required information bearing upon the risk shall have been truly and fairly stated, and that in case of any misrepresentation, or any concealment of material facts, the insurance shall be forfeited. In practice, however, this forfeiture is rarely insisted on unless there has been an evident intention to deceive. Other systems and conditions of life insurance policies may be shortly noticed.

The usual division of policies is into " non-participating " and " participating." Non-participating policies are contracts for the

payment on death of a certain fixed sum in consideration of a given premium, and these amounts are not affected by the profit made by the company. Participating policies entitle the holders to a share in the profits of the company. These profits are applied in various ways, as described above. A policy may be a whole life one, that is, the policyholder may pay a periodical premium throughout life, or it may be a limited payment one (the holder paying a premium for a limited number of years), or an endowment policy, under which the insurer receives the amount he has insured for at a given age, say fifty- five or sixty; or if death occur previously, the sum is paid to his representatives. There are also endowment policies for children, under which parents or others receive a specified sum on a child attaining a given age, the premiums being returnable if the child dies before the specified age.

As to Payment of Premiums. — A certain period of grace is allowed, most commonly thirty days, after each premium falls due. If payment is not made within that time, the presumption is that the policyholder intends to drop the contract, and the risk of the office comes to an end. It may, however, be revived on certain conditions, usually the production of evidence of health and payment of a fine in addition to the premium. An impression used to prevail among the public that the offices were interested in encouraging the for- feiture of policies. If any such impression was ever shared by the offices themselves it must have long since passed away, every reason- able effort being now made on their part, not only to secure in- surances but to retain them, and to afford all the facilities that can be extended to policyholders with that object.

As to Foreign Travel and Residence, and as to Hazardous Occu- pations. — When Babbage wrote his Comparative View of Assurance Institutions in 1826, voyaging abroad was scarcely permitted under a British life policy. The Elbe and the Garonne, Texel and Havre, Texel and Brest, the Elbe and Brest were the limits prescribed by most of the English offices. Even at a much later period the extra premiums charged for leave to travel or reside abroad were very heavy. But improved means of conveyance — in some places better sanitary appliances, and habits of living more suited to the climatic conditions — and, more than all perhaps, the knowledge that has been gained by experience as to the extent of the extra risks involved and the relative salubrity of foreign climates— have enabled the offices to modify their terms very considerably. The limits of free residence and travel have been greatly widened, and where extra premiums are still required these are, as a rule, much lower than formerly. The assured are now commonly permitted to reside any-

where within such limits as north of 35° N, lat. (except in Asia) or south of 30° S. lat., and to travel to and from any places within those limits, without extra premium.

Military men (when on active service) and seafaring men are usually charged extra rates, as are also persons following specially dangerous or unhealthy occupations at home.

As to Suicide— The policies of most companies used to contain a proviso that the insurance shall be void in case the person whose life is insured dies by his own hand, but it is now seldom inserted. Some offices, acting on a sound principle, limit its operation to a fixed period, the extent of which varies in different offices from six months to seven years from the date of issue of the policy.

The practice of rendering policies indisputable and free from restriction as to foreign travel or residence, after a certain period, has tended greatly to simplify the contract between the office and the insured. A declaration of indisputability covers any inaccuracies in the original documents on which a policy was granted, unless these inaccuracies amount to fraud, which the law will not condone under any circumstances.

A remarkable difference in the development of life insurance between Great Britain and the United States is, that among the British companies only one-third of the insurances in force is in purely mutual institutions, while in America the proportion exceeds four-fifths. In both countries there are also "mixed" companies, in which policyholders receive a fixed percentage of the realized surplus, often from three-fourths to nine-tenths of the whole, but the control and management are in the hands of shareholders. These form the great majority of the proprietary offices in the United Kingdom, and the profits of the business have been large. The amount of capital paid in by shareholders of forty-one joint-stock companies was £5,931,000, but the capital authorized and sub- scribed was much more, and the subscriptions have often been paid, wholly or in part, by credits from surplus. The shares of these companies, at market prices, represent a value of at least £50,000,000, but the dividends upon these shares are drawn largely from other business, many of the largest and most prosperous corporations conducting also fire insurance, and some of them marine or casualty insurance.

No branch of social statistics has been more diligently studied than life insurance, and several governments publish classified accounts of corporations insuring lives within their jurisdiction. But the reports

are not uniform in method and in periods covered, and aggregates derived from them must be used with reserve. By the Life Assurance Companies Act 1870, and amendments made in later years, each company issuing policies in the United Kingdom must deposit with the Board of Trade every year its revenue account and balance-sheet for the preced- ing year, and must at fixed intervals cause an investigation of its financial condition to be made by an actuary, and furnish the public through the Board of Trade with the detailed results, in forms prescribed by the act. Thus these returns are the highest authority for the conditions and operations of the offices, which often supplement or anticipate them by voluntary publications. In the United States the laws exact still more minute and much prompter reports to the insurance departments of the states; and every annual statement is required to show the results of an actuarial investigation. All these facts are collected, classified and compared by statisticians for several standard annuals in both countries, especially the Post Magazine Almanack, Bourne's Directory and Manual and the Insurance Blue Book in London, and The Insurance Year-Book of the Spectator Company in New York.

The reports of the insurance department of New York cover more companies than those of any other state. The institutions not in- cluded in them are about thirty-five in number, mostly small and local. The New York reports represent very nearly 95 % of the entire business of the United States. While the amount of life assurance done by British and other foreign offices in the United States is insignificant, fourteen companies of the United States have agencies in Canada (ten for new business), and four transact business in Europe and in other parts of the world. The home business of the American companies is in the aggregate about 875 % of the whole.

In the principal countries of continental Europe life assurance is offered by the chief international institutions of Great Britain and the United States, and their policies are in force probably to the aggregate amount of £140,000,000. The domestic companies have been stimulated to increased activity by the aggressive canvassingˆ the foreign agencies, and the business in recent years has grown rapidly, until now the total sum insured upon lives on thi continent of Europe is little less than a milliard of pounds sterling. Much information about life assurance in the different countries of Europe will be found in Ehrenzweig's Assekuranzjahrbuch (Vienna).

(C. T. L.;T. A. I.)

V. British Post Office Insurance

In 1864 Mr Gladstone, then chancellor of the exchequer, advocated the extension of life insurance amongst persons of small means, and, encouraged by the remarkable success of the

Post Office Savings Bank, then recently established, proposed that the services of the postmaster-general should be enlisted in the promotion of insurance. The result was the passing of the Government Annuities Act 1864. This act authorized the commissioners for the reduction of the national debt, for the first time, to insure a life without granting an annuity upon it, and enabled the postmaster-general to act as the agent of the commissioners in the issue of life policies and the grant of annuities. The limits of insurance were fixed at £20 and £100, and of annuities at £4 and £50; and the purchase of deferred annuities or old-age pay, by monthly, or even more frequent instalments, was sanctioned. The work was eagerly accepted by Lord Stanley of Alderley, the postmaster-general of the day, and the machinery for putting the act in action was elaborated by Frank Ives Scudamore of the Post Office and Sir Alexander Spearman of the National Debt office. The business was commenced on the 17th of April 1865. By the end of the year 560 policies of insurance had been issued, and 94 immediate and 54 deferred annuities granted. In the first twelve months these figures had increased to 809 policies and 230 annuities. The opportunity thus given of insuring through the Post Office with government security was not, however, embraced with the warmth which had been anticipated. In 1882, when Mr Henry Fawcett, then in office, examined the subject, he found that the average number of policies of insurance granted annually during the seventeen years which had elapsed was under 400 — less, in fact, than during the first twelve months of the system. The purchase of annuities had increased slightly, but the business was transacted chiefly in immediate annuities, and hardly indicated any progress in provision for old age by means of early savings. Mr Fawcett procured a Select Committee of the House of Commons on the subject, Before this committee Mr James Cardin, then assistant receiver and accountant-general of the Post Office, propounded a scheme for combining the annuity and insurance business of the Post Office with that of the savings bank. The Committee recommended the adoption of this scheme, together with some enlargement of range and some

relaxation of conditions. The recommendations of the Committee were embodied in the Government Annuities Act 1882, which came into operation on the 3rd of June 1884, and which forms the basis of the present system.

Any person between 14 and 65 can now insure through the medium of the Post Office Savings Bank for any amount from £5 to £100; and the life of a young person between 8 and 14 can be insured for £5- Through the same channel can be purchased annuities, immediate or deferred, from £1 to £100, on the life of any person from 5 years old upwards Old-age policies, that is, policies securing payment of a specific sum either at the expiration of a fixed period (varying from 10 to 40 years), or upon the attainment of a certain age, or sooner in case of death, can also be obtained. Policies for a fixed period can only be purchased by a single payment, but in all other cases the purchase can be effected by payment either of a lump sum or of annual instalments. Further, all purchases are effected through the Post Office Savings Bank. As soon as a contract is completed, the purchaser is required to pay the first instalment to his account in the bank, or, if he has no account already, to open an account for the purpose. This and all further instalments are then transferred by the postmaster-general, as they become due, to the credit of the National Debt Commissioners; all the purchaser has to do is to keep his banking account in funds; he can pay his savings into the bank when and as he pleases. So, also, when old-age pay, secured either by a deferred annuity or an endowment policy, becomes due. it is paid to the account of the purchaser; and, if it does not cause the sum standing to his credit to exceed the statutory limits, it can remain there earning interest, and be drawn out in such amounts as may be convenient from time to time. The purchaser has also the advantage of the ubiquity of the Post Office Savings Bank. He can make his deposits, and can draw out his old-age pay when it becomes due, at any one of the 13,000 odd post offices where savings bank business is transacted. He can even, if his savings are made from day to day, use the penny stamp slips introduced by Mr Fawcett, affixing a stamp whenever he has a penny to spare, and paying in the slip when it is worth a shilling. In short, every advantage open to the ordinary depositor in the Savings Bank is placed at the service of the working man or woman who wishes to secure old-age pay, or to have a small sum to aid those who may suffer pecuniarily from his or her death. Even the reluctance of many persons to submit themselves to medical examination is tenderly regarded. A policy for any sum up to £25 may, if the information

afforded is satisfactory, be obtained without a doctor's certificate,

on condition that, if death happens during the first year, only the premium paid is returned, and if during the second year, only half the sum insured is paid. As regards old-age pay, a purchaser can, by adopting a slightly higher scale of payment, secure the return of his purchase money if at any time before the annuity falls in he repents of his bargain. Further, employers of labour and friendly societies can, on behalf of their workmen or members, make all the payments necessary to buy an insurance or annuity, and recoup themselves out of wages or members' contributions.

The act of 1882 directed that the tables upon which annuities and policies of insurance are granted should be revised from time to time; and in February 1896 new tables reducing the rates of annual premiums, and giving greater facilities for old-age insurance, were issued. The rates are now but very slightly (less than 3%) higher than the average rates of the larger insurance offices. But the ex- pense of small insurance business must necessarily be above the average, and it is fairer to compare the Post Office rates with those of the office which stands pre-eminent in the insurance of the working classes. Such a comparison shows that up to the age of 40 a life insurance can be effected with the Post Office at a cheaper rate than with the Prudential Insurance Company; between 40 and 60 the advantage is slightly on the side of the company.

In 1885, the first complete year after Mr Fawcett 's improvement took effect, 103 deferred annuities and 457 insurance policies were granted; in 1905, 158 deferred annuities and 741 policies. The increase of business, measured in percentages, is no doubt appreciable, but the figures themselves are so small as to make such a comparison trivial. If we compare the two periods, before and after Mr Fawcett's reforms, we find that between the 17th of April 1865 and the 2nd of June 1884 (about nineteen years) 7064 policies of insurance, amount- ing to £557,625, were issued, and between the latter date and the end of 1905, 16,577 policies, amounting to £875,496. For the whole period the figures are 23,641 policies for £1,433,121. During the same time 3144 contracts for old-age pay, amounting in all to £64,378, were made. When we contrast with this sum total the fact that in 1905 alone 1,435,329 new accounts were opened in the Post Office Savings Bank, and more than £42,000,000 deposited in the bank in the course of the year, it becomes apparent that, while the Savings Bank has reached the mass of the population, insurance against old age and death through the Post Office has not.

In 1894 Mr C. D. Lang, the Controller of the Post Office Savings Bank, and Mr Cardin, giving evidence before the Commission on Old-

Age Pensions, ascribed the small insurance and annuity business of the Post Office to the want of a personal canvass. They pointed out that there had been some temporary increase in insurance, through an appeal to the Post Office employe themselves, and they suggested that something might be done if the masters of the ele- mentary schools could be induced to interest themselves in recom- mending to their scholars and the parents of their scholars the advantages offered by the Post Office. It was also pointed out that the friendly societies might, if they were so disposed, act as inter- mediaries between their members and the Post Office, and thereby, as it were, reinsure their risks with the government ; but it was added that all overtures of this nature to the societies had failed, ap- parently from the fear — quite groundless — of introducing government control of the societies' affairs. There may, indeed, be another reason for the failure of the deferred annuity system. The insurance of old-age pay is not popular even amongst the members of friendly societies, or even in Germany, where it has been given to the work- men largely at the expense of other people. Insurance against death, sickness and accidents appeals to the young working man; but old age is too far off to be an object of solicitude, especially since the grant of old-age pensions by the state has made the future secure from destitution at least. However, if at any time opinion changes, the Post Office stands ready to make foresight or philanthropy easy. Though no great results have been achieved, a machinery has been established which works with perfect smoothness, and which may some day be of service to the nation.*

VI. Marine Insurance

*Marine insurance long antedates the kindred businesses of fire and life insurance. Villani, a 14th-century Florentine historian, speaks of marine insurance as having History. originated in Lombardy in 1182. This proves, at least, that in his day it was no novelty. It is mentioned in a * Pisan ordinance of 13 18, and in Venetian public documents of the early years of the 15th century. The earliest form of policy known is that given in the Florentine statute of 1523. It is uncertain whether insurance was introduced into England directly from Italy or by way of Flanders. The earliest policies issued in England which have yet been discovered are in Italian, but the subscriptions are in English (" Santa Maria di Venetia," Cadiz to London, 1547, " Santa Maria de Porto Salvo," Hampton to Messina, 1548).*

MARINE INSURANCE]

The earliest known policies in English are one of 1555 on the " Sancta Crux " " from any porte of the Isles of Indea of Calicut unto Lixborne," and one of 1557 on the " Ele " from Velis Maliga to Antwerp. The authority for this statement is Mr R. G. Marsden, who edited for the Selden Society the records of the Admiralty Court; nothing earlier had been found at the Record Office down to May 1907. In the " Sancta Crux " policy there is no detailed statement of perils insured against, or of risks undertaken by the underwriter; the whole obligation of the underwriter to the assured is embodied in the following words: " We will that this assurans shall be so strong and good as the most ample writinge of assurans, which is used to be maid in the strete of London, or in the burse of Andwerp, or in any other forme that shulde have more force." This reference to Antwerp usage is 67 years before the date of C. Malynes' statement that all Antwerp policies contained a clause providing that they should in all things be the same as policies made in Lombard Street of London. The wording of the English policies written in Italian is very much simpler than the Florentine form of 1523, from which it almost seems that the wording used in England followed an earlier Italian form. But even the Italian policies in the two " Santa Marias " mention the uses and customs of " questa strada Lombarda di Londra " as the standard of the assurance they afford. The next most ancient policy we possess is dated 1613; it covers goods on the " Tiger " from London to " Zante, Petrasse and Saphalonia." The " Tiger " policy is interesting in another connexion. It recalls Shakespeare's Macbeth- I. iii. 7 (written about 1605) : —

" Her husband's to Aleppo gone, master of the 'Tiger.' "

Clark & Wright's note (in the " Clarendon Press " series edition) cites Sir Kenelm Digby's journal of 1628 mentioning " the ' Tyger ' of London going for Scanderone " (Alexandretta). Hakluyt {Voyages) gives letters and journals of a voyage of the " Tyger of London " to Tripolis in 1583. Shakespeare again mentions a ship called the " Tiger " in Twelfth Night, V. iii. 63: —

" And this is he that did the ' Tiger ' board."

The policy by the " Tiger " is much more ample than any of those already mentioned; it details the perils insured against in words closely resembling the Florentine formula of 1523, and differing only

slightly from the form adopted by Lloyd's at a general meeting held in 1779, and afterwards incorporated in the Sea Insurance Stamp Act of 1795, which is the stem form of all modern British and American marine insurance policies.

While the form of the insurance policy was thus developing, there was a singular absence of legislation (and, as far as we can yet trace, of litigation) on the subject. Till 1601 differences seem to have been generally settled by arbitration. This accounts for the poverty of the British Admiralty records in matters of marine insurance. In 1601 a special tribunal was established by statute for summary trial of disputes arising on insurance policies; but, owing mainly to the opposition of the common-law judges, the new court languished, and by 1720 it had fallen into utter disuse. J. A. Park states that not more than sixty insurance cases were reported between 1603 and 1756. Consequently, when Lord Mansheld came to the court of king's bench in the latter year, he found a clear field. He practically created the insurance law of England. He made use of all the continental ordinances and codes extant in his day, taking his legal principles largely from them; the customs of trade he learnt from mercantile special jurors. Subsequent legislation referred solely to the prohibiting of certain insurances (wager policies, &c), the naming in the policy of parties interested therein, and the stamp duty levied on marine insurances. In 1894 Lord Herschell introduced his Marine Insurance Bill, which endeavoured " to reproduce as exactly as possible the existing law relating to marine insurance." After Lord Herschell's death, Lord Chancellor Halsbury took up the Dill, introducing it in the House of Lords in 1899 and again in 1900; he appointed a committee on which underwriters, shipowners and average adjusters were represented, and, presiding himself, went through the bill with them clause by clause. The bill was then passed by the Lords, but was always blocked in the House of Commons till 1906, when it was taken up by Lord Chancellor Loreburn in conjunction with Lord Halsbury. After some amendment and modification it was finally passed by both Houses and became law on the 1st of January 1907 (6 Ed. VII., c. 41).' In America a less happy fate has attended the insurance code, forming part of the proposed civil code of New York, completed and published in 1865, of which a very slightly altered version was adopted in California and has been in effect there since the 1st of January 1873. On the continent of Europe legislation at first took the form of local ordinances of commercial cities, such as Barcelona (1434-1484), Florence (1523), Burgos (1538), Bilbao (1560), Middelburg (1600), Rotterdam (1604-1655). In the third quarter of the 16th century Rouen produced a

handy guide to marine insurance, Le Guidon de la mer; and in 1656

1 An important addition to the marine insurance law of the United Kingdom was made by the Marine Insurance (Gambling Policies) Act 1909, which made void policies taken out by persons uninterested in ships or cargo, who only gain by the loss of the vessel. Such policies are known as " policies proof of interest " (P.P.I.).

Etienne Cleirac published there his Vs et coutumes de la -mer. This was followed in 1681 by the Ordonnance de la marine, which, through Lord Mansfield, had a great effect on English case law. In 1807 France produced the Code de commerce, on the model of which nearly every European nation has issued a similar code. Probably the " best considered " (Willes, J.) of these, and the most adequate as regards marine insurance, is that of the German empire; but Hamburg and Bremen still preserve many of their local conditions by special contract in their policies. In fact it is doubtful whether the German Code could have been produced without the previous elaboration of the Conditions of Hamburg and of Bremen. The Hamburg Conditions of 1847, revised 1867, constitute an admirable compendium of marine insurance as practised in that city.

Marine insurance being peculiarly an international business, being a factor in 95 % of the operations of oversea trade, it is natural that those engaged in this business or making use of marine _.

insurance in their business should experience the diffi- J°" ° culty and hardship arising from the differences between the marine insurance law of different states, and should attempt to find a remedy. Such an attempt was made at the Buffalo conference of the International Law Association in 1899 to prepare a body of rules dealing with those parts of marine insurance on which the laws of maritime countries differ. This undertaking was of the same nature as the earlier efforts of the same association which resulted in the formulation of the York-Antwerp rules of general average. There are four important subjects on which great divergence prevails: (a) Constructive total loss; (b) Deductions from costs of repairs, new from old; (c) Effect of unseaworthiness and negligence; (d) Double insurance.

(a) Constructive total loss results, according to the law of France, Italy, Spain, Belgium, Holland, in case of loss or deterioration of the things insured amounting to not less than three-quarters; in German law a ship is considered to be " unworthy of repair "when the cost of the repair, without deductions new for old, would amount to over three-fourths of the ship's former value (no similar provision seems

to exist in Germany for goods); in the law of America a damage over 50% of the value of the vessel when repaired is a con- ‘ structive total loss of the vessel, in case of the policy containing no express provision to the contrary. None of these varying systems appears to be so equitable to all concerned as the British rule, which was for this reason suggested to the Buffalo conference for inter- national adoption. As regards the time when the test for constructive total loss should be applied, it was suggested to reject the British rule, prescribing that it shall be the time of commencing action against underwriters, and to adopt the continental and American rule re- ferring to the facts as they existed at the time of abandonment. Then, as respects the effect of a valid abandonment on the rights in the property insured, the conference proposed to adopt the British and American rule of making the abandonment refer back to the time of the loss, as against the continental European system of making the transfer operative only from the date of the notice of abandonment. Finally, as to the freight of a properly-abandoned ship, it was proposed to follow for international purposes the American rule of dividing the freight of the voyage between shipowner and underwriter in the proportion of the distances run before the disaster and to be run thereafter, rejecting the British rule of complete’ transfer to the underwriter and the various continental rules of proportional division between shipowner and underwriter.

(0) It was proposed to adopt the deductions set forth in the York-Antwerp rules as being suitable for international adoption in marine insurance contracts.

(c) As regards unseaworthiness and its effect on insurances on ships and goods, it was proposed in the case of ships to reduce materially the obligations of the insured as required by English and American law; to diminish the requirement from the absolute attainment of seaworthiness to the mere exercise of all reasonable care to make the vessel seaworthy. Even this attenuation did not appear sufficient, as it was proposed to degrade the performance of the already minimized warranty from being a condition of the insurance, and its non-performance from invalidating the policy. As to goods, they were proposed to be exempted from any warranty of seaworthiness of ship. Concerning negligence, it was proposed to hold the underwriter liable (subject to the new seaworthiness warranty) for any loss caused proximately by a peril insured against, although wholly or partly the result of the neglect of the insured, or his servants or agents, or by the wilful act of his servants or agents, or the inherent nature or unsoundness of the article insuredˆ id) In case of double or multiple insurance, the conference proposed to adopt the British rule

of making all the policies effectual, inde- pendently of the order in which they were effected, arid of making all the underwriters entitled to contributions inter se. As regards the premium, it was proposed that no premium should be returnable, where the risk has attached.

With the exception of those embodying the two suggestions named in par. (a), all tne resolutions proposed were accepted by the conference. But it appears extremely unlikely that British and American underwriters will voluntarily consent to the practical annihilation of the seaworthiness warranty, and no less improbable that American and continental assured will voluntarily accept the stricter rule of constructive total loss embodied in English law, when their national

law enforces on the underwriter terms more favourable to the assured. The fewness of the international insurance markets of the world diminishes the need for uniform international regulations in this matter. The matter may be one for adjustment by variation in the rate of premium, but this is not certain.

The Glasgow conference of 1901 adopted the rules, after excepting time policies from the scope of the rule respecting seaworthiness. The rules are known as the Glasgow Marine Insurance Rules. The writer knows of no instance in which they have been adopted in practice.

Returning to marine insurance in the United Kingdom, it is to be observed that the passing of the Marine Insurance Act of 1906 sharply marks an important change in the nature of the law of the subject. Till then it was based almost entirely on common law, only a few disconnected points having been dealt with by statute. The reported cases were thus of great importance, and being about 2000 in number (teste Sir M. D. Chalmers) were not easy to master. No doubt many of them referred to commercial conditions no longer prevalent ; still they could not be entirely ignored. But the original introducer of the bill described it as an endeavour " to reproduce as exactly as possible the existing law relating to marine insurance," and as by being made law the language of the act has become authoritative, insured and insurers have now no call to go behind the wording of the act in any matter with which it deals. It thus appears that the case law of the subject existing before the 1st of January 1907 may be left aside, unless, perhaps, for use as affording examples of the way in which the provisions of the act work.

A contract of marine insurance is a contract of indemnity

whereby the insurer undertakes to indemnify the insured, in

*r. *. u, the manner and to the extent agreed, against marine Deftnltloa. , ... ■ . °*

losses, i.e. the losses incident to marine adventure.

The contract may by its express terms or by usage be extended to cover risks on inland waters or land risks incidental to any sea voyage. There is a " maritime adventure," where any ship, goods or other movables are exposed to maritime perils, such property being termed " insurable property "; also where the earning of any freight, hire or other pecuniary profit or benefit, or the security for any loan or expenditure, is endangered by the exposure of insurable property to maritime perils; and where any liability to a third party may be incurred by the person interested in or responsible for insurable property by reason of its exposure to maritime perils. By " maritime perils " are meant the perils consequent on or incidental to the navigation of the sea, i.e. perils of the seas, fire, war perils, pirates, rovers, thieves, captures, seizures and restraints, and detainments of princes and peoples, jettisons, barratry, and any other perils, either of the like kind or which may be designated by the policy.

The contract being one of indemnity against maritime perils, it is evident that no one can derive benefit from it who has not some interest exposed to these perils. Consequently while, subject to the provisions of the act, every lawful marine adventure may be insured, all contracts of marine insurance are void when (1) the assured has no insurable interest, and has entered into the contract without expectation of acquiring such interest; (2) when the policy is a " wager " policy, being made " interest or no interest," " without further proof of interest than the policy itself," " without benefit of salvage to the insurer," or subject to any similar terms. But if there is no possibility of salvage a policy " without benefit of salvage to the insurer " is legally valid. Wager policies are illegal only in the sense of being void to all legal purposes. They cannot be sued upon, hence they are known as " honour " policies. They are of frequent use, generally for the protection of interests which, though real, are not easily defined, or are of pecuniary value hard to determine. But they are ignored by the courts. The essential of insurable interest is the pecuniary advantage seen at the time of insurance as arising to the assured from the safety or due arrival of the adventure, or the pecuniary disadvantage similarly arising from its loss or

deterioration. But such interest may lapse before arrival or destruction of the venture, and with the interest lapses the right of the assured to recover from the underwriter. Without interest at the time of the loss there is no right to recover from the underwriter. Should the assured simply transfer his interest to another, e.g. by sale, he can assign his policy to the party who acquires his interest — unless, of course, the policy contains terms expressly prohibiting assignment. The customary form of assignment is endorsement of the policy either in blank or to a specified party. Within the limits already named, interests are insurable whether complete or partial, de- feasible or contingent ; similarly loans on bottomry or respondentia, advance freight not repayable in case of loss, charges of insurance, also shipmaster's, officers' and seamen's wages.

The owner of insurable property may insure its full value even though some third party have agreed or become liable to in- demnify him in case of loss: a mortgagor has the same right of

[MARINE INSURANCE

insuring to full value; while a mortgagee may insure only up to the sum due or to become due to him under the mortgage, unless themortgagee is insuring forthe benefit of the mortgagor as well as for himself, in which case, even though he insure in his own name only, he may insure up to the full value. A consignee may insure in his own "name the total amount of his interest and that of others for whose benefit he insures. Where no special contract is made between insured and underwriter, the insurable value of certain matters of insurance is ascertained as follows: — Ship — Her value at the commencement of the risk, including outfit, provisions, stores, advances of wages, and any other outlays expended to make the ship fit for the voyage cr period of navigation covered, plus cost of insurance upon the whole. In the case of a steamship, the word " ship " includes machinery, boilers, coals and engine stores. In the case of a vessel engaged in a special trade, the word " ship " includes the ordinary fittings necessary for that trade. Freight (whether paid in advance or not) — The gross amount of freight at the risk of the assured, plus cost of insurance. Goods — The prime cost, plus expenses of and incidental to shipping and cost of insurance. Other interests — The amount at the insured's risk when the policy attaches, plus cost of insurance.

To be admissible in evidence a contract of marine insurance must be embodied in a document called a policy, which must specify the name of the assured (or of his agent in the effecting of the policy),

the objects insured, and the risk insured against, the voyage or time (or both) covered, the sum insured, the name of the assurers. The signature of the assurer is necessary; it is found at the end of the policy, and the assurer is often on this account called the underwriter. The objects insured must be designated with reasonable certainty, regard being had to customary usage. The undertaking to insure is usually ex- pressed by saying that the insured or his agent " doth make assurance and cause himself to be insured." The risks are either the whole body of maritime perils detailed above, or any one or set of these, or any other named peril against which the assured desires protection. There is no restriction by law of the length of voyage that may be insured, but time policies are, subject to the Finance Act 1901, invalid if made for more than one year; a voyage and a period of time may be covered on one policy. Policies are classed as " time " or " voyage " policies. It is not necessary to state in the policy the value of the objects insured, but generally the value is given; policies are therefore classed as " valued " or " unvalued," the latter being often called " open " policies. The values of objects insured under open or unvalued policies are the insurable values given above. As it frequently happens that merchants desire to have all their shipments of whatever nature Covered, by whatever vessel they may come, they require insurance in general terms; such a policy is termed a " floating " policy. It states the limits of voyage and value covered by the underwriter, and the class of ships to be employed. The particulars of each shipment are declared as the shipments occur, and in the order of despatch or shipment, the declarations being usually endorsed on the policy. All shipments within the terms of the policy must be declared at their honest value, or in accordance with the special provisions of the policy, if any. An omission or erroneous declaration may be corrected even after loss or arrival, provided it was made in good faith.

The consideration paid by the insured to the underwriter in return for the protection granted by the latter is called the premium. Until payment be made or tendered the policy is not ordinarily issuable, i.e. unless otherwise agreed. When the insured effects insurance with an underwriter through a broker, then, unless other- wise agreed, the broker is liable for the premium to the underwriter, who is, however, directly responsible to the assured for losses or liabilities falling on the policy and for returnable premium. But the broker has a lien on the policy for the premium and for his brokerage, and in case he has had dealings as a principal with the insured, he has a lien on the policy for any balance due to himself in insurance transactions, unless he should have known that in these transactions the insured

was merely an agent. Some policy forms state definitely that the premium has been paid ; when such a form is used and no fraud is proved, this receipt is binding between assured and underwriter, but not between broker and underwriter. If an insurance is effected at a premium " to be arranged," and no

arrangement is made, then a reasonable premium is payable. The same holds where additional premiums have to be charged at a rate to be arranged and no arrangement is made.

It is evident that in nearly all the particulars of any adventure insured by an underwriter he is entirely dependent upon the insured for correct information. It is therefore the law that an insurance contract can be avoided and broken by either of the parties to it if the utmost good faith {uberrima fides) be not observed by the other. The obligation of perfect good faith is thus made reciprocal. Bad faith may show itself either in concealment or in misrepresentation. It is therefore made essential to the stability of any insurance contract that the insured must disclose before conclusion of the contract every material circumstance known by him, failing which the underwriter may avoid the contract. The insured is deemed to know every circumstance which in the ordinary course of business ought to be known by him. Every circumstance is deemed material which would influence the underwriter in his decision as to acceptance of the risk or the fixing of the rate of premium. Consequently the insured is not bound, unless specially asked by the underwriter, to disclose the favourable features of the risk offered, or matters known or presumably known by the underwriter (matters which are of common knowledge, and such as an underwriter ought in his usual business to be aware of), or matters respecting which the under- writer waives or declines information, or which any express or implied warranty renders superfluous. An agent effecting an in- surance must, in addition to his principal's material knowledge, disclose everything material known to himself, or that he should know in the ordinary conduct of his business. Every representation of material fact made to an underwriter before conclusion of a contract by the insured or his agent must be true, or the underwriter may avoid the contract. Every representation is material which would influence the underwriter in his decision as to acceptance of the risk or to fixing

the rate of premium. A representation of fact is regarded as true if it be substantially correct ; literal correct- ness is not essential. A representation of expectation or belief is true if it is made in good faith. A representation may be withdrawn or corrected before the contract is concluded. The contract is deemed to be concluded when the underwriter accepts the risk, whether the policy be then issued or not.

It frequently happens that before a vessel has completed the venture on which she is engaged arrangements have already been

made for her future employment. Where a vessel is insured. insured on time, this is of no moment as respects her

insurance. It has likewise been decided that where any insurable object is covered by a voyage policy " from " or " at and from " a named place, the policy is not rendered invalid by her not being at that place when the insurance is concluded; but, on the other hand, there is an implied condition that she will begin the venture within a reasonable time, and that if she fails in this the underwriter may avoid the contract. If the delay springs from circumstances known to the underwriter at the time of conclusion of the contract, or if the underwriter then ac- quiesces in it, the implied condition is nullified. If the insured abandons the venture insured, the contract expires; e.g. if, before the risk commences, the vessel's destination is changed to one not covered by the policy. Where the policy specifies a place of departure, and the ship does not sail from that place, the risk does not attach. If, however, the vessel actually starts from her intended port of departure, and commences the venture, and thereafter it is decided to change her destination, this decision constitutes a change of voyage. In default of provision to the contrary, the underwriter may elect to avoid his insurance from the time of that decision, although the ship be still in the course she would have followed in her originally intended venture.

Should a ship depart from the proper course of the voyage she starts upon, and for which she is insured, such departure, when made without lawful excuse or justification, is termed deviation. From the moment it occurs, even though she subsequently return to her proper course without loss or injury, the underwriter may avoid his contract ; but the mere intention to deviate is immaterial. Deviation occurs (1) when in a policy a course is definitely specified and the vessel departs from it ; (2) when, in absence of such definite specifica- tion in the policy, the vessel departs from the course usually and customarily followed in the voyage insured. If a policy provides for

several named ports of discharge, the vessel may, without com- mitting deviation, omit to proceed to one or more; but whether she goes to all or to some she must (in absence of usage or sufficient cause to the contrary) take them in the order in which they appear in the policy, if not there is a deviation. If the policy provides for " ports of discharge " in a given district, then (in absence of usage or sufficient cause to the contrary) unless the vessel proceeds to them

Warran- ties.

in their geographical order she makes a deviation. Similarly, in the case of a voyage policy, the want of reasonable despatch throughout, unless lawful excuse or justification exists, entitles the underwriter to avoid the contract from the time that the delay becomes un- reasonable. As excuses for deviation or delay on the voyage con- templated by the policy, the following are regarded as valid : authorization by licence or other provision in the policy , force majeure, compliance with express or implied conditions of the policy (e.g. warranties, see below), reasonable steps taken for the safety of the ship or other objects insured, saving life, helping a ship in such distress that life may be in danger, or obtaining medical or surgical aid for some person on board. If barratry is insured against, delay arising from barratrous conduct of master or crew does not avoid the policy. A deviation ceases to be excusable unless the ship resumes her proper course and proceeds on her voyage with reasonable- promptitude after the cause of the excusable deviation or delay ceases to be effective.

In every contract of insurance there are certain conditions precedent to the liability of the underwriter and incumbent on the insured, which must be fully and literally complied with, whether material to the risk or not. These conditions are known in insurance as warranties. The name is unfortunate, as in every other branch of the law of con- tract it bears another meaning; still it is convenient, and its insurance signification is now firmly established. Failure on the part of the insured to fulfil a warranty literally entitles the under- writer to avoid his contract as from the moment of breach, 1 but it does not limit his obligation up to that moment. Breach of warranty is not nullified by subsequent remedy of the breach, consequently loss occurring after breach of warranty is not at the charge of the underwriter, even although before the loss the insured has again complied with the warranty. But breach of warranty may be waived by the insurer. Breach of warranty is excused in two cases only: (a) when by change of circum- stances the warranty ceases to be applicable to the contract, (b) when by subsequent legislation the

warranty becomes unlawful.

Warranties are of two classes: (1) express (2) implied. Express warranties must be written or printed on the policy, or contained in some document explicitly referred to in the policy, and so regarded as incorporated in the contract. No special form of words is essential to the validity of a warranty if the intention to warrant can be inferred. Express warranties may refer to anything which the parties to the contract choose, e.g. the nationality of the vessel, her sailing on a named day, proceeding under convoy, being excluded from certain voyages or trades or the carriage of certain cargoes, being " well " or " in good safety " on a named day (in which case the warranty is fulfilled if she be safe at any time of that day). As regards nationality, if no express warranty be given there is no undertaking on the part of the insured that the vessel is of any particular nationality or that she will not change it while the risk lasts. The warranty of neutrality in case of insurance of ship or goods means that at the beginning of the risk the property concerned is actually neutral, and that as far as the insured can control the matter it shall so continue during the whole course of the risk. It is also an implied condition of the ship being warranted neutral that to the utmost of the insured's power she must carry the papers necessary to establish her neutrality, must not falsify or suppress these papers, or use simulated papers; if this condition is broken the insurer can avoid the contract. The words of an express warranty are always to be taken in their commercial sense; within that sense they are to be strictly and literally taken. An " express " warranty does not exclude an " implied " warranty (see below) unless it be inconsistent therewith.

In addition to these expressed conditions, there are also certain essential factors or conditions inherent in each and every contract of marine insurance without exception ; these are implied warranties, which are presumed from the very fact of the making of the insurance. They are (a) completion of the prescribed venture without deviation, (b) legality of the venture (viz. that the adventure insured is a lawful one, and that,- so far as the insured can control it, it shall be carriecl, out in a lawful manner), (c) seaworthiness of the ship. In a voyage policy it is an implied warranty that at the commencement of the voyage the ship shall be seaworthy for the particular venture insured. If the risk commences when the ship is in port, then she must in addition be reasonably fit to stand the ordinary dangers of the port. If the voyage insured is one in which different degrees of peril are to be encountered, or for which the ship needs different kinds of outfit at different stages, then she must be seaworthy for each stage

at

1 Lord Mansfield expressed it: " The warranty in a contract of insurance is a condition or a contingency, and unless that be performed there is no contract " (Hibbert v. Pigou, apud Marshall, 3rd ed., p. 375)-

its commencement, and the warranty will be fulfilled if she is at the beginning of each stage seaworthy for that stage. The warranty of seaworthiness is held to be fulfilled when the ship is reasonably fit in every respect to meet the ordinary marine dangers of the venture insured ; that is to say, the mere loss of a vessel by perils of the sea is not a proof of unseaworthiness in the sense of this warranty. The only ship policies not subject to the warranty of seaworthiness are policies on time (the reason given being that there is nothing to prevent a time policy lapsing and a new one commencing when the vessel is at sea beyond her owner's control as to seaworthiness) ; but where the insured knowingly sends a ship to sea in an unfit state and a loss is attributable to that unseaworthiness, the underwriter is not liable for such loss. It is not implied in a policy on goods or movables that these goods, &c, are seaworthy, but it is implied that at the beginning of the voyage the carrying vessel is not only sea- worthy as a ship but reasonably fit to carry the goods to the destina- tion named. in the policy.

When the main points of the preceding particulars of the contract of insurance are summarized it may be said that the transaction is (1) a contract of indemnity reduced to written or printed words, (2) made in good faith, (.3) referring to a defined proportion or amount, (4) of a genuine interest in a named object, (5) being against contingencies definitely expressed, to which that object is actually exposed, and (6) in return for a fixed and determined consideration.

It may happen by accident or by design that an insurance object has been covered twice or more times, and that in con- sequence the sum of the insurance effected exceeds the fnsuraace. vame m the policy or the insurable value, if an un- valued policy has been employed. This occurrence involves a new set of relations between the insured and his various underwriters; the underwriters themselves are brought

into relation to one another. As regards the insured, he may, in the absence of agreement to the contrary, claim payment from whomsoever of the underwriters he may select, but he is not entitled to receive in all more than his proper indemnity. Each underwriter, whether his policy be valued or unvalued, is entitled to receive credit for his proper proportion of the sum obtained by the insured under any other policy. If the insured does obtain any sum in excess of indemnity, he is regarded as holding it in trust for his whole body of underwriters. It thus appears that in case of multiple insurance each underwriter is bound, as between himself and the other underwriters, to contribute to the loss rateably in proportion to the amount of his liability under the policy; and if any one pays more than his proper share, he is entitled to sue the rest for contribution. Should the insured get any of his premium back? It would not be equitable to enforce a return from any underwriter who has at any time stood alone so as to be liable to the full extent of his policy; but if overlapping policies were accidentally effected all at the same time, the case is rather different. This leads to the general question of return of premium. Such return may be claimed under the terms of the policy, in which case the claim for return is simply the carrying out of the agreement between the parties; it may refer to the whole or to a part of the interest insured. But there are other circumstances in which returns can legally be claimed. For instance, it may turn out that interest insured by a particular vessel and for a particular voyage is never shipped in that vessel for that voyage; the underwriter has in this case run no risk, and therefore the consideration for which he received the premium totally fails, and the premium is properly returnable to the intending insured, unless there has been fraud or illegality on the part of the insured. Similarly, in the case of part of the interest insured on a policy, if that part is distinguishable in the policy or by custom of trade. But the interest might have made the voyage in the vessel, and the intending insured might yet remain without insurable interest. In this case, in absence of fraud or illegality, and if the policy is not merely a gaming or wagering contract, the insured is entitled to return of his premium. Similarly, in the absence of fraud or illegality, if the underwriter legally voids his policy from the beginning of the risk; as he runs no risk, he receives no premium. The only cases, except those of fraud and illegality, in which the underwriter can retain his premium without running risk, are those of risks underwritten " lost or not lost," and

Total loss.

arrived safely without the underwriter's knowledge, in which the

underwriter takes his chance as to the condition and situation of the ship when he assumes the risk. But this is practically a case of agreement that there shall be no return.

When the insured has overinsured on an unvalued policy, a proportionate part of the premium is returnable. But where double insurance has been knowingly effected by the insured or any earlier policy has at any time borne the entire risk or a claim has been paid on a policy in respect of its full value, no premium is returnable.

The policy issued by the underwriter to the insured makes mention of certain perils against which the insurance is granted, and unless the policy otherwise provides, the underwriter is liable for any loss proximately caused by any of these perils, but is not liable for any loss not proximately caused by a peril insured against. He is not responsible for any loss due to the wilful misconduct of the insured but, unless the policy other- wise provides, he is liable for any loss proximately caused by a peril insured against even though it would not have happened but for the misconduct or negligence of master or crew. Nor is he responsible for any loss caused by delay, although the delay be caused by a peril insured against; nor for ordinary wear and tear, ordinary leakage or breakage, inherent vice or character of objects insured, loss from rats or vermin, or injury to machinery not proximately caused by sea-perils.

Losses are divided into " total " and " partial." A " total " loss may be (1) actual, or (2) constructive; and an insurance against total loss covers the insured against both, unless a different intention appears from the terms of the policy. It is an " actual " total loss when the object insured is destroyed or damaged so as to cease to be of the denomination of goods to which it belonged when insured, or when the insured is irretrievably de- prived of the property insured. In the case of an actual total loss no notice of abandonment need be given. In the case of a missing ship after the lapse of a reasonable time without news, an " actual " total loss may be presumed. There is a " constructive " total loss when the interest insured has been abandoned on account of what appears inevitable actual total loss, or because the cost of preventing such loss would exceed the value after such expenditure. E.g. if ship or merchandise is in such a position that recovery is unlikely or the cost of recovery would exceed the value recovered, there is con- . structive total loss; likewise in the case of a damaged ship, if the cost of repair would exceed the repaired value of the ship. (In making the estimate of cost of repairs no deduction is to be made for the share of them payable in general average by other interests, but account is to be taken of

*the cost of later salvage operations and of the ship's proportion of any later general averages.) Similarly for damaged goods, there is constructive total loss if the cost of repair and of forwarding to destination exceeds the arrived value. The insured may either treat constructive total loss as a partial loss or as an actual total loss, in which latter case he abandons his insured interest to the underwriter. If he decides to Abandonˆ abandon he must give notice of abandonment, else he will msn *- recover only for a partial loss. This notice may be wholly or partly written or oral, and in any terms if only they indicate the intention to transfer unconditionally all interest to the underwriter. The refusal of abandonment by the underwriter does not prejudice the assured's rights. Abandonment may either be expressly accepted by the underwriter or may be implied from his conduct, but his mere silence does not imply acceptance. When notice is accepted, abandonment is irrevocable. Notice may be waived by the under- writer. Notice is unnecessary where, when the news reaches the insured, there would be no benefit to the underwriter if notice were given to him. On valid abandonment the underwriter adopts the interest of the insured in the subject insured, or what remains of it, and all incidental proprietary rights, e.g. in the case of a ship he is entitled to any freight in the course of being earned and which is earned by her subsequent to the accident causing the loss, less the expenses incurred after the accident ; and if the cargo is on owner's account, the underwriter is entitled to reasonable freight from the, place of casualty to destination.*

Any loss other than a total loss, as defined and described above, is a " partial " loss. As such are classed general average, salvage charges, particular average, particular charges. " General average " is really an outlying branch of the law of affreightment (see Average and Affreightment): its connexion with insurance is merely secondary, arising out of the underwriter's contract to pay losses generally and this special liability in accordance with definite provisions of the policy. Any extraordinary sacrifice or expenditure voluntarily and reasonably made in a moment of peril in order to preserve General all the property in the venture, is a general average act ave ge ' and the loss arising therefrom is a general average loss. The party

Partial loss.

MARINE INSURANCE]

INSURANCE

Salvage charges.

on whom it falls is entitled to a rateable contribution from the others. These rateable contributions are repayable by the respective under- writers subject to the special provisions of their policies, unless the sacrifice or expenditure was made to avert a peril not covered by the policies, when there is no liability. The party originally incurring a general average sacrifice may recover from his underwriter the whole loss without having enforced his right of contribution from the others concerned in the venture. When ship, freight and cargo, or any two of them, belong to one person, the underwriter's liability is determined as' if these interests were each owned by separate persons. " Salvage charges " are the charges recoverable under maritime law by a salvor independently of contract : if incurred in averting perils insured against, and if not otherwise provided in the policy, they are recovered as a loss from these perils. The cost of similar services of the insured or his agents or hired employees are recovered as a general average loss when the cost fulfils the character of general average expenditure, or in all other cases as " particular charges," Thus all expenses Particular ˆ or on behalf f tne ; nsurec i to save or preserve the average. interest insured are either general average, salvage charges or particular charges. Particular charges are not included in " par- ticular average," which may now be defined as a partial loss of the subject insured, caused by a peril insured against, and not being a general average loss.

The nature of the liability for loss of the underwriter having been determined, it remains to fix its extent, or in other words the " measure of indemnity"; each underwriter bears that ™ ea j" proportion of the loss which his subscription bears in the of indent- case Q f a va] uec] policy to the insured value, and in the case " y ' of an unvalued policy to the insurable value. In the case

of a total loss, the measure of indemnity is the sum fixed by the policy if valued, or the insurable value of the object insured if the policy be unvalued. When the insured fails in an action for total loss, he is not precluded from recovering a partial loss if the policy insures him against partial loss. In the case of damage to a ship not amounting to a total loss the insured is, subject to the terms of his policy, entitled to recover the reasonable cost of repairs less customary deductions, but not exceeding for any one casualty the sum insured. If the repairs are only partial he is in addition entitled to an allowance for unrepaired damage, but the aggregate must not exceed the cost of complete repairs, less customary deductions. If the

damaged ship has neither been repaired nor sold during the risk, the insured is entitled to reasonable depreciation but not exceeding the reasonable cost of repairs, less customary deductions. As regards freight, the underwriter's liability for partial loss is, subject to the terms of the policy, the proportion of the policy value, or (in case of an unvalued policy) of the insurable value, which the freight lost bears to the whole freight at risk of the insured under the policy. When there is liability under a policy for total loss of part of the goods insured its amount is determined as follows: on an unvalued policy, it is the insurable value of the portion lost, ascertained as in case of total loss; on a valued policy, it is the proportion of the sum insured which the insurable value of the portion lost bears to that of the whole. Subject to any express provision of the policy, when goods are delivered at destination damaged throughout or in part, the liability is for the same proportion of the sum insured (or, in an unvalued policy, of the insurable value) that the difference between gross sound and gross damaged values at destination bears to the gross sound value there. Gross sound value means the wholesale price including freight, landing charges and duty; gross damaged value means the actual price obtained at a sale when all charges on sale are paid by the sellers. In case of goods customarily sold in bond, the bonded price is taken to be the gross value. When different kinds of property are insured under a single valuation, that valuation is apportioned over them in proportion to the respective insurable values they would have on an unvalued policy, but when the prime cost cannot be ascertained the division is made over the net arrived sound values of the different kinds of property. The liability for general average contribution and salvage charges is, for anything insured for its full contributing value, the full amount of the contribution; but in case of insurance not attaining the full contributing value there is a reduction in proportion to the under insurance; and where a particular average is payable on the contributing goods, its amount must be deducted from the insured value when the underwriter's liability is being ascertained. On policies covering liabilities to third parties, the measure of indemnity, subject to the condition of the policy, is the amount paid or payable to the third party. When property is insured " free of particular average " (f.p.a.), then unless the policy is apportionable, as above, there is no liability for loss of part with exception of loss of part occasioned by a general average sacrifice, but there is liability for total loss of an apportionable part. The underwriter on f.p.a. terms is liable for salvage charges, particular charges and charges incurred under the " sue and labour " clause of the policy to avert a loss insured against. Unless otherwise provided in the policy when

goods are insured f.p.a. under a certain named percentage, a general average loss cannot be added to a particular average loss to make up the specified percentage; nor may particular charges nor the expenses of ascertaining and proving the loss; in fact only the actual loss suffered by the object insured may be taken into account The engagement evidenced by

F.P.A. liabili- ties.

the " sue and labour " clause of a policy is regarded as supplementary to the contract of insurance, and the expenses incurred under it are recoverable from the underwriter, even if he has paid a total loss or has insured the goods f.p.a. with or without any franchise being specified. General average losses and contributions are not " sue and labour " expenses, nor are salvage charges, as defined above. The expenses of averting a loss not covered by the policy cannot be recovered under the " sue and labour " clause. The Marine Insurance Act specially declares that " It is the duty of the insured and his agents, in all cases, to take such measures as may be reasonable for the purpose of averting or minimizing a loss."

Unless otherwise provided, and subject to the provisions of the law, the underwriter is liable for successive losses, even though their aggregate amount exceeds the sum insured. But where, under one policy, an unrepaired or uncompensated partial loss is followed by a total loss, the insured can only recover the total loss. These provisions do not affect the underwriter's liability under the " sue and labour " clause, for, as explained above, the " sue and labour " clause is a contract supplementary to the insurance contract con- tained in the policy.

The payment of a total loss of the whole or of an apportionable portion of the object insured entitles the underwriter to take over the insured's interest in all that remains of the same, the underwriter becoming subrogated to all the ~""" .S' a " rights and remedies of the insured in and regarding °"' the interest insured as from the time of the accident oc- casioning the loss. The payment of a partial loss gives the under- writer a similar subrogation but only in so far as the insured has been indemnified in accordance with law by such payment for the loss.

In case of double (or multiple) insurance each underwriter is bound to contribute, as between himself and the other underwriters, rateably to loss in proportion to the amount for which his policy

makes him liable; for any excess of this Co ” ,s <"- amount he may maintain action against the coinsurers ance – and may obtain the same remedy as a surety who has paid more than his proportion of a debt.

Where the object is insured for less than the insurable value, as defined above, the insured is deemed to be his own underwriter for the balance. %

Recent extensions of marine insurance in England have mostly been in the direction of giving to shipowners protection against liabilities to third parties. The first addition was the running down clause (r.d.c.) by which underwriters take Liabili- burden of a proportion, usually three-quarters, of the damage inflicted on other vessels by collision for which the insured vessel is held to blame. The rapid increase in the use and size of steamships was accompanied by an equally rapid increase in the frequency of collisions at sea, tending to make the shipowner desirous of insuring himself against the balance of his collision liability, and against whatever other liabilities to third parties might be imposed upon him. There was a hesitation on the part of underwriters to meet these wante and the result is that in Great Britain most liability insurances are effected in mutual insurance societies. The insurance of such liabilities is perhaps simpler in Great Britain than in other countries, as the amount for which a shipowner can be liable is limited by law, although, of course, none but English tribunals are bound by that law. A new and extensive set of liabilities has been thrown on shipowners by the Workmen’s Com- pensation Act of 1906; the liabilities in this case vary with the wages of the workmen concerned. Another interesting class of insurances has received much attention, namely, those against the risks of capture, seizure and detention by a hostile power, generally described briefly as war risks. But the difficulties con- nected with such risks probably lie more in determining the legal position of the owners of the property, and the obligations under which they lie, than in settling those of their underwriters. Such questions concern blockade, contraband, domicile, nationality, neutrality, &c.

The usual procedure in the offer and acceptance of a risk is as follows: The intending insured (principal or broker) offers the risk by showing to the underwriter a brief description of the venture in question, called in Great Britain a slip, in Course ot America an application. The underwriter signifies his baslaess – acceptance of the whole or of a part of the value exposed to perils by signing or initialling the slip, putting down the amount for which he accepts

liability. Or he may sign and issue to the insured (principal or broker) a similar document made out in his own office, called a covering note or insurance note. These documents are simply first sketches of the contract, memoires pour servir, so im- perfect that they can be explained only in conjunction with the contract in its completed form (the policy). In America it is not at all rare for insurances to be effected through applications alone without any policy existing. In Great Britain the existence of a policy is essential, slips and covering notes being merely provisional agreements, binding in honour only, to issue policies on certain terms and conditions on receipt of the necessary information. One reason for insisting on a policy being issued for every risk is that a means of raising revenue by stamp taxes is thus created. In Great

Britain the stamp duties under the Stamp Act 1891 are as follows : —

Where the premium does not exceed | % of the

amount insured id.

Where the premium exceeds i % of amount insured : —

(a) On any voyage, per £100 or per any fractional

part of £100 id.

(b) For any time not exceeding six months, per

£100, &c, as above 3d.

(c) For any time exceeding six months, and not

exceeding twelve months, per £100, &c, as above 6d.

In consequence of this regulation, no time policy can be issued for a period exceeding twelve months. Policies or certificates of in- surance coming from abroad are subject to the same duties, which should be paid within ten days after receipt in the United Kingdom. The shortness of the time allowed for stamping often prevents payment. of the tax. These stamp regulations are very troublesome, and produce only a comparatively insignificant revenue. On small

premium insurances the tax is so excessive that it drives business out of the country. A uniform tax per policy has been several times suggested, but these proposals have not yet been accepted by the Treasury.

The documents required to establish a claim for total loss are: (1) Protest of master. (2) Set of bills of lading (endorsed if neces- sary, so as to be available to the underwriter). (3) Policy or certifi- cate of insurance (endorsed if necessary). (4) In the United States: Statement of loss in detail. In the United States certified copies of Nos. (1), (2), and (3) are taken; but as none of these copy-documents can transfer possession to the underwriter, there is necessary for that purpose another document, viz. (5) Bill of sale and abandon- ment with subrogation to underwriter — that is, an assignment of all interest to the underwriter. In the absence of the full set of bills of 'lading, a similar document should be taken in Great Britain, especially in all cases in which salvage operations are likely to be undertaken. Such a document handed to a salvage association or a manager of salvage (whether acting for shipowner or for under- writer) settles the ownership of salved goods, and ensures that any claim for salvage expenses will be sent directly to the underwriter. This is from the insured's point of view desirable, and it greatly simplifies the management of salvage cases. As a claim for total loss cannot extend beyond the full amount insured in the policy, it follows that the documents required to substantiate such a claim must be supplied to the underwriter free of charge.

For the substantiation of a claim for particular average the following documents are required: (1) Protest of master or log- book. (2) Set of bills of lading (cargo claims). (3) Policy or certificate of insurance (endorsed if necessary). (4) Certified state- ments in detail of actual cash value at destination of goods in damaged state, all charges paid. Certified statements in detail of sound value at destination of goods on same day, all charges paid. Or original vouchers of costs of repair of ship, all discounts, rebates, allowances and returns deducted. (5) In the United States, subrogation to underwriters of damaged goods.

Authorities. — E. K. Allen, Stamp Duties on Sea Insurances (2nd ed., London, 1903) ; Th. Andresen, Seeversicherung (Hamburg, 1888) ; Joseph Arnould, Treatise on the Law of Marine Insurance and Average (2 vols., 2nd edition, London, 1857); eighth edition by de Hart and Simey (London, 1909) ; Laurence R. Baily, Perils of the Seas (London, i860); William Barber, Principles of the Law of Insurance (San Francisco, 1887); W. G. Black, Digest of Decisions in Scottish Shipping Cases, 1865-1890 (Edinburgh, 1891); Sir M. D.

Chalmers and Douglas Owen, Marine Insurance Act 1906 (London, 1906) ; Alfred de Courcy, Commentaire des polices franchises d'assurances maritime; (2nd edition, Paris, 1888); E. L. de Hart and R. I. Simey, The Marine Insurance Act 1906 (London, 1907); R. R. Douglas, Index to Maritime Law Decisions (London, 1888); John Duer, Law and Practice of Marine Insurance (2 vols., New York, 1845, 1846); William Gow, Marine Insurance (3rd corrected edition, London, 1909); Victor Jacobs, Etude sur les assurances marilimes et les avaries ({Brussels, 1885); Richard Lowndes, Practical Treatise on the Law of Marine Insurance (2nd edition, London, 1885) ; Law of General Average, English and Foreign (4th edition, London, 1888) ; Charles M'Arthur, Contract of Marine Insurance (2nd edition, London, 1890); D. Maclachlan, Arnould on the Law of Marine Insurance (2 vols., 6th edition, London, 1887) ; Reginald G. Marsden, Admiralty Cases, 1648 to i860 (London, 1885); Law of Collisions at Sea (5th edition, London, 1904) , Douglas Owen, Marine Insur- ance Notes and Clauses (3rd edition, 1890); Theophilus Parsons, Law of Marine Insurance and General Average (2 vols., Boston, 1868) ; G. G. Phillimore, " Marine Insurance " in Encyclopaedia of the Laws of England, vol. viii. (London, 1907); Willard Phillips, Treatise on the Law of Insurance (2 vols., 5th edition, New York, 1867); C. R. Tyser, Law relating to Losses under a Policy of Marine Insurance (London, 1894); Rudolph Ulrich, Grosse Haverei (2nd ed., 3 vols., Berlin, 1903, 1905, 1906); G. Denis Weil, Des assurances marilimes el des avaries (Paris, 1870) (W. Go.)

INTAGLIO (an Ital. word, from intagliare, to incise, cut into), a form of engraving or carving, in which the pattern or design is sunk below the surface of the material thus treated, opposed to " cameo " or " relievo " — carving or engraving where the design is raised. Intaglio is thus applied to incised gems, as cameo (q.v.) to gems cut in relief (see Gems).

INTELLECT (Lat. inlelleclus, from inteliigere, to understand), the general term for the mind in reference to its capacity for knowing or understanding. It is very vaguely used in common language. A man is described as " intellectual " generally because he is occupied with theory and principles rather than with practice, often with the further implication that his theories are concerned mainly with abstract matters: he is aloof from the world, and especially is a man of training and culture who cares little for the ordinary pleasures of sense. " Intellect " is thus distinguished from " intelligence " by the field of its opera- tions, " intelligence " being used in the practical sphere for readiness to grasp a situation. (The employment of the

word as a synonym for " news " is mere journalese; such phrases as " Intelligence Department " in connexion with newspapers and public offices are more justifiable.) In philosophy the "intellect " is contrasted with the senses and the will; it sifts and combines sense-given data, which otherwise would be only momentary, lasting practically only as long as the stimuli continued to operate. It thus includes the cognitive processes, and is the source of all real knowledge. Various attempts have been made to narrow the use of the term, e.g. to the higher regions of knowledge en- tirely above the region of sense (so Kant), or to conceptual processes; but no agreement has been reached. " Intellection " (i.e. the process as opposed to the capacity) has similarly been narrowed (e.g. by Professor James Ward) to the sphere of con- cepts; other writers, however, give it a much wider meaning. " Intellectualism " is a term given to any system which empha- sizes the cognitive function; thus aesthetic intellectualism is that view of aesthetics which subordinates the sensual gratifica- tion or the delight in purely formal beauty to what may be called the ideal content.

INTELLIGENCE IN ANIMALS. 1 Professor G. J. Romanes, in his work on Animal Intelligence (1881), used the term "in- telligence " as synonymous with " reason," and defined it as follows: "Reason or intelligence is the faculty which is con- cerned in the intentional adaptation of means to ends. It therefore implies the conscious knowledge of the relation between means employed and ends attained, and may be exercised in adaptation to circumstances novel alike to the experience of the individual and that of the species. " There is here some ambiguity as to the exact psychological significance of the words " inten- tional adaptation " and of the phrase " conscious knowledge of the relation between the means employed and the ends attained." A chick a day or two old learns to leave untouched nauseous caterpillars, and Romanes would certainly have regarded this as a case of intelligent profiting by experience; but how far there is intentional adaptation and whether the chick has conscious knowledge of the relation of means to ends, is doubtful, and, to say the least of it, open to discussion. St George Mivart, the acute dialectical .opponent of Romanes, denied that animals are capable of the exercise of reason or intelligence. He urged that according to traditional views reason should denote and include all intellectual perception, whether it be direct and intuitive or indirect and inferential (sensu siricto) , and contended that under neither head are to, be included the sensuous perceptions and merely practical inferences of animals. Wasmann, who argues on similar .grounds, regards such behaviour as that of the chicken as instinctive

in the wider sense (see Instinct) and not intelligent; man alone, he contends, is intelligent, that is to say has the power of perceiving the relations of concepts to each other, and of drawing conclusions therefrom. It is clear that the discussion largely turns on the definition of terms; but more than this lies behind it. Both Mivart and Wasmann are emphatic in their assertions that instinctive modes of behaviour in the wider sense or the sensuou? 1 For a discussion of human intelligence, see Psychology.

perceptions and practical inferences of animals differ funda-mentally in kind from the rational or intelligent conduct of human folk, and that by no conceivable process of evolution could the one pass upwards into the other.

Wasmann regards the inclusion of those activities which result from sense-experience under the term ” intelligence ”

as pseudo-psychological. To modern psychologists laxLtd’ °f standing we must therefore turn. Under the head- iefiauion. ing ” Intellect or Intelligence,” in the Dictionary of

Philosophy and Psychology, G. F. Stout and J. Mark Baldwin say: ” There is a tendency to apply the term intellect more especially to the capacity for conceptual thinking. This does not hold in the same degree of the connected word intelli- gence. We speak freely of ‘ animal intelligence,’ but the phrase ‘ animal intellect ‘ is unusual. However, the restriction of the term to -onceptual process is by no means so fixed and definite as to justify us in including it in the definition.” With respect to the word intellection again: ” There is a tendency to restrict the term to conceptual thinking. Ward does so definitely and consistently. Croom-Robertson, on the other hand, gives the word the widest possible application, making it cover all forms of cognitive process. On the whole, if the term is to be employed at all, Robertson’s usage appears preferable, as corresponding better to the generality of the words intellect and intelligence.” It does not seem to be pseudo-psychological, therefore, to apply the term intelligence to the capacity, unquestionably possessed by animals, of profiting by sensory experience. The present writer has suggested that the term may be conveniently restricted to the capacity of guiding behaviour through perceptual process, reserving the terms intellect and reason for the so-called faculties

which involve conceptual process. There are, however, advan- tages, as Stout and Baldwin contend, in employing the word in a somewhat wide and general sense. It is probably best for strictly psychological purposes to define somewhat strictly perceptual and conceptual (or ideational) process and to leave to intelligence the comparative freedom of a word to be used in general literature and therein defined by its context. It may be helpful, however, to place in tabular form the different uses above indicated: —

Perceptual Process.

i. Instinct (wider sense). 2. Sense-perception

3-

4. Intelligence.

Intelligence

Conceptual Process.

Intelligence (e.g. Wasmann). Intelligence (e.g. Mivart).

(e.g. Stout and Baldwin). Intellect and Reason (e.g. Lloyd Morgan).

From this table it may be seen at a glance that, with such divergence of usage, the application of the word " intelligent " to any given case of animal behaviour has in itself little psycho- logical significance. If the psychological status of the animal is to be seriously discussed, the question to be answered is this: Are the observed activities explainable in terms of perceptual process only, or do they demand also a supplementary exercise of conceptual process ? Granting that they are intelligent in the broad acceptation of the word, are they only perceptually intelligent or also conceptually intelligent ?

It would require more space than is at our command to make the distinction which is drawn by those who use these terms clear , and distinct; but enough may perhaps be said to process. enable the general reader to grasp the salient points. It will be convenient to take a concrete case. A chick in the performance of its truly instinctive activities pecks at all sorts of small objects. In doing so it gains a certain amount of initial experience. Very soon it may be observed that some grubs and caterpillars are seized with avidity whenever occasion offers; while others are after a few trials let alone. Broadly speaking, we have here intelligent selection and rejection. Psychologically interpreted what is believed to take place

is somewhat as follows. Each grub or caterpillar affords a visual impression or sensation. This as such is just a presentation to sight and nothing more. But in virtue of previous experience it suggests what was formerly presented to consciousness in

that experience. It has meaning. An impression which carries meaning begotten of previous experience is raised to the level of a percept; and behaviour which is influenced and guided by such percepts, that is to say by impressions and the meaning for behaviour they suggest, is the outcome of perceptual process. If a dog learns to open a gate by lifting the latch, this may be due to perceptual process. Through previous experience the sight of the latch may suggest meaning for practical behaviour. His action may be simply due to the fact that the visual presenta- tion has been directly associated with the appropriate bodily activities, and now by suggestion reinstates like activities; he may not, though on the other hand he may, exercise conceptual thought. Let us suppose that the chick ceptual which selects certain caterpillars and rejects others process. does form concepts. What does this imply from the standpoint of psychology ? Stout and Baldwin define concep- tion as the " cognition of a universal as distinguished from the particulars which it unifies. The universal apprehended in this way is called a concept." If then the chick apprehends the universal " good-for-eating " as exemplified in the particular maggot, and the maggot as a concrete case of the abstract and universal " good-for-eating," it has a capacity for conceptual thought. " There is one point in our definition," say Stout and Baldwin, " which requires to be specially emphasized. Concep- tion is the cognition of a universal as distinguished from the particulars which it unifies. The words " as distinguished from " are of essential importance. The mere presence of a universal element in cognition does not constitute a concept. Otherwise all cognition would be conceptual. The simplest perception includes a universal. . . . The universal must be apprehended in antithesis to the particulars which it unifies. " The general, or in technical phraseology, the universal characteristic " good- for-eating " is present in all that the chick practically finds to be edible; but the chick may just eat the nice caterpillars without thinking for a moment of edibility.

Few would dream of contending that the chick a few days old is capable of conceptual thought. Naive perceptual process pretty obviously suffices for an explanation of the behaviour of the little bird. But so too, it may be value. said, does it suffice for the explanation of much of the practical behaviour of men. If a great number of the actions of animals are only perceptually intelligent, so

too are a great number of the actions of men and women. This is unquestionably the case; and it serves to bring out the distinction in value which may be assigned to the percept and the concept respectively. The value of the percept is for simple direct practical behaviour; the value of the concept is for the elaboration of systematic knowledge. Any given impression may have meaning for behaviour in a given situation which is like that which has previously developed in a certain manner; but it may also have significance for the interpretation of such situations in a con- ceptual scheme of thought. The sight of the sage-blossom may have meaning for the bee which has sucked the sweets contained in such flowers; the sight of the bee in this situation may have significance for scientific interpretation as an example of the fertilization of flowers by insects. The bee may be only perceptually intelligent; the man who observes its action may or may not be conceptually intelligent.

A good deal of human behaviour may be interpreted in terms of perceptual intelligence, and a far larger proportion of animal behaviour may be so interpreted. But some human conduct cannot be explained save as the outcome of conceptual intelligence. The question is, whether any carefully observed and well-authenticated cases of animal procedure are inexplicable in the absence of conceptual thought, and if so what concepts are necessarily involved ? It is now conceded that the mere collection of anecdotes which result from casual as opposed to systematic observation can afford no satisfactory basis for an answer to this question. A solution can only be obtained by well-planned observations conducted by those who have an adequate psychological training. Even under these conditions a criterion of the presence or absence of conceptual factors is

ment of concept.

Are

animals conceptu- ally in- telligent?

needed; and such a criterion is not easy to formulate or to apply.

If we institute inquiries with a view to ascertaining how the conceptual factor originates, it appears to be the result of analysis and abstraction, and to be reached by a Develop- p rocess f comparison which becomes intentional and deliberate. If, for example, in educational procedure, we seek to assist children in forming concepts of colour, shape and material, we place before them a number of objects, some round, some square, some triangular; some red, some yellow, some blue; some made of paper, some of wood, some of flannel. Any given object is both red and square and made of flannel, blue and round and made of wood, and so on. We teach the child to group the objects, to put all the blues, yellows and reds together irrespective of shape or material; then all the rounds, squares and triangles together; then all which are made of like material. We thus help the children to grasp that though shape, colour and material are combined in each object, yet for the immediate purpose in hand one matters and the others do not matter. TJiat which does matter is abstracted from the rest. The child has to analyse his experience and fix his attention on some given factor therein. He has to compare the objects intentionally, that is, for a definite end. He reaches, for example, the concept " blue" and realizes that the word may be applied to a number of particular objects differing in other respects, and that each is an example of what he understands by the word blue. Whether he could reach the concept without words is a question on which opinions differ.

Locke held that animals are incapable of the abstraction which is implied in such procedure. Dr Stout considers that observation of their behaviour shows little if any evidence of intentional comparison. And it is open to discussion whether they are able to analyse the situations opened up by their perceptual behaviour. The matter cannot be fully considered here. It must suffice if enough has been said to show the nature of the distinction between perceptual and conceptual process.

An example may, however, be given of the kind of observation which, since it was carefully planned and carried out, is of evidential value. Dr Alexander Hill's fox terrier was " taught " to open the side door of a large box by lifting a projecting latch. When the door swung open he was never allowed to find anything in the box, but was given a piece of biscuit from the hand. Then a warm chop-bone

was put inside the box, which was placed in a courtyard so that the dog would pass it when no one was near, though he could be watched from the window. Details of the terrier's behaviour are given by Dr Hill in Nature (lxvii. 558, April 1903). The net result was that the dog failed to apply- at once his quite familiar experience of lifting the latch in the usual way. Here two situations were presented; first the box with people around and a piece of biscuit to be obtained from one of them by lifting the latch; secondly the box with no one near and a redolent chop-bone inside. To us it is obvious enough that the lifted latch is the key to the development of both situations; we analyse them so as to get the essential factor which matters. The dog apparently did not do so. He seemingly was incapable of this modest amount of analysis and abstraction.

*We can now see more clearly what was meant by saying that Romanes' phrase (that intelligence " implies a conscious know- ledge of the relation between means employed and oTphfase en(ˆ s attained ") is ambiguous. The dog which lifts " con- the latch of a gate and goes out when the gate swings scions open undoubtedly employs means to reach an end; o/meanf!" ˆ e nee < * not analytically think the means as conducive to the end and the end as reached by the means; he need not conceive this relationship as exemplified in a number of particular cases; he need not cognize the universal as distin- guished from the particulars. Perceptual experience, therefore, does not imply what Romanes states if his words are interpreted in terms of conception ; it does, however, imply that the relation-*

ship is contained within the unanalysed whole of experience and is a factor contributing to an acquired mode of behaviour. Opinions differ as to how far, if at all, animals show what we are bound to interpret as the rudiments of conceptual thinking. It is perhaps best to regard the question as still sub judice. The evolutionist school, but not without exception, incline to the view that we find in animals the beginnings of conceptual experience; some are, however, of opinion that, in the absence of language, conceptual analysis is well-nigh impossible, and in any case cannot be carried far. To an evolutionist the assertion that conceptual intelligence could not conceivably have had a natural genesis from perceptual experience, appears to be made on grounds other than scientific. Few if any psychologists contend, on strictly psychological grounds, for a distinction of kind such as Mivart and Wasmann postulate. Conscious experience is indeed sui generis and is distinct in kind from the energy with which the physicist or the physiologist has to deal; but within conscious experience from its earliest manifestation to its latest development

scientific psychology only recognizes differences of mode.

In individual development the earliest manifestation of experience is the conscious accompaniment or concomitant of that type of organic behaviour which includes all reflex and instinctive acts. This affords the primordial f^J p °' tissue of experience, including a conscious awareness ment. of the stimulating presentations which initiate organic behaviour and the kinaesthetic presentations which accompany it. Thus arises an awareness of the development of the instinctive situation. Perceptual intelligence depends upon associative re-presentation — the earlier phases of a presented situation calling up a revival of the whole previous experience before its later phases are again actually presented. Through the process of inhibition, to the clearer understanding of which physiology is daily contributing fresh data, the actual development through behaviour of the later phases of the situation is checked, and an acquired modification of the behaviour results. The whole range of perceptual intelligence in animals illustrates the manner in which accommodation to varied circumstances is reached. On these foundations in varied experience conceptual intelligence is developed. The early stages of its development, whether in the child, in whom it unquestionably occurs, or in the higher animals, in which it is not improbably incipient, are difficult to determine on the basis of observation of its expression in behaviour or conduct. But the distinguishing features of con- ceptual as contrasted with perceptual intelligence are the comparison of situations with a view to their analysis, the disentangling of factors which are of importance for some purpose of interpretation or of conduct, and the attitude of mind which is expressed by saying that the particular case is an example of what experience has shown to be, in technical phrase, universal, and is realized as such. Under the comprehensive phrase, intelligence in animals, this may or may not be included. For literature, see under Instinct. (C. Ll. M.)*

INTENDANT (from Lat. intendens, pres. part, of intendere, to apply the mind to, to watch over; cf. " superintendent "), the name used in early times in France to designate a functionary invested by the king with an important and durable commission. 1 As early as the 14th century the title of intendentes or super- intendentes financiarum was given to the commissaries appointed by the king to levy the aides, or temporary subsidies. In the 16th century Francis I. created the intendants des finances, permanent functionaries who formed the central . and superior 1 In Germany the title Intendant is applied to the head of public institutions, more particularly to the high officials in charge of court theatres, royal gardens, palaces and the like. The

director of certain civic theatres is now also sometimes styled Intendant. _ The title Generalintendant implies the same official duties, but higher rank. In the German army the Intendantur corresponds to the British quartermaster-general's and financial departments of the War Office, the French intendance militaire. Subordinate to these are the intendances (Intendantur en) under general officers commanding, the heads of which are in Germany called Korpsintendanten, and in France intendants-generaux, intendants militaires, &c. (see Army, §58).

administration in financial matters. They took the place of the gtneraux des finance s and the " treasurers of France," who became provincial functionaries in the various gene'ralites. The intendants des finances existed until the end of the ancien regime; they were at first under the authority of the surintendant, and subsequently under that of the controleur general des finances. The intendants des provinces date from the last thirty years of the 16th century. They were commissaries sent by the king with wide powers to restore order in the provinces after the civil wars. Their functions were at first extraordinary and temporary, but a few were retained as permanent state officials, and in course of time they came to be fairly generally distributed over the whole kingdom. The existing territorial divisions were not disturbed, each intendant being placed over a generality, save in some cases where slight modifications were necessary for administrative purposes. In their functions, however, there is another element worthy of notice. In the 13th and 14th centuries the monarchy had organized a species of inspection (chevauchee) over the provincial functionaries, which was performed by the mattres des requites, and this the reform ordinances of the 16th century sought to revive. This inspectorate passed to the intendant, who became the resident local inspector and supervisor of all the other functionaries in his district ; its connexion with the old chevauchee is plainly shown by the fact that the intendants were almost invariably selected from the mattres des requites. The early intendants had naturally been largely concerned with the troops; eventually special military intendants (the only ones that exist in modern French law) were created, but the intendants des provinces retained certain military duties, notably those relating to the housing of the troops.

The early intendants were called indifferently intendants de justice or intendants de finances, their full official title being intendants de

justice, police et finances, et commissaires, departis dans les generalites du royaume pour V execution des ordres de Sa Majeste. This title shows the wide range of their duties, the word " police " in this connexion connoting general administra- tion. Not being officers of the king, but merely commissaries, they could always be recalled, and their powers were fixed by the commission they received from the king. As their functions became pre-eminently administrative the laws of the 17th and 1 8th centuries referred many questions to their decision, and, in this respect, their powers were determined by law. They became the direct general representatives of the king in each genSralite, with authority over the other officials, whom they were empowered to censure, suspend or sometimes even replace. They were in constant touch with the king's council, with which they were connected by their original rights as mattres des requites. In the first half of the 17th century they encountered some opposition from the governors of provinces, who had formerly been the direct political representatives of the crown, and also from the parliaments, which traditionally intervened in the administration, especially by means of arrets de reglement (decisions, from which there was no appeal, regulating questions of procedure, civil law or custom). The intendants, however, were energetically supported, and so complete was their triumph that in the 18th century governors of provinces could not enter upon their duties without formal lettres de residence.

The intendants had wide powers in the drawing by lot of the militia and in the royal corvees for the making and repair of the high roads, and were largely concerned with the administration of the taille, in which they effected useful reforms. They were the sole administrators of the principal direct and indirect imposts created in the second half of the 17th century and in the 18th century, and had full powers to settle disputes arising out of these taxes. Owing to the vast size of the districts allotted to the intendants (there were no more than thirty-two intendants in 1788), they often felt the need of assistants. As commissaries of the king, they could delegate their powers to sub-delegues , who were, however, not royal officials, but merely mandatories of the intendant. Decisions of the intendant could be Carried to the king's council, and those of the sub-delegue to the intendant.

See Gabriel Hanotaux, Origines de I'institution des intendants des provinces (1884); D'Arbois de Jubainville, V Administration des intendants d'apres les archives de I'Aube (1880); P. ArdaschefF, Provintzalnaya administratsiya vo Frantsii ve poshednoyo porou starago poryadka: provintsialny Intendanty (St Petersburg, 1900-I9°6)- (J- P. E-)

INTENT (from Lat. intendere, to stretch out, extend, particularly in the phrase intendere animum, to turn one's mind to, purpose), in law, the purpose or object with which an act is done. The question of intent is important with reference both to civil and criminal responsibility. Briefly, it may be said that in criminal law the constituent element of an offence is the mens rea or the guilty intent. The commission of an act without the intent is not, as a general rule, sufficient to constitute a crime, nor, on the other hand, does the existence of a guilty intent without commission of the act amount to the legal conception of a crime (see Criminal Law). In the case of civil wrongs, in general, the opposite holds good. A wrongful act done to the person or property of another carries with it legal liability, irrespective of the motive with which the act was done (see Tort) . In refer- ence to the construction of contracts, wills and other documents, the question of intention is material as showing the sense and meaning of the words used, and what they were intended to effect. INTERAMNA LIRENAS, an ancient town of Italy in the Volscian territory near the modern Pignataro Interamna, 5 m. S.E. of Aquinum; the additional name distinguishes it from Interamna Praetuttianorum (mod. Teramo) and Interamna Nahartium (mod. Terni). It was founded by the Romans as a Latin colony in 312 B.C. as a military base in the war against Samnium, no fewer than 4000 colonists being sent thither. It was among the Latin colonies which in 209 B.C. refused to supply further contingents or money for the Hannibalic war. It became a municipium with the other Latin colonies, but we hear no more of it — mainly, no doubt, because it lay off the Via Latina. Livy's description of it as on the Via Latina is not strictly accurate, and cannot be used as an indication that the former course of the Via Latina was through Interamna. The city lay on a hill on the N. bank of the Liris, between two of its tributaries, thus lacking natural defences on the N. side alone. Many inscriptions have been found, and there are considerable remains of antiquity. One inscription bears the date a.d. 408, and the site was occupied in the middle ages by a castle called Terame or Termine. (T. As.)

INTERCALARY (from Lat. intercalare, to proclaim, calare, the insertion of a day in the calendar), a term applied to a month, day or da}'S inserted between other months or days in order to adjust the reckoning of time, based on the revolution of the earth round the sun, the day, and of the moon round the earth, the lunar month, to the revolution of the earth round the sun, the solar year (see Calendar). From the meaning of something inserted or placed between, intercalary is used for something which interrupts a series, or comes between two types. In botany, the term is used of growth

which is not apical but somewhere between the apex and base of an organ, such as the growth in length of an Iris leaf, or of the internode of a grass-haulm.

INTERCOLUMNIATION, in architecture, the distance between the columns of a peristyle, generally referred to in terms of the lower diameter of the column. They are thus set forth by Vitruvius (iii. 2): (a) Pycnostyle, equal to if diameters; (b) Systyle, 2 diameters; (c) Eustyle, 2j diameters (which was the proportion preferred by him); (d) Diastyle, 3 diameters; and (e) Araeostyle or wide spaced, 4-diameters, a span only- possible when the architrave was in wood. Vitruvius's definition would seem to apply only to examples with which he was acquainted in Rome, or to Greek temples described by authors he had studied. In the earlier Doric temples the intercolumnia- tion is sometimes less than one diameter, and it increases gradu- ally as the style developed; thus in the Parthenon it is ij, in the Temple of Diana Propylaea at Eleusis, i|; and in the portico at Delos, 25. The intercolumniations of the columns of the Ionic Order are greater, averaging 2 diameters, but then the relative proportion of height to diameter in the column has to be taken into account, as also the width of the peristyle. Thus

in the temple of Apollo Branchidae, where the columns are slender and over 10 diameters in height, ihe intercolumniation is if, notwithstanding its late date, and in the Temple of Apollo Smintheus in Asia Minor, in which the peristyle is pseudo- dipteral, or double width, the intercolumniation is just over i J. Temples of the Corinthian Order follow the proportions of those of the Ionic Order.

INTERDICT (Lat. interdictum, from interdicere, to forbid by decree, lit., interpose by speech), in its full technical sense as an ecclesiastical term, a sentence by a competent ecclesiastical authority forbidding all celebration of public worship, the administration of some sacraments (baptism, confirmation and penance are permitted) and ecclesiastical burial. From general interdicts, however, are excepted the feast days of Christmas, Easter, Whitsunday, the Assumption and Corpus Christi. – An interdict may be either local, personal or mixed, according as it applies to a locality, to a particular person or class of persons, or to a particular locality as long as it shall be the residence of a particular person or class of persons. Local interdicts again may be either general or

particular; in the latter instance they refer only to particular buildings set apart for religious services. An interdict is a measure which seeks to punish a population or a religious body (e.g. a chapter) for the fault of some only of its members, who cannot be reached separately. It is a penalty directed against society rather than against individuals. In 869 Hincmar of Laon laid his entire diocese under an interdict, a proceeding for which he was severely censured by Hincmar of Reims. In the Chronicle of Ademar of Limoges (ad ann. 994) it is stated that Bishop Alduin introduced there " a new plan for punishing the wickedness of his people; he ordered the churches and monasteries to cease from divine worship and the people to abstain from divine praise, and this he called excommunication " (see Gieseler, Kirchengesch. iii. 342, where also the text is given of a proposal to a similar effect made by Odolric, abbot of St Martial, at the council of Limoges in 1031). It was not until the nth century that the use of the interdict obtained a recognized place among the means of discipline at the disposal of the Roman hierarchy, which used it, without great success, to bring back the secular authorities to obedience. Important historical instances of the use of the interdict occur in the cases of Scotland under Pope Alexander III. in 1181, of France under Innocent III. in 1200, and of England under the same pope in 1209. So far as the interdict is " personal," that is to say, applied to a particular individual, it may be regarded as a kind of partial excommunication; for instance, a bishop may, for certain faults, be interdicted from entering the church (ab ingressu ecclesiae), that is, without being excommunicated, he must not celebrate or assist at the celebration of divine offices. Interdicts cease at the expiration of the term, or by removal (relaxalio) . General and local interdicts are no longer in use.

See the canonists in tit. 39 lib. v., De sententia excommun., &c. ; L. Ferraris, Prompta bibliotheca canonica, &c, s.v. " Interdictum."

Interdict, in Scots law, is an order of court pronounced on cause shown for stopping any proceedings complained of as 'Hegal or wrongful. It may be resorted to as a remedy against all encroachments either on property or possession. For the analogous English practice see Injunction. •

INTERDICTION, in Scots law, a process of restraint applied to prodigals and others who, " from weakness, facility or profusion, are liable to imposition." It is either voluntary or judicial. Voluntary interdiction is effected by the prodigal himself, who executes a bond obliging h'mself to do no deed which may affect his estate without

the assent of certain persons called the " interdictors." This may be removed by the court of session, by the joint act of the interdictors and the interdicted, and by the number of interdictors being reduced below the number const ; tuting a quorum. Judicial interdiction is imposed by order of the court, either moved by an interested party or acting in the exercise of its nobile oficium, and can only be removed by a simi'ar order. Deeds done by the interdicted person, so far as they affect or purport to affect his heritable estate, are reducible, unless they have been done with the

consent of the interdictors. Interdiction has no effect, however, on movable prope ty.

INTERESSE TERMINI (Lat. for "interest in a term"), in law, an executory interest, being the right of entry which the grant of a lease confers upon a lessee. Actual entry on the lands by the lessor converts the right into an estate. If the lease, however, has been created by a bargain and sale or by any other conveyance under the Statute of Uses, which does not require an entry, the term vests in the lessee at once. An interesse termini gives a cause of action against any person through whose action entry by the lessee or delivery of possession to him may have been prevented. An interesse termini is a right in rem, alienable at common law, and transmissible to the executors of the lessee.

INTEREST, etymologically a state or condition of being concerned in or having a share in anything, hence a legal or other claim to or share in property, benefits or advantages. Further developments of meaning are found in the application of the word to the benefits, advantages, matters of importance, &c, in which " interest " or concern can be felt, and to the feeling of concern so excited; hence also the word is used of the persons who have a concern in some common " interest," e.g. the trading or commercial interest, and of the personal or other influence due to a connexion with specific " interests." The woid is derived from the Latin interesse (literally "to be between"), to make a difference, to concern, be of importance. The' form which the word takes in English is a substantival use of the 3rd person singular of the present indicative of the Latin verb, and is due to a similar use in French of the older interest, modern intirit. The earlier English word was interess, which survived till the end of the 17th century; the earliest example of " interest " in the New English Dictionary is from the Rolls of Parliament of 1450.

These meanings of " interest " are plainly derived from the ordinary uses of the Latin interesse. The origin of the application of the word

to the compensation paid for the use of money or for the forbearance of a debt, with which, as far as present English law is concerned, this article deals, forms part of the history of Usury and Money-Lending (q.v.). By Roman law, where one party to a contract made default, the other could enforce, over and above the fulfilment of the agreement, com- pensation based on the difference (id quod interest) to the creditor's position caused by the default of the debtor, which was techni- cally known as mora, delay. This difference could be reckoned according as actual loss had accrued, and also on a calculation of the profit that might have been made had performance been carried out. Now this developed the canonist doctrine of damnum emergens and lucrum cessans respectively, which played a con- siderable part in the breaking down of the ecclesiastical pro- hibition of the taking of usury. The medieval lawyers used the phrase damna et interesse (in French dommages et intirets) for such compensation by way of damages for the non-fulfilment of a contract, and for damages and indemnity generally. Thus interesse and interit came to be particularly applied to the charge for the use of money disguised by a legal fiction under the form of an indemnity for the failure to perform a contract.

At English common law an agreement to pay interest is not implied unless in the case of negotiable instruments, when it is supported by mercantile usage. As a general rule therefore debts certain, payable at a specified time, do not carry interest from that time unless there has been an express agreement that they should do so. But when it has been the constant practice ""of a trade or business to charge interest, or where as between the parties interest has been always charged and paid, a contract to pay interest is implied. It is now provided by the Civil Procedure Act 1833 that, " upon all debts or sums certain payable at a certain time or otherwise, the jury on the trial of any issue or in any inquisition of damages may if they shall think fit allow interest to the creditor at a rate not exceeding the current rate of interest, from the time when such debts or sums certain were payable, if such debts or sums be payable by virtue of some written instrument at a certain time; or if payable

otherwise, then from the time when demand of payment shall have been made in writing, so as such demand shall give notice to the debtor that interest will be claimed from the date of such demand until the term of payment: provided that interest shall be payable in

all cases in which it is now payable by law." Compound interest requires to be supported by positive proof that it was agreed to by the parties; an established practice to account in this manner will be evidence of such an agreement. When interest is awarded by a court it is generally at the rate of 4%; under special circumstances 5% has been allowed.

INTERFERENCE OF LIGHT. § 1. This term 1 and the ideas underlying it were introduced into optics by Thomas Young. His Bakerian lecture on " The Theory of Light and Colours " {Phil. Trans., 1801) formulated the following hypotheses and propositions, and thereby laid the foundations of the wave theory: —

Hypotheses.

*(i.) A luminiferous aether pervades the universe, rare and elastic in a high degree. **

(ii.) Undulations are excited in this aether whenever a body becomes luminous.

(iii.) The sensation of different colours depends on the different frequency of vibrations excited by the light in the retina.

(iv.) All material bodies have an attraction for the aethereal medium, by means of which it is accumulated in their substance, and for a small distance around them, in a state of greater density but not of greater elasticity.

Propositions.

(i.) All impulses are propagated in a homogeneous elastic medium with an equaoie velocity.

(ii.) An undulation conceived to originate from the vibration of a single particle must expand through a homogeneous medium in a spherical form, but with different quantities of motion in different parts.

(iii.) A portion of a spherical undulation, admitted through an aperture into a quiescent medium, will proceed to be further propagated rectilinearly in concentric superfices, terminated laterally by weak and irregular portions of newly diverging undulations.

(iv.) When an undulation arrives at a surface which is the limit of mediums of different densities, a partial reflection takes place,

proportionate in force to the difference of the densities.

(v.) When an undulation is transmitted through a surface ter- minating different mediums, it proceeds in such a direction that the sines of the angles of incidence and refraction are in the constant ratio of the velocity of propagation in the two mediums.

(vi.) When an undulation falls on the surface of a rarer medium, so obliquely that it cannot be regularly refracted, it is totally re- flected at an angle equal to that of its incidence.

(vii.) If equidistant undulations be supposed to pass through a medium, of which the parts are susceptible of permanent vibrations somewhat slower than the undulations, their velocity will be some- what lessened by this vibratory tendency; and, in the same medium, the more, as the undulations are more frequent.

(viii.) When two undulations, from different origins, coincide either perfectly or very nearly in direction, their joint effect is a com- bination of the motions belonging to each.

(ix.) Radiant light consists in undulations of the luminiferous aether.

In the Philosophical Transactions for 1802, Young refers to his discovery of " a simple and general law." The law is that " wherever two portions of the same light arrive at the eye by different routes, either exactly or very nearly in the same direc- tion, the light becomes most intense where the difference of the routes is a multiple of a certain length, and least intense in the intermediate state of the interfering portions; and this length is different for light of different colours."

This appears to be the first use of the word interfering or interference as applied to light. When two portions of light by their co-operation cause darkness, there is certainly " interfer- ence " in the popular sense; but from a mechanical or mathe- matical point of view, the superposition contemplated in pro- position viii. would more naturally be regarded as taking place without interference. Young applied his principle to the explana- tion of colours of striated surfaces (gratings), to the colours of thin plates, and to an experiment which we shall discuss later

1 The word " interference " as formed, on the false analogy of such words as " difference," from " to interfere," which originally was applied to a horse striking (Lat. ferire) one foot or leg against the other.

in the improved form given to it by Fresnel, where a screen is illuminated simultaneously by light proceeding from two similar sources. As a preliminary to these explanations we require an analytical expression for waves of simple type, and an examination of the effects of compounding them.

§ 2. Plane Waves of Simple Type. — Whatever may be the character of the medium and of its vibration, the analytical expression for an infinite train of plane waves is

Acosj y(V ‘ -) + «}*

(1),

in which X represents the wave-length, and V the corresponding velocity of propagation. The coefficient A is called the amplitude, and its nature depends upon the medium and may here be left an open question. The phase of the wave at a given time and place is represented by a. The expression retains the same value whatever integral number of wave-lengths be added to or subtracted from x. It is also periodic with respect to /, and the period is

V = X/V (2).

In experimenting upon sound we are able to determine independently t, X, and V; but on account of its smallness the periodic time of luminous vibrations eludes altogether our means of observation, and is only known indirectly from X and V by means of (2).

There is nothing arbitrary in the use of a circular function to represent the waves. As a general rule this is the only kind of wave which can be propagated without a change of form; and, even in the exceptional cases where the velocity is independent of wave- length, no generality is really lost by this procedure, because in accordance with Fourier’s theorem any kind of periodic wave may be regarded as compounded of a series of such as (1), with wave- lengths in harmonical progression.

A well-known characteristic of waves of type (1) is that any number of trains of various amplitudes and phases, but of the same wave-length, are equivalent to a single train of the same type. Thus

ZAcos j + al = XAcosa.cosˆ(Vt-x)-XAsina.sin(Vt-x)

= PcosJy(V < -) + < # > J (3),*

where P = (2A coso) 2 +2(Asina) i! (4),

‘ 2(Asina) , ,

*tan * = S(Acosa) (5).*

An important particular case is that of two component trains only.

A cos J ˆ(Vt-x)+a I +A’cos j ˆ(Vt-x) +a’ I

=?Pcosjˆ(V<-)+0 j, where P 2 =A 2 H-A' 2 -|-2AA'cos (a-o') (6).*

The composition of vibrations of the same period is precisely analogous, as was pointed out by Fresnel, to the composition of forces, or indeed of any other two-dimensional vector quantities. The magnitude of the force corresponds to the amplitude of the vibration, and the inclination of the force corresponds to the phase. A group of forces, of equal intensity, represented by lines drawn from the centre to the angular points of a regular polygon, con- stitute a system in equilibrium. Consequently, a system of vibra- tions of equal amplitude and of phases symmetrically distributed round the period has a zero resultant.

According to the phase-relation, determined by (a — a’), the amplitude of the resultant may vary from (A — A’) to (A+A’). If A’ and A are equal, the minimum resultant is zero, showing that two equal trains of waves may neutralize one another. This happens when the phases are opposite, or differ by half a (complete) period, and the effect is that described by Young as ” interference.”

§ 3. Intensity. — The intensity of light of given wave-length must depend upon the amplitude, but the precise nature of the relation is not at once apparent. We are not able to appreciate by simple inspection the relative intensities of two unequal lights; and, when we say, for example, that one candle is twice as bright as another, we mean that two of the latter burning independently would give- us the same light as one of the former. This may be regarded as the definition; and then experiment may be appealed to to prove that the intensity of light from a given source varies inversely as the square of the distance. But our conviction of the truth of the law is perhaps founded quite as much upon the idea that something not liable to loss is radiated outwards, and is distributed in suc- cession over the surfaces of spheres concentric with the source, whose areas are as the squares of the radii. The something can only be energy; and thus we are led to regard the rate at which energy is propagated across a given area parallel to the waves as the measure of intensity; and this

is proportional, not to the first power, but to the square of the amplitude.

§ 4. Resultant of a Large Number of Vibrations of Arbitrary Phase. — We have seen that the resultant of two vibrations of equal amplitude

is wholly dependent upon their phase-relation, and it is of interest to inquire what we are to expect from the composition of a large number (>i) oi equal vibrations of amplitude unity, and of arbitrary phases. The intensity of the resultant will of course depend upon the precise manner in which the phases are distributed, and may vary from re 2 to zero. But is there a definite intensity which becomes more and more probable as re is increased without limit ?

The nature of the question here raised is well illustrated by the special case in which the possible phases are restricted to two opposite phases. \e may then conveniently discard the idea of phase, and regard the amplitudes as at random positive or negative. If all the signs are the same, the intensity is re 2 ; if, on the other hand, there are as many positive as negative, the result is zero. But, although the intensity may range from o to re 2 , the smaller values are much more probable than the greater.

The simplest part of the problem relates to what is called in the theory ot probabilities the " expectation " of intensity, that is, the mean intensity to be expected after a great number of trials, in each of which the phases are taken at random. The chance that all the vibrations are positive is 2~», and thus the expectation of intensity corresponding to this contingency is ^-".re 2 . In like manner the expectation corresponding to the number of positive vibrations being (n-i) is

2~".m.(«-2) 2 ,

and so on. The whole expectation of intensity is thus

^{ l.re 2 +re.(re-2) 2 +fcIi(„-4)'-

- | w(«-l)(n-2) + 1.2.3 (»-6) 2 +

(I).

Now the sum of the (re + i) terms of this series is simply n, as may be proved by comparison of coefficients of x 2 in the equivalent

forms

{e'+e-)« = 2 n {l + \x*+ . . .[])»*

gnI+ „ s („-2> + ?L(lL_L) (,*

The expectation of intensity is therefore re, and this whether n be

great or small.

The same conclusion holds good when the phases are unrestricted hrom (4), § 2, if A= I,

P 2 = »+22cos (02 — Oi) (2),

where under the sign of summation are to be included the cosines ot the t n(n-i) differences of phase. When the phases are arbitrary this sum is as likely to be positive as negative, and thus the mean value ol I" is re.

The reader must be on his guard here against a fallacy which has misled some high authorities. We have not proved that when re is large there is any tendenc} for a single combination to give tnc intensity equal to re, but the quite different proposition that in a large number of trials, in each of which the phases are rearranged arbitranly the mean intensity will tend more and more to the vame n. It is true that even in a single combination there is no reason why any of the cosines in (2) should be positive rather than negative, and from this we may infer that when n is increased the sum ot the terms tends to vanish in comparison with the number ot terms. But, the number of terms being of the order re 2 , we can

with 11" " g '^ l0 VaU,e ° f tHe SUm ° f the Ser ' eS in com P arison Indeed it is not true that the intensity in a single combination approximates to n, when n is large. It can be proved (Phil. Map., 1880, top. 73; 1899, 47 p. 246) that the probability of a resultant intermediate in amplitude between r and r+dr is

- e-rs i"rdr n

The probability of an amplitude less than r is thus

2 ('

J o e-r”- n rdr = l-e r2 !”

‘(3)

(4),

or, which is the same thing, the probability of an amplitude greater than r is ”

e ~’ ,!n ‘ (5).

The accompanying table gives the probabilities of intensities

less than the fractions of n named in the first column. For example the probability of intensity less than n is -6321.

•05

•0488

•80

■5506

•10

•0952

1 00

•6321

•20

•1 813

1-50

•7768

•40

•3296

2-00

•8647

•60

•4512

3-00

•9502

It will be seen that, however great » may be, there is a fair chance ot considerable relative fluctuations of intensity in consecutive combinations.

The mean intensity, expressed by

2 r x

is, as we have already seen, equal to n.

It is with this mean intensity only that we are concerned in j a 1 P hotometr y- A source of light, such as a candle or even a soda flame, may be regarded as composed of a very large number of luminous centres disposed throughout a very sensible space- arid, even though it be true that the intensity at a particular point of a screen illuminated by it and at a particular moment of time is a matter of chance, further processes of averaging must be gone through before anything is arrived at of which our senses could ordinarily take cognizance. In the smallest interval of time during which the eye could be impressed, there would be opportunity for any number of rearrangements of phase, due either to motions of the particles or to irregularities in their modes of vibration. And even if we supposed that each luminous centre was fixed, and emitted perfectly regular vibrations, the manner of composition arid consequent intensity would vary rapidly from point to point of the screen, and in ordinary cases the mean illumination over the smallest appreciable area would correspond to a thorough averaging of the phase-relationships. In this way the idea of the intensity of a luminous source, independently of any questions of phase, is seen to be justified, and we may properly say that two candles are twice as bright as one.

§ 5. Interference Fringes— In Fresnel's fundamental experi ment light from a point O (fig. 1) falls upon an isosceles prism of glass BCD, with the angle at C very little less than two right

o,.. o- o,-

D

Fig. 1.

angles. The source of light may be a pin-hole through which sunlight enters a dark room, or, more conveniently, the image of the sun formed by a lens of short focus (1 or 2 in.). For actual experiment when, as usually happens, it is desirable to economize light, the point may be replaced by a line of light perpendicular to the plane of the diagram, obtained either from a linear source, such as the filament of an incandescent electric lamp, or by admitting light through a narrow vertical slit.

If homogeneous light be used, the light which passes through the prism will consist of two parts, diverging as if from points O x and U 2 symmetrically situated on opposite sides of the line CO. Suppose a sheet of paper to be placed at A with its plane perpendicular to the line OLA, and let us consider what illumination will be produced at different parts of this paper. As Oi and 0, are images of O, crests ot waves must be supposed to start from them simultaneously Hence they wi 1 arrive simultaneously at A, which is equidistant irorn them, and there they will reinforce one another. Thus there will be a bright band on the paper parallel to the edges of the prism It Fi be chosen so that the difference between Pi0 2 and P1O1 is half a wave-length {i.e. half the distance between two successive crests), 'the two streams of light will constantly meet in such relative conditions as to destroy one another. Hence there will be a line of darkness on the paper, through Pi, parallel to the edges of the prism. At P., where 2 P 2 exceeds OiP 2 by a whole wave-length we have another bright band; and at P 3 . where 2 P 3 exceeds 0,P 3 by a wave-length and a half, another dark band ; and so on. Hence as everything is symmetrical about the bright band through A the screen will be illuminated by a series of bright and dark bands, gradually shading into one another. If the paper screen be moved parallel to itself to or from the prism, the locus of all the successive positions of any one band will (by the nature of the curve) obviously be an hyperbola whose foci are Oj and 2 . Thus the interval between any two bands will increase in a more rapid ratio than does the distance of the screen from the source of light. But the intensity of the bngnt bands diminishes rapidly as the screen moves farther off; so that, in order to measure their distance from A, it is better to substitute the eye (furnished with a convex lens) for the screen If we thus measure the distance A Pi between A and the nearest bright band, measure also AO, and calculate (from the known material and form of the prism, and the distance CO) the distance

n d ' 'V'X Y? V1 ous that we can deduce from them the lengths of OiP

2 and 2 P 2 . Their difference is the length of a wave of the homogeneous light experimented with. Though this is not the method actually employed for the purpose (as it admits of little precision), it has been thus fully explained here because it shows in a very' simple way the possibility of measuring a wave-length.

The difference between OjP! and 2 P! becomes greater as AP, is greater. Thus it is clear that the bands are more widely separated the longer the wave-length of the homogeneous light employed. Hence

when we use white light, and thus have systems of bands of every visible wave-length superposed, the band A will be red at its edges, the next bright bands will be blue at their inner edges and red at their outer edges. But, after a few bands are passed, the bright bands due to one kind of light will gradually fill up the dark bands due to another; so that, while we may count hundreds of successive bright and dark bars when homogeneous light is used, with white light the bars become gradually less and less denned as they are farther from A, and finally merge into an almost uniform white illumination of the screen.

If D be the distance from O to A, and P be a point on the screen in the neighbourhood of A, then approximately

0,P-0 2 P= V{D 2 + (" + ii) 2 !V!D 2 + (M W-} =«6/D, where Oi0 2 = 6, AP = «.

Thus, if X be the wave-length, the places where the phases are accordant are given by

« = »XD/6 (1),

n being an integer.

If the light were really homogeneous, the successive fringes would be similar to one another and unlimited in number; more- over there would be no place that could be picked out by inspection as the centre of the system. In practice X varies, and (as we have seen) the only place of complete accordance for all kinds of light is at A, where u = o. Theoretically, there is no place of complete discordance for all kinds of light, and consequently no complete blackness. In consequence, however, of the fact that the range of

sensitiveness of the eye is limited to less than an " octave," the centre of the first dark band (on either side) is sensibly black, even when white light is employed ; but it should be carefully remarked that the existence of even one band is due to selection, and that the formation of several visible bands is favoured by the capability of the retina to make chromatic distinctions within the visible range.

The number of perceptible bands increases pari passu with the approach of the light to homogeneity. For this purpose there are two methods that may be used.

We may employ light, such as that from the soda flame, which possesses ab initio a rather high degree of homogeneity. If the range of wave-length included be 5-0007), a corresponding number of interference fringes may be made visible. The above was the number obtained by A. H. L. Fizeau. Using vacuum tubes contain- ing, for example, mercury or cadmium vapour, A. A. Michelson has been able to go much farther. The narrowness of the bright line of light seen in the spectroscope, and the possibility of a large number of Fresnel's bands, depend upon precisely the same con- ditions; the one is in truth as much an interference phenomenon as the other.

In the second method the original light may be highly composite, and homogeneity is brought about with the aid of a spectroscope. The analogy with the first method is closest if we use the spectro- scope to give us a line of homogeneous light in simple substitution for the artificial flame. Or, following J. B. L. Foucault and Fizeau, we may allow the white light to pass, and subsequently analyse the mixture transmitted by a narrow slit in the screen upon which the interference bands are thrown. In the latter case we observe a channelled spectrum, with maxima of brightness corresponding to the wave-lengths bul(nD). In either case the number of bands observable is limited solely by the resolving power of the spectro- scope, and proves nothing with respect to the regularity, or other- wise, of the vibrations of the original light.

In lieu of the biprism, reflectors may be invoked to double the original source of light. In one arrangement two reflected images are employed, obtained from two reflecting surfaces nearly parallel and in the same plane. Glass, preferably blackened behind, may be used, provided the incidence be made sufficiently oblique. In another arrangement, due to H. Lloyd, interference takes place between light proceeding directly from the original source, and from one reflected image. Lloyd's experiment deserves to be better known, as it may be performed with great facility and without special apparatus. Sunlight

is admitted horizon- tally into a darkened room through a slit situated in a window- shutter, and, at a distance of 15 to 20 ft., is received at nearly grazing incidence upon a vertical s?ab of plate glass. The length of the slab in the direction of the light should not be less than 2 or 3 in., and for some special observations may advantageously be much increased. The bands are observed on a plane through the hinder vertical edge of the slab by means of a hand-magnify- ing glass of from 1 to 2 in. focus. The obliquity of the reflector is, of course, to be adjusted according to the fineness of the bands required.

From the manner of their formation it might appear that under no circumstances could more than half the system be visible. But according to Sir G. B. Airy's principle (see below) the bands

may be displaced if examined through a prism. In practice all that is necessary is to hold the magnifier somewhat excentric- ally. The bands fhay then be observed gradually to detach themselves from the mirror, until at last the complete system is seen, as in Fresnel's form of the experiment.

The fringes now under discussion are those which arise from the superposition of two simple and equal trains of waves whose direc- tions are not quite parallel. If the two directions of propagation are inclined on opposite sides of the axis of x at small angles a, the expressions for two components of equal amplitude are

cos ˆ-{V<-.v cos a-

y sin a]

and

cos -ˆ-jv/- X

x cos a + y sin a},

so that the resultant is expressed by

2jry sin a 2jr.,., ,

2 cos — =ˆ cos r\t-x cos a),

X X

from which it appears that the vibrations advance parallel to the axis

of x, unchanged in type, and with a uniform velocity V/cos a. Considered as depending on y, the vibration is a maximum when y sin a is equal to O, X, 2X, 3X, &c, corresponding to the centres of the bright bands, while for intermediate values JX, |X, &c, there is no vibration.

From (1) we see that the linear width A of the bands, reckoned from bright to bright or dark to dark, is

A = XD/6 (2).

The degree of homogeneity necessary for the approximate per- fection of the n th Fresnel's band maybe found at once from (1) and (2). For if du be the change in u corresponding to the change < 2X, then

dul\ = nd\/\ (3).

Now clearly du must be a small fraction of A, so that rfX/X must be many times smaller than i/n, if the darkest places are to be sensibly black. But the phenomenon will be tolerably well marked it the proportional range of wave-length do not exceed i/2«, provided, that is, that the distribution of illumination over this range be not con- centrated towards the extreme parts.

So far we have supposed the sources at Oi, O2 to be matherr.atic ally small. In practice, the source is an elongated slit, whost direction requires to be carefully adjusted to parallelism with the reflecting surface or surfaces. By this means an important ad- vantage is gained in respect of brightness without loss of definition, as the various parts of the aperture give rise to coincident s > slims of bands.

The question of the admissible width of the slit requires considera- tion. We will suppose that the light issuing from various parts of the aperture is without permanent phase-relations, as when the slit is backed immediately by a flame, or by an incandescen t fila- ment. Regular interference can then only take place between light coming from corresponding parts of the two images, and a distinction must be drawn between the two ways in which the images may be situated relatively to one another. In Fresnel's experiment, whether carried out with the mirrors or with the biprism, the correspond- ing parts of the images are on the same side; that is, the right of one corresponds to the right of the other, and the left of the one to the left of the other. On the other hand, in Lloyd's arrangement the reflected image

is reversed relatively to the original source; the two outer edges corresponding, as also the two inner. Thus in the first arrangement the bands due to various parts of the slit differ merely by a lateral shift, and the condition of distinctness is simply that the projection of the width of the slit be a small fraction of the width of the bands. From this it follows as a corollary that the limiting width is independent of the order of the bands undei examination. It is otherwise in Lloyd's method. In this case the centres of the systems of bands are the same, whatever part of the slit is supposed to be operative, and it is the distance apart of the images (b) that varies. The bands corresponding to the various parts of the slit are thus upon different scales, and the resulting confusion must increase with the order of the bands. From (1) the corresponding changes in u and b are given by

*du — »XD db/b ; * –*

so that

du/A = -ndb/b (4).

If db represents twice the width of the slit, (4) gives a measure of the resulting confusion in the bands. The important point is that the slit must be made narrower as n increases if the bands are to retain the same degree of distinctness.

§ 6. Achromatic Interference Bands. — We have already seen that in the ordinary arrangement, where the source is of white light entering through a narrow slit, the heterogeneity of the light forbids the visibility of more than a few bands. The scale

of the various band-systems is proportional to X. But this condition of things, as we recognize from (2) (see § 5), depends upon the constancy of b, i.e. upon the supposition that the various kinds of light all come from the same place. Now there is no reason why such a limitation need be imposed. If we regard b as variable, we see that we have only to take b pro- portional to X, in order to render the band-interval A independent of colour. In such a case the system of bands is achromatic, and the heterogeneity of the light is no obstacle to the formation of visible bands of high order.

These requirements are very easily met by the use of Lloyd's mirrors,

and of a diffraction grating (see Diffraction) with which to form a spectrum. White light enters the dark room through a slit in the window-shutter, and falls in succession upon a grating and an achromatic lens, so as to form a real diffraction spectrum, or rather a series of such, in the focal plane. # The central image and all the lateral coloured images except one are intercepted by a screen. The spectrum which is allowed to pass is the proximate source of light in the interference experiment, and since the deviation of any colour from the central white image is proportional to X, it is only necessary to arrange the mirror so that its plane passes through the white image in order to realize the conditions for the formation of achromatic bands.

When a suitable grating is at hand, the experiment in this form succeeds very well. If we are satisfied with a less perfect fulfilment of the achromatic conditions, the diffraction spectrum may be replaced by a prismatic one, so arranged that $<2(X/6)=o$ for the most luminous rays. The bands are then achromatic in the sense that the ordinary telescope is so. In this case there is no objection to a merely virtual spectrum, and the experiment may be very simply executed with Lloyd's mirror and a prism of (say) 20° held just in front of it.

The number of black and white bands shown by the prism is not so great as might be expected. The lack of contrast that soon supervenes can only be due to imperfect superposition of the various component systems. That the fact is so is at once proved by ob- serving according to the method of Fizeau ; for the spectrum from a slit at a very moderate distance out is seen to be traversed by bands. If the adjustment has been properly made, a certain region in the yellow-green is uninterrupted, while the closeness of the bands increases towards the other end of the spectrum. So far as regards the red and blue rays, the original bands may be considered to be already obliterated, but so far as regards the central rays, to be still fairly defined. Under these circumstances it is remarkable that so little colour should be apparent on direct inspection of the bands. It would seem that the eye is but little sensitive to colours thus presented, perhaps on account of its own want of achromatism.

§ 7. Airy's Theory of the White Centre. — If a system of Fresnel's bands be examined through a prism, the central white band undergoes an abnormal displacement, which has been supposed to be inconsistent with theory. The explanation has been shown by Airy {Phil. Mag., 1833, 2, p. 161) to depend upon the peculiar manner in which the white band is in general formed.

" Any one of the kinds of homogeneous light composing the incident heterogeneous light will produce a series of bright and dark bars, unlimited in number as far as the mixture of light from the two pencils extends, and undistinguishable in quality. The consideration, therefore, of homogeneous light will never enable us to determine which is the point that the eye immediately turns to as the centre of the fringes. What then is the physical circumstance that determines the centre of the fringes?

" The answer is very easy. For different colours the bars have different breadths. If then the bars of all colours coincide at one part of the mixture of light, they will not coincide at any other part ; but at equal distances on both sides from that place of coin- cidence they will be equally far from a state of coincidence, ff then we can find where the bars of all colours coincide, that point is the centre of the fringes.

" It appears then that the centre of the fringes is not necessarily the point where the two pencils of light have described equal paths, but is determined by considerations of a perfectly different kind. . . . The distinction is important in this and in other experiments."

The effect in question depends upon the dispersive power of the prism. If v be the linear shifting due to the .prism of the originally central band, v must be regarded as a function of X. Measured from the original centre, the position of the n th bar is now

The coincidence of the various bright bands occurs when this quantity is as independent as possible of X, that is, when n is the nearest integer to

6 dv

D < 2X

(1);

or, as Airy expresses it in terms of the width of a band (A), » = — dv/dA.

The apparent displacement of the white band is thus not v simply, but

v — Adv/dA (2).

The signs of dv and dK being opposite, the abnormal displacement is in addition to the normal effect of the prism. But, since dv/dA, or

dv/dX, is not constant, the achromatism of the white band is less perfect than when no prism is used.

ff a grating were substituted for the prism, v would vary as A, and (2) would vanish, so that in all orders of spectra the white band would be seen undisplaced.

In optical experiments two trains of waves can interfere only when they have their origin in the same source. Otherwise, as it is usually put, there can be no permanent phase-relation, and therefore no regular interference. It should be understood, however, that this is only because trains of optical waves are never absolutely homogeneous. A really homogeneous train could maintain a permanent phase-relation with another such train, and, it may be added, would of necessity be polarized in its character. The peculiarities of polarized light with respect to interference are treated under Polarization of Light.

In a classical experiment interference-bands were employed to examine whether light moved faster or slower in glass than in air. For this purpose a very thin piece of glass may be interposed in the path of one of the interfering rays, and the resulting displacement of the bands is such as to indicate that the light passing through the glass is retarded. In a better form of the experiment two pieces of parallel glass cut from the same plate are interposed between the prism and the screen, so that the rays from Oi (fig. 1) pass through one part and those from O2 through the other. So long as these pieces are parallel, no shifting takes place, but if one be slightly turned, the bands are at once displaced. In the absence'of dispersion the retardation R due to the plate would be independent of X, and therefore completely compensated at the point determined by u = DR/ft ; but when there is dispersion it is accompanied by a fictitious displacement of the fringes on the principle explained by Airy, as was shown by Stokes.

Before quitting this subject it is proper to remark that Fresnel's bands are more influenced by diffraction than their discoverer supposed. On this account the fringes are often unequally broad and undergo fluctuations of brightness. A more precise calculation has been given by H. F. Weber and by H. Struve, but the matter is too complicated to be further considered here. The observations of Struve appear to agree well with the corrected theory.

§ 8. Colours of Thin Plates. — These colours, familiarly known as those of the soap-bubble, are seen under a variety of conditions and

were studied with some success by Robert Hooke under the name of "fantastical colours" (Micrographia, 1664). The inquiry was resumed by Sir Isaac Newton with his accustomed power (" Discourse on Light and Colours," 1675, Opticks, book ii.), and by him most of the laws regulating these pheno- mena were discovered. Newton experimented especially with thin plates of air enclosed by slightly curved glasses, and the coloured rings so exhibited are usually called after him " Newton's rings."

The colours are manifested in the greatest purity when the re- flecting surfaces are limited to those which bound the thin film. This is the case of the soap-bubble. When, as is in other respects more convenient, two glass plates enclosing a film of air are sub- stituted, the light under examination is liable to be contaminated by that reflected from the outer surfaces. A remedy may be found in the use of wedge-shaped glasses so applied that the outer surfaces, though parallel to one another, are inclined to the inner operating surfaces. By suitable optical arrangements the two portions of light, desired and undesired, may then be separated.

In his first essay upon this subject Thomas Young was able to trace the formation of these colours as due to the interference of light reflected from the two surfaces of the plate; or, as it would be preferable to say, to the superposition of the two reflected vibrations giving resultants of variable magnitude according to the phase-relation. A difficulty here presents itself which might have proved insurmountable to a less acute inquirer. The luminous vibration reflected at the second surface travels a distance increased by twice the thickness of the plate, and it might naturally be supposed" that the relative retardation would be .neasured by this quantity. If this were so, the two vibrations reflected from the surfaces of an infinitely thin plate would be in accordance, and the intensity of the resultant a maximum. The facts were notoriously the reverse. At the place of contact of Newton's glasses, or at the thinnest part of a soap-film just before it bursts, the colour is black and not white as the explanation seems to require. Young saw that the reconcilia- tion lies in the circumstance that the two reflections occur under different conditions, one, for example, as the light passes from air to water, and the second as it passes from water to air. According to mechanical principles the second reflection involves a change of sign, equivalent to a gain or loss of half an undulation. When a*

scries of waves constituting any particular coloured light is reflected from an infinitely thin plate, the two partial reflections are in absolute discordance and, if of equal intensity, must give on super-position complete darkness. With the aid of this principle the sequence of colours in Newton's rings is explained in much the same way as that of interference fringes (above, § 5).

The complete theory of the colours of chin plates requires us to take account not merely of the two reflections already mentioned

but of an infinite series of such reflections. This was first effected by S. D. Poisson for the case of retardations which are exact multiples of the half wave-length, and afterwards more generally by Sir G. B. Airy (Camb. Phil. Trans., 1832, 4, p. 409). In fig. 2, ABF is the ray, perpendicular to the wave-front, re- flected at the upper surface, ABCDE the ray transmitted at B, reflected at C and transmitted at D; and these are accompanied by other rays reflected internally 3, 5, &c, times. The first step is to calculate the retardation d between the first and second waves, so far as it depends on the distances travelled in the plate (of index n) and in air.

If the angle ABF = 2a, angle BCD = 2a' and the thickness of plate = /, we have

S = m(BC + CD)-BG = 2/iBC— 2BCsinasina' = 2MBC(l — sin 2 a') = 2)xt cos a' (1).

In (1) a' is the angle of refraction, and we see that, contrary to what might at first have been expected, the retardation is least when the obliquity is greatest, and reaches a maximum when the obliquity is zero or the incidence normal. If we represent all the vibrations by complex quantities, from which finally the imaginary parts are rejected, the retardation S may be expressed by the intro- duction of the factor e~« 6 , where z' = V (-1), and k = 2x/X.

At each reflection or refraction the amplitude of the incident wave must be supposed to be altered by a certain factor which allows room for the reversal postulated by Young. When the light proceeds from the surrounding medium to the plate, the factor for reflection will be supposed to be b, and for refraction c; the corresponding quantities when the progress is from the plate tc the surrounding medium will be denoted by e, f. Denoting the incident vibration by unity, we have then for the first component of the reflected wave b, for the second ce/e -1 '" 8 , for the third ce 3 /e -2 ' lc5 , and so on. Adding these together, and summing the geometric series, we find

In like manner for the wave transmitted through the plate we get

l~ c 2 t us (3)

The quantities b, c, e, / are not independent. The simplest way to find the relations between them is to trace the consequences of supposing S=o in (2) and (3). This may be regarded as a development from Young's point of view. A plate of vanishing thickness is ultimately no obstacle at all. In the nature of things a surface cannot reflect. Hence with a plate of vanishing thickness there must be a vanishing reflection and a total transmission, and accord- ingly

6+e = 0, r/=l-e 2 (4) f

the first of which embodies Arago's law of the equality of reflections, as well as the famous " loss of half an undulation." Using these we find for the reflected vibration,

l- e a e -i«« and for the transmitted vibration

1-e 2

l-e 2 €

(5),

(6).

Intensity of reflected light = e

(I-coskS) 2 -f sin 2 k6

(1- « 2 cos ko)'- +e 4 sin?K& _ 4e 2 sin 2 (|/<5) ~l-2e 2 cosKd+e i

(I-? 2) 2

(7); (8),

The intensities of the reflected and transmitted lights are the squares of the moduli of these expressions. Thus

Intensity of transmitted light — ,— „-= =-; — ,

° l-2e 2 cosrf+e

the sum of the two expressions being unity.

According to (7) not only does the reflected light vanish com- pletely when 5 = o, but also whenever %k& = mr, n being an integer that is, whenever 5 = nX. When the first and third mediums are

the same, as we have here supposed, the central spot in the system of Newton's ring is black, even though the original light contain a mixture of all wave-lengths. If the light reflected from a plate of any thickness be examined with a spectroscope of sufficient resolving power, the spectrum will be traversed by dark bands, of which the centre corresponds to those wave-lengths which the plate is incompetent to reflect. It is obvious that there is no limit to the fineness of the bands which may be thus impressed upon a spectrum, whatever may be the character of the original mixed light.

The relations between the factors b, c, e, f have been proved, independently of the theory of thin plates, in a general manner by Stokes, who called to his aid the general mechanical principle of reversibility. If the motions constituting the reflected and refracted rays to which an incident ray gives rise be supposed to be reversed, they will reconstitute a reversed incident ray. This gives one relation; and another is obtained from the consideration that there is no ray in the second medium, such as would be generated by the operation alone of either the reversed reflected or refracted rays. Space does not allow of the re- production of the argument at length, but a few words may perhaps give the reader an idea of how the conclusions are arrived at. The incident ray (IA) (fig. 3) being 1, the reflected (AR) and refracted (AF) rays are denoted by b and c. When b is reversed, it gives rise to a reflected ray b 1 along AI, and a re- fracted ray be along AG (say). When c is reversed, it Fig. 3. gives rise to cf along AI, and ce along AG. Hence bc--ceˆo, b 2 --cf = i, which agree with (4). It is here assumed that there is no change of phase in the act of reflection or refraction, except such as can be represented by a change of sign.

When the third medium differs from the first, the theory of thin plates is more complicated, and need not here be discussed. One particular case, however, may be mentioned. When a thin trans- parent film is backed by a perfect reflector, no colours should be visible, all the light being ultimately reflected, whatever the wave- length may be. The experiment may be tried with a thin layer of gelatin on a polished silver plate. In other cases- where a different result is observed, the inference is that either the metal does not reflect perfectly, or else that the material of which the film is com- posed is not sufficiently transparent. Some apparent exceptions to the above rule, exhibited by thin films of collodion resting upon silver

surfaces, have been described by R. W. Wood (Physical Optics, p. 143), wh'o attributes the very curious effects observed to frilling of the collodion film.

For study of the colours of thin plates there are no more interesting subjects than the soap-film. For projection the films may be stretched across vertical rings of iron wire coated with paraffin. In their undisturbed condition they thin from the top, and the colours are disposed in horizontal bands. If, as suggested by Brewster, a jet of wind issuing from a small nozzle and supplied from a well-regulated bellows be allowed to impinge obliquely, parts of the film are set in rotation, and displays of colours may be exhibited to a large audience, astonishing by their brilliance and by the rapidity with which they change. Permanent films, analogous to soap-films, are best obtained by Glew's method. A few drops of celluloid varnish are poured upon the surface of water contained in a large dish. After evaporation of the solvent, the films may be picked up upon rings of iron wire.

As a variant upon Newton's rings, interesting effects may be obtained by the partial etching of the surfaces of picked pieces of plate-glass. A surface is coated in parallel stripes with paraffin wax and treated with dilute hydrofluoric acid for such a time (found by preliminary trials) as is required to eat away the exposed portions to a depth of one quarter of the mean wave-length of light. Two such prepared surfaces pressed in the crossed position into suitable contact exhibit a chess-board pattern. Where two uncorroded, or where two corroded, parts overlap, the colours are nearly the same; but where a corroded and an uncorroded surface meet, a strongly contrasted colour is developed. The combination lends itself to projection and the pattern seen upon the screen is very beautiful if proper precautions are taken to eliminate the white light reflected from the first and fourth surfaces of the plates (see Nature, iqoi,

64,385).

Theory and observation alike show that the transmitted colours of a thin plate, e.g. a soap film or a layer of air, are very inferior to those reflected. Specimens of ancient glass, which have undergone superficial decomposition, on the other hand, sometimes "show transmitted colours of remarkable brilliancy. The probable explanation, suggested by Brewster, is that we have here to deal not merely with one, but with a series of thin plates of not very different thicknesses. It is evident that with such a series the transmitted colours would be much purer, and the reflected much brighter, than

usual. If the thicknesses are strictly equal, certain wave- lengths must still be absolutely missing in the reflected light; while on the other hand a constancy of the interval between the plates will in general lead to a special preponderance of light of some other wave- length for which all the component parts as they ultimately emerge are in agreement as to phase.

On the same principle are doubtless to be explained the colours of fiery opals, and, more remarkable still, the iridescence of certain

crystals of potassium chlorate. Stokes showed that the reflected light is often in a high degree monochromatic, and that it is con- nected with the existence of twin planes. A closer discussion appears to show that the twin planes must be repeated in a periodic manner (Phil, Mag., 1888, 26, 241, 256; also see R. W. Wood, Phil. Mag., 1906).

A beautiful example of a similar effect is presented by G. Lipp- mann's coloured photographs. In this case the periodic structure is actually the product of the action of light. The plate is exposed to stationary waves, resulting from the incidence of light upon a reflecting surface (see Photography).

All that can be expected from a physical theory is the determina- tion of the composition of the light reflected from or transmitted by a thin plate in terms of the composition of the incident light. The further question of the chromatic character of the mixtures thus obtained belongs rather to physiological optics, and cannot be answered without a complete knowledge of the chromatic re- lations of the spectral colours themselves. Experiments upon this subject have been made by various observers, and especially by J. Clerk Maxwell (Phil. Trans., i860), who has exhibited his results on a colour diagram as used by Newton. A calculation of the colours of thin plates, based upon Maxwell's data, and accompanied by a drawing showing the curve representative of the entire series up to the fifth order, has been given by Rayleigh (Edin. Trans., 1887). The colours of Newton's scale are met with also in the light trans- mitted by a somewhat thin plate of doubly-refracting material, such as mica, the plane of analysis being perpendicular to that of primitive polarization.

The same series of colours occur also in other optical experiments, e.g. at the centre of the illuminated area when light issuing from a point passes through a small round aperture in an otherwise opaque screen.

The colours of which we have been speaking are those formed at nearly perpendicular incidence, so that the retardation (reckoned as a distance), viz. 2/jf cos a', as sensibly independent of X. This state of things may be greatly departed from when the thin plate is rarer than its surroundings, and the incidence is such that a' is nearly equal to 90 , for then, in consequence of the powerful dispersion, cos o' may vary greatly as we pass from one colour to another. Under these circumstances the series of colours entirely alters its character, and the bands (corresponding to a graduated thickness) may even lose their coloration, becoming sensibly black and white through many alternations (Newton's Opticks, bk. ii.; Fox- Talbot, Phil. Mag., 1836, 9, p. 401). The general explanation of this remarkable phenomenon was suggested by Newton.

Let us suppose that plane waves of white light travelling in glass are incident at angle a upon a plate of air, which is bounded again on the other side by glass. If m be the index of the glass, a' the angle of refraction, then sin a' = ˆsin a; and the retardation, expressed by the equivalent distance in air, is

2t sec a'— n . 2/ tan a' sin a = 2t cos a' ; and the retardation in phase is 2/ cos a'/\, X being as usual the wave- length in air.

The first thing to be noticed is that, when o approaches the critical angle, cos a becomes as small as we please, and that_ conse- quently the retardation corresponding to a given thickness is very much less than at perpendicular incidence. Hence the glass surfaces need not be so close as usual.

A second feature is the increased brilliancy of the light. Ac- cording to (7) the intensity of the reflected light when at a maximum (sin jk5 = i) is 4e 2 /(i+e 2) 5 . At perpendicular incidence e is about I, and the intensity is somewhat small; but, as cos a' approaches zero, e approaches unity, and the brilliancy is much increased.

But the peculiarity which most demands attention is the lessened influence of a variation in X upon the phase-retardation. A diminu- tion of X of itself increases the retardation of phase, but, since waves of shorter wave-length are more refrangible, this effect may be more or less perfectly compensated by the greater obliquity, and conse-

quent diminution in the value of cos a'. We will investigate the conditions under which the retardation of phase is stationary in spite of a variation of X.

In order that X -1 cos a' may be stationary, we must have X sin a'da'+cos a' d\ = o,

where (a being constant)

cos a'da' = sin a dp.

„ / X du , .

Thus cotV=—^ (9),

giving a' when the relation between ju and X is known.

According to A. L. Cauchy's formula, which represents the facts very well throughout most of the visible spectrum,

M = A + BX- 2 so that (10),

, , 2B 2(m-A) . ,

cot V = 535—^— (11).

If we take, as for Chance's "extra-dense flint," B = -984X10 10 , and as for the soda lines, m = '-65, \ = 5-89Xio – ', we get a' = 79°30'.

At this angle of refraction, and with this kind of glass, the retardation of phase is accordingly nearly independent of wave-length, and therefore the bands formed, as the thickness varies, are approxi- mately achromatic. Perfect achromatism would be possible only under a law of dispersion

M 2 = A'-B'X 2 .

If the source of light be distant and very small, the black bands are wonderfully fine and numerous. The experiment is best made (after Newton) with a right-angled prism, whose hypothenusal surface may be brought into approximate contact, with a plate of black glass. The bands should be observed with a convex lens, of about 8 in. focus. If the eye be at twice this distance from the prism, and the lens be held midway between, the advantages are combined of a large field and of maximum distinctness.

If Newton's rings are examined through a prism, some very remarkable phenomena are exhibited, described in his twenty-fourth observation (Opticks ; see also Place, Pogg. Ann., 1861, 114, 504). " When the two object-glasses are laid upon one another, so as to make the rings of the colours appear, though with my naked eye I could not discern above eight or nine of those rings, yet by viewing them through a prism I could see a far greater multitude, insomuch that I could number more than forty .... And I believe that the experiment may be improved to the discovery of far greater numbers. . . . But it was on but one side of these rings, namely, that towards which the refraction was made, which by the refraction was rendered distinct, and the other side became more confused than when viewed with the naked eye. . . .

" I have sometimes so laid one object-glass upon the other that to the naked eye they have all over seemed uniformly white, without the least appearance of any of the coloured rings; and yet by viewing them through a prism great multitudes of those rings have discovered themselves."

Newton was evidently much struck with these " so odd circum-stances "; .and he explains the occurrence of the rings at unusual thicknesses as due to the dispersing power of the prism. The' blue system being more refracted than the red, it is possible under certain conditions that the n ih blue ring may be so much displaced relatively to the corresponding red ring as at one part of the circumference to compensate for the different diameters. A white stripe may thus be formed in a situation where without the prism the mixture of colours would be complete, so far as could be judged by the eye.

The simplest case that can be considered is when the " thin plate " is bounded by plane surfaces inclined to one another at a small angle. By drawing back the prism (whose edge is parallel to the intersection of the above-mentioned planes) it will always be possible so to adjust the effective dispersing power as to bring the « tb bars to coincidence for any two assigned colours, and therefore approxi- mately for the entire spectrum. The formation of the achromatic band, or rather central black band, depends indeed upon the same principles as the fictitious shifting of the centre of a system of Fresnel's bands when viewed through a prism.

But neither Newton nor, as would appear, any of his successors has explained why the bands should be more numerous than usual, and under certain conditions sensibly achromatic for a large number of alternations. It is evident that, in the particular case of the wedge-

shaped plate above specified, such a result would not occur. The width of the bands for any colour would be proportional to X, as well after the displacement by the prism as before; and the succession of colours formed in white light and the number of perceptible bands would be much as usual.

The peculiarity to be explained appears to depend upon the curvature of the surfaces bounding the plate. For simplicity, suppose that the lower surface is plane (y = o), and that the approximate equation of the upper surface is y = a+bx 2 , a being thus the least distance between the plates. The black of the n th order for wave- length X occurs when

ˆrih = a+bx 2 (12);

and thus the width (3) at this place of the band is given by*

i\ = 2bx&x (13);

or hx = Wx = Ub. V(i»X-a) (J 4>-

If the glasses be in contact, as is usually supposed in the theory of Newton's rings, a=o, and SxcoXi, or the width of the band of the recorder varies as the square root of the wave-length, instead" of as the first power. Even in this case the overlapping and subse- quent obliteration of the bands is greatly retarded by the use of the prism, but the full development of the phenomenon requires that a should be finite. Let us inquire what is the condition in order that the width of the band of the n th order may be stationary, as X varies. By (14) it is necessary that the variation of X 2 /(JrcX— a) should vanish. Hence a = JraX, so that the interval between the surfaces at the place where the w th band is formed should be half due to curvature and half to imperfect contact at the place of closest approach. If this condition be satisfied, the achromatism of the n th band, effected by the prism, carries with it the achromatism of a large number of neighbouring bands, and thus gives rise to the remarkable effects described by Newton. Further developments

are given by Lord Rayleigh in a paper " On Achromatic Interference Bands" (Phil'. Mag., 1889, 28, pp. 77, 189); see also E. Mascart, Traite d'optique.

In Newton's rings the variable element is the thickness of the plate, to which the retardation is directly proportional, and in the ideal case the angle of incidence is constant. To observe them the eye is focused upon the thin plate itself, and if the plate is very thin no particular precautions are necessary. As the plate thickens and the order of interference increases, there is more and more demand for homogeneity in the light, and we may have recourse to a sodium-flame or a helium vacuum tube. At the same time the disturbing influence of obliquity increases. Unless the aperture of the eye is reduced, the rays reaching it from even the same point of the plate are differently affected, and complications ensue tending to impair the distinctness of the bands. To obviate this disturbance it is best to work at incidences as nearly as possible perpendicular.

The bands seen when light from a soda flame falls upon nearly parallel surfaces are often employed as a test of flatness. Two flat

surfaces can be made to fit, and then the bands are few and ˆ broad, if not entirely absent ; and, how- ever the surfaces may be presented to one another, the bands should be straight, parallel and equidistant. If this condition be violated, one or other of the surfaces deviates from flatness. In fig. 4, A and B represent the glasses to be tested, and C is a lens of 2 or 3 ft. focal length. Rays diverging from a soda flame at E are rendered parallel by the lens, and after reflection from the surfaces are recombined by the lens at E. To make an observation, the coincidence of the radiant point and its image must be somewhat disturbed, the one being

Fig.

displaced to a position a little beyond, and the other to a position a little in front of the diagram. The eye, protected from the flame by a suitable screen, is placed at the image, and being focused upon AB, sees the field traversed by bands. The reflector D is introduced as a matter of convenience to make the line of vision horizontal.

These bands may be photographed. The lens of the camera takes the place of the eye, and should be as close to the flame as possible. With suitable plates, sensitized by cyanin, the exposure required may vary from ten minutes to an hour. To get the best results, the hinder surface of A should be blackened, and the front surface of B should be thrown out of action by the superposition of a wedge-shaped plate of glass, the intervening space being filled with oil of turpentine or other fluid having nearly the same refraction as glass. Moreover, the light should be purified from blue rays by a trough containing

solution of bichromate of potash. With these precautions the dark parts of the bands are very black, and the exposure may be prolonged much beyond what would otherwise be admissible.

By this method it is easy to compare one flat with another, and thus, if the first be known to be free from error, to determine the errors of the second. But how are we to obtain and verify a standard? The plan usually followed is to bring three surfaces into comparison. The fact that two surfaces can be made to fit another in all azimuths proves that they are spherical and of equal curvatures, but one convex and the other concave, the case of perfect flatness not being excluded. If A and B fit one another, and also A and C, it follows that B and C must be similar. Hence, if B and C also fit one another, all three surfaces must be flat. By an extension of this process the errors of three surfaces which are not flat can be found from a consideration of the interference bands which they present when combined in three pairs.

The free surface of undisturbed water is almost ideally flat, and, as Lord Rayleigh (Nature, 1893, 48, 212) has shown, there is no great difficulty in using it as a standard of comparison. Following the same idea we may construct a parallel plate by superposing a layer of water upon mercury. If desired, the superior reflecting power of the mercury may be compensated by the addition of colouring matter to the water.

Haidinger's Rings dependent on Obliquity. — It is remarkable that the well-known theoretical investigation, undertaken with the view of explaining Newton's rings, applies more directly to a different system of rings discovered at a later date.

The results embodied in equations (1) to (8) have application in the first instance to plates whose surfaces are absolutely parallel, though doubtless they may be employed with fair accuracy when the thickness varies but slowly.

We have now to consider t constant and o' variable in (1). If o' be small,

5 = 2M(l-K 2) = 2M < -*

and since the differences of 6 are proportional to a, the law of formation is the same as for Newton's rings, where a' is constant and / proportional to the square of the distance from the point of contact. In order to see these rings distinctly the eye must be focused,*

not upon the plate, but for infinitely distant objects.

The earliest observation of rings dependent upon obliquity appears to have been made by W. von Haidinger {Pogg. Ann., 1849, 77, p. 219; 1855, 96, p. 453), who employed sodium light reflected from a plate of mica (e.g. 0-2 mm. thick). The transmitted rays are the easier to see in their completeness, though they are necessarily somewhat faint. For this purpose it is sufficient to look through the mica, held close to the eye and perpendicular to the line of vision, at a sheet of white paper or card illuminated by a sodium flame. Although Haidinger omitted to consider the double refraction of the mica and gave formulae not quite correct for even singly refracting plates, he fully appreciated the distinctive character of the rings, contrasting Berilhrungsringe und Plattenringc. The latter may appropriately be named after him. Their tardy discovery may be attributed to the technical difficulty of obtaining sufficiently parallel plates, unless it be by the use of mica or by the device of pouring water upon mercury. Haidinger's rings were rediscovered by O. R. Lummer (Wied. Ann., 1884, 23, p. 49), who pointed out the advantages they offer in the examination of plates intended to be parallel.

The illumination depends upon the intensity of the monochro- matic source of light, and upon the reflecting power of the surfaces. If R be the intensity of the reflected light we have from (7)

i_ T 1 d-e 2) 2 . R " r 4e 2 sin 2 (it5) '

from which we see that if e = i absolutely, l/R = R = i for all values of 5. If e = l very nearly, R = 1 nearly for all values of S for which sin 2 (Jic5) is not very small. In the light reflected from an extended source, the ground will be of full brightness corresponding to the source, but it will be traversed by narrow dark lines. By transmitted light the ground, corresponding to general values of the obliquity, will be dark, but will be interrupted by narrow bright rings, whose position is determined by sin 2(«5) = o. In permitting for certain directions a complete transmission in spite of a high reflecting power (e) of the surfaces, the plate acts the part of a resonator.

There is no transparent material for which, unless at high obliquity, e approaches unity. In C. Fabry and A. Perot's apparatus the reflections at nearly perpenfficular incidence are enhanced by lightly silvering the surfaces. In this way the advantage of narrowing the bright rings is attained in great measure without too heavy a sacri- fice of light. The plate in the optical sense is one of air, and is

bounded by plates of glass whose inner silvered surfaces are accurately flat and parallel. The outer surfaces need only ordinary flatness, and it is best that they be not quite parallel to the inner ones. The arrangement constitutes a spectroscope, inasmuch as it allows the structure of a complex spectrum line to be directly observed. If, for example, we look at a sodium flame, we see in general two distinct systems of narrow bright circles corresponding to the two D-lines. With particular values of the thickness of the plate of air the two systems may coincide so as to be seen as a single system, but a slight alteration of thickness will cause a separation.

It will be seen that in this apparatus the optical parts are them- selves of extreme simplicity; but they require accuracy of con- struction and adjustment, and the demand in these respects is the more severe the further the ideal is pursued of narrowing the rings by increase of reflecting power. Two forms of mounting are em- ployed. In one instrument, called the interferometer, the distance between the surfaces — the thickness of the plate — is adjustable over a wide range. In its complete development this instrument is elaborate and costly. The actual measurements of wave-lengths by Fabry and Perot were for the most part effected by another form of instrument called an etalon or interference-gauge. The thickness of the optical plate is here fixed ; the glasses are held .up to metal knobs, acting as distance-pieces, by adjustable springs, and the final adjustment to parallelism is effected by regulating the pressure exerted by these springs. The distance between the surfaces may be 5 or 10 mm.

The theory of the comparison of wave-lengths by means of this apparatus is very simple, and it may be well to give it, following closely the statement of Fabry and Perot (Ann. chim. phys., 1902, 25, p. no). Consider first the cadmium radiation X treated as a standard. It gives a system of rings. Let P be the ordinal number of one of these rings, for example the first counting from the centre. This integer is supposed known. The order of interference at the centre will be p = P--e. We have to determine this number e, lying ordinarily between o and 1. The diameter of the ring under

consideration increases with e; so that a measure of the diameter allows us to determine the latter. Let t be the thickness of the plate of air. The order of interference at the centre is p = 2t/. This corresponds to normal passage. At an obliquity i the order of

interference is p cos i. Thus if x be the angular diameter of the ring P, p cos |x = P ; or since x is small,

p = P(i +!»).*

In like manner, from observations upon another radiation X' to be compared with X, we have

p' = P'(i+|' 2);*

whence if / be treated as an absolute constant,

*' P / , x 2 x' 2 *

(16).

sin 8;

*The ratio X/X' is thus detei mined as a function of the angular diameters *, x' and of the integers P, P'. If P, say for the cadmium red line, is known, an approximate value of X/X' will usually suffice to determine what integral value must be assigned to P', and thence by (16) to allow of the calculation of the corrected ratio X'/X.*

In order to find P we may employ a modified form of (16), viz.,

P' X / .r 2 x' 2 \ , .

using spectrum lines, such as the cadmium red and the cadmium green, for which the relative wave-lengths are already known with , accuracy from A. A. Michelson's work. To test a proposed integral I value of P (cadmium red), we calculate P' (cadmium green) from (17), using the observed values of x, x'. If the result deviates from an integer by more than a small amount (depending upon the accuracy of the observations), the proposed value of P is to be rejected. In this way by a process of exclusion the true value is ultimately arrived at (Rayleigh, Phil. Mag., 1906, 685). It appears that by Fabry and Perot's method comparisons cf wave-lengths may be made accurate to about one-millionth part ; but it is neces- sary to take account of the circumstance that the effective thickness t of the plate is not exactly the same for various wave-lengths as assumed in (16).

§ 9. Newton's Diffusion Rings. — In the fourth part of the second book of his Oplicks Newton investigates another series of rings, usually (though not very appropriately) known as the colours of thick plates. The fundamental experiment is as follows. At the centre

of curvature of a concave looking-glass, quicksilvered behind, is placed an opaque card, perforated by a small hole through which sunlight is admitted. The main body of the light returns through the ape»ture; but a series of con- centric rings are seen upon the card, the formation of which was proved by Newton to require the co-operation of the two surfaces of the mirror. Thus the diameters of the rings depend ! upon the thickness of the glass, and none are formed when the i glass is replaced by a metallic speculum. The brilliancy of the j rings depends upon imperfect polish of the anterior surface of 1 the glass, and may be augmented by a coat of diluted milk, a | device used by Michel Ferdinand, due de Chaulnes. The rings j may also be well observed without a screen in the manner recommended by Stokes. For this purpose all that is required is to place a small flame at the centre of curvature of the prepared glass, so as to coincide with its image. The rings are then seen surrounding the flame and occupying a definite position in space.

The explanation of the rings, suggested by Young, and developed by Herschel, refers them to interference between one portion of light scattered or diffracted by a particle of dust, and then regularly refracted and reflected, and another portion first regularly refracted and reflected and then diffracted at emergence by the same particle. It has been shown by Stokes (Catnb. Trans., 1851, 9, p. 147) that no regular interference is to be expected between portions of light diffracted by different particles of dust.

In the memoir of Stokes will be found a very complete discussion of the whole subject, and to this the reader must be referred who desires a fuller knowledge. Our limits will not allow us to do more than touch upon one or two points. The condition of fixity of the rings when observed in air, and of distinctness when a screen is used, is that the systems due to all parts of the diffusing surface should coincide; and it is fulfilled only when, as in Newton's ex- periments, the source and screen are in the plane passing through the centre of curvature of the glass.

As the simplest for actual calculation, we will consider a little further the case where the glass is plane and parallel, of thickness t and index m, and is supplemented by a lens at whose focus the source of light is placed. This lens acts both as collimator and as

object-glass, so that the combination of lens and plane mirror replaces the concave mirror of Newton's experiment. The retarda- tion is calculated in the same way as for thin plates. In fig. 5 the diffracting particle is situated at B, and we have to find the relative

retardation of the two rays which emerge finally at inclination 8, the one diffracted at emergence following the path ABDBIE, and the other diffracted at entrance and following the path ABFGH. The retardation of the former from B to I is 2m< +BI, and of the latter from B to the equivalent place Gis 2/xBF. NowFB =/secfl', 0′ being the angle of refraction; BI=2i tan relative retardation F is given by

*R = 2m<(l+Mˆtanfl'sinfl-secfl'} =2/*r(l-cos0')-*

If 8, 6′ be small, we may take

R = 2W 2 /m (i)-

as sufficiently approximate.

The condition of distinctness is here satisfied, since R is the same for every ray emergent parallel to a given one. The rays of one parallel system are collected by the lens to a focus at a definite point in the neighbourhood of the original source.

The formula (1) was discussed by Herschel, and shown to agree with Newton's measures. The law of formation of the rings follows immediately frcm the expression for the retardation, the radius of the ring of n th order being proportional to n and to the square root of the wave-length.

§ 10. Interferometer. — In many cases it is necessary that the two rays ultimately brought to interference should be sufficiently separated over a part of their course to undergo a different treatment; for example, it may be desired to pass them through different gases.

A simple modification of Young's original experiment suffices to solve this problem. Light proceeding from a slit at A (fig. 6) per- pendicular to the plane of the paper, falls upon a colli- mating lens B whose aper- ture is limited by two parallel A and rather narrow slits of

equal width. The parallel rays p IG- g

CE, DF (shown broken in the

figure) transmitted by these slits are brought to a focus at G by the lens EF where they form an image of the original slit A. This image is examined with an eye-piece of high magnifying power. The interference bands at G undergo displacement if the rays CE : DF are

subjected to a relative retardation. Consider what happens at the point G, which is the geometrical image of A. If all is sym- metrical so that the paths CE, DF are equal, there is brightness. But if, for example, CE be subjected to a relative retardation of half a wave-length, the brightness is replaced by darkness, and the bands are shifted through half a band-interval.

An apparatus of this kind has been found suitable for deter- mining the refractivity of gases, especially of gases available only in small quantities (Proc. Roy. Soc, 1896, 59, p. 198; 1898, 64, p. 95). There is great advantage in replacing the ordinary eye-piece by a simple cylindrical magnifier formed ˆ

of a glass rod 4 mm. in diameter. Under these conditions a paraffin lamp sufficed to illuminate the slit at A, and allowed the refractivities of gases to be compared to about one-thousandth part.

If the object be to merely see the bands in full development the lenses of the above apparatus may be dispensed with. A metal or pasteboard tube 10 in. long carries at one end a single slit (analogous to A) and at the other a double slit (analogous to C, D). This double slit, which requires to be very fine, may be made by scraping two parallel lines with a knife on a piece of silvered glass. The tube is pointed to a bright light, and the eye, held close behind the double slit, is focused upon the far slit.

§ 11. Other Refractometers. — In another form of refractometer, employed by J. C. Jamin, the separations are effected by reflections at the surfaces of thick plates. Two thick glass mirrors, exactly the same in all respects, are arranged as in fig. 7. The first of the two interfering rays is that which is reflected at the first surface of the first reflector and at the second surface of the second reflector. The second ray undergoes reflection at the second surface of the first reflector and at the fiist surface of the second reflector. Upon

Fig. 7.

the supposition that the plates are parallel and equally thick, the paths pursued by these two rays are equal. P represents a thin plate of glass interposed in the path, of one ray, by which the bands are shifted.

In Jamin's apparatus the two rays which produce interference are separated by a distance proportional to the thickness of the mirrors, and since there is a practical limit to this thickness, it is not possible to separate the two rays very far. In A. A. Michelson's interferometer there is no such restriction. " The light starts from source S (fig. 8) and separates at the rear of plate A, part of it being

reflected to the plane mirror C, returning exactly, on its path through A, to O, where it may be observed by a telescope or received upon a screen. The other part of the ray goes through the glass plate R x\ A, passes through B, and is re-

D fleeted by the plane mirror D, returns on its path to the start- ing point A, where it is reflected so as nearly to coincide with the first ray. The plane parallel glass B is introduced to com- thickness of glass which the first ray

Without

Fig. 8.

pensate for the extra

has traversed in passing twice through the plate A. it the two paths would not be optically identical, because the first would contain more glass than the second. Some light is reflected from the front surface of the plate A, but its effect may be rendered insignificant by covering the rear surface of A with a coating of silver of such thickness that about equal portions of the incident light are reflected and transmitted. The plane parallel plates A and B are worked originally in one piece, which is afterwards cut in two. The two pieces are placed parallel to one another, thus ensuring exact equality in the two optical paths AC and AD" (see Michelson, Light-Waves and their Uses, Chicago, 1903).

The adjustments of this apparatus are very delicate. Of the fully silvered mirrors C, D, the latter must be accurately parallel to the image of the former. For many purposes one of the mirrors, C, must be capable of movement parallel to itself, usually requiring the use of very truly constructed ways. An escape from this difficulty may be found in the employment of a layer of mercury, standing on copper, the surface of which automatically assumes the horizontal position.

Michelson's apparatus, employed to view an extended field of homogeneous light, exhibits Haidinger's rings, and if all is in good order the dark parts are sensibly black. As the order of interference

increases, greater and greater demand is made upon the homogeneity of the light. Thus, if the illumination be from a sodium flame, the rings are at first distinct, but as the difference of path increases the duplicity of the bright sodium line begins to produce complications. After 500 rings, the bright parts of one system coincide with the dark parts of the other (Fizeau), and if the two systems were equally bright all trace of rings would disappear. A little later the rings would again manifest themselves and, after 1000 had gone by, would be nearly or quite as distinct as at first. And these alterna- tions of distinctness and indistinctness would persist until the point was reached at which even a single sodium line was insufficiently homogeneous. Conversely, the changes of visibility of the rings as the difference of path increases give evidence as to the duplicity of the line. In this way Michelson obtained important information as to the constitution of the approximately homogeneous lines obtained from electrical discharge through attenuated metallic vapours. Especially valuable is the vacuum tube containing cadmium. The red line proved itself to be single and narrow in a high degree, and the green line was not far behind.

But although in Michelson's hands the apparatus has done ex- cellent spectroscopic work, it is not without its weak points. A good deal of labour is required to interpret the visibility curves, and in some cases the indications are actually ambiguous. For instance, it is usually impossible to tell on which side of the principal component a feebler companion lies. It would seem that for spectro- scopic purposes this apparatus must yield to that of Fabry and Perot, in which multiple reflections are utilized; this is a spectro- scope in the literal sense, inasmuch as the constitution of a spectrum line is seen by simple inspection. (R.)

INTERIM, originally a Latin word for " in the meantime." The word was hence applied to certain edicts and decrees passed by the emperor and the diets during the reformation in Germany with the object of temporarily settling a controversy. These " interims " regulated points of religious and ecclesiastical difference until they could be decided by a general council. The best example of such a modus vivendi is the Augsburg Interim of 1548, drawn up by Michael Helding, Julius von Pflug and John Agricola (a medievalist, an Erasmian, and a conservative Lutheran) at the bidding of Charles V., and accepted by the diet. It was an ambiguous document, teaching from the

Roman Catholic side transubstantiation, the seven sacraments, adoration of the Virgin and saints, and papal headship, and from the

Protestant, justification by faith, marriage of priests, the use of the cup by the laity. Maurice of Saxony was permitted to vary the interim for his dominions, and his edition was called the Leipzig Interim. An earlier interim was that of Regensburg,

1541-

INTERLACED ARCHES, the term for a scheme of decoration employed in Romanesque and Gothic architecture, where arches are thrown from alternate piers, interlacing or intersecting one another. In the former case, the first arch mould is carried alternately over and under the second, in the latter the mouldings actually intersect and stop one another. An example of the former exists in St Peter's in the East, Oxford, and of the latter in St Joseph's chapel, Glastonbury, and in the cathedral of Bristol.

INTERLAKEN, a Swiss town (1864 ft.) in the canton of Berne, situated on the flat plain {Bodeli) between the lakes of Brienz (E.) and of Thun (W.), and connected by steamer, as well as by railway (17! m.) with the town of Thun. It is built on the left bank of the Aar, and grew up around the religious house of Austin Canons, founded about 11 30 and suppressed in 1528. In the surviving buildings of the convent religious services (Anglican, Scottish Presbyterian and French Protestant) are now held, while the more modern castle is occupied by offices of the Cantonal Government. The fine and well-shaded avenue called the Hoheweg runs through the main portion of the town, and is lined on the north side by a succession of huge hotels and the large Kursaal. Interlaken is much frequented in summer, partly because of the glorious view of the Jungfrau (13,669 ft.) which it commands to the south, and partly because it is the best starting-point for many excursions, as to Schynige Platte, Lauterbrunnen and Grindelwald. The lines serving these places all start from the eastern railway station (that from Thun reaches the western or main railway station), whence steamers depart for the Giessbach Falls, Brienz and Meiringen, on the way to Lucerne or to the Grimsel Pass. In 1900 the popula- tion of Interlaken was 2962 (mainly Protestant and German- speaking). Opposite Interlaken, and on the right bank of the Aar is Unterseen (in 1900, 2607 inhabitants), which was built in 1280 by Berthold von Eschenbach.

See Fontes rerum Bernensium (original documents up to 1366) (8 vols., Berne, 1883-1903); Die Regesten des Klosters zu Interlaken (Coire, 1849) ; E. Tatarinoff , Die Entwickelung der Probstei Interlaken im XIII. Jahrhundert (Schaffhausen, 1892). (W. A. B. C.)

INTERLOPER, one who interferes in affairs in which he has no concern. This word, with the verbal form " to interlope," first appears at the end of the 16th and beginning of the 17th century in connexion with the interference of unauthorized persons in the trading monopoly of the Russia Company and later of the East India Company. The New English Dictionary quotes from H. Lane (1590), Hakluyt's Voyages, " From those parts the Muscovites were furnished out of Dutchland by enterlopers with all arts and artificers and had few or none by us," and also from the Minutes of the Court of the East India Company, 22nd of February 1615, "to examine all suspected personnes that intend interlopinge into the East Indies or Muscovy." Edward Phillips {New World of Words, 1658) defines interlopers at common law as those " that without legal authority intercept the trade of a company, as it were Interleapers." The word appears to be of English origin, for the Dutch enter- looper, smuggler, often given as the source, was taken frornˆ English, as was the French interlope. The word is a compound of inter, between, and lope, a dialectal variant of " leap." A common word for a vagrant, cr " straggler," as it is defined, was till 1580 " landloper," and the combination of " straggler " and " interloper " is found in Horsey's Travels (Hakluyt Soc), 1603-16 2 7, " all interlopers and straglyng Englishmene lyving in that country."

INTERNATIONAL, THE. The International Working Men's Association, commonly called " The International," was formed at London in 1864. It was a society of working men of all nations, somewhat like a cosmopolitan trades union, but

bearing a still closer resemblance to an international social science association for discussing and furthering the rights of labour. The occasion of its formation was the visit of some French workmen to the London Exhibition of 1862. In the course of their visit the labour question was discussed, and a desire for the further interchange of ideas expressed. Nothing decisive was done till 1864, when a great public meeting of working men of all nations was held at St Martin's Hall, London, and a provisional committee was appointed to draft the con- stitution of the new association.

The first four congresses of the International, held at Geneva (September 1866), Lausanne (1867), Brussels (1868), and Basel (1869), marked the rapid development of the association. It gained

its first triumph in the effectual support of the bronze- workers at Paris during their lock-out in 1867; and it repeatedly aided the English unionists by preventing the importation of cheap labour from the continent. It soon spread as far east as Poland and Hungary, and it had affiliated societies with journals devoted to its cause in every country of western Europe.

It was supposed to be concerned in all the revolutionary movements and agitations of Europe, gaining notoriety as the rallying point of social overthrow and ruin. Its prestige, however, was always based more on the vast possibilities of the cause it represented than on its actual power. Its organization was loose, its financial resources insignificant; the continental unionists joined it more in the hope of borrowing than of con- tributing support. At the successive congresses its socialistic tendencies became more and more pronounced; it declared its opposition to private property not only in railways but in mines and the soil, holding that these should revert to the community. Even the principle of inheritance was saved only by a narrow majority. In 1869 M. Bakunin, the Russian socialist or nihilist, with his party joined the association, and at once asserted his character as the " apostle of universal destruction." The relation of the association to the communal rising at Paris in the spring of 1871 has been the subject of much dispute. It is now agreed that the International as such had no part either in originating or conducting it; some of its French members joined it, but only on their individual responsibility. Its complicity after the event is equally clear. After the fall of the commune the general council of London, Karl Marx included, issued a long and trenchant manifesto, approving its action and extolling the " glorious vanquished." From this point the decline and fall of the association is to be dated. The English unionists, intent on more practical concerns at home, never took a deep interest in its proceedings; the German socialists were hindered by law from corporate action; America was too remote. But it found its worst enemies amongst its own friends; the views of Marx and his school were too moderate for the universally subversive principles of M. Bakunin and the radical Swiss federation of the Jura. It came to a rupture at the congress of 1872, held at the Hague, when Bakunin, being outvoted and " excommunicated " by the Marx party, formed a rival International, which found its chief support in Spain and Italy. Wearied of its European contentions and desirous to form a basis of operation in America, the Marx International now transferred the seat of its general council to New York; but it survived just long enough to hold another congress at Geneva in 1874, and then quietly expired.

The party of destruction styling themselves " autonomists " had a bloodier history. The programme of this party was to overturn all existing institutions, with the view to reconstruct- ing them on some vague communal basis such as had been tried at Paris in 1871. It endeavoured to realize this in the great communal risings in southern Spain in 1873, when its adherents set up their peculiar form of government at Barcelona, Seville, Cadiz and Cartagena — at the last-mentioned place also seizing part of the ironclad fleet of Spain. As at Paris, they failed in leadership and organization, and were suppressed, though not without difficulty, by the national troops. The " autonomists " lingered on till 1879. The collapse was complete of an association

which once extended from Hungary to San Francisco, and alarmed the minds of men with visions of universal ruin.

See Villetard, Histoire de V Internationale (Paris, 1871); Testut, L' Internationale (Paris, 1871); Onslow Yorke, Secret History of the International (London, 1871); J. Rae, Contemporary Socialism; also the articles Marx and Socialism.

INTERNATIONAL LAW, the general term for the law govern- ing the relations and intercourse of states with one another. The parties in its application are states (see State) and not nations, so that the word " international " does not accurately limit the scope of the subject. Nor do authors always confine themselves to its proper limitation. Thus the rules relating to nationality and naturalization, extradition, patents, trade marks, &c, which affect states on the one side and foreign persons on the other, are generally included among the subject- matter of International Law. There is a special branch of International Law known as Private International Law (see International Law, Private) which deals exclusively with the relations of persons belonging to different states, in which states as such are not parties.

The term " international " was first used by Bentham. His explanation of the new term was as follows: —

" The word international, it must be acknowledged, is a new one; though, it is hoped, sufficiently analogous and intelligible. It is calculated to express, in a more significant way, the branch of law which goes commonly under the name of " law of nations," an appellation so uncharacteristic that, were it not for the force of custom, it would seem rather to refer to internal jurisprudence. The chancellor d'Aguesseau has already made, I find, a similar remark;

he says that what is commonly called droit des gens ought rather to be termed droit entre les gens. There remain then the mutual transactions between sovereigns as such, for the subject of that branch of jurisprudence which may be properly and exclusively termed international." l

There has been much controversy as to the aptness of the use of the word " law " in this connexion. " International law," said the 3rd marquess of Salisbury in a speech on the establish- ment of a Court of International Arbitration, " has no existence in the sense in which the term ' law ' is usually understood. It depends generally upon the prejudices of writers of text-books. It can be enforced by no tribunal, and therefore to apply to it the phrase ' law ' is to some extent misleading." 2 This has been more or less the view not only of most British statesmen but also of many practical English jurists. It found one of its most emphatic exponents in Lord Chief- Justice Coleridge. " Strictly speaking," he observed in his judgment on the Franconia case, 3 " international law is an inexact expression, and it is apt to mislead, if its inexactness is not kept in mind. Law implies a lawgiver and a tribunal capable of enforcing it and coercing its transgressors, but there is no common lawgiver to sovereign states, and no tribunal has the power to bind them by decrees or coerce them if they transgress. The law of nations is that collection of usages which civilized states have agreed to observe in their dealings with one another. What these usages are, whether a particular one has or has not been agreed to, must be matter of evidence. Treaties and acts of states are but evidence of the agreement of nations, and do not, in England at least, per se bind the tribunals. Neither certainly does a consensus of jurists, but it is evidence of the agreement of nations on international points, and on such points, when they arise, the English courts give effect as part of English law to such agreement."

In opposition to this view may be cited the more recent one expressed by Lord Russell of Killowen, who challenged Lord Coleridge's view as " based on too narrow a definition of law,' a definition which relies too much on force as the governing idea." " If," he added, " the development of law is historically con- sidered it will be found to exclude that body of customary law which in early stages of society precedes law. As govern- ment becomes more frankly democratic, laws bear less and less the character of commands imposed by a coercive authority, and acquire more and more the character of customary law founded

1 Introduction to the Principles of Morals and Legislation (Clarendon Press edition of 1879).

2 The Times, July 26, 1887. » R. v. Keyn, 2, Ex.D. 63.

on consent. ... I claim that the aggregate of the rules to which nations have agreed to conform in their conduct towards one another are properly to be designated International Law." 1 This recalls Blackstone's definition: " The law of nations is a system of rules, deducible by natural reason, and established by universal consent among the civilized inhabitants of the world, in order to decide all disputes, to regulate all ceremonies and civilities, and to ensure the observance of justice and good faith in that intercourse which must frequently occur between two or more independent states, and the individuals belonging to each." 2 The current English narrower view owes its origin chiefly to the influence of John Austin, and the current broader one to that of Sir Henry Maine. 3 The increasing popularity of references to international arbitration (see Arbitration, International), the adoption of a large number of special treaties making such references compulsory in certain cases, the establishment of and increasing recourse to the court for the decision of difficulties between ' states created by The Hague " Convention for the pacific settlement of disputes between States " of 1899 (see Peace), the adoption of fixed rules of law in the international conventions in 1899, 1907 and 1909 dealing with many of the most controversial questions of international usage, have so transformed the subject that if, as Lord Coleridge said, law implies a lawgiver and a tribunal capable of enforcing it, these conditions are now at any rate partly fulfilled. We shall see below to what extent it may be necessary to regard power of enforce- ment against transgressors as requisite to give international law the character of law properly so-called.

Sanctions. — The subject of the enforcement of International Law, or its " sanctions," has given rise to much controversy. The word " sanction " is derived from the Lat. sanclio, which in turn is derived from sancire, to consecrate. In its original sense sanclio means consecration. From this followed the sense of religious obligation. Thus sancire legem is used by Roman writers as meaning that observance was made obligatory, but without reference to the idea of there being a remedy or penalty for non-observance. With the development of an organized judicial system the religious or moral obligation was displaced by the growth of remedial procedure. Cicero observes of some legal restrictions, hoc non sancitur lege civili (this

is not con- secrated by the civil law, i.e. with penalties). A collateral sense of the word grew up which meant ratification, as where Cicero speaks of sancire acta Caesaris or of sancire joedus.

Bentham, who worked out the theory of legal sanctions as applied to modern law, describes them as equivalent to pleasures and pains derived from four different sources. These are physical, political, moral and religious. The first three belong to experi- ence in the present life, the fourth to that in the present life or hereafter. 4

Austin's analysis of this vague subdivision led him to a more precise determination of the relationship of sanctions to law, viz. that a law properly so-called is a command and its sanction is the power to enforce obedience to it. Stated briefly, any other kind of law according to Austin is not positive law but merely called so by analogy. Applying this test to International Law he concludes that the law obtaining between nations is not posi- tive law; for every positive law is set by a given sovereign to a person or persons in a state of subjection to its author. The law obtaining between nations is only law set by general opinion,

1 Address at Saratoga Springs, N.Y., 1896 {Law Quarterly Review, October 1896).

2 Commentaries on the Law of England, 4th ed., iv. 66.

3 Austin's view, as set out in the Province of Jurisprudence Determined, is that laws proper, or properly so-called, are commands; laws which are not commands are laws improper or improperly so-called. A command implies a definite superior in a position to enforce the command. Where there is no superior to impose obedience there is no law. Rules which " are imposed among nations or sovereigns by opinions current among nations are usually styled the law of nations or international law. Now, a law set or imposed by public opinion is a law improperly so-called " (p. 147). For Sir H. Maine's views see below.

4 Introduction to the Principles of Morals and Legislation (Oxford, 1879), pp. 24 et seq.

with duties which are only enforced by moral sanction; by fear on the part of nations, or by fear on the part of a sovereign, of provoking general hostility, and incurring its probable evils, in case they should violate maxims generally respected. 5

Sir H. Maine's somewhat indirect answer to Austin may now be

taken as the view held at least by British theoretical writers, " Austin," he said, " has shown, though not without some straining of language, that the sanction is found everywhere, in positive law, civil and criminal. This is, in fact, the great feat which he performed, but some of Ins disciples seem to me to draw the inference from his language that men always obey rules from fear of punishment. As a matter of fact this is quite untrue, for the largest number of rules which men obey are obeyed unconsciously, from a mere habit of mind. Men do sometimes obey rules for fear of the punishment which will be inflicted if they are violated, but, compared with the mass of men in each community, this class is but small; probably it is substantially confined to what are called the criminal classes, and for one man who refrains from stealing or murdering because he fears the penalty there must be hundreds of thousands who refrain without a thought on the subject." 6

The view, however, that a law is not devoid of binding character because there is no authority to enforce its observance hardly requires justification at the present day. The fact that any well-established international usage is observed, and that states invariably endeavour to answer any reproach of departing from such usage by explanations showing that the incriminated act is justified by recognized rules of International Law, is evidence of its binding character. As the late Professor Rivier, one of the leading authorities on Roman Law, as well as an international jurist of eminence, has expressed it: " The law of nations is positive law because states wish it to be so. They recognize its compulsory character and proclaim it. As they are their own legislators and make their common laws by express or tacit consent, they attest explicitly and implicitly their conviction that its principles are binding upon them, as judicial principles, as law. Innumerable public acts, affirmations, declarations and conventions are there to prove it. On the other hand, never in any published official act of the present age, verbal or written, has a state dared to declare that it did not consider itself bound by the law of nations and its principles." 7 States, as Professor Rivier says, have again and again solemnly declared their determination to abide by the principles of International Law. Witness the Declaration of Aix-la-Chapelle of November 15, 1818, in which the representatives of five powers, Austria, France, Great Britain, Russia and Prussia, solemnly stated that " the sovereigns in forming this august union have regarded as its fundamental basis their unchangeable resolution never to depart, either amongst themselves or in their relations with other states, from the strictest observance of the principles of the law of nations, principles which,

in their applica- tion to a permanent state of peace, can alone effectively guarantee thˆ independence of each government and the stability of the general association." In the negotiations for the Treaty of London concerning the Black. Sea (March 13, 1871), at which seven powers were represented, Austria-Hungary, France, Germany, Great Britain, Italy, Russia and Turkey, a resolution on the sanctity of treaties was annexed to the first protocol, stating that the plenipotentiaries recognize that it is an essential principle of the law of nations that " no power can liberate itself

5 Province of Jurisprudence Determined (1861), p. 177; Austin explains his view more fully at p. 127.

6 International Law, p. 50.

"Droit des gens (1896), i. 22. Compare Savigny: "A com- munity of judicial conscience can be formed among nations like that which positive law creates in the bosom of one people. The foundations of that intellectual community are constituted partly by a community of race, partly and especially by a com- munity of religious convictions. Such is the basis of the law of nations which exists principally among European Christian states, but which was not known to the peoples of antiquity. We are entitled to look upon this law as a positive law, although it is an incomplete judicial formation " (eine unvollendete Rechtsbildung), System des heutigen romischen Rechts (1840), i. § 11.

from the engagements of a treaty, nor modify the stipulations thereof, unless with the consent of the contracting powers by means of an amicable arrangement." Even in 1908, when Austria-Hungary proceeded to the annexation of Bosnia- Herzegovina without obtaining the prior assent of the high contracting powers, who under the treaty of Berlin of 1878 had granted her temporary occupation of the annexed provinces, the protests of the powers concerned were answered by Austria-Hungary declaring that she had done nothing contrary to the law of nations or affecting the sanctity of treaties, because the powers had given their tacit consent to the practical transformation of her temporary into a permanent occupation.

The public opinion of the civilized world, in fact, plays in an ever-increasing degree the part of a sanctioning authority. With the

growth of international intercourse and international interdependence the danger of isolation or of discredit or even of " boycotting " becomes a matter of increasing importance in the conduct of states. The national press and periodical litera- ture, with exceptions no doubt, are among the chief factors in the development of this public opinion, but it is by no means dependent upon them. Personal intercourse among citizens of the same country, and between statesmen, politicians and citizens of different countries has a still greater effect in the creation of the mental attitude of nations towards each other. This exposes any departure from recognized usage or any dis- regard for international obligations to such reprobation through- out the whole world, that, far from taking advantage of the absence of any coercive method of enforcing obedience to the principles of international law, states compete with each other in asserting their strict fidelity to such principles. And now successive diplomatic conferences have codified many of the chief branches of international usage, thus diminishing the possible cases in which states can take advantage of the uncertainty of the law and, by quibbling over its interpretation, escape from its obligations.

Sources and Foundations. — It is usual, following Wheaton's classification, 1 to enumerate the sources of International Law in the following groups: text- writers of authority as witnesses of usage; treaties of peace, alliance and commerce; ordinances of particular states, prescribing rules for the conduct of their commissioned cruisers and prize tribunals; adjudications of international tribunals; written opinions of official jurists given confidentially to their own government; history of wars, negotiations, treaties and other transactions relating to the public intercourse of nations. It is in these different classes of opinions and precedents that writers have been in the habit of searching for those arguments and analogies on which have been built up the system and principles called International Law.

Wheaton, it is seen, regarded text-writers as witnesses of the usage of nations. He explains his meaning as follows: " With- out wishing to exaggerate the importance of these writers, or to substitute in any case their authority for the principles of reason, it may be affirmed that they are generally impartial in their judgment. They are witnesses of the sentiments and usages of civilized nations, and the weight of their testimony increases every time that their authority is invoked by statesmen, and every year that passes without the rules laid down in their works being impugned by the avowal of contrary principles." This distinguished writer's quasi-explanation of the

sources of Inter- national Law is extremely vague. He masses together cause and effect, private and public opinions, usage and exceptions. Professor Oppenheim has endeavoured to give a more scientific explanation of the growth and development of International Law, and objects to calling sources of International Law what are mere factors influencing its growth: —

"... Custom and treaties," he observes, " are the two exclusive sources of the Law of Nations. When writers on International Law frequently enumerate other sources besides custom and treaties

1 Elements (London, 1885), pp. 22 et seq.

Prece- dents.

they confound the term ' source ' with that of ' cause ' 2 by calling sources of International Law such factors as influence the gradual growth of new rules of International Law without, however, being the historical facts out of which these rules receive their legal force. Important factors of this kind are: Opinions of famous writers on International Law, decisions of prize courts, arbitral awards, instruc- tions issued by the different states for the guidance of their diplomatic and other organs, state papers concerning foreign politics, certain municipal laws, decisions of municipal courts. All these and other factors may influence the growth of International Law either by creating usages which gradually turn into custom, or by inducing the members of the Family of Nations to conclude such treaties as stipulate legal rules for future international conduct.

" A factor of the special kind which also influences the growth of International Law is the so-called comity (Comitas gentium, Con- venance et courtoisie Internationale, Staatengunst) . In their inter- course with one another states do observe not only legally binding rules and such rules as have the character of usages, but also rules of politeness, convenience and goodwill. Such rules of international conduct are no rules of law, but of comity. The Comity of Nations is certainly not a source of International Law, as it is distinctly the contrast to the Law of Nations. But there can be no doubt that many a rule which formerly was a rule of International Comity only is nowadays a rule of International Law. And it is certainly to be expected that this development will go on in future also, and that thereby many a rule of present International Comity will in future become one of International Law." 3

We prefer to regard International Law as deriving the rules

composing it from practically the same sources as domestic law, and to attribute to text-writers more or less the same value in its development as in that of the private law of nations. The same primary rules of conduct are appealed to between states as between individuals, and precedents play exactly the same part wherever human actions are concerned. In both cases what has been done before commends itself when the responsibility of taking steps pledging the future is concerned. Statesmen on whom great responsibility impends, on whom the conduct of momentous negotiations has devolved, and who will have to render an account of their work to the sovereign or nation they represent, preserve an argument in their own favour in departing as little as possible from any course taken in previous similar circumstances. Precedents, moreover, are arguments for acceptance by their adversaries or counter-negotiators. In fact, in diplomacy even more than in matters of domestic government precedents play a dominant part in the growth of usage. These precedents are often in themselves originally local usages, such as grew up in the intercourse of the Italian communities. Italy, in fact, served as a laboratory for early diplomatists and writers. It was in the influence. intercourse of these active and ambitious states, that grew up the very notion of a foreign diplomacy and the necessity of rules of conduct in this miniature Europe, with its perpetual antagonisms and jealousies, its balance of power, its idea of a state distinct from a nation and of a community of

2 " It seems to me," says Professor L. Oppenheim, " that most writers confound the conception of ' source ' with that of ' cause,' and through this mistake come to a standpoint from which certain factors which influence the growth of International Law appear as sources of rules of the Law of Nations. This mistake can be avoided by going back to the meaning of the term ' source ' in general. Source means a spring or well, and has to be defined as the rising from the ground of a stream of water; and, wanting to know whence it comes, we follow the stream upwards until we come to the spot where it rises naturally from the ground. On that spot, we say, is the source of the stream of water. We know very well that this source is not the cause of the existence of the stream of water. ' Source ' signifies only the natural rising of water from a certain spot of the ground, whatever natural causes there may be for that rising. If we apply the conception of source in this meaning to the term ' source of law ' the confusion of source with cause cannot arise. Just as we see streams of water running over the surface of the earth, so we see, as it were, streams of rules running over the area of law. And if we want to know

whence these rules come, we have to follow

these streams upwards until we come to their beginning. Where we find that such rules rise into existence there is the source of them. Of course, rules of law do not rise from a spot on the ground as water does; they rise from facts in the historical development of a community. Thus a good many rules of law rise every year from the Acts of Parliament. Source of Law is therefore the name for an historical fact out of which rules of conduct rise into existence and legal force " {International Law, London, 1905, sec. 15.). 3 International Law (London, 1905) sec. 19.

Orotlus.

Pufen- ttorf.

states elbowing each other in their daily contact. It was there that grew up the institution of passports, the distinction between armed forces and civilians, international comity, and in fact the very notion that states have an interest in the observance of law and order among them. In the same way the active commercial intercourse in the Mediterranean led, in the common interest, to the development of rules of the sea in time of peace, and later to others in time of war.

In the north of Europe, again, out of the active commercial intercourse among the Baltic and North Sea communities grew rules of the sea in the same common interest. It was y ,rty , the Thirty Years' War, with its revolting cruelty, War. which brought out the contrast between the more

humane practice of war as an art in Italy and the mere bludgeonry which prevailed in the brutal struggle which disgraced the first half of the 17 th century. The brutality of the struggle turned thinkers' attention to the need of formulating rules for the protection in time of war of non-combatants and the innocent subjects of absolute sovereigns, the treatment of the sick and wounded, the prohibition of wanton pillage and the other horrors which shocked the awakening conscience of northern Europe. It was the starting-point of the age of text-books.

The first effective work, the one which was the first to influence sovereigns and statesmen, was Grotius's De jure belli ac pacts (Paris,

1625), which practically exhausted the theoreti- cal arguments in favour of the new subject. Nobody has in fact since brought to light any new conception of the foundations of international law. An exhaustive and masterly treatise having been published, no further subsequent treatise was necessary to show what all men were beginning to feel. He sublimated the feelings of his age, and having arrived at the pure substance, the work of proving the need of his subject was disposed of for all time. Pufendorf (1632-1697), who, in the sequence of effective text-writers, succeeded Grotius, endeavoured to base international law on an ethical basis accepted by all peoples without necessity for a common creed or standard of morals, but it is doubtful, whatever may have been the extent to which he stimulated the study of jurisprudence, whether he did much in advancing the practical development of the law of nations. His book De jure naturae et gentium (1672), as its name indicates, based international law on what he called the law of nature, a subject which has much exercised the minds of jurists searching for an ethical basis for existing law.

The scientific mind of Leibnitz (1646-1716) revolted against this theoretical and doctrinaire tendency of Pufendorf and other writers, who were following with feeble tread in the giant footsteps of Grotius. He saw that the practice of nations was taking a course dictated by the current moral standards of civilized society, and that the philosophizing of the text-book writers was leading them away from that actual practice which they should use as data for their conclusions. Natural science, moreover, had taught him the risk of theorizing on imperfect data, and while writing a history of Brunswick it occurred to him that treaties and diplomatic documentb generally were the substances and tests of the publicist's laboratory. His codex juris gentium diplomaticus (1693-1700) gave a more precise direction to speculations on the subject.

The next great writer of authority united all the qualities of a practical lawyer and jurist. This was Bynkershoek (1673- 1743). He was the first writer on international lav/ shoe"' wno dealt with public maritime law as a matter demanding special treatment and involving a set of principles not called into action in territorial warfare. A magistrate administering the law in a great commercial country, whose interests were on or across the high seas rather than within the narrow European limits of Holland, Bynkershoek, like Leibnitz, searched for his data in the actual practice of nations in their intercourse with one another. He applied his clear legally trained mind to deriving principles from practice instead of endeavouring to build up a practice on abstract principles. It was he

who first generalized the different isolated usages

Leibnitz.

Vattel.

which had grown up at different spots in northern Europe in the interest of maritime defence, and evolved from practice the principle that dominion seawards was limited to the extent to which it was possible to enforce it (cannon-shot range), a principle which not only created the legal institution of territorial waters, but has since been imported into other branches of International Law, and has indirectly influenced the suppression of fictitious blockades and more recently of fictitious occupations of territory. A contemporary of Bynkershoek was Christian de Wolff (1679-1754), a philosopher, mathematician, theologian, lawyer and disciple of Leibnitz. Wolff's great work on the Institutions of the Law of Nature and Nations is a learned wont. and accurate treatise drawn from all the well-known sources of knowledge, and, just as Grotius based his demonstra- tions on the then imperfect knowledge of public events of his time, Wolff based his on the more accurate sources of information which had grown up under the influence of Leibnitz, and created a connected system out of the scattered fragments available. But his book was written in Latin at a period when scholarship had declined, and its influence was only felt after Vattel (1714- 1767) wrote his Droit des gens, ou principes de la loi naturelle dppliquees a la conduite et aux affaires des nations et des eouverains (1758). His book had all the charm, although Vattel was a Neufchatelois, of the French writers of his time, and he it was who popularized the study of International Law. His book was based chiefly on the work of Wolff, but in it he gave what was- best amongst his predecessors without attempting to add anything original of his own. It became the handbook of statesmen and jurists, and has never ceased to be quoted by them down to the present day.

But the opinions of jurists in International Law can have little more than the value of criticism and co-ordination. They have seldom served to make law, though they have the weight of all statements made by those who have made a special study of any branch of law, as to what they had gathered to be the existing practice at the time when they wrote, or as to the trend which they showed that practice might be taking. Great lawyers and writers like those we have mentioned, and such as Lord Mansfield, Sir William Scott, Chief-Justice Marshall and others, have done the work of classifying facts, deducing con- clusions from them and connecting rules with

psychological and ethical motives, and have thus sent a current of higher intelligence through the subject which has raised it to its present methodical form. Still International Law remained a wide field for con- troversy. Authors were agreed on general principles, but when these general principles were applied in practice, the shortcomings of unwritten usage often caused as much difficulty as that which the appeal to principles was intended to overcome.

What may be called the first enactment of rules of Inter- national Law was the Declaration of Paris of 1856, but the great work of codification, or rather of reducing into writing n axuea nd the rules which had been floating as an unwritten law London in the conscience of Europe, was undertaken by the Confer- Hague Conferences, which may be said to be and to eaces – have created an entirely new factor in the domain of International Law. Two of the conventions adopted in 1899 completed work which had already been commenced long before, viz. those on the usages of war and on the adaptation of the Geneva Con- vention to naval war. The third established methods for the pacific settlement of international difficulties, including the formation of the Hague Court of Arbitration. Recourse to"t]je latter was purely optional, but the other two conventions have been absorbed into the national law of the ratifying countries, and thus have also the domestic sanction states give to their own laws. The work of the Conference of 1907 was of a much wider and more exhaustive character than that of 1899. It comprised, besides revised conventions on the matters dealt with in 1899, new Conventions on the following subjects: Opening of hostilities; Position in naval war of enemy's merchant ships at beginning of hostilities; Conversion of merchant vessels into warships; Rights and duties of neutral states in naval war; The laying of automatic submarine contact mines; The

bombardment of undefended places by naval forces; Treatment of fishing vessels, postal correspondence and capture generally in maritime war; and Recovery by force of contract debts. It also adopted a convention for the creation of an International Prize Court of Appeal, which led to the calling of a fresh Con- ference on Prize Law. This conference sat in London from December 4, 1908, to February 26, 1909, and was confined to representatives of the following countries: Great Britain, France, Germany, United States of America, Italy, Austria- Hungary, Russia, Japan, Holland and

Spain. It adopted a series of rules on naval warfare relating to Blockade in time of war; Contraband of war; Unneutral service; Destruction of neutral prizes; Transfer to neutral flag; Enemy character; Convoy; and Resistance to search and Compensation.

The revolution effected in the relations of states by the Hague and London Conferences, however, is not confined to the reduc- tion into writing of more or less vague usages nor to the elabora- tion of details which no usage can possibly determine. Until a machinery was provided for the reform of the law it was futile to speculate on the advantages or disadvantages of any rule admitted by the majority of civilized nations. The territorial waters 3″ m. limit, for instance, had its origin in the distance seawards of cannon- range in a past period. Its almost universal recognition only came long after the range of coast-guns had far exceeded this distance. This superannuated rule has now no legal basis at all except the so-called ” common consent of nations,” a boon no doubt which outweighs any consideration of absolute fitness still unrecognized, but of which the learned Barbeyrac truly said, 1 ” Ce commun consentement des peuples que Ton suppose avoir force de loi est une chose qu'on ne prouvera jamais.” The institution of the Hague Conferences has now provided a method of obtaining the consent of nations, not only to existing rules, but to their reform and to the introduc- tion of new rules. It is now an understanding among the states of the world, that these conferences shall be held periodically. It is, of course, possible fc- one great state to hold aloof and thus wreck the chances of universal agreement, but even then we have the power of the majority as against that of the minority. A case actually arose in a recent war between non-signatories of the declaration of Paris of 1856. Neither the United States nor 'Spain was a party to that declaration, yet neither ventured to disregard it.

The chief source of International Law will, therefore, in all probability for the future be that ” Parliament of mankind,” the Hague Conferences. The Hague Court and its adjunct in time of war, the proposed International Prize Court of Appeal, will form the Judicature applying and construing the enactments of the Conferences acting as a sort of international Legislature.

Fundamental Principles. — Underlying the details of both

the new International Legislature and the new International

Judicature are certain principles which may some day

Standard ˆave to be officially defined. These principles have of right „ , • , , f t r- 1

conduct. necessarily fluctuated with the standard of morals

of each period. With the contemporary development

of the public conscience, they are undergoing changes and a

betterment which it is not desirable to check by yet nailing them

up as immutable articles of faith. Till quite recently it was usual

to speak of the common standard of right conduct prevailing

throughout the Christian world, a standard to which responsible

statesmen tried to adjust their direction of the affairs of state.

The admission of Japan into the councils of the great powers has

introduced a non-Christian element whose standard of conduct

was not identical with nor based upon Christian morals. Turkey,

though admitted in 1856 to European Councils, remained rather

the occasion of their deliberations than a deliberating party.

Her new position as a constitutional state, with a code of morals

at any rate in some essentials distinct from that of Christian

peoples, will add a further new non-Christian element into the

moral foundations of international conduct. The influence of

western Europe, however, in both Japan and Turkey, has

hitherto in all external development been paramount. Japan,

1 Note 8 to Grotius, L., ii. c. iii. § 3.

after examining all the existing systems, has even adopted the best she found in Western morals, and in her schools inculcates Christian ethics as a subject per se without reference to divine revelation or authority. Turkey too has the advantage of possess- ing a code of morals which produces so high a standard of right conduct in private

life that very little in the way of moral lessons will have to be learned by the Ottomans from Western civiliza- tion. As regards practice, it is unreasonable to expect that the high estimate of the moral standard of west European civiliza- tion, which is cherished by those who profess its principles, should be accepted by other peoples with unqualified assent. Are not the nations of western Europe still vaguely influenced by the instincts of their conquering ancestors, and by the tradi- tions of —

"… the good old rule, . . . The simple plan,

That they should take who have the power

And they should keep who can " ?

There is nothing essentially different between many recent wars and military enterprises undertaken by Western nations against heathen peoples, and wars and conquering enterprises undertaken by the Northmen of a thousand years ago. In his Northern Antiquities Mallet 2 describes the primitive feeling of the Northmen in the following passages: —

" The rules of justice, far from checking their prejudices, had been themselves warped and adapted to their bias. It is no exaggeration to say that all the Teutonic nations entertained opinions on this subject quite opposite to the theory of our times. They looked upon war as a real act of justice, and esteemed it an incontestable title over the weak, a visible mark that God had intended to subject them to the strong. They had no doubt but the intentions of this divinity had been to establish the same dependence among men which there is among animals, and setting out from the principle of the inequality of men, as our modern civilians do, from that of their equality, they inferred thence that the weak had no right to what they could not defend. This maxim which formed the basis of the law of Nations among the ancient inhabitants of Europe being dictated by their most darling passion, we cannot wonder that they should so steadily act up to it in practice. And, which after all is worst, to act and think as they did, or, like the moderns, with better principles, to act as ill? As to the ancient nations, we attribute nothing to them here but what is justified to them by a thousand facts. They adopted the above maxim in all its rigour and gave the name of Divine Judgment not only to the Judiciary Combat, but to conflicts and battles of all sorts: victory being in their opinion the only certain mark by which Providence enables us to distinguish those which it has appointed to command others."

The very notion of the " right of conquest," and that the

victorious are entitled to an indemnity without reference to any

question of right and wrong or of justice and injustice,

shows that there are principles in actual practice which , h .f ,s . a*

,1 , ■ , • • 1 r civilized

he outside and have no analogy in the principles of state?

private law. In the partition of Africa native states have been treated as non-existent except as local bodies. They have been annexed to European states without reference to their will or consent. Treaties have indeed been made with them, but they have rather been regarded as evidence of prior occupa- tion than as involving any question of native right. The test in the distinction between civilized and uncivilized states which is regarded as warranting exclusion from enjoyment of the right to consideration as independent states, and admission to the community of the civilized world, is in practice the possession of a regular government sufficient to ensure to Europeans who settle among them safety of life and property. Every country, in principle, possessing such a government has prima facie the rank of a state and is entitled to treatment as a civilized com munity. Treaties made with it for the purpose of extra-territorial jurisdiction are intended merely to take into account a difference of judicial institutions but are not supposed to detract otherwise from the possession of such equality and independence: This principle has no analogy in private morals, and has been, slight as it is, more honoured in the breach than the observance. If indifference to native right has provoked reaction, it has been on the part rather of philanthropists than of statesmen. Their movement for the protection of African aborigines has, however, 2 Bishop Percy's translation (1847), p. 138.

resulted in at least one great international charter for the pre- vention of the further degradation of African aborigines, viz. the General Act of Brussels of 1885. A vigorous outcry has also been raised against the methods of the government of the Congo State. But the agitation ought not to be confined to this part of Central Africa. Other governments are also in fault. In fact, the contact of the

European with Central Africa has, throughout, with few exceptions, been one of barbarous practice quite incon- sistent with the principles which Christian missionaries have been sent to teach the African native.

In the case of European enterprise in Asia, the " good old rule " has had still less justification. The action taken for the repression of the Boxer movement in China, like previous Euro- pean incursions, had no essential characteristic distinguishing it from the expeditions of the Northmen described by Mallet in the above – quoted passage. The Japanese took part in the " Boxer " expedition, and the example of respect for native right and of orderly self-restraint they set has been universally acknowledged. But the lesson is one of greater significance than one of comparative ethics. The rise of the power of Japan and her obvious determination to constitute herself the champion of the races of eastern Asia has widened the scope of International Law, and we may now regard China as henceforth under the protection of the same principles as European states.

The three chief principles of inter-state intercourse, those, in fact, on which International Law is based are: —

1. Recognition of each other's existence and integrity as

states.

2. Recognition of each other's independence.

3. Recognition of equality, one with another, of all

independent states. As regards the first of these principles see State. From the principle of independence it follows that every state has a right to change its form of government and to enjoy the Chief f ree exerc i se f it s internal energies. This is subject

only to the limitation that in the exercise of this right other states or their subjects shall not be molested or otherwise suffer. The equality of all independent states entitles them to respect by other states of all the forms of ceremonial and to the same treatment by others, where their interests are identical, whether they are strong or weak. This principle has often been violated, but it is, nevertheless, acknowledged wherever possible, as in diplomatic conferences relating to all matters of an economic, hygienic, industrial or social character. Even at the Conference of Algeciras, though the powers immediately concerned from a political point of view were only Great Britain, France, Germany and Spain, the following were also represented as having economic interests in Morocco, Austria-Hungary, Italy, Russia, Belgium, Holland, Portugal and Sweden.

Ships on the high sea being regarded as detached portions of the national territory, there is also the derived principle of the freedom of the high sea, of the independence and equality upon it of the ships of all nations, subject only to due respect being paid to the independence and equality of all others and to such conventional restrictions as states may impose upon themselves (see Territorial Waters). This principle is re-enunciated in the preamble to the Convention of 1907 on the laying of automatic submarine contact mines (see Peace Conferences).

The Hague Conventions are based on these principles, to which there is a tendency to add another, viz. the right to arbitration in certain cases. This principle is set out The right more or i ess tentatively, it is true, but it is being Won. " completed by separate treaties of compulsory arbitra- tion in connexion with the cases referred to. It is enunciated in the following article of the Convention of 1907 for the pacific settlement of International disputes: —

" In questions of a legal nature, and especially in the interpretation or application of International Conventions, arbitration is recognized by the contracting powers as the most effective, and, at the same

time, the most equitable means of arranging disputes which

prin- ciples.

High sea.

diplomacy has failed to settle. Consequently, it is desirable that, in disputes regarding the above-mentioned questions, the contracting powers should, if need be, have recourse to arbitration, in so far as circumstances permit " (Art. 28).

The principle of arbitration has also been adopted in reference to the recovery of contract debts under the following article of the " Convention respecting the limitation of the employment of force for the recovery of contract debts " : —

" The contracting powers agree not to have recourse to armed force for the recovery of contract debts claimed from the government of one country by the government of another country as being due to its subjects or citizens. This undertaking is, however, not applic- able when the debtor state refuses or neglects to reply to an offer of arbitration, or, after accepting the offer, renders the settlement of the Compromis impossible, or, after the arbitration, fails to comply with the award " (Art. 1).

The codification of International Law itself, begun at the Hague and London Conferences, is an admission of the binding character of the primary principles set out above.

One of the chief tendencies of contemporary reform is also to restrict the effect of fictions and reduce rights to the limits of their practical application. Between two alternatives, R es tric» the one to assert rights which cannot possibly be tion of maintained by force such as claims to dominion over effect of portions of the high sea (see High Sea, Territorial fictions. Waters), "paper blockades" (see Blockade) and fictitious occupations of territory (see Occupation), and the other to require actual physical assertion, a medium course is growing up, viz. that of recognizing potential assertion, that is assertion limited to physical possibilities. 1 With the aid of the Institute of International Law, the International Law Association and other reforming agencies (see Peace), expert opinion in these matters is becoming homogeneous throughout the civilized world, and the ground is being prepared for a clearer understand- ing of these fundamental principles by the statesmen ,and state officials who have to apply them in practice.

Bibliography. — The following are works on international law, diplomacy and treaty relations, from the beginning of the 19th century until 1910. Many of the older authors have been omitted to permit the inclusion of more recent writers.

Alcorta, Tratado de derecho international (Buenos Aires, 1878); D. Anzilotti, Teoria generate della responsabilitct dello Stato nel dirillo internazionale (Florence, 1902) ; Arendt, Le Droit public et la neutrality de la Belgique (Brussels, 1845); Nagao Ariga, La Guerre russo- japonaise, au point de vue continental et le droit international (Paris, 1908), La Guerre sino-japonaise au point de vue du droit international (Paris, 1896); Sir Sherston Baker, First Steps in International Law (London, 1899) ; Barboux, Jurisprudence du conseil des prises pendant la guerre franco-allemande (1872); Sir T. Barclay, Problems of International Practice and Diplomacy (London, 1907) ; T. Baty,In- ternational Law (London, 1909) ; Bello, Principios de derecho international, 2nd ed. by Silva (Madrid, 1884); Norman Bentwich, The Law of Private Property in War with a Chapter on Conquest (London, 1 907) ; Bergbohm, Staats-Vertrdge und-Gesetze als Quellen des Volkerrechts (Leipzig, 1877); T. M. Bernard, Four Lectures on Subjects connected with Diplomacy (London, 1868); Bluntschli, Das moderne Volkerrecht der civilisirten Staaten als Rechtsbuch dargestellt (Nordlingen, 1868), trans, into French by Lardy (Le Droit international codifiS) (Paris, 2nd ed., 1874), Die Bedeutung und die Fortschritte des modernen Volkerrechts (2nd ed., Berlin, 1873); De Boeck, Le Droit de la propriety ennemie privee sous pavilion ennemi (Paris, 1882); Henri Bonfils, Manuel de droit international public (1894, 4th ed., by Fauchille, 1904); Percy Bordwell, The Law of War between Belligerents — a History and Commentary (Chicago, 1908); Bornemann, Forelaesninger over den positive folkeret (Copen- hagen, 1866); Brusa, Del modierno diritto internazionale pubblico (Florence, 1876) ; De Burgh, Elements of Maritime International Law (London, 1868); Aug. von Bulmerincq, Praxis, Theorie und Codification des Volkerrechts (Leipzig, 1874), Das Volkerrecht (1887); Montagu Burrows, History of the Foreign Policy of Great Britain (London, 1897); Charles Henry Butler, The Treaty-making Power of the United States (2 vols., New York, 1902); Carlos Calvo, Le Droit international (5th ed., 6 vols., Paris, 1896); Cauchy, Le Droit maritime international considers dans ses origines et ses rapports avec les progres de la civilisation (2 vols., Paris, 1862), Du respect de la propriety privee dans la guerre maritime (Paris, 1866); Carnazza- Amari, Trattato di diritto internazionale de pace (2 vols., 1 867-1 875); Pitt Cobbett, Cases and Opinions on International

Law and various points of English Law connected therewith (London, 1st ed. 1885,

1 We have seen this in the progress made in the three instances given above at the Congress of Paris (1856), the Conference of Berlin (1878) and the Hague Conference of 1907.

2nd ed. 1892, 3rd ed. 19O9) (part 1, " Peace ") ; Miguel Cruchaga, Nociones de derecho international (1899, 2nd ed. 1902); Cogordan, La Nationality an point de vue des rapports intemationaux (Paris, 1879); de Courcy, Reforme Internationale du droit maritime (Paris, 1863); R. T. Crane, State in Constitutional and International Law (1907) ; Creasy, First Platform of International Law (London, 1876) ; G. B. Davis, Outlines of International Law, with an Account of its origin and sources, and of its historical development (New York, 1887) ; Elements of International Law, with an account of its origin, sources and historical development (new and revised edition, New York and London, 1900); de Clercq, Recueil des traites, conventions et actes diplomatiques conclus par la France avec les puissances etrangeres, publies sous les auspices du min. des aff.' etrangeres (Paris, 21 vols.); Descamps, L'Evolution de la neutrality en droit international (Brussels, 1898); F. Despagnet, Cours de droit international public (2nd ed., Paris, 1899), La Diplomatie de la Troisieme Republique et le droit des gens (Paris, 1904) ; Professor Giulio Diena, Principi di diritto internazionale (Naples, 1908) ; Dufraisse, Histoire du droit de guerre et de paix (Paris, 1867); Jacques Dumas, Les Sanctions de Varbitrage international (Paris, 1905) ; E. Duplessix, La Loi des nations, projet de code de droit international public (Paris, 1906) ; L' Organisation internationale (Paris, 1909) ; Charles Dupuis, Les Tarifs douaniers et les traites de commerce (Paris, 1895); Le Principe d'equilibre et le concert europeen de la paix de Westphalie a I'acte d'Algesiras (Paris, 1909) ; Eden, Law of Nature and of Nations, Policy of Europe (London, 1823); Ed. Engelhardt. Du regime con ventionnel des fleuves intemationaux (Paris, 1879); Paul Errera, Das Staatsrecht des Kbnigsreichs Belgien (Tubingen, 1909) ; T. H. S. Escott, The Story of British Diplomacy; Its Makers and Movements (London, 1908); Fauchille, La Diplomatie francaise el la ligue des neutres de 1780 (1776-1783) (Paris, 1893) ; Du Hocus maritime (Paris, 1882); Ferguson, A Manual of International Law (2 vols., London, 1884); David Dudley Field, Outlines of an International Code (New York

and London, 2nd ed., 1876); Fiore, Trattado di diritto internazionale pubblico (3rd ed., Turin, 1888), Nouveau Droit international public (3 vols., Paris, 1885); Le Droit international codifie et sa sanction juridique — traduit de I'italien par A. Chretien (Paris, 1889); Funck-Brentano et Sorel, Precis du droit des gens (Paris, 1877, new ed. 1894); Fusinato, // Principio delta scuola italiana nel diritto internazional pubblico (Macerata, 1884); Francois Gairal, Le Protectorat international (Paris, 1896); E. M. Gallaudet, Inter- national Law (New York, 1886); Guillaume de Garden, Histoire generate des traites de paix, et autres transactions principales, entre toutes les puissances de I'Europe depuis la paix de Westphalie (14 vols., Paris, 1848-1859); Gareis, Institutionen des V ' Hkerrechts (1888, 2nd ed., 1901); L. Gessner, Zur Reform des Kriegseerechts (Berlin, 1875), Le Droit des neutres sur mer (2nd ed., Berlin, 1876), Guelle, Droit international. La guerre continentale et les personnes (Paris, 1879); Gueronniere, Le Droit public de I'Europe moderne (Paris, 1876); Guesalaga, Derecho diplomatico y consular (Buenos Aires, 1900) ; Hagerup, " La Neutrality permanente" (Revue generate du droit international public) (Paris, 1905) ; VV. E. Hall, A Treatise on Inter- national Law (6th ed., edited by j. B. Atlay, Oxford, 1909) ; Foreign Powers and Jurisdiction of the British Crown (London, 1894); H. W. Halleck, International Law (Philadelphia, 1866, edit, by Sir Sherston Baker, 4th ed., 2 vols., London 1908); A. B. Hart, Foundations of American Foreign Policy (New York, 1901) ; Hartmann, Institutionen des praktischen Volkerrechts in Friedenszeiten (1887); L. B. Haute- feuille, Quelques questions de droit international maritime a propos de la guerre d ' Amirique (Leipzig and Paris. 1861); Droits et devoirs des nations neutres (3 vols., 3rd ed., Paris, 1868); Questions de droit maritime international (Paris, 1868) ; Histoire des origines, des progres et des variations du droit maritime international (Paris, 1858. 2nd ed. 1869); Heffter, Das europaische Volkerrecht der Gegenwart (Berlin, 1855, trans, into French by Bergson, Le Droit international de I'Europe, 4th ed., enlarged and annotated by Geffcken, Berlin and Paris, 1883); Amos E. Hershey, The International Law and Diplomacy of the Russo-Japanese War (New York, 1906) ; Hertslet's Commercial Treaties (24 vols., London, 1840-1907); Sir Edward Hertslet, Map of Europe by Treaty, showing the territorial changes since the general Peace of 1814-1891 (4 vols., London, 1875-1891) ; Map of Africa by Treaty (1778-18Q5) (3 vols., London, 1896), Index to British and Foreign State Papers, vols. 1 to 63 (1879); A. Pearce Higgins, The Hague Peace Conferences and other International Conferences concerning the Laws and Usages of War (Cambridge, 1909) ; Historicus (Sir William Harcourt). Letters on

some Questions of International Law (1863); Albert E. Hogan, Pacific Blockade ; T. E. Holland, The Elements of Jurisprudence (London, 1880, 10th ed., Oxford, 1906), Studies in International Law (Oxford, 1898), The Laws of War on Land (Oxford, 1908), Letters to The Times upon War and Neutrality (1881-1909) with some commentary (London, 1909) , British Admiralty Manual of the Law of Prize (1888) ; G. F. W. Holls, The Peace Conference at The Hague (New York, 1900); Holtzen- dorff, Handbuch des Volkerrechts (4 vols.. Hamburg, 1885-1889); J. Hosack, On the Rise and Growth of the Law of Nations from the earliest Times to the Treaty of Utrecht (London, 1882); Huber, Die Stmten-Succession, volkerrechtliche und staatsrechtliche Praxis im iq. Jahrhundert (Leipzig, 1898); International American Conference, Plan of Arbitration for the settlement of disputes between the American Republics, Report and Recommendations (Washington, 1890);

International American Conference, Report and Recommendations concerning a Uniform Code of International Law (Washington, 1890) ; Joseph Imbart Latour, La Mer territoriale (Paris, 1889) ; Atherley Jones, Commerce in War (London, 1907); Kaltenborn, Critik des Volkerrechts (Leipzig, 1847), Zur Geschichte des Natur- und Volker- rechts (Leipzig, 1848); L. Kamarowsky, Le Tribunal international (trans, into French by Serge de Westman, Paris, 1887); Wilhelm Kaufmann, The Egyptian State Debt and its Relation to International Law (London, 1892); Die Rechtskraft des internationalen Rechtes (Stuttgart, 1899) ; Kennedy, Influence of Christianity on International Law (Cambridge, 1856); James Kent, Commentary on International Law (rev. with notes and cases by J. T. Abdy, 2nd ed. rev., London, 1877); Kleen, De la contrebande de guerre (Paris, 1893), Lois el usages de la neutrality (2 vols., Paris, 1898-1900), Krigets historia ur folkrdttelig Synpunkt (Stockholm, 1906), Kodificerad Handbok i Krigets Lagar till lands och till Sjos (Stockholm, 1909) ; Otto Krauske, Die Entwickelung der stdndigen Diplomatie vom iˆlen Jahrhundert bis zu den Beschliissen von 1815 und 1818 (Leipzig, 1885); Jean Lagor- gette, Le Role de la guerre. Etude de la sociologie generate (Paris, 1905) ; Lammasch, Fortbildung des Volkerrechts durch die Haager Conferenz (Munich, 1900) ; Alma Latifi, Effects of War on Property, being Studies in International Law and Policy (London, 1909) ; Frangois Laurent, Histoire du droit des gens et des relations inter- nationales, continued at vol. iv. under title of Etudes de I'histoire de I'humanite (18 vols., Brussels, 1861-1880); Laveleye, Du respect de la propriete privee en temps de guerre (Brussels, 1875) I T. J. Lawrence, Essays on Disputed Questions of Modern International Law (Cam- bridge,

1884), The Principles of International Law (London, 1895, 3rd ed. 1900), Handbook of Public International Law (4th ed., London, 1898), War and Neutrality in the Far East (London, 1904); Emile Lefevre, Reorganisation du consulat francais d Vetranger (Paris, 1883); Ernest Lehr, La Nationality dans les principaux ktats du globe (Paris, 1909) ; Ernest Lemonon, La Seconde Conference de la paix (Paris, 1908, an exhaustive volume in 790 pp.) ; de Leval, De la protection diplomatique des nationaux a Vetranger (Brussels, 1907) ; Leone Levi, The Law of Nature and Nations as affected by Divine Law (London, 1855), International Law, with Materials for a Code of International Law (London, 1888); Liszt, Das Volkerrecht (1898, 6th ed., 1910); Lorimer, The Institutes of the Law of Nations (2 vols., London, 1883); Lueder, Der neueste Codificalionsversuch auf dem Gebiete des Volkerrechts (1874) ; Theo. Lyman, Diplomacy of the United States (Boston, 1828); Mackintosh, Discourse on the Study of the Law of Nature and Nations (2nd ed., London, 1828); Sir Henry S. Maine, International Law (London, 1888): Terenzio Mamiani, Des traites de 1815 et d'un nouveau droit europeen, traduit par Leonce Lehmann (Paris, 1862); Mancini, Diritto internazionale (Naples, 1873); Manning, Commentaries on the Law of Nations (London, 1839, 2nd ed., by Sheldon Amos, 1875); Mariotti, Du droit des gens en temps de guerre (Paris, 1883) ; C. de Martens, Causes celebres du droit des gens (Leipzig, 5 vols., 1858-1861); G. F. de Martens, Recueil de traites des puissances et etats de I'Europe (1761, continued under other editors down to present time), Cours diplo- matique, ou tableau des relations exterieures des puissances de I'Europe, tant entre qu'avec etats dans les diverses parties du globe (Berlin, 1801, 3 v. o), Precis du droit des gens modernes de I'Europe. Augmente des notes de Pinheiro-Ferreira, avec bibliographie par C. Verge (2 vols., Paris, 1864), Law of Nations, trans, by W. Cobbett (London, 1829); F. de Martens, Le Droit international actuel des peuples civilises, trans, by L60 (Traite de droit international) (3 vols., Paris, 1883); Edwin Maxey, International Law (St Louis, 1909) ; A. Merignhac, Traite de droit public international, vol. i., " Les Prolegomenes," " Les Theories gencrales," vol. ii., "Le Droit de la paix" (Paris. 1905-1907), Traite theorique et pratique de I' arbitrage international (Paris, 1895); La Conference international de la paix (Paris, 1900) ; Christian Meurer, Die Haager Friedenskonferenz (2 vols., 1905-1907); Mass6, Le Droit commercial dans ses rapports avec le droit des gens (4 vols., Paris, 1844-1848) ; Mohl, Encyclopddie der Staatswissenschaften, Staatsrecht, Volkerrecht und Politik (3 vols., 1860-1869); John Bassett Moore, History and Digest of the International Arbitrations to which the United States has been a Party (6 vols., Washington,

1898, official), " Asylum in Legations and Consulates and in Vessels " (Political Science Quarterly, vol. vii., Nos. 1, 2 and 3, New York, 1902); Digest of International Law, as embodied in diplomatic discussions, treaties and other international agreements, international awards, the decisions of municipal courts and the writings of jurists and especially in documents published and unpublished issued by presidents and secretaries of state of the United States, the opinions of the Attorneys-General and the decisions of courts, federal and state (8 vols., Washington, government printing office, 1906); Morin, Lois relatives A la guerre selon le droit des gens modernes. Droit public et droit criminel des pays civilises (Paris, 1872); Negrin, Derecho maritimo international (Madrid, 1873); Neumann, Grundriss des heutigen europdischen Volkerrechtes (Vienna, 1856, 3rd ed., 1885, trans, into French by Riedmatten, Elements du droit des gens europeens, Paris, 1885); Nippold, Fortbildung des Verfahrens in volkerrechtlichen Streitigkeiten (1907); Ernest Nys, Le Droit international (4 vols., Brussels and Paris, 1904-1906) ; Le Droit de la guerre et les precurseurs de Grotius (Paris, 1882) ; Les Theories politiques et le droit international en France jusqu'au XVIII' siecle (Brussels and Paris, 2nd ed., 1899); Etudes de droit international et de droit politique (2 e seYie, Brussels and*

Paris, 1901, Le Droit romain, le droit des gens et le college des docteurs en droit civil (Brussels, 1910) ; Marquis de Olivart, Trattato y notas de derecho international publico (2 vols., 1887, 4th ed., 1903); Luigi Olivi, Di alcune odierne tendenze del diritto internazionale (Venice, 1907) ; Onezimo, Discurso sobre la historia del derecho international (Buenos Aires, 1872); Oppenheim, System des Vblkerrechts (Frank- fort, 1845); L. Oppenheim, International Law, vol. i. "Peace," vol. ii. " War and Neutrality " (London, 1905-1906); International Incidents for Discussion in Conversation Classes (Cambridge, 1909; solutions are not given); Gerechtigkeit und Gesetz (Basel, 1895); Ortolan, Regies internationales et diplomalie de la mer (4th ed., Paris, 1864); Paiva, Elementos de direito des gentes (Coimbra, 1864); Pando, Elementos de derecho international (Madrid, 1843, 2nd ed., 1852); Pardessus, Us. et coutumes de mer (Paris, 1847); Paroldo, Saggio di codificazione del diritto internazionale (Turin, 1851); Perels, Das internationale Seerecht der Gegenwart (Berlin, 1 882-1903; transl. Arendt, Manuel de droit maritime international (Paris, 1884); Perez-Gomar, Curso

de derecho de gentes (Montevideo, 1 864-1 866); Pertille,, Elementi di diritto internazionale nel seculo XIX. (Naples 1877), Trattato di diritto internazionale (1881); Sir R. Phillimore, Commentaries upon International Law (4 vols., 3rd ed., London, 1879-1889) ; Coleman Phillipson, Effect of War on Contracts (London, 1909), Studies in International Law (London, 1908); Robert Piede- lievre, Precis de droit international public (2 vols., 1891-1895); Pierantoni, Storia del diritto internazionale nel seculo XIX. (Naples, 1877), Trattado di diritto internazionale (1881-1887); Sir F. T. Piggott, Nationality, including Naturalization and English Law on the High Seas and beyond the Realm (2 vols., London, 1907), Ex- territoriality, Law relating to Consular Jurisdiction and to Residence in Oriental Countries (Hongkong and London, 1907) ; Pillet, Recherches sur les droits fondamentaux des etats dans I'ordre des rapports inlernationaux (Paris, 1899); Pinheiro-Ferreira, Droit public interne et externe (Paris, 1830); Sir Frederick Pollock, "The Monroe Doctrine " {Nineteenth Century, 1902); Poison, Principles of the Law of Nations (London, 1848); J. N. Pomeroy, International Law in Time of Peace, ed. by Theo. D. Woolsey (New York, 1886) : Pradier-Fodere, La Question de V Alabama et le droit des gens (Paris, 1872), Traile de droit international public europien et americain (7 vols., Paris, 1885-1897); Quaritsch, Compendium der europdischen Vblkerrechts (Berlin, 1873); Carman F. Randolph, The Law and Policy of Annexation with special reference to the Philippines together with Observations on the Status of Cuba (London, New York and Bombay, 1901), " Notes on the Foreign Policy of the United States suggested by the War with Spain " (New York, 1898, pamphlet), W. F. Reddaway, The Monroe Doctrine (Cambridge, 1898); Reddie, Inquiries in International Law (London, 1842); Maritime Inter- national Law (Edinburgh, 1844-1845), Emil Reich, Foundations of Modern Europe (London, 1904) ; Renault, Introduction d, I'etude du droit international (Paris, 1879) ; Riquelme, Elementos de derecho publico international (Madrid, 1849); A. Rivier, Principes du droit des gens (2 vols., Paris, 1896); Saalfeld, Grundriss eines Systems des europdischen Vblkerrechts (Gottingen, 1809); C. Salomon, L' Occupa- tion des territoires sans maitre, etude de droit international (Paris, 1889); Sanchez, Elementos de derecho international publico (Madrid, 1866); Eugene Schuyler, American Diplomacy and Furtherance of Commerce (New York, 1886); James Brown Scott, Cases on Inter- national Law (Boston, 1902), The Hague Peace Conference of 1S99 and 1907 (2 vols., Baltimore, 1909); R. F. Seijas, El Derecho inter- national hispano-americano, publico y privado (6 vols., Caracas, 1884); Senior, Law of Nations, &c. (London, 1865); Sheldon Amos,

Lectures on International Law (London, 1874); Sierra, Lecciones de derecho maritime international (Mexico, 1854); F. E. Smith, International Law (London, 1900, " Temple Primers " series) , International Law as interpreted during the Russo-Japanese War (in collaboration with N. W. Sibley; London, 2nd ed., 1907); Stephen, International Law and International Relations (London, 1884); Ellery C. Stowell, Consular Cases and Opinions from the Decisions of the English and American Courts and the Opinions of the Attorneys-General (Washing- ton, D.C., 1909); Sakuye Takahashi, Cases on International Law during the Chino- Japanese War (Cambridge, 1900) , International Law applied to the Russo-Japanese War with the Decisions of the Japanese Prize Courts (London, 1908); H. L. Strisower, "Die Donaufrage" Zeit- schrififur das prival. undbffentliche Recht der Gegenwart (Vienna, 1884) ; Hannis Taylor, Treatise on International Public Law (Chicago, 1901) ; Tetens, Droits reciproques des puissances belligerantes et des puissances neutres sur mer. Principes du droit de guerre en general (Copenhagen, 1805); Tetot, Repertoire des traites de paix, de commerce, d'alliance, etc., conventions et autres actes conclus entre loutes les puissances du globe principalement depuis la paix de Westphalie jusqu' & nos jours (Partie chronologique, 1866, partie alphabetique, 1873, supplement, 1895); Alberto Torres, Vers la paix. Etudes sur I'elablissement de la paix generate et sur V organisation de I'ordre international (Rio de Janeiro, 1909) ; Heinrich Triepcl, Vblkerrecht und Landesrecht (Leipzig, 1899); Sir Travers Twiss, The Law of Nations considered as Independent Communities (2 vols., 2nd ed., London, 1875-1892); von Ullmann, Vblkerrecht (1895; 2nd ed. 1908) ; Verraes, Les Lois de la guerre et la neutrality (Brussels, 1906) ; T. A. Walker, The Science of International Law (London, 1893), Manual of Public International Law (London, 1895), History of the Law of Nations (London, 1899); John Westlake, Chapters on the

Principles of International Law (Cambridge, 1894), International Law, vol. i. "Peace" (Cambridge, 1904), vol. ii. "War" (1907); Francis Wharton, Digest of the International Law of the United States, taken from documents issued by Presidents and Secretaries of State, from decisions of Federal Courts and Opinions of Attorneys-General (Washington, 1886, 3 vols., official), The Revolutionary Diplomatic Correspondence of the United States (6 vols., Washington, 1889, official) ; H. Wheaton, History of the Law of Nations in Europe and America from the earliest times to the Treaty of Washington, 1842 (New York, 1845) ; Elements of International Law (1st ed., 1836; edit. Lawrence, 1855; edit. Dana, 1866; edit.

Boyd, London, 1880; edit. Abdy, Cambridge, 1888; 3rd Eng. ed. by Sir Sherston Baker, 1893; 4th Eng. ed. by Atlay, 1904) ; Wildman, Institutes of International Law (London, 1849); Theodore D. Woolsey, Introduction to the Study of International Law (6th ed., New York, 1891); Spencer Walpole, Foreign Relations (" English Citizen " series, London, 1882) ; Andr6 Weiss, " Crimes et delits politiques dans les rapports de l'Autriche et de la Russie " (Journal de droit international prive, Paris, 1883). (T. Ba.)

INTERNATIONAL LAW (PRIVATE). There is in every territory the law of the land, or territorial law, by which the courts decide all cases that include no circumstances connected with any foreign territory. Often, however, such a circumstance suggests the question whether justice does not require that the law of some other territoiy shall be applied. Thus the Gretna Green marriages, by which English minors escaped the necessity of banns or the consent of parents or guardians, suggested the question, which was answered in the affirmative, whether even in England their validity ought not to be tried by the law of Scotland, where they were celebrated. Often, again, the question is suggested whether justice does not require that the courts of law should allow some effect to foreign legal proceedings, such as a judgment obtained or litigation pending abroad. Such questions as these are answered by private international law, which, since both laws and legal proceedings are emanations of public authority, may be denned as the department of legai science which is concerned with the effect to be given in the courts of law of any territory to the public authority of another territory. The extradition of criminals is also an effect given to foreign public authority, but rather by the government which surrenders the criminal (see Extradition) than by the courts of law, whose only function is to check the surrender so far as the domestic legislation allows them to do so. If private inter- national law were denned as the effect to be given by any mode in one territory to the public authority of another, extradition would be included in it, as is often done; but since the principles governing extradition have little to do with those applicable to the other cases, it seems best to treat it as a separate depart- ment of law, as is generally done in England.

Comity of Nations. — In the 17th century the Dutch jurists Paul and John Voet and Huber brought forward a view which has since been largely adopted in England and the United States, namely, that the effect given by courts of law to foreign public authority is only due to the comity of nations, but for which every possible question before them would have to be decided by the law of the land. Comity, in that phrase, may only be intended to express the truth that foreign

public authority has no inherent effect, without denying that the effect which domestic public authority allows to it is dictated by justice. But the limitations implied in the popular meaning of comity have sometimes been made the ground for deciding questions of private international law in the manner supposed to be most for the interest of litigants belonging to the territory; the phrase is consequently reprobated by most European continental writers, and had better be dropped. The justice on ivhich private international law is founded acknowledges no interest but the general one of intercourse between persons sharing a common civilization in different countries. This interest, as manifesting itself in the domain of law, it seeks to satisfy, and it is therefore a true legal justice, rightly classed under law, droit, recht, diritto, derecho and other corresponding terms.

Of the two words which, together with law, make up the title of our subject, private is justified by the fact that its application is between litigants in courts of law, and not between governments except so far as they may be such litigants. International (although interterritorial would be better) is justified by the

facts that public authority, which may be internationally foreign, has to be considered, and that governments display a great interest in the question by concluding treaties about it, and occasionally even by suspending diplomatic relations when a court of one country has applied to the subjects of another a rule which the government of the latter deems unjust. But those who think that the primary division of law should be into public and private, and not into international (or interterritorial) and territorial, object to the order in which the three words of the name are usually placed, and call the subject " international private law."

Conflict of Laws. — This is another name for our subject, and indeed an older one than " private international law," besides being still much used. But although laws may differ, they cannot properly be said to conflict, unless each can lay a just claim to application in the same circumstances. Now this does not happen. The justice which points out that in certain cases effect ought to be given in one territory to the laws or legal proceedings of another really traces the limits of laws and legal proceedings in space; and the tracing of limits is rather the prevention of conflict than its solution. Savigny

has well pointed out that our subject is analogous to the determination of the limits of laws in time, which has to be made when the just application of a new enactment is to be distin- guished from the ex post facto application which cannot justly be allowed it. The truth which is aimed at in the phrase " conflict of laws " is that the main problem of our subject is the selection of a law for each given case; but different laws are candidates for selection, not from anything in them as laws, but from differing opinions about the justice of the case. From this selection, again, will be seen the contrast between private inter- national law and attempts at the assimilation of the laws of different countries. To a great extent such assimilation is desir- able, especially in mercantile law, but it must always be limited by different views of social order and differences in national habits of thought and action. So far as it is realized, private international law comes to an end with the occasion for selection.

Territory. — This word, as entering into the definition of private international law, does not imply a separate state, whether sovereign or semi-sovereign; it includes every geo- graphical area having a separate legal system, England and Scot- land, as well as France or Germany. The case of the Gretna Green marriages illustrates the necessity of rules of private international law between all such, as well as between areas internationally foreign to one another; and indeed the rules are so applied, and in the language of our subject, the area of every separate legal system is foreign to every other such area. Only where a rule contemplates a person as attached more or less permanently to a particular territory, the tie which so attaches him to it may be either nationality or domicile if the territory is a separate state, as France; but it can only be domicile if the territory is combined with others in one state. Nothing but domicile can distinguish British subjects as belonging to England, Scotland or Jamaica, or citizens of the United States as belonging to New York or Pennsylvania.

Legal rules must have relation to the physical and mental characters, and the consequent habits of action, of the populations for which they are intended; they would not satisfy legal justice if they endangered social order as understood and desired by those populations, or if they failed to give due effect to the expectations of parties. This must be true for the rules of private international law as well as for those of any territorial law, and it leads us to ask whether the differences which preclude the universal identity of the latter must not also preclude the existence of the former. The answer is: (i) That where circum- stances connected with different territories are concerned, wise rules for the selection of a law will generally give

better effect to the expectations of the parties than an exclusive adherence to the territorial law of the court; (2) That the circumstances in which a foreign law is held to apply are exceptional as compared with those in which the domestic law applies, and naturally occur oftenest among the persons and in the affairs having most

of a cosmopolitan character, so that the moral shock of applying to them a law founded on a foreign social order is greatly attenu- ated; (3) That throughout Christendom (to which Japan has now been added for legal purposes) there does exist, though not an identity, yet a considerable similarity in views of social order and prevalent habits of thought and action. Within the same geographical limits there also exists another requisite for the working of a system of private international law, namely, a mutual confidence between countries in the enlightenment and purity of their respective judicatures, to whose proceedings the respect enjoined by the rules of our subject is to be mutually given.

Even within the geographical limits just mentioned there are certain differences on points of social order, especially on marriage or divorce, which have hitherto prevented a complete agreement being attained in the rules of private international law. But no attempt has ever been made to establish any system of the kind as between Christian communities and Mahommedan or other polygamous ones, or between countries enjoying a Christian standard of civilization and those, of which China may be taken as an example, which, whether polygamous or not, do not inspire the necessary confidence in their judicatures. In Turkey and other Eastern countries (in which designation Japan is no longer included for purposes of law) Christians are placed by treaty under the jurisdiction in civil matters of their respective consuls. When in the courts of Christian countries Eastern persons or circumstances connected with Eastern laws have to be dealt with, the peculiar institutions of those countries are not enforced; and while in other respects the judges may be assisted by some of the rules of private international law, especially such as have for their object to carry into effect the reasonable intentions of parties, yet those rules are not applied as parts of an authoritative system.

Rules for the selection of the territorial law to be applied in the different classes of cases, or for the recognition of foreign legal proceedings, have sometimes been made the subject of international treaties, and have often been enacted by territorial legislatures. England possesses a few such enactments, as in the Bills of Exchange

Act 1882, and many other countries possess them to a much larger extent in their codes. Where such enact- ments exist, or where treaty stipulations have been entered into, and the territorial law makes such stipulations binding on the judges, the courts of law must obey and apply them as they must obey and apply any other part of the law of the land. If, as in England, judicial precedents are held to be binding, so that the law of the land consists in part of judge-made law, a similar result is produced; an English court must follow English precedents on the application of foreign law or the refusal to apply it, to the same extent to which it would be bound to follow them on any other point. So far as our matter remains open for a judge, he has, to assist him towards a just decision, the treaties, written laws and judicial precedents of other countries as examples, and a vast literature which has grown up in all Christian countries. That this apparatus is far from having furnished concordant results is due, not only to the divergences on points of social order referred to, but also to the different bases of the legal systems with which the respective governments and writers have been familiar. The legal systems of different countries have been founded on Roman law, feudal law, English common law and still other bases. The arguments of lawyers are affected by the prepossessions thence arising, and – they have consequently failed to arrive by their unaided efforts at so much agreement on the rules of private international law as would have been compatible with the conditions and modes of life and action surrounding them. But the general accept- ance of a complete body of rules on private international law is a goal which for other countries than England is well within sight by the road of international treaties concluded under the joint direction of professional and non-professional minds.

The most remarkable steps taken in or towards the conclusion of such treaties are those initiated, to its high credit, by the

government of the Netherlands. That government first moved in the matter in 1874, and has succeeded in assembling at the Hague the official representatives of nearly all European powers in conferences held in 1893, 1894, 1900 and 1904. At these conferences rules on many branches of private international law were agreed on for submission to the respective governments, which has led to conventions, one of the 14th of November 1896, three of the 12th of June 1902, and four of the 19th of July 1905, regulating the

selection of the laws for determining the validity of marriage and of contracts made on the occasion of marriage, their effects on property and on the status of the wife and children, divorce and judicial separation, the guardianship of minors and of interdicted persons, the validity of testamentary dispositions and the rules of intestate succession, and many points of judicial procedure. These conventions may be found at length in the Revue de droit international et de legislation comparee, t. 28, pp. 574-579; 2 e serie, t. 4, pp. 485-500; and 2 e serie, t. 7, pp. 646-678. A draft relating to bankruptcy was also prepared at the conference of 1904, but was intended to serve, not as a general convention, but as the base of separate conventions to be concluded between particular states. The extent to which the continent has become united with regard to private inter- national law appears from the fact that France, Germany, Italy, the Netherlands, Portugal, Rumania and Sweden are parties to all the conventions — that Luxemburg, Russia and Spain are parties to those relating to judicial procedure — and that all the ten except Russia, but with the addition of Austria, Belgium and Switzerland, are parties to those on the validity of marriage, divorce and judicial separation, and the guardianship of minors; while all remain open to adhesion by other powers. It is much to be regretted that the British government has declined all invitations to take part in this great international work. The fact must in part be ascribed to the hindrance which the differ- ence between the English common law and the Roman law places, even for lawyers, in the way of joint action with the con- tinent, and in part to the necessity that the rules laid down in any convention should be enacted for the United Kingdom by parliament, the leaders of which belonging to either party take no interest in any such matters.

Next in importance among combined official efforts should be mentioned the congress of seven South American states at Monte- video in 1 888- 1 889, which on many branches of private inter- national law drew up rules intended for adoption by treaty on that continent.

Nationality: Domicile. — Coming now to the particular rules of private international law which are received in England, or have been most widely received elsewhere, the most obvious cases which present themselves for admitting foreign circum- stances to influence the decision of a judge are those in which rights are so connected with the person of an individual that the justice of deciding on them by a law having relation to hiS'person speaks almost for itself. Hence arises the notion of a personal law, which must be that either of the person's political nation- ality or of his domicile, these being the only

circumstances that for the time being are fixed for the individual, irrespectively of the spot where he may happen to be, and of the transaction in which he may happen to engage. We have seen in the article on Domicile what is the legal meaning of that term, how its existence is ascertained, that in and long after the middle ages it was the usual criterion of the personal law, and that in modern times political nationality has largely replaced it as such criterion on the continent of Europe. Thus as well by the conventions mentioned as by the codes of many states — France, Italy and Germany among the number — the capacity and status of persons is now governed by the law of their political nationality. In Latin America the criterion of the personal law is still generally held to be domicile, which is among the reasons why the South American states prefer to pursue the codification of private international law independently of European conferences and conventions.

The English courts were slow to recognize a personal law at all and as iate as Lord Eldon's time they held that the com-

petency of a person to contract depended on the law of the place where the contract was made. Their decisions have since come into line with the continental decisions so far as to make capacity and status depend on a personal law, but not so far as to make nationality its criterion. Hence in England, and in a minority of European continental countries, of which Denmark is an example, the capacity of a party to enter into a contract, whether it be disputed on the ground of his age, or, in the case of the contract of marriage, on the ground of his consanguinity or affinity with the other party, will be decided by the law of his domicile. Guardians, curatoraand committees of foreign minors or lunatics, deriving their authority from the law or jurisdiction of the latter's domicile or nationality, can sue and give receipts for their personal property. A court will not decree the divorce of persons not domiciled within its jurisdiction, and it will recognize foreign divorces if, and only if, they have been decreed by a jurisdiction to which the parties were subject by domicile or nationality. And the legitimation of a child by the subsequent marriage of its parents will be held to depend on the law of its father's domicile or nationality. But the reference to the place of contract, carried to North America with the rest of the English jurisprudence of that date, still maintains in the courts of the United States a struggle with the doctrine of personal law as governing capacity and status.

Here must be noticed a difficulty which arises about the application of any foreign law to the capacity for contracting. It will be

understood by the German provision intended to meet it, namely, that if a foreigner enters in Germany into a trans- action for which he is incapable or has only a restricted capacity, he is to be treated for that transaction as being so far capable as he would be by the German legislation. This, however, does not apply to transactions with regard to rights of family or of succession, or to those disposing of foreign immovable property " (Art. 7 of the statute enacting the code). In a spirit similar to that which dictated the German enactment, the French courts have not generally allowed a Frenchman to suffer from the incapacity, by his personal law, of a foreigner who contracts in France, when the foreigner would have been capable by French law, and the Frenchman was in good faith and without great imprudence ignorant of his incapacity. Lately a disposition has been shown to limit this protection of nationals to the case in which the foreigner has been guilty of fraud. English courts usually hold themselves to be more stringently bound by rules, whether those enacted by parliament or those adopted for themselves; and if they should continue to profess the doctrine that capacity depends on the law of the domicile, it is not prob- able that they will deem themselves entitled to make exceptions for the protection of persons contracting in England with foreigners not enjoying such capacity. The point furnishes an illustration of the fact that to deal satisfactorily with so complex a subject as private international law requires the assistance of the legislature, which again cannot be given with full utility unless uniform provisions, to be enacted in different countries, are settled by international convention.

Another ground for the application of a personal law is furnished by the cases in which masses of property and rights have to be dealt with collectively, by reason of their being grouped around persons. The principal instances of that kind are when it is necessary to determine the validity and operation of a marriage settlement or contract, or the effect of marriage on the property of the husband and wife in the absence of any express settlement or contract, and when property passes ©n death, either by a will or by intestate succession.

These matters, at least when the property concerned is movable, are generally referred to the personal law of the husband at the time of the marriage, or to that of the deceased respectively; but about them, besides the question between domicile and nationality, there arises the question whether immovable property is to be included in the mass governed by the personal law, or is to follow the territorial law of its own situation ilex situs). Here we touch the distinction between

real and personal statutes which arose in the middle ages, when the local legislation of the free cities was con- trasted, under the name of statutes, with the general Roman law. That distinction did not bear the same character at all times, but

in the 16th century, under d'Argentr6, it acquired its most developed form, absorbing all laws into one or other of the two classes, and giving a vast extension to the real class, for which was claimed exclusive application to immovables situate in the territory of the law. In accordance with this system, the highly feudal character of which was very sympathetic to English jurisprudence, English practice has refused to include English immovables in the mass to be dealt with as a unit on marriage or death. But it refers the validity and operation of a marriage settlement, at least as to movables, and the effect of marriage, in the absence of express contract, on the movable property of the husband and wife, to the law of the husband's domicile at the time of the marriage, called the matrimonial domicile. And with regard to the succession to mov- ables on death, it adopts the principle of massing them irrespectively of their situation, so far as is permitted by the peculiar system under which the property in movables situate in England does not pass directly to the legatees or next of kin, but to the executors or administrators, who are charged with the duty of paying the debts of the deceased and distributing the beneficial surplus. The validity of a will of movables, otherwise than in respect of form (about which more hereafter), and the rights, whether under a will or under an intestacy, in the beneficial surplus arising from them, are determined in England by the law of the testator's last domicile. On the points glanced at in this paragraph the decisions in the United States generally agree with those in England, only allowing the pecuniary relations of a married couple, in the absence of express contract, to be varied by a change of domicile, notwithstanding that such change is in the husband's exclusive power, instead of maintaining them as fixed by the matrimonial domicile. On the continent of Europe

C artisans of a variation after the marriage are scarcely to be found ; ut as between the nationality and the domicile of the husband or of the deceased, and on the question whether the mass to be governed either by nationality or domicile, on marriage or on death, includes immovables situate under a different law, the division of opinion, legislation and practice is considerable and intricate.

Lex situs, lex loci actus, lex loci contractus, lex fori. — The law of the territory in which they are situate {lex situs) is generally applied to the property in particular things, whether movable or immovable, so far as they are not included in any mass grouped round a person; in England, therefore, always to immovables. In drawing up documents and conducting ceremonies public functionaries must necessarily follow the law from which they derive their authority, wherefore the law of the place where any public document is entered into, or any public ceremony per- formed {lex loci actus), is the only one that can be followed in its external form. This maxim applies to the forms of notarial acts, and to that of marriage celebrated with the official con- currence of clergymen, registrars and so forth. And since documents and ceremonies entered into without official con- currence are rarer on the continent of Europe than in England, the inevitableness of the form of the lex actus, when such con- currence is had, has generally led to that form being also held sufficient whenever the affair comes to be inquired into later. Nor in England has the sufficiency of the form of the lex loci actus for the celebration of marriage ever been doubted, but a will made by a notarial act in accordance with that law was not admitted. Disregarding the distinction between external form and internal validity and operation, a will of English land could not take effect unless made in English form (that is, since the Wills Act of 1837, with two witnesses), and a will of personal estate could not be admitted in England to probate unless made in the form of the law of the testator's last domicile. But now, by Lord Kingsdown's Act, passed in 1861, there are given for wills of personal property made by British subjects, besides the form of their last domicile, three alternative forms, namely, the form of the place of making the will, that of the testator's domicile at the time when it was made, and that of the part of the British dominions where he had his domicile of origin — only the first of the three, however, being offered when the will is made in the United Kingdom ; and no will is to be revoked or invalidated by a change of the testator's domicile after making it.

The law of the place of contract lex loci contractus, is distinguished into that of the place where the contract is entered into, lex loci contractus celebrati, and that of the place where it is to be per- formed, which, from the particular case in which the performance consists only in a payment, is called lex loci solutionis. To the first of these is generally referred the formal validity of a contract, so far as entered into without the intervention of a functionary, and therefore not covered by the principle of the lex loci actus, and so far also as the performance is not tied to any particular place. For

example, the form for contracting marriage, whether with official intervention as in England, or by private and even oral contract as in Scotland, depends, both as to necessity and as to sufficiency, on the law of the place of contracting it. But as to the internal validity, interpretation and operation of a contract, there has been and still remains much difference of opinion between the laws of the place of contracting and of that of stipulated performance ; the former being supported, among other grounds, on some texts of Roman law which Savigny has shown to have been misunderstood, while the latter agrees much oftener with the intention of the parties. The English decisions do not adhere closely to either of those laws, but while repeating much of the traditional language about the lex loci contractus, they aim at doing substantial justice by referring a contract to that place with which its matter has the closest connexion, or which the intention of the parties points out.

In matters of legal procedure every court follows its own practice exclusively {lex fori), as, for instance, whether the remedy on a contract shall be damages or specific performance, and whether a judgment may be executed against the person or only against the property of a party. A point much disputed under this head is whether the time of limitation of actions shall, as held in the United Kingdom, be decided by the lex fori, as an incident to the procedure, or by the lex loci contractus in one of its varieties, as an essential modality of the obligation.

Renvoi. — We will now suppose that the rules of private international law, as practised in any country (A), refer a case arising in its courts to the law of another country (B), as being that of the domicile or nationality of a person, and that those rules as practised in (B) in turn refer {renvoieni) the same case to the law of (A), as being that of the nationality or domicile or perhaps of (he locus actus: what are the courts of (A) to decide? This question, which involves nothing less than that of the meaning in which the reference to a law is to be understood in our subject, has during recent years excited great discussion both among the jurists and in the courts of all nations. It is answered by the English courts to the effect that (B) by its reference back {renvoi) has disclaimed the control of the case, which must therefore be decided without regard to (B)'s par- ticular laws. See In re Trufort, 36 Ch. D. 600, and In re Johnson, 1903, 1 Ch. 821. This principle practically gives efficacy to the renvoi, and coincides with the express provisions both of the above-mentioned convention of the 12th of June 1902, Art. 1, as to the right of contracting marriage, and of the statute enacting the German code, Art. 27, as to capacity generally. The English law

agrees in opinion, and is supported by a numerical pre- ponderance of the judicial precedents in France and Belgium; but it must be admitted that a numerical preponderance of the jurists who have declared themselves hold that the courts of (A) ought to apply the particular laws of (B).

Public Order. — It must not be supposed that the law of the land, the proper territorial law of the court which has to deal with a case in which foreign circumstances arise, always gives way to the foreign law pointed out by the general maxims which even that particular court accepts. All rules for the application of foreign laws are subject to an exception commonly called that of public order, i.e. where such application would interfere with essential principles of morality or policy received in the territory. This reservation is usually made in general terms where legisla- tion on private international law is attempted, as in Article 6 of the Code Napoleon, and preliminary Article 1 2 of the Italian code; but the courts have to administer it, as they have also in England and other countries where it rests only on judicial practice, and the greater or less extent given to it is one of the causes of the uncertainty and want of uniformity in our subject. One example often quoted is the refusal of the courts in all Christian countries to give effect to polygamous marriage, but this case goes deeper still, for none of the countries in which polygamous marriage exists is allowed to enter at all into the communion of private international law. All, so far as Great Britain has settled legal relations with them, are among those in which British subjects live under consular protection and jurisdiction, or (in Egypt) under that of the Mixed Courts. A better instance is afforded by the refusal of courts, normally within the pale of European legal communion, to recognize divorce as dissolving a marriage, notwithstanding that it has been decreed under the personal law. As another instance,

there can be little doubt that an incapacity to marry imposed by the personal law in virtue of religious vows or orders would be disregarded by the English courts in the case of a person marrying in England. Again, it is established in England that damages cannot be recovered for a tort unless the act complained of was a wrong both by the law of the country where it was done and by the law of England; and Article 12 of the statute enacting the German code is in accordance with that doctrine. Now the law of the country where the act is done would naturally give the standard for measuring its legal

consequences, and it seems to be due to the connexion which laws qualifying acts as wrongs have with public order that respect for that law is tempered by respect for the law of the countries in which it is invoked; but Article 8 of the Belgian code refers the liability for torts to the former law without any restriction.

Foreign Judgments. — In the rules which have passed before us in the foregoing general review it is easy to perceive a leading motive — that of securing, so far as public order allows, the cer- tainty and stability both of personal and of business relations in the international or interterritorial intercourse which has always accompanied civilization, but is now especially frequent and extensive. It has been attempted to erect this motive into a guiding principle of law, laying down that rights once accrued in any territory, or sometimes, it is said, by virtue of any terri- torial law, are to be recognized and enforced, subject to the requirements of public order, in any other territory in which they may be invoked before a court of justice. From this, which may be called the principle of the acceptance of foreign rights, it is claimed that the rules of private international law are to be deduced, and that by their consonance with it any such rules are to be tested when proposed. The difficulties of the subject, however, do not admit of being unlocked by so simple a key. They meet us again when we inquire in what territory, or by virtue of what territorial law, a particular alleged right has accrued. Persons belonging by domicile or nationality to A enter in B into a contract to be performed in C; where and by virtue of what law does either acquire a right against the other? Is it to be in or by the law of their homes, where they are normally, though not always necessarily, to be sued? Or of the country where they contract, which for various purposes, as those of police, but not for all purposes, has the control of them when they contract? Or of the country where their contract is to be performed, under a similar control by which, perhaps extending to the very acts of performance, they or their agents may be brought by the operation of their contract? Evidently we cannot apply the principle to guide us in our choice of a law till the very problem which that choice presents has first been solved. There is, however, one case in which the principle of the acceptance of foreign rights leads to a conclusion, namely, where the right has been declared by the judgment of a competent court, which may have been given in an ordinary case, presenting no question of private international law, but in which, if such a question arose, it has been solved by choosing the law and basing the judgment on it. The rule in England and in many other countries as to foreign judgments is that the judgments of

com- petent courts in other territories (foreign in the sense of civil law, whether politically foreign or not) are to be enforced without reopening the merits of the questions disposed of by them. In some countries, however, a foreign judgment is examinable on its merits before being enforced. This was formerly the unquestioned rule in France, though the practice there seems to be now turning the other way. In the system adopted in England everything turns on the competence. For judgments in rem, declaring or disposing of the property in a thing, the test of competence is that the thing, whether movable or immovable, was within the territory of the court. Judgments which declare the status of a person, as with regard to marriage or majority, are competent if the person was subject to the jurisdiction by nationality or domicile. The property or the status is treated as being what has been so declared or decreed. For judgments in personam, decreeing the payment of a certain sum, the test of competence for the present purpose is again that the person xiv. 23

against whom it was pronounced was subject to the jurisdiction by nationality or domicile; the judgment may then be sued on as giving of itself a good title to the sum decreed by it to be paid. For domestic purposes the competence may exist on quite other grounds. By its own territorial law a court may be authorized to entertain a suit in personam because the plaintiff possesses its nationality, as by Article 14 of the code Napoleon, or because the contract sued on was made or was to be performed in the territory, and so forth. But judgments based on these grounds will not be enforceable outside the territory. Here we touch the root principles of our subject. The distinction between domestic and international grounds of competence can only be explained by the history of law, and we come in sight of the fact that the rules of private international law rest finally on con- ventions which could not have existed if the civilization of different countries had not so much that was common in its origin and in the course which it has followed, but which suit the life of those countries just because that life is itself another outcome of those common antecedents.

Authorities. — The best authority on the history of private international law to the end of the 18th century is Laine, Intro- duction au droit international prive (2 vols., Paris, 1888). For modern progress the most copious materials are to be found in the Revue de droit international et de legislation comparee (Brussels, from 1869) ; the Journal du droit international prive et de la jurisprudence com- paree (Paris, from 1 874) ; and the Annuaire de Vinstitut de droit international (Paris, from 1877). The most comprehensive general treatise is that of von Bar, of which the 2nd

edition appeared at Gottingen in 1889, and has been translated : The Theory and Practice of Private International Law, by L. v. Bar, 2nd ed., translated, by Gillespie (Edinburgh, 1892). Other works, many of great merit, are numerous in all languages; but in this, as in every department of law, the first place for England and the United States must be given to the different Law Reports, since in those countries it is not in the study but on the bench that the highest legal intellect is usually displayed, and the judgments delivered are often essays on the points involved. The following works, however, among others, treat the subject from the English or United States point of view: Story, Commentaries on the Conflict of Laws, Foreign and Domestic, 8th ed., by Bigelow (Boston, 1883); Wharton, A Treatise on the Conflict of Laws or Private International Law (2nd ed., Philadelphia, 1881); J. Westlake, A Treatise on Private International Law, with Principal Reference to its Practice in England (4th ed., London, 1905) ; Foote, A Concise Treatise on Private International Jurisprudence, based on the Decisions in the English Courts (3rd ed., London, 1904); A. V. Dicey, A Digest of the Law of England with Reference to the Conflict of Laws (2nd ed., London, 1908); Beale, A Selection of Cases on the Conflict of Laws, with Notes and Summary (Cambridge, Mass., 1900-1903) ; Bate, Notes on the Doctrine of Renvoi (1904). (J NO – W.)

INTERPELLATION (from Lat. interpellate, to interrupt), a term meaning, in general, an interruption, more particularly used of a method of procedure adopted in some of the legislative chambers of continental Europe, especially those of France and Italy, and somewhat similar to that of a motion to adjourn the House in the British parliament. It was originally confined to the asking of a question, after due notice, on some affair of state. It is now, however, the chief means by which the policy or action of the ministry of the day is challenged. An interpellation can be brought on without the consent of the minister to be attacked; it is usually made the subject of a general debate, and generally ends with a vote of confidence or want ‘ of confidence in the ministry. The right of permitting or vetoing an interpellation rests with the chamber. In France a tendency has been growing among deputies to use the interpellation as a method of attack on or .accusation against individual colleagues.

INTERPLEADER, in English law, the form of action by which” a person who is sued at law by two or more parties claiming adversely to each other for the recovery of money or goods wherein he has no interest, obtains relief by procuring the rival claimants to try their rights between or among themselves only. Originally the only relief

available to the possessor against such adverse claims was by means of a bill of interpleader in equity. The Interpleader Act 183 1 enabled the defendant in such cases, on application to the court, to have the original action stayed and converted into a trial between the two claimants. The Common Law Procedure Act of i860 further extended the power of the

11

common law courts in interpleader; and the Judicature Act 1875 enacted that the practice and procedure under these two statutes should apply to all divisions of the High Court of Justice. The Judicature Act also extended the remedy of interpleader to a debtor or other person liable in respect of a debt alleged to be assigned, when the assignment was disputed. In 1883 the acts of 1 83 1 and i860 were embodied in the form of rules by the Rules of the Supreme Courts (1883), O. lvii. by reference to which all questions of interpleader in the High Court of Justice are now determined. The acts themselves were repealed by the Statute Law Revision Act of the same year. Interpleader is the equivalent of multiplepoinding in Scots law.

INTERPOLATION (from Lat. inter polare, to alter, or insert something fresh, connected with polire, a polish), in mathe- matics, the process of obtaining intermediate terms of a series of which particular terms only are given. The cubes, for instance, shown in the second column of the accompanying table, may

Number.

Cube of Number.

1

1

2

8

3

27

4

64

5

125

6

216

be regarded as terms of a series, and the cube of a fractional number, not exceeding the last number in the first column, may be found by interpolation. The process of obtaining the cube of a number exceeding the last number in the first column would be extrapolation; the formulae which apply to inter- polation apply in theory to extrapolation, but in practice special precautions as to accuracy are necessary. The present article deals only with interpolation.

*The term is usually limited to those cases in "which there are two quantities, x and u, which are so related that when x has any arbitrary value, lying perhaps between certain limits, the value of u is determinate. There is a given series of associated values of u and of x, and interpolation consists in determining the value of u for any arbitrary value of x, or the value of x for any arbitrary value of u, lying between two of the values in the series. Either of the two quantities may be regarded as a function of the' other; it is convenient to treat one, x, as the " independent variable," the other, u, being treated as the "dependent variable," i.e. as a function of x. If, as is usually the case, the successive values of one of the quantities proceed by a constant increment, this quantity is to be regarded as the independent variable. The two series of values may be tabulated, those of * being placed in a column (or row), and those of u in a parallel column (or row) ; u is then said to be tabulated in terms of x. The inde- pendent variable * is called the argument, and the dependent variable 11 is called the entry. Interpolation, in the ordinary sense, consists in determining the value of u for a value of * intermediate between two values appearing in the table. This may be described as direct interpolation, to distinguish it from inverse interpolation, which consists in determining the value of x for a value of u intermediate between two in the table. The methods employed can be extended to cases in which the value of u depends*

on the values of two or more independent quantities x. y, . . .

In the ordinary case we may regard the values of x as measured along a straight line OX from a fixed point O, so that to any value of x there corresponds a point on the line. If we represent the corresponding value of u by an ordinate drawn from the line, the extremities of all such ordinates will lie on a curve which will be the graph of 11 with regard to x. Interpolation therefore consists in determining the length of the ordinate of a curve occupying a particular position, when the lengths of ordinates occupying certain specified positions are known. If u is a function of two variables, x and y, we may similarly represent it by the ordinate of a surface, the position of the ordinate being determined by the values of x and of y jointly.

The series or tables to which interpolation has to be applied may for convenience be regarded as falling into two main groups. The first group comprises mathematical tables, i.e. tables of mathematical functions; in the case of such a table the value of the function u for each tabulated value of x is calculated to a known degree of accuracy, and the degree of accuracy of an interpolated value of u can be estimated. The second group comprises tables of values which are found experimentally, e.g. values of a physical quantity or of a statistical ratio ; these values are usually subject to certain " errors " of observation or of random selection (see Probability). The methods of interpolation are usually the same in the two groups of cases, but special considerations have to be taken into account in the second group. The line of demarcation of the two groups is not absolutely fixed; the tables used by actuaries, for instance, which are of great importance in practical life, are based on statisti- cal observations, but the tables formed directly from the observations have been " smoothed " so as to obtain series which correspond in form to the series of values of mathematical functions.

It must be assumed, at any rate in the case of a mathematical function, that the " entry " u varies continuously with the " argu- ment " x, i.e. that there are no sudden breaks, changes of direction, &c, in the curve which is the graph of u.

Various methods of interpolation are described below. The simplest is that which uses the principle of proportional parts; and mathematical tables are usually arranged so as to enable this method to be employed. Where this is not possible, the methods are based either on the use of Taylor's Theorem, which gives a formula involving differential coefficients (see Infinitesimal Calculus), or on

the properties of finite differences (see Differences, Calculus of). Taylor's Theorem can only be applied directly to a known mathematical function ; but it can be applied indirectly, by means of finite differences, in various cases where the form of the function expressing u in terms of x is unknown ; and even where the form of this function is known it is sometimes more convenient to deter- mine the differential coefficients by means of the differences than to calculate them directly from their mathematical expressions. Finally, there are cases where we cannot even employ finite-differ- ence formulae directly. In these cases we must adopt some special method; e.g. we may instead of u tabulate some function of «, such as its logarithm, which is found to be amenable to ordinary processes, then determine the value of this function corresponding to the particular value of x, and thence determine the corresponding value of u itself.

In considering methods of interpolation, it will be assumed, unless the contrary is stated, that the values of x proceed by a constant increment, which will be denoted by h.

In order to see what method is to be employed, it is usually necessary to arrange the given series of values of u in the form of a table, as explained above, and then to take the successive differences of u. The differences of the successive values of u are called its first differences; these form a new series, the first differences of which are the second differences of «; and so on. The systems of notation of the differences are explained briefly below. For the fuller discussion, reference should be made to Differences, Cal-

culus of.

I. Interpolation from Mathematical Tables A. Direct Interpolation.

I. Interpolation by First Differences. — The simplest cases are those in which the first difference in u is constant, or nearly so. For example : —

Example 1. — (w = log io x). Example 2. — [u = log io).*

X.

u.

istDiff.

+

4-341

•6375898

1000

4-342

•6376898

1000

4-343

•6377898

1000

4-344

•6378898

1000

4-345

•6379898

7-40

7-4i

7-42 7-43 7-44

•86923 •86982 •87040 •87099

■*87157*

1st Diff.

+ 59 58 59 58

In Example 1 the first difference of u corresponding to a difference of /j= =-ooi in x is oooiooo; but, since we are working throughout to seven places of decimals, it is more convenient to write it 1000. This system of ignoring the decimal point in dealing with differences will be adopted throughout this article. To find a for an inter mediate value of x we assume the principle of proportional parts, i.e. we

assume that the difference in « is proportional to the difference in x. Thus for ˆ = 4-342945 the difference in u is -945 of 1000 = 945, so that » is -6376898 + -0000945 = -6377843. For x = 4-34294482 the difference in u would be 944-82, so that the value of u would apparently be -6376898 + -000094482 = -637784282. This, however, would be incorrect. It must be remembered that the values of u are only given " correct to seven places of decimals," i.e. each

tabulated value differs from the corresponding true value by a tabular error which may have any value up to = § of • 000000 1 ; and we cannot therefore by interpolation obtain a result which is correct to nine places. If the interpolated value of u has to be used in calculations for which it is important that this value should be as accurate as possible, it may be convenient to retain it temporarily in the form -6376898 + 944 82 = -6377842 82 or -6376898 + 944 s2 = ■6377842 s2 ; but we must ultimately return to the seven-place arrangement and write it as -6377843. The result of interpolation by first difference is thus usually subject to two inaccuracies, the first being the tabular error of u itself, and the second being due to the necessity of adjusting the final figure of the added (proportional) difference. If the tabulated values are correct to seven places of decimals, the interpolated value, with the final figure adjusted, will be within -oooooi of its true value.

In Example 2 the differences do not at first sight appear to run regularly, but this is only due to the fact that the final figure in each value of u represents, as explained in the last paragraph, an approximation to the true value. The general principle on which we proceed is the same; but we use the actual difference correspond- ing to the interval in which the value of x lies. Thus for .r = 7-41373 we should have m = -86982 + (-373 of 58) = -87004; this result being correct within -ooooi.

2. Interpolation by Second Differences. — If the consecutive first differences of u are not approximately equal, we must take account of the next order of differences. For example: —

Example 3.-

-(a = log iox).

X.

u.

1st Diff.

2nd Diff.

6-o

■*77815*

+ 718

6-i

•78533

+706

-12

6-2

•79239

+695

— 11

6-3

•79934

+684

— 11

6-4

•80618

+673

— 11

i 6-5

•81291

U) = u +BAu –

AH10... (1).

In such a case the advancing-difference formula is generally used. The notation is as follows. The series of values of x and of u are respectively x a , xi, X2, . . . and u , «i, u 2 , . ■ . ; and the successive differences of u are denoted by Au, A-u, . . , Thus Aw denotes ui— «o, and A 2 «o denotes Aui— A«j = u ! – 2Wi+« . The value of x for which u is sought is supposed to lie between x and Xi. If we write it equal to Xo+8(xi — Xo) — xn+dh, so that 8 lies between o and I, we may denote it by x e , and the corresponding value of u by tt e . We have then

2! ˆ Uo+ 3!

Tables of the values of the coefficients of A 2 tto and A 3 «o to three places of decimals for various values of 8 from o to 1 are given in the ordinary collections of mathematical tables; but the formula is not really convenient if we have to go beyond A 2 k , or if A 2 ;< itself contains more than two significant figures.

To apply the formula to Example 3 for x = 6-277, we have = -77, so that % = -79239 + (-77 of 695) -(-089 of -u) = -79239 +

535 15+0 98 = 79775

Here, as elsewhere, we use two extra figures in the intermediate calculations, for the purpose of adjusting the final figure in the ultimate result.

3. Taylor's Theorem. — Where differences beyond the second are involved, Taylor's Theorem is useful. This theorem (see Infinitesimal Calculus) gives the formula

= Mo + ClS-

•C2J1+C3-J+ ,

(2),

line, then (see Differences, Calculus of) the values of c u c 2: are given by

Ci=m5wo — 6m5 3 Mo + 3 1 oi" s5 «o — i / U< > 7 M0 . . c 2 =5 2 M — jˆS-'mo + sVˆ'o — sJtf s8w o+ • • • C3=M<5 3 «.e — |

m8 5 Ko + iIi)m5 7 J/o— • • •

C 4 =5 4 Mo— IS^Uo+tsIu^Uo— ...

d, =fj.S b Uo — iiJ.dHio+... y (4).

c 6 = 5 6 Mo-J5% + •■•

If a calculating machine is used, the formula (2) is most conveniently written

liiun — 1-(Ai(+Ah_i)

S 2 Ho=A 2 M_i /iS 3 «o = I (A 3 tt_i + A%_ 2 &c.

(3),

where, ci, c 2 , c 3 , . . . are the values for x = x of the first, second, third, . . . differential coefficients of u with regard to x. The values of c, c%, . . . can occasionally be calculated from the analytical expressions for the differential coefficients of u; but more generally they have to be calculated from the tabulated differences. For this purpose central-difference formulae are the best. If we write

so that, if (as in §§ 1 and 2) each difference is placed opposite the space between the two quantities of which it is the difference, the expressions 5 2 m , S'mo, . . . denote the differences of even order in a horizontal line with u , and iiSu , m^ 3 «c, . • . denote the means of the differences of odd order immediately below and above this

«0 = Ml) + P,0

Pi=ei+-U\0

P2 = c,+ : ;p 3

(5)-

Using 8 as the multiplicand in each case, the successive expressions . . . P 3 , P2, Pi, tie are easily calculated.

As an example, take u= tan x to five places of decimals, the values of x proceeding by a difference of 1 °. It will be found that the following is part of the table: —

Example 4. — (a = tan x).

X.

u.

1st Diff.

2nd Diff.

3rd Diff.

4th Diff.

+

+

+

+

65°

2-14451

ioi53

732

96

16

66°

2-24604

1 098 1

828

“5

19

6 7 °

2-35585

943

18

To find u for x = 66 23 , we have 8 = 23/60 = -3833333. The following shows the full working: in actual practice it would be abbreviated. The operations commence on the right-hand side. It will be noticed that two extra figures are retained throughout.

S 4 !<0. + I9OO

C4 = + I9°”

2.24604

-10567™

+ 828’»>

m5 3 ho-

+105=”

Pl8 = +4ios«

W fl = 2. 28710

ci— -I-10549′ 1 –

;p 2 »= + i6i°2

U J 3

= +?26 !;

=+ 13 71

Pl =+io 7 io« P 2 =J-84o 1:

P 3 =

The value 2-2870967, obtained by retaining the extra figures, is correct within -7 of -ooooi (§ 8), so that 2-28710 is correct within •00001 I.

In applying this method to mathematical tables, it is desirable, on account of the tabular error, that the differences taken into account in (4) should end with a difference of even order. If, e.g. we use v5 3

u in calculating c u and c 3 , we ought also to use 5% for calculating c 2 and c 4 , even though the term due to 5 4 «o would be negligible if 5 4 « were known exactly.

4. Geometrical and Algebraical Interpretation. — In applying the principle of proportional parts, in such a case as that of Example 1, we in effect treat the graph of u as a straight line. We see that the extremities of a number of consecutive ordinates lie approximately in 3 straight line: i.e. that, if the values are correct within ±ip, a straight line passes through points which are within a corresponding distance of the actual extremities of the ordinates; and we assume that-this is true for intermediate ordinates. Algebraically we treat u as being of the form A+Bx, where A and B are constants determined by the values of u at the extremities of the interval through which we interpolate. In using first and second differences we treat u as being of the form A + Bx+Cx 2 ; i.e. we pass a parabola (with axis vertical) through the extremities of three consecutive ordinates, and consider that this is the graph of u, to the degree of accuracy given by the data. Similarly in using differences of a higher order we replace the graph by a curve whose equation is of the form M=A-j-Bx+C.r 2 +Dx 3 + . . . The various forms that interpolation-formulae take are due to the various principles on which ordinates are selected for determining the values of A, B, C . . .

B. Inverse Interpolation.

5. To find the value of x when u is given, i.e. to find the value of 8 when u is given, we use the same formula as for direct interpolation, but proceed (if differences beyond the first are involved) by successive approximation. Taylor's Theorem, for instance, gives

= («8-«o)ˆ(A+C 2 ||+...) = («« — Mo) + Pl

(6),

We first find an approximate value for 8: then calculate Pi, and find by (6) a more accurate value of 8; then, if necessary, recal- culate Pi, and thence 8, and so on.

II. Construction of Tables by Subdivision of Intervals

6. When the values of u have been tabulated for values of x

*proceeding by a difference k, it is often desirable to deduce a table in which the differences of * are h/n, where n is an integer.*

If n is even it may be advisable to form an intermediate table in which the intervals are \h. For this purpose we have

« t =4(Uo+U.) (7),

where

■i^u-iWS'u-

•••)}]

(8).

The following is an example; the data are the values of tan x to five places of decimals, the interval in x being I °. The differences of odd order are omitted for convenience of printing.

Example 5.

*i *•*

1

« = tan.*

S'-u.

8 f u.

b s u.

+

U.

u = mean of values of U .

X.

1

+

+

|73°

3-27085

2339

100

5

3-26794 95

3-37594

73ï°

! 74 a

3-48741

2808

132

23

3-48392 98

3-60588

74ï°

:75 U

3-73205

3409

187

18

3-72783 17

3-86671

751°

76″

4-01078

4197

260

5i

4-oo559 22

4-16530

76i°

177″

4-33I48

5245

384

64

4-32501 07

If a new table is formed from these values, the intervals being 5°, it will be found that differences beyond the fourth are negligible.

To subdivide h into smaller intervals than \h, various methods may be used. One is to calculate the sets of quantities which in the new table will be the successive differences, corresponding to «o, mi, . . . and to find the intermediate terms by successive additions. A better method is to use a formula due to J. D. Everett. If we write = I —0, Everett's formula is, in its most symmetrical form,

Uf-

eMl+ (l+l^^^ I+ (L+M±liff£z^^l) g%1+ . . .

+ Uo +

3!

(

5′

-l)y tfu| (-

■Ofo-2)

“(9).

« 4 «0 + .,

3! ” “^ 5!

For actual calculations a less symmetrical form may be used. Denoting

(0 + 1)0(9 -!)„.. , (0+2)(9 + l)0(0-l)(9-2) 1

3’-

■Jl# ui + (t> +2)0 + 1)9(0 i)(0

l &*Ul+. . . (10)

by eVi, we have, for interpolation between « and «i,

M S = 2< (:+0Awo+eVi+i_0Vo (11),

the successive values or ft being l/n, 2 In (n — l)/n. For

interpolation between «i and m 2 we have, with the same succession of values of 0,

»i+e = «i+eVi, V 2 +,_,Vi ‘ (12).

The values of i_«Vi in (12) are exactly the same as those of 9V1 in (11), but in the reverse order. The process is therefore that (i.) we find the successive values of tto+0Au o , &c, i.e. we construct a table, with the required intervals of x, as if we had only to take first differences into account; (ii.) we construct, in a parallel column, a table giving the values of »Vi, &c. ; (iii.) we repeat these latter values, placing the set belonging to each interval h in the interval next following it, and writing the values in the reverse order; and (iv.) by adding horizontally we get the final values for the new table. As an example, take the values of tan x by intervals of 5 in x, as found above (Ex. 5). The first diagram below is a portion of this table, with the differences, and the second shows the calculation of the terms of (11) so as to get a table in which the intervals are o-i of

i°. The last column but one in the second diagram is introduced lor convenience of calculation.

Example 6

,

X.

w = tan x.

au.

8 l M.

Pu.

*S*u.*

+

+

+

+

1 1 147

• 62

74°-o

3-48741

1 1 847

700

70

8

74°-5

3-60588

770

9

12617

79

X

ttO + 0AMo-

«Vi.

l-ijVo.

eVi + i_eV < >.

u.

73°-6

-22 35

,

73°-7

-39 11

.

.

73”-8

-44 71

.

73”-9

74-o

3-48741 00

-33 54

• 3-4874I

74; 1

3-5111040

-2458

-33 54

-58 12

351052

74°-2 74°‘3 74°-4 74°-5

353479 80 3 55849 20 3-58218 60 3-60588 00

-4302 -49 18 -3689

-44 71

-39 n

-22 35

-87 73 -8829

-5924

3 53392 3-55761 3-58159 3-60588

The following are the values of the coefficients of «i, 5 2 Mi, S 4 Mi, and S s Ui in (9) for certain values of n. For calculating the four terms due to 6 2 Wi in the case of n — 5 it should be noticed that the third term is twice the first, the fourth is the mean of the first and the third, and the second is the mean of the third and the fourth. In table 3, and in the last column of table 2, the coefficients are corrected in the last figure.

Table i. — n = $.

CO. u.

co. S 2 u.

*co. i*u.*

co. S e u.

+

+

—

•2

•032

•006336

•00135168 = 1/740 approx.

•4

•056

•010752

•00226304 = I /442 ,,

•6

•064

•01 1648

•00239616 = 1/417 ,,

•8

■048

•008064

•00160512 = 1/623

Table 2. — » = io.

CO. «.

co. hhi.

co. d'u.

CO. 5 6 M.

+

—

+

—

- *I*
- *0165*
- *00329175*
- *000704591*
- *2*
- *0320*
- *00633600*
- *001351680*
- *3*
- *0455*
- *00889525*
- *001887064*
- *4*
- *0560*
- *01075200*
- *002263040*
- *5*
- *0625*
- *01171875*
- *002441406*

•6

•0640

•01 164800

•002396160

•7

■0595

•01044225

•0021 15799

•8

•0480

•00806400

•001605120

•9

•0285

•00454575

•000886421

Table 3.— -« = i2.

CO. u.

co. S 2 u.

CO. S 4 M.

CO. & e u.

+

—

+

—

1/12

•013792438

•OO2753699

•000589623

2/12

•027006173

•OO5363726

•001 145822

3/12

■039062500

•OO769O43O

•001636505

4/12

•049382716

•0O9602I95

•00203221 1

5/12

•0573881 17

•OIO979463

•002307357

6/12

•062500000

•OII7I875O

•002441406

7/12

•064139660

•01 1736667

•002419911

8/12

•061728395

•010973937

•002235432

9/12

■054687500

•009399414

•001888275

10/12

•042438272

•007014103

•001387048

11/12

•024402006

■003855178

■000748981

III. General Observations

7. Derivation of Formulae. — The advancing-difference formula (1) may be written, in the symbolical notation of finite differences,

«0 = (l+A) s Wo = E e K O (13):

and it is an extension of the theorem that if n is a positive integer

«o = Mo+raAwo+

n(n~\)

A 2 Wo+. . .

(14),

the series being continued until the terms vanish. The formula (14) is identically true: the formula (13) or (1) is only formally true, but its applicability to concrete cases is due to the fact that the series in (1), when taken for a definite number of terms, differs from the true value of u$ by a " remainder" which in most cases is very small when this definite number of terms is properly chosen.

Everett's formula (9), and the central-difference formula obtained by substituting from (4) in (2), are modifications of a standard formula

*■*t = Uo+eSu 1+ 2 , J ff«o+*

8(B-i) „ t , (fl + iWfl-i)

3] « 3 »i +

(e+i)g(fl-i)(o-2)

4!

s 4 «o+... (i£

which may similarly be regarded as an extension of the theorem that, if n is a positive integer,

. . – , n(n — i)_, . (n + i)n(n — i)_, , , ,..

u n = u +ndui-\ — +-j — i 5 2 a + i — ! — —f -5 3 wj+... (16).

2. 3-

There are other central-difference formulae besides those mentioned

above; the general symbolical expression is

11$ = (cosh 0AD + sinh OhD)ˆ

vhere

cosh §/iD = m, sinhjAD = |S

(17). (18).

8. Comparative Accuracy. — Central-difference formulae are usually more accurate than advancing-difference formulae, whether we consider the inaccuracy due to omission of the " remainder " mentioned in the last paragraph or the error due to the approximative character of the tabulated values. The latter is the more important. If each tabulated value of u is within ±jp of the corresponding true value, and if the differences used in the formulae are the tabular differences, i.e. the actual successive differences of the tabulated values of u, then the ratio of the limit of error of u$, as calculated from the first r terms of the series in (i), to \p is the sum of the first r terms of the series

l + o + 9(i -6) 0(i -0)(2-0) T y > (i -0)(2-0)(3-0)-r-

|9(l-0)(2-0)(3-0)(4-0) + ˆ 8 0(i-0). . .(5-0) + – - .,

while the corresponding ratio for the use of differences up to 5 2p tto inclusive in (4) or up to d 2p Ui and o 2p uo in (9) (i.e. in effect, up to 6 2p + i mj) is the sum of the first p + l terms of the series

only from # = 6o° to x = 8o°, we could then complete the table of differences by making the entries shown in italics below.

Example 7.

1 +

0(1-

-8) (1 + 0)0(1

-0)(2-0)

(2\y

+

(2+0)(l+0)0(l-0)(2-0)(3-9)

(3D 2 + ‘

it being supposed in each case that lies between o and 1. The following table gives a comparison of the respective limits of error; the lines I. and II. give the errors due to the advancing-difference and the central-difference formulae, and the coefficient p is omitted throughout.

Table 4.

Error due to use of Differences up to and including

1st.

2nd.

3rd.

4th.

5th.

6th.

7th.

•siil: : :

•500 •500

•625 •625

•813 •625

1-086

■696

1-497

•696

2-132

•745

3-147

•745

-in 1 : : :

•500 •500

■*580 •580*

•724 •580

■*960 •624*

1-343

•624

1-976

•653

3-042

•653

■*4i,i: : :*

•500 •500

•620 •620

•812 •620

1-104

•688

1-553

•688

2-265

•734

3-422

•734

«iii: : :

•500 •500

•620 •620

•788 •620

1-024

•688

1-366

■688

1-886

•734

2-700

•734

-iii: : :

•500 •500

•580 •580

■676

-580

•800 •624

•969 •624

1-213

•653

1-582

•653

In some cases the differences tabulated are not the tabular differences, but the corrected differences; i.e. each difference, like each value of u, is correct within ^p. It does not follow that these differences should be used for interpolation. Whatever formula is employed, the first difference should always be the tabular first difference, not the corrected first difference; and, further, if a central- difference formula is used, each difference of odd order should be the tabular difference of the corrected differences of the next lower order. (This last result is indirectly achieved if Everett's formula is used.) With these precautions (i.) the central-difference formula is slightly improved by using corrected instead of tabular differences, and (ii.) the advancing-difference formula is greatly improved, being better than the central-difference formula with tabular differences, but still not so good as the latter with corrected differences. For = -5, for instance, supposing we have to go to fifth differences, the limits ±1-497 and ±-696, as given above, become =’=•627 and ±•575 respectively.

9. Completion of Table of Differences. — If no values of u outside the range within which we have to interpolate are given, the series of differences will be incomplete at both ends. It may be con- tinued in each direction by treating as constant the extreme difference of the highest order involved; and central-difference formulae can then be employed uniformly throughout the whole range.

Suppose, for instance, that the values of tan x in § 6 extended

60° 6i°

62

63° 64°

75° 76° 77° 78°

79° 8o°

u = ta.nx.

1-73205 1-80405 1-88073 1-96261 2-05030

3-73205 4-01078

4-33I48

4-70463

5 -14455 5-67128

5w.

+ 6775

720O

7668 8188 8769

27873 32070

37315 43992 52673 64182

+

425

468

520

581

652

3409 4197 5245 6677 8681

II50Q

S 3 u.

+ 34

43

52

61

71

1048

H32

2004 2828 3968

+

9

9

9

10

9

187 260 384 572 824 1140

S 6 M.

+

73 124 188 252 316 380

6 6 «.

+

18

51 64 64 64

For interpolating between $x = 6o^\circ$ and $x = 6i^\circ$ we should obtain the same result by applying Everett's formula to this table as by using the advancing-difference formula; and similarly at the other end for the receding differences.

Interpolation by Substituted Tabulation.

10. The relation of u to x may be such that the successive differences of u increase rapidly, so that interpolation-formulae cannot be employed directly. Other methods have then to be used. The best method is to replace u by some expression v which is a function of u such that (i.) the value of v or of u can be determined for any given value of u or of v, and (ii.) when v is tabulated in terms of x the differences decrease rapidly. We can then calculate v, and thence u, for any intermediate value of x.

If, for instance, we require tan x for a value of x which is nearly 90 , it will be found that the table of tangents is not suitable for interpolation. We can, however, convert it into a table of cotangents

to about the same number of significant figures; from this we can easily calculate cot x, and thence tan x.

11. This method is specially suitable for statistical data, where the successive values of u represent the area of a figure of frequency up to successive ordinates. We have first to determine, by in- spection, a curve which bears a general similarity to the unknown curve of frequency, and whose area and abscissa are so related that either can be readily calculated with the other is known. This may be called the auxiliary curve. Denoting by £ the abscissa of this curve which corresponds to area u, we find the value of £ corresponding to each of the given values of u. Then, tabulating I in terms of' x, we have a table in which, if the auxiliary curve has been well chosen, differences of £ after the first or second are negligible. We can therefore find £, and thence u, for any inter- mediate value of x.

Extensions.

1-2. Construction of Formulae. — Any difference of « of the rth order involves r + l consecutive values of u, and it might be ex- pressed by the suffixes which indicate these values. Thus we might write the table of differences

X.

u.

1st Diff.

2nd Diff.

3rd Diff.

4th Diff.

(-1,0)

(-2, -1, 0, 1)

Xo

u

(0,1)

(-1,0,1)

(-1,0, 1,2)

(-2, -1, 0, 1, 2)

Xi

Mi

(1.2)

(0, 1, 2)

(0, 1, 2, 3)

(-1,0, 1,2,3)

X2

%

(2,3)

(1.2,3)

(1, 2, 3, 4)

(0, 1, 2, 3, 4)

710

INTERPRETATION— INTERREGNUM

The formulae (i) and (15) might then be written

= u, + ˆ(o, 1) +2

-.?o x—X i i ‘ 2h ‘

(o, 1,2) +

X — Xp X — Xi

h ■ 2h

-Xi

*3**

(O, I, 2, 3) + • • • (19).

, X ˆ Xq , , . X Xo

« = «o + - lr (o,i) + - F –

2h

-(-1,0, I) +

X — Xo X — Xi

-X-i

h

2h

*3**

(— I, o, 1, 2) + . . . (20).

The general principle on which these formulae are constructed, and which may be used to construct other formulae, is that (i.) we start with any tabulated value of u, (ii.) we pass to the successive differences by steps, each of which may be either downwards or upwards, and (iii.) the new suffix which is introduced at each step determines the new factor (involving x) for use in the next term. For any particular value of x, however, all formulae which end with the same difference of the rth order give the same result, provided tabular differences are used. If, for instance, we go only to first differences, we have

*1 X Xo / v 1 X X\ r **

«iH — £— (o, i) = «H — j— (o, 1)

identically.

13. Ordinates not Equidistant. — When the successive ordinates in the graph of u are not equidistant, i.e. when the differences of successive values of x are not equal, the above principle still applies, provided the differences are adjusted in a particular way. Let the values of x for which u is tabulated be a = Xo + a/j, b = Xo + fih, c = Xo + yh, . . . Then the table becomes

X.

u.

Adjusted Differences.

1st Diff.

2nd Diff.

&c

a=x a b = xp c-x y

Up u y

(a, >)

03, 7)

(0, ff, y)

- 1

In this table, however, (a, f3) does not mean uˆ — u a , but (#p— u a)s- (/S — a); (a, ,8, 7) means {(0, 7) — (a, /9)}-H J(7 — a) < and, generally any quantity (17, . . .) in the column headed " rth diff." is obtained by dividing the difference of the adjoining quantities in the preceding column by (0-ij)/r. If the table is formed in this way, we may apply the principle of § 12 so as to obtain formulae such as

x — a , n . , x — a x — b

u = u a +-

h

■ *(a,fi)+i*

h .ˆ.(a,0,7)+...(2l),

u=u y ~ . (f>,y) x irˆir '. (o,/s lT)+... (22).

The following example illustrates the method, h being taken to be 1°: —

Example 8.

To find u for £ = 31°, we use the values for 26°, 27°, 32 ° and 35°

and obtain

« = -438371 1 Oo+5(i 5 6i 9 4 00) +f. |(-1445 47) +

\ ■ I ■ ˆ(-46 00) =-5150380, which is only wrong in the last figure.

If the values of u occurring in (21) or (22) are « a

«0. » y , •

/ of x, the formula may be

corresponding to values a, b, c, more symmetrically written

*(x — b) (x-c). . .(x-l) (x-a) (x-c). . .(x-l) u (a-b) (a-c). . .(a-l) u * + (b-a) (b-c). . .(b-l) u P + –*

■ +

(x—a) (x — b) (x—c). . . (I -a) (l-b) (l-c). ..

(23)-

1st Diff.

2nd Diff.

3rd Diff.

(adjusted).

(adjusted).

(adjusted).

4-

—

—

20°

•3420201

162932 50

22°

•3746066

161245 00

1 125 00

48 75

23°

•390731 1

158800 00

1222 50

48 30

26°

•438371 1

156194 00

1303 00

47 49

27°

•4539905

151857 60

1445 47

46 00

32°

•5299193

145523 67

1583 48

1 35°

L _..

This is known as Lagrange's formula, but it is said to be due to Euler. It is not convenient for practical use, since it does not show how many terms have to be taken in any particular case.

14. Interpolation from Tables of Double Entry. — When u is a function of x and y, and is tabulated in terms of x and of y jointly, its calculation for a pair of values not given in the table may be effected either directly or by first forming a table of values of u in terms of y for the particular value of x and then determining u from this table for the particular value of y. For direct interpolation, consider that A represents differencing by changing x into x + i, and A' differencing by changing y into y+l. Then the formula is

«».» = (1 +A) x (i +A')»«o,o ;

and the right-hand side can be developed in whatever form is most convenient for the particular case.

References. — For general formulae, with particular applications, see the Text-book of the Institute of Actuaries, part ii. (1st ed. 1887, 2nd ed. 1902), p. 434; H. L. Rice, Theory and Practice of Interpolation (1899). Some historical references are given by C. W. Merrifield, " On Quadratures and Interpolation," Brit. Assoc. Report (1880), p. 321 ; see also Encycl. der math. Wiss. vol. i. pt. 2, pp. 800-819. For J. D. Everett's formula, see Quar. Jour. Pure and Applied Maths., No. 128 (1901), and Jour. Inst. Actuaries, vol. xxxv. (1901), p. 452. As to relative accuracy of different formulae, see Proc. Lon. Math. Soc. (2) vol. iv. p. 320. Examples of interpolation by means of auxiliary curves will be found in Jour. Royal Stat. Soc. vol. lxiii. pp. 433, 637. See also Differences, Calculus of. (W. F. Sh.)

INTERPRETATION (from Lat. inter pretari, to expound, explain, interpres, an agent, go-between, interpreter; inter, between, and the root pret-, possibly connected with that seen either in Greek , to speak, or irpaTTetv, to do), in general, the action of explaining, or rendering the sense of an obscure form of words or an unknown tongue into a language compre- hended by the person addressed. In legal use the word " inter- pretation " is employed in the sense of ascertaining the meaning of the language of a document, as well as its relation to facts. It is also applied to acts of parliament, as

pointing out the sense in which particular words used therein are to be understood. The interpretation of documents and statutes is subject to definite legal rules, the more important of which will be found in the articles Contract, Statute, Will, &c.

INTERREGNUM (Lat. inter, between, and regnum, reign), strictly a period during which the normal constituted authority is in abeyance, and government is carried on by a temporary authority specially appointed. Though originally and specific- ally confined to the sphere of sovereign authority, the term is commonly used by analogy in other connexions for any suspension of authority, during which affairs are carried on by specially appointed persons. The term originated in Rome during the regal period when an intcrrex was appointed (traditionally by the senate) to carry on the government between the death of one king and the election of his successor (see Rome : History, ad init.). It was subsequently used in Republican times of an officer appointed to hold the comitia for the election of the consuls when for some reason the retiring consuls had not done so. In the regal period when the senate, instead of appointing a king, decided to appoint interreges, it divided itself into ten decuries from each of which one senator was selected. Each of these ten acted as king for five days, and if, at the end of fifty days, no king had been elected, the rotation was renewed. It was their duty to nominate a king, whose appointment was then ratified or refused by the curiae. Under the Republic similarly interreges acted for five days each. When the first consuls were elected (according to Dionysius iv. 84 and Livy i. 60), Spurius Lucretius held the comitia as interrex, and from that time down to the Second Punic War such officers were from time to time appointed. Thenceforward there is no record of the office till 82 B.C., when the senate appointed an interrex to hold the comitia which made

Sulla dictator (Appian, Bell. civ. i. 98). In 55, 53 and 52 interreges are again found, the last-mentioned being on the occasion when Pompey was elected sole consul.

The most noteworthy use of the term ” Interregnum ” in post-classical times is that of the Great Interregnum in German history between the death of Conrad IV. (1254) and the election of Rudolf of Habsburg (1273). See Germany: History.

INTERSTATE COMMERCE. The phrase " interstate com- merce," as used in the United States, denotes commerce between the citizens of different states of the Union. The words " inter- state " and "intrastate " are not found in the constitution nor, until comparatively recently, in decisions of the courts or in legislative acts (probably being first used officially in 1887 in the Interstate Commerce Act). The constitution of 1789 uses the phrase " commerce among the states," and the first official decision interpreting the phrase says that " it may very properly be restricted to that commerce which concerns more states than one " (Chief Justice Marshall in Gibbons v. Ogden, 9 Wheaton 194). Commerce among the states is there distinguished from " commerce which is completely internal, which is carried on between man and man in a state, or between parts of the same state, and which does not extend to or affect other states." It was declared {Lehigh case, 145 U.S. 192) that commerce between two persons in the same state is not interstate even when there is a temporary deviation to the soil of another state; but later [Hanlcy case, 187 U.S. 617, distinguishing the Lehigh case) it was declared that as to transportation, such commerce is inter- state. The courts have interpreted commerce to denote not merely a mutual selling or traffic, but as " a term of the largest import," including intercourse for the purposes of trade in any and all its forms {Gibbons v. Ogden, 9 Wheaton 194, and Welton v. Missouri, 91 U.S. 280). Thus have been included not only the actions of trading, navigation, transportation, and communi- cation, but also the instruments and agents employed, including even telegraph messages and, in the extremest cases, lottery tickets. 1

The decision of the question where federal control of interstate traffic ends and state control begins has been" one of great practical difficulty. In general it has been held that whenever a com- modity begins to move as an article of trade from one state to another, commerce in that commodity between the states has begun. Mere intention to ship goods does not make them subjects of interstate commerce, but they must actually be put in motion or committed to the carrier for that purpose {Coe v. Errol, 116 U.S. 517). As a practical guide in deciding when state control should be resumed, the court as early as 1827 {Brown v. Maryland) laid down the " original package rule," that the taxing power of the state should begin when the original package in which the goods had been imported into the state had been broken up or sold. The injustice of allowing goods to be held thus, for long periods escaping local taxation, led to a modification of the rule in 1868 {Woodruff v. Parkham, 8 Wall. 123), and such goods after reaching their destination

1 The lottery tickets were included only by a divided court {Lottery Cases, 188 U.S. 321) four judges emphatically dissenting. The moral issue doubtless influenced a decision so difficult to reconcile with other opinions of the court, which otherwise had held regularly that commerce involves the physical movement of persons or things and does not include the contractual relations between citizens incident to commercial intercourse. Not all things incidental to commerce are included in it, and it has been held that the following are not included: bills of exchange (in 1850, Nathan v. Louisiana, 8 How. 73), trade marks (in 1879, trade mark cases, 100 U.S. 82), insurance (in 1869, Paul v. Virginia, 8 Wall. 168), and manufacturing (in 1895, U.S. v. Knight Co., 156 U.S. 1). In the last-named case, which concerned a combination of sugar refineries controlling a large proportion of the product of the country, it was said that commerce succeeds manufacture and is not a part of it. The relation of the manufacturer to interstate and foreign commerce being thus only incidental and indirect, the business is subject to state control. By a series of decisions the transportation of persons has been decided to be commerce. (In 1848, passenger cases, 7 How. 283. In 1867, Crandallv. Nevada 6, Wall. 35. In 1875, Henderson v. the Mayor of New York, 92 U.S. 259, &c).

may be taxed as property in common with other property in the state. 2

Reason for Federal Control of Interstate Commerce. — Immedi- ately after the close of the War of American Independence in 1783 appeared the separatist tendencies and local jealousies usual in a confederation. The Congress of the Confederation had no power to levy tariff duties or to regulate commerce between the states, and the separate states freely and recklessly exercised their rights in this matter. Though commerce at that time was comparatively unimportant, the results of this restric- tive policy were most unfortunate. The Annapolis Convention of 1786 was called by the Virginia legislature to take into consideration the trade of the United States and to consider how far a uniform system in their commercial relations might be necessary to the common interests and their permanent harmony. This conference resulted in the call of the Philadelphia Conven- tion of 1787, which framed the present Constitution. Chief Justice Marshall, in one of the early cases on this subject {Brown v. Maryland, 12 Wheaton 419, in 1827), said in words often since quoted: " It may be doubted whether any of the evils proceeding from the feebleness of the federal government contributed more to that great revolution which introduced the present system than the deep and general conviction that commerce

ought to be regulated by Congress."

Every year has increased the importance of the congressional power of regulating commerce. At the time of the adoption of the Constitution, each neighbourhood supplied nearly all its needs by its own industry, but improving means of transportation and communication have multiplied the commercial ties between the citizens of the various states. This change went on slowly until 1830, more rapidly between 1830 and i860, and at an ever-hastening pace after the Civil War. Until 1824 no case involving directly the consideration of this power reached the United States Supreme Court. From 1824 to 1840 the Supreme Court decided an average of one-third of a case a year; from 1841 to i860, an average of three-fourths of a case; from 1861 to 1870, an average of one case; from 1871 to 1880, an average of nearly six cases; from 1881 to 1890, an average of more than seven cases; and from 1891 to 1900, an average of more than ten cases. The decisions have not been entirely uniform, and there were some decisions too contradictory to be explained by any ingenuity. The Supreme Court itself has said {Fargo v. Michigan, 121 U.S. 230) that " it may be admitted that the court has not always employed the same language, and that all of the judges of the court who have written opinions for it may not have meant precisely the same thing." Though in the period just preceding the Civil War the doctrine of states' rights tended to weaken somewhat the federal power, the broad outlines of the interpretation by Chief Justice Marshall laid down in 1824 in Gibbons v. Ogden remain to-day almost undimmed.

Interstate Commerce in the Federal Constitution. — Freedom of trade, without discrimination, between the citizens of all the states was in the main ensured by one brief sentence, usually called the " commerce clause " of the federal constitution: — " The Congress shall have power • • • to regulate commerce with foreign nations, and among the several states, and with the Indian tribes " (Art.i, sec. 8, clause 3). Hardly less important is the power " to make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this Constitution in the government of the United States, or in any department or officer thereof " (Art. 1, sec. 8, clause 18). To the same end of freedom of commerce, Congress is limited id that " no tax or duty shall be laid on articles exported from any state, " and " no preference shall be given by any regulation of commerce or revenue to the

2 The question arose with reference to the police power of the state in those states prohibiting the liquor traffic, and in 1889 it was held

(Leisy v. Hardin) that, in the absence of legislation by Congress, the right to sell goods taken into a state was unrestricted. This made it impossible for a state to exclude the importation of liquors to be sold within its territory, but this difficulty was remedied by the Wilson Original Package Bill of 1890, which made liquor subject to the police powers of the state to which it was carried.

ports of one state over those of another; nor shall vessels bound to or from one state be obliged to enter, clear, or pay duties in another" (Art. i, sec. 9, clauses 5 and 6). Directly and by implication, Congress was granted a number of other powers over commerce, in that it may coin money, establish uniform laws of bankruptcy, establish post-offices and post roads, regulate weights and measures, exercise admiralty jurisdiction (now interpreted to extend to all public waterways accessible to the traffic of more than one state), grant patents and copy- rights, and use the power of taxation to protect, repress or even destroy the agencies of commerce (e.g. state bank notes). But these powers can be exercised only in ways which favour and make free the intercourse among all parts of the nation.

Even if the commerce clause had been omitted from the Constitution, a large part of its object would have been attained by certain prohibitions upon the states as follows: " The citizens of each state shall be entitled to all privileges and immunities of citizens in the several states " (Art. 4, sec. 2). " No state shall, without the consent of the Congress, lay any impost or duties on imports or exports, except what may be absolutely necessary for executing its inspection laws; and the net produce of all duties and impost, laid by any state on imports or exports, shall be for the use of the treasury of the United States, and all such laws shall be subject to the revision and control of the Congress " (Art. 1, sec. 10, clause 2). " No state shall, without the consent of Congress, lay any duty of tonnage " (Art. 1, sec. 10, clause 3). Thus by threefold measures of precaution was ensured domestic freedom of trade from every point in the land to its farthest frontiers.

Negative Working of the Commerce Provisions. — For nearly a hundred years these provisions were important only in their negative effects of preventing the states from granting special privileges to their citizens or taxing unequally the citizens of other states. The decision in 1824 of Gibbons v. Ogden stopped the attempt of the

state of New York to grant the monopoly of steamboat traffic on the waters of that state. Had the clear and unequivocal opinion in that case been different, local ingenuity doubtless would have devised a multitude of discrimina- tions. " The power to tax involves the power to destroy," and ever since the decision of McCulloch v. Maryland in 181 9 it has been held that no agencies created by the federal government, such as banks or legal tender notes, are subject to state taxation, and the rule has also been laid down repeatedly by the Supreme Court (for the first time in 1886) that no burden can be laid upon the act of taking goods into or out of the state, of soliciting sales, or of delivering goods even though the tax is without discrimina- tion as between the state's own citizens and others; that is, interstate commerce " cannot be taxed at all " (Robbins v. Shelby County Taxing District, 120 U.S. 489) .'

1 However, a very important distinction is drawn between taxing the commerce and taxing property employed in commerce. With the increase of interstate commerce, the states have been hard pushed to find sources of revenue adequate to their increasing needs. The courts, therefore, have sought to draw a line between taxes on the privilege of carrying on interstate commerce and taxes on the property employed in carrying on such commerce as a part of the general body of property in the state. Thus it has been held in the case of State Freight Tax (1872, 15 Wall. 232) that a state could not lay a tax on freight transported from one state to another, and yet the same year the court held in State Tax on Gross Receipts (15 Wall. 284) that a tax was valid when laid upon the receipts of railways organized under the laws of the state, as upon a fund which had become incorporated with the general mass of property. This latter decision was by a divided court (three of the nine judges dissenting), but it has since been frequently confirmed. The tax on gross receipts of all railway companies doing business in the state has been supported when levied in proportion to the mileage within as compared with the total within and without the state (Erie Ry. v. Pa., 21 Wall. 492). This so-called " unit rule," as applied either to gross receipts or to the entire value of an interstate railway, has been upheld in a number of decisions. The method of taxation by gross receipts, however, has not tended to increase of late, but the unit rule, as applied to ad valorem taxes on property, is more and more being applied. Every ease involving the distinction between a tax on commerce and a tax on property employed in commerce presents its own difficulties, yet a practical way is thus found to prevent discriminating action by the several states, while leaving to them adequate sources of revenue.

Federal control of interstate commerce has been interpreted by the courts to be exclusive of any control by the states. This is not self-evident in the clause, " Congress shall have power to regulate commerce among the several states." Over some other subjects the power of the federal and state governments is concurrent, the state being able to act until Congress enacts some conflicting legislation. Although the early decisions suggested that the power of Congress was exclusive, yet for nearly a century no positive decision was rendered and no positive action was taken by Congress. Between 1870 and 1886 the states made great progress in the regulation of railways on the assumption that until Congress had acted the states were free to act. The question was put beyond doubt in a series of decisions establishing the principle that the non-action of Congress indicates its will that commerce shall be free and untrammelled and that the states cannot interfere either through their police power or their taxing power. 2

Positive Federal Regulation. — Though the regulation of inter- state commerce up to the Civil War was mainly negative, some positive actions of the federal government had indirect effects on commerce, as, for example, the coinage of money, the estab- lishment of post-offices, the charter of the first and second United States banks, and the charter of the Pacific Railroad. The power to do these things was conferred by the Constitution in some cases directly, in other cases by implication in that any means appropriate to lawful ends might be employed (as in case of charter of the United States Bank, McCulloch v. Maryland). From 185c to 1862 the federal government had made numerous land grants in aid of railways, but always to the states, not directly to the corporations, and it had never until 1862 granted a charter to a railway, canal, turnpike or transportation company. In 1866 Congress passed an act authorizing railway companies whose roads were operated by steam to carry passengers, freight, &c, " on their way from any state to another state and to receive compensation therefor and to connect with roads of other states so as to form continuous lines for the transportation of the same to the place of destination." 3 This act, so vague and general in its terms, had very little effect, though it has been the occasion of considerable litigation to determine its influence upon existing police laws of the states. In 1884 Congress established the Bureau of Animal Industiy for preventing the exportation of diseased cattle and for the extirpation of disease among domestic animals. This had little significance at the time for interstate commerce, its purpose being to meet the objections of foreign countries to the importa- tion of American meat. In 1887 was passed the Interstate Commerce Act,

providing a national commission to supervise interstate railways. In 1888 was passed an Arbitration Act, replaced in 1898 by an act which provides that in case of disputes between common carriers subject to the Interstate Commerce Act and their employees, conciliation shall be tried, and, in case this should fail, indicates the methods that may be used for the voluntary submission of the dispute to a board of arbitration.

2 1873, State Freight Tax, 15 Wall. 232; 1887, Robbins v. Shelby County Taxing District, 120 U.S. 489; Wabash R. R. Company v. Illinois, 118 US. 557. The last-named case arose out of the attempts of the state of Illinois to prevent discrimination between two shippers, both being its own citizens and within its own borders, one of whom was being charged more than the other for a shorter shipment on the same line and in the same direction, from a point outside the state, The court, applying the established definition of interstate commerce with verbal formality of logic, decided that the state could do nothing, for even in such a case all regulation of interstate commerceˆ from the beginning to the end of a shipment, was confided to Congress' exclusively. Thus a clause whose clear purpose was to prevent one state from burdening unequally the citizens of other states was successfully invoked by a private corporation to forbid the state securing equality of treatment for its own citizens as regards such parts of shipments as lay within its own borders. Most railway traffic was by this decision declared to be subject to legislation by Congress but Congress had not acted. The impossibility of this situation was so evident that the Interstate Commerce Act, long under discussion, became a law a few months later.

3 This was probably aimed at the discriminating between New York and Philadelphia (see speech of Charles Sumner on the railroad usurpation of New Jersey in U.S. Senate, February 14, 1865).

In 1890 was passed the Sherman Anti-Trust Act, making illegal every contract and combination in restraint of trade or com- merce among the several states or with foreign nations. In 1893 a Safety Appliance Act, the administration of which was put into the hands of the Interstate Commerce Commission, pro- moted the safety of employees and travellers, and required the roads engaged in interstate commerce to equip their cars and locomotives with

automatic couplers and brakes. In 1895 was prohibited the interstate carriage of condemned carcasses of animals, and of lottery tickets (see above reference to the inter- pretation of the Lottery Act), in 1897 of obscene literature, and in 1900 of game killed in violation of state laws. In 1901 carriers engaged in interstate commerce were required to make full reports of all accidents to the Interstate Commerce Commission. In 1902 was prohibited the interstate carriage of dairy products falsely labelled or branded as to the state or territory in which produced, and in 1903 the Secretary of Agriculture was em- powered to establish rules concerning importation and trans- portation of live stock. In 1903 the Bureau of Corporations was established with power to investigate the conduct of corporations engaged in interstate and foreign commerce, excepting common carriers subject to the Interstate Commerce Act. In 1903 the Interstate Commerce Act was amended by the Elkins Act, making much more difficult the granting of rebates. In 1905 the President was authorized to grant medals of honour to persons who by their daring save life or prevent accident on railways. In 1906 the Interstate Commerce Act was amended in important particulars (specified below). In 1906 were passed pure food laws, greatly enlarging the duties of the Department of Agriculture in reference to inspection of foods prepared for interstate commerce.

The Interstate- Commerce Act. — The period of positive action by Congress in the regulating of interstate commerce practically begins, therefore, with the enactment of the Interstate Commerce Act of February 1887, the outcome of fully seventeen years of agitation and discussion. The law was modelled in large part upon English acts. It applied to common carriers wholly by railway, and partly by railway and partly by water when both are used under a common arrangement for continuous shipment; forbade unjust discrimination and undue and unreasonable pre- ference; made it unlawful to charge more for a shorter than for a longer distance over the same line in the same direction, the shorter being included within the longer distance (though a carrier might be freed by the Cpmmission from the working of this provision) ; and forbade pooling and division of earnings. The administration of the law was entrusted to a Commission of five members, appointed by the President. From this act much was expected, but eighteen years of its operation gave as net results little more than a greater uniformity of railway accounting and much better understanding by the public of the nature of the railway problem. Discrimination and secret rebates continued. The anti-pooling clause (pretty generally recognized by the well-informed to be a mistake) prevented open but not secret

agreements between carriers, and probably hastened the movement toward consolidation. The long and short haul clause was made meaningless by the judicial inter- pretation that any competition, even that of other carriers subject to the act, justified the railway in charging more for a shorter than for a longer haul. The effectiveness of the Com- mission was destroyed by the judicial decision that it had no power to fix rates for the future. Until 1897, the Commission, when it adjudged a rate unreasonable, usually declared what rate was reasonable, and directed the carrier to reduce the rate by a given date to the designated maximum. Of 135 orders made in decisions rendered in the first ten years of the Com- mission, 68 prescribed a maximum rate for the future. In 1897 it was finally decided in the Cincinnati Freight Bureau Case (167 U.S. 479) that Congress had not conferred upon the Com- mission the power to prescribe any rate for the future. The court said that Congress might fix the rate itself or authorize a sub-tribunal to do so, but that Congress had not yet given that iuthority.

The need of further legislation had been felt from the beginning by many, and after 1903 the agitation became very active. Ihe position taken by President Roosevelt in his message to Congress in 1904 made the amendment of the Interstate Commerce Act the' principal political issue before Congress in the sessions of 1905 and of 1906. After the most remarkable senatorial debates heard at Washington in years, followed with close interest by the country, a number of amendments became law on the 29th of June 1906. The act was strengthened to a degree hardly expected by the most earnest advocates of revision. A number of minor changes made in the light of experience were : increasing the number of commissioners to seven and their pay to $10,000; facilitating procedure and the taking of evidence; requiring thirty days notice of a change of rates; requiring appeal from the Commission's decision to be taken within thirty days; empower- ing the Commission to establish joint rates and to order switches to be built. The following are generally thought to be still more important changes: (1) Including within the application of the act pipe lines (particularly for oil), express and sleeping car companies, and all the facilities and services in connexion with goods transported; (2) giving publicity to railway business by empowering the Commission to prescribe all forms of accounts and to examine the books at all times, and by forbidding any other accounts or memoranda to be kept by the companies; and (3) empowering the Commission to prescribe reasonable maxi- mum«rates to take effect within not less than thirty days and to continue not over two years unless set aside by the courts.

The Anti-Trust Act of i8go. — The growth of large corporations with some degree of monopoly power, the so-called trusts, had called forth in a number of the states anti-trust laws before 1890. When it became evident that the states were not succeeding in dealing with the problem, public sentiment found expression in the Sherman Anti-Trust Act, approved on the 2nd of July 1890. This act declared illegal and criminal, punishable by fine or imprisonment or both, every contract in restraint of trade or commerce among the several states or with foreign nations. The statute thus changed the common law wherein such con- tracts were merely unenforceable but not criminal. This act was at first construed by the Supreme Court as applying to any con- tract in restraint of interstate commerce, whether reasonable or unreasonable {Trans-Missouri Freight Association, 166 U.S. 331), but later, in 1905 (Stock Yards case, 2$ Supreme Court Reporter 276) it was held that the act did not apply to agreements for the better conduct of business which incidentally affected interstate commerce. 1 The act has been interpreted to apply to transportation (Freight Association case, 166 U.S. 290, and Northern Securities case), with results felt even by some of the advocates of railway regulation to be unfortunate. It applies to unlawful combinations of manufacturers to divide the territory and regulate the prices (Addyston Pipe Trust Case, 175 U.S. 211). In the Sugar Trust case (1895 U.S. v. Knight Co. 156 U.S.) it was declared that the statute did not apply to a manufacturing company which had acquired nearly complete control of the manufacture of refined sugar by means of the purchase of stock of other refining companies.

The Attorney-General submitted to the Senate, in June 1906, a statement of the results of all suits instituted by the Depart- ment of Justice under the anti-trust law, the Interstate Commerce Act and the Elkins Act, in the period from 1887 to June 1906 inclusive. Thirty-six suits were still pending; of the 250 which had been disposed of in some manner 186 ended in dismissal, non-prosecution or acquittal, and 64 were successful in securing in whole or in large part the object of the suit (in 30 cases con- viction, in 34 cases the granting of a petition or an injunction, &c). In addition to these results of federal efforts to regulate industry must be counted the cases in which carriers complied

1 In the Northern Securities case, Justice Brewer, who had Con- curred in the opinion in the Trans-Missouri Freight Association case, took occasion to say that while he still believed the former case had been correctly decided, he thought that the reasons given for the judgment were in some respects faulty, and that the ruling should have been that the contracts there considered were unreasonable

restraints and as such were forbidden bv the act

with the orders of the Interstate Commerce Commission without suit; but even then the total by 1906 was somewhat meagre.

The establishment of the Bureau of Corporations in 1903, and the considerable extension of the powers of inspection of the Department of Agriculture are recent changes of which the results cannot yet be fairly judged. The aim of the Bureau of Corporations is to ensure publicity in the management of corpora- tions engaged in interstate and foreign commerce. The first commissioner, Mr James R. Garfield, showed much activity in pursuing the purposes of the act, and published informing reports upon the beef trust (1905), and upon the Standard Oil Company (1906). But the effect and possible extension of federal interference became from this time burning political questions of far-reaching importance of too recent a date to be dealt with historically in this article.

_ See also the A nnual Reports of the I nterstate Commerce Commission since 1887, and decisions; Prentice and Egan, The Commerce Clause of the Federal Constitution (Chicago, 1898); Reports of the Com- missioner of Corporations on the Beef Industry (1905), on the Transportation of Petroleum (1906); W. Z. Ripley fed.), Trusts, Pools and Corporations (1905), containing leading cases and analyses of the voluminous "trust literature; F. N. Judson, The Law of Interstate Commerce and its Federal Regulation (Chicago, 1905) ; Beale and Wyman, Railroad Rate Regulation (Boston, 1906) ; Frank Hendrick, The Power to Regulate Corporations and Commerce (New York, 1906), favouring less of new legislation. (F. A. F.)

*INTERVAL, a space left between the component parts *of a continuous series, a pause in continuous action, a period of time intervening between two other points of time or chronological sequence of events. The Lat. intervallum, from which the English word has come through the French, originally meant a space between the palisades on a rampart {vallum), or between the rampart and the tents of the legionaries. In medical language " interval " is used of the intervening periods between attacks or paroxysms of a disease, particularly of the periods of a rational or normal condition of mind sometimes experienced by an insane person, a " lucid interval "; this*

phrase frequently occurs in legal documents from the 13th to the 15th centuries, non compos mentis sed gaudet lucidis intervaUis. In music " interval " ex- presses the distance in pitch between two or more musical sounds (see Music). Interval, or more commonly " intervale," is used, particularly in North America, as a geographical term for a low-lying tract of land along the banks of rivers, frequently overflowed by freshets, or more loosely for any low level land shut in by hills. This particular application, as also the form " intervale," is due to a confusion of the termination of the word with " vale," valley.

INTESTACY (Lat. intestatus, one who has not made a will, from testari, tobear witness), the condition of the property of a person who dies without making a will. Here the law of England distinguishes sharply between his real and his personal property. The devolution of the former is regulated by the rules of inherit- ance (q.v.). The destination of the latter is marked out by the Statute of Distributions. The proper conditions of a testa- mentary disposition of property will be found under the heading Will.

The distribution of an intestate's personal property is carried out under the authority of administrators, whose duties are generally the same as those of executors under a will. Admini- stration was until 1857 a matter cognizable by the ecclesiastical courts, and the ordinary was in fact the administrator until the passing of an act of Edward III. for administration upon in- testacy (1357). An earlier statute (Westminster 2, 1275), directed against the abuses of the system, required the ordinary, instead of applying the residue of the estate to " pious uses," to pay the debts of the intestate. The act of Edward III. went further in providing that " in case where a man dieth intestate, the ordinaries shall depute of the next and most lawful friends . of the dead person intestate to administer his goods," with power to sue for debts due to the deceased, and under obligation to pay debts due by him, and to answer to the ordinary like executors in the case of testament. Administrators remained on this footing of deputies appointed by the ordinary until the

Probate Act 1857 transferred the jurisdiction in administration of the ecclesiastical courts to the new court of probate.

The courts of law having held that by the grant of administra- tion the authority of the ecclesiastical courts was exhausted, the administrator became entitled to the privilege, similar to that formerly enjoyed by the ordinary, of dealing as he pleased with residue of the property. The next of kin of the same degree of

relationship to the deceased were thus aggrieved by the preference of the administrator, and it was to remedy this grievance that the Statute of Distributions 1670/1 was passed. It empowered the ordinary to take a bond from the administrator binding him to make a fair and complete distribu- tion of the property among the next of kin. Such distribution is to be in the following manner: one-third to the wife of the intestate, and all the residue by equal portions to and amongst the children, and their representatives if any of such children be dead, exclusive of children who shall have any estate by the settlement of the intestate, or shall be advanced by the intestate in his lifetime by portions equal to the shares allotted to the other children under the distribution. If such advancement should be less than the share of the other children in distribution, then it shall be made equal thereto. But the " heir-at-law, notwithstanding any land that he shall have by descent or otherwise from the intestate, is to have an equal part in distribu- tion with the rest of the children " (§ 5). By § 6, if there be no children nor any legal representatives of children, one moiety of the property is to be allotted to the wife of the intestate, the residue " to be distributed equally to any of the next of kindred of the intestate who are equal in degree and those who legally represent them." By § 7 there shall " be no representation admitted among collaterals after brothers' and sisters' children; and in case there be no wife, then all the said estate to be distributed equally to and among the children; and in case there be no child, then to the next of kindred in equal degree of or unto the intestate and their legal representatives as aforesaid, and in no other manner whatsoever." For the protection of creditors it is enacted that there shall be no distribution till a full year after the intestate's death, and if any debts should be discovered after distribution, the persons sharing the estate shall refund the amount of the same ratably. With reference to the above rules the following points may be observed: (1) The husband's absolute right to administer his wife's estate is not affected by the act. This was made clear by a later act of the same reign. (The Statute of Frauds 1677). Administration is now granted to the representatives of the husband where he has died without taking out administration to his wife, unless it can be shown that' the wife's next of kin are beneficially interested. (2) The widow, in the event of there being no children or next of kin, takes only her half. The other half goes to the crown. The widow's rights, however, have been enlarged by the Intestate Estates Act 1890. By this act where a man dies wholly intestate and without issue, his property, both real and personal, shall, if it does not exceed £500 in net value, belong to his widow absolutely. If the estate exceeds £500 net, the widow is entitled to £500 out of the estate and has a charge

for that amount upon the real and personal property of the deceased. (3) The child or children take equally, two-thirds if the widow be alive, and the whole if she be dead. If some of the children be alive and some dead having issue, then such issue will take their parents' share equally among themselves. There has been some difference of opinion as to whether if all the children have predeceased their parent but have left issue, such grandchildren take as between themselves per stirpes as representatives of their parent or per capita as next of kin. Thus if A and B predecease their father but A leaves three children and B one, should the property be divided into fourths, or first into moieties and then one moiety subdivided into thirds among A's children and the other moiety be given undivided to B's child ? It is now settled that the latter method of distribu- tion is the correct one, and it is thought that this will also apply when only great-grandchildren are alive. (4) The next of kin must be ascertained according to the rules of consanguinity,

which are the same in English as in the civil law. Degree is calculated from the intestate, through the common ancestor if any, to the kindred. Thus from son to father is one degree, to grandfather two degress, to brother two degrees, to uncle three degrees, and so on. The statute ordains distribution to be made " to the next of kindred in equal degrees pro suo cuique jure, according to the laws in such cases and the rules and limitations hereafter set down." Equality in degree is therefore not in all cases accompanied by equality in rights of succession. Neglecting the cases of wife and children already noticed, the father excludes all other next of kin. So would a mother, in default of a father surviving, but an act of 1685 enacted that in such a case the brothers and sisters, and children of brothers and sisters, of the intestate should share equally with the mother. In the absence of brothers or sisters and their representatives, the mother in the case supposed would take the whole. Mothers-in-law and stepmothers are not within the rules of consanguinity. As between a brother and a grandfather who are both in the second degree, preference is given to the brother; but a grandfather, being in the second degree, will exclude an uncle, who is in the third. An uncle and a nephew, both being in the third degree, take together. Brothers or sisters of the half blood take equally with brothers and sisters of the whole blood. The rule which prohibits representation after brothers' and sisters' children would, in a case where the next of kin were uncles or nephews, wholly exclude the children of a deceased

uncle or nephew. Also, as between the son of a brother and the grandson of a brother, the latter would not be admitted by representation. Where a brother and the children of a deceased brother are the next of kin, they will take per stirpes, i.e. the brother will take one half, and the children of the other brother will take the other half between them. When the next of kin are all children of the deceased brothers or sisters, they will take equally per capita. Subject to these modifications, the personal property will be divided equally among the next of kin of equal degree, e.g. great-grandfathers would share with uncles or aunts, as being in the third degree. Failing next of kin, under these rules, the estate goes to the crown as ultimus haeres, a result which is more likely to happen in the case of illegitimate persons than in any other.

Personal or movable property takes its legal character from the domicile of the owner, and the distribution of an intestate's goods is therefore regulated by the law of the country in which the intestate was domiciled. A domiciled Scotsman, for example, dies intestate in England, leaving personal property in England; the administrator appointed by the court of probate will be bound to distribute the property according to the Scots rules of succession.

In the law of Scotland the free movable estate of the intestate is divided amongst the nearest of kin, the full blood excluding the half blood, and neither mother nor maternal relations being originally admitted. The heir of the heritable (i.e. real) property if one of the next of kin must collate with the next of kin if he wishes to share in the movables. Proximity of kin is reckoned in the same order as in the case of inheritance. The Intestate Movable Succession Act 1855 among other changes allows the issue of a predeceasing next of kin to come in the place of their parent in succession to an in- testate, gives the father of an intestate dying without issue one-half of the movable property in preference to brothers and sisters, and to the mother if the father be dead a similar preference to the extent of one-third, and admits brothers and sisters uterine in the absence of brothers and sisters german or consanguinean.

In the United States the English Statute of Distribution has been taken as the basis of the law for the distribution of personal property in intestacy, and its principles have been applied to real property also. " In a majority of the states the descent of real and personal property is to the same persons and in the same proportions, and the regulation is the same in substance as the English Statute of Distribution. In Georgia the real and personal property of the intestate is considered as altogether of the same nature and upon the

same footing." There are many states, however, in which the distribution differs materially from the English statute. In Illinois the distribution is the same as descent of real property. In Alabama the whole goes

to the widow if there are no children (Phillips v. Lawing, 1007, 43 Southern Rep. 494). In many states, the husband's share is in all cases like the widow's, as in Texas, New York and Washington. In Pennsylvania he takes an equal share with the children.

The statutes of each state of the American union must be con- sulted, as no general rules can be laid down. As to the right to the intestate's interest in community property in the states where the law of " community " — of " acquets and gains " — prevails, see Inheritance.

INTESTINAL OBSTRUCTION (IUus), in surgery, a condition in which the onward passage of the faeces is prevented. It is often associated with phenomena due to strangulation of the gut, leading to gangrene, and with systemic poisoning due to the absorption of toxins, resulting from the decomposition of the retained faeces. Intestinal obstruction may be conveni- ently divided into acute and chronic.

Acute Intestinal Obstruction forms one of the most urgent of surgical emergencies. The following are its chief causes: (1) strangulation by bands or adhesions or through apertures; (2) volvulus; (3) the impaction of foreign bodies; (4) acute intussusception; {5) strangulation over a band or acute kinking of the gut; (6) the termination supervening on chronic obstruct tion; (7) congenital malformations of the intestines.

Strangulation by Bands or Adhesions or through Apertures. — These terms are applied to obstruction by constricting bands within the abdomen. These may be the result of the stretching of old inflam- matory adhesions, the result of former peritonitis. These bands arc commonly situated between different parts of the mesentery or between the mesentery and another organ such as the appendix. Two methods of producing strangulation exist; in the first the bowel passes under an arch or loop formed by some short con- stricting band and cannot return, or if the band is long it may form a noose in which the bowel is strangled (fig. 1); in the second the remains of a foetal structure (Meckel's diverticulum) becoming adherent to some _ „. .. „„ other organ may ensnare the intestine in show how
**Strangula- the loop. A coil of intestine may also slip tion by a Band may into a hole in the mesentery or omentum take place, or find its*

way into a pouch of peritoneum,

forming what is known as an internal hernia. The onset of symptoms is sudden and abrupt. The patient is seized with acute abdominal pain associated with collapse. The pain is usually referred to the region of the umbilicus; this localization, however, is no guide to the situation of the lesion. Vomiting is early and persistent, generally assuming a faecal character between the second and the ninth day. There is no obvious tumour; constipa- tion is present, the abdominal walls are flaccid at first, but if no relief is obtained become tender when peritonitis ensues. This form of obstruction is most frequent in young people, and there is usually a history 01 previous peritonitis. In cases not treated by operation the average duration is five to seven days, and death takes place from exhaustion or from toxaemia following peritonitis.

*Volvulus means a torsion or twisting of the gut. There are two chief varieties: (1) in which the bowel is twisted" upon its mesenteric axis (fig. 2) ; (2) in which it is wound round another coil of intestine. The sigmoid flexure is the situation in which volvulus most commonly takes place, but it may occur in the caecum and small intestine. When once present, plastic peritonitis fixes the coil in position and the blood supply becomes obstructed. Volvulus is generally preceded by a history of chronic constipation. The acute symp- **-£ /S?f \e V. toms start abruptly and are similar to those of internal strangulation, but the pain at first is more intermittent Fig. 2. — Diagram to show in type. There is usually early tender- how Volvulus may take ncss over the spot and constipation is place, absolute. Much distress is occasioned*

by abdominal distension from flatus, which develops with remark- able rapidity. The swelling is localized at first. Spontaneous natural cure is unknown, and without surgical interference death is inevitable.

Impacted Foreign Bodies. — Gall-stones may cause obstruction when they are of large size. These gall-stones when lodged in the intestine may there be enlarged by subsequent accretion. Leichenstern de- scribes such a stone with a circumference of 5 in., and Sir F. Treves removed from the intestine of an old lady a calculus, the large size of which was due to layers of magnesia, the patient having taken

Fig. 1. — Diagram to

carbonate of magnesia daily for many years. Gall-stones may give rise to intermittent sub-acute attacks of incomplete obstruction and finally give rise to an Scute attack accompanied by severe pain and vomiting, which is constant and early becomes faecal. The abdomen is soft and flaccid and the affected coil is rarely to be felt. The symptoms vary with the situation of the obstruction and are generally more urgent the nearer to the duodenum. Foreign bodies that, have been swallowed by accident or otherwise may give rise to obstruction, though extraordinary objects, as knives, coins, pipes, flints, &c. swallowed by jugglers, are known to have passed by rectum without injury. In cases where the foreign body lodges in the intestine the caecum and duodenum are favourite situations for obstruction. In the museum of the Royal College of Surgeons is a specimen in which the duodenum is blocked by a mass of pins weighing nearly a pound. Foreign bodies may remain weeks or months in situ before giving rise to serious symptoms, the progress of the larger substances being marked by temporary obstruction. In a case quoted by Duchaussoy the obstructing mass consisted of over 700 cherry stones. The diagnosis of obstruction by foreign bodies has been much simplified since the introduction of the X-rays. Enteroliths may themselves cause obstruction. They may consist of masses of indigestible vegetable material matted together with faeces and mucous. In Scotland they are frequently found to consist of husks of coarse oatmeal (aenoliths). In thin persons large enteroliths and foreign bodies may be palpable. The symptoms are those similar to obstruction by a large gall-stone.

Acute Intussusception forms about 30% of all cases of intestinal obstruction, and is the most common variety found in children. More than 50% of the cases are found during the first ten years of life, and half that amount in babies under one year; the large pre- ponderance is in males. By intussusception is meant an invagination or protrusion of a part of the intestine in the lumen of the intestine immediately below it; the lower part of the intestine may be said to have swallowed that immediately above it. The mesentery attached to the upper portion is necessarily dragged in with it. The condition may be seen by referring to the diagram (fig. 3). The invaginated portion is termed the intussusceptum, and the lower portion which it enters is known as the intussuscipiens. It is to the constriction of the vessels in the entering mesentery and later to their possible complete obstruction that are due the late serious phenomena of intussusception, e.g. gangrene or rupture of the gut. Peritonitis also ensues, and by the formation of adhesions between the serous coats

of the entering and returning parts leads to irreducibility of the intussusception. A cure occasionally

Diagram how an

Intussusception takes ? nsue ? f f r ? m spontaneous reduction of the . r invagination, or again permanent stenosis v>f

P ace ‘ the intestine may result from the adhesion

of the opposed surfaces, or the occurrence of gangrene may lead to perforation of the intestine with acute septic peritonitis. Occasionally when there is no perforation adherence takes place between the segments, and the gangrenous portion sloughs off and is discharged by the rectum. The cause of intussusception is said to be violent peristaltic action, however produced. Poly- poid tumours or masses of worms, or masses of irritating ingesta, are said to lead to its occurrence. X. Dolore and R. Leriche contend that the primary factor is congenital mobility of the caecum. They state that in 48 % of foeti the caecum is mobile in half, fixation gradually going on; while in 8ˆ5 % of adults it retains its mobility. They thus endeavour to account for the fact that in 300 collected cases 204 occurred in children less than one year old. Intussuscep- tion is met with in four chief situations: (a) the ileo-caecal, which is said to be the most frequent, constituting 44% of all cases (Treves); (b) the enteric variety, involving the small intestine; (e) the colic form ; (d) the ileo-colic, the ileum being invaginated through the ileo- caecal valve. Intussusception may be acute or chronic, sometimes lasting intermittently for years. The acute form is the most common. In young children an attack occurs with severe pain, at first par-oxysmal but later continuous; vomiting is less early and less con-tinuous than in strangulation by bands, and diarrhoea tenesmus, much straining and the passage of blood mucus from the anus are common. Collapse soon supervenes. Early in the case the abdomen is but little distended, and in about half the cases a distinct tumour can be felt. In some cases the invaginated gut may be felt protrud- ing through the sphincter. Chronic intussusception occurs more frequently in adults than in children; the symptoms may resemble chronic enteritis and be so masked that the nature of the illness remains undiagnosed until an acute attack supervenes, or the patient succumbs to the diarrhoea, vomiting and haemorrhage.

Congenital Malformations of the intestines. — Cases have been re-corded in which the small intestine ended in a blind pouch. Im-perforate anus is a fairly frequent occurrence in young infants, but

attention is usually called to the condition. Partial strictures of the intestine, if the stricture be not too narrow, may pass unnoticed for years, and final complete obstruction may result from a blockage of the stricture by some foreign substance such as a plug of hard faecal matter or a fruit stone.

Treatment of Acute Intestinal Obstruction. — Early diagnosis and early laparotomy are essential, and it is important to operate before the patient is poisoned by the absorption of toxins from the bowel. To administer purgatives is worse than useless. Of massage and abdominal taxis Sir F. Treves says: " These are to be condemned, as they may rupture the already moribund bowel and make effective a threatened perforation. These measures are for the most part feeble excuses for avoiding or delaying the operation." The opera- tion may be undertaken in one or two stages, and includes the opening and evacuation of the distended intestines and the search for and reduction or removal of the obstruction.

Chronic Intestinal Obstruction. — The causes of chronic obstruc- tion are very numerous, and may be divided into the following groups: (1) intra-intestinal conditions, i.e. the impaction of foreign bodies and impaction of faeces; (2) affections of the intestinal wall such as stricture, new growths in the intestine, particularly those of a malignant type, adhesions or matting together of the intestines from peritonitis or kinking of the gut from disease of the mesenteric glands; (3) chronic intussuscep- tion; (4) compression of the bowel by a tumour or bands developing outside the intestine. Of these the commonest are malignant growths and faecal impaction.

The general symptoms of chronic obstruction are more or less alike. The patient is attacked with gradually increasing constipation, wlrch may alternate with diarrhoea which is generally set up by the irritation of the retained faeces. In obstruction due to malignant growths the character of the motions is changed, they become scybalous, pipe-like or flattened. The abdomen becomes distended, and at intervals severe symptoms may supervene, consisting of pain and vomiting with complete constipation owing to some temporary complete obstruction. The attacks usually pass off, and relief may be obtained naturally or by the administration of a purgative, but they have a tendency to recur and in malignant disease to increase to complete obstruction. Finally a seizure may persist and take on all the characters of an acute attack, and death may supervene from exhaustion, perforation or peritonitis, unless immediately treated. When it arises from simple stricture no tumour is to be felt, but in malignant disease the tumour may be frequently palpated, unless

during an acute attack when the abdomen is much distended with gas.

Faecal Impaction is not uncommon in adult females who have suffered from chronic constipation. The common seat of the block-age is in the colon, chiefly in the sigmoid flexure and in the rectum, but it may occur in the caecum. The accumulation may form a doughy tumour which in parts may be nodular and intensely hard. The causes are due to the state of the contents of the bowel itself, to congenital or acquired weakness and diminished expulsive power of the bowel, or to painful affections of the anus, fissures, piles and painful bladder affections. The acute symptoms are always pre-ceded by a prolonged period of malaise; the breath is offensive and the tongue foul, and the temperature may be raised from the ab-sorption of toxins. Faecal impaction requires the regular and repeated administration of large enemata, given through a long tube, together with the administration of calomel and belladonna. Large impacted masses in the rectum may be broken up and removed by a scoop.

Strictures of the Intestinal Wall. — Simple strictures are infrequent, and are dealt with by the operation of lateral anastomosis. They follow dysenteric or tuberculous ulceration or the passage of gall-stones. Stricture due to carcinoma of the intestinal wall occurs usually in the old or middle-aged, and the symptoms come on insidi-ously. As soon as the condition is diagnosed an attempt should be made to remove the tumour if freely movable, or if this is not possible to afford relief by short-circuiting the intestine or by colotomy.

Chronic Intussusception has been frequently mistaken in the diagnosis for rectal polypus, cancer, tuberculous peritonitis, &c. (Treves). If diagnosed it may be reduced by inflation with aif7 b.ut frequently too many adhesions are present for this to be possible, and laparotomy with excision of the mass should be undertaken ; the results are said to be very encouraging.

Compression of the bowel due to a tumour or bands external to the bowel may occasionally give rise to obstruction. An exploratory operation should be undertaken for the excision of the tumour, or the separation of adhesions and release of the bowel, or if the intestines are much matted together by peritonitis an intestinal anastomosis may give relief. Obstruction due to paralysis of the muscular coat of the intestine has been described (adynamic ob- struction), but its existence is a subject of dispute. (H. L. H.)

INTESTINE (Lat. intestinus, internal, usually in neuter plural intestina. from intus, within), in anatomy, the lower part of the

alimentary canal; in man and mammals divided into the smaller intestine, from the pylorus to the iliocaecal valve, and the larger, reaching from the caecum and colon to the end of the rectum. The word is frequently applied to the whole of the alimentary canal in invertebrates. (See Alimentary. Canal.)

INTOXICATION (Lat. toxicare, intoxicare, to smear with poison, toxicum, an adaptation of Gr. to&kov, sc. (pap/iaKov, a poison smeared on arrows ; t6£oc, bow) , poisoning, or the action of poisons, whether of drugs, bacterial products, or other toxic substances, and hence the condition resulting from such poisoning, particu- larly the disorder of the nervous system produced by excessive drinking of alcohol (see Inebriety and Drunkenness).

INTRA, a town of Piedmont, Italy, in the province of Novara, on the W. shore of Lake Maggiore, 685 ft. above sea-level, 12 m. N. of Arona by steamer. Pop. (1901) 6924. It is situated between two torrents, which afford water-power for cotton and silk mills, hat factories, foundries, &c; these chiefly belong to Swiss proprietors, who have fine villas with beautiful gardens. The church is a large edifice of 1708-1751.

INTRADOS (a French term, Lat. intra, within, Fr. dos, back), in architecture, the under-curved surface or soffit of an arch

(?•”•)■

INTRANSIGENT (adopted from the Fr. intransigeant, taken, through the Spanish intransigente, from the Lat. in, not, and transigere, to come to an understanding), one whose attitude is that of an irreconcilable. The term is used chiefly of politicians of an advanced type; those in complete antagonism to the existing form of government; but is especially applied on the continent of Europe to members of legislatures holding extreme Radical views. In this sense the word was first used in the political troubles which arose in Spain in the years 1873- 1874. Intransigentism implies an attitude of uncompromising disagreement with political opponents. The word is also used non-politically, in the sense of intractability and intolerance.

INTRINSIC (through Fr. intrinsique, from Lat. intrinsecus, inwardly; inter, within, secus, following, from root of sequi, to follow), an adjective originally applied to something internal or inside another, but now ordinarily used to express a quality inherent in or inseparable from a person, thing or abstract conception. In anatomy the term is, however, still used of a muscle which has both its origin and insertion in the organ in which it is found.

INTROSPECTION (from Lat. introspicere, to look within), in psychology, the process of examining the operations of one's own mind with a view to discovering the laws which govern psychic processes. The introspective method has been adopted by psychologists from the earliest times, more especially by Hobbes, Locke, Berkeley, Hume, and English psychologists of the earlier school. It possesses the advantage that the individual has fuller knowledge of his own mind than that of any other person, and is able therefore to observe its action more accurately under systematic tests. On the other hand it has the obvious weakness that in the total content of the psychic state under examination there must be taken into account the conscious- ness that the test is in progress. This consciousness necessarily arouses the attention, and may divert it to such an extent that the test as such has little value. Such psychological problems as those connected with the emotions and their physical con- comitants are especially defective in the introspective method; the fact that one is looking forward to a shock prepared in advance constitutes at once an abnormal psychic state, just as a nervous person's heart will beat faster when awaiting a doctor's diagnosis. The purely introspective method has of course always been supplemented by the comparison of similar psychic states in other persons, and in modern psycho-physiology it is of com- paratively minor importance.

See Psychology, Attention, &c. ; a clear statement will be found in G. F. Stout's Manual of Psychology (1898), i. 14.

INTUITION (from Lat. intueri, to look at), in philosophy, a term applied to immediate or direct apprehension. The truth of a theorem in geometry is demonstrated by a more or less elaborate series of arguments. This is not the case, according

to the intuitionalist school of philosophy, with the apprehension of universal principles, which present themselves as necessarily true in their own right, without any sort of proof. The fact that things which are equal to the same things are equal to one another is apprehended directly or immediately without demonstration. Similarly in ethics

the intuitional school holds that the principles of right and wrong are immediately appre- hended without reference to any other criterion and without any appeal to experience. Ethical intuitionalism sometimes goes even farther, and holds that the conscience when faced with any particular action at once assigns to it a definite moral value. Such a view presupposes that the moral quality of an action has, as it were, concrete reality which the special faculty of conscience immediately recognizes, much in the same way as a barometer records atmospheric pressure. The intuitionalist view is attacked mainly on the ground that it is false to the facts of experience, and it is maintained that many of the so- called immediate a priori judgments are in point of fact the resu.lt of forgotten processes of reasoning, and therefore a posteriori. Minor grounds of attack are found in the difficulty of discovering in certain primitive peoples any intuitive conception of right and wrong, and in the great differences which exist between moral systems in different countries and ages.

INULIN (C 6 Hio05)x» in chemistry, a starch-like carbohydrate, known also as alantin, menyanthin, dahlin, synanthrin and sinistrin. It occurs in many plants of the large genus Composilae, to which the elicampane (Lat. inula) belongs; and forms a white tasteless powder, sparingly soluble in cold water, very soluble in hot water and insoluble in alcohol. It is not coloured blue by iodine; and it reduces ammoniacal silver and gold solutions, but not Fehling's solution. Heated with water or dilute acids, it is converted into laevulose.

INVAR, an alloy of nickel and steel, characterized by an extremely small coefficient of thermal expansion; it is specially useful in the construction of pendulums and of geodetic measuring apparatus, in fact, in all mechanical devices where it is an advantage to avoid temperature compensation. The name was chosen as expressing the invariability of its dimensions with heat. See Clock; Geodesy.)

INVARIABLE PLANE, in celestial mechanics (see Astronomy), that plane on which the sum of the moments of momentum of all the bodies which make up a system is a maximum. It derives its celebrity from the demonstration by Laplace that to whatever mutual actions all the bodies of a system may be subjected, the position of this plane remains invariable.

A conception of it may be reached in the following way. Suppose that from the centre of gravity of the solar system (instead of which we may, if we choose, take the centre of the sun), lines or radii vectores be drawn to every body of the solar system. As the planet revolves

around the centre, each radius vector describes a surface of which the area swept over in a unit of time measures the areal velocity of the planet. The constancy of this velocity in the case of the sun and a single planet is formulated in Kepler's second law. Next pass any plane through the centre of motion and project the area just defined upon that plane. We shall thus have a projected areal velocity, the product of which by the mass of the planet is the moment of momentum of the latter. Form this product for every body or mass of matter in the system, and the sum of the moments is then invariable whatever be the direction of the plane of projection. In the case of a single body revolving around the sun this plane is that of its orbit. When all the bodies of the system are taken into account, the invariable plane is a certain mean among the planes of all the orbits.

In the case of the solar system the moment of Jupiter is so pre-ponderant that the position of the invariable plane does not deviate much from that of the orbit of Jupiter. The influence of Satun! comes next in determining it, that of all the other planets is much smaller. The latest computation of the position of this plane is by T. J. J. See, whose result for the position of the invariable plane is inclination to ecliptic 1° 35′ 7"'74, longitude of node on ecliptic 106° 8′ 46"- 7 (Eq. 1850).

INVENTORY (post-class. Lat. inventarium, a list or repertory, from invenire to find), a detailed list, schedule or enumeration in writing, of goods and chattels, credits and debts, and some- times also of lands and tenements.

(i) In law, perhaps its earliest, and certainly its most imDortaut

use has been in connexion with the doctrine of " benefit of inventory," derived by many legal systems from the beneficium inventarii of Roman law, according to which an heir might enter on his ancestor's inheritance without being liable for the debts attaching to it or to the claims of legatees beyond the value — previously ascertained by " inventory " — of the estate. The benefit of inventory exists in Scots law, in France (benefice d'inventaire), in Italy, Mauritius {Civil Code, Art. 774), Quebec {Civil Code, Art. 660), St Lucia {Civil Code, Art. 585), Louisiana {Civil Code, Arts. 1025 et seq.), and under the Roman Dutch law in Ceylon. In South Africa benefit of inventory is super- seded by local legislation.

(ii.) In many systems of law, the duty is imposed on executors and administrators of making an " inventory " of the estate of the testator or intestate, in order to secure the property to the persons entitled to it. In England this duty was created by statute in 1529. In modern practice an inventory is not made unless called for, but the court may order it ex officio, and will do so on the application of any really interested party. Similar provisions for an inventory of the estate of deceased persons are made in Scots law (Probate and Legacy Duties Act 1808 (s. 38), and Executors (Scotland) Act 1900 (s. 5), and in most of the British colonies. In Scotland, prior to the Finance Act 1894 (which imposed a tax, called " estate duty," on the principal value of all property, heritable or movable, passing on death), the stamp duty on movable property was termed " inventory duty."

In the United States, the duty of preparing an inventory is gener- ally imposed on executors and administrators; see Kent, Com- mentaries on American Law (new ed., 1896), ii. 414, 415; and cf. Gen. Stats, of Connecticut, 1888., s. 578; New York Stats, s. 2714; New Jersey (Orphans Court, s. 58).

(iii.) An analogous duty of preparing an " inventory " is imposed in many countries on guardians and curators. In Scotland judicial factors are charged with a similar statutory duty (Act of Sederunt, Nov. 25th, 1857, under the Bankruptcy (Scotland) Act 1856) as regards the estate of insolvent debtors.

(iv.) In Scots law, the term " inventory " is also applied to a list of documents made up for any purpose, e.g. the inventory of process or the inventory of documents, in an action, and the inventory of title-deeds produced on a judicial sale of iands.

(v.) In England an " inventory " of the personal chattels comprised in the security is required to be annexed to a bill of sale (Bills of Sale Act 1882, s. 5). See also Executors and Administrators.

INVERARAY, a royal and municipal burgh, the county town of Argyllshire, Scotland. Pop. (1901) 1369. It lies on the southern shore of a bay, where the river Aray enters Loch Fyne, 40 m. directly N.W. of Glasgow, and 85 m. by water. The town consists of one street running east and west, and a row of houses facing the bay. Near the church stands an obelisk in memory of the Campbells who were hanged, untried, for their share in the Argyll expedition of 1685 in connexion with the duke of Mon- mouth's rebellion. The ancient market-cross, 8 ft. high, sup- posed to have been brought

from Iona in 1472, is a beautiful specimen of the Scottish sculptured stones. The chief industry is the herring fishery, the herring of Loch Fyne being celebrated. The town originally stood on the north side of the bay, clustering round the ancient baronial hold, attributed to Sir Colin Campbell of Lochow, " the Singular," who flourished at the end of the 14th century, but it was removed to its present site in the middle of the 18th century. Inveraray was erected into a burgh of barony in 1472; and Charles I., while a prisoner in Carisbrooke Castle, raised it to a royal burgh in 1648. Much has been done for it by the ducal house of Argyll, whose seat, Inveraray Castle, is about 1 m. from the town. This handsome square structure, built between 1744 and 1761 from designs by Robert Adam, consists of two storeys, with a round overtopping tower at each corner. Some fine tapestry and valuable relics were destroyed by fire in 1877, but the damage to the castle was repaired in 1880. The earls and dukes of Argyll were great planters of trees— mainly larch, spruce, silver fir and New England pines— and their estates around Inveraray are consequently among

the most luxuriantly wooded in the Highlands. Duniquoich. a finely timbered conical hill about 900 ft. high, adjoins the castle on the north and is a picturesque landmark.

INVERCARGILL, the chief town of Southland county, South Island, New Zealand, 139 m. by rail S.W. by W. from Dunedin. Pop. (1906) 7299. It lies on a deep estuary of the south coast named New River Harbour, which receives several streams famous for trout-fishing. It is the centre of the large grazing and farming district of Southland; and has a number of factories, including breweries, foundries, woollen mills and timber-works. The plan of the town is rectangular, with wide streets; and there is a fine open reserve. The harbour is deep and well sheltered, but the greater part of the trade passes through the neighbouring Bluff Harbour, on which is Campbelltown, 17 m. S. of Invercargill by rail. Bluff Harbour is the port of call and departure for steamers for Melbourne and Hobart. Exports are wool, preserved meat and timber. The district of Southland was surveyed in 1841, but was reported unfavourable, and settlement was delayed till 1857. Southland was a separate province between i860 and 1870, but, failing financially as such, rejoined the parent province of Otago. Invercargill became a municipality in 187.1, and there are five suburban municipalities. The town is the regular starting-point of a journey to the famous lakes Wakatipu and Te Anau, which are approached by rail.

INVERELL, a town of Gough county, New South Wales, Australia, on

the Macintyre river, 341 m. N. of Sydney, with which it is connected by rail. Pop. (1901) 3293. It is the centre of a prosperous agricultural district producing, chiefly, wheat and maize; the vine is also largely grown and excellent wine is made. Silver, tin and diamond mines are worked near the town. Inverell became a municipality in 1872.

INVERKEITHING, a royal and police burgh of Fifeshire, Scotland. Pop. (1901) 1676. It is situated on an inner bay of the shore of the Firth of Forth, 3! m. S.E. of Dunfermline and 131 m. N.W. of Edinburgh by the North British railway, via the Forth Bridge. The chief industries are tanning, shipbuilding, milling, paper-making, rope-making and brick-making. With Stirling, Dunfermline, Culross and Queensferry, Inverkeithing returns one member to parliament (the Stirling district burghs). It received its charter from David I. St Peter's, the parish church, dates from the 12th century, but having been nearly destroyed by fire was rebuilt in 1826 in the Gothic style, the ancient tower, however, being preserved. Sir Samuel Greig, the father of the Russian navy and designer of the fortifications at Cronstadt, was born at Inverkeithing in 1735. About half-way towards Dunfermline the battle of Inverkeithing or Pitreavie took place on the 20th of July 1650, when Cromwell's forces defeated the Royalists. A mile and a half to the south lies North Queensferry (pop. 594), the first railway station on the north side of the Forth Bridge. A little to the west lies the bay of St Margaret's Hope, which in 1903 was acquired by the government as the site for the naval base of Rosyth, so named from the neighbouring ruined castle of Rosyth, once the residence of Queen Margaret, wife of Malcolm Canmore. On the west side of the Forth Bridge, in the fairway, lies the rocky islet of Bimar with a lighthouse, and immediately to the east is the island of Inchgarvie (Gaelic, "the rough island"), which once contained a castle used as a State prison, the ruins of which were removed to make way for one of the piers of the Forth Bridge.

INVERNESS, a royal, municipal and police burgh, seaport and county town of Inverness -shire, Scotland. Pop. (1891) I 9,3°3! (1901) 21,238. It lies on both banks, though principally on the right, of the Ness; and is 118 m. N of Perth by the Highland railway. Owing to its situation at the north-eastern extremity of Glen More, the beauty of its environment and its fine buildings, it is held to be the capital of the Highlands; and throughout the summer it is the headquarters of an immense tourist traffic. The present castle, designed by William Burn (1789-1870), dates from 1835, and is a picturesque structure effectively placed on a hill by the river's s ; de; it contains the court and county offices. Of the churches, the High or*

Li'urch has a square tower surmounted with a steeple, containing one of the bells which Cromwell removed from Fortrose cathedral. On the left bank of the river stands St Andrew's Episcopal Cathedral, in the Decorated Gothic, erected in 1866 from designs by Dr Alexander Ross. Among the schools are the High School, the collegiate school, the school of science and art, and the Royal Academy, incorporated by royal charter in 1792. Other public buildings are the museum, public library, observatory, the northern infirmary, the district asylum, an imposing structure at the base of Dunain Hill (940 ft.), the Northern Counties Blind Institute, the Highland Orphanage and the Town Hall, opened in 1882. In front of the last stands the Forbes Memorial Fountain, and near it is the old town cross of 1685, at the foot of which, protected since the great fire of 141 1, is the lozenge-shaped stone called Clach-na-Cudain (Stone of the Tubs), from its having served as a resting-place for women carrying water from the river. The old gaol spire, slightly twisted by the earthquake of 1816, serves as a belfry for the town clock. Half a mile to the west of the Ness is the hill of Tomnahurich (Gaelic, " The Hill of the Fairies "), upon which is one of the most beautifully-situated cemeteries in Great Britain. The open spaces in the town include Victoria park, Maggot Green and the ground where the Northern Meeting — the most important athletic gathering in Scotland — is held at the end of September. Inverness is the great distributing centre for the Highlands. Its industries, however, are not extensive, and consist mainly of tweed (tartan) manufactures, brewing, distilling, tanning, soap and candle-making; there are also nurseries, iron-foundries, saw-mills, granite works, and the shops of the Highland Railway Company. There is some shipbuilding and a considerable trade with Aberdeen, Leith, London and the east coast generally, and by means of the Caledonian Canal with Glasgow, Liverpool and Ireland. The Caledonian Canal passes within 1 m. of the town on its western side. In Muirtown Basin are wharves for the loading and unloading of vessels, and at Clachnaharry the Canal enters Beauly Firth. There is little anchorage in the Ness, but at Kessock on the left bank of the river-mouth, where there are piers, a breakwater and a coastguard station, there are several acres of deep water. The river at Inverness is crossed by four bridges, two of them for pedestrians only, and a railway viaduct. The town, which is governed by a provost, bailies and council, unites with Forres, Fortrose and Nairn (Inverness

Burghs) in sending one member to parliament.

Inverness was one of the chief strongholds of the Picts, and in 565 was visited by Columba with the intention of converting the Pictish king Brude, who is supposed to have resided in the vitrified fort on Craig Phadrick (550 ft.), i§ m. W. of the town. The castle is said to have been built by Malcolm Canmore, after he had razed to the ground the castle in which Macbeth according to tradition murdered Duncan, and which stood on a hill 5 m. to the north-east. William the Lion (d. 1214) granted the town four charters, by one of which it was created a royal burgh. Of the Dominican abbey founded by Alexander III. in 1233 hardly a trace remains. On his way to the battle of Harlaw in 141 1 Donald of the Isles burrled the town, and sixteen years later James I. held a parliament in the castle to which the northern chieftains were summoned, of whom three were executed for asserting an independent sovereignty. In 1562, during the progress undertaken to suppress Huntly's insurrection, Queen Mary was denied admittance into the castle by the governor, who belonged to the earl's faction, and whom she afterwards therefor caused to be hanged. The house in which she lived meanwhile stands in Bridge Street. Beyond the northern limits of the town Cromwell built a fort capable of accommodating 1000 men, but with the exception of a portion of the ramparts it ™as demolished at the Restoration. In 171 5 the Jacobites occupied the royal fortress as barracks, and in 1746 they blew it up.

INVERNESS-SHIRE, a highland county of Scotland, bounded N. by Ross and Cromarty, and the Beauly and Moray Firths, N.E. by the shires of Nairn and Elgin, E. by Banff and Aberdeen shires, S.E. by Perthshire, S. by Argyllshire and W. by the

Atlantic. It includes the Outer Hebrides south of the northern boundary of Harris, and several of the Inner Hebrides (see Hebrides) and is the largest shire in Scotland. It occupies an area of 2,695,037 acres, or 4211 sq. m., of which more than one-third belongs to the islands. The county comprises the districts of Moidart, Arisaig and Morar in the S.W., Knoydart in the W., Lochaber in the S., Badenoch in the S.E. and the Aird in the N. Excepting comparatively small and fertile tracts in the N. on both sides of the river Ness, in several of the glens and on the shores of some of the sea lochs, the county is wild and mountainous in the extreme and characterized by beautiful and in certain respects sublime scenery. There are more than fifty mountains exceeding 3000 ft. in height, among them Ben Nevis (4406), the highest mountain in the British Isles, the extraordinary assemblage of peaks forming the Monadh- liadh mountains in the

S.E., Ben Alder (3757) in the S., and the grand group of the Cairngorms on the confines of the shires of Aberdeen and Banff.

In the north-west the Beauly river (16 m. long) is formed by the confluence of the Farrar and the Glass. The Enrick (18 m.), rising in Loch-nan-Eun, takes a north-easterly direction for several miles, and then flowing due east falls into Loch Ness, just beyond Drumnadrochit, close to the ruined keep of Castle Urquhart. The Ness (7 m.), a fine stream for its length, emerges from Loch Dochf our and enters the sea to the north of Inverness. The Moriston (19 m.), flows out of Loch Clunie, and pursuing a course E. by N.E. falls into Loch Ness 4 m. south of Mealfour- vounie (2284 ft.) on the western shore opposite Foyers. The Lochy (9 m.), issuing from the loch of that name, runs parallel with the Caledonian Canal and enters Loch Linnhe at Fort William. The Spean (18 m.), flowing westwards from Loch Laggan, joins the Lochy as it leaves Loch Lochy. The Nevis (12 m.), rising at the back of Ben Nevis, flows round the southern base of the mountain and then running north-westwards enters Loch Linnhe at Fort William. The Leven (12 m.), draining a series of small lochs to the north-west of Rannoch, flows westward to Loch Leven, forming during its course the boundary between the shires of Inverness and Argyll. The Dulnain (28 m.), rising in the Monadhliath Mountains, flows north-eastwards and enters the Spey near Grantown, falling in its course nearly 2000 ft. The Truim (153 m.), rising close to the Perthshire frontier, flows N.N.E. into the Spey. Three great rivers spring in Inver- ness-shire, but finish their course in other counties. These are the Spey, which for the first 60 m. of its course belongs to the shire; the Findhorn (70 m.), rising in the Monadhliath Moun- tains a few miles N.W. of the source of the Dulnain; and the Nairn (38 m.), rising within a few miles of Loch Farraline. The two falls of Foyers — the upper of 40 ft., the lower of 165 ft. — are celebrated for their beauty, but their volume is affected, especially in drought, by the withdrawal of water for the works of the British Aluminium Company, which are driven by electric power derived from the river Foyers, the intake being situated above the falls. Other noted falls are Moral on the Enrick and Kilmorack on the Beauly.

The number of hill tarns and little lakes is very great, con- siderably more than 200 being named. Loch Ness, the most beautiful and best known of the larger lakes, is 22! m. long, 1 1 m. broad at its widest point (Urquhart Bay), has a drainage area of 696 m., and, owing to its vast depth (751 ft.), uniformity of temperature, and continual movement of its waters, never freezes. It is the largest body of fresh water in Great Britain, and forms part of the scheme of the

Caledonian Canal. A few miles S.W. is Loch Oich (4 m. long), also utilized for the purposes of the Canal, which reaches its summit level (105 ft.) in this lake. To the S.W. of it is Loch Lochy (9! m.), which is also a portion of the Canal. Loch Arkaig (12 m.) lies in the country of the Camerons, Achnacarry House, the seat of Lochiel, the chief of the clan, being situated on the river Arkaig near the point where it issues from the lake. The old castle was burnt down by the duke of Cumberland, but a few ruins remain. After Culloden Prince Charles Edward found shelter in a cave in the " Black Mile," as the road between Lochs Arkaig and Lochy is called.

Loch Quoich (6 m.) lies N. by W. of Loch Arkaig, and Loch Garry (4! m.) a few miles to the N. E.; Loch Morar (ii§ m. long by i| bioad) is only about 600 yds. from the sea, to which it drains by the river Morar, which falls over a rocky barrier, at the foot of which is a famous salmon pool. The loch is 1017 ft. deep and is thus the deepest lake in the United Kingdom. It contains several islands, on one of which Lord Lovat was captured in 1746. Loch Laggan (7 m.) and Loch Treig (5J m.) in the south of the county are both finely situated in the midst of natural forests. The principal salt-water lochs on the Atlantic seaboard are Loch Hourn (" Hell's Lake," so named from the wild precipices rising sheer from the water), running inland for 14 m. from the Sound of Sleat and separating Glenelg from Knoydart; and Loch Nevis (14 m.), a few miles farther south.

The parallel roads of Glen Roy, a glen with a north-easterly to south-westerly trend, a few miles east of Loch Lochy, presented a problem that long exercised the minds of geologists. At heights of 1 148 ft., 1067 ft. and 835 ft., there run uninterruptedly along each side of the glen terraces of a width varying from 3 to 30 ft. Local tradition ascribes them to the Ossianic heroes, and John Playfair (1 748-1810) argued that they were aqueducts. The fact that they occur also in the neighbouring Glen Gloy and Glen Spean, however, disposes of an artificial origin. John MacCulloch (1773-1835) propounded the theory that they were lacustrine and not marine, and Agassiz followed him with the suggestion that the water had been held up by a barrier of glacier ice. This view is now generally accepted, and the roads may therefore be regarded as the gently sloping banks of lakes dammed up by glacier ice. Glen More-nan-Albin, or the Great (den, is a vast " fault," or dislocation, 62 m. in length, through which Thomas Telford constructed (1804-1822) the

Caledonian Canal connecting Loch Linnhe and the Moray Firth. Glen More is said to be liable to shocks of earthquake, and Loch Ness was violently agitated at the time of the great Lisbon earthquake (1755).

Among the glens renowned for beauty are Glen Urquhart and Glen Moriston to the west of Loch Ness, Glen Feshie in the east, and Glen Nevis at the southern base of Ben Nevis. Glen Garry, to the west of Loch Oich, gave its name to the well-known cap or " bonnet " worn both in the Highlands and Lowlands. In Glen Finnan, at the head of Loch Shiel, Prince Charles Edward raised his standard in 1745, an incident commemorated by a monument erected in 1815 by Alexander Macdonald of Glenaladale. The great straths or valleys are in the north and east, the chief among them being Strathfarrar, Strathglass and Strathnairn, and the heads of Strathearn and Strathspey.

Geology. — Almost the entire area of this county is occupied by the younger Highland schists and metamorphic rocks. East of Loch Ericht and the rivers Traim and Spcy as far as Airemore and between there and Duthel there are quartzites and quartzose schists; on the remaining area the various kinds of schistose and gneissose rock have hardly been worked out in detail. Granite masses occur in numerous isolated patches; the largest is on the eastern boundary and includes the flanks of Cairn Gorm, Cairn Tout, Braeriach, Cam Ban and Meall Tisnail. Other smaller ones are found at Ben Nevis, where the lower part of the mountain is granite, the upper part porphyritic felsite; between Moy and Ben Buidhe Mhor; E. of Foyers, includ- ing Whitebridge, Aberchalder and Loch Farraline ; at Ben Alder, \V. of Loch Ericht and another between that loch and the river Pattack; at Banavie on the W. of the river Lochy; around the upper end of Loch Clunie and at several other places. The dioritic mass of Rannoch Moor just enters this county between Loch Ericht and Loch Ossian.

The Old Red Sandstone extends into this county from Nairn through Culloden Moor past Inverness and down Loch Ness to a point south of Foyers ; it occurs also on the south-east side of Loch Oich, and around Beauty, where it forms the falls of Kilmorach. These rocks consist at the base of coarse breccias and conglomerates passing upwards into chocolate-coloured sandstone and flags, with the shaly series containing limestone nodules known as the fish bed from the abundance and importance of its fossil contents; it is well exposed in the Big Burn and near Loch Ashie. At a higher horizon come more purple flags and grits. The Great Glen which traverses the county is an old line of earth fracture along which displace- ments have been produced during more than one geological period. Roches moutonnees, glacial striations and moraines and other evidences of the great Ice age are abundant, besides the parallel roads of Glen

Roy to which allusion has already been made. The

lowest of these terraces is prolonged into Glen Spean. At numerous places on the coasts the remains of old marine terraces occur at 100 ft. and 25 ft. above the sea.

Of the small isles belonging to Inverness-shire those of Rum and Eigg are of the greatest interest. The northern part of Rum is made of Torridonian rocks, shales below and red sandstones above; altogether over 10,000 ft. are visible. These rocks have suffered thrusting and the shales are thus made in places to overlie the sandstones. A few patches of Torridonian occur in the south. Tertiary peridotites in laccolitic masses cover a large area in the south of the island and form the highest ground. These are penetrated by eucrites and gabbros, followed later by granites; and the whole has been subsequently crushed into a complex gneissose mass. • Still later, dolerite sills and sheets and dikes of granophyre and quartz felsite followed in the same region. Eigg is mainly built of great basaltic lava flows with intrusions of doleritic rocks; these were succeeded by more acid intrusions, and again by a more basic series of dikes. Pitchstones occur among the later rocks. The Sgurr is capped by a thick intrusion of pitchstone. Jurassic rocks, including the Estuarine Lower Oolite sandstones, shales and limestones and Middle Oolite Oxfordian rocks are found in the north of this island; there is also a small trace of Upper Cretaceous sandstone. Canna, Sanday and Muck are almost wholly basaltic; a small patch of Jurassic occurs on the south of the last-named island. (See also Skye.)

Forests and Fauna. — Deer forests occupy an enormous area, particularly in the west, in the centre, in the south and south-east and in Skye. From the number of trees found in peat bogs, the county must once have been thickly covered with wood. Strathspey is still celebrated for its forests, and the natural woods on Loch Arkaig, in Glen Garry, Glen Moriston, Strathglass and Strathfarrar, and at the head of Loch Sheil, are extensive. The forests consist chiefly of oak, Scotch fir, birch, ash, mountain- ash (rowan), holly, elm, hazel and Scots poplar, but there are also great plantations of larch, spruce, silver fir, beech and plane. Part of the ancient Caledonian forest extends for several miles near the Perthshire boundary. Red and roe deer, the Alpine and common hare, black game and ptarmigan, grouse and pheasant abound on the moors and woodlands. Foxes and wild cats occur, and otters are met with in the lakes and streams. There are also eagles, hawks and owls, while great flocks of waterfowl, particularly swans, resort to Loch Inch and other lakes in Badenoch. Many of the rivers and several of the lochs abound with

salmon and trout, the salmon fisheries of the Beauly, Ness and Lochy yielding a substantial return.

*Climate and Agriculture. — Rain is heavy and frequent in the mountains, but slighter towards the northern coast; the fall for the year varying from 73-17 in. at Fort William to 43-17 in. at Fort Augustus, and 26-53 in. at Inverness. The mean temperature for the year is 47-2°F., for January 38-5° and for August 58°. Although since 1852 the cultivated area has increased greatly, actually the percentage of land under crops is still small. The Aird and Beauly districts, some of the straths and several of the glens are fertile. Oats are the predominant crop, barley is grown (mostly for the distilleries), but the wheat acreage is trifling. Of green crops turnips do well in certain districts, artificial manures being extensively used. In those quarters where the soil is dry, potatoes are successfully. raised. An immense number of the holdings are crofts, averaging 5 acres or under. About 50% are between 5 acres and 50; but few are above 50. The operations of the Crofters' Commission (1886) have been beneficial in a variety of ways. Not only have rentals been reduced considerably and arrears cancelled, but the increased sense of security resulting from the granting of fair rentals, fixity of tenure and compensation for disturbance has induced tenants to reclaim waste land, to enlarge their holding's and to apply themselves more thriftily and with greater enterprise and intelligence to the development of their farms. On the large holdings the most modern methods of husbandry are followed, the farm buildings are excellent and the implements up-to-date. The hills furnish good pastures. The flocks of sheep are exceptionally heavy, the chief varieties on the uplands being Cheviots and black-faced and in some of the lower districts Leicesters and half-breeds. Of the cattle the principal breed is the Highland, the largest and best herds of which are in thp Western Isles. Polled and shorthorns are also reared, arr**

Ayrshires are kept for dairy purposes. Great numbers of the hardy Highland ponies are raised on the hill farms, and the breed of agricultural horses was improved by the introduction of Clydesdale stallions. Where pigs are reared they appear to be kept, especially amongst the crofters, for domestic consumption. Industries. — Manufactures are few. Indeed, excepting the industries carried on in Inverness, they are almost entirely confined to distilling — at Fort William, Kingussie, Carbost, Muir of Ord and some other places —

brewing, woollens (especially tartans, plaids and rough tweeds), milling and (at Kirktown near Inverness) artificial manures. The catering for the wants of thousands of sportsmen and tourists, however, provides employment for a large number of persons, and has led to the opening of hotels even in the remotest regions. The fisheries, on the other hand, are of great value, especially to the Hebrideans. The kelp industry has died out.

Communications. — Owing to its physical character communication by rail is somewhat restricted, but the Highland railway enters the shire from the south near Dalwhinnie and runs to Inverness via Aviemore and Daviot. Another portion of the same system also reaches the county town from Nairnshire. The Dingwall and Skye railway passes along the southern shore of Beauly Firth. In the south-west the West Highland railway (North British) enters the county 2 m. N. W. of Rannoch station and terminates at Mallaig, via Fort William and Banavie, sending off at Spean Bridge a branch to Fort Augustus. There is also communication by steamer with the piers of the Caledonian Canal and with the Western Isles, and a considerable amount of shipping reaches Beauly and Inverness by way of Moray Firth. Coaches supplement rail and steamer at various points.
Population and Government. — The population was 90,121 in 1891, and 90,104 in 1901, when 43,281 persons spoke Gaelic and English, and 11,722 Gaelic only. The only considerable towns are Inverness (pop. in 1901, 23,066) and Fort William (2087). The county returns one member to parliament, but the county town, along with Forres, Fortrose and Nairn, belongs to the Inverness district group of parliamentary burghs. Inver- ness forms a sheriffdom with Elgin and Nairn, and there are resident sheriffs-substitute at Inverness, Fort William, Portree and Lochmaddy. The county is under school-board jurisdiction, and there are voluntary schools (mostly Roman Catholic) in several places. The secondary schools in Inverness and some in the county earn grants for higher education. The town council of Inverness subsidizes the burgh technical and art school. At Fort Augustus is a well-known collegiate institution for the education of the sons of well-to-do Roman Catholics.

History. — To the north of the boundary hills of the present counties of Argyll and Perth (beyond which the Romans attempted no occupation) the country was occupied by the Picts, the true Caledonians. The territory was afterwards called the province of Moray, and extended from the Spey and Loch Lochy to Caithness. These limits it retained until the 17th century, when Caithness (in 1617), Sutherland (in 1633) and Ross-shire (in 1661) were successively detached. Towards the end of the 6th century Columba

undertook the conversion of the Picts, himself baptizing their king, Brude, at Inverness; but paganism died hard and tribal wars prevented progress. In the nth century, after the death of Duncan, Scotland was divided between Macbeth and the Norwegian leader Thorfinn, who took for his share the land peopled by the northern Picts. Malcolm Canmore, avenging his father, defeated and slew Macbeth (1057), and at a later date reduced the country and annexed it to the kingdom of Scotland. In 1107, when the bishopric of Moray was founded, the influence of the Church was beginning to effect some improvement in manners. Neverthe- less, a condition of insurrection supervened until the reign of David I., when colonists of noble birth were settled in various parts of the shire. After the battle of Largs (1263) the Norse yoke was thrown off. In 1303 Edward I.'s expedition to Scotland passed through the northern districts, his army laying siege to Urquhart and Beaufort castles. After the plantation the clan system gradually developed and attained in the shire

its fullest power and splendour. The Frasers occupied the Aird and the district around Beauly; the Chisholms the Urquhart country; the Grants the Spey; the Camerons the land to the west and south of Loch Lochy (Locheil) ; the Chattan — compris- ing several septs such as the Macphersons, Mackintoshes, Farquharsons and Davidsons— Badenoch; the Macdonalds of the Isles Lochaber; the Clanranald Macdonalds Moidart, Knoydart, Morar, Arisaig and Glengarry; and the Macleods Skye. Unfortunately the proud and fiery chieftains were seldom quiet. The clans were constantly fighting each other, occasionally varying their warfare by rebellion against the sovereign. In many quarters the Protestant movement made no headway, the clansmen remaining steadfast to the older creed. At the era of the Covenant, Montrose conducted a vigorous campaign in the interests of the Royalists, gaining a brilliant victory at Inverlochy (1645), but the effects of his crusade were speedily neutralized by the equally masterly strategy of Cromwell. Next Episcopacy appeared to be securing a foothold, until Viscount Dundee fell at Killiecrankie, that battle being followed by a defeat of the Highlanders at Cromdale in 1690. The futile rising headed by Mar ini7i5 led to a com- bined effort to hold the clans in check. Forts were constructed at Inverness, Kilchumin (Fort Augustus) and-Kilmallie (Fort William); Wade's famous roads— exhibiting at many points notable examples of engineering — enabled the king's soldiers rapidly to scour the country, and general disarming was required. Prince Charles Edward's attempt in 1745 had the effect of bringing most of the clans together for a while; but the clan system was broken up after his

failure and escape. Heritable jurisdictions were abolished. Even the wearing of the Highland dress was proscribed. The effects of this policy were soon evident. Many of the chieftains became embarrassed, their estates were sold, and the glensfolk, impoverished but high- spirited, sought homes in Canada and the United States. As time passed and passion abated, the proposal was made to raise several Highland regiments for the British army. It was entertained with surprising favour, and among the regiments then enrolled were the 79th Cameron Highlanders. With the closing of the chapter of the Jacobite romance the shire gradually settled down to peaceful pursuits.

The county in parts is rich in antiquarian remains. Stone axes and other weapons or tools have been dug up in the peat, and prehistoric jewelry has also been found. Lake dwellings occur in Loch Lundy in Glengarry and on Loch Beauly, and stone circles are numerous, as at Inches, Clava, and in the valley of the Ness. Pictish towers or brochs are met with in Glenbeg (Glenelg), and duns (forts) in the Aird and to the west and south-west of Beauly and elsewhere. Among vitrified forts the principal are those on Craig Phadrick, Dundbhairdghall in Glen Nevis, Dun Fionn or Fingal's fort on the Beauly, near Kilmorack, Achterawe in Glengarry and in Arisaig.

See J. Cameron Lees, History of the County 0} Inverness (Edinburgh, 1897); C. Fraser-Mackintosh, Letters of Two Centuries (Inverness, 1890); Alexander Mackenzie, Histories of the Mackenzies, Camerons, &c. (Inverness, 1874-1896) ; A. Stewart, Nether Lochaber (Edinburgh, 1883);- Alexander Carmichael, "Grazing and Agrestic Customs of the Outer Hebrides " {Crofters' Commission Report, 1884).

INVERSION (Lat. invertere, to turn about), in chemistry, the name given to the hydrolysis of cane sugar into a mixture of glucose and fructose (invert sugar); it was chosen because the operation was attended by a change from dextro-rotation of polarized light to a laevo-rotation. In mathematics, inversion is a geometrical method, discovered jointly by Stubbs aqd Ingram of Dublin, and employed subsequently with conspicuous success by Lord Kelvin in his electrical researches. The notion may be explained thus: If R be a circle of centre and radius r, and P, Q be two points on a radius such that OP.OQ = r 2 , then P, Q are said to be inverse points for a circle of radius r, and O is the centre of inversion. If one point, say P, traces a curve, the corresponding locus of Q is said to be the inverse of the path of P. The fundamental propositions are: (1) the inverse of a circle is a line or a circle according as the centre of

inversion is on or off the circumference; (2) the angle at the

intersection of two circles or of a line and a circle is unaltered by inversion. The method obviously affords a ready means for converting theorems involving lines and circles into other propositions involving the same, but differently placed, figures; in mathematical physics it is of special value in solving geo- metrically electrostatical and optical problems.

INVERURIE, a royal, municipal and police burgh of Aberdeen- shire, Scotland, situated at the confluence of the rivers Don and Ury, i6| m. N.W. of Aberdeen by rail, on the Great North of Scotland railway. Pop. (1001) 3624. Paper-making, milling, and the making of mineral waters are the chief manufactures, but the town is an important centre of the cattle trade with London, markets being held at frequent intervals. It also con- tains the workshops of the Great North of Scotland railway. Inverurie belongs to the Elgin district group of parliamentary burghs. At Harlaw, about 3 m. to the N.W., was fought in 141 1 the great battle between Donald, lord of the Isles, and the royal forces under the earl of Mar. Not far from the scene of this conflict stands Balquhain Castle, a seat of the Leslies, now a mere shell, which was occupied by Queen Mary in September 1562 before the fight at Corrichie between her forces, led by the earl of Moray, and those of the earl of Huntly. The granite block from which she is said to have viewed the combat is still called the Queen's Chair or the Maiden Stone. Near Bennachie (1619 ft.) are stone circles and monoliths supposed to be of Druidical origin. There is a branch line from Inverurie to Old Meldrum, 5! m. to the N.E. by rail, a market town with a charter dating from 1672, where brewing and distilling are carried on.

INVESTITURE (Late Lat. investiture) , the formal installation into an office or estate, which constituted in the middle ages one of the acts that betokened the feudal relation between suzerain and vassal. The suzerain, after receiving the vassal's homage and oath of fealty, invested him with his land or office by presenting some symbol, such as a clod, a banner, a branch, or some other object according to the custom of the fief. Otto of Freising says: " It is customary when a kingdom is delivered over to any one that a sword be given to represent it, and when a province is transferred a standard is given." As feudal customs grew more stereotyped, the sword and sceptre,

emblem- atic respectively of service and military command and of judicial prerogatives, became the usual emblems of investiture of laymen. The word investiture (from veslire, to put in possession) is later than the 9th century; the thing itself was an outcome of feudal society.

It is in connexion with the Church that investiture has its greatest historical interest. The Church quite naturally shared in feudal land-holding; in addition to the tithes she possessed immense estates which had been given her by the faithful from early times, and for the defence of which she resorted to secular means. The bishops and abbots, by confiding their domains to laymen on condition of assistance with the sword in case of need, became temporal lords and suzerains with vassals to fight for them, with courts of justice, and in short with all the rights and privileges exercised by lay lords. On the other hand there were bishop-dukes, bishop-counts, &c, themselves vassals of other lords, and especially of the king, from whom they received the investiture of their temporalities. Many of the faithful founded abbeys and churches on condition that the righf of patronage, that is the choice of beneficiaries, should be reserved to them and their heirs. Thus in various ways ecclesi- astical benefices were gradually transformed into fiefs, and lay suzerains claimed the same rights over ecclesiastics as over other vassals from whom they received homage, and whom they invested with lands. This ecclesiastical investiture by lay princes dates at least from the time of Charlemagne. It did not seem fitting at first to confer ecclesiastical investiture by such military and worldly emblems as the sword and sceptre, nor to exact an oath of fealty. The emperor Henry I. invested bishops with a glove; Otto II. presented the pastoral staff; Conrad II., according to Wipo, went farther and required from the archbishop of Milan an oath of fealty. By the time of

Henry III. investiture with ring and crozier had become the general practice: it probably had been customary in some places since Otto II.

Investiture of ecclesiastics by laymen had certain serious effects which were bound to bring on a conflict between the temporal and spiritual authorities. In the first place the lay authorities often rendered elections uncanonical by interfering in behalf of some favourite, thereby impairing the freedom of the electors. Again, benefices were kept vacant for long periods in order to ensure to the lord as long as possible the exercise of his regalian rights. And, finally, control by temporal princes of investiture, and indirectly of election, greatly increased simony. Otto II. is charged with having

practised simony in this connexion, and under Conrad II. the abuse grew prevalent. At a synod at Reims in 1049, the bishops of Nevers and Coutances affirmed that they had bought their bishoprics, and the bishop of Nantes stated that his father had been a bishop and that on his decease he himself had purchased the see. At a synod at Toulouse in 1056, Berengar of Narbonne accused the bishop of having purchased his see for 100,000 solidi, and of having plundered his church and sold relics and crucifixes to Spanish Jews in order to secure another 100,000 solidi with which to buy for his brother the bishopric of Urgel. Innumerable similar cases appear in acts of synods and in chronicles during the nth century. Ecclesiastical investiture was further complicated by the considerable practice of concubinage. There was always the tendency for clerics in such cases to invest their sons with the temporalities of the Church; and the synod convened by Benedict VIII. at Pavia in 1018 (or 1022 according to some authorities) was mainly concerned with the issue of decrees against clerics who lived with wives or concubines and bestowed Church goods on their children. In time the Church came to perceive how closely lay investiture was bound up with simony. The sixth decree of the Lateran synod of 1059 forbade any cleric to accept Church office from a layman. In the following year this decree was reaffirmed by synods held at Vienne and Toulouse under the presidency of a legate of Nicholas II. The main investiture struggle with the empire did not take place, however, until Hildebrand became Pope Gregory VII. To Gregory it was intolerable that a layman, whether emperor ; king or baron, should invest a churchman with the emblems of spiritual office; ecclesiastical investiture should come only from ecclesiastics. To the emperor Henry IV. it was highly undesirable that the advantages and revenues accruing from lay investiture should be surrendered; it was reasonable that ecclesiastics should receive investiture of temporalities from their temporal protectors and suzerains.

Although the full text of the decrees of the famous Lenten synod of 1075 has not been preserved, it is known that Gregory on that occasion denounced the marriage of the clergy, ex- communicated five of Henry IV. 's councillors on the ground that they had gained church offices through simony, and forbade the emperor and all laymen to grant investiture of bishopric or inferior dignity. The pope immediately summoned Henry to appear at Rome in order to justify his private misconduct, and Henry replied by causing the partisan synod of Worms (1076) to pronounce Gregory's deposition. The pope excom- municated the emperor and stirred up civil war against him in Saxony with such success that he brought about Henry's bitter

humiliation at Canossa in the following year. The papal prohibition of lay investiture was renewed at synods in 1078 and 1080, and although Gregory's death in exile (1085) prevented him from realizing his aim in the matter, his policy was stead- fastly maintained by his successors. Victor III. condemned lay investiture at the synod of Benevento in 1087, and Urban II. at that of Melfi in 1089. At the celebrated council of Cler- mont (1095), at which the first crusade was preached, Urban strengthened the former prohibitions by declaring that no one might accept any spiritual office from a layman, or take an oath of fealty to any layman. Urban's immediate successor, Paschal II., stirred up the rebellion of the emperor's son, but soon found Henry V. even more persistent in the claim of

investiture than Henry IV. had been. Several attempts at settlement failed. In February 1 1 1 1 legates of Paschal II. met Henry V. at Sutri and declared that the pope was ready to surrender all the temporalities that had been bestowed on the clergy since the days of Charlemagne in return for freedom of election and the abolition of lay investiture. Henry, having agreed to the proposal, entered Rome to receive his crown. The bishops and clergy who were present at the coronation protested against this surrender, and a tumult arising, the ceremony had to be abandoned. The king then seized pope and curia and left the city. After two months of close confinement Paschal consented to an unqualified renunciation on his part of the right of investiture. In the following year, however, a Lateran council repudiated this compact as due to violence, and a synod held at Vienne with papal approval declared lay investiture to be heresy and placed Henry under the ban. The struggle was complicated throughout its course by political and other con- siderations; there were repeated rebellions of German nobles, constant strife between rival imperial and papal factions in the Lombard cities and at Rome, and creation of several anti-popes, of whom Guibert of Ravenna (Clement III.) and Gregory VIII. were the most important. Final settlement of the struggle was retarded, moreover, by the question of the succession to the lands of the great Countess Matilda, who had bequeathed all her property to the Holy See, Henry claiming the estates as suzerain of the fiefs and as heir of the allodial lands. The efforts of Gelasius II. to settle the strife by a general council were rendered fruitless by his death (1119).

At length in n 22 the struggle was brought to an end by the concordat of Worms, the provisions of which were incorporated in the eighth and ninth canons of the general Lateran council of 1 1 23. The settlement was a compromise. The emperor, on the one hand, preserved feudal suzerainty over ecclesiastical benefices; but, on the other, he ceased to confer ring and crozier, and thereby not only lost the right of refusing the elect on the grounds of unworthiness, but also was deprived of an efficacious means of maintaining vacancies in ecclesiastical offices. Few efforts were made to undo the compromise. King Lothair the Saxon demanded of Innocent II. the renewal of lay investiture as reward for driving the antipope Anacletus from Rome, but the opposition of St Bernard and the German pre- lates was so potent that the king dropped his demand, and Innocent in 1133 confirmed the concordat. In fact, the imperial control over the election of bishops in Germany came later to be much curtailed in practice, partly by the tacitly changed relations between the empire and its feudatories, partly by explicit concessions wrung at various times from individual emperors, such as Otto IV. in 1209 and Frederick II. in 1213; but the principles of the concordat of Worms continued theoreti- cally to regulate the tenure of bishoprics and abbacies until the dissolution of the empire on 1806.

In France the course of the struggle was somewhat different. As in the empire, the king and the nobles, each within his own sphere of influence, claimed the right of investing with ring and crozier and of exacting homage and oaths of fealty. The struggle, however, was less bitter chiefly because France was not a united country, and it was eventually terminated without formal treaty. The king voluntarily abandoned lay investiture and the claim to homage during the pontificate of Paschal II., but continued to interfere with elections, to appropriate the revenues of vacant benefices, and to exact an oath of fealty before admitting the elect to the enjoyment of his tempor- alities. Most of the great feudal lords followed the king's example, but their concessions varied considerably, and in the south of France some of the bishops were still doing homage for their sees until the closing years of the 13th century; but long before then the right of investing with ring and crozier had disappeared from every part of France.

England was the scene of an investiture contest in which the chief actors were Henry I. and Anselm. The archbishop, in obedience to the decrees of Gregory VII. and Urban II., not only refused to perform homage to the king (1100), but also

refused to consecrate newly-chosen bishops who had received

investiture from Henry. The dispute was bitter, but was carried on without any of the violence which characterized the conflict between papacy and empire; and it ended in a compromise which closely foreshadowed the provisions of the concordat of Worms and received the confirmation of Paschal II. in 1106. Freedom of election, somewhat similar in form to that which still exists, was formally conceded under Stephen, and confirmed by John in Magna Carta.

Many documents relating to the investiture struggle have been edited by E. Diimmler in Monumenta Germaniae historica, Libelli de lite imperatorum et pontificum saeculis xi. et xii. (3 vols., 1891-1897). See Ducange, Glossarium, s.v. " Investitura."

On investiture in the empire consult C. Mirbt, Die Publizistik im Zeitalter Gregors VII. (Leipzig, 1894) ; E. Bernheim, Das Wormser Konkordat (Breslau, 1906) ; R. Boerger, Die Belehnungen der deutschen geistlichen Fiirsten (Leipzig, 1901); K. E. Benz, Die Stellung der Bischbfe von Meissen, Merseburg und Naumburg im Investiturstreite unter Heinrich IV. und Heinrich V. (Dresden, 1899); W. Martens, Gregor VII., sein Leben und Wirken (2 vols., Leipzig, 1894); H. Fisher, The Medieval Empire, c. 10 (London, 1898). For France, see P. Imbart de la Tour, Les Elections episcopales dans I'eglise de France du XI" au XII' siecle (Paris, 1891); A. Luchaire, Ilistoire des institutions monarchiques de la France sous les premiers Capetiens 987-1180 (2nd ed., Paris, 1891); P. Viollet, Ilistoire des institutions politiques et administrates de la France (Paris, 1898); Ibach.Der Kampf zwischen Papstlum und Kbnigtum von Gregor VII. bis Calixto II. (Frankfort, 1884). For England, see J. F. Bohmer, Kirche und Staat in England una in der Normandie in XI. und XII. Jahrhundert (Leipzig, 1899); E. A. Freeman, The Reign of William II. Rufus and the Accession of Henry I. (London, 1882); H. W. C. Davis, England under the Normans and Angevins (London, 1905).

INVOICE (originally a plural, Invoyes or Invoys, of Invoy, a variant of " envoy," from the French envoy er, to send), a state- ment giving full particulars of goods sent or shipped by a trader to a customer, with the quantity, quality and prices, and the charges upon them. Consular invoices, i.e. invoices signed at the port of shipment by a consul of the country to which the goods are being consigned, are generally demanded by those countries which impose ad valorem duties.

INVOLUTION (Lat. involvere, to roll up), a rolling up or complication. In arithmetic, involution is the operation of raising a quantity to any power; it is the converse of evolution, which is the

operation of extracting any root of a quantity (see Arithmetic; Algebra). In geometry, an involution is a one-to-one correspondence between two ranges of points or between two pencils (see Geometry: Projective). The " involute " of a curve may be regarded as the locus of the extremity of a string when it is unwrapped from the curve (see Infinitesimal Calculus).

10, in Greek mythology, daughter of Inachus, the river-god of Argos and its first king. As associated with the oldest worship of Hera she is called the daughter of Peiren, who made the first image of that goddess out of a pear-tree at Tiryns; and under the name of Callithyia Io was regarded as the first priestess of Hera. Zeus fell in love with her, and, to protect her from the wrath of Hera, changed her into a white heifer (Apollodorus ii. 1; Hyginus, Fab. 145; Ovid, Metam. i. 568-733); according to Aeschylus (Supplices, 299) the metamorphosis was the work of Hera herself. Hera, having persuaded Zeus to give her the heifer, set Argus Panoptes to watch her. Zeus thereupon sent Hermes, who lulled Argus to sleep and cut off his head with the sword with which Perseus afterwards slew the Gorgon. In another account Argus is killed by a stone thrown by Hermes. But the wrath of Hera still pursued Io. Maddened by a gadfly sent by the goddess she wandered all over the earth, swam the strait known on this account as the Bosporus (Ox-ford), and crossed the Ionian sea (traditionally called after her) until at last she reached Egypt, where she was restored to her original form and became the mother of Epaphus. Accounts of her wanderings (differing considerably in detail) are given in the Supplices and Prometheus Vinctus of Aeschylus. Various interpretations are given of the latter part of her story, which dates from the 7th century B.C., when intercourse was frequent between Greece and Egypt, and when much influence was

exerted on Greek thought by Egyptian religion. According to the rationalistic explanation of Herodotus (i. i) Io was an Argive princess who was carried off to Egypt by the Phoenicians. Epaphus, the son of Io, the supposed founder of Memphis, was identified with Apis. He was said to have been carried off by order of Hera to Byblus in Syria, where he was found again by Io. On returning to Egypt, Io, afterwards identified with Isis, married Telegonus and founded the royal families of Egypt, Phoenicia, Argos and Thebes. The journey to Syria in search of Epaphus was invented to explain the fact that the

Phoenician goddess Astarte, who was sometimes represented as horned, was confounded with Io.

Io herself is variously interpreted. She is usually understood to be the moon in the midst of the mighty heaven, studded with stars, represented by Argus. According to others, she is the annual rising of the Nile; the personification of the Ionian race; the mist; the earth. It seems probable that she was a duplicate of Hera (Io /Soii/cepcos is Hera fiowiris), or a deity in primitive times worshipped under the symbol of a cow, whose worship was superseded by that of Hera; the recollection of this early identity would account for Io being regarded as the priestess of the goddess in later times. Amongst the Romans she was sometimes identified with Anna Perenna. The legend of Io spread beyond Argos, especially in Byzantium and Euboea, where it was associated with the town of Argura. It was a favourite subject among Greek painters, and many representa- tions of it are preserved on vases and wall paintings; Io herself appears as a horned maiden or as the heifer watched by Argus.

See R. Engelmann, De lone (1868), with notes containing references to authorities, and his article in Roscher's Lexikon der Mythologie; J. Overbeck, De lone, telluris, non lunae, Dea (1872); P. W. Forchhammer, Die Wanderungen der Inachostochter Io (1881), with map and special reference to Aeschylus's account of lo's wanderings; F. Durrbach in Daremberg and Saglio's Dictionnaire des antiquites; G. Mellen, De lus fabula (1901); Wernicke s.v. "Argos" in Pauly-Wissowa's Realencyclopddie, ii. pt. i. (1896); J. E. Harrison in Classical Review (1893, p. 76); Bacchylides xviii. (xix.), with Jebb's notes.

IODINE (symbol I, atomic weight 126-92), a chemical element, belonging to the halogen group. Its name is derived from Gr. toeiSijs (violet-coloured), in allusion to the colour of its vapour. It was discovered in 181 2 by B. Courtois when investigating the products obtained from the mother-liquors prepared by lixiviating kelp or burnt seaweed, and in 181 5 L. J. Gay-Lussac showed that it was an element. Iodine does not occur in nature in the uncombined condition, but is found very widely but sparingly distributed in the form of iodides and iodates, chiefly of sodium and potassium. It is also found in small quantities in sea-water, in some seaweeds, and in various mineral and medicinal springs. Deep-sea weeds as a rule contain more iodine than those which are found in the shallow waters.

Iodine is obtained either from kelp (the ashes of burnt sea- weed) or

from the mother-liquors obtained in the purification of Chile saltpetre. In the former case the seaweed is burnt in large heaps, care being taken that too high a temperature is not reached, for if the ash be allowed to fuse much iodine is lost by volatilization. The product obtained after burning is known either as kelp or varec. Another method of obtaining kelp is to heat the seaweed in large retorts, whereby tarry and ammoniacal liquors pass over and a very porous residue of kelp remains. A later method consists in boiling the weed with sodium carbonate; the liquid is filtered and hydrochloric acid added to the filtrate, when alginic acid is precipitated; this is also filtered off, the filtrate neutralized by caustic soda, and the whole evaporated to dryness and carbonized, the residue obtained being known as kelp substitute. The kelp obtained by any of these methods is then lixiviated with water, which extracts the soluble salts, and the liquid is concentrated, when the less soluble salts, which are chiefly alkaline chlorides, sulphates and carbonates, crystallize out and are removed. Sulphuric acid is now added to the liquid, and any alkaline sulphides and sulphites present are decomposed, while iodides and bromides are converted into sulphates, and hydriodic and hydrobromic

acids are liberated and remain dissolved in the solution. The liquid is run into the iodine still and gently warmed, manganese dioxide in small quantities being added from time to time, when the iodine distils over and is collected. In the second method it is found that the mother-liquors obtained from Chile saltpetre contain small quantities of sodium iodate NalOs; this liquor is mixed with the calculated quantity of sodium bisulphite in large vats, and iodine is precipitated: —

2NaI0 3 +5NaHS0 3 = 3NaHS04+2Na 2 S0 4 -|-H 2 0+l2.

The precipitate is washed and then distilled from iron retorts. Iodine may also be prepared by the decomposition of an iodide with chlorine, or by heating a mixture of an iodide and manganese dioxide with- concentrated sulphuric acid. Commercial iodine may be purified by mixing it with a little potassium iodide and then subliming the mixture; in this way any traces of bromine or chlorine are removed. J. S. Stas recommends solution of the iodine in potassium iodide and subsequent precipitation by the addition of a large excess of water, the precipitate being washed, distilled in steam, and dried in vacuo over solid calcium nitrate, and then over solid caustic baryta.

Iodine is a greyish-black shining solid, possessing a metallic lustre

and having somewhat the appearance of graphite. Its specific gravity is 4-948 (i7°/4°). It melts at 114-2° C. and boils at 184-35° C. under atmospheric pressure (W. Ramsay and S. Young). The specific heat of solid iodine is 0-0541 (H. Kopp). Its latent heat of fusion is 11-7 calories, and its latent heat of vaporization is 23-95 calories (P. A. Favre and J. T. Silbermann). The specific heat of iodine vapour at constant pressure is 0-03489, and at constant volume 0-02697. It volatilizes slowly at ordinary temperatures, but rapidly on heating. Iodine vapour on heating passes from a violet colour to a deep indigo blue; this behaviour was investigated by V. Meyer (Ber., 1880, I 3 I P- 394); who found that the change of colour was accompanied by a change of vapour density. Thus, the density of air being taken as unity, Victor Meyer found the following values for the density of iodine vapour at different temperatures: —

T°C. Density

253 450 S°6 842 1027 1570 8-89 8-84 8-73 6-o8 5-75 5-67

This shows that the iodine molecule becomes less complex in structure at higher temperatures.

Iodine possesses a characteristic penetrating smell, not so pungent, however, as that of chlorine or bromine. It is only very sparingly soluble in water, but dissolves readily in solutions of the alkaline iodides and in alcohol, ether, carbon bisulphide, chloroform, and many liquid hydrocarbons. Its solutions in the alkaline iodides and in alcohol and ether are brown in colour, whilst in chloroform and carbon bisulphide the solution is violet. It appears to combine with the solvent (P. Waentig, Zeit. phys. Chem., 1909, p. 513). Its chemical properties closely resemble those of chlorine and bromine; its affinity for other elements, however, is as a rule less than that of either. It will only combine with hydrogen in the presence of a catalyst, but combines with many other elements directly; for example, phosphorus melts and then inflames, antimony burns in the vapour, and mercury when heated with iodine combines with it rapidly. It is com- pletely oxidized to iodic acid when boiled with fuming nitric acid. It is soluble in a solution of caustic potash, a dilute solu- tion most probably containing the hypoiodite, which, however, changes slowly into iodate, the change taking place rapidly on warming.- When alkali is added to aqueous iodine, followed immediately by either soda water or sodium bicarbonate, most" of the original iodine is precipitated (R. L. Taylor, Jour. Chem. Soc, 1897, 71, p. 725, and K. J. P. Orton, ibid. p. 830). Iodine can be readily detected by the characteristic blue coloration that it

immediately gives with starch paste; the colour is destroyed on heating, but returns on cooling provided the heating has not been too prolonged. Iodine in the presence of water frequently acts as an oxidizing agent; thus arsenious acid and the arsenites, on the addition of iodine solution, are con- verted into arsenic acid and arsenates. A dilute solution of iodine prevents the decomposition of hydrogen peroxide by

colloidal platinum (G. Bredig, Zeit. phys. Chem., 1899, 31, p. 258; 1901, 37, p. 323.

Iodine finds application in organic chemistry, forming addition products with unsaturated compounds, the combination, how- ever, being more slow than in the case of chlorine or bromine. It rarely substitutes directly, because the hydriodic acid produced reverses the reaction; this can be avoided by the presence of precipitated mercuric oxide or iodic acid, which react with the hydriodic acid as fast as it is formed, and consequently remove it from the reacting system. As a rule it is preferable to use iodine in the presence of a carrier, such as amorphous phosphorus or ferrous 'iodide or to use it with a solvent. It is found that most organic compounds containing the grouping CH3COC- or CH 3 -CH(OH)-C- in the presence of iodine and alkali give iodoform CHI 3 .

Hydriodic acid, HI, is formed by the direct union of its components in the presence of a catalytic agent; for this purpose platinum black is used, and the hydrogen and iodine vapour are passed over the heated substance. On shaking up iodine Vith a solution of sulphur- etted hydrogen in. water, a solution of hydriodic acid is obtained, sulphur being at the same time precipitated. The acid cannot be prepared by the action of concentrated sulphuric acid on an iodide on account of secondary reactions taking place, which result in the formation of free iodine and sulphur dioxide. The usual method is to make a mixture of amorphous phosphorus and a large excess of iodine and then to allow water to drop slowly upon it; the reaction starts readily, and the gas obtained can be freed from any admixed iodine vapour by passing it through a tube containing some amorphous phosphorus. It is a colourless sharp-smelling gas which fumes strongly on exposure to air. It readily liquefies at 0° C. under a pressure of four atmospheres, the liquefied acid boiling at — 34-14° C. (730-4 mm.); it can also be obtained as a solid melting at

—50-8° C. It is readily soluble in water, one volume of water at 10° C. dissolving 425 volumes of the acid. The saturated aqueous solution is colourless and fumes strongly on exposure to air; after a time it darkens in colour owing to liberation of iodine. The gas is readily decomposed by heat into its constituent elements. It is a powerful reducing agent, and is frequently employed for this purpose in organic chemistry ; thus hydroxy acids are readily reduced on heating with the concentrated acid, and nitro compounds are reduced to amino compounds, &c. It is preferable to use the acid in the presence of amorphous phosphorus, for the iodine liberated during the reduction is then utilized in forming more hydriodic acid, and consequently the original amount of acid goes much further. It forms addition compounds with unsaturated compounds.

It has all the characteristics of an acid, dissolving many metals with evolution of hydrogen and formation of salts, called iodides. The iodides can be prepared either by direct union of iodine with a metal, from hydriodic acid and a metal, oxide, hydroxide or carbonate, or by action of iodine on some metallic hydroxides or carbonates (such as those of potassium, sodium, barium, &c. ; other products, however, are formed at the same time). The iodides as a class resemble the chlorides and bromides, but are less fusible and volatile. Silver iodide, mercurous iodide, and mercuric iodide are insoluble in water; lead iodide is sparingly soluble, whilst most of the other metallic iodides are soluble. Strong heating decomposes the majority of the iodides. Nitrous acid and chlorine readily decompose them with liberation of iodine; the same effect being produced when they are heated with concentrated sulphuric acid and manganese dioxide. The soluble iodides, on the addition of silver nitrate to their nitric acid solution, give a yellow precipitate of silver iodide, which is insoluble in ammonia solution. Hydriodic acid and the iodides may be estimated by conversion into silver iodide.

Iodine combines with chlorine to form iodine monochloride, IC1, which may be obtained by passing dry chlorine over dry iodine until the iodine is completely liquefied, or according to R. Bunsen by boiling iodine with aqua regia and extracting with ether. It exists in two different crystalline forms, the more stable or a form melting at 27-2° C, and the less stable or /3 form melting at 13-9° C. It is readily decomposed by water. The trichloride, ICI3, results from the action of excess of chlorine on iodine, or from iodic acid and hydrochloric acid, or by heating iodine pentoxide with phosphorus pentachloride. It crystallizes in long yellow needles and decomposes readily on heating into the monochloride and chlorine. It is readily soluble in water, but excess of water decomposes it. (See W.

Stortenbeker, Zeit. phys. Chem., 1889, 3, p. 11.) Iodine monochloride in glacial acetic acid solution was used by A. Michael and T. H. Norton (Ber., 1876, 9, p. 1752) for the preparation of paraiodo- acetanilide.

Iodine Pentoxide, I2O5, the best-known oxide, is obtained as a white crystalline solid by heating iodic acid to 170° C. ; it is easily soluble in water, combining with the water to regenerate iodic acid; and when heated to 300° C. it breaks up into its constituent elements, (see M. Guichard, Compt. rend., 1909, 148, p. 925.) Iodine dioxide, I2O4, obtained by Milton, and reinvestigated by M. M. P. Muir

{Jour. Chem. Soc, 1909, 95, p. 656), is a lemon-yellow solid obtained by acting on iodic acid with sulphuric acid, oxygen being evolved. By acting with ozone on a chloroform solution of iodine, F. Fichter and F. Rohner (Ber., 1909, 42, p. 4093) obtained a yellowish white oxide, of the formula I4O9, which they regard as an iodate of tervalent iodine, Millon's oxide being considered a basic iodate.

Although hypoiodous acid is not known, it is extremely probable that on adding iodine or iodine monochloride to a dilute solution of a caustic alkali, hypoiodites are formed, the solution obtained having a characteristic smell of iodoform, and being of a pale yellow colour. It oxidizes arsenites, sulphites and thiosulphates immediately. The solution is readily decomposed on the addition of sodium or potassium bicarbonates, with liberation of iodine. The hypoiodite disappears gradually on standing, and rapidly on warming, being converted into iodate (see R. L. Taylor, Jour. Chem. Soc, 1897, 7 r > p. 725, and K. J. P. Orton, ibid. p. 830). The peculiar nature of the action between iodine and chlorine in aqueous solution has led to the suggestion that the product is a base, i.e. iodine hydroxide. Tri-iodine hydroxide, I 3 -OH, is obtained by oxidizing potassium iodide with sulphuric acid and potassium permanganate (A. Skrabal and F. Buchter, Chem. Zeit., 1909, 33, pp. 1184, 1193).

Iodic Acid, HIO3, can be prepared by dissolving iodine pentoxide in water; by boiling iodine with fuming nitric acid, 6I-f-10HNO 3 = 6HIO3 + I0NO+2H2O; by decomposing barium iodate with the calculated quantity of sulphuric acid, previously diluted with water, or by suspending iodine in water and passing in chlorine, \i--hC\i--6H2O=2HIO 3 -r-10HCl. It is a white crystalline solid, easily soluble in water, the solution showing a strongly acid reaction with litmus; the colour, however, is ultimately discharged by the bleaching power of the compound. It is a most powerful oxidizing agent,

phosphorus being readily oxidized to phosphoric acid, arsenic to arsenic acid, silicon at 250° C. to silica, and hydrochloric acid to chlorine and water. It is readily reduced, with separation of iodine, by sulphur dioxide, -hydriodic acid or sulphuretted hydrogen, thus: —

HIO, + 5HI = 3H 2 0-r-3r 2 ;2HI03 + 5S0 2 -r-4H 2 = 5H 2 SO« + Ij;

2HI0 3 + 5H 2 S = I 2 + 5S + 6H 2 0.

The salts, known as the iodates, can be prepared by the action of the acid on a base, or sometimes by the oxidation of iodine in the presence of a base. They are mostly insoluble or only very slightly soluble in water. The iodates of the alkali metals are, however, readily soluble in water (except potassium iodate). They are more easily reduced than the corresponding chlorates; an aqueous solution of hydriodic acid giving free iodine and a metallic oxide, whilst aqueous hydro- chloric acid gives iodine trichloride, chlorine, water and a chloride. They are decomposed on heating, with liberation of oxygen, in some cases leaving a residue of iodide and in others a residue of oxide of the metal, with liberation of iodine as weli as of oxygen.

Periodic Acid, HI0 4 -2H 2 0, is only known in the hydrated form. It can be prepared by the action of iodine on perchloric acid, or by boiling normal silver periodate with water: 2AgI04 + 4H 2 = Ag 2 H3l0 6 + HI04-2H20. It is a colourless, crystalline, deliquescent solid which melts at 135° C, and at 140° C. is completely decom- posed into iodine pentoxide, water and oxygen. The periodates are a very complex class of salts, and may be divided into four classes, namely, meta-periodates derived from the acid HIO4; meso- periodates from HI04-H 2 0, para-periodates from HIC > 4-2H 2 and the diperiodates from 2HI0 4 -H 2 (see C. Kimmins, Jour. Chem. Soc, 1887, 51, p. 356). ...

Iodine has extensive applications in volumetric analysis, being used more especially for the determination of copper.

The atomic weight of iodine was determined by J. S. Stas, from the analysis of pure silver iodate, and by C. Marignac from the determinations of the ratios of silver to iodine, and of silver iodide to iodine; the mean value obtained for the atomic weight being 126-53. G. P. Baxter (Jour. Amer. Chem. Soc, 1904, 26, p. 1577; '905, 27, p. 876; 1909, 31, p. 201), using the method of Marignac, obtained the value 126-985 (0 = i6). P. Kothner and E. Aeuer (Ber., 1904,

37, p. 2536; Ann., 1904, 337, p. 362), who converted pure ethyl iodide into hydriodic acid and subsequently into silver iodide, which they then analysed, obtained the value 126-026 (H = 1) ; a discussion of this and other values gave as a mean 126-97 (0 = i6).

In medicine iodine is frequently applied externally as a counter-irritant, having powerful antiseptic properties. In the form of~ certain salts iodine is very widely used, for internal administration in medicine and in the treatment of many conditions usually classed as surgical, such as the bone manifestations of tertiary syphilis. The most commonly used salt is the iodide of potassium; the iodides of sodium and ammonium are almost as frequently employed, and those of calcium and strontium are in occasional use. The usual doses of these salts are from five to thirty grains or more. Their pharmacological action is as obscure as their effects in certain diseased conditions are consistently brilliant and unexanjpled. Our ignorance of their mode of action is cloaked by the term deobstruent, which implies that they possess

the power of driving out impurities from the blood and tissues. Most notably is this the case with the poisonous products of syphilis. In its tertiary stages — and also earlier — this disease yields in the most rapid and unmistakable fashion to iodides; so much so that the administration of these salts is at present the best means of determining whether, for instance, a cranial tumour be syphilitic or not. No surgeon would think of operating on such a case until iodides had been freely administered and, by failing to cure, had proved the disease to be non-syphilitic. Another instance of this deobstruent power — " alterative," it was formerly termed — is seen in the case of chronic lead poisoning. The essential part of the medicinal treatment of this condition is the administration of iodides, which are able to decompose the insoluble albuminates of lead which have become locked up in the tissues, rapidly causing their degenera- tion, and to cause the excretion of the poisonous metal by means of the intestine and the kidneys. The following is a list of the principal conditions in which iodides are recognized to be of definite value: metallic poisonings, as by lead and mercury, asthma, aneurism, arteriosclerosis, angina pectoris, gout, goitre, syphilis, haemophilia, Bright's disease (nephritis) and bronchitis.

Small quantities of the iodate (KIO_3) are a frequent impurity in

iodide of potassium, and cause the congeries of symptoms known as iodism. These comprise dyspepsia, skin eruption and the manifestations which are usually identified with a " cold in the head." In many cases, as in syphilis, aneurism, lead poisoning, &c, the life of the patient depends on the free and continued use of the iodide, and this is best to be accomplished by securing an absolutely pure supply of the salt. Another often successful method of preventing the onset of symptoms of poisoning is to administer small doses of ammonium carbonate with the drug, thereby neutralizing the iodic acid which is liberated in the stomach.

IODOFORM, CHI3, a valuable antiseptic discovered by G. S. Serullas in 1822; in 1834 J. B. Dumas showed thai it contained hydrogen. It is formed by the action of iodine and aqueous potash on ethyl alcohol, acetone, acetaldehyde and from most compounds containing the grouping CH 3 -CO-C — . Its formation from alcohol may be represented thus: C2H5OH+ 4l2+6KHO = CHl3+KHC0 2 +5KI-l-5H20. It crystallizes in yellow hexagonal plates, melting at 119-120° C, and is readily soluble in alcohol and ether, but is insoluble in water. It has a characteristic odour and is volatile in steam. On reduction with hydriodic acid, it yields methylene iodide, CH2I2.*

More recently, iodoform has been prepared by the electrolysis of a solution of potassium iodide in the presence of alcohol or acetone, the electrolytic cell being fitted with a diaphragm, in order to prevent the hydrogen which is formed at the same time from reducing the iodoform, or from combining with the iodine to form hydriodic acid. K. Elbs uses a solution of potassium iodide and sodium carbonate in water, which with the necessary alcohol is contained in a porous cell fitted with a lead anode, whilst the cathode compartment contains a solution of caustic soda and a nickel electrode. The electrolysis is carried out at a temperature of 70 C, and a current density of one ampere per square decimetre is used. At the end of three hours a yield of 70 % of the theoretical quantity is obtained.

IOLA, a city and the county-seat of Allen county, Kansas, U.S.A., on the Neosho river, about 100 m. S. by W. of Kansas City. Pop. (1890) 1706; (1900) 5791, of whom 237 were fcreign- born and 207 were negroes; (1905) 10,287; (1910) 9032. It is served by the Atchison, Topeka & Santa Fe, the Missouri Pacific and the Missouri, Kansas & Texas railways. It is pleasantly situated in a level valley where there is a great abundance of natural gas and some fine building stone. The city has large zinc smelters and zinc rolling-mills, a foundry, machine shops, and manufactories of cement, sulphuric acid and

brick. The municipality owns and operates its waterworks, gas plant and electric-lighting plant. lola was founded in 1859 by a company whose members were dissatisfied with the location of the county-seat at Humboldt. It became the county- seat in 1865, was chartered as a city of the third class in 1870 and became a city of the second class in 1898. The rapid growth of the city dates from the discovery of natural gas here, on Christmas Day 1893.

IOLITE, a mineral occasionally cut as a gem-stone, and named from the violet colour which it sometimes presents

(tov, "violet"; \L9os, "stone"). It is generally called by petrographers cordierite, a name given by R. J. Hatiy in honour of the French mineralogist, P. L. Cordier, who discovered its remarkable dichroism, and suggested for it the name dichroite, still sometimes used. The difference of colour which it shows in different directions is so marked as to be well seen without the dichroscope. The typical colours are deep blue, pale blue and yellowish grey. While the crystal as a whole shows these three colours, each face is dichroic.

lolite is a hydrous magnesium and aluminium silicate, with ferrous iron partially replacing magnesium. It crystallizes in the orthorhombic system. In hardness and specific gravity it much resembles quartz. The transparent blue or violet variety used as a gem occurs as pebbles in the gravels of Ceylon, and bears in many cases a resemblance to sapphire. The paler kinds are often called water-sapphire (saphir d'eau of French jewellers) and the darker kinds lynx-sapphire; the shade of colour varying with the direction in which the stone is cut. From sapphire the iolite is readily distinguished by its stronger pleochroism, its lower density (about 2-6)- and its inferior hardness (about 7).*

Iolite occurs in granite and in true eruptive rocks, but is most characteristically developed as a product of contact meta- morphism in gneiss and altered slates. A variety occurring at the contact of clay-slate and granite on the border of the provinces of Shimotsukti and Kodzuke in Japan has been called cerasite. It readily suffers chemical change, and gives rise to a number of alteration-products, of which pinite is a character- istic example.

Although iolite, or cordierite, is rather widely distributed as a constituent of certain rocks, fine crystals of the mineral are of very limited occurrence. One of the best-known localities is Bodenmais, in Bavaria, where it occurs with pyrrhotite in a granite matrix. It is found also in Norway, Sweden and Finland, in Saxony and in

Switzerland. Large crystals are developed in veins of granite running through gneiss at Haddam, Connecticut; and it is known at many other localities in the United States. (F. W. R.)*

ION, of Chios, Greek poet, lived in the age of Pericles. At an early age he went to Athens, where he made the acquaintance of Aeschylus. He was a great admirer of Cimon and an opponent of Pericles. He subsequently met Sophocles in his native island at the time of the Samian war. From Aristophanes (Peace, 830 ff.) it is concluded that he died before the production of that play (421). His first tragedy was produced between 452-449 B.C.; and he was third to Euripides and Iophon in the tragic contest of 429. In a subsequent year he gained both the tragic and dithyrambic prizes, and in honour of his victory gave a jar of Chian wine to every Athenian citizen (Athenaeus p. 3). He is further credited by the scholiast on Aristophanes (loc. cit.) with having composed comedies, dithyrambs, epigrams, paeans, hymns, scolia, encomia and elegies; and he is the reputed author of a philosophical treatise on the mystic number three. His historical or biographical works were five in number, and included an account of the antiquities of Chios and of kmSrudai, recollections of visitors to the island.

See C. Nieberding, De lonis Chii vita (1836, containing the frag- ments) ; F. Allegre, De lone Chio (1890), an exhaustive monograph; and Bentley, Epistola ad Millium.

IONA, or Icolmkill, an island of the Inner Hebrides, Argyll- shire, Scotland, 6| m. S. of Staffa and if m. W. of the Rose of Mull, from which it is separated by the shallow Sound of Iona. Pop. (1901) 213, It is about 35 m. long and i| m. broad; its area being some 2200 acres, of which about one-third is under cultivation, oats, potatoes and barley being grown. In the rest of the island grassy hollows, yielding pasturage for a few hundred cattle and sheep and some horses, alternate with rocky elevations, which culminate on the northern coast in Duni (332 ft.), from the base of which a dazzling stretch of white shell sand, partly covered with grass, stretches to the sea. To the south-west the island is fringed with precipitous cliffs. Iona is composed entirely of ancient gneisses and schists of Lewisian age; these

include bands of quartzite, slate, marble and serpentine. The strike

of the rocks is S.W.-N.E. and they are tilted to very high angles. Fronting the Sound is the village of Iona, or Buile Mor, which has two churches and a school. The inhabitants depend partly on agriculture and partly on fishing.

The original form of the name Iona was Hy, Hii or I, the Irish for Island. By Adamnan in his Life of St Columba it is called Ioua insula, and the present name Iona is said to have originated in some transcriber mistaking the u in Ioua for n. It also received the name of Hii-colum-kill (Icolmkill), that is, " the island of Columba of the Cell," while by the Highlanders it has been known as Innis nan Druidhneah (" the island of the Druids "). This last name seems to imply that Iona was a sacred spot before St Columba landed there in 563 and laid the founda- tions of his monastery. After this date it quickly developed into the most famous centre of Celtic Christianity, the mother community of numerous monastic houses, whence missionaries were despatched for the conversion of Scotland and northern England, and to which for centuries students flocked from all parts of the north. After St Columba's death the soil of the island was esteemed peculiarly sanctified by the presence of his relics, which rested here until they were removed to Ireland early in the oth century. Pilgrims came from far and near to die in the island, in order that they might lie in its holy ground; and from all parts of northern Europe the bodies of the illustrious

dead were brought here for burial. The fame and wealth of the monastery, however, sometimes attracted less welcome visitors. Several times it was plundered and burnt and the monks massacred by the heathen Norse sea-rovers. Late in the nth century the desecrated monastery was restored by the saintly Queen Margaret, wife of Malcolm Canmore, king of Scotland; and in 1203 a new monastery and a nunnery were founded by Benedictine monks who either expelled or absorbed the Celtic community. In 838 the Western Isles, then under the rule of the kings of Man, were erected into a bishopric of which Iona was the seat. When in 1098 Magnus III., " Barefoot," king of Norway, ousted the jarls of Orkney from the isles, he united the see of the Isles (Sudreyar, " the southern islands," Lat. Sodorenses insulae) with that of Man, and placed both under the jurisdiction of the archbishopric of Trondhjem. About 1507 the island again became the seat of the bishopric of the Isles; but with the victory of the Protestant party in Scotland its ancient religious glory was finally eclipsed, and in 1561 the monastic buildings were dismantled by, order of the Convention of Estates. (For the political fortunes of Iona see Hebrides.)

The existing ancient remains include part of the cathedral church of St Mary, of the nunnery of St Mary, St Oran's chapel, and a number of tombs and crosses. The cathedral dates from the 13th century; a great portion of the walls with the tower, about 75 ft. high, are still standing. The choir and nave have been roofed, and the cathedral has in other respects been re- stored, the ruins having been conveyed in 1899 to a body of trustees by the eighth duke of Argyll. The remains of the conventual buildings still extant, to judge by the portion of a Norman arcade, are of earlier date than the cathedral. The small chapel of St Oran, or Odhrain, was built by Queen Margaret on the supposed site of Columba's cell, and its ruins are the oldest in Iona. Its round-arched western doorway has the characteristic Norman beak-head ornamentation. Of the nunnery only the chancel and nave of the Norman chapel remain, the last prioress, Anna (d. 1543), being buried within its walls. The cemetery, called in Gaelic Reilig Oiran (" the burial-place of kings "), is said to contain the remains of forty-eight Scottish, four Irish and eight Danish and Norwegian monarchs, and possesses a large number of monumental stones. At the time of the Reformation it is said to have had 360 crosses, of which most were thrown into the sea by order of the synod of Argyll. Many, however, still remain, the finest being Maclean's cross and St Martin's. Both are still almost perfect, and are richly carved with Runic inscriptions, emblematic devices and fanciful scroll work. Of Columba's monastery, which was built of wood about i m. from the present ruins, nothing remains.

IONIA, in ancient geography, the name given to a portion of the W. coast of Asia Minor, adjoining the Aegean Sea and bounded on the E. by Lydia. It consisted of a narrow strip of land near the coast, which together with the adjacent islands was occupied by immigrant Greeks of the Ionic race, and thus distinguished from the interior district, inhabited by the Lydians. According to' the universal Greek tradition, the cities of Ionia were founded by emigrants from the other side of the Aegean (see Ionians), and their settlement was connected with the legendary history of the Ionic race in Attica, by the statement that the colonists were led by Neleus and Androclus, sons of Codrus, the last king of Athens. In accordance with this view the " Ionic migration," as it was called by later chronologers, was dated by them one hundred and forty years after the Trojan war, or sixty years after the return of the Heraclidae into the Peloponnese. Without assigning any definite date, we may say that recent research has tended to support the popular Greek idea that Ionia received its main Greek element rather late — after the descent of the Dorians, and, therefore, after any part of the Aegean period. The only Aegean

objects yet found (1910) in or near Ionia are some sherds of the very latest Minoan age at Miletus. It is not probable that all the Greek colonists were of the not numerous Ionian race. Herodotus tells us (i. 146) that they comprised settlers from many different tribes and cities of Greece (a fact indicated also by the local traditions of the cities), and that they intermarried with the native races. A striking proof of this was the fact that so late as the time of the historian distinct dialects were spoken by the inhabitants of different cities within the limits of so restricted an area. E. Curtius supposed that the population of this part of Asia was aboriginally of Ionic race and that the settlers from Greece found the country in the possession of a kindred people. The last contention is probably true; but the kinship was certainly more distant than that between two branches of one Ionian stock.

The cities called Ionian in historical times were twelve in number, — an arrangement copied as it was supposed from the constitution of the Ionian cities in Greece which had originally occupied the territory in the north of the Peloponnese subse- quently held by the Achaeans. These were (from south to north) — Miletus, Myus, Priene, Ephesus, Colophon, Lebedus, Teos, Erythrae, Clazomenae and Phocaea, together with Samos and Chios. Smyrna (q.v.), originally an Aeolic colony, was afterwards occupied by Ionians from Colophon, and became an Ionian city, — an event which had taken place before the time of Herodotus. But at what period it was admitted as a member of the league we have no information. The cities above enumerated unquestion- ably formed a kind of league, of which participation in the Pan-Ionic festival was the distinguishing characteristic. This festival took place on the north slope of Mt. Mycale in a shrine called the Panionium. But like the Amphictyonic league in Greece, the Ionic was rather of a sacred than a political character; every city enjoyed absolute autonomy, and, though common interests often united them for a common political object, they never formed a real confederacy like that of the Achaeans or Boeotians. The advice of Thales of Miletus to combine in a political union was rejected.

Ionia was of small extent, not exceeding 90 geographical miles in length from N. to S., with a breadth varying from 20 to 30 m., but to this must be added the peninsula of Mimas, together with the two large islands. So intricate is the coast- line that the voyage along its shores was estimated at nearly four times the direct distance. A great part of this area was, moreover, occupied by mountains. Of these the most lofty and striking were Mimas and Corycus, in the peninsula which stands out to the west, facing the island of Chios; Sipylus, to

the north of Smyrna; Corax, extending to the south-west from the Gulf of Smyrna, and descending to the sea between Lebedus and Teos; and the strongly marked range of Mycale, a con- tinuation of Messogis in the interior, which forms the bold head- land of Trogilium or Mycale, opposite Samos. None of these mountains attains a height of more than 4000 ft. The district

comprised three extremely fertile valleys formed by the outflow of three rivers, among the most considerable in Asia Minor: the Hermus in the north, flowing into the Gulf of Smyrna, though at some distance from the city of that name; the Cayster, which flowed under the walls of Ephesus; and the Maeander, which in ancient times discharged its waters into the deep gulf that once bathed the walls of Miletus, but which has been gradually filled up by this river's deposits. With the advantage of a peculiarly fine climate, for which this part of Asia Minor has been famous in all ages, Ionia enjoyed the reputation in ancient times of being the most fertile of all the rich provinces of Asia Minor; and even in modern times, though very imper- fectly cultivated, it produces abundance of fruit of all kinds, and the raisins and figs of Smyrna supply almost all the markets of Europe.

The colonies naturally became prosperous. Miletus especially was at an early period one of the most important commercial cities of Greece; and in its turn became the parent of numerous other colonies, which extended all around the shores of the Euxine and the Propontis from Abydus and Cyzicus to Trapezus and Panticapaeum. Phocaea was one of the first Greek cities whose mariners explored the shores of the western Mediterranean. Ephesus, though it did not send out any colonies of importance, from an early period became a flourishing city and attained to a position corresponding in some measure to that of Smyrna at the present day.

History. — The first event in the history of Ionia of which we have any trustworthy account is the inroad of the Cimmerii (see Scythia), who ravaged a great part of Asia Minor, including Lydia, and sacked Magnesia on the Maeander, but were foiled in their attack upon Ephesus. This event may be referred to the middle of the 7th century B.C. About 700 B.C. Gyges, first Mermnad king of Lydia, invaded the territories of Smyrna arid Miletus, and is said to have taken Colophon as his son Ardys did Priene. But it was not till the reign of

Croesus (560-545 B.C.) that the cities of Ionia successively fell under Lydian rule. The defeat of Croesus by Cyrus was followed by the conquest of all the Ionian cities. These became subject to the Persian monarchy with the other Greek cities of Asia. In this position they enjoyed a considerable amount of autonomy, but were for the most part subject to local despots, most of whom were creatures of the Persian king. It was at the instigation of one of these despots, Histiaeus (q.v.) of Miletus, that in about 500 B.C. the principal cities broke out into insurrection against Persia. They were at first assisted by the Athenians, with whose aid they pene- trated into the interior and burnt Sardis, an event which ultimately led to the Persian invasion of Greece. But the fleet of the Ionians was defeated off the island of Lade, and the destruction of Miletus after a protracted siege was followed by the reconquest of all the Asiatic Greeks, insular as well as continental.

The victories of the Greeks during the great Persian war had the effect of enfranchizing their kinsmen on the other side of the Aegean ; and the battle of Mycale (479 B.C.), in which the defeat of the Persians was in great measure owing to the Ionians, secured their emancipa- tion. They henceforth became the dependent allies of Athens (see Delian League) though still retaining their autonomy, which they preserved until the peace of Antalcidas in 387 B.C. once more placed them as well as the other Greek cities in Asia under the nominal dominion of Persia. They appear, however, to have retained a considerable amount of freedom until the invasion of Asia Minor by Alexander the Great. After the battle of the Granicus most of the Ionian cities submitted to the conqueror. Miletus, which alone held out, "'as reduced after a long siege (334 B.C.). From this time they passed under the dominion of the successive Macedonian rulers of Asia, but continued, with the exception of Miletus (q.v.), to enjoy great prosperity both under these Greek dynasties and after they became part of the Roman province of Asia.

Ionia has laid the world under its debt not only by giving birth to a long roll of distinguished men of letters and science (see Ionian School of Philosophy), but by originating the distinct school of art which prepared the way for the brilliant artistic development of Athens in the 5th century. This school flourished in the 8th, 7th and 6th centuries, and is distinguished by the fineness of workmanship and minuteness of detail with which it treated subjects, inspired always to some extent by non-Greek models. Naturalism is progressively obvious in its treatment, e.g. of the human figure, but to the end it is still subservient to convention. It has been thought that the Ionian migration from Greece carried with it some part of a

population which retained the artistic traditions of the " Mycenaean "

civilization, and so caused the birth of the Ionic school; but whether this was so or not, it is certain that from the 8th century onwards we find the true spirit of Hellenic art, stimulated by commercial intercourse with eastern civilizations, working out its development chiefly in Ionia and its neighbouring isles. The great names of this school are Theodorus and Rhoecus of Samos; Bathycles of Magnesia on the Maeander; Glaucus, Melas, Micciades, Archermus, Bupalus and Athenis of Chios. Notable works of the school still extant are the famous archaic female statues found on the Athenian Acropolis in 1885-1887, the seated statues of Branchidae, the Nike of Archermus found at Delos, and the objects in ivory and electrum found by D. G. Hogarth in the lower strata of the Artemision at Ephesus in 1004-1905 (see Greek Art).

Bibliography. — Beside general authorities under Asia Minor see especially F. Beaufort, Ionian Antiquities (181 1); R. Chandler, &c, Ionian Antiquities (1769 ff.); Histories of Greek Sculpture by A. S. Murray, M. Collignon and E. A. Gardner, and special works cited under particular cities; E. Curtius, Die lonier vor der ionischen Wanderung (1855); D. G. Hogarth, Ionia and the East (1909), with map. ' (E. H. B.; D. G. H.)

IONIA, a city and the county-seat of Ionia county, Michigan, U.S.A., on the Grand river, about 34 m. E. of Grand Rapids. Pop. (1904) 5222; (1910) 5030. It is served by the Grand Trunk and the Pere Marquette railways. The greater part of the city is built on the bottom-lands of the valley within an area 2 m. in length and 1 m. in width, but some of the finest residences stand on the hills, which form an irregular semicircle behind the city, and command extensive views of the valley. Much of the build- ing material is a brown sandstone obtained from quarries only 3 m. distant; white clay, also, is found in the vicinity. The city is a trade centre for a rich farming district, has car-shops (of the Pere Marquette railway) and iron foundries, and manu- factures wagons, pottery, furniture and clothing. The water- works are owned and operated by the municipality. Ionia was settled in 1833 by immigrants from German Flats, near Herkimer, New York. It was incorporated as a village in 1857, but the charter was allowed to lapse; it was again incorporated as a village in 1865, an(l was chartered as a city in 1873.

IONIAN ISLANDS, the collective name for the Greek islands of

Corfu, Cephalonia, Zante, Santa Maura, Ithaca, Cythera (Cerigo) and Paxo, with their minor dependencies. These seven islands (for details of wliich see their separate headings) are often described also as the Heptanesus (" Seven Islands "), but they have no real geographical unity. The history of the name " Ionian " in this connexion is obscure, but it is probably due to ancient settlements of Ionian colonists on the coasts and islands. The political unity of the seven islands is of compara- tively modern date; their independence as a separate state lasted only seven years (1800-1807). To a certain extent they have passed under the same succession of influences; they have been subjected to the same invasions, and have re- ceived accessions to their populations from the same currents of migration or conquest. But even what may be considered as common experiences have affected the individual islands in different ways; in the matter of population, for instance, Corfu has undergone much more important modifications than Ithaca.

The Ionian islands consist almost entirely of Cretaceous and Tertiary beds, but in Corfu Jurassic deposits belonging to various horizons have also been found. The o'dest beds which have yet been recognized are shales and hornstones with Liassic fossils. These are overlaid conformably by a thick series of platy limestones, known as the Viglas limestone, which appears to represent the rest of the Jurassic system and also the lower part of the Cretaceous. Then follows a mas3 of dolomite and unbedded limestones containing Hippurites and evidently of Upper Cretaceous age. The Eocene beds are folded with the Cretaceous, and in many places the two formations have not yet been separately distinguished. Both occasionally assume the form of Flysch. Miocene beds are found in Corfu and Zante, and Pliocene deposits cover much of the low-lying ground.

History. — The beginning of Heptanesian history may be said to date from the 9th century. Leo the Philosopher (about a.d. 890) formed all or most of the islands into a distinct: province under the title of the Thema of Cephallenia, and in this condition

they belonged to the Eastern empire after Italy had been divided into various states, but this political or administrative unity could not last long in the case of islands exposed by their situation to opposite currents of conquest. Robert Guiscard, having captured Corfu

(1081) and Cephalonia, might have become the founder of a Norman dynasty in the islands but for his early death at Cassopo. Amid the struggles between Greek emperors and Western crusaders during the 12th century, Corfu, Cepha- lonia, Zante, &c, emerge from time to time; but it was not till the Latin empire was established at Constantinople in 1204 that the Venetians, who were destined to give the Ionian Islands their place in history, obtained possession of Corfu. They were afterwards robbed of the island by Leon Vetrano, a famous Genoese corsair; but he was soon defeated and put to death, and the senate, to secure their position, granted fiefs in Corfu to ten noble families in order that they might colonize it (1206). The conquest of Cephalonia and Zante followed, and we find five counts of the family of Tocco holding Cephalonia, and probably Zante as well as Santa Maura, as tributary to the republic. But the footing thus gained by the Venetians was not maintained, and through the closing part of the 13th and most of the 14th century the islands were a prey by turns to corsairs and to Greek and Neapolitan claimants. In 1386, however, the people of Corfu made voluntary submission to the Venetian republic which had now risen to be the first maritime power in the Mediterranean. In 1485 Zante was purchased from the Turks in a very depopulated condition; and in 1499 Cephalonia was captured from the same masters; but Santa Maura, though frequently occupied for a time, was not finally attached to Venice till 1684, and Cerigo was not taken till 1717.

The Venetians, who exacted heavy contributions from the islands, won the adherence of the principal native families Venetian by the bestowal of titles and appointments; the and Roman Catholic Church was established, and the

French Italian and Greek races were largely assimilated by ru,e ‘ intermarriage; Greek ceased to be spoken except by

the lower classes, which remained faithful to the Orthodox communion. On the fall of the Venetian republic in 1797 the treaty of Campo Formio, which gave Venice to Austria, annexed the Ionian Islands to France; but a Russo-Turkish force drove out the French at the close of 1798; and in the spring of 1799 Corfu capitulated. By treaty with the Porte in 1800, the emperor Paul erected the ” Septinsular Republic,” but anarchy and confusion followed till a secret article in the treaty of Tilsit, in 1807, declared the Islands an integral part of the French empire. They were incorporated with the province of Illyria, and in this condition they remained till the decline of the French power. The British forces, under General Oswald, took Zante, Cephalonia and Cerigo in 1809, and Santa

Maura in 1810; Colonel (afterwards Sir Richard) Church (q.v.), reduced Paxo in 1814; and after the abdication of Napoleon, Corfu, which had been well defended by General Donzelot, was, by order of Louis XVIII., surrendered to Sir James Campbell. By the treaty of Paris (9th November 181 5) the contracting powers — Great Britain, Russia, Austria and Prussia — agreed to place the " United States of the Ionian Islands " under the exclusive protection of Great Britain, and to give Austria the right of equal commercial advantage with the protecting country, a plan strongly approved by Count Capo d'Istria, the famous Corfiot noble who afterwards became president of the new republic of Greece.

The terms of the treaty of Paris were not only of indefinite import but were susceptible of contradictory interpretations. And instead of interpreting the other articles in harmony Protec w ' tn tne ˆ rst ' wn i cn declared the islands one " sole torate free and independent state," the protecting Power availed itself of every ambiguity to extend its authority. The first lord high commissioner, Sir Thomas Maitland, who as governor of Malta had acquired the sobriquet of " King Tom," was not the man to foster the constitutional liberty of an infant state. The treaty required, with questionable wisdom, that a constitution should be established, and this was accordingly

done; but its practical value was trifling. The constitution, voted by a constituent assembly in 181 7 and applied in the following year, placed the administration in the hands of a senate of six members and a legislative assembly of forty members; but the real authority was vested in the high com- missioner, who was able directly to prevent anything, and indirectly to effect almost anything. Sir Thomas Maitland was not slow to exercise the control thus permitted him, though on the whole he did so for the benefit of the islands. The construc- tion of roads, the abolition of direct taxes and of the system of farming the church lands, the securing of impartial administra- tion of justice, and the establishment of educational institutions are among the services ascribed to his efforts. These, however, made less impression on the Heptanesians than his despotic character and the measures which he took to prevent them giving assistance in the Greek war of independence in 182 1. He was succeeded in 1823 by General Sir Frederick Adam, who in the main carried out the same policy. Under his government the new fortifications of Corfu and some of the most important public works which still do honour to the English protectorate were undertaken. Lord Nugent, who became high commissioner in 1832, was followed by Sir Howard Douglas (1835-1841), who ruled with a firm, too often with a high hand; and he was met by continual intrigues, the

principal exponent of the opposi- tion being the famous Andreas Mustoxidi (d. 1861). A complete change of policy was inaugurated by Mr Mackenzie (1841-1843), and his successor Lord Seaton (1843-1849) was induced by the European disturbances of 1848 to initiate a number of important reforms. But the party which wished for union with Greece was rapidly growing in vigour and voice. Serious insurrections of the peasantry, especially in Cephalonia, had to be put down by military force, and the parliament passed a resolution in favour of immediate union with Greece. The hopes of the unionists were roused by the appointment of W. E. Gladstone as high commissioner extraordinary to investigate the condition of the islands. From his known sympathy with Greek inde- pendence, it was their expectation that he would support their pretensions. But after a tour through the principal islands Gladstone came to the conclusion that the abolition of the protectorate was not the wish of the mass of the people. For a few days in 1859 he held office as lord high commissioner, and in that capacity he proposed for the consideration of the assembly a series of reforms. These reforms were, however, declared inadmissible by the assembly; and Sir Henry Storks, who succeeded Gladstone in February 1859, began his rule by a prorogation. The contest continued between the assembly and the protectorate. The British government was slow to realize the true position of affairs: as late as May 1861 Gladstone spoke of the cession of the islands as " a crime against the safety of Europe," and Sir Henry Storks continued to report of tran- quillity and contentment. The assembly of 1862 accused the high commissioner of violation of the constitution and of the treaty of Paris, and complained that England remained in ignorance of what took place in the islands.

On the abdication of King Otho of Greece in 1862 the Greek people by universal suffrage voted Prince Alfred of England to the throne, and when he declined to accept the crown England was asked to name a successor. The Qˆ e ™ ° candidate proposed was Prince William George of Gliicksburg, brother of the princess of Wales; and the British government declared to the provisional government of Greece that his selection would be followed by the long-refused cession of the Ionian Islands. After the prince's election by the national assembly in 1863 the high commissioner laid before the Ionian parliament the conditions on which the cession would be carried out. The rejection of one of those conditions — -the demolition of the fortifications of Corfu — led to a new prorogation; but none the less (on March 29, 1864) the plenipotentiaries of the five great powers signed the treaty by which the protectorate was

brought to a close. The neutrality which they attributed to the whole of the islands was (January 1864) confined to Corfu and Paxo. On May 31st of that year Sir Henry Storks left Corfu with

the English troops and men-of-war. King George made his entry into Corfu on the 6th of June.

Since their annexation to Greece the history of the Ionian islands has been uneventful; owing to various causes their prosperity has somewhat declined. Corfu (Corcyra) with Paxo; Cephalonia; Santa Maura (Levkas) with Thiaki (Ithaca) and Zante (Zacynthos) each form separate nomarchies or depart- ments; Cerigo (Cythera) forms part of the nomarchy of Laconia. The islands retain the exemption from direct taxation which they enjoyed under the British protectorate; in lieu of this there is an ad valorem tax of 205% on exported oil and a tax of 6% on wine exported to Greek ports; these commodities are further liable to an export duty of i|% which is levied on all agricultural produce and articles of local manufacture for the main- tenance and construction of roais. The excellent roads, which date from the British administration, are kept in fair repair.

See Mustoxidi, Delle cose Corciresi (Corfu. 1848) . Lunzi, Hepl rrjs

7roXi7-«7js Karac/raveus rfjs 'EwTavncrov tiri '~EvtrG>v (Athens, 1856):

Ansted, The I. I. (London. 1863); Viscount Kirkwall, Four Years in

the I. I. (London. 1864) vol. i. confaining a chronological history of

the British protectorate; F Lenormant, La Grece et les ties ioniennes

(Paris, 1865) ; P. Chiotis, Hist, des lies ioniennes (Zante, 1815-1864) ;

Mardo, Saggio di una descrizione geografico-storica delle Isole (Corfu,

1865) (mainly geographical); De Bosset, Description des monnaies

d'lthaque et de Cephalonie (London, 1815) ; Postolakas, KaraXoycs

t&v aox a ˆ v voy,iv KipKvpas, Aevna5os, &c. (Athens,

1868), Wiebel, Die Insel Kephalonia und die Meermiihlen von Argostoh (Hamburg, 1873); Tsitselis, T\u>a (Athens, 1876); 'Ora/iom ffwajK l.v Keˆa Wrjvig. in the " Parnassus" i. 9-12 (Athens, 1877); Riemann, " Recherches archeologiques sur les lies ioniennes " in Bibliotheque des jHcoles francaises d'Athenes et de Rome (Paris, 1879-1880); Gregorovius, Corfu; eine ionische Idylle (Leipzig. 1882) ; J. Partsch, Die Insel Corfu: eine geographische Monographic (Gotha, 1887); Die Insel Levkas (Gotha, 1889); Kephallenia und Ilhaka (Gotha, 1890); Die Insel Zante (Gotha, 1891). (J. D. B.)

IONIANS, the name given by the Greeks to one of the principal divisions of the Hellenic peoples. In historic times it was applied to the inhabitants of (1) Attica, where some believed the Ionians to have originated; (2) parts of Euboea; (3) the Cycladic islands, except Melos and Thera; (4) a section of the west coast of Asia Minor, from the gulf of Smyrna to that of Iasus (see Ionia); (5) colonies from any of the foregoing, notably in Thrace, Propontis and Pontus in the west, and in Egypt (Naucratis, Daphnae); some authorities have found traces of an ancient Ionian population in (6) north-eastern Peloponnese. The meaning and derivation of the name are not known. It occurs in two forms, 'laFoves and/Icoˆes (compare Xaows and KSivts in Epirus) — not counting the name 'Ibvux

applied to the open sea west of Greece. In the traditional genealogy of the Hellenes, Ion, the ancestor of the Ionians, is brother of Achaeus and son of Xuthus (who held Peloponnese after the dispersal of the children of Hellen) . But this genealogy, though it is attributed to Hesiod, is apparently post-Homeric; and it is clear that the Ionian name had independent and varied uses and meanings in very early times. In Homer the word 'laFoves occurs as a name of inhabitants of Attica, with the epithet eXKextrcoees (//. xiii. 685 = " trail-vest "), describing some point of costume, and later regarded as imputing effeminacy. The Homeric Hymn to Apollo of Delos (7th century) describes an Ionian population in the Cyclades with a loose religious league about the Delian sanctuary.

The same word 'I&Fuv (J avail) appears in Hebrew literature of the 8th and 7th centuries, to denote one group of the " Japhetic " peoples of Asia Minor, Cyprus and perhaps Rhodes: " by these were the isles of the nations divided, in their lands, every one after his tongue, after their families, in their nations," a comprehensive expression for the island-strewn regions farther west (Gen. x. 10). In Ezek. xxvii. 13, 19, J avail trades with Tyre in slaves, bronze-work, iron and drugs. Later allusions show that on Semitic lips Javan meant western traders in general. In Persian Yauna was the generic term for Greeks. 1 1 Yunan is still a popular synonym for Oroum, a Greek, among the Arabs; in India Yavana was long the generic name for all foreigners from the north and west, a use dating probably from Alexander's day and the Graeco-Bactrian monarchs.

The earliest explicit Greek account of the Ionians is given in the 5th century by Herodotus (i. 45, 56, 143-145, v. 66, vii. 94, viii. 44-46). The " children of Ion " originated in north-eastern Peloponnese; and traces of them remained in Troezen and Cynuria. Expelled by the Achaeans (who seem to have entered Peloponnese about four generations before the Dorian Invasion) they invaded and dominated Attica; and about the time of the Dorian Invasion took the

lead under the Attic branch of the Neleids of Pylus (Hdt. i. 147, v. 65) in the colonization of the Cyclades and of Asiatic Ionia, which in Homer is still " Carian." Many of the colonists, however, were not Ionians, but refugees from other parts of Greece, between Euboea and Argolis (Hdt. i. 146), others looked on Attica as their first home, though the true Ionians were intruders there. The Pan-Ionian sanctuary of Poseidon on the Asiatic promontory of Mycale was regarded as perpetuating a cult from Peloponnesian Achaea, and the league of twelve cities which maintained it, as imitated from an Achaean dodecapolis, and as claiming (absurdly, according to Herodotus i. 143) purer descent than other Ionians.

In Herodotus's account of the first Greek intercourse with Egypt (about 664 b c.) he describes " Ionian and Carian " adventurers and mercenaries in the Delta. Later the commoner antithesis is between Ionian and Dorian, first (probably) in the colonial regions of Asia Minor, and later more universally.

In the 5th century the name " Ionian " was already falling into discredit. Causes of this were (1) the peace-loving luxury (born of commercial wealth and contact with Oriental life) of the great Ionian cities of Asia; (2) the tameness with which they submitted first to Lydia and to Persia, then to Athenian pretensions, then to Sparta, and finally to Persia again; (3) the decadence and downfall of Athens, which still counted as Ionian and had claimed (since Solon's time) seniority among " Ionian " states. In the later 4th century the name survives only (a) as a geographical expression for part of the coast of Asia Minor, (b) in European Greece as the name of that section of the Northern Amphictyony in which Athens and its colonies were reckoned.

The traditional history of Asiatic Ionia is generally accepted, and in its broad outlines is probably well founded. Common to all groups of Ionians in the Aegean is a dialect of Greek which has r\ for a (in Attic only partially) and (in Asiatic Ionian especi- ally) k for tt in certain words. Herodotus states that there were four distinct dialects in Asiatic Ionia itself (i. 142) and the dialect of Attica differed widely from all other forms of Ionic. Earlier phases of Ionic forms are dominant in the language of Homer. Most Ionian states exhibit also traces of the fourfold tribal divisions named after the " children of Ion "; but addi- tional tribes occur locally. (Hdt. v. 66, 69.) All reputed colonies from Attica (except Ephesus and Colophon) kept also the feast of Apaturia; and many worshipped Apollo Patrous as the reputed father of Ion. The few observations hitherto made on the sites of Ionian cities indicate continuity of settlement and culture as

far back as the latest phases of the Mycenaean (Late Minoan III.) Age and not farther, supporting thus far the traditional founda- tion dates.

The theory of E. Curtius (1856-1890) that the Ionians origin- ated in Asia Minor and spread thence through the Cyclades to Euboea and Attica deserts ancient tradition on linguistic and ethnological grounds of doubtful value. Ad. Holm supports it {Gesch. Gr., Berlin, 1886, i. 86), but A. von Gutschmid {Beitr. z. Gesch. d. alien Orients, Leipzig, 1856, 124 ff.) and E. Meyer (Philologus NF. 2, 1889, p. 268 ff.; NF. 3, 1890, p. 479 ff.) follow' Herodotus with qualifications. J. B. Bury (Eng. Hist. Rev. xv. 228), though he regards the Ionian peoples as of European origin, thinks that they may have got their name from some part of the Asiatic coast. Ionian culture and art, though little known in their earlier phases, derive their inspiration on the one side from those of the old Aegean (Minoan) civilization, on the other from the Oriental (mainly Assyrian) models which penetrated to the coast through the Hittite civilization of Asia Minor. Egyptian influence is almost absent until the time of Psammeti- chus, but then becomes predominant for a while. Local and

regional peculiarities, however, disappear almost wholly in the 5th and 4th centuries, under the overpowering influence of Athens.

Authorities. — Besides the sections on Ionians in the general histories of Greece and the references given in G. Busolt, Griechische Geschichte, i. (2nd ed., Gotha, 1893), pp. 262, 277 ff., see E. Curtius, Die Ionier vor der ionischen Wanderung (Berlin, 1855), and papers in Gott. Gel. Anz. (1856), p. 11 52 f. and (1859), p. 2021 f. ; Jahrb. f. kl. Philol. 83 (i860), p. 449 f. ; Hermes 25 (1890), p. 141 f. ; A. von Gutschmid, Beitrdge z. Gesch. d. alien Orients (Leipzig, 1856), p. 124 ff.; E. Meyer, Philologus 47 (NF. 2, 1889), p. 268 ff. and 49 (NF. 3, 1890), p. 479 ff . ; V. Boehlau, Aus ionischen und aolischen Necro- polen (Cassel, 1897); H. W. Smyth, The Ionic Dialect (1889). P. Cauer, " De dialecto attica vetustiore quaestiones epigraphicae," in G. Curtius, Studien z. gr. u. lat. Gramm. 8 (1875), p. 223, 399; Karsten, De titulorum lonicorum dialecto (Halle, 1882) ; F. Bechtel, Die Inschriften des ion. Dialekts (Gottingen, 1877). For the political history of the Ionian Greeks see Greece : History, and Ionia ; for the special history and characteristics of individual Ionian

cities, the respective names. (J. L. M.)

IONIAN SCHOOL OF PHILOSOPHY. Under this name are included a number of philosophers of the 6th and 5th centuries b.c. Mainly Ionians by birth, they are united by a local tie and represent all that was best in the early Ionian intellect. It is a most interesting fact in the history of Greek thought that its birth took place not in Greece but in the colonies on the Eastern shores of the Aegean Sea. But not only geographically do these philosophers form a school; they are one in method and aim. They all sought to explain the material universe as given in sensible perception; their explanation was in terms of matter, movement, force. In this they differed from the Eleatics and the Pythagoreans who thought in the abstract, and explained knowledge and existence in metaphysical terminology. In tracing the development of their ideas, two periods may be distinguished. The earliest thinkers down to Heraclitus en- deavoured to find a material substance of which all things con- sist; Heraclitus, by his principle of universal flux, took a new line and explained everything in terms of force, movement, dynamic energy. The former asked the question, " What is the substratum of the things we see?"; the latter, " How did the sensible world become what it is; of what nature was the motive force?"

The first name in the list of the Ionian philosophers — and, indeed, in the history of European thought — is that of Thales {q.v.). He first, so far as we know, sought to go behind the infinite multiplicity of phenomena in the hope of finding an infinite unity from which all difference has been evolved. This unity he decided is Water (two M«p lar'tv). It is impossible to discover precisely what he conceived to be the relation of this unity to the plurality of phenomena. Later writers from whom we derive our knowledge of Thales attributed to him ideas which seem to have been conceived by subsequent thinkers. Thus the suggestion preserved by Stobaeus that he conceived water to be endowed with mind is discredited by the specific statement of Aristotle that the earlier physicists (physiologi) did not distinguish the material from the moving cause, and that before Anaxagoras no one postulated creative intelligence. Again in the De anima (i. 5) Aristotle quotes the statement that Thales attributed to water a divine intelligence, and criticizes it as an inference from later speculations. It is probably safest to credit Thales with the bare mechanical conception of a universal material cause, leaving pan- theistic ideas to a later period of thought.

The successors of Thales were Anaximander and Anaximenes, who also sought for a primal substance of things. Anaximander

postulated a corporeal substance intermediate between air and fire on the one hand, and between earth and water on the other hand. This substance he called " the Infinite " (t6 4x«poe). Unlike Thales, he was struck by the infinite variety in things ; he felt that all differences are finite, that they have emerged from primal unity (first called apxv by him) into which they must ultimately return, that the Infinite One has been, is, and always will be, the same, indeterminate but immutable. Change, growth and decay he explained on the principle of mechanical compensation (SiSorai -yap avra rto-tv nal biK-qv rijs dSuaas).

Anaximenes, pupil of Anaximander, seems to have rebelled against the extreme materialism of his master. Perceiving that air is necessary to life, that the universe is surrounded by air, he was convinced that out of air all things have resulted. The process by which things grow is twofold, condensation (■jrinci'wem) and rarefaction apoicoffis), or, in other words, heat and cold. From the former process result cloud, water and stone; from the latter, fire and aether. This theory is closely allied to that of Thales, but it is superior in that it specifies the processes of change. Further, it is difficult not to accept Cicero's statement that Anaximenes made air a conscious

deity; we are, at all events, justified in regarding Anaximenes as a link (perhaps an unconscious link) between crude Hylozoism (q.v.) and definitely metaphysical theories of existence.

We have seen that Thales recognized change, but attempted no explanation; that Anaximander spoke of change in two directions; that Anaximenes called these two directions by specific names. From this last, the transition to the doctrine of Heraclitus is easy. He felt that change is the essential fact of experience and pointed out that any merely physical explanation of plurality is inherently impossible. The Many is of Sense ; Unity is of Thought. Being is intelligible only in terms of Becoming. That which is, is what it is in virtue of its perpetually changing relations (xdxra pel K ai ov&lv ixkvti). By this recognition of the necessary correlation of Being and Not-being, Heraclitus is in a very real sense the father of meta- physical and scientific speculation, and in him the Ionian school of philosophy reached, its highest point. Yet there is reason to doubt the view of Hegel and Lassalle that Heraclitus recognized the funda- mental distinction of subject and object and the relations of mind and matter. Like the early Ionians he postulated a primary sub- stance, fire, out of which all things have emerged and into which all must return. This elemental fire is in itself a divine rational process, the

harmony of which constitutes the law of the universe. Human knowledge consists in the comprehension of this all-pervading harmony as embodied in the manifold of perception; the senses are " bad witnesses " in that they report multiplicity as fixed and existent in itself rather than in its relation to the One. This theory gives birth to a sort of ethical by-product whose dominant note is Harmony, the subordination of the individual to the universal reason ; moral failure is proportionate to the degree in which the individual declines to recognize his personal transience in relation to the eternal Unity. From the same principle there follows the doctrine of Immortality. The individual, like the phenomena of sense, comes out of the infinite and again is merged ; hence on the one hand he is never a separate entity at all, while on the other hand he exists in the infinite and must continue to exist. Moreover, the soul ap- proaches most nearly to perfection when it is least differentiated from elemental fire; it follows that "while we live our souls are dead within us, but when we die our souls are restored to life." This doctrine is at once the assertion and the denial of the self, and furnishes a striking parallel between European thought in its earliest stages and the fundamental principles of Buddhism. Knowledge of the self is one with knowledge of the Universal Logos (Reason); such knowledge is the basis not only of conduct but of existence itself in its only real sense.

Thus far the Ionian philosophers had held the field of thought. Each succeeding thinker had more or less assumed the methods of Thales, and had approached the problem of existence from the empirical side. About the time of Heraclitus, however, there sprang up a totally new philosophical spirit. Parmenides and Zeno (see Eleatic School) enunciated the principle that " Nothing is born of nothing." Hence the problem becomes a dialectical a priori specula- tion wherein the laws of thought transcend the sense-given data of experience. It was therefore left for the later Ionians to frame an eclectic system, a synthesis of Being and Not-being, a correlation of universal mobility and absolute permanence. This examination of diametrically opposed tendencies resulted in several different theories. It will be sufficient here to deal with Anaxagoras, Diogenes of Apollonia, Archelaus and Hippo, leaving Empedocles, Leucippus and Democritus to special articles {q.v.). The latter three do not belong strictly to the Ionian School.

Anaxagoras {q.v.) elaborated a quasi-dualistic theory according to which all things have existed from the beginning. Originally they existed in infinitesimal fragments, infinite in number and devoid of arrangement. Amongst these fragments were the seeds of all things which have since emerged by the process of aggregation and segrega-

tion, wherein homogeneous fragments came together. These processes are the work of Nous (coOs) which governs and arranges. But this Nous, or Mind, is not incorporeal; it is the thinnest of all things; its action on the particle is conceived materially. It originated a rotatory movement, which arising in one point gradually extended till the whole was in motion , which motion continues and will continue infinitely. By this motion things are gradually constructed not entirely of homogeneous particles (the homoeomere, oMotoMepˆ) but in each thing with a majority of a certain kind of particle. It is this aggregation which we describe variously as birth, death, maturity, decay, and of which the senses give inaccurate reports. His vague dualism works a very distinct advance upon the crude hylozoism of the early Ionians (see Atom), and the criticisms of Plato and Aristotle show how highly his work was esteemed. The great danger is that we should credit him with more than he actually thought. His Nous was not a spiritual force; it was no omnipotent deity; it is not a pantheistic world-soul. But by isolating Reason from all other growths, by representing it as the motor-energy of the Cosmos, in popularizing a term which suggested personality and will, Anaxagoras gave an impetus to ideas which were the basis of Aristotelian philosophy in Greece and in Europe at large.

In Diogenes of Apollonia we find a return to Anaximenes. Diogenes {q.v.) began by insisting on the necessity of there being only one principle of things, herein contradicting the pluralism of Heraclitus. This principle is that of the universal homogeneity of nature; all

things are at bottom the same, or interaction would be impossible ('Ka.vra ra lovra. d7ro rod airrov krepoiovadaL icai to abrb etvat. This universal substance is Air. But Diogenes went much farther than Anaximenes by attributing to air not only infinity and eternity but also intelligence. This Intelligence alone would have produced the orderly arrangement which we observe in Nature, and is the basis of human thought by the physical process of inhalation.

Another pupil of Anaxagoras was Archelaus of Miletus (g.v.). His work was mainly the combination of previous views, except that he is said to have introduced an ethical side into the Ionian philo- sophy. " Justice and injustice," he said, " are not natural but legal." He endeavoured to overcome the dualism of Anaxagoras, and in so doing approached more nearly to the older Ionians.

The last of the Ionians whom we need mention is Hippo (q.v.), who, like Archelaus, is intellectually amongst the earlier members of the school. He thought that the source of all things was moisture (to vypov), and is by Aristotle coupled with Thales {Metaphysics, A3).

Bibliography. — Ritter and Preller, ch. i.; Zeller's History of Greek Philosophy, J. Burnet, Early Greek Philosophy (1892); Fair- banks, The First Philosophers of Greece (1898); Grote, History of Greece, ch. viii.; Windelband, History of Ancient Philosophy (1899); Benn, The Greek Philosophers (1883) and The Philosophy of Greece (1898); Th. Gomperz, Greek Thinkers (Eng. trans, vol. i., L. Magnus, 1901).

IOPHON, Greek tragic poet, son of Sophocles. He gained the second prize in 428 b.c, Euripides being first, and Ion third. He must have been living in 405, the date of the production of the Frogs of Aristophanes, in which he is spoken of as the only good Athenian tragic poet, although it is hinted that he owed much to his father's assistance. He wrote 50 plays, of which only a few fragments remain. It is said that Iophon accused his father before the court of the phratores of being incapable of managing his affairs, to which Sophocles replied by reading the famous chorus of the Oedipus at Colonus (688 ff.), with the result that he was triumphantly acquitted.

See Aristophanes, Frogs, 73, 78, with scholia; Cicero, De senec- tute, vii. 22; Plutarch, Moralia, 785 b; A. Nauck, Tragicorum Graecorum fragmenla (1889); O. Wolff, De Iophonte poeta (Leipzig,

1884).

I.O.U. (" I owe you "), a written acknowledgment of a debt. It usually runs thus:

To -. I.O.U. pounds.

(Signed) ■. Date .

An I.O.U., if worded as above, or even if the words " for value received " are added, does not acquire a stamp, as it contains no terms of agreement. If any such words as " to be paid on such a day " are added, it requires a stamp. An I.O.U. should be addressed to the creditor by name, though its validity is not impaired by such omission. Being a distinct admission of a sum due, it is prima facie evidence of an account stated, but where it is the only item of evidence of account it may be rebutted by showing there was no debt

and no demand which could be enforced by virtue of it. An I.O.U. is not negotiable.

IOVILAE, or Jovilae, a latinized form of iuvilas, the name given by the Oscan-speaking Campanians in the 5th, 4th and 3rd centuries B.C. to an interesting class of monuments, not yet fully understood. They all bear crests or heraldic emblems proper to some family or group of families, and inscriptions directing the annual performance of certain ceremonies on fixed days. While some of them are dedicated to Jupiter (in a special capacity, which our present knowledge of Oscan is insufficient to determine), others were certainly found attached to graves.

See the articles Osca Lingua, Capua, Cumae and Messapii. The text of all those yet discovered (at Capua and Cumae), with particulars of similar usages elsewhere in Italy and other historical and archaeological detail, is given by R. S. Conway in Tlie Italic Dialects (Cambridge, 1897, pp. 101 ft".). A briefer but valuable discussion of the chief characteristics of the group will be found in R. von Planta's Oskisch-utnbrische Grammatik, ii. 631 ff., and a summary description in C. D. Buck's Osco- Umbrian Grammar, 247. (R. S. C.)

IOWA, a north central state of the United States, situated between latitudes 40° 36′ and 43 ° 30′ N. and between longitudes 89° 5′ and 96° 31′ W. It is bounded N. by Minnesota, E. by the Mississippi river, which separates it from Wisconsin and Illinois, S. by Missouri, and W. by the Missouri and Big Sioux rivers,

which separate it from Nebraska and South Dakota. Its total area is 56,147 sq. m., of which 561 sq. m. are water surface.

Physical Features. — Topographically, Iowa lies wholly in the Prairie Plains Region, part of it having been overrun bv the Great Ice Sheet of the Glacial epoch. For the most part the surface is that of a prairie tableland, moderately rolling, and with a general but scarcely perceptible slope, which in the eastern two-thirds is from N.W. to S.E., and in the western third from N.E. to S.W. Elevations above the sea range from between 1200 to 1675 ft. in the N.W. to 500 ft. and less in the S.E., the highest point being in the vicinity of Spirit lake in Dickinson county, the lowest at Keokuk. In the southern half of the state the height of the crests of the divides is very uniform. The northern half is more broken and irregular; elevations, usually rounded, mingle with depressions some of which are occupied by small shallow lakes or ponds, the characteristic physical features of this region being due to glaciation. But the most marked departures

from the prairie surface are in the N.E. and S.W. In the N.E. the whole of Allamakee and parts of Winneshiek, Fayette, Clayton, Delaware, Dubuque and Jackson counties form the only driftless area of the state; in that section cliffs frequently rise almost vertically from the banks of a river to a height of from 300 to 400 ft., and Irom the summit of the cliff to the crest of the divide, a few miies distant, there is another ascent of 300 ft. or more ter- minating occasionally in knob-topped hills crowned in many instances with small cedar. Moreover, the largest streams have numerous tributaries, and nearly all alike flow circuitously between steep if not vertical cliffs or in deep craggy ravines overlooked by distant hills, among which the wagon road has wound its way with difficulty. In the W., S. from the mouth of the Big Sioux river, extends a line of mound-like bluffs usually free from rocks, but rising abruptly from the flood plain of the Missouri to a height varying from 100 to 300 ft. A broad water-parting extending from Spirit lake, on the northern border, nearly S. to within 60 m. of the southern border, and thence S.E. to Wayne county in the south central part of Iowa, divides the state into two drainage systems. That to the E., com- prising about two-thirds of the whole area, is drained by tributaries of the Mississippi, of which the Des Moines, the Skunk, the Iowa with its tributary the Cedar, and the Wapsipinicon are the largest, streams of long courses and easy fall over beds frequently pebbly in the N. but muddy in the S., and through valleys broad at their sources, well drained, and gently sloping in the middle of their courses, but becoming narrower and deeper towards their mouths ; that to the W. is drained by tributaries of the Missouri, mostly short streams taking their rise from numerous rivulets, flowing quite rapidly over muddy beds through much of their courses, and in the bluff belt along the Missouri having steep but grassy banks 200 ft. in height or more. (For geological details, see United States, section Geology, ad fin.)

Flora and Fauna. — The predominant feature of the flora is the grasses of the prairie. The former forests of the state were of two general classes: on the bottom lands along the rivers grew cotton- wood, willow, honey-locust, coffee trees, black ash, and elm ; on the less heavily wooded uplands were oaks (white, red, yellow and bur), hickory (bitternut and pignut), white and green ash, butternut, ironwood and hackberry. The growth was heavier, however, in the E. than in the W., but, it has been estimated, covered in all about one-fi f th of the area of the state at the time of its first settlement by the whites. In the N.E., also, small cedar and pine are found. But everywhere now most of the merchantable timber has been cut ; in 1900 it was estimated that there were altogether about 7000, sq. m.

of woodland in the state. The bison and elk long ago dis- appeared; black bear and deer were long found in unsettled parts of the state. Ducks, geese and other water birds are common, especially during their migrations.

Climate. — The climate is one of great extremes of heat and cold, with a dry winter and a usually wet summer, the prevailing wind of winter being N.W. while in summer it not infrequently blows from the S.W. Both the midwinter isotherm of Montreal and the mid-summer one of Washington, D.C., pass through the state. The mean annual temperature is 47-5° F. ; the average range of extremes per year during the decade ending with 1900 was 136 F., while the greatest extremes recorded are from-43°F. in 1888 to H3°F.in 1901, a difference of 156 F. From 1893 to 1898 the average mean annual temperature at Cresco in Howard county, near the N.E. corner of the state, was 44-3° F., while at. Keokuk in the S.E. corner it was 52-2″ F-, and as the isotherms cross the state, especially in the N., their tendency is to move S.W. The rainfall is also very unequal in distri-bution throughout the year, as also between the same periods of different years, and as between the different parts of the state. For while the mean annual precipitation is 31-42 in., 22-48 in., or 71% of this, fall during the six months from the 1st of April to the 1st of October, or 10% in winter, 23% in autumn, 28% in spring and 39% in summer, Tune and July being the two wettest months. At the same time extremes during the four most critical crop months, from the 1st of May to the 1st of September, have ranged from 6-75 in. in 1894 to 27-8″ in. in 1902. Within any one year the precipitation is in general usually less in the western part of the state than in the eastern, the mean difference for all the years of record up to the close of 1903 being 2-5 in.; the western part also is marked by having a

still larger per cent of its rain in spring and summer than has -the eastern. The unequal distribution throughout the state is in much larger measure due to local showers. Injury to crops from drought aid hot winds has occu red aoout two or three times in a decade, but liability to injury of the crops from excessive rainfall and hailstorms is greater than that from a deficiency of moisture. Three notable tornadoes have swept portions of the state: the Comanche in June i860, the Grinnell in June 1882 and the Pomeroy in July 1893; but the greatest area traversed by any of these was less than one-

twentieth of 1 % of the total area of the state, and this kind of storm has been less destructive to human life, animals and buildings than the lightning which accompanies summer showers.

Soil; Agriculture. — Its depth, together with its porous nature, makes the fertile soil of Iowa capable of withstanding the extremes of wet and dry remarkably well, and it is perhaps true that, taken as a whole, no other state in the Union has a superior soil for agriculture. Certainly no other has so many acres of improved land, or so large a proportion— from 85 to 90% — of its land subject to cultivation. The soil is of four kinds : till or drift, alluvial, loess or bluff and geest. The dark drift, composed chiefly of clay, sand, gravel, boulders and lime, is both the soil and subsoil of the greater part (about 66%)] of the state, being especially predominant in the N. and N.W. The alluvial soil, composed of what has been washed from other soils, together with decayed vegetable matter, covers about 6% of the surface of the state and is found in the river bottoms, of greatest extent in that of the Missouri; it varies much in fertility. The loess soil, chiefly a mixture of porous clay and carbonate of lime, forms the bluffs bordering the bottom lands of the Missouri and is common in the N.E. Its fertility is not inferior to that of the better drift. Geest is found particularly in the north-eastern part of the state; it covers less than I % of the area of the state.

The superior qualities of the soil, together with the usually warm and moist months of spring and summer, make Iowa one of the fore- most states of the Union in agriculture and stock-raising, especially in the production of Indian corn, oats, hay and eggs, and in the rais- ing of hogs, horses, dairy cows and poultry. In comparison with its other industries it stands also pre-eminently as an agricultural state ; for of its 789,404 labourers in 1900, 371,604, or 47 %, were engaged in agriculture, 129,006 being engaged in trade and transportation, and 124,803 in manufactures and mechanical pursuits. In 1899 the total value of the agricultural products, $365,411,528, was greater than that of any other state. Of the farms 65-1 % were cultivated by owners in 1900, a decrease from 76-2 % in 1880; and 19-5% were cultivated by cash tenants, an increase from 4-5% in 1880. After 1880 the percentage of farms operated by share tenants slowly but steadily decreased, falling from 19-4% in 1880 to 15-4% in 1900. Between 1880 and 1900 the average number of acres to a farm slightly increased— from 133-5 acres in 1880 to 151 2 acres in 1900 — instead of decreasing as in the older states of the Union; though the increase was not nearly so marked as in such states as Nevada, Montana, Wyoming and Texas. Iowa about equals Illinois in the production of both Indian corn and oats, nearly 10,000,000

acres or about one third of its improved area usually being planted with Indian corn, with a yield varying from 227,908,850 bushels in 1901 (according to state reports) to 373,275,000 (the largest in the United States, with a crop value second only to that of Illinois) in 1906. According to the Department of Agriculture in 1907 the acreage was 9,160,000 and the yield 270,220,000 bushels (considerably less than the Illinois crop); the yield of oats was 168,364,170 bushels (Twelfth U.S. Census) in 1899, 124,738,337 bushels (U.S. Department of Agri- culture) in 1902, and in 1907 the acreage and crop (greater than those of any other state) were 4,500,000 acres and 108,900,000 bushels, valued at $41,382,000 — a valuation second only to that of Illinois. In total acreage of cereals (16,920,095 in 1899) it ranked first (Twelfth Census of the United States), and in product of cereals was exceeded by Illinois only; in acreage of hay and forage (4,649,37 s ' n 1899) as well as in the annual supply of milk (535,872,240 gallons in 1899) it was xceeded by New York only. In 1905, according to railway re- ports, 91 ,051 ,551 lb of butter were carried to points outside the state. It ranked far ahead of any other state in 1008 in the number of its hogs (8,4.13,000, being 15 % of the whole number in the United States), Illinois, the second in rank, having only about half as many. It ranked first in 1900 in the number of horses (1,392,573); > n the number of poultry (about 20,000,000); in the annual egg product (99,621,290 dozen in 1899) ; in the total acreage of all crops (22,170,000) ; in the total value of agricultural products; and in the total value of live stock ($271,844,034^. In 1899 it ranked fourth in the production of barley (18,059,050 bushels) and in 1907 sixth (14,178,000 bushels). The wheat crop has varied from 12,531,304 bushels in 1903, 13,683,003 bushels in 1905, 7,653,000 bushels in 1907 (according to the U.S. Department of Agriculture), to 22,769,440 bushels (Twelfth Census) in 1899. Potatoes, apples and small fruits are grown successfully. For the most part the several crops are quite evenly distributed throughout the state; but nearly all the winter wheat is grown in the S. and N.W., spring wheat most largely in the N.W., barley mostly in the N., flax-seed and prairie hay in the N.E.

Minerals. — The first mines to be worked in Iowa were those for lead and zinc at Dubuque and to the northward. These are little mined at present, only no tons of lead ore and 516 tons of zinc ore being taken from the mines in 1908. Of more promise is the gypsum deposit

extending over an area of about 50 sq. m. in the vicinity of Fort Dodge (Webster county), from which was taken in 1908 a product valued at $565,645, having increased to that figure from $45,819 in

1898. Limestones and sandstone are also profitably quarried, the value of the product in 1908 being $530,945 for limestone and $2337 for sandstone. The principal mineral of Iowa, however, is bituminous coal; it ranked in 1908 eighth among the coal-producing states of the Union, its product being valued at $11,706,402. The beds lie in the southern half of the state, extending under about two-fifths of its surface.

Trade and Commerce. — The manufactures of Iowa are chiefly such as have to do with the products of the farm. Meat packing is the most important, the product of this industry amounting in 1900 to $25,695,044, and in 1905 to $30,074,070, an increase of 17% in this period; in 1900 the state was seventh, in 1905 sixth, among the states in the value of this industry, producing in each year 3-3% of the total. Next in importance is the manufacture of dairy products, the value of which in 1900 was $15,846,077 (an increase of 50-3% in ten years) and in 1905 was $15,028,326; at both censuses the state ranked third in the value of cheese, butter, and condensed milk and of food preparations, which were valued at $6,934,724 in 1905. Flour and grist-mill products ranked third both in 1900 and 1905, the value of the product for the later year being $12,099,493, an increase of 9-9 % over the value for the earlier. Among the lesser manufactures are lumber and timber products (value in 1905, $5,610,772), most of the raw material being floated down on rafts from Wisconsin and Minnesota. The largest centres of industry are Sioux City, Davenport, Dubuque, Des Moines, Burlington and Council Bluffs. In 1905 the gross value of the manufactured product (of establishments on the factory system) was $160,572,313, as against $132,870,865 in 1900, an increase of 20-8%; whereas, even includ- ing the products of smaller establishments not technically factories, the value of the product in 1850 was only $3,551,783, and in 1880 was only $71,045,926.

The means of transportation is afforded chiefly by the steam rail-ways, of which the state had 9,907-44 m. in January 1909. Scarcely a farm is more than 6 or 8 m. from a railway station ; and only three other states have a greater railway mileage. The great period of railway building in Iowa was during the twenty-five years immedi-ately following the close of the Civil War, the railway mileage being only 655 m. in i860. The several roads are under the management of twenty-seven companies, but about 75 % of the business is done by the Chicago Burlington & Quincy, the Chicago & North-Western, the Chicago Milwaukee & St Paul and the Chicago Rock Island & Pacific. Electric interurban railways are increasing in importance for freight and passenger service. In 1908 about 225 m. of such railways

were in operation. Transportation facilities by water are afforded by the Mississippi river. The former difficulties with the Des Moines Rapids of the Mississippi (which are passable for rafts and light boats at high water) have been overcome by a canal from Keokuk to Montrose constructed by the National Government. Other federal improvements undertaken are a harbour at Muscatine, a harbour of refuge below Davenport and channel improvements at Clinton.

Population. — The population of Iowa in 1850 was 192,214; in i860, 674,913; in 1880, 1,624,615; in 1890, 1,911,896; in 1900, 2,231,853. The state census of 1905 showed a total population of 2,210,050, and the Federal census of 1910, of 2,224,771. Of the population in 1905, 1,264,443 (57-2%) were native whites of native parentage, 648,532 (29-3%) were native whites of foreign parentage, 289,296 (12-8%) were foreign-born and 14,832 (0-7%) were coloured, including 346 Indians. The Indians, a remnant of the Sauk and Foxes, are most unprogressive, and are settled on a reservation in Tama county in the east- central section of the state.

In 1906 it was estimated that there were 788,667 communicants of all religious denominations; of these 207,607 were Roman Catholics; 164,329 Methodists; 117,668 Lutherans; 60,081 Presbyterians; 55,948 Disciples of Christ; 44,096 Baptists; 37,061 Congregationalists; 11,681 members of the German Evangelical Synod; and 8990 Protestant Episcopalians.

The rural element of the population is large, though it is not increasing as rapidly as the urban; and no other state in the Union is so uniformly settled. There were in 1905 seven cities with a population of 25,000 or more; twenty with 8000 or more; and thirty-seven with 4000 or more. Between 1890 and 1900 the urban population increased 38-3%, while the rural increased 14-6%. The chief cities are Des Moines (pop. in 1905, 75,626), Dubuque (41,941), Davenport (39,797), Sioux City (40,952), Cedar Rapids (28,759), Council Bluffs (25,231) and Burlington

(25,318)-

Government. — There is comparatively little in the political institutions of Iowa dissimilar to those of other states of the

Union; they show in recent years a tendency toward greater

centralization — in boards, however, rather than in individual officers. The constitution now in force was adopted in 1857, the constitution of 1846 having been superseded chiefly on account of its prohibition of banking corporations. The present one admits of amendment by a vote of a majority of the members of both houses of the legislature, followed by a majority vote of the electors in the state voting on the amendment; and by this process it was amended in 1868, 1880, 1884 and 1904. The present constitution also provides that the question, " Shall there be a convention to revise the constitution and amend the same? " shall be submitted to the people once every ten years (beginning with 1870), but the affirmative vote taken in accordance with this provision has hitherto been small. The suffrage now belongs to all male citizens of the United States at least twenty-one years of age who shall have resided in the state for six months, and in some one county sixty days preced- ing an election, except idiots and persons insane or convicted of some infamous crime. The franchise was conferred on negroes by an amendment adopted in 1868. Prior to 1904 elections were annual, but by an amendment of that year they became biennial.

The central executive and administrative authority is vested in a governor, a lieutenant-governor, an executive council, several boards and a few other officers. The governor and the lieutenant-governor was elected for a term of two years, and the qualifications for both offices require that the incumbents shall be at least thirty years of age and shall have been for two years immediately before their election residents of the state. Under the Territorial government when first organized the governor was given an extensive appointing power, as well as the right of an absolute veto on all legislation, but this speedily resulted in such friction between him and the legislature that Congress was petitioned for his removal, with the outcome that the office has since been much restricted in its appointing power, and the veto has been subjected to the ordinary United States limit, i.e. it may be overridden by a two-thirds vote of both houses of the legislature. Members of boards of regents or trustees of state institutions are for the most part elected by the General Assembly; railway commissioners are elected by the state electors; while in the case of the few appointments left for the governor, the recommendation or approval of the executive council, a branch of the legislature, or of some board, is usually required. He, however, is himself a member of the executive council as well as of some important boards or com- missions, and it is in such capacity that he often has the greatest opportunity to exert power and influence. His salary is $5000 per annum (with $600 for house rent and $800 as a

member of the executive council). The executive council, composed of the governor, secretary of state, auditor of state and treasurer of state, all elected by the people for a term of two years, has extensive powers. It supervises and audits the accounts of state departments, directs the taking of the census, transfers cities from one class to another in accordance with census returns, constitutes the board for canvassing election returns, classifies railways, assesses railway and other companies, constitutes the state board of equalization for adjusting property valuations between the several counties for taxing purposes, supervises the incorporation of building and loan associations, appoints the board of examiners of mine inspectors and has many other powers. Among other state boards the more important are the board of railroad commissioners, the board of control of state institutions, the board of health, and the board of educational examiners.

The state legislature, or General Assembly, composed of a senate and a house of representatives, sits biennially at Des Moines. Senators are elected for a term of four years, one from each of fifty senatorial districts, the term of one-half expiring every two years. Senators must be at least twenty-five years of age and residents of the state for one year at the time of election. Representatives are elected for a term of two years, one from each of the ninety-nine counties, with an additional one from each

of the counties (not exceeding nine) having the largest popula- tion; the ratio of representation and the apportionment of the additional representatives from the larger counties is fixed by the General Assembly. The qualifications for representatives differ from those for electors only in that they must have been residents of the state for one year at the time of election, the disqualifica- tion of negroes for sitting in both senate and house having been removed by an amendment adopted in 1880. No bill can pass either house without the assent of a majority of all the members elected to that house; the governor is allowed three days (Sunday excepted) in which to veto a bill.

The state judiciary consists of a supreme court of six judges and a district court of fifty-three judges, from one to four in each of twenty districts. The supreme court has three sessions a year, while each district-court judge is directed to hold at least one session a year in each county of his district, and no two district- court judges may sit together on the same case. The supreme court has appellate jurisdiction in chancery cases only, but may correct errors at law in other cases. The district court has general, original and exclusive

jurisdiction in all matters civil, criminal and probate not expressly conferred on an inferior court, and may hear appeals from inferior courts, boards or officers.

For purposes of administration and local government the state is divided into ninety-nine counties, each of which is itself divided into townships that are usually 6 m. square. The township may be divided into school districts and highway districts, but in these matters option has resulted in irregularity. Each county has its own administrative boards and officers; and there are two justices of the peace and two constables for every township. The board of supervisors, consisting of not more than seven members, elected for a term of three years, has the care of county property and the management of county business, including highways and bridges ; it fixes the rate of county taxes within prescribed limits, and levies the taxes for state and county purposes. The officers of the township are three trustees, a clerk and an assessor. The trustees are elected for a term of three years, the clerk and assessor for two years. All taxable property of the state, that of corporations for the most part excepted, is assessed by the township assessor.

The municipal corporations are civil divisions quite independent of the county and township system. They are divided into cities of the first class, cities of the second class and towns, besides a few cities with special charters. Cities of the first class are those having a population of 15,000 or over; cities of the second class are those having a population of 2000 but less than 15,000; all other municipal corporations, except cities with special charters, are known as in- corporated towns. In all these cities and towns a mayor, council and various officers are elected, and also a police judge in cities of the first class where there is no superior court. By a law of 1907 cities with a population of 25,000 or more may adopt a commission form of government, with a mayor and four councilmen elected at large on a non-partisan ticket.

Under the laws of Iowa a wife enjoys property rights equal to those of her husband. The expenses of the family, including the education of the children, are chargeable alike upon the property of either or both. Otherwise, the wife may control her property as if single, and neither is liable for what are clearly the debts of the other. Incase of the death of either, one-third of the property of the deceased becomes that of the survivor. A homestead cannot be conveyed or encumbered without the consent of both husband and wife, if held by a married man; and a homestead, to the value of $500, is exempt from liability for debts postdating the purchase, unless for improvements

on the property. A petition for a divorce may be presented after a residence within the state of one year immediately preceding, and a decree may be granted against the defendant if judged guilty of adultery, desertion for two years without reasonable cause, habitual drunkenness, such inhuman treatment as to endanger the life of the plaintiff, or if convicted of felony after marriage. In 1882 an amendment to the constitution was passed prohibiting the manufacture and the sale of intoxicating liquors within the state. In April 1883 the Supreme Court pro- nounced this amendment invalid on the ground of irregularity In recording it, whereupon the legislature provided for a like pro- hibition in an ordinary statute. But attempts to execute this were so unsuccessful that it has been succeeded by a law imposing what is known as the " mulct tax," which requires the payment of $600 in quarterly instalments for a licence to sell such liquors and places a lien for the whole amount on the real property in use for the business. One-half the proceeds goes to the county and one-half to the munici- pality or township in which the liquor is sold. The exceptional dependence of Iowa on eastern markets has given more than ordinary prominence to railway legislation, and the conflict of interests between the railways and the shippers has agitated the state for forty years, various attempts being made to regulate freight rates by legal enactment. In 1888 an elective commission was established with

Dower to fix maximum rates, which has met with general commendation throughout the country.

The charitable, penal and reformatory institutions of the state are all under a " Board of Control of State Institutions," composed of three electors appointed by the governor and approved by two- thirds of the senators, careful provision being made also to prevent the board from becoming subject to either political party. The institutions under its charge include a Soldiers' Orphans' Home at Davenport ; a Soldiers' Home at Marshalltown ; a College for the Blind at Vinton ; a School for the Deaf at Council Bluffs; an Institution for Feeble-minded Children at Glenwood; an Industrial School for Boys at Eldora; an Industrial School for Girls at Mitchellville; and, at Oakdale, a Sanatorium for the Treatment of Tuberculosis. The Board of Control of State Institutions has supervisory and inquisitorial powers over all county and private institutions in the state in which insane are kept, and over homes for friendless children maintained by societies or institutions. In 1907 the General Assembly passed a law under which the indeterminate sentence was established in the state, and the governor appoints a Board of Parole of three members, of whom one must be an attorney and not more than two are to belong to the same political party.

Education. — The percentage of illiterates (i.e. both those unable to read and write and those unable to write) ten years of age and over, according to the census returns of 1900, was only 2-3 ; of all the other states of the Union, Nebraska alone made such a good return. But teachers were poorly paid, and fourteen schools have been closed at a time within a single county from want of teachers. However, there are laws requiring that each school be taught at least six months in a year, and that children between the ages of seven and fourteen attend for at least twelve consecutive weeks, and for a total of sixteen weeks in every year. In 1905-1906 male teachers received on an average $63-97 P er month, women teachers, $43-41. Although the electors of each school district have ample powers reserved to them, in actual practice matters are attended to chiefly by an elected board of directors. The county administration is in the hands of a board of education and a superintendent. The school tax was de- rived in 1905-1906 from interest on the state's permanent school fund — amounting to 2-3% of the total tax, and distributed in proportion to the population of school age; from a 1 to 3 mill county tax, amounting to 5-2% of the whole; and from local or district taxation, 92-5% of the entire tax. A law of the state provides for the establishment of a county high school whenever a majority of the

electors of a county desire it, but in 1902 only one county (Guthrie county) had such a school. The number of public high schools in towns and cities, however, increased from 256 in 1893 to 345 in 1903. The state established a university at Iowa City in 1847, a State Agricultural College and Model Farm in 1858 (opened at Ames in 1869 as the Iowa State College of Agriculture and the Mechanic Arts), an Agricultural Experiment Station in 1887, an Engineering Experiment Station in 1904, and a normal school at Cedar Falls in

1876.

At the head of the whole system is the state superintendent of public instruction, assisted by a board of educational examiners. In 1901 the total receipts for school purposes were $6,001,187; and the total disbursements $5,813,541; in 1906 the receipts were $7,126,162-12 and the disbursements $6,950,580-27. The pupils enumerated in 1906 were 707,843. Educational institutions not supported by the state include: Iowa Wesleyan University (Methodist, opened in 1842) at Mt. Pleasant; Iowa College (Congre- gational, 1848) at Grinnell; Central University of Iowa (Baptist, 1853) a t Pella; Cornell College (Methodist, 1857) at Mt. Vernon; Western College (United Brethren, 1856) at Toledo; Upper Iowa University (Methodist Episcopal, 1857) at Fayette; Leander Clark College (United Brethren, 1857) at Toledo; Lenox College (Presby- terian, 1859) at Hopkinton; Luther College (Norwegian Evangelical Lutheran, 1861) at Decorah; Des Moines College (Baptist, 1865) at Des Moines; Tabor College (Congregational, 1866) at Tabor; Simpson College (Methodist, 1867) at Indianola; Wartburg Kollege (Lutheran, 1868) at Clinton; Amity College (Non -sectarian, 1872) at College Springs; German College (Methodist Episcopal, 1873) at Mt. Pleasant; Penn College (Friends, 1873). at Oskaloosa; St Joseph's College (Roman Catholic, 1873) at Dubuque; Parsons College (Presbyterian, 1875) at Fairfield; Coe College (Presbyterian, 1 881) at Cedar Rapids; Drake University (Disciples of Christ, 1881) at Des Moines; Palmer College (Disciples of Christ, 1889) at Legrand; Buena Vista College (Presbyterian, 1891) at Storm Lake; Charles City College (Methodist Episcopal, 1891) at Charles City; Morningside College (Methodist Episcopal, 1894) at Sioux City; Graceland College (Reorganized Church of Latter Day Saints, 1895) at Lamoni.

Finance. — The taxing system of Iowa embraces a general property tax, corporation taxes (imposed on the franchises or on either the capital stock or the stock in the hands of shareholders), taxes on certain businesses and a collateral inheritance tax. Several im-

portant attempts have been made to effect a segregation as between state and local taxes, but for the most part without success. For the year ending June 30th, 1908, the receipts of the state from all sources were $3,663,154-67, and the total expenditure was $3,891,842-81. The full value of all property, according to assessment of 1904, is $2,567,330,328. The state has no bonded debt, and

the constitution forbids it to incur debts exceeding in the aggregate a quarter of a million dollars, except for warlike purposes or for some single work to which the people give their consent by vote; the constitution also forbids any county or municipal corporation from incurring an indebtedness exceeding 5 % of the value of its taxable property. When first admitted into the Union, Iowa had a strongly pronounced antipathy to banks. This was largely overcome by the year 1857, and yet the constitution of that date prohibits any legislation of primary importance relating to banks without referring the matter to a direct vote of the people. The number of banks and the amount of banking business has, nevertheless, rapidly increased.

History. — Iowa, as a part of the whole Mississippi Valley, was taken into the formal possession of France in 1682; in 1762 as a part of the western half of that valley it was ceded to Spain; in 1800 it was retroceded to France; in 1803 was ceded to the United States; from 1804 to 1805, as a part of the District of Louisiana, it was under the government of Indiana Territory; from 1805 to 181 2 it was a part of Louisiana Territory; from 1812 to 1821 a part of Missouri Territory; from 1821 to 1834 a part of the unorganized territory of the United States; from 1834 to 1836 a part of Michigan Territory; from 1836 to 1838 a part of Wisconsin Territory. In 1838 Wisconsin Territory was divided, the western portion being named Iowa, and out of this the state with its present bounds was carved in 1846.

The name Iowa (meaning " sleepy ones ") was taken from a tribe of Siouan Indians (probably of Winnebago stock), which for some time had dwelt in that part of the country and were still there when the first white men came — the Frenchmen, Marquette and Joliet, in 1673 and Hennepin in 1680. Early in the next century the Sauk and Foxes, vanquished by the French in Michigan,, retreated westward, and in their turn largely supplanted the Iowas. Thither also came Julien Dubuque, a French Canadian, to trade with the new occupants. He dis- covered lead mines on and near the site of the city which now bears his name, in 1788 obtained an Indian grant or lease of about 21 sq. m., established there a settlement of miners and continued his mining operations, together with a trade in furs, until

his death in 1810. The Indians refused permission to others to work the mines, and when intruders attempted to do so without it United States troops protected the red man's rights, especially from 1830 to 1832. But Black Hawk's war policy soon resulted in letting the white man in; for the war which he instigated was concluded in 1832 by a cession to the United States of nearly 9000 sq. m., embracing much of what is now the district of the Iowa lead and zinc mines. Without further waiting, though still in the face of the Act of Congress of 1807 prohibiting such settlements, the frontiersmen rushed in to mine and to farm, and government was established through voluntary associations. Such proceedings of these associations as related to claims to land were later recognized by the United States authorities, while such as related to the establishment of schools were tolerated for a time by the state government. Iowa, having separated from Wisconsin in 1838 on account of lack of courts for judicial relief, the question of applying for admission into the Union as a state was voted on as early as 1840, the Territory in that year having a population of 43,112; but the measure was defeated then, as it was again in 1842, by those who most wished to avoid an increase of taxes. In 1844, however, the vote was otherwise, a convention was called, a constitution framed and application for admission made. The question of boundaries, to which the question of slavery gave rise, then became the cause of delay, but the Territory became a state in 1846.

During the period in which the question of admission was under consideration, the Whigs opposed the measure, while the Demo- crats carried it through and remained in power until 1854; but ever since 1857 the state has been preponderantly Republican in all national campaigns; and with but two exceptions, in 1889 and 1891, when liquor and railroad legislation were the leading issues, has elected a Republican state administration. Neverthe- less there has always been a strong sentiment in the state urging that corporations be held more in check, and its industries are not such as to receive a large benefit directly from tariff legislation. As a consequence there has been a tendency towards the forma- tion of two opposing elements within the dominant party; the

more radical seeking the promotion of what since 1902 has been known as the " Iowa Idea," which in substance is to further the expansion of the trade of the United States with the rest of the world

through the more extended application of tariff reciprocity, and at the same time to revise the tariff so as to prevent it from " affording a shelter to monopoly."

Robert Lucas . John Chambers James Clark

Ansel Briggs . Stephen Hempstead . James Wilson Grimes.

Governors of Iowa

Territorial. Democrat . Whig Democrat

State. Democrat

Whig and Free-Soil

Democrat Republican

Ralph P. Lowe . Samuel Jordan Kirkwoed

William Milo Stone . ,,

Samuel Merrill . ,,

Cyrus Clay Carpenter ,,

Samuel Jordan Kirkwood ,,

Joshua Giddings Ncwbold 1 ,,

John Henry Gear . ,,

Buren Robinson Sherman ,,

William Larrabee . ,, Horace Boies . . . Democrat Frank Darr Jackson . Republican

Francis Marion Drake „

Leslie Mortier Shaw . ,,

Albert Baird Cummins „

B. F. Carroll ... ,,

1838-1841 1841-1845 1845-1846

1 846-1 850

I 850-1 854

1854-1858

I 858-1 860

1 860-1 864

1 864- I 868

1868-1872 1872-1876 1876-1877 1877-1878 1878-1882 1882-1886 1886-1890

I 890-1 894

1 894- 1 896 1 896-1 898 1 898- 1 902

I 902-1 909

1909-

Bibliography. — Publications of the Iowa Geological Survey (Des Moines, 1868); Iowa Weather and Crop Service (Des Moines, 1889); U.S. Census; F. H. Dixon, State Railroad Control, with a History of its Development in Iowa (New York, 1896), a detailed history of the control of Iowa railways through the commission system; B. F. Shambaugh, History of the Constitution of Iowa (Des Moines, 1902) ; Jesse Macy, Institutional Beginnings in a Western State in Johns Hopkins University St„d'e; in Historical and Political Science (Baltimore, 1894); H. M. Bowman, The Administration of Iowa, a Study in Centralization (New York, 1903), an able presentation of the present administrative system in the light of its historical development; William Salter, Iowa, the first Free State in the Louisiana Purchase (Chicago, 1905); B. F. Shambaugh, Documentary Material relating to the History of Iowa (Iowa City, 1897), and The Messages and Pro- clamations of the Governors of Iowa (Iowa City, 1903-1904); Annals of Iowa., 3 series: Series 1, The Annals of the State Historical Society of Iowa (Iowa City and Davenport, 1863-1874); Series 2, vol. i , The Annals of Iowa; vol. ii., Howe's Annals of Iowa (Iowa City, 1882-1884) ; Series 3, The Annals of Iowa, published by the Historical Department of Iowa (Des Moines, 1893-); Iowa Historical Record (Iowa City, 1885-1902) ; Iowa Journal of History and Politics (Iowa City, 1903 seq.); and G. T. Flom, Chapters on Scandinavian Immigration to Iowa (Iowa City, 1907).

IOWA CITY, a city and the county-seat of Johnson county, Iowa, U.S.A., on Iowa river, about 120 m. E. of Des Moines. Pop. (1890) 7016; (1900) 7987, of whom 1355 were foreign born; (1905) 8497; (1910) 10,091. It is served by two branches of the Chicago, Rock Island & Pacific railroad, and by the Iowa City & Cedar Rapids Interurban railway (electric), of which it is a terminus. The ground on which the city is built forms an amphitheatre surrounded for the most part by hills and bluffs. Iowa City is the seat of the state university of Iowa, of Iowa City Academy, of the library of the State Historical Society and of the state Sanatorium for the Treatment of Tuberculosis. The university, organized in 1847, and occupying the old State Capitol grounds, is an integral part of the public school system of the state, and is under the control of a board of regents, consisting of the governor, the superintendent of public instruc- tion and eleven members, elected — one from each congressional district — by the General Assembly. The university's preparatory department was opened in 1855 and continued until 1879; the first collegiate session was in 1856-1857, but during 1858-1860 the collegiate department was closed. The institution embraces a college of liberal arts (i860), with a school of political and

1 As lieutenant-governor, Newbold serves for the unexpired portion of the term to which Kirkwood was elected; Kirkwood resigned on the 1st of February 1877, having been chosen United States senator.

social science (1900) — which offers courses in commerce, adminis- tration, modern history and practical philanthropy — and a school of education, first opened in 1907, to train secondary and college teachers and school principals and superintendents; a college of law (1868); a college of medicine (1870), including a training school for nurses (1897); a college of homoeopathic medicine (1877), including a nurses' training school (1894); a college of dentistry (1882); a college of pharmacy (1885); a graduate college; a college of applied science (1903), with courses in civil, electrical, mechanical, mining, municipal and sanitary engineer- ing and courses in chemistry; a summer school for teachers and librarians and a university extension department. Affiliated with the university is a school of music. The university's income is derived from the proceeds of invested funds and lands originally given by the United States, from permanent appro- priations by the state and from the proceeds of a one-fifth mill tax to be used for buildings alone. In 1907-1908 the institution had 28 buildings (including the old State Capitol, built in 1840), a teaching and administrative force of nearly 200 members and 2315 students, of whom 1082 were in the college of liberal arts; the university library had about 65,000 volumes

(25,000 were destroyed by fire in 1897), and the university law library, 14,000 volumes; and the total income of the university was about $611,000. In 1908 the library of the State Historical Society of Iowa, housed in the Hall of the Liberal Arts of the university, numbered about 40,000 volumes. Iowa City has a considerable variety of small manufacturing establishments. In 1839 Iowa City was selected as the site for the seat of govern- ment of the newly created Territory of Iowa. The legislature met for the first time in 1841" and continued to hold its sessions here until 1857, when Des Moines, on account of its more central position, was made the capital.

IPECACUANHA. 2 The root used in medicine under this name is obtained from Psychotria (or Uragoga) Ipecacuanha, a small shrubby plant of the natural order Rubiaceae. It is a native of Brazil, growing in clumps or patches in moist shady forests from 8° to 2 2 S., and is also found in New Granada and probably in Bolivia. The drug of commerce is procured chiefly from the region lying between the towns of Cuyaba, Villa Bella, Villa Maria and Diamantina in the province of Matto Grosso, and near the German colony of Philadelphia, north of Rio Janeiro. Ipecacuanha, although in common use in Brazil, was not em- ployed in Europe previous to 1672. In France within a few years after that date it formed the chief ingredient in a remedy for dysentery, the secret of the composition of which was purchased by the French Government for 1000 louis d'or, and made public in 1688. The botanical source of ipecacuanha was not accurately known until 1800. The root appears to be possessed of very great vitality, for in 1869 M'Nab, of the Botanical Gardens of Edinburgh, discovered that so small a portion as^of an inch of the annulated root, placed in suitable soil, would throw out a leaf -bud and develop into a fresh plant, while Lindsay, a gardener in the same establishment, proved that even the leaf-stalk is capable of producing roots and buds; hence there is but little probability of the plant being destroyed in its native habitat. The great value of the drug in dysentery, and its rapid increase in price from an average of 2s. o,Jd. per lb in 1850 to about 8s. gd. per lb in 1870, led to attempts to acclimatize the plant in India, which, however, have not hitherto proved to be a commercial success, owing to the difficulty of finding suitable spots for its cultivation, and to its slowness of growth. Like other dimorphic plants, ipecacuanha ripens seeds best when cross-fertilized, aiM presents various forms. Two of these were described by the late Professor F. M. Balfour of Edinburgh, one distinguished by having a woody stem, firm elliptic or oval leaves, with wavy margins and few hairs, and the other by an herbaceous stem, and

leaves less coriaceous in texture, more hairy and not wavy at the margins. This diversity of form is most apparent in young plants, and tends to disappear with age. •

- *The name is the Portuguese form of the native word i-pe-kaa-guene, which is said to mean " road-side sick-making plant " (Skeat, Etym. Diet. 1898).*

Ipecacuanha root occurs in pieces about 2 or 3 lines in thickness, of a greyish-brown or reddish-brown tint externally, having a ringed or annulated surface (see r in fig.), and exhibiting a white or greyish interior and a hard wiry centre. It has a faint rather musty odour, and a bitterish taste. It is usually mixed with more or less of the slender subterranean stem, which has a very thin bark, and is thus easily distinguished from the root. The activity of the drug resides chiefly in the cortical portion, and hence the presence of the steVn diminishes its value. The variety imported from Colombia and known as Cartagena ipecacuanha differs only in its larger size and in being less conspicuously annulated. Ipecacuanha owes its properties to the presence of rather more than 1 % of the alkaloid emetine, which, with the exception of traces, occurs only in the cortical

Ipecacuanha Plant (about \ nat. size). 1, 2, Flowers cut open, showing short-styled (1) and long-styled (2) forms; 3, Flower after removal of corolla, showing the inferior ovary (0), the small toothed calyx ©, and the style {s) with its forked stigma; 4, Ovary cut lengthwise showing the two chambers with the basally attached ovules; r, annulated root.

portion of the root. It is a white amorphous substance, with the formula C20H30NO5. It has a bitter taste, no odour, and turns yellow when exposed to air and light. There are also present a volatile oil, starch, gum, and a glucoside, which is a modifica- tion of tannin and is known as ipecacuanhic acid. The dose of the powdered root is \ to 2 grains when an expectorant action is desired, and from 15 to 30 grains when it is given as an emetic, which is one of its most valuable functions. The Pharmacopoeias contain a very large number of preparations of ˆnis substance, most of which are standardized. A preparation from which the emetine has been removed; and known as " de-emetized ipecacuanha " is also in use for cases of dysentery. When applied to the skin, ipecacuanha

powder acts as a powerful irritant, even to the extent of causing pustulation. When inhaled it causes violent sneezing and a mild inflammation

of the nasal mucous membrane, resembling a common cold in the head. It has feeble antiseptic properties. Small doses of ipecacuanha act as a stimulant to the secretions of the mouth, stomach, intestine and liver. The drug, therefore, increases appetite and aids digestion. Toxic doses cause gastro-enteritis, cardiac failure, dilatation of the blood-vessels, severe bronchitis and pulmonary inflammation closely resembling that seen in ordinary lobar pneumonia. In this respect and in its action on the skin, the drug resembles tartar emetic. Ipecacuanha is very frequently used as an expectorant in cases in which the bronchial secretion is deficient. Its diaphoretic properties are employed in the pulvis ipecacuanhae compositus or Dover's powder, which contains one part of ipecacuanha powder and one part of opium in ten.

Other plants to which the name of ipecacuanha has been popularly applied are American ipecacuanha (Gillenia stipulacea) , wild ipecacuanha {Euphorbia Ipecacuanha), bastard ipecacuanha {Asclepias curassavica), Guiana ipecacuanha (Boerhavia decumbens), Venezuela ipecacuanha (Sarcostemma glaucum), and ipecacuanha des Allemands {Vincetoxicum officinale). All these possess emetic properties to a greater or less degree.

The term poaya is applied in Brazil to emetic roots of several genera belonging to the natural orders Rubiaceae, Violaceae and Polygalaceae, and hence several different roots have from time to time been sent over to England as ipecacuanha; but none of them possesses the ringed or annulated appearance of the true drug. Of these the roots of Ionidium Ipecacuanha, Richardsonia scabra and Psychotria emetica are those which have most frequently been exported from Brazil or Colombia.

IPEK (Slav. Petch, Lat. Pescium), a town of Albania, European Turkey, in the vilayet of Kossovo and sanjak of Novibazar, 73 m. E.N.E. of Scutari, near the eastern base of the Mokra Planina, the Montenegrin frontier, and the head- waters of the Ibar and White Drin. Pop. (1905), about 15,000, principally Albanians and Serbs. A small stream bearing, like several others in the Balkan peninsula, the name of Bistritza (the bright or clear), flows through the town. On one of the neighbouring heights is situated the monastery of Ipek,

founded by Archbishop Arsenius in the 13th century, and famous as the seat until 1690 of the patriarchs of the Servian church. The buildings are surrounded by thick walls, and comprise a large central church (Our Lady's), and two side chapels (the Martyrs' and St Demetrius'), each surmounted by a leaden cupola. The church dates from the 16th and 17th centuries. Among its numerous objects of interest are the white marble tombs of Arsenius and other chiefs of the Servian church, and the white marble throne on which the patriarchs were crowned. Ipek has been incorrectly identified by some writers with Doclea or Dioclea (Dukle in Montenegro), the birthplace of Diocletian, and the capital of a small principality which was overthrown by the Bulgarians in the nth century.

See Barth, Reise durch das Innere der europaischen Turkei (Berlin, 1864); A. P. Irby and G. M. M. Mackenzie, Travels in the Slavonic Provinces of Turkey (1877) ; M. E. Durham, Through the Lands of the Serb (London, 1904).

IPHICRATES, Athenian general, son of a shoemaker, flourished in the earlier half of the 4th century B.C. He owes his fame as much to the improvements which he made in the accoutrements of the peltasts or light-armed mercenaries (so called from their small round shield, irkkTri) as to his military successes. Increas- ing the length of their javelins and swords, substituting linen corselets for their heavy coats-of-mail, and introducing the use of a kind of light leggings, called after him " iphicratides," he increased greatly the rapidity of their movements (Diod. Sic. xv. 44). He also paid special attention to discipline, drill and manoeuvres. With his peltasts Iphicrates seriously injured the allies of the Lacedaemonians in the Corinthian War, and in 392 (or 390) dealt the Spartans a heavy blow by almost annihilating a mora (battalion of about 600 men) of their famous hoplites (Diod. Sic. xiv. 91; Plutarch, Agesilaus, 22). Following up his success, he took city after city for the Athenians; but in consequence of a quarrel with the Argives he was transferred from Corinth to the Hellespont, where he was equally successful. After the peace of Antalcidas (387) he assisted Seuthes, king of the Thracian Odrysae, to recover his kingdom, and fought

against Cotys, with whom, however, he subsequently concluded an alliance. About 378 he was sent with a force of mercenaries to assist the Persians to -reconquer Egypt; but a dispute with Pharnabazus led

to the failure of the expedition (Diod. Sic. xv. 29-43). On his return to Athens he commanded an expedition in 373 for the relief of Corcyra, which was besieged by the Lacedaemonians (Xenophon, Hellenica, vi. 2). On the peace of 371, Iphicrates returned to Thrace, and somewhat tarnished his fame by siding with his father-in-law Cotys in a war against Athens for the possession of the entire Chersonese. The Athenians, however, soon pardoned him and gave him a joint command in the Social War. He and two of his colleagues were impeached by Chares, the fourth commander, because they had refused to give battle during a violent storm. Iphicrates was acquitted but sentenced to pay a heavy fine. He afterwards remained at Athens (according to some he retired to Thrace) till his death (about 353).

There is a short sketch of his life by Cornelius Nepos; see also C. Rehdantz, Vitae Iphicralis, Chabriae el Timothei (1854); Bauer, Griech. Kriegsaltert. in Muller's Handbuch, 4, § 49; and histories of Greece, e.g. Holm, Eng. trans., vol. iii.

IPHIGENEIA, or Iphianassa, in Greek legend, daughter of Agamemnon and Clytaem(n)estra. Agamemnon had offended Artemis, who prevented the Greek fleet from sailing for Troy, and, according to the soothsayer Calchas, could be appeased only by the sacrifice of Agamemnon's daughter. According to some accounts the sacrifice was completed, according to others Artemis carried away the maiden to be her priestess in the Tauric Chersonese {Crimea] and substituted for her a hind. In this new country it was her duty to sacrifice to the goddess all strangers; and as her brother Orestes came to search for her and to carry off to Attica the image of the goddess, she was about to sacrifice him, when a happy recognition took place. These legends show how closely the heroine is associated with the cult of Artemis, and with the human sacrifices which accompanied it in older times before the Hellenic spirit had modified the barbarism of this borrowed religion. Orestes and Iphigeneia fled, taking with them the image; at Delphi they met Electra, the sister of Orestes, who having heard that her brother had been sacrificed by the Tauric priestess, was about to tear out the eyes of Iphigeneia. The brother and sister returned to Mycenae; Iphigeneia deposited the image in the deme of Brauron in Attica, where she remained as priestess of Artemis Brauronia. Attica being one of the chief seats of the worship of Artemis, this explains why Iphigeneia is sometimes called a daughter of Theseus and Helen, and thereby connected with the national hero. The grave of Iphigeneia was shown at Brauron and Megara. According to other versions of the legend, when saved from sacrifice Iphigeneia was transported to the island of Leuke, where she was wedded to Achilles under the name of Orsilochia

(Antoninus Liberalis 27); or she was transformed by Artemis into the goddess Hecate (Pausanias i. 43. 1). According to the Spartans, the image of Artemis was transported by Orestes and Iphigeneia to Laconia, where the goddess was worshipped as Artemis Orthia, the human sacrifices originally offered to her being abolished by Lycurgus and replaced by the flogging of youths {diamastigosis, Pausan. iii. 16). At Hermione, Artemis was worshipped under the name of Iphigeneia, thus showing the heroine in the last resort to.be a form of that goddess (Pausanias ii. 35. 1). Originally, Iphigeneia, the " mighty born," is prob- ably merely an epithet of Artemis, in which the notion of a priestess of the goddess had its origin. Iphigeneia is a favourite subject in Greek literature. She is the heroine of two plays of Euripides, and of many other tragedies which have been lost (see also Pindar, Pythia xi. 23; Ovid, Metam. xii. 27). In ancient vase paintings she is frequently met with; and the picture by Timanthes representing Agamemnon hiding his face at her sacrifice was one of the famous works of antiquity (Pliny, Nat. Hist. xxxv. 10).

See M. Jacobson, De fabuhs ad Iphigeniam pertinenlibus (1888); R. Forster, Iphigenie (1898); H. W. Stoll in Roscher's Lexikon der Mythologie ; and P. Decharme in Daremberg and Saglio's Dictionnaire des antiquites.

IPSWICH, a town of Stanley county, Queensland, Australia, on the river Bremer, 23I m. by rail W. by S. of Brisbane. Pop. (1901), 8637. It is the centre of a rich and populous agricultural mining and manufacturing district. Coal is worked on the banks of the river with but little labour, as it crops out on the surface. There are a woollen factory, several saw-mills, and foundries and large railway workshops at North Ipswich. The first settlement was made here in 1829; the town was incorporated in i860.

IPSWICH, a municipal, county and parliamentary borough and county town of Suffolk, England, 69 m. N.E. by E. from London by the Great Eastern railway. Pop. (1901), 66,630 It stands on a gentle ascent above the left bank of the river Gipping, which here widens into the tidal estuary of the Orwell. This land-locked inlet extends n m. S.E. to Harwich and Felix- stowe at opposite sides of its mouth, near which the wider Stour estuary unites with it. Its banks are gently undulating, well wooded and picturesque. In the lower and older portion of Ipswich, with its irregular streets, are some few antiquarian remains. Sparrowe's house (1567), named from a family which occupied it for some two centuries, is well preserved and has ornate gabled fronts to two streets. Archdeacon's Place (1471) is

another still earlier example. Wolsey's Gateway (1528), a Tudor brick building, is the only remnant of the Cardinal's foundation to supply scholars to his great college (Cardinal's College, now Christ Church) at Oxford. The older churches are all towered flint-work structures, wholly or mainly Perpendicular in style, with the exception of St Peter's, which is principally Decorated, with a Norman font of marble. They include St Margaret's with a beautiful oak Tudor roof, elaborately painted temp. William and Mary; St Mary-at-Key (or Quay), with a similar roof; St Lawrence; and St Clement's. The most noteworthy modern churches are St Michael's (1880), All Saints' (1892), St John the Baptist's (1899) and St Bartholomew's (1901). The Roman Catholic church of St Pancras (1863), a late First Pointed edifice, has a richly carved reredos and a lofty fieche. Among public buildings, the town hall (1868) is an imposing structure in Venetian style, with clock tower; forming part of a fine group including the corn exchange (1881) and post office (1880). The museum, including an art gallery, contains archaeo-logical and ornithological collections, and a noteworthy series or Red Crag fossils. It was founded in 1847, and moved to new buildings in 1881. The East Suffolk hospital was founded in 1836. In the theatre David Garrick made his first important and regular appearance in 1741. The grammar school, dating at latest from 1477, was refounded by Queen Elizabeth in 1565, and is housed in buildings in Tudor style (1851). There are borough science, art and technical schools, with a picture gallery in the fine Tudor mansion (1549) in Christchurch Park. There are also a middle school for boys, a high school and an endowed school for girls, a scientific society, corporation library and small medical library. Of two beautiful arboretums the upper is public; part of Christchurch Park adjacent to this is owned by the corporation; there are also recreation grounds and a race-course. Industries include large engineering and agricultural implement works, railway plant works, the making of artificial manures, boots and shoes, clothing, bricks and tobacco and malting. The port has a dock of nearly 30 acres, accommodating vessels drawing 19 ft. and a large extent of quayage. Imports are principally grain, timber and coal; exports agricultural machinery, railway plant, artificial manures, oil cake, &c. Ipswich is a suffragan bishopric in the diocese of Norwich. The parliamentary borough returns two members. The cor- poration consists of a mayor, 10 aldermen and 30 councillors. Area, 81 12 acres.

A Roman villa has been discovered kere. But the Saxon settlement at the head of the Orwell was doubtless the first of any importance. In 991 the town {Gipeswic, Gipeswich) was sacked by vikings. It owes

its subsequent prosperity to its situation on a harbour admirably suited for trade with the Continent. The townsmen had acquired the privileges of burgesses by 1086 when Roger Bigot kept the borough in the

king's hands. In 1200 King John granted the burgesses their first charter, confirming their town to them to be held at fee-farm, exempting them from tolls and similar customs, and granting them a gild-merchant. These liberties were extended in 1256; Edward I. and Edward III. both resumed the borough for short periods, but the charter of 1200 was confirmed by almost every subsequent sovereign. The burgesses were definitely incor- porated in 1464 and re-incorporated in 1665 under a charter which remained in force previous to its modification by the Municipal Act of 1835, except during a short period in the reign of Charles II. From 1295 onwards the town has sent two representatives to parliament. The cattle market, held on Tuesdays, and the provision market on Saturdays are the prescriptive right of the corporation. A September fair, still held in 1 792, was in the hands of the corporation in the 17th century. Large ironworks were established late in he 18th century. The wool and cloth trade which flourished here in the 14th and 15th centuries was super- seded by the manufacture of sailcloth, now represented by the sacking industry.

See Victoria County History: Suffolk; J. Wodderspoon, Memorials of the Ancient Town of Ipswich (ed. 1850).

IPSWICH, a township of Essex county, Massachu etts, U.S.A., on both sides of the Ipswich river, about 27 m. N.N.E. of Boston. Pop. 1910 (Federal census), 5777- It is served by the Boston & Maine railroad. The surface is diversified by drumlins, vales, meadows, sand-dunes and tidal marshes. Ipswich has several manufacturing industries, including hosiery. The public library was the gift of Augustine Heard. Among the residences are several built in the 17th and 18th centuries. The oldest of these, the John Whipple House, is the home of the Ipswich Historical Society (1890), which has gathered here a collection of antiques and issues publications ol antiquarian interest. In the Ipswich Female Seminary, which no longer exists, Mary Lyon taught from 1828 to 1834 and here planned Mount Holyoke Seminary; Professor J. P. Cowles and his wife conducted a famous school for girls in the building for many

years. Facing the South Common were the homes of Rev. Nathaniel Ward (1 578-1652), principal author of the Massachusetts " Body of Liberties " (1641), the first code of laws in New England, and author of The Simple Cooler of Aggawam in America, Willing to help mend his Native Country, lamentably tattered, both in the upper-Leather and the Sole (1647), published under the pseudonym, " Theodore de la Guard," one of the most curious and interesting books of the colonial period; of Richard Saltonstall (1610-1694), who wrote against the life tenure of magistrates, and although himself an Assistant espoused the more liberal principles of the Deputies; and of Ezekiel Cheever (1614-1708), a famous school- master, who had charge of the grammar school in 1650-1660. In the vicinity was the house of the Rev. William Hubbard (1621- 1704), author of a Narrative of the Troubles with the Indians in New England (Boston, 1677) and a general History of New England, published by the Massachusetts Historical Society in

1815.

The town was founded under the name of Aggawam in 1633 by John Winthrop, jun., and twelve others, with a view to preventing the French from occupying the N. part of Massa- chusetts, and in the next year it was incorporated under its present name. In wealth and influence during the early colonial period it was little inferior to Boston, whose policies it not infrequently opposed. When Governor Andros and his Council in 1687 issued an order for levying a tax, a special town meeting of Ipswich promptly voted " that the s'd act doth infringe their Liberty as Free borne English subjects of His Majestie by interfearing with ye statutory Laws of the Land, By which it is enacted that no taxes shall be levied on ye Subjects without consent of an assembly chosen by ye Freeholders for assessing the same," and refused to assess the tax. For this offence six leaders, headed by the Rev. John Wise, minister of the Chebacco Parish (now Essex), were prosecuted, found guilty, imprisoned for three weeks to await sentence and then disqualified for office;

they were also fined from £15 to £50 each, and were required to give security for their good behaviour. In Ipswich were originally

included the present townships of Hamilton (1793) and Essex

(1819).

See T. F. Waters, Ipswich in the Massachusetts Bay Colony 1633-1700 (Ipswich, 1905), and the publications of the Ipswich Historical

Society.

IQUIQUE, a city and port of Chile, capital of the province of Tarapaca, 820 m. N.of Valparaiso, in 20 12′ is"S., 70° 11′ 15″ W. Pop. (1895), 33,031; (1900, est.), 42,440. The coast here runs due N. and S. and the city is built on a narrow level plain between the sea and bluffs, the latter rising steeply 2000 ft. to the level of the great desert plain of Tarapaca, celebrated for its rich deposits of nitrate of soda. Facing the city is the low barren island of Serrano, or Iquique, which is connected with the mainland by a stone causeway 1500 ft. long, and shelters the anchorage from southerly storms. A mole extending from the N.E. end of the island affords some further protection. The city is laid out in the rectangular plan, with broad streets and large squares. Water is brought by pipes from Pica, 50 m. distant. Iquique is a city of much commercial importance and is provided with banks, substantial business houses, newspapers, clubs, schools, railways, tramways, electric lights, telephone lines, and steamship and cable communication with the outside world. It exports iodine and immense quantities of nitrate of soda obtained from the desert region of the province. A large number of vessels are engaged in the nitrate trade, and Iquique ranks as one of the two leading ports of Chile in the aggregate value of its foreign commerce. It is connected by rail with the inland town of Tarapaca and various mining centres, and through them with the ports of Pisagua on the N., and Patillos on the S. Iquique was an insignificant Peruvian fishing settlement until 1830 when the export of nitrate began. In 1868 the town was nearly destroyed by an earthquake, in 1875 by fire, and again in 1877 by earthquakes, a fire and a tidal wave. It was occupied by the Chileans in 1879 in the war between Chile and Peru, and was ceded to Chile by the treaty of the 20th of October 1883.

IQUITOS, a tribe of South American Indians. It is divided into many branches, some on the river Tigre, others on the Nanay. Missionary efforts have failed and they remain savages, worship- ping figures carved in the shape of birds and beasts. They brew the Indian fermented liquor chicha better than any of the neighbouring tribes, flavouring it with the shoots of some plant which has the effect of an opiate.

IQUITOS, a city and river port of Peru, and capital of the great inland department of Loreto, on the left bank of the upper Amazon near the mouth of the Rio Nanay, 87 m. below the mouth of the Ucayali and 930 m. from Puerto Bermudez. The geographical position of Iquitos is 3 44′ S., 73 W. Pop. of the city (1906, est.),

6000; of the district (1906, est.), 12,000. Iquitos stands about 348 ft. above sea-level, on the low wooded banks of the river opposite some islands of the same name, and has a warm but healthful climate (mean annual temperature, about 75° F.). The city consists of two pueblos, the larger of which is occupied by Indians and half-breeds, the descendants of the Iquitos tribe from whom the city takes its name. The opening of the Amazon to navigation, and the subsequent arrival of foreign ocean-going vessels at Iquitos, added immensely to the importance of the city, and made it the commercial entrepot of eastern Peru. In 1908 three lines of ocean-going steamers were making regular voyages up the Amazon to Iquitos (about 2500 m.). The city has a large import and export trade for an immense region watered by the Maranon, Huallaga, Ucayali and other large Amazonian rivers navigated from Iquitos by lines of small boats. Iquitos was put in wireless telegraphic communication with Puerto Bermudez on the 8th of July 1908, whence a land line runs across the Andes to Lima. Besides machine shops and shipbuilding facilities, the important in- dustries are the weaving of hats and hammocks, and the pre- paration of salt fish; and there is a considerable export of rubber and straw hats. Tobacco is produced in the vicinity and sent to other parts of the Montana region. Iquitos dates officially from 1863, when it had a population of 431, though there had been a white settlement there for more than half a century.*

IRAK, a province of Persia, situated W. of Kum and Kashan and E. of Burujird, and paying a yearly revenue of about £16,000. The province has many flourishing villages which produce much grain, but its greatest income is derived from the carpets made in many of its villages and mostly exported to Europe, the value of which is estimated at about £100,000 per annum. An important British firm is established at Sultanabad, the capital of the province, solely for this trade. Sultanabad is situated 77 m. S.W. of Kum in 34 6′ N. and 40° 42′ E. at an elevation of 5925 ft. It has a population of about 8000 and post and telegraph offices. It was founded in 1808 and made a recruiting centre for some battalions of infantry which were to form part of the reorganized Persian army as recommended by the chief of the French mission, General Gardane. In consequence of its recent foundation it is still occasionally spoken of as Shahr-i-no, the ” new city.”

IRAK-ARABI (Traq-Arabi, “Arab Irak”), the name employed since

the Arab conquest to designate that portion of the valley of the Tigris and Euphrates known in older literature as Babylonia. Irak is approximately the region below the Median Wall, from Opis on the Tigris, at the mouth of Shatt-el- Adhem, to the neighbourhood of Ramadieh (Ramadiya) on the Euphrates; that is, from nearly latitude 34° to the Persian Gulf, and from the Syrian desert to the Persian mountains. It consists of two unequal portions, an extensive dry steppe with a healthy desert climate, and an unhealthy region of swamps. There is a good deal more agriculture along the Euphrates than along the Tigris, but swamps are at the same time much more extensive along the former. The borders of both streams wherever there is habitation are lined with date-palms. This is especially true of the lower part of Irak in the Basra vilayet, where the date-palm forms dense groves bordering the banks for a distance of many days' journey. A luxuriant vegetation of water plants is to be found in the swamps, which are the haunt of numerous wild beasts — pigs, lions, different kinds of aquatic animals and birds. These swamps are inhabited by a wild race of men, dark of hue, with many negroes among them, who cultivate rice and weave straw mats. Their chiefs, with their wives and a very few retainers or members of their immediate families, live in mud castles; the tribesmen live in rude huts of reeds and mats about these castles. In the main these swamp-dwellers, who designate themselves Ma -dan, keep pretty free both of the Turkish government and of the semi-Bedouins of Irak. Some of them are very lawless, especially the inhabitants of the region below the Shatt-el-Hal, between the two rivers. Here the Turkish government exercises no authority, and the tribesmen of the swamps play pirate on the merchandise passing up and down the Euphrates above Korna, where for some 80 m. the river has been allowed to form an immense swamp. Some of the Bedouin tribes also engage in marauding expeditions and terrorize certain portions of the country. Especially trouble- some are the edh-Dhafir, westward of the Euphrates, opposite the mouth of the Shatt-el-Hai, and the Beni Lam (7500 tents strong) who occupy the country east of the Tigris to the south of Bagdad. Still more difficult of control is the great tribe of Shammar, who descend every year from the north, pitching their tents in the Jezireh (i.e. the region between the two rivers) southward of Bagdad, and terrifying the whole country during their stay. The Turkish government is, however, gradually extending its authority over all Irak partly by force, partly by treachery. The Affech nation, Ma'-dan Arabs, occupying the swamps behind Diwanieh between the Tigris and Euphrates, and the great Montefich tribes, Bedouins who claimed the whole country southward of the Affech to the Shatt-el-Hal and beyond, have since 1880 been deprived gradually of their

power and a considerable part of their independence. In 1903 the Turkish government transferred the capital of the sanjak of Hillah to Diwanieh opposite the Affech swamps, and there is now a line of towns, centres of Turkish power and Turkish force, extending southward from Ana to Nasrieh, at the mouth of the Shatt-el- Hal canal, while similar stations are being established or strengthened along the Tigris. Some important steps have also

been taken by the Turkish government to control the Euphrates floods, and to drain the swamps in some sections of the country, especially westward of the Euphrates. A dam was built at the mouth of the Hindieh canal to prevent the waters of the Euphrates from losing themselves as reretofore in the swamps westward, and to assure a continual supply of water in the main bed of the Euphrates. It is, however, frequently carried away. The ancient Assyrium Stagnum, or Bahr Nejef near the town of that name, with other swamps formed by the overflow of the Hindieh, have been drained and turned into rice plantations. At the same time large sections of Irak have been converted into imperial domain, to the diminution of the revenues of the country but to the increase of the prosperity of the population which inhabits that domain. Something, though not very much, has thus been done to restore the land to its ancient fertility.

Ethnographically Irak is subject to a double influence. On the one hand the connexion with Nejd, the centre plateau of Arabia, continues uninterrupted, even the 'Agel Bedouins from central Arabia having a quarter of their own in Bagdad. Many of these Arabs come to Irak merely for a temporary residence, returning later to their homes with the earnings acquired in that comparatively rich country; but a considerable number remain permanently. Even stronger than the influence of Arabia is that of Persia. In general the inhabitants of Irak are Shi'ites not Sunnites, and their religious connexion and allegiance is therefore toward Persia, not Turkey. Persian customs are in fashion, Persian coinage is used equally with the Turkish, and in some parts, more especially in Bagdad, there is an important Persian quarter, while Kerbela and Meshed 'AH to the west of the Euphrates- are really Persian enclaves in Turkish territory. No traces remain of that rich intellectual development which was produced in the time of the caliphs through the reciprocal action of Persian and Arabic elements. Still, the quick-wittedness of the inhabitants of Irak makes a decided impression on the traveller passing through Asiatic Turkey. Throughout Irak also Indian influence is visible in not a few particulars. In the hot summer months, for instance, when the natives live in those underground

apartments called serdab, the Indian punkah is used in the houses of the rich. There are also small Indian colonies at most of the large towns and a considerable trade with India is carried on, especially in horses.

The trade of Irak is even now not unimportant. The principal exports from Basra are dates, various grains, millet seed, rice and wool, while the imports consist chiefly of Manchester goods, lumber, petroleum, coal and household necessities. Besides this there is a consiuerable land commerce by caravan, of which Bagdad is the centre. The total value of the exports of Irak according to the official figures of the Turkish government amounts to nearly £2,000,000, while the imports of every kind reach the value of about £1,800,000. If the ancient system of irrigation were restored and the land restored to cultivation, the country could support five hundred times as many in- habitants as it usually contains. Steamboats navigate the Tigris only as far as Bagdad, and that with great difficulty. In general, communication by water is carried on by means of the most primitive craft. Goods are transported in the so-called turradas, moderately big high-built vessels, which also venture out into the Persian Gulf as far as Kuwet. Passengers are con- veyed, especially on the Euphrates, in the meshhuf, a very long narrow boat, mostly pushed along the river bank with poles or towed by ropes. The Mesopotamian kelleks, rafts laid {m goat-skin bladders, come down the Tigris as far as Bagdad. At Bagdad round boats made of plaited reeds pitched with asphalt, the so-called kufas (qufas), are used. At Basra the bcllems are in use, boats of large size, having the appearance of being hollowed out of tree trunks and partly in fact so con- structed. There are no roads, and the extensive swamps and periodic inundations which lay large sections under water render land traffic by caravan somewhat uncertain.

Irak in general is an alluvial plain, formed by the deposits of the rivers Tigris and Euphrates, with a few scattered reaches of sand

appearing here and there. The mass of solid matter which the rivers

F?n°hiL 1S – VC ˆ consld ? ra He- The maximum proportion for the Euphrates in the month of January ls gS and at other times ˆ; for he Tigris the maximum is r J 5 . In general, the northern plains of the ntenor have a slight but well-defined southerly inclination, with local depressions. The territory undulates in the central districts and then sinks away into mere marshes and lakes. The clav of a deep blue colour, abounds with marine shells, and shows a strong efflorescence of natron and sea-salt. When the soil is parched the appearance of

the mirage (serab) is very common. As extensive inundations in spring are caused by both the rivers, especially the Tigris, great changes must have taken place in this part of the tWˆnY" the ™ urse ° f thousands of years. It has been asserted that in former times the alluvial area at the mouth of the river in- creased I m. in the space of thirty years; and from this it has been assumed that about the 6th century B.C. the Persian Gulf must have stretched from 45 to 55 m. farther inland than at present The wl"i fate OI lncrease at the present time is about 72 ft. per annum. While we may be unable to determine accurately the former physical configuration of southern Babylonia, it is at least certain that in Babylonian times the Euphrates and Tigris reached the sea as inde- pendent rivers, and Ritter estimates that in the time of Alexander the Great the embouchures were still separated by a good day's journey. Although they cannot now be traced, great alterations have probably taken place also in the upper portions of the rivers as well as in the country near their mouths. The names of a large number of canals occur in the old Babylonian inscriptions, as in the works of the Arabian geographers, but while some of these have been traced it has not been possible hitherto to identify the greater number ot them with actually existing canals or remains of canals. To the west of the Euphrates, on the edge of the Syrian desert from Hit downward to the neighbourhood of Basra and beyond, ran the Sa ade, now for the most part dry, a very ancient canal, extended or enlarged at different periods. Lower down near Mussaib, the Hindieh canal, at least equal in volume to the present main stream, branches off and after traversing and irrigating an extensive territory rejoins the river at Samawa. Between the Euphrates and the Tigris, there was a large number of great canals, especially in the region northward of Babylon between that city and the northern edge of the alluvia plain, of which the most famous were the 'Isa, the Sarsar,

«W, (vn° y o t 1′ the Ca , nal of Kutha ' the Sura and the Arakhat X m "t .7)- u- I, only one at P res ent carries water, namely, the Nahr Isa, which, leaving the Euphrates at Sakhlawieh (Sakh lawiya), terminates in extensive marshes near Bagdad; but this is now no longer navigable. Southward of Babylon the Daghara canal, which leaves the Euphrates a little below Hillah and empties into the Affech marshes and the Shatt-el-Kehr, which, leaving that stream a little above Diwameh makes a great curve through the interior of the Jezireh finally losing itself in the Hosainieh (Hosainiya) marshes near the mouth of the Shatt-el-Hai, are the only navigable or partly navigable canals of the Euphrates in the Jezireh. The Tigris canals are not so numerous as those of the Euphrates and were not so

famous in history, but eastward of that river the great

£> a £ ra i!. Va £ ChanneI 8 i lU exlsts > P a rt, while the Tigris is connected with the Euphrates by a navigable stream, the Shatt-el-Hai, which kaves the former river at Kut-el-'Amara and enters the Euphrates rLai ' 5yT ywh J ere , th f count ry is intersected with ancient

canals, some still deep dry beds, other so silted up that their course is represented only by parallel lines of hillocks. Some of these, of great antiquity, like the Shatt-en-Nil, which can be traced through its whole course from Babylon, through or past Nippur, Udnun (Bismya) Gishban (Gis-ukh), Erech and Larsa, to the Hosainieh marshes, were equally as important as the Euphrates itself; and indeed it mav be said that in ancient times that stream after reaching the alluvial plain was divided into a large number of channels, partly natural partly artificial, no single one of which, but all together constituted the Euphrates. By the restoration of these old canals,' traces of which are met with at every step, the country might be again raised to that condition of high civilization which it enjoyed not only in antiquity but even as late as the time of the caliphs The classical writers are unanimous in their admiration of Babylonia and it is certain that nowhere else in the ancient world was the applica- tion of canals to the exigencies of agriculture worked out so success- fully as here. The most luxuriant vegetation was diffused over the whole country and three crops were obtainable in the year In the matter of civilization indeed no country of the ancient world sur- passed Babylonia. How densely peopled this country once was frf/sˆ n red f , TOm t – he fact that about 794 B.C., 89 fortified towns and 820 smaller places in the Chaldaean region were captured during one military expedition. And even in the times of the caliphs there stood on the royal canal and its branches, north of Babylon, 160 hˆfn g< ; S Vh 0r l tr lb . utI "S ' n goW 225,000 dirhems to the state treasury besides the tax in kind To-day the whole region from the swamps about Basra northward is dotted with ruin mounds, and at places the plain itself is strewn for miles with fragments of glass and pottery evidence of earlier occupation, while, as stated? lines of canals of all possible sizes, from the great triple canals with four rows pi parallel hillocks, down to the small canals for purposes of irrigation, intersect the country in every direction.

IRAK-I-AJAMI

There seem to have been almost from the outset two centres which strove with one another for political supremacy in this region, the south and the north. In the north in the Babylonian time lay Kish, Akkad, Kutha (Tell-Ibrahim), Sippara (Abu Habba), Babylon and Borsippa (Birs-Nimrud). In the south were Endu and Ur (Mughair)—originally on the shores of the Persian Gulf, now 125 m. inland—Erech (Warka), Larsa (Senkereh), Lagash (Tello) and Gishban (Yokha). Nearly in the centre lay .Nippur and Udnun (Bismya). Besides these there were numerous other cities, some of considerable import- ance, which are known to us at present only by name; and there are in Irak hundreds of ruin mounds, some of them of considerable size, covering ancient Babylonian cities, the greater part of which are still unexplored and unidentified. During the period of Greek domination a Greek city, Seleucia (q.v.), which after- wards attained great prosperity, was founded by Seleucus I in an extremely favourable situation on the right bank of the Tigris. Greek cities were founded also in the south, at the head of the Persian Gulf, and some of the ancient Babylonian cities of the interior like Lagash, Erech and Nippur, were rebuilt on the old sites. After the conquest of Babylonia by the Parthians (130 B.C.) Ctesiphon (q.v.) was built on the east bank of the Tigris opposite Seleucia, and became the winter residence of the Persian kings. Later this double city became the imperial capital of the Sassamds, and under the name Madain still con- tinued to flourish after the Arabic conquest, to be finally super- seded by the neighbouring Bagdad. That region was called in the time of the Sassanids, Suristan, a translation of the Aramaean designation Beth-Aramaya, " country of the Syrians " for the land was mainly occupied by Aramaeans. By a notable substitution the Arabs afterwards gave the name Nabat, i e Nabataeans, to these Aramaean tenantry, who it may be added were already found in these parts at the time of the Babylonian empire. Indeed, some small portion of this old Syrian population of Irak still remains distinguished by a special religion (see Mandaeans), chiefly on the shores of the lower Euphrates in the neighbourhood of Suk-esh-Sheiukh. Another important city of the Sassanian period was Perisabora, known in the Arabian period as Anbar, the centre also of Babylonian Judaism after the destruction of Pombeditha in a.d. 588, situated on the east bank of the Euphrates in about the same latitude as Bagdad. During the Sassanian period flourished in the south- east the Arabic kingdom of Hira (q.v.). There was also for a time a Jewish kingdom in Babylonia, and Nehardea and Pombe- ditha are mentioned as centres of Jewish religions and national lite during this period.

After the Arabian conquest in the 7th century a d Irak entered for a time on a new period of prosperity. Several important new cities were founded, among them Kufa, Basra Wasit on the Shatt-el-Hai, and Bagdad on the site of an old Babylonian city of the same name, which later became under the Abbasid caliphs not only the capital of Irak but for a time the metropolis of the world (see Caliphate). With the decay of the Abbasid power the system of irrigation began to fall into disrepair, the ancient sites were gradually deserted, and the country finally returned to a condition of semi-barbarism alternating between inundation and drought, which is its present

St cltC

*See Ritter Die Erdkunde von Asien, 2nd ed., vol. vii., 10th and ZttWrˆˆtfV W.u W – F – Ainsw ° r th, Researches in n/Z s- (° n i°V 838); F J R – Chesney, Expedition for the Survey of the Rivers Euphrates and Tigris (2 vols., London, 1850) ; W. K Loftus, Chaldaea and Susiana (1857); F. Delitzsch, Wo las das MftTpfˆK- Ainsworth, The Euphrates Expelt turn (1888); I. P. Peters, Nippur (1897); E. Sachau, Am Euphrat rToo/ *M a £ I90 ft : F – De I1: Q zsch > InLande des einstigen Paradieses ffi '. Maps: Chesney (1850 ; Selby, Bewsher and Collingwood (1871); Kiepert, Ruinenfelder (1883). (A. So.; J. P. Pe.)*

IRAK-I-AJAMI (i.e. Persian Irak), the name (now obsolete) oi the important Persian province which the Arab geographer called I Jebel (the mountainous region) . It used to be the country bounded N. by Azerbaijan and Gilan, E. by Samnan and the central Persian desert, S. by Kerman, Fars and Arabistan*

W. by Kermanshah and Kurdistan. Its length, N.W.-S.E., was about 600 m. from the Kaftan Kuh on the Kizil Uzain, the frontier of Azerbaijan, to the frontier of Kerman beyond Yezd, and its width, N.E.-S.W., about 300 m.

IRAN, the great plateau between the plain of the Tigris in the west and the valley of the Indus in the east, the Caspian Sea and the Turanian desert in the north, and the Persian Gulf and the Indian Ocean in the south, surrounded on all sides by high mountain ranges with a great salt desert in the centre. The modern name Iran, in middle-Persian Eran (a form preferred by many German authors) is

derived from the ancient Aryana, " the country of the Aryans," i.e. that part of the Aryans which we call Iranians. Eratosthenes limited the name of Ariana to the south-eastern part of Iran, and excluded Persia, Media and Bactria, and therein he is followed by Strabo (ii. 78, 130, xv. 720 ff.; Pomp. Mela i. 3; Pliny, Nat. Hist. vi. 113, 116, xii. 33); Pliny (Nat. Hist. vi. 93) confounds it with Aria, Areia, Pers. Haraiva, i.e. the district of Herat; but Strabo himself says (xv. 724) that some extended the name to the Persians, Medes, Bactrians and Sogdians, as they all spoke the same language with small dialectic variations (cf. 727 and i. 66, xi. 523).

For the ethnography and history of Iran see Persia. (Ed. M.)

IRBIT, a town of Russia, in the government of Perm, no m. N.E. of Ekaterinburg, and on the Irbit river. Pop. (i860) 3408, (1897) 20,064. It is famous for a great fair, held since 1643, which lasts from the 1st of February to the 1st of March (O.S.), and at which are sold (to an average annual value of over £4,000,000) cottons, woollens, flax and hemp, silks, leather, metals, metallic and other manufactured goods, furs, hides, felt, raw wool and tea.

IRELAND, JOHN (1761-1842), English divine and dean of Westminster, was born at Ashburton, Devonshire, on the 8th of September 1761, his father being a butcher in that town. For a short time he worked in a shoemaker's shop. Subsequently he proceeded to Oxford, and in due course took holy orders. Through the interest of the earl of Liverpool he was in 1802 appointed a prebendary of Westminster Abbey, in 181 5 he was promoted to the deanery of Westminster, and from 1816 to 1835 he was also rector of Islip, Oxfordshire. In 1825 he gave £4000 for the foundation at Oxford of four " Ireland " scholarships of the value of £30 a year each, " for the promotion of classical learning and taste." He also gave £500 to Westminster school for the establishment of prizes for Latin hexameters. He died at Westminster on the 2nd of September 1842, and was buried in the abbey.

IRELAND, JOHN (1838-), American Roman Catholic prelate, was born at Burnchurch, County Kilkenny, Ireland, on the nth of September 1838. In 1849 he was taken to the United States by his parents, who settled at St Paul, Minnesota Territory. After being educated in France for the priesthood, he returned to the United States in 186 1; he was ordained at St Paul and in the following year he accompanied the 5th Minnesota Volunteer Infantry south as chaplain. Subsequently he became rector of the cathedral at St Paul, and in 1870-1871 represented Bishop Thomas Langdon Grace

(1814-1897) at the Vatican council at Rome. In 1875 he was appointed bishop of Nebraska, but at the urgent request of Bishop Grace the appointment was changed so that he might remain at St Paul as bishop-coadjutor with the right of succession; at the same time he was made titular bishop of Maronea. In 1884 he succeeded to the bishopric, and in 1888 he became the first archbishop of the see. His liberal views gave him a wide influence and reputation both within and without the church, and he came to be looked upon as a leader of the " American " as distinguished from the " Roman " party in the clergy. His views were, however, opposed by several leading Catholics; and several of his administrative acts, notably his plan for the partial taking, over of control of the parochial schools by the local authorities (known from the town in which it was first attempted, "the Faribault plan"), were strenuously attacked. He was prominently identified with the planting of Catholic communities or colonies in the North- West, with the establishment of the Catholic University at Washington,

and with the Catholic total abstinence movement. The degree of LL.D. was conferred on him by Yale University in 1901. He published The Church and Modern Society (1896).

IRELAND, WILLIAM HENRY (1777-1835), forger of Shakespearian manuscripts, was born in London in 1777. His father, Samuel Ireland, was an engraver and author, and dealer in rare books and curios. In 1794 young Ireland, with his father, visited Stratford, where he met John Jordan, a local poet who had published a deal of gossipy matter about Shakespeare and had even forged the will of the poet's father. Seeing his own father's credulous interest, Ireland conceived the idea of doing a little forgery on his own account. He copied, in ink which had all the signs of age, Shakespeare's style and handwriting, and produced leases, contracts with actors, notes, receipts, a profession of faith, and even a love letter to Anne Hathaway with an enclosed lock of hair, to the delight of his unsuspecting father, and the deception of many scholars who attested their belief in the genuineness of his finds. These he accounted for by inventing an ancestor " William Henrye Irelaunde," to whom they had been bequeathed by Shakespeare in gratitude for rescue from drowning. At last the discovery of a whole new play named Vortigem was announced. Sheridan purchased it for Drury Lane Theatre, and an overflowing house assembled on the 2nd of April 1 796 to sit in judgment upon it. But away from the glamour of crabbed handwriting and yellow paper, the feeble dialogue and crude conceptions of the tragedy could not stand the test, and its one representation was greeted with shouts of laughter. Its fate prevented

the composition of a series of historical plays, of which Henry II. had already been produced by this audacious forger. Samuel Ireland the elder had pub- lished in 1795 the Miscellaneous Papers and' Legal Instruments under the Hand and Seal of William Shakespeare; including the Tragedy of King Lear and a small fragment of Hamlet (dated 1796). He had the fullest belief in their authenticity, but the hostile criticism of Malone and others, and the unsatisfactory account of the source of the papers, made him demand a full disclosure from his son. Harassed by the success of his own deceit, which had carried him far beyond his first intention, Ireland at last confessed his fraud, and published (1796) an Authentic Account of the Shakespearian MSS., and in 1805, a more elaborate Confession, entirely exculpating his father and making a full admission. The elder Ireland felt the disgrace very bitterly, and it probably hastened his death, which occurred in July 1800. After the exposure Ireland was forced to abandon both his home and his profession. He wrote several novels of no value, gradually sank into penury, and died on the 17th of April 1835.

The more interesting publications on the Ireland forgeries are: Inquiry into the authenticity of certain Papers, &c, attributed to Shakespeare, by Edmond Malone (1796); the elder Ireland's Vindi- cation of his Conduct (1796); An Apology for the Believers in the Shakespeare Papers (1797), and a Supplemental Apology (1799), both by George Chalmers; and pamphlets by Boaden, Waldron, Wyatt, Webb and Oulton. Vortigem was republished in 1832. The elder Ireland's correspondence with regard to the forgeries is preserved in the British Museum, with numerous specimens of his son's talent. Ireland's career supplied the subject-matter of James Payn's novel The Talk of the Town (1885).

IRELAND, an island lying west of Great Britain, and forming with it the United Kingdom of Great Britain and Ireland. It extends from 51° 26′ to 55° 21′ N., and from 5° 25′ to io° 30′ W. It is encircled by the Atlantic Ocean, and on the east is separated from Great Britain by narrow shallow seas, towards the north by the North Channel, the width of which at the narrowest part between the Mull of Cantire (Scotland) and Torr Head is only 13J m.; in the centre by the Irish Sea, 130 m. in width, and in the south by St George's Channel, which has a width of 69 m. between Dublin and Holyhead (Wales) and of 47 m. at its southern extremity. The island has the form of an irregular rhomboid, the largest diagonal of which, from Torr Head in the north-east to Mizen Head in the south-west, measures 302 m. The greatest breadth due east and west is 174 m., from Dundrum Bay to Annagh Head, county Mayo; and the average breadth is about no m.

The total area is 32,531 sq. m.

PHYSICAL FEATURES]

IRELAND

743

Ireland is divided territorially into four provinces and thirty- two counties: — (a) Ulster (northern division): Counties Antrim, Armagh, Cavan, Donegal, Down, Fermanagh, Londonderry, Monaghan, Tyrone, (b) Leinster (eastern midlands and south- east): Counties Carlow, Dublin, Kildare, Kilkenny, King's County, Longford, Louth, Meath, Queen's County, Westmeath, Wexford, Wicklow. (c) Connaught (western midlands) : Counties Galway, Leitrim, Mayo, Roscommon, Sligo. (d) Munster (south- western division): Counties Clare, Cork, Kerry, Limerick, Tipperary, Waterford.

Physical Geography. — Ireland stands on the edge of the European " continental shelf." Off the peninsula of Mullet (county Mayo) there are ioo fathoms of water within 25 m. of the coast which overlooks the Atlantic; eastward, northward and southward, in the narrow seas, this depth is never reached. The average height of the island is about 400 ft., but the distribu- tion of height is by no means equal. The island has no spinal range or dominating mountain mass. Instead, a series of small, isolated clusters of mountains, reaching from the coast to an extreme distance of some 70 m. inland, almost surrounds a great central plain which seldom exceeds 250 ft. in elevation. A physical description of Ireland, therefore, falls naturally under three heads — the coasts, the mountain rim and the central plain.

The capital city and port of Dublin lies a little south of the central point of the eastern coast, at the head of a bay which marks a _ . sudden change in the coastal formation. Southward from

*s * its northern horn, the rocky headland of Howth, the coast is generally steep, occasionally sheer, and the mountains of county Wicklow approach it closely. Northward (the direction first to be followed) it is low, sandy and fringed with shoals* for here is one point at which the central plain extends to the coast. This con- dition obtains from 53 25′ N. until at 34 N. the mountains close down again, and the narrow inlet or fjord of Carlingford Lough separates the abrupt heights of the Carlingford and Mourne Moun- tains. Then*

the low and sandy character is resumed ; the fine east- ward sweep of Dundrum Bay is passed, the coast turns north again, . and a narrow channel gives entry to the island-studded lagoon of Strangford Lough. Reaching county Antrim, green wooded hills plunge directly into the sea; the deep Belfast Lough strikes some 10 m. inland, and these conditions obtain nearly to Fair Head, the north-eastern extremity of the island. Here the coast turns west- ward, changing suddenly to sheer cliffs, where the basaltic formation intrudes its strange regular columns, most finely developed in the famous Giant's Causeway.

The low land surrounding the plain-track of the Bann intervenes between this and the beginning of a coastal formation which is common to the north-western and western coasts. From the oval indentation of Lough Foyle a bluff coast trends north-westward to Malin Head, the northernmost promontory of the island. Thence over the whole southward stretch to Mizen Head in county Cork is found that physical appearance of a cliff-bound coast fretted with deep fjord-like inlets and fringed with many islands, which through- out the world is almost wholly confined to western seaboards. Mountains impinge upon the sea almost over the whole length, sometimes, as in Slieve League (county Donegal), immediately facing it with huge cliffs. Eight dominant inlets appear. Lough Foyle is divided from Lough Swilly by the diamond-shaped peninsula of Inishowen. Following the coast southward, Donegal Bay is divided from Galway Bay by the hammer-like projection of county Mayo and Connemara, the square inlet of Clew Bay intervening. At Galway Bay the mountain barrier is broken, where the great central plain strikes down to the sea as it does on the east coast north of Dublin. After the stern coast of county Clare there follow the estuary of the great river Shannon, and then three large inlets striking deep into the mountains of Kerry and Cork — Dingle Bay, Kenmare river and Bantry Bay, separating the prongs of the fork- like south-western projection of the island. The whole of this coast is wild and beautiful, and may be compared with the west coast of Scotland and even that of Norway, though it has a strong indi- viduality distinct from either; and though for long little known to travellers, it now possesses a number of small watering-places, and is in many parts accessible by railway. The islands though numerous are not as in Scotland and Norway a dominant feature of the coast, being generally small and often mere clusters of reefs. Exceptions, however, are Tory Island and North Aran off the Donegal coast, Achill and Clare off Mayo, the South Arans guarding Galway Bay, the Blasquets and Valencia off the Kerry coast. On many of these desolate rocks, which could have

afforded only the barest sustenance, there are remains of the dwellings and churches of early religious settlers who sought solitude here. The settlements on Inishmurray (Sligo), Aranmore in the South Arans, and Scattery in the Shannon estuary, had a fame as retreats of piety and learning far outside Ireland itself, and the significance of a pilgrimage to their sites is not

yet wholly forgotten among the peasantry, while the preservation of their remains has come to be a national trust.

The south coast strikes a mean between the east and the west. It is lower than the west though still bold in many places; the inlets are narrower and less deep, but more easily accessible, as appears from the commercial importance of the harbours of Cork and Waterford. Turning northward to the east of Waterford round Carnsore Point, the lagoon-like harbour of Wexford is passed, and then a sweeping, almost unbroken, line continues to Dublin Bay. But this coast, though differing completely from the western, is not lacking in beauty, for, like the Mournes in county Down, the moun- tains of Wicklow rise close to the sea, and sometimes directly from it. Every mountain group in Ireland forms an individual mass, isolated by complex systems of valleys in all directions. They seldom exceed 3000 ft. in height, yet generally possess a „ . . certain dignity, whether from their commanding position oan os ‘ or their bold outline. Every variety of form is seen, from steep flat-topped table-mountains as near Loughs Neagh and Erne, to peaks such as those of the Twelve Pins or Bens of Connemara. Unlike the Scottish Highlands no part of them was capable of sheltering a whole native race in opposition to the advance of civilization, though early customs, tradition and the common use of the Erse language yet survive in some strength in the wilder parts of the west. From the coasts there is almost everywhere easy access to the interior through the mountains by valley roads; and though the plain exists unbroken only in the midlands, its ramifications among the hills are always easy to follow. Plain and lowland of an elevation below 500 ft. occupy nearly four-fifths of the total area; and if the sea were to submerge these, four distinct archipelagos would appear, a. northern, eastern, western and south-western. The principal groups, with their highest points, are the Mournes (Slieve Donard, 2796 ft.) and the Wicklow mountains (Lugnaquilla, 3039) on the east; the Sperrins (Sawel, 2240) in the north; the Derryveagh group in the north-west (Errigal, 2466) ; the many groups or short ranges of Sligo, Mayo and Galway (reaching 1695 ft. in the Twelve Pins of Connemara) ; in the south-west those of Kerry and Cork, where in Carrantuohill or Carntual (3414) the famous Macgillicuddy Reeks which beautify the environs

of Killarney include the highest point in the island; and north-east from these, the Galtees of Tipperary (3018) and Slieve Bloom, the farthest inland of the important groups. Nearer the south coast are the Knockmealdown (2609) and Commeragh Mountains (2470) of county Waterford.

It will be realized from the foregoing description that it is impossible to draw accurate boundary lines to the great Irish plain, yet it rightly carries the epithet central because it dis- . , . tinctly divides the northern mountain groups from the ra

southern. The plain is closely correlated with the bogs

plain.

which are the best known physical characteristic of Ireland, but the centre of Ireland is not wholly bog-land. Rather the bogs of the plain are intersected by strips of low-lying firm ground, and the central plain consists of these bright green expanses alternating with the brown of the bogs, of which the best known and (with its offshoots) one of the most extensive is the Bog of Allen in the eastern midlands. But the bogs are not confined to the plain. They may be divided into black and red according to the degree of moisture and the vegetable matter which formed them. The black bogs are those of the plain and the deeper valleys, while the red, firmer and less damp, occur on the mountains. The former supply most of the peat, and some of the tree-trunks dug out of them have been found so flexible from immersion that they might be twisted into ropes. Owing to the quantity of tannin they contain, no harmful miasma exhales from the Irish bogs.

The central plain and its offshoots are drained by rivers to all the coasts, but chiefly eastward and westward, and the water- partings in its midst are sometimes impossible to define. „. The main rivers, however, have generally a mountain source, and according as they are fed from bogs or springs may be differentiated as black and bright streams. In this connexion the frequent use of the. name Blackwater is noticeable. The principal rivers are — from the Wicklow Mountains, the Slaney, flowing S. to Wexford harbour, and the Liffey, flowing with a tortuous course N. and E. to Dublin Bay; the Boyne, fed from the central plain and discharging into Drogheda Bay ; from the mountains of county Down, the Lagan, to Belfast Lough, and the Bann, draining the great Lough Neagh to the northern sea; the Foyle, a collection-of streams from the mountains of Tyrone and Donegal, flowing north" to Lough Foyle. On the west the rivers are generally short and torrential, excepting the Erne, which drains

the two beautiful loughs of that name in county Fermanagh, and the Shannon, the chief river of Ireland, which, rising in a mountain spring in county Cavan, follows a bow-shaped course to the south and south-west, and draws off the major part of the waters of the plain by tributaries from the east. In the south, the Lee and the Blackwater intersect the mountains of Kerry and Cork flowing east, and turn abruptly into estuaries opening south. Lastly, rising in the Slieve Bloom or neighbouring mountains, the Suir, Nore and Barrow follow widely divergent courses to the south to unite in Waterford harbour.

The lakes (called loughs — pronounced lochs) of Ireland are innumerable, and (apart from their formation) are almost all contained in two great regions, (i) The central plain by its nature Lakes. abounds in loughs — dark, peat-stained pools with low shores. The principal of these lie in county Westmeath, such as Loughs Ennel, Owel and Derravaragh, famed for their trout-fishing in the May-fly season. (2) The Shannon, itself forming several large loughs, as Allen, Ree and Derg; and the Erne, whose course lies almost wholly through loughs — Gowna, Oughter and the Loughs Erne, irregular of outline and studded with islands — separate this region from the principal lake-region of Ireland, coincident with the province of Connaught. In the north lie Loughs Melvin, close above Donegal Bay, and Gill near Sligo, Lough Gara, draining to the Shannon, and Lough Conn near Ballina (county Mayo), and in the south, the great expanses of Loughs Mask and Corrib, joined by a subterranean channel. To the west of these last, the mountains of Connemara and, to a more marked degree, the narrow plain of bog-land between them and Galway Bay, are sown with small lakes, nearly every hollow of this wild district being filled with water. Apart from these two regions the loughs of Ireland are few but noteworthy. In the south-west the lakes of Killarney are widely famed for their exquisite scenic setting; in the north-east Lough Neagh has no such claim, but is the largest lake in the British Isles, while in the south-east there are small loughs in some of the picturesque glens of county Wicklow.

Climate. — The climate of Ireland is more equable than that of Great Britain as regards both temperature and rainfall. No district in

Ireland has a rainfall so heavy as that of large portions of the Highlands of Scotland, or so light as that of several large districts in the east of Great Britain. In January the mean temperature scarcely falls below 40° F. in any part of Ireland, whereas over the larger part of the eastern slope of Great Britain it is some 3 lower; and in July the extremes in Ireland are 59° in the north and 62° in Kilkenny. The range from north to south of Great Britain in the same month is some io°, but the greater extent of latitude accounts only for a part of this difference, which is mainly occasioned by the physical configuration of the surface of Ireland in its relations to the prevailing moist W.S.W. winds. Ireland presents to these winds no unbroken mountain ridge running north and south, which would result in two climates as distinct as those of the east and west of Ross-shire; but it presents instead only a series of isolated groups, with the result that it is only a few limited districts which enjoy climates approaching in dryness the climates of the whole of the eastern side of Great Britain. (O. J. R. H.).

Geology. — Ireland, rising from shallow seas on the margin of the submarine plateau of western Europe, records in its structure the successive changes that the continent itself has undergone. The first broad view of the country shows us a basin-shaped island consisting of a central limestone plain surrounded by mountains; but the diverse modes of origin of these mountains, and the differ- ences in their trend, suggest at once that they represent successive epochs of disturbance. . The north-west highlands of Donegal and the Ox Mountains, with their axes of folding running north-east and south-west, invite comparison with the great chain of Leinster, but also with the Grampians and the backbone of Scandinavia. The ranges from Kerry to Waterford, on the other hand, truncated by the sea at either end, are clearly parts of an east and west system, the continuation of which may be looked for in South Wales and Belgium. The hills of the north-east are mainly the crests of lava-plateaux, which carry the mind towards Skye and the volcanic province of the Faeroe Islands. The two most important points of contrast between the geology of Ireland and that of England are, firstly, the great exposure of Carboniferous rocks in Ireland, Mesozoic strata being almost absent; and, secondly, the presence of volcanic rocks in place of the marine Eocene of England.

The fact that no Cambrian strata have been established by palaeontological evidence in the west of Ireland has made it equally difficult to establish any pre-Cambrian system. The great difference in character, however, between the Silurian strata at Pomeroy in county Tyrone and the adjacent metamorphic series makes it highly

probable that the latter masses are truly Archean. They form an interesting and bleak moorland between Cookstown and Omagh, extending north-eastward into Slieve Gallion in county Londonderry, and consist fundamentally of mica-schist and gneiss, affected by earth-pressures, and invaded by granite near Lough Fee. The axis along which they have been elevated runs north-east and south-west, and on either flank a series of " green rocks " appears, consisting of altered amygdaloidal andesitic lavas, intrusive dolerites, coarse gabbros and diorites, and at Beagh-beg and Creggan in central Tyrone ancient rhyolitic tuffs. Red and grey cherts, which have not so far yielded undoubted organic remains- occur in this series, and it has in consequence been compared with the Arenig rocks of southern Scotland. The granite invades this " green- rock " series at Slieve Gallion and elsewhere, but is itself pre-

Devonian. Even if the volcanic and intrusive basic rocks prove to be Ordovician (Lower Silurian), which is very doubtful, the metamorphic series of the core is clearly distinct, and appears to be " fundamental " so far as Ireland is concerned.

The other metamorphic areas of the north present even greater difficulties, owing to the absence of any overlying strata older than the Old Red Sandstone. Their rocks have been variously held to be Archean, Cambrian and Silurian, and their general trend has undoubtedly been determined by post-Silurian earth-movements. Hence it is useful to speak of them merely as " Dalradian," a convenient term invented by Sir A. Geikie for the metamorphic series of the old kingdom of Dalriada. They come out as mica-schists under the Carboniferous sandstones of northern Antrim, and dis- appear southward under the basaltic plateaux. The red gneisses near Torr Head probably represent intrusive granite; and this small north-eastern exposure is representative of the Dalradian series which covers so wide a field from central Londonderry to the coast of Donegal. The oldest rocks in this large area are a stratified series of mica-schists, limestones and quartzites, with numerous intrusive sheets of diorite, the whole having been metamorphosed by pressure, with frequent overfolding. Extensive subsequent metamorphism has been produced by the invasion of great masses of granite. Similar rocks come up along the Ox Mountain axis, and occupy the wild west of Mayo and Connemara. The quartzites here form bare white cones and ridges, notably in Errigal and Aghla Mt. in county Donegal, and in the group of the Twelve Bens in county Galway.

Following on these rocks of unknown but obviously high an- tiquity, we find fossiliferous Ordovician (Lower Silurian) strata near Killary

harbour on the west, graduating upwards into a complete Gotlandian (Upper Silurian) system. Massive conglomerates occur in these series, which are unconformable on the Dalradian rocks of Connemara. In the Wenlock beds of the west of the Dingle pro- montory there are contemporaneous tuffs and lavas. Here the Ludlow strata are followed by a thick series of barren beds (the Dingle Beds), which have been variously claimed as Upper Silurian and Lower Devonian. No certain representative of the Dingle Beds has been traced elsewhere throughout the south of Ireland, where the Old Red Sandstone succeeds the uptilted Silurian strata with striking unconformity. The Silurian rocks were indeed greatly folded before the Old Red Sandstone was laid down, the general trend of the folds being from south-west to north-east. The best example of these folds is the axis of Leinster, its core being occupied by granite which is now exposed continuously for 70 m., forming a moorland from Dublin to New Ross. On either flank the Silurian shales, slates and sandstones, which are very rarely fossiliferous, rise with steep dips. They are often contorted, and near the contact with the granite pass into mica-schists and quartzites. The foothills and lowlands throughout southern Wicklow and almost the whole of Wexford, and the corresponding country of western Wicklow and eastern Kildare, are thus formed of Silurian beds, in which numerous contemporaneous and also intrusive igneous rocks are intercalated, striking like the chain N.E. and S.W. In south- eastern Wexford, in northern Wicklow (from Ashford to Bray), and in the promontory of Howth on Dublin Bay, an apparently earlier series of green and red slates and quartzites forms an im- portant feature. The quartzites, like those of the Dalradian series, weather out in cones, such as the two Sugarloaves south of Bray, or in knob-set ridges, such as the crest of Howth or Carrick Mt. in county Wicklow. The radial or fan-shaped markings known as Oldhamia were first detected in this series, but are now known from Cambrian beds in other countries; in default of other satis- factory fossils, the series of Bray and Howth has long been held to be Cambrian.

All across Ireland, from the Ballyhoura Hills on the Cork border to the southern shore of Belfast Lough, slaty and sandy Silurian beds appear in the axes of the anticlinal folds, surrounded by Old Red Sandstone scarps or Carboniferous Limestone lowlands. These Silurian areas give rise to hummocky regions, Where small hills abound, without much relation to the trend of the axis of elevation. The most important area appears north of the town of Longford, and extends thence to the coast of Down. In Slieve Glah it reaches a height of 1057 ft. above the sea. Granite is exposed along its axis

from near Newry to Slieve Croob, and again appears at Crossdoney in county Cavan. These occurrences of granite, with that of Leinster, in connexion with the folding of the Silurian strata, make it highly probable that many of the granites of the Dalradian areas, which have a similar trend and which have invaded the schists "So intimately as to form with them a composite gneiss, date also from a post-Silurian epoch of earth-movement. Certain western and northern granites are however older, since granite boulders occur in Silurian conglomerates derived from the Dalradian complex.

This group of N.E. and S.W. ridges and hollows, so conspicuous in the present conformation of Donegal, Sligo and Mayo, in the axis of Newry, and in the yet bolder Leinster Chain, was impressed upon the Irish region at the close of Silurian times, and is clearly a part of the " Caledonian " system of folds, which gave to Europe the guiding lines of the Scottish Highlands and of Scandinavia.

On the land-surface thus formed the Devonian lakes gathered, while the rivers poured into them enormous deposits of sand and conglomerate. A large exposure of this Old Red Sandstone stretches

A Longitude "West 3)0 of Gxeeiw&ch

"'■ "■"■k."NC«m.3».S" 1 r'. , »>"'9*

: £•,■■-■'>. ■•■ n*. ;■>.■», ,, .« ■■ jiMia*

Dalkeylelana.

HeproiW From Original Cilorjnfflte By ThejGiD Eiigrawhˆ: la, N.X

*Copyright x&.*ha tStited States of Ameri.ca,191H. ~fy/r The Rs cyclopaedia Eritajmica Co.*

GEOLOGY]

IRELAND

745

from Enniskillen to the Silurian beds at Pomeroy, and some contemporaneous andesites are included, reminding us of the volcanic activity at the same epoch in Scotland. The numerous " felstone " dikes, often lamprophyric, occurring in the north and west of Ireland, are probably also of Devonian age. The conglomerates appear at intervals through the limestone covering of central Ireland,

and usually weather out as conspicuous scarps or " hog's-backs." The Slieve Bloom Mountains are thus formed of a dome of Old Red Sandstone folded on a core of unconformable Silurian strata; while in several cases the domes are worn through, leaving rings of Old Red Sandstone hills, scarping inwards towards broad exposures of Silurian shales. The Old Red Sandstone is most fully manifest in the rocky or heather-clad ridges that run from the west of Kerry to central Waterford, rising to 3414 ft. in Carrantuohill in Macgillicuddy's Reeks, and 3015 ft. in Galtymore. In the Dingle Pro-

r'^'^1 Cretaceous

j Trim, sometimes surmounted i by Lower Jurassic

J Upper Carboniferous

| I Carboniferous Limestone

English Miles 2 30 y y 60

EmcrrVolfcc^ tc<

Lower Carboniferous Sandstone and Slate flatter in South)

Devonian (Old Bed Sandstone)

Silurian (and Cambrian ?)

"Dalradian" Metamorphlc Series

Diorite and allied Basic Rocks

=S>| Granite and allied Acid Rocks

montory the conglomerates of this period rest with striking unconformity on the Dingle Beds and Upper Silurian series. Here there may be a local break between Lower and Upper Devonian strata. The highest beds of Old Red Sandstone type pass up conformably in the south of Ireland into the Lower Carboniferous, through the " Yellow Sandstone Series " and the " Coomhola Grits " ab~ve it. The Yellow Sandstone contains Archanodon, the oldest known fresh-water mollusc, and plant-remains; the Coomhola Grits are marine, and are sometimes regarded as Carboniferous, sometimes as uppermost Devonian.

In the south, the Carboniferous deposits open with the Carboniferous Slate, in the base of which the Coomhola Grits occur. Its lower

part represents the Lower Carboniferous Shales and Sand- stones of the central and northern areas, while its upper part corre- sponds with a portion of the Carboniferous Limestone. The Carboni- ferous Limestone, laid down in a sea which covered nearly the whole Irish area, appears in the synclinal folds at Cork city and Kenmare, And is the prevalent rock from the north side of the Knockmealdown Mountains to Enniskillen and Donegal Bay. On the east it spreads to Drogheda and Dublin, and on the west to the heart of Mayo and of Clare. Loughs Mask and Corrib are thus bounded on the west by rugged Silurian and Dalradian highlands, and on the east appear as were water-filled hollows in the great limestone plain.

The Lower Carboniferous Sandstones are conspicuous in the region from Milltown near Inver Bay in southern Donegal to Bally- castle in county Antrim. In the latter place they contain workable coal-seams. The Carboniferous Limestone often contains black flint (chert), and at some horizons conglomerates occur, the pebbles being derived from the unconformable ridges of the " Caledonian " land. A black and often shaly type called " calp " contains much clay derived from the same land-surface. While the limestone has been mainly worn down to a lowland, it forms fine scarps and table- lands in county Sligo and other western regions. Subterranean rivers and water-worn caves provide a special type of scenery below the surface. Contemporaneous volcanic action is recorded by tuffs and lavas south-east of Limerick and north of Philipstown. The beds above the limestone are shales and sandstones, sometimes reaching the true Coal-Measures, but rarely younger than the English Millstone Grit. They are well seen in the high ground about Lough Allen, where the Shannon rises on them, round the Castlecomer and Killenaule coalfields, and in a broad area from the north of Clare to Killarney. Some coals occur in the Millstone Grit horizons. The Upper Coal-Measures, as a rule, have been lost by denudation, much of which occurred before Triassic times. South of the line between Galway and Dublin the coal is anthracitic, while north of this line it is bituminous. The northern coalfields are the L. Carboniferous one at Ballycastle, the high outliers of Millstone Grit and Coal-Measures round Lough Allen, and the Dungannon and Coalisland field in county Tyrone. The last named is in part concealed by Triassic strata. The only important occurrences of coal in the south are in eastern Tipperary, near Killenaule, and in the Leinster coalfield (counties Kilkenny and Carlow and Queen's County), where there is a high synclinal field, including Lower and Middle Coal-Measures, and resembling in structure the Forest of Dean area in England.

The " Hercynian " earth-movements, which so profoundly affected

north-west and north-central Europe at the close of Carboni- ferous times, gave rise to a series of east and west folds in the Irish region. The Upper Carboniferous beds were thus lifted within easy reach of denuding forces, while the Old Red Sandstone, and the under- lying " Caledonian " land-surface, were brought up from below in the cores of domes and anticlines. In the south, even the Carboniferous Limestone has been so far removed that it is found only in the floors of the synclinals. The effect of the structure of these folds on the courses of rivers in the south of Ireland is discussed in the paragraphs dealing with the geology of county Cork. The present central plain itself may be regarded as a vast shallow synclinal, including a multitude of smaller folds. The earth-wrinkles of this epoch were turned into a north-easterly direction by the pre-existing Leinster Chain, and the trend of the anticlinal from Limerick to the Slieve Bloom Mountains, and that of the synclinal of Millstone Grit and Coal- Measures from Cashel through the Leinster coalfield, bear witness to the resistance of this granite mass. The Triassic beds rest on the various Carboniferous series in turn, indicating, as in England, the amount of denudation that followed on the uplift of the Hercynian land. Little encouragement can therefore be given in Ireland to the popular belief in vast hidden coalfields.

The Permian sea has left traces at Holywood on Belfast Lough and near Stewartstown in county Tyrone. Certain conglomeratic beds on which Armagh is built are also believed to be of Permian age. The Triassic sandstones and marls, with marine Rhaetic beds above, are preserved mainly round the basaltic plateaus of the north-east, and extend for some distance into county Down. An elongated outlier south of Carrickmacross indicates their former presence oyer a much wider area. Rock-salt occurs in these beds north of Carrick- fergus. r

The Jurassic system is represented in Ireland by the Lower Lias alone, and it is probable that no marine beds higher than the Upper Lias were deposited during this period. From Permian times on- ward, in fact, the Irish area lay on the western margin of the seas that played so large a part in determining the geology of Europe. The Lower Lias appears at intervals under the scarp of the basaltic plateaus, and contributes, as in Dorsetshire and Devonshire, to the formation of landslips along the coast. The alteration of the fossil- iferous Lias by dolerite at Portrush into a flinty rock that looked like basalt served at one time as a prop for the " Neptunist " theory of the origin of igneous rocks. Denudation, consequent on the renewed uplift of the country, affected the Jurassic beds until the middle of Cretaceous times. The sea then returned, in the north-east at any rate, and the first Cretaceous deposits indicate the nearnessjqf a

shore-line. Dark " green-sands," very rich in glauconite, : are followed by yellow sandstones with some flint. These two stages represent the Upper Greensand, or the sandy type of the English Gault. Further sands represent the Cenomanian. The Turanian is also sandy, but in most areas was not deposited, or has been denuded away during a local uplift that preceded Senonian times. The Senonian limestone itself, which rests in the extreme north on Trias or even on the schists, is often conglomeratic and glauconitic at the base, the pebbles being worn from the old metamorphic series. The term " Hibernian Greensand " was used by Tate for all the beds below the Senonian; the quarrymen know the conglomeratic Senonian as " Mulatto-stone." The Senonian chalk, or " White Limestone," is hard, with numerous bands of flint, and suffered from denudation in early Eocene times. Probably its original thickness

was not more than 150 ft., while now only from 40 to 100 ft. remain. This chalk appears to underlie nearly the whole basaltic plateaus, appearing as a fringe round them, and also in an inlier at Templepatrick. The western limit was probably found in the edge of the old continental land in Donegal. Chalk flints occur frequently in the surface-deposits of the south of Ireland, associated with rocks brought from the north during the glacial epoch, and probably also of northern origin. It is just possible, however, that here and there the Cretaceous sea that spread over Devonshire may have penetrated the Irish area.

After the Irish chalk had been worn into rolling downs, on which flint -gravels gathered, the great epoch of volcanic activity opened, which was destined to change the character of the whole north-west European area. The critical time had arrived when the sea was to be driven away eastward, while the immense ridges due to the " Alpine " movements were about to emerge as the backbones of new continental lands. Fissure after fissure, running with remark- able constancy N.W. and S.E., broke through the region now occupied by the British Isles, and basalt was pressed up along these cracks, forming thousands of dikes, from the coast of Down to the Dalradian ridges of Donegal. One of these on the north side of Lough Erne is 15 m. long. The more deep-seated type of these rocks is seen in the olivine-gabbro mass of Carlingford Mountain; but most of the

igneous region became covered with sheets of basaltic lava, which filled up the hollows of the downs, baked the gravels into a layer of red flints, and built up, pile upon pile, the great plateaus of the north. There was little explosive action, and few of the volcanic vents can now be traced. After a time, a quiet interval allowed of the forma- tion of lakes, in which red iron-ores were laid down. The plant- remains associated with these beds form the only clue to the post- Cretaceous period in which the volcanic epoch opened, and they have been placed by Mr Starkie Gardner in recent years as early Eocene. During this time of comparative rest, rhyolites were extruded locally in county Antrim ; and there is very strong evidence that the granite of the Mourne Mountains, and that which cuts the Carlingford gabbro, were added at the same time to the crust. The basalt again broke out, through dikes that cut even the Mourne granite, and some of the best-known columnar masses of lava overlie the red deposits of iron-ore and mark this second basaltic epoch. The volcanic plateaus clearly at one time extended far west and south of their present limits, and the denu- dation of the lava-flows has allowed a large area of Mesozoic strata also to disappear.

Volcanic activity may have extended into Miocene times; but the only fossiliferous relics of Cainozoic periods later than the Eocene are the pale clays and silicified lignites on the south shore of Lough Neagh, and the shelly gravels of pre-glacial age in county Wexford. Both these deposits may be Pliocene. Probably before this period the movements of subsidence had set in which faulted the basalt plateaus, lowered them to form the basin of Lough Neagh, and broke up the continuity of the volcanic land of the North Atlantic area. As the Atlantic spread into the valleys on the west of Ireland, forming the well-known marine inlets, Europe grew, under the influence of the " Alpine " movements, upon the east; and Ireland was caught in, as it were, on the western edge of the new continent. It seems likely that it was separated from the British region shortly before the glacial epoch, and that some of the ice which then abutted on the country travelled across shallow seas. The glacial deposits profoundly modified the surface of the country, whether they resulted from the melting of the ice-sheets of the time of maximum glaciation, or from the movements of local glaciers. Boulder-clays and sands, and gravels rearranged by water, occur throughout the lowlands; while the eskers or " green hills," characteristic grass-covered ridges of gravel, rise from the great plain, or run athwart valleys and over hill-sides, marking the courses of sub-glacial streams. When the superficial deposits are removed, the underlying rocks are found to be scored and smoothed by ice-action, and whole

mountain-sides in the south and west have been similarly moulded during the Glacial epoch. In numerous cases, lakelets have gathered under rocky cirques behind the terminal moraines of the last surviving glaciers.

There is no doubt that at this epoch various movements of eleva- tion and subsidence affected the north-west of Europe, and modern Ireland jnay have had extensions into warmer regions on the west and south, while the area now left to us was almost buried under ice. In post-Glacial times, a subsidence admitted the sea into the Lagan valley and across the eastern shore in several places; but elevation, in the days of early human occupation, brought these last marine deposits to light, and raised the beaches and shore-terraces some 10 to 20 ft. along the coast. At Lame, Greenore and in the neck between Howth and Dublin, these raised beaches remain conspicuous. To sum up, then, while the main structural features of Ireland were impressed! upon her before the opening of the Mesozoic era, her present outline and superficial contours date from an epoch of climatic and geographical change which falls within the human period.

See maps and explanatory memoirs of the Geological Survey of

Ireland (Dublin); G. Wilkinson, Practical Geology and Ancient Architecture of Ireland (London, 1845) ; R. Kane, Industrial Resources of Ireland (2nd ed., Dublin, 1845); G. H. Kinahan, Manual of the Geology of Ireland (London, 1878); E. Hull, Physical Geology and Geography of Ireland (2nd ed., London, 1891); G. H. Kinahan, Economic Geology of Ireland (Dublin, 1889) ; A. McHenry and W. W. Watts, Guide to the Collection of Rocks and Fossils, Geol. Survey of Ireland (2nd ed., Dublin, 1898). (G. A. J. C.)

Economics and Administration

Population. — Various computations are in existence of the population of Ireland prior to 18 21, in which year the first govern- ment census was taken. According to Sir William Petty the number of inhabitants in 1672 was 1,320,000. About a century later the tax-collectors estimated the population at a little over 2,500,000, and in 1791 the same officials calculated that the number had risen to over 4,200,000. The census commissioners returned the population in 1821 as 6,801,827, in 1831 as 7,767,401, and in 1841 as 8,196,597. It is undoubted that a great increase of population set in towards the close of the 18th century and continued during the first 40 years or so of the 19th. This increase was due to a variety of

causes — the improvement in the political condition of the country, the creation of leaseholds after the abolition of the 40s. franchise, the productiveness and easy cultivation of the potato, the high prices during the war with France, and probably not least to the natural prolificness of the Irish people. But the census returns of 1851 showed a remarkable alteration — a decrease during the previous decade of over 1,500,000 — and since that date, as the following table shows, the continuous decrease in the number of its inhabitants has been the striking feature in the vital statistics of Ireland.

Decrease per cent, of Population 1841-1901.

1841-1851.

1851-1861.

1861-1871.

1871-1881.

1881-1891.

1891-1901.

Leinster Munster Ulster . . Connaught

15-25 22-47 15-69 28-81

12-86

18-53

4-85

9-59

8-n

7 93 4-23 7-33

4-49 4.98

5-ii

3-43

6-8

n-8

7-07 12-4

3-5 8-4 2-4 9-7

Ireland

19-85

11-50

6-67

4-69

9-08

5-3

The cause of the continuous though varying decrease which these figures reveal has been emigration. This movement of population took its first great impulse from the famine of 1846 and has continued ever since. When that disaster fell upon the country it found a teeming population fiercely competing for a very narrow margin of subsistence; and so widespread and devastating were its effects that between 1847 and 1852 over 1,200,000 of the Irish people emigrated to other lands. More than 1,000,000 of these went to the United States of America, and to that country the main stream has ever since been directed. Between 1851 and 1905 4,028,589 emigrants left Ireland — 2,092,154 males and 1,936,435 females, the proportion of females to males being extraordinarily high as compared with the emigration statistics of other countries. Between these years the numbers fluctuated widely — 1852 showing the highest total, 190,322 souls, and 1905 the lowest, 30,676 souls. Since 1892, however, the emigrants in any one year have never exceeded 50,000, probably because the process of exhaustion has been so long in operation. As Ireland is mainly an agricultural country the loss of population has been most marked in the rural districts. The urban population, indeed, has for some years shown a tendency to increase. Thus in 1841 the rural population was returned as 7,052,923 and the urban as 1,143,674, while the corresponding figures, in 1901 were respectively 3,073,846 and 1,384,929. This is further borne out by the percentages given in the above table, from which it will be seen that the greatest proportional decrease of population has occurred in the two provinces of Munster

and Connaught, which may be regarded as almost purely agricultural. That the United States remained the great centre of attraction for Irish emi- grants is proved by the returns for 1905, which show that nearly 80% of the whole number for the year sailed for that country. Ireland does little to swell the rising tide of

emigration that now flows from England and Scotland to British North America.

Turning now to the census figures of 1901, we find that the population had diminished as compared with 1891 by 245,975. During the decade only three counties, Dublin, Down and Antrim, showed any increase, the increase being due to the growth of certain urban areas. Of the total population of 4,458,775, 2,200,040 were males and 2,258,735 were females. The inhabitants of the rural districts (3,073,846) decreased during the decade by over 380,000; that of the urban districts, i.e. of all towns of not less than 2000 inhabitants (1,384,929) increased by over 140,000. This increase was mainly due to the growth of a few of the larger towns, notably of Belfast, the chief industrial centre of Ireland. Between 1891 and 1901 Belfast increased from 273,079 to 349,180; Dublin from 268,587 to 289,108; and Londonderry, another industrial centre in Ulster, from 33,200 to 39,873. On the other hand, towns like Cork (75,978), Waterford (26,743) and Limerick (38,085)! remained almost stationary during the ten years, but the urban districts of Pembroke and of Rathmines and Rathgar, which are practically suburbs of Dublin, showed considerable increases.

From the returns of occupation in 1901, it appears that the indefinite or non-productive class accounted for about 55 % of the entire population. The next largest class was the agricultural, which numbered 876,062, a decrease of about 40,000 as compared with 1891. The industrial class fell from 656,410 to 639,413, but this represented a slight increase in the percentage of the population. The professional class was 131,035, the domestic 219,418, and the commercial had risen from 83,173 in 1891 to 97,889 in 1901. The following table shows the number of births and deaths registered in Ireland during the five years 1901-1905.

The following table shows the principal Irish railways, their mileage and the districts which they serve.

Births.

Deaths.

1901 1902

1903 1904 1905

100,976 101,863 101,831 103,811 102,832

79.“9 77.676 77,358 79.513 75.071

The number of illegitimate births is always very small in proportion to the legitimate. In 1905 illegitimate births numbered 2710 or 2-6 of the whole, a percentage which has been very constant for a number of years.

Railways. — The first act of parliament authorizing a railway in Ireland was passed in 1831. The railway was to run from Dublin to Kingstown, a distance of about 6 m., and was opened in 1834. In 1836 the Ulster railway to connect Belfast and Armagh, and the Dublin and Drogheda railway uniting these two towns were sanctioned. In the same year commissioners were nominated by the crown to inquire (inter alia) as to a general system for railways in Ireland, and as to the best mode of directing the development of the means of intercourse to the channels whereby the greatest advantage might be obtained by the smallest outlay. The commissioners presented a very valuable report in 1838, but its specific recommendations were never adopted by the government, though they ultimately proved of service to the directors of private enterprises. Railway development in Ireland progressed at first very slowly and by 1845 only some 65 m. of railway were open. During the next ten years, however, there was a considerable advance, and in 1855 the Irish railways extended to almost 1000 m. The total authorized capital of all Irish railways, exclusive of light railways, at the end of 1905 was £42,881,201, and the paid-up capital, including loans and debenture stock, amounted to £37,238,888. The total gross receipts from all sources of traffic in 1905 were £4,043,368, of which £2,104,108 was derived from passenger traffic and £1,798,520 from goods traffic. The total number of passengers carried (exclusive of season and periodical ticket-holders) was 27,950,150. Under the various acts passed to facilitate the construction of light railways in backward districts some 15 lines

have been built, principally in the western part of the island from Donegal to Kerry. These railways are worked by existing companies.

Name of Railway.

Mileage.

Districts Served.

Great Southern &

1083

The southern half of Lein-

Western

ster, the whole of Munster, and part of Connaught, the principal towns served being Dublin, Cork, Waterford, Limerick and Sligo. The central districts of Ire-

Midland Great Western

538

land and a great part of

Connaught, the principal

towns served being Dublin,

Athlone, Galway and Sligo. The northern half of Leinster

Great Northern .

533

and a great part of Ulster,

the principal towns served

being Dublin, Belfast,

Londonderry, Dundalk,

Drogheda, Armagh and

Lisburn.

Northern Counties x (now

249

The counties of Antrim,

owned by the Midland

Tyrone and Londonderry.

Railway of England)

Dublin & South

161

The counties of Dublin,

Eastern 2

Wicklow, Wexford and Waterford.

106

The counties of Tyrone and

Donegal. The counties of Londonderry

Londonderry & Lough

99

Swilly

and Donegal.

Cork, Bandon & South

95

The counties of Cork and

Coast

Kerry.

Belfast & County

76

The county of Down.

Down

1 Formerly Belfast and Northern Counties.

2 Formerly Dublin, Wicklow and Wexford.

There is no lack of cross-channel services between Ireland and Great Britain. Belfast is connected by daily sailings with Glasgow, Ardrossan, Liverpool, Feetwood, Barrow and Heysham Harbour, Dublin with Holyhead and Liverpool, Greenore (Co. Down) with Holyhead, Larne (Co. Antrim) with Stranraer, Rosslare(Co.Wexford) with Fishguard and Kingstown (Co. Dublin) with Holyhead.

Navigable Waterways.- — Ireland is intersected by a network ot canals and waterways, which if efficiently managed and developed would prove of immense service to the country by affording a cheap means for the carriage of goods, especially agricultural produce. Two canals — the Grand and the Royal — connect Dublin with the Shannon; the former leading from the south of Dublin to Shannon Harbour and thence on the other side of that river to Ballinasloe, with numerous branches; the latter from the north side of Dublin to Cloondera on the Shannon, with a branch to Longford. The Barrow Navigation connects a branch of the Grand canal with the tidal part of the river Barrow. In Ulster the Bann navigation connects Coleraine, by means of Lough Neagh, with the Lagan navigation which serves Belfast; and the Ulster canal connects Lough Neagh with Lough Erne. The river Shannon is navigable for a distance of 143 m. in a direct course and occupies almost a central position between the east and west coasts.

Agriculture. — Ireland possesses as a whole a soil which is naturally fertile and easily cultivated. Strong heavy clay soils, sandy and gravelly soils, are almost entirely absent; and the mixture of soil arising from the various stratifications and from the detritus carried down to the plains has created many districts of remarkable richness. The " Golden Vein " in Munster, which stretches from Cashel in Tipperary to near Limerick," probably forms the most fertile part of the country. The banks of the rivers Shannon, Suir, Nore, Barrow and Bann are lined with long stretches of flat lands capable of producing fine crops. In the districts of the Old and New Red Sandstone, which include the greater part of Cork and portions of Kerry, Waterford, Tyrone, Fermanagh, Monaghan, Mayo and Tipperary, the soil in the hollows is generally remarkably fertile. Even in the mountainous districts which are unsuitable for tillage there is often sufficient soil to yield, with the aid of the moist atmosphere, abundant pasturage of good quality. The excessive moisture in wet seasons in however hostile to cereal crops, especially

in the southern and western districts, though improved drainage has

done something to mitigate this evil, and might do a great deal more.

Irish political history has largely affected the condition of agriculture. Confiscations and settlements, prohibitive laws (such as those which ruined the woollen industry), penal enact- ments against the Roman Catholics, absenteeism, the creation for political purposes of 40s. freeholders, and other factors have combined to form a story which makes painful reading from whatever point of view, social or political, it be regarded. Happily, however, at the beginning of the 20th century Irish agriculture presented two new features which can be described without necessarily arousing any party' question — the work of the Department of Agriculture and the spread of the principle of co-operation. Another outstanding feature has been the effect of the Land Purchase Acts in transferring the ownership of the land from the landlords to the tenants. Before dealing with these three features, some general statistics may be given bearing upon the condition of Irish agriculture.

Number of Holdings. — Before 1846 the number of small holdings was inordinately large. In 1841, for example, there were no less than 310,436 of between I and 5 acres in extent, and 252,799 of between 5 and 15 acres. This condition of affairs was due mainly to two causes — to the 40s. franchise which prevailed between 1793 and 1829, and after that date to the fierce competition for land by a rapidly increasing population which had no other source of livelihood than agriculture. But the potato famine and the repeal of the Corn Laws, occurring almost simultaneously, caused an immediate and startling diminution in the number of smaller holdings. In 1851 the number between I and 5 acres in extent had fallen to 88,033 and the number between 5 and 15 acres had fallen to 191,854. Simultaneously the number between 15 and 30 acres had increased from 79,342 to 141,311, and the number above 30 acres from 48,625 to 149,090.

Since 1851 these tendencies have not been so marked. Thus in 1905 the number of holdings be- tween 1 and 5 acres was 62,126, the number between 5 and 15 acres 154,560, the number between 15

and 30 acres 134,370 and the number above 30 acres 164,747. Generally speaking, however, it will be seen from the figures that since the middle of the 19th century holdings between I and 30 acres have decreased and holdings over 30 acres have increased. Of the total holdings under 30 acres considerably more than one-third are in Ulster, and of the hold- ings over 30 acres more than one-third are in Munster. The number of holdings of over 500 acres is only 1526, of which 475 are in Connaught. A considerable proportion, however, of these larger holdings, especially in Connaught, consist of more or less waste land, which at the best can only be used for raising a few sheep.

Tillage and Pasturage. — The fact that probably about 1,000,000 acres formerly under potatoes went out of cultivation owing to the potato disease in 1847 makes a comparison between the figures for crops in that year with present figures somewhat fallacious. Starting, however, with that year as the most important in Irish economic history in modern times, we find that between 1847 and 1905 the total area under crops — cereals, green crops, flax, meadow and clover — decreased by 582,348 acres. Up to 1861, as the area formerly under potatoes came back gradually into cultivation, the acreage under crops increased; but since that year, when the total crop area was 5,890,536 acres, there has been a steady and gradual decline, the area in 1905 having fallen to 4,656,227 acres. An analysis of the returns shows, that the decline has been most marked in the acreage under cereal crops, especially wheat. In 1847 the number of acres under wheat was 743,871 and there has been a steady and practically continuous decrease ever since, the wheat acreage in 1905 being only 37,860 acres. In that year the wheat area, excluding less than 5000 acres in Connaught, was pretty equally divided between the other three provinces. Oats has always been the staple cereal crop in Ireland, but since 1847 its cultivation has declined by over 50 . In that year 2,200,870 acres were under oats and in 1905 only 1 ,066,806 acres. Nearly one-half of the area under oats is to be found in Ulster; Leinster and Munster are fairly equal ; and Connaught has something over 100,000 acres under this crop. The area under barley and rye has also declined during the period under review by about one-half — from 345,070 acres in 1847 to 164,800 in 1905. The growing of these crops is confined almost entirely to Leinster and Munster. Taking all the cereal crops together, their cultivation during the last 60 years has gradually declined (from 3,313,579 acres in 1847 to 1,271,190 in 1905) by over 50. The area, however, under green crops — potatoes, turnips, mangel-wurzel, beet, cabbage, &c, shows during the same period a

much less marked decline — -only some 300,000 acres. There has been a very considerable decrease

since about 1861 in the acreage under potatoes. This is probably due to two causes — the emigration of the poorer classes who subsisted on that form of food, and the gradual introduction of a more varied dietary. The total area under potatoes in 1905 was 616,755 acres as compared with 1,133,504 acres in 1861. Since about 1885 the acreage under turnips has remained fairly stationary in the neigh- bourhood of 300,000 acres, while the cultivation of mangel-wurzel has considerably increased. Outside the recognized cereal and green crops, two others may be considered, flax and meadow and clover. The cultivation of the former is practically confined to Ulster and as compared with 20 or 30 years ago has fallen off by considerably more than 50 %, despite the proximity of the linen industry. The number of acres under flax in 1905 was only 46,158. The Department of Agriculture has made efforts to improve and foster its cultivation, but without any marked results as regards increasing the area sown. During the period under review the area under meadow and clover has increased by more than 50 %, rising from 1,138,946 acres in 1847 to 2,294,506 in 1905. It would thus appear that a large proportion of the land which has ceased to bear cereal or green Crops is now laid down in meadow and clover. The balance has become pasturage, and the total area under grass in Ireland has so largely increased that it now embraces more than one-half of the entire country. This increase of the pastoral lands, with the corresponding decrease of the cropped lands, has been the marked feature of Irish agricultural returns since 1847. It is attribut- able to three chief reasons, the dearth of labour owing to emigration, the greater fall in prices of produce as compared with live stock, and the natural richness of the Irish pastures. The following table shows the growth of pasturage and the shrinkage of the crop areas since i860.

Year.

Total Area,

Cultivated Area (Crops and Grass).

Crops (other than Meadow and Clover).

Meadow

and Clover.

Grass.

i860

1880 1900 1905

20,284,893 20,327,764

20,333.344 20,350,725

15.453.773 15.340,192 15,222,104 15,232,699

4.375.621

3.I7I.259 2,493.oi7

2,410,813

I.594.5I8

1,909,825 2,165,715 2,224,165

9,483,634 10,259,108 10,563,372

io,597,72i

One more table may be given showing the proportional areas under the various kinds of crops, grass, woods and plantations, fallow, bog, waste, &c, over a series of years.

Year.

Cereal Crops.

Green Crops.

Meadow

and Clover.

Grass.

Total

Agricultural

Land.

Woods.

Fallow.

Waste.

1851 1880 1905

15-2 8-1 6-3

6-7

5-5 53

61

8-1 1 1-3. .

430 50-5 ,52- 1

71-0 72-2

75-o

1-5 1-7

i-5

1-0

o-o o-o

25-7

22-8

23-5

Produce and Live Stock. — With the decrease of the area under cereal and green crops and the increase of pasturage there has naturally been a serious fall in the amount of agricultural produce and a considerable rise in the number of live stock since the middle of the 19th century. Thus in 1851 the number of cattle was returned as 2,967,461 and in 1905 as 4,645,215, the increase during the inter- vening period having been pretty gradual and general. Sheep in 1851 numbered 2,122,128 and in 1905 3,749,352, but the increase in this case has not been so continuous, several of the intervening years showing a considerably higher total than 1905, and for a good many years past the number of sheep has tended to decline. The

number of pigs has also varied considerably from year to year, 1905 showing an increase of about 150,000 as compared with 1851.

The Department of Agriculture.- — By an act of 1899 a Depart- ment of Agriculture and other industries and technical instruction was established in Ireland. To this department were transferred numerous powers and duties previously exercised by other authorities, including the Department of Science and Art. To assist the department the act also provided for the establishment of a council of agriculture, an agricultural board and a board – of technical instruction, specifying the constitution of each of the three bodies. Certain moneys (exceeding £180,000 per annum) were placed by the act at the disposal of the department, provisions were made for their application, and it was enacted that local authorities might contribute funds. The powers aqd duties of the department are very wide, but under the present section its chief importance lies in its administrative work with regard to agriculture. In the annual reports of the department this work is usually treated under three heads: (1) agricultural instruction, (2) improvement of live stock, and (3) special investigations.

i. The ultimate aim of the department's policy in the matter ji agricultural instruction is, as defined by itself, to place within the reach of a large number of young men and young women the means of obtaining in their own country a good technical knowledge of all ubjects relating to agriculture, an object which prior to the estab lishment of the department was for all practical purposes unattain T able. Before such a scheme could be put into operation two things had to be done. In the first place, the department had to train teachers of agricultural subjects; and secondly, it had to demonstrate to farmers all over Ireland by a system of itinerant instruction some of the advantages of such technical instruction, in order to indu'ce them to make some sacrifice to obtain a suitable education for their sons and daughters. In order to accomplish the first of these two preliminaries, the department established a Faculty of Agriculture at the Royal College of Science in Dublin, and offered'a considerable number of scholarships the competition for which becomes in- creasingly keen. They also reorganized the Albert Agricultural College at Glasnevin for young men who have neither the time nor

the means to attend the highly specialized courses at the Royal College of Science ; and the Munster Institute at Cork is now devoted solely to the instruction of girls in such subjects as butter-making, poultry-keeping, calf-rearing, cooking, laundry-work, sewing and gardening. In addition to these three permanent institutions, local schools and classes have been established in different parts of the country where systematic instruction in technical agriculture is given to young men. In this and in other branches of its work the department is assisted by agricultural committees appointed by the county councils. The number of itinerant instructors is governed entirely by the available supply of qualified men. The services of every available student on completing his course at the Royal College of Science are secured by some county council committee. The work of the itinerant instructors is very varied. They hold classes and carry out field demonstrations and experiments, the results of which are duly published in the department's journal. The department has also endeavoured to encourage the fruit-growing industry in Ireland by the. establishment of a horticultural school at Glasnevin, by efforts to secure uniformity in the packing and grading of fruit, by the establishment of experimental fruit-preserving factories, by the planting of orchards on a large scale in a few districts, and by pioneer lectures. As the result of all these efforts there has been an enormous increase in the demand for fruit trees of all kinds.

2. The marked tendency which has been visible for so many years in Ireland for pasturage to increase at the expense of tillage makes the improvement of live-stock a matter of vital importance to all concerned in agriculture. Elaborate schemes applicable' to horse-breeding, cattle-breeding and swine-breeding, have been drawn up by the department on the advice of experts, but the working of the schemes is for the most part left to the various county council committees. The benefits arising from these schemes are being more and more realized by farmers, and the department is able to report an increase in the number of'pure bred cattle and horses in Ireland.

3. The special investigations carried out by the department naturally vary from year to year, but one of the duties of each instructor in agriculture is to conduct a number of field experiments, mainly oh the influence of manures and seeds in the yield of crops. The results of these experiments are issued in the form of leaflets and distributed widely among farmers. One of the most interesting experiments, which may have far- reaching economic effects, has been in the cultivation of tobacco. So far it has been proved (1) that the tobacco plant can be grown successfully in Ireland, and (2) that the crop when blended with American leaf can be manufac- tured into a

mixture suitable for smoking. But whether Irish to bacco can be made a profitable crop depends upon a good many other considerations.

Agricultural Co-operation. — In 1894 the efforts of a number of Irishmen drawn from all political parties were successfully directed towards the formation of the Irish Agricultural Organization Society, which has for its object the organizing of groups of farmers on co-operative prin- ciples and the provision of in- struction in proper technical methods. The society had at first many difficulties to con- front, but after the first two or its progress became more

beyond all question one of the most hopeful features in Irish agriculture.

Perhaps the chief success of the society was seen in the establish- ment of creameries, which at the end of 1905 numbered 275 — 123 in Ulster, 102 in Munster, 20 in Leinster and 30 in Connaught. The members numbered over 42,000 and the trade turnover for the year was £1,245,000. Agricultural societies have been established for the purchase of seed, implements, &c, on co-operative lines and of these there are 150, with a membership of some 14,000. The society was also successful in establishing a large number of credit societies, from which farmers can borrow at a low rate of interest. There are also societies for poultry-rearing, rural industries, bee-keeping, bacon-curing, &c, in connexion with the central organization. The system is rounded off by a number of trade federations for the sale and purchase of various commodities. The Department of Agricul- ture encourages the work of the Organization Society by an annual grant.

Land Laws. — The relations of landlord and tenant in Ireland have been a frequent subject of legislation (see History below). Under the act of 1881, down to the 31st of March 1906, the rents of 360,135 holdings, representing nearly 11,000,000 acres, had been fixed for the first statutory term of 15 years either by the land commissioners or by agreements between landlords and tenants, the aggregate reduction being over 20 % as compared with the old rents. The rents of 120,515 holdings, representing over 3,500,000 acres, had been further fixed for the second statutory term, the aggregate reduction being over 19 % as compared with the first term rents. Although the acts of 1870 and 1 88 1 provided facilities for the purchase of holdings by the tenants, it was only after the passing of the Ashbourne Act in 1885 that the transfer of ownership to the occupying tenants began on an extended scale. Under this act

between 1885 and 1902, when further proceedings were suspended, the number of loans issued was 25,367 (4221 in Leinster; 5204 in Munster; 12,954 in Ulster, and 2988 in Connaught) and the amount was £9,992,536. Between August 1891 and April 1906, the number of loans issued under the acts of 1891 and 1896 was 40,395 (7838 in Leinster; 7512 in Munster; 14,955 m Ulster, and 10,090 in Connaught) and the amount was £11,573,952. Under the Wyndham Act of 1903 the process was greatly extended.

The following tables give summarized particulars, for the period from the 1st of November 1903 to the 31st of March 1906, of (1) estates for which purchase agreements were lodged in cases of sale direct from landlords to tenants; (2) estates for the purchase of which the Land Commission entered into agreements under sects. 6 and 8 of the act ; (3) estates in which the offers of the Land Com- mission to purchase under sect. 7 were accepted by the land judge; and (4) estates for the purchase of which, under sections 72 and 79, originating requests were transmitted by the Congested Districts Board to the Land Commission : —

Classification.

No. of

Estates.

No. of Purchasers.

Purchase Money.

Price.

Amount of

Advances

applied for.

Amount of

Proposed

Cash Payments.

Direct Sales . Sections 6 and 8 Section 7 … Sections 72 and 79 .

3446 54 29 67

86,898

3,567 1

I.I74 1 5,6o6 1

£32,811,564

1,231,014

383,388

975,2H

£32,692,066

1,226,832

381,722

975,2H

£119,498

4,182 1,666

Total ....

3596

97,245

£35,401,177

£35,275,831

£125,346

Classification.

No. of Estates.

No. of Purchasers.

Purchase Money.

Price.

Amount of

Advances

made.

Amount of Cash Payments.

Direct Sales . Sections 6 and 8 Section 7 ... Sections 72 and 79 .

925 40 29 12

16,732

3,047

1,174

763

£8,317,063

1,048,459

383,388

I99,58i

£8,226,736

1,047,007

381,722

I99,58i

£90-327

1,452 1,666

Total ....

1006

21,716

£9,948,491

£9,855,046

£93,445

1 Estimated number of purchasers on resale.

three years of its existence rapid, and co-operation became

It will be seen from these two tables that though the amount of ad-'ances applied for during the period dealt with amounted to over

75°

IRELAND

[MANUFACTURES

£35,000,000 the actual advances made were less than £10,000,000. It will be seen further that the act operated almost entirely by means of direct sales by landlords to tenants. Of the total amount advanced up to March 31, 1906, almost one-half was in respect of estates in the province of Leinster, the balance being divided pretty equally between estates in the other three provinces.

Fisheries. — The deep-sea and coast fisheries of Ireland form a valuable national asset, which still admits of much develop- ment and improvement despite the fact that a considerable number of acts of parliament have been passed to promote and foster the fishing industry. In 1882 the Commissioners of Public Works were given further powers to lend money to fishermen on the recommendation of the inspectors of fisheries; and under an act of 1883 the Land Commission was authorized to pay from time to time such sums, not exceeding in all £250,000, as the Commissioners of Public Works might require, for the creation of a Sea Fishery Fund, such fund to be expended — a sum of about £240,000 has been expended— on the construction and improvement of piers and harbours. Specific acts have also been passed for the establishment and development of oyster, pollan and mussel fisheries. Under the Land Purchase Act 1 89 1, a portion of the Sea Fisheries Fund was reserved for administration by the inspectors of fisheries in non-congested districts. Under this head over £36,000 had been advanced on loan up to December 31, 1905, the greater portion of which had been repaid. In 1900 the powers and duties of the inspectors of fisheries were vested in the Department of Agriculture and Technical Instruction. Under the Marine Works Act 1902, which was intended to benefit and develop industries where the people were suffering

from congestion, about £34,000 was expended upon the construction and improvement of fishery harbours in such districts.

For administrative purposes Ireland is divided into 31 deep-sea and coast fisheries and during 1905, 6190 vessels were engaged in these districts, giving employment to a total of 24,288 hands. Ex- cluding salmon, nearly one million hundredweights of fish were taken, and including shell-fish the total money received by the fishermen exceeded £414,000. In the same year 13,436 hands were engaged in the 25 salmon fishing districts into which the country is divided. In addition to the organized industry which exists in these salmon districts, there is a good deal of ordinary rod and line fishing in the higher reaches of the larger rivers and good trout fishing is obtainable in many districts.

Mining. — The mineral produce of Ireland is very limited, and its mines and quarries in 1905 gave employment to only about 6000 persons. Coal-fields are found in all the provinces, but in 1905 the total output was less than 100,000 tons and its value at the mines was given as £43,000. Iron ore is worked in Co. Antrim, over 113,000 tons having been produced in 1905. Alum clay or bauxite, from which aluminium is manufactured, is found in the same county. Clays of various kinds, mainly fire and brick clay, are obtained in several places and there are quarries of marble (notably in Connemara), slate, granite, limestone and sandstone, the output of which is considerable. Silver is obtained in small quantities from lead ore in Co. Donegal, and hopes have been entertained of the re-discovery of gold in Co. Wicklow, where regular workings were established about 1796 but were destroyed during the Rebellion.

Woollen Manufacture. — At an early period the woollen manu-factures of Ireland had won a high reputation and were exported in considerable quantities to foreign countries. Bonifazio Uberti (d. c. 1367) refers in a posthumous poem called Dila mundi to the " noble serge " which Ireland sent to Italy, and fine mantles of Irish frieze are mentioned in a list of goods exported from England to Pope Urban VI. In later times, the establishment of a colony from the German Palatinate at Carrick-on-Suir in the reign of James I. served to stimulate the manufacture, but in the succeeding reign the lord-deputy Strafford adopted the policy of fostering the linen trade at the expense of the woollen in order to prevent the latter from competing with English products. An act of the reign of Charles II. prohibited the export of raw wool to foreign countries from Ireland as well as England, while at the same time Ireland was practically excluded by heavy duties from the English markets,

and as the Navigation Act of 1663 did not apply to her the colonial market was also closed against Irish exports. The foreign market, however, was still open, and after the prohibition of the export of Irish cattle to England the Irish farmers turned their attention to the breeding of sheep, with such good effect that the woollen manufacture increased with great rapidity. Moreover the improved quality of the wool showed itself in the improvement of the finished article, to the great alarm of the English manufacturer. So much trade jealousy was aroused that both Houses of Parliament petitioned William III. to interfere. In accordance with his wishes the Irish parliament in 1698 placed heavy additional duties on all woollen clothing (except friezes) exported from Ireland, and in 1699 the English Parliament passed an act prohibiting the export from Ireland of all woollen goods to any country except England, to any port of England except six, and from any town in Ireland except six. The cumulative effect of these acts was practically to annihilate the woollen manufacture in Ireland and to reduce whole districts and towns, in which thousands of persons were directly or indirectly supported by the industry, to the last verge of poverty. According to Newenham's tables the annual average of new drapery exported from Ireland for the three years ending March 1702 was only 20 pieces, while the export of woollen yarn, worsted yarn and wool, which to England was free, amounted to 349,410 stones. In his essay on the Trade of Ireland, pub- lished in 1729, Arthur Dobbs estimated the medium exports oi wool, worsted and woollen yarn at 227,049 stones, and he valued the export of manufactured woollen goods at only £2353. On the other hand, the imports steadily rose. Between 1779 and 1782 the various acts which had hampered the Irish woollen trade were either repealed or modified, but after a brief period of deceptive prosperity followed by failure and distress, the expansion of the trade was limited to the partial supply of the home market. According to evidence laid before the House of Commons in 1822 one-third of the woollen cloth used in Ireland was imported from England. A return presented to Parliament in 1837 stated that the number of woollen or worsted factories in Ireland was 46, employing 1321 hands. In 1879 the number of factories was 76 and the number of hands 2022. Since then the industry has shown some tendency to increase, though the number of persons employed is still comparatively very small, some 3500 hands.

Linen Manufacture. — Flax was cultivated at a very early period in Ireland and was both spun into thread and manu- factured into cloth. In the time of Henry VIII. the manufacture constituted one of the principal branches of Irish trade, but it did not prove a very

serious rival to the woollen industry until the policy of England was directed to the discouragement of the latter. Strafford, lord-deputy in the reign of Charles I., did much to foster the linen industry. He invested a large sum of his own money in it, imported great quantities of flax seed from Holland and induced skilled workmen from France and the Netherlands to settle in Ireland. A similar policy was pursued with even more energy by his successor in office, the duke of Ormonde, at whose instigation an Irish' act was passed in 1665 to encourage the growth of flax and the manufacture of linen. He also established factories and brought over families from Brabant and France to work in them. The English parliament in their desire to encourage the linen industry at the expense of the woollen, followed Ormonde's lead by passing an act inviting foreign workmen to settle in Ireland, and admitting all articles made of flax or hemp into England free of duty. In 17 10, in accordance with an arrangement made between the two king- doms, a board of trustees was appointed to whom a considerable sum was granted annually for the promotion of the linen manu- facture; but the jealousy of English merchants interposed to check the industry whenever it threatened to assume proportions which might interfere with their own trade, and by an act of George II. a tax was imposed on Irish sail-cloth imported into England, which for the time practically ruined the hempen manufacture. Between 1700 and 1777 the board of trustees expended nearly £850,000 on the promotion of the linen trade,

and in addition parliamentary bounties were paid on a consider- able scale. In 1727 Arthur Dobbs estimated the value of the whole manufacture at £1,000,000. In 1830 the Linen Board ceased to exist, the trade having been for some time in a very depressed condition owing to the importation of machine-made yarns from Scotland and England. A year or two later, however, machinery was introduced on a large scale on the river Bann. The experiment proved highly successful, and from this period may be dated the rise of the linen trade of Ulster, the only great industrial manufacture of which Ireland can boast. Belfast is the centre and market of the trade, but mills and factories are to be found dotted all over the eastern counties of Ulster.

In 1850 the number of spindles was 396,338 and of power looms 58;

in 1905 the corresponding figures were 826,528 and 34,498. In 1850 the number of persons employed in flax mills and factories was 21,121; in 1901 the number in flax, hemp and jute textile factories was 64,802.

Cotton Manufacture. — This was introduced into Ireland in 1777 and under the protection of import duties and bounties increased so rapidly that in 1800 it gave employment to several thousand persons, chiefly in the neighbourhood of Belfast. The trade continued to grow for several years despite the removal of the duties; and the value of cotton goods exported from Ireland to Great Britain rose from £708 in 1814 to £347,606 in 1823. In 1822 the number of hands employed in the industry was stated to be over 17,000. The introduction of machinery, however, which led to ftie rise of the great cotton industry of Lancashire, had very prejudicial effects, and by 1839 the number of persons employed had fallen to 4622. The trade has dwindled ever since and is now quite insignificant.

Silk Manufacture. — About the end of the 17th century French Huguenots settled in Dublin and started the manufacture of Irish poplin, a mixture of silk and wool. In 1823 between 3000 and 4000 persons were employed. But with the abolition of the protective duties in 1826 a decline set in; and though Irish poplin is still celebrated, the industry now gives employment to a mere handful of people in Dublin.

Distilling and Brewing. — Whisky has been extensively distilled in Ireland for several centuries. An excise duty was first imposed in 1661, the rate charged being 4d. a gallon. The imposition of a duty gave rise to a large amount of illicit distillation, a practice which still prevails to some extent, though efficient police methods have largely reduced it. During recent years the amount of whisky produced has shown a tendency to deciease. In 1900 the number of gallons charged with duty was 9,589,571, in 1903 8,215,355, and in 1906 7,337,928. There are breweries in most of the larger Irish towns, and Dublin is celebrated for the porter produced by the firm of Arthur Guinness & Son, the largest establishment of the kind in the world. The number of barrels of beer — the inclusive term used by the Inland Revenue Department — charged with duty in 1906 was 3,275,309, showing an increase of over 200,000 as compared with 1900.

The following table shows the net annual amount of excise duties received in Ireland in a series of years: —

Articles.

1900.

1902.

1904.

1906.

Beer . Licences . Spirits Other sources

£983,841

209,577 4,952,061 502

£1,200,711

213,092

4,292,286

436

£1,262,186

213,964

4,3",763 508

£1,227,528

214,247

3.952,509

798

Total . .

£6,145,981

£5,706,525

£5.788,421

£5,395,082

merchants of Dublin fled from their city at the time of the Anglo-Norman invasion it was given by Henry II. to merchants from Bristol, to whom free trade with other portions of the kingdom was granted as well as other advantages. In the Staple Act of Edward III., Dublin, Waterford, Cork and Drogheda are men- tioned as among the towns where staple goods could be purchased by foreign merchants. During the 15th century the trade of these and other towns increased rapidly. With the 17th century began the restrictions on Irish trade. In 1637 duties were im- posed on the chief commodities to foreign nations not in league with England. Ireland was left out of the Navigation Act of 1663 and in the same year was prohibited from exporting cattle to England in any month previous to July. Sir William Petty estimated the value of Irish exports in 1672 at £500,000 per annum, and owing principally to the prosperity of the woollen industry these had risen in value in 1698 to £996,000, the imports in the same year amounting to £576,000. A rapid fall in exports followed upon the prohibition of the export of woollen manu-factures to foreign countries, but in about 20 years' time a recovery took place, due in part to the increase of the linen trade. Statistics of exports and imports were compiled for various, years by writers like Newenham, Arthur Young and 'Cesar Moreau, but these are vitiated by being given in Irish currency which was altered from time to time, and by the fact that the method of rating at the custom-house also varied. Taking the figures, however, for what they are worth, it appears that between 1701 and 1 7 10 the average annual exports from Ireland to all parts of the world were valued at £553,000 (to Great Britain, £242,000) and the average annual imports at £513,000 (from Great Britain, £242,000). Between 1751 and 1760 the annual values had risen for exports to £2,002,000 (to Great Britain, £1,068,000) and for imports to £1,594,000 (from Great Britain, £734,000). Between 1794 and 1803 the figures had further risen to £4,310,000 (to Great Britain, £3,667,000) and £4,572,000 (from Great Britain £3,404,000). It is clear, therefore, that during the 18th century the increase of commerce was considerable.

In 1825 the shipping duties on the cross-Channel trade were abolished and since that date no official figures are available as to a large part of Irish trade with Great Britain. The export of cattle and other animals, however, is the most important part of this trade and details of this appear in the following table: —

Other Industries. — Shipbuilding is practically confined to Belfast, where the firm of Harland and Wolff, the builders of the great " White Star " liners, have one of the largest yards in the world, giving employment to several thousand hands. There are extensive

engineering works in the same city which supply the machinery and other requirements of the linen industry. Paper is manufactured on a considerable scale in- various places, and Balbriggan is celebrated for its hosiery.

Commerce and Shipping. — From allusions in ancient writers it would appear that in early times Ireland had a considerable commercial intercourse with various parts of Europe. When the

Year.

Cattle.

Sheep.

Swine.

Total.

1891 1900

!9°5

630,802 745,519 749.131

893.175 862,263 700,626

505.584 715,202

363.973

2,029,561

2,322,984 1,813,730

The value of the animals exported in 1905 was estimated (at certain standard rates) at about £14,000,000.

Since 1870 the Board of Trade has ceased to give returns of the foreign and colonial trade for each of the separate kingdoms of England, Scotland and Ireland. Returns are given, however, for the principal ports of each kingdom. Between 1886 and 1905 these imports at the Irish ports rose from £6,802,000 in value to £12,394,000 and the exports from £825,000 to £1,887,000.

The following table shows the value of the total imports and exports of merchandise in the foreign and colonial trade at the ports of

Dublin, Belfast and Limerick in each of the years 1901- 1905:—

Ports.

Dublin- Imports Exports

Belfast- Imports Exports

Cork — Imports Exports

Limerick — Imports Exports

1901.

£

2,666,000 54,000

6,626,000 1,442,000

1,062,000 15,000

826,000 2,000

1902.

£

2,856,000 63,000

6,999,000 1,344,000

1,114,000 17,000

913,000 400

1903.

£

3,138,000 122,000

7,773,000 1,122,000

1,193,000 6,000

855,000 3,000

1904.

£

2,771,000 79,000

7,033,000 1,332,000

1,156,000 8,000

935,000 600

1905.

£

2,664,000. 78,000

6,671,000 1,780,000

1,010,000 5.000

854,000 3,000

The Department of Agriculture published in 1906 a report on the imports and exports at Irish ports for the year 1904. In this report,

the compiling of which presented great difficulties in the absence of official returns, are included (l) the direct trade between Ireland and all countries outside of Great Britain, (2) the indirect trade of Ireland with those same countries via Great Britain, and (3) the local trade between Ireland and Great Britain. The value of im- ports in 1904 is put at £55,148,206, and of exports at £46,606,432. But it is pointed out in the report that while the returns as regards farm produce, food stuffs, and raw materials may be considered approximately complete, the information as to manufactured goods — especially of the more valuable grades — is rough and in- adequate. It was estimated that the aggregate value of the actual import and export trade in 1904 probably exceeded a total of £105,000,000. The following table gives some details: —

Imports.

Exports.

I. Farm Produce, Food and Drink

Stuffs— (a) Live-stock, meat, bacon, fish

and dairy produce . (6) Crops, fruit, meal, Hour, &c. .

(c) Spirits, porter, ale, &c.

(d) Tea, coffee, tobacco, spices, &c.

II. Raw Materials —

(a) Coal

(b) Wood

(c) Mineral

(d) Animal and vegetable products

III. Goods, partly manufactured or of simple manufacture .

IV. Manufactured goods. ...

£3,028,170

11,859,201

919,161

4,230,478

2,663,523 1,880,095 1,012,822 4,529,002

7,996,143 17,059,611

£23,445,122

1,721,753 4,222,194 1,121,267

235,479

282,081

3,067,398

2,576,993 9,934,145

From the figures given in the report it would appear that there was in 1904 an excess of imports amounting to over £8,500,000. But owing to the imperfect state of existing information, it is impossible to say with any certainty what is the real state of the balance of visible trade between Ireland and other countries.

Shipping returns also throw some light upon the commercial condition of Ireland. Old figures are not of much value, but it may be stated that Arthur Dobbs gives the number of ships engaged in the Irish trade in 1721 as 3334 with a tonnage of 158,414. Ac- cording to the statistics of Cesar Moreau the number of ships be- longing to Irish ports in 1788 was 1016 with a tonnage of over 60,000, and in 1826 they had increased, according to the trade and navigation returns, to 139 1 with a tonnage of over 90,000. In 1905 the vessels registered at Irish ports numbered 934 with a tonnage of over 259,000. In the same year the vessels entering and clearing in the colonial and foreign trade numbered 1 199 with a tonnage of over 1,086,000, and the vessels entering and clearing in the trade between Great Britain and Ireland numbered 41,983 with a tonnage of over 9,776,000.

Government, b°c. — The executive government of Ireland is vested in a lord-lieutenant, assisted by a privy council and by a chief secretary, who is always a member of the House of Commons and generally of the cabinet. There are a large number of administrative departments and boards, some, like the Board of Trade, discharging the same duties as the similar department in England; others, like the Congested Districts Board, dealing with matters of purely Irish concern.

Parliamentary Representation. — The Redistribution of Seats Act 1885 entirely altered the parliamentary representation of Ireland. Twenty-two small boroughs were disfranchized. The towns of Galway, Limerick and Waterford lost one member each, while Dublin and Belfast were respectively divided into four divisions, each returning one member. As a result of these changes 85 members now represent the counties, 16 the boroughs, and 2 Dublin University — a total of 103. The total number of electors (exclusive of Dublin University) in 1906 was 686,661; II[3>595 f° r the boroughs and 573,066 for the counties. Ireland is represented in the House of Lords by 28 temporal peers elected for life from among the Irish

peers.

Local Government. — Irish local government was entirely re-modelled by the Local Government (Ireland) Act 1898, which conferred on Ireland the same system and measure of self-government enjoyed by Great Britain. The administrative and fiscal duties previously exercised by the grand jury in each county were transferred to a county council, new administrative counties being formed for the purposes of the act, in some cases by the alteration of existing boundaries. To the county councils were also assigned the power of assessing and levying the poor rate in rural districts, the management of lunatic asylums, and the

administration of certain acts such as the Explosives Act, the Technical Education Act and the Diseases of Animals Act. Subordinate district councils, urban and rural, were also established as in England and Scotland to manage the various local areas within each county. The provisions made for the admini- stration of the Poor Law by the act under consideration are very complicated, but roughly it may be said that it was handed over to these new subordinate local bodies. Six towns — Dublin, Belfast, Cork, Limerick, Londonderry and Waterford — were constituted county boroughs governed by separate county councils; and five boroughs — Kilkenny, Sligo, Clonmel, Drogheda and Wexford — retained their former corporations. The act provides facilities for the conversion into urban districts of (1) towns having town commissioners who are not sanitary authorities and (2) non-municipal towns with populations of over 1 500 and entitled to petition for town commissioners.

Justice. — The Supreme Court of Judicature is constituted as follows: the court of appeal, which consists of the lord chancellor, the lord chief justice, and the master of the rolls and the chief baron of the exchequer as ex-qfficio members, and two lords justices of appeal; and the high court of justice which includes (1) the chancery division, composed of the lord chancellor, the master of the rolls and two justices, (2) the king's bench division composed of the lord chief justice, the chief baron of the exchequer and eight justices, and (3) the land commissions with two judicial commissioners. At the first vacancy the title and rank of chief baron of the exchequer will be abolished and the office reduced to a puisne judgeship. By the County Officers and Courts (Ireland) Act 1877, it was provided that the chairmen of quarter sessions should be called " county court judges and chairmen of quarter sessions " and that their number should be reduced to twenty-one, which was to include the recorders

of Dublin, Belfast, Cork, Londonderry and Galway. At the same time the jurisdiction of the county courts was largely extended. There are 66 resident (stipendiary) magistrates, and four police magistrates in Dublin.

Police. — The Royal Irish Constabulary were established in 1822 and consisted at first of 5000 men under an inspector- general for each of the four provinces. In 1836 the entire force was amalgamated under one inspector-general. The force, at present consists of about 10,000 men of all ranks, and costs over £1,300,000 a year. Dublin has a separate metropolitan police force.

Crime. — The following table shows the number of persons committed for trial, convicted and acquitted in Ireland in 1886, 1891, 1900 and 1905: —

Year.

Committed.

Convicted.

Acquitted.

1886 1891 1900 1905

3,028 2,112 1,682 2,060

1,619

1,255 1,087

1.367

1286 669 331 417

Of the 1367 convicted in 1905, 375 were charged with offences against the person, 205 with offences against property with violence, 545 with offences against property without violence, 52 with malicious injury to property, 44 with forgery and offences against the currency, and 146 with other offences. In 1904, 81,775 cases of drunkenness were brought before Irish magistrates as compared with 227,403 in England and 43,580 in Scotland.

Poor Law. — The following table gives the numbers in receipt of indoor and outdoor relief (exclusive of persons in institutions for the blind, deaf and dumb, and for idiots and imbeciles) in. the years

1902-1905, together with the total expenditure for relief of the poor: —

Year.

Aggregate number relieved during the year.

Total Annual Expenditure.

Indoor.

Outdoor.

Total.

1902 1903 1904 1905

363-483 363.091 390,047

434-U7

105,501 99,150 98,607

124,697

468,984 452,241 488,654 558,814

£1,026,691

986,301

1,033,168

1,066,733

The average daily number in receipt of relief of all kinds (except outdoor relief) during the same years was as follows: 1902, 41,163 ; 1903, 43,600; 1904, 43,721; 1905, 43,911. The percentage of indoor paupers to the estimated population in 1905 was I -co.

Congested Districts Board. — This body was constituted by the Purchase of Land Act 1891, and is composed of the chief secretary,

a member of the Land Commission and five other members. A considerable sum of money was placed at its disposal for carrying out the objects for which it was created. It was provided that where more than 20% of the population of a county lived in electoral divisions of which the total rateable value, when divided by the number of the population, gave a sum of less than £1, 10s. for each individual, these divisions should, for the purposes of the act, form a separate county, called a congested districts county, and should be subject to the opera- tions of the board. In order to improve the condition of affairs in congested districts, the board was empowered (1) to amal- gamate small holdings either by directly aiding migration or emigration of occupiers, or by recommending the Land Commis- sion to facilitate amalgamation, and (2) generally to aid and develop out of its resources agriculture, forestry, the breeding of live-stock, weaving, spinning, fishing and any other suitable industries. Further provisions regulating the operations of funds of the board were enacted in 1893, 1896, 1899 and 1903; and by its constituting act the Department of Agriculture wUs empowered to exercise, at the request of the board, any of its powers and duties in congested districts.

Religion. — The great majority of the Irish people belong to the Roman Catholic Church. In 1891 the Roman Catholics numbered 3,547,307 or 75% of the total population, and in 1901 they numbered 3,308,661 or 74%. The adherents of the Church of Ireland corne next in number (581,089 in 1901 or 13% of the population), then the Presbyterians (443,276 in 1901 or 10% of the population), the only other denomination with a considerable number of members being the Methodists (62,006 in 1901). As the result of emigration, which drains the. Roman Catholic portion of the population more than any other, the Roman Catholics show a larger proportional decline in numbers than the Protestants; for example, between 1891 and 1901 the Roman Catholics decreased by over 6%, the Church of Ireland by a little over 3%, the Presbyterians by less than 1%, while' the Methodists actually increased by some 11%. The only counties in which the Protestant religion predominates are Antrim, Down, Armagh and Londonderry.

The Roman Catholic Church is governed in Ireland by 4 arch- bishops, whose sees are in Armagh, Dublin, Cashel and Tuam, and 23 bishops, all nominated by the pope. The episcopal emolu- ments arise from the mensal parishes, the incumbency of which is retained by the bishops, from licences and from an annual contri- bution, varying in amount, paid by the clergy of the diocese. The clergy are supported by fees and the voluntary contributions of their flocks. At

the census of 1901 there were 1084 parishes, and the clergy numbered 371 1. In addition to the secular clergy there are several communities of regular priests scattered over the country, ministering in their own churches but without parochial juris- diction. There are also numerous monasteries and convents, a large number of which are devoted to educational purposes. The great majority of the secular clergy are educated at Maynooth College (see below).

The Protestants of Ireland belong mainly to the Church of Ireland (episcopalian) and the Presbyterian Church. (For the former see Ireland, Church of).

The Presbyterian Church, whose adherents are found principally in Ulster and are the descendants of Scotch settlers, was originally formed in the middle of the 17th century, and in 1840 a reunion took place of the two divisions into which the Church had formerly separated. The governing body is the General Assembly, consisting of ministers and laymen. In 1906 there were 569 congregations, arranged under 36 presbyteries, with 647 ministers. The ministers are supported by a sustentation fund formed of voluntary con- tributions, the rents of seats and pews, and the proceeds of the commutation of the Regium Donum made by the commissioners under the Irish Church Act 1869. Two colleges are connected with the denomination, the General Assembly's College, Belfast, and the Magee College, Londonderry. In 1881 the faculty of the Belfast College and the theological professors of the Magee College were incorporated and constituted as a faculty with the power of granting degrees in divinity.

The Methodist Church in Ireland was formed in 1878 by the

Union of the Wesleyan with the Primitive Wesleyan Methodists. The number of ministers is over 250.

Education. — The following table shows that the proportion per cent of the total population of five years old and upwards able to read and write has been steadily rising since 1861 : —

Proportion per cent.

1861.

1871.

1881.

1891.

1901.

Read and write

Read only ....

Neither read nor write

41 20 39

49 17 33

59 16

25

71 11 18

79

7

14

Further details on the same subject, according to provinces and religious denominations in 1901, are subjoined: —

Roman Catholics —

Read and write .

Read only

Neither read nor write Protestant Episcopalians- Read and write

Read only

Neither read nor write Presbyterians —

Read and write

Read only

Neither read nor write Methodists —

Read and write .

Read only

Neither read nor write Others —

Read and write .

Read only

Neither read nor write Total- Read and write .

Read only …

Neither read nor write

Leinster.

80

7

13

95 1

4

97 1

2

97 1 2

9i

2

7

83

6

11

Munster.

80

5 15

95 2

3

96 2 2

97 1 2

91

2

7

81

5

14'

Ulster.

70

II

19

81

9 10

7 5

90 5 5

90 6

4

79 9

12

^Jonnaught.

72

7

?j

93 3 4

95 3 2

96 2 2

94 1

5

72

7 21

Language. — The number of persons who speak Irish only continues to decrease. In 1881 they numbered 64,167; in 1891, 38,192; and in 1901, 20,953. If to those who spoke Irish only are added the persons who could speak both Irish and English, the total number who could speak Irish in 1901 was 641,142 or about 14% of the population. The purely Irish-speaking population is to be found principally in the province of Connaught, where in 1901 they numbered over 12,000. The efforts of the Gaelic League, founded to encourage the study of Gaelic literature and the Irish language, produced results seen in the census returns for 1 901, which showed that the pupils learning Irish had very largely in- creased as compared with 1891.

The university of Dublin (q.v.), which is for practical purposes identical with Trinity College, Dublin, was incorporated in 1591. The government is in the hands of a board consisting Vn{ . of the provost and the senior fellows, assisted by . versitles a council in the election of professors and in the ani regulation of studies. The council is composed of the colle xe s – provost (and, in his absence, the vice-provost) and elected members. There is also a senate, composed of the chancellor or vice-chancellor and all doctors and masters who have kept their names on the books of Trinity College. Religious tests were abolished in 1873, and the university is now open to all; but, as a matter of fact, the vast majority of the students, even since the abolition of tests, have always belonged to the Church of. Ireland, and the divinity school is purely Protestant.

In pursuance of the University Education (Ireland) Act 1879, the Queen's University in Ireland was superseded in 1882 by the Royal University of Ireland, it being provided that the graduates and students of the former should have similar rank in the new university. The government of the Royal University was vested in a senate consisting of a chancellor and senators, with power to grant all such degrees as could be conferred by any university in the United Kingdom, except in theology. Female students had exactly the same rights as male students. The university was simply an examining body, no residence in any college nor attendance at lectures being obligatory. All

appointments to the senate and to fellowships were made on the principle that one half of those appointed should be Roman Catholics and the other half Protestants; and in such subjects as history and philosophy there were two courses of study pre- scribed, one for Roman Catholics and the other for Protestants. In 1905 the number who matriculated was 947, of whom 218 were females, and the number of students who passed the academic examinations was 2190. The university buildings are in Dublin and the fellows were mostly professors in the various colleges whose students were undergraduates.

The three Queen's Colleges, at Belfast, Cork and Galway, were founded in 1849 and until 1882 formed the Queen's University. Their curriculum comprised all the usual courses of instruction, except theology. They were open to all denominations, but, as might be expected, the Belfast college (dissolved under the Irish Universities Act 1908; see below) was almost entirely Protestant. Its situation in a great industrial centre also made it the most important and flourishing of the three, its students numbering over 400. It possessed an excellent medical school, which was largely increased owing to private benefactions.

The Irish Universities Act 1908 provided for the foundation of two new universities, having their seats respectively at Dublin and at Belfast. The Royal University of Ireland at Dublin and the Queen's College, Belfast, were dissolved. Pro- vision was made for a new college to be founded at Dublin. This college and the existing Queen's

Colleges at Cork and Galway were made constituent colleges of the new university at Dublin. Letters patent dated December 2, 1908, granted charters to these foundations under the titles of the National University of Ireland (Dublin), the Queen's University of Belfast and the University Colleges of Dublin, Cork and Galway. It was provided by the act that no test of religious belief should be imposed on any person as a condition of his holding any position in any foundation under the act. A body of commissioners was appointed for each of the new foundations to draw up statutes for its government; and for the purpose of dealing with any matter calling for joint action, a joint commission, half from each of the above commissions, was established. Regulations as to grants-in-aid were made by the act, with the stipulation that no sum from them should be devoted to the provision or maintenance of any building, or tutorial or other office, for religious purposes, though private benefaction for such purposes is not prohibited. Provisions were also made as to the transfer of graduates and students, so that they might occupy under the new regime positions equivalent to those which they occupied previously, in respect both of degrees and the keeping of terms. The commissioners were directed to work out schemes for the employment of officers already employed in the institutions affected by the new arrange- ments, and for the compensation of those whose employment could not be continued. A committee of the privy council in Ireland was appointed, to be styled the Irish Universities Committee.

The Roman Catholic University College in Dublin may be described as a survival of the Roman Catholic University, a voluntary institution founded in 1854. In 1882 the Roman Catholic bishops placed the buildings belonging to the university under the control and direction of the archbishop of Dublin, who undertook to maintain a college in which education would be given according to the regulations of the Royal University. In 1883 the direction of the college was entrusted to the Jesuits. Although the college receives no grant from public funds, it has proved very successful and attracts a considerable number of students, the great majority of whom belong to the Church of Rome.

The Royal College of Science was established in Dublin in 1867 under the authority of the Science and Art Department, London. Its object is to supply a complete course of instruction in science as applicable to the industrial arts. In 1900 the college was transferred from the Science and Art Department to the Department of Agriculture and Technical Instruction.

Maynooth (q.v.) College was founded by an Irish act of

parliament in 1795 i° r the training of Roman Catholic students for the Irish priesthood. By an act of 1844 it was permanently endowed by a grant from the consolidated fund of over £26,000 a year. This grant was withdrawn by the Irish Church Act 1869, the college receiving as compensation a lump sum of over £372,000. The average number of students entering each year is about 100.

There are two Presbyterian colleges, the General Assembly's College at Belfast, which is purely theological, and the Magee College, Londonderry, which has literary, scientific and theo- logical courses. In 1881 the Assembly's College and the theo- logical professors of Magee College were constituted a faculty with power to grant degrees in divinity.

In addition to. the foregoing, seven Roman Catholic institutions were ranked as colleges in the census of 1901 : — All Hallows (Drunv condra), Holycross (Clonliffe), University College (Blackrock), St Patrick's (Carlow), St Kieran's (Kilkenny), St Stanislaus's (Tulla- more) and St Patrick's (Thurles). In 1901 the aggregate number of students was 715, of whom 209 were returned as under the faculty of divinity.

As regards secondary schools a broad distinction can be drawn according to religion. The Roman Catholics have diocesan schools, schools under religious orders, monastic and convent Schools schools, arid Christian Brothers' schools, which were attended, according to the census returns in 1901, by nearly 22,000 pupils, male and female. On the other hand are the endowed schools, which are almost exclusively Protestant in their government. Under this heading may be included royal and diocesan schools and schools upon the foundation of Erasmus Smith, and others privately endowed. In 1901 these schools numbered 55 and had an attendance of 2653 pupils. To these must be added various private establishments, which in the same year had over 8000 pupils, mainly Protestants. Dealing with these secondary schools as a whole the

census of 1901 gives figures as to the number of pupils engaged upon what the commissioners call the " higher studies," i.e. studies involving instruction in at least one foreign language. In 1881 the number of such pupils was 18,657; in 1891, 23,484; and in 1901, 28,484, of whom 17,103 were males and 11,381 females, divided as follows among the different religions — Roman Catholics 18,248, Protestant Episcopalians 5669, Presbyterians 301 1, Methodists 760, and others 567. This increase in the number of pupils engaged in the higher studies is probably due to a large extent to the scheme for the encouragement of intermediate education which was established by act of parliament in 1879. A sum of £1,000,000, part of the Irish Church surplus, was assigned by that act for the promotion of the intermediate secular education of boys and girls in Ireland. The administration of this fund was entrusted to a board of commissioners, who were to apply its revenue for the purposes of the act (1) by carrying on a system of public examinations, (2) by awarding exhibitions, prizes and certificates to students, and (3) by the payment of results fees to the manager of schools. An amending act was passed in 1900 and the examinations are now held under rules made in virtue of that act. The number of students who presented themselves for examination in 1905 was 9677; the amount expended in exhibitions and prizes was £8536; and the grants to schools amounted to over £50,000. The examinations were held at 259 centres in 99 different localities.

Primary education in Ireland is under the general control of the commissioners of national education, who were first created in 1831 to take the place of the society for the education of the poor, and incorporated in 1845. In the year of their incorporation the schools under the control of the commissioners numbered 3426, with 432,844 pupils, and the amount of the parliamentary grants was £75,000; while in 1905 there were 8659 schools, with 737,752 pupils, and the grant was almost £1 ,400,000. Of the pupils attending in the latter year, 74% were Roman Catholics, 12% Protestant Episcopalians and 1 1 % Presbyterians. The schools under the commissioners include national schools proper, model and workhouse schools and a number of monastic and convent schools. The Irish Education Act of 1892 provided that the parents of children of not less than 6 nor more than 14 years of, age should cause them to attend school in the absence of reasonable excuse on at least 150 days in the year in municipal boroughs and in towns or townships under commissioners; and provisions were made for the partial or total abolition of fees i .1 specified circumstances, for a parliamentary school grant in lieu of abolished school fees, and for

the augmenta- tion of the salaries of the national teachers.

There are 5 reformatory schools, 3 for boys and 2 for girls, and 68 industrial schools, 5 Protestant and 63 Roman Catholic.

By the constituting act of 1899 the control of technical education in Ireland was handed over to the Department of Agriculture and Technical Instruction and now forms an important part Technical of its work. The annual sum of jC55,ooo was allocated lasttvc- for the purpose, and this is augmented in various ways. #„„. The department has devoted itself to (i) promoting in- struction in experimental science, drawing, manual instruction and

domestic economy in day secondary schools, (2) supplying funds to country and urban authorities for the organization of schemes for technical instruction in non-agricultural subjects — these subjects embracing not only preparation for the highly organized industries but the teaching of such rural industries as basket-making, (3) the training of teachers by classes held at various centres, (4) the provision of central institutions, and (5) the awarding of scholarships.

Revenue and Expenditure. — The early statistics as to revenue and expenditure in Ireland are very fragmentary and afford little possibility of comparison. During the first 15 years of Elizabeth's reign the expenses of Ireland, chiefly on account of wars, amounted, according to Sir James Ware's estimate, to over £490,000, while the revenue is put by some writers at £8000 per annum and by others at less. In the reign of James I. the customs increased from £50 to over £9000; but although he obtained from various sources about £10,000 a year and a considerable sum also accrued from the plantation of Ulster, the revenue is supposed to have fallen short of the expenditure by about £16,000 a year. During the reign of Charles I. the customs increased fourfold in value, but it was found necessary to raise £120,000 by yearly subsidies. According to the report of the committee appointed by Cromwell to investigate the financial condition of Ireland, the revenue in 1654 was £197,304 and the expenditure £630,814. At the Restoration the Irish parliament granted an hereditary revenue to the king, an excise for

the maintenance of the army, a subsidy of tonnage and poundage for the navy, and a tax on hearths in lieu of feudal burdens. " Additional duties " were granted shortly after the Revolution. " Appropriate duties " were imposed at different periods; stamp duties were first granted in 1773, and the post office first became a source of revenue in 1783. In 1706 the hereditary revenue with additional duties produced over £394,000.

Returns of the ordinary revenue were first presented to the Irish parliament in 1730. From special returns to parliament the following table shows net income and expenditure over a series of years up to 1868: —

Year.

Income.

Expenditure.

1731

£405,000

£407,000

1741

441,000

441,000

1 761

571,000

773,000

1781

739,000

1,015,000

1800

3,OT7,757

6,615,000

1834

3,814,000

3,439,800

1850

4,332,000

4,120,000

i860

7,851,000

6,331,000

1868

6,176,000

6,621,000

The amount of imperial revenue collected and expended in Ireland under various heads for the five years 1902-1906 appears in the following tables: —

Subtracting in each year the total expenditure from the estimated true revenue it would appear from the foregoing table that Ireland contributed to imperial services in the years under consideration the following sums: £2,570,000, £2,852,000, £2,200,500, £2,186,500 and £1,811,500.

The financial relations between Great Britain and Ireland have long been a subject of controversy, and in 1894 a royal commission was appointed to consider them, which presented its report in 1896. The commissioners, though differing on several points, were practically agreed on the following five conclusions: (1) that Great Britain and Ireland must, for the purposes of a financial inquiry, be considered as separate entities; (2) that the Act of Union imposed upon Ireland a burden which, as events showed, she was unable to bear; (3) that the increase of taxation laid upon Ireland between 1853 and i860 was not justified by the then existing circumstances; (4) that identity of rates of taxation did not necessarily involve equality of burden;

(5) that, while the actual tax revenue of Ireland was about one-eleventh of that of Great Britain, the relative taxable capacity of Ireland was very much smaller, and was not estimated by any of the commissioners as exceeding one-twentieth. This report furnished the material for much controversy, but little practical outcome; it was avowedly based on the consideration of Ireland as a separate country, and was therefore inconsistent with the principles of Unionism.

The public debt of Ireland amounted to over £134,000,000 in 1817, in which year it was consolidated with the British national debt.

Local Taxation. — The Local Government (Ireland) Act 1898 effected considerable changes in local finance. The fiscal duties of the grand jury were abolished, and the county council which took the place of the grand jury for both fiscal and administrative purposes was given three sources of revenue: (1) the agricultural grant, (2) the licence duties and other imperial grants, and (3) the poor rate. These may be considered separately. (1) It was provided that the Local Government Board should ascertain the amount of county cess and poor rate levied off agricultural land in Ireland during the year ending (as regards the poor rate) on the 29th of September, and (as regards the county cess) on the 21st of June 1897; and that half this amount, to be called the agricultural grant, should be paid annually without any variation from the original sum out of the consolidated fund to a local taxation account. The amount of the agricultural grant was ascertained to be over £727,000. Elaborate- provisions were also made in the act for fixing the proportion of the grant to which each county should be entitled, and the lord-lieutenant was empowered to pay half-yearly the proportion so ascertained to the county council. (2) Before the passing of the act grants were made from the imperial exchequer to the grand juries in aid of the maintenance of lunatics and to boards of guardians for medical and educational purposes and for salaries under the Public Health (Ireland) Act. In 1897 these grants amounted to over £236,000. Under the Local Government Act they ceased, and in lieu thereof it was provided that there should be annually paid out of the consolidated fund to the local taxation account a sum equal to the duties collected in Ireland on certain

Revenue.

Year.

Customs.

Excise.

Estate, &c.

Duties and

Stamps.

Property and Income Tax.

Post Office.

Miscel- laneous.

Total Revenue.

Estimated

True Revenue.

1902 1903 1904

1905 1906

£2,244,000

2,717,000

2,545,000 2,575,000

2,524,000

£5,822,000

6,011,000 5,904,000 5,584,000 5,506,000

£1,072,000

922,000

1,033,000

1,016,000

890,000

£1,143,000

1,244,000

1,038,000

1,013,000

983,000

£923,000

960,000

980,000

1,002,000

1,043,000

£149,000

148,500 146,500 150,500 150,000

£11,353,000

12,002,500 11,646,500 11,340,500 11,096,000

£9,784,000

10,205,000

9,748,500

9,753,500

9,447,000

Expenditure.

Year.

Consolidated Fund.

Voted.

Local Taxation Accounts.

Total

Civil

Charges.

Collection of Taxes.

Post Office.

Total Expended.

Estimated

True Revenue.

Local Taxation Revenue.

Exchequer Revenue.

1902

1903 1904

1905 1906

£169,000

168,500 170,000 166,000 164,000

£4,271,000 4,357,5oo

4,569,000 4,547,000 4,582,500

£389,000

383,000 376,000

374,ooo

385,000

£1,055,000

1,058,000 1,059,000 1,059,000 1,059,000

£5,884,000

5,967,000 6,174,000 6,146,000 6,191,500

£243,000

246,000 248,000 249,000 245,000

£1,087,000

1,140,000 1,126,000 1,172,000 1,199,000

£7,214,000 7,353,000

7,548,000 7,567,000 7,635,500

£9,784,000

10,205,000

9,784,500

9,753,500

9,447,000

specified local taxation licences. In addition, it was enacted that a fixed sum of £79,000 should be forthcoming annually from the consolidated fund. (3) The county cess was abolished, and the county councils were empowered to levy a single rate for the rural districts and unions, called by the name of poor rate, for all the purposes of the act. This rate is made upon the occupier and not upon the landlord, and the occupier is not entitled, save in a few specified cases, to deduct any of the rate from his rent. For the year ending the 31st of March 1905, the total receipts of the Irish county councils, exclusive of the county boroughs, were £2,964,298 and their total expenditure was £2,959,961, the two chief items of expenditure being " Union Charges " £1,002,620 and " Road Expenditure " £779,174. During the same period the total receipts from local taxation in Ireland amounted to £4,013,303, and the amount granted from imperial sources in aid of local taxation was £1,781,143.

Loans. — The total amount issued on loan, exclusive of closed sources, by the Commissioners of Public Works, up to the 31st of

March 1906, was £26,946,393, of which £15,221,913 had been repaid to the exchequer as principal and £9,011,506 as interest, and £1,609,694 had been remitted. Of the sums advanced, about £5.5 O0 . o ˚0 was under the Improvement of Lands Acts, nearly £3,500,000 under the Public Health Acts, over £3,000,000 for lunatic asylums, and over £3,000,000 under the various Labourers Acts.

Banking. — The Bank of Ireland was established in Dublin in 1783 with a capital of £600,000, which was afterwards enlarged at various times, and on the renewal of its charter in 1821 it was increased to £3,000,000. It holds in Ireland a position corresponding to the Bank of England in England. There are eight other joint- stock banks in Ireland. Including the Bank of Ireland, their sub- scribed capital amounts to £26,349,230 and their paid-up capital to £7.3˚9i 2 30. The authorized note circulation is £6,354,494 an "l the actual note circulation in June 1906 was £6,310,243, two of the banks not being banks of issue. The deposits in the joint-stock banks amounted in 1880 to £29,350,000; in 1890 to £33,061,000; in 1900 to £40,287,000; and in 1906 to £45,842,000. The deposits in the Post Office Savings Banks rose from £1,481,000 in 1880 to £10,459,000 in 1906, and the deposits in Trustee Savings Banks from £2,100,165 in 1880 to £2,488,740 in 1905.

National Wealth. — To arrive at any estimate of the national wealth is exceptionally difficult in the case of Ireland, since the largest part of its wealth is derived from agriculture, and many important factors, such as the amount of capital invested in the linen and other industries, cannot be included, owing to their uncertainty. The following figures for 1905-1906 may, however, be given: valua- tion of lands, houses, &c, £15,466,000; value of principal crops, £35-362,ooo; value of cattle, &c, £81,508,000; paid-up capital and reserve funds of joint-stock banks, £11,300,000; deposits in joint-stock and savings banks, £58,791,000; investments in government stock, transferable at Bank of Ireland, £36,952,000; paid-up capital and debentures of railway companies, £38,405,000; paid-up capital of tramway companies, £2,074,000.

In 1906 the net value of property assessed to estate duty, &c, in Ireland was £16,016,000 as compared with £306,673,600 in England and £38,451,000 in Scotland; and in 1905 the net produce of the income tax in Ireland was £983,000, as compared with £27,423,000 in England and £2,888,000 in Scotland.

Bibliography.— Agriculture: Accounts of the land systems of Ireland

will be found in James Godkin's Land War in Ireland (1870); Sigerson's History of Land Tenure in Ireland (1871); Joseph Fisher's History of Land Holding in Ireland (1877); R. B. O'Brien's History of the Irish Land Question (1880); A. G. Richey's Irish Land Laws (1880). General information will be found in J. P. Kennedy's Digest of the evidence given before the Devon Com- mission (Dublin, 1847-1848); the Report of the Bessborough Commission, 1881, and of the commission on the agriculture of the L'nited Kingdom, 1881. The Department of Agriculture publishes several official annual reports, dealing very fully with Irish agri- culture.

Manufactures and Commerce : Discourse on the Woollen Manu- facture of Ireland (1698); An Inquiry into the State and Progress of the Linen Manufacture in Ireland (Dublin, 1757); G. E. Howard, Treatise on the Revenue of Ireland (1776); John Hely Hutchinson, Commercial Restraints of Ireland (1779); Lord Sheffield, Observations on tlie Manufactures, Trade and Present Slate of Ireland (1785); R. B. Clarendon, A Sketch of the Revenue and Finances of Ireland (1791); the annual reports of the Flax Supply Association and other local bodies, published at Belfast; reports by the Department of Agriculture on Irish imports and exports (these are a new feature and contain much valuable information).

Miscellaneous: Sir William Petty, Political Anatomy of Ireland (1691); Arthur Dobbs, Essay on the Trade of Ireland (1729); Ab- stract of the Number of Protestant and Popish Families in Ireland (1726); Arthur Young, Tour in Ireland (1780); T. Newenham, View of the Circumstances of Ireland (1809), and Inquiry into the Population of Ireland (1805); Cesar Moreau, Past and Present State of Ireland (1827); J. M. Murphy, Ireland, Industrial, Political and Social (1870); R. Dennis, Industrial Ireland (1887); Grimshaw, Facts and Figures about Ireland (1893); Report of the Recess Com-

mittee (1896, published in Dublin) ; Report of the Financial Relations Commission (1897); Sir H. Plunkett, Ireland in the New Century (London, 1905); Filson Young, Ireland at the Cross-Roads' (London, 1904); Thorn's Almanac, published annually in Dublin, gives a very useful summary of statistics and other information.

(W. H. Po.)

Early History

On account of its isolated position we might expect to find Ireland in possession of a highly developed system of legends bearing on the

*origins of its inhabitants. Ireland remained outside the pale of the ancient Roman "'f.™'^*

*11 1 r * i>i sources**

world, and a state of society which was peculiarly favourable to the preservation of national folk-lore sur- vived in the island until the 16th century. The jealousy with which the hereditary antiquaries guarded the tribal genealogies naturally leads us to hope that the records which have come down to us may shed some light on the difficult problems connected with the early inhabitants of these islands and the west of Europe. Although innumerable histories of Ireland have appeared in print since the publication of Roderick O'Flaherty's Ogygia (London, 1677), the authors have in almost every case been content to reproduce the legendary accounts without bringing any serious criticism to bear on the sources. This is partly to be explained by the fact that the serious study of Irish philology only dates from 1853 and much of the most important material has not yet appeared in print. In the middle of the 19th century O'Donovan and O'Curry collected a vast amount of undigested information about the early history of the island, but as yet J. B. Bury in his monograph on St Patrick is the only trained historian who has ever adequately dealt with any of the problems connected with ancient Ireland. Hence it is evident that our knowledge of the subject must remain extremely unsatisfactory until the chief sources have been properly sifted by competent scholars. A beginning has been made by Sir John Rhys in his " Studies in Early Irish History " {Proceedings of the British Academy, vol. i.), and by John MacNeill in a suggestive series of papers contributed to the New Ireland Review (March 1906-Feb. 1907). Much might reasonably be expected from the sciences of archaeology and anthropology. But although Ireland is as rich as, or even richer in monuments of the past than, most countries in Europe, comparatively little has been done owing in large measure to the lack of systematic investigation.

It may be as well to specify some of the more important sources at the outset. Of the classical writers who notice Ireland Ptolemy is the only one who gives us any very definite information. The legendary origins first appear in Nennius and in a number of poems by such writers as Maelmura (d. 884), Cinaed Uah Artacain (d. 975), Eochaid Ua Flainn (d. 984), Flann Mainistrech (d. 1056) and Gilla Coemgin (d. 1072). They are also embodied in the Leabhar Gabhdla or Book of Invasions, the earliest copy of which is contained in the Book of Leinster, a 12th-century MS.,. Geoffrey Keating's History, Dugald MacFirbis's Genealogies and various collections of annals

such as those ˆby the Four Masters. Of prime importance for the earlier period are the stories known collectively as the Ulster cycle, among which the lengthy epic the Tdin Bo Cualnge takes first place. Amongst the numerous chronicles the Annals of Ulster, which commence with the year 441, are by far the most trustworthy. The Book of Rights is another compilation which gives valuable information with regard to the relations of the various kingdoms to one anothei. Finally, there are the exten- sive collections of genealogies preserved in Rawlinson B 502, the Books of Leinster and Ballymote.

Earliest Inhabitants. — There is as yet no certain evidence to show that Ireland was inhabited during the palaeolithic period. But there are abundant traces of wan in the neolithic state of culture (see Sir W. R. W. Wilde's Catalogue of the antiquities in the Museum of the Royal Irish Academy). The use of bronze was perhaps introduced about 1450 B.C. The craniological evidence is unfortunately at present insufficient to show whether the introduction of metal coincided with a ly particular invasion

either from Britain or the European continent. At any rate it was not until well on in the Bronze Age, perhaps about 600 or 500 B.C., that the Goidels, the first invaders speaking a Celtic language, set foot in Ireland. The newcomers probably overran the whole island, subduing but not exterminating the older race with which they doubtless intermarried freely, as pre-Celtic types are frequent among the populations of Connaught and Munster at the present day. What the language was that was spoken by the neolithic aborigines is a question which will probably never be settled. The division into provinces or " fifths " (Ulster, Leinster, Connaught, E. Munster and W. Munster) appears to be older than the historical period, and may be due to the Goidels. Between 300 B.C. and 150 B.C. '. various Belgic and other Brythonic tribes established themselves in Britain bringing with them the knowledge of how to work in iron. Probably much about the same time certain Belgic tribes effected settlements in the S.E. of Ireland. Some time must have elapsed before any Brythonic people undertook to defy the powerful Goidelic states, as the supremacy of the Brythonic kingdom of Tara does not seem to have been acknow- ledged before the 4th century of our era. The

early Belgic settlers constituted perhaps in the main trading states which acted as intermediaries of commerce between Ireland and Gaul. 1 In addition to these Brythonic colonies a number of Pictish tribes, who doubtless came over from Scotland, conquered for themselves parts of Antrim and Down where they maintained their independence till late in the historical period. Picts are also represented as having settled in the county of Roscommon; but we have at present no means of ascertaining when this invasion took place.

Classical Writers. — Greek and Roman writers seem to have possessed very little definite information about the island, though much of what they relate corresponds to the state of society disclosed in the older epics. Strabo held the inhabitants to be mere savages, addicted to cannibalism and having no marriage ties. Solinus speaks of the luxurious pastures, but the natives he terms an inhospitable and warlike nation. The conquerors among them having first drunk the blood of their enemies, afterwards besmear their faces therewith; they regard right and wrong alike. Whenever a woman brings forth a male child, she puts his first food on the sword of her husband, and lightly introduces the first auspicium of nourishment into his little mouth with the point of the sword. Pomponius Mela speaks of the climate as unfit for ripening grain, but he, too, notices the luxuriance of the grass. However, it is not until we reach Ptolemy that we feel we are treading on firm ground. His description is of supreme importance for the study of early Irish ethnography. Ptolemy gives the names of sixteen peoples in Ireland, several of which can be identified. As we should expect from our knowledge of later Irish history scarcely any towns are mentioned. In the S.E., probably in Co. Wicklow, we find the Manapii — evidently a colony from N.E. Gaul. North of them, perhaps in Kildare, a similar people, the Cauci, are located. In Waterford and Wexford are placed the Brigantes, who also occur in Yorkshire. The territory to the west of the Brigantes is occupied by a people called by Ptolemy the Iverni. Their capital he gives as Ivernis, and in the extreme S.W. of the island he marks the mouth of the riVer Iernos, by which the top of Dingle Bay called Castlemaine Harbour is perhaps intended. The Iverni must have been a nation of considerable importance, as they play a prominent part in the historical period, where they are known as the Ernai or Eraind of Munster. It would seem that the Iverni were the first native tribe with whom foreign traders came in contact, as it is from them that the Latin name for the whole island is derived. The earliest form was probably Iveriyo or IveriyU, genitive Iveryonos, from which come Lat. Iverio, Hiverio (Antonine Itinerary), Hiberio

(Confession of St Patrick), Old Irish £riu,' Heriu, gen. HSrenn

1 The importance of the commerce between Ireland and Gaul in early times, and in particular the trade in wine, has been insisted upon by H. Zimmer in papers in the Abh. d. Berl. Akad.d. Wissen-schaften (1909).

with regular loss of intervocalic v, Welsh Iwerddon (from the oblique cases). West of the Iverni in Co. Kerry Ptolemy mentions the Vellabori, and going in a northerly direction following the coast we find the Gangani, Autini (Autiri), Nagnatae (Magnatae). Erdini (cf. the name Lough Erne), Vennicnii, Rhobogdii, Darini and Eblanii, none of whom can be identified with certainty. In south Ulster Ptolemy locates a people called the Voluntii who seem to correspond to the Ulidians of a later period (Ir. Ulaid, in Irish Lat. Uloli). About Queen's county or Tipperary are situated the Usdiae, whose name is compared with the later Ossory (Ir. Os-raige). Lastly, in the north of Wexford we find the Coriondi who occur in Irish texts near the Boyne (Mid. Ir. Coraind). It would seem as if Ptolemy's description of Ireland answered in some measure to the state of affairs which we find . obtaining in the older Ulster epic cycle. 2 Both are probably anterior to the foundation of a central state at Tara.

Legendary Origins. — We can unfortunately derive no further assistance from external sources and must therefore examine the native traditions. From the 9th century onwards we find accounts of various races who had colonized the island. These stories naturally become amplified as times goes on, and in what we may regard as the classical or standard versions to be found in Keating, the Four Masters, Dugald MacFirbis and elsewhere, no fewer than five successive invasions are enumerated. The first colony is represented as having arrived in Ireland in a.m. 2520, under the leadership of an individual named Partholan who hailed from Middle Greece. His company landed in Ken mare Bay and settled in what is now Co. Dublin. After occupying the island for 300 years they were all carried off by a plague and were buried at Tallaght (Ir. Tamlacht, " plague-grave "), at which place a number of ancient remains (probably belonging, however, to the Viking period) have come to light. In a.m. 2850 a warrior from Scythia called Nemed reached Ireland with 900 fighting men. Nemed's people are represented as having to struggle for their existence with a race of sea-pirates known as the Fomorians. The latter's stronghold was Tory Island, where they had a mighty fortress. After undergoing great hardship the Nemedians succeeded in destroying the fortress and in slaying the enemies' leaders, but the Fomorians received reinforcements from

Africa. A second battle was fought in which both parties were nearly exterminated. Of the Nemedians only thirty warriors escaped, among them being three descendants of Nemed, who made their way each to a different country (a.m. 3066). One of them, Simon Brec, proceeded to Greece, where his posterity multiplied to such an extent that the Greeks grew afraid and reduced them to slavery. In time their position became so intolerable that they resolved to escape, and they arrived in Ireland a.m. 3266. This third body of invaders is known col- lectively as Firbolgs, and is ethnologically and historically very important. They are stated to have had five leaders, all brothers, each of whom occupied one of the provinces or " fifths." We find them landing in different places. One party, the Fir Galeoin, landed at Inber Slangi, the mouth of the Slaney, and occupied much of Leinster. Another, the Fir Domnand, settled in Mayo where their name survives in Irrus Domnand, the ancient name for the district of Erris. A third band, the Firbolg proper, took possession of Munster. Many authorities such as Keating and MacFirbis admit that descendants of the Firbolgs were still to be found in parts of Ireland in their own day, though they are characterized as " tattling, guileful, tale-bearing, noisy, con- temptible, mean, wretched, unsteady, harsh and inhospitable.'" The Firbolgs had scarcely established themselves in the island when a fresh set of invaders appeared on the scene. These were the Tuatha D6 Danann (" tribes of the god Danu "), who accord- ing to the story were also descended from Nemed. They came originally from Greece and were highly skilled in necromancy. Having to fiee from Greece on account o{ a Syrian invasion tlney

proceeded to Scandinavia. Under Nuadu Airgetlaim they

s On the subject of Ptolemy's description of Ireland see articles by G. H. Orpen in the Journal of the Royal Society of Antiquaries of Ireland (June 1894), and John MacNeill in the New Ireland Review I (September 1906).

moved to Scotland, and finally arrived in Ireland (a.m. 3303), bringing with them in addition to the celebrated Lia Fail (" stone of destiny ") which they set up at Tara, the cauldron of the Dagda and the sword and spear of Lugaid Lamfada. Eochaid, son of Ere, king of

the Firbolgs, having declined to surrender the sovereignty of Ireland, a great battle was fought on the plain of Moytura near Cong (Co. Mayo), the site of a prehistoric cemetery. In this contest the Firbolgs were overthrown with great slaughter, and the remnants of the race according to Keating and other writers took refuge in Arran, Islay, Rathlin and the Hebrides, where they dwelt until driven out by Picts. Twenty-seven years later the Tuatha De had to defend themselves against the Fomorians, who were almost annihilated at the battle of north Moytura near Sligo. The Tuatha De then enjoyed undisturbed possession of Ireland until the arrival of the Milesians in a.m. 3500.

All the early writers dwell with great fondness on the origin and adventures of this race. The Milesians came primarily from Scythia and after sojourning for some time in Egypt, Crete and in Scythia again, they finally arrived in Spain. In the line of mythical ancestors which extends without interruption up to Noah, the names of Fenius Farsaid, Goedel Glas, Eber Scot and Breogan constantly recur in Irish story. At length eight sons of Miled (Lat. Milesius) set forth to conquer Ireland. The spells of the Tuatha De accounted for most of their number. However, after two battles the newcomers succeeded in over- coming the older race; and two brothers, Eber Find and Eremon, divided the island between them, Eber Find taking east and west Munster, whilst Eremon received Leinster and Connaught. Lugaid, son of the brother of Miled, took possession of south-west Munster. At the same time Ulster was left to Eber son of Ir son of Miled. The old historians agree that Ireland was ruled by a succession of Milesian monarchs until the reign of Roderick O'Connor, the last native king. The Tuatha De are represented as retiring into the sid or fairy mounds. Eber Find and Eremon did not remain long in agreement. The historians place the beginnings of the antithesis between north and south at the very commencement of the Milesian domination. A battle was fought between the two brothers in which Eber Find lost his life. In the reign of Eremon the Picts are stated to have arrived in Ireland, coming from Scythia. It will have been observed that Scythia had a peculiar attraction for medieval Irish chroniclers on account of its resemblance to the name Scotti, Scots. The Picts first settled in Leinster; but the main body were forced to remove to Scotland, only a few remaining behind in Meath. Among the numerous mythical kings placed by the annalists between Eremon and the Christian era we may mention Tigern- mas (a.m. 3581), Ollam Fodla (a.m. 3922) who established the meeting of Tara, Cimbaeth (c. 305 B.C.) the reputed founder of Emain Macha, Ugaine Mor, Labraid Loingsech, and Eochaid Feidlech, who built Rath Cruachan for his celebrated daughter, Medb queen of

Connaught. During the 1st century of our era we hear of the rising of the aithech-tuatha, i.e. subject or plebeian tribes, or in other words the Firbolgs, who paid daer- or base rent to the Milesians. From a resemblance in the name which is probably fortuitous these tribes have been identified with the Attecotti of Roman writers. Under Cairbre Cinnchait (" cat- head ") the oppressed peoples succeeded in wresting the sovereignty from the Milesians, whose princes and nobles were almost exterminated (a.d. 90). The line of Eremon was, however, restored on the accession of Tuathal Techtmar (" the legitimate ") , who reigned a.d. 130-160. This ruler took measures to consoli- date the power of the ardrl (supreme king). He constructed a number of fortresses on the great central plain and carved out the kingdom of Meath to serve as his mensal land. The new kingdom was composed of the present counties of Meath, West- meath and Longford together with portions of Monaghan, Cavan, King's Co. and Kildare. He was also the first to levy the famous Leinster tribute, the boroma, in consequence of an insult offered to him by one of the kings of that province. This tribute, which was only remitted in the 7th century at the instance of St Moling, must have been the source of constant war and oppression. A

grandson of Tuathal's, the famous Conn Cetchathach (" the hundred-fighter "), whose death is placed in the year 177 after a reign of about twenty years, was constantly at war with the Munster ruler Eogan Mor, also called Mog Nuadat, of the race of Eber Find. Eogan had subdued the Ernai and the Corco Laigde (descendants of Lugaid son of Ith) in Munster, and even the supreme king was obliged to share the island with him. Hence the well-known names Leth Cuinn or " Conn's half " (north Ireland), and Leth Moga or " Mug's half " (south Ireland). The boundary line ran from the Bay of Galway to Dublin along the great ridge of gravel known as Eiscir Riada which stretches across Ireland. Mog Nuadat had a son Ailill Aulom who plays a prominent part in the Irish sagas and genealogies, and his sons Eogan, Cian and Cormac Cas, all became the ancestors of well-known families. Conn's grandson, Cormac son of Art, is repre- sented as having reigned in great splendour (254-266) and as having been a great patron of learning. It was during this reign that the sept of the Desi were expelled from Meath. They settled in Munster where their name still survives in the barony of Decies (Co. Waterford). A curious passage in Cormac's Glossary connects one of the leaders of this sept, Cairpre Muse, with the settlements of the Irish in.south Wales which may have taken place as early as the 3rd century. Of greater consequence was the invasion of Ulster by the three Collas, cousins of the ardrl Muredach. The stronghold of Emain Macha was

destroyed and the Ulstermen were driven across the Newry River into Dalriada, which was inhabited by Picts.

The old inhabitants of Ulster are usually termed Ulidians to distinguish them from the Milesian peoples who overran the province. With the advent of Niall Noigiallach (" N. of the nine hostages " reigned 379-405) son of Eochaid Muigmed6in (358- 366) we are treading safer ground. It was about this time that the Milesian kingdom of Tara was firmly established. Nor was Niall's activity confined to Ireland alone. Irish sources represent him as constantly engaged in marauding expeditions oversea, and it was doubtless on one of these that St Patrick was taken captive. These movements coincide with the inroads of the Picts and Scots recorded by Roman writers. It is probably from this period that the Irish colonies in south Wales, Somerset, Devon and Cornwall date. And the earliest migrations from Ulster to Argyll may also have taken place about this time. Literary evidence of the colonization of south Wales is preserved both in Welsh and Irish sources, and some idea of the extent of Irish oversea activity may be gathered from the distribution of the Ogam inscriptions in Wales, south-west England and the Isle of Man.

Criticism of the Legendary Origins. — It is only in recent years that the Irish legendary origins have been subjected to serious criticism. The fondly cherished theory which attributes Milesian descent to the bulk of the native population has at length been assailed. MacNeill asserts that in MacFirbis's genealogies the majority of the tribes in early Ireland do not trace their descent to Eremon and Eber Find; they are rather the descendants of the subject races, one of which figures in the list of conquests under the name of Firbolg. The stories of the Fomorians were doubtless suggested in part by the Viking invasions, but the origin of the Partholan legend has not been discovered. The Tuatha De do not appear in any of the earliest quasi-historical documents, nor in Nennius, and they scarcely correspond to any particular race. It seems more probable that a special invasion was assigned to them by later writers in order to explain the presence of mythical personages going by their name in the heroic cycles, as they were found inconvenient by the monkish historians. In the early centuries of our era Ireland would therefore have been occupied by the Firbolgs and kindred races and the Milesians. According to MacNeill the Firbolg tribal names are formed with the suffix -raige, e.g. Ciarraige, Kerry, Osraige, Ossory, or with the obscure words Corcu and mocu (maccu), e.g. Corco Duibne, Corkaguiney, Corco Mruad, Corcomroe, Macu Loegdae, Macu Teimne. In the case of corcu and mocu the name which follows is frequently the name of an

eponymous ancestor. The Milesians on the other hand, named

themselves after an historical ancestor employing terms such as ui, " descendants," eland, " children," ddl, " division," cinM, " kindred," or sil, " seed." In this connexion it may be noted that practically all the Milesian pedigrees converge on three ancestors in the 2nd century — Conn Cetchathach king of Tara, Cathair Mor of Leinster, and Ailill Aulom of Munster, — whilst in scarcely any of them are mythological personages absent when we go farther back than A.d. 300. Special gene- alogies were framed to link up other races, e.g. the Eraind and Corcu Loegdi of Munster and the Ulidians with the Milesians of Tara.

The peculiar characteristic of the Milesian conquest is the establishment of a central monarchy at Tara. No trace of such a state of affairs is to be found in the Ulster epic. In the Tdin B6 Ciialnge we find Ireland divided into fifths, each ruled over by its own king. These divisions were: Ulster with Emain Macha as capital, Connaught with Cruachu as residence, north Munster from Slieve Bloom to north Kerry, south Munster from south Kerry to Waterford, and Leinster consisting of the two kingdoms of Tara and Ailinn. Moreover, the kings of Tara mentioned in the Ulster cycle do not figure in any list of Milesian kings. It would appear then that the central kingdom of Tara was an innovation subsequent to the state of society described in the oldest sagas and the political position reflected in Ptolemy's account. It was probably due to an invasion undertaken by Brythons 1 from Britain, but it is impossible to assign a precise date for their arrival. Until the end of the 3rd century the Milesian power must have been confined to the valley of the Boyne and the district around Tara. At the beginning of the 4th century the three Collas founded the kingdom of Oriel (comprising the present counties of Armagh, Monaghan, north Louth, south Fermanagh) and drove the Ulidians into the eastern part of the province. Brian and Fiachra, sons of Eochaid Muigmedoin, conquered for themselves the country of the Ui Briuin (Roscommon, Leitrim, Cavan) and Tir Fiachrach, the territory of the Firbolg tribe the Fir Domnann in the valley of the Moy (Co. Mayo). Somewhat later south Connaught was similarly wrested from the older race and colonized by descendants of Brian and Fiachra, later known as Ui Fiachrach Aidni and Ui

Briuin Seola. The north of Ulster is stated to have been conquered and colonized by Conall and Eogan, sons of Niall N6igiallach. The former gave his name to the western portion, Tir Conaill (Co. Donegal), whilst Inishowen was called Tir Eogain after Eogan. The name Tir Eogain later became associated with south Ulster where it survives in the county name Tyrone. The whole kingdom of the north is commonly designated the kingdom of Ailech, from the ancient stronghold near Deny which the sons of Niall probably took over from the earlier inhabitants. At the end of the 5th century Maine, a relative of the king of Tara, was apportioned a tract of Firbolg territory to the west of the Suck in Connaught, which formed the nucleus of a powerful state known as Hy Maine (in English commonly called the " O'Kelly's country "). Thus practically the whole of the north and west gradually came under the sway of the Milesian rulers. Nevertheless one portion retained its independence. This was Ulidia, consisting of Dalriada, Dal Fiatach, Dal Araide, including the present counties of Antrim and Down. The bulk of the population here was probably Pictish; but the Dal Fiatach, representing the old Ulidians or ancient population of Ulster, maintained themselves until the 8th century when they were subdued by their Pictish neighbours. The relationship of Munster and Leinster to the Tara dynasty is not so easy to define. The small kingdom of Ossory remained independent until a very late period. As for Leinster none of the Brythonic peoples mentioned by Ptolemy left traces of their name, although it is possible that the ruling

1 Scholars are only beginning to realize how close was the connexion between Ireland and Wales from early times. Pedersen has recently pointed out the large number of Brythonic and Welsh loan words received into Irish from the time of the Roman occupation of Britain to the beginning of the literary period. Welsh writers now assume an Irish origin for much of the contents of the Mabinogion.

family may have been derived from them. It would seem that the Fir Galeoin who play such a prominent part in the Tdin had been crushed before authentic history begins. The king of Leinster was for centuries the most determined opponent of the ardri, an antithesis which is embodied in the story of the boroma tribute. When we turn to Munster we find that Cashel was the seat of power in historical times. Now Cashel (a loanword from Lat. castellum) was not founded Until the beginning of the 5th century by Core son of Lugaid. The legendary account attributes the subjugation of the various peoples inhabiting Munster to Mog Nuadat, and the pedigrees are invariably traced up to his son Ailill Aulom. Rhys adopts the view that the race of Eber Find was not Milesian but a branch of the

Ernai, and this theory has much in its favour. The allegiance of the rulers of Munster to Niall and his descendants can at the best of times only have been nominal.

In this way we get a number of over-kingdoms acknowledging only the supremacy of the Tara dynasty. These were (1) Munster with Cashel as centre, (2) Connaught, (3) Ailech, (4) Oriel, (5) Ulidia, (6) Meath, (7) Leinster, (8) Ossory. Some of these states might be split up into various parts at certain periods, each part becoming for the time-being an over-kingdom. For instance, Ailech might be resolved into Tir Conaill and Tir Eogain according to political conditions. Hence the number of over-kingdoms is given variously in different documents. The supremacy was vested in the descendants of Niall Noigiallach without interruption until 1002; but as Niall's descendants were represented by four reigning families, the high-kingship passed from one branch to another. Nevertheless after the middle of the 8th century the title of ardri (high-king) was only held by the Cinel Eogain (northern Hy Neill) and the rulers of Meath (southern Hy Neill), as the kingdom of Oriel had dropped into insignificance. The supremacy of the ardri was more often than not purely nominal. This must have been particularly the case in Leth Moga.

Religion in Early Ireland. — Our knowledge of the beliefs of the pagan Irish is very slight. The oldest texts belonging to the heroic cycle are not preserved in any MS. before 1100, and though the sagas were certainly committed to writing several centuries before that date, it is evident that the monkish tran- scribers have toned down or omitted features that savoured too strongly of paganism. Supernatural beings play an important part in the Tdin B6 Cualgne, Cuchulinn's Sickbed, the Wooing of Enter and similar stories, but the relations between ordinary mortals and such divine or semi-divine personages is not easy to establish. It seems unlikely that the ancient Irish had a highly developed pantheon. On the other hand there are abundant traces of animistic worship, which have survived in wells, often associated with a sacred tree (Ir. bile), bullans, pillar stones, weapons. There are also traces of the worship of the elements, prominent among which are sun and fire. The belief in earth spirits or fairies (Ir. aes side, sid) forms perhaps the most striking feature of Irish belief. The sagas teem with references to the inhabitants of the fairy mounds, who play such an important part in the mind of the peasantry of our own time. These supernatural beings are sometimes represented as immortal, but often they fall victims to the prowess of mortals. Numerous cases of marriage between fairies and mortals are recorded. The Tuatha De Danann is used as a collective name for the

aes side. The representatives of this race in the Tdin B6 Cualgne play a somewhat similar part to the gods of the ancient Greeks in th&. Iliad, though they are of necessity of a much more shadowy nature. Prominent among them were Manannan mac Lir, who is connected with the sea and the Isle of Man, and the Dagda, the father of a numerous progeny. One of them, Bodb Derg, re- sided near Portumna on the shore of Lough Derg, whilst another, Angus Mac-in-6g, dwelt at the Brug of the Boyne, the well-known tumulus at New Grange. The Dagda's daughter Brigit trans- mitted many of her attributes to the Christian saint of the same name (d. 523). The ancient Brigit seems to have been the patroness of the arts and was probably also the goddess of fertility. At any rate it is with her that the sacred fire at Kildare which

burnt almost uninterruptedly until the time of the Reformation was associated; and she was commonly invoked in the Hebrides, and until quite recently in Donegal, to secure good crops. Well- known fairy queens are Clidna (south Munster) and Aibell (north Munster) . We frequently hear of three goddesses of war — Ana, Bodb and Macha, also generally called Morrigu and Badb. They showed themselves in battles hovering over the heads of the combatants in the form of a carrion crow. The name Bodb appears on a Gaulish stone as (Cathu-)bodvae. The Geniti glinni and demna aeir were other fierce spirits who delighted in carnage. When we come to treat of religious rites and worship, our sources leave us completely in the dark. We hear in several documents of a great idol covered with gold and silver named Cromm Cruach, or Cenn Cruaich, which was surrounded by twelve lesser idols covered with brass or bronze, and stood on Mag Slecht (the plain of prostrations) near Ballymagauran, Co. Cavan. In one text the Cromm Cruach is styled the chief idol of Ireland. According to the story St Patrick overthrew the idol, and one of the lives of the saint states that the mark of his crosier might still be seen on the stone. In the Dindsenchus we are told that the worshippers sacrificed their children to the idol in order to secure corn, honey and milk in plenty. On the occasion of famine the druids advised that the son of a sinless married couple should be brought to Ireland to be killed in front of Tara and his blood mixed with the soil of Tara. We might naturally expect to find the druids active in the capacity of priests in Ireland. D'Arbois de Jubainville maintains that

in Gaul the three classes of druids, vates and gutuatri, corresponded more or less to the pontifices, augurs and flamens of ancient Rome. In ancient Irish literature the functions of the druids correspond fairly closely to those of their Gaulish brethren recorded by Caesar and other writers of antiquity. Had we contemporary accounts of the position of the druid in Ireland prior to the introduction of Christianity, it may be doubted if any serious difference would be discovered. In early Irish literature the druids chiefly appear as magicians and diviners, but they are also the repositaries of the learning of the time which they transmitted to the disciples accompanying them (see Druidism). The Druids were believed to have the power to render a person insane by flinging a magic wisp of straw in his face, and they were able to raise clouds of mist, or to bring down showers of fire and blood. They claimed to be able to foretell the future by watching the clouds, or by means of divining-rods made of yew. They also resorted to sacrifice. They possessed several means for rendering a person invisible, and various peculiar and complicated methods of divination, such as Imbas Jorosna, tein laegda, and dichetal do chennaib, are described in early authorities. Whether or not the Irish druids taught that the soul was immortal is a question which it is impossible to decide. There is one passage which seems to support the view that they agreed with the Gaulish druids in this respect, but it is not safe to deny the possible influence of Christian teaching in the document in question. The Irish, however, possessed some more or less definite notions about an abode of everlasting youth and peace inhabited by fairies. The latter either dwell in the sid, and this is probably the earlier conception, or in islands. out in the ocean where they live a life of never-ending delight. These happy abodes were known by various names, as Tir Tairngiri (Land of Promise), Mag Mell (Plain of Pleasures). Condla Caem son of Conn Cetchathach was carried in a boat of crystal by a fairy maiden to the land of youth, and among other mortals who went thither Bran, son of Febal, and Ossian are the most famous. The doctrine of metempsychosis seems to have been familiar in early Ireland. Mongan king of Dalriada in the 7th century is stated to have passed after death into various shapes — a wolf, a stag, a salmon, a seal, a swan. Fintan, nephew of Partholan, is also reported to have survived the deluge and to have lived in various shapes until he was reborn as Tuan mac Cairill in the 6th century. This legend appears to have been worked up, if not manufactured, by the historians of the 9th to nth centuries to support their fictions. It may, however, be mentioned that Giraldus Cambrensis and the Speculum Regale

state in all seriousness that certain of the inhabitants of Ossory were

able at will to assume the form of wolves, and similar stories are not infrequent in Irish romance.

Conversion to Christianity. — In the beginning of the 4th century there was an organized Christian church in Britain; and in view of the intimate relations existing between Wales and Ireland during that century it is safe to conclude that there were Christians in Ireland before the time of St Patrick. Returned colonists from south Wales, traders and the raids of the Irish in Britain with the consequent influx of British captives sold into slavery must have introduced the knowledge of Christianity into the island considerably before a.d. 400. In this connexion it is interesting to find an Irishman named Fith (also called Iserninus) associated with St Patrick at Auxerre. Further, the earliest Latin words introduced into Irish show the influence of British pronunciation (e.g. O. Ir. trindoit from trinitdt-em shows the Brythonic change of a to 6). Irish records preserve the names of three shadowy pre-Patrician saints who were connected with south-east Ireland, Declan, Ailbe and Ciaran.

In one source the great heresiarch Pelagius is stated to have been a Scot. He may have been descended from an Irish family settled in south Wales. We have also the statement of Prosper of Aquitaine that Palladius was sent by Pope Celestine as first bishop to the Scots that believe in Christ. But though we may safely assume that a number of scattered communities existed in Ireland, and probably not in the south alone, it is unlikely that there was any organization before the time of St Patrick. This mission arose out of the visit of St Germanus of Auxerre to Britain. The British bishops had grown alarmed at the rapid growth of Pelagianism in Britain and sought the aid of the Gaulish church. A synod summoned for the occasion commissioned Germanus and Lupus to go to Britain, which they accordingly did in 429; Pope Celestine, we are told, had given his sanction to the mission through the deacon Palladius. The heresy was successfully stamped out in Britain, but distinct traces of it are to be found some three centuries later in Ireland, and it is to Irish monks on the European continent that we owe the preserva- tion of the recently discovered copies of Pelagius's Commentary. Palladius's activity in Britain probably marked him out as the man to undertake the task of bringing Ireland into touch with Western Christianity. In any case Prosper and the Irish Annals represent him as arriving in Ireland in 431 with episcopal rank. His missionary activity unfortunately is extremely obscure. Tradition associates his name with Co. Wicklow, but Irish sources state that after a brief sojourn there he proceeded to the land of the Picts, among whom he was beginning to labour when his career was cut short by death.

St Patrick. — At this juncture Germanus of Auxerre decided to consecrate his pupil Patrick for the purpose of carrying on the work begun by Palladius. Patrick would possess several qualifications for the dignity of a missionary bishop to Ireland. Born in Britain about '389, he had been carried into slavery in Ireland when a youth of sixteen. He remained with his master for seven years, and must have had ample opportunity for observing the conditions, and learning the language, of the people around him; and such knowledge would have been indispensable to the Christian bishop in view of the peculiar state of Irish society (see Patrick, St) . The new bishop landed in Wicklow in 432. Leinster was probably the province in which Christianity was already most strongly represented, and Patrick may have entrusted this part of his sphere to two fellow-workers- from Gaul, Auxilius and Iserninus. At any rate he seems rather to have addressed himself more especially to the task of founding churches in Meath, Ulster and Connaught. In Ireland the land nominally belonged to the tribe, but in reality a kind of feudal system existed. In order to succeed with the body of the tribe it was necessary to secure the adherence of the chief. The conversion in consequence was in large measure only apparent; and such pagan superstitions and practices as did not run directly counter to the new teaching were tolerated by the saint. Thus, whilst the mass of the people practically still continued in heathendom, the apostle was enabled to found

churches and schools and educate a priesthood which should provide the most effective and certain means of conversion. It would be a mistake to suppose that his success was as rapid or as complete as is generally assumed. There can be no doubt that he met with great opposition both from the high-king Loigaire and from the druids. But though Loigaire refused to desert the faith of his ancestors we are told that a number of his nearest kinsmen accepted Christianity; and if there be any truth in the story of the codification of the Brehon Laws we gather that he realized that the future belonged to the new religion. St Patrick's work seems to fall under two heads. In the first place he planted the faith in parts of the riorth and west which had probably not yet heard the gospel. He also organized the already existing Christian communities, and with this in view founded a church at Armagh as his metropolitan see (444). It is further due to him that Ireland became linked up with Rome and the Christian

countries of the Western church, and that in consequence Latin was introduced as the language of the church. It seems probable that St Patrick consecrated a considerable number of bishops with small but definite dioceses which doubtless coincided in the main with the territories of the tuaiha. In any case the ideal of the apostle from Britain was almost certainly very different from the monastic system in vogue in Ireland in the 6th and 7th centuries.

The Early Irish Church. — The church founded by St Patrick was doubtless in the main identical in doctrine with the churches of Britain and Gaul and other branches of the Western church; but after the recall of the Roman legions from Britain the Irish church was shut off from the Roman world, and it is only natural that there should not have been any great amount of scruple with regard to orthodox doctrine. This would explain the survival of the writings of Pelagius in Ireland until the 8th century. Even Columba himself, in his Latin hymn Alius prosalor, was suspected by Gregory the Great of favouring Arian doctrines. After the death of St Patrick there was apparently a relapse into paganism in many parts of the island. The church itself gradually became grafted on to the feudal organization, the result of which was the peculiar system which we find in the 6th and 7th centuries. Wherever Roman law and municipal institutions had been in force the church was modelled on the civil society. The bishops governed ‘ ecclesiastical districts co-ordinate with the civil divisions. In Ireland there were no cities and no municipal institutions; the nation consisted of groups of tribes connected by kinship, and loosely held together by a feudal system which we shall examine later. Although St Patrick endeavoured to organize the Irish church on regular diocesan lines, after his death an approximation to the lay system was under the circumstances almost inevitable. When a chief became a Christian and bestowed lands on the church, he at the same time transferred all his rights as a chief; but these rights still remained with his sept, albeit subordinate to the uses of the church. At first all church offices were exclusively confined to members of the sept. In this new sept there was consequently a twofold succession. The religious sept or family consisted in the first instance not only of the ecclesiastical persons to whom the gift was made, but of all the cSli or vassals, tenants and slaves, connected with the land bestowed. The head was the coarb (Ir. comarba, ” co-heir “), i.e. the inheritor both of the spiritual and temporal rights and privileges of the founder; he in his temporal capacity exacted rent and tribute like other chiefs, and made war not on temporal chiefs only, the spectacle of two coarbs making war on each other not being unusual. The ecclesiastical colonies that went forth from a parent

family generally remained in subordination to it, in the same way that the spreading branches of a ruling family remained in general subordinate to it. The heads of the secondary families were also called the coarbs of the original founder. Thus there were coarbs of Columba at Iona, Kells, Derry, Durrow and other places. The coarb of the chief spiritual foundation was called the high coarb (ard"-chomarba). The coarb might be a bishop or only an abbot, but in either case all the ecclesiastics in the family were subject to him; in this way it frequently

happened that bishops, though their superior functions were recognized, were in subjection to abbots who were only priests, as in the case of St Columba, or even to a woman, as in the case of St Brigit. This singular association of lay and spiritual powers was liable to the abuse of allowing the whole succession to fall into lay hands, as happened to a large extent in later times. The temporal chief had his steward who superintended the collection of his rents and tributes; in like manner the coarb of a religious sept had his airchinnech (Anglo-Irish erenach, herenach), whose office was generally, but not necessarily, hereditary. The office embodied in a certain sense the lay succession in the family.

*From the beginning the life of the converts must have been in some measure coenobitic. Indeed it could hardly have been otherwise in a pagan and half*savage land. St Patrick himself in his Confession makes mention of monks in Ireland in connexion with his mission, but the few glimpses we get of the monastic life of the decades immediately following his death prove that the earliest type of coenobium differed considerably from that known at a later period. The coenobium of the end of the 5th century consisted of an ordinary sept or family whose chief had become Christian. After making a gift of his lands the chief either retired, leaving it in the hands of a coarb, or remained as the religious head himself. The family went on with their usual avocations, but some of the men and women, and in some cases all, practised celibacy, and all joined in fasting and prayer. It may be inferred from native documents that grave disorders were prevalent under this system. A severer and more exclusive type of monasticism succeeded this primitive one, but apart from the separation of the sexes the general character never entirely changed.*

Diocesan organization as understood in countries under Roman Law being unknown, there was not that limitation of the number of bishops which territorial jurisdiction- renders necessary, and consequently the number of bishops increased beyond all pro-

portions. Thus, St Mochta, abbot of Louth, and a reputed disciple of St Patrick, is stated to have had no less than 100 bishops in his monastic family. All the bishops in a coenobium were subject to the abbot; but besides the bishop in the monastic families, every tuath or tribe had its own bishop. The church in Ireland having been evolved out of the monastic nuclei already described the tribe bishop was an episcopal development of a somewhat later period. He was an important personage, his status being fixed in the Brehon laws, from which we learn that his honour price was seven cumals, and that he had the right to be accompanied by the same number of followers as a petty king. The power of the bishops was considerable, as they were strong enough to resist the kings with regard to the right of sanctuary, ever a fertile source of dissension. The tuath bishop in later centuries corresponded to the diocesan bishop as closely as it was possible in two systems so different as tribal and municipal government. When diocesan jurisdiction was introduced into Ireland in the 12th century the tuath became a diocese. Many of the old dioceses represent ancient tuaiha, and even enlarged modern dioceses coincide with the territories of ancient tribal states. Thus the diocese of Kilmacduagh was the territory of the Hui Fiachrach Aidne; that of Kilfenora was the tribe land of Corco-Mruad or Corcomroe. Many deaneries also represent tribe territories. Thus the deanery of Musgrylin (Co. Cork) was the ancient Muscraige Mitaine, and no doubt had its tribe bishop in ancient times. Bishops without dioceses and monastic bishops were not unknown outside Ireland in the Eastern and Western churches in very early times, but they had dis- appeared with rare exceptions in the 6th century when the Irish reintroduced the monastic bishops and the monastic church into Britain and the continent.

In the 8th and 9th centuries, when the great emigration of Irish scholars and ecclesiastics took place, the number of wander- ing bishops without dioceses became a reproach to the Irish church; and there can be no doubt that it led to much incon- venience and abuse, and was subversive of the stricter discipline that the popes had succeeded in establishing in the Western

church. They were accused of ordaining serfs without the consent of their lords, consecrating bishops per solium, i.e. of making men

bishops who had not previously received the orders of priests, and of permitting bishops to be consecrated by a single bishop. This custom can hardly, however, be a reproach to the Irish church, as the practice was never held to be invalid; and besides, the Nicene canons of discipline were perhaps not known in Ireland until comparatively late times. The isolated position of Ireland, and the existence of tribal organization in full vigour, explain fully the anomalies of Irish discipline, many of which were also survivals of the early Christian practices before the complete organization of the church.

After the death of St Patrick the bond between the numerous church families which his authority supplied was greatly relaxed; and the saint's most formidable opponents, the druids, probably regained much of their old power. The transition period which follows the loosening of a people's faith in its old religion and before the authority of the new is universally accepted is always a time of confusion and relaxation of morals. Such a period appears to have followed the fervour of St Patrick's time. To judge from the early literature the marriage-tie seems to have been regarded very lightly, and there can be little doubt that pagan marriage customs were practised long after the intro- duction of Christianity. The Brehon Laws assume the existence of married as well as unmarried clergy, and when St Patrick was seeking a bishop for the men of Leinster he asked for "a man of one wife." Marriage among the secular clergy went on in Ireland until the 15th century. Like the Gaulish druids described by Caesar, the poet (fili) and the druid possessed a huge stock of unwritten native lore, probably enshrined in verse which was learnt by rote by their pupils. The exalted position occupied by the learned class in ancient Ireland perhaps affords the key to the wonderful outbursts of scholarly activity in Irish monasteries from the 6th to the 9th centuries. That some of the f lid embraced Christianity from the outset is evident from the story of Dubthach. As early as the second half of the 5th century Enda, a royal prince of Oriel (c. 450-540), after spending some time at Whithorn betook himself to Aranmore, off the coast of Galway, and founded a school there which attracted scholars from all over Ireland. The connexion between Ireland and Wales was strong in the 6th century, and it was from south Wales that the great reform movement in the Irish mon- asteries emanated. Findian of Clonard (c. 470-548) is usually regarded as the institutor of the type of monastery for which Ireland became so famous during the next few centuries. He spent some time in Wales, where he came under the influence of St David, Gildas and Cadoc; and on returning to Ireland he founded his famous monastery at Clonard (Co. Meath) about 520. Here no less than 3000 students

are said to have received instruction at the same time. Such a monastery consisted of countless tiny huts of wattles and clay (or, where stone was plentiful, of beehive cells) built by the pupils and enclosed by a fosse, or trench, like a permanent military encampment. The pupils sowed their own corn, fished in the streams, and milked their own cows. Instruction was probably given in the open air. Twelve of Findian's disciples became known as the twelve apostles of Ireland, the monastic schools they founded becoming the greatest centres of learning and religious instruction not only in Ireland, but in the whole of the west of Europe. Among the most famous were Moville (Co. Down), founded by another Findian, c. 540; Clonmacnoise, founded by Kieran, 541; Derry, founded by Columba, 546; Clonfert, founded by Brendan, 552; Bangor, founded in 558 by Comgall; Durrow, founded by Columba, c. 553. The chief reform due to the influence of the British church 1 seems to have been the intro- duction of monastic life in the strict sense of the word, i.e. communities entirely separated from the laity with complete separation of the sexes. One almost immediate outcome of the reformation effected

1 It seems probable that the celebrated monastery of Whithorn in Galloway played some part in the reform movement, at any rate in the north of Ireland. Findian of Moville spent some years there.

by Findian was that wonderful spirit of missionary enterprise which made the name of Scot and of Ireland so well known throughout Europe, while at the same time the Irish were being driven out of their colonies in Wales and south-west Britain owing to the advance of the Saxon power. In 563 Columba founded the monastery of Hi (Iona), which spread the knowledge of the Gospel among the Picts of the Scottish mainland. From this same solitary outpost went forth the illustrious Aidan to plant another Iona at Lindisfarne, which, " long after the poor parent brotherhood had fallen to decay, expanded itself into the bishopric of Durham." And Lightfoot claims for Aidan " the first place in the evangelization of the English race. Augustine was the apostle of Kent, but Aidan was the apostle of England." In 590 Columbanus, a native of Leinster (b. 543), went forth from Bangor, accompanied by twelve companions, to preach the Gospel on the continent of Europe. Columbanus was the first of the long stream of famous Irish monks who left their traces in Italy, Switzerland, Germany and France; amongst them being Gallus or St Gall, founder of St Gallen, Kilian of Wiirzburg, Virgil of Salzburg, Cathald of Tarentum and numerous others. At the beginning of the 8th century a long series of missionary establishments extended from the mouths of the Meuse and Rhine to the Rhone and the Alps, whilst many others

founded by Germans are the offspring of Irish monks. Willibrord, the apostle of the Frisians, for instance, spent twelve years in Ireland. Other Irishmen seeking remote places wherein to lead the lives of anchorites, studded the numerous islands on the west coast of Scotland with their little buildings. Cormac ua Liathain, a disciple of St Columba, visited the Orkneys, and when the Northmen first discovered Iceland they found there books and other traces of the early Irish church. It may be mentioned that the geographer Dicuil who lived at the court of Charlemagne gives a description of Iceland which must have been obtained from some one who had been there. The peculi- arities which owing to Ireland's isolation had survived were brought into prominence when the Irish missionaries came into contact with Roman ecclesiastics. The chief points of difference were the calculation of Easter and the form of the tonsure, in addition to questions of discipline such as the consecration of bishops per saltum and bishops without dioceses. With regard to tonsure it would seem that the druids shaved the front part of the head from ear to ear. St Patrick doubtless introduced the ordinary coronal tonsure, but in the period following his death the old druidical tonsure was again revived. In the calculation of Easter the Irish employed the old Roman and Jewish 84-years' cycle which they may have received from St Patrick and which had once prevailed all over Europe. Shut off from the world, they were probably ignorant of the new cycle of 532 years which had been adopted by Rome in 463. This question aroused a controversy which waxed hottest in England, and as the Irish monks stubbornly adhered to their traditions they were vehemently attacked by their opponents. As early as 633 the church of the south of Ireland, which had been more in contact with Gaul, had been won over to the Roman method of computation. The north and Iona on the other hand refused to give in until Adamnan induced the north of Ireland to yield in 697, while Iona held out until 716, although by this time the monastery had lost its influence in Pictland. Owing to these controversies the real work of the early Irish missionaries in converting the pagans of Britain and central Europe, and sowing the seeds of culture there, is apt to be- overlooked. Thus, when the Anglo-Saxon, Winfrid, surnamed Boniface, appeared in the kingdom of the Franks as papal legate in 723, to romanize the existing church of the time, neither the Franks, the Thuringians, the Alemanni nor the Bavarians could be considered as pagans. What Irish missionaries and their foreign pupils had implanted for more than a century quite independently of Rome, Winfrid organized and established under Roman authority partly by force of arms.

During the four centuries which elapsed between the arrival of St

Patrick and the establishment of a central state in Dublin by the Norsemen the history of Ireland is almost a blank as

regards outstanding events. From the time that the Milesians of Tara had come to be recognized as suzerains of the whole island all political development ceases. The annals contain nothing save a record of intertribal warfare, which the high-king was rarely powerful enough to stay. The wonderful achievements of the Irish monks did not affect the body politic as a whole, and it may be doubted if there was any distinct advance in civilization in Ireland from the time of Niall Noigiallach to the Anglo-Norman invasion. NialFs posterity held the position of ardrl uninterruptedly until 1002. Four of his sons, Loigaire, Conall Crimthand, Fiacc and Maine, settled in Meath and adjoining territories, and their posterity were called the southern Hy Neill. The other four, Eogan, Enna Find, Cairpre and Conall Gulban, occupied the northern part of Ulster. Their descendants were known as the northern Hy Neill. 1 The descendants of Eogan were the O'Neills and their numerous kindred septs ; the posterity of Conall Gulban were the O'Donnells and their kindred septs. Niall died in 406 in the English Channel whilst engaged in a marauding expedition. He was succeeded by his nephew Dathi, son of Fiachra, son of Eochaid Muigmedoin, who is stated to have been struck by lightning at the foot of the Alps in 428. Loigaire, son of Niall (428-463), is identified with the story of St Patrick. According to tradition it was during his reign that the codification of the Senchus M6r took place. A well-known story represents him as constantly at war with the men of Leinster. His successor, Ailill Molt (463-483), son of Dathi, is remarkable as being the last high-king for 500 years who was not a direct descendant of Niall.

In 503 a body of colonists under Fergus, son of Ere, moved from Dalriada to Argyll and effected settlements there. The circumstances which enabled the Scots to succeed in occupying Kintyre and Islay cannot now be ascertained. The little kingdom had great difficulty to maintain itself, and its varying fortunes are very obscure. Neither is it clear that bodies of Scots had not already migrated to Argyll. Diarmait, son of Fergus Cerbaill (544-565), of the southern Hy Neill, undoubtedly professed Christianity though he still clung to many pagan practices, such as polygamy and the use of druidical

incantations in battle. The annals represent him as getting into trouble with the Church on account of his violation of the right of sanctuary. At an assembly held at Tara in 554 Curnan, son of the king of Connaught, slew a nobleman, a crime punishable with death. The author of the deed fled for sanctuary to St Columba. But Diarmait pursued him, and disregarding the opposition of the saint seized Curnan and hanged him. St Columba's kinsmen, the northern Hy Neill, took up the quarrel, and attacked and defeated the king at Culdreimne in 561. In this battle Diarmait is stated to have employed druids to form an airbe druad (fence of protection?) round his host. A few years later Diarmait seized by force the chief of Hy Maine, who had slain his herald and had taken refuge with St Ruadan of Lothra. According to the legend the saint, accompanied by St Brendan of Birr, followed the king to Tara and solemnly cursed it, from which time it was deserted. It has been suggested that Tara was abandoned during the plague of 548-549. Others have surmised that it was abandoned as a regular place of residence long before this, soon after the northern and southern branches of the Hy Neill had consolidated their power at Ailech and in Westmeath. Whatever truth there may be in the legend, ic demonstrates conclusively the absence of a rallying point where the idea of a central government might have taken root. Aed, son of Ainmire (572-598) of the northern Hy Neill, figures prominently in the story of St Columba. It was during his reign that the famous assembly of Drumcet (near Newtown- limavaddy in Co. Derry) was held. The story goes that the filid had increased in number to such an extent that they included one-third of the freemen. There was thus quite an army of impudent swaggering idlers roaming about the country and

1 The O'Neills who played such an important part in later Irish history do not take their name from Niall Noigiallach, though they are descended from him. They take their name from Niall Gliindub (d. 919).

quartering themselves on the chiefs and nobles during the winter and spring, story-telling, and lampooning those who dared to hesitate to comply with their demands.

Some idea of the style of living of the learned professions in early Ireland may be gathered from the income enjoyed in later times by the literati of Tir Conaill (Co. Donegal). It has been computed that no less than £2000 was set aside yearly in this small state for the maintenance of the class. No wonder, then, that Aed determined to banish them from Ireland. At the convention of Drumcet the number of filid was greatly reduced, lands were assigned for their

maintenance, the ollams were required to open schools and to support the inferior bards as teachers. This reform may have helped to foster the cultiva- tion of the native literature, and it is possible that we owe to it the preservation of the Ulster epic. But the Irish were un- fortunately incapable of rising above the saga, consisting of a mixture of prose and verse. Their greatest achievement in literature dates back to the dawn of history, and we find no more trace of development in the world of letters than in the political sphere. The Irishman, in his own language at any rate, seems incapable of a sustained literary effort, a consequence of which is that he invents the most intricate measures. Sense is thus too frequently sacrificed to sound. The influence of the professional literary class kept the clan spirit alive with their elaborate genealogies, and in their poems they only pandered to the vanity and vices of their patrons. That no new ideas came in may be gathered from the fact that the bulk of Irish literature so far published dates from before 800, though the MSS. which contain it are much later. Bearing in mind how largely the Finn cycle is modelled on the older Ulster epic, works of originality composed between 1000 and 1600 are with one or two exceptions conspicuously absent.

At the convention of Drumcet the status of the Dalriadic settlement in Argyll was also regulated. The ardrl desired to make the colony an Irish state tributary to the high-king; but on the special pleading of St Columba it was allowed to remain independent. Aed lost his life in endeavouring to exact the boroma tribute from Brandub, king of Leinster, who defeated him at Dunbolg in 598. After several short reigns the throne was occupied by Aed's son Domnall (627-641). His predecessor, Suibne Menn, had been slain by the king of Dalaraide, Congal Claen. The latter was driven out of the country by Domnall, whereupon Congal collected an army of foreign adventurers made up of Saxons, Dalriadic Scots, Britons and Picts to regain his lands and to avenge himself on the high-king. In a sanguinary encounter at Mag Raith (Moira in Co. Down), which forms the subject of a celebrated romance, Congal was slain and the power of the settlement in Kintyre weakened for a considerable period. A curious feature of Hy Neill rule about this time was joint kingship. From 563 to 656 there were no less than five such pairs. In. 681 St Moling of Ferns prevailed upon the ardrl Finnachta (674-690) to renounce for ever the boroma, tribute, which had always been a source of friction between the supreme king and the ruler of Leinster. This was, however, unfortunately not the last of the boroma. Fergal (711-722), in trying to enforce it again, was slain in a famous battle at Allen in Kildare. As a sequel Fergal's son, Aed Allan (734-743), defeated the

men of Leinster with great slaughter at Baliyshannon (Co. Kildare) in 737. If there was so little cohesion among the various pro- vinces it is small wonder that Ireland fell such an easy prey to the Vikings in the next century. In 697 an assembly was he!4 at Tara in which a law known as Cdin Adamndin was passed, at the instance of Adamnan, prohibiting women from taking part in battle; a decision that shows how far Ireland with its tribal system lagged behind Teutonic and Latin countries in civilization. A similar .enactment exempting the clergy, known as Cdin Patraic, was agreed to in 803. The story goes that the ardri Aed Oirdnigthe (797-819) made a hostile incursion into Leinster and forced the primate of Armagh and all his clergy to attend him. When representations were made to the king as to the impropriety of his conduct, he referred the matter to his adviser, Fothud, who was also a cleric. Fothud pronounced that

the clergy should be exempted, and three verses purporting to be his decision are still extant.

Invasion of the Northmen. — The first incursion of the Northmen took place in a.d. 795, when they plundered and burnt the church of Rechru, now Lambay, an island north of Dublin Bay. When this event occurred, the power of the over-king was a mere shadow. The provincial kingdoms had split up into more or less independent principalities, almost constantly at war with each other. The oscillation of the centre of power between Meath and Tir Eogain, according as the ardri belonged to the southern or northern Hy Neill, produced corresponding per- turbations in the balance of parties among the minor kings. The army consisted of a number of tribes, each commanded by its own chief, and acting as so many independent units without cohesion. The tribesmen owed fealty only to their chiefs, who in turn owed a kind of conditional allegiance to the over-king, depending a good deal upon the ability of the latter to enforce it. A chief might through pique or other causes withdraw his tribe even on the eve of a battle without such defection being deemed dishonourable. What the tribe was to the nation or the province, the fine or sept was to the tribe itself. The head of a sept had a voice not only in the question of war or peace, for that was determined by the whole tribe, but in all subsequent operations. However brave the individual soldiers of such an army might be, the army itself was

unreliable against a well-organized and disciplined enemy. Again, such tribal forces were only levies gathered together for a few weeks at most, unprovided with military stores or the means of transport, and consequently generally unprepared to attack fortifications of any kind, and liable to melt away as quickly as they were gathered together. Admirably adapted for a sudden attack; such an army was wholly unfit to carry on a regular campaign or take advantage of a victory. These defects of the Irish military system were abundantly shown throughout the Viking period and also in Anglo-Norman times.

The first invaders were probably Norwegians 1 from Hordaland in search of plunder and captives. Their attacks were not confined to the sea-coasts; they were able to ascend the rivers in their ships, and already in 801 they are found on the upper Shannon. At the outset the invaders arrived in small bodies, but as these met with considerable resistance large fleets com- manded by powerful Vikings followed. With such forces it was possible to put fleets of boats on the inland lakes. Rude earthen or stockaded forts, serving as magazines and places of retreat, were erected; or in some cases use was made of strong- holds already existing, such as Dun Almain in Kildare, Dunlavin in Wicklow and Fermoy in Cork. Some of these military posts in course of time became trading stations or grew into towns. During the first half of the oth century attacks were incessant in most parts of the island. In 801 we find Norwegians on the upper Shannon; in 820 the whole of Ireland was harried; and five years later we hear of Vikings in Co. Dublin, Meath, Kildare, Wicklow, Queen's Co., Kilkenny and Tipperary. However, the invaders do not appear to have acted in concert until 830. About this time a powerful leader, named Turgeis (Turgesius), accompanied by two nobles, Saxolb and Domrair (Thorir), arrived with a " royal fleet." Sailing up the Shannon they built strongholds on Lough Ree and devastated Connaught and Meath. Eventually Turgeis established himself in. Armagh, whilst his wife Ota settled at Clonmacnoise and profaned the monastery church with pagan rites. Indeed, the numerous ecclesiastical establishments appear to have been quite as much the object of the invaders' fury as the civil authorities. The monastery of Armagh was rebuilt ten times, and as often de- stroyed. It was sacked three times in one month. Turgeis himself is reported to have usurped the abbacy of Armagh. To escape from the continuous attacks on the monasteries, Irish monks and scholars fled in large numbers to the continent carrying with them their precious books. Among them were

1 At this period it is extremely difficult to distinguish between Norwegians and Danes on account of the close connexion between

the ruling families of both countries.

many of the greatest lights in the world of letters of the time, such as Sedulius Scottus and Johannes Scottus Erigena. The figure of Turgeis has given rise to considerable discussion, as there is no mention of him in Scandinavian sources. It seems probable that his Norwegian name was Thorgils and he was possibly related to Godfred, father of Olaf the White, who figures prominently in Irish history a little later. Turgeis appar- ently united the Viking forces, as he is styled the first king of the Norsemen in Ireland. A permanent sovereignty over the whole of Ireland, such as Turgeis seems to have aimed at, was then as in later times impossible because of the state of society. During his lifetime various cities were founded— the first on Irish soil. Dublin came into existence in 840, and Waterford and Limerick appear in history about the same time. Although the Norsemen were constantly engaged in conflict with the Irish, these cities soon became important commercial centres trading with England, France and Norway. Turgeis was captured and drowned by the ardri Maelsechlainn in 844, and two years later Domrair was slain. However cruel and rapacious the Vikings may have been, the work of disorder and ruin was not all theirs. The condition of the country afforded full scope for the jealousy, hatred, cupidity and vanity which characterize the tribal state of political society. For instance, Fedilmid, king of Munster and archbishop of Cashel, took the opportunity of the misfortunes of the country to revive the claims of the Munster dynasty to be kings of Ireland. To enforce this claim he ravaged and plundered a large part of the country, took hostages from Niall Caille the over-king (833-845), drove out the comarba of St Patrick, or archbishop of Armagh, and for a whole year occupied his place as bishop. On his return he plundered the termon lands of Clonmacnoise " up to the church door," an exploit which was repeated the following year. There is no mention of his having helped to drive out the foreigners.

For some years after the death of Turgeis the Norsemen appear to have lacked a leader and to have been hard pressed. It was during this period that Dublin was chosen as the point of concentration for their forces. In 848 a Danish fleet from the south of England arrived in Dublin Bay. The Danes are called in Irish Dubgaill, or black foreigners, as distinguished from the Findgaill? or white foreigners, i.e. Norwegians. The origin of these terms, as also of the Irish name for Norway (Lochlann), is obscure. At first the Danes and Norwegians appear to have made common cause, but two years later the new city of Dublin was stormed by the Danes. In 851 the Dublin Vikings succeeded in vanquishing the Danes after a three days' battle

at Snaim Aignech (Carlingford Lough), whereupon the defeated party under their leader Horm took service with Cerball, king of Ossory. Even in the first half of the 9th century there must have been a great deal of inter- marriage between the invaders and the native population, due in part at any rate to the number of captive women who were carried off. A mixed race grew up, recruited by many Irish of pure blood, whom a love of adventure and a lawless spirit led away. This heterogeneous population was called Gallgoidel or foreign Irish (whence the modern name Galloway), and like their northern kinsmen they betook themselves to the sea and practised piracy. The Christian element in this mixed society soon lapsed to a large extent, if not entirely, into paganism. The Scandinavian settlements were almost wholly confined to the seaport towns, and except Dublin included none of the surrounding territory. Owing to its position and the character" of the country about it, especially the coast-land to the north of the Liffey which formed a kind of border-land between the territories of the kings of Meath and Leinster, a considerable tract passed into the possession of so powerful a city as Dublin. The social and political condition of Ireland, and the pastoral occupation of the inhabitants, were unfavourable to the develop- ment of foreign commerce, and the absence of coined money among them shows that it did not exist on an extensive scale.

! This name survives in Fingall, the name of a district north of Dublin city. Dubgall is contained in the proper names MacDougall, MacDowell.

The foreign articles of luxury (dress, ornaments, wine, &c.) required by them were brought to the great oenachs or fairs held periodically in various parts of the country. A flourishing commerce, however, soon grew up in the Scandinavian towns; mints were established, and many foreign traders — Flemings, Italians and others — settled there. It was through these Scandinavian trading communities that Ireland came into contact with the rest of Europe in the nth and 12th centuries. If evidence were needed it is only necessary to point to the names of three of the Irish provinces, Ulster, Leinster, Munster, which are formed from the native names (Ulaid, Laigin, Muma-n) with the addition of Norse staSr; and the very name by which the island is now generally known is Scandinavian in form (Ira-land, the

land of the Irish). The settlers in the Scandinavian towns early came to be looked upon by the native Irish as so many septs of a tribe added to the system of petty states forming the Irish political system. They soon mixed in the domestic quarrels of neighbouring tribes, at first selling their protection, but afterwards as vassals, sometimes as allies, like the septs and tribes of the Goidel among themselves. The latter in turn acted in similar capacities with the Irish-Norwegian chiefs, Irish tribes often forming part of the Scandinavian armies in Britain. This intercourse led to frequent intermarriage between the chiefs and nobility of the two peoples. As an instance, the case of Cerball, king of Ossory (d. 887), may be cited Eyvindr, sur- named AustmaSr, "the east-man," 1 son of Bjorn, agreed to defend Cerball's territory on condition of receiving his daughter Raforta in marriage. Among the children of this marriage were Helgi Magri, one of the early settlers in Iceland, and Thurida, wife of Thorstein the Red. Three other daughters of Cerball married Scandinavians: Gormflaith (KormloS) married Grimolf, who settled in Iceland, Fridgerda married Thorir Hyrna, and Ethne (Edna) married HloSver, father of Earl Sigurd Digri who fell at Clontarf. Cerball's son Domnall (Dufnialr) was the founder of an Icelandic family, whilst the names Raudi and Baugr occur in the same family. Hence the occurrence of such essentially Irish names as Konall, Kjaran, Njall, Kormakr, Brigit, KaSlin, &c, among Icelanders and Nor- wegians cannot be a matter for surprise; nor that a number of Norse words were introduced into Irish, notably terms connected with trade and the sea.

The obscure contest between the Norwegians and Danes for supremacy in Dublin appears to have made the former feel the need of a powerful leader. At any rate, in 851-852 the king of Lochlann (Norway) sent his son Amlaib (Olaf the White) to assume sovereignty over the Norsemen in Ireland and to receive tribute and vassals. From this time it is possible to speak of a Scandinavian kingdom of Dublin, a kingdom which lasted almost without interruption until the Norman Conquest. The king of Dublin exercised overlordship over the other Viking communities in the island, and thus became the most dangerous opponent of the ardri, with whom he was constantly at variance, Amlaib was accompanied by Ivar, who is stated in one source to have been his brother. Some writers wish to identify this prince with the famous Ivar Beinlaus, son of Ragnar Lodbrok. Amlaib was opposed to the ardri Maelsechlainn I. (846-863) who had overcome Turgeis. This brave ruler gained a number of victories over the Norsemen, but in true Irish fashion they were never followed up. Although his successor

Aed Finnliath (863-870) gave his daughter in marriage to Amlaib, no better relations were established. The king of Dublin was certainly the most commanding figure in Ireland in his day, and during his lifetime the Viking power was greatly extended. In 870 he captured the strongholds of Dumbarton and Dunseverick (Co. Antrim). He disappears from the scene in 873. One source represents him as dying in Ireland, but the circumstances are quite obscure. Ivar only survived Olaf two or three years, and it is stated that he died a Christian. During the ensuing period Dublin was the scene of constant family feuds, which weakened

' In Anglo-Norman times the Scandinavians of Dublin and other cities are always called Ostmen, i.e. Eastmen; hence the name Ostmanstown, now Oxmanstown. a part of the city of Dublin.

its power to such an extent that in 901 Dublin and Waterford were captured by the Irish and were obliged to acknowledge the supremacy of the high-king. The Irish Annals state that there were no fresh invasions of the Northmen for about forty years dating from 877. During this period Ireland enjoyed comparative rest notwithstanding the intertribal feuds in which the Norse settlers shared, including the campaigns of Cormac, son of Cuilennan, the scholarly king-bishop of Cashel.

Towards the end of this interval of repose a certain Sigtrygg, who was probably a great-grandson of the Ivar mentioned above, addressed himself to the task of winning back the kingdom of his ancestor. Waterford was retaken in 914 by Ivar, grandson of Ragnall and Earl Ottir, and Sigtrygg won a signal victory over the king of Leinster at Cenn Fuait (Co. Kilkenny?) two years later. Dublin was captured, and the high-king Niall Glundub (910-919) prepared to oppose the invaders. A battle of prime importance was gained by Sigtrygg over the ardri, who fell fighting gallantly at Kilmashogue near Dublin in 919. Between 920 and 970 the Scandinavian power in Ireland reached its zenith. The country was desolated and plundered by natives and foreigners alike. The lower Shannon was more thoroughly occupied by the Norsemen, with which fact the rise of Limerick is associated. Carlow, Kilkenny and the territory round Lough Neagh were settled, and after the capture of Lough Erne in 932 much of Longford was colonized. The most prominent figures at this time were Muirchertach " of the leather cloaks," son of Niall Glundub, Cellachan of Cashel and Amlaib (Olaf) Cuaran. The first-named waged constant warfare against the foreigners and was the most formidable opponent the Scandinavians had yet met. In his famous circuit of Ireland (941) he took all the provincial kings, as

well as the king of Dublin, as hostages, and after keeping them for five months at Ailech he handed them over to the feeble titular ardri, showing that his loyalty was greater than his ambition. Unlike Muirchertach, Cellachan of Cashel, the hero of a late romance, was not particular whether he fought for or against the Norsemen. In 920 Sigtrygg (d.927) was driven out of Dublin by his brother Godfred (d. 934) and retired to York, where he became king of Northumbria. His sons Olaf and Godfred were expelled by ˆEthelstan. The former, better known as Amlaib (Olaf) Cuaran, married the daughter of Constantine, king of Scotland, and fought at Brunanburh (938). Born about 920, he perhaps became king of York in 941. Expelled in 944-945 he went to Dublin and drove out his cousin Blakare, son of Godfred. At the same time he held. sway over the kingdom of Man and the Isles. We find this romantic character constantly engaged on expeditions in England, Ireland and Scotland. In 956 Congalach, the high-king, was defeated and slain by the Norse of Dublin. In 973 his son Domnall, in alliance with Amlaib, defeated the high-king Domnall O'Neill at Cell Mona (Kilmoon in Co. Meath). This Domnall O'Neill, son of Muirchertach, son of Niall Glundub, was the first to adopt the name O'Neill (Ir. ua, <5= " grandson "), The tanists or heirs of the northern and southern Hy Neill having died, the throne fell to Maelsechlainn II., of the Cland Colmain, the last of the Hy Neill who was undisputed king of Ireland. Maelsechlainn, who succeeded in 980, had already distinguished himself as king of Meath in war with the Norsemen. In the first year of his reign as high-king he defeated them in a bloody battle at Tara, in which Amlaib's son, Ragnall, fell. This victory, won over the combined forces of the Scandinavians of Dublin, Man and the Isles, compelled Amlaib to deliver up all his captives and. hostages, — among whom were Domnall Claen, king of Leinster, and several notables — to forgo the tribute which he had imposed upon the southern Hy Neill and to pay a large contribution of cattle and money. Amlaib's spirit was so broken by this defeat that he retired to the monastery of Hi, where he died the same year.

The Dalcais Dynasty. — We have already seen that the dominant race in Munster traced descent from Ailill Aulom. The Cashel dynasty claimed to descend from his eldest son Eogan, whilst the Dalcassians of Clare derived their origin from a younger son Cormac Cas. Ailill Aulom is said to have ordained that the

succession to the throne should alternate between the two lines as in the case of the Hy Neill. This, however, is perhaps a fiction of later poets who wished to give lustre to the ancestry of Brian Boruma, as very few of the Dalcais princes appear in the list of the kings of Cashel. The Dalcassians play no prominent part in history until, in the middle of the 10th century, they were ruled by Kennedy (Cennetig), son of Lorcan, king of Thomond (d. 954), by whom their power was greatly extended. He left two sons, Mathgamain (Mahon) and Brian, called Brian Boruma probably from a village near Killaloe. 1 About the year 920 a Viking named Tomrair, son of Elgi, had seized the lower Shannon and established himself in Limerick, from which point constant incursions were made into all parts of Munster. After a period of guerrilla warfare in the woods of Thomond, Mathgamain concluded a truce with the foreigners, in which Brian refused to join. Thereupon Mathgamain crossed the Shannon and gained possession of the kingdom of Cashel, as Dunchad, the repre- sentative of the older line, had just died. Receiving the support of several of the native tribes, he felt himself in a position to attack the settlements of the foreigners in Munster. This aroused the ruler of Limerick, Ivar, who determined to carry the war into Thomond. He was supported by Maelmuad, king of Desmond, and Donoban, king of Hy Fidgeinte, and Hy Cairpri. 1 heir army was met by Mathgamain at Sulchoit near Tipperary where the Norsemen were defeated with great slaughter (968)' This decisive victory gave the Dalcais Limerick, which they sacked and burnt, and Mathgamain then took hostages of all the chiefs of Munster. Ivar escaped to Britain, but returned after a year and entrenched himself at Inis Cathaig(Scattery Island in the lower Shannon) . A conspiracy was formed between Iyar and his son Dubcenn and the two Munster chieftains Donoban and Maelmuad. Donoban was married to the daughter of a Scandinavian king of Waterford, and his own daughter was married to Ivar of Waterford. In 976 Inis Cathaig was attacked and plundered by the Dalcais and the garrison, including Ivar and Dubcenn, slain. Shortly before this Mathgamain had been murdered by Donoban, and Brian thus became king of Thomond whilst Maelmuad succeeded to Cashel. In 977 Brian made a sudden and rapid inroad into Donoban's territory, captured his fortress and slew the prince himself with a vast number of his followers. Maelmuad, the other conspirator, met with a like fate at Belach Lechta in Barnaderg (near Ballyorgan). After this battle Brian was acknowledged king of all Munster (978). Alter reducing the Desi, who were in alliance with the Northmen of Waterford and Limerick, in 984 he subdued Ossory and took hostages from the kings of East and West Leinster. In this manner he became virtually king of Leth*

Moga.

This rapid rise of the Dalcassian leader was bound to bring him into conflict with the ardri. Already in 982 Maelsechlainn had invaded Thomond and uprooted the venerable tree under which the Dalcais rulers were inaugurated. After the battle of Tara he had placed his half-brother Gluniarind, son of Amlaib Cuaran, in Dublin. This prince was murdered in 989 and was succeeded by Sigtrygg Silkiskeggi, son of Amlaib and Gormflaith sister of Maelmorda, king of Leinster. In the same year Mael- sechlainn took Dublin and imposed an annual tribute on the city. During these years there were frequent trials of strength between the ardri and the king of Munster. In 992 Brian invaded Meatn, and four years later Maelsechlainn defeated Brian in Munster. In 998 Brian ascended the Shannon with a large force intending to attack Connaught, and Maelsechlainn, who received no support from the northern Hy Neill, came to terms with him. All hostages held by the over-king from the Northmen and Irish of Leth Moga were to be given up to Brian, which was a virtual surrender of all his rights over the southern half of Ireland- while Brian on his part recognized Maelsechlainn as sole king of Leth Cuinn. In 1000 Leinster revolted against Brian and entered into an alliance with the king of Dublin. Brian advanced towards the city, halting at a place called Glen Mama near 1 On the name see K. Meyer Erin, iv. pp. 71-7?

the mS™" ' the n° n u thi t Iva r °f Wa terford, 'is the ancestor of the O Donavans, Donoban that of the O' Donovans.

[EARLY HISTORY

Dunlavin (Co. Wicklow). He was attacked by the allied forces who were repulsed with great slaughter. Maelmorda, king of Leinster, was taken prisoner, and Sigtrygg fled for protection to AUech. The victor gave proof at once that he was not only a clever general but also a skilful diplomatist. Maelmorda was restored to his kingdom, Sigtrygg received Brian's daughter in marriage, whilst Brian took to himself the Dublin king's mother the notorious Gormflaith, who had already been divorced by Maelsechlainn. After thus establishing peace and consolidat- ing his power, Brian returned to his residence Cenn Corad and matured his plan of obtaining the high-kingship for himself. When everything was ready he entered Mag Breg with an army consisting of his own troops, those of Ossory, his South Connaught vassals and the Norsemen of Munster. The king of Dublin also sent a small force to his assistance. Maelsechlainn, taken by surprise and feeling himself unequal to the contest endeavoured to

gain time. An armistice was concluded, during which he was to decide whether he would give Brian hostages (t.e. abdicate) or not. He applied to the northern Hy Neill to come to his assistance, and even offered to abdicate in favour of the chief of the Cinel Eogain, but the latter refused unless Maelsechlainn undertook to cede to them half the territory of his own tribe, the Cland Colmain. The attempt to unite the whole of the Eremonian against the Eberian race and preserve a dynasty that had ruled Ireland for 600 years, having failed, Maelsechlainn submitted to Brian, and without any formal act of cession the latter became ardri. During a reign of twelve years (1002-1014) he is said to have effected much improvement in the country by the erection and repair of churches and schools and the construction of bridges, causeways, roads and fortresses. We are also told that he administered rigid and impartial justice and dispensed royal hospitality. As he was liberal to the bards they did not forget his merits.

*Towards the end of Brian's reign a conspiracy was entered into between Maelmorda, king of Leinster, and his nephew Sigtrygg of Dublin. The ultimate cause of this movement was an insult offered by Murchad, Brian's son, to the king of Leinster, who was egged on by his sister Gormflaith. Sigtrygg secured promises of assistance from Sigurd, earl of Orkney, and Brodir of Man. In the spring of 1014 Maelmorda and Sigtrygg had collected a considerable army in Dublin, consisting of contingents from all the Scandinavian settlements in the west in addition to Maelmorda's own Leinster forces, the whole being commanded by Sigurd, earl of Orkney. This powerful prince whose mother was a daughter of Cerball of Ossory (d. 887)' appears to have aimed at the supreme command of all the Scandinavian settlements of the west, and in the course of a tew years conquered the kingdom of the Isles, Sutherland, Ross, Moray and Argyll. To meet such formidable opponents, Brian now an old man unable to lead in person, mustered all the forces of Munster and Connaught, and was joined by Maelsechlainn in command of the forces of Meath. The northern Hy Neill and the Ulaid took no part in the struggle. Brian advanced into the plain of Fingall, north of Dublin, where a council of war was held. The longest account of the battle that followed occurs in a source very partial to Brian and the deeds of Munster- men, in which Maelsechlainn is accused of treachery, and of holding his troops in reserve. The battle, generally known as the battle of Clontarf, though the chief fighting took place close to Dublin, about the small river Tolka, was fought on Good *nday 1014. After a stout and protracted resistance the Norse-forces were routed. Maelsechlainn with his Meathmen came down on*

the fugitives as they tried to cross the bridge leading to Dublin or to reach their ships. On both sides the slaughter was terrible, and most of the leaders lost their lives. Brian himself perished along with his son Murchad and Maelmorda. I his great struggle finally disposed of the possibility of Scandi- navian supremacy in Ireland, but in spite of this it can only be regarded as a national misfortune. The power of the kingdom of Dublin had been already broken by the defeat of Amlaib Luaran at Tara in 980, and the main result of the battle of Uontarf was to weaken the central power and to throw the

whole island into a state of anarchy. Although beaten on the field of battle the Norsemen still retained possession of their fortified cities, and gradually they assumed the position of native tribes. The Dalcassian forces had been so much weakened by the great struggle that Maelsechlainn was again recognized as king of Ireland. However, the effects of Brian's revolution were permanent; the prescriptive rights of the Hy Neill were disputed, and from the battle of Clontarf until the coming of the Normans the history of Ireland consisted of a struggle for ascendancy between the O'Brians of Munster, the O'Neills of Ulster and the O'Connors of Connaught.

From the Battle of Clontarf to the Anglo-Norman Invasion.— The death of Maelsechlainn in 1022 afforded an opportunity for an able and ambitious man to subdue Ireland, establish a strong central government, break up the tribal system and further the gradual fusion of factions into a homogeneous nation. Such a man did not arise; those who afterwards claimed to be ardri lacked the qualities of founders of strong dynasties, and are termed by the annalists " kings with opposi- tion." Brian was survived by two sons, Tadg and Donnchad, the elder of whom was slain in 1023. Donnchad (d. 1064) was certainly the most distinguished figure in Ireland in his day. He subdued more than half of Ireland, and almost reached the position once held by his father. His strongest opponent was his son-in-law Diarmait Mael-na-mB6, king of Leinster, who was also the foster-father of his brother Tadg's son, Tordelbach (Turlough) O'Brian. On the death of Diarmait in 1072 Tordel- bach (d. 1086) reigned supreme in Leth Moga; Meath and Connaught also submitted to him, but he failed to secure the allegiance of the northern Hy Neill. He was succeeded by his son Muirchertach (d. mo), who spent

most of his life contending against his formidable opponent Domnall O'Lochlainn, king of Tir Eogain (d. 1 1 2 1) . The struggle for the sovereignty between these two rivals continued, with intervals of truce negotiated by the clergy, without any decisive advantage on either side. In 1 102 Magnus Barefoot made his third and last expedition to the west with the express design of conquering Ireland. Muirchertach opposed him with a large force, and a conference was arranged at which a son of Magnus was betrothed to Biadmuin, daughter of the Irish prince. He was also mixed up in English affairs, and as a rule maintained cordial relations with Henry I. After the death of Domnall O'Lochlainn there was an interregnum of about fifteen years with no ardri, until Tordelbach (Turlough) O'Connor, king of Connaught, resolved to reduce the other provinces. Munster and Meath were re- peatedly ravaged, and in 1151 he crushed Tordelbach (Turlough) O'Brian, king of Thomond, at Moanmor. O'Connor's most stubborn opponent was Muirchertach O'Lochlainn, with whom he wrestled for supremacy until the day of his death (1156). Tordelbach, who enjoyed a great reputation even after his death, was remembered as having thrown bridges over the Shannon, and as a patron of the arts. However, war was so constant in Ireland at this time that under the year 1145 the Four Masters describe the island as a " trembling sod." Tordelbach was succeeded by his son Ruadri (Roderick, q.v.), who after some resistance had to acknowledge Muirchertach O'Lochlainn's supremacy. The latter, however, was slain in n 66 in con- sequence of having wantonly blinded the king of Dal Araide. Ruadri O'Connor, now without a serious rival, was inaugurated with great pomp at Dublin.

Diarmait MacMurchada (Dermod MacMurrough), great- grandson of Diarmait Mael-na-mB6, as king of Leinster was by descent and position much mixed up with foreigners, and generally in a state of latent if not open hostility to the high-kings of the Hy Neill and Dalcais dynasties. He was a tyrant and a bad character. In n 52 Tigernan O'Rourke, prince of Breifns, had been dispossessed of his territory by Tordelbach O'Connor, aided by Diarmait, and the latter is accused also of carrying off Derbforgaill, wife of O'Rourke. On learning that O'Rourke was leading an army against him with the support of Ruadri, he burnt his castle of Ferns and went to Henry II. to seek assistance. The momentous consequences of this step belong

to the next section, and it now remains for us to state the condition of the church and society in the century preceding the Anglo-Norman invasion.

Although the Irish Church conformed to Roman usage in the matter

of Easter celebration and tonsure in the 7th century, the bond between Ireland and Rome was only slight until several centuries later. Whatever co-ordination may have existed in the church of the 8th century was doubtless destroyed during the troubled period of the Viking invasions. It is probable that St Patrick established Armagh as a metropolitan see, but the history of the primacy, which during a long period can only have been a shadow, is involved in obscurity. Its supremacy was undoubtedly recognized by Brian Boruma in 1004, when he laid 20 oz. of gold upon the high altar. In the nth century a competitor arose in the see of Dublin. The Norse rulers were bound to come under the influence of Christianity at an early date. For instance, Amlaib Cuaran was formally converted in England in 942 and was baptized by Wulfhelm of Canterbury. The antithesis between the king of Dublin and the ardri seems to have had the effect of linking the Dublin Christian community rather with Canterbury than Armagh. King Sigtrygg founded the bishopric of Dublin in 1035, and the early bishops of Dublin, Waterford and Limerick were all consecrated by the English primate. As Lanfranc and Anselm were both anxious to extend their jurisdiction over the whole of Ireland, the submission of Dublin opened the way for Norman and Roman influences. At the beginning of the 12th century Gilbert, bishop of Limerick and papal legate, succeeded in winning over Celsus, bishop of Armagh (d. n 29), to the reform movement. Celsus belonged to a family which had held the see for 200 years; he was grandson of a previous primate and is said to have been himself a married man. Yet he became, in the skilful hands of Gilbert and Mael- maedoc O'Morgair, the instrument of overthrowing the hereditary succession to the primatial see. In n 18 the important synod of Rathbressil was held, at which Ireland was divided into dioceses, this being the first formal attempt at getting rid of that anarchical state of church government which had hitherto prevailed. The work begun under Celsus was completed by his successor Maelmaedoc (Malachy). At a national synod held about 1 134 Maelmaed6c, in his capacity as bishop of Armagh, was solemnly elected to the primacy; and armed with full power of church and state he was able to overcome all opposition. Under his successor Gelasius, Cardinal Paparo was despatched as supreme papal legate. At the synod of Kells (115 2) there was established that diocesan system "which has ever since con- tinued without material alteration. Armagh was constituted the seat of the primacy, and Cashel, Tuam and Dublin were raised to the rank of archbishoprics. It was also ordained that tithes should be levied for the support of the clergy.

Social Conditions. — In the middle ages there were considerable

forests in Ireland encompassing broad expanses of upland pastures and marshy meadows. It is traditionally stated that fences first came into general use in the 7th century. There were no cities or large towns before the arrival of the Norsemen; no stone bridges spanned the rivers; stepping stones or hurdle bridges at the fords or shallows offered the only mode of crossing the broadest streams, and connecting the unpaved roads or bridle paths which crossed the country over hill and dale from the principal dtins. The forests abounded in game, the red deer and wild boar were common, whilst wolves ravaged the flocks. Scattered over the country were numerous small hamlets, composed mainly of wicker cabins, among which were scitne which might be called houses; other hamlets were composed of huts of the rudest kind. Here and there were large villages that had grown up about groups of houses surrounded by an earthen mound or rampart; similar groups enclosed in this manner were also to be found without any annexed hamlet. Sometimes there were two or three circumvallations or even more, and where water was plentiful the ditch between was flooded. The simple rampart enclosed a space called lis 1 which contained

1 The term rath was perhaps applied to the rampart, but both lis and rath are used to denote the whole structure.

the agricultural buildings and the groups of houses of the owners. The enclosed houses belonged to the free men (aire, pi. airig). The size of the houses and of the enclosing mound and ditch marked the wealth and rank of the aire. If his wealth consisted of chattels only, he was a bd-aire (covf-aire). When he possessed ancestral land he was zftaith or lord, and was entitled to let his lands for grazing, to have a hamlet in which lived labourers and to keep slaves. The larger fort with several ramparts was a dtin, where the ri (chieftain) lived and kept his hostages if he had subreguli. The houses of all classes were of wood, chiefly wattles and wicker-work plastered with clay. In shape they were most frequently cylindrical, having conical roofs thatched with rushes or straw. The oratories were of the same form and material, but the larger churches and kingly banqueting halls were rect- angular and made of sawn boards. Bede, speaking of a church built by Finan at Lindisfarne, says, " nevertheless, after the manner of the Scots, he made it not of stone but of hewn oak and

covered it with reeds." When St Maelmaedoc in the first half of the 12th century thought of building a stone oratory at Bangor it was deemed a novelty by the people, who exclaimed, " we are Scotti not Galli." Long before this, however, stone churches had been built in other parts of Ireland, and many round towers. In some of the stone-forts of the south-west (Ir. cathir) the houses within the rampart were made of stone in the form of a bee-hive, and similar cloghans, as they are called, are found in the western isles of Scotland.

Here and there in the neighbourhood of the hamlets were patches of corn grown upon allotments which were gavelled, or redistributed, every two or three years. Around the dans and raths, where the corn land was the fixed property of the lord, the cultivation was better. Oats was the chief corn crop, but wheat, barley and rye were also grown. Much attention was paid to bee-keeping and market-gardening, which had probably been introduced by the church. The only industrial plants were flax and the dye-plants, chief among which were woad and rud, roid (a kind of bed-straw?). Portions of the pasture lands were reserved as meadows; the tilled land was manured. There are native names for the plough, so it may be assumed that some form of that implement, worked by oxen, yoked together with a simple straight yoke, was in use in early times. Wheeled carts were also known; the wheels were often probably only solid disks, though spoked wheels were used for chariots. Droves of swine under the charge of swineherds wandered through the forests; some belonged to the ri, others to lords (flaitti) and others again to village communities. The house-fed pig was then as now an important object of domestic economy, and its flesh was much prized. Indeed, fresh pork was one of the inducements held out to visitors to the Irish Elysium. Horned cattle constituted the chief wealth of the country, and were the standard for estimating the worth of anything, for the Irish had no coined money and carried on all commerce by barter. The unit of value was called a sit, a word denoting a jewel or precious object of any kind. The normal sit was an average milch-cow. Gold, silver, bronze, tin, clothes and all other kinds of property were estimated in sits. Three sits were equal to a cumal (female slave). Sheep were kept everywhere for their flesh and their wool, and goats were numerous. Horses were extensively employed for riding, working in the fields and carrying loads. Irish horsemen rode without saddle or stirrups. So important a place did bee-culture hold in the rural economy of the ancient Irish that a lengthy section is devoted to the subject in the Brehon Laws. The honey was used both in cooking and for making mead, as well as for eating.

The ancient Irish were in the main a pastoral people. When they had sown their corn, they drove their herds and flocks to the mountains, where such existed, and spent the summer there, returning in autumn to reap their corn and take up their abode in their more sheltered winter residences.- This custom of " booleying " (Ir. buaile, " shieling ") is not originally Irish, according to some writers, but was borrowed from the Scandi- navians. Where the tribe had land on the sea-coast they also appear to have migrated thither in summer. The chase in the

summer occupied the freemen, not only as a source of enjoyment but also as a matter of necessity, for wolves were very numerous. For this purpose they bred dogs of great swiftness, strength and sagacity, which were much admired by the Romans.

The residences within enclosing ramparts did not consist of one house with several apartments, but every room was a separate house. Thus the buildings forming the residence of a well-to-do farmer of the bd-aire class as described in the Laws, consisted of a living-house in which he slept and took his meals, a cooking- house, a kiln for drying corn, a barn, a byre for calves, a sheep- fold and a pigsty. In the better classes the women had a separate house known as griandn (sun-chamber). The round houses were constructed in the following manner. The wall was formed of long stout poles placed in a circle close to one another, with their ends fixed firmly in the ground. The spaces between were closed in with rods (usually hazel) firmly interwoven. The poles were peeled and polished smooth. The whole surface of the wicker-work was plastered on the outside and made brilliantly white with lime, or occasionally striped in various colours, leaving the white poles exposed to view. There was no chimney; the fire was made in the centre of the house and the smoke escaped through a hole in the roof, or through the door as in Hebridean houses of the present day. Near the fire, fixed in a kind of holder, was a candle of tallow or raw beeswax. Around the wall in the houses of the wealthy were arranged the bedsteads, or rather compartments, with testers and fronts, sometimes made of carved yew. At the foot of each compartment, and projecting into the main room, there was a low fixed seat, often stuffed with some soft material, for use during the day. Besides these there were on the floor of the main apartment a number of detached movable couches or seats, all low, with one or more low tables of some sort. In the halls of the kings the position of each person's bed and seat, and the portion of meat which ' he was entitled to receive from the distributor, were regulated according to a rigid rule of precedence. Each person who had a seat in the king's house had his shield

suspended over him. Every king had hostages for the fealty of his vassals; they sat unarmed in the hall, and those who had become forfeited by a breach of treaty or allegiance were placed along the wall in fetters. There were places in the king's hall for the judge, the poet, the harper, the various craftsmen, the juggler and the fool. The king had his bodyguard of four men always around him; these were commonly men whom he had saved from execution or redeemed from slavery. Among the miscellaneous body of attendants about the house of a king or noble were many Saxon slaves, in whom there was a regular trade until it was abolished by the action of the church in n 71. The slaves slept on the ground in the kitchen or in cabins outside the fort.

The children of the upper classes in Ireland, both boys and girls, were not reared at home but were sent elsewhere to be fostered. It was usual for a chief to send his child to one of his own sub-chiefs, but the parents often chose a chief of their own rank. For instance, the ollamfili, or chief poet, who ranked in some respects with a tribe-king, sent his sons to be fostered by the king of his own territory. Fosterage might be undertaken out of affection or for payment. In the latter case the fee varied according to rank, and there are numerous laws extant fixing the cost and regulating the food and dress of the child according to his position. Sometimes a chief acted as foster-father to a large number of children. The cost of the fosterage of boys seems to have been borne by the mother's property, that of the daughters by the father's. The ties created by fosterage were nearly as close and as binding on children as those of blood.

There is ample evidence that great laxity prevailed with regard to the marriage tie even after the introduction of Christianity, ■as marrying within the forbidden degrees and repudiation continued to be very frequent in spite of the efforts of the church. Marriage by purchase was universal, and the wealth of the contracting parties constituted the primary element of a legitimate union: The bride and bridegroom should be provided with a joint fortune proportionate to their rank. When they were of equal rank, and the family of each contributed an equal

share to the marriage portion, the marriage was legal in the full

sense and the wife was a wife of equal rank. The church endeavoured to make the wife of a first marriage the only true wife ; but concubinage was known as an Irish institution until long after the Anglo-Norman invasion, and it is recognized in the Laws. If a concubine had sons her position did not differ materially in some respects from that of a chief wife. As the tie of the sept was blood, all the acknowledged children of a man, whether legitimate or illegitimate, belonged equally to his sept. Even adulterine bastardy was no bar to a man becoming chief of his tribe, as in the case of Hugh O'Neill, earl of Tyrone. (See O'Neill.)

The food of the Irish was very simple, consisting in the main of oaten cakes, cheese, curds, milk, butter, and the flesh of domestic animals both fresh and salted. The better classes were acquainted with wheaten bread also. The food of the inhabitants of the Land of Promise consisted of fresh pork, new milk and ale. Fish, especially salmon, and game should of course be added to the list. The chief drinks were ale and mead.

The dress of the upper classes was similar to that of a Scottish Highlander before it degenerated into the present conventional garb of a highland regiment. Nsxt ihe skin came a shirt (Mine) of fine texture often richly embroidered. Over this was a tightly fitting tunic (inar, lend) reaching below the hips with a girdle at the waist. In the case of women the inar fell to the feet. Over the left shoulder and fastened with a brooch hung the loose cloak (hrat), to which the Scottish plaid corresponds. The kilt seems to have been commonly worn, especially by soldiers, whose legs were usually bare, but we also hear of tight-fitting trousers extending below the ankles. The feet were either entirely naked or encased in shoes of raw hide fastened with thongs. Sandals and shoes of bronze are mentioned in Irish literature, and quite a number are to be seen in museums. A loose flowing garment, intermediate between the brat and lend, usually of linen dyed saffron, was commonly worn in outdoor life, and was still used in the Hebrides about 1700. A modified form of this over-tunic with loose sleeves and made of frieze formed probably the general covering of the peasantry. Among the upper classes the garments were very costly and variously coloured. It would seem that the number of colours in the dress indicated the rank of the wearer. The hair was generally worn long by men as well as women, and ringlets were greatly admired. Women braided their hair into tresses, which they confined with a pin. The beard was also worn long. Like all ancient and semi- barbarous people, the Irish were fond of ornaments. Indeed the profusion of articles of gold which have been found is remark- able; in the Dublin Museum may be seen bracelets,

armlets, finger-rings, torques, crescents, gorgets, necklets, fibulae and diadems, all of solid gold and most exquisite workmanship.

The principal weapons of the Irish soldiers were a lance, a sword and a shield; though prior to the Anglo-Norman invasion they had adopted the battle-axe from the Scandinavians. The shields were of two kinds. One was the sciaih, oval or oblong in shape, made of wicker-work covered with hide, and often large enough to cover the whole body. This was doubtless the form introduced by the Brythonic invaders. But round shields, smaller in size, were also commonly employed. These were made of bronze backed with wood, or of yew covered with hide. This latter type scarcely goes back to the round shield of the Bronze age. Armour and helmets were not generally employed at the time of the Anglo-Norman invasion.

In the Brehon Laws the land belongs in theory to the tribe, but this did not by any means correspond to the state of affairs. We find that the power of the petty king has made a very con- siderable advance, and that all the elements of feudalism are present, save that there was no central authority strong enough to organize the whole of Irish society on a feudal basis. The tuath or territory of a ri (represented roughly by a modern barony) was divided among the septs. The lands of a sept consisted of the estates in severalty of the lords {flathi), and of the Jerand dulhaig, or common lands of the sept. The dwellers on each of these kinds of land differed materially from each other.

xrv. 2{

On the former lived a motley population of slaves, horse-boys, and mercenaries composed of broken men of other clans, many of whom were fugitives from justice, possessing no rights either in the sept or tribe and entirely dependent on the bounty of the lord, and consequently living about his fortified residence. The poorer servile classes or cottiers, wood-cutters, swine-herds, &c, who had a right of domicile (acquired after three generations), lived here and there in small hamlets on the mountains and poorer lands of the estate. The good lands were let to a class of tenants called fuidirs, of whom there were several kinds, some grazing the land with their own cattle, others receiving both land and cattle from the lord. Fuidirs had no rights in the sept; some were true serfs, others tenants-at-will; they lived in scattered homesteads like theJarmers of the present time. The lord was responsible before the law for the acts of all the servile classes on his estates, both new-comers and senchleithe, i.e. descendants of fuidirs, slaves, &c, whose families had lived on the estate during the time of three lords. He paid their blood- fines and

received compensation for their slaughter, maiming or plunder. The fuidirs were the chief source of a lord's wealth, and he was consequently always anxious to increase them.

The freemen were divided into freemen pure and simple, freemen possessing a quantity of stock, and nobles (flathi) having vassals. Wealth consisted in cattle. Those possessed of large herds of kine lent out stock under various conditions. In the case of a chief such an offer could not be refused. In return, a certain customary tribute was paid. Such a transaction might be of two kinds. By the one the freemen took saer-stock and retained his status. But if he accepted daer-stock he at once descended to the rank of a vassal. In this way it was possible for the chief to extend his power enormously. Rent was com- monly paid in kind. As a consequence of this, in place of receiv- ing the farm produce at his own home the chief or noble reserved to himself the right of quartering himself and a certain number of followers in the house of his vassal, a practice which must have been ruinous to the small farmers. Freemen who possessed twenty-one cows and upwards were called airig (sing, aire), or, as we should say, had the franchise, and might fulfil the functions of bail, witness, &c. As the chief sought to extend his power in the tuath, he also endeavoured to aggrandize his position at the expense of other tuatha by compelling them to pay tribute to him. Such an aggregate of tuatha acknowledging one ri was termed a mdrthuath. The ruler of a. mdrthuath paid tribute to the provincial king, who in his turn acknowledged at any rate in theory the overlordship of the ardri.

The privileges and tributes of the provincial kings are .preserved in a remarkable 10th century document, the Book of Rights. The rules of succession were extraordinarily complicated. Theoretically the members of a sept claimed common descent from the same ancestor, and the land belonged to the freemen. The chief and nobles, however, from various causes had come to occupy much of the territory as private property: the re- mainder consisted of tribe-land and commons-land. The portions of the tribe-land were not occupied for a fixed term, as the land of the sept was liable to gavelkind or redistribution from time to time. In some cases, however, land which belonged originally to a.flaith was owned by a family; and after a number of generations such property presented a great similarity to the gavelled land. A remarkable development of family ownership was the geilfine system, under which four groups of persons, all nearly related to each other, held four adjacent tracts of land- as a sort of common property, subject to regulations now very difficult to understand. 1 The king's mensal land; as also that of the tanist or

successor to the royal office appointed during the king's lifetime, was not divided up but passed on in its entirety to the next individual elected to the position. When the family of an aire remained in possession of his estate in a corporate capacity, they formed a " joint and undivided family," the head of which was an aire, and thus kept up the rank of the family. Three or four poor members of a sept might combine their property and agree to form a " joint family," one of whom 1 See D'Arbois de Jubainville, Revue celtique, xxv. 1 ff., 181 ff.

as the head would be an aire. In consequence of this organiza- tion the homesteads of airig commonly included several families, those of his brothers, sons, &c. (see Brehon Laws).

The ancient Irish never got beyond very primitive notions of justice. Retaliation for murder and other injuries was a common method of redress, although the church had endeavoured to introduce various reforms. Hence we find in the Brehon Laws a highly complicated system of compensatory payment; but there was no authority except public opinion to enforce the payment of the fines determined by the brehon in cases submitted to him.

There were many kinds of popular assemblies in ancient Ireland. The sept had its special meeting summoned by its chief for purposes such as the assessment of blood-fines due from the sept, and the distribution of those due to it. At larger gatherings the question of peace and war would be deliberated. But the most important of all such assemblies was the fair (oenach), which was summoned by a king, those summoned by the kings of provinces having the character of national assemblies. The most famous places of meeting were Tara, Telltown and Carman. The oenach had many objects. The laws were publicly promulgated or rehearsed; there were councils to deal with disputes and matters of local interest; popular sports such as horse-racing, running and wrestling were held; poems and tales were recited, and prizes were awarded to the best performers of every ddn or art ; while at the same time foreign traders came with their wares, which they exchanged for native produce, chiefly skins, wool and frieze. At some of these assemblies match-making played a prominent part. Tradition connects the better known of these fairs with pagan

rites performed round the tombs of the heroes of the race; thus the assembly of Tell- town was stated to have been instituted by Lugaid Lamfada. Crimes committed at an oenach could not be commuted by payment of fines. Women and men assembled for deliberation in separate airechta or gatherings, and no man durst enter the women's airecht under pain of death.

The noble professions almost invariably ran in families, so that members of the same household devoted themselves for generations to one particular science or art, such as poetry, history, medicine, law. The heads of the various professions in the tuath received the title of ollam. It was the rule for them to have paying apprentices living with them. The literary ollam or fill was a person of great distinction. He was provided with mensal land for the support of himself and his scholars, and he was further entitled to free quarters for himself and his retinue. The harper, the metal-worker (cerd), and the smith were also provided with mensal land, in return for which they gave to the chief their skill and the product of their labour as customary tribute (bestigi).

Authorities. — The Annals of the Four Masters, ed. J. O'Donovan (7 vols., Dublin, 1856); Annals of Ulster (4 vols., London, 1887-1892): Keating's Forus Feasa ar Hirinn (3 vols., ed. D. Comyn and P. Dinneen, London, 1902-1908) ; E. Windisch, Tain Bo Cualnge (Leipzig, 1905), with a valuable introduction; P. W. Joyce, A Social History of Ancient Ireland (2 vols., London, 1903), also A Short History of Ireland from the Earliest Times to 1608 (London, 1895); A. G. Richey, A Short History of the Irish People (Dublin,

1887); W. F. Skene, Celtic Scotland (3 vols., Edinburgh, 1876-1880); J. Rhys, "Studies in Early Irish History," in Proceedings of the British Academy, vol. i. ; John MacNeill, papers in New

Ireland Review (March 1906-February 1907) ; Leabhar na gCeart, ed. O'Donovan (Dublin, 1847); E. O'Curry, The Manners and Customs of the Ancient Irish, ed. W. K. Sullivan (3 vols., London, 1873); G. T. Stokes, Ireland and the Celtic Church, revised by H. J. Lawlor (London 6 , 1907); J. Healy, Ireland's Ancient Schools and Scholars (Dublin 3 , 1897); H. Zimmer, article ' Keltische Kirche" in Hauck's Realencyklopddie fur prolestantische Theologie und Kirche (trans. A. Meyer, London, 1902), cf. H. Williams, " H. Zimmer on the History of the Celtic Church," Zeitschr. f. celt. Phil. iv. 527-574; H. Zimmer, " Die Bedeutung des irischen Elements in der mittelalterlichen Kultur," Preussische Jahrbucher, vol. lix., trans. J. L. Edmands, The Irish Element in Medieval Culture (New York,

1891); J. H. Todd, St Patrick, the Apostle of Ireland (Dublin, 1864); J. B. Bury, Life of St Patrick (London, 1905); W. Reeves, Adamnan's Life of Columba (Dublin, 1857; also ed. with introd. by J. T. Fowler, Oxford, 1894); M. Roger, V Enseignement des lettres classiques d'Ausone & Alcuin (Paris, 1905); J. H. Todd, The

War of the Gcedhil with the Gall (London, 1867) ; L. J. Vogt, Dublin som Norsk By (Christiania, 1897); J. Steenstrup, Normannerne, vols, ii., iii. (Copenhagen, 1878-1882); W. G. Collingwood, Scandinavian Britain (London, 1908). (E. C. Q.)

History from the Anglo-Norman Invasion.

According to the Melalogus of John of Salisbury, who in 11 55 went on a mission from King Henry II. to Pope Adrian IV., the only Englishman who has ever occupied the papal chair, the pope in response to the envoy's /^^ lan iy m prayers granted to the king of the English the hereditary lordship of Ireland, sending a letter, with a ring as the symbol of investiture. Giraldus Cambrensis, in his Expugnatio Hibernica, gives what purports to be the text of this letter, known as " the Bull Laudabiliter," and adds further a Privilegium of Pope Alexander III. confirming Adrian's grant. The Privilegium is undoubtedly spurious, a fact which lends weight to the arguments of those who from the 19th century onwards have attacked the genuineness of the " Bull." This latter, indeed, appears to have been concocted by Gerald, an ardent champion of the English cause in Ireland, from genuine letters of Pope Alexander III., still preserved in the Black Book of the Exchequer, which do no more than commend King Henry for reducing the Irish to order and extirpating tantae abomina- tionis spurcitiam, and exhort the Irish bishops and chiefs to be faithful to the king to whom they had sworn allegiance. 1

Henry was, indeed, at the outset in a position to dispense with the moral aid of a papal concession, of which even if it existed he certainly made no use. In n 56 Dermod MacMurrough (Diarmait MacMurchada), deposed for his tyranny from the kingdom of Leinster, repaired to Henry in Aquitaine (see Early History above). The king was busy with the French, but gladly seized the opportunity, and gave Dermod a letter authorizing him to raise forces in England. Thus armed, and provided with gold extorted from his former subjects in Leinster, Dermod went to Bristol and sought the acquaintance of Richard de Clare, earl of Pembroke, a Norman noble of great ability but broken fortunes. Earl Richard, whom later usage has named Strongbow, agreed to reconquer Dermod's kingdom for him. The stipulated consideration was the hand of Eva his only

*child, and according to feudal law his sole heiress, to whose issue lands and kingdoms would naturally pass. But Irish customs admitted no estates of inheritance, and Eva had no more right to the reversion of Leinster than she had to that of Japan. It is likely that Strong- bow had no conception of this, and that his first collision with the tribal system was an unpleasant surprise. Passing through Wales, Dermod agreed with Robert Fitzstephen and Maurice Fitzgerald to invade Ireland in the ensuing spring. About the 1st of May 1169 Fitzstephen landed on the Wexford shore with a small force, and next day Maurice de Prendergast brought another band nearly to the same spot. The lava- Dermod joined them, and the Danes of Wexford soon sionot submitted. According to agreement Dermod granted Strong- the territory of Wexford, which had never belonged to **

him, to Robert and Maurice and their heirs for ever; and here begins the conflict between feudal and tribal law which was destined to deluge Ireland in blood. Maurice Fitzgerald soon followed with a fresh detachment. About a year after the first landing Raymond Le Gros was sent over by Earl Richard with his advanced guard, and Strongbow himself landed near Water- ford on the 23rd of August 11 70 with 200 knights and about 1000 other troops.

The natives did not understand that this invasion was quite different from those of the Danes. They made alliances with the strangers to aid them in their intestine wars, and the annalist writing in later years (Annals of Lough Ce) describes with pathetic brevity the change wrought in Ireland: — "Earl Strongbow came into Erin with Dermod MacMurrough to avenge his expul- sion by Roderick, son of Turlough O'Connor; and Dermod gave

1 The whole question is discussed by Mr J. H. Round in his article on " The Pope and the Conquest of Ireland " (Commune of London. 1899, pp. 171-200), where further references will be found.

him his own daughter and a part of his patrimony, and Saxon foreigners have been in Erin since then."

Most of the Norman leaders were near relations, many being descended from Nesta, daughter of Rhys Ap Tudor, prince of South

Wales, the most beautiful woman of her time, and mistress of Henry I. Her children by that king were called Fitzhenry. She afterwards married Gerald de Windsor, by whom she had three sons — Maurice, ancestor of all the Geraldines; William, from whom sprang the families of Fitzmaurice, Carew, Grace and Gerard; and David, who became bishop of St David's. Nesta's daughter, Angareth, married to William de Barri, bore the chronicler Giraldus Cambrensis, and was ancestress of the Irish Barries. Raymond le Gros, Hervey de Montmorency, and the Cogans were also descendants of Nesta, who, by her second husband, Stephen the Castellan, was mother of Robert Fitz- stephen. i-

While waiting for Strongbow's arrival, Raymond and Hervey were attacked by the Danes of Waterford, whom they overthrew. Strongbow himself took Waterford and Dublin, and the Danish inhabitants of both readily combined with their French-speaking kinsfolk, and became firm supporters of_the Anglo-Normans against the native Irish.

Alarmed at the principality forming near him, Henry invaded Ireland in person, landing near Waterford on the 18th of October 1172. Giraldus says he had 500 knights and many other soldiers; Regan, the metrical chronicler, says he had 4000 men, of whom 400 were knights; the Annals of Lough Ct that he had 240 ships. The Irish writers tell little about these great Jevents, except that the king of the Saxons took the hostages of Munster at Waterford, and of Leinster, Ulster, Thomond and Meath at Dublin. They did not take in the grave significance of doing homage to a Norman king, and becoming his "man."

Henry's farthest point westward was Cashel, where he received the homage of Donald O'Brien, king of Thomond, but he does not appear to have been present at the famous synod. la Ireland. Christian O'Conarchy, bishop of Lismore and papal legate, presided, and the archbishops of Dublin, Cashel and Tuam attended with their suffragans, as did many abbots and other dignitaries. The primate of Armagh, the saintly Gelasius, was absent, and presumably his suffragans also, but Giraldus says he afterwards came to the king at Dublin, and favoured him in all things. Henry's sovereignty was acknowledged, and constitutions made which drew Ireland closer to Rome. In spite of the "enormities and filthinesses," which Giraldus says defiled the Irish Church, nothing worse could be found to condemn than marriages within the prohibited degrees and trifling irregularities about baptism. Most of the details rest on the authority of Giraldus only, but the main facts are clear. The synod is not

mentioned by the Irish annalists, nor by Regan, but it is by Hoveden and Ralph de Diceto. The latter says it was held at Lismore, an error arising from the president having been bishop of Lismore. Tradition says the members met in Cormac's chapel.

Henry at first tried to be suzerain without displacing the natives, and received the homage of Roderick O'Connor, the high king. But the adventurers were uncontrollable, and he had to let them conquer what they could, exercising a precarious authority over the Normans only through a viceroy. The early governors seemingly had orders to deal as fairly as possible with the natives, and this involved them in quarrels with the "conquerors," whose object was to carve out principalities for themselves, and who only nominally respected the sovereign's wishes. The mail-clad knights were not uniformly successful against the natives, but they generally managed to occupy the open plains and fertile valleys. Geographical configuration preserved centres of resistance — the O'Neills in Tyrone and Armagh, the O'Donnells in Donegal, and . the Macarthies in Cork being the largest tribes that remained practically unbroken. On the coast from Bray to Dundalk, and by the navigable rivers of the east and south coasts, the Norman put his iron foot firmly down. Prince John landed at Waterford in 1185, and the neighbouring

chiefs hastened to pay their respects to the king's son. Prince and followers alike soon earned hatred, the former showing the incurable vices of his character, and pulling the beards of the chieftains. After eight disgraceful months he left the govern- ment to John de Courci, but retained the title "Dominus Hiberniae." It was even intended to crown him; and Urban III. sent a licence and a crown of peacock's feathers, which was never placed on his head. Had Richard I. had children Ireland might have become a separate kingdom.

Henry II. had granted Meath, about 800,000 acres, to Hugh de Lacy (d. 1186), reserving scarcely any prerogative to the crown, and making his vassal almost independent. De Lacy sublet the land among kinsmen and retainers, and to his grants the families of Nugent, Tyrell, Nangle, Tuyt, Fleming and others owe their importance in Irish history. It is not surprising that the Irish bordering on Meath should have thought De Lacy the real king of Ireland.

During his brother Richard I.'s reign, John's viceroy was William Marshal, earl of Pembroke, who married Strongbow's daughter, and thus succeeded to his claims in Leinster. John's reputation was no better in Ireland than in Bg England. He thwarted or encouraged the

Anglo-Normans as best suited him, but on the whole they increased their pos- sessions. In 1 210 John, now king, visited Ireland again, and being joined by Cathal Crovderg O'Connor, king of Con- naught, marched from Waterford by Dublin to Carrickfergus without encountering any serious resistance from Hugh de Lacy (second son of the Hugh de Lacy mentioned above), who had been made earl of Ulster in 1205. John did not venture farther west than Trim, but most of the Anglo-Norman lords swore fealty to him, and he divided the partially obedient districts into twelve counties — Dublin (with Wicklow), Meath (with West- meath), Louth, Carlow, Kilkenny, Wexford, Waterford, Cork, Limerick, .Kerry and Tipperary. John's resignation of his kingdom to the pope in 12 13 included Ireland, and thus for the second time was the papal claim to Ireland formally recorded.

During Henry III.'s long reign the Anglo-Norman power increased, but underwent great modifications. Richard Marshal, grandson of Strongbow, and to a great extent heir of his power, was foully murdered by his own feudatories 7,« l ? r — men of his own race; and the colony never quite on). recovered this blow. On the other hand, the De Burghs, partly by alliance with the Irish, partly by sheer hard fighting, made good their claims to the lordship of Connaught, and the western O'Connors henceforth play a very subordinate part in Irish history. Tallage was first imposed on the colony in the first year of this reign, but yielded little, and tithes were not much better paid.

On the 14th of January 1217 the king wrote from Oxford to his justiciary, Geoffrey de Marisco, directing that no Irishman should be elected or preferred in any cathedral in Ireland, "since by that means our land might be disturbed, to j rts ˆ which is to be deprecated." This order was annulled clergy: in 1224 by Honorius III., who declared it "destitute of all colour of right and honesty." The pope's efforts failed, for in the 14th century several Cistercian abbeys excluded Irishmen, and as late as 1436 the monks of Abingdon complained bitterly that an Irish abbot had been imposed on them by lay violence. Parliament was not more liberal, for the statute of Kilkenny, passed in 1366, ordained that "no Irishman be admitted into any cathedral or collegiate church, nor to any benefice among the English of the land," and also "that no religious house situated among the English shall henceforth receive an Irishman to their profession." This was confirmed by the English parliament in 1416, and an Irish act of Richard III. enabled the archbishop of Dublin to collate Irish clerks for two years, an exception proving the rule. Many Irish separa- monasteries admitted no Englishmen, and at least

one tion of attempt was made, in 1250, to apply the same rule to cathedrals. The races remained nearly separate, the Irish simply staying outside the feudal system. If an Englishman

the two races.

slew an Irishman (except one of the five regal and privileged bloods) he was not to be tried for murder, for Irish law admitted composition (eric) for murder. In Magna Charta there is a proviso that foreign merchants shall be treated as English merchants are treated in the country whence the travellers came. Yet some enlightened men strove to fuse the two nations together, and the native Irish, or that section which bordered on the settlements and suffered great oppression, offered 8000 marks to Edward I. for the privilege of living under English law. The justiciary supported their petition, but the prelates and nobles refused to consent.

There is a vague tradition that Edward I. visited Ireland about 1256, when his father ordained that the prince's seal should have regal authority in that country. A vast ft272^' number of documents remain to prove that he did 1307). not neglect Irish business. Yet this, great king cannot

be credited with any specially enlightened views as to Ireland. Hearing with anger of enormities committed in his name, he summoned the viceroy, Robert de Ufford (d. 1298), to explain, who coolly said that he thought it expedient to wink at one knave cutting off another, " whereat the king smiled and bade him return into Ireland." The colonists were strong enough to send large forces to the king in his Scottish wars, but as there was no corresponding immigration this really weakened the English, whose best hopes lay in agriculture and the arts of peace, while the Celtic race waxed proportionally numerous. Outwardly all seemed fair. The De Burghs were supreme in Connaught, and English families occupied eastern Ulster. The fertile southern and central lands were dominated by strong castles. But Tyrone and Tyrconnel, and the mountains everywhere, sheltered the Celtic race, which, having reached its lowest point under Edward I., began to recover under his son.

In 1315, the year after Bannockburn, Edward Bruce landed near

*Larne with 6000 men, including some of the best knights in Scotland. Supported by O'Neill and other chiefs, 0307ˆ"' an< * * or a t ' me ass ' ste d by his famous brother, Bruce 132T). gained many victories. There was no general effort*

of the natives in their favour; perhaps the Irish thought one Norman no better than another, and their total incapacity for national organization forbade the idea of a native sovereign. The family quarrels of the O'Connors at this time, and their alliances with the Burkes, or De Burghs, and the Berminghams, may be traced in great detail in the annalists — the general result being fatal to the royal tribe of Connaught, which is said to have lost 10,000 warriors in the battle of Temple- togher. In other places the English were less successful, the Butlers being beaten by the O'Carrolls in 1318, and Richard de Clare falling about the same time in the decisive battle of Dysert O'Dea. The O'Briens re-established their sway in Thomond and the illustrious name of Clare disappears from Irish history. Edward Bruce fell in battle near Dundalk, and most of his army recrossed the channel, leaving behind a reputation for cruelty and rapacity. The colonists were victorious, but their organiza- tion was undermined, and the authority of the crown, which had never been able to keep the peace, grew rapidly weaker. Within twenty years after the great victory of Dundalk, the quarrels of the barons allowed the Irish to recover much of the land they had lost.

John de Bermingham, earl of Louth, the conqueror of Bruce, was murdered in 1329 by the Gernons, Cusacks, Everards and other English of that county, who disliked his firm M W ft327- J? overnment – They were never brought to justice. 1377). Talbot of Malahide and two hundred of Bermingham 's relations and adherents were massacred at the same time. In 1333, William de Burgh, the young earl of Ulster, was murdered by the Mandevilles and others; in this case signal vengeance was taken, but the feudal dominion never recovered the blow, and on the north-east coast the English laws and language were soon confined to Drogheda and Dundalk. The earl left one daughter, Elizabeth, who was of course a royal ward. She married Lionel, duke of Clarence, and from her springs the

royal line of England from Edward IV., as well as James V. of Scotland and his descendants.

The two chief men among the De Burghs were loth to hold their lands of a little absentee girl. Having no grounds for opposing the royal title to the wardship of the heiress, they abjured English law and became Irish chieftains. As such they were obeyed, for the king's arm

was short in Ireland. The one appropriated Mayo as the Lower (Oughter) M'William, and the earldom of Mayo perpetuates the memory of the event. The other as the Upper (Eighter) M'William took Galway, and from him the earls of Clanricarde afterwards sprung.

Edward III. being busy with foreign wars had little time to spare for Ireland, and the native chiefs everywhere seized their opportunity. Perhaps the most remarkable of these aggressive chiefs was Lysaght O'More, who reconquered Leix. Clyn the Franciscan annalist, whose Latinity is so far above the medieval level as almost to recall Tacitus, sums up Lysaght's career epigrammatically: " He was a slave, he became a master; he was a subject, he became a prince (de servo dominus, de subjecto princeps effectus)." The two great earldoms whose contests form a large part of the history of the south of Ireland were created by Edward III. James Butler, eldest son of Edmund, earl of Carrick, became earl of Ormonde and palatine of Tipperary in 1328. Next year Maurice Fitzgerald was made earl of Desmond, and from his three brethren de- scended the historic houses of the White Knight, the knight of Glin, and the knight of Kerry. The earldom of Kildare dates from 1316. In this reign too was passed the statute of Kilkenny (

In two expeditions to Ireland Richard II. at first overcame all opposition, but neither had any permanent effect. Art MacMurrough, the great hero of the Leinster Celts, practically had the best of the contest. The king in SˆSj. his despatches divided the population into Irish 1399). enemies, Irish rebels and English subjects. As he found them so he left them, lingering in Dublin long enough to lose his own crown. But for MacMurrough and his allies the house of Lancaster might never have reigned. No English king again visited Ireland until James II., declared by his English subjects to have abdicated, and by the more outspoken Scots to have forfeited the crown, appealed to the loyalty or piety of the Catholic Irish.

Henry IV. had a bad title, and his necessities were conducive to the growth of the English constitution, but fatal to the Anglo- Irish. His son Thomas, duke of Clarence, was viceroy in 1401, but did very little. "Your son," wrote the ˆ399ˆ™ Irish council to Henry, " is so destitute of money that t4i3). he has not a penny in the world, nor can borrow a single penny, because all his jewels and his plate that he can spare, and those which he must of necessity keep, are pledged to lie in pawn." The nobles waged private war unrestrained, and the game of playing off one chieftain against another was carried on with varying success. The provisions of the statute of Kilkenny

against trading with the Irish failed, for markets cannot exist without buyers.

The brilliant reign of Henry V. was a time of extreme misery to the colony in Ireland. Half the English-speaking people fled to England, where they were not welcome. The disastrous reign of the third Lancastrian completed VjJ!ˆ V ‘ the discomfiture of the original colony in Ireland. 1422). Quarrels between the Ormonde and Talbot parties paralysed the government, and a “Pale” of 30 m. by 20 was all that remained. Even the walled towns, Kilkenny, Ross, Wexford, Kinsale, Youghal, Clonmel, Kilmallock, Thomastown, Fethard and Cashel, were almost starved Hear y ”’ out ; Waterford itself was half ruined and half deserted. Only one parliament was held for thirty years, but taxation was not remitted on that account. No viceroy everi ‘ pretended to reside continuously. The north and west -were! Still

{1422- I46t).

FROM ANGLO-NORMAN INVASION]

IRELAND

773

worse off than the south. Some thoughtful men saw clearly the danger of leaving Ireland to De seized by the first chance comer, and the Libel of English Policy, written about 1436, contains a long and interesting passage declaring England’s interests in protecting Ireland as “a boterasse and a poste ” of her own power. Sir John Talbot, immortalized by Shakespeare, was several times viceroy; he was almost uniformly successful in the field, but feeble in council. He held a parliament at Trim which made one law against men of English race wearing moustaches, lest they should be mistaken for Irishmen, and another obliging the sons of agricultural labourers to follow their

father's vocation under pain of fine and imprisonment. The earls of Shrewsbury are still earls of Waterford, and retain the right to carry the white staff as hereditary stewards, but the palatinate jurisdiction over Wexford was taken away by Henry VIII. The Ulster annalists give a very different estimate of the great Talbot from that of Shakespeare: "A son of curses for his venom and a devil for his evils; and the learned say of him that there came not from the time of Herod, by whom Christ was crucified, any one so wicked in evil deeds " (O'Donovan's Four Masters).

In 1449 Richard, duke of York, right heir by blood to the throne of Edward III., was forced to yield the regency of France to his rival Somerset, and to accept the Irish vice-

*R ft ar i, royalty. He landed at Howth with his wife Cicely of York In * .,/ . ,, , A . , , . /,*

inland. Neville, and Margaret of Anjou hoped thus to get rid

of one who was too great for a subject. The Irish government was given to him for ten years on unusually liberal terms. He ingratiated himself with both races, taking care to avoid identification with any particular family. At the baptism of his son George — " false, fleeting, perjured Clarence " — who was born in Dublin Castle, Desmond and Ormonde stood sponsors together. In legislation Richard fared no better than others. The rebellion of Jack Cade, claiming to be a Mortimer and cousin to the duke of York, took place at this time. This adventurer, at once ludicrous and formidable, was a native of Ireland, and was thought to be put forward by Richard to test the popularity of the Yorkist cause. Returning suddenly to England in 1450, Richard left the government to James, earl of Ormonde and Wiltshire, who later married Eleanor, daughter of Edmund Beaufort, duke of Somerset, and was deeply engaged on the Lancastrian side. This earl began the deadly feud with the house of Kildare, which lasted for generations. After Bio re Heath Richard

was attainted by the Lancastrian parliament, and returned to Dublin, where the colonial parliament acknow- ledged him and assumed virtual independence. A separate coinage was established, and the authority of the English parliament was repudiated. William Overy, a bold squire of Ormonde's, offered to arrest Richard as an attainted traitor, but was seized, tried before the man whom he had come to take, and hanged, drawn and quartered. The duke only maintained his separate kingdom about a year. His party triumphed in England, but he himself fell at Wakefield.

Among the few prisoners taken on the bloody field of Towton was Ormonde, whose head long adorned London Bridge. He

and his brothers were attainted in England and by rv< 1*461- tne Yorkist parliament in Ireland, but the importance 1483). °f the family was hardly diminished by this. For*

the first six years of Edward's reign the two Geraldine earls engrossed official power. The influence of Queen Elizabeth Woodville, whom Desmond had offended, then made itself felt. Tiptoft, earl of Worcester, became deputy. He was an accomplished Oxonian, who made a speech at Rome in such good Latin as to draw tears from the eyes of that great patron of letters Pope Pius II. (Aeneas Sylvius). But his Latinity did not soften his manners, and he was thought cruel even in that age. Desmond was beheaded, ostensibly for using Irish exactions, really, as the partisans of his family hold, to please Elizabeth. The remarkable lawlessness of this reign was in- creased by the practice of coining. Several mints had been established since Richard of York's time; the standards varied and imitation was easy.

Richard III.

During Richard III.'s short reign the earl of Kildare, head of the Irish Yorkists, was the strongest man in Ireland. He espoused the cause of Lambert Simnel (1487), whom the Irish in general seem always to have thought a true Plantagenet. The Italian primate, Octavian de Palatio, knew better, and incurred the wrath of Kildare by refusing to officiate at the impostor's coronation. The local magnates and several distinguished visitors attended, and Lambert was shown to the people borne aloft f!%£¥ V,L on " great D'Arcy of Platten's " shoulders. His i$09). enterprise ended in the battle of Stoke, near Newark, where the flower of the Anglo-Irish soldiery fell. " The Irish," says Bacon, " did not fail in courage or fierceness, but, being almost naked men, only armed with darts and skeins, it was rather

an execution than a fight upon them." Conspicuous among Henry VII. 's adherents in Ireland were the citizens of Waterford, who, with the men of Clonmel, Callan, Fethard and the Butler connexion generally, were prepared to take the field in his favour. Waterford was equally conspicuous some years later in resisting Perkin Warbeck, who besieged it un- successfully, and was chased by the citizens, who fitted out a fleet at their own charge. The king conferred honour and rewards on the loyal city, to which he gave the proud title of urbs intacta. Other events of this reign were the parliament of Drogheda, held by Sir Edward Poynings, which gave the control of Irish legislation to the English council (" Poynings's Act " — the great bone of contention in the later days of Flood and Grattan), and the battle of Knockdoe, in which the earl of Kildare used the viceregal authority to avenge a private quarrel. '

Occupied in pleasure or foreign enterprise, Henry VIII. at first paid little attention to Ireland. The royal power was practically confined to what in the previous century Henry had become known as the " Pale," that is Dublin, vm. Louth, Kildare and a part of Meath, and within this U509- narrow limit the earls of Kildare were really more t54T). powerful than the crown. Waterford, Drogheda, Dundalk, Cork, Limerick and Gal way were not Irish, but rather free cities than an integral part of the kingdom; and many inland towns were in the same position. The house of Ormonde had created a sort of small Pale about Kilkenny, and part of Wexford had been colonized by men of English race. The Desmonds were Irish in all but pride of blood. The Barretts, Condons, Courcies, Savages, Arundels, Carews and others had disappeared or were merged in the Celtic mass. Anglo-Norman nobles became chiefs of pseudo-tribes, which acknowledged only the Brehon law, and paid dues and services in kind. These pseudo-tribes were often called " nations," and a vast number of exactions were practised by the chiefs. " Coyne and livery " — the right of free-quarters for man and beast — arose among the Anglo- Normans, and became more oppressive than any native custom. When Henry took to business, he laid the foundation of re-conquest. The house of Kildare, which had actually besieged Dublin (1534), was overthrown, and the Pale saved from a standing danger (see Fitzgerald). But the Pale scarcely extended 20 m. from Dublin, a march of uncertain width inter- vening between it and the Irish districts. Elsewhere, says an elaborate report, all the English folk were of " Irish language and Irish condition," except in the cities and walled towns. Down and Louth paid black rent to O'Neill, Meath and Kildare to O'Connor, Wexford to the Kavanaghs, Kilkenny and Tipperary to O'Carroll, Limerick to the O'Briens, and Cork to the

MacCarthies. MacMurrough Kavanagh, in Irish eyes the representative of King Dermod, received an annual pension from the exchequer. Henry set steadily to work to reassert the royal title. He assumed the style of king of Ireland, so as to get rid of the notion that he held the island of the pope. The Irish chiefs acknowledged his authority and his ecclesiastical supre- macy, abjuring at the same time that of the Holy See. The lands of the earl of Shrewsbury and other absentees, who had performed no duties, were resumed; and both Celtic and feudal nobles were encouraged to come to court. Here begins the long line of official deputies, often men of moderate birth and fortune.

[FROM ANGLO-NORMAN INVASION

The Irish Church.

Butler and Geraldine, O'Neill and O'Donnell, continued to spill each other's blood, but the feudal and tribal systems were alike doomed. In the names of these Tudor deputies and other officers we seethe origin of many great Irish families — Skeffington, BrabSzon, St Leger, Fitzwilliam, Wingfield, Bellingham, Carew, Bingham, Loftus and others. Nor were the Celts overlooked. O'Neill and O'Brien went to London to be invested as earls of Tyrone and Thomond respectively. O'Donnell, whose descend- ants became earls of Tyrconnel, went to court and was well received. The pseudo-chief MacWilliam became earl of Clanri- carde, and others reached lower steps in the peerage, or were knighted by the king's own hand. All were encouraged to look to the crown for redress of grievances, and thus the old order slowly gave place to the new.

The moment when Protestantism and Ultramontanism are about to begin their still unfinished struggle is a fit time to notice the chief points in medieval Irish church history. Less than two years before Strongbow's arrival Pope Eugenius had established an ecclesiastical constitution in Ireland depending on Rome, but the annexation was very imperfectly carried out, and the hope of fully asserting the Petrine claims was a main cause of Adrian's gift to Henry II. Hitherto the Scandinavian section of the church in Ireland had been most decidedly inclined to receive the hierarchical and diocesan as distinguished from the monastic and quasi-tribal system. The bishops or abbots of Dublin derived their succes- sion from Canterbury from

1038 to 1162, and the bishops of Waterford and Limerick also sought consecration there. But both Celt and Northman acknowledged the polity of Eugenius, and it was chiefly in the matters of tithe, Peter's pence, canonical degrees and the observance of festivals that Rome had still victories to gain. Between churchmen of Irish and English race there was bitter rivalry; but the theory that the ancient Celtic church remained independent, and as it were Protestant, while the English colony submitted to the Vatican, is a mere controversial figment. The crown was weak and papal aggres- sion made rapid progress. It was in the Irish church, about the middle of the 13th century, that the system of giving jurisdiction to the bishops " in temporalibus " was adopted by Innocent IV. The vigour of Edward I. obtained a renunciation in particular cases, but the practice continued unabated. The system of provisions was soon introduced at the expense of free election, and was acknowledged by the statute of Kilkenny. In the more remote districts it must have been almost a matter of necessity. Many Irish parishes grew out of primitive monasteries, but other early settlements remained monastic, and were com- pelled by the popes to adopt the rule of authorized orders, generally that of the Augustinian canons. That order became much the most numerous in Ireland, having not less than three hundred houses. Of other sedentary orders the Cistercians were the most important, and the mendicants were very numerous. Both Celtic chiefs and Norman nobles founded convents after Henry II. 's time, but the latter being wealthier were most distinguished in this way. Religious houses were useful as abodes of peace in a turbulent country, and the lands attached were better cultivated than those of lay proprietors. Attempts to found a university at Dublin (131 1) or Drogheda (1465) failed for want of funds. The work of education was partially done by the great abbeys, boys of good family being brought up by the Cistercians of Dublin and Jerpoint, and by the Augustinians of Dublin, Kells and Connel, and girls by the canonesses of Gracedieu. A strong effort was made to save these six houses, but Henry VIII. would not hear of it, and there was no Irish Wolsey partially to supply the king's omissions.

Ample evidence exists that the Irish church was full of abuses before the movement under Henry VIII. We have detailed accounts of three sees — Clonmacnoise, Enaghdune and Ardagh. Ross, also in a wild district, was in rather better case. But even in Dublin strange things happened; thus the archiepiscopal crozier was in pawn for eighty years from 1449. The morals of the dergy were no better than in other countries, and we have evidence of many scandalous irregularities. But perhaps the most

severe condemnation is that of the report to Henry VIII. in 1515. " There is," says the document, " no archbishop, ne bishop, abbot, ne prior, parson, ne vicar, ne any other person of the church, high or low, great or small, English or Irish, that useth to preach the word of God, saving the poor friars beggars . . . the church of this land use not to learn any other science, but the law of canon, for covetise of lucre transitory." Where his hand reached Henry had little difficulty in suppressing the monasteries or taking their lands, which Irish chiefs swallowed as greedily as men of English blood. But the friars, though pretty generally turned out of doors, were themselves beyond Henry's power, and continued to preach everywhere among the people. Their devotion and energy may be freely admitted; but the mendicant orders, especially the Carmelites, were not uniformly distinguished for morality. Monasticism was momentarily suppressed under Oliver Cromwell, but the Restoration brought the monks back to their old haunts. The Jesuits, placed by Paul III. under the protection of Conn O'Neill, " prince of the Irish of Ulster," came to Ireland towards the end of Henry's reign, and helped to keep alive the Roman tradition. Anglicanism was regarded as a symbol of conquest and intrusion. The Four Masters thus describes the Reformation: "A heresy and new error arising in England, through pride, vain glory, avarice, and lust, and through many strange sciences, so that the men of England went into opposition to the pope and to Rome." The destruction of relics and images and the establishment of a schismatic hierarchy is thus recorded: " Though great was the persecution of the Roman emperors against the church, scarcely had there ever come so great a persecution from Rome as this."

The able opportunist Sir Anthony St Leger, who was accused by one party of opposing the Reformation and by the other of lampooning the Sacrament, continued to rule during the early days of Edward VI. To him succeeded v/Tm<7« Sir Edward Bellingham, a Puritan soldier whose 1553). hand was heavy on all who disobeyed the king. He bridled Connaught by a castle at Athlone, and Munster by a garrison at Leighlin Bridge. The O'Mores and O'Connors were brought low, and forts erected where Maryborough and Philipstown now stand. Both chiefs and nobles were forced to respect the king's representative, but Bellingham was not wont to flatter those in power, and his administration found little favour in England. Sir Francis Bryan, Henry VIII. 's favourite, succeeded him, and on his death St Leger was again appointed. Neither St Leger nor his successor Sir James Croft could do anything with Ulster, where the papal primate Wauchop, a Scot by birth, stirred up rebellion among

the natives and among the Hebridean invaders. But little was done under Edward VI. to advance the power of the crown, and that little was done by Bellingham.

The English government long hesitated about the official establishment of Protestantism, and the royal order to that effect was withheld until 1551. Copies of the new TbeR . liturgy were sent over, and St Leger had the com- tarnation. munion service translated into Latin, for the use of priests and others who could read, but not in English. The popular feeling was strong against innovation, as Edward Staples, bishop of Meath, found to his cost. The opinions of Staples, like those of Cranmer, advanced gradually until at last he went to Dublin and preached boldly against the mass. He saw men shrink from him on all sides. " My lord," said a beneficed priest, whom he had himself promoted, and Who wept as he spoke, " before ye went last to Dublin ye were the best beloved man in your diocese that ever came in it, now ye are the worst beloved. ... Ye have preached against the sacra- ment of the altar and the saints, and will make us worse than Jews. . . . The country folk would eat you. ... Ye have more curses than ye have hairs of your head, and I advise you for Christ's sake not to preach at Navan." Staples answered that preaching was his duty, and that he would not fail; but he feared for his life. On the same prelate fell the task of conducting a public controversy with the archbishop of Armagh, George Dowdall, which of course ended in the conversion

of neither. Dowdall fled; his see was treated as vacant, and Cranmercast about him for a Protestant to fill St Patrick's chair. His first nominee, Dr Richard Turner, resolutely declined the honour, declaring that he would be unintelligible to the people; and Cranmer could only answer that English was spoken in Ireland, though he did indeed doubt whether it was spoken in the diocese of Armagh. John Bale, a man of great learning and ability, became bishop of Ossory. There is no reason to doubt his sincerity, but he was coarse and intemperate — Froude roundly calls him a foul-mouthed ruffian — without the wisdom of the serpent or the harmlessness of the dove. His choice rhetoric stigmatized the dean of St Patrick's as ass-headed, a blockhead who cared only for his kitchen and his belly.

The Reformation having made no real progress, Mary found it easy to recover the old ways. Dowdall was restored; Staples and others were deprived. Bale fled for bare life, and his see was treated as vacant. Yet the queen

Mary (1SS3- ISS8).

found it impossible to restore the monastic lands

though she showed some disposition to scrutinize the titles of grantees. She was Tudor enough to declare her intention of maintaining the old prerogatives of the crown against the Holy See, and assumed the royal title without papal sanction. Paul IV. was fain to curb his fiery temper, and to confer graciously what he could not withhold. English Protestants fled to Ireland to escape the Marian persecution; but had the reign continued a little longer, Dublin would probably have been no safe place of refuge.

Mary scarcely varied the civil policy of her brother's ministers. Gerald of Kildare, who had been restored to his estates by Edward VI., was created earl of Kildare. The plan of settling Leix and Offaly by dividing the country between colonists and natives holding by English tenure failed, owing to the unconquer- able love of the people for their own customs. But resistance gradually grew fainter, and we hear little of the O'Connors after this. The O'Mores, reduced almost to brigandage, gave trouble till the end of Elizabeth's reign, and a member of the clan was chief contriver of the rebellion of 1641. Maryborough and Philipstown, King's county and Queen's county, commemo- rate Mary's marriage.

Anne Boleyn's daughter succeeded quietly, and Sir Henry Sidney was sworn lord-justice with the full Catholic ritual.

When Thomas Radclyffe, earl of Sussex, superseded (.1558-' mm as lord-lieutenant, the litany was chanted in 1603). English, both cathedrals having been painted, and

scripture texts substituted for " pictures and popish fancies." At the beginning of 1560 a parliament was held which restored the ecclesiastical legislation of Henry and Edward. In two important points the Irish Church was made more de- pendent on the state than in England : congSsd'Hire were abolished and heretics made amenable to royal commissioners or to parlia- ment without reference to any synod or convocation. According to a contemporary list, this parliament consisted of 3 arch- bishops, 17 bishops, 23

temporal peers, and members returned by 10 counties and 28 cities and boroughs. Some of the Irish bishops took the oath of supremacy, some were deprived. In other cases Elizabeth connived at what she could not prevent, and hardly pretended to enforce uniformity except in the Pale and in the large towns.

Ulster demanded the immediate attention of Elizabeth. Her father had conferred the earldom of Tyrone on Conn Bacach O'Neill, with remainder to his supposed son Matthew, of Shane created baron of Dungannon, the offspring of a O'Neill. smith's wife at Dundalk, who in her husband's life- time brought the child to Conn as his own. When the chief's legitimate son Shane grew up he declined to be bound by this arrangement, which the king may have made in partial ignorance of the facts. " Being a gentleman," he said, " my father never refusid no child that any woman namyd to be his." When Tyrone died, Matthew's son, Brian O'Neill, baron of Dungannon, claimed his earldom under the patent. Shane being chosen O'Neill by his tribe claimed to be chief by election,

and earl as Conn's lawful son. Thus the English government was committed to the cause of one who was at best an adulterine bastard, while Shane appeared as champion of hereditary right (See O'Neill). Shane maintained a contest which had begun under Mary until 1567, with great ability and a total absence of morality, in which Sussex had no advantage over him. The lord-lieutenant twice tried to have Shane murdered; once he proposed to break his safe-conduct; and he held out hopes of his sister's hand as a snare. Shane was induced to visit London, where the government detained him for some time. On his return to Ireland, Sussex was outmatched both in war and diplomacy; the loyal chiefs were crushed one by one; and the English suffered checks of which the moral effect was ruinous. Shane diplomatically acknowledged Elizabeth as his sovereign, and sometimes played the part of a loyal subject, wreaking his private vengeance under colour of expelling the Scots from Ulster. At last, in 1566, the queen placed the sword of state in Sidney's strong grasp. Shane was driven helplessly from point to point, and perished miserably at the hands of the MacDonnells, whom he had so often oppressed and insulted.

Peace was soon broken by disturbances in the south. The earl of Desmond having shown rebellious tendencies was detained for six years in London. Treated leniently, but First grievously pressed for money, he tried to escape, and, Desmond the attempt being judged treasonable, he was persuaded Rebellion, to surrender his estates — to receive them back or not at the queen's discretion. Seizing the

opportunity, English adventurers proposed to plant a military colony in the western half of Munster, holding the coast from the Shannon to Cork harbour. Some who held obsolete title-deeds were encouraged to go to work at once by the example of Sir Peter Carew, who had established his claims in Carlow. Carew's title had been in abeyance for a century and a half, yet most of the Kavanaghs attorned to him. Falling foul of Ormonde's brothers, seizing their property and using great cruelty and violence, Sir Peter drove the Butlers, the only one among the great families really loyal, into rebellion. Ormonde, who was in London, could alone restore peace; all his disputes with Desmond were at once settled in his favour, and he was even allowed to resume the exaction of coyne and livery, the abolition of which had been the darling wish of statesmen. The Butlers returned to their allegiance, but continued to oppose Carew, and great atrocities were committed on both sides. Sir Peter had great but undefined claims in Munster also, and the people there took warning. His imitators in Cork were swept away. Sidney first, and after him Humphrey Gilbert, could only circumscribe the rebellion. The presidency of Munster, an office the creation of which had long been contemplated, was then conferred on Sir John Perrot, who drove James "Fitzmaurice" Fitzgerald into the mountains, reduced castles everywhere, and destroyed a Scottish contingent which had come from Ulster to help the rebels. Fitzmaurice came in and knelt in the mud at the president's feet, confessing his sins; but he remained the real victor. The colonizing scheme was dropped, and the first presidency of Munster left the Desmonds and their allies in possession. Similar plans were tried unsuccessfully in Ulster, first by a son of Sir Thomas Smith, afterwards by Walter Devereux, earl of Essex, a knight-errant rather than a statesman, who was guilty of many bloody deeds. He treacherously captured Sir Brian O'Neill and massacred his followers. The Scots in Rathlin were slaughtered wholesale. Essex struggled on for more than three years, seeing his friends gradually drop away, and dying ruined and unsuccessful.

Towards the end of 1575 Sidney was again persuaded to become viceroy. The Irish recognized his great qualities, and he went everywhere without interruption. Henceforth pre- sidencies became permanent institutions. Sir William Drury in Munster hanged four hundred persons in one year, Sir Nicholas Malby in reducing the Connaught Burkes spared neither young nor old, and burned all corn and houses. The Desmonds deter- mined on a great effort. A holy war was declared. Fitzmaurice I landed in Kerry with a few followers, and accompanied by the

famous Nicholas Sanders, who was armed with a legate's commission and a banner blessed by the pope. Fitzmaurice fell soon after in a skirmish near Castleconnell, but Sanders and Desmond's brothers still kept the field. When it was too late to act with effect, Desmond himself, a vain man, neither frankly loyal nor a bold rebel, took the field. He surprised Youghal, then an English town, by night, sacked it, and murdered the people. Roused at last, Elizabeth sent over Ormonde as general of Munster, and after long delay gave him the means of conducting a campaign. It was as much a war of Butlers against Geraldines as of loyal subjects against rebels, and Ormonde did his work only too well. , Lord Baltinglass raised a hopeless subsidiary revolt in Wicklow (1580), which was signalized by a crushing defeat of the lord deputy, Lord Grey de Wilton (Arthegal) in Glenmalure. A force of Italians and Spaniards landing at Smerwick in Kerry, Grey hurried thither, and the foreigners, who had no commission, surrendered at discretion, and were put to the sword. Neither Grey nor the Spanish ambassador seems to have seen anything extraordinary in thus disposing of inconvenient prisoners. Spenser and Raleigh were present. Sanders perished obscurely in 1581, and in 1583 Desmond himself was hunted down and killed in the Kerry mountains. More than 500,000 Irish acres were forfeited to the crown. The horrors of this war it is impossible to exaggerate. The Four Masters says that the lowing of a cow or the voice of a ploughman could scarcely be heard from Cashel to the farthest point of Kerry; Ormonde, who, with all his severity, was honourably distinguished by good faith, claimed to have killed 5000 men in a few months. Spenser, an eye-witness, says famine slew far more than the sword. The survivors were unable to walk, but crawled out of the woods and glens. " They looked like anatomies of death; they did eat the dead carrion and one another scon after, insomuch as the very carcasses they spared not to scrape out of their graves; … to a plot of watercresses or shamrocks they flocked as to a feast."

In 1584 Sir John Perrot, the ablest man available after Sidney's retirement, became lord-deputy. Sir John Norris, famed in the Netherland wars, was president of Munster, and so impressed the Irish that they averred him to be in league with the devil. Perrot held a parliament in 1585 in which the number of members was considerably increased. He made a strenuous effort to found a university in Dublin, and proposed to endow it with the revenues of St Patrick's, reasonably arguing that one cathedral was enough for

any city. Here he was opposed by Adam Loftus, archbishop of Dublin and chancellor, who had expressed his anxiety for a college, but had no idea of endowing it at his own expense. The colonization of the Munster forfeitures was undertaken at this time. It failed chiefly from the grants to individuals who neglected to plant English farmers, and were often absentees themselves. Raleigh obtained 42,000 acres. The quit rents reserved to the crown were less than one penny per acre. Racked with the stone, hated by the official clique, thwarted on all sides, Perrot was goaded into using words capable of a treasonable interpretation. Archbishop Loftus pursued him to the end. He died in the Tower of London under sentence for treason, and we may charitably hope that Elizabeth would have pardoned him. In his will, written after sentence, he emphatically repudiates any treasonable intention — "I deny my Lord God if ever I proposed the same."

In 1584 Hugh O'Neill, if O'Neill he was (being second son

of Matthew, mentioned above), became chief of part of Tyrone;

in 1587 he obtained the coveted earldom, and in

hf st . 1503 was the admitted head of the whole tribe. A Desmond J ˆ J , . . , . . , , .

Rebellion, quarrel with the government was inevitable, and,

Hugh Roe O'Donnell having joined him, Ulster

**'as united against the crown. In 1598 James Fitzthomas*

Fitzgerald assumed the title of Desmond, to which he had

some claims by blood, and which he pretended to hold as Tyrone's

gift. Tyrone had received a crown of peacock's feathers from

the pope, who was regarded by many as king of Ireland. The

title of Sugan or straw-rope earl has been generally given to

the Desmond pretender Both ends of the island were soon

in a blaze, and the Four Masters says that in seventeen days there was not one son of a Saxon left alive in the Desmond territories. Edmund Spenser lost his all, escaping only to die of misery in a London garret. Tyrone more than held his own in the north,

completely defeated Sir Henry Bagnal in the battle of the Yellow Ford (1598), invaded Munster, and ravaged the lands of Lord Barrymore, who had remained true to his allegiance. Tyrone's ally, Hugh Roe O'Donnell, overthrew the president of Connaught, Sir Conyers Clifford. " The Irish of Connaught," says the Four Masters, " were not pleased at Clifford's death; … he had never told them a falsehood." Robert Devereux, earl of Essex, came over in 1599 with a great army, but did nothing of moment, was outgeneralled and out-witted by Tyrone, and threw up his command to enter on the mad and criminal career which led to the scaffold. In 1600 Sir George Carew became president of Munster, and, as always happened when the crown was well served, the rebellion was quickly put down. Charles Blount, Lord Mountjoy (afterwards earl of Devonshire), who succeeded Essex, joined Carew, and a Spanish force which landed at Kinsale surrendered. The destruction of their crops starved the people into submission, and the contest was only less terrible than the first Desmond war because it was much shorter. In Ulster Mountjoy was assisted by Sir Henry Docwra, who founded the second settle ment at Derry, the first under Edward Randolph having been abandoned. Hugh O'Donnell sought help in Spain, where he died. Tyrone submitted at last, craving pardon on his knees, renouncing his Celtic chiefry, and abjuring all foreign powers; but still retaining his earldom, and power almost too great for a subject. Scarcely was the compact signed when he heard of the great queen's death. He burst into tears, not of grief, but of vexation at not having held out for better terms.*

In reviewing the Irish government of Elizabeth we shall find much to blame, a want of truth in her dealings and of steadiness in her policy. Violent efforts of coercion E / Iza . were succeeded by fits of clemency, of parsimony bet h an or of apathy. Yet it is fair to remember that she Was Conquest surrounded by enemies, that her best energies were otlrelaad – expended in the death-struggle with Spain, and that she was rarely able to give undivided attention to the Irish problem. After all she conquered Ireland, which her predecessors had failed to do, though many of them were as crooked in action and less upright in intention. Considering the times, Elizabeth cannot be called a persecutor. "Do not," she said to the elder Essex, "seek too hastily to bring people that pouty" have beeru trained in another religion from that in which they have been brought up." Elizabeth saw that the Irish could only be reached through their own language. But for that harvest the labourers were necessarily few. The fate of Bishop Daly of Kildare, who preached in Irish, and who thrice had his house burned over his head, was not*

likely to encourage missionaries. In all wild parts divine service was neglected, and wandering friars or subtle Jesuits, supported by every patriotic or religious feeling of the people, kept Ireland faithful to Rome. Against her many shortcomings we must set the queen's foundation of the university of Dublin, which has been the most successful English institution in Ireland, and which has continually borne the fairest fruit.

Great things were expected of James I. He was Mary Stuart's son, and there was a curious antiquarian notion afloat that, because the Irish were the original " Scoti," a Scottish ,king would sympathize with Ireland. Corporate ifSˆ 1 ' towns set up the mass, and Mountjoy, who could I62S) argue as well as fight, had to teach them a sharp lesson. Finding Ireland conquered and in no condition to rise again, James established circuits and a complete ' system of shires. Sir John Davies was sent over as solicitor-general. His famous book (Discoverie of the State of Ireland) in which he glorifies his own and the king's exploits gives far too much credit to the latter and far too little to his great predecessor.

Two legal decisions swept away the customs of tanistry and of Irish gavelkind, and the English land system was violently

*substituted. The earl of Tyrone was harassed by sheriffs and other officers, and the government, learning that he was engaged in an insurrectionary design, prepared to seize him. The informa- tion was probably false, but Tyrone was growing old and perhaps despaired of making good his defence. By leaving Ireland he played into his enemies' hands. Rory O'Donnell, created earl of Tyrconnel, accompanied him. Cuconnaught Maguire had already gone. The " flight of the earls," as it is called, com- pleted the ruin of the Celtic cause. Reasons or pretexts for declaring forfeitures against O'Cahan were easily found. O'Dogherty, chief of Inishowen, and foreman of the grand jury which found a bill for treason against the earls of Tyrone and Tyrconnel, was insulted by Sir George Paulet, the governor of Derry. O'Dogherty rose, Derry was sacked, arid Paulet murdered. O'Dogherty having been killed and O'Hanlon and others being implicated, the whole of northern Ulster was at the disposal of the government. Tyrone, Donegal, * fl " Armagh, Cavan, Fermanagh*

and Derry were parcelled Ulster. ou t among English and Scottish colonists, portions being reserved to the natives. The site of Derry was granted to the citizens of London, who fortified and armed it, and Londonderry became the chief bulwark of the colonists in two great wars. Whatever may have been its morality, in a political point of view the plantation of Ulster was successful. The northern province, which so severely taxed the energies of Elizabeth, has since been the most prosperous and loyal part of Ireland. But the conquered people remained side by side with the settlers; and Sir George Carew, who reported on the plantation in 1611, clearly foresaw that they would rebel again. • Those natives who retained land were often oppressed by their stronger neighbours, and sometimes actually swindled out of their property. It is probable that in the neglect of the grantees to give proper leases to their tenants arose the Ulster tenant-right custom which attracted so much notice in more modern times.

The parliamentary history of the English colony in Ireland corresponds pretty closely to that of the mother country. First there are informal meetings of eminent persons; then, in 1295, there is a parliament of which some acts remain, and to which only knights of the shire were summoned to represent the commons. Burgesses were added as early as 1310. The famous parliament of Kilkenny in 1366 was largely attended, but the details of its composition are not known. That there was substantial identity in the character of original and copy may be inferred from the fact that the well-known tract called Modus tenendi parliamentum was exemplified under the Great Seal of Ireland in 6 Hen. V. The most ancient Irish parliament remaining on record was held in 1374, twenty members in all being summoned to the House of Commons, from the counties of Dublin, Louth, Kildare and Carlow, the liberties and crosses of Meath, the city of Dublin, and the towns of Drogheda and Dundalk. The liberties were those districts in which the great vassals of the crown exercised palatinate jurisdiction, and the crosses were the church lands, where alone the royal writ usually ran. Writs for another parlia- ment in the same year were addressed in addition to the counties of Waterford, Cork and Limerick; the liberties and crosses of Ulster, Wexford, Tipperary and Kerry; the cities of Water- ford, Cork and Limerick; and the towns of Youghal, Kinsale, Ross, Wexford and Kilkenny. The counties of Clare and Long- ford, and the towns of Gal way and Athenry, were afterwards added, and the number of popular representatives does not appear to have much exceeded sixty during the later middle ages. In the House of Lords the temporal peers were largely out- numbered by the bishops and mitred abbots.

In the parliament which conferred the royal title on Henry VIII. it was finally decided that the proctors of the clergy had no voice or votes. Elizabeth's first parliament, held in 1559, was attended by 76 members of the Lower House, which increased to 122 in 1585. In 1613 James I. by a wholesale creation of new boroughs, generally of the last insignificance, increased the House of Commons to 232, and thus secured an Anglican majority to

The Irish

ParBa-

ment.

carry out his policy. He told those who remonstrated to mind

their own business. " What is it to you if I had created 40

noblemen and 400 boroughs ? The more the merrier, the

fewer the better cheer." In 1639 the House of Commons had

274 members, a number which was further increased to 300

at the Revolution, and so it remained until the Union.

Steeped in absolutist ideas, James was not likely to tolerate

religious dissent. He thought he could " mak what liked

him law and gospel." A proclamation for banishing

Romish priests issued in 1605, and was followed Religious 1 . 1 , • , • , policy or

by an active and general persecution, which was so j ames /.

far from succeeding that they continued to flock in from abroad, the lord-deputy Arthur Chichester admitting that every house and hamlet was to them a sanctuary. The most severe English statutes against the Roman Catholic laity had never been re-enacted in Ireland, and, in the absence of law, illegal means were taken to enforce uniformity. Privy seals addressed to men of Wealth and position commanded their attendance at church before the deputy or the provincial president, on pain of unlimited fine and imprisonment by the Irish Star Chamber. The Roman Catholic gentry and lawyers, headed by Sir Patrick Barnewall, succeeded in proving the flagrant illegality of

these mandates, and the government had to yield. On the whole Protestantism made little progress, though the number of Protestant settlers increased. -As late as 1622, when Sir Henry Cary, Viscount Falkland, was installed as deputy, the illustrious James Ussher, then bishop of Meath, preached from the text " he beareth not the sword in vain," and descanted on the over-indulgence shown to recusants. The primate, Christopher Hampton, in a letter which is a model of Christian eloquence, mildly rebuked his eminent suffragan.

The necessities of Charles I. induced his ministers to propose that a great part of Connaught should be declared forfeited, owing to mere technical flaws in title, and planted like Ulster. Such was the general outcry that the scheme n62s- had to be given up; and, on receiving a large 1649). grant from the Irish parliament, the king promised certain graces, of which the chief were security for titles, free trade, and the substitution of an oath of allegiance for that of supremacy. Having got the money, Charles as usual broke his word; and in 1635 the lord-deputy Strafford began a general system of extortion. The Connaught tra u oa „/ and Munster landowners were shamelessly forced to Stratford. pay large fines for the confirmation of even recent titles. The money obtained by oppressing the Irish nation was employed to create an army for the oppression of the Scottish and English nations. The Roman Catholics were neither awed nor conciliated. Twelve bishops, headed by the primate Ussher, solemnly protested that " to tolerate popery is a grievous sin." The Ulster Presbyterians were rigorously treated. Of the prelates employed by Strafford in this persecution the ablest was John Bramhall (1594-1663) of Derry, who not only op- pressed the ministers but insulted them by coarse language. The " black oath," which bound those who took it never to oppose Charles in anything, was enforced on all ministers, and those who refused it were driven from their manses and often stripped of their goods.

Strafford was recalled to expiate his career on the scaffold; the army was disbanded; and the helm of the state remained in the hands of a land-jobber and of a superannuated soldier. Disbanded troops are the ready weapons ti64t. of conspiracy, and the opportunity was not lost. The Roman Catholic insurgents of 1641 just failed to seize Dublin, but quickly became masters of nearly the whole country. That there was no definite design of massacring the Protestants is likely, but it was intended to drive them out of the country. Great numbers were killed, often in cold blood and with circum- stances of great barbarity. The English under Sir Charles Coote and others retaliated. In 1642 a Scottish army under General Robert Monro landed in Ulster, and formed a rallyinp point for the colonists.

Londonderry, Enniskillen, Coleraine, Carrickfergus and some other places defied Sir Phelim O'Nsill'i

tumultuary host. Trained in foreign wars, Owen Roe O'Neill gradually formed a powerful army among the Ulster Irish, and showed many of the qualities of a skilful general. But like other O'Neills, he did little out of Ulster, and his great victory over Monro at Benburb on the Blackwater (June 5, 1646) had no lasting results. The English of the Pale were forced into rebellion, but could never get on with the native Irish, who hated them only less than the new colonists. Ormonde through- out maintained the position of a loyal subject, and, as the king's representative, played a great but hopeless part. The Celts cared nothing for the king except as a weapon against the Protestants; the old Anglo-Irish Catholics cared much, but the nearer Charles approached them the more completely he alienated the Protestants. In 1645 Rinuccini reached Ireland as papal legate. He could never co-operate with the Roman Catholic confederacy at Kilkenny, which was under old English influence, and by throwing in his lot with the Celts only widened the gulf between the two sections. The state of parties at this period in Ireland has been graphically described by Carlyle. " There are," he says, " Catholics of the Pale, demanding freedom of religion, under my lord this and my lord that. There are Old-Irish Catholics, under pope's nuncios, under Abba O'Teague of the excommunications, and Owen Roe O'Neill, demanding not religious freedom only, but what we now call ' repeal of the union,' and unable to agree with Catholics of the English Pale. Then there are Ormonde Royalists, of the Episcopalian and mixed creeds, strong for king without covenant; Ulster and other Presbyterians strong for king and covenant; lastly, Michael Jones and the Commonwealth of England, who want neither king nor covenant."

In all their negotiations with Ormonde and Glamorgan, Henrietta Maria and the earl of Bristol, the pope and Rinuccini stood out for an arrangement which would have destroyed the royal supremacy and established Romanism in Ireland, leaving to the Anglicans bare toleration, and to the Presbyterians not even that. Charles behaved with his usual weakness. Ormonde was forced to surrender Dublin to the Parliamentarians (July 1647), and the inextricable knot awaited

Cromwell's sword.

Cromwell's campaign (1649-1650) showed how easily a good general with an efficient army might conquer Ireland. Resist- ance in the field was soon at an end; the starving- out policy of Carew and Mountjoy was employed against the guerrillas, and the soldiers were furnished with scythes to cut down the green corn. Bibles were also regularly served out to them. Oliver's severe conduct at Drogheda and elsewhere is not morally defensible, but such methods were common in the wars of the period, and much may be urged in his favour. Strict discipline was maintained, soldiers being hanged for stealing chickens; faith was always kept; and short, sharp action was more merciful in the long run than a milder but less effective policy. Cromwell's civil policy, to use Macaulay's words, was " able, straightforward, and cruel." He thinned the disaffected population by allowing foreign enlistment, and 40,000 are said to have been thus got rid of. Already Irish Catholics of good family had learned to offer their swords to foreign princes. In Spain, France and the Empire they often rose to the distinction which they were denied at home. About 9000 persons were sent to the West Indies, practically into slavery. Thus, and by the long war, the population was reduced to some 850,000, of whom 150,000 were English and Scots. Then came the transplantation beyond the Shannon. The Irish Catholic gentry were removed bodily with their servants and such tenants as consented to follow them, and with what remained of their cattle. They suffered dreadful hardships. To exclude foreign influences, a belt of 1 m. was reserved to soldiers on the coast from Sligo to the Shannon, but the idea was not fully carried out. The derelict property in the other provinces was divided between adventurers who had advanced money and soldiers who had fought in Ireland. Many of the latter sold their claims to officers or speculators, who were thus enabled to form estates. The majority of Irish labourers stayed to work under the settlers, and the country gradually became

Cromwell.

peaceful and prosperous. Some fighting Catholics haunted woods and hills under the name of tories, afterwards given in derision to a great party, and were hunted down with as little compunction as the wolves to which they were compared. Measures of great severity were taken against Roman Catholic priests; but it is said that Cromwell had great numbers in his pay, and that they kept him well informed. All classes of Protestants were tolerated, and Jeremy Taylor preached unmolested. Commercial equality being given to Ireland, the woollen trade at once revived, and a shipping interest sprang up.

A legislative union was also effected, and Irish members attended at Westminster.

Charles II. was bound in honour to do something for such Irish Catholics as were innocent of the massacres of 1641, and the claims were not scrutinized too severely. It was found impossible to displace the Cromwellians, but JjJS? 1 they were shorn of about one-third of their lands. 168S). When the Caroline settlement was complete it was found that the great rebellion had resulted in reducing the Catholic share of the fertile parts of Ireland from two-thirds to one-third. Ormonde, whose wife had been allowed by Crom- well's clemency to make him some remittances from the wreck of his estate, was largely and deservedly rewarded. A revenue of £30,000 was settled on the king, in consideration of which Ireland was in 1663 excluded from the benefit of the Navigation Act, and her nascent shipping interest ruined. In 1666 the importation of Irish cattle and horses into England was forbidden, the value of the former at once falling five-fold, of the latter twenty-fold. Dead meat, butter and cheese were also excluded, yet peace brought a certain prosperity. The woollen 'manu- facture grew and flourished, and Macaulay is probably warranted in saying that under Charles II. Ireland was a pleasanter place of residence than it has been before or since. But it was pleasant only for those who conformed to the state religion. Roman Catholicism was tolerated, or rather connived at; but its professors were subject to frequent alarms, and to great severities during the ascendancy of Titus Oates. Bramhall became primate, and his hand was heavy against the Ulster Presbyterians. Jeremy Taylor began a persecution which stopped the influx of Scots into Ireland. Deprived of the means of teaching, the Independents and other sectaries soon disappeared. In a military colony women were scarce, and the " Ironsides " had married natives. Roman Catholicism held its own. The Quakers became numerous during this reign, and their peaceful industry was most useful. They venerate as their founder William Edmundson (1627-1712), a Westmorland man who had borne arms for the Parliament, and who settled in Antrim in 1652.

The duke of Ormonde was lord-lieutenant at the death of Charles II. At seventy-five his brain was as clear as ever, and James saw that he was no fit tool for his purpose. " See, gentlemen," said the old chief, lifting his glass J ,"^" lL at a military dinner-party, " they say at court I am i6S9). old and doting. But my hand is steady, nor doth my heart fail. ... To the king's health." Calculating on his loyal subservience, James appointed his brother-in-law, Lord Clarendon, to succeed Ormonde. Monmouth's enterprise made no stir, but gave an excuse for disarming the Protestant militia. The tories at once

emerged from their hiding-places, and Clarendon found Ireland in a ferment. It was now the turn of the Protestants to feel persecution. Richard Talbot, one of the few survivors of Drogheda, governed the king's Irish policy, while the lord-lieutenant was kept in the dark. Finally Talbot, created earl of Tyrconnel, himself received the sword of state. Protestants were weeded out of the army, Protestant officers in particular being superseded by idle Catholics of gentle blood, where they could be found, and in any case by Catholics. Bigotry rather than religion was Tyrconnel's ruling passion, and he filled up offices with Catholics independently of character. Sir Alexander Fitton, a man convicted of forgery, became chancellor, and but three Protestant judges were left on the bench. The outlawries growing out of the affairs of 1641 were reversed as quickly as possible. Protestant corporations were dissolved by

"quo warrantos"; but James was still Englishman enough to refuse an Irish parliament, which might repeal Poyning's Act and the Act of Settlement.

At the close of 1688 James was a fugitive in France. By this time Londonderry and Enniskillen had closed their gates, and the final struggle had begun. In March 1689 James reached Ireland with some French troops, and summoned a parliament which repealed the Act of Settlement. The estates of absentees were vested in the crown, and, as only two months law was given, this was nearly equivalent to confiscating the property of all Protestants. Between 2000 and 3000 Protestants were attainted by name, and moreover the act was not published. The appalling list may be read in the State of the Protestants by William King, archbishop of Dublin, one of many divines converted by the logic of events to believe in the lawfulness of resistance. Interest- ing details may be gleaned from Edmundson's Diary. The dispossessed Protestants escaped by sea or flocked into Ulster, where a gallant stand was made. The glories of Londonderry and Enniskillen will live as long as the English language. The Irish cause produced one great achievement — the defence of Limerick, and one great leader — Patrick Sarsfield. The Roman Catholic Celts aided by France were entirely beaten, the Pro- testant colonists aided by England were entirely victorious at the battle of the Boyne, on the 1st of July 1690; w/ _ and at the battle of Aughrim on the 12th of

July

1 69 1. Even the siege of Limerick showed the irre- concilable divisions which had nullified the efforts of 1641. Hugh Baldearg O'Donnell, last of Irish chiefs, sold his services to William for £500 a year. But it was their king that condemned the Irish to hopeless failure. He called them cowards, whereas the cowardice was really his own, and he deserted them in their utmost need. They repaid him with the opprobrious nickname of " Sheemas-a-Cacagh," or dirty James.

Irish rhetoric commonly styles Limerick " the city of the violated treaty." The articles of capitulation (Oct. 3, 1691) may be read in Thomas Leland's History of Ireland (1773) or in F. P. Plowden's History of Ireland (1809); from the first their interpretation was disputed. Hopes of religious liberty were held out, but were not fulfilled. Lords Justices Porter and Coningsby promised to do their utmost to obtain a parlia- mentary ratification, but the Irish parliament would not be persuaded. There was a paragraph in the original draft which would have protected the property of the great majority of Roman Catholics, but this was left out in the articles actually signed. William thought the omission accidental, but this is hardly possible. At all events he ratified the treaty in the sense most favourable to the Catholics, while the Irish parliament adhered to the letter of the document. Perhaps no breach of faith was intended, but the sorrowful fact remains that the modern settlement of Ireland has the appearance of resting on a broken promise. More than 1,000,000 Irish acres were for- feited, and, though some part returned to Catholic owners, the Catholic interest in the land was further diminished. William III. was the most liberally minded man in his dominions; but the necessities of his position, such is the awful penalty of greatness, forced him into intolerance against his will, and he promised to discourage the Irish woollen trade. His manner of disposing of the Irish forfeitures was inexcusable. The lands were resumed by the English parliament, less perhaps from a sense of justice than from a desire to humiliate the deliverer of England, and were resold to the highest bidder. Nevertheless it became the fashion to reward nameless English services at the expense of Ireland. Pensions and sinecures which would not bear the light in England were charged on the Irish establishment, and even bishoprics were given away on the same principle. The tremendous uproar raised by Swift about Wood's halfpence was heightened by the fact that Wood shared his profits with the duchess of Kendal, the mistress of George I.

From the first the victorious colonists determined to make another 1641 impossible, and the English government failed to moderate their severity. In 1 708 Swift declared that the Papists were politically as inconsiderable as the women and children.

In despair of effecting anything at home, the young and strong enlisted in foreign armies, and the almost incredible number of 450,000 are said to have emigrated for this purpose between 1691 and 1745. This and the hatred felt towards James II. prevented any rising in 1715 or 1745. The panic-stricken severity of minorities is proverbial, but it is not to be forgotten that the Irish Protestants had been turned out of house and home twice within fifty years. The restrictions on Irish com- merce provoked Locke's friend William Molyneux (1656-1698) to write his famous plea for legislative independence (1698). Much of the learning contained in it now seems obsolete, but the question is less an antiquarian one than he supposed. Later events have shown that a mother country must have supreme authority, or must relax the tie with self-governing colonies merely into a close alliance. In the case of Ireland the latter plan has always been impossible. In 1703 the Irish parliament begged for a legislative union, but as that would have involved at least partial free trade the English monopolists prevented it. By Poynings's law (see above) England had control of all Irish legislation, and was therefore an accomplice in the penal laws. These provided that no Papist might teach a school or any child but his own, or send children la ˆ s

abroad, the burden of proof lying on the accused, and the decision being left to magistrates without a jury. Mixed marriages were forbidden between persons of property, and the children might be forcibly brought up Protestants. A Catholic could not be a guardian, and all wards in chancery were brought up Protestants. The Protestant eldest son of a Catholic landed proprietor might make his father tenant for life and secure his own inheritance. Among Catholic children land went in compulsory gavelkind. Catholics could not take longer leases than thiry-one years at two-thirds of a rack rent; they were even required to conform within six months of an inheritance accruing, on pain of being ousted by the next Protestant heir. Priests from abroad were banished, and their return declared treason. All priests were required to register and to remain in their own parishes, and informers were to be rewarded at the expense of the Catholic inhabitants. No Catholic was allowed arms, two justices being empowered to search; and if he had a good horse any Protestant might claim it on tendering £5.

These laws were of course systematically evaded. The property of

Roman Catholics was often preserved through Protestant trustees, and it is understood that faith was generally kept. Yet the attrition if slow was sure, and by the end of the century the proportion of land belonging to Roman Catholics was probably not more than one-tenth of the whole. We can see now that if the remaining Roman Catholic landlords had been encouraged they would have done much to reconcile the masses to the settlement. Individuals are seldom as bad as corporations, and the very men who made the laws against priests practically shielded them. The penal laws put a premium on hypocrisy, and many conformed only to preserve their property or to enable them to take office. Proselytizing schools, though supported by public grants, entirely failed.

The restraints placed by English commercial jealousy on Irish trade destroyed manufacturing industry in the south and west (see the section Economics above). Driven by the Caroline legislation against cattle into breeding ^"y . sheep, Irish graziers produced the best wool in Europe, restraints. Forbidden to export it, or to work it up profitably at home, they took to smuggling, for which the indented coast gave great facilities. The enormous profits of the contraband trade with France enabled Ireland to purchase English goods to an extent greater than her whole lawful traffic. The moral effect was disastrous. The religious penal code it was thought meritorious to evade; the commercial penal code was ostenta- tiously defied; and both tended to make Ireland the least law-abiding country in Europe. The account of the smugglers is the most interesting and perhaps the most valuable part of J. A. Froude's work in Ireland, and should be compared with the Irish and Scottish chapters of Lecky's History.

When William III. promised to depress the Irish woollen trade, he promised to do all he could for Irish linen. England did not fulfil the second promise; still the Ulster Ulster weavers were not crushed, and their industry flourished. pemus. Some Huguenot refugees, headed by Louis Crommelin (1652-1727), were established by William III. at Lisburn, and founded the manufacturing prosperity of Ulster. Other Huguenots attempted other industries, but commercial restraints brought them to nought. The peculiar character of the flax business has prevented it from crossing the mountains which bound the northern province. Wool was the natural staple of the south.

The Scottish Presbyterians who defended Londonderry were treated little better than the Irish Catholics who besieged it— the sacramental test of 1704 being the work seaters. ˚f tne English council rather than of the Irish parlia- ment. In 1 7 1 5 the Irish House of Commons resolved that any one who should prosecute a Presbyterian for accepting a commission in the army without taking the test was an enemy to the king and to the Protestant interest. Acts of indemnity were regularly passed throughout the reign of George II., and until 1780, when the Test Act was repealed. A bare toleration had been granted in 1720. Various abuses, especially forced labour on roads which were often private jobs, caused the Oakboy Insurrection in 1764. Eight years later the Steelboys rose against the exactions of absentee landlords, who often turned out Protestant yeomen to get a higher rent from Roman Catholic cottiers. The dispossessed men carried to America an undying hatred of England which had much to say to the American revolution, and that again reacted on Ireland. Law- less Protestant associations, called Peep o' Day Boys, terrorized the north and were the progenitors of the Orangemen (1789). Out of the rival " defenders " Ribbonism in part sprung, and the United Irishmen drew from both sources (1791).

The Ulster peasants were never as badly off as those of the south and west. Writers the most unlike each other— Swift and Hugh Boulter, George Berkeley and George Poverty Stone, Arthur Young and Dr Thomas Campbell— peasantry. a ˆ tell tne same tale. Towards the end of the 17th century Raleigh's fatal gift had already become the food of the people. When Sir Stephen Rice (1637-1715), chief baron of the Irish exchequer, went to London in 1688 to urge the Catholic claims on James II ν the hostile populace escorted him in mock state with potatoes stuck on poles. Had manu- factures been given fair play in Ireland, population might have preserved some relation to capital. As it was, land became almost the only property, and the necessity of producing wool for smuggling kept the country in grass. The poor squatted where they could, receiving starvation wages, and paying exorbitant rents for their cabins, partly with their own labour. Unable to rise, the wretched people multiplied on their potato plots with perfect recklessness. During the famine which began in the winter of 1739 one-fifth of the population is supposed to have perished; yet it is hardly noticed in literature, and seems not to have touched the conscience of that English public which in 1755 subscribed £100,000 for the sufferers by the Lisbon earthquake. As might be expected where men were allowed to smuggle and forbidden to work, redress was sought in illegal combinations and secret

societies. The dreaded ˆname of White- boy was first heard in 1761; and agrarian crime has never since been long absent. Since the Union we have had the Threshers, the Terry Alts, the Molly Maguires, the Rockites, and many others. Poverty has been the real cause of all these disturbances, which were often aggravated by the existence of factions profoundly indicative of barbarism. Communism, cupidity, scoundrelism of all kinds have contributed to every disturbance. The tendency shown to screen the worst criminals is sometimes the result of sympathy, but more often of fear. The 1 cruelties which have generally accompanied Whiteboyism is common to servile insurrections all over the world. No wonder if Irish landlords were formerly tyrannical, for they were in the position of slave- owners. The steady application of modern principles, by extend-

ing legal protection to all, has altered the slavish character of the oppressed Irish. The cruelty has not quite died out, but it is much rarer than formerly; and, generally speaking, the worst agrarianism has of late years been seen in the districts which retain most of the old features.

The medieval colony in Ireland was profoundly modified by the pressure of the surrounding tribes. While partially adopting their laws and customs, the descendants of the con- querors often spoke the language of the natives, and in so doing nearly lost their own. The Book of Howth and many documents composed in the Pale during the 16th century show this clearly. Those who settled in Ireland after 1641 were in a very different mood. They hated, feared and despised the Irish, and took pride in preserving their pure English speech. Molyneux and Petty, who founded the Royal Society of Dublin in 1683, were equally Englishmen, though the former was born in Ireland. Swift and Berkeley did not consider themselves Irishmen at all. Burke and Goldsmith, coming later, though they might not call themselves Englishmen, were not less free from provincialism. It would be hard to name other four men who, within the same period, used Shakespeare's language with equal grace and force. They were all educated at Trinity College, Dublin. The Sheridans were men of Irish race, but with the religion they adopted the literary tone of the dominant caste, which was small and ex- clusivej with the virtues and the vices of an aristocracy. Systematic infringement of English copyright was discreditable in itself, but sure evidence of an appetite for reading. " The bookseller's property," says Gibbon of his first volume, " was twice invaded by the pirates of Dublin." The oratory of the day was of a high order, and incursions into the wide field of pamphlet literature often repay the student. Handel was appreciated in Dublin at a time when it was still the

fashion to decry him in London. The public buildings of the Irish capital have great architectural merit, and private houses still preserve much evidence of a refined taste. Angelica Kauffmann worked long in Ireland; James Barry and Sir Martin Archer Shee were of Irish birth; and on the whole, considering the small number of educated inhabitants, it must be admitted that the Ireland of Flood and Grattan was intellectually fertile.

*The volunteers (see Flood, Henry) extorted partial free trade (1779), but manufacturing traditions had perished, and common experience shows how hard these are to recover. The demand for union was succeeded by a craving ˆ tra f s *? m for independence. Poynings's Uw was repealed, and peadeace. in 1782, in Grattan's opinion, Ireland was at last a nation. The ensuing period of eighteen years is the best known in Irish history. The quarrel and reconciliation of Flood and Grattan (q.v.), the kindly patriotism of Lord Charlemont, the eloquence, the devotion, the corruption, are household words. (Details will be found in the biographical articles on these and other men of the period.) In the parliament of 1784, out of 300 members 8-2 formed the regular opposition, of whom 30 were the nominees of Whig potentates and 52 were really elected. The majority contained 29 members considered independent, 44 who expected to be bought, 44 placemen, 12 sitting for regular government boroughs, and 12 who were supposed to support the government on public grounds. The remaining seats were proprietary, and were let to government for valuable consideration. The House of Lords, composed largely of borough mongers and controlled by political bishops, was even Jess independent. Only Protestant freeholders had votes, which encouraged leases for lives, about the worst kind of tenure, and the object of each proprietor was to control as many votes as possible. The necesiity of finding Protestants checked sub- division for a time, but in 1793 the Roman Catholics received the franchise, and it became usual to make leases in common, so that each lessee should have a freehold interest of 40s. The landlord indeed had little choice, for his importance depended on the poll-book. Salaries, sinecures, even commissions in the army were reserved for those who contributed to the return of some local magnate.*

FROM ANGLO-NORMAN INVASION]

IRELAND

But no political cause swelled the population as much as the potato. Introduced by Raleigh in 1610, the cultivation of this important tuber developed with extraordinary eaceoa' rapidity. The Elizabethan wars were most injurious the potato, to industry, for men will not sow unless they hope to reap, and the very essence of military policy had been to deprive a recalcitrant people of the means of living. The Mantuan peasant was grieved at the notion of his harvest being gathered by barbarian soldiers, and the Irishman could not be better pleased to see his destroyed. There was no security for any one, and every one was tempted to live from hand to mouth. The decade of anarchy which followed 1641 stimu- lated this tendency fearfully. The labour of one man could plant potatoes enough to feed forty, and they could neither be destroyed nor carried away easily. When Petty wrote, early in Charles II. 's reign, this demoralizing esculent was already the national food. Potatoes cannot be kept very long, but there was no attempt to keep them at all; they were left in the ground, and dug as required. A frost which penetrated deep caused the famine of 1739. Even with the modern system of storing in pits the potato does not last through the summer, and the " meal months " — June, July and August— always brought great hardship. The danger increased as the growing population pressed ever harder upon the available land. Between 1 83 1 and 1842 there were six seasons of dearth, approaching in some places to famine.

The population increased from 2,845,032 in 1785 to 5,356,594 in 1803. They married and were given in marriage. Wise men foresaw the deluge, but people who were already half- starved every summer did not think their case could well be worse. In 1845 the population had swelled to 8,295,061, the greater part of whom depended on the potato only. There was no margin, and when the " precarious exotic " failed an awful famine was the result.

Great public and private efforts were made to meet the case, and relief works were undertaken, on which, in March 1847, 734,000 persons, representing a family aggregate of not less than 3,000,000, were employed. It was found that labour and exposure were not good for half-starved men. The jobbing was frightful, and is probably inseparable from wholesale operations of this kind. The policy of the government was accordingly changed, and the task of feeding a whole people was undertaken. More than 3,000,000 rations, generally cooked, were at one time distributed, but no exertions

could altogether avert death in a country where the usual machinery for carrying, distributing and preparing food was almost entirely wanting. From 200,000 to 300,000 perished of starvation or of fever caused by insuffi- cient food. An exodus followed which, necessary as it was, caused dreadful hardship, and among the Roman Catholic Irish in America Fenianism took its rise. One good result of the famine was thoroughly to awaken Englishmen to their duty towards Ireland. Since then, purse-strings have been even too readily untied at the call of Irish distress.

Great brutalities disgraced the rebellion of 1798, but the people had suffered much and had French examples before them. The real originator of the movement was of 1798. Theobald Wolfe Tone (q.v.), whose proffered services were rejected by Pitt, and who founded the United Irishmen. His Parisian adventures detailed by himself are most interesting, and his tomb is still the object of an annual pilgrim- age. Tone was a Protestant, but he had imbibed socialist ideas, and hated the priests whose influence counteracted his own. In Wexford, where the insurrection went farthest, the ablest leaders were priests, but they acted against the policy of their church.

The inevitable union followed (1st January 1801). From this period the history of Ireland naturally becomes intermingled Union of w ‘ t ‘ 1 English politics (see English History), and Great much of the detail will also be found in the biographical

*Britain articles on prominent Irishmen and other politicians. Ireland P ‘ tl k ac * some time before (r 78s) offered a commercial partnership, which had been rejected on the ground that it involved the ultimate right of England to tax Ireland.*

He was not less liberally inclined in religious matters, but George III. stood in the way, and like William III. the minister would not risk his imperial designs. Carried in great measure by means as corrupt as those by which the constitution of ‘82 had been worked, the union earned no gratitude. But it was a political necessity, and Grattan never gave his country- men worse advice than when he urged them to ” keep knocking at the union.” The advice has, however, been taken. Robert Emmet’s insurrection (1803) was the first emphatic protest. Then came the struggle for emancipation, /ˆanc/pa- It was proposed to couple the boon with a veto on tlon. the appointment of Roman Catholic bishops. It was the ghost of the old question of investitures. The remnant of the Roman Catholic aristocracy would have granted it; even Pius VII. was not invincibly opposed to it; but

Daniel O'Connell took the lead against it. Under his guidance the Catholic association became a formidable body. At last the priests gained control of the elections; the victor of Waterloo was obliged to confess that the king's government could no longer be carried on, and Catholic emancipation had to be granted in 1829. The tithe war followed, and this most oppres- sive of all taxes was unfortunately commuted (1838) only in deference to clamour and violence. The repeal agitation was unsuccessful, but let us not be extreme to mark the faults of O'Connell's later years. He doubtless a ltuuion. believed in repeal at first; probably he ceased to believe in it, but he was already deeply committed, and had abandoned a lucrative profession for politics. With some help from Father Mathew he kept the monster meetings in order, and his constant denunciations of lawless violence distinguish him from his imitators. His trial took place in 1844. There is a sympathetic sketch of O'Connell's career in Lecky's Leaders of Public Opinion in Ireland. (1871); Sir Thomas Wyse's Historical Sketch of the late Catholic Association (1829) gives the best account, of the religious struggle, and much may be learned from W. J. Fitzpatrick's Life of Bishop Doyle (1880).

The national system of education introduced in 1833 was the real recantation of intolerant opinions, but the economic state of Ireland was fearful. The famine, emigration and the new poor law nearly got rid of starvation, but the people never' became frankly loyal, feeling that they owed more to their own importunity and to their own misfortunes than to the wisdom of their rulers. The literary efforts of young Ireland eventuated in another rebellion (1848); a revolutionary wave could not roll over Europe without touching the unlucky island. After the failure of that outbreak there was peace until the close of the American civil war released a number of adventurers trained to the use of arms and filled with hatred to England.

Already in 1858 the discovery of the Phoenix conspiracy had shown that the policy of John Mitchel (1815-1875) and his associates was not forgotten. John O'Mahony, one of the men of '48, organized a formidable secret society in America, which his historical studies led him to call the Fenian brother- hood (see Fenians).

The Fenian movement disclosed much discontent, and was attended by criminal outrages in England. The disestablishment of the Irish Church, the privileged position of which had long been condemned by public opinion, was then decreed (1869) and the land question was next taken in hand (1870). These reforms did not, however, put an end to Irish agitation. The – Home Rule party which demanded the

restoration of a separate Irish . parliament, showed increased activity, and the general election of 1874 gave it a strong representation at Westminster, where one section of the party developed into the " obstructionists " (see the articles on Isaac Butt and C. S. Parnell).

Isaac Butt, who died in May 1879, led a parliamentary party of fifty-four, but the Conservatives were strong enough to out- vote them and the Liberals together. His procedure was essentially lawyer-like, for he respected the House of Commons and dreaded revolutionary violence. His death left the field

clear for younger and bolder men. William Shaw succeeded him as chairman of the Irish party in Parliament; but after the election of 1880, Parnell, who had the Land League at his back, ousted him by 23 votes to 18.

The Land Law of i860, known as Deasy's Act, had been based on the principle that every tenancy rested on contract either expressed or implied. The act of 1870, ad- LetJiie rnitting the divergence between theory and practice, protected the tenants' improvements and provided compensation for disturbance within certain limits, but not where the ejectment was for non-payment of rent. In good times this worked well enough, but foreign competition began to tell, and 1879 was the worst of several bad seasons. A succes- sion of wet summers told against all farmers, and in mountainous districts it was difficult to dry the turf on which the people depended for fuel. A famine was feared, and in the west there was much real distress. The Land League, of which Michael Davitt (q.v.) was the founder, originated in Mayo in August, and at a meeting in Dublin in October the organization was extended to all Ireland, with Parnell as president. The country was thickly covered with branches before the end of the year, and in December Parnell went to America to collect money. He was absent just three months, visiting over sixty cities and towns; and 200,000 dollars were subscribed. Parnell had to conciliate the Clan-na-Gael and the Fenians generally, both in Ireland and America, while abstaining from action which would make his parliamentary position untenable. He did not deny that he would like an armed rebellion, but acknow- ledged that it was an impossibility.

Speaking at Cincinnati on the 23rd of February 1880, he declared that the first thing necessary was to undermine English power by destroying the Irish landlords. Ireland might thus become independent. " And let us not forget," he added, " that that is the ultimate goal at which all we Irishmen aim. None of us, whether we be in America or in Ireland, or wherever we may be, will be satisfied until we have destroyed the last link which keeps Ireland bound to England." At Gal way in October of the same year he said that he " would not have taken off his coat " to help the tenant farmers had he not known that that was the way to legislative independence. Fenianism and agrarianism, essentially different as they are, might be worked to the same end.

To meet the partial failure of the potatoes in Connaught and Donegal, very large sums were subscribed and administered by two committees, one under the duchess of Marlborough and the other under the lord mayor of Dublin. When Lord Beaconsfield appealed to the country in March 1880, he reminded the country in a letter to the viceroy, the duke of Marlborough, that there was a party in Ireland " attempting to sever the constitutional tie which unites it to Great Britain in that bond which has favoured the power and prosperity of both," and that such an agitation might in the end be " scarcely less disastrous than pestilence and famine." But the general election did not turn mainly upon Ireland, and the result gave Gladstone a majority of 50 over Conservatives and Home Rulers combined. Earl Cowper became lord-lieutenant, with W. E. Forster (q.v.) as chief secretary, and Parnell remained chairman of his own party in parliament. The Compensation for Disturbance Bill, even where the ejectment was for non-payment of rent,

passed the House of Commons, but the Lords threw it out, and this has often been represented as the great cause of future trouble. Probably it made little real difference, for the extreme party in Ireland were resolved to stop at nothing. It is not easy to defend the principle that a landlord who has already lost his rent should also have to pay the defaulter before getting a new tenant or deriving a profit from the farm by working it himself. Speaking at Ennis on the 19th of September, cottiar. Parnell told the people to punish a man for taking a farm from which another had been evicted " by isolating him from his kind as if he was a leper of old." The advice was at once taken and its scope largely extended. For refusing to receive rents at figures fixed by the tenants, Captain Boycott (1832-1897), Lord Erne's agent in Mayo, was severely " boycotted," the name of the first victim being given to tie new system. His servants were forced to leave him, his crops were left unsaved, even the post and telegraph were interfered with. The Ulster Orangemen resolved to get in the crops, and to go in armed force sufficient for the purpose. The govern- ment allowed 50 of them to go under the protection of about 900 soldiers. The cost seemed great, but the work was done and the law vindicated. In Cork William Bence-Jones (1812- 1882) was attacked. The men in the service of the steam-packet companies refused to put his cattle on board, and they were eventually smuggled across the Channel in small lots. Several associations were formed which had more or less success against the League, and at last a direct attack was made. Parnell with four other members of parliament and the chief officers of the Land League were indicted for conspiracy in the Queen's Bench. No means of intimidating the jurors was neglected, and in the then state of public feeling a verdict was hardly to be expected. On the 25th of January 1881 the jury disagreed, and Parnell became stronger than ever.

Then followed a reign of terror which lasted for years. No one was safe, and private spite worked freely in the name of freedom. The system originated by Parnell's Ennis speech became an all-devouring tyranny. In the House of Commons, on the 24th of May 1882, Gladstone said that boycotting required a sanction like every other creed, and that the sanction which alone made it effective " is the murder which is not to be denounced." The following description by a resident in Munster was published in The Times of the 5th of November 1885: " Boycotting means that a peaceable subject of the queen is denied food and drink, and that he is ruined in his business; that his cattle are unsaleable at fairs; that the smith will not shoe his horse, nor the carpenter mend his cart; that old friends pass him by on the other side, making the sign of the cross; that his children are hooted at the village school; that he sits apart like an outcast in his usual place of public worship: all for doing nothing but what the law says he has a perfect right to do. I know of a man who is afraid to visit his own son. A trader who is even suspected of dealing with such a victim of tyranny may be ruined by the mere imputation ; his customers shun him from fear, and he is obliged to get a character from some notorious leaguer. Membership of the National League is, in many cases, as necessary a protection as ever was a certifi- cate of civism under Robespierre. The real Jacobins are few, but the masses groan and submit." Medicine was refused by a shopkeeper even for the sick child of a boycotted person. A clergyman was threatened for visiting a parishioner who was under the ban of the League. Sometimes no one could be found to dig a grave. The League interfered in every relation of life, and the mere fact of not belonging to it was often severely punished. " The people," says the report of the Cowper Com- mission, " are more afraid of boycotting, which depends for its success on the probability of outrage, than they are of the judgments of the courts of justice. This unwritten law in some districts is supreme."

The session of parliament of 1881 was chiefly occupied with Ireland. " With fatal and painful precision," Gladstone told the House of Commons on the 28th of January, " the steps of crime dogged the steps of the Land League," and the first thing was to restore the supremacy of the law. In 1871 there had been an agrarian war in Westmeath, and an act had been passed authorizing the arrest of suspected persons and their detention without trial. The ringleaders disappeared and the county became quiet again. It was now proposed to do the same thing for the whole of Ireland, the power of detention to continue until the 30th of September 1882. Parnell cared nothing for the dignity of the House of Commons. His leading idea was that*

no concession could be got from England by fair means, and he made himself as disagreeable as possible. Parliamentary forms were used with great success to obstruct parliamentary action. The " Coercion Bill " was introduced on the 24th of January 1881. There was a sitting of 22 hours and another of 41 hours, and on the 2nd of February

the debate was closured by the Speaker on his own responsibility and the bill read a first time. The Speaker's action was ap- proved by the House generally, but acrimonious debates were raised by Irish members. Parnell and 35 of his colleagues were suspended, and the bill became law on the 2nd of March, but not before great and permanent changes were made in parlia- mentary procedure. An Arms Bill, which excited the same sort of opposition, was also passed into law.

That a Land Act should be passed was a foregone conclusion as soon as the result of the general election was known. There were many drafts and plans which never saw the /88/. light; but it was at last resolved to adopt the policy

known as the "Three F's" — free sale, fixity of tenure and fair rents. By the first tenants at will were empowered to sell their occupation interests, the landlord retaining a right of pre-emption. By the second the tenant was secured from eviction except for non-payment of rent. By the third the tenant was given the right to have a "fair rent" fixed by a newly formed Land Commission Court, the element of com- petition being entirely excluded. There were several exceptions and qualifying clauses, but most of them have been swept away by later acts. The act of 1881 can scarcely be said to have worked well or smoothly, but it is not easy to see how any sort of settlement could have been reached without accepting the principle of having the rent fixed by a third party. Drastic as the bill was, Parnell refused to be a party to it, and on the second reading, which was carried by 352 to 176, he walked out of the House with 35 of his followers. When the bill became law in August he could not prevent the tenants from using it, but he did what he could to discourage them in order to please his American paymasters, who repudiated all parlia- mentary remedies. In September a convention was held in Dublin, and Parnell

reported its action to the American Land League: "Resolutions were adopted for national self-govern- ment, the unconditional liberation of the land for the people, tenants not to use the rent-fixing clauses of the Land Act, but follow old Land League lines, and rely on the old methods to reach justice. The executive of the League is empowered to select test cases, in order that tenants in surrounding districts may realize, by the results of cases decided, the hollowness of the act" (Barry O'Brien, Life of C. S. Parnell, i. 306). His organ United Ireland declared that the new courts must b'e cowed into giving satisfactory decisions. The League, however, could not prevent the farmers from using the fair-rent clauses. It was more successful in preventing free sale, maintaining the doctrine that, rent or no rent, no evictions were to be allowed. At the first sitting of the Land Commission in Dublin the crier, perhaps by accident, declared "the court of the Land League to be open." Speaking at Leeds on the 7th of October, Gladstone said " the resources of civilization were not exhausted," adding that Parnell " stood between the living and the dead, not like Aaron to stay the plague, but to spread the plague." Two days later Parnell called the prime minister a " masquerading knight-errant," ready to oppress the unarmed, but submissive to the Boers as soon as he found " that they were able to shoot straighter than his own soldiers." Four days after this Parnell was arrested under the Coercion Act and lodged in Kilmainham gaol. The Land League having retorted by ordering KlimaiB- tne tenan { S t0 p a y no j-eht^ it was declared illegal, "Treaty." and suppressed by proclamation. Parnell is said to have disapproved of the no-rent manifesto, as also Mr John Dillon, who was in Kilmainham with him, but both of them signed it (ib. i. 319). At Liverpool on the 27th of October Gladstone described Parnell and his party as " marching through rapine to the disintegration and dismemberment of the empire." In 1881, 4439 agrarian outrages were reported; nothing attracted more attention in England than the cruel mutilations of cattle, which became very frequent. The Ladies' Land League tried to carry on the work of the suppressed organization and there was even an attempt at a Children's League. Sex had no effect in softening the prevalent style of oratory, but the government thought it better to take no

notice. The imprisonment of suspects under the Coercion Act had not the expected result, and outrages were incessant, the agitation being supported by constant supplies of money from America. Gladstone resolved on a complete change of policy. It was decided to check evictions by an Arrears Bill, and the three imprisoned members of parliament — Messrs Parnell, Dillon and O'Kelly — were released on

the 2nd of May 1882, against the wishes of the Irish government. This was known as the Kilmainham Treaty. Lord Cowper and Forster at once resigned, and were succeeded by Lord Spencer and Lord Frederick Cavendish, who entered Dublin on the 6th of May.

That same evening Lord Frederick and the permanent under-secretary Thomas Henry Burke were murdered in the Phoenix Park in broad daylight. The weapons were amputating knives imported for the purpose. The assassins drove p™ ix rapidly away; no one, not even those who saw the murders. deed from a distance, knew what had been done. A Dublin tradesman named Field, who had been a juror in a murder trial, was attacked by the same gang and stabbed in many places. He escaped with life, though with shattered health, and it was the identification of the man who drove his assailants' car that afterwards led to the discovery of the whole conspiracy. The clue was obtained by a private examination of suspected persons under the powers given by the Crimes Act. To obtain convictions the evidence of an informer was wanted, and the person selected was James Carey, a member of the Dublin Corporation and a chief contriver of the murders. He swore that they had been ordered immediately after the ˆappearance of an article in the Freeman's Journal which declared that a " clean sweep " should be made of Dublin Castle officials. The evidence disclosed the fact that several abortive attempts had been previously made to murder Forster. Out of twenty persons, subsequently arraigned, five were hanged, and others sentenced to long terms of imprisonment. Carey embarked for South Africa in the following July, and was murdered on board ship by Patrick O'Donnell, who was brought to England, convicted, and hanged on the 17th of December*

1883.

Mr (afterwards Sir) G. O. Trevelyan had been appointed chief secretary in May 1882, and in July the Crimes Prevention Act was passed for three years on lines indicated by Lord Cowper. In the first six months of the year L# aga e. 2597 agrarian outrages were reported, and in the last six months 836. They fell to 834 in 1883, and to 744 in 1884. The Arrears Bill also became law. Money enough was advanced out of the surplus property of the Irish Church to pay for tenants of holdings under £30 one year's rent upon all arrears accruing before November 1880, giving them a clear receipt to that date on condition of their paying another year themselves; of the many reasons against the measure the most important was that it was a concession to agrarian violence. But the same could be and was said of the Land Act of 1881. That had been passed, and it was

probably impossible to make it work at all smoothly without checking evictions by dealing with old arrears. The Irish National League was, however, founded in October to take up the work of the defunct Land League, and the country continued to be disturbed. The law was paralysed, for no jury could be trusted to convict even en the clearest evidence, and the National League branches assumed judicial functions. Men were openly tried all over the country for disobeying the revolutionary decrees, and private spite was often the cause of their being accused. " Tenants," to quote the Cowper Commission again, " who have paid even the judicial rents have been summoned to appear before self-constituted tribunals, and if they failed to do so, or on appearing failed to satisfy those tribunals, have been fined or boycotted." In February T883 Mr Trevelyan gave an account of his stewardship at Hawick, and said that all law-abiding Irishmen, whether Conservative or Liberal, were on one side, while on the other were those who " planned and executed the Galway and Dublin murders, the boycotting and

firing into houses, the mutilation of cattle and intimidation of every sort." In this year the campaign of outrage in Ireland was reinforced by one of dynamite in Great Britain. yaam e. ˆg nome secretary, Sir W. Harcourt, brought in an Explosives Bill on the 9th of April, which was passed through all its stages in one day and received the royal assent on the next. The dynamiters were for the most part Irish-Americans, who for obvious reasons' generally spared Ireland, but one land-agent's house in Kerry was shaken to its foundations in November 1884. At Belfast in the preceding June Lord Spencer, who afterwards became a Home Ruler, had announced that the secret conspirators would " not terrify the English nation." On the 22nd of February 1883 Forster made his great attack on Parnell in the House of Commons, accusing him of moral complicity with Irish crime. A detailed answer was never attempted, and public attention was soon drawn to the trial of the " Invincibles " who contrived the Phoenix Park murders. On the nth of December Parnell received a present of £37,000 from his followers in Ireland. The tribute, as it was called, was raised in spite of a papal prohibition. As a complement to the Land Act and Arrears Act, boards of guardians Jds ™ were tn ˆ s vear empowered to build labourers' cottages with money borrowed on the security of the rates and repayable out of them. Half an acre of land

went with the cottage, and by a later act this was unwisely extended to one acre. That the labourers had been badly housed was evident, and there was little chance of improvement by private capitalists, for cottage property is not remunerative. But the working of the Labourers Acts was very costly, cottages being often assigned to people who were not agricultural labourers at all. In many districts the building was quite overdone, and the rent obtainable being far less than enough to recoup the guardians, the system operated as out-door relief for the able-bodied and as a rate in aid of wages. .

The Explosives Act, strong as it was, did not at once 'effect its object. In February 1884 there was a plot to blow up four London railway stations by means of clockwork infernal machines containing dynamite, brought from America. Three Irish- Americans were convicted, of whom one, John Daly, who was sentenced to penal servitude for life, lived to be mayor of Limerick in 1899. In January 1885 Parnell visited Thurles, where he gave a remarkable proof of his power by breaking down local opposition to his candidate for Tipperary. In April the prince and princess of Wales visited Ireland. At Dublin they were well received, and at Belfast enthusiastically, but there were hostile demonstrations at Mallow and Cork. In May it was intended to renew the Crimes Prevention Act, but before that was done the government was beaten on a financial question by 264 to 252, Parnell and 39 of his followers voting with the Conservatives. The Crimes Prevention Act expired on the 1 2th of July, and the want of it was at once felt. The number of agrarian outrages reported in the first six months of the year was 373; in the last six months they rose to 543, and the number of persons boycotted was almost trebled. Lord Salisbury came into office, with Lord Carnarvon as lord-lieutenant and Sir W. Hart Dyke as chief secretary. The lord-lieutenant had an interview with Parnell, of which very conflicting accounts were given, but the Irish leader issued a manifesto advising his friends to vote against the Liberals as oppressors and coercionists, who promised everything and did nothing. The constitutional Liberal party in Ireland was in fact annihilated by the extension of the franchise to agricultural labourers and very small farmers. The most important Irish measure of the session was the Ashbourne Act, by which £5,000,000 was allotted on the security of the land for the creation of an occupying proprietary. Later the same sum was again granted, and there was still a good deal unexpended when the larger measure of 1891 became- law. In December 1885, when the general election was over, an anonymous scheme of Home Rule appeared in some newspapers, and in spite of disclaimers it was at once believed that Gladstone had

made up his mind to surrender. In October 1884, only fourteen

Ashbourne Act.

months before, he had told political friends that he had a sneaking regard for Parnell, and that Home Rule might be a matter for serious consideration within ten years (Sir A. West's Recollec- tions, 1899, ii. 206). The shortening of the time was perhaps accounted for by the fact that the new House of Commons consisted of 331 Liberals, 249 Conservatives, 86 Home Rulers and Independents, Parnell thus holding the balance of parties. In Ireland there had been 66 elections contested, and out of 451,000 voters 93,000 were illiterates. Such were the constituencies to whom it was proposed to hand Ireland over. On the 26th of January 1886 the government were defeated by a combination of Liberal and Nationalists on an issue not directly connected with Ireland, and their resigna- tion immediately followed. Gladstone became prime minister, with Lord Aberdeen as lord-lieutenant bui'is^. and Mr John Morley as chief secretary. Lord Harring- ton and Mr Goschen were not included in this adminis- tration. In February Parnell again showed his power by forcing Captain O'Shea upon the unwilling electors of Galway. He introduced a Land Bill to relieve tenants from legal process if they paid half their rent, and foretold disorder in consequence of its rejection. In April the Government of Ireland Bill was brought in, Mr Chamberlain (q.v.), Mr Trevelyan and others leaving the ministry. The bill attempted to safeguard British interests, white leaving Ireland at the mercy of the native politicians. Irish members were excluded from the imperial parliament. The local legislature was to consist of two orders sitting and voting together, but with the power of separating on the demand of either order present. The 28 representative peers, with 75 other members having an income of £200, or a capital of £4000, elected for ten years by £25 occupiers, were to constitute the first order. The second was to have 204 members returned for five years by the usual parliamentary electorate. The status of the lord-lieutenant was unalterable by this legisla- ture. Holders of judicial offices and permanent civil servants had the option of retiring with pensions, but the constabulary, whom the Home Rulers had openly threatened to punish when their time came, were to come after an interval under the power of the Irish Parliament. Parnell accepted the bill, but without enthusiasm.

The Government of Ireland Bill gave no protection to land- owners, but as the crisis was mainly agrarian, it would have been hardly decent to make no show of considering them. A Land Purchase Bill was accordingly introduced on the 16th of April by the prime

minister under " an obligation of honour and policy," to use his own words. Fifty millions sterling in three years was proposed as payment for what had been officially undervalued at 113 millions. It was assumed that there would be a rush to sell, the choice apparently lying between that and confiscation, and priority was to be decided by lot. The Irish landlords, however, showed no disposition to sell their country, and the Purchase Bill was quickly dropped, though Gladstone had declared the two measures to be inseparable. He reminded the landlords that the " sands were running in the hour-glass," but this threat had no effect. The Unionists of Ireland had been taken by surprise, and out of Ulster they had no organization capable of opposing the National League and the government combined. Individuals went to England and spoke wherever they could get a hearing, but it was uphill work. In Ulster the Orange lodges were always available, •and the large Protestant population made itself felt. Terrible riots took place at Belfast in June, July and August. In October there was an inquiry by a royal commission with Mr Justice Day at its head, and on the report being published in the follow- ing January there were fresh riots. Foolish and criminal as these disturbances were, they served to remind the English people that Ireland would not cease to be troublesome under Home Rule. In parliament the Home Rule Bill soon got into rough water; John Bright declared against it. The " dis- sentient Liberals," as Gladstone always called them, were not converted by the abandonment of the Purchase Bill, and on the 7th of June 93 of them voted against the second readin?,*

which "was lost by 30 votes. A general election followed in July, and 74 Liberal Unionists were returned, forming with the Conservatives a Unionist party, which outnumbered Glad- stonians and Parnellites together by over a hundred. Gladstone resigned, and Lord Salisbury became prime minister, with • Lord Londonderry as lord-lieutenant and Sir M. Hicks-Beach (afterwards Lord St Aldwyn) as chief secretary. •

The political stroke having failed, agrarianism again occupied the ground. The " plan of campaign " was started, against Parnell's wishes, towards the end of 1886. The gist ofCa'm- 3 " °t tn ' s movement was that tenants should offer what paiga." they were

pleased to consider a fair rent, and if it was refused, should pay the money into the hands of a committee. In March 1887 Sir M. Hicks-Beach resigned on account of illness, and Mr Arthur Balfour (q.v.) became chief secretary. The attempt to govern Ireland under what was called " the ordinary law " was necessarily abandoned, and a perpetual Crimes Act was passed which enabled the lord- lieutenant to proclaim disturbed districts and dangerous associa- tions, and substituted trial by magistrates for trial by jury in the case of certain acts of violence. In August the National League was suppressed by proclamation. The conservative instincts of the Vatican were alarmed by the lawless state of Ireland, and an eminent ecclesiastic, Monsignor Persico, arrived in the late summer on a special commission of inquiry. He made no secret of his belief that the establishment of an occupying proprietary was the only lasting cure, but the attitude of the clergy became gradually more moderate. The government passed a bill giving leaseholders the benefit of the act of 1881, and prescribing a temporary reduction upon judicial rents already fixed. This last provision was open to many great and obvious objections, but was more or less justified by the fall in prices which had taken place since 1881.

The steady administration of the Crimes Act by Mr Balfour gradually quieted the country. Parnell had now gained the bulk of the Liberal party, including Lord Spencer (in spite of all that he had said and done) and Sir G. Trevelyan (in spite of his Hawick speech). In the circumstances the best chance for Home Rule was not to stir the land question. Cecil Rhodes, hoping to help imperial federation, gave Parnell £10,000 for the cause. In September 1887 a riot arising out of the " plan of campaign " took place at Mitchelstown. The police fired, and two lives were lost, Mr Henry Labouchere and Mr (after- wards Sir John) Brunner, both members of parliament, being present at the time. The coroner's jury brought in a verdict against the police, but that was a matter of course, and the government ignored it. A telegram sent by Gladstone a little later, ending with the words " remember Mitchelstown," created a good deal of feeling, but it did the Home Rulers no good. In October Mr Chamberlain visited Ulster, where he was received with enthusiasm, and delivered several stirring Unionist speeches. In November Lord Hartington and Mr Goschen were in Dublin, and addressed a great loyalist meeting there.

In July 1888 an act was passed appointing a commission, consisting of Sir James Hannen, Mr Justice Day and Mr Justice A. L. Smith, to inquire into certain charges made by Parnell fhe Times against Parnell and his party. What sion. ' caused most excitement was the

publication by The Times on the 15th of May 1887 of a. facsimile letter purporting to have been written by Parnell on the 15th of May 1882, nine days after the Phoenix Park murders. The writer of this letter suggested that his open condemnation of the murders had been a matter of expediency, and that Burke deserved his fate. Parnell at once declared that this was a forgery, but he did nothing more at the time. Other alleged incriminating letters followed. The case of O'Donnell v. Walter, tried before the Lord Chief Justice of England in July 1888, brought matters to a head, and the special commission followed. The proceedings were necessarily of enormous length, and the commissioners did not report until the 13th of February 1890, but the question of the letters was decided just twelve months earlier, Richard Pigott, who shot himself at Madrid,

having confessed to the forgeries. A few days later, on the 8th of March 1889, Parnell was entertained at dinner by the Eighty Club, Lords Spencer and Rosebery being present; and he was well received on English platforms when he chose to appear. Yet the special commission shed a flood of light on the agrarian and Nationalist movement in Ireland. Eight members of parliament were pronounced by name to have conspired for the total political separation of the two islands. The whole party were proved to have disseminated newspapers tending to incite to sedition and the commission of crime, to have abstained from denouncing the system of intimidation, and to have compensated persons injured in committing crime. (See Parnell.)

The conduct of the agrarian war had in the meantime almost passed from Parnell's hands. The " plan of campaign " was not his work, still less its latest and most remark- able exploit. To punish Mr Smith-Barry (afterwards xip pera ry. Lord Barrymore) for his exertions in favour of a brother landlord, his tenants in Tipperary were ordered to give up their holdings. A sum of £50,000 was collected to build " New Tipperary," and the fine shops and flourishing concerns in the town were deserted to avoid paying small ground-rents. The same course was pursued with the farmers, some of whom had large capitals invested. Mr William O'Brien presided at the inaugural dinner on the 12th of April, and some English M.P.'s were present, but his chief supporter throughout was Father Humphreys. Parnell was invited, but neither came nor answered. No shopkeeper nor farmer had any quarrel with his landlord. " Heretofore," a tenant wrote in The Times in the following December, " people were boycotted for taking farms; I am boycotted for not giving up mine, which I have held for twenty-five years. A neighbour of mine, an English- man, is undergoing the same treatment, and we

alone. We are the only Protestant tenants on the Cashel estate. The re- mainder of the tenants, about thirty, are clearing everything off their land, and say they will allow themselves to be evicted." In the end the attack on Mr Smith-Barry completely failed, and he took back his misguided tenants. But the town of Tipperary has not recovered its old prosperity.

The principal Irish measure passed in 1891 was Mr Balfour's Purchase Act, to extend and modify the operation of the Ash- bourne acts. £30,000,000 were provided to convert tenants into proprietors, the instalments paid being J^chase. again available, so that all the tenanted land in Ireland might ultimately be passed through if desired. The land itself in one shape or another formed the security, and guaranteed stock was issued which the holder might exchange for consols. The 40th clause of the Land Act of 1896 greatly stimulated the creation of occupying owners in the case of over-incumbered estates, but solvent landlords were not in a hurry to sell. The interests of the tenant were so carefully guarded that the prices obtainable were ruinous to the vendor unless he had other resources. The security of the treasury was also so jealously scrutinized that even the price which the tenant might be willing to pay was often disallowed. Thus the Land Commission really fixed the price of all property, and the last vestige of free contract was obliterated. Compulsory purchase became a popular cry, especially in Ulster. Owners, however, could not with any pretence of justice be forced to sell at ruinous prices, nor tenants be forced to give more than they thought fair. If the state, for purposes of its own, insisted upon expropriating all landlords, it was bound to find the differ- ence, or to enter upon a course of undisguised confiscation. The Purchase Act was not the only one relied on by Mr Balfour. The Light Railways Act, passed by him in 1890, did much to open up some of the poorest parts of the west, and the temporary scarcity of that year was dealt with by relief works.

An action begun by Parnell against The Times was settled by the payment of a substantial sum. The Nationalist leader seemed to stand higher than ever, but the writ in the divorce proceedings, brought by Captain O'Shea against his wife, with the Irish leader as co-respondent, was hanging over him. To

public astonishment, when the case came on for trial there was no defence, and on the 17th of November 1800 a decree nisi was granted. Parnell's subsequent marriage with downfall. tne respondent before a registrar did him no good with his Roman Catholic supporters. The Irish bishops remained silent, while in England the " Nonconformist conscience " revolted. Three days after the verdict a great meeting was held in the Leinster Hall, Dublin, attended by 25 members of the Irish parliamentary party. The result was an enthusiastic vote of confidence in Parnell, moved by Mr Justin M'Carthy and seconded by Mr T. M. Healy. Five days later he was unanimously re-elected chairman by his party in parliament, but the meeting was scarcely over when Glad- stone's famous letter to Mr Morley became public. The writer in effect demanded Parnell's resignation of the leadership as the condition upon which he could continue at the head of the Liberal party. He had to choose between the Nonconformist vote and the Irish leader, and he preferred the former. Next day the secession of the Irish members from their chief began. Long and acrimonious debates followed in committee-room 15, and on the 6th of December Parnell was left in the chair with only 26 supporters. The majority of 4.5 members — Anti-Parnellites, as they came to be called— went into another room, unanimously deposed him, and elected Mr Justin M'Carthy in his place. Parnell then began a campaign as hopeless as that of Napoleon after Leipzig. He seized the office of United Ireland in person. The Fenian element was with him, as he admitted, but the clergy were against him, and the odds were too great, especially against a Protestant politician. His candidate in a by-election at Kilkenny was beaten by nearly two to one, and he himself was injured in the eyes by lime being thrown at him. Similar defeats followed at Sligo and Carlow. He went over to France to meet Messrs Dillon and O'Brien, who had not yet taken sides, but nothing was agreed to, and in the end both these former followers went against him. Every Saturday he went from London to Dublin and addressed some Sunday meeting in the country. The last was on the 27th of September. On the 6th of October 1891 he died at Brighton, from the effects of a chill following on overwork and excitement. His funeral at Glasnevin was attended by 200,000 people. At the general election of 1892, however, only 9 Parnellites — the section which under Mr John Redmond remained staunch to his memory — were returned to parliament.

The " Parnellite split," as it was called, proved fatal to the cause of Home Rule, for the Nationalist party broke up into factions. No one of the sectional leaders commanded general confidence, and personal

rivalries were of the bitterest kind. An important result of these quarrels was to stop the supply of American money, without which neither the Land League nor the Home Rule agitation could have been worked. The Unionist party had adopted a policy of local government for Ireland while opposing legislative independence, and a bill was introduced into the House of Commons by Mr Balfour in February 1892. The principle was affirmed by a great majority, but the measure could not then be proceeded with. At the general election in July the Gladstonians and Nationalists together obtained a majority of 40 over Conservatives and Liberal Unionists. Lord Salisbury resigned in August, and was succeeded by Gladstone, with Lord Houghton (afterwards earl of Crewe) as lord-lieutenant and Mr John Morley as chief secretary. The Crimes Act, which had already been relaxed, was altogether suspended, and the proclamation declaring the National League illegal was revoked. The lord-lieutenant, on taking up his quarters in Dublin, refused a loyal address because of its Unionist tone; and in October the government issued a commission, with Mr Justice Mathew as chairman, which had the restoration of the evicted tenants as its avowed object. Two of the commissioners very shortly resigned, and the whole inquiry became somewhat farcical. It was given in evidence that out of £234,431 collected under the plan of campaign only £125,000 had been given to evicted tenants.

In February 1893, on the application of the sheriff of Kerry, an order from Dublin Castle, refusing protection, was pronounced illegal in the Queen's Bench, and persons issuing it were declared liable to criminal prosecution. In the same month Gladstone introduced his second Home Rule Bill, which pro- posed to retain 80 Irish members in the imperial Bill 1893. parliament instead of 103, but they were not to vote on any proceedings expressly confined to Great Britain. On the 8th of April 1886 he had told the House of Commons that it "passed the wit of man" to draw a practical distinction between imperial and non-imperial affairs. On the 20th of July 1888 he informed the same assembly that there was no difficulty in doing so. It had become evident, in the meantime, to number- less Englishmen that the exclusion of the Irish members would mean virtual separation. The plan now proposed met with no greater favour, for a good many English Home Rulers had been mainly actuated all along by the wish to get the Irish members out of their way. The financial provisions of the bill were objected to by the Nationalists as tending to keep Ireland in bondage.

During the year 1892 a vast number of Unionist meetings were held throughout Ireland, the most remarkable being the great Ulster

convention in Belfast, and that of the three other provinces in Dublin, on the 14th and 23rd of June. On the 22nd of April 1893, the day after the second reading of the bill, the Albert Hall in London was filled by enthusiastic Unionist delegates from all parts of Ireland. Next day the visitors were entertained by Lord Salisbury at Hatfield, the duke of Devonshire, Mr Balfour, Mr Goschen and Mr Chamber- lain being present. Between the second reading and the third on 1st September the government majority fell from 43 to 34. A great part of the bill was closured by what was known as the device of the " gag " without discussion, although it occupied the House of Commons altogether eighty-two nights. It was thrown out by the Lords by 419 to 41, and the country un- doubtedly acquiesced in their action. On the 3rd of March

1894 Gladstone resigned, and Lord Rosebery (q.v.) became prime minister. A bill to repeal the Crimes Act of 1887 was read a second time in the Commons by 60, but went no farther. A committee on the Irish Land Acts was closured at the end of July by the casting vote of the chairman, Mr Morley, and the minority refused to join in the report. The bill to restore the evicted tenants, which resulted from the Mathew Com- mission, was rejected in the Lords by 249 to 30. In March

1895 Mr Morley introduced a Land Bill, but the government majority continued to dwindle. Another Crimes Act Repeal Bill passed the second reading in May by only 222 to 208. In July, however, the government were defeated on the question of the supply of small-arms ammunition. A general election followed, which resulted in a Unionist majority of 150. The Liberal Unionists, whose extinction had once been so con- fidently foretold, had increased from 46 to 71, and the Parnellites, in spite of the most violent clerical opposition, from 9 to 12. Lord Cadogan became lord-lieutenant of Ireland, and Mr Gerald Balfour — who announced a policy of " killing Home Rule by kindness " — chief secretary.

In the session of 1896 a new Land Act was added to the statute-book. The general effect was to decide most disputed points in favour of the tenants, and to repeal the exceptions made by former acts in the landlord's lg9 6. favour. Dairy farms, to mention only a few of the most important points which had been hitherto excluded, were admitted within the scope of the Land Acts, and purely pastoral holdings of between £50 and £100 were for the first time included. A presumption of law in the tenant's favour was created as to improvements made since 1850. The 40th clause introduced the principle of compulsory sale to the tenants of estates in the hands of

receivers. The tendency of this provision to lower the value of all property was partly, but only partly, neutralized by the firmness of the land judge. The landlords of Ireland, who had made so many sacrifices and worked so hard to return Lord Salisbury to power, felt that

the measure was hardly what they had a right to expect from a Unionist administration. In their opinion it unsettled the agricultural mind, and encouraged judicial tenants to go to law at the expiration of the first fifteen years' term instead of bargaining amicably with their landlords.

In the autumn of this year was published the report of the royal commission on the financial relations between England and Ireland. Mr Hugh C ; E. Childers was the original relations, chairman of this commission, which was appointed in 1894 with the object of determining the fiscal contribution of Ireland under Home Rule, and after his death in 1896 The O'Conor Don presided. The report — or rather the collection of minority reports — gave some countenance to those who held that Ireland was overtaxed, and there was a strong agitation on the subject, in which some Irish Unionists joined without perceiving the danger of treating the two islands as " separate entities." No individual Irishman was taxed on a higher scale than any corresponding citizen of Great Britain. No tax, either on commodities or property, was higher in Ireland than in England. The alleged grievance was, however, ex- ploited to the utmost extent by the Nationalist party. In 1897 a royal commission, with Sir Edward Fry as chair- man, was appointed to inquire into the operation of the Land Acts. Voluminous evidence was taken in different parts of Ireland, and the commissioners reported in the following year. The methods and procedure of the Land Commission were much criticized, and many recommendations were made, but no legislation followed. This inquiry proved, what few in Ireland doubted, that the prices paid for occupancy interest or tenant right increased as the landlord's rent was cut down.

The session of 1898 was largely occupied with the discussion of a bill to establish county and district councils on the lines Local ° l ˆ e En g nsn Act of 1888. The fiscal jurisdiction*

Govern- of grand juries, which had lasted for more than two meat Ad centuries and a half, was entirely swept away. Local l898 ‘ government for Ireland had always been part of

the Unionist programme, and the vote on the abortive bill of 1892 had committed parliament to legislation. It may, nevertheless, be doubted whether enough attention was paid to the local peculiarities of Ireland, and whether English pre- cedents were not too closely followed. In Ireland the poor- rate used to be divided between landlord and tenant, except on holdings valued at £4 and under, in which the landlord paid the whole. Councils elected by small farmers were evidently unfit to impose taxes so assessed. The poor-rate and the county cess, which latter was mostly paid by the tenants, were con- solidated, and an agricultural grant of £730,000 was voted by parliament in order to relieve both parties. The consolidated rate was now paid by the occupier, who would profit by economy and lose by extravagance. The towns gained nothing by the agricultural grant, but union rating was established for the first time. The net result of the county council elections in the spring of 1899 was to displace, except in some northern counties, nearly all the men who had hitherto done the local business. Nationalist pledges were exacted, and long service as a grand juror was an almost certain bar to election. The Irish gentry, long excluded, as landlords and Unionists, from political life, now felt to a great extent that they had no field for activity in local affairs. The new councils very generally passed resolutions of sympathy with the Boers in the South African war. The one most often adopted, though sometimes rejected as too mild, was that of the Limerick corporation, hoping ” that it may end in another Majuba Hill.” Efforts not wholly unsuccessful were made to hinder recruiting in Ireland, and every reverse or repulse of British arms was greeted with Nationalist applause.

The scheme for a Roman Catholic University — of which Mr Arthur Balfour, speaking for himself and not for the govern- ment, made himself a prominent champion — was much can- vassed in 1899, but it came to nothing. It had not been forgotten that this question wrecked the Liberal party in 1874.

The chief Irish measure of 1899 was an Agricultural and Technical Instruction Act, which established a new depart- ment (see the section Economics above) with the chief secretary at its head and an elaborate system Board of of local committees. Considerable funds were made

Agri- culture.

1900.

available, and Mr (afterwards Sir) Horace Plunkett, who as an independent Conservative member had been active in promoting associations for the improvement of Irish methods in this direction, became the first vice-president. The new county councils were generally induced to further attempts at technical instruction and to assist them out of the rates, but progress in this direction was necessarily slow in a country where organized industries have hitherto been so few. In agriculture, and especially in cattle-breeding, improvement was formerly due mainly to the landlords, who had now been deprived by law of much of their power. The gap has been partly filled by the new department, and a good deal has been done. Some experience has been gained not only through the voluntary associations promoted by Sir H. Plunkett, but also from the Congested Districts Board founded under the Land Purchase Act of 1 89 1. This board has power within the districts affected by it to foster agriculture and fisheries, to enlarge holdings, and to buy and hold land. In March 1899′ it had from first to last laid out a little more than half a million. The principal source of income was a charge of £41,250 a year upon the Irish Church surplus, but the establishment expenses were paid by parliament.

At the opening of the session in January 1900 there was a formal reconciliation of the Dillonite, Healyite, and Red- mondite or Parnellite factions. It was evident from the speeches made on the occasion that there was not much cordiality between the various leaders, but the outward solidarity of the party was calculated to bring in renewed subscriptions both at home and from America. It was publicly agreed that England's difficulty in South Africa was Ireland's opportunity, and that all should abstain from supporting an amendment to the address which admitted that the war would have to be fought out. Mr John Redmond was chosen chairman, and the alliance of Nationalists and Gladstonian Liberals was dissolved. The United Irish League, founded in Mayo in 1898 by Mr William O'Brien, had recently become a sort of rival to the parliamentary party, its avowed object being to break up the great grass farms, and its methods resembling those of the old Land League.

The most striking event, however, in Ireland in the earlier part of 1900 was Queen Victoria's visit. Touched by the gallantry of the Irish regiments in South Africa, and moved to some extent, no doubt, by the presence of the duke of Connaught in Dublin as commander-in-chief, the queen determined in April to make up for the loss of her usual spring holiday abroad by paying a visit to Ireland. The last

time the queen had been in Dublin was in 1861 with the Prince Consort. Since then, besides the visit of the prince and princess of Wales in 1885, Prince Albert Victor and Prince George of Wales had visited Ireland in 1887, and the duke and duchess of York (afterwards prince and princess of Wales) in 1897; but the lack of any permanent royal residence and the long-continued absence of the sovereign in person had aroused repeated comment. Directly the announcement of the queen's intention was made the greatest public interest was taken in the project. Shortly before St Patrick's Day the queen issued an order which intensified this interest, that Irish soldiers might in future wear a sprig of shamrock in their headgear on this national festival. For some years past the " wearing of the green " had been regarded by the army authorities as improper, and friction had con- sequently occurred, but the queen's order put an end in a graceful manner to what had formerly been a grievance. The result was that St Patrick's Day was celebrated in London and throughout the empire as it never had been before, and when the queen went over to Dublin at the beginning of April she was received with the greatest enthusiasm.

The general election later in the year made no practical

difference in the strength of parties, but Mr George Wyndham took Mr Gerald Balfour's place as chief secretary, without a seat in the Cabinet. Both before and after the election the United Irish League steadily advanced, fresh branches con- tinually springing up.

The visit of Mr Redmond and others to America in 1901 was not believed to have brought in much money, and the activity of the League was more or less restrained by want of funds. Boycotting, however, became rife, especially in Sligo, and paid agents also promoted an agitation against grass farms in Tipperary, Clare and other southern counties. In Roscommon there was a strike against rent, especially on the property of Lord De Freyne. This was due to the action of the Congested Districts Board in buying the Dillon estate and reducing all the rents without consulting the effect upon others. It was argued that no one else's tenants could be expected to pay

more. Some pro- secutions were undertaken, but the government was much criticized for not using the special provisions of the Crimes Act; and in April 1902 certain counties were "proclaimed" under it. In February 1902 Lord Rosebery definitely repudiated Home Rule, and steps to oppose his followers were at once taken among Irish voters in English constituencies.

Lord Cadogan resigned the viceroyalty in July 1902, and was succeeded by Lord Dudley. In November Sir Antony Macdonnell (b. 1844), a member of the Indian Council, became under-secretary to the lord-lieutenant. During a long and successful career in India (1865-1901) Sir Antony had never concealed his Nationalist proclivities, .but his appointment, about the form of which there was nothing peculiar, was favoured by Lord Lansdowne and Lord George Hamilton, and ultimately sanctioned by Mr Balfour, who had been prime minister since Lord Salisbury's resignation in July. About the same time a conference took place in Dublin between certain landlords and some members of the Nationalist party, of whom Mr W. O'Brien was the most conspicuous. Lord Dunraven presided, and it was agreed to recommend a great extension of the Land Purchase system with a view to give the vendor as good an income as before, while decreasing the tenants' annual burden. This was attempted in Mr Wyndham's Land Purchase Act of 1903, which gave the tenants a material reduction, a bonus of 12% on the purchase-money being granted to vendors from funds provided by parliament. A judicial decision made it doubtful whether this percentage became the private property of tenants for life on settled estates, but a further act passed in 1904 answered the question in the affirmative. After this the sale of estates proceeded rapidly. In March 1903 was published the report of the Royal Commission on Irish University Education appointed two years before with Lord Robertson as chairman, Trinity College, Dublin, being excluded from the inquiry. The report, which was not really unanimous, was of little value as a basis for legislation. It recommended an examining university with the Queen's Colleges at Belfast, Cork and Galway, and with a new and well-endowed Roman Catholic college in Dublin.

In August was formed the Irish Reform Association out of the wreckage of the late Land Conference and under Lord The Dunraven's presidency, and it was seen that Sir

"Devola- A. Macdonnell took a great interest in the proceedings. Besides transferring private bill legislation to Dublin on the Scottish plan, to which no one in Ireland objected, it was proposed to hand over the internal expenditure of Ireland to a financial council

consisting half of nominated and half of elected members, and to give an Irish assembly the initiative in public Irish bills. This policy, which was called Devolution, found little support anywhere, and was ultimately repudiated both by Mr Wyndham and by Mr Balfour. But a difficult parliamentary crisis, caused by Irish Unionist suspicions on the subject, was only temporarily overcome by Mr Wyndham's resignation in March 1905. Mr Walter. Long succeeded him. One of the chief questions at issue was the position actually occupied by Sir Antony Macdonnell. The

tloa" question.

new chief secretary, while abstaining from displacing the under-secretary, whose encouragement of " devolution " had caused considerable commotion among Unionists, announced that he considered him as on the footing of an ordinary and sub- ordinate civil servant, but Mr Wyndham had said that he was " invited by me rather as a colleague than as a mere under- secretary to register my will," and Lord Lansdowne that he " could scarcely expect to be bound by the narrow rules of routine which are applicable to an ordinary member of the civil service." While Mr Long remained in office no further complication arose, but in 1906 (Sir A. Macdonnell being re- tained in office by the Liberal government) his Nationalist leanings again became prominent, and the responsibility of the Unionist government in introducing him into the Irish adminis- tration became a matter of considerable heart-burning among the Unionist party.

Mr Balfour resigned in December 1905 and was succeeded by Sir Henry Campbell-Bannerman, Lord Aberdeen becoming lord-lieutenant for the second time, with Mr James Bryce as chief secretary. The general 'election at the beginning of 1906 was disastrous to the Unionist party, and the Liberal govern- ment secured an enormous majority. Mr Walter Long, un- seated at Bristol, had made himself very popular among Irish Unionists, and a seat was found him in the constituency of South ■ Dublin. Speaking in August 1906 he raised anew the Macdonnell question and demanded the production of all correspondence ! connected with the under-secretary's appoint- ment. Sir A. Macdonnell at once admitted . through the news- papers that he had in his possession letters (rumoured to be " embarrassing " to the Unionist leaders) which he might publish at his own discretion; and the discussion as to how far his appointment by Mr Wyndham had prejudiced the Unionist cause was reopened in public with much bitterness, in view of the anticipation of further steps in the Home Rule direction by the

Liberal ministry. In 1908 Sir Antony resigned and was created a peer as Baron Macdonnell. Soon after the change of government in 1906 a royal commission, with ex-Lord Justice Fry as chairman, was appointed to inves- tigate the condition of Trinity College, Dublin, and another under Lord Dudley to inquire into the question of the congested districts.

Mr Bryce being appointed ambassador to Washington, Mr Birrell faced the session of 1907 as chief secretary. Before he left office Mr Bryce publicly sketched a scheme of his own for remodelling Irish University Education, but his scheme was quietly put on the shelf by his successor and received almost universal condemnation. Mr Birrell began by introducing a bill for the establishment of an Irish Council, which would have given the Home Rulers considerable leverage, but, to the surprise of the English Liberals, it was summarily rejected by a Nationalist convention in Dublin, and was forthwith abandoned. The extreme party of Sinn Fein (" ourselves alone ") were against it because of the power it gave to the government officials, and the Roman Catholic clergy because it involved local control of primary education, which would have imperilled their position as managers. An Evicted Tenants Bill was however passed at the end of the session, which gave the Estates Commissioners unprecedented powers to take land compulsorily. In the late summer and autumn, agitation in Ireland (led by Mr Ginnell, M.P.) took the form of driving cattle off large grass farms, as part of a campaign against what was known as " ranching.!' This reckless and lawless practice extended to several counties, but was worst in Galway and Roscommon. The government was determined not to use the Crimes Act, and the result was that offenders nearly always went unpunished, benches of magistrates being often swamped by the chairmen of district councils who were ex officio justices under the act of 1898.

The general election of 1910 placed the Liberal and Unionist parties in a position of almost exact equality in the House of Commons, and it was at once evident that the Nationalists under Mr Redmond's leadership would hold the balance of power and control ' the fortunes of Mr Asquith's government.

A small body of " independent Nationalists," led by Mr William O'Brien and Mr T. M. Healy, voiced the general dislike in Ireland of the Budget of 1909, the rejection of which by the House of Lords had

precipitated the dissolution of parliament. But although this band of free-lances was a menace to Mr Redmond's authority and to the solidarity of the " pledge-bound" Irish parliamentary party, the two sections did not differ in their desire to get rid of the " veto " of the House of Lords, which they recognized as the standing obstacle to Home Rule, and which it was the avowed policy of the government to abolish.

Bibliography.— Ancient: The Annals of the Four Masters, ed. J. O'Donovan (1851), compiled in Donegal under Charles I., gives a continuous account of Celtic Ireland down to 1616. The independent Annals of Lough Ce (Rolls series) end with 1590. The Topographia and Expugnatio of Giraldus Cambrensis (Rolls series) are chiefly valuable for his account of the Anglo-Norman invaders and for descriptions of the country. Sir J. T. Gilbert's Viceroys of Ireland (Dublin, 1865) gives a connected view of the feudal establish- ment to the accession of Henry VIII. The Calendar of Documents relating to Ireland in the Public Record Office extends from 11 71 to 1307. Christopher Pembridge's Annals from 1162 to 1370 were published by William Camden and reprinted in Sir J. T. Gilbert's Chartularies of St Mary's Abbey (Dublin, 1884). The Annals of Clyn, Dowling and Grace have been printed by the Irish Archaeological Society and the Celtic Society.

For the 16th century see volumes ii. and iii. of the Printed State Papers (1834), and the Calendars of State Papers, Ireland, including that of the Carew MSS. 1515 to 1603. See also Richard Stanihurst's Chronicle, continued by John Hooker, which is included in Holin-shed's Chronicles; E. Spenser, View of the State of Ireland, edited by H. Morley (1890); Fynes Moryson, History of Ireland (1735); Thomas Stafford, Pacata Hibernia (1810); and R. Bagwell, Ireland under the Tudor s (1 885-1 890).

For the 17th century see the Calendars of Irish State Papers, 1603-1665 (Dublin, 1772); Strafford Letters, edited by W. Knowler (1739); Thomas Carte, Life of Ormonde (1735-1736), and Ormonde Papers (i739); Roger Boyle, earl of Orrery, State Letters (1743); the Contemporary History of Affairs in Ireland, 1641-1652 (1879-1880), and History of the Irish Confederation and the War in Ireland 1641-1640 (1882-1891), both edited by Sir J. T. Gilbert; Edmund Ludlow's Memoirs, edited by C. H. Firth (1894); the Memoirs of James Touchet, earl of Castlehaven (1815); and Cromwell's Letters and Speeches, edited by T. Carlyle (1904). See also J. P. Prendergast, The Cromwellian Settlement of Ireland (1870); Denis Murphy, Cromwell in Ireland (1885): M. A. Hickson,

Ireland in the 17th Century (1884); Sir John Temple, History of the Irish Rebellion (1812); P. Walsh, History of the Remonstrance (1674); George Story, Impartial History of the Wars of Ireland (1693); Thomas Witheron-, Derry and Enniskiller. (1873); Philip Dwyer, Siege of Deny (1893) ; Lord Macaulay, History of England; and S. R. Gardiner, History of England, 1603-1656. Further writings which may be consulted are: The Embassy in Ireland of Rinuccini, 1645-1649, translated from the Italian by A. Hutton (1873); Sir William Petty's Down Survey, edited by T. A. Larcom (1851), and his Economic Writings, edited by C. H. Hull (1899); Charles O'Kelly's Macariae Exaduim, edited by J. C. O'Callaghan (1850); and A Jacobite Narrative of the War in Ireland, 1688-91, edited by Sir J. T. Gilbert

("1892).

For the 18th century J. A. Froude's English in Ireland and W. E. H. Lecky's History of England cover the whole ground. See also the Letters 1724-1/38 of Archbishop Hugh Boulter, edited by G. Faulkner (1770); the Works of Dean Swift; John Campbell's Philosophical Suroey of Ireland (1778); Arthur Young's Tour in Ireland (1780); Henry Grattan's Life of the Right Hon. Henry Grattan (1 839-1 846) ; the Correspondence of the Marquess Cornwallis, edited by C. Ross (1859); Wolfe Tone's Autobiography, edited by R. B. O'Brien (1893); and R. R. Madden's United Irishmen (1842-

1846).

For the 19th and the beginning of the 20th century see the Annual Register; R. M. Martin, Ireland before and after the Union (1848); Sir T. Wyse, Historical Sketch of the late Catholic Association (1829); G. L. Smyth, Ireland, Historical and Statistical (1844-1849); Sir C. E. Trevclyan, The Irish Crisis (1880); N. W. Senior, Journals, Conversations and Essays relating to Ireland (1868) ; Sir G. C. Lewis, On Local Disturbances in Ireland and on the Irish Church Question (1836); John Morley, Life of W. E. Gladstone; Lord Fitzmaurice, Life of Lord Granville (1905); and R. Barry O'Brien, Life of Parnell (1898). Other authorities are Isaac Butt, Irish Federalism (1870); H. O. Arnold-Forster, The Truth about the Land League (1883); A. V. Dicey, England's Case-against Home Rule (1886); \V. E. Gladstone, History of an Idea (1886), and a reply to this by J. E. Webb entitled The Queen's Enemies in America (1886); and Mrs E. Lynn Linton, About Ireland (1890). See also the Report of the Parnell Special Commission (1890); the Report of the

Bessborough Commission (1881), of the Richmond Com- mission (1881), of the Cowper Commission (1887), and of the Mathew

Commission (1893), and the Report "of the Congested Districts Board

(1899),

For the church in Ireland see: Henry Cotton, Fasti ecclesiae hibernicae (1848-1878); W. M. Brady, The Episcopal Succession (Rome, 1876); R. Mant, History of the Church of Ireland (1840); J. T. Ball, The Reformed Church in Ireland, 1537-1886 (1886); and W. D. Killen, Ecclesiastical History of Ireland (1875). A. Theiner's Vetera Monumenta (Rome, 1864) contains documents concerning the medieval church, and there are many others in Ussher's Works, and for a later period in Cardinal Moran's Spicilegium Ossoriense (1874-1884). The Works of Sir James Ware, edited by Walter Harris, are generally useful, and Alice S. Green's The Making of Ireland and its Undoing (1908), although written from a partisan standpoint, may also be consulted. (R. Ba.)

IRELAND, CHURCH OF. The ancient Church of Ireland (described in the Irish Church Act 1869 by this its historic title) has a long and chequered history, which it will be interest- ing to trace in outline. The beginnings of Christianity in Ireland are difficult to trace, but there is no doubt that the first Christian missionary whose labours were crowned with any considerable success was Patrick (fl. c. 450), who has always been reckoned the patron saint of the country. For six centuries the Church of which he was the founder occupied a remarkable position in Western Christendom. Ireland, in virtue at once of its geographical situation and of the spirit of its people, was less affected than other countries by the movements of European thought; and thus its development, social and religious, was largely independent of foreign influences, whether Roman or English. In full communion with the Latin Church, the Irish long preserved many peculiarities, such as their monastic system and the date at which Easter was kept, which distinguished them in discipline, though not conspicuously in doctrine, from the Christians of countries more immediately under papal control (see Ireland: Early History). The incessant incursions of the Danes, who were the scourge of the land for a period of nearly three hundred years, prevented the Church from redeem- ing the promise of her infancy ; and at the date of the English conquest of Ireland (1172) she had lost much of her ancient zeal and of her independence. By this time she had come more into line with the rest of Europe, and the Synod of Cashel put the seal to a

new policy by its acknowledgment of the papal jurisdiction and by its decrees assimilating the Church, in ritual and usages, to that of England. There was no thought of a breach of continuity, but the distinctive features of Celtic Christianity gradually disappeared from this time onwards. English influence was strong only in the region round Dublin (known as the Pale); and beyond this district the Irish were not disposed to view with favour any ecclesiastical reforms which had their origin in the sister country. Thus from the days of Henry VIII. the Reformation movement was hindered in Ireland by national prejudice, and it never succeeded in gaining the allegiance of the Irish people as a whole. The policy which directed its progress was blundering and stupid, and reflects little credit on the English statesmen who were responsible for it. No attempt was made to commend the principles of the Reformation to the native Irish by conciliating national sentiment; and the policy which forbade the transla- tion of the Prayer Book into the Irish language, and suggested that where English was not understood Latin might be used as an alternative, was doomed to failure from the beginning. And, in fact, the reformed church of Ireland is to this day the church of a small section only of the population.

The Reformation period begins with the passing of the Irish Supremacy Act 153 7- As in England, the changes in religion of successive sovereigns alternately checked and promoted the progress of the movement, although in Ireland the mass of the people were less deeply affected by the religious con- troversies of the times than in Great Britain. At Mary's ac- cession five bishops either abandoned, or were deprived of, their sees; but the Anglo-Irish who remained faithful to the Reformation were not subjected to persecution such as would have been their fate on the other side of the Channel. Again, under Elizabeth, while two bishops (William Walsh of Meath and Thomas Leverous of Kildare) were deprived for open resistance

to the new order of things, and while stern measures were taken to suppress treasonable plotting against the constitution, the uniform policy of the government in ecclesiastical matters was one of toleration. James I. caused the Supremacy Act to be rigorously enforced, but on political rather than on religious grounds. In distant parts of Ireland, indeed, the unreformed order of service was often used without interference from the secular authority, although the bishops had openly accepted the Act of Uniformity.

The episcopal succession, then, was unbroken at the Reforma- tion. The Marian prelates are admitted on all hands to have been the true bishops of the Church, and in every case they were followed by a line of lawful successors, leading down to the present occupants of the several sees. The rival lines of Roman Catholic titulars are not in direct succession to the Marian bishops, and cannot be regarded as continuous with the medieval Church. The question of the continuity of the pre- Reformation Church with the Church of the Celtic period before the Anglo-Norman conquest of Ireland is more difficult. Ten out of eleven archbishops of Armagh who held office between 1272 and 1439 were consecrated outside Ireland, and there is no evidence forthcoming that any one of them derived his apostolic succession through bishops of the Irish Church. It may be stated with confidence that the present Church of Ireland is the direct and legitimate successor of the Church of the 14th and 15th centuries, but it cannot so clearly be demonstrated that any existing organization is continuous with the Church of St Patrick. In the reign of James I. the first Convocation of the clergy was summoned in Ireland, of which assembly the most notable act was the adoption of the " Irish Articles " (161 5). These had been drawn up by Usher, and were more decidedly Calvinistie in tone than the Thirty-nine Articles, which were not adopted as standards in Ireland until 1634, when Strafford forced them on . Convocation. During the Commonwealth period the bishoprics which became vacant were not filled; but on the accession of Charles II. the Church was strengthened by the translation of John Bramhall (the most learned and zealous of the prelates) from Derry to the primatial see of Armagh, and the consecration of twelve other bishops, among whom was Jeremy Taylor. The short period during which the policy of James II. prevailed in Ireland was one of disaster to the Church; but under William and Mary she regained her former position. She had now been reformed for more than 100 years, but had made little progress; and the tyrannical provisions of the Penal Code introduced by the English government made her more unpopular than ever. The clergy, finding their ministrations unacceptable to the great mass of the population, were tempted to indolence and non-residence; and although bright exceptions could be named, there was much that called for reform. To William King (1650- 1729), bishop of Derry, and subsequently archbishop of Dublin, it was mainly due that the work of the Church was reorganized, and the impulse which he gave it was felt all through the 18th century. His ecclesiastical influence was exerted in direct opposition to Primate Hugh Boulter and his school, who aimed at making the Established Church the instrument for the promotion of English political opinions rather than the spiritual home of the Irish

people. In 1800 the Act of Union was passed by the Legislature; and thenceforward, until Disestablishment, there was but one " United Church of England and Ireland."

Continuous agitation for the removal of Roman Catholic disabilities brought about in 1833 the passing of the Church Temporalities Act, one of the most important provisions of which was the reduction of the number of Irish archbishoprics from four to two, and of bishoprics from eighteen to ten, the funds thus released being administered by commissioners. In 1838 the Tithe Rentcharge Act, which transferred the pay- ment of tithes from the occupiers to the owners of land, was passed, and thus a substantial grievance was removed. It became increasingly plain, however, as years passed, that all such measures of relief were inadequate to allay the dissatisfac- tion felt by the majority of Irishmen because of the continued

existence of the Established Church. Her position had been pledged to her by the Act of Union, and she was undoubtedly the historical representative of the ancient Church of the land; but such arguments proved unavailing in view of the visible fact that she had not gained the affections of the people. The census of 1861 showed that out of a total population of 5,798,967 only 693,357 belonged to the Established Church, 4,505,265 being Roman Catholics; and once this had been made clear, the passing of the Act of Disestablishment was only a question of time. Introduced by Mr Gladstone, and passed in 1869, it became law on the 1st of January 1871.

The Church was thus suddenly thrown on her own resources, and called on to reorganize her ecclesiastical system, as well as to make provision for the maintenance of her future clergy. A convention of the bishops, clergy, and laity was summoned in 1870, and its first act was to declare the adherence of the Church of Ireland to the ancient standards, and her determination to uphold the doctrine and discipline of the Catholic and Apostolic Church, while reaffirming her witness, as Protestant and Re- formed, against the innovations of Rome. Under the constitu- tion then agreed on, the supreme governing body of the Church is the General Synod, consisting of the bishops and of 208 clerical and 416 lay representatives of the several dioceses, whose local affairs are managed by subordinate Diocesan Synods. The bishops are elected as vacancies arise, and, with certain restrictions, by the Diocesan Synods, the Primate, whose see is Armagh, being chosen by the bishops out of their own number. The patronage of benefices is vested in boards of nomination, on which both the diocese and the parish are represented. The Diocesan

Courts, consisting of the bishop, his chancellor, and two elected members, one clerical and the other lay, deal as courts of first instance with legal questions; but there is an appeal to the Court of the General Synod, composed of three bishops and four laymen who have held judicial office. During the years 1871 to 1878 the revision of the Prayer Book mainly occupied the attention of the General Synod; but although many far-reaching resolutions were proposed by the then predominant Evangelical party, few changes of moment were carried, and none which affected the Church's doctrinal position. A two-thirds majority of both the lay and clerical vote is necessary before any change can be made in the formularies, and an ultimate veto rests, on certain conditions, with the house of bishops.

The effects of Disestablishment have been partly good and partly evil. On the one hand, the Church has now all the benefits of autonomy and is free from the anomalies incidental to state control. Her laws are definite, and the authority of her judicial courts is recognized by all her members. The place given to the laity in her synods has quickened in them the sense of responsibility so essential to the Church's progress. And although there are few worldly inducements to men to take orders in Ireland, the clergy are, for the most part, the equals of their predecessors in social standing and in intellectual equipment, while the standard of clerical activity is higher than in pre-Disestablishment days. On the other hand, the vesting of patronage in large bodies like synods, or (as is the case in some districts) in nominators with little knowledge of the Church beyond the borders of their own parish, is not an ideal system, although it is working better as the dangers of parochialism and provinciality are becoming more generally recognized than in the early years of Disestablishment.

The finances are controlled by the Representative Church Body, to which the sum of £7,581,075,. sufficient to provide life annuities for the existing clergy (2043 in number), amounting to £596,913, was handed over by the Church Temporalities Commissioners in 1870. So skilfully was this fund administered, and so generous were the contributions of clergy and laity, at and since Disestablishment, that while on 31st December 1906 only 136 annuitants were living, the total assets in the custody of the Representative Church Body amounted at that date to £8,729,941. Of this sum no less than £6,525,952 represented the free-will offerings of the members of the Church

IRENAEUS

for the thirty-seven years ending 31st December 1906. Out of the interest on capital, augmented by the annual parochial assessments, which are administered by the central office, pro- vision has to be made for two archbishops at £2500 per annum, eleven bishops, who receive about £1500 each, and over 1500 parochial clergy. Of the clergy only 338 are curates, while 1 161 are incumbents, the average annual income of a benefice being about £240, with (in most cases) a house. The large majority of the clergy receive their training in the Divinity School of Trinity College, Dublin. At the census of 1901 the members of the Church of Ireland numbered 579,385 out of a total population of 4,456,546.

See R. Mant, History of the Church of Ireland (2 vols., London, 1840) ; Essays on the Irish Church, by various writers (Oxford, 1866); Maziere Brady, The Alleged Conversion of the Irish Bishops (London, 1877); A. T. Lee, The Irish Episcopal Succession (Dublin, 1867); G. T. Stokes, Ireland and the Celtic Church (London, 1888), Ireland and the Anglo-Norman Church (London, 1892), Some Worthies of the Irish Church (London, 1900); T. Olden, The Church of Ireland (London, 1892) ; J. T. Ball, The Reformed Church of Ireland (London, 1890); H.C. Groves, The Titular Archbishops of Ireland (Dublin, 1897) ; W. Lawlor, The Reformation in Ireland (London, 1906); Reports of the Representative Church Body (Dublin, 1872-1905). (J. H. Be.)

IRENAEUS, bishop of Lyons at the end of the 2nd century, was one of the most distinguished theologians of the ante- Nicene Church. Very little is known of his early history. His childhood was spent in Asia Minor, probably at or near Smyrna; for he himself tells us {Adv. haer. iii. 3, 4, and Euseb. Hist. Eccl. v. 20) that as a child he heard the preaching of Poly- carp, the aged bishop of Smyrna (d. February 22, 156). But we do not know when this was. He can hardly have been born very long after 130, for later on he frequently mentions having met certain Christian presbyters who had actually seen John, the disciple of our Lord. The circumstances under which he came into the West are also unknown to us; the only thing which is certain is that at the time of the persecution of the Gallic Church under Marcus Aurelius (177) he was a presbyter of the church at Lyons. In 177 or 178 he went to Rome on a mission from this church, to make representations to Bishop Eleutherius in favour of a more lenient treatment of the Montanists (see Montanism.; Eus. v. 4. 2). On his return he was called upon to undertake the direction of the church at Lyons in the place of Bishop Pothinus, who had perished in the

persecution (Eus. v. 5. 8). As bishop he carried on a great and fruitful work. Though the statement of Gregory of Tours (Hist. Franc, i. 29), that within a short time he succeeded in converting all Lyons to Christianity, is probably exaggerated, from him at any rate dates the wide spread of Christianity in Lyons and its neighbourhood. He devoted particular attention to trying to reconcile the numerous sects which menaced the existence of the church (see below). In the dispute on the question of Easter, which for a long time disturbed the Christian Church both in West and East, he endeavoured by means of many letters to effect a compromise, and in particular to exercise a moderating influence on Victor, the bishop of Rome, and his unyielding attitude towards the dissentient churches of Africa, thus justifying his name of " peace-maker " (Eirenaios) (Eus. H.E. v. 24. 28). The date of his death is unknown. His martyrdom under Septimius Severus is related by Gregory of Tours, but by no earlier writer.

The chief work of Irenaeus, written about 180, is his " Refuta- tion and Overthrow of Gnosis, falsely so called " (usually in- dicated by the name A gainst the Heresies) . Of the Greek original of this work only fragments survive; it only exists in full in an old Latin translation, the slavish fidelity of which to a certain extent makes up for the loss of the original text. The treatise is divided into five books: of these the first two contain a minute and well-informed description and criticism of the tenets of various heretical sects, especially the Valentinians; the other three set forth the true doctrines of Christianity, and it is from them that we find out the theological opinions of the author. Irenaeus admits himself that he is not a good writer. And indeed, as he worked, his materials assumed such un- manageable proportions that he could not succeed in throwing

them into a satisfactory form. But however clumsily he may have handled his material, he has produced a work which is even nowadays rightly valued as the first systematic exposition of Catholic belief. The foundation upon which Irenaeus bases his system consists in the episcopate, the canon of the Old and New Testaments, and the rule of faith. With their assistance he sets forth and upholds, in opposition to the gnostic dualism, i.e. the severing of the natural and the supernatural, the Catholic monism, i.e. the unity of the life of faith as willed by God. The " grace of truth " (the charisma), which the apostles had called down upon their first disciples by prayer and laying- on of hands, and which was to be imparted anew by way of succession (StoSoxˆ, successio) to the bishops from generation to generation without a break, makes those who receive it

living witnesses of the salvation offered to the faithful by written and spoken tradition. The Scriptures of the Old and New Testaments, rightly expounded by the church alone, give us an insight into God's plan of salvation for mankind, and explain to us the covenant which He made on various occasions (Moses and Christ; or Noah, Abraham, Moses and Christ). Finally, the " rule of faith " {regula fidei) , received at baptism, contains in itself all the riches of Christian truth. To distribute these, i.e. to elucidate the rule of faith as set forth in the creed, and further to point out its agreement with the Scriptures, is the object of Irenaeus as a theologian. Hence he lays the greatest stress on the conception of God's disposition of salvation towards mankind (oeconomia), the object of which is that mankind, who in Adam were sunk in sin and death, should in Christ, comprised as it were in his person, be brought back to life. God, as the head of the family, so to speak, disposes of all. The Son, the Word (Logos) for ever dwelling with the Father, carries out His behests. The Holy Ghost (Pneuma), however, as the Spirit of wisdom for ever dwelling with the Father, controls what the Father has appointed and the Son fulfilled, and this Spirit lives in the church. The climax of the divine plan of salvation is found in the incarnation of the Word. God was to become man, and in Christ he became man. Christ must be God; for if not, the devil would have had a natural claim on him, and he would have been no more exempt from death than the other children of Adam; he must be man, if his blood were indeed to redeem us. On God incarnate the power of the devil is broken, and in Him is accomplished the reconciliation between God and man, who henceforth pursues his true object, namely, to become like unto God. In the God-man God has drawn men up to Himself. Into their human, fleshly and perishable nature imperishable life is thereby engrafted; it has become deified, and death has been changed into immortality. In the sacrament of the Lord's Supper it is the heavenly body of the God-man which is actually partaken of in the elements. This exposition by Irenaeus of the divine economy and the incarnation was taken as a criterion by later theologians, especi- ally in the Greek Church (cf. Athanasius, Gregory of Nyssa, Cyril of Alexandria, John of Damascus). He himself was especially influenced by St John and St Paul. Before him the Fourth Gospel did not seem to exist for the Church; Irenaeus made it a living force. His conception of the Logos is not that of the philosophers and apologists; he looks upon the Logos not as the " reason " of God, but as the " voice " with which the Father speaks in the revelation to mankind, as did the writer of the Fourth Gospel. And the Pauline epistles are adopted almost bodily by Irenaeus, according to the ideas contained in them; his expositions often present the appearance

of a patchwork of St Paul's ideas. Certainly, it is only one side of Paul's thought that he displays to us. The great con- ceptions of justification and atonement are hardly ever touched by Irenaeus. In Irenaeus is no longer heard the Jew, striving about and against the law, who has had to break free from his early tradition of Pharisaism.

Till recent times whatever other writings and letters of Irenaeus are mentioned by Eusebius appeared to be lost, with the exception of a fragment here or there. Recently, however, two Armenian scholars, Karapet Ter-Mekerttschian and Erwand

Ter-Minassianz, have published from an Armenian translation a German edition (Leipzig, 1907; minor edition 1908) of the work "in proof of the apostolic teaching" mentioned by Eusebius {H.E. v. 26). This work, which is in the form of a dialogue with one Marcianus, otherwise unknown to us, contains a statement of the fundamental truths of Christianity. It is the oldest catechism extant, and an excellent example of how Bishop Irenaeus was able not only to defend Christianity as a theologian and expound it theoretically, but also to preach it to lay- men.

Bibliography. — The edition of the Benedictine R. Massuet (Paris, 1 710 and 1734, reprinted in Migne, Cursus patrologiae. Series Graeca, vol. v., Paris, 1857) long continued to be the standard one, till it was superseded by the editions of Adolph Stieren (2 vols , Leipzig, 1848-1853) and of W. Wigan Harvey (2 vols., Cambridge, 1857), the latter being the only edition which contains the Synac fragments. For an English translation see the Ante-Nicene Library. Of modern monographs consult H. Ziegler, Irenaeus, der Bischof von Lyon (Berlin, 1871); Friedrich Loofs, Irenaeus-Handschriften (Leipzig, 1888); Johannes Werner, Der Paulinismus des Irenaeus (Leipzig, 1889); Johannes Kunze, Die Gotteslehre des Irenaeus (Leipzig. 1891); Ernst Klebba, Die Anthropologic des heiligen Irenaeus (Miinster, 1894); Albert Dufourcq, Saint Irenee (Paris, 1904) ; Franz Stoll, Die Lehre des Heil. Irenaeus von der Erlbsung und Heiligung (Mainz, 1905); also the histories of dogma, especially Harnack, and Bethune-Baker, An Introduction to the Early History of Christian Doctrine (London, 1903). (G. K.)

IRENE, the name of several Byzantine empresses.

1. Irene (752-803), the wife of Leo IV., East Roman emperor. Originally a poor but beautiful Athenian orphan, she speedily gained the love and confidence of her feeble husband, and at his death v in 780 was left by him sole guardian of the empire and of their ten-year-old son Constantine VI. Seizing the supreme power in the name of the latter, Irene ruled the empire at her own discretion for ten years, displaying great firmness and sagacity in her government.- Her most notable act was the restoration of the orthodox image-worship, a policy which she always had secretly favoured, though compelled to abjure it in her husband's lifetime. Having elected Tarasius, one of her partisans, to the patriarchate (784), she summoned two church councils. The former of these, held in 786 at Constantinople, Was frustrated by the opposition of the soldiers. The second, convened at Nicaea in 787, formally revived the adoration of images and reunited the Eastern church with that of Rome. As Constantine approached maturity he began to grow restive under her autocratic sway. An attempt to free himself by force was met and crushed by the empress, who demanded that the oath of fidelity should thenceforward be taken in her name alone. The discontent which this occasioned swelled in 790 into open resistance, and the soldiers, headed by the Armenian guard, formally proclaimed Constantine VI. as the sole ruler. A hollow semblance of friendship was maintained between Constantine and Irene, whose title of empress was confirmed in 792; but the rival factions remained, and Irene, by skilful intrigues with the bishops and courtiers, organized a powerful conspiracy on her own behalf. Constantine could only flee for aid to the pro- vinces, but even there he was surrounded by participants in the plot. Seized by his attendants on the Asiatic shore of the Bosporus, the emperor was carried back to the palace at Con-stantinople; and there, by the orders of his mother, his eyes were stabbed out. An eclipse of the sun and a darkness of seventeen days' duration were attributed by the common superstition to the horror of heaven. Irene reigned in prosperity and splendour for five years. She is said to have endeavoured to negotiate a marriage between herself and Charlemagne; but according to Thsophanes, who alone mentions it, the scheme was frustrated by Aetius, one of her favourites. A projected alliance between Constantine and Charlemagne's daughter, Rothrude, was in turn broken off by Irene. In 802 the patricians, upon whom she had lavished every honour and favour, conspired against her, and placed on the throne Nicephorus, the minister of finance. The haughty and unscrupulous princess, " who never lost sight of political power in the height of her religious zeal," was exiled to Lesbos and forced to support herself by spinning. She died the following .year. Her zeal in restoring images and

monasteries has given her a place among the saints of the Greek church.

See E. Gibbon, The Decline and Fall of the Roman Empire (ed. J. Bury, London, 1896), vol. v.; G. Finlay, History of Greece (ed. 1877, Oxford,) vol. 11. ; F. C. Schlosser, Geschichte der bilderstiir-menden Kaiser des ostromischen Reiches (Frankfort, 1812) ; J. D. Phoropoulos, Eipijwj t) aiTcKpa.Tei.pa 'PupiaUov (Leipzig, 1887); J. B. Bury, The Later Roman Empire (London, 1889), ii. 480-498; C. Diehl, Figures byzantines (Paris, 1906), pp. 77-109. (M. O. B. C.)

2. Irene (c, 1066-c. 1120), the wife of Alexius I. The best- known fact of her life is the unsuccessful intrigue by which she endeavoured to divert the succession from her son John to Nicephorus Bryennius, the husband of her daughter Anna. Having failed to persuade Alexius, or, upon his death, to carry out a coup d'etat with the help of the palace guards, she retired to a monastery and ended her life in obscurity.

3. Irene (d. 1161), the first wife of Manuel Comnenus. She was the daughter of the count of Sulzbach, and sister-in-law of the Roman emperor Conrad II., who arranged her betrothal. The marriage was celebrated at Constantinople in 1146 The new empress, who had exchanged her earlier name of Bertha for one more familiar to the Greeks, became a devoted wife, and by the simplicity of her manner contrasted favourably with most Byzantine queens of the age.

H. v. Kap-Herr, Die abendldndische Politik des Kaisers Manuel (Strassburg, 1881).

IRETON, HENRY (1611-1651), English parliamentary general, eldest son of German Ireton of Attenborough, Nottinghamshire, was baptized on the 3rd of November 161 1, became a gentleman commoner of Trinity College, Oxford, in 1626, graduated B.A. in 1629, and entered the Middle Temple the same year. On the outbreak of the Civil War he joined the parliamentary army, fought at Edgehill and at Gainsborough in July 1643, was made by Cromwell deputy-governor of the Isle of Ely, and next year served under Manchester in the Yorkshire campaign and at the second battle of Newbury, afterwards supporting Cromwell in his accusations of incompetency against the general. On the night before the battle of Naseby, in June 1645, he succeeded in surprising the Royalist army and captured many prisoners, and next day, on the suggestion of Cromwell, he was made commissary-general and appointed to the command of the left wing, Cromwell himself

commanding the right. The wing under Ireton was completely broken by the impetuous charge of Rupert, and Ireton was wounded and taken prisoner, but after the rout of the enemy which ensued on the successful charge of Cromwell he regained his freedom. He was present at the siege of Bristol in the September following, and took an active part in the sub- sequent victorious campaign which resulted in the overthrow of the royal cause. On the 30th of October 1645 Ireton entered parliament as member for Appleby, and while occupied with the siege of Oxford he was, on the 15th of June 1646, married to Bridget, daughter of Oliver Cromwell. This union brought Ireton into still closer connexion with Cromwell, with whose career he was now more completely identified. But while Cromwell's policy was practically limited to making the best of the present situation, and was generally inclined to compromise, Ireton's attitude was based on well-grounded principles of statesmanship. He was opposed to the destructive schemes of the extreme party, disliked especially the abstract and un- practical theories of the Republicans and the Levellers, and desired, while modifying their mutual powers, to retain the constitution of King, Lords and Commons. He urged these views in the negotiations of the army with the parliament, ami in the conferences with the king, being the person chiefly entrusted with the drawing up of the army proposals, including the mani- festo called " The Heads of the Proposals." He endeavoured to prevent the breach between the army and the parliament, but when the division became inevitable took the side of the former. He persevered in supporting the negotiations with the king till his action aroused great suspicion and unpopularity. He became at length convinced of the hopelessness of dealing with Charles, and after the king's flight to the Isle of Wight treated his further proposals with coldness and urged the parliament

to establish an administration without him. Ireton served under Fairfax in the second civil war in the campaigns in Kent and Essex, and was responsible for the executions of Lucas and Lisle at Colchester. After the rejection by the king of the last offers of the army, he showed special zeal in bringing about his trial, was one of the chief promoters of " Pride's Purge," attended the court regularly, and signed the death-warrant. The regiment of Ireton having been chosen by lot to accompany Cromwell in his Irish campaign, Ireton was appointed major-general; and on the recall of his chief to take the command in Scotland, he remained with the title and powers of lord-deputy to complete Cromwell's work of reduction and

replantation. This he pro- ceeded to do with his usual energy, and as much by the severity of his methods of punishment as by his military skill was rapidly bringing his task to a close, when he died on the 26th of November 1651 of fever after the capture of Limerick. His loss " struck a great sadness into Cromwell," and perhaps there was no one of the parliamentary leaders who could have been less spared, for while he possessed very high abilities as a soldier, and great political penetration and insight, he resembled in stern un- flinchingness of purpose the protector himself. By his wife, Bridget Cromwell, who married afterwards General Charles Fleetwood, Ireton left one son and three daughters.

Bibliography. — Article by C. H Firth in Diet, of Nat. Biog. with authorities there quoted; Wood's Ath. Oxon. iii 298, and Fasti, i. 451; Cornelius Brown's Lives of Notts Worthies, 181; Clarke Papers published by Camden Society; Gardiner's History of the Civil War and of the Commonwealth.

IRIARTE (or Yriarte) Y OROPESA, TOMAS DE (1750- 1791), Spanish poet, was born on the 18th of September 1750, at Orotava in the island of Teneriffe, and received his literary education at Madrid under the care of his uncle, Juan de Iriarte, librarian to the king of Spain. In his eighteenth year the nephew began his literary career by translating French plays for the royal theatre, and in 1770, under the anagram of Tirso Imarete, he published an original comedy entitled Hacer que hacemos. In the following year he became official translator at the foreign office, and in 1776 keeper of the records in the war department. In 1780 appeared a dull didactic poem in silvas entitled La Musica, which attracted some attention in Italy as well as at home. The F&bulas literarias (1781), with which his name is most intimately associated, are composed in a great variety of metres, and show considerable ingenuity in their humorous attacks on literary men and methods; but their merits have been greatly exaggerated. During his later years, partly in consequence of the Fdbulas, Iriarte was absorbed in personal controversies, and in 1786 was reported to the Inquisi- tion for his sympathies with the French philosophers. He died on the 17th of September 1791.

He is the subject of an exhaustive monograph (1897) by Emilio Cotarelo y Mori.

IRIDACEAE (the iris family), in botany, a natural order of flowering plants belonging to the series Liliiflorae of the class Monocotyledons, containing about 800 species in 57 genera, and widely distributed in temperate and tropical regions. The members of this order are

generally perennial herbs growing from a corm as in Crocus and Gladiolus, or a rhizome as in Iris; more rarely, as in the Spanish iris, from a bulb. A few South African representatives have a shrubby habit. The flowers are hermaphrodite and regular as in Iris (fig. 1) and Crocus (fig. 3), or with a symmetry in the median plane as in Gladiolus. The petaloid perianth consists of two series, each with three members, which are joined below into a longer or shorter tube, followed by one whorl of three stamens; the inferior ovary is three-celled and contains numerous ovules on an axile placenta; the style is branched and the branches are often petaloid. The fruit (fig. 2) is a capsule opening between the partitions and containing generally a large number of roundish or angular seeds. The arrangement of the parts in the flower resembles that in the nearly allied order Amaryllidaceae (Narcissus, Snowdrop, &c). but differs in the absence of the inner whorl of stamens.

The most important genera are Crocus (q.v.), with about 70

species, Iris (q.v.), with about 100, and Gladiolus (q.v.), with 150. Ixia, Freesia (q.v.) and Tritonia (including Montbretia),

Fig. i.- — Yellow Iris, Iris Pseudacorus.

Flower, from which the outer petals and the stigmas have been removed, leaving the inner petals (a) and stamens.

Pistil with petaloid stigmas.

3. Fruit cut across showing the

three chambers containing seeds.

4. A seed. 1-4 about j nat. size.

all natives of South Africa, are well known in cultivation. Sisyrinchium, blue-eyed grass, is a new-world genus extending

I

Fig. 2. — Seed-vessel (capsule) of the Flower-de-Luce (iris), opening in a loculi- cidat manner. The three valves bear the septa in the centre and the opening takes place through the back of the chambers. Each valve is formed by the halves of con- tiguous carpels.

Fig. 3. — 1. Crocus in flower, reduced. 2. Flower dissected, b, V ‘, Upper and lower membranous spathe-like bracts; c, Tube of perianth

; d, Ovary ; e, Style ; /, Stigmas.

from arctic America to Patagonia and the Falkland Isles. One

species, 5. angustifolium, an arctic and temperate North American species, is also native in Galway and Kerry in Ireland. Other British representatives of the order are: Iris Pseudacorus, (yellow iris) , common by river-banks and ditches, /. foetidissima (stinking iris), Gladiolus communis, a rare plant found in the New Forest and the Isle of Wight, and Romulea Columnae, a small plant with narrow recurved leaves a few inches long and a short scape bearing one or more small regular funnel-shaped flowers, which occurs at Dawlish in Devonshire.

IRIDIUM (symbol Ir.; atomic weight 193-1), one of the metals of the platinum group, discovered in 1802 by Smithson Tennant during the examination of the residue left when platinum ores are dissolved in aqua regia ; the element occurs in platinum ores in the form of alloys of platinum and iridium, and of osmium and iridium. Many methods have been devised for the separa- tion of these metals (see Platinum), one of the best being that of H. St. C. Deville and H. J. Debray (Comptes rendus, 1874, 78, p. 1502). In this process the osmiridium is fused with zinc and the excess of zinc evaporated; the residue is then ignited with barium nitrate, extracted with water and boiled with nitric acid. The iridium is then precipitated from the solution (as oxide) by the addition of baryta, dissolved in aqua regia, and precipitated as iridium ammonium chloride by the addition of ammonium chloride. The double chloride is fused with nitre, the melt extracted with water and the residue fused with lead, the excess of lead being finally removed by solution in nitric acid and aqua regia. It is a brittle metal of specific gravity 22-4 (Deville and Debray), and is only fusible with great difficulty. It may be obtained in the spongy form by igniting iridium ammonium chloride, and this variety of the metal readily oxidizes when heated in air.

Two oxides of iridium are known, namely the sesquioxide, lr 2 3 , and the dioxide, Ir0 2 , corresponding to which there are two series of salts, the sesqui-salts and the iridic salts; a third series of salts is also known (the iridious salts) derived from an oxide IrO. Iridium sesquioxide, lr 2 3 , is obtained when potassium iridium chloride is heated with sodium or potassium carbonates, in a stream of carbon

dioxide. It is a bluish-black powder which at high temperatures decomposes into the metal, dioxide and oxygen. The hydroxide, Ir(OH) 3 , may be obtained by the addition of caustic potash to iridium sodium chloride, the mixture being then heated with alcohol. Iridium dioxide, Ir0 2 , may be obtained as small needles by heating the metal to bright redness in a current of oxygen (G. Geisenheimer, Comptes rendus, 1890, no, p. 855). The corresponding hydroxide, Ir(OH)i, is formed when potassium iridate is boiled with ammonium chloride, or when the tetrachloride is boiled with caustic potash or sodium carbonate. It is an indigo-blue powder, soluble in hydro-chloric acid, but insoluble in dilute nitric and sulphuric acids. On the oxides see L. Wohler and W. Witzmann, Zeit. anorg. Chem. (1908), 57, p. 323. Iridium sesquichloride, IrCl 3 , is obtained when one of the corresponding double chlorides is heated with concentrated sulphuric acid, the mixture being then thrown into water. It is thus obtained as an olive green precipitate which is insoluble in acids and alkalis. Potassium iridium sesquichloride, K 3 Ir0 6 3H 2 0, is obtained by passing sulphur dioxide into a suspension of potassium chloriridate in water until all dissolves, and then adding potassium carbonate to the solution (C. Claus, Jour. prdk. Chem., 1847, 42, p. 351). It forms green prisms which are readily soluble in water. Similar sodium and ammonium compounds are known. Iridium tetrachloride, IrCh, is obtained by dissolving the finely divided metal in aqua regia; by dissolving the hydroxide in hydrochloric acid; and by digesting the hydrated sesquichloride with nitric acid. On evaporating the solution (not above 40 C.) a dark mass is obtained, which contains a little sesquichloride. It forms double chlorides with the alkaline chlorides. For a bromide see A. Gautbier and M. Riess, Ber., 1909, 42, p. 3905. Iridium sulphide, IrS, is obtained when the metal is ignited in sulphur vapour. The sesquisulphide, Ir 2 S 3 , is obtained as a brown precipitate when sulphuretted hydrogen is passed into a solu tion of one of the sesqui-salts. It is slightly soluble in potassium sulphide. The disulphide, IrSj, is formed when powdered iridium is heated with sulphur and an alkaline carbonate. It is a dark brown powder. Iridium forms many ammine derivatives, which are ana- logous to the corresponding platinum compounds (see M. Skoblikoff, Jahresb., 1852, p. 428; W. Palmer, Ber., 1889, 22, p. 15; 1890, 23, p. 3810; 1891, 24, p. 2090; Zeit. anorg. Chem., 1896, 13, p. 211).

Iridium is always determined quantitatively by conversion into the metallic state. The atomic weight of the element has been determined in various ways, C.Seubert (Ber., 1878, II, p. 1770), by the analysis of potassium chloriridate obtaining the value 192-74, and A. Joly

(Comptes rendus, 1890, 1 10, p. 1 131) from analyses of potassium and ammonium chloriridites, the value 191-78 (0 = 15-88).

IRIGA, a town of the province of Ambos Camarines, Luzon, Philippine Islands, on the Bicol river, about 20 m. S.E. of Nueva Caceres and near the S.W. base of Mt. Iriga, a volcanic peak reaching a height of 4092 ft. above the sea. Pop. (1903) 19,297. Iriga has a temperate climate. The soil in its vicinity is rich, producing rice, Indian corn, sugar, pepper, cacao, cotton, abaca, tobacco and copra. The neighbouring forests furnish ebony, molave, tindalo and other very valuable hardwoods. The language is Bicol.

IRIS, in Greek mythology, daughter of Thaumas and the Ocean nymph Electra (according to Hesiod), the personifica- tion of the rainbow and messenger of the gods. As the rainbow unites earth and heaven, Iris is the messenger of the gods to men; in this capacity she is mentioned frequently in the Iliad, but never in the Odyssey, where Hermes takes her place. She is represented as a youthful virgin, with wings of gold, who hurries with the swiftness of the wind from one end of the world to the other, into the depths of the sea and the underworld. She is especially the messenger of Zeus and Hera, and is associated with Hermes, whose caduceus or staff she often holds. By command of Zeus she carries in a ewer water from the Styx, with which she puts to sleep all who perjure themselves. Her attributes are the caduceus and a vase.

IRIS, in botany. The iris flower belongs to the natural order Iridaceae of the class Monocotyledons, which is characterized by a petaloid six-parted perianth, an inferior ovary and only three stamens (the outer series), being thus distinguished from the Amaryllidaceae family, which has six stamens. They are handsome showy-flowered plants, the Greek name having been applied on account of the hues of the flowers. The genus con- tains about 170 species widely distributed throughout the north temperate zone. Two of the species are British. /. Pseudacorus, the yellow flag or iris, is common in Britain on river-banks, and in marshes and ditches. It is called the " water-flag " or " bastard floure de-luce " by Gerard, who remarks that " although it be a water plant of nature, yet being planted in gardens it prospereth well." Its flowers appear in June and July, and are of a golden-yellow colour. The leaves are from 2 to 4 ft. long, and half an inch to an inch broad. Towards the latter part of the year they are eaten by cattle. The seeds are numerous and pale-brown; they have been recommended when roasted as a substitute for coffee, of which, however, they have not the properties. The astringent rhizome has diuretic, purgative and emetic properties, and

may, it is said, be used for dyeing black, and in the place of galls for ink-making. The other British species, /. foetidissima, the fetid iris, gladdon or roast- beef plant, the Xyris or stinking gladdon of Gerard, is a native of England south of Durham, and also of Ireland, southern Europe and North Africa. Its flowers are usually of a dull, leaden-blue colour; the capsules, which remain attached to the plant throughout the winter, are 2 to 3 in. long; and the seeds scarlet. When bruised this species emits a peculiar and disagreeable odour.

Iris florentina, with white or pale-blue flowers, is a native of the south of Europe, and is the source of the violet-scented orris root used in perfumery. Iris versicolor, or blue flag, is indigenous to North America, and yields " iridin," a powerful hepatic stimulant. Iris germanica of central Europe, " the most common purple Fleur de Luce" of Ray, is the large common blue iris of gardens, the bearded iris or fleur de luce and probably the Illyrian iris of the ancients. From the flowers of Iris floren- tina a pigment — the " verdelis," " vert d'iris," or iris-green,, formerly used by miniature painters — was prepared by maceration, the fluid being left to putrefy, when chalk or alum was added. The garden plants known as the Spanish iris and the English iris are both of Spanish origin, and have very showy flowers. Along with some other species, as /. reticulata and J. persica, both of which are fragrant, they form great favourites with florists. All these just mentioned differ from those formerly named in the nature of the underground stem, which forms a bulb and not a strict creeping rhizome as in /. Pseudacorus, germanica, florentina, &c. Some botanists separate these bulbous

si

Fig. 2. — Diagram of Trimerous Sym- metrical Flower of Iris, with two whorls

irises from the genus Iris, and place them apart in the genus

Xiphium, the Spanish iris, including about 30 species, all from

the Mediterranean region and the East.

The iris flower is of special interest as an example of the relation

between the shape of the flower and the position of the pollen-

receiving and stig- matic surfaces on the one hand and the visits of insects on the other. The large outer petals form a landing-stage for a flying insect which in probing the perianth- tube for honey will first come in contact of "'perianth' three with the stigmatic stamens in one whorl surface which is borne and an ovary formed ., . s c of three carpels, the

on the outer face of three dots p indicate

*a shelf-like transverse tne position of an projection on the inner whorl of Fig. 1.— Gynoecium under side of the stamens which is of Iris,consisting of an pe t a loid style-arm. P"**? 4 ln $*°M inferior ovary 0, and a %,. ant}lpr y which families AmarylU- style", with three peta- ih antner, wmen daceae and Lihaceae loid segments s.bearing opens towards the but absent in Irid- stigmas st. outside, is sheltered aceae.*

beneath the over-arching style arm below the stigma, so that the insect comes in contact with its pollen-covered surface only after passing the stigma, while in backing out of the flcwer it will come in contact only with the non-receptive lower face of the stigma. Thus an insect bearing pollen from one flower will in entering a second deposit the pollen on the stigma, while in backing out of a flower the pollen which it bears will not be rubbed off on the stigma of the same flower.

The hardier bulbous irises, including the Spanish iris (/. Xiphium) and the English iris (/. xiphioides, so called, which is also of Spanish origin), require to be planted in thoroughly drained beds in very light open soil, moderately enriched, and should have a rather sheltered position. Both these present a long series of beautiful varieties of the most diverse colours, flowering in May, June and July, the smaller Spanish iris being the earlier of the two. There are many other smaller species of bulbous iris. Being liable to perish from excess of moisture, they should have a well-drained bed of good but porous soil made up for them, in some sunny spot, and in winter should be protected by a 6-in. covering of half-decayed leaves or fresh coco-fibre refuse. To this set belong J. persica, reticulata, filifolia, Histrio, juncea, Danfordiae Rosenbachiar.a and others which flower as early as February and March.

The flag irises are for the most part of the easiest culture; they grow in any good free garden soil, the smaller and more delicate species only needing the aid of turfy ingredients, either peaty or loamy, to keep it light and open in texture. The earliest to bloom are the dwarf

forms of Iris pumila, which blossom during March, April and May; and during the latter month and the following one most of the larger growing species, such as /. germanica, florentma, pallida, variegata, amoena, flavescens, sambucina, neglecta, ruthenica, &c, produce their gorgeous flowers. Of many of the foregoing there are, besides the typical form, a considerable number of named garden varieties. Iris unguicularis (or stylosa) is a remarkable winter flowering species from Algeria, with sky-blue flowers blotched with yellow, produced at irregular intervals from November to March, the bleakest period of the year.

The beautiful Japanese Iris Kaempferi (or J. laevigata) is of comparatively modern introduction, and though of a distinct type is equally beautiful with the better-known species. The outer segments are rather spreading than deflexed, forming an almost circular flower, which becomes quite so in some of the very remarkable duplex varieties, in which six of these broad segments are produced instead of three. Of this too there are numberless varieties cultivated under names. They require a sandy peat soil on a cool moist subsoil.

What are known as Oncocyclus, or cushion irises, constitute a magnificent group of plants remarkable for their large, showy and beautifully marked flowers. Compared with other irises the " cushion " varieties are scantily furnished with narrow sickle- shaped leaves and the blossoms are usually borne singly on the stalks. The best-known kinds are atrofusca, Barnumae, Bismarckiana, Gatesi, Heylandiana, iberica, Lorteti, Haynei, lupina, Mariae, meda, paradoxa, sari, sofarana and susiana — the last-named being popularly called the " mourning " iris owing to the dark silvery

appearance of its huge flowers. All these cushion irises are somewhat fastidious growers, and to be successful with them they must be planted rather shallow in very gritty well-drained soil. They should not be disturbed in the. autumn, and after the leaves have withered the roots should be protected from heavy rains until growth starts again naturally.

A closely allied group to the cushion irises are those known as Regelia, of which Korolkowi, Leichtlini and vaga are the best known. Some magnificent hybrids have been raised between these two groups, and a hardier and more easily grown race of garden irises has been produced under the name of Regelio-Cydus. They are best planted in September or October in warm sunny positions, the rhizomes being lifted the following July after the leaves have withered.

IRISH MOSS, or Carrageen (Irish carraigeen, " moss of the rock "), a sea- weed {Chondrus crispus) which grows abundantly along the rocky parts of the Atlantic coast of Europe and North America. In its fresh condition the plant is soft and cartilaginous, varying in colour from a greenish-yellow to a dark purple or purplish -brown; but when washed and sun-dried for preserva- tion it has a yellowish translucent horn-like aspect and consist- ency. The principal constituent of Irish moss is a mucilaginous body, of which it contains about S5%; and with that it has nearly 10% of albuminoids and about 15% of mineral matter rich in iodine and sulphur. When softened in water it has a sea-like odour, and from the abundance of its mucilage it will form a jelly on boiling with from 20 to 30 times its weight of water. The jelly of Irish moss is used as an occasional article of food. It may also be used as a thickener in calico-printing and for fining beer. Irish moss is frequently mixed with Gigartina mammillosa, G. acicularis and other sea-weeds with which it is associated in growth.

IRKUTSK, a government of Asiatic Russia, in East Siberia, bounded on the W. by the government of Yeniseisk, on the N. by Yakutsk, on the E. by Lake Baikal and Transbaikalia and on the S. and S.W. by Mongolia; area, 287,061 sq. m. The most populous region is a belt of plains 1200 to 2000 ft. in altitude, which stretch north-west to south-east, having the Sayan mountains on the south and the Baikal mountains on the north, and narrowing as it approaches the town of Irkutsk. The high road, now the Trans-Siberian railway, follows this belt. The south-western part of the government is occupied by mountains of the Sayan system, whose exact orography is as yet not well known. From the high plateau of Mongolia, fringed by the Sayan mountains, of which the culminating point is the snow-clad Munko-sardyk (11,150 ft.), a number of ranges, 7500 to 8500 ft. high, strike off in a north-east direction. Going from south to north they are distinguished as the Tunka Alps, the Kitoi Alps (both snow-clad nearly all the year round), the Ida mountains and the Kuitun mountains. These are, however, by no means regular chains, but on the contrary are a complex result of upheavals which took place at different geological epochs, and of denudation on a colossal scale. A beautiful, fertile valley, drained by the river Irkut, stretches between the Tunka Alps and the Sayan, and another somewhat higher plain, but not so wide, stretches along the river Kitoi. A succession of high plains, 2000 to 2500 ft. in altitude, formed of horizontal beds of Devonian (or Upper Silurian) sandstone and limestone, extends to the north of the railway along the Angara, or Verkh- nyaya {i.e. upper) Tunguzka, and the upper Lena, as far as Kirensk. The

Bratskaya Steppe, west of the Angara, is a prairie peopled by Buriats. A mountain region, usually de- scribed as the Baikal range, but consisting in reality of several ranges running north-eastwards, across Lake Baikal, and scooped out to form the depression occupied by the lake, is fringed on its north-western slope by horizontal beds of sandstone and limestone. Farther north-east the space between the Lena and the Vitim is occupied by another mountain region belonging to the Olekma and Vitim system, composed of several parallel mountain chains running north-eastwards (across the lower Vitim), and auriferous in the drainage area of the Mama (N.E. of Lake Baikal). Lake Baikal separates Irkutsk from Trans- baikalia. The principal rivers of the government are the Angara, which flows from this lake northwards, with numerous sharp windings, and receives from the left several large tributaries.

as the Irkut, Kitoi, Byelaya, Oka and Iya. The Lena is the principal means of communication both with the gold-mines on its own tributary, the lower Vitim, and with the province of Yakutsk. The Nizhnyaya Tunguzka flows northwards, to join the Yenisei in the far north, and the mountain streams tributary to the Vitim drain the north-east.

The post-Tertiary formations are represented by glacial deposits in the highlands and loess on their borders. Jurassic deposits are met with in a zone running north-westwards from Lake Baikal to Nizhne-udinsk. The remainder of this region is covered by vast series of Carboniferous, Devonian and Silurian deposits — the first two but slightly disturbed over wide areas. All the highlands are built up of older, semi-crystalline Cambro-Silurian strata, which attain a thickness of 2500 ft., and of crystalline slates and limestones of the Laurentian system, with granites, syenites, diorites and diabases protruding from beneath them. Very extensive beds of basaltic lavas and other volcanic deposits are spread along the border ridge of the high plateau, about Munko-sardyk, up the Irkut, and on the upper Oka, where cones of extinct volcanoes are found (Jun-bulak). Earthquakes are frequent in the neighbourhood of Lake Baikal and the surrounding region. Gold is extracted in the Nizhne-udinsk district ; graphite is found on the Botii-gol and Alibert mountains (abandoned many years since) and on the Olkhon island of Lake Baikal. Brown coal (Jurassic) is found in many places, and coal on the Oka. The salt springs of Usoliye (45 m. west of Irkutsk), as also

those on the Ilim and of Ust-Kutsk (on the Lena), yield annually about 7000 tons of salt. Fireclay, grindstones, marble and mica, lapis-lazuli, granites and various semi-precious stones occur on the Sludyanka (south-west corner of the Baikal).

The climate is severe; the mean temperatures being at Irkutsk (1520 ft), for the year 31 Fahr., for January -6°, for July 65°; at Shimki (valley of the Irkut, 2620 ft.), for the year 24°, for January -17 , for July 63 . The average rainfall is 15 in. a year. Virgin forests cover all the highlands up to 6500 ft.

The population which was 383,578 in 1879, was 515,132 in 1897, of whom 233,997 were women and 60,396 were urban;- except about 109,000 Buriats and 1700 Tunguses, they are Russians. The estimated population in 1906 was 552,700. Immigration contributes about 14,000 every year. Schools are numerous at Irkutsk, but quite insufficient in the country districts, and only 12% of the children receive education. The soil is very fertile in certain parts, but meagre elsewhere, and less than a million acres are under crops (rye, wheat, barley, oats, buckwheat, potatoes). Grain has to be imported from West Siberia and cattle from Transbaikalia. Fisheries on Lake Baikal supply every year about 2,400,000 Baikal herring (omul). Industry is only beginning to be developed (iron- works, glass- and pottery-works and distilleries, and all manufactured goods are imported from Russia. The government is divided into five districts, the chief towns of which are Irkutsk (q.v.), Balagansk (pop., 1313 in 1897), Kirensk (2253), Nizhneudinsk and Verkholensk. (P. A. K.; J. T. Be.)

IRKUTSK, the chief town of the above government, is the most important place in Siberia, being not only the largest centre of population and the principal commercial depot north of Tashkent, but a fortified military post, an archbishopric of the Orthodox Greek Church and the seat of several learned societies. It is situated in 52 17′ N. and 104° 16′ E., 3792 m. by rail from St Petersburg. Pop. (1875) 32,512, (1900) 49,106. The town proper lies on the right bank of the Angara, a tributary of the Yenisei, 45 m. below its outflow from Lake Baikal, and on the opposite bank is the Glaskovsk suburb. The river, which has a breadth of 1900 ft., is crossed by a flying bridge. The Irkut, from which the town takes its name, is a small river which joins the Angara directly opposite the town, the main portion of which is separated from the monastery, the castle, the port and the suburbs by another confluent, the Ida or Ushakovka. Irkutsk has long been reputed a remarkably fine city — its streets being straight, broad, well paved and well lighted; but in 1879, on the 4th and 6th of July, the palace of the (then) governor- general,

the principal administrative and municipal offices and many of the other public buildings were destroyed by fire; and the government archives, the library and museum of the Siberian section of the Russian Geographical Society were utterly ruined. A cathedral (built of wood in 1693 and rebuilt of stone in 1718), the governor's palace, a school of medicine, a museum, a military hospital, and the crown factories are among

the public institutions and buildings. An important fair is held in December. Irkutsk grew out of the winter-quarters established (1652) by Ivan Pokhabov for the collection of the fur tax from the Buriats. Its existence as a town dates from 1686.

IRMIN, or Irminus, in Teutonic mythology, a deified eponymic hero of the Herminones. The chief seat of his worship was Irminsal, or Ermensul, in Westphalia, destroyed in 772 by Charlemagne. Huge wooden posts (Irmin pillars) were raised to his honour, and were regarded as sacred by the Saxons.

IRNERIUS (Hirnerius, Hyrnerius, Iernerius, Gernerius, Guarnerius, Warnerius, Wernerius, Yrnerius), Italian jurist, sometimes referred to as " lucerna juris." He taught the " free arts " at Bologna, his native city, during the earlier decades of the 1 2th century. Of his personal history nothing is known, except that it was at the instance of the countess Matilda, Hildebrand's friend, who died in 1115, that he directed his attention and that of his students to the Institutes and Code of Justinian; that after n 16 he appears to have held some office under the emperor Henry V.; and that he died, perhaps during the reign of the emperor Lothair II., but certainly before 1 140. He was the first of the Glossators (see Gloss), and according to ancient opinion (which, however, has been much controverted) was the author of the epitome of the Novellae of Justinian, called the Authentica, arranged according to the titles of the Code. His Formularium tabellionum (a directory for notaries) and Quaestiones (a book of decisions) are no longer extant. (See Roman Law.)

See Savigny, Gesck. d. rom. Rechts im Mittelalter, iii. 83 ; Vecchio, Notizie di Irnerio e delta sua scuola (Pisa, 1869) ; Ficker, Forsch. z. Reichs- u. Rechtsgesch. Italiens, vol. iii. (Innsbruck, 1870); and Fitting, Die Anfange der Rechlsschule zu Bologna (Berlin, 1888).

IRON [symbol Fe, atomic weight 55-85 (0=i6)], a metallic chemical element. Although iron occurs only sparingly in the free state, the abundance of ores from which it may be readily obtained led to its application in the arts at a very remote period. It is generally agreed,

however, that the Iron Age, the period of civilization during which this metal played an all-important part, succeeded the ages of copper and bronze, notwithstanding the fact that the extraction of these metals required greater metallurgical skill. The Assyrians and Egyptians made con- siderable use of the metal; and in Genesis iv. 22 mention is made of Tubal-cain as the instructor of workers in iron and copper. The earlier sources of the ores appear to have been in India; the Greeks, however, obtained it from the Chalybes, who dwelt on the south coast of the Black Sea; and the Romans, besides drawing from these deposits, also exploited Spain, Elba and the province of Noricum. (See Metal-work.)

The chief occurrences of metallic iron are as minute spiculae disseminated through basaltic rocks, as at Giant's Causeway and in the Auvergne, and, more particularly, in meteorites (q.v.). In combination it occurs, usually in small quantity, in most natural waters, in plants, and as a necessary constituent of blood. The economic sources are treated under Iron and Steel below; in the same place will be found accounts of the manufacture, properties, and uses of the metal, the present article being confined to its chemistry. The principal iron ores are the oxides and carbonates, and these readily yield the metal by smelting with carbon. The metal so obtained invariably contains a certain amount of carbon, free or combined, and the proportion and condition regulate the properties of the metal, giving origin to the three important varieties: cast iron, steel, wroug-ht iron. The perfectly pure metal may be prepared by heating the oxide or oxalate in a current of hydrogen; when obtained at a low temperature it is a black powder which oxidizes in air with incandescence; produced at higher temperatures the metal is not pyrophoric. Peligot obtained it as minute tetragonal octahedra and cubes by reducing ferrous chloride in hydrogen. It may be obtained electrolytically from solutions of ferrous and magnesium sulphates and sodium bicarbonate, a wrought iron anode and a rotating cathode of copper, thinly silvered and iodized, being employed (S. Maximowitsch, Zeit. Elektrochem., 1905, 11, p. 52).

In bulk, the metal has a silvery white lustre and takes a high polish. Its specific gravity is 7 84; and the average specific heat over the range i5 -ioo is 0-10983; this value increases with temperature to 850°, and then begins to diminish. It is the most tenacious of all the ductile metals at ordinary temperatures with the exception of cobalt

and nickel; it becomes brittle, however, at the temperature of liquid air. It softens at a red heat, and may be readily welded at a white heat; above this point it becomes brittle. It fuses at about 1550 – 1600 , and may be distilled in the electric furnace (H. Moissan, Compt. rend., 1906, 142, p. 425). It is attracted by a magnet and may be magnetized, but the magnetization is quickly lost. The variation of physical properties which attends iron on heating has led to the view that the metal exists in allotropic fo ms (see Irox and Steel, below).

Iron is very reactive chemically. Exposed to atmospheric influences it is more or less rapidly corroded, giving the familiar rust (q.v.). S. Burnie (Abst. J.C.S., 1907, ii. p. 469) has shown that water is decomposed at all temperatures from o° to ioo° by the finely divided metal with liberation of hydrogen, the action being accelerated when oxides are present. The de- composition of steam by passing it through a red-hot gun- barrel, resulting in the liberation of hydrogen and the production of magnetic iron oxide, Fe 3 O s , is a familiar laboratory method for preparing hydrogen (q.v.). When strongly heated iron inflames in oxygen and in sulphur vapour; it also combines directly with the halogens. It dissolves in most dilute acids with liberation of hydrogen; the reaction between sulphuric acid and iron turnings being used for the commercial manu- facture of this gas. It dissolves in dilute cold nitric acid with the formation of ferrous and ammonium nitrates, no gases being liberated; when heated or with stronger acid ferric nitrate is formed with evolution of nitrogen oxides.

It was observed by James Keir (Phil. Trans., 1790, p. 359) that iron, after having been immersed in strong nitric acid, is insoluble in acids, neither does it precipitate metals from solutions. This " passivity " may be brought about by immer- sion in other solutions, especially by those containing such oxidizing anions as X0′ 3 , C10′ 8 , less strongly by the anions SO",, CX', CXS', C,H 3 0′ 2 , OH', while CI', Br' practically inhibit passivity; H' is the only cation which has any effect, and this lends to exclude passivity. It is also occasioned by anodic polarization of iron in sulphuric acid. Other metals may be rendered passive; for example, zinc does not precipitate copper from solutions of the double cyanides and sulphocyanides, nickel and cadmium from the nitrates, and iron from the sulphate, but it immediately throws down nickel and cadmium from the sulphates and chlorides, and lead and copper from the ■titrates (see O. Sackur, Zeit. Elektrochem., 1904, 10, p. 841). \nodic polarization in potassium chloride solution renders molybdenum, niobium, ruthenium, tungsten, and vanadium oassive

(W. Muthmann and F. Frauenberger, Sitz. Bayer. \kad. Wiss., 1904, 34, p. 201), and also gold in commercial potassium cyanide solution (A. Coehn and C. L. Jacobsen, Abs. J.C.S., 1907, ii. p. 926). Several hypotheses have been promoted 10 explain this behaviour, and, although the question is not definitely settled, the more probable view is that it is caused by the formation of a film of an oxide, a suggestion made many years ago by Faraday (see P. Krassa, Zeit. Elektrochem., 1009. 15, p. 490). Fredenhagen (Zeit. physik. Chcm., 1903, 43, p. 1). on the other hand, regarded it as due to surface films of a gas; submitting that the difference between iron made passive by nitric acid and by anodic polarization was explained by the film being of nitrogen oxides in the first case and of oxygen in the second case. H. L. Heathcote and others regard the passivity as invariably due to electrolytic action (see papers in the Zeit. physik. Chem., 1901 et seq.).

Compounds of Iron.

Oxides and Hydroxides. — Iron forms three oxides: ferrous oxide, FeO, ferric oxide, Fe»0 3 , and ferroso-ferric oxide, Fe 3 0,|. The first two give origin to well-defined series of salts, the ferrous

salts, wherein the metal is divalent, and the ferric salts, wherein the metal is trivalent; the former readily pass into the latter on oxidation, and the latter into the former on reduction.

Ferrous oxide is obtained when ferric oxide is reduced in hydrogen at 300 as a black pyrophoric powder. Sabatier and Senderens (Compt. rend., 1892, 114, p. 1429) obtained it by acting with nitrous oxide on metallic iron at 200 , and Tissandier by heating the metal to 900 in carbon dioxide; Donau (Monats., 1904, 25, p. 181), on the other hand, obtained a magnetic and crystalline-ferroso-ferric oxide at 1200 . It may also be prepared as a black velvety powder which readily takes up oxygen from the air by adding ferrous oxalate to boiling caustic potash. Ferrous hydrate, Fc(OH) 2 , when prepared from a pure ferrous salt and caustic soda or potash free from air, is a white powder which may be preserved in an atmosphere of hydrogen. Usually, however, it forms a greenish mass, owing to partial oxidation. It oxidizes on exposure with considerable evolution of heat; it rapidly absorbs carbon dioxide; and readily dissolves in acids to form ferrous salts, which are usually white when anhydrous, but greenish when hydrated.

Ferric oxide or iron sesquioxide, Fe 2 3 , constitutes the valuable ores red haematite and specular iron; the minerals brown haematite or limonite, and gothite and also iron rust are hydrated forms. It is obtained- as a steel-grey crystalline powder by igniting the oxide or any ferric salt containing a volatile acid. Small crystals are formed by passing ferric chloride vapour over heated lime. When finely ground these crystals yield a brownish red powder which dissolves slowly in acids, the most effective solvent being a boiling mixture of 8 parts of sulphuric acid and 3 of water. Ferric oxide is employed as a. pigment, as jeweller's rouge, and'for polishing metals. It forms several hydrates, the medicinal value of whidh was recognized in very remote times. Two series of synthetic hydrates were recognized by Muck and Tommasi: the " red " hydrates, obtained by precipitating ferric salts with alkalis, and the " yellow " hydrates, obtained by oxidizing moist ferrous hydroxide or carbonates. J. van Bem- melen has shown that the red hydrates are really colloids, the amount of water retained being such that its vapour pressure equals

the pressure of the aqueous vapour in the superincumbent atmosphere. By heating freshly prepared red ferric hydrate with water under 5000 atmospheres pressure Ruff (Ber., 1901, 34, p. 3417) obtained definite hydrates corresponding to the minerals limonite (3o°-42-5°), gothite (42-s°-62-5°), and hydrohaematite (above 62-5°). Thomas Graham obtained a soluble hydrate by dissolving the freshly prepared hydrate in ferric chloride and dialysing the solution, the soluble hydrate being left in the dialyser. All the chlorine, however, does not appear to be removed by this process, the residue having the composition 82Fe(OH) 3 -FeCl 3 ; but it may be by electrolysing in a porous cell (Tribot and Chretien, Compt. rend., 1905, 140, p. 144). On standing, the solution usually gelatinizes, a process accelerated by the addition of an electrolyte. It is employed In medicine under the name Liquor Jerri dialysati. The so-called soluble meta-ferric hydroxide, FeO(OH) (?), discovered by Pean de St Gilles in 1856, may be obtained by several methods. By heating solutions of certain iron salts for some time and then adding a little sulphuric acid it is precipitated as a brown powder. Black scales, which dissolve in water to form a red solution, are obtained by adding a trace of hydrochloric acid to a solution of basic ferric nitrate which has been heated to too for three days. A similar compound, which, however, dissolves in water to form an orange solution, results by adding salt to a heated solution of ferric chloride. These compounds are insoluble in concentrated, but dissolve readily in dilute acids.

Red ferric hydroxide dissolves in acids to form a well-defined series of salts, the ferric salts, also obtained by oxidizing ferrous salts; they are usually colourless when anhydrous, but yellow or brown when hydrated. It has also feebly acidic properties, forming ferrites with strong bases.

Magnetite, Fe 3 4 , may be regarded as ferrous ferrite, FeO-Fe 2 3 . This important ore of iron is most celebrated for its magnetic properties (see Magnetism and Compass), but the

mineral is not always magnetic, although invariably attracted by a magnet. It may be obtained artificially by passing steam over red-hot iron. It dissolves in acids to form a mixture of a ferrous and ferric salt, 1 and if an alkali is added to the solution a black precipitate is obtained which dries to a dark brown mass of the composition

Fe(OH) 2 -Fe 2 3 ; this substance is attracted by a magnet, and thus may be separated from the admixed ferric oxide. Calcium ferrite, magnesium ferrite and zinc ferrite, ROFe2C>3 (R = Ca, Mg, Zn), are obtained by intensely heating mixtures of the oxides; magnesium ferrite occurs in nature as the mineral magnoferrite, and zinc ferrite as franklinite, both forming black octahedra.

Ferric acid, H 2 Fe0 4 . By fusing iron with saltpetre and extracting the melt with water, or by adding a solution of ferric nitrate in nitric acid to strong potash, an amethyst or purple-red solution is obtained which contains potassium ferrate. E. Fremy investigated this discovery, made by Stahl in 1702, and showed that the same solution resulted when chlorine is passed into strong potash solution containing ferric hydrate in suspen- sion. Haber and Pick (Zeit. Eleklrochem., 1900, 7, p. 215) have prepared potassium ferrate by electrolysing concentrated potash solution, using an iron anode. A temperature of 70°, and a reversal of the current (of low density) between two cast iron electrodes every few minutes, are the best working conditions. When concentrated the solution is nearly black, and on heating it yields a yellow solution of potassium ferrite, oxygen being evolved. Barium ferrate, BaFe0 4 -H 2 0, obtained as a dark red powder by adding barium chloride to a solution of potassium ferrate, is fairly stable. It dissolves in acetic acid to form a red solution, is not decomposed by cold sulphuric acid, but with hydrochloric or nitric acid it yields barium and ferric salts, with evolution of chlorine or oxygen (Baschieri, Gazetta, 1906, 36, ii. p. 282).

Halogen Compounds. — Ferrous fluoride, FeF 2 , is obtained as colourless prisms (with 8H 2 0) by dissolving iron in hydrofluoric acid, or as anhydrous colourless rhombic prisms by heating iron or ferric chloride in dry hydrofluoric acid gas. Ferric fluoride, FeF 5 , is ob- tained as colourless crystals (with 4|H 2 0) by evaporating a solution of the hydroxide in hydrofluoric acid. When heated in air it yields ferric oxide. Ferrous chloride, FeCl 2 , is obtained as shining scales by passing chlorine, or, better, hydrochloric acid gas, over red-hot iron, or by reducing ferric chloride in a current of hydrogen. It is very deliquescent, and freely dissolves in water and alcohol. Heated in air it yields a mixture of ferric oxide and chloride, and in steam magnetic oxide, hydrochloric acid, and hydrogen. It absorbs ammonia gas, forming the compound FeCl 2 -6NH a , which on heating loses ammonia, and, finally, yields ammonium chloride, nitrogen and iron nitride. It fuses at a red-heat, and volatilizes at a yellow-heat ; its vapour density at 1300 — 1400° corresponds to the formula FeCl s . By evaporating in vacuo the solution obtained by

dis- solving iron in hydrochloric acid, there results bluish, monoclinic crystals of FeCl 2 4H 2 0, which deliquesce, turning greenish, on ex posure to air, and effloresce in a desiccator. Other hydrates are known. By adding ammonium chloride to the solution, evaporating in vacuo, and then volatilizing the ammonium chloride, anhydrous ferrous chloride is obtained. The solution, in common with those of most ferrous salts, absorbs nitric oxide with the formation of a brownish solution.

Ferric chloride, FeCl 3 , known in its aqueous solution to Glauber as oleum martis, may be obtained anhydrous by the action of dry chlorine on the metal at a moderate red-heat, or by passing hydro-chloric acid gas over heated ferric oxide. It forms iron-black plates or tablets which appear red by transmitted and a metallic green by reflected light. It is very deliquescent, and readily dissolves in water, forming a brown or yellow solution, from which several hydrates may be separated (see Solution). The solution is best prepared by dissolving the hydrate in hydrochloric acid and re- moving the excess of acid by evaporation, or by passing chlorine into the solution obtained by dissolving the metal in hydrochloric acid and removing the excess of chlorine by a current of carbon dioxide. It also dissolves in alcohol and ether; boiling point determinations of the molecular weight in these solutions point to the formula FeCl 3 . Vapour density determinations at 448° indicate a partial dissociation of the double molecule Fe 2 Cl 6 ; on stronger heating it splits into ferrous chloride and chlorine. It forms red crystalline double salts with the chlorides of the metals of the alkalis and of the*

1 By solution in concentrated hydrochloric acid, a yellow liquid is obtained, which on concentration over sulphuric acid gives yellow deliquescent crusts of ferroso-ferric chloride, FesClg-lSI-ˆO.

magnesium group. An aqueous solution of ferric chloride is used in pharmacy under the name Liquor ferri perchloridi ; and an alcoholic solution constitutes the quack medicine known as " Lamotte's golden drops." Many oxychlorides are known; soluble forms are obtained by dissolving precipitated ferric hydrate in ferric chloride, whilst insoluble compounds result when ferrous chloride is oxidized in air, or by boiling for some time aqueous solutions of ferric chloride.

Ferrous bromide, FeBr 2 , is obtained as yellowish crystals by the union of bromine and iron at a dull red-heat, or as bluish-green rhombic tables of the composition FeBr 2 -6H 2 by crystallizing a solution of iron in hydrobromic acid. Ferric bromide, FeBr s , is obtained as dark red crystals by heating iron in an excess of bromine

vapour. It closely resembles the chloride in being deliquescent, dissolving ferric hydrate, and in yielding basic salts. Ferrous iodide, Fel 2 , is obtained as a grey crystalline mass by the direct union of its components. Ferric iodide does not appear to exist.

Sulphur Compounds. — Ferrous sulphide, FeS, results from the direct union of its elements, best by stirring molten sulphur with a white-hot iron rod, when the sulphide drops co the bottom of the crucible. It then forms a yellowish crystalline mass, which readily dissolves in acids with the liberation of sulphuretted hydrogen. Heated in air it at first partially oxidizes to ferrous sulphate, and at higher temperatures it yields sulphur dioxide and ferric oxide. It is unaltered by ignition in hydrogen. An amorphous form results when a mixture of iron filings and sulphur are triturated with water. This modification is rapidly oxidized by the air with such an elevation of temperature that the mass may become incandescent. Another black amorphous form results when ferrous salts are precipitated by ammonium sulphide.

Ferric sulphide, Fe 2 S 3 , is obtained by gently heating a mixture of its constituent elements, or by the action of sulphuretted hydrogen on ferric oxide at temperatures below 100 . It is also prepared by precipitating a ferric salt with ammonium sulphide; unless the alkali be in excess a mixture of ferrous sulphide and sulphur is ob- tained. It combines with other sulphides to form compounds of the type M' 2 Fe 2 S 4 . Potassium ferric sulphide, K 2 Fe 2 S 4 , obtained by- heating a mixture of iron filings, sulphur and potassium carbonate, forms purple glistening crystals, which burn when heated in air. Magnetic pyrites or pyrrhotite has a composition varying between Fe 7 S 8 and Fe 8 S 9 , i.e. 5FeS-Fe 2 S 3 and 6FeS-Fe 2 S 3 . It has a some- what brassy colour, and occurs massive or as hexagonal plates; it is attracted by a magnet and is sometimes itself magnetic. The mineral is abundant in Canada, where the presence of about 5 % of nickel makes it a valuable ore of this metal. Iron disulphide, FeS 2 , constitutes the minerals pyrite and marcasite (q.v.) ; copper pyrites is (Cu, Fe)S 2 . Pyrite may be prepared artificially by gently heating ferrous sulphide with sulphur, or as brassy octahedra and cubes by slowly heating an intimate mixture of ferric oxide, sulphur and sal- ammoniac. It is insoluble in dilute acids, but dissolves in nitric acid with separation of sulphur.

Ferrous sulphite, FeS0 3 . Iron dissolves in a solution of sulphur dioxide in the absence of air to form ferrous sulphite and thio- sulphate; the former, being less soluble than the latter, separates out as colourless or greenish crystals on standing.

Ferrous sulphate, green vitriol or copperas, FeS0 4 -7H 2 0, was known to, and used by, the alchemists; it is mentioned in the writings of Agricola, and its preparation from iron and sulphuric acid occurs in the Tractatus chymico-philosophicus ascribed to Basil Valentine. It occurs in nature as the mineral melanterite, either crystalline or fibrous, but usually massive; it appears to have been formed by the oxidation of pyrite or marcasite. It is manufactured by piling pyrites in heaps and exposing to atmospheric oxidation, the ferrous sulphate thus formed being dissolved in water, and the solution run into tanks, where any sulphuric acid which may be formed is decomposed by adding scrap iron. By evaporation the green vitriol is obtained as large crystals. The chief impurities are copper and ferric sulphates; the former may be removed by adding scrap iron, which precipitates the copper; the latter is eliminated by recrystallization. Other impurities such as zinc and manganese sulphates are more difficult to remove, and hence to prepare the pure sah. it is best to dissolve pure iron wire in dilute sulphuric acid. Ferrous sulphate forms large green crystals belonging to the mono- clinic system ; rhombic crystals, isomorphous with zinc sulphate, are obtained by inoculating a solution with a crystal of zinc sulphate, and triclinic crystals of the formula FeS0 4 5H 2 by inoculating with copper sulphate. By evaporating a solution containing free sul phuric acid in a vacuum, the hepta-hydrated salt first separates, then the penta-, and then a tetra-hydrate, FeS0 4 -4H 2 0, isomorphous with manganese sulphate. By gently heating in a vacuum to 140°, the hepta-hydrate loses 6 molecules of water, and yields a white powder, which on heating in the absence of air gives the anhydrous salt. The monohydrate also results as a white precipitate when . concentrated sulphuric acid is added to a saturated solution of ferrous sulphate. Alcohol also throws down the salt from aqueous solution, the composition of the precipitate varying with the amount of salt and precipitant employed. The solution absorbs nitric oxide to form a dark brown solution, which loses the gas on heating or by placing in a vacuum. Ferrous sulphate forms double salts with the alkaline sulphates. The most important is ferrous ammonium sulphate, FeS0 4 -(NH 4) 2 S0 4 -6H 2 0, obtained by dissolving equivalent amounts

of the two salts in water and crystallizing. It is very stable and is much used in volumetric analysis.

Ferric sulphate, Fe2(S0 4) 3 , is obtained by adding nitric acid to a

hot solution of ferrous sulphate containing sulphuric acid, colourless crystals being deposited on evaporating the solution. The an- hydrous salt is obtained by heating, or by adding concentrated sulphuric acid to a solution. It is sparingly soluble in water, and on heating it yields ferric oxide and sulphur dioxide. The mineral coquimbite is Fe 2 (S0 4) 3 -9H 2 O. Many basic ferric sulphates are known, some of which occur as minerals; carphosiderite is Fe(FeO) 5 (SO 4)4-10H 2 O; amarantite is Fe(FeO) (S0 4) 2 -7H 2 0; utahite is 3(FeO) 2 S0 4 -4H 2 0; copiapite is Fe 3 (FeO) (S0 4) 6 -18H 2 0; castanite is Fe(FeO) (S0 4) 2 -8H 2 0; romerite is FeS0 4 -Fe2(S0 4)3-12H 2 0. The iron alums are obtained by crystallizing solutions of equivalent quantities of ferric and an alkaline sulphate. Ferric potassium sulphate, the common iron alum, K 2 S04-Fe 2 (S0 4)r24H 2 0, forms bright violet octahedra.

Nitrides, Nitrates, &c. — Several nitrides are known. Guntz (Compt. rend., 1902, 135, p. 738) obtained ferrous nitride, Fe 3 N 2 , and ferric nitride, FeN, as black powders by heating lithium nitride with ferrous potassium chloride and ferric potassium chloride re- spectively. Fowler (Jour. Chem. Soc, 1901, p. 285) obtained a nitride Fe 2 N by acting upon anhydrous ferrous chloride or bromide, finely divided reduced iron, or iron amalgam with ammonia at 420 ; and, also, in a compact form, by the action of ammonia on red- hot iron wire. It oxidizes on heating in air, and ignites in chlorine ; on solution in mineral acids it yields ferrous and ammonium salts, hydrogen being liberated. A nitride appears to be formed when nitrogen is passed over heated iron, since the metal is rendered brittle. Ferrous nitrate, Fe(N0 3) 2 -6H 2 0, is a very unstable salt, and is obtained by mixing solutions of ferrous sulphate and barium nitrate, filtering, and crystallizing in a vacuum over sulphuric acid. Ferric nitrate, Fe(NOs)s, is obtained by dissolving iron in nitric acid (the cold dilute acid leads to the formation of ferrous and ammonium nitrates) and crystallizing, when cubes of Fe(.N03)3-6H 2 or mono- clinic crystals of Fe(N0 3)r9HjO are obtained. It is used as a mordant.

Ferrous solutions absorb nitric oxide, forming dark green to black solutions. The coloration is due to the production of unstable compounds of the ferrous salt and nitric oxide, and it seems that in neutral solutions the compound is made up of one molecule of salt to one of gas; the reaction, however, is reversible, the composition varying with temperature, concentration and nature of the salt. Ferrous chloride dissolved in strong hydrochloric acid absorbs two molecules of the gas (Kohlschiitter and Kutscheroff, Ber., 1907, 40, p. 873). Ferric chloride also absorbs the gas. Reddish brown

amorphous powders of the formulae 2FeCla-.NO and 4FeCl3-NO are obtained by passing the gas over anhydrous ferric chloride. By passing the gas into an ethereal solution of the salt, nitrosyl chloride is produced, and on evaporating over sulphuric acid, black needles of FeCl 2 -NO-2H 2 are obtained, which at 60° form the yellow FeClz-XO. Complicated compounds, discovered by Roussin in 1858, are obtained by the interaction of ferrous sulphate and alkaline nitrites and sulphides. Two classes may be distinguished: — (1) the ferrodinitroso salts, e.g. K[Fe(NO) 2 S], potassium ferrodinitroso-sulphide, and (2) the ferroheptanitroso salts, e.g. K[Fe 4 (NO)7S 8], potassium ferroheptanitrososulphide. These salts yield the corresponding acids with sulphuric acid. The dinitroso acid slowly decomposes into sulphuretted hydrogen, nitrogen, nitrous oxide, and the heptanitrono acid. The heptanitroso acid is precipitated as a brown amorphous mass by dilute sulphuric acid, but if the salt be heated with strong acid it yields nitrogen, nitric oxide, sulphur, sulphuretted hydrogen, and ferric, ammonium and potassium sulphates. Phosphides, Phosphates. — H. Le Chatelierand S. Wologdine (Compt. rend., 1909, 149, p. 709) have obtained Fe 3 P, Fe 2 P, FeP, Fe 2 P 3 , but failed to prepare five other phosphides previously described. Fe 3 P occurs as crystals in the product of fusing iron with phosphorus; it dissolves in strong hydrochloric acid. Fe 2 P forms crystalline needles insoluble in acids except aqua reg^ia; it is obtained by fusing copper phosphide with iron. FeP is obtained by passing phosphorus vapour over Fe 2 P at a red-heat. Fe 2 P 3 is prepared by the action of phosphorus iodide vapour on reduced iron. Ferrous phosphate, Fe 3 (PO«) 2 -8H 2 0, occurs in nature as the mineral vivianite. It may be obtained artificially as a white precipitate, which rapidly turns blue or green on exposure, by mixing solutions of ferrous sulphate and sodium phosphate. It is employed in medicine. Normal ferric phosphate, FePGv2H 2 0, occurs as the mineral strengite, and is obtained as a yellowish-white precipitate by mixing solutions of ferric chloride and sodium phosphate. It is insoluble in dilute acetic acid, but dissolves in mineral acids. The acid salts Fe(H 2 P0 4) 3 and 2FeH 3 (P0 4) 2 -5H 2 have been described. Basic salts have been prepared, and several occur in the mineral kingdom; dufrenite is i-e 2 (OH) 3 P0 4 .

A rsenides, Arsenites, &c. — Several iron arsenides occur as minerals ; lolingite, FeAs^ forms silvery rhombic prisms; mispickel or arsenical pyrites, FejAsS^ is an important commercial source of arsenic. A basic ferric arsenite, 4Fe 2 3 As>0 3 5H 2 0, is obtained as a flocculent ijruwn precipitate by adding an arsenite to ferric acetate, or by ..baking freshly prepared ferric hydrate with a solution

of arsenious oxide. The last reaction is the basis of the application of ferric

hydrate as an antidote in arsenical poisoning. Normal ferric arsenate, FeAs0 4 2H 2 0, constitutes the mineral scorodite ; pharmaco siderite is the basic arsenate 2FeAs0 4 -Fe(OK) 3 -5H 2 0. An acid arsenate, 2Fej(HAs0 4) 3 -9H 2 0, is obtained as a white precipitate by mixing solutions of ferric chloride and ordinary sodium phosphate. It readily dissolves in hydrochloric acid.

Carbides, Carbonates. — The carbides of iron play an important part in determining the properties of the different modifications of the commercial metal, and are discussed under Iron and Steel.

Ferrous carbonate, FeC0 3 , or spathic iron ore, may be obtained as microscopic rhombohedra by adding sodium bicarbonate to ferrous sulphate and heating to 150° for 36 hours. Ferrous sulphate and sodium carbonate in the cold give a flocculent precipitate, at first white but rapidly turning green owing to oxidation. A soluble carbonate and a ferric salt give a precipitate which loses carbon dioxide on drying. Of great interest are the carbonyl compounds. Ferropentacarbonyl, Fe(C0)5, obtained by L. Mond, Quincke and Langer (Jour. Chem. Soc, 1891; see also ibid. 1910, p. 798) by treating iron from ferrous oxalate with carbon monoxide, and heating at 150 , is a pale yellow liquid which freezes at about -20 , and boils at io2-5°. Air and moisture decompose it. The halogens give ferrous and ferric haloids and carbon monoxide; hydrochloric and hydrobromic acids have no action, but hydriodic decomposes it. By exposure to sunlight, either alone or dissolved in ether or ligroin, it gives lustrous orange plates of diferrononacarbonyl, Fe 2 (CO)i. If this substance be heated in ethereal solution to 50°, it deposits lustrous dark-green tablets of ferrotetracarbonyl, Fe(CO) 4 , very stable at ordinary temperatures, but decomposing at i40°-i5o° into iron and carbon monoxide (J. Dewar and H. O. Jones, Abst. J.C.S., 1907, ii. 266). For the cyanides see Prussic Acid.

Ferrous salts give a greenish precipitate with an alkali, whilst ferric give a characteristic red one. Ferrous salts also give a bluish white precipitate with ferrocyanide, which on exposure turns to a dark blue; ferric salts are characterized by the intense purple coloration with a thiocyanate. (See also Chemistry, § Analytical). For the quantitative estimation see Assaying.

A recent atomic weight determination by Richards and Baxter (Zeit. anorg. Chem., 1900, 23, p. 245 ; 1904, 38, p. 232), who found the

amount of silver bromide given by ferrous bromide, gave the value 5544 [0 = 16].

Pharmacology. All the official salts and preparations of iron are made directly or indirectly from the metal. The pharmacopoeial forms of iron are as follow : —

1. Ferrum, annealed iron wire No. 35 or wrought iron nails free from oxide ; from which we have the preparation Vinum ferri, iron wine, iron digested in sherry wine for thirty days. (Strength, 1 in 20.)

2. Ferrum redactum, reduced iron, a powder containing at least 75 % of metallic iron and a variable amount of oxide. A preparation of it is Trochiscus ferri redacti (strength, 1 grain of reduced iron in each).

3. Ferri sulphas, ferrous sulphate, from which is prepared Mistura ferri composita, " Griffiths' mixture," containing ferrous sulphate 2 5 & T -t potassium carbonate 30 gr., myrrh 60 gr., sugar 60 gr., spirit of nutmeg 50 m., rose water 10 fl. oz.

4. Ferri sulphas exsiccatus, which has two subpreparations :

(a) Pilula ferri, " Blaud's pill " (exsiccated ferrous sulphate 150, exsiccated sodium carbonate 95, gum acacia 50, tragacanth 15, glycerin 10, syrup 150, water 20, each to contain about I grain of ferrous carbonate); (b) Pilula aloes et ferri (Barbadoes aloes 2, exsiccated ferrous sulphate I, compound powder of cinnamon 3, syrup of glucose 3).

5. Ferri carbonas saccharatus, saccharated iron carbonate. The carbonate forms about one-third and is mixed with sugar into a greyish powder.

6. Ferri arsenas, iron arsenate, ferrous and ferric arsenates with some iron oxides, a greenish powder.

7. Ferri phosphas, a slate-blue powder of ferrous and ferric phosphates with some oxide. Its preparations are: (a) Syrupus ferri phosphalis (strength, I gr. of ferrous phosphate in each fluid drachm) ;

(b) Syrupus ferri phosphatis cum quinina et slrychnina, " Easton's syrup " (iron wire 75 grs., concentrated phosphoric acid 10 fl. dr., powdered strychnine 5 gr., quinine sulphate 130 gr., syrup 14 fl. oz., water to make 20 fl. oz.), in which each fluid drachm represents 1

gr. of ferrous phosphate, f gr. of quinine sulphate, and fe gr. of strychnine.

8. Syrupus ferri iodidi, iron wire, iodine, water and syrup (strength, 5-5 gr. of ferrous iodide in one fl. dr.).

9. Liquor ferri perchloridi fortis, strong solution of ferric chloride (strength, 22-5 % of iron); its preparations only are prescribed, viz. Liquor ferri perchloridi and Tinctura ferri perchloridi.

10. Liquor ferri persulpkatis, solution of ferric sulphate.

11. Liquor ferri pernitratus, solution of ferric nitrate (strength, 3-3% of iron). . _

12. Liquor ferri acetatis, solution of ferric acetate.

13. The scale preparations of iron, so called because they are dried to form scales, are three in number, the base of all being ferric hydrate :

(a) Ferrum tartaratum, dark red scales, soluble in water.

(b) Ferri et quininae citratis, greenish yellow scales soluble in water.

(c) Ferri et ammonii citratis, red scales soluble in water, from which is prepared Vinum ferri citratis (ferri et ammonii citratis I gr., orange wine I fl. dr.).

*Substances containing tannic or gallic *=id turn black when compounded with a ferric salt, so it cannfl! be used in combination with vegetable astringents except with the infusion of quassia or calumba. Iron may, however, be prescribed in combination with digitalis by the addition of dilute phosphoric acid. Alkalis and their carbonates, lime water, carbonate of calcium, magnesia and its carbonate give green precipitates with ferrous and brown with ferric salts.*

Unofficial preparations of iron are numberless, and some of them are very useful. Ferri hydroxidum (U.S. P.), the hydrated oxide of iron, made by precipitating ferric sulphate with ammonia, is used solely as an antidote in arsenical poisoning. The Syrupus ferri phosphatis Co. is well known as " Parrish's " syrup or chemical food, and the

Pilulae ferri phosphatis cum quinina et strychnina, known as Easton's pills, form a solid equivalent to Eastern's syrup.

There are numerous organic preparations of iron. Ferratin is a reddish brown substance which claims to be identical with the iron substance found in pig's liver. Carniferrin is another tasteless powder containing iron in combination with the phosphocarnic acid of muscle preparations, and contains 35% of iron. Ferratogen is prepared from ferric nuclein. Triferrin is a paranucleinate of iron, and contains 22 % of iron and 2j % of organically combined phosphorus, prepared from the casein of cow s milk. Haemoglobin is extracted from the blood of an ox and may be administered in bolus form. Dieterich's solution of peptonated iron contains about 2 gr. of iron per oz. Vachetta has used the albuminate of iron with striking success in grave cases of anaemia. Succinate of iron has been prepared by Hausmann. Haematogen, introduced by Hommel, claims to contain the albuminous constituents of the blood serum and all the blood salts as well as pure haemoglobin. Sicco, the name given to dry haematogen, is a tasteless powder. Haemalbumen, introduced by Dahmen, is soluble in warm water.

Therapeutics. Iron is a metal which is used both as a food and as a medicine and has also a definite local action. Externally, it is not absorbed by the unbroken skin, but when applied to the broken skin, sores, ulcers and mucous surfaces, the ferric salts are powerful astringents, because they coagulate the albuminous fluids in the tissues themselves. The salts of iron quickly cause coagulation of the blood, and the clot plugs the bleeding vessels. They thus act locally as haemostatics or styptics, and will often arrest severe haemorrhage from parts which are accessible, such as the nose. They were formerly used in the treatment of post partum haemorrhage. The perchloride, sulphate and pernitrate arc strongly astringent; less extensively they are used in chronic discharges from the vagina, rectum and nose, while injected into the ,'cctum they destroy worms.

Internally, a large proportion of the various articles of ordinary diet contains iron. When given medicinally preparations of iron have an astringent taste, and the teeth and tongue are blackened owing to the formation of sulphide of iron. It is therefore advisable to take liquid iron preparations through a glass tube or a quill.

In the stomach all salts of iron, whatever their nature, are converted into ferric chloride. If iron be given in excess, or if the hydrochloric acid in the gastric juice be deficient, iron acts directly as an astringent upon the mucous membrane of the stomach wall.

Iron, therefore, may disorder the digestion even in healthy subjects. Acid preparations are more likely to do this, and the acid set free after the formation of the chloride may act as an irritant. Iron, therefore, must not be given to subjects in whom the gastric functions &re disturbed, and it should always be given after meals. Preparations which are not acid, or are only slightly acid, such as reduced iron, dialysed iron, the carbonate and scale preparations, do not disturb the digestion. If the sulphate is prescribed in the form of a pill, it may be so coated as only to be soluble in the intestinal digestive fluid. In the intestine the ferric chloride becomes changed into an oxide of iron; the sub-chloride is converted into a ferrous carbonate, which is soluble. Lower down in the bowel these compounds are converted into ferrous sulphide and tannate, and are eliminated with the faeces, turning them black. Iron in the intestine causes an astringent or constipating effect. The astringent salts are therefore useful occasionally to check diarrhoea and dysentery. Thus most salts of iron are distinctly constipating, and are best used in com- bination with a purgative. The pill of iron and aloes (B.P.) is de- signed for this purpose. Iron is certainly absorbed from the intestinal canal. As the iron in the food supplies all the iron in the body of a healthy person, there is no doubt that it is absorbed in the organic form. VVhether inorganic salts are directly absorbed has been a matter of much discussion ; it has, however,' been directly proved by the experiments of Kunkel (Archiv fur die gesamte Physiologie des Menschen und der Tiere, lxi.) and Gaule. The amount of iron existing in the human blood is only 38 gr. ; therefore, when an excess of iron is absorbed, part is excreted immediately by the bowel and kidneys, and part is stored in the liver and spleen.

Iron being a constituent part of the blood itself, there is a direct indication for the physician to prescribe it when the amount of haemoglobin in the blood is lowered or the red corpuscles arc diminished. In certain forms of anaemia the administration of iron rapidly improves the blood in both respects. The exact method in which the prescribed iron acts is still a matter of dispute. Ralph Stockman points out that there are three chief theories as to the action of iron in anaemia. The first is based on the fact that the iron in the haemoglobin of the blood must be derived from the food, therefore iron medicinally administered is absorbed. The second theory is that there is no absorption of iron given by the mouth, but it acts as a local stimulant to the mucous membrane, and so improves anaemia by increasing the digestion of the food. The third theory is that of Bunge, who says that in chlorotic conditions there is an excess of sulphuretted hydrogen in the bowel, changing the food iron

into sulphide of iron, which Bunge states cannot be absorbed. He believes that inorganic iron saves the organic iron of the food by combining with the sulphur, and improves anaemia by protecting the organic food iron. Stockman's own experiments are, however, directly opposed to Bunge's view. Wharfinger states that in chlorosis the specific action of iron is only obtained by administering those inorganic preparations which give a reaction with the ordinary re-agents; the iron ions in a state of dissociation act as a catalytic agent, destroying the hypothetical toxin which is the cause of chlorosis. Practical experience teaches every clinician that, what-ever the mode of action, iron is most valuable in anaemia, though in many cases, where there is well-marked toxaemia from absorption of the intestinal products, not only laxatives in combination with iron but intestinal antiseptics are necessary. That form of neuralgia which is associated with anaemia usually yields to iron.

IRON AGE, the third of the three periods, Stone, Bronze and Iron Ages, into which archaeologists divide prehistoric time; the weapons, utensils and implements being as a general rule made of iron (see Archaeology). The term has no real chronological value, for there has been no universal synchronous sequence of the three epochs in all quarters of the world. Some countries, such as the islands of the South Pacific, the interior of Africa, and parts of North and South America, have passed direct from the Stone to the Iron Age. In Europe the Iron Age may be said to cover the last years of the prehistoric and the early years of the historic periods. In Egypt, Chaldaea, Assyria, China, it reaches far back, to perhaps 4000 years before the Christian era. In Africa, where there has been no Bronze Age, the use of iron succeeded immediately the use of stone. In the Black Pyramid of Abusir (Vlth Dynasty), at least 3000 B.C., Gaston Maspero found some pieces of iron, and in the funeral text of Pepi I. (about 3400 B.C.) the metal is mentioned. The use of iron in northern Europe would seem to have been fairly general long before the invasion of Caesar. But iron was not in common use in Denmark until the end of the 1st century a.d. In the north of Russia and Siberia its introduction was even as late as a.d. 800, while Ireland enters upon her Iron Age about the beginning of the 1st century. In Gaul, on the other hand, the Iron Age dates back some 800 years B.C.; while in Etruria the metal was known some six centuries earlier. Homer represents Greece as beginning her Iron Age twelve hundred years before our era. The knowledge of iron spread from the south to the north of Europe. In approaching the East from the north of Siberia or from the south of Greece and the Troad, the history of iron in each country eastward is relatively later; while a review of

European countries from the north towards the south shows the latter becoming acquainted with the metal earlier than the former It is suggested that these facts support the theory that it is from Africa that iron first came into use. The finding of worked iron in the Great Pyramids seems to corroborate this view. The metal, however, is singularly scarce in collections of Egyptian antiquities. The explanation of this would seem to lie in the fact that the relics are in most cases* the paraphernalia of tombs, the funereal vessels and vases, and iron being considered an impure metal by the ancient Egyptians it was never used in their manufacture of these or for any religious purposes. This idea of impurity would seem a further proof of the African origin of iron. It was attributed to Seth, the spirit of evil who according to Egyptian tradition governed the central deserts of Africa. The Iron Age in Europe is character- ized by an elaboration of designs in weapons, implements and utensils. These are no longer cast but hammered into shape, and decoration is elaborate curvilinear rather than simple

rectilinear, the forms and character of the ornamentation of the Twrthern European weapons resembling in some respects Roman awns, while in others they are peculiar and evidently repre- sentative of northern art. The dead were buried in an extended position, while in the preceding Bronze Age cremation had been the rule.

See Lord Avebury, Prehistoric Times (1865; 1900); Sir J. Evans, Ancient Stone Implements (1897); Horae Ferales, or Studies in the A rchaeology oj Northern Nations, by Kemble (1863) ; Gaston C. C. Maspero, Guide du Mtisee de Boulaq, 296; Scotland in Pagan Times — The Iron Age, by Joseph Anderson (1883).

IRON AND STEEL. 1 1. Iron, the most abundant and the cheapest of the heavy metals, the strongest and most magnetic of known substances, is perhaps also the most indispensable of all save the air we breathe and the water we drink. For one kind of meat we could substitute another; wool could be replaced by cotton, silk or fur; were our common silicate glass gone, we could probably perfect and cheapen some other of the transparent solids; but even if the earth could be made to yield any substitute for the forty or fifty million tons of iron which we use each year for rails, wire, machinery, and structural purposes of many kinds, we could not replace either the steel of our cutting tools or the iron of our magnets, the basis of all

commercial electricity. This usefulness iron owes in part, indeed, to its abundance, through which it has led us in the last few thousands of years to adapt our ways to its; but still in chief part first to the single qualities in which it

very weak; conducting heat and electricity easily, and again offering great resistance to their passage; here welding readily, there incapable of welding; here very infusible, there melting with relative ease. The coincidence that so indispensable a thing should also be so abundant, that an iron-needing man should be set on an iron-cored globe, certainly suggests design. The indispensableness of such abundant things as air, water and light is readily explained by saying that their very abundance has evolved a creature dependent on them. But the indis- pensable qualities of iron did not shape man's evolution, because its great usefulness did not arise until historic times, or even, as in case of magnetism, until modern times.

These variations in the properties of iron are brought about in part by corresponding variations in mechanical and thermal treatment, by which it is influenced profoundly, and in part by variations in the proportions of certain foreign elements which it contains; for, unlike most of the other metals, it is never used in the pure state. Indeed pure iron is a rare curiosity. Foremost among these elements is carbon, which iron inevitably absorbs from the fuel used in extracting it from its ores. So strong is the effect of carbon that the use to which the metal is put, and indeed its division into its two great classes, the malleable one, comprising steel and wrought iron, with less than 2 '20% of carbon, and the unmalleable one, cast iron, with more than this quantity, are based on carbon-content. (See Table I.)

Table I. — General Classification of Iron and Steel according (1) to Carbon- Content and (2) to Presence or Absence of Inclosed Slag.

Containing very little Carbon (say, less than 0-30%).

Containing an Intermediate

Quantity of Carbon (say, between

0-30 and 2-2 %).

Containing much Carbon (say, from 2-2 to 5%).

Slag-bearing or " Weld-metal " Series.

Wrought Iron. Puddled and bloomary, or Charcoal- hearth iron belong here.

Weld Steel.

Puddled and blister steel

belong here.

Slaglcss or " Ingot- Metal " Series.

Low-Carbon or Mild Steel, sometimes called " ingot-ircn."

It may be either Bessemer, open- hearth, or crucible steel.

Half-Hard and High-Carbon Steels, sometimes called " ingot-steel." They may be either Bessemer, open-hearth, or crucible steel. Malleable cast iron also often belongs here.

Cast Iron.

Normal cast iron, " washed " metal, and most " malleable cast iron " belong here.

Alloy Steels.

Nickel, manganese, tungsten, and

chrome steels belong here.

*Alloy Cast Irons.**

Spiegeleisen, ferro-manganese, and

silico-spiegel belong here.

- *The term " Alloy Cast Irons " is not actually in frequent use, not because of any question as to its fitness or meaning, but because the need of such a generic term rarely arises in the industry.*

excels, such as its strength, its magnetism, and the property which it alone has of being made at will extremely hard by sudden cooling and soft and extremely pliable by slow cooling; second, to the special combinations of useful properties in which it excels, such as its strength with its ready welding and shaping both hot and cold; and third, to the great variety of its pro- perties. It is a very Proteus. It is

extremely hard in our files and razors, and extremely soft in our horse-shoe nails, which in some countries the smith rejects unless he can bend them on his forehead; with iron we cut and shape iron. It is extremely magnetic and almost non-magnetic; as brittle as glass and almost as pliable and ductile as copper; extremely springy, and springless and dead; wonderfully strong, and

1 The word " iron " was in O. Eng. iren, isern or isen, cf. Ger. Eisen, Dut. ysen, Swed. jam, Dan.j'erH ; the original Teut. base is isarn, and cognates are found in Celtic, Ir. iarun, Gael, iarunu, Breton, houarn, &c. The ulterior derivation is unknown ; connexion has been suggested without much probability with is, ice, from its hard bright surface, or with Lai. aes, aeris, brass. The change from isen to iren (.in 16th cent, yron) is due to rhotacism, but whether direct from isen or through isern, irern is doubtful. " Steel "■ represents the O. Eng. stel or stHe (the true form ; only found, however, with spelling style, cf. styl-ecg, steel-edged), cognate with

XIV. 26

2. Nomenclature. — Until about i860 there were only three important classes of iron — wrought iron, steel and cast iron. The essential characteristic of wrought iron was its nearly complete freedom from carbon; that of steel was its moderate carbon-content (say between 0-30 and 2-2%), which, though great enough to confer the property of being rendered intensely hard and brittle by sudden cooling, yet was not so great but that the metal was malleable when cooled slowly; while that of cast iron was that it contained so much carbon as to be very brittle whether cooled quickly or slowly. This classification was based on carbon-content, or on the properties which it gave. Beyond this, wrought iron, and certain classes of steel which then were important, necessarily contained much slag or " cinder," because they were made by welding together pasty particles of metal in a bath of slag, without subsequent fusion. . But the best class of steel, crucible steel, was freed from slag by fusion in crucibles; hence its name, " cast steel." Between i860 and 1870 the invention of the Bessemer and open-hearth processes introduced a new class of iron to-day called " mild " or " low- carbon steel," which lacked the essential property of steel, the hardening power, yet differed from the existing forms of wrought iron in freedom from slag, and from cast iron in being very malleable. Logically it was wrought iron, the essence of which was that it was (1) "iron" as distinguished from steel, and

(2) malleable, i.e. capable of being " wrought." This name did not please those interested in the new product, because existing wrought iron was a low-priced material. Instead of inventing a wholly new name for the wholly new product, they appropriated the name " steel," because this was associated in the public mind with superiority. This they did with the excuse that the new product resembled one class of steel — cast steel— in being free from slag; and, after a period of protest, all acquiesced in calling it " steel," which is now its firmly established name. The old varieties of wrought iron, steel and cast iron preserve their old names; the new class is called steel by main force. As a result, certain varieties, such as blister steel, are called " steel " solely because they have the hardening power, and others, such as low-carbon steel, solely because they are free from slag. But the former lack the essential quality, slaglessness, which makes the latter steel, and the latter lack the essential quality, the hardening power, which makes the former steel. " Steel " has come gradually to stand rather for excellence than for any specific quality. These anomalies, however confusing to the general reader, in fact cause no appreciable trouble to important makers or users of iron and steel, beyond forming an occasional side-issue in litigation.

3. Definitions. — Wrought iron is slag-bearing malleable iron, containing so little carbon (0-30% or less), or its equivalent, that it does not harden greatly when cooled suddenly.

Steel is iron which is malleable at least in some one range of temperature, and also is either (a) cast into an initially malleable mass, or (b) is capable of hardening greatly by sudden cooling, or © is both so cast and so capable of hardening. (Tungsten steel and certain classes of manganese steel are malleable only when red-hot.) Normal or carbon steel contains between 0-30 and 2- 20% of carbon, enough to make it harden greatly when cooled suddenly, but not enough to prevent it from being usefully malleable when hot.

Cast iron is, generically, iron containing so much carbon (2-20% or more) or its equivalent that it is not usefully malleable at any temperature. Specifically, it is cast iron in the form of castings other than pigs, or remelted cast iron suitable for such castings, as distinguished from pig iron, i.e. the molten cast iron as it issues from the blast furnace, or the pigs into which it is cast.

Malleable cast iron is iron which has been cast in the condition of cast iron, and made malleable by subsequent treatment without fusion.

Alloy steels and cast irons are those which owe their properties chiefly to the presence of one or more elements other than carbon. Ingot iron is slagless steel with less than 0-30% of carbon. Ingot steel is slagless steel containing more than 0ˆ30 % of carbon.

Weld steel is slag-bearing iron malleable at least at some one temperature, and containing more than 0-30% of carbon.

4. Historical Sketch. — The iron oxide of which the ores of iron consist would be so easily deoxidized and thus brought to the metallic state by the carbon, i.e. by the glowing coals of any primeval savage's wood fire, and the resulting metallic iron would then differ so strikingly from any object which he had previously seen, that its very early use by our race is only natural. The first observing savage who noticed it among his ashes might easily infer that it resulted from the action of burning wood on certain extremely heavy stones. He could pound it out into many useful shapes. The natural steps first of making it intention- ally by putting such stones into his fire, and next of improving his fire by putting it and these stones into a cavity on the weather side of some bank with an opening towards the prevalent wind, would give a simple forge, differing only in size, in lacking forced blast, and in details of construction, from the Catalan forges and bloomaries of to-day. Moreover, the coals which deoxidized the iron would inevitably carburize some lumps of it, here so far as to turn it into the brittle and relatively useless cast iron, there only far enough to convert it into steel, strong and very useful even in its unhardened state. Thus it is almost certain that much of the earliest iron was in fact steel. How soon after

man's discovery, that he could beat iron and steel out while cold into useful shapes, he learned to forge it while hot is hard to conjecture. The pretty elaborate appliances, tongs or their equivalent, which would be needed to enable him to hold it conveniently while hot, could hardly have been devised till a very much later period; but then he may have been content to forge it inconveniently, because the great ease with which it mashes out when hot, perhaps pushed with a stout stick from the fire to a neighbouring fiat stone, would compensate for much inconvenience. However this may be, very soon after man began to practise hot-forging he would inevitably learn that sudden cooling, by quenching in water, made a large proportion of his metal, his steel, extremely hard and brittle, because he would

certainly try by this very quenching to avoid the inconvenience of having the hot metal about. But the invaluable and rather delicate art of tempering the hardened steel by a very careful and gentle reheating, which removes its extreme brittleness though leaving most of its precious hardness, needs such skilful handling that it can hardly have become known until very long after the art of hot-forging.

The oxide ores of copper would be deoxidized by the savage's wood fire even more easily than those of iron, and the resulting copper would be recognized more easily than iron, because it would be likely to melt and run together into a mass conspicuous by its bright colour and its very great malleableness. From this we may infer that copper and iron probably came into use at about the same stage in man's development, copper before iron in regions which had oxidized copper ores, whether they also had iron ores or not, iron before copper in places where there were pure and easily reduced ores of iron but none of copper. Moreover, the use of each metal must have originated in many different places independently. Even to-day isolated peoples are found with their own primitive iron-making, but ignorant of the use of copper.

If iron thus preceded copper in many places, still more must it have preceded bronze, an alloy of copper and tin much less likely than either iron or copper to be made unintentionally. Indeed, though iron ores abound in many places which have neither copper nor tin, yet there are but few places which have both copper and tin. It is not improbable that, once bronze became known, it might replace iron in a measure, perhaps even in a very large measure, because it is so fusible that it can be cast directly and easily into many useful shapes. It seems to be much more prominent than iron in the Homeric poems; but they tell us only of one region at one age. Even if a nation here or there should give up the use of iron completely, that all should is neither probable nor shown by the evidence. The absence of iron and the abundance of bronze in the relics of a prehistoric people is a piece of evidence to be accepted with caution, because the great defect of iron, its proneness to rust, would often lead to its complete disappearance, or conversion into an unrecognizable mass, even though tools of bronze originally laid down beside it might remain but little corroded. That the ancients should have discovered an art of hardening bronze is grossly improbable, first because it is not to be hardened by any simple process like the hardening of steel, and second because, if they had, then a large proportion of the ancient bronze tools now known ought to be hard, which is not the case. Because iron would be so easily made by prehistoric and even by*

primeval man, and would be so useful to him, we are hardly surprised to read in Genesis that Tubal Cain, the sixth in descent from Adam, discovered it; that the Assyrians had knives artd saws which, to be effective, must have been of hardened steel, i.e. of iron which had absorbed some carbon from the coals with which it had been made, and had been quenched in water from a red heat; that an iron tool has been found embedded in the ancient pyramid of Kephron (probably as early as 3500 B.C.); that iron metallurgy had advanced at the time of Tethmosis (Thothmes) III. (about 1500 B.C.) so far that bellows were used for forcing the forge fire; that in Homer's time (not later than the 9th century B.C.) the delicate art of hardening and tempering steel was so familiar that the poet used it for a simile, likening

the hissing of the stake which Ulysses drove into the eye of Polyphemus to that of the steel which the smith quenches in water, and closing with a reference to the strengthening effect of this quenching; and that at the time of Pliny (a.d. 23-79) the relative value of different baths for hardening was known, and oil preferred for hardening small tools. These instances of the very early use of this metal, intrinsically at once so useful and so likely to disappear by rusting away, tell a story like that of the single foot-print of the savage which the waves left for Robinson Crusoe's warning. Homer's familiarity with the art of tempering could come only after centuries of the wide use of iron.

5. Three Periods. — The history of iron may for convenience be divided into three periods: a first in which only the direct extraction of wrought iron from the ore was practised; a second which added to this primitive art the extraction of iron in the form of carburized or cast iron, to be used either as such or for conversion into wrought iron; and a third in which the iron worker used a temperature high enough to melt wrought iron, which he then called molten steel. For brevity we may call these the periods of wrought iron, of cast iron, and of molten steel, recognizing that in the second and third the earlier pro- cesses continued in use. The first period began in extremely remote prehistoric times; the second in the 14th century; and the third with the invention of the Bessemer process in 1856.

6. First Period. — We can picture to ourselves how in the first period the savage smith, step by step, bettered his control over his fire, at

once his source of heat and his deoxidizing agent. Not con- tent to let it burn by natural draught, he would blow it with his own breath, would expose it to the prevalent wind, would urge it with a fan, and would devise the first crude valveless bellows, perhaps the pigskin already familiar as a water-bottle, of which the psalmist says: " lam become as a bottle in the smoke. ' ' To drive the air out of this skin by pressing on it, or even by walking on it, would be easy; to fill it again with air by pulling its sides apart with his fingers would be so irksome that he would soon learn to distend it by means of strings. If his bellows had only a single opening, that through which they delivered the blast upon the fire, then in inflating them he would draw back into them the hot air and ashes from the fire. To prevent this he might make a second or suction hole, and thus he would have a veritable engine, perhaps one of the very earliest of all. While inflating the bellows he would leave the suction port open and close the discharge port with a pinch of his finger; and while blowing the air against the fire he would leave the discharge port open and pinch together the sides of the suction port.

The next important step seems to have been taken in the 4th century when some forgotten Watt devised valves for the bellows. But in spite of the activity of the iron manufacture in many of the Roman provinces, especially England, France, Spain, Carinthia and near the Rhine, the little forges in which iron was extracted from the ore remained, until the 14th century, very crude and wasteful of labour, fuel, and iron itself: indeed probably not very different from those of a thousand years before. Where iron ore was found, the local smith, the Waldschmied, converted it with the charcoal of the surrounding forest into the wrought iron which he worked up. Many farmers had their own little forges or smithies to supply the iron for their tools.

The fuel, wood or charcoal, which served both to heat and to deoxidize the ore, has so strong a carburizing action that it would turn some of the resultant metal into " natural steel," which differs from wrought iron only in containing so much carbon that it is re- latively hard and brittle in its natural state, and that it becomes intensely hard when quenched from a red heat in water. Moreover, this same carburizing action of the fuel would at times go so far as to turn part of the metal into a true cast iron, so brittle that it could not be worked at all. In time the smith learnt how to convert this unwelcome product into wrought iron by remelting it in the forge, exposing it to the blast in such a way as to burn out most of its carbon.

7. Second Period. — With the second period began, in the 14th

century, the gradual displacement of the direct extraction of wrought iron from the ore by the intentional and regular use of this indirect method of first carburizing the metal and thus turning it into cast iron, and then converting it into wrought iron by remelting it in the forge. This displacement has been going on ever since, and it is not quite complete even to-day. It is of the familiar type of the replacing of the simple but wasteful by the complex and economical, and it was begun unintentionally in the attempt to save fuel and labour, by increasing the size and especially the height of the forge, and by driving the bellows by means of water-power. Indeed it was the use of water-power that gave the smith pressure strong enough to force his blast up through a longer column of ore and fuel, and thus enabled him to increase the height of his forge, enlarge the scale of his operations, and in turn save fuel and labour. And it was the lengthen-

ing of the forge, and the length and intimacy of contact between ore and fuel to which it led, that carburized- the metal and turned it into cast iron. This is so fusible that it melted, and, running together into a single molten mass, freed itself mechanically from the " gangue," as the foreign minerals with which the ore is mixed are called. Finally, the improvement in the quality of the iron which resulted from thus completely freeing it from the gangue turned out to be a great and unexpected merit of the indirect process, probably the merit which enabled it, in spite of its complexity, to drive out the direct process. Thus we have here one of these cases common in the evolution both of nature and of art, in which a change, made for a specific purpose, has a wholly unforeseen advantage in another direction, so important as to outweigh that for which it was made and to determine the path of future development.

With this method of making molten cast iron in the hands of a people already familiar with bronze founding, iron founding, i.e. the casting of the molten cast iron into shapes which were useful in spite of its brittleness, naturally followed. Thus ornamental iron castings were made in Sussex in the 14th century, and in the 16th cannons weighing three tons each were cast.

The indirect process once established, the gradual increase in the height and diameter of the high furnace, which has lasted till our own days, naturally went on and developed the gigantic blast furnaces of the present time, still called " high furnaces " in French and German. The impetus which the indirect process and the acceleration of civilization in the 15th and 1 6th centuries gave to the iron industry was so great that the demands of the iron masters for

fuel made serious inroads on the forests, and in 1558 an act of Queen Elizabeth's forbade the cutting of timber in certain parts of the country for iron-making. Another in 1584 forbade the building of any more iron-works in Surrey, Kent, and Sussex. This increasing scarcity of wood was probably one of the chief causes of the attempts which the iron masters then made to replace charcoal with mineral fuel. In 161 1 Simon Stcrtevant patented the use of mineral coal for iron-smelting, and in 1619 Dud Dudley made with this coal both cast and wrought iron with technical success, but through the opposition of the charcoal iron-makers all of his many attempts were defeated. In 1625 Stradda's attempts in Hainaut had no better success, and it was not till more than a century later that iron- smelting with mineral fuel was at last fully successful. It was then, in 1735, that Abraham Darby showed how to make cast iron with coke in the high furnace, which by this time had become a veritable blast furnace.

The next great improvement in blast-furnace practice came in 181 1, when Aubertot in France used for heating steel the furnace gases rich in carbonic oxide which till then had been allowed to burn uselessly at the top of the blast furnace. The next was J. B. Neilson's invention in 1828 of heating the blast, which increased the pro- duction and lessened the fuel-consumption of the furnace wonder- fully. Very soon after this, in 1832, the work of heating the blast was done by means of the waste gases, at Wasseralfingen in Bavaria.

Meanwhile Henry Cort had in 1784 very greatly simplified the conversion of cast iron into wrought iron. In place of the old forge, in which the actual contact between the iron and the fuel, itself an energetic carburizing agent, made decarburization difficult, he devised the reverberatory puddling furnace (see fig. 14 below), in which the iron lies in a chamber apart from the fire-place, and is thus protected from the carburizing action of the fuel, though heated by the flame which that fuel gives out.

The rapid advance in mechanical engineering in the latter part of this second period stimulated the iron industry greatly, giving it in 1728 Payn and Hanbury's rolling mill for rolling sheet iron, in 1760 John Smeaton's cylindrical cast-iron bellows in place of the wooden and leather ones previously used, in 1783 Cort's grooved rolls for rolling bars and rods of iron, and in 1838 James Nasmyth's steam hammer. But even more important than these were the advent of the steam' engine between 1760 and 1770, and of the railroad in 1825, each of which gave the iron industry a great impetus. Both created a great demand for iron, not only for themselves but for the industries which they in turn stimulated; and both directly aided the iron master: the

steam engine by giving him powerful and con- venient tools, and the railroad by assembling his materials and distributing his products.

About 1740 Benjamin Huntsman introduced the " crucible process " of melting steel in small crucibles, and thus freeing it from the slag, or rich iron silicate, with which it, like wrought iron, was mechanically mixed, whether it was made in the old forge or in the puddling furnace. This removal of the cinder very greatly improved the steel ; but the process was and is so costly that it is used only for making steel for purposes which need the very best quality.

*8. Third Period. — The third period has for its great distinction the invention of the Bessemer and open-hearth processes, which are like Huntsman's crucible process in that their essence is their freeing wrought iron and low carbon steel from mechanically entangled cinder, by developing the hitherto unattainable temperature, rising to above 1500° C, needed for melting these relatively infusible pro- ducts. These processes are incalculably more important than Huntsman's, both because they are; incomparably cheaper, and because their products are far more ijpef*il than his.*

Thus the distinctive work of thˆseˆcond and third periods is freeing

the metal from mechanical impurities by fusion. The second period, by converting the metal into the fusible cast iron and melting this, for the first time removed the gangue of the ore; the third period by giving a temperature high enough to melt the most infusible forms of iron, liberated the slag formed in deriving them from cast iron.

In 1856 Bessemer not only invented his extraordinary process of making the heat developed by the rapid oxidation of the impurities in pig iron raise the temperature above the exalted melting-point of the resultant purified steel, but also made it widely known that this steel was a very valuable substance. Knowing this, and having in the Siemens regenerative gas furnace an independent means of gener- ating this temperature, the Martin brothers of Sireuil in France in 1864 developed the open-hearth process of making steel of any desired carbon-content by melting together in this furnace cast and wrought iron. The great defect of both these processes, that they could not remove the baneful phosphorus with which all the ores of iron are associated, was remedied in 1878 by S. G. Thomas, who

showed that, in the presence of a slag rich in lime, the whole of the phosphorus could be removed readily.

y. After the remarkable development of the blast, furnace, the Bessemer, and the open-hearth processes, the most important work of this, the third period of the history of iron, is the birth and growth of the science and art of iron metallography. In 1868 Tschernoff enunciated its chief fundamental laws, which were supplemented in 1885 by the laws of Brinell. In 1888 F. Osmond showed that the wonderful changes wh ich thermal treatment andthe presence of certain foreign elements cause were due to allotropy, and from these and like teachings have come a rapid growth of the use of the so-called " alloy steels" in which, thanks to special composition and treatment, the iron exists in one or more of its remarkable allotropic states. These include the austenitic or gamma non-magnetic manganese steel, already patented by Robert Hadfield in 1S83, the first important known substance which combined great mjlleableness with great hardness, and the martensitic or beta " high speed tool steel " of White and Taylor, which retains its hardness and cutting power even at a red heat.

10. Constitution of Iron and Steel. — The constitution of the various classes of iron and steel as shown by the microscope explains readily the great influence of carbon which was outlined in §§ 2 and 3. The metal in its usual slowly cooled state is a conglomerate like the granitic rocks. Just as a granite is a conglomerate or mechanical mixture of distinct crystalline grains of three perfectly definite minerals, mica, quartz, and felspar, so iron and steel in their usual slowly cooled state consist of a mixture of microscopic particles of such definite quasi- minerals, diametrically unlike. These are cementite, a definite iron carbide, Fe:sC, harder than glass and nearly as brittle, but probably very strong under gradually and axially applied stress; and ferrite, pure or nearly pure metallic a-iron, soft, weak, with high electric conductivity, and in general like copper except in colour. In view of the fact that the presence of 1 % of carbon implies that 15% of the soft ductile ferrite is replaced by the glass-hard cementite, it is not surprising that even a – little carbon influences the properties of the metal so profoundly.

But carbon affects the properties of iron not only by giving rise to varying proportions of cementite, but also both by itself shifting from one molecular state to another, and by enabling us to hold the iron itself in its unmagnetic allotropic forms, j3- and 7-iron, as will be explained below. Thus, sudden cooling from a red heat leaves the carbon not in definite combination as cementite, but actually

dissolved in /J- and 7-allotropic iron, in the conditions known as martensite and austenite, not granitic but glass-like bodies, of which the " hardened " and " tempered " steel of our cutting tools in large part consists. Again, if more than 2% of carbon is present, it passes readily into the state of pure graphitic carbon, which, in itself soft and weak, weakens and embrittles the metal as any foreign body would, by breaking op its continuity.

11. The Roberts- Austen or carbon-iron diagram (fig. 1), in which vertical distances represent temperatures and horizontal ones the percentage of carbon in the iron, aids our study of these constituents of iron. If, ignoring temporarily and for simplicity the fact that part of the carbon may exist in the state of graphite, we consider the behaviour of iron in cooling from the molten state, AB and BC give the temperature at which, for any given percentage of carbon, solidification begins, and Aa, aB, and Be that at which it ends. But after solidification is complete and the metal has cooled to a much lower range of temperature,

usually between 900 and 690° C, it undergoes a very remarkable series of transformations. GHSa gives the temperature at which , for any given percentage of carbon, these transformations begin, and PSP' that at which they end.

These freezing-point curves and transformation curves thus divide the diagram into 8 distinct regions, each with its own specific state or constitution of the metal, the molten state for region 1, a mixture of molten metal and of solid austenite for region 2, austenite alone for region 4 and so on. This will be explained below. If the metal followed the laws of equilibrium, then whenever through change of temperature it entered a new region, it would forthwith adopt the constitution normal to that region. But in fact the change of constitution often lags greatly, so that the metal may have the constitution normal to a region higher than that in which it is, or even a patchwork constitution, representing fragments of those of two or more regions. It is

Cast Iron

Steel

*s«a 3-o a'-s «*n «*a*

*07*8 QT'O e6'6 96- O 85*5 00-0*

Percentage Composition

Fig. i.- — Roberts- Austen or Carbon-Iron diagram. The Cementite-Austenitc or Metastable form.

by taking advantage of this lagging that thermal treatment causes such wonderful changes in the properties of the cold metal.

12. With these facts in mind we may now study further these different constituents of iron.

Austenite, gamma (y) iron. — Austenite is the name of the solid solution of an iron carbide in allotropic 7-iron of which the metal normally consists when in region 4. In these solid solutions, as in aqueous ones, the ratios in which the different chemical substances are present are not fixed or definite, but vary from case to case, not per solium as between definite chemical compounds, but by infinitesimal steps. The different substances are as it were dissolved in each other in a state which has the indefiniteness of composition, the absolute merging of identity, and the weakness of reciprocal chemical attraction, characteristic of aqueous solutions.

On cooling into region 6 or 8 austenite should normally split up into ferrite and cementite, after passing through the successive stages of martensite, troostite and sorbite, Fe I C = Fe 3 C-fFed-s). But this change may be prevented so as to preserve the austenite in the cold, either very incompletely, as when high-carbon steel is " hardened," i.e. is cooled suddenly by quenching in water, in which case the carbon present seems to act as a brake to retard the change; or completely, by the presence of a large quantity of manganese, nickel, tungsten or molybdenum, which in effect sink the lower boundary GHSa of region 4 to below the atmospheric tempera- ture. The important manganese steels of commerce and certain nickel steels are manganiferous and niccoliferous austenite, un- magnetic and hard but ductile.

Austenite may contain carbon in any proportion up to about 2-2 %. It is non-magnetic, and, when preserved in the cold either by quenching or by the presence of manganese, nickel, &c, it has a very remarkable combination of great malleability with very marked hard- ness, though it is less hard than common carbon steel is when hardened, and probably less hard than martensite. When of eutectoid com- position, it is called " hardenite." Suddenly cooled carbon steel.

even if rich in austenite, is strongly magnetic because of the very magnetic a-iron which inevitably forms even in the most rapid cooling from region 4. Only in the presence of much manganese, nickel, or their equivalent can the true austenite be preserved in the cold so completely that the steel remains non-magnetic.

13. Beta (fi) iron, an unmagnetic, intensely hard and brittle allotropic form of iron, though normal and stable only in the little triangle GHM, is yet a state through which the metal seems always to pass when the austenite of region 4 changes into the ferrite and cementite of regions 6 and 8. Though not normal below MHSP', yet like 7-iron it can be preserved in the cold by the presence of about 5°o of manganese, which, though not enough to bring the lower boundary of region 4 below the atmospheric temperature and thus to preserve austenite in the cold, is yet enough to make the transformation of /3 into o iron so sluggish that the former remains untransformed even during slow cooling.

Again. /3-iron may be preserved incompletely as in the " hardening of steel." which consists in heating the steel into the austenite state of region 4, and then cooling it so rapidly, e.g. by quenching it in cold water, that, for lack of the time needed for the completion of the change from austenite into ferrite and cementite, much of the iron is caught in transit in the (3 state. According to our present theory, it is chiefly to beta iron, preserved in one of these ways, that all of our tool steel proper, i.e. steel used for cutting as distinguished from grinding, seems to owe its hardness.

14. Martensite, Troostile and Sorbite are the successive stages through which the metal passes in changing from austenite into ferrite and cementite. Martensite, very hard because of its large content of (3-iron, is characteristic of hardened steel, but the two others, far from being definite substances, are probably only roughly bounded stages of this transition. Troostile and sorbite, indeed, seem to be chiefly very finely divided mixtures of ferrite and cementite, and it is probably because of this fineness that sorbitic steel has its remarkable combination of strength and elasticity with ductility which fits it for resisting severe vibratory and other dynamic stresses, such as those to which rails and shafting are exposed.

15. Alpha (a) iron is the form normal and stable for regions 5, 6 and 8, i.e. for all temperatures below MHSP'. It is the common, very magnetic form of iron, in itself ductile but relatively soft and weak, as we know- it in wrought iron and mild or low-carbon steel.

16. Ferrite and cementite, already described in § 10, are the final products of the transformation of austenite in slow-cooling. /?-ferrite and austenite are the normal constituents for the triangle GHM, a-ferrite (i.e. nearly pure a-iron) with austenite for the space MHSP, cementite with austenite for region 7, and a-ferrite and cementite jointly for regions 6 and 8. Ferrite and cementite are thus the normal and usual constituents of slowly cooled steel, including all structural steels, rail steel, &c, and of white cast iron (see § 18).

17. Pcarlite. — The ferrite and cementite present interstratify habitually as a " eutectoid " 1 called " pearlite " (see Alloys, PI., fig. 11), in the ratio of about 6 parts of ferrite to 1 of cementite, and hence containing about 0-90% of carbon. Slowly cooled steel containing just 0-90 ° of carbon (S in fig. 1) consists of pearlite alone. Steel and white cast iron with more than this quantity of carbon consist typically of kernels of pearlite surrounded by envelopes of free cementite (see Alloys, PL, fig. 13) sufficient in quantity to represent their excess of carbon over the eutectoid ratio; they arc called " hyper-eutectoid," and are represented by region 8 of fig. 1 . Steel containing less than this quantity of carbon consists typically of kernels of pearlite surrounded by envelopes of ferrite (see Alloys, PL, fig. 12) sufficient in quantity to represent their excess of iron over this eutectoid ratio; is called " hypo-eutectoid "; and is represented by region 6 of fig. I. This typical " envelope and kernel " structure is often only rudimentary.

1 A " eutectic " is the last-freezing part of an alloy, and corresponds to what the mother-liquor of a saline solution would become if such a solution, after the excess of saline matter had been crystallized out, were finally completely frozen. It is the mother-liquor or " bittern " frozen. Its striking characteristics are: (1) that for given metals alloyed together its composition is fixed, and does not vary with the proportions in which those metals are present, because any " excess metal," i.e. so much of either metal as is present in excess over the eutectic ratio, freezes out before the eutectic; (2) that though thus constant, its composition is not in simple atomic proportions; (3) that its freezing-point is constant; and (4) that, when first formed, it habitually consists of interstratified plates of the metals which compose it. If the alloy has a composition very near that of its own eutectic, then when solidified it of course contains a large proportion of the eutectic, and only a small proportion of the excess metal. If it differs widely from the eutectic in composition, then when solidi- fied it consists of only a small quantity of eutectic and a very large quantity of the excess metal. But, far below the freezing-point, transformations may take place in the solid metal, and follow a

course quite parallel with that of freezing, though with no suggestion of liquidity. A " eutectoid " is to such a transformation in solid metal what a eutectic is to freezing proper. It is the last part of the metal to undergo this transformation and, when thus transformed, it is of constant though not atomic composition, and habitually consists ol intcr.-tratified plates of its component metals.

The percentage of pearlite and of free ferrite or cementite in these products is shown in fig. 2, in which the ordinates of the line ABC represent the percentage of pearlite corresponding to each percentage of carbon, and the intercept ED, MN or KF, of any point H, P or L,

).ˆ s V2 1.6 2-0 2-4 fl-8 3-2 3-6 4-0 4,3 4-4 4-8 ?2 5-6 6-0 0-4 »'«7

Percentage of Combined Carbon

Fig. 2. — Relation between the carbon-content and the percentage of the several constituents of slowly cooled steel and white cast iron,

measuresHne" percentage of the excess of ferrite or cementite for hypo- and hyper-eutectic steel and white cast iron respectively.

*18. The Carbon-Content, i.e. Die Ratio of Ferrite to Cementite, oj certain typical Steels. — Fig. 3 shows how, as the carbon-content rises from o to 4-5 %, the percentage of the glass-hard cementite, which is 15 times that of the carbon itself, rises, and that of the soft copper- like ferrite falls, with consequent continuous increase of hardness and loss of maileableness and ductility. The tenacity or tensile strength increases till the carbon-content reaches about I 25 %, and the cementite about 19 %, and then in turn falls, a result by no means surprising. The presence of a small quantity of the hard cementite ought naturally to strengthen the mass, by opposing the tendency of the soft ferrite to flow under any stress applied to it; but more cementite by its brittleness naturally weakens the mass, causing it to crack open under the distortion which stress inevitably causes. The fact that this decrease of strength begins shortly after the carbon content rises above the eutectoid or pearlite ratio of 0*90 % is natural, because the brittleness of the cementite which, in hyper-eutectoid steels, forms a more or less continuous skeleton (Alloys, PL, fig. 13) should be much more effective in starting cracks under distortion than that of the far more minute particles of cementite which lie embedded, indeed drowned, in the sixfold greater mass of ferrite with which they are associated in the pearlite itself. The large massive plates of cementite which form the network or skeleton in hyper-eutectoid steels should, under distortion, naturally tend to cut,*

in the softer pearlite, chasms too serious to be healed by the inflowing of the plastic ferrite, though this ferrite flows around and Steel White Cast Iron

*1-5 2-0 2-5 3*0 3-5 4-0 4-fi*

Percentage of Carbon «— -_ Tenacity — ..... Ductility _._—.. Hardness ..Per cent ferrite or Cementite*

Flo. 3.— Physical properties and assumed microscopic con- stitution of the pearlite series, graphiteless steel slowly cooled and white cast iron. By " total ferrite " is meant both that which forms part of the pearlite and that which is in excess of the pearlite, taken jointly. So with the " total cementite."

immediately heals over any cracks which form in the small quantity of cementite interstratified with it in the pearlite of hypo-eutectoid steels.

As the carbon-content increases the welding power naturally decreases rapidly, because of the rapid fall of the " solidus curve at which solidification is complete (Ao of fig. i), and hence of the range in which the steel is coherent enough to be manipulated, and, finally, of the attainable pliancy and softness of the metal. Clearly the mushy mixture of solid austenite and molten iron of which the metal in region 2 consists cannot cohere under either the blows or the pressure by means of which welding must be done. Rivet steel, which above all needs extreme ductility to endure the distortion of being driven home, and tube steel which must needs weld easily, no matter at what sacrifice of strength, are made as free from carbon, i.e. of as nearly pure ferrite, as is practicable. The distortion which rails undergo in manufacture and use is incomparably less than that to which rivets are subjected, and thus rail steel may safely be much richer in carbon and hence in cementite, and therefore much stronger and harder, so as to better endure the load and the abrasion of the passing wheels. Indeed, its carbon-content is made small quite as much because of the violence of the shocks from these wheels as because of any actual distortion to be expected, since, within limits, as the

carbon-content increases the shock-resisting power decreases. Here, as in all cases, the carbon-content must be the result of a

compromise, neither so small that the rail flattens and wears out like lead, nor so great that it snaps like glass. Boiler plates undergo in shaping and assembling an intermediate degree of distortion, and therefore they must be given an intermediate carbon-content, following the general rule that the carbon-content and hence the strength should be as great as is consistent with retaining the degree of ductility and the shock-resisting power which the object will need in actual use. Thus the typical carbon-content may be taken as about 0-05 % for rivets and tubes, 0-20% for boiler plates, and 0-50 to 0-75% for rails, implying the presence of 075 % of cementite in the first two, 3 % in the third and 75% to 11-25% in the last.

19. Carbon-Content of Hardened Steels.— Turning from these cases in which the steel is used in the slowly cooled state, so that it is a mixture of pearlite with ferrite or cementite, i.e. is pearlitic, to those in which it is used in the hardened or martensitic state, we> find that the carbon-content is governed by like considerations. Railway car springs, which are exposed to great shock, have typically about °'75% of carbon; common tool steel, which is exposed to less severe shock, has usually between 0-75 and 1-25%; file steel, which is subject to but little shock, and has little demanded of it but to bite hard and stay hard, has usually from 1-25 to 1-50%. The carbon-content of steel is rarely greater than this, lest the brittleness be excessive. But beyond this are the very useful, because very fusible, cast iron3 with from 3 to 4 % of carbon, the embrittling effect of which is much lessened by its being in the state of graphite.

20. Slag or Cinder, a characteristic component of wrought iron, which usually contains from 0-20 to 2-O0% of it,_ is essentially a silicate of iron (ferrous silicate), and is present in wrought iron simply because this product is made by welding together pasty granules of iron in a molten bath of such slag, without ever melting the resultant mass or otherwise giving the envelopes of slag thus imprisoned a chance to escape completely.

21. Graphite, nearly pure carbon, is characteristic of " gray cast iron," in which it exists as a nearly continuous skeleton of very thin laminated plates or flakes (fig. 27), usually curved, and forming from 2-50% to 3-50% of the whole. As these flakes readily split open, when a piece of this iron is broken rupture passes through them, with the result that, even though the graphite may form only some 3 % of the mass by weight (say 10 % by volume), practically nothing but graphite is seen in the fracture. Hence the weakness and the dark-grey fracture of this iron, and hence, by brushing this fracture with a wire brush and so detaching these loosely clinging

flakes of graphite, the colour can be changed nearly to the very light-grey of pure iron. There is rarely any important quantity of graphite in commercial steels. (See § 26.)

22. Further Illustration of the Iron-Carbon Diagram. — In order to illustrate further the meaning of the diagram (fig. 1), let us follow by means of the ordinate QUw the undisturbed slow cooling of molten hyper-eutectoid steel containing I % of carbon, for simplicity assuming that no graphite forms and that the several transformations occur promptly as they fall due. When the gradually falling temperature reaches 1430 (g), the mass begins to freeze as 7-iron or austenite, called " primary " to distinguish it from that which forms part of the eutectic. But the freezing, instead of completing itself at a fixed temperature as that of pure water does, continues until the temperature sinks to r on the line Aa. Thus the iron has rather a freezing-range than a freezing-point. Moreover, the freezing is " selective." The first particles of austenite to freeze contain about 0-33 % of carbon (p). As freezing progresses, at each successive temperature reached the frozen austenite has the carbon-content of the point on Aa which that temperature abscissa cuts, and the still molten part or " mother-metal " has the carbon-content horizontally opposite this on the line AB. In other words, the composition of the frozen part and that of the mother-metal respectively are p and q at the beginning of the freezing, and r and t' at the end; and during freezing they slide along Aa and AB from p to r and from q to t'. This, of course, brings the final composition of the frozen austenite when freezing is complete exactly to that which the molten mass had before freezing began.

The heat evolved by this process of solidification retards the fall of temperature; but after this the rate of cooling remains regular until T (750) on the line Sa (Ar 3) is reached, when a second retarda- tion occurs, due to the heat liberated by the passage within the pasty mass of part of the iron and carbon from a state of mere solution to that of definite combination in the ratio Fe 3 C, forming microscopic particles of cementite, while the remainder of the iron and carbon continue dissolved in each other as austenite. This formation of cementite continues as the temperature falls, till at about 690 C, (U, called Ar 2 _i) so much of the carbon (in this case about o-io%) and of the iron have united in the form of cementite, that the composition of the remaining solid-solution or " mother- metal " of austenite has reached that of the eutectoid, hardenite; i.e. it now contains 0-90% of carbon. The cementite which has thus far been forming may be called " pro-eutectoid " cementite, because it forms before the remaining austenite reacnes the eutectoid com- position. As the

temperature now falls past 690 , this hardenite mother-metal in turn splits up, after the fashion of eutectics, into alternate layers of ferrite and cementite grouped together as pearlite,

so that the mass as a whole now becomes a mixture of pearlite with cementite. The iron thus liberated, as the ferrite of this pearlite, changes simultaneously to a-ferrite. The passage of this large quantity of carbon and iron, 0-90% of the former and 12-6 of the latter, from a state of mere solution as hardenite to one of definite chemical union as cementite, together with the passage of the iron itself from the 7 to the a state, evolves so much heat as actually to heat the mass up so that it brightens in a striking manner. This phenomenon is, called the " recalescence."

This change from austenite to ferrite and cementite, from the 7 through the to the a state, is of course accompanied by the loss of the "hardening power," i.e. the power of being hardened by sudden cooling, because the essence of this hardening is the retention of the /S state. As shown in Alloys, PI., fig. 13, the slowly cooled steel now consists of kernels of pearlite surrounded by envelopes of the cementite which was born of the austenite in cooling from T to U.

23. To take a second case, molten hypo-eutectoid steel of 0-20 % of carbon on freezing from Ktoa; passes in the like manner to the state of solid austenite, 7-iron with this 0-20 % of carbon dissolved in it. Its further cooling undergoes three spontaneous retardations, one at K' (Ar 3 about 820), at which part of the iron begins to isolate itself within the austenite mother-metal in the form of envelopes of /3-ferrite, i.e. of free iron of the allotropic modification, which surrounds the kernels or grains of the residual still undecomposed part of the austenite. At the second retardation, K" (Ar 2 , about 770°) this ferrite changes to the normal magnetic a-ferrite, so that the mass as a whole becomes magnetic. Moreover, the envelopes of ferrite which began forming at Ar 3 continue to broaden by the accession of more and more ferrite born from the austenite progressively as the temperature sinks, till, by the time when Ari (about 690°) is reached, so much free ferrite has been formed that the remaining mother-metal has been enriched to the composition of hardenite, i.e. it now contains 0-90% of carbon. Again, as the temperature in turn falls past An this hardenite mother-metal splits up into cementite and ferrite grouped together as pearlite, with the resulting recalescence, and the mass, as shown in Alloys, PI., fig. 12, then consists of kernels of pearlite surrounded by envelopes of ferrite. All these phenomena are parallel with those of 1 -oo % carbon steel at this same critical point An. As such steel cools slowly

past Ar 3 , Ar 2 and An, it loses its hardening power progressively.

In short, from Ar 8 to An the excess substance ferrite or cementite, in hypo- and hyper-eutectoid steels respectively, progressively crystallizes out as a network or skeleton within the austenite mother-metal, which thus progressively approaches the composition of hardenite, reaching it at An, and there splitting up into ferrite and cementite interstratified as pearlite. Further, any ferrite liberated at Ar s changes there from 7 to 0, and any present at Ar 2 changes from j8 to o. Between H and S, Ar 3 and Ar 2 occur together, as do Ar 2 and An between S and P' and Ar 3 , Ar 2 and An at S itself ; so that these critical points in these special cases are called Ar 3 _ 2 , Ari_i and Ar 3 _2_i respectively. The corresponding critical points which occur during rise of temperature, with the reverse transformations, are called Aci, Ac 2 , Ac 3 , &c. A (Tschernoff) is the generic name, r refers to falling temperature (refroidissant) and c to rising temperature (chauffant, Osmond).

24. The freezing of molten cast iron of 2-50% of carbon goes on selectively like that of these steels which we have been studying, till the enrichment of the molten mother-metal in carbon brings its carbon-contents to B, 4-30 %, the eutectic 1 carbon-content, i.e. that of the greatest fusibility or lowest melting-point. At this point selection ceases ; the remaining molten metal freezes as a whole, and in freezing splits up into a conglomerate eutectic of (1) austenite of about 2-2 % of carbon, and therefore saturated with that element, and (2) cementite: and with this eutectic is mixed the " primary " austenite which froze out as the temperature sank from v to v'. The white-hot, solid, but soft mass is now a conglomerate 01 v T) " primary " austenite, (2) " eutectic " austenite and (3) " eutectic " cementite. As the temperature sinks still farther, pro-eutectoid cementite (see § 22) forms progressively in the austenite both primary and eutectic, and this pro-eutectoid cementite as it comes into existence tends to assemble in the form of a network enveloping the kernels or grains of the austenite from which it springs. The reason for its birth, of course, is that the solubility of carbon in austenite pro- gressively decreases as the temperature falls, from about 2-2% at 1130° (a), to 0-90% at 690 ° (An), as shown by the line aS, with the consequence that the austenite keeps rejecting in the form of this pro-eutectoid cementite all carbon in excess of its saturation-poirit tor the existing temperature. Here the mass consists of (1) primary austenite, (2) eutectic austenite and cementite interstratified and (3) pro-eutectoid cementite.

This formation of cementite through the rejection of carbon by both

the primary and the eutectic austenite continues quite as in the case of 1 -oo % carbon steel, with impoverishment of the austenite to the hardenite or eutectoid ratio, and the splitting Hp of that hardenite into pearlite at An, so that the mass when cold finally consists of (l)

1 Note the distinction between the " eutectic " or alloy of lowest freezing-point, 1 130°, B, with 4-30 % of carbon, and the " eutectoid." hardenite and pearlite, or alloy of lowest transformation-point, 690 S, with 0-90% of carbon. (See § 17.)

the primary austenite now split up into kernels of pearlite surrounded by envelopes of pro-eutectoid cementite, (2) the eutectic of cementite plus austenite, the latter of which has in like manner split up into a mixture of pearlite plus cementite. Such a mass is shown in fig. 4. Here the black bat-like patches are the masses of pearlite plus pro- eutectoid cementite resulting from the splitting up of the primary austenite. The magnification is too small to show the zebra striping of the pearlite. In the black-and-white ground mass the white is the eutectic cementite, and the black the eutectic austenite, now split up into pearlite and pro-eutectoid cementite, which cannot here be distinguished from each other.

25. As we pass to cases with higher and higher carbon-content, the primary austenite which freezes in cooling across region 2 forms a

Fig. 4. — The constitution of hypo-eutectic white or cementitifer- ous cast iron (washed metal), W. Campbell. The black bat-like areas are the primary austenite, the zebra-marked ground mass the eutectic, composed of white stripes of cementite and black stripes of austenite. Both the primary and eutectic austenite have changed in cooling into a mixture of pearlite and pro-eutectoid cementite, too fine to be distinguished here.

smaller and smaller proportion of the whole, and the austenite-cementite eutectic which forms at the eutectic freezing-point, 1130 (oB), increases in amount until, when the carbon-content reaches the eutectic ratio, 4-30 , there is but a single freezing-point, and the whole mass when solid is made up of this eutectic. If there is more than 4-30 of carbon, then in cooling through region 3 the excess of carbon over this ratio freezes out as " primary " cementite. But in any event the changes which have just been described for cast iron of

2 50% of carbon occur in crossing region 7, and at Ari (PSP').

Just as variations in the carbon-content shift the temperature of the freezing-range and of the various critical points, so do variations in the content of other elements, notably silicon, phosphorus, manganese, chromium, nickel and tungsten. Nickel and manganese lower these critical points, so that with 25% of nickel Ar 3 lies below the common temperature 20 C. With 13 % of manganese Ar 3 is very low, and the austenite decomposes so slowly that it is preserved practically intact by sudden cooling. These steels then normally consist of 7-iron, modified by the large amount of nickel or manganese with which it is alloyed. They are non-magnetic or very feebly magnetic. But the critical points of such nickel steel though thus depressed, are not destroyed; and if it is cooled in liquid air below its Arj, it passes to the a state and becomes magnetic.

26. Double Nature of the Carbon-Iron Diagram. — The part played by graphite in the constitution of the iron-carbon compounds, hitherto ignored for simplicity, is shown in fig. 5. Looking at the matter in a broad way, in all these carbon-iron alloys, both steel and cast irons, part of the carbon may be dissolved in the iron, usually as austenite, e.g. in regions 2, 4, 5 and 7 of fig. I ; the rest, i.e. the carbon which is not dissolved, or the " undissolved carbon," forms either the definite carbide, cementite, FesC, or else exists in the free state as graphite. Now, just as fig. 1 shows the constitution of these iron-carbon alloys for all temperatures and all percentages of carbon when the undissolved carbon exists as cementite, so there should be a diagram showing this constitution when all the undissolved carbon exists as graphite. In short, there are two distinct carbon-iron diagrams, the iron-cementite one shown in fig. I and studied at length in §§ 22 to 25, and the iron-graphite one shown in fig. 5 in unbroken lines, with the iron-cementite diagram reproduced in broken lines for comparison. What here follows represents our present rather ill-established theory. These two diagrams naturally have much the same general shape, but though the boundaries of the several regions in the iron-cementite diagram are known pretty accurately, and though the relative positions of the boundaries of the

/

two diagrams are probably about as here shown, the exact topography of the iron-graphite diagram is not yet known. In it the normal con- stituents are, for region II., molten metal + primary austenite; for region III., molten metal -(-primary graphite; for region IV., primary austenite; for region VII., eutectic austenite,

eutectic graphite, and a quantity of pro-eutectoid graphite which increases as we pass from the upper to the lower part of the region, together with primary austenite at the left of the eutectic point B' and primary graphite at the right of that point. Thus when iron containing 2ˆ50 % of carbon (v. fig. 1) solidifies, its carbon may form cementite following the cementite-austenite diagram so that white, i.e. cementitiferous, cast iron results; or graphite, following the graphite-austenite diagram, so that ultra -grey, i.e. typical graphitic cast iron results; or, as usually happens, certain molecules may follow one diagram while the rest follow the other diagram, so that cast iron which has. both cementite and graphite results, as in most commercial grey cast iron, and typically in " mottled cast iron," in which there are distinct patches of grey and others of white cast iron.

Though carbon passes far more readily under most conditions into the state of cementite than into that of graphite, yet of the two graphite is the more stable and cementite the less stable, or the " metastable " form. Thus cementite is always tending to change over into graphite by the reaction Fe 8 C = 3Fe + Gr, though this tendency is often held in check by different causes; but graphite never changes back directly into cementite, at least according to our present theory. The fact that graphite may dissolve in the iron as austenite, and that when this latter again breaks up it is more likely to yield cementite than graphite, is only an apparent and not a real exception to this law of the greater stability of graphite than of cementite.

Slow cooling, slow solidification, the presence of an abundance of carbon, and the presence of silicon, all favour the formation of graphite; rapid cooling, the presence of sulphur, and in most cases that of manganese, favour the formation of cementite. For in- stance, though in cast iron, which is rich in carbon, that carbon passes comparatively easily into the state of graphite, yet in steel, which contains much less carbon, but little graphite forms under most conditions. Indeed, in the common structural steels which contain only very little carbon, hardly any of that carbon exists as graphite.

27. Thermal Treatment. — The hardening, tempering and annealing of steel, the chilling and annealing of cast iron, and the annealing of malleable cast iron are explained readily by the facts just set forth.

28. The hardening of steel consists in first transforming it into austenite by heating it up into region 4 of fig. 1, and then quenching it, usually in cold water, so as to cool it very suddenly, and thus to deny the time which the complete transformation of the austenite

into ferrite and cementite requires, and thereby to catch much of the iron in transit in the hard brittle /S state. In the cold this transformation cannot take place, because of molecular rigidity or some

Steel

Cast Iron

*a.o *5 i-o <*

•••• «,• H>« flt'O 17-B «7-» M'S t».0 fB.f If •«.« M-0 S*.&tl.«3*

Perctntaf Composition*

Fig. 5.- — Graphite-austenite or stable carbon-iron, diagram.

other impediment. The suddenly cooled metal is hard and brittle, because the cold /3-iron which it contains is hard and brittle.

The degree of hardening which the steel undergoes increases with its carbon-content, chiefly because, during sudden cooling, the presence of carbon acts like a brake to impede the transformations, and thus to increase the quantity of /S-iron caught in transit, but probably also in part because the hardness of this /S-iron increases with its carbon-content. Thus, though sudden cooling has very little effect on steel of 0-10% of carbon, it changes that of 1-50% from a somewhat ductile body to one harder and more brittle than glass.

29. The Tempering and Annealing of Steel. — But this sudden cooling goes too far, preserving so much /S-iron as to make the steel too brittle for most purposes. This brittleness has therefore in general to be mitigated or " tempered," unfortunately at the cost of losing part of the hardness proper, by reheating the hardened steel slightly,

usually to between 200° and 300° C, so as to relax the molecular rigidity and thereby to allow the arrested transformation to go on a little farther, shifting a little of the /3-iron over into the a state. The higher the tempering-temperature, i.e. that to which the hardened steel is thus reheated, the more is the molecular rigidity relaxed, the farther on does the transformation go, and the softer does the steel become; so that, if the reheating reaches a dull- red heat, the transformation from austenite into fcrrite and cementite completes

itself slowly, and when now cooled the steel is as soft and ductile as if it had never been hardened. It is now said to be " annealed."

30. Chilling cast iron, i.e. hastening its cooling by casting it in a cool mould, favours the formation of cementite rather than of graphite in the freezing of the eutectic at a-Bc, and also, in case of hyper-eutectic iron, in the passage through region 3. Like the hardening of steel, it hinders the transformation of the austenite, whether primary or eutectic, into pearlite , if thus chilled and annealed consists of cementite and pearlite. But in most such cases, in spite of the annealing, this hardness is accom panied by a degree of brittleness too great for most purposes. The process therefore is so managed that only the outer shell of the cast- ing is chilled, and that the interior remains graphitic, i.e. grey cast iron, soft and relatively malleable.

31. In making malleable castings the annealing, i.e. the change towards the stable state of ferrite -f-graphite, is carried much farther by means of a much longer and usually a higher heating than in the manufacture of chilled castings. The castings, initially of white cast iron, are heated for about a week, to a temperature usually above 730 C. and often reaching 900 C. (1346 and 1652 F.). For about 60 hours the heat is held at its highest point, from which it descends extremely slowly. The molecular freedom which this high tempera-ture gives enables the cementite to change gradually into a mixture of graphite and austenite with the result that, after the castings have been cooled and their austenite has in cooling past Aci changed into pearlite and ferrite, the mixture of cementite and pearlite of which they originally consisted has now given place to one of fine or ' ' temper ' ' graphite and ferrite, with more or less pearlite according to the completeness of the transfer of the carbon to the state of graphite. Why, then, is this material malleable, though the common grey cast iron, which is made up of about the same constituents and often in about the same proportion, is brittle? The reason is that the particles of temper graphite which are thus formed within the solid casting in its long annealing are so finely divided that they do not break up the continuity of the mass in a very harmful way ; whereas in grey cast iron both the eutectic graphite formed in solidifying, and also the primary graphite which, in case the metal is hyper- eutectic, forms in cooling through region 3 of fig. 1, surrounded as it is by the still molten mother-metal out of which it is growing, form a nearly continuous skeleton of very large flakes, which do break up in a most harmful way the continuity of the mass of cast iron in which they are embedded.

In carrying out this process the castings are packed in a mass of iron

oxide, which at this temperature gradually removes the fine or " temper " graphite by oxidizing that in the outer crust to carbonic oxide, whereon the carbon farther in begins diffusing outwards by " molecular migration," to be itself oxidized on reaching the crust. This removal of graphite doubtless further stimulates the formation uf graphite, by relieving the mechanical and perhaps the osmotic pressure. Thus, first, for the brittle glass-hard cementite there is gradually substituted the relatively harmless temper graphite; and, second, even this is in part removed by surface oxidation.

32. Fineness of Structure. — Each of these ancient processes thus consists essentially in so manipulating the temperature that, out of the several possible constituents, the metal shall actually consist of a special set in special proportions. But in addition there is another very important principle underlying many of our thermal processes, viz. that the state of aggregation of certain of these con- stituents, and through it the properties of the metal as a whole, are profoundly affected by temperature manipulations. Thus, prior exposure to a temperature materially above Acs coarsens the struc- ture of most steel, in the sense of giving it when cold a coarse fracture, and enlarging the grains of pearlite, &c, later found in the slowly cooled metal. This coarsening and the brittleness which accompanies it increase with the temperature to which the metal has been exposed. Steel which after a slow cooling from about 722 ° C. will bend 166 before breaking, will, after slow cooling from about 1050° C, bend only 18° before breaking. This injury fortunately can be cured

either by reheating the steel to AC3 when it " refines," i.e. returns spontaneously to its fine-grained ductile state (cooling past Ar3 does not have this effect) ; or by breaking up the coarse grains by mechani- cal distortion, e.g. by forging or rolling. For instance, if steel has been coarsened by heating to 1400 C, and if, when it has cooled to a lower temperature, say 850 C. we forge it, its grain-size and ductility when cold will be approximately those which it would have had if heated only to 850°. Hence steel which has been heated very highly, whether for welding, or for greatly softening it so that it can be rolled to the desired shape with but little expenditure of power, ought later to be refined, either by reheating it from below An to slightly above AC3 or by rolling it after it has cooled to a relatively low temperature, i.e. by having a low ' finishing temperature." Steel castings have initially the extremely coarse structure due to cooling without mechanical distortion from their very high tempera- ture of solidification; they are " annealed," i.e. this coarseness and the consequent brittleness are removed, by reheating them much above AC3, which also relieves the internal

stresses due to the different rates at which different layers cool, and hence contract, during and after solidification. For steel containing less than about 0-13% of carbon, the embrittling temperature is in a different range, near 700 C, and such steel refines at temperatures above 900 C.

33 . The Possibilities of Thermal Treatment. — When we consider the great number of different regions in fig. 1, each with its own set of constitutents, and remember that by different rates of cooling from different temperatures we can retain in the cold metal these different sets of constituents in widely varying proportions; and when we further reflect that not only the proportion of each constituent present but also its state of aggregation can be controlled by thermal treatment, we see how vast a field is here opened, how great a variety of different properties can be induced in any individual piece of steel, how enormous the variety of properties thus attainable in the different varieties collectively, especially since for each percentage of carbon an incalculable number of varieties of steel may be made by alloying it with different proportions of such elements as nickel, chromium, &c. As yet there has been only the roughest survey of certain limited areas in this great field, the further exploration of which will enormously increase the usefulness of this wonderful metal.

34. Alloy steels have come into extensive use for important special purposes, and a very great increase of their use is to be expected. The chief ones are nickel steel, manganese steel, chrome steel and chrome-tungsten steel. The general order of merit of a given variety or specimen of iron or steel may be measured by the degree to which it combines strength and hardness with ductility. These two classes of properties tend to exclude each other, for, as a general rule, whatever tends to make iron and steel hard and strong tends to make it corre- spondingly brittle, and hence liable to break treacherously, especially under shock. Manganese steel and'nickel steel form an important exception to this rule, in being at once very strong and hard and extremely ductile. Nickel steel, which usually contains from 3 to 3-50% of nickel and about 0-25% of carbon, combines very great tensile strength and hardness, and a very high limit of elasticity, with great ductility. Its combination of ductility with strength and hardening power has given it very extended use for the armour of war-vessels. For instance, following Krupp's formula, the side and barbette armour of war-vessels is now generally if not universally made of nickel steel containing about 3-25% of nickel, 0-40% of carbon, and 1-50% of chromium, deeply carburized on its impact face. Here the merit of nickel steel is not so much that it

resists perforation, as that it does not crack even when deeply penetrated by a projectile. The combination of ductility, which lessens-the tendency to break when overstrained or distorted, with a very high limit of elasticity, gives it great value for shafting, the merit of which is measured by its endurance of the repeated stresses to which its rotation exposes it whenever its alignment is not mathematically straight. The alignment of marine shafting, changing with every passing wave, is an extreme example. Such an intermittently applied stress is far more destructive to iron than a continuous "ne, and even if it is only half that of the limit of elasticity, its indefinite repetition eventually causes rupture. In a direct competitive test the presence of 3-25 % of nickel increased nearly sixfold the

number of rotations which a steel shaft would endure before breaking.

35. As actually made, manganese steel contains about 12% of manganese and 1-50% of carbon. Although the presence of 1-50% of manganese makes steel relatively brittle, and although a further addition at first increases this brittleness, so that steel containing between 4 and 5-5% can be pulverized under the hammer, yet a still further increase gives very great ductility, accompanied by great hardness — a combination of properties which was not possessed by any other known substance when this remarkable alloy, known as Hadfield's manganese steel, was discovered. Its ductility, to which it owes its value, is profoundly affected by the rate of cooling. Sudden cooling makes the metal extremely ductile, and slow cooling makes it brittle. Wts behaviour in this respect is thus the opposite of that of carbon steel. But its great hardness is not materially affected by the rate of cooling. It is used extensively for objects which require both hardness and ductility, such as rock-crushing machinery, railway crossings, mine-car wheels and safes. The burglar's blow-pipe locally " draws the temper," i.e. softens a spot on a hardened carbon steel or chrome steel safe by simply heating it, so that as soon as it has again cooled he can drill through it and introduce his charge of dynamite. But neither this nor any other procedure softens manganese steel rapidly. Vet this very fact that it is unalterably hard has limited its use, because of the great difficulty of cutting it to shape, which has in general to be done with emery wheels instead of the usual iron-cutting tools. Another defect is its relatively low elastic limit.

36. Chrome steel, which usually contains about 2 % of chromium and o-8o to 2% of carbon, owes its value to combining, when in the " hardened " or suddenly cooled state, intense hardness with a high elastic limit, so that itis neither deformed permanently nor cracked by extremely violent shocks. For this reason it is the material generally if not always used for armour-piercing projectiles. It is much used also for certain rock-crushing machinery (the shoes and dies of stamp-mills) and for safes. These are made of alternate layers of soft wrought iron and chrome steel hardened by sudden cooling. The hardness of the hardened chrome steel resists the burglar's drill, and the ductility of the wrought iron the blows of his sledge.

Vanadium in small quantities, 0-15 or 0-20%, is said to improve steel greatly, especially in increasing its resistance to shock and to often-repeated stress. But the improvement may be due wholly to the considerable chromium content of these so- called vanadium steels.

37. Tungsten steel, which usually contains from 5 to 10% of tungsten and from 1 to 2% of carbon, is used for magnets, because of its great retentivity.

38. Chrome-tungsten or High-speed Steel. — Steel with a large content of both chromium and tungsten has the very valuable property of " red-hardness," i.e. of retaining its hardness and hence its power of cutting iron and other hard substances, even when it is heated to dull redness, say 6oo° C. (1112 F.) by the friction of the work which it is doing. Hence a machinist can cut steel or iron nearly six times as fast with a lathe tool of this steel as with one of carbon steel, because with the latter the cutting speed must be so slow that the cutting tool is not heated by the friction above say 250° C. (482 F.), lest it be unduly softened or " tempered " (§ 29). This effect of chromium, tungsten and carbon jointly consists essentially in raising the " tempering temperature," i.e. that to which the metal, in which by suitable thermal treatment the iron molecules have been brought to the allotropic 7 or (3 state or a mixture of both, can be heated without losing its hardness through the escape of that iron into the a state. In short, these elements seem to impede the allotropic change of the iron itself. The composition of this steel is as follows: —

The usual limits. Apparently the best. Carbon .... 0-32 to 1-28 o-68 to 0-67

Manganese .... 0-03 ,, 0-30 0-07 ,, o-n

Chromium .... 2-23 ,, 7-02 5-95 ,, 5-47

Tungsten .... 9-25 „ 25-45 17-81 „ 18-19

39. Impurities. — The properties of iron and steel, like those of most of the metals, are profoundly influenced by the presence of small and sometimes extremely small quantities of certain impurities, of which the most important are phosphorus and sulphur, the former derived chiefly from apatite (phosphate of lime) and other minerals which accompany the iron ore itself, the latter from the pyrite found not only in most iron ores but in nearly all coal and coke. All commercial iron and steel contain more or less of both these impurities, the influence of which is so strong that a variation of o-oi %, i.e. of one part in 10,000, of either of them has a noticeable effect. The best tool steel should not contain more than 0-02% of either, and in careful practice it is often specified that the phosphorus and sulphur respectively shall not exceed 0-04 and 0-05% in the steel for important bridges, or 0-06 and 0-07% in, rail steel, though some very prudent engineers allow as much as -085% or even o-io% of phosphorus in rails.

40. The specific effect of phosphorus is to make the metal cold-short, i.e. brittle in the cold, apparently because it increases the size and the sharpness of demarcation of the crystalline grains of which the mass is made up. The specific effect of sulphur is to make the metal red-short, i.e. brittle, when at a red heat, by forming a network of iron sulphide which encases these crystalline grains and thus plays the part of a weak link in a strong chain.

41. Oxygen, ‘ probably dissolved in the iron as ferrous oxide FeO, also makes the metal red-short.

42. Manganese by itself rather lessens than increases the malleableness and, indeed, the general merit of the metal, but it is added intentionally, in quantities even as large as 1-5% to palliate the effects of sulphur and oxygen. With sulphur it forms a sulphide which draws together into almost harmless drops, instead of encasing the grains of iron. With oxygen it probably forms manganous oxide, which is less harmful than ferrous oxide. (See § 35.)

43. Ores of Iron. — Even though the earth seems to be a huge iron meteor with but a thin covering of rocks, the exasperating proneness of iron to oxidize explains readily why this metal is only rarely found native, except in the form of meteorites. They are four important iron ores, magnetite, haematite, limonite and siderite, and one of less but still considerable importance, pyrite or pyrites.

44. Magnetite, Fe 3 04, contains 72-41 % of iron. It crystallizes in the cubical system, often in beautiful octahedra and rhombic dodecahedra. It is black with a black streak. Its specific gravity is 5-2, and its hardness 5-5 to 6-5. It is very magnetic, and sometimes polar.

45. Haematite, or red haematite, FeaOs, contains 70% of iron. It crystallizes in the rhombohedral system. Its colour varies from brilliant bluish-grey to deep red. Its streak is always red. Its specific gravity is 5-3 and its hardness 5-5 to 6-5.

46. Limonite, 2Fe 2 3 , 3H 2 0, contains 59-9% of iron. Its colour varies from light brown to black. Its streak is yellowish-black, its specific gravity 3-6 to 4-0, and its hardness 5 to 5-5. Limonite and the related minerals, turgite, 2Fe 2 3 -r-II 2 0, and gothite, Fe 2 3 -r-H 2 0, are grouped together under the term " brown haema tire."

47. Siderite, or spathic iron ore, FeC0 3 , crystallizes in the rhombo hedral system and contains 48-28 % of iron. Its colour yaries from yellowish-brown to grey. Its specific gravity is 3-7 to 3-9, and its hardness 3-5 to 4-5. The clayey siderite of the British coal measures is called " clay band," and that containing bituminous matter is called " black band."

48. Pyrite, FeS 2 , contains 46-7% of iron. It crystallizes in the cubic system, usually in cubes, pentagonal dodecahedra or octa- hedra, often of great beauty and perfection. It is golden-yellow., with a greenish or brownish-black streak. Its specific gravity is 4-83 to 5-2, its hardness 6 to 6-5. Though it contains far too much sulphur to be

used in iron manufacture without first being desulphur- ized, yet great quantities of slightly cupriferous pyrite, after yielding nearly all their sulphur in the manufacture of sulphuric acid, and most of the remainder in the wet extraction of their copper, are then used under the name of " blue billy " or " purple ore," as an ore of iron, a use which is likely to increase greatly in importance with the gradual exhaustion of the richest deposits of the oxidized ores.

49. The Ores actually Impure. — As these five minerals actually exist in the earth's crust they are usually more or less impure chemically, and they are almost always mechanically mixed with

barren mineral matter, such as quartz, limestone and clay, collectively called " the gangue." In some cases the iron-bearing mineral, such as magnetite or haematite, can be separated from the gangue after crushing, either mechanically or magnetically, so that the part thus enriched or " concentrated " alone need be smelted.

50. Geological Age. — The Archaean crystalline rocks abound in deposits of magnetite and red haematite, many of them very large and rich. These of course are the oldest of our ores, and from deposits of like age, especially those of the more readily decomposed silicates, has come the iron which now exists in the siderites anojred and brown haematites of the later geological formations.

51. The World's Supply of Iron Ore. — The iron ores of the earth's crust will probably suffice to supply our needs for a very long period, perhaps indeed for many thousand years. It is true that an official statement, which is here reproduced,

Table II. — Professor Tornebohm's Estimate of the World's Ore Supply.

Workable

Annual

Annual Con-

Country.

Deposits.

Output.

sumption.

tons.

tons.

tons.

United States .

1,100,000,000

35,000,000

35,000,000

Great Britain .

1,000,000,000

14,000,000

20,000,000

Germany

2,200,000,000

21,000,000

24,000,000

Spain ....

500,000,000

8,000,000

1,000,000

Russia and Finland

1,500,000,000

4,000,000

6,000,000

France ....

1,500,000,000

6,000,000

8,000,000

Sweden

1,000,000,000

4,000,000

1 ,000,000

Austria-Hungary

1 ,200,000,000

3,000,000

4,000,000

Other countries

Total . .

5,000,000

1,000,000

10,000,000,000

100,000,000

100,000,000

Note to Table. — Though this estimate seems to be near the truth as regards the British ores, it does not credit the United States with one-tenth, if indeed with one-twentieth, of their true quantity as estimated by that country's Geological Survey in 1907.

given in 1905 by Professor Tornebohm to the Swedish parliament, credited the world with only 10,000,000,000 tons of ore, and that, if the consumption of iron should continue to increase hereafter as it

did between 1893 and 1906, this quantity would last only until 1946. How then can it be that there is a supply for thousands of years? The two assertions are not to be reconciled by pointing out that Professor Tornebohm underestimated, for instance crediting the United States with only i-i billion tons, whereas the United States Geological Survey's expert credits that country with from ten to twenty times this quantity; nor by pointing out that only certain parts of Europe and a relatively small part of North America have thus far been carefully explored for iron ore, and that the rest of these two continents and South America, Asia and Africa may reasonably be expected to yield very great stores of iron, and that pyrite, one of the richest and most abundant of ores, has not been included. Important as these considerations are, they are much less important than the fact that a very large proportion of the rocks of the earth's crust contain more or less iron, and therefore are potential iron ores.

52. What Constitutes an Iron Ore. — Whether a ferruginous rock is or is not ore is purely a question of current demand and supply. That is ore from which there is reasonable hope that metal can be extracted with profit, if not to-day, then within a reasonable length of time. Rock containing 2j% of gold is an extraordinarily rich gold ore; that with 2!% of copper is a profitable one to-day; that containing 2j% of iron is not so to-day, for the sole reason that its iron cannot be extracted with profit in competition with the existing richer ores. But it will become a profitable ore as soon as the richer ore shall have been exhausted. Very few of the ores which, are mined to-day contain less than 25% of iron, and some of them contain over 60%. As these richest ores are exhausted, poorer and, poorer ones will be used, and the cost of iron will increase progressively if measured either in units of the actual energy used in mining

and smelting it, or in its power of purchasing animal and vegetable products, cotton, wool, corn, &c, the supply of which is renewable and indeed capable of very great increase, but probably not if measured in its power of purchasing the various mineral products, e.g. the other metals, coal, petroleum and the precious stones, of which the supply is limited. This is simply one instance of the inevitable progressive increase in cost of the irrecreatable mineral relatively to the recreatable animal and vegetable. When, in the course of centuries, the exhaustion of richer ores shall have forced us to mine, crush and concentrate mechanically or by magnetism the ores which contain only 2 or 3% of iron, then the cost of iron in the ore, measured in terms of the energy needed to mine and concentrate it, will be comparable with the actual cost of the copper in the ore of

the copper-mines of to-day. But, intermediate in richness between these two extremes, the iron ores mined to-day and these 2 and 3% ores, there is an incalculably great quantity of ore capable of mechanical concen- tration, and another perhaps vaster store of ore which we do not yet know how to concentrate mechanically, so that the day when a pound of iron in the ore will cost as much as a pound of copper in the ore costs to-day is immeasurably distant.

53. Future Cost of Ore. — The cost of iron ore is likely to rise much less rapidly than that of coal, because the additions to our known supply are likely to be very much greater in the case of ore than in that of coal, for the reason that, while rich and great iron ore beds may exist anywhere, those of coal are confined chiefly to the Carboniferous formation, a fact which has led to the systematic survey and measurement of this formation in most countries. In short, a very large part of the earth's coal supply is known and measured, but its iron ore supply is hardly to be guessed. On the other hand, the cost of iron ore is likely t© rise much faster than that of the potential aluminium ores, clay and its derivatives, because of the vast extent and richness of the deposits of this latter class. It is possible that, at some remote day, aluminium, or one of its alloys, may become the great structural material, and iron be used chiefly for those objeets for which it is especially fitted, such as magnets, springs and cutting tools.

In passing, it may be noted that the cost of the ore itself forms a relatively small part of the cost even of the cruder forms of steel, hardly a quarter of the cost of such simple products as rails, and an insignificant part of the cost of many most important finished objects, such as magnets, cutting tools, springs and wire, for which iron is almost indispensable. Thus, if the use of ores very much poorer than those we now treat, and the need of concentrating them mechanically, were to double the cost of a pound of iron in the concentrated ore ready for smelting, that would increase the cost of rails by only one quarter. Hence the addition to the cost of finished steel objects which is due to our being forced to use progressively poorer and poorer ores is likely to be much less than the addition due to the progressive rise in the cost of coal and in the cost of labour, because of the ever-rising scale of living. The effect of each of these additions will be lessened by the future improvements in processes of manufacture, and more particularly by the progressive replace- ment of that ephemeral source of energy, coal, by the secular sources, the winds, waves, tides, sunshine, the earth's heat and, greatest of all, its momentum.

54. Ore Supply of the Chief Iron-making Countries. — The United States mine nearly all of their iron ores, Austria-Hungary, Russia and France mine the greater part of theirs, but none of these countries exports much ore. Great Britain and Germany, besides mining a great deal of ore, still have to import much from Spain, Sweden and in the case of Germany from Luxemburg, although, because of the customs arrangement between these last two countries, this importation is not usually reported." Belgium imports nearly all of its ore, while Sweden and Spain export most of the ore which they mine.

55. Great Britain has many valuable ore beds, some rich in iron, many of them near to beds of coal and to the sea-coast, to canals or to navigable rivers. They extend from Northamptonshire to near Glasgow. About two-thirds of the ore mined is clayey siderite. In 1905 the Cleveland district in North Yorkshire supplied 41 % of the total British product of iron ores; Lincolnshire, 14-8 ; Northamptonshire, 13-9; Leicestershire, 4-7%; Cumberland, 8-6%; North Lancashire, 2-7%; Staffordshire, 6-1 %; and Scotland, 5-7 %. The annual production of British iron ore reached 18,031,957 tons in 1882, but in 1905 it had fallen to 14,590,703 tons,

valued at £3,482,184. In addition 7,344,786 tons, or about half as much as was mined in Great Britain, were imported, 78-5 % of it from Spain. The most important British ore deposit is the Lower Cleveland bed of oolitic siderite in the Middle Lias, near Middles-borough. It is from 10 to 17 ft. thick, and its ore contains about 30 °o of iron.

56. Geographical Distribution of the British Works. — Most of the British iron works lie in and near the important coal-fields in Scotland between the mouth of the Clyde and the Forth, in Cleveland and Durham, in Cumberland and Lancashire, in south Yorkshire, Derbyshire, and Lincolnshire, in Staffordshire and Northamptonshire, and in south Wales in spite of its lack of ore.

The most important croup is that of Cleveland and Durham, which makes about one-third of all the British pig iron. It has the great Cleveland ore bed and the excellent Durham coal near tide- water at Middlesbrough. The most important seat of the manu- facture of cutlery and the finer kinds of steel is at Sheffield.

57. The United States have great deposits of ore in many different places. The rich beds near Lake Superior, chiefly red haematite, yielding at present about 55 % of iron, are thought to contain between 1 1 and 2 billion tons, and the red and brown haematites of the southern states about 10 billion tons. The middle states, New York, New Jersey and Pennsylvania, are known to have many great deposits of rich magnetite, which supplied a very large pro- portion of the American ores till the discovery of the very cheaply mined ores of Lake Superior. In 1906 these latter formed 80% of the American production, and the southern states supplied about 13 ° of it, while the rich deposits of the middle states are husbanded in accordance with the law that ore bodies are drawn on in the order of their apparent profitableness.

The most important American iron-making district is in and about Pittsburg, to whose cheap coal the rich Lake Superior ores are brought nearly 1000 m., about four-fifths of the distance in the large ore steamers of the Great Lakes. Chicago, nearer to the Lake ores, though rather far from the Pittsburg coal-field, is a very important centre for rail-making for the railroads of the western states. Ohio, the Lake Erie end of New York State, eastern Pennsylvania and Maryland have very important works, the ore for which comes in part from Lake Superior and in part from Pennsylvania, New York and Cuba, and the fuel from Pennsylvania and its neighbourhood. Tennessee and Alabama in the south rely on southern ore and fuel.

58. Germany gets about two-thirds of her total ore supply from the great Jurassic " Minette " ore deposit of Luxemburg and Lorraine, which reaches also into France and Belgium. In spite of its contain- ing only about 36 % of iron, this deposit is of very great value because of its great size, and of the consequent small cost of mining. It stretches through an area of about 8 m. wide and 40 m. long, and in some places it is nearly 60 ft. thick. There are valuable deposits also in Sicgerland and in many other parts of the country.

59. Sweden has abundant, rich and very pure iron ores, but her lack of coal has restricted her iron manufacture chiefly to the very purest and best classes of iron and steel, in making which her thrifty and intelligent people have developed very rare skill. The magnetite ore bodies which supply this industry lie in a band about 180 m. long, reaching from a little north of Stockholm westerly toward the Norwegian frontier, between the latitudes 59° and 61 ° N. In Swedish Lapland, near the Arctic circle, are the great Gellivara, Kirunavara ■ and Luossavara magnetite beds, among the largest in Europe. From these beds, which in some parts are about 300 ft. thick, much

ore is sent to Germany and Great Britain.

60. Other Countries. — Spain has large, rich and pure iron ore beds, near both her northern and her southern sea coast. She exports about 90 % of all the iron ore which she mines, most of- it to England. France draws most of her iron ore from her own part of the great Minette ore deposit, and from those parts of it which were taken from her when she lost Alsace and Lorraine. Russia's most valuable ore deposit is the very large and easily mined one of Krivoi Rog in the south, from which comes about half of the Russian iron ore. It is near the Donetz coal-field, the largest in Europe. There are also important ore beds in the Urals, near the border of Finland, and at the south of Moscow. In Austria-Hungary, besides the famous Styrian Erzberg, with its siderite ore bed about 450 ft. thick, there are cheaply mined but poor and impure ores near Prague, and important ore beds in both northern and southern Hungary. Algeria, Canada, Cuba and India have valuable ore bodies.

61. Richness of Iron Ores. — The American ores now mined are decidedly richer than those of most European countries. To make a ton of pig iron needs only about 1 -9 tons of ore in the United States, 2 tons in Sweden and Russia, 2-4 tons in Great Britain and Germany, and about 2-7 tons in France and Belgium, while about 3 tons of the native British ores are needed per ton of pig iron.

62. The general scheme of iron manufacture is shown dia-grammatically in fig. 6. To put the iron contained in iron: ore into a state in which it can be used as a metal requires essentially, first its deoxidation, and second its separation from t he '< other mineral matter, such as clay, quartz, &c. with which it is found associated. These two things arc done simultaneously by heating

and melting the ore in contact with coke, charcoal or anthracite, in the iron blast furnace, from which issue intermittently two molten streams, the iron now deoxidized and incidentally carburized by the fuel with which it has been in contact, and the mineral matter, now called " slag." This crude cast iron, called " pig iron," may be run from the blast furnace directly

Ore i

Fig. 6. — General Scheme of Iron Manufacture.

into moulds, which give the metal the final shape in which it is to be used in the arts; but it is almost always either remelted, following

path 1 of fig. 6, and then cast into castings of cast iron, or converted into wrought iron or steel by purifying it, following path 2.

If it is to follow path I, the castings into which it is made may be either (a) grey or (6) chilled or © malleable. Grey iron castings are made by remelting the pig iron either in a small shaft or " cupola " furnace, or in a reverberatory or " air " furnace, with very little change of chemical composition, and then casting it directly into suitable moulds, usually of either " baked," i.e. oven-dried, or " green," i.e. moist undried, sand, but sometimes of iron covered with a refractory coating to protect it from being melted or over- heated by the molten cast iron. The general procedure in the manu- facture of chilled and of malleable castings has been described in §§30 and 31.

If the pig iron is to follow path 2, the purification which converts it into wrought iron or steel consists chiefly in oxidizing and thereby removing its carbon, phosphorus and other impurities, while it is molten, either by means of the oxygen of atmospheric air blown through it as in the Bessemer process, or by the oxygen of iron ore stirred into it as in the puddling and Bell-Krupp processes, or by both together as in the open hearth process.

On its way from the blast furnace to the converter or open hearth furnace the pig iron is often passed through a great reservoir called a " mixer," which acts also as an equalizer, to lessen the variation in composition of the cast iron, and as a purifier, removing part of the_ sulphur and silicon.

63. Shaping and Adjusting Processes. — Besides these ex- traction and purification processes there are those of adjust- ment and shaping. The adjusting processes adjust either the ultimate composition, e.g. carburizing wrought iron by long heating in contact with charcoal (cementation), or the proximate composition or constitution, as in the hardening, tempering and annealing of steel already described (§§ 28, 29), or both, as in the process of making malleable cast iron (§ 31). The shaping processes include the mechanical ones, such as rolling, forging and wire-drawing, and the remelting ones such as the crucible process of melting wrought iron or steel in crucibles and casting it in ingots for the manufacture of the best kinds of tool steel. Indeed, the remelting of cast iron to make grey iron castings belongs here. This classification, though it helps to give a general idea of the subject, yet like most of its kind cannot be applied rigidly. Thus the crucible process in its American form both carburizes and remelts, and the open hearth process is often used

rather for remelting than for purifying.

64. The iron blast furnace, a crude but very efficient piece of apparatus, is an enormous shaft usually about 80 ft. high and 20 ft. wide at its widest part. It is at all times full from top to bottom, somewhat as sketched in figs. 7 and 8, of a solid column of lumps of fuel, ore and limestone, which are charged through a hopper at the top, and descend slowly as the lower end of the column is eaten off through the burning away of its coke by means of very hot air or " blast " blown through

holes or " tuyeres " near the bottom or " hearth," and through the melting away, by the heat thus generated, both of the iron itself which has been deoxidized in its descent, and of the other minerals of the ore, called the " gangue," which unite with the

SI

Moltrn Slug MoIUh fmn

FlG. 8. — Lower Part of the Blast Furnace.

Lumps of Coke

Lumps'of Iron Ore – Lumps of Lime –

-%

«

Drops of Slug |

J).rops of Iron (

*Layer of Molten Slag- ■■ 3*lj8 Layer of Molten Iron –*

- *Tlie ore and lime actually exist here in powder. They are shown in lump form because of the difficulty of presenting to the eye their powdered state.*

lime of the limestone and the ash of the fuel to form a complex molten silicate called the " cinder " or " slag."

Interpenetrating this descending column of solid ore, limestone and coke, there is an upward rushing column of hot gases, the atmospheric nitrogen of the blast from the tuyeres, and I he

GG, HH,

J.

K,

O

Fig. 7. — Section of Duquesne Blast Furnace.

Flanges on the ore bucket ; P, Cinder notch

Fixed flanges on the top of RR',

the furnace; S,

Counterweighted false bell; T, Main bell; Tuyere;

Water cooled boxes ;

Blast pipe;

Cable for allowing conical

bottom of bucket to

drop.

Fig, o..— Method of transferring charge from bucket to main charging bell, without permitting escape ot furnace gas (lettering as in fig. 7)-

carbonic oxide from the combustion of the coke by that blast. The upward ascent of the column of gases is as swift as the descent of the solid charge is slow. The former occupies but a very few seconds, the latter from la to 15 hours.

In the upper part of the furnace the carbonic oxide deoxidizes the iron oxide of the ore by such reactions as xCO+FeO = Fe+*C02.*

Part of the resultant carbonic acid is again de- oxidized to carbonic oxide by the surrounding fuel, $CO2 + C = 2CO$, and the carbonic oxide thus formed deoxidizes more iron oxide, &c. As indicated in fig. 7, before the iron ore has descended very far it has given up nearly the whole of its oxygen, and thus lost its power of oxidizing the rising carbonic oxide, so that from here down the atmosphere of the furnace consists essentially of carbonic oxide and nitrogen.

But the transfer of heat from the rising gases to the sinking solids, which has been going on in the upper part of the furnace, continues as the solid column gradually sinks downward to the hearth, till at the " fusion level " (A in fig. 7) the solid matter has become so hot that the now deoxidized iron melts, as does the slag as fast as it is formed by the union of its three constituents, the gangue, the lime resulting from the decom- position of the limestone and the ash of the fuel. Hence from this level down the only solid matter is the coke, in lumps which are burning rapidly and hence shrinking, while between them the molten iron and slag trickle, somewhat as sketched in fig. 8, to collect in the hearth in two layers as distinct as water and oil. the iron below, the slag above.

As they collect, the molten iron is drawn off at intervals through a hole A (fig. 8), temporarily stopped with clay, at the very bottom, and the slag through another hole a little higher up, called the " cinder notch." Thus the furnace may be said to have four zones, those of (1) deoxidation, (2) heating, (3) melting, and (4) collecting, though of course the heating is really going on in all four of them.

In its slow descent the deoxidized iron nearly saturates itself with carbon, of which it usually contains between 3-5 and 4 %, taking it in part from the fuel with which it is in such intimate contact, and in part from the finely divided carbon deposited within the very lumps of ore, by the reaction $2CO = C$-f- $CO2$. This carburizing is an indispensable part of the process, because through it alone can the iron be made fusible enough to melt at the temperature which can be generated in the furnace, and only when liquid can it be separated readily and completely from the slag. In fact, the molten iron is heated so far above its melting point that, instead of being run at once into pigs as is usual, it may, without solidifying, be carried even several miles in large clay-lined ladles to the mill where it is to be converted into steel.

65. The fuel has, in addition to its duties of deoxidizing and carburizing the iron and yielding the heat needed for melting both the iron and slag, the further task of desulphurizing the iron,

probably by the reaction FeS-|-CaO-f-C = Fe-f CaS + CO.

The desulphurizing effect of this transfer of the sulphur from union with iron to union with calcium is due to the fact that, whereas iron sulphide dissolves readily in the molten metallic iron, calcium sulphide, in the presence of a slag rich in lime, does not, but by preference enters the slag, which may thus absorb even as much as 3 °'o of sulphur. This action is of great importance whether the metal is to be used as cast iron or is to be converted into wrought iron or steel. In the former case there is no later chance to remove sulphur, a minute quantity of which does great harm by leading to the formation of cementite instead of graphite and fcrrite, and thus making the cast-iron castings too hard to be cut to exact shape with steel tools; in the latter case the converting or purifying pro- cesses, which are essentially oxidizing ones, though they remove the other impurities, carbon, silicon, phosphorus and manganese, are not well adapted to desulphurizing, which needs rather deoxidiz- ing conditions, so as to cause the formation of calcium sulphide, than oxidizing ones.

66. The duty of the limestone (CaC0 3) is to furnish enough lime to form with the gangue of the ore and the ash of the fuel a lime silicate Or slag of such a composition (1) that it will melt at the temperature which it reaches at about level A, of fig. 7, (2) that it will be fluid enough to run out through the cinder notch, and (3) that it will be rich enough in lime to supply that needed for the desulphurizing reaction FeS+ CaO + C = Fe+CaS + CO. In short, its duty is to "flux" the gangue and ash, and wash out the sulphur.

67. In order that the slag shall have these properties its composition usually lies between the following limits: silica, 26 to 35%; lime, plus 1-4 times the magnesia, 45 to 55%; alumina, 5 to 20'%. Of these the silica and alumina are chiefly those which the gangue of the ore and the ash of the fuel intro- duce, whereas the lime is that added intentionally to form with these others a slag of the needed physical properties.

Thus the more gangue the ore contains, i.e. the poorer it is in iron, the more limestone must in general be added, and hence the more slag results, though of course an ore the gangue of which initially contains much lime and little silica needs a much smaller addition of limestone than one of which the gangue is chiefly silica. Further, the more sulphur there is to remove, the greater must be the quantity of slag needed to dissolve it as calcium sulphide. In smelting the rich Lake Superior ores the quantity of slag made was formerly as small

as 28 % of that of the pig iron, whereas in smelting the Cleve- land ores of Great Britain it is usually necessary to make as much as 1 j tons of slag for each ton of iron.

68. Shape and Size of the Blast-Furnace. — Large size has here, as in most metallurgical operations, not only its usual advantage of economy of installation, labour and administration per unit of product, but the further very important one that it lessens the proportion which the outer heat-radiating and hence heat- wasting surface bears to the whole. The limits set to the furnace builder's natural desire to make his furnace as large as possible, and its present shape (an obtuse inverted cone set below an acute upright one, both of them truncated), have been reached in part empirically, and in part by reasoning which is open to question, as indeed are the reasons which will now be offered reservedly for both size and shape.

First the width at the tuyeres (fig. 7) has generally been limited to about 12! ft. by the fear that, if it were greater, the blast would penetrate so feebly to the centre that the differ- ence in conditions between centre and circumference would be so great as to cause serious unevenness of working. Of late furnaces have been built even as wide as 17 ft. in the hearth, and it may prove that a width materially greater than 12! ft- can profitably be used. With the width at the bottom thus limited, the furnace builder naturally tries to gain volume as rapidly as possible by flaring or " battering " his walls outwards, i.e. by making the " bosh " or lower part of his furnace an inverted cone as obtuse as is consistent with the free descent of the solid charge. In practice a furnace may be made to work regularly if its boshes make an angle of between 73° and 76° with the horizontal, and we may assume that one element of this regularity is the regular easy sliding of the charge over this steep slope. A still steeper one not only gives less available room, but actually leads to irregular working, perhaps because it unduly favours the passage of the rising gas along the walls instead of up and through the charge, and thus causes the deoxidation of the central core to lag behind that of the periphery of the column, with the consequence that this central core arrives at the bottom incompletely deoxidized.

In the very swift-running furnaces of the Pittsburg type this outward flare of the boshes ceases at about 12 ft. above the tuyeres, and is there reversed, as in fig. 7, so that the furnace above this is a very acute upright cone, the walls of which make an angle of about 4 with the vertical, instead of an obtuse inverted cone.

In explanation or justification of this it has been said that a much

easier descent must be provided above this level than is needed below it. Below this level the solid charge descends easily, because it consists of coke alone or nearly alone, and this in turn because the temperature here is so high as to melt not only the iron now de-oxidized and brought to the metallic state, but also the gangue of the ore and the limestone, which here unite to form the molten slag, and run freely down between the lumps of coke. This coke descends freely even through this fast-narrowing space, because it is perfectly solid and dry without a trace of pastiness. But immediately above this level the charge is relatively viscous, because here the temperature has fallen so far that it is now at the melting or formation point of the slag, which therefore is pasty, liable to weld the whole mass together as so much tar would, and thus to obstruct the descent of the charge, or in short to " scaffold."

The reason why at this level the walls must form an upright instead of an inverted cone, why the furnace must widen downward instead of narrowing, is, according to some metallurgists, that this

shape is needed in order that, in spite of the pastiness of the slag in this formative period of incipient fusion, this layer may descend freely as the lower part of the column is gradually eaten away. To this very plausible theory it may be objected that in many slow-running furnaces, which work very regularly and show no sign of scaffolding, the outward flare of the boshes continues (though steepened) far above this region of pastiness, indeed nearly half-way to the top of the furnace. This proves that the regular descent of the material in its pasty state can take place even in a space which is narrowing downwards. To this objection it may in turn be answered that, though this degree of freedom of descent may suffice for a slow-running furnace, particularly if the slag is given such a composition that it passes quickly from the solid state to one of decided fluidity, yet it is not enough for swift-running ones, especially if the com-position of the slag is such that, in melting, it remains long in a very sticky condition. In limiting the diameter at the tuyeres to 125 ft., the height of the boshes to one which will keep their upper end below the region of pastiness, and their slope to one over which the burning coke will descend freely, we limit the width of the furnace at the top of the boshes and thus complete the outline of the lower part of the furnace.

The height of the furnace is rarely as great as 100 ft., and in the belief of many metallurgists it should not be much more than 80 ft. There -are some very evident disadvantages of excessive height; for instance, that the weight of an excessively high column of solid coke, ore and limestone tends to crush the coke and jam the charge in the lower and narrowing part of the furnace, and that the frictional resistance of a long column calls for a greater consumption of power for driving the blast up through it. Moreover, this resistance increases much more rapidly than the height of the furnace, even if the rapidity with which the blast is forced through is constant; and it still further increases if the additional space gained by lengthening the furnace is made useful by increasing proportionally the rate of production, as indeed would naturally be done, because the chief motive for gaining this additional space is to increase production.

The reason why the frictional resistance would be further increased is the very simple one that the increase in the rate of production implies directly a corresponding increase in the quantity of blast forced through, and hence in the velocity of the rising gases, because the chemical work of the blast furnace needs a certain quantity of blast for each ton of iron made. In short, to increase the rate of production by lengthening the furnace increases the frictional resistance of the rising gases, both by increasing their quantity and hence their velocity and by lengthening their path. _

Indeed, one important reason for the difficulties in working very high furnaces, e.g. those 100 ft. high, may be that this frictional resistance becomes so great as actually to interrupt the even descent of the charge, parts of which are at times suspended like a ball in the rising jet of a fountain, to fall perhaps with destructive violence when some shifting condition momentarily lessens the friction. We see how powerful must be the lifting effect of the rising gases when we reflect that their velocity in a 100 ft. furnace rapidly driven is probably at least as great as 2000 ft. per minute, or that of a " high wind." Conceive these gases passing at this great velocity through the narrow openings between the adjoining lumps of coke and ore. Indeed, the velocity must be far greater than this where the edge or corner of one lump touches the side of another, and the only room for the passage of this enormous quantity of gas is that left by the roughness and irregularity of the individual lumps.

The furnace is made rather narrow at the top or " stock line," in order that the entering ore, fuel and' flux may readily be distributed evenly. But extreme narrowness would not only cause the escaping gases to move so swiftly that they would sweep much of the fine ore

out of the furnace, but would also throw needless work on the blowing engines by throttling back the rising gases, and would lessen unduly the space available for the charge in the upper part of the furnace.

From its top down, the walls of the furnace slope outward at an angle of between 3° and 8°, partly in order to ease the descent of the charge, here impeded by the swelling of the individual particles of ore caused by the deposition within them of great quantities of fine carbon, by the reaction of 2CO = C+CC>2. To widen it more abruptly would indeed increase the volume of the furnace, but would probably lead to grave irregularities in the distribution of the gas and charge, and hence in the working of the furnace.

When we have thus fixed the height of the furnace, its diameter at its ends, and the slope of its upper and lower

parts, we have completed its outline closely enough for oui purpose here.

69. Hot Blast and Dry Blast. — On its way from the blowing engine to the tuyeres of the blast-furnace, the blast, i.e. the air forced in for the purpose of burning the fuel, is usually pre-heated, and in some of the most progressive works is dried by Gayley's refrigerating process. These steps lead to a saving of fuel so great as to be astonishing at first sight — indeed in case of Gayley's blast-drying process incredible to most writers, who proved easily and promptly to their own satisfaction that the actual saving was impossible. But the explanation is really so very simple that it is rather the incredulity of these writers that is astonishing. In the hearth of the blast furnace the heat made latent by the fusion of the iron and slag must of course be supplied by some body which is itself at a temperature above the melting point of these bodies, which for simplicity of exposition we may call the critical temperature of the blast-furnace process, because heat will flow only from a hotter to a cooler object. Much the same is true of the heat needed for the deoxidation of the silica, Si0 2 +2C = Si-r-2C02- Now the heat developed by the combustion of coke to carbonic oxide with cold air containing the usual quantity of moisture, develops a temperature only slightly above this critical point; and it is only the heat represented by this narrow temperature-margin that is available for doing this critical work of fusion and deoxidation. That is the crux of the matter. If by preheating the blast we add to the sum of the heat available; or if by drying it we subtract from the work to be done by that heat the quantity needed for decomposing the atmospheric moisture; or if by

removing part of its nitrogen we lessen the mass over which the heat developed has to be spread— if by any of these means we raise the temperature developed by the combustion of the coke, it is clear that we increase the proportion of the total heat which is available for this critical work in exactly the way in which we should increase the proportion of the water of a stream, initially 100 in. deep, which should flow over a waste weir initially 1 in. beneath the stream's surface, by raising the upper surface of the water 10 in. and thus increasing the depth of the water to no in. Clearly this raising the level of the water by 10% increases tenfold, or by 1000%, the volume of water which is above the level of the weir.

The special conditions of the blast-furnace actually exaggerate the saving due to this widening of the available temperature-margin, and beyond this drying the blast does great good by preventing the serious irregularities in working the furnace caused by changes in the humidity of the air with varying weather.

70. Means of Heating the Blast.— After the ascending column of gases has done its work of heating and deoxidizing the ore, it still necessarily contains so much carbonic oxide, usually between 20 and 26% by weight, that it is a very valuable fuel, part of which is used for raising steam for generating the blast itself and driving the rolling mill engines, &c, or directly in gas engines, and the rest for heating the blast. This heating was formerly done by burning part of the gases, after their escape from the furnace top, in a large combustion chamber, around a series of cast iron pipes through which the blast passed on its way from the blowing engine to the tuyeres. But these " iron pipe stoves " are fast going out of use, chiefly because they are destroyed quickly if an attempt is made to heat the blast above 1000 F. (538° C), often a very important thing. In their place the regenerative stoves of the Whitwell and Cowper types (figs. 10 and n) are used. With these the regular temperature of the blast at some works is about 1400 F. (76o°C), and the usual blast temperature lies between ooo° and iaoo°F. 480 and 650° C).

Like the Siemens furnace, described in § 90, they have two distinct phases: one, " on gas," during which part of the waste gas of the blast-furnace is burnt within the stove, highly heating the great surface of brickwork which for that purpose is provided within it; the other, "on wind," during which the blast is heated by passing it back over these very surfaces which have thus been heated. They are heat-filters or heat-traps for

impounding the heat developed by the combustion of the furnace gas, and later returning it to the blast. Each blast-furnace is now provided with three or even four of these stoves, which collectively may be nearly thrice as large as the furnace itself. At any given time one of these is " on wind " and the others " on gas."

The Whitwell stove (fig. 10), by means of the surface of several fire-brick walls, catches in one phase the heat evolved by the burning

gas as it sweeps through, and in the other phase returns that heat to the entering blast as it sweeps through from left to right. In the original Whitwell stove, which lacks the chimneys shown at the top of fig. 10, both the burning gas and the blast pass up and down re-peatedly. In the H. Kennedy modifica- tion, shown in fig. 10, the gas and air in one phase enter at the bottom of all three of the large vertical chambers, burn in passing up- wards, and escape at once at the top, as shown by the broken arrows. In the other phase the cold blast, forced in at A, passes four times up and down, as shown by

Wind " , 15 HS§ = §§il^^!!^^^ii H 1 B the unbroken arrows, k (I OS raf^5«S5^Ss^SEa H B and escapes as hot

blast at B. This,

then , is a " one-pass ' '

stove when on gas

but a " four-pass "

one when on wind.

The Cowper stove

(fig. 11) differs from

the Whitwell (1) in

having not a series

of flat smooth walls,

Fig. 10. — Whitwell Hot-Blast Stove, as modified by H. Kennedy. When " on wind," the cold blast is forced in at A, and passes

four times up and down, as shown by means , , . , •

of unbroken arrows, escaping as hot-blast at b f ut a S reat number

. v\ hen on gas, the gas and air enter at the bottom of each of the three larger

emission of the heat]uence

of narrow vertical flues, E, forthealter-

vertical chambers, pass once up through the nate ?bsorption and

stove, and escape at the top, as shown by emission of the ˆ

means of broken arrows. Hence this is a four- ™™ t] ? e consec l

*pass stove when on wind, but a one-pass t ?. at ‘ \? r S lv . en ou *-*

stove when on gas. sl ˆ e dimensions it

oners about one-half more heating surface than the true Whitwell stove; and (2) in that the gas and the blast pass only once up and once down through it, instead of twice up and twice down as in the modern true Whitwell stoves. As regards frictional resistance, this smaller number of reversals of direction compensates in a measure for the smaller area of the Cowper flues. The large combustion chamber B permits thorough combustion of the gas.

71. Preservation of the Furnace Walls. — The combined fluxing and abrading action of the descending charge tends to wear away the lining of the furnace where it is hottest, which of course is near its lower end, thus changing its shape materially, lessening its efficiency, and in particular increasing its consump- tion of fuel. The walls, therefore, are now made thin, and are thoroughly cooled by water, which circulates through pipes or boxes bedded in them. James Gayley’s method of cooling, shown in fig. 7, is to set in the brick- work walls several horizontal rows of flat water-cooled bronze boxes, RR’, extending nearly to the interior of the furnace, and tapered so that they can readily be withdrawn and replaced in case they burn through. The brick- work may wear back to the front edges of these boxes, or even, as is shown at R’, a little farther. But in the latter case their edges still determine -the effective profile of the furnace walls because the depressions at the back of these edges become filled

with carbon and scoriaceous rfl&tlef when the furnace is in normal working. Each of these rows, of which five are shown in fig. 7, consists of a great number of short segmental boxes.

72. Blast-furnace Gas Engines.— When the gas which escapes from the furnace top is used in gas engines it generates about four times as much power as when it is used for raising steam. It has been calculated that the gas from a pair of old-fashioned blast-furnaces making 1600 tons of iron per week would in this way yield some 16,000 horse-power in excess of their own needs, and that all the available blast-furnace gas in the United States would develop about 1,500,000 horse-power, to develop which by raising steam would need about 20,000,000 tons of coal a year. Of this power about half would be used at the blast- furnaces them- selves, leaving 750,000 horse- power available for driving the machinery of the rolling mills, &c.

This use of the gas engine is likely to have far – reaching results. In order to utilize this power, the converting mill, in which the pig iron is converted into steel, and the rolling mills must adjoin the blast – furnace. The numerous con- verting mills which treat pig iron made at a distance will now have the crush- ing burden of pro- viding in other ways the power which their rivals get from ˆ the blast-furnace, in addition to the severe disadvantage under which they already suffer, of wasting the initial heat of the molten cast iron as it runs from the blast- furnace. Before its use in the gas engine, the blast- furnace gas has to be freed care- fully from the large quantity of fine ore dust which it carries in suspension.

73. Mechanical Appliances. — ■ Mov- ing the raw ma- terials and the pro- ducts: In order to move economically the great quantity of materials which enter and issue from each furnace daily, mechanical appli- ances have at many works displaced hand labour wholly, and indeed that any of the materials

should be shovelled by hand is not to be thought of in designing new works.

The arrangement at the Carnegie Company's Duquesne works £fig. 12) may serve as an example of modern methods of handling. The standard-gauge cars which bring the ore and coke to Duquesne pass oyer one of three very long rows of bins, A, B, and C (fig. 12), of which A and B receive the materials (ore, coke and limestone)

Fig. 11. — Diagram of Cowper Hot-Blast Stove at Duquesne. (After

J.Kennedy.) Broken arrows show the path of the gas and air while the stove is " on gas," and solid arrows that of the blast while it is " on wind."

A, Entrance for blast-furnace gas.

B, B, Combustion chamber.

C, Chimney valve.

D, Cold blast main.

E, Hollow bricks.

use i

or immediate use, while C receives those to be stored for winter lse. From A and B the materials are drawn as they are needed .nto large buckets D standing on cars, which carry them to the foot of the hoist track EE, up which they are hoisted to the top of the furnace. Arrived here, the material is introduced into the furnace by an ingenious piece of mechanism which completely prevents the furnace gas from escaping into the air. The hoist-engineer in the house F at the foot of the furnace, when informed by means of an indicator that the bucket has arrived at the top, lowers it so that its flanges GG (fig. 7) rest on the corresponding fixed flanges HH, as shown in fig. 9. The farther descent of the bucket being thus arrested, the special cable T is now slackened, so that the conical bottom of the bucket drops down, pressing down by its weight the

the string of moulds, each thus containing a pig, moves slowly forward, the pigs solidify and cool, the more quickly because in transit they are sprayed with water or even submerged in

Fig 12.— Diagram of the Carnegie Blast-Furnace Plant at Duquesne, Pa. .

r " jl 6 „ TT . . , N N N. Ladles carrying the molten

B, Bins for stock for immediate use. „ F, Hoist-engine house. JN , in , in , > aa e , y j, (

A and B, Bins for stock for immediate; use.

C, Receiving bin for winter stock pile.

D, D, Ore bucket.

EE, Hoist-track.

LL, Travelling crane commanding stock pile. M, Ore bucket receiving ore for stock pile. M', Bucket removing ore from stock pile.

cast iron to the works, where it is converted into steel by the open hearth process.

counter-weighted false cover J of the furnace, so that the contents of the bucket slide down into the space between this false cover and the true charging bell, K. The special cable T is now tightened again, and lifts the bottom of the bucket so as both to close it and to close the soace between J and K, by allowing J to rise back to its initial place. The bucket then descends along the hoist-track to make way for the next succeeding one, and K is lowered, dropping the charge into the furnace. Thus some 1700 tons of materials are charged daily into each of these furnaces without being shovelled at all running by gravity from bin to bucket and from bucket to furnace, and being hoisted and charged into the furnace by a single engineer below, without any assistance or supervision at the furnace-

° The winter stock of materials is drawn from the left-hand row of bins, and distributed over immense stock piles by means ot the

water in the tank EE. Arrived at the farther sheave C, the now cool pigs are dumped into a railway car.

Besides a great saving of labour, only partly offset by the cost of repairs, these machines have the great merit of making the management independent of a very troublesome set of labourers, the hand pig-breakers, who were not only absolutely ˆdispensable ■ forwy cast and every day, because the pig iron must be removed Promptly to make way.ir the next succeeding cast of iron, but very difficult to replace because of the great physical endurance which their work requires.

Fig. 13. — Diagram of A, Ladle bringing the cast iron from the blast-furnace. BB, The moulds. .

C, D, Sheaves carrying the endless chain ot moulds.

great crane LL (fig. 12), which transfers it as it is needed to the row

A of bins, whence it is carried to the furnace, as already ex-

plained.

74 Casting the Molten Pig Iron.— The molten pig iron at many works is still run directly from the furnace into sand or iron moulds arranged in a way which suggests a nursing litter of pigs; hence the name " pig iron." These pigs are then usually broken by hand. The Uehling casting machine (fig. 13) has displaced this method in many works. It consists essentially of a series of thin-walled moulds, BB, carried by endless chains past the lip of a great ladle A. This pours into them the molten cast iron which it has just received directly from the blast-furnace. As

Pig-Casting Machine.

EE, Tank in which the moulds are submerged.

F, Car into which the cooled pigs are dropped.

G, Distributing funnel.

present way of getting the iron of the ore into the form of wrought iron and steel by first making cast iron and then purifying it, ie by first putting carbon and silicon into the iron and then taking them out again at great expense, at first sight seems so unreasonably roundabout that many " direct processes of extracting the iron without thus charging it with carbon and silicon have been proposed, and some of them have at times been important. But to-day they have almost ceased to exist.

That the blast-furnace process must be followed by a purifying one, that carburization must at once be undone by decarbu ."^ 1 ° n j A c earlv a disadvantage, but it is one which is far out -we lg hed by five important incidcnta advantages. (1) The strong deoxidizing

action incidental to this carburizing removes the sulphur easily and cheaply, a thing hardly to be expected of any direct process so far as we can see. (2) The carburizing incidentally carburizes the brickwork of the furnace, and thus protects it against corrosion by the molten slag. (3) It protects the molten iron against reoxidation, the greatest stumbling block in the way of the direct processes

hitherto. (4) This same strong deoxidizing action leads to the practically complete deoxidation and hence extraction of the iron. (5) In that carburizing lowers the melting point of the iron greatly, it lowers somewhat the temperature to which the mineral matter of the ore has to be raised in order that the iron may be separated from it, because this separation requires that both iron and slag shall be very fluid. Indeed, few if any of the direct processes have attempted to make this separation, or to make it complete, leaving it for some subsequent operation, such as the open hearth process.

In addition, the blast-furnace uses a very cheap source of energy, coke, anthracite, charcoal, and even certain kinds of raw bituminous coal, and owing first to the intimacy of contact between this fuel and the ore on which it works, and second to the thoroughness of the transfer of heat from the products of that fuel's combustion in their long upward journey through the descending charge, even this cheap energy is used most effectively.

Thus we have reasons enough why the blast-furnace has displaced all competing processes, without taking into account its further advantage in lending itself easily to working on an enormous scale and with trifling consumption of labour, still further lessened by the general practice of transferring the molten cast iron in enormous ladles into the vessels in which its conversion into steel takes place. Nevertheless, a direct process may yet be made profitable under conditions which specially favour it, such as the lack of any fuel suitable for the blast-furnace, coupled with an abundance of cheap fuel suitable for a direct process and of cheap rich ore nearly free from sulphur.

76. The chief difficulty in the way of modifying the blast furnace process itself so as to make it accomplish what the direct processes aim at, by giving its product less carbon and silicon than pig iron as now made contains, is the removal of the sulphur. The processes for converting cast iron into steel can now remove phosphorus easily, but the removal of sulphur in them is so difficult that it has to be accomplished for the most part in the blast-furnace itself. As desulphurizing seems to need the direct and energetic action of carbon on the molten iron itself, and as molten iron absorbs carbon most greedily, it is hard to see how the blast-furnace is to desulphurize without carburizing almost to saturation, i.e. without making cast iron.

77. Direct Metal and the Mixer. Until relatively lately the cast iron for the Bessemer and open-hearth processes was nearly always*

allowed to solidify in pigs, which were next broken up by hand and remelted at great cost. It has long been seen that there would be a great saving if this remelting could be avoided and " direct metal," i.e. the molten cast iron direct from the blast- furnace, could be treated in the conversion process. The obstacle is that, owing to unavoidable irregularities in the blast-furnace process, the silicon- and sulphur-content of the cast iron vary to a degree and with an abruptness which are inconvenient for any conversion process and intolerable for the Bessemer process. For the acid variety of this process, which does not remove sulphur, this most harmful element must be held below a limit which is always low, though it varies somewhat with the use to which the steel is to be put. Further, the point at which the process should be arrested is recognized by the appearance of the flame which issues from the converter's mouth, and variations in the silicon-content of the cast iron treated alter this appearance, so that the indications of the flame become confusing, and control over the process is lost. Moreover, the quality of the resultant steel depends upon the temperature of the process, and this in turn depends upon the proportion of silicon, the combustion of which is the chief source of the heat developed. Hence the importance of having the silicon-content constant. In the basic Bessemer process, also, unforeseen variations in the silicon- content are harmful, because the quantity of lime added should be just that needed to neutralize the resultant silica and the phosphoric acid and no more. Hence the importance of having the silicon-content uniform. This uniformity is now given by the use of the " mixer " invented by Captain W. R. Jones.

This " mixer " is a great reservoir into which successive lots of molten cast iron from all the blast-furnaces available are poured, forming a great molten mass of from 200 to 750 tons.

This is kept molten by a flame playing above it, and successive lots of the cast iron thus mixed are drawn off, as they are needed, for conversion into steel by the Bessemer or open-hearth process. An excess of silicon or sulphur in the- cast iron from one blast- furnace is diluted by thus mixing this iron with that from the other furnaces. Should several furnaces simultaneously make iron too rich in silicon, this may be diluted by pouring into the mixer some low-silicon iron melted for this purpose in a cupola furnace. This device not only makes the cast iron much more uniform, but also removes much of its sulphur by a curious slow reaction. Many metals have the power of dissolving their own oxides and sulphides, but not those of other metals. Thus iron, at least highly carburetted, i.e. cast iron, dissolves its own sulphide freely, but not that of either calcium or manganese.

Consequently, when we deoxidize calcium in the iron blast- furnace, it greedily absorbs the sulphur which has been dissolved in the iron as iron sulphide, and the sulphide of calcium thus formed separates from the iron. In like manner, if the molten iron in the mixer contains manganese, this metal unites with the sulphur present, and the manganese sulphide, insoluble in the iron, slowly rises to the surface, and as it reaches the air, its sulphur oxidizes to sulphurous acid, which escapes. Further, an important part of the silicon may be removed in the mixer by keeping it very hot and covering the metal with a rather basic slag. This is very useful if the iron is intended for either the basic Bessemer or the basic open-hearth process, for both of which silicon is harmful.

78. Conversion or Purifying Processes for converting Cast Iron into Steel or Wrought Iron. — As the essential difference between cast iron on one hand and wrought iron and steel on the other is that the former contains necessarily much more carbon, usually more silicon, and often more phosphorus that are suit- able or indeed permissible in the latter two, the chief work of all these conversion processes is to remove the excess of these several foreign elements by oxidizing them to carbonic oxide CO, silica Si02, and phosphoric acid P2O5, respectively. Of these the first escapes immediately as a gas, and the others unite with iron oxide, lime, or other strong base present to form a molten silicate or silico-phosphate called " cinder " or " slag," which floats on the molten or pasty metal. The ultimate source of the oxygen may be the air, as in the Bessemer process, or rich iron oxide as in the puddling process, or both as in the open-hearth process; but in any case iron oxide is the chief immediate source, as is to be expected, because the oxygen of the air would naturally unite in much greater proportion with some of the great quantity of iron offered to it than with the small quantity of these im- purities. The iron oxide thus formed immediately oxidizes these foreign elements, so that the iron is really a carrier of oxygen from air to impurity. The typical reactions are something like the following: Fe 3 4 +4C = 4CO+3Fe; Fe 3 4 +C = 3FeO+CO; 2P.+ 5Fe.,0 4 = 12FeO + 3FeO,P 2 6 ; Si + 2Fe 3 4 = 3FeO,Si0 2 + 3FeO. Beside this their chief and easy work of oxidizing carbon, silicon and phosphorus, the conversion processes have the harder task- of removing sulphur, chiefly by converting it into calcium sulphide, CaS, or manganous sulphide, MnS, which rise to the top of the molten metal and there enter the overlying slag, from which the sulphur may escape by oxidizing to the gaseous compound, sulphurous acid, SO2.

79. In the puddling process molten cast iron is converted into wrought iron, i.e. low-carbon slag-bearing iron, by oxidizing its

carbon, silicon and phosphorus, by means of iron oxide stirred into it as it lies in a thin shallow layer in the " hearth " or flat basin of a reverberatory furnace (fig. 14), itself lined with iron ore. As the iron oxide is stirred into the molten metal laboriously by the workman or "puddler" with his hook or "rabble," it oxidizes the silicon to silica and the phosphorus to phosphoric acid, and unites with both these products, forming with them a basic iron silicate rich in phosphorus, called " puddling " or " tap cinder." It oxidizes the carbon also, which escapes in purple jets of burning carbonic oxide. As the melting point of the metal is gradually raised by the progressive decarburization, it at length passes above the temperature of the furnace, about

1400 C, with the consequence that the metal, now below its melting point, solidifies in pasty grains, or " comes to nature." These grains the puddler welds together by means of his rabble

Fig. 15. — Plan of Burden's Excentric Revolving Squeezer for Puddled Balls.

Fig. 14. — Puddling Furnace.

into rough 80-lb balls, each like a sponge of metallic iron particles with its pores filled with the still molten cinder. These balls are next worked into merchantable shape, and the cinder is simultaneously expelled in large part, first by hammering them one at a time under a steam hammer (fig. 37) or by squeez- ing them, and next by rolling them. The squeezing is usually done in the way shown in fig. 15.

Here BB is a large fixed iron cylinder, corrugated within, and C an excentric cylinder, also corrugated, which, in turning to the

right, by the friction of its cor- rugated surface rotates the puddled ball D which has just entered at A, so that, turning around its own axis, it travels to the right and is gradually changed from a ball into a bloom, a rough cylindrical mass of white hot iron, still dripping with cinder. This bloom is im- mediately rolled down into a long fiat bar, called " muck bar," and this in turn is cut into short lengths which, piled one on another, are reheated and again rolled down, sometimes with repeated cutting, piling and re-rolhngf, into the final shape in which it is actually to be used. But, roll and re-roll as often as we like, much cinder remains imbedded in the iron, in the form of

threads and rods drawn out in the direction of rolling, and of course weakening the metal in the transverse direction.

80. Machine Puddling. — The few men who have, and are willing to exercise, the great strength and endurance which the puddler needs when he is stirring the pasty iron and balling it up, command such high wages, and with their little 500-lb charges turn out their iron so slowly, that many ways of puddling by machinery have been tried. None has succeeded permanently, though indeed one offered by J. P. Roe is not without promise. The essential difficulty has been that none of them could sub- divide the rapidly solidifying charge into the small balls which the workman dexterously forms by hand, and that if the charge is not thus subdivided but drawn as a single ball, the cinder cannot be squeezed out of it thoroughly enough.

81. Direct Puddling.— In common practice the cast iron as it runs from the blast-furnace is allowed to solidify and cool completely in the form of pigs, which are then graded by their fracture, and remelted in the puddling furnace itself. At Hourpes, in order to save the expense of this remelting, the molten cast iron as it comes from the blast-furnace is poured directly into the puddling furnace, in large charges of about 2200 lb, which are thus about four times as large as those of common puddling furnaces. These large charges are puddled by two gangs of four men each, and a great saving in fuel and labour is effected.

Attractive as are these advances in puddling, they have not been widely adopted, for two chief reasons: First, owners of puddling works have been reluctant to spend money freely in plant for a process of which the future is so uncertain, and this unwillingness has been the more natural because these very men are in large part the more conservative fraction, which has resisted the tempta- tion to abandon puddling and adopt the steel-making processes. Second, in puddling iron which is to be used as a raw material for making very fine steel by the crucible process, quality is the thing

of first importance. Now in the series of operations, the blast-furnace, puddling and crucible processes, through which the iron passes from the state of ore to that of crucible tool steel, it is so difficult to detect just which are the conditions essential to excellence in the final product that, Once a given procedure has been found to yield excellent steel, every one of its details is adhered to by the more cautious ironmasters, often with surprising conservatism. Buyers of certain excellent classes of Swedish iron have been said to object even to the substitution of electricity for water-power as a means of

driving the machinery of the forge. In case of direct puddling and the use of larger charges this conservatism has some foundation, because the established custom of allowing the cast iron to solidify gives a better opportunity of examining its fracture, and thus of rejecting unsuitable iron, than is afforded in direct puddling. So, too, when several puddlers are jointly responsible for the thoroughness of their work, as happens in puddling large charges, they will not exercise such care (nor indeed will a given degree of care be so effective) as when responsibility for each charge rests on one man.

82. The removal of phosphorus, a very important duty of the puddling process, requires that the cinder shall be " basic," i.e. that it shall have a great excess of the strong base, ferrous oxide, FeO, for the phosphoric acid to unite with, lest it be deoxidized by the carbon of the iron as fast as it forms, and so return to the iron, following the general rule that oxidized bodies enter the slag and unoxidized ones the metallic iron. But this basicity implies that for each part of the silica or silicic acid which inevitably results from the oxidation of the silicon of the pig iron, the cinder shall contain some three parts of iron oxide, itself a valuable and expensive substance. Hence, in order to save iron oxide the pig iron used should be nearly free from silicon. It should also be nearly free from sulphur, because of the great difficulty of removing this element in the puddling process. But the strong deoxidizing conditions needed in the blast-furnace to remove sulphur tend strongly to deoxidize silica and thus to make the pig iron rich in silicon.

83. The " refinery process " of fitting pig iron for the puddling process by removing the silicon without the carbon, is sometimes used because of this difficulty in making a pig iron initially low in both sulphur and silicon. In this process molten pig iron with much silicon but little sulphur has its silicon oxidized to silica and thus slagged off, by means of a blast of air playing on the iron through a blanket of burning coke which covers it. The coke thus at once supplies by its combustion the heat needed for melting the iron and keeping it hot, and by itself dissolving in the molten metal returns carbon to it as fast as this element is burnt out by the blast, so that the " refined " cast iron which results, though still rich in carbon and therefore easy to melt in the puddling process, has relatively little silicon.

84. In the Bessemer or " pneumatic " process, which indeed might be called the " fuel-less " process, molten pig iron is converted into steel by having its carbon, silicon and manganese, and often its phosphorus and sulphur, oxidized and thus removed by air forced

through it in so many fine streams and hence so rapidly that the heat generated by the oxidation of these im- purities suffices in and by itself, unaided by burning any other fuel, not only to keep the iron molten, but even to raise its temperature from a point initially but little above the melting point of cast iron, say 1150 to 1250° C, to one well above the melting point of the resultant steel, say 1 500 C. The " Bessemer converter " or " vessel " (fig. 16) in which this wonderful process is carried out is a huge retort, lined with clay, dolomite or other refractory material, hung aloft and turned on trunnions, DD, through the right-hand one of which the blast is carried to the gooseneck E, which in turn delivers it to the tuyeres Q at the bottom.

There are two distinct varieties of this process, the original undephosphorizing or " acid " Bessemer process, so called because the converter is lined with acid materials, i.e. those rich in silicic acid, such as quartz and clay, and because the slag is consequently acid, i.e. siliceous; and the dephosphorizing or " Thomas " or " basic Bessemer " process, so called because the converter is lined with basic materials, usually calcined dolomite, a mixture of lime and magnesia, bound together with tar, and because the slag is made very basic by adding much

lime to it. In the basic Bessemer process phosphorus is readily removed by oxidation, because the product of its oxidation, phosphoric acid, P2O5, in the presence of an excess of base forms stable phosphates of lime and iron which pass into the slag, making it valuable as an artificial manure. But this dephos- phorization by oxidation can be carried out only in the case slag is basic. If it is acid, i.e. if it holds much more than 20% of.

[WW:. 1

i;s-.\£S > £s£saAj

s^^r

Fig. 16. — 12-15 ton Bessemer Converter.

A,

Trunnion-ring.

0,

Tuyere-plate.

B,

Main shell.

1

False plate.

c,

Upper part of shell.

u.

Tuyeres.

u,

Trunnions.

K,

Keys holding lid of t

K,

Goose-neck.

box.

F,

Tuyere-box.

s,

Refractory lining.

N,

Lid of tuyere-box.

u,

Key-link holding bottom.

tuyere-

so powerful an acid as silica, then the phosphoric acid has so feeble a hold on the base in the slag that it is immediately re- deoxidized by the carbon of the metal, or even by the iron itself, Ps05 + 5Fe = 2P + 5FeO, and the resultant deoxidized phosphorus immediately recombines with the iron. Now in an acid-lined converter the slag is necessarily acid, because even an initially basic slag would immediately corrode away enough of the acid lining to make itself acid. Hence phosphorus cannot be removed in an acid-lined converter. Though all this is elementary to-day, not only was it unknown, indeed unguessed, at the time of the invention of the Bessemer process, but even when, nearly a quarter of a century later, a young English metallurgical chemist, Sidney Gilchrist Thomas (1850-1885), offered to the British Iron and Steel Institute a paper describing his success in dephosphoriz- ing by the Bessemer process with a basic-lined converter and a basic slag, that body rejected it. , ˆ

85. In carrying out the acid Bessemer process, the con- verter, preheated to about 1200 C. by burning coke in it, is turned into the position shown in fig. 17, and the charge Fie. 17. — Bessemer Converter, of molten pig iron, which turned down in position to receive sometimes weighs as much and discharge the molten metal. ag 2Q tong> j g pQUred ; nto k

through its mouth. The converter is then turned upright into the position shown in fig. 16, so that the blast, which has been let on just before this, entering through the great number of tuyere holes in the bottom, forces its way up through the relatively shallow layer of iron, throwing it up within the con- verter as a boiling foam, and oxidizing the foreign elements so

rapidly that in some cases their removal is complete after 5 minutes. The oxygen of the blast having been thus taken up by the molten metal, its nitrogen issues from the mouth of the converter as a pale spark-bearing cone. Under normal conditions the silicon oxidizes first. Later, when most of it has been oxidized, the carbon begins to oxidize to carbonic oxide, which in turn burns to carbonic acid as it meets the outer air on escaping from the mouth of the converter, and generates a true flame which grows bright, then brilliant, then almost blinding, as it rushes and roars, then " drops," i.e. shortens and suddenly grows quiet when the last of the carbon has burnt away, and no flame-forming substance remains. Thus may a 20-ton charge

of cast iron be converted into steel in ten minutes. 1 It is by the appearance of the flame that the operator or " blower " knows when to end the process, judging by its brilliancy, colour, sound, sparks, smoke and other indications.

86. Recarburizing. — The process may be interrupted as soon as the carbon-content has fallen to that which the final product is to have, or it may be continued till nearly the whole of the carbon has been burned out, and then the needed carbon may be added by " recarburizing." The former of these ways is followed by the very skilful and intelligent blowers in Sweden, who, with the temperature and all other conditions well under control, and with their minds set on the quality rather than on the quantity of their product, can thus make steel of any desired carbon-content from o-io to 1-25%. But even with all their skill and care, while the carbon-content is still high the indications of the flame are not so decisive as to justify them in omitting to test the steel before removing it from the converter, as a check on the accuracy of their blowing. The delay which this test causes is so unwelcome that in all other countries the blower continues the blow until decarburization is nearly complete, because of the very great accuracy with which he can then read the indications of the flame, an accuracy which leaves little to be desired. Then, without waiting to test the product, he " recarburizes " it, i.e. adds enough carbon to give it the content desired, and then immediately pours the steel into a great clay- lined casting ladle by turning the converter over, and through a nozzle in the bottom of this ladle pours the steel into its ingot moulds. In making very low-carbon steel this recarburizing proper is not needed; but in any event a considerable quantity of manganese must be added unless the pig iron initially Contains much of that metal, in order to remove from the molten steel the oxygen which it has absorbed from the blast, lest this make it redshort. If the carbon-content is not to be raised materially, this manganese is added in the form of preheated lumps of " ferro-manganese," which contains about, 80% of manganese, 5% of carbon and 15% of iron, with a little silicon and other impurities. If, on the other hand, the carbon-content is to be raised, then carbon and manganese are usually added together in the form of a manganiferous molten pig iron, called spiegel- eisen, i.e. " mirror-iron," from the brilliancy of its facets, and usually containing somewhere about 12% of manganese and 4% of carbon, though the proportion between these two elements has to be adjusted so as to introduce the desired quantity of each into the molten steel. Part of the carbon of this spiegel- eisen unites with the oxygen occluded in the molten iron to form carbonic oxide, and again a bright flame,

greenish with manganese, escapes from the converter.

87. Darby's Process. — Another way of introducing the carbon is Darby's process of throwing large paper bags filled with • anthracite, coke or gas-carbon into the casting ladle as the molten steel is pouring into it. The steel dissolves the carbon of this fuel even more quickly than water would dissolve salt under like conditions.

88. Bessemer and M ushet.— Bessemer had no very wide knowledge of metallurgy, and after overcoming many stupendous

1 The length of the blow varies very greatly, in general increasing with the proportion of silicon and with the size of charge. Thus the small Swedish charges with but little silicon may be blown in 5 minutes, but for a 20-ton charge the time is more likely to reach, or exceed 10 minutes, and sometimes reaches 20 minutes or even more.

difficulties he was greatly embarrassed by the brittleness or " redshortness " of his steel, which he did not know how to cure. But two remedies were quickly offered, one by the skilful Swede, Goransson, who used a pig iron initially rich in manganese and stopped his blow before much oxygen had been taken up; and the other by a British steel maker, Robert Mushet, who proposed the use of the manganiferous cast iron called spiegeleisen, , and thereby removed the only remaining serious obstacle to the rapid spread of the process.

From this many have claimed for Mushet a part almost or even quite equal to Besseme^'s in the development of the Bessemer pro- cess, even calling it tne " Bessemer-Mushet process." But this seems most unjust. Mushet had no such exclusive knowledge of the effects of manganese that he alone could have helped Bessemer; and even if nobody had then proposed the use of spiegeleisen, the development of the Swedish Bessemer practice would have gone on, and, the process thus established and its value and great economy thus shown in Sweden, it would have been only a question of time how soon somebody would have proposed the addition of manganese. Mushet's aid was certainly valuable, but not more than Goransson's, who, besides thus offering a preventive of redshortness, further helped the process on by raising its temperature by the simple expedient of further subdividing the blast, thus increasing the surface of contact

between blast and metal, and thus in turn hasten- ing the oxidation. The two great essential discoveries were first that the rapid passage of air through molten cast iron raised its temperature above the melting point of low-carbon steel, or as it was then called " malleable iron," and second that this low-carbon steel, which Bessemer was the first to make in important quantities, was in fact an extraordinarily valuable substance when made under proper conditions.

80. Source of Heat. — The carbon of the pig iron, burning as it does only to carbonic oxide within the converter, does not by itself generate a temperature high enough for the needs of the process. The oxidation of manganese is capable of generating a very high temperature, but it has the very serious disadvantage of causing such thick clouds of smoky oxide of manganese as to hide the flame from the blower, and prevent him from recognizing the moment when the blow should be ended. Thus it comes about that the temperature is regulated primarily by adjusting the quantity of silicon in the pig iron treated, ij% of this element usually sufficing. If any individual blow proves to be too hot, it may be cooled by throwing cold " scrap " steel such as the waste ends of rails and other pieces, into the converter, or by injecting with the blast a little steam, which is decomposed by the iron by the endothermic reaction H 2 0-f-Fe = 2H + FeO. If the temperature is not high enough, it is raised by managing the blast in such a way as to oxidize some of the iron itself permanently, and thus to generate much heat.

90. The basic or dephosphorizing variety of the Bessemer process, called in Germany the " Thomas " process, differs from the acid process in four chief points: (1) that its slag is made very basic and hence dephosphorizing by adding much lime to it; (2) that the lining is basic, because an acid lining would quickly be destroyed by such a basic slag; (3) that the process is arrested not at the " drop of the flame " (§85) but at a pre- determined length of time after it; and (4) that phosphorus instead of silicon is the chief source of heat. Let us consider these in turn.

91. The slag, in order that it may have such an excess of base that this will retain the phosphoric acid as fast as it is formed by the oxidation of the phosphorus of the pig iron, and prevent it from being re-deoxidized and re-absorbed by the iron, should, according to von Ehrenwerth's rule which is generally followed, contain enough lime to form approximately a tetra-calcic silicate, 4CaO,Si0 2 with the silica which results from the oxidation of the silicon of the pig iron and tri-calcic phosphate, 3CaO,P20 6 , with the phosphoric acid which forms. The danger of this " rephosphorization " is greatest at

the end of the blow, when the recarburizing additions are made. This lime is charged in the form of common quicklime, CaO, resulting from the calcina- tion of a pure limestone, $CaC0_3$, which should be as free as possible from silica. The usual composition of this slag is iron oxide, 10 to 16%; lime, 40 to 50%; magnesia, 5%; silica, 6 to 9%; phosphoric acid, 16 to 20%. Its phosphoric acid makes it so valuable as a fertilizer that it is a most important

by-product. In order that the phosphoric acid may be the more fully liberated by the humic acid, &c, of the earth, a little silicious sand is mixed with the still molten slag after it lias been poured off from the molten steel. The slag is used in agriculture with no further preparation, save very fine grinding.

92. The lining of the converter is made of 90% of the mixture of lime and magnesia which results from calcining dolomite, $(Ca,Mg)C0_3$, at a very high temperature, and 10% of coal tar freed from its water by heating. This mixture may be rammed in place, or baked blocks of it may be laid up like a masonry wall. In either case such a lining is expensive, and has but a short life, in few works more than 200 charges, and in some only 100, though the silicious lining of the acid converter lasts thousands of charges. Hence, for the basic process, spare converters must be provided, so that there may always be some of them re-lining, either while standing in the same place as when in use, or, as in Holiey's arrangement, in a separate repair house, to which these gigantic vessels are removed bodily.

93. Control of the Basic Bessemer Process. — The removal of the greater part of the phosphorus takes place after the carbon has been oxidized and the flame has consequently " dropped," probably because the lime, which is charged in solid lumps, is taken up by the slag so slowly that not until late in the operation does the slag become so basic as to be retentive of phosphoric acid. Hence in making steel rich in carbon it is not possible, as in the acid Bessemer process, to end the operation as soon as the carbon in the metal has fallen to the point sought, but it is necessary to remove practically all of the carbon, then the phosphorus, and then " recarburize," i.e. add whatever carbon the steel is to contain. The quantity of phosphorus in the pig iron is usually known accurately, and the dephosphoriza- tion takes place so regularly that the quantity of air which it needs can be foretold closely. The blower therefore stops the process when he has blown a predetermined quantity of air through, counting from the drop of the flame; but as a check on his forecast he usually tests the blown metal before recar- burizing it.

94. Source of Heat. — Silicon cannot here be used as the chief source of heat as it is in the acid Bessemer process, because most of the heat which its oxidation generates is consumed in heating the great quantities of lime needed for neutralizing the resultant silica. Fortunately the phosphorus, turned from a curse into a blessing, develops by its oxidation the needed temperature, though the fact that this requires at least i-8o% of phosphorus limits the use of the process, because there are few ores which can be made to yield so phosphoric a pig iron. Further objec- tions to the presence of silicon are that the resultant silica (1) corrodes the lining of the converter, (2) makes the slag froth so that it both throws much of the charge out and blocks up the nose of the converter, and (3) leads to rephosphorization. These effects are so serious that until very lately it was thought that the silicon could not safely be much in excess of 1%. But Massenez and Richards, following the plan outlined by Pourcel in 1879, have found that even 3% of silicon is permissible if, by adding iron ore, the resultant silica is made into a fluid slag, and if this is removed in the early cool part of the process, when it attacks the lining of the converter bat slightly. Manganese to the extent of i-8o% is desired as a means of preventing the resultant steel from being redshort, i.e. brittle at a red or forging heat. The pig iron should be as nearly free as possible from sulphur, because the removal of any large quantity of this injurious element in the process itself is both difficult and' expensive.

95. The car casting system deserves description chiefly because it shows how, when the scale of operations is as enormous as it is in the Bessemer process, even a slight simplification and a slight heat-saving may be of great economic importance.

Whatever be the form into which the steel is to be rolled, it must in general first be poured from the Bessemer converter in which it is made into a large clay-lined ladle, and thence cast in vertical pyramidal ingots. To bring them to a temperature suitable for rolling, these ingots must be set in heating or soaking furnaces (§ 125), and this should be done as soon as possible after they are cast, both to lessen the loss of their initial heat, and to make way

for the next succeeding lot of ingots, a matter of great importance, because the charges of steel follow each other at such very brief intervals. A pair of working converters has made 4958 charges of 10

tons each, or a total of 50,547 tons, in one month, or at an average rate of a charge every seven minutes and twenty-four seconds throughout every working day. It is this extraordinary rapidity that makes the process so economical and determines the way in which its details must be carried out. Moreover, since the mould acts as a covering to retard the loss of heat, it should not be removed from the ingot until just before the latter is to be placed in its soaking furnace. These conditions are fulfilled by the car casting system of F. W. Wood, of Sparrows Point, Md., in which the moulds, while receiving the steel, stand on a train of cars, which are im- mediately run to the side of the soaking furnace. Here, as soon as the ingots have so far solidified that they can be lifted without breaking, their moulds are removed and set on an adjoining train of cars, and the ingots are charged directly into the soaking furnace. The mould-train now carries its empty moulds to a cooling yard, and, as soon as they are cool enough to be used again, carries them back to the neighbourhood of the converters to receive a new lot of steel. In this system there is for each ingot and each mould onlv one handling in which it is moved as a separate unit, the mould from one train to the other, the ingot from its train into the furnace. In the other movements, all the moulds and ingots of a given charge of steel are grouped as a train, which is moved as a unit by a loco- motive. The difficulty in the way of this system was that, in pouring the steel from ladle to mould, more or less of itoccasionally spatters, and these spatterings, if they strike the rails or the running gear of the cars, obstruct and foul them, preventing the movement of the train, because the solidified steel is extremely tenacious. But this cannot be tolerated, because the economy of the process requires extreme promptness in each of its steps. On account of this difficulty the moulds formerly stood, not on cars, but directly on the floor of a casting pit while receiving the molten steel. When the ingots had so far solidified that they could be handled, the moulds were removed and set on the floor to cool, the ingots were set on a car and carried to the soaking furnace, and the moulds were then replaced in the casting pit. Here each mould and each ingot was handled as a separate unit twice, instead of only once as in the car casting system; the ingots radiated away great quantities of heat in passing naked from the converting mill to the soaking furnaces, and the heat which they and the moulds radiated while in the converting mill was not only wasted, but made this mill, open-doored as it was, so intolerably hot, that the cost of labour there was materially in- creased. Mr Wood met this difficulty by the simple device of so shaping the cars that they completely protect both their own running gear and the track from all possible spattering, a device which,

simple as it is, has materially lessened the cost of the steel and greatly increased the production. How great the increase has been, from this and many other causes, is shown in Table III.

Table III. — Maximum Production of Ingots by a Pair of American Converters.

Gross Tons per Week.	
1870	254
1880	3,433
1889	8,549
1899 (average for a month)	11,233
1903	5.704

Thus in thirty-three years the rate of production per pair of vessels increased more than sixty-fold. The production of European Bessemer works is very much less than that of American. Indeed, the whole German production of acid Bessemer steel in 1899 was at a rate but slightly greater than that here given for one pair of American converters; and three pairs, if this rate were continued, would make almost exactly as much steel as all the sixty-five active British Bessemer converters, acid and basic together, made in 1899.

96. Range in Size of Converters. — In the Bessemer process, and indeed in most high-temperature processes, to operate on a large scale has, in addition to the usual economies which it offers in other industries, a special one, arising from the fact that from a large hot furnace or hot mass in general a very much smaller proportion of its heat dissipates through radiation and like causes than from a smaller body, just as a thin red-hot wire cools in the air much faster than a thick bar equally hot. Hence the progressive increase which has occurred in the size of converters, until now some of them can treat a 20-ton charge, is not surprising. But, on the other hand, when only a relatively small quantity of a special kind of steel is needed, very much smaller charges, in some cases weighing even less than half a ton, have been treated with technical success.

97. The Bessemer Process for making Steel Castings. — This has been particularly true in the manufacture of steel castings, i.e. objects usually of more or less intricate shape, which are cast initially in the form in which they are to be used, instead of being forged or rolled to that form from steel cast originally in ingots. For making castings,

especially those which are so thin and intricate that, in order that the molten steel may remain molten long enough to run into the thin parts of the mould, it must be heated initially very far above its melting-point, the Bessemer process has a very great

advantage in that it can develop a much higher temperature than it attainable in either of its competitors, the crucible and the open-hearth processes. Indeed, no limit has yet been found to the temperature which can be reached, if matters are so arranged that not only the carbon and silicon of the pig iron, but also a considerable part of the metallic iron which is the iron itself, are oxidized by the blast; or if, as in the Walrand-Legenisel modification, after the combustion of the initial carbon and silicon of the pig iron has already raised the charge to a very high temperature, a still further rise of temperature is brought about by adding more silicon in the form of ferro-silicon, and oxidizing it by further blowing. But in the crucible and the open-hearth processes the temperature attainable is limited by the danger of melting the furnace itself, both because some essential parts of it, which, unfortunately, are of a destructible shape, are placed most unfavourably in that they are surrounded by the heat on all sides, and because the furnace is necessarily hotter than the steel made within it. But no part of the Bessemer converter is of a shape easily affected by the heat, no part of it is exposed to the heat on more than one side, and the converter itself is necessarily cooler than the metal within it, because the heat is generated within the metal itself by the combustion of its silicon and other calorific elements. In it the steel heats the converter, whereas in the open-hearth and crucible processes the furnace heats the steel.

98. The open-hearth process consists in making molten steel out of pig or cast iron and " scrap," i.e. waste pieces of steel and iron melted together on the " open hearth," i.e. the un- covered basin-like bottom of a reverberatory furnace, under conditions of which fig. 18 may give a general idea. The con-

FlG. 18.— Open-Hearth Process. Half Section showing condition
Half Section showing condition

of charge when boiling very of charge when boiling violently gently.
during oreing.

version of cast iron into steel, of course, consists in lessening its content of the several foreign elements, carbon, silicon, phos- phorus, &c. The open-hearth process does this by two distinct steps: (1) by

oxidizing and removing these elements by means of the flame of the furnace, usually aided by the oxygen of light charges of iron ore, and (2) by diluting them with scrap steel or its equivalent. The "pig and ore" or "Siemens" variety of the process works chiefly by oxidation, the " pig and scrap " or " Siemens-Martin " variety chiefly by dilution, sometimes indeed by extreme dilution, as when 10 parts of cast iron are diluted with 90 parts of scrap. Both varieties may be carried out in the basic and dephosphorizing way, i.e. in presence of a basic slag and in a basic- or neutral-lined furnace; or in the acid and undephosphorizing nay, in presence of an acid, i.e. silicious slag, and in a furnace with a silicious lining.

The charge may be melted down on the " open hearth " itself, or, as in the more advanced practice, the pig iron may be brought in the molten state from the blast furnace in which it is made. Then the furnaceman, controlling the decarburiza- tiou and purification of the molten charge by his examination of test ingots taken from time to time, gradually oxidizes and so removes the foreign elements, and thus brings the metal simultaneously to approximately the composition needed and to a temperature far enough above its present melting- point to permit of its being cast into ingots or other castings. He then pours or taps the molten charge from the furnace into a large clay-lined casting ladle, giving it the final additions of manganese, usually with carbon and often with silicon, needed to give it exactly the desired composition. He then casts it into its final form through a nozzle in the bottom of the casting ladle, as in the Bessemer process.

The oxidation of the foreign elements must be very slow, lest the effervescence due to the escape of carbonic oxide from the carbon of the metal throw the charge out of the doors and

ports of the furnace, which itself must be shallow in order to hold the flame down close to the charge. It is in large part because of this shallowness, which contrasts so strongly with the height and roominess of the Bessemer converter, that the process lasts hours where the Bessemer process lasts minutes, though there is the further difference that in the operi-hearth process the transfer of heat from flame to charge through the intervening layer of slag is necessarily slow, whereas in the Bessemer process the heat, generated as it is in and by the metallic bath itself, raises the temperature very rapidly.

The slowness of this rise of the temperature compels us to make the removal of the carbon slow for a very simple reason. That removal progressively raises the melting-point of the metal, after line Aa of fig. i, i.e. makes the charge more and more infusible; and this progressive rise of the melting-point of the charge must not be allowed to outrun the actual rise of tempera- ture, or in other words the charge must always be kept molten, because once solidified it is very hard to remelt. Thus the neces- sary slowness of the heating up of the molten charge would compel us to make the removal of the carbon slow, even if this slowness were not already forced on us by the danger of having the charge froth so much as to run out of the furnace.

The general plan of the open-hearth process was certainly conceived by Josiah Marshall Heath in 1845, if not indeed by Reaumur in 1722, but for lack of a furnace in which a high enough temperature could be generated it could not be carried out until the development of the Siemens regenerative gas furnace about i860. It was in large part through the efforts of Le Chatelier that this process, so long conceived, was at last, in 1864, put into actual use by the brothers Martin, of Sireuil in France.*

99. Siemens Open-Hearth Furnace. — These furnaces are usually stationary, but in that shown in figs. 19 to 22 the working chamber or furnace body, G of fig. 22, rotates about its own axis, rolling on the rollers M shown in fig. 21. In this working chamber, a long quasi-cylindrical vessel of brickwork, heated by burning within it pre-heated gas with pre-heated air, the charge is melted and brought to the desired composition and temperature. The working chamber indeed is the furnace proper, in which the whole of the open-hearth process is carried out, and the function of all the rest of the apparatus, apart from the tilting mechanism, is simply to pre-heat the air and gas, and to lead them to the furnace proper and thence to the chim- ney. How this is done may be understood more easily if figs. 19 and 20 are regarded for a moment as forming a single diagrammatic figure instead of sections in different planes. The unbroken arrows show the direction of the incoming gas and air, the broken ones the direction of the escaping product's of their combustion. The air and gas, the latter coming from the gas producers or other source, arrive through H and J respectively, and their path thence is deter- mined by the position of the reversing valves K and K'. In the position shown in solid lines, these valves deflect the air and gas into the left-hand pair of " regenerators " or spacious heat-trans- ferring chambers. In these, bricks in great numbers are piled loosely, in such a way that, while they leave ample

passage for the gas and air, yet they offer to them a very great extent of surface, and therefore readily transfer to them the heat which they have as readily sucked out of the escaping products of combustion in the last preceding phase. The gas and air thus separately pre-heated to about 1100° C. (201 2 F.) rise thence as two separate streams through the uptakes (fig. 22), and first mix at the moment of entering the working chamber through the ports L and 1/ (fig. 19). As they are so hot at starting, their combustion of course yields a very much higher temperature than if they had been cold before burning, and they form an enormous flame, which fills the great working chamber. The products of combustion are sucked by the pull of the chimney through the farther or right-hand end of this chamber, out through the exit ports, as shown by the dotted arrows, down through the right-hand pair of regenerators, heating to perhaps 1300° C. the upper part of the loosely-piled masses of brickwork within them, and thence past the valves K and K' to the chimney-flue O. _ During this phase the incoming gas and air have been withdrawing heat from the left-hand regenerators, which have thus been cooling.down, while the escaping products of combustion have been depositing heat in the right-hand pair of regenerators, which have thus been heating up. After some thirty minutes this condition of things is reversed by turning the valves K and K' 90 into the positions shown in dotted lines, when they deflect the incoming gas and air into the right-hand regenerators, so that they may absorb in passing the heat which has just been stored there; thence they pass up through the right-hand uptakes and ports into the working chamber, where as before they mix, burn and heat the rharco. Thence they are sucked out by the chimney-draught through the left-hand ports,

down through the uptakes and regenerators, here again meeting and heating the loose mass of " regenerator " brickwork, and finally escape by the chimney-flue O. After another thirty minutes the

Fig. 19.— Section on EF through Furnace and Port Ends.

Fig. 20. — Plan through Regenerators, Flues and Reversing Valves.

Fig. 21. — Section on CD through Body of Furnace.

Fig. 22. — Section on AB through Uptake, Slag Pocket and Regenerator.

Figs. 19 to 22. — Diagrammatic Sectionsof Tilting Siemens Furnace. G, Furnace body. N, Hydraulic cylinder for tilting

H, Air supply. J, Gas supply. K. Air reversing valve. K', Gas reversing valve. 1., Air port. L', Gas port.

M, Rollers on which the furnace tilts.

Hydraulic cylinder for tilting

the furnace. O, Flue leading to chimney. P, Slag pockets. R, Charging boxes. VV, Water-cooled joints between

furnace proper, G, and ports

L, L'.

current is again reversed to its initial direction, and so on. These regenerators are the essence of the Siemens or " regenerative

and storing by their

furnace '

they are hcat-lraps, catching

enormous surface of brickwork the heat of the escaping products of combustion, and in the following phase restoring the heat to the entering air and gas. At any givan moment one pair of regenerators is storing heat, while the other is restoring it.

The tilting working chamber is connected with the stationary ports L and L' by means of the loose water-cooled joint W in Campbell's system, which is here shown. The furnace, resting on the rollers M, is tilted by the hydraulic cylinder N. The slag- pockets P (fig. 22), below the uptakes, are provided to catch the dust carried out of the furnace proper by the escaping products of combustion, lest it enter and choke the regenerators. Wellman|s tilting furnace rolls on a fixed rack instead of on rollers. By his charging system a charge of as much as fifty tons is quickly intro- duced. The metal is packed by unskilled labourers in iron boxes, R (fig. 21), standing on cars in the stock-yard. A locomotive carries a train of these cars to the track running beside a long line of open-hearth furnaces. Here the charging machine lifts one box at a time from its car, pushes it through the momentarily opened furnace door, and empties the metal upon the

hearth of the furnace by inverting the box, which it-then replaces on its car.

100. The proportion of pig to scrap used depends chiefly on the relative cost of these two materials, but sometimes in part also on the carbon-content which the resultant steel is to have. Thus part at least of the carbon which a high-carbon steel is to contain may be supplied by the pig iron from which it is made. The length of the process increases with the proportion of pig used. Thus in the Westphalian pig and scrap practice, scrap usually forms 75 or even 80% of the charge, and pig only from 20 to 25%, indeed only enough to supply the carbon inevitably burnt out in melting the charge and heating it up to a proper casting temperature; and here the charge lasts only about 6 hours. In some British and Swedish " pig and ore " practice (§ 98), on the other hand, little or no scrap is used, and here the removal of the large quantity of carbon, silicon and phosphorus prolongs the process to 17 hours. The common practice in the United States is to use about equal parts of pig and scrap, and here the usual length of a charge is about u| hours. The pig and ore process is held back, first by the large quantity of carbon, and usually of silicon and phosphorus, to be removed, and second by the necessary slowness of their removal. The gangue of the ore increases the quantity of slag, which separates the metal from the source of its heat, the flame, and thus delays the rise of temperature; and the purification by " oreing," i.e. by means of the oxygen of the large lumps of cold iron ore thrown in by hand, is extremely slow, because the ore must be fed in very slowly lest it chill the metal both directly and because the reaction by which it removes the carbon of the metal, Fe 2 3 -fC = 2FeO + CO, itself absorbs heat. Indeed, this local cooling aggravates the frothing. A cold lump of ore chills the slag immediately around it, just where its oxygen, reacting on the carbon of the metal, generates carbonic oxide; the slag becomes cool, viscous, and hence easily made to froth, just where the froth-causing gas is evolved.

The length of these varieties of the process just given refers to the basic procedure. The acid process goes on much faster, because in it the heat insulating layer of slag is much thinner. For instance it lasts only about 8§ hours when equal parts of pig and scrap are used, instead of the 1 1 J hours of the basic process. Thus the actual cost of conversion by the acid process is materially less than by the basic, but this difference is more than outweighed in most places by the greater cost of pig and scrap free enough from phosphorus to be used in the undephosphorizing acid process.

1 01. Three special varieties of the open-hearth process, the Bertrand-Thiel, the Talbot and the Monell, deserve notice. Bertrand and Thiel oxidize the carbon of molten cast iron by pouring it into a bath of molten iron which has first been oxygenated, i.e. charged with oxygen, and superheated, in an open-hearth furnace. The two metallic masses coalesce, and the reaction between the oxygen of one and the carbon of the other is therefore extremely rapid because it occurs throughout their depth, whereas in common pro- cedure oxidation occurs only at the upper surface of the bath of cast iron at its contact with the overlying slag. Moreover, since local cooling, with its consequent viscosity and tendency to froth, are avoided, the frothing is not excessive in spite of the rapidity of the reaction. The oxygenated metal is prepared by melting cast iron diluted with as much scrap steel as is available, and oxidizing it with the flame and with iron ore as it lies in a thin molten layer on the hearth of a large open-hearth furnace; the thinness of the layer hastens the oxidation, and the large size of the furnace permits considerable frothing. But the oxygenated metal might be prepared easily in a Bessemer converter.

To enlarge the scale of operations makes strongly for economy in the open-hearth process as in other high temperature ones. Yet the use of an open-hearth furnace of very great capacity, say of 200 tons per charge, has the disadvantage that such very large lots of steel, delivered at relatively long intervals, are less readily managed in the subsequent operations of soaking and rolling down to the final shape, than smaller lots delivered at shorter intervals. To meet this difficulty Mr B. Talbot carries on the process as a quasi- continuous instead of an intermittent one, operating on 100-ton or 200-ton lots of cast iron in such a way as to draw off his steel in 20-ton lots at relatively short intervals, charging a fresh 20-ton lot

of cast iron to replace each lot of steel thus drawn off, and thus keep- ing the furnace full of metal from Monday morning till Saturday night. Besides minor advantages, this plan has the merit of avoiding an ineffective period which occurs in common open-hearth procedure just after the charge of cast iron has been melted down. At this time the slag is temporarily rich in iron oxide and silica, resulting from the oxidation of the iron and of its silicon as the charge slowly melts and trickles down. Such a slag not only corrodes the furnace lining, but also impedes dephosphorization, because it is irretentive of phosphorus. Further, the relatively low temperature impedes decarburization. Clearly, no such period can exist in the continuous process.

At a relatively low temperature,' say 1300 C, the phosphorus of cast iron oxidizes and is removed much faster than its carbon, while at a higher temperature, say 1500 C, carbon oxidizes in pre- ference to phosphorus. It is well to remove this latter element early, so that when the carbon shall have fallen to the proportion which the steel is to contain, the steel shall already be free from phosphorus, and so ready to cast. In common open-hearth pro- cedure, although the temperature is low early in the process, viz. at the end of the melting down, dephosphorization is then impeded by the temporary acidity of the slag, as just explained. At the Carnegie works Mr Monell gets the two dephosphorizing conditions, low temperature and basicity of slag, early in the process, by pour- ing his molten but relatively cool cast iron upon a layer of pre-heated lime and iron oxide on the bottom of the open-hearth furnace. The lime and iron oxide melt, and, in passing up through the over- lying metal, the iron oxide very rapidly oxidizes its phosphorus and thus drags it into the slag as phosphoric acid. The ebullition from the formation of carbonic oxide puffs up the resultant phosphoric slag enough to make most of it run out of the furnace, thus both removing the phosphorus permanently from danger of being later deoxidized and returned to the steel, and partly freeing the bath of metal from the heat-insulating blanket of slag. Yet frothing is not excessive, because the slag is not, as in common practice, locally chilled and made viscous by cold lumps of ore.

102. In the duplex process the conversion of the cast iron into steel is begun in the Bessemer converter and finished in the open- hearth furnace. In the most promising form of this process an acid converter and a basic open-hearth furnace are used. In the former the silicon and part of the carbon are moved rapidly, in the latter the rest of the carbon and the phosphorus are removed slowly, and the metal is brought accurately to the proper temperature and composition. The advantage of this combination is that, by simpli- fying the conditions with which the composition of the pig iron has to comply, it makes the management of the blast furnace easier, and thus lessens the danger of making " misfit " pig iron, i.e. that which, because it is not accurately suited to the process for which it is intended, offers us the dilemma of using it in that process at poor advantage or of putting it to some other use, a step which often implies serious loss.

For the acid Bessemer process the sulphur-content must be small and the silicon-content should be constant; for the basic open- hearth process the content of both silicon and sulphur should be small, a thing difficult to bring about, because in the blast furnace most of the conditions which make for small sulphur-content make also for large

silicon-content. In the acid Bessemer process the reason why the sulphur-content must be small is that the process removes no sulphur; and the reason why the silicon-content should be constant is that, because silicon is here the chief source of heat, variations in its content cause corresponding variations in the temperature, a most harmful thing because it is essential to the good quality of the steel that it shall be finished and cast at the proper temperature. It is true that the use of the " mixer " (§ 77) lessens these variations, and that there are convenient ways of mitigating their effects. Nevertheless, their harm is not com- pletely done away with. But if the conversion is only begun in the converter and finished on the open-hearth, then there is no need of regulating the temperature in the converter closely, and variations in the silicon-content of the pig iron thus become almost harmless in this respect. In the basic open-hearth process, on the other hand, silicon is harmful because the silica which results from its oxidation not only corrodes the lining of the furnace but interferes with the removal of the phosphorus, an essential part of the process. The sulphur-content should be small, because the removal of this element is both slow and difficult. But if the silicon, of the pig iron is. removed by a preliminary treatment in the Bessemer converter, then its presence in the pig iron is harmless as regards the open-hearth process. Hence the blast furnace process, thus freed from the hampering need of controlling accurately the silicon-content, can be much more effectively guided so as to prevent the sulphur from entering the pig iron.

Looking at the duplex process in another "way, the preliminary desilicidizing in the Bessemer converter should certainly be an advantage ; but whether it is more profitable to give this treatment in the converter than in the mixer remains to be seen.

103. In the cementation process bars of wrought iron about \ in. thick are carburized and so converted into high carbon "blister steel," by heating them in contact with charcoal in

i closed chamber to about 1000° C. (1832° F.) for from 8 to n days. Low-carbon steel might thus be converted into high- carbon steel, but this is not customary. The carbon dissolves in the hot but distinctly solid 7-iron (compare fig. 1) as salt dissolves in water, and works its way towards the centre of the bar by diffusion. When the mass is cooled, the carbon changes over into the condition of cementite as

usual, partly inter- stratified with ferrite in the form of pearlite, partly in the form of envelopes enclosing kernels of this pearlite (see Alloys, PI. fig. 13). Where the carbon, in thus diffusing inwards, meets particles of the slag, a basic ferrous silicate which is always present in wrought iron, it forms carbonic oxide, $FeO + C = Fe + CO$, which puffs the pliant metal up and forms blisters. Hence the name " blister steel." It was formerly sheared to short lengths and formed into piles, which were then rolled out, perhaps to be resheared and rerolled into bars, known as " single shear " or " double shear " steel according to the number of shearings. But now the chief use for blister steel is for remelting in the crucible process, yielding a product which is asserted so positively, so universally and by such com- petent witnesses to be not only better but very much better than that made from any other material, that we must believe that it is so, though no clear reason can yet be given why it should be. For long all the best high-carbon steel was made by remelting this blister steel in crucibles (§ 106), but in the last few years the electric processes have begun to make this steel (§108).

104. Case Hardening. — The many steel objects which need an extremely hard outer surface but a softer and more malleable interior may be carburized superficially by heating them in contact with charcoal or other carbonaceous matter, for instance for between 5 and 48 hours at a temperature of 800° to 900 C. This is known as " case hardening." After this carburizing these objects are usually hardened by quenching in cold water (see § 28).

105. Deep Carburizing; Harvey and Krupp Processes. — Much of the heavy side armour of war-vessels (see Armour- Plate) is made of nickel steel initially containing so little carbon that it cannot be hardened, i.e. that it remains very ductile even after sudden cooling. The impact face of these plates is given the intense hardness needed by being converted into high-carbon steel, and then hardened by sudden cooling. The impact face is thus carburized to a depth of about ij in. by being held at a temperature of 1100 for about a week, pressed strongly against a bed of charcoal (Harvey process). The plate is then by Krupp's process heated so that its impact face is above while its rear is below the hardening temperature, and the whole is then cooled suddenly with sprays of cold water. Under these conditions the hardness, which is very extreme at the impact face, shades off toward the back, till at about quarter way from face to back all hardening ceases, and the rest of the plate is in a very strong, shock-resisting state. Thanks to the glass-hardness of this face, the projectile is arrested so abruptly that it is shattered, and its energy is delivered piecemeal by its fragments; but as the face is

integrally united with the unhardened, ductile and slightly yielding interior and back, the plate, even if it is locally bent backwards somewhat by the blow, neither cracks nor flakes.

106. The crucible process consists essentially in melting one or another variety of iron or steel in small 80-lb. charges in closed crucibles, and then casting it into ingots or other castings, though in addition the metal while melting may be carburized. Its chief, indeed almost its sole use, is for making tool steel, the best kinds of spring steel and other very excellent kinds of high-carbon and alloy steel. After the charge has been fully melted, it is held in the molten state from 30 to 60 minutes. This enables it to take up enough silicon from the walls of the crucible to prevent the evolution of gas during solidification, and the consequent formation of blowholes or internal gas bubbles. In Great Britain the charge usually consists of blister steel, and is therefore high in carbon, so that the crucible process has very little to do except to melt the charge. In the

United States the charge usually consists chiefly of wrought iron, and in melting in the crucible it is carburized by mixing with it either charcoal or " washed metal," a very pure cast iron made by the Bell-Krupp process (§ 107).

Compared with the Bessemer process, which converts a charge of even as much as 20 tons of pig iron into steel in a few minutes, and the open-hearth process which easily treats charges of 75 tons, the crucible process is, of course, a most expensive one, with its little 80-lb charges, melted with great consumption of fuel because the heat is kept away from the metal by the walls of the crucible, themselves excellent heat insulators. But it survives simply be- cause crucible steel is very much better than either Bessemer or open- hearth steel. This in turn is in part because of the greater care which can be used in making these small lots, but probably in chief part because the crucible process excludes the atmospheric nitrogen, which injures the metal, and because it gives a good opportunity for the suspended slag and iron oxide to rise to the surface. Till Hunts- man developed the crucible process in 1740, the only kinds of steel of commercial importance were blister steel made by carburizing wrought iron without fusion, and others which like it were greatly injured by the presence of particles of slag. Huntsman showed that the mere act of freeing these slag-bearing steels from their slag by melting them in closed crucibles greatly improved them. It is true that Reaumur in 1722 described his method of making molten steel in crucibles, and that the Hindus have for centuries done this on a small scale, though they let the molten steel resolidify in the crucible. Nevertheless, it is

to Huntsman that the world is immediately indebted for the crucible process. He could make only high-carbon steel, because he could not develop within his closed crucibles the temperature needed for melting low-carbon steel. The crucible process remained the only one by which slagless steel could be made, till Bessemer, by his astonishing invention, discovered at once low-carbon steel and a process for making both it and high- carbon steel extremely cheaply.

107. In the Bell-Krupp or "pig- washing" process, invented independently by the famous British iron-master, Sir Lowthian Bell, and Krupp of Essen, advantage is taken of the fact that, at a relatively low temperature, probably a little above 1200 C, the phosphorus and silicon of molten cast iron are quickly oxidized and removed by contact with molten iron oxide, though carbon is thus oxidized but slowly. By rapidly stirring molten iron oxide into molten pig iron in a furnace shaped like a saucer, slightly inclined and turning around its axis, at a temperature but little above the melting-point of the metal itself, the phosphorus and silicon are removed rapidly, without removing much of the carbon, and by this means an extremely pure cast iron is made. This is used in the crucible process as a convenient source of the carbon needed for high-carbon steel.

108. Electric steel-making processes, or more accurately processes in which electrically heated furnaces are used, have developed very rapidly. In steel-making, electric furnaces are used for two distinct purposes, first for making steel sufficiently better than Bessemer and open-hearth steels to replace these for certain important purposes, and second for replacing the very expensive crucible process for making the very best steel. The advantages of the electric furnaces for these purposes can best be understood after examining the furnaces themselves and the way in which they are used. The most important ones are either " arc " furnaces, i.e. those heated by electric arcs, or " induction " ones, i.e. those in which the metal under treat- ment is heated by its own resist- ance to a current of electricity induced in it from without. The Heroult furnace, the best known in the arc class, and the Kjellin and Roechling-Rodenhauser fur- naces, the best known of the induction class, will serve as examples.

The Heroult furnace (fig. 23) is practically a large closed crucible, ABCA, with two carbon electrodes, E and F, " in series " with the bath, H, of molten steel. A pair of electric

arcs play between these electrodes and the molten steel, passing

through the layer of slag, G, and generating much heat. The lining of the crucible may be of either magnesite (MgO) or chromite (FeO-CrjOs). The whole furnace, electrodes and all, rotates about the line KL for the purpose of pouring out the molten

t>l

Fig. 23. — Heroult Double- arc Electric Steel Purifying Furnace.

siag and purified metal through the spout J at the end of the process. This spout and the charging doors A, A are kept closed except when in actual use for pouring or charging.

The Kjellin furnace consists essentially of an annular trough, AA (fig. 24), which contains the molten charge. This charge is heated, like the filaments of a common household electric lamp, by the resistanre which it offers to the passage of a current of electricity

induced in it by means of the core C and the frame EEE. The ends of this core are connected above, below and at the right of the trough A, by means of that frame, so that the trough and this core and frame stand to each other in a position like that of two successive links of a common oval – linked chain. A current of great electromotive force (in- tensity or voltage) passed through the coil D, in- duces, by means of the core and frame, a current of enormous quantity (volume or amperage), but very small electromotive force, in the metal in the trough. Thus the apparatus is analogous to the common transformers used for inducing from currents of great electromotive force and small quantity, which carry energy through long distances, currents of great quantity and small electromotive force for incandescent lights and for welding The molten metal in the Kjellin trough forms the " secondary " circuit. Like the Heroult furnace, the Kjellin furnace may be lined with either magnesite or chromite, and it may be tilted for the purpose of pouring off slag and metal.

The shape which the molten metal under treatment has in the Kjellin furnace, a thin ring of large diameter, is evidently bad, inconvenient for manipulation and with excessive heatTradiating surface. In the Roechling-Rodenhauser induction furnace (fig. 25),

Fig. 24. — Kjellin Induction Electric Steel Melting Furnace.

Fig. 25. — Plan of Roechling-Rodenhauser Induction Electric Furnace.

the molten metal lies chiefly in a large compact mass A, heated at three places on its periphery by the current induced in it there by means of the three coils and cores CCC. The molten metal also extends round each of these three coils, in the narrow channels B. It is in the metal in these channels and in that part of the main mass of metal which immediately adjoins the coils that the current is induced by means of the coils and cores, as in the Kjellin furnace.

When the Heroult furnace is used for completing the purification of molten steel begun in the Bessemer or open-hearth process, and this is its most appropriate use, the process carried out in it may be divided into two stages, first dephosphorization, and second deoxidation and desulphurization.

In the first stage the phosphorus is removed from the molten steel by oxidizing it to phosphoric acid, P2O5, by means of iron oxide contained in a molten slag very rich in lime, and hence very basic and retentive of that phosphoric acid. This slag is formed by melting lime and iron oxide, with a little silica sand if need be. Floating on top of the molten metal, it rapidly oxidizes its phos- phorus, and the resultant phosphoric acid combines with the lime in the overlying slag as phosphate of lime. When the removal of the phosphorus is sufficiently complete, this slag is withdrawn from the furnace.

Next comes the deoxidizing and desulphurizing stage, of which the first step is to threw some strongly deoxidizing substance, such

as coke or ferro-silicon, upon the molten metal, in order to remove thus the chief part of the oxygen which it has taken up during the oxidation of the phosphorus in the preceding stage. Next the metal is covered with a very basic slag, made by melting lime with a little silica and fluor spar. Coke now charged into this slag first deoxidizes any iron oxide contained in either slag or metal, and next deoxidizes part of the lime of the slag and thus forms calcium, which, uniting with the sulphur present in the molten metal, forms calcium sulphide, $CaO + FeS + 0 = CaS + Fe + CO$. This sulphide is nearly insoluble in the metal, but is readily soluble in the over- lying basic slag, into which it therefore passes. The thorough removal of the sulphur is thus brought about by the deoxidation of the calcium. It is by forming calcium sulphide that sulphur is removed in the manufacture of pig iron in the iron blast furnace, in the crucible of which, as in the electric furnaces, the conditions are strongly deoxidizing But in

the Bessemer and open-hearth processes this means of -removing sulphur cannot be used, because in each of them there is always enough oxygen in the atmosphere to re-oxidize any calcium as fast as it is deoxidized. Here sulphur may indeed be removed to a very important degree in the form of manganese sulphide, which distributes itself between metal and slag in rough accord with the laws of equilibrium. But if we rely on this means we have difficulty in reducing the sulphur content of the metal to 0-03% and very great difficulty in reducing it to 0-02 %, whereas with the calcium sulphide of the electric furnaces we can readily reduce it to less than o-oi %.

When the desulphurization is sufficiently complete, the sulphur-bearing slag is removed, the final additions needed to give the metal exactly the composition aimed at are made, and the molten steel is tapped out of the furnace into its moulds. If the initial quantity of phosphorus or sulphur is large, or if the removal of these im- purities is to be made very thorough, the dephosphorizing or the desulphurizing slagging off may be repeated. While the metal lies tranquilly on the bottom of the furnace, any slag mechanically suspended in it has a chance to rise to the surface and unite with the slag layer above.

In addition to this work of purification, the furnace may be used for melting down the initial charge of cold metal, and for beginning the purification — in short not only for finishing but also for roughing. But this is rarely expedient, because electricity is so expensive that it should be used for doing only those things which cannot be accom-plished by any other and cheaper means. The melting can be done much more cheaply in a cupola or open-hearth furnace, and the first part of the purification much more cheaply in a Bessemer converter or open-hearth furnace.

The normal use of the Kjellin induction furnace is to do the work usually done in the crucible process, i.e. to melt down very pure iron for the manufacture of the best kinds of steel, such as fine tool and spring steel, and to bring the molten metal simultaneously to the exact composition and temperature at which it should be cast into its moulds. This furnace may be used also for purifying the molten metal, but it is not so well suited as the arc furnaces for dephosphorizing. The reason for this is that in it the slag, by means of which all the purification must needs' be done, is not heated effectively; that hence it is not readily made thoroughly liquid; that hence the removal of the phosphoric slag made in the early dephosphorizing stage of the process is liable to be incomplete; and that hence, finally, the phosphorus of any of this slag which is left in

the furnace becomes deoxidized during the second or de- oxidizing stage, and is thereby returned to befoul the underlying steel. The reason why. the slag is not heated effectively is that the heat is developed only in the layer of metal itself, by its resistance to the induced current; and hence the only heat which the slag receives is that supplied to its lower surface by the metal, while its upper side is constantly radiating heat away towards the relatively cool roof above.

The Roechling-Rodenhauser furnace is unfitted, by the vulner- ability of its interior walls, for receiving charges of cold metal to be melted down, but it is used to good advantage for purifying molten basic Bessemer steel sufficiently to fit it for use in the form of rail- way rails.

We are now in a position to understand why electricity should be used as a source of heat in making molten steel. Electric furnaces are at an advantage over others as regards the removal of sulphur and of iron oxide from the molten steel, because their atmosphere is free from the sulphur always present in the flame of coal-fired furnaces, and almost free from oxygen, because this element is quickly absorbed by the carbon and silicon of the steel, and in the case of arc furnaces by the carbon of the electrodes themselves, and is replaced only very slowly by leakage, whereas through the Bessemer converter and the open-hearth furnace a torrent of air is always rushing. As we have seen, the removal of sulphur can be made complete only by deoxidizing calcium, and this cannot be done if much oxygen is present. Indeed, the freedom of the atmosphere of the electric furnaces from oxygen is also the reason indirectly

why the molten metal can be freed from mechanically suspended slag more perfectly in them than in the Bessemer converter or the open-hearth furnace. In order that this finely divided slag shall rise to the surface and there coalesce with the overlying layer, the metal must be tranquil. But tranquillity -is clearly impossible in the Bessemer converter, in which the metal can be kept hot only by being torn into a spray by the blast. It is practically unattainable in the open-hearth furnace, because here the oxygen of the furnace atmosphere indirectly oxidizes the carbon of the metal which is kept boiling by the escape of the resultant carbonic oxide. In short the electric furnaces can be used to improve the molten product of the Bessemer

converter and open-hearth furnace, essentially because their atmosphere is free from sulphur and oxygen, and because they can therefore remove sulphur, iron oxide and mechanically suspended slag, more thoroughly than is possible in these older furnaces. They make a better though a dearer steel.

Further, the electric furnaces, e.g. the Kjellin, can be used to replace the crucible melting process (§ 106), chiefly because their work is cheaper for two reasons. First, they treat a larger charge, a ton or more, whereas the charge of each crucible is only about 80 pounds. Second, their heat is applied far more economically, directly to the metal itself, whereas in the crucible process the heat is applied most wastefully to the outside of the non-conducting walls of a closed crucible within which the charge to be heated lies. Beyond this sulphur and phosphorus can be removed in the electric furnace, whereas in the crucible process they cannot. In short electric furnaces replace the old crucible furnace primarily because they work more cheaply, though in addition they may be made to yield a better steel than it can.

Thus we see that the purification in these electric furnaces has nothing to do with electricity. We still use the old familiar purifying agents, iron oxide, lime and nascent calcium. The electricity is solely a source of heat, free from the faults of the older sources which for certain purposes it now replaces. The electric furnaces are likely to displace the crucible furnaces completely, because they work both more cheaply and better. They are not likely to displace either the open-hearth furnace or the Bessemer con- verter, because their normal work is only to improve the product of these older furnaces. Here their use is likely to be limited by its costliness, because for the great majority of purposes the superiority of the electrically purified steel is not worth the cost of the electric purification.

109. Electric Ore-smelling Processes. — Though the electric processes which have been proposed for extracting the iron from iron ore, with the purpose of displacing the iron blast furnace, have not become important enough to deserve description here, yet it should be possible to devise one which would be useful in a place (if there is one) which has an abundance of water power and iron ore and a local demand for iron, but has not coke, charcoal or bituminous coal suitable for the blast furnace. But this ancient furnace does its fourfold work of deoxidizing, melting, removing the gangue and desulphurizing, so very economically that it is not likely to be driven out in other places until the exhaustion of our coal-fields shall have gone so far as to increase the cost of coke greatly.

no. Comparison of Steel-making Processes. — When Bessemer discovered that by simply blowing air through molten cast iron rapidly he could make low-carbon steel, which is essentially wrought iron greatly improved by being freed from its essential defect, its necessarily weakening and embrittling slag, the very expensive and exhausting puddling process seemed doomed, unable to survive the time when men should have familiarized themselves with the use of Bessemer steel, and should have developed the evident possibilities of cheapness of the Bessemer process. Nevertheless the use of wrought iron actually continued to increase. The first of the United States decennial censuses to show a decrease in the production of wrought iron was that in 1890, 35 years after the invention of the Bessemer process. It is still in great demand for certain normal purposes for which either great ease in welding or resistance to corrosion by rusting is of great importance; for purposes requiring special forms of extreme ductility which are not so confidently expected in steel; for miscellaneous needs of many users, some ignorant, some

very conservative; and for remelting in the crucible process. All the best cutlery and tool steel is made either by the crucible process or in electric furnaces, and indeed all for which any considerable excellence is claimed is supposed to be so made, though often incorrectly. But the great mass of the steel of commerce is made by the Bessemer and the open-hearth processes. Open-hearth steel is generally thought to be better than Bessemer, and the acid variety of each of these two processes is thought to yield a better product than the basic variety. This may not necessarily be true, but the acid variety lends itself more readily to excellence than the basic. A very large proportion of ores cannot be made to yield cast iron either free enough from phosphorus for the acid Bessemer or the acid open-hearth process, neither of which removes that most injurious element, or rich enough in phosphorus 'for the basic Bessemer process, which must rely on that element as its source of heat. But cast iron for the basic open-hearth process can be made from almost any ore, because its requirements, comparative freedom from silicon and sulphur, depend on the management of the blast-furnace rather than on the composition of the ore, whereas the phosphorus-content of the cast iron depends solely on that of the ore, because nearly all the phosphorus of the ore necessarily passes into the cast iron. Thus the basic open-hearth process is the only one which can make steel from cast iron containing more than o-io % but less than i-8o %of phosphorus.

The restriction of the basic Bessemer process to pig iron containing at least i-8o% of phosphorus has prevented it from getting a foothold in

the United States; the restriction of the acid Bessemer process to pig iron very low in phosphorus, usually to that containing less than o-io % of that element, has almost driven it out of Germany, has of late retarded, indeed almost stopped, the growth of its use in the United States, and has even caused it to be displaced at the great Duquesne works of the Carnegie Steel Company by the omnivorous basic open-hearth process, the use of which has increased very rapidly. Under most conditions the acid Bessemer process is the cheapest in cost of conversion, the basic Bessemer next, and the acid open- hearth next, though the difference between them is not great. But the crucible process is very much more expensive than any of the others.

Until very lately the Bessemer process, in either its acid or its basic form, made all of the world's rail steel ; but even for this work it has now begun to be displaced by the basic open-hearth process, partly because of the fast-increasing scarcity of ores which yield pig iron low enough in phosphorus for the acid Bessemer process, and partly because the increase in the speed of trains and in the loads on the individual engine- and car-wheels has made a demand for rails of a material better than Bessemer steel.

in. Iron founding, i.e. the manufacture of castings of cast iron, consists essentially in pouring the molten cast iron into moulds, and, as preparatory steps, melting the cast iron itself and preparing the moulds. These are usually made of sand containing enough clay to give it the needed coherence, but of late promising attempts have been made to use permanent iron moulds. In a very few places the molten cast iron as it issues from the blast furnace is cast directly in these moulds, but in general it is allowed to solidify in pigs, and then remelted either in cupola furnaces or in air furnaces. The cupola furnace (fig. 26) is a shaft much like a miniature blast furnace, filled from top to bottom by a column of lumps of coke and of iron. The blast of' air forced in through the tuyeres near the bottom of the furnace burns the coke there, and the intense heat thus caused melts away the surrounding iron, so that this column of coke and iron gradually descends; but it is kept at its full height by feeding more coke and iron at its top, until all the iron needed for the day's work has thus been charged. As the iron melts it runs out through a tap hole and spout at the bottom of the furnace, to be poured into the moulds by means of clay-lined ladles. The air furnace is a reverberatory furnace like that used for puddling (fig. 14), but larger, and in it the pigs of iron, lying on the bottom or hearth, are melted down by the flame from the coal which burns in the firebox. The iron is then held molten till it has grown hot enough for casting and till enough of its

Chaining Door

carbon has been burnt away to leave just the carbon-content desired, and it is then tapped out and poured into the moulds.

Of the two the cupola is very much the more economical of fuel, thanks to the direct transfer of heat from the burning coke to the

pig iron with which g |j|| it is in contact. But

this contact both causes the iron to absorb sulphur from the coke to its great harm, and prevents it from having any large part of its carbon burnt away, which in many cases would improve it very greatly by strengthening it. Thus it comes about that the cupola, because it is so economical, is used for all but the rela- tively few cases in which the strength- ening of the iron by the removal of part of its carbon and the prevention of the absorption of sulphur are so im- portant as to com- pensate for the greater cost of the air-furnace melt- ing.

112. Cast iron for foundry pur- poses, i.e. for making castings of cast iron. Though, as we have seen in § 19, steel is rarely given a carbon- t content greater than 1-50% lest its { brittleness should be excessive, yet cast iron with be- tween 3 and 4% of carbon, the usual cast iron of the foundry, is very

Fig. 26. — Cupola Furnace for Remelting Pig Iron.

useful. Because of the ease and cheapness with which, thanks to its fluidity and fusibility (fig. 1), it can be melted and run even into narrow and intricate moulds, castings made of it are very often more economical, i.e. they serve a given purpose more cheaply, in the long run, than either rolled or cast steel, in spite of their need of being so massive that the brittleness of the material itself shall be endurable. Indeed this high carbon-content, 3 to 4%, in practice actually leads to less brittleness than can readily be had with somewhat less carbon, because with it much of the carbon can easily be thrown into the relatively harmless state of graphite, whereas if the carbon amounts to less than 3% it can be brought to this state only with difficulty. For crushing certain kinds of rock, the hardness of which cast iron is capable really makes it more valuable, pound for pound, than steel.

113. Qualities needed in Cast Iron Castings. — Different kinds of castings need very different sets of qualities, and the com- position of the cast iron itself must vary from case to case so as to give each the qualities needed. The iron for a statuette must first of all be very fluid, so that it will run into every crevice in its mould, and it must expand in solidifying, so that it shall reproduce accurately every detail of that mould. The iron for most engineering purposes needs chiefly to be strong and not excessively brittle. That for the thin-walled water mains must combine strength with the fluidity needed to enable it to run

freely into its narrow moulds; that for most machinery must be soft enough to be cut easily to an exact shape; that for hydraulic cylinders must combine strength with density lest the water leak through; and that for car- wheels must be intensely hard in its wearing parts, but in its other parts it must have that shock-resisting power which can be had only along with great softness. Though all true cast iron is brittle, in the sense that it is not usefully malleable, i.e. that it cannot be hammered from one shape into another, yet its degree of brittleness differs as that of soapstone does from that of glass, so that there are the intensely hard and brittle cast irons, and the less brittle ones, softer and unhurt by a shock which would shiver the former.

Of these several qualities which cast iron may have, fluidity is given by keeping the sulphur-content low and phosphorus- content high; and this latter element must be kept low if shock is to be resisted; but strength, hardness, endurance of shock, density and expansion in solidifying are controlled essentially by the distribution of the carbon between the states of graphite and cementite, and this in turn is controlled chiefly by the proportion of silicon, manganese and sulphur present, and in many cases by the rate of cooling.

114. Constitution of Cast Iron.— Cast iron naturally has a high carbon-content, usually between 3 and 4%, because while molten it absorbs carbon greedily from the coke with which it is in contact in the iron blast furnace in which it is made, and in the cupola furnace in which it is remelted for making most castings. This carbon may all be present as graphite, as in typical grey cast iron ; or all present as cementite, Fe 3 C, as in typical white cast iron; or, as is far more usual, part of it may be present as graphite and part as cementite. Now how does it come about that the distribution of the carbon between these very unlike states determines the strength, hardness and many other valuable properties of the metal as a whole? The answer to this is made easy, by a careful study of the effect of this

same distribution on the constitution of the metal, because it is through controlling this constitution that the condition of the carbon controls these useful properties. To fix our ideas let us assume that the iron contains 4 % of carbon. If this carbon is all present as graphite, so that in cooling the graphite-austenite diagram has been followed strictly (§ 26), the constitution is extremely simple; clearly the mass consists first of a metallic matrix, the carbonless iron itself with whatever silicon, manganese, phosphorus and sulphur happen to be present, in short an impure ferrite, encased in which as a wholly distinct foreign body is the graphite. The primary graphite (§ 26) generally forms a coarse, nearly continuous skeleton of curved black plates, like those shown in fig. 27; the eutectic graphite is much

Fig. 27. — Graphite in Grey Cast Iron.

finer; while the pro-eutectoid and eutectoid graphite, if they exist, are probably in very fine particles. We must grasp clearly this conception of metallic matrix and encased graphite skeleton if we are to understand this subject.

Now this matrix itself is equivalent to a very low-carbon steel, strictly speaking to a carbonless steel, because it consists of pure ferrite, which is just what such a steel consists of ; and the cast iron as a whole is therefore equivalent to a matrix of very low-carbon

steel in which is encased a skeleton of graphite plates, besides some very fine scattered particles of graphite.

Next let us imagine that, in a series of cast irons all containing 4 % of carbon, the graphite of the initial skeleton changes gradually into cementite and thereby becomes part of the matrix, a change which of course has two aspects, first, a gradual thinning of the graphite skeleton and a decrease of its continuity, and second, a gradual introduction of cementite into the originally pure ferrite matrix. By the time that 0-4% of graphite has thus changed, and in changing has united with o-4Xl4 = 5‘6% of[the iron of the original ferrite matrix, it will have changed this matrix from pure ferrite into a mixture of

Cementite 0-4 + 5-6 = 6-0

Ferrite 96-0-5-6 = 90-4

The residual graphite skeleton forms 4

But this matrix is itself equivalent to a steel of about 0-40% of carbon (more accurately o-4oXioo- = -96-4 = o-4I5%), a rail steel, because it is of just such a mixture of ferrite and cementite in the ratio of 90-4 : 6 or 94 % and 6 %, that such a rail steel consists. The mass as a whole, then, consists of 96-4 parts of metallic matrix, which itself is in effect a 0-415 % carbon rail steel, weakened and embrittled by having its continuity broken up by this skeleton of graphite forming 3-6 % of the whole mass by weight, or say 12 % by volume. As, in succeeding members of this same series of cast irons, more of the graphite of the initial skeleton changes into cementite and tnereby becomes part of the metallic matrix, so the graphite skeleton becomes progressively thinner and more discontinuous, and the matrix richer in cementite and hence in carbon and hence equivalent first to higher and higher carbon steel, such as tool steel of I % carbon, file steel of 1-50%, wire-die steel of 2% carbon and then to white cast iron, which consists essentially of much cementite with little ferrite. Eventually, when the whole of the graphite of inged into cementite, the mass as a whole becomes typical or ultra white cast iron, consisting of nothing but ferrite and cementite, distributed as follows (see fig. 2) : —

Eutectoid ferrite

,, cementite

,, Interstratified as pearlite .

Cementite, primary, eutectoid and pro-eutectoid

portion of ferrite and cementite respectively in the matrix, DEF, KS and TU reproduced from fig. 3 give the consequent properties of the matrix, and GAF, RS and VU give, partly from conjecture, the properties of the cast iron as a whole. Above the diagram are giyen the names of the different classes of cast iron to which different stages in the change from graphite to cementite correspond, and above these the names of kinds of steel or cast iron, to which at the corresponding stages the constitution of the matrix corresponds, while below the diagram are given the properties of the cast iron as a whole corresponding to these stages, and still lower the purposes for which these stages fit the cast iron, first because of its strength and shock-resisting power, and second because of its hardness.

115. Influence of the Constitution of Cast Iron on its Properties. —

How should the hardness, strength and ductility, or rather shock-resisting power, of the cast iron be affected by this progressive change from graphite into cementite ? First, the hardness (VU) should increase progressively as the soft ferrite and graphite are replaced by the glass-hard cementite. Second, though the brittle- ness should be lessened somewhat by the decrease in the extent to which the continuity of the strong matrix is broken up by the graphite skeleton, yet this effect is outweighed greatly by that of the rapid substitution in the matrix of the brittle cementite for the very ductile copper-like ferrite, so that the brittleness increases continuously (RS), from that of the very grey graphitic cast irons, which, like that of soapstone, is so slight that the metal can endure severe shock and even indentation without breaking, to that of the pure white cast iron which is about as brittle as porcelain. Here let us recognize that what gives this transfer of carbon from graphite skeleton to metallic matrix such very great influence on the pro- perties of the metal is the fact that the transfer of each 1 % of carbon means substituting in the matrix no less than 15% of the brittle, glass-hard cementite for the soft, very ductile ferrite. Third, the tensile strength of steel proper, of which the matrix consists, as we have already seen (fig. 3), increases with the carbon- content till this reaches about I -25 %, and then in turn decreases (fig. 28, DEF). Hence, as with the progressive transfer of the carbon from the graphitic to the cementite state in our imaginary the skeleton has changed into cementite, the mass as a whole becomes series of cast irons, the combined carbon present in the matrix

‘ ‘ ‘■ ‘■■■ – - ‘ – ■ ■— ■’■—■ -‘ ---‘- = — – <- — ■■ <•—•<■ ■ increases, so does the tensile strength of the mass as a whole for

two reasons; first, because the strength of the matrix itself is in- creasing (DE), and second, because the discontinuity is decreasing with the decreasing proportion of graphite. With further transfer of the carbon from the graphitic to the combined state, the matrix itself grows weaker (EF); but this weakening is offset in a measure by the continuing decrease of discontinuity due to the decreasing proportion of graphite. The resultant of these two effects has not yet been well established; but it is probable that the strongest cast iron has a little more-than I % of carbon combined as cementite, so that its matrix is nearly equivalent to the strongest of the steels. As regards both tensile strength and ductility not only the quantity but the distribution of the graphite is of great importance. Thus it is extremely probable that the primary graphite, which forms large sheets, is much more weakening and embrittling than the eutectic and other forms, and therefore that, if either strength or ductility

is sought, the metal should be free from primary graphite, i.e.

that it should not be hyper-eutcctic.

The presence of graphite has two further and very natural

effects. First, if the skeleton which it forms is continuous, then

its planes of junction with the metallic matrix offer a path of

00 low resistance to the passage of liquids or gases, or in short they

-> make the metal so porous as to unfit it for objects like the

I cylinders of hydraulic presses, which ought to be gas-tight

" and water-tight. F'or such purposes the graphite-content should

be low. Second, the very genesis of so bulky a substance as the

primary and eutectic graphite while the metal is solidifying

(fig. 5) causes a sudden and permanent expansion, which forces

the metal into even the ' finest crevices in its mould, a fact

which is taken advantage of in making ornamental castings and

others which need great sharpness of detail, by making them

rich in graphite.

To sum this up, as graphite is replaced by carbon combined as cementite, the hardness, brittleness and density increase, and the expansion in solidification decreases, in both cases continuously, while the tensile strength increases till the com- bined carbon-content rises a little above I %, and then in turn decreases. That strength is good and brittleness bad goes with; out saying; but here a word is needed about hardness. The expense of cutting castings accurately to shape,_ cutting on them screw threads and what not, called " machining " in trade parlance, is often a very large part of their total cost; and it increases rapidly with the hardness of the metal. On the other

Total ferrite . Total cementite

The constitution and properties of such a series of cast irons, all

containing 4% of carbon but with that carbon shifting prO-

Namc of matrix

White cast iron

Very open gray

or very graphitic

cast iron

Mottled cast iron

“White cast

Come-Awfl Carton 3f O Orefie/teˆA'O*

Hardness

strength!

and I the iron t» distance} suited to to stack uses in which It win have to undcrgoot – resist

hardness

Soft

snodmte shack.

the troo u suited to tocct engineering VMtrposes

no shock unle: rnetal is Strongly supported

much machining in preparation,

but little abrasion in use

raorlcrste machin- ing m preparation, not excessive shraslon th use

no machining

in preparation,

much abrasion

In use

Fig. 28.— Physical" Properties and assumed Microscopic Constitution hand, the extreme hardness of nearly graphiteless cast iron is Cast Iron containing 4 % of carbon, as affected by the distribution of great value for objects of which the chief duty is to resist

of „..- .

of that carbon between the combined and graphitic states,

gressively from the state of graphite to that of cementite as we pass from specimen to specimen, may, with the foregoing picture of a skeleton-holding matrix clearly in our minds be traced by means of fig. 28. The change from graphite into cementite is supposed to take

place as we pass from left to right. BC and OH give the pro-

abrasion, such as parts of crushing machinery. Hence objects which need much machining are made rich in graphite, so that

they may be cut easily, and those of the latter class rich in

cementite so that they may not wear out.

116. Means of controlling the Constitution of Cast Iron. — The

distribution of the carbon between these two states, so as to give

the cist iron the Droperties needed, is brought about chiefly by

adjusting the silicon-content, because the presence of this element favours the formation of graphite. Beyond this, rapid cooling and the presence of sulphur both oppose the formation of graphite, and hence in cast iron rich in sulphur, and in thin and therefore rapidly cooling castings, the silicon-content must be greater than in thick ones and in those freer from sulphur. Thus thick machinery cast- ings usually contain between 1-50 and 2-25% of silicon, whereas thin castings and ornamental ones which must reproduce the finest details of the mould accurately may have as much as 3 or even 3-40% of it. Castings which, like hydraulic press cylinders and steam radiators, must be dense and hence must have but little graphite lest their contents leak through their walls, should not have more than 1-75% of silicon and may have even as little as 1 “„ if impenetrability is so important that softness and consequent ease of machining must be sacrificed to it. Cast iron railroad car- wheels, the tread or rim of which must be intensely hard so as to endure the grinding action of the brakeshoe while their central parts must have good shock-resisting power, are given such moderate siiicon-content, preferably between 0-50 and o-8o%, as in and by itself leaves the tendencies toward graphite-forming and toward cementite-forming nearly in balance, so that they are easily controlled by the rate of cooling. The ” tread ” or circumferential part of the mould itself is made of iron, because this, by conducting the heat away from the casting rapidly, makes it cool quickly, and thus causes most of the carbon here to form cementite, and thus in turn makes the tread of the wheel intensely hard; while those parts of the mould which come in contact with the central parts of the wheel are made of sand, which conducts

the heat away from the molten metal so slowly that it solidifies slowly, with the result that most of its carbon forms graphite, and here the metal is soft and shock-resisting.

117. Influence of Sulphur. — Sulphur has the specific harmful effects of shifting the carbon from the state of graphite to that of cementite, and thus of making the metal hard and brittle; of making it thick and sluggish when molten, so that it does not run freely in the moulds; and of making it red short, i.e. brittle at a red heat, so that it is very liable to be torn by the aeolotachic contraction in cooling from the molten state; and it has no good effects to offset these. Hence the sulphur present is, except in certain rare cases, simply that which the metallurgist has been unable to remove. The sulphur-content should not exceed 0-12%, and it is better that it should not exceed 0-08 % in castings which have to be soft enough to be machined, nor 0-05% in thin castings the metal for which must be very fluid.

118. Influence of Manganese. — Manganese in many cases, but not in all, opposes the formation of graphite and thus hardens the iron, and it lessens the red shortness (§ 40), which sulphur causes,

1 by leading to the formation of the less harmful manganese sulphide instead of the more harmful iron sulphide. Hence the manganese-content needed increases with the sulphur-content which has to be endured. In the better classes of castings it is usually between 0-40 and 0-70%, and in chilled railroad car-wheels it may well be between 0-15 and 0-30%; but skilful founders, confronted with the task of making use of cast iron rich in manganese, have succeeded in making good grey iron castings with even as much as 2-20% of this element.

u<). Influence of Phosphorus. — Phosphorus has, along with its great merit of giving fluidity, the grave defect of causing brittleness, especially under shock. Fortunately its embrittling effect on cast iron is very much less than on steel, so that the upper limit or greatest tolerable proportion of phosphorus, instead of being o-io or better 0-08% as in the case of rail steel, may be put at 0-50% in c.ise of machinery castings even if they are exposed to moderate shock:,; at 1 -60% for gas and water mains in spite of the gravity of the disasters which extreme brittleness here might cause; and even higher for castings which are not exposed to shock, and are so thin that the iron of which they are made must needs be very fluid. The permissible phosphorus-content is lessened by the presence of either much sulphur or much manganese, and by rapid cooling, as for instance in case of thin castings, because each of these three things,

by leading to the formation of the brittle cementite, in itself creates brittleness which aggravates that caused by phos- phorus.

120. Defects in Steel Ingots. — Steel ingots and other steel castings are subject to three kinds of defects so serious as to deserve notice here. They are known as " piping," " blowholes " and " segregation."

121. Piping. — In an early period of the solidification of a molten steel ingot cast in a cold iron mould we may distinguish three parts: (1) the outer layers, i.e. the outermost of the now solid metal ; (2) the inner layers, i.e. the remainder of the solid metal ; and (3) the molten lake, i.e. the part which still is molten. At this instant the outer layers, because 6f their contact with the cold mould, are cooling much faster than the inner ones, and hence tend to contract faster. But this excess of their contraction is resisted by the almost incompressible inner layers so that the outer layers are prevented from contracting as much as they naturally would if unopposed, and they are thereby; virtually stretched. Later on the

*:: > **

•-.".-.-J v.

ft

cooling of the inner layers becomes more rapid than that of the

outer ones, and on this account their contraction tends to become

greater than that of the outer ones. Because the outer and inner

layers are integrally united, this excess of

contraction of the inner layers makes them

draw outward towards and against the outer

layers, and because of their thus drawing out- ward the molten lake within no longer suffices

to fill completely the central space, so that

its upper surface begins to sink. This ebb

continues, and, combined with the progressive

narrowing of the molten lake as more and more

of it solidifies and joins the shore layers, gives

rise to the pipe, a cavity like an inverted pear,

as shown at C in fig. 29. Because this pipe is

due to the difference in the rates of contraction

of interior and exterior, it may be lessened

by retarding the cooling of the mass as a

whole, and it may be prevented from stretch- ing down deep by retarding the solidification

of the upper part of the ingot, as, for instance,

by preheating the top of the mould, or by

covering the ingot with a mass of burning fuel

or of molten slag. This keeps the upper part

of the mass molten, so that it continues to

flow down and feed the pipe during the early part of its formation in the lower and quicker- cooling part of the ingot. In making castings of steel this same difficulty arises; and much of the steel-founder's skill consists either in preventing these pipes, or in so placing them that they shall not occur in the finished cast- ing, or at least not in a harmful position. In making armour-plates from steel ingots, gram showing how as much as 40% of the metal may be re- a pipe is formed, jected as unsound from this cause. An ingot A, Superficial should always stand upright while solidifying, blowholes,

so that the unsound region due to the pipe g T Deep-seated may readily be cut off, leaving the rest of ' blowholes, the ingot solid. If the ingot lay on its side rj ; Pipe, while solidifying, the pipe would occur as shown in fig. 30, and nearly the whole of the ingot would be unsound.

122. Blowholes. — Iron, like water and many other substances, has a higher solvent power for gases, such as hydrogen and nitrogen, when molten, i.e. liquid, than when frozen, i.e. solid. Hence in the act of solidifying it expels any excess of gas which it has dissolved while liquid, and this gas becomes entangled in the freezing mass, causing gas bubbles or blowholes, as at A and B in fig. 29. Because

the volume of the pipe represents the excess of the contraction of the inner walls and the molten lake jointly over that of the outer walls, between the time when the lake begins to ebb and the time when even the axial metal is too firm to be drawn further open by this contraction, the space occupied by blowholes must, by compensating for part of this excess, lessen the size of the pipe, so that the more

Dia-

Fig. 30. — Diagram showing a Pipe so formed as to render Ingot unsound.

abundant and larger the blowholes are, the smaller will the pipe be. The interior surface of a blowhole which lies near the outer crust of the ingot, as at A in fig. 29, is liable to become oxidized by the diffusion of the atmospheric oxygen, in which case it can hardly be completely welded later, since welding implies actual contact of metal with metal; it thus forms a permanent flaw. But deep- seated blowholes like those at B are relatively harmless in low- carbon easily welding steel, because the subsequent operation of forging or rolling usually obliterates them by welding their sides firmly together.

Blowholes may be lessened or even wholly prevented by adding to the molten metal shortly before it solidifies either silicon or aluminium, or both; even as little as 0-002 % of aluminium is usually sufficient. These additions seem to act in part by deoxidizing the minute quantity of iron oxide and carbonic oxide present, in part by increasing the solvent power of the metal for gas, so that even after freezing it can retain in solution the gas which it had dissolved when molten. But, because preventing blowholes in- creases the volume of the pipe, it is often better to allow them to form, but to control their position, so that they shall be deep-seated. This is done chiefly by casting the steel a, a relatively low tempera- ture, and by limiting the quantity of manganese and silicon which it contains. Brinell finds that, for certain normal conditions, if the sum of the percentage of manganese plus 5-2 times that of the*

silicon equals 1-66, there will be no blowholes; if this sum is less, blowholes will occur, and will be injuriously near the surface unless this sum is reduced to 0-28. He thus finds that this sum should be

either as great as 1-66, so that blowholes shall be absent; or as low as 0-28, so that they shall be harmlessly deep-seated. These numbers must be varied with the variations in other conditions, such as casting temperature, rapidity of solidification, &c.

123. Segregation. — The solidification of an ingot of steel takes place gradually from without inwards, and each layer in solidifying tends to expel into the still molten interior the impurities which it contains, especially the carbon, phosphorus, and sulphur, which by this process are in part concentrated or segregated in the last-freezing part of the ingot. This is in general around the lower part of the pipe, so that here is a second motive for rejecting the piped part of the ingot. While segregation injures the metal here, often fatally, by giving it an indeterminate excess of phosphorus and sulphur, it clearly purifies the remainder of the ingot, and on this account it ought, under certain conditions, to be promoted rather than re-strained. The following is an extreme case :—

Carbon.

Silicon.

Manganese.

Phosphorus.

Sulphur.

Composition of the

initial metal per

cent

0‘24

0-336

0-97

0-089

0074

Composition of the

segregate

1-27

0-41

1 -08

0-753

0-418

The surprising fact that the degree of segregation does not increase greatly either with the slowness of solidification or with the size of the ingot, at least between the limits of 5 in. sq. and 16 in. sq., has been explained by the theory that the relative quiet due to the gentleness of the convection currents in a slowly cooling mass favours the formation of far outshooting pine-tree crystals, and that the tangled branches of these crystals landlock much of the littoral molten mother metal, and thus mechanically impede that cantreward diffusion and convection of the impurities which is the essence of segregation.

124. Castings and Forgings. — There are two distinct ways of making the steel objects actually used in the arts, such as rails, gear wheels, guns, beams, &c, out of the molten steel made by the Bessemer, open hearth, or crucible process, or in an electric furnace. The first is by " steel founding," i.e. casting the steel as a " steel casting " in a mould which has the exact shape of the object to be made, e.g. a gear wheel, and letting it solidify there. The second is by casting it into a large rough block called an " ingot, 1 ' and rolling or hammering this out into the desired shape. Though the former certainly seems the simpler way, yet its technical difficulties are so great that it is in fact much the more expensive, and therefore it is in general used only in making objects of a shape hard to give by forging or rolling. These technical difficulties are due chiefly to the very high melting point of the metal, nearly 1500° C. (2732 F.), and to the conse- quent great contraction which it undergoes in cooling through the long range between this temperature and that of the room. The cooling of the thinner, the outer, and in general the more exposed parts of the casting outruns that of the thicker and less exposed parts, with the consequence that, at any given instant, the different parts are contracting at very different rates, i.e. aeolotachically; and this aeolotachic contraction is very likely to concentrate severe stress on the slowest cooling parts at the time when they are passing from the molten to the solid state, when the steel is mushy, with neither the fluidity of a liquid nor the strength

and ductility of a solid, and thus to tear it apart. Aeolotachic contraction further leads to the " pipes " or contraction cavities already described in § 121, and the procedure must be carefully planned first so as to reduce these to a minimum, and second so as to induce them to form either in those parts of the casting which are going to be cut off and rc-melted, or where they will do little harm. These and kindred difficulties make each new shape or size a new problem, and in particular they require that for each and every individual casting a new sand or clay mould shall be made with care by a skilled workman. If a thousand like gears are to be cast, a thousand moulds must be made up, at least to an important extent by hand, for even machine moulding leaves something for careful manipulation by the moulder. It is a detail, one is tempted to say a retail, manufacture.

In strong contrast with this is the procedure in making rolled

products such as rails and plates. The steel is cast in lots, weighing in some cases as much as 75 tons, in enduring cast iron moulds into very large ingots, which with their initial heat are immediately rolled down by a series of powerful roll trains into their final shape with but slight wear and tear of the moulds and the machinery. But in addition to the greater cost of steel founding as compared with rolling there are two facts which limit the use of steel castings: (1) they are not so good as rolled products, because the kneading which the metal undergoes in rolling improves its quality, and closes up its cavities; and (2) it would be extremely difficult and in most cases impracticable to cast the metal directly into any of the forms in which the great bulk of the steel of commerce is needed, such as rails, plates, beams, angles, rods, bars, and wire, because the metal would become so cool as to solidify before running far in such thin sections, and because even the short pieces which could thus be made would pucker or warp on account of their aeolotachic contraction.

125. Heating Furnaces are used in iron manufacture chiefly for bringing masses of steel or wrought iron to a temperature proper for rolling or forging. In order to economize power in these operations, the metal should in general be as soft and hence as hot as is consistent with its reaching a low temperature before the rolling or forging is finished, because, as explained in § 32, undisturbed cooling from a high temperature injures the metal. Many of the furnaces used for this heating are in a general way like the puddling furnace shown in fig. 14, except that they are heated by gas, that the hearth or bottom of the chamber in which they are heated is nearly flat, and that it is usually very much larger than that of a puddling

furnace. But in addition there are many special kinds of furnaces arranged to meet the needs of each case. Of these two will be shown here, the Gjers soaking pit for steel ingots, and the Eckman or continuous furnace, as modified by C. H. Morgan for heating billets.

126. Gjers Soaking Pit. — When the outer crust of a large ingot in which a lot of molten steel has been cast has so far cooled that it can be moved without breaking, the temperature of the interior is still far above that suitable for rolling or hammer- ing—so far above that the surplus heat of the interior would more than suffice to reheat the now cool crust to the rolling temperature, if we could only arrest or even greatly retard the further escape of heat from that crust. Bringing such an ingot, then, to the rolling temperature is not really an operation of heat- ing, because its average tempera- ture is already above the rolling temperature, but one of equal- izing the temperature, by allow- ing the internal excess of heat to " soak " through the mass. Gjers did this by setting the partly- solidified ingot in a well-closed " pit " of brickwork, preheated by the excess heat of previous lots of ingots. The arrange- ment, shown in fig. 31, has three advantages — (1) that the tem- perature is adjusted with abso- lutely no consumption of fuel; (2) that the waste of iron due to the oxidation of the outer crust of the ingot is very slight, because the little atmospheric oxygen initially in the pit is not renewed, whereas in a common heating furnace the flame brings a constant fresh supply of oxygen; and (3) that the ingot remains upright during solidification, so that its pipe is con- centrated at one end and is thus removable. (See § 1 2 1 .) In this form the system is rather inflexible, for if the supply of ingots is delayed the pits grow unduly cool, so that the next ensuing lot of ingots either is not heated hot enough or is delayed too long in soaking. This defect is usually remedied by heating the pits by the Siemens regenerative system (see § 99) ; the greater

Fig. 31 . — Section of Gjers Soaking Pit.

flexibility thus gained outweighs the cost of the fuel used and the increased loss of iron by oxidation by the Siemens gas flame.

127. Continuous Heating Furnace.— The Gjers system is not applicable to small ingots or " billets," 1 because they lack the inner surplus heat of large ingots; indeed, they are now allowed to cool

completely. To heat these on the intermittent plan for further rolling, i.e. to charge a lot of them as a whole in a heating furnace, bring them as a whole to rolling temperature, and then withdraw them as a whole for rolling, is very wasteful of heat, because it is only in the first part of the heating that the outside of the ingots is cool enough to abstract thoroughly the heat from the flame. During all the latter part of the heating, when the temperature of the ingot has approached that of the flame, only an ever smaller and smaller part of the heat of that flame can be absorbed by the ingots. Hence in the intermittent system most of the heat generated within the furnace escapes from it with the products of combustion. The continuous heating system (fig. 32) recovers this heat by bringing the flame into contact

Fig. 33. — Wire undergoing Reduction in the Die.

miLWimiii:

II II II Ml i! Ill

*IVxyNX\NVV>NN.'^vVVV>>a*X^VNN\X^^*

Fig. 32.-

-Diagram of C. H. Morgan's Continuous Heating Furnace for 2-inch billets 30 ft. long.

A, Hottest billet ready for roll-

ing.

B, Exit door.

C, Pusher, for forcing billets for-

ward.

D, Water-cooled pipe on which

billets are pushed forward.

E, Magnesite bricks on which the

hot billets slide forward.

F, The billet last entered.

G, The suspended roof.

H, The incoming air preheated by G and by the pipes N and brought from above G to between N by a flue not shown.

J, The incoming gas.

L, The flame.

M, The escaping products of com- bustion.

N, Pipes through which the pro- ducts of combustion pass.

with successively cooler and cooler billets, A-F, and finally with quite cold ones, of consequently great heat-absorbing capacity.

As soon as a hot billet A is withdrawn by pushing it endwise out of the exit door B, the whole row is pushed forward by a set of mechanical pushers C, the billets sliding on the raised water-cooled pipes D, and, in the hotter part of the furnace, on the magnesite bricks E, on which iron slides easily when red-hot. A new cold billet is then charged at the upper end of the hearth, and the new cycle begins by pushing out through B a second billet, and so forth. To lessen the loss in shape of " crop ends," and for general economy, these billets are in some cases 30 ft. long, as in the furnace shown in fig. 32. It is to make it wide enough to receive such long billets that its roof is suspended, as here shown, by two sets of iron tie-rods. As the foremost end of the billet emerges from the furnace it enters the first of a series of roll-trains, and passes immediately thence to others, so that before half of the billet has emerged from the furnace its front end has already been reduced by rolling to its final shape, that of merchant-bars, which are relatively thin, round or square rods, in lengths of 300 ft.

In the intermittent system the waste heat can, it is true, be utilized either for raising steam (but inefficiently and inconveniently, because of the intermittency), or by a regenerative method like the Siemens, Fig. 19; but this would probably recover less heat than the continuous system, first, because it transfers the heat from flame to metal indirectly instead of directly; and, second, because the brick-work of the Siemens system is probably a poorer heat-catcher than the iron billets of the continuous system, because its disadvantages of low conductivity and low specific heat probably outweigh its advantages of roughness and porosity.

128. Rolling, Forging, and Drawing. — The three chief processes for

shaping iron and steel, rolling, forging (i.e. hammering, pressing or stamping) and drawing, all really proceed by squeezing

1 A " billet " is a bar, 5 in. sq. or smaller, drawn down from a bloom, ingot, or pile for further manufacture.

the metal into the desired shape. In forging, whether under a hammer or under a press, the action is evidently a squeeze, however skilfully guided. In drawing, the pull of the pincers (fig- 33) upon the protruding end, F, of the rod, transmitted to the still undrawn part, E, squeezes the yielding metal of the rod against the hard unyielding die, C. As when a half-opened umbrella is thrust ferrule-foremost between the balus- ters of a staircase, so when the rod is drawn forward, its yielding metal is folded and forced backwards and centrewards by the resistance of the unyielding die, and thus it is reduced in diameter and simultaneously lengthened proportionally, without material change of volume or density.

129. Methods of Rolling. — Of rolling much the same is true. The rolling mill in its simplest form is a pair of cylindrical rollers, BB (figs. 34 and 35) turning about their axes in opposite directions as shown by the arrows, and supported at their ends in strong frames called " housings," CC (fig. 35). The skin of the object, D, which is undergoing rolling, technically called " the piece," is drawn forward powerfully by the friction of the revolving rolls, and especially of that part of their surface which at any given instant is moving horizontally (HH in fig. 34), much as, the rod is drawn through the die in fig. 33, while the vertical com- ponent of the motion of the rear part JJ of the rolls' forces the plastic metal of that part of " the piece " with which they are in contact backwards and centre- wards, reducing its area and simul- taneously lengthening it proportion- ally, here again as in drawing through a die. The rolls thus both draw the piece forward like the pincers of a wire die, and themselves are a die which like a river ever renews or rather main- tains its fixed shape and position, though its particles themselves are

moving constantly forward with " the piece " which is passing between them.

After the piece has been reduced in thickness by its first passage or " pass " between the rolls, it may be given a second reduction and then a third and so on, either by bringing the two rolls nearer together, as in case of the plain rolls BB at the left in fig. 35, or by passing the piece through an aperture, F', smaller than the first F, as in case of the grooved rolls, AA, shown at the right, or by both means jointly.

If, as sketched in fig. 34, the direction in which each of the rolls turns is constant, then after the piece has passed once through the rolls to the right, it cannot undergo a second pass till it has been brought

Fig. 34. — Two-high Rolling Mill.-"

back to its initial position at the left. But bringing it back

Fig. 35.— Two-high Rolling Mill.

wastes power and, still worse, time, heat, and metal, because the yellow- or even white-hot piece is rapidly cooling down and oxidizing. In order to prevent this waste the direction in which the rolls move may be reversed, so that the piece may be reduced a second time in passing to the left, in which case the rolls are I usually driven by a pair of reversing engines; or the rolls may

he " three high," as shown in fig. 36, with the upper and the lower roll moving constantly to the right and the middle roll constantly to the left, so that the piece first passes to the right between the middle and lower rolls, and then to the left between the middle and upper rolls. The advantage of the " reversing " system is that it avoids lifting the piece from below to above the middle roll, and again lowering it, which is rather difficult because the white-hot piece cannot be guided directly by hand, but must be moved by means of hooks, tongs, or even complex mechanism. The advantage of the

p , Tri ree three-high mill is that, because each of its

high Rolling Mill, moving parts is always moving in the same direction, it may be driven by a relatively small and hence cheap engine, the power delivered by which between the passes is taken up by a powerful fly-wheel, to be given up to the rolls during the next pass. (See also Rolling Mill.)

130. Advantages and Applicability of Rolling. — Rolling uses very much less power than drawing, because the friction against the fixed die in the latter process is very great. For much the same reason rolling proceeds much faster than drawing, and on both these accounts it is incomparably the cheaper of the two. It is also very much cheaper than forging, in large part because it works so quickly.

The piece travels through the rolls very rapidly, so that the reduction takes place over its whole length in a very few seconds, whereas in forging, whether under hammer or press, after one part of the piece has been compressed the piece must next be raised, moved forward, and placed so that the hammer or press may compress the next part of its length. This moving is expensive, because it has to be done, or at least guided, by hand, and it takes up much time, during which both heat and iron are wasting. Thus it comes about that rolling is so very much cheaper than either forging or drawing that these latter processes are used only when rolling is impracticable. The conditions under which it is impracticable are (1) when the piece has either an extremely large or an extremely small cross section, and (2) when its cross section varies materially in different parts of its length. The number of great shafts for marine engines, reaching a diameter of 22J- in. in the case of the " Lusitania," is so small that it would be wasteful to instal for their manu- facture the great and costly rolling mill needed to reduce them from the gigantic ingots from which they must be made, with its succession of decreasing passes, and its mechanism for rotating the piece between passes and for transferring it from pass to pass. Great armour plates can indeed be made by rolling, because in making such flat plates the ingot is simply rolled back and forth between a pair of plain cylindrical rolls, like BB of fig. 35, instead of being transferred from one grooved pass to another and smaller one. Moreover, a single pair of rolls suffices for armour plates of any width or thickness, whereas if shafts of different diameters were to be rolled, a special final groove would be needed for each different diameter, and, as there is room for only a few large grooves in a single set of rolls, this would imply not only providing but installing a separate set of rolls for almost every diameter of shaft. Finally the quantity of armour plate needed is so enormous that it justifies the expense of installing a great rolling mill. Krupp's armour- plate mill, with rolls 4 ft. in diameter and 12 ft. long, can roll an ingot 4 ft. thick.

Pieces of very small cross section, like wire, are more con- veniently made by drawing through a die than by rolling, essentially because a single draft reduces the cross section of a wire much more than a single pass between rolls can. This in turn is because the direct pull of the pincers on the protruding end of the wire is much stronger than the forward-drawing pull due to the friction of the cold rolls on the wire, which is necessarily cold because of its small section.

Pieces which vary materially in cross section from point to point in their length cannot well be made by rolling, because the cross sec'ion of the piece as it emerges from the rolls is

necessarily that of the aperture between the rolls from which it is emerging, and this aperture is naturally of constant size because the rolls are cylindrical. Of course, by making the rolls eccentric, and by varying the depth and shape of the different parts of a given groove cut in their surface, the cross section of the piece made in this groove may vary somewhat from point to point. But this and other methods of varying the cross section have been used but little, and they do not seem capable of wide application.

The fact that rolling is so much cheaper than forging has led engineers to design their pieces so that they can be made by rolling, i.e. to make them straight and of uniform cross section. It is for this reason, for instance, that railroad rails are of constant uniform section throughout their length, instead of having those parts of their length which come between the supporting ties deeper and stronger than the parts which rest on the ties. When, as in the case of eye bars, it is imperative that one part should differ materially in section from the rest, this part may be locally thickened or thinned, or a special part may here be welded on. When we come to pieces of very irregular shape, such as crank-shafts, anchors, trunnions, &c.,we must resort to forging, except for purposes for which unforged castings are good enough.

131. Forging proceeds by beating or squeezing the piece under treatment from its initial into its final shape, as for instance by hammering a square ingot or bloom first on one corner and then on another until it is reduced to a cylindrical

shape as shown at A in

fig. 37. As the ingot is

reduced in section, it is of

course lengthened propor- tionally. Much as in the

smith's forge the object

forged rests on a massive

anvil and anvil block, B

and C, and is struck by

the tup D of the hammer.

This tup is raised and driven down by steam pressure applied below or above the piston E of the steam cylinder mounted aloft, and connected with the tup by means of the strong piston-rod F. The demand for very large forgings, especially for guns and armour plate, led to the building of enormous steam hammers. The falling parts of the largest of these, that at Bethlehem, Pa., weigh 125 tons.

The first cost of a hammer of moderate size is much less than that of a hydraulic press of like

Fig. 37. — Steam Hammer.

A, Round bar to be hammered.

B, Anvil.

C, Anvil block or foundation.

D, Falling tup.

E, Steam piston.

F, Piston-rod for lifting tup

driving it down.

G, Steam cylinder.

and

capacity, as is readily understood when we stop to reflect what powerful pressure, if gradually applied, would be needed to drive the nail which a light blov/ from our hand hammer forces easily into the woodwork. Never- theless the press uses much less power than the hammer, because much of the force of the latter is dissipated in setting up useless — indeed harmful, and at times destructh e — vibrations in the foundations and the surrounding earth and buildings. Moreover, the effect of the sharp blow of the hammer is relatively superficial, and does not penetrate to the interior of a large piece as the slowly applied pressure of the hydraulic press does. Because of these facts the great hammers have given place to enormous forging presses, the 125-ton Bethlehem hammer, for instance, to a 14,000-ton hydraulic press, moved by water under a pressure of

,000 lb per square inch, supplied by pumps of 1 6,000 horse power.

132. Statistics. — The cheapening of manufacture by improvements in processes and machinery, and by the increase in the scale of operations, has been very great. The striking examples of it shown in Table IV. are only typical of what has been going on continuously

In this same period the production of Great Britain increased 28 , and that of the world more than tripled. The corresponding changes in the case of steel are even more striking. The United States production in 1907 was 1714 times that of 1865, and the proportion which it formed of the worlds steel rose from 3 in 1865 to 10% in 1870, 30% in 1880; 36% in 1890, 40% in 1899 an< l 46% in 1907. In

1907 the British steel production was nearly five times, that of the

Table IV. — Reduction in Cost of Iron Manufacture in America — C. Kirchcf.

Place represented.

Operation represented.

Period covered.

Cost, Profit and Production.at End of Period in Percentage I of that at Beginning of Period. f

From

To

Cost.

Profit

per

Ton.

Produc-

: tion per

Furnace,

&c, per

Day.

Ore.

Fuel.

Ilabour.

Total.

Total excluding

Raw Material.

A large Southern Establishment North-eastern District . Pittsburg District .... Eastern District ....

Not stated

Manufacture of Pig Iron

Manufacture of Bessemer Steel Ingots Rolling Wire Rods

1889 1890 1887 1891

1887

I1888

1898 1898 1897 1898 1897 1898

79

i°3-7

64-1

97

51-9

6i-i

46

75

63-4

65-8

64-39 63-6

44 52

47-9 33-9

167-7

I63-3

107

since 1868. Note, for instance, a reduction of some 35% in the total cost, and an even greater reduction in the cost of labour, reaching in one case 54 %, in a period of between seven and ten years. This great economy is not due to reduction in wages. Ac- cording to Mr Carnegie, in one of the largest American steel works the average wages in 1900 for all persons paid by the day, including labourers, mechanics and boys, were more than $4 (say, 16s. 6d.) a day for the 311 working days. How economical the methods of mining, transportation and manufacture have become is shown by the fact that steel billets have been sold at $13-96 (£2, 17s. 8d.) per ton, and in very large quantities at $15 (£3, 2s.) per ton, in the latter case, according to Mr Carnegie, without further loss than that represented by interest, although the cost of each ton includes that of mining 2 tons of ore and carrying them 1000 miles, mining and coking 1-3 tons of coal and carrying its coke 50 m., and quarrying one-third of a ton of limestone and carrying it 140 m., besides the cost of smelting the ore, converting the resultant cast iron into steel, and rolling that steel into rails.

Table V. — Reduction in Price of Certain Products.

Yearly average Price in Pennsylvania, gross

tons. 1

Date.

Bar (Wrought) Iron.

Wrought Iron Rails.

Steel Rails.

No. 1 Foundry Pig Iron.

1800

8100-50]

144-5° I

1815

1824

82-50 Hammered iii-ooJ

1837

1850

59- 54ˆ

$47-88

$20-88

1865

10646

98-62

SI58-46 3

46-08

1870

78-96

72-25

106-79

33-23

1880

62-04

Best

49-25

67-52

28-48

1890

45-83

^ refined

25-18

31-78

18-41

: 1898

2865

rolled

12-39 2

17-62

n-66

1900

44-00

19-51 2

32-29

19-98

| 1906

23-03 2

28-00

20-98

1908 ‘

31-00.

1 18-25 2

28-00

17-25

1 July 1st. ! Old, i.e. second-hand wrought iron rails. 3 1868.

Table V. shows the reduction in prices. The price of wrought iron in Philadelphia reached $155 (£32, os. 8d.) in 1815, and, after declining to 880 (£16, 10s. 8d.), again reached $115 (£23, 15s. 4d.) m 1837. Bessemer steel rails sold at Si 74 in the depreciated currency of 1868 (equivalent to about £25, 17s. 4d. in gold), and at $17 (£3, ios. 3d.) in 1898.

133. Increase in Production. — In 1810 the United States made about 7%, and in 1830, 1850 and i860 not far from 10% of the world's production of pig iron, though, indeed, in 1820 their production was only about one-third as great as in 1810. But after the close of the Civil War the production increased by leaps and bounds, till in 1907 it was thirty-one times as great as in 1865; and the percentage which it formed of the world's production rose to some 14 % in 1870, 21 % in 1880, 35 % in 1900 and 43 % in 1907. In this last year the United States production of pig iron was nearly 7 times, and that of Germany and Luxemburg nearly 5 times, that of 1880.

United States nearly nineteen times, as great as in 1880. Of the combined wrought iron and steel of the United States, steel formed only 2 % in 1865, but 37 % in 1880, 85 % in 1899 and 91 % in 1907. Thus in the nineteen years between 1880 and 1899 the age of iron gave place to that of steel.

The per capita consumption of iron in Great Britain, excluding exports, has been calculated as 144 lb in 1855 and 250 lb in 1890, that of the United States as 117 lb for 1855, 300 lb for 1890 and some 378 lb for 1899, and that of the United Kingdom, the United States and Germany for 1906 as about a quarter of a ton, so that the British per capita consumption is about four-fold and the American about five-fold that of 1855. This great increase in the per capita con- sumption of iron by the human race is of course but part of the general advance in wealth and civilization. Among the prominent causes of this increase is the diversion of mankind from agricultural to manufacturing, i.e. machinery-using work, nearly all machinery being necessarily made of iron. This diversion may be unwelcome, but it is inevitable for the two simple reasons that the wonderful improvements in agriculture decrease the number of men needed to raise a given quantity of food, i.e. to feed the rest of the race; and that with every decade our food forms a smaller proportion of our needs, so rapidly do these multiply and diversify. Among the other

causes of the increase of the per capita consumption of iron are the displacement of wood by iron for ships and bridge-building; the great extension of the use of iron beams, columns and other pieces in constructing buildings of various kinds; the growth of steam and electric railways; and the introduction of iron fencing. The in- creased importance of Germany and Luxemburg may be referred in large part to the invention of the basic Bessemer and open-hearth processes by Thomas, who by them gave an inestimable value to the phosphoric ores of these countries. That of the United States is due in part to the growth of its population ; to the introduction of labour- saving machinery in iron manufacture; to the grand scale on which this manufacture is carried on ; and to the discovery of the cheap and rich ores of the Mesabi region of Lake Superior. But, given all these, the 1000 m. which separate the ore fields of Lake Superior from the cheap coal of Pennsylvania would have handi- capped the American iron industry most seriously but for the re- markable cheapening of transportation which has occurred. As this in turn has been due to the very men who have developed the iron industry, it can hardly be questioned that, on further analysis, this development must in considerable part be referred to racial qualities. The same is true of the German iron development. We may note with interest that the three great iron producers so closely related by blood — Great Britain, the United States and Germany and Luxemburg — made in 1907 81 % of the world's pig iron and 83 % of its steel ; and that the four great processes by which nearly all steel and wrought iron are made — the puddling, crucible and both the acid and basic varieties of the Bessemer and open-hearth processes, as well as the steam- hammer and grooved rolls for rolling iron and steel — were invented by Britons, though in the case of the open- hearth process Great Britain must share with France the credit of the invention.

Tables VI., VII., VIII. and IX. are compiled mainly from figures given in J. M. Swank's Reports (American Iron and Steel Associa- tion). Other authorities are indicated as follows: ", The Mineral Industry (1892); \ Idem (1899); ", Idem (1907); ", Journal Iron and Steel Institute (1881), 2; <, Eckel in Mineral Resources of the United States, (published by the United States Geological Sutvey (1906), pp. 92-93.

II

«34

IRON MASK

Table VI. — Production of Pig Iron (in thousands c

/ long tons).

Year.

United States.

Great Britain.

Germany and Luxemburg.

The World.

1800

825

1810

54

1830

165

677

1,825

1850

565

4,75 < >

1865

832

4825

972

9,250

1870

1,665

5964

1,369

11,900

1880

3,835

7749

2,685

17,950

1890

9,203

7904

4,583

27,157

1900

13,789

8960

8,386

38,973 c

j 1907

a5,78i

9924

12,672

59,72i c

Table VII. — Production of Pig Iron in the United States (in thousands of long tons).

Year.

Anthracite.

Charcoal.

Coke and Bituminous.

Total.

1880

1614

480

i,74i

3,835

1885

1299

357

2,389

4,045

1890

2186

628

6,388

9,203

1895

1271

225

7,950

9,446

1900

1677

384

11,728

13,789

1907

1372

437

23,972

25,781

" Anthracite " here includes iron made with anthracite and coke mixed, " Bituminous " includes iron made with coke, with raw bituminous coal, or with both, and " Charcoal " in 1900 and 1907 includes iron made either with charcoal alone or with charcoal mixed with coke.

Table VIII. — Production of Wrought Iron, also that of Bloomary Iron (in thousands of long tons).

1870.

United States Great Britain

1880.

United States Great Britain

1890.

United States Great Britain

1899.

United States Great Britain

1900.

United States Great Britain

1907.

United States Great Britain

Wrought Iron.

Bloomary Iron direct from the Ore.

“53

2083C)

2518C)

1894

*1202**

2200

975

36

7 3 4

1 Hammered products are excluded.

Table IX. — Production of Steel (in thousands of long tons).

.

1870.

United States . Great Britain .

The World . .

1880.

United States . Great Britain Germany and

Luxemburg . The World . .

1890.

United States . Great Britain Germany and

Luxemburg . The World .

1900.

United States

Great Britain

Germany and Luxemburg The World .

1907.

United States

Great Britain

Germany and Luxemburg The World

Bessemer.

37... 215

(for 1873)

1,074 1,044

Open- Hearth.

(Acid (Basic (Acid / Basic

j Acid (Basic (Acid (Basic (Acid J Basic

6o8«

3,689 2,015

6,685

o 1,254 {

491 5

11,668

o

1,280

579

381 1

7.098 1

1

78

101 251

87′

513 1,564

8531 2,5455

3,156

1,270 10,279

3,385

1,279

209

3,976′

Crucible and Mis- cellaneous..

31

72 80

33

75 100

105 149

Total.

II

145

208 ;

69

292″

692″

1,247 1,375

728

4,205°

4,277 3,679

2,127 11,902″

10,188 5,050

6,54i

28,273

23,363

6,523 >

“,873 50,375

1 Ingots only.

1 Bessemer and open hearth only.

1 Castings.

Table X. — Tonnage (gross register) of Iron and Steel Vessels built under Survey of Lloyd’s Registry (in thousands of tons).

1877-

1880.

1885.

1890.

1895.

1900.

1906.

Wrought Iron Steel . . .

443

460 35

304 162

50 1079

8 863

14 1305

1492

Table XI. — Production of Iron Ore (in thousands of long tons).

United States

Germany and Luxemburg

Great Britain

Spain

France

Russia

Sweden

Austria-Hungary Other Countries

1905-

Thousands of Long Tons.

42,526 23,074 14.591 8,934 7,279 5,954 ‘ 4,297 3,639 3,457

Per Cent.

1906.

Thousands of Long Tons.

Per Cent.

Total

H3,75i

37-4 20-3

12-8

7-9 6-4 5-2 3-8 3-2 3-0

47,750

26,312

15,500

9,299

8,347

3,812

4,431 4,024

4,297

IOO-O

123,773

38-6

21-3

12-5 7-5 6-7 3-1 3-6 3-3 3-5

IOO'I

1907.

Thousands of Long Tons.

5i,72i

27,260 15,732

4,330 s

1 Calculated from the production of pig iron

IRON MASK (masque de fer). The identity of the " man in the iron mask " is a famous historical mystery. The person so called was a political prisoner under Louis XIV., who died in the Bastille in 1703. To the mask itself no real importance attaches, though that feature of the story gave it a romantic

; Approximately.

(H. M. H.)

interest; there is no historical evidence that the mask he was said always to wear was made of anything but black velvet (Velours), and it was only afterwards that legend converted its material into iron. As regards the " man," we have the con- temporary official journals of fitienne du Junca (d. 1706), the

IRON MASK

835

king's lieutenant at the Bastille, from which we learn that on the 18th of September 1698 a new governor, Benigne D'Auvergne de Saint-Mars, arrived from the fortress of the Isles Ste Marguerite (in the bay of Cannes), bringing with him " un ancien prisonnier qu'il avait a Pignerol " (Pinerolo, in Piedmont), whom he kept always masked and whose name remained untold. (Saint-Mars, it may here be notedjˆhad been commandant at Pignerol from the end of 1664 till 1681; he was in charge there of such important prisoners as Fouquet, from 1665 to his death in 1680, and Lauzun, from 1671 till his release in 1681; he was then in authority at Exiles from 1681 to 1687, and at Ste Marguerite from 1687 to 1698). Du Junca subsequently records that " on Monday the 19th of November 1703, the unknown prisoner, always masked with a black velvet mask, whom M. de Saint-Mars had brought with him from the islands of Ste Marguerite, and had kept for a long time, . . . died at about ten o'clock in the evening." He adds that " this unknown prisoner was

buried on the 20th in the parish cemetery of Saint Paul, and was registered under a name also unknown "—noting in the margin that he has since learnt that the name in the register was " M. de Marchiel. " The actual name in the register of the parish cemetery of Saint Paul (now destroyed, but a facsimile is still in existence) was " Marchioly "; and the age of the deceased was there given as " about 45."

The identity of this prisoner was already, it will be observed, a mystery before he died in 1703, and soon afterwards we begin to see the fruit of the various legends concerning him which presumably started as early as 1670, when Saint-Mars himself (see below) found it necessary to circulate " fairy tales " (conks jaunes). In 1711 the Princess Palatine wrote to the Electress Sophia of Hanover, and suggested that he was an English nobleman who had taken part in a plot of the duke of Berwick against William III. Voltaire, in his Steele de Louis XIV (1751), told the story of the mysterious masked prisoner with many graphic details; and, under the heading of " Ana " in the Questions sur V encyclopedic (Geneva, 1771), he asserted that he was a bastard brother of Louis XIV., son of Mazarin and Anne of Austria. Voltaire's influence in creating public interest in the " man in the mask/' was indeed enormous; he had himself been imprisoned in the Bastille in 1717 and again in 1726; as early as 1745 he is found hinting that he knows something; in the Siecle de Louis XI V he justifies his account on the score of conversations with de Bernaville, who succeeded Saint-Mars (d. 1708) as governor of the Bastille, and others; and after Heiss

in 1770 had identified the " mask " with Mattioli (see below), Voltaire was not above suggesting that he really knew more than he had said, but thought it sufficient to have given the clue to the enigma. According to the Abbe Soulavie, the duke of Richelieu's advice was to reflect on Voltaire's " last utterances " on the subject. In Soulavie's Mimoires of Richelieu (London, 1790) the masked man becomes (on the authority of an apocryphal note by Saint-Mars himself) the legitimate twin brother of Louis XIV. In 1801 the story went that this scion of the royal house of France had a son born to him in prison, who settled in Corsica under the name of " De Buona Parte," and became the ancestor of Napoleon! Dumas's Vicomte de Bragelonne afterwards did much to popularize the theory that he was the king's brother. Meanwhile other identifications, earlier or later, were also supported, in whose case the facts are a sufficient refutation. He was Louis, count of Vermandois, son of Louise de la Valliere (Mimoires secrets pour servir a I'histoirc de Perse, Amsterdam, 1745) ; Vermandois, however, died in 1683. He was the duke of Monmouth (Leltre de Sainte Foy . . . Amsterdam, 1768), although Monmouth was beheaded in 1685. He was Francois de Vend&me, duke of Beaufort, who disappeared (and pretty certainly died) at the siege of Candia (1669); Avedick, an Armenian patriarch seized by the Jesuits, who was not imprisoned till 1706 and died in 17 n; Fouquet, who undoubtedly died at

Pignerol in 1680; and even, according to A. Loquin (1883),

Moliere!

Modern criticism, however, has narrowed the issue. The " man in the mask " was either (1) Count Mattioli, who became

the prisoner of Saint-Mars at Pignerol in 1679, or (2) the person called Eustache Dauger, who was imprisoned in July 1669 in the same fortress. The evidence shows conclusively that these two were the only prisoners under Saint-Mars at Pignerol who could have been taken by him to the Bastille in 1698. The arguments in favour of Mattioli (first suggested by Heiss, and strongly supported by Topin in 1870) are summed up, with much weight of critical authority, by F. Funck-Brentano in vol. lvi. of the Revue historique (1894); the claims of Eustache Dauger were no less ably advocated by J. Lair in vol. ii. of his Nicolas Foucquet (1890). But while we know who Mattioli was, and why he was imprisoned, a further question still remains for supporters of Dauger, because his identity and the reason for his incarceration are quite obscure.

It need only be added, so far as other modern theories are concerned, that in 1873 M. Jung (La Verite sur la masque defer) had brought forward another candidate, with the attractive name of "Marechiel," a soldier of Lorraine who had taken part in a poisoning plot against Louis XIV., and was arrested at Peronne by Louvois in 1673, and said to be lodged in the Bastille and then sent to Pignerol. But Jung's arguments, though strong destructively against the Mattioli theory, break down as regards any valid proof either that the prisoner arrested at Peronhe was a Bastille prisoner in 1673 or that he was ever at Pignerol, where indeed we find no trace of him. Another theory, propounded by Captain Bazeries (La Masque de fer, 1883), identified the prisoner with General du Bulonde, punished for cowardice at the siege of Cuneo; but Bulonde only went to Pignerol in 1 69 1, and has been proved to be living in 1705.

The Mattioli Theory. — Ercole Antonio Mattioli (born at Bologna on the 1st of December 1640) was minister of Charles IV., duke of Mantua, who as marquess of Montferrat was in possession of the frontier fortress of Casale, which was coveted by Louis XIV. He negotiated the sale of Casale to the French king for 100,000 crowns, and himself received valuable presents from Louis. But on the eve of the occupation of Casale by the French, Mattioli— actuated by a tardy sense of patriotism or by the hope of further gain — betrayed the transaction to the governments of Austria, Spain, Venice and

Savoy. Louis, in revenge, had him kidnapped (1679) by the French envoy, J. F. d'Estrades, abbe of Moissac, and Mattioli was promptly lodged in the fortress of Pignerol. This kidnapping of Mattioli, however, was no secret, and it was openly discussed in La Pru- denza trionfante di Casale (Cologne, 1682), where it was stated that Mattioli was masked when he was arrested. In February 1680 he is described as nearly mad, no doubt from the effects of solitary confinement. When Saint-Mars was made governor of Exiles in 1681 we know from one of his letters that Mattioli was left at Pignerol; but in March 1694, Pignerol being about to be given up by France to Savoy, he and two other prisoners were removed with much secrecy to Ste Marguerite, where Saint-Mars had been governor since 1687. Funck-Brentano emphasizes the fact that, although Eustache Dauger was then at Ste Marguerite, the king's minister Barbezieux, writing to Saint-Mars (March 20, 1694) about the transfer of these prisoners, says: " You know that tiiey are of more consequence (plus de consequence), at least one " (presumably Mattioli), " than those who are at present at the island." From this point, however, the record is puzzling. A month after his arrival at Ste Marguerite, a prisoner who had a valet died there. 1 Now Mattioli undoubtedly had a valet at Pignerol, and nobody else at Ste Marguerite is known at this time to have had one; so that he may well have been the prisoner who died. In that case he was clearly not " the mask " of 1698 and 1703. Funck- Brentano's attempt to prove that Mattioli did not die in 1604 is far from convincing; but the assumption that he did is inferential, and to that extent arguable. " Marchioly " in the burial register of Saint Paul naturally suggests indeed at first that the " ancien prisonnier " taken by Saint-Mars to the Bastille in 1698 was Mattioli, Saint-Mars himself sometimes

1 Barbezieux to Saint-Mars, May 10, 1694 : " J'ai recu la lettre que vous avez pris la peine de m'fcrire le 29 du mois pass6; vous pouvez, suivant que vous le proposez, faire mettre dans la prison voutfie le valet du prisonnier qui est mort." It may be noted that Barbezieux had recently told Saint-Mars to designate his prisoners by circum- locutions iu his correspondence, and not by name.

writing the name " Marthioly " in his letters; but further consideration leaves this argument decidedly weak. In any case the age stated in the burial register, " about 45," was fictitious, whether for Mattioli (63) or Dauger (at least 53); and, as Lair points out,

Saint-Mars is known to have given false names at the burial of other prisoners. Monsigntfr Barnes, in The Man of the Mask (1908), takes the entry " Marchioly " as making it certain that the prisoner was not Mattioli, on the ground (1) that the law 1 explicitly ordered a false name to be given, and (2) that after hiding his identity so carefully the authorities were not likely to give away the secret by means of a burial register.

In spite of Funck-Brentano it appears practically certain that Mattioli must be ruled out. If he was the individual who died in 1703 at the Bastille, the obscurity which gathered round the nameless masked prisoner is almost incomprehensible, for there was no real secret about Mattioli's incarceration. The existence of a "legend" as to Dauger can, however, be traced, as will be seen below, from the first. Any one who accepts the Mattioli theory must be driven, as Lang suggests, to suppose that the mystery which grew up about the unknown prisoner was somehow transferred to Mattioli from Dauger.

The Dauger Theory. — What then was Dauger's history? Unfortunately it is only in his capacity as a prisoner that we can trace it. On the 19th of July 1669 Louvois, Louis XIV. 's minister, writes to Saint-Mars at Pignerol that he is sending him " le nomme Eusfcache Dauger " (Dauger, D'Angers — the spelling is doubtful), 2 whom it is of the last importance to keep with special closeness; Saint-Mars is to threaten him with death if he speaks about anything except his actual needs. On the same day Louvois orders Vauroy, major of the citadel of Dunkirk, to seize Dauger and conduct him to Pignerol. Saint- Mars writes to Louvois (Aug. 21) that Vauroy had brought Dauger, and that people " believe him to be a marshal of France." Louvois (March 26, 1670) refers to a report that one of Fouquet's valets — there was constant trouble about them — had spoken to Dauger, who asked to be left in peace, and he emphasizes the importance of there being no communication. Saint-Mars (April 12, 1670) reports Dauger as "resigne a la volonte de Dieu et du Roy," and (again the legend grows) says that " there are persons who are inquisitive about my prisoner, and I am obliged to tell conies jaunes pour me moquer d'cux." In 1672 Saint-Mars proposes — the significance of this action is discussed later — to allow Dauger to act as " valet " to Lauzun; Louvois firmly refuses, but in 1675 allows him to be employed as valet to Fouquet, and he impresses upon Saint-Mars the importance of nobody learning about Dauger's " past." After Fouquet's death (1680) Dauger and Fouquet's other (old-standing) valet La Riviere are put together, by Louvois's special orders, in one lower dungeon; Louvois evidently fears their knowledge of things heard from Fouquet, and he orders Lauzun (who

had recently been allowed to converse freely with Fouquet) to be told that they are released. When Saint-Mars is transferred to Exiles, he is ordered to take these two with him, as too important to be in other hands; Mattioli is left behind. At Exiles they are separated and guarded with special precautions; and in January 1687 one of them (all the evidence admittedly pointing to La Riviere) dies. When Saint-Mars is again trans- ferred, in May 1687, to Ste Marguerite, he takes his " prisoner " (apparently he now has only one — Dauger) with great show of caution; and next year (Jan. 8, 1688) he writes to Louvois that "mon prisonnier " is believed "in all this province" to be a son of Oliver Cromwell, or else the duke of Beaufort (a point which at once rules out Beaufort). In 1691 Louvois's successor, Barbezieux, writes to him about his " prisonnier de vingt ans " (Dauger was first imprisoned in 1669, Mattioli in 1679), and Saint-Mars replies that " nobody has seen him but myself." Subsequently Barbezieux and the governor continue to write to one another about their " ancien prisonnier "

1 He cites Bingham's Bastille, i. 27.

2 It was the common practice to give pseudonyms to prisoners, and this is clearly such a case. Mattioli's prison name was Lcstang.

(Jan. 6, 1696; Nov. 17, 1697). When, therefore, we come to Saint-Mars's appointment to the Bastille in 1698, Dauger appears almost certainly to be the " ancien prisonnier " he took with him. 3 There is at least good ground for supposing Mattioli's death to have been indicated in 1694, but nothing is known that would imply Dauger's, unless it was he who died in 1703.

Theories as to Dauger's Identity. — Here we find not only sufficient indication of the growth of a legend as to Dauger, but also the existence in fact of a real mystery as to who he was and what he had done, two things both absent in Mattioli's case. The only " missing link " is the want of any precise allusion to a mask in the references to Dauger. But in spite of du Junca's emphasis on the mask, it is in reality very question- able whether the wearing of a mask was an unusual practice. It was one obvious Way of enabling a prisoner to appear in public (for exercise or in travelling) without betrayal of identity. Indeed three years before the arrival of Saint-Mars we hear {Gazette d' Amsterdam, March 14, 1695) of another masked man being brought to the Bastille, who eventually was known to be the son of a Lyons banker.

Who then was Dauger, and what was his " past "? We will take first

*a theory propounded by Andrew Lang in The Valet's Tragedy (1903). As the result of research in the diplomatic correspondence at the Record Office in London * Mr Lang finds a clue in the affairs of the French Huguenot, Roux de Marsilly,. the secret agent for a Protestant league against France between Sweden, Holland, England and the Protestant cantons of Switzerland, who in February 1669 left London, where he had been negotiating with Arlington (apparently with Charles II. 's knowledge), for Switzerland, his confidential valet Martin remaining behind. On the 14th of April 1669 Marsilly was kidnapped for Louis XIV. in Switzerland, in defiance of inter- national right, taken toj Paris and on the 22nd of June tortured 1 to death on a trumped-up charge of rape. The duke of York, is said to have betrayed him to Colbert, the French ambassador in London. The English intrigue was undoubtedly a serious matter, because the shifty Charles II. was at the same time- negotiating with Louis XIV. a secret alliance against Holland,, in support of the restoration of Roman Catholicism in England.. It would therefore be desirable for both parties to remove- anybody who was cognizant of the double dealing. Now Louvois's original letter to Saint-Mars concerning Dauger (July 19, 1669), after dealing with the importance of his being; guarded with special closeness, and of Saint-Mars personally taking him food and threatening him with death if he speaks, proceeds as follows (in a second paragraph, as printed in DelorV, i. 155,156):—*

" Je mande au Sieur Poupart de faire incessamment travailler a ce que vous desirerez, et vous ferez preparer les meubles qui sont necessaires pour la vie de celui que Ton vous amenera, observant que comme ce n est qu'un valet, il ne lui en faut pas de bien considerables, et je vous ferai rembourser tant de la dispenses des meubles, que de ce que vous desirerez pour sa nourriture."

Assuming the words here, " as he is only a valet," to refer to Dauger, and taking into account the employment of Dauger from 1675 t° J 68o as Fouquet's valet, Mr' Lang now obtains a solution of the problem of why a mere valet should be a political

3 Funck-Brentano argues that " un ancien prisonnier qu'il avait a. Pignerol " (du Junca's words) cannot apply to Dauger, because then du Junca would have added " et a Exiles." But this is de- cidedly far-fetched; du Junca would naturally refer specially to Pignerol, the fortress with which Saint-Mars had been originally and particularly associated. Funck-Brentano also insists that the references to the " ancien prisonnier " in 1696 and 1697 must be to Mattioli, giving ancien the meaning of " late " or " former " (as in the phrase "

ancien ministre “), and regarding it as an expression pertinent to Mattioli, who had been at Pignerol with Saint-Mars but not at Exiles, and not to Dauger, who had always been with Saint- Mars. But when he attempts to force du Junca’s phrase ” un ancien prisonnier qu’il avait a Pignerol ” into this sense, he is straining language. The natural interpretation of the word ancien is simply ” of old standing,” and Barbezieux’s use of it, coming after Louvois’s phrase in 1691, clearly points to Dauger being meant.

4 This identification had been previously suggested by H. Mont-audon in Revue de la societe des etudes historiques for 1888, p. 452, and by A. le Grain in V Inter mediairc des chcrchcurs for 1891, col. 227-228.

prisoner of so much concern to Louis XIV. at this time. He points out that Colbert, on the 3rd, 10th and 24th of June, writes from London to Louis XIV. about his efforts to get Martin, Roux de MarsiUy’s valet, to go to France, and on the 1st of July expresses a hope that Charles II. will surrender ” the valet.” Then, on the 19th of July, Dauger is arrested at Dunkirk, the regular port from England. Mr Lang regards his conclusion as to the identity between these valets as irresistible. It is true that what is certainly known about Martin hardly seems to provide sufficient reason for Eustache Dauger being regarded for so long a time as a specially dangerous person. But Mr Lang’s answer on that point is that this humble supernumerary in Roux de MarsiUy’s conspiracy simply became one more wretched victim of the “red tape “of the old French absolute monarchy.

Unfortunately for this identification, it encounters at once a formidable, if not fatal, objection. Martin, the Huguenot conspirator MarsiUy’s valet, must surely have been himself a Huguenot. Dauger, on the other hand, was certainly a Catholic; indeed Louvois’s second letter to Saint-Mars about him (Sept. 10, 1669) gives precise directions as to his being allowed to attend mass at the same time as Fouquet. It may perhaps be argued that Dauger (if Martin) simply did not make bad worse by pro- claiming his creed; but against this, Louvois must have known that Martin was a Huguenot. Apart from that, it wiU be observed that the substantial reason for connecting the two men is simply that both were ” valets.” The identification is inspired by the apparent necessity of an explanation why Dauger, being a valet, should be a political prisoner of importance. The

assumption, however, that Dauger was a valet when he was arrested is itself as unnecessary as the fact is intrinsically improbable. Neither Louvois's letter of July 19, 1669, nor Dauger's employment as valet to Fouquet in 1675 (six years later) — and these are the only grounds on which the assumption rests — prove anything of the sort.

Was Dauger a valet? If Dauger was the " mask," it is just as well to remove a misunderstanding which has misled too many commentators.

1. If Louvois's letter of July 19 be read in connexion with the preceding correspondence it will be seen that ever since Fouquet's incarceration in 1665 Saint-Mars had had trouble over his valets. They fall ill, and there is difficulty in replacing them, or they play the traitor. At last, on the 12th of March 1669, Louvois writes to Saint-Mars to say (evidently in answer to some suggestion from Saint-Mars in a letter which is not preserved): " It is annoying that both Fouquet's valets should have fallen ill at the same time, but you have so far taken such good measures for avoiding inconvenience that I leave it to you to adopt whatever course is necessary." There are then no letters in existence from Saint-Mars to Louvois up to Louvois's letter of July 19. in which he first refers to Dauger; and for three months (from April 22 to July 19) there is a gap in the correspondence, so that the sequence is obscure. The portion, however, of the letter of the 19th of July, cited above, in which Louvois uses the words " ce n'est qu'un valet," does not, in the present writer's judgment, refer to Dauger at all, but to something which had been mooted in the meanwhile with a view to obtaining a valet for Fouquet. This is indeed the natural reading of the letter as a whole. If Louvois had meant to write that Dauger was " only a valet " he would have started by saying so. On the contrary, he gives precise and apparently comprehensive directions in the first part of the letter about how he is to be treated: "Je vous en donne advis par advance, afin que vous puissiez faire accomoder un cachot ou vous le mettrez surement, observant de faire en sorte que les jours qu'aura le lieu ou il sera ne donnent point sur les lieux qui puissent estre abordez de personne, et qu'il y ayt assez de portes fermees, les unes sur les autres, pour que vos sentinelles ne puissent bien entendre," &c. Having finished his instructions about Dauger, he then proceeds in a fresh paragraph to tell Saint-Mars that orders have been given to " Sieur Poupart " to do " whatever you shall desire." He is here dealing with a different question; and it is unreasonable to suppose.

and indeed contrary to the style in which Louvois corresponds with Saint-Mars, that he devotes the whole letter to the one subject with

which he started. The words " et vous ferez preparer les meubles qui sont necessaires pour la vie de celui que 1'on vous amenera " are not at all those which Louvois would use with regard to Dauger, after what he has just said about him. Why " celui que Ton vous amenera," instead of simply "Dauger," who was being brought, as he has said, by Vauroy ? The clue to the interpretation of this phrase may be found in another letter from Louvois not six months later (Jan. 1, 1670J, when he writes: " Le roy se remet a vous d'en uzer comme vous le jugerez a propos a, l'esgard des valets de Monsieur Foucquet; il faut seulement observer que si vous luy donnez des valets que 1' on vous amenera d'icy, il pourra bien arriver qu'ils seront gaignez par avance, et qu'ainsy ils feroient pis que ceux que vous en osteriez presentement." Here we have the identical phrase used of valets whom it is contemplated to bring in from outside for Fouquet; though it does not follow that any such valet was in fact brought in. The whole previous correspondence (as well as a good deal afterwards) is full of the valet difficulty; and it is surely more reasonable to suppose that when Louvois writes to Saint-Mars on the 19th of July that he is sending Dauger, a new prisoner of importance, as to whom " il est de la derniere importance qu'il soit garde avec une grande seurete," his second paragraph as regards the instructions to " Sieur Poupart " refers to some- thing which Saint-Mars had suggested about getting a valet from outside, and simply points out that in preparing furniture for " celui que Ton vous amenera " he need not do much, " comme ce n'est qu'un valet."

2. But this is not all. If Dauger had been originally a valet, he might as weU have been used as such at once, when one was particularly wanted. On the contrary, Louvois flatly refused Saint-Mars's request in 1672 to be aUowed to do so, and was exceedingly chary of allowing it in 1675 (only " en cas de neces- site," and " vouspouvez donner le dit prisonnier a M. Foucquet, si son valet venoit a. luy manquer et non autrement"). The words used by Saint-Mars in asking Louvois in 1672 if he might use Dauger as Lauzun's valet are themselves significant to the point of conclusiveness: "II ferait, ce me semble, un bon valet." Saint-Mars could not have said this if Dauger had all along been known to be a valet. The terms of his letter to Louvois (Feb 20, 1672) show that Saint-Mars wanted to use Dauger as a valet simply because he was not a valet. That a person might be used as a valet who was not really a valet is shown by Louvois having told Saint-Mars in 1666 (June 4) that Fouquet's old doctor, Pecquet, was not to be aUowed to serve him " soit dans sa profession, soit dans le mestier d'un simple valet." The fact was that Saint-Mars was hard put to it in the prison for anybody who could be

trusted, and that he had convinced himself by this time that Dauger (who had proved a quiet harmless fellow) would give no trouble. Probably he wanted to give him some easy employment, and save him from going mad in confinement. It is worth noting that up to 1672 (when Saint-Mars suggested utilizing Dauger as valet to Lauzun) none of the references to Dauger in letters after that of July 19, 1669, suggests his being a valet; and their contrary character makes it all the more clear that the second part of the letter of July 19 does not refer to Dauger.

In this connexion it may be remarked (and this is a point on which Funck-Brentano entirely misinterprets the aUusion) that, even in his capacity as valet to Fouquet, Dauger was stUl regarded an as exceptional sort of prisoner; for in 1C79 when Fouquet and Lauzun were afterwards allowed to walk freely all over the citadel, Louvois impresses on Saint-Mars that " le nomme Eustache " is never to be allowed to "be in Fouquet's room when Lauzun or any other stranger, or anybody but Fouquet and the "ancien valet," La Riviere, is there, and that he is to stay in Fouquet's room when the latter goes out to walk in the citadel, and is only to go out walking with Fouquet and La Riviere when they promenade in the special part of the fortress previously set apart for them (Louvois's letter to Saint- Mars, Jan. 30, 1670).

Was Danger James de la Cloche? In The Man of the Mask (1908) Monsignor Barnes, while briefly dismissing Mr Lang's identification with Martin, and apparently not realizing the possibility of reading Louvois's letter of July 19, 1669, as in- dicated above l deals in detail with the history of James de la Cloche, the natural son of Charles II. (acknowledged privately as such by the king) in whom he attempts to unmask the person- ality of Dauger. Mr Lang, in The Valet's Tragedy, had some years earlier ironically wondered why nobody made this sugges- tion, which, however, he regarded as untenable. The story of James de la Cloche is indeed itself another historical mystery; he abruptly vanishes as such at Rome at the end of 1668, and thus provides a disappearance of convenient date; but the question concerning him is complicated by the fact that a James Henry de Bovere Roano Stuardo, who married at Naples early in 1669 and undoubtedly died in the following August, claiming to be a son of Charles IL, makes just afterwards an equally abrupt appearance; in many respects the two men seem to be the same, but

Monsignor Barnes, following Lord Acton, here regards James Stuardo as an impostor who traded on a knowledge of James de la Cloche's secret. If the latter then did not die in 1669, what became of him ? According to Monsignor Barnes's theory, James de la Cloche, who had been brought up to be a Jesuit and knew his royal father's secret profession of Roman Catholicism, was being employed by Charles II. as an inter- mediary with the Catholic Church and with the object of making him his own private confessor; he returned from Rome at the beginning of 1669, and is then identified by Monsignor Barnes with a certain Abbe Pregnani, an "astrologer" sent by Louis in February 1669 to influence Charles II. towards the French alliance. Pregnani, however, made a bad start by " tipping winners" at Newmarket with disastrous results, and was quickly recalled to France, actually departing on July 5th (French 15th). But he too now disappears, though a letter from Lionne (the French foreign secretary) to Colbert of July 17 (two days before Louvois's letter to Saint-Mars about Dauger) says that he is expected in Paris. Monsignor Barnes's theory is that Pregnani alias James de la Cloche, without the knowledge of Charles II., was arrested by order of Louis and imprisoned as Dauger on account of his knowing too much about the French schemes in regard to Charles II. This identification of Pregnani with James de la Cloche is, however, intrinsically incredible. We are asked to read into the Pregnani story a deliberate intrigue on Charles's part for an excuse for having James de la Cloche in England. But this does not at all seem to square with the facts given in the correspondence, and it is hard to understand why Charles should have allowed Pregnani to depart, and should not have taken any notice of his son's " disappearance." There would still remain, no doubt, the possibility that Pregnani, though not James de la Cloche, was nevertheless the " man in the mask." But even then the dates will not suit; for Lionne wrote to Colbert on July 27, saying, "Pregnani has been so slow on his voyage that he has only given me (m'a rendu) your despatch of July 4 several days after I had already received those of the 8th and the nth." Allowing for the French style of dating this means that instead of arriving in Paris by July 18, Pregnani only saw Lionne there at earliest on July 25. This seems to dispose of his being sent to Pignerol on the 19th. Apart altogether, however, from such considerations, it now seems fairly certain, from Mr Lang's further research into the problem of James de la Cloche (see La Cloche), that the latter was identical with the "Prince" James Stuardo who died in Naples in 1669, and that he hoaxed the general of the Jesuits and forged a number of letters purporting to be from Charles II. which were relied on in Monsignor Barnes's book; so that the theory breaks down at all points.

1 The view taken by Monsignor Barnes of the phrase " Ce n'est qu'ttn valet " in Louvois's letter of July 19, is that (reading this part of the letter as a continuation of what precedes) the mere fact of Louvois's saying that Dauger is only a valet means that that was just what he was not ! Monsignor Barnes is rather too apt to employ the method of interpretation by contraries, on the ground that in euch letters the writer always concealed the real facts.

The identification of Dauger thus still remains the historical problem behind the mystery of the "man in the mask." He was not the valet Martin; he was not a valet at all when he was sent to Pignerol; he was not James de la Cloche. The fact nevertheless that he was employed as a valet, even in Special circumstances, for Fouquet, makes it difficult to believe that Dauger was a man of any particular social standing. We may be forced to conclude that the interest of the whole affair, so far as authentic history is concerned, is really nugatory, and that the romantic imagination has created a mystery in a fact of no importance.

Authorities. — The correspondence between Saint-Mars and Louvois is printed by J. Delort in Histoire de la detention des philosophes (1829). Apart from the modern studies by Lair, Funck- Brentano, Lang and Barnes, referred to above, there is valuable historical matter in the work of Roux-Fazaillac, Recherches historiques sur I'homme au masque defer (1801) ; see also Marius Topin, L'Honime au masque defer (Paris, 1870), and Loiseleur, Trots inigmes historiques (1882). (H. Ch.)

IRON MOUNTAIN, a city and the county-seat of Dickinson county, Michigan, U.S.A., about 50 m. W. by N. of Escanaba, in the S.W. part of the Upper Peninsula. Pop. (1900) 9242, of whom 4376 were foreign-born; (1904) 8585; (1910) 9216. It is served by the Chicago & North Western and the Chicago, Milwaukee & Saint Paul railways. The city is situated about 1 160 ft. above sea-level in an iron-mining district, and the mining of iron ore (especially at the Great Chapin Iron Mine) is its principal industry. Iron Mountain was settled in 1879, and was chartered in 1889.

IRONSIDES, a nickname given to one of great bravery, strength or endurance, particularly as exhibited in a soldier. In English history Ironside or Ironsides first appears as the name of Edmund II., king of the English. In the Great Rebellion it was first given by Prince Rupert to Cromwell, after the battle of Marston Moor in 1644 (see S. R. Gardiner's History of the Great Civil War, 1893, vol. ii. p. 1, and Mercurius civicus, September 19-26, 1644, quoted there). From

Cromwell it was transferred to the troopers of his cavalry, those "God-fearing men," raised and trained by him in an iron discipline, who were the main instrument of the parliamentary victories in the field. This (see S. R. Gardiner, op. cit. iv. 179) was first given at the raising of the siege of Pontefract 1648, but did not become general till later.

I RONTON, a city and the county-seat of Lawrence county, Ohio, U.S.A., on the Ohio river, about 142 m. E.S.E. of Cincinnati. Pop. (1890) 10,939; (iQ 00) 11,868, of whom 924 were negroes and 714 foreign-born; (1910 census) 13,147. It is served by the Chesapeake and Ohio, the Cincinnati, Hamilton and Dayton, the Norfolk and Western, and the Detroit, Toledo and Irontoit railways, and by river steamboats. The city is built on a plain at the base of hills rising from the river bottom and abounding in iron ore and bituminous coal; fire and pottery clay also occur in the vicinity. Besides mining, Iron ton has important lumber interests, considerable river traffic, and numerous manufactures, among which are iron, wire, nails, machinery, stoves, fire-brick, pressed brick, terra-cotta, cement, carriages and wagons, and furniture. The total value of its factory product in 1905 was $4,755,304; in 1900, $5,410,528. The municipality owns and operates its water-works. Ironton was first settled in 1848, and in 1851 was incorporated.

JRONW00D, a city of Gogebic county, Michigan, U.S.A., on the Montreal river, in the N.W. part of the upper peninsula. Pop. (1890) 7745; (1900) 9705, of whom 4615 were foreign-born; (1910 census) 12,821. It is served by the Chicago and North- western and the Wisconsin Central railways. The city is situated about 1500 ft. above sea-level in the Gogebic iron- district, and is principally a mining town; some of the largest iron mines in the United States are within the city limits. Ironwood was settled in 1884, and was chartered as a city in

1889.

IRON-WOOD, the name applied to several kinds of timber,

the produce of trees from different parts of the tropics, and

belonging to very different natural families. Usually the

I wood is extremely hard, dense and dark-coloured, and sink?

in water. Several species of Sideroxylon (Sapotaceae) yield iron-wood, Sideroxylon cinereum or Bojerianunt being the bois de fer blanc of Africa and Mauritius, and the name is also given to species of Metrosideros (Myrtaceae) and Diospyros (Ebenaceae).

West Indian iron-wood is the produce of Cdubrina reclinata (and C . ferruginosa {Rhamnaceae) , and of Aegiphila martinicensis V erbenaccae) . Ixora (Siderodendron) triflorum {Rubiaceae) is the bois defer of Martinique, and Zanthoxylum Pterota (Rutaceae) is the iron-wood of Jamaica, while Robinia Ponacoco {Legumi- nosae) is described as the iron-wood of Guiana. The iron-wood of India and Ceylon is the produce of Mesua ferrea (Gultiferae). The iron- wood tree of Pegu and Arracan is Xylia dolabriformis (Leguminosae), described as the most important timber-tree of Burma after teak, and known as pyingado. The endemic bois de fer of Mauritius, once frequent in the primeval woods, but now becoming very scarce, is Stadtmannia Sideroxylon (Sapindaceae), while Cossignya pinnata is known as the bois de fer de Judas. In Australia species of Acacia, Casuarina, Eucalyptus, Melaleuca, Myrtus, and other genera are known more or less widely as iron-wood. Tasmanian iron-wood is the produce of Notelaea ligustrina (Oleaceae), and is chiefly used for making ships' blocks. The iron-wood or lever-wood of North America is the timber of the American hop hornbeam, Ostrya virginica (Cupuliferae). In Brazil A puleia ferrea and Caesalpinia ferrea yield a kind of iron-wood, called, however, the Pao ferro or false iron-wood.

IRON-WORK, as an ornament in medieval architecture, is chiefly confined to the hinges, &c, of doors and of church chests, &c. Specimens of Norman iron-work are very rare. Early English specimens are numerous and very elaborate. In some instances not only do the hinges become a mass of scroll work, but the surface of the doors is covered by similar ornaments. In both these periods the design evidently partakes of the feeling exhibited in the stone or wood carving. In the Decorated period the scroll work is more graceful, and, like the foliage of the time, more natural. As styles progressed, there was a greater desire that the framing of the doors should be richer, and the ledges were chamfered or raised, then panelled, and at last the doors became a mass of scroll panelling. This, of course, interfered with the design of the hinges, the ornamentation of which gradually became unusual. In almost all styles the smaller and less important doors had merely plain strap-hinges, terminat- ing in a few bent scrolls, and latterly in fleurs-de-

lis. Escutcheon and ring handles, and the other furniture, partook more or less of the character of the time. On the continent of Europe the knockers are very elaborate. At all periods doors have been ornamented with nails having projecting heads, sometimes square, sometimes polygonal, and sometimes ornamented with roses. &c. The iron work of windows is generally plain, and the ornament confined to simple fleur-de-lis heads to the stanchions. For the iron-work of screens enclosing tombs and chapels see Grille; and generally see Metal-Work.

IRONY (Gr. tifXAivtia, from tlfxisv, one who says less than he means, tlpfiv, to speak), a form of speech in which the real meaning is concealed or contradicted by the words used; it is particularly employed for the purpose of ridicule, mockery or contempt, frequently taking the form of sarcastic phrase. The word is frequently used figuratively, especially in such phrases as " the irony of fate," of an issue or result that seems to contradict the previous state or condition. The Greek word was particularly used of an under-statement in the nature of dis- simulation. It is especially exemplified in the assumed ignorance which Socrates adopted as a method of dialectic, the " Socratic irony " (see Socrates). In tragedy, what is called " tragic irony " is a device for heightening the intensity of a dramatic situation. Its use is particularly characteristic of the drama of ancient Greece, owing to the familiarity of the spectators with the legends on which so many of the plays were based. In this form of irony the words and actions of the characters belie the real situation, which the spectators fully realize. It may take several forms; the character speaking may be con-

scious of the irony of his words while the rest of the actors may not, or he may be unconscious and the actors share the knowledge with the spectators, or the spectators may alone realize irony. The Oedipus Tyrannus of Sophocles is the classic example of tragic irony at its fullest and finest.

IROQUOIS, or Six Nations, a celebrated confederation of North American Indians. The name is that given them by the French. It is suggested that it was formed of two cere- monial words constantly used by the tribesmen, meaning " real adders," with the French addition of ois. The league was originally composed of five tribes or nations, viz. Mohawks, Oneidas, Onondagas, Senecas and Cayugas. The confederation probably took place towards the close of the 16th century and in 1722 the Tuscaroras were admitted, the league being then called that of " the Six Nations." At that time their total number was estimated at 11,650, including 2150 warriors. They were

unquestionably the most powerful confederation of Indians on the continent. Their home was the central and western parts of New York state. In the American War of Independence they fought on the English side, and in the repeated battles their power was nearly destroyed. They are now to the number of 17,000 or more scattered about on various reservations in New York state, Oklahoma, Wisconsin and Canada. The Iroquoian stock, the larger group of kindred tribes, of which the five nations were the most powerful, had their early home in the St Lawrence region. Besides the five nations, the Neutral nation, Huron, Erie, Conestoga, Nottoway, Meherrin, Tuscarora and Cherokee were the most important tribes of the stock. The hostility of the Algonquian tribes seems to have been the cause of the southward migration of the Iroquoian peoples. In 1535 Jacques Carrier found an Iroquoian tribe in possession of the land upon which now stand Montreal and Quebec; but seventy years later it was in the hands of Algon- quians.

See L. H. Morgan, League of the Hodeno Swanee or Iroquois (Rochester,N.Y.,i854) ; Handbook of American Indians (Washington, 1907). Also Indians, North American.

IRRAWADDY, or Irawadi, the principal river in the province of Burma, traversing the centre of the country, and practically running throughout its entire course in British territory. It is formed by the confluence of the Mali and N'mai rivers (usually called Mali-kha and N'mai-kha, the kha being the Kachin word for river) in 25 45′ N. The N'mai is the eastern branch. The definite position of its source is still uncertain, and it seems to be made up of a number of considerable streams, all rising within a short distance of each other in about 28 30′ N. It is shown on some maps as the Lu river of Tibet; but it is now quite certain that the Tibetan Lu river is the Salween, and that the N'mai has its source or sources near the southern boundary of Tibet, to the north-east or east of the source of the Mali. At the confluence the N'mai is larger than the Mali. The general width of its channel seems to be 350 or 400 yds. during this part of its course. In the rains this channel is filled up, but in the cold weather the average breadth is from 150 to 200 yds. The N'mai is practically unnavigable. The Mali is the western branch. Like the main river, it is called Nam Kiu by the Shans. It rises in the hills to the north of the Hkamti country, probably in about 28° 30′ N. Between Hkamti and the country compara- tively close to the confluence little or nothing is known of it, but it seems to run in a narrow channel through continuous hills. The highest point on the Mali reached from the south by Major Hobday in 1891 was Ting Sa, a village a little off the river, in 26 15′ N. About 1 m. above the

confluence it is 150 yds. wide in January and 17 ft. deep, with a current of 3} m. an hour. Steam launches can only ascend from Myitkyina to the confluence in the height of the rains. Native boats ascend to Laikaw or Sawan 26 2′ N., all the year around, but can get no farther at any season. From the confluence the river flows in a southerly direction as far as Bhamo, then turns west as far as the confluence of the Kaukkwe stream, a little above Katha, where it again turns in a southerly direction, and maintains this in its general course through Upper and

Lower Burma, though it is somewhat tortuous immediately below Mandalay. Just below the confluence of the Mali and N'mai rivers the Irrawaddy is from 420 to 450 yds. wide and about 30 ft. deep in January at its deepest point. Here it flows between hills, and after passing the Manse and Mawkan rapids, reaches plain country and expands to nearly. 500 yds. at Sakap. At Myitkyina it is split into two channels by Naung- talaw island, the western channel being 600 yds. wide and the eastern 200. The latter is quite dry in the hot season. At Kat-kyo, 5 or 6 m. below Myitkyina, the width is 1000 yds and below this it varies from 600 yds. to f m. at different points. Three miles below Sinbo the third defile is entered by a channel not more than 50 yds. wide, and below this, throughout the defile, it is never wider than 250 yds., and averages about 100. At the ' Gates of the Irrawaddy " at Poshaw two prism-shaped rocks narrow the river to S o yds., and the water banks up in the middle with a whirlpool on each side of the raised pathway All navigation ceases here in the floods. The defile ends at Hpatin, and below this the river widens out to a wet-season channel of 2 m., and a breadth in the dry season of about 1 m. At Sinkan, below Bhamo, the second defile begins. It is not so narrow nor is the current so strong as in the third defile. The narrowest place is more than 100 yds. wide. The hills are higher, but the defile is much shorter. At Shwegu the river leaves the hills and becomes a broad stream, flowing through a wide plain. The first defile is tame compared with the others. The river merely flows between low hills or high wooded banks. The banks are covered at this point with dense vegetation and slope down to the water's edge. Here and there are places which are almost perpendicular, but are covered with forest growth. The course of the Irrawaddy after receiving the waters of the Myit-nge at Sagaing, as far as 17° N. lat., is exceedingly tortuous; the line of Lower Burma is crossed in io° 29′ 3″ N. lat., 9S° 15′ E. long., the breadth of the river here being J m.;

about n m. lower down it is nearly 3 m. broad. At Akauk- taung, where a spur of the Arakan hills end in a precipice 300 ft. high, the river enters the delta, the hills giving place to low alluvial plains, now protected on the west by embank- ments. From 17 N. lat. the Irrawaddy divides and subdivides, converting the lower portion of its valley into a network of intercommunicating tidal creeks. It reaches the sea in 15 50′ N. lat. and 95° 8′ E. long., by nine principal mouths. The only ones used by sea-going ships are the Bassein and Rangoon mouths. The area of the catchment basin of the Irrawaddy is 158,000 sq. m.; its total length from its known source to the sea is about 1300 m. As far down as Akauk-taung in Henzada district us bed is rocky, but below this sandy and muddy. It is full of islands and sandbanks; its waters are extremely muddy, and the mud is carried far out to sea. The river com- mences to rise in March; about June it rises rapidly, and attains its maximum height about September. The total flood discharge is between four and five hundred million metre tons of 37 cub. ft. From Mandalay up to Bhamo the river is navigable a distance of nearly 1000 m. for large steamers all the year round; but small launches and steamers with weak engines are often unable to get up the second defile in the months of July, August and September, owing to the strong current. The Irrawaddy Flotilla Company's steamers go up and down twice a week all through the rains, and the mails are carried to Bhamo on intermediate days by a ferry-boat from the railway terminus at Katha. During the dry season the larger boats are always liable to run on sandbanks, more especially in November and December, when new channels are forming after the river has been in flood! From Bhamo up to Sinbo no steamers can ply during the rains, that is to say, usually from June to November. From Novem- ber to June small steamers can pass through the third defile from Bhamo to Sinbo. Between Sinbo and Myitkyina small launches can run all the year round. Aboye Myitkyina small steamers can reach the confluenceˆ at the height of the flood with some difficulty, but when the water is lower they cannot pass the Mawkan rapid, just above Mawme, and the navigation of the river above Myitkyina is always difficult. The journey

*from Bhamo to Sinbo can be made during the rains in native boats, but it is always difficult and sometimes dangerous. It is never done in less than five days and often takes twelve or more. As a natural source of irrigation the value of the Irrawaddy is enormous, but the river supplies no artificial systems of irrigation. It is nowhere bridged, though crossed by two steam ferries to connect the railway system on either bank. (t r- c *

IRREDENTISTS, an Italian patriotic and political' party which was of importance in the last quarter of the 19th century". The name was formed from the words Italia Irredenta— Un- redeemed Italy— and the party had for its avowed object tin emancipation of all Italian lands still subject to foreign rule The Irredentists took language as the test of the alleged Italian nationality of the countries they proposed to emancipate, which were South Tirol (Trentino), Gorz, Istria, Trieste, Tessino, Nice, Corsica and Malta. The test was applied in the most arbitrary manner, and in some cases was not applicable at all Italian is not universally spoken in South Tirol, Gorz or Istria Malta has a dialect of its own though Italian is used for literary and judicial purposes, while Dalmatia is thoroughly non-Italian though it was once under the political dominion of the ancient Republic of Venice. The party was of little note before 1878. In that year it sprang into prominence because the Italians were disappointed by the result of the conference at Berlin summoned to make a European settlement after the Russo-Turkish War of 1877. The Italians had hoped to share in the plunder of Turkey, but they gained nothing, while Austria was endowed with the protectorate of Bosnia, and the Herzegovina, the vitally important hinterland of her possessions on the Adriatic. Under the sting of this disappointment the cry of Italia Irredenta became for a time loud and apparently popular. It was in fact directed almost wholly against Austria, and was also used as a stalking-horse by discontented parties in Italian domestic politics— the Radicals, Republicans and Socialists. In addition to the overworked argument from language, the Irredentists made much of an unfounded claim that the Trentino had been conquered by Giuseppe Garibaldi during the war of 1866 and they insisted that the district was an " enclave " in Italian territory which would give Austria a dangerous advantage in a war of aggression. It would be equally easy and no less accurate to call the Trentino an exposed and weak spot of the frontier of Austria. On the 21st of July 1878 a noisy public meeting was held at Rome with Menotti Garibaldi, the son of the famous Giuseppe, in the chair, and a clamour was raised for the formation of volunteer battalions to conquer the Trentino. Signor Cairoli then prime minister of Italy, treated the agitation with tolerance' It was, however, mainly superficial, for the mass of the Italians had no wish to launch on a dangerous policy of adventure against Austria, and still less to attack France for the sake of Nice and Corsica, or Great Britain for Malta. The only practical con- sequences of the Irredentist agitation outside of Italy were such things as the assassination plot organized against the emperor Francis Joseph in Trieste in 1882 by Oberdank, which was detected and punished. When the Irredentist movement became

troublesome to Italy through the activity of Republicans and Socialists, it was subject to effective police control by Signor Depretis. It sank into insignificance when the French occupation of Tunis in 1881 offended the Italians deeply, and their government entered into those relations with Austria and Germany which took shape by the formation of the Triple Alliance. In its final stages it provided a way in which Italian- who sympathized with French republicanism, and who disliked the monarchical governments of Central Europe, could agitate against* their own government. It also manifested itself ir. periodical war scares based on affected fears of Austrian aggres- sion in northern Italy. Within the dominions of Austria Irre- dentism has been one form of the complicated language question which has disturbed every portion of the Austro-Hungarian empire.*

See Colonel von Haymerle, Italicae res (Vienna, 1879) for the' early history of the Irredentists.

IRRIGATION

841

IRRIGATION (Lat. in, and rigare, to water or wet), the artificial application of water to land in order to promote vegeta- tion; it is therefore the converse of " drainage " (q.v.), which is the artificial withdrawal of water from lands that are over- saturated. In both cases the object is to promote vegetation.

I. General. — Where there is abundance of rainfall, and when it falls at the required season, there is in general no need for irrigation. But it often happens that, although there is sufficient rainfall to raise an inferior crop, there is not enough to raise a more valuable one.

Irrigation is an art that has been practised from very early times. Year after year fresh discoveries are made that carry back our knowledge of the early history of Egypt. It is certain that, until the cultivator availed himself of the natural overflow of the Nile to saturate the soil, Egypt must have been a desert, and it is a very small step from that to baling up the water from the river and pouring it over lands which the natural flood has not touched. The sculptures and paintings of ancient Egypt bear no trace of anything approaching scientific irrigation, but they often show the peasant baling up the water at least as early as 2000 B.C. By means of this simple plan of raising water and pouring it over the fields thousands of acres are watered every year in India, and the system has many

advantages in the eyes of the peasant. Though there is great waste of labour, he can apply his labour when he likes; no permission is required from a government official; no one has to be bribed. The simplest and earliest form of water-raising machinery is the pole with a bucket suspended from one end of a crossbeam and a counterpoise at the other. In India this is known as the dcnkli or paccotlah; in Egypt it is called the shaduf. All along the Nile banks from morning to night may be seen brown-skinned peasants working these shadHjs, tier above tier, so as to raise the water 15 or 16 ft. on to their lands. With a shadiif it is only possible to keep about 4 acres watered, so that a great number of hands are required to irrigate a large surface. Another method largely used is the shallow basket or bucket suspended to strings between two men, who thus bail up the water. A step higher than these is the rude water-wheel, with earthen pots on an endless chain running round it, worked by one or two bullocks. This is used everywhere in Egypt, where it is known as the stikya. In Northern India it is termed the harat, or Persian wheel. With one such water-wheel a pair of oxen can raise water any height up to 18 ft., and keep from 5 to 12 acres irrigated throughout an Egyptian summer. A very familiar means in India of raising water from wells in places where the spring level is as much sometimes as 100 ft. below the surface of the field is the churras, or large leather bag, suspended to a rope passing over a pulley, and raised by a pair of bullocks which go up and down a slope as long as the depth of the well. All these primitive contrivances are still in full use throughout India.

It is not improbable that Assyria and Babylon, with their splendid rivers, the Euphrates and Tigris, may have taken the idea from the Nile, and that Carthage and Phoenicia as well as Greece and Italy may have followed the same example. In spite of a certain amount of investigation, the early history of irrigation in Persia and China remains imperfectly known. In Spain irrigation may be traced directly to the Moorish occupation, and almost everywhere throughout Asia and Africa where the Moslem penetrated is to be found some knowledge of irrigation. Reservoirs are familiar everywhere for the water-supply of towns, but as the volume necessary, even for a large town, does not go far in irrigating land, many sites which would do admirably for the former would not contain water sufficient to be worth applying to the latter purpose. In the Mediterranean provinces of Spain there are some very remarkable irrigation dams. The great masonry dam of Alicante on the river Monegre, which dates from 1579, is situated in a narrow gorge, so that while 140 ft. high, it is only 190 ft. long at the crest. The

reservoir is said to contain 130 million cub. ft. of water, and to serve for the irrigation of 9000 acres, but unless it refills several times a year, it is hardly possible that so much land can be watered in any one season. The Elche reservoir,

India.

Spain.

in the same province, has a similar dam 55 ft. high. In neither case is there a waste-weir, the surplus water being allowed to pour over the crest of the dam. South of Elche is the province of Murcia, watered by the river Segura, on which there is a dam 25 ft. high, said to be 800 years old, and to serve for the irrigation of 25,000 act s. The Lorca dam in the same neighbourhood irrigates 27,000 acres. In the jungles of Ceylon are to be found remains of gigantic irrigation dams, and on the neighbouring mainland of Southern India, throughout the provinces of Madras and Mysore, the country is covered with irrigation reservoirs, or, as they are locally termed, tanks. These vary from village ponds to lakes 14 or 15 m. long. Most of them are of old nafive construction, but they have been greatly improved and enlarged within the last half century. The casual traveller in southern India constantly remarks the ruins of old dams, and the impression is conveyed that at one time, before British rule prevailed, the irrigation of the country was much more perfect than it is now. That idea, however, is mistaken. An irrigation reservoir, like a human being, has a certain life. Quicker or slower, the water that fills it will was h in sand and mud, and year by year this process will go on till ultimately the whole reservoir is filled up. The embankment is raised, and raised again, but at last it is better to abandon it and make a new tank elsewhere, for it would never pay to dig out the silt by manual labour. It may safely be said that at no time in history were there more tanks in operation than at present. The ruins which are seen are the ruins of long centuries of tanks that once flourished and became silted up. But they did not all flourish at once.

In the countries now being considered, the test of an irrigation work is how it serves in a season of drought and famine. It is evident that if there is a long cessation of rain, there can be none to fill the reservoirs. In September 1877 there were very few in all southern India that were not dry. But even so, they helped to shorten the famine period; they stored up the rain after it had ceased to fall, and they caught up and husbanded the first drops when it began again.

Irrigation effected by river-fed canals naturally depends on the regimen of the rivers. Some rivers vary much in their discharge at different seasons. In some cases this variation is comparatively little. Sometimes the flood canals. season recurs regularly at the same time of the year; sometimes it is uncertain. In some rivers the water is generally pure; in others it is highly charged with fertilizing alluvium, or, it may be, with barren silt. In countries nearly rainless, such as Egypt or Sind, there can be no cultivation without irrigation. Elsewhere the rainfall may be sufficient for ordinary crops, but not for the more valuable kinds. In ordinary years in southern India the maize and the millet, which form so large a portion of the peasants' food, can be raised without irrigation, but it is required for the more valuable rice or sugar-cane. Elsewhere in India the rainfall is usually sufficient for all the cultivation of the district, but about every eleven years comes a season of drought, during which canal water is so precious as to make it worth while to construct costly canals merely to serve as a protection against famine. When a river partakes of the nature of a torrent, dwindling to a paltry stream at one season anil swelling into an enormous flood at another, it is impossible to construct a system of irrigation canals without very costly engineering works, sluices, dams, waste-weirs, &c, so as to giw the engineer entire control of the water. Such may be seen on the canals of Cuttack, derived from the Mahanadi,a river of which the discharge does not exceed 400 cub. ft. per second in the dry season, and rises to 1,600,000 cub. ft. per second in the. rainy season.

Very differently situated are the great canals of Lombardy, drawn from theTicino and Adda rivers, flowing from the Maggiore and Como lakes. The severest drought never exhausts these reservoirs, and the heaviest rain can never convert these rivers into the resistless floods which they would be but for the moderat- ing influence of the great lakes. The Ticino and Adda do not rise in floods more than 6 or 7 ft. above their ordinary level.

or fall in droughts more than 4 or 5 ft. below it, and their water is at all seasons very free from silt or mud. Irrigation cannot be practised in more favourable circumstances than these. The great lakes of Central Africa, Victoria and Albert Nyanza, and the vast swamp tract of the Sudan, do for the Nile on a gigantic scale what Lakes Maggiore and Como do for the rivers Ticino and Adda. But for these great reservoirs the Nile would decrease in summer to quite an

insignificant stream. India possesses no great lakes from which to draw rivers and canals, but through the plains of northern India flow rivers which are fed from the glaciers of the Himalaya; and the Ganges, the Indus, and their tributaries are thus prevented from diminishing very much in volume. The greater the heat, the more rapidly melts the ice, and the larger the quantity of water available for irrigation. The canal system of northern India is the most perfect the world has yet seen, and contains works of hydraulic engineering which can be equalled in no other country. In the deltas of southern India irrigation is only practised during the monsoon season. The Godaveri, Kistna and Kaveri all take their rise on the Western Ghats, a region where the rainfall is never known to fail in the monsoon season. Across the apex of the deltas are built great weirs (that of the Godaveri being 2ˆ m. long), at the ends and centre of which is a system of sluices feeding a network of canals. For this monsoon irrigation there is always abundance of water, and so long as the canals and sluices are kept in repair, there is little trouble in distributing it over the fields. Similar in character was the ancient irrigation of Egypt practised merely during the Nile flood— a system which still prevails in part of Upper Egypt. A detailed description of it will be found below.

Where irrigation is carried on throughout the whole year,

even when the supply of the river is at its lowest, the distribution

of the water becomes a very delicate operation. It

Distribu- j s generally considered sufficient in such cases if during Hon of the ° J . . , , , , °

water. an y one crop one-third of the area that can be com- manded is actually supplied with water. This encourages a rotation of crops and enables the precious liquid to be carried over a larger area than could be done otherwise. It becomes then the duty of the engineer in charge to use every effort to get its full value out of every cubic foot of water. Some crops of course require water much oftener than others, and much depends on the temperature at the time of irrigation. During the winter months in northern India magnificent wheat crops can be produced that have been watered only twice or thrice. But to keep sugar-cane, or indigo, or cotton alive in summer before the monsoon sets in in India or the Nile rises in Egypt the field should be watered every ten days or fortnight, while rice requires a constant supply of water passing over it.

Experience in these sub-tropical countries shows the absolute necessity of having, for successful irrigation, also a system of thorough drainage. It was some time before this was discovered in India, and the result has been the deterioration of much good land.

In Egypt, prior to the British occupation in 1883, no attempt had been made to take the water off the land. The first impres- sion of a great alluvial plain is that it is absolutely flat, with no drainage at all. Closer examination, however, shows that if the prevailing slopes are not more than a few inches in the mile, yet they do exist, and scientific irrigation requires that the canals should be taken along the crests and drains along the hollows. In the diagram (fig. 1) is shown to the right of the river a system of canals branching out and afterwards rejoining one another so as to allow of no means for the water that passes off the field to escape into the sea. Hence it must either evaporate or sink into the soil. Now nearly all rivers contain some small percentage of salt, which forms a distinct ingredient in alluvial plains. The result of this drainless irrigation is an efflorescence of salt on the surface of the field. The spring level rises, so that water can be reached by digging only a few feet, and the land, soured and water-logged, relapses into barrenness. Of this description was the irrigation of Lower Egypt previous to 1883. To the left of the diagram is shown (by firm lines) a system of canals

laid out scientifically, and of drains (by dotted lines) flowing between them. It is the effort of the British engineers in Egypt to remodel the surface of the fields to this type.

Further information may be found in Sir C. C. Scott-Moncrieff, Irrigation in Southern Europe (London, 1868) ; Moncrieff, " Lectures on Irrigation in Egypt," Professional Papers of the Corps of Royal Engineers, vol. xix. (London, 1893); W. Willcocks, Egyptian Irriga- tion (2nd ed., London, 1899).

II. Water Meadows. — Nowhere in England can it be said that irrigation is necessary to ordinary agriculture, but it is occasion- ally employed in stimulating the growth of grass and meadow herbage in what are known as water-meadows. These are in some instances of very early origin. On the Avon in Wiltshire and the Churn in Gloucestershire they may be traced back to Roman times. This irrigation is not practised in the drought of summer, but in the coldest and wettest months of the year,

Sea

.Irrigation disGributaiy Canals. .firaina/pe lines.

Fig. I. — Diagram showing irrigation properly combined with drainage (to left), and laid out regardless of drainage required later (to right).

the water employed being warmer than the natural moisture of the soil and proving a valuable protection against frost.

Before the systematic conversion of a tract into water-meadows can be safely determined on, care must be taken to have good drainage, natural or artificial, a sufficient supply of water, and water of good quality. It might indeed have been thought that thorough drainage would be unnecessary, but it must be noted that porous subsoils or efficient drains do not act merely by carrying away stagnant water which would otherwise cool the earth, incrust.the surface, and retard plant growth. They cause the soil to perform the office of a filter. Thus the earth and the roots of grasses absorb the useful matters not only from the water that passes over it, but from that which passes through it. These fertilizing materials are found stored up in the soil ready for the use of the roots of the plants. Stagnation of water is inimical to the action of the roots, and does away with the advantageous processes of flowing and percolating currents. Some of the best water-meadows in England have but a thin soil resting on gravel and flints, this constituting a most effectual system of natural drainage. The fall of the water supply must suffice for a fairly rapid current, say 10 in. or 1 ft. in from 100 to

Quantity of water.

200 yds. If possible the water should be taken so far above the meadows as to have sufficient fall without damming up the river. If a dam be absolutely necessary, care must be taken so to build it as to secure the fields on both sides from possible inundation; and it should be constructed substantially, for the cost of repair- ing accidents to a weak dam is very serious.

Even were the objects of irrigation always identical, the condi- tions under which it is carried on are so variable as to preclude calculations of quantity. Mere making up of necessary water in droughty seasons is one thing, protection against frost is another, while the addition of soil material is a third. Amongst causes of

variation in the quantity of water needed will be its quality and temperature and rate of flow, the climate, the season, the soil, the subsoil, the artificial drainage, the slope, the aspect and the crop. In actual practice the amount of water varies from 300 gallons per acre in the hour to no less than 28,000 gallons. Where water is used, as in dry and hot countries, simply as water, less is generally needed than in cold, damp and northerly climates, where the higher tempera- ture and the action of the water as manure are of more con- sequence. But it is necessary to be thoroughly assured of a good supply of water before laying out a water-meadow. Except in a few places where unusual dryness of soil and climate indicate the employment of water, even in small quantity, merely to avoid the consequences of drought, irrigation works are not to be commenced upon a large area, if only a part can ever be efficiently watered. The engineer must not decide upon the plan till he has gauged at different seasons the stream which has to supply the water, and has ascertained the rain-collecting area available, and the rainfall of the district, as well as the proportion of storable to percolating and evaporating water. Reservoirs for storage, or for equalizing the flow, are rarely resorted to in England; but they are of absolute necessity in those countries in which it is just when there is least water that it is most wanted. It is by no means an injudicious plan before laying out a system of water-meadows, which is intended to be at all extensive, to prepare a small trial plot, to aid in determining a number of questions relating to the nature and quantity of the water, the porosity of the soil, &c.

The quality of the water employed for any of the purposes of irrigation is of much importance. Its dissolved and its sus- pended matters must both be taken into account. Clear water ° water is usually preferable for grass land, thick for arable land. If it is to be used for warping, or in any way for adding to the solid material of the irrigated land, then the nature and amount of the suspended material are necessarily of more importance than the character of the dissolved substances, provided the latter are not positively injurious. For use on ordinary water-meadows, however, not only is very clear water often found to be perfectly efficient, but water having no more than a few grains of dissolved matter per gallon answers the purposes in view satisfactorily. Water from moors and peat- bogs or from gravel or ferruginous sandstone is generally of small utility so far as plant food is concerned. River water, especially that which has received town sewage, or the drainage of highly manured land, would naturally be considered most suitable for irrigation, but excellent results are obtained also with waters which

are uncontaminated with manurial matters, and which contain but 8 or 10 grains per gallon of the usual dissolved constituents of spring water. Experienced English irrigators generally commend as suitable for water-meadows those streams in which fish and waterweeds abound. But the particular plants present in or near the water-supply afford further indications of quality. Water-cress, sweet flag, flowering rush, several potamogetons, water milfoil, water ranunculus, and the reedy sweet watergrass (Glyceria aquatica) rank amongst the criteria of excellence. Less favourable signs are furnished by such plants as Arundo Donax (in Germany), Cicuta virosa and Typha latifolia, which are found in stagnant and torpid waters. Water when it has been used for irrigation generally becomes of less value for the same purpose. This occurs with clear water as well as with turbid, and obviously arises mainly from the

loss of plant food which occurs when water filters through or trickles over poor soil. By passing over or through rich soil the water may, however, actually be enriched, just as clear water passed through a charcoal filter which has been long used becomes impure. It has been contended that irrigation water suffers no change in composition by use, since by evapora- tion of a part of the pure water the dissolved matters in the remainder would be so increased as to make up for any matters removed. But it is forgotten that both tˆ« plant and the soil enjoy special powers of selective absorption, which remove and fix the better constituents of the water and leave the less valuable.

Of the few leguminous plants which are in any degree suitable for water-meadows, Lotus comiculatus major, Trifolium hybridum, and T. pratense are those which generally flourish best; T. repens is less successful. Amongst grasses See , /or the highest place must be assigned to ryegrass, especially meadows. to the Italian variety, commonly called Lolium italicum. The mixture of seeds for sowing a water-meadow demands much consideration, and must be modified according to local circumstances of soil, aspect, climate and drainage. From the peculiar use which is made of the produce of an irrigated meadow, and from the conditions to which it is subjected, it is necessary to include in our mixture of seeds some that produce an early crop, some that give an abundant growth, and some that impart sweetness and good flavour, while all the kinds sown must be capable of flourishing on irrigated soil.*

The following mixtures of seeds (stated in pounds per acre) have been recommended for sowing on water-meadows, Messrs Sutton of Reading, after considerable experience, regarding No. I. as the more suitable:

1.

11.

Lolium perenne .

. 8

12

Lolium italicum .

.

8

Poa trivialis .

. 6

3

Glyceria fluitans .

. 6

2

Glyceria aquatica .

• 4

1

Agrostis alba .

.

1

Agrostis stolonifera .

. 6

2

Alopecurus pratensis

.

2

Festuca elatior

• 3

2

I. II.

Festuca pratensis . Festuca loliacea Anlhoxanthum odoratum Phleum pratense . Phalaris arundinacea Lotus comiculatus major Trifolium hybridum . Trifolium pratense

In irrigated meadows, though in a less degree than on sewaged land, the reduction of the amount or even the actual suppression of certain species of plants is occasionally well marked. changes Sometimes this action is exerted upon the finer grasses, m irri- but happily also upon some of the less profitable gated constituents of the miscellaneous herbage. Thus herbage. Ranunculus bulbosus has been observed to become quite rare after a few years' watering of a meadow in which it had been most abundant, R. acris rather increasing by the same treatment ; Plantago media was extinguished and P. lanceolata reduced 70%. Amongst the grasses which may be spared, Aira caes-pitosa, Briza media and Cynosurus cristatus are generally much reduced by irrigation. Useful grasses which are increased are Lolium perenne and Alopecurus pratensis, and among those of less value Avenafavescens, Dactylis glomerata and Poa pratensis.

Four ways of irrigating land with water are practised in England: (1) bedwork irrigation, which is the most efficient although it is also the most costly method by which currents of water can be applied to level land; (2) catchwork irrigation, in which the same water is caught and used repeatedly; (3) subterraneous or rather upward irrigation, in which the water in the drains is sent upwards through the soil towards the surface; and (4) warping, in which the water is allowed to stand over a level field until it has deposited the mud suspended in it.

There are two things to be attended to most carefully in the construction of a water-meadow on the first or second of these plans. First, no portion of them whatever should be on a dead level, but every part should belong to one or other of a series of true inclined planes. The second point of primary importance is the size and slope

of the main conductor, which brings the water from the river to the meadow. The size of this depends

Methods.

upon the quantity of water required, but whatever its size its bottom at its origin should be as low as the bed of the river, in order that it may carry down as much as possible of the river mud. Its course should be as straight and as near a true inclined plane as possible. The stuff taken out of the conductor should be employed in making up its banks or correcting inequalities in the meadow.

In bed work irrigation, which is eminently applicable to level ground, the ground is thrown into beds or ridges. Here the con- Bed ork ductor should be led along the highest end or side of the w ‘ meadow in an inclined plane; should it terminate in the meadow, its end should be made to taper when there are no feeders, or to terminate in a feeder. The main drain to carry off the water from the meadow should next be formed. It should be cut in the lowest part of the ground at the lower end or side of the meadow. Its dimensions should be capable of carrying off the whole water used so quickly as to prevent the least stagnation, and discharge it into the river. The next process is the forming of the ground in- tended for a water-meadow into beds or ridges. That portion of the ground which is to be watered by one conductor should be made into beds to suit the circumstances of that conductor; that is, instead of the beds over the meadow being all reduced to one common level, they should be formed to suit the different swells in the ground, and, should any of these swells be considerable, it will be necessary to give each side of them its respective conductor. The beds should run at or nearly at right angles to the line of the conductor. The breadth of the beds is regulated by the nature of the soil and the supply of water. Tenacious soils and subsoils, with a small supply of water, require beds as narrow as 30 ft. Porous soils and a large supply of water may have beds of 40 ft. The length of the beds is regulated by the supply of water and the fall from the conductor to the main drain. If the beds fall only in one direction longitudinally, their crowns should be made in the middle; but, should they fall laterally as well as longitudinally, as is usually the case, then the crowns should be made towards the upper sides, more or less ac- cording to the lateral slope of the ground. The crowns should rise 1 ft. above the adjoining furrows. The beds thus

formed should slope in an inclined plane from the conductor to the main drain, that the water may flow equably over them.

The beds are watered by " feeders," that is, channels gradually tapering to the lower extremities, and their crowns cut down, wherever these are placed. The depth of the feeders depends on their width, and the width on their length. A bed 200 yds. in length requires a feeder of 20 in. in width at its junction with the conductor, and it should taper gradually to the extremity, which should be I ft. in width. The taper retards the motion of the water, which con- stantly decreases by overflow as it proceeds, whilst it continues to fill the feeder to the brim. The water overflowing from the feeders down the sides of the beds is received into small drains formed in the furrows between the beds. These small drains discharge themselves into the main drain, and are in every respect the reverse of the feeders. The depth of the small drain at the junction is made about as great as that of the main drain, and it gradually lessens towards the taper to 6 in. in tenacious and to less in porous soils. The depth of the feeders is the same in relation to the conductor. For the more equal distribution of the water over the surface of the beds from the conductor and feeders, small masses, such as stones or solid portions of earth or turf fastened with pins, are placed in them, in order to retard the momentum which the water may have acquired. These " stops," as they are termed, are generally placed at regular intervals, or rather they should be left where any inequality of the current is observed. Heaps of stones answer very well for stops in the con- ductor, particularly immediately below the points of junction with the feeders. The small or main drains require no stops. The descent of the water in the feeders will no doubt necessarily increase in rapidity, but the inclination of the beds and the tapering of the feeders should be so adjusted as to counteract the increasing rapidity. The distribution of the water over the whole meadow is regulated by the sluices, which should be placed at the origin of every conductor. By means of these sluices any portion of the meadow that is desired can be watered, whilst the rest remains dry; and alternate watering must be adopted when there is a scarcity of water. All the sluices should be substantially built at first with stones and mortar, to prevent the leakage of water; for, should water from a leak be permitted to find its way into the meadow, that portion of it will stagnate and produce coarse grasses. In a well-formed water-meadow it is as necessary to keep it perfectly dry at one time as it is to place it under water at another. A small sluice placed in the side of the conductor opposite to the meadow, and at the upper end of it, will drain away the leakage that may have escaped from the head

sluice.

To obtain a complete water-meadow, the ground will often require to be broken up and remodelled. This will no doubt be attended with cost; but it should be considered that the first cost is the least, and remodelling the only way of having a complete water- meadow which will continue for years to give satisfaction. To effect a remodelling when the ground is in stubble, let it be ploughed up, harrowed, and cleaned as in a summer fallow, the levelling-box

employed when required, the stuff from the conductors and main drains spread abroad, and the beds ploughed into shape — all operations that can be performed at little expense. The meadow should be ready by August for sowing with one of the mixtures of grass-seeds already given. But though this plan is ultimately better, it is attended with the one great disadvantage that the soft ground cannot be irrigated for two or three years after it is sown with grass-seeds. This can only be avoided where the ground is covered with old turf which will bear to be lifted. On ground in that state a water-meadow may be most perfectly formed. Let the turf be taken off with the spade, and laid carefully aside for relaying. Let the stript ground then be neatly formed with the spade and barrow, into beds varying in breadth and shape according to the nature of the soil and the dip of the ground — the feeders from the conductor and the small drains to the main drain being formed at the same time. Then let the turf be laid down again and beaten firm, when the meadow will be complete at once, and ready for irrigation. This is the most beautiful and most expeditious method of making a complete water-meadow where the ground is not natur- ally sufficiently level to begin with.

The water should be let on, and trial made of the work, whenever it is finished, and the motion of the water regulated by the intro- duction of a stop in the conductors and feeders where a change in the motion of the current is observed, beginning at the upper end of the meadow. Should the work be finished as directed by August, a good crop of hay may be reaped in the succeeding summer. There are few pieces of land where the natural descent of the ground will not admit of the water being collected a second time, and applied to the irrigation of a second and lower meadow. In such a case the main drain of a watered meadow may form the conductor of the one to be watered, or a new conductor may be formed by a prolongation of the main drain; but either expedient is only advisable where water is scarce. Where it is plentiful, it is better to supply the second meadow directly from the river, or by a continuation of the first main conductor.

In the ordinary catch work water-meadow, the water is used over and over again. On the steep sides of valleys the plan is easily and cheaply carried out, and where the whole course of the catch-

water is not long the peculiar properties which give it WO rk

value, though lessened, are not exhausted when it reaches that part of the meadow which it irrigates last. The design of any piece of catchwork will vary with local conditions, but generally it may be stated that it consists in putting each conduit save the first to the double use of a feeder or distributor and of a drain or collector. In upward or subterranean irrigation the water used rises upward through the soil, and is that which under ordinary circumstances would be carried off by the drains. The system has .. .

received considerable development in Germany, where the s „2L r . ° elaborate method invented by Petersen is recommended ranean by many agricultural authorities. In this system the well-fitting earthenware drain-pipes arje furnished at intervals with vertical shafts terminating at the surface of the ground in movable caps. Beneath each cap, and near the upper end of the shaft, are a number of vertical slits through which the drainage water which rises passes out into the conduit or trench from which the irrigating streams originate. In the vertical shaft there is first of all a grating which intercepts solid matters, and then, lower down, a central valve which can be opened and closed at pleasure from the top of the shaft. In the ordinary English system of upward or drainage irrigation, ditches are dug all round the field. They act the part of conductors when the land is to be flooded, and of main drains when it is to be laid dry. The water flows from the ditches as conductors into built conduits formed at right angles to them in parallel lines through the fields; it rises upwards in them as high as the surface of the ground, and again subsides through the soil and the conduits into the ditches as main drains, and thence it passes at a lower level either into a stream or other suitable outfall. The ditches may be filled in one or other of several different ways. The water may be drainage-water from lands at a higher level; or it may be water from a neighbouring river; or it may be drainage- water accumulated from a. farm and pumped up to the necessary level. But it may also be the drainage-water of the field itself. In this case the mouths of the underground main pipe-drains are stopped up, and the water in them and the secondary drains thus caused to stand back until it has risen sufficiently near the surface. Of course it is necessary to build the mouths of such main drains of very solid masonry, and to construct efficient sluices for the re-tention of the water in the drains. Irrigation of the kind now under

discussion may be practised wherever a command of water can be secured, but the ground must be level. It has been success- fully employed in recently drained morasses, which are apt to become too dry in summer. It is suitable for stiffish soils where the subsoil is fairly open, but is less successful in sand. _ The water used may be turbid or clear, and it acts, not only for moistening the soil, but as manure. For if, as is commonly the case, the water em- ployed be drainage-water from cultivated lands, it is sure to contain a considerable quantity of nitrates, which, not being subject to retention by the soil, would otherwise escape. These coming into contact with the roots of plants during their season of active growth, are utilized as direct nourishment for the vegetation. It is necessary

in upward or subterranean irrigation to send the water on and to take it off very gently, in order to avoid the displacement and loss of the finer particles of the soil which a forcible current would cause.

In warping the suspended solid matters are of importance, not merely for any value they may have as manure, but also as a material Warolaz Edition to the ground to be irrigated. The warping which is practised in England is almost exclusively confined to the overflowing of level ground within tide mark, and is conducted mostly within the districts commanded by estuaries or tidal rivers. The best notion of the process of warping may be gained by sailing up the Trent from the Humber to Gainsborough. Here the banks of the river were constructed centuries ago to protect the land within them from the encroachments of the tide. A great tract of country was thus laid comparatively dry. But while the wisdom of one age thus succeeded in restricting within bounds the tidal water of the ,'iver, it was left to the greater wisdom of a succeeding age to improve upon this arrangement by admitting these muddy waters to lay a fresh coat of rich silt on the exhausted soils. The process began more than a century ago, but has become a system in recent times. Large sluices of stone, with strong doors, to be shut when it is wished to exclude the tide, may be seen on both banks of the river, and from these greet conduits are carried miles inward through the flat country to the point previously prepared by embankment over which the muddy waters are allowed to spread. These main conduits, being very costly, are constructed for the warping of large adjoining districts,- and openings are made at such points as are then under- going the operation. The mud is deposited and the waters return with the

falling tide to the bed of the river. Spring-tides are pre- ferred, and so great is the quantity of mud in these rivers that from 10 to 15 acres have been known to be covered with silt from 1 to 3 ft. in thickness during one spring of ten or twelve tides. Peat-moss of the most sterile character has been by this process covered with soil of the greatest fertility, and swamps which used to be resorted to for leeches are now, by the effects of warping, converted into firm and fertile fields. The art is now so well understood that, by careful attent ion to the currents, the expert warp farmer can temper his soil as he pleases. When the tide is first admitted the heavier particles, which are pure sand, are first deposited; the second deposit is a mixture of sand and fine rnud, which, from its friable texture, forms the most valuable soil ; while lastly the pure mud subsides, contain- ing the finest particles of all, and forms a rich but very tenacious soil. The great effort, therefore, of the warp farmer is to get the second or mixed deposit as equally over the whole surface as he can and to prevent the deposit of the last. This he does by keeping the water in constant motion, as the last deposit can only take place when the water is suffered to be still. Three years may be said to be spent in the process, one year warping, one year drying and consolidating, and one year growing the first crop, which is generally seed-hoed in by hand, as the mud at this time is too soft to admit of horse labour.

The immediate effect, which is highly beneficial, is the deposition of silt from the tide. To ensure this deposition, it is necessary to surround the field to be warped withastrong embankment, in order to retain the water as the tide recedes. The water is admitted by valved sluices, which open as the tide flows into the field and shut, by the pressure of the confined water when the tide recedes. These sluices are placed on as low a level as possible to permit the most turbid water at the bottom of the tide to pass through a channel in the base of the embankment. The silt deposited after warping is exceedingly rich and capable of carrying any species of crop. It may be admitted in so small a quantity as only to act asa manure to arable soil, or in such a large quantity as to form a new soil. This latter acquisition is the principal object of warping, and it excites astonishment to witness how soon a new soil may be formed. From June to September a soil of 3 ft. in depth may be formed under the favourable circumstances of a very dry season and long drought. In winter and in floods warping ceases to be beneficial. In ordinary circumstances on the Trent and Humber a soil from 6 to 16 in. in dept h may be obtained and inequalities of 3 ft. filled up. But every tide generally leaves only i in. of silt, and the field which has only one sluice can only be warped every other tide. The silt, as deposited in each tide,

does not mix into a uniform mass, but remains in distinct layers. The water should be made to run completely off and the ditches should become dry before the influx of the next tide, other- wise the silt will not incrust and the tide not have the same effect. Warp soil is of surpassing fertility. The expense of forming canals, embankments and sluices for warping land is from £10 to £20 an acre. A sluice ol 6 ft. in height and 8 ft. wide will warp from 60 to 80 acres, according to the distance of the field from the river. The embank- ments may be from 3 to 7 ft. in height, as the field may stand in regard to the level of the highest tides. After the new land has been left for a year or two in seeds and clover, it produces great crops of wheat ana potatoes.

Warping is practised only in Lincolnshire and Yorkshire, on the estuary of the Humber, and in the neighbourhood of the rivers which flow into it — the Trent, the Ouse and the Don. The silt and mud brought down by these rivers is rich in clay and organic matter, anil sometimes when dry contains as much as I ° u of nitrogen.

Constant care is required if a water-mea,dow is to yield quite satisfactory results. The earliness of the feed, its quantity and its quality will all depend in very great measure Manage- upon the proper management of the irrigation. The meat points which require constant attention are — the and ad- perfect freedom of all carriers, feeders and drains • vanta ˆ es – from every kind of obstruction, however minute; the state and amount of water in the river or stream, whether it be sufficient to irrigate the whole area properly or only a part of it; the length of time the water should be allowed to remain on the meadow at different periods of the season; the regula- tion of the depth of the water, its quantity and its rate of flow, in accordance with the temperature and the condition of the herbage; the proper times for the commencing and ending of pasturing and of shutting up for hay; the mechanical condition of the surface of the ground; the cutting out of any very large and coarse plants, as docks; and the improvement of the physical and chemical conditions of the soil by additions to it of sand, silt, loam, chalk, &c.

Whatever may be the command of water, it is unwise to attempt to irrigate too large a surface at once. Even with a river supply- fairly constant in level and always abundant, no attempt should be made to force on a larger volume of water than the feeders can properly distribute and the drains adequately re- move, or one part of the meadow will be deluged and another stinted. When this inequality of irrigation once occurs, it is likely to increase from the consequent derangement of the feeders and drains. And one result on the

herbage will be an irregularity of composition and growth, seriously detrimental to its food-value. The adjustment of the water by means of the sluices is a delicate operation when there is little water and also when there is much; in the latter case the fine earth may be washed away from some parts of the meadow; in the former case, by attempting too much with a limited water current, one may permit the languid streams to deposit their valuable suspended matters instead of carrying them forward to enrich the soil. The water is not to be allowed to remain too long on the ground at a time. The soil must get dry at stated intervals in order that the atmospheric air may come in contact with it and penetrate it. In this way as the water sinks down through the porous subsoil or into the subterranean drains oxygen enters and supplies an element which is needed, not only for the oxidation of organic matters in the earth, but also for the direct and indirect nutrition of the roots. With- out this occasional drying of the soil the finer grasses and the leguminous plants will infallibly be lost; while a scum of confervae and other algae will collect upon the surface and choke the higher forms of vegetation. The water should be run off thoroughly, for a little stagnant water lying in places upon the surface does much injury. The practice of irrigating differs in different places with differences in the quality of the water, the soil, the drainage, &c. As a general rule, when the irrigating season begins in November the water may flow for a fortnight continuously, but subsequent waterings, especially after December, should be shortened gradually in duration till the first week in April, when irrigation should cease. It is necessary to be very careful in irrigating during frosty weather. For. though grass will grow even under ice, yet if ice be formed under and around the roots of the grasses the plants may be thrown out by the expansion of the water at the moment of its conversion into ice. The water should be let off on the morning of a dry day, and thus the land will be dry enough at night not to suiter from the frost; -or the water may be taken off in the morning and let on again at night. In spring the newly grown and tender grass will be easily destroyed by frost if it be not protected by water, or if the ground be not made thoroughly dry.

Although in many cases it is easy to explain the reasons why water artificially applied to land brings crops or increases their yield, the theory of our ordinary water-meadow Theory irrigation is rather obscure. For we are not dealing in these grass lands with a semi-aquatic plant like rice, nor are

we supplying any lack of water in the soil, nor are we restoring the moisture which the earth cannot retain under a burning sun. We irrigate chiefly in the colder and wetter half of the year, and we " saturate " with water the soil in which are growing such plants as are perfectly content with earth not containing more than one-fifth of its weight of moisture. We must look in fact to a number of small advantages and not to any one striking beneficial process in explaining the aggregate utility of water-meadow irrigation. We attribute the usefulness of water-meadow irrigation, then,, to the following causes : (i) the temperature of the water being rarely less than 10° Fahr. above freezing, the severity of frosts in winter is thus obviated, and the growth, especially of the roots of grasses, is encouraged; (2) nourishment or plant food is actually brought on to the soil, by which it is absorbed and retained, both for the immediate and for the future use of the vegetation, which also itself obtains some nutrient material directly; (3) solution and redistribution of the plant food already present in the soil occur mainly through the solvent action of the carbonic acid gas present in a dis solved state in the irrigation- water; (4) oxidation of any excess of organic matter in the soil, with consequent production of useful carbonic acid and nitrogen compounds, takes place through the dissolved oxygen in the water sent on and through the soil where the drainage is good; and (5) improvement of the grasses, and especially of the miscellaneous herbage, of the meadow is promoted through the encouragement of some at least of the better species and the extinction or reduction of mosses and of the innutritious weeds.

To the united agency of the above-named causes may safely be attributed the benefits arising from the special form of water-irrigation which is practised in England. Should it be thought that the traces of the more valuable sorts of plant food (such as compounds of nitrogen, phosphates, and potash salts) existing in ordinary brook or river water can never bring an appreciable amount of manurial matter to the soil, or exert an appreciable effect upon the vegetation, yet the quantity of water used during the season must be taken into account. If but 3000 gallons hourly trickle over and through an acre, and if we assume each gallon to contain no more than one- tenth of a grain of plant food of the three sorts just named taken together, still the total, during a season including ninety days of actual irrigation, will not be less than o lb per acre. It appears, however, that a very large share of the benefits of water-irrigation is attributable to the mere contact of abund- ance of moving water, of an even temperature, with the roots of the grass. The growth is less checked

by early frosts; and whatever advantages to the vegetation may accrue by occasional excessive warmth in the atmosphere in the early months of the year are experienced more by the irrigated than by the ordinary meadow grasses by reason of the abundant development of roots which the water has encouraged.

III. Italian Irrigation. — The most highly developed irrigation in the world is probably that practised in the plains of Piedmont and Lombardy, where every variety of condition is to be found. The engineering works are of a very high class, and from long generations of experience the farmer knows how best to use his water. The principal river of northern Italy is the Po, which rises to the west of Piedmont and is fed not from glaciers like the Swiss torrents, but by rain and snow, so that the water has a somewhat higher temperature, a point to which much importance is attached for the valuable meadow irrigation known as marcite. This is only practised in winter when there is abundance of water available, and it much resembles the water-meadow irrigation of England. The great Cavour canal is drawn from the left bank of the Po a few miles below Turin, and it is carried right across the drainage of the country. Its full discharge is 3800 cub. ft. per second, but it is only from October to May, when the water is least required, that it carries anything like this amount. For the summer irrigation Italy depends on the glaciers of the Alps; and the great torrents of the Dora Baltea and Sesia can be counted on for a volume exceeding 6000 cub. ft. per second. Lombardy is quite as well

off as Piedmont for the means of irrigation and, as already said, its canals have the advantage that being drawn froni the lakes Maggiore and Como they exercise a moderating influence on the Ticino and Adda rivers, which is much wanted in the Dora Baltea. The Naviglio Grande of Lombardy is a very fine work drawn from the left bank of the Ticino and useful for navigation as well as irrigation. It discharges between 3000 and 4000 cub. ft. per second, and probably nowhere is irriga- tion carried on with less expense. Another canal, the Villoresi, drawn from the same bank of the Ticino farther upstream, is capable of carrying 6700 cub. ft. per second. Like the Cavour canal, the Villoresi is taken across the drainage of the country, entailing a number of very bold and costly works.

Interesting as these Italian works are, the administration and distribution of the water is hardly less so. The system is due to the ability of the great Count Cavour; what he originated in Piedmont has been also carried out in Lombardy. The Pied- montese company takes over from the government the control of all the irrigation

within a triangle between the left bank of the Po and the right bank of the Sesia. It purchases from govern- ment about 1250 cub. ft. per second, and has also obtained the control of all private canals. Altogether it distributes about 2275 cub. ft. of water and irrigates about 141,000 acres, on which rice is the most important crop. The association has 14,000 members and controls nearly 10,000 m. of distributary channels. In each parish is a council composed of all land- owners who irrigate. Each council sends two deputies to what may be called a water parliament. This assembly elects three small committees, and with them rests the whole management of the irrigation. An appeal may be made to the civil courts from the decision of these committees, but so popular are they that such appeals are never made. The irrigated area is divided into districts, in each of which is an overseer and a staff of watchmen to see to the opening and shutting of the modules (see Hydraulics, §§ 54 to 56) which deliver the water into the minor channels. In the November of each year it is decided how much water is to be given to each parish in the year following, and this depends largely on the number of acres of each crop proposed to be watered. In Lombardy the irrigation is conducted on similar principles. Throughout, the Italian farmer sets a very high example in the loyal way he submits to regulations which there must be sometimes a strong tempta- tion to break. A sluice surreptitiously opened during a dark night and allowed to run for six hours may quite possibly double the value of his crop, but apparently the law is not often broken.

IV. Egypt. — The very life of Egypt depends on its irrigation, and, ancient as this irrigation is, it was never practised on a really scientific system till after the British occupation. _. As every one knows, the valley of the Nile outside of i stlcs of the tropics is practically devoid of rainfall. Yet it was the Nile the produce of this valley that formed the chief granary Val { e % of the Roman Empire. Probably nowhere in the world is there so large a population per square mile depending solely on the produce of the soil. Probably nowhere is there an agricultural population so prosperous, and so free from the risks attending seasons of drought or of flood. This wealth and prosperity are due to two very remarkable properties of the Nile. First, the regimen of the river is nearly constant. The season of its rise and its fall, and the height attained by its waters during the highest flood and at lowest Nile vary to a comparatively small extent. Year after year the Nile rises At the same period, it attains its maximum in September and begins to diminish first rapidly till about the end of December, and then more slowly and more steadily until the following June. A late rise is not more than about three weeks

behind an early rise. From the lowest to the highest gauge of water-surface the rise is on an average 25-5 ft. at the First Cataract. The highest flood is 3-5 ft. above this average, and this means peril, if not disaster, in Lower Egypt. The lowest flood on record has risen only to 5 '5 ft. below the average, or to 20 ft. above the mean water- surface of low Nile. Such a feeble Nile flood has occurred only

four limes in modern history: in 1877, when it caused wide- spread famine and death throughout Upper Egypt, 947,000 acres remained barren, and the land revenue lost £1,112,000; in 1899 and again in 1902 and 1907, when by the thorough remodelling of the whole system of canals since 1883 all famine and disaster were avoided and the loss of revenue was comparatively slight. In 1907. for instance, when the flood was nearly as low as in 1877, the area left unwatered was little more than 10% of the area affected in 1877.

This regularity of flow is the first exceptional excellence of the river Nile. The second is hardly less valuable, and consists in the remarkable richness of the alluvium brought down the river year after year during the flood. The object of the engineer is so to utilize this flood-water that as little as possible of the alluvium may escape into the sea, and as much as possible may be deposited on the fields. It is the possession of these two properties that imparts to the Nile a value quite unique among rivers, and gives to the farmers of the Nile Valley advantages over those of any rain-watered land in the world.

Until the 19th century irrigation in Egypt on a large scale was practised merely during the Nile flood. Along each edge of the river and following its course has been erected during"" an earthen embankment high enough not to be high Nik. topped by the highest floods. In Upper Egypt, the valley of which rarely exceeds 6 m. in width, a series of cross embankments have been constructed, abut-ting at the inner ends on those along the Nile, and at the outer ends on the ascending sides of the valley. The whole country has thus been divided into a series of oblongs, surrounded by embankments on three sides and by the. desert slopes on the fourth. These oblong areas vary from 60,000 to 1 500 or 2000 acres in extent. Throughout all Egypt the Nile is deltaic in character; that is, the slope of the country in the valley is away from the river and not towards it. It is easy, then, when the Nile is low, to cut short, deep canals in the river banks, which fill as the flood rises, and carry the

precious mud-charged water into these great flats. There the water remains for a month or more, some 3 ft. deep, depositing its mud, and thence at the end of the flood the almost clear water may either be run off directly into the receding river, or cuts may be made in the cross embankments, and it may be allowed to flow from one flat to another and ultimately into the river. In November the waters have passed off; and when- ever a man can walk over the mud with a pair of bullocks, it is roughly turned over with a wooden plough, or merely the branch of a tree, and the wheat or barley crop is immediately sown. So soaked is the soil after the flood, that the grain germinates, sprouts, and ripens in April', without a shower of rain or any other watering.

In Lower Egypt this system was somewhat modified, but it was the same in principle. No other was known in the Nile Valley until the country fell, early in the 10th century, under the vigorous rule of Mehemet Ali Pasha. He soon recognized that with such a climate and soil, with a teeming population, and with the markets of Europe so near they might produce in Egypt something more profitable than wheat and maize. Cotton and sugar-cane would fetch far higher prices, but they could only be grown while the Nile was low, and they required water at all seasons.

It has already been said that the rise of the Nile is about 252 ft., so that a canal constructed to draw water out of the river while at its lowest must be 25J ft. deeper than during " " '- ' s intended to draw off only during the highest low Mie. floods. Mehemet Ali began by deepening the canals of Lower Egypt by this amount, a gigantic and futile task; for as they had been laid out on no scientific principles, the deep channels became filled with mud during the first flood, and all the excavation had to be done over again, year after year. With a serf population even this was not impossible; but as the beds of the canals were graded to no even slope, it did not follow that if water entered the head it would flow*

evenly on. As the river daily fell, of course the water in the canals fell too, and since they were never dug deep enough to draw water from the very bottom of the river, they occasionally ran dry altogether in the month of June, when the river was at its lowest, and when, being the month of greatest heat, water was more than ever necessary for the cotton crop. Thus large tracts which had been sown, irrigated, weeded and nurtured for perhaps three months perished in the fourth, while all the time the precious Nile water was flowing useless to the sea. The obvious remedy was to throw a weir across each branch of the river to control the water and force it into

canals taken from above it. The task of constructing this great work was committed to Mougel Bey, a French engineer of ability, who designed and constructed the great barrage across the two branches of the Nile at the apex of the delta, about 12 m. north Barrage. of Cairo (fig. 2). It was built to consist of two bridges- one over the eastern or Damietta branch of the river having 71 arches, the other, over the Rosetta branch, having 61 arches, each arch being of 5 metres or 16-4 ft. span. The building was all of stone, the floors of the arches were inverts. The height of pier from edge of flooring to spring of arch] was 28-7 ft., the spring of the arch being about the surface-level of maximum flood. The arches were designed to be fitted with self-acting drop gates; but they were not a success, and were only put into place on the Rosetta branch. The gates were in-w tended to hold up the water 4-5 metres,*

Fig. 2. — Map showing the Damietta and Rosetta dams on the Nile.

or 14-76 ft., and to divert it into three main canals— the Behera on the west, theMenufia in the centre and the Tewfikia on the east. The river was thus to be emptied, and to flow through a whole network of canals, watering all Lower Egypt. Each barrage was provided with locks to pass Nile boats 160 by 28 ft. in area.

Mougel's barrage, as it may now be seen, is a very imposing and stately work. Considering his want of experience of such rivers as the Nile, and the great difficulties he had to contend with under a succession of ignorant Turkish rulers, it would be unfair to blame him because, until it fell into the hands of British engineers in 1884, the work was condemned as a hopeless failure. It took long years to complete, at a cost which can never be estimated, since much of it was done by serf labour. In 1861 it was at length said to be finished; but it was not until 1863 that the gates of the Rosetta branch were closed, and they were reopened again immediately, as a settlement of the masonry took place. The experiment was repeated year after year till 1867, when the barrage cracked right across from foundation to top. A massive coffer-dam was then erected, covering the eleven arches nearest the crack; but the work was never trusted again, nor the water-surface raised more than about 3 ft.

An essential part of the barrage project was the three canals, taking their water from just above it, as shown in fig. 2. The heads of the existing old canals, taken out of the river at intervals throughout the delta, were to be closed, and the canals themselves all put into connexion with the three high-level trunk lines taken from above the barrage. The central canal, or Menufia, was more or less finished,

and, although full of defects, has done good service. The eastern canal was never dug at all until

the British occupation. The western, or Behera, canal was dug, but within its first 50 m. it passes through desert, and sand drifted into it. Corvees of 20,000 men used to be forced to clear it out year after year, but at last it was abandoned. Thus the whole system broke down, the barrage was pronounced a failure, and attention was turned to watering Lower Egypt by a system of gigantic pumps, to raise the water from the river and dis- charge it into a system of shallow surface-canals, at an annua) cost of about £250,000, while the cost of the pumps was estimated at {700,000. Negotiations were on foot for carrying out this system when the British engineers arrived in Egypt. They soon resolved that it would be very much better if the original scheme of using the barrage could be carried out, and after a careful examination of the work they were satisfied that this could be done. The barrage rests entirely on the alluvial bed of the Nile. Nothing more solid than strata of sand and mud is to be found for more than 200 ft. below the river. It was out of the question, therefore, to think of founding on solid material, and yet it was desired to have a head of water of 13 or 14 ft. upon the work. Of course, with such a pressure as this, there was likely to be percolation under the founda- tions and a washing-out of the soil. It had to be considered whether this percolation could best be checked by laying a solid wall across the river, going down to 50 or 60 ft. below its bed, or by spreading out the foundations above and below the bridge, so as to form one broad water-tight flooring — a system practised with eminent success by Sir Arthur Cotton in Southern India. It was decided to adopt the latter system. As originally designed, the flooring of the barrage from up-stream to down- stream face was 111-50 ft. wide, the distance which had to be travelled by water percolating under the foundations. This width of flooring was doubled to 223 ft., and along the up- stream face a line of sheet piling was driven 16 ft. deep. Over the old flooring was superposed 15 in. of the best rubble masonry, an ashlar floor of blocks of close-grained trachyte being laid directly under the bridge, where the action was severest. The working season lasted only from the end of November to the end of June, while the Nile was low; and the difficulty of getting in the foundations was increased, as, in the interests of irrigation and to supply the Menufia canal, water was held up every season while the work was in progress to as much as

10 ft. The work was begun in 1886, and completed in June 1890. More- over, in the meantime the eastern, or Tewfikia, canal was dug and supplied with the necessary masonry works for a distance of 23 m., to where it fed the network of old canals. The western, or Behera, canal was thoroughly cleared out and remodelled; and thus the whole delta irrigation was supplied from above the barrage.

The outlay on the barrage between 1883 and 1891 amounted to about £460,000. The average cotton crop for the 5 years preceding 1884 amounted to 123,000 tons, for the 5 years ending 1898 it amounted to 251,200 tons. At the low rate of £40 per ton, this means an annual increase to the wealth of Lower Egypt of £5,128,000. Since 1890 the barrage has. done its duty without accident, but a work of such vast importance to Lower Egypt required to be placed beyond all risk. It having been found that considerable hollow spaces existed below the foundations of some of the piers, five bore-holes from the top of the roadway were pierced-vertically through each pier of both barrages, and similar holes were drilled at intervals along all the lock walls. Down these holes cement grout was injected under high pressure on the system of Mr Kinipple. The work was successfully carried out during the seasons 1896 to 1898. During the summer of 1898 the Rosetta barrage was worked under a pressure of 14 ft. But this was looked on as too near the limit of safety to be relied on, and in 1899 subsidiary weirs were started across both branches of the river a short distance below the two barrages. These were estimated to cost £530,000 altogether, and were to stand io-8 ft. above the river's bed, allowing the water-surface up-stream of the barrage to be raised 7-2 ft., while the pressure on that work itself would not exceed 10 ft. These weirs were satisfactorily completed in 1901.

The barrage is the greatest, but by no means the only im- portant masonry work in Lower Egypt. Numerous regulating bridges and locks have been built to give absolute control of the water and facilities for navigation; and since 1901 a second weir has been constructed opposite Zifta, across the Damietta branch of the Nile, to improve the irrigation of the Dakhilia province.

In the earlier section of this article it is explained how necessary it is that irrigation should always be accompanied by drainage. This had been totally neglected in Egypt; but very large sums have been spent on it, and the country is now covered with a network of drains nearly as complete as that of the canals.

The ancient system of basin irrigation is still pursued in Upper Egypt,

though by the end of 1907 over 320,000 feddans of land formerly under basin irrigation had been Basin given, at a cost of over £E3 ,000,000, perennial irriga- irrigation tion. This conversion work was carried out in the ”’ ‘Upper provinces situated between Cairo and Assiut, a region sometimes designated Middle Egypt. The ancient system seems simple enough; but in order really to flood the whole Nile Valley during seasons of defective as well as favourable floods, a system of regulating sluices, culverts and syphons is necessary; and for want of such a system it was found, in the feeble flood of 1888, that there was an area of 260,000 acres over which the water never flowed. This cost a loss of land revenue of about £300,000, while the loss of the whole season’s crop to the farmer was of course much greater. The attention of the British engineers was then called to this serious calamity ; and fortunately for Egypt there was serving in the country Col. J. C. Ross, R.E., an officer who had devoted many years of hard work to the irrigation of the North-West Provinces of India, and who possessed quite a special knowledge as well as a glowing enthusiasm for the subject. Fortunately, too, it was possible to supply him with the necessary funds to com- plete and remodel the canal system. When the surface-water of a river is higher than the fields right and left, there is nothing easier than to breach the embankments and flood the fields— in fact, it may be more difficult to prevent their being flooded than to flood them — but in ordinary floods the Nile is never higher than all the bordering lands, and in years of feeble flood it is higher than none of them. To water the valley, there- fore, it is necessary to construct canals having bed-slopes less than that of the river, along which the water flows until its surface is higher than that of the fields. If, for instance, the slope of the river be 4 in. per mile, and that of the canal 2 in. it is evident that at the end of a mile the water in the canal will be 2 in. higher than in the river; and if the surface of the land is 3 ft. higher than that of the river, the canal, gaining on it at 2 in. per mile, will reach the surface in 18 m., and from thence onwards will be above the adjoining fields. But to irrigate this upper 18 m., water must either be raised artificially, or supplied from another canal taking its source 18 m. farther up. This would, however, involve the country in great lengths of canal between the river and the field, and circumstances are not so unfavourable as this. Owing to the deltaic nature of the Nile Valley, the fields on the banks are 3 ft. above the flood, at 2 m. away from the banks they may not be more than 1 ft. above that level, so that the canal, gaining 2 in. per mile and receding from the river, will command the country in 6 m. The slope of the river, moreover, is taken in its winding course; and if it is 4 in. per mile, the slope of the axis of the valley parallel to which the

canals may be made to flow is^at least 6 in. per mile, so that a canal with a slope of 2 in. gains 4 in. per mile.

The system of having one canal overlapping another has one difficulty to contend with. Occasionally the desert cliffs and slopes come right down to the river, and it is difficult, if not impossible, to carry the higher-level canals past these obstructions. It should also be noticed that on the higher strip bordering the river it is the custom to take advantage of its nearness to raise water by pumps, or other machinery, and thereby to grow valuable crops of sugar-cane, maize or vegetables. When the

river rises, these crops, which often form a very important part of the year's produce and are termed Nabdri, are still in the ground, and they require water in moderate and regulated quantities, in contradistinction to the wholesale flooding of the flats beyond. Fig. 3 will serve to explain this system of irriga- tion, the firm lines representing canals, the dotted lines embank- ments. It will be seen, beginning on the east or right bank of the river, that a high-level canal from an upper system is carried past a steep slope, where perhaps it is cut entirely out of rock, and it divides into two. The right branch waters all the desert slopes within its reach and level. The left branch passes, by a syphon aqueduct, under what is the main canal of the system, taken from the river close at hand (and therefore at a lower level). This left branch irrigates the Nabdri on the high lands bordering the river. In years of very favourable flood this high-level canal would not be wanted at all: the irrigation could be done from the main canal, and with this great advantage, that the main canal water would carry with it much more fertilizing matter than would be got from the tail of the high- level canal, which left the river perhaps 25 m. up. The main canal flows freely over the flats C and D, and, if the flood is good, over B and part of A. It is carried round the next desert point, and to the north becomes the high-level canal. The masonry

[icpt »«"

Cantt

*-j**

•m,**

^

W)£

Fig. 3. — Map of the Basin System of Irrigation.

works required for this system are a syphon to pass the high level under the main canal near its head, bridges fitted with sluices where each canal passes under an embankment, and an escape weir at the tail of the system, just south of the desert point, to return surplus water to the river. Turning to the left bank, there is the same high-level canal from the upper system irrigating the basins K, P and L, as well as the large basin E in such years as it cannot be irrigated from the main canal. Here there are two main canals — one following the river, irrigat- ing a series of smaller basins, and throwing out a branch to its left, the other passing under the desert slopes and supplying the basins F, G, H and S. For this system two syphons will be required near the head, regulating bridges under all the embank- ments, and an escape weir back into the river.

In the years following 1888 about 100 new masonry works of this kind were built in Upper Egypt, nearly 400 m. of new canal were dug, and nearly 300 m. of old canal were enlarged and deepened. The result has been, as already stated, that with a complete failure of the Nile flood the loss to the country has been trifling compared with that of 1877.

The first exception in Upper Egypt to the basin system of irrigation was due to the Khedive Ismail. The khedive, having acquired vast estates in the provinces of Assiut, Miniah, Beni- Suef and the Fayum, resolved to grow sugar-cane on a very large scale, and with this object constructed a very important perennial canal, named the Ibrahimia, taking out of the left bank of the Nile at the town of Assiut, and flowing parallel to the river for about 200 m., with an important branch which irrigates the Fayum. This canal was badly constructed, and by entirely blocking the drainage of the valley did a great deal of harm to the lands. Most of its defects had been remedied, but one

remained. There being at its head no weir across the Nile, the water in the Ibrahimia canal used to rise and fall with that of the river, and so the supply was apt to run short during the hottest months, as was the case with the canals of Lower Egypt before the barrage was built. To supply the Ibrahimia canal at all during low Nile, it had been necessary to carry on dredging operations at an annual cost of about

£12,000. This has now been rectified, in the same way as in Lower Egypt, by the construction of a weir across the Nile, intended to j^sUit give complete control over the river and to raise the Weiraad water-surface 8-2 ft. The Assiut weir is constructed Bsaa on a design very similar to that of the barrage in arra x e – Lower Egypt. It consists of a bridge of in arches, each 5 metres span, with piers of 2 metres thickness. In each arch are fitted two gates. There is a lock 80 metres long and 16 metres wide at the left or western end of the weir, and adjoining it are the regulating sluices of the Ibrahimia canal. The Assiut weir across the Nile is just about half a mile long. The work was begun at the end of 1898 and finished early in 1902 — in time to avert over a large area the disastrous effects which would otherwise have resulted from the low Nile of that year. The money value of the crops saved by the closing of the weir was not less than £E69o,ooo. The conversion of the lands north of Assiut from basin to perennial irrigation began immediately after the completion of the Assiut weir and was finished by the end of 1908. To render the basin lands of the Kena province independent of the flood being bad or good, another barrage was built across the Nile at Esna at a cost of £1,000,000. This work was begun in 1906 and completed in 1909.

These works, as well as that in Lower Egypt, are intended to raise the water-surface above it, and to control the distribution of its supply, but in storage. no way to store that supply. The idea of ponding up the superfluous flood discharge of the river is not a new one, and if Herodotus is to be believed, it was a system actually pursued at a very early period of Egyptian history, when Lake Moeris in the Fayum was filled at each Nile flood, and drawn upon as the river ran down. When British engineers first undertook the management of Egyptian irrigation representations were made to them of the advantage of storing the Nile water; but they consistently maintained that before entering on that subject it was their duty to utilize every drop of the water at their disposal. This seemed all the more evident, as at that time financial reasons made the construction of a costly Nile dam out of the question. Every year, however, between 1890 and 1902 the supply of the Nile during May and June was actually exhausted, no water at all flowing then out into the sea. In these years, too, owing to the extension of drainage works, the irrigable area of Egypt was greatly enlarged, so that if perennial cultivation was at all to be increased, it was necessary to increase the volume of the river, and this could only be done by storing up the flood supply. The first difficulty that presented itself in carrying this out, was that during the months of highest flood the Nile is so charged with alluvial matter that to pond it up then would inevitably lead to a deposit of

silt in the reservoir, which would in no great number of years fill it up. It was found, however, that the flood water was comparatively free from deposit by the middle of November, while the river was still so high that, without injuring the irrigation, water might go on being stored up until March. Accordingly, when it was determined to construct a dam, it was decided that it should be supplied with sluices large enough to discharge unchecked the whole volume of the river as it comes down until the middle of November, and then to begin the storage.

The site selected for the great Nile dam was at the head of the First Cataract above Assuan. A dyke of syenite granite here crosses the valley, so hard that the river had nowhere scoured a deep channel through it, and so it was found possible to construct the dam entirely in the open air, without the

many

8 5 o

IRRIGATION

The

Assuan

Dam.

necessity of laying under-water foundations. The length of the dam is about 6400 ft. — nearly ij m. The greatest head of water in it is 65 ft. It is pierced by 140 under-sluices of 150 sq. ft. each, and by 40 upper-sluices, each of 75 sq. ft. These, when fully open, are capable of discharging the ordinary maximum Nile flood of 350,000 cub. ft. per second, with a velocity of 15-6 ft. per second and a head of 6-6 ft. The top width of the dam is 23 ft., the bottom width at the deepest part about 82 ft. On the left flank of the dam there is a canal, provided with four locks, each 262 by 31 ft. in area, so that navigation is possible at all seasons. The storage capacity of the reservoir is about 3,750,000 millions of cub. ft., which creates a lake extending up the Nile Valley for about 200 m. The reservoir is filled yearly by March; after that the volume reaching the reservoir from the south is passed on through the sluices. In May, or earlier when the river is late in rising, when the demand for water increases, first the upper and then the under sluices are gradually opened, so as to increase the river supply, until July, when all the gates are open, to allow of the free passage of the flood. On the 10th of December 1902

this magnificent work was completed. The engineer who designed it was Sir W. Willcocks. The contractors were Messrs John Aird & Co., the contract price being £2,000,000. The financial treaties in which the Egyptian government were bound up prevented their ever paying so large a sum as this within five years; but a company was formed in London to advance periodically the sum due to the contractors, on receipt from the government of Egypt of promissory notes to pay sixty half-yearly instalments of £78,613, beginning on the 1st of July 1903. Protective works downstream of the dam were completed in 1906 at a cost of about ££304,000. It had been at first intended to raise the dam to a height which would have involved the submergence, for some months of eve,ry year, of the Philae temples, situated on an island just upstream of the dam. Had the natives of Egypt been asked to choose between the preservation of Ptolemy's famed temple and the benefit to be derived from a considerable additional depth of water storage, there can be no question that they would have preferred the latter; but they were not consulted, and the classical sentiment and artistic beauty of the place, skilfully pleaded by archaeologists and artists, prevailed. In 1907, however, it was decided to carry out the plan as originally proposed and raise the dam 26 ft. higher. This would increase the storage capacity 2j times, or to about 9,375,000 millions of cubic feet.

There is no middle course of farming in Egypt between irrigation and desert. No assessment can be levied on lands which have not been watered, and the law of Egypt requires that in order to render land liable to taxation the water during the Nile flood must have flowed naturally over it. It is not enough that it should be pumped on to the land at the expense of the landowner. The tax usually levied is from £1 to £2

per acre.

See Sir W. Willcocks, Egyptian Irrigation (2nd ed., 1899); Sir C. C. Scott-Moncrieff, Lectures on Irrigation in Egypt. Professional Papers on the Corps of Royal Engineers, vol. xix. (London, 1893); Sir W. Garstin, Report upon the Basin of the Upper Nile. Egypt No. 2

(1904).

V. India. — Allusion has already been made to the irrigation of India. The year 1878, which saw the end of a most disastrous famine, may be considered as the commencement of a new era as regards irrigation. It had at last been recognized that such famines must be expected to occur at no very long intervals of time, and that

the cost of relief operations must not be met by increasing the permanent debt on the country, but by the creation of a famine relief and a famine insurance fund. For this purpose it was fixed that there should be an annual provision of Rx. 1, 500, 000, to be spent on: (1) relief, (2) protective works, :'3) reduction of debt. Among protective works the first place was given to works of irrigation. These works were divided into three classes: (i.) productive works; (ii.) protective works; (iii.) minor works.

Productive works, as their name implies, are such as may

reasonably be expected to be remunerative, and they include all the larger irrigation systems. Their capital cost is provided from loan funds, and not from the relief funds mentioned above. In the seventeen years ending 1 896-1 89 7 the capital expenditure on such works was Rx. 10,954,948, including a sum of Rx. 1 , 742, 246 paid to the Madras Irrigation Company as the price of the Kurnool-Cuddapah canal, a work which can never be financially productive, but which nevertheless did. good service in the famine of 1896-1897 by irrigating 87,226 acres. In the famine year 1877-1878 the area irrigated by productive canals was 5,171,497 acres. In the famine year 1896-1897 the area was 9>57i»779 acres, including an area of 123,087 acres irrigated on the Swat river canal in the Punjab. The revenue of the year 1879-1880 was nearly 6% on the capital outlay. In 1897-1898 it was 7j%. In the same seventeen years Rx.2,099,253 were spent on the construction of protective irrigation works, not expected to be directly remunerative, but of great value during famine years. On four works of this class were spent Rx. 1 ,649,823 , which in 1 896-1897 irrigated 200,733 acres, a valuable return then, although in an ordinary year their gross revenue does not cover their working expenses. Minor works may be divided into those for which capital accounts have been kept and those where they have not. In the' seventeen years ending 1896-1897, Rx.827,214 were spent on the former, and during that year they yielded a return of 9-13 %. In the same year the irrigation effected by minor works of. all sorts showed the large area of 7,442,990 acres. Such are the general statistics of outlay, revenue and irrigated area up to the end of 1896-1897. The government might well be congratulated on having through artificial means ensured in that year of widespread drought and famine the cultivation of 27,326 sq. m., a large tract even in so large a country as India. And progress has been steadily made in subsequent years.

Some description will now be given of the chief of these irrigation works. Beginning with the Punjab, the province in which most

progress has been made, the great Sutlej canal, which irrigates the country to the left of that river, was opened in 1882, and the Western Jumna canal (perhaps the oldest in India) was extended into the dry Hissar and Sirsa districts, and generally improved so as to increase by nearly 50% its area of irrigation between 1878 and 1897. Perhaps this is as much as can well be done with the water at command for the country between the Sutlej and the Jumna, and it is enough to secure it for ever from famine. The Bari Doab canal, which irrigates the Gurdaspur, Amritsar and Lahore districts, has been enlarged and extended so as to double its irrigation since it was projected in 1877-1878. The Chenab canal, the largest in India and the most profitable, was only begun in 1889. It was designed to command an area of about 2j million acres, and to irrigate annually rather less than half that area. This canal flows through land that in 1889 was practically desert. From the first arrangements were made for bringing colonists in from the more congested parts of India. The colonization began in 1892. Nine years later this canal watered 1,830,525 acres. The population of the immigrant colony was 792,666, consisting mainly of thriving and prosperous peasants with occupancy rights in holdings of about 28 acres each. The direct revenue of this canal in 1906 was 26% on the capital outlay. The Jhelum canal was opened on the 30th of October, 1901. It is a smaller work than the Chenab, but it is calculated to command 1,130,000 acres, of which at least half will be watered annually. A much smaller work, but one of great interest, is the Swat- river canal in the Peshawar valley. It was never expected that this would be a remunerative work, but it was thought for political reasons expedient to construct it in order to induce turbulent frontier tribes to settle down into peaceful agriculture. This has had a great measure of success, and the canal itself has proved remunerative, irrigating 123,000 acres in 1896-1897. A much greater scheme than any of the above is that of the Sind Sagar canal, projected from the left bank of the Indus opposite Kalabagh, to irrigate 1,750,000 acres at a cost of Rx.6,000,000. Another great canal scheme for the Punjab

proposed to take off from the right bank of the Sutlej, and to irrigate about 600,000 acres in the Montgomery and Multaa districts, at a cost of Rx. 2,500,000. These three last projects would add 2,774,000 acres to the irrigated area of the province, and as they would flow through tracts almost unpeopled, they would afford a most valuable outlet for the congested districts of northern India. In

addition to these great perennial canals, much has been done since 1878 in enlarging and extending what are known as the " inundation canals " of the Punjab, which utilize the flood waters in the rivers during the monsoon season and are dry at other times. By these canals large portions of country throughout most of the Punjab are brought under cultivation, and the area thus watered has increased from about 180,000 to 500,000 acres since 1878.

It is on inundation canals such as these that the whole cultiva- tion of Sind depends. In 1878 the area was about 1,500,000 acres; in 1896-1897 it had increased to 2,484,000 acres. This increase was not due to famine in Sind, for that rainless province depends always on the Indus, as Egypt does on the Nile, and where there is no rainfall there can be no drought. But the famine prices obtained for agricultural produce doubtless gave an im- petus to cultivation. In Sind, too, there is room for much in- crease of irrigation. It has been proposed to construct two new canals, the Jamrao and the Shikarpur, and to improve and extend three existing canals—Nasrat, Naulakhi and Dad. The total cost of these five projects, some of which are now in progress, was estimated at Rx.1,596,682, and the extension of irrigation at 660,563 acres.

Turning from the basin of the Indus to that of the Ganges, the commissioners appointed to report on the famine of 1896-1897 found that in the country be- tween the Ganges and the Jumna little was left to be done beyond the completion of some distribu- tary channels. The East India Company's great work, the Ganges canal, constructed between 1840 and 1854 before there was a mile of railway open in India, still holds its place unsurpassed among later irrigation work for boldness of design and complete- ness of execution, a lasting monu- ment to the genius of Sir Proby Cautley, an officer of the Bengal Artillery, but a born engineer. Ever since 1870 consideration has been given to projects for irrigat- ing the fertile province of Oudh by means of a great canal to be drawn from the river Sarda. The water is there in abundance, the land is well adapted for irrigation, but as there is a considerable rainfall, it is doubtful whether the scheme would prove remunerative, and a large section of the landowners have hitherto opposed it, as likely to waterlog the country. Among the four protective works of irrigation which were said above to have irrigated 200,733 acres in 1806-1897, one of the most important is the Betwa canal, in the parched district of Bundelkhand. This canal has cost Rx.42S,o86, and causes an annual loss to the state in interest and working expenses of about Rx. 20,000. It irrigated, how- ever, in 1896-1897 an area of 87,306 acres, raising crops valued at Rx. 231,081, or

half the cost .of the canal, so it may be said to have justified its construction. A similar canal from the river Ken in the same district has been constructed. Pro- ceeding farther east, we find very satisfactory progress in the irrigation of southern Behar, effected by the costly system of canals drawn from the river Sone. In 1877-1878 these canals irrigated 241,790 acres. Rapid progress was not expected here, and 792,000 acres was calculated as being the maximum area that could be covered with the water supply available.

In the five years preceding 1901-1902 the average irrigated area was 463,181 acres, and during that year the area was 555,156 acres, the maximum ever attained.

The canal system of Orissa was never expected to be re- munerative, since in five years out of six the local rainfall is sufficient for the rice crop. In 1878-1879 the area irrigated was 111,350 acres, and the outlay up to date was Rx.i, 750,000. In 1900-1901 the area was 203,540 acres, the highest ever attained, and the capital outlay amounted to Rx.2,623,703. It should be mentioned in favour of these canals that although the irriga- tion is not of yearly value, they supply very important water communication through a province which, from its natural configuration, is not likely to be soon intersected by railways. If, moreover, such a famine were again to occur in Orissa as that of 1866-1867, there would be no doubt of the value of these fine canals.

In the Madras presidency and in Mysore irrigation has long assumed a great importance, and the engineering works of the three great deltas of the Godavari, Kistna and Cauvery, the outcome of the genius and indefatigable enthusiasm of Sir Arthur Cotton, have always been quoted as showing what a boon irrigation is to a country. In 1878 the total area of irrigation in the Madras presidency amounted to about 5,000,000 acres. The irrigation of the eight productive systems was 1,680,178 acres, and the revenue Rx.739,778. In 1898 there were ten of these systems, with an irrigation area, as shown by the accompanying table, of 2,685,915 acres, and a revenue of Rx.i, 163,268:

Irrigation.

Area Watered.

Total Revenue.

Total Expenditure.

Net Revenue.

Capital

and Indirect Charges.

Percentage

of Net Revenue to Capital.

Major Works.

1. Godavari Delta

2. Kistna Delta

3. Pennar Weir System .

4. Sangam System

5. Kurnool Canal

6. Barur Tank System

7. Cauvery Delta

8. Srivaikuntam System

9. Periyar Project

10. Rushikulya Canal .

Total . . . . .

Minor Works.

23 Works for which Capital and Revenue Accounts are kept

Minor Works for which such Accounts are not kept

Grand Total

Acres.

779.435

520,373

70,464

76,277

47,008

4,421

989,808

41,668

89.H3

67,318

Rx.

3 2 8.443

254,579

28,160

32,627

15,622

1,162

434.346

‘9,349

37,526

n,454

Sx.

68,376

74. 142 5,937 7,037

12,404

385

43,464

4,680

10,751 3,678

Rx.

260,067

180,437

23.123

25.590

3,218

777

390,882

14,669

26,775

7,776

«x.

1,297,807

1,319,166

189,919

385,601

2,171,740

4,250

199,458

147,192

852,914

464.423

19–15

13–18

7–59

3–68

•15

■ 1–39

44–87

5–45

•27

•54

2,685,915

535.813 3.131.009

1,163,268

200,558 830,175

229.954

34.655 193.295

933–314

165,903 636,880

7,033,470 1,693.878

7 -.88 4-44

6,352,737

2,194,001

457,904

1,736,097

In the three great deltas, and the small southern one that depends on the Srivaikuntam weir over the river Tumbraparni, extension and improvement works have been carried on. The Sangam and Pennar systems depend on two weirs on the river Pennar in the Nellore district, the former about 18 m. above and the latter just below the town of Nellore. The former irrigates on the left, the latter on the right bank of the river. This district suffered severely in the famine of 1877-1878, and the irrigation works were started in consequence. The Barur tank system in the Salem district was also constructed after the famine of 1877-1878. As yet it has not fulfilled expectations. The Periyar scheme has for its object both the addition of new irrigation and the safeguarding of that which exists in the district of Madura, a plain watered by means of a great number of shallow tanks , drawing, their supply from a very uncertain river, the Vaigai. This river takes its rise on the eastern slopes of the Ghat range of mountains, and just opposite to it, on the western face of the range, is the source of the river Periyar. The rainfall on the west very much exceeds that on the east, and the Periyar used to find its way by a short tonent

course to the sea, rendering no service to mankind. Its upper waters are now stemmed by a masonry dam 178 ft. high, forming a large lake, at the eastern end of which is a tunnel 5700 ft. long, piercing the watershed and discharging 1600 cub. ft. per second down the eastern side of the mountains into the river Vaigai. No bolder or more original work of irrigation has been carried out in India, and the credit of it is due to Colonel J. Pennycuick, C.S.I. The dam and

tunnel were works of unusual difficulty. The country was roadless and uninhabited save by wild beasts, and fever and cholera made sad havoc of the working parties; but it was successfully accomplished. The last of those given in the table above was not expected to be remunerative, but it should prove a valuable protective against famine. The system consists of weirs over the rivers Gulleri, Mahanadi and Rushikulya in the backward province of Ganjam, south of Orissa. From these weirs flow canals altogether about 127 m. long, which, in connexion with two large reservoirs, are capable of irrigating 120,000 acres. In 1901 the works, though incomplete, already irrigated 67,318 acres.

In addition to all these great engineering systems, southern India is covered with minor works of irrigation, some drawn from springs in the sandy beds of rivers, some from the rainfall of 5 sq. m. ponded up in a valley. In other cases tanks are fed from neighbouring streams, and the greatest ingenuity is displayed in preventing the precious water from going to waste.

Allusion has been already made to the canals of Sind. Else- where in the Bombay presidency, in the Deccan and Gujarat, there are fewer facilities for irrigation than in other parts of India. The rivers are generally of uncertain volume. The cost of storage works is very great. The population is back- ward, and the black soil is of a nature that in ordinary years can raise fair crops of cotton, millet and maize without artificial watering. Up to the end of 1896-1897 the capital spent on the irrigation works of the Deccan and Gujarat was -Rx. 2,616,959. The area irrigated that year was 262,830 acres. The most important works are the Mutha and Nira canals in the Poona district.

In Upper Burma three productive irrigation works were planned at the opening of the century — the Mandalay, the Shwebo, and the Mon canals, of which the first was estimated to cost -Rx. 323, 280, and to irrigate 72,000 acres. The area estimated from the whole three projects is 262,000 acres, situated in the only part of Burma that is considered liable to famine.

In 1901, after years of disastrous drought and famine, the government of India appointed a commission to examine throughout all India what could be done by irrigation to alleviate the horrors of famine. Up to that time it had been the principle of the government not to borrow money for the execution of irrigation works unless there was a reasonable expectation that within a few years they would give a return of 4 or 5% on the capital outlay. In 1901 the

government took larger views. It was found that although some irrigation works (especially in the Bombay Deccan) would never yield a direct return of 4 or 5%, still in a famine year they might be the means of producing a crop which would go far to do away with the necessity for spending enormous sums on famine relief. In the Sholapur district of Bombay, for instance, about three years' revenue was spent on relief during the famine of 1901. An expenditure of ten years' revenue on irrigation works might have done away for all future time with the necessity for the greater part of this outlay. The Irrigation Commission of 1901- 1903 published a very exhaustive report after a careful study of every part of India. While emphatically asserting that irrigation alone could never prevent famine, they recommended an outlay of £45,000,000 spread over a period of 25 years.

See also A nnual Reports Irrigation Department Local Governments of India ; Reports of the Indian Famine Commissions of 1878, 1808 and 1901; Sir Hanbury Brown, Irrigation, its Principles and Practice (London, 1907).

VI. United States. — At the opening of the 20th century, during Mr Roosevelt's presidency, the new " Conservation "

policy (i.e. conservation of natural resources by federal initiative and control), to which he gave so much impetus and encouragement, brought the extension of irrigation works in the United States to the front in American statecraft (see Vrooman, Mr Roosevelt, Dynamic Geographer, 1909). Though the carrying out of this policy on a large scale was hampered by many difficulties, the subject was made definitely one of national importance.

On account of the aridity of the climate throughout the greater part of the western third of the United States, the practice of agriculture is dependent upon an artificial supply of water. On most of the country west of the 97th meridian and extending to the Pacific Ocean less than 20 in. of rain falls each year. The most notable exceptions are in the case of a narrow strip west of the Cascade Range and of some of the higher mountain masses. In ordinary years the climate is too dry for successful cultivation of the field crops, although under favourable condi- tions of soil and cultivation there are certain areas where cereals are grown by what is known as " dry farming." The progress in irrigation up to the end of the 19th century was spasmodic but on the whole steady. The eleventh census of the United States, 1890, showed that 3,564,416 acres were irrigated in 1889. This included only the lands from which crops were produced.

Besides this, there were probably 10 million acres under irriga- tion systems constructed in whole or in part. In 1899 the irrigated area in the arid states and territories was more than twice as great as in 1889, the acreage being as follows: —

Arizona 185,936

California 1,445,872

Colorado

Idaho

Montana

Nevada .

New Mexico

Oregon

Utah

Washington

Wyoming

Total

1,611,271 602,568

95LI54

504,168 203,893 388,310 629,293 135.470 605,878

7.263,813

In addition to the area above given, in 1899, 273,117 acres were under irrigation in the semi-arid region, east of the states above mentioned and including portions of the states of North and South Dakota, Nebraska, Kansas, Texas and Oklahoma. The greater part of these lands was irrigated by canals or ditches built by individuals acting singly or in co-operation with their neighbours, or by corporations. The national and state govern- ments had not built any works of reclamation excepting where the federal government, through the Indian department, had constructed irrigation ditches for Indian tribes, notably the Crow Indians of Montana. A few of the

state governments, such, for example, as Colorado, had built small reservoirs or portions of canals from internal improvement funds.

The construction of irrigation canals and ditches was for the most part brought about by farmers joining to plough out or dig ditches from the rivers, descending on a gentle grade. Some of the corporations constructing works for the sale of water built structures of notable size, such, for example, as the Sweet-water and Hemet dams of southern California, the Bear river canal of Utah, and the Arizona canal, taking water from Salt river, Arizona. The cost of bringing water to the land averaged about $8 per acre where the ordinary ditches were built. Trie owners of extensive works were charged from $12 to $20 per acre and upwards for so-called " water rights," or the privilege to take water from the canal, this covering cost of construction. Besides the first cost of construction, the irrigator was usually called upon to pay annually a certain amount for maintenance, which might often be worked out by labour on the canal. The cost ranged from 50 cents to $1 per acre; or, with incorporated com- panies, from $1.50 to $2.50 per acre and upwards. The largest expense for water rights and for annual maintenance was in- curred in southern California, where the character of the crops, such as citrus fruits, and the scarcity of the water make possible

expensive construction and heavy charges. The legal expense for the maintenance of water rights was often large because of the interminable suits brought during the times of water scarcity. The laws regarding water in most of the arid states were indefinite or contradictory, being based partly on the common law regarding riparian rights, and partly upon the Spanish law allowing diversion of water from natural streams. Few fundamental principles were established, except in the case of the state of Wyoming, where an official was charged with the duty of ascertaining the amount of water in the streams and apportioning this to the claimants in the order of their priority of appropriation for beneficial use.

It may be said that, up to the year 1900, irrigation progressed to such an extent that there remained few ordinary localities where water could not be easily or cheaply diverted from creeks and rivers for the cultivation of farms. The claims for the avail- able supply from small streams, however, exceeded the water to be had in the

latter part of the irrigating season. There remained large rivers and opportunities for water storage which could be brought under irrigation at considerable expense. The large canals and reservoirs built by corporations had rarely been successful from a financial standpoint, and irrigation con- struction during the latter part of the decade 1890-1899 was relatively small. Owing to the difficulty and expense of securing water from running streams by gravity systems, a great variety of methods were developed of pumping water by wind-mills, gasoline or hot-air engines, and steam. Ordinary recipro-cating pumps were commonly employed, and also air lifts and similar devices for raising great quantities of water to a height of from 20 to 50 ft. For greater depths the cost was usually prohibitive. Throughout the Great Plains region, east of the Rocky Mountains, and in the broad valleys to the west, wind- mills were extensively used, each pumping water for from 1 to 5 acres of cultivated ground. In a few localities, notably in South Dakota, the Yakima valley of Washington, San Joaquin, and San Bernardino valleys of California, San Luis valley of Colorado, and Utah valley of Utah, water from artesian wells was also used for the irrigation of from 1 to 160 acres. The total acreage supplied by such means was probably less than 1 % of that watered by gravity systems.

The development of irrigation was in part retarded by the improper or wasteful use of water. On permeable soils, especially those of the terrace lands along the valleys, the soluble salts commonly known as alkali were gradually leached out and carried by the percolating waters towards the lower lands, where, reaching the surface, the alkali was left as a glistening crust or as pools of inky blackness. Farms adjacent to the rivers were for a time increased in richness by the alkaline salts, which in diffuse form might be valuable plant foods, and then suddenly become valueless when the concentration of alkali had reached a degree beyond that which the ordinary plants would endure.

The situation as regards the further progress of irrigation on a large scale was however dominated in the early years of the 20th century by the new Conservation policy. Mr Roosevelt brought the whole subject before Congress in his message of the ,?rd of December 1901, and thereby started what seemed likely to be a new sphere of Federal initiative and control. After referring to the effects of forests (see Forests and Forestry) on water-supply, he went on as follows: —

" The forests alone cannot fully regulate and conserve the waters of the arid regions. Great storage works are necessary to equalize the How of the streams and to save the flood waters. Their construction

has been conclusively shown to be an undertaking too vast for private effort. Nor can it be best accomplished by the individual states acting alone.

" Far-reaching interstate problems are involved, and the re- sources of single states would often be inadequate. It is properly a national function, at least in some of its features. It is as right for the National Government to make the. streams and rivers of the arid regions useful by engineering works for water storage, as to make useful the rivers and harbours of the humid regions by engineering works of another kind. The storing of the floods in reservoirs at the headquarters of our rivers is but an enlargement of our present policy

of riwr control, under which levees are built on the lower reaches of the same streams.

" The government should construct and maintain these reservoirs as it does other public works. Where their purpose is to regulate the flow of streams, the water should be turned freely into the channels in the dry season, to take the same course under the same laws as the natural flow.

" The reclamation of the unsettled arid public lands presents a different problem. Here it is not enough to regulate the flow of streams. The object of the government is to dispose of the land to settlers who will build homes upon it. To accomplish the object water must be brought within their reach.

" The reclamation and settlement of the arid lands will enrich every portion of our country, just as the settlement of the Ohio and Mississippi valleys brought prosperity to the Atlantic States. The increased demand for manufactured articles will stimulate industrial production, while wider home markets and the trade of Asia will consume the larger food supplies and effectually prevent Western competition with Eastern agriculture. Indeed, the products of irrigation will be consumed chiefly in upbuilding, local centres of mining and other industries, which would otherwise not come into existence at all. Our people as a whole will profit, for successful home-making is but another name for the upbuilding of the nation."

In 1902, by Act of Congress, a " reclamation fund " was created from moneys received from the sale of public lands; it was to be used under a " Reclamation Service " (part of the Department of the Interior) for the reclamation of arid lands. The " Truckee-Carson

project " for irrigation in Nevada was immediately begun. About thirty other government projects were taken in hand under the new Reclamation Service, in some cases involving highly interesting engineering problems, as in the Uncompahgre Project in Colorado. Here the Uncompahgre and Gunnison rivers flowed parallel, about 10 m. apart, with a mountain range 2000 ft. high between them. The Uncompaghre, with only a small amount of water, flowed through a broad and fertile valley containing several hundred thousand acres of cultivable soil. The Gunnison, with far more water, flowed through a canyon with very little land. The problem was to get the water from the Gunnison oyer the mountain range into the Uncompahgre valley; and a tunnel, 6 m. long, was cut through, resulting in 1909 in 148,000 acres of land being irrigated and thrown open to settlers. Similarly, near Yuma in Arizona, a project was undertaken for carrying the waters of the main canal on the California side under the Colorado river by a siphon. In the report for 1907 of the Reclamation Service it was stated that it had dug 1881 m. of canals, some carrying whole rivers, like the Truckee river in Nevada and the North Platte in Wyoming, and had erected 281 large structures, including the great dams in Nevada and the Minidoka dam (80 ft. high and 650 ft. long) in Idaho. As the result of the operations eight new towns had been established, 100 m. of branch railroads constructed, and 14,000 people settled in what had been the desert.

A White House conference of governors of states was held at Washington in May 1909, which drew up a " declaration of principles " for the conservation of natural resources, recommending the appointment of a commission by each state to co-operate with one another and with the Federal government ; and by the end of the year thirty-six states had appointed Conservation committees. Thus, in the first decade of the 20th century a great advance had been made in the way in which the whole problem was being viewed in America, though the very immensity of the problem of bringing the Federal power to bear on operations on so vast a scale, involving the limitation of private land speculation in important areas, still presented political difficulties of considerable magnitude.

IRULAS (" Benighted ones," from Tamil, iral, " darkness "), a semi-Hinduized forest-tribe of southern India, who are found mainly in North Arcot, Chingleput, South Arcot, Trichinopoly, and the Malabar Wynaad. The typical Irulas of the Nilgiris live a wild life on the lower slopes of those hills. At the 1901 census this branch of the Irulas numbered 1915, while the total of so-called Irulas was returned at 86,087.

See J. W. Breeks, Primitive Tribes of the Nilgiris (1873); Nilgiri Manual, i. 214-217; North Arcot Manual, i. 248-249.

IRUN, a frontier town of northern Spain, in the province of Guipuzcoa, on the left bank of the river Bidassoa, opposite the French village of Hendaye. Pop. (1900) 9012. Irun is the northern terminus of the Spanish Northern railway, and a

thriving industrial town, with ironworks, tan-yards, potteries and paper mills. Its principal buildings are the fine Renaissance parish church and the fortress-like 17th-century town hall. It derives its prosperity from the fact that it is the most important custom-house in Spain for the overland trade with the rest of Europe. Irun is also on the chief highway for travellers and mails. It is the terminus of some important narrow-gauge mining railways and steam tramways, which place it in communi- cation with the mining districts of Guipuzcoa and Navarre, and with the valuable oak, pine and beech forests of both provinces. There are hot mineral springs in the town.

IRVINE, a royal, municipal and police burgh, and seaport of Ayrshire, Scotland. Pop. (1901) 9607. It is situated on the north bank of the estuary of the Irvine, 295 m. S.W. of Glasgow by the Caledonian railway, with a station also on the Glasgow & South Western railway. It is connected with the suburb of Fullarton on the south side of the river by a stone bridge, which was built in 1746 and widened in 1827. Alexander II. granted it a charter, which was confirmed by Robert Bruce. Towards the end of the 17th century it was reckoned the third shipping port in Scotland (Port Glasgow and Leith being the leaders), and though its importance in this respect declined owing to the partial silting-up of the harbour, its water-borne trade revived after 1875, the sandy bar having been removed and the wharfage extended and improved. The public buildings include the town hall, academy (1814) and fever hospital. The principal historical remains are the square tower of Stanecastle and the ancient Seagate Castle, which contains some good speci- mens of Norman architecture. The industries include engine- making, shipbuilding, iron- and brass-founding, the manufacture of chemicals, brewing and soap-making. Irvine unites with Ayr, Campbeltown, Inveraray and Oban in sending one member to parliament. The exports consist principally of coal, iron and chemical products, and the imports of grain, timber, lime- stone, ores

and general produce. At Dreghorn, 2 m. to the S.E. (pop. 1 1 55) coal and iron are worked.

IRVING, EDWARD (1792-1834), Scottish church divine, generally regarded as the founder of the " Catholic Apostolic Church " (q.v.), was born at Annan, Dumfriesshire, on the 4th of August 1792. By his father's side, who followed the occupa- tion of a tanner, he was descended from a family long known in the district, and the purity of whose Scottish lineage had been tinged by alliance with French Protestant refugees; but it was from his mother's race, the Lowthers, farmers or small pro- prietors in Annandale, that he seems to have derived the most distinctive features of his personality. The first stage of his education was passed at a school kept by " Peggy Paine," a relation of the well-known author of the Age of Reason, after which he entered the Annan academy, taught by Mr Adam Hope, of whom there is a graphic sketch in the Reminiscences of Thomas Carlyle. At the age of thirteen he entered the university of Edinburgh. In 1809 he graduated M.A.; and in 1810, on the recommendation of Sir John Leslie, he was chosen master of an academy newly established at Haddington, where he became the tutor of Jane Welsh, afterwards famous as Mrs Carlyle. He became engaged in 181 2 to Isabella Martin, whom in 1823 he married; but it may be at once stated here that meanwhile he gradually fell in love with Jane Welsh, and she with him. He tried to get out of his engagement with Miss Martin, but was prevented by her family. If he had married Miss Welsh, his life, as well as hers, would have been very dif- ferent. It was Irving who in 18 21 introduced Carlyle to her.

His appointment at Haddington he exchanged for a similar one at Kirkcaldy in 181 2. Completing his divinity studies by a series of partial sessions, he was " licensed " to preach in June 1 81 5, but continued to discharge his scholastic duties for three years. He devoted his leisure, not only to mathematical and physical science, but to a course of reading in English literature, his bias towards the antique in sentiment and style being strengthened by a perusal of the older classics, among whom Richard Hooker was his favourite author. At the same time his love of the marvellous found gratification in the wonders

of the Arabian Nights, and it is further characteristically related of him that he used to carry continually in his waistcoat pocket a miniature copy of Ossian, passages from which he frequently recited with " sonorous elocution and vehement gesticulation."

In the summer of 18 18 he resigned his mastership, and, in order to

increase the probability of obtaining a permanent appointment in the church, took up his residence in Edinburgh. Although his exceptional method of address seems to have gained him the qualified approval of certain dignitaries of the church, the prospect of his obtaining a settled charge seemed as remote as ever, and he was meditating a missionary tour in Persia when his departure was arrested by steps taken by Dr Chalmers, which, after considerable delay, resulted, in October 1819, in Irving being appointed his assistant and missionary in St John's parish, Glasgow. Except in the case of a select few, Irving's preaching awakened little interest among the congregation of Chalmers, Chalmers himself, with no partiality for its bravuras and flourishes, comparing it to " Italian music, appreciated only by connoisseurs "; but as a missionary among the poorer classes he wielded an influence that was altogether unique. The benediction " Peace be to this house," with which, in accordance with apostolic usage, he greeted every dwelling he entered, was not inappropriate to his figure and aspect, and it is said " took the people's attention wonderfully," the more especially after the magic of his personality found opportunity to reveal itself in close and homely intercourse. This half-success in a sub- ordinate sphere was, however, so far from coinciding with his aspirations that he had again, in the winter of 1821, begun to turn his attention towards missionary labour in the East, when the possibility of fulfilling the dream of his life Was suddenly revealed to him by an invitation from the Caledonian church, Hatton Garden, London, to " make trial and proof " of his gifts before the " remnant of the congregation which held together." Over that charge he was ordained in July 1822. Some years previously he had expressed his conviction that " one of the chief needs of the age was to make inroad after the alien, to bring in the votaries of fashion, of literature, of senti- ment, of policy and of rank, who are content in their several idolatries to do without piety to God and love to Him whom He hath sent "; and, with an abruptness which must have produced on him at first an effect almost astounding, he now had the satisfaction of beholding these various votaries thronging to hear from his lips the words of wisdom which would deliver them from their several idolatries and remodel their lives according to the fashion of apostolic times.

This sudden leap into popularity seems to have been occasioned in connexion with a veiled allusion to Irving's Striking eloquence made in the House of Commons by Canning, who had been induced to attend his church from admiration of an expression in one of his prayers, quoted to him by Sir James Mackintosh. His commanding stature, the symmetry of his form, the dark and melancholy beauty

of his countenance, rather rendered piquant than impaired by an obliquity of vision, produced an imposing impression even before his deep and powerful voice had given utterance to its melodious thunders; and harsh and superficial half-truths enunciated with surpassing ease and grace of gesture, and not only' with an air of absolute conviction but with the authority of a prophetic messenger, in tones whose magical fascination was inspired by an earnestness beyond all imitation of art, acquired a plausibility and importance which, at least while the orator spoke, made his audience entirely forgetful of their preconceived objections against them. The subject-matter of his orations, and his peculiar treatment of his themes, no doubt also, at least at first, constituted a con- siderable part of his attractive influence. He had specially prepared himself, as he thought, for " teaching imaginative men, and political men, and legal men, and scientific men who bear the world in hand "; and he did not attempt to win their attention to abstract and worn-out theological arguments, but discussed the opinions, the poetry, the politics, the manners and customs of the time, and this not with philosophical com- prehensiveness, not in terms of warm eulogy Or measured blame,

but of severe satire varied by fierce denunciation, and with a specific minuteness which was concerned primarily with individuals. A fire of criticism from pamphlets, newspapers and reviews opened on his volume of Orations, published in 1823; but the excitement produced was merely superficial and essen- tially evanescent. Though cherishing a strong antipathy to the received ecclesiastical formulas, Irving's great aim was to revive the antique style of thought and sentiment which had hardened into these formulas, and by this means to supplant the new influences, the accidental and temporary moral shortcomings of which he detected with instinctive certainty, but whose pro- found and real tendencies were utterly beyond the reach of his conjecture. Being thus radically at variance with the main current of the thought of his time, the failure of the commission he had undertaken was sooner or later inevitable; and shortly after the opening of his new church in Regent Square in 1827, he found that " fashion had taken its departure," and the church, " though always well filled," was " no longer crowded." By this desertion his self-esteem, one of his strongest passions, though curiously united with singular sincerity and humility, was doubtless hurt to the quick; but the wound inflicted was of a deeper and deadlier kind, for it

confirmed him finally in his despair of the world's gradual amelioration, and established his tendency towards supernaturalism.

For years the subject of prophecy had occupied much of his thoughts, and his belief in the near approach of the second advent had received such wonderful corroboration by the perusal of the work of a Jesuit priest, writing under the assumed Jewish name of Juan Josafat Ben-Ezra, that in 1827 he published a translation of it, accompanied with an eloquent preface. Probably the religious opinions of Irving, originally in some respects more catholic and truer to human nature than generally prevailed in ecclesiastical circles, had gained breadth and comprehensiveness from his intercourse with Coleridge, but gradually his chief interest in Coleridge's philosophy centred round that which was mystical and obscure, and to it in all likelihood may be traced his initiation into the doctrine of millenarianism. The first stage of his later development, which resulted in the establishment of the " Irvingite " or " Holy Catholic Apostolic Church," in 1832, was associated with conferences at his friend Henry Drummond's seat at Albury concerning unfulfilled prophecy, followed by an almost exclusive study of the prophetical books and especially of the Apocalypse, and by several series of sermons on prophecy both in London and the provinces, his apocalyptic lectures in 1828 more than crowding the largest churches of Edinburgh in the early summer mornings. In 1830, however, there was opened up to his ardent imagination a new vista into spiritual things, a new hope for the age in which he lived, by the seeming actual revival in a remote comer of Scotland of those apostolic gifts of prophecy and healing which he had already in 1828 persuaded himself had only been kept in abeyance by the absence of faith. At once he welcomed the new " power " with an unquestioning evidence which could be shaken by neither the remonstrances or desertion of his dearest friends, the recantation of some of the principal agents of the " gifts," his own declension into a comparatively subordinate position, the meagre and barren results of the manifestations, nor their general rejection both by the church and the world. His excommunication by the presbytery of London, in 1830, for publishing his doctrines regarding the humanity of Jesus Christ, and the condemnation of these opinions by the General Assembly of the Church of Scotland in the following year, were secondary episodes which only affected the main issue of his career in so far as they tended still further to isolate him from the sympathy of the church; but the "irregularities" connected with the manifestation of the " gifts " gradually estranged the majority of his own congre- gation, and on the complaint of the trustees -to the presbytery of London, whose authority they had

formerly rejected, he was declared unfit to remain the minister of the National Scotch Church of Regent Square. After he and those who adhered to him (describing themselves as of the Holy Catholic Apostolic

Church) had in 1832 removed to a new building in Newman Street, he was in March 1833 deposed from the ministry of the Church of Scotland by the presbytery of Annan on the original charge of heresy. With the sanction of the " power " he was now after some delay reordained " chief pastor of the church assembled in Newman Street," but unremitting labours' and ceaseless spiritual excitement soon completely exhausted the springs of his vital energy. He died, worn out and wasted with labour and absorbing care, while still in the prime of life, on the 7th of December 1834.

The writings of Edward Irving published during his lifetime were For the Oracles of God, Four Orations (1823); For Judgment to come (1823); Babylon and Infidelity foredoomed (1826); Sermons, &c. (3 vols., 1828) ; Exposition of the Book of Revelation (1831) ; an introduction to a translation of Ben-Ezra; and an introduction to Home's Commentary on the Psalms. His collected works were pub- lished in 5 volumes, edited by Gavin Carlyle. See also the article Catholic Apostolic Church.

The Life of Edward Irving, by Mrs Oliphant, appeared in 1862 in 2 vols. Among a large number of biographies published previously, that by Washington Wilks (1854) has some merit. See also Hazlitt's Spirit of the Age; Coleridge's Notes on English Divines; Carlyle's Miscellanies, and Carlyle's Reminiscences, vol. i. (1881).

IRVING, SIR HENRY (1838-1905), English actor, whose original name was John Brodribb, was born at Keinton-Mande- ville, Somerset, on the 6th of February 1838. After a few years' schooling he became a clerk to a firm of East India merchants in London, but he soon gave up a commercial career and started as an actor. On the 29th of September 1856 he made his first appearance at Sunderland as Gaston, duke of Orleans, in Bulwer Lytton's Richelieu, billed as Henry Irving. This name he eventually assumed by royal licence. For ten years he went through an arduous training in various provincial stock companies, acting in more than five hundred parts. By degrees his ability gained recognition, and in 1866 he obtained an engagement at the St James's Theatre, London, to play Doricourt in The Belle's Stratagem. A year later he joined the company of the newly-opened Queen's Theatre, where he acted with Charles Wyndham, J. L. Toole, Lionel Brough, John Clayton, Mr and Mrs

Alfred Wigan, Ellen Terry and Nelly Farren. This was followed by short engagements at the Hay- market, Drury Lane and Gaiety. At last he made his first con- spicuous success as Digby Grant in James Albery's The Two Roses, which was produced at the Vaudeville on the 4th of June 1870 and ran for 300 nights. In 1871 he began his association with the Lyceum Theatre by an engagement under Bateman's management. The fortunes of the house were at a low ebb when the tide was turned by Irving's immediate success as Mathias in The Bells, a version of Erckmann-Chatrian's Le Juif Polcmais by Leopold Lewis. The play ran for 150 nights.- With Miss Bateman, Irving was seen in W. G. Wills's Charles I. and Eugene Aram, in Richelieu, and in 1874 in Hamlet. The unconventionality of this last performance, during a run of 200 nights, aroused keen discussion, and singled him out as the most interesting English actor of his day. In 1875, still with Miss Bateman, he was seen as Macbeth; in 1876 as Othello, and as Philip in Tennyson's Queen Mary', in 1877 in Richard III. and The Lyons Mail.

In 1878 Irving opened the Lyceum under his own management. With Ellen Terry as Ophelia and Portia, he revived Hamlet and produced The Merchant of Venice (1879). His' Shylock was as much discussed as his Hamlet had been, the dignity with which he invested the Jew marking a departure from the traditional interpretation of the role, and pleasing some as much as it offended others. After the production of Tennyson's The Cup, a revival of Othello (in which Irving played Iago to the Othello of Edwin Booth) and of Romeo and Juliet, there began a period at the Lyceum which had a potent effect on the English stage. The Lyceum stage management, and the brilliancy of its produc- tions in scenery, dressing and accessories, were revelations in the art of mise-en-scbne. Much Ado about Nothing (1882) was followed by Twelfth Night (1884), Olivia — an adaptation of Goldsmith's Vicar of Wakefield by W. G. Wills (1885); Faust (1886); Macbeth (1888): The Dead Heart, by Watts Phillips

(1889); and Ravenswood— Herman Merivale's dramatic version of Scott's Bride of Lammermoor (1890). Fine assumptions in 1892 of the characters of Wolsey in Henry VIII. and of King Lear were followed in 1893 by a striking and dignified performance of Becket in Tennyson's play of that name. During these years too, Irving, with the whole Lyceum company, paid several visits to America, which met with conspicuous success, and were repeated in succeeding

years. The chief remaining novelties at the Lyceum (luring Irving's sole managership (the theatre passed, at the beginning of 1899, into the hands of a limited liability company) were Comyns Carr's King Arthur in 1895; Cymbeline, in which Irving played Iachimo, in 1896; Sardou's Madame Sam-Gene in 1897; Peter the Great, a play by Laurence Irving, the actor's second son, in 1898; and Conan Doyle's Waterloo (1894). The new regime at the Lyceum was signalized by the production of Sardou's Robespierre in 1899, in which Irving reappeared after a serious illness, and in 1901 by an elaborate revival of Coriolanus. Irving s only subsequent production in London was Sardou's Dante (1903), a vast spectacular drama, staged at Drury Lane He died " on tour " at Bradford on the 13th of October 1905 and was buried in Westminster Abbey. '

Both on and off the stage Irving always maintained a high ideal of his profession, and in 1895 he received the honour of knighthood, the first ever accorded an actor. He was also the recipient of honorary degrees from the universities of Dublin Cambridge and Glasgow. His acting, apart from his genius as a presenter of plays, divided criticism, opinions differing as to the extent to which his mannerisms of voice and deportment interfered with or assisted the expression of his ideas. So strongly marked a personality as his could not help giving its own colour- ing to whatever part he might assume, but the richness and originality of this colouring at its best cannot be denied, any more than the spirit and intellect which characterized his render- ings. At the least, extraordinary versatility must be conceded to an actor who could satisfy exacting audiences in roles so widely different as Digby Grant and Louis XL, Richard III. and Becket, Benedick and Shylock, Mathias and Dr Primrose.

Sir Henry Irving had two sons, Harty Brodribb (b. 1870) and Laurence (b. 1872). They were educated for other walks of life, the former for the bar, and the latter for the diplomatic service; but both turned to the stage, and the elder, who had already established himself as the most prominent of the younger English actors at the time of his father's death, went into management on his own account.

IRVING, WASHINGTON (1783-1859), American man of letters, was born at New York on the 3rd of April 1783. Both his parents were immigrants from Great Britain, his father, originally an officer in the merchant service, but at the time of Irving's birth a considerable merchant, having come from the Orkneys, and his mother from Falmouth. Irving was intended for the legal profession, but his studies were interrupted by an illness necessitating a voyage to

Europe, in the course of which he pro- ceeded as far as Rome, and made the acquaintance of Washington Allston. He was called to the bar upon his return, but made little effort to practise, preferring to amuse himself with literary ventures. The first of these of any importance, a satirical miscellany entitled Salmagundi, or the Whim-Whams and Opinions of Launcelot Langstaff and others, written in conjunction with his brother William and J. K. Paulding, gave ample proof of his talents as a humorist. These were still more conspicuously displayed in his next attempt, A History of New York from the Beginning of the World to the End of the Dutch Dynasty by ' Diednch Knickerbocker" (2 vols., New York, 1809) The satire of Salmagundi had been principally local, and the original design of " Knickerbocker's " History was only to burlesque a pretentious disquisition on the history of the city in a guide book by Dr Samuel Mitchell. The idea expanded as Irving proceeded, and he ended by not merely satirizing the pedantry of local antiquaries, but by creating a distinct literary type out of the solid Dutch burgher whose phlegm had long been an object ot ridicule to the mercurial Americans. Though far from the most finished of Irving's productions, "Knickerbocker"

manifests the most original power, and is the most genuinely national in its quaintness and drollery. The very tardiness and prolixity of the story are skilfully made to heighten the humorous effect.

Upon the death of his father, Irving had become a sleeping partner in his brother's commercial house, a branch of which was established at Liverpool. This, combined with the restora- tion of peace, induced him to visit England in 1815, when he found the stability of the firm seriously compromised. After some years of ineffectual struggle it became bankrupt. This mis- fortune compelled Irving to resume his pen as a means of sub- sistence. His reputation had preceded him to England, and the curiosity naturally excited by the then unwonted apparition of a successful American author procured him admission into the highest literary circles, where his popularity was ensured by his amiable temper and polished manners. As an American, moreover, he stood aloof from the political and literary disputes which then divided England. Campbell, Jeffrey, Moore, Scott , were counted among his friends, and the last-named zealously recommended him to the publisher Murray, who, after at first refusing, consented (1820) to bring out The Sketch Book of Geoffrey Crayon, Gent. (7 pts., New York, 1819-1820). The most interesting part of this work is the description of an English Christmas, which displays a delicate humour not unworthy of the writer's evident

model Addison. Some stories and sketches on American themes contribute to give it variety; of these Rip van Winkle is the most remarkable. It speedily obtained the greatest success on both sides of the Atlantic. Bracebridge Hall, or the Humourists (2 vols., New York), a work purely English in subject, followed in 1822, and showed to what account the American observer had turned his experience of English country life. The humour is, nevertheless, much more English than American. Tales of a Traveller (4 pts.) appeared in 1824 at Philadelphia, and Irving, now in comfortable circumstances, determined to enlarge his sphere of observation by a journey on the continent. After a long course of travel he settled down at Madrid in the house of the American consul Rich. His intention at the time was to translate the Coleccion de los Viajes y Descubrimientos (Madrid, 1825-1837) of Martin Fernandez de Navarrete; finding, however, that this was rather a collection of valuable materials than a systematic biography, he determined to compose a biography of his own by its assistance, supplemented by independent researches in the Spanish archives. His History of the Life and Voyages of Christopher Columbus (London, 4 vols.) appeared in 1828, and obtained a merited success. The Voyages and Discoveries of the Companions of Columbus (Philadelphia, 1831) followed; and a prolonged residence in the south of Spain gave Irving materials for two highly picturesque books, A Chronicle of the Conquest of Granada from the MSS. of fan imaginary] Fray Antonio Agapida (2 vols., Philadelphia, 1829), and The Alhambra: a series of tales and sketches of the Moors and Spaniards (2 vols., Philadelphia, 1832). Previous to their appearance he had been appointed secretary to the embassy at London, an office as purely complimentary to his literary ability as the legal degree which he about the same time received from the university of Oxford.

Returning to the United States- in 1832, after seventeen years' absence, he found his name a household word, and himself universally honoured as the first American who had won for his country recognition on equal terms in the literary republic. After the rush of fetes and public compliments had subsided,' he undertook a tour in the western prairies, and returning to the neighbourhood of New York built for himself a delightful retreat on the Hudson, to which he gave the name of " Sunnyside." His acquaintance with the New York millionaire John Jacob Astor prompted his next important work — Astoria (2 vols., Philadelphia, 1836), a history of the fur-trading settlement founded by Astor in Oregon, deduced with singular literary ability from dry commercial records, and, without laboured attempts at word-painting, evincing a remarkable faculty

for bringing scenes and incidents vividly before the eye. The

Adventures of Captain Bonneville (London and Philadelphia, 1837), based upon the unpublished memoirs of a veteran explorer, was another work of the same class. In 1842 Irving was appointed ambassador to Spain. He spent four years in the country, without this time turning his residence to literary account; and it was not until two years after his return that Forster's life of Goldsmith, by reminding him of a slight essay of his own which he now thought too imperfect by comparison to be included among his collected writings, stimulated him to the production of his Life of Oliver Goldsmith, with Selections from his Writings (2 vols., New York, 1849). Without pretensions to original research, the book displays an admirable talent for employing existing material to the best effect. The same may be said of The Lives of Mahomet and his Successors (New York, 2 vols., 1849-1850). Here as elsewhere Irving correctly dis- criminated the biographer's province from the historian's, and leaving the philosophical investigation of cause and effect to writers of Gibbon's calibre, applied himself to represent the picturesque features of the age as embodied in the actions and utterances of its most characteristic representatives. His last days were devoted to his Life of George Washington (5 vols., 1855-1850. New York and London), undertaken in an enthusi- astic spirit, but which the author found exhausting and his readers tame. His genius required a more poetical theme, and indeed the biographer of Washington must be at least a potential soldier and statesman. Irving just lived to complete this work, dying of heart disease at Sunnyside, on the 28th of November 1859.

Although one of the chief ornaments of American literature, Irving is not characteristically American. But he is one of the few authors of his period who really manifest traces of a vein of national peculiarity which might under other circumstances have been productive. " Knickerbocker's" History of New York, although the air of mock solemnity which constitutes the staple of its humour is peculiar to no literature, manifests never- theless a power of reproducing a distinct national type. Had circumstances taken Irving to the West, and placed him amid a society teeming with quaint and genial eccentricity, he might possibly have been the first Western humorist, and his humour might have gained in depth and richness. In England, on the other hand, everything encouraged his natural fastidiousness;

he became a refined writer, but by no means a robust one. His biographies bear the stamp of genuine artistic intelligence, equally remote from compilation and disquisition. In execution they are almost faultless; the narrative is easy, the style pellucid, and the writer's judgment nearly always in accordance with the general verdict of history. Without ostentation or affectation, he was exquisite in all things, a mirror of loyalty, courtesy and good taste in all his literary connexions, and exemplary in all the relations of domestic life. He never married, remaining true to the memory of an early attachment blighted by death.

The principal edition of Irving's works is the "Geoffrey Crayon," published at New York in 1880 in 26 vols. His Life and Letters was published by his nephew Pierre M. Irving (London, 1862-1864, 4 vols.; German abridgment by Adolf Laun, Berlin, 1870, 2 vols.) There is a good deal of miscellaneous information in a compilation entitled Irvingiana (New York, i860); and W. C. Bryant's memorial oration, though somewhat too uniformly laudatory, may be consulted with advantage. It was republished in Studies of Irving (1880) along with C. Dudley Warner's introduction to the " Geoffrey Crayon " edition, and Mr G. P. Putnam's personal reminiscences of Irving, which originally appeared in the Atlantic Monthly. See also Washington Irving (1881), by C. D. Warner, in the " American Men of Letters " series; H. R. Haweis, American Humourists (London, 1883). (R. G.)

IRVINGTON, a town of Essex county, New T-rsey, U.S.A., bordering on the S.W. side of Newark. Pop. (iqoo) 5255, of whom QQ3 were foreign-born; (1905) 7180; (1010) 11,877. lrvington is served by the Lehigh Ya'ley railroad and by electric railway to Newark. It is principally a residential suburb of Newark, but it has a small smelter (for gold and silver), and various manufactures, including textile working machinery, measuring rules and artisans' tools. There arc large strawberry-

farms here. lrvington was settled near the close of the 17th century, and was called Camptown until 1852, when the present name was adopted in honour of Washington Irving. It was incorporated as a village in 1874, and as a town in 1898.

ISAAC (Hebrew for " he laughs," on explanatory references to the name, see Abraham), the only child of Abraham and Sarah, was born when his parents were respectively a hundred and ninety years of age (Gen. xvii. 17). Like his father, Isaac lived a nomadic pastoral life, but within much narrower local limits, south of Beersheba (Gen.

xxvi., on the incidents here recorded, see Abimelech). After the death of his mother, when he was forty years old, he married Rebekah the Aramaean, by whom after twenty years of married life he became the father of Esau and Jacob. He died at the age of one hundred and eighty. 1 " Isaac " is used as a synonym for " Israel " by Amos (vii. 9, 16), who also bears witness to the importance of Beersheba as a sanctuary. It was in this district, at the well Beer-Lahai-roi, that Isaac dwelt (Gen. xxiv. 62, xxv. n), and the place was famous for an incident in the life of Hagar (xvi. 14). This was perhaps the original scene of the striking episode " in the land of Moriah," when at the last moment he was by angelic interposition released from the altar on which he was about to be sacrificed by his father in obedience to a divine command (Gen. xxii). 2 The narrative (which must be judged with due regard to the condi- tions of the age) shows that the sacrifice of the first-born, though not inconsistent with Yahweh's claims (Ex. xxii. 29), was neither required nor tolerated (cp. Micah vi. 6-8). See Moloch.

Isaac is by general consent of the Christian church taken as a representative of the unobtrusive, restful, piously contemplative type of human character. By later Judaism, which fixed its atten- tion chiefly on the altar scene, he was regarded as the pattern and prototype of all martyrs. The Mahommedan legends regarding him are curious, but trifling.

The resemblance between incidents in the lives of Isaac and Abraham is noteworthy; in each case Isaac appears to be the more original. See further Ishmael, and note that the pair Isaac and Ishmael correspond to Abraham and Lot, Jacob and Esau. On general questions, see E. Meyer, Israeliten (Index, s.v.). For attempts to find a mythological interpretation of Isaac's life, see Goldziher, Mythology of the Hebrews; Winckler, Gesch. Israels (vol. ii.).

ISAAC I. (Comnenus), emperor of the East (1057-1059), was the son of an officer of Basil II. named Manuel Comnenus, who on his deathbed commended his two sons Isaac and John to the emperor's care. Basil had them carefully educated at the monastery of Studion, and afterwards advanced them to high official positions. During the disturbed reigns of Basil's seven immediate successors, Isaac by his prudent conduct won the confidence of the army; in 1057 he joined with the nobles of the capital in a conspiracy against Michael VI. , and after the latter's deposition was invested with the crown, thus founding the new dynasty of the Comneni. The first care of the new emperor was to reward his noble partisans with appointments that removed them from Constantinople, and his next was to repair the

beggared finances of the empire. He revoked numerous pensions and grants conferred by his predecessors upon idle courtiers, and, meeting the reproach of sacrilege made by the patriarch of Constantinople by a decree of exile, resumed a proportion of the revenues of the wealthy monasteries. Isaac's only military expedition was against the Hungarians and Petchenegs, who began to ravage the northern frontiers in 1059. Shortly after this successful campaign he was seized with an illness, and believing it mortal appointed as his successor Constantine Ducas, to the exclusion of his own brother John. Although he recovered Isaac did not resume the purple, but retired to the monastery of Studion and spent the remaining two years of his life as a monk, alternating menial offices with literary studies. His Scholia to

1 The stories, including the delightful history of the courting of Rebekah by proxy, are due to the oldest narrators. The jarring chronological notices belong to the post-exilic framework of the book (see Genesis).

2 The name is hopelessly obscure, and the identification with the mountain of the temple in Jerusalem rests upon a late view (2 Chron. iii. 1). It is otherwise called " Yahweh-yir'eh " (" Y. sees ") which is analogous to " El-ro'i " (" a God of Seeing ") in xvi. 13. See further the commentaries.

the Iliad and other works on the Homeric poems are still extant in MS. He died in the year 1061. Isaac's great aim was to restore the former strict organization of the government, and his reforms, though unpopular with the aristocracy and the clergy, and not understood by the people, certainly con- tributed to stave off for a while the final ruin of the Byzantine empire.

See E. Gibbon, The Decline and Fall of the Roman Empire (ed. J. Bury, London, 1896, vol. v.) ; G. Finlay, History of Greece (ed. 1877, Oxford, vols. ii. and iii.).

ISAAC II. (Angelus), emperor of the East 1185-1195, and again 1 203-1 204, was the successor of Andronicus I. He inaugurated his reign by a decisive victory over the Normans in Sicily, but elsewhere his policy was less successful. He failed in an attempt to recover Cyprus from a rebellious noble, and by the oppressiveness of his

taxes drove the Bulgarians and Vlachs to revolt (1 186). In 1187 Alexis Branas, the general sent against the rebels, treacherously turned his arms against his master, and attempted to seize Constantinople, but was defeated and slain. The emperor's attention was next demanded in the east, where several claimants to the throne successively rose and fell. In 1 189 Frederick Barbarossa of Germany sought and obtained leave to lead his troops on the third crusade through the Byzantine territory; but he had no sooner crossed the border than Isaac, who had meanwhile sought an alliance with Saladin, threw every impediment in his way, and was only compelled by force of arms to fulfil his engagements. The next five years were disturbed by fresh rebellions of the Vlachs, against whom Isaac led several expeditions in person. During one of these, in 1195, Alexius, the emperor's brother, taking advantage of the latter's absence from camp on a hunting expedition, proclaimed himself emperor, and was readily recognised by the soldiers. Isaac was blinded and imprisoned in Constantinople. After eight years he was raised for six months from his dungeon to his throne once more (see Crusades). But both mind and body had been enfeebled by captivity, and his son Alexius IV. was the actual monarch. Isaac died in 1204, shortly after the usurpation of his general, Mour- zouphles. He was one of the weakest and most vicious princes that occupied the Byzantine throne. Surrounded by a crowd of slaves, mistresses and flatterers, he permitted his empire to be administered by unworthy favourites, while he squandered the money wrung from his provinces on costly buildings and expensive gifts to the churches of his metropolis.

See Gibbon, Decline and Fall (ed. J. Bury, London, 1896, vol. vi.) ; G. Finlay, History of Greece (ed. 1877, Oxford, vols. iii. and iv.).

ISAAC OF ANTIOCH, "one of the stars of Syriac literature," 1 the reputed author of a large number of metrical homilies, 2 many of which are distinguished by an originality and acumen rare among Syriac writers. As to the identity and history of the author considerable difficulty has arisen. The statements of ancient writers, Eastern and Western, were collected by Assemani {B.O. i. 207-214). According to these accounts Isaac flourished under Theodosius II. (408-450) , 3 and was a native either of Amid (Diarbekr) or of Edessa. Several writers identify him with Isaac, the disciple of S. Ephraim, who is mentioned in the anonymous Life of that father; but according to the patriarch Bar ShQshan (d. 1073), who made a collection of his homilies, his master was Ephraim's disciple Zenobius. He is supposed to have migrated to Antioch, and to have become abbot of one of the convents in its neighbourhood. According

to Zacharias Rhetor he visited Rome and other cities, and the chronicle of Pseudo-Dionysius of Tell-Mahre informs us that he composed poems on the secular games of 404, and wrote on the destruction of Rome by Alaric in 410. He also commemorated the destruction of Antioch by an earthquake in 459, so that he must have lived till about 460. Unfortunately these poems have perished. He is of course to be

1 W. Wright, Short Hist, of Syr. Lit. p. 51.

2 The fullest list, by G. Bickell, contains 191 which are extant in MSS.

3 The trustworthy Chronicle of Edessa gives his date as 451-452 (Hallier, No. lxvii.); and the recently published Chronicle of Michael the Syrian makes him contemporary with Nonus, who became the 31st bishop of Edessa in 449.

distinguished from Isaac of Nineveh, a Nestorian writer on the ascetic life who belongs to the second half of the 7th century. 4

When we examine the collection of homilies attributed to Isaac, a difficulty arises on two grounds. (1) The author of some of the poems is fervently orthodox or Catholic (see especially Nos. 1.-3 in Bickell's edition = 62-64 in Bedjan), in other and more important homilies (such as Bickell 6, 8 = Bedjan 59, 6l, and especially Bedjan 60) the doctrine is monophysite, even though Eutyches and Nestorius are equally condemned. (2) One of the monophysite homilies, the famous poem of 2136 lines on the parrot which uttered the Trisagion in the streets of Antioch (Bickell, 8 = Bedjan 61), appears to have been written at Antioch after Peter the Fuller (patriarch 471-488) raised the dispute about the addition to the doxology of the words qui crucifixus es pro nobis. It is therefore scarcely possible that the author of this homily should be the same who composed the lost poems on the secular games in 404 and on the sack of Rome.

Moreover, Lamy (S. Ephraemi hymni et sermones, iv. 361-364) and Bedjan {Homiliae S. Isaaci, i. pp. iv-ix) have recently called attention to statements made by Jacob of Edessa (708) in a letter to John the Stylite. He says there were three Isaacs who wrote in Syriac — two orthodox (i.e. monophysite), and one a Chalcedonian heretic (i.e. orthodox or Catholic), (a) The first, he says, a native of Amid, and pupil of S. Ephraim, visited Rome in the time of Arcadius (395-408), on his return journey suffered imprisonment at Byzantium, and afterwards became a priest in the church of Amid,

(b) The second was a priest of Edessa, and flourished in the reign of Zeno (474-491). He went up to Antioch in the time of Peter the Fuller. Jacob then tells the story of the parrot (see above), (c) The third was also an Edessene. At first in the days of Bishop Paul (510-522) he was orthodox (monophysite) : but afterwards in the time of the Chalcedonian (Catholic) bishop Asclepius he became Nestorian (Catholic) and wrote poems setting forth Nestorian doctrine.

With such conflicting evidence it is impossible to arrive at a certain result. But Jacob is an early witness: and on the whole it seems safe to conclude with Bedjan (p. ix) that works by at least two authors have been included in the collection attributed to Isaac of Antioch. Still the majority of the poems are the work of one hand — the 5th-century monophysite who wrote the poem on the parrot. 6 A full list 6 of the 191 poems existing in European MSS. is given by Bickell, who copied out 181 with a view to publishing them all: the other 10 had been previously copied by Zingerle. But the two volumes published by Bickell in his lifetime (Giessen, 1873 and 1877) contain only 37 homilies. Bedjan's edition, of which the first volume has alone appeared (Paris, 1903) contains 67 poems, viz. 24 previously published (18 by Bickell), and 43 that are new, though their titles are all included in Bickell's list.

The writer's main interest lies in the application of religion to the practical duties of life, whether in the church or in the world. He has a great command of forcible language and con- siderable skill in apt illustration. The zeal with which he denounces the abuses prevalent in the church of his day, and particularly in the monastic orders, is not unlike that of the Protestant reformers. He shows acquaintance with many phases of life. He describes the corruption of judges, the pre- valence of usury and avarice, the unchastity which especially characterized trie upper classes, and the general hypocrisy of so-called Christians. His doctrinal discussions are apt to be diffuse; but he seldom loses sight of the bearing of doctrine on practical life. He judges with extreme severity those who argue about religion while neglecting its practice, and those who though stupid and ignorant dare to pry into mysteries which are sealed to the angels. " Not newly have we found Him, that we should search and pry into God. As He was He is : He changeth not with the times. . . . Confess that He formed thee of dust: search not the mode of His being: Worship Him that He redeemed thee by His only Son: inquire not the manner of His birth." 7

Some of Isaac's works have an interest for the historian of the 5th

century. In two poems (Bickell n, 12 = Bedjan 48, 49), written probably at Edessa, he commemorates the capture of Beth-Hurˆta

4 The date of_ Isaac of Nineveh is now known from the Liber fundatorum of Isho'-denah, an 8th-century writer; see Bedjan's edition, and Chabot, Livre de la chastete, p. 63 Assemani (B.O. i. 445) had placed him late in the 6th century, and Chabot (De S. Isaaci Ninivitae vita, &c.) in the second half of the 5th.

6 Lamy (op. tit. iv. 364-366) has pointed out that several of the poems are in certain MSS. attributed to Ephraim. Possibly the author of the orthodox poems was not named Isaac at all.

6 Assemani's list of 104 poems (B.O. i. 214-234) is completely covered by Bickell's.

7 From a really noble poem (Bedjan 60) on the problem whether God suffered anil died on the cross.

ISABELLA-ISABELLA H-Li

■*59

city near Nisibis) by the Arabs. Although the historical allusions are far from clear, we gather that Beth-Hur, which in zealous paganism had been a successor to rfaran, had been in earlier days devastated by the Persians : 1 but for the last 34 years the Persians had themselves suffered subjection. 2 And now had come a flood of Arab invaders, " sons of Hagar," who had swept away the city and carried all its inhabitants captive. From these two poems, and from the 2nd homily on Fasting (Bickell l4 = Bedjan 17) we gain a vivid picture of the miseries borne by the inhabitants of that frontier region during the wars between Persia and the Romano-Greek empire. There are also instructive references to the heathen practices and the worship of pagan deities (such as Baalti, Uzzi, Gedlath and the planet Venus) prevalent in Mesopotamia. Two other poems (Bickell 35, 36 = Bedjan 66, 67), written probably at Antioch, 3 describe the prevalence of sorcery and the extraordinary influence possessed by "Chaldeans" and enchanters over women who were nominally Christians. The metre of all the published homilies is heptasyllabic. (N. M.)

ISABELLA (1451-1504), surnamed la Catolica, " the Catholic," queen of Castile, was the second child and only daughter of John II. of Castile by his second wife Isabella, granddaughter of John I. of Portugal (thus being through both parents a descendant of John of

Gaunt), and was born at Madrigal on the 22nd of April 145 1. On the death of her father, who was succeeded by her brother Henry IV. (1454), she was withdrawn by her mother to Arevalo, where her early education was con- ducted in the deepest seclusion; in 1462, however, along with her uterine brother Alphonso, she was removed by Henry to the court, where she showed a remarkable example of staidness and sobriety. Already more than one suitor had made application for her hand, Ferdinand of Aragon, who ultimately became her husband, being among the number; for some little time she was engaged to his elder brother Charles, who died in 1461. In her thirteenth year her brother promised her in marriage to Alphonso of Portugal, but she firmly refused to consent; her resistance seemed less likely to be effectual in the case of Pedro Giron, grand master of the order of Calatrava and brother of the marquis of Villena, to whom she was next affianced, when she was delivered from her fears by the sudden death of the bridegroom while on his way to the nuptials in 1466. After an offer of the crown of Castile, made by the revolutionary leaders in the civil war, had been declined by her, she was in 1468 formally recognized by her brother as lawful heir, after himself, to the united crowns of Castile and Leon. New candidates for her hand now appeared in the persons of a brother of Edward IV. of England (probably Richard, duke of Gloucester), and the duke of Guienne, brother of Louis XL, and heir presumptive of the French monarchy. Finally however, in face of very great difficulties, she was married to Ferdinand of Aragon at Valladolid on the 19th of October 1469. Thence forward the fortunes of Ferdinand and Isabella were inseparably blended. For some time they held a humble court at Duenas, and after- wards they resided at Segovia, where, on the death of Henry, she was proclaimed queen of Castile and Leon (December 13, 1474). Spain undoubtedly owed to Isabella's clear intellect, resolute energy and unselfish patriotism much of that greatness which for the first time it acquired under " the Catholic sovereigns." The moral influence of the queen's personal character over the Castilian court was incalculably great; from the debasement and degradation of the preceding reign she raised it to being " the nursery of virtue and of generous ambition." She did much for letters in Spain by founding the palace school and by her protection of Peter Martyr d'Anghiera. The very sincerity of her piety and strength of her religious convictions led her more than once, however, into great errors of state policy, and into more than one act which offends the moral sense of a more refined age;' her efforts for the introduction of the Inquisition into Castile, and for the proscription of the Jews, are outstanding evidences of what can only be called her bigotry. But not even

1 Possibly in the war at the beginning of the reign of Bahram V. : but on the uncertainty see Noldeke, Cesch. d. Perser.und Araber, 117.

2 Probably at the hands of the Hephthalites or White Huns of KQshan : cf. Isaac's mention of the Huns in 1. 420 of the 1st poem.

3 The author refers to the weeping for Tammuz (1. 125 of the 1st poem), and speaks of his city as illustrious throughout the world lib. 1. 132).

the briefest sketch of her life can omit to notice that happy instinct or intuition which led her, when all others had heard with in- credulity the scheme of Columbus, to recall the wanderer to her presence with the words, " I will assume the undertaking for my own crown of Castile, and am ready to pawn my jewels to defray the expenses of it, if the funds in the treasury should be found inadequate." She died at Medina del Campo on the 24th of November 1504, and was succeeded by her daughter Joanna " la loca " (the " Crazy ") and her husband, Philip of Habsburg.

See W. H. Prescott, History of the Reign of Ferdinand and Isabella (1837), where the original authorities are exhaustively enumerated; and for later researches, Baron de Nervo, Isabella the Catholic, translated by Lieut.-Col. Temple-West (1897).

ISABELLA II. (1830-1904), queen of Spain, was born in Madrid on the 10th of October 1 830. She was the eldest daughter of Ferdinand VII., king of Spain, and of his fourth wife, Maria Christina, a Neapolitan Bourbon, who became queen-regent on 29th September 1833, when her daughter, at the age of three years, was proclaimed on the death of the king. Queen Isabella succeeded to the throne because Ferdinand VII. induced the Cortes to assist him in setting aside the Salic law, which the Bourbons had introduced since the beginning of the 18th century, and to re-establish the older succession law of Spain. The brother of Ferdinand, Don Carlos, the first pretender, fought seven years, during the minority of Isabella, to dispute her title, and her rights were only maintained through the gallant support of the army, the Cortes and the Liberals and Progressists, who at the same time established constitutional and parliamentary government, dissolved the religious orders, confiscated the property of the orders and of the Jesuits, disestablished the Church property, and attempted to restore order in finances. After the Carlist war the queen-regent, Christina, resigned to make way for Espartero, the most successful and most popular general of the Isabelline armies, who only remained regent two

years. He was turned out in 1843 by a military and political pronnnciamiento, led by Generals O'Donnell and Narvaez, who formed a cabinet, presided over by Joaquin Maria Lopez, and this government induced the Cortes to declare Isabella of age at thirteen. Three years later the Moderado party or Castilian Conservatives made their queen marry, at sixteen, her cousin, Prince Francisco de Assisi de Bourbon (1822-1902), on the same day (10th October 1846) on which her younger sister married the duke of Montpensier. These marriages suited the views of France and Louis Philippe, who nearly quarrelled in consequence with Great Britain; but both matches were anything but happy. Queen Isabella reigned from 1843 to 1868, and that period was one long succession of palace intrigues, back-stairs and ante- chamber influences, barrack conspiracies, military pronuncia- mientos to further the ends of the political parties — Moderados, who ruled from 1846 to 1854, Progressists from 1854 to 1856, Union Liberal from 1856 to 1863; Moderados and Union Liberal quickly succeeding each other and keeping out the Progressists so steadily that the seeds were sown which budded into the revolution of 1868. Queen Isabella II. often interfered in politics in a wayward, unscrupulous manner that made her very unpopular. She showed most favour to her reactionary generals and statesmen, to the Church and religious orders, and was constantly the tool of corrupt and profligate courtiers and favourites who gave her court a deservedly bad name. She went into exile at the end of September 1868, after her Moderado generals had made a slight show of resistance that was crushed at the battle of Alcolea by Marshals Serrano and Prim. The only redeeming traits of Queen Isabella's reign were a war against Morocco, which ended in an advantageous treaty and some cession of territory; some progress in public works, especially railways; a slight improvement in commerce and finance. Isabella was induced to abdicate in Paris on 25th June 1870 in favour of her son, Alphonso XII., and the cause of the restoration was thus much furthered. She had separated from her husband in the previous March. She continued to live in France after the restoration in 1874. On the occasion of one of her visits to Madrid during Alphonso XII. 's reign she began to intrigue with the

politicians of the capital, and was peremptorily requested to go abroad again. She died on the 10th of April 1904.

ISABELLA, Isabeau, or Elizabeth of Bavaria (1370-1435), wife of

Charles VI. of France, was the daughter of Stephen 11., duke of Bavaria. She was born in 1370, was married to Charles VI. on the 17th of July 1385, and crowned at Paris on the 22nd of August 1389. After some years of happy married life she fell under the influence of the dissolute court in which she lived, and the king having become insane (August 1392) she consorted chiefly with Louis of Orleans. Frivolous, selfish, avaricious and fond of luxury, she used her influence, during the different periods when she was invested with the regency, not for the public welfare, but mainly in her own personal interest. After the assassination of the duke of Orleans (November 23, 1407) she attached herself sometimes to the Armagnacs, sometimes to the Burgundians, and led a scandalous life. Louis de Bosredon, the captain of her guards, was executed for complicity in her excesses; and Isabella herself was imprisoned at Blois and after- wards at Tours (141 7). Having been set free towards the end of that year by John the Fearless, duke of Burgundy, whom she had called to her assistance, she went to Troves and established her government there, returning afterwards to Paris when that city had capitulated to the Burgundians in July 1418. Once more in power, she now took up arms against her son, the dauphin Charles; and after the murder of John the Fearless she went over to the side of the English, into whose hands she surrendered France by the treaty of Troves (May 21, 1420), at the same time giving her daughter Catherine in marriage to the king of England, Henry V. After her triumphal entry into Paris with the latter she soon became an object of loathing to the whole French nation. She survived her husband, her son-in-law, and eight out of her twelve children, and she passed the last miserable years of her life in poverty, solitude and ill-health. She died at the end of September 1435, and was interred without funeral honours in the abbey of St Denis, bv the side of her husband, Charles VI.

See Vallet de Viriville, Isabeau de Baviere (1859) ; Marcel Thibault, Isabeau de Baviere, Reine de France, La Jeunesse,' iijo-1405 (1903).

(J. V.)*

ISABELLA OF HAINAUT (1170-1190), queen of France, was the daughter of Baldwin V., count of Hainaut, and Margaret, sister of Philip of Alsace, and was born in n 70 at Lille. She was married to Philip Augustus, and brought to him as her dowry the province of Artois. She was crowned at St Denis on the 29th of May 1180. As Baldwin V. claimed to be a descendant of Charlemagne, the chroniclers of the time saw in this marriage a union of the Carolingian and Capetian dynasties. Though she received

extravagant praise from certain annalists, she failed to win the affections of Philip, who, in 1184, waging war against Flanders, was angered at seeing Baldwin support his enemies, and called a council at Sens for the purpose of repudiat- ing her. Robert, the king's uncle, successfully interposed. She died in childbirth in 1190, and was buried in the church of Notre Dame in Paris. Her son became Louis VIII. of France.

See Cartellieri, " L'Avenement de Phil. Aug." in Rev. hist. liii. 262 et seq.

ISABEY, JEAN BAPTISTE (1767-1855), French painter, was born at Nancy on the nth of April 1767. At nineteen, after some lessons from Dumont, miniature painter to Marie Antoinette, he became a pupil of David. Employed at Versailles on portraits of the dukes of Angouleme and Berry, he was given a commission by the queen , which opens the long list of those which he received, up to the date of his death in 1855, from the successive rulers of France. Patronized by Josephine and Napoleon, he arranged the ceremonies of their coronation and prepared drawings for the publication intended as its official commemoration, a work for which he was paid by Louis XVIII. , whose portrait (en- graved, Debucourt) he executed in 1814: Although Isabey did homage to Napoleon on his return from Elba, he continued to enjoy the favour of the Restoration, and took part in arrange- ments for the coronation of Charles X. The monarchy of July conferred on him an important post in connexion with the royal

collections, and Napoleon III. granted him a pension, and the cross of commander of the Legion of Honour. " Review of Troops by the First Consul " was one of his most important com- positions, and " Isabey's Boat," — a charming drawing of himself and family — produced at a time when he was much occupied with lithography — had an immense success at the Salon of 1820 (engraved, Landon, Annates, i. 125). His portrait of " Napoleon at Malmaison " is held to be the best ever executed, and even his tiny head of the king of Rome, painted for a breast-pin, is distinguished by a decision and breadth which evidence the hand of a master.

A biography of Isabey was published by M. E. Taigny in 1859, and M. C. Lenormant's article, written for Michaud's Biog. univ., is founded on facts furnished by Isabey's family.

ISABNORMAL (or Isaxomalous) LINES, in physical geo- graphy, lines upon a map or chart connecting places having an abnormal temperature. Each place has, theoretically, a proper temperature due

to its latitude, and modified by its configuration. Its mean temperature for a particular period is decided by observation and called its normal temperature, Isabnormal lines may be used to denote the variations due to warm winds or currents, great altitudes or depressions, or great land masses as compared with sea. Or they may be used to indicate the abnormal result of weather observations made in an area such as the British Isles for a particular period.

ISAEUS (c. 420 b.c.c. 350 B.C.), Attic orator, the chronological limits of whose extant work fall between the years 390 and 353 B.C., is described in the Plutarchic life as a Chalcidian; by Suidas, whom Dionysius follows, as an Athenian. The accounts have been reconciled by supposing that his family sprang from the settlement (KXypovxia) of Athenian citizens among whom the lands of the Chalcidian hippobotae (knights) had been divided about 509 B.C. In 411 B.C. Euboea (except Oreos) revolted from Athens; and it would not have been strange if residents of Athenian origin had then migrated from the hostile island to Attica. Such a connexion with Euboea would explain the non Athenian name Diagoras which is borne by the father of Isaeus, while the latter is said to have been " an Athenian by descent " ('Aftjj'euos to yevos). So far as we know, Isaeus took no part in the public affairs of Athens. " I cannot tell," says Dionysius, " what were the politics of Isaeus — or whether he had any politics at all." Those words strikingly attest the profound change which was passing over the life of the Greek cities. It would have been scarcely possible, fifty years earlier, that an eminent Athenian with the powers of Isaeus should have failed to leave on record some proof of his interest in the political concerns of Athens or of Greece. But now, with the decline of personal devotion to the state, the life of an active citizen had ceased to have any necessary contact with political affairs. Already we are at the beginning of that transition which is to lead from the old life of Hellenic citizenship tc that Hellenism whose children are citizens of the world.

Isaeus (who was born probably about 420 B.C.) is believed to have been an early pupil of Isocrates, and he certainly was a student of Lysias. A passage of Photius has been understood as meaning that personal relations had existed between Isaeus and Plato, but this view appears erroneous. 1 The profession of Isaeus was that of which Antiphon had been the first repre- sentative at Athens — that of a \(ryoypaos, who composed speeches which his clients were to deliver in the law-courts. But, while Antiphon had written such speeches chiefly (as Lysias frequently) for public causes, it was with private causes that Isaeus was almost exclusively concerned. The fact marks the progressive subdivision of labour in his calling, and the extent to

which the smaller interests of private life now absorbed the attention of the citizen.

The most interesting recorded event in the career of Isaeus is one which belongs to its middle period — his connexion with Demosthenes. Born in 384 B.C., Demosthenes attained his civic majority in 366. At this time he had already resolved to

'See further Jebb's Attic Orators from Antiphon to Isaeus, (ii. 264).

prosecute the fraudulent guardians who had stripped him of his patrimony. In prospect of such a legal contest, he could have found no better ally than Isaeus. That the young Demosthenes actually resorted to his aid is beyond reason- able doubt. But the pseudo-Plutarch embellishes the story after his fashion. He says that Demosthenes, on coming of age, took Isaeus into his house, and studied with him for four years — paying him the sum of 10,000 drachmas (about £400), on condition that Isaeus should withdraw from a school of rhetoric which he had opened, and devote himself wholly to his new pupil. The real Plutarch gives us a more sober and a more probable version. He simply states that Demosthenes " employed Isaeus as his master in rhetoric, though Isocrates was then teaching, either (as some say) because he could not pay Isocrates the prescribed fee of ten minae, or because he preferred the style of Isaeus for his purpose, as being vigorous and astute" (dpaarripiov Kai Tavovpyov). It may be observed that, except by the pseudo-Plutarch, a school of Isaeus is not mentioned, — for a notice in Plutarch need mean no more than that he had written a text- book, or that his speeches were read in schools; 1 nor is any other pupil named. As to Demosthenes, his own speeches against Aphobus and Onetor (363-362 B.C.) afford the best possible gauge of the sense and the measure in which he was the disciple of Isaeus; the intercourse between them can scarcely have been either very close or very long. The date at which Isaeus died can only be conjectured from his work; it may be placed about

35° B-C-

Isaeus has a double claim on the student of Greek literature. He is the first Greek writer who comes before us as a consummate master of strict forensic controversy. He also holds a most important place

in the general development of practical oratory, and therefore m the history of Attic prose. Antiphon marks the beginning of that development, Demosthenes its consummation. Between them stand Lysias and Isaeus. The open, even ostentatious, art of Antiphon had been austere and rigid. The concealed art of Lysias had charmed and persuaded by a versatile semblance of natural grace and simplicity. Isaeus brings us to a final stage of transition, in which the gifts distinctive of Lysias were to be fused into a perfect harmony with that masterly art which receives its most powerful expression in Demosthenes. Here, then, are the two cardinal points by which the place of Isaeus must be determined. We must consider, first, his relation to Lysias; secondly, his relation to Demosthenes.

A comparison of Isaeus and Lysias must set out from the distinc- tion between choice of words (Xe|is) and mode of putting words together (avvBeais). In choice of words, diction, Lysias and Isaeus are closely alike. Both are clear, pure, simple, concise; both have the stamp of persuasive plainness (dˆeXeta), and both combine it with graphic power (hapyeia). In mode of putting words together, composition, there is, however a striking difference. Lysias threw off the stiff restraints of the earlier periodic style, with its wooden monotony; he is too fond indeed of antithesis always to avoid a rigid effect; but, on the whole, his style is easy, flexible and various; above all, its subtle art usually succeeds in appearing natural. Now this is just what the art of Isaeus does not achieve. With less love of antithesis than Lysias, and with a diction almost equally pure and plain, he yet habitually conveys the impression of conscious and confident art. Hence he is least effective in adapting his style to those characters in which Lysias peculiarly excelled — the in- genuous youth, the homely and peace-loving citizen. On the other hand, his more open and vigorous art does not interfere with his moral persuasiveness where there is scope for reasoned remonstrance, for keen argument or for powerful denunciation. Passing from the formal to the real side of his work, from diction and composition to the treatment of subject-matter, we find the divergence wider still. Lysias usually adheres to a simple four-fold division — proem, narrative, proof, epilogue. Isaeus frequently interweaves the narrative with the proof. 2 He shows the most dexterous ingenuity in adapting his manifold tactics to the case in hand, and often " out-generals " (Ka.T

1 Plut. De glor. Athen. p. 350 c, where he mentions rohs 'Icro- Kpareis Kai ' AptujnSctos Ktd 'laaiovs among tovs kv Tals

2 Here he was probably influenced by the teaching of Isocrates. The forensic speech of Isocrates known as the Aegineticus (Or. xix.),

which belongs to the peculiar province of Isaeus, as dealing with a claim to property (kindiKaala) , affords perhaps the earliest example of narrative and proof thus interwoven. Earlier forensic writers had kept the 5ˆ77)0-11 and -irlffras distinct, as Lysias does.

Sir William Jones well remarks, Isaeus lays close siege to the understandings of the jury. 3

Such is the general relation of Isaeus to Lysias. What, we must next ask, is the relation of Isaeus to Demosthenes ? The Greek critic who had so carefully studied both authors states his own view in broad terms when he declares that " the power of Demosthenes took its seeds and its beginnings from Isaeus " (Dion. Halic. Isaeus, 20). A closer examination will show that within certain limits the statement may be allowed. Attic prose expression had been con- tinuously developed as an art; the true link between Isaeus and Demosthenes is technical, depending on their continuity. Isaeus had made some original contributions to the resources of the art ; and Demosthenes had not failed to profit by these. The composition of Demosthenes resembles that of Isaeus in blending terse and vigorous periods with passages of more lax and fluent ease, as well as in that dramatic vivacity which is given by rhetorical question and similar devices. In the versatile disposition of subject-matter, the divisions of " narrative " and " proof " being shifted and interwoven according to circumstances, Demosthenes has clearly been instructed by the example of Isaeus. Still more plainly and strikingly is this so in regard to the elaboration of systematic proof; here Demosthenes invites direct and close comparison with Isaeus by his method of drawing out a chain of arguments, or enforcing a proposition by strict legal argument. And, more generally, Demosthenes is the pupil of Isaeus, though here the pupil became even greater than the master, in that faculty of grappling with an adversary's case point by point, in that aptitude for close and strenuous conflict which is expressed by the words a.y6>v, hvayo>vio$. i

The pseudo-Plutarch, in his life of Isaeus, mentions an Art of Rhetoric and sixty-four speeches, of which fifty were accounted genuine. From a passage of Photius it appears that at least 5 the fifty speeches of recognized authenticity were extant as late as A.D. 850. Only eleven, with a large part of a twelfth, have comedown to us; but the titles of forty-two 6 others are known. 7

The titles of the lost speeches confirm the statement of Dionysius that the speeches of Isaeus were exclusively forensic; and only three titles indicate speeches made in public causes. The remainder, concerned

with private causes, may be classed under six heads: — (1) Kh-qpuiol — cases of claim to an inheritance; (2) iwiK\ripi.Koi — cases of claim to the hand of an heiress; (3) (SiaSucaaiat — cases of claim of property; (4) airooTaaiov — cases of claim to the ownership of a slavef (5) hyyvqs — action brought against a surety whose principal had made default; (6) avruiwaia (as = ■Kapaypaxj>ii) — a special plea; (7) icptais — appeal from one jurisdiction to another.

Eleven of the twelve extant speeches belong to class (1), the KS.qpt.Koi, or claims to an inheritance. This was probably.the branch of practice in which Isaeus had done his most important and most characteristic work. And, according to the ancient custom, this class of speeches would therefore stand first in the manuscript collec tions of his writings. The case of Antiphon is parallel : his speeches in cases of homicide ((poviKoi) were those on which his reputation mainly depended, and stood first in the manuscripts. Their ex-clusive preservation, like that of the speeches made by Isaeus in will-cases, is thus primarily an accident of manuscript tradition, but partly also the result of the writer's special prestige.

Six of the twelve extant speeches are directly concerned with claims to an estate; five others are connected with legal proceedings arising out of such a claim. They may be classified thus (the name given in each case being that of the person whose estate is in dispute) :

I. Trials of Claim to an Inheritance (SiaSiKcuricu).

1. Or. i., Cleonymus. Date between 360 and 353 B.C.

2. Or. iv., Nicostratus. Date uncertain.

3. Or. vii., Apollodorus. 353 B.C.

4. Or. viii., Ciron. 375 B.C.

5. Or. ix., Astyphilus. 369 B.C. (c. 390, Schomann).

6. Or. x., Aristarchus. 377-371 B.C. (386-384, Schomann).

3 This is what Dionysius means when he says (Isaeus, 61) that Isaeus differs from Lysias — t p.i) Kar' ivObiitjixa 7-1 Ai7«c &XX& hot' hmxei-p-qna. Here the ' ' enthy meme ' ' means a rhetorical syllogism

with one premiss suppressed (curtum, Juv. vi. 449) ; " epicheireme," such a syllogism stated in full. Cf. R. Volkmann, Rhetorik der Griechen una Rbmer, 1872, pp. 153 f.

4 Cleon's speech in Thuc. iii. 37, 38, works out this image with remarkable force; within a short space we have £vvkaeas ayiiv — toiv Totwˆ5e ayojfcav — a.yo > VL(TT7]S — ayuviˆcGdai — avrayoiviˆetrdat. — ayuvo- 6ertiv. See Attic Orators, vol. i. 39; ii. 304.

5 For the words of Photius (cod. 263), roirrwv &i oi t6 yvriawv liapTvprfiivTa v' KaxaKdirovra.!. fihvov, might be so rendered as to imply that, besides these fifty, others also were extant. See Att. Oral. ii. 311, note 2. 6 Forty-four are given in Thalheim's ed.

7 The second of our speeches (the Meneclean) was discovered in the Laurentian Library in 1785, and was edited in that year by Tyrwhitt. In editions previous to that date, Oration i. is made to conclude with a few lines which really belong to the end of Orat. ii. (§ 47, dXX' lireiSr) rb Tpayna . . . \p7!laaadt) , and this arrangement is followed in the translation of Isaeus by Sir William Jones, to whom our second oration, was, of course, then (1779) unknown. In Oration i. all that follows the words fxi) -woi-qaavrts in § 22 was first published in 1815 by Mai, from a MS. in the Ambrosian Library at Milan.

n

862

ISAIAH

II. Actions for False Witness (5koi ˆ/evSoiiapTvpidv) .

1. Or. ii., Menecles. 354 B.C.

2. Or. iii., Pyrrhus. Date uncertain, but comparatively late.

3. Or. vi., Philoctemon. 364-363 B.C.

III. Action to Compel the Discharge of a Suretyship (£7761)5 Siktj).

Or. v., Dicaeogenes. 390 B.C. IV. Indictment of a Guardian for Maltreatment of a Ward (eiaayyMa KOK&treois 6p <] > avou). Or.'xi., Hagnias. 359 B.C. V. Appeal from Arbitration to a Dicastery (? < £effis).

Or. xii., For Euphiletus. (Incomplete.) Date uncertain. The speeches of Isaeus supply valuable illustrations to the early history of testamentary law. They show us the faculty of adoption, still, indeed, associated with the religious motive in which it originated, as a mode of securing that the sacred rites of the family shall continue to be discharged by one who can call himself the son of the deceased. But practically the civil aspect of adoption is, for the Athenian citizen, predominant over the religious; he adopts a son in order to bestow property on a person to whom he wishes to bequeath it. The Athenian system, as interpreted by Isaeus, is thus intermediate, at least in spirit, between the purely religious stand- point of the Hindu and the maturer form which Roman testamentary law had reached before the time of Cicero. 1 As to the form of the speeches, it is remarkable for its variety. There are three which, taken together, may be considered as best representing the diversity and range of their author's power. The fifth, with its simple but lively diction, its graceful and persuasive narrative, recalls the finalities of Lysias. The eleventh, with its sustained and impetuous power, has no slight resemblance to the manner of Demosthenes. The eighth is, of all, the most characteristic, alike in narrative and in argument. Isaeus is here seen at his best. No reader who is interested in the social life of ancient Greece need find Isaeus dull. If the glimpses of Greek society which he gives us are seldom so gay and picturesque as those which enliven the pages of Lysias, they are certainly not less suggestive. Here, where the innermost rela- tions and central interests of the family are in question, we touch the springs of social life; we are not merely presented with scenic details of dress and furniture, but are enabled in no small degree to conceive the feelings of the actors.

The best manuscript of Isaeus is in the British Museum, — Crippsianus A (= Burneianus 95,(1 3th century), which contains also Antiphon, Andocides, Lycurgus and Dinarchus. The next best, is Bekker's Laurentianus B (Florence), of the 15th century. Besides these, he used Marcianus L (Venice), saec. 14, Vratislaviensis Z saec. 14 s and two very inferior MSS. Ambrosianus A. 99, P (which he dismissed after Or. i.), and Ambrosianus D. 42, Q (which contains only Or. i., ii.). Schomann, in his edition of 1831, generally followed Bekker's text; he had no fresh apparatus beyond a collation of a Paris MS. R in part of Or. i. ; but he had sifted the Aldine more carefully. Baiter and Sauppe (1850) had a new collation of A, and also used a collation of Burneianus 96, M, given by Dobson in vol. iv. of his edition (1828). C. Scheibe (Teubner, i860) made it his especial aim to complete the work of his predecessors by restoring the correct Attic forms of words; thus (e.g.) he gives 17776a for ivtyiia,

&kbi)W for SeSLafiev, and the like, — following the consent of the MSS., however, in such forms as the accusative of proper names in -t \v rather than -ij, or (e.g.) the future (pavqaonai rather than ˆavoC/ ioi, &c, and on such doubtful points as pa.Ttpes instead of paropts, or EJXijSuias instead of EtXeiflutas.

Editions. — Editio princeps (Aldus, Venice, 1513); in Oratores Allici, by I. Bekker (1823-1828); W. S. Dobson (1828); J. G. Baiter and Hermann Sauppe (1850) ; separately, by G. F. Schomann, with commentary (1831); C. Scheibe (i860) (Teubner series, new ed. by T. Thalheim, 1903); H. Buermann (1883); W. Wyse (1904). English translation by Sir William Jones, 1779.

On Isaeus generally see Wyse's edition; R. C. Jebb, Attic Orators; F. Blass, Die attische Beredsamkeit (2nd ed., 1887-1893); and L. Moy, £tude sur les plaidoyers d'Isee (1876). (R. C. J.)

ISAIAH. I. Life and Period. — Isaiah is the name of the greatest, and both in life and in death the most influential of the Old Testament prophets. We do not forget Jeremiah, but Jeremiah's literary and religious influence is secondary compared with that of Isaiah. Unfortunately we are reduced to inference and conjecture with regard both to his life and to the extent of his literary activity. In the heading (i. 1) of what we may call the occasional prophecies of Isaiah (i.e. those which were called forth by passing events), the author is called "the son of Amoz" and Rabbinical legend identifies this Amoz with a brother of Amaziah, king of Judah; but this is evidently based on a mere etymological fancy. We know from his works that (unlike Jeremiah) he was married (viii. 3), and that he had at least two

1 Cf. Maine's Ancient Law, ch. vi., and the Tagore Law Lectures (1870) by Herbert Cowell, lect. ix., " On the Rite of Adoption," pp. 208 f.

2 The date of L and Z is given as the end of the 15th century in the introduction to Wyse's edition.

sons, whose names he regarded as, together with his own, symbolic by divine appointment of certain decisive events or religious truths — Isaiah (Yesha'-yahu), meaning " Salvation — Yahweh "; Shear-Yashub, "a remnant shall return"; and Maher-shalal-hash-baz, " swift (swiftly cometh) spoil, speedy (speedily cometh) prey " (vii. 3, viii. 3, 4, 18). He lived at Jerusalem, perhaps in the " middle " or " lower city " (2 Kings xx. 4), exercised at one time great influence at

court (chap, xxxvii.), and could venture to address a king unbidden (vii. 4), and utter the most unpleasant truths, unassailed, in the plainest fashion. Presumably therefore his social rank was far above that of Amos and Micah; certainly the high degree of rhetorical skill displayed in his discourses implies a long course of literary discipline, not improbably in the school of some older prophet (Amos vii. 14 suggests that " schools " or companies " of the prophets " existed in the southern kingdom). We know but little of Isaiah's predecessors and models in the prophetic art (it were fanaticism to exclude the element of human preparation) ; but certainly even the acknowledged prophecies of Isaiah (and much more the disputed ones) could no more have come into existence suddenly and without warning than the masterpieces of. Shakespeare. In the more recent commentaries (e.g. Cheyne's Prophecies 0} Isaiah, ii. 218) lists are generally given of the points of contact both in phraseology and in ideas between Isaiah and the prophets nearly contemporary with him. For Isaiah cannot be studied by himself.

The same heading already referred to gives us our only traditional information as to the period during which Isaiah prophesied; it refers to Uzziah, Jotham, Ahaz and Hezekiah as the contemporary kings. It is, however, to say the least, doubtful whether any of the extant prophecies are as early as the reign of Uzziah. Exegesis, the only safe basis of criticism for the prophetic literature, is unfavourable to the view that even chap. i. belongs to the reign of this king, and we must therefore regard it as most probable that the heading in i. 1 is (like those of the Psalms) the work of one or more of the Sopherlm (or students and editors of Scripture) in post-exilic times, apparently the same writer (or company of writers) who prefixed the headings of Hosea and Micah, and perhaps of some of the other books. Chronological study had already begun in his time. But he would be a bold man who would profess to give trustworthy dates either for the kings of Israel or for the prophetic writers. (See Bible, Old Testament, Chronology; the article " Chronology " in the Encyclopaedia Biblica; and cf. H. P. Smith, Old Testa- ment History, Edin., 1903, p. 202, note 2.)

II. Chronological Arrangement, how far possible. — Let us now briefly sketch the progress of Isaiah's prophesying on the basis of philological exegesis, and a comparison of the sound results of the study of the inscriptions. If our results are imperfect and liable to correction, that is only to be expected in the present position of the historical study of the Bible. Chap, vi., which describes a vision of Isaiah " in the death-year of King Uzziah " (740 or 734 B.C.?) may possibly have arisen out of notes put down in the reign of Jotham;

but for several reasons it is not an acceptable view that, in its present form, this striking chapter is earlier than the reign of Ahaz. It seems, in short, to have originally formed the preface to the small group of prophecies which now follows it, viz. vii. i.-ix. 7. The portions which may represent discourses of Jotham's reign are chap. ii. and chap. ix. 8 -x. 4 — stern denunciations which remind us somewhat of Amos. But the allusions in the greater part of chaps, ii.-v. correspond to no period so closely as the reign of Ahaz, and the same remask applies still more self-evidently to vii. i-ix. 7. 3 Chap. xvii. 1-11 ought undoubtedly to be read in immediate connexion with chap. vii.; it presupposes the alliance of Syria and northern Israel, whose destruction it predicts, though opening a door of hope for a remnant of Israel. The fatal siege of Samaria (724-722 B.C.) seems to have given occasion to chap, xxviii.; but the following

3 On the question of the Isaianic origin of the prophecy, ix. 1-6, and the companion passage, xi. 1-8, see Cheyne Introd. to the Book of Isaiah, 1895, pp. 44, 45 and 62-66. Cf., however, J. Skinner " Isaiah i.-xxxix." in Cambridge Bible.

prophecies (chaps, xxix.-xxxiii.) point in the main to Sennacherib's invasion, 701 B.C., which evidently stirred Isaiah's deepest feelings and was the occasion of some of his greatest prophecies. It is, however, the vengeance taken by Sargon upon Ashdod (711) which seems to be preserved in chap. xx.,and the striking little prophecy in xxi. 1-10, sometimes referred of late to a supposed invasion of Judah by Sargon, rather belongs to some one of the many prophetic personages who wrote, but did not speak like the greater prophets, during and after the Exile. It is also an opinion largely held that the prophetic epilogue in xvi. 13, 14, was attached by Isaiah to an oracle on archaic style by another prophet (Isaiah's hand has, however, been traced by some in xvi. 46, 5). In fact no progress can be expected in the accurate study of the prophets until the editorial activity both of the great prophets themselves and of their more reflective and studious successors is fully recognized.

Thus there were two great political events (the Syro-Israelitish invasion under Ahaz, and the great Assyrian invasion of Sennacherib) which called forth the spiritual and oratorical faculties of our prophet, and quickened his faculty of insight into the future. The Sennacherib prophecies must be taken in connexion with the

historical appendix, chaps, xxxvi.-xxxix. The beauty and incisiveness of the poetic prophecy in xxxvii. 21-32 have, by some critics, been regarded as evidence for its authenticity. This, however, is, on critical grounds, most questionable.

A special reference seems needed at this point to the oracle on Egypt, chap. xix. The comparative feebleness of the style has led to the conjecture that, even if the basis of the prophecy be Isaianic, yet in its present form it must have undergone the manipulation of a scribe. More probably, however, it belongs to the early Persian period. It should be added that the Isaianic origin of the appendix in xix. 18-24 is, if possible, even more doubtful, because of the precise, circumstantial details of the prophecy which arc not like Isaiah's work. It is plausible to regard v. 18 as a fictitious prophecy in the interests of Onias, the founder of the rival Egyptian temple to Yahweh at Leontopolis in the name of Heliopolis (Josephus, Ant. xii. 0, 7).

III. Disintegration Theories. — We must now enter more fully into the question whether the whole of the so-called Book of Isaiah was really written by that prophet. The question relates, at any rate, to xiii.-xiv. 23, xxi. 1-10, xxiv.-xxvii., xxxiv., xxxv. and xl.-lxvi. The father of the controversy may be said to be the Jewish rabbi, Aben Ezra, who died a.d. 1167. We need not, however, spend much time on the well-worn but inconclusive arguments of the older critics. The existence of a tradition in the last three centuries before Christ as to the authorship of any book is (to those acquainted with the habits of thought of that age) of but little critical moment; the Sophertm, i.e. students of Scripture, in those times were simply anxious for the authority of the Scriptures, not for the ascertainment of their precise historical origin. It was of the utmost importance to declare that (especially) Isaiah xl.-lxvi. was a prophetic work of the highest order; this was reason sufficient (apart from any presumed phraseological affinities in xl.-lxvi.) for ascribing them to the royal prophet Isaiah. When the view had once obtained currency, it would naturally become a tradition. The question of the Isaianic or non-Isaianic origin of the disputed prophecies (especially xl.-lxvi.) must be decided on grounds of exegesis alone. It matters little, therefore, when the older critics appeal to Ezra i. 2 (interpreted by Josephus, Ant. xi. 1, 1-2), to the Septuagint version of the book (produced between 260 and 130 B.C.), in which the disputed prophecies are already found, and to the Greek translation of the Wisdom of Jesus, the son of Sirach, which distinctly refers to Isaiah as the comforter of those that mourned in Zion (Eccles. xlviii. 24, 25).

The fault of the controversialists on both sides has been that each party has only seen " one side of the shield." It will be admitted by philological students that the exegetical data supplied by (at any rate) Isa. xl.lxvi. are conflicting, and there fore susceptible of no simple solution. This remark applies, it is true, chiefly to the portion which begins at lii. 13. The earlier part of Isa. xl.-lxvi. admits of a perfectly consistent

interpretation from first to last. There is nothing in it to indicate that the author's standing-point is earlier than the Babylonian captivity. His object is (as most scholars, probably, believe) to warn, stimulate or console the captive Jews, some full believers, some semi-believers, some unbelievers or idolaters. The develop- ment of the prophet's message is full of contrasts and surprises: the vanity of the idol-gods and the omnipotence of Israel's helper, the sinfulness and infirmity of Israel and her high spiritual destiny, and the selection (so offensive to patriotic Jews, xlv. 9, 10) of the heathen Cyrus as the instrument of Yahweh's purposes, as in fact his Messiah or Anointed One (xlv. 1), are brought successively before us. Hence the semi-dramatic char- acter of the style. Already in the opening passage mysterious voices are heard crying, " Comfort ye, comfort ye my people "; the plural indicates that there were other prophets among the exiles besides the author of Isa. xl.xlviii. Then the Jews and the Asiatic nations in general are introduced trembling at the imminent downfall of the Babylonian empire. The former are reasoned with and exhorted to believe; the latter are contemptu ously silenced by an exhibition of the futility of their religion. Then another mysterious form appears on the scene, bearing the honourable title of " Servant of Yahweh," through whom God's gracious purposes for Israel and the world are to be realized. The cycle of poetic passages on the character and work of this " Servant," or commissioned agent of the Most High, may have formed originally a separate collation which was somewhat later inserted in the Prophecy of Restoration {i.e. chaps, xl.-xlviii., and its appendix chaps, xlix.-lv.).

The new section which begins at chap. xlix. is written in much the same delightfully flowing style. We are still among the exiles at the close of the captivity, or, as others think, amidst a poor community in Jerusalem, whose members have now been dispersed among the Gentiles. The latter view is not so strange as it may at first appear, for the new book has this peculiarity, that Babylon and Cyrus are not mentioned in it at all. [True, there was not so much said about Babylon as we should have expected even in the first book; the paucity of references to the local characteristics of Babylonia is in fact one of the negative arguments urged by older scholars in favour

of the Isaianic origin of the prophecy.] Israel himself, with all his inconsistent qualities, becomes the absorbing subject of the prophet's medita- tions. The section opens with a soliloquy of the " Servant of Yahweh," which leads on to a glorious comforting discourse, " Can a woman forget her sucking child," &c. (xlix. 1, comp. li. 12, 13). Then his tone rises, Jerusalem can and must be redeemed; he even seems to see the great divine act in process of accomplishment. Is it possible, one cannot help asking, that the abrupt description of the strange fortunes of the " Servant " — by this time entirely personalized — was written to follow chap. lii. 1-12?

The whole difficulty seems to arise from the long prevalent assumption that chaps, xl.lxvi. form a whole in themselves. Natural as the feeling against disintegration may be, the diffi culties in the way of admitting the unity of chaps, xl.-lxvi. are insurmountable. Even if, by a bold assumption, we grant the unity of authorship, it is plain upon the face of it that the chapters in question cannot have been composed at the same time or under the same circumstances; literary and artistic unity is wholly wanting. But once admit (as it is only reasonable to do) the extension of Jewish editorial activity to the prophetic books and all becomes clear. The record before us gives no information as to its origin. It is without a heading, and by its abrupt transitions, and honestly preserved variations of style, invites us to such a theory as we are now indicating. It is only the inveterate habit of reading Isa. xlix.lxvi. as a part of a work relating to the close of the Exile that prevents us from seeing how inconsistent are the tone and details with this pre supposition.

The present article in its original form introduced here a survey of the portions of Isa. xl.-lxvi. which were plainly of Palestinian origin. It is needless to reproduce this here, because the information is now readily accessible elsewhere; in 1881 there was an originality in this survey, which gave promise of a still more radical treatment

viich a? that of Bernhard Duhm, a fascinating commentary published in 1892. See also Cheyne, Jewish Quarterly Review, July and October 1891; Introd. to Book of Isaiah (1895), which also point forward, like Stade's Geschichte in Germany, to a bolder criticism of Isaiah.

IV. Non-Isaianic Elements in Chaps, i.-xxxix. — We have said

nothing hitherto, except by way of allusion, of the disputed prophecies scattered up and down the first half of the book of Isaiah. There is only one of these prophecies which may, with any degree of apparent plausibility, be referred to the age of Isaiah, and that is chaps, xxiv.-xxvii. The grounds are (1) that according to xxv. 6 the author dwells on Mount Zion; (2) that Moab is referred to as an enemy (xxv. 10); and (3) that at the close of the prophecy, Assyria and Egypt are apparently mentioned as the principal foes of Israel (xxvii. 12, 13). A careful and thorough exegesis will show the hollowness of this justification. The tone and spirit of the prophecy as a whole point to the same late apocalyptic period to which chap, xxxiv. and the book of Joel; and also the last chapter (especially) of the book of Zechariah, may unhesitatingly be referred.

A word or two may perhaps be expected on Isa. xiii., xiv. and xxxiv., xxxv. These two oracles agree in the elaborateness of their description of the fearful fate of the enemies of Yahweh (Babylon and Edom are merely representatives of a class), and also in their view of the deliverance and restoration of Israel as an epoch for the whole human race. There is also an unre- lieved sternness, which pains us by its contrast with Isa. xl.lxvi. (except those passages of this portion which are probably not homogeneous with the bulk of the prophecy). They have also affinities with Jer. 1. li., a prophecy (as most now agree) of post exilic origin.

There is only one passage which seems in some degree to make "up for the aesthetic drawbacks of the greater part of these late compositions. It is the ode on the fall of the king of Babylon in chap. xiv. 4-21, which is as brilliant with the glow of lyric enthusiasm as the stern prophecy which precedes it is, from the same point of view, dull and uninspiring. It is in fact worthy to be put by the side of the finest passages of chaps, xl.-lxvi. — of those passages which irresistibly rise in the memory when we think of " Isaiah."

V. Prophetic Contrasts in Isaiah. — From a religious point of view there is a wide difference, not only between the acknow- ledged and the disputed prophecies of the book of Isaiah, but also between those of the latter which occur in chaps, i.-xxxix., on the one hand, and the greater and more striking part of chaps. xl.lxvi. on the other. We may say, upon the whole, with Duhm, that Isaiah represents a synthesis of Amos and Hosea, though not without important additions of his own. And if we cannot without much hesitation admit that Isaiah was really the first preacher of a personal Messiah whose record has come down to us, yet his editors certainly had good reason for thinking him capable of such a lofty height of prophecy. It

is not because Isaiah could not have conceived of a personal Messiah, but because the Messiah passages are not plainly Isaiah's either in style or in thought. If Isaiah had had those bright visions, they would have affected him more.

Perhaps the most characteristic religious peculiarities of the 1 various disputed prophecies are — (1) the emphasis laid on the uniqueness, eternity, creatorship and predictive power of Yahweh (xl. 18, 25, xli. 4, xliv. 6, xlviii. 12, xiv. 5, 6, 18, 22, xlvi. 9, xlii. 5, xiv. iS, xli. 26, xliii. 9, xliv. 7, xiv. 21, xlviii. 14); (2) the conception of the " Servant of Yahweh "; (3) the ironical descriptions of idolatry (Isaiah in the acknowledged prophecies only refers incidentally to idolatry) xl. 19, 20, xli. 7, xliv. 9-17, xlvi. 6; (4) the personality of the Spirit of Yahweh (mentioned no less than seven times, see especially xl. 3, xlviii. 16, lxiii. 10, 14); (5) the influence of the angelic powers (xxiv. 21); (6) the resurrection of the body (xxvi. 19); (7) the everlasting punishment of the wicked (lxvi. 24) ; (8) vicarious atonement (chap. liii.).

We cannot here do more than chronicle the attempts of a Jewish scholar, the late Dr Kohut, in the Z.D.M.G. for 1876 to prove. a Zoroastrian influence on chaps, xl.-lxvi. The idea is

not in itself inadmissible, at least for post-exilic portions, for Zoroastrian ideas were in the intellectual atmosphere of Jewish writers in the Persian age.

There is an equally striking difference among the disputed prophecies themselves, and one of no small moment as a sub- sidiary indication of their origin. We have already spoken of the difference of tone between parts of the latter half of the book; and, when we compare the disputed prophecies of the former half with the Prophecy of Israel's Restoration, how inferior (with all reverence be it said) do they appear! Truly " in many parts and many manners did God speak " in this composite book of Isaiah! To the Prophecy of Restoration we may fitly apply the words, too gracious and too subtly chosen to be translated, of Renan, " ce second Isaie, dont Fame lumineuse semble comme impregnee, six cent ans d'avance, de toutes les rosees, de tous les parfums de 1'avenir " {U Antichrist, p. 464); though, indeed, the common verdict of sympathetic readers sums up the sentence in a single phrase — " the Evangelical Prophet." The freedom and the inexhaustibleness of the undeserved grace of God is a subject to which this gifted son constantly returns with " a monotony which is never monotonous." The defect of the disputed prophecies in the former part of the book (a defect, as long

as we regard them in isolation, and not as supplemented by those which come after) is that they emphasize too much for the Christian sentiment the stern, destructive side of the series of divine interpositions in the latter days.

VI. The Cyrus Inscriptions. — Perhaps one of the most im- portant contributions to the study of II. Isaiah has been the discovery of two cuneiform texts relative to the fall of Babylon and the religious policy of Cyrus. The results are not favourable to a mechanical view of prophecy as involving absolute accuracy of statement. Cyrus appears in the unassailably authentic cylinder inscription "as a complete religious indifferentist, willing to go through any amount of ceremonies to soothe the prejudices of a susceptible population." He preserves a strange and significant silence with regard to Ahura-mazda, the supreme God of Zoroastrianism, and in fact can- hardly have been a Zoroastrian believer at all. On the historical and religious bearings of these two inscriptions the reader may be referred to the article " Cyrus " in the Encyclopaedia Biblica and the essay on " II. Isaiah and the Inscriptions " in Cheyne's Prophecies of Isaiah, vol. ii. It may, with all reverence, be added that out estimate of prophecy must be brought into harmony with facts, not facts with our preconceived theory of inspiration.

Authorities. — Lowth, Isaiah: a new translation, with a pre- liminary dissertation and notes (1778); Gesenius, Der Proph. Jes. (1821); Hitzig, Der Proph. Jes. (1833); Delitzsch, Der Pr. Jes. (4th cd., 1889); Dillmann-Kittel, Isaiah (1898); Duhm (1892; 2nd ed., 1902) ; Marti (1900) ; Cheyne, The Prophecies of Isaiah (2 vols., 1880-1881); Introd. to Book of Isaiah (1898); " The Book of the Prophet Isaiah," in Paul Haupt's Polychrome Bible (1898); S. R. Driver, Isaiah, his life and times (1888); J. Skinner, " The Book of Isaiah," in Cambridge Bible (2 vols., 1896, 1898); G. A. Smith, in Expositor's Bible (2 vols., 1888, 1890); Condamin (Rom. Cath.) (1905); G. H. Box (1908); Article on Isaiah in Ency. Bib. by Cheyne; in Hastings' Diet, of the Bible by Prof. G. A. Smith. R. H. Kennett's Schweich Lecture (1909), The Composition of the Book of Isaiah in the\Light of Archaeology and History, an interesting attempt at a synthesis of results, is a brightly written but scholarly sketch of the growth of the book of Isaiah, which went on till the' great success of the Jews under Judas Maccabaeus. The outbursts of triumph (e.g. Isa. ix. 2-7) are assigned to this period. The most original statement is perhaps the view that the words of Isaiah were pre- served orally by his disciples, and did not see the light (in a revised form) till a considerable time after the crystallization of the reforms of Josiah into laws. (T. K. C.) •»

ISAIAH, ASCENSION OF, an apocryphal book of the Old Testament. The Ascension of Isaiah is a composite work of very great interest. In its present form it is probably not older than the latter half of the 2nd century of our era. Its various constituents, however, and of these there were three—the Martyrdom of Isaiah, the Testament of Hezekiah and the Vision of Isaiah — circulated independently as early as the 1st century. The first of these was of Jewish origin, and is of less interest than the other two, which were the work of Christian writers. The Vision of Isaiah is important for the knowledge it affords us of

ist-century beliefs in certain circles as to the doctrines of the Trinity, the Incarnation, the Resurrection, the Seven Heavens, &c. The long lost Testament of Hezekiah, which is, in the opinion of R.H.Charles, to be identified with iii. i3b-iv. 1 8, of our present work, is unquestionably of great value owing to the insight it gives us into the history of the Christian Church at the close of the ist century. Its descriptions of the worldliness and lawless- ness which prevailed among the elders and pastors, i.e. the bishops and priests, of the wide-spread covetousness and vainglory as well as the growing heresies among Christians generally, agree with similar accounts in 2 Peter, 2 Timothy and Clement of Rome.

Various Titles. — Origen in his commentary on Matt. xiii. 57 (Lommatzsch 111. 4, 9) calls it Apocryph of Isaiah— 'AirdKpvˆv "Hccuou, bpiphanius (Haer. xl. 2) terms it the Ascension of Isaiah — rd a.va0a.TLK6v 'Haaiov, and similarly Jerome — Ascensio Isaiae. It was also known as the Vision of Isaiah and finally as the Testament of Hezekiah (see Charles, The Ascension of Isaiah, pp. xii.-xv.).

The Greek Original and the Versions.— The book was written in Greek, though not improbably the middle portion, the Testament of Hezekiah, was originally composed in Semitic. The Greek in its original form, which we may denote by G, is lost. It has, however been in part preserved to us in two of its recensions, G 1 and G 2 ! From G l the Ethiopic Version and the first Latin Version (consisting of 11. H-m- 13. vii. 1-19) were translated, and of this recension the actual Greek has survived in a multitude of phrases in the Greek Legend. G 2 denotes the Greek text from which the Slavonic and the second Latin Version (consisting of vi.-xi.) Were translated. Of this recension 11. 4-iv. 2 have been discovered by Grenfell and Hunt. 1 For complete details see Charles', op. cit. pp. xviii.-xxxiii. ; also

Hemming in Hennecke's NTliche Apok.

Latin Version.— The first Latin Version (L 1) is fragmentary (= 11. 14-111. 13, vn. 1-19). It was discovered and edited by Mai in 1828 (Script, vet. nova collectio III. ii. 238), and reprinted by Dillmann in his edition of 1877, and subsequently in a more correct form by Charles in his edition of 1900. The second version (L 2), which consists of vi.-xi., was first printed at Venice in 1522 by Gieseler in 1832, Dillmann in 1877 and Charles in 1900.

Ethiopic Version.— There are three MSS. This version is on the whole a faithful reproduction of G 1 . These were used by Dillmann and subsequently by Charles in their editions.

Different Elements in the Book.— The compositeness of this work is universally recognized. Dillmann's analysis is as follows, (i.) Martyrdom of Isaiah, of Jewish origin; ii. i-iii. 12, v. 2-14. (ii.) The Vision of Isaiah, of Christian origin, vi. i-xi. I, 23-40. (iii.) The above two constituents were put together by a Christian writer, who prefixed 1. 1, 2, 4b- 13 and appended xi. 42, 43. (iv.) Finally a later Christian editor incorporated the two sections iii. 13-v. 1 and xi. 2-22 and added i. 3, 4a, v. 15, 16, xi. 41. '

This analysis has on the whole been accepted by Harnack, Schtirer Deane and Beer. These scholars have been influenced by Gebhardt's statement that in the Greek Legend there is not a trace of iii. 13-v. 1, xi. 2-22, and that accordingly these sections were absent from the text when the Greek Legend was composed. But this statement is wrong, for at least five phrases or clauses in the Greek Legend are derived from the sections in question. Hence R. H. Charles has examined {op. cit. pp. xxxviii.-xlvii.) the problem de novo, and arrived at the following conclusions. The book is highly composite, and arbitrariness and disorder are found in every section. There are three original documents at its base, (i.) The Martyrdom of Isaiah = 1. I, 2a, 6b-i3a, ii. 1-8, 10-iii. 12, v. ib-14. This is but an im- perfect survival of the original work. Part of the original work omitted by the final editor of our book is preserved in the Opus imperfectum, which goes back not to our text, but to the original Martyrdom. (11.) The Testament of Hezekiah = iii. I3b-iv. 18. This work is mutilated and without beginning or end. (iii.) The Vision of Isaiah = vi.-xi. 1-40. The archetype of this section existed inde- pendently in Greek; for the second Latin and the Slavonic Versions presuppose an independent circulation of their Greek archetype in western and Slavonic countries. This archetype differs in many respects from the form in which it was republished by the editor of the entire work.

We may in short, put this complex matter as follows: The conditions of the problem are sufficiently satisfied by supposing a single editor, who had three works at his disposal, the Martyrdom of Isaiah of Jewish origin, and the Testament of Hezekiah and the Vision of Isaiah, of Christian origin. These he reduced or enlarged as it suited his purpose, and put them together as they stand in our text. Some of the editorial additions are obvious, as i. 2b-6a, 13a, ii. 9 iii 13a iv. ia, 19-v. ia, 15, 16, xi. 41-43. ‘ ‘

Dates of the Various Constituents of the Ascension.— {a) The Martyrdom is quoted by the Opus Imperfectum, Ambrose, Jerome,

1 Published by them in the Amherst Papyri, an account of the Greek papyri in the collection of Lord Amherst (1900), and bv Charles in his edition.

Origen, Tertulhan and by Justin Martyr. It was probably known to the writer of the Epistle to the Hebrews. Thus we are brought back to the 1st century a.d. if the last reference is trustworthy. And this is no doubt the right date, for works written by Jews in the 2nd century would not be likely to become current in the Christian cnurch. (b) 1 he Testament of Hezekiah was written between A D 88- 100 The grounds for this date will be found in Charles, op. cit pp. lxxi.-lxxn. and 30-31. (c) The Vision of Isaiah. The later re- cension ot this Vision was used by Jerome, and a more primitive form ot the text by the Archontici according to Epiphanius. It is still earlier attested by the Actus Petri Vercellenses. Since the Prote- yangel of James was apparently acquainted with it, and likewise Ignatius (ad. Ephes. xix.), the composition of the primitive form of the Vision goes back to the close of the 1st century.

The work of combining and editing these three independent writings may go back to early in the 3rd or even to the 2nd century

Literature.— Editions of the Ethiopic Text: Laurence, Ascensio Isaiae Mis (1819); Dillmann, Ascensio Isaiae Aethiopice et Latine cum prolegomems, adnotationibus criticis et exegeiicis, additis versionum. Lahnarum reliquiis edita (1877); Charles, Ascension of Isaiah, translated from the Ethiopic Version, which, together with the new Greek Fragment,. the Latin Versions and tlie Latin translation of the Slavonic is here published in full, edited with Introduction, Notes

and Indices (1900) ; Flemming, in Hennecke's NTliche Apok. 292-30S • NThche^ Apok.-Handbuch, 323-331. This translation is made from Charles s text, and his analysis of the text is in the main accepted by this- scholar. Translations: In addition to the translations given in the preceding editions, Basset, Les Apocryphes ethiopiens iii L Ascensipnd Isaie"(l89 4) ; Beer,Apok.undPseud. (i90o)ii.i2 4 -i27' 1 he latter is a German rendering of ii.-iii. 1-12, v. 2-14, of Dillmann's text. Critical Inquiries: Stokes, art. "Isaiah, Ascension of," in Smith sDict. of Christian Biography (1882), iii. 298-301 ; Robinson,

I he Ascension of Isaiah" in Hastings' Bible Diet. ii. 499-501. lor complete bibliography see Schtirer, 3 Gesch. des jild Volks 111. 280-285 ; Charles, op. cit. (R. H. C.)

ISANDHLWANA, an isolated hill in Zululand, 8 m. S.E. of Rorke's Drift across the Tugela river, and 105 m. N. by W. of Durban. On the 22nd of January 1879 a British force encamped at the foot of the hill was attacked by about 10,000 Zulus, the flower of Cetewayo's army, and destroyed. Of eight hundred Europeans engaged about forty escaped (see Zululand: History) .

ISAR (identical with I sere, in Celtic " the rapid "), a river of Bavaria. It rises in the Tirolese Alps N.E. from Innsbruck, at an altitude of 5840 ft. It first winds in deep, narrow glens and gorges through the Alps, and at T6lz (2100ft.), due north from its source, enters the Bavarian plain, which it traverses in a generally north and north-east direction, and pours its waters into the Danube immediately below Deggendorf after a course of 219 m. The area of its drainage basin is 38,200 sq. m. Below Munich the stream is 140 to 350 yards wide, and is studded with islands. It is not navigable, except for rafts. The total fall of the river is 4816 ft. The Isar is essentially the national stream of the Bavarians. It has belonged from the earliest times to the Bavarian people and traverses the finest corn land in the kingdom. On its banks lie the cities of Munich and Landshut, and the venerable episcopal see of Freising, and the inhabitants of the district it waters are reckoned the core of the Bavarian race.

See C. Gruber, Die Isar nach ihrer Entwickelung und ihren hydrologischen Verhaltnissen (Munich, 1889); and Die Bedeutung der Isar als Verkehrsstrasse (Munich, 1890).

ISATIN, C 8 H 6 N0 2 , in chemistry, a derivative of indol, interesting on account of its relation to indigo; it may be regarded as the anhydride of ortho-aminobenzoylformic or isatinic acid. It crystallizes in orange red prisms which melt at 200-201 C. It may be prepared by oxidizing indigo with nitric or chromic acid (O. L. Erdmann, Jour. prak. Chem., 1841, 24, p. 11); by boiling ortho-nitrophenylpropiolic acid with alkalis (A. Baeyer, Ber., 1880, 13, p. 2259), or by oxidizing carbostyril with alkaline potassium permanganate (P. Friedlander and H. Qstermaier, Ber., 1881, 14, p. 1921). P. J. Meyer (German Patent 26736 (1883)) obtains substituted isatins by condensing para-toluidine with dichloracetic acid, oxidizing the product with air and then hydrolysing the oxidized product with hydrochloric acid. T.Sandmeyer (German Patents 113981 and 119831 (1899)) ob- tained isatin-a-anilide by condensing aniline with chloral hydrate andhydroxylamine, an intermediate product isonitrosodiphenyl- acetamidine being obtained, which is converted into isatin-a- anilide by sulphuric acid. This can be converted into indigo

by reduction with ammonium sulphide. Isatin dissolved in concentrated sulphuric acid gives a blue coloration with thiophene, due to the formation of indophenin (see Abst. J.C.S., 1907). Concentrated nitric acid oxidizes it to oxalic acid, and alkali fusion yields aniline. It dissolves in soda forming a violet solution, which soon becomes yellow, a change due to the transformation of sodium N-isatin into sodium isatate, the aci- isatin salt being probably formed intermediately (Heller, Abst. J.C.S., 1907, i. p. 442). Most metallic salts are N-derivatives yielding N-methyl ethers; the silver salt is, however, an O-derivative, yielding an O-methyl ether (A. v. Baeyer, 1883; W. Peters, Abst. J.C.S., 1907, i. p. 239).

CO

CO

CO 00 CO 010 CO ***

Sodium ult

Isatia

Saver wit

ISAURIA, in ancient geography, a district in the interior of Asia Minor, of very different extent at different periods. The permanent nucleus of it was that section of the Taurus which lies directly to south of Iconium and Lystra. Lycaonia had all the Iconian plain; but Isauria began as soon as the foothills were reached. Its two original towns, Isaura Nea and Isaura Palaea, lay, one among these foothills (Dorla) and the other on the watershed (Zengibar Kale). When the Romans first encountered the Isaurians (early in the 1st century B.C.), they regarded Cilicia Trachea as part of Isauria, which thus extended to the sea ; and this extension of the name continued to be in common use for two centuries. The whole basin of the Calycadnus was reckoned Isaurian, and the cities in the valley of its southern branch formed what was known as the Isaurian Decapolis. Towards the end of the 3rd century a.d., however, all Cilicia was detached for administrative purposes from the northern slope of Taurus, and we find a province called at first Isauria-Lycaonia, and later Isauria alone, extending up to the limits of Galatia, but not passing Taurus on the south. Pisidia, part of which had hitherto been included in one province with Isauria, was also detached, and made to include Iconium. In compensation Isauria received the eastern part of Pamphylia. Restricted again in the 4th century, Isauria ended as it

began by being just the wild district about Isaura Palaea and the heads of the Calycadnus. Isaura Palaea was besieged by Perdiccas, the Macedonian regent after Alexander's death; and to avoid capture its citizens set the place alight and perished in the flames. During the war of the Cilician and other pirates against Rome, the Isaurians took so active a part that the proconsul P. Servilius deemed it necessary to follow them into their fastnesses, and compel the whole people to submission, an exploit for which he received the title of Isauricus (75 B.C.). The Isaurians were afterwards placed for a time under the rule of Amyntas, king of Galatia; but it is evident that they continued to retain their predatory habits and virtual independence. In the 3rd century they sheltered the rebel emperor, Trebellianus. In the 4th century they are still described by Ammianus Marcellinus as the scourge of the neighbouring provinces of Asia Minor; but they are said to have been effectually subdued in the reign of Justinian. In common with all the eastern Taurus, Isauria passed into the hands of Turcomans and Yuruks with the Seljuk conquest-. Many of these have now coalesced with the aboriginal population and form a settled element: but the district is still lawless.

This comparatively obscure people had the honour of producing two Byzantine emperors, Zeno, whose native name was Traska- lisseus Rousoumbladeotes, and Leo III., who ascended the throne of Constantinople in 718, reigned till 741, and became the founder of a dynasty of three generations. The ruins of Isaura Palaea are mainly remarkable for their fine situation and their fortifications and tombs. Those of Isaura Nea have disappeared, but numerous inscriptions and many sculptured stelae, built into the houses of Dorla, prove the site. It was the latter, and not the former town, that Servilius reduced by cutting off the water supply. The site was identified by W. M.

Ramsay in 1901. The only modern exploration of highland Isauria was that made by J. S. Sterrett in 1885; but it was not exhaustive.

Bibliography. — W. M. Ramsay, Historical Geography of Asia Minor (1890), and article " Nova Isaura " in Journ. Hell. Studies (1905); A. M. Ramsay, ibid. (1904); J. R. S. Sterrett, "Wolfe Expedition to Asia Minor," Papers Amer. Inst, of Arch. iii. (1888); C. Ritter, Erdkunde, xix. (1859); E. J. Davis, Life in As. Turkey (1879)- (D. G. H.)

ISCHIA (Gr. TLiBrjKovaa, Lat. Aenaria, in poetry Inarime), an island off the coast of Campania, Italy, 16 m. S.W. of Naples, to the province of which it belongs, and 7 m. S.W. of the Capo Miseno, the nearest point of the mainland. Pop. about 20,000. It is situated at

the W. extremity of the Gulf of Naples, and is the largest island near Naples, measuring about 19 m. in circum- ference and 26 sq. m. in area. It belongs to the same volcanic system as the mainland near it, and the Monte Epomeo (anc. 'Eirajirew, viewpoint), the highest point of the island (2588 ft.), lies on the N. edge of the principal crater, which is surrounded by twelve smaller cones. The island was perhaps occupied by Greek settlers even before Cumae; its Eretrianand Chalcidian inhabitants abandoned it about 500 B.C. owing to an eruption, and it is said to have been deserted almost at once by the greater part of the garrison which Hiero I. of Syracuse had placed there about 470 B.C., owing to the same cause. Later on it came into the possession of Naples, but passed into Roman hands in 326, when Naples herself lost her independence. The ancient town, traces of the fortifications of which still exist, was situated near Lacco, at the N.W. corner of the island. Augustus gave it back to Naples in exchange for Capri. After the fall of Rome it suffered attacks and devastations from the successive masters of Italy, until it was finally taken by the Neapolitans in 1299.

Several eruptions are recorded in Roman times. The last of which we have any knowledge occurred in 1301, but the island was visited by earthquakes in 1881 and 1883, 1 700 lives being lost in the latter year, when the town of Casamicciola on the north side of the island was almost entirely destroyed. The hot springs here, which still survive from the period of volcanic activity, rise at a temperature of 147 Fahr. and are alkaline and saline; they are much visited by bathers, especially in summer. They were known in Roman times, and many votive altars dedicated to Apollo and the nymphs have been found. The whole island is mountainous, and is remarkable for its beautiful scenery and its fertility. Wine, corn, oil and fruit are produced, especially the former, while the mountain slopes are clothed with woods. Tiles and pottery are made in the island. Straw-plaiting is a considerable industry at Lacco; .and a certain amount of fishing is also done. The potter's clay of Ischia served for the potteries of Cumae and Puteoli in ancient times, and was indeed in considerable demand until the catastrophe at Casamicciola in 1883.
V

The chief towns are Ischia on the E. coast, the capital and the seat of a bishop (pop. in 1901, town, 2756; commune, 7012), with a 15th-century castle, to which Vittoria Colonna retired after the death of her husband in 1525; Casamicciola (pop. in 1901, town, 1085; commune, 3731) on the north, and Forio on the west coast (pop. in 1901, town, 3640; commune, 7197). There is regular communication with Naples, both by steamer direct, and also by

steamer to Torregaveta, 2 m. W.S.W. of Baiae and 12ˆ m. W.S.W. of Naples, and thence by rail.

See J. Beloch, Campanien (Breslau, 1890), 202 sqq. (T. As.} 1
ISCHL, a market-town and watering-place of Austria, in Upper Austria, 55 m. S.S.W. of Linz by rail. Pop. (1900) 9646. It is beautifully situated on the peninsula formed by the junction of the rivers Ischl and Traun and is surrounded by high moun- tains, presenting scenery of the finest description. To the S. is the Siriuskogl or Hundskogl (i960 ft.), and to the W. the Schafberg (5837 ft.), which is ascended from St Wolfgang by a rack-and- pinion railway, built in 1893. It possesses a fine parish church, built by Maria Theresa and renovated in 187 7-1 880, and the Imperial Villa is surrounded by a magnificent park. Ischl is one of the most fashionable spas of Europe, being the favourite

summer residence of the Austrian Imperial family and of the Austrian nobility since 1822. It has saline and sulphureous drinking springs and numerous brine and brine-vapour baths. The brine used at Ischl contains about 25% of salt and there are also mud, sulphur and pine-cone baths. Ischl is situated at an altitude of 1533 ft. above sea-level and has a very mild climate. Us mean annual temperature is 49-4° F. and its mean summer temperature is 63-5° F. Ischl is an important centre of the salt industry and 4 m. to its W. is a celebrated salt mine, which has been worked as early as the 12th century.

ISEO, LAKE OF (the Lacus Sebinus of the Romans), a lake in Lombardy, N. Italy, situated at the southern foot of the Alps, and between the provinces of Bergamo and Brescia. It is formed by the Oglio river, which enters the northern extremity of the lake of Lovere, and issues from the southern end at Sarnico, on its way to join the Po. The area of the lake is" about 24 sq. m., it is 175 m. in length, and 3 m. wide in the broadest portion, while the greatest depth is said to be about 984 ft. and the height of its surface above sea-level 607 ft. It contains one large island, that of Siviano, which culminates in the Monte Isola (1965 ft.) that is crowned by a chapel, while to the south is the islet of San Paolo, occupied by the buildings of a small Franciscan convent now abandoned, and to the north the equally tiny island of Loreto, with a ruined chapel containing frescoes. At the southern end of the lake are the small towns of Iseo

(15 m. by rail N.W. of Brescia) and of Sarnico. From Paratico, opposite Sarnico, on the other or left bank of the Oglio, a railway runs in 6j m. to Palazzolo, on the main Brescia-Bergamo line. Towards the head of the lake, the deep wide valley of the Oglio is seen, dominated by the glittering snows of the Adamello (11,661 ft.), a glorious prospect. Along the e-ast shore (the west shore is far more rugged) a fine carriage road runs from Iseo to the consider- able town of Pisogne (135 m.), situated at the northern end of the lake, and nearly opposite that of Lovere, on the right bank of the Oglio. The portion, of this road some way S. of Pisogne is cleverly engineered, and is carried through several tunnels. The lake's charms were celebrated by Lady Mary Wortley- Montagu, who spent ten summers (1747-1757) in a villaat Lovere, then much frequented by reason of an iron spring. The lake has several sardine and eel fisheries. (W. A. B. C.)

ISERE [anc. Isara], one of the chief rivers in France as well as of those flowing down on the French side of the Alpine chain. Its total length from its source to its junction with the Rhone is about 180 m., during which it descends a height of about 7550 ft. Its drainage area is about 4725 sq. m. It flows through the departments of Savoie, Isere and Drome. This river rises in the Galise glaciers in the French Graian Alps and flows, as a mountain torrent, through a narrow valley past Tignes in a north-westerly direction to Bourg St Maurice, at the western foot of the Little St Bernard Pass. It now bends S.W., as far as Moutiers, the chief town of the Tarentaise, as the upper course of the Isere is named. Here it again turns N.W. as far as Albert- ville, where after receiving the Arly (right) it once more takes a south-westerly direction, and near St Pierre d'Albigny receives its first important tributary, the Arc (left), a wild mountain stream flowing through the Maurienne and past the foot of the Mont Cenis Pass. A little way below, at Montmelian, it becomes officially navigable (for about half of its course), though it is but little used for that purpose owing to the irregular depth of its bed and the rapidity of its current. Very probably, in ancient days, it flowed from Montmelian N.W. and, after passing through or forming the Lac du Bourget, joined the Rhone. But at present it continues from Montmelian in a south-westerly direction, flowing through the broad and fertile valley of the Graisivaudan, though receiving but a single affluent of any importance, the Breda (left). At Grenoble, the most important town on its banks, it tends for a short distance again N.W. But just below that town it receives by far its most important affluent (left) the Drac, which itself drains the entire S. slope of the lofty snow-clad Dauphine Alps, and which, 11 m. above Grenoble, had

received the Romanche (right), a mountain stream which, drains the entire central and N. portion of the same

Alps. Hence the Drac is, at its junction with the Isere, a stream of nearly the same volume, while these two rivers, with the Durance, drain practically the entire French slope of the Alpine chain, the basins of the Arve and of the Var forming the sole exceptions. A short distance below Moirans the Isere changes its direction for the last time and now flows S.W. past Romans before joining the Rhone on the left, as its principal affluent after the Saone and the Durance, between Tournon and Valence. The Isere is remarkable for the way in which it changes its direction, forming three great loops of which the apex is respectively at Bourg St Maurice, Albertville and Moirans. For some way after its junction with the Rhone the grey troubled current of the Isere can be distinguished in the broad and peaceful stream of the Rh6ne. (W. A. B. C)

ISfiRE, a department of S.E. France, formed in 1790 out of the northern part of the old province of Dauphine. Pop. (1906) 562,315. It is bounded N. by the department of the Ain, E. by that of Savoie, S. by those of the Hautes Alpes and the Dr6me and W. by those of the Loire and the Rhone. Its area is 3179 sq. m. (surpassed only by 7 other departments), while its greatest length is 93 m. and its greatest breadth 53 m. The river Isere runs for nearly half its course through this department, to which it gives its name. The southern portion of the department is very mountainous, the loftiest summit being the Pic Lory (13,396 ft.) in the extensive snow-clad Oisans group (drained by the Drac and Romanche, two mighty mountain torrents), while minor groups are those of Belledonne, of Allevard, of the Grandes Rousses, of the Devoluy, of the Trieves, of the Royan- nais, of the Vercors and, slightly to the north of the rest, that of the Grande Chartreuse. The northern portion of the depart- ment is composed of plateaux, low hills and plains, while on every side but the south it' is bounded by the course of the Rhone. It forms the bishopric of Grenoble (dating from the 4th century), till 1790 in the ecclesiastical province of Vienne, and now in that of Lyons. The department is divided into four arrondissements (Grenoble, St Marcellin, La Tour du Pin and Vienne), 45 cantons and 563 communes. Its capital is Grenoble, while other important towns in it are the towns of Vienne, St Marcellin and La Tour du Pin. It is well supplied with railways (total length 342 m.), which give access to Gap, to Chambery, to Lyons, to St Rambert and to Valence, while it also possesses many tramways (total length over 200 m.). It contains silver, lead, coal and iron mines, as well as extensive slate, stone and marble quarries, besides several mineral springs (Allevard, Uriage and La Motte). The

forests cover much ground, while among the most flourishing industries are those of glove making, cement, silk weaving and paper making. The area devoted to agriculture (largely in the fertile valley of the Graisivaudan, or Isere, N.E. of Grenoble) is about 121 1 sq. m. (W. A. B. C.)

ISERLOHN, a town in the Prussian province of Westphalia, on the Baar, in a bleak and hilly region, 17 m. W. of Arnsberg, and 30 m. E.N.E. from Barmen by rail. Pop. (1900) 27,265. Iserlohn is one of the most important manufacturing towns in Westphalia. Both in the town and neighbourhood there are numerous foundries and works for iron, brass, steel and bronze goods, while other manufactures include wire, needles and pins, fish-hooks, machinery, umbrella-frames, thimbles, bits, furniture, chemicals, coffee-mills, and pinchbeck and britannia- metal goods. Iserlohn is a very old town, its gild of armourers being referred to as " ancient " in 1443.

ISFAHAN (older form Ispahan), the name of a Persian province and town. The province is situated in the centre of the country, and bounded S. by Fars, E. by Yezd, N. by Kashan, Natanz and Irak, and W. by the Bakhtiari district and Arabistan. It pays a yearly revenue of about £100,000, and its population exceeds 500,000. It is divided into twenty-five districts, its capital, the town of Isfahan, forming one of them. These twenty-five districts, some very small and consisting of only a little township and a few hamlets, are Isfahan, Jai, Barkhar, Kahab, Kararaj, Baraan, Rtidasht, Marbin, Lenjan, Kerven, Rar, Kiar, Mizdej, Ganduman, Somairam, Jarkviyeh, Ardistan, Kuhpayeh, Najafabad,Kormsheh,Chadugan,Varzek,Tokhmaklu,

Gurji, Chinarud. Most of these districts are very fertile, and produce great quantities of wheat, barley, rice, cotton, tobacco and opium. Lenjan, west of the city of Isfahan, is the greatest rice-producing district; the finest cotton comes from Jarkuyeh; the best opium and tobacco from the villages in the vicinity of the city.

The town of Isfahan or Ispahan, formerly the capital of Persia, now the capital of the province, is situated on the Zayendeh river in 3 2° 39′ N. and 51 40′ E. 1 at an elevation of 5370 it. Its population, excluding that of the Armenian colony of Julfa on the right or south bank of the river (about 4000), is estimated at 100,000 (73,654,

including 5883 Jews, in 1882). The town is divided into thirty-seven mahallehs (parishes) and has 210 mosques and colleges (many half ruined), 84 caravanserais, 150 public baths and 68 flour mills. The water supply is principally from open canals led off from the river and from several streams and canals which come down from the hills in the north-west. The name of the Isfahan river was originally Zendeh (Pahlavi zendek) rud, " the great river "; it was then modernized into Zindeh-rud, " the living river," and is now called Zayendeh rud, " the life-giving river." Its principal source is the Jananeh rud which rises on the eastern slope of the Zardeh Kuh about 90 to 100 m. W. of Isfahan. After receiving the Khursang river from Feridan on the north and the Zarln rud from Chaharmahal on the south it is called Zendeh rud. It then waters the Lenjan and Marbin districts, passes Isfahan as Zayendeh-rud and 70 m. farther E. ends in the Gavkhani depression. From its entrance into Lenjan to its end 105 canals are led off from it for purposes of irrigation and 14 bridges cross it (5 at Isfahan). Its volume of water at Isfahan during the spring season has been estimated at 60,000 cub. ft. per second; in autumn the quantity is reduced to one- third, but nearly all of it being then used for feeding the irriga- tion canals very little is left for the river bed. The town covers about 20 sq. m., but many parts of it are in ruins. The old city walls — a ruined mud curtain — are about 5 m. in circumference. Of the many fine public buildings constructed by the Sefavis and during the reign of the present dynasty very little remains. There are still standing in fairly good repair the two palaces named respectively Chehel Situn, " the forty pillars," and Hasht Behesht, " the eight paradises," the former constructed by Shah Abbas I. (1587-1629), the latter by Shah Soliman in 1670, and restored and renovated by Fath Ali Shah (1 797-1834). They are ornamented with gilding and mirrors in every possible variety of Arabesque decoration, and large and brilliant pictures, representing scenes of Persian history, cover the walls of their principal apartments and have been ascribed in many instances to Italian and Dutch artists who are known to have been in the service of the Sefavis. Attached to these palaces were many other buildings such as the Imaretino built by Amin ed-Dowleh (or Addaula) for Fath Ali Shah, the Imaret i Ashref built by Ashref Khan, the Afghan usurper, the Talar Tavlleh, Guldasteh, Sarpushideh, &c, erected in the early part of the 19th century by wealthy courtiers for the convenience of the sovereign and often occupied as residences of European ministers travelling between Bushire and Teheran and by other distinguished travellers. Perhaps the most agreeable residence of all was the Haft Dast, "the seven courts," in .the beautiful garden of Saadetabad on the southern bank

of the river, and 2 or 3 m. from the centre of the city. This palace was built by Shah Abbas II. (1642-1667), and Fath Ali Shad Kajar died there in 1834. Close to it was the Aineh Khaneh, " hall of mirrors " and other elegant buildings in the Hazar jerib (1000 acre) garden. All these palaces and buildings on both sides of the river were surrounded by extensive gardens, traversed by avenues of tall

1 These figures are approximate for the centre of the town north of the river. The result of astronomical observations taken by the German expedition for observing the transit of Venus in 1874 and by Sir O. St John in 1870 on the south bank of the river near, and in Julfa respectively was 51 40′ 3-45″ E., 32 37′ 30″ N. The stone slab commemorating the work of the expedition and placed on the spot where the observations were taken has been carried off and now verves as a door plinth of an Armenian house.

trees, principally planes, and intersected by paved canals of running water with tanks and fountains. Since Fath Ali Shah's death, palaces and gardens have been neglected. In 1902 an official was sent from Teheran to inspect the crown buildings, to report on their condition, and repair and renovate some, &c. The result was that all the above-mentioned buildings, excepting the Chehel Situn and Hasht Behesht, were demolished and their timber, bricks, stone, &c, sold to local builders. The gardens are wildernesses. The garden of the Chehel Situn palace opens out through the Ala Kapu (" highest gate, sublime porte ") to the Maidan-i-Shah, which is one of the most imposing piazzas in the world, a parallelogram of 560 yds. (N.-S.) by 174 yds. (E.-W.) surrounded by brick buildings divided into two storeys of recessed arches, or arcades, one above the other. In front of these arcades grow a few stunted planes and poplars. On the south side of the maidan is the famous Masjed i Shah (the shah's mosque) erected by Shah Abbas I. in 1612-1613. It is covered with glazed tiles of great brilliancy and richly decorated with gold and silver ornaments and cost over £175,000. It is in good repair, and plans of it were published by C. Texier (L Armenie, la Perse, &c, vol. i. pis. 70-72) and P. Coste {Monu- ments de la Perse). On the eastern side of the maidan stands the Masjed i Lutf Ullah with beautiful enamelled tiles and in good repair. Opposite to it on 'the western side of the maidan is the Ala Kapu, a lofty building in the form of an archway overlooking the maidan and crowned in the fore part by an immense open throne-room supported by wooden columns, while the hinder part is elevated three storeys higher. On the north side of the maidan is the entrance gate to the main bazaar surmounted by the Nekkareh-Khaneh, or drumhouse, where is blared forth the appalling music saluting the rising and setting sun, said to have been instituted by

Jamshld many thousand years ago. West of the Chehel Situn palace and conducting N.-S. from the centre of the city to the great bridge of Allah Verdi Khan is the great, avenue nearly a mile in length called Chahar Bagh, " the four gardens," recalling the fact that it was originally occupied by four vineyards which Shah Abbas I. rented at £360 a year and converted into a splendid approach to his capital.

It was thus described by Lord Curzon of Kedleston in 1 880: " Of all the sights of Isfahan, this in its present state is the most pathetic in the utter and pitiless decay of its beauty. Let me indi- cate what it was and what it is. At the upper extremity a two- storeyed pavilion, 2 connected by a corridor with the Seraglio of the palace, so as to enable the ladies of the harem to gaze unobserved upon the merry scene below, looked out upon the centre of the avenue. Water, conducted in stone channels, ran down the centre, falling in miniature cascades from terrace to terrace, and was occasionally collected in great square or octagonal basins where cross roads cut the avenue. On either side of the central channel was a row of oriental planes and a paved pathway for pedestrians. Then occurred a succession of open parterres, usually planted or sown. Next on either side was a second row of planes, between which and the flanking walls was a raised causeway for horsemen. The total breadth is now fifty-two yards. At intervals corresponding with the successive terraces and basins, arched doorways with recessed open chambers overhead conducted through these walls into the various royal or noble gardens that stretched on either side, and were known as the Gardens of the Throne, of the Nightingale, of Vines, of Mul- berries, Dervishes, &c. Some of these pavilions were places of public resort and were used as coffee-houses, where when the business of the day was over, the good burghers of Isfahan assembled to sip that beverage and inhale their kalians the while; as Fryer puts it: ' Night drawing on, all the pride of Spahaun was met in the Chaur- baug and the Grandees were Airing themselves, prancing about with their numerous Trains, striving to outvie each other in Pomp and. Generosity.' At the bottom, quays lined the banks of the river, and were bordered with the mansions of the nobility."

Such was the Chahar Bagh in the plenitude of its fame. But now what a tragical contrast! The channels are empty, their stone borders crumbled and shattered, the terraces are broken down, the parterres are unsightly bare patches, the trees, all lopped and pollarded, have been chipped and hollowed out or cut down for fuel by the soldiery of the Zil, the side pavilions are abandoned and tumbling to pieces and the gardens are wildernesses. Two centuries of decay could never make the Champs Elysees in Paris, the Unter

2 This pavilion was the Persian telegraph office of Isfahan for nearly forty years and was demolished in 1 903.

den Linden in Berlin, or Rotten Row in London, look one half as miserable as does the ruined avenue of Shah Abbas. It is in itself an epitome of modern Iran.”

Towards the upper end of the avenue on its eastern side stands the medresseh (college) which Shah Hosain built in 17 10. It still has a few students, but is very much out of repair; Lord Curzon spoke of it in 1888 as ” one of the stateliest ruins that he saw in Persia.” South of this college the avenue is altogether without trees, and the gardens on both sides have been turned into barley fields. Among the other notable buildings of Isfahan must be reckoned its five bridges, all fine structures, and one of them, the bridge of Allah Verdi Kahn, 388 yds. in length with a paved roadway of 30 ft. in breadth, is one of the stateliest bridges in the world, and has suffered little by the march of decay. Another striking feature of Isfahan is the line of covered bazaars, which extends for nearly 3 m. and divides the city from south to north. The confluence of people in these bazaars is certainly very great, and gives an exaggerated idea of the populousness of the city, the truth being that while the in- habitants congregate for business in the bazaars, the rest of the city is comparatively deserted. When surveyed from a command- ing height within the city, or in the immediate environs, the enormous extent of mingled garden and building, about 30 m. in circuit, gives an impression of populousness and busy life, but a closer scrutiny reveals that the whole scene is nothing more than a gigantic sham. With the exception of the bazaars and a few parishes there is really no continuous inhabited area. Whole streets, whole quarters of the city have fallen into utter ruin and are absolutely deserted, and the traveller who is bent on visiting some of the remarkable sites in the northern part of the city or in the western suburbs, such as the minarets dating from the 12th century, the remains of the famous castle of Tabarrak built by the Buyid Rukn addaula (d. 976), the ruins of the old fire temple, the shaking minarets of Guladan, &c, has to pass through miles of crumbling mud walls and roofless houses. It is believed indeed that not a twentieth part of the area of the old city is at present peopled, and the million or 600,000 inhabitants of Chardin’s time (middle of the 17th century) have now dwindled to about 85,000. The Armenian suburb of Julfa, at any rate, which

contained a population of 30,000 souls in the 17th century, has now only 4000, and the Christian churches, which numbered thirteen and were maintained with splendour, are now reduced to half a dozen edifices with bare walls and empty benches. Much improvement has recently taken place in the education of the young and also in their religious teaching, the wealthy Armenians of India and Java having liberally contributed to the national schools, and the Church Missionary Society of London having a church, schools and hospitals there since 1869.

The people of Isfahan have a very poor reputation in Persia either for courage or morals. They are regarded as a clever but at the same time dissolute and disorderly community, whose government requires a strong hand. The lutis (hooligans) of Isfahan are proverbial as the most turbulent and rowdy set of vagabonds in Persia. The priesthood of Isfahan are much respected for their learning and high character, and the merchants are a very respectable class. The commerce of Isfahan has greatly fallen off from its former flourishing condition, and it is doubtful whether the trade of former days can ever be restored. (A. H.-S.)

History. — The natural advantages of Isfahan — a genial climate, a fertile soil and abundance of water for irrigation — must have always made it a place of importance. In the most ancient cuneiform docu- ments, referring to a period between 3000 and 2000 B.C., the province of Anshan, which certainly included Isfahan, was the limit of the geographical knowledge of the Babylonians, typifying the extreme east, as Syria (or Martu-ki) typified the west. The two provinces of Anshan and Subarta, by which we must understand the country from Isfahan to Shuster, were ruled in those remote ages by the same king, who undoubtedly belonged to the great Turanian family; and from this first notice of Anshan down to the 7th century B.C. the region seems to have remained, more or less, dependent on the paramount power of Susa. With regard to the eastern frontier of Anshan, however, ethnic changes were probably in extensive opera- tion during this interval of twenty centuries. The western Iranians,

for instance, after separating from their eastern brethren on the Oxus, as early perhaps as 3000 B.C., must have followed the line of the Elburz mountains, and then bifurcating into two branches must have scattered, westward into Media and southward towards Persia. The first substantial settlement of the southern branch would seem then to have been at Isfahan, where Jem, the eponym of the Persian race, is said to have founded a famous castle, the remains of which were visible as late as the 10th century a.d. This castle is known in

the Zoroastrian writings as Jem-gird, but its proper name was Saru or Sarilk (given in the Bundahish as Sruwa or Srobak), and it was especially famous in early Mahommedan history as the building where the ancient records and tables of the Persians were discovered which proved of so much use to Albumazar and his con- temporaries. A valuable tradition, proceeding from quite a different source, has also been preserved to the effect that Jem, who invented the original Persian character, " dwelt in Assan, a district of Shuster " (see Fliigel's Fihrist, p. 12, 1. 21), which exactly accords with the Assyrian notices of Assan or Anshan classed as a depend- ency of Elymais. Now, it is well known that native legend repre- sented the Persian race to have been held in bondage for a thousand years, after the reign of Jem, by the foreign usurper Zohak or Biverasp, a period which may well represent the duration of Ely- maean supremacy over the Aryans of Anshan. At the commence- ment of the 7th century B.C. Persia and Ansan are still found in the annals of Sennacherib amongst the tributaries of Elymais, confeder- ated against Assyria; but shortly afterwards the great Susian monarchy, which had lasted for full 2000 years, crumbled away under continued pressure from the west, and the Aryans of Anshan recovered their independence, founding for the first time a national dynasty, and establishing their seat of government at Gabae on the site of the modern city of Isfahan.

The royal city of Gabae was known as a foundation of the Achae- menidae as late as the time of Strabo, and the inscriptions show that Achaemenes and his successors did actually rule at Anshan until the great Cyrus set out on his career of western victory. Whether the Kabi or Kavi of tradition, the blacksmith of Isfahan, who is said to have headed the revolt against Zohak, took his name from the town of Gabae may be open to question; but it is at any rate re- markable that the national standard of the Persian race, named after the blacksmith, and supposed to have been first unfurled at this epoch, retained the title of Darafsh-a Kavani (the banner of Kavi) to the time of the Arab conquest, and that the men of Isfahan were, moreover, throughout this long period, always especially charged with its protection. The provincial name of Anshan or Assan seems to have been disused in the country after the age of Cyrus, and to have been replaced by that of Gabene or Gabiane, which alone appears in the Greek accounts of the wars of Alexander and his successors, and in the geographical descriptions of Strabo. Gabae or Gavi became gradually corrupted to Jai during the Sassanian period, and it was thus by the latter name that the old city of Isfahan was generally known at the time of the Arab in- vasion. Subsequently the title of

Jai became replaced by She- heristan or Medineh, " the city " par excellence, while a suburb which had been founded in the immediate vicinity, and which took the name of Yahudleh, or the " Jews' town," from its original Jewish inhabi- tants, gradually rose into notice and superseded the old capital. 1

Sheheristan and Yahudleh are thus in the early ages of Islam described as independent cities, the former being the eastern and the latter the western division of the capital, each surrounded by a separate wall; but about the middle of the roth century the famous Buyid king, known as the Rukn-addaula (al-Dowleh), united the two suburbs and many of the adjoining villages in one general enclosure which was about 10 m. in circumference. The city, which had now resumed its old name of Isfahan, continued to flourish till the time of Timur (a.d. 1387), when in common with so many other cities of the empire it suffered grievously at the hands of the Tatar invaders. Timur indeed is said to have erected a Kelleh Minar or "skull tower " of 70,000 heads at the gate of the city, as a warning to deter other communities from resisting his arms. The place, however, owing to its natural advantages, gradually recovered from the effects of this terrible visitation, and when the Safavid dynasty, who suc- ceeded to power in the 16th century, transferred their place of residence to it from Kazvin, it rose rapidly in populousness and wealth. It was under Shah Abbas the first, the most illustrious sovereign of this house, that Isfahan attained its greatest prosperity. This monarch adopted every possible expedient, by stimulating

1 The name of Yahudieh or " Jews' town " is derived by the early Arab geographers from a colony of Jews who are said to have migrated from Babylonia to Isfahan shortly after Nebuchadrezzar's conquest of Jerusalem, but this is pure fable. The Jewish settle- ment really dates from the 3rd century A.D. as is shown by a notice in the Armenian history of Moses of Chorene, lib. iii. cap. 35. The name Isfahan has been generally compared with the Aspadana of Ptolemy in the extreme north of Persis, and the identification is probably correct. At any rate the title is of great antiquity being found in the Bundahish, and being derived in all likelihood from the family name of the race of Feridun, the Atheiyan of romance, who were entitled Aspiyan in Pahlavi, according to the phonetic rules of that language.

commerce, encouraging arts and manufactures, and introducing

luxurious habits, to attract visitors to his favourite capital. He built several magnificent palaces in the richest style of Oriental decoration, planted gardens and avenuts, and distributed amongst them the waters of the Zendeh-rud in an endless series of reservoirs, fountains and cascades. The baths, the mosques, the colleges, the bazaars and the caravanserais of the city received an equal share of his attention, and European artificers and merchants were largely encouraged to settle in his capital. Ambassadors visited his court from many of the first states of Europe, and factories were permanently established for the merchants of England, France, Holland, the Hanseatic towns, Spain, Portugal and Moscow. The celebrated traveller Chardin, who passed a great portion of his life at Isfahan in the latter half of the 17th century, has left a detailed and most interesting account of the statistics of the city at that period. He himself estimated the population at 600,000, though in popular belief the number exceeded a million. There were 1500 flourishing villages in the immediate neighbourhood; the enceinte of the city and suburbs was reckoned at 24 m., while the mud walls surrounding the city itself, probably nearly following the lines of the Buyid enclosure, measured 20,000 paces. In the interior were counted 162 mosques, 48 public colleges, 1802 caravanserais, 273 baths and 12 cemeteries. The adjoining suburb of Julia was also a most flourishing place. Originally founded by Shah Abbas the Great, who transported to this locality 3400 Armenian families from the town of Julfa on the Arras, the colony increased rapidly under his fostering care, both in wealth and in numbers, the Christian population being estimated in 1685 at 30,000 souls. The first blow to the prosperity of modern Isfahan was given by the Afghan invasion at the beginning of the 1 8th century, since which date, although continuing for some time to be the nominal head of the empire, the city has gradually dwindled in importance, and now only ranks as a second or third rate provincial capital. When the Kajar dynasty indeed mounted the throne of Persia at the end of the 18th century the seat of government was at once transferred to Teheran, with a view to the support of the royal tribe, whose chief seat was in the neighbouring province of Mazenderan; and, although it has often been proposed, from considerations of state policy in reference to Russia, to re-establish the court at Isfahan, which is the true centre of Persia, the scheme has never commanded much attention. At the same time the government of Isfahan, owing to the wealth of the surrounding districts, has always been much sought after. Early in the 19th century the post was often conferred upon some powerful minister of the court, but in later times it has been usually the apanage of a favourite son or brother of the reigning sovereign. 1 Fath AH Shah,

who had a particular affection for Isfahan, died here in 1834, and it became a time-honoured custom for the monarch on the throne to seek relief from the heat of Teheran by forming a summer camp at the rich pastures of Ganduman, on the skirts of Zardeh-Kuh, to the west of Isfahan, for the exercise of his troops and the health and amusement of his courtiers, but in recent years the practice has been discontinued. (H. C. R.)

ISHIM, a town of West Siberia, in the government of Tobolsk, 180 m. N.W. of Omsk, on a river of the same name, tributary, on the left, of the Irtysh. Pop. (1897) 7161. The town, which was founded in 1630, has tallow- melting and carries on a large trade in rye and rye flour. The fair is one of the most important in Siberia, its returns being estimated at £500,000 annually.

ISHMAEL (a Hebrew name meaning " God hears "), in the Bible, the son of Abraham by his Egyptian concubine Hagar, and the eponym of a number of (probably) nomadic tribes living outside Palestine. Hagar in turn personifies a people found to the east of Gilead (1 Chron. v. 10) and Petra (Strabo). 2 Through the jealousy of Sarah, Abraham's wife, mother and son were driven away, and they wandered in the district south of Beersheba and Kadesh (Gen. xvi. J, xxi. E); see Abraham. It had been foretold to his mother before his birth that he should be " a wild ass among men," and that he should dwell " before the face of " (that is, to the eastward of) his brethren. It is subsequently stated that after leaving his father's roof he " became an archer, 3 and dwelt in the wilderness of Paran, and

1 Zill es Sultan, elder brother of Muzafar ed d-n Shah, became governor-general of the Isfahan province in 1869.

2 On Paul's use of the story of Hagt>r (Gal. iv. 24-26), see Ency. Bib. col. 1934; and H. St J. Thackeray, Relation of St Paul to contemporary Jewish Thought (London, 1900), pp. 196 sqq. ; Hagar typifies the old Sinaitic covenant, and Sarah represents the new covenant of freedom from bondage. The treatment of the concubine and her son in Gen. xvi. compared with ch. xxi. illustrates old Hebrew customs, on which see further S. A. Cook, Laws of Moses, &c. (London, 1903), pp. 116 sqq., 140 sq.

'The Ituraean archers were of Jetur, one of the "sons" of Ishmael (Gen. xxv. 15), and were Roman mercenaries, perhaps even in Great Britain (Pal. Expl. Fund, Q.S., 1909, p. 283).

his mother took him a wife out of the land of Egypt." But the

genealogical relations were rather with the Edomites, Midianites and other peoples of North Arabia and the eastern desert than with Egypt proper, and this is indicated by the expressions that " they dwelt from Havilah unto Shur that is east of Egypt, and he settled to the eastward of his brethren " (see Mizraim). Like Jacob, the ancestor of the Israelites, he had twelve sons (xxv. 12-18, P), of which only a few have historical associations apart from the biblical records. Nebaioth and Kedar suggest the Nabataei and Cedrei of Pliny (v. 12). the first-mentioned of whom were an important Arab people after the time of Alexander (see Nabataeans). The names correspond to the Nabaitu and Kidru of the Assyrian inscriptions occupying the desert east of the Jordan and Dead Sea, whilst the Massa and Tema lay probably farther south. Dumah may perhaps be the same as the Domata of Pliny (vi. 32) and the Aov/xeda or AovfiaLda of Ptolemy (v. 19, 7, viii. 22, 3) — Sennacherib conquered a fortress of " Aribi " named Adumu, — and Jetur is obviously the Ituraea of classical geographers. 4

" Ishmael," therefore, is used in a wide sense of the wilder, roving peoples encircling Canaan from the north-east to the south, related to but on a lower rank than the " sons " of Isaac. It is practically identical with the term " Arabia " as used by the Assyrians. Nothing certain is known of the history of these mixed populations. They arc represented as warlike nomads and with a certain reputation for wisdom (Baruch iii. 23). Not improbably they spoke a dialect (or dialects) akin to Arabic or Aramaic. 6 According to the Mahommedans, Ishmael, who is recognized as their ancestor, lies buried with his mother in the Kaaba in Mecca. See further, T. Noldeke, Ency. Bib., s.v., and the articles Edom, Midian. (S. A. C.)

1SHPEMING, a city of Marquette county, Michigan, U.S.A., about 15 m. W. by S. of Marquette, in the N. part of the upper peninsula. Pop. (1890) 11,197; (1900) 13,255, of whom 5970 were foreign-born ; (1004) 11,623; (191°) 12,448. It is served by the Chicago & North Western, the Duluth, South Shore & Atlantic, and the Lake Superior and Ishpeming railways. The city is 1400 ft. above sea-level (whence its name, from an Ojibway Indian word, said to mean "high up"), in the centre of the Marquette Range iron district, and has seven mines within its limits; the mining of iron ore is its principal industry. Ishpeming was settled about 1854, and was incorporated as a city in 1873.

ISHTAR, or Istar, the name of the chief goddess of Babylonia and Assyria, the counterpart of the Phoenician Astarte (q.v.). The meaning of the name is not known, though it is possible that the

underlying stem is the same as that of Assur (q.v.), which would thus make her the " leading one " or " chief." At all events it is now generally recognized that the name is Semitic in its origin. Where the name originated is likewise uncertain, but the indications point to Erech where we find the worship of a great mother-goddess independent of any association with a male counterpart flourishing in the oldest period of Babylonian history. She appears under various names, among which are Nana, Innanna, Nina and Anunit. As early as the days of Khammurabi we find these various names which represented originally different goddesses, though all manifest as the chief trait the life-giving power united in Ishtar. Even when the older names are employed it is always the great mother-goddess who is meant. Ishtar is the one goddess in the pantheon who retains her independent position despite and throughout all changes that the Babylonian-Assyrian religion undergoes. In a certain sense she is the only real goddess in the pantheon, the rest being mere reflections of the gods with whom they are associated as consorts. Even when Ishtar is viewed as the consort of some chief — of Marduk occasionally in the south, of Assur more frequently in the north — the consciousness that she has a personality of her own apart from this association is never lost sight of.

4 With Adbeel (Gen. xxv. 13) may be identified Idibi'il (-ba'il) a tribe employed by Tiglath-Pileser IV. (733 B.C.) to watch the frontier of Musri (Sinaitic peninsula or N. Arabia ?).

5 This is suggested by the fact that Ashurbanipal (7th century) mentions as the name of their deity Atar-Samain (i.e. " Ishtar of the heavens ").

We may reasonably assume that the analogy drawn from the process of reproduction among men and animals led to the conception of a female deity presiding over the life of the universe. The extension of the scope of this goddess to life in general— to the growth of plants and trees from the fructifying seed — was a natural outcome of a fundamental idea; and so, whether we turn to incantations or hymns, in myths and in epics, in votive inscriptions and in historical annals, Ishtar is celebrated and invoked as the great mother, as the mistress of lands, as clothed in splendour and power — one might almost say as the personifica- tion of life itself.

But there are two aspects to this goddess of life. She brings forth, she fertilizes the fields, she clothes nature in joy and glad- ness, but she also withdraws her favours and when she does so the fields wither, and men and animals cease to reproduce. In place of life, barrenness and death ensue. She is thus also a grim goddess, at once cruel and destructive. We can, there- fore, understand that she was also invoked as a goddess of war and battles and of the chase; and more particularly among the warlike Assyrians she assumes this aspect. Before the battle she appears to the army, clad in battle array and armed with bow and arrow. In myths symbolizing the change of seasons she is portrayed in this double character, as the life-giving and the life-depriving power. The most noteworthy of these myths describes her as passing through seven gates into the nether world. At each gate some of her clothing and her ornaments are removed until at the last gate she is entirely naked. While she remains in the nether world as a prisoner — whether voluntary or involuntary it is hard to say — all fertility ceases on earth, but the time comes when she again returns to earth, and as she passes each gate the watchman restores to her what she had left there until she is again clad in her full splendour, to the joy of mankind and of all nature. Closely allied with this myth and personifying another view of the change of seasons is the story of Ishtar's love for Tammuz — symbolizing the spring time — but as midsummer approaches her husband is slain and, according to one version, it is for the purpose of saving Tammuz from the clutches of the goddess of the nether world that she enters upon her journey to that region.

In all the great centres Ishtar had her temples, bearing such names as E-anna, " heavenly house," in Erech; E-makh, " great house," in Babylon; E-mash-mash, "house of offerings," in Nineveh. Of the details of her cult we as yet know little, but there is no evidence that there were obscene rites connected with it, though there may have been certain mysteries introduced at certain centres which might easily impress the uninitiated as having obscene aspects. She was served by priestesses as well as by priests, and it would appear that the votaries of Ishtar were in all cases virgins who, as long as they remained in the service of Ishtar, were not permitted to marry.

In the astral-theological system, Ishtar becomes the planet Venus, and the double aspect of the goddess is made to correspond to the strikingly different phases of Venus in the summer and winter seasons. On monuments and seal-cylinders she appears frequently with bow and arrow, though also simply clad in long robes with a crown on her head and an eight-rayed star as her symbol. Statuettes have been found in large numbers representing her as naked with her

arms folded across her breast or holding a child. The art thus reflects the popular conceptions formed of the goddess. Together with Sin, the moon-god, and Shamash, the sun-god, she is the third figure in a triad personifying the three great forces of nature— moon, sun and earth, as the life-force. The doctrine involved illustrates the tendency of the Babylonian priests to centralize the manifesta- tions of divine power in the universe, just as the triad Anu, Bel and Ea (q.v.) — the heavens, the earth and the watery deep — form another illustration of this same tendency.

Naturally, as a member of a triad, Ishtar is dissociated from any local limitations, and similarly as the planet Venus — a conception which is essentially a product of theological speculation— no thought of any particular locality for her cult is present. It is because her cult, like that of Sin (q.v.) and Shamash (q.v.), is spread over all Babylonia and Assyria, that she becomes available for purposes of theological speculation.

Cf. Astarte, Atargatis, Great Mother of the Gods, and specially Babylonian and Assyrian Religion. (M. Ja.)

ISHTIB, or Istib (anc. Astibon, Slav. Shtipliye or Shtip), a town of Macedonia, European Turkey, in the vilayet of

Kossovo; 45 m. E.S.E. of Uskub. Pop. (1905) about 10,000. Ishtib is built on a hill at the confluence of the small river Ishtib with the Bregalnitza, a tributary of the Vardar. It has a thriving agricultural trade, and possesses several fine mosques, a number of fountains and a large bazaar. A hill on the north- west is crowned by the ruins of an old castle.

ISIDORE OF ALEXANDRIA, 1 Greek philosopher and one of the last of the Neoplatonists, lived in Athens and Alexandria towards the end of the 5th century a.d. He became head of the school in Athens in succession to Marinus who followed Proclus. His views alienated the chief members of the school and he was compelled to resign his position to Hegias. He is known princi- pally as the preceptor of Damascius whose testimony to him in the Life of Isidorus presents him in a very favourable light as a man and a thinker. It is generally admitted, however, that he was rather an enthusiast than a thinker; reasoning with him was subsidiary to inspiration, and he preferred the theories of Pythagoras and Plato to the unimaginative logic and the practical ethics of the Stoics and the Aristotelians. He seems to have given loose rein to a sort of theosophical speculation and attached great importance to dreams and waking visions on which he

used to expatiate in his public discourses.

Damascius' Life is preserved by Photius in the Bibliotheca, and the fragments are printed in the Didot edition of Diogenes Laertius. See Agathias, Hist. ii. 30; Photius, Bibliotheca, 181; and histories of Neoplatonism.

ISIDORE OF SEVILLE, or Isidorus Hispalensis (c. 560-636), Spanish encyclopaedist and historian, was the son of Severianus, a distinguished native of Cartagena, who came to Seville about the time of the birth of Isidore. Leander, bishop of Seville, was his elder brother. Left an orphan while still young, Isidore was educated in a monastery, and soon distinguished himself in con- troversies with the Arians. In 599, on the death of his brother, he was chosen archbishop of Seville, and acquired high renown by his successful administration of the episcopal office, as well as by his numerous theological, historical and scientific works. He founded a school at Seville, and taught in it himself. In the provincial and national councils he played an important part, notably at Toledo in 610, at Seville in 619 and in 633 at Toledo, which profoundly modified the organization of the church in Spain. His great work, however, was in another line. Pro- foundly versed in the Latin as well as in the Christian literature, his indefatigable intellectual curiosity led him to condense and reproduce in encyclopaedic form the fruit of his wide reading. His works, which include all topics — science, canon law, history or theology — are unsystematic and largely uncritical, merely reproducing at second hand the substance of such sources as were available. Yet in their inadequate way they served to keep alive throughout the dark ages some little knowledge of the antique culture and learning. The most elaborate of his, writings is the Originum she etymologiarum libri XX. It was the last of his works, written between 622 and 633, and was corrected by his friend and disciple Braulion. It is an encyclo- paedia of all the sciences, under the form of an explanation of the terms proper to each of them. It was one of the capital books of the middle ages.

On the Libri differ entiarum sive de proprietate sermonum — of which the first book is a collection of synonyms, and the second of ex- planations of metaphysical and religious ideas — see A. Mack's doctoral dissertation, Rennes, 1900. Mommsen has edited the Chronica majora or Ckronicon de sex aetatibus (from the creation to A.D. 615) and the " Historia Gothorum, Wandalorum, Sueborum," in the Monumenta Germaniae historica, auctores antiqitissimil Chronica minora II. The history of the Goths is a historical source of the first order. The De scriptoribus ecclesiasticis or better De viris

illustribus, was a continuation of the work of St Jerome and of Gennadius (cf . G. von Dzialowski in Kirchengeschichtliche Studien, iv. (1899). Especially interesting is the De natura rerum ad Sisebutum

1 With Isidore of Alexandria has been confused an Isidore of Gaza, mentioned by Photius. Little is known of him except that he was one of those who accompanied Damascius to the Persian court when Justinian closed the schools in Athens in 529. Suidas, in speaking of Isidore of Alexandria, says that Hypatia was his wife, but there is no means of approximating the dates (see Hypatia). Suetonius, in his Life of Nero, refers to a Cynic philosopher named Isidore, who is said to have jested publicly at the expense of Nero.

regem, a treatise on astronomy and meteorology, which contained the sum of physical philosophy during the early middle ages. The Regula monachorum of Isidore was adopted by many of the mon- asteries in Spain during the 7th and 8th centuries. The collection of canons known as the Isidoriana or Hispalensis is not by him, and the following, attributed to him, are of doubtful authenticity: De ortu ac obitu patrum qui in Scriptura laudibus efferuntur; Alle- goriae scripturae sacrae et liber numerorum; De ordine crealurarum.

The edition of all of Isidore's works by F. Orevalo (Rome, 1797-1803, 7 vols.), reproduced in Migne, Patrologia Latina, 81-84, is carefully edited. See also C. Canal, San Isidoro, exposition de sus obras e indicaciones a cerca de la influencia que han ejercido en la civilization espanola (Seville, 1897). A list of monographs is in the BiUiogrnphie of Ulysse Chevalier.

ISINGLASS (probably a corruption of the Dutch huisenblas, Ger. Hausenblase, literally " sturgeon's bladder "), a pure form of commercial gelatin obtained from the swimming bladder or sound of several species of fish. The sturgeon is the most valu- able, various species of which, especially Acipenser stellalus (the seuruga), A. ruthenus (the sterlet) and A. guldenstddtii (the ossetr), flourish in the Volga and other Russian rivers, in the Caspian and Black Seas, and in the Arctic Ocean, and yield the "Russian isinglass"; a large fish, Silurus parkerii, and probably some other fish, yield the " Brazilian isinglass "; other less definitely characterized fish yield the " Penang " product; while the common cod, the hake and other

Gadidae also yield a variety of isinglass. The sounds, having been removed from the fish and cleansed, undergo no other preparation than desicca- tion or drying, an operation needing much care; but in this process the sounds are subjected to several different treatments. If the sound be unopened the product appears in commerce as "pipe," "purse" or "lump isinglass"; if opened and unfolded, as " leaf " or " honeycomb "; if folded and dried, as " book," and if rolled out, as " ribbon isinglass." Russian isinglass generally appears in commerce as leaf, book, and long and short staple; Brazilian isinglass, from Para and Maranham, as pipe, lump and honeycomb; the latter product, and also the isinglass of Hudson's Bay, Penang, Manila, &c, is darker in colour and less soluble than the Russian product.

The finest isinglass, which comes from the Russian ports of Astrakhan and Taganrog, is prepared by steeping the sounds in hot water in order to remove mucus, &c. ; they are then cut open and the inner membrane exposed to the air; after drying, the outer membrane is removed by rubbing and beating. As imported, isinglass is usually too tough and hard to be directly used. To increase its availability, the raw material is sorted, soaked in water till it becomes flexible and then trimmed; the trimmings are sold as a lower grade. The trimmed sheets are sometimes passed between steel rollers, which reduce them to the thickness of paper; it then appears as a transparent ribbon, " shot " like watered silk. The ribbon is dried, and, if necessary, cut into strips.

The principal use of isinglass is for clarifying wines, beers and other liquids. This property is the more remarkable since it is not possessed by ordinary gelatin; it has been ascribed to its fibrous structure, which forms, as it were, a fine network in the liquid in which it is disseminated, and thereby mechanically carries down all the minute particles which occasion the turbidity. The cheaper varieties are more commonly used; many brewers prefer the Penang product; Russian leaf, however, is used by some Scottish brewers; and Russian long staple is used in the Worcestershire cider industry. Of secondary importance is its use for culinary and confectionery purposes, for example, in making jellies, stiffening jams, &c. Here it is often replaced by the so-called " patent isinglass," which is a very pure gelatin, and differs from natural isinglass by being useless for clarifying liquids. It has few other applications in the arts. Mixed with gum, it is employed to give a lustre to ribbons and silk; incorporated with water, Spanish liquorice "and lamp black it forms an Indian ink; a solution, mixed with a little tincture of benzoin, brushed over sarsenet and allowed to dry, forms the well-known " court plaster." Another plaster is obtained by adding acetic acid and

a little otto of roses to a solution of fine glue. It also has valuable agglutinating properties; by

dissolving in two parts of pure alcohol it forms a diamond cement, the solution cooling to a white, opaque, hard solid; it also dissolves in strong acetic acid to form a powerful cement, which is especially useful for repairing glass, pottery and like substances.

ISIS (Egyptian Ese), the most famous of the Egyptian god- desses. She was of human form, in early times 'distinguished

only by the hieroglyph of her name J| upon her head. Later

she commonly wore the horns of a cow, and the cow was sacred to her; it is doubtful, however, whether she had any animal representation in early times, nor had she possession of any considerable locality until a late period, when Philae, Behbet and other large temples were dedicated to her worship. Yet she was Of great importance in mythology, religion and magic, appearing constantly in the very ancient Pyramid texts as the devoted sister-wife of Osiris and mother of Horus. In the divine genealogies she is daughter of Keb and Nut (earth and sky). She was supreme in magical power, cunning and know- ledge. A legend of the New Kingdom tells how she contrived to learn the all-powerful hidden name of Re' which he had confided to no one. A snake which she had fashioned for the purpose stung the god, who sent for her as a last resort in his unendurable agony; whereupon she represented to him that nothing but his own mysterious name could overcome the venom of the snake. Much Egyptian magic turns on the healing or protection of Horus by Isis, and it is chiefly from magical texts that the myth of Isis and Osiris as given by Plutarch can be illustrated. The Metternich stela (XXXth Dynasty), the finest example of a class of prophylactic stelae generally known by the name of " Horus on the crocodiles," is inscribed with a long text relating the adventures of Isis and Horus in the marshes of the Delta. With her sister Nephthys, Isis is frequently repre- sented as watching the body of Osiris or mourning his death.

Isis was identified with Demeter by Herodotus, and described as the goddess who was held to be the greatest by the Egyptians; he states that she and Osiris, unlike other deities, were worshipped throughout the land. The importance of Isis had increased greatly since the end of the New Kingdom. The great temple of Philae was begun under the XXXth Dynasty; that of Behbet seems to have been built by Ptolemy II. The cult of Isis spread into Greece with that of Serapis early in the

3rd century B.C. In Egypt itself Isea, or shrines of Isis, swarmed. At Coptos Isis became a leading divinity on a par with the early god Min. About 80 B.C. Sulla founded an Isiac college in Rome, but their altars within the city were overthrown by the consuls no less than four times in the decade from 58 to 48 B.C., and the worship of Isis at Rome continued to be limited or suppressed by a succession of enactments which were enforced until the reign of Caligula. The Isiac mysteries were a representation of the chief events in the myth of Isis and Osiris — the murder of Osiris, the lamentations of Isis and her wanderings, followed by the triumph of Horus over Seth and the resurrection of the slain god — accompanied by music and an exposition of the inner meaning of the spectacle. These were traditional in ancient Egypt, and in their later development were no doubt affected by the Eleusinian mysteries of Demeter. They appealed power- fully to the imagination and the religious sense. The initiated went through rites of purification, and practised a degree of asceticism; but for many the festival was believed to be an occasion for dark orgies. Isis nursing the child Horus (Har- pokhrates) was a very common figure in the Deltaic period, and in these later days was still a favourite representation. The Isis temples discovered at Pompeii and in Rome show that ancient monuments as well as objects of small size were brought from Egypt to Italy for dedication to her worship, but the goddess absorbed the attributes of all female divinities; she was goddess of the earth and its fruits, of the Nile, of the sea, of the underworld, of love, healing and magic. From the time of Vespasian onwards the worship of Isis, always popular with some sections, had a great vogue throughout the western world, and is not without traces in Britain. It proved the most successful

of the pagan cults in maintaining itself against Christianity, with which it had not a little in common, both in doctrine and in emblems. But the destruction of the Serapeum at Alexandria in a.d. 397 was a fatal blow to the prestige of the Graeco-Egyptian divinities. The worship of Isis, however, survived in Italy into the 5th century. At Philae her temple was frequented by the barbarous Nobatae and Blemmyes until the middle of the 6th century, when the last remaining shrine of Isis was finally closed.

See G. Lafaye, art. " Isis " in Daremberg et Saglio, Dictionnaire des antiquitis (1900); id. Hist.du culte des divinites d'Alexandrie hors de I'kgypte (1883); Meyer and Drexler, art. "Isis" in Roscher's Lexicon

der griech. und rbm. Mythologie (1891-1892) (very elaborate) ; E. A. W. Budge, Gods of the Egyptians, vol. ii. ch. xiii.; Ad. Rusch, De Serapide et Iside in Graecia cultis (dissertation) (Berlin, 1906). (The author especially collects the evidence from Greek inscriptions earlier than the Roman conquest; he contends that the mysteries of Isis were not equated with the Eleusinian mysteries.) (F. Ll. G.)

ISKELIB, the chief town of a Caza (governed by a kaimakam) in the vilayet of Angora in Asia Minor, altitude 2460 ft., near the left bank of the Kizil Irmak (anc. -Halys), 100 m. in an air-line N.E. of Angora and 60 S.E. of Kastamuni (to which vilayet it belonged till 1894). Pop. 10,600 (Cuinet, La Turquie d' Asie, 1894). It lies several miles off the road, now abandoned by wheeled traffic, between Changra and Amasia in a picturesque cul de sac amongst wooded hills, at the foot of a limestone rock crowned by the ruins of an ancient fortress now filled with houses (photograph in Anderson, Studia Pontica, p. 4). Its ancient name is uncertain. Near the town (on S.) are saline springs, whence salt is extracted.

ISLA, JOSfi FRANCISCO DE (1703-1781), Spanish satirist, was born at Villavidanes (Leon) on the 24th of March 1703. He joined the Jesuits in 1719, was banished from Spain with his brethren in 1767, and settled at Bologna, where he died on the 2nd of November 1781. His earliest publication, a Carta de un residente en Roma (1725), is a panegyric of trifling interest, and La Juventud triunfante (1727) was written, in collaboration with Luis de Lovada. Isla's gifts were first shown in his Triunfo del amor y de la lealtad: Dia Grande de Navarra, a satirical description of the ceremonies at Pamplona in honour of Ferdinand VI. 's accession; its sly humour so far escaped the victims that they thanked the writer for his appreciation of their local efforts, but the true significance of the work was discovered shortly afterwards, and the protests were so violent that Isla was transferred by his superiors to another district. He gained a great reputation as an effective preacher, and his posthumous Sermones morales (1 792-1793) justify his fame in this respect. But his position in the history of Spanish literature is due to his Historia del famoso predicador fray Gerundio de Campazas, alias Zotes (1758), a novel which wittily caricatures the bom- bastic eloquence of pulpit orators in Spain. Owing to the protests of the Dominicans and other regulars, the book was prohibited in 1760, but the second part was issued surreptitiously in 1768. He translated Gil Bias, adopting more or less seriously Voltaire's unfounded suggestion that Le Sage plagiarized from Espinel's Marcos de Obregdn, and other Spanish books; the text appeared in 1783, and in 1828 was greatly modified by Evaristo Pena y Martin, whose arrangement is still widely read.

See Policarpo Mingote y Tarrazona, Varones ilustres de la provincia de Leon (Leon, 1880), pp. 185-215; Bernard Gaudeau, Les Precheurs burlesques en Espagne au XVIII' siecle (Paris, 1891); V. Cian, V Immigrazione dei Gesuiti spagnuoli letterati in Italia (Torino,

1895). (J- F – K ")

ISLAM, an Arabic word meaning " pious submission to the will of God," the name of the religion of the orthodox Mahom- medans, and hence used, generically, for the whole body of Mahommedan peoples. Salama, from which the word is derived appears in salaam, " peace be with you," the greeting of the East, and in Moslem, and means to be " free " or " secure." (See Mahommedan Religion, &c.)

ISLAMABAD, a town of India in the state of Kashmir, on the north bank of the Jhelum. Pop. (1901) 9390. The town crowns the summit of a long low ridge, extending from the mountains eastward. It is the second town in Kashmir, and

was originally the capital of the valley, but is now decaying. It ; contains an old Summer palace, overshadowed by plane trees, with numerous springs, and a fine mosque and shrine: Below the town is a reservoir containing a spring of clear water called the Anant Nag, slightly sulphurous, from which volumes of gas continually arise; the water swarms with sacred fish. There are manufactures of Kashmir shawls, also of chintzes, cotton and woollen goods.

ISLAND (O.E. ieg = isle, +land 1), in physical geography a term generally definable as a piece of land surrounded by water. Islands may be divided into two main classes, continental and oceanic. The former are such as would result from the submergence of a coastal range, or a coastal highland, until the mountain bases were cut off from the mainland while their summits remained above water. The island may have been formed by the sea cutting through the landward end of a peninsula, or by the eating back of a bay or estuary until a portion of the mainland is detached and becomes surrounded by water. In all cases where the continental islands occur, they are con- nected with the mainland by a continental shelf, and their structure is essentially that of the mainland. The islands off the west coast of Scotland and the Isles of Man and Wight have this relation to Britain, while Britain and Ireland have a similar relation to the continent of Europe. The north-east coast of Australia furnishes similar examples, but in addition to these in that locality there are true oceanic islands near the mainland, formed by the

growth of the Great Barrier coral reef. Oceanic islands are due to various causes. It is a question whether the numberless islands of the Malay Archipelago should be regarded as continental or oceanic, but there is no doubt that the South Sea islands scattered over a portion of the Pacific belong to the oceanic group. The ocean floor is by no means a level plain, but rises and falls in mounds, eminences and basins towards the surface. When this configuration is emphasized in any particular oceanic area, so that a peak rises above the surface, an oceanic island is produced. Submarine volcanic activity may also raise material above sea-level, or the buckling of the ocean-bed by earth movements may have a similar result. Coral islands (see Atoll) are oceanic islands, and are frequently clustered upon plateaux where the sea is of no great depth, or appear singly as the crown of some isolated peak that rises from deep water.

Island life contains many features of peculiar interest. The sea forms a barrier to some forms of life but acts as a carrier to other colonizing forms that frequently develop new features in their isolated surroundings where the struggle for existence is greater or less than before. When a sea barrier has existed for a very long time there is a marked difference between the fauna and flora even of adjacent islands. In Bali and Borneo, for example, the flora and fauna are Asiatic, while in Lombok and Celebes they are Australian, though the Bali Straits are very narrow. In Java and Sumatra, though belonging to the same group, there- are marked developments of bird life, the peacock being found in Java and the Argus pheasant in Sumatra, having become too specialized to migrate. The Cocos, Keeling Islands and Christmas Island in the Indian Ocean have been colonized by few animal forms, chiefly sea-birds and insects, while they are clothed with abundant vegetation, the seeds of which have been carried by currents and by other means, but the variety of plants is by no means so great as on the mainland. Island life, therefore, is a sure indication of the origin of the island, which may be one of the remnants of a shattered er dissected continent, or may have arisen independently from the sea and become afterwards colonized by drift.

The word " island " is sometimes used for a piece of land cut off by the tide or surrounded by marsh (e.g. Hayling Island).

1 The O.E. ieg, ig, still appearing in local names, e.g. Anglesey, Battersea, is cognate with Norw. 6y, Icel. ey, and the first part of Ger. Eiland, &c. ; it is referred to the original Teut. ahwia, a place in water, ahwa, water, cf. Lat. aqua; the same word is seen in English " eyot," " ait," an islet in a river. The spelling " island," accepted

before 1700, is due to a false connexion with " isle," Fr. tie, Lat. insula.

iSLAY, the southernmost island of the Inner Hebrides, Argyll- shire, Scotland, 16 m. W. of Kintyre and f m. S.W. of Jura, from which it is separated by the Sound of Islay. Pop. (1901) 6857; area, 150,400 acres; maximum breadth 19 m. and maximum length 25 m. The sea-lochs Gruinart and Indaal cut into it so deeply as almost to convert the western portion into a separate island. It is rich and productive, and has been called the " Queen of the Hebrides." The surface generally is regular, the highest summits being Ben Bheigeir (1609 ft.) and Sgorr nam Faoileann (1407 ft.). There are several freshwater lakes and streams, which provide good fishing. Islay was the ancient seat of the " lord of the Isles," the first to adopt that title being John Macdonald of Isle of Islay, who died about 1386; but the Macdonalds were ultimately ousted by their rivals, the Campbells, about 1616. Islay House, the ancient seat of the Campbells of Islay, stands at the head of Loch Indaal. The island was formerly occupied by small crofters and tacksmen, but since 1831 it has been gradually developed into large sheep and arable farms and considerable business is done in stock-raising. Dairy-farming is largely followed, and oats, barley and various green crops are raised. The chief difficulty in the way of reclamation is the great area of peat (60 sq. m.), which, at its present rate of consumption, is calculated to last 1500 years. The island contains several whisky distilleries, producing about 400,000 gallons annually. Slate and marble are quarried, and there is a little mining of iron, lead and silver. At Bowmore, the chief town, there is a considerable shipping trade. Port Ellen, the principal village, has a quay with lighthouse, a fishery and a golf-course. Port Askaig is the ferry station for Faolin on Jura. Regular com- munication with the Clyde is maintained by steamers, and a cable was laid between Lagavulin and Kintyre in 1871.

ISLES OF THE BLEST, or Fortunate Islands (Gr. at tuv na.Ka.poiv vfjcoi: Lat., Fortunatae Insulae), in Greek mythology a group of islands near the edge of the Western Ocean, peopled not by the dead, but by mortals upon whom the gods had conferred immortality. Like the islands of the Phaeacians in Homer (Od. viii.) or the Celtic Avalon and St Brendan's island, the Isles of the Blest are represented as a land of perpetual summer and abundance of all good things. No reference is made to them by Homer, who speaks instead of the

Elysian Plain (Od. iv. and ix.), but they are mentioned by Hesiod (Works and Days, 168) and Pindar (01. ii.). A very old tradition suggests that the idea of such an earthly paradise was a reminiscence of some unrecorded voyage to Madeira and the Canaries, which are sometimes named Fortunatae Insulae by medieval map-makers. (See Atlantis.)

ISLINGTON (in Domesday and later documents Iseldon, Isendon and in the 16th century Hisselton), a northern metro- politan borough of London, England, bounded E. by Stoke Newington and Hackney, S. by Shoreditch and Finsbury, and W. by St Pancras, and extending N. to the boundary of the county of London. Pop. (1901)334,991. The name is commonly applied to the southern part of the borough, which, however, includes the districts of Holloway in the north, Highbury in the east, part of Kingsland in the south-east, and Barnsbury and Canonbury in the south-central portion. The districts in- cluded preserve the names of ancient manors, and in Canonbury, which belonged as early as the 13th century to the priory of St Bartholomew, Smithfield, traces of the old manor house remain. The fields and places of entertainment in Islington were favourite places of resort for the citizens of London in the 17th century and later; the modern Ball's Pond Road recalls the sport of duck-hunting practised here and on other ponds in the parish, and the popularity of the place was increased by the discovery of chalybeate wells. At Copenhagen Fields, now covered by the great cattle market (1855) adjoining Caledonian Road, a great meeting of labourers was held in 1834. They were suspected of intending to impose their views on parliament by violence, but a display of military force held them in check. The most noteworthy modern institutions in Islington are the Agricultural Hall, Liverpool Road, erected in 1862, and used for cattle and horse shows and other exhibitions; Pentonville

Prison, Caledonian Road (1842), a vast pile of buildings radiating from a centre, and Holloway Prison. The borough has only some 40 acres of public grounds, the principal of which is Highbury Fields. Among its institutions are the Great Northern Central Hospital, Holloway, the London Fever Hospital, the Northern Polytechnic, and the London School of Divinity, St John's Hall. Highbury. Islington is a suffragan bishopric in the diocese of London. The parliamentary borough of Islington has north, south, east and west divisions, each returning one member. The borough council consists of a mayor, 10 aldermen and 60 councillors. Area, 3091-5 acres.

ISLIP, a township of Suffolk county, New York, U.S.A., in the central part of the S. side of Long Island. Pop. (1905, state census)

13,721; (1910) 18,346. The township is 16 m. long from E. to W., and 8 m. wide in its widest part. It is bounded on the S. by the Atlantic Ocean; between the ocean and the Great South Bay, here 5-7 m. wide, is a long narrow strip of beach, called Fire Island, at the W. end of which is Fire Island Inlet. The " Island " beach and the Inlet, both very dangerous for shipping, are protected by the Fire Island Lighthouse, the Fire Island Lightship, and a Life Saving Station near the Lighthouse and another at Point o' Woods. Near the Light- house there are a United States Wireless Telegraph Station and a station of the Western Union Telegraph Company, which announces to New York incoming steamships; and a little farther E., on the site formerly occupied by the Surf House, a well-known resort for hay-fever patients, is a state park. Along the " Island " beach there is excellent surf-bathing. The township is served by two parallel branches of the Long Island railroad about 4 m. apart. On the main (northern) division are the villages of Brentwood (first settled as Modern Times, a quasi free-love community), which now has the Convent and School of St Joseph and a large private sanitarium; Central Islip, the seat of the Central Islip State Hospital for the Insane; and Ronkonkoma, on the edge of a lake of the same name (with no visible outlet or inlet and suffering remarkable changes in area) . On the S. division of the Long Island railroad are the villages of Bay Shore (to the W. of which is West Islip) ; Oakdale; West Sayville, originally a Dutch settlement; Sayville and Bayport. The " South Country Road " of crushed clam or oyster shells runs through these villages, which are famous for oyster and clam fisheries. About one-half of the present township was patented in 1684, 1686, 1688 and 1697 by William Nicolls (1657-1723), the son of Matthias Nicolls, who came from Islip in Oxfordshire, England; this large estate (on either side of the Connetquot or Great river) was kept intact until 1786; the W. part of Islip was mostly included in the Moubray patent of 1 708 ; and the township was incorporated in 1710.

ISLY, the name of a small river on the Moroccan-Algerian frontier, a sub-tributary of the Tafna, famous as the scene of the greatest victory of the French army in the Algerian wars. The intervention of Morocco on the side of Abd-el-Kader led at once to the bombardment of Tangier by the French fleet under the prince de Joinville, and the advance of the French army of General Bugeaud (1844). The enemy, 45,000 strong, was found to be encamped en the Isly river near Kudiat-el-Khodra. Bugeaud disposed of some 6500 infantry and 1500 cavalry, with a few pieces of artillery. In his own words, the formation adopted was " a boar's head." With the army were

Lamoriciere, Pelissier and other officers destined to achieve distinction. On the 14th of August the " boar's head " crossed the river about 9 m. to the N.W. of Kudiat and advanced upon the Moorisrf camp; it was immediately attacked on all sides by great masses of cavalry; but the volleys of the steady French infantry broke the force of every charge, and at the right moment the French cavalry in two bodies, each of the strength of a brigade, broke out and charged. One brigade stormed the Moorish camp (near Kudiat) in the face of artillery fire, the other sustained a desperate conflict on the right wing with a large body of Moorish horse which had not charged; and only the arrival of infantry I put an end to the resistance in this quarter. A general rally I of the Moorish forces was followed by another action in which

they endeavoured to retake the camp. Bugeaud's forces, which had originally faced S. when crossing the river, had now changed direction until they faced almost W. Near Kudiat-el-Khodra the Moors had rallied in considerable force, and prepared to retake their camp. The French, however, continued to attack in perfect combination, and after a stubborn resistance the Moors once more gave way. For this great victory, which was quickly followed by proposals of peace, Bugeaud was made due d'Isly.

ISMAIL (1830-1895), khedive of Egypt, was born at Cairo on the 31st of December 1830, being the second of the three sons of Ibrahim and grandson of Mehemet Ali. After receiving a European education at Paris, where he attended the ficole d'Ftat-Major, he returned home, and on the death of his elder brother became heir to his uncle, Said Mohammed, the Vali of Egypt. Said, who apparently conceived his own safety to lie in ridding himself as much as possible of the presence of his nephew, employed him in the next few years on missions abroad, notably to the pope, the emperor Napoleon III. and the sultan of Turkey. In 1 86 1 he was despatched at the head of an army of 14,000 to quell an insurrection in the Sudan, and this he successfully accomplished. On the death of Said, on 18th January 1863, Ismail was proclaimed viceroy without opposition. Being of an Orientally extravagant disposition, he found with considerable gratification that the Egyptian revenue was vastly increased by the rise in the value of cotton which resulted from the American Civil War, the Egyptian crop being worth about £25,000,000 instead of £5,000,000. Besides acquiring luxurious tastes in his sojourns

abroad, Ismail had discovered that the civilized nations of Europe made a free use of their credit for raising loans. He proceeded at once to apply this idea to his own country by transferring his private debts to the state and launching out on a grand scale of expenditure. Egypt was in his eyes the ruler's estate which was to be exploited for his benefit and his renown. His own position had to be strengthened, and the country provided with institutions after European models. To these objects Ismail applied himself with energy and cleverness, but without any stint of expense. During the 'sixties and 'seventies Egypt became the happy hunting-ground of self-seeking financiers, to whose schemes Ismail fell an easy and a willing prey. In 1 866-1 867 he obtained from the sultan of Turkey, in exchange for an increase in the tribute, firmans giving him the title of khedive, and changing the law of succession to direct descent from father to son; and in 1873 he obtained a new firman making him to a large extent independent. He projected vast schemes of internal reform, remodelling the customs system and the post office, stimulating commercial progress, creating a sugar industry, introducing European improvements into Cairo and Alexandria, building palaces, entertaining lavishly and maintaining an opera and a theatre. It has been calculated that, of the total amount of debt incurred by Ismail for his projects, about 10% may have been sunk in works of permanent utility — always excluding the Suez Canal. Meanwhile the opening of the Canal had given him opportunities for asserting himself in foreign courts. On his accession he refused to ratify the concessioas to the Canal company made by Said, and the question was referred in 1864 to the arbitration of Napoleon III., who awarded £3,800,000 to the company as compensation for the losses they would incur by the changes which Ismail insisted upon in the original grant. Ismail then used every available means, by his own undoubted powers of fascination and by judicious expenditure, to bring his personality before the foreign sovereigns and public, and he had no little success. He was made G.C.B. in 1867, and in the same year visited Paris and London, where he was received by Queen Victoria and welcomed by the lord mayor; and in 1869 he again paid a visit to England. The result was that the opening of the Canal in November 1869 enabled him to claim to rank among European sovereigns, and to give and receive royal honours: this excited the jealousy of the sultan, but Ismail was clever enough to pacify his overlord. In 1876 the old system of consular jurisdiction for foreigners was modified, and the system of mixed courts introduced, by which European and native judges sat together to try all civil

cases without respect of nationality. In all these years Ismail had

governed with eclat and profusion, spending, borrowing, raising the taxes on the fellahin and combining his policy of independence with dazzling visions of Egyptian aggrandizement. In 1874 he annexed Darfur, and was only prevented from extending his dominion into Abyssinia by the superior fighting power of the Abyssinians. But at length the inevitable financial crisis came. A national debt of over one hundred millions sterling (as opposed to three millions when he became viceroy) had been incurred by the khedive, whose fundamental idea of liquidating his borrowings was to borrow at increased interest. The bond-holders became restive. Judgments were given against the khedive in the international tribunals. When he could raise no more loans he sold his Suez Canal shares (in 1875) to Great Britain for £3,976,582; and this was immediately followed by the beginning of foreign intervention. In December 1875 Mr Stephen Cave was sent out by the British government to inquire into the finances of Egypt, and in April 1876 his report was published, advising that in view of the waste and extrava- gance it was necessary for foreign Powers to interfere in order to restore credit. The result was the establishment of the Caisse de la Dette. In October Mr (afterwards Lord) Goschen and M. Joubert made a further investigation, which resulted in the establishment of Anglo-French control. A further commission of inquiry by Major Baring (afterwards Lord Cromer) and others in 1878 culminated in Ismail making over his estates to the nation and accepting the position of a constitutional sovereign, with Nubar as premier, Mr (afterwards Sir Charles) Rivers Wilson as finance minister, and M. de Blignieres as minister of public works. Ismail professed to be quite pleased. " Egypt," he said, " is no longer in Africa; it is part of Europe." The new regime, however, only lasted six months, and then Ismail dis- missed his ministers, an occasion being deliberately prepared by his getting Arabi (g.v.) to foment a military pronunciamiento. England and France took the matter seriously, and insisted (May 1879) on the reinstatement of the British and French ministers; but the situation was no longer a possible one; the tribunals were still giving judgments for debt against the govern- ment, and when Germany and Austria showed signs of intending to enforce execution, the governments of Great Britain and France perceived that the only chance of setting matters straight was to get rid of Ismail altogether. He was first advised to abdicate, and a few days afterwards (26th June), as he did not take the hint, he received a telegram from the sultan (who had not forgotten the earlier history of Mehemet Ali's dynasty), addressed to him as ex-khedive, and informing him that his son Tewfik was his successor. He at once left Egypt for Naples, but eventually was permitted by the sultan to retire to his palace of

Emirghian on the Bosporus. There he remained, more or less a state prisoner, till his death on the 2nd of March 1895. Ismail was a man of undoubted ability and remarkable powers. But beneath a veneer of French manners and education he remained throughout a thorough Oriental, though without any of the moral earnestness which characterizes the better side of Mahom- medanism. Some of his ambitions were not unworthy, and though his attitude towards western civilization was essentially cynical, he undoubtedly helped to make the Egyptian upper classes realize the value of European education. Moreover, spendthrift as he was, it needed — as is pointed out in Milner's England in Egypt — a series of unfortunate conditions to render his personality as pernicious to his country as it actually became. " It needed a nation of submissive slaves, not only bereft of any vestige of liberal institutions, but devoid of the slightest spark of the spirit of liberty. It needed a bureaucracy which it would have been hard to equal for its combination of cowardice and corruption. It needed the whole gang of swindlers — mostly European — by whom Ismail was surrounded. " It was his early encouragement of Arabi, and his introduction of swarms of foreign concession-hunters, which precipitated the " national movement " that led to British occupation. His greatest title to remembrance in history must be that he made Eiviopean interven- tion in Egypt compulsory. (H. CH.)

ISMAIL HADJI MAULVI-MOHAMMED (1781-1831), Mussul- man reformer, was born at Pholah near Delhi. In co-operation with Syed Ahmed he attempted to free Indian Mahommedanism from the influence of the native early Indian faiths. The two men travelled extensively for many years and visited Mecca. In the Wahhabite movement they found much that was akin to their own views, and on returning to India preached the new doctrine of a pure Islam, and gathered many adherents. The official Mahommedan leaders, however, regarded their propa- ganda with disfavour, and the dispute led to the reformers being interdicted by the British government in 1827. The little company then moved to Punjab where, aided by an Afghan chief, they declared war on the Sikhs and made Peshawar the capital of the theocratic community which they wished to establish (1829). Deserted by the Afghans they had to leave Peshawar, and Ismail Hadji fell in battle against the Sikhs amid the Pakhli mountains (1831). The movement survived him, and some adherents are still found in the mountains of the north-west frontier.

Ismail's book Taqouaiyat el Iman was published in Hindustani and translated in the Journal of the Royal Asiatic Society, xiii. 1852.

ISMAILIA, a town of Lower Egypt, the central station on the Suez Canal, on the N.W. shore of Lake Timsa, about 50 m. from the Mediterranean and the Red Sea, and 93 m. N.E. of Cairo by rail. Pop. (1907) 10,373. It was laid out in 1863, in connexion with the construction of the canal, and is named after the khedive Ismail. It is divided into two quarters by the road leading from the landing-place to the railway station, and has numerous public offices, warehouses and other buildings, including a palace of the khedive, used as a hospital during the British military operations in 1882, but subsequently allowed to fall into a dilapidated condition. The broad macadamized streets and regular squares bordered with trees give the town an attractive appearance; and it has the advantage, a rare one in Egypt, of being surrounded on three sides by flourishing gardens. The Quai Mehemet Ali, which lies along the canal for upwards of a mile, contains the chalet occupied by Ferdinand de Lesseps during the building of the canal. At the end of the quay are the works for supplying Port Said with water. On the other side of the lake are the so-called Quarries of the Hyenas, from which the building material for the town was obtained.

ISMAY, THOMAS HENRY (1837-1899), British shipowner, was born at Maryport. Cumberland, on the 7th of January 1837. He received his education at Croft House School, Carlisle, and a t the age of sixteen was apprenticed to Messrs Imrie & Tomlinson, shipowners and brokers, of Liverpool. He then travelled for a time, visiting the ports of South America, and on returning to Liverpool started in business for himself. In 1867 he took over the White Star line of Australian clippers, and in 1868, perceiving the great future which was open to steam navigation, established, in conjunction with William Imrie, the Oceanic Steam Navigation Company, which has since become famous as the White Star Line. While continuing the Australian service, the firm determined to engage in the American trade, and to that end ordered from Messrs Harland & Wolff, of Belfast, the first Oceanic (3807 tons), which was launched in 1870. This vessel may fairly be said to have marked an era in North Atlantic travel. The same is true of the successive types of steamer which Ismay, with the co-operation of the Belfast shipbuilding firm, subsequently provided for the American trade. To Ismay is mainly due the credit of the arrangement by which some of the fastest ships of the British mercantile marine are held at the disposal of the government in case of war. The origin of this plan dates from the Russo-Turkish war, when there seemed a likelihood of England being

involved in hostilities with Russia, and when, therefore, Ismay offered the admiralty the use of the White Star fleet. In 1892 he retired from, partnership in the firm of Ismay, Imrie and Co., though he retained the chairman- ship of the White Star Company. He served on several important committees and was a member of the royal commission in 1888 on army and navy administration. He was always most generous

in his contributions to charities for the relief of sailors, and in 1887 he contributed £20,000 towards a pension fund for Liverpool sailors. He died at Birkenhead on the 23rd of November 1899.

ISMID, or ISNIKMID (anc. Nicomedia), the chief town of the Khoja Hi sanjak of Constantinople, in Asia Minor, situated on rising ground near the head of the gulf of Ismid. The sanjak has an area of 4650 sq. m. and a population of 225,000 (Moslems 131,000). It is an agricultural district, producing cocoons and tobacco, and there are large forests of oak, beech and fir. Near Yalova there are hot mineral springs, much frequented 'in summer. The town is connected by the lines of the Anatolian railway company with Haidar Pasha, the western terminus, and with Angora, Konia and Smyrna. It contains a fine 16th- century mosque, built by the celebrated architect Sinan. Pop. 20,000 (Moslems 9500, Christians 8000, Jews, 2500). As the seat of a mutessarif, a Greek metropolitan and an Armenian archbishop, Ismid retains somewhat of its ancient dignity, but the material condition of the town is little in keeping with its rank. The head of the gulf of Ismid is gradually silting up. The dockyard was closed in 1879, and the port of Ismid is now at Darinje, 3! m. distant, where the Anatolian Railway Company have established their workshops and have buiit docks and a quay. ' ' ■ • –

ISNARD, MAXIMIN (1758-1825), French revolutionist, was a dealer in perfumery at Draguignan when he was elected deputy for the department of the Var to the Legislative Assembly, where he joined the Girondists. Attacking the court, and the "Austrian committee" in the Tuileries, he demanded the disbandment of the king's bodyguard, and reproached Louis XVI. for infidelity to the constitution. But on the 20th of June 1792, when the crowd invaded the palace, he was one of the deputies who went to place themselves beside the king to protect him. After the 10th of August 1792 he was sent to the army of the North to justify the insurrection. Re-elected to the Convention, he voted the death of Louis XVI. and was a member of the Committee of General Defence when it was organized on the 4th of January 1793. The committee, consisting of 25 members, proved

unwieldy, and on the 4th of April Isnard presented, on behalf of the Girondist majority, the report recommending a smaller committee of nine, which two days later was established as the Committee of Public Safety. On the 25th of May, Isnard was presiding at the Convention when a deputation of the commune of Paris came to demand that J. R. Hebert should be set at liberty, and he made the famous reply: "If by these insurrections, continually renewed, it should happen that the principle of national representation should suffer, I declare to you in the name of France that soon people will search the banks of the Seine to see if Paris has ever existed." On the 2nd of June 1793 he offered his resignation as representative of the people, but was not comprised in the decree by which the Convention determined upon the arrest of twenty-nine Girondists. On the 3rd of October, however, his arrest was decreed along with that of several other Girondist deputies who had left the Convention and were fomenting civil war in the departments. He escaped, and on the 8th of March 1795 was recalled to the Convention, where he supported all the measures of reaction. He was elected deputy for the Var to the Council of Five Hundred, where he played a very insignificant r61e. In 1797 he retired to Draguignan. In 1800 he published a pamphlet De I'immortalite de I'dme, in which he praised Catholicism; in 1804 Reflexions relatives au senatus-consulte du 28 florSal an XII., which is an enthusiastic apology for the Empire. Upon the restoration he professed such royalist senti- ments that he was not disturbed, in spite of the law of 1816 proscribing regicide ex-members of the Convention.

See F. A. Aulard, Les Orateurs de la Legislative et de la Convention (Paris, 2nd ed., 1906).

ISOBAR (from Gr. IVos, equal, and /3dpos, weight), a line upon a meteorological map or pressure chart connecting points where the atmospheric pressure is the same at sea-level, or upon the earth's surface. A general pressure map will indicate, by these

lines, the average . pressure for any month or season over large areas. The daily weather charts for more confined regions indicate the presence of a cyclonic or anticyclonic system by means of lines, which connect all places having the same baro- metric pressure at the same time. It is to be noted that isobaric lines are the intersections of inclined isobaric surfaces with the surface of the earth.

ISOCLINIC LINES (Gr. Uos, equal, and kXLvuv, to bend), lines connecting those parts of the earth's surface where the magnetic inclination is the same in amount. (See Magnetism, Terrestrial.)

ISOCRATES (436-338 b.c), Attic orator, was the son of Theo- dorus, an Athenian citizen of the deme of Erchia — the same in which, about 431 B.C., Xenophon was born — who was sufficiently wealthy to have served the state as choregus. The fact that he possessed slaves skilled in the trade of flute-making perhaps lends point to a passage in which his son is mentioned by the comic poet Strattis. 1 Several popular " sophists " are named as teachers of the young Isocrates. Like other sons of prosperous parents, he may have been trained in such grammatical subtleties as were taught by Protagoras or Prodicus, and initiated by Theramenes into the florid rhetoric of Gorgias, with whom at a later time (about 390 B.C.) he was in personal intercourse. He tells us that his father had been careful to provide for him the best education which Athens could afford. A fact of greater interest is disclosed by Plato's Phaedrus (278 e). " Isocrates is still young, Phaedrus," says the Socrates of that dialogue, "but I do not mind telling you what I prophesy of him. ... It would not surprise me if, as years go on, he should make all his predecessors seem like children in the kind of oratory to which he is now addressing himself, or if — supposing this should not content him — some divine impulse should lead him to greater things. My dear Phaedrus, a certain philosophy is inborn in him." This conversation is dramatically supposed to take place about 410 B.C. It is unnecessary to discuss here the date at which the Phaedrus was actually composed. From the passage just cited it is at least clear that there had been a time — while Isocrates could still be called " young " — at which Plato had formed a high estimate of his powers.

Isocrates took no active part in the public life of Athens; he was not fitted, as he tells us, for the contests of the popular assembly or of the law-courts. He lacked strength of voice — a fatal defect in the ecclesia, when an audience of many thousands was to be addressed in the open air; he was also deficient in " boldness." He was, in short, the physical opposite of the successful Athenian demagogue in the generation after that of Pericles; by temperament as well as taste he was more in sympathy with the sedate decorum of an older school. Two ancient biographers have, however, preserved a story which, if true, would show that this lack of voice and nerve did not involve any want of moral courage. During the rule of the Thirty Tyrants, Critias denounced Theramenes, who sprang for safety to the sacred hearth of the council chamber. Isocrates alone, it is said, dared at that moment to plead for the life of his friend. 2 Whatever

may be the worth of the story, it would scarcely have connected itself with the name of a man to whose traditional character it was repugnant. While the Thirty were still in power, Isocrates withdrew from Athens to Chios. 3 He has mentioned that, in the course of the Peloponnesian War — doubtless in the troubles which attended on its close — he lost the whole of that private fortune which had enabled his father to serve the state, and that he then adopted the profession of a teacher. The proscription of the " art of words " by the Thjrty would thus have given him a special motive for withdrawing

1 'AraXavTri, fr. I, Meineke, Poetarum comicorum Graecorum frag. (1855), p. 292.

2 [Plut.] Vita Isocr., and the anonymous biographer. Dionysius does not mention the story, though he makes Isocrates a pupil of Theramenes.

5 Some would refer the sojourn of Isocrates at Chios to the years 398-395 B.c, others to 393-388 B.C. The reasons which support the view given in the text will be found in Jebb's Attic Orators, vol. ii. (1893), p. 6, note 2.

from Athens. He returned thither, apparently, either soon before or soon after the restoration of the democracy in 403 B.C. " For ten years from this date he was occupied — at least occasionally — as a writer of speeches for the Athenian law- courts. Six of these speeches are extant. The earliest (Or. xxi.) may be referred to 403 B.C.; the latest (Or. xix.) to 394- 393 B.C. This was a department of his own work which Isocrates afterwards preferred to ignore. Nowhere, indeed, does he say that he had not written forensic speeches. But he frequently uses a tone from which that inference might be drawn. He loves to contrast such petty concerns as engage the forensic writer with those larger and nobler themes which are treated by the politician. This helps to explain how it could be asserted — by his adopted son, Aphareus — that he had written nothing for the law-courts. Whether the assertion was due to false shame or merely to ignorance, Dionysius of Halicarnassus decisively disposes of it. Aristotle had, indeed, he says, exag- gerated the number of forensic speeches written by Isocrates; but some of those which bore his name were unquestionably genuine, as was attested by one of the orator's own pupils, Cephisodorus. The real vocation of Isocrates was discovered from the moment that he devoted himself to the work of teaching and writing. The instruction which Isocrates undertook to impart was based on rhetorical composition, but it was by no means merely rhetorical. That " inborn philosophy," of which Plato

recognized the germ, still shows itself. In many of his works — notably in the Panegyricus — we see a really remarkable power of grasping a complex subject, of articulating it distinctly, of treating it, not merely with effect but luminously, at once in its widest bearings and in its most intricate details. Young men could learn more from Isocrates than the graces of style; nor would his success have been what it was if his skill had been confined to the art of expression.

It was about 392 b.c. — when he was forty-four — that he opened his school at Athens near the Lyceum. In 339 B.C. he describes himself as revising the Panathenaicus with some of his pupils; he was then ninety-seven. The celebrity enjoyed by the school of Isocrates is strikingly attested by ancient writers. Cicero describes it as that school in which the eloquence of all Greece was trained and perfected: its disciples were "brilliant in pageant or in battle," 4 foremost among the accomplished writers or powerful debaters of their time. The phrase of Cicero is neither vague nor exaggerated. Among the literary pupils of Isocrates might be named the historians Ephorus 1 and Theopompus, the Attic archaelogist Androtion, and Isocrates of Apollonia, who succeeded his master in the school. Among the practical orators we have, in the forensic kind, Isaeus; in the political, Leodamas of Acharnae, Lycurgus and Hypereides. Hermippus of Smyrna (mentioned by Athe- naeus) wrote a monograph on the " Disciples of Isocrates." And scanty as are now the sources for such a catalogue, a modern scholar 5 has still been able to recover forty-one names. At the time when the school of Isocrates was in the zenith of its fame it drew disciples, not only from the shores and islands of the Aegean, but from the cities of Sicily and the distant colonies of the Euxine. As became the image of its master's spirit, it was truly Panhellenic. When Mausolus, prince of Caria, died in 351 B.C., his widow Artemisia instituted a contest of panegyrical eloquence in honour of his memory. Among all the competitors there was not one — if tradition may be trusted — who had not been the pupil of Isocrates.

Meanwhile the teacher who had won this great reputation had also been active as a public writer. The most interesting and most characteristic works of Isocrates are those in which he deals with the public questions of his own day. The influence which he thus exercised throughout Hellas might be compared to that of an earnest political essayist gifted with a popular and attractive style. And Isocrates had a dominant idea which gained strength with his years, until its realization had become, we might say, the main purpose of his life. This idea was

4 Partim in pompa, partim in acie illustres (De orat. ii. 24). 6 P. Sanneg, De schola Isocratea (Halle, 1867).

the invasion of Asia by the united forces of Greece. The Greek cities were at feud with each other, and were severally torn by intestine faction. Political morality was become a rare and a somewhat despised distinction. Men who were notoriously ready to sell their cities for their private gain were, as Demos- thenes says, rather admired than otherwise. 1 The social condi- tion of Greece was becoming very unhappy. The wealth of the country had ceased to grow; the gulf between rich and poor was becoming wider; party strife was constantly adding to the number of homeless paupers; and Greece was full of men who were ready to take service with any captain of mercenaries, or, failing that, with any leader of desperadoes. Isocrates draws a vivid and terrible picture of these evils. The cure for them, he firmly believed, was to unite the Greeks in a cause which would excite a generous enthusiasm. Now was the time, he thought, for that enterprise in which Xenophon's comrades had virtually succeeded, when the headlong rashness of young Cyrus threw away their reward with his own life. 2 The Persian empire was unsound to the core — witness the retreat of the Ten Thousand: let united Greece attack it and it must go down at the first onset. Then new wealth would flow into Greece; and the hungry pariahs of Greek society would be drafted into fertile homes beyond the Aegean.

A bright vision; but where was the power whose spell was first to unite discordant Greece, and, having united it, to direct its strength against Asia? That was the problem. The first attempt of Isocrates to solve it is set forth in his splendid Panegyricus (380 B.C.). Let Athens and Sparta lay aside their jealousies. Let them assume, jointly, a leadership which might be difficult for either, but which would be assured to both. That eloquent pleading failed. The next hope was to find some one man equal to the task. Jason of Pherae, Dionysius I. of Syracuse, Archidamus III., son of Agesilaus — each in turn rose as a possible leader of Greece before the im- agination of the old man who was still young in his enthusiastic hope, and one after another they failed him. But now a greater than any of these was appearing on the Hellenic horizon, and to this new luminary the eyes of Isocrates were turned with eager anticipation. Who could lead united Greece against Asia so fitly as the veritable representative of the Heracleidae, the royal descendant of the Argive line — a king of

half-barbarians it is true, but by race, as in spirit, a pure Hellene — Philip of Macedon? We can still read the words in which this fond faith clothed itself; the ardent appeal of Isocrates to Philip is extant; and another letter shows that the belief of Isocrates in Philip lasted at any rate down to the eve of Chaeronea. 3 Whether it survived that event is a doubtful point. The popular account of the orator's death ascribed it to the mental shock which he received from the news of Philip's victory. He was at Athens, in the palaestra of Hippocrates, when the tidings came. He repeated three verses in which Euripides names three foreign Conquerors of Greece — Danaus, Pelops, Cadmus — and four days later he died of voluntary starvation. Milton (perhaps thinking of Eli) seems to conceive the death of Isocrates as instantaneous: —

" As that dishonest victory At Chaeronea, fatal to liberty, Killed with report that old man eloquent."

Now the third of the letters which bears the name of Isocrates is addressed to Philip, and appears to congratulate him on his victory at Chaeronea, as being an event which will enable him to assume the leadership of Greece in a war against Persia. Is the letter genuine? There is no evidence, external or internal, against its authenticity, except its supposed inconsistency with the views of Isocrates and with the tradition of his suicide. As to his views, those who have studied them in his own writings will be disposed to question whether he would have regarded

1 De falsa legat. p. 426 oix 071-ws upyiˆovro f} KoXAfeu' i)%lovv tovs TCLvra TCoiovvrtxSi aXX 6.Trefi\eTroi>, c£r t \ovp, (rlp.u>v, &p5pas Tjyovvro.*

- tKeivovs yap dfioXoytiTai . . . ribt\ kyuparets bonovvras etpai T&v irpayti.a.Twt' Sia ri)V Kipov vpoiriTetav aTVXV< raL {PhilippUS, 90; cp. Panegyr. 149).

3 Philippus, 346 B.C. ; Epist. ii. end of 342 B.C. (?).

Philip's victory at Chaeronea as an irreparable disaster for Greece. Undoubtedly he would have deplored the conflict between Philip and Athens; but he would have divided the blame between the combatants. And, with his old belief in Philip, he would probably have hoped, even after Chaeronea, that the new position won by Philip would eventually prove compatible with the independence of the Greek cities, while it would certainly promote the project on which, as he was profoundly convinced, the ultimate welfare of

Greece depended, — a Panhellenic expedition against Persia. As to the tradition of his suicide, the only rational mode of reconciling it with that letter is to suppose that Isocrates destroyed himself, not because Philip had conquered, but because, after that event, he saw Athens still resolved to resist. > We should be rather disposed to ask how much weight is to be given to the tradition. The earliest authority for it — Dionysius of Halicarnassus in the age of Augustus — may have had older sources; granting, however, that these may have remounted even to the end of the 4ljh century B.C., that would not prove much. Suppose that Isocrates — being then ninety-eight and an invalid — had happened to die from natural causes a few days after the battle of Chaeronea. Nothing could have originated more easily than a story that he killed himself from intense chagrin. Every one knew that Isocrates had believed in Philip; and most people would have thought that Chaeronea was a crushing refutation of that belief. Once started, the legend would have been sure to live, not merely because it was picturesque, but also because it ser/ed to accentu- ate the contrast between the false prophet and the true— between Isocrates and Demosthenes; and Demosthenes was very justly the national idol of the age which followed the loss of Greek independence. 4

Isocrates is said to have taught his Athenian pupils gratuitously, and to have taken money only from aliens; but, as might have been expected, the fame of his school exposed him to attacks on the ground of his gains, which his enemies studiously ex- aggerated. After the financial reform of 378 B.C. he was one of those 1200 richest citizens who constituted the twenty unions {(jviAnopitu) for the assessment of the war-tax (eiaifiopa) . He had discharged several public services (huTovpylai.) ; in particular, he had thrice served as trierarch. He married Plathane, the widow of the " sophist " Hippias of Elis, and then adopted her son Aphareus, afterwards eminent as a rhetorician and a tragic poet. In 355 B.C. he had his first and only lawsuit. A certain Megaclides (introduced into the speech under the fictitious name of Lysimachus) challenged him to undertake the trierarchy or exchange properties. This was the lawsuit which suggested the form of the discourse which he calls the Antidosis (" exchange of properties " — 353 B.C.) — his defence of his professional life.

He was buried on a rising ground near the Cynosarges — a temenos of Heracles, with a gymnasion, on the east side of Athens, outside the Diomeian gate. His tomb was surmounted by a column some 45 ft. high, crowned with the figure of a siren, the symbol of persuasion and of death. A tablet of stone, near the column, represented a group

of which Gorgias was the centre; his pupil Isocrates stood at his side. Aphareus erected a statue to his adopted father near the Olympieum. Timotheus, the illustrious son of Conon, dedicated another in the temple of Eleusis.

It was a wonderful century which the life of one man had thus all but spanned. Isocrates had reached early manhood when the long struggle of the Peloponnesian War — begun in his-child- hood — ended with the overthrow of Athens. The middle period of his career was passed under the supremacy of Sparta. His more advanced age saw that brief ascendancy which the genius of Epameinondas secured to Thebes. And he lived to urge on Philip of Macedon a greater enterprise than any which the Hellenic world could offer. His early promise had won a glowing tribute from Plato, and the rhetoric of his maturity furnished matter to the analysis of Aristotle; he had composed his imaginary

4 The views of several modern critics on the tradition of the suicide are brought together in the Attic Orators, ii. (1893) p. 31, note I.

picture of that Hellenic host which should move through Asia in a pageant of sacred triumph, just as Xehophon was publishing his plain narrative of the retreat of the Ten Thousand; and, in the next generation, his literary eloquence was still demonstrat- ing the weakness of Persia when Demosthenes was striving to make men feel the deadly peril of Greece. This long life has an element of pathos not unlike that of Greek tragedy; a power above man was compelling events in a direction which Isocrates could not see; but his own agency was the ally of that power, though in a sense which he knew not; his vision was of Greece triumphant over Asia, while he was the unconscious prophet of an age in which Asia should be transformed by the diffusion of Hellenism. 1

His character should be viewed in both its main aspects — the political and the literary.

With regard to the first, two questions have to be asked : (1) How far were the political views of Isocrates peculiar to himself, and different from those of the clearest minds contemporary with him? (2) How far were those views falsified by the event?

1. The whole tone of Greek thought in that age had taken a bent

towards monarchy in some form. This tendency may be traced alike in the practical common sense of Xenophon and in the lofty idealism of Plato. There could be no better instance of it than a well-known passage in the Politics of Aristotle. He is speaking of the gifts which meet in the Greek race — a race warlike, like the Europeans, but more subtle — keen, like the Asiatics, but braver. Here, he says, is a race which " might rule all men, if it were brought under a single govern- ment." 2 It is unnecessary to suppose a special allusion to Alexander; but it is probable that Aristotle had in his mind a possible union of the Greek cities under a strong constitutional monarchy. His advice to Alexander (as reported by Plutarch) was to treat the Greeks in the spirit of a leader (rjye/iovtKui) and the barbarians in the spirit of a master (dtcrirori Kws). 3 Aristotle conceived the central power as political and permanent; Isocrates conceived it as, in the first place, military, having for its immediate aim the conduct of an ex- pedition against Asia. The general views of Isocrates as to the largest good possible for the Greek race were thus in accord with the prevailing tendency of the best Greek thought in that age.

2. The vision of the Greek race " brought under one polity " was not, indeed, fulfilled in the sense of Aristotle or of Isocrates. But the invasion of Asia by Alexander, as captain-general of Greece, became the event which actually opened new and larger destinies to the Greek race. The old political life of the Greek cities was worn out ; in the new fields which were now opened, the empire of Greek civiliza- tion entered on a career of world-wide conquest, until Greece became to East and West more than all that Athens had been to Greece. Athens, Sparta, Thebes, ceased indeed to be the chief centres of Greek life; but the mission of the Greek mind could scarcely have been accomplished with such expansive and penetrating power if its influence had not radiated over the East from Pergamum, Antioch and Alexandria.

Panhellenic politics had the foremost interest for Isocrates. But in two of his works — the oration On the Peace and the Areopagiticus (both of 355 B.C.) — he deals specially with the politics of Athens. The speech On the Peace relates chiefly to foreign affairs. It is an eloquent appeal to his fellow-citizens to abandon the dream of supremacy, and to treat their allies as equals, not as subjects. The fervid orator personifies that empire, that false mistress which has lured Athens, then Sparta, then Athens once more, to the verge of destruction. " Is she not worthy of detestation?" Leadership passes into empire; empire begets insolence; insolence brings ruin. The Areopagiticus breathes a kindred spirit in regard to home policy. Athenian life had lost its old tone. Apathy to public interests,

dissolute frivolity, tawdry display and real poverty — these are the features on which Isocrates dwells. With this picture he contrasts the elder democracy of Solon and Cleisthenes, and, as a first step towards reform, would restore to the Areopagus its general censorship of morals It is here, and here alone — in his comments on Athenian affairs at home and abroad — that we can distinctly recognize the man to whom the Athens of Pericles was something more than a tradition. We are carried back to the age in which his long life began. We find it difficult to realize that the voice to which we listen is the same which we hear in the letter to Philip.

Turning from the political to the literary aspect of his work, we are at once upon ground where the question of his merits will now provoke comparatively little controversy. Perhaps the most serious prejudice with which his reputation has had to contend in

1 Isocrates, a loyal and genuine Hellene, can yet conceive of Hellenic culture as shared by men not of Hellenic blood (Panegyr. 50). He is thus, as Ernst Curtius has ably shown, a forerunner of Hellenism — analogous, in the literary province, to Epameinondas and Timotheus in the political (History of Greece, v. 116, 204, tr. Ward).

: to t&v 'EXXˆvcoi' 7ˆ05 . . . hvvanevov apx&> v ttq.vtwv, /Has Tvyx lV0V jroXtTcfas (Polit. iv. [vil.j 6, 7).*

3 De Alex. virt. i. 6.

modern times has been due to an accident of verbal usage. He repeatedly describes that art which he professed to teach as his 4>i \oao4>ia. His use of this word — joined to the fact that in a few passages he appears to allude slightingly to Plato or to the Socratics — has exposed him to a groundless imputation. It cannot be too distinctly understood that, when Isocrates speaks of his i\ooola, he means simply his theory or method of " culture " — to use the only modern term which is really equivalent in latitude to the Greek word as then current. 4

The iKo(fo4>la, or practical culture, of Isocrates was not in conflict, because it had nothing in common, with the Socratic or Platonic philosophy. The personal influence of Socrates may, indeed, be traced in his work. He constantly desires to make his teaching bear on the practical life. His maxims of homely moral wisdom frequently recall Xenophon's Memorabilia. But there the relation ends. Plato alludes to Isocrates in perhaps three places. The glowing prophecy in the Phaedrus has been quoted ; in the Corgias a phrase

of Isocrates is wittily parodied; and in the Euthydemus Isocrates is probably meant by the person who dwells " on the borderland between philosophy and statesmanship." 5 The writings of Isocrates contain a few more or less distinct allusions to Plato's doctrines or works, to the general effect that they are barren of practical result. 6 But Isocrates nowhere assails Plato's philosophy as such. When he declares "knowledge" (ImcrHjfni) to be un- attainable, he means an exact " knowledge " of the contingencies which may arise in practical life. " Since it is impossible for human nature to acquire any science (iirwTiip.f)v) by which we should know what to do or to say, in the next resort I deem those wise who, as a rule, can hit what is best by their opinions" (86£as). 7

Isocrates should be compared with the practical teachers of his day. In his essay Against the Sophists, and in his speech on the Antidosis, which belong respectively to the beginning and the close of his professional career, he has clearly marked the points which distinguish him from "the sophists of the herd" (A.ye

In one of his letters to Atticus, Cicero says that he has used " all the fragrant essences of Isocrates, and all the little stores of his disciples." 9 The phrase has a point of which the writer himself was perhaps scarcely conscious: the style of Isocrates had come to Cicero through the school of Rhodes ; and the Rhodian imitators had more of Asiatic splendour than of Attic elegance. But, with this allowance made, the passage may serve to indicate the real place of Isocrates in the history of literary style. The old Greek critics consider him as representing what they call the " smooth " or "florid" mode of composition (yha4>vpa, acflijpd Apuovia.) as distinguished from the "harsh" (afcrnjpa) style of Antiphon and the perfect "mean" (p-icrrj) of Demosthenes. Tried by a modern standard, the language of Isocrates is certainly not " florid." The only sense in which he merits the epithet is that (especially in his

4 The word <£iAotiv as simply = " to study "; as e.g. an invalid " studies " the means of relief from pain, Lys. Or. xxiv. 10; cf. Isocr. Or. iv. 6, &c. 6 Plato, Gorg. p. 463; Euthyd. 304-306.

6 These allusions are discussed in the Attic Orators, vol. ii. ch. 13.

7 Isocr. Or. xv. 271.

8 A. Cartelier, Le Discours d'Isocrate sur lui-meme, p. lxii. (1862).

9 Totum Isocratis nvpoBijKiov atque omnes ejus discipuloruro

arculas (Ad Att. ii. 1).

earlier work) he delights in elaborate antitheses. Isocrates is an " orator " in the larger sense of the Greek word rhetor; but his real distinction consists in the fact that he was the first Greek who gave an artistic finish to literary rhetoric. The practical oratory of the day had already two clearly separated branches — the forensic, represented by Isaeus, and the deliberative, in which Callistratus was the forerunner of Demosthenes. Meanwhile Isocrates was giving form and rhythm to a standard literary prose. Through the influence of his school, this normal prose style was transmitted — with the addition of some florid embellishments — to the first generation of Romans who studied rhetoric in the Greek schools. The distinctive feature in the composition of Isocrates is his structure of the periodic sentence. This, with him, is no longer rigid or monotonous, as with Antiphon — no longer terse and compact, as with Lysias — but ample, luxuriant, unfolding itself (to use a Greek critic's image) like the soft beauties of a winding river. Isocrates was the first Greek who worked out the idea of a prose rhythm. He saw clearly both its powers and its limits; poetry has its strict rhythms and precise metres; prose has its metres and rhythms, not bound by a rigid framework, yet capable of being brought under certain general laws which a good ear can recognize, and which a speaker or writer may apply in the most various combinations. This fundamental idea of prose rhythm, or number, is that which the style of Isocrates has imparted to the style of Cicero. When Quintilian (x. I. 108) says, somewhat hyperbolically, that Cicero has artistically reproduced (effinxisse) " the force of Demosthenes, the wealth of Plato, the charm of Isocrates," he means principally this smooth and har- monious rhythm. Cicero himself expressly recognizes this original and distinctive merit of Isocrates. 1 Thus, through Rome, and especially through Cicero, the influence of Isocrates, as the founder of a literary prose, has passed into the literatures of modern Europe. It is to the eloquence of the preacher that we may perhaps look for the nearest modern analogue of that kind in which Isocrates excelled — especially, perhaps, to that of the great French preachers. Isocrates was one of the three Greek authors, Demosthenes and Plato being the others, who contributed most to form the style of Bossuet.

Works. — The extant works of Isocrates consist of twenty-one speeches or discourses and nine letters. 2 Among these, the six

forensic speeches represent the first period of his literary life — belonging to the years 403-393 B.C. All six concern private causes. They may be classed as follows: I. Action for Assault {bUij aUlas), Or. xx., Against Lochites, 394 B.C. 2. Claim to an Inheritance (eTriSiKatrlc.), Or. xix., Aegineticus, end of 394 or early in 393 B.C.

3. Actions to Recover a Deposit: (1) Or. xxi., Against Euthynus, 403 B.C.; (2) Or. xvii., Trapeziticus, end of 394 or early in 393 B.C.

4. Action for Damage (Siieq /SX&.Stjs), Or. xvi., Concerning the Team of Horses, 397 B.C. 5. Special Plea (irapaypa

The remaining fifteen orations or discourses do not easily lend themselves to the ordinary classification under the heads of " deliberative " and " epideictic." Both terms must be strained; and neither is strictly applicable to all the pieces which it is required to cover. The work of Isocrates travelled out of the grooves in which the rhetorical industry of the age had hitherto moved. His position among contemporary writers was determined by ideas peculiar to himself; and his compositions, besides having a style of their own, are in several instances of a new kind. The only adequate principle of classification is one which considers them in respect to their subject-matter. Thus viewed, they form two clearly separated groups — the scholastic and the political.

Scholastic Writings. — Under this head we have, first, three letters or essays of a hortatory character. (1) The letter to the young Demonicus 3 — once a favourite subject in the schools — contains

1 Idque princeps Isocrates instituisse fertur, . . . ut inconditam antiquorumdicendiconsuetudinem . . . numerisastringeret (Deor. iii. 44, 173).

2 The dates here given differ to some extent from those in F. Blass, Die attische Beredsamkeit (2nd ed., 1887-1898).

3 Some authorities consider the Ad Demonicum spurious.

a series of precepts neither below nor much above the average practical morality of Greece. (2) The letter to Nicocles — the young king of the Cyprian Salamis — sets forth the duty of a monarch to his subjects. (3) In the third piece, it is Nicocles who speaks, and impresses on the Salaminians their duty to their king — a piece remarkable as containing a popular plea for monarchy, composed by a citizen of Athens. These three letters may be referred to the years

374~372 B.C.

Next may be placed four pieces which are ” displays ” {imbtllitis) in the proper Greek sense. The Busiris (Or. xi., 390-391 B.C.) is an attempt to show how the ill-famed king of Egypt might be praised. The Encomium on Helen (Or. x., 370 B.C.), a piece greatly superior to the last, contains the celebrated passage on the power of beauty. These two compositions serve to illustrate their author's view that ” encomia ” of the hackneyed type might be elevated by combining the mythical matter with some topic of practical interest — as, in the case of Busiris, with the institutions of Egypt, or, in that of Helen, with the reforms of Theseus. The Evagoras (Or. ix., 365 B.C.?), the earliest known biography, is a laudatory epitaph on a reaily able man — the Greek king of the Cyprian Salamis. A passage of singular interest describes how, under his rule, the influences of Hellenic civilization had prevailed over the surrounding barbarism. The Panathenaicus (Or. xii.), intended for the great Panathenaea of 342 B.C., but not completed till 339 B.C., contains a recital of the services rendered by Athens to Greece, but digresses into personal defence against critics; his last work, written in extreme old age, it bears the plainest marks of failing powers.

The third subdivision of the scholastic writings is formed by two most interesting essays on education — that entitled Against the Sophists (Or. xiii., 391-390 B.C.), and the Antidosis (Or. xv., 353 B.C.). The first of these is a manifesto put forth by Isocrates at the outset of his professional career of teaching, in which he seeks to distinguish his aims from those of other ” sophists.” These ” sophists ” are (1) the ” eristics ” (01 irepi rds epiSas), by whom he seems to intend the minor Socratics, especially Euclides; (2) the teachers of practical rhetoric, who had made exaggerated claims for the efficacy of mere instruction, independently of natural faculty or experience; (3) the writers of “arts” of rhetoric, who virtually devoted themselves (as Aristotle also complains) to the lowest, or forensic, branch of their subject (see also E. Holzner, Platos Phaedrus und die Sophistenrede des Isokrates, Prague, 1894). As this piece is the prelude to his career, its epilogue is the speech on the “Antidosis” — so called because it has the form of a speech made in court in answer to a challenge to undertake the burden of the trierarchy, or else exchange properties with the challenger. The discourse ” Against the Sophists ” had stated what his art was not; this speech defines what it is. His own account of his ct>CKoao4>la — ” the discipline of discourse ” (1? tQv XiJywj' irtuSda) — has been embodied in the sketch of it given above.

Political Writings. — These, again, fall into two classes — those which concern (1) the relations of Greece with Persia, (2) the internal affairs of Greece. The first class consist of the Panegyricus (Or. iv., 380 B.C.) and the Philippus (Or. v., 346 B.C.). The Panegyricus takes its name from the fact that it was given to the Greek public at the time of the Olympic festivals — probably by means of copies circulated there. The orator urges that Athens and Sparta should unite in leading the Greeks against Persia. The feeling of antiquity that this noble discourse is a masterpiece of careful work finds ex- pression in the tradition that it had occupied its author for more than ten years. Its excellence is not merely that of language, but also — and perhaps even more conspicuously — that of lucid arrange- ment. The Philippus is an appeal to the king of Macedon to assume that initiative in the war on Persia which Isocrates had ceased to expect from any Greek city. In the view of Demosthenes, Philip was the representative barbarian ; in that of Isocrates, he is the first of Hellenes, and the natural champion of their cause.

Of those discourses which concern the internal affairs of Greece, two have already been noticed, — that On the Peace (Or. viii.), and the Areopagiticus (Or. vii.) — both of 355 B. c. — as dealing respectively with the foreign and the home affairs of Athens. The Plataicus (Or. xiv.) is supposed to be spoken by a Plataean before the Athenian ecclesia in 373 B.C. In that year Plataea had for the second time in its history been destroyed by Thebes. The oration — an appeal to Athens to restore the unhappy town — is remarkable both for the power with which Theban cruelty is denounced, and for the genuine pathos of the peroration. The Archidamus (Or. vi.) is a speech pur- porting to be delivered by Archidamus III., son of Agesilaus, in a debate at Sparta on conditions of peace offered by Thebes in 366 B.C. It was demanded that Sparta should recognize the indepen- dence of Messene, which had lately been restored by Epameinondas (370 B.C.). The oration gives brilliant expression to the feeling which such a demand was calculated to excite in Spartans who knew the history of their own city. Xenophon witnesses that the attitude of Sparta on this occasion was actually such as the Archidamus assumes (Hellen. vii. 4. 8-1 1).

Letters. — The first letter — to Dionysius I. — is fragmentary; but a passage in the Philippus leaves no doubt as to its object. Isocrates was anxious that the ruler of Syracuse should undertake the com- mand of Greece against Persia. The date is probably 368 B.C.

ISODYNAMIC LINES— ISOMERISM

Next in chronological order stands the letter " To the Children of Jason " (vi.). Jason, tyrant of Pherae, had been assassinated in 370 B.C.; and no fewer than three of his successors had shared the same fate. Isocrates now urges Thebe, the daughter of Jason, and her half-brothers to set up a popular government. The date is 359 B.C. 1 The letter to Archidamus III. (ix.) — the same person who is the imaginary speaker of Oration vi. — urges him to execute the writer's favourite idea, — " to deliver the Greeks from their feuds, and to crush barbarian insolence." It is remarkable for a vivid picture of the state of Greece; the date is about 356 B.C. The letter to Timotheus (vii., 345 B.C.), ruler of Heraclea on the Euxine, introduces an Athenian friend who is going thither, and at the same time offers some good counsels to the benevolent despot. The letter " to the government of Mytilene " (viii., 350 B.C.) is a petition to a newly established oligarchy, begging them to permit the return of a democratic exile, a distinguished musician named Agenor. The first of the two letters to Philip of Macedon (ii.) remonstrates with him on the personal danger to which he had recklessly exposed himself, and alludes to his beneficent intervention in the affairs of Thessaly; the date is probably the end of 342 B.C. The letter to Alexander (v.), then a boy of fourteen, is a brief greeting sent along with the last, and congratulates him on preferring " practical " to " eristic " studies — a distinction which is explained by the sketch of the author's i\oatxt>ia, and of his essay " Against the Sophists," given above. It was just at this time, probably, that Alexander was beginning to receive the lessons of Aristotle (342 B.C.). The letter to Antipater (iv.) introduces a friend who wished to enter the military service of Philip. Antipater was then acting as regent in Macedonia during Philip's absence in Thrace (340-339 B.C.). The later of the two letters to Philip (iii.) appears to be written shortly after the battle of Chaeronea in 338 B.C. The questions raised by it have already been discussed.

No lost work of Isocrates is known from a definite quotation, except an " Art of Rhetoric," from which some scattered precepts are cited. Quintilian, indeed, and Photius, who had seen this " Art," felt a doubt as to whether it was genuine. Only twenty-five dis- courses — out of an ascriptive total of some sixty — were admitted as authentic by Dionysius; Photius {circ. A.D. 850) knew only the number now extant — twenty-one.

With the exception of defects at the end of Or. xiii., at the be- ginning of Or. xvi., and probably at the end of Letters i., vi., ix., the

existing text is free from serious mutilations. It is also unusually pure. The smooth and clear style of Isocrates gave few opportunities for the mistakes of copyists. On the other hand, he was a favourite author of the schools. Numerous glosses crept into his text through the comments or conjectures of rhetoricians. This was already the case before the 6th century, as is attested by the citations of Priscian and Stobaeus. Jerome Wolf and Koraes successively accomplished much for the text. But a more decided advance was made by Immanuel Bekker. He used five MSS., viz. (1) Codex Urbinas III. T (this, the best, was his principal guide) ; (2) Vaticanus 936, A (3) Laurentianus 87, 14,6 (13th century); (4) Vaticanus 65, A and (5) Marcianus 415, H. The first three, of the same family, have Or. xv. entire; the last two are from the same original, and have Or. xv. incomplete.

J. G. Baiter and H. Sauppe in their edition (1850) follow r " even more constantly than Bekker." Their apparatus is enriched, however, by a MS. to which he had not access — Ambrosianus O. 144, E, which in some cases, as they recognize, has alone preserved the true reading. The readings of this MS. were given in full by G. E. Benseler in his second edition (1854-1855). The distinctive characteristic of Benseler's textual criticism was a tendency to correct the text against even the best MS., where the MS. conflicted with the usage of Isocrates as inferred from his recorded precepts or from the statements of ancient writers. Thus, on the strength of the rule ascribed to Isocrates — (jmvTttvra fj.fi avinrlTrrav — Benseler would remove from the text every example of hiatus (on the MSS. of Isocrates, see H. Biirmann, Die handschriftliche t) berlieferung des Isocrates, Berlin, 1 885-1 886, and E. Drerup, in Leipziger Studten, xvii., 1895)- (R. C. J.)

Editions. — In Oratores Attici, ed. Imm. Bekker (1823, 1828); W. S. Dobson (1828); J. G. Baiter and Hermann Sauppe (1850). Separately Ausgcwahlte Reden, Panegyrikos und Areopagitikos, by Rudolf Rauchenstein, 6th ed., Karl Munscher (1908); in Teubner's series, by G. E. Benseler (new ed., by F. Blass, 1886-1895) and by E. Drerup (1906-); Ad Demonicum et Panegyricus, ed. J. E. Sandys (1868); Evagoras, ed. H. Clarke (1885). Extracts from Orations iii., iv., vi., % vii., viii., ix., xiii., xiv., xv., xix., and Letters iii., v., edited with revised text and commentary, in Selections from the Attic Orators, by R. C. Jebb (1880); vol. i. of an English prose translation, with introduction and notes by J. H. Freese, has been published in Bohn's Classical Library (1894). See generally Jebb's

1 This was shown by R.C.Jebb in a paper on " The Sixth Letter of

Isocrates," Journal of Philology, v. 266 (1874). The fact that Thebe, widow of Alexander of Pherae, was the daughter of Jason is incidentally noticed by Plutarch in his life of Pelopidas, c. 28. It is this fact which gives the clue to the occasion of the letter; cf. Diod. Sic. xvi. 14.

Attic Orators (where a list of authorities is given) and F. Blass, Die attische Beredsamkeit (2nd ed., 1887-1898), and the latter's Die Rhythmen der attischen Kunstprosa (1901). There is a special lexicon by S. Preuss (1904). On the philosophy of Isocrates and his relation to the Socratic schools, see Thompson's ed. of Plato's Phaedrus, Appendix 2.

ISODYNAMIC LINES (Gr. icob'bvaiMs, equal in power), lines connecting those parts of the earth's surface where the magnetic force has the same intensity (see Magnetism, Terrestrial).

ISOGONIC LINES (Gr. iffoywvios, equianguHt), lines connect- ing those parts of the earth's surface where the magnetic declina- tion is the same in amount (see Magnetism, Terrestrial).

ISOLA DEL LIRI, a town of Campania, in the province of Caserta, Italy, 15 m. by rail N.N.W. of Roccasecca, which is on the main line from Rome to Naples, 10 m. N.W. of Cassino. Pop. (1901), town, 2384; commune, 8244. The town consists of two parts, Isola Superiore and Isola Inferiore; as its name implies it is situated between two arms of the Liri. The many waterfalls of this river and of the Fibreno afford motive power for several important paper-mills. Two of the falls, 80 ft. in height, are especially fine. About 1 m. to the N. is the church of San Domenico, erected in the 12th century, which probably marks the site of the villa of Cicero (see Arpino).

ISOMERISM, in chemistry. When Wohler, in 1825, analysed his cyanic acid, and Liebig his quite different fulminic acid in 1824, the composition of both compounds proved to be absolutely the same, containing each in round numbers 28% of carbon, 33% of nitrogen, 37% of oxygen and 2% of hydrogen. This fact, inconsistent with the then dominating conception that difference in qualities was due to difference in chemical com- position, was soon corroborated by others of analogous nature, and so Berzelius introduced the term isomerism (Gr. icoˆepijs, composed of equal parts) to denominate the existence' of the property of substances having different qualities, in chemical behaviour as well as physical, notwithstanding identity in chemical composition. These phenomena were quite in accord- ance with the atomic conception of matter, since a compound containing

the same number of atoms of carbon, nitrogen, oxygen and hydrogen as another in the same weight might differ in internal structure by different arrangements of those atoms. Even in the time of Berzelius the newly introduced conception proved to include two different groups of facts. The one group included those isomers where the identity in composi- tion was accompanied by identity in molecular weight, i.e. the vapour densities of the isomers were the same, as in butylene and isobutylene, to take the most simple case; here the molecular conception admits that the isolated groups in which the atoms are united, i.e. the molecules, are identical, and so the molecule of both butylene and isobutylene is indicated by the same chemical symbol C 4 H 8 , expressing that each molecule contains, in both cases, four atoms of carbon © and eight of hydrogen (FI). This group of isomers was denominated metamers by Berzelius, and now often " isomers " (in the restricted sense), whereas the term polymerism (Gr. ttoKvs, many) was chosen for compounds like butylene, CiHg, and ethylene, C2H4, corre- sponding to the same composition in weight but differing in molecular formula, and having different densities in gas or vapour, a litre of butylene and isobutylene weighing, "for instance, under ordinary temperature and pressure, about 2-5 gr., ethylene only one-half as much, since density is pro- portional to molecular weight.

A further distinction is "necessary to a survey of the sub- divisions of isomerism regarded in its widest sense. There are subtle and more subtle differences causing isomerism. In the case of metamerism we can imagine that the atoms are differently linked, say in the case of butylene that the atoms of carbon are joined together as a continuous chain, expressed by -C-C-C-C-, normally as it is called, whereas in isobutylene the fourth atom of carbon is not attached to the third but to the

C— second carbon atom, i.e. -C-C<ˆp_- Now there are cases

in which analogy of internal structure goes so far as to exclude even that difference in linking, the only remaining possibility

then being the difference in relative position. This kind of isomerism has been denominated stereoisomerism (q.v.) often stereomerism. But there is a last group belonging here in which identity of structure goes farthest. There are substances such as sulphur, showing

difference of modification in crystalline state — the ordinary rhombic form in which sulphur occurs as a mineral, while, after melting and cooling, long needles appear which belong to the monosymmetric system. These differences, which go hand in hand with those in other properties, e.g. specific heat and specific gravity, are absolutely confined to the crystalline state, disappearing with it when both modifica- tions of sulphur are melted, or dissolved in carbon disulphide or evaporated. So it is natural to admit that here we have to deal with identical molecules, but that only the internal arrangement differs from case to case as identical balls may be grouped in different ways. This case of difference in properties combined with identical composition is therefore called poly- morphism.

To summarize, we have to deal with polymerism, metamerism, stereoisomerism, polymorphism; whereas phenomena denom- inated tautomerism, pseudomerism and desmotropism form different particular features of metamerism, as well as the phenomena of allotropy, which is merely the difference of properties which an element may show, and can be due to poly- merism, as in oxygen, where by the side of the ordinary form with molecules 2 , we have the more active ozone with O3. Poly- morphism in the case of an element is illustrated in the case of sulphur, whereas metamerism in the case of elements has so far as yet not been observed; and is hardly probable, as most elements are built up, like the metals, from molecules containing only one atom per molecule; here metamerism is absolutely excluded, and a considerable number of the rest, having diatomic molecules, are about in the same condition. It is only in cases like sulphur with octatomic molecules, where a difference of internal structure might play a part.

Before entering into detail it may be useful to consider the nature of isomerism from a general standpoint. It is probable that the whole phenomenon of isomerism is due to the possibility that compounds or systems which in reality are unstable yet persist, or so slowly change that practically one can speak of their stability; for instance, such systems as explosives and a mixture of hydrogen and oxygen, where the stable form is water, and in which, according to some, a slow but until now undetected change takes place even at ordinary temperatures. Consequently, of each pair of isomers we may establish beforehand which is the more stable; either in particular circumstances, a direct change taking place, as, for instance, with maleic acid, which when exposed to sunlight in presence of a trace of bromine, yields the isomeric fumaric acid almost at once, or, indirectly, one may conclude that the isomer which forms under

greater heat-development is the more stable, at least at lower tempera- tures. Now, whether a real, though undetected, change occurs is a question to be determined from case to case; it is certain, however, that a substance like aragonite (a mineral form of calcium carhonate) has sensibly persisted in geological periods, though the polymorphous calcite is the more stable form. Nevertheless, the theoretical possibility, and its realization in many cases, has brought considerations to the front which have recently become of predominant interest; consequently the possible transformations of isomers and polymers will be con- sidered later under the denomination of reversible or dynamical isomerisms.

Especially prominent is the fact that polymerism and meta- merism are mainly reserved to the domain of organic chemistry, or the chemistry of carbon, both being discovered there; and, more especially, the phenomenon of metamerism in organic chemistry has largely developed our notions concerning the structure of matter. That this particular feature belongs to carbon compounds is due to a property of carbon which charac- terizes the whole of organic chemistry, i.e. that atoms attached to carbon, to express it in the atomic style, cling more intensely to it than, for instance, when combined with oxygen. This

explains a good deal of the possible instability; and, from a practical point of view, it coincides with the fact that such a large amount of energy can be stored in our most intense explo- sives such as dynamite, the explanation being that hydrogen is attached to carbon distant from oxygen in the same molecule, and that only the characteristic resistance of the carbon linkage prevents the hydrogen from burning, which is the main occurrence in the explosion of dynamite. The possession of this peculiar property by carbon seems to be related to its high valency, amounting to four; and, generally, when we consider the most primitive expression of isomerism, viz. the allotropy of elements, we meet this increasing resistance with increasing valency. The monovalent iodine, for instance, is transformed by heating into an allotropic form, corresponding to the formula I, whereas ordinary iodine answers to I 2 . Now these modifications show hardly any tendency to persist, the one stable at high tempera- tures being formed at elevated temperatures, but changing in the reverse sense on cooling. In the divalent oxygen we meet with the modification called ozone, which, although unstable, changes but slowly into oxygen. Similarly the trivalent phos- phorus in the ordinary white form shows such resistance as if it were practically stable; on the other hand the red modification is in reality also stable, being formed, for instance, under the influence of light.

In the case of the quadrivalent carbon, diamond seems to be the stable form at ordinary temperatures, but one may wait long before it is formed from graphite.

This connexion of isomerism with resistant linking, and of this with high valency, explains, in considerable measure, why inorganic compounds afforded, as a rule, no phenomena of this kind until the systematic investigation of metallic compounds by Werner brought to light many instances of isomerism in inorganic compounds. Whereas carbon renders isomerism possible in organic compounds, cobalt and platinum are the determining elements in inorganic chemistry, the phenomena being exhibited especially by complex ammoniacal derivatives. The constitution of these inorganic isomers is still somewhat questionable; and in addition it seems that polymerism, metamerism and stereoisomerism play a part here, but the general feature is that cobalt and platinum act in them with high valency, probably exceeding four. The most simple case is presented by the two platinum compounds PtClj(NHj)2, the platosemidiammine chloride of Peyrone, and the platosammine chloride of Jules Reiset, the first formed according to the equation PtCl 4 K 2 -|-2NH 3 = PtCl 2 (NH3)2 + 2KCl, the second according to Pt(NH 3) 4 Cl2 = PtCl 2 (NH3)2 + 2NH 3 , these compounds differing in solubility, the one dissolving in 33, the other in 160 parts of boiling water. With cobalt the most simple case was discovered in 1892 by S. Jorgensen in the second dinitrotetramminecobalt chloride, [Co(N02)2(NH 3) 4]Cl, designated as flavo — whereas the older isomer of Gibbs was distinguished as croceo-salt. An interesting lecture on the subject was delivered by A. Werner before the German chemical society (Ber., 1007, 40, p. 15). (See Cobalt; Platinum.)

Dealing with organic compounds, it is metamerism that deserves chief attention, as it has largely developed our notions as to molecular structure. Polymerism required no particular explanation, since this was given by the difference in molecular magnitude. One general remark, however, may be made here. There are polymers which have hardly any inter-relations other than identity in composition; on the other hand, there are others which are related by the possibility of mutual trans- formation; examples of this kind are cyanic acid (CNOH) and cyanuric acid (CNOH)3, the latter being a solid which readily transforms into the former on heating as an easily condensable vapour; the reverse transformation may also be realized; and the polymers methylene oxide (CH 2 0) and trioxymethylene (CH 2 0) 3 . In the first group we may mention the homologous series of hydrocarbons derived from ethylene, given by the general formula C»H 2 „, and the two compounds methylene-

oxide and honey-sugar CeHi 2 06. The cases of mutual transformation are generally characterized by the fact

that in the compound of higher molecular weight no new links of carbon with carbon are introduced, the trioxymethylene

being probably 0 < ˆchˆoˆ > CH 2 , whereas honey-sugar corre- sponds to CH 2 OHCHOHCHOHCHOH-CHOH-CHO, each point representing a linking of the carbon atom to the next. This observation is closely related to the above-mentioned resistivity of the carbon-link, and corroborates it in a special case. As carbon tends to hold the atom attached to it, one may presume that this property expresses itself in a pre- dominant way where the other element is carbon also, and so the linkage represented by — C— C— is one of the most difficult to loosen.

The conception of metamerism, or isomerism in restricted sense, has been of the highest value for the development of our notions concerning molecular structure, i.e. the conception as to the order in which the atoms composing a molecule are linked together. In this article we shall confine ourselves to the fatty compounds, from which the fundamental notions were first obtained; reference may be made to the article Chemistry: Organic, for the general structural relations of organic com- pounds, both fatty and aromatic.

A general philosophical interest is attached to the phenomena of isomerism. By Wilhelm Ostwald especially, attempts have been made to substitute the notion of atoms and molecular structure by less hypothetical conceptions; these ideas may some day receive thorough confirmation, and when this occurs science will receive a striking impetus. The phenomenon of isomerism will probably supply the crucial test, at least for the chemist, and the question will be whether the Ostwaldian conception, while substituting the Daltonian hypothesis, will also explain isomerism. An early step accomplished by Ostwald in this direction is to define ozone in its relation to oxygen, considering the former as differing from the latter by an excess of energy, measurable as heat of transformation, instead of defining the difference as diatomic molecules in oxygen, and triatomic in ozone. Now, in this case, the first definition expresses much better the whole chemical behaviour of ozone, which is that of " energetic " oxygen, while the second only includes the fact of

higher vapour-density ; but in apply- ing the first definition to organic compounds and calling isobutylene ” butylene with somewhat more energy ” hardly anything is indicated, and all the advantages of the atomic conception — the possibility of exactly predicting how many isomers a given formula includes and how you may get them — are lost.

To Kekule is due the credit of taking the decisive step in introducing the notion of tetravalent carbon in a clear way, i.e. in the property of carbon to combine with four different monatomic elements at once, whereas nitrogen can only hold three (or in some cases five), oxygen two (in some cases four), hydrogen one. This conception has rendered possible a clear idea of the linking or internal structure of the molecule, for example, in the most simple case, methane, CH4, is expressed by

H

1

H-C-H

1

H

It is by this conception that possible and impossible com- pounds are at once fixed. Considering the hydrocarbons given by the general formula CrH„, the internal linkages of the carbon atoms need at least x—i bonds, using up 2(x— 1) valencies of the 4x to be accounted for, and thus leaving no more than 2(ˆ+1) for binding hydrogen: a compound C3H9 is therefore impossible, and indeed has never been met. The second pre- diction is the possibility of metamerism, and the number of metamers, in a given case among compounds, which are realiz- able. Considering the predicted series of compounds C„H2„+2, which is the well-known homologous series of methane, the first member, the possible of isomerism lies in that of a different linking of the carbon atoms. This first presents itself when

four are present, i.e. in the difference between C — C— C— C C-C-C

and 1 . With this compound C4H10, named butane,

C isomerism is actually observed, being limited to a pair, whereas the former members ethane, C2EL;, and propane, C3H8, showed no isomerism. Similarly, pentane, C5H12, and hexane, C&Hu, may exist in three and five theoretically isomeric forms respect- ively; confirmation of this theory is supplied by the fact that all these compounds have been obtained, but no more. The third most valuable indication which molecular structure gives about these isomers is how to prepare them, for instance, that normal hexane, represented by CH3-CH2-CH 2 -CH2-CH2-CH 3 , may be obtained by action of sodium on propyl iodide, CH3-CH2-CH2-I, the atoms of iodine being removed from two molecules of propyl iodide, with the resulting fusion of the two systems of three carbon atoms into a chain of six carbon atoms. But it is not only the formation of different isomers which is included in their constitution, but also the different ways in which they will decompose or give other products. As an example another series of organic compounds may be taken, viz. that of the alcohols, which only differ from the hydrocarbons by having a group OH, called hydroxyl, instead of H, hydrogen; these compounds, when derived from the above methane series of hydrocarbons, are expressed by the general formula CmH 2n +iOH. In this case it is readily seen that isomerism introduces itself in the three carbon atom derivative: the propyl alcohols, expressed by the formulae CHaCHrCHsOHandCHa-CHOH-CHa, are known as propyl and isopropyl alcohol respectively. Now in oxidizing, or introducing more oxygen, for instance, by means of a mixture of sulphuric acid and potassium bichromate, and admitting that oxygen acts on both compounds in analogous ways, the two alcohols may give (as they lose two atoms of hydrogen) CH 3 CH 2 -COH and CH 3 CO-CH 3 . The first com- pound, containing a group COH, or more explicitly = C— H, is an aldehyde, having a pronounced reducing power, producing silver from the oxide, and is therefore called propylaldehyde; the second compound containing the group — C-CO-C— behaves differently but just as characteristically, and is a ketone, it is therefore denominated propylketone (also acetone or dimethyl ketone). And so, as a rule, from isomeric alcohols, those con- taining a group — CH 2 OH, yield by oxidation aldehydes and are distinguished by the name primary; whereas those contain ing CH-OH, called secondary, produce ketones. (Compare Chemistry: Organic.)

The above examples may illustrate how, in a general way, chemical properties of isomers, their formation as well as trans- formation,

may be read in the structure formula. It is different, however, with physical properties, density, &c; at present we have no fixed rules which enable us to predict quantitatively the differences in physical properties corresponding to a given difference in structure, the only general rule being that those differences are not large.

Perhaps a satisfactory point of view may be here obtained by applying the van der Waals' equation $A(P+a/V^2)(V-b)=2T$, which connects volume V, pressure P and temperature T (see Condensation of Gases). In this equation a relates to molecular attraction; and it is not improbable that in isomeric molecules, containing in sum the same amount of the same atoms, those mutual attractions are approximately the same, whereas the chief difference lies in the value of b, that is, the volume occupied by the molecule itself. For what reason this volume may differ from case to case lies close at hand; in connexion with the notion of negative and positive atoms, like chlorine and hydrogen, experience tends to show that the former, as well as the latter, have a mutual repulsive power, but the former acts on the latter in the opposite sense; the necessary consequence is that, when those negative and positive groups are distributed in the molecule, its volume will be smaller than if the negative elements are heaped together. An example may prove this, but before quoting it, the question of determining b must be decided ; this results immediately from the above quotation, b being the volume V at the absolute zero ($T=0$) ; so the volume of isomers ought to be compared at the absolute zero. Since this has not been done we must adopt the approximate rule that the volume at absolute zero is proportional to that at the boiling-point. Now taking the isomers $H_3C\text{-}CCl_3$ ($M_{„}=108$) and $ClH_2C\text{-}CHCl_2$ ($M_{„}=103$), we see the negative chlorine atoms heaped up in the left hand

formula, but distributed in the second ; the former therefore may be presumed to occupy a larger space, the molecular volume, that is, the volume in cubic centimetres occupied by the molecular weight in grams, actually being 108 in the former, and 103 in the latter case (compare Chemistry : Physical). An analogous remark applies to the boiling-point of isomers. According to the above formula the critical temperature is given by 80A/546, and as the critical temperature is approximately proportional to the boiling-point, both being estimated on the absolute scale of temperature, we may con- clude that the larger value of b corresponds to the lower boiling- point, and indeed

the isomer corresponding to the left-hand formula boils at 74°, the other at 114°. Other physical properties might be considered; as a general rule they depend upon the distribution of negative and positive elements in the molecule.

Reversible (dynamical) Isomerism. — Certain investigations on isomerism which have become especially prominent in recent times bear on the possibility of the mutual transformation of isomers. As soon as this reversibility is introduced, general laws related to thermodynamics are applicable (see Chemical Action; Energetics). These laws have the advantage of being applicable to the mutual transformations of isomers, whatever be the nature of the deeper origin, and so bring polymerism, metamerism and polymorphism together. As they are pursued furthest in the last case, this may be used as an example. The study of polymorphism has been especially pursued by Otto Lehmann, who proved that it is an almost general property; the variety of forms which a given substance may show is often great, ammonium nitrate, for instance, show- ing at least four of them before melting. The general rule which correlates this polymorphic change is that its direction changes at a given temperature. For example, sulphur is stable in the rhombic form till 95-4°, from then upwards it tends to change over into the prismatic form. The phenomenon absolutely corresponds to that of fusion and solidification, only that it generally takes place less quickly; consequently we may have prismatic sulphur at ordinary temperature for some time, as well as rhombic sulphur at ioo°. This may be expressed in

the chosen case by a symbol: " rhombic sulphur

95-4 2

prismatic

sulphur," indicating that there is equilibrium at the so-called " transition-point," 95-4°, and opposite change below and above. This comparison with fusion introduces a second notion, that of the " triple-point," this being in the melting-phenomenon the only temperature at which solid, liquid and vapour are in equilibrium, in other words, where three phases of one substance are co-existent. This temperature is somewhat different from the ordinary melting-point, the latter corresponding to atmo- spheric pressure, the former to the maximum vapour-pressure; and so we come to a third relation for polymorphism. Just as the melting-point changes with pressure, the transition-point also changes; even the same quantitative relation

holds for both, as L. J. Reicher proved with sulphur: aT/aP = A1T/9, v being the change in volume which accompanies the change from rhombic to prismatic sulphur, and q the heat absorbed. Both formula and experiment proved that an increase of pressure of one atmosphere elevated the transition point for about 0-04°. The same laws apply to cases of more complicated nature, and one of them, which deserves to be pursued further, is the mutual transformation of cyanuric acid, C3H3N3O3, cyanic acid, CHNO, and cyamelide (CHNO) ; the first corresponding to prismatic sulphur, stable at higher temperatures, the last to rhombic,*

the equilibrium-symbol being: cyamelide

150″

cyanuric acid;

the cyanic acid corresponds to sulphur vapour, being in equi- librium with either cyamelide or cyanuric acid at a maximum pressure, definite for each temperature.

A second law for these mutual transformations is that when they take place without loss of homogeneity, for example, in the liquid state, the definite transition point disappears and the change is gradual. This seems to be the case with molten sulphur, which, when heated, becomes dark-coloured and plastic; and also in the case of metals, which obtain or lose magnetic properties without loss of continuous structure. At the same time, however, the transition point sometimes reappears even in the liquid

state; in such cases two layers are formed, as has been recently observed with sulphur, and by F. M. Jager in complicated organic compounds. Thus the introduction of heterogeneity, or the appearance of a new phase, demands the existence of a fixed temperature of transformation.

On the basis of the relation between physical phenomena and thermodynamical laws, properties of the polymorphous compounds may be predicted. The chief consideration here is that the stable form must have the lower vapour pressure, otherwise, by distillation, it would transform in opposite sense. From this it follows that the stable form must have the higher melting-point, since at the melting-point the vapour of the solid and of the liquid have the same pressure. Thus prismatic sulphur has a higher melting-point (120) than the rhombic form (116°), and it is even possible to calculate the

difference theoretically from the thermodynamic relations. A third consequence is that the stable form must have the smallei solubility: J. Meyer and J. N. Bronstedt found that at 25°, 10 c.c. of benzene dissolved 0-25 and p-i8 gr. of prismatic and rhombic sulphur respectively. It can be easily seen that this ratio, according to Henry's law, must correspond to that of vapour-pressures, and so be independent of the solvent; in fact, in alcohol the figures are 0-0066 and 0'0052. Recently Hermann Walther Nernst has been able to deduce the transition- point in the case of sulphur from the specific heat and the heat developed in the transition only. This best studied case shows that a number of mutual relations are to be found between the properties of two modifications when once the phenomenon of mutual transformation is accessible.

In ordinary isomers indications of mutual transformation often occur; and among these the predominant fact is that denoted as tautomerism or pseudomerism. It exhibits itself in the peculiar behaviour of some organic compounds containing the group CCOC, e.g. CH3COCHXCO2C2H5, derivatives of acetoacetic ester. These compounds generally behave as ketones; but at the same time they may act as alcohols, i.e. as if containing the OH group; this leads to the formula H 3 C-C(OH): CX-C02C2H5. In reality such tautomeric com- pounds are apparently a mixture of two isomers in equilibrium, and indeed in some cases' both forms have been isolated; then one speaks of desmotropy (Gr. Secr/ws, a bond or link, and rpcnrri, a turn or change). Nevertheless, the relations obtained in reversible cases such as sulphur have not yet found applica- tion in the highly interesting cases of ordinary irreversible isomerism.

A further step in this direction has been effected by the intro- duction of reversibility into a non-reversible case by means of a catalytic agent. The substance investigated was acetaldehyde, C2H4O, in its relation to paraldehyde, a polymeric modification. The phenomena were first observed without mutual transforma- tion, aldehyde melting at —11 8°, paraldehyde at 13°, the only mutual influence being a lowering of melting-point, with a minimum at- 1 20° in the eutectic point. When a catalytic agent, such as sulphurous acid, is added, which produces a mutual change, the whole behaviour is different; only one melting- point, viz. 7 , is observed for all mixtures; this has been called the " natural melting-point." It corresponds to one of the melt- ing-points in the series without catalytic agents, viz. in that mixture which contains 88 % of paraldehyde and 1 2 % of acetal- dehyde, which the catalytic agent leaves unaffected. Such an introduction of reversibility is also possible by allowing sufficient time to permit the transformation to

be produced by itself. By R. Rothe and Alexander Smith's interesting observations on sulphur, results have been obtained which tend to prove that the melting-point, as well as the appearance of two layers in the liquid state, correspond to unstable conditions. (J. H. van't H.)

ISOTHERM (Gr. tow, equal, and 0ep/«j, heat), a line upon a map connecting places where the temperature is the same at sea-level on the earth's surface. These isothermal lines will be found to vary from- month to month over the two hemispheres, or over local areas, during summer and winter, and their position is modified by continental or oceanic conditions.

ISOXAZOLES, monazole chemical compounds corresponding to furfurane, in which the ˆCH group adjacent to the oxygen atom is replaced by a nitrogen atom, and therefore they contain

HC=N X the ring system I ~)>0. They may be prepared

HC = CH'

by the elimination of water from the monoximes of /3-diketones, jS-ketone aldehydes or oxymethylene ketones (L. Claisen, Ber., 1801, 24, p. 3906), the general reaction proceeding according to the equation

R-CO-CH 2 -COR + H 2 N-OH=2H 2 + RC = N v

I > (Hr=r/i

>0. HC=Cˆ-R

W. Dunstan and T. S. Dymond (Jour. Chem. Soc, 1891, 49, p. 410) have also prepared isoxazoles by the action of alkalis on nitroparaffins, but have not been able to obtain the parent substance. Those isoxazoles in which the carbon atom adjacent to nitrogen is substituted are stable compounds, but if this is not the case, rearrangement of the molecule takes place and nitriles are formed. The isoxazoles are feebly basic.

The isoxazolones are the keto derivatives of the as yet unknown dihydroisoxazole, and are compounds of strongly acid nature, decomposing the carbonates of the alkaline earth metals and forming

salts with metals and with ammonia. Their constitution is not yet definitely fixed and they may be regarded as derived from one of the three types

CH 2 -CO N HC-CCK HC = C(OH) v

I) > 0; ..!.,,. > 0; I > 0

CH = N / HC-NH/ HC = N

By the action of nitrous acid on the oxime of o-aminobenzophenone

as a-phenyl indoxazene, C 6 H 4 <ˆ j] > N , is obtained ; this is a de-

O rivative of benzisoxazole.

ISRAEL (Hebrew for " God strives " or " rules "; see Gen. xxxii. 28; and the allusion in Hosea xii. 4), the national designa- tion of the Jews. Israel was a name borne by their ancestor Jacob the father of the twelve tribes. For some centuries the term was applied to the northern kingdom, as distinct from Judah, although the feeling of national unity extended it so as to include both. It emphasizes more particularly the position of the Hebrews as a religious community, bound together by common aims and by their covenant-relation with the national God, Yahweh.

See further Jacob, Hebrew Language, Hebrew Religion, Jews : History and Palestine.

ISRAELI, ISAAC BEN SOLOMON (gth-ioth centuries), Jewish physician and philosopher. A contemporary of Seadiah (q.v.), he was born and passed his life in North Africa. He died c. 950. At Kairawan, Israeli was court physician; he wrote several medical works in Arabic, and these were afterwards trans- lated into Latin. Similarly his philosophical writings were translated, but his chief renown was in the circle of Moslem authors.

ISRAELS, JOSEF (1824-), Dutch painter, was born at Groningen, of Hebrew parents, on the 27th of January 1824. His father intended him to be a man of business, and it was only after a determined struggle that he was allowed to enter on an artistic career. However, the attempts he made under the guid- ance of two second-rate painters in his native town — Buys and van Wicheren — while still working under his father as a stock- broker's clerk, led to his being sent to Amsterdam, where he became a pupil of Jan Kruseman and attended the drawing class at the academy. He then spent two years

in Paris, working inPicot's studio, and returned to Amsterdam. There he remained till 1870, when he moved to The Hague for good. Israels is justly regarded as one of the greatest of Dutch painters. He has often been compared to J. F. Millet. As artists, even more than as painters in the strict sense of the word, they both, in fact, saw in the life of the poor and humble a motive for expressing with peculiar intensity their wide human sympathy; but Millet was the poet of placid rural life, while in almost all Israels' pictures we find some piercing note of woe. Duranty said of them that " they were painted with gloom and suffering."

He began with historical and dramatic subjects in the romantic style of the day. By chance, after an illness, he went to recruit his strength at the fishing-town of Zandvoort near Haarlem, and there he was struck by the daily tragedy of life. Thenceforth he was possessed by a new vein of artistic expression, sincerely realistic, full of emotion and pity. Among his more important subsequent works are " The Zandvoort Fisherman " (in the Amsterdam gallery), " The Silent House " (which gained a gold medal at the Brussels Salon, 1858) and " Village Poor " (a prize at Manchester). In 1862 he achieved great success in London with his " Shipwrecked," purchased by Mr Young, and " The Cradle," two pictures of which the Athenaeum spoke as " the most touching pictures of the exhibi- tion." We may also mention among his maturer works " The Widower " (in the Mesdag collection), " When we grow Old " and " Alone in the World " (Amsterdam gallery), " An Interior " (Dordrecht gallery), "A Frugal Meal" (Glasgow museum), " Toilers of the Sea," "A Speechless Dialogue," " Between the Fields and the Seashore," " The Bric-a-brac Seller " (which gained medals of honour at the great Paris Exhibition of 1900). " JDavid Singing before Saul," one of his latest works, seems to hint at a return on the part of the venerable artist to the Rembrandtesque note of his youth. As a water-colour painter and etcher he produced a vast number of works, which, like his oil paintings, are full of deep feeling. They are generally treated in broad masses of light and shade, which give prominence to the principal subject without any neglect of detail.

See Jan Veth, Mannen of Beteckenis: Jozef Israels; Chesneau, Peintres francais et Strangers; Ph. Zilcken, Peintres hollandais modernes (1893); Dumas, Illustrated Biographies of Modern Artists (1882-1884); J. de Meester, in Max Rooses' Dutch Painters of the Nineteenth Century (1898); Jozef Israels, Spain: the Story of a Journey (1900).

ISSACHAR (a Hebrew name meaning apparently " there is a hire,"

or " reward "), Jacob's ninth " son," his fifth by Leah; also the name of a tribe of Israel. Slightly differing explanations of the reference in the name are given in Gen. xxx. 16 (J) and v. 18 (E). 1 The territory of the tribe (Joshua xix. 17-23) lay to the south of that allotted to Zebulun, Naphtali, Asher and Dan, and included the whole of the great plain of Esdraelon, and the hills to the east of it, the boundary in that direction extending from Tabor to the Jordan, apparently along the deep gorge of Wadi el Bireh. In the rich territory of Issachar, traversed by the great commercial highway from the Mediterranean and Egypt to Bethshean and the Jordan, were several important towns which remained in the hands of the Canaanites for some time (Judges i. 2 7) , separating the tribe from Manasseh. Although Issachar is mentioned as having taken some part in the war of freedom under Deborah (Judges v. 15), it is impossible to misunderstand the reference to its tributary condition in the blessing of Jacob (Gen. xlix. 14 seq.), or the fact that the name of this tribe is omitted from the list given in Judges i. of those who bestirred themselves against the earlier inhabitants of the country. In the " blessing upon Zebulun and Issachar " in Deut. xxxiii. 18 seq., reference is made to its agricultural life in terms suggesting that along with its younger, but more successful " brother," it was the guardian of a sacred mountain (Carmel, Tabor?) visited periodically for sacrificial feasts.

ISSEDONES, an ancient people of Central Asia at the end of the trade route leading north-east from Scythia (q.v.), described by Herodotus (iv. 26). The position of their country is fixed as the Tarym basin by the more precise indications of Ptolemy, who tells how a Syrian merchant penetrated as far. as Issedon. They had their wives in common and were accustomed to slay the old people, eat their flesh and make cups of their skulls. Such usages survived among Tibetan tribes and make it likely that the Issedones were of Tibetan race. Some of the Issedones seem to have invaded the country of the Massa- getae to the west, and similar customs are assigned to a section of these. (E. H. M.)

1 On the origin of the name, see the article by H. W. Hogg, Ency. Bib. col. 2290; E. Meyer, Israeliten, p. 536 seq.

ISSERLEIN, ISRAEL (d. 1460), German Talmudist. His fame attracted many students to Neustadt, and his profound learning did

much to revive the study of the original Rabbinic authorities. After the publication of the Code of Joseph Qaro (q.v.) the decisions of Isserlein in legal matters were added in notes to that code by Moses Isserles. His chief works were Terumath ha-Deshen (354 decisions) and Peasqim u-kethafiim (267 decisions) largely on points of the marriage law.

ISSERLES, MOSES BEN ISRAEL (c. 1520-1572), known as Rema, was born at Cracow and died there in 1572. He wrote commentaries on the Zohar, the " Bible of the Kabbalists," but is best known as the critic and expander of the Shulhan Aruch of Joseph Qaro (Caro) (?.t>.). His chief halakhic (legal) works were Darke Moshe and Mappah. Qaro, a Sephardic (Spanish) Jew, in his Code neglected Ashkenazic (German) customs. These deficiencies Isserles supplied, and the notes of Rema are now included in all editions of Qaro's Code.

ISSOIRE, a town of central France, capital of an arrondissement in the department of Puy-de-D6me, on the Couze, near its junction with the Allier, 22 m. S.S.E. of Clermont-Ferrand on the Paris-Lyon-Mediterranee railway to Nimes. Pop. (190,6) 5274. Issoire is situated in the fertile plain of Limagne. The streets in the older part of the town are narrow and crooked, but in the newer part there are several fine tree-shaded pro- menades, while a handsome boulevard encircles the town. The church of St Paul or St Austremoine built on the site of an older chapel raised over the tomb of St Austremoine (Stremonius) affords an excellent specimen of the Romanesque architecture of Auvergne. Issoire is the seat of a sub-prefect; its public institutions include tribunals of first instance and commerce and a communal college. Brewing, wool-carding and the manufacture of passementerie, candles, straw hats and woollen goods are carried on. There is trade in lentils and other agri- cultural products, in fruit and in wine.

Issoire (1 ciodurum) is said to have been founded by the Arverni, and in Roman times rose to some reputation for its schools. In the 5th century the Christian community established there by Stremonius in the 3rd century was overthrown by the fury of the Vandals. During the religious wars of the Reforma- tion, Issoire suffered very severely. Merle, the leader of the Protestants, captured the town in 1574, and treated the inhabitants with great cruelty. The Roman Catholics retook it in 1577, and the ferocity of their retaliation may be inferred from the inscription " Id fut Issoire " carved on a pillar which was raised on the site of the town. In the contest between the Leaguers and Henry IV., Issoire sustained further sieges, and never

wholly regained its early prosperity.

ISSOUDUN, a town of central France, capital of an arrondisse- ment in the department of Indre, on the right bank of the Theols, 17 m. N.E. of Chateauroux by rail. Pop. (1906) 10,566. Among the interesting buildings are the church of St Cyr, combining various architectural styles, with a fine porch and window, and the chapel of the Hotel Dieu of the early 16th century. Of the fortifications with which the town was formerly surrounded, a town-gate of the 16th century and the White Tower, a lofty cylindrical building of the reign of Philip Augustus, survive. Issoudun is the seat of a sub-prefecture, and has tribunals of first instance and of commerce, a chamber of arts and manu- factures and a communal college. The industries, of which the most important is leather-dressing, also include malting and brewing and the manufacture df bristles for brushes and parch- ment. Trade is in grain, live-stock, leather and wine.

Issoudun, in Latin Exoldunum or Uxellodunum, existed in and before Roman times. In 1 195 it was stoutly and successfully defended by the partizans of Richard Coeur-de-Lion against Philip Augustus, king of France. It has suffered severely from fires. A very destructive one in 1651 was the result of an attack on the town in the war of Fronde; Louis XIV. rewarded its fidelity to him during that struggle by the grant of several privileges.

ISSYK-KUL, also called Tuz-Kul, and by the Mongols Temnrtu-nor , a lake of Central Asia, lying in a deep basin (5400 ft.

above sea-level), between the Kunghei Ala-tau and the Terskei Ala-tau, westward continuations of the Tian-shan mountains, and extending from 76 10′ to 78 20′ E. The length from W.S.W. to E.N.E. is 115 m. and the breadth 38 m., the area being estimated at 2230 sq. m. The name is Kirghiz for ” warm lake,” and, like the Chinese synonym She-hai, has reference to the fact that the lake is never entirely frozen over. On the south the Terskei Ala-tau do not come down so close to the shore as the mountains on the north, but leave a strip 5 to 13 m. broad. The margins of the lake are overgrown with reeds. The water is brackish. Fish are remarkably abundant, the prncipal species being carp.

It was by the route beside this lake that the tribes {e.g. Yue-chi) driven from China by the Huns found their way into the Aralo-Caspian basin in the end of the 2nd century. The Ussuns or Uzuns settled on the lake and built the town of Chi-gu, which still existed in the 5th century. It is to Hsttan-tsang, the Chinese Buddhist pilgrim,

that we are indebted for the first account of Issyk-kul based on personal observation. In the beginning of the 14th century Nestorian Christians reached the lake and founded a monastery on the northern shore, indicated on the Catalan map of 1374. It was not till 1856 that the Russians made acquaintance with the district.

ISTAHBANAT, a town and district of Persia in the province of Fars. The district, which is very fertile, extends for nearly 50 m. east and west along the southern shore of the Bakhtegan lake and produces much grain, cotton, good tobacco and excellent fruit, particularly pomegranates and grapes, walnuts and figs. The town is situated in the midst of a plain 12 m. from the eastern corner of the lake and about 100 m. S.E. of Shiraz, and has a population of about 10,000. It occupies the site of the ancient city of Ij, the capital of the old province of Shabankareh, which was captured and partly destroyed by Mubariz ed-din, thefounder of the Muzaffarid dynasty, in 1355. When rebuilt it became known by its present name. Of the old period a ruined mosque and two colleges remain; other mosques and colleges are of recent construction. At the entrance of the town stands a noble chinar (oriental plane), measuring 45 ft. in circumference at 2 ft. from the ground.

ISTHMUS (Gr.tcr0yu6s, neck), a narrow neck of land connecting two larger portions of land that are otherwise separated by the sea.

ISTRIA (Ger. Istrien), a margraviate and crownland of Austria, bounded N. by the Triestine territory, Gorz and Gradisca, and Carniola, E. by Croatia and S. and W. by the Adriatic; area 1908 sq. m. It comprises the peninsula of the same name (area 1545 sq. m.), which stretches into the Adriatic Sea between the Gulf of Trieste and the Gulf of Quarnero, and the islands of Veglia, Cherso, Lussino and others. The coast line of Istria extends for 267 m., including Trieste, and presents many good bays and harbours. Besides the great Gulf of Trieste, the coast is indented on the W. by the bays of Muggia, Capodistria, Pirano, Porto Quieto and Pola, and on the E. by those of Medo- lino, Arsa, Fianona and Volosca. A great portion of Istria belongs to the Karst region, and is occupied by the so-called Istrian plateau, flanked on the north and east by high mountains, which attain in the Monte Maggiore an altitude of 4573 ft. In the south and west the surface gradually slopes down in undulat- ing terraces towards the Adriatic. The Quieto in the west and the Arsa in the east, neither navigable, are the principal streams. The climate of Istria, although it varies with the varieties of surface, is on the whole warm and dry. The coasts are exposed to the prevailing winds, namely the Sirocco from the south-south- east, and the Bora from the north-east.

Of the total area 33-21% is occupied by forests, 32-09% by pastures, n-2% by arable land, 9-5% by vineyards, 7-21% by meadows and 3-26% by gardens. The principal agricultural products are wheat, maize, rye, oats and fruit, namely olives, figs and melons. Viticulture is well developed, and the best sorts of wine are produced near Capodistria, Muggia, Isola, Parenzo and Dignano, while well-known red wines are made near Refosco and Terrano. The oil of Istria was already famous in Roman times. Cattle-

breeding is another great source of revenue, and the exploitation of the forests gives beech and oak timber (good for shipbuilding), gall-nuts, oak-bark and cork. Fishing, the recovery of salt from the sea-water, and shipbuilding constitute the other principal occupations of the population. Istria had in 1900 a population of 344,173, equivalent t'o 180 inhabitants per square mile. Two- thirds of the population were Slavs and the remainder Italians, while nearly the whole of the inhabitants (99-6%) were Roman Catholics, under the ecclesiastical jurisdiction of three bishops. The local Diet, which meets at Parenzo, and of which the three bishops are members ex-qfficio, is composed of 33 members, and Istria sends 5 deputies to the Reichsrat at Vienna. For adminis- trative purposes the province is divided into 6 districts and an autonomous municipality, Rovigno (pop. 10,205). Other important places are Pola (45,052), Capodistria (10,711), Pin- guente (15,827), Albona (10,968), Isola (7500), Parenzo (9962), Dignano (9684). Castua (17,988), Pirano (i3,339)and Mitterburg

(16,056).

The modern Istria occupies the same position as the ancient Istria or Histria, known to the Romans as the abode of a fierce tribe of Illyrian pirates. It owed its name to an old belief that the Danube (Ister, in Greek) discharged some of its water by an arm entering the Adriatic in that region. The Istrians, protected by the difficult navigation of their rocky coasts, were only sub- dued by the Romans in 1 77 B.C. after two wars. Under Augustus the greater part of the peninsula was added to Italy, and, when the seat of empire was removed to Ravenna, Istria reaped many benefits from the proximity of the capital. After the fall of the Western empire it was pillaged by the Longobardi and the Goths; it was annexed to the Frankish kingdom by Pippin in 789; and about the middle of the 10th century

it fell into the hands of the dukes of Carinthia. Fortune after that, however, led it succes- sively through the hands of the dukes of Meran, the duke of Bavaria and the patriarch of Aquileia, to the republic of Venice. Under this rule it remained till the peace of Campo Formio in 1797, when Austria acquired it, and added it to the north-eastern part which had fallen to her share so early as 1374. By the peace of Pressburg, Austria was in 1805 compelled to cede Istria to France, and the department of Istria was formed; but in 1813 Austria again seized it, and has retained it ever since.

See T. G. Jackson, Dalmatia, the Quarnero and Istria (Oxford,

1887).

ISYLLUS, a Greek poet, whose name was rediscovered in the course of excavations on the site of the temple of Asclepius at Epidaurus. An inscription was found engraved on stone, consisting of 72 lines of verse (trochaic tetrameters, hexameters, ionics), mainly in the Doric dialect. It is preceded by two lines of prose stating that the author was Isyllus, an Epidaurian, and that it was dedicated to Asclepius and Apollo of Malea. It contains a few political remarks, showing general sympathy with an aristocratic form of government; a self-congratulatory notice of the resolution, passed at the poet's instigation, to arrange a solemn procession in honour of the two gods; a paean (no doubt for use in the procession), chiefly occupied with the genealogical relations of Apollo and Asclepius; a poem of thanks for the assistance rendered to Sparta by Asclepius against Philip, when he led an army against Sparta to put down the monarchy. The offer of assistance was made by the god himself to the youthful poet, who had entered the Asclepieum to pray for recovery from illness, and communicated the good news to the Spartans. The Philip referred to is identified with (a) Philip II. of Macedon, who invaded Peloponnesus after the battle of Chaeronea in 338, or (b) with Philip III., who undertook a similar campaign in 218.

W ilamowitz-Mollendorff , who characterizes Isyllus as a " poetaster without talent and a farcical politician," has written an elaborate treatise on him (Kiessling and Mollendorff, Philosophische Unler-suchungen, Heft 9, 1886), containing the text with notes, and essays on the political condition of Peloponnesus and the cult of Asclepius. The inscription was first edited by P. Kavvadias (1885), and by J. F. Baunack in Studien auf dem Gebiete der griechischen und der arischen Spracken (1886).

ITACOLUMITE, the name given to a variety of porous yellow sandstone or quartzose schist, which occurs at Itacolumi, in the

southern portion of Minas Geraes, Brazil. This rock is of interest for two reasons; it is believed to be the source of the diamonds which are found in great numbers in the district, and it is the best and most widely known example of a flexible sandstone. Itacolumite is yellow or pale-brown, and splits readily into thin flat slabs. It is a member of a metamorphic series, being accom- panied by clay-slate, mica schist, hornblende schist and various types of ferriferous schists. In many places itacolumite is really a coarse grit or fine conglomerate. Other quartzites occur in the district, and there is some doubt whether the diamantiferous sandstones are always itacolumites and also as to the exact manner in which the presence of diamond in these rocks is to be accounted for. Some authorities hold that the diamond has been formed in certain quartz veins which traverse the itacolumite. It is clear, however, that the diamonds are found only in those streams which contain the detritus of this rock.

On the split faces of the slabs, scales of greenish mica are visible, but in other respects the rock seems to be remarkably pure. If a piece which is a foot or two long and half an inch thjck be sup- ported at its ends it will gradually bend by its own weight. If it then be turned over it will straighten and bend in the opposite direction. Flakes a millimetre or two thick can be bent between the fingers and are said to give out a creaking sound. It should be noted that specimens showing this property form only a small part of the whole mass of the rock. Flexible focks have also been reported and described from North and South Carolina, Georgia, Delhi, and from the north of England (Durham). They are mostly sandstones or quartzites, but the Durham rock is a variety of the magnesian limestone of that district.

Some discussion has taken place regarding the cause of the flexi- bility. At one time it was ascribed to the presence of thin scales of mica which were believed to permit a certain amount of motion between adjacent grains of quartz. More probably, however it is due to the porous character of the rock together with the inter- locking junctions between the sand grains. The porosity allows interstitial movement, while the hinge-like joints by which the particles are connected hold them together in spite of the displace- ment. These features are dependent to some extent on weathering; as the rocks contain perishable constituents which are removed and leave open cavities in their place, while at the same time additional silica may have been deposited on the quartz grains fitting their irregular surfaces more 'perfectly together. Most of the known flexible rocks

are also fine-grained; in some cases they are said to lose their flexibility after being dried for some time, probably because of the hardening of some interstitial substance, but many specimens kept in a dry atmosphere for years retain this property in a high degree. (J. S. F.)

ITAGAKI, TAISUKE, Count (1837-), Japanese statesman, was born in Tosa in 1837. He distinguished himself originally as one of the soldier politicians who contributed so much to the overthrow of feudalism and the restoration of the administrative power to the throne. After taking a prominent part in subduing the resistance offered by a section of the shogun's feudatories to those changes, he received cabinet rank in the newly organized system. But in 1873 he resigned his portfolio as a protest against the ministry's resolve to refrain from warlike action against Korea. This incident inspired Itagaki with an apprehension that the country was about to pass under the yoke of a bureau- cratic government. He became thenceforth a warm advocate of constitutional systems, though at the outset he does not seem to have contemplated anything like apopular assembly in the English sense of the term, his ideas being limited to the enfranchise- ment of the samurai class. Failing to obtain currency for his radical propaganda, he retired to his native province, and there established a school (the Risshi-sha) for teaching the principles of government by the people, thus earning for himself the epithet of " the Rousseau of Japan." His example found imitators. Not only did pupils flock to Tosa from many quarters, attracted alike by the novelty of Itagaki's doctrines, by his eloquence and by his transparent sincerity, but also similar schools sprang up among the former vassals of other fiefs, who saw themselves excluded from the government. In 1875 no less than seven of these schools sent deputies to hold a convention in Osaka, and for a moment an appeal to force seemed possible. But the states- men in power were not less favourable to constitutional institu- tions than the members of the Aikoku Ko-to (public party of patriots), as Itagaki and his followers called themselves. A con- ference attended by Kido, Okubo, Inouye, Ito, Itagaki and others

entered into an agreement by which they pledged themselves to the principle of a constitutional monarchy and a legislative assembly. Itagaki now accepted office once more. Finding, however, that his colleagues in the administration favoured a much more leisurely rate

of progress than he himself advocated, he once more retired into private life (1876) and renewed his liberal propagandism. It is in the nature of such movements to develop violent phases, and the leaders of the Aikoku-sha (patriotic association), as the agitators now called themselves, not infrequently showed disregard for the preservation of peace and order. Itagaki made the mistake of memorializing the government at the moment when its very existence was im- perilled by the Satsuma rebellion (1877), and this evident disposi- tion to take advantage of a great public peril went far to alienate the sympathies of the cabinet. Recourse was had to legislation in restraint of free speech and public meeting. But repression served only to provoke opposition. Throughout 1879 and 1880 Itagaki'sfollowersevincednolittleskill in employing the weapons of local association, public meetings and platform tours, and in November 1881 the first genuine political party was formed in Japan under the name of Jiyihto, with Itagaki for declared leader. A year later the emperor announced that a parliamentary system should be inaugurated ini8oi, and Itagaki's task might be said to have been accomplished. Thenceforth he devoted himself to consolidating his party. In the spring of 1882, he was stabbed by a fanatic during the reception given in the public park at Gifu. The words he addressed to his would-be assassin were: " Itagaki may perish, but liberty will survive." Once afterwards (1898) he held office as minister of home affairs, and in 1900 he stepped down from the leadership of the Jiyu-to in order that the latter might form the nucleus of the Seiyu-kai organized by Count Ito. Itagaki was raised to the nobility with the title of " count " in 1887. From the year 1900 he retired into private life, devoting himself to the solution of socialistic problems. His countrymen justly ascribe to him the fame of having been the first to organize and lead a political party in Japan.

ITALIAN LANGUAGE. 1 The Italian language is the language of culture in the whole of the present kingdom of Italy, in some parts of Switzerland (the canton of Ticino and part of the Grisons) , in some parts of the Austrian territory (the districts of Trent and Gorz, Istria along with Trieste, and the Dalmatian coast), and in the islands of Corsica 2 and Malta. In the Ionian Islands, likewise, in the maritime cities of the Levant, in Egypt, and more particularly in Tunis, this literary language is extensively maintained through the numerous Italian colonies and the ancient traditions of trade.

The Italian language has its native seat and living source in Middle Italy, or more precisely Tuscany and indeed Florence. For real linguistic unity is far from existing in Italy ; in some respects the variety is less, in others more observable than in other countries

which equally boast a political and literary unity. Thus, for example, Italy affords no linguistic contrast so violent as that presented by Great Britain with its English dialects alongside of the Celtic dialects of Ireland, Scotland and Wales, or by France with the French dialects alongside of the Celtic dialects of Brittany, not to speak of the Basque of the Pyrenees

1 The article by G. I. Ascoli in the 9th edition of the Encyclopaedia Britannica, which has been recognized as a classic account of the Italian language, was reproduced by him, with slight modifications, in Arch, glott. viii. 98-128. The author proposed to revise his article for the present edition of the Encyclopaedia, but his death on the 21st of January 1907 prevented his carrying out this work, and the task was undertaken by Professor C. Salvioni. In the circum- stances it was considered best to confine the revision to bringing Ascoli's article up to date, while preserving its form and main ideas, together with the addition of bibliographical notes, and occasional corrections and substitutions, in order that the results of more recent research might be embodied. The new matter is principally in the form of notes or insertions within square brackets.

- *[In Corsica the present position of Italian as a language of culture is as follows. Italian is only used for preaching in the country churches. In all the other relations of public and civil life (schools, law courts, meetings, newspapers, correspondence, &c), its place is taken by French. As the elementary schools no longer teach Italian but French, an educated Corsican nowadays knows only his own dialect for everyday use, and French for public occasions.]*

and other heterogeneous elements. The presence of not a few Slavs stretching into the district of Udine (Friuli), of Albanian, Greek and Slav settlers in the southern provinces, with the Catalans of Alghero (Sardinia, v. Arch, glott. ix. 261 et seq.), a few Germans at Monte Rosa and in some corners of Venetia, and a remnant or two of other comparatively modern immigra- tions is not sufficient to produce any such strong contrast in the conditions of the national speech. But, on the other hand, the Neo-Latin dialects which live on side by side in Italy differ from each other much more markedly than, for example, the English dialects or the Spanish; and it must be added that, in Upper Italy especially, the familiar use of the dialects is tenaciously retained even by the most cultivated classes of the population. In the present rapid sketch of the forms of speech which occur in modern Italy, before considering the Tuscan or Italian par excellence, the language which has come to be the noble organ of modern national

culture, it will be convenient to discuss (A) dialects connected in a greater or less degree with Neo-Latin systems that are not peculiar to Italy; 3 (B) dialects which are detached from the true and proper Italian system, but form no integral part of any foreign Neo-Latin system; and © dialects which diverge more or less from the true Italian and Tuscan type, but which at the same time can be conjoined with the Tuscan as forming part of a special system of Neo-Latin dialects.

A. Dialects which depend in a greater or less degree on Neo-Latin systems not peculiar to Italy.

1. Franco-Provencal and Provenqal Dialects. — (a) Franco-Provencal (see Ascoli, Arch, glott. iii. 61-120; Suchicr, in Grundriss der roma- nischen Philologie, 2nd ed., i. 755, &c. ; Nigra, Arch, glott. iii. 1 sqq. ; Salvioni, Rendic. istit. lomb., s. ii. vol. xxxvii. 1043 sqq. ; Cerlogne, Dictionnaire die patois valdotain (Aosta, 1907). These occupy at the present time very limited areas at the extreme north-west of the kingdom of Italy. The system stretches from the borders of Savoy and Valais into the upper basin of the Dora Baltea and into the head-valleys of the Oreo, of the northern Stura, and of the Dora Riparia. As this portion is cut off by the Alps from the rest of the system, the type is badly preserved; in the valleys of the Stura and the Dora Riparia, indeed, it is passing away and everywhere yielding to the Piedmontese. The most salient characteristic of the Franco-Provengal is the phonetic phenomenon by which the Latin o, whether as an accented or as an unaccented final, is reduced to a thin vowel (e, i) when it follows a sound which is or has been palatal, but on the contrary is kept intact when it follows a sound of another sort. The following are examples from the Italian side of these Alps : Aosta: travalji, Fr. travailler; zarzi, Fr. charger; enteruzi, Fr. interroger; zevra, Fr. chevre; zir, Fr. cher; gljdce, Fr. glace; vdsze, Fr. vache; alongside of sa, Fr. sel; man, Fr. main; epousa, Fr. epouse; erba, Fr. herbe. Val. So ana: talUr, Fr. tailler; coti-sse, Fr. se coucher; tin, Fr. chien; tivra, Fr. chevre; vatci, Fr. vache; mdnfei, Fr. manche; alongside of aldr, Fr. aller; porti, Fr. porte; amdra, Fr. amere; neva, Fr. neuve. Chiamorio (Val di Lanzo) : la spranssi dla vendeta, sperantia de ilia vindicta. Vlfj ; pansci, pancia. Usseglio: la milragli, muraille. A morphological characteristic is the preservation of that paradigm which is legiti- mately traced back to the Latin pluperfect indicative, although possibly it may arise from a fusion of this pluperfect with the im- perfect subjunctive (amaram, amarem, alongside of habueram, haberem), having in Franco-Provencal as well as in Provengal and in the continental Italian dialects in which it will be met with further on

(C 3, b; cf. B. 2) the function of the conditional. Val Soana : portdro, portdre, portdret ; portdront ; Aosta : dvre = Prov. agra, haberet (see Arch. iii. 31 »). The final t in the third persons of this paradigm in the Val Soana dialect is, or was, constant in the whole conjugation, and becomes in its turn a particular characteristic in this section of the Franco- Provengal. Val Soana: eret, Lat. erat; se'jt, sit; pdrtet, portdvet; portont, portdvgnt; Chiamorio: jiret, erat; ant dit, habent dictum; ejssount jet, habuissent factum; Viu : che s'minget, Ital. che si mangi : Gravere (Val di Susa) : at pensd, ha pensato; avdt, habebat; Giaghone (sources of the Dora Riparia) ; macidvont, mangiavano. — From the valleys, where, as has just been said, the type is disappearing, a few examples of what is still genuine Franco-Provencal may be subjoined: Civreri (the name of a mountain between the Stura and the Dora Riparia), which, according to the regular course of evolution, presupposes a Latin Capraria (cf. maneri, maniera, even in the Chiamorio dialect); tarasti (ciarasti), carestia, in the Viu dialect; and tintd, cantare, in that of Usseglio. From Chiamorio, li tins, i tempi, and chejehes birbes, alcune (qua lche) birbe, are worthy of mention on account of the 3 [It may be asked whether we ought not to include under this section the Vegliote dialect (Veglioto), since under this form the Dalmatian dialect (Dalmatico) is spoken in Italy. But it should be remembered that in the present generation the_ Dalmatian dialect has only been heard as a living language at Veglia.]

final s. [In this connexion should also be mentioned the Franco-Provencal colonies of Transalpine origin, Faeto and Celle, in Apulia (v. Morosi, Archivio glotlologico, xii. 33-75), the linguistic relations of which are clearly shown by such examples as talij, Ital. tagliare; bahij, Ital. bagnare; side by side with tantd, Ital. cantare; hid, Ital. levare.]

(b) Provencal (see La Lettura i. 716-717, Romanische Forschungen xxiii. 525-539). — Farther south, but still in the same western extremity of Piedmont, phenomena continuous with those of the Maritime Alps supply the means of passing from the Franco-Provencal to the Provencal proper, precisely as the same transition takes place beyond the Cottian Alps in Dauphine almost in the same latitude. On the Italian side of the Cottian and the Maritime Alps the Franco- Provencal and the Provencal are connected with each other by the continuity of the phenomenon t (a pure explosive) from the

Latin c before a. At Oulx (sources of the Dora Riparia), which seems, however, to have a rather mixed dialect, there aiso occurs the important Franco-Provencal phenomenon of the surd interdental (English th in thief) instead of the surd sibilant (for example ithi = Fr. ici). At the same time

2. Ladin Dialects (Ascoli, Arch, glott. i., iv. 342 sqq., vii. 406 sqq. ; Gartner, Rdtoromanische Grammatik (Heilbronn, 1883), and in Grundriss der romanischen Philologie, 2nd ed., i. 608 sqq.; Salvioni, Arch, glott. xvi. 219 sqq.). — The purest of the Ladin dialects occur on the northern versant of the Alps in the Grisons (Switzerland), and they form the western section of the system. To this section also belongs both politically and in the matter of dialect the valley of Miinster (Monastero) ; it sends its waters to the Adige, and might indeed consequently be geographically considered Italian, but it slopes towards the north. In the central section of the Ladin zone there are two other valleys which likewise drain into tributaries of the Adige, but are also turned towards the north, — the valleys of the Gardena and Gadera, in which occurs the purest Ladin now extant in the central section. The valleys of Miinster, the Gardena and the Gadera may thus be regarded as inter-Alpine, and the ques- tion may be left open whether or not they should be included even geographically in Italy. There remain, however, within what are strictly Italian limits, the valleys of the Noce, the Avisio, the Corde- vole, and the Boite, and the upper basin of the Piave (Comelico), in which are preserved Ladin dialects, more or less pure, belonging to the central section of the Ladin zone or belt. To Italy belongs, further, the whole eastern section of the zone composed of the Friulian territories. It is by far the most populous, containing about 500,000 inhabitants. The Friulian region is bounded on the north by the Carnic Alps, south by the Adriatic, and west by the eastern rim of the upper basin of the Piave and the Livenza; while on the east it stretches into the eastern versant of the basin of the Isonzo, and, further the ancient dialect of Trieste was itself Ladin {Arch, glott. x. 447 et seq.). The Ladin element is further found in greater or less degree throughout an altogether Cis-Alpine " amphizone," which begins at the western slopes of Monte Rosa, and is to be noticed more particularly in the upper valley of the Ticino and the upper valley of the Liro and of the Mera on the Lombardy versant, and in the Val Fiorentina and central Cadore on the Venetian versant.

The Ladin element is clearly observable in the most ancient examples of the dialects of the Venetian estuary {Arch. i. 448-473). The main characteristics by which the Ladin type is determined may be summarized as follows: (1) the guttural of the formulae c + a and g

+a passes into a palatal; (2) the / of the formulae pi, cl, &c, is preserved; (3) the s of the ancient terminations is preserved; (4) the accented e in position breaks into a diphthong; (5) the accented in position breaks into a diphthong ; (6) the form of the diphthong which comes from short accented or from the o of position is ue (whence He, b) ; (7) long accented e and short accented i break into a diphthong, the purest form of which is sounded ei; (8) the accented a tends, within certain limits, to change into e, especially if preceded by a palatal sound; (9) the long accented u is represented by ii. These characteristics are all foreign to true and genuine Italian. Cam, carne; spelunta, spelunca; clefs, claves; fuormas, formae; infiern, infernu ; ordi, hordeu ; mod, modu ; plain, plenu ; pail, pilu; quael, quale; pur, puru — may be taken as examples from the Upper Engadine (western section of the zone). The following are examples from the central and eastern sections on the Italian versant : —

a. Central Section. — Basin of the Noce : examples of the dialect of Fondo: tavel, capillu; pesiador, piscatore; pluevia, pluvia (plovia) ; pluma (dial, of Val de Rumo : plbvia, pliimo) ; vtcla, vetula ; (antes, cantas. The dialects of this basin are disappearing. — Basin of the Avisio: examples of the dialect of the Val di Fassa: tarn, carne; t'eier, cadere (cad-jere); vdta, vacca; forta, furca; gl'ezia. {gezia), ecclesia; oeglje {oeje), oculi; tans, canes; rdmes, rami; teila, tela; niif, nive; coessa, coxa. The dialects of this basin which are farther west than Fassa are gradually being merged in the Veneto-Tridentine dialects. — Basin of the Cordevole: here the district of Livinal-Lungo (Buchenstein) is Austrian politically, and that of Rocca dAgordo and Laste is Italian. Examples of the dia- lect of Livinal-Lungo: tarie, Ital. caricare; iante, cantatus; ogle, oculu; tans, canes; taveis, capilli; vierm, verme; ftioc, focu; avei, habere; nei, nive. — Basin of the Boite: here the district of Ampezzo (Heiden) is politically' Austrian, that of Oltrechiusa Italian. Examples of the dialect of Ampezzo are tasa, casa; tandera, candela; fortes, furcae, pi.; sentes, sentis. It is a decadent form. — Upper Basin of the Piave: dialect of the Comelico: tSsa, casa; ten (can), cane; talje, caligariu; bos, boves; noevo, novu; loego, locu.

b. Eastern Section or Friulian Region. — Here there still exists a flourishing " Ladinity," but at the same time it tends towards Italian, particularly in the want both of the e from a and of the « (and consequently of the 0). Examples of the Udine variety: tarr, carro ; iaval, caballu ; iastiel, castellu ; forte, furca ; clar, claru ; glaq, glacie; plan, planu; colors, colores; lungs, longi, pi.; devis, debes; vidiel, vitello; fieste, festa; puess, possum; cuett, coctu; udrdi, hordeu. — The most ancient specimens of the Friulian dialect belong

to the 14th century (see Arch. iv. 188 sqq.).

B. Dialects which are detached from the true and proper Italian system, but form no integral part of any foreign Neo-Latin system.

1. Here first of all is the extensive system of the dialects usually called Gallo- Italian, although that designation cannot be considered sufficiently distinctive, since it would be equally applicable to the Franco-Provencal (A. 1) and the Ladin (A. 2). The system is sub-divided into four great groups — {a) the Ligurian, {b) the Piedmontese, {c) the Lombard and (d) the Emilian — the name furnishing on the whole sufficient indication of the localization and limits. — These groups, considered more particularly in their more pronounced varieties, differ greatly from each other; and, in regard to the Ligurian, it was even denied that it belongs to this system at all (see Arch. ii. Ill sqq.). — Characteristic of the Piedmontese, the Lombard and the Emilian is the continual elision of the unaccented final vowels except a {e.g. Turinese 07, oculu; Milanese vgq, voce; Bolognese vid, Ital. vite), but the Ligurian does not keep them company {e.g. Genoese bggu, oculu; voze, voce). In the Piedmontese and Emilian there is further a tendency to eliminate the protonic vowels-?— a tendency much more pronounced in the second of these groups than in the first {e.g. Pied, dne, danaro ; viin, vicino ; fn64, finocchio; Bolognese tpra, disperato). This phenomenon involves in large measure that of the prothesis of a; as, e.g. in Piedmontese and Emilian armor, rumore; Emilian alvdr, levare, &c. U for the long accented Latin u and 6 for the short accented Latin o (and even within certain limits the short Latin 6 of position) are common to the Piedmontese, the Ligurian, the Lombard and the northernmost section of the Emilian: e.g., Turinese, Milanese and Piacentine diir, and Genoese diiu, duro; Turinese and Genoese move, Parmigiane mover, and Milanese mof, muovere; Piedmontese dorm, dorme; Milanese volta, volta. Ei for the long accented Latin e and for the short accented Latin i is common to the Piedmontese and the Ligurian, and even extends over a large part of Emilia : e.g. Turinese and Genoese avei, habere, Bolognese aveir; Turinese and Genoese beive, bibere Bolognese neiv, neve. In Emilia and part of Piedmont ei occurs aiso in the formulae en, ent, emp; e.g. Bolognese and Modenese bein, solamcint. In connexion with these examples, there is also the Bolognese fein, Ital. fine, representing the series in which e is derived from an i followed by n, a phenomenon which occurs, to a greater or less extent throughout the Emilian dialects ; in them

also is found, parallel with the ei from e, the ou from o : Bolognese udour, Ital. odore; famous, Ital. famoso; louv, lupu. The system shows a repugnance throughout to ie for the short accented Latin e (as it occurs in Italian friede, &c.) ; in other words, this diphthong has died out, but in various fashions; Piedmontese and Lombard dec;, dieci; Genoese deze (in some corners of Liguria, however, occurs dieze) ; Bolognese die , old Bolognese, diese. The greater part of the phenomena indicated above have " Gallic " counterparts too evident to require to be specially pointed out. One of the most important traces of Gallic or Celtic reaction is the reduction of the Latin accented a into e (a, &c), of which phenomenon, however, no certain indications have as yet been found in the Ligurian group. On the other hand it remains, in the case of very many of the Piedmontese dialects, in the e of the infinitives of the first conjugation: porte, portare, &c. ; and numerous vestiges of it are still found in Lombardy {e.g. in Bassa Brianza: andae, andato; guardae, guardato; sae, sale; see Arch. i. 296-298, 536). Emilia also preserves it in very extensive use: Modenese ander, andare; ariveda, arrivata; pec, pace; Faenzan parte, parlare and parlato; parleda, parlata; ches, caso; &c. The phenomenon, in company with other Gallo- Italian and more specially Emilian characteristics extends to the valley of the Metauro, and even passes to the opposite side of the Apennines, spreading on both banks of the head stream of the Tiber and through the valley of the Chiane: hence the types artrover, ritrovare, porteto, portato, &c, of the Perugian and Aretine dialects (see infra C. 3, b). In the phenomenon of 6 passing into e (as indeed, the Gallo-Italic evolution of other Latin vowels) special distinctions would require to be drawn between bases in which a (not standing in position) precedes a non-nasal consonant {e.g. amdto), and those which have a before a nasal : and in the latter case there would be a non-positional subdivision {e.g. fame, pane) and a positional one {e.g. qudnto, amdndo, cdmpo) ; see Arch. i. 293 sqq. This leads us to the nasals, a category of sounds comprising other Gallo-Italic characteristics. There occurs more or less widely, throughout all the sections of the system, and in different gradations, that " velar " nasal in the end of a syllable {pan, man ; tanta, mont) 1 which may be weakened into a simple nasalizing of a vowel {pa, &c.) or even grow completely inaudible (Bergamese pa, pane; padru, padrone; iep, tempo; met, mente; mut, monte; pHt, ponte; piUa, punta, i.e. " puncta "), where Celtic and especially Irish analogies and even the frequent use of t for nt, &c, in ancient Um- brian orthography occur to the mind. Then we have the faucal n by which the Ligurian and

the Piedmontese {lana liina, &c.) are con- nected with the group which we call Franco-Provencal (A. 1). — We pass on to the ” Gallic ” resolution of the nexus ct {e.g. facto, fajto, fajtjo. fait, fat ; tecto, tejto, tejtjo, teit, tec) which invariably occurs in the Piedmontese, the Ligurian and the Lombard: Pied./3n)i is more sparing in this respect; and still more so is the Emilian. In the Piedmontese and in the Alpine dialects of Lombardy is also found that other purely Gallic resolution of the guttural between two vowels by which we have the types brdja, mania, over against the Ligurian brdga, mdnega, braca, manica. Among the phonetic phenomena peculiar to the Ligurian is a con tinual reduction (as also in Lombardy and part of Piedmont) of / between vowels into r and the subsequent dropping of this r at the end of words in the modern Genoese; just as happens also with the primary r : thus

1 As a matter of fact the ” velar ” at the end of a word, when preceded by an accented vowel, is found also in Venetia and Istria. This fact, together with others (v. Kritischer Jahresbericht iiber die Fortschritte der roman. Philol. vii. part i. 130), suggests that we ought to assume an earlier group in which Venetian and Gallo-Italian formed part of one and the same group. In this connexion too should be noted the atonic pronoun she (Ital. ci-a. lui, a lei, a loro), which is found in Venetian, Lombard, North-Emilian and Ligurian.

*the following forms in the plural and 2nd person singular: old Piedmontese drayp pi. of drap, Ital. drappo; man,_ meyn, Ital. mano, -i; long, loyng, Ital. lungo, -ghi; Genoese, kail, ken, Ital. cane, -i ; bun, buih, Ital. buono, -i ; Bolognese, far, fir, Ital. ferro, -i; peir, pir, Ital. pero, -i. zop, zxip, Ital. zoppo, -i; louv, luv, Ital. lupo, -i; vedd, vi, Ital. io vedo, tu vedi; vojj, vii, Ital. io voglio, tu vuoi; Milanese quest, quist, Ital. questo, -i, and, in the Alps of Lombardy, pal, pel, Ital. palo, -i; red, rid, Ital. rete, -i; cor, cor, Ital. cuore, -i; ors, ilrs, Ital. orso, -i; law, lew, Ital. io lavo, tu lavi ; mat, mil, Ital. io”metto, tu metti ; mow mow, Ital. io muovo, tu muovi ; cor, cur, Ital. io corro, tu corri. [Vicentine porno, pumi, Ital. porno, -i; pero, pieri— *piri, Ital. pero, -i; v. Arch. i. 540-541; ix. 235 et seq., xiv. 329-330]. — Among morphological peculiarities the first place may be given to the Bolognese sipa {seppa), because, thanks to Dante and others, it has acquired great literary celebrity. It really signifies “sia” (sim, sit), and is an analogical form fashioned on aepa, a legitimate continuation of the corresponding forms of the other auxiliary (habeam, habeat), which is still heard in ch’me aepa purtae, ch’lu aepa purtae, ch’io abbia portato, ch’egli abbia portato. Next may be noted the 3rd person singular in p of the perfect of esse and of the first conjugation in the Fori! dialect {fop, fu; man dep, mando; &c).*

This also must be analogical, and due to a legitimate ep, ebbe (see Arch. ii. 401; and compare fobbe, fu, in the dialect of Camerino, in the province of Macerata, as well as the Spanish analogy of tuve estiive formed after hube). Characteristic of the Lombard dialect is the ending -fin the 1st person sing. pres. indie, {mi a porti, Ital. io porto) ; and of Piedmontese, the ejea, as indicating the subjunctive imperfect {portejea, Ital. portassi) the origin of which is to be sought in imperfects of the type staesse, faisse reduced normally to stejg, fejc-. Lastly, in the domain of syntax, may be added the tendency to repeat the pronoun {e.g. ti te cdntet of the Milanese, which really is tu tu cdntas-iu, equivalent merely to " cantas "), a tendency at work in the Emilian and Lombard, but more particularly pronounced in the Piedmontese. With this the corresponding tendency of the Celtic languages has been more than once and with justice compared; here it may be added that the Milanese nun, apparently a single form for " noi," is really a com- pound or reduplication in the manner of the ni-ni, its exact counter- part in the Celtic tongues. [From Lombardy, or more precisely, from the Lombardo- Alpine region extending from the western slopes of Monte Rosa to the St Gotthard, are derived the Gallo-Italian dialects, now largely, though not all to the same extent, Sicilianized, from the Sicilian communes of Sanfratello, Piazza-Armerina, Nicosia, Aidone, Novara and Sperlinga (v. Arch, glott. viii. 304-316, 406-422, xiv. 436-452; Romania, xxviii. 409-420; Memorie del- I'lstituto lombardo, xxi. 255 et seq.). The dialects of Gombitelli and Sillano in the Tuscan Apennines are connected with Emilia {Arch, glott. xii. 309-354). And from Liguria come those of Carloforte in Sardinia, as also those of Monaco, and of Mons, Escragnolles and Biot in the French departments of Var and Alpes Maritimes {Revue de linguistique, xiii. 308)]. The literary records for this group go back as far as the 12th century, if we are right in considering as Piedmontese the Gallo-Italian Sermons published and annotated by Foerster {Romanische Sliidien, iv. 1-92). But the documents published by A. Gaudenzi {Dial, di Bologna, 168-172) are certainly Piedmontese, or more precisely Canavese, and seem to belong to the 13th century. The Chieri texts date from 132 1 {Miscellanea difilol. e linguistica, 345-355), and to the 14th century also belongs the Grisostomo {Arch, glott. vii. 1-120), which represents the old Pied- montese dialect of Pavia {Bollett. della Soc. pav. di Storia Patria, ii. 193 et seq.). The oldest Ligurian texts, if we except the " con- trasto" in two languages of Rambaud de Vaqueiras (12th century v. Crescini, Manualetto provenzale, 2nd ed., 287-291), belong to the first decades of the 14th century {Arch, glott. xiv. 22 et seq., ii. 161-312, x. 109-140, viii. 1-97). Emilia has manuscripts going back to the first or second half of the 13th

century, the Parlamenti of Guido Fava (see Gaudenzi, op. cit. 127-160) and the Regola dei servi published by G. Ferraro (Leghorn, 1875). An important Emilian text, published only in part, is the Mantuan version of the De proprietatibus rerum of Bartol. Anglico, made by Vivaldo Belcalzer in the early years of the 14th century {v. Cian. Giorn, stor. della lelteratura italiana, supplement, No. 5, and cf. Rendiconti Islituto Lombardo, series ii. vol. xxxv. p. 957 et seq.). For Modena also there are numerous documents, starting from 1327. For western Lombardy the most ancient texts (13th century, second half) are the poetical compositions of Bonvesin de la Riva and Pietro da Bescape, which have reached us only in the 14th-century copies. For eastern Lombardy we have, preserved in Venetian or Tuscan versions, and in MSS. of a later date, the works of Gerardo Patecchio, who lived at Cremona in the first half of the 13th century. Bergamasc literature is plentiful, but not before the 14th century {v. Studi medievali, i. 281-292; Giorn. stor. della lett. ital. xlvi. 351 et seq.).

2. Sardinian Dialects. 2 — These are three — the Logudorese or

2 [The latest authorities for the Sardinian dialects are W. Meyer-Liibke and M. Bartoli, in the passages quoted by Guarnerio in his " II sardo e il c6rso in una nuova classificazione delle lingue romanze " {Arch, glott. xvi. 491-516). These scholars entirely _ dissociate Sardinian from the Italian system, considering it as forming in itself

central, the Campidanese or southern and the Gallurese-or northern. The third certainly indicates a Sardinian basis, but is strangely disturbed by the intrusion of other elements, among which the Southern Corsican (Sartene) is by far the most copious. The other two are homogeneous, and have great affinity with each other; the Logudorese comes more particularly under consideration here. — The pure Sardinian vocalism has this peculiarity that each accented vowel of the Latin appears to be retained without alteration. Consequently there are no diphthongs representing simple Latin vowels; nor does the rule hold good which is true for so great a proportion of the Romance languages, that the representatives of the e and the i on the one hand and those of the and the u on the other are normally coincident. Hence plenu (e) ; deghe, decern (e) ; binu, vino (i) ; pilu (t) ; fiore (o) ; roda, rota (0) ; duru (il) ; nughe, nuce (u). The unaccented vowels keep their ground well, as has already been seen

in the case of the finals by the examples adduced.— The j and / of the ancient termination are preserved, though not constantly : tres, onus, passados annos, plantas, faghes, facis, tenemus ; mulghet, mulghent. — The formulae ce, ci, ge, gi may be represented by che (ke), &c. ; but this appearance of special antiquity is really illusory (see Arch. ii. 143-144). The nexus cl, &c, may be maintained in the beginning of words (claru, plus) ; but if they are in the body of the word they usually undergo resolutions which, closely related though they be to those of Italian, sometimes bring about very singular results (e.g. usare, which by the intermediate forms uscare, us jar e leads back to usclare = ustlare = ustulare). Nz is the representative of nj (testimonzu, &c.) ; and Ij is reduced to z alone (e.g. mezus, melius; Campidanese melius). For // a frequent substitute is dd: massldda, maxilla, &c. Quite characteristic is the continual labialization of the formulae qua, gua, cu, gu, &c. ; e.g. ebba, equa ; sambene, sanguine (see Arch. ii. 143). The dropping of the primary d (roere, rodere, &c.) but not of the secondary (finidu, sanidade, maduru) is frequent. Characteristic also is the Logudorese prothesis of i before the initial s followed by a consonant (iscamnu, istella, ispada), like the prothesis of e in Spain and in France (see Arch. iii. 447 sqq.). — In the order of the present discussion it is in connexion with this territory that we are for the first time led to consider those phonetic changes in words of which the cause is merely syntactical of transitory, and chiefly those passing accidents which occur to the initial consonant through the historically legitimate or the merely analogical action of the final sound that precedes it. The general explanation of such phenomena reduces itself to this, that, given the intimate syntactic relation of two words, the initial consonant of the second retains or modifies its character as it would retain or modify it if the two words were one. The Celtic languages are especially distinguished by this peculiarity; and among the dialects of Upper Italy the Bergamasc offers a clear example. This dialect is accustomed to drop the v, whether primary or secondary, between vowels in the individual vocables (cad, cavare; /da, fava, &c), but to preserve it if it is preceded by a consonant (serva, &c.).— And similarly in syntactic combination we have, for example, de i, di vino; but ol vi, il vino. Insular, southern and central Italy furnish a large number of such phenomena; for Sardinia we shall simply cite a single class, which is at once obvious and easily explained, viz. that represented by su oe, il bove, alongside of sos boes, i. buoi (cf. biere, bibere; erba). — The article is derived from ipse instead of from tile: su sos, sa sas, — again a geographical anticipation of Spain, which in the Catalan of the Balearic islands still preserves the article from ipse. — A special connexion with Spain exists besides in the nomine type of

inflexion, which is constant among the Sardinians (Span, nomne, &c. .whence nombre, &c), nomen, nomene, rdmine, aera- mine, legurnene, &c. (see Arch. ii. 429 sqq.). — Especially noteworthy in the conjugation of the verb is the paradigm cantere cantSres, &c. timere, timeres, &c, precisely in the sense of the imperfect subjunctive (cf. A. 1 ; cf. C. 3 b). Next comes the analogical and almost corrupt diffusion of the -si of the ancient strong perfects (such as post, rosi)

a Romance language, independent of the others ; a view in which they are correct. The chief discriminating criterion is supplied by the treatment of the Latin -s, which is preserved in Sardinian, the Latin accusative form prevailing in the declension of the plural, as opposed to the nominative, which prevails in the Italian system. In this respect the Gallo-Italian dialects adhere to the latter system, rejecting the -s and retaining the nominative form. On the other hand, these facts form an important link between Sardinian and the Western Romance dialects, such as the Iberian, Gallic and Ladin; it is not, however, to be identified with any of them, but is distinguished from them by many strongly-marked characteristics peculiar to itself, chief among which is the treatment of the Latin accented vowels, for which see Ascoli in the text. As to the internal classification of the Sardinian dialects, Guarnerio assumes four types, the Campidanese, Logudorese, Gallurese and Sassarese. The separate individuality of the last of these is indicated chiefly by the treatment of the accented vowels (dezi, Ital. died; tela, Ital. tela; pelu, Ital. pelo; ngbu, Ital. nuovo; fieri, Ital. fiore; nozi, Ital. noce, as compared, e.g. with Gallurese deci, tela, pilu, nou, figri, nuci). Both Gallura and Sassari, however, reject the -s, and adopt the nominative form in the plural, thus proving that they are not entirely distinct from the Italian system.]

by which canlesi, timesi (cantavi, timui), dolfesi, dolui, are reached. Proof of the use and even the abuse of the strong perfects is afforded, however, by the participles and the infinitives of the category to which belong the following .examples: tennidu, tenuto; pdrfidu, parso; bdlfidu, valso; tinnere, bdtere, &c. (Arch. ii. 432-433). The future, finally, shows the unagglutinated periphrasis: hapo a mandigare (ho a mangiare = manger-6) ; as indeed the unagglutinated forms of the future and the conditional occur in ancient vernacular texts of other Italian districts. [The Campidanese manuscript, in Greek characters, published by Blancard and Wescher (Bibliotheque de I'lLcole des Charles, xxxv. 256-257), goes back as far as the last years of the nth century. Next come the Cagliari MSS. published by Solmi (Le Carte volgari dell' A rchivio arcivescovile di

Cagliari, Florence, 1905; cf. Guarnerio in Studi romanzi, fascicolo iv. 189 et seq.), the most ancient of which in its original form dates from 1114-1120. For Logoduro, the Condaghe di S. Pietro di Silchi (§§ xii.-xiii.), published by G. Bonazzi (Sassari-Cagliari, 1900; cf. Meyer-Lilbke, Zur Kenntnis des Altlogudoresischen, Vienna. 1902), is of the highest importance.]

[3- Vegliote (Vegliolo). — Perhaps we may not be considered to be departing from Ascoli's original plan if we insert here as a third member of the group B the neo-Latin dialect which found its last refuge in the island of Veglia (Gulf of Quarnero), where it came definitively to an end in 1 898. The Vegliote dialect is the last remnant of a language which some long time ago extended from thence along the Dalmatian coast, whence it gained the name of Dalmatico, a language which should be carefully distinguished from the Venetian dialect spoken to this day in the towns of the Dalmatian littoral. Its character reminds us in many ways of Rumanian, and of that type of Romano-Balkan dialect which is represented by the Latin elements of Albanian, but to a certain extent also, and especially with regard to the vowel sounds, of the south-eastern dialects of Italy, while it has also affinities with Friuli, Istria and Venetia. These characteristics taken altogether seem to suggest that Dalmatico differs as much as does Sardinian from the purely Italian type. It rejects the -s, it is true, retaining instead the nominative form in the plural; but here these facts are no longer a criterion, since in this point Italian and Rumanian are in agreement. A tendency which we have already noted, and shall have further cause to note hereafter, and which connects in a striking way the Vegliote and Abruzzo-Apulian dialects, consists in reducing the accented vowels to diphthongs: examples of this are: spuota, Ital. spada; buarka, Ital. barca; fiar, Ital. ferro; nuat, Ital. notte; kataina, Ital. catena; paira, Ital. pero; Lat. ptru; jaura, Ital. ora; nauk, Ital. noce; Lat. nuce; ortaika, Ital. ortica; joiva, Ital. uova. Other vowel phenomena should also be noted, for example those exemplified in prut, Ital. prato; dik, Ital. dieci, Lat. decern; luk, Ital. luogo, Lat. locu; krask, Ital. crescere; cenk, Ital. cinque, Lat. quinque; buka, Ital. bocca, Lat. biicca. With regard to the con- sonants, we should first notice the invariable persistence of the explosive surds (as in Rumanian and the southern dialects) for which several of the words just cited will serve as examples, with the addition of huosa, Ital. casa; praiza, Ital. presa; struota, Ital. strada; rosuota, Ital. rugiada; latri, Ital. ladro; raipa, Ital. riva. The c in the formula ce, whether primary or secondary, is repre- sented by k: kaina, Ital. cena; kanaisa, Ital. cinigia; akait, Ital. aceto; plakdr, Ital. piacere; dik, Ital. dieci;

mukna, Ital. macina; dotko, Ital. dodici; and similarly the g in the formula ge is repre- sented by the corresponding guttural: ghelut, Ital. gelato; jongdr, Ital. giungere; plungre, Ital. piangere, &c. On the contrary, the guttural of the primitive formula cu becomes i (col, Ital. culo) ; this phenomenon is also noteworthy as seeming to justify the inference that the u was pronounced ii. Pt is preserved, as in Rumanian (sapto, Lat. septem), and often, again as in Rumanian, ct is also reduced to pt (guapto, Lat. octo). As to morphology, a characteristic point is the preservation of the Lat. cantavero, Ital. avro cantato, in the function of a simple future. Cantaverum also occurs as a conditional. For Vegliote and Dalmatico in general, see M. G. Bartoli's fundamental work, Das Dalmatische (2 vols., Vienna, 1906), and Zeitschrift fur roman. Philologie, xxxii. 1 sqq.; Merlo, Rivista di filologia e d'istruzione class, xxxv. 472 sqq. A short document written about 1280 in the Dalmatic dialect of Rag- usa is to be found in Archeografo Triestino, new series, vol. i. pp. 85-86.]

C. Dialects which diverge more or less from the genuine Italian or Tuscan type, but which at the same time can be conjoined with the Tuscan as forming part of a special system of Neo-Latin dialects.

I. Venetian. — Between "Venetian" and " Venetic " several distinctions must be drawn (Arch. i. 391 sqq.). At the present day the population of the Venetian cities is " Venetian " in language, but the country districts are in various ways Venetic. 1 The ancient language of Venice itself and of its estuary was not a little different from that of the present time; and the Ladin vein was particularly

1 On this point see the chapter, " La terra ferma veneta considerata in ispecie ne' suoi rapporti con la sezione centrale della zona ladina," in Arch. i. 406-447.

evident (see A. 2). A more purely Italian vein — the historical explanation of which presents an attractive problem — has ultimately gained the mastery and determined the " Venetian " type which has since diffused itself so vigorously. — In the Venetian, then, we do not find the most distinctive characteristics of the dialects of Upper Italy comprised under the denomination Gallo-Italic (see B. 1),— neither the ii nor the d, nor the velar 1 and faucal nasals, nor the Gallic resolution of the ct, nor the frequent elision of un- accented vowels, nor the great redundancy of pronouns. On the

contrary, the pure Italian diphthong of 8 {e.g. cuor) is heard, and the diphthong of e is in full currency {dieie, dieci, &c). Nevertheless the Venetian approaches the type of Northern Italy, or diverges notably from that of Central Italy, by the following phonetic phenomena: the ready elision of primary or secondary d {cruo, crudo ; sea, seta, &c.) ; the regular reduction of the surd into the sonant guttural {e.g. cuogo, Ital. cuoco, coquus) ; the pure 6 in the resolution of d {e.g. tave, clave; oreta, auricula); the i for g {sovene, Ital. giovane) ; c for s and c {pece, Ital. pesce; ciel, Ital. cielo). Lj preceded by any vowel, primary or secondary, except i, gives g: famega, familia. No Italian dialect is more averse than the Venetian to the doubling of consonants. — In the morphology the use of the 3rd singular for the 3rd plural also, the analogical participle in esto {tatesto, Ital. taciuto, &c. ; see Arch. iv. 393, sqq.) and se, Lat. est, are particularly noteworthy. A curious double relic of Ladin influence is the interrogative type represented by the example credis-tu, credis tu, — where apart from the interrogation ti credi would be used. For other ancient sources relating to Venice, the estuary of Venice, Verona and Padua, see Arch. i. 448, 465, 421-422; iii. 245-247. [Closely akin to Venetian, though differing from it in about the same degree that the various Gallo-Italian dialects differ among one another, is the indigenous dialect of Istria, now almost entirely ousted by Venetian, and found in a few localities only (Rovigno, Dignano). The most salient characteristics of Istrian can be recognized in the treatment of the accented vowels, and are of a character which recalls, to a certain extent at least, the Vegliote dialect. Thus we have in istrian i for 4 {bivi, Ital. bevi, Lat. bibis; tila, Ital. tela; viro, Ital. vero and vetro, Lat. veru, vilru; nito, Ital. netto, Lat. nitidu, &c.) and analogously u for q {fiur, Ital. fiore, Lat. flore; bus, Ital. voce, Lat. voce, &c.) ; ei and ou from the Lat. i and u respectively {ameigo, Lat. amicu, feil, Lat. fllu, &c. ; mour, Lat. mu.ru; noudu, Lat. nudu; frouto, Ital. frutto, Lat. fructu, &c.) ; ie and uo from e and respectively in position {piel, Lat. pelle, mierlo, Ital. merlo, Lat. merula; kuorno, Lat. cornu; puorta, Lat. porta), a phenomenon in which Istrian resembles not only Vegliote but also Friulian. The resemblance with Verona, in the reduction of final unaccented -e to should also be noted {nuoto, Ital. notte, &c, bivo, Ital. beve; malamentro, Ital. malamente, &c), and that with Belluno and Treviso in the treatment of -bni, -dni (barboi, -oin, Ital. barboni), though it is peculiar to Istrian that -ain should give -en {kail, ken, Ital. cane -i). With regard to consonants, we should point out the n for gn {lino, Ital. legno) ; and as to morphology, we should note certain survivals of the inflexional type, amita, -dnis (sing, sia, Ital. zia, pi. sianne).] The most ancient Venetian documents take us

back to the first half of the 13th century (0. E. Bertanza and V. Lazzarini, // Dialetto venezianof.no alia morte di Dante Alighieri, Venice, 1891), and to the second half of the same century seems to belong the Saibante MS. For Verona we have also documents of the 13th century {v. Cipolla, in Archivio storico italiano, 1881 and 1882); and to the end of the same century perhaps belongs the MS. which has preserved for us the writings of Giacomino da Verona. See also Archivio glottologico, i. 448, 465, 421-422, iii. 245-247.

2. Corsican.* — If the " Venetian," in spite of its peculiar " Italianity," has naturally special points of contact with the other dialects of Upper Italy (B. 1), the Corsican in like manner, particularly in its southern varieties, has special points of contact with Sardinian proper (B. 2). In general, it is in the southern section of the island, which, geographically even, is farthest removed from Tuscany, that the most characteristic forms of speech are found. The unaccented vowels are undisturbed; but u for the Tuscan is common to almost all the island, — an 'insular phenomenon par excellence which connects Corsica with Sardinia and with Sicily, and indeed with Liguria also. So also -i for the Tuscan -e {latti, latte; li cateni, le catene), which prevails chiefly in the southern section, is also found in Northern and Southern Sardinian, and is

1 [There are also examples of Istrian variants, such as lanna, Ital. lana; kadenna, Ital. catena.]

2 [There have been of late years many different opinions concerning the classification of Corsican. Meyer-Liibke dissociates it from Italian, and connects it with Sardinian, making of the languages of the two islands a unit independent of the Romance system. But even he (in Grober's Grundriss, 2nd ed., vol. i. p. 698) recognized that there were a number of characteristics, among them the participle in -utu and the article illu, closely connecting Sassari and Corsica with the mainland. The matter has since then been put in its true light by Guarnerio {Arch, elott. xvi. 510 et seq.), who points out that there are two varieties of language in Corsica, the Ultramontane or southern, and the Cismontane, by far the most widely spread, in the rest of the island. The former is, it is true, connected with

common to Sicily. It is needless to add that this tendency to u and i manifests itself, more or less decidedly, also within the words. Corsican, too, avoids the diphthongs of t and {pe, eri; cori, fora) : but, unlike Sardinian, it treats t and u in the Italian fashion: beju, bibo; peveru, piper; pesci; nod, nuces. 3 — It is one of its characteristics to reduce a to e in the formula ar + a consonant {cherne,

birba, &c), which should be compared particularly with the Piedmontese examples of the same phenomenon {Arch. ii. 133, 144-150). But the gerund in -endu of the first conjugation {turnendu, lagrimendu, &c.) must on the contrary be considered as a phenomenon of analogy, as it is especially recognized in the Sardinian dialects, to all of which it is common (see Arch. ii. 133). And the same is most probably the case with forms of the present participle like merchente, mercante, in spite of enzi and innenzi (anzi, innanzi), in which latter forms there may probably be traced the effect of the Neo-Latin i which availed to reduce the t of the Latin ante ; alongside of them we find also anzi and nantu. But cf. also, grendi, Ital. grande. In Southern Corsican dr for // is conspicuous — a phenomenon which also connects Corsica with Sardinia, Sicily and a good part of Southern Italy (see C. 2; and Arch. ii. 135, &c), also with the northern coast of Tuscany, since examples such as beddu belong also to Carrara and Montignoso. In the Ultramontane variety occur besides, the phenomena of rn changed tor (= rr) and of nd becoming ran {furu, Ital. forno; koru, Ital. corno; kuannu, Ital. quando; vidennu, Ital. vedendo) . The former of these would connect Corsican with Sardinian {corru, cornu ; carre, carne, &c.) ; the latter more especially with Sicily, &c. A particular connexion with the central dialects is given by the change of Id into 11 {kallu, Ital. caldo). — As to phonetic pheno- mena connected with syntax, already noticed in B. 2, space admits the following examples only: Cors. na vella, una bella, e bella {ebbilla, et bella); lu jallu, to gallo, gran ghiallu; cf. Arch. ii. 136 (135, 150), xiv. 185. As Tommaseo has already noted, one is for the Corsicans not less than for the Sicilians, Calabrians and the French a termina tion of diminution: e.g. fratedronu, fratellino. — In the first person of the conditional the b is maintained {e.g. farebe, farei), as even at Rome and elsewhere. Lastly, the series of Corsican verbs of the derivative order which run alongside of the Italian series of the original order, and may be represented by the example dissipeghja, dissipa (Falcucci), is to be compared with the Sicilian series repre- sented by cuadiari, riscaldare, curpidri, colpire {Arch. ii. 151).

3. Dialects of Sicily and of the Neapolitan Provinces. — Here the territories on both sides of the Strait of Messina will first be treated together, chiefly with the view of noting their common linguistic peculiarities. — Characteristic then of these parts, as compared with Upper Italy and even with Sardinia, is, generally speaking, the tenacity of the explosive elements of the Latin bases (cf. Arch. ii. 154, &c). Not that these consonants are constantly preserved uninjured; their degradations, and especially the Neapolitan

degradation of the surd into the sonant, are even more frequent than is shown by the dialect as written, but their disappearance is comparatively rather rare; and even the degradations, whether regard be had to the conjunctures in which they occur or to their specific quality, are very different from those of the dialects of Upper Italy. Thus, the t between vowels ordinarily remains intact in Sicilian and Neapolitan {e.g. Sicil. sita, Neap, seta, seta, where in the dialects of Upper Italy we should have seda, sea) ; and in the Neapolitan dialects it is reduced to d when it is preceded by n or r {e.g. viende, vento), which is precisely a collocation in which the t would be maintained intact in Upper Italy. The d, on the other hand, is not resolved by elision, but by its reduction to r {e.g. Sicil. viriri, Neap, dialects vere, vedere), a phenomenon which has been frequently compared, perhaps with too little caution, with the d passing into rs {d) in the Umbrian inscriptions. The Neapolitan reduction of nl into nd has its analogies in the reduction of nc (nk) into Kg, and of mp into mb, which is also a feature of the Neapolitan dialects, and in that of ns into nz; and here and there we even find a reduction of nf into mb {nf, nv, nb, mb), both in Sicilian and Neapolitan {e.g. at Casteltermini in Sicily 'mbiernu, inferno, and in the Abruzzi cumbonn' , 'mbonn', confondere, infondere). Here we find ourselves in a series of phenomena to which it may seem that some special contributions were furnished by Oscan and Umbrian {nt, mp, nc into nd, &c), but for which more secure and general, and so to say " isothermal," analogies are found in modern Greek and Albanian. The Sicilian does not appear to fit in here as far as the formulae nt

Sardinian, but with that variety, precisely, which, as we have already seen, ought to be separated from the general Sardinian type. Here we might legitimately assume a North-Sardinian and South-Corsican type, having practically the same relation to Italian as have the Gallo-Italian dialects. As to the Cismontane, it has the Tuscan accented vowel-system, does not alter 11 or rn, turns lj into i (Ital. gli), and shares with Tuscan the peculiar pronunciation of I between vowels, while, together with many of the Tuscan and central dialects, it reduces rr to a single consonant. For these reasons, Guarnerio is right in placing the Cismontane, as Ascoli does for all the Corsican dialects, on the same plane as Umbrian, &c.)

3 The Ultramontane variety has, however, tela, pilu, iddu, boti, gula, furu, corresponding exactly to the Gallurese tela, pilu, Ital. pelo, iddu; Ital. " ello," Lat. illu; boci, Ital. voce; gula, Ital. gole.

and mp are concerned ; and it may even be said to go counter to this tendency by reducing ni and ni to nt, nz (e.g. puntiri, pungere ; menzu, Ital. meizo; sponza, Ital. spugna, Ven. sponza)} Nay, even in the passing of the sonant into the surd, the Neapolitan dia- lects would yield special and important contributions (nor is even the Sicilian limited to the case just specified), among which we will only mention the change of d between vowels into t in the last syllable of proparoxytones (e.g. ummeto, Sicil. umitu, umido), and in the formula dr (Sicil. and Neap, quatro, Ital. quadro, &c). From these series of sonants changing into surds comes a peculiar feature of the southern dialects. — A pretty common characteristic is the regular progressive assimilation by which nd is reduced to nn, fig to nn, mb to mm, and even nv also to mm (nv, nb, mb, mm), e.g. Sicil. sinniri, Neap, itnnere, scendere; Sicil. chiummu. Neap. chiumme, piombo; Sicil. and Neap, 'mmidia, invidia; Sicil. sdfifiu, sangue. As belonging to this class of phenomena the Palaeo-Italic analogy (nd into nn, n), of which the Umbrian furnishes special evidence, readily suggests itself. Another important common characteristic is the reduction of secondary pj fj into kj (ch.ia.nu e, Sicil., Neap., &c, Ital. piano), $ (Sicil. Hmi, Neap, iumme, fiume),' of secondary bj to j (which may be strengthened to ghj) if initial (Sicil. jancu, Neap, janche, bianco; Sicil. agghianchiari, imbiancare), to / if between vowels (Neap, neglia, nebbia, Sicil. nigliu, nibbio) ; of primary pj and bj into 6 (Sicil. sitta. Neap, seita, seppia) or £ respectively (Sicil. ragga, Neap, arragga, rabbia), for which pheno mena see also Genoese (B. 1). Further is to be noted the tendency to the sibilation of cj, for which Sicil. jazzit, ghiaccio, may serve as an example (Arch. ii. 149), — a tendency more particularly betrayed in Upper Italy, but Abruzzan departs from it (cf. Abr. jacce, ghiaccio, vracce, braccio, &c). There is a common inclination also to elide the initial unaccented palatal vowel, and to prefix a, especially before r (this second tendency is found likewise in Southern Sardinian, &c. ; see Arch. ii. 138); e.g. Sicil. 'nttnniri, Neap. 'ndennere, intendere; Sicil. arriccamdri, Neap, arragamare, ricamare (see Arch. ii. 150). Throughout the whole district, and the adjacent territories in Central Italy, a tendency also prevails towards resolving certain combinations of consonants by the insertion of a vowel ; thus combinations in which occur r or /, w or j (Sicil. kiruci, Ital. croce, fUdgutu, Ital. flauto, salivari, salvare, vdriva, Ital. barba; Abr. cdlechene, Ital. ganghero, SaleviUre, Silvestro, feulemendnde, fulminante, jereve, Itajf. erba, &c; Avellinese garamegna, gramigna; Neap, dvotro = * dwtro, Ital. dllro, cevoza — * cewza, Ital. gelso, ajetd side by side with ajtd, Ital.

*eta, 6dejo = 6djo, Ital. odio, &c; Abr. 'nniveje, indiva, nebbeje, nebbia, &c); cattdjeve=~cattdjve, cattivo, gouele, = * gowle, gola, &c. &c, are examples from Molfetta, where is also normal the resolution of ik by $ek (meSekere, maschera, iekdtele, scatola, &c.) ; cf. seddegno, sdegno, in some dialects of the province of Avellino. In complete contrast to the tendency to _ get rid _ of double consonants which has been particularly noted in Venetian (C. 1) , we here come to the great division of Italy where the tendency grows strong to gemination (or the doubling of consonants), especi- ally in proparoxytones; and the Neapolitan in this respect goes farther than the Sicilian (e.g. Sicil. soggiru, suocero, cinniri, cenere, doppu, dopo; 'nsemmula, insieme, in-simul; Neap, dellecato, dificato; ummeto, umido; dSbbole). — As to the phonetic phenomena connected with the syntax (see B. 2), it is sufficient to cite such Sicilian examples as niiuna ronna, nesuna donna, alongside of c' 6 donni, c' e donne; fincu jorna, cinque giorni, alongside of chiti ghiorna, piu giorni; and the Neapolitan la vocca, la bocca, alongside of a bocca, ad buccam, &c.*

We now proceed to the special consideration, first, of the Sicilian and, secondly, of the dialects of the mainland.

(a) Sicilian. — The Sicilian vocalism is conspicuously etymological. Though differing in colour from the Tuscan, it is not less noble, and between the two there are remarkable points of contact. The dominant variety, represented in the literary dialect, ignores the diphthongs of t and of i, as it has been seen that they are ignored in Sardinia (B. 2), and here also the t and the fi appear intact; but the t and the o are fittingly represented by i and u; and with equal symmetry unaccented e and o are reproduced by i and u. Examples : tint, tiene; ndvu, nuovo; pilu, pelo; mthnttta, Ital. vendetta; jugu, giogo; agustu, Ital. agosto; cridiri, credere; vinniri, Ital. vendere; sira, sera; vina, vena; suli, Ital. sole; ura, ora; furma, Ital. forma. In the evolution of the consonants it is enough to add here the change of Ij into ghj (e.g. figghiu, Ital. figlio) and of 11 into 44 (e.g. gaddu, Ital. gallo). As to morphology, we will confine our- selves to pointing out the masculine plurals of neuter form (li pastura, li marinara). For the Sicilian dialect we have a few frag- ments going back to the 13th century, but the documents are scanty until we come to the 14th century.

(b) Dialects of the Neapolitan Mainland. — The Calabrian (by which is to be understood more particularly the vernacular group of the two Further Calabrias) may be fairly considered as a continuation of the Sicilian type, as is seen from the following examples: — cori, 1

[Traces are not lacking on the mainland of ni becoming nt, not only in Calabria, where at Cosenza are found, e.g. chidncere, Ital. piangere, manciare, but also in Sannio and Apulia: chiance, monce, Ital. mungere, in the province of Avellino, ptinci, Ital. (tu) pungi, at Brindisi. In Sicily, on the other hand, can be traced examples of nt nk nt mp becoming ni ng nd mb.]

cuore; petra; fimmina, femina; mice, voce; unure, onore; figghiu, figlio; spadde, spalle; trizza, treccia. Both Sicilian and Calabrian is the reducing of rl to rr (Sicil. parrari, Cal. parrare, parlare, &c). The final vowel -e is reduced to i, but is preserved in the more southern part, as is seen from the above examples. Even the k for £ = fj, as in hurt (Sicil. iuri, fiore), which is characteristic in Calabrian, has its forerunners in the island (see Arch. ii. 456). And, in the same way, though the dominant varieties of Calabria seem to cling to the mb (it sometimes happens that mm takes the form of mb: imbiscare = Sicil. 'mmiscari 'immischiare', &c.) and nd, as opposed to the mm, nn, of the whole of Southern Italy and Sicily, we must remember, firstly, that certain other varieties have, e.g. granne, Ital. grande, and chiummu, Ital. piombo; and secondly, that even in Sicily (at Milazzo, Barcelona, and as far as Messina) districts are to be found in which nd is used. Along the coast of the extreme south of Italy, when once we have passed the interruptions caused by the Basilisco type (so called from the Basilicata), the Sicilian vocalism again presents itself in the Otrantine, especially in the seaboard of Capo di Leuca. In the Lecce variety of the Otrantine the vocalism which has just been described as Sicilian also keeps its ground in the main (cf. Morosi, Arch, iv.): sira, sera; leilu, oliveto; pilu; ura, ora; dulure. Nay more, the Sicilian pheno menon of Ij into ghj (figghiu, figlio, &c.) is well marked in Terra d'Otranto and also in Terra di Bari, and even extends through the Capitanata and the Basilicata (cf. D' Ovidio, Arch. iv. 159-160). As strongly marked in the Terra d'Otranto is the insular phenomenon of II into dd (dr), which is also very widely distributed through the Neapolitan territories on the eastern side of the Apennines, sending outshoots even to the Abruzzo. But in Terra d'Otranto we are already in the midst of the diphthongs of t and of t, both non- positional and positional, the development or permanence of which is determined by the quality of the unaccented final vowel, — as generally happens in the dialects of the south. The diphthongs of S and S, determined by final -i and -u, are also characteristic of central and northern Calabria (viecchiu -i, vecchio -a, vecchia -e, vecchia -e; buonu -i, bona e, &c. &c). Thus there comes to be a treatment of the vowels, peculiar to the two peninsulas of Calabria and Salent. The diphthongal product of the o is here ue. The

*following are examples from the Lecce variety of the dialect: core, pi. cuen; metu, mieti, mete, mieto, mieti, miete (Lat. metere); senlu, sienti, sente; olu, uSH, ola, volo, voli, vola; mordu, muerdi, morde. The ue recalls the fundamental reduction which belongs to the Gallic (not to speak of the Spanish) 'regions, and stretches through the north of the Terradi Bari, where there areotherdiph thongs curiously suggestive of the Gallic : e.g. at Bitonto alongside of lueche, luogo, suenne, sonno, we have the oi and the ai from 1 or e of the previous phase (vetoine, vicino), and the au from o of the previous phase (anaure, onore), besides a diphthongal disturbance of the a. Here also occurs the change of a into an e more or less pure (thus, at Cisternino, scunsulete, sconsolata; at Canosa di Puglia, arruite, arrivata; n-ghepe, "in capa," that is, in capo); to which may be added the continual weakening or elision of the unaccented vowels not only at the end but in the body of the word (thus, at Bitonto, vendett, spranz). A similar type meets us as we cross into Capitanata (Cengnola: graite and grei-, creta (but also peite, piede, &c), coute, coda (but also foure, fuori, &c.) ; vgine, vino, and similarly pgile, pelo (Neap, pilo), &c. ; fueke, fuoco; caretate, carita, parla, parlare, &c); such forms being apparently the outposts of the Abruzzan, which, however, is only reached through the Molise — a district not very populous even now, and still more thinly peopled in bygone days — whose prevailing forms of speech in some measure interrupt the historical continuity of the dialects of the Adriatic versant, presenting, as it were, an irruption from the other side of the Apennines. In the head valley of the Molise, at Agnone, the legitimate precursors of the Abruzzan vernaculars reappear (fedfa, fava, stufedte and uote, stufo, anriojato, fed, fare; chiezza, piazza, chiegne, piangere, cuene, cane; pudle, palo, pruote, prato, cuone, cane; veire and vaire, vero, moile, melo, and similarly voive and veive, vivo; deune, dono, deuva, doga; minaure, minore; cuerpe, corpo, but cuolle). The following are pure Abruzzan examples. (1) From Bucchianico (Abruzzo Citeriore): veive, vivo; rraje, re; allaure, allora; craune, corona; circhi, cercare; mile, male; grinne, grande; qutnne; but 'nsultate, insultata; strode, strada (where again it is seen that the reduction of the d depends on the quality of the final unaccented vowel, and that it is not produced exclusively by *', which would give rise to a further reduction: scillarite, scellerati; ampire, impari). (2) From Pratola Peligna (Abruzzo Ulteriore II.); maje, mia; 'naure, onore; 'njuriite, inguriata; desperite, disperata(alongside of vennecd, vendi care) . It almost appears that a continuity with Emilian 1 ought to be established across the Marches (where another irruption of greater*

1 It should, however, be noticed that there seem to be examples of the 6 from d in the southern dialects on the Tyrrhenian side; texts of Serrara d'Ischia give: mancete, mangiata, maretete, mari- tata, manneto, mandato; also tenno < = Neap, tanno, allora. As to the diphthongs, we should not omit to mention that some of them are obviously of comparatively recent formation. Thus, exampi&i from Cerignola, such as levgite, oliveto, come from olivitu (cf. Lecc. leibu, &c), that is to say, they are posterior to the phenomenon e

" Italianity " has taken place; a third of more dubious origin has been indicated for Venice, C- i); see Arch, ii., 445. A negative characteristic for Abruzzan is the absence of the change in the third syllable of the combinations pi. bl, fl (into kj, j-, i) and the reason seems evident. Here the pj, bj and fj themselves appear to be modern or of recent reduction — the ancient formulae sometimes occurring intact (as in the Bergamasc for Upper Italy), e.g. pldnje and pranje alongside of pidnje, piagnere, branghe alongside of bianghe, bianco (Fr. blanc), flume a.ndfrume alongside fiume, flume. To the south of the Abruzzi begins and in the Abruzzi grows pro- minent that contrast in regard to the formulae alt aid (resolved in the Neapolitan and Sicilian into aut, &c, just as in the Piedmontese, &c), by which the types aldare, altare, and calle, caldo, are reached. 2 For the rest, when the condition and connexions of the vowel system still retained by so large a proportion of the dialects of the eastern versant of the Neapolitan Apennines, and the difference which exists in regard to the preservation of the unaccented vowels between the Ligurian and the Gallo-Italic forms of speech on the other versant of the northern Apennines, are considered, one cannot fail to see how much justice there is in the longitudinal or Apenninian partition of the Italian dialects indicated by Dante. — But, to con- tinue, in the Basilicata, which drains into the Gulf of Taranto, and may be said to lie within the Apennines, not only is the elision of final unaccented vowels a prevailing characteristic; there are also frequent elisions of the unaccented vowels within the word. Thus at Matera : sintenn la femn chessa cos, sentendo la femina questa cosa; disprdt, disperata; at Saponara di Grumento: uomnn' scilrati, uomini scellerati; mnetta, vendetta.— But even if we return to the Mediterranean versant and, leaving the Sicilian type of the Calabrias, retrace our steps till we pass into the Neapolitan pure and simple, we find that even in Naples the unaccented final vowels behave badly, the labial turning to e (bielle, bello) and even the a (bella) being greatly weakened. And

*here occurs a Palaeo-Italic instance which is worth mention : while Latin was accustomed to drop the u of its nominative only in presence of r (gener from *gener- u-s, vir from *vir-u-s; cf. the Tuscan or Italian apocopated forms vener = v6nere, venner = vennero, &c.),Oscanand Umbrian go much farther: Oscan, hurz = *hort-u-s, Lat. hortus; Umbr. pihaz, piatus; emps, emptus, &c. In Umbrian inscriptions we find u alternating with the a of the nom. sing. fem. and plur. neut. In complete contrast with the Sicilian vocalism is the Neapolitan e for unaccented and particularly final i of the Latin and Neo-Latin or Italian phases {e.g. viene, vieni; cf. infra), to say nothing further of the regular diphthongization, within certain limits, of accented e or o in position (apierte, aperto, fem. aperta; muorte, morto, fem. morta, &c). — In the quasi-morphological domain it is to be noted how the Siculo- Calabrian u for the ancient 6 and &, and the Siculo-Calabrian i for the ancient $, t, are also still found in the Neapolitan, and, in parti- cular, that they alternate with and e in a manner that is determined by the difference of (termination. Thus cosetore, cucitore, pi. coselure (i.e. coseturi, the -i passing into e in keeping with the Neapolitan characteristic already mentioned); russe, Ital. rosso, -i; rossa -e, Ital. rossa -e; noce, noce, pi. nuce; crede, io credo; cride (*cridi), tu credi; crede, egli crede; nigre, but negra.*

Passing now to a cursory mention of purely morphological pheno-mena, we begin with that form which is referred to the Latin plu-perfect (see A. I, B. 2), but which here too performs the functions of the conditional. Examples from the living dialects of (1) Calabria Citeriore are faceru, farei (Castrovillari) ; tu te la collerre, tu te l'acolleresti (Cosenza) ; I'aicettera, l'accetterebbe (Grimaldi) ; and from those of (2) the Abruzzi, vuler', vorrei (Castelli); dere, darei (Atessa) ; candere, canterei. For the dialects of the Abruzzi, we can check our observations by examples from the oldest chronicle of Aquila, as non habera lassato, non avrebbe lasciato (str. 180) (cf. negara, Ital. negherei, in old MS. of the Marches). There are some interesting remains (more or less corrupted both In form and usage) of ancient consonantal terminations which have not yet been sufficiently studied : s' incaricaviti, s' incaricava/ abat (Basili cata, Senise); ebbiti, ebbe (ib.); aviadi, aveva (Calabria, Grimaldi); arrivaudi, arrivo (ib.). The last example also gives the -au of the 3rd pers. sing. perf. of the first conjugation, which still occurs in Sicily and between the horns of the Neapolitan mainland. In the Abruzzi (and in the Ascolan district) the 3rd person of the plural is in process of disappearing (the no having fallen away and the preceding vowel being obscured), and its function is assumed by the 3rd person

singular; cf. C. I. 3 The explanation of the Nea

*vowel change by which the formula e,-u became i-u. And, still in the same dialect, in an example like grgjte, creta, the ej seems perhaps to be recent, for the reason that another e, derived from an original e (Lat. e), is treated in the same way (pejte, piede, Sec.). As to examples from Agnone like puole, palo, there still exists a plural pjele which points to the phase *palo.*

1 We should here mention that callu is also found in the Voca- bolario Siciliano, and further occurs in Capitanata.

3 This is derived in reality from the Latin termination -unt, which is reduced phonetically to -u, a phenomenon not confined to the Abruzzi; cf. facciu, Ital. fanno, Lat. faciunt, at Norcia; crisciu, Ital. crescono, Lat. crescunt, &c, at Rieti. And examples are also to be found in ancient Tuscan.

politart forms songhe, io sono, essi sono, donghe, io do, stonghe, io sto, as also of the enclitic of the 2nd person plural which exists, e.g. in the Sicil. avissivu, Neap, avisteve, aveste, has been correctly given more than once. It may be remarked in conclusion that this Neo-Latin region keeps company with the Rumanian in maintaining in large use the -ora derived from the ancient neuter plurals of the type tempora; Sicil. jocura, giuochi; Calabr. nidura, Abruzz. nidere, nidi, Neap, ortola (= ±ra), orti, Capitanata dcure, aghi, Apulian aceddere (Tarantine aceddiri), uccelli, &c. It is in this region, and more particularly in Capua, that we can trace the first appearance of what can definitely be called Italian, as shown in a Latin legal document of the year 960 (sao co kelle terre per kelle fini qui hi content trenta anni le possette parte Sancti Benedicti, Ital. " so che quelle terre per quei confini che qui contiene trent 'anni le possedette la parte di S. Benedetto "), and belongs more precisely to Capua. The so-called Carta Rossanese (Calabria), written in a mixture of Latin and vulgar tongue, belongs to the first decades of the 12th century; while a document of Fondi (Campania) in the vulgar tongue goes back to the last decades of the same century. Neapolitan docu- ments do not become abundant till the 14th century. The same is true of the Abruzzi and of Apulia; in the case of the latter the date should perhaps be put even later.

4. Dialects of Umbria, the Marches and the Province of Rome. — The phenomena characteristic of the Gallo-Italian dialects can be traced in the northern Marches in the dialects not only of the pro- vinces of Pesaro and Urbino (Arch, glott. ii. 444), where we note also the

constant dropping of the final vowels, strong elisions of accented and unaccented vowels, the suffix -ariu becoming -er, &c, but also as far as Ancona and beyond. As in Ancona, the double consonants are reduced to single ones; there are strong elisions (breta, Ital. berretta; blin, Ital. bellino; figurte, Ital. "figiirati"; vermne, Ital. verme, " vermine," &c.) ; the k becomes g; the s, J. At Jesi t and k become d and g, and the g is also found at Fabriano, though here it is modified in the Southern fashion (spia = spiga, Ital. spica). Examples are also found of the dropping of d primary between vowels: Pesaran rdica, Ital. radica; Fabr. peo; Ital. piede, which are noteworthy in that they indicate an isolated Gallo- Italian phenomenon, which is further traceable in Umbria (peacchia = ped-, Ital. orma; rdica and raice, Ital. radice; triibio, Ital. torbido; frdcio, Ital. fracido; at Rieti also the dropping of the d is normal: veo, Ital. vedo; fidtu, Ital. fidato, &c. ; and here too is found the dropping of initial d for syntactical reasons: ente, Ital. dente, from lu [d]ente). According to some scholars of the Marches, the e for a also extends as far as Ancona; and it is certainly continued from the north, though it is precisely in the territory of the Marches that Gallo-Italian and Abruzzan come into contact. The southern part of the Marches (the basin of the Tronto), after all, is Abruzzan in character. But the Abruzzan or Southern phenomena in general are widely diffused throughout the whole of the region comprising the Marches, Umbria, Latium and Aquila (for the territory of Aquila, belonging as it does both geographically and politically to the Abruzzi, is also attached linguistically to this group), which with regard to certain phenomena includes also that part of Tuscany lying to the south of the southern Ombrone. Further, the Tuscan dialect strictly so called sends into the Marches a few of its char- acteristics, and thus at Arcevia we have the pronunciation of t between vowels as £ (formesce, Ital. forbici), 4 and Ancona has no changes of tonic vowels determined by the final vowel. Again; Umbria and the Sabine territory, and some parts oi the Roman territory, are connected with Tuscany by the phenomenon of -ajo for ariu (molinajo, Ital. mugnaia, &c). But, to come to the Abruzzan Southern phenomena, we should note that the Abruzzan 11 for Id extends into the central region (Norcia: callu, caldo; Rome: ariscalla, riscalda; the phenomenon, however, occurs also in Corsica) ; and the assimilation of nd into nn, and of mb into mm stretches through Umbria, the Marches and Rome, and even crosses from the Roman province into southern Tuscany (Rieti: quanno, quando; Spoleto: comannava, comandava; Assisi: piagnenno, piangendo; Sanseverino Marches: piagnenne, 'mmece, invece (imbece); Fabri- ano: vennecasse, vendicarsi; Osimo: monno, . mondo; Rome: fronna, fronda; piommo, piombo; 'Pitigliano

(Tuscany): quanno, piagnenno). It ig curious to note, side by side with this phenomenon, in the same districts, that of nd for nn, which we still find and which was more common in the past (affando, affanno, &c, see Zeitschrift fur roman. PhUol. xxii. 510). Even the diphthongs of the e and the in position are largely represented. Examples are — at Norcia, Hempi, uocchi, stuortu; Assisi and Fabriano: tiempo; Orvieto: tiempo, tierra, le tuorte, li torti, and even duonna. The change of preconsonantal / into r, so frequent throughout this region, and particularly characteristic of Rome, is a phenomenon common to the Aquilan dialect. Similar facts might be adduced in abundance. And it is to be noted that the features common to Umbro- Roman and the Neapolitan dialects must have been more numerous in the past, as this was the region where the Tuscan current met the southern, and by reason of its superior culture gradually gained the

4 [This resolution of 6 by s, or by a sound very near to I, is, however, a Roman phenomenon, found in some parts of Apulia (Molfettese lausce, luce, &c), and also heard in parts of Sicily}.;

ascendancy. 1 Typical for the whole district (except the Marches) is the reduction to t (and later to j) of // and of / initial, when followed by i or u (Velletri, tuna, tuce; Sora, juna, Ital. luna, jima, Ital. lima; melica. Ital. mollica, bete, Ital. belli, bello, in vulgar Latin bellu; but bella, bella, &c). The phonological connexions between the Northern Umbrian, the Aretine, and the Gallo-Italic type have already been indicated (B. 2). In what relates to morphology, the ■orno of the 3rd pers. plur. of the perfect of the first conjugation has been pointed out as an essential peculiarity of the Umbro-Roman territory; but ,even this it shares with the Aquila vernaculars, which, moreover, extend it to the other conjugations (amorno, timorono, &c), exactly like the -0 of the 3rd person singular. Further, this termination is found also in the Tuscan dialects.

Throughout almost the whole district should be noted the distinction between the masculine and neuter substantive, expressed by means of the article, the distinction being that the neuter substantive has an abstract and indeterminate signification ; e.g. at S. Ginesio, in the Marches, lu pesc'e, but lo pesce, of fish in general, as food, &c. ; at Sora te wetre, the sheet of glass, but le wetre, glass, the material, original substance. 2 As to the inflection of verbs, there is in the

ancient texts of the region a notable prevalence of perfect form in the formation of the imperfect conjunctive; tolzesse, Ital. togliesse; sostenesse, Ital. sostenesse; conubbessero, Ital. conoscessero, &c. In the northern Marches, we should note the preposition sa, Ital. con (sa lia, Ital. con lei), going back to a type similar to that of the Ital. " con-esso."

In a large part of Umbria an m or / is prefixed to the sign of the dative: t-a lu, a lui; m-al re, al re; 3 which must be the remains of the auxiliary prepositions int(us), a(m)pud, cf. Prov. amb, am (cf. Arch. ii. 444-446). By means of the series of Perugine texts this group of dialects may be traced back with confidence to the 13th century; and to this region should also belong a " Confession," half Latin half vernacular, dating from about the nth century, edited and annotated by Flechia (Arch. vii. 121 sqq.). The "chronicle" of Monaldeschi has been already mentioned. The MSS. of the Marches go back to the beginning of the 13th century and perhaps still further back. For Roman (see Monaci, Rendic. dell'Accad. del Lincei, xvi. 103 sqq.) there is a short inscription of the nth century. To the 13th century belongs the Liber historiarum Romanorum (Monaci, Archivio delta Societa rom. di storia patria, xii. ; and also, Rendic. dei Lincei, i. 94 sqq.), and to the first half of the same century the Formole volgari of Raineri da Perugia (Monaci, ib., xiv. 268 sqq.). There are more abundant texts for all parts of this district in the 14th century, to which also belongs the Cronica Aquilana of Buccio di Ranallo, republished by De Bartholomaeis (Rome, 1907).

D. Tuscan, and the Literary Language of the Italians. .

We have now only to deal with the Tuscan territory. It is bounded on the W. by the sea. To the north it terminates with the Apennines; for Romagna Toscana, the strip of country on the Adriatic versant which belongs to it administratively, is assigned to Emilia as regards dialect. In the north-west also the Emilian presses on the Tuscan, extending as it does down the Mediterranean slope of the Apennines in Lunigiana and Garfag- nana. Intrusions which may be called Emilian have also been noted to the west of the Apennines in the district where the Arno and the Tiber take their rise (Aretine dialects); and it has been seen how thence to the sea the Umbrian and Roman dialects surround the Tuscan. Such are the narrow limits of the " promised land " of the language which has succeeded and was worthyx to succeed Latin in the history of Italian culture and

1 There is therefore nothing surprising in the fact that, for example, the chronicle of Monaldeschi of Orvieto (14th century) should

indicate a form of speech of which Muratori remarks: " Romanis tunc familiaris, nimirurn quae in nonnullis accedabat ad Neapolitanam seu vocibus seu pronuntiatione." The alt into ait, &c. (aitro, motto), which occur in the well-known Vita di Cola di Rienzo, examples of which can also be found in some corners of the Marches, and of which there are also a few traces in Latium, also shows Abruzzan affinity. The phenomenon occurs also, however, in Emilian and Tuscan.

2 A distinction between the masculine and the neuter article can also be noticed at Naples and elsewhere in the southern region, where it sometimes occurs that the initial consonant of the sub- stantive is differently determined according as the substantive itself is conceived as masculine or neuter; thus at Naples, neut. lo bero, masc. lo vera, " il vero," &c. ;at Cerignola (Capitanata), u mmggghie, " il meglio," side by side with ii mqise " il mese." The difference is evidently to be explained by the fact that the neuter article originally ended in a consonant (-d or -c? ; see Merlo, Zeitschrift fur roman. Philol. xxx. 449), which was then assimilated to the initial letter of the substantive, while the masculine article ended in a vowel.

3 This second prefix is common to the opposite valley of the Metauro, and appears farther south in the form of me,— Camerino: me lu pettu, nel petto, me lu Seppurgru, al Sepolcro.

civilization, — the land which comprises Florence, Siena, Lucca and Pisa. The Tuscan type may be best described by the negative method. There do not exist in it, on the one hand, any of those phenomena by which the other dialectal types of Italy mainly differ from the Latin base (such as U = u; frequent elision of unaccented vowels; ba = gua; S=fl; nn = nd, &c), nor, on the other hand, is there any series of alterations of the Latin base peculiar to the Tuscan. This twofold negative description may further serve for the Tuscan or literary Italian as contrasted with all the other Neo-Latin languages; indeed, even where the Tuscan has a tendency to alterations common to other types of the family, it shows itself more sober and self- denying — as may be seen in the reduction of the t between vowels into d or of c (k) between vowels into g, which in Italian affects only a small part of the lexical series, while in Provencal or Spanish it may be said to pervade the whole (e.g. Prov. and Span, mudar, Ital. mutare; Prov. segur, Span, seguro, Ital. stair 0). It may consequently be affirmed without any partiality that, in respect to historical nobility, the Italian not only holds the first rank among Neo-Latin languages, but almost constitutes an intermediate grade between the ancient or Latin and the modern or Romance. What has just been said about the

Tuscan, as compared with the other dialectal types of Italy, does not, however, preclude the fact that in the various Tuscan veins, and especially in the plebeian forms of speech, there occur particular instances of phonetic decay; but these must of necessity be ignored in so brief a sketch as the present. We shall confine ourselves to noting — what has a wide territorial diffusion — the reduction of c (k) between vowels to a mere breathing {e.g. fiidho, fuoco, but porco), or even its complete elision; the same phenomenon occurs also between word and word (e.g. la hasa, but in casa), thus illustrating anew that syntactic class of phonetic alterations, either qualitative or quantitative, conspicuous in this region, also, which has been already discussed for insular and southern Italy (B. 2; C. 2, 3), and could be exemplified for the Roman region as well (C. 4). As regards one or two individual phenomena, it must also be confessed that the Tuscan or literary Italian is not so well preserved as some other Neo-Latin tongues. Thus, French always keeps in the beginning of words the Latin formulae cl, pi, fl (clef, plaisir, fleur, in contrast with the Italian chiave, piacere, fiore) ; but the Italian makes up for this by the greater vigour with which it is wont to resolve the same formula within the words, and by the greater symmetry thus produced between the two series (in opposition to the French clef, clave, we have, for example, the French ceil, oclo; whereas, in the Italian, chiave and occhio correspond to each other). The Italian as well as the Rumanian has lost the ancient sibilant at the end (-s of the plurals, of the nominative singular, of the 2nd persons, &c), which throughout the rest of the Romance area has been preserved more or less tenaciously; and consequently it stands lower than old Provencal and old French, as far as true declension or, more precisely, the functional distinction between the forms of the casus rectus and the casus obliquus is concerned. But even in this respect the superiority of French and Provencal has proved merely transitory, and in their modern condition all the Neo-Latin forms of speech are generally suipassed by Italian even as regards the pure grammatical consistency of the noun. In conjugation Tuscan has lost that tense which for the sake of brevity we shall continue to call the pluperfect indicative; though it still survives outside of Italy and in other dialectal types of Italy itself (C. 36; cf. B. 2). It has also lost the futurum exactum, or perfect subjunctiveˆ which is found in Spanish and Rumanian. But no one would on that account maintain that the Italian conjugation is less truly Latin than the Spanish, the Rumanian, or that of any other Neo-Latin language. It is, on the contrary, by far the most distinctively Latin as regards the tradition both of form and function, although many effects of the principle of analogy are to be observed, sometimes common to Italian with the

other Neo-Latin languages and sometimes peculiar to itself.

Those who find it hard to believe in the ethnological explana-

tion of linguistic varieties ought to be convinced by any example so clear as that which Italy presents in the difference between the Tuscan or purely Italian type on the one side and the Gallo- Italic on the other. The names in this instance correspond exactly to the facts of the case. For the Gallo-Italic on either side of the Alps is evidently nothing else than a modification — varying in degree, but always very great — of the vulgar Latin, due to the reaction of the language or rather the oral tendencies of the Celts who succumbed to the Roman civilization. In other words, the case is one of new ethnic individualities arising from the fusion of two national entities, one of which, numerically more or less weak, is so far victorious that its speech is adopted, while the other succeeds in adapting that speech to its own habits of utterance. Genuine Italian, on the other hand, is not the result of the combination or conflict of the vulgar Latin with other tongues, but is the pure development of this alone. In other words, the case is that of ah ancient national fusion in which vulgar Latin itself originated. Here that is native which in the other case was intrusive. This greater purity of constitution gives the language a persistency which approaches permanent stability. There is no Old Italian to oppose to Modern Italian in the same sense as we have an Old French to oppose to a Modern French. It is true that in the old French writers, and even in the writers who used the dialects of Upper Italy, there was a tendency to bring back the popular forms to their ancient dignity; and it is true also that the Tuscan or literary Italian has suffered from the changes of centuries; but nevertheless it remains undoubted that in the former cases we have to deal with general transformations between old and new, while in the latter it is evident that the language of Dante continues to be the Italian of modern speech and literature. This character of invariability has thus been in direct proportion to the purity of its Latin origin, while, on the contrary, where popular Latin has been adopted by peoples of foreign speech, the elaboration which it has undergone along the lines of their oral tendencies becomes always the greater the farther we get away from the point at which the Latin reached them, — in proportion, that is, to the time and space through which it has been transmitted in these foreign mouths. 1

As for the primitive seat of the literary language of Italy, not only must it be regarded as confined within the limits of that narrower Tuscany already described; strictly speaking, it must be identified with the city of Florence alone. Leaving out of account, therefore, a small number of words borrowed from other Italian dialects, as a certain number have naturally been borrowed from foreign tongues, it may be said that all that was not Tuscan was eliminated from the literary form of speech. If we go back to the time of Dante, we find, throughout almost all thedialects of the mainland with the exception of Tuscan, the change of vowels between singular and plural seen in paese, paisi; quello, quilli; amore, amuri (see B. i; C. 3 b); but the literary language knows nothing at all of such a phenomenon, because it was unknown to the Tuscan region. But in Tuscan itself there were differences between Florentine and non- Florentine; in Florentine, e.g. it was and is usual to say unto, giunto, punto, while the non- Florentine had it onto, gionlo, ponto, (Lat. unctu, &c); at Florence they say piazza, mezzo, while elsewhere (at Lucca, Pisa) they say or used to say, piassa, messo. Now, it is precisely the Florentine forms which alone have currency in the literary language.

In the ancient compositions in the vulgar tongue, especially in poetry, non-Tuscan authors on the one hand accommodated their own dialect to the analogy of that which they felt to be the purest representative of the language of ancient Roman culture, while the Tuscan authors in their turn did not refuse to adopt the forms which had received the rights of citizenship from the

1 A complete analogy is afforded by the history of the Aryan or Sanskrit language in India, which in space and time shows always more and more strongly the reaction of the oral tendencies of the aboriginal races on whom it has been imposed. Thus the Pali presents the ancient Aryan organism in a condition analogous to that of 1 he oldest French, and the Prakrit of the Dramas, on the other hand, in a condition like that of modern French.

literary celebrities of other parts of Italy. It was this state of matters which gave rise in past times to the numerous disputes about the true fatherland and origin of the literary language of the Italians. But these have been deprived of all right to exist by the scientific investigation of the history of that language. If the older Italian poetry assumed or maintained forms alien to Tuscan speech, these forms were afterwards gradually eliminated, and the field was left to those which were purely Tuscan and indeed purely Florentine. And thus it remains absolutely true that, so far as phonetics, morphology, rudimental syntax, and in short the whole character and material of

words and sentences are concerned, there is no literary language of Europe that is more thoroughly characterized by homogeneity and oneness, as if it had come forth in a single cast from the furnace, than the Italian.

But on the other hand it remains equally true that, so far as concerns a living confidence and uniformity in the use and style of the literary language — that is, of this Tuscan or Florentine material called to nourish the civilization and culture of all the Italians — the case is not a little altered, and the Italian nation appears to enjoy less fortunate conditions than other nations of Europe. Modern Italy had no glowing centre for the life of the whole nation into which and out of which the collective thought and language could be poured in ceaseless current for all and by all. Florence has not been Paris. Territorial contiguity and the little difference of the local dialect facilitated in the modern Rome the elevation of the language of conversation to a level with the literary language that came from Tuscany. A form of speech was thus produced which, though certainly destitute of the grace and the abundant flexibility of the Florentine, gives a good idea of what the dialect of a city becomes when it makes itself the language of a nation that is ripening its civilization in many and dissimilar centres. In such a case the dialect loses its slang and petty localisms, and at the same time also somewhat of its freshness; but it learns to express with more conscious sobriety and with more assured dignity the thought and the feeling of the various peoples which are fused in one national life. But what took place readily in Rome could not with equal ease happen in districts whose dialects were far removed from the Tuscan. In Piedmont, for example, or in Lombardy, the language of conversation did not correspond with the language of books, and the latter accordingly became artificial and laboured. Poetry was least affected by these unfortunate conditions; for poetry may work well with a multiform language, where the need and the stimulus of the author's individuality assert themselves more strongly. But prose suffered immensely, and the Italians had good cause to envy the spontaneity and confidence of foreign literatures — of the French more particularly. In this reasonable envy lay the justification and the strength of the Manzoni school, which aimed at that absolute naturalness of the literary language, that absolute identity between the language of conversation and that of books, which the bulk of the Italians could reach and maintain only by naturalizing them- selves in the living speech of modern Florence. The revolt of Manzoni against artificiality and mannerism in language and style was worthy of his genius, and has been largely fruitful. But the historical

difference between the case of France (with the colloquial language of Paris) and that of Italy (with the colloquial language of Florence) implies more than one difficulty of principle; in the latter case there is sought to be produced by deliberate effort of the literati what in the former has been and remains the necessary and spontaneous product of the entire civilization. Manzoni's theories too easily lent themselves to deplorable exaggerations; men fell into a new artificiality, a manner of writing which might be called vulgar and almost slangy. The remedy for this must lie in the regulating power of the labour of the now regenerate Italian intellect, — a labour ever growing wider in its scope, more assiduous and more thoroughly united. The most ancient document in the Tuscan dialect is a very short fragment of a jongleur's song (12th century; see Monaci, Creslomazia, 9-10). After that there is nothing till the 13th century. P. Santini has published the important and fairly

numerous fragments of a book of notes of some Florentine bankers, of the year 1211. About the middle of the century, our attention is arrested by the Memoriali of the Sienese Matasala di Spinello. To 1278 belongs the MS. in which is preserved the Pistojan version of the Traltati morali of Albertano, which we owe to Sofredi del Grathia. The Riccardian Tristano, published and annotated by E. G. Parodi, seems to belong to the end of the 13th and beginning of the 14th centuries. For other 13th- century writings see Monaci, op. cit. 31-32, 40, and Parodi, Giornale storico della letteratura italiana, x. 178-179. For the question concerning language, see Ascoli, Arch, glolt. i. v. et seq.; D' Ovidio, Le Correzioni ai Promessi Sposi e la questione della lingua, 4th ed. Naples, 1895.

Literature. — K. L. Fernow in the third volume of his Romische Studien (Zurich, 1806-1808) gave a good survey of the dialects of Italy. The dawn of rigorously scientific methods had not then appeared; but Fernow's view is wide and genial. Similar praise is due to Biondelli's work Sui dialetti gallo-italici (Milan, 1853), which, however, is still ignorant of Diez. August Fuchs, between Fernow and Biondelli, had made himself so far acquainted with the new methods; but his exploration {Vber die sogenannten unregel- massigen Zeitwbrter in den romanischen Sprachen, nebst Andeutungen iiber die wichiigsten romanischen Mundarten, Berlin, 1840), though certainly of utility, was not very successful. Nor can the rapid survey of the Italian dialects given by Friedrich Diez be ranked among the

happiest portions of his great masterpiece. Among the followers of Diez who distinguished themselves in this department the first outside of Italy were certainly Mussafia, a cautious ard clear continuator of the master, and the singularly acute Hugo Schuchardt. Next came the Archivio glottologico italiano (Turin, 1873 and onwards. Up to 1897 there were published 16 vols.), the lead in which was taken by Ascoli and G. Flechia (d. 1892), who, together with the Dalmatian Adolf Mussafia (d. 1906), may be looked upon as the founders of the study of Italian dialects, and who have applied to their writings a rigidly methodical procedure and a historical and comparative standard, which have borne the best fruit. For historical studies dealing specially with the literary language, Nannucci, with his good judgment and breadth of view, led the way; we need only mention here his Analisi critica dei verbi italiani (Florence, 1844). But the new method was to show how much more it was to and did effect. When this movement on the part of the scholars men- tioned above became known, other enthusiasts soon joined them, and the Arch, glottologico developed into a school, which began to produce many prominent works on language [among the first in order of date and merit may be mentioned " Gli Allotropi italiani," by U. A. Canello (1887), Arch, glott. ui. 285-419; and Le Origini della lingua poetica italiana, by N. Caix (d. 1882), (Florence, 1880)], and studies on the dialects. We shall here enumerate those of them which appear for one reason or another to have been the most notable. But, so far as works of a more general nature are con- cerned, we should first state that there have been other theories as to the classification of the Italian dialects (see also above the various notes on B. 1, 2 and C. 2) put forward by W. Meyer-Lubke (Ein- fiihrung in das Studium der romanischen Sprachwissenschaft, Heidel- berg, 1901 ; pp. 21-22), and M. Bartoli {Altitalienische Chrestomathie, von P. Savj-Lopez und M. Bartoli, Strassburg, 1903, pp. 171 et seq. 193 et seq., and the table at the end of the volume). W. Meyer- Liibke afterwards filled in details of the system which he had sketched in Grober's Grundriss der romanischen Philologie, i., 2nd ed. (1904), pp. 696 et seq. And from the same author comes that masterly work, the Italienische Grammatik (Leipzig, 1890), where the language and its dialects are set out in one organic whole, just as they are placed together in the concise chapter devoted to Italian in the above- mentioned Grundriss (pp. 637 et seq.). We will now give the list, from which we omit, however, the works quoted incidentally throughout the text: B. I o: Parodi, Arch, glott. xiv. I sqq., xv. I sqq., xvi. 105 sqq. 333 sqq.; Poesie in dial, tabbiese del sec. X VII. illustrate da E. G. Parodi (Spezia, 1904) ; Schadel, Die Mundart von Ormea (Halle, 1903); Parodi, Studj romanzi, fascic. v.; b:

Giacomino, Arch, glolt. xv. 403 sqq.; Toppino, ib. xvi. 517 sqq.; Flechia, ib. xiv. Ill sqq.; Nigra, Miscell. Ascoli (Turin, 1901), 247 sqq.; Renier, // Gelindo (Turin, 1896); Salvioni, Rendiconti Islilulo lombardo, s. ii., vol. xxxvii. 522, sqq.; c: Salvioni, Fonetica del dialelto di Milano (Turin, 1884) ; Sludi di filol. romanza, viii. I sqq.; Arch, glolt. ix. 188 sqq. xiii. 355 sqq.; Rendic. 1st. lomb. s. ii., vol. xxxv. 905 sqq. ; xxxix. 477 sqq.; 505 sqq. 569 sqq. 603 sqq., xl. 719 sqq.; Bollettino storico della Svizzera italiana, xvii. and xviii. ; Michael, Der Dialekt des Poschiavotals (Halle, I9 5) ; v. Ettmayer, Bergamaskische Alpenmundarten (Leipzig, 1903); Romanische Forschungen, xiii. 321 sqq.; d: Mussafia, Darstellung der romagnolischen Mundart (Vienna, 1871); Gaudcnzi, / Suoni ecc. della ciltd. di Bologna (Turin, 1889) ; Ungarelli, Vocab. del dial, bologn. con una inlroduzione di A. Trauzzi sulla fonetica e sulla morfologia del dialetto (Bologna, 1901); Bertoni, // Dialetto di Modena (Turin, 1905); Pul'e, " Schizzo dei dialetti del Frignano " in L' Apennino modenese. 673 sqq. (Rocca S. Casciano, 1895);

xiv. 20

Piagnoli, Fonetica parmigiana (Turin, 1904); Restori, Note fonetiche sui parlari dell' alta valle di Macra (Leghorn, 1892) ;_ Gorra, Zeitschrift fiir romanische Philologie, xvi. 372 sqq.; xiv. 133 sqq.; Nicoli, Studi di filologia romanza, viii. 197 sqq. B. 2: Hofmann, Die logudoresische und campidanesische Mundart (Marburg, 1885); Wagner, Lautlehre der sudsardischen Mundarten (Malle a. S., 1907); Campus, Fpnetica del dialetto logudorese (Turin, 1901); Guarnerio, Arch, glott. xiii. 125 sqq., xiv. 131 sqq., 385 sqq. C. 1 : Rossi, Le Lettere di Messer Andrea Calmo (Turin, 1888); Wendriner, Die paduanische Mundart bei Ruzante (Breslau, 1889); Le Rime di Bartolomeo Cavassico notaio bellunese della prima meta" del sec. xvi. con illustraz. e note di v. Cian, e con illustrazioni linguistiche e lessico a cura di C. Salvioni (2 vols., Bologna, 1893-1894); Gartner, Zeitschr. fur roman. Philol. xvi. 183 sqq., 306 sqq.; Salvioni, Arch, glolt. xvi. 245 sqq.; Vidossich, Studi sui dialelto triestino (Triest, 1901); Zeitschr. fiir rom. Phil, xxvii. 749 sqq.; Ascoli, Arch, glott. xiv. 325 sqq.; Schneller, Die romanischen Volksmundarten in Sudlirol, i. (Gera, 1870); von Slop, Die tridenlinische Mundart (Klagenfurt, 1 888); Ive, / Dialetti ladino-veneti dell' Istria (Strassburg, 1900). C. 2: Guarnerio, Arch, glott. xiii. 125 sqq., xiv. 131 sqq-, 385 sqq. C. 3 a: Wentrup-Pitre, in Pitr6, Fiabe, novelle e racconti popolari siciliani, vol. i., pp. cxviii. sqq.; Schneegans, Laute und Lautentwickelung des sicil. Dialektes (Strassburg, 1888); De Gregorio, Saggio di fonetica siciliana (Palermo, 1890) ; Pirandello, Laute und Lautentwickelung der Mundart von Girgenti (Halle,

1891); Cremona, Fonetica del Caltagironese (Acireale, 189O; Santangelo, Arch, glott. xvi. 479 sqq.; La Rosa, Saggi di morfologia siciliana, i. Sosta'ntivi (Noto, 1901); Salvioni, Rendic. 1st. lomb. s. ii., vol. xl. 1046 sqq., 1 106 sqq., 1145 sqq.; 6: Scerbo, Sui dialetto calabro (Florence, 1886); Accattati's, Vocabolario del dial, calabrese (Cas- trovillari, 1895); Gentili, Fonetica del dialetto cosentino (Milan, 1897); Wentrup, Beilrage zur Kenntniss der neapolitanischen Mundart (Wittenberg, 1855); Subak, Die Konjugation tm Neapolitanischen (Vienna, 1897) ; Morosi, Arch, glott. iv. 117 sqq.; De Noto, Appunti di fonetica sui dial, di Taranlo (Trani, 1897); Subak, Das Zeitwort in der Mundart von Parent (Briinn, 1897); Panareo, Fonetica del dial, di Maglie d' Otranto (Milan, 1903) ; Nitti di Vito, II Dial, di Bari, part 1, " Vocalismo moderno (Milan, 1896); Abbatescianni, Fonologia del dial, barese (Avellino, 1896); Zingarelli, Arch, glott. xv. 83 sqq., 226 sqq.; Ziccardi, Studi glottologici, iv. 171 sqq.; D' Ovidio, Arch, glott. iv. 145 sqq., 403 sqq.; Finamore, Vocabolario dell' uso abruzzese (2nd ed., Citta di Castello, 1893); Rollin, Mittei- lung XIV. der Gesellschaft zur Forderung deutscher Wissenschaft, Kunst und Literatur in Bbhmen (Prague, 1901); De Lollis, Arch. glolt. xii. 1 sqq., 187 sqq.; Miscell. Ascoli, 275 sqq.; Savini, La Grammatica e il lessico del dial, teramano (Turin, 1881). C. 4: Merlo, Zeitschr. f. roman. Phil., xxx. II sqq., 438 sqq., xxxi. 157 sqq.; E. Monaci (notes on old Roman), Rendic. dei Lincei, Feb. 21st, 1892, p. 94 sqq.; Rossi-Case, Bollett. di stor. patria degli Abruzzi, vi.; Crocioni, Miscell. Monaci, pp. 429 sqq.; Ceci, Arch, glott. x. 167 sqq.; Parodi, ib. xiii. 299 sqq.; Campanelli, Fonetica d,el dial. reatino (Turin, 1896); Verga, Sonelti e allre poesie di R. Torelli in dial, perugino (Milan, 1895) ; Bianchi, II Dialetto e la etnografia di CittA di Castello (Citta di Castello, 1888); Neumann-Spallart, Zeitschrift fur roman. Phil, xxviii. 273 sqq., 450 sqq.; Weitere Beitrage zur Charakteristik des Dialektes der Marche (Halle a. S., 1907); Crocioni, Sludi di fit. rom., ix. 617 sqq.; Studi romanzi, fasc. 3 , 113 sqq., // Dial, di Arcevia (Rome, 1906) ; Lindsstrom, Studi romanzi, fasc. 5 , 237 sqq. ; Crocioni, ib. 27 sqq. D. : Parodi, Romania, xviii. ; Schwenke, De dialecto quae carminibus popularibus tuscanicis a Tigrio editis continetur (Leipzig, 1872); Pieri, Arch, glott. xii. 107 sqq., 141 sqq., 161 sqq.; Miscell. Caix-Canello, 305 sqq.; Note sui dialetto aretino (Pisa, 1 886); Zeitschr. fiir rom. Philol. xxviii. 161 sqq.; Salvioni, Arch, glott. xvi. 395 sqq.; Hirsch, Zeitschrift f. rom. Philol. ix. 513 sqq., x. 56 sqq., 411 sqq. For re- searches on the etymology of all the Italian dialects, but chiefly of those of Northern Italy, the Beitrag zur Kunde der norditalienischen Mundarten im XV. Jahrhundert of Ad. Mussafia (Vienna, 1873) and the Postille

etimologiche of Giov. Flechia (Arch, glott. ii., hi.) are of the greatest importance. Biondelli's book is of no small service also for the numerous translations which it contains of the Prodigal Son into Lombard, Piedmontese and Emilian dialects. A dialogue translated into the vernaculars of all parts of Italy will be found in Zuccagni Orlandini's Raccolta di dialetti italiani con illustrazioni etnologiche (Florence, 1864). And every dialectal division is abund- antly represented in a series of versions of a short novel of Boc- caccio, which Papanti has published under the title I Parlari italiani in Certaldo, &c. (Leghorn,. 1875).

[A very valuable and rich collection of dialectal essays on the most ancient documents for all parts of Italy is to be found in the Crestomazia italiana dei primi secoli of E. Monaci (Citta di Castello, 1889-1897); see also in the Altitalienische Chrestomathie of P. Savj-Lopez and M. Bartoli (Strassburg, 1903).] (G. I. A.; C. S.)*

ITALIAN LITERATURE. 1. Origins.— One characteristic fact distinguishes the Italy of the middle ages with regard to its in- tellectual conditions — the tenacity with which the Latin tradition clung to life (see Latin). At the end of the 5th century the

northern conquerors invaded Italy. The Roman world crumbled to pieces. A new kingdom arose at Ravenna under Theodoric, and there learning was not extinguished. The liberal arts flourished, the very Gothic kings surrounded themselves with masters of rhetoric and of grammar. The names of Cassiodorus, of Boetius, of Symmachus, are enough to show how Latin thought maintained its power amidst the political effacement of the Roman empire. And this thought held its ground throughout the subsequent ages and events. Thus, while elsewhere all culture had died out, there still remained in Italy some schools of laymen, 1 and some really extraordinary men were educated in them, such as Ennodius, a poet more pagan than Christian, Arator, Fortunatus, Venantius Jovannicius, Felix the gram- marian, Peter of Pisa, Paulinus of Aquileia and many others, in all of whom we notice a contrast between the barbarous age they lived in and their aspiration towards a culture that should reunite them to the classical literature of Rome. The Italians never had much love for theological studies, and those who were addicted to them preferred Paris to Italy. It was something more practical, more positive, that had attraction for the Italians, and especially the study

of Roman law. This zeal for the study of jurisprudence furthered the establishment of the medieval universities of Bologna, Padua, Vicenza, Naples, Salerno, Modena and Parma; and these, in their turn, helped to spread culture, and to prepare the ground in which the new vernacular literature was afterwards to be developed. The tenacity of classical traditions, the affection for the memories of Rome, the pre- occupation with political interests, particularly shown in the wars of the Lombard communes against the empire of the Hohenstaufens, a spirit more naturally inclined to practice than to theory — all this had a powerful influence on the fate of Italian literature. Italy was wanting in that combination of conditions from which the spontaneous life of a people springs. This was chiefly owing to the fact that the history of the Italians never underwent interruption, — no foreign nation having come in to change them and make them young again. That childlike state of mind and heart, which in other Latin races, as well as in the Germanic, was such a deep source of poetic inspiration, was almost utterly wanting in the Italians, who were always much drawn to history and very little to nature; so, while legends, tales, epic poems, satires, were appearing and spreading on all sides, Italy was either quite a stranger to this movement or took a peculiar part in it. We know, for example, what the Trojan traditions were in the middle ages; and we should have thought that in Italy — in the country of Rome, retaining the memory of Aeneas and Virgil — they would have been specially developed, for it was from Virgil that the medieval sympathy for the conquered of Troy was derived. In fact, however, it was not so. A strange book made its appearance in Europe, no one quite knows when, the Historia de excidio Trojae, which purported to have been written by a certain Dares the Phrygian, an eye-witness of the Trojan war. In the middle ages this book was the basis of many literary labours. Benoit de Sainte-More composed an interminable French poem founded on it, which afterwards in its turn became a source for other poets to draw from, such as Herbort of Fritzlar and Conrad of Wiirzburg. Now for the curious phenomenon displayed by Italy. Whilst Benoit de Sainte-More wrote his poem in French, taking his material from a Latin history, whilst the two German writers, from a French source, made an almost original work in their own language — an Italian, on the other hand, taking Benoit for his model, composed in Latin the Historia deslructionis Trojae; and this Italian was Guido delle Colonne of Messina, one of the vernacular poets of the Sicilian school, who must accordingly have known well how to use his own language. Guido was an imitator of the Provencals; he understood French, and yet wrote his own book in Latin, nay, changed the romance of the Trouba- dour into serious history. Much

the same thing occurred with the other great legends. That of Alexander the Great {q.v.) gave rise to many French, German and Spanish poems, — in Italy,

'See Giesebrecht, De litter arum studiis apud Italos primis ntedi- aevi saecidis (Berlin, 1845.)

only to the Latin distichs of Qualichino of Arezzo. The whole of Europe was full of the legend of Arthur (q.v.). The Italians contented themselves with translating and with abridging the French romances, without adding anything of their own. The Italian writer could neither appropriate the legend nor colour it with his own tints. Even religious legend, so widely spread in the middle ages, and springing up so naturally as it did from the heart of that society, only put out a few roots in Italy. Jacopo di Voragine, while collecting his lives of the saints, remained only an historian, a man of learning, almost a critic who seemed doubtful about the things he related. Italy had none of those books in which the middle age, whether in its ascetic or its chivalrous character, is so strangely depicted. The intellectual life of Italy showed itself in an altogether special, positive, almost scientific, form, in the study of Roman law, in the chronicles of Farfa, of'Marsicano and of many others, in transla- tions from Aristotle, in the precepts of the school of Salerno, in the travels of Marco Polo — in short, in a long series of facts which seem to detach themselves from the surroundings of the middle age, and to be united on the one side with classical Rome and on the other with the Renaissance.

*The necessary consequence of all this was that the Latin language was most tenacious in Italy, and that the elaboration of the new vulgar tongue was very slow, — being in fact ˆ; preceded by two periods of Italian literature in foreign aa(/ French languages. That is to say, there were many Italians prepara- who wrote Provencal poems, such as the Marchese *»& Alberto Malaspina (12th century), Maestro Ferrari of P erlods – Ferrara, Cigala of Genoa, Zorzi of Venice, Sordello of Mantua, Buvarello of Bologna, Nicoletto of Turin and others, who sang of love and of war, who haunted the courts, or lived in the midst of the people, accustoming them to new sounds and new har- monies. At the same time there was other poetry of an epic kind, written in a mixed language, of which French was the basis, but in which forms and words belonging to the Italian dialects were continually mingling. We find in it hybrid words exhibiting a treatment of sounds according to the rules of both languages, — French words with Italian terminations, a system of vocalization within the words approaching the Italo-Latin usage, — in short,*

something belonging at once to both tongues, as it were an attempt at interpenetration, at fusion. Such were the Chansons de Geste, Macaire, the Entree en Espagne written by Niccola of Padua, the Prise de Pampelune and some others. All this preceded the appearance of a purely Italian literature. .

In the Franco-Italian poems there was, as it were, a clashing, a struggle between the two languages, the French, however, gaining the upper hand. This supremacy became Dialect gradually less and less. As the struggle continued between French and Italian, the former by degrees lost as much as the latter gained. The hybridism recurred, but it no longer predominated. In the Bovo d' Antona and the Rainardo e Lesengrino the Venetian dialect makes itself clearly felt, although the language is influenced by French forms. Thus these writings, which G. I. Ascoli has called " miste " (mixed), immediately preceded the appearance of purely Italian works.

*It is now an established historical fact that there existed no writing in Italian before the 13th century. It was in the course of that century, and especially from 1230 onwards, that the new literature largely unfolded and developed ^^*

itself. This development was simultaneous in the whole peninsula, only there was a difference in the subject-matter of the art. In the north, the poems of Giacomino of Verona and Bonvecino of Riva were specially religious, and were intended to be recited to the people. They were written in a dialect partaking of the Milanese and the Venetian; and in their style they strongly bore the mark of the influence of French narrative poetry. They may be considered as belonging to the popular kind of poetry, taking the word, however, in a broad sense. Perhaps this sort of composition was encouraged by the old custom in the north of Italy of listening in the piazzas and on the highways to the songs of the jongleurs. To the very same I crowds who had been delighted with the stories of romance,

and who had listened to the story of the wickedness of Macaire and the misfortunes of Blanciflor, another jongleur would sing of the terrors of the Babilenia Infernale and the blessedness of the Gerusalemme celeste, and the singers of religious poetry vied with

those of the Chansons de Geste.

In the south of Italy, on the other hand, the love-song prevailed, of which we have an interesting specimen in the Contrasio attributed to Ciullo d'Alcamo, about which modern Italian critics have much exercised themselves. This " contrasto " (dispute) between a man and a woman in Sicilian dialect certainly must not be considered as the most ancient or as the only southern poem of a popular kind. It belongs without doubt to the time of the emperor Frederick II., and is important as a proof that there existed a popular poetry independent of literary poetry. The Contrasto of Ciullo d'Alcamo is the most remarkable relic of a kind of poetry that has perished or which perhaps was smothered by the ancient Sicilian literature. Its distinguishing point was its possessing all the opposite qualities to the poetry of the rhymers of what we shall call the Sicilian school. Vigorous in the expression of feelings, it seems to come from a real sentiment. The conceits, which are some times most bold and very coarse, show that it proceeded from the lowest grades of society. Everything is original in Ciullo's Contrasto. Conventionality has no place in it. It is marked by the sensuality characteristic of the people of the South.

The reverse of all this happened in the Siculo-Provencal school, at the head of which was Frederick II. Imitation was the fundamental characteristic of this school, to which Provencal belonged Enzio, king of Sardinia, Pier delle Vigne, School. Inghilfredi, Guido and Odo delle Colonne, Jacopo d'Aquino, Rugieri Pugliese, Giacomo da Lentino, Arrigo Testa and others. These rhymers never moved a step beyond the ideas of chivalry; they had no originality; they did not sing of what they felt in their heart; they abhorred the true and the real. They only aimed at copying as closely as they could the poetry of the Provencal troubadours. 1 The art of the Siculo-Provencal school was born decrepit, and there were many reasons for this — first, because the chivalrous spirit, from which the poetry of the troubadours was derived, was now old and on its death-bed; next, because the Provencal art itself, which the Sicilians took as their model, was in its decadence. It may seem strange, but it is true, that when the emperor Frederick II., a philosopher, a statesman, a very original legislator, took to writing poetry, he could only copy and amuse himself with absolute puerilities. His art, like that of all the other poets of his court, was wholly conventional, mechanical, affected. It was completely wanting in what constitutes poetry — ideality, feeling, sentiment, inspiration. The Italians have had great disputes among themselves about the original form of the poems of the Sicilian school, that is to say, whether they were written in

Sicilian dialect, or in that language which Dante called " volgare, illustre, aulico, cortigiano." But the critics of most authority hold that the primitive form of these poems was the Sicilian dialect, modified for literary purposes with the help of Provencal and Latin; the theory of the "lingua illustre" has been almost entirely rejected, since we cannot say on what rules it could have been founded, when literature was in its infancy, trying its feet, and lisping its first words. The Sicilian certainly, in accordance with a tendency common to all dialects, in passing from the spoken to the written form, must have gained in dignity; but this was not enough to create the so-called " lingua illustre," which was upheld by Perticari and others on grounds rather political than literary.

In the 13th century a mighty religious movement took place in Italy, of which the rise of the two great orders of Saint Francis Religious and Saint Dominic was at once the cause and the lyric effect. Around Francis of Assisi a legend has grown

up in which naturally the imaginative element prevails. Yet from some points in it we seem to be able to infer that its hero had a strong feeling for nature, and a heart open

1 See Gaspary, Die sicilianische Dichterschule des Tjten Jahrhunderts (Berlin, 1878).

poetry la Umbria.

to the most lively impressions. Many poems are attributed to him. The legend relates that in the eighteenth year of his penance, when almost rapt in ecstasy, he dictated the Cantico del Sole. Even if this hymn be really his, it cannot be considered as a poetical work, being written in a kind of prose simply marked by assonances. As for the other poems, which for a long time were believed to be by Saint Francis, their spuiiousness is now generally recognized. The true poet who represented in all its strength and breadth the religious feeling that had made special progress in Umbria was Jacopo dei Benedetti of Todi, known as Jacopone. The story is that sorrow at the sudden death of his wife had disordered his mind, and that, having sold all he possessed and given it to the poor, he covered himself with rags, and took pleasure in being laughed at, and followed by a crowd of people who mocked him and called after him " Jacopone, Jacopone." We do not know whether this be true. What we do know is that a vehement passion must have stirred his heart and maintained a despotic hold over him, the passion of divine love. Under its influence Jacopone went on raving for years and years, subjecting

himself to the severest sufferings, and giving vent to his religious intoxication in his poems. There is no art in him, there is not the slightest indication of deliberate effort; there is only feeling, a feeling that absorbed him, fascinated him, penetrated him through and through. His poetry was all inside him, and burst out, not so much in words as in sighs, in groans, in cries that often seem really to come from a mono- maniac. But Jacopone was a mystic, who from his hermit's cell looked out into the world and specially watched the papacy, scourging with his words Celestine V. and Boniface VIII. He was put in prison and laden with chains, but his spirit lifted itself up to God, and that was enough for him. The same feeling that prompted him to pour out in song ecstasies of divine love, and to despise and trample on himself, moved him to reprove those who forsook the heavenly road, whether they were popes, prelates or monks. In Jacopone there was a strong originality, and in the period of the origins of Italian literature he was one of the most characteristic writers.

The religious movement in Umbria was followed by another literary phenomenon, that of the religious drama. In 1258 an old hermit, Raniero Fasani, leaving the cavern in which he had lived for many years, suddenly appeared religious at Perugia. These were very sad times for Italy. The drama. quarrels in the cities, the factions of the Ghibellines and the Guelphs, the interdicts and excommunications issued by the popes, the reprisals of the imperial party, the cruelty and tyranny of the nobles, the plagues and famines, kept the people in constant agitation, and spread abroad mysterious fears. The commotion was increased in Perugia by Fasani, who repre- sented himself as sent by God to disclose mysterious visions, and to announce to the world terrible visitations. Under the influence of fear there were formed " Compagnie di Disciplinanti," who, for a penance, scourged themselves till they drew blood, and sang " Laudi " in dialogue in their confraternities. These " Laudi," closely connected with the liturgy, were the first example of the drama in the vulgar tongue of Italy. They were written in the Umbrian dialect, in verses of eight syllables, and of course they have not any artistic value. Their develop- ment, however, was rapid. As early as the end of the same 13th century we have the Devozioni del Giovedl e Venerdi Santo, which have some dramatic elements in them, though they are still connected with the liturgical office. Then we have the representation di un Monaco che andb al servizio di Bio (" of a monk who entered the service of God "), in which there is already an approach to the definite form which this kind of literary work assumed in the following centuries.

In the 13th century Tuscany was peculiarly circumstanced both as regards its literary condition and its political life. The Tuscans spoke a dialect which most closely resembled the mother-tongue, Latin— one which afterwards poetry. became almost exclusively the language of literature, and which was already regarded at the end of the 13th century as surpassing the others; " Lingua Tusca magis apta est ad

literam sive literaturam " : thus writes Antonio da Tempo of Padua, born about 1275. Being very little or not at all affected by the Germanic invasion, Tuscany was never subjected to the feudal system. It had fierce internal struggles, but they did not weaken its life; on the contrary, they rather gave it fresh vigour and strengthened it, and (especially after the final fall of the Hohenstaufens at the battle of Benevento in 1266) made it the first province of Italy. From 1266 onwards Florence was in a position to begin that movement of political reform which in 1282 resulted in the appointment of the Priori delle Arti, and the establishment of the Arti Minori. This was after- wards copied by Siena with the Magistrato dei Nove, by Lucca, by Pistoia, and by other Guelph cities in Tuscany with similar popular institutions. In this way the gilds had taken the govern- ment into their hands, and it was a time of both social and political prosperity. It was no wonder that literature also rose to an unlooked-for height. In Tuscany, too, there was some popular love poetry; there was a school of imitators of the Sicilians, their chief being Dante of Majano; but its literary originality took another line — that of humorous and satirical poetry. The entirely democratic form of government created a style of poetry which stood in the strongest antithesis to the medieval mystic and chivalrous style. Devout invocation of God or of a lady came from the cloister and the castle; in the streets of the cities everything that had gone before was treated with ridicule or biting sarcasm. Folgore of San Gimignano laughs when in his sonnets he tells a party of Sienese youths what are the occupations of every month in the year, or when he teaches a party of Florentine lads the pleasures of every day in the week. Cene della Chitarra laughs when he parodies Folgore's sonnets. The sonnets of Rustico di Filippo are half fun and half satire; laughing and crying, joking and satire, are all to be found in Cecco Angiolieri of Siena, the oldest " humorist " we know, a far-off precursor of Rabelais, of Montaigne, of Jean Paul Richter, of Sydney Smith. But another kind of poetry also began in Tuscany. Guittone

d'Arezzo made art quit chivalrous for national motives, Provencal forms for Latin. He attempted political poetry, and, although his work is full of the strangest obscurities, he prepared the way for the Bolognese school. In the 13th century Bologna was the city of science, and philo- sophical poetry appeared there. Guido Guinicelli was the poet after the new fashion of the art. In him the ideas of chivalry are changed and enlarged; he sings of love and, together with it, of the nobility of the mind. The reigning thought in Guinicelli's Canzoni is nothing external to his own subjectivity. His specu- lative mind, accustomed to wandering in the field of philosophy, transfuses its lucubrations into his art. Guinicelli's poetry has some of the faults of the school of Guittone d'Arezzo: he reasons too much; he is wanting in imagination; his poetry is a product of the intellect rather than of the fancy and the heart. Nevertheless he marks a great development in the history of Italian art, especially because of his close connexion with Dante's lyric poetry.

*But before we come to Dante, certain other facts, not, however, unconnected with his history, must be noticed. In the 13th century, there were several poems in the allegorical ■**" j style. One of these is by Brunetto Latini, who, it poetry. is well known, was attached by ties of strong affection to Alighieri. His Tesoretlo is a short poem, in seven- syllable verses, rhyming in couplets, in which the author professes to be lost in a wilderness and to meet with a lady, who is Nature, from whom he receives much instruction. We see here the vision, the allegory, the instruction with a moral object — three elements which we shall find again in the Divina Commedia. Francesco da Barberino, a learned lawyer who was secretary to bishops, a judge, a notary, wrote two little allegorical poems — the Documenti d' amore and Del reggimento e dei costumi delle donne. Like the Tesoretlo, these poems are of no value as works of art, but are, on the other hand, of importance in the history of manners. A fourth allegorical work was the Intelligenza, by some attributed to Dino Compagni, but probably not his, and only a version of French poems.*

While the production of Italian poetry in the 13th century was abundant and varied, that of prose was scanty. The oldest specimen dates from 1231, and consists of short notices of entries and expenses by Mattasala di J^f ete . Spinello dei Lambertini of Siena. In 1253 and 1260 tury. there are some commercial letters of other Sienese. But there is no sign of literary prose. Before we come to any, we meet with a phenomenon like that we noticed in regard to poetry. Here again we find a period of Italian literature in French. Halfway

on in the century a certain Aldobrando or Aldobrandino (it is not known whether he was of Florence or of Siena) wrote a book for Beatrice of Savoy, countess of Provence, called Le Regime du corps. In 1267 Martino da Canale wrote in the same " langue d'oil " a chronicle of Venice. Rusticiano of Pisa, who was for a long while at the court of Edward I. of England, composed many chivalrous romances, derived from the Arthurian cycle, and subsequently wrote the travels of Marco Polo, which may perhaps have been dictated by the great traveller himself. And finally Brunetto Latini wrote his Tesoro in French.

Next in order to the original compositions in the langue d'oil come the translations or adaptations from the same. There are some moral narratives taken from religious legends; a romance of Julius Caesar; some short histories of ancient knights; the Tawla rotonda; translations of the Viaggi of Marco Polo and of the Tesoro of Latini. At the same time there appeared translations from Latin of moral and ascetic works, of histories and of treatises on rhetoric and oratory. Up to very recent times it was still possible to reckon as the most ancient works in Italian prose the Cronaca of Matteo Spinello da Giovenazzo, and the Cronaca of Ricordano Malespini. But now both of them have been shown to be forgeries of a much later time. Therefore the oldest prose writing is a scientific book — the Composizione del mondo by Ristoro d' Arezzo, who lived about the middle of the 13th century. This work is a copious treatise on astronomy and geography. Ristoro was superior to the other writers of the time on these subjects, because he seems to have been a careful observer of natural phenomena, and consequently many of the things he relates were the result of his personal investigations. There is also another short treatise, De regimine rectoris, by Fra Paolino, a Minorite friar of Venice, who was probably bishop of Pozzuoli, and who also wrote a Latin chronicle. His treatise stands in close relation to that of Egidio Colonna, De regimine principum. It is written in the Venetian dialect.

The 13th century was very rich in tales. There is a collection called the Cento Novelle anliche, which contains stories drawn from Oriental, Greek and Trojan traditions, from ancient and medieval history, from the legends of Brittany, Provence and Italy, and from the Bible, from the local tradition of Italy as well as from histories of animals and old mythology. This book has a distant resemblance to the Spanish collection known as El Conde Lucanor. The peculiarity of the Italian book is that the stories are very short, and that they seem to be mere outlines to be filled in by the narrator as he goes along. Other prose novels were inserted by Francesco Barberino in

his work Del reggimento e dei costumi delle donne, but they are of much less importance than the others. On the whole the Italian novels of the 13th century have little originality, and are only a faint reflection of the very rich legendary literature of France. Some attention should be paid to the Lettere of Fra Guittone d'Arezzo, who wrote many poems and also some letters in prose, the subjects of which are moral and religious. Love of antiquity, of the traditions of Rome and of its language, was so strong in Guittone that he tried to write Italian in a Latin style, and it turned out obscure, involved and altogether barbarous. He took as his special model Seneca, and hence his prose assumed a bombastic style, which, according to his views, was very artistic, but which in fact was alien to the true spirit of art, and resulted in the extravagant and grotesque.

2. The Spontaneous Development of Italian Literature. — In the year 1282, the year in which the new Florentine constitution

of the " Arti minori " was completed, a period of literature New began that does not belong to the age of first begin

Tuscan nings, but to that of development. With the school School of Lapo Gianni, of Guido Cavalcanti, of Cino da of lytic Pistoia and Dante Alighieri, lyric poetry became ex- poetry. c] us i ve iy Tuscan. The whole novelty and poetic power of this school, which really was the beginning of Italian art, consist in what Dante expresses so happily —

" Quando Amore spira, noto, ed a quel modo Ch' ei detta dentro, vo significando" —

that is to say, in a power of expressing the feelings of the soul in the way in which love inspires them, in an appropriate and graceful manner, fitting form to matter, and by art fusing one with the other. The Tuscan lyric poetry, the first true Italian art, is pre-eminent in this artistic fusion, in the spontaneous and at the same time deliberate action of the mind. In Lapo Gianni the new style is not free from some admixture of the old associations of the Siculo-Provencal school. He wavered as it were between two manners. The empty and involved phraseo- logy of the Sicilians is absent, but the poet does not always rid himself of their influence. Sometimes, however, he draws freely from his own heart, and then the subtleties

and obscurities disappear, and his verse becomes clear, flowing and elegant.

Guido Cavalcanti was a learned man with a high conception of his art. He felt the value of it, and adapted his learning to it.

Cavalcanti was already a good deal out of sympathy c"w- w '^ tne me dieval spirit; he reflected deeply on his canti. pwn work, and from this reflection he derived his

poetical conception. His poems may be divided into two classes — those which portray the philosopher, " il sottilissimo dialettico," as Lorenzo the Magnificent called him, and those which are more directly the product of his poetic nature imbued with mysticism and metaphysics. To the first set belongs the famous poem Sulla natura d'amore, which in fact is a treatise on amorous metaphysics, and was annotated later in a learned way by the most renowned Platonic philosophers of the 15th century, such as Marsilius Ficinus and others. In other poems of Cavalcanti's besides this we see a tendency to subtilize and to stifle the poetic imagery under a dead weight of philosophy. But there are many of his sonnets in which the truth of the images and the elegance and simplicity of the style are admirable, and make us feel that we are in quite a new period of art. This is particularly felt in Cavalcanti's Ballate, for in them he pours himself out ingenuously and without affectation, but with an invariable and profound consciousness of his art. Far above all the others for the reality of the sorrow and the love displayed, for the melancholy longing expressed for the distant home, for the calm and solemn yearning of his heart for the lady of his love, for a deep subjectivity which is never troubled by metaphysical subtleties, is the ballata composed by Cavalcanti when he was banished from Florence with the party of the Bianchi in 1300, and took refuge at Sarzana.

The third poet among the followers of the new school was Cino da Pistoia, of the family of the Sinibuldi. His love poems

are so sweet, so mellow and so musical that they are Pistoia. on ly surpassed by Dante. The pains of love are

described by him with vigorous touches; it is easy to see that they are not feigned out real. The psychology of love and of sorrow nearly reaches perfection.

As the author of the Vita nuova, the greatest of all Italian poets, Dante also belongs to the same lyric school. In the lyrics .

of the Vila nuova (so called by its author to indicate U265- tnat ms ˆ rst meetm g Wltn Beatrice was the beginning 1321). f° r him of a life entirely different from that he had

hitherto led) there is a high idealization of love. It seems as if there were in it nothing earthly or human, and that the poet had his eyes constantly fixed on heaven while singing of his lad)'. Everything is supersensual, aerial, heavenly, and the real Beatrice is always gradually melting more and more into the symbolical one — passing out of her human nature and into the divine. Several of the lyrics of the Canzoniere deal with the xiv. 20 a

theme of the " new life "; but all the love poems do not refer to Beatrice, while other pieces are philosophical and bridge over to the Convito.

The work which made Dante immortal, and raised him above all other men of genius in Italy, was his Divina Commedia. An allegorical meaning is hidden under the literal one of this great epic. Dante travelling through Hell, Purgatory and Paradise, is a symbol of mankind aiming at the double object of temporal and eternal happiness. By the forest in which the poet loses himself is meant the civil and religious confusion of society, deprived of its two guides, the emperor and the pope. The mountain illuminated by the sun is universal monarchy. The three beasts are the three vices and the three powers which offered the greatest obstacles to Dante's designs: envy is Plorence, light, fickle and divided by the Bianchi and Neri; pride is the house of France; avarice is the papal court; Virgil represents reason and the empire. Beatrice is the symbol of the supernatural aid without which man cannot attain the supreme end, which is God.

But the merit of the poem does not lie in the allegory, which still connects it with medieval literature. What is new in it is the individual art of the poet, the classic art transfused for the first time into a Romance form. Dante is above all a great artist. Whether he describes nature, analyses passions, curses the vices or sings hymns to the virtues, he is always wonderful for the grandeur and delicacy of his art. Out of the rude medieval vision he has made the greatest work of art of modern times. He took the materials for his poem from theology, from philo- sophy, from history, from mythology — but more especially from his own passions, from hatred and love; and he has breathed the breath of genius into all these materials. Under the pen of the poet, the dead come to life again; they become men again, and speak the language of their time, of their passions. Farinata degli

Uberti, Boniface VIII., Count Ugolino, Manfred, Sordello, Hugh Capet, St Thomas Aquinas, Cacciaguida, St Benedict, St Peter, are all so many objective creations; they stand before us in all the life of their characters, their feelings, their habits.

Yet this world of fancy in which the poet moves is not only made living by the power of his genius, but it is changed by his consciousness. The real chastizer of the sins, the rewarder of the virtues, is Dante himself. The personal interest which he brings to bear on the historical representation of the three worlds is what most interests us and stirs us. Dante remakes history after his own passions. Thus the Divina Commedia can fairly be called, not only the most life-like drama of the thoughts and feelings that moved men at that time, but also the most clear and spontaneous reflection of the individual feelings of the poet, from the indignation of the citizen and the exile to the faith of the believer and the ardour of the philosopher. The Divina Corn- media- fixed and clearly defined the destiny of Italian literature, to give artistic lustre, and hence immortality, to all the forms of literature which the middle ages had produced. Dante begins the great era of the Renaissance.

Two facts characterize the literary life of Petrarch — classical research and the new human feeling introduced into his lyric poetry. Nor are these two facts separate; rather is the one the result of the other. The Petrarch who

Petrarch

(1304-

travelled about unearthing the works of the great 1374). Latin writers helps us to understand the Petrarch who, having completely detached himself from the middle ages, loved a real lady with a human love, and celebrated her in her life and after her death in poems full of studied elegance. Petrarch was the first humanist, and he was at the same time the first lyric poet of the modern school. His career was long and tempestuous. He lived for many years at Avignon, cursing the corruption of the papa) court; he travelled through nearly the whole of Europe; he corresponded with emperors and popes; he was considered the first man of letters of his time; he had honours and riches; and he always bore about within him discontent, melancholy and incapacity for satisfaction — three characteristics of the modern man.

His Canzoniere is divided into three parts — the first containing

the poems written during Laura's lifetime, the second the poems written after her death, the third the Trionfi. The one and only subject of these poems is love; but the treatment is full of variety in conception, in imagery and in sentiment, derived from the most varied impressions of nature. Petrarch's love is real and deep, and to this is due the merit of his lyric verse, which is quite different, not only from that of the Provencal troubadours and of the Italian poets before him, but also from the lyrics of Pante. Petrarch is a psychological poet, who dives down into his own soul, examines all his feelings, and knows how to render them with an art of exquisite sweetness. The lyrics of Petrarch are no longer transcendental like Dante's, but on the contrary keep entirely within human limits. In struggles, in doubts, in fears, in disappointments, in griefs, in joys, in fact in everything, the poet finds material for his poetry. The second part of the Canzoniere is the more passionate. The Trionfi are inferior; it is clear that in them Petrarch tried to imitate the Divina Commedia, but never came near it. The Canzoniere includes also a few political poems — a canzone to Italy, one supposed to be addressed to Cola di Rienzi and several sonnets against the court of Avignon. These are remarkable for their vigour of feeling, and also for showing that Petrarch had formed the idea of Italianila better even than Alighieri. The Italy which he wooed was different from any conceived by the men of the middle ages, and in this also he was a precursor of modern times and of modern aspirations. Petrarch had no decided political idea. He exalted Cola di Rienzi, invoked the emperor Charles IV., praised the Visconti; in fact, his politics were affected more by impressions than by principles; but above all this reigned constantly the love of Italy, his ancient and glorious country, which in his mind is reunited with Rome, the great city of his heroes Cicero and Scipio.

Boccaccio had the same enthusiastic love of antiquity and the same worship for the new Italian literature as Petrarch. He was the first, with the help of a Greek born in Calabria, mf' to P ut to g etner a Latin translation of the Iliad and 1375). tne Odyssey. His vast classical learning was shown

specially in the work De genealogia deorum, in which he enumerates the gods according to genealogical trees con- structed on the authority of the various authors who wrote about the pagan divinities. This work marked an era in studies preparatory to the

revival of classical learning. And at the same time it opened the way for the modern criticism, because Boccaccio in his researches, and in his own judgment was always independent of the authors whom he most esteemedv. The Genealogia deorum is, as A. H. Heeren said, an encyclopaedia of mythological knowledge; and it was the precursor of the great humanistic movement which was developed in the 15th century. Boccaccio was also the first historian of women in his De daris mtdieribus, and the first to undertake to tell the story of the great unfortunate in his De casibus virorum illustriutn. He continued and perfected former geographical investigations in his interesting book De montibus, silvis, fontibus. lacubus,fluminibus, stagnis, et paludibus,et de nominibus maris, for which he made use of Vibius Sequester, but which contains also many new and valuable observations. Of his Italian works his lyrics do not come anywhere near to the perfection of Petrarch's. His sonnets, mostly about love, are quite mediocre. His narrative poetry is better. Although now he can no longer claim the distinction long conceded to him of having invented the octave stanza (which afterwards became the metre of the poems of Boiardo, of Ariosto and of Tasso), yet he was certainly the first to use it in a work of some length and written with artistic skill, such as is his Teseide, the oldest Italian romantic poem. The FUostrato relates the loves of Troiolo and Griseida (Troilus and Cressida). It may be that Boccaccio knew the French poem of the Trojan war by Benoit de Sainte-More; but the interest of the Italian work lies in the analysis of the passion of love, which is treated with a masterly hand. The Ninjale fiesolano tells the love story of the nymph Mesola and the shepherd Africo. The Amorosa Visione, a poem in triplets, doubtless owed its origin to the

Divina Commedia. The Ameto is a mixture of prose and poetry, and is the first Italian pastoral romance.

The Filocopo takes the earliest place among prose romances. In it Boccaccio tells in a laborious style, and in the most prolix way, the loves of Florio and Biancafiore, Probably for this work he drew materials from a popular source or from a Byzantine romance, which Leonzio Pilato may have mentioned to him. In the Filocopo there is a remarkable exuberance in the mytho- logical part, which damages the romance as an artistic work, but which contributes to the history of Boccaccio's mind. The Fiammelta is another romance, about the loves of Boccaccio and Maria d'Aquino, a supposed natural daughter of King Robert, whom he always called by this name of Fiammetta.

The Italian work which principally made Boccaccio famous was the

Decamerone, a collection of a hundred novels, related by a party of men and women, who had retired to a villa near Florence to escape from the plague in 1348. Novel-writing, so abundant in the preceding centuries, especially in France, now for the first time assumed an artistic shape. The style of Boccaccio tends to the imitation of Latin, but in him prose first took the form of elaborated art. The rudeness of the old fabliaux gives place to the careful and conscientious work of a mind that has a feeling for what is beautiful, that has studied the classic authors, and that strives to imitate them as much as possible. Over and above this, in the Decamerone, Boccaccio is a delineator of character and an observer of passions. In this lies his novelty. Much has been written about the sources of the novels of the Decamerone. Probably Boccaccio made use both of written and of oral sources. Popular tradition must have furnished him with the materials of many stories, as, for example, that of Griseida.

Unlike Petrarch, who was always discontented, preoccupied, wearied with life, disturbed by disappointments, we find Boccaccio calm, serene, satisfied with himself and with his surroundings. Notwithstanding these fundamental differences in their characters, the two great authors were old and warm friends. But their affection for Dante was not equal. Petrarch, who says that he saw him once in his childhood, did not preserve a pleasant recollection of him, and it would be useless to deny that he was jealous of his renown. The Divina Commedia was sent him by Boccaccio, when he was an old man, and he con- fessed that he never read it. On the other hand, Boccaccio felt for Dante something more than love — enthusiasm. He wrote a biography of him, of which the accuracy is now unfairly depreciated by some critics, and he gave public critical lectures on the poem in Santa Maria del Fiore at Florence.

Fazio degli Uberti and Federigo Frezzi were imitators of the Divina Commedia, but only in its external form. The former wrote the Dittamondo, a long poem, in which the author supposes that he was taken by the geographer '™' a ' ors Solinus into different parts of the world, and that his commedia. guide related the history of them. The legends of the rise of the different Italian cities have some importance historically. Frezzi, bishop of his native town Foligno, wrote the Quadriregio, a poem of the four kingdoms — Love, Satan, the Vices and the Virtues. This poem has many points of resemblance with the Divina Commedia. Frezzi pictures the condition of man who rises from a state of vice to one of virtue, and describes hell, the limbo, purgatory and heaven. The poet has Pallas for a companion.

Ser Giovanni Fiorentino wrote, under the title of Pecorone, a collection of tales, which are supposed to have been related by a monk and a nun in the parlour of the monastery „ .. of Forli. He closely imitated Boccaccio, and drew on Villani's chronicle for his historical stories. Franco Sacchetti wrote tales too, for the most part on subjects taken from Florentine history. His book gives a life-like picture of Florentine society at the end of the 14th century. The subjects are almost always improper; but it is evident that Sacchetti collected all these anecdotes in order to draw from them his own conclusions and moral reflections, which are to be found at the end of every story. From this point of view Sacchetti's work comes near to

the Monalisationes of the middle ages. A third novelist was Giovanni Sercambi of Lucca, who after 1374 wrote a book, in imitation of Boccaccio, about a party of people who were supposed to fly from a plague and to go travelling about in different Italian cities, stopping here and there telling stories. Later, but important, names are those of Massuccio Salernitano (Tommaso Guardato), who wrote the Novellino, and Antonio Cornazzano whose Proverbii became extremely popular.

It has already been said that the Chronicles formerly believed to have been of the 13 th century are now regarded as forgeries

*of later times. At the end of the 13th century, however, chronk- we ˆ n< * a c ˆ tron ˆ e by Dino Compagni, which, not- lers. withstanding the unfavourable opinion of it entertained*

especially by some German writers, is in all probability authentic. Little is known about the life of Compagni. Noble by birth, he was democratic in feeling, and was a supporter of the new ordinances of Giano della Bella. As prior and gon- falonier of justice he always had the public welfare at heart. When Charles of Valois, the nominee of Boniface VIII., was expected in Florence, Compagni, foreseeing the evils of civil discord, assembled a number of citizens in the church of San Giovanni, and tried to quiet their excited spirits. His chronicle relates the events that came under his own notice from 1280 to 13 1 2. It bears the stamp of a strong subjectivity. The narrative is constantly personal. It often rises to the finest dramatic

style. A strong patriotic feeling and an exalted desire for what is right pervade the book. Compagni is more an historian than a chronicler, because he looks for the reasons of events, and makes profound reflections on them. According to our judgment he is one of the most important authorities for that period of Florentine history, notwithstanding the not insignificant mistakes in fact which are to be found in his writings. On the contrary, Giovanni Villani, born in 1300, was more of a chronicler than an historian. He relates the events up to 1347. The journeys that he made in Italy and France, and the information thus acquired, account for the fact that his chronicle, called by him Isforie fiorerJine, comprises events that occurred all over Europe. What specially distinguishes the work of Villani is that he speaks at length, not only of events in politics and war, but also of the stipends of public officials, of the sums of money used for paying soldiers and for public festivals, and of many other things of which the knowledge is very valuable. With such an abundance of information it is not to be wondered at that Villani's narrative is often encumbered with fables and errors, particularly when he speaks of things that happened before his own time. Matteo was the brother of Giovanni Villani, and continued the chronicle up to 1363. It was again continued by Filippo Villani. Gino Capponi, author of the Commentari dell' acquisto di Pisa and of the narration of the Tumulto dei ciompi, belonged to both the 14th and the 15th centuries.

The Divina Commedia is ascetic in its conception, and in a good many points of its execution. To a large extent similar

is the genius of Petrarch; yet neither Petrarch nor writers. Dante could be classified among the pure ascetics of

their time. But many other writers come under this head. St Catherine of Siena's mysticism was political. She was a really extraordinary woman, who aspired to bring back the Church of Rome to evangelical virtue, and who has left a collection of letters written in a high and lofty tone to all kinds of people, including popes. She joins hands on the one side with Jacopone of Todi, on the other with Savonarola. Hers is the strongest, clearest, most exalted religious utterance that made itself heard in Italy in the 14th century. It is not to be thought that precise ideas of reformation entered into her head, but the want of a great moral reform was felt in her heart. And she spoke indeed ex abundantia cordis. Anyhow the daughter of Jacopo Benincasa must take her place among those who from afar off prepared the way for the religious movement which took effect, especially in Germany and England, in the 16th

century. Another Sienese, Giovanni Colombini, founder of the order of Jesuati, preached poverty by precept and example, going back to the religious idea of St Francis of Assisi. His letters

are among the most remarkable in the category of ascetic works in the 14th century. Passavanti, in his Specchio della vera penitenza, attached instruction to narrative. Cavalca translated from the Latin the Vile dei santi padri. Rivalta left behind him many sermons, and Franco Sacchetti (the famous novelist) many discourses. On the whole, there is no doubt that one of the most important productions of the Italian spirit of the 14th 'century was the religious literature.

In direct antithesis with this is a kind of literature which has a strong popular element. Humorous poetry, the poetry of laughter and jest, which as we saw was largely developed in the 13th century, was carried on in the 14th by poetry. Bindo Bonichi, Arrigo di Castruccio, Cecco Nuccoli, Andrea Orgagna, Filippo de' Bardi, Adriano de' Rossi, Antonio Pucci and other lesser writers. Orgagna was specially comic; Bonichi was comic with a satirical and moral purpose. Antonio Pucci was superior to all of them for the variety of his production. He put into triplets the chronicle of Giovanni Villani (Centiloquio) , and wrote many historical poems called Serventesi, many comic poems, and not a few epico-popular compositions on various subjects. A little poem of his in seven cantos treats of the war between the Florentines and the Pisans from 1362 to 1365. Other poems drawn from a legendary source celebrate the Reina d' Oriente, Apollonio di Tiro, the Bel Gherardino, &c. These poems, meant to be recited to the people, are the remote ancestors of the romantic epic, which was developed in the 16th century, and the first representatives of which were Boiardo and Ariosto.

Many poets of the 14th century have left us political works. Of these Fazio degli Uberti, the author of Dittamondo, who wrote a Serventese to the lords and people of Italy, a Political poem on Rome, a fierce invective against Charles IV. and of Luxemburg, deserves notice, and Francesco di amatory: Vannozzo, Frate Stoppa and Matteo Frescobaldi. It P° et fy- may be said in general that following the example of Petrarch many writers devoted themselves to patriotic poetry. From this period also dates that literary phenomenon known under the name of Petrarchism. The Petrarchists, or those who sang of love, imitating Petrarch's manner, were found already in the 14th century. But others treated the same subject with more originality, in a manner that might be called semi-popular. Such were the Ballate of Ser Giovanni Fiorentino, of Franco Sacchetti, of Niccolo Soldanieri, of Guido and Bindo Donati. Ballate were poems sung to dancing, and

we have

c ‘ • t ,, ■ fi , „, Histories

very many songs for music of the 14th century. We la Yerse- have already stated that Antonio Pucci versified Villani’s Chronicle. This instance of versified history is not unique, and it is evidently connected with the precisely similar phenomenon offered by the ” vulgar Latin ” literature. It is enough to notice a chronicle of Arezzo in terza rima by Gorello de’ Sinigardi, and the history, also in terza rima, of the journey of Pope Alexander III. to Venice by Pier de’ Natali. Besides this, every kind of subject, whether history, tragedy or hus- bandry, was treated in verse. Neri di Landocio wrote a life of St Catherine; Jacopo Gradenigo put the gospels into triplets; Paganino Bonafede in the Tesoro dei rustici gave many precepts in agriculture, beginning that kind of Georgic poetry which was fully developed later by Alamanni in his Coltivazione, by Girolamo Baruffaldi in the Canapajo, by Rucellai in the Api, by Barto- lommeo Lorenzi in the Coltivazione dei monti, by Giambattista Spolverini in the Coltivazione del riso, &c.

There cannot have been an entire absence of dramatic litera- ture in Italy in the 14th century, but traces of it are wanting, although we find them again in great abundance in the Drama 15th century. The 14th century had, however, one drama unique of its kind. In the sixty years (1250 to 1310) which ran from the death of the emperor Frederick II. to the expedition of Henry VII., no emperor had come into Italy. In the north of Italy, Ezzelino da Romano, with the title of imperial vicar, had taken possession of almost the whole of the March of Treviso, and threatened Lombardy. The popes proclaimed a crusade against him, and, crushed by it, the Ezzelini fell. Padua then began to breathe again, and took to extending its dominion.

There was living at Padua Albertino Mussato, born in 1261, a year after the catastrophe of the Ezzelini ; he grew up among the survivors of a generation that hated the name of the tyrant. After having written in Latin a history of Henry VII. he devoted himself to a dramatic work on Ezzelino, and wrote it also in Latin The Eccerinus, which was probably never represented on the stage, has been by some critics compared to the great tragic works of Greece. It would probably be nearer the truth to say that it has nothing in common

with the works of Aeschylus; but certainly the dramatic strength, the delineation of certain situations, and the narration of certain events are very original. Mussato's work stands alone in the history of Italian dramatic literature. Perhaps this would not have been the case if he had written it in Italian.

In the last years of the 14th century we find the struggle that was soon to break out between the indigenous literary tradition and the reviving classicism already alive in spirit. As repre- sentatives of this struggle, of this antagonism, we may consider Luigi Marsilio and Coluccio Salutati, both learned men who spoke and wrote Latin, who aspired to be humanists, but who meanwhile also loved Dante, Petrarch and Boccaccio, and felt and celebrated in their writings the beauty of Italian literature.

*3. The Renaissance. — A great intellectual movement, which had been gathering for a long time, made itself felt in Italy in the 1 5th century. A number of men arose, all learned, ? r * eco ~ laborious, indefatigable, and all intent on one great learning. wor k- Such were Niccolo Niccoli, Giannozzo Manetti, Palla Strozzi, Leonardo Bruni, Francesco Filelfo, Poggio Bracciolini, Carlo d'Arezzo, Lorenzo Valla. Manetti buried himself in his books, slept only for a few hours in the night, never went out of doors, and spent his time in translating from Greek, studying Hebrew, and commenting on Aristotle. Palla Strozzi sent into Greece at his own expense to search for ancient books, and had Plutarch and Plato brought for him. Poggio Bracciolini went to the Council of Constance, and found in a monastery in the dust-hole Cicero's Orations. He copied Quintilian with his own hand, discovered Lucretius, Plautus, Pliny and many other Latin authors. Guarino went through the East in search of codices. Giovanni Aurispa returned to Venice with many hundreds of manuscripts. What was the passion that excited all these men ? What did they search after ? What did they look to? These Italians were but handing on the solemn tradition which, although partly latent, , was the informing principle of Italian medieval history, and now at length came out triumphant. This tradition was that same tenacious and sacred memory of Rome, that same worship of its language and institutions, which at one time had retarded the development of Italian literature, and now grafted the old Latin branch of ancient classicism on the flourishing stock of Italian literature. All this is but the continuation of a phenomenon that has existed for ages. It is the thought of Rome that always dominates Italians, the thought that keeps appearing from Boetius to Dante Alighieri, from Arnold of Brescia to Cola di Rienzi, which gathers strength with Petrarch and Boccaccio, and finally be- comes triumphant in literature and life —*

in life, because the modern spirit is fed on the works of the ancients. Men come to have a more just idea of nature: the world is no longer cursed or despised; truth and beauty join hands; man is born again; and human reason resumes its rights. Everything, the individual and society, are changed under the influence of new facts.

First of all there was formed a human individuality, which was wanting in the middle ages. As J. Burckhardt has said, the man was changed into the individual. He began to feel and assert his own personality, which was constantly conditions, attaining a fuller realization. As a consequence of this, the idea of fame and the desire for it arose. A really cultured class was formed, in the modern meaning of the word, and the conception was arrived at (completely unknown in former times) that the worth of a man did not depend at all on his birth but on his personal qualities. Poggio in his dialogue De nobilitate declares that he entirely agreed with his inter-

New social

locutors Niccolo Niccoli and Lorenzo de' Medici in the opinion that there is no other nobility but that of personal merit. External life was growing more refined in all particulars; the man of society was created; rules for civilized life were made; there was an increasing desire for sumptuous and artistic entertainments. The medieval idea of existence was turned upside down; men who had hitherto turned their thoughts exclusively to heavenly things, and believed exclusively in the divine right, now began to think of beautifying their earthly existence, of making it happy and gay, and returned to a belief in their human rights. This was a great advance, but one which carried with it the seeds of many dangers. The conception of morality became gradually weaker. The " fay ce que vouldras " of Rabelais became the first principle of life. Religious feeling was blunted, was weakened, was changed, became pagan ■ again. Finally the Italian of the Renaissance, in his qualities and his passions, became the most remarkable representative of the heights and depths, of the virtues and faults, of humanity. Corruption was associated with all that is most ideal in life; a profound scepticism took hold of people's minds; indifference to good and evil reached its highest point.

Besides this, a great literary danger was hanging over Italy. Humanism threatened to submerge its youthful national litera- ture. There were authors who laboriously tried to Literary give Italian Latin forms, to do again, after Dante's dangers time, what Guittone d'Arezzo had so unhappily done ofLatin- in the 13th century.

Provincial dialects tried to lsm ‘ reassert themselves in literature. The great authors of the 14th century, Dante, Petrarch, Boccaccio, were by many people forgotten or despised.

It was Florence that saved literature by reconciling the classical models to modern feeling, Florence that succeeded in assimilating classical forms to the ” vulgar ” art. Still gathering vigour and elegance from classicism, Influence still drawing from the ancient fountains all that they rence. could supply of good and useful, it was able to preserve its real life, to keep its national traditions, and to guide literature along the way that had been opened to it by the writers of the preceding century. At Florence the most celebrated humanists wrote also in the vulgar tongue, and commented on Dante and Petrarch, and defended them from their enemies. Leone Battista Alberti, the learned Greek and Latin scholar, wrote in the vernacular, and Vespasiano da Bisticci, whilst he was constantly absorbed in Greek and Latin manuscripts, wrote the Vite di uomini illustri, valuable for their historical contents, and rivalling the best works of the 14th century in their candour and simplicity. Andrea da Barberino wrote the beautiful prose of the Reali di Francia, giving a colouring of ” romanita ” to the chivalrous romances. Belcari and Benivieni carry us back to the mystic idealism of earlier times.

But it is in Lorenzo de’ Medici that the influence of Florence on the Renaissance is particularly seen. His mind was formed by the ancients: he attended the class of the Greek Argyropulos, sat at Platonic banquets, took pains to de , gigou. collect codices, sculptures, vases, pictures, gems and drawings to ornament the gardens of San Marco and to form the library afterwards called by his name. In the saloons of his Florentine palace, in his villas at Careggi, Fiesole and Ambra, stood the wonderful chests painted by Dello with stories from Ovid, the Hercules of Pollajuolo, the Pallas of Botticelli, the works of Filippino and Verrocchio. Lorenzo de’ Medici lived entirely in the classical world; and yet if we read his poems we only see the man of his time, the admirer of Dante and of the old Tuscan poets, who takes inspiration from the popular muse, and who succeeds in giving to his poetry the colours of the most pronounced realism as well as of the loftiest idealism, who passes from the Platonic sonnet to the impassioned triplets of the Amori di Venere, from the grandiosity of the Salve to Nencia and to Beoni, from the Canto carnascialesco to the Lauda. The feeling of nature is strong in him — at one time sweet and melan- choly, at another vigorous and deep, as if an echo of the feelings, the sorrows, the ambitions of that deeply agitated life. He

liked to look into his own heart with a severe eye, but he was also able to pour himself out with tumultuous fulness. He described with the art of a sculptor; he satirized, laughed, prayed, sighed, always elegant, always a Florentine, but a Florentine who read Anacreon, Ovid and Tibullus, who wished to enjoy life, but also to taste of the refinements of art.

Next to Lorenzo comes Poliziano, who also united, and with greater art, the ancient and the modern, the popular and the Poliziano. classical style. In his Rispetti and in his Ballate the

freshness of imagery and the plasticity of form are inimitable. He, a great Greek scholar, wrote Italian verses with dazzling colours; the purest elegance of the Greek sources pervaded his art in all its varieties, in the Orfeo as well as the Stanze per la giostra.

As a consequence of the intellectual movement towards the Renaissance, there arose in Italy in the 15th century three

academies, those of Florence, of Naples and of Rome. demies. ‘ The Florentine academy was founded by Cosmo I.

de’ Medici. Having heard the praises of Platonic philosophy sung by Gemistus Pletho, who in 1439 was at the council of Florence, he took such a liking for those opinions that he soon made a plan for a literary congress which was especially to discuss them. Marsilius Ficinus has described the occupations and the entertainments of these academicians. Here, he said, the young men learnt, by way of pastime, precepts of conduct and the practice of eloquence; here grown-up men studied the government of the republic and the family; here the aged consoled themselves with the belief in a future world. The academy was divided into three classes: that of patrons, who were members of the Medici family; that of hearers, among whom sat the most famous men of that age, such as Pico della Mirandola, Angelo Poliziano, Leon Battista Alberti; that of disciples, who were youths anxious to distinguish themselves in philosophical pursuits. It is known that the Platonic academy endeavoured to promote, with regard to art, a second and a more exalted revival of antiquity. The Roman academy was founded by Giulio Pomponio Leto, with the object of promoting the discovery and the investigation of ancient monuments and books. It was a sort of religion of classicism, mixed

with learning and philosophy. Platina, the celebrated author of the lives of the first hundred popes, belonged to it. At Naples, the academy known as the Pontaniana was instituted. The founder of it was Antonio Beccadelli, surnamed II Panormita, and after his death the head was II Pontano, who gave his name to it, and whose mind animated it.

Romantic poems were the product of the moral scepticism and the artistic taste of the 15th century. Italy never had any

true epic poetry in its period of literary birth. Still poet-,, ” l ess could it have any in the Renaissance. It had,

however, many poems called Cantari, because they contained stories that were sung to the people; and besides there were romantic poems, such as the Buovo d'Antona, the Regina Ancroja and others. But the first to introduce elegance and a new life into this style was Luigi Pulci, who grew up in the house of the Medici, and who wrote the Morgante Maggiore at the request of Lucrezia Tornabuoni, mother of Lorenzo the Magnifi- cent. The material of the Morgante is almost completely taken from an obscure chivalrous poem of the 15th century recently discovered by Professor Pio Rajna. On this foundation Pulci erected a structure of his own, often turning the subject into ridicule, burlesquing the characters, introducing many digres- sions, now capricious, now scientific, now theological. Pulci's merit consists in having been the first to raise the romantic epic which had been for two centuries in the hands of story-tellers into a work of art, and in having united the serious and the comic, thus happily depicting the manners and feelings of the time. With a more serious intention Matteo Boiardo, count of Scandiano, wrote his Orlando innamorato, in which he seems to have aspired to embrace the whole range of Carlovingian legends; but he did not complete his task. We find here too a large vein of humour and burlesque. Still the Ferrarese poet is drawn to the world of romance by a profound sympathy for chivalrous

Drama.

manners and feelings — that is to say, for love, courtesy, valour and generosity. A third romantic poem of the 15th century was the Mambriano by Francesco Bello (Cieco of Ferrara). He drew from the Carlovingian cycle, from the romances of the Round Table, from classical antiquity. He was a poet of no common genius, and of ready imagination. He showed the influence of Boiardo, especially in something of the fantastic which he introduced into his work.

The development of the drama in the 15th century was very great. This kind of semi-popular literature was born in Florence, and attached itself to certain popular festivities that were usually held in honour of St John the Baptist, patron saint of the city. The Sacra Rappresentazione is in substance nothing more than the development of the medieval Mistero (" mystery-play "). Although it belonged to popular poetry, some of its authors were literary men of much renown. It is enough to notice Lorenzo de' Medici, who wrote San Gio- vanni e Paolo, and Feo Belcari, author of the San Panunzio, the Abramo ed I sac, &c. From the 15th century, some element of the comic-profane found its way into the Sacra Rappresentazione. From its Biblical and legendary conventionalism Poliziano emancipated himself in his Orfeo, which, although in its exterior form belonging to the sacred representations, yet substantially detaches itself from them in its contents and in the artistic element introduced.

From Petrarch onwards the eclogue was a kind of literature that much pleased the Italians. In it, however, the pastoral element is only apparent, for there is nothing really rural in it. Such is the Arcadia of Jacopo Sannazzaro poetry. of Naples, author of a wearisome Latin poem De Partu Virginis, and of some piscatorial eclogues. The Arcadia is divided into ten eclogues, in which the festivities, the games, the sacrifices, the manners of a colony of shepherds are described. They are written in elegant verses, but it would be vain to look in them for the remotest feeling of country life. On the other hand, even in this style, Lorenzo de' Medici was superior. His Nencia da Barberino, as a modern writer says, is as it were the new and clear reproduction of the popular songs of the environs of Florence, melted into one majestic wave of octave stanzas. Lorenzo threw himself into the spirit of the bare realism of country life. There is a marked contrast between this work and the conventional bucolic of Sannazzaro and other writers. A rival of the Medici in this style, but always inferior to him, was Luigi Pulci in his Beca da Dicomano.

The lyric love poetry of this century was unimportant. In its stead we see a completely new style arise, the Canto carna- scialesco. These were a kind of choral songs, which were accompanied with symbolical masquerades, poetry. common in Florence at the carnival. They were written in a metre like that of the ballate; and for the most part they were put into the mouth of a party of workmen and tradesmen, who, with not very chaste allusions, sang the praises of their art. These triumphs and masquerades were directed by Lorenzo himself. At eventide there set out into the city large companies on horseback, playing and singing these songs. There are

some by Lorenzo himself, which surpass all the others in their mastery of art. That entitled Bacco ed Arianna is the most famous.

Girolamo Savonarola, who came to Florence in 1489, arose to fight against the literary and social movement of the Renais- sance. Some have tried to make out that Savonarola Religious was an apostle of liberty, others that he was a precursor reaction. of the Reformation. In truth, however, he was neither Savon- the one nor the other. In his struggle with Lorenzo de' Medici, he directed his attack against the promoter of classical studies, the patron of pagan literature, rather than against the political tyrant. Animated by mystic zeal, he took the line of a prophet, preaching against reading voluptuous authors, against the tyranny of the Medici, and calling for popular government. This, however, was not done from a desire for civil liberty, but because Savonarola saw in Lorenzo and his court the greatest obstacle to that return to Catholic doctrine which wa.0 bis heart's

desire; while he thought this return would be easily accom- plished if, on the fall of the Medici, the Florentine republic should come into the hands of his supporters. There may be more justice in looking on Savonarola as the forerunner of the Reforma- tion. If he was so, it was more than he intended. The friar of Ferrara never thought of attacking the papal dogma, and always maintained that he wished to remain within the church of Rome. He had none of the great aspirations of Luther. He only repeated the complaints and the exhortations of St Catherine of Siena; he desired a reform of manners, entirely of manners, not of doctrine. He prepared the ground for the German and English religious movement of the 16th century, but uncon- sciously. In the history of Italian civilization he represents retrogression, that is to say, the cancelling of the great fact of the Renaissance, and return to medieval ideas. His attempt to put himself in opposition to his time, to arrest the course of events, to bring the people back to the faith of the past, the belief that all the social evils came from a Medici and a Borgia, his not seeing the historical reality, as it was, his aspiring to found a republic with Jesus Christ for its king— all these things show that Savonarola was more of a fanatic than a thinker. Nor has he any great merit as a writer. He wrote Italian sermons, hymns (laudi), ascetic and political treatises, but they are roughly executed, and only important as throwing light on the history of his ideas. The religious poems of

Girolamo Benivieni are better than his, and are drawn from the same inspirations. In these lyrics, sometimes sweet, always warm with religious feeling, Benivieni and with him Feo Belcari carry us back to the literature of the 14th century.

History had neither many nor very good students in the

15th century. Its revival belonged to the following age. It

was mostly written in Latin. Leonardo Bruni of

tfa ' Arezzo wrote the history of Florence, Gioviano

Pontano that of Naples, in Latin. Bernardino Corio

wrote the history of Milan in Italian, but in a rude way.

Leonardo da Vinci wrote a treatise on painting, Leon Battista Alberti one on sculpture and architecture. But the names of these two men are important, not so much as authors of these treatises, but as being embodiments of another characteristic of the age of the Renaissance — versatility of genius, power of application along many and varied lines, and of being excellent in all. Leonardo was an architect, a poet, a painter, an hydraulic engineer and a distinguished mathematician. Alberti was a musician, studied jurisprudence, was an architect and a draughts- man, and had great fame in literature. He had a deep feeling for nature, an almost unique faculty of assimilating all that he saw and heard. Leonardo and Alberti are representatives and almost a compendium in themselves of all that intellectual vigour of the Renaissance age, which in the 16th century took to developing itself in its individual parts, making way for what has by some been called the golden age of Italian literature.

4. Development of the Renaissance. — The fundamental characteristic of the literary epoch following that of the Renaissance is that it perfected itself in every kind of art, in particular uniting the essentially Italian character of its language with classicism of style. This period lasted from about 1494 to about 1560; and, strange to say, this very period of greater fruitfulness and literary greatness began from the year 1494, which with Charles VIII. 's descent into Italy marked the beginning of its political decadence and of foreign domination over it. But this is not hard to explain. All the most famous men of the first half of the 16th had been educated in the preceding century. Pietro Pomponazzi was born in 1462, Marcello Virgilio Adriani in 1464, Castiglione in 1468, Machiavelli in 1469, Bembo in 1470, Michelangelo Buonarroti and Ariosto in 1474,

Nardi in 1476, Trissino in 1478, Guicciardini in 1482. Thus it is easy to under- stand how the literary activity which showed itself from the end of the 15th centuiy to the middle of the following one was the product of the political and social conditions of the age in which these minds were formed, not of that in which their powers were displayed. Niccolo Machiavelli and Francesco Guicciardini were the chief

originators of the science of history. Machiavelli 's principal works are the Istorie fiorenline, the Discorsi sulla prima decs di Tito Livio, the Arte della guerra andthe Principe. His merit consists in having been the creator of the experi- mental science of politics — in having observed facts, studied histor- ies and drawn consequences from them. His history is sometimes inexact in facts; it is rather a political than an historical work. The peculiarity of Machiavelli's genius lay, as has been said, in his artistic feeling for the treatment and discussion of politics in and for themselves, without regard to an immediate end — in his power of abstracting himself from the partial appearances of the transitory present, in order more, thoroughly to possess himself of the eternal and inborn kingdom, and to bring it into subjection to himself.

Next to Machiavelli both as an historian and a statesman comes Francesco Guicciardini. Guicciardini was very observant, and endeavoured to reduce his observations to a science. His Storia d'ltalia, which extends from the death of Lorenzo de' Medici to 1534, is full of political wisdom, is skilfully. arranged in its parts, gives a lively picture of the character of the persons it treats of, and is written in a grand style. He shows a profound knowledge of the human heart, and depicts with truth the temperaments, the capabilities and the habits of the different European nations. Going back to the causes of events, he looked for the explanation of the divergent interests of princes and of their reciprocal jealousies. The fact of his having witnessed many of the events he related, and having taken part in them, adds authority to his words. The political reflections are always deep; in the Pensieri, as G. Capponi 1 says, he seems to aim at extracting through self- examination a quintessence, as it were, of the things observed and done by him— thus endeavouring to form a political doctrine as adequate as possible in all its parts. Machiavelli and Guicciardini may be considered, not only as distinguished historians, but as originators of the science of history founded on observation.

Inferior to them, but still always worthy of note, were Jacopo: Nardi (a just and faithful historian and a virtuous man, who defended the

rights of Florence against the Medici before : Charles V.), Benedetto Varchi, Giambattista Adriani, Bernardo Segni; and, outside Tuscany, Camillo Porzio, who related the Congiura de' baroni and the history of Italy from 1547 to 1552, AngekV di Costanza, Pietro Bembo, Paolo Paruta and others.

Ariosto's Orlando furioso was a continuation of Boiardo's Innamorato. His characteristic is that he assimilated the romance of chivalry to the style and models of classicism. Romantic Ariosto was an artist only for the love of his art; his epic sole aim was to make a romance that should please Ariosto , the generation in which he lived. His Orlando has V 4 ? 4 " no grave and serious purpose; on the contrary it creates a fantastic world, in which the poet rambles, indulging his caprice, and sometimes smiling at his own work. His great desire is to depict everything with the greatest possible perfection ; the cultivation of style is what occupies him most. In his hands the style becomes wonderfully plastic to every conception, whether high or low, serious or sportive. The octave stanza reached in him the highest perfection of grace, variety and harmony.

Meanwhile, side by side with the romantic, there was an attempt at the historical epic. Gian Giorgio Trissino of Vicenza composed apoem called Italia liberata dai Goti. Full of learning and of the rules of the ancients, he formed himself on the latter, in order to sing of the campaigns of Belisarius; he said that he had forced himself to observe all the rules of Aristotle, and that he had imitated Homer. In this again, we see one of the products of the Renaissance; and, although Trissino's work is poor in invention and without any original poetical colouring, yet it helps one to understand better what were the conditions of mind in the 16th century. Lyric poetry was certainly not one of the kinds that rose to ' Storia delta repubblicadi Firenze (Florence, 1876).

Heroic epic.

any great height in the 16th century. Originality was entirely wanting, since it seemed in that century as if nothing bettier could be done than to copy Petrarch. Still, even yn f rv in this style there were some vigorous poets. Monsignore Giovanni Guidiccioni of Lucca (1 500-1 541) showed that he had a generous heart. In fine sonnets he gave expression to his grief for the sad state to which his country was

reduced. Francesco Molza of Modena (1489-1544), learned in Greek, Latin and Hebrew, wrote in a graceful style and with spirit. Giovanni della Casa (1503-1556) and Pietro Bembo (1470-1547), although Petrarchists, were elegant. Even Michelangelo Buonarroti was at times a Petrarchist, but his poems bear the stamp of his extraordinary and original genius. And a good many ladies are to be placed near these poets, such as Vittoria Colonna (loved by Michelangelo), Veronica Gambara, Tullia d'Aragona, Giulia Gonzaga, poetesses of great delicacy, and superior in genius to many literary men of their time.

The 1 6th century had not a few tragedies, but they are all weak. The cause of this was the moral and religious indifference Tragedy. °^ tne Italians, the lack of strong passions and vigorous characters. The first to occupy the tragic stage was Trissino with his Sofonisba, following the rules of the art most scrupulously, but written in sickly verses, and without warmth of feeling. The Oreste and the Rosmunda of Giovanni Rucellai were no better, nor Luigi Alamanni's Antigone. Sperone Speroni in his Canace and Giraldi Cintio in his Orbecche tried to become innovators in tragic literature, but they only succeeded in making it grotesque. Decidedly superior to these was the Torrismondo of Torquato Tasso, specially remarkable for the choruses, which sometimes remind one of the chorus of the Greek tragedies.

The Italian comedy of the 16th century was almost entirely modelled on the Latin comedy. They were almost always Comedy. au ke in the plot, in the characters of the old man, of the servant, of the waiting-maid; and the argument was often the same. Thus the Lucidi of Agnolo Firenzuola, and the Vecchio amoroso of Donato Giannotti were modelled on comedies by Plautus, as were the Sporta by Gelli, the Marito by Dolce, and others. There appear to be only three writers who should be distinguished" among the many who wrote comedies — Machiavelli, Ariosto and Giovan Maria Cecchi. In his Mandragora Machiavelli, unlike all the others, composed a comedy of character, creating types which seem living even now, because they were copied from reality seen with a finely observant eye. Ariosto, on the other hand, was distinguished for his picture of the habits of his time, and especially of those of the Ferrarese nobles, rather than for the objective delineation of character. Lastly, Cecchi left in his comedies a treasure of spoken language, which nowadays enables us in a wonderful way to make ourselves acquainted with that age. The notorious Pietro Aretino might also be included in the list of the best writers of comedy.

The 15th century was not without humorous poetry; Antonio Cammelli, surnamed the Pistoian, is specially deserving of notice, because of his " pungent bonhomie," as Sainte- lesque Beuve called it. But it was Francesco Berni who and satire, carried this kind of literature to perfection in the 16th century. From him the style has been called " bernesque " poetry. In the " Berneschi " we find nearly; the same phenomenon that we already noticed with regard to Orlando furioso. It was art for art's sake that inspired and moved Berni to write, as well as Anton Francesco Grazzini, called II Lasca, and other lesser writers. It may be said that there is nothing in their poetry; and it is true that they specially delight in praising low and disgusting things and in jeering at what is noble and serious. Bernesque poetry is the clearest reflection of that religious and moral scepticism which was one of the characteristics of Italian social life in the 16th century, and which showed itself more or less in all the works of that period, that scepticism which stopped the religious Reformation in Italy, and which in its turn was an effect of historical conditions. The Berneschi, and especially Berni himself, sometimes assumed

Didactic works.

Fiction.

a satirical tone. But theirs could not be called true satire. Pure satirists, on the other hand, were Antonio Vinciguerra, a Venetian, Lodovico Alamanni and Ariosto, the last superior to the others for the Attic elegance of his style, and for a certain frankness, passing into malice, which is particularly interesting when the poet talks of himself.

In the 1 6th century there were not a few didactic works. In his poem of the A pi Giovanni Rucellai approaches to the perfec- tion of Virgil. His style is clear and light, and he adds interest to his book by frequent allusions to the events of the time. But of the didactic works that which surpasses all the others in importance is Baldassare Castiglione's Cortigiano, in which he imagines a discussion in the palace of the dukes of Urbino between knights and ladies as to what are the gifts required in a perfect courtier. This book is valuable as an illustration of the intellectual and moral state of the highest Italian society in the first half of the 16th century.

Of the novelists of the 16th century, the two most important were Anton Francesco Grazzini and Matteo Bandello — the former as playful and bizarre as the latter is grave and solemn. As part of the

*history of the times, we must not forget that Bandello was a Dominican friar and a bishop, but that notwithstanding his novels were very loose in subject, and that he often holds up the ecclesiastics of his time to ridicule. At a time when admiration for qualities of style, the desire for classical elegance, was so strong as in the 16th century, much attention was naturally paid to translating Latin and Greek authors. Among the very numerous translations tloas. *~ of the time those of the Acneid and of the Pastorals of Longus the Sophist by Annibal Caro are still famous; as are also the translations of Ovid's Metamorphoses by Giovanni Andrea dell' Anguillare, of Apuleius's Golden Ass by Firenzuola, and of Plutarch's Lives and Moraiia by Marcello Adriani.*

The historians of Italian literature are in doubt whether Tasso should be placed in the period of the highest development of the Renaissance, or whether he should form a period by himself, intermediate between that and the one Tasso

following. Certainly he was profoundly out of harmony with the century in which he lived. His religious faith, the seriousness of his character, the deep melancholy settled in his heart, his continued aspiration after an ideal perfection, all place him as it were outside the literary epoch represented by Machiavelli, by Ariosto, by Berni. As Carducci has well said, Tasso "is the legitimate heir of Dante Alighieri: he believes, and reasons on his faith by philosophy; he loves, and comments on his love in a learned style; he is an artist, and writes dialogues of scholastic speculation that would fain be Platonic." He was only eighteen years old when, in 1562, he tried his hand at epic poetry, and wrote Rinaldo, in which he said that he had tried to reconcile the Aristotelian rules with the variety of Ariosto. He afterwards wrote the Aminta, a pastoral drama of exquisite grace. But the work to which he had long turned his thoughts was an heroic poem, and that absorbed all his powers. He himself explains what his intention was in the three Discorsi written whilst he was composing the Gerusalemme: he would choose a great and wonderful subject, not so ancient as to have lost all interest, nor so recent as to prevent the poet from em- bellishing it with invented circumstances; he meant to treat it rigorously according to the rules of the unity of action observed . in Greek and Latin poems, but with a far greater variety and splendour of episodes, so that in this point it should not fall short of the romantic poem; and finally, he would write it in a lofty and ornate style. This is what Tasso has done in the Gerusalemme liberala, the subject of which is the liberation of the sepulchre of Jesus Christ in the nth century by Godfrey of Bouillon. The poet does not follow faithfully all the historical facts, but sets

before us the principal causes of them, bringing in the supernatural agency of God and Satan. The Gerusalemme is the best heroic poem that Italy can show. It approaches to classical perfection. Its episodes above all are most beautiful. There is profound feeling in it, and everything reflects the melancholy soul of the poet. As regards the style, however.

(1544-

IS9S).

although Tasso studiously endeavoured to keep close to the classical models, one cannot help noticing that he makes excessive use of metaphor, of antithesis, of far-fetched conceits; and it is specially from this point of view that some historians have •placed Tasso in the literary period generally known under the name of " Secentismo," and that others, more moderate in their criticism, have said that he prepared the way for it.

5. Period of Decadence. — From about 1559 began a period of decadence in Italian literature. The Spanish rule oppressed and corrupted the peninsula. The minds of men were day by day gradually losing their force; every high aspiration was quenched. No love of country could any longer be felt when the country was enslaved to a stranger. The suspicious rulers fettered all freedom of thought and word; they tortured Campanella, burned Bruno, made every effort to extinguish all high sentiment, all desire for good. Cesare Balbo says, " if the happiness of the masses consists in peace without industry, if the nobility's con- sists in titles without power, if princes are satisfied by acquies- cence in their rule without real independence, without sovereignty, if literary men and artists are content to write, paint and build with the approbation of their contemporaries, but to the con- tempt of posterity, if a whole nation is happy in ease without dignity and the tranquil progress of corruption, — then no period ever was so happy for Italy as the hundred and forty years from the treaty of Cateau Cambresis to the war of the ceatismo. Spanish succession." This period is known in the history of Italian literature as the Secentismo. Its writers, devoid of sentiment, of passion, of thoughts, resorted to exaggeration; they tried to produce effect with every kind of affectation, with bombast, with the strangest metaphors, in fact, with what in art is called

mannerism, "barocchism." The utter poverty of the matter tried to cloak itself under exuberance of forms. It seemed as if the writers vied with one another as to who could best burden his art with useless metaphors, with phrases, with big-sounding words, with affectations, with hyper- bole, with oddities, with everything that could fix attention on the outer form and draw it off from the substantial element of thought. At the head of the school of the " Secentisti " comes Giovan Battista Marini of Naples, born in 1569, especially known by a poem called L'Adone. His aim was to excite wonder by novelties; hence the most extravagant metaphors, the most forced antitheses, the most far-fetched conceits, are to be found in his book. It was especially by antitheses that he thought he could produce the greatest effect. Sometimes he strings them together one after the other, so that they fill up whole stanzas without a break. Achillini of Bologna followed in Marini's steps. He had less genius, however, and hence his peculiarities were more extravagant, becoming indeed absolutely ridiculous. In general, we may say that all the poets of the 17th century were more or less infected with " Marinism." Thus Alessandro Guidi, although he does not attain to the exaggeration of his master, is emptily bombastic, inflated, turgid, while Fulvio Testi is artificial and affected. Yet Guidi as well as Testi felt the influence of another poet, Gabriello Chiabrera, born at Savona in 1552. In him the Secentismo took another character. Enamoured as he said he was of the Greeks, he made new metres, especially in imitation of Pindar, treating of religious, moral, historical and amatory subjects. It is easy . to understand that a Pindaric style of poetry in the 17 th century in Italy could not but end in being altogether artificial, without anything of those qualities which constitute the greatness of the Greek poet. Chiabrera, though elegant enough in form, proves empty of matter, and, in his vain attempt to hide this vacuity, has recourse to poetical ornaments of every kind. These again, in their turn, become in him a fresh defect. Nevertheless, Chiabrera's school, in the decadence of the 17th century, marks an improvement; and sometimes he showed that he had lyrical capacities, which in better literary surroundings would have brought forth excellent fruit. When he sings, for example, of the victories of the Tuscan galleys against the Turks and the pirates of the Mediterranean, he rises to grand imagery, and seems quite another poet.

Marini.

Filicaja the Florentine has a certain lyric Hon, particularly in the songs about Vienna besieged by the Turks, which seems to raise him more than the others above the vices of the time; but even in him we

see clearly the rhetorical artifice and the falseness of the conceits. And in general all the lyric poetry of the 17 th century may be said to have had the same defects, but in different degrees— defects which may be summed up as absence of feeling and exaggeration of form. There was no faith; there was no love; and thus art became an exercise, a pastime, a luxury, for a servile and corrupt people.

The belief then arose that it would be sufficient to change the form in order to restore literature, in forgetfulness that every reform must be the effect of a change in social and moral conditions. Weary of the bombastic style of the Arcadia. 17th century, full of conceits and antithesis, men said — let us follow an entirely different line, let us fight the turgid style with simplicity. In 1690 the " Academy of Arcadia " was instituted. Its founders were Giovan Maria Crescimbeni and Gian Vincenzo Gravina. The Arcadia was so called because its chief aim and intention were to imitate in literature the simplicity of the ancient shepherds, who were fabulously supposed to have lived in Arcadia in the golden age. As the " Secentisti " erred by an overweening desire for novelty, which made them always go beyond the truth, so the Arcadians proposed to them- selves to return to the fields of truth, always singing of subjects of pastoral simplicity. This was obviously nothing else than the substitution of a new artifice for the old one; and they fell from bombast into effeminacy, from the hyperbolical into the petty, from the turgid into the over-refined. The Arcadia was a re- action against Secentismo, but a reaction which, reversing the movement of that earlier epoch, only succeeded in impoverishing still further and completely withering up the literature. The poems of the " Arcadians " fill many volumes, and are made up of sonnets, madrigals, canzonets and blank verse. The one whc most distinguished himself among the sonneteers was Felice Zappi. Among the authors of songs Paolo Rolli was illustrious. Innocenzo Frugoni was more famous than all the others, a man of fruitful imagination but of shallow intellect, whose wordy verses nobody now reads.

Whilst the political and social conditions in Italy in the 17th century were such as to make it appear that every light of intelligence, all spirit of liberty, was extinguished, Symptoms there appeared in the peninsula, by that law of reaction of revival. which in great part governs human events, some strong Scleatuic and independent thinkers, such as Bernardino Telesio, Giordano Bruno, Tommaso Campanella, Lucilio Vanini, who turned philosophical inquiry into fresh channels, and opened the way for the scientific conquests of Galileo Galilei, the great contemporary of Descartes in France and of Bacon in England. Galileo was not only a great man of science, but

also occupied a conspicuous place in the history of letters. A devoted student of Ariosto, he seemed to transfuse into his prose the qualities of that great poet— a clear and frank freedom of expression, a wonderful art of knowing how to say everything with precision and ease, and at the same time with elegance. Galileo's prose is in perfect antithesis to the poetry of his time. Perhaps it is the best prose that Italy has ever had; it is clear, goes straight to the point, is without rhetorical ornaments and without vulgar slips, artistic without appearing to be so.

Another symptom of revival, a sign of rebellion against the vileness of Italian social life, is given us in satire and in particular in that of Salvator Rosa and Alessandro Tassoni. Salvator Rosa, born in 1615, near Naples, was a painter, a musician and a poet. As a poet he showed that he felt the sad condition of his country, showed that he mourned over it, and gave vent to his feeling (as another satire-writer, Giuseppe Giusti, said) in generosi rabbuffi. His exhortation to Italian poets to turn their thoughts to the miseries of their country as a subject for their song — their country languishing under the tyrant's hands — certain passages where he deplores the effeminacy of Italian habits, a strong apostrophe against Rome, make Salvator Rosa a precursor of the patriotic literature which inaugurated the revival of the 18th century.

Tassoni, a man really quite exceptional in this century, was superior to Rosa. He showed independent judgment in the midst of universal servility, and his Secckia Rapita proved that he was an eminent writer. This is an heroic comic poem, which is at the same time an epic and a personal satire. He was bold enough to attack the Spaniards in his Filippiche, in which he urged Duke Carlo Emanuele of Savoy to persist in the war against them.

6. The Revival in the 18th Century. — Having for the most part freed itself from the Spanish dominion in the 18th century, the New political condition of Italy began to improve. Pro-

Potttkat moters of this improvement, which was shown in many Condi- civil reforms, were Joseph II., Leopold I. and Charles I. lions. rpˆ wor k f these princes was copied from the philo-

sophers, who in their turn felt the influence of a general move- ment

of ideas, which was quietly working in many parts of Europe, and which came to a head in the French encyclopedists. Giambattista Vico was a token of the awakening of historical consciousness in Italy. In his Scienza nuova he applied himself to the investigation of the laws governing the progress vnrks. ˚f the human race, and according to which events are developed. From the psychological study of man he endeavoured to infer the " comune natura delle nazioni," i.e. the universal laws of history, or the laws by which civilizations rise, flourish and fall.

From the same scientific spirit which animated the philo- sophical investigation of Vico, there was born a different kind of investigation, that of the sources of Italian civil and literary history, Lodovico Antonio Muratori, after having collected in one entire body (Rerum Italicarum scriplores) the chronicles, the biographies, the letters and the diaries of Italian history from 500 to 1500, after having discussed the most obscure historical questions in the Antiquitates Italicae medii aevi, wrote the Annali d' Italia, minutely narrating facts derived from authentic sources. Muratori's associates in his historical re- searches were Scipione Maffei of Verona and Apostolo Zeno of Venice. In his Verona Ulustrata the former left, not only a treasure of learning, but an excellent specimen of historical monograph. The latter added much to the erudition of literary history, both in his Dissertazioni Vossiane and in his notes to the Biblioteca dell' eloquenza italiana of Monsignore Giusto Fontanini. Girolamo Tiraboschi and Count Giovanni Maria Mazzuchelli of Brescia devoted themselves to literary history.

While the new spirit of the times led men to the investigation of historical sources, it also led them to inquire into the mechan- ism of economical and social laws. Francesco Galiani science. wrote on currency; Gaetano Filangieri wrote a Scienza della legislazione. Cesare Beccaria, in his treatise Dei delitti e delle pene, made a contribution to the reform of the penal system and promoted the abolition of torture. The man in whom above all others the literary revival of the 1 8th century was most conspicuously embodied was Giuseppe Parini. He was born in a Lombard village in 1729, was mostly educated at Milan, and as a youth was known among the Arcadian poets by the name of Darisbo Elidonio. Even as an Arcadian, however, Parini showed signs of departing Parini. from the common, type. In a collection of poems that he published at twenty-three years of age, under the name of Ripano Eupilino, there are some pastoral sonnets in which the poet shows that he had the faculty of taking his scenes from real life, and also some satirical pieces in which he exhibits a spirit of somewhat rude opposition to

his own times. These poems are perhaps based on reminiscences of Berni, but at any rate they indicate a resolute determination to assail boldly all the literary conventionalities that surrounded the author. This, however, was only the beginning of the battle. Parini lived in times of great social prostration. The nobles and the rich, all given up to ease and to silly gallantry, consumed their lives in ridiculous trifles or in shameless self-indulgence, wasting themselves on immoral " Cicisbeismo," and offering the most miserable spectacle of feebleness of mind and character. It was against this social condition that Parini's muse was

directed. Already, improving on the poems of his youth, he had proved himself an innovator in his lyrics, rejecting at once Petrarchism, Secentismo and Arcadia, the three maladies that had weakened Italian art in the centuries preceding his own, and choosing subjects taken from real life, such as might help in the instruction of his contemporaries. In the Odi the satirical note is already heard. But it came out more strongly in the poem Del giorno, in which he imagines himself to be teaching a young Milanese patrician all the habits and ways of gallant life; he shows up all its ridiculous frivolities, and with delicate irony unmasks the futilities of aristocratic habits. Dividing the day into four parts, the Mattino, the Mezzogiorno, the Vespero, the Notte, by means of each of these he describes the trifles of which they were made up, and the book thus assumes a social and historical value of the highest importance. Parini, satirizing his time, fell back upon truth, and finally made art serve the purpose of civil morality. As an artist, going straight back to classical forms, aspiring to imitate Virgil and Dante, he opened the way to the fine school that we shall soon see rise, that of Alfieri, Fdscolo and Monti. As a work of art, the Giorno is wonderful for the Socratic skill with which that delicate irony is constantly kept up by which he seems to praise what he effectually blames. The verse has new harmonies; sometimes it is a little hard and broken, not by accident, but as a protest against the Arcadian monotony. Generally it flows majestically, but without that Frugonian droning that deafens the ears and leaves the heart cold.

Gasparo Gozzi's satire was less elevated, but directed towards the same end as Parini's. In his Osservatore, something like Addison's Spectator, in his Gazzetta veneta, in the Mondo morale, by means of allegories and novelties Baretti. he hit the vices with a delicate touch, and inculcated a practical moral with much good sense. Gozzi's satire has some slight resemblance in style to Lucian's. It is smooth and light, but withal it does not go less straight to its aim, which is to point out the defects of society and to correct them. Gozzi's prose is

very graceful and lively. It only errs by its overweening affecta- tion of imitating the writers of the 14th century. Another satirical writer of the first half of the 18th century was Giuseppe Baretti of Turin. In a journal called the. Frusta letteraria he took to lashing without mercy the works which were then being published in Italy. He had learnt much by travelling; and especially his long stay in England had contributed to give an independent character to his mind, and made him judge of men and things with much good sense. It is true that his judgments are not always right, but the Frusta letteraria was the first book of independent criticism directed particularly against the Arcadians and the pedants.

Everything tended to improvement, and the character of the reform was to throw off the conventional, the false, the artificial, and to return to truth. The drama felt this influence of the times. Apostolo Zeno and Metastasio (the Arcadian name for Pietro Trapassi, a native of Rome) had endeavoured to make " melodrama and reason compatible." The latter in particular succeeded in giving fresh expression to the affections, a natural turn to the dialogue and some interest to the plot; and if he had not fallen into constant unnatural over-

Dramalk reform.

refinement and unseasonable mawkishness, and into frequent anachronisms, he might have been considered as the first dramatic reformer of the 18th century. That honour belongs to Carlo Goldoni, a Venetian. He found comedy either entirely devoted to classical imitation or given up to extrava- gance, to coups de theatre, to the most boisterous succession of unlikely situations, or else treated by comic actors who recited impromptu on a given subject, of which they followed the outline. In this old popular form of comedy, with the masks of pantaloon, of the doctor, of harlequin, of Brighella, &c, Goldoni found the strongest obstacles to his reform. But at last he conquered, creating the comedy of character. No doubt Moliere's example helped him in this. Goldoni's characters are always true, but often a little superficial. He studied nature, but he did not plunge into psychological depths. In most of his creations, the

classic- ism.

external rather than the internal part is depicted. In this respect he is much inferior to Moliere. But on the other hand he surpasses him in the liveliness of the dialogue, and in the facility with which he finds his dramatic situations. Goldoni wrote much, in fact too much (more than one hundred and fifty comedies), and had no time to correct, to polish, to perfect his works, which are ail rough cast. But for a comedy of cha- racter we must go straight from Machiavelli's Mandragora to him. Goldoni's dramatic aptitude is curiously illustrated by the fact that he took nearly all his types from Venetian society, and yet managed to give them an inexhaustible variety. A good many of his comedies were written in Venetian dialect, and these are perhaps the best.

The ideas that were making their way in French society in the 18th century, and afterwards brought about the Revolution Patriotic of 1 789, gave a special direction to Italian literature literature of the second half of the 18th century. Love of ideal and liberty, desire for equality, hatred of tyranny, created

return to [n Italy a literature which aimed at national objects, seeking to improve the condition of the country by freeing it from the double yoke of political and religious despotism. But all this was associated with another tendency. The Italians who aspired to a political redemption believed that it was inseparable from an intellectual revival, and it seemed to them that this could only be effected by a reunion with ancient classicism — in other words, by putting themselves in more direct communication with ancient Greek and Latin writers. This was a repetition of what had occurred in the first half of the 15th century. The 17th century might in fact be considered as a new Italian Middle Age without the hardness of that iron time, but corrupted, enervated, overrun by Spaniards and French, an age in which previous civilization was cancelled. A reaction was necessary against that period of history, and a construction on its ruins of a new country and a new civilization. There had already been forerunners of this movement; at the head of them the revered Parini. Now the work must be completed, and the necessary force must once more be sought for in the ancient literature of the two classic nations.

Patriotism and classicism then were the two principles that inspired the literature which began with Alfieri. He worshipped the Greek and Roman idea of popular liberty in arms A i7dol against the tyrant. He took the subjects of his 1803). tragedies almost invariably from the history of these

nations, made continual apostrophes against the despots, made his ancient characters talk like revolutionists of his time; he did not trouble himself with; nor think about, 1 he truth of the characters; it was enough for him that his hero was Roman in name, that there was a tyrant to be killed, that liberty should triumph in the end. But even this did not satisfy Alfieri. Before his time and all about him there was the Arcadian school, with its foolish verbosity, its empty abundance of epithets, its nauseous pastoralizing on subjects of no civil import- ance. It was necessary to arm the patriotic muse also against all this. If the Arcadians, not excluding the hated Metastasio, diluted their poetry with languishing tenderness, if they poured themselves out in so many words, if they made such set phrases, it behoved the others to do just the contrary — to be brief, concise, strong, bitter, to aim at the sublime as opposed to the lowly and pastoral. Having said this, we have told the good and evil of Alfieri. He desired a political reform by means of letters; he saved literature from Arcadian vacuities, leading it towards a national end; he armed himself with patriotism and classicism in order to drive the profaners out of the temple of art. But in substance he was rather a patriot than an artist. In any case the results of the new literary movement were copious.

U#o Foscolo was an eager patriot, who carried into life the heat of the most unbridled passion, and into his art a rather rhetorical manner, but always one inspired by classical models. The Lettere di Jacopo Ortis, inspired by Goethe's Werther, are a love story with a mixture of patriotism; they contain a violent protest against the treaty of Campo Formio, and an outburst from Foscolo's own heart about an unhappy

Foscolo.

love-affair of his. His passions were sudden and violent; they came to an end as abruptly as they began; they were whirlwinds that were over in a quarter of an hour. To one of these passions Ortis owed its origin, and it is perhaps the best, the most sincere, of all his writings. Even in it he is sometimes pompous and rhetorical, but much less so than he is, for example, in the lectures Dell' origine e dell' ufficio della letleratura. On the whole, Foscolo's prose is turgid and affected, and reflects the character of the man who always tried to pose, even before himself, in dramatic attitudes. This was indeed the defect of the Napoleonic epoch; there was a horror of anything common, simple, natural; everything must be after the model of the hero who made all the world gaze with wonder at him; everything must assume some heroic shape. In Foscolo this tendency was

excessive; and it not seldom happened that, in wishing to play the hero, the exceptional man, the little Napoleon of ladies' drawing-rooms, he became false and bad, false in his art, bad in his life. The Sepolcri, which is his best poem, was prompted by high feeling, and the mastery of versification shows wonderful art. Perhaps it is to this mastery more than to anything else that the admiration the Sepolcri excites is due. There are most obscure passages in it, as to the meaning of which it would seem as if even the author himself had not formed a clear idea. He left incomplete three hymns to the Graces, in which he sang of beauty as the source of courtesy, of all high qualities and of happiness. Here again what most excites our admiration is the harmonious and easy versification. Among his prose works a high place belongs to his translation of the Sentimental Journey of Sterne, a writer by whom one can easily understand how Foscolo should have been deeply affected. He went as an exile to England, and died there. He wrote for English readers some Essays on Petrarch and on the texts of the Decamerone and of Dante, which are remarkable for the time at which they were written, and which may be said to have initiated a new kind of literary criticism in Italy. Foscolo is still greatly admired, and not without reason. His writings stimulate the love of father- land, and the men that made the revolution of 1848 were largely brought up on them.

If in Foscolo patriotism and classicism were united, and formed almost one passion, so much cannot be said of Vincenzo Monti, in whom the artist was absolutely predominant. Yet Monti was a patriot too, but in his own way. He had no one deep feeling that ruled him, or rather the mobility of his feelings is his characteristic; but each of these was a new form of patriotism, that took the place of an old one. He saw danger to his country in the French Revolution, and wrote the Pellegrino apostolico, the Bassvilliana and the Feroniade; Napoleon's victories caused him to write the Prometeo and the Musagonia; in his Fanatismo and his Superstizione he attacked the papacy; afterwards he sang the praises of the Austrians. Thus every great-event made him change his mind, with a readi- ness which might seem incredible, but is yet most easily explained. Monti was above everything an artist; art was his real, his only passion; everything else in him was liable to change, that alone was persistent. Fancy was his tyrant, and under its rule he had no time to reason and to see the miserable aspect of his political tergiversation. It was an overbearing deity that moved him, and at its dictation he wrote. Pius VI. , Napoleon, Francis II., were to him but passing shadows, to which he hardly gives the attention of an hour; that which endures, which is eternal to him, is art alone It were unjust to

accuse Monti of baseness. If we say that nature in giving him one only faculty had made the poet rich and the man poor, we shall speak the truth. But the poet was indeed rich. Knowing little Greek, he succeeded in making a translation of the Iliad which is remarkable for its Homeric feeling, and in his Bassvilliana he is on a level with Dante. In fine, in him classical poetry seemed to revive in all its florid grandeur.

Monti was born in 1754, Foscolo in 1778; four years later still was born another poet of the same school, Giambattista „ ■ ■ Niccolini. In literature he was a classicist; in politics he was a Ghibelline, a rare exception in Guelph Florence, his :

Monti.

Historians.

birthplace.- In translating ory if the expression is preferred, imitating Aeschylus, r as' well as in writing the Discorsi sulla tragedia greca, • and on -the' .Sublime e Michelangelo, Niccolini displayed his passionate devotion to ancient literature. In his tragedies he set himself free from the excessive rigidity of Alfieri, and partly approached the English and German tragic authors. He nearly always chose political subjects, striving to keep alive in his compatriots the love of liberty. Such are Nabucco, Antonio Foscarini, Giovanni da Procida, Lodovico il Mora, &c. He assailed papal Rome in Arndldo da Brescia, a long tragic piece, not suited for acting, and epic rather than dramatic. Niccolini's tragedies show a rich lyric vein rather than dramatic genius. At any rate he has the merit of having vindicated liberal ideas, and of having opened a new path to Italian tragedy.

The literary period we are dealing with had three writers who are examples of the direction taken by historical study. It seems strange that, after the learned school begun by Mura- tori, there should have been a backward movement here, but it is clear that this retrogression was due to the influence of classicism and patriotism, which, if they revived poetry, could not but spoil history. Carlo Botta, born in 1766, was a spectator of French spoliation in Italy and of the over- bearing rule of Napoleon. Hence, excited by indignation, he wrote a History of Italy from 1789 to 181 4; and

later on he continued Guicciardini's History up to 1789. He wrote after the manner of the Latin authors, trying to imitate Livy, putting together long and sonorous periods in a style that aimed at being like Boccaccio's, caring little about that which constitutes the critical material of history, only intent on declaiming his academic prose for his country's benefit. Botta wanted to be classical in a style that could no longer be so, and hence he failed com- pletely to attain his literary goal. His fame is only that of a man of a noble and patriotic heart. Not so bad as the two histories of Italy is that of the Guerra dell' indipendenza americana.

Close to Botta comes Pietro Colletta, a Neapolitan born nine years after him. He also in his Sloria del reame di Napoli dal IJ34 al 1825 had the idea of defending the independence and liberty of Italy in a style borrowed from Tacitus; and he suc- ceeded rather better than Botta. He has a rapid, brief, nervous style, which makes his book attractive reading. But it is said that Pietro Giordani and Gino Capponi corrected it for him. Lazzaro Papi of Lucca, author of the Commentari della rivoluzione francese dal 1789 al 1814, was not altogether unlike Botta and Colletta. He also was an historian in the classical style, and treats his subject with patriotic feeling; but as an artist he perhaps excels the other two.

At first sight it seems unnatural that, whilst the most burning political passions were raging, and whilst the most brilliant men of genius in the new classical and patriotic school were at the height of their influence, a question should have arisen about " purism " of language. Yet the phenomenon can be easily accounted for. Purism is another form of classicism and patriotism. In the second half of the i8th century the Italian language was specially full of French expressions. There was great indifference about fitness, still more about elegance of style. Prose then was to be restored for the sake of national dignity, and it was believed that this could not be done except by going back to the writers of the 14th century, to the " aurei trecentisti," as they were called, or else to the classics of Italian literature. One of the promoters of the new school was Antonio Cesari of Verona, who republished ancient authors, and brought out a new edition, with additions, of the Vocabolario della Crusca. He wrote a dissertation Sopra lo stalo presente della lingua italiana, and endeavoured to establish the supremacy of Tuscan and of the three great writers Dante, Petrarch, Boccaccio. And in accordance with that principle he wrote several books, taking pains to copy the " trecentisti " as closely as possible. But patriotism in Italy has always had something municipal in it; so to this Tuscan supremacy, pro- claimed and upheld by Cesari, there was opposed a Lombard school,

which would know nothing of Tuscan, and with Dante's De vulgari cloquio returned to the idea of the " lingua illustre."

The Purists.

This was an old question, largely and bitterly argued in the Cinquecento (16th century) by Varchi, Muzio, Castelvetro, Speroni and others. Now the question came up again quite fresh, as if no one had ever discussed it before. At the head of the Lombard school were Monti and his son-in-law Count Giulio Perticari. This gave Monti an occasion to write Proposta di alcune correzioni ed aggiunte al vocabolario della Crusca, in which he attacked the Tuscanism of the Crusca, but in a graceful and easy style, such in fact as to form a prose that is one of the most beautiful in Italian literature. Perticari on the other hand, with a very inferior intellect, narrowed and exasperated the question in two treatises, Degli scrittori del Trecento and Dell' amor patrio di Dante, in which, often disguising or altering the facts, he only makes confusion where there was none. Meantime, however, the impulse was given. The dispute about language took its place beside literary and political disputes, and all Italy took part in it — Basilio Puoti at Naples, Paolo Costa in the Romagna, Marc' Antonio Parenti at Modena, Salvatore .Betti at Rome, Giovanni Gherardini in Lombardy, Luigi Fornaciari at Lucca, Vincenzo Nannucci at Florence.

A patriot, a classicist and a purist all at once was Pietro Giordani, born in 1774; he was almost a compendium of the literary movement of the time. His whole life was _. , a battle fought for liberty. Most learned in Greek . and Latin authors, and in the Italian trecentisti, he only left a few writings behind him, but they were carefully elaborated in point of style, and his prose was in his time considered wonder- ful. Now it is looked on as too majestic, too much laboured in phrases and conceits, too far from nature, too artificial. Giordani closes the literary epoch of the classicists.

7. Nineteenth Century and After. — At this point the contemn porary period of literature begins. It has been said that the first impulse was given to it by the romantic school, which had as its organ the Conciliatore established in 1818 at Milan, and on the staff of which were Silvio Pellico, Lodovico di Breme, Giovile Scalvini, Tommaso Grossi, Giovanni Berchet, Samuele Biava and lastly Alessandro Manzoni. It need not be denied that all these men were influenced by the ideas that, especially in Germany, at the beginning of the 19th century constituted the movement called Romanticism. Nevertheless, in Italy the course of literary reform took another direction. There is

no doubt that the real head of the reform, or at least its most distinguished man, was Alessandro Manzoni. He formulated in a letter of his the objects of the new school, saying that it aspired to try and discover and express " il vero ' storico " and " il vero morale," not only as an end, but as the widest and eternal source of the beautiful. And it is precisely realism in art that characterizes Italian literature from Manzoni onwards. The Promessi Sposi is the one of his works that has made him immortal. No doubt the idea of the historical novel came to him from Sir Walter Scott, but he succeeded in some- thing more than an historical novel in the narrow meaning of that word; he created an eminently realistic work of art. The romance disappears; no one cares for the plot, which moreover is of very little consequence. The attention is entirely fixed on the powerful objective creation of the characters. From the greatest to the least they have a wonderful verisimilitude; they are living persons standing before us, not with the qualities of one time more than another, but with the human qualities of all time. Manzoni is able to unfold a character in all particulars, to display it in all its aspects, to follow it through its different phases. He is able also to seize one moment, and from that moment to make us guess all the rest. Don Abbondio and Renzo are as perfect as Azzeccagarbugli and II Sarto. Manzoni dives down into the innermost recesses of the human heart, and draws thence the most subtle psychological reality. In this his greatness lies, which was recognized first by his comr panion in' genius, Goethe. As a poet too he had gleams of genius, especially in the Napoleonic ode, // Cinque Maggio, and where he describes human affections, as in some stanzas of the Inni and in the chorus of the Adelchi. But it is on the Promessi Sposi alone that his fame now rests.

The great poet of the age was Leopardi, born thirteen years after Manzoni at Recanati, of a patrician family, bigoted and

avaricious. He became so familiar with Greek authors ' that he used afterwards to say that the Greek mode of thought was more clear and living to his mind than the Latin or even the Italian. Solitude, sickness, domestic tyranny, prepared him for profound melancholy. From this he passed into complete religious scepticism, from which he sought rest in art. Everything is terrible and grand in his poems, which are the most agonizing cry in modern literature, uttered with a solemn quietness that at once elevates and terrifies us. But besides

being the greatest poet of nature and of sorrow, he was also an admirable prose writer. In his Operette morali — dialogues and discourses marked by a cold and bitter smile at human destinies which freezes the reader — the clearness of style, the simplicity of language and the depth of conception are such that perhaps he is not only the greatest lyrical poet since Dante, but also one of the most perfect writers of prose that Italian literature has had.

As realism in art gained ground, the positive method in criticism kept pace with it. From the manner of Botta and

Colletta history returned to its spirit of learned re- uterature. searcn > as is shown in such works as the Archivio

storico italiano, established at Florence by Giampietro Vieusseux, the Storia d' Italia nel medio evo by Carlo Troya, a remarkable treatise by Manzoni himself, Sopra alcuni punti delta storia longobardica in Italia, and the very fine history of the Vespri siciliani by Michele Amari. But alongside of the great artists Leopardi and Manzoni, alongside of the learned scholars, there was also in the first half of the 19th century a patriotic literature. To a close observer it will appear that historical learning itself was inspired by the love of Italy. Giampietro Vieusseux had a distinct political object when in 1820 he established the monthly review Antologia. And it is equally well known that his Archivio storico italiano (1842) was, under a different form, a continuation of the Antologia, which was suppressed in 1833 owing to the action of the Russian government. Florence was in those days the asylum of all the Italian exiles, and these exiles met and shook hands in Vieus- seux's rooms, where there was more literary than political talk, but where one thought and one only animated all minds, the thought of Italy.

The literary movement which preceded and was contemporary with the political revolution of 1848 may be said to be repre- sented by four writers — Giuseppe Giusti, Francesco Domenico Guerrazzi, Vincenzo Gioberti and Cesare Balbo. Giusti wrote epigrammatic satires in popular language. In incisive phrase he scourged the enemies of Italy; his' manner seemed very original, but it really was partly imitated from Beranger. He was a telling political writer, but a mediocre poet. Guerrazzi had a great reputation and great influence, but his historical novels, though read with ferverish avidity before 1848, are now almost forgotten. Gioberti, a powerful polemical writer, had a noble heart and a great mind; his philosophical works are now as good as dead, but the Primato morale e civile degli Italiani will last as an important document of the times, and the

Gesuita moderno will live as the most tremendous indictment ever written against the Jesuits. Balbo was an earnest student of history, and made history useful for politics. Like Gioberti in his first period, Balbo was zealous for the civil papacy, and for a federa- tion of the Italian states presided over by it. His Sommario delta storia d' Italia is an excellent epitome. (A. Ba.)

*After the year 1850 political literature becomes less important, one of the last poets distinguished in this genre being Francesco dall' Ongaro, with his stornelli politici. For details as Cootem- t0 tne wor k s f recen t writers, reference may be made literature. * tne separate biographical articles, and here a summary must suffice. Giovanni Prati and Aleardo Aleardi continue romantic traditions. The dominating figure of this later period, however, is Giosue Carducci, the opponent of the Romantics and restorer of the ancient metres and spirit^ who, great as a poet, was scarcely less distinguished as a literary*

critic and historian. Other classical poets are Giuseppe Chiarini, Domenico Guoli, Arturo Graf, Guido Mazzoni and Giovanni Marradi, of whom the two last named may perhaps be regarded as special disciples of Carducci, while another, Giovanni Pascoli, best known by his Myricae and Poemetli, only began as such. Enrico Panzacchi (b. 1842) was at heart still a romantic. Olindo Guerrini (who wrote under the pseudonym of Lorenzo Stecchetti) is the chief representative of veriomo in poetry, and, though his early works obtained a succes de scandale, he is the author of many lyrics of intrinsic value. Alfredo Baccelli and Mario Rapisardi are epic poets of distinction. Felice Cavallotti is the author of the stirring Marcia de Leonida. Among dialect writers, the great Roman poet Giuseppe Gioachinb Belli has found numerous successors, such as Renato Fucini (Pisa), Berto Barbarini (Verona) and Cesare Pascarella (Rome). Among the women poets, Ada Negri, with her socialistic Fatalita and Tempesle, has achieved a great reputation ; and others, such as Vittoria Aganoor, A. Brunacci-Brunamonti and Annie Vivanti, are highly esteemed in Italy.

Among the dramatists, Pietro Cossa in tragedy, Gherardi del Testa, Ferdinando Martini and Paolo Ferrari in comedy, represent the older schools. More modern methods were adopted by Giuseppe Giacosa and Gerolamo Rovetta.

In fiction, the historical romance has fallen into disfavour, though Emilio de Marchi has written some good examples in this genre. The novel of intrigue was cultivated by Anton Giulio Barrili and

Salvatore Farina, the psychological novel by Enrico Annibale Butti, the realistic local tale by Giovanni Verga, the mystic philosophical novel by Antonio Fogazzaro. Edmondo de Amicis, perhaps the most widely read of all modern Italians, has written acceptable fiction, though his moral works and travels are more generally known. Of the women novelists, Matilde Serao and Grazia Deledda have become deservedly popular.

Gabriele d' Annunzio has produced original work in poetry, drama and fiction, of extraordinary quality. He began with some lyrics which were distinguished no less by their exquisite beauty of form than by their licence, and these characteristics reappeared in a long series of poems, plays and novels. D'Annunzio's position as a man of the widest literary and artistic culture is undeniable, and even his sternest critics admit his mastery of the Italian tongue, based on a thorough knowledge of Italian literature from the earliest times. But with all his genius, his thought is unhealthy and his pessimism depressing; the beauty of his work is the beauty of decadence.

Bibliografhy. — Among the more aesthetic accounts of Italian literature, those of Emiliano Giudici (Florence, 1855) and Francesco de Sanctis (Naples, 1870) are still the best. Two histories of real scientific value were interrupted by the death of the authors: that of Adolfo Bartoli (Florence, 1879-1899) breaking off in the 14th century, and that of Gaspary (Berlin, 1 884-1 889; English version, so far only down to the death of Dante, London, 1901) breaking off before Tasso (a completion being undertaken by Wendriner). Bartoli's article in the 9th edition of this encyclopaedia has been reproduced, with some slight revision, above. Among the many recent Italian works, the most important is the elaborate series of volumes contributing the Storia lett. d' Italia scritta da una societa di professori (1900 sqq.) : Giussani, Lett, romana; Novati, Origini delta lingua; Zingarelli, Dante; Volpi, It Trecento; Rossi, //

8uattrocento; Flamini, It Cinquecento; Belloni, // Seicento; oncari, // Settecento; Mazzoni, V Ottocento. Each volume has a full bibliography. Important German works, besides Gaspary, are those of Wilse and Percopo (illustrated; Leipzig, 1899), and of Casini (in Grober's Grundr. der rom. Phil. , Strassburg, 1896-1899). English students are referred to Symonds's Renaissance in Italy (especially, but not exclusively, vols. iv. and v.; new ed., London, 1902), and to R. Garnett's History of Italian Literature (London, 1898). (H. O.)

ITALIAN WARS (1848- 18 70), a generic name for the series of wars for Italian unity which began with the Milan insurrection of the 18th

of March 1848 and closed with the capture of Rome by the Italians on the 20th of September 1870. For their Italian political interest see Italy: History. The present article deals with certain campaigns of distinctively military importance, viz. 1848-49, 1859 and 1866, in the first and third of which the centre of gravity of the nationalist movement was the Piedmontese

regular army, and in the second the French army commanded by Napoleon III. On the other side the Austrian army was throughout the basis of the established order of things, settled at the Congress of Vienna on the theory that Italy was " a geographical expression." Side by side with these regular armies, each of which was a special type, there fought national levies of widely varying kinds, and thus practically every known form of military service, except the fully organized " nation in arms " (then peculiar to Prussia) made its appearance in the field. Further, these wars constitute the greater part of European military history between Waterloo and Koniggratz — a bridge — if a broken one — between Napoleon and Moltke. They there- fore present a considerable technical interest, wholly apart from their historical importance and romantic interest.

Austro-Sardinian War of 1848- 1849 From about 1846 the spirit of revolt against foreign domina- tion had gathered force, and two years later, when Europe was on die verge of a revolutionary outburst, the struggle for Italian unity was initiated by the insurrection at Milan. At this moment the Austrian army in Lombardy, practically a highly-trained force of long-service professional soldiers, was commanded by Radetzky, one of the greatest generals in Austrian history. Being, however, virtually an army of occupation, it was broken up into many garrisons, and in all was not more than 70,000 strong, so that after five days' fighting in the streets of Milan, Radetzky did as Wellington had proposed to do in 181 7 when his army of occupation in France was threatened by a national rising, and withdrew to a concentration area to await reinforce- ments. This area was the famous Quadrilateral, marked by the fortresses of Mantua, Verona, Peschiera and Legnago, and there, in the early days of April, the scattered fractions of the Austrians assembled. Lombardy and Venetia had followed the example of Milan, and King Charles Albert of Sardinia, mobiliz- ing the Piedmontese army in good time, crossed the frontier, with 45,000 regulars two days after the Austrians had withdrawn from Milan.

Had the insurrectionary movements and the advance of the Piedmontese been properly co-ordinated, there can be little doubt that some, at any rate, of the Austrian detachments would have been destroyed or injured in their retreat, but as it was they escaped without material losses. The blow given to Austrian prestige by the revolt of the great cities was, however, so severe that the whole peninsula rallied to Charles Albert. Venice, reserving a garrison for her own protection, set on foot an improvised army 11,000 strong on the mainland; some 5 000 Lombards and 9000 insurgents from the smaller duchies gathered on both sides of the Po; 15,000 Papal troops under Durando and 13,000 Neapolitans under the old patriot general Pepe moved up to Ferrara and Bologna respectively, and Charles Albert with the Piedmontese advanced to the Mincio at the beginning of April. His motley command totalled 96,000 men, of whom, however, only half were thoroughly trained and disciplined troops. The reinforcements available in Austria were about 25,000 disciplined troops not greatly inferior in quality to Radetzky's own veterans. Charles Albert could call up 45,000 levies at a few weeks' notice, and eventually all the resources of the patriot party.

The regular war began in the second week of April on the Mincio, the passages of which river were forced and the Austrian advanced troops driven back on the 8th (action of Goito) and 9th. Radetzky maintained a careful defensive, and the king's attempts to sur- prise Peschiera (14th) and Mantua (19th) were unsuccessful. But Peschiera was closely invested, though it was not forced to capitulate until the end of May. Meantime the Piedmontese army advanced towards Verona, and, finding Radetzky with a portion of his army on their left flank near Pastrengo, swung northward and drove him over the Adige above Verona, but on turning towards Verona they were checked (action of Pastrengo 28th-30th April and battle of Santa Lucia di Verona, 6th May).

Meantime the Austrian reinforcements assembled in Carniola under an Irish-born general, Count Nugent von Westmeath (1777- 1862) and entered Friuli. Their junction with the field marshal was in the last degree precarious, every step of their march was contested by the levies and the townsmen of Venetia. The days of rifled artillery were not yet come, and a physical obstacle to the combined movements of trained regulars and a well-marked line of defence were all that was necessary to convert even medieval

walled towns into centres of effective resistance. When the spirit of resistance was lacking, as it had been for example in 1799 (see French Revolutionary Wars), the importance of the walled towns

corresponded simply to their material strength, which was practically negligible. But throughout the campaign of 1848- 1849, the essential moral conditions of defence being present, the Austrians were hampered by an endless series of minor sieges, in which the effort expended was out of all proportion to the success achieved.

Nugent, however, pressed on, though every day weakened by small detachments, and, turning rather than overpowering each obstacle as it was encountered, made his way slowly by Belluno to Vicenza and Treviso and joined Radetzky at Verona Radetzky on the 25th of May. The latter then for a moment took ’” the the offensive, passing around the right flank of the loyal Qwdrl- army by way of Mantua (actions of Curtatone, 29th May, lateral- arid Goito, 30th May), but, failing of the success he expected he turned swiftly round and with 30,000 men attacked the 20,000 Italians (Papal troops, volunteers, Neapolitans) under Durando, who had established themselves across his line of communication at Vicenza, drove them away and reoccupied Vicenza (9th June), where a second body of reinforcements from Trent, clearing the Brenta valley (Val Sugana) as they advanced, joined him, the king meanwhile being held in check by the rest of Radetzky’s army.

After beating down resistance in the valleys of the Brenta and Piave, the field marshal returned to Verona. Charles Albert had now some 75,000 men actually in hand on the line of high ground, S. Giustina-Somma Campagna, and made the mistake of extending inordinately so as to cover his proposed siege of Mantua. Napoleon, fifty years before on the same ground (see French Revolutionary Wars), had only with great difficulty solved this same problem by the economical grouping and resolute handling of his forces, and Charles Albert, setting out his forces en cordon, was weak at all points of his long front of 45 m. Thus Radetzky, gathering his forces opposite the king’s centre (Sona, Somma Campagna), was able to break it (23rd July). The Piedmontese, however, fell back steadily, and 25,000 of them collected at Villafranca, whence on the 24th they counter-attacked and regained the heights at Custozza and Somma Campagna that they had lost. Radetzky, however, took the offensive again next morning and having succeeded in massing half of his army opposite to one quarter of the Piedmontese, was completely victorious (first battle of Custozza, 24th-25th July). Pursuing vigorously, the Austrians drove the king over the Mincio (action of Volta, 26th-27th), the Chiese, the Adda and the Ticino into his own dominions, Milan being reoccupied without fighting. The smaller bands of patriots were one after the other driven over the borders or destroyed. Venice alone held out to the end. Be- sieged by land and

water, and bombarded as well, she prolonged her resistance until October 1849, long after the war had everywhere else come to an end.

The first campaign for unity had ended in complete failure, thanks to the genius of Radetzky and the thorough training, mobility and handiness of his soldiers. During the winter of 1848-1849 — for, to avoid unnecessary waste of his precious veterans, Radetzky let the Piedmontese army retire unmolested over the Ticino — Charles Albert took energetic measures to reorganize, refit and augment his army. But his previous career had not fitted him to meet the crisis. With aspirations for unity he sympathized, and to that ideal he was soon to sacrifice his throne, but he had nothing in common with the distinctively revolutionary party, with whom circumstances had allied him. Radicalism, however, was a more obvious if a less real force than nationalism, and Charles Albert made it a fatal concession in appointing the Polish general Albert Chrzanowski (1788-1861) his principal adviser and commander-in-chief — an appointment that alienated the generals and the army, while scarcely modifying the sentiments of distrust with which the Liberal party regarded the king. 1

In March the two main armies were grouped in the densely intersected district between Milan, Vercelli and Pavia (see sketch map below), separated by the Ticino, of which the out- posts of either side watched the passages. Charles Cam P al X" Albert had immediately in hand 65,000 men, some 25,000 ot more being scattered in various detachments to right and Novara – left. Radetzky disposed of 70,000 men for field operations, besides garrisons. The recovery of Milan, the great city that had been the first to revolt, seemed to the Italians the first objective of the campaign. It was easier indeed to raise the whole country in arms than to crush the field-marshal's regulars, and it was hoped that Radetzky would, on losing Milan, either retire to Lodi and perhaps

1 Several of the French generals — Lamoriciere, Bedeau, Chan-garnier and others — who had been prominent in Algeria and in the 1848 revolution in France had been invited to take the command, but had declined it.

to Mantua (as in 1848), or gather his forces for battle before Milan.

Radetzky himself openly announced that he would take the offensive, and the king's plans were framed to meet this case also. Two-thirds of the army, 4 divisions, were grouped in great depth between Novara, Galliate and Castelnuovo. A little to the right, at Vespolate and Vigevano, was one division under Durando, and the remaining division under Ramorino was grouped opposite Pavia with orders to take that place if possible, but if Radetzky advanced thence, to fall back fighting either on Mortara or Lomello, 1 while the main body descended on the Austrian flank. The grouping both of Ramorino and of the main body — as events proved in the case of the latter — cannot be seriously criticized, and indeed one is almost tempted to assume that Chrzanowski considered the case of Radetzky's advance on Mortara more carefully than that of his own advance on Milan. But the seething spirit of revolt did not allow the army that was Italy's hope to stand still at a foreign and unˆ tried general's dictation and await Radetzky's coming. On the 19th of March orders were issued to the main body for the advance on Milan and on the 20th one division, led by the king himself, crossed the Ticino at San Martino.

But no Austrians were encountered, and such information as was available indicated that Radetzky was concentrating to his left on the Pavia-Lodi road. Chrzanowski thereupon, abandoning (if indeed he ever entertained) the idea of Radetzky's retirement and his own triumphal march on Milan, suspended the advance. His fears were justified, for that evening he heard that Ramorino had abandoned his post and taken his division across the Po. After the war this general was shot for disobedience, and deservedly, for the covering division, the fighting flank-guard on which Chrzanowski's defensive-offensive depended, was thus withdrawn at the moment when Radetzky's whole army was crossing the Ticino at Pavia and heading for Mortara. 2

The four Austrian corps began to file across the Ticino at noon on the 20th, and by nightfall the heads of Radetzky's columns were at Zerbolo, Gambolo and La Cava, the reserve at Pavia, a flank-guard holding the Cava-Casatisma road over the Po against the contingency of Ramorino's return, and the two brigades that had furnished the outposts along the Ticino closing on Bereguardo.

Chrzanowski, however, having now to deal with a foreseen case, gave his orders promptly. To replace Ramorino, the 1st division was ordered from Vespolate through Mortara to Trumello ; Action of ˆg 2nc j ˆvision f r0 m Cerano to push south on Vigevano ; Mortara. t ˆ c reserve from Novara to Mortara; the remainder to follow the 2nd

division. Had the 1st division been placed at Mortara instead of Vespolate in the first instance the story of the campaign might have been very different, but here again, though to a far less culpable degree, a subordinate general's default imperilled the army. Durando (21st March), instead of pushing on as ordered to Trumello to take contact with the enemy, halted at Mortara. The reserve also halted there and deployed west of Mortara to guard against a possible attack from San Giorgio. The Sardinian ad- vanced guard on the other road reached Borgo San Siro, but there met and was driven back by Radetzky's II. corps under Lieut. Field Marshal d'Aspre (1789-1850), which was supported by the brigades that now crossed at Bereguardo. But the Italians were also supported, the Austrians made little progress, and by nightfall the Sardinian II., III. and IV. divisions had closed up around Vigevano. Radetzky indeed intended his troops on the Vigevano road to act simply as a defensive flank-guard and had ordered the rest of his army by the three roads, Zerbolo-Gambolo, Gropello- Trumello and Lomello-San Giorgio, to converge on Mortara. The rearmost of the two corps on the Gambolo road (the I.) was to serve at need as a support to the flank-guard, and, justly confident in his troops, Radetzky did not hesitate to send a whole corps by the eccentric route of Lomello. And before nightfall an important success had justified him, for the II. corps from Gambolo, meeting Durando outside Mortara had defeated him before the Sardinian reserve, prematurely deployed on the other side of the town, could come to his assistance. The remaining corps of Radetzky's army were still short of Mortara when night came, but this could hardly be well known at the royal headquarters, and, giving up the slight chances of success that a counterstroke from Vigevano on Mortara offered, Chrzanowski ordered a general concentration on Novara. This was effected on the 22nd, on which day Radetzky, pushing out the II. corps towards Vespolate, concentrated the rest at Mortara. That the Italians had retired was clear, but it was not known whither, and, precisely as Napoleon had done before Marengo (see Frenxh Revolutionary Wars), he sent one corps to seize the king's potential line of retreat, Novara-Vercelli, kept one back at Mortara —

1 Students of Napoleonic strategy will find it interesting to replace Ramorino by, say, Lannes, and to post Durando at Mortara-Vigevano instead of Vespolate- Vigevano, and from these conditions to work out the probable course of events.

2 Ramorino's defence was that he had received information that the Austrians were advancing on Alessandria by the south bank of the Po. But Alessandria was a fortress, and could be expected to hold out

for forty-eight hours ; moreover, it could easily have been succoured by way of Valenza if necessary.

ready, it may be presumed, to grapple an enemy coming from Vigevano — and engaged the other three in a single long column, widely spaced out, on the Novara road. Thus it came about that on the 23rd d'Aspre's II. corps encountered Charles Albert's whole army long before the III. and Reserve could join it. The battle of Novara was, nevertheless, as great an event in the history of the Imperial-Royal Army as Marengo in that of the French.

First the II. corps, and then the II. and III. together attacked with the utmost resolution, and as the hours went by more and more of the whitecoats came on the field until at last the Novara IV. corps, swinging inward from Robbio, came on to the flank of the defence. This was no mere strategical triumph; the Austrians, regiment for regiment, were more than a match for the Italians and the result was decisive. Charles Albert abdicated, and the young Victor Emmanuel II., his successor, had to make a hasty armistice.

After Novara, the first great struggle for Italian unity was no more than a spasmodic, if often desperate, struggle of small bodies of patriots and citizens of walled towns to avert the inevitable. The principal incidents in the last phase were the siege of Venice, the sack of Brescia by the merciless Haynau and the capture of Rome by a French expeditionary corps under General Oudinot.

The Italian War or 1859 The campaign of Magenta and Solferino took place ten years later. Napoleon III., himself an ex-carbonaro, and the apostle of the theory of " nationalities," had had his attention and his ambitions drawn towards the Italian problem by the attempt upon his life by Orsini. The general political horizon was by no means clear at the end of 1858, and on the 1st of January 1859 the emperor of the French publicly expressed to the Austrian ambassador his regret that " our relations are not so good as heretofore." This was regarded by all concerned as a prelude to war, and within a short time a treaty and a marriage- contract allied Sardinia with the leading European power'. In the smaller Italian states, as before, the governments were on the side of Austria and the " settlement of 1815, " and the peoples on that of United Italy. The French still maintained a garrison in Rome to support the pope. The thorny question of the temporal power versus the national movement was not yet in the foreground, and though Napoleon's support of the former was later to prove his undoing, in 1859 the main enemy was Austria and the paramount factor was the assistance of 200,000

French regulars in solving the immediate problem.

The Sardinian army, reconstituted by La Marmora with the definite object of a war for Union and rehabilitated by its conduct in the Crimea, was eager and willing. The French army, proud of its reputation as the premier army in the world, and composed, three-fourths of it, of professional soldiers whose gospel was the " Legend," welcomed a return to the first Napoleon's battle-grounds, while the emperor's ambitions coincided with his sentiments. Austria, on the other hand, did not desire war. Her only motive of resistance was that it was impossible to cede her Italian possessions in face of a mere threat. To her, even more than to France and infinitely more than to Italy, the war was a political war, a " war with a limited aim " or " stronger form of diplomatic note "; it entirely lacked the national and personal spirit of resistance which makes even a passive defence so powerful.

Events during the period of tension that preceded the actual declaration of war were practically governed by these moral conditions. Such advantages as Austria possessed at the outset could only be turned to account, as will presently appear, by prompt action. But her army system was a combination of conscription and the " nation in arms," which for the diplomatic war on hand proved to be quite inadequate. Whereas the French army was permanently on a two-thirds war footing (400,000 peace, 600,000 war), that of Austria required to be more than doubled on mobilization by calling in reservists. Now, the value of reservists is always conditioned by the temper of the population from which they come, and it is more than probable that the indecision of the Austrian government between January and April 1859 was due not only to its desire on general grounds to avoid war, but also, and perhaps still more,

to its hopes of averting' it by firmness, without having recourse to the possibly dangerous expedient of a real mobilization. A few years before the method of " bluffing " had been completely successful against Prussia. But the Prussian reservist of 1850 did not want to fight, whereas the French soldier of 1859 desired nothing more ardently.

In these conditions the Austrian preparations were made sparingly, but with ostentation. The three corps constituting the Army of Italy

(commanded since Radetzky's death in 1858 by Feldzeugmeister Count Franz Gyulai (1798-1863)), were maintained at war efficiency, but not at war strength (corps averaging 15,000). Instead, however, of mobilizing them, the Vienna government sent an army corps (III.) from Vienna at peace strength in January. This was followed by the II. corps, also at peace strength, in February, and the available field force, from that point, could have invaded Piedmont at once. 1 The initial military situation was indeed all in favour of Austria. Her mobilization was calculated to take ten weeks, it is true, but her concentration by rail could be much more speedily effected than that of the French, who had either to cross the Alps on foot or to proceed to Genoa by sea and thence by one line of railway to the interior. Further, the demands of Algeria, Rome and other garrisons, the complicated political situation and the consequent necessity of protecting the French coasts against an English attack, 2 and still more the Rhine frontier against Prussia and other German states (a task to which the greatest general in the French army, P61issier, was assigned), materially reduced the size of the army to be sent to Italy. But the Austrian government held its hand, and the Austrian commander, apparently nonplussed by the alternation of quiescence and boldness at Vienna, asked for full mobilization tioa ' an d turned his thoughts to the Quadrilateral that had served Radetzky so well in gaining time for the reserves to come up. March passed away without an advance, and it was not until the 5th of April that the long-deferred order was issued from Vienna to the reservists to join the II., III., V., VII. and VIII. corps in Italy. And, after all, Gyulai took the field, at the end of April, with most of his units at three- quarters of their war strength. 3 On the side of the allies the Sardinians mobilized 5 infantry and 1 cavalry divisions, totalling 64,000, by the third week in April. A few days later Austria sent an ultimatum to Turin. This was rejected on the 26th, war being thereupon declared. As for the French, the emperor's policy was considerably in advance of his war minister's prepara- tions. The total of about 130,000 men (all that could be spared out of 500,000) for the Italian army was not reached until operations were in progress; and the first troops only entered Savoy or disembarked in Genoa on the 25th and 26th of April.

Thus, long as the opening had been delayed, there was still a period after both sides had resolved on and prepared for war, during which the Austrians were free to take the Austrian ff ens i ve- Had the Austrians crossed the frontier meats. instead of writing an ultimatum on the 19th of April, they would have had from a week to a fortnight to deal with the Sardinians. But even the three or four days that

elapsed between the declaration and the arrival of the first French soldiers were wasted. Vienna ordered Gyulai to take the offensive on the 27th, but it was not until the 30th that the Austrian general crossed the Ticino. His movements were unopposed, the whole of the Sardinian army having concentrated (by arrangement between La Marmora and Marshal Canrobert) in a flank position between Casale and Alessandria, where it covered Turin indirectly and Genoa, the French disembarkation

' The Sardinians, at peace strength, had some 50,000 men, and during January and February the government busied itself chiefly with preparations of supplies and armament. Here the delay in calling out the reserves was due not to their possible ill-will, but to the necessity of waiting on the political situation.

2 The Volunteer movement in England was the result of this crisis in the relations of England and France.

3 As far as possible Italian conscripts had been sent elsewhere and replaced by Austrians.

port, directly. Gyulai's left was on the 2nd of May opposite the allied centre, and his right stretched as far as Vercelli. 4 On the 3rd he planned a concentric attack on King Victor Emmanuel's position, and parts of his scheme were actually put into execution, but he suspended it owing to news of the approach of the French from Genoa, supply difficulties (Radetzky, the inheritor of the 18th-century traditions, had laid it down that the soldier, must be well fed and that the civilian must not be plundered, conditions which were unfavourable to mobility) and the heavy weather and the dangerous state of the rivers.

Gyulai then turned his attention to the Sardinian capital. Three more days were spent in a careful flank march to the right, and on the 8th of May the army (III., V. and VII.) was grouped about Vercelli, with outposts 10-14 m. beyond the Sesia towards Turin, reserves (II. and VIII.) round Mortara, and a flank-guard detached from Benedek's VIII. corps watching the Po. The

*Canals **

extreme right of the main body skirmished with Garibaldi's volunteers on the edge of the Alpine country. The Turjn scheme was, however, soon given up. Bivouacs, cancelled orders and crossings of marching columns all contributed to exhaust the troops needlessly.

On the 9th one corps (the V.) had its direction and disposition altered four times, without any change in the general situation to justify this. In fact, the 't"^pedat Austrian headquarters were full of able soldiers, each Mortara. of whom had his own views on the measures to be taken and a certain measure of support from Vienna — Gyulai, Colonel Kuhn his chief of staff, and Feldzeugmeister Hess, who had formerly played Gneisenau to Radetzky's Blucher. But what emerges most clearly from the movements of these days is that Gyulai himself distrusted the offensive projects he had -been ordered to execute, and catching apparently at some expression of approval given by the emperor, had determined to imitate Radetzky in " a defensive based on the Quadrilateral." His immediate intention, on abandoning the advance on Turin was to group his army around Mortara and to strike out as opportunity offered against the heads of the allied columns wherever they appeared. Meantime, the IX. corps had been sent to Italy, and the I. and XI. were mobilizing. These were to form the I. Army, Gyulai's the II. The latter was by the 13th of May grouped in the Lomellina, one third (chiefly VII. corps) spread

4 The movements of the division employed'in policing Lombardy (Urban's) are not included here, unless specially mentioned.

t»y brigades fanwise from Vercelli along the Sesia and Po to Vaccarizza, two thirds massed in a central position about Mortara. There was still no information of the enemy's distribu- tion, except what was forwarded from Vienna or gathered by the indefatigable Urban's division, which moved from Milan to Biella, thence to Brescia and Parma, and back to Lombardy in search of revolutionary bands, and the latter's doings in the nature of things could not afford any certain inferences as to the enemy's regular armies.

On the side of the allies, the Piedmontese were grouped on the i st of May in the fortified positions selected for them by Canrobert about Valenza-Casale- Alessandria. The French III. corps arrived on the 2nd and 3rd and the IV. corps on the 7th at Alessandria from Genoa. Unhampered by Gyulai's offensive, though at times and places disquieted by his minor reconnais- sances, the allies assembled until on the 16th the French were stationed as follows: I. corps, Voghera and Pontecurone, II., Sale and Bassignana, III., Tortona, IV., Valenza, Guard, Alessandria, and the king's army between Valenza

and Casale. The V. French corps under Prince Napoleon had a political mission in the duchies of middle Italy; one division of this corps, however, followed the main army. On the eve of the first collision the emperor Napoleon, commanding in chief, had in hand about 100,000 French and about 60,000 Sardinian troops (not including Garibaldi's enlisted volunteers or the national guard). Gyulai's II. Army was nominally of nearly equal force to that of the allies, but in reality it was only about 106,000 strong in com batants.

The first battle had no relation to the strategy contemplated by the emperor, and was still less a part of the defence scheme framed by Gyulai. The latter, still pivoting on Mortara, 4e ,y 0< " had between the 14th and 19th drawn his army some- what to the left, in proportion as more and more of the French came up from Genoa. He had further ordered a reconnaissance in force in the direction of Voghera by a mixed corps drawn from the V., Urban's division and the IX. (the last belonging to the I. Army). The saying that " he who does not know what he wants, yet feels that he must do something, appeases his conscience by a reconnaissance in force," applies to no episode more forcibly than to the action of Monte- bello (20th May) where Count Stadion, the commander of the V. corps, not knowing what to reconnoitre, engaged dis- connected fractions of his available 24,000 against the French division of Forey (I. corps), 8000 strong, and was boldly attacked and beaten, with a loss of 1400 men against Forey's

700.

Montebello had, however, one singular result: both sides fell back and took defensive measures. The French head- quarters were already meditating, if they had not Flank actually resolved upon, a transfer of all their forces

uwAWes. from "& ht t0 left > t0 be loUowed by a march on Milan (a scheme inspired by Jomini). But the opening of the movement was suspended until it became quite certain that Stadion's advance meant nothing, while Gyulai (impressed by Forey's aggressive tactics) continued to stand fast, and thus it was not until the 28th that the French offensive really began. 1 The infantry of the French III. corps was sent by rail from Ponte- curone to Casale, followed by the rest of the army, which marched by road. To cover the movement D'Autemarre's division of Prince Napoleon's corps (V.) was posted at Voghera and one division of the king's army remained at Valenza. The rest of the Piedmontese were pushed northward to join Cialdini's

division which was already at Vercelli. The emperor's orders were for Victor Emmanuel to push across the Sesia and to take

1 The advantages and dangers of the flank march are well summarized in Colonel H. C. Wylly's Magenta and Solferino, p. 65, where the doctrinaire objections of Hamley and Riistow are set in parallel with the common-sense views of a much-neglected English writer (Major Adams, Great Campaigns) and with the clear and simple doctrine of Moltke, that rested on the principle that strategy does not exist to avoid but to give effect to tactics. The waste of lime in execution, rather than the scheme, is condemned by General Silvestre.

post at Palestro on the 30th to cover the crossing of the French at Vercelli. This the king carried out, driving back outlying bodies of the enemy in spite of a stubborn resistance and the close and difficult character of the country. Hearing of the fighting, Gyulai ordered the recapture of Palestro by the II. corps, but the Sardinians during the night strengthened their positions and the attack (31st) was repulsed with heavy loss. These two initial successes of the allies, the failures in Austrian tactics and leadership which they revealed, and the fatigues and privation to which indifferent staff work had exposed his troops, combined to confirm Gyulai in his now openly expressed intention of " basing his defensive on the Quadrilateral." And indeed his only alternatives were now to fall back or to concentrate on the heads of the French columns as soon as they had passed the Sesia about Vercelli. Faithful to his view of the situation he adopted the former course (1st June). The retreat began on the 2nd, while the French were still busied in closing up. Equally with the Austrians, the French were the victims of a system of marching and camping that, by requiring the tail of the columns to close up on the head every evening, reduced the day's net progress to 6 or 7 m., although the troops were often under arms for fourteen or fifteen hours. The difference between the supreme commands of the rival armies lay not in the superior generalship of one or the other, but in the fact that Napoleon III. as sovereign knew what he wanted and as general pursued this object with much energy, whereas Gyulai neither knew how far his government would go nor was entire " master in his own house."

The latter became very evident in his retreat. Kuhn, the chief of staff, who was understood to represent the views of the general staff in Vienna, had already protested against Gyulai's retrograde movement, and on the 3rd Hess retreat appeared from Vienna as the emperor's direct repre- sentative and stopped the movement. It was

destined to be resumed after a short interval, but meanwhile the troops suffered from the orders and counter-orders that had marked every stage in the Austrian movements and were now intensified instead of being removed by higher intervention. Meanwhile (June 1-2) the allies had regrouped themselves east of the Sesia for the movement on Milan. The IV. corps, driving out an Austrian detachment at Novara, established itself there, and was joined by the II. and Guard. The king's army, supported by the I. and III. corps, was about Vercelli, with cavalry far out to the front towards Vespolate. From Novara, the emperor, who desired to give his troops a rest-day on the 2nd, pushed out first a mixed reconnaissance and then in the afternoon two divisions to seize the crossing of the Ticino, Camou's of the French Guard on Turbigo, Espinasse's of the II. corps on advance San Martino. Further the whole of the Vercelli

The centre of gravity was now at Buffalora, a village on the main Milan road at the point where it crosses the Naviglio Grande. Here, on the night of the 1st, Count Clam-Gallas, commanding the Austrian I. corps (which had just arrived in Italy and was to form part of the future I. Army) had posted a division, with a view to occupying the bridge-head of San Martino. On inspecting the latter Clam-Gallas concluded that it was indefensible, and, ordering the San Martino road and railway bridges to be destroyed (an order

which was only partially executed), he called on Gyulai for support, sent out detachments to the right against the French troops re- ported at Turbigo, and prepared to hold his ground at Buffalora. On receipt of Clam-Gallas's report at the Austrian headquarters, Hess ordered the resumption of the retreat that he had counter- manded, but it was already late and many of the troops did not halt for the night till midnight, June 3rd/4th. Gyulai promised them the 4th as a rest-day, but fortune ordered it otherwise. This much at least was in favour of the Austrians, that when the troops at last reached their assigned positions four-fifths of them were within 12 m. of the battlefield. But, as before, the greater part of tne army was destined to be chained to " supporting positions " well back from the battlefield.

When day broke on the 4th, the emperor of the French was still uncertain as to Gyulai's whereabouts, and his intention was there- Battle of ˆ ore no more than to secure the passage of the Ticino and Magenta. t0 P' ace hi s army on both sides of the river, in sufficient

strength to make head against Gyulai, whether the latter advanced from Mortara and Vigevano or from Abbiategrasso. He therefore kept back part of the French army and the whole of the Sardinian. But during the morning it became known that Gyulai had passed the Ticino on the evening of the 3rd; and Napoleon then ordered up all his forces to San Martino and Turbigo. The battlefield of Magenta is easily described. It consists of two level plateaux, wholly covered with vineyards, and between them the broad and low-lying valley of the Ticino. This, sharply defined by the bluffs of the adjoining plateaux, is made up of backwaters, channels, water meadows and swampy woods. At Turbigo the band of low ground is if m. wide, at Buffalora 2 J. Along the foot of the eastern or Austrian bluffs between Turbigo and Buffalora runs the Grand Canal (Naviglio Grande) ; this, however, cuts into the plateau itself at the latter place and trending gradually inwards leaves a tongue of high ground separate from the main plateau. The Novara- Milan road and railway, crossing the Ticino by the bridge of San Martino, pass the second obstacle presented by the canal by the New Bridges of Magenta, the Old Bridge being 1000 yards south of these. The canal is bridged at several points between Turbigo and Buffalora, and also at Robecco, 1 J m. to the (Austrian) left of the Old Bridge. Clam-Gallas's main line of defence was the canal between Turbigo and the Old Bridge, skirmishers being posted on the tongue of high ground in front of the New Bridges, which wck kept open for their retreat. He had been joined by th» II. corps and disposed of 40,000 men, 27,000 more being at Abbiategrasso (2J m. S. of Robecco). Of his immediate command, he disposed about 12,000 for the defence of the New Bridges, 12,000 for that of Buffalora, 8000 at Magenta and 8000 at Robecco; all bridges, except the New Bridges, were broken. Cavalry played no part whatever, and artillery was only used in small force to fire along roads and paths.

Napoleon, as has been mentioned, spent the morning of the 4th in ascertaining that Gyulai had repassed the Ticino. Being desirous merely of securing the passage and having only a small force available for the moment at San Martino, he kept this back in the hope that MacMahon's advance from Turbigo on Magenta and Buffalora would dislodge the Austrians. MacMahon advanced in two columns, 2 divisions through Cuggiono and I through Inveruno. The former drove back the Austrian outposts with ease, but on approaching Buffalora found so serious a resistance that MacMahon broke off the fight in order to close up and deploy his full force. Meantime, however, on hearing the cannonade Napoleon had ordered forward Mellinet's division of the Guard on the New Bridges and Buffalora.

The bold advance of this corps d'elite carried both points at once, but the masses of the allies who had been retained to meet a possible attack from Mortara and Vigevano were still far distant and Mellinet was practically unsupported. Thus the French, turning towards the Old Bridge, found themselves (3.30 P.M.) involved in a close fight with some 18,000 Austrians, and meantime Gyulai had begun to bring up his III. and VII. corps towards Robecco and (with Hess) had arrived on the field himself. The VII. corps, on its arrival, drove Mellinet back to and over the New Bridges, but the French, now broken up into dense swarms of individual fighters, held on to the tongue of high ground and prevented the Austrians from destroying the bridges, while . the occupants of Buffalora similarly held their own, and beyond them MacMahon, advancing through orchards and vineyards in a line of battle 2 m. long, slowly gained ground towards Magenta. The III. Austrian corps, mean- while, arriving at Robecco spread out on both sides of the canal and advanced to take the defenders of the New Bridges in rear, but were checked by fresh French troops which arrived from San Martino (4 P.M.). The struggle for the New and Old Bridges continued till 6 P.M., more and more troops being drawn into the vortex, but at last the Austrians, stubbornly defending each vineyard, fell back on Magenta. B it while nearly all the Austrian reinforcements from the iower Ticino had successively been directed on the bridges, MacMahon had only had to deal with the 8000 men who had originally formed the garrison of Magenta. The small part of the reinforcing troops that had been directed thither by Gyulai before he was aware of the situation, had in consequence no active r61e defined in their orders and (initiative being then regarded as a vice)

they stood fast while their comrades were beaten. But it was not until after sunset that the thronging French troops at last broke into Magenta and the victory was won. The splendid Austrian cavalry (always at a disadvantage in Italy) found no opportunity to redress the balance, and their slow-moving and over-loaded infantry, in spite of its devotion, was no match in broken country for the swift and eager French. The forces engaged were 54,000 French (one-third of the allied army) to 58,000 Austrians (about half of Gyulai's total force). Thus the fears of Napoleon as regards an Austrian attack from Mortara-Vigevano neutralized the bad dis- tribution of his opponent's force, and Magenta was a fair contest of equal numbers. The victory of the French was palpably the conse- quence not of luck or generalship but of specific superiority in the soldier. The great result of the battle was therefore a conviction, shared by both sides, that in future encounters nothing but ex- ceptional good fortune or

skilful generalship could give the Austrians victory. The respective losses were : French 4000 killed and wounded and 600 missing, Austrians 5700 killed and wounded, 4500 missing.

While the fighting was prolonged to nightfall, the various corps of the Austrian army had approached, and it was Gyulai's intention to resume the battle next day with 100,000 men. But Clam-Gallas reported that the I. and II. corps were fought out, and thereupon Gyulai resolved to retreat on Cremona and Mantua, leaving the great road Milan-Brescia unused, for the townsmen's patriotism was sharpened by the remembrance of Haynau, " the Hyena of Brescia." Milan and Pavia were evacuated on the 5th, Hess departed to meet the emperor Francis Joseph (who was coming to take command of the united I. and II. Armies), and although Kuhn was still in favour of the offensive Gyulai decided that the best service he could render was to deliver up the army intact to his sovereign on the Mincio. On the 8th of June Napoleon and Victor Emmanuel made their triumphal entry into Milan, while their corps followed up rather than pursued the retreating enemy along the Lodi and Cremona roads. On the same day, the 8th of June, the I. and II. French ccrps, under the general command of Marshal Baraguay d'Hilliers, attacked an Austrian rearguard (part of VIII. corps, Benedek) at the village of Melegnano. MacMahon with the II. corps was to turn the right flank, the IV. the left of the defenders, while Baraguay attacked in front. But MacMahon, as at Magenta, deployed into a formal line of battle before closing on the village, and his progress through the vineyards was correspondingly slow. The IV. corps was similarly involved in intricate country, but Baraguay, whose corps had not been present at Magenta, was burning to attack, and being a man aussi dur & ses soldats qu'A lui-mime, he delivered the frontal attack about 6 p.m. without waiting for the others. This attack, as straightforward, as brusque, and as destitute of tactical refinements as that of the Swiss on that very ground in 151 5 (Marignan), was carried out, without " prepara- tion," by Bazaine's division d la baionnetle. Benedek was dislodged, but retreated safely, having inflicted a loss of over 1000 men on the French, as against 360 in his own command.

After Melegnano, as after Magenta, contact with the retiring enemy was lost, and for a fortnight the story of the war is simply that of a triumphal advance of the allies and a quiet retirement and reorganization of the Austrians. Up to Magenta Napoleon had a well-defined scheme and executed it with vigour. But the fierceness of the battle itself had not a little effect on his strange dreamy character, and although it was proved beyond doubt that under reasonable conditions the French must win in every encounter, their emperor

turned his attention to dis- lodging rather than to destroying the enemy. War clouds were gathering elsewhere — on the Rhine above all. The simple brave promise to free Italy " from the Alps to the Adriatic " became complicated by many minor issues, and the emperor was well content to let his enemy retire and to accelerate that retirement by manoeuvre as far as might be necessary. He therefore kept on the left of his adversary's routes as before, and about the 20th of June the whole allied army (less Cialdini's Sardinian division, detached to operate on the fringe of the mountain country) was closely grouped around Montechiaro on the Chiese. It now consisted of 107,000 French and 48,000 Sardinians (combatants only). The Austrians had disappeared into the Quadrilateral, where

Meleg- nano.

gi8

ITALIAN WARS

Austrian s on the Mlncio.

but evil.

{he emperor Francis Joseph assumed personal command, with Hess as his chief of staff. Gyulai had resigned the command of the II. Army to Count Schlick, a cavalry general of 70 years of age. The I. Army was under Count Wimpffen. But this partition produced nothing The imperial headquarters still issued voluminous detailed orders for each corps, and the intervening army staff was a cause not of initiative or of simplification, but of un- necessary delay. The direction of several armies, in fact, is only feasible when general directions {directives as they are technically called) take the place of orders. All the necessary conditions for working such a system — uniformity of training, methods and doctrine in the recipients, abstention from inter- ference in details by the supreme command — were wanting in the Austrian army of 1859. The I. Army consisted of the III., IX. and XI. corps with one cavalry division and details, 67,000

Battle of Solferino,

in all; the II. Army of the I., V., VII. and VIII. corps, one cavalry division and details or 90,000 combatants — total 160,000, or practically the same force as the allies. The emperor had made several salutary changes in the administration, notably an order to

the infantry to send their heavy equipment and parade full-dress into the fortresses, which enormously lightened the hitherto overburdened infantryman. At this moment the political omens were favourable, and gathering the impression from his outpost reports that the French were in two halves, separated by the river Chiese, the young emperor at last accepted Hess's advice to resume the offensive, in view of which Gyulai had left strong outposts west of the Mincio, when the main armies retired over that river, and had maintained and supplemented the available bridges.

The possibility of such a finale to the campaign had been considered but dismissed at the allied headquarters, where it was thought that if the Austrians took the offensive it would be on their own side, not the enemy's, of the Mincio and in the midst of the Quadrilateral. Thus the advance of the French army on the 24th was simply to be a general move to the line of the Mincio, preparatory to forcing the crossings, coupled with the destruction of the strong outpost bodies that had been left by the Austrians at Solferino, Guidizzolo, &c. The Austrians, who advanced over the Mincio on the 23rd, also thought that the decisive battle would take place on the third or fourth day of their advance. Thus, although both armies moved with all precautions as if a battle was the immediate object, neither

expected a collision, and Solferino was consequently a pure encounter-battle.

Speaking generally, the battlefield falls into two distinct halves, the hilly undulating country, of which the edge (almost everywhere cliff like) is defined by Lonato, Castiglione, Cavriana and Volta, and the plain of Medole and Guidizzolo. The village of Solferino is within the elevated ground, but close to the edge. Almost in the centre of the plateau is Pozzolengo, and from Solferino and Pozzolengo roads lead to cross ing places of the Mincio above Volta (Monzambano-Salionze and Valeggio). These routes were assigned to the Piedmontese (44,000) and the French left wing (I., II. and Guard, 57,000), the plain to the III. and IV. corps and 2 cavalry divisions (50,000). On the other side the Austrians, trusting to the defensive facilities of the plateau, had directed the II. Army and part of the I. (86,000) into the plain, 2 corps of the I. Army (V. and I.) on Solferino-Cavriana (40,000), and only the VIII. corps (Benedek), 25,000 strong, into the heart of the undulating ground. One division was sent from Mantua towards Marcaria. Thus both armies, though disposed in parallel lines, were grouped in very unequal density at different points in these lines.

The French orders for the 24th were — Sardinian army on Pozzo lengo, I. corps Esenta to Solferino, II. Castiglione to Cavriana,

IV. with two cavalry divisions, Carpenedolo to Guidizzolo, III. Mezzane to Medole by Castel Goffredo; Imperial Guard in reserve at Castiglione. On the other side the VIII. corps from Monzambano was to reach Lonato, the remainder of the II. Army from Cavriana, Solferino and Guidizzolo to Esenta and Castiglione, and the I. Army from Medole, Robecco and Castel Grimaldo towards Car- penedolo. At 8 A.M. the head of the French I. corps encountered several brigades of the I. Army in advance of Solferino. The fighting was severe, but the French made no progress. MacMahon ad- vancing on Guidizzolo came upon a force of the Austrians at Casa Morino and (as on former occasions) immediately set about deploying his whole corps in line of battle. Meanwhile masses of Austrian infantry became visible on the edge of the heights near Cavriana and the firing in the hills grew in intensity. Marshal MacMahon therefore called upon General Niel on his right rear to hasten his march. The latter had already expelled a small body of the Austrians from Medole and had moved forward to Robecco, but there more Austrian masses were found, and Niel, like MacMahon, held his hand until Canrobert (III. corps) should come up on his right. But the latter, after seizing Castel Goffredo, judged it prudent to collect his corps there before actively intervening. Meantime, however, MacMahon had completed his preparations, and capturing Casa Morino with ease, he drove forward to a large open field called the Campo di Medole ; this, aided by a heavy cross fire from his artillery and part of Niel's, he carried without great loss, Niel meantime attacking Casa Nuova and Robecco. But the Austrians had not yet developed their full strength, and the initial successes of the French, won against isolated brigades and battalions, were a mere prelude to the real struggle. Meanwhile the stern Baraguay d'Hih liers had made ceaseless attacks on the V. corps at Solferino, where, on a steep hill surmounted by a tower, the Austrian guns fired with great effect on the attacking masses. It was not until after mid- day, and then only because it attacked at the moment when, in accordance with an often fatal practice of those days, the Austrian

V. corps was being relieved and replaced by the I., that Forey's division of the I. corps, assisted by part of the Imperial Guard, succeeded in reaching the hill, whereupon Baraguay stormed the village and cemetery of Solferino with the masses of infantry that had gradually gathered opposite this point. By 2 P.M. Solferino was definitively lost to the Austrians.

During this time MacMahon had taken, as ordered, the direction of Cavriana, and was by degrees drawn into the fighting on the heights. Pending the arrival of Canrobert — who had been alarmed by the reported movement of an Austrian force on his rear (the division from Mantua above mentioned) and having given up his cavalry to Niel was unable to explore for himself — Niel alone was left to face the I. Army. But Count Wimpffen, having been ordered at 1 1 to change direction towards Castiglione, employed the morning in redistributing his intact troops in various " mutually supporting positions," and thus the forces opposing Niel at Robecco never outnumbered him by more than 3 to 2. Niel, therefore, attacking again and again and from time to time supported by a brigade or a regiment sent by Canrobert, not only held his own but actually captured Robecco. About the same time MacMahon gained a foothold on the heights between Solferino and Cavriana, and as above mentioned, Baraguay had stormed Solferino and the tower hill. The greater part of the II. Austrian Army was beaten and in retreat on Valeggio before 3 P.M. But the Austrian emperor had not lost hope, and it was only a despairing message from Wimp- ffen, who had suffered least in the battle, that finally induced him to order the retreat over the Mincio. On the extreme right Benedek and the VIII. corps had fought successfully all day against the Sardinians, this engagement being often known by the separate name of the battle of San Martino. On the left Wimpffen, after sending his despondent message, plucked up heart afresh and, lor a moment, took the offensive against Niel, who at last, supported by the most part of Canrobert's corps, had reached Guidizzolo.

In the centre the Austrian rearguard held out for two hours in several successive positions against the attacks of MacMahon and the Guard. But the battle was decided. A violent storm, the exhaustion of the assailants, and the firm countenance of Benedek, who, retiring fropj.San Martino, covered the retreat of the rest of the II. Army over th,£ Mincio, precluded an effective pursuit.

The losses on either side had been: Allies, 14,415 killed and wounded and 2776 rriisWg, total 17,191; Austrians, 13,317 killed and wounded, 9220 missing, total 221537. The heaviest losses in the French army were in Niel's corps (IV.), which lost 4483, and in Baraguay d'Hilliers' (I.), which lost 4431. Of the total of 17,191, 5521 was the share of the Sardinian army, which in the battle of San

Martino had had as resolute an enemy, and as formidable a position to attack, as had Baraguay at Solferino. On the Austrian side the IX. corps, which bore the brunt of the fighting on the plain, lost 4349 and the V. corps, that had defended Solferino, 4442. Solferino, in the first instance an encounter-battle in which each corps fought whatever enemy it found in its path, became after a time a decisive trial of strength. In the true sense of the word, it was a soldier's battle, and the now doubly-proved superiority of the French soldier being reinforced by the conviction that the Austrian leaders were incapable of neutralizing it by superior strategy, the war ended without further fighting. The peace of Villafranca was signed on the nth of July.

The Campaign of 1866

In the seven years that elapsed between Solferino and the second battle of Custozza the political unification of Italy had proceeded rapidly, although the price of the union of Italy had been the cession of Savoy and Nice to Napoleon III. Garibaldi's irregulars had in i860 overrun Sicily, and regular battles, inspired by the same great leader, had destroyed the kingdom of Naples on the mainland (Volturno, ist-2nd October i860). At Castelfidardo near Ancona on the 18th of September in the same year Cialdini won another victory over the Papal troops commanded by Lamoriciere. In 1866, then, Italy was no longer a " geographical expression," but a recognized kingdom. Only Rome and Venetia remained of the numerous, disunited and reactionary states set up by the congress of Vienna. The former, still held by a French garrison, was for the moment an unattain- able aim of the liberators, but the moment for reclaiming Venetia, the last relic of the Austrian dominions in Italy, came when Austria and Prussia in the spring of 1866 prepared to fight for the hegemony of the future united Germany (see Seven Weeks' War).

The new Italian army, formed on the nucleus of the Sardinian army and led by veterans of Novara and Solferino, was as strong as the whole allied army of 1859, but in absorbing so many recruits it had temporarily lost much of its efficiency. It was organized in four corps, of which one, under Cialdini, was detached from the main body. Garibaldi, as before, commanded a semi- regular corps in the Alpine valleys, but being steadily and skilfully opposed by Kuhn, Gyulai's former chief of staff, he made iittle or no progress during the brief campaign, on which indeed his operations had no influence. The main Austrian army, still the best-trained part of the emperor's forces, had been, up to the verge of the war, commanded by Benedek, but Benedek was induced to give up his place to the archduke Albert,

and to take up the far harder task of commanding against the Prussians in Bohemia. It was in fact a practically foregone conclusion that in Italy the Austrians would win, whereas in Bohemia it was more than feared that the Prussians would carry all before them. But Prussia and Italy were allied, and whatever the result of a battle in Venetia, that province would have to be ceded in the negotiations for peace with a victorious Prussia. Thus on the Austrian side the war of 1866 in Italy was, even more than the former war, simply an armed protest against the march of events.

The part of Hess in the campaign of Solferino was played with more success in that of Custozza by Major-General Franz, Freiherr von John (1815-1876). On this officer's i^/"'/ a d y i ce trie Austrian army, instead of remaining Custozza. behind the Adige, crossed that river on the 23rd of June and took up a position on the hills around Pastrengo on the flank of the presumed advance of Victor Emmanuel's army. The latter, crossing the Mincio the same day, headed by Villafranca for Verona, part of it in the hills*

about Custozza, Somma-Campagna and Castelnuovo, partly on the plain. The object of the king and of La Marmora, who was his adviser, was by advancing on Verona to occupy the Austrian army (which was only about 80,000 strong as against the king's 120,000), while Cialdini's corps from the Ferrara region crossed the lower Po and operated against the Austrian rear. The archduke's staff, believing that the enemy was making for the lower Adige in order to co-operate directly with Cialdini's detachment, issued orders for the advance on the 24th so as to reach the southern edge of the hilly country, preparatory to descending upon the flank of the Italians next day. However, the latter were nearer than was supposed, and an encounter- battle promptly began for the possession of Somma-Campagna and Custozza. The king's army was unable to use its superior numbers and, brigade for brigade, was much inferior to its opponents. The columns on the right, attempting in succession to debouch from Villafranca in the direction of Verona, were checked by two improvised cavalry brigades under Colonel Pulz, which charged repeatedly, with the old-fashioned cavalry spirit that Europe had almost forgotten, and broke up one battalion after another. In the centre the leading brigades fought in vain for the possession of Custozza and the edge of the plateau, and on the left the divisions that had turned north- ward from Valeggio into the hills were also met and defeated. About 5 p.m. the Italians, checked and in great disorder, retreated over the Mincio. The losses were— Austrians, 4600 killed and wounded and 1000 missing; Italians, 3800 killed and wounded and 4300 missing. The archduke was too weak in

numbers to pursue, his losses had been considerable, and a resolute offensive, in the existing political conditions, would have been a mere waste of force. The battle necessary to save the honour of Austria had been handsomely won. Ere long the bulk of the army that had fought at Custozza was transported by rail to take part in defending Vienna itself against the victorious Prussians. One month later Cialdini with the. re-organized Italian army, 140,000 strong, took the field again, and the 30,000 Austrians left in Venetia retreated to the Isonzo without engaging.

In spite of Custozza and of the great defeat sustained by the Italian navy at the hands of Tegetthof near Lissa on the 20th of July, Venetia was now liberated and incorporated in the kingdom of Italy, and the struggle for unity, that had been for seventeen years a passionate and absorbing drama, and had had amongst its incidents Novara, Magenta, Solferino and the Garibaldian conquest of the Two Sicilies, ended in an anti-climax.

Three years later the cards were shuffled, and Austria, France and Italy were projecting an offensive alliance against Prussia. This scheme came to grief on the Roman question, and the French chassepot was used for the first time in battle against Garibaldi at Mentana, but in 1870 France was compelled to withdraw her Roman garrison, and with the assent of their late enemy Austria, the Italians under Cialdini fought their way into Rome and there established the capital of united Italy.

Bibliography. — The war of 1848-49 has been somewhat neglected by modern military historians, but the following are useful: Der Feldzug der osterr. Armee in Iialien 1848-49 (Vienna, 1852) ; Gavenda, Sammlung alter Armeebefehle u.s.iv. mit Bezug auf die Hauptmomente des Krieges 1848-49; Major H. Kunz, Feldziige des F. M. Radetzki in Oberitalien (Berlin, 1900), and Major Adams, Great Campaigns. Both the French and the Austrian governments issued official accounts (Campagne de Napoleon III en Italie 1859, Der Krieg in Italien 1859) of the war of 1859. The standard critical work is Der italienische Feldzug 1859 by the German general staff (practically dictated by Moltke). Prince Kraft zu Hohenlohe-Ingelnngen, who had many friends in the Austrian army, deals with the Magenta campaign in vol. i. of his Letters on Strategy. General Silvestre's Etude sur la campagne de 1859 was published in 1909. In English, Col. H. C. Wylly, Magenta and Solferino (1906), and in German General Ciimmerer, Magenta, and Major Kunz, Von Montebello bis Solferino should be consulted.

.. For the Italian campaign of 1866 see the Austrian official history, Osterreichs Kampfe 1866 (French translation), and the Italian official account, La Campagna del 1866, of which the volume dealing with Custozza was published in 1909. A short account is given in Sir H. Hozier's Seven Weeks' War, and tactical studies in v. Verdy's Custozza (tr. Henderson), and Sir Evelyn Wood. Achievements' t)j Cavalry. (C. F. A.)

ITALIC, i.e. Italian, in Roman archaeology, history and law, a term used, as distinct from Roman, of that which belongs to the races, languages, &c, of the non-Roman parts of Italy (see Italy, Ancient Languages and, Peoples). In architecture the Italic order is another name for the Composite order (see Order). The term was applied to the Pythagorean school of philosophy in Magna Graecia, and to an early Latin version of the Bible,

known also as Ilala, which was superseded by the Vulgate, but its special technical use is of a particular form of type, in which the letters slope to the right. This is used, in present-day printing, chiefly to emphasize words or phrases, to indicate words or sentences in a foreign language, or to mark the titles of books, &c. It was introduced by the Aldine Press (see Manutius and Typography).

PRliWKD IK U.S. A

VOL15_ITALY-KYSHTYM

Britannica

THE

ENCYCLOPEDIA BRITANNICA

ELEVENTH EDITION

FIRST

edition,

published in

three volumes,

1768-

-1771.

SECOND

> >

99

ten ,,

1777-

-1784.

THIRD

> >

»»

eighteen „

1788-

-1797.

FOURTH

>»

> >

twenty ,,

1801-

-1810.

FIFTH

»5

>»

twenty ,,

1815-

-1817.

SIXTH

»)

> >

twenty „

1823-

-1824.

SEVENTH EIGHTH

> >

>J

twenty-one „

1830-

-1842.

»

»J

twenty-two „

i8S3″

-i860.

NINTH

»>

)»

twenty-five ,,

1875-

-1889.

TENTH

99

ninth edition and eleven

supplementary volumes,

1902-

-1903.

ELEVENTH

9)

published in

twenty-nine volumes,

1910-

-1911.

COPYRIGHT

in all countries subscribing to the

Bern Convention

by

THE CHANCELLOR, MASTERS AND SCHOLARS

of the UNIVERSITY OF CAMBRIDGE

All rights reserved

THE

ENCYCLOPEDIA BRITANNICA

A

DICTIONARY

OF

ARTS, SCIENCES, LITERATURE AND GENERAL

INFORMATION

ELEVENTH EDITION

VOLUME XV

ITALY to KYSHTYM

New York

Encyclopaedia Britannica, Inc.

342 Madison Avenue

Copyright, in the United States of America, 1911,

by

The Encyclopedia Britannica Company,

INITIALS USED IN VOLUME XV. TO IDENTIFY INDIVIDUAL CONTRIBUTORS, 1 WITH THE HEADINGS OF THE ARTICLES IN THIS VOLUME SO SIGNED.

A. A. M. Arthur Anthony Macdonell, M.A., Ph.D. f

Boden Professor of Sanskrit in the University of Oxford. Keeper of the Indian j xfsiiflsco Institute. Fellow of Balliol College; Fellow of the British Academy. Author of 1 ft – auuasa ‘ A Vedic Grammar ; A History of Sanskrit Literature ; Vedic Mythology ; &c. L

A. B. D. Rev. Andrew B. Davidson, D.D. f T . ,. rt

See the biographical article: Davidson, A. B. \ JoD V n P art >’

A.C.S. Algernon Charles .Swinburne. \k*z.\& (in part).

See the biographical article: Swinburne, A. C. L

A. D. Henry Austin Dobson, LL.D.

See the biographical article: Dobson, H. Austin. \ ‘

A. E. S. Arthur Everett Shipley, M.A., F.R.S., D.Sc. j”

Master c\f Christ’s College, Cambridge. Reader in Zoology, Cambridge University, -j Kjnorhyncha. Joint-editor of the Cambridge Natural History. [_

A. F. P. Albert Frederick Pollard, M.A., F.R.Hist.Soc.

A.

Go

•

A.

G.

D.

A.

H.

S.

A.

H.

-s.

A.

H.

Sm

A.

M.

C.

A.

Ml

.

A.N.

A Kauffmann, Angelica.

Professor of English History in the University of London. Fellow of All Souls' College, Oxford. Assistant Editor of the Dictionary of National Biography, 1893- 1901. Lothian Prizeman (Oxford), 1892; Arnold prizeman, 1898. Author of England under the Protector Somerset ; Henry VIII. ; Life of Thomas Cranmer ; &c.

Jewel, John.

A. G. Major Arthur George Frederick Griffiths (d. 1908). f

H.M. Inspector of Prisons, 1878-1896. Author of The Chronicles of Newgate ; \ Juvenile Offenders (in part).

Secrets of the Prison House ; &c. I

Rev. Alexander Gordon, M.A. f Joris;

Lecturer on Church History in the University of Manchester. \ Knipperdollinck.

Arthur George Doughty, C.M.G., M.A., Litt.D., F.R.S.(Canada), F.R.Hist.S. f

Dominion Archivist of Canada. Member of the Geographical Board of Canada. J j jy dg Lotbiniere Author of The Cradle of New France; &c. Joint-editor of Documents relating to 1 the Constitutional History of Canada. L

Rev. Archibald Henry Sayce, Litt.D., LL.D. J Kassites.

See the biographical article: Sayce, A. H. L

Sir A. Houtum-Schindler/CI.E. JKarun; Kerman;

General in the Persian Army. Author of Eastern Persian Irak. I Khorasan; Kishm.

Arthur Hamilton Smith, M.A., F.S.A. f

Keeper of the Department of Greek and Roman Antiquities in the British Museum. J Jewelry Member of the Imperial German Archaeological Institute. Author of Catalogue [of Greek Sculpture in the British Museum ; &c. I

Agnes Mary Clerke. f j{ eB i er

See the biographical article : Clerke, A. M. I ˆ

Alfred Ogle Maskell, F.S.A. f

Superintendent of the Picture Galleries, Indian and Colonial Exhibition, 1887. J Ivory. Cantor Lecturer, 1906. Founder and first editor of the Downside Review. Author j of Ivories; &c. I.

fJabiru; Jacamar; JaQana;

Alfred Newton, F.R.S. i”” 5 K ˆ V °”

See the biographical article: Newton, Alfred. 1 „ ,1′ K »”! eer ; »mg

Bird; Kingfisher; Kinglet’

Kite; Kiwi; Knot. A. T. I. Alexander Taylor Innes, M.A., LL.D. f

Scotch advocate. Author of lohn Knox; Law of Creeds in Scotland; Studies in\ Knox, John. Scottish History; &c. (_

1 A complete list, showing all individual contributors, appears in the final volume.

A. W. H.* Arthur William Holland. f

Formerly Scholar of St John’s College, Oxford. Bacon Scholar of Gray’s

Inn, ■< Jacobites. 1900. [

A. W. W. Adolphus William Ward, LL.D., D.Litt. f Tft _ cn _ n ._

See the biographical article: Ward, A. W. \ Jonson > Ben –

B. F. S. B.-P. Major Baden F. S. Baden-Powell, F.R.A.S., F.R.Met.S. f”

Inventor of man-lifting kites. Formerly President of Aeronautical Society. Author < Kite-flying (in part). of Ballooning as a Sport ; War in Practice ; &c. (_

B. W. B. Rev. Benjamin Wisner Bacon, A.M., D.D., Litt.D., LL.D. f T „ .

Professor of New Testament Criticism and Exegesis in Yale University. Formerly J James > epistle Ot;

Director of American School of Archaeology, Jerusalem. Author of The Fourth Jude, The General Epistle of.

Gospel in Research and Debate ; The Founding of the Church ; &c. L

C. D. G. Rev. Christian David Ginsburg, LL.D. [“„. ..,.,. . A

See the biographical article: Ginsburg, C. D. ˆKabbalah (in part).

C. El. Sir Charles Norton Edgcumbe Eliot, K.C.M.G., C.B., M.A., LL.D., D.C.L. r

Vice- Chancellor of Sheffield University. Formerly Fellow of Trinity College, Kashgar (in part) ; Oxford. H.M.‘s Commissioner and Commander-in-Chief for the British East -s Khazars (in part); Africa Protectorate; Agent and Consul-General at Zanzibar; Consul-General for Khiva (in -bart) German East Africa, 1900-1904. I * ”

C. E. D. B. C. E. D. Black. J” u

Formerly Clerk for Geographical Records, India Office, London. \ Kashgar (m part).

C. H. Ha. Carlton Huntley Hayes, A.M., Ph.D. f

Assistant Professor of History in Columbia University, New York City. Members John XXL” Julius II. of the American Historical Association. I *’ ”

- H. T.* Crawford Howell Toy. f T , ,•.,■>

See the biographical article: Toy, Crawford Howell. \ J0 ” (– m P art >-

C. J. J. Charles Jasper Joly, F.R.S., F.R.A.S. (1864-1006). f

Royal Astronomer of Ireland, and Andrews Professor of Astronomy in the Uni- J «• , -j„ c „„_. versity of Dublin, 1897-1906. Fellow of Trinity College, Dublin. Secretary of the 1 *«ieiaoscope. Royal Irish Academy. I

C. J. L. Sir Charles James Lyall, K.CS.L, CLE., LL.Dˆ (Edin.). . . _ f

Secretary, Judicial and Public Department, India Office. Fellow of King’s College, London. Secretary to Government of India in Home Department, 1 889-1 894. Chief Commissioner, Central Provinces, India, 1 895-1 898. Author of Translations of Ancient Arabic Poetry; &c.

L

C L. K. Charles Lethbridge Kingsford, M.A., F.R.Hist.Soc, F.S.A. f

Assistant Secretary to the Board of Education. Author of Life of Henry V. Editor -j Kempe. of Chronicles of London, and Stow’s Survev of London. [

C. Mi. Chedomille Mijatovich. f

Senator of the Kingdom of Servia. Envoy Extraordinary and Minister Pleni- J Karageorge; potentiary of the King of Servia to the Court of St James’s, 1895-1900, and 1002- I Karajich. I9°3- I

C. M. W. Sir Charles Moore Watson, K.C.M.G., C.B. <-

Colonel, Royal Engineers. Deputy-Inspector-General of Fortifications, 1896-1902. J Jerusalem (in part). Served under General Gordon in the Sudan, 1874-1875. [

C. R. B. Charles Raymond Beazley, M.A., D.Litt., F.R.G.S., F.R.Hist.S.

Professor of Modern History in the University of Birmingham. Formerly Fellow

of Merton College, Oxford, and University Lecturer in the History of Geography.

Lothian Prizeman, Oxford, 1889. Lowell Lecturer, Boston, 1908.

Author of

Henry the Navigator; The Dawn of Modern Geography; &c.

C. S. C. Caspar Stanley Clark. J Kashi / ■ j. ,\ Assistant in Indian Section, Victoria and Albert Museum, South Kensington. 1 \n y). •

C u/a Cfctt Weathert y C

Formerly Scholar of Queen's College, Oxford. Barrister-at-Law, Inner Temple. \ Knighthood: Orders of.

C W. W. Sir Charles William Wilson, K.C.B., K.C.M.G., F.R.S. (1836-1907).

Major-General, Royal Engineers. Secretary to the North American Boundary Commission, 1858-1862. British Commissioner on the Servian Boundary Com-

Jerusalem (in part) ;

mission. Director-General of the Ordnance Survey, 1886-1894. Director-General^ Jordan (in part);

of Military Education, 1895-1898. Author of From Korti to Khartoum; Life of Lord Clive; &c.

Kurdistan (in part).

D. G. H. David George Hogarth, M.A. r T , ., T , , . A

Keeper of the Ashmolean Museum, Oxford. Fellow of Magdalen College, Oxford. Jebeii; Jordan (in part); Fellow of the British Academy. Excavated at Paphos, 1888; Naucratis, 1899^ Karamania; and 1903; Ephesus, 1904-1905; Assiut, 1906-1907. Director, British School at Kha'rput; Konia. Athens, 1897-1900. Director, Cretan Exploration Fund, 1899. I

D. H. David Hannay. f Junius; Kanaris;

Formerly British Vice-Consul at Barcelona. Author of Short History of the Royal -I Keith, Viscount; Navy, 1217-1688; Life of Emilio Castelar; &c. I Keppel, Viscount.

B. B. Edward Breck, M. A., Ph.D. r

Formerly Foreign Correspondent of the New York Herald and the New

York Times. J Kite-flying (in pwf). Author of Fencing, Wilderness Pets; Sporting in Nova Scotia; &c. (_

INITIALS AND HEADINGS OF ARTICLES

ni

E. Br. E. F. S.

E. G. E. Gr. E. He.

E. H. B.

E. H. M.

Ed. M.

E. 0.*

E. Tn.

F. By.

F. C. C.

Ernest Barker, M.A.

Fellow and Lecturer in Modern History, St John's College, Fellow and Tutor of Merton College. Craven Scholar, 1895.

Oxford. Formerly^ Jordanes (in part).

Edward Fairbrother Strange.

Assistant Keeper, Victoria and Albert Museum, South Kensington. Member of Council, Japan Society. Author of numerous works on art subjects; Joint-editor of Bell's " Cathedral " Series.

Edmund Gosse, LL.D.

See the biographical article :

Gosse, Edmund.

Ernest Arthur Gardner, M.A.

See the biographical article: Gardner, Percy.

Edward Heawood, M.A.

Gonville and Caius College, Cambridge. Librarian of the Royal Geographical Society, London.

Sir Edward Herbert Bunbury, Bart., M.A., F.R.G.S. (d. 1895).

M.P. for Bury St Edmunds, 1847-1852. Author of A History of Ancient Geography; &c.

Ellis Hovell Minns, M.A.

University Lecturer in Palaeography, Cambridge.

Japan: Art {in part) Korin, Ogata; Kyosai, Sho-Fu.

f Jacobsen, Jens Peter; IKalewala; Kyd, Thomas.

■I Ithaca.

Kenya; Kilimanjaro.

-j Italy: Geography (in part).

Lecturer and Assistant Librarian

at Pembroke College, Cambridge. Formerly Fellow of Pembroke College.

Iyrcae; Kashubes.

Eduard Meyer, Ph.D., D.Litt. (Oxon.), LL.D. f

Professor of Ancient History in the University of Berlin. Author of Geschichte des \ Kavadh. Alterthums ; Geschichte des alien Aegyptens; Die Israeliten und ihre Nachbarstamme. _

Edmund Owen, M.B., F.R.C.S., LL.D., D.Sc.

Consulting Surgeon to St Mary's Hospital, London, and to the Children's Hospital, Great Ormond Street; late Examiner in Surgery in the Universities of Cambridge, Durham and London. Author of A Manual of Anatomy for Senior Students.

Joints: Diseases and Injuries; Kidney Diseases (in part).

Jesuits (in part).

Rev. Ethelred Luke Taunton (d. 1907).

Author of The English Black Monks of St Benedict ; History of the Jesuits in England.

Captain Frank Brinkley, R.N. r

Foreign Adviser to Nippon Yusen Kaisha, Tokyo. Correspondent of The Times J . in Japan. Editor of the Japan Mail. Formerly Professor of Mathematics at 1 Ja P an – Imperial Engineering College, Tokyo. Author of Japan; &c. [

Frederick Cornwallis Conybeare, M.A., D.Th. (Giessen).

Fellow of the British Academy. Formerly Fellow of University College, Oxford. -I Jacobite Church. Author of The Ancient Armenian Texts of Aristotle; Myth, Magic and Morals; &c.

F.

G.

M. B.

F.

G.

P.

F.

L.

L.

F.

LI.

G.

F.

R.

C.

Fr

. Sy.

F.

S.

P,

F.

v.

H.

F.

W

. R.*

G

, A

. Gr.

Frederick George Meeson Beck, M.A.

Fellow and Lecturer in Classics, Clare College, Cambridge.

Kent, Kingdom of.

G. E.

G. F. Mo.

Frederick Gymer Parsons, F.R.C.S., F.Z.S., F.R.Anthrop.Inst. f

Vice-President, Anatomical Society of Great Britain and Ireland. Lecturer on J T„j_i,.. a , Anatomy at St Thomas's Hospital and the London School of Medicine for Women. 1 J0lnl5 – Anatomy. Formerly Hunterian Professor at the Royal College of Surgeons. I

Lady Lugard. f Kano;

See the biographical article: Lugard, Sir F. J. D. \Katagum.

Francis Llewellyn Griffith, M.A., Ph.D. (Leipzig), F.S.A. r

Reader in Egyptology, Oxford University. Editor of the Archaeological Survey J – . and Archaeological Reports of the Egypt Exploration Fund. Fellow of Imperial 1 “ rnaK « German Archaeological Institute. L

Frank R. Cana.

Author of South Africa from the Great Trek to the Union.

Friedrich Schwally.

Professor of Semitic Philology in the University of Gieseen.

Francis Samuel Philbrick, A.M., Ph.D. r

Formerly Teaching Fellow of Nebraska State University, and Scholar and Fellow -| Jefferson, Thomas. of Harvard University. Member of American Historical Association. I ‘ ”

Baron Friedrich von Hugel.

Member of Cambridge Philological Society ; Member of Hellenic Society, of The Mystical Element of Religion ; &c.

Frederick William Rudler, I. SO., F.G.S.

Curator and Librarian of the Museum of Practical Geology, London, 1879-1902. President of the Geologists’ Association, 1887-1889.

George Abraham Grierson, CLE., Ph.D., D.Litt. /■

Member of the Indian Civil Service, 1873-1903. In charge of the Linguistic Survey I of India, 1898-1902. Gold Medallist, Royal Asiatic Society, 1909. Vice-President J Kashmiri. of the Royal Asiatic Society. Formerly Fellow of Calcutta University. Author of The Languages of India ; &c. [_

Rev. George Edmundson, M.A., F.R.Hist.S. f

Formerly Fellow and Tutor of Brasenose College, Oxford. Ford’s Lecturer, 1909. J Jaeoba Hon. Member, Dutch Historical Society, and Foreign Member, Netherlands Associa- | tion of Literature. I

Rev. George Foot Moore.

See the biographical article : Moore, George Foot.

i Kharga.

I Koran (in part).

Author [John: The Apostle; J John, Gospel of St.

Jade; Jargoon; Jasper; Kaolin.

Jehovah.

Vlll G. G. Co.

G. H. Bo.

G. K.

G. Mi.

G. Sa. G. S. L. G. S. R.

G. W. T.

H. A. W. H. Ch. H. CI.

H. C. H.

INITIALS AND HEADINGS OF ARTICLES

H.

C.

R.

H.

De

H.

M.

C.

H.

M.

R.

H.

M.

V.

H.

W

C.

D

H

W

S.

H

Y.

LA.

George Gordon Coulton, M.A.

Birkbeck Lecturer in Ecclesiastical History, Trinity College, Cambridge. Author of Medieval Studies ; Chaucer and his England ; From St Francis to Dante ; &c.

Knighthood and Chivalry.

Rev. George Herbert Box, M.A.

Rector of Sutton Sandy, Beds. Formerly Hebrew Master, Merchant Taylors' School, London. Lecturer in Faculty of Theology, University of Oxford, 1908- 1909. Author of Translation of Book of Isaiah; &c. {_

Gtjstav Kruger. <"

Professor of Church History in the University of Giessen. Author of Das Papsttum; -I Justin Martyr.

John the Baptist; Joseph (New Testament); Jubilee, Year of {in part]

{

&c.

Rev. George Miixigan, D.D.

Professor of Divinity and Biblical Criticism in the University of Glasgow. Author of The Theology of the Epistle to the Hebrews ; Lectures from the Greek Papyri ; &c.

George Saintsbury, LL.D., D.C.L.

See the biographical article: Saintsbury, G. E. B.

George Somes Layard.

Barrister-at-Law, Inner Temple. Author of Charles Keene; Shirley Brooks; &c.

Sir George Scott Robertson, K.C.S.I., D.C.L., M.P.

Formerly British Agent in Gilgit. Author of The Kafirs of the Hindu Kush ; Chitral: the Story of a Minor Siege. M.P. Central Division, Bradford.

Rev. Griffithes Wheeler Thatcher, M.A., B.D.

Warden of Camden College, Sydney, N.S.W. Formerly Tutor in Hebrew and Old – Testament History at Mansfield College, Oxford.

James (New Testament); Judas Iscariot.

Joinville. Keene, Charles S.

Kafiristan.

Jahiz;

Jarir Ibn ‘Atiyya ul-Khatfl; Jauhari; Jawaliqi; Jurjani, KhalH Ibn Ahmad; Khansa; Kindi; Kumait Ibn Zaid.

Editor of the Scottish Geographical -I Java (in part) .

Hugh Alexander Webster.

Formerly Librarian of University of Edinburgh.

Magazine.

Hugh Chisholm, M.A.

Formerly Scholar of Corpus Christi College, Oxford. Editor of the nth edition of the Encyclopaedia Britannica; Co-editor of the loth edition.

Sir Hugh Charles Clifford, K.C.M.G.

Colonial Secretary, Ceylon. Fellow of the Royal Colonial Institute. Formerly Resident, Pahang. Colonial Secretary, Trinidad and Tobago, 1903-1907. Author of Studies in Brown Humanity ; Further India; &c. Joint-author of A Dictionary of the Malay Language.

Horace Carter Hovey, A.M., D,D.

Fellow of the American Association for the Advancement of Science, Geological Society of America, National Geographic Society and Societe de Speleologie (France). Author of Celebrated American Caverns; Handbook of Mammoth Cave of Kentucky; &c.

Sir Henry Creswicke Rawlinson, Bart.

See the biographical article: Rawlinson, Sir H. C.

Hippolyte Delehaye, S.J.

Assistant in the compilation of the Bollandist publications: Analecta Bollandiana and Acta sanctorum.

Hector Munro Chadwick, M.A.

Librarian and Fellow of Clare College, Cambridge. Reader in Scandinavian , J JuteS. Cambridge University. Author of Studies on Anglo-Saxon Institutions.

Hugh Munro Ross.

Formerly Exhibitioner of Lincoln College, Oxford. Editor of The Times Engineering \ Kelvin, Lord (in part). Supplement. Author of British Railways.

Joan of Arc (in part).

Johor.

Jacobs Cavern.

Kurdistan (in part).

Januarius, St; Kilian, St.

Herbert M. Vaughan, F.S.A.

Keble College, Oxford. Author of The Last of the Royal Stuarts; The Medici Popes ; The Last Stuart Queen.

Henry William Carless Davis, M.A.

Fellow and Tutor of Balliol College, Oxford. Fellow of All Souls' College, Oxford, 1895-1902. Author of England under the Normans and Angevins; Charlemagne.

H. Wickham Steed.

Correspondent of The Times at Vienna. Correspondent of The Times at Rome,

1897-1902.

Sir Henry Yule, K.C.S.I., C.B.

See the biographical article: Yule, Sir Henry.

Israel Abrahams, M.A.

Reader in Talmudic and Rabbinic Literature in the University of Cambridge Formerly President, Jewish Historical Society of England. Author of A Short History of Jewish Literature; Jewish Life in the Middle Ages; Judaism; &c.

James: the Pretender; King's Evil.

John, King of England; John of Hexham.

Italy: History (F.).

Kublai Khan.

Jacob ben Asher;

Jellinek;

Jews: Dispersion to Modern

Times; Joel;

Johanan Ben Zaceia; Josippon; Kalisch, Marcus; Krochmal.

INITIALS AND HEADINGS OF ARTICLES

IX

I. L. B. J. A. H

J. A. R

Isabella L. Bishop.

See the biographical article : Bishop, Isabella.

{

Korea (in part).

J.

A. S.

J.

Br.

J.

Bt.

J.

B. A.

J.

F.-K.

J. G. C. A. J. G. Se. J. Hn.

J. H. A. H. J. H. F. J. H. R.

J. HI. R. J. Ja.

J. J. L,*

J. Mt. J. N. K.

J. P. P. J. P. Pe.

J. R. B.

{ Italy: History ©. \ Justinian I.

John Allen Howe. _ f Joints (Geology) ;

Curator and Librarian of the Museum of Practical Geology, London. Author of -j Jurassic' Keuper* The Geology of Building Stones. [Kimeridgian. '

Very Rev. Joseph Armitage Robinson, D.D. r

Dean of Westminster. Fellow of the British Academy. Hon. Fellow of Christ's J College, Cambridge, and Norrisian Professor of Divinity in the University. Author 1 JeSUS Christ.

of Some Thoughts on the Incarnation ; &c. l_

John Addington Symonds, LL.D.

See the biographical article, Symonds, John Addington.

Right Hon. James Bryce, D.C.L., D.Litt.

See the biographical article: Bryce, James.

James Bartlett.

Lecturer on Construction, Architecture, Sanitation, Quantities, &c, at King's College, London. Member of Society of Architects. Member of Institute of Junior Engineers.

Joseph Beavington Atkinson.

Formerly art-critic of the Saturday Review. Author of An Art Tour in the Northern – Capitals of Europe ; Schools of Modern A rt in Germany.

James Fitzmaurice-Kelly, Litt.D., F.R.Hist.S.

Gilmour Professor of Spanish Language and Literature, Liverpool University. Norman McColl Lecturer, Cambridge University. Fellow of the British Academy. ' Member of the Royal Spanish Academy. Knight Commander of the Order of Alphonso XII. Author of A History of Spanish Literature; &c.

John George Clark Anderson, M.A.

Censor and Tutor of Christ Church, Oxford. Formerly Fellow of Lincoln College; Craven Fellow, Oxford, 1896. Conington Prizeman, 1893.

Sir James George Scott, K.C.I.E.

Superintendent and Political Officer, Southern Shan States. The Upper Burma Gazetteer.

Joinery.

Kaulbach.

Author of Burma;

Juan Manuel, Don.

Kastamuni.

Karen;

Karen-Ni; KengTung.

Justus Hashagen, Ph.D. f

Privatdozent in Medieval and Modern History, University of Bonn. Author of -j John King of SaXOUV.

Das Rheinland unter die franzosische Herrschaft. {_ ‘

John Henry Arthur Hart, M.A.

Fellow, Theological Lecturer and Librarian, St John’s College, Cambridge.

John Henry Freese, M.A.

Formerly Fellow of St John’s College, Cambridge.

J Jews: Greek Domination. X Josephus.

f Janus;

I Julian (in pari).

John Horace Round, M.A., LL.D. (Edin.). f”

Author of Feudal England; Studies in Peerage and Family History; Peerage and I Knight-Service. Pedigree. [_

John Holland Rose, M.A., Litt.D. f Italy History CD)•

Lecturer on Modern History to the Cambridge University Local Lectures Syndicate. J . .. . * ^ ”’ Author of Life of Napoleon I. ; Napoleonic Studies; The Development of the European) JOsepnine; Nations; The Life of Pitt; &c. I Junot.

Joseph Jacobs, Litt.D. r

Professor of English Literature in the Jewish Theological Seminary, New York.

Formerly President of the Jewish Historical Society of England. Corresponding < jgˆy The Wandering. Member of the Royal Academy of History, Madrid. Author of Jews of Angevin England; Studies in Biblical Archaeology; &c. L

Rev. John James Lias, M.A.

Chancellor of Llandaff Cathedral. Formerly Hulsean Lecturer in Divinity and Lady Margaret Preacher, University of Cambridge.

James Moffatt, M.A., D.D.

Jowett Lecturer, London, 1907.

Author of Historical New Testament ; &c.

Ketteler, Baron von.

-J John, Epistles of.

Jevons, William Stanley.

Juvenal (in part).

John Neville Keynes, M.A., D.Sc

Registrary of the University of Cambridge. University Lecturer in Moral Science. Secretary to the Local Examinations and Lectures Syndicate. Formerly Fellow of Pembroke College. Author of Studies and Exercises in Formal Logic; &c.

John Percival Postgate, M.A., Litt.D.

Professor of Latin in the University of Liverpool. Fellow of Trinity College, . Cambridge. Fellow of the British Academy. Editor of the Classical Quarterly. Editor-in-Chief of the Corpus Poetarum Latinorum ; &c. 1.

Rev. John Punnett Peters, Ph.D., D.D. f

Canon Residentiary, P.E. Cathedral of New York. Formerly Professor of Hebrew in Kerbela; the University of Pennsylvania. Director of the University Expedition to Baby- -j Kerkuk; Ionia, 1888-1895. Author of Nippur, or Explorations and Adventures on the Khorsabad. Euphrates. I

John Rose Bradford, M.D., D.Sc, F.R.C.P., F.R.S. f

Physician to University College Hospital. Professor of Materia Medica and . Therapeutics, University College, London. Secretary of the Royal Society. Formerly Member of Senate, University of London.

Kidney Diseases (in part).

INITIALS AND HEADINGS OF ARTICLES

J. T. Be.

J. T. S.* J. V.*

J. W. He.

K. K. S.

L.

L. F. V.-H. L. J. S.

L. C. L. D.* L. V.*

M.

M. Br. M. F.

M. M. Bh. M. 0. B. C. M. P.* N. H. N. V.

John Thomas Bealby.

Joint-author of Stanford's Europe. Formerly Editor of the Scottish Geographical Magazine. Translator of Sven Hedin's Through Asia,

Central Asia and Tibet; &c.

Kalmuck; Kaluga; Kamchatka; Kara-Kum; Kars; Kazan; Kerch; Khingan; Khiva; Khokand; Khotan; Kiev; Kronstadt; Kuban; Kuen-Lun; Kursk; Kutais.

-j Joan of Arc (in part).

James Thomson Shotwell, Ph.D.

Professor of History in Columbia University, New York City.

Jules Viard. f

Archivist at the National Archives, Paris. Officer of Public Instruction. Author 1 Jacquerie, The. of La France sous Philippe VI. de Valois; &c. I

James Wycliffe Headlam, M.A.

Staff Inspector of Secondary Schools under the Board of Education. Formerly Fellow of King's College, Cambridge. Professor of Greek and Ancient History at ■{ Kossuth. Queen's College, London. Author of Bismarck and the Foundation of the German Empire; &c.

Baron Dairoku Kikuchi, M.A., D.Sc., LL.D.

President of the Imperial University of Kyoto. President of Imperial Academy of _ Japan. Emeritus Professor, Imperial University, Tokio. Author of Japanese Education; &c.

Kathleen Schlesinger.

Editor of the Portfolio of Musical Archaeology. Orchestra; &c.

Japan: The Claim of Japan.

Author of The Instruments of ihe\ „ . , J I Keyboard.

Count Lutzow, Litt.D. (Oxon.), D.Ph. (Prague), F.R.G.S.

Chamberlain of H.M. the Emperor of Austria, King of Bohemia. Hon. Member of the Royal Society of Literature. Member of the Bohemian Academy, &c. Author of Bohemia, a Historical Sketch; The Historians of Bohemia (Ilchester Lecture, Oxford, 1904); The Life and Times of John Hus; &c.

Leveson Francis Vernon-Harcourt, M.A., M.Inst.CE. (1839-1907).

Formerly Professor of Civil Engineering at University College, London. Author of Rivers and Canals; Harbours and Docks; Civil Engineering as applied in Con- struction; &c.

Leonard James Spencer, M.A.

Jerome of Prague.

1

Jetty.

Assistant in the Department of Mineralogy, British Museumˆ Formerly Scholar J . .,

of Sidney Sussex College, Cambridge, and Harkness Scholar. logical Magazine.

Rev. Lewis Campbell, D.C.L., LL.D.

See the biographical article: Campbell, Lewis.

Louis Duchesne.

See the biographical article: Duchesne, L. M. O.

Editor of the Minera-

-(Jowett.

/John XIX.; I Julius I.

J

LUIGI VlLLARI.

Italian Foreign Office (Emigration Department). Formerly Newspaper Corre- spondent in east of Europe. Italian Vice-Consul in New Orleans, 1906; Phila- J Italy; History (E and G-), delphia, 1907; Boston, U.S.A., 1907-1910. Author of Italian Life in Town and Country; Fire and Sword in the Caucasus; &c.

Lord Macaulay.

See the biographical article: Macaulay, Baron.

Margaret Bryant.

Sir Michael Foster, K.C.B., D.C.L., D.Sc, LL.D., F.R.S. See the biographical article : Foster, Sir M.

Sir Mancherjee Merwanjee Bhownaggree.

Fellow of Bombay University. M.P. for N.E. Bethnal Green, 1895-1906. of History of the Constitution of the East India Company ; &c.

Maximilian Otto Bismarck Caspari, M.A.

Reader in Ancient History at London University. Lecturer in Greek at Birming- ham University, 1905-1908.

Leon Jacques Maxime Prinet.

Formerly Archivist to the French National Archives, of France (Academy of Moral and Political Sciences).

Norman McLean, M.A.

Lecturer in Aramaic, Cambridge University. Fellow and Hebrew Lecturer, Christ's College, Cambridge. Joint-editor of the larger Cambridge Septuagint.

Joseph Marie Noel Valois.

Member of Academie des Inscriptions et Belles-Lettres, Paris. Honorary Archivist at the Archives Nationales. Formerly President of the Societe de l'Histoire de France and the Societe de l'ficole de Chartes. Author of La France et le grand schisme a" Occident; &c.

{

Author -j

Auxiliary of the Institute

Johnson, Samuel. Keats (in part). K611iker. Jeejeebhoy.

Justin II.

Joinville (Family);

Joyeuse;

Juge, Boffllle de.

Jacob of Edessa;

Jacob of Serugh;

Joshua the Stylite.

John XXIII.

INITIALS AND HEADINGS OF ARTICLES

XL

0. H.*

0. J. R. H. P. A.

P. A. A.

P. A. K.

P. Gi.

P. G. T. P. La.

P. L. G.

P. Vi. R. A.* R. Ad. R. A. S. M.

R. A. W.

R. F. L.

R. G. R. H. C.

R. I. P. R. J. M.

R. K. D. R. L.*

Otto Hehner, F.I.C., F.C.S.

Public Analyst. Formerly President of Society of Public Analysts. Vice-President j T „ mc „_ A T „. of Institute of Chemistry of Great Britain and Ireland. Author of works on butter I Jams ana J61H6S. analysis; Alcohol Tables; &c. L

I.

Osbert John Radcliffe Howarth, M.A.

Christ Church, Oxford. Geographical Scholar, 1901. Assistant Secretary of the British Association.

Java (in part) ; Korea (in part).

Paul Daniel Alphandery. _ r

Professor of the History of Dogma, Ecole pratique des Hautes Etudes, Sorbonne, J Joachim Of Floris; Paris. Author of Les Idi.es morales chez les heterodoxes latines au debut du XIII' 1 John XXII. Steele.

Philip A. Ashworth, M.A., Doc. Juris. New College, Oxford. Barrister-at-Law. of the English Constitution.

n-

Translator of H. R. von Gneist's History -j Jhering.

Prince Peter Alexeivitch Kropotkin.

See the biographical article: Kropotkin, P. A.

Kalmuck; Kaluga; Kamchatka; Kara-Kum; Kazan; Kerch; Khingan; Khokand; Kiev; Kronstadt; Kuban; Kuen-Lun; Kursk; Kutais.

Peter Giles, M.A., LL.D., Litt.D. r

Fellow and Classical Lecturer of Emmanuel College, Cambridge, and University J J. Reader in Comparative Philology. Formerly Secretary of the Cambridge Philo- 1 K. logical Society. Author of Manual of Comparative Philology. [

{ Knot.

Japan: Geology.

I Jurisprudence, Comparative.

•j Kersaint.

Kant (in part).

{

j Joppa; [Kerak.

Peter Guthrie Tait.

See the biographical article: Tait, Peter Guthrie.

Philip Lake, M.A., F.G.S.

Lecturer on Physical and Regional Geography in Cambridge University. Formerly . of the Geological Survey of India. Author of Monograph of British Cambrian Ttilobites. Translator and Editor of Kayser's Comparative Geology. I

Philip Lyttelton Gell, M.A. |~

Sometime Scholar of Balliol College, Oxford. Secretary to the Clarendon Press, i Khazars (in -barf) Oxford, 1884-1897. Fellow of King's College, London. I "

Paul Vinogradoff, D.C.L., LL.D.

See the biographical article : VlNOGRADOFF, PAUL.

Robert Anchel.

Archivist to the Departement de l'Eure.

Robert Adamson, LL.D.

See the biographical article: Adamson, Robert.

Robert Alexander Stewart Macalister, M.A., F.S.A.

St John's College, Cambridge. Director of Excavations for the Palestine Explora- tion Fund.

Robert Alexander Wahab, C.B., C.M.G., CLE. r

Colonel, Royal Engineers. Formerly H.M. Commissioner, Aden Boundary De- J ifnuoot limitation, and Superintendent, Survey of India. Served with Tirah Expeditionary] A – uwet " Force, 1897-1898; Anglo-Russian Boundary Commission, Pamirs, 1895; &c. I

Rev. Richard Frederick Littledale, M.A., LL.D., D.C.L. (1833-1800).

Author of Religious Communities of Women in the Early Church; Catholic Ritual in the Church of England; Why Ritualists do not become Roman Catholics.

Richard Garnett, LL.D.

See the biographical article: Garnett, Richard.

Rev. Robert Henry Charles, M.A., D.D., D.Litt. (Oxon.).

Grinfield Lecturer and Lecturer in Biblical Studies, Oxford and Fellow of Merton College. Fellow of the British Academy. Formerly Senior Moderator of Trinity College, Dublin. Author and Editor of Book of Enoch ; Book of Jubilees ; Assumption of Moses; Ascension of Isaiah; Testaments of the XII. Patriarchs; &c.

Reginald Innes Pocock, F.Z.S.

Superintendent of the Zoological Gardens, London.

Ronald John McNeill, M.A.

Christ Church, Oxford. Barrister-at-Law. Gazette, London.

Sir Robert Kennaway Douglas.

Formerly Editor of the St James's

Jesuits (in part).

Krazewski.

Jeremy, Epistle of; Jubilees, Book of; Judith, The Book of.

j King-Crab.

J Jeffreys, 1st Baron; 1 Keith: Family.

Formerly Keeper of Oriental Printed Books and MSS. at the British Museum, and J JenghlZ Khan; Professor of Chinese, King's College, London. Author of The Language and Litera- 1 Julien. ture of China ; &c. I

Richard Lydekker, F.R.S., F.G.S. , F.Z.S.

Member of the Staff of the Geological Survey of India, 1874-1882. Author of Catalogue of Fossil Mammals, Reptiles and Birds in the British Museum ; The ' Deer of all Lands; The Game Animals of Africa; &c.

Jerboa;

Kangaroo (in part).

INITIALS AND HEADINGS OF ARTICLES

R. N. B.

R. Po.

R. P. S.

R. S. C.

S. A. C.

St.

C.

s.

N.

T.

As.

T.

A. I.

T.

A.J.

T.

F. C.

T.

H.

T.

H. H.*

T.

K.

T.

K. C.

Th. N.

T

Se.

T. Wo.

T. W. R. D.

W. An.

Ivan I.- VI.; Jellaehieh; John III. : Sobieski ; Juel, Jens; Juel, Neils; Karman; Kemeny, Baron; Kisfaiudy; Kollontaj; Koniecpolski; Kosciuszko; Kurakin, Prince.

J4hn, Duke of Burgundy.

Robert Nisbet Bain (d. 1909).

Assistant Librarian, British Museum, 1883-1909. Author of Scandinavia, the Political History of Denmark, Norway and Sweden, 1513-1900; The First Romanovs, 16 1 3-1 725 ; Slavonic Europe, the Political History of Poland and Russia from 1460 to 1796; &c.

Rene Poupardin, D. es L. r

Secretary of the Ecole des Chartes. Honorary Librarian at the Bibliotheque J Nationale, Paris. Author of Le Royaume de Provence sous les Carclingiens ; Recueil\ des chartes de Saint-Germain ; &c. I

R. Phene Spiers, F.S.A., F.R.I.B.A.

Formerly Master of the Architectural School, Royal Academy, London. Past

President of Architectural Association. Associate and Fellow of King’s College, J Jacobean Style.

London. Corresponding Member of the Institute of France. Editor of Fergusson's

History of A rchitecture. Author of A rchitecture : East and West ; &c.

Robert Seymour Conway, M.A., D.Litt. (Cantab.).

Professor of Latin and Indo-European Philology in the University of Manchester. Formerly Professor of Latin in University College, Cardiff ; and Fellow of Gonville ' and Caius College, Cambridge. Author of The Italic Dialects.

Stanley Arthur Cook, M.A.

Lecturer in Hebrew and Syriac, and formerly Fellow, Gonville and Caius College, Cambridge. Editor for Palestine Exploration Fund. Examiner in Hebrew and Aramaic, London University, 1904-1908. Author of Glossary of Aramaic In- scriptions; The Laws of Moses and the Code of Hammurabi; Critical Notes on Old Testament History ; Religion of A ncient Palestine ; &c.

Viscount St Cyres.

See the biographical article :

Iddesleigh, ist Earl of.

Simon Newcomb, D.Sc, D.C.L.

See the biographical article : Newcomb, Simon.

Thomas Ashby, M.A., D.Litt. (Oxon.).

Director of British School of Archaeology at Rome. Formerly Scholar of Christ Church, Oxford. Craven Fellow, 1897. Conington Prizeman, 1906. Member of

Italy: History (A.).

Jacob; Jehciakim; Jehoram; Jehoshaphat; Jehu; Jephthah; Jerahmeel; Jeroboam; Jews: Old Testament History; Jezebel; Joab; Joash; Joseph: Old Testament; Joshua; Josiah; Judah; Judges, Book of; Kabbalah {in part) ; Kenites; Kings, Books of.

Jansen; Jansenism.

Jupiter: Satellites.

the Imperial German Archaeological Institute.

Thomas Allan Ingram, M.A., LL.D. Trinity College, Dublin.

Thomas Athol Joyce, M.A.

Assistant in Department of Ethnography, British Museum. Hon. Sec, Royal J Kavirondo Anthropological Institute.

Theodore Freylinghuysen Collier, Ph.D.

Assistant Professor of History, Williams College, Williamstown, Mass., U.S.A.

Thomas Hodgkin, D.C.L., LL.D.

See the biographical article : Hodgkin, T.

{Italy: Geography and Statistics; History (B.); Ivrea.

-I Juvenile Offenders {in part).

J]

I

Julius III.

Balliol College, Oxford. University of London.

Sir Thomas Hungereord Holdich, K.C.M.G., K.C.I.E., D.Sc, F.R.G.S.

Colonel in the Royal Engineers. Superintendent Frontier Surveys, India, 1892- 1898. Gold Medallist, R.G.S. (London), 1887. H.M. Commissioner for the Perso- Beluch Boundary, 1 896. Author of The Indian Borderland ; The Gates of India ; &c.

Thomas Kirkup, M.A., LL.D.

Author of An Inquiry into Socialism; Primer of Socialism; &c.

Rev. Thomas Kelly Cheyne, D.D.

See the biographical article : Cheyne, T. K.

Theodor Noldeke, Ph.D.

See the biographical article: Noldeke, Theodor.

Thomas Seccombe, M.A.

Lecturer in History, East London and Birkbeck Colleges, Stanhope Prizeman, Oxford, 1887. Assistant Editor of Dictionary of National Biography, 1891-1901. Author of The Age of Johnson. Joint-author of Bookman History of English Literature ; &c.

Thomas Woodhouse.

Head of the Weaving and Textile Designing Department, Technical College, Dundee.

Thomas William Rhys Davids, LL.D., Ph.D.

Professor of Comparative Religion, Manchester. Professor of Pali and Buddhist Literature, University College, London, 1882-1904. President of the Pali Text Society. Fellow of the British Academy. Secretary and Librarian of Royal Asiatic Society, 1 885-1902. Author of Buddhism; Sacred Books of the Buddhists; Early Buddhism; Buddhist India; Dialogues of the Buddha; &c.

William Anderson, F.R.C.S.

Formerly Chairman of Council of the Japan Society. Author of The Pictorial Arts of Japan; Japanese Wood Engravings; Catalogue of Chinese and Japanese Pictures in the British Museum ; &c.

Jordanes {in part).

f Kabul; Kalat; Kandahar; Kashmir; Khyber Pass; Kunar; Kushk.

Julian {in part).

J Jeremiah; Joel {in part)- \ Jonah.

■] Koran {in part).

Johnson, Samuel.

Jute. Jains;

JcHctKcly

Kanishka.

J Japan: Art {in part).

W. A.B.C.

W. A. P.

W. B.*

W. Ba. W. Be. W. F. C.

W. F. D. W.G.

w.

G.

S.

w.

H.

Be.

w.

H.

Di.

w.

H.

F.

w.

L.

F.

w.

L.-

■W.

w.

H.

R.

w.

M.

Ra.

w.

P.

J.

w.

R.

S.

w.

W

. F.*

w

W

.R.*

w.

Y.

S.

Rev. William Augustus Brevoort Coolidge, M.A., F.R.G.S., Ph.D. (Bern). Fellow of Magdalen College, Oxford. Professor of English History, St David's College, Lampeter, 1880-1881. Author of Guide to Switzerland; The Alps in Nature and in History; &c. Editor of The

Alpine Journal, 1880-1889.

Walter Alison Phillips, M.A.

Formerly Exhibitioner of Merton College and Senior Scholar of St John's College, Oxford. Author of Modern Europe; &c.

(" Jenatsch, Georg; i Jungfrau; [Jura.

Jacobins;

King; Kriemhild;

Kriidener, Baroness von.

-! Jonah, Rabbi; Kimhi. ■\ Jefleries. i Jury.

William Burton, M.A., F.C.S.

Chairman, Joint Committee of Pottery Manufacturers of Great Britain. Author of i Kashi (in part). English Stoneware and Earthenware ; &c.

William Bacher, Ph.D.

Professor of Biblical Studies at the Rabbinical Seminary, Buda-Pest.

Sir Walter Besant.

See the biographical article: Besant, Sir Walter.

William Feilden Craies, M.A.

Barrister-at-Law, Inner Temple. Lecturer on Criminal Law at King's College, London. Editor of Archbold's Criminal Pleading, 23rd ed.

William Frederick Denning, F.R.A.S.

Gold Medal, R.A.S. President, Liverpool Astronomical Society, 1877-1878. Corresponding Fellow of Royal Astronomical Society of Canada; &c. Author of Telescopic Work for Starlight Evenings ; The Great Meteoric Shower ; &c.

William Garnett, M.A., D.C.L.

Educational Adviser to the London County Council. Formerly Fellow and Lecturer of St John's College, Cambridge. Principal and Professor of Mathematics, Durham College of Science, Newcastle-on-Tyne.

Author of Elementary Dynamics ; &c.

William Graham Sumner.

See the biographical article: Sumner, William Graham.

William Henry Bennett, M.A., D.D., D.Litt. (Cantab.).

Professor of Old Testament Exegesis in New and Hackney Colleges, London. Formerly Fellow of St John's College, Cambridge. Lecturer in Hebrew at Firth College, Sheffield. Author of Religion of the Post-Exilic Prophets ; &c.

William Henry Dines, F.R.S.

Director of Upper Air Investigation for the English Meteorological Office.

Sir William H. Flower, LL.D.

See the biographical article: Flower, Sir W. H.

Walter Lynwood Fleming, A.M., Ph.D.

Professor of History in Louisiana State University. of Reconstruction ; &c.

Sir William Lee-Warner, M.A., K. C.S.I.

Member of Council of India. Formerly Secretary in the Political and Secret Department of the India Office. Author of Life of the Marquis of Dalhousie; Memoirs of Field- Marshal Sir Henry Wylie Norman; &c.

William Michael Rossetti.

See the biographical article : Rossetti, Dante G.

Sir William Mitchell Ramsay, LL.D., D.C.L. See the biographical article, Ramsay, Sir W. M.

William Price James.

Barrister-at-Law, Inner Temple. High Bailiff, Cardiff County Court. Author of Romantic Professions; &c.

William Robertson Smith, LL.D.

See the biographical article: Smith. William Robertson.

William Warde Fowler, M.A.

Fellow of Lincoln College, Oxford. Sub-rector, 1881-1904. Gifford Lecturer Edinburgh University, 1908. Author of The City-State of the Greeks and Romans The Roman Festivals of the Republican Period ;'&c.

William Walker Rockwell, Lic.Theol.

Assistant Professor of Church History, Union Theological Seminary, New York.

William Young Sellar, LL.D.

See the biographical article: Sellar, W. Y.

Author of Documentary History

•j Jupiter.

J. Kelvin, Lord.

i Jaekson, Andrew. -j Japheth.

< Kite-flying (in part).

-I Kangaroo (in part).

j Knights of the Golden Circle; I Ku KIux Klan.

} Jung Bahadur, Sir.

j Kneller.

j Jupiter (in part).

i Kipling, Rudyard.

f Joel (in part) ; t Jubilee, Year of (in part).

\ Juno;

1 Jupiter (in part).

■I Jerusalem, Synod of. i Juvenal (in part).

Ivy.

Jamaica. Janissaries. Jaundice. Ju-Jutau.

PRINCIPAL UNSIGNED ARTICLES

Jumping. Juniper. Jurisprudence. Kaffirs.

Kansas. Kent. Kentucky. Kerry.

Ketones.

Kildare.

Kilkenny.

Know Nothing Party.

ENCYCLOPEDIA BRITANNICA

ELEVENTH EDITION

VOLUME XV

ITALY (Italia), the name 1 applied both in ancient and in modern times to the great peninsula that projects from the mass of central Europe far to the south into the Mediterranean Sea, where the island of Sicily may be considered as a continuation of the continental promontory. The portion of the Mediterranean commonly termed the Tyrrhenian Sea forms its limit on the W. and S., and the Adriatic on the E.; while to the N., where it joins the main continent of Europe, it is separated from the adjacent regions by the mighty barrier of the Alps, which sweeps round in a vast semicircle from the head of the Adriatic to the shores of Nice and Monaco.

Topography. — The land thus circumscribed extends between the parallels of 46° 40′ and 36 38′ N., and between 6° 30′ and 18° 30′ E. Its greatest length in a straight line along the main- land is from N.W. to S.E., in which direction it measures 708 m. in a direct line from the frontier near Courmayeur to Cape Sta Maria di Leuca, south of Otranto, but the great mountain peninsula of Calabria extends about two degrees farther south to Cape Spartivento in lat. 37° 55’. Its breadth is, owing to its configuration, very irregular. The northern portion, measured from the Alps at the Monte Viso to the mouth of the Po, has a breadth of about 270 m., while the maximum breadth, from the Rocca Chiardonnet near Susa to a peak in the valley of the

Isonzo, is 354 m. But the peninsula of Italy, which forms the largest portion of the country, nowhere exceeds 150 m. in breadth, while it does not generally measure more than 100 m. across. Its southern extremity, Calabria, forms a complete peninsula, being united to the mass of Lucania or the Basilicata by an isthmus only 35 m. in width, while that between the gulfs of Sta Eufemia and Squillace, which connects the two portions of the province, does not exceed 20 m. The area of the kingdom of Italy, exclusive of the large islands, is computed at 91,277 sq. m. Though the Alps form throughout the northern boundary of Italy, the exact limits at the extremities of the Alpine chain are not clearly marked. Ancient geographers appear to have generally regarded the remarkable headland which descends from the Maritime Alps to the sea between Nice and Monaco as the limit of Italy in that direction, and in a purely geographical point of view it is probably the best point that could be selected. But Augustus, who was the first to give to Italy a definite political organization, carried the frontier to 1 On the derivation see below, History, section A, ad. init. XV. J

Bound- aries.

the river Varus or Var, a few miles west of Nice, and this rivei continued in modern times to be generally recognized as the boundary between France and Italy. But in i860 the annexation of Nice and the adjoining territory to France brought the political frontier farther east, to a point between Mentone and Ventimiglia which constitutes no natural limit.

Towards the north-east, the point where the Julian Alps approach close to the seashore (just at the sources of the little stream known in ancient times as the Timavus) would seem to constitute the best natural limit. But by Augustus the frontier was carried farther east so as to include Tergeste (Trieste), and the little river Formio (Risano) was in the first instance chosen as the limit, but this was subsequently transferred to the river Arsia (the Arsa), which flows into the Gulf of Quarnero, so as to include almost all Istria; and the circumstance that the coast of Istria was throughout the middle ages held by the republic of Venice tended to perpetuate this arrangement, so that Istria was generally regarded as belonging to Italy, though certainly not forming any natural portion of that country. Present Italian aspirations are similarly directed.

The only other part of the northern frontier of Italy where the boundary is not clearly marked by nature is Tirol or the valley of the Adige. Here the main chain of the Alps (as marked by the watershed)

recedes so far to the north that it has never constituted the frontier. In ancient times the upper valleys of the Adige and its tributaries were inhabited by Raetian tribes and included in the province of Raetia; and the line of demarca- tion between that province and Italy was purely arbitrary, as it remains to this day. Tridentum or Trent was in the time of Pliny included in the tenth region of Italy or Venetia, but he tells us that the inhabitants were a Raetian tribe. At the present day the frontier between Austria and the kingdom of Italy crosses the Adige about 30 m. below Trent — that city and its territory, which previous to the treaty of Luneville in 1801 was governed by sovereign archbishops, subject only to the German emperors, being now included in the Austrian empire.

While the Alps thus constitute the northern boundary of Italy, its configuration and internal geography are determined almost entirely by the great chain of the Apennines, which branches off from the Maritime Alps between Nice and Genoa, and, after stretching in an unbroken line from the Gulf of Genoa to the Adriatic, turns more to the south, and is continued throughout

Central and Southern Italy, of which it forms as it were the back-bone, until it ends in the southernmost extremity of Calabria at Cape Spartivento. The great spur or promontory projecting towards the east to Brindisi and Otranto has no direct con- nexion with the central chain.

One chief result of the manner in which the Apennines traverse Italy from the Mediterranean to the Adriatic is the marked division between Northern Italy, including the region north of the Apennines and extending thence to the foot of the Alps, and the central and more southerly portions of the peninsula. No such line of separation exists farther south, and the terms Central and. Southern Italy, though in general use among geographers and convenient for descriptive purposes, do not correspond to any natural divisions.

i. Northern Italy. — By far the larger portion of Northern Italy is occupied by the basin of the Po, which comprises the whole of the broad plain extending from the foot of the Apennines to that of the Alps, together with the valleys and slopes on both sides of it. From its

source in Monte Viso to its outflow into the Adriatic — a distance of more than 220 m. in a direct line — the Po receives all the waters that flow from the Apennines northwards, and all those that descend from the Alps towards the south, Mincio (the outlet of the Lake of Garda) inclusive. The next river to the E. is the Adige, which, after pursuing a parallel course with the Po for a considerable distance, enters the Adriatic by a separate mouth. Farther to the N. and N.E. the various rivers of Venetia fall directly into the Gulf of Venice. ,

There is no other instance in Europe of a basin of similar extent equally clearly characterized — the perfectly level character of the plain being as striking as the boldness with which the lower slopes of the mountain ranges begin to rise on each side of it. This is most clearly marked on the side of the Apennines, where the great Aemilian Way, which has been the high road. from the time of the Romans to our own, preserves an unbroken straight line from Rimini to Piacenza, a distance of more than 150 m., during which the underfalls of the mountains continually approach it on the left, without once crossing the line of road.

The geography of Northern Italy will be best described by following the course of the Po. That river has its origiji as a mountain torrent descending from two little dark lakes on the north flank of Monte Viso, at a height of more than 6000 ft. above the sea; and after a course of less than 20 m. it enters the plain at Saluzzo, between which and Turin, a distance of only 30 m., it receives three considerable tribu- taries — the Chisone on its left bank, bringing down the waters from the valley of Fenestrelle, and the Varaita and Maira on the south, contributing those of two valleys of the Alps immediately south of that of the Po itself. A few miles below Valenza it is joined by the Tanaro, a large stream, which brings with it the united waters of the Stura, the Bormida and several minor rivers.

More important are the rivers that descend from the main chain of the Graian and Pennine Alps and join the Po on its left bank. Of these the Dora (called for distinction's sake Dora Riparia), which unites with the greater river just below Turin, has its source in the Mont Genevre, and flows past Susa at the foot of the Mont Cenis. Next comes the Stura, which rises in the glaciers of the Roche Melon; then the Orca, flowing through the Val di Locana; and then the Dora Baltea, one of the greatest of all the Alpine tributaries of the Po, which has its source in the glaciers of Mont Blanc, above Cour- mayeur, and thence descends through the Val d'Aosta for about 70 m. till it enters the plain at Ivrea, and, after flowing about 20 m. more, joins the Po a few miles below Chivasso. This great valley — one of the most considerable on the

southern side of the Alps — has attracted special attention, in ancient as well as modern times, from its leading to two of the most frequented passes across the great mountain chain — the Great and the Little St Bernard — the former diverging at Aosta, and crossing the main ridges to the north into the valley of the Rhone, the other following a more westerly direction into Savoy. Below Aosta also the Dora Baltea receives several considerable tributaries, which descend from the glaciers between Mont Blanc and Monte Rosa. About 25 m. below its confluence with the Dora, the Po receives the Sesia, also a large river, which has its source above Alagna at the southern foot of Monte Rosa, and after flowing by Varallo and Vercelli falls into the Po about 14 m. below the latter city. About 30 m. east of this confluence — in the course of which the Po makes a great bend south to Valenza, and then returns again to the north- ward — it is joined by the Ticino, a large and rapid river, which brings with it the outflow of Lago Maggiore and all the waters that flow into it. Of these the Ticino itself has its source about 10 m. above Airolo at the foot of the St Gotthard, and after flowing above 36 m. through the Val Leventina to Bellinzona (where it is joined by the Moesa bringing down the waters of the Val Misocco) enters the lake through a marshy plain at Magadino, about 10 m. distant. On the west side of the lake the Toccia or Tosa descends from the pass of the Gries nearly due south to Domodossola, where it receives the waters of the Doveria from the Simplon, and a few miles lower down those of the Val d'Anzasca from the foot of Monte Rosa, and 12 m.

farther has its outlet into the lake between Baveno and Pallanza. The Lago Maggiore is also the receptacle of the waters of the Lago di Lugano on the east and the Lago d'Orta on the west.

The next great affluent of the Po, the Adda, forms the outflow of the Lake of Como, and has also its sources in the Alps, above Bormio, whence it flows through the broad and fertile valley of the Valtellina for more than 65 m. till it enters the lake near Colico. The Adda in this part of its course has a direction almost due east to west; but at the point where it reaches the lake, the Liro descends the valley of S. Giacomo, which runs nearly north and south from the pass of the Spliigen, thus affording one of the most direct lines of communication across the Alps. The Adda flows out of the lake at its south-eastern extremity at Lecco, and has thence a course through the plain of above 70 m. till it enters the Po between Piacenza and Cremona. It flows by Lodi and Pizzighettone, and receives the waters of the Brembo, descending from the Val Brembana, and the Serio from the Val Seriana above Bergamo. The Oglio, a more considerable stream than either of the last two, rises in the Monte Tonale above Edolo, and

descends through the Val Camonica to Lovere, where it expands into a large lake, called Iseo from the town of that name on its southern shore. Issuing thence at its south- west extremity, the Oglio has a long and winding course through the plain before it finally reaches the Po a few miles above Borgoforte. In this lower part it receives the smaller streams of the Mella, which flows by Brescia, and the Chiese, which proceeds from the small Lago d'Idro, between the Lago d'Iseo and that of Garda.

The last of the great tributaries of the Po is the Mincio, which flows from the Lago di Garda, and has a course of about 40 m. from Peschiera, where it issues from the lake at its south-eastern angle, till it joins the Po. About 12 m. above the confluence it passes under the walls of Mantua, and expands into a broad lake-like reach so as entirely to encircle that city. Notwithstanding its extent, the Lago di Garda is not fed by the snows of the high Alps, nor is the stream which enters it at its northern extremity (at Riva) commonly known as the Mincio, though forming the main source of that river, but is termed the Sarca; it rises at the foot of Monte Tonale.

The Adige, formed by the junction of two streams — the Etsch or Adige proper and the Eisak, both of which belong to Tirol rather than to Italy — descends as far as Verona, where it enters the great plain, with a course from north to south nearly parallel to the rivers last described, and would seem likely to discharge its waters into those of the Po, but below Legnago it turns eastward and runs parallel to the Po for about 40 m., entering the Adriatic by an independent mouth about 8 m. from the northern outlet of the greater stream. The waters of the two rivers have, however, been made to communicate by artificial cuts and canals in more than one place.

The Po itself, which is here a very large stream, with an average width of 400 to 600 yds., continues to flow with an undivided mass of waters as far as Sta Maria di Ariano, where it parts into two arms, known as the Po di Maestra and Po di Goro, and these again are subdivided into several other branches, forming a delta above 20 m. in width from north to south. The point of bifurcation, at present about 25 m. from the sea, was formerly much farther inland, more than 10 m. west of Ferrara, where a small arm of the river, still called the Po di Ferrara, branches from the main stream. Previous to the year 1 1 54 this channel was the main stream, and the two small branches into which it subdivides, called the Po di Volano and Po di Primaro, were in early times the two main outlets of the river. The southernmost of these, the Po di Primaro, enters the Adriatic about 12 m. north of Ravenna, so that if these two arms be included, the delta

of the Po extends about 36 m. from south to north. The whole course of the river, including its windings, is estimated at about 450 m. Besides the delta of the Po and the large marshy tracts which it forms, there exist on both sides of it extensive lagoons of salt water, generally separated from the Adriatic by narrow strips of sand or embankments, partly natural and partly artificial, but having openings which admit the influx and efflux of the sea-water, and serve as ports for communication with the mainland. The best known and the most extensive of these lagoons is that in which Venice is situated, which extends from Torcello in the north to Chioggia and Brondolo in the south, a distance of above 40 m. ; but they were formerly much more extensive, and afforded a continuous means of internal navigation, by what were called ” the Seven Seas ” (Septem Maria), from Ravenna to Altinum, a few miles north of Torcello. That city, like Ravenna, originally stood in the midst of a lagoon; and the coast east of it to near Monfalcone, where it meets the mountains, is occupied by similar expanses of water, which are, however, becoming gradually converted into dry land.

The tract adjoining this long line of lagoons is, like the basin of the Po, a broad expanse of perfectly level alluvial plain, extending from the Adige eastwards to the Carnic Alps, where they approach close to the Adriatic between Aquileia and Trieste, and northwards to the foot of the great chain, which here sweeps round in a semicircle from the neighbourhood of Vicenza to that of Aquileia. The space thus included was known in ancient times as Venetia, a name applied in the middle ages to the well-known city ; the eastern portion of it became known in the middle ages as the Frioul or Friuli.

Returning to the south of the Po, the tributaries of that river on its right bank below the Tanaro are very inferior in volume and importance to those from the north. Flowing from the Ligurian

Apennines, which never attain the limit of perpetual snow, they generally dwindle in summer into insignificant streams. Beginning from the Tanaro, the principal of them are — (i) the Scrivia.a small but rapid stream flowing from the Apennines at the back of Genoa ; (2) the Trebbia, a much larger river, though of the same torrent-like character, which rises near Torriglia within 20 m. of Genoa, flows by Bobbio, and joins the Po a few miles above Piacenza; (3) the Nure, a few miles east of the preceding; (4) the Taro, a more con- siderable

stream; (5) the Parma, flowing by the city of the same name; (6) the Enza; (7) the Secchia, which flows by Modena; (8) the Panaro, a few miles to the east of that city; (9) the Reno, which flows by Bologna, but instead of holding its course till it dis- charges its waters into the Po, as it did in Roman times, is turned aside by an artificial channel into the Po di Primaro. The other small streams east of this — of which the most considerable are the Solaro, the Santerno, flowing by Imola, the Lamone by Faenza, the Montone by Forli, all in Roman times tributaries of the Po — have their outlet in like manner into the Po di Primaro, or by artificial mouths into the Adriatic between Ravenna and Rimini. The river Marecchia, which enters the sea immediately north of Rimini, may be considered as the natural limit of Northern Italy. It was adopted by Augustus as the boundary of Gallia Cispadana; the far-famed Rubicon was a trifling stream a few miles farther north, now called Fiumicino. The Savio is the only other stream of any importance which has always flowed directly into the Adriatic from this side of the Tuscan Apennines.

The narrow strip of coast-land between the Maritime Alps, the Apennines and the sea — called in ancient times Liguria, and now known as the Riviera of Genoa — is throughout its extent, from Nice to Genoa on the one side, and from Genoa to Spezia on the other, almost wholly mountainous. It is occupied by the branches and offshoots of the mountain ranges which separate it from the great plain to the north, and send down their lateral ridges close to the water's edge, leaving only in places a few square miles of level plains at the mouths of the rivers and openings of the valleys. The district is by no means devoid of fertility, the steep slopes facing the south enjoying so fine a climate as to render them very favourable for the growth of fruit trees, especially the olive, which is cultivated in terraces to a considerable height up the face of the mountains, while the openings of the valleys are generally occupied by towns or villages, some of which have become favourite winter resorts.

From the proximity of the mountains to the sea none of the rivers in this part of Italy has a long course, and they are generally mere mountain torrents, rapid and swollen in winter and spring, and almost dry in summer. The largest and most important are those which descend from the Maritime Alps between Nice and Albenga. The most considerable of them are — the Roja, which rises in the Col di Tenda and descends to Ventimiglia; the Taggia, between San Remo and Oneglia ; and the Centa, which enters the sea at Albenga. The Lavagna, which enters the sea at Chiavari, is th# only stream of any importance between Genoa and the Gulf of Spezia. But immediately east of that inlet (a remarkable instance of a deep land- locked gulf

with no river flowing into it) the Magra, which descends from Pontremoli down the valley known as the Lunigiana-, is a large stream, and brings with it the waters of another considerable stream, the Vara. The Magra (Macra), in ancient times the boundary between Liguria and Etruria, may be considered as constituting on this side the limit of Northern Italy.

The Apennines (q.v.), as has been already mentioned, here traverse the whole breadth of Italy, cutting off the peninsula properly so termed from the broader mass of Northern Italy by a continuous barrier of considerable breadth, though of far inferior elevation to that of the Alps. The Ligurian Apennines may be considered as taking their rise in the neighbourhood of Savona, where a pass of very moderate elevation connects them with the Maritime Alps, of which they are in fact only a continuation. From the neighbour- hood of Savona to that of Genoa they do not rise to more than 3000 to 4000 ft., and are traversed by passes of less than 2000 ft. As they extend towards the east they increase in elevation; the Monte Bue rises to 5915 ft., while the Monte Cimone, a little farther east, attains 7103 ft. This is the highest point in the northern Apennines, and belongs to a group of summits of nearly equal altitude; the range which is continued thence between Tuscany and what are now known as the Emilian provinces presents a continuous ridge from the mountains at the head of the Val di Mugello (due north of Florence) to the point where they are traversed by the celebrated Furlo Pass. The highest point in this part of the range is the Monte Falterona, above the sources of the Arno, which attains 5410 ft. Throughout this tract the Apennines are generally covered with extensive forests of chestnut, oak and beech ; while their upper slopes afford admirable pasturage. Few towns of any importance are found either on their northern or southern declivity, and the former region especially, though occupying a tract of from 30 to 40 m. in width, between the crest of the Apennines and the plain of the Po, is one of the least known and at the same time least interesting portions of Italy.

2. Central Italy. — The geography of Central Italy is almost wholly determined by the Apennines, which traverse it in a direction from about north-north-east to south-south-west, almost precisely parallel to that of the coast of the Adriatic from Rimini to Pescara.

The line of the highest summits and of the watershed ranges is about 30 to 40 m. from the Adriatic, while about double that distance separates it from the Tyrrhenian Sea on the west. In this part of the range almost all the highest points of the Apennines are found. Beginning from the group called the Alpi della Luna near the sources

of the Tiber, which attain 4435 ft., they are continued by the Monte Nerone (5010 ft.), Monte Catria (5590), and Monte Maggio to the Monte Pennino near Nocera (5169 ft.), and thence to the Monte della Sibilla, at the source of the Nar or Nera, which attains 7663 ft. Proceeding thence southwards, we find in succession the Monte Vettore (8128 ft.), the Pizzo di Sevo (7945 ft.), and the two great mountain masses of the Monte Corno, commonly called the Gran Sasso d'ltalia, the most lofty of all the Apennines, attaining to a height of 9560 ft., and the Monte della Maiella, its highest summit measuring 9170 ft. Farther south no very lofty summits are found till we come to the group of Monti del Matese, in Samnium (6660 ft.), which according to the division here adopted belongs to Southern Italy. Besides the lofty central masses enumerated there are two other lofty peaks, outliers from the main range, and separated from it by valleys of considerable extent. These are the Monte Terminillo, near Leonessa (7278 ft.), and the Monte Velino near the Lake Fucino, rising to 8192 ft., both of which are covered with snow from November till May. But the Apennines of Central Italy, instead of presenting, like the Alps and the northern Apennines, a definite central ridge, with transverse valleys leading down from it on both sides, in reality constitute a mountain mass of very considerable breadth, composed of a number of minor ranges and groups of mountains, which pre- serve a generally parallel direction, and are separated by upland valleys, some of them of considerable extent as well as considerable elevation above the sea. Such is the basin of Lake Fucino, situated in the centre of the mass, almost exactly midway between the two . seas, at an elevation of 2180 ft. above them; while the upper valley of the Aterno, in which Aquila is situated, is 2380 ft. above the sea. Still more elevated is the valley of the Gizio (a tributary of the Aterno), of which Sulmona is the chief town. This communicates with the upper valley of the Sangro by a level plain called the Piano di Cinque Miglia, at an elevation of 4298 ft., regarded as the most wintry spot in Italy. Nor do the highest summits form a continuous ridge of great altitude for any considerable distance; they are rather a series of groups separated by tracts of very inferior elevation forming natural passes across the range, and broken in some places (as is the case in almost all limestone countries) by the waters from the upland valleys turning suddenly at right angles, and breaking through the mountain ranges which bound them. Thus the Gran Sasso and the Maiella are separated by the deep valley of the Aterno, while the Tronto breaks through the range between Monte Vettore and the Pizzo di Sevo. This constitution of the great mass of the central Apennines has in all ages exercised an important influence upon the character of this portion of Italy, which may be considered as divided by nature into two great regions, a cold and barren upland

country, bordered on both sides by rich and fertile tracts, enjoying a warm but temperate climate.

The district west of the Apennines, a region of great beauty and fertility, though inferior in productiveness to Northern Italy, coincides in a general way with the countries familiar to all students of ancient history as Etruria and Latium. Until the union of Italy they were comprised in Tuscany and the southern Papal States. The northern part of Tuscany is indeed occupied to a considerable extent by the underfalls and offshoots of the Apennines, which, besides the slopes and spurs of the main range that constitutes its northern frontier towards the plain of the Po, throw off several outlying ranges or groups. Of these the most remarkable is the group between the valleys of the Serchio and the Magra, commonly known as the mountains of Carrara, from the celebrated marble quarries in the vicinity of that city. Two of the summits of this group, the Pizzo d'Uccello and the Pania della Croce, attain 6155 and 6100 ft. Another lateral range, the Prato Magno, which branches off from the central chain at the Monte Falterona, and separates the upper valley of the Arno from its second basin, rises to 5188 ft.; while a similar branch, called the Alpe di Catenaja, of inferior elevation, divides the upper course of the Arno from that of the Tiber.

The rest of this tract is for the most part a hilly, broken country, of moderate elevation, but Monte Amiata, near Radicofani, an isolated mass of volcanic origin, attains a height of 5650 ft. South of this the country between the frontier of Tuscany and the Tiber is in great part of volcanic origin, forming hills with distinct crater-shaped basins, in several instances occupied by small lakes (the Lake of Bolsena, Lake of Vico and Lake of Bracciano). This volcanic tract extends across the Campagna of Rome, till it rises again in the lofty group of the Alban hills, the highest summit of which, the Monte Cavo, is 3160 ft. above the sea. In this part the Apennines are separated from the sea, distant about 30 m. by the undulating volcanic plain of the Roman Campagna, from which the mountains rise in a wall-like barrier, of which the highest point, the Monte Gennaro, attains 4165 ft. South of Palestrina again, the main mass of the Apennines throws off another lateral mass, known in ancient times as the Volscian mountains (now called the Monti Lepini), separated from the central ranges by the broad valley of the Sacco, a tributary of the Liri (Liris) or Garigliano, and forming a large and rugged mountain mass, nearly 5000 ft. in height, which descends to the sea at Terracina, and

between that point and the mouth of the Liri throws out several rugged mountain headlands, which may be considered as constituting the natural boundary between Latium and Campania, and consequently the natural limit of Central Italy. Besides these offshoots of the Apennines there are in this part of Central Italy several detached mountains, rising almost like islands on the seashore, of which the two most remarkable are the Monte Argentaro on the coast of Tuscany near Orbetello (2087 ft.) and the Monte Circello (1771 ft.) at the angle of the Pontine Marshes, by the whole breadth of which it is separated from the Volscian Apennines.

The two valleys of the Arno and the Tiber (Ital. Tevere) may be considered as furnishing the key to the geography of all this portion of Italy west of the Apennines. The Arno, which has its source in the Monteˆ Falterona, one of the most elevated summits of the main chain of the Tuscan Apennines, flows nearly south till in the neighbourhood of Arezzo it turns abruptly north-west, and pursues that course as far as Pontassieve, where it again makes a sudden bend to the west, and pursues a westerly course thence to the sea, passing through Florence ‘and Pisa. Its principal tributary is the Sieve, which joins it at Pontassieve, bringing down the waters of the Val di Mugello. The Elsa and the Era, which join it on its left bank, descending from the hills near Siena and Volterra, are inconsiderable streams; and the Serchio, which flows from the territory of Lucca and the Alpi Apuani, and formerly joined the Arno a few miles from its mouth, now enters the sea by a separate channel. The most considerable rivers of Tuscany south of the Arno are the Cecina, which flows through the plain below Volterra, and the Ombrone, which rises in the hills near Siena, and enters the sea about 12 m. below Grosseto.

The Tiber, a much more important river than the Arno, and the largest in Italy with the exception of the Po, rises in the Apennines, about 20 in. east of the source of the Arno, and flows nearly south by Borgo S. Sepolcro and Citta di Castello, then between Perugia and Todi to Orte, just below which it receives the Nera. The Nera, which rises in the lofty group of the Monte della Sibilla, is a consider- able stream, and brings with it the waters of the Velino (with its tributaries the Turano and the Salto), which joins it a few miles below its celebrated waterfall at Terni. The Teverone or Anio, which enters the Tiber a few miles above Rome, is an inferior stream to the Nera, but brings down a considerable body of water from the mountains above Subiaco. It is a singular fact in the geography of Central Italy that the valleys of the Tiber and Arno are in some measure connected by that of the Chiana,

a level and marshy tract, the waters from w.hich flow partly into the Arno and partly into the Tiber.

The eastern declivity of the central Apennines towards the Adriatic is far less interesting and varied than the western. The central range here approaches much nearer to the sea, and hence, with few exceptions, the rivers that flow from it have short courses and are of comparatively little importance. They may be enumerated, proceeding from Rimini southwards: (1) the Foglia; (2) the Metauro, of historical celebrity, and affording access to one of the most frequented passes of the Apennines; (3) the Esino; (4) the Potenza; (5) the Chienti; (6) the Aso; (7) the Tronto; (8) the Vomano; (9) the Aterno; (10) the Sangro; (11) the Trigno, which forms the boundary of the southernmost province of the Abruzzi, and may therefore be taken as the limit of Central Italy.

The whole of this portion of Central Italy is a hilly country, much broken and cut up by the torrents from the mountains, but fertile, especially in fruit-trees, olives and vines; and it has been, both in ancient and modern times, a populous district, containing many small towns though no great cities. Its chief disadvantage is the absence of ports, the coast preserving an almost unbroken straight line, with the single exception of Ancona, the only port worthy of the name on the eastern coast of Central Italy.

3. Southern Italy. — The great central mass of the Apennines, which has held its course throughout Central Italy, with a general direc- tion from north-west to south-east, may be considered as continued in the same direction for about 100 m. farther, from the basin-shaped group of the Monti del Matese (which rises to 6660 ft.) to the neigh- bourhood of Potenza, in the heart of the province of Basilicata, corresponding nearly to the ancient Lucania. The whole of the district known in ancient times as Samnium (a part of which retains the name of Sannio, though officially designated the province of Campobasso) is occupied by an irregular mass of mountains, of much inferior height to those of Central Italy, and broken up into a number of groups, intersected by rivers, which have for the most part a very tortuous course. This mountainous tract, which has an average breadth of from 50 to 60 m., is bounded west by the plain of Cam- pania, now called the Terra di Lavoro, and east by the much broader and more extensive tract of Apulia or Puglia, composed partly of level plains, but for the most part of undulating downs, contrasting strongly with the mountain ranges of the Apennines, which rise abruptly above them. The central mass of the mountains, however, throws out two outlying ranges, the one to the west, which separates the Bay of Naples from

that of Salerno, and culminates in the Monte S. Angelo above Castellammare (4720 ft.), while the detached volcanic cone of Vesuvius (nearly 4000 ft.) is isolated from the neighbouring mountains by an intervening strip of plain. On the east side in like manner the Monte Gargano (3465 ft.), a detached limestone mass

which projects in a bold spur-like promontory into the Adriatic, forming the only break in the otherwise uniform coast-line Of Italy on that sea, though separated from the great body of the Apennines by a considerable interval of low country, may be considered as merely an outlier from the central mass.

From the neighbourhood of Potenza, the main ridge of the Apennines is continued by the Monti della Maddalena in a direction nearly due south, so that it approaches within a short distance of the Gulf of Policastro, whence it is carried on as far as the Monte Pollino, the last of the lofty summits of the Apennine chain, which exceeds 7000 ft. in height. The range is, however, continued through the

frovince now called Calabria, to the southern extremity or ” toe ” of taly, but presents in this part a very much altered character, the broken limestone range which is the true continuation of the chain as far as the neighbourhood of Nicastro and Catanzaro, and keeps close to the west coast, being flanked on the east by a great mass of granitic mountains, rising to about 6000 ft., and covered with vast forests, from which it derives the name of La Sila. A similar mass, separated from the preceding by a low neck of Tertiary hills, fills up the whole of the peninsular extremity of Italy from Squillace to Reggio. Its highest point is called Aspromonte (6420 ft.).

While the rugged and mountainous district of Calabria, extending nearly due south for a distance of more than 150 m., thus derives its character and configuration almost wholly from the range of the Apennines, the long spur-like promontory which projects towards the east to Brindisi and Otranto is merely a continuation of the low tract of Apulia, with a dry calcareous soil of Tertiary origin. The Monte Volture, which rises in the neighbourhood of Melfi and Venosa to 4357 ft-, is of volcanic origin, and in great measure detached from the adjoining mass of the Apennines. Eastward from this the ranges of low bare hills called the Murgie of Gravina and Altamura gradually sink into the still more moderate level of those which constitute the peninsular tract between Brindisi and Taranto as far as the Cape of Sta Maria di Leuca, the south-east extremity of Italy. This projecting tract, which may be termed the ” heel ” or ” spur ” of Southern Italy, in conjunction with the great promontory of Calabria, forms the deep

Gulf of Taranto, about 70 m. in width, and somewhat greater depth, which receives a number of streams from the central mass of the Apennines.

None of the rivers of Southern Italy is of any great importance. The Liri (Liris) or Garigliano, which has its source in the central Apennines above Sora, not far from Lake Fucino, and enters the Gulf of Gaeta about 10 m. east of the city of that name, brings down a considerable body of water; as does also the Volturno, which rises in the mountains between Castel di Sangro and Agnone, flows past Isernia, Venafro and Capua, and enters the sea about 15 m. from the mouth of the Garigliano. About 16 m. above Capua it receives the Calore, which flows by Benevento. The Silarus or Sele enters the Gulf of Salerno a few miles below the ruins of Paestum. Below this the watershed of £he Apennines is too near to the sea on that side to allow the formation of any large streams. Hence the rivers that flow in the opposite direction into the Adriatic and the Gulf of Taranto have much longer courses, though all partake of the character of mountain torrents, rushing down with great violence in winter and after storms, but dwindling in the summer into scanty streams, which hold a winding and sluggish course through the great plains of Apulia. Proceeding south from the Trigno, already mentioned as constituting the limit of Central Italy, there are (1) the Biferno and (2) the Fortore, both rising in the mountains of Samnium, and flow- ing into the Adriatic west of Monte Gargano; (3) the Cervaro, south of the great promontory; and (4) the Ofanto, the Aufidus of Horace, whose description of it is characteristic of almost all the rivers of Southern Italy, of which it may be taken as the typical representative. It rises about 15 m. west of Conza, and only about 25 m. from the Gulf of Salerno, so that it is frequently (though erroneously) described as traversing the whole range of the Apennines. In its lower course it flows near Canosa and traverses the celebrated battlefield of Cannae. (5) The Bradano, which rises near Venosa, almost at the foot of Monte Volture, flows towards the south-east into the Gulf of Taranto, as do the Basento, the Agri and the Sinni, all of which descend from the central chain of the Apennines south of Potenza. The Crati, which flows from Cosenza northwards, and then turns abruptly eastward to enter the same gulf, is the only stream worthy of notice in the rugged peninsula of Calabria; while the arid limestone hills projecting eastwards to Capo di Leuca do not give rise to anything more than a mere streamlet, from the mouth of the Ofanto to the south-eastern extremity of Italy.

The only important lakes are those on or near the north frontier, formed by the expansion of the tributaries of the Po. They have been already noticed in connexion with the rivers by which . . they are

formed, but may be again enumerated in order of i-axes. succession. They are, proceeding from west to east, (1) the Lago d'Orta, (2) the Lago Maggiore, (3) the Lago di Lugano, (4) the Lago di Como, (5) the Lago d'Iseo, (6) the Lago d'Idro, and (7) the Lago di Garda. Of these the last named is considerably the largest, covering an area of 143 sq. m. It is 32! m. long by 10 broad; while the Lago Maggiore, notwithstanding its name, though considerably exceeding it in length (37 m.), falls materially below it in superficial extent. They are all of great depth-*-the Lago Maggiore having an extreme

w

B

D

E

.7 ' ■

rˆ

..ff.tt/aj/iA-e.fl-.

■" 'I'M* I?"

r Trieste 4 Pirano—

W

36′

JChioggia- p„

f BroudoLu , / .

wc«e / e n 1 c e

l£v ; Re

iifiSi Moutht of J (fro />o

!I#r

Scale, 1-500,000 Mi)<:

ffa itoat/s,. .'>■**■ ffoatfs .. = Jlquerfucts.

a. £. G e n oa

V »

Seˆ A/o* > 5\

®**$ˆ?LJ&

/iwo**)/*!

ˆTOˆl

rhornwy

?ˆA- jt”-

RosietY&fc

” Voltemˆ- 11

Vada|E

ˆˆS?ˆ

. ■■:: ■’■■■.; Cficfitil

ˆv >

Bastia;

Environs of ROME

ˆ3 ,, < ,#

ˆ , .ˆ-

in**

Capam

li,Bigugtia

Goto ■:■’:■:

Pte.Soandoii ˆ G-ofPottqˆ

CORSICA™”

fto Frarlce) 0.

Mte.Arge n[(t/l

1. -. : ;v:W-.:-

v

Pta.CaDm,

Cfenˆ-ˆM Pt* Capicci’o/o BoiiifacfS***

Strait of Bonifaclty &*g$&w

bC.Figari I ; ■G t 9fTepraniuia .

M*-*ˆat»ˆw:%«‘aECS*ˆˆˆ -t! ˆ « w oC.ji—

G. 0/ Qkosei

SARDINIA

it ” w «?* KtHˆi

fetagostt

Yieste : a* « ivSfM\ Gargaao Prom. s – „MqH« SanVAngel»

rManfredonia . .

Qutf of Manfredorua

r YRRHENIAN

toctaiSQˆ. Greco 1

- Pisctotfti

Pta. Pa/Jnvn

/Fn

£Sfanv.Gau«f!0 CPatiKftri : ‘ ;: v; : ; ::

;S.Ami.c

Mur avers*: ‘:.■: C,Fffr/a.to

; me.

°S.Cipi’iaJiQ. : ;£ J T’a.’^roIa- ;”■:’■”

Lf-iisai

. Totrc.Gayetj

v. «%

Environs of

NAPLES

Scale, 1 :72o,ooo English Miles –

O 1 8 } 4 S !?

£ A

, s©D^ce

, — ^— — =- — — — Ho l f

.«*

^Craft, : – : —uft 1 -...

&*’

•^gj

.O^”

aTeducciSs

l’*© %:°&.\J Po “^ Vesuvius

flschia ■ ■ ■•!

‘/sc/l/« gflH 0/ /1/a/j/eSCasteIIammai

”- ‘»■ “^ ■■■■■’::■;■ ~r :: ■ ^ rrGffr’iT JS-imm^

^A

G«/// 0/ Salerno

Aega

.0..A,

%

■■■’ < >%» %. V : -s VJS – Oa* ”

iian Is. ˆ>j>.

t/‘parf Islands 0Si “,ˆ

•’/»

F ‘«”” §

‘Misa ::v ‘patiat>a [yˆCi

1»>ltace

idpl«W:-V:’ :■’■■■

ˆ

■’: [Gulf’of—Catama-

ˆSyracuse’: ; : ;

iPachirio : ::

MEDITERRANEAN

SEA

Mi-

Malta (British) 1 Valletta

o 5 r

A A x\ X-/ jl

(Modern) Scale, 1:3,700,000 English Miles ? 20 40 60 80 too

Boundaries of Provinces : i-

Botindaries of Compartments ,^..

Capitals of Compartments…

Railways ~- Fortifications.. ..... .^

Canals… * . M ^^. Glaciers ®3

A «

B

“£) Longitude East 14° of Greenwich £]

EiacryWatk«f $c<

TOPOGRAPHY]

ITALY

depth of 1 198 ft., while that of Como attains to 1365 ft. Of a wholly different character is the Lago di Varese, between the Lago Maggiore and that of Lugano, which is a mere shallow expanse of water, surrounded by hills of very moderate elevation. Two other small lakes in the same neighbourhood, as well as those of Erba and Pusiano, between Como and Lecco, are of a similar character.

The lakes of Central Italy, which are comparatively of trifling dimensions, belong to a wholly different class. The most important of these, the Lacus Fucinus of the ancients, now called the Lago di Celano, situated almost exactly in the centre of the peninsula, occupies a basin of considerable extent, surrounded by mountains and without any natural outlet, at an elevation of more than 2000 ft. Its waters have been in great part carried off by an artificial channel, and more than half its surface laid bare. Next in size is the Lago Trasimeno.a broad expanse of shallow waters, about 30 m. in circumference, surrounded by low hills. The neighbouring lake of Chiusi is of similar character, but much smaller dimensions. All the other lakes of Central Italy, which are scattered through the volcanic districts west of the Apennines, are of an entirely different formation, and occupy

deep cup-shaped hollows, which have undoubtedly at one time formed the craters of extinct volcanoes. Such is the Lago di Bolsena, near the city of the same name, which is an extensive sheet of water, as well as the much smaller Lago di Vico (the Ciminian lake of ancient writers) and the Lago di Bracciano, nearer Rome, while to the south of Rome the well known lakes of Albano and Nemi have a similar origin.

The only lake properly so called in southern Italy is the Lago del Matese, in the heart of the mountain group of the same name, of small extent. The so-called lakes on the coast of the Adriatic north and south of the promontory of Gargano are brackish lagoons communicating with the sea.

The three great islands of Sicily, Sardinia and Corsica are closely connected with Italy, both by geographical position and community Islands. °ˆ ˆ an S ua S e > Dut tne y are considered at length in separate articles. Of the smaller islands that lie near the coasts of Italy, the most considerable is that of Elba, off the west coast of central Italy, about 50 m. S. of Leghorn, and separated from the mainland at Piombino by a strait of only about 6 m. in width. North of this, and about midway between Corsica and Tuscany, is the small island of Capraia, steep and rocky, and only 4J m. long, but with a secure port; Gorgona, about 25 m. farther north, is still smaller, and is a mere rock, inhabited by a few fishermen. South of Elba are the equally insignificant islets of Pianosa and Monte- cristo, while the more considerable island of Giglio lies much nearer the mainland, immediately opposite the mountain promontory of Monte Argentaro, itself almost an island. The islands farther south in the Tyrrhenian Sea are of an entirely different character. Of these Ischia and Procida, close to the northern headland of the Bay of Naples, are of volcanic origin, as is the case also with the more distant group of the Ponza Islands. These are three in number — Ponza, Palmarola and Zannone; while Ventotene (also of volcanic formation) is about midway between Ponza and Ischia. The island of Capri, on the other hand, opposite the southern promontory of the Bay of Naples, is a precipitous limestone rock. The Aeolian or Lipari Islands, a remarkable volcanic group, belong rather to Sicily than to Italy, though Stromboli, the most easterly of them, is about equi- distant from Sicily and from the mainland.

The Italian coast of the Adriatic presents a great contrast to its opposite shores, for while the coast of Dalmatia is bordered by a succession of islands, great and small, the long and uniform coast-line of Italy from Otranto to Rimini presents not a single adjacent island ; and the small outlying group of the Tremiti Islands (north of the

Monte Gargano and about 15 m. from the mainland) alone breaks the monotony of this part of the Adriatic.

Geology. — The geology of Italy is mainly dependent upon that of the Apennines (q.v.). On each side of that great chain are found extensive Tertiary deposits, sometimes, as in Tuscany, the district of Monferrat, &c, forming a broken, hilly country, at others spreading into broad plains or undulating downs, such as the Tavoliere of Puglia, and the tract that forms the spur of Italy from Bari to Otranto.

Besides these, and leaving out of account the islands, the Italian peninsula presents four distinct volcanic districts. In three of them the volcanoes are entirely extinct, while the fourth is still in great activity.

1. The Euganean hills form a small group extending for about 10 m. from the neighbourhood of Padua to Este, and separated from the lower offshoots of the Alps by a portion of the wide plain of Padua. Monte Venda, their highest peak, is 1890 ft. high.

2. The Roman district, the largest of the four, extends from the hills of Albano to the frontier of Tuscany, and from the lower slopes of the Apennines to the Tyrrhenian Sea. It may be divided into three groups: the Monti Albani, the second highest 1 of which, Monte Cavo (31 15 ft.), is the ancient Mons Albanus, on the summit of which stood the temple of Jupiter Latialis, where the assemblies of the cities forming the Latin confederation were held; the Monti Cimini, which extend from the valley of the Tiber to the neighbour-

1 The actually highest point is the Maschio delle Faete (3137 ft.). (See Albanus Mons.)

hood of Civita Vecchia, and attain at their culminating point an elevation of 3454 ft.; and the mountains of Radicofani and Monte Amiata, the latter of which is 5688 ft. high. The lakes of Bolsena (Vulsiniensis), of Bracciano (Sabatinus), of Vico (Ciminus), of Albano (Albanus), of Nemi (Nemorensis), and other smaller lakes belong to this district; while between its south-west extremity and Monte Circello the Pontine Marshes form a broad strip of alluvial soil infested by malaria.

3. The volcanic region of the Terra di Lavoro is separated by the Volscian mountains from the Roman district. It may be also divided into three groups. Of Roccamonfina, at the N.N.W. end of the Campanian Plain, the highest cone, called Montagna di Santa Croce, is 3291 ft. The Phlegraean Fields embrace all the country round Baiae

and Pozzuoli and the adjoining islands. Monte Barbaro (Gaurus), north-east of the site of Cumae, Monte San Nicola (Epomeus), 2589 ft. in Ischia, and Camaldoli, 1488 ft., west of Naples, are the highest cones. The lakes Averno (Avernus), Lucrino (Lucrinus), Fusaro (Palus Acherusia), and Agnano are within this group, which has shown activity in historical times. A stream of lava issued in 1198 from the crater of the Solfatara, which still con- tinues to exhale steam and noxious gases; the Lava dell' Arso came out of the N.E. flank of Monte Epomeo in 1302; and Monte Nuovo, north-west of Pozzuoli (455 ft.), was thrown up in three days in September 1538. Since its first historical eruption in A.D. 79, Vesuvius or Somina, which forms the third group, has been in con- stant activity. The Punta del Nasone, the highest point of Somma, is 3714 ft. high, while the Punta del Palo, the highest point of the brim of the crater of Vesuvius, varies materially with successive eruptions from 3856 to 4275 ft.

4. The Apulian volcanic formation consists of the great mass of Monte Volture, which rises at the west end of the plains of Apulia, on the frontier of Basilicata, and is surrounded by the Apennines on its south-west and north-west sides. Its highest peak, the Pizzuto di Melfi, attains an elevation of 4365 ft. Within the widest crater there are the two small lakes of Monticchio and San Michele. In connexion with the volcanic districts we may mention Le Mofete, the pools of Ampsanctus, in a wooded valley S.E. of Frigento, in the province of Avellino, Campania (Virgil, Aeneid, vii. 563-571). The largest is not more than 160 ft. in circumference, and 7 ft. deep.

The whole of the great plain of Lombardy is covered by Pleistocene and recent deposits. It is a great depression — the continuation of the Adriatic Sea — filled up by deposits brought down by the rivers from the mountains. The depression was probably formed during the later stages of the growth of the Alps.

Climate and Vegetation. — The geographical position of Italy, extending from about 46 to 38° N., renders it one of the hottest countries in Europe. But the effect of its southern latitude is tempered by its peninsular character, bounded as it is on both sides by seas of considerable extent, as well as by the great range of the Alps with its snows and glaciers to the north. There are thus irregular variations of climate. Great differences also exist with regard to climate between northern and southern Italy, due in great part to other circumstances as well as to differences of latitude. Thus the great plain of northern Italy is chilled by the cold winds from the Alps, while the damp warm winds from the Mediterranean are to a great extent intercepted by the Ligurian Apennines. Hence this part of the country has a cold winter

climate, so that while the mean summer temperature of Milan is higher than that of Sassari, and equal to that of Naples, and the extremes reached at Milan and Bologna are a good deal higher than those of Naples, the mean winter temperature of Turin is actually lower than that of Copenhagen. The lowest recorded winter temperature at Turin is 5 Fahr. Throughout the region north of the Apennines no plants will thrive which cannot stand occasional severe frosts in winter, so that not only oranges and lemons but even the olive tree cannot be grown, except in specially favoured situations. But the strip of coast between the Apennines and the sea, known as the Riviera of Genoa, is not only extremely favourable to the growth of olives, but produces oranges and lemons in abundance, while even the aloe, the cactus and the palm flourish in many places.

Central Italy also presents striking differences of climate and temperature according to the greater or less proximity to the mountains. Thus the greater part of Tuscany, and the provinces thence to Rome, enjoy a mild winter climate, and are well adapted to the growth of mulberries and olives as well as vines, but it is not till after passing Terracina, in proceeding along the western coast towards the south, that the vegetation of southern Italy develops in its full luxuriance. Even in the central parts of Tuscany, however, the climate is very much affected by the neighbouring mountains, and the increasing elevation of the Apennines as they proceed south produces a corresponding effect upon the temperature. But it is when we reach the central range of the Apennines that we find the coldest districts of Italy. In all the upland valleys of the Abruzzi snow begins to fall early in November, and heavy storms occur often as late as May; whole communities are shut out for months from any intercourse with their neighbours, and some villages are so long buried in snow that regular passages are made between the different houses for the sake of communication among the inhabitants. The district from the south-east of Lake Fucino to the Piano di Cinque Miglia, enclosing the upper basin of the Sangro

and the small lake of Scanno, is the coldest and most bleak part of Italy south of the Alps. Heavy falls of snow in June are not uncommon, and only for a short time towards the end of July are the nights totally exempt from light frosts. Yet less than 40 m. E. of this district, and even more to the north, the olive, the fig-tree and the orange thrive luxuriantly on the shores of the Adriatic from Ortona to

Vasto. In the same way, whilst in the plains and hills round Naples snow is rarely seen, and never remains long, and the ther- mometer seldom descends to the freezing-point, 20 m. E. from it in the fertile valley of Avellino, of no great elevation, but encircled by high mountains, light frosts are not uncommon as late as June; and 18 m. farther east, in the elevated region of San Angelo dei Lombardi and Bisaccia, the inhabitants are always warmly clad, and vines grow with difficulty and only in sheltered places. Still farther south-east, Potenza has almost the coldest climate in Italy, and certainly the lowest summer temperatures. But nowhere are these contrasts so striking as in Calabria. The shores, especially on the Tyrrhenian Sea, present almost a continued grove of olive, orange, lemon and citron trees, which attain a size unknown in the north of Italy. The sugar-cane flourishes, the cotton-plant ripens to perfection, date- trees are seen in the gardens, the rocks are clothed with the prickly- pear or Indian fig, the enclosures of the fields are formed by aloes and sometimes pomegranates, the liquorice-root grows wild, and the mastic, the myrtle and many varieties of oleander and cistus form the underwood of the natural forests of arbutus and evergreen oak. If we turn inland but 5 or 6 m. from the shore, and often even less, the scene changes. High districts covered with oaks and chestnuts succeed to this almost tropical vegetation; a little higher up and we reach the elevated regions of the Pollino and the Sila, covered with firs and pines, and affording rich pastures even in the midst of summer, when heavy dews and light frosts succeed each other in July and August, and snow begins to appear at the end of September or early in October. Along the shores of the Adriatic, which are ex- posed to the north-east winds, blowing coldly from over the Albanian mountains, delicate plants do not thrive so well in general as under the same latitude along the shores of the Tyrrhenian Sea.

Southern Italy indeed has in general a very different climate from the northern portion of the kingdom; and, though large tracts are still occupied by rugged mountains of sufficient elevation to retain the snow for a considerable part of the year, the districts adjoining the sea enjoy a climate similar to that of Greece and the southern provinces of Spain. Unfortunately several of these fertile tracts suffer severely from malaria (q.v.), and especially the great plain adjoining the Gulf of Tarentum, which in the early ages of history was surrounded by a girdle of Greek cities — some of which attained to almost unexampled prosperity — has for centuries past been given up to almost complete desolation. 1

It is remarkable that, of the vegetable productions of Italy, many which are at the present day among the first to attract the attention of

the visitor are of comparatively late introduction, and were un- known in ancient times. The olive indeed in all ages clothed the hills of a large part of the country; but the orange and lemon, are a late importation from the East, while the cactus or Indian fig and the aloe, both of them so conspicuous on the shores of southern Italy, as well as of the Riviera of Genoa, are of Mexican origin, and conse- quently could not have been introduced earlier than the 16th century. The same remark applies to the maize or Indian corn. Many botanists are even of opinion that the sweet chestnut, which now constitutes so large a part of the forests that clothe the sides both of the Alps and the Apennines, and in some districts supplies the chief food of the inhabitants, is not originally of Italian growth ; it is certain that it had not attained in ancient times to anything like the extension and importance which it now possesses. The eucalyptus is of quite modern introduction; it has been extensively planted in malarious districts. The characteristic cypress, ilex and stone-pine, however, are native trees, the last-named flourishing especially near the coast. The proportion of evergreens is large, and has a marked effect on the landscape in winter.

Fauna. — The chamois, bouquetin and marmot are found only in the Alps, not at all in the Apennines. In the latter the bear was found in Roman times, and there are said to be still a few remaining. Wolves are more numerous, though only in the mountainous districts ; the flocks are protected against them by large white sheep- dogs, who have some wolf blood in them. Wild boars are also found in mountainous and forest districts. Foxes are common in the neighbourhood of Rome. The sea mammals include the common dolphin (Delphinus delphis). The birds are similar to those of central Europe; in the mountains vultures, eagles, buzzards, kites, falcons and hawks are found. Partridges, woodcock, snipe, &c, are among the game-birds; but all kinds of small birds are also 9hot for food, and their number is thus kept down, while many members of the migratory species are caught by traps in the foothills on the south side of the Alps, especially near the Lake of Como, on their passage. Large numbers of quails are shot in the spring. Among reptiles, the various kinds of lizard are noticeable. There are several varieties of snakes, of which three species (all vipers) are poisonous. Of sea-

fish there are many varieties, the tunny, the sardine and the anchovy being commercially the most important. Some of the other edible fish, such as the palombo, are not found in northern waters. Small cuttlefish are in common use as an article of diet. Tortoiseshell, an important article of commerce, is derived from the Thalassochelys caretta, a sea turtle. Of freshwater fish the trout of the mountain

streams and the eels of the coast lagoons may be mentioned. The tarantula spider and the scorpion are found in the south of Italy. The aquarium of the zoological station at Naples contains the finest collection in the world of marine animals, showing the wonderful variety of the different species of fish, molluscs, Crustacea, &c, found in the Mediterranean. (E. H. B.; T. As.)

Population. — The following table indicates the areas of the several provinces (sixty-nine in number), and the population of each according to the censuses of the 31st of December 1881 and the 9th of February 1901. (The larger divisions or compartments in which the provinces are grouped are not officially recognized.}

1 On the influence of malaria on the population of Early Italy see W. H. S. Jones in Annals of Archaeology and Anthropology, ii. 97 sqq. (Liverpool, 1909).

Provinces and Compartments. 1

Area in

Popul

ation.

1881.

1901.

1950

729,710

825,745

2882

635,4 00

670,504

2553

675-926

763.830

Piedmont ….

3955

1,029,214

1,147,414

11,34°

3,070,250

3,407,493

1582

760,122

931.156

Porto Maurizio …. Liguria ….

455

132,251

144,604

2037

892,373

1,075,760

1098

39°-775

467.549

1845

471,568

541.765

1091

515,050

594.304

695

302,097

329.471

912

295,728

315.448

1223

1,114,991

1,450,214

1290

469,831

.504,382

Lombardy , . . .

r

1232

120,534

130,966

9386

3,680,574

4.334.099

1293

174,140

214,803

823

397 > 762

444,360

685

217,700

222,057

960

375.7°4

416,945

2541

501.745

614,720

934

356,708

399.823

1 188

394-065

427,018

Venetia ….

1052

396,349

453.621

9476

2,814,173

3.193.347

1448

464,879

529,619

1012

230,807

27°.558

Forll

725

251,110

283,996

987

279-254

323.598

1250

267,306

303.694

954

226,758

25°,49l

715

218,359

234.656

Reggio (Emilia) .... Emilia ....

876

244.959

281,085

7967

2,183,432

2,477.697

1273

238,744

275.588

2265

790,776

945.324

1738

114.295

137,795

133

121,612

121,137

558

284,484

329.986

Massa and Carrara

687

169,469

202,749

Pisa

1179

283,563

319.854

Tuscany ….

1471

205,926

233.874

9304

2,208,869

2,566,307

762

267,338

308,346

796

309,185

251,829

1087

239.713

269,505

Pesaro and Urbino

Marches …. Perugia — Umbria ….

1118

223,043

259.083

3763

939.279

1,688,763

3748

572,060

675.352

4663

903,472

1,142,526

POPULATION]

ITALY

[

■Provinces and Compartments.

Area in

Population.

sq. m.

1881.

1901.

Aquila degli Abruzzi (Abruzzo Ulteriore II.) .... Campobasso (Molise) . Chieti (Abruzzo Citeriore) Teramo (Abruzzo Ulteriore I.)

Abruzzi and Molise

Avellino (Principato Ulteriore)

Caserta (Terra di Lavoro)

Naples

Salerno (Principato Citeriore)

Campania

Bari delle Puglie (Terra di Bari) Foggia (Capitanata) . I Lecce (Terra di Otranto) .

Apulia ….

Potenza (Basilicata)

Catanzaro (Calabria Ulteriore

II.)

Cosenza (Calabria Citeriore) . Reggio di Calabria (Calabria

Ulteriore I.)

Calabria ….

Syracuse ….

Sicily

Sardinia ….

2484 1691 1 138 1067

353.027 365,434 343.948 254,806

436,367 389,976 387,604 312,188

6380

1,317,215

1,526,135

1 1 72 818

2033 350

1916

392,619

238,425

7H,i3i

1,001,245

550,157

421,766 265,460

8o5,345

1,141,788

585,132

6289

2,896,577

3,219.491

2065 2688 2623

679.499 356,267

553.298

837,683

421,115 705,382

7376

1,589,064

1,964,180

3845

524.504

491,558

2030 2568

1221

433,975 451.185

372,723

498,791 503,329

437,209

5819

1,257,883

1,439,329

1263 1917 1172 1246 1948 1442 948

266,379 563,457 312,487 460,924

699,151

34L526

283,977

329.449 703,598 380,666 550,895 796,151 433.796 373.569

9936

2,927,901

3,568,124

5204 4090

420,635 261,367

486,767 309,026

9294

682,002

795.793

Kingdom of Italy ….

110,623

28,459,628

32,965,504

The number of foreigners in Italy in 1901 was 61,606, of whom 37,762 were domiciled within the kingdom.

,, population given in the foregoing table is the resident or

” legal ” population, which is also given for the individual towns. This is 490,251 higher than the actual population, 32,475,253, ascertained by the census of the 10th of February 1901 ; the differ- ence is due to temporary absences from their residences of certain individuals on military service, &c, who probably were counted twice, and also to the fact that 469,020 individuals were returned as absent from Italy, while only 61,606 foreigners were in Italy at the date of the census. The kingdom is divided into 69 provinces, 284 regions, of which 197 are classed as circondarii and 87 as districts (the Tatter belonging to the province of Mantua and the 8 provinces of Venetia), 1806 administrative divisions (mandamenti) and 8262 communes. These were the figures at the date of the census. In 1906 there were 1805 mandamenti and 8290 communes, and 4 boroughs in Sardinia not connected with communes. The mandamenti or administrative divisions no longer correspond to the judicial divisions (mandamenti giudiziarii) which in November 1 891 were reduced from 1806 to 1535 by a law which provided that judicial reform should not modify existing administrative and electoral divisions. The principal elective local administrative bodies are the provincial and the communal councils. The franchise is somewhat wider than the parliamentary. Both bodies are elected for six years, one-half being renewed every three years. The provincial council elects a provincial commission and the communal council a municipal council from among its own members; these smaller bodies carry on the business of the larger while they are not sitting. The syndic of each commune is elected by ballot by the communal council from among its own members.

The actual (not the resident or ” legal”) population of Italy since 1770 is approximately given in the following table (the first census of the kingdom as a whole was taken in 1871) : —

1770 .

• 14,689,317

1861 .

. 25,016,801

1800 .

. 17,237,421

1871 .

. 26,801,154

1825 .

• 19,726,977

1881 .

. 28,459,628

1848 .

• 23,617,153

1901 .

• 32,475,253

The average density increased from 257-21 per sq. m. in 1881 to 293-28 in 1901. In Venetia, Emilia, the Marches, Umbria and Tuscany the proportion of concentrated population is only from 40 to 55%; in Piedmont, Liguria and Lombardy the proportion rises to from 70 to 76%; in southern Italy, Sicily and Sardinia it attains a maximum of from 76 to 93 %.

The population of towns over 100,000 is given in the following table according to the estimates for 1906. The population of the town itself is distinguished from that of its commune, which often includes a considerable portion of the surrounding country.

Town. Commune.

Bologna 105,153 160,423

Catania 135,548 159,210

Florence 201,183 226,559

Genoa 255,294 267,248

Messina 108,514 165,007

Milan 560,613

Naples 491,614 585,289

Palermo 264,036 323,747

Rome 403,282 516,580

Turin 277,121 361,720

Venice 146,940 169,563

The population of the different parts of Italy differs in charac- ter and dialect; and there is little community of sentiment between them. The modes of life and standards of comfort and morality in north Italy and in Calabria are widely different; the former being far in front of the latter. Much, however, is effected towards unification, by compulsory military service, it being the principle that no man shall serve within the military district to which he belongs. In almost all parts the idea of personal loyalty {e.g. between master and servant) retains an almost feudal strength. The inhabitants of the north — the Pied- montese, Lombards and Genoese especially — have suffered less than those of » the rest of the peninsula from foreign domination and from the admixture of inferior racial elements, and the cold winter climate prevents the heat of summer from being enervat- ing. They, and also the inhabitants of central Italy, are more industrious than the inhabitants of the southern provinces, who have by no means recovered from centuries of misgovern- ment and oppression, and are naturally more hot-blooded and excitable, but less stable, capable of organization or trust- worthy. The southerners are apathetic except when roused, and socialist doctrines find their chief adherents in the north. The Sicilians and Sardinians have something of Spanish dignity, but the former are one of the most mixed and the latter probably one of the purest races of the Italian kingdom. Physical character- istics differ widely; but as a whole the Italian is somewhat short of stature, with dark or black hair and eyes, often good looking. Both sexes reach maturity early. Mortality is decreasing, but if we may judge from the physical conditions of the recruits the physique of the nation shows little or no improvement. Much of this lack of progress is attributed to the heavy manual (especially agricultural) work undertaken by women and children. The women especially age rapidly, largely owing to this cause (E. Nathan, Vent'' anni di vita italiana attraverso all'

annuario, 169 sqq.).

Births, Marriages, Deaths. — Birth and marriage rates vary considerably, being highest in the centre and south (Umbria, the Marches, Apulia, Abruzzi and Molise, and Calabria) and lowest in the north (Piedmont, Liguria and Venetia), and in Sardinia. The death-rate is highest in Apulia, in the Abruzzi and Molise, and in Sardinia, and lowest in the north, especially in Venetia and Piedmont. Taking the statistics for the whole kingdom, the annual marriage- rate for the years 1876-1880 was 7-53 per 1000; in 1881-1885 it rose to8-o6; in 1886-1890 it was 7-77; in 1891-1895 it was 7-41, and in 1896-1900 it had gone down to 7-14 (a figure largely produced by the abnormally low rate of 6-88 in 1898), and in 1902 was 7-23. Divorce is forbidden by the Roman Catholic Church, and only 839 judicial separations were obtained from the courts in 1902, more than half of the demands made having been abandoned. Of the whole population in 1901, 57-5% were unmarried, 36-0% married, and 6-5% widowers or widows. The illegitimate births show a decrease, having been 6-95 per 100 births in 1872 and 5-72 in 1902, with a rise, however, in the intermediate period as high as 7-76 in 1883. The birth-rate shows a corresponding decrease from 38-10

Eer 1000 in 1881 to 33-29 in 1902. The male births have since 1872 een about 3%(3-i4 in 1872-1875 and 2-72 in 1896-1900) in excess of the female births, which is rather more than compensated for by the greater male mortality, the excess being 2-64 in 1872-1875 and having increased to 4-08 in 1 896-1900. (The calculations are made

in both cases on the total of births and deaths of both sexes.) The result is that, while in 1871 there was an excess of 143,370 males over females in the total population, in 1881 the excess was only 71,138, and in 1901 there were 169,684 more females than males. The death-rate (excluding still-born children) was, in 1872, 3078 per 1000, and has since steadily decreased — less rapidly between 1886-1890 than during other years; in 1902 it was only 22-15 and in 1899 was as low as 21-89. The excess of births over deaths shows considerable variations — owing to a very low birth-rate, it was only 3-12 per 1000 in 1880, but has averaged 11-05 P er I00 ° from 1896 to 1900, reaching 11-98 in 1899 and 11-14 m 1902. For the four years I

899-1902 24-66 % died under the age of one year, 9-41 between one and two years. The average expectation of life at birth for the same period was 52 years and 11 months, 62 years and 2 months at the age of three years, 52 years at the age of fifteen, 44 years at the age of twenty-four, 30 years at the age of forty; while the average period of life, which was 35 years 3 months per individual in 1882, was 43 years' per individual in 1901. This shows a considerable improvement, largely, but not entirely, in the diminution of infant mortality; the expectation of life at birth in 1882, it is true, was only 33 years and 6 months, and at three years of age 56 years I month ; but the increase, both in the expectation of life and in its average duration, goes all through the different ages.

Occupations. — In the census of 1901 the population over nine years of age (both male and female) was divided as follows as regards the main professions : —

Total.

Males.

Females.

Agricultural (including hunt- ing and fishing) ....

Industrial

Commerce and transport (public and private services)

Domestic service, &c.

Professional classes, admini- stration, &c

Religion

9,666,467 -4,505,736

1,003,888 574,855

1,304,347 204,012 129,893

6,466,165 3,017,393

885,070 171,875

855,217 204,012

89,329

3,200,302 1,488,343

118,818 402,980

449,130 40,564

Emigration. — The movement of emigration may be divided into two currents, temporary and permanent — the former going chiefly towards neighbouring European countries and to North Africa, and consisting of manual labourers, the latter towards trans-oceanic countries, principally Brazil, Argentina and the United States. These emigrants remain abroad for several years, even when they do not definitively establish themselves there. They are composed principally of peasants, unskilled workmen and other manual labourers. There was a tendency towards increased emigration during .the last quarter of the 19th century. The principal causes are the growth of population, and the over-supply of and low rates of remuneration for manual labour in various Italian provinces. Emigration has, however, recently assumed such proportions as to lead to scarcity of labour and rise of wages in Italy itself. Italians form about half of the total emigrants to America.

Year.

Temporary Emigration.

Permanent Emigration.

Total No. of Emigrants.

Per every 100,000 of Population.

Total No. of Emigrants.

Per every 100,000 of Population.

1881 1891 1901

94,225 118,111 281,668

333

389 865

41,607 175,520 251,577

147 578 772

The increased figures may, to a minor extent, be due to better registration, in consequence of the law of 1901.

From the next table will be seen the direction of emigration in the years specified: —

1900.

1901.

1902.

1903.

1904.

1905-

N. Africa

U.S. and Canada Mexico (Central America) South America Asia and Oceania

Total ….

181,047

5,417 89,400

2,069

74,168

691

244,298

9,499 124,636

997

152,543 1,272

236,066

11,771

196,723

766

85,097 1,086

215,943

9,452

200,383

1,3″

78,699

2,168

209,942

14,709

173-537

1,828

74,209

2,966

266,982

11,910

322,627

2,044

“i,943

2,715

352,792

533,245

531,509

507,956

477-191

718,221

The figures for 1905 show that the total of 718,221 emigrants was made up, as regards numbers, mainly by individuals from Venetia, Sicily, Campania, Piedmont, Calabria and the Abruzzi; while the percentage was highest in Calabria (4-44), the Abruzzi, Venetia, Basilicata, the Marches, Sicily (2-86), Campania, Piedmont (2-02). Tuscany gives 1-20, Latium 1-14 %, Apulia only 102, while Sardinia with 0-34 % occupies an exceptional position. The figure for Sicily, which was 106,000 in 1905, reached 127,000 in 1906 (3-5 %), and of

these about three-fourths would be adults; in the meantime, how- ever, the population increases so fast that even in 1905 there was a net increase in Sicily of 20,000 souls; so that in three years 220,000 workers were replaced by 320,000 infants.

The phenomenon of emigration in Sicily cannot altogether be explained by low wages, which have risen, though prices have done the same. It has been defined as apparently ” a kind of collective madness.”

Agriculture. — Accurate statistics with regard to the area occupied in different forms of cultivation are difficult to obtain, both on account of their varied and piecemeal character and from the lack of a complete cadastral survey. A complete survey was ordered by the law of the 1st of March 1886, but many years must elapse before its completion. The law, however, enabled provinces most heavily burdened by land tax to ac- celerate their portion of the survey, and to profit by the reassess- ment of the tax on the new basis. An idea of the effects of the survey may be gathered from the fact that the assessments in the four provinces of Mantua, Ancona, Cremona and Milan, which formerly amounted to a total of £1,454,696, are now £2,788,080, an increase of 91%. Of the total area of Italy, 70,793,000 acres, 71% are classed as “productive.” The unproductive area comprises 16% of the total area (this includes 4% occupied by lagoons or marshes, and 1-75% of the total area susceptible of bonificazione or improvement by. drainage. Between 1882 and 1902 over £4,000,000 was spent on this by the government). The uncultivated area is 13%. This includes 3-50% of the total susceptible of cultivation.

The cultivated area may be divided into five agrarian regions or zones,

named after the variety of tree culture which flourishes in them. (1) Proceeding from south to north, the first zone is that of the agrumi (oranges, lemons and similar fruits). It comprises a great part of Sicily. In Sardinia it extends along the southern and western coasts. It predominates along the Ligurian Riviera from Bordighera to Spezia, and on the Adriatic, near San Benedetto del Tronto and Gargano, and, crossing the Italian shore of the Ionian Sea, prevails in some regions of Calabria, and terminates around the gulfs of Salerno, Sorrento and Naples. (2) The region of olives comprises the internal Sicilian valleys and part of the mountain slopes; in Sardinia, the valleys near the coast on the S.E., S.W. and N.W. ; on the mainland it extends from Liguria and from the southern extremities of the Romagna to Cape Santa Maria di Leuca in Apulia, and to Cape Spartivento in Calabria. Some districts of the olive region ar& near the lakes of upper Italy and in Venetia, and the territories of Verona, Vicenza, Treviso and Friuli. (3) The vine region begins on the sunny slopes of the Alpine spurs and in those Alpine valleys open towards the south, extending over the plains of Lombardy and Emilia. In Sardinia it covers the mountain slopes to a considerable height, and in Sicily covers the sides of the Madonie range, reaching a level above 3000 ft. on the southern slope of Etna. The Calabrian Alps, the less rocky sides of the Apulian Murgie and the whole length of the Apennines are covered at different heights, according to their situation. The hills of Tuscany, and of Monferrato in Piedmont, produce the most celebrated Italian vintages. (4) The region of chestnuts extends from the valleys to the high plateaus of the Alps, along the northern slopes of the Apennines in Liguria, Modena, Tuscany, Romagna, Umbria, the Marches and along the southern Apennines to the Calabrian and Sicilian ranges, as well as to the mountains of Sardinia. (5) The wooded region covers the Alps and Apennines above the chestnut level. The woods consist chiefly of pine and hazel upon the Apennines, and upon the Calabrian, Sicilian and Sardinian mountains of oak, ilex, hornbeam and similar trees.

Between these regions of tree culture lie zones of different herbaceous culture, cereals, vegetables and textile plants. The style of cultivation varies according to the nature of the ground, terraces supported by stone walls being much used in mountainous districts. Cereal cultivation occupies the foremost place in area and quantity though it has been on the decline since 1903, still representing, however, an advance on previous years. Wheat is the most important crop and is widely distributed. In 1905 12,734,491 acres, or about 18% of the total area, produced 151,696,571 bushels of wheat, a yield of only 12 bushels per acre. The importation has, however, enormously increased since 1882 — from 164,600 to 1,126,368 tons;

while the extent of land devoted to corn cultivation has slightly decreased. Next in importance to wheat comes maize, occupying about 7 % of the total area of the country, and cultivated almost everywhere as an alternative crop. The production of maize in 1905

reached about 96,250,000 bushels, a slight increase on the average. The production of maize is, however, insufficient, and 208,719 tons were imported in 1902 — about double the amount imported in 1882. Rice is cultivated in low-lying, moist lands, where spring and summer temperatures are high. The Po valley and the valleys of Emilia and the Romagna are best adapted for rice, but the area is diminishing on account of the competition of foreign rice and of the impoverishment of the soil by too intense cultivation. The area is about 0-5 % of the total of Italy. The area under rye is about 0-5 % of the total, of which about two-thirds lie in the Alpine and about one-third in the Apennine zone. The barley zone is geographically extensive but embraces not more than 1 % of the total area, of which lalf is situated in Sardinia and Sicily. Oats, cultivated in the Roman and Tuscan maremma and in Apulia, are used almost exclusively for horses and cattle. The area of oats cultivation is 1-5% of the total area. The other cereals, millet and panico sorgo (Panicum italicum), have lost much of their importance in consequence of the introduc- tion of maize and rice. Millet, however, is still cultivated in the north of Italy, and is used as bread for agricultural labourers, and as forage when mixed with buckwheat {Sorghum saccaratum). The manufacture of macaroni and similar foodstuff is a characteristic Italian industry. It is extensively distributed, but especially flourishes in the Neapolitan provinces. The exportation of ” corn- flour pastes ” sank, however, from 7100 tons to 350 between 1882 and 1902.

The cultivation of green forage is extensive and is divided into the categories of temporary and perennial. The temporary includes vetches, pulse, lupine, clover and trifolium ; and the perennial, meadow-trefoil, lupinella, sulla (Hedysarum coronarium), lucerne and darnel. The natural grass meadows are extensive, and hay is grown all over the country, but especially in the Po valley. Pasture occupies about 30% of the total area of the country, of which Alpine pastures occupy 1-25%. Seed-bearing vegetables are comparatively scarce. The principal are: white beans, largely consumed by the working classes;

lentils, much less cultivated than beans; and green peas, largely consumed in Italy, and exported as a spring vegetable. Chick-pease are extensively cultivated in the southern provinces. Horse beans are grown, especially in the south and in the larger islands; lupines are also grown for fodder.

Among tuberous vegetables the potato comes first. The area occupied is about 0-7% of the whole of the country. Turnips are grown principally in the central provinces as an alternative crop to wheat. They yield as much as 12 tons per acre. Beetroot (Beta vulgaris) is used as fodder, and yields about 10 tons per acre. Sugar beet is extensively grown to supply the sugar factories. In I 898-1899 there were only four sugar factories, with an output of 5972 tons; in 1905 there were thirty-three, with an output of 93,916 tons.

Market gardening is carried on both near towns and villages, where products find ready sale, and along the great railways, on account of transport facilities. Rome is an exception to the former rule and imports garden produce largely from the neighbourhood of Naples and from Sardinia.

Among the chief industrial plants is tobacco, which grows wherever suitable soil exists. Since tobacco is a government monopoly, its cultivation is subject to official concessions and prescriptions. Experiments hitherto made show that the cultivation of Oriental tobacco may. profitably be extended in Italy. The yield for 1901 was 5528 tons, but a large increase took place subsequently, eleven million new plants having been added in southern Italy in 1905.

The chief textile plants are hemp, flax and cotton. Hemp is largely cultivated in the provinces of Turin, Ferrara, Bologna, Forli, Ascoli Piceno and Caserta. Bologna hemp is specially valued. Flax covers about 160,000 acres, with a product, in fibre, amounting to about 20,000 tons. Cotton (Gossypium herbaceum) , which at the beginning of the 19th century, at the time of the Continental blockade, and again during the American War of Secession, was largely cultivated, is now grown only in parts of Sicily and in a few southern provinces. Sumach, liquorice and madder are also grown in the south.

The vine is cultivated throughout the length and breadth of Italy, but while in some of the districts of the south and centre it occupies from 10 to 20% of the cultivated area, in some of the northern provinces, such as Sondrio, Belluno, Grosseto, &c, the average is only about I or 2 %. The methods of cultivation are varied ; but the planting of the vines by themselves in long rows of insignificant bushes is the

exception. In Lombardy, Emilia, Romagna, Tuscany, the Marches, Umbria and the southern provinces, they are trained to trees which are either left in their natural state or subjected to pruning and pollarding. In Campania the vines are allowed to climb freely to the tops of the poplars. In the rest of Italy the elm and the maple are the trees mainly employed as supports. Artificial props of several kinds — wires, cane work, trellis work, &c. — are also in use in many districts (in the neighbourhood of Rome canes are almost exclusively employed), and in some the plant is permitted to trail along the ground. The vintage takes place, according to locality and climate, from the beginning of September to the beginning of November. The vine has been attacked by the Oidium Tuckeri, the Phylloxera vastatrix and the Peronospora viticola, which in rapid succession wrought great havoc in Italian vineyards. American vines, are, however, immune and have been largely adopted. The

production of wine in the vintage of 1 907, which was extraordinarily abundant all over the country, was estimated at 1232 million gallons (56 million hectolitres), the average for 1901-1903 being some 352 million gallons less; of this the probable home consumption was estimated at rather over half, while a considerable amount remained over from 1906. The exportation in 1902 only reached about 45 million gallons (and even that is double the average) , while an equally abundant vintage in France and Spain rendered the exportation of the balance of 1907 impossible, and fiscal regulations rendered the distillation of the superfluous amount difficult. The quality, too, owing to bad weather at the time of vintage, was not good ; Italian wine, indeed, never is sufficiently good to compete with the best wines of other countries, especially France (though there is more opening for Italian wines of the Bordeaux and Burgundy type) ; nor will many kinds of it stand keeping, partly owing to their natural qualities and partly to the insufficient care devoted to their preparation. There has been some improvement, however, while some of the heavier white wines, noticeably the Marsala of Sicily, have excellent keeping qualities. The area cultivated as vineyards has increased enormously, from about 4,940,000 acres to 9,880,000 acres, or about 14% of the total area of the country. Over-production seems thus to be a considerable danger, and improvement of quality is rather to be sought after. This has been encouraged by government prizes since 1904.

Next to cereals and the vine the most important object of cultiva- tion is the olive. In Sicily and the provinces of Reggio, Catanzaro, Cosenza and Lecce this tree flourishes without shelter; as far north as Rome, Aquila and Teramo it requires only the slightest protection ; in the rest

of the peninsula it. runs the risk of damage by frost every ten years or so. The proportion of ground under olives is from 20 to 36% at Porto Maurizio, and in Reggio, Lecce, Bari, Chieti and Leghorn it averages from 10 to 19%. Throughout Piedmont, Lombardy, Venetia and the greater part of Emilia, the tree is of little importance. In the olive there is great variety of kinds, and the methods of cultivation differ greatly in different districts; in Bari, Chieti and Lecce, for instance, there are regular woods of nothing but olive-trees, while in middle Italy there are olive-orchards with the interspaces occupied by crops of various kinds. The Tuscan oils from Lucca, Calci and Buti are considered the best in the world; those of Bari, Umbria and western Liguria rank next. The wood of the olive is also used for the manufacture of small articles. The olive-growing area occupies about 3-5% of the total area of the country, and the crop in 1905 produced about 75,000,000 gallons of oil. The falling off of the crop, especially in 1899, was due to bad seasons and to insects, notably the Cycloconium oleoginum, and the Dacus oleae, or oil-fly, which have ravaged the olive-yards, and it is noticeable that lately good and bad seasons seem to alter- nate ; between 1900 and 1905 the crops were alternately one half of, and equal to, that of the latter year. With the development of agricultural knowledge, notable improvements have been effected in the manufacture of oil. The steam mills give the best results. The export trade, however, is decreasing considerably, while the home consumption is increasing. In 1901, 1985 imperial tuns of oil were shipped from Gallipoli for abroad — two-thirds to the United Kingdom, one-third to Russia — and 666 to Italian ports; while in 1904 the figures were reversed, 1633 tuns going to Italian ports, and only 945 tuns to foreign ports. The other principal port of shipping is Gioia Tauro, 30 m. N.N.E. of Reggio Calabria. A certain amount of linseed-oil is made in Lombardy, Sicily, Apulia and Calabria; colza in Piedmont, Lombardy, Venetia and Emilia; and castor-oil in Venetia and Sicily. The product is principally used for industrial purposes, and partly in the preparation of food, but the amount is decreasing.

The cultivation of oranges, lemons and their congeners (collec- tively designated in Italian by the term agrumi) is of comparatively modern date, the introduction of the Citrus Bigaradia being probably due to the Arabs. Sicily is the chief centre of cultivation — the area occupied by lemon and orange orchards in the province of Palermo alone having increased from 11,525 acres in 1854 to 54,340 in 1874. Reggio Calabria, Catanzaro, Cosenza, Lecce, Salerno, Naples and Caserta are the continental provinces which come next after Sicily. In Sardinia the cultivation is extensive, but receives little attention. Both crude and concentrated lime-juice is exported, and essential oils are extracted

from the rind of the agrumi, more particularly from that of the lemon and the bergamot. In northern and central Italy, except in the province of Brescia, the agrumi are almost non-existent. The trees are planted on irrigated soil and the fruit gathered between November and August. Considerable trade is done in agro di limone or lemon extract, which forms the basis of citric acid. Extraction is extensively carried on in the provinces of Messina and Palermo.

Among other fruit trees, apple-trees have special importance. Almonds are widely cultivated in Sicily, Sardinia and the sonthern provinces; walnut trees throughout the peninsula, their wood being more important than their fruit ; hazel nuts, figs, prickly pears (used in the south and the islands for hedges, their fruit being a minor consideration), peaches, pears, locust beans and pistachio nuts are among the other fruits. The mulberry -tree (Morus alba), whose leaves serve as food for silkworms, is cultivated in every region,, considerable progress having been made in its cultivation and in the rearing of silkworms since 1850. Silkworm-rearing establishments

of importance now exist in the Marches, Umbria, in the Abruzzi, . Tuscany, Piedmont and Venetia. The chief silk-producing provinces are Lombardy, Venetia and Piedmont. During the period 1900-1904 the average annual production of silk cocoons was 53,500 tons, and of silk 5200 tons.

The great variety in physical and social conditions throughout the peninsula gives corresponding variety to the methods of agricul- ture. In the rotation of crops there is an amazing diversity — shifts of two years, three years, four years, six years, and in many cases whatever order strikes the fancy of the farmer. The fields of Tuscany for the most part bear wheat one year and maize the next, in per- petual interchanges, relieved to some extent by green crops. A similar method prevails in the Abruzzi, and in the provinces of Salerno, Benevento and Avellino. In Lombardy a six-year shift is common: either wheat, clover, maize, rice, rice, rice (the last year manured with lupines) or maize, wheat followed by clover, clover, clover ploughed in, and rice, rice and rice manured with lupines. The Emilian region is one where regular rotations are best observed — a common shift being grain, maize, clover, beans and vetches, &c, grain, which has

the disadvantage of the grain crops succeeding each other. In the province of Naples, Caserta, &c, the method of fallows is widely adopted, the ground often being left in this state for fifteen or twenty years; and in some parts of Sicily there is a regular interchange of fallow and crop year by year. The following scheme indicates a common Sicilian method of a type which has many varieties: fallow, grain, grain, pasture, pasture— pother two divisions of the area following the same order, but beginning respectively with the two years of grain and the two of pasture.

Woods and forests play an important part, especially in regard to the consistency of the soil and to the character of the water- Woods courses. The chestnut is of great value for its wood and j its fruit, an article of popular consumption. Good timber

forests ls lurmsne d by the oak and beech, and pine and fir forests of the Alps and Apennines. Notwithstanding the efforts of the government to unify and co-ordinate the forest laws previously existing in the various states, deforestation has continued in many regions. This has been due to speculation, to the unrestricted pasturage of goats, to the rights which many communes have over the forests, and to some extent to excessive taxation, which led the proprietors to cut and sell the trees and then abandon the ground to the Treasury. The results are — a lack of water-supply and of water-power, the streams becoming mere torrents for a short period and perfectly dry for the rest of the year; lack of a sufficient supply of timber; the denudation of the soil on the hills, and, where the valleys below have insufficient drainage, the formation of swamps. If the available water-power of Italy, already very considerable, be harnessed, converted into electric power (which is already being done in some districts), and further increased by reafforestation, the effect upon the industries of Italy will be incalculable, and the importation of coal will be very materially diminished. The area of forest is about 14-3% of the total, and of the chestnut-woods 1-5 more; and its products in 1886 were valued at £3,520,000 (not including chestnuts). A quantity of it is really brushwood, used for the manufacture of charcoal and for fuel, coal being little used except for manufacturing purposes. Forest nurseries have also been founded.

According to an approximate calculation the number of head of live stock in Italy in 1890 was 16,620,000, thus divided : — • horses, 720,000; asses, 1,000,000; mules, 300,000; cattle, 5,000,000; sheep, 6,000,000; goats, 1,800,000; swine, 1,800,000.

The breed of cattle most widely distributed is that known as the

Podolian, usually with white or grey coat and enormous horns. Of the numerous sub-varieties, the finest is said to be that of the Val di Chiana, where the animals are stall-fed all the year round; next is ranked the so-called Valle Tiberina type. Wilder varieties roam in vast herds over the Tuscan and Roman maremmas, and the corre- sponding districts in Apulia and other regions. In the Alpine districts there is a stock distinct from the Podolian, generally called razza montanina. These animals are much smaller in stature and more regular in form than the Podolians; they are mainly kept for dairy purposes. Another stock, with no close allies nearer than the south of France, is found in the plain of Racconigi and Carmagnola ; the mouse-coloured Swiss breed occurs in the neighbourhood of Milan; the Tirolese breed stretches south to Padua and Modena; and a red-coated breed named of Reggio or Friuli is familiar both in what were the duchies of Parma and Modena, and in the provinces of Udine and Treviso. In Sicily the so-called Modica race is of note; and in Sardinia there is a distinct stock which seldom exceeds the weight of 700 lb. Buffaloes are kept in several districts, more particularly of southern Italy.

Enormous flocks are possessed by professional sheep-farmers, who pasture them in the mountains in the summer, and bring them down to the plains in the winter. At Saluzzo in Piedmont there is a stock with hanging ears, arched face and tall stature, kept for its dairy qualities; and in the Biellese the merino breed is maintained by some of the larger proprietors. In the upper valleys of the Alps there are many local varieties, one of which at Ossola is like the Scottish blackface. Liguria is not much adapted for sheep-farming on a large scale; but a number of small flocks come down to the

plain of Tuscany in the winter. With the exception of a few sub-Alpine districts near Bergamo and Brescia, the great Lombard plain is decidedly unpastoral. The Bergamo sheep is the largest breed in the country ; that of Cadore and Belluno approaches it in size. In the Venetian districts the farmers often have small stationary flocks. Throughout the Roman province, and Umbria, Apulia, the Abruzzi, Basilicata and Calabria, is found in its full development a remarkable system of pastoral migration with the change of seasons which has been in existence from the most ancient times, and has attracted attention as much by its picturesqueness as by its industrial import- ance (see Apulia). Merino sheep have been acclimatized in the Abruzzi, Capitanata and Basilicata. The number of sheep, however, is on the decrease. Similarly, the number of goats, which are reared only in hilly regions, is decreasing, especially on account of the exist- ing

forest laws, as they are the chief enemies of young plantations. Horse-breeding is on the increase. The state helps to improve the breeds by placing choice stallions at the disposal of private breeders at a low tariff. The exportation is, however, unimportant, while the importation is largely on the increase, 46,463 horses having been imported in 1902. Cattle-breeding varies with the different regions. In upper Italy cattle are principally reared in pens and stalls; in central Italy cattle are allowed to run half wild, the stall system being little practised ; in the south and in the islands cattle are kept in the open air, few shelters being provided. The erection of shelters, however, is encouraged by the state. Swine are extensively reared in many provinces. Fowls are kept on all farms and, though methods are still antiquated, trade in fowls and eggs is rapidly increasing.

In 1905 Italy exported 32,786 and imported 17,766 head of cattle; exported 33,574 and imported 6551 sheep; exported 95,995 and imported 1604 swine. The former two show a very large decrease and the latter a large increase on the export figures for 1882. The export of agricultural products shows a large increase.

The north of Italy has long been known for its great dairy districts. Parmesan cheese, otherwise called Lodigiano (from Lodi) or grana, was presented to King Louis XII. as early as 1509. Parmesan is not confined to the province from which it derives its name; it is manufactured in all that part of Emilia in the neighbourhood of the Po, and in the provinces of Brescia, Bergamo, Pavia, Novara and Alessandria. Gorgonzola, which takes its name from a town in the province, has become general throughout the whole of Lombardy, in the eastern parts of the “ancient provinces,” and in the province of Cuneo. The cheese known as the cacio-cavallo is produced in regions extending from 37 to 43° N. lat. Gruyere, extensively manufactured in Switzerland and France, is also produced in Italy in the Alpine regions and in Sicily. With the exception of Parmesan, Gorgonzola, La Fontina and Gruyere, most of the Italian cheese is consumed in the locality of its production. Co-operative dairy farms are numerous in north Italy, and though only about half as many as in 1889 (114 in 1902) are better organized. Modern methods have been introduced.

The drainage of marshes and marshy lands has considerably extended. A law passed on the 22nd of March 1900 gave a n special impulse to this form of enterprise by fixing the ratio ™* lna X e ‘ of expenditure incumbent respectively upon the State, the provinces, the communes, and the owners or other private individuals directly interested.

The Italian Federation of Agrarian Unions has greatly contributed to

agricultural progress. Government travelling teachers . Hm of agriculture, and fixed schools of viticulture, also do good ˆ work. Some unions annually purchase large quantities eC V” > ‘ of merchandise for their members, especially chemical mlcs – manures. The importation of machinery amounted to over 5000 tons in 1901.

Income from land has diminished on the whole. The chief diminution has taken place in the south in regard to oranges and lemons, cereals and (for some provinces) vines. Since 1895, however, the heavy import corn duty has caused a slight rise in the income from corn lands. The principal reasons for the general decrease are the fall in prices through foreign competition and the closing of certain markets, the diseases of plants and the increased outlay required to combat them, and the growth of State and local taxation. One of the great evils of Italian agricultural taxation is its lack of elas- ticity and of adaptation to local conditions. Taxes are not sufficiently proportioned to what the land may reasonably be expected to produce, nor sufficient allowance made for the exceptional conditions of a southern climate, in which a few hours’ bad weather may destroy a whole crop. The Italian agriculturist has come to look (and often in vain) for action on a large scale from the state, for irrigation, drainage of uncultivated low-lying land, which may be made fertile, river regulation, &c. ; while to the small proprietor the state often appears only as a hard and inconsiderate tax-gatherer.

The relations between owners and tillers of the soil are still regulated by the ancient forms of agrarian contract, which have remained almost untouched by social and political changes. The

Cossibility of reforming these contracts in some parts of the kingdom as been studied, in the hope of- bringing them into closer harmony with the needs of rational cultivation and the exigencies of social justice. I Peasant proprietorship is most common in Lombardy and Pied- ‘ mont, but it is also found elsewhere. Large farms are found in certain

of the more open districts; but in Italy generally, and especially in Sardinia, the land is very much subdivided. The following forms of contract are most usual in the several regions: In Piedmont the

mezzadria (metayage), the terzieria, the colonia parziaria, the boaria, the schiavenza and the affitto, or lease, are most usual. Under mezzadria the contract generally lasts three years. Products are usually divided in equal proportions between the owner and the tiller. The owner pays the taxes, defrays the cost of preparing the ground, and provides the necessary implements. Stock usually belongs to the owner, and, even if kept on the half-and-half system, is usually bought by him. The peasant, or mezzadro, provides labour. Under terzieria the owner furnishes stock, implements and seed, and the tiller retains only one-third of the principal products. In the colonia parziaria the peasant executes all the agricultural work, in return for which he is housed rent-free, and receives one- sixth of the corn, one-third of the maize and has a small money wage. This contract is usually renewed from year to year. The boaria is widely diffused in its two forms of cascina fatta and paghe. In the former case a peasant family undertakes all the necessary work in return for payment in money or kind, which varies according to the crop; in the latter the money wages and the payment in kind are fixed beforehand. Schiavenza, either simple or with a share in the crops, is a form of contract similar to the boaria, but applied princi- pally to large holdings. The wages are lower than under the boaria. In the affitto, or lease, the proprietor furnishes seed and the imple- ments. Rent varies according to the quality of the soil.

I n Lombardy , besides the mezzadria, the lease is common, but the terzieria is rare. The lessee, or farmer, tills the soil at his own risk; usually he provides live stock, implements and capital, and has no right to compensation for ordinary improvements, nor for extra-ordinary improvements effected without the landlord's consent. He is obliged to give a guarantee for the fulfilment of his engage- ments. In some places he pays an annual tribute in grapes, corn and other produce. In some of the Lombard mezzadria contracts taxes are paid by the cultivator.

In Venetia it is more common than elsewhere in Italy for owners to till their own soil. The prevalent forms of contract are the mezzadria and the lease. In Liguria, also, mezzadria and lease are the chief forms of contract.

In Emilia both mezzadria and lease tenure are widely diffused in the provinces of Ferrara, Reggio and Parma; but other special forms of contract exist, known as the famiglio da spesa, boaria, braccianti obbligati and braccianti disobbligati. In the famiglio da spesa the tiller receives a small wage and a proportion of certain products. The boaria is of two kinds. If the tiller receives as much as 45 lire per month,

supplemented by other wages in kind, it is said to be boaria a salario; if the principal part of his remuneration is in kind, his contract is called boaria a spesa.

In the Marches, Umbria and Tuscany, mezzadria prevails in its purest form. Profits and losses, both in regard to produce and stock, are equally divided. In some places, however, the landlord takes two-thirds of the olives and the whole of the grapes and the mulberry leaves. Leasehold exists in the province of Grosseto alone. In Latium leasehold and farming by landlords prevail, but cases of mezzadria and of " improvement farms " exist. In the agro Romano, or zone immediately around Rome, land is as a rule left for pasturage. It needs, therefore, merely supervision by guardians and mounted overseers, or butteri, who are housed and receive wages. Large landlords are usually represented by ministri, or factors, who direct agricultural operations and manage the estates, but the estate is often let to a middleman, or mercante di campagna. Wherever corn is cultivated, leasehold predominates. Much of the work is done by companies of peasants, who come down from the mountainous districts when required, permanent residence not being possible owing to the malaria. Near Velletri and Frosinone " improvement farms " prevail. A piece of uncultivated land is made over to a peasant for from 20 to 29 years. Vines and olives are usually planted, the landlord paying the taxes and receiving one-third of the produce. At the end of the contract the landlord either cultivates his land himself or leases it, repaying to the improver part of the expenditure incurred by him. This repayment sometimes consists of half the estimated value of the standing crops.

In the Abruzzi and in Apulia leasehold is predominant. Usually leases last from three to six years. In the provinces of Foggia and Lecce long leases (up to twenty-nine years) are granted, but in them it is explicitly declared that they do not imply enfiteusi (perpetual leasehold), nor any other form of contract equivalent to co-pro-prietorship. Mezzadria is rarely resorted to. On some small hold- ings, however, it exists with contracts lasting from two to six years. Special contracts, known as colonie immovibili and colonie temporanee are applied to the latifondi or huge estates, the owners of which receive half the produce, except that of the vines, olive-trees and woods, which he leases separately. " Improvement contracts " also exist. They consist of long leases, under which the landlord shares the costs of improvements and builds farm-houses; also leases of orange and lemon gardens, two-thirds of the produce of which go to the landlord, while the farmer contributes half the cost of farming besides the labour. Leasehold, varying from four to six years for arable land and

from six to eighteen years for forest-land, prevails also in Campania, Basilicata and Calabria. The estaglio, or rent,

is often paid in kind, and is equivalent to half the produce of good land and one-third of the produce of bad land. ” Improvement contracts ” are granted for uncultivated bush districts, where one fourth of the produce goes to the landlord, and for plantations of fig-trees, olive-trees and vines, half of the produce of which belongs to the landlord, who at the end of ten years reimburses the tenant for a part of the improvements effected. Other forms of contract are the piccola mezzadria, or sub-letting by tenants to under-tenants, on the half-and-half system; enfiteusi, or perpetual leases at low rents — a form which has almost died out; and mezzadria (in the provinces of Caserta and Benevento).

In Sicily leasehold prevails under special conditions. In pure leasehold the landlord demands at least six months’ rent as guarantee, and the forfeiture of any fortuitous advantages. Under the gabella lease the contract lasts twenty-nine years, the lessee being, obliged to make improvements, but being sometimes exempted from rent during the first years. Inquilinaggio is a form of lease by which the landlord, and sometimes the tenant, makes over to tenant or sub- tenant the sowing of corn. There are various categories of inquili- naggio, according as rent is paid in money or in kind. Under mezzadria or metateria the landlord divides the produce with the farmer in various proportions. The farmer provides all labour. Latifondi farms are very numerous in Sicily. The landlord lets his land to two or more persons jointly, who undertake to restore it to him in good condition with one-third of it ” interrozzito,” that is, fallow, so as to be cultivated the following year according to triennial rotation. These lessees are usually speculators, who divide and sub-let the estate. The sub-tenants in their turn let a part of their land to peasants in mezzadria, thus creating a system disastrous both for agriculture and the peasants. At harvest-time the produce is placed in the barns of the lessor, who first deducts 25% as premium, then 16% for battiteria (the difference between corn before and after winnowing) , then deducts a proportion for rent and subsidies, so that the portion retained by the actual tiller of the soil is extremely meagre. In bad years the tiller, moreover, gives up seed corn before beginning harvest. In Sardinia landlord-farming and leasehold prevail. In the few^ cases of mezzadria the Tuscan system is followed.

Mines. — The number of mines increased from 589 in 1881 to 1580 in 1902. The output in 1881 was worth about £2,800,000, but by 1895 had decreased to £1,800,000, chiefly on account of the fall in the

price of sulphur. It afterwards rose, and was worth more than £3,640,000 in 1899, falling again to £3,118,600 in 1902 owing to severe American competition in sulphur (see Sicily). The chief minerals are sulphur, in the production of which Italy holds one of the first places, iron, zinc, lead; these, and, to a smaller extent, copper of an inferior quality, manganese and antimony, are successfully mined. The bulk of the sulphur mines are in Sicily, while the majority of the lead and zinc mines are in Sardinia; much of the lead smelting is done at Pertusola, near Genoa, the company formed for this purpose having acquired many of the Sardinian mines. Iron is mainly mined in Elba. Quicksilver and tin are found (the latter in small quantities) in Tuscany. Boracic acid is chiefly found near Volterra, where there is also a little rock salt, but the main supply is obtained by evapora- tion. The output of stone from quarries is greatly diminished (from 12,500,000 tons, worth £1,920,000, in 1890, to 8,000,000 tons, worth £1,400,000, in 1899), a circumstance probably attributable to the slackening of building enterprise in many cities, and to the decrease in the demand for stone for railway, maritime and river embankment works. The value of the output had, however, by 1902 risen to £1,600,000, representing a tonnage of about 10,000,000. There is good travertine below Tivoli and elsewhere in Italy; the finest granite is found at Baveno. Lava is much used for paving-stones in the neighbourhood of volcanic districts, where pozzolana (for cement) and pumice stone are also important. Much of Italy contains Pliocene clay, which is good for pottery and brickmaking. Mineral springs are very numerous, and of great variety.

Fisheries. — The number of boats and smacks engaged in the fisheries has considerably increased. In 1881 the total number was 15,914, with a tonnage of 49,103. In 1902 there were 23,098 boats, manned by 101,720 men, and the total catch was valued at just over half a million sterling — according to the government figures, which are certainly below the truth. The value has, however, undoubtedly diminished, though the number of boats and crews increases. Most' of the fishing boats, properly so called, start from the Adriatic coast, the coral boats from the western Mediterranean coast, and the sponge boats from the western Mediterranean and Sicilian coasts. Fishing and trawling are carried on chiefly off the Italian (especially Ligurian, Austrian and Tunisian coasts; coral is found principally near Sardinia and Sicily, and sponges almost exclusively off Sicily arid Tunisia in the neighbourhood of Sfax. For sponge fishing no accurate statistics are available before 1896; in that year 75 tons of sponges were secured, but there has been considerable diminution since, only 31 tons being obtained in 1902. A considerable proportion was obtained by foreign

boats. The island of Lampedusa may be considered its centre. Coral fishing, which fell off between 1889 and 1892 on account of the temporary closing of the Sciacca coral reefs has greatly decreased since 1884, when the fisheries produced 643 tons, whereas in 1902 they only produced 225 tons. The value of the product has, however, proportionately increased, so that the sum realized was little less, while less than half the number of men

was employed. Sardinian coral commands from £3 to £4 per kilogramme (2-204 lb), and is much more valuable than the Sicilian coral. The Sciacca reefs were again closed for three winters by a decree of 1904. The fishing is largely carried on by boats from Torre del Greco, in the Gulf of Naples, where the best coral beds are now exhausted. In 1879 4000 men were employed; in 1902 only just over 1000. In 1902 there were 48 tunny fisheries, employing 3006 men, and 51 16 tons of fish worth £80,000 were caught. The main fisheries are in Sardinia, Sicily and Elba. Anchovy and sardine fishing (the products of which are reckoned among the general total) are also of considerable importance, especially along the Ligurian and Tuscan coasts. The lagoon fisheries are also of great importance, more especially those of Comacchio, the lagoon of Orbetello and the Mare Piccolo at Taranto &c The deep-sea fishing boats in 1902 numbered 1368, with a total tonnage of 16,149 ; 100 of these were coral-fishing boats and III sponge-fishing boats. Industrial Progress. — The industrial progress of Italy has been great since 1880. Many articles formerly imported are now made at home, and some Italian manufactures have begun to compete in foreign markets. Italy has only unimportant lignite and anthracite mines, but water power is abundant and has been largely applied to industry, especially in generating electricity. The electric power required for the tramways and the illumina- tion of Rome is entirely supplied by turbines situated at Tivoli, and this is the case elsewhere, and the harnessing of this water- power is capable of very considerable extension. A sign of industrial development is to be found in the growing number of manufacturing companies, both Italian and foreign.

The chief development has taken place in mechanical industries, though it has also been marked in metallurgy. Sulphur mining „ . supplies large industries of sulphur-refining and grinding,

Ud’. m s P’ te °^ American competition. Very little pig iron is cannausma ^ most f t h e iron ore being exported, and iron es ‘ manufactured consists of old iron resmelted. For steel-

making foreign pig iron is chiefly used. The manufacture of steel rails, carried on first at Terni and afterwards at Savona, began in Italy in 1886. Tin has been manufactured since 1892. Lead, antimony, mercury and copper are also produced. The total salt production in 1902 was 458,497 tons, of which 248,215 were produced in the government salt factories and the rest in the free salt-works of Sicily. Great progress has been made in the manufacture of machinery; locomotives, railway carriages, electric tram-cars, &c, and machinery of all kinds, are now largely made in Italy itself, especially in the north and in the neighbourhood of Naples. At Turin the manufacture of motor-cars has attained great importance and the F.I.A.T. (Fabbrica Italiana Automobili Torino) factory em- ploys 2000 workmen, while eight others employ 2780 amongst them. The textile industries, some of which are of ancient date, are among those that have most rapidly developed. Handlooms and small spin- re tiles mn § establishments have, in the silk industry, given place x ‘ to large establishments with steam looms. The production of raw silk at least tripled itself between 1875 and 1900, and the value of the silks woven in Italy, estimated in 1890 to be £2,200,000, is now, on account of the development of the export trade, calculated to be almost £4,000,000. Lombardy (especially Como, Milan and Bergamo), Piedmont and Venetia are the chief silk-producing regions. There are several public assay offices in Italy for silk; the first in the world was established in Turin in 1750. The cotton industry has also rapidly developed. Home products not only supply the Italian market in increasing degree, but find their way into foreign markets. While importation of raw cotton increases importations of cotton thread and of cotton stuffs have rapidly decreased. The value of the annual produce of the various branches of the cotton industry, which in 1885 was calculated to be £7,200,000, was in 1900, not- withstanding the fall in prices, about £12,000,000. The industry is chiefly developed in Lombardy, Piedmont and Liguria; to some extent also in Campania, Venetia and Tuscany, and to a less extent in Lazio (Rome), Apulia, Emilia, the Marches, Umbria, the Abruzzi and Sicily. A government weaving school was established in Naples in 1906. As in the case of cotton, Italian woollen fabrics are con- quering the home market in increasing degree. The industry centres chiefly in Piedmont (province of Novara), Venetia (province of Vicenza), Tuscany (Florence), Lombardy (Brescia), Campania (Caserta); Genoa, Umbria, the Marches and Rome. To some extent the industry also exists in Emilia, Calabria, Basilicata, the Abruzzi,

Sardinia and Sicily. It has, however, a comparatively small export trade.

The other textile industries (flax, jute, &c.) have made notable progress. The jute industry is concentrated in a few large factories, which from 1887 onwards have more than supplied the home market, and have begun considerably to export.

Chemical industries show an output worth £2,640,000 in 1902 as against £1,040,000 in 1893. The chief products are sulphuric acid; Chemicals su ‘P na te of copper, employed chiefly as a preventive of ‘ certain maladies of the vine; carbonate of lead, hyper- phosphates and chemical manures; calcium carbide; explosive powder ; dynamite and other explosives. Pharmaceutical industries,

as distinguished from those aboye mentioned, have kept pace with the general development of Italian activity. The principal product is quinine, the manufacture of which has acquired great importance, owing to its use as a specific against malaria. ‘ Milan and Genoa are the principal centres, and also the government military pharma- ceutical factory at Turin. Other industries of a semi-chemical character are candle-, soap-, glue-, and perfume-making, and the preparation of india-rubber. The last named has_ succeeded, by means of the large establishments at Milan in supplying not only the whole Italian market but an export trade.

The match-making industry is subject to special fiscal conditions. In 1902-1903 there were 219 match factories scattered throughout Italy, but especially in Piedmont, Lombardy and Venetia. The number has been reduced to less than half since 1897 by the sup- pression of smaller factories, while the production has increased from 47,690 millions to 59,741 millions.

The beetroot-sugar industry has attained considerable proportions in Umbria, the Marches, Lazio, Venetia and Piedmont since 1890. In 1898-1899, 5972 tons were produced, while in 1905 the figure had risen to 93,916. The rise of the industry has been favoured by protective tariffs and by a system of excise which allows a con- siderable premium to manufacturers.

Alcohol has undergone various oscillations, according to the legislation governing distilleries. In 1871 only 20 hectolitres were produced, but in 1881 the output was 318,000 hectolitres, the maximum hitherto attained. Since then special laws have hampered development, some provinces, as for instance Sardinia, being allowed

to manufacture for their own consumption but not for export. In other parts the industry is subjected to an almost prohibitive excise- duty. The average production is about 180,000 hectolitres per annum. The greatest quantity is produced in Lombardy, Piedmont, Venetia and Tuscany. The quantity of beer is about the same, the greater part of the beer drunk being imported from Germany, while the production of artificial mineral waters has somewhat decreased. There is a considerable trade (not very large for export, however) in natural mineral waters, which are often excellent.

Paper-making is highly developed in the provinces of Novara, Caserta, Milan, Vicenza, Turin, Como, Lucca, Ancona, Genoa, Brescia, Cuneo, Macerata and Salerno. The hand-made paper of Fabriano is especially good.

Furniture-making in different styles is carried on all over Italy, especially as a result of the establishment of industrial schools. Each region produces a special type, Venetia turning out imitations of 16th- and 17th-century styles, Tuscany the 15th-century or cinque- cento style, and the Neapolitan provinces the Pompeian style. Furniture and cabinet-making in great factories are carried on particularly in Lombardy and Piedmont. Bent-wood factories have been established in Venetia and Liguria.

A characteristic Italian industry is that of straw-plaiting for hat-making, which is carried on principally in Tuscany, in the district of Fermo, in the Alpine villages of the province of Vicenza, and in some communes of the province of Messina. The plaiting is done by country women, while the hats are made up in factories. Both plaits and hats are largely exported.

Tobacco is entirely a government monopoly; the total amount manufactured in 1902-1903 was 16,599 tons — a fairly constant figure. The finest glass is made in Tuscany and Venetia; Venetian glass is often coloured and of artistic form.

In the various ceramic arts Italy was once unrivalled, but the ancient tradition for a long time lost its primeval impulse. The works at Vinovo, which had fame in the 1 8th century, came to an untimely end in 1820; those of Castelli (in the Abruzzi), which have been revived, were supplanted by Charles III.‘s establishment at Capodimonte, 175R, which after producing articles of surprising execution was closed before the end of the century. The first place now belongs to the Delia Doccia works at Florence. Founded in 1735 by the marquis Carlo Ginori, they maintained a reputation of the very

highest kind down to about i860; but since then they have not kept pace with their younger rivals in other lands. They still, however, are com- mercially successful. Other cities where the ceramic industries keep their ground are Pesaro, Gubbio, Faenza (whose name long ago became the distinctive term for the finer kind of potter's work in France, faience), Savona and Albissola, Turin, Mondovi, Cuneo, Castellamonte, Milan, Brescia, Sassuolo, Imola, Rimini, Perugia, Castelli, &c. In all these the older styles, by which these places became famous in the l6th-l8th centuries, have been revived. It is estimated that the total production of the finer wares amounts on the average to £400,000 per annum. The ruder branches of the art — -the making of tiles and common wares — are pretty generally diffused.

The jeweller's art received large encouragement in a country which had so many independent courts ; but nowhere has it attained a fuller development than at Rome. A vast variety of trinkets — in coral, glass, lava, &c. — is exported from Italy, or carried away by the annual host of tourists. The copying of the paintings of the ojd masters is becoming an art industry of no small mercantile import- ance in some of the larger cities.

The production of mosaics is an industry still carried on with much success in Italy, which indeed ranks exceedingly high in the

department. The great works of the Vatican are especially famous (more than 17,000 distinct tints are employed in their productions), and there are many other establishments in Rome. The Florentine mosaics are perhaps better known abroad; they are composed of larger pieces than the Roman. Those of the Venetian artists are remarkable for the boldness of their colouring. There is a tendency towards the fostering of feminine home industries — lace-making, linen-weaving, &c.

Condition of the Working Classes. — The condition of the numerous agricultural labourers (who constitute one-third of the population) is, except in some regions, hard, and in places absolutely miserable. Much light was thrown upon their position by the agricultural inquiry (inchiesta agraria) completed in 1884. The large numbers of

emigrants, who are drawn chiefly from the rural classes, furnish another proof of poverty. The terms of agrarian contracts and leases (except in districts where mezzadria prevails in its essential form) , are in many regions disadvantageous to the labourers, who suffer from the obligation to provide guarantees for payment of rent, for repayment of seed corn and for the division of products.

It was only at the close of the 19th century that the true cause of malaria — the conveyance of the infection by the bite of the Malaria. Anopheles claviger — was discovered. This mosquito does not as a rule enter the large towns; but low-lying coast districts and ill-drained plains are especially subject to it. Much has been done in keeping out the insects by fine wire netting placed on the windows and the doors of houses, especially in the railway- men's cottages. In 1902 the state took up the sale of quinine at a low price, manufacturing it at the central military pharmaceutical laboratory at Turin. Statistics show the difference produced by this measure.

Financial Year.

Pounds of quinine sold.

Deaths by Malaria.

1901-1902 1 902- 1 903 1903-1904 1904-1905 1 905- 1 906 1 906- 1 907

4.932 15.915 30,956 41,166

45,591

13,358 9,908

8,513 8,501

7,838 4,875

The profit made by the state, which is entirely devoted to a special fund for means against malaria, amounted in these five years to £41,759. It has been established that two 3-grain pastilles a day are a sufficient prophylactic; and the proprietors of malarious estates and contractors for public works in malarious districts are bound by law to provide sufficient quinine for their workmen, death for want of this precaution coming under the pro- visions of the workmen's compensation act. Much has also been, though much remains to be, done in the way of bonijicamento, i.e. proper drainage and

improvement of the (generally fertile) low-lying and hithtrto malarious plains.

In Venetia the lives of the small proprietors and of the salaried peasants are often extremely miserable. There and in Lombardy the disease known as pellagra is most widely diffused. The disease is due to poisoning by micro-organisms produced by deteriorated maize, and can be combated by care in ripening, drying and storing the maize. The most recent statistics show the disease to be diminish- ing. Whereas in 1881 there were 104,067 (16-29 per 1000) peasants afflicted by the disease, in 1899 there were only 72,603 (10-30 per 1000) peasants, with a maximum of 39,882 (34‘32_per 1000) peasants in Venetia, and 19,557 (12-90 per 1000) peasants in Lombardy. The decrease of the disease is a direct result of the efforts made to combat it, in the form of special hospitals or pellagrosari, economic kitchens, rural bakeries and maize-drying establishments. A bill for the better prevention of pellagra was introduced in the spring of 1902. The deaths from it dropped in that year to 2376, from 3054 in the previous year and 3788 in 1900.

In Liguria, on account of the comparative rarity of large estates, agricultural labourers are in a better condition. Men earn between is. 3d. and 2s. id. a day, and women from 5d. to 8d. In Emilia the day labourers, known as disobbligati, earn, on the contrary, low wages, out of which they have to provide for shelter and to lay by something against unemployment. Their condition is miserable. In Tuscany, however, the prevalence of mezzadria, properly so called, has raised the labourers’ position. Yet in some Tuscan provinces, as, for instance, that of Grosseto, where malaria rages, labourers are organized in gangs under ” corporals,” who undertake harvest work. They are poverty-stricken, and easily fall victims to fever. In the Abruzzi and in Apulia both regular and irregular workmen are engaged by the year. The curatori or curatoli (factors) receive £40 a year, with a slight interest in the profits; the stock- men hardly earn in money and kind £13; the muleteers and under- workmen get between £5 to £8, plus firewood, bread and oil;

irregular workmen have even lower wages, with a daily distribution of bread, salt and oil. In Campania and Calabria the curatoli and massari earn, in money and kind, about £12 a year; cowmen, shepherds and muleteers about £10; irregular workmen are paid from 8Jd. to is. 8d. per day, but only find employment, on an average, 230 days in the year. The condition of Sicilian labourers is also miserable. The huge extent of the latifondi, or large estates, often results in their being left in the hands of speculators, who exploit both workmen and farmers

with such usury that the latter are often compelled, at the end of a scanty year, to hand over their crops to the usurers before harvest. In Sardinia wage-earners are paid iod. a day, with free shelter and an allotment for private cultivation. Irregular adult workmen earn between iod. and is. 3d., and boys from 6d. to iod. a day. Woodcutters and vine-waterers, however, sometimes earn as much as 3s. a day.

The peasants somewhat rarely use animal food — this is most largely used in Sardinia and least in Sicily — bread and polenta or macaroni and vegetables being the staple diet. Wine is the prevailing drink.

The condition of the workmen employed in manufactures has improved during recent years. Wages are higher, the cost of the prime necessaries of life is, as a rule, lower, though taxation on some of them is still enormous; so that the remuneration of work has improved. Taking into account the variations in wages and in the price of wheat, it may be calculated that the number of hours of work requisite to earn a sum equal to the price of a cwt. of wheat fell from 183 in 187 1 to 73 in 1894. In 1898 it was 105, on account of the rise In the price of wheat, and since then up till 1902 it oscillated between 105 and 95.

Wages have risen from 22-6 centimes per hour (on an average) to 26-3 centimes, but not in all industries. In the mining and woollen industries they have fallen, but have increased in mechanical, chemical, silk and cotton industries. Wages vary greatly in different parts of Italy, according to the cost of the necessaries of life, the degree of development of working-class needs and the state of working-class organization, which in some places has succeeded in increasing the rates of pay. Women are, as a rule, paid less than men, and though their wages have also increased, the rise has been slighter than in the case of men. In some trades, for instance the silk trade, women earn little more than iod. a day, and, for some classes of work, as little as 7d. and 4Jd. The general improvement in sanitation has led to a corresponding improvement in the condi- tion of the working classes, though much still remains to be done, especially in the south. On the other hand, it is generally the case that even in the most unpromising inn the bedding is clean.

The number of industrial strikes has risen from year to year, although, on account of the large number of persons involved in some of them, the rise in the number of strikers has not strikes always corresponded to the number of strikes. During the years 1900 and 1901 strikes were increasingly numerous, chiefly on account of the growth of Socialist and working-class organizations.

The greatest proportion of strikes takes place in northern Italy, especially Lombardy and Piedmont, where manufacturing industries are most developed. Textile, building and mining industries show the highest percentage of strikes, since they give employment to large numbers of men concentrated in single localities. Agricultural strikes, though less frequent than those in manufacturing industries, have special importance in Italy. They are most common in the north and centre, a circumstance which shows them to be promoted less by the more backward and more ignorant peasants than by the better-educated labourers of Lombardy and Emilia, among whom Socialist organizations are widespread. Since 1901 there have been, more than once, general strikes at Milan and elsewhere, and one in the autumn of 1905 caused great inconvenience throughout the country, and led to no effective result.

Although in some industrial centres the working-class movement has assumed an importance equal to that of other countries, there is no general working-class organization comparable to the English trade unions. Mutual benefit and co-operative societies serve the purpose of working-class defence or offence against the employers. In 1893, after many vicissitudes, the Italian Socialist Labour Party was founded, and has now become the Italian Socialist Party, in which the majority of Italian workmen enrol themselves. Printers and hat-makers, however, possess trade societies. In 1899 an agita- tion began for the organization of ” Chambers of Labour, ‘ intended to look after the technical education of workmen and to form com- missions of arbitration in case of strikes. They act also as employ- ment bureaux, and are often centres of political propaganda. At present such ” chambers ” exist in many Italian cities, while “leagues of improvement,”, or of ” resistance,” are rapidly spreading in the country districts. In many cases the action of these organizations has proved, at least temporarily, advantageous to the working classes.

Labour legislation is backward in Italy, on account of the late development of manufacturing industry and of working-class organization. On the 17th of April 1898 a species of Employers’ Liability Act compelled employers of more than five workmen in certain industries to insure their employees against accidents.

H

ITALY

[COMMUNICATIONS

On the 17th of July 1898 a national fund for the insurance of workmen against illness and old age was founded by law on the principle of optional registration. In addition to an initial endowment by the state, part of the annual income of the fund is furnished in various forms by the state (principally by making over a proportion of the profits of the Post Office Savings Bank), and part by the premiums of the workmen. The minimum annual premium is six lire for an annuity of one lira per day at the age of sixty, and insurance against sickness. The low level of wages in many trades and the jealousies of the ” Chambers of Labour ” and other working-class organizations impede rapid development.

A law came into operation in February 1908, according to which a weekly day of rest (with few exceptions)was established on Sunday in every case in which it was possible, and otherwise upon some other day of the week.

The French institution of Prudhommes was introduced into Italy in 1893, under the name of Collegi di Probiviri. The institution has not attained great vogue. Most of the colleges deal with matters affecting textile and mechanical industries. Each ” college ” is founded by royal decree, and consists of a president, with not fewer than ten and not more than twenty members. A conciliation bureau and a jury are elected to deal with disputes concerning wages, hours of work, labour contracts, &c, and have power to settle the disputes, without appeal, whenever the amounts involved do not exceed £8.

Provident institutions have considerably developed in Italy

under the forms of savings banks, assurance companies

iastu -” an d mutual benefit societies. Besides the Post Office

hobs. Savings Bank and the ordinary savings banks, many

co-operative credit societies and ordinary credit banks

receive deposits of savings.

The greatest number of savings banks exists in Lombardy; Piedmont and Venetia come next. Campania holds the first place in the south, most of the savings of that region being deposited in the provident institutions of Naples. In Liguria and Sardinia the habit of thrift is less developed. Assurance societies in Italy are subject to the general dispositions of the commercial code regarding com- mercial companies. Mutual benefit societies have increased rapidly, both

because their advantages have been appreciated, ftnd because, until recently, the state had taken no steps directly to insure work- men against illness. The present Italian mutual benefit societies resemble the ancient beneficent corporations, of which in some respects they may be considered a continuation. The societies require government recognition if they wish to enjoy legal rights. The state (law of the 15th of April 1896) imposed this condition in order to determine exactly the aims of the societies, and, while allowing them to give help to their sick, old or feeble members, or aid the families of deceased members, to forbid them to pay old-age pensions, lest they assumed burdens beyond their financial strength. Nevertheless, the majority of societies have not sought recognition, being suspicious of fiscal state intervention.

Co-operation, for the various purposes of credit, distribution, production and labour, has attained great development in Italy.

Credit co-operation is represented by a special type tion. ‘ °f association known as People’s Banks (Banche

Popolari). They are not, as a rule, supported by workmen or peasants, but rather by small tradespeople, manu- facturers and farmers. They perform a useful function in protecting their clients from the cruel usury which prevails, especially in the south. A recent form of co-operative credit banks are the Casse Rurali or rural banks, on the Raffeisen system, which lend money to peasants and small proprietors out of capital obtained on credit or by gift. These loans are made on personal security, but the members of the bank do not contribute any quota of the capital, though their liability is unlimited in case of loss. They are especially widespread in Lombardy and Venetia.

Distributive co-operation is confined almost entirely to Piedmont, Liguria, Lombardy, Venetia, Emilia and Tuscany, and is practically unknown in Basilicata, the Abruzzi and Sardinia.

Co-operative dairies are numerous. They have, however, much decreased in number since 1889. More numerous are the agricultural and viticultura! co-operative societies, which have largely increased in number. They are to be found mainly in the fertile plains of north Italy, where they enjoy considerable success, removing the cause of labour troubles and strikes, and providing for cultivation on a sufficiently large scale. The richest, however, of the co-operative societies, though few in number, are those for the production of electricity, for textile industries and for ceramic and glass manu-factures.

Co-operation in general is most widely diffused, in proportion to population, in central Italy; less so in northern Italy, and much less so in the south and the islands. It thus appears that co-operation

flourishes most in the districts in which the mezzadria system has been prevalent.

Railways. — The first railway in Italy, a line 16 m. long from Naples to Casteilammare, was opened in 1840. By 1881 there were some 5500 m. open, in 1891 some 8000 m., while in 1901 the total length was 9317 m. In July 1905 all the principal lines, which had been constructed by the state, but had been since 1885 let out to three companies (Mediterranean, Adriatic, Sicilian), were taken over by the state; their length amounted in 1901 to 6147 m., and in 1907 to 8422 m. The minor lines (many of them narrow gauge) remain in the hands of private companies. The total length, including the Sardinian railways, was 10,368 m. in 1907. The state, in taking over the railways, did not exercise sufficient care to see that the lines and the rolling stock were kept up to a proper state of efficiency and adequacy for the work they bad to perform; while the step itself was taken somewhat hastily. The result was that for the first two years of state administration the service was distinctly bad, and the lack of goods trucks at the ports was especially felt. A capital expenditure of £4,000,000 annually was decided on to bring the lines up to the necessary state of efficiency to be able to cope with the rapidly increasing traffic. It was estimated in 1906 that this would have to be maintained for a period of ten years, with a further total expenditure of £14,000,000 on new lines.

Comparing the state of things in 190 1 with that of 1881, for the whole country, we find the passenger and goods traffic almost doubled (except the cattle traffic), the capital expenditure almost doubled, the working expenses per mile almost imperceptibly increased, and th'j gross receipts per mile slightly lower. The personnel had increased from 70,568 to 108,690. The construction of numerous unremunerative lines, and the free granting of con- cessions to government and other employees (and also of cheap tickets on special occasions for congresses, &c, in various towns, without strict inquiry into the qualifications of the claimants) will account for the failure to realize a higher profit. The fares (in slow trains, with the addition of 10 % for expenses) are : 1st class, 1 -85d. ; 2nd, 1 -3d.; 3rd, o-725d. per mile. There are, however, considerable reductions for distances over 93 m., on a scale increasing in propor- tion to the distance.

The taking over of the main lines by the state has of course produced a considerable change in the financial situation of the railways. The state incurred in this connexion a liability of some £20,000,000, of which about £16,000,000 represented the rolling stock. The state has considerably improved the engines and passenger carriages. The capital value of the whole of the lines, rolling stock, &c, for 1908-1909 was calculated approximately at £244,161,400, and the profits at £5,295,019, or 2-2%.

Milan "is the most important railway centre in the country, and is followed by Turin, Genoa, Verona, Bologna, Rome, Naples. Lombardy and Piedmont are much better provided with railways in proportion to their area than any other parts of Italy; next come Venetia, Emilia and the immediate environs of Naples.

The northern frontier is crossed by the railway from Turin to Ventimiglia by the Col di Tenda, the Mont Cenis line from Turin to Modane (the tunnel is 7 m. in length), the Simplon line (tunnel 11 m. in length) from Domodossola to Brigue, the St Gotthard from Milan to Chiasso (the tunnel is entirely in Swiss territory), the Brenner from Verona to Trent, the line from Udine to Tarvis and the line from Venice to Triest by the Adriatic coast. Besides these international lines the most important are those from Milan to Turin (via Vercelli and via Alessandria), to Genoa via Tortona, to Bologna via Parma and Modena, to Verona, and the shorter lines to the district of the lakes of Lombardy; from Turin to Genoa via Savona and via Alessandria; from Genoa to Savona and Ventimiglia along the Riviera, and along the south-west coast of Italy, via Sarzana (whence a line runs to Parma) to Pisa (whence lines run to Pistoia and Florence) and Rome; from Verona to Modena, and to Venice via Padua; from Bologna to Padua, to Rimini (and thence along the north-east coast via Ancona, Casteilammare Adriatico and Foggia to Brindisi and Otranto), and to Florence and Rome; from Rome to Ancona, to Casteilammare Adriatico and to Naples; from Naples to Foggia, via Metaponto (with a junction for Reggio di Calabria), to Brindisi and to Reggio di Calabria. (For the Sicilian and Sardinian lines, see Sicily and Sardinia.) The speed of the trains is not high, nor are the runs without stoppage long as a rule. One of the fastest runs is from Rome to Orte, 52-40 m. in 69 min., or 45-40 m. per hour, but this is a double line with little traffic. The low speed reduces the potentiality of the lines. The insufficiency of rolling stock, and especially of goods wagons, is mainly caused by delays in " handling " traffic consequent on this or other causes, among which may be mentioned the great length of the single lines south of Rome. It is thus a matter of difficulty to provide trucks for a sudden emergency, e.g. the vintage season; and in 1905-1907

complaints were many ,» while the seaports were continually short of trucks. This led to deficiencies in the supply of coal to the manufacturing centres, and to some diversion elsewhere of shipping.

Steam and Electric Tramways. — Tramways with mechanical traction have developed rapidly. Between 1875, when the first line was opened, and 1901, the length of the lines grew to 1890 m. of steam and 270 m. of electric tramways. These lines exist principally in Lombardy (especially in the province of Milan), in Piedmont,

especially in the province of Turin, and in other regions of northern and central Italy. In the south they are rare, on account partly of the mountainous character of the country, and partly of the scarcity of traffic. All the important towns of. Italy are provided with internal electric tramways, mostly with overhead wires.

Carriage-roads have been greatly extended in modern times, although their ratio to area varies in different localities. In north Italy there are 1480 yds. of road per sq. m.; in central Italy 993; in southern Italy 405; in Sardinia 596, and in Sicily only 244. They are as a rule well kept up in north and central Italy, less so in the south, where, especially in Calabria, many villages are inac- cessible by road and have only footpaths leading to them. By the act of 1903 the state contributes half and the province a quarter of the cost of roads connecting communes with the nearest railway stations or landing places.

Inland Navigation. — Navigable canals had in 1886 a total length of about 655 m. ; they are principally situated in Piedmont, Lombardy and Venetia, and are thus practically confined to the Po basin. Canals lead from Milan to the Ticino, Adda and Po. The Po is itself navigable from Turin downwards, but through its delta it is so sandy that canals are preferred, the Po di Volano i*nd the Po di Primaro on the right, and the Canale Bianco on the left. The total length of navigable rivers is 967 m.

Posts, Telegraphs and Telephones. — The number of post offices (including collettorie, or collecting offices, which are rapidly being eliminated) increased from 2200 in 1862 to 4823 in 1881, 6700 in 1891 and 8817 in 1904. In spite of a large increase in the number of

letters and post cards (i.e. nearly 10 per inhabitant per annum in 1904, as against 5-65 in 1888) the average is considerably below that of most other European countries. The number of state tele- graph offices was 4603, of other offices (railway and tramway stations, which accept private telegrams for transmission) 1930. The telephone system is considerably developed; in 1904, 92 urban and 66 inter – urban systems existed. They were installed by private companies, but have been taken over by the state. International communication between Rome and Paris, and Italy and Switzerland also exists. The parcel post and money order services hav* largely increased since 1 887-1 888, the number of parcels having almost doubled (those for abroad are more than trebled), while the number of money orders issued is trebled and their value doubled (about £40,000,000). The value of the foreign orders paid in Italy increased from £1,280,000 to £2,356,000 — owing to the increase of emigration and of the savings sent home by emigrants.

At the end of 1907 Italy was among the few countries that had not adopted the reduction of postage sanctioned at the Postal Union congress, held in Rome in 1906, by which the rates became 2ˆd. for the first oz., and ijd. per oz. afterwards. The internal rate is 15c. (ijd.) per j oz. ; post-cards 10c. (id.), reply 15c. On the other hand, letters within the postal district are only 5c. (|d.) per \ oz. Printed matter is 2c. (Jd.) per 50 grammes (if oz.). The regulations provide that if there is a greater weight of correspondence (including book- packets) than ij lb for any individual by any one delivery, notice shall be given him that it is lying at the post office, he being then obliged to arrange for fetching it. Letters insured for a fixed sum are not delivered under any circumstances.

Money order cards are very convenient and cheap (up to 10 lire [8s.] for 10c. [id.]), as they need not be enclosed in a letter, while a short private message can be written on them. Owing to the com- oaratively small amount of letters, it is found possible to have a travelling post office on all principal trains (while almost every train has a travelling sorter, for whom a compartment is reserved) without a late fee being exacted in either case. In the principal towns letters may be posted in special boxes at the head office just before the departure of any given mail train, and are conveyed direct to the travelling post office. Another convenient arrangement is the provision of letter-boxes on electric tramcars in some cities.

Mercantile Marine. — Between the years 1881 and 1905 the number of ships entered and cleared at Italian ports decreased slightly (219,598 in 1881 and 208,737 in 1905), while their aggregate

tonnage increased (32,070,704 in 1881 and 80,782,030 in 1905). In the move- ment of shipping, trade with foreign countries prevails (especially as regards arrivals) over trade between Italian ports. Most of the merchandise and passengers bound for and hailing from foreign ports sail under foreign flags. Similarly, foreign vessels prevail over Italian vessels in regard to goods embarked. European countries absorb the greater part of Italian sea-borne trade, whereas most of the passenger traffic goes to North and South America. The substi- tution of steamships for sailing vessels has brought about a diminu- tion in the number of vessels belonging to the Italian mercantile marine, whether employed in the coasting trade, the fisheries or in traffic on the high seas. Thus : —

Year.

Tctal No. of Ships.

Steamships.

Sailing Vessels.

Number.

Tonnage (Net).

Number.

Tonnage

(Net).

1 1881

i 1905

7815 5596

176 513

93.698 462,259

7.639 5,083

895.359 570,355

Among the steamers the increase has chiefly taken place in vessels of more than 1000 tons displacement, but the number of large sailing

vessels has also increased. The most important Italian ports are (in order) : Genoa, Naples, Palermo, Leghorn, Messina, Venice, Catania.

Foreign Trade. — Italian trade with foreign countries (imports and exports) during the quinquennium 1872-1876 averaged £94,000,000 a year; in the quinquennium 1 893-1 897 it fell to £88,960,000 a year. In 1898, however, the total rose to £104,680,000, but the increase was principally due to the extra importation of corn in that year. In 1899 it was nearly £120,000,000. Since 1899 there has been a steady increase both in imports and exports. Thus : —

Year.

Trade with Foreign Countries in £1000 (exclusive of Precious Metals).
1

Totals.

Imports.

Exports.

Excess of

Imports over

Exports.

1871 1881 1891 1900 1904

81,966

96,208

80,135

121,538

HO,437

38,548 49,587

45.o63

68,009 76,549

43.418 46,621 35.072 53.529 63,888

-4.870 2,966

9,991

14,480 12,661

1 No account has here been taken of fluctuations of exchange.

The great extension of Italian coast-line is thought by some to be not really a source of strength to the Italian mercantile marine, as few of the ports have a large enough hinterland to provide them with traffic, and in this hinterland (except in the basin of the Po) there are no canals or navigable rivers. Another source of weakness is the fact that Italy is a country of transit and the Italian mercantile marine has to enter into competition with the ships of other countries, which call there in passing. A third difficulty is the comparatively small tonnage and volume of Italian exports relatively to the imports, the former in 1907 being about one-fourth of the latter, and greatly out of proportion to the relative value; while a fourth is the lack of facilities for handling goods, especially in the smaller ports.

The total imports for the first six months of 1907 amounted to £57,840,000, an increase of £7,520,000 as compared with the corresponding period of 1906. The exports for the corresponding period amounted to £35,840,000, a diminution of £1,520,000 as compared with the corresponding period of 1906. The diminution was due to a smaller exportation of raw silk and oil. The countries with which this trade is mainly carried on are : (imports) United Kingdom, Germany, United States, France, Russia and India; (exports) Switzerland, United States, Germany, France, United Kingdom and Argentina.

The most important imports are minerals, including coal and metals (both in pig and wrought) ; silks, raw, spun and woven ; stone, potter's earths, earthenware and glass; corn, flour and farinaceous products; cotton, raw, spun and woven ; and live stock. The principal exports are silk and cotton tissues, live stock, wines, spirits and oils; corn, flour, macaroni and similar products; and minerals, chiefly sulphur. Before the tariff reform of 1887 manu- factured articles, alimentary products and raw materials for manu- facture held the principal places in the imports. In the exports, alimentary products came first, while raw materials for manufacture and manufactured articles were of little account. The transforma- tion of Italy from a purely agricultural into a largely industrial country is shown by the circumstance that trade in raw stuffs, semi- manufactured and manufactured materials, now preponderates over that in alimentary

products and wholly-manufactured articles, both the importation of raw materials and the exportation of manufactured articles having increased. The balance of Italian trade has under- gone frequent fluctuations. The large predominance of imports over exports after 1884 was a result of the falling off of the export trade in live stock, olive oil and wine, on account of the closing of the French market, while the importation of corn from Russia and the Balkan States increased considerably. In 1894 the excess of imports over exports fell to £2,720,000, but by 1898 it had grown to £8,391,000, in consequence chiefly of the increased importation of coal, raw cotton and cotton thread, pig and cast iron, old iron, grease and oil-seeds for use in Italian industries. In 1899 the excess of imports over exports fell to £3,006,000; but since then it has never been less than £12,000,000.

Education. — Public instruction in Italy is regulated by the state, which maintains public schools of every grade, and requires that other public schools shall conform to the rules of the state schools. No private person may open a school without state authorization. Schools may be classed thus: —

1. Elementary, of two grades, of the lower of which there must legally be at least one for boys and one for girls in each commune; while the upper grade elementary school is required in communes having normal and secondary schools or over 4000 inhabitants. In both the instruction is free They are maintained by the communes, sometimes with state help.

The age limit is six to nine years for the lower grade, and up to twelve for the higher grade, attendance being obligatory at the latter also where it exists. 2. Secondary instruction (i.) classical in the ginnasi and licet, the latter leading to the universities; (ii.) technical. 3. Higher education — universities, higher institutes and special schools.

Of the secondary and higher educatory methods, in the normal schools and licei the state provides for the payment of the staff and for scientific material, and often largely supports the ginnasi and technical schools, which should by law be supported by the communes. The universities are maintained by the state and by their

own ancient resources; while the higher special schools are maintained conjointly by the state, the province, the com- mune and (sometimes) the local chamber of commerce.

The number of persons unable to read and write has gradually decreased, both absolutely and in proportion to the number of inhabitants. The census of 1871 gave 73% of illiterates, that of 1881, 67%, and that of 1901, 56%, i.e. 51-8 for males and 6o-8 for females. In Piedmont there were 17-7% of illiterates above six years (the lowest) and in Calabria 78-7% (the highest), the figures for the whole country being 48-5. As might be expected, progress has been most rapid wherever education, at the moment of national unification, was most widely diffused. For instance, the number of bridegrooms unable to write their names in 1872 was in the province of Turin 26%, and in the Calabrian province of Cosenza 90%; in 1899 the percentage in the province of Turin had fallen to 5 , while in that of Cosenza it was still 76. Infant asylums (where the first rudiments of instruction are imparted to children between two and a half and six years of age) and elementary schools have increased in number. There has been a corresponding increase in the number of scholars. Thus: —

Year.

Infant Asylums (Public and Private).

Daily Elementary Schools (Public and Private).

Number of Asylums.

Number of Scholars.

Number of Schoolrooms.

Number of Scholars.

1885-86 1890-91 1901-02

2083 2296

33H

240,365 278,204

355.594

53.628 57.077 61,777

2,252,898 2,418,692 2,733.349

greatest increase has taken place in technical education, where it has been much more rapid than in classical education. There are three higher commercial schools, with academic rank, at Venice, Genoa and Bari, and eleven secondary commercial schools; and technical and commercial schools for women at Florence and Milan. The number of agricultural schools has also grown, although the total is relatively small when compared with population. The attendance at the various classes of secondary schools in 1882 and 1902 is shown by the following table : —

The teachers in 1901-1902 numbered 65,739 (exclusive of 576 non-teaching directors and 322 teachers of special subjects) or about 41-5 scholars per teacher.

The rate of increase in the public state-supported schools has been much greater than in the private schools. School buildings have been improved and the qualifications of teachers raised. Neverthe- less, many schools are still defective, both from a hygienic and a teaching point of view; while the economic position of the ele- mentary teachers, who in Italy depend upon the communal admini- strations and not upon the state, is still in many parts of the country extremely low.

The law of 1877 rendering education compulsory for children between six and nine years of age has been the principal cause of the spread of elementary education. The law is, however, imperfectly enforced for financial reasons. In 1901-1902 only 65 % out of the whole number of children between six and nine years of age were registered in the lower standards of the elementary and private schools. The evening schools have to some extent helped to spread education. Their number and that of their scholars have, however, decreased since the withdrawal of state subsidies. In 1871-1872 there were 375,947 scholars at the evening schools and 154,585 at the holiday schools, while in 1900-1901 these numbers had fallen to 94,510 and 35,460 respectively. These are, however, the only institutions in which a decrease is shown, and by the law of 1906 5000 of these institutions are to be provided in the communes where the proportion of illiterates is highest. In 1895 they numbered 4245, with 138,181 scholars. Regimental schools impart elementary education to illiterate soldiers. Whereas the levy of 1894 showed 40% of the recruits to be completely illiterate, only 27% were illiterate when the levy was discharged in 1897. Private institutions and working-class associations have striven to improve the intel- lectual conditions of the working classes. Popular

universities have lately attained considerable development. The number of institutes devoted to secondary education remained almost unchanged between 1880-1881 and 1895-1896. In some places the number has even been diminished by the suppression of private educational institutes. But the number of scholars has considerably increased, and shows a ratio superior to the general increase of the population. The

1882.

1902.

No. of Schools.

Ginnasi —

Government

On an equal footing with govern- ment schools

Not on such a footing ….

Total . . .

Technical schools — ■

On an equal footing …. Not on such a footing ….

Total . . .

Licei —

On an equal footing …. Not on such a footing ….

Total . . .

Technical institutes —

On an equal footing …. Not on such a footing.

Total . . .

Nautical institutes —

On an equal footing …. Not on such a footing ….

Total . . .

13.875

6,417 22,609

24,081

7.208 24.850′

192

76, 442

42,811

56,139

710

7.5IO

8,653 8,670

30,411 12,055 3.623 1

188

IOI

I06 1

24.833

46,089

395

6,623 1,167 4,600

10,983 1.955 4.962′

121

33

187

12,390

17,900

341

5.555

1,684

619

9.654

1,898

378′

54 18

7

7,858

11,930

79

758 69

13

1,878 38 29 1

18 1 1

816

1.945

20

1 1896.

The schools which do not obtain equality with government schools are either some of those conducted by religious orders, or else those in which a sufficient standard is not reached. The total number of such schools was, in 1896, 742 with 33,813 pupils.

The pupils of the secondary schools reach a maximum of 6-6o per

1000 in Liguria and 5-92 in Latium, and a minimum of 2-30 in the Abruzzi, 2-27 in Calabria and 1-65 in Basilicata.

For the boarding schools, or convitti, there are only incomplete reports except for the institutions directly dependent on the ministry of public instruction, which are comparatively few. The rest are largely directed by religious institutions. In 1 895-1 896 there were 919 convitti for boys, with 59,066 pupils, of which 40, with 3814 pupils, were dependent on the ministry (in 1901-1902 there were 43 of these with 4036 pupils) ; and 1456 for girls, with 49,367 pupils, of which only 8, with about 600 pupils, were dependent on the ministry.

The scuole normali or training schools (117 in number, of which 75 were government institutions) for teachers had 1329 male students in 1901-1902, showing hardly any increase, while the female students increased from 8005 in 1882-1883 to 22,316 in 1895-1896, but decreased to 19,044 in 1901-1902, owing to the admission of women to telegraph and telephone work. The female secondary schools in 1881-1882 numbered 77, of which 7 were government institutions, with 3569 pupils; in 1901-1902 there were 233 schools (9 governmental) with 9347 pupils.

The total attendance of students in the various faculties at the different universities and higher institutes is as follows : —

1882.

1902.

Law

Philosophy and letters Medicine and surgery Professional diploma, pharmacy Mathematics and natural science

Engineering

Agriculture

Total

4,801 419

4,428 798

1.364 982

145 128

8,385

1.703

9.055

. 3.290

3.500

1.293

507

167

13.065

27,900

LIBRARIES AND CHARITIES]

ITALY

i7

Thus a large all-round increase in secondary and higher education is shown — satisfactory in many respects, but showing that more young men devote themselves to the learned professions (especially to the law) than the economic condition of the country will justify. There are 21 universities— Bologna, Cagliari, Camerino, Catania, Ferrara,Genoa,Macerata, Messina, Modena, Naples, Padua, Palermo, Parma, Pavia, Perugia, Pisa, Rome, Sassari, Siena, Turin, Urbino, of which Camerino, Ferrara, Perugia and Urbino are not state institutions; university courses are also given at Aquila, Bari and Catanzaro. Of these the most frequented in 1 904-1 905 were: Naples (4745). Turin (3451), Rome (2630), Bologna (171 1), Pavia (1559), Padua (1364), Genoa (1276), and the least frequented, Cagliari (254), Siena (235) and Sassari (200). The professors are ordinary and extraordinary, and free professors (liberi docenti), corresponding to the German Privatdozenten, are also allowed to be attached to the universities.

The institutions which co-operate with the universities are the special schools for engineers at Turin, Naples, Rome and Bologna (and others attached to some of the universities), the higher technical institute at Milan, the higher veterinary schools of Milan, Naples and Turin, the

institute for higher studies at Florence {Istituto di studi superiori, pratici e di perfezionamento) , the literary and scientific academy of Milan, the higher institutes for the training of female teachers at Florence and Rome, the Institute of Social Studies at Florence, the higher commercial schools at Venice, Bari and Genoa, the commercial university founded by L. Bocconi at Milan in 1902, the higher naval school at Genoa, the higher schools of agriculture at Milan and Portici, the experimental institute at Perugia, the school of forestry at Vallambrosa, the industrial museum at Turin. The special secondary institutions, distinct from those already reckoned under the universities and allied schools, include an Oriental institute at Naples with 243 pupils; 34 schools of agriculture with (1904-1905) 1925 students; 2 schools of mining (at Caltanisetta and Iglesias) with (1904-1905) 83 students; 308 industrial and commercial schools with (1903-1904) 46,411 students; 174 schools of design and moulding with (1898) 12,556 students; 13 government fine art institutes (1904-1905) with 2778 students and 13 non- government with 1662 students; 5 government institutes of music with 1026 students, and 51 non-government with 4109 pupils (1904- 1905). Almost all of these show a considerable increase.

Libraries are numerous in Italy, those even of small cities being often rich in manuscripts and valuable works. Statistics collected in 1893-1894 and 1896 revealed the existence of 1831 libraries, either private (but open to the public) or completely public. The public libraries have been enormously increased since 1870 by the incorporation of the treasures of suppressed monastic institutions. The richest in manuscripts is that of the Vatican, especially since the purchase of the Barberini Library in 1902; it now contains over 34,000 MSS. The Vatican archives are also of great importance. Most large towns contain im- portant state or communal archives, in which a considerable amount of research is being done by local investigators; the various societies for local history [Societa di Storia Patria) do very good work and issue valuable publications; the treasures which the archives contain are by no means exhausted. Libraries and archives are under the superintendence of the Ministry of Public Instruction. A separate department of this ministry under a director-general has the charge of antiquities and fine arts, making archaeological excavations and supervising those undertaken by private persons (permission to foreigners, even to foreign schools, to excavate in Italy is rarely granted), and maintaining the numerous state museums and picture galleries. The exportation of works of art and antiquities from Italy without leave of the ministry is forbidden (though it has in the past been sometimes evaded). An inventory of those subjects, the

exportation of which can in no case be permitted, has been prepared; and the ministry has at its disposal a fund of £200,000 for the purchase of important works of art of all kinds.

Charities. — In Italy there is no legal right in the poor to be supported by the parish or commune, nor any obligation on the commune to relieve the poor — except in the case of forsaken children and the sick poor. Public charity is exercised through the permanent charitable foundations {opere pie), which are, however, very unequally distributed in the different provinces. The districts of Italy which show between 1881 and 1903 the greatest increase of new institutions, or of gifts to old ones, are Lombardy, Piedmont, Liguria, while Sardinia, Calabria and Basilicata stand lowest, Latium standing comparatively low.

The patrimony of Italian charitable institutions is considerable and is constantly increasing. In 1880 the number of charitable

institutions (exclusive of public pawnshops, or Monti di Pieta, and other institutions which combine operations of credit with charity) was approximately 22,000, with an aggregate patrimony of nearly £80,000,000. The revenue was about £3,600,000; after deduction of taxes, interest on debts, expenses of management, &c, £2,080,000. Adding to this £1,240,000 of communal and provincial subsidies, the product of the labour of inmates, temporary subscriptions, &c, the net revenue available for charity was, during 1880, £3,860,000. Of this sum £260,000 was spent for religious purposes. Between 1881 and 1905 the bequests to existing institutions and sums left for the endowment of new institutions amounted to about £16,604,600.

Charitable institutions take, as a rule, the two forms of outdoor and indoor relief and attendance. The indoor institutions are the more important in regard to endowment, and consist of hospitals for the infirm (a number of these are situated at the seaside) ; of hospitals for chronic and incurable diseases ; of orphan asylums ; of poorhouses and shelters for beggars; of infant asylums or in- stitutes for the first education of children under six years of age ; of lunatic asylums ; of homes for the deaf and dumb ; and of institutes for the blind. The outdoor charitable institutions include those which distribute help in money or food; those which supply medicine and medical help ; those which aid mothers unable to rear their own children; those which subsidize orphans and foundlings; those which subsidize educational institutes ; and those which supply marriage portions. Between 1881 and 1898 the chief increases took place in the endowments of hospitals; orphan asylums; infant asylums; poorhouses; almshouses;

voluntary workhouses', and institutes for the blind. The least creditably administered of these are the asylums for abandoned infants; in 1887, of a total of 23,913, 53-77% died; while during the years 1893-1896 (no later statistics are available) of 117,970 51-72% died. The average mortality under one year for the whole of Italy in 1893-1896 was only 16-66 %

Italian charity legislation was reformed by the laws of 1862 and 1890, which attempted to provide efficacious protection for endow- ments, and to ensure the application of the income to the purposes for which it was intended. The law considers as " charitable in- stitutions " {opere pie) all poorhouses, almshouses and institutes which partly or wholly give help to able-bodied or infirm paupers, or seek to improve their moral and economic condition ; and also the Congregazioni di caritd (municipal charity boards existing in every commune, and composed of members elected by the municipal council), which administer funds destined for the poor in general. All charitable institutions were under the protection of provincial adminis- trative junta, existing in every province, and empowered to control the management of charitable endowments. The supreme control was vested in the minister of the Interior. The law of 1890 also empowers every citizen to appeal to the tribunals on behalf of the poor, for whose benefit a given charitable institution may have been intended. A more recent law provides for the formation of a central body, with provincial commissions under it. Its effect, however, has been comparatively small.

Public pawnshops or Monti di pietd, numbered 555 in 1896, with a net patrimony of £2,879,625. In that year their income, including revenue from capital, was £416,385, and their expenditure £300,232. The amount lent on security was £4,153,229.

The Monti frumentarii or co-operative corn deposits, which lend seed corn to farmers, and are repaid after harvest with interest in kind, numbered 1615 in 1894, and possessed a patrimony of £240,000.

In addition to the regular charitable institutions, the communal and provincial authorities exercise charity, the former (in 1899) to the extent of £1,827,166 and the latter to the extent of £919,832 per annum. Part of these sums is given to hospitals, and part spent directly by the communal and provincial authorities. Of the sum spent by the communes, about \ goes for the sanitary service (doctors, midwives, vaccination), -| for the maintenance of foundlings, 1*5 for the support of the sick in hospitals, and fa for sheltering the aged and needy. Of the sum spent by the provincial authorities, over half goes to lunatic

asylums and over a quarter to the mainten ance of foundling hospitals.

Religion. — The great majority of Italians — 97-12% — are Roman Catholics. Besides the ordinary Latin rite, several others are recognized. The Armenians of Venice maintain their traditional characteristics. The Albanians of the southern provinces still employ the Greek rite and the Greek language in their public worship, and their priests, like those of the Greek Church, are allowed to marry. Certain peculiarities introduced by St Ambrose distinguish the ritual of Milan from that of the general church. Up to 187 1 the island of Sicily was, according to the bull of Urban II., ecclesiastically dependent on the king, and exempt from the canonical power of the pope.

Though the territorial authority of the papal see was practically abolished in 1870, the fact that Rome is the seat of the administrative centre of the vast organization of the church is not without significance to the nation. In the same city in which the administrative functions of the body politic are centralized

there still exists the court of the spiritual potentate which in 1879 consisted of 1821 persons. Protestants number some 65,000, of whom half are Italian and half foreign. Of the former 22,500 are Waldensians. The number of Jews was returned as 36,000, but is certainly higher. There are, besides, in Italy some 2500 members of the Greek Orthodox Church. There were in 1001 20,707 parishes in Italy, 68,444 secular clergy and 48,043 regulars (monks, lay brothers and nuns). The size of parishes varies from province to province, Sicily having larger parishes in virtue of the old Sicilian church laws, and Naples, and some parts of central Italy, having the smallest. The Italian parishes had in 1901 a total gross revenue, including assignments from the public worship endowment fund, of £1,280,000 or an average of £63 per parish; 51% of this gross sum consists of revenue from glebe lands.

The kingdom is divided into 264 sees and ten abbeys, or prelatures nullius dioceseos. The dioceses are as follows : —

A. 6 suburbicarian sees — Ostia and Velletri, Porto and Sta Rufina, Albano, Frascati, Palestrina, Sabina — all held by cardinal bishops.

B. 74 sees immediately subject to the Holy See, of which 12 are archiepiscopal and 61 episcopal.

C. 37 ecclesiastical provinces, each under a metropolitan, com- posed of 148 suffragan dioceses. Their position is indicated in the following table : —

Metropolitans. Suffragans.

Acerenza-Matera . . . Anglona-Tursi, Tricarico, Venosa.

Bari Conversano, Ruvo-Bitonto.

Benevento . . . . S. Agata de' Goti, Alife, Ariano, Ascoli

Satriano Cerignola, Avellino, Bojano, Bovino, Larino, Lucera, S. Severo, Telese (Cerreto), Termoli.

Bologna Faenza, Imola.

Brindisi and Ostuni . . No suffragan.

Cagliari Galtelli-Nuoro, Iglesias, Ogliastra.

Capua Caiazzo, Calvi-Teano, Caserta, Isernia-

Venafro, Sessa. Chieti and Vasto . . . No suffragan.

Conza and Campagna . S. Angelfj de' Lombardi-Bisaccia, Lace-

donia, Muro Lucano.

Ferrao Macerata-Tolentino, Montalto, Ripatran-

sone, S. Severino.

Florence Borgo S. Sepolcro, Colle di Val d'Elsa,

Fiesole, S. Miniato, Modigliana, Pistoia- Prato.

Genoa Albenga, Bobbio, Chiavari, Savona-Noli,

Tortona, Ventimiglia. Lanciano and Ortona . No suffragan.
Manfredonia and Viesti . No suffragan.

Messina Lipari, Nicosia, Patti.

Milan Bergamo, Brescia, Como, Crema,

Cremona, Lodi, Mantua, Pavia.

Modena Carpi, Guastalla, Massa-Carrara, Reggio.

Monreale Caltanisetta, Girgenti.

Naples Acerra, Ischia, Nola, Pozzuoli.

Oristano Ales-Terralba.

Otranto Gallipoli, Lecce, Ugento.

Palermo Cefalu, Mazzara, Trapani.

Pisa Leghorn, Pescia, Pontremoli, Volterra.

Ravenna Bertinoro, Cervia, Cesena, Comacchio,

Forli, Rimini, Sarsina. Reggio Calabria . . . Bova, Cassano, Catanzaro, Cotrone, Gerace, Nicastro, Oppido, Nicotera- Tropea, Squillace.

Salerno Acerno, Capaccio-Vallo, Diano, Marsico-

Nuovo and Potenza, Nocera dei Pagani, Nusco, Policastro.

Sassari Alghero, Ampurias and Tempio, Bisarhio,

Bosa. S. Severino …. Cariati.

Siena Chiusi-Pienza,Grosseto,MassaMarittima,

Sovana-Pitigliano.

Syracuse Caltagirone, Noto, Piazza-Armerina.

Sorrento Castellammare.

Taranto Castellaneta, Oria.

Trani-Nazareth-Barletta,

Bisceglie …. Andria.

Turin Acqui, Alba, Aosta, Asti, Cuneo, Fossano,

Ivrea, Mondovi.Pinerolo, Saluzzo.Susa.

Urbino S. Angelo in Vado-Urbania, Cagli- Pergola,

Fossombrone, Montefeltro, Pesaro, Sinigaglia. Venice (patriarch) . . Adria, Belluno-Feltre, Ceneda (Vittorio),

Chioggia, Concordia-Portogruaro,

Padua, Treviso, Verona, Vicenza.

Vercelli Alessandria della Paglia, Biella, Casale,

Monferrato, Novara, Vigevano.

Twelve archbishops and sixty-one bishops are independent of all metropolitan supervision, and hold directly of the Holy See. The archbishops are those of Amain, Aquila, Camerino and Treia, Catania, Cosenza, Ferrara, Gaeta, Lucca, Perugia, Rossano, Spoleto, and Udine, and the bishops those of Acireale, Acquapendente, Alatri, Amelia, Anagni, Ancona-Umana, Aquino-Sora-Pontecorvo, Arezzo, Ascoli, Assisi, Aversa, Bagnorea, Borgo San Donnino, Cava-Sarno, Citta di Castello, Citta della Pieve, Civita Castellana-Orte-Gallese, Corneto-Civita Vecchia; Cortona, Fabriano-Matelica, Fano,Ferentino Foggia, Foligno, Gravina-Montepeloso, Gubbio, Jesi, Luni-Sarzana and Bragnato, S. Marco-Bisignano, Marsi (Pescina), Melfi-Rapolla Mileto,Molfetta-Terlizzi-Giovennazzo,Monopoli,Montalcino,Monte-fiascone, Montepulciano, Nardo, Narni, Nocera in Umbria, Norcia, Orvieto, Osimo-Cingoli, Parma, Penne-Atri, Piacenza, Poggio Mirteto, Recanati-Loreto, Rieti, Segni, Sutri-Nepi, Teramo, Terni, Terracina-Piperno-Sezze, Tivoli, Todi, Trivento, Troia, Valva- Sulmona, Veroli, Viterbo-Toscanella. Excluding the diocese of Rome and suburbicarian sees, each see has an average area of 430 sq. m. and a population of 121,285 souls. The largest sees exist in Venetia and Lombardy, and the smallest in the provinces of Naples, Leghorn, Forli, Ancona, Pesaro, Urbino, Caserta, Avellino and Ascoli. The Italian sees (exclusive of Rome and of the suburbi- carian sees) have a total annual revenue of £206,000 equal to an average of £800 per see. The richest is that of Girgenti, with £6304, and the poorest that of Porto Maurizio, with only £246. In each diocese is ˆ seminary or diocesan school.

In 1855 an act was passed in the Sardinian states for the dis-establishment of all houses of the religious orders not engaged in preaching, teaching or the care of the sick, of all chapters „ „ . of collegiate churches not having a cure of souls or existing p *”?”/ in towns of less than 20,000 inhabitants, and of all private tu!ns ”’ benefices for which no service was paid by the holders. The property and money thus obtained were used to form an ecclesi- astical fund

(Cassa Ecclesiastica) distinct from the finances of the state. This act resulted in the suppression of 274 monasteries with 3733 friars, of 61 nunneries with 1756 nuns and of 2722 chapters and benefices. In i860 and 1861 the royal commissioners (even before the constitution of the new kingdom of Italy had been formally declared) issued decrees by which there were abolished — (1) in Umbria, 197 monasteries and 102 convents with 1809 male and 2 393 female associates, and 836 chapters or benefices; (2) in the Marches, 292 monasteries and 127 convents with 2950 male and 2728 female associates ; (3) in the Neapolitan provinces, 747 monas- teries and 275 convents with 8787 male and 7493 female associates. There were thus disestablished in seven or eight years 2075 houses of the regular clergy occupied by 31,649 persons; and the confiscated property yielded a revenue of £398,298. And at the same time there had been suppressed 11,889 chapters and benefices of the secular clergy, which yielded an annual income of £199,149. The value of the capital thus potentially freed was estimated at £12,000,000; though hitherto the ecclesiastical possessions in Lombardy, Emilia, Tuscany and Sicily had been untouched. As yet the Cassa Ecclesi- astica had no right to dispose of the property thus entrusted to it ; but in 1862 an act was passed by which it transferred all its real property to the national domain, and was credited with a corre- sponding amount by the exchequer. The property could now be disposed of like the other property of the domain; and except in Sicily, where the system of emphyteusis was adopted, the church lands began to be sold by auction. To encourage the poorer classes of the people to become landholders, it was decided that the lots offered for sale should be small, and that the purchaser should be allowed to pay by five or ten yearly instalments. By a new act in 1866 the process of secularization was extended to the whole kingdom. All the members of the suppressed communities received full exercise of all the ordinary political and civil rights of laymen ; and annuities were granted to all those who had taken permanent religious vows prior to the 18th of January 1864. To priests and choristers, for example, of the proprietary or endowed orders were assigned £24 per annum if they were upwards of sixty years of age, £16 if upwards of 40, and £14, 8s. if younger. The Cassa Ecclesiastica was abolished, and in its stead was instituted a Fondo pel Culto, or public worship fund. From the general confiscation were exempted the buildings actually used for public worship, as episcopal residences or seminaries, &c, or which had been appropriated to the use of schools, poorhouses, hospitals, &c. ; as well as the buildings, appurtenances, and movable property of the abbeys of Monte Casino, Delia Cava dei Tirreni, San Martino della Scala, Monreale, Certosa near Pavia, and other estab- lishments of the same kind of importance as architectural

or historical monuments. An annuity equal to the ascertained revenue of the suppressed institutions was placed to the credit of the fund in the government 5 % consols. A fourth of this sum was to be handed to the communes to be employed on works of beneficence or education as soon as a surplus was obtained from that part of the annuity assigned for the payment of monastic pensions; and in Sicily, 209 communes entered on their privileges as soon as the patrimony was liquidated. Another act in 1867 decreed the suppression of certain foundations which had escaped the action ‘of previous measures, put an extraordinary tax of 30 % on the whole of the patrimony of the church, and granted the government the right of issuing 5 % bonds sufficient to bring into the treasury £16,000,000,

which were to be accepted at their nominal value as purchase money for the alienated property. The public worship endowment fund has relieved the state exchequer of the cost of public worship; has gradually furnished to the poorer parish priests an addition to their stipends, raising them to £32 per annum, with the prospect of further raising them to £40; and has contributed to the outlay incurred by the communes for religious purposes. The monastic buildings required for public purposes have been made over to the communal and provincial authorities, while the same authorities have been entrusted with the administration of the ecclesiastical revenues previously set apart for charity and education, and objects of art and historical interest have been consigned to public libraries and museums. By these laws the reception of novices was for- bidden in the existing conventual establishments the extinction of which had been decreed, and all new foundations were forbidden, except those engaged in instruction and the care of the sick. But the laws have not been rigorously enforced of late years; and the ecclesiastical possessions seized by the state were thrown on the market simultaneously, and so realized very low prices, being often bought up by wealthy religious institutions. The large number of these institutions was increased when these bodies were expelled from France.

On the 30th of June 1903 the patrimony of the endowment fund amounted to £17,339,040, of which only £264,289 were represented by buildings still occupied by monks or nuns. The rest was made up of capital and interest. The liabilities of the fund (capitalized) amounted

to £10,668,105, of which monastic pensions represented a rapidly diminishing sum of £2,564,930. The chief items of annual expenditure drawn from the fund are the supplementary stipends to priests and the pensions to members of suppressed religious houses. The number of persons in receipt of monastic pensions on the 30th of June 1899 was 13,255; but while this item of expenditure will disappear by the deaths of those entitled to pensions, the supple- mentary stipends and contributions are gradually increasing. The following table shows the course of the two main categories of the fund from 1876 to 1902-1903 : —

1876.

1 885-1 886.

1898-1899.

1 902- 1 903.

Monastic pensions, liquidation of re- ligious property and provision of

Supplementary stipends to bishops and parochial clergy, assignments to Sar- dinian clergy and expenditure for edu- cation and charitable purposes

£749.172

142,912

£491,339

128,521

£220,479

210,020

£165,144

347.940

Roman Charitable and Religious Fund. — The law of the 19th of June 1873 contained special provisions, in conformity with the character of Rome as the seat of the papacy, and with the situation created by the Law of Guarantees. According to the census of 1 87 1 there were in the city and province of Rome 474 monastic establish- ments (311 for monks, 163 for nuns), occupied by 4326 monks and 3825 nuns, and

possessing a gross revenue of 4,780,891 lire. Of these, 126 monasteries and 90 convents were situated in the city, 51 monasteries and 22 convents in the ” suburbicariates.” The law of 1873 created a special charitable and religious fund of the city, while it left untouched 23 monasteries and 49 convents which had either the character of private institutions or were supported by foreign funds. New parishes were created, old parishes were improved, the property of the suppressed religious corporations was assigned to charitable and educational institutions and to hospitals, while property having no special application was used to form a charitable and religious fund. On the 30th of June 1903 the balance-sheet of this fund showed a credit amounting to £1,796,120 and a debit of £460,819. Expenditure for the year 1902-1903 was £889,858 and revenue £818,674.

Constitution and Government. — The Vatican palace itself (with St Peter’s), the Lateran palace, and the papal villa at Castel Gandolfo have secured to them the privilege of extraterritoriality by the law of 1871. The small republic of San Marino is the only other enclave in Italian territory. Italy is a constitutional monarchy, in which the executive power belongs exclusively to the sovereign, while the legislative power is shared by him with the parliament. He holds supreme command by land and sea, appoints ministers and officials, promulgates the laws, coins money, bestows honours, has the right of pardoning, and summons and dissolves the parliament. Treaties with foreign powers, however, must have the consent of parliament. The sovereign is irresponsible, the ministers, the signature of one of whom is required to give validity to royal decrees, being responsible. Parliament consists of two chambers, the senate and the Chamber of Deputies, which are nominally on an equal footing, though practically

the elective chamber is the more important. The senate consists of princes of the blood who have attained their majority, and of an unlimited number of senators above forty years of age, who are qualified under any one of twenty-one specified cate- gories — by having either held high office, or attained celebrity in science, literature, &c. In 1908 there were 318 senators exclusive of five members of the royal family. Nomination is by the king for life. Besides its legislative functions, the senate is the highest court of justice in the case of political offences or the impeachment of ministers. The deputies to the lower house are 508 in number, i.e. one to every 64,893 of the population, and all the constituencies are single-member constituencies. The party system is not really strong. The suffrage is extended to all citizens over twenty-one years of age who can read and write and have either attained a certain standard of

elementary education or are qualified by paying a rent which varies from £6 in communes of 2500 inhabitants to £16 in communes of i5P,ooo inhabitants, or, if peasant farmers, 16s. of rent; or by being sharers in the profits of farms on which not less than £3, 4s. of direct (including provincial) taxation is paid; or by paying not less than £16 in direct (including provincial) taxation. Others, e.g. members of the professional classes, are qualified to vote by their position. The number of electors (2,541,327) at the general election in 1904 was 29% of the male population over twenty-one years of age, and 7-6% of the total population — exclusive of those temporarily disfranchised on account of military service; and of these 62-7% voted. No candidate can be returned unless he obtains more than half the votes given and more than one-sixth of the total number on the register; otherwise a second ballot must be held. Nor can he be returned under the age of thirty, and he must be qualified as an elector. All salaried government officials (except minis- ters, under-secretaries of state and other high functionaries, and officers in the army or navy), and ecclesiastics, are disqualified for election. Senators and deputies receive no salary but have free passes on railways throughout Italy and on certain lines of steamers. Parliaments are quinquennial, but the king may dissolve the Chamber of Deputies at any time, being bound, however, to convoke a new chamber within four months. The executive must call parliament together annually. Each of the chambers has the right of introducing new bills, as has also the government; but all money bills must originate in the Chamber of Deputies. The consent of both chambers and the assent of the king is necessary to their being passed. Ministers may attend the debates of either house but can only vote in that of which they are members. The sittings of both houses are public, and an absolute majority of the members must be present to make a sitting valid. The ministers are eleven in number and have salaries of about £1000 each; the presidency of the council of ministers (created in 1889) may be held by itself or (as is usual) in conjunction with any other portfolio. The ministries are : interior (under whom are the prefects of the several provinces), foreign affairs, treasury (separated from finance in 1889), finance, \ public works, justice and ecclesiastical affairs, war, marine, public instruction, commerce, industry and agriculture, posts and telegraphs (separated from public works in 1889). Each minister is aided by an under-secretary of state at a salary of £500. There is a council of state with advisory functions, which can also decide certain questions of administration, especially applications from local authorities and conflicts between ministries, and a court of accounts, which has the right of examining all details of state expenditure. In every country the bureaucracy is abused, with more or less reason, for un- progressiveness, timidity and ” red-tape,”

and Italy is no exception to the rule. The officials are not well paid, and are certainly numerous; while the manifold checks and counter-checks have by no means always been sufficient to prevent dishonesty.

Titles of Honour. — The former existence of so many separate sovereignties and ” fountains of honour ” gave rise to a great many hereditary titles of nobility. Besides many hundreds of princes, dukes, marquesses, counts, barons and viscounts, there are a large number of persons of ” patrician ” rank, persons with a right to the designation nobile or signori, and certain hereditary knights or cavalieri. In the ” Golden Book of the Capitol ” (Libro d’Oro del Campidoglio) are inscribed 321 patrician families, and of these 28 have the title of prince and 8 that of duke, while the others are marquesses, counts or simply patricians. For the Italian orders of knighthood see Knighthood and Chivalry: Orders of Knighthood. The king’s uncle is duke of Aosta, his son is prince of Piedmont and his cousin is duke of Genoa.

Justice.— The judiciary system of Italy is mainly framed on the French model. Italy has courts of cassation at Rome, Naples, Palermo, Turin, Florence, 20 appeal court districts, 162 tribunal districts and 1535 mandamenti, each with its own magistracy (prelum) . In 13 of the principal towns there are also pretori who have exclusively penal jurisdiction. For minor civil cases involving sums up to 100 lire (£4), giudici conciliatori have also jurisdiction, while they may act as arbitrators up to any amount by request. The Roman court of cassation is the highest, and in both penal and civil matters has a right to decide questions of law and disputes between the lower judicial authorities, and is the only one which has juris- diction in penal cases, while sharing with the others the right to revise civil cases.

The pretori have penal jurisdiction concerning all misdemeanours (contrayvenzioni) or offences (delitti) punishable by imprisonment not exceeding three months or by fine not exceeding 1000 lire (£40). The penal tribunals have jurisdiction in cases involving imprison- ment up to ten years, or a fine exceeding £40, while the assize courts, with a jury, deal with offences involving imprisonment for life or over ten years, and have exclusive jurisdiction (except that the senate is on occasion a high court of justice) over all political offences. Appeal may be made from the sentences of the pretori to the tribunals] and

from the tribunals to the courts of appeal; from the assize courts there is no appeal except on a point of form, which appeal goes to the court of cassation at Rome. This court has the supreme power in all questions of legality of a sentence, jurisdiction or competency.

The penal code was unified and reformed in 1890. A reform of late years is the condanna condizionale, equivalent to the English ” being bound over to appear for judgment if called upon,” applied in 94,489 cases in 1907. In civil matters there is appeal from the giudice conahatore to the pretore (who has jurisdiction up to a sum of 1500 lire = £60). from the pretore to the civil tribunal, from the civil tribunal to the court of appeal, and from the court of appeal to the court of cassation.

The judges of all kinds are very poorly paid. Even the first president of the Rome court of cassation only receives £600 a year.

The statistics of civil proceedings vary considerably from province to province. Lombardy, with 25 lawsuits per 1000 inhabitants, holds the lowest place; Emilia comes next with 31 per iooo- Tuscany has 39; Venetia, 42; Calabria, 144; Rome, 146; Apulia’ ‘53; and Sardinia, 360 per 1000. The high average in Sardinia is chiefly due to cases within the competence of the conciliation offices I he number of penal proceedings, especially those within the com- petence of praetors, has also increased, chiefly on account of the frequency of minor contraventions of the law referred to in the section Crime. The ratio of criminal proceedings to population is as a rule, much higher in the south than in the north.

A royal decree, dated February 1891, established three classes of prisons: judiciary prisons, for persons awaiting examination or persons sentenced to arrest, detention or seclusion for less than six months; penitentiaries of various kinds (ergastoli, case di reclusione detenztone or custodia), for criminals condemned to long terms of imprisonment; and reformatories, for criminals under age and vagabonds. Capital punishment was abolished in 1877 penal servitude for life being substituted. This generally involves solitary confinement of the most rigorous nature, and, as little is done to occupy the mind, the criminal not infrequently becomes insane. Certain types of dangerous individuals are relegated after serving a sentence in the ordinary convict prisons, and by administrative, not by judicial process, to special penal colonies known as domicilii coatti or forced residences. ‘ These establishments are, however, un- satisfactory, being mostly situated on small islands, where it is often difficult to find work for the coatti, who are free by day, being only confined at night. They

receive a small and hardly sufficient, allowance for food of 50 centesimi a day, which they are at liberty to supplement by work if they can find it or care to do it.

Notwithstanding the construction of new prisons and the transformation of old ones, the number of cells for solitary confinement is still insufficient for a complete application of the penal system established by the code of 1890, and the moral effect of the association of the prisoners is not good, though the system of solitary confinement as practised in Italy is little better. The total number of prisoners, including minors and inhabitants of enforced residences, which from 76,066 (2-84 per 1000 inhabitants) on the 31st of December 1871 rose to a maximum of 80,792 on the 31st of December 1879 (2-87 per 1000), decreased to a minimum of 60,621 in 1896 (1-94 per

1000), and on the 31st of December 1898 rose again to 75,470 (2-38 per 1000), of whom 7038, less than one-tenth, were women. The lowness of the figures regarding women is to be noticed throughout. On the 31st of December 1903 it had decreased to 65,819, of which 6044 were women. Of these, 31,219 were in lock- ups, 25,145 in penal establishments, 1837 minors in government, and 4547 in private reformatories, and 3071 (males) were inmates of forced residences.

Crime. — Statistics of offences, including contravoenzioni or breaches of by-laws and regulations, exhibit a considerable increase per 100,000 inhabitants since 1887, and only a slight diminution on the figures of 1897. The figure was 1783-45 per 100,000 in 1887, 2164-46 in 1892, 2546-49 in 1897, 2 497-90 in 1902. The increase is partly covered by contravvenzioni, but almost every class of penal offence shows a rise except homicide, and even in that the diminution is slow, 5418 in 1880, 3966 in 1887., 4408 in 1892, 4005 in 1897, 3202 in 1902; and Italy remains, owing to the frequent use of the knife, the European country in which it is most frequent. Libels, insults, &c, resistance to public authority, offences against good customs, thefts and frauds, have increased ; assaults are nearly stationary. There is also an increase in juvenile delinquency. From 1890 to 1900 the actual number rose by one-third (from 30,108 to 43,684), the proportion to the rest of those sentenced from one-fifth to one-fourth; while in 1905 the actual number rose to 67,944, being a considerable pro- portionate rise also. In Naples, the Camorra and in Sicily, the Mafia are secret societies whose power of resistance to authority is still not inconsiderable.

“Procedure, both civil and criminal, is somewhat slow, and the pre-

liminary proceedings before the juge a” instruction occupy much time; and recent murder trials, by the large number of witnesses called (including experts) and the lengthy speeches of counsel, have been dragged out to an unconscionable length. In this, as in the inter- vention of the presiding judge, the French system has been adopted; and it is said {e.g. by Nathan, Vent’ anni di vita italiana, p. 241) that. the efforts of the juge d ‘instruction are, as a rule, in fact, though not in law, largely directed to prove that the accused is guilty. In 1902 of 884,612 persons accused of penal offences, 13-12% were ac- quitted during the period of the instruction, 30-31 by the courts, 46-32 condemned and the rest acquitted in some other way. This shows that charges, often involving preliminary imprisonment, are brought against an excessive proportion of persons who either are not or cannot be proved to be guilty. The courts of appeal and cassation, too, often have more than they can do; in the year 1907 the court of cassation at Rome decided 948 appeals on points of law in civil cases, while no fewer than 460 remained to be decided.

As in most civilized countries, the number of suicides in Italy has increased from year to year.

The Italian suicide rate of 63-6 per 1,000,000 is, however, lower than those of Denmark, Switzerland, Germany and France’, while it approximates to that of England. The Italian rate is highest in the more enlightened and industrial north, and lowest in the south. Emilia gives a maximum rate of 10-48 per 100,000, while that of Liguria and Lazio is little lower. The minimum of 1-27 is found in the Basilicata, though Calabria gives only 2-13. About 20% of the total are women, and there is an increase of nearly 3 % since 1882 in the proportion of suicides under twenty years of age.

Army. — The Italian army grew out of the old Piedmontese army with which in the main the unification of Italy was brought about. This unification meant for the army the absorption of contingents from all parts of Italy and presenting serious differences in physical and moral aptitudes, political opinions and education. Moreover the strategic geography of the country required the greater part of the army to be stationed permanently within reach of the north-eastern and north-western frontiers. These conditions made a territorial system of recruiting or organ- ization, as understood in Germany, practically impossible. To secure fairly uniform efficiency in the various corps, and also as a means of unifying Italy, Piedmontese, Umbrians and Neapolitans are mixed in the same corps and sleep in the same barrack room. But on leaving the colours the men disperse to their homes, and thus a regiment has, on mobilization, to draw largely on

the nearest reservists, irrespective of the corps to which they belong. The remedy for this condition of affairs is sought in a most elaborate and artificial system of transferring officers and men from one unit to another at stated intervals in peace-time, but this is no more than a palliative, and there are other difficulties of almost equal importance to be surmounted. Thus in Italy the universal service system, though probably the best organization both for the army and the nation, works with a maximum of friction. ” Army Reform,” therefore, has been very much in the forefront of late years owing to the estrangement of Austria (whicb power can mobilize much more rapidly), but financial difficulties have hitherto stood in the way

of any radical and far-reaching reforms, and even the proposals of the Commission of 1907, referred to below, have only been partially accepted.

The law of 1875 therefore still regulates the principles of military service in Italy, though an important modification was made in 1907-1908. By this law, every man liable and accepted for service served for eight or nine years on the Active Army and its Reserve (of which three to five were spent with the colours), four or five in the Mobile Militia, and the rest of the service period of nineteen years in the Territorial Militia. Under present regulations the term of liability is divided into nine years in the Active Army and Reserve (three or two years with the colours) four in the Mobile Militia and six in the Territorial Militia. But these figures do not represent the actual service of every able-bodied Italian. Like almost all ” Universal Service ” countries, Italy only drafts a small pro- portion of the available recruits into the army.

The following table shows the operation of the law of 1875, with the figures of 1871 for comparison: —

30th Sept.

30th.

une.

1871.

1881.

1891.

1901.

Officers ‘

Men

ActingArmy & Reserve Mobile Militia Territorial Militia . .

14,070 521,969 536,039

22,482

1,833,554

73M49

294,714

823,970

36,739

2,821,367

843,160

445,315

1,553,784

36,718

3,330,202

734.401

320,170

2,275,631

1 Including officers on special service or in the reserve.

Thus, on the 30th of September 187 1 the various categories of the army included only 2 % of the population, but on the 30th of June

1898 they included 10%. But in 1901 the strength of the active army and reserve shows a marked diminution, which became accentuated in the year following. The table below in- dicates that up to 1907 the army, though always below its nominal strength, never absorbed more than a quarter of the available contingent.

1902.

1903.

1904.

1906.

Liable

441,171

453,640

469,860

475,737

Physically unfit . Struck off … . Failed to appear Put back for re-examina- tion

91,176 12,270 33,634

108,835

98,065 13,189

34,7H

108,618

119,070 13,130 39,219

107,173

122,559 18,222 40,226

122,205

Assigned to Territorial Militia and excused peace service .

92,952

96,916

94,136

87,032

Assigned to active army Joined active army . .

102,204 88,666

102,141

86,448

97,132 81,581

87,493 66,836

The serious condition of recruiting was quickly noticed, and the tabulation of each year's results was followed by a new draft law, but no solution was achieved until a special commission assembled. The inquiries made by this body revealed an unsatisfactory con- dition in the national defences, traceable in the main to financial exigencies, and as regards recruiting a new law was brought into force in 1907-1908.

One specially difficult point concerned the effectives of the peace-strength army. Hitherto the actual time of training had been less than the nominal. The recruits due to join in November were not incorporated till the following March, and thus in the winter months Italy was defenceless. The army is always maintained at a low peace effective (about one-quarter of war establishment) and even this was reduced, by the absence of the recruits, until there were often only 15 rank and file with a company, whose war strength is about 230. Even in the summer and autumn a large proportion of the army consisted of men with but a few months' service — a highly dangerous state of things considering the peculiar mobiliza- tion conditioiEs of the country. Further — and this case no legislation can cover — the contingent, and (what is more serious) the reserves, are being steadily weakened by emigration. The increase in the numbers rejected as unfit is accounted for by the fact that if only a small proportion of the contingent can be taken for service, the medical standard of acceptance is high.

The new recruiting scheme of 1907 re-established three categories of recruits, 1 the 2nd category corresponding practically to the German

Ersatz-Reserve. The men classed in it have to train for six months, and they are called up in the late summer to bridge the

‘The 2nd category of the 1875 ‘ aw had practically ceased to exist.

gap above mentioned. The new terms of service for the other categories have been already stated. In consequence, in 1908, of 490,000 liable, some 110,000 actually joined for full training and 24,000 of the new 2nd category for short training, which contrasts very forcibly with the feeble embodiments of 1906 and 1907. These changes threw a considerable strain on the finances, but the imminence of the danger caused their acceptance.

The peace strength under the new scheme is nominally 300,000, but actually (average throughout the year) about 240,000. The army is organized in 12 army corps (each of 2 divisions), 6 of which are quartered on the plain of Lombardy and Venetia and on the frontiers, and 2 more in northern Central Italy. Their headquarters are: I. Turin, II. Alessandria, III. Milan, IV. Genoa, V. Verona, VI. Bologna, VII. Ancona, VIII. Florence, IX. Rome, X. Naples, XI. Bari, XII. Palermo, Sardinian division Cagliari. In addition there are 22 ” Alpini ” battalions and 15 mountain batteries stationed on the Alpine frontiers.

The war strength was estimated in 1901 as, Active Army (incl. Reserve) 750,000, Mobile Militia 320,000, Territorial Militia 2,300,000 (more than half of the last-named untrained). These figures are, with a fractional increase in the Regular Army, applicable to-day. When the 1907 scheme takes full effect, however, the Active Army and the Mobile Militia will each be augmented by about one-third. In 1915 the field army should, including officers and permanent cadres, be about 1,012,000 strong. The Mobile Militia will not, however, at that date have felt the effects of the scheme, and the Territorial Militia (setting the drain of emigration against the increased population) will probably remain at about the same figure as in 1901.

The army consists of 96 three-battalion regiments of infantry of the line and 12 of bersaglieri (riflemen), each of the latter having a cyclist company (Bersaglieri cyclist battalions are being (1909) provisionally formed) ; 26 regiments of cavalry, of which 10 are lancers, each of 6 squadrons; 24 regiments of artillery, each of 8 batteries; 2 I regiment of horse artillery of 6 batteries; I of mountain artillery of 12 batteries, and 3 independent mountain batteries. The armament of the infantry is the Mannlicher-Carcano magazine rifle of 1891. The field and horse artillery was in 1909 in process of rearmament with a Krupp quick-firer. The garrison artillery consists of 3 coast and 3 fortress

regiments, with a total of 72 companies. There are 4 regiments (11 battalions) of engineers. The carabinieri or gendarmerie, some 26,500 in number, are part of the standing army; they are recruited from selected volunteers from the army. In 1902 the special corps in Eritrea numbered about 4700 of all ranks, including nearly 4000 natives.

Ordinary and extraordinary military expenditure for the financial year 1 898-1 899 amounted to nearly £10,000,000, an increase of £4,000,000 as compared with 1871. The Italian Chamber decided that from the 1st of July 1901 until the 30th of June 1907 Italian military expenditure proper should not exceed the maximum of £9,560,000 per annum fixed by the Army Bill of May 1897, and that military pensions should not exceed £1,440,000. Italian military expenditure was thus until 1907 £11,000,000 per annum. In 1908 the ordinary and extraordinary expenditure was £10,000,000. The demands of the Commission were only partly complied with, but a large special grant was voted amounting to at least £1,000,000 per annum for the next seven years. The amount. spent is slight compared with the military expenditure of other countries.

The Alpine frontier is fortified strongly, although the condition of the works was in many cases considered unsatisfactory by the 1907 Commission. The fortresses in the basin of the Po chiefly belong to the era of divided Italy and are now out of date; the chief coast fortresses are Vado, Genoa, Spezia, Monte Argentaro, Gaeta, Straits of Messina, Taranto, Maddalena. Rome is protected by a circle of forts from a coup de main from the sea, the coast, only 12 m. off, being flat and deserted.

Navy. — For purposes of naval organization the Italian coast is divided into three maritime departments, with headquarters at Spezia, Naples and Venice; and into two comandi militan, with headquarters at Taranto and at the island of Maddalena. The personnel of the navy consists of the following corps: (1) General staff; (2) naval engineers, chiefly employed in building and repairing war vessels; (3) sanitary corps; (4) commissariat corps, for supplies and account-keeping; (5) crews.

The maUriel of the Italian navy has been completely trans- formed, especially in virtue of the bill of the 31st of March 1875. Old types of vessels have been sold or demolished, and replaced by newer types.

2 This may be reduced, in consequence of the adoption of the new Q.F. gun, 1 to 6.

In March 1907 the Italian navy contained, excluding ships of no fighting value : —

Effective.

Completing.

Projected.

Modern battleships

4

4

3

Old battleships

10

Armoured cruisers

6

2

Protected cruisers . .

H

Torpedo gunboats

13

Destroyers ….

13

4

10

Modern torpedo boats

34

15

Submarines

1

4

2

The four modern ships — the ” Vittorio Emanuele ” class, laid down in 1897 — have a tonnage of 12,625, two 12-in. and twelve 8-in. guns, an I.H.P. of 19,000, and a designed speed of 22 knots, being intended to avoid any battleship and to carry enough guns to destroy any cruiser.

The personnel on active service consisted of 1799 officers and 25,000 men, the former being doubled and the latter trebled since

1882.

Naval expenditure has enormously increased since 1871, the total for 1871 having been about £900,000, and the total for 1905-1906 over £5,100,000. Violent fluctuations have, however, taken place from year to year, according to the state of Italian finances. To permit the steady execution of a normal programme of shipbuilding, the Italian Chamber, in May 1901, adopted a resolution limiting naval expenditure, inclusive of naval pensions and of premiums on mercantile shipbuilding, to the sum of £4,840,000 for the following six years, i.e. from 1st July 1901 until 30th June 1907. This sum consists of £4,240,000 of naval expenditure proper, £220,000 for naval pensions and £380,000 for premiums upon mercantile ship-building. During the financial year ending on the 30th of June 1901 these figures were slightly exceeded.

Finance. — The volume of the Italian budget has considerably increased as regards both income and expenditure. The income of £60,741,418 in 1881 rose in 1899-1900 to £69,917,126; while the expenditure increased from £58,705,929 in 1881 to £69,708,706 in 1899-1900, an increase of £9,175,708 in income and £1 1,002,777 in expenditure, while there has been a still further increase since, the figures for 1905-1906 showing (excluding items which figure on both

sides of the account) an increase of £8,766,995 in income and £5,434,560 in expenditure over 1899-1900. These figures include not only the categories of ” income and expenditure ” proper, but also those known as ” movement of capital,” ” rail- way constructions ” and ” partite di giro” which do not constitute real income and expenditure. 1 Considering only income and expenditure proper, the approximate totals are: —

Financial Year.

Revenue.

Expenditure.

Surpluses or Deficits.

1882

£52,064,800

£51,904,800

£ + 160,000

1 885-1 886

56,364,000

57,304,400

— 940,400

1890-1891

61,600,000

64,601,600

— 3,001,600

1895-1896

65,344,000

67,962,800

— 2,618,800

1898-1899

66,352,800

65,046,400

+ 1,306,400

1 899- 1 900

66,860,800

65,323.600

+ i,537,20o

1900-1901

68,829,200

66,094,400

+2,734,800

1905-1906

77,684,100

75,143,300

+2,540,900

The financial year 1862 closed with a deficit of more than £16,000,000, which increased in 1866 to £28,840,000 on account of the preparations for the war against Austria. Excepting the in- creases of deficit in 1868 and 1870, the annual deficits tended thence- forward to decrease, until in 1875 equilibrium between expenditure and revenue was attained, and was maintained until 1881. Ad- vantage was taken of the equilibrium to abolish certain imposts, amongst them the grist tax, which prior to its gradual repeal pro-

1 ” Movement of capital ” consists, as regards ” income,” of the proceeds of the sale of buildings, Church or Crown lands, old prisons, barracks, &c, or of moneys derived from sale of consolidated stock. Thus ” income ” really signifies diminution of patrimony or increase of debt. In regard to ” expenditure,” ” movement of capital ” refers to extinction of debt by amortization or otherwise, to pur- chases of

buildings or to advances made by the state. Thus ” ex- penditure” really represents a patrimonial improvement, a creation of credit or a decrease of indebtedness. The items referring to ” railway construction ” represent, on the one hand, repayments made to the exchequer by the communes and provinces of money disbursed on their account by the State Treasury; and, on the other, the cost of new railways incurred by the Treasury. The items of the ” partite di giro ” are inscribed both on the credit and debit sides of the budget, and have merely a figurative value.

duced more than £3,200,000 a year. From 1 885-1886 onwards, outlay on public works, military and colonial expenditure, and especially the commercial and financial crises, contributed to pro- duce annual deficits ; but owing to drastic reforms introduced in 1894-1895 and to careful management the year 1898-1899 marked a return of surpluses (nearly £1,306,400).

The revenue in the Italian financial year 1905-1906 (July I, 1905 to June 30, 1906) was £102,486,108, and the expenditure £99,945,253, or, subtracting the partite di giro, £99,684,121 and £97,143,266, leaving a surplus of £2, 540,855.2 The surplus was made up by contributions from every branch of the effective revenue, except the ” contributions and repayments from local authorities.” The rail- ways showed an increase of £351,685; registration transfer and succession, £295,560; direct taxation, £42,136 (mainly from income tax, which more than made up for the remission of the house tax in the districts of Calabria visited by the earthquake of 1906) ; customs and excise, £1,036,742; government monopolies, £291,027; posts, £41,310; telegraphs, £23,364; telephones, £65,771. Of the surplus £1,000,000 was allocated to the improvement of posts, telegraphs and telephones; £1,000,000 to public works (£720,000 for harbour im- provement and £280,000 for internal navigation) ; £200,000 to the navy (£132,000 for a second dry dock at Taranto and £68,000 for coal purchase) ; and £200,000 as a nucleus of a fund for the purchase of valuable works of art which are in danger of exportation.

The state therefore draws its principal revenues from the imposts, the taxes and the monopolies. According to the Italian tributary system, ” imposts,” properly so called are those upon land, Taxation buildings and personal estate. The impost upon land is based upon the cadastral survey independently of the vicissitudes of harvests. In 1869 the main quota to the impost was increased by one-tenth, in addition to the extra two-tenths previously imposed in 1866. Subsequently, it was decided to repeal these additional tenths, the first being abolished in 1886 and the rest in 1887. On account of the inequalities still existing

in the cadastral survey, in spite of the law of 1886 (see Agriculture, above), great differences are found in the land tax assessments in various parts of Italy. Land is not so heavily burdened by the government quota as by the additional centimes imposed by the provincial and communal authorities. On an average Italian landowners pay nearly 25 % of their revenues from land in government and local land tax. The buildings impost has been assessed since 1866 upon the basis of 12-50% of " taxable revenue." Taxable revenue corresponds to two-thirds of actual income from factories and to three-fourths of actual income from houses; it is ascertained by the agents of the financial administra- tion. In 1869, however, a third additional tenth was added to the previously existing additional two-tenths, and, unlike the tenths of the land tax, they have not been abolished. At present the main quota with the additional three-tenths amounts to 16-25 % of tax- able income. The imposts qn incomes from personal estate {ricchezza mobile) were introduced in 1866; it applies to incomes derived from investments, industry or personal enterprise, but not to landed revenues, it is proportional, and is collected by deduction from salaries and pensions paid to servants of the state, where it is assessed on three-eighths of the income, and from interest on consolidated stock, where it is assessed on the whole amount; and by register in the cases of private individuals, who pay on three-fourths of their income, professional men, capitalists or manufacturers, who pay on one-half or nine-twentieths of their income. From 1871 to 1894 it was assessed at 13-20% of taxable income, this quota being formed of 12 % main quota and I -20% as an additional tenth. In 1894 the quota, including the additional tenth, was raised to the uniform level of 20 %. One-tenth of the tax is paid to the communes as compensa- tion for revenues made over to the state.

Taxes proper are divided into (a) taxes on business transactions and (b) taxes on articles of consumption. The former apply prin- cipally to successions, stamps, registrations, mortgages, &c. ; the latter to distilleries, breweries, explosives, native sugar and matches, though the customs revenue and octrois upon articles of general consumption, such as corn, wine, spirits, meat, flour, petroleum, butter, tea, coffee and sugar, may be considered as belonging to this class. The monopolies are those of salt, tobacco and the lottery.

Since 1880, while income from the salt and lotto monopolies has remained almost stationary, and that from land tax and octroi has diminished, revenue derived from all other sources has notably increased, especially that from the income tax on personal estate, and the customs, the yield from which has been nearly doubled.

It will be seen that the revenue is swollen by a large number of taxes which can only be justified by necessity; the reduction and, still more, the readjustment of taxation (which now largely falls on articles of primary necessity) is urgently needed. The government in presenting the estimates for 1907-1908 proposed to set aside a sum of nearly £800,000 every year for this express purpose. It must be remembered that the sums realized by the octroi go in the main to the various communes. It is only in Rome and Naples that the octroi is collected directly by the government, which pays over a certain proportion to the respective communes.

The external taxation is not only strongly protectionist, but is

2 Financial operations (mainly in connexion with railway purchase) figure on each side of the account for about £22,000,000.

applied to goods which cannot be made in Italy ; hardly anything comes in duty free, even such articles as second-hand furniture paying duty, unless within six months of the date at which the importer has declared domicile in Italy. The application, too, is somewhat rigorous, e.g. the tax on electric light is applied to foreign ships generating their own electricity while lying in Italian ports.

The annual consumption per inhabitant of certain kinds of food and drink has considerably increased, e.g. grain from 270 lb per head in 1884-1885 to 321 lb in 1901-1902 (maize remains almost stationary at 158 lb) ; wine from 73 to 125 litres per head; oil from 12 to 13 lb per head (sugar is almost stationary at 7\ lb per head, and coffee at about 1 lb) ; salt from 14 to 16 lb per head. Tobacco slightly diminished in weight at a little over I lb per head, while the gross receipts are considerably increased — by over 2 J millions sterling since 1884-1885 — showing that the quality consumed is much better. The annual expenditure on tobacco was 5s. per inhabitant in 1902-1903, and is increasing.

The annual surpluses are largely accounted for by the heavy taxation on almost everything imported into the country, 1 and by the monopolies on tobacco and on salt ; and are as a rule spent, and well spent, in other ways. Thus, that of 1907-1908 was devoted mainly to raising the salaries of government officials and university professors;

even then the maximum for both (in the former class, tor an under-secretary of state) was only £500 per annum. The case is frequent, too, in which a project is sanctioned by law, but is then not carried into execution, or only partly so, owing to the lack of funds. Additional stamp duties and taxes were imposed in 1909 to meet the expenditure necessitated by the disastrous earthquake at the end of 1908.

The way in which the taxes press on the poor may be shown by the number of small proprietors sold up owing to inability to pay the. land and other taxes. In 1882 the number of landed proprietors was 14-52% of the population, in 1902 only 12-66, with an actual diminution of some 30,000. Had the percentage of 1882 been kept up there would have been in 1902 600,000 more proprietors than there were. Between 1884 and 1902 no fewer than 220,616 sales were effected for failure to pay taxes, while, from 1886 to 1902, 79,208 expropriations were effected for other debts not due to the state. In 1884 there were 20,422 sales, of which 35-28% were for debts of 4s. or less, and 51-95 for debts between 4s. and £2; in 1902 there were 4857 sales, but only 1 1 -oi % for debts under 4s. (the treasury having given up proceeding in cases where the property is a tiny piece of ground, sometimes hardly capable of cultivation), and 55-69 % for debts between 4s. and £2. The expropriations deai as a rule with properties of higher value; of these there were 3217 in 1886, 5993 in 1892 (a period of agricultural depression), 3910 in 1902. About 22 % of them are for debts under £40, about 49 % from £40 to £200, about 26 % from £200 to £2000.

Of the expenditure a large amount is absorbed by interest on debt. Debt has continually increased with the development of the state. The sum paid in interest on debt amounted to £17,640,000 in 1871, £19,440,000 in 1881, £25,600,000 in 1891-1892

The debt per head of population was, in 1905, £14, lbs. 3d., and the interest 13s. 5d.

In July 1906 the 5% gross (4% net), and 4% net rente were successfully converted into 3 J % stock (to be reduced to 3ˆ % after five years), to a total amount of £324,017,393. The demands for reimbursement at par represented a sum of only £187,588 and the market value of the stock was hardly affected; while the saving to the Treasury was to be £800,000 per annum for the first five years and about double the amount afterwards.

Currency. — The lira (plural lire) of 100 centesimi (centimes) is equal in value to the French franc. The total coinage (exclusive of Eritrean

currency) from the 1st of January 1862 to the end of 1907 was 1,104,667,116 lire (exclusive of recoinage), divided as follows: gold, 427,516,970 lire; silver, 570,097,025 lire; nickel, 23,417,000 lire; bronze, 83,636,121 lire. The forced paper currency, instituted in 1866, was abolished in 188 1, in which year were dissolved the Union of Banks of Issue created in 1874 to furnish to the state treasury a milliard of lire in notes, guaranteed collectively by the banks. Part of the Union notes were redeemed, part replaced by 10 lire and 5 lire state notes, payable at sight in metallic legal tender by certain state banks. Nevertheless the law of 1881 did not succeed in maintaining the value of the state notes at a par with the metallic currency, and from 1885 onwards there reappeared a gold premium, which during 1899 and 1900 remained at about 7 %, but subsequently fell to about 3 % and has since 1902 practically disappeared. The paper circulation to the debit of the state and the paper currency issued by the authorized state banks is shown below : —

Expendi- ture.

and £27,560,000 in 1899-1900; but had been reduced to £23,100,409 by the 30th of June 1906. The public debt at that date was composed as follows : —

Part I. — Funded Debt. Grand Livre — Amount.

Consolidated 5 % £316,141,802

3 % 6,404,335

4i%net 28,872,511

4 % „ 7,875,592

3i% , 37,689,880

Total . . . £396,984,120

Debts to be transferred to the Grand Livre . 60,868

Perpetual annuity to the Holy See . . . 2,580,000

Perpetual debts (Modena, Sicily, Naples) . 2,591,807

Total . . . £402,216,795

Part II.— Unfunded Debt. . ‘ Debts separately inscribed in the Grand Livre . Various railway obligations, redeemable, &c. .

Sicilian indemnities

Capital value of annual payment to South

Austrian Company

Long date Treasury warrants, law of July 7, 1901 Railway certificates (3-65% net), Art. 6 of law,

June 25, 1905, No. 261

Total Part I.

10,042,027

56,375,351

195,348

37,102,908 1,416,200

14,220,000

£“9,351,834 £402,216,795

Direct Liability of State.

Notes issued

Aggregate

Date.

by State

Paper

State Notes.

Bonsde Caisse.l

Banks.

Currency.

Lire.

Lire.

Lire.

Lire.

31st December 1881

940,000,000

735.579,197

1,675,579,197

„ 1 886

446,665,535

i,03i,86g,7i2

1,478,535,247

„ i8gi

34L949-237

1,121,601,079

1,463.550,316

„ 1896

400,000,000

110,000,000

1,069,233,376

1,579,233,376

„ i8gg

451,431,780

42,138,152

1,180,110,330

1,673,680,262

„ IQ05

441,304,780

1,874,184

1,406,474,800

1,848,657,764

1 These ceased to have legal currency at the end of 1901; they were notes of I and 2 lire.

Banks. — Until 1893 the juridical status of the Banks of Issue was regulated by the laws of the 30th of April 1874 on paper currency and of the 7th of April 1881 on the abolition of forced currency. At that time four limited companies were authorized to issue bank notes, namely, the National Bank, the National Bank of Tuscany, the Roman Bank and the Tuscan Credit Bank; and two banking corporations, the Bank of Naples and the Bank of Sicily. In 1893 the Roman Bank was put into liquidation, and the other three limited companies were fused, so as to create the Bank of Italy, the privilege of issuing bank notes being thenceforward confined to the Bank of Italy, the Bank of Naples and the Bank of Sicily. The gold reserve in the possession of the Banca d'ltalia on September 30th 1907 amounted to £32,240,984,

and the silver reserve to £4,767,861 ; the foreign treasury bonds, &c. amounted to £3,324,074, making the total reserve £40,332,919; while the circulation amounted to £54,612,234. The figures were on the 31st of December 1906:

Paper Circulation.

Reserve.

Banca d'ltalia Banca di Napoli . Banca di Sicilia .

Total . .

£47,504,352

13,893,152

2,813,692

£36,979,235

9,756,284 2,060,481

£64,211,196

£48,796,000

Grand Total . £521,568,629

'For example, wheat, the price of which was in 1902 26 lire per cwt., pays a tax of 7j lire; sugar pays four times its wholesale value in tax; coffee twice its wholesale value.

This is considerably in excess of the circulation, £40,404,000, fixed by royal decree of 1900; but the issue of additional notes was allowed, provided they were entirely covered by a metallic reserve, whereas up to the fixed limit a 40 % reserve only was necessary. These notes are of 50, 100, 500 and 1000 lire; while the state issues notes for 5, 10 and 25 lire, the currency of these at the end of October 1906 being £17,546,967; with a total guarantee of £15,636,000 held against them. They were in January 1908 equal in value to the metallic currency of gold and silver.

The price of Italian consolidated 5 % (gross, 4 % net, allowing for the 20% income tax) stock, which is the security most largely negotiated abroad, and used in settling differences between large financial institutions, has steadily risen during recent years. After being

depressed between 1885 and 1894, the prices in Italy and abroad reached, in 1899, on the Rome Stock Exchange, the average of 100-83 and of 94-8 on the Paris Bourse. By the end of 1901 the price of Italian stock on the Paris Bourse had, however, risen to par or thereabouts. The average price of Italian 4% in 1905 was 105-29; since the conversion to 3 J % net (to be further reduced to 3 J in five more years), the price has been about 103-5. Rates of exchange, or, in other words the gold premium, favoured Italy during the years immediately following the abolition of the forced currency in 188 1. In 1885, however, rates tended to rise, and though they fell in 1886 they subsequently increased to such an extent as to reach 110% at the end of August 1894. For the next four years they continued

low, but rose again in 1898 and 1899. In 1900 the maximum rate was 107-32, and the minimum 105-40, but in 1901 rates fell considerably, and were at par in 1902-1909.

There are in Italy six clearing houses, namely, the ancient one at Leghorn, and those of Genoa, Milan, Rome, Florence and Turin, founded since 1882.

The number of ordinary banks, which diminished between 1889 and 1894, increased in the following years, and was 158 in 1898. At the same time the capital employed in banking decreased by nearly one-half, namely, from about £12,360,000 in 1880 to about £6,520,000 in 1898. This decrease was due to the liquidation of a number of large and small banks, amongst others the Bank of Genoa, the General Bank, and the Societa di Credito Mobiliare Italiano of Rome, and the Genoa Discount Bank — establishments which alone repre- sented £4,840,000 of paid-up capital. Ordinary credit operations are also carried on by the co-operative credit societies, of which there are some 700.

Certain banks make a special business of lending money to owners Df land or buildings {credito jondiario). Loans are repayable by Agrarian instalments, and are guaranteed by first mortgages not Credit greater in amount than half the value of the hypothecated

Banks. property. The banks may buy up mortgages and advance money on current account on the security of land or buildings. The

development of the large cities has induced these banks to turn their attention rather to building enterprise than to mortgages on rural property. The value of their land certificates or cartelle fondiarie (representing capital in circulation) rose from £10,420,000 in 1881 to £15,560,000 in 1886, and to £30,720,000 in 1891, but fell to £29,320,000 in 1896, to £27,360,000 in 1898, and to £24,360,000 in 1907; the amount of money lent increased from £10,440,000 in 1881 to £15,600,000 in 1886, and £30,800,000 in 1891, but fell to £29,320,000 in 1896, to £27,360,000 in 1899, and to £21,720,000 in 1907. The diminution was due to the law of the 10th of April 1893 upon the banks of issue, by which they were obliged to liquidate the loan and mortgage business they had pre- viously carried on.

Various laws have been passed to facilitate agrarian credit. The law of the 23rd of January 1887 (still in force) extended the dis- positions of the Civil Code with regard to " privileges," 1 and established special " privileges " in regard to harvested produce, produce stored in barns and farm buildings, and in regard to agricul- tural implements. Loans on mortgage may also be granted to land- owners and agricultural unions, with a view to the introduction of agricultural improvements. These loans are regulated by special disposition, and are guaranteed by a share of the increased value of the land after the improvements have been carried out. Agrarian credit banks may, with the permission of the government, issue cartelle agrarie, or agrarian bonds, repayable by instalments and bearing interest.

Internal Administration. — It was not till 1865 that the adminis- trative unity of Italy was realized. Up to that year some of the regions of the kingdom, such as Tuscany, continued to have a kind of autonomy; but by the laws of the 20th of March the whole country was divided into 69 provinces and 8545 communes. The extent to which communal independence had been maintained in Italy through all the centuries of its political disintegration was strongly in its favour. The syndic (sindaco) or chief magistrate of the commune was appointed by the king for three years, and he was assisted by a " municipal junta."

Local government was modified by the law of the 10th of February 1 889 and by posterior enactments. The syndics (or mayors) are now elected by a secret ballot of the communal council, though they are still government officials. In the provincial administrations the functions of the prefects have been curtailed. Each province has a prefect, responsible to and appointed by the Ministry of the Interior, while each of the regions (called variously circondarii and distretti) has its sub-prefect. Whereas the prefect was formerly ex-officio

president of the provincial deputation or executive committee of the provincial council, his duties under the present law are reduced to mere participation in the management of provincial affairs, the president of the provincial deputation being chosen among and elected by the members of the deputation. The most important change introduced by the new law has been the creation in every province of a provincial administrative junta entrusted with the supervision of communal administrations, a function previously discharged by the provincial deputation. Each provincial adminis- trative junta is composed, in part, of government nominees, and in larger part of elective elements, elected by the provincial council for four years, half of whom require to be elected every two years. The acts of communal administration requiring the sanction of the provincial administrative junta are chiefly financial. Both com- munal councils and prefects may appeal to the government against the decision of the provincial administrative juntas, the government being guided by the opinion of the Council of State. Besides possess- ing competence in regard to local government elections, which

1 ” Privileges ” assure to creditors priority of claim in case of foreclosure for debt or mortgage. Prior to the law of the 23rd of January 1887 harvested produce and agricultural implements were legally exempt from ” privilege.”

previously came within the jurisdiction of the provincial deputations, the provincial administrative juntas discharge magisterial functions in administrative affairs, and deal with appeals presented by private persons against acts of the communal and provincial administrations. The juntas are in this respect organs of the administrative juris- prudence created in Italy by the law of the 1st of May 1890, in order to provide juridical protection for those rights and interests outside the competence of the ordinary tribunals. The provincial council only meets once a year in ordinary session.

The former qualifications for electorship in local government elections have been modified, and it is now sufficient to pay five lire annually in direct taxes, five lire of certain communal taxes, or a certain rental (which varies according to the population of a com- mune), instead of being obliged to pay, as previously, at least five lire annually of direct taxes to the state. In consequence of this change the number of local electors increased by more than one- third between 1 887-1 889; it decreased, however, as a result of an extraordinary revision of the registers in 1894. The period for which both communal and provincial councils are elected is six years, one-half being renewed every three years.

The ratio of local electors to population is in Piedmont 79 , but in Sicily less than 45. The ratio of voters to qualified electors tends to increase; it is highest in Campania, Basilicata and in the south generally; the lowest percentages are given by Emilia and Liguria.

Local finance is regulated by the communal and provincial law of May 1898, which instituted provincial administrative juntas, em- powered to examine and sanction the acts of the com- munal financial administrations. The sanction of the Local provincial administrative junta is necessary for sales or finance. purchases of property, alterations of rates (although in case of increase the junta can only act upon request of ratepayers paying an aggregate of one-twentieth of the local direct taxation), and ex- penditure affecting the communal budget for more than five years. The provincial administrative junta is, moreover, empowered to order ” obligatory ” expenditure, such as the upkeep of roads, sanitary works, lighting, police {i.e. the so-called ” guardie di pubblica sicurezza,” the ” carabinieri ” being really a military force; only the largest towns maintain a municipal police force), charities, education, &c. , in case such expenditure is neglected by the communal authorities. The cost of fire brigades, infant asylums, evening and holiday schools, is classed as ” optional ” expenditure. Communal revenues are drawn from the proceeds of communal property, interest upon capital, taxes and local dues. The most important of the local dues is the gate tax, or dazio di consumo, which may be either a surtax upon commodities (such as alcoholic drinks or meat), having already paid customs duty at the frontier, in which case the local surtax may not exceed 50% of the frontier duty, or an exclusively communal duty limited to 10 % on flour, bread and farinaceous products, 2 and to 20 % upon other commodities. The taxes thus vary considerably in different towns.

In addition, the communes have a right to levy a, surtax not ex- ceeding 50% of the quota levied by the state upon lands and buildings; a family tax, or fuocatico, upon the total incomes of families, which, for fiscal purposes, are divided into various cate- gories; a tax based upon the rent- value of houses, and other taxes upon cattle, horses, dogs, carriages and servants; also on licences for shopkeepers, hotel and restaurant keepers, &c. ; on the slaughter of animals, stamp duties, one-half of the tax on bicycles, &c. Occa- sional sources of interest are found in the sale of communal property, the realization of communal credits, and the contraction of debt.

The provincial administrations are entrusted with the manage- ment of the affairs of the provinces in general, as distinguished from those of the communes. Their expenditure is likewise classed as ” obligatory

” and ” optional.” The former category comprises the maintenance of provincial roads, bridges and watercourse embank- ments; secondary education, whenever this is not provided for by private^ institutions or by the state (elementary education being maintained by the communes), and the maintenance of foundlings and pauper lunatics. ” Optional ” expenditure includes the cost of servicesof general public interest, though not strictly indispensable. Provincial revenues are drawn from provincial property, school taxes, tolls and surtaxes on land and buildings. The provincial surtaxes may not exceed 50% of the quotas levied by the state. In 1897 the total provincial revenue was £3,732,253, of which £3,460,000 was obtained from the surtax upon lands and buildings. Expenditure amounted to £3,768,888, of which the principal items were £760,600 for roads and bridges, £520,000 for lunatic asylums, £240,000 for foundling hospitals, £320,000 for interest on debt and £200,000 for police. Like communal revenue, provincial revenue has considerably increased since 1880, principally on account of the increase in the land and building surtax.

The Italian local authorities, communes and provinces alike, have considerably increased their indebtedness since 1882. The ra tio of communal and provincial debt per inhabitant has grown

2 At the beginning of 1902 the Italian parliament sanctioned a bill providing for the abolition of municipal duties on bread and farin- aceous products within three years of the promulgation of the bill on 1st July 1902.

from 30-79 lire (£1, 4s. 7Jd.) to 43-70 lire (£1, 14s. 1 id.), an increase due in great part to the need for improved buildings, hygienic reforms and education, but also attributable in part to the manner in which the finances of many communes are administered. The total was in 1900, £49,496,193 for the communes and £6,908,022 for the provinces. The former total is more than double arid the latter more than treble the sum in 1873, while there is an increase of 62 % in the former and 26% in the latter over the totals for 1882.

See Annuario statistico italiano (not, however, issued regularly each year) for general statistics; and other official publications; W. Deecke, Italy; a Popular Account of the Country, its People and its Institutions

(translated by H. A. Nesbitt, London, 1904); B. King and T. Okey, Italy to-day (London, 1901); E. Nathan, Vent Anni di vita itaUana attraverso all' Annuario (Rome, 1906); G. Strafforello, Geografia deW Italia (Turin, 1890-1902). ' (T. As.)

History

The difficulty of Italian history lies in the fact that until modern times the Italians have had no political unity, no inde- pendence, no organized existence as a nation. Split up into numerous and mutually hostile communities, they never, through the fourteen centuries which have elapsed since the end of the old Western empire, shook off the yoke of foreigners completely; they never until lately learned to rnerge their local and conflicting interests in the common good of undivided Italy. Their history is therefore not the history of a single people, centralizing and absorbing its constituent elements by a process of continued evolution, but of a group of cognate populations, exemplifying divers types of constitutional developments.

The early history of Italy will be found under Rome and allied headings. The following account is therefore mainly concerned with the periods succeeding a.d. 476, when Romulus Augustulus was deposed by Odoacer. Prefixed to this are two sections dealing respectively with (A) the ethnographical and philological divisions of ancient Italy, and (B) the unification of the country under Augustus, the growth of the road system and so forth. The subsequent history is divided into five periods: (C) From 476 to 1796; (D) From 1796 to 1814; (E) From 1815 to 1870; (F) From 1870 to 1902; (G) From 1902 to 1910.

A. Ancient Languages and Peoples

The ethnography of ancient Italy is a very complicated and difficult subject, and notwithstanding the researches of modern scholars is still involved in some obscurity. The great beauty and fertility of the country, as well as the charm of its climate, undoubtedly attracted, even in early ages, successive swarms of invaders from the north, who sometimes drove out the previous occupants of the most favoured districts, at others reduced them to a state of serfdom, or settled down in the midst of them, until the two races gradually coalesced. Ancient writers are agreed as to the composite character of the population of Italy, and the diversity of races that were found within the limits of the peninsula. But unfortunately the traditions they have trans- mitted to us are often various and conflicting, while the only safe test of the affinities of nations, derived from the comparison of their languages,

is to a great extent inapplicable, from the fact that the idioms that prevailed in Italy in and before the 5th century B.C. are preserved, if at all, only in a few scanty and fragmentary inscriptions, though from that date onwards we have now a very fair record of many of them (see, e.g. Latin Language, Osca Lingua, Iguvium, Volsci, Etruria: section Language, and below). These materials, imperfect as they are, when combined with the notices derived from ancient writers and the evidence of archaeological excavations, may be considered as having furnished some results of reasonable certainty.

It must be observed that the name ” Italians ” was at one time confined to the Oenotrians; indeed, according to Antiochus of Syracuse (apud Dion. Hal. Ant. Rom. ii. 1), the name of Italy was first still more limited, being applied only to the southern portion of the Bruttium peninsula (now known as Calabria). But in the time of that historian, as well as of Thucydides, the names of Oenotria and Italia, which appear to have been at that period regarded as synonymous, had been extended to include the shore of the Tarentine Gulf as far as Metapontum and from thence across to the gulfs of Laus and Posidonia on the

Tyrrhenian Sea. It thus still comprised only the two provinces subsequently known as Lucania and Bruttium (see references s.v. ” Italia ” in R. S. Conway’s Italic Dialects, p. 5) . The name seems to be a Graecized form of an Italic Vitelia, from the stem vitlo-, ” calf ” (Lat. vitulus, Gr. iraXos), and perhaps to have meant ” calf-land,” ” grazing-land “; but the origin is more certain than the meaning; the calf may be one of the many animals connected with Italian tribes (see Hirpini, Sahnites) .

Taking the term Italy to comprise the whole peninsula with the northern region as far as the Alps, we must first distinguish the tribe or tribes which spoke Indo-European languages from those who did not. To the latter category it is now possible to refer with certainty only the Etruscans (for the chronology and limits of their occupation of Italian soil see Etruria: section Language). Of all the other tribes that inhabited Italy down to the classical period, of whose speech there is any record (whether explicit or in the form of names and glosses), it is impossible to maintain that any one does not belong to the Indo-European group. Putting aside the Etruscan, and also the different Greek dialects of the Greek colonies, like Cumae, Neapolis, Tarentum, and proceeding from the south to the north, the different languages or dialects, of whose separate existence at some time between, say, 600 and 200 B.C., we can be sure, may be enumerated as follows: (1) Sicel, (2) South Oscan and Oscan, (3) Messapian, (4)

North Oscan, (5) Volscian, (6) East Italic or ” Sabellic,” (7) Latinian, (8) Sabine, (9) Iguvine or ” Umbrian,” (10) Gallic, (11) Ligurian and (12) Venetic.

Between several of these dialects it is probable that closer affinities exist. (1) It is probable, though not very clearly demonstrated, that Venetic, East Italic and Messapian are connected together and with the ancient dialects spoken in Illyria (q.v.), so that these might be provisionally entitled the Adriatic group, to which the language spoken by the Eteocretes of the city of Praesos in Crete down to the 4th century B.C. was perhaps akin. (2) Too little is known of the Sicel language to make clear more than its Indo-European character. But it must be reckoned among the languages of Italy because of the well-supported tradition of the early existence of the Sicels in Latium (see Siculi). Their possible place in the earlier stratum of Indo-European population is discussed under Sabini. How far also the language or languages spoken in Bruttium and at certain points of Lucania, such as Anxia, differed from the Oscan of Samnium and Campania there is not enough evidence to show (see Bruttii). (3) It is doubtful whether there are any actual inscriptions which can be referred with certainty to the language of the Ligures, but some other evidence seems to link them with the CO peoples, whose early distribution is discussed under Volsci and Liguria. (4) It is difficult to point to any definite evidence by which we may determine the dates of the earliest appearance of Gallic tribes in the north of Italy. No satisfactory collection has been made of the Celtic inscriptions of Cisalpine Gaul, though many are scattered about in different museums. For our present purpose it is important to note that the archaeological stratification in deposits like those of Bologna shows that the Gallic period supervened upon the Etruscan. Until a scientific collection of the local and personal names of this district has been made, and until the archaeological evidence is clearly interpreted, it is impossible to go beyond the region of conjecture as to the tribe or tribes occupying the valley of the Po before the two invasions. It is clear, however, that the Celtic and Etruscan elements together occupied the greater part of the district between the Apennines and the Alps down to its Romanization, which took place gradually in the course of the 2nd century B.C. Their linguistic neighbours were Ligurian in the south and south-west, and the Veneti on the east.

We know from the Roman historians that a large force of Gauls came as far south as Rome in the year 390 B.C., and that some part of this horde settled in what was henceforward known as the Ager Gallicus, the easternmost strip of coast in what was later known as Umbria, including the towns of Caesena, Ravenna and •Arlminum. A bilingual

inscription (Gallic and Latin) of

the 2nd century b.c. was found as far south as Tuder, the modern Todi (Italic Dialects, ii. 528; Stokes, B Bamberger's BeitrUge, 11, p. 113).

(5) Turning now to the languages which constitute the Italic group in the narrower sense, (a) Oscan; (b) the dialect of Velitrae, commonly called Volscian; (c) Latinian (i.e. Latin and its nearest congeners, like Faliscan); and (d) Umbrian (or, as it may more safely be called, Iguvine), two principles of classifica- tion offer themselves, of which the first is purely linguistic, the second linguistic and topographical. Writers on the ethnology of Italy have been hitherto content with the first, namely, the broad distinction between the dialects which preserved the Indo- European velars (especially the breathed plosive q) as velars or back-palatals (gutturals), with or without the addition of a w-sound, and the dialects which converted the velars wholly into labials, for example, Latinian quis contrasted with Oscan, Volscian and Umbrian pis (see further Latin Language).

This distinction, however, takes us but a little way towards an historical grouping of the tribes, since the only Latinian dialects of which, besides Latin, we have inscriptions are Faliscan and Marsian (see Falisci, Marst); although the place-names of the Aequi (q.v.) suggest that they belong to the same group in this respect. Except, therefore, for a very small and appar- ently isolated area in the north of Latium and south of Etruria, all the tribes of Italy, though their idioms differed in certain particulars, are left undiscriminated. This presents a strong contrast to the evidence of tradition, which asserts very strongly (1) the identity of the Sabines and Samnites; (2) the conquest of an earlier population by this tribe; and which affords (3) clear evidence of the identity of the Sabines with the ruling class, i.e. the patricians, at Rome itself (see Sabini; and Rome. Early History and Ethnology) .

Some clue to this enigma may perhaps be found in the second principle of classification proposed by the present writer at the Congresso Internationale di Scienze Storiche at Rome (Atti del Congresso, ii) in 1903. It was on that occasion pointed out that the ethnica or tribal and oppidan names of communities belonging to the

Sabine stock were marked by the use of the suffix NO as in Sabini; and that there was some linguistic evidence that this stratum of population overcame an earlier population, which used, generally, ethnica in CO or TI (as in Marruci, Ardeales, transformed later into Marrucini, Ardeatini).

The validity of this distinction and its results are discussed under Sabjni and Volsci, but it is well to state here its chief consequences.

1. Latin will be counted the language of the earlier plebeian stratum of the population of Rome and Latium, probably once spread over a large area of the peninsula, and akin in some degree to the language or languages spoken in north Italy before either the Etruscan or the Gallic invasions began.

2. It would follow, on the other hand, that what is called Oscan represented the language of the invading Sabines (more correctly Safines), whose racial affinities would seem to be of a distinctly more northern cast, and to mark them, like the Dorians or Achaeans in Greece, as an early wave of the invaders who more than once in later history have vitally influenced the fortunes of the tempting southern land into which they forced their way.

3. What is called Volscian, known only from the important inscription of the town of Velitrae, and what is called Umbrian, known from the famous Iguvine Tables with a few other records, would be regarded as Safine dialects, spoken by Safine com- munities who had become more or less isolated in the midst of the earlier and possibly partly Etruscanized populations, the result being that as early as the 4th century B.C. their language had suffered corruptions which it escaped both in the Samnite mountains and in the independent and self-contained community of Rome.

For fuller details the reader must be referred to the separate articles already mentioned, and to Iguvium, Picenum, Osca Lingua, M arsi, Aequi, Siculi and Liguria. Such archaeological evidence as can be connected with the linguistic data will there be discussed.

(R. S. C.)

B. Consolidation of Italy

We have seen that the name of Italy was originally applied only to the southernmost part of the peninsula, and was only gradually extended so as to comprise the central regions, such as Latium and Campania, which were designated by writers as late as Thucydides and Aristotle

as in Opicia. The progress of this change cannot be followed in detail, but there can be little doubt that the extension of the Roman arms, and the gradual union of the nations of the peninsula under one dominant power, would contribute to the introduction, or rather would make the necessity felt, for the use of one general appellation. At first, indeed, the term was apparently confined to the regions of the central and southern districts, exclusive of Cisalpine Gaul and the whole tract north of the Apennines, and this continued to be the official or definite signification of the name down to the end of the republic. But the natural limits of Italy are so clearly marked that the name came to be generally employed as a geo- graphical term at a much earlier period. Thus we already find Polybius repeatedly applying it in this wider signification to the whole country, as far as the foot of the Alps; and it is evident from many passages in the Latin writers that this was the familiar use of the term in the days of Cicero and Caesar. The official distinction was, however, still retained. Cisalpine Gaul, includ- ing the whole of northern Italy, still constituted a ” province,” an appellation never applied to Italy itself. As such it was assigned to Julius Caesar, together with Transalpine Gaul, and it was not till he crossed the Rubicon that he entered Italy in the strict sense of the term.

Augustus was the first who gave a definite administrative organization to Italy as a whole, and at the same time gave official sanction to that wider acceptation of the name which had already established itself in familiar usage, and which has continued to prevail ever since.

The division of Italy into eleven regions, instituted by Augustus for administrative purposes, which continued in official use till the reign of Constantine, was based mainly on the territorial divisions previously existing, and preserved with few exceptions the ancient limits.

The first region comprised Latium (in the more extended sense of the term, as including the land of the Volsci, Hernici and Aurunci), together with Campania and the district of the Picentini. It thus extended from the mouth of the Tiber to that of the Silarus (see Latium).

The second region included Apulia and Calabria (the name by which the Romans usually designated the district known to the Greeks as Messapia or Iapygia), together with the land of the Hirpini, which had usually been considered as a part of Samnium.

The third region contained Lucania and Bruttium; it was bounded on

the west coast by the Silarus, on the east by the Bradanus.

The fourth region comprised all the Samnites (except the Hirpini), together with the Sabines and the cognate tribes of the Frentani, Marrucini, Marsi, Peligni, Vestini and Aequiculi. It was separated from Apulia on the south by the river Tifernus, and from Picenum on the north by the Matrinus.

The fifth region was composed solely of Picenum, extending along the coast of the Adriatic from the mouth of the Matrinus to that of the Aesis, beyond Ancona.

The sixth region was formed by Umbria, in the more extended sense of the term, as including the Ager Gallicus, along the coast of the Adriatic from the Aesis to the Ariminus, and separated from Etruria on the west by the Tiber.

The seventh region consisted of Etruria, which preserved its ancient limits, extending from the Tiber to the Tyrrhenian Sea, and separated from Liguria on the north by the river Macra.

The eighth region, termed Gallia Cispadana, comprised the southern portion of Cisalpine Gaul, and was bounded on the north (as its name implied) by the river Padus or Po, from above Placentia to its mouth. It was separated from Etruria and Umbria by the main chain of the Apennines; and the river

Emery Walker sc

GOTHIC AND LOMBARD KINGDOMS]

ITALY

27

Roads.

Ariminus was substituted for the far-famed Rubicon as its limit on the Adriatic.

The ninth region comprised Liguria, extending along the sea- coast from the Varus to the Macra, and inland as far as the river Padus, which constituted its northern boundary from its source in Mount Vesulus to its confluence with the Trebia just above Placentia.

The tenth region included Venetia from the Padus and Adriatic to the

Alps, to which was annexed the neighbouring peninsula of Istria, and to the west the territory of the Cenomani, a Gaulish tribe, extending from the Athesis to the Addua, which had previously been regarded as a part of Gallia Cisalpina.

The eleventh region, known as Gallia Transpadana, included all the rest of Cisalpine Gaul from the Padus on the south and the Addua on the east to the foot of the Alps.

The arrangements thus established by Augustus continued almost unchanged till the time of Constantine, and formed the basis of all subsequent administrative divisions until the fall of the Western empire.

The mainstay of the Roman military control of Italy first, and of the whole empire afterwards, was the splendid system of roads. As the supremacy of Rome extended itself over Italy, the Roman road system grew step by step, each fresh conquest being marked by the pushing forward of roads through the heart of the newly-won territory, and the establishment of fortresses in connexion with them. It was in Italy that the military value of a network of roads was first appreciated by the Romans, and the lesson stood them in good stead in the provinces. And it was for military reasons that from mere cart-tracks they were developed into permanent highways (T. Ashby, in Papers of the British School at Rome, i. 129). From Rome itself roads radiated in all directions. Communications with the south-east were mainly provided by the Via Appia (the ” queen of Roman roads,” as Statius called it) and the Via Latina, which met close to Casilinum, at the crossing of the Volturnus, 3 m. N.W. of Capua, the second city in Italy in the 3rd century B.C., and the centre of the road system of Campania. Here the Via Appia turned eastward towards Beneventum, while the Via Popilia continued in a south-easterly direction through the Campanian plain and thence southwards through the mountains of Lucania and Bruttii as far as Rhegium. Coast roads of minor importance as means of through com- munication also existed on both sides of the ” toe ” of the boot. Other roads ran south from Capua to Cumae, Puteoli (the most important harbour of Campania), and Neapolis, which could also be reached by a coast road from Minturnae on the Via Appia. From Beneventum, another important road centre, the Via Appia itself ran south-east through the mountains past Venusia to Tarentum on the south-west coast of the ” heel,” and thence across Calabria to Brundusium, while Trajan’s correction of it, following an older mule-track, ran north-east through the moun- tains and then through the lower ground of Apulia, reaching the coast at Barium. Both met at Brundusium, the principal port for the East. From Aequum Tuticum,

on the Via Traiana, the Via Herculia ran to the south-east, crossing the older Via Appia, then south to Potentia and so on to join the Via Popilia in the centre of Lucania.

The only highroad of importance which left Rome and ran eastwards, the Via • Valeria, was not completed as far as the Adriatic before the time of Claudius; but on the north and north- west started the main highways which communicated with central and northern Italy, and with all that part of the Roman empire which was accessible by land. The Via Salaria, a very ancient road, with its branch, the Via Caecilia, ran north-eastwards to the Adriatic coast and so also did the Via Flaminia, which reached the coast at Fanum Fortunae, and thence followed it to Ariminum. The road along the east coast from Fanum Fortunae down to Barium, which connected the terminations of the Via Salaria and Via Valeria, and of other roads farther south crossing from Campania, had no special name in ancient times, as far as we know. The Via Flaminia was the earliest and most important road to the north; and it was soon extended (in 187 B.C.) by

the Via Aemilia running through Bononia as far as Placentia, in an almost absolutely straight line between the plain of the Po and the foot of the Apennines. In the same year a road was constructed over the Apennines from Bononia to Arretium, but it is difficult to suppose that it was not until later that the Via Cassia was made, giving a direct communication between Arretium and Rome. The Via Clodia was an alternative route to the Cassia for the first portion out of Rome, a branch having been built at the same time from Florentia to Lucca and Luna. Along the west coast the Via Aurelia ran up to Pisa and was continued by another Via Aemilia to Genoa. Thence the Via Postumia led to Dertona, Placentia and Cremona, while the Via Aemilia and the Via Julia Augusta continued along the coast into Gallia Narbonensis.

The road system of Cisalpine Gaul was mainly cok Utioned by the rivers which had to be crossed, and the Alpine passes which had to be approached.

Cremona, on the north bank of the Po, was an important meeting point of roads and Hostilia (Ostiglia) another; so also was Patavium, farther east, and Altinum and Aquileia farther east still. Roads, indeed, were almost as plentiful as railways at the present day in the basin of the Po.

As to the roads leading out of Italy, from Aquileia roads diverged northward into Raetia, eastward to Noricum and Pannonia, and southwards to the Istrian and Dalmatian coasts. Farther west came the

roads over the higher Alpine passes — the Brenner from Verona, the Septimer and the Spliigen from Clavenna (Chiavenna), the Great and the Little St Bernard from Augusta Praetoria (Aosta) , and the Mont Genevre from Augusta Taurinorum (Turin).

Westward two short but important roads led on each side of the Tiber to the great harbour at its mouth; while the coast of Latium was supplied with a coast road by Septimius Severus. To the south-west the roads were short and of little importance.

On ancient Italian geography in general see articles in Pauly-Wissowa, Realer.cyclopadie (1899, sqq.); Corpus inscriptionum Latinarum (Berlin, 1862 sqq.) ; G. Stranorello, Geografia dell' Italia (Turin, 1890-1892); H. Nissen, Italische Landeskunde (Berlin, 1883-1902) ; also references in articles Rome, Latium, &c. (T. As.)

C. From 476 to 1796

The year 476 opened a new age for the Italian people. Odoacer, a chief of the Herulians, deposed Romulus, the last Augustus of the West, and placed the peninsula beneath the titular sway of the Byzantine emperors. At Pavia the barbarian conquerors of Italy proclaimed him king, and he received from Zeno the dignity of Roman patrician. Thus began that system of mixed government, Teutonic and Roman, which, in the absence of a national monarch, impressed the institutions of new Italy from the earliest date with dualism. The same revolution vested supreme authority in a non-resident and inefficient autocrat, whose title gave him the right to interfere in Italian affairs, but who lacked the power and will to rule the people for his own or their advantage. Odoacer inaugurated that long series of foreign rulers — Greeks, Franks, Germans, Spaniards and Austrians — who have successively contributed to the misgovernment of Italy from distant seats of empire.

I. Gothic and Lombard Kingdoms. — In 488 Theodoric, king of the East Goths, received commission from the Greek emperor, Zeno, to undertake the affairs of Italy. He defeated Odoacer, drove him to Ravenna, besieged him there, and in 493 completed the conquest of the country by murdering the Herulian- chief with his own hand. Theodoric respected the Roman institutions which he found in Italy, held the Eternal City sacred, and governed by ministers chosen from the Roman population. He settled at Ravenna, which had been the capital of Italy since the days of Honorius, and which still testifies by its monuments to the Gothic chieftain's Romanizing policy. Those who believe that the Italians would have gained strength by unification in

a single monarchy must regret that this Gothic kingdom lacked the elements of stability. The Goths, except in the valley of the Po, resembled an army of occupation rather than a people numerous enough to blend with the Italic stock. Though their

rule was favourable to the Romans, they were Arians; and religious differences, combined with the pride and jealousies of a nation accustomed to imperial honours, rendered the in- habitants of Italy eager to throw off their yoke. When, there- fore, Justinian undertook the reconquest of Italy, his generals, Belisarius and Narses, were supported by the south. The struggle of the Greeks and the Goths was carried on for fourteen years, between 539 and 553, when Teias, the last Gothic king, was finally defeated in a bloody battle near Vesuvius. At its close the provinces of Italy were placed beneath Greek dukes, controlled by a governor-general, entitled exarch, who ruled in the Byzantine emperor's name at Ravenna.

This new settlement lasted but a few years. Narses had employed Lombard auxiliaries in his campaigns against the The Goths; and when he was recalled by an insulting

Lombards, message from the empress in 565, he is said to have invited this fiercest and rudest of the Teutonic clans to seize the spoils of Italy. Be this as it may, the Lombards, their ranks swelled by the Gepidae, whom they had lately conquered, and by the wrecks of other barbarian tribes, passed southward under their king Alboin in 568. The Herulian invaders had been but a band of adventurers; the Goths were an army; the Lombards, far more formidable, were a nation in movement. Pa via offered stubborn resistance; but after a three years' siege it was taken, and Alboin made it the capital of his new kingdom.

In order to understand the future history of Italy, it is necessary to form a clear conception of the method pursued by the Lombards in their conquest. Penetrating the peninsula, and advancing like a glacier or half-liquid stream of mud, they occupied the valley of the Po, and moved slowly downward through the centre of the country. Numerous as they were compared with their Gothic predecessors, they had not strength or. multitude enough to occupy the whole peninsula. Venice, which since the days of Attila had offered an asylum to Roman

refugees from the northern cities, was left untouched. So was Genoa with its Riviera. Ravenna, entrenched within her lagoons, remained a Greek city. Rome, protected by invincible prestige, escaped. The sea-coast cities of the south, and the islands, Sicily, Sardinia and Corsica, preserved their independence. Thus the Lombards neither occupied the extremities nor subjugated the brain-centre of the country. The strength of Alboin's kingdom was in the north; his capital, Pavia. As his people pressed southward, they omitted to possess themselves of the coasts; and what was worse for the future of these conquerors, the original impetus of the invasion was checked by the untimely murder of Alboin in 573. After this event, the semi-independent chiefs of the Lombard tribe, who borrowed the title of dukes from their Roman predecessors, seem to have been contented with con- solidating their power in the districts each had occupied. The duchies of Spoleto in the centre, and of Benevento in the south, inserted wedge-like into the middle of the peninsula, and enclos- ing independent Rome, were but loosely united to the kingdom at Pavia. Italy was broken up into districts, each offering points for attack from without, and fostering the seeds of internal revolution. Three separate capitals must be discriminated — Pavia, the seat of the new Lombard kingdom; Ravenna, the garrison city of the Byzantine emperor; and Rome, the rallying point of the old nation, where the successor of St Peter was already beginning to assume that national protectorate which proved so influential in the future.

It is not necessary to write the history of the Lombard kingdom in detail. Suffice it to say that the rule of the Lombards proved at first far more oppressive to the native population, and was less intelligent of their old customs, than that of the Goths had been. Wherever the Lombards had the upper hand, they placed the country under military rule, resembling in its general character what we now know as the feudal system. Though there is reason to suppose that the Roman laws were still ad- ministered within the cities, yet the Lombard code was that of the kingdom; and the Lombards being Arians, they added the oppression of religious intolerance to that of martial despotism

and barbarous cupidity. The Italians were reduced to the last extremity when Gregory the Great (590-604), having strengthened his position by diplomatic relations with the duchy of Spoleto, and brought about the conversion of the Lombards to orthodoxy, raised the cause of the remaining Roman population throughout Italy. The fruit of his policy, which made of Rome a counterpoise against the effete empire of the Greeks upon the one hand and against the pressure of the feudal kingdom on the other, was seen in the succeeding century. When Leo the Isaurian published his decrees

against the worship of images in 726, Gregory II. allied himself with Liudprand, the Lombard king, threw off allegiance to Byzantium, and established the autonomy of Rome. This pope initiated the dangerous policy of playing one hostile force off against another with a view to securing independence. He used the Lombards in his struggle with the Greeks, leaving to his successors the duty of checking these unnatural allies. This was accomplished by calling the Franks in against the Lombards. Liudprand pressed hard, not only upon the Greek dominions of the exarchate, but also upon Rome. His successors, Rachis and Aistolf, attempted to follow the same game of conquest. But the popes, Gregory III., Zachary and Stephen II., determining at any cost to espouse the national cause and to aggrandize their own office, continued to rely upon the Franks. Pippin twice crossed the Alps, and forced Aistolf to relinquish his acquisitions, including Ravenna, Pentapolis, the coast towns of Romagna and some cities in the duchy of Spoleto. These he handed over to the pope, of Rome. This donation of Pippin in 756 confirmed the papal see in the protectorate of the Italic party, and conferred upon it sovereign rights. The virtual outcome of the contest carried on by Rome since the year 726 with Byzantium and Pavia was to place the popes in the position held by the Greek exarch, and to confirm the limitation of the Lombard kingdom. We must, however, be cautious to remember that the south of Italy was comparatively unaffected. The dukes of the Greek empire and the Lombard dukes erf Benevento, together with a few autonomous commercial cities, still divided Italy below the Campagna of Rome (see Lombards).

II. Frankish Emperors. — The Franko-Papal alliance, which conferred a crown on Pippin and sovereign rights upon the see of Rome, held within itself that ideal of mutually Charles supporting papacy and empire which exercised so the Great powerful an influence in medieval history. When aaa the Charles the Great (Charlemagne) deposed his father-in- uneians. law Desiderius, the last Lombard king, in 774, and when he received the circlet of the empire from Leo III. at Rome in 800, he did but complete and ratify the compact offered to his grandfather, Charles Martel, by Gregory III. The relations between the new emperor and the pope were ill defined; and this proved the source of infinite disasters to Italy and Europe in the sequel. But for the moment each seemed necessary to the other; and that sufficed. Charles took possession of the kingdom of Italy, as limited by Pippin's settlement. The pope was confirmed in his rectorship of the cities ceded by Aistolf, with the further understanding, tacit rather than expressed, that, even as he had wrung these provinces for the Italic people from both Greeks and Lombards, so in the future he might

claim the protectorate of such portions of Italy, external to the kingdom, as he should be able to acquire This, at any rate, seems to be the meaning of that obscure re-settlement of the peninsula which Charles effected. The kingdom of Italy, trans- mitted on his death by Charles the Great, and afterwards con- firmed to his grandson Lothar by the peace of Verdun in 843, stretched from the Alps to Terracina. The duchy of Benevento remained tributary, but independent. The cities of Gaeta and Naples, Sicily and the so-called Theme of Lombardy in South Apulia and Calabria, still recognized the Byzantine emperor. Venice stood aloof, professing a nominal allegiance to the East. The parcels into which the Lombards had divided the peninsula remained thus virtually unaltered, except for the new authority acquired by the see of Rome.

Internally Charles left the affairs of the Italian kingdom

much as he found them, except that he appears to have pursued the policy of breaking up the larger fiefs of the Lombards, substituting counts for their dukes, and adding to the privileges of the bishops. We may reckon these measures among the earliest advantages extended to the cities, which still contained the bulk of the old Roman population, and which were destined to intervene with decisive effect two centuries later in Italian history. It should also here be noticed that the changes intro- duced into the holding of the fiefs, whether by altering their boundaries or substituting Frankish for Lombard vassals, were chief among the causes why the feudal system took no permanent hold in Italy. Feudalism was not at any time a national institution. The hierarchy of dukes and marquises and counts consisted of foreign soldiers imposed on the indigenous inhabitants; and the rapid succession of conquerors, Lombards, Franks and Germans following each other at no long interval, and each endeavouring to weaken the remaining strength of his predecessor, prevented this alien hierarchy from acquiring Ixity by permanence of tenure. Among the many miseries .nflicted upon Italy by the frequent changes of her northern rulers, this at least may be reckoned a blessing.

The Italians acknowledged eight kings of the house of Charles the Great, ending in Charles the Fat, who was deposed in 888. Frankish After them followed ten sovereigns, some of whom and have been

misnamed Italians by writers too eager

Italian t0 ca t c h at any resemblance of national glory for a * people passive in the hands of foreign masters. The

truth is that no period in Italian history was less really glorious than that which came to a close in 961 by Berengar II. ‘s cession of his rights to Otto the Great. It was a period marked in the first place by the conquests of the Saracens, who began to occupy Sicily early in the oth century, overran Calabria and Apulia, took Bari and threatened Rome. In the second place it was marked by a restoration of the Greeks to power. In 890 they established themselves again at Bari, and ruled the Theme of Lombardy by means of an officer entitled Catapan. In the third place it was marked by a decline of good government in Rome. Early in the 10th century the papacy fell into the hands of a noble family, known eventually as the counts of Tusculum, who almost succeeded in rendering the office hereditary, and in uniting the civil and ecclesiastical functions of the city under a single member of their house. It is not necessary to relate the scandals of Marozia’s and Theodora’s female reign, the infamies of John XII. or the intrigues which tended to convert Rome into a duchy. The most important fact for the historian of Italy to notice is that during this time the popes abandoned, not only their high duties as chiefs of Christendom, but also their protectorate of Italian liberties. A fourth humiliating episode in this period was the invasion of the Magyar barbarians, who overran the north of Italy, and reduced its fairest provinces to the condition of a wilderness. Anarchy and misery are indeed the main features of that long space of time which elapsed between the death of Charles the Great and the descent of Otto. Through the almost impenetrable darkness and confusion we only discern this much, that Italy was powerless to constitute herself a nation.

The discords which followed on the break-up of the Carolingian power, and the weakness of the so-called Italian emperors, who were unable to control the feudatories (marquises of Ivrea and Tuscany, dukes of Friuli and Spoleto), from whose ranks they sprang, exposed Italy to ever-increasing misrule. The country by this time had become thickly covered over with castles, the seats of greater or lesser nobles, all of whom were eager to detach themselves from strict allegiance to the ” Regno.” The cities, exposed to pillage by Huns in the north and Saracens in the south, and ravaged on the coast by Norse pirates, asserted their right to enclose themselves with walls, and taught their burghers the use of arms. Within the circuit of their ramparts, the bishops already began to exercise authority in rivalry with the counts, to whom, since the days of Theodoric, had been entrusted the

government of the Italian burghs. Agreeably to feudal customs, these nobles, as they grew in power, retired from the town,

and built themselves fortresses on points of vantage in the neighbourhood. Thus the titular king of Italy found himself simultaneously at war with those great vassals who had chosen him from their own class, with the turbulent factions of the Roman aristocracy, with unruly bishops in the growing cities and with the multitude of minor counts and barons who occupied the open lands, and who changed sides according to the interests of the moment. The last king of the quasi-Italian succession, Berengar II., marquis of Ivrea (951-961), made a vigorous effort to restore the authority of the regno; and had he succeeded, it is not impossible that now at the last moment Italy might have become an independent nation. But this attempt at unification was reckoned to Berengar for a crime. He only won the hatred of all classes, and was represented by the obscure annalists of that period as an oppressor of the church and a remorseless tyrant. In Italy, divided between feudal nobles and almost hereditary ecclesiastics, of foreign blood and alien sympathies, there was no national feeling. Berengar stood alone against a multitude, unanimous in their intolerance of discipline. His predecessor in the kingdom, Lothar, had left a young and beautiful widow, Adelheid. Berengar imprisoned her upon the Lake of Como, and threatened her with a forced marriage to his son Adalbert. She escaped to the castle of Canossa, where the great count of Tuscany espoused her cause, and appealed in her behalf to Otto the Saxon. The king of Germany descended into Italy, and took Adelheid in marriage. After this episode Berengar was more discredited and impotent than ever. In the extremity of his fortunes he had recourse himself to Otto, making a formal cession of the Italian kingdom, in his own name and that of his son Adalbert, to the Saxon as his overlord. By this slender tie the crown of Italy was joined to that of Germany; and the formal right of the elected king of Germany to be con- sidered king of Italy and emperor may be held to have accrued from this epoch.

III. The German Emperors. — Berengar gained nothing by his act of obedience to Otto. The great Italian nobles, in their turn, appealed to Germany. Otto entered Lombardy gaxon in 961, deposed Berengar, assumed the crown in San and Fran- Ambrogio at Milan, and in 962 was proclaimed conian emperor by John XII. at Rome. Henceforward emoero “- Italy changed masters according as one or other of the German families’ assumed supremacy beyond the Alps. It is one of the strongest instances furnished by history of the fascination exercised by an idea that the Italians themselves should have grown to glory in this dependence of their nation upon Caesars who had nothing but a name

in common with the Roman Imperator of the past.

The first thing we have to notice in this revolution which placed Otto the Great upon the imperial throne is that the Italian kingdom, founded by the Lombards, recognized by the Franks and recently claimed by eminent Italian feudatories, virtually ceased to exist. It was merged in the German kingdom; and, since for the German princes Germany was of necessity their first care, Italy from this time forward began to be left more and more to herself. The central authority of Pavia had always been weak; the regno had proved insufficient to combine the nation. But now even that shadow of union disappeared, and the Italians were abandoned to the slowly working influences which tended to divide them into separate states. The most brilliant period of their chequered history, the period which includes the rise of communes, the exchange of municipal liberty for despotism and the gradual discrimination of the five great powers (Milan, Venice, Florence, the Papacy and the kingdom of Naples), now begins. Among the centrifugal forces which determined the future of the Italian race must be reckoned, first and foremost, the new spirit of municipal independence. We have seen how the cities enclosed themselves with walls, and how the bishops defined their authority against that of the counts. Otto encouraged this revolution by placing the enclosures of the chief burghs beyond the jurisdiction of the counts. Within those precincts the bishops and the citizens were independent of all feudal masters but the emperor. He further

broke the power of the great vassals by redivisions of their feuds, and by the creation of jiew marches which he assigned to his German followers. In this way, owing to the dislocation of the ancient aristocracy, to the enlarged jurisdiction of a power so democratic as the episcopate, and to the increased privileges of the burghs, feudalism received a powerful check in Italy. The Italian people, that people which gave to the world the commerce and the arts of Florence, was not indeed as yet apparent. But the conditions under which it could arise, casting from itself all foreign and feudal trammels, recognizing its true past in ancient Rome, and reconstructing a civility out of the ruins of those glorious memories, were now at last granted. The nobles from this time forward retired into the country and the mountains, fortified themselves in strong

places outside the cities, and gave their best attention to fostering the rural population. Within the cities and upon the open lands the Italians, in this and the next century, doubled, trebled and quadrupled their numbers. A race was formed strong enough to keep the empire itself in check, strong enough, except for its own internecine contests, to have formed a nation equal to its happier neighbours.

The recent scandals of the papacy induced Otto to deprive the Romans of their right to elect popes. But when he died in 973, his son Otto II. (married to Theophano of the imperial Byzantine house) and his grandson, Otto III., who descended into Italy in 996, found that the affairs of Rome and of the southern provinces were more than even their imperial powers could cope with. The faction of the counts of Tusculum raised its head from time to time in the Eternal City, and Rome still claimed to be a commonwealth. Otto III.'s untimely death in 1002 introduced new discords. Rome fell once more into the hands of her nobles. The Lombards chose Ardoin, marquis of Ivrea, for king, and Pavia supported his claims against those of Henry of Bavaria, who had been elected in Germany. Milan sided with Henry; and this is perhaps the first eminent instance of cities being reckoned powerful allies in the Italian disputes of sovereigns. It is also the first instance of that bitter feud between the two great capitals of Lombardy, a feud rooted in ancient antipathies between the Roman population of Medio- lanum and the Lombard garrison of Alboin's successors, which proved so disastrous to the national cause. Ardoin retired to a monastery, where he died in 1015. Henry nearly destroyed Pavia, was crowned in Rome and died in 1024. After this event Heribert, the archbishop ofjklilan, invited Conrad, the Franconian king of Germany, into Italy, and crowned him with the iron crown of the kingdom.

The intervention of this man, Heribert, compels us to turn a closer glance upon the cities of North Italy. It is here, at the Heribert present epoch and for the next two centuries, that the and the pith and nerve of the Italian nation must be sought; Lombard anc j amon g the burghs of Lombardy, Milan, the eldest urg s ' daughter of ancient Rome, assumes the lead. In Milan we hear for the first time the word Comune. In Milan the citizens first form themselves into a Parlamenlo. In Milan the archbishop organizes the hitherto voiceless, defenceless population into a community capable of expressing its needs, and an army ready to maintain its rights. To Heribert is attributed the invention of the Carroccio, which played so singular and important a part in the warfare of Italian cities. A huge car drawn by oxen, bearing the standard of the burgh, and carrying an altar with the host, this carroccio, like the ark of the Israelites, formed a rallying point in battle, and reminded the armed artisans that they had a city and a

church to fight for. That Heribert ‘s device proved effectual in raising the spirit of his burghers, and consolidating them into a formidable band of warriors, is shown by the fact that it was speedily adopted in all the free cities. It must not, however, be supposed that -at this epoch the liberties of the burghs were fully developed. The mass of the people remained unrepresented in the government; and even if the consuls existed in the days of Heribert, they were but humble legal officers, transacting business for their constituents in the courts of the bishop and his viscount. It

Rome.

still needed nearly a century of struggle to render the burghers independent of Jordship, with a fully organized commune, self-governed in its several assemblies. While making these reservations, it is at the same time right to observe that certain Italian communities were more advanced upon the path of independence than others. This is specially the case with the maritime ports. Not to mention Venice, which has not yet entered the Italian community, and remains a Greek free city, Genoa and Pisa were rapidly rising into ill-defined autonomy. Their command of fleets gave them incontestable advantages, as when, for instance, Otto II. employed the Pisans in 980 against the Greeks in Lower Italy, and the Pisans and Genoese together attacked the Saracens of Sardinia in 1017. Still, speaking generally, the age of independence for the burghs had only begun when Heribert from Milan undertook the earliest organization of a force that was to become paramount in peace and war.

Next to Milan, and from the point of view of general politics even more than Milan, Rome now claims attention. The destinies of Italy depended upon the character which the see of St Peter should assume. Even the liberties of her republics in the north hung on the issue of a contest which in the nth and 12th centuries shook Europe to its farthest boundaries. So fatally were the internal affairs of that magnifi- cent but unhappy country bound up with concerns which brought the forces of the civilized world into play. Her ancient prestige, her geographical position and the intellectual primacy of her most noble children rendered Italy the battleground of principles that set all Christendom in motion, and by the clash of which she found herself for ever afterwards divided. During the reign of Conrad II., the party of the counts of Tusculum revived in Rome; and Crescentius, claiming the title of consul in the imperial city, sought once more to control the election of the popes. When Henry III., the son of Conrad, entered Italy in 1046, he found three popes in Rome. These he abolished, and, taking the appointment into his own hands, gave

German bishops to the see. The policy thus initiated upon the precedent laid down by Otto the Great was a remedy for pressing evils. It saved Rome from becoming a duchy in the hands of the Tusculum house. But it neither raised the prestige of the papacy, nor could it satisfy the Italians, who rightly regarded the Roman see as theirs. These German popes were short-lived and in- efficient. Their appointment, according to notions which defined themselves within the church at this epoch, was simoniacal; and during the long minority of Henry IV., who succeeded his father in 1056, the terrible Tuscan monk, Hildebrand of Soana, forged weapons which he used with deadly effect against the presumption of the empire. The condition of the church seemed desperate, unless it could be purged of crying scandals — of the subjection of the papacy to the great Roman nobles, of its subordination to the German emperor and of its internal demoralization. It was Hildebrand's policy throughout three papacies, during which he controlled the counsels of the Vatican, and before he himself assumed the tiara, to prepare the mind of Italy and Europe for a mighty change. His programme included these three points: (1) the celibacy of the clergy; (2) the abolition of ecclesiastical appointments made by the secular authority; (3) the vesting of the papal election in the hands of the Roman clergy and people, presided over by the curia of cardinals. How Hildebrand paved the way for these reforms during the pontificates of Nicholas II. and Alexander II., how he succeeded in raising the papal office from the depths of degradation and subjection to illimitable sway over the minds of men in Europe, and how his warfare with the empire estab- lished on a solid basis the still doubtful independence of the Italian burghs, renewing the long neglected protectorate of the Italian race, and bequeathing to his successors a national policy which had been forgotten by the popes since his great pre- decessor Gregory II., forms a chapter in European history which must now be interrupted. We have to follow the fortunes of unexpected allies, upon whom in no small measure his success depended.

AGE OF THE COMMUNES]

ITALY

3 1

In order to maintain some thread of continuity through the perplexed and tangled vicissitudes of the Italian race, it has been Norman necessary to disregard those provinces which did not conquest immediately contribute to the formation of its history. of the For this reason we have left the whole of the south up sfcjHe *° t ne present

point unnoticed. Sicily in the hands ot the Mussulmans, the Theme of Lombardy abandoned to the weak suzerainty of the Greek catapans, the Lombard duchy of Benevento slowly falling to pieces and the maritime republics of Naples, Gaeta and Amalfi extending their influence by com- merce in the Mediterranean, were in effect detached from the Italian regno, beyond the jurisidiction of Rome, included in no parcel of Italy proper. But now the moment had arrived when this vast group of provinces, forming the future kingdom of the Two Sicilies, was about to enter definitely and decisively within the bounds of the Italian community. Some Norman adventurers, on pilgrimage to St Michael's shrine on Monte Gargano, lent their swords in 1017 to the Lombard cities of Apulia against the Greeks. Twelve years later we find the Normans settled at Aversa under their Count Rainulf . From this station as a centre the little band of adventurers, playing the Greeks off against the Lombards, and the Lombards against the Greeks, spread their power in all directions, until they made themselves the most con- siderable force in southern Italy William of Hauteville was proclaimed count of Apulia. His half-brother, Robert Wiskard or Guiscard, after defeating the papal troops at Civitella in 1053, received from Leo IX. the investiture of all present and future conquests in Apulia, Calabria and Sicily, which he agreed to hold as fiefs of the Holy See. Nicholas II. ratified this grant, and con- firmed the title of count. Having consolidated their possessions on the mainland, the Normans, under Robert Guiscard's brother, the great Count Roger, undertook the conquest of Sicily in 1060. After a prolonged struggle of thirty years, they wrested the whole island from the Saracens; and Roger, dying in 1101, bequeathed to his son Roger a kingdom in Calabria and Sicily second to none in Europe for wealth and magnificence. This, while the elder branch of the Hauteville family still held the title and domains of the Apulian duchy; but in 1127, upon the death of his cousin Duke William, Roger united the whole of the future realm. In 1130 he assumed the style of king of Sicily, inscribing upon his sword the famous hexameter —

"Appulus et Calaber Siculus mihi servit et Afer." This Norman conquest of the two Sicilies forms the most romantic episode in medieval Italian history. By the con- solidation of Apulia, Calabria and Sicily into a powerful kingdom, by checking the growth of the maritime republics and by recognizing the over-lordship of the papal see, the house of Hauteville influenced the destinies of Italy with more effect than any of the princes who had previously dealt with any portion of the peninsula. Their kingdom, though Naples was from time to time separated from Sicily, never quite lost the cohesion they had given it; and all the disturbances of equilibrium in Italy were due in

after days to papal manipulation, of the rights acquired by Robert Guiscard's act of homage. The southern regno, in the hands of the popes, proved an insurmountable obstacle to the unification of Italy, led to French interference in Italian affairs, introduced the Spaniard and maintained in those rich southern provinces the reality of feudal sovereignty long after this alien element had been eliminated from the rest of Italy (see Normans; Sicily: History).

For the sake of clearness, we have anticipated the course of events by nearly a century. We must now return to the date of Hildebrand's elevation to the papacy in 1073, when lovesti- he cnose the memorable name of Gregory VII. In tuns. the next year after his election Hildebrand convened

a council, and passed measures enforcing the celibacy of the clergy. In 1075 ne caused the investiture of ecclesiastical dignitaries by secular potentates of any degree to be condemned. These two reforms, striking at the most cherished privileges and most deeply-rooted self-indulgences of the aristocratic caste in Europe, inflamed the bitterest hostility. Henry IV., king of Germany, but not crowned emperor, convened a diet in the

following year at Worms, where Gregory was deposed and ex-communicated. The pope followed with a counter excommunica- tion, far more formidable, releasing the king's subjects from their oaths of allegiance. War was thus declared between the two chiefs of western Christendom, that war of investitures which out-lasted the lives of both Gregory and Henry, and was not terminated till the year 1122. The dramatic episodes of this struggle are too well known to be enlarged upon. In his single- handed duel with the strength of Germany, Gregory received material assistance from the Countess Matilda of Tuscany. She was the last heiress of the great house of Canossa, whose fiefs stretched from Mantua across Lombardy, passed the Apennines, included the Tuscan plains, and embraced a portion of the duchy of Spoleto. It was in her castle of Canossa that Henry IV. per- formed his three days' penance in the winter of 1077; and there she made the cession of her vast domains to the church. That cession, renewed after the death of Gregory to his successors, conferred upon the popes indefinite rights, of which they after- wards availed themselves in the consolidation of their temporal power. Matilda died in the year 1115. Gregory had passed before her from the scene of his contest, an exile at Salerno, whither Robert Guiscard carried him in 1084 from the anarchy of rebellious Rome. With unbroken spirit, though the objects of his life were unattained, though Italy and Europe had been thrown into confusion, and the issue of the conflict

was still doubtful, Gregory expired in 1085 with these words on his lips: ” I loved justice, I hated iniquity, therefore in banishment I die.”

The greatest of the popes thus breathed his last; but the new spirit he had communicated to the papacy was not destined to expire with him. Gregory’s immediate successors, Victor III., Urban II. and Paschal II., carried on his struggle with Henry

IV. and his imperial antipopes, encouraging the emperor’s son to rebel against him, and stirring up Europe for the first crusade. When Henry IV. died, his own son’s prisoner, in 1106, Henry

V. crossed the Alps, entered Rome, wrung the imperial coronation from Paschal II. and compelled the pope to grant his claims on the investitures. Scarcely had he returned to Germany when the Lateran disavowed all that the pope had done, on the score that it had been extorted by force. France sided with the church. Germany rejected the bull of investiture. A new descent into Italy, a new seizure of Rome, proved of no avail. The emperor’s real weakness was in Germany, where his subjects openly expressed their discontent. He at last abandoned the contest which had distracted Europe. By the concordat of Worms, 1 1 22, the emperor surrendered the right of investiture by ring and staff, and granted the right of election to the clergy. The popes were henceforth to be chosen by the cardinals, the bishops by the chapters subject to the pope’s approval. On the other hand the pope ceded to the emperor the right of investiture by the sceptre. But the main issue of the struggle was not in these details of ecclesiastical government; principles had been at stake far deeper and more widely reaching. The respective relations of pope and emperor, ill-defined in the compact between Charles the Great and Leo III., were brought in question, and tlie two chief potentates of Christendom, no longer tacitly concordant, stood against each other in irreconcil- able rivalry. Upon this point, though the battle seemed to be a drawn one, the popes were really victors. They remained independent of the emperor, but the emperor had still to seek the crown at their hands. The pretensions of Otto the Great and Henry III. to make popes were gone for ever (see Papacy; Investiture).

IV. Age of the Communes. — The final gainers, however, by the war of investitures were the Italians. In the first place, from this time forward, owing to the election of popes by the Roman curia, the Holy See remained in the hands /^° of Italians; and this, though it was by no means an cities. unmixed good, was a great glory to the nation. In the next place, the antagonism of the popes to the emperors, which became hereditary in the Holy College, forced the former to assume

the protectorate of the national cause. But by far th

burghs. During the forty-seven years' war, when pope and emperor were respectively bidding for their alliance, and offering concessions to secure their support, the communes grew in self-reliance, strength and liberty. As the bishops had helped to free them from subservience to their feudal masters, so the war of investitures relieved them of dependence on their bishops. The age of real autonomy, signalized by the supremacy of consuls in the cities, had arrived.

In the republics, as we begin to know them after the war of investitures, government was carried on by officers called consuls, varying in number according to custom and according to the division of the town into districts. These magistrates, as we have already seen, were originally appointed to control and protect the humbler classes. But, in proportion as the people gained more power in the field the consuls rose into importance, superseded the bishops and began to represent the city in trans- actions with its neighbours. Popes and emperors who needed the assistance of a city, had to seek it from the consuls, and thus these officers gradually converted an obscure and indefinite authority into what resembles the presidency of a common-wealth. They were supported by a deliberative assembly, called credenza, chosen from the more distinguished citizens. In addition to this privy council, we find a gran consiglio, consist- ing of the burghers who had established the right to interfere immediately in public affairs, and a still larger assembly called parlamento, which included the whole adult population. Though the institutions of the communes varied in different localities, this is the type to which they all approximated. It will be perceived that the type was rather oligarchical than strictly democratic. Between the parlamento and the consuls with their privy council, or credenza, was interposed the gran consiglio of privileged burghers. These formed the aristocracy of the town, who by their wealth and birth held its affairs within their custody. There is good reason to believe that, when the term popolo occurs, it refers to this body and not to the whole mass of the population. The comune included the entire city — bishop, consuls, oligarchy, councils, handicraftsmen, proletariate. The popolo was the governing or upper class. It was almost inevitable in the transition from feudalism to democracy that this inter- mediate ground should

be traversed; and the peculiar Italian phrases, primo popolo, secondo popolo, terzo popolo, and so forth, indicate successive changes, whereby the oligarchy passed from one stage to another in its progress toward absorption in democracy or tyranny.

Under their consuls the Italian burghs rose to a great height of prosperity and splendour. Pisa built her Duomo. Milan undertook the irrigation works which enriched the soil of Lombardy for ever. Massive walls, substantial edifices, com- modious seaports, good roads, were the benefits conferred by this new government on Italy. It is also to be noticed that the people now began to be conscious of their past. They recognized the fact that their blood was Latin as distinguished from Teutonic, and that they must look to ancient Rome for those memories which constitute a people's nationality. At this epoch the study of Roman law received a new impulse, and this is the real meaning of the legend that Pisa, glorious through her consuls, brought the pandects in a single codex from Amalfi. The very name consul, no less than the Romanizing character of the best archi- tecture of the time, points to the same revival of antiquity.

The rise of the Lombard communes produced a sympathetic revolution in Rome, which deserves to be mentioned in this place. A monk, named Arnold of Brescia, animated with the la Rome spirit °f the Milanese, stirred up the Romans to shake off the temporal sway of their bishop. He attempted, in fact, upon a grand scale what was being slowly and quietly effected in the northern cities. Rome, ever mindful of her unique past, listened to Arnold's preaching. A senate was established, and the republic was proclaimed. The title of patrician was revived and offered to Conrad, king of Italy, but not crowned emperor. Conrad refused it, and the Romans conferred it upon one of their own nobles. Though these institu- tions borrowed high-sounding titles from antiquity, they were

in reality imitations of the Lombard civic system. The patrician stood for the consuls. The senate, composed of nobles, repre- sented the credenza and the gran consiglio. The pope was unable to check this revolution, which is now chiefly interesting as further proof of the insurgence of the Latin as against the feudal elements in Italy at this period (see Rome: History).

Though the communes gained so much by the war of investi- tures, the division of the country between the pope's and emperor's parties was no small price to pay for hide- m un i ci . pendence. It inflicted upon Italy the ineradicable pa iwars. curse of party-warfare, setting city against city, house against house, and rendering concordant

action for a national end impossible. No sooner had the compromise of the investitures been concluded than it was manifest that the burghers of the new enfranchised communes were resolved to turn their arms against each other. We seek in vain an obvious motive for each separate quarrel. All we know for certain is that, at this epoch, Rome attempts to ruin Tivoli, and Venice Pisa; Milan fights with Cremona, Cremona with Crema, Pavia with Verona, Verona with Padua, Piacenza with Parma, Modena and Reggio with Bologna, Bologna and Faenza with Ravenna and Imola, Florence and Pisa with Lucca and Siena, and so on through the whole list of cities. The nearer the neighbours, the more rancor- ous and internecine is the strife; and, as in all cases where animosity is deadly and no grave local causes of dispute are apparent, we are bound to conclude that some deeply-seated permanent uneasiness goaded these fast growing communities into rivalry. Italy was, in fact, too small for her children. As the towns expanded, they perceived that they must mutually exclude each other. They fought for bare existence, for primacy in commerce, for the command of seaports, for the keys of mountain passes, for rivers, roads and all the avenues of wealth and plenty. The pope's cause and the emperor's cause were of comparatively little moment to Italian burghers; and the names of Guelph and Ghibelline, which before long began to be heard in every street, on every market-place, had no meaning for them. These watchwords are said to have arisen in Germany during the disputed succession of the empire between 113 5 and 1152, when the Welfs of Bavaria opposed the Swabian princes of Waiblingen origin. But in Italy, although they were severally identified with the papal and imperial parties, they really served as symbols for jealousies which altered in complexion from time to time and place to place, expressing more than antagonistic political principles, and involving differences vital enough to split the social fabric to its foundation.

Under the imperial rule of Lothar the Saxon (1125-1137) and Conrad the Swabian (1138-1152), these civil wars increased in violence owing to the absence of authority. Neither swabian Lothar nor Conrad was strong at home; the former emperors. had no influence in Italy, and the latter never entered Italy at all. But when Conrad died, the electors chose his nephew Frederick, surnamed Barbarossa, who united the rival honours of Welf and Waiblingen, to succeed him; and it was soon obvious that the empire had a master powerful pˆaerick of brain and firm of will. Frederick immediately Barbarossa determined to reassert the imperial rights in his and the southern provinces, and to check the warfare of the Lomba " 1 burghs. When he first crossed the Alps in 1154, c es ' Lombardy was, roughly speaking, divided

between two parties, the one headed by Pavia professing loyalty to the empire, the other headed by Milan ready to oppose its claims. The municipal animosities of the last quarter of a century gave substance to these factions; yet neither the imperial nor the anti-imperial party had any real community of interest with Frederick. He came to supersede self-government by consuls, to deprive the cities of the privilege of making war on their own account and to extort his regalian rights of forage, food and lodging for his armies. It was only the habit of interurban jealousy which prevented the communes from at once combining to resist demands which threatened their liberty of action, and would leave them passive at the pleasure of a foreign master. The diet was opened at Roncaglia near Piacenza, where Frederick

listened to the complaints of Como and Lodi against Milan, of Pavia against Tortona and of the marquis of Montferrat against Asti and Chieri. The plaintiffs in each case were imperialists; and Frederick's first action was to redress their supposed griev- ances. He laid waste Chieri, Asti and Tortona, then took the Lombard crown at Pavia, and, reserving Milan for a future day, passed southward to Rome. Outside the gates of Rome he was met by a deputation from the senate he had come to supersede, who addressed him in words memorable for expressing the republican spirit of new Italy face to face with autocratic feudalism: " Thou wast a stranger, I have made thee a citizen "; it is Rome who speaks: " Thou earnest as an alien from beyond the Alps, I have conferred on thee the principality." Moved only to scorn and indignation by the rhetoric of these presump- tuous enthusiasts, Frederick marched into the Leonine city, and took the imperial crown from the hands of Adrian IV. In return for this compliance, the emperor delivered over to the pope his troublesome rival Arnold of Brescia, who was burned alive by Nicholas Breakspear, the only English successor of St Peter. The gates of Rome itself were shut against Frederick; and even on this first occasion his good understanding with Adrian began to suffer. The points of dispute between them related mainly to Matilda's bequest, and to the kingdom of Sicily, which the pope had rendered independent of the empire by renewing its investiture in the name of the Holy See. In truth, the papacy and the empire had become irreconcilable. Each claimed illimitable authority, and neither was content to abide within such

limits as would have secured a mutual tolerance. Having obtained his coronation, Frederick withdrew to Germany, while Milan prepared herself against the storm which threatened. In the ensuing struggle with the empire, that great city rose to the altitude of patriotic heroism. By their sufferings no less than by their deeds of daring, her citizens showed themselves to be sublime, devoted and disinterested, winning the purest laurels which give lustre to Italian story. Almost in Frederick's presence, they rebuilt Tortona, punished Pavia, Lodi, Cremona and the marquis of Montferrat. Then they fortified the Adda and Ticino, and waited for the emperor's next descent. He came in 1158 with a large army, overran Lombardy, raised his imperial allies, and sat down before the walls of Milan. Famine forced the burghers to partial obedience, and Frederick held a victorious diet at Roncaglia. Here the jurists of Bologna appeared, armed with their new lore of Roman law, and ex- pounded Justinian's code in the interests of the German empire. It was now seen how the absolutist doctrines of autocracy developed in Justinian's age at Byzantium would bear fruits in the development of an imperial idea, which was destined to be the fatal mirage of medieval Italy. Frederick placed judges of his own appointment, with the title of podesta, in all the Lombard communes; and this stretch of his authority, while it exacer- bated his foes, forced even his friends to join their ranks against him. The war, meanwhile, dragged on. Crema yielded after an heroic siege in 1160, and was abandoned to the cruelty of its fierce rival Cremona. Milan was invested in 1161, starved into capitulation after nine months' resistance, and given up to total destruction by the Italian imperialists of Frederick's army, so stained and tarnished with the vindictive passions of municipal rivalry was even this, the one great glorious strife of Italian annals. Having ruined his rebellious city, but not tamed her spirit, Frederick withdrew across the Alps. But, in the interval between his second and third visit, a league was formed against him in north-eastern Lombardy. Verona, Vicenza, Padua, Treviso, Venice entered into a compact to defend their liberties; and when he came again in 1163 with a brilliant staff of German knights, the imperial cities refused to join his standards. This vas the first and ominous sign of a coming change.

Meanwhile the election of Alexander III. to the papacy in 1 1 59 added a powerful ally to the republican party. Opposed by an anti-pope whom the emperor favoured, Alexander found it was his truest policy to rely for support upon the anti- imperialist communes. They in return gladly accepted a champion who lent them the prestige and influence of the xv. 2

church. When Frederick once more crossed the Alps in 1166, he

advanced on Rome, and besieged Alexander in the Coliseum. But the affairs of Lombardy left him no leisure to persecute a recalcitrant pontiff. In April 1167 a new league was formed between Cremona, Bergamo, Brescia, Mantua and Ferrara. In December of the same year this league allied itself with the elder Veronese league, and received the addition of Milan, Lodi, Piacenza, Parma, Modena and Bologna. The famous league of Lombard cities, styled Concordia in its acts of settlement, was now established. Novara, Vercelli, Asti and Tortona swelled its ranks; only Pavia and Montferrat remained imperialist between the Alps and Apennines. Frederick fled for

Lombard League.

his life by the Mont Cenis, and in 1168 the town of Alessandria was erected to keep Pavia and the marquisate in check. In the emperor's absence, Ravenna, Rimini, Imola and Forli joined the league, which now called itself the " Society of Venice, Lombardy, the March, Romagna and Alessandria." For the fifth time, in 11 74, Frederick entered his rebellious dominions. The fortress town of Alessandria stopped his progress with those mud walls contemptuously named " of straw," while the forces of the league assembled at Modena and obliged him to raise the siege. In the spring of n 76 Frederick threatened Milan. His army found itself a little to the north of the town near the village of Legnano, when the troops of the city, assisted only by a few allies from Piacenza, Verona, Brescia, Novara and Vercelli, met and overwhelmed it. The victory was complete. Frederick escaped alone to Pavia, whence he opened negotiations with Alexander. In consequence of these transactions, he was suffered to betake himself unharmed to Venice. Here, as upon neutral ground, the emperor met the pope, and a truce for six years was concluded with the Lombard burghs. Looking back from the vantage-ground of history upon the issue of this long struggle, we are struck with the small results which satisfied the Lombard communes. They had humbled and utterly defeated their foreign lord. They had proved their strength in combination. Yet neither the acts by which their league was ratified nor the terms negotiated for them by their patron Alexander evince the smallest desire of what we now understand as national independence. The name of Italy is never mentioned. The supremacy of the emperor is not called in question. The conception of a permanent confederation, bound together in Offensive and defensive alliance for common objects, has not occurred to these hard fighters and stubborn asserters of their civic privileges. All they claim is municipal autonomy; the right to manage their own affairs within the city walls, to fight their battles as they choose, and to follow their several ends unchecked. It is vain to lament that, when they might

have now established Italian independence upon a secure basis, they chose local and municipal privileges. Their mutual jealousies, combined with the prestige of the empire, and possibly with the selfishness of the pope, who had secured his own position, and was not likely to foster a national spirit that would have threatened the ecclesiastical supremacy, deprived the Italians of the only great opportunity they ever had of forming themselves into a powerful nation.

When the truce expired in 11 83, a permanent peace was ratified at Constance. The intervening years had been spent by the Lombards, not in consolidating their union, but in attempting to secure special privileges for their ^^f" „ several cities. Alessandria della Paglia, glorious by stance' her resistance to the emperor in n 74, had even changed her name to Cesarea ! The signatories of the peace of Constance were divided between leaguers and imperialists. On the one side we find Vercelli, Novara, Milan, Lodi, Bergamo, Brescia, Mantua, Verona, Vicenza, Padua, Treviso, Bologna, Faenza, Modena, Reggio, Parma, Piacenza; on the other, Pavia, Genoa, Alba, Cremona, Como, Tortona, Asti, Cesarea. Venice, who had not yet entered the Italian community, is conspicuous by her absence. According to the terms of this treaty, the communes were confirmed in their right of self-government by consuls, and their right of warfare. The emperor retained the supreme courts of appeal within the cities, and

his claim for sustenance at their expense when he came into Italy.

The privileges confirmed to the Lombard cities by the peace of Constance were extended to Tuscany, where Florence, having War of ruined Fiesole, had begun her career of freedom and cities prosperity. The next great chapter in the history of

against Italian evolution is the war of the burghs against the nobles. nobles. The consular cities were everywhere sur- rounded by castles; and, though the feudal lords had been weakened by the events of the preceding centuries, they con- tinued to be formidable enemies. It was, for instance, necessary to the well-being of the towns that they should possess territory round their walls, and this had to be wrested

from the nobles. We cannot linger over the details of this warfare. It must suffice to say that, partly by mortgaging their property to rich burghers, partly by entering the service of the cities as condottieri (mercenary leaders), partly by espousing the cause of one town against another, and partly by forced submission after the siege of their strong places, the counts were gradually brought into connexion of dependence on the communes. These, in their turn, forced the nobles to leave their castles, and to reside for at least a portion of each year within the walls. By these measures the counts became citizens, the rural population ceased to rank as serfs, and the Italo-Roman population of the towns absorbed into itself the remnants of Franks, Germans and other foreign stocks. It would be impossible to exaggerate the importance of this revolution, which ended by destroying the last vestige of feudality, and prepared that common Italian people which afterwards distinguished itself by the creation of European culture. But, like all the vicissitudes, of the Italian race, while it was a decided step forward in one direction, it introduced a new source of discord. The associated nobles proved ill neighbours to the peaceable citizens. They fortified their houses, retained their military habits, defied the consuls, and carried on feuds in the streets and squares. The war against the castles became a war against the palaces; and the system of government by consuls proved inefficient to control the clashing elements within the state. This led to the establishment of podestas, who represented a compromise between two radically hostile parties in the city, and whose business it was to arbitrate and keep the peace between them. Invariably a foreigner, elected for a year with power of life and death and control of the armed force, but subject to a strict account at the expiration of his office, the podesta might be compared to a dictator invested with limited authority. His title was derived from that of Frederick Barbarossa's judges; but he had no dependence on the empire. The citizens chose him, and voluntarily submitted to his rule. The podesta marks an essentially transitional state in civic government, and his intervention paved the way for despotism.

The thirty years which elapsed between Frederick Barbarossa's death in noo and the coronation of his grandson Frederick II. in 1 220 form one of the most momentous epochs in Italian history. Barbarossa, perceiving the advantage that would accrue to his house if he could join the crown of Sicily to that of Germany, and thus deprive the popes of their allies in Lower Italy, procured the marriage of his son Henry VI. to Constance, daughter of King Roger, and heiress of the Hauteville dynasty. When William II., the last monarch of the Norman race, died, Henry VI. claimed that kingdom in his wife's right, and was

recognized in 1104. Three years afterwards he died, leaving a son, Frederick, to the care of Constance, who in her turn died in 1198, bequeathing the young prince, already crowned king of Germany, to the guardianship of Innocent III. It was bold policy to confide Frederick to his greatest enemy and rival; but the pope honourably discharged his duty, until his ward outgrew the years of tutelage, and became a fair mark for ecclesiastical hostility. Frederick's long minority was occupied by Innocent's pontificate. Among the principal events of that reign must be reckoned the foundation of the two orders, Fran- ciscan and Dominican, who were destined to form a militia for the holy see in conflict with the empire and the heretics of Lombardy.

Innocent

111.

A second great event was the fourth crusade, undertaken in 1198, which established the naval and commercial supremacy of the Italians in the Mediterranean. The Venetians, who contracted for the transport of the crusaders, and whose blind doge Dandolo was first to land in Constantinople, received one-half and one- fourth of the divided Greek empire for their spoils. The Venetian ascendancy in the Levant dates from this epoch ; for, though the republic had no power to occupy all the domains ceded to it, Candia was taken, together with several small islands and stations on the mainland. The formation of a Latin empire in the East increased the pope's prestige; while at home it was his policy to organize Countess Matilda's heritage by the formation of Guelph leagues, over which he presided. This is the meaning of the three leagues, in the March, in the duchy of Spoleto and in Tuscany, which now combined the chief cities of the papal territory into allies of the holy see. From the Tuscan league Pisa, consistently Ghibelline, stood aloof. Rome itself again at this epoch established a republic, with which Innocent would not or could not interfere. The thirteen districts in their council nominated four caporioni, who acted in concert with a senator, appointed, like the podesta of other cities, for supreme judicial functions. Meanwhile the Guelph and Ghibelline factions were beginning to divide Italy into minute parcels. Not only did commune range itself against commune under the two rival flags, but party rose up against party within the city walls. The introduction of the factions into Florence in 121 5, owing to a private quarrel between the Buondelmonti, Amidei and Donati, is a celebrated instance of what was happening in every burgh.

Frederick II. was left without a rival for the imperial throne in 1 2 18

by the death of Otto IV., and on the 22nd of November 1220, Honorius III., Innocent's successor, crowned him in Rome. It was impossible for any section of the PˆderkA Italians to mistake the gravity of his access to power. p ' ero ' r a " In his single person he combined the prestige of empire with the Crowns of Italy, Sicily, Sardinia, Germany and Bur- gundy; and in 1225, by marriage with Yolande de Brienne, he added that of Jerusalem. There was no prince greater or more formidable in the habitable globe. The communes, no less than the popes, felt that they must prepare themselves for contest to the death with a power which threatened their existence. Already in 1 2 18, the Guelphs of Lombardy had resuscitated their old league, and had been defeated by the Ghibellines in a battle near Ghibello. Italy seemed to lie prostrate before the emperor, who commanded her for the first time from the south as well as from the north. In 1227 Frederick, who had promised to lead a crusade, was excommunicated by Gregory IX. because he was obliged by illness to defer his undertaking; and thus the spiritual power declared war upon its rival. The Guelph towns of Lom- bardy again raised their levies. Frederick enlisted his Saracen troops at Nocera and Luceria, and appointed the terrible Ezzelino da Romano his vicar in the Marches of Verona to quell their insurrection. It was 1236, however, before he was able to take the field himself against the Lombards. Having established Ezzelino in Verona, Vicenza and Padua, he defeated the Milanese and their allies at Cortenuova in 1237, and sent their carroccio as a trophy of his victory to Rome. Gregory IX. feared lest the Guelph party would be ruined by this check. He therefore made alliance with Venice and Genoa, fulminated a new ex- communication against Frederick, and convoked a council at Rome to ratify his ban in 1241. The Genoese undertook to bring the French bishops to this council. Their fleet was attacked at Meloria by the Pisans, and utterly defeated. The French prelates went in silver chains to prison in the Ghibelline capital of Tuscany. So far Frederick had been successful at all points. In 1243 a new pope, Innocent IV., was elected, who prosecuted the war with still bitterer spirit. Forced to fly to France, he there, at Lyons, in r245, convened a council, which enforced his condemnation of the emperor. Frederick's subjects were freed from their allegiance, and he was declared dethroned and deprived o c all rights. Five times king and emperor as he was, Frederick, placed under the ban of the church, led henceforth a doomed existence. The mendicant monks stirred up the populace to acts of fanatical

enmity. To plot against him, to attempt his life by poison or the sword, was accounted virtuous. His secretary, Piero delle Vigne, was wrongly suspected of conspiring. The crimes of his vicar Ezzelino, who laid whole provinces waste and murdered men by thousands in his Paduan prisons, increased the horror with which he was regarded. Parma revolted from him, and he spent months in 1 247-1 248 vainly trying to reduce this one time faithful city. The only gleam of success which shone on his ill fortune was the revolution which placed Florence in the hands of the Ghibellines in 1248. Next year Bologna rose against him, defeated his troops and took his son Enzio, king of Sardinia, prisoner at Fossalta. Hunted to the ground and broken-hearted, Frederick expired at the end of 1250 in his Apulian castle of Fiorentino. It is difficult to judge his career with fairness. The only prince who could, with any probability of success, have established the German rule in Italy, his ruin proved the im- possibility of that long-cherished scheme. The nation had out- grown dependence upon foreigners, and after his death no German emperor interfered with anything but miserable failure in Italian affairs. Yet from many points of view it might be regretted that Frederick was not suffered to rule Italy. By birth and breeding an Italian, highly gifted and widely cultivated, liberal in his opinions, a patron of literature, a founder of uni- versities, he anticipated the spirit of the Renaissance. At his court Italian started into being as a language. His laws were wise. He was capable of giving ‘to Italy a large and noble culture. But the commanding greatness of his position proved his ruin. Emperor and king of Sicily, he was the natural enemy of popes, who could not tolerate so overwhelming a rival,

After Frederick’s death, the popes carried on their war for eighteen years against his descendants. The cause of his son Conrad was sustained in Lower Italy by Manfred, asra/ns7 ar one ˚f Frederick’s many natural children; and, when Frede- Conrad died in 1254, Manfred still acted as vicegerent ***’* for the Swabians, who were now represented by a boy

sueces’ Conradin. Innocent IV. and Alexander IV. continued to make head against the Ghibelline party. The most dramatic incident in this struggle was the crusade preached against Ezzelino. This tyrant had made himself justly odious; and when he was hunted to death in 1259, the triumph was less for the Guelph cause than for humanity outraged by the iniquities of such a monster. The battle between Guelph and Ghibelline raged with unintermitting fury. While the former faction gained in Lombardy by the massacre of Ezzelino, the

latter revived in Tuscany after the battle of Montaperti, which in 1260 placed Florence at the discretion of the Ghibellines. Manfred, now called king of Sicily, headed the Ghibellines, and there was no strong counterpoise against him. In this necessity Urban IV. and Clement IV. invited Charles of Anjou to enter Italy and take the Guelph command. They made him senator of Rome and vicar of Tuscany, and promised him the investiture of the regno provided he stipulated that it should not be held in combination with the empire. Charles accepted these terms, and was welcomed by the Guelph party as their chief throughout Italy. He defeated Manfred in a battle at Grandella near Benevento in 1266. Manfred was killed; and, when Conradin, a lad of sixteen, descended from Germany to make good his claims to the kingdom, he too was defeated at Tagliacozzo in 1267. Less lucky than his uncle, Conradin escaped with his life, to die upon a scaffold at Naples. His glove was carried to his cousin Constance, wife of Peter of Aragon, the last of the great Norman-Swabian family. Enzio died in his prison four years later. The popes had been successful; but they had purchased their bloody victory at a great cost. This first invitation to French princes brought with it incalculable evils.

Charles of Anjou, supported by Rome, and recognized as chief in Tuscany, was by far the most formidable of the Italian potentates. In his turn he now excited the jealousy of the popes, who began, though cautiously, to cast their tfelght into the Ghibelline scale. Gregory initiated the policy of establish- ing an equilibrium between the parties, which was carried out bv his successor Nicholas III. Charles was forced to resign

the senatorship of Rome and the signoria of Lombardy and Tuscany. In 1 282 he received a more decided check, when Sicily rose against him in the famous rebellion of the Vespers. ci uw He lost the island, which gave itself to Aragon; and f Guelphs thus the kingdom of Sicily was severed from that of anj Naples, the dynasty in the one being Spanish and Ohlbei- Ghibelline, in the other French and Guelph. Mean- while a new emperor had been elected, the prudent Rudolf of Habsburg, who abstained from interference with Italy, and who confirmed the territorial pretensions of the popes by solemn charter in 1278. Henceforth Emilia, Romagna, the March of Ancona, the patrimony of St Peter and the Campagna of Rome held of the Holy See, and not of the empire. The imperial chancery, without inquiring closely into the deeds furnished by the papal curia, made a deed of gift, which placed the pope in the position of a temporal sovereign. While Nicholas III. thus bettered the position of the church in Italy, the Guelph party grew stronger than ever, through the crushing defeat of the Pisans by the Genoese at Meloria in 1284. Pisa, who had ruined

Amalfi, was now ruined by Genoa. She never held her head so high again after this victory, which sent her best and bravest citizens to die in the Ligurian dungeons. The Mediterranean was left to be fought for by Genoa and Venice, while Guelph Florence grew still more powerful in Tuscany. Not long after the battle of Meloria Charles of Anjou died, and was succeeded by his son Charles II. of Naples, who played no prominent part in Italian affairs. The Guelph party was held together with a less tight hand even in cities so consistent as Florence. Here in the year 1300 new factions, subdividing the old Guelphs and Ghibellines under the names of Neri and Bianchi, had acquired such force that Boniface VIII., a violently Guelph pope, called in Charles of Valois to pacify the republic and undertake the charge of Italian affairs. Boniface was a passionate and unwise man. After quarrelling with the French king, Philip le Bel, he fell into the hands of the Colonna family at Anagni, and died, either of the violence he there received or of mortifica- tion, in October 1303.

After the short papacy of Benedict XL a Frenchman, Clement V., was elected, and the seat of the papacy was transferred to Avignon. Thus began that Babylonian exile of the Tr aas- popes which placed them in subjection to the French latioa crown and ruined their ‘prestige in Italy. Lasting of the seventy years, and joining on to the sixty years of ˆ»P at y’«» the Great Schism, this enfeeblement of the papal v « Doi *’ authority, coinciding as it did with the practical elimination of the empire from Italian affairs, gave a long period of com- parative independence to the nation. Nor must it be forgotten that this exile was due to the policy which induced the pontiffs, in their detestation of Ghibellinism, to rely successively upon the houses of Anjou and of Valois. This policy it was which justified Dante’s fierce epigram — the putlaneggiar co regi.

The period we have briefly traversed was immortalized by Dante in an epic which from one point of view might be caHed the poem of the Guelphs and Ghibellines. From the foregoing bare narration of events it is impossible to estimate the importance of these parties, or to understand theii bearing on subsequent Italian history. We are therefore forced to pause awhile, and probe beneath the surface. The civil wars may be regarded as a continuation of the previous municipal struggle, intensified by recent hostilities between the burghers and the nobles. The quarrels of the church and empire lend pretexts and furnish war-cries; but the real question at issue is not the supremacy of pope or emperor. The conflict is a social one, between civic and feudal institutions, between commercial and military interests, between progress and conservatism. Guelph de- mocracy and industry idealize the pope. The banner of the church waves above the

camp of those who aim at positive prosperity and republican equality. Ghibelline aristocracy and immobility idealize the emperor. The prestige of the empire, based upon Roman law and feudal tradition, attracts imaginative patriots and systematic thinkers. The two ideals are counter – I posed and mutually exclusive. No city calls itself either Guelph

or Ghibelline till it has expelled one-half of its inhabitants; for each party is resolved to constitute the state according to its own conception, and the affirmation of the one programme is the negation of the other. The Ghibelline honestly believes that the Guelphs will reduce society to chaos. The Guelph is persuaded that the Ghibellines will annihilate freedom and strangle commerce. The struggle is waged by two sets of men who equally love their city, but who would fain rule it upon diametrically opposite principles, and who fight to the death for its possession. This contradiction enters into the minutest details of life — armorial bearings, clothes, habits at table, symbolize and accentuate the difference. Meanwhile each party forms its own organization of chiefs, finance-officers and registrars at home, and sends ambassadors to foreign cities of the same complexion. A network of party policy embraces and dominates the burghs of Italy, bringing the most distant centres into relation, and by the very division of the country augmenting the sense of nationality. The Italians learn through their dis- cords at this epoch that they form one community. .The victory in the conflict practically falls to the hitherto unenfranchised plebeians. The elder noble families die out or lose their pre- ponderance. In some cities, as notably in Florence after the date 1292, it becomes criminal to be scioperato, or unemployed in industry. New houses rise into importance; a new commercial aristocracy is formed. Burghers of all denominations are enrolled in one or other of the arts or gilds, and these trading companies furnish the material from which the government or signoria 6f the city is composed. Plebeian handicrafts assert their right to be represented on an equality with learned professions and wealthy corporations. The ancient classes are confounded and obliterated in a population more homogeneous, more adapted for democracy and despotism.

In addition to the parliament and the councils which have been already enumerated, we now find a council of the party Newcoa-

established within the city. This body tends to stitution become a little state within the state, and, by con- of the free trolling the victorious majority, disposes of the cities. government as it thinks best. The consuls are merged

in ancients or priors, chosen from the arts. A new magistrate, the gonfalonier of justice, appears in some of the Guelph cities, with the special duty of keeping the insolence of the nobility in check. Meanwhile the podesta. still subsists; but he is no longer equal to the task of maintaining an equilibrium of forces. He sinks more and more into a judge, loses more and more the character of dictator. His ancient place is now occupied by a new functionary, no longer acting as arbiter, but concentrating the forces of the triumphant party. The captain of the people, acting as head of the ascendant Guelphs or Ghibellines, under- takes the responsibility of proscriptions, decides on questions of policy, forms alliances, declares war. Like all officers created to meet an emergency, the limitations to his power are ill-defined, and he is often little better than an autocrat.

Y. Age of the Despots. — Thus the Italians, during the heat of

the civil wars, were ostensibly divided between partisans of the

empire and partisans of the church. After the death

Tynaaies. °f Frederick II. their affairs were managed by Manfred

and by Charles of Anjou, the supreme captains of

the parties, under whose orders acted the captains of the

people in each city. The contest being carried on by warfare,

it followed that these captains in the burghs were chosen on

account of military skill; and, since the nobles were men of

arms by profession, members of ancient houses took the lead

again in towns where they had been absorbed into the bourgeoisie.

In this way, after the downfall of the Ezzelini of Romano, the

Delia Scala dynasty arose in Verona, and the Carraresi in Padua.

The Estensi made themselves lords of Ferrara; the Torriani

headed the Guelphs of Milan. At Ravenna we find the Polenta family, at Rimini the Malatestas, at Parma the Rossi, at Piacenza the Scotti, at Faenza the Manfredi. There is not a burgh of northern Italy but can trace the rise of a dynastic house to the vicissitudes of this period. In Tuscany, where the Guelph party was very strongly organized, and the commercial constitution of Florence kept the nobility in check, the communes remained as yet free from hereditary masters. Yet generals from time to time arose, the Conte Ugolino della Gheradesca at Pisa, Uguccione della Faggiuola at Lucca, the Conte Guido di Montefeltro at Florence, who threatened the liberties of Tuscan cities with military despotism.

Left to themselves by absentee emperors and exiled popes, the Italians pursued their own course of development unchecked. After the commencement of the 14th century, the civil wars decreased in fury, and at the same time it was perceived that their effect had been to confirm tyrants in their grasp upon free cities. Growing up out of the captain of the people or signore of the commune, the tyrant annihilated both parties for his own profit and for the peace of the state. He used the dictatorial powers with which he was invested to place himself above the law, resuming in his person the state-machinery which had preceded him. In him, for the first time, the city attained self- consciousness; the blindly working forces of previous revolutions were combined in the will of a ruler. The tyrant's general policy was to favour the multitude at the expense of his own caste. He won favour by these means, and completed the levelling down of classes, which had been proceeding ever since the emergence of the communes.

In 1309 Robert, grandson of Charles, the first Angevine sovereign, succeeded to the throne of Naples, and became the leader of the Guelphs in Italy. In the next year Henry VII. of Luxembourg crossed the Alps soon after his ofcivtt election to the empire, and raised the hopes of the wars. Ghibellines. Dante from his mountain solitudes Advent 0/ passionately called upon him to play the part of a ~4/ g ˆ r " Messiah. But it was now impossible for any German to control the " Garden of the Empire." Italy had entered on a new phase of her existence, and the great poet's De monorchia represented a dream of the past which could not be realized. Henry established imperial vicars in the Lombard towns, confirm- ing the tyrants, but gaining

nothing for the empire in exchange for the titles he conferred. After receiving the crown in Rome, he died at Buonconvento, a little walled town south of Siena, on his backward journey in 1313. The profits of his inroad were reaped by despots, who used the Ghibelline prestige for the consolidation of their own power. It is from this epoch that the supremacy of the Visconti, hitherto the unsuccessful rivals of the Guelphic Torriani for the signory of Milan, dates. The Scaligers in Verona and the Carraresi in Padua were strengthened; and in Tuscany Castruccio Castracane, Uguccione's successor at Lucca, became formidable. In 13 2 5 he defeated the Florentines at Alto Pascio, and carried home their carroccio as a trophy of his victory over the Guelphs. Louis of Bavaria, the next emperor, made a similar excursion in the year 1327, with even greater loss of imperial prestige. He deposed Galeazzo Visconti on his downward journey, and offered Milan for a sum of money to his son Azzo upon his return. Castruccio Castracane was nominated by him duke of Lucca; and this is the first instance of a dynastic title conferred upon an Italian adventurer by the emperor. Castruccio dominated Tuscany, where the Guelph cause, in the weakness of King Robert, languished. But the adventurer's death in 1328 saved the stronghold of republican institutions, and Florence breathed freely for a while again. Can Grande della Scala's death in the next year inflicted on the Lombard Ghibellines a loss hardly inferior to that of Castruccio's on their Tuscan allies. Equally contemptible in its political results and void of historical interest was the brief visit of John of Bohemia, son of Henry VII., whom the Ghibellines next invited to assume their leadership. He sold a few privileges, conferred a few titles, and recrossed the Alps in 1333. It is clear that at this time the fury of the civil wars was spent . In spite of repeated efforts on the part of the Ghibellines, in spite of King Robert's supine incapacity, the imperialists gained no permanent advan- tage. The Italians were tired of fighting, and the leaders of both factions looked exclusively to their own interests. Each city which had been the cradle of freedom thankfully accepted a master, to quench the conflagration of party strife, encouragr

trade, and make the handicraftsmen comfortable. Even the Florentines in 1342 submitted for a few months to the despotism of the duke of Athens. They conferred the signory upon him for life; and, had he not mismanaged matters, he might have held the city in his grasp. Italy

was settling cown and turning her attention to home comforts, arts and literature. Boccaccio, the contented bourgeois, succeeded to Dante, the fierce aristocrat. The most marked proof of the change which came over Italy towards the middle of the 14th century is furnished by the companies of adventure. It was with their own militia that the burghers won freedom in the war of independence, subdued the nobles, and fought the battles of the parties. But from this time forward they laid down their arms, and played the game of warfare by the aid of mercenaries. Ecclesiastical overlords, interfering from a distance in Italian politics; prosperous republics, with plenty of money to spend but no leisure or inclination for camp-life; cautious tyrants, glad of every pretext to emasculate their subjects, and courting popularity by exchanging conscription for taxation— all combined to favour the new system. Mercenary troops are said to have been first levied from disbanded Germans, together with Breton and English adventurers, whom the Visconti and Castruccio took into their pay. They soon appeared under their own captains, who hired them out to the highest bidder, or marched them on marauding expeditions up and down the less protected districts. The names of some of these earliest captains of adventure, Fra Moriale, Count Lando and Duke Werner, who styled himself the ” Enemy of God and Mercy,” have been preserved to us. As the companies grew in size and improved their discipline, it was seen by the Italian nobles that this kind of service offered a good career for men of spirit, who had learned the use of arms. To leave so powerful and profitable a calling in the hands of foreigners seemed both dangerous and un- economical. Therefore, after the middle of the century, this profession fell into the hands of natives. The first Italian who formed an exclusively Italian company was Alberico da Barbiano, a nobleman of Romagna, and founder of the Milanese house of Belgiojoso. In his school the great condottieri Braccio da Montone and Sforza Attendolo were formed; and henceforth the battles of Italy were fought by Italian generals command- ing native troops. This was better in some respects than if the mercenaries had been foreigners. Yet it must not be forgotten that the new companies of adventure, who decided Italian affairs for the next century, were in no sense patriotic. They sold themselves for money, irrespective of the cause which they upheld; and, while changing masters, they had no care for any interests but their own. The name condottiero, derived from condotta, a paid contract to supply so many fighting men in serviceable order, sufficiently indicates the nature of the business. In the hands of able captains, like Francesco Sforza or Piccinino, these mercenary troops became moving despotisms, draining the country of its wealth, and always eager to fasten and found tyrannies upon the provinces they had been

summoned to defend. Their generals substituted heavy-armed cavalry for the old militia, and introduced systems of campaigning which reduced the art of war to a game of skill. Battles became all but bloodless; diplomacy and tactics superseded feats of arms and hard blows in pitched fields. In this way the Italians lost their military vigour, and wars were waged by despots from their cabinets, who pulled the strings of puppet captains in their pay. Nor were the people only enfeebled for resist- ance to a real foe; the whole political spirit of the race was demoralized. The purely selfish bond between condottieri and their employers, whether princes or republics, involved intrigues and treachery, checks and counterchecks, secret terror on the one hand and treasonable practice on the other, which ended by making statecraft in Italy synonymous with perfidy.

It must further be noticed that the rise of mercenaries was synchronous with a change in the nature of Italian despotism. The tyrants, as we have already seen, established themselves as captains of the people, vicars of the empire, vicars for the church, leaders of the Guelph and Ghibelline parties. They were

accepted by a population eager for repose, who had merged old class distinctions in the conflicts of preceding centuries. They rested in large measure on the favour of the multitude, change and pursued a policy of sacrificing to their interests in type the nobles. It was natural that these self-made otdes- princes should seek to secure the peace which po sm ‘ they had promised in their cities, by freeing the people from military service and disarming the aristocracy. As their tenure of power grew firmer, they advanced dynastic claims, assumed titles, and took the style of petty sovereigns. Their government became paternal; and, though there was no limit to their cruelty when stung by terror, they used the purse rather than the sword, bribery at home and treasonable intrigue abroad in preference to coercive measures or open war. Thus was elabor- ated the type of despot which attained completeness in Gian Galeazzo Visconti and Lorenzo de’ Medici. No longer a tyrant of Ezzelino’s stamp, he reigned by intelligence and terrorism masked beneath a smile. He substituted cunning and corruption for violence. The lesser people tolerated him because he extended the power of their city and made it beautiful with public buildings. The bourgeoisie, protected in their trade, found it convenient to support him. The nobles, turned into courtiers, placemen, diplomatists and men of affairs, ended by preferring his autho- rity to the alternative of democratic institutions. A lethargy of well-being, broken only by the pinch of taxation for war-costs, or by outbursts of frantic ferocity and lust in the less calculating tyrants, descended on the population of cities which had boasted of their

freedom. Only Florence and Venice, at the close of the period upon which we are now entering, maintained their republican independence. And Venice was ruled by a close oligarchy; Florence was passing from the hands of her oligarchs into the power of the Medicean merchants.

Between the year 1305, when Clement V. settled at Avignon, and the year 1447, when Nicholas V. re-established the papacy upon a solid basis at Rome, the Italians approximated Discrimi- more nearly to self-government than at any other nation of epoch of their history. The conditions which have the five been described, of despotism, mercenary warfare “*’

DOWCfS

and bourgeois prosperity, determined the character of this epoch, which was also the period when the great achievements of the Renaissance were prepared. At the end of this century and a half, five principal powers divided the peninsula; and their confederated action during the next forty-five years (1447-1492) secured for Italy a season of peace and brilliant prosperity. These five powers were the kingdom of Naples, the duchy of Milan, the republic of Florence, the republic of Venice and the papacy. The subsequent events of Italian history will be rendered most intelligible if at this point we trace the development of these five constituents of Italian greatness separately.

When Robert of Anjou died in 1343, he was succeeded by his grand-daughter Joan, the childless wife of four successive husbands, Andrew of Hungary, Louis of Taranto, James of Aragon and Otto of Brunswick. Charles of Sicilies. Durazzo, the last male scion of the Angevine house in Lower Italy, murdered Joan in 1382, and held the kingdom for five years. Dying in 1387, he transmitted Naples to his son Ladislaus, who had no children, and was followed in 1414 by his sister Joan II. She too, though twice married, died without issue, having at one time adopted Louis III. of Provence and his brother Rene, at another Alfonso V. of Aragon, who inherited the crown of Sicily. After her death in February 1435 the kingdom was fought for between Rene of Anjou and Alfonso, surnamed the Magnanimous. Rene found supporters among the Italian princes, especially the Milanese Visconti, who helped him to assert his claims with arms. During the war of succession which ensued, Alfonso was taken prisoner by the Genoese fleet in August 1435, and was sent a prisoner to Filippo Maria at Milan. Here he pleaded his own cause so powerfully, and proved so incontestably the advantage which might ensue to the Visconti from his alliance, if he held the regno, that he obtained his release and recognition as king. From the end of the year 1435

3»

ITALY

Alfonso reigned alone and undisturbed in Lower Italy, combining for the first time since the year 1282 the crowns of Sicily and Naples. The former he held by inheritance, together with that of Aragon. The latter he considered to be his by conquest. Therefore, when he died in 1458, he bequeathed Naples to his natural son Ferdinand, while Sicily and Aragon passed together to his brother John, and so on to Ferdinand the Catholic. The twenty-three years of Alfonso's reign were the most prosperous and splendid period of South Italian history. He became an Italian in taste and sympathy, entering with enthusiasm into the humanistic ardour of the earlier Renaissance, encouraging men of letters at his court, administering his kingdom on the principles of an enlightened despotism, and lending his authority to establish that equilibrium in the peninsula upon which the politicians of his age believed, not without reason, that Italian independence might be secured.

The last member of the Visconti family of whom we had occasion to speak was Azzo, who bought the city in 1328 from Ducft of Louis of Bavaria. His uncle Lucchino succeeded, but Milan. was murdered in 1349 by a wife against whose life he had been plotting. Lucchino's brother John, arch- bishop of Milan, now assumed the lordship of the city, and extended the power of the Visconti over Genoa and the whole of north Italy, with the exception of Piedmont, Verona, Mantua, Ferrara and Venice. The greatness of the family dates from the reign of this masterful prelate. He died in 1354, and his heritage was divided between three members of his house, Matteo,Bernabo and Galeazzo. In the next year Matteo, being judged incom- petent to rule, was assassinated by order of his brothers, who made an equal partition of their subject cities — Bernabo residing in Milan, Galeazzo in Pavia. Galeazzo was the wealthiest and most magnificent Italian of his epoch. He married his daughter Violante to our duke of Clarence, and his son Gian Galeazzo to a daughter of King John of France. When he died in 1378, this son resolved to reunite the domains of the Visconti; and, with this object in view, he plotted and executed the murder of his uncle Bernabo. Gian Galeazzo thus became by one stroke the most formidable of Italian despots. Immured in his castle at Pavia, accumulating wealth by systematic taxation and methodical economy, he organized the mercenary troops who eagerly took service under so good a paymaster; and, by directing their operations from his cabinet, he threatened the whole of Italy with conquest. The last scions of the Delia Scala family still reigned in Verona, the last Carraresi in Padua; the Estensi were powerful in Ferrara, the Gonzaghi in Mantua. Gian Galeazzo, partly by force and partly by intrigue,

discredited these minor despots, pushed his dominion to the very verge of Venice, and, having subjected Lombardy to his sway, proceeded to attack Tuscany. Pisa and Perugia were threatened with extinction, and Florence dreaded the advance of the Visconti arms, when the plague suddenly cut short his career of treachery and conquest in the year 1402. Seven years before his death Gian Galeazzo bought the title of duke of Milan and count of Pavia from the emperor Wenceslaus, and there is no doubt that he was aiming at the sovereignty of Italy. But no sooner was he dead than the essential weakness of an artificial state, built up by cunning and perfidious policy, with the aid of bought troops, dignified by no dynastic title, and consolidated by no sense of loyalty, became apparent. Gian Galeazzo's duchy was a masterpiece of mechanical contrivance, the creation of a scheming intellect and lawless will. When the mind which had planned it was with- drawn, it fell to pieces, and the very hands which had been used to build it helped to scatter its fragments. The Visconti's own generals, Facino Cane, Pandolfo Malatesta, Jacopo dal Verme, Gabrino Fondulo, Ottobon Terzo, seized upon the tyranny of several Lombard cities. In others the petty tyrants whom the Visconti had uprooted reappeared. The Estensi recovered their grasp upon Ferrara, and the Gonzaghi upon Mantua. Venice strengthened herself between the Adriatic and the Alps. Florence reassumed her Tuscan hegemony. Other communes which still preserved the shadow of independence, like Perugia and Bologna, began once more to dream of republican freedom under their

own leading families. Meanwhile Gian Galeazzo had left two sons, Giovanni Maria and Filippo Maria. Giovanni, a monster of cruelty and lust, was assassinated by some Milanese nobles in 141 2; and now Filippo set about rebuilding his father's duchy. Herein he was aided by the troops of Facino Cane, who, dying opportunely at this period, left considerable wealth, a well- trained band of mercenaries, and a widow, Beatrice di Tenda. Filippo married and then beheaded Beatrice after a mock trial for adultery, having used her money and her influence in reuniting several subject cities to the crown of Milan. He subsequently spent a long, suspicious, secret and incomprehensible career in the attempt to piece together Gian Galeazzo's Lombard state, and to carry out his schemes of Italian conquest. In this endeavour he met with vigorous opponents. Venice and Florence, strong in the strength of their resentful oligarchies, offered a determined resistance; nor was Filippo equal in ability to his father. His infernal cunning often defeated its own aims, checkmating him at the point of achievement by suggestions of duplicity or terror. In the course of Filippo's wars with Florence and Venice, the greatest generals of this

age were formed — Francesco Carmagnola, who was beheaded between the columns at Venice in 1432; Niccolo Piccinino, who died at Milan in 1444; and Francesco Sforza, who survived to seize his master's heritage in 1450. Son of Attendolo Sforza, this Francesco received the hand of Filippo's natural daughter, Bianca, as a reward for past service and a pledge of future support. When the Visconti dynasty ended by the duke's death in 1447, he pretended to espouse the cause of the Milanese republic, which was then re-established; but he played his cards so subtly as to make himself, by the help of Cosimo de' Medici in Florence, duke de facto if not de jure. Francesco Sforza was the only condottiero among many aspiring to be tyrants who planted themselves firmly on a throne of first- rate importance. Once seated in the duchy of Milan, he displayed rare qualities as a ruler; for he not only entered into the spirit of the age, which required humanity and culture from a despot, but he also knew how to curb his desire for territory. The con- ception of confederated Italy found in him a vigorous supporter. Thus the limitation of the Milanese duchy under Filippo Maria Visconti, and its consolidation under Francesco Sforza, were equally effectual in preparing the balance of power to which Italian politics now tended.

This balance could not have been established without the con- current aid of Florence. After the expulsion of the duke of Athens in 1343, and the great plague of 1348, the Florentine proletariate rose up against the merchant princes. This insur- gence of the artisans, in a republic which had been remodelled upon economical principles by Giano della Bella's constitution of 1292, reached a climax in 1378, when the Ciompi rebellion placed the city for a few years in the hands of the Lesser Arts. The revolution was but temporary, and was rather a symptom of democratic tendencies in the state than the sign of any capacity for government on the part of the working classes. The neces- sities of war and foreign affairs soon placed Florence in the power of an oligarchy headed by the great Albizzi family. They fought the battles of the republic with success against the Visconti, and widely extended the Florentine domain over the Tuscan cities. During their season of ascendancy Pisa was enslaved, and Florence gained the access to the sea. But throughout this period a powerful opposition was gathering strength. It was led by the Medici, who sided with the common people, and increased their political importance by the accumulation and wise employ- ment of vast commercial wealth. In 1433 the Albizzi and the Medici came to open strife. Cosimo de' Medici, the chief of the opposition, was exiled to Venice. In the next year he returned, assumed the presidency of the democratic party, and by a system of corruption and popularity-hunting, combined with the

patronage of arts and letters, established himself as the real but unacknowledged dictator of the commonwealth. Cosimo aban- doned the policy of his predecessors. Instead of opposing Fran- cesco Sforza in Milan, he lent him his prestige and influence, foreseeing that the dynastic future of his own family and the pacification of Italy might be secured by a balance of power in

Venice.

which Florence should rank on equal terms with Milan and Naples.

The republic of Venice differed essentially from any other state in Italy; and her history was so separate that, up to this point, it would have been needless to interrupt the narrative by tracing it. Venice, however, in the 14th century took her place at last as an Italian power on an equality at least with the very greatest. The constitution of the common- wealth had slowly matured itself through a series of revolutions, which confirmed and defined a type of singular stability. During the earlier days of the republic the doge had been a prince elected by the people, and answerable only to the popular assemblies. In 1032 he was obliged to act in concert with' a senate, called pregadi; and in 11 72 the grand council, which became the real sovereign of the state, was formed. The several steps whereby the members of the grand council succeeded in eliminating the people from a share in the government, and reducing the doge to the position of their ornamental representative, cannot here be described. It must suffice to say that these changes cul- minated in 1 297, when an act was passed for closing the grand council, or in other words for confining it to a fixed number of privileged families, in whom the government was henceforth vested by hereditary right. This ratification of the oligarchical principle, together with the establishment in 131 1 of the Council of Ten, completed that famous constitution which endured till the extinction of the republic in 1797. Meanwhile, throughout the middle ages, it had been the policy of Venice to refrain from conquests on the Italian mainland, and to confine her energies to commerce in the East. The first entry of any moment made by the Venetians into strictly Italian affairs was in 1336, when the republics of Florence and St Mark allied them- selves against Mastino della Scala, and the latter took possession of Treviso. After this, for thirty years, between 1352

and 1381, Venice and Genoa contested the supremacy of the Mediterranean. Pisa's maritime power having been extinguished in the battle of Meloria (1284), the two surviving republics had no rivals. They fought their duel out upon the Bosporus, off Sardinia, and in the Morea, with various success. From the first great encounter, in 1355, Venice retired well-nigh exhausted, and Genoa was so crippled that she placed herself under the protection of the Visconti. The second and decisive battle was fought upon the Adriatic. The Genoese fleet under Luciano Doria defeated the Venetians off Pola in 1379, and sailed without opposition to Chioggia, which was stormed and taken. Thus the Venetians found themselves blockaded in their own lagoons. Meanwhile a fleet was raised for their relief by Carlo Zeno in the Levant, and the admiral Vittore Pisani, who had been imprisoned after the defeat at Pola, was released to lead their forlorn hope from the city side. The Genoese in their turn were now blockaded in Chioggia, and forced by famine to surrender. The losses of men and money which the war of Chioggia, as it was called, entailed, though they did not immediately depress the spirit of the Genoese republiCj signed her naval ruin. During this second struggle to the death with Genoa, the Venetians had been also at strife with the Carraresi of Padua and the Scaligers of Verona. In 1406, after the extinction of these princely houses they added Verona, Vicenza and Padua to the territories they claimed on terra firma. Their career of conquest, and their new policy of forming Italian alliances and entering into the management of Italian affairs were confirmed by the long dogeship of Francesco Foscari (1423- 1457) , who must rank with Alfonso, Cosimo de' Medici, Francesco Sforza and Nicholas V., as a joint-founder of confederated Italy. When Constantinople fell in 1453, the old ties between Venice and the Eastern empire were broken, and she now entered on a wholly new phase of her history. Ranking as one of the five Italian powers, she was also destined to defend Western Christendom against the encroachments of the Turk in Europe. (See Venice: History.)

By their settlement in Avignon, the popes relinquished their protectorate of Italian liberties, and lost their position as Italian potentates. Rienzi's revolution in Rome (1347-1354), and his establishment of a republic upon a fantastic basis, half classical,

half feudal, proved the temper of the times; while the rise of dynastic families in the cities of the church, claiming the title of papal vicars, but acting in their own interests, weakened the authority of the Holy See. The pre- papacy. datory expeditions of Bertrand du Poiet and Robert of Geneva were as ineffective as the descents of the emperors; and, though the cardinal Albornoz conquered Romagna and the March

in 1364, the legates who resided in those districts were not long able to hold them against their despots. At last Gregory XI. returned to Rome; and Urban VI., elected in 1378, put a final end to the Avignonian exile. Still the Great Schism, which now distracted Western Christendom, so enfeebled the papacy, and kept the Roman pontiffs so engaged in ecclesiastical disputes, that they had neither power nor leisure to occupy themselves seriously with their temporal affairs. The threatening presence of the tw.o princely houses of Orsini and Colonna, alike dangerous as friends or foes, rendered Rome an unsafe residence. Even when the schism was nominally terminated in 141 5 by the council of Constance, the next two popes held but a precarious grasp upon their Italian domains. Martin V. (1417-1431) resided principally at Florence. Eugenius IV. (1431-1447) followed his example. And what Martin managed to regain Eugenius lost. At the same time, the change which had now come over Italian politics, the desire on all sides for a settlement, and the growing conviction that a federation was necessary, proved advantageous to the popes as sovereigns. They gradually entered into the spirit of their age, assumed the style of despots and made use of the humanistic movement, then at its height, to place themselves in a new relation to Italy. The election of Nicholas V. in 1447 determined this revolution in the papacy, and opened a period of temporal splendour, which ended with the establishment of the popes as sovereigns. Thomas of Sarzana was a distinguished humanist. Humbly born, he had been tutor in the house of the Albizzi, and afterwards librarian of the Medici at Florence, where he imbibed the politics together with the culture of the Renaissance. Soon after assuming the tiara, he found himself without a rival in the church; for the schism ended by Felix V.'s resignation in 1449. Nicholas fixed his residence in Rome, which he began to rebuild and to fortify, determining to render the Eternal City once more a capital worthy of its high place in Europe. The Romans were flattered; and, though his reign was disturbed by republican conspiracy, Nicholas V. was able before his death in 1455 to secure the modern status of the pontiff as a splendid patron and a wealthy temporal potentate.

Italy was now for a brief space independent. The humanistic movement had created a common culture, a common language and sense of common nationality. The five great /

powers, with their satellites — dukes of Savoy and rated Urbino, marquesses of Ferrara and Mantua, republics uafy. of Bologna, Perugia, Siena — were constituted. All political institutions tended toward despotism. The Medici became yearly more indispensable to Florence, the Bentivogli more autocratic in Bologna, the Baglioni in

Perugia; and even Siena was ruled by the Petrucci. But this despotism was of a mild type. The princes were Italians; they shared. the common enthusiasms of the nation for art, learning, literature and science; they studied how to mask their tyranny with arts agreeable to the multitude. When Italy had reached this point, Constantinople was taken by the Turks. On all sides it was felt that the Italian alliance must be tightened; and one of the last, best acts of Nicholas V.'s pontificate was the appeal in 1453 to the five great powers in federation. As regards their common opposition to the Turk, this appeal led to nothing; but it marked the growth of a new Italian consciousness.

Between 1453 and 1492 Italy continued to be prosperous and tranquil. Nearly all wars during this period were undertaken either to check the growing power of Venice or to further the ambition of the papacy. Having become despots, the popes sought to establish their relatives in principalities. The word nepotism acquired new significance in the reigns of Sixtus IV. and Innocent VIII. Though the country was convulsed by no great struggle, these forty years witnessed a truly appalling

increase of political crime. To be a prince was tantamount to being the mark of secret conspiracy and assassination. Among the most noteworthy examples of such attempts may be mentioned the revolt of the barons against Ferdinand I. of Naples (1464), the murder of Galeazzo Maria Sforza at Milan (1476) and the plot of the Pazzi to destroy the Medici (1478). After Cosimo de' Medici's death in 1464, the presidency of the Florentine republic passed to his son Piero, who left it in 1469 to his sons Lorenzo and Giuliano. These youths assumed the style of princes, and it was against their lives that the Pazzi, with the sanction of Sixtus IV., aimed their blow. Giuliano was murdered, Lorenzo escaped, to tighten his grasp upon the city, which now loved him and was proud of him. During the following fourteen years of his brilliant career he made himself absolute master of Florence, and so modified her institutions that the Medici were henceforth necessary to the state. Apprehending the importance of Italian federation, Lorenzo, by his personal tact and prudent leadership of the republic, secured peace and a common intel- ligence between the five powers. His own family was fortified by the marriage of his daughter to a son of

Innocent VIII., which procured his son Giovanni's elevation to the cardinalate, and involved two Medicean papacies and the future dependence of Florence upon Rome.

VI. Age of Invasions. — The year 1492 opened a new age for Italy. In this year Lorenzo died, and was succeeded by his son, the vain and weak Piero; France passed beneath of Charles *- ne personal control of the inexperienced Charles via. VIII.; the fall of Granada freed Spain from her

embarrassments; Columbus discovered America, destroying the commercial supremacy of Venice; last, but not least, Roderigo Borgia assumed the tiara with the famous title of Alexander VI. In this year the short-lived federation of the five powers was shaken, and Italy was once more drawn into the vortex of European affairs. The events which led to this disaster may be briefly told. After Galeazzo Maria's assassination, his crown passed to a boy, Gian Galeazzo, who was in due course married to a grand-daughter of Ferdinand I. of Naples. But the government of Milan remained in the hands of this youth's uncle, Lodovico, surnamed II Moro. Lodovico resolved to become duke of Milan. The king of Naples was his natural enemy, and he had cause to suspect that Piero de' Medici might abandon his alliance. Feeling himself alone, with no right to the title he was bent on seizing, he had recourse to Charles VIII. of France, whom he urged to make good his claim to the kingdom of Naples. This claim, it may be said in passing, rested on the will of King Rene of Anjou. After some hesitation, Charles agreed to invade Italy. He crossed the Alps in 1495, passed through Lombardy, entered Tuscany, freed Pisa from the yoke of Florence, witnessed the expulsion of the Medici, marched to Naples and was crowned there — all this without striking a blow. Meanwhile Lodovico procured his nephew's death, and raised a league against the French in Lombardy. Charles hurried back from Naples, and narrowly escaped destruc- tion at Fornovo in the passes of the Apennines. He made good his retreat, however, and returned to France in 1495. Little remained to him of his light acquisitions; but he had convulsed Italy by this invasion, destroyed her equilibrium, exposed her military weakness and political disunion, and revealed her wealth to greedy and more powerful nations.

The princes of the house of Aragon, now represented by Frederick, a son of Ferdinand I., returned to Naples. Florence Louis XII. ma de herself a republic, adopting a form of constitu- tion analogous to that of Venice. At this crisis she was ruled by the monk Girolamo Savonarola, who inspired the people with a thirst for freedom, preached the necessity of reformation, and placed himself in direct

antagonism to Rome. After a short but eventful career, the influence of which was long effective, he lost his hold upon the citizens. Alexander VI. procured a mock trial, and his enemies burned him upon the Piazza in 1498. In this year Louis XII. succeeded Charles VIII. upon the throne of France. As duke of Orleans he had certain claims to Milan through his grandmother Valentina, daughter of

Gian Galeazzo, the first duke. They were not valid, for the investiture of the duchy had been granted only to male heirs. But they served as a sufficient pretext, and in 1499 Louis entered and subdued the Milanese. Lodovico escaped to Germany, returned the next year, was betrayed by his Swiss mercenaries and sent to die at Loches in France. In 1500 Louis made the blunder of calling Ferdinand the Catholic to help him in the conquest of Naples. By a treaty signed at Granada, the French and Spanish kings were to divide the spoil. The conquest was easy; but, when it came to a partition, Ferdinand played his ally false. He made himself supreme over the Two Sicilies, which he now reunited under a single crown. Three years later, unlessoned by this experience, Louis signed the treaty of Blois (1504), whereby he invited the emperor Maximilian to aid him in the subjugation of Venice. No policy could have been less far-sighted; for Charles V., joint heir to Austria, Burgundy, Castile and Aragon, the future overwhelming rival of France, was already born.

The stage was now prepared, and all the actors who were destined to accomplish the ruin of Italy trod it with their armies. Spain, France, Germany, with their Swiss auxiliaries, had been summoned upon various pretexts to partake her provinces. Then, too late, patriots like Machiavelli perceived the suicidal self-indulgence of the past, which, by substituting mercenary troops for national militias, left the Italians at the absolute discretion of their neighbours. Whatever parts the Italians themselves played in the succeeding quarter of a century, the game was in the hands of French, Spanish and German invaders. Meanwhile, no scheme for combination against common foes arose in the peninsula. Each petty potentate strove for his own private advantage in the confusion; and at this epoch the chief gains accrued to the papacy. Aided by his terrible son, Cesare Borgia, Alexander VI. chastised the Roman nobles, subdued Romagna and the March, threatened Tuscany, and seemed to be upon the point of creating a Central Italian state in favour of his progeny, when he died suddenly in 1503. His conquests reverted to the Holy See. Julius II., his bitterest enemy and powerful successor, continued Alexander's policy, but no longer in the interest of his own relatives. It became the nobler ambition of Julius to aggrandize the church, and to reassume the protectorate of the Italian people. With this object, he secured Emilia,

carried his victorious arms against Ferrara, and curbed the tyranny of the Baglioni in Perugia. Julius II. played a perilous game; but the stakes were high, and he fancied himself strong enough to guide the tempest he evoked. Quarrel- ling with the Venetians in 1508, he combined the forces of all Europe by the league of Cambray against them; and, when he had succeeded in his first purpose of humbling them even to the dust, he turned round in 1510, uttered his famous resolve to expel the barbarians from Italy, and pitted the Spaniards against the French. It was with the Swiss that he hoped to effect this revolution; but the Swiss, now interfering for the first time as principals in Italian affairs, were incapable of more than adding to the already maddening distractions of the people. Formed for mercenary warfare, they proved a perilous instrument in the hands of those who used them, and were hardly less injurious to their friends than to their foes. In 151 2 the battle of Ravenna between the French troops and the allies of Julius — Spaniards, Venetians and Swiss — was fought. Gaston de Foix bought a doubtful victory dearly with his death; and the allies, though beaten on the banks of the Ronco, immediately afterwards expelled the French from Lombardy. Yet Julius II. had failed, as might have been foreseen. He only exchanged one set of foreign masters for another, and taught a new barbarian race how pleasant were the plains of Italy. As a consequence of the battle of Ravenna, the Medici returned in 151 2 to Florence. When Leo X. was elected in 1513, Rome and Florence rejoiced; but Italy had no repose. Louis XII. had lost the game, and the. Spaniards were triumphant. But new actors appeared upon the scene, and the same old struggle was resumed with fiercer energy. By the victory of Marignano in 151 5 Francis I., having now succeeded to the throne of France, regained the Milanese,

and broke the power of the Swiss, who held it for Massimiliano Sforza, the titular duke. Leo for a while relied on Francis; for the vast power of Charles V., who succeeded to the empire in 1519, as in 1516 he had succeeded to the crowns of Spain and Lower Italy, threatened the whole of Europe. It was Leo’s nature, however, to be inconstant. In 1521 he changed sides, allied himself to Charles, and died after hearing that the imperial troops had again expelled the French from Milan. During the next four years the Franco-Spanish war dragged on in Lombardy until the decisive battle of Pavia in 1525, when Francis

was taken prisoner, and Italy lay open to the Spanish armies. Meanwhile Leo X. had been followed by Adrian VI., and Adrian by Clement VII., of the house of Medici, who had long ruled Florence. In the reign of this pope Francis was released from his prison in Madrid (1526), and Clement hoped that he might still be used in the Italian interest as a counterpoise to Charles. It is impossible in this place to follow the tangled intrigues of that period. The year 1527 was signalized by the famous sack of Rome. An army of mixed German and Spanish troops, pretending to act for the emperor, but which may rather be regarded as a vast marauding party, entered Italy under their leader Frundsberg. After his death, the Constable de Bourbon took command of them; they marched slowly down, aided by the marquis of Ferrara, and unopposed by the duke of Urbino, reached Rome, and took it by assault. The constable was killed in the first onslaught; Clement was im- prisoned in the castle of St Angelo; Rome was abandoned to the rage of 30,000 ruffians. As an immediate result of this catastrophe, Florence shook off the Medici, and established a republic. But Clement, having made peace with the emperor, turned the remnants of the army which had sacked Rome against his native city. After a desperate resistance, Florence fell in 1530. Alessandro de' Medici was placed there with the title of duke of Civita di Penna; and, on his murder in 1537, Cosimo de' Medici, of the younger branch of the ruling house, was made duke. Acting as lieutenant for the Spaniards, he subsequently (1555) subdued Siena, and bequeathed to his descendants the grand-duchy of Tuscany.

VII. Spanish-Austrian Ascendancy. — It was high time, after the sack of Rome in 1527, that Charles V. should undertake Italian affairs. The country was exposed to anarchy, S ? t f£?" >nt of which this had been the last and most disgrace- by Spain. f u l example. The Turks were threatening western Europe, and Luther was inflaming Germany. By the treaty of Barcelona in 1529 the pope and emperor made terms. By that of Cambray in the same year France relinquished Italy to Spain. Charles then entered the port of Genoa, and on the 5th of November met Clement VII. at Bologna. He there received the imperial crown, and summoned the Italian princes for a settlement of all disputed claims. Francesco Sforza, the last and childless heir of the ducal house, was left in Milan till his death, which happened in 1535. The republic of Venice was respected in her liberties and Lombard territories. The Este family received a confirmation of their duchy of Modena and Reggio, and were invested in their fief of Ferrara by the pope. The marquessate of Mantua was made a duchy; and Florence was secured, as we have seen, to the Medici. The great gainer by this settlement was the papacy, which held the most sub- stantial Italian

province, together with a prestige that raised it far above all rivalry. The rest of Italy, however parcelled, henceforth became but a dependence upon Spain. Charles V., it must be remembered, achieved his conquest and confirmed his authority far less as emperor than as the heir of Castile and Aragon. A Spanish viceroy in Milan and another in Naples, supported by Rome and by the minor princes who followed the policy dictated to them from Madrid, were sufficient to preserve the whole peninsula in a state of somnolent inglorious servitude. From 1530 until 1796, that is, for a period of nearly three centuries, the Italians had no history of their own. Their annals are filled with records of dynastic changes and redistributions of territory, consequent upon treaties signed by foreign powers, in the settlement of quarrels which no wise concerned the people.

Italy only too often became the theatre of desolating and dis- tracting wars. But these wars were fought for the most part by alien armies; the points at issue were decided beyond the Alps; the gains accrued to royal families whose names were unpronounceable by southern tongues. The affairs of Europe during the years when Habsburg and Bourbon fought their domestic battles with the blood of noble races may teach grave lessons to all thoughtful men of our days, but none bitterer, none fraught with more insulting recollections, than to the Italian people, who were haggled over like dumb driven cattle in the mart of chaffering kings. We cannot wholly acquit the Italians of their share of blame. When they might have won national independence, after their warfare with the Swabian emperors, they let the golden opportunity slip. Pampered with commercial prosperity, eaten to the core with inter-urban rivalries, they submitted to despots, renounced the use of arms, and offered themselves in the hour of need, defenceless and dis- united to the shock of puissant nations. That they had created modern civilization for Europe availed them nothing. Italy, intellectually first among the peoples, was now politically and practically last; and nothing to her historian is more heart- rending than to watch the gradual extinction of her spirit in this age of slavery.

In 1534 Alessandro Farnese, who owed his elevation to his sister Giulia, one of Alexander VI. ‘s mistresses, took the tiara with the title of Paul III. It was his ambition to create a duchy for his family; and with this object he Pontm- gave Parma and Piacenza to his son Pier Luigi. After Paul m# much wrangling between the French and Spanish parties, the duchy was confirmed in 1586 to Ottaviano Farnese and his son Alessandro, better known as Philip II. ‘s general, the prince of Parma. Alessandro’s descendants reigned in Parma and Piacenza till the year 1731. Paul III.‘s pontificate was further marked by important

changes in the church, all of which confirmed the spiritual autocracy of Rome. In 1540 this pope approved of Loyola's foundation, and secured the powerful militia of the Jesuit order. The Inquisition was established with almost unlimited powers in Italy, and the press was placed under its jurisdiction. Thus free thought received a check, by which not only ecclesiastical but political tyrants knew how to profit. Henceforth it was impossible to publish or to utter a word which might offend the despots of church or state; and the Italians had to amuse their leisure with the polite triflings of academics. In 1545 a council was opened at Trent for the reformation of church discipline and the promulgation of orthodox doctrine. The decrees of this council defined Roman Catholicism against the Reformation; and, while failing to regenerate morality, they enforced a hypocritical observance of public decency. Italy to outer view put forth blossoms of hectic and hysterical piety, though at the core her clergy and her aristocracy were more corrupt than ever.

In 1556 Philip II., by the abdication of his father Charles V., became king of Spain. He already wore the crown of the Two Sicilies, and ruled the duchy of Milan. In the next year Ferdinand, brother of Charles, was elected em- pˆJrf jj. peror. The French, meanwhile, had not entirely abandoned their claims on Italy. Gian Pietro Caraffa, who was made pope in 1555 with the name of Paul IV., en- deavoured to revive the ancient papal policy of leaning upon France. He encouraged the duke of Guise to undertake the conquest of Naples, as Charles of Anjou had been summoned by his predecessors. But such schemes were now obsolete and" anachronistic. They led to a languid lingering Italian campaign, which was settled far beyond the Alps by Philip's victories over the French at St Quentin and Gravelines. The peace of Cateau Cambresis, signed in 1559, left the Spanish monarch undisputed lord of Italy. Of free commonwealths there now survived only Venice, which, together with Spain, achieved for Europe the victory of Lepanto in 1573; Genoa, which, after the ineffectual Fieschi revolution in 1547, abode beneath the rule of the great Doria family, and held a feeble sway in Corsica; and the two insignificant republics of Lucca and San Marino.

[SPANISH-AUSTRIAN ASCENDANCY

The future hope of Italy, however, was growing in a remote and hitherto neglected corner. Emmanuel Philibert, duke of Savoy,

represented the oldest and not the least illustrious reigning house in Europe, and his descendants were destined to achieve for Italy the independence which no other power or prince had given her since the fall of ancient Rome. (See Savoy, House of.)

When Emmanuel Philibert succeeded to his father Charles III. in ˆS. ne w as a duke without a duchy. But the princes of the house of Savoy were a race of warriors; and what Emmanuel Philibert lost as sovereign he regained as captain of adventure in the service of his cousin Philip II. The treaty of Cateau Cambresis in 1559, and the evacuation of the Piedmontese cities held by French and Spanish troops in is 74, restored his state. By removing the capital from Chambery to Turin, he completed the transformation of the dukes of Savoy from Burgundian into Italian sovereigns. They still owned Savoy beyond the Alps, the plains of Bresse, and the maritime province of Nice.

Emmanuel Philibert was succeeded by his son Charles Emmanuel I., who married Catherine, a daughter of Philip II. He seized the first opportunity of annexing Saluzzo, which had been lost to Savoy in the last two reigns, and renewed the disastrous policy of his grandfather Charles III. by invading Geneva and threatening Provence. Henry IV. of France forced him in 1601 to relinquish Bresse and his Burgundian possessions. In return he was allowed to keep Saluzzo. All hopes of conquest on the transalpine side were now quenched; but the keys of Italy had been given to the dukes of Savoy; and their attention was still further concentrated upon Lombard conquests. Charles Emmanuel now attempted the acquisition of Montferrat, which was soon to become vacant by the death of Francesco Gonzaga, who held it together with Mantua. In order to secure this territory, he went to war with Philip III. of Spain, and allied himself with Venice and the Grisons to expel the Spaniards from the Valtelline. When the male line of the Gonzaga family expired in 1627, Charles, duke of Nevers, claimed Mantua and Montferrat in right of his wife, the only daughter of the last duke. Charles Emmanuel was now checkmated by France, as he had formerly been by Spain. The total gains of all his strenuous endeavours amounted to the acquisition of a few places on the borders of Montferrat.

Not only the Gonzagas, but several other ancient ducal families, died out about the date which we have reached. The Extlac- legitimate line of the Estensi ended in 1597 by the iioa 0/ death of Alfonso II., the last duke of Ferrara. He old ducal left his domains to a natural relative, Cesare d’Este, families. wno wou j(j j n ear ii er days have inherited without dispute, for bastardy had been no bar on more than

one occasion in the Este pedigree. Urban VIII., however, put in a claim to Ferrara, which, it will be remembered, had been recognized a papal fief in 1530. Cesare d'Este had to content himself with Modena and Reggio, where his descendants reigned as dukes till 1794. Under the same pontiff, the Holy See absorbed the duchy of Urbino on the death of Francesco Maria II., the last representative of Montefeltro and Delia Rovere. The popes were now masters of a fine and compact territory, embracing no inconsiderable portion of Countess Matilda's legacy, in addition to Pippin's donation, and the patrimony of St Peter. Meanwhile Spanish fanaticism, the suppression of the Huguenots in France and the Catholic policy of Austria combined to strengthen their authority as pontiffs. Urban's predecessor, Paul V., advanced so far as to extend his spiritual jurisdiction over Venice, which, up to the date of his election (1605), had resisted all encroachments of the Holy See. Venice offered the single instance in Italy of a national church. The republic managed the tithes, and the clergy acknowledged no chief above their own patriarch. Paul V. now forced the Venetians to admit his ecclesiastical supremacy; but they refused to readmit the Jesuits, who had been expelled in 1606. This, if we do not count the proclamation of James I. of England (1604), was the earliest instance of the order's banishment from a state where it had proved disloyal to the commonwealth.

Venice rapidly declined throughout the 17th century. The loss of trade consequent upon the closing of Egypt and the Levant, together with the discovery of America and Decline the sea-route to the Indies, had dried up her chief at Venice source of wealth. Prolonged warfare with the Otto- *»>d mans, who forced her to abandon Candia in 1669, s P a,n – as they had robbed her of Cyprus in 1570, still further crippled her resources. Yet she kept the Adriatic free of pirates, notably by suppressing the sea-robbers called Uscocchi (1601-1617), maintained herself in the Ionian Islands, and in 1684 added one more to the series of victorious episodes which render her annals so romantic. In that year Francesco Morosini, upon whose tomb we still may read the title Peloponnesiacus, wrested the whole of the Morea from the Turks. But after his death in 17 15 the republic relaxed her hold upon his conquests. The Venetian nobles abandoned themselves to indolence and vice. Many of them fell into the slough of pauperism, and were saved from starvation by public doles. Though the signory still made a brave show upon occasions of parade, it was clear th'at the state was rotten to the core, and sinking into the decrepitude of dotage. The Spanish monarchy at the same epoch dwindled with apparently less reason. Philip's Austrian successors reduced it to the rank of a secondary European power. This decline of vigour was felt, with the

customary effects of discord and bad government, in Lower Italy. The revolt of Masaniello in Naples (1647), followed by rebellions at Palermo and Messina, which placed Sicily for a while in the hands of Louis XIV. (1676- 1678) were symptoms of progressive anarchy. The population, ground down by preposterous taxes, ill-used as only the subjects of Spaniards, Turks or Bourbons are handled, rose in blind exasperation against their oppressors. It is impossible to attach political importance to these revolutions; nor did they bring the people any appreciable good. The destinies of Italy were decided in the cabinets and on the battlefields of northern Europe. A Bourbon at Versailles, a Habsburg at Vienna, or a thick-lipped Lorrainer, with a stroke of his pen, wrote off province against province, regarding not the populations who had bled for him or thrown themselves upon his mercy.

This inglorious and passive chapter of Italian history is con- tinued to the date of the French Revolution with the records of three dynastic wars, the war of the Spanish succession, the war of the Polish succession, the war of the Austrian ˆ ars °f succession, followed by three European treaties, s / oa . which brought them respectively to diplomatic terminations. Italy, handled and rehandled, settled and re-settled, upon each of these occasions, changed masters without caring or knowing what befell the principals in any one of the disputes. Humiliating to human nature in general as are the annals of the 18th-century campaigns in Europe, there is no point of view from which they appear in a light so tragi-comic as from that afforded by Italian history. The system of setting nations by the ears with the view of settling the quarrels of a few reigning houses was reduced to absurdity when the people, as in these cases, came to be partitioned and exchanged without the assertion or negation of a single principle affecting their interests or rousing their emotions.

In 1700 Charles II. died, and with him ended the Austrian family in Spain. Louis XIV. claimed the throne for Philip, duke of Anjou. Charles, archduke of Austria, opposed him. The dispute was fought out in Flanders; but Spanish Lombardy felt the shock, as usual, of the French and s/OHt Austrian dynasties. The French armies were more than once defeated by Prince Eugene of Savoy, who drove them out of Italy in 1707. Therefore, in the peace of Utrecht (17 13), the services of the house of Savoy had to be duly recognized. Victor Amadeus II. received Sicily with the title of king. Mont- ferrat and Alessandria were added to his northern provinces, and his state was recognized as independent. Charles of Austria, now emperor, took Milan, Mantua, Naples and Sardinia for his portion of the Italian spoil. Philip founded the Bourbon line of Spanish kings, renouncing in Italy all that his

Habsburg predecessors had gained. Discontented with this diminution

of the Spanish heritage, Philip V. married Elisabetta Farnese, heiress to the last duke of Parma, in 1714. He hoped to secure this duchy for his son, Don Carlos; and Elisabetta further brought with her a claim to the grand-duchy of Tuscany, which would soon become vacant by the death of Gian Gastone de' Medici. After this marriage Philip broke the peace of Europe by invading Sardinia. The Quadruple Alliance was formed, and the new king of Sicily was punished for his supposed adherence to Philip V. by the forced exchange of Sicily for the island of Sardinia. It was thus that in 1720 the house, of Savoy assumed the regal title which it bore until the declaration of the Italian kingdom in the last century. Victor AmadeusII.'s reign was of great import- ance in the history of his state. Though a despot, as all monarchs were obliged to be at that date, he reigned with prudence, probity and zeal for the welfare of his subjects. He took public education out of the hands of the Jesuits, which, for the future development of manliness in his dominions, was a measure of incalculable value. The duchy of Savoy in his days became a kingdom, and Sardinia, though it seemed a poor exchange for Sicily, was a far less perilous possession than the larger and wealthier island would have been. In 1730 Victor Amadeus abdicated in favour of his son Charles Emmanuel III. Repenting of this step, he subsequently attempted to regain Turin, but was imprisoned in the castle of Rivoli, where he ended his days in 1732.

The War of the Polish Succession which now disturbed Europe is only important in Italian history because the treaty of Vienna in 1738 settled the disputed affairs of the duchies Polish ˆ Q f p arma an(j Tuscany. The duke Antonio Farnese sioa. died in 1731; the grand-duke Gian Gastone de'

Medici died in 1737. In the duchy of Parma Don Carlos had already been proclaimed. But he was now transferred to the Two Sicilies, while Francis of Lorraine, the husband of Maria Theresa, took Tuscany and Parma. Milan and Mantua remained in the hands of the Austrians. On this occasion Charles Emmanuel acquired Tortona and Novara.

Worse complications ensued for the Italians when the emperor Charles VI., father of Maria Theresa, died in 1740. The three branches of the

Bourbon house, ruling in France, Austrian gpain and the Sicilies, joined with Prussia, Bavaria sion. an d the kingdom of Sardinia to despoil Maria Theresa

of her heritage. Lombardy was made the seat of war; and here the king of Sardinia acted as in some sense the arbiter of the situation. After war broke out, he changed sides and supported the Habsburg-Lorraine party. At first, in 1745, the Sardinians were defeated by the French and Spanish troops. But Francis of Lorraine, elected emperor in that year, sent an army to the king's support, which in 1746 obtained a signal victory over the Bourbons at Piacenza. Charles Emmanuel now threatened Genoa. The Austrian soldiers already held the town. But the citizens expelled them, and the republic kept her independence. In 1748 the treaty of Aix-la-Chapelle, which put an end to the War of the Austrian Succession, once more redivided Italy. Parma, Piacenza and Guastalla were formed into a duchy for Don Philip, brother of Charles III. of the Two Sicilies, and son of Philip V. of Spain. Charles III. was confirmed in his kingdom of the Two Sicilies. The Austrians kept Milan and Tuscany. The duchy of Modena was placed under the protection of the French. So was Genoa, which in 1755, after Paoli's insurrection against the misgovernment of the republic, ceded her old domain of Corsica to France.

From the date of this settlement until 1792, Italy enjoyed a period of repose and internal amelioration under her numerous Forty paternal despots. It became the fashion during these tour forty-four years of peace to encourage the industrial

gears' population and to experimentalize in economical re- peace. forms. The Austrian government in Lombardy under Maria Theresa was characterized by improved agriculture, regular administration, order, reformed taxation and increased educa- tion. A considerable amount of local autonomy was allowed, and dependence en Vienna was very slight and not irksome. The nobles and the clergy were rich and influential, but kept in order

by the civil power. There was no feeling of nationality, but the people were prosperous, enjoyed profound peace and were placidly content with the existing order of things. On the death of Maria Theresa in 1780, the emperor Joseph II. instituted much wider reforms. Feudal privileges were done away with, clerical influence diminished and many monasteries and convents sup- pressed, the criminal law rendered more humane and torture abolished largely as a result of G. Beccaria's famous pamphlet Dei delitti e delle pene. At the same time Joseph's administration was more arbitrary, and local autonomy was

to some extent curtailed. His anti-clerical laws produced some ill-feeling among the more devout part of the population. On the whole the Austrian rule in pre-revolutionary days was beneficial and far from oppressive, and helped Lombardy to recover from the ill-effects of the Spanish domination. It did little for the moral education of the people, but the same criticism applies more or less to all the European governments of the day. The emperor Francis I. ruled the grand-duchy of Tuscany by lieutenants until his death in 1765, when it was given, as an independent state, to his second son, Peter Leopold. The reign of this duke was long remembered as a period of internal prosperity, wise legislation and important public enterprise. Leopold, among other useful works, drained the Val di Chiana, and restored those fertile upland plains to agriculture. In 1790 he succeeded to the empire, and left Tuscany to his son Ferdinand. The kingdom of Sardinia was administered upon similar principles, but with less of geniality. Charles Emmanuel made his will law, and erased the remnants of free institutions from his state. At the same time he wisely followed his father's policy with regard to education and the church. This is perhaps the best that can be said of a king who incarnated the stolid absolutism of the period. From this date, however, we are able to trace the revival of independent thought among the Italians. The European ferment of ideas which preceded the French Revolution expressed itself in men like Alfieri, the fierce denouncer of tyrants, Beccaria, the philo- sopher of criminal jurisprudence, Volta, the physicist, and numerous political economists of Tuscany. Moved partly by external influences and partly by a slow internal reawakening, the people was preparing for the efforts of the 19th century. The papacy, during this period, had to reconsider the question of the Jesuits, who made themselves universally odious, not only in Italy, but also in France and Spain. In the pontificate of Clement XIII, they ruled the Vatican, and almost succeeded in embroiling the pope with the concerted Bourbon potentates of Europe. His successor, Clement XIV. suppressed the order altogether by a brief of 1773. (J. A. S.)

D. Italy in the Napoleonic Period, 1796-1814

The campaign of 1796 which led to the awakening of the Italian people to a new consciousness of unity and strength is detailed in the article Napoleonic Campaigns. Here we can attempt only a general survey of the events, political, civic and social, which heralded the Risorgimento in its first phase. It is desirable in the first place to realize the condition of Italy at the time when the irruption of the French and the expulsion of the Austrians opened up a new political vista for that oppressed and divided people.

For many generations Italy had been bandied to and fro between the Habsburgs and the Bourbons The decline of French influence at the close of the reign of Louis XIV. left the Habsburgs and the Spanish Bourbons without ofthe serious rivals. The former possessed the rich duchies Frecch of Milan (including Mantua) and Tuscany; while Reroiu- through a marriage alliance with the house of Este of Modena (the Archduke Ferdinand had married the heiress of Modena) its influence over that duchy was supreme. It also had a few fiefs in Piedmont and in Genoese territory. By marrying her daughter, Maria Amelia, to the young duke of Parma, and another daughter, Maria Carolina, to Ferdinand of Naples, Maria Theresa consolidated Habsburg influence in the north and south of the peninsula. The Spanish Bourbons held Naples and Sicily, as well as the duchy of Parma.

[THE NAPOLEONIC PERIOD

Of the nominally independent states the chief were the kingdom of Sardinia, ruled over by the house of Savoy, and comprising Piedmont, the isle of Sardinia and nominally Savoy and Nice, though the two provinces last named had virtually been lost to the monarchy since the campaign of 1793. Equally extensive, but less important in the political sphere, were the Papal States and Venetia, the former torpid under the obscurantist rule of pope and cardinals, the latter enervated by luxury and the policy of unmanly complaisance long pursued by doge and council. The ancient rival of Venice, Genoa, was likewise far gone in decline. The small states, Lucca and San Marino, completed the map of Italy. The worst governed part of the peninsula was the south, where feudalism lay heavily on the cultivators and corruption pervaded all ranks. Milan and Piedmont were comparatively well governed; but repugnance to Austrian rule in the former case, and the contagion of French Jacobinical opinions in the latter, brought those populations into increasing hostility to the rulers. The democratic propaganda, which was permeating all the large towns of the peninsula, then led to the formation of numerous and powerful clubs and secret societies; and the throne of Victor Amadeus III., of the house of Savoy, soon began to totter under the blows delivered by the French troops at the mountain barriers of his kingdom and under the insidious assaults of the friends of liberty at Turin. Plotting was rife at Milan, as also at Bologna, where the memory of old liberties predisposed men to cast off clerical rule and led to the first rising on

behalf of Italian liberty in the year 1794. At Palermo the Sicilians struggled hard to establish a republic in place of the odious government of an alien dynasty. B °tl~\ ˆ ne anatnemas °f the pope, the bravery of Piedmontese fafy. ” and Austrians, and the subsidies of Great Britain failed to keep the league of Italian princes against France intact. The grand-duke of Tuscany was the first of the European sovereigns who made peace with, and recognized the French republic, early in 1793. The first fortnight of Napoleon’s campaign of 1796 detached Sardinia from alliance with Austria and England. The enthusiasm of the Italians for the young Corsican ” liberator ” greatly helped his progress. Two months later Ferdinand of Naples sought for an armistice, the central duchies were easily overrun, and, early in 1797, Pope Pius VI. was fain to sign terms of peace with Bonaparte at Tolentino, practically ceding the northern part of his states, known as the Legations. The surrender of the last Habsburg stronghold, Mantua, on the 2nd of February 1797 left the field clear for the erection of new political institutions.

Already the men of Reggio, Modena and Bologna had declared for a democratic policy, in which feudalism and clerical rule should have no place, and in which manhood suffrage, Tl> d C ‘ S ‘ together with other rights promised by Bonaparte Republic to the men of Milan in May 1796, should form the basis of a new order of things. In taking this step the Modenese and Romagnols had the encouragement of Bonaparte, despite the orders which the French directory sent to him in a contrary sense. The result was the formation of an assembly at Modena which abolished feudal dues and customs, declared for manhood suffrage and established the Cispadane Repubb’c (October 1796).

The close of Bonaparte’s victorious campaign against the Archduke Charles in 1797 enabled him to mature those designs respecting Venice which are detailed in the article Napoleon. On a far higher level was his conduct towards the Milanese. While the French directory saw in that province little more than a district which might be plundered and bargained for, Bonaparte, though by no means remiss in the exaction of gold and of artistic treasures, was laying the foundation of a friendly republic. During his sojourn at the castle of Montebello or Mombello, near Milan, he commissioned several of the leading men of northern Italy to draw up a project of constitution and list of reforms for that province. Meanwhile he took care to curb the excesses of the Italian Jacobins and to encourage the Moderates, who were favourable to the French connexion as promising a guarantee against Austrian domination and

internal anarchy. He summed up his conduct in the letter of the 8th of May 1797 to the French directory, ” I cool the hot heads here and warm the cool ones.” The Transpadane Republic, or, as it was soon called, the Cisalpine **?** Republic, began its organized life on the 9th of July Republic. 1797, with a brilliant festival at Milan. The constitution was modelled on that of the French directory, and, lest there should be a majority of clerical or Jacobinical deputies, the French Republic through its general, Bonaparte, nominated and appointed the first deputies and administrators of the new government. In the same month it was joined by the Cispadane Republic; and the terms of the treaty of Campo Formio (October 17, 1797), while fatal to the political life of Venice, awarded to this now considerable state the Venetian territories west of the river Adige. A month later, under the pretence of stilling the civil strifes in the Valtelline, Bonaparte absorbed that Swiss district in the Cisalpine Republic, which thus included all the lands between Como and Verona on the north, and Rimini on the south.

Early in the year 1798 the Austrians, in pursuance of the scheme of partition agreed on at Campo Formio, entered Venice and brought to an end its era of independence which had lasted some 1 100 years. Venice with its mainland ^° a of the territories east of the Adige, inclusive of Istria and ff epub uc Dalmatia, went to the Habsburgs, while the Venetian isles of the Adriatic (the Ionian Isles) and the Venetian fleet went to strengthen France for that eastern expedition on which Bonaparte had already set his heart. Venice not only paid the costs of the war to the two chief belligerents, but her naval resources also helped to launch the young general on his career of eastern adventure. Her former rival, Genoa, had also been compelled, in June 1797, to bow before the young conqueror, and had undergone at his hands a remodelling on the lines already followed at Milan. The new Genoese republic, French in all but name, was renamed the Ligurian Republic.

Before he set sail for Egypt, the French had taken possession of Rome. Already masters of the papal fortress of Ancona, they began openly to challenge the pope’s authority French at the Eternal City itself. Joseph Bonaparte, then occupa- French envoy to the Vatican, encouraged democratic “»” of manifestations; and one of them, at the close of 1797, Rome. led to a scuffle in which a French general, Duphot, was killed. The French directory at once ordered its general, Berthier, to march to Rome: the Roman democrats proclaimed a republic on the 15th of February 1798, and on their invitation Berthier and his troops marched in. The pope, Pius VI., was forthwith haled away to Siena and a year later to Valence in the south of France, where he died.

Thus fell the temporal power. The ” liberators ” of Rome thereupon proceeded to plunder the city in a way which brought shame on their cause and disgrace (perhaps not wholly deserved) on the general left in command, Massena.

These events brought revolution to the gates of the kingdom of Naples, the worst-governed part of Italy, where the boorish king, Ferdinand IV. {il re lazzarone, he was termed), and his whimsical consort, Maria Carolina, scarcely held in check the discontent of their own subjects. A British fleet under Nelson, sent into the Mediterranean in May 1798 primarily for their defence, checkmated the designs of Bonaparte in Egypt, and then, returning to Naples, encouraged that court to adopt a spirited policy. It is now known that the influence of Nelson and of the British ambassador, Sir William Hamilton, and Lady Hamilton precipitated the rupture between Naples and France. The results were disastrous. The Neapolitan troops at first occupied Rome, but, being badly handled by their leader, the Austrian general, Mack, they were soon scattered in flight; and the Republican troops under General Tne Championnet, after crushing the stubborn resistance Partheno- of the lazzaroni, made their way into Naples and paean proclaimed the Parthenopaean Republic (January 23, R e P” bu ‘ c – 1799). The Neapolitan Democrats chose five of the’r leading men to be directors, and tithes and feudal dues and customs

Naples.

Savarov In Italy.

were abolished. Much good work was done by the Republicans during their brief tenure of power,but it soon came to an end owing to the course of events which favoured a reaction against France. The directors of Paris, not content with overrunning and plunder- ing Switzerland, had outraged German sentiment in many ways. Further, at the close of 1798 they virtually compelled the young king of Sardinia, Charles Emmanuel IV., to. abdicate at Turin. He retired to the island of Sardinia, while the French despoiled Piedmont, thereby adding fuel to the resentment rapidly growing against them in every part of Europe.

The outcome of it all was the War of the Second Coalition, in which

Russia, Austria, Great Britain, Naples and some secondary states of Germany took part. The incursion of an Austro-Russian army, led by that strange but magnetic being, Suvarov, decided the campaign in northern Italy. The French, poorly handled by Scherer and Serurier, were everywhere beaten, especially at Magnano (April 5) and Cassano (April 27). Milan and Turin fell before the allies, and Moreau, who took over the command, had much difficulty in making his way to the Genoese coast-line. There he awaited the arrival of Macdonald with the ari y of Naples. That general, Championnet's successor, had been compelled by these reverses and by the threatening pressure of Nelson's fleet to evacuate Naples and central Italy. In many parts the peasants and townsfolk, enraged by the licence of the French, hung on his flank and rear. The republics set up by the French at Naples, Rome and Milan collapsed as soon as the French troops retired; and a reaction in favour of clerical arid Austrian influence set in with great violence. For the events which then occurred at Naples, so compromising to the reputation of Nelson, see Nelson and Naples. Sir William Hamilton was subse- quently recalled in a manner closely resembling a disgrace, and his place was taken by Paget, who behaved with more dignity and tact.

Meanwhile Macdonald, after struggling through central Italy, had defeated an Austrian force at Modena (June 12, 1799), but Suvarov was able by swift movements utterly to overthrow him at the Trebbia (June 17-19). The wreck of his force drifted away helplessly towards Genoa. A month later the ambitious young general, Joubert, who took over Moreau's command and rallied part of Macdonald's following, was utterly routed by the Austro-Russian army at Novi (August 15) with the loss of 12,000 men. Joubert perished in the battle. The growing friction between Austria and Russia led to the transfer- ence of Suvarov and his Russians to Switzerland, with results which were to be fatal to the allies in that quarter. But in Italy the Austrian successes continued. Melas defeated Championnet near Coni on the 4th of November; and a little later the French garrisons at Ancona and Coni surrendered. The tricolour, which floated triumphantly over all the strongholds of Italy early in the year, at its close waved only over Genoa, where Massena prepared for a stubborn defence. Nice and Savoy also seemed at the mercy of the invaders. Everywhere the old order of things was restored. The death of the aged Pope Pius VI. at Valence (August 29, 1799) deprived the French of whatever advantage they had hoped to gain by dragging him into exile; on the 24th of March 1800 the conclave, assembled for greater security on the island of San Giorgio at Venice, elected a new pontiff, Pius VII.

Such was the position of affairs when Bonaparte returned from Egypt

and landed at F re jus. The contrast presented by his triumphs, whether real or imaginary, to the reverses Campaign sustame(i by the armies of the French directory, was Marengo, fatal to that body and to popular institutions in France. After the coup d'Uat of Brumaire (November 1799) he, as First Consul, began to* organize an expedition against the Austrians (Russia having now retired from the coalition), in northern Italy. The campaign culminating at Marengo was trie result. By that triumph (due to Desaix and Kellermann rather than directly to him), Bonaparte consolidated his own position in France and again laid Italy at his feet. The Austrian general, Melas, signed an armistice whereby he was to retire

with his army beyond the river Mincio. Ten days earlier, namely on the 4th of June, Massena had been compelled by hunger to capitulate at Genoa; but the success at Marengo, followed up by that of Macdonald in north Italy, and Moreats at Hohenlinden (December 2, 1800), brought the emperor Francis to sue for peace which was finally concluded at Luneville on the 9th of February 1801. The ª v ni e . Cisalpine and Ligurian Republics (reconstituted soon after Marengo) were recognized by Austria on condition that they were independent of France. The rule of Pius VII. over the Papal States was admitted; and Italian affairs were arranged much as they were at Campo Formio: Modena and Tuscany now reverted to French control, their former rulers being promised compensation in Germany. Naples, easily worsted by the French, under Miollis, left the British alliance, and made peace by the treaty of Florence (March 1801), agreeing to withdraw her troops from the Papal States, to cede Piombino and the Presidii (in Tuscany) to France and to close her ports to British ships and commerce. King Ferdinand also had to accept a French garrison at Taranto, and other points in the south.

Other changes took place in that year, all of them in favour of France. By complex and secret bargaining with the court of Madrid, Bonaparte procured the cession to France ˆrapofeon-g of Louisiana, in North America, and Parma; while reorgan- the duke of Parma (husband of an infanta of Spain) Nation of was promoted by him to the duchy of Tuscany, now * r * renamed the kingdom of Etruria. Piedmont was declared to be a military division at the disposal of France (April 21, 1801); and on the 21st of September 1802, Bonaparte, then First Consul for life, issued a decree for its definitive incorporation in the French Republic. About that time, too, Elba fell into the hands of Napoleon. Piedmont was organized in six departments on the model of those of France, and a number of French veterans were settled by Napoleon in and near the fortress of Alessandria. Besides copying the Roman habit of planting military colonies, the First Consul imitated

the old conquerors of the world by extending and completing the road-system of his outlying districts, especially at those important passes, the Mont Cenis and Simplon. He greatly improved the rough track over the Simplon Pass, so that, when finished in 1807, it was practicable for artillery. Milan was the terminus of the road, and the construction of the Foro Buonaparte and the completion of the cathedral added dignity to the Lombard capital. The Corniche road was improved; and public works in various parts of Piedmont, and the Cisalpine and Ligurian Republics attested the foresight and wisdom of the great organizer of industry and quickener of human energies. The universities of Pavia and Bologna were reopened and made great progress in this time of peace and growing prosperity. Somewhat later the Pavia canal was begun in order to connect Lake Como with the Adriatic for barge-traffic.

The personal nature of the tie binding Italy to France was illustrated by a -curious incident of the winter of 1802-1803. Bonaparte, now First Consul for life, felt strong enough to impose his will on the Cisalpine Republic and to set at defiance one of the stipulations of the treaty of Luneville. On the pretext of consolidating that republic, he invited 450 of its leading men to come to Lyons to a consulta. In reality he and his agents had already provided for the passing of proposals which were agree- able to him. The deputies having been dazzled by fetes and reviews, Talleyrand and Marescalchi, ministers of foreign affairs at Paris and Milan, plied them with hints as to the course to be followed by the consulta; and, despite the rage of the more democratic of their number, everything corresponded to the wishes of the First Consul. It remained to find a chief. Very many were in favour of Count Melzi, a Lombard noble, who had been chief of the executive at Milan; but again Talleyrand and French agents set to work on behalf of their master, with the result that he was elected president for ten years. He accepted that office because, as he frankly informed the deputies, he had found no one who ” for his services rendered to his country, his authority with the people and his separation from party

has deserved such an office.” Melzi was elected vice-president with merely honorary functions. The constitution comprised a considta charged with executive duties, a legislative body of 150 members and

a court charged with the maintenance of the fundamental laws. These three bodies were to be chosen by three electoral colleges consisting of (a) landed proprietors, (6) learned men and clerics, (c) merchants and traders, holding their sessions biennially at Milan, Bologna and Brescia re- spectively. In practice the consulta could override the legislature; and, as the considta was little more than the organ of the president, the whole constitution may be pronounced as autocratic as that of France after the changes brought about by Bonaparte in August 1802. Finally we must note that the Cisalpine now took the name of the Italian Republic, and that by a concordat with the pope, Bonaparte regulated its relations to the Holy See in a manner analogous to that adopted in the famous French concordat promulgated at Easter 1802 (see Concordat). It remains to add that the Ligurian Republic and that of Lucca remodelled their constitutions in a way some- what similar to that of the Cisalpine.

Bonaparte's ascendancy did not pass unchallenged. Many of the Italians retained their enthusiasm for democracy and national independence. In 1803 movements in these directions o/ "fa£f* took place at Rimini, Brescia and Bologna; but they were sharply repressed, and most Italians came to acquiesce in the Napoleonic supremacy as inevitable and indeed beneficial. The complete disregard shown by Napoleon for one of the chief conditions of the treaty of Luneville (February 1 801) — that stipulating for the independence of the Ligurian and Cisalpine Republics — became more and more apparent every year. Alike in political and commercial affairs they were for all practical purposes dependencies of France. Finally, after the proclamation of the French empire (May 18, 1804) Napoleon proposed to place his brother Joseph over the Italian state, which now took the title of kingdom of Italy. On Joseph declining, Napoleon finally decided to accept the crown which Melzi, Marescalchi, Serbelloni and others begged him to assume. Accordingly, on the 26th of May 1805, in the cathedral at Milan, he crowned himself with the iron crown of the old Lombard kings, using the traditional formula, " God gave it me: let him beware who touches it." On the 7th of June he appointed his step-son, Eugene Beauharnais, to be viceroy. Eugene soon found that his chief duty was to enforce the will of Napoleon. The legislature at Milan having ventured to alter some details of taxation, Eugene received the following rule of conduct from his step-father: " Your system of government is simple: the emperor wills it to be thus." Republicanism was now every- where discouraged. The little republic of Lucca, along with Piombino, was now awarded as a principality by the emperor to Elisa Bonaparte and her husband, Bacciocchi.

In June 1805 there came a last and intolerable affront to the emperors of Austria and Russia, who at that very time were seeking to put bounds to Napoleon's ambition and to redress the balance of power. The French emperor, at the supposed request of the doge of Genoa, declared the Ligurian Republic to be an integral part of the French empire. This defiance to the sovereigns of Russia and Austria rekindled the flames of war. The third coalition was formed between Great Britain, Russia and Austria, Naples soon joining its ranks.

For the chief events of the ensuing campaigns see Napoleonic Campaigns. While Massena pursued the Austrians into their own lands at the close of 1805, Italian forces under Eugene and Gouvion St Cyr {q.v.) held their ground against allied forces landed at Naples. After Austerlitz (December 2, 1805) Austria made peace by the treaty of Pressburg, ceding to the kingdom of Italy her part of Venetia along with the provinces of Istria and Dalmatia. Napoleon then turned fiercely against Maria Carolina of Naples upbraiding her with her " perfidy." He sent Joseph Bonaparte and Massena southwards with a strong column, compelled the Anglo-Russian forces to evacuate Naples, and occupied the south of the peninsula with little opposition except at the fortress of Gaeta. The Bourbon court

sailed away to Palermo, where it remained for eight years under the protection afforded by the British fleet and a British army of occupation. On the 15th of February 1806 Joseph Bonaparte entered Naples in triumph, his Bonaparte troops capturing there two hundred pieces of cannon, fo Naples. Gaeta, however, held out stoutly against the French. Sir Sidney Smith with a British squadron captured Capri (February 1806), and the peasants of the Abruzzi and Calabria soon began to give trouble. Worst of all was the arrival of a small British force in Calabria under Sir John Stuart, which beat off with heavy loss an attack imprudently delivered by General R6ynier on level ground near the village of Maida (July 4). The steady volleys of Kempt's light infantry were fatal to the French, who fell back in disorder under a bayonet charge of the victors, with the loss of some 2700 men. Calabria now rose in revolt against King Joseph, and the peasants dealt out savage reprisals to the French troops. On the 18th of July, however, Gaeta surrendered to Mass6na, and that marshal, now moving rapidly southwards, extricated Reynier, crushed the Bourbon rising in Calabria with great barbarity, and compelled the British force to re-embark for Sicily. At Palermo Queen Maria Carolina continued to make vehement but futile efforts for the overthrow of King Joseph.

It is more important to observe that under Joseph and his ministers or advisers, including the Frenchmen Roederer, Dumas, Miot de Melito

and the Corsican Saliceti, great progress was made in abolishing feudal laws and customs, in reforming the judicial procedure and criminal laws on the model of the Code Napolion, and in attempting the beginnings of elementary education. More questionable was Joseph's policy in closing and confiscating the property of 213 of the richer monasteries of the land. The monks were pensioned off, but though the confiscated property helped to fill the empty coffers of the state, the measure aroused widespread alarm and resentment among that superstitious people.

The peace of Tilsit (July 7, 1807) enabled Napoleon to press on his projects for securing the command of the Mediterranean, thenceforth a fundamental axiom of his policy. Consequently, in the autumn of 1807 he urged on Joseph the adoption of vigorous measures for the capture of Sicily. Already, in the negotiations with England during the summer of 1806, the emperor had shown his sense of the extreme importance of gaining possession of that island, which indeed caused the breakdown of the peace proposals then being considered; and now he ordered French squadrons into the Mediterranean in order to secure Corfu and Sicily. His plans respecting Corfu succeeded. That island and some of the adjacent isles fell into the hands of the French (some of them were captured by British troops in 1809-10); but Sicily remained unassailable. Capri, however, fell to the French on the 18th of October 1808, shortly after the arrival at Naples of the new king, Murat.

This ambitious marshal, brother-in-law of Napoleon, foiled in his hope of gaining the crown of Spain, received that of Naples in the summer of 1808, Joseph Bonaparte being moved from Naples to Madrid. This arrangement pleased ningot neither of the relatives of the emperor; but bis will Naples, now was law on the continent. Joseph left Naples on the 23rd of May 1808; but it was not until the 6th of September that Joachim Murat made his entry. A fortnight later his consort Caroline arrived, and soon showed a vigour and restless- ness of spirit which frequently clashed with the dictates of her brother, the emperor and the showy, unsteady policy of her consort. The Spanish national rising of 1808 and thereafter the Peninsular War diverted Napoleon's attention from the affairs of south Italy. In June 1809, during his campaign against Austria, Sir John Stuart with an Anglo-Sicilian force sailed northwards, captured Ischia and threw Murat into great alarm; but on the news of the Austrian defeat at Wagram, Stuart sailed back again.

It is now time to turn to the affairs of central Italy. Early in 1808 Napoleon proceeded with plans which he had secretly concerted after

the treaty of Tilsit for transferring the infanta

Central Italy.

of Spain who, after the death of her consort, reigned at Florence on behalf of her young son, Charles Louis, from her kingdom of Etruria to the little principality of Entre Douro e Minho which he proposed to carve out from the north of Portugal. Etruria reverted to the French empire, but the Spanish princess and her son did not receive the promised indemnity. Elisa Bonaparte and her husband, Bacciocchi, rulers of Lucca and Piombino, became the heads of the administration in Tuscany, Elisa showing decided governing capacity.

The last part of the peninsula to undergo the Gallicizing influ- ence was the papal dominion. For some time past the relations between Napoleon and the pope, Pius VII., had been Na P o, <- 0a severely strained, chiefly because the emperor insisted Papacy. on controlling the church, both in France and in the kingdom of Italy, in a way inconsistent with the traditions of the Vatican, but also because the pontiff refused to grant the divorce between Jerome Bonaparte and the former Miss Patterson on which Napoleon early in the year 1806 laid so much stress. These and other disputes led the emperor, as successor of Charlemagne, to treat the pope in a very high- handed way. " Your Holiness (he wrote) is sovereign of Rome, but I am its emperor "; and he threatened to annul the pre- sumed " donation " of Rome by Charlemagne, unless the pope yielded implicit obedience to him in all temporal affairs. He further exploited the Charlemagne tradition for the benefit of the continental system, that great engine of commercial war by which he hoped to assure the ruin of England. This aim prompted the annexation of Tuscany, and his intervention in the affairs of the Papal States. To this the pope assented under pressure from Napoleon; but the latter soon found other pretexts for intervention, and in February 1808 a French column under Miollis occupied Rome, and deposed the papal authorities. Against this violence Pius VII. protested in vain. Napoleon sought to push matters to an extreme, and on the 2nd of April Annexa- e adopted the rigorous measure of annexing to the tlon of the kingdom of Italy the papal provinces of Ancona, Papal Urbino, Macerata and Camerina. This measure, which states. seemed to the pious an act of sacrilege, and to

Italian patriots an outrage on the only independent sovereign of the peninsula, sufficed for the present. The outbreak of war in Spain, followed by the rupture with Austria in the spring of 1809, distracted the attention of the emperor. But after the occupation of Vienna the conqueror dated from that capital on the 17th of May 1809 a decree virtually annexing Rome and the Patri- monium Petri to the French empire. Here again he cited the action of Charlemagne, his ” august predecessor,” who had merely given ” certain domains to the bishops of Rome as fiefs, though Rome did not thereby cease to be part of his empire.”

In reply the pope prepared a bull of excommunication against those who should infringe the prerogatives of the Holy See in this matter. Thereupon the French general, Miollis, who still occupied Rome, caused the pope to be arrested and carried him away northwards into Tuscany, thence to Savona; finally he was taken, at Napoleon’s orders, to Fontainebleau. Thus, a second time, fell the temporal power of the papacy. By an imperial decree of the 17th of February 1810, Rome and the neighbouring districts, including Spoleto, became part of the French empire. Rome thenceforth figured as its second city, and entered upon a new life under the administration of French officials. The Roman territory was divided into two departments — the Tiber and Trasimenus; the Code Napoleon was introduced, public works were set on foot and great advance was made in the material sphere. Nevertheless the harshness with which the emperor treated the Roman clergy and suppressed the monasteries caused deep resentment to the orthodox.

There is no need to detail the fortunes of the Napoleonic states in Italy. One and all they underwent the influences emanating Character ˆ rom Paris; an d in respect to civil administration, ofNapo- law, judicial procedure, education and public works, koas they all experienced great benefits, the results of which ”’*• never wholly disappeared. On the other hand, they

suffered from the rigorous measures of the continental system,

which seriously crippled trade at the ports and were not com- pensated by the increased facilities for trade with France which Napoleon opened up. The drain of men to supply his armies in Germany, Spain and Russia was also a serious loss. A powerful Italian corps marched under Eugene Beauharnais to Moscow, and distinguished itself at Malo-Jaroslavitz, as also during thfc horrors of the retreat in the closing weeks of 1812. It is said that out of 27,000 Italians who entered Russia with Eugene, only 333 saw their country

again. That campaign marked the beginning of the end for the Napoleonic domination in Italy as else- collapse where. Murat, left in command of the Grand Army at ofNapo- Vilna, abandoned his charge and in the next year made leon's overtures to the allies who coalesced against Napoleon. ru,e ' For his vacillations at this time and his final fate, see Murat. Here it must suffice to say that the uncertainty caused by his policy in 1813-1814 had no small share in embarrassing Napoleon and in precipitating the downfall of his power in Italy. Eugene Beauharnais, viceroy of the kingdom of Italy, snowed both constancy and courage; but after the battle of Leipzig (October 16-19, I 8i3) his power crumbled away under the assaults of the now victorious Austrians. By an arrangement with Bavaria, they were able to march through Tirol and down the valley of the Adige in force, and overpowered the troops of Eugene whose position was fatally compromised by the defection of Murat and the dissensions among the Italians. Very many of them, distrust- ing both of these kings, sought to act independently in favour of an Italian republic. Lord William Bentinck with an Anglo- Sicilian force landed at Leghorn on the 8th of March 1814, and issued a proclamation to the Italians bidding them rise against Napoleon in the interests of their own freedom. A little later he gained possession of Genoa. Amidst these schisms the defence of Italy collapsed. On the 16th of April 1814 Eugene, on hearing of Napoleon's overthrow at Paris, signed an armistice at Mantua by which he was enabled to send away the French troops beyond the Alps and entrust himself to the consideration of the allies. The Austrians, under General Bellegarde, entered Milan without resistance; and this event precluded the restoration of the old political order.

The arrangements made by the allies in accordance with the treaty of Paris (June 12, 18 14) and the Final Act of the congress of Vienna (June 9, 1815), imposed on Italy boundaries which, roughly speaking, corresponded to those of the pre-Napoleonic era. To the kingdom of Sardinia, now reconstituted under Victor Emmanuel I., France ceded its old provinces, Savoy and Nice; and the allies, especially Great Britain and Austria, insisted on the addition to that monarchy of the territories of the former republic of Genoa, in respect of which the king took the title of duke of Genoa, in order to strengthen it for the duty of acting as a buffer state between France and the smaller states of central Italy. Austria recovered the Milanese, and all the possessions of the old Venetian Republic on the mainland, including Istria and Dalmatia. The Ionian Islands, formerly belonging to Venice, were, by a treaty signed at Paris on the 5th of November 1815, placed under the protection of Great Britain. By an instrument signed on the 24th of April 1815, the Austrian territories in north Italy were erected into the

kingdom of Lombardo-Venetia, which, though an integral part of the Austrian empire, was to enjoy a separate administration, the symbol of its separate individuality being the coronation of the emperors with the ancient iron crown cf Lombardy ("Proclamation de l'empereur d'Autriche, &c," April 7, 1815, State Papers, ii. 906). Francis IV., son of the archduke Ferdinand of Austria and Maria Beatrice, daughter of Ercole Rinaldo, the last of the Estensi, was reinstated as duke of Modena. Parma and Piacenza were assigned to Marie Louise, daughter of the Austrian emperor and wife of Napoleon, on behalf of her son, the little Napoleon, but by subsequent arrange- ments (18T6-1817) the duchy was to revert at her death to the Bourbons of Parma, then reigning at Lucca. Tuscany was restored to the grand-duke Ferdinand III. of Habsburg-Lorraine. The duchy of Lucca was given to Marie Louise of Bourbon- Parma, who, at the death of Marie Louise of Austria, would

return to Parma, when Lucca would be handed over to Tuscany. The pope, Pius VIi., who had long been kept under restraint by Napoleon at Fontainebleau, returned to Rome in May 1814, and was recognized by the congress of Vienna (not without some demur on the part of Austria) as the sovereign of all the former possessions of the Holy See. Ferdinand IV. of Naples, not long after the death of his consort, Maria Carolina, in Austria, returned from Sicily to take possession of his dominions on the mainland. He received them back in their entirety at the hands of the powers, who recognized his new title of Ferdinand I. of the Two Sicilies. The rash attempt of Murat in the autumn of 1815, which led to his death at Pizzo in Calabria, enabled the Bourbon dynasty to crush malcontents with all the greater severity. The reaction, which was dull and heavy in the dominions of the pope and of Victor Emmanuel, systematically harsh in the Austrian states of the north, and comparatively mild in Parma and Tuscany, excited the greatest loathing in southern Italy and Sicily, because there it was directed by a dynasty which had aroused feelings of hatred mingled with contempt.

There were special reasons why Sicily should harbour these feelings against the Bourbons. During eight years (1806-1814) the chief places of the island had been garrisoned by British troops; and the commander of the force which upheld the tottering rule of Ferdinand

at Palermo naturally had great authority. The British government, which awarded a large annual subsidy to the king and queen at Palermo, claimed to have some control over the administration. Lord William Bentinck finally took over large administrative powers, seeing that Ferdinand, owing to his dulness, and Maria Carolina, owing to her very suspicious intrigues with Napoleon, could never be trusted. The contest between the royal power and that of the Sicilian estates threatened to bring matters to a deadlock, until in 181 2, under the impulse of Lord William Bentinck, a con- stitution modelled largely on that of England was passed by the estates. After the retirement of the British troops in 1814 the constitution lapsed, and the royal authority became once more absolute. But the memory of the benefits conferred by " the English constitution " remained fresh and green amidst the arid waste of repression which followed. It lived on as one of the impalpable but powerful influences which spurred on the Sicilians and the democrats of Naples to the efforts which they put forth in 1821, 1830, 1848 and i860:

This result, accruing from British intervention, was in some respects similar to that exerted by Napoleon on the Italians of the mainland. The brutalities of Austria's white coats in the north, the unintelligent repression then characteristic of the house of Savoy, the petty spite of the duke of Modena, the medieval obscurantism of pope and cardinals in the middle of the peninsula and the clownish excesses of Ferdinand in the south, could not blot out from the minds of the Italians the recollection of the benefits derived from the just laws, vigorous administra- tion and enlightened aims of the great emperor. The hard but salutary training which they had undergone at his hands had taught them that they were the equals of the northern races both in the council chamber and on the field of battle. It had further revealed to them that truth, which once grasped can never be forgotten, that, despite differences of climate, character and speech, they were in all essentials a nation. (J. Hl. R.) '

E. The Risorgimento, 1815-1870

As the result of the Vienna treaties, Austria became the real mistress of Italy. Not only did she govern Lombardy and Venetia directly, but Austrian princes ruled in Modena, Parma and Tuscany; Piacenza, Ferrara and Comacchio had Austrian garrisons; Prince Metternich, the Austrian chancellor, believed that he could always secure the election of an Austrophil pope, and Ferdinand of Naples, reinstated by an Austrian army, had bound himself, by a secret article of the treaty of June 12, 181 5, not to introduce methods of government incompatible with those adopted in Austria's Italian possessions. Austria also

concluded offensive and defensive alliances with Sardinia,

Tuscany and Naples; and Metternich ‘s ambition was to make Austrian predominance over Italy still more absolute, by placing an Austrian archduke on the Sardinian throne.

Victor Emmanuel I., the king of Sardinia, was the only native ruler in the peninsula, and the Savoy dynasty was popular with all classes. But although welcomed with enthusiasm R eac ti on on his return to Turin, he introduced a system of in the reaction which, if less brutal, was no less uncom- Italian promising than that of Austrian archdukes or Bourbon state& princes. His object was to restore his dominions to the condi- tions preceding the French occupation. The French system of taxation was maintained because it brought in ampler revenues; but feudalism, the antiquated legislation and bureaucracy were revived, and all the officers and officials still living who had served the state before the Revolution, many of them now in their dotage, were restored to their posts; only nobles were eligible for the higher government appointments; all who had served under the French administration were dismissed or reduced in rank, and in the army beardless scions of the aristocracy were placed over the heads of war-worn veterans who had commanded regiments in Spain and Russia. The influence of a bigoted priesthood was re-established, and ” every form of intellectual and moral torment, everything save actual persecution and physical torture that could be inflicted on ■ the ‘ impure ‘ was inflicted ” (Cesare Balbo’s Autobiography). All this soon pro- voked discontent among the educated classes. In Genoa the government was particularly unpopular, for the Genoese resented being handed over to their old enemy Piedmont like a flock of sheep. Nevertheless the king strongly disliked the Austrians, and would willingly have seen them driven from Italy.

In Lombardy French rule had ended by making itself un- popular, and even before the fall of Napoleon a national party, called the Italici puri, had begun to advocate the independence of Lombardy, or even its union with Austrian Sardinia. At first a part of the population were Italy. content with Austrian rule, which provided an honest and efficient administration; but the rigid system of centraliza- tion which, while allowing the semblance of local autonomy, sent every minute question for settlement to Vienna; the severe police methods; the bureaucracy, in which the best appointments were usually conferred on Germans or Slavs wholly dependent on Vienna, proved galling to the people, and in view of the growing disaffection the country was turned into a vast armed camp. In Modena Duke Francis proved a cruel tyrant. In Parma, on the other hand, there was very little

oppression, the French codes were retained, and the council of state was consulted on all legislative matters. Lucca too enjoyed good government, and the peasantry were well cared for and prosperous. In Tuscany the rule of Ferdinand and of his minister Fossombroni was mild and benevolent, but enervating and demoralizing. The Papal States were ruled by a unique system of theocracy, for not only the head of the state but all the more important officials were ecclesiastics, assisted by the Inquisition, the Index and all the paraphernalia of medieval church government. The administration was inefficient and corrupt, the censorship uncom- inRome. promising, the police ferocious and oppressive, although quite unable to cope with the prevalent anarchy and brigandage; the antiquated pontifical statutes took the place of the French laws, and every vestige of the vigorous old communal independ- ence was swept away. In Naples King Ferdinand retained some of the laws and institutions of Murat's regime, and many of the functionaries of the former government entered his service; but he revived the Bourbon tradition, the odious police system and the censorship; and a degrading religious bigotry, to which the masses were all too much inclined, became the basis of government and social life. The upper classes were still to a large extent inoculated with French ideas, but the common people were either devoted to the dynasty or indifferent. In Sicily, which for centuries had enjoyed a feudal constitution modernized and Anglicized under British auspices in 181 2, and where anti-Neapolitan feeling was strong, autonomy

Naples.

THE RISORGIMENTO]

ITALY

49

was suppressed, the constitution abolished in 1816, and the island, as a reward for its fidelity to the dynasty, converted into a Neapolitan province governed by Neapolitan bureaucrats.

To the mass of the people the restoration of the old govern- ments undoubtedly brought a sense of relief, for the terrible drain in men and money caused by Napoleon's wars had caused much discontent, whereas now there was a prospect of peace and rest. But the restored governments in their terror of revolution would not realize that the late regime had wafted a breath of new life over the country and left ineffaceable traces in the way of improved laws, efficient

administration, good roads and the sweeping away of old abuses; while the new-born idea of Italian unity, strengthened by a national pride revived on many a stricken field from Madrid to Moscow, was a force to be reckoned with. The oppression and follies of the restored governments made men forget the evils of French rule and remember only its good side. The masses were still more or less indifferent, but among the nobility and the educated middle Secret classes, cut off from all part in free political life, there societies, was developed either the spirit of despair at Italy's The Car- mora i degradation, as expressed in the writings of Foscolo and Leopardi, or a passion of hatred and revolt, which found its manifestation, in spite of severe laws, in the development of secret societies. The most important of these were the Carbonari lodges, whose objects were the expulsion of the foreigner and the achievement of constitutional freedom (see Carbonari).

When Ferdinand returned to Naples in 181 5 he found the kingdom, and especially the army, honeycombed with Carbonar- Revoiu- * sm > t0 w hi cn many noblemen and officers were thtt la affiliated; and although the police instituted prosecu- Napies, tions and organized the counter-movement of the Calderai, who may be compared to the " Black Hundreds " of modern Russia, the revolutionary spirit continued to grow, but it was not at first anti-dynastic. The granting of the Spanish constitution of 1820 proved the signal for the beginning of the Italian liberationist movement; a military mutiny led by two officers, Silvati and Morelli, and the priest Menichini, broke out at Monteforte, to the cry of " God, the King, and the Constitution!" The troops sent against them commanded by General Guglielmo Pepe, himself a Carbonaro, hesitated to act, and the king, finding that he could not count on the army, granted the constitution (July 13, 1820), and appointed his son Francis regent. The events that followed are described in the article on the history of Naples (q.v.). Not only did the constitution, which was modelled on the impossible Spanish constitution of 181 2, prove unworkable, but the powers of the Grand Alliance, whose main object was to keep the peace of Europe, felt themselves bound to interfere to prevent the evil precedent of a successful military revolution. The diplomatic developments that led to the intervention of Austria are sketched elsewhere (see Europe : History) ; in general the result of the deliberations of the congresses of Troppau and Laibach was to establish, not the general right of intervention claimed in the Troppau Protocol, but the special right of Austria to safeguard her interests in Italy. The defeat of General Pepe by the Austrians at Rieti (March 7, 1821) and the re-establishment of King Ferdinand's autocratic power under the protection of Austrian

bayonets were the effective assertion of this principle.

The movement in Naples had been purely local, for the Neapolitan Carbonari had at that time no thought save of Naples; it was, moreover, a movement of the middle revolun an(ˆ u PP er classes in which the masses took little Piedmont, interest. Immediately after the battle of Rieti a Carbonarist mutiny broke out in Piedmont independently of events in the south. Both King Victor Emmanuel and his brother Charles Felix had no sons, and the heir presumptive to the throne was Prince Charles Albert, of the Carignano branch of the house of Savoy. Charles Albert felt a certain interest in Liberal ideas and was always surrounded by young nobles of Carbonarist and anti-Austrian tendencies, and was therefore regarded with suspicion by his royal relatives. Metter-

nich, too, had an instinctive dislike for him, and proposed to exclude him from the succession by marrying one of the king's daughters to Francis of Modena, and getting the Salic law abolished so that the succession would pass to the duke and Austria would thus dominate Piedmont. The Liberal movement had gained ground in Piedmont as in Naples among the younger nobles and officers, and the events of Spain and southern Italy aroused much excitement. In March 1821, Count Santorre di Santarosa and other conspirators informed Charles Albert of a constitutional and anti-Austrian plot, and asked for his help. After a momentary hesitation he informed the king; but at his request no arrests were made, and no precautions were taken. On the 10th of March the garrison of Alessandria mutinied, and its example was followed on the 12th by that of Turin, where the Spanish constitution was demanded, and the black, red and blue flag of the Carbonari paraded the streets. The next day the king abdicated after appointing Charles Albert regent. The latter immediately proclaimed the constitution, but the new king, Charles Felix, who was at Modena at the time, repudiated the regent's acts and exiled him to Tuscany; and, with his consent, an Austrian army invaded Piedmont and crushed the constitutionalists at Novara. Many of the con- spirators were condemned to death, but all succeeded in escaping. Charles Felix was most indignant with the ex-regent, but he resented, as an unwarrantable interference, Austria's attempt to have him excluded from the succession at the congress of Verona (1822). Charles Albert's somewhat equivocal conduct also roused the hatred of the Liberals, and for a long time the esecrato Carignano was regarded, most unjustly, as a traitor even by many who were not republicans.

Carbonarism had been introduced into Lombardy by two Romagnols, Count Laderchi and Pietro Maroncelli, but the leader of the movement

was Count F. Confalonieri, who was in favour of an Italian federation composed i B £on- m of northern Italy under the house of Savoy, central bardy. Italy under the pope, and the kingdom of Naples. There had been some mild plotting against Austria in Milan, and an attempt was made to co-operate with the Piedmontese movement of 1821; already in 1820 Maroncelli and the poet Silvio Pellico had been arrested as Carbonari, and after the movement in Piedmont more arrests were made. The mission of Gaetano Castiglia and Marquis Giorgio Pallavicini to Turin, where they had interviewed Charles Albert, although without any definite result — for Confalonieri had warned the prince that Lombardy was not ready to rise — was accidentally discovered, and Confalonieri was himself arrested. The plot would never have been a menace to Austria but for her treatment of the conspirators. Pellico and Maroncelli were immured in the Spielberg; Confalonieri and two dozen others were condemned to death, their sentences being, however, commuted to imprison- ment in that same terrible fortress. The heroism of the prisoners, and Silvio Pellico's account of his imprisonment (Le mie Prigioni), did much to enlist the sympathy of Europe for the Italian cause. During the next few years order reigned in Italy, save for a few unimportant outbreaks in the Papal States; there was, however, perpetual discontent and agitation, especially _. p . in Romagna, where misgovernment was extreme, states. Under Pius VII. and his minister Cardinal Consalvi oppression had not been very severe, and Metternich's proposal to establish a central inquisitorial tribunal for political offences throughout Italy had been rejected by the papal government. But on the death of Pius in 1823, his successor Leo XII. (Cardinal Delia Genga) proved a ferocious reactionary under whom barbarous laws were enacted and torture frequently applied. The secret societies, such as the Carbonari, the Adelfi and the Bersaglieri d'America, which flourished in Romagna, replied to these persecutions by assassinating the more brutal officials ans spies. The events of 1820-1821 increased the agitation in Romagna, and in 1825 large numbers of persons were condemned to death, imprisonment or exile. The society of the Sanfedisti, formed of the dregs of the populace, whose object was to murder every Liberal, was openly protected and encouraged. Leo died

in 1829, and the mild, religious Pius VIII. (Cardinal Castiglioni) only reigned until 1830, when Gregory XVI. (Cardinal Cappellari) was

elected through Austrian influence, and proved another zelante. The July revolution in Paris and the declara- Revohi- t j Qn £ ˆe new king, Louis Philippe, that France, as 1830. a Liberal monarchy, would not only not intervene

in the internal affairs of other countries, but would not permit other powers to do so, aroused great hopes among the oppressed peoples, and was the immediate cause of a revolution in Romagna and the Marches. In February 1831 these provinces rose, raised the red, white and green tricolor (which henceforth took the place of the Carbonarist colours as the Italian flag), and shook off the papal yoke with surprising ease. 1 At Parma too there was an outbreak and a demand for the constitution; Marie Louise could not grant it because of her engagements with Austria, and, therefore, abandoned her dominions. In Modena Duke Francis, ambitious of enlarging his territories, coquetted with the Carbonari of Paris, and opened indirect negotiations with Menotti, the revolutionary leader in his state, believing that he might assist him in his plans. Menotti, for his part, conceived the idea of a united Italian state under the duke. A rising was organized for February 1831; but Francis got wind of it, and, repenting of his dangerous dallying with revolution, arrested Menotti and fled to Austrian territory with his prisoner. In his absence the insurrection took place, and Biagio Nardi, having been elected dictator, proclaimed that ” Italy is one; the Italian nation one sole nation.” But the French king soon abandoned his principle of non-intervention on which the Italian revolutionists had built their hopes; the Austrians intervened unhindered; the old governments were re-established in Parma, Modena and Romagna; and Menotti and many other patriots were hanged. The Austrians evacuated Romagna in July, but another insurrection having broken out immediately afterwards which the papal troops were unable to quell, they returned. This second intervention gave umbrage to France, who by way of a counterpoise sent a force to occupy Ancona. These two foreign occupations, which were almost as displeasing to the pope as to the Liberals, lasted until 1838. The powers, immediately after the revolt, presented a memor- andum to Gregory recommending certain moderate reforms, but no attention was paid to it. These various movements proved in the first place that the masses were by no means ripe for revolution, and that the idea of unity, although now advocated by a few revolutionary leaders, was far from being generally accepted even by the Liberals; and, secondly, that, in spite of the indifference of the masses, the despotic governments were unable to hold their own without the assistance of foreign bayonets.

On the 27th of April 1831, Charles Albert succeeded Charles Felix on

the throne of Piedmont. Shortly afterwards he received Mazzlal a letter from an unknown person, in which he was and exhorted with fiery eloquence to place himself at the

” Young head of the movement for liberating and uniting Italy.” Italy and expelling the foreigner, and told that he was free to choose whether he would be ” the first of men or the last of Italian tyrants.” The author was Giuseppe Mazzini, then a young man of twenty-six years, who, though in theory a republican, was ready to accept the leadership of a prince of the house of Savoy if he would guide the nation to freedom. The only result of his letter, however, was that he was forbidden to re-enter Sardinian territory. Mazzini, who had learned to distrust Carbonarism owing to its lack of a guiding principle and its absurd paraphernalia of ritual and mystery, had conceived the idea of a more serious political association for the emancipa- tion of his country not only from foreign and domestic despotism but from national faults of character; and this idea he had materialized in the organization of a society called the Giovane Italia (Young Italy) among the Italian refugees at Marseilles. After the events of 1831 he declared that the liberation of Italy could only be achieved through unity, and his great merit lies

1 Among the insurgents of Romagna was Louis Napoleon, after- wards emperor of the French.

in having inspired a large number of Italians with that idea at a time when provincial jealousies and the difficulty of communica- tions maintained separatist feelings. Young Italy spread to all centres of Italian exiles, and by means of literature carried on an active propaganda in Italy itself, where the party came to be called ” Ghibellini,” as though reviving the traditions of medieval anti-Papalism. Though eventually this activity of the Giovane Italia supplanted that of the older societies, in practice it met with no better success; the two attempts to invade Savoy in the hope of seducing the army from its allegiance failed miserably, and only resulted in a series of barbarous sentences of death and imprisonment which made most Liberals despair of Charles Albert, while they called down much criticism on Mazzini as the organizer of raids in which he himself took no part. He was now forced to leave France, but continued his work of agitation from London. The disorders in Naples and Sicily in 1837 had no connexion with Mazzini, but the forlorn hope of the brothers Bandiera, who in 1844 landed on the Calabrian coast, was the work of the Giovane Italia. The rebels were captured and shot, but the significance of the attempt lies in the fact that it was the first occasion on which north Italians (the Bandieras were Venetians and officers in

the Austrian navy) had tried to raise the standard of revolt in the south.

Romagna had continued a prey to anarchy ever since 1831; the government organized armed bands called the Centurioni (descended from the earlier Sanfedisti) , to terrorize the Liberals, while the secret societies continued their ” propaganda by deeds.” It is noteworthy that Romagna was the only part of Italy where the revolutionary movement was accompanied by murder. In 1845 several outbreaks occurred, and a band led by Pietro Renzi captured Rimini, whence a proclamation drawn up by L. C. Farini was issued demanding the reforms advocated by the powers' memorandum of 1 83 1. But the movement collapsed without result, and the leaders fled to Tuscany.

Side by side with the Mazzinian propaganda in favour of a united Italian republic, which manifested itself in secret societies, plots and insurrections, there was another Liberal movement based on the education of opinion and on economic development. i, ** ra ” s ‘ n In Piedmont, in spite of the government's reactionary an , methods, a large part of the population were genuinely ˆgyjjˆlf attached to the Savoy dynasty, and the idea of a regenera- .„/ tion of Italy under its auspices began to gain ground. Some writers proclaimed the necessity of building railways, develop- ing agriculture and encouraging industries, before resorting to revolution ; while others, like the Tuscan Gino Capponi, inspired by the example of England and France, wished to make the people fit for freedom by means of improved schools, books and periodicals. Vincenzo Gioberti (q.v.) published in 1843 his famous treatise Del primato morale e civile degli Italiani, a work, which, in striking con- trast to the prevailing pessimism of the day, extolled the past great- ness and achievements of the Italian people and their present virtues. His political ideal was a federation of all the Italian states under the presidency of the pope, on a basis of Catholicism, but without a constitution. In spite of all its inaccuracies and exaggerations the book served a useful purpose in reviving the self-respect of a de- spondent people. Another work of a similar kind was Le Speranze d'ltalia (1844) by the Piedmontese Count Cesare Balbo (q.v.). Like Gioberti he advocated a federation of Italian states, but he declared that before this could be achieved Austria must be expelled from Italy and compensation found for her in the Near East by making her a Danubian power — a curious forecast that Italy's liberation would begin with an eastern war. He extolled Charles Albert and appealed to his patriotism; he believed that the church was necessary and the secret societies harmful; representative govern- ment was undesirable, but he advocated a consultative assembly. Above all Italian character must be reformed and the nation edu-

cated. A third important publication was Massimo d'Azeglio's Degli ultimi cast di Romagna, in which the author, another Pied- montese nobleman, exposed papal misgovernment while condemning the secret societies and advocating open resistance and protest. He upheld the papacy in principle, regarded Austria as the great enemy of Italian regeneration, and believed that the means of expelling her were only to be found in Piedmont.

Besides the revolutionists and republicans who promoted con- spiracy and insurrection whenever possible, and the moderates or " Neo-Guelphs," as Gioberti's followers were called, we must mention the Italian exiles who were learning the art »JJ. a

of war in foreign countries — in Spain, in Greece, in ex n es

Poland, in South America — and those other exiles who, in Paris or London, eked out a bare subsistence by teaching Italian or

by their pen, and laid the foundations of that love of Italy which, especially in England, eventually brought the weight of diplomacy into the scales for Italian freedom. All these forces were equally necessary — the revolutionists to keep up agitation and make govern- ment by bayonets impossible; the moderates to curb the impetu- osity of the revolutionists and to present a scheme of society that was neither reactionary nor anarchical; the volunteers abroad to gain military experience ; and the more peaceful exiles to spread the name of Italy among foreign peoples. All the while a vast amount of revolutionary literature was being printed in Switzerland, France and England, and smuggled into Italy ; the poet Giusti satirized the Italian princes, the dramatist G. B. Niccolini blasted tyranny in his tragedies, the novelist Guerrazzi re-evoked the memories of the last struggle for Florentine freedom in L'Assedio di Firenze, and Verdi's operas bristled with political double entendres which escaped the censor but were understood and applauded by the audience.

On the death of Pope Gregory XVI. in 1846 Austria hoped to secure the election of another zealot; but the Italian cardinals, who did'not want an Austrophil, finished the conclave Plus IX. before the arrival of Cardinal Gaysriick, Austria's mouthpiece, and in June elected Giovanni Maria Mastai Ferretti as Pius IX. The new pope, who while

bishop of Imole had evinced a certain interest in Liberalism, was a kindly man, of inferior intelligence, who thought that all difficulties could be settled with a little good-will, some reforms and a political amnesty. The amnesty which he granted was the beginning of the immense if short-lived popularity which he was to enjoy. But he did not move so fast in the path of reform as was expected, and agitation continued throughout the papal states. 1 In 1847 some administrative reforms were enacted, the laity were admitted to certain offices, railways were talked about, and political newspapers permitted. In April Pius created a Consulla, or consultative assembly, and soon afterwards a council of ministers and a municipality for Rome. Here he would willingly have stopped, but he soon realized that he had hardly begun. Every fresh reform edict was greeted with demonstrations of enthusiasm, but the ominous cry ” Viva Pio Nonosolo!” signified dissatisfaction with the whole system of government. A lay ministry was now demanded, a constitution, and an Italian federation for war against Austria. Rumours of a reactionary plot by Austria and the Jesuits against Pius, induced him to create a national guard and to appoint Cardinal Ferretti as secretary of state.

Events in Rome produced widespread excitement throughout Europe. Metternich had declared that the one thing which had not entered into his calculations was a Liberal pope, only that was an impossibility ; still he was much disturbed by Pius’s attitude, and tried to stem the revolutionary tide by frightening the princes. Seizing the agitation in Romagna as a pretext, he had the town of Ferrara occupied by Austrian troops, which provoked the indignation not only of the Liberals but also of the pope, for according to the treaties Austria had the right of occupying the citadel alone. There was great resentment throughout Italy, and in answer to the pope’s request Charles Albert declared that he was with him in everything, while from South America Giuseppe Garibaldi wrote to offer his services to His Holiness. Charles Albert, although maintaining his reactionary policy, had introduced administrative reforms, built railways, reorganized the army and developed the resources of the country. He had little sympathy with Liberalism and abhorred revolution, but his hatred of Austria and his resentment at the galling tutelage to which she subjected him had gained strength year by year. Religion was still his dominant passion, and when a pope in Liberal guise appeared on the scene and was bullied by Austria, his two strongest feelings — piety and hatred of Austria — ceased Revolu- t0 b e incompatible. In 1847 Lord Minto visited the tionary Italian courts to try to induce the recalcitrant despots agitation, to mend their ways, so as to avoid revolution and war, I84T. (.jjg latter being England’s especial anxiety; this

mission, although not destined to produce much effect, aroused extravagant hopes among the Liberals. Charles Louis, the opera-

1 In Rome itself a certain Angelo Brunetti, known as Ciceruacchio, a forage merchant of lowly birth and a Carbonaro, exercised great influence over the masses and kept the peace where the authorities would have failed.

boufie duke of Lucca, who had coquetted with Liberalism in the past, now refused to make any concessions to his subjects, and in 1847 sold his duchy to Leopold II. of Tuscany (the successor of Ferdinand III. since 1824) to whom it would have reverted in any case at the death of the duchess of Parma. At the same time Leopold ceded Lunigiana to Parma and Modena in equal parts, an arrangement which provoked the indignation of the in- habitants of the district (especially of those destined to be ruled by Francis V. of Modena, who had succeeded to Francis IV. in 1846), and led to disturbances at Fivizzano. In September 1847, Leopold gave way to .the popular agitation for a national guard, in spite of Metternich's threats, and allowed greater freedom of the press; every concession made by the pope was followed by demands for a similar measure in Tuscany.

Ferdinand I. of the Two Sicilies had died in 1825, and was succeeded by Francis I. At the latter's death in 1830 Ferdinand II. succeeded, and although at first he gave promise of proving a wiser ruler, he soon reverted to the traditional Bourbon methods. An ignorant bigot, he concentrated the whole of the executive into his own hands, was surrounded by priests and monks, and served by an army of spies. In 1847 there were unimportant disturbances in various parts of the kingdom, but there was no anti-dynastic outbreak, the jealousy between Naples and Sicily largely contributing to the weakness of the movement. On the 1 2th of January, however, a revolution, the first of the many throughout Europe that was to make the year 1848 memorable, broke out at Palermo under the leadership of Ruggiero Settimo. The Neapolitan army sent to crush the rising was at first un- successful, and the insurgents demanded the constitution of 181 2 or complete independence. Disturbances occurred at Naples also, and the king, who could not obtain Austrian help, as the pope refused to allow Austrian troops to pass through his dominions, on the advice of his prime minister, the duke of Serracapriola, granted a constitution, freedom of the press, the national guard, &c. (January 28).

The news from Naples strengthened the demand for a con- stitution in Piedmont. Count Camillo Cavour, then editor of a new and influential paper called // Risorgimento, had advocated it strongly, and monster

demonstrations * evo *«- were held every day. The king disliked the idea, but i848. great pressure was brought to bear on him, and finally, on the 4th of March 1848, he granted the charter which was destined to be the constitution of the future Italian kingdom. It provided for a nominated senate and an elective chamber of deputies, the king retaining the right of veto; the press censor- ship was abolished, and freedom of meeting, of the press and of speech were guaranteed. Balbo was called upon to form the first constitutional ministry. Three days later the grand-duke of Tuscany promised similar liberties, and a charter, prepared by a commission which included Gino Capponi and Bettino Ricasoli, was promulgated on the 17th.

In the Austrian provinces the situation seemed calmer, and the government rejected the moderate proposals of Daniele Manin and N. Tommaseo. A demonstration in favour of Pius IX. on the 3rd of January at Milan was dispersed with unnecessary severity, and martial law was proclaimed the following month. The revolution which broke out on the 8th of March in Vienna itself and the subsequent flight of Metternich (see Austria- Hungary: History), led to the granting of feeble concessions to Lombardy and Venetia, which were announced in Milan on the 1 8th. But it was too late; and in spite of the exhortations of the mayor, Gabrio Casati, and of the republican C. Cattaneo, who believed that a rising against 15,000 Austrian soldiers under Field-Marshal Radetzky was madness, the famous Five Days' revolution began. It was a popular outburst of pent-up hate, unprepared by leaders, although leaders such as Luciano Manara soon arose. Radetzky occupied the citadel and other points of vantage; but in the night barricades sprang up by the hundred and were manned by citizens of all classes, armed with every kind of weapon. The desperate struggle lasted until the 22nd, when the Austrians, having lost 5000 killed and wounded, were forced to evacuate the city. The rest of Lombardy and Venetia

now flew to arms, and the Austrian garrisons, except in the Quadrilateral (Verona, Peschiera, Mantua and Legnano) were expelled. In Venice the people, under the leadership of Manin, rose in arms and forced the military and civil governors (Counts Zichy and Palffy) to sign a capitulation on the 22nd of March, after which the republic was proclaimed. At Milan, where there was a division of

opinion between the monarchists under Casati and the republicans under Cattaneo, a provisional administration was formed and the question of the form of government postponed for the moment. The duke of Modena and Charles Louis of Parma (Marie Louise was now dead) abandoned their capitals; in both cities provisional governments were set up which sub- sequently proclaimed annexation to Piedmont. In Rome the pope gave way to popular clamour, granting one concession after another, and on the 8th of February he publicly called down God's blessing on Italy — that Italy hated by the Austrians, whose name it had hitherto been a crime to mention. On the 10th of March he appointed a new ministry, under Cardinal Antonelli, which included several Liberal laymen, such as Marco Minghetti, G. Pasolini, L. C. Farini and Count G. Recchi. On the nth a constitution drawn up by a commission of cardinals, without the knowledge of the ministry, was promulgated, a constitution which attempted the impossible task of reconciling the pope's temporal power with free institutions. In the mean- while preparations for war against Austria were being carried on with Pius's sanction.

There were now three main political tendencies, viz. the union of north Italy under Charles Albert and an alliance with the pope and Naples, a federation of the different states under their present rulers, and a united republic of all Italy. All parties, however, were agreed in favour of war against Austria, for which the peoples forced their unwilling rulers to prepare. But the only state capable of taking the initiative was Piedmont, and the king still hesitated. Then came the news of the Five Days of Milan, which produced the wildest excitement in Turin; unless First war tne army were sent to assist the struggling Lombards of Italy at once the dynasty was in jeopardy. Cavour's stirring against articles in the Risorgimento hastened the king's decision , Austria. an(j on t jj e 2 ˆ rc j f March he declared war (see for the military events Italian Wars, 1848-70). But much precious time had been lost, and even then the army was not ready. Charles Albert could dispose of 90,000 men, including some 30,000 from central Italy, but he took the field with only half his force. He might yet have cut off Radetzky on his retreat, or captured Mantua, which was only held by 300 men. But his delays lost him both chances and enabled Radetzky to receive reinforcements from Austria. The pope, unable to resist the popular demand for war, allowed his army to depart (March 23) under the command of General Durando, with instructions to act in concert with Charles Albert, and he corresponded with the grand-duke of Tuscany and the king of Naples with a view to a military alliance. But at the same time, fearing a schism in the church should he attack Catholic Austria, he forbade his troops to do

more than defend the frontier, and in his Encyclical of the 29th of April stated that, as head of the church, he could not declare war, but that he was unable to prevent his subjects from following the example of other Italians. He then requested Charles Albert to take the papal troops under his command, and also wrote to the emperor of Austria asking him voluntarily to relinquish Lombardy and Venetia. Tuscany and Naples had both joined the Italian league; a Tuscan army started for Lombardy on the 30th of April, and 17,000 Neapolitans commanded by Pepe (who had returned after 28 years of exile) went to assist Durando in intercepting the Austrian reinforce- Tirnts under Nugent. The Piedmontese defeated the enemy it Pastrengo (April 30), but did not profit by the victory. The Neapolitans reached Bologna on the 17th of May, but in the meantime a dispute had broken out at Naples between the king and parliament as to the nature of the royal oath; a cry of treason was raised by a group of factious youngsters, barricades were erected and street fighting ensued (May 15)- On the 17th Ferdinand dissolved parliament and recalled the army.

On receiving the order to return, Pepe, after hesitating for some time between his oath to the king and his desire to fight for Italy, finally resigned his commission and crossed the Po with a few thousand men, the rest of his force returning south. The effects of this were soon felt. A force of Tuscan volunteers was attacked by a superior body of Austrians at Curtatone and Montanaro and defeated after a gallant resistance on the 27th of May; Charles Albert, after wasting precious time round Peschiera, which capitulated on the 30th of May, defeated Radetzky at Goito. But the withdrawal of the Neapolitans left Durando too weak to intercept Nugent and his 30,000 men; and the latter, although harassed by the inhabitants of Venetia and repulsed at Vicenza, succeeded in joining Radetzky, who was soon further reinforced from Tirol. The whole Austrian army now turned on Vicenza, which after a brave resistance sur- rendered on the 10th of June. All Venetia except the capital was thus once more occupied by the Austrians. On the 23rd, 24th and 25th of July (first battle of Custozza) the Piedmontese were defeated and forced to retire on Milan with Radetzky's superior force in pursuit. The king was the object of a hostile demonstration in Milan, and although he was ready to defend the city to the last, the town council negotiated a capitulation with Radetzky. The mob, egged on by the republicans, attacked the palace where the king was lodged, and he escaped with difficulty, returning to Piedmont with the remnants of his army. On the 6th of August Radetzky re-entered Milan, and three days later an armistice was concluded between Austria and Piedmont, the latter agreeing to evacuate Lombardy and Venetia. The offer of French

assistance, made after the pro- clamation of the republic in the spring of 1848, had been rejected mainly because France, fearing that the creation of a strong Italian state would be a danger to her, would have demanded the cession of Nice and Savoy, which the king refused to consider.

Meanwhile, the republic had been proclaimed in Venice; but on the 7th of July the assembly declared in favour of fusion with Piedmont, and Manin, who had been elected president, resigned his powers to the royal com-

Danlele Manin and

missioners. Soon after Custozza, however, the y en i cem Austrians blockaded the city on the land side. In Rome the pope's authority weakened day by day, and disorder increased. The Austrian attempt to occupy Bologna was re- pulsed by the citizens, but unfortunately this success was followed by anarchy and murder, and Farini only with difficulty restored a semblance of order. The Mamiani ministry having failed to achieve anything, Pius summoned Pellegrino Rossi, a learned lawyer who had long been exiled in France, to form a cabinet. On the 15th of November he was assassinated, and as no one was punished for this crime the insolence of the disorderly elements increased, and shots were exchanged with the Swiss Guard. The terrified pope fled in disguise to Gaeta (November 25), and when parliament requested him to return he refused even to receive the deputation. This meant a complete rupture; on the 5th of February 1849 a constituent assembly was summoned, and on the 9th it voted the downfall of the temporal power and proclaimed the republic. Mazzini hurried prodama- to Rome to see his dream realized, and was chosen tlonofthe head of the Triumvirate. On the 18th Pius invited Roman the armed intervention of France, Austria, Naples Republic. and Spain to restore his authority. In Tuscany the government drifted from the moderates to the extreme democrats; the Ridolfi ministry was succeeded after Custozza by that of Ricasoli, and the latter by that of Capponi. The lower classes provoked disorders, which were very serious at Leghorn, and were only quelled by Guerrazzi's energy. Capponi resigned in October 1848, and Leopold reluctantly consented to a democratic ministry led by Guerrazzi and Montanelli, the former a very ambitious and unscrupulous man, the latter honest but fantastic. Follow- ing the Roman example, a constituent assembly was demanded to vote on union with Rome and eventually with the rest of Italy. The grand-duke, fearing an excommunication from the I pope, refused the request, and left Florence for Siena and

S. Stefano; on the 8th of February 1849 the republic was pro- claimed, and on the 21st, at the pressing request of the pope and the king of Naples, Leopold went to Gaeta.

Ferdinand did not openly break his constitutional promises until Sicily was reconquered. His troops had captured Messina after a bombardment which earned him the sobriquet of ” King Bomba “; Catania and Syracuse fell soon after, hideous atrocities being everywhere committed with his sanction. He now pro- rogued parliament, adopted stringent measures against the Liberals, and retired to Gaeta, the haven of refuge for deposed despots.

But so long as Piedmont was not completely crushed none of the princes dared to take decisive measures against theirsubjects; in spite of Custozza, Charles Albert still had an army, and Austria, with revolutions in Vienna, Hungary and Bohemia on her hands, could not intervene. In Piedmont the Pinelli-Revel ministry, which had continued the negotiations for an alliance with Leopold and the pope, resigned as it could not count on a parliamentary majority, and in December the returned exile Gioberti formed a new ministry. His proposal to reinstate Leopold and the pope with Piedmontese arms, so as to avoid Austrian intervention, was rejected by both potentates, and met with opposition even in Piedmont, which would thereby have forfeited its prestige throughout Italy. Austrian mediation was now imminent, as the Vienna revolution had been crushed, and the new emperor, Francis Joseph, refused to consider any settlement other than on the basis of the treaties of 1815. But Charles Charles Albert, who, whatever his faults, had a generous Albert re- nature, was determined that so long as he had an news the a rmy in being he could not abandon the Lombards war ‘ and the Venetians, whom he had encouraged in their

resistance, without one more effort, though he knew full well that he was staking all on a desperate chance. On the 12th of March 1849, he denounced the armistice, and, owing to the want of confidence in Piedmontese strategy after 1848, gave the chief command to the Polish General Chrzanowski. His forces amounted to 80,000 men, including a Lombard corps and some Roman, Tuscan and other volunteers. But the discipline and moral of the army were shaken and

its organization faulty. General Ramorino, disobeying his instructions, failed to prevent a corps of Austrians under Lieut. Field-Marshal d'Aspre from seizing Mortara, a fault for which he was afterwards court- martialled and shot, and after some preliminary fighting Radetzky won the decisive battle of Novara (March 23) which broke up the Piedmontese army. The king, who had sought death in vain all day, had to ask terms of Radetzky; the latter demanded Accession a snce °^ Piedmont and the heir to the throne (Victor ot victor Emmanuel) as a hostage, without a reservation for Emmanuel the consent of parliament. Charles Albert, realizing his own failure and thinking that his son might obtain better terms, abdicated and departed at once for Portugal, where he died in a monastery a few months later. Victor Emmanuel went in person to treat with Radetzky on the 24th of March. The Field-Marshal received him most courteously and offered not only to waive the demand for a part of Piedmontese territory, but to enlarge the kingdom, on condition that the constitution should be abolished and the blue Piedmontese flag substituted for the tricolor. But the young king was determined to abide by his father's oath, and had therefore to agree to an Austrian occupation of the territory between the Po, the Ticino and the Sesia, and of half the citadel of Alessandria, until peace should be concluded, the evacuation of all districts occupied by his troops outside Piedmont, the dissolution of his corps of Lombard, Polish and Hungarian volunteers and the withdrawal of his fleet from the Adriatic.

Novara set Austria free to reinstate the Italian despots. Ferdinand at once re-established autocracy in Naples; though the struggle in Sicily did not end until May, when Palermo, after a splendid resistance, capitulated. In Tuscany disorder continued, and although Guerrazzi, who had been appointed dictator, saved the country from complete anarchy, a large part of the population, especially among the peasantry, was still

Garibaldi.

loyal to the grand-duke. After Novara the chief question was how to avoid an Austrian occupation, and owing to the prevailing confusion the town council of Florence took matters into its own hands and declared the grand-duke reinstated, but on a constitutional basis and without foreign help (April 12). Leopold accepted as regards the constitution, but said nothing about foreign intervention. Count Serristori, the grand-ducal com- missioner, arrived in Florence on the 4th of May 1849; the national guard was disbanded; and on the 25th, the Austrians under d'Aspre entered Florence.

On the 28th of July Leopold returned to his capital, and while that event was welcomed by a part of the people, the fact that he had come under Austrian protection ended by destroying all loyalty to the dynasty, and consequently contributed not a little to Italian unity.

In Rome the triumvirate decided to defend the republic to the last. The city was quieter and more orderly than it had ever been before, for Mazzini and Ciceruacchio success- fully opposed all class warfare; and in April the defenders received a priceless addition to their strength in the person of Garibaldi, who, on the outbreak of the revolution in 1848, had returned with a few of his followers from his exile in South America, and in April 1849 entered Rome with some 500 men to fight for the republic. At this time France, as a counterpoise to Austrian intervention in other parts of Italy, decided to restore the pope, regardless of the fact that this action would necessitate the crushing of a sister p rance republic. As yet, however, no such intention was and the publicly avowed. On the 25th of April General Roman Oudinot landed with 8000 men at Civitavecchia, and Re P" bIlc – on the 30th attempted to capture Rome by suprise, but was completely defeated by Garibaldi, who might have driven the French into the sea, had Mazzini allowed him to leave the city. The French republican government, in order to gain time for reinforcements to arrive, sent Ferdinand de Lesseps to pretend to treat with Mazzini, the envoy himself not being a party to this deception. Mazzini refused to allow the French into the city, but while the negotiations were being diagged on Oudinot's force was increased to 35,000 men. At the same time an Austrian army was marching through the Legations, and Neapolitan and Spanish troops were advancing from the south. The Roman army (20,000 men) was commanded by General Rosselli, and included, besides Garibaldi's red-shirted legionaries, volunteers from all parts of Italy, mostly very young men, many of them wealthy and of noble family. The Neapolitans were ignomini- ously beaten in May and retired to the frontier; on the 1st of June Oudinot declared that he would attack Rome on the 4th, but by beginning operations on the 3rd, when no attack was expected, he captured an important position in the Pamphili gardens.

In spite of this success, however, it was not until the end of the month, and after desperate fighting, that the French pene- trated within the walls and the defence ceased (June 29). The Assembly, which had continued in session, was dispersed by the French troops on the 2nd of July, but Mazzini escaped a week later. Garibaldi quitted the city, followed by 4000 of his men, and attempted to join the defenders of Venice. In spite of the fact that he was pursued by the armies of four

Powers, he succeeded in reaching San Marino; but his force melted away and, after hiding in the marshes of Ravenna, he fled across the peninsula, assisted by nobles, peasants and priests, to the Tuscan coast, whence he reached Piedmont and eventually America, to await a new call to fight for Italy (see. Garibaldi). After a heroic defence, conducted by Giuseppe Martinengo, Brescia was recaptured in April by the Austrians under Lieut. Field-Marshal von Haynau, the atrocities Which # et j oc . followed earning for Haynau the name of ” The Hon of Hyena of Brescia.” In May they seized Bologna, Venkeby and Ancona in June, restoring order in those towns ” s a ” by the same methods as at Brescia. Venice alone still held out; after Novara the Piedmontese commissioners withdrew and Manin again took charge of the government. The assembly

after the war.

voted: ” Venice resists the Austrians at all costs,” and the citizens and soldiers, strengthened by the arrival of volunteers from all parts of Italy, including Pepe, who was given the chief command of the defenders, showed the most splendid devotion in their hopeless task. By the end of May the city was blockaded by land and sea, and in July the bombardment began. On the 24th the city, reduced by famine, capitulated on favourable terms. Manin, Pepe and a few others were excluded from the amnesty and went into exile.

Thus were despotism and foreign predominance re-established throughout Italy save in Piedmont. Yet the ” terrible year ” was by no means all loss. The Italian cause had been crushed, but revolution and war had strengthened the feeling of unity, for Neapolitans had fought for Venice, Lombards for Rome, Piedmontese for all Italy. Piedmont was shown to possess the qualities necessary to constitute the nucleus of a great nation. It was now evident that the federal idea was impossible, for none of the princes except Victor Emmanuel could be trusted, and that unity and freedom could not be achieved under a republic, for nothing could be done without the Piedmontese army, which was royalist to the core. All reasonable men were now convinced that the question of the ultimate form of the Italian government was secondary, and that the national efforts should be concentrated on the task of expelling the Austrians; the form of

government could be decided afterwards. Liberals were by no means inclined to despair of accomplishing this task; for hatred of the foreigners, and of the despots restored by their bayonets, had been deepened by the humiliations and cruelties suffered during the war into a passion common to all Italy.

When the terms of the Austro-Piedmontese armistice were announced in the Chamber at Turin they aroused great indigna- tion, but the king succeeded in convincing the deputies IˆHltl* triat *- ne y w ere inevitable. The peace negotiations dragged on for several months, involving two changes of ministry, and D'Azeglio became premier. Through Anglo-French mediation Piedmont's war indemnity was reduced from 230,000,000 to 75,000,000 lire, but the question of the amnesty remained. The king declared himself ready to go to war again if those compromised in the Lombard revolution were not freely pardoned, and at last Austria agreed to amnesty all save a very few, and in August the peace terms were agreed upon. The Chamber, however, refused to ratify them, and it was not until the king's eloquent appeal from Moncalieri to his people's loyalty, and after a dissolution and the election of a new parlia- ment, that the treaty was ratified (January 9, 1850). The situation in Piedmont was far from promising, the exchequer was empty, the army disorganized, the country despondent and suspicious of the king. If Piedmont was to be fitted for the part which optimists expected it to play, everything must be built up anew. Legislation had to be entirely reformed, and the bill for abolishing the special jurisdiction for the clergy (foro ecclesi- aslico) and other medieval privileges aroused the bitter opposition of the Vatican as well as of the Piedmontese clericals. This same year (1850) Cavour, who had been in parliament for some time and had in his speech of the 7th of March struck the first note of encouragement after the gloom of Novara, became minister of agriculture, and in 1851 also assumed the portfolio of finance. He ended by dominating the cabinet, but owing to his having negotiated a union of the Right Centre and the Left Centre (the Connubio) in the conviction that the country needed the moderate elements of both parties, he quarrelled with D'Azeglio (who, as an uncompromising conservative, failed to see the value of such a move) and resigned. But D'Azeglio was not equal to the situation, and he, too, resigned in November 1852; whereupon the king appointed Cavour prime minister, a position which with short intervals he held until his death.

The Austrians in the period from 1849 to 1859, known as the decennio della resistenza (decade of resistance), were made to feel that they were in a conquered country where they could have no social intercourse with the people; for no self-respecting Lombard or

Venetian would even speak to an Austrian. Austria, on the other hand, treated her Italian subjects with great severity.

Cavour.

The Italian provinces were the most heavily taxed in the whole empire, and much of the money thus levied was spent either for the benefit of other provinces or to pay for the huge army of occupation and the fortresses in Austrian Italy. The promise of a constitution for the empire, l849 made in 1849, was never carried out; the government of Lombardo-Venetia was vested in Field-Marshal Radetzky; and although only very few of the revolutionists were excluded from the amnesty, the carrying of arms or the distribution or possession of revolutionary literature was punished with death. Long terms of imprisonment and the bastinado, the latter even inflicted on women, were the penalties for the least expression of anti-Austrian opinion.

The Lombard republicans had been greatly weakened by the events of 1848, but Mazzini still believed that a bold act by a few revolutionists would make the people rise en masse and expel the Austrians. A conspiracy, planned with the object, among others, of kidnapping the emperor while on a visit to Venice and forcing him to make concessions, was postponed in consequence of the coup d'etat by which Louis Napoleon became emperor of the French (1852); but a chance discovery led to a large number of arrests, and the state trials at Mantua, conducted in the most shamelessly inquisitorial manner, resulted in five death sentences, including that of the priest Tazzoli, and many of imprisonment for long terms. Even this did not convince Mazzini of the hopelessness of such attempts, for he was out of touch with Italian public opinion, and he greatly weakened his influence by favouring a crack-brained outbreak at Milan on the 6th of February 1853, which was easily quelled, numbers of the insurgents being executed or imprisoned. Radetzky, not satisfied with this, laid an embargo on the property of many Lombard emigrants who had settled in Piedmont and become naturalized, accusing them of complicity. The Piedmontese government rightly regarded this measure as a violation of the peace treaty of 1850, and Cavour recalled the Piedmontese minister from Vienna, an action which was endorsed by Italian public opinion generally, and won the approval of France and England.

Cavour's ideal for the present was the expulsion of Austria from Italy and the expansion of Piedmont into a north Italian kingdom; and, although he did not yet think of Italian unity as a question of practical

policy, he began to foresee it as a future possibility. But in reorganizing the shattered finances of the state and preparing it for its greater destinies, he had to impose heavy taxes, which led to rioting and involved the minister himself in considerable though temporary unpopularity. His ecclesiastical legislation, too, met with bitter opposition from the Church.

But the question was soon forgotten in the turmoil caused by the Crimean War. Cavour believed that by taking part in the war his country would gain for itself a military status and a place in the councils of the great Powers, and war"" establish claims on Great Britain and France for the realization of its Italian ambitions. One section of public opinion desired to make Piedmont's co-operation subject to definite promises by the Powers; but the latter refused to bind, them- selves, and both Victor Emmanuel and Cavour realized that, even without such promises, participation would give Piedmont a claim. There was also the danger that Austria might join the allies first and Piedmont be left isolated; but there were also strong arguments on the other side, for while the Radical party saw no obvious reason why Piedmont should fight other people's battles, and therefore opposed the alliance, there was the risk that Austria might join the alliance together with Piedmont, which would have constituted a disastrous situation. Da Bormida, the minister for foreign affairs, resigned rather than agree to the proposal, and other statesmen were equally opposed to it. But after long negotiations the treaty of alliance was signed in January 1855, and while Austria remained neutral, a well-equipped Pied- montese force of 15,000 men, under General La Marmora, sailed for the Crimea. Everything turned out as Cavour had hoped.

Italy and the Congress ol 'Paris,

1856.

THE RISORGIMENTO]

ITALY

SS

Restored govern- ments after

1849.

The Piedmontese troops distinguished themselves in the field, gaining the sympathies of the French and English; and at the subsequent

congress of Paris (1856), where Cavour himself was Sardinian representative, the Italian question was discussed, and the intolerable oppression of the Italian peoples by Austria and the despots ventilated.

Austria at last began to see that a policy of coercion was useless and dangerous, and made tentative efforts at conciliation. Taxation was somewhat reduced, the censorship was made less severe, political amnesties were granted, humaner officials were appointed and the Congregations (a sort of shadowy consultative assembly) were revived. In 1856 the emperor and empress visited their Italian dominions, but were received with icy coldness; the following year, on the retirement of Radetzky at the age of ninety-three, the archduke Maximilian, an able, cultivated and kind-hearted man, was appointed viceroy. He made desperate efforts to conciliate the population, and succeeded with a few of the nobles, who were led to believe in the possi- bility of an Italian confederation, including Lombardy and Venetia which would be united to Austria by a personal union alone; but the immense majority of all classes rejected these advances, and came to regard union with Piedmont with increasing favour. 1

Meanwhile Francis V. of Modena, restored to his duchy by Austrian bayonets, continued to govern according to the traditions of his house. Charles II. of Parma, after having been reinstated by the Austrians, abdicated in favour of his son Charles III. a drunken libertine and a cruel tyrant (May 1849); the latter was assassinated in 1854, and a regency under his widow, Marie Louise, was insti- tuted during which the government became somewhat more tolerable, although by no means free from political persecution; in 1857 the Austrian troops evacuated the duchy. Leopold of Tuscany suspended the constitution, and in 1852 formally abolished it by order from Vienna; he also concluded a treaty of semi-subjection with Austria and a Concordat with the pope for granting fresh privileges to the Church. His government, how- ever, was not characterized by cruelty like those of his brother despots, and Guerrazzi and the other Liberals of 1849, although tried and sentenced to long terms of imprisonment, were merely exiled. Yet the opposition gained recruits among all the ablest and most respectable Tuscans. In Rome, after the restoration of the temporal power by the French troops, the pope paid no attention to Louis Napoleon’s advice to maintain some form of constitution, to grant a general amnesty, and to secularize the administration. He promised, indeed, a consultative council of state, and granted an amnesty from which no less than 25,000 persons were excluded; but on his return to Rome (12th April 1850), after he was quite certain that France had given up all idea of imposing constitutional

limitations on him, he re-estab- lished his government on the old lines of priestly absolutism, and, devoting himself to religious practices, left political affairs mostly to the astute cardinal Antonelli, who repressed with great severity the political agitation which still continued. At Naples Persecu- a trifling disturbance in September 1849, led to the tton of arrest of a large number of persons connected with the Liberals Unita Italiana, a society somewhat similar to the in Naples. c ar tj 0nar j_ The prisoners included Silvio Spaventa, Luigi Settembrini, Carlo Poerio and many other cultured and worthy citizens. Many condemnations followed, and hundreds of ” politicals ” were immured in hideous dungeons, a state of things which provoked Gladstone’s famous letters to Lord Aberdeen, in which Bourbon rule was branded for all time as ” the negation of God erected into a system of government.” But oppressive, corrupt and inefficient as it was, the government was not confronted by the uncompromising hostility of the whole people; the ignorant priest-ridden masses were either indifferent or of mildly Bourbon sympathies; the opposition was constituted by the educated middle classes and a part of the

l The popular cry of “Viva Verdi!” did not merely express enthusiasm for Italy’s most eminent musician, but signified, in initials: ” Viva Vittorio Emanuele Re d’ Italia ! ”

nobility. The revolutionary attempts of Bentivegna in Sicily (1856) and of the Mazzinian Carlo Pisacane, who landed at Sapri in Calabria with a few followers in 1857, failed from lack of popular support, and the leaders were killed.

The decline of Mazzini’s influence was accompanied by the rise of a new movement in favour of Italian unity under Victor Emmanuel, inspired by the Milanese marquis Giorgio New Pallavicini, who had spent 14 years in the Spielberg, Unionist and by Manin, living in exile in Paris, both of them move- ex-republicans who had become monarchists. The ment ‘ propaganda was organized by the Sicilian La Farina by means of the Societa Nazionale. All who accepted the motto ” Unity, Independence and Victor Emmanuel ” were admitted into the society. Many of the republicans and Mazzinians joined it, but Mazzini himself regarded it with no sympathy. In the Austrian provinces and in the duchies it carried all before it, and gained many adherents in the Legations, Rome and Naples, although in the latter regions the autonomist feeling was still strong even among the Liberals. In Piedmont itself it was at first less successful; and Cavour, although he aspired ultimately to a united Italy with Rome as the capital, 2 openly professed no ambition beyond the expulsion of Austria and the formation of a North Italian kingdom. But he gave secret

encouragement to the movement, and ended by practically directing its activity through La Farina. The king, too, was in close sympathy with the society's aims, but for the present it was necessary to hide this attitude from the eyes of the Powers, whose sympathy Cavour could only hope to gain by professing hostility to everything that savoured of revolution. Both the king and his minister realized that Piedmont alone, even with the help of the National Society, could not expel Austria from Italy without foreign assistance. Piedmontese finances had been strained to breaking-point to organize an army obviously intended for other than merely defensive purposes. Cavour now set himself to the task of isolating Austria and securing an alliance for her expulsion. A British alliance would have been preferable, but the British government was too much concerned with the preservation of European peace. The emperor Napoleon, almost alone among Frenchmen, had genuine Italian sympathies. Napoleon But were he to intervene in Italy, the intervention it a w. would not only have to be successful; it would have to bring tangible advantages to France. Hence his hesitations and vacillations, which Cavour steadily worked to overcome. Suddenly on the 14th of January 1858 Napoleon's life was attempted by Felice Orsini (q.v.) a Mazzinian Romagno], who believed that Napoleon was the chief obstacle to the success of the revolution in Italy. The attempt failed and its author was caught and executed, but while it appeared at first to destroy Napoleon's Italian sympathies and led to a sharp interchange of notes between Paris and Turin, the emperor was really impressed by the attempt and by Orsini's letter from prison exhorting him to intervene in Italy. He realized how deep the Italian feeling for independence must be, and that a refusal to act now might result in further attempts on his life, as indeed Orsini's letter stated. Consequently negotiations with Cavour were resumed, and a meeting with him was arranged to take place at Plom- bieres (20th and 21st of July 1858). There it was agreed that France should supply 200,000 men and Piedmont 100,000 for the expulsion of the Austrians from Italy, that Piedmont should be expanded into a kingdom of North Italy, that central Italy should form a separate kingdom, on the throne of which the emperor contemplated placing one of his own relatives, and Naples another, possibly under Lucien Murat; the pope, while retaining only the " Patrimony of St Peter " (the Roman province), would be president of the Italian confederation. In exchange for French assistance Piedmont would cede Savoy and perhaps Nice to France; and a marriage between Victor Emmanuel's daughter Clothilde and Jerome Bonaparte, to which Napoleon attached great importance, although not made a definite condition, was also discussed. No written agreement, however, was signed.

2 La Farina's Epistolario, ii. 426.

On the i st of January 1859, Napoleon astounded the diplo- matic world by remarking to Baron Hiibner, the Austrian ambassador, at the New Year's reception at the Tuileries, that he regretted that relations between France and Austria were " not so good as they had been "; and at the opening of the Piedmontese parliament on the 10th Victor Emmanuel pro- nounced the memorable words that he could not be insensible to the cry of pain (il grido di dolore) which reached him from all parts of Italy. Yet after these warlike declarations and after the signing of a military convention at Turin, the king agreeing to all the conditions proposed by Napoleon, the latter suddenly became pacific again, and adopted the Russian suggestion that Italian affairs should be settled by a congress. Austria agreed on condition that Piedmont should disarm and should not be admitted to the congress. Lord Malmesbury urged the Sardinian government to yield; but Cavour refused to disarm, or to accept the principle of a congress, unless Piedmont were admitted to it on equal terms with the other Powers. As neither the Sardinian nor the Austrian government seemed disposed to yield, the idea of a congress had to be abandoned. Lord Malmesbury now proposed that all three Powers should disarm simultaneously and that, as suggested by Austria, the precedent of Laibach should be followed and all the Italian states invited to plead their cause at the bar of the Great Powers. To this course Napoleon consented, to the despair of King Victor Emmanuel and Cavour, who saw in this a proof that he wished to back out of his engagement and make war impossible. When war seemed imminent volunteers from all parts of Italy, especially from Lombardy, had come pouring into Piedmont to enrol themselves in the army or in the specially raised volunteer corps (the com- mand of which was given to Garibaldi), and " to go to Piedmont " became a test of patriotism throughout the country. Urged by a peremptory message from Napoleon, Cavour saw the necessity of bowing to the will of Europe, of disbanding the volunteers and reducing the army to a peace footing. The situation, how- ever, was saved by a false move on the part of Austria. At Vienna the war party was in the ascendant; the convention for disarmament had been signed, but so far from its being carried out, the reserves were actually called out on the 12th of April; and on the 23rd, before Cavour's decision was known at Vienna, an Austrian

ultimatum reached Turin, summoning Piedmont to disarm within three days on pain of invasion. Cavour was filled with joy at the turn affairs had taken, for

Austria now appeared as the aggressor. On the Italian 2 g tn jr ranc ; s Joseph declared war, and the next day ISS9. hist roops crossed theTicino, a move which was followed,

as Napoleon had stated it would be, by a French declaration of war. The military events of the Italian war of 1859 are described under Italian Wars. The actions of Montebello (May 20), Palestro (May 31) and Melegnano (June 8) and the battles of Magenta (June 4) and Solferino (June 24) all went against the Austrians. Garibaldi's volunteers raised the standard of insurrection and held the field in the region of the Italian lakes. After Solferino the allies prepared to besiege the Quadrilateral. Then Napoleon suddenly drew back, un- willing, for many reasons, to continue the campaign. Firstly, he doubted whether the allies were strong enough to attack the Quadrilateral, for he saw the defects of his own army's organiza- tion; secondly, he began to fear intervention by Prussia, whose attitude appeared menacing; thirdly, although really anxious to expel the Austrians from Italy, he did not wish to create a too powerful Italian state at the foot of the Alps, which, besides constituting a potential danger to France, might threaten the pope's temporal power, and Napoleon believed that he could not stand without the clerical vote; fourthly, the war had been declared against the wishes of the great majority of Frenchmen and was even now far from popular. Consequently, to the surprise of all Europe, while the allied forces were drawn up ready for battle, Napoleon, without consulting Victor Emmanuel, sent General Fleury on the 6th of July to Francis Joseph to ask for an armistice, which was agreed to. The king was now informed, and on the 8th Generals Vaillant, Delia Rocca and

Hess met at Villafranca and arranged an armistice until the 1 5th of August. But the king and Cavour were terribly upset by this move, which meant peace without Venetia; Cavour hurried to the king's headquarters at Monzambano " 4 ˆf/' ce and in excited, almost disrespectful, language implored franca' him not to agree to peace and to continue the war alone, relying on the Piedmontese army and a general Italian revolution. But Victor Emmanuel on this occasion proved the greater statesman of the two; he understood that, hard as it was, he must content himself with Lombardy for the present, lest all be lost. On the nth the two emperors met at Villafranca, where they agreed that Lombardy should be ceded to Piedmont, and Venetia retained by Austria but governed by Liberal methods; that the rulers

of Tuscany, Parma and Modena, who had been again deposed, should be restored, the Papal States reformed, the Legations given a separate administration and the pope made president of an Italian confederation including Austria as mistress of Venetia. It was a revival of the old impossible federal idea, which would have left Italy divided and dominated by Austria and France. Victor Emmanuel regretfully signed the peace preliminaries, adding, however, pour ce qui me concerne (which meant that he made no undertaking with regard to central Italy), and Cavour resigned office.

The Lombard campaign had produced important effects throughout the rest of Italy. The Sardinian government had formally invited that of Tuscany to participate in Unl . . the war of liberation, and on the grand-duke rejecting move- the proposal, moderates and democrats combined to meats in present an ultimatum to Leopold demanding that he Ceatr >d should abdicate in favour of his son, grant a constitu- y ‘

tion and take part in the campaign. Qn his refusal Florence rose as one man, and he, feeling that he could not rely on his troops, abandoned Tuscany on the 27th of April 1839. A provisional government was formed, led by Ubaldino Peruzzi, and was strengthened on the 8th of May by the inclusion of Baron Bettino Ricasoli, a man of great force of character, who became the real head of the administration, and all through the ensuing critical period aimed unswervingly at Italian unity. Victor Emmanuel, at the request of the people, assumed the protector- ate over Tuscany, where he was represented by the Sardinian minister Boncompagni. On the 23rd of May Prince Napoleon, with a French army corps, landed at Leghorn, his avowed object being to threaten the Austrian flank; 1 and in June these troops, together with a Tuscan contingent, departed for Lombardy. In the duchy of Modena an insurrection had broken out, and after Magenta Duke Francis joined the Austrian army in Lombardy, leaving a regency in charge. But on the 14th of June the municipality formed a provisional government and proclaimed annexation to Piedmont; L. C. Farini was chosen dictator, and 4000 Modenese joined the allies. The duchess- regent of Parma also withdrew to Austrian territory, and on the nth of June annexation to Piedmont was proclaimed. At the same time the Austrians evacuated the Legations and Cardinal Milesi, the papal representative, departed. The muni- cipality of Bologna formed a Giunta, to which Romagna and the Marches adhered, and invoked the dictatorship of Victor Emmanuel; at Perugia, too, a provisional government was constituted under F. Guardabassi. But the Marches were soon reoccupied by pontifical troops, and Perugia fell, its capture being followed by an indiscriminate massacre of men, women and

children. In July the marquis D'Azeglio arrived at Bologna as royal commissioner.

After the meetings at Villafranca Napoleon returned to France. The question of the cession of Nice and Savoy had not been raised; for the emperor had not fulfilled his part of the bargain, that he would drive the Austrians out of Italy, since Venice was yet to be freed. At the same time he was resolutely opposed to the Piedmontese annexations in central Italy. But here Cavour intervened, for he was determined to maintain the annexations, at all costs. Although he had resigned, he remained

1 In reality the emperor was contemplating an Etrurian kingdom with the prince at its head.

in office until Rattazzi could form a new ministry; and while officially recalling the royal commissioners according to the preliminaiies of Villafranca, he privately encouraged them to remain and organize resistance to the return of the despots, if necessary by force (see Cavour). Farini, who in August was elected dictator of Parma as well as Modena, and Ricasoli, who since, on the withdrawal of the Sardinian commissioner Bon- compagni, had become supreme in Tuscany, were now the men who by their energy and determination achieved the annexation of central Italy to Piedmont, in spite of the strenuous opposition of the French emperor and the weakness of many Italian Liberals. In August Marco Minghetti succeeded in forming a military league and a customs union between Tuscany, Romagna and the duchies, and in procuring the adoption of the Piedmontese codes; and envoys were sent to Paris to mollify Napoleon. Constituent assemblies met and voted for unity under Victor Emmanuel, but the king could not openly accept the proposal owing to the emperor's opposition, backed by the presence of French armies in Lombardy; at a word from Napoleon there might have been an Austrian, and perhaps a Franco-Austrian, invasion of central Italy. But to Napoleon's statement that he could not agree to the unification of Italy, as he was bound by his promises to Austria at Villafranca, Victor Emmanuel replied that he himself, after Magenta and Solferino, was bound in honour to link his fate with that of the Italian people; and General Manfredo Fanti was sent by the Turin government to organize the

army of the Central League, with Garibaldi under him.

The terms of the treaty of peace signed at Zurich on the ioth of November were practically identical with those of the pre- liminaries of Villafranca. It was soon evident, however, Zurich. tnat: t ˆ e Italian question was far from being settled. Central Italy refused to be bound by the treaty, and offered the dictatorship to Prince Carignano, who, himself unable to accept owing to Napoleon's opposition, suggested Boncompagni, who was accordingly elected. Napoleon now realized that it would be impossible, without running serious risks, to oppose the movement in favour of unity. He suggested an international congress on the question; inspired a pamphlet, Le Pape et le Congres, which proposed a reduction of the papal territory, and wrote to the pope advising him to cede Romagna in order to obtain better guarantees for the rest of his dominions. The proposed congress fell through, and Napoleon thereupon raised the question of the cession of Nice and Savoy as the price of his consent to the union of the central provinces with the Italian kingdom. In January 1866 the Rattazzi ministry fell, after completing the fusion of Lombardy with Piedmont, and Cavour was again summoned by the king to the head of affairs.

Cavour well knew the unpopularity that would fall upon him by consenting to the cession of Nice, the birthplace of Garibaldi, and Savoy, the cradle of the royal house; but he realized the necessity of the sacrifice, if central Italy was to be won. The negotiations were long drawn out; for Cavour struggled to save Nice and Napoleon was anxious to make conditions, especially as regards Tuscany. At last, on the 24th of March, the treaty was signed whereby the cession was agreed upon, but subject to the vote of the populations concerned and ratification by the Italian parliament. The king having formally accepted the voluntary annexation of the duchies, Tuscany and Romagna, appointed the prince of Carignano viceroy with Ricasoli as governor-general (22nd of March), and was immediately after- wards excommunicated by the pope. On the 2nd of April i860 the new Italian parliament, including members from central Italy, assembled at Turin. Three weeks later the treaty of Turin ceding Savoy and Nice to France was ratified, though not without much opposition, and Cavour was fiercely reviled for his share in the transaction, especially by Garibaldi, who even contemplated an expedition to Nice, but was induced to desist by the king.

In May 1859 Ferdinand of Naples was succeeded by his son Francis II., who gave no signs of any intention to change his father's policy, and, in spite of Napoleon's advice, refused to

grant a constitution or to enter into an alliance with Sardinia. The result was a revolutionary agitation which in Sicily, stirred up by Mazzini's agents, Rosalino Pilo and Francesco Crispi, culminated, on the 5th of April i860, in open Na P ,es revolt. An invitation had been sent Garibaldi to put p ranc j S //, himself at the head of the movement; at first he had refused, but reports of the progress of the insurrection soon determined him to risk all on a bold stroke, and on the 5th of May he embarked at Quarto, near Genoa, with Bixio, the Hungarian Tiirr and some 1000 picked followers, on two steamers. The preparations for the expedition, openly made, were viewed by Cavour with mixed feelings. With its object he sympathized; yet he could not give official sanction to an armed attack on a friendly power, nor on the other hand could he forbid an action enthusiastically approved by public opinion. He accordingly directed the Sardinian admiral Persano only to arrest the expedition should it touch at a Sardinian port; while in reply to the indignant protests of the continental powers he disclaimed all knowledge of the affair. On the nth Garibaldi landed at Marsala, without opposition, defeated the Neapolitan forces at Calatafimi on the 15th, and on the 27th entered Palermo in triumph, where he proclaimed himself, in King Victor Emmanuel's name, dictator of Sicily. By the end of July, after the hard-won victory of Milazzo, the whole island, with the exception of the citadel of Messina and a few unim- portant ports, was in his hands.

From Cavour's point of view, the situation was now one of extreme anxiety. It was certain that, his work in Sicily done, Garibaldi would turn his attention to the Neapolitan dominions on the mainland; and beyond these lay Umbria and the Marches and — Rome. It was all-important that whatever victories Garibaldi might win should be won for the Italian kingdom, and, above all, that no ill-timed attack on the Papal States should provoke an intervention of the powers. La Farina was accordingly sent to Palermo to urge the immediate annexation of Sicily to Piedmont. But Garibaldi, who wished to keep a free hand, distrusted Cavour and scorned all counsels of expediency, refused to agree; Sicily was the necessary base for his projected invasion of Naples; it would be time enough to announce its union with Piedmont when Victor Emmanuel had been pro- claimed king of United Italy in Rome. Foiled by the dictator's stubbornness, Cavour had once more to take to underhand methods; and, while continuing futile negotiations with King Francis, sent his agents into Naples to stir up disaffection and create a sentiment in favour of national unity strong enough, in any event, to force Garibaldi's hand.

On the 8th of August, in spite of the protests and threats of most of the powers, the Garibaldians began to cross the Straits, and in a short time

20,000 of them were on the main- land. The Bourbonists in Calabria, utterly dis- iˆNf B i es organized, broke before the invincible red-shirts, and the 40,000 men defending the Salerno-Avellino line made no better resistance, being eventually ordered to fall back on the Volturno. On the 6th of September King Francis, with his family and several of the ministers, sailed for Gaeta, and the next day Garibaldi entered Naples alone in advance of the army, and was enthusiastically welcomed. He proclaimed himself dictator of the kingdom, with Bertani as secretary of state, but as a proof of his loyalty he consigned the Neapolitan fleet to Persano.

His rapid success, meanwhile, inspired both the French emperor and the government of Turin with misgivings. There was a danger that Garibaldi's entourage, composed of ex-Mazzinians, might induce him to proclaim a republic >" ierveam and march on Rome; which would have meant pj e ˆ m0B t, French intervention and the undoing of all Cavour's work. King Victor Emmanuel and Cavour both wrote to Garibaldi urging him not to spoil all by aiming at too much. But Garibaldi poured scorn on all suggestions of compromise; and Cavour saw that the situation could only be saved by the armed participation of Piedmont in the liberation of south Italy.

Recogni- tion of the united kingdom of Italy.

The situation was, indeed, sufficiently critical. The unrest in Naples had spread into Umbria and the Marches, and the papal troops, under General Lamoriciere, were preparing to suppress it. Had they succeeded, the position of the Pied- montese in Romagna would have been imperilled; had they failed, the road would have been open for Garibaldi to march on Rome. In the circumstances, Cavour decided that Piedmont must anticipate Garibaldi, occupy Umbria and the Marches and place Italy between the red-shirts and Rome. His excuse was the pope's refusal to dismiss his foreign levies (September 7). On the nth of September a Piedmontese army of 35,000 men crossed the frontier at La Cattolica; on the 18th the pontifical army was crushed at Castelfidardo; and when, on the 29th, Ancona fell, Umbria and the Marches were in the power of Piedmont. On the 15th of October King Victor Emmanuel crossed the Neapolitan border at the head of his troops.

It had been a race between Garibaldi and the Piedmontese. ” If we do not arrive at the Volturno before Garibaldi reaches La Cattolica,” Cavour had said, ” the monarchy is lost, and Italy will remain in the prison-house of the Revolution.” x Fortun- ately for his policy, the red-shirts had encountered a formidable obstacle to their advance in the Neapolitan army entrenched on the Volturno under the guns of Capua. On the 19th of September the Garibaldians began their attack on this position with their usual impetuous valour; but they were repulsed again and again, and it was not till the 2nd of October, after a two days’ pitched battle, that they succeeded in carrying the position. The way was now open for the advance of the Pied- montese, who, save at Isernia, encountered practically no resistance. On the 29th Victor Emmanuel and Garibaldi met, and on the 7th of November they entered Naples together. Garibaldi now resigned his authority into the king’s hands and, refusing the title and other honours offered to him, retired to his island home of Caprera. 2

Gaeta remained still to be taken. The Piedmontese under Cialdini had begun the siege on the 5th of November, but it was not until the 10th of January 1861, when at the instance of Great Britain Napoleon withdrew his squadron, that the blockade could be made complete. On the 13th of February the fortress surrendered, Francis and his family having departed by sea for papal territory. The citadel of Messina capitulated on the 22nd, and Civitella del Tronto, the last stronghold of Bourbonism, on the 21st of March. On the 18th of February the first Italian parliament met at Turin, and Victor Emmanuel was proclaimed king of Italy. The new kingdom was recognized by Great Britain within a fortnight, by France three months later, and subsequently by other powers. It included the whole peninsula except Venetia and Rome, and these the government and the nation were determined to annex sooner or later.

There were, however, other serious problems calling for im- mediate attention. The country had to be built up and converted from an agglomeration of scattered medieval princi- palities into a unified modern nation. The first question which arose was that of brigandage in the south. Brigand- age had always existed in the Neapolitan kingdom, largely owing to the poverty of the people; but the evil was now aggravated by the mistake of the new government in “*” dismissing the Bourbon troops, and then calling them out

again as recruits. A great many turned brigands rather than serve again, and together with the remaining adherents of Bourbon rule and malefactors of all kinds, were made use of by the ex-king and his entourage to harass the Italian administration. Bands of desperadoes

were formed, commanded by the most infamous criminals and by foreigners who came to fight in what they were led to believe was an Italian Vendee, but which was in reality a campaign of butchery and plunder. Villages were sacked and burnt, men, women and children mutilated, tortured or roasted alive, and women outraged. The authors of these deeds when pursued by troops fled into papal territory, where they were welcomed by the authorities and allowed to refit and raise fresh recruits under the aegis of the Church. The prime organizers of the movement were King Francis's uncle, the count of Trapani, and Mons. de Merode, a Belgian ecclesiastic who

1 N. Bianchi, Cavour, p. 118.

2 He asked for the Neapolitan viceroyalty for life, which the king very wisely refused.

baUFs volun- teers.

Problems of the new govern- ment. Brigand-

enjoyed immense influence at the Vatican. The task of suppressing brigandage was entrusted to Generals La Marmora and Cialdini; but in spite of extreme severity, justifiable in the circumstances, it took four or five years completely to suppress the movement. Its vitality, indeed, was largely due to the mistakes made by the new administration, conducted as this was by officials ignorant of southern conditions and out of sympathy with a people far more primitive than in any other part of the peninsula. Politically, its sole outcome was to prove the impossibility of allowing the continu- ance of an independent Roman state in the heart of Italy.

Another of the government's difficulties was the question of what to do with Garibaldi's volunteers. Fanti, the minister of war, had three armies to incorporate in that of Piedmont, viz. that _ .

of central Italy, that of the Bourbons and that of Garibaldi. The first caused no difficulty; the rank and file of the second were mostly disbanded, but a number of the officers were taken into the Italian army ; the third offered a more serious problem. Garibaldi demanded that all his officers should be given equivalent rank in the Italian army, and in this he had the support of Fanti. Cavour, on the other hand, while anxious to deal generously with the Garibaldians, recognized the impossibility of such a course, which would not only have offended the conservative spirit of the Piedmontese military caste, which disliked and despised irregular troops, but would almost

certainly have introduced into the army an element of indiscipline and disorder.

On the 1 8 th of April the question of the volunteers was discussed in one of the most dramatic sittings of the Italian parliament. Garibaldi, elected member for Naples, denounced Cavour in unmeasured terms for his treatment of the volunteers and for the cession of Nice, accusing him of leading the country to civil war. These charges produced a tremendous uproar, but Bixio by a splendid appeal for concord succeeded in calming the two adversaries. On the 23rd of April they were formally reconciled in the presence of the king, but the scene of the 1 8th of April hastened Cavour's end. In May the Roman question was discussed in parliament. Cavour had often declared that in the end the capital of Italy must be Rome, for it alone of all Italian cities had an unquestioned claim to moral supremacy, and his views of a free church in a free state were well known. He had negotiated secretly with the pope through unofficial agents, and sketched out a scheme of settlement of the Roman question, which foreshadowed in its main features the law of papal guarantees. But it was not given him to see this problem solved, for his health was broken by the strain of the last few years, during which practically the whole administration of the country was concentrated in his hands. He died after a short illness on the 6th of June 1861, at a moment when Italy had the greatest need of his statesman- ship.

Ricasoli now became prime minister, Cavour having advised the king to that effect. The financial situation was far from brilliant, for the expenses of the administration of Italy were far larger than the total of those of all the separate states, and everything had to be created or rebuilt. The budget of 1861 showed a deficit of 344,000,000 lire, while the service of the debt was 110,000,000; deficits were met by new loans issued on unfavour- able terms (that of July 1861 for 500,000,000 lire cost the govern- ment 714,833,000), and government stock fell as low as 36. It was now that the period of reckless finance began which, save for a lucid interval under Sella, was to last until nearly the end'of the century. Considering the state of the country and the coming war for Venice, heavy expenditure was inevitable, but good management might have rendered the situation less dangerous. Ricasoli, honest and capable as he was, failed to win popularity; his attitude on the Roman question, which became more un- compromising after the failure of his attempt at conciliation, and his desire to emancipate Italy from French predominance, brought down on him the hostility of Napoleon. He fell in March 1862, and was succeeded by Rattazzi, who being more pliable and intriguing managed at first to please every- body, including Garibaldi. At this

time the extremists and even the moderates were full of schemes for liberat- ing Venice and Rome. Garibaldi had a plan, with which the premier was connected, for attacking Austria by raising a revolt in the Balkans and Hungary, and later he contemplated a raid

Death of Cavour.

Ricasoli Ministry. Financial diffi- culties.

Rattazzi Ministry.

into the Trentino; but the government, seeing the danger of such an attempt, arrested several Garibaldians at Sarnico (near Brescia), and in the Smeute which followed several persons were shot. Garibaldi now became an opponent of the ministry, and in June went to Sicily, where, after taking counsel and Rome, with his former followers, he decided on an immediate Affair of raid on Rome. He summoned his legionaries, and in Aspro- August crossed over to Calabria with iooo men. His J^_ e ‘ intentions in the main were still loyal, for he desired to capture Rome for the kingdom; and he did his best to avoid the regulars tardily sent against him. On the 29th of August 1862, however, he encountered a force under Pallavicini at Aspromonte, and, although Garibaldi ordered his men not to fire, some of the raw Sicilian volunteers discharged a few volleys which were returned by the regulars. Garibaldi himself was seriously wounded and taken prisoner. He was shut up in the fortress of Varignano, and after endless discussions as to whether he should be tried or not, the question was settled by an amnesty. The affair made the ministry so unpopular Ministry. tnat ˆ was f° rc ed to resign. Farini, who succeeded, retired almost at once on account of ill-health, and Minghetti became premier, with Visconti-Venosta as minister for foreign affairs. The financial situation continued to be seriously embarrassing; deficit was piled on deficit, loan upon loan, and the service of the debt rose from 90,000,000 lire in i860 to 220,000,000 in 1864.

Negotiations were resumed with Napoleon for the evacuation of Rome by the French troops; but the emperor, though he saw Prance t ˆ lat t ˆ le temporal power could not for ever be supported Italy and by French bayonets, desired some guarantee that the the Roman evacuation

should not be followed, at all events question, immediately, by an Italian occupation, lest Catholic opinion should lay the blame for this upon France. Ultimately the two governments concluded a convention on the 15th of September 1864, whereby France agreed to withdraw her troops from Rome so soon as the papal army should be reorganized, or at the outside within two years, Italy undertaking not to attack it nor permit others to do so, and to transfer the capital from Turin to some other city within six months. 1 The change of capital would have the appearance of a definite abandonment of the Roma capitate programme, although in reality it was to be merely a tappa (stage) on the way. The convention was kept secret, Capital but l ˆ e ˆ ast c l ause leaked out and caused the bitterest trans- feeling among the people of Turin, who would have femdto been resigned to losing the capital provided it were Florence, transferred to Rome, but resented the fact that it was to be established in any other city, and that the con- vention was made without consulting parliament. Demonstra- tions were held which were repressed with unnecessary violence, and although the change of capital was not unpopular in the rest of Italy, where the Piemontesismo of the new regime was beginning to arouse jealousy, the secrecy with which the affair was arranged and the shooting down of the people in Turin raised such a storm of disapproval that the king for the first time used his privilege of dismissing the ministry. Under La Marmora's ad- Marmora ministration the September convention was ratified, Ministry, and the capital was transferred to' Florence the follow- ing year. This affair resulted in an important political change, for the Piedmontese deputies, hitherto the bulwarks of moderate conservatism, now shifted to the Left or constitutional opposition.

Meanwhile, the Venetian question was becoming more and more acute. Every Italian felt the presence of the Austrians in the lagoons as a national humiliation, and between question. I ˆS° an< ˆ *ˆ66 countless plots were hatched for their expulsion. But, in spite of the sympathy of the king, the attempt to raise armed bands in Venetia had no success, and it became clear that the foreigner could only be driven from the peninsula by regular war. To wage this alone Italy was still too weak, and it was necessary to look round for an ally. Napoleon

1 The counterblast of Pius IX. to this convention was the encyclical Quanta Curaoi Dec. 8, 1864, followed the famous Syllabus.

was sympathetic; he desired to see the Austrians expelled, and the Syllabus of Pius IX., which had stirred up the more aggressive elements among the French clergy against his government, had brought him once more into harmony with the views of Victor

Emmanuel; but he dared not brave French public opinion by another war with Austria, nor did Italy desire an alliance which would only have been bought"' at the price of further cessions. There remained Prussia, which, now that the Danish campaign of 1864 was over, was completing her prepara- tions for the final struggle with Austria for the hegemony of Germany; and Napoleon, who saw in the furthering of Bismarck's plans the surest means of securing his own influence in a divided Europe, willingly lent his aid in negotiating a Prusso- Italian alliance. In the summer of 1865 Bismarck made formal proposals to La Marmora; but the pourparlers were interrupted by the conclusion of the convention of Gastein (August 14), to which Austria agreed partly under pressure of the Prusso-Italian entente. To Italy the convention seemed like a betrayal; to Pmsso- Napoleon it was a set-back which he tried to retrieve by Italian suggesting to Austria the peaceful cession of Venetia to Alliance the Italian kingdom, in order to prevent any danger of ° its alliance with Prussia. This proposal broke on the refusal of the emperor Francis Joseph to cede Austrian territory except as the result of a struggle; and Napoleon, won over by Bismarck at the famous interview at Biarritz, once more took up the idea of a Prusso-Italian offensive and defensive alliance. This was actually concluded on the 8th of April 1866. Its terms, dictated by a natural suspicion on the part of the Italian government, stipulated that it should only become effective in the event of Prussia declaring war on Austria within three months. Peace was not to be concluded until Italy should have received Venetia, and Prussia an equivalent territory in Germany.

The outbreak of war was postponed by further diplomatic complications. On the 12th of June Napoleon, whose policy throughout had been obscure and contradictory, signed a secret treaty with Austria, under which Venice was to be handed over to him, to be given to Italy in the event of her making a separate peace. La Marmora, however, who believed himself bound in honour to Prussia, refused to enter into a separate arrangement. On the 16th the Prussians began hostilities, and on the 20th Italy declared war.

Victor Emmanuel took the supreme command of the Italian army, and La Marmora resigned the premiership (which was assumed by Ricasoli), to become chief of the staff. La Marmora had three army corps (130,000 men) Ministry. under his immediate command, to operate on the Mincio, while Cialdini with 80,000 men was to operate on the Po. The Austrian southern army consisting of 95,000 men was commanded by the archduke Albert, with General von John as chief of the staff. On the 23rd of June La Marmora crossed the Mincio, and on the 24th a battle was fought at Custozza, under circumstances highly disadvantageous to the Italians, which after a stubborn contest ended in a crushing Austrian victory. Bad generalship, bad organization and the jealousy between La Marmora and Delia Rocca were responsible for this defeat. Custozza might have been afterwards retrieved, for the Italians had plenty of fresh troops besides Cialdini's army; but nothing was done, as both the king and La Marmora believed the situation to be much worse than it actually was. On the 3rd of July the Prussians completely defeated the Austrians at Koniggratz, and on the 5th Austria ceded Venetia to Napoleon, accepting his mediation in favour of peace. The Italian iron-clad fleet com- manded by the incapable Persano, after wasting much time at Taranto and Ancona, made an unsuccessful attack on the Dalmatian island of Lissa on the 18th of July, and on the 20th was completely defeated by the Austrian squadron, consisting of wooden ships, but commanded by the capable Admiral Tegethoff.

On the 22nd Prussia, without consulting Italy, made an armis- tice with Austria, while Italy obtained an eight days' truce on condition of evacuating the Trentino, which had almost entirely

Battle of

KSnlg-

grata.

Sicily,

1866.

fallen into the hands of Garibaldi and his volunteers. Ricasoli wished to go on with the war, rather than accept Venetia as a gift from France; but the king and La Marmora saw that peace must be made, as the whole Austrian army of 350,000 men was now free to fall on Italy. An armistice was accord- ingly signed at Cormohs on the 12th of August; Austria handed Venetia over to General Leboeuf, representing Venice Napoleon; and on the 3rd of October peace between “o Italy. Austria and Italy was concluded at Vienna. On the 10th Leboeuf handed Venetia over to the Venetian representatives, and at the plebiscite held on the 21st and 22nd, 647,246 votes were returned in favour of union with Italy, only 69 against it. When this result was announced to the king by a deputation from Venice he said: ” This is the finest day of my life; Italy is made, but it is not complete.” Rome was still wanting.

Custozza and Lissa were not Italy’s only misfortunes in 1866. There had been considerable discontent in “Sicily, where the government had made itself unpopular. The priest- teyot ’” hood and the remnants of the Bourbon party fomented an agitation, which in September culminated in an attack on Palermo by 3000 armed insurgents, and in similar outbreaks elsewhere. The revolt was put down owing to the energy of the mayor of Palermo, Marquis A. Di Rudini, and the arrival of reinforcements. The Ricasoli cabinet fell over the law against the religious houses, and was succeeded by that of Rattazzi, who with the support of the Left Ministry. was apparently more fortunate. The French regular troops were withdrawn from Rome in December 1866; but the pontifical forces were largely recruited in France and commanded by officers of the imperial army, and service under the pope was considered by the French war office as equivalent to service in France. This was a violation of the letter as welt as of the spirit of the September convention, and a stronger and more straightforward statesman than Rattazzi would have declared Italy absolved from its provisions. Mazzini now wanted to promote an insurrection in Roman territory, whereas Garibaldi advocated an invasion from without. He delivered a series of violent speeches against the papacy, and made open prepara- tions for a raid, which were not interfered with by the govern- ment; but on the 23rd of September 1867 Rattazzi had him suddenly arrested and confined to Caprera. In spite of the vigilance of the warships he escaped on the 14th of aaribaldl October and landed in Tuscany. Armed bands had plrne* already entered papal territory, but achieved nothing in particular. Their presence, however, was a sufficient excuse for Napoleon, under pressure of the clerical party, to send another expedition to Rome (26th of October). Rattazzi, after ordering a body of troops to enter papal territory with no definite

object, now resigned, and was succeeded by Afto/sˆJT Menabrea. Garibaldi joined the bands on the 23rd, but his ill-armed and ill-disciplined force was very inferior to his volunteers of ‘49, ‘60 and ‘66. On the 24th he captured Monte Rotondo, but did not enter Rome as the expected insurrection had not broken out. On the 29th a French force, under de Failly, arrived, and on the 3rd of November a battle took place at Mentana between 4000 or 5000 red- ˆHeatana. shirts and a somewhat ‘ superior force of French and pontificals. The Garibaldians, mowed down by the new French chassepdt rifles, fought until their last cartridges were exhausted, and retreated the next day towards the Italian frontier, leaving 800 prisoners.

The affair of Mentana caused considerable excitement through- out Europe, and the Roman question entered on an acute stage. Napoleon suggested his favourite expedient of a congress, but the proposal broke down owing to Great Britain’s refusal to participate; and Rouher, the French premier, declared in the Chamber (5th of December 1867) that France could never permit the Italians to occupy Rome. The attitude of France strengthened that anti-French feeling in Italy which had begun with Villafranca; and Bismarck was not slow to make use of this hostility, with a view to creventing Italy from taking

sides with France against Germany in the struggle between the two powers which he saw to be inevitable. At the same time Napoleon was making overtures both to Austria and to Italy, overtures which were favourably received. Victor Emmanuel was sincerely anxious to assist Napoleon, for in spite of Nice and Savoy and Mentana he felt a chivalrous desire to help the man who had fought for Italy. But with the French at Civita- vecchia (they had left Rome very soon after Mentana) a war for France was not to be thought of, and Napoleon would not promise more than the literal observance of the September convention. Austria would not join France unless Italy did the same, and she realized that that was impossible unless Napoleon gave way about Rome. Consequently the negotiations were suspended. A scandal concerning the tobacco monopoly led to the fall of Menabrea, who was succeeded in December Ministry. 1869 by Giovanni Lanza, with Visconti-Venosta at the foreign office and Q. Sella as finance minister. The latter introduced a sounder financial policy, which was maintained until the fall of the Right in 1876. Mazzini, now openly hostile to the monarchy, was seized with a perfect monomania for in- surrections, and promoted various small risings, the only effect of which was to show how completely his influence was gone.

In December 1869 the XXI. oecumenical council began its sittings in Rome, and on the 18th of July 1870 proclaimed the infallibility of the

pope (see Vatican Council). Two days previously Napoleon had declared war on Prussia, and immedi- ately afterwards he withdrew his troops from Civitavecchia; but he persuaded Lanza to promise to abide by the September convention, and it was not until after Worth and Gravelotte that he offered to give Italy a free hand to occupy Rome. Then it was too late; Victor Emmanuel asked Thiers if he could give his word of honour that with 100,000 Italian troops France could be saved, but Thiers remained silent. Austria replied like Italy: ” It is too late.” On the 9th of August Italy made a declaration of neutrality, and three weeks later Visconti- Venosta informed the powers that Italy was about to occupy Rome. On the 3rd of September the news of Sedan reached Florence, and with the fall of Napoleon’s empire the September convention ceased to have any value. The powers having engaged to abstain from intervention in Italian affairs, Victor Emmanuel addressed a letter to Pius IX. asking him in the name of religion and peace to accept Italian protection instead of the temporal power, to which the pope replied that he Italian would only yield to force. On the nth of September occupa- General Cadorna at the head of 60,000 men entered Von of papal territory. The garrison of Civitavecchia sur- ” ome – rendered to Bixio, but the 10,000 men in Rome, mostly French, Belgians, Swiss and Bavarians, under Kanzler, were ready to fight. Cardinal Antonelli would have come to terms, but the pope decided on making a sufficient show of resistance to prove that he was yielding to force. On the 20th the Italians began the attack, and General Maze de la Roche’s division having effected a breach in the Porta Pia, the pope ordered the garrison to cease fire and the Italians poured into the Eternal City followed by thousands of Roman exiles. By noon the whole city on the left of the Tiber was occupied and the garrison laid down their arms; the next day, at the pope’s request, the Leonine City on the right bank was also occupied. It had been intended to leave that part of Rome to the pope, but by the earnest desire of the inhabitants it too was included in the Italian kingdom. At the plebiscite there were 133,681 votes for union and 1507 against it. In July 1872 King Victor Emmanuel made his solemn entry into Rome, which was then declared the capital of Italy. Thus, after a struggle of more than half a century, in spite of apparently insuperable obstacles, the liberation and the unity of Italy were accomplished.

Bibliography. — A vast amount of material on the Risorgimento has been published both in Italy and abroad as well as numerous works of a literary and critical nature. The most detailed Italian history of the period is Carlo Tivaroni’s Storia critica del Risorgi- mento Italiano in 9 vols. (Turin, 1888-1897), based on a diligent study of the original

authorities and containing a large amount of informa- tion; the author is a Mazzinian, which fact should be taken into

account, but he generally quotes the opinions of those who disagree with him as well. Another voluminous but less valuable work is F. Bertolini's Storia d' Italia dal 1814 al 1878, in 2 parts (Milan, 1880-188 1). L. Chiala's Lettere del Conte di Cavour (7 vols., Turin, 1883-1887) and D. Zanichelli's Scritti del Conte di Cavour (Bologna, 1892) are very important, and so are Prince Metternich's Memoires (7 vols., Paris, 1881). P. Orsi's L' Italia moderna (Milan, 1901) should also be mentioned. N. Bianchi's Storia della diplomazia europea in Italia (8 vols., Turin, 1865) is an invaluable and thoroughly reliable work. See also Zini's Storia d' Italia (4 vols., Milan, 1875); Gualterio's Gli ullitni rivolgimenti italiani (4 vols., Florence, 1850) is important for the period from 1831 to 1847, and so also is L. Farina's Storia d'llalia dal 1815 al 184Q (5 vols., Turin, 1851) ; \V. R. Thayer's Dawn of Italian Independence (Boston, 1893) is gushing and not always accurate; C. Cantu's Dell' indipendenza italiana cronistoria (Naples, 1 872-1 877) is reactionary and often unreliable; V. Bersezio, // Regno di Vittorio Emanuele II (8 vols., Turin, 1889, &c). For English readers Countess E. Martinengo Cesaresco's Liberation of Italy (London, 1895) is to be strongly recommended, and is indeed, for accuracy, fairness and synthesis, as well as for charm of style, one of the very best books on the subject in any language; Bolton King's History of Italian Unity (2 vols., London, 1899) is bulkier and less satisfactory, but contains a useful bibliography. A succinct account of the chief events of the period will be found in Sir Spencer Walpole's History of Twenty-Five Years (London, 1904). See also the Cambridge Modern History, vols. x. and xi. (Cambridge, 1907, &c), where full bibliographies will be found. (L. V.*)

F. History, 1870-1902

The downfall of the temporal power was hailed throughout Italy with unbounded enthusiasm. Abroad, Catholic countries Italian at nrst received the tidings with resignation, and occupa- Protestant countries with joy. In France, where the tton of Government of National Defence had replaced the Rome. Empire, Cremieux, as president of the government delegation at Tours, hastened to offer his congratulations

to Italy. The occupation of Rome caused no surprise to the French government, which had been forewarned on nth September of the Italian intentions. On that occasion Jules Favre had recognized the September convention to be dead, and, while refusing explicitly to denounce it, had admitted that unless Italy went to Rome the city would become a prey to dangerous agitators. At the same time he made it clear that Italy would occupy Rome upon her own responsibility. Agreeably surprised by this attitude on the part of France, Visconti-Venosta lost no time in conveying officially the thanks of Italy to the French government. He doubtless foresaw that the language of Favre and Cremieux would not be endorsed by the French Clericals. Prussia, while satisfied at the fall of the temporal power, seemed to fear lest Italy might recompense the absence of French opposi- tion to the occupation of Rome by armed intervention in favour of France. Bismarck, moreover, was indignant at the connivance of the Italian government in the Garibaldian expedition to Dijon, and was irritated by Visconti-Venosta's plea in the Italian parliament for the integrity of French territory. The course of events in France, however, soon calmed German apprehensions. The advent of Thiers, his attitude towards the petition of French bishops on behalf of the pope, the recall of Senard, the French minister at Florence — who had written to congratulate Victor Emmanuel on the capture of Rome — and the instructions given to his successor, the comte de Choiseul, to absent himself from Italy at the moment of the king's official entry into the new capital (2nd July 187 1), together with the haste displayed in appointing a French ambassador to the Holy See, rapidly cooled the cordiality of Franco-Italian relations, and reassured Bismarck on the score of any dangerous intimacy between the two governments.

The friendly attitude of France towards Italy during the period immediately subsequent to the occupation of Rome

seemed to cow and to dishearten the Vatican. For A tth" ,e a ˆ ew wee ks the relations between the Curia and the Vatican. Italian authorities were marked by a conciliatory

spirit. The secretary-general of the Italian foreign office, Baron Blanc, who had accompanied General Cadorna to Rome, was received almost daily by Cardinal Antonelli, papal secretary of state, in order to settle innumerable questions arising out of the Italian occupation. The royal commissioner

for finance, Giacomelli, had, as a precautionary measure, seized the pontifical treasury; but upon being informed by Cardinal Antonelli

that among the funds deposited in the treasury were 1,000,000 crowns of Peter's Pence offered by the faithful to the pope in person, the commissioner was authorized by the Italian council of state not only to restore this sum, but also to indemnify the Holy See for moneys expended for the service of the October coupon of the pontifical debt, that debt having been taken over by the Italian state. On the 29th of September Cardinal Antonelli further apprised Baron Blanc that he was about to issue drafts for the monthly payment of the 50,000 crowns inscribed in the pontifical budget for the maintenance of the pope, the Sacred College, the apostolic palaces and the papal guards. The Italian treasury at once honoured all the papal drafts, and thus contributed a first instalment of the 3,225,000 lire per annum afterwards placed by Article 4 of the Law of Guarantees at the disposal of the Holy See. Payments would have been regularly continued had not pressure from the French Clerical party coerced the Vatican into refusing any further instalment.

Once in possession of Rome, and guarantor to the Catholic world of the spiritual independence of the pope, the Italian government prepared juridically to regulate its relations to the Holy See. A bill known as the Law of 'J* Law Guarantees was therefore framed and laid before antees . parliament. The measure was an amalgam of Cavour's scheme for a " free church in a free state," of Ricasoli's Free Church Bill, rejected by parliament four years previously, and of the proposals presented to Pius IX. by Count Ponza di San Martino in September 1870. After a debate lasting nearly two months the Law of Guarantees was adopted in secret ballot on the 21st of March 1871 by 185 votes against 106.

It consisted of two parts. The first, containing thirteen articles, recognized (Articles 1 and 2) the person of the pontiff as sacred and intangible, and while providing for free discussion of religious I questions, punished insults and outrages against the pope in the same way as insults and outrages against the king. Royal honours were attributed to the pope (Article 3), who was further guaranteed the same precedence as that accorded to him by other Catholic sovereigns, and the right to maintain his Noble and Swiss guards. Article 4 allotted the pontiff an annuity of 3,225,000 lire (£129,000) for the maintenance of the Sacred College, the sacred palaces, the congregations, the Vatican chancery and the diplomatic service. The sacred palaces, museums and libraries were, by Article 5, exempted from all taxation, and the pope was assured perpetual enjoyment of the Vatican and Lateran buildings and gardens, and of the papal villa at Castel Gandolfo. Articles 6 and 7 forbade access of any Italian official or agent to the above-mentioned palaces or to any eventual

conclave or oecumenical council without special author- ization from the pope, conclave br council. Article 8 prohibited the seizure or examination of any ecclesiastical papers, documents, books or registers of purely spiritual character. Article 9 guaranteed to the pope full freedom for the exercise of his spiritual ministry, and provided for the publication of pontifical announcements on the doors of the Roman churches and basilicas. Article 10 extended immunity to ecclesiastics employed by the Holy See, and bestowed upon foreign ecclesiastics in Rome the personal rights of Italian citizens. By Article n, diplomatists accredited to the Holy See, and papal diplomatists while in Italy, were placed on the same footing as diplomatists accredited to the Quirinal. Article 12 provided for the transmission free of cost in Italy of all papal telegrams and correspondence both with bishops and foreign governments, and sanctioned the establishment, at the expense of the Italian state, of a papal telegraph office served by papal officials in communication with the Italian postal and telegraph system. Article 13 exempted all ecclesiastical seminaries, academies, colleges and schools for the education of priests in the city of Rome from all interference on the part of the Italian government.

This portion of the law, designed to reassure foreign Catholics, met with little opposition; but the second portion, regulating the relations between state and church in Italy, was sharply criticized by deputies who, like Sella, recognized the ideal of a ” free church in a free state ” to be an impracticable dream. The second division of the law abolished (Article 14) all restrictions upon the right of meeting of members of the clergy. By Article 15 the government relinquished its rights to apostolic legation in Sicily, and to the ap- pointment of its own nominees to the chief benefices throughout the kingdom. Bishops were further dispensed from swearing fealty to the king, though, except in Rome and suburbs, the choice of bishops was limited to ecclesiastics of Italian nationality. Article 16 abolished the need for royal exequatur and placet for ecclesiastical publications, but subordinated the enjoyment of temporalities by

bishops and priests to the concession of state exequatur and placet. Article 17 maintained the independence of the ecclesiastical juris- diction in spiritual and disciplinary matters, but reserved for the state

the exclusive right to carry out coercive measures.

On the 12th of July 1871, Articles 268, 269 and 270 of the Italian Penal Code were so modified as to make ecclesiastics liable to imprisonment for periods varying from six months to five years, and to fines from 1000 to 3000 lire, for spoken or written attacks against the laws of the state, or for the fomenta- tion of disorder. An encyclical of Pius IX. to the bishop? of the Catholic Church on the 15th of May 187 1 repudiated the Law of Guarantees, and summoned Catholic princes to co-operate in restoring the temporal power. Practically, therefore, the law has remained a one-sided enactment, by which Italy considers herself bound, and of which she has always observed the spirit, even though the exigencies of self-defence may have led in some minor respects to non-observance of the letter. The annuity payable to the pope has, for instance, been made subject to quinquennial prescription, so that in the event of tardy recogni- tion of the law the Vatican could at no time claim payment of more than five years' annuity with interest.

For a few months after the occupation of Rome pressing questions incidental to a new change of capital and to the administration of a new domain distracted public attention from the real condition of Italian affairs. The rise of the Tiber and the flooding of Rome in December 1870 (tactfully used by Victor Emmanuel as an opportunity for a first visit to the new capital) illustrated the imperative necessity of reorganizing the drainage of the city and of constructing the Tiber embankment. In spite of pressure from the French government, which desired Italy to maintain Florence as the political and to regard Rome merely as the moral capital of the realm, the government offices and both legislative chambers were transferred in 1871 to the Eternal City. Early in the year the crown prince Humbert with the Princess Margherita took up their residence in the Quirinal Palace, which, in view of the Vatican refusal to deliver up the keys, had to be opened by force. Eight monasteries were expropriated to make room for the chief state departments, pending the construction of more suitable edifices. The growth of Clerical influence in France engendered a belief that Italy would soon have to defend with the sword her newly-won unity, while the tremendous lesson of the Franco-Prussian War con- vinced the military authorities of the need for thorough military reform. General Ricotti Magnani, minister of war, therefore framed an Army Reform Bill designed to bring the Italian army as nearly as possible up to the Prussian standard. Sella, minister of finance, notwithstanding the sorry plight of the Italian exchequer, readily granted the means for the reform. " We must arm," he said, " since we have overturned the papal throne," and he pointed to France as the quarter from which

attack was most likely to come.

Though perhaps less desperate than during the previous decade, the condition of Italian finance was precarious indeed. With taxation screwed up to breaking point on personal and real estate, on all forms of commercial and industrial activity, and on salt, flour and other necessaries of life; with a deficit of £8,500,000 for the current year, and the prospect of a further aggregate deficit of £i?,ooo,ooo during the next quin- quennium, Sella's heroic struggle against national bankruptcy was still far from a successful termination. He chiefly had borne the brunt and won the laurels of the unprecedented fight against deficit in which Italy had been involved since 1862. As finance minister in the Rattazzi cabinet of that year he had been confronted with a public debt of nearly £120,000,000, and with an immediate deficit of nearly £18,000,000. In 1864, as minister in the La Marmora cabinet, he had again to face an excess of expenditure over income amounting to more than £14,600,000. By the seizure and sale of Church lands, by the sale of state railways, by " economy to the bone" and on one supreme occasion by an appeal to taxpayers to advance a year's quota of the land-tax, he had met the most pressing engagements of that troublous period. The king was persuaded to forgo

Finance.

one-fifth of his civil list, ministers and the higher civil servants were required to relinquish a portion of their meagre salaries, but, in spite of all, Sella had found himself in 1865 compelled to propose the most hated of fiscal burdens — a grist tax on cereals. This tax (macinato) had long been known in Italy. Vexatious methods of assessment and collection had made it so unpopular that the Italian government in 1859-1860 had thought it expedient to abolish it throughout the realm. Sella hoped by the application of a mechanical meter both to obviate the odium attaching to former methods of collection and to avoid the maintenance of an army of inspectors and tax-gatherers, whose stipends had formerly eaten up most of the proceeds of the impost. Before proposing the reintroduction of the tax, Sella and his friend Ferrara improved and made exhaustive experi- ments with the meter. The result of their efforts was laid before parliament in one of the most monumental and most painstaking preambles ever prefixed to a bill. Sella, nevertheless, fell before the storm of opposition which his scheme aroused. Scialoja, who succeeded him, was obliged to adopt a similar proposal, but parliament again proved refractory. Ferrara, successor of Scialoja, met a like fate; but Count Cambray-Digny, finance minister in the Menabrea cabinet of 1868-1869, driven

to find means to cover a deficit aggravated by the interest on the Venetian debt, succeeded, with Sella's help, in forcing a Grist Tax Bill through parliament, though in a form of which Sella could not entirely approve. When, on the 1st of January 1869, the new tax came into force, nearly half the flour-mills in Italy ceased work. In many districts the government was obliged to open mills on its own account. Inspectors and tax-gatherers did their work under police protection, and in several parts of the country riots had to be suppressed manu militari. At first the net revenue from the impost was less than £1,100,000; but under Sella's firm administration (1869-1873), and in consequence of improvements gradually introduced by him, the net return ultimately exceeded £3,200,000. The parliamentary opposition to the impost, which the Left denounced as " the tax on hunger," was largely factitious. Few, except the open partisans of national bankruptcy, doubted its necessity; yet so strong was the current of feeling worked up for party purposes by opponents of the measure, that Sella's achievement in having by its means saved the financial. situation of Italy deserves to rank among the most noteworthy performances of modern parliamentary statesman- ship.

Under the stress of the appalling financial conditions represented by chronic deficit, crushing taxation, the heavy expenditure necessary for the consolidation of the kingdom, the reform of the army and the interest on the pontifical debt, Sella, on the nth of December 1871, exposed to parliament the financial situation in all its nakedness. He recognized that considerable improvement had already taken place. Revenue from taxation had risen in a decade from £7,000,000 to £20,200,000; profit on state monopolies had increased from £7,000,000 to £9,400,000; exports had grown to exceed imports; income from the working of telegraphs had tripled itself; rail- ways had been extended from 2200 to 6200 kilometres, and the annual travelling public had augmented from 15,000,000 to 25,000,000 persons. The serious feature of the situation lay less in the income than in the " intangible " expenditure, namely, the vast sums required for interest on the various forms of public debt and for pensions. Within ten years this category of outlay had increased from £8,000,000 to £28,800,000. During the same period the assumption of the Venetian and Roman debts, losses on the issue of loans and the accumulation of annual deficits, had caused public indebtedness to rise from £92,000,000 to £328,000,000, no less than £100,000,000 of the latter sum having been sacrificed in premiums and commissions to bankers and underwriters of loans. By economies and new taxes Sella had reduced the deficit to less than £2,000,000 in 1871, but for 1872 he found himself confronted with a total expenditure of £8,000,000 in

excess of revenue. He therefore proposed to make over the treasury service to the state banks, to increase the forced currency, to raise the stamp and registration duties and

to impose a new tax on textile fabrics. An optional conversion of sundry internal loans into consolidated stock at a lower rate of interest was calculated to effect considerable saving. The battle over these proposals was long and fierce. But for the tactics of Rattazzi, leader of the Left, who, by basing his opposition on party considerations, impeded the secession of Minghetti and a part of the Right from the ministerial majority, Sella would have been defeated. On the 23rd of March 1872, however, he suc- ceeded in carrying his programme, which not only provided for the pressing needs of the moment, but laid the foundation of the much-needed equilibrium between expenditure and revenue.

In the spring of 1873 it became evident that the days of the Lanza-Sella cabinet were numbered. Fear of the advent of a Radical administration under Rattazzi alone prevented the Minghettian Right from revolting against the government. The Left, conscious of its strength, impatiently awaited the moment of accession to power. Sella, the real head of the Lanza cabinet, was worn out by four years' continuous work and disheartened by the perfidious misrepresentation in which Italian politicians, particularly those of the Left, have ever excelled. By sheer force of will he compelled the Chamber early in 1873 to adopt some minor financial reforms, but on the 29th of April found himself in a minority on the question of a credit for a proposed state arsenal at Taranto. Pressure from all sides of the House, how- ever, induced the ministry to retain office until after the debate on the application to Rome and the Papal States of the Religious Orders Bill (originally passed in 1866) — a measure which, with the help of Ricasoli, was carried at the end of May. While leaving intact the general houses of the various confraternities (except that of the Jesuits), the bill abolished the Religious corporate personality of religious orders, handed over Bill. their schools and hospitals to civil administrators,

placed their churches at the disposal of the secular clergy, and provided pensions for nuns and monks, those who had families being

sent to reside with their relatives, and those who by reason of age or bereavement had no home but their monasteries being allowed to end their days in religious houses specially set apart for the purpose. The proceeds of the sale of the suppressed convents and monasteries were partly converted into pensions for monks and nuns, and partly allotted to the municipal charity boards which had undertaken the educational and charitable functions formerly exercised by the religious orders. To the pope was made over £16,000 per annum as a contribution to the expense of maintaining in Rome represen- tatives of foreign orders; the Sacred College, however, rejected this endowment, and summoned all the suppressed confraternities to reconstitute themselves under the ordinary Italian law of association. A few days after the passage of the Religious Orders Bill, the death of Rattazzi (5th June 1873) removed all probability of the immediate advent of the Left. Sella, uncertain of the loyalty of the Right, challenged a vote on the immediate dis- cussion of further financial reforms, and on the 23rd of June was overthrown by a coalition of the Left under Depretis with a part of the Right under Minghetti and the Tuscan Centre under Correnti. The administration which thus fell was unquestionably the most important since the death of Cavour. It had completed national unity, transferred the capital to Rome, overcome the chief obstacles to financial equilibrium, initiated military reform and laid the foundation of the relations between state and church. The succeeding Minghetti-Visconti-Venosta cabinet — which held office from the 10th of July 1873 to the 18th of March 1876 — continued in essential points the work of the preceding administration. Minghetti's finance, though less clear- sighted and less resolute than that of Sella, was on the whole prudent and beneficial. With the aid of Sella he concluded conventions for the redemption of the chief Italian railways from their French and Austrian proprietors. By dint of expedients he gradually overcame the chronic deficit, and, owing to the normal increase of revenue, ended his term of office with the announce- ment of a surplus of some £720,000. The question whether this surplus was real or only apparent has been much debated, but fchere is no reason to doubt its substantial reality. It left out of

account a sum of £1,000,000 for railway construction which was covered by credit, but, on the other hand, took no note of £360,000 expended in the redemption of debt. Practically, therefore, the Right, of which the Minghetti cabinet was the last representative administration, left Italian finance with a surplus of £80,000. Outside the all-important domain of finance, the attention of Minghetti and his colleagues was principally absorbed by strife between church and

state, army reform and railway redemption. For some time after the occupation of Rome the pope, in order to substantiate the pretence that his spiritual freedom had been diminished, avoided the creation of cardinals and the nomination of bishops. On the 22nd of December 1873, however, he unexpectedly created twelve cardinals, and subsequently proceeded to nominate a number of bishops. Visconti-Venosta, who had retained the portfolio for foreign affairs in the Minghetti cabinet, at once drew the attention of the European powers to this proof of the pope's spiritual freedom and of the imaginary nature of his " imprisonment " in the Vatican. At the same time he assured them that absolute liberty would be guaranteed to the deliberations of a conclave. In relation to the Church in Italy, Minghetti's policy was less perspicacious. He let it be understood that the announcement of the appoint- ment of bishops and the request for the royal exequatur might be made to the government impersonally by the congregation of bishops and regulars, by a municipal council or by any other corporate body — a concession of which the bishops were quick to take advantage, but which so irritated Italian political opinion that, in July 1875, the government was compelled to withdraw the temporalities of ecclesiastics who had neglected to apply for the exequatur, and to evict sundry bishops who had taken possession of their palaces without authorization from the state. Parliamentary pressure further obliged Bonghi, minister of public instruction, to compel clerical seminaries either to forgo the instruction of lay pupils or to conform to the laws of the state in regard to inspection and examination, an ordinance which gave rise to conflicts between ecclesiastical and lay authorities, and led to the forcible dissolution of the Mantua seminary and to the suppression of the Catholic university in Rome.

More noteworthy than its management of internal affairs were the efforts of the Minghetti cabinet to strengthen and consolidate national defence. Appalled by the weak- ness, or rather the non-existence, of the navy, Admiral MIII J ary Saint-Bon, with his coadjutor Signor Brin, addressed reform. himself earnestly to the task of recreating the fleet, which had never recovered from the effects of the disaster of Lissa. During his three years of office he laid the foundation upon which Brin was afterwards to build up a new Italian navy. Simultaneously General Ricotti Magnani matured the army reform scheme which he had elaborated under the preceding administration. His bill, adopted by parliament on the 7th of June 1875, still forms the ground plan of the Italian army.

It was fortunate for Italy that during the whole period 1869- 1876 the direction of' her foreign policy remained in the experi- enced hands of

Visconti-Venosta, a statesman whose Foreign trustworthiness, dignity and moderation even political policy opponents have been compelled to recognize. Diplo- matic records fail to substantiate the accusations of lack of initiative and instability of political criterion currently brought against him by contemporaries. As foreign minister of a young state which had attained unity in defiance of the most formidable religious organization in the world and in opposition to the traditional policy of France, it could but be Visconti- Venosta ‘s aim to uphold the dignity of his country while convinc- ing European diplomacy that United Italy was an element of order and progress, and that the spiritual independence of the Roman pontiff had suffered no diminution. Prudence, moreover, counselled avoidance of all action likely to serve the predominant anti-Italian party in France as a pretext for violent intervention in favour of the pope. On the occasion of the Metrical Congress, which met in Paris in 1872, he, however, successfully protested against the recognition of the Vatican delegate, Father Secchi,

under the Right.

as a representative of a ” state,” and obtained from Count de Remusat, French foreign minister, a formal declaration that the presence of Father Secchi on that occasion could not constitute a diplomatic precedent. The irritation displayed by Bismarck at the Francophil attitude of Italy towards the end of the Franco-German War gave place to a certain show of goodwill when the great chancellor found himself in his turn involved in a struggle against the Vatican and when the policy of Thiers began to strain Franco-Italian relations. Thiers had consistently opposed the emperor Napoleon’s pro-Italian policy. In the case of Italy, as in that of Germany, he frankly regretted the constitu- tion of powerful homogeneous states upon the borders of France. Personal pique accentuated this feeling in regard to Italy. The refusal of Victor Emmanuel II. to meet Thiers at the opening of the Mont Cenis tunnel (a refusal not unconnected with offensive language employed at Florence in October 1870 by Thiers during his European tour, and with his instructions to the French minister to remain absent from Victor Emmanuel’s official entry into Rome) had wounded the amour propre of the French statesman, and had decreased whatever inclination he might otherwise have felt to oppose the French Clerical

agitation for the restoration of the temporal power, and for French interference with the Italian Religious Orders Bill. Consequently relations between France and Italy became so strained that in 1873 both the French minister to the Quirinal and the Italian minister to the Republic remained for several months absent from their posts. At this juncture the emperor of Austria invited Victor Emmanuel to visit the Vienna Exhibition, and the Italian government received a confidential intimation that acceptance of the invitation to Vienna would be followed by a further invitation from Berlin. Perceiving the advantage of a visit to the imperial and apostolic court after the Italian occupation of Rome and the suppression of the religious orders, and con- vinced of the value of more cordial intercourse with the German empire, Visconti-Venosta and Minghetti advised their sovereign to accept both the Austrian and the subsequent German invita- tions. The visit to Vienna took place on the 17th to the 22nd of September, and that to Berlin on the 22nd to the 26th of September 1873, the Italian monarch being accorded in both capitals a most cordial reception, although the contemporaneous publication of La Marmora's famous pamphlet, More Light on the Events of 1866, prevented intercourse between the Italian ministers and Bismarck from being entirely confidential. Visconti- Venosta and Minghetti, moreover, wisely resisted the chancellor's pressure to override the Law of Guarantees and to engage in an Italian Kulturkampf. Nevertheless the royal journey contributed notably to the establishment of cordial relations between Italy and the central powers, relations which were further strengthened by the visit of the emperor Francis Joseph to Victor Emmanuel at Venice in April 1875, and by that of the German emperor to Milan in October of the same year. Meanwhile Thiers had given place to Marshal Macmahon, who effected a decided improvement in Franco-Italian relations by recalling from Civitavecchia the cruiser " Orenoque," which since 1870 had been stationed in that port at the disposal of the pope in case he should desire to quit Rome. The foreign policy of Visconti- Venosta may be said to have reinforced the international position of Italy without sacrifice of dignity, and without the vacillation and short-sightedness which was to characterize the ensuing administrations of the Left.

The fall of the Right on the 18th of March 1876 was an event destined profoundly and in many respects adversely to affect the course of Italian history. Except at rare and not auspicious intervals, the Right had held office from 1849 to 1876. Its rule was associated in the popular mind with severe administra- tion; hostility to the democratic elements represented by Garibaldi, Crispi, Depretis and Bertani; ruthless imposition and collection of taxes in order to meet the

financial engagements forced upon Italy by the vicissitudes of her Risorgimento; strong predilection for Piedmontese, Lombards and Tuscans, and a steady determination, not always scrupulous in its choice of means, to retain executive power and the most important

administrative offices of the state for the consorteria, or close corporation, of its own adherents. For years the men of the Left had worked to inoculate the electorate with suspicion of Conservative methods and with hatred of the imposts which they nevertheless knew to be indispensable to sound finance. In regard to the grist tax especially, the agitators of the Left had placed their party in a radically false position. Moreover, the redemption of the railways by the state — contracts for which had been signed by Sella in 1875 on behalf of the Minghetti cabinet with Rothschild at Basel and with the Austrian govern- ment at Vienna — had been fiercely opposed by the Left, although its members were for the most part convinced of the utility of the operation. When, at the beginning of March 1876, these contracts were submitted to parliament, a group of Tuscan deputies, under Cesare Correnti, joined the opposition, and on the 1 8th of March took advantage of a chance motion concerning the date of discussion of an interpellation on the grist tax to place the Minghetti cabinet in a minority. Depretis, ex-pro- dictator of Sicily, and successor of Rattazzi in the leadership of the Left, was entrusted by the king with the formation of a Liberal ministry. Besides the premiership, Depretis assumed the portfolio of finance; Nicote”ra, an ex-Garibaldian of somewhat tarnished reputation, but a man of energetic \! and conservative temperament, was placed at the cabinet. ministry of the interior; public works were entrusted to Zanardelli, a Radical doctrinaire of considerable juridical attainments; General Mezzacapo and Signor Brin replaced General Ricotti Magnani and Admiral Saint-Bon at the war office and ministry of marine; while to Mancini and Coppino, pro- minent members of the Left, were allotted the portfolios of jus- tice and public instruction. Great difficulty was experienced in finding a foreign minister willing to challenge comparison with Visconti-Venosta. Several diplomatists in active service were approached, but, partly on account of their refusal, and partly from the desire of the Left to avoid giving so important a post to a diplomatist bound by ties of friendship or of interest to the Right, the choice fell upon Melegari, Italian minister at Bern.

The new ministers had long since made monarchical professions of faith, but, up to the moment of taking office, were nevertheless considered to be tinged with an almost revolutionary hue. The king alone appeared to feel no misgiving. His shrewd sense of political expediency and his loyalty to constitutional principles saved -him

from the error of obstructing the advent and driving into an anti-dynastic attitude politicians who had succeeded in winning popular favour. Indeed, the patriotism and loyalty of the new ministers were above suspicion. Danger lay rather in entrusting men schooled in political conspiracy and in un- scrupulous parliamentary opposition with the government of a young state still beset by enemies at home and abroad. As an opposition party the Left had lived upon the. facile credit of political promises, but had no well-considered programme nor other discipline nor unity of purpose than that born of the common eagerness of its leaders for office and their common hostility to the Right. Neither Depretis, Nicotera, Crispi, Cairoli nor Zanardelli was disposed permanently to recognize the superiority of any one chief. The dissensions which broke out among them within a few months of the accession of their party to power never afterwards disappeared, except at rare moments when it became necessary to unite in preventing the return of the Conservatives. Considerations such as these could not be expected to appeal to the nation at large, which hailed the advent of the Left as the dawn of an era of unlimited popular sovereignty, diminished administrative pressure, reduction of taxation and general prosperity. The programme of Depretis corresponded only in part to these expectations. Its chief points were extension of the franchise, incompatibility of a parliamentary mandate with an official position, strict Pro ˆ enforcement of the rights of the State in regard to the gramme Church, protection of freedom of conscience, mainten- of the ance of th e military and naval policy inaugurated by the Conservatives, acceptance of the railway redemption contracts, consolidation of the financial equilibrium, abolition of the lorcee

currency, and, eventually, fiscal reform. The long-promised abolition of the grist tax was not explicitly mentioned, opposition to the railway redemption contracts was transformed into approval, and the vaunted reduction of taxation replaced by lip-service to the Conservative deity of financial equilibrium. The railway redemption contracts were in fact immediately voted by parliament, with a clause pledging the government to legislate in favour of farming out the railways to private companies.

Nicotera, minister of the interior, began his administration of home

affairs by a sweeping change in the personnel of the prefects, sub-prefects and public prosecutors, but found himself obliged to incur the wrath of his supporters by prohibiting Radical meetings likely to endanger public order, and by enunciat- ing administrative principles which would have befitted an inveterate Conservative. In regard to the Church, he instructed the prefects strictly to prevent infraction of the law against religious orders. At the same time the cabinet, as a whole, brought in a Clerical Abuses Bill, threatening with severe punishment priests guilty of disturbing the peace of families, of opposing the laws of the state, or of fomenting disorder. Depretis, for his part, was compelled to declare impracticable the immediate abolition of the grist tax, and to frame a bill for the increase of revenue, acts which caused the secession of some sixty Radicals and Republicans from the ministerial majority, and gave the signal for an agitation against the premier similar to that which he himself had formerly undertaken against the Right. The first general election under the Left (November 1876) had yielded the cabinet the overwhelming majority of 421 Ministerialists against 87 Conservatives, but the very size of the majority rendered it unmanageable. The Clerical Abuses Bill provoked further dissensions: Nicotera was severely affected by revelations concerning his political past; Zanardelli refused to sanction the construction of a railway in Calabria in which Nicotera was interested; and Depretis saw fit to com- pensate the supporters of his bill for the increase of revenue by decorating at one stroke sixty ministerial deputies with the Order of the Crown of Italy. A further derogation from the ideal of democratic austerity was committed by adding £80,000 per annum to the king's civil list (14th May 1877) and by burden- ing the state exchequer with royal household pensions amounting to £20,000 a year. The civil list, which the law of the 10th of August 1862 had fixed at £650,000 a year, but which had been voluntarily reduced by the king to £530,000 in 1864, and to £490,000 in 1867, was thus raised to £570,000 a year. Almost the only respect in which the Left could boast a decided im- provement over the administration of the Right was the energy displayed by Nicotera in combating brigandage and the mafia in Calabria and Sicily. Successes achieved in those provinces failed, however, to save Nicotera from the wrath of the Chamber, and on the 14th of December 1877 a cabinet crisis arose over a question concerning the secrecy of telegraphic correspondence. Depretis thereupon reconstructed his administration, excluding Nicotera, Melegari and Zanardelli, placing Crispi at the home office, entrusting Magliani with finance, and himself assuming the direction of foreign affairs.

In regard to foreign affairs, the debut of the Left as a governing party was scarcely more satisfactory than its home policy. Since the war of 1866 the Left had advocated an Italo- ou t P russ ‘ an alliance in opposition to the Francophil the Lett, tendencies of the Right. On more than one occasion Bismarck had maintained direct relations with the chiefs of the Left, and had in 1870 worked to prevent a Franco-Italian alliance by encouraging the ” party of action ” to press for the occupation of Rome. Besides, the Left stood for anti- clericalism and for the retention by the State of means of coercing the Church, in opposition to the men of the Right, who, with the exception of Sella, favoured Cavour’s ideal of ” a free Church in a free State,” and the consequent abandonment of state control over ecclesiastical government. Upon the outbreak of the Prussian Kulturkampf the Left had pressed the Right to introduce an Italian counterpart to the Prussian May laws, xv. 3

especially as the attitude of Thiers and the hostility of the French Clericals obviated the need for sparing French sus- ceptibilities. Visconti-Venosta and Minghetti, partly from aversion to a Jacobin policy, and partly from a conviction that Bismarck sooner or later would undertake his Gang nach Canossa, regardless of any tacit engagement he might have assumed towards Italy, had wisely declined to be drawn into any infraction of the Law of Guarantees. It was, however, expected that the chiefs of the Left, upon attaining office, would turn resolutely towards Prussia in search of a guarantee against the Clerical menace embodied in the regime of Marshal Macmahon. On the contrary, Depretis and Melegari, both of whom were imbued with French Liberal doctrines, adopted towards the Republic an attitude so deferential as to arouse suspicion in Vienna and Berlin. Depretis recalled Nigra from Paris and replaced him by General Cialdini, whose ardent plea for Italian intervention in favour of France in 1870, and whose comradeship with Marshal Macmahon in 1859, would, it was supposed, render him persona gratissima to the French government. This calculation was falsified by events. Incensed by the elevation to the rank of embassies of the Italian legation in Paris and the French legation to the Quirinal, and by the introduction of the Italian bill against clerical abuses, the French Clerical party not only attacked Italy and her representative, General Cialdini, in the Chamber of Deputies, but promoted a monster petition against the Italian bill. Even the coup d’etat of the 16th of May 1877 (when Macmahon dismissed the Jules Simon cabinet for opposing the Clerical petition) hardly availed to change the attitude of Depretis. As a precaution against an eventual French attempt to restore the temporal power, orders were hurriedly given to complete the defences

of Rome, but in other respects the Italian government maintained its subservient attitude. Yet at that moment the adoption of a clear line of policy, in accord with the central powers, might have saved Italy from the loss of prestige entailed by her bearing in regard to the Russo-Turkish War and the Austrian acquisition of Bosnia, and might have prevented the disappointment subsequently occasioned by the outcome of the Congress of Berlin. In the hope of inducing the European powers to ” compensate” Italy for the increase of Austrian influence on the Adriatic, Crispi undertook in the autumn of 1877, with the approval of the king, and in spite of the half-disguised opposition of Depretis, a semi-official mission to Paris, Berlin, London and Vienna. The mission appears not to have been an unqualified success, though Crispi afterwards affirmed in the Chamber (4th March 1886) that Depretis might in 1877 ” have harnessed fortune to the Italian chariot.” Depretis, anxious only to avoid ” a policy of adventure,” let slip whatever opportunity may have presented itself, and neglected even to deal energetically with the impotent but mischievous Italian agitation for a ” rectification ” of the Italo-Austrian frontier. He greeted the treaty of San Stefano (3rd March 1878) with undisguised relief, and by the mouth of the king, congratulated Italy (7th March 1878) on having maintained with the powers friendly and cordial relations ” free from suspicious precautions,” and upon having secured for herself ” that most precious of alliances, the alliance of the future ” — a phrase of which the empty rhetoric was to be bitterly demonstrated by the Berlin Congress and the French occupation of Tunisia.

The entry of Crispi into the Depretis cabinet (December 1877) placed at the ministry of the interior a strong hand and sure eye at a moment when they were about to become im- crispi. peratively necessary. Crispi was the only man of truly statesmanlike calibre in the ranks of the Left. Formerly a friend and disciple of Mazzini, with whom he had broken On the question of the monarchical form of government which Crispi believed indispensable to the unification of Italy, he had afterwards been one of Garibaldi’s most efficient coadjutors and an active member of the ” party of action.” Passionate, not always scrupulous in his choice and use of political weapons, intensely patriotic, loyal with a loyalty based rather or reason than sentiment, quick- witted, prompt in action, determined and pertinacious, he possessed in eminent degree many qualities lacking in other

Liberal chieftains. Hardly had he assumed office when the unexpected death of Victor Emmanuel II. (9th January Deaths of l &7&) stirred national feeling to an unprecedented victor depth, and placed the continuity of monarchical in- Emmanuel stitutions in Italy upon trial before Europe. For thirty years Victor Emmanuel had been the centre point of national hopes, the token and embodiment of the struggle for national redemption. He had led the country out of the despondency which followed the defeat of Novara and the abdication of Charles Albert, through all the vicissitudes of national unification to the final triumph at Rome. His dis- appearance snapped the chief link with the heroic period, and removed from the helm of state a ruler of large heart, great experience and civil courage, at a moment when elements of continuity were needed and vital problems of internal reorganiza- tion had still to be faced. Crispi adopted the measures necessary to ensure the tranquil accession of King Humbert with a quick energy which precluded any Radical or Republican demonstra- tions. His influence decided the choice of the Roman Pantheon as the late monarch's burial-place, in spite of formidable pressure from the Piedmontese, who wished Victor Emmanuel II. to rest with the Sardinian kings at Superga. He also persuaded the new ruler to inaugurate, as King Humbert I., the new dynastical epoch of the kings of Italy, instead of continuing as Humbert IV. the succession of the kings of Sardinia. Before the commotion caused by the death of Victor Emmanuel had passed away, the decease of Pius IX (7th February 1878) placed further demands upon Crispi's sagacity and promptitude. Like Victor Emmanuel, Pius IX. had been bound up with the history of the Risorgimento, but. unlike him, had represented and embodied the anti-national, reactionary spirit. Ecclesiastically, he had become the instru- ment of the triumph of Jesuit influence, and had in turn set his seal upon the dogma of the Immaculate Conception, the Syllabus and Papal Infallibility. Yet, in spite of all, his jovial disposition and good-humoured cynicism saved him from unpopularity, and rendered his death an occasion of mourning. Notwithstanding the pontiff's bestowal of the apostolic benediction in articulo mortis upon Victor Emmanuel, the attitude of the Vatican had remained so inimical as to make it doubtful whether the conclave would be held in Rome. Crispi, whose strong anti-clerical con- victions did not prevent him from regarding the papacy as pre- eminently an Italian institution, was determined both to prove to the Catholic world the practical independence of the govern- ment of the Church and to retain for Rome so potent a centre of universal attraction as the presence of the

future pope. The Sacred College having decided to hold the conclave abroad, Crispi assured them of absolute freedom if they remained in Rome, or of protection to the frontier should they migrate, but warned them that, once evacuated, the Vatican would be occupied in the name of the Italian government and be lost to the Church as headquarters of the papacy. The cardinals thereupon overruled their former decision, and the conclave was held in Rome, the new pope, Cardinal Pecci, being elected on the 20th of February 1878 without let or hindrance. The Italian government not only Leo xni prorogued the Chamber during the conclave to prevent unseemly inquiries or demonstrations on the part of deputies, but by means of Mancini, minister of justice, and Cardinal di Pietro, assured the new pope protection during the settlement of his outstanding personal affairs, an assurance of which Leo XIII. on the evening after his election, took full advantage. At the same time the duke of Aosta, commander of the Rome army corps, ordered the troops to render royal honours to the pontiff should he officially appear in the capital. King Humbert addressed to the pope a letter of congratulation upon his election, and received a courteous reply. The improve- ment thus signalized in the relations between Quirinal and Vatican was further exemplified on the 18th of October 1878, when the Italian government accepted a papal formula with regard to the granting of the royal exequatur for bishops, whereby they, upon nomination by the Holy See, recognized state control over, and made application for, the payment of their temporalities.

Calroll.

The Depretis-Crispi cabinet did not long survive the opening of the new reign. Crispi's position was shaken by a morally plausible but juridically untenable charge of bigamy, while on the 8th of March the election of Cairoli, an opponent of the ministry and head of the extremer section of the Left, to the presidency of the Chamber, induced Depretis to tender his resignation to the new king. Cairoli succeeded in forming an administration, in which his friend Count Corti, Italian ambassador at Constantinople, accepted the portfolio of foreign affairs, Zanardelli the ministry of the interior, and Seismit Doda the ministry of finance. Though the cabinet had no stable majority, it induced the Chamber to sanction a commercial treaty which had been negotiated with France and a general " autonomous " customs tariff. The commercial treaty was, however, rejected by the French Chamber in June 1878, a cir- cumstance necessitating the application of the Italian general tariff, which implied a 10 to 20% increase in the duties on the principal French exports. A highly imaginative financial exposi- tion by Seismit Doda, who announced a

surplus of £2,400,000, paved the way for a Grist Tax Reduction Bill, which Cairoli had taken over from the Depretis programme. The Chamber, though convinced of the danger of this reform, the perils of which were incisively demonstrated by Sella, voted by an overwhelming majority for an immediate reduction of the impost by one- fourth, and its complete abolition within four years. Cairoli's premiership was, however, destined to be cut short by an attempt made upon the king's life in November 1878, during a royal visit to Naples, by a miscreant named Passanante. In spite of the courage and presence of mind of Cairoli, who received the dagger thrust intended for" the king, public and parb'amentary indigna- tion found expression in a vote which compelled the ministry to resign.

Though brief, Cairoli's term of office was momentous in regard

to foreign affairs. The treaty of San Stefano had led to the

convocation of the Berlin Congress, and though Count

Corti was by no means ignorant of the rumours con- *r y *,,

, „ . . the Berlin

cernmg secret agreements between Germany, Austria congress.

and Russia, and Germany, Austria and Great Britain, he scarcely seemed alive to the possible effect of such agreements upon Italy. Replying on the 9th of April 1878 to interpellations by Visconti - Venosta and other deputies on the impending Congress of Berlin, he appeared free from apprehension lest Italy, isolated, might find herself face to face with a change of the balance of power in the Mediterranean, and declared that in the event of serious complications Italy would be " too much sought after rather than too much forgotten." The policy of Italy in the congress, he added, would be to support the interests of the young Balkan nations. Wrapped in this optimism, Count Corti proceeded, as first Italian delegate, to Berlin, where he found himself obliged, on the 28th of May, to join reluctantly in sanctioning the Austrian occupation of Bosnia and Herzegovina. On the 8th of July the revelation of the Anglo-Ottoman treaty for the British occupation of Cyprus took the congress by surprise. Italy, who had made the integrity of the Ottoman empire a cardinal point of her Eastern policy, felt this change of the Mediterranean status quo the more severely inasmuch as, in order not to strain her relations with France, she had turned a deaf ear to Austrian, Russian and German advice to prepare to occupy Tunisia in

agreement with Great Britain. Count Corti had no suspicion that France had adopted a less disinterested attitude towards similar suggestions from Bismarck and Lord Salisbury. He therefore returned from the German capital with ” clean ” but empty hands, a plight which found marked disfavour in Italian eyes, and stimulated anti-Austrian Irre- dentism. Ever since Venetia had been ceded by Austria to the emperor Napoleon, and by him to Italy, /sm> after the war of 1866, secret revolutionary com- mittees had been formed in the northern Italian provinces to prepare for the “redemption” of Trent and Trieste. For twelve years these committees had remained comparatively in- active, but in 1878 the presence of the ex-Garibaldian Cairoli at the head of the government, and popular dissatisfaction at the

spread of Austrian sway on the Adriatic, encouraged them to begin a series of noisy demonstrations. On the evening of the signature at Berlin of the clause sanctioning the Austrian occupa- tion of Bosnia and Herzegovina, an Irredentist riot took place before the Austrian consulate at Venice. The Italian govern- ment attached little importance to the occurrence, and believed that a diplomatic expression of regret would suffice to allay Austrian irritation. Austria, indeed, might easily have been persuaded to ignore the Irredentist agitation, had not the equivocal attitude of Cairoli and Zanardelli cast doubt upon the sincerity of their regret. The former at Pa via (15th October 1878), and the latter at Arco (3rd November), declared publicly that Irredentist manifestations could not be prevented under existing laws, but gave no hint of introducing any law to sanction their prevention. ” Repression, not prevention ” became the official formula, the enunciation of which by Cairoli at Pavia caused Count Corti and two other ministers to resign.

The fall of Cairoli, and the formation of a second Depretis cabinet in 1878, brought no substantial change in the attitude of the government towards Irredentism, nor was the position improved by the return of Cairoli to power in the following July. Though aware of Bismarck’s hostility towards Italy, of the conclusion of the Austro-German alliance of 1879, and of the undisguised ill-will of France, Italy not only made no attempt to crush an agitation as mischievous as it was futile, but granted a state funeral to General Avezzana, president of

the Irredentist League. In Bonghi's mordant phrase, the foreign policy of Italy during this period may be said to have been characterized by " enormous intellectual impotence counterbalanced by equal moral feebleness." Home affairs were scarcely better managed. Parliament had degenerated into a congeries of personal groups, whose members were eager only to overturn cabinets in order to secure power for the leaders and official favours for themselves. Depretis, who had succeeded Cairoli in December 1878, fell in July 1879, after a vote in which Cairoli and Nicotera joined the Conservative opposition. On 12th July Cairoli formed a new administration, only to resign on 24th November, and to recon- struct his cabinet with the help of Depretis. The administration of finance was as chaotic as the condition of parliament. The £2,400,000 surplus announced by Seismit Doda proved to be a myth. Nevertheless Magliani, who succeeded Seismit Doda, had neither the perspicacity nor the courage to resist the abolition of the grist tax. The first vote of the Chamber for the immediate diminution of the tax, and for its total abolition on 1st January 1883, had been opposed by the Senate. A second bill was passed by the Chamber on 18th July 1879, pro- viding for the immediate repeal of the grist tax on minor cereals, and for its total abolition on 1st January 1884. While approving the repeal in regard to minor cereals, the Senate (24th January 1880) again rejected the repeal of the tax on grinding wheat as prejudicial to national finance. After the general election of 1880, however, the Ministerialists, aided by a number of factious Conservatives, passed a third bill repealing the grist tax on wheat (10th July 1880), the repeal to take effect from the 1st of January 1884 onwards. The Senate, in which the partisans of the ministry had been increased by numerous appointments ad hoc, finally set the seal of its approval upon the measure. Not- withstanding this prospective loss of revenue, parliament showed great reluctance to vote any new impost, although hardly a year previously it had sanctioned (30th June 1879) Depretis's scheme for spending during the next eighteen years £43,200,000 in building 5000 kilometres of railway, an expenditure not wholly justified by the importance of the lines, and useful principally as a source of electoral sops for the constituents of ministerial deputies. The unsatisfactory financial condition of the Florence, Rome and Naples municipalities necessitated state help, but the Chamber nevertheless proceeded with a light heart (23rd February 1881) to sanction the issue of a foreign loan for £26,000,000, with a view to the abolition of the forced currency, thus adding to the burdens of the exchequer a load which three years later again dragged Italy into the gulf of chronic deficit.

Tunisia.

In no modern country is error or incompetence on the part of administrators more swiftly followed by retribution than in Italy; both at home and abroad she is hemmed in by political and economic conditions which leave little margin for folly, and still less for " mental and moral insufficiency," such as had been displayed by the Left. Nemesis came in the spring of 1881, in the form of the French invasion of Tunisia. Guiccioli, the biographer of Sella, observes that Italian politicians find it especially hard to resist " the temptation of appearing crafty." The men of the Left believed themselves subtle enough to retain the confidence and esteem of all foreign powers •while coquetting at home with elements which some of these powers had reason to regard with suspicion. Italy, in constant danger from France, needed good relations with Austria and Germany, but could only attain the goodwill of the former by firm treatment of the revolutionary Irredentist agitation, and of the latter by clear demonstration of Italian will and ability to cope with all anti-monarchical forces. Depretis and Cairoli did neither the one nor the other. Hence, when opportunity offered firmly to establish Italian predominance in the central Mediterranean by an occupation of Tunisia, they found themselves deprived of those confidential relations with the central powers, and even with Great Britain, which might have enabled them to use the opportunity to full advantage. The conduct of Italy in declining the suggestions received from Count Andrassy and General Ignatiev on the eve of the Russo- Turkish War — that Italy should seek compensation in Tunisia for the extension of Austrian sway in the Balkans — and in subsequently rejecting the German suggestion to come to an arrangement with Great Britain for the occupation of Tunisia as compensation for the British occupation of Cyprus, was certainly due to fear lest an attempt on Tunisia should lead to a war with France, for which Italy knew herself to be totally unprepared. This very unpreparedness, however, rendered still less excusable her treatment of the Irredentist agitation, which brought her within a hair's-breadth of a conflict with Austria. Although Cairoli, upon learning of the Anglo-Ottoman convention in regard to Cyprus, had advised Count Corti of the possibility that Great Britain might seek to placate France by conniving at a French occupation of Tunisia, neither he nor Count Corti had any inkling of the verbal arrangement made between Lord Salisbury and Waddington at the instance of Bismarck, that, when con- venient, France should occupy Tunisia, an agreement afterwajds confirmed (with a reserve as to the eventual attitude of Italy) in despatches exchanged in July and August 1878 between the Quai d'Orsay and Downing Street. Almost up to the moment of the French occupation of Tunisia the Italian government believed that Great Britain, if only out of gratitude for the bearing of

Italy in connexion with the Dulcigno demonstration in the autumn of 1880, would prevent French acquisition of the Regency. Ignorant of the assurance conveyed to France by Lord Granville that the Gladstone cabinet would respect the engagements of the Beaconsfield-Salisbury administration, Cairoli, in deference to Italian public opinion, endeavoured to neutralize the activity of the French consul Roustan by the appointment of an equally energetic Italian consul, Maccio. The rivalry between these two officials in Tunisia contributed not a little to strain Franco- Italian relations, but it is doubtful whether France would have precipitated her action had not General Menabrea, Italian ambassador in London, urged his government to purchase the Tunis-Goletta railway from the English company by which it had been constructed. A French attempt to purchase the line was upset in the English courts, and the railway was finally secured by Italy at a price more than eight times its real value. This pertinacity engendered a belief in France that Italy was about to undertake in Tunisia a more aggressive policy than necessary for the protection of her commercial interests. Roustan therefore hastened to extort from the bey concessions calculated to neutralize the advantages which Italy had hoped to secure by the possession of the Tunis-Goletta line, and at the same time the French government prepared at Toulon an expeditionary corps for the occupation of the Regency. In the spring of 1881

the Kroumir tribe was reported to have attacked a French force on the Algerian border, and on the 9th of April Roustan informed the bey of Tunis that France would chastise the assailants. The bey issued futile protests to the powers. On the 26th of April the island of Tabarca was occupied by the French, Bizerta was seized on the 2nd of May, and on the 1 2th of May the bey signed the treaty of Bardo accepting the French protectorate. France undertook . the maintenance of order in the Regency, and assumed the representation of Tunisia in all dealings with other countries.

Italian indignation at the French coup de main was the deeper on account of the apparent duplicity of the government of the Republic. On the nth of May the French foreign minister, Barth616my Saint Hilaire, had officially assured the Italian ambassador in Paris that France ” had no thought of occupying Tunisia or any part of Tunisian

territory, beyond some points of the Kroumir country." This assurance, dictated by Jules Ferry to Barthelemy Saint Hilaire in the presence of the Italian ambassador, and by him telegraphed en clair to Rome, was considered a binding pledge that France would not materially alter the status quo in Tunisia. Documents subsequently published have somewhat attenuated the responsibility of Ferry and Saint Hilaire for this breach of faith, and have shown that the French forces in Tunisia acted upon secret instructions from General Farre, minister of war in the Ferry cabinet, who pursued a policy diametrically opposed to the official declarations made by the premier and the foreign minister. Even had this circum- stance been known at the time, it could scarcely have mitigated the intense resentment of the whole Italian nation at an event which was considered tantamount not only to the destruction of Italian aspirations to Tunisia, but to the ruin of the interests of the numerous Italian colony and to a constant menace against the security of the Sicilian and south Italian coasts.

Had the blow thus struck at Italian influence in the Mediter- ranean induced politicians to sink for a while their personal differences and to unite in presenting a firm front to foreign nations, the crisis in regard to Tunisia might not have been wholly unproductive of good. Unfortunately, on this, as on other critical occasions, deputies proved themselves incapable of common effort to promote general welfare. While excitement over Tunisia was at its height, but before the situation was irretrievably compromised to the disadvantage of Italy, Cairoli had been compelled to resign by a vote of want of confidence in the Chamber. The only politician capable of dealing adequately with the situation was Sella, leader of the Right, and to him the crown appealed. The faction leaders of the Left, though divided by personal jealousies and mutually incompatible ambitions, agreed that the worst evil which could befall Italy would be the return of the Right to power, and conspired to preclude the possibility of a Sella cabinet. An attempt by Depretis to re- compose the Cairoli ministry proved fruitless, and after eleven precious days had been lost, King Humbert was obliged, on the 19th of April 1881, to refuse Cairoli's resignation. The conclusion of the treaty of Bardo on the 12th of May, however, compelled Cairoli to sacrifice himself to popular indignation. Again Sella was called upon, but again the dog-in-the-manger policy of Depretis, Cairoli, Nicotera and Baccarini, in conjunction with the intolerant attitude of some extreme Conservatives, proved fatal to his endeavours. Depretis then succeeded in recomposing the Cairoli cabinet without Cairoli, Mancini being placed at the foreign office. Except in regard to an increase of the army estimates, urgently demanded by public opinion, the new ministry had practically no

programme. Public opinion was further irritated against France by the massacre of some Italian workmen at Marseilles on the occasion of the return of the French expedition from Tunisia, and Depretis, in response to public feeling, found himself obliged to mobilize a part of the militia for military exercises. In this condition of home and foreign affairs occurred disorders at Rome in connexion with the transfer of the remains of Pius IX. from St Peter's to the basilica of San Lorenzo. Most of the responsibility lay with the Vatican, which had arranged the procession in the way best calculated to

irritate Italian feeling, but little excuse can be offered for the failure of the Italian authorities to maintain public order. In conjunction with the occupation of Tunisia, the effect of these disorders was to exhibit Italy as a country powerless to defend its interests abroad or to keep peace at home. The scandal and the pressure of foreign Catholic opinion compelled Depretis to pursue a more energetic policy, and to publish a formal declaration of the intangibility of the Law of Guarantees.

Meanwhile a conviction was spreading that the only way of escape from the dangerous isolation of Italy lay in closer agree- ment with Austria and Germany. Depretis tardily recognized the need for such agreement, if only to ˆT >w ˆ°} remove the " coldness and invincible diffidence " which, Alliance. by subsequent confession of Mancini, then characterized the attitude of the central powers; but he was opposed to any formal alliance, lest it might arouse French resentment, while the new Franco-Italian treaty was still unconcluded, and the foreign loan for the abolition of the forced currency had still to be floated. He, indeed, was not disposed to concede to public opinion anything beyond an increase of the army, a measure insistently demanded by Garibaldi and the Left. The Right like- wise desired to strengthen both army and navy, but advocated cordial relations with Berlin and Vienna as a guarantee against French domineering, and as a pledge that Italy would be vouch- safed time to effect her armaments without disturbing financial equilibrium. The Right also hoped that closer accord with Germany and Austria would compel Italy to conform her home policy more nearly to the principles of order prevailing in those empires. More resolute than Right or Left was the Centre, a small group led by Sidney Sonnino, a young politician of unusual fibre, which sought in the press and in parliament to spread a conviction that the only sound basis for Italian policy would be close alliance with the central powers and a friendly understanding with Great Britain in regard to Mediter- ranean affairs. The principal Italian public men were divided in opinion on the subject of an alliance. Peruzzi, Lanza and Bonghi pleaded for equal

friendship with all powers, and especially with France; Crispi, Minghetti, Cadorna and others, including Blanc, secretary-general to the foreign office, openly favoured a pro-Austrian policy. Austria and Germany, however, scarcely reciprocated these dispositions. The Irredentist agita- tion had left profound traces at Berlin as well as at Vienna, and had given rise to a distrust of Depretis which nothing had yet occurred to allay. Nor, in view of the comparative weakness of Italian armaments, could eagerness to find an ally be deemed conclusive proof of the value of Italian friendship. Count di Robilant, Italian ambassador at Vienna, warned his government not to yield too readily to pro-Austrian pressure, lest the dignity of Italy be compromised, or her desire for an alliance be granted on onerous terms. Mancini, foreign minister, who was as anxious as Depretis for the conclusion of the Franco-Italian commercial treaty, gladly followed this advice, and limited his efforts to the maintenance of correct diplomatic relations with the central powers. Except in regard to the Roman question, the advantages and disadvantages of an Italian alliance with Austria and Germany counterbalanced each other. A rapprochement with France and a continuance of the Irredentist movement could not fail to arouse Austro-German hostility; but, on the other hand, to draw near to the central powers would inevitably accentuate the diffidence of France. In the one hypothesis, as in the other, Italy could count upon the moral support of Great Britain, but could not make of British friendship the keystone of a Continental policy. Apart from resentment against France on account of Tunisia there remained the question of the temporal power of the pope to turn the scale in favour of Austria and Germany. Danger of foreign interference in the relations between Italy and the papacy had never been so great since the Italian occupation of Rome, as when, in the summer of i88i,the disorders during the transfer of the remains of Pius IX. had lent an unwonted ring of plausibility to the papal complaint concerning the ” miserable ” position of the Holy See. Bismarck at that moment had entered upon his I ” pilgrimage to Canossa,” and was anxious to obtain from the

Vatican the support of German Catholics. What resistance could Italy have offered had the German chancellor, seconded by Austria, and assuredly supported by France, called upon Italy to revise the Law of Guarantees in conformity with Catholic exigencies, or had he taken

the initiative of making papal in- dependence the subject of an international conference? Friend- ship and alliance with Catholic Austria and powerful Germany could alone lay this spectre. This was the only immediate advantage Italy could hope to obtain by drawing nearer the central Powers.

The political conditions of Europe favoured the realization of Italian desires. Growing rivalry between Austria and Russia in the Balkans rendered the continuance of the " League of the Three Emperors " a practical impossibility. The Austro- German alliance of 1879 formally guaranteed the territory of the contracting parties, but Austria could not count upon effectual help from Germany in case of war, since Russian attack upon Austria would certainly have been followed by French attack upon Germany. As in 1869-1870, it therefore became a matter of the highest importance for Austria to retain full disposal of all her troops by assuring herself against Italian aggression. The tsar, Alexander III., under the impression of the assassination of his father, desired, however, the renewal of the Dreikaiserbund, both as a guarantee of European peace and as a conservative league against revolutionary parties. The German emperor shared this desire, but Bismarck and the Austrian emperor wished to substitute for the imperial league some more advantageous combination. Hence a tacit under- standing between Bismarck and Austria that the latter should profit by Italian resentment against France to draw Italy into the orbit of the Austro-German alliance. For the moment Germany was to hold aloof lest any active initiative on her part should displease the Vatican, of whose help Bismarck stood in need.

At the beginning of August 1881 the Austrian press mooted the idea of a visit from King Humbert to the emperor Francis Joseph. Count di Robilant, anxious that Italy should not seem to beg a smile from the central Powers, advised Mancini to receive with caution the suggestions of the Austrian press. Depretis took occasion to deny, in a form scarcely courteous, the prob- ability of the visit. Robilant's opposition to a precipitate acceptance of the Austrian hint was founded upon fear lest King Humbert at Vienna might be pressed to disavow Irredentist aspirations, and upon a desire to arrange for a visit of the emperor Francis Joseph to Rome in return for King Humbert's visit to Vienna. Seeing the hesitation of the Italian government, the Austrian and German semi-official press redoubled their efforts to bring about the visit. By the end of September the idea had gained such ground in Italy that the visit was practically settled, and on the 7th of October Mancini informed Robilant (who was then in Italy) of the fact. Though he considered such precipitation impolitic, Robilant, finding that confidential information of Italian

intentions had already been conveyed to the Austrian government, sought an interview with King Humbert, and on the 17th of October started for Vienna to settle the conditions of the visit. Depretis, fearing to jeopardize the impending conclusion of the Franco-Italian commercial treaty, would have preferred the visit to take the form of an act of personal courtesy between sovereigns. The Austrian government, for its part, desired that the king should be accompanied by Depretis, though not by Mancini, lest the presence of the Italian foreign minister should lend to the occasion too marked a political character. Mancini, unable to brook exclusion, insisted, how- ever, upon accompanying the king. King Humbert with Queen Margherita reached Vienna on the morning of the 27th of October, and stayed at the Hofburg until the 31st of October. The visit was marked by the greatest cordiality, Count Robilant's fears of inopportune pressure with regard to Irredentism proving groundless. Both in Germany and Austria the visit was construed as a preliminary to the adhesion of Italy to the Austro-German alliance. Count Hatzfeldt, on behalf of the German Foreign Office, informed the Italian ambassador in

Berlin that whatever was done at Vienna would be regarded as having been done in the German capital. Nor did nascent irritation in France prevent the conclusion of the Franco-Italian commercial treaty, which was signed at Paris on the 3rd of November.

In Italy public opinion as a whole was favourable to the visit, especially as it was not considered an obstacle to the projected increase of the army and navy. Doubts, however, soon sprang up as to its effect upon the minds of Austrian statesmen, since on the 8th of November the language employed by Kallay and Count Andrassy to the Hungarian delegations on the subject of Irredentism was scarcely calculated to soothe Italian suscepti- bilities. But on 9th November the European situation was suddenly modified by the formation of the Gambetta cabinet, and, in view of the policy of revenge with which Gambetta was supposed to be identified, it became imperative for Bismarck to assure himself that Italy would not be enticed into a Francophil attitude by any concession Gambetta might offer. As usual when dealing with weaker nations, the German chancellor re- sorted to intimidation. He not only re-established the Prussian legation to the Vatican, suppressed since 1874, and omitted from the imperial message to the Reichstag (17th November i88r) all reference to King Humbert's visit to Vienna, but took occasion on the 29th of November to refer to Italy as a country tottering on the verge of revolution, and opened in the German semi-official press a campaign in favour of an international guarantee for the independence of the papacy. These manoeuvres produced their effect upon Italian public opinion. In the

long and important debate upon foreign policy in the Italian Chamber of Deputies (6th to 9th December) the fear was repeatedly expressed lest Bismarck should seek to purchase the support of German Catholics by raising the Roman question. Mancini, still unwilling frankly to adhere to the Austro-German alliance, found his policy of ” friendship all round “impeded by Gambetta’s uncompromising attitude in regard to Tunisia. Bismarck never- theless continued his press campaign in favour of the temporal power until, reassured by Gambetta’s decision to send Roustan back to Tunis to complete as minister the anti-Italian programme begun as consul, he finally instructed his organs to emphasize the common interests of Germany and Italy on the occasion of the opening of the St Gothard tunnel. But the effect of the German press campaign could not be effaced in a day. At the new year’s reception of deputies King Humbert aroused enthusiasm by a significant remark that Italy intended to remain ” mistress in her own house “; while Mancini addressed to Count de Launay, Italian ambassador in Berlin, a haughty despatch, repudiating the supposition that the pope might (as Bismarckian emissaries had suggested to the Vatican) obtain abroad greater spiritual liberty than in Rome, or that closer relations between Italy and Germany, such as were required by the interests and aspirations of the two countries, could be made in any way contingent upon a modification of Italian freedom of action in regard to home affairs.

The sudden fall of Gambetta (26th January 1882) having removed the fear of immediate European complications, the cabinets of Berlin and Vienna again displayed diffidence towards Italy. So great was Bismarck’s distrust of Italian parliamentary instability, his doubts of Italian capacity for offensive warfare and his fear of the Francophil tendencies of Depretis, that for many weeks the Italian ambassador at Berlin was unable to obtain audience of the chancellor. But for the Tunisian question Italy might again have been drawn into the wake of France. Mancini tried to impede the organization of French rule in the Regency by refusing to recognize the treaty of Bardo, yet so careless was Bismarck of Italian susceptibilities that he in- structed the German consul at Tunis to recognize French decrees. Partly under the influence of these circumstances, and partly in response to persuasion by Baron Blanc, secretary-general for foreign affairs, Mancini instructed Count di Robilant to open negotiations for an Italo-Austrian alliance — instructions whka. Robilant neglected until questioned by Count Kalnoky on the sub- ject. The first exchange of ideas between the two Governments;

proved fruitless, since Kalnoky, somewhat Clerical-minded, was averse from guaranteeing the integrity of all Italian territory, and Mancini was equally unwilling to guarantee to Austria permanent possession of Trent and Trieste. Mancini, moreover, wished the treaty of alliance to provide for reciprocal protection of the chief interests of the contracting Powers, Italy undertaking to second Austria-Hungary in the Balkans, and Austria and Germany pledging themselves to support Italy in Mediterranean questions. Without some such proviso Italy would, in Mancini's opinion, be exposed single-handed to French resentment. At the request of Kalnoky, Mancini defined his proposal in a memorandum, but the illness of himself and Depretis, combined with an untoward discussion in the Italian press on the failure of the Austrian emperor to return in Rome King Humbert's visit to Vienna, caused negotiations to drag. The pope, it transpired, had refused to receive the emperor if he came to Rome on a visit to the Quirinal, and Francis Joseph, though anxious to return King Humbert's visit, was unable to offend the feelings of his Catholic subjects. Meanwhile (nth May 1882) the Italian parliament adopted the new Army Bill, involving a special credit of £5,100,000 for the creation of two new army corps, by which the war footing of the regular army was raised to nearly 850,000 men and the ordinary military estimates to £8,000,000 per annum. Garibaldi, who, since the French occupation of Tunis, had ardently worked for the increase of the army, had thus the satisfaction of seeing his desire realized before his death at Caprera, on the 2nd aaribaidi. °^ J une 1882. " In spirit a child, in character a man of classic mould," Garibaldi had remained the nation's idol, an almost legendary hero whose place none could aspire to fill. Gratitude for his achievements and sorrow for his death found expression in universal mourning wherein king and peasant equally joined. Before his death, and almost con- temporaneously with the passing of the Army Bill, negotiations for the alliance were renewed. Encouraged from Berlin, Kalnoky agreed to the reciprocal territorial guarantee, but declined reciprocity in support of special interests. Mancini had therefore to be content with a declaration that the allies would act in mutually friendly intelligence. Depretis made some opposition, but finally acquiesced, and the treaty of triple alliance was signed on the 20th of May 1882, five days after the promulgation of the Franco-Italian commercial treaty in Paris. Though partial signature revelations have been made, the exact tenor of the of the treaty of triple alliance has never been divulged.

Treaty, It is known to have been concluded for a period of 1882. g ve y earSj t0 -have pledged the contracting parties

to join in resisting attack upon the territory of any one of them, and to have specified the military disposition to be adopted by each in case attack should come either from France, or from Russia, or from both simultaneously. The Italian General Staff is said to have undertaken, in the event of war against France, to operate with two armies on the north-western frontier against the French armee des Alpes, of which the war strength is about 250,000 men. A third Italian army would, if expedient, pass into Germany, to operate against either France or Russia. Austria undertook to guard the Adriatic on land and sea, and to help Germany by checkmating Russia on land. Germany would be sufficiently employed in carrying on war against two fronts. Kalnoky desired that both the terms of the treaty and che fact of its conclusion should remain secret, but Bismarck and Mancini hastened to hint at its existence, the former in the Reichstag on the 12th of June 1882, and the latter in the Italian semi-official press. A revival of Irredentism in connexion with the execution of an Austrian deserter named Oberdank, who after escaping into Italy endeavoured to return to Austria with explosive bombs in his possession, and the cordial references to France made by Depretis at Stradella (8th October 1882), prevented the French government from suspecting the existence of the alliance, or from ceasing to strive after a Franco-Italian understanding. Suspicion was not aroused until March 1883, when Mancini, in defending himself against strictures upon his refusal to co-operate with Great Britain in Egypt, practically

revealed the existence of the treaty, thereby irritating France and destroying Depretis's secret hope of finding in the triple alliance the advantage of an Austro-German guarantee without the disadvantage of French enmity. In Italy the revelation of the treaty was hailed with satisfaction except by the Clericals, who were enraged at the blow thus struck at the restoration of the pope's temporal power, and by the Radicals, who feared both the inevitable breach with republican France and the reinforcement of Italian constitutional parties by intimacy with strong monarchical states such as Germany and Austria. These very considerations naturally combined to recommend the fact to constitutionalists, who saw in it, besides the territorial guarantee, the elimination of the danger of foreign interference in the relations between Italy and the Vatican, such as Bismarck had recently threatened and such as France was believed ready to propose.

Nevertheless, during its first period (1882-1887) the triple alliance failed to ensure cordiality between the contracting Powers. Mancini

exerted himself in a hundred ways to soothe French resentment. He not only refused to join Great Britain in the Egyptian expedition, but agreed to suspend Italian consular jurisdiction in Tunis, and deprecated suspicion of French designs upon Morocco. His efforts were worse than futile. France remained cold, while Bismarck and Kalnoky, distrustful of the Radicalism of Depretis and Mancini, assumed towards their ally an attitude almost hostile. Possibly Germany and Austria may have been influenced by the secret treaty signed between Austria, Germany and Russia on the 21st of March 1884, and ratified during the meeting of the three emperors at Skierniewice in September of that year, by which Bismarck, in return for " honest brokerage " in the Balkans, is understood to have obtained from Austria and Russia a promise of bene- volent neutrality in case Germany should be " forced " to make war upon a fourth power — France. Guaranteed thus against Russian attack, Italy became in the eyes of the central powers a negligible quantity, and was treated accordingly. Though kept in the dark as to the Skierniewice arrangement, the Italian government soon discovered from the course of events that the triple alliance had practically lost its object, European peace having been assured without Italian co-operation. Meanwhile France provided Italy with fresh cause for uneasiness by abating her hostility to Germany. Italy in consequence drew nearer to Great Britain, and at the London conference on the Egyptian financial question sided with Great Britain against Austria and Germany. At the same time negotiations took place with Great Britain for an Italian occupation of Massawa, and Mancini, dreaming of a vast Anglo-Italian enterprise against the Mahdi, expatiated in the spring of 1885 upon the glories of an Anglo- Italian alliance, an indiscretion which drew upon him a scarcely- veiled dementi from London. Again speaking in the Chamber, Mancini claimed for Italy the principal merit in the conclusion of the triple alliance, but declared that the alliance left Italy full liberty of action in regard to interests outside its scope, " especially as there was no possibility of obtaining protection for such interests from those who by the alliance had not under- taken to protect them." These words, which revealed the absence of any stipulation in regard to the protection of Italian interests in the Mediterranean, created lively dissatisfaction in Italy and corresponding satisfaction in France. They hastened Mancini's downfall (17th June 1885), and prepared the advent of count di Robilant, who three months later succeeded Mancini at the Italian Foreign Office. Robilant, for whom the Skiernie- wice pact was no secret, followed a firmly independent policy throughout the Bulgarian crisis of 1885-1886, declining to be drawn into any action beyond that required by the treaty of Berlin and the protection of Italian interests

in the Balkans. Italy, indeed, came out of the Eastern crisis with enhanced prestige and with her relations to Austria greatly improved. Towards Prince Bismarck Robilant maintained an attitude of dignified independence, and as, in the spring of 1886, the moment for the renewal of the triple alliance drew near, he profited by the development of the Bulgarian crisis and the

Internal reforms.

threatened Franco-Russian understanding to secure from the central powers ” something more ” than the bare territorial guarantee of the original treaty. This ” something more ” consisted, at least in part, of the arrangement, with the help of Austria and Germany, of an Anglo-Italian naval understanding having special reference to the Eastern question, but providing for common action by the British and Italian fleets in the Mediterranean in case of war. A vote of the Italian Chamber on the 4th of February 1887, in connexion with the disaster to Italian troops at Dogali, in Abyssinia, brought about the resignation of the Depretis-Robilant cabinet. The crisis dragged for three months, and before its definitive solution by the formation of a Depretis-Crispi ministry, Robilant succeeded (17th March 1887) in renewing the triple alliance on terms more favourable to First re- Italy than those obtained in 1882. Not only did he newaiot secure concessions from Austria and Germany corre- the Triple sponding in some degree to the improved state of the Alliance. Italian army and navy, but, in virtue of the Anglo- Italian understanding, assured the practical adhesion of Great Britain to the European policy of the central powers, a triumph probably greater than any registered by Italian diplomacy since the completion of national unity.

The period between May 1881 and July 1887 occupied, in the region of foreign affairs, by the negotiation, conclusion and renewal of the triple alliance, by the Bulgarian crisis and by the dawn of an Italian colonial policy, was marked at home by urgent political and economic problems, and by the parliamentary phenomena known as trasformismo. On the 29th of June 1881 the Chamber adopted a Franchise Reform Bill, which increased the electorate from 600,000 to 2,000,000 by lowering the fiscal qualification from 40 to 19-80 lire in direct taxation, and by extending the suffrage to all persons who had

passed through the two lower standards of the elementary schools, and practically to all persons able to read and write. The immediate result of the reform was to increase the political influence of large cities where the proportion of illiterate workmen was lower than in the country districts, and to exclude from the franchise numbers of peasants and small proprietors who, though of more conservative temperament and of better economic position than the artizan population of the large towns, were often unable to fulfil the scholarship qualification. On the 12th of April 1883 the forced currency was formally abolished by the resumption of treasury payments in gold with funds obtained through a loan of £14,500,000 issued in London on the 5th of May 1882. Owing to the hostility of the French market, the loan was covered with difficulty, and, though the gold premium fell and commercial exchanges were temporarily facilitated by the resumption of cash payments, it is doubtful whether these advantages made up for the burden of £640,000 additional annual interest thrown upon the exchequer. On the 6th of March 1885 parliament finally sanctioned the conventions by which state railways were farmed out to three private companies — the Mediterranean, Adriatic and Sicilian. The railways redeemed in 1875-1876 had been worked in the interval by the government at a heavy loss. A commission of inquiry reported in favour of private management. The conven- tions, concluded for a period of sixty years, but terminable by either party after twenty or forty years, retained for the state the possession of the lines (except the southern railway, viz. the line from Bologna to Brindisi belonging to the Societa Meridionale to whom the Adriatic lines were now farmed), but sold rolling stock to the companies, arranged various schedules of state subsidy for lines projected or in course of construction, guaranteed interest on the bonds of the companies and arranged for the division of revenue between the companies, the reserve fund and the state. National control of the railways was secured by a proviso that the directors must be of Italian nationality. Depretis and his colleague Genala, minister of public works, experienced great difficulty in securing parliamentary sanction for the conventions, not so much on account of their defective character, as from the opposition of local interests anxious to extort new lines from the government. In fact, the conventions

were only voted by a majority of twenty-three votes after the government had undertaken to increase the length of new state- built lines from 1500 to 2500 kilometres. Unfortun- ately, the calculation of probable railway revenue on The rail-

which the conventions had been based proved to be way \? 0B ” . it-. 1 i n/ ventions.

enormously exaggerated. I 1 or many years the 375%

of the gross revenue (less the cost of maintaining the rolling stock, incumbent on the state) scarcely sufficed to pay the interest on debts incurred for railway construction and on the guaranteed bonds. Gradually the increase of traffic con- sequent upon the industrial development of Italy decreased the annual losses of the state, but the position of the government in regard to the railways still remained so unsatisfactory as to render the resumption of the whole system by the state on the expiration of the first period of twenty years in 1905 inevitable. Intimately bound up with the forced currency, the railway conventions and public works was the financial question in general. From 1876, when equilibrium between expenditure and revenue had first been attained, taxation yielded steady annual surpluses, which in 1881 reached the satisfactory level of £2,120,000. The gradual abolition of the grist tax on minor cereals diminished the surplus in 1882 to £236,000, and in 1883 to £110,000, while the total repeal of the grist tax on wheat, which took effect on the 1st of January 1884, coincided with the opening of a new and disastrous period of deficit. True, the repeal of the grist tax was not the only, nor possibly even the principal, cause of the deficit. The policy of ” fiscal transformation ” inaugurated by the Left increased revenue from indirect taxation from £17,000,000 in 1876 to more than £24,000,000 in 1887, by substituting heavy corn duties for the grist tax, and by raising the sugar and petroleum duties to unprecedented levels. But partly from lack of firm financial administration, partly through the increase of military and naval expenditure (which in 1887 amounted to £9,000,000 for the army, while special efforts were made to strengthen the navy), and principally through the constant drain of railway construction and public works, the demands upon the exchequer grew largely to exceed the normal increase of revenue, and necessitated the contraction of new debts. In their anxiety to remain in office Depretis and the finance minister, Magliani, never hesitated to mortgage the financial future of their country. No concession could be denied to deputies, or groups of deputies, whose support was indispensable to the life of the cabinet, nor, under such conditions, was it possible to place any effective check upon administrative abuses in which politicians or their electors were interested. Railways, roads and harbours which contractors had undertaken to construct for reasonable amounts were frequently made to cost thrice the original estimates. Minghetti, in a trenchant exposure of the parliamentary condition of Italy during this period, cites a case in which a credit for

certain public works was, during a debate in the Chamber, increased by the govern- ment from £6,600,000 to £9,000,000 in order to conciliate local political interests. In the spring of 1887 Genala, minister of public works, was taken to task for having sanctioned expenditure of £80,000,000 on railway construction while only £40,000,000 had been included in the estimates. As most of these credits were spread over a series of years, succeeding administrations found their financial liberty of action destroyed, and were obliged to cover deficit by constant issues of consolidated stock. Thus the deficit of £940,000 for the financial year 1885-1886 rose to nearly £2,920,000 in 1887-1888, and in 1888-1889 attained the terrible level of £9,400,000.

Nevertheless, in spite of many and serious shortcomings, the long series of Depretis administrations was marked by the adoption of some useful measures. Besides the realization of the formal programme of the Left, consisting of the repeal of the grist tax, the abolition of the forced currency, the extension of the suffrage and the development of the railway system, Depretis laid the foundation for land tax re-assessment by intro- ducing a new cadastral survey. Unfortunately, the new survey was made largely optional, so that provinces which had reason

to hope for a diminution of land tax under a revised assessment hastened to complete their survey, while others, in which the average of the land tax was below a normal assessment, neglected to comply with the provisions of the scheme. An important undertaking, known as the Agricultural Inquiry, brought to light vast quantities of information valuable for future agrarian legislation. The year 1885 saw the introduction and adoption of a measure embodying the principle of employers' liability for accidents to workmen, a principle subsequently extended and more equitably defined in the spring of 1899. An effort to encourage the development of the mercantile marine was made in the same year, and a convention was concluded with the chief lines of passenger steamers to retain their fastest vessels as auxiliaries to the fleet in case of war. Sanitation and public hygiene received a potent impulse from the cholera epidemic of 1884, many of the unhealthiest quarters in Naples and other cities being demolished and rebuilt, with funds chiefly furnished by the state. The movement

was strongly supported by King Humbert, whose intrepidity in visiting the most dangerous spots at Busca and Naples while the epidemic was at its height, reassuring the panic-stricken inhabitants by his presence, excited the enthusiasm of his people and the admiration of Europe.

During the accomplishment of these and other reforms the condition of parliament underwent profound change. By degrees the administrations of the Left had ceased to rely mismo.” sc, l e ly upon the Liberal sections of the Chamber, and had carried their most important bills with the help of the Right. This process of transformation was not exclusively the work of Depretis, but had been initiated as early as 1873, when a portion of the Right under Minghetti had, by joining the Left, overturned the Lanza-Sella cabinet. In 1876 Minghetti himself had fallen a victim to a similar defection of Conservative deputies. The practical annihilation of the old Right in the elections of 1876 opened a new parliamentary era. Reduced in number to less than one hundred, and radically changed in spirit and composition, the Right gave way, if not to despair, at least to a despondency unsuited to an opposition party. Though on more than one occasion personal rancour against the men of the Moderate Left prevented the Right from following Sella’s advice and regaining, by timely coalition with cognate parlia- mentary elements, a portion of its former influence, the bulk of the party, with singular inconsistency, drew nearer and nearer to the Liberal cabinets. The process was accelerated by Sella’s illness and death (14th March 1884), an event which cast profound discouragement over the more thoughtful of the Conservatives and Moderate Liberals, by whom Sella had been regarded as a supreme political reserve, as a statesman whose experienced vigour and patriotic sagacity might have been trusted to lift Italy from any depth of folly or misfortune. By a strange anomaly the Radical measures brought forward by the Left diminished instead of increasing the distance between it and the Conservatives. Numerically insufficient to reject such measures, and lacking the fibre and the cohesion necessary for the pursuance of a far-sighted policy, the Right thought prudent not to employ its strength in uncompromising opposition, but rather, by sup- porting the government, to endeavour to modify Radical legisla- tion in a Conservative sense. In every case the calculation proved fallacious. Radical measures were passed unmodified, and the Right was compelled sadly to accept the accomplished fact. Thus it was with the abolition of the grist tax, the reform of the suffrage, the railway conventions and many other bills. When, in course of time, the extended suffrage increased the Republican and Extreme Radical elements in the Chamber, and the Liberal ” Pentarchy ” (composed of

Crispi, Cairoli, Nicotera, Zanardelli and Baccarini) assumed an attitude of bitter hostility to Depretis, the Right, obeying the impulse of Minghetti, rallied openly to Depretis, lending him aid without which his prolonged term of office would have been impossible. The result was parlia- mentary chaos, baptized trasformismo. In May 1883 this process received official recognition by the elimination of the Radicals Zanardelli and Baccarini from the Depretis cabinet, while in

the course of 1884 a Conservative, Signor Biancheri, was elected to the presidency of the Chamber, and another Conservative, General Ricotti, appointed to the War Office. Though Depretis, at the end of his life in 1887, showed signs of repenting of the confusion thus created, he had established a parliamentary system destined largely to sterilize and vitiate the political life of Italy.

Contemporaneously with the vicissitudes of home and foreign policy under the Left there grew up in Italy a marked tendency towards colonial enterprise. The tendency itself dated from 1869, when a congress of the Italian chambers of po ucy. commerce at Genoa had urged the Lanza cabinet to establish a commercial depot on the Red Sea. On the nth of March 1870 an Italian shipper, Signor Rubattino, had bought the bay of Assab, with the neighbouring island of Darmakieh, from Beheran, sultan of Raheita, for £1880, the funds being furnished by the government. The Egyptian government being unwilling to recognize the sovereignty of Beheran over Assab or his right to sell territory to a foreign power, Visconti-Venosta thought it opportune not then to occupy Assab. No further step was taken until, at the end of 1879, Rubattino prepared to establish a commercial station at Assab. The British government made inquiry as to his intentions, and on the 19th of April 1880 received a formal undertaking from Cairoli that Assab would never be fortified nor be made a military establishment. Mean- while (January 1880) stores and materials were landed, and Assab was permanently occupied. Eighteen months later a party of Italian sailors and explorers under Lieutenant. Biglieri and Signor Giulietti were massacred in Egyptian territory. Egypt, however, refused to make thorough inquiry into the massacre, and was only prevented from occupying Raheita and coming into conflict with Italy by the good offices of Lord Granville, who dissuaded the Egyptian government from enforcing its sove- reignty. On the 20th of September 1881 Beheran formally accepted Italian protection, and in the following February an Anglo-Italian convention established the Italian title to Assab on condition that Italy should formally recognise the suzerainty of the Porte and of the khedive over the Red Sea coast, and should prevent the transport of arms and munitions of war through the territory of Assab. This convention was

never recognized by the Porte nor by the Egyptian government. A month later (1 oth March 1882) Rubattino made over his establishment to the Italian government, and on the 12th of June the Chamber adopted a bill constituting Assab an Italian crown colony.

Within four weeks of the adoption of this bill the bombardment of Alexandria by the British fleet (nth July 1882) opened an era destined profoundly to affect the colonial position of Italy. The revolt of Arabi Pasha (September 1881) ™ e mn had led to the meeting of an ambassadorial conference Question. at Constantinople, promoted by Mancini, Italian minister for foreign affairs, in the hope of preventing European intervention in Egypt and the permanent establishment of an Anglo-French condominium to the detriment of Italian influence. At the opening of the conference (23rd June 1882) Italy secured the signature of a self-denying protocol whereby all the great powers undertook to avoid isolated action; but the rapid develop- ment of the crisis in Egypt, and the refusal of France to co- operate with Great Britain in the restoration of order, necessitated vigorous action by the latter alone, In view of the French refusal, Lord Granville on the 27th of July invited Italy to join in restoring order in Egypt; but Mancini and Depretis, in spite of the efforts of Crispi, then in London, declined the offer. Financial considerations, lack of proper transports for an expeditionary corps, fear of displeasing France, dislike of a ” policy of adventure,” misplaced deference towards the ambassa- dorial conference in Constantinople, and unwillingness to thwart the current of Italian sentiment in favour of the Egyptian ” nationalists,” were the chief motives of the Italian refusal, which had the effect of somewhat estranging Great Britain and Italy. Anglo-Italian relations, however, regained their normal cordiality two years later, and found expression in the support

lent by Italy to the British proposal at the London conference on the Egyptian question (July 1884). About the same time Mancini was informed by the Italian agent in Cairo that Great Britain would be well disposed towards an extension of Italian influence on the Red Sea coast. Having sounded Lord Granville, Mancini received encouragement to seize Beilul and Massawa, in view of the projected restriction of the Egyptian zone of military occupation consequent on the Mahdist rising in the Sudan. Lord Granville further inquired

whether Italy would co-operate in pacifying the Sudan, and received an affirmative reply. Italian action was hastened by news that, in December 1884, an exploring party under Signor Bianchi, royal commissioner for Assab, had been massacred in the Aussa (Danakil) country, an event which aroused in Italy a desire to punish the assassins and to obtain satisfaction for the still unpunished massacre of Signor Giulietti and his companions. Partly to satisfy public opinion, partly in order to profit by the favourable disposition of the British government, and partly in the hope of remedying the error committed in 1882 by refusal to co-operate with Great Britain in Egypt, the Italian government in January 1885 despatched an expedition under Admiral Caimi and Colonel Saletta to occupy Massawa and Beilul. The occupation, effected on the 5th of February, was accelerated by fear lest Italy might be forestalled by France or Russia, both of which powers were suspected of desiring to establish themselves firmly on the Red Sea and to exercise a protectorate over Abyssinia. News of the occupation reached Europe simultaneously with the tidings of the fall of Khartum, an event which disappointed Italian hopes of military co-operation with Great Britain in the Sudan. The resignation of the Gladstone-Granville cabinet further precluded the projected Italian occupation of Suakin, and the Italians, wisely' refraining from an independent attempt to succour Kassala, then besieged by the Mahdists, bent their efforts to the increase of their zone of occupation around Massawa. The ex- tension of the Italian zone excited the suspicions of John, negus of Abyssinia, whose apprehensions were assiduously fomented by Alula, ras of Tigre, and by French and Greek adventurers. Measures, apparently successful, were taken to reassure the negus, but shortly afterwards protection inopportunely accorded by Italy to enemies of Ras Alula, induced the Abyssinians to enter upon hostilities. In January 1886 Ras Alula raided the village of Wa, to the west of Zula, but towards the end of the year (23rd November) Wa was occupied by the irregular troops of General Gene, who had superseded Colonel Saletta at Massawa. Angered by this step, Ras Alula took prisoners the members of an Italian exploring party commanded by Count Salimbeni, and held them as hostages for the evacuation of Wa. General Gene nevertheless reinforced Wa and pushed forward a detachment to Saati. On the 25th of January 1887 Ras Alula attacked Saati, but was repulsed with loss. On the following day, however, the Abys- sinians succeeded in surprising, near the village of Dogali, an Italian force of 524 officers and men under Colonel De Cristoforis, who were convoying provisions to the garrison of Saati. The Abyssinians, 20,000 strong, speedily overwhelmed the small Italian force, which, after exhausting its ammunition, was destroyed where it stood. One man only escaped.

Four hundred and seven men and twenty- three officers were killed outright, and one officer and eighty-one men wounded. Dead and wounded alike were horribly mutilated by order of Alula. Fearing a new attack, General Gene withdrew his forces from Saati, Wa and Arafali; but the losses of the Abyssinians at Saati and Dogali had been so heavy as to dissuade Alula from further hostilities.

In Italy the disaster of Dogali produced consternation, and caused the fall of the Depretis-Robilant cabinet. The Chamber, Abyssinia. ea 8 er Ior revenge, voted a credit of £200,000, and sanctioned the despatch of reinforcements. Mean- while Signor Crispi, who, though averse from colonial adventure, desired to vindicate Italian honour, entered the Depretis cabinet as minister of the interior, and obtained from parliament a new credit of £800,000. In November 1887 a strong expedition under General di San Marzano raised the strength of the Massawa

Disaster of Dogali.

garrison to nearly 20,000 men. The British government, desirous of preventing an Italo-Abyssinian conflict, which could but strengthen the position of the Mahdists, despatched Mr (afterwards Sir) Gerald Portal from Massawa on the 29th of October to mediate with the negus. The mission proved fruitless. Portal returned to Massawa on the 25th of December 1887, and warned the Italians that John was preparing to attack them in the following spring with an army of 100,000 men. On the 28th of March 1888 the negus indeed descended from the Abyssinian high plateau in the direction of Saati, but finding the Italian posi- tion too strong to be carried by assault, temporized and opened negotiations for peace. His tactics failed to entice the Italians from their position, and on the 3rd of April sickness among his men compelled John to withdraw the Abyssinian army. The negus next marched against Menelek, king of Shoa, whose neutrality Italy had purchased with 5000 Remington rifles and a supply of ammunition, but found him with 80,000 men too strongly en- trenched to be successfully attacked. Tidings of a new Mahdist incursion into Abyssinian territory reaching the negus induced him to postpone the settlement of his quarrel with Menelek until the dervishes had been chastised. Marching towards the Blue Nile, he joined battle with the Mahdists, but on the 10th of March 1889 was killed, in the hour of victory, near Gallabat. His death gave rise to an Abyssinian war of succession between Mangasha, natural son of John, and Menelek, grandson of the Negus Sella-Sellassie. Menelek, by means of Count Antonelli, resident in the Shoa country, requested Italy to execute a diversion in his favour by occupying Asmara and

other points on the high plateau. Antonelli profited by the situation to obtain Menelek's signature to a treaty fixing the frontiers of the Italian colony and defining Italo-Abyssinian relations. The treaty, signed at Uccialli on the 2nd of May 1899, arranged for regular intercourse between Italy and Abyssinia and t/ce/a«/° conceded to Italy a portion of the high plateau, with the positions of Halai, Saganeiti and Asmara. The main point of the treaty, however, lay in clause 17: —

" His Majesty the king of kings of Ethiopia consents to make use of the government of His Majesty the king of Italy for the treatment of all questions concerning other powers and governments. ' '

Upon this clause Italy founded her claim to a protectorate over Abyssinia. In September 1889 the treaty of Uccialli was ratified in Italy by Menelek's lieutenant, the Ras Makonnen. Makonnen further concluded with the Italian premier, Crispi, a convention whereby Italy recognized Menelek as emperor of Ethiopia, Menelek recognized the Italian colony, and arranged for a special Italo-Abyssinian currency and for a loan. On the 1 ith of October Italy communicated article 17 of the treaty of Uccialli to the European powers, interpreting it as a valid title to an Italian protectorate over Abyssinia. Russia alone neglected to take note of the communication, and persisted in the hostile attitude she had assumed at the moment of the occupation of Massawa. Meanwhile the Italian mint coined thalers bearing the portrait of King Humbert, with an inscription referring to the Italian protectorate, and on the 1st of January 1890 a royal decree conferred upon the colony the name of " Eritrea."

In the colony itself General Baldissera, who had replaced General Saletta, delayed the movement against Mangasha desired by Menelek. The Italian general would have preferred to wait until his intervention was requested Opera- by both pretenders to the Abyssinian throne. Pressed Abyssinia. by the home government, he, however, instructed a native ally to occupy the important positions of Keren and Asmara, and prepared himself to take the offensive against Mangasha and Ras Alula. The, latter retreated south of the river Mareb, leaving the whole of the cis-Mareb territory, includ- ing the provinces of Hamasen, Agameh, Serae and Okule-Kusai, in Italian hands. General Orero, successor of Baldissera, pushed offensive action more vigorously, and on the 26th of January 1890 entered Adowa, a city considerably to the south of the Mareb — an imprudent step which aroused Menelek's suspicions, and had hurriedly to be retraced. Mangasha, seeing further resistance to be useless, submitted to Menelek, who at the end

of February ratified at Makalle the additional convention to the treaty of Uccialli, but refused to recognize the Italian occupa- tion of the Mareb. The negus, however, conformed to article 17 of the treaty of Uccialli by requesting Italy to represent Abyssinia at the Brussels anti-slavery conference, an act which strengthened Italian illusions as to Menelek's readiness to submit to their protectorate. Menelek had previously notified the chief European powers of his coronation at Entotto (14th December 1889), but Germany and Great Britain replied that such notifica- tion should have been made through the Italian government. Germany, moreover, wounded Menelek's pride by employing merely the title of " highness." The negus took advantage of the incident to protest against the Italian text of article 17, and to contend that the Amharic text contained no equivalent for the word "consent," but merely stipulated that Abyssinia " might " make use of Italy in her relations with foreign powers. On the 28th of October 1890 Count Antonelli, negotiator of the treaty, was despatched to settle the controversy, but on arriving at Adis Ababa, the new residence of the negus, found agreement impossible either with regard to the frontier or the protectorate. On the 10th of April 1891, Menelek communicated to the powers his views with regard to the Italian frontier, and announced his intention of re-establishing the ancient boundaries of Ethiopia as far as Khartum to the north-west and Victoria Nyanza to the south. Meanwhile the marquis de Rudini, who had succeeded Crispi as Italian premier, had authorized the abandonment of article 1 7 even before he had heard of the failure of Antonelli's negotiations. Rudini was glad to leave the whole dispute in abeyance and to make with the local ras, or chieftains, of the high plateau an arrangement securing for Italy the cis-Mareb provinces of Serae and Okule-Kusai under the rule of an allied native chief named Bath-Agos. Rudini, however, was able to conclude two protocols with Great Britain (March and April 1 891) whereby the British government definitely recognized Abyssinia as within the Italian sphere of influence in return for an Italian recognition of British rights in the Upper Nile.

The period 1887-1890 was marked in Italy by great political activity. The entry of Crispi into the Depretis cabinet as minister of the interior (4th April 1887) introduced ^}j, into the government an element of vigour which had Cabinet. l° n g been lacking. Though sixty-eight years of age, Crispi possessed an activity, a rapidity of decision and an energy in execution with which none of his contemporaries could vie.

Within four months the death of Depretis (29th July 1887) opened for Crispi the way to the premiership. Besides assuming the presidency of the council of ministers and retaining the ministry of the interior, Crispi took over the portfolio of foreign affairs which Depretis had held since the resignation of Count di Robilant. One of the first questions with which he had to deal was that of conciliation between Italy and the Vatican. At the end of May the pope, in an allocution to the cardinals, had spoken of Italy in terms of unusual cordiality, and had expressed a wish for peace. A few days later Signor Bonghi, one of the framers of the Law of Guarantees, published in the Nuova Antologia a plea for reconciliation on the basis of an amendment to the Law of Guarantees and recognition by the pope of the Italian title to Rome. The chief incident cf the movement towards conciliation consisted, however, in the publication of a pamphlet entitled La Conciliazione by Father Tosti, a close friend and confidant of the pope, extolling the advantages of peace between Vatican and Quirinal. Tosti's pamphlet was known to represent papal ideas, and Tosti himself was persona grata to the Italian government. Recon- coaciifa-' 1 c i nat ' on seemed within sight when suddenly Tosti's tioa. pamphlet was placed on the Index, ostensibly on

account of a phrase, " The whole of Italy entered Rome by the breach of Porta Pia; the king cannot restore Rome to the pope, since Rome belongs to the Italian people." On the 4th of June 1887 the official Vatican organ, the Osservatore Romano, published a letter written by Tosti to the pope condition- ally retracting the views expressed in the pamphlet. The letter had been written at the pope's request, on the understanding

that it should not be published. On the 15th of June the pope addressed to Cardinal Rampolla del Tindaro, secretary of state, a letter reiterating in uncompromising terms the papal claim to the temporal power, and at the end of July Cardinal Rampolla reformulated the same claim in a circular to the papal nuncios abroad. The dream of conciliation was at an end, but the Tosti incident had served once, more to illustrate the true position of the Vatican in regard to Italy. It became clear that neither the influence of the regular clergy, of which the Society of Jesus is the most powerful embodiment, nor that of foreign clerical parties, which largely control the Peter's Pence fund, would ever permit renunciation of the papal claim to temporal power. France, and the French Catholics especially, feared lest concilia- tion should diminish the reliance of the Vatican upon Terms France, and consequently French hold over the of the Vatican. The Vatican, for its part, felt its claim to "Homau temporal power to be too valuable a pecuniary asset s ,on ' and too efficacious an instrument of church

discipline lightly to be thrown away. The legend of an ” imprisoned pope,” subject to every whim of his gaolers, had never failed to arouse the pity and loosen the purse-strings of the faithful; dangerous innovators and would-be reformers within the church could be compelled to bow before the symbol of the temporal power, and their spirit of submission tested by their readiness to forgo the realization of their aims until the head of the church should be restored to his rightful domain. More important than all was the interest of the Roman curia, composed almost exclusively of Italians, to retain in its own hands the choice of the pontiff and to maintain the predominance of the Italian element and the Italian spirit in the ecclesiastical hierarchy. Conciliation with Italy would expose the pope and his Italian entourage to suspicion of being unduly subject to Italian political influence— of being, in a word, more Italian than Catholic. Such a suspicion would inevitably lead to a movement in favour of the inter- nationalization of the curia and of the papacy. In order to avoid this danger it was therefore necessary to refuse all com- promise, and, by perpetual reiteration of a claim incompatible with Italian territorial unity, to prove to the church at large that the pope and the curia were more Catholic than Italian. Such rigidity of principle need not be extended to the affairs of everyday contact between the Vatican and the Italian authorities, with regard to which, indeed, a tacit modus vivendi was easily attainable. Italy, for her part, could not go back upon the achievements of the Risorgimento by restoring Rome or any portion of Italian territory to the pope. She had hoped by conciliation to arrive at an understanding which should have ranged the church among the conservative and not among the disruptive forces of the country, but she was keenly desirous to retain the papacy as a preponderatingly Italian institution, and was ready to make whatever formal concessions might have appeared necessary to reassure foreign Catholics concerning the reality of the pope’s spiritual independence. The failure of the conciliation movement left profound irritation between Vatican and Quirinal, an irritation which, on the Vatican side, found expression in vivacious protests and in threats of leaving Rome; and, on the Italian side, in the deposition of the syndic of Rome for having visited the cardinal-vicar, in the anti-clerical provisions of the new penal code, and in the inauguration (9th June 1889) of a monument to Giordano Bruno on the very site of his martyrdom.

The internal situation inherited by Crispi from Depretis was very unsatisfactory. Extravagant expenditure on railways and public works, loose administration of finance, the cost of colonial enterprise, the growing demands for the army and navy, the impending tariff war with France, and the over- speculation in building and in industrial

ventures, which had absorbed all the floating capital of the country, had combined to produce a state of affairs calling for firm and radical treatment. Crispi, burdened by the premiership and by the two most important portfolios in the cabinet, was, however, unable to exercise efficient control over all departments of state. Neverthe- less his administration was by no means unfruitful. Zanardelli,

minister of justice, secured in June 1888 the adoption of a new penal code; state surveillance was extended to the opere pie, or charitable institutions; municipal franchise was reformed by granting what was practically manhood suffrage with residential qualification, provision being made for minority representation; and the central state administration was reformed by a bill fixing the number and functions of the various ministries. The management of finance was scarcely satisfactory, for though Giolitti, who had succeeded Magliani and Perazzi at the treasury, suppressed the former's illusory " pension fund," he lacked the fibre necessary to deal with the enormous deficit of nearly £10,000,000 in 1 888-1 889, the existence of which both Perazzi and he had recognized. The most successful feature of Crispi's term of office was his strict maintenance of order and the suppression of Radical and Irredentist agitation. So vigorous was his treatment of Irredentism that he dismissed without warning his colleague Seismit Doda, minister of finance, for having failed to protest against Irredentist speeches delivered in his presence at Udine. Firmness such as this secured for him the support of all constitutional elements, and after three years' premiership his position was infinitely stronger than at the outset. The general election of 1890 gave the cabinet an almost unwieldy majority, comprising four-fifths of the Chamber. A lengthy term of office seemed to be opening out before him when, on the 31st of January 1891, Crispi, speaking in a debate upon an unimportant bill, angrily rebuked the Right for its noisy interruptions. The rebuke infuriated the Conservative deputies, who, protesting against Crispi's words in the name of the " sacred memories " of their party, precipitated a division and placed the cabinet in a minority. The incident, whether due to chance or guile, brought about the resignation of Crispi. A few days later he was succeeded in the premiership by the marquis di Rudini, leader of the Right, who formed a coalition cabinet with Nicotera and a part of the Left.

The sudden fall of Crispi wrought a great change in the character of Italian relations with foreign powers. His policy had been characterized by extreme cordiality towards Austria and Germany, by a close understanding with Great Britain in regard to Mediterranean questions, and by an apparent animosity towards France, which at one moment seemed likely to lead to war. Shortly before the fall of the Depretis-Robilant cabinet Count Robilant had announced the intention of Italy to denounce the commercial treaties with France and Austria, which would lapse en the 31st of December 1887, and had intimated his readiness to negotiate new treaties. On the 24th of June 1887, in view of a possible rupture of com- mercial relations with France, the Depretis-Crispi cabinet introduced a new general tariff. The probability of the conclu- sion of a new Franco-Italian treaty was small, both on account of the protectionist spirit of France and of French resentment at the renewal of the triple alliance, but even such slight proba- bility vanished after a visit paid to Bismarck by Crispi (October 1887) within three months of his appointment to the premiership. Crispi entertained no a priori animosity towards France, but was strongly convinced that Italy must emancipate herself from the position of political dependence on her powerful neighbour which had vitiated the foreign policy of the Left. So far was he from desiring a rupture with France, that he had subordinated acceptance of the portfolio of the interior in the Depretis cabinet to an assurance that the triple alliance contained no provision for offensive warfare. But his ostentatious visit to Friedrichsruh, and a subsequent speech at Turin, in which, while professing sentiments of friendship and esteem for France, he eulogized the personality of Bismarck, aroused against him a hostility on the part of the French which he was never afterwards able to allay. France was equally careless of Italian susceptibilities, and in April 1888 Goblet made a futile but irritating attempt to enforce at Massawa the Ottoman regime of the capitulations in regard to non-Italian residents. In such circumstances the negotiations for the new commercial treaty could but fail, and though the old treaty was prolonged by special arrangement for two months, differential tariffs were put in force on both sides

Radial.

of the frontier on the 29th of Februarj' 1888. The value of French exports into Italy decreased immediately by one-half, while Italian exports to France decreased by nearly two-thirds. At the end of 1889 Crispi abolished the differential duties against French imports and returned to the general Italian tariff, but France declined to follow his lead and maintained her prohibitive dues. Meanwhile the enthusiastic reception accorded to the young German emperor on the occasion of

his visit to Rome in October 1888, and the cordiality shown towards King Humbert and Crispi at Berlin in May 1889, increased the tension of Franco- Italian relations; nor was it until after the fall of Prince Bismarck in March 1890 that Crispi adopted towards the Republic a more friendly attitude by sending an Italian squadron to salute President Carnot at Toulon. The chief advantage derived by Italy from Crispi's foreign policy was the increase of con- fidence in her government on the part of her allies and of Great Britain. On the occasion of the incident raised by Goblet with regard to Massawa, Bismarck made it clear to France that, in case of complications, Italy would not stand alone; and when in February 1888 a strong French fleet appeared to menace the Italian coast, the British Mediterranean squadron demon- strated its readiness to support Italian naval dispositions. Moreover, under Crispi's hand Italy awoke from the apathy of former years and gained consciousness of her place in the world. The conflict with France, the operations in Eritrea, the vigorous interpretation of the triple alliance, the questions of Morocco and Bulgaria, were all used by him as means to stimulate national sentiment. With the instinct of a true statesman, he felt the pulse of the people, divined their need for prestige, and their preference for a government heavy-handed rather than lax. How great had been Crispi's power was seen by contrast with the policy of the Rudini cabinet which succeeded him in February 1891. Crispi's so-called " megalomania " gave place to retrenchment in home affairs and to a deferential attitude towards all foreign powers. The premiership second of Rudini was hailed by the Radical leader, Cavallotti, renewal ol as a pledge of the non-renewal of the triple alliance, th ? Triple against which the Radicals began a vociferous campaign. Their tactics, however, produced a contrary effect, for Rudini, accepting proposals from Berlin, renewed the alliance in June 1891 for a period of twelve years. None of Rudini's public utterances justify the supposition that he assumed office with the intention of allowing the alliance to lapse on its expiry in May 1892; indeed, he frankly declared it to form the basis of his foreign policy. The attitude of several of his colleagues was more equivocal, but though they coquetted with French financiers in the hope of obtaining the support of the Paris Bourse for Italian securities, the precipitate renewal of the alliance destroyed all probability of a close understanding with France. The desire of Rudini to live on the best possible terms with all powers was further evinced in the course of a visit paid to Monza by M. de Giers in October 1891, when the Russian statesman was apprised of the entirely defensive nature of Italian engagements under the triple alliance. At the same time he carried to a successful conclusion negotiations begun by Crispi for the renewal of commercial treaties with Austria and Germany

upon terms which to some extent compensated Italy for the reduction of her commerce with France, and concluded with Great Britain conventions for the delimitation of British and Italian spheres of influence in north-east Africa. j*In home affairs his administra- tion was weak and vacillating, nor did the economies effected in naval and military expenditure and in other departments suffice to strengthen the position of a cabinet which had dis- appointed the hopes of its supporters. On the 14th of April 1892 dissensions between ministers concerning the financial programme led to a cabinet crisis, and though Rudini succeeded in reconstructing his administration, he was defeated in the Chamber on the 5th of May and obliged to resign. King Humbert, who, from lack of confidence in Rudini, had declined to allow him to dissolve parliament, entrusted Signor Giolitti, a Piedmontese deputy, sometime treasury minister in the Crispi cabinet, with the formation of a ministry of

Qioitta.

the Left, which contrived to obtain six months' supply on account, and dissolved the Chamber

The ensuing general election (November 1892), marked by unprecedented violence and abuse of official pressure upon the electorate, fitly ushered in what proved to be scandals. *he most unfortunate period of Italian history since the completion of national unity. The influence of Giolitti was based largely upon the favour of a court clique, and especially of Rattazzi, minister of the royal household. Early in 1893 a scandal arose in connexion with the manage- ment of state banks, and particularly of the Banca Romana, whose managing director, Tanlongo, had issued £2,500,000 of duplicate bank-notes. Giolitti scarcely improved matters by creating Tanlongo a member of the senate, and by denying in parliament the existence of any mismanagement. The senate, however, manifested the utmost hostility to Tanlongo, whom Giolitti, in consequence of an interpellation in the Chamber, was compelled to arrest. Arrests of other prominent persons followed, and on the 3rd of February the Chamber authorized the prosecution of De Zerbi, a Neapolitan deputy accused of corruption. On the 20th of February De Zerbi suddenly expired. For a time Giolitti successfully opposed inquiry into the

conditions of the state banks, but on the 21st of March was compelled to sanction an official investigation by a parliamentary commission composed of seven members. On the 23rd of November the report of the commission was read to the Chamber amid intense excitement. It established that all Italian cabinets since 1880 had grossly neglected the state banks; that the two preceding cabinets had been aware of the irregularities committed by Tanlongo; that Tanlongo had heavily subsidized the press, paying as much as £20,000 for that purpose in 1888 alone; that a number of deputies, including several ex-ministers, had received from him loans of a considerable amount, which they had apparently made no effort to refund; that Giolitti had deceived the Chamber with regard to the state banks, and was open tosuspicion of having, after the arrest of Tanlongo, abstracted a number of documents from the latter's papers before placing the remainder in the hands of the judicial authorities. In spite of the gravity of the charges formulated against many prominent men, the report merely " deplored " and " disapproved " of their conduct, without proposing penal proceedings. Fear of extending still farther a scandal which had already attained huge dimensions, and the desire to avoid any further shock to national credit, convinced the commissioners of the expediency of avoiding a long series of prosecutions. The report, however, sealed the fate of the Giolitti cabinet, and on the 24th of November it resigned amid general execration.

Apart from the lack of scruple manifested by Giolitti in the bank scandals, he exhibited incompetence in the conduct of foreign and home affairs. On the 16th and 18th of Ajgues- August 1893 a number of Italian workmen were massacre, massacred at Aigues-Mortes. The French authorities, under whose eyes the massacre was perpetrated, did nothing to prevent or repress it, and the mayor of Marseilles even refused to admit the wounded Italian workmen to the municipal hospital. These occurrences provoked anti-French demonstrations in many parts of Italy, and revived the chronic Italian rancour against France. The Italian foreign minister, Brin, began by demanding the punishment of the persons guilty of the massacre, but hastened to accept as satisfactory the anodyne measures adopted by the French government. Giolitti removed the prefect of Rome for not having prevented an expression of popular anger, and presented formal excuses to the French consul at Messina for a demonstration against that consulate. In the following December the French tribunal at Angoulfime acquitted all the authors of the massacre. At home Giolitti displayed the same weakness. Riots at Naples in August 1893 and symptoms of unrest in Sicily found him, as usual, unprepared and vacillating. The closing of the French market to Sicilian produce, the

devastation wrought by the phylloxera and the decrease of the sulphur trade had combined to produce in Sicily a discontent of which Socialist agitators

took advantage to organize the workmen of the towns and the peasants of the country into groups known as fasci. The movement had no well-defined object. Here and there it was based upon a bastard Socialism, insarrec- in other places it was made a means of municipal sicily. party warfare under the guidance of the local mafia, and in some districts it was simply popular effervescence against the local octrois on bread and flour. As early as January 1893 a . conflict had occurred between the police and the populace, in which several men, women and children were killed, an occurrence • used by the agitators further to inflame the populace. Instead of maintaining a firm policy, Giolitti allowed the movement to spread until, towards the autumn of 1893, he became alarmed and drafted troops into the island, though in numbers insufficient to restore order. At the moment of his fall the movement assumed the aspect of an insurrection, and during the interval between his resignation (24th November) and the formation of a new Crispi cabinet (10th December) conflicts between the public forces and the rioters were frequent. The return of Crispi to power- — a return imposed by public opinion as that of the only man capable of dealing with the desperate situation — marked the turning-point of the crisis. Intimately acquainted with the conditions of his native island, Crispi adopted efficacious remedies. The fasci were suppressed, Sicily was filled with troops, the reserves were called out. a state of siege proclaimed, military courts instituted and the whole movement crushed in a few weeks. The chief agitators were either sentenced to heavy terms of imprisonment or were compelled to flee the country. A simultaneous insurrection at Massa – Carrara was crushed with similar vigour. Crispi's methods aroused great outcry in the Radical press, but the severe sentences of the military courts were in time tempered by the Royal prerogative of amnesty.

But it was not alone in regard to public order that heroic measures were necessary. The financial situation inspired serious misgivings. While engagements contracted by Depretis in regard to public works had more than ciJI™ " neutralized the normal increase of revenue from taxa- tion, the whole credit of the state had been affected by the severe economic and financial crises of the years 1889-1893. The state banks, already hampered by maladministration, were encumbered by huge quantities of real estate which had been taken over as compensation for unredeemed mortgages. Baron Sidney Sonnino, minister of finance in the Crispi cabinet, found a prospective deficit of £7,080,000, and in spite of economies was obliged to face an actual

deficit of more than £6,000,000. Drastic measures were necessary to limit expenditure and to provide new sources of revenue. Sonnino applied, and sub- sequently amended, the Bank Reform Bill passed by the previous Administration (August 10, 1893) for the creation of a supreme state bank, the Bank of Italy, which was entrusted with the liquidation of the insolvent Banca Romana. The new law forbade the state banks to lend money on real estate, limited their powers of discounting bills and securities, and reduced the maximum of their paper currency. In order to diminish the gold premium, which under Giolitti had risen to 16%, forced currency was given to the existing notes of the banks of Italy, Naples and Sicily, while special state notes were issued to meet immediate currency needs. Measures were enforced to prevent Italian holders of consols from sending their coupons abroad to be paid in gold, with the result that, whereas in 1893 £3,240,000 had been paid abroad in gold for the service of the January coupons and only £680,000 in paper in Italy, the same coupon was paid a year later with only £1,360,000 abroad and £2,540,000 at home. Economies for more than £1 ,000,000, were immediately effected, taxes, calculated to produce £2,440,000, were proposed to be placed upon land, incomes, salt and corn, while the existing income-tax upon consols (fixed at 8% by Cambray-Digny in 1868, and raised to 13-20% by Sella in 1870) was increased to 20% irrespectively of the stockholders' nationality. These proposals met with opposition so fierce as to cause a cabinet crisis, but Sonnino who resigned office as minister of finance,

returned to power as minister of the treasury, promulgated some of his proposals by royal decree, and in spite of vehement opposition secured their ratification by the Chamber. The tax upon consols, which, in conjunction with the other severe fiscal measures, was regarded abroad as a pledge that Italy intended at all costs to avoid bankruptcy, caused a rise in Italian stocks. When the Crispi cabinet fell in March 1896 Sonnino had the satisfaction of seeing revenue increased by £3,400,000, expendi- ture diminished by £2,800,000, the gold premium reduced from 16 to 5%, consolidated stock at 95 instead of 72, and, notwith- standing the expenditure necessitated by the Abyssinian War, financial equilibrium practically restored.

While engaged in restoring order and in supporting Sonnino's

courageous struggle against bankruptcy, Crispi became the object of fierce attacks from the Radicals, Socialists oa'crispi an d anarchists. On the 16th of June an attempt by an anarchist named Lega was made on Crispi's life; on the 24th of June President Carnot was assassinated by the anarchist Caserio; and on the 30th of June an Italian journalist was murdered at Leghorn for a newspaper attack upon anarchism — a series of outrages which led the government to frame and parliament to adopt (nth July) a Public Safety Bill for the pre- vention of anarchist propaganda and crime. At the end of July the trial of the persons implicated in the Banca Romana scandal revealed the fact that among the documents abstracted by Giolitti from the papers of the bank manager, Tanlongo, were several bearing upon Crispi's political and private life. On the nth of December Giolitti laid these and other papers before the Chamber, in the hope of ruining Crispi, but upon examination most of thern were found to be worthless, and the rest of so private a nature as to be unfit for publication. The effect of the incident was rather to increase detestation of Giolitti than to damage Crispi. The latter, indeed, prosecuted the former for libel and for abuse of his position when premier, but after many vicissitudes, including the flight of Giolitti to Berlin in order to avoid arrest, the Chamber refused authorization for the prosecution, and the matter dropped. A fresh at'empt of the same kind was then made against Crispi by the Radical leader Cavallotti, who advanced unproven charges of corruption and embezzlement. These attacks were, however, unavailing to shake Crispi's position, and in the general election of May 1895 his government obtained a majority of nearly 200 votes. Nevertheless public confidence in the efficacy of the parliamentary system and in the honesty of politicians was seriously diminished by these un- savoury occurrences, which, in combination with the acquittal of all the defendants in the Banca Romana trial, and the abandon- ment of the proceedings against Giolitti, reinforced to an alarm- ing degree the propaganda of the revolutionary parties.

The foreign policy of the second Crispi Administration, in which the portfolio of foreign affairs was held by Baron Blanc, was, as before, marked by a cordial interpretation of Complka- tne tr jpj e alliance, and by close accord with Great Eritrea. Britain. In the Armenian question Italy seconded with energy the diplomacy of Austria and Germany, while the Italian fleet joined the British Mediterranean squadron in a demonstration off the Syrian coast. Graver than any foreign question were the complications in Eritrea. Under the arrange- ment concluded in 1891 by Rudini with native chiefs in regard to the Italo-Abyssinian frontier districts, relations with Abyssinia had remained comparatively satisfactory. Towards the Sudan, however,

the Mahdists, who had recovered from a defeat inflicted by an Italian force at Agordat in 1890, resumed operations in December 1893. Colonel Arimondi, commander of the colonial forces in the absence of the military governor, General Baratieri, attacked and routed a dervish force 10,000 strong on the 21st of December. The Italian troops, mostly native levies, numbered only 2200 men. The dervish loss was more than 1000 killed, while the total Italian casualties amounted to less than 250. General Baratieri, upon returning to the colony, decided to execute a coup de main against the dervish base at Kassala, both in order to relieve pressure from that quarter and to preclude a combined Abyssinian and dervish attack upon the colony at the end of

1894. The protocol concluded with Great Britain on the 15th of April 1891, already referred to, contained a clause to the effect that, were Kassala occupied by the Italians, the place should be trans- ferred to the Egyptian government as soon as the latter should be in a position to restore order in the Sudan. Concentrating a little army of 2600 men, Baratieri surprised and captured Kassala on the 17th of July 1894, and garrisoned the place with native levies under Italian officers. Meanwhile Menelek, jealous of the extension o'f Italian influence to a part of northern Somaliland and to the Benadir coast, had, with the support of France and Russia, completed his preparations for asserting his authority as independent ruler of Ethiopia. On the nth of May 1893 he denounced the treaty of Uccialli, but the Giolitti cabinet, absorbed by the bank scandals, paid no heed to his action. Possibly an adroit repetition in favour of Mangasha and against Menelek of the policy formerly followed in favour of Menelek against the negus John might have consolidated Italian influence in Abyssinia by preventing the ascendancy of any single chieftain. The Italian government, however, neglected this opening, and Mangasha came to terms with Menelek. Consequently the efforts of Crispi and his envoy, Colonel Piano, to conclude a new treaty with Menelek in June 1894 not only proved unsuccessful, but formed a prelude to troubles on the Italo-Abyssinian frontier. Bath-Agos, the native chieftain who ruled the Okule-Kusai and the cis-Mareb provinces on behalf of Italy, intrigued with Mangasha, ras of the trans-Mareb province of Tigre, and with Menelek, to raise a revolt against Italian rule on the high plateau. In December 1894 the revolt broke out, but Major Toselli with a small force marched rapidly against Bath Agos, whom he routed and killed at Halai. General Baratieri, having reason to suspect the complicity of Mangasha in the revolt, called upon him to furnish troops for a projected Italo-Abyssinian campaign against the Mahdists. Mangasha made no reply, and Baratieri crossing the Mareb advanced to Adowa, but four days later was obliged to return

northwards. Mangasha thereupon took the offensive and attempted to occupy the village of Coatit in Okule-Kusai, but was forestalled and defeated by Baratieri on the 13th of January 1895. Hurriedly retreating to Senafe, hard pressed by the Italians, who shelled Senafe on the evening of the 1 5th of January, Mangasha was obliged to abandon his camp and provisions to Baratieri, who also secured a quantity of corre- spondence establishing the complicity of Menelek and Mangasha in the revolt of Bath-Agos.

The comparatively facile success achieved by Baratieri against Mangasha seems to have led him to undervalue his enemy, and to forget that Menelek, negus and king of Shoa, had an interest in allowing Mangasha to be o/rigre. crushed, in order that the imperial authority and the superiority of Shoan over Tigrin arms might be the more strikingly asserted. After obtaining the establishment of an apostolic prefecture in Eritrea under the charge of Italian Franciscans, Baratieri expelled from the colony the French Lazarist mission- aries for their alleged complicity in the Bath-Agos insurrection, and in March 1895 undertook the conquest of Tigre. Occupying Adigrat and Makalle, he reached Adowa on the 1st of April, and thence pushed forward to Axum, the holy city of Abyssinia. These places were garrisoned, and during the rainy season Baratieri returned to Italy, where he was received with unbounded enthusiasm. Whether he or the Crispi cabinet had any inkling of the enterprise to which they were committed by the occupa- tion of Tigre is more than doubtful. Certainly Baratieri made no adequate preparations to repel an Abyssinian attempt to reconquer the province. Early in September both Mangasha and Menelek showed signs of activity, and on the 20th of Sep- tember Makonnen, ras of Harrar, who up till then had been regarded as a friend and quasi-ally by Italy, expelled all Italians from his territory and marched with 30,000 men to join the negus. On returning to Eritrea, Baratieri mobilized his native reserves and pushed forward columns under Major Toselli and General Arimondi as far south as Amba Alagi. Mangasha fell back before the Italians, who obtained several minor successes; but on the 6th of December Toselli's column, 2000 strong, which

through a misunderstanding continued to hold Amba Alagi, was almost annihilated by the Abyssinian vanguard of 40,000 men. Toselli

and all but three officers and 300 men fell at their posts after a desperate resistance. Arimondi, collecting the survivors of the Toselli column, retreated to Makalle and Adigrat. At Makalle, however, he left a small garrison in the fort, which on the 7th of January 1896 was invested by the Abyssinian army. Repeated attempts to capture the fort having failed, Menelek and Makonnen opened negotiations with Baratieri for its capitula- tion, and on the 21st of January the garrison, under Major Galliano, who had heroically defended the position, were per- mitted to march out with the honours of war. Meanwhile Baratieri received reinforcements from Italy, but remained undecided as to the best plan of campaign. Thus a month was lost, during which the Abyssinian army advanced to Hausen, a position slightly south of Adowa. The Italian commander attempted to treat with Menelek, but his negotiations merely enabled the Italian envoy, Major Salsa, to ascertain that the Abyssinians were nearly 100,000 strong mostly armed with rifles and well supplied with artillery. The Italians, including camp-followers, numbered less than 25,000 men, a force too small for effective action, but too large to be easily provisioned at 200 m. from its base, in a roadless, mountainous country, almost devoid of water. For a moment Baratieri thought of retreat, especially as the hope of creating a diversion from Zaila towards Harrar had failed in consequence of the British refusal to permit the landing of an Italian force without the consent of France. The defection of a number of native allies (who, however, were attacked and defeated by Colonel Stevani on the 18th of February) rendered the Italian position still more precarious; but Baratieri, unable to make up his mind, continued to manoeuvre in the hope of drawing an Abyssinian attack. These futile tactics exasperated the home government, which on the 22nd of February despatched General Baldissera, with strong reinforcements, to supersede Baratieri. On the 25th of February Crispi telegraphed to Baratieri, denouncing his opera- tions as ” military phthisis,” and urging him to decide upon some strategic plan. Baratieri, anxious probably to obtain some success before the arrival of Baldissera, and alarmed by the rapid diminution of his stores, which precluded further immobility, called a council of war (29th of February) and obtained the approval of the divisional commanders for a plan of attack. During the night the army advanced towards Adowa in three divisions, under Generals Dabormida, Arimondi and Albertone, each division being between 4000 and 5000 strong, and a brigade 5300 strong under General Ellena remaining in reserve. All the divisions, save that of Aibertone, consisted chiefly of Italian troops. During the march Albertone’s native division mistook the road, and found itself obliged to delay in the Arimondi column by retracing its steps. Marching rapidly, however, Albertone outdistanced the other columns, but, in

consequence of allowing his men an hour's rest, arrived upon the scene of action when the Abyssinians, whom it had been hoped to surprise at dawn, were ready to receive the attack. Pressed by overwhelming forces, the Italians, after a violent combat, began to give way. The Dabormida division, unsupported by Albertone, found itself likewise engaged in a separate combat against superior numbers. Similarly the Arimondi brigade was attacked by 30,000 Shoans, and encumbered by the debris of Albertone's troops. Baratieri vainly attempted to push forward the reserve, but the Italians were already overwhelmed, and the battle — or rather, series of distinct engagements — ended in a general rout. The Italian loss is estimated to have been more than 6000, of whom 3125 were whites. Between 3000 and 4000 prisoners were taken by the Abyssinians, including General Albertone, while Generals Arimondi and Dabormida were killed and General Ellena wounded. The Abyssinians lost more than 5000 killed and 8000 wounded. Baratieri, after a futile attempt to direct the retreat, fled in haste and reached Adi-Caje before the debris of his army. Thence he despatched telegrams to Italy throwing blame for the defeat upon his troops, a proceeding which sub-

Battle ot Adowa.

sequent evidence proved to be as unjustifiable as it was unsoldier-like. Placed under court-martial for his conduct, Baratieri was acquitted of the charge for having been led to give battle by other than military considerations, but the sentence " deplored that in such difficult circumstances the command should have been given to a general so inferior to the exigencies of the situation."

In Italy the news of the defeat of Adowa caused deep dis- couragement and dismay. On the 5th of March the Crispi cabinet resigned before an outburst of indignation which the Opposition had assiduously fomented, and five days later a new cabinet was formed by General Ricotti-Magnani, who, however, made over the premiership to the marquis di Rudini. The latter, though leader of the Right, had long been intriguing with Cavallotti, leader of the Extreme Left, to overthrow Crispi, but without the disaster of Adowa his plan would scarcely have succeeded. The first act of the new cabinet was to confirm instructions given by its predecessor to General Baldissera (who had succeeded General Baratieri on the 2nd of March) to treat for peace with Menelek if he thought desirable. Baldissera opened negotiations with the negus through Major Salsa, and simultaneously reorganized the Italian army. The negotiations having failed, he marched to relieve the beleaguered garrison of Adigrat; but Menelek, discouraged by the heavy losses at Adowa, broke up his camp and

returned southwards to Shoa. At the same time Baldissera detached . -f*L?/. Colonel Stevani with four native battalions to relieve me nt Kassala, then hard pressed by the Mahdists. Kassala was relieved on the 1st of April, and Stevani a few days later severely defeated the dervishes at Jebel Mokram and Tucruff. Returning from Kassala Colonel Stevani rejoined Baldissera, who on the 4th of May relieved Adigrat after a well-executed march. By adroit negotiations with Mangasha. the Italian general obtained the release of the Italian prisoners in Tigre, and towards the end of May withdrew his whole force north of the Mareb. Major Nerazzini was then despatched as special envoy to the negus to arrange terms of peace. On the 26th of October Nerazzini succeeded in concluding, at Adis Ababa, a provisional treaty annulling the treaty of Uccialli; recognizing the absolute independence of Ethiopia; postponing for one year the definitive delimitation of the Italo-Abyssinian boundary, but allowing the Italians meanwhile to hold the strong Mareb- Belesa-Muna line; and arranging for the release of the Italian prisoners after ratification of the treaty in exchange for an indemnity of which the amount was to be fixed by the Italian government. The treaty having been duly ratified, and an indemnity of £400,000 paid to Menelek, the Shoan prisoners were released, and Major Nerazzini once more returned to Abyssinia with instructions to secure, if possible, Menelek's assent to the definitive retention of the Mareb-Belesa-Muna line by Italy. Before Nerazzini could reach Adis Ababa, Rudini, in order partially to satisfy the demands of his Radical supporters for the abandonment of the colony, announced in the Chamber the intention of Italy to limit her occupation to the triangular zone between the points Asmara, Keren and Massawa, and, possibly, to withdraw to Massawa alone. _ This declaration, of which Menelek was swiftly apprised by French agents, rendered it impossible to Nerazzini to obtain more than a boundary leaving to Italy but a small portion of the high plateau and ceding to Abyssinia the fertile provinces of Serae and Okule-Kusai. The fall of the Rudini cabinet in June 1898, however, enabled Signor Ferdinando Martini and Captain Cicco di Cola, who had been appointed respectively civil governor of Eritrea and minister resident at Adis Ababa, to prevent the cession of Serae and Okule- Kusai, and to secure the assent of Menelek to Italian retention of the Mareb-Belesa-Muna frontier. Eritrea has now approxi- mately the same extent as before the revolt of Bath-Agos, except in regard (1) to Kassala, which was transferred to the Anglo-Egyptian authorities on the 25th of December 1897, in pursuance of the above-mentioned Anglo-Italian convention; and (2) to slight rectifications of its northern and eastern bound- aries by conventions concluded between the Eritrean and the

Anglo-Egyptian authorities. Under Signor Ferdinando Martini's able administration (1898-1906) the cost of the colony to Italy was reduced and its trade and agriculture have vastly improved. While marked in regard to Eritrea by vacillation and un- dignified readiness to yield to Radical clamour, the policy of the marquis di Rudini was in other respects chiefly characterized by a desire to demolish Crispi and his supporters. Actuated by rancour against Crispi, he, on the 29th of April 1896, authorized the publication of a Green Book on Abyssinian affairs, in which, without the consent of Great Britain, the confidential Anglo- Italian negotiations in regard to the Abyssinian war were disclosed. This publication, which amounted to a gross breach of diplomatic confidence, might have endangered the cordiality of Anglo-Italian relations, had not the esteem of the British government for General Ferrero, Italian ambassador in London, induced it to overlook the incident. Fortunately for Italy, the marquis Visconti Venosta shortly afterwards consented to assume the portfolio of foreign affairs, which had been resigned by Duke Caetani di Sermoneta, and again to place, after an interval of twenty years, his unrivalled experience at the service of his country. In September 1896 he succeeded in concluding with France a treaty with regard to Tunisia in place of the old Italo-Tunisian treaty, denounced by the French Government a year previously. During the Greco-Turkish War of 1897 Visconti Venosta laboured to maintain the European concert, joined Great Britain in preserving Greece from the worst consequences of her folly, and lent moral and material aid in establishing an autonomous government in Crete. At the same time he mitigated the Francophil tendencies of some of his colleagues, accompanied King Humbert and Queen Margherita on their visit to Homburg in September 1897, and, by loyal observance of the spirit of the triple alliance, retained for Italy the confidence of her allies without forfeiting the goodwill of France.

The home administration of the Rudini cabinet compared unfavourably with that of foreign affairs. Bound by a secret understanding with the Radical leader Cavallotti, an able but unscrupulous demagogue, Rudini was compelled to bow to Radical exigencies. He threw all the influence of the government against Crispi, who was charged with complicity in embezzlements perpetrated by Favilla, managing director of the Bologna branch of the Bank of Naples. After being subjected to persecu- tion for nearly two

years, Crispi's character was substantially vindicated by the report of a parliamentary commission ap- pointed to inquire into his relations with Favilla. True, the commission proposed and the Chamber adopted a vote of censure upon Crispi's conduct in 1894, when, as premier and minister of the interior, he had borrowed £12,000 from Favilla to replenish the secret service fund, and had subsequently repaid the money as instalments for secret service were in due course furnished by the treasury. Though irregular, his action was to some extent justified by the depletion of the secret service fund under Giolitti and by the abnormal circumstances prevailing in 1893-1894, when he had been obliged to quell the insurrections in Sicily and Massa-Carrara. But the Rudini-Cavallotti alliance was destined to produce other results than those of the campaign against Crispi. Pressed by Cavallotti, Rudini in March 1897 dissolved the Chamber and conducted the general election in such a way as to crush by government pressure the partisans of Crispi, and greatly to strengthen the (Socialist, Republican and Radical) revolutionary parties. More than ever at the mercy of the Radicals and of their revolutionary allies, Rudini continued so to administer public affairs that subversive propaganda and associations obtained unprecedented extension. The effect was seen in May 1898, when, in consequence of a rise in the price of bread, disturbances occurred in southern Italy. The corn duty was reduced to meet the emergency, but the disturbed area extended to Naples, Foggia, Bari, Minervino- Riots of Murge, Molfetta and thence along the line of railway which skirts the Adriatic coast. At Faenza, Piacenza, Cremona, Pavia and Milan, where subversive associa- tions were stronger, it assumed the complexion of a political revolt. From the 7th to the 9th of May Milan remained practically in

May,

1898.

the hands of the mob. A palace was sacked, barricades were erected and for forty-eight hours the troops under General Bava-Beccaris, notwithstanding the employment of artillery, were unable to restore order. In view of these occurrences, Rudini authorized the proclamation of a state of siege at Milan, Florence, Leghorn and Naples, delegating the suppression of disorder to special military commissioners. By these means order was restored, though not without considerable loss of life at Milan and elsewhere. At Milan alone the official returns confessed to eighty killed and several hundred wounded, a total generally considered below the real figures. As in 1894, excess- ively severe sentences were passed by the military tribunals upon revolutionary leaders and other persons considered to

have been implicated in the outbreak, but successive royal amnesties obliterated these condemnations within three years.

No Italian administration since the death of Depretis under- went so many metamorphoses as that of the marquis di Rudini. Modified a first time within five months of its forma- tion (July 1896) in connexion with General Ricotti's 1°"? Army Reform Bill, and again in December 1897, s trucUon. when Zanardelli entered the cabinet, it was recon- structed for a third time at the end of May 1898 upon the question of a Public Safety Bill, but fell for the fourth and last time on the 18th of June 1898, on account of public indignation at the results of Rudini's home policy as exemplified in the May riots. On the 29th of June Rudini was succeeded in the premier- ship by General Luigi Pelloux, a Savoyard, whose only title to office was the confidence of the king. The Pelloux cabinet possessed no clear programme except in regard to the Public Safety Bill, which it had taken over from its predecessor. Pre- sented to parliament in November 1898, the bill was read a second time in the following spring, but its third reading was violently obstructed by the Socialists, Radicals and Republicans of the Extreme Left. After a series of scenes and scuffles the bill was promulgated by royal decree, the decree being post- dated to allow time for the third reading. Again obstruction precluded debate, and on the 22nd of July 1899 the decree automatically acquired force of law, pending the adoption of a bill of indemnity by the Chamber. In February 1900 it was, however, quashed by the supreme court on a point of procedure, and the Public Safety Bill as a whole had again to be presented to the Chamber. In view of the violence of Extremist obstruc- tion, an effort was made to reform the standing orders of the Lower House, but parliamentary feeling ran so high that General Pelloux thought it expedient to appeal to the country. The general election of June 1900 not only failed to reinforce the cabinet, but largely increased the strength of the extreme parties (Radicals, Republicans and Socialists), who in the new Chamber numbered nearly 100 out of a total of 508. General Pelloux therefore resigned, and on the 24th of June a moderate Liberal cabinet was formed by the aged Signor Saracco, president of the senate. Within five weeks of its formation King Humbert was shot by an anarchist assassin named Bresci while leaving an athletic festival at Monza, where his Majesty had distributed the prizes (29th July 1900). The death of the unfortunate monarch, against whom an attempt had previously been made by the anarchist Acciarito (22nd April De . a ˆ 1897), caused an outburst of profound sorrow and Humbert indignation. Though not a great monarch, King Humbert had, by his unfailing generosity and personal courage, won the esteem and affection of his people. During

the cholera epidemic at Naples and Busca in 1884, and the Ischia earth- quake of 1885, he, regardless of danger, brought relief and en- couragement to sufferers, and rescued many lives. More than £100,000 of his civil list was annually devoted to charitable pur- poses. Humbert was succeeded by his only son, Victor A lBBem t aa Emmanuel III. (b. November n, 1869), a liberal- ofKiag minded and well-educated prince, who at the time of Victor his father's assassination was returning from a cruise Emmamel in the eastern Mediterranean. The remains of King u,m Humbert were laid to rest in the Pantheon at Rome beside those of his father, Victor Emmanuel II. (9th August). Two

Foreign affairs.

days later Victor Emmanuel III. swore fidelity to the con- stitution before the assembled Houses of Parliament and in the presence of his consort, Elena of Montenegro, whom he had married in October 1896.

The later course of Italian foreign policy was marked by many vicissitudes. Admiral Canevaro, who had gained distinc- tion as commander of the international forces in Crete (1896-1898), assumed the direction of foreign affairs in the first period of the Pelloux administration. His diplomacy, though energetic, lacked steadiness. Soon after taking office he completed the negotiations begun by the Rudini administration for a new commercial treaty with France (October 1898), whereby Franco-Italian commercial relations were placed upon a normal footing after a breach which had lasted for more than ten years. By the despatch of a squadron to South America he obtained satisfaction for injuries inflicted thirteen years previously upon an Italian subject by the United States of Colombia. In December 1898 he convoked a diplomatic conference in Rome to discuss secret means for the repression of anarchist propaganda and crime in view of the assassination of the empress of Austria by an Italian anarchist (Luccheni), but it is doubtful whether results of practical value were achieved. The action of the tsar of Russia in convening the Peace Conference at The Hague in May 1900 gave rise to a question as to the right of the Vatican to be officially represented, and Admiral Canevaro, supported by Great Britain and Germany, succeeded in prevent- ing the invitation of a papal delegate. Shortly afterwards his

term of office was brought to a close by the failure of an attempt to secure for Italy a coaling station at Sanmen and a sphere of influence in China; but his policy of active participation in Chinese affairs was continued in a modified form by his successor, the Marquis Visconti Venosta, who, entering the reconstructed Pelloux cabinet in May 1899, retained the portfolio of foreign affairs in the ensuing Saracco administration, and secured the despatch of an Italian expedition, 2000 strong, to aid in repress- ing the Chinese outbreak and in protecting Italian interests in the Far East (July 1900). With characteristic foresight, Visconti Venosta promoted an exchange of views between Italy and France in regard to the Tripolitan hinterland, which the Anglo-French convention of 1899 had placed within the French sphere of influence — a modification of the status quo ante con- sidered highly detrimental to Italian aspirations in Tripoli. For this reason the Anglo-French convention had caused pro- found irritation in Italy, and had tended somewhat to diminish the cordiality of Anglo-Italian relations. Visconti Venosta is believed, however, to have obtained from France a formal declaration that France would not transgress the limits assigned to her influence by the convention. Similarly, in regard to Albania, Visconti Venosta exchanged notes with Austria with a view to the prevention of any misunderstanding through the conflict between Italian and Austrian interests in that part of the Adriatic coast. Upon the fall of the Saracco cabinet (9th February 1901) Visconti Venosta was succeeded at the foreign office by Signor Prinetti, a Lombard manufacturer of strong temperament, but without previous diplomatic experience. The new minister continued in most respects the policy of his predecessor. The outset of his administration was marked by Franco-Italian fetes at Toulon (10th to 14th April 1901), when the Italian fleet returned a visit paid by the French Mediterranean squadron to Cagliari in April 1899; and by the despatch of three Italian warships to Prevesa to obtain satis- faction for damage done to Italian subjects by Turkish officials. The Saracco administration, formed after the obstructionist crisis of 1899-1900 as a cabinet of transition and pacification, was Zaaar- overthrown in February 1901 in consequence of its deiu- vacillating conduct towards a dock strike at Genoa.

Qiolltl It was succeeded by a Zanardelli cabinet, in which the Cab,aet – portfolio of the interior was allotted to Giolitti. Com- posed mainly of elements drawn from the Left, and dependent for a majority upon the support of the subversive groups of the Extreme Left, the formation of this cabinet gave the signal for a vast working-class movement, during which the Socialist party

sought to extend its political influence by means of strikes and the

organization of labour leagues among agricultural labourers and artisans. The movement was confined chiefly to the northern and central provinces. During the first six months of 1 901 the strikes numbered 600, and involved more than 1,000,000 workmen. (H. W. S.)

G. 1902-1909

In 1901-1902 the social economic condition of Italy was a matter of grave concern. The strikes and other economic agita- tions at this time may be divided roughly into three groups: strikes in industrial centres for higher wages, troubles. shorter hours and better labour conditions generally; strikes of agricultural labourers in northern Italy for better con- tracts with the landlords; disturbances among the south Italian peasantry due to low wages, unemployment (particularly in Apulia), and the claims of the labourers to public land occupied illegally by the landlords, combined with local feuds and the struggle for power of the various influential families. The prime cause in most cases was the unsatisfactory economic condition of the working classes, which they realized all the more vividly for the very improvements that had been made in it, while education and better communications enabled them to organize themselves. Unfortunately these genuine grievances were taken advantage of by the Socialists for their own purposes, and strikes and disorders were sometimes promoted without cause and conciliation impeded by outsiders who acted from motives of personal ambition or profit. Moreover, while many strikes were quite orderly, the turbulent character of a part of the Italian people and their hatred of authority often converted peaceful demands for better conditions into dangerous riots, in which the dregs of the urban population (known as teppisti or the mala vita) joined.

Whereas in the past the strikes had been purely local and due to local conditions, they now appeared of more general and political character, and the ” sympathy ” strike came to be a frequent and undesirable addition to the ordinary economic agitation. The most serious movement at this time was that of the railway servants. The agitation had begun some fifteen years before, and the men had at various times demanded better pay and shorter hours, often with success. The next demand was for greater fixity of tenure and more regular promotion, as well as for the recognition by the companies of the railwaymen’s union. On the 4th of January 1902, the employees of the Mediterranean railway advanced these demands at a meeting at Turin, and threatened to strike if they were not satisfied. By the beginning of February the agitation had spread all over Italy, and the government was faced by the possibility of a strike which would

paralyse the whole economic life of the country. Then the Turin gas men struck, and a general ” sympathy ” strike broke out in that city in consequence, which resulted in scenes of violence lasting two days. The government called out all the railwaymen who were army reservists, but continued to keep them at their railway work, exercising military discipline over them and thus ensuring the continuance of the service. At the same time it mediated between the companies and the employees, and in June a settlement was formally concluded between the ministers of public works and of the treasury and the directors of the companies concerning the grievances of the employees.

One consequence of the agrarian agitations was the increased use of machinery and the reduction in the number of hands employed, which if it proved advantageous to the landlord and to the few labourers retained, who received higher wages, resulted in an increase of unemployment. The Socialist party, which had grown powerful under a series of weak-kneed administrations, now began to show signs of division; on the one hand there was the revolutionary wing, led by Signor Enrico Ferri, the Mantuan deputy, which advocated a policy of uncompromising class warfare, and on the other the riformisti, or moderate Socialists, led by Signor Filippo Turati, deputy for Milan, who adopted a more conciliatory attitude and were ready to ally themselves with other parliamentary parties. Later the division took another

aspect, the extreme wing being constituted by the sindacalisti, who were opposed to all legislative parliamentary action and favoured only direct revolutionary propaganda by means of the sindacati or unions which organized strikes and demonstrations. In March 1902 agrarian strikes organized by the leghe broke out in the district of Copparo and Polesine (lower valley of the Po), owing to a dispute about the labour contracts, and in Apulia on account of unemployment. In August there were strikes among the dock labourers of Genoa and the iron workers of Florence; the latter agitation developed into a general strike in that city, which aroused widespread indignation among the orderly part of the population and ended without any definite result. At Como 15,000 textile workers remained on strike for nearly a month, but there were no disorders.

The year 1903, although not free from strikes and minor disturbances, was quieter, but in September 1904 a very serious situation was brought about by a general economic a f^l m, t and political agitation. The troubles began with the 1904. disturbances at Buggeru in Sardinia and Castelluzzo in

Sicily, in both of which places the troops were compelled to use their arms and several persons were killed and wounded; at a demonstration at Sestri Ponente in Liguria to protest against what was called the Buggeru ” massacre,” four cara- bineers and eleven rioters were injured. The Monza labour exchange then took the initiative of proclaiming a general strike throughout Italy (September 15th) as a protest against the government for daring to maintain order. The strike spread to nearly all the industrial centres, although in many places it was limited to a few trades. At Milan it was more serious and lasted longer than elsewhere, as the movement was controlled by the anarchists under Arturo Labriola; the hooligans committed many acts of savage violence, especially against those workmen who refused to strike, and much property was wilfully destroyed. At Genoa, which was in the hands of the leppisii for a couple of days, three persons were killed and 50 wounded, including 14 policemen, and railway communications were interrupted for a short time. Venice was cut off from the mainland for two days and all the public services were suspended. Riots broke out also in Naples, Florence, Rome and Bologna. The deputies of the Extreme Left, instead of using their influence in favour of pacification, could think of nothing better than to demand an immediate convocation of parliament in order that they might present a bill forbidding the troops and police to use their arms in all conflicts between capital and labour, whatever the provocation might be. This preposterous proposal was of course not even discussed, and the movement caused a strong feeling of reaction against Socialism and of hostility to the government for its weakness; for, however much sympathy there might be with the genuine grievances of the working classes, the September strikes were of a frankly revolutionary character and had been fomented by professional agitators and kept going by the dregs of the people. The mayor of Venice sent a firm and dignified protest to the government for its inaction, and the people of Liguria raised a large subscription in favour of the troops, in recognition of their gallantry and admirable discipline during the troubles.

Early in 1905 there was a fresh agitation among the railway servants, who were dissatisfied with the clauses concerning the personnel in the bill for the purchase of the lines 1905. ky the state. They initiated a system of obstruction

which hampered and delayed the traffic without alto- gether suspending it. On the 17th of April a general railway strike was ordered by the union, but owing to the action of the authorities, who for once showed energy, the traffic was carried on. Other disturbances of a serious character occurred among the steelworkers of Terni, at Grammichele in Sicily and at Alessandria. The extreme parties now began to direct especial attention to propaganda in the army, with a view to destroying its cohesion and thus paralysing the action of the government. The campaign was conducted on the lines of the anti-militarist movement in France identified with the name of Herve. Fortu- nately, however, this policy was not successful, as military service is less unpopular in Italy than in many other countries; aggressive

militarism is quite unknown, and without it anti-militarism can gain no foothold. No serious mutinies have ever occurred in the Italian army, and the only results of the propaganda were occasional meetings of hooligans, where Herveist sentiments were expressed and applauded, and a few minor disturbances among reservists unexpectedly called back to the colours. In the army itself the esprit de corps and the sense of duty and discipline nullified the work of the propagandists.

In June and July 1907 there were again disturbances among the agricultural labourers of Ferraia and Rovigo, and a wide- spread strike organized by the leghe throughout those provinces caused very serious losses to all concerned. /907> The leghisti, moreover, were guilty of much criminal violence; they committed one murder and established a veritable reign of terror, boycotting, beating and wounding numbers of peaceful labourers who would not join the unions, and brutally maltreating solitary policemen and soldiers. The authorities, however, by arresting a number of the more prominent leaders succeeded in restoring order. Almost immediately afterwards an agitation of a still less defensible character broke out in various towns under the guise of anti-clericalism. Certain scandals had come to light in a small convent school at Greco near Milan. This was seized upon as a pretext for violent anti-clerical demon- strations all over Italy and for brutal and unprovoked attacks on unoffending priests; at Spezia a church was set on fire and another dismantled, at Marino Cardinal Merry del Val was attacked by a gang of hooligans, and at Rome the violence of the teppisti reached such a pitch as to provoke reaction on the part of all respectable people, and some of the aggressors were very roughly handled. The Socialists and the Freemasons were largely responsible for the agitation, and they filled the country with stories of other priestly and conventual immoralities, nearly all of which, except the

original case at Greco, proved to be without foundation. In September 1907 disorders in Apulia over the repartition of communal lands broke out anew, and were particularly serious at Ruvo, Bari, Cerignola and Satriano del Colle. In some cases there was foundation for the labourers' claims, but unfortunately the movement got into the hands of professional agitators and common swindlers, and the leader, a certain Giampetruzzi, who at one time seemed to be a worthy colleague of Marcelin Albert, was afterwards tried and condemned for having cheated his own followers.

In October 1907 there was again a general strike at Milan, which was rendered more serious on account of the action of the railway servants, and extended to other cities; traffic was disorganized over a large part of northern Italy, until the government, being now owner of the railways, dismissed the ringleaders from the service. This had the desired effect, and although the Sindacato del ferrovieri (railway servants' union) threatened a general railway strike if the dismissed men were not reinstated, there was no further trouble. In the spring of 1908 there were agrarian strikes at Parma; the labour contracts had pressed hardly on the peasantry, who had cause for complaint; but while some improvement had been effected in the new contracts, certain unscrupulous demagogues, of whom Alceste De Ambris, representing the " syndacalist " wing of the Socialist party, was the chief, organized a widespread agitation. The landlords on their part organized an agrarian union to defend their interests and enrolled numbers of non-union labourers to carry on the necessary work and save the crops. Conflicts occurred between the strikers and the independent labourers and the police; the trouble spread to the city of Parma, where violent scenes occurred when the labour exchange was occupied by the troops, and many soldiers and policemen, whose behaviour as usual was exemplary throughout, were seriously wounded. The agitation ceased in June with the defeat of the strikers, but not until a vast amount of damage had been done to the crops and all had suffered heavy losses, including the government, whose expenses for the maintenance of public order ran into tens of millions of lire. The failure of the strike caused the Socialists to quarrel among themselves and to accuse each other of dis- honesty in the management of party funds; it appeared in fact

that the large sums collected throughout Italy on behalf of the strikers had been squandered or appropriated by the “synda- calist” leaders. The spirit of indiscipline had begun to reach the lower classes of state employees, especially the school teachers and the postal and telegraph clerks, and at one time it seemed as though the country were about to face a situation similar to that which arose in France in the spring of 1909. Fortunately, however, the government, by dismissing the ringleader, Dr Campanozzi, in time nipped the agitation in the bud, and it did attempt to redress some of the genuine grievances. Public opinion upheld the government in its attitude, for all persons of common sense realized that the suspension of the public services could not be permitted for a moment in a civilized country.

In parliamentary politics the most notable event in 1902 was the presentation of a divorce bill by Signor Zanardelli’s government; this was done not because there was any ‘“cuts’ real deman

In January 1903 Signor Prinetti, the minister for foreign affairs, resigned on account of ill-health, and was succeeded by Admiral Morin, while Admiral Bettolo took the latter’s place as minister of marine. The unpopularity of the ministry forced Signor Giolitti, the minister of the interior, to resign (June 1903), and he was followed by Admiral Bettolo, whose administration had been violently attacked by the Socialists; in October Signor Zanardelli, the premier, resigned on account of his health, and the king entrusted the formation of the cabinet to Signor Giolitti. The latter accepted the task, and the new administration included Signor Tittoni, late prefect of Naples, as foreign minister, Signor Luigi Luzzatti, the eminent financier, at the treasury, General Pedotti at the war office, and Admiral Mirabello as minister of marine. Almost immediately after his appointment Signor Tittoni accompanied the king and queen of Italy on a state visit to France and then to England, where various international questions were discussed, and the cordial reception which the royal pair met with in London and at Windsor served to dispel the small cloud which had arisen in the relations of the two countries on account of the Tripoli agreements and the language question in Malta. The premier’s programme was not well received by the Chamber, although the treasury minister’s financial statement was again satisfactory. The weakness of the government in dealing with the strike riots caused a feeling of profound dissatisfaction, and the so-called ” experiment of liberty,” conducted with the object of conciliat- ing the extreme parties, proved a dismal failure. In October r904, after the September strikes, the Chamber was dissolved, and at the general elections in November a ministerial majority was returned, while the deputies of the Extreme Left (Socialists, Republicans and Radicals) were reduced from 107 to 94, and a few mild clericals elected. The municipal elections in several of the larger cities, which had hitherto

been regarded as strong- holds of socialism, marked an overwhelming triumph for the constitutional parties, notably in Milan, Turin and Genoa, for the strikes had wrought as much harm to the working classes as to the bourgeoisie. In spite of its majority the Giolitti cabinet, realizing that it had lost its hold over the country, resigned in March 1905.

1903- 1905.

1905- 1906.

1906- 1909.

Signor Fortis then became premier and minister of the interior, Signor Maiorano finance minister and Signor Carcano treasury minister, while Signor Tittoni, Admiral Mirabello and General Pedotti retained the portfolios they had held in the previous administration. The new government was colourless in the extreme, and the premier's programme aroused no enthusiasm in the House, the most important bill presented being that for the purchase of the railways, which was voted in June 1905. But the ministry never had any real hold over the country or parliament, and the dissatisfaction caused by the modus vivendi with Spain, which would have wrought much injury to the Italian wine-growers, led to demonstrations and riots, and a hostile vote in the Chamber produced a cabinet crisis (December 17, 1905) ; Signor Fortis, however, reconstructed the ministry, inducing the marquis di San Giuliano to accept the portfolio of foreign affairs. This last fact was significant, as the new foreign secretary, a Sicilian deputy and a specialist on international politics, had hitherto been one of Signor Sonnino's staunchest adherents; his defection, which was but one of many, showed that the more prominent members of the Sonnino party were tired of waiting in vain for their chief's access to power. Even this cabinet was still-born, and a hostile vote in the Chamber on the 30th of January 1906 brought about its fall.

Now at last, after waiting so long, Signor Sonnino's hour had struck, and he became premier for the first time. This result was most satisfactory to all the best elements in the country, and great hopes were entertained that the advent of a rigid and honest statesman would usher in a new era of Italian parliamentary life. Unfortunately at the very outset of its career the composition of the new cabinet proved disappointing; for while such men as Count Guicciardini, the minister for foreign affairs, and Signor Luzzatti at the treasury commanded general approval, the choice of Signor Sacchi as minister of justice and of Signor Pantano as minister of agriculture and trade, both of them advanced and militant Radicals, savoured of an unholy compact between the premier and his erstwhile bitter enemies, which boded

ill for the success of the administration. For this unfortunate combination Signor Sonnino himself was not altogether to blame; having lost many of his most faithful followers, who, weary of waiting for office, had gone over to the enemy, he had been forced to seek support among men who had professed hostility to the existing order of things and thus to secure at least the neutrality of the Extreme Left and make the public realize that the " reddest " of Socialists, Radicals and Republicans may be tamed and rendered harmless by the offer of cabinet appointments. A similar experiment had been tried in France not without success. Unfortunately in the case of Signor Sonnino public opinion expected too much and did not take to the idea of such a com- promise. The new premier's first act was one which cannot be sufficiently praised: he suppressed all subsidies to journalists, and although this resulted in bitter attacks against him in the columns of the " reptile press " it commanded the approval of all right-thinking men. Signor Sonnino realized, however, that his majority was not to be counted on: " The country is with me," he said to a friend, " but the Chamber is against me." In April 1906 an eruption of Mount Etna caused the destruction of several villages and much loss of life and damage to property; in appointing a committee to distribute the relief funds the premier refused to include any of the deputies of the devastated districts among its members, and when asked by them for the reason of this omission, he replied, with a frankness more characteristic of the man than politic, that he knew they would prove more solicitous in the distribution of relief for their own electors than for the real sufferers. A motion presented by the Socialists in the Chamber for the immediate discussion of a bill to prevent " the massacres of the proletariate " having been rejected by an enormous majority, the 28 Socialist deputies resigned their seats; on presenting themselves for re-election their number was reduced to 25. A few days later the ministry, having received an adverse vote on a question of procedure, sent in its resignation (May 17).

I 902- I 909]

ITALY

83

The fall of Signor Sonnino, the disappointment caused by the non-fulfilment of the expectations to which his advent to power had given rise throughout Italy and the dearth of influential statesmen, made the return to power of Signor Giolitti inevitable. An appeal to the country might have brought about a different result, but it is said that opposition from the highest quarters rendered this course practically impossible. The change of government brought Signor Tittoni back to the foreign office; Signor Maiorano became treasury minister, General Vigano minister of war,

Signor Cocco Ortu, whose chief claim to con- sideration was the fact of his being a Sardinian (the island had rarely been represented in the cabinet) minister of agriculture, Signor Gianturco of justice, Signor Massimini of finance, Signor Schanzer of posts and telegraphs and Signor Fusinato of educa- tion. The new ministry began auspiciously with the conversion of the public debt from 4% to 3!%, to be eventually reduced

to 35

This operation had been prepared by Signor Luzzatti

under Signor Sonnino's leadership, and although carried out by Signor Maiorano it was Luzzatti who deservedly reaped the honour and glory; the bill was presented, discussed and voted by both Houses on the 29th of June, and by the 7th of July the conversion was completed most successfully, showing on how sound a basis Italian finance was now placed. The surplus for the year amounted to 65,000,000 lire. In November Signor Gianturco died, and Signor Pietro Bertolini took his place as minister of public works; the latter proved perhaps the ablest member of the cabinet, but the acceptance of office under Giolitti of a man who had been one of the most trusted and valuable lieutenants of Signor Sonnino marked a further step in the degringolade of that statesman's party, and was attributed to the fact that Signor Bertolini resented not having had a place in the late Sonnino ministry. General Vigano was succeeded in December by Senator Casana, the first civilian to become minister of war in Italy. He made various reforms which were badly wanted in army administration, but on the whole the experiment of a civilian " War Lord " was not a complete success, and in April 1909 Senator Casana retired and was suc- ceeded by General Spingardi, an appointment which received general approval.

The elections of March 1909 returned a chamber very slightly different from its predecessor. The ministerial majority was over three hundred, and although the Extreme Left was some- what increased in numbers it was weakened in tone, and many of the newly elected " reds " were hardly more than pale pink.

Meanwhile, the relations between Church and State began to show signs of change. The chief supporters of the claims of the papacy to temporal power were the clericals of France and state. an< ˆ Austria, but in the former country they had lost all influence, and the situation between the Church and the government was becoming every day more strained. With the rebellion of her " Eldest Daughter," the Roman Church could not continue in her old attitude of uncompromising hostility towards United Italy, and the Vatican began to realize the folly of placing every Italian in the

dilemma of being either a good Italian or a good Catholic, when the majority wished to be both. Outside of Rome relations between the clergy and the authorities were as a rule quite cordial, and in May 1903 Cardinal Sarto, the patriarch of Venice, asked for and obtained an audience with the king when he visited that city, and the meeting which followed was of a very friendly character. In July following Leo XIII. died, and that same Cardinal Sarto became pope under the style of Pius X. The new pontiff, although nominally upholding the claims of the temporal power, in practice attached but little importance to it. At the elections for the local bodies the Catholics had already been permitted to vote, and, availing themselves of the privilege, they gained seats in many municipal councils and obtained the majority in some. At the general parliamentary elections of 1904 a few Catholics had been elected as such, and the encyclical of the 1 ith of June 1905 on the political organization of the Catholics, practically abolished the non expedit. In September of that year a number of religious institutions in the Near East, formerly under the protectorate of the

French government, in view of the rupture between Church and State in France, formally asked to be placed under Italian pro- tection, which was granted in January 1907. The situation thus became the very reverse of what it had been in Crispi's time, when the French government, even when anti-clerical, protected the Catholic Church abroad for political purposes, whereas the conflict between Church and State in Italy extended to foreign countries, to the detriment of Italian political interests. A more difficult question was that of religious education in the public elementary schools. Signor Giolitti wished to conciliate the Vatican by facilitating religious education, which was desired by the majority of the parents, but he did not wish to offend the Freemasons and other anti-clericals too much, as they could always give trouble at awkward moments. Consequently the minister of education, Signor Rava, concocted a body of rules which, it was hoped, would satisfy every one: religious instruction was to be maintained as a necessary part of the curriculum, but in communes where the majority of the municipal councillors were opposed to it it might be suppressed; the council in that case must, however, facilitate the teaching of religion to those children whose parents desire it. In practice, however, when the council has suppressed religious instruction no such facilities are given. At the general elections of March 1909, over a score of Clerical deputies were returned, Clericals of a very mild tone who had no thought of the temporal power and were supporters of the monarchy and anti-socialists; where no Clerical candidate was in the field the Catholic voters plumped for the constitutional candidate against all representatives of the Extreme Left. On the other hand, the attitude of the Vatican towards Liberalism within the Church was one of uncompromising reaction, and under the new pope the doctrines of Christian Democracy and Modernism were condemned in no

uncertain tone. Don Romolo Murri, the Christian Democratic leader, who exercised much influence over the younger and more progressive clergy, having been severely censured by the Vatican, made formal submission, and declared his intention of retiring from the struggle. But he appeared again on the scene in the general elections of 1909, as a Christian Democratic candidate; he was elected, and alone of the Catholic deputies took his seat in the Chamber on the Extreme Left, where all his neighbours were violent anti-clericals.

At 5 a.m. on the 28th of December 1908, an earthquake of appalling severity shook the whole of southern Calabria and the eastern part of Sicily, completely destroying the cities Earth- of Reggio and Messina, the smaller towns of Canitello, quake of Scilla, Villa San Giovanni, Bagnara, Palmi, Melito, f££ mber Porto Salvo and Santa Eufemia, as well as a large number of villages. In the case of Messina the horror of the situation was heightened by a tidal wave. The catastrophe was the greatest of its kind that has ever occurred in any country; the number of persons killed was approximately 150,000, while the injured were beyond calculation.

The characteristic feature of Italy's foreign relations during this period was the weakening of the bonds of the Triple Alliance and the improved relations with France, while the traditional friendship with England remained un- affairs. impaired. Franco-Italian friendship was officially cemented by the visit of King Victor Emmanuel and Queen Elena in October 1903 to Paris where they received a very cordial welcome. The visit was returned in April 1904 when M. Loubet, the French president, came to Rome; this action was strongly resented by the pope, who, like his predecessor since 1870, objected to the presence of foreign Catholic rulers in Rome, and led to the final rupture between France and the Vatican. The Franco-Italian understanding had the effect of raising Italy's credit, and the Italian rente, which had been shut out of the French bourses, resumed its place there once more, a fact which contributed to increase its price and to reduce the unfavour- able rate of exchange. That agreement also served to clear up the situation in Tripoli; while Italian aspirations towards Tunisia had been ended by the French occupation of that territory, Tripoli and Bengazi were now recognized as coming within the Italian ' ' sphere of influence . " The Tripoli hinterland ,

however, was in danger of being absorbed by other powers having large

African interests; the Anglo-French declaration of the 2 1 st of March 1899 in particular seemed likely to interfere with Italian activity.

The Triple Alliance was maintained and renewed as far as paper documents were concerned (in June 1902 it was reconfirmed for 12 years), but public opinion was no longer so favourably disposed towards it. Austria's petty persecutions of her Italian subjects in the irredente provinces, her active propaganda incompatible with Italian interests in the Balkans, and the anti- Italian war talk of Austrian military circles, imperilled the relations of the two " allies "; it was remarked, indeed, that the object of the alliance between Austria and Italy was to prevent war between them. Austria had persistently adopted a policy of pin-pricks and aggravating police provocation towards the Italians of the Adriatic Littoral and of the Trentino, while encouraging the Slavonic element in the former and the Germans in the latter. One of the causes of ill-feeling was the university question; the Austrian government had persistently refused to create an Italian university for its Italian subjects, fearing lest it should become a hotbed of " irredentism," the Italian- speaking students being thus obliged to attend the German- Austrian universities. An attempt at compromise resulted in the institution of an Italian law faculty at Innsbruck, but this aroused the violent hostility of the German students and populace, who gave proof of their superior civilization by an unprovoked attack on the Italians in October 1902. Further acts of violence were committed by the Germans in 1903, which led to anti- Austrian demonstrations in Italy. The worst tumults occurred in November 1904, when Italian students and professors were attacked at Innsbruck without provocation; being outnumbered by a hundred to one the Italians were forced to use their revolvers in self-defence, and several persons were wounded on both sides. Anti-Italian demonstrations occurred periodically also at Vienna, while in Dalmatia and Croatia Italian fishermen and workmen (Italian citizens, not natives) were subject to attacks by gangs of half-savage Croats, which led to frequent diplomatic " inci- dents." A further cause of resentment was Austria's attitude towards the Vatican, inspired by the strong clerical tendencies of the imperial family, and indeed of a large section of the Austrian people. But the most serious point at issue was the Balkan question. Italian public opinion could not view without serious misgivings the active political propaganda which Austria was conducting in Albania. The two governments frequently discussed the situation, but although they had agreed to a self- denying ordinance whereby each bound itself not to occupy any part of Albanian territory, Austria's declarations and promises were hardly borne out by the activity of her agents in the Balkans. Italy, therefore, instituted a counter-propaganda by means of schools and commercial agencies. The Macedonian troubles of 1903 again brought Austria and Italy into conflict.

The accept- ance by the powers of the Miirzsteg programme and the appoint- ment of Austrian and Russian financial agents in Macedonia was an advantage for Austria and a set-back for Italy; but the latter scored a success in the appointment of General de Giorgis as commander of the international Macedonian gendarmerie; she also obtained, with the support of Great Britain, France and Russia, the assignment of the partly Albanian district of Monastir to the Italian officers of that corps.

In October 1908 came the bombshell of the Austrian annexa- tion of Bosnia, announced to King Victor Emmanuel and to other rulers by autograph letters from the emperor-king. The news caused the most widespread sensation, and public opinion in Italy was greatly agitated at what it regarded as an act of brigandage on the part of Austria, when Signor Tittoni in a speech at Carate Brianza (October 6th) declared that " Italy might await events with serenity, and that these could find her neither unpre- pared nor isolated." These words were taken to mean that Italy would receive compensation to restore the balance of power upset in Austria's favour. When it was found that there was to be no direct compensation for Italy a storm of indignation was aroused against Austria, and also against Signor Tittoni.

On the 29th of October, however, Austria abandoned her military posts in the sandjak of Novibazar, and the frontier between Austria and Turkey, formerly an uncertain one, which left Austria a half-open back door to the Aegean, was now a distinct line of demarcation. Thus the danger of a " pacific penetration " of Macedonia by Austria became more remote. Austria also gave way on another point, renouncing her right to police the .Montenegrin coast and to prevent Montenegro from having warships of its own (paragraphs 5, 6 and n of art. 29 of the Berlin Treaty) in a note presented to the Italian foreign office on the 12th of April 1909. Italy had developed some important commercial interests in Montenegro, and anything which strengthened the position of that principality was a guarantee against further Austrian encroachments. The harbour works in the Montenegrin port of Antivari, commenced in March 1905 and completed early in 1909, were an Italian concern, and Italy became a party to the agreement for the Danube-Adriatic Railway (June 2, 1908) together with Russia, France and Servia; Italy was to contribute 35,000,000 lire out of a total capital of 100,000,000, and to be represented by four directors out of twelve. But the whole episode was a warning to Italy, and the result was a national movement for security. Credits for the army and navy were voted almost without a dissentient voice; new battleships were laid down, the strength of the army was increased, and the defences of the exposed eastern border were strengthened. It was clear that so long as Austria, bribed by Germany, could act in a way so opposed to Italian interests in the Balkans, the Triple

Alliance was a mockery, and Italy could only meet the situation by being prepared for all contingencies.

Bibliography. — It is difficult to indicate in a short space the most important sources of general Italian history, Muratori's great collection, the Return Italicarum scriptores. in combination with his Dissertationes, the chronicles and other historical material published by the Archivio Storico Italiano, and the woiks of detached annalists of whom the Villani are the most notable, take first rank. Next we may mention Muratori's Annali d' Italia, together with Guicciardini's Storia a" Italia and its modern continuation by Carlo Botta. Among the more recent contributions S. de Sismondi's Republiques ilaliennes (Brussels, 1838) and Carlo Troya's Storia a" Italia nel medio evo are among the most valuable general works, while the large Storia Politico, d' Italia by various authors, published at Milan, is also im- portant — F. Bertolini, / Barbari; F. Lanzani, Storia dei comuni italiani dalle origini fino al 1313 (1882); C. Cipolla, Storia delle Signorie Italiane dal 1313 al 1530 (iS3i); A. Cosci, V Italia durante le preponderanze straniere, 1530-1780 (1875): A. Franchetti, Storia d' Italia dal 1789 al 1799; G. de Castro, Storia d' Italia dal 1789 al 1814 (1881). For the beginnings of Italian history the chief works are T. Hodgkin's Italy and her Invaders (Oxford, 1892-1899) and P. Villari's Le Invasioni barbariche (Milan, 1900), both based on original research and sound scholarship. The period from 1494 to modern times is dealt with in various volumes of the Cambridge Modern History, especially in vol. i., " The Renaissance," which contains valuable bibliographies. Giuseppe Ferrari's Rivoluzioni d' Italia (1858) deserves notice as a work of singular vigour, though no great scientific importance, and Cesare Balbo's Sommario (Florence, 1856) presents the main outlines of the subject with brevity and clearness. For the period of the French revolution and the Napoleonic wars see F. Lemmi's Le Origini del risorgimento italiano (Milan, 1906); E. Bonnal de Ganges, La Chute d'une re- publique [Venise] (Paris, 1885); D. Carutti, Storia della corte di Savoia durante la rivoluzione e V impero francese (2 vols., Turin, 1892); G. de Castro, Storia d' Italia dal 1797 al 1814 (Milan, 1881); A. Dufourcq, Le Regime jacobin en Italie, 1796-1799 (Paris, 1900); A. Franchetti, Storia d' Italia dal 1789 al 1799 (Milan, 1878); P. Gaffarel, Bonaparte et les republiques ilaliennes (1796-1799) (Paris, 1895); R. M. Johnston, The Napoleonic Empire in Southern Italy (2 vols., with full bibliography, London, 1904); E. Ramondini, V Italia durante la dominazione francese (Naples, 1882); E. Ruth, Geschichte des italienischen Volkes unter der napoleonischen Herrschaft (Leipzig, 1859). For modern times, see Bolton King's History of Italian Unity (1899) and Bolton King and Thomas Okey's Italy To-day (1901). With regard to the history of separate provinces it may suffice to notice N. Machiaveili's Storia fiorentina, B. Corio's Storia di Milano, G. Capponi's Storia della repubblica

di Firenze (Florence, 1875), P. Villari's / primi due secoli della storia di Firenze (Florence, 1905), F. Pagano's Istoria del regno di Napoli (Palermo-Naples, 1832, &c), P. Romanin's Storia documentata di Venezia (Venice, 1853), M. Amari's Musulmani di Sicilia (1854-1875), F. Gregorovius's Geschichte der Stadt Rom (Stuttgart, 1881), A. von Reumont's Geschichte der Stadt Rom (Berlin, 1867), L. Cibrario's Storia della monarchia piemontese (Turin, 1840), and D. Carutti's

ITEM— ITINERARIUM

»5

Storia della diplomazia della corte di Savoia (Rome, 1875). The Archivii slorici and Deputazioni di storia patria of the various Italian towns and provinces contain a great deal of valuable material for local history. From the point of view of papal history, L. von Ranke's History of the Popes (English edition, London, 1870), M. Creighton's History of the Papacy (London, 1897) and L. Pastor's Geschichte der Pdpste (Freiburg i. B., 1886-1896), should be mentioned. From the point of view of general culture, Jacob Burckhardt's Cultur der Renaissance in Italien (Basel, i860), E. Guinet's Revolu- tions d'ltalie (Paris, 1857), and J. A. Symonds's Renaissance in Italy (5 vols., London, 1875, &c.) should be consulted. (L. V.)*

ITEM (a Latin adverb meaning " also," " likewise "), originally used adverbially in English at the beginning of each separate head in a list of articles, or each detail in an account book or ledger or in a legal document. The word is thus applied, as a noun, to the various heads in any such enumeration and also to a piece of information or news.

ITHACA ('I0om7), vulgarly Thiaki (OtdKij), next to Paxo the smallest of '.he seven Ionian Islands, with an area of about 44 sq. m. It forms an eparchy of the nomos of Cephalonia in the kingdom of Greece, and its population, which was 9873 in 1870, is now about 13,000. The island consists of two mountain masses, connected by a narrow isthmus of hills, and separated by a wide inlet of the sea known as the Gulf of Molo. The northern and greater mass culminates in the heights of Anoi (2650 ft.), and the southern in Hagios Stephanos, or Mount Merovigli (2100 ft.). Vathy (Ba0i> = "deep "), the chief town and port of the island, lies at the northern foot of Mount Stephanos, its whitewashed houses stretching for about a mile round the deep bay in the Gulf of Molo, to which it owes its name. As there are only one or two small stretches of arable land in Ithaca, the inhabitants are dependent on commerce for their grain supply; and olive oil, wine and currants are the principal products obtained by the cultivation of the thin stratum of soil that covers the calcareous rocks.

Goats are fed in con- siderable number on the brushwood pasture of the hills; and hares (in spite of Aristotle's supposed assertion of their absence) are exceptionally abundant. The island is divided into four districts: Vathy, Aeto (or Eagle's Cliff), Anoge (Anoi) or Upland, and Exoge (Exoi) or Outland.

The name has remained attached to the island from the earliest historical times with but little interruption of the tradi- tion; though in Brompton's travels (12th century) and in the old Venetian maps we find it called Fale or Val de Compar, and at a later date it not unfrequently appears as Little Cephalonia. This last name indicates the general character of Ithacan history (if history it can be called) in modern and indeed in ancient times; for the fame of the island is almost solely due to its position in the Homeric story of Odysseus. Ithaca, according to the Homeric epos, was the royal seat and residence of King Odysseus. The island is incidentally described with no small variety of detail, picturesque and topographical; the Homeric localities for which counterparts have been sought are Mount Neritos, Mount Neion, the harbour of Phorcys, the town and palace of Odysseus, the fountain of Arethusa, the cave of the Naiads, the stalls of the swineherd Eumaeus, the orchard of Laertes, the Korax or Raven Cliff and the island Asteris, where the suitors lay in ambush for Telemachus. Among the " identificationists " there are two schools, one placing the town at Polis on the west coast in the northern half of the island (Leake, Gladstone, &c), and the other at Aeto on the isthmus. The latter site, which was advocated by Sir William Gell {Topography and Antiquities of Ithaca, London, 1807), was supported by Dr H. Schliemann, who carried on excavations in 1873 and 1878 (seeH. Schliemann, Ilhaque, le Peloponnese, Troie, Paris, 1869, also published in German; his letter to The Times, 26th of September, 1878; and the author's life prefixed to Ilios, London, 1880). But his results were mainly negative. The fact is that no amount of ingenuity can reconcile the descriptions given in the Odyssey with the actual topography of this island. Above all, the passage in which the position of Ithaca is described offers great difficulties. " Now Ithaca lies low, farthest up the sea line towards the darkness, but those others face the dawning and the sun " (Butcher and Lang). Such a passage fits very ill an island

lying, as Ithaca does, just to the east of Cephalonia. Accordingly Professor W. Dorpfeld has suggested that the Homeric Ithaca is not the island which was called Ithaca by the later Greeks, but must be identified with Leucas (Santa Maura, q.v.). He succeeds in fitting the Homeric topography to this latter island, and suggests that the name may have been transferred in con- sequence of a migration of the inhabitants. There is no doubt that Leucas fits the Homeric descriptions much better than Ithaca; but, on the other hand, many scholars maintain that it is a mistake to treat the imaginary

descriptions of a poet as if they were portions of a guide-book, or to look, in the author of the Odyssey, for a close familiarity with the geography of the Ionian islands.

See, besides the works already referred to, the separate works on Ithaca by Schreiber (Leipzig, 1829) ; Riihle von Lilienstern (Berlin, 1832); N. Karavias Grivas ('laropia rijs vqarov 'Ifldiojs) (Athens, 1849); Bowen (London, 1851); and Gandar, (Paris, 1854); Hercher, in Hermes (1866); Leake's Northern Greece; Mure's Tour in Greece; Bursian's Geogr. von Griechenland; Gladstone, "The Dominions of Ulysses," in Macmillan's Magazine (1877) A history of the discus- sions will be found in Buchholz, Die Homerischen Realien (Leipzig, 1871); Partsch, Kephallenia und Ithaka (1890); W. Dorpfeld in Melanges Perrot, pp. 79-93 (1903 1 ; P. Goessler, Leukas-Ithaka (Stuttgart, 1904). (E. Gr.)

ITHACA, a city and the county-seat of Tompkins county, New York, U.S.A., at the southern end of Cayuga Lake, 60 m. S.W. of Syracuse. Pop. (1890) 11,079, (1900) 13,136, of whom 1310 were foreign-born, (1910 census) 14,802. It is served by the Delaware, Lackawanna & Western and the Lehigh Valley railways and by interurban electric line; and steam- boats ply on the lake. Most of the city is in the level valley, from which it spreads up the heights on the south, east and west. The finest residential district is East Hill, particularly Cornell and Cayuga Heights (across Fall Creek from the Cornell campus). Ren wick Beach, at the head of the lake, is a pleasure resort. The neighbouring region is one of much beauty, and is frequented by summer tourists. Near the city are many water- falls, the most notable being Taughannock Falls (9 m. N.), with a fall of 215 ft. Through the city from the east run Fall, Cas- cadilla and Six Mile Creeks, the first two of which have cut deep gorges and have a number of cascades and waterfalls, the largest, Ithaca Fall in Fall Creek, being 120 ft. high. Six Mile Creek crosses the south side of the city and empties into Cayuga Inlet, which crosses the western and lower districts, often inundated in the spring. The Inlet receives the waters of a number of small streams descending from the south-western hills. Among the attractions in this direction are Buttermilk Falls and ravine, on the outskirts of the city, Lick Brook Falls and glen and Enfield Falls and glen, the last 7 m. distant. Fall Creek furnishes good water-power. The city has various manufactures, including fire-arms, calendar clocks, traction engines, electrical appliances, patent chains, incubators, auto- phones, artesian well drills, salt, cement, window glass and wall- paper. The value of the factory product increased from $1,500,604 in 1900 to $2,080,002 in 1905, or 38-6%. Ithaca is also a farming centre and coal market, and much fruit is grown in the vicinity. The city is best known as the seat of Cornell University {q.v.). It has also the Ezra Cornell Free Library of about 28,000 volumes, the Ithaca Conservatory of Music, the Cascadilla School and the Ithaca High School.

Ithaca was settled about 1 789, the name being given to it by Simeon De Witt in 1806. It was incorporated as a village in 1821, and was chartered as a city in 1888. At Buttermilk Falls stood the principal village of the Tutelo Indians, Coreorgonel, settled in 1753 and destroyed in 1779 by a detachment of Sullivan's force.

ITINERARIUM {i.e. road-book, from Lat. iter, road), a term applied to the extant descriptions of the ancient Roman roads and routes of traffic, with the stations and distances. It is usual to distinguish two classes of these, Itineraria adnolala or scripta and Itineraria picta — the former having the character of a book, and the latter being a kind of travelling map. Of the Itineraria Scripta the most important are: (1) It. Antonini (see Antonini Itinerarium), which consists of two parts, the

one dealing with roads in Europe, Asia and Africa, and the other with familiar sea-routes — the distances usually being measured from Rome; (2) //. Hierosolymitanum or Burdigalense, which belongs to the 4th century, and contains the route of a pilgrimage from Bordeaux to Jerusalem and from Heraclea by Rome to Milan (ed. G. Parthey and M. Pinder, 1848, with the Itinerarium Anlonini); (3) It. Alexandria containing a sketch of the march- route of Alexander the Great, mainly derived from Arrian and prepared for Constantius's expedition in a.d. 340-345 against the Persians (ed. D. Volkmann, 1871). A collected edition of the ancient itineraria, with ten maps, was issued by Fortia d'Urban, Recueil des itineraires anciens (1845). Of the Itineraria Picta only one great example has been preserved. This is the famous Tabula Peutingeriana, which, without attending to the shape or relative position of the countries, represents by straight lines and dots of various sizes the roads and towns of the whole Roman world (facsimile published by K. Miller, 1888; see also Map).

ITIUS PORTUS, the name given by Caesar to the chief harbour which he used when embarking for his second expedition to Britain in 54 B.C. (De bello Callico, v. 2). It was certainly near the uplands round Cape Grisnez (Promuntorium Itium), but the exact site has been violently disputed ever since the renaissance of learning. Many critics have assumed that Caesar used the same port for his first expedition, but the name does not appear at all in that connexion (B. G. iv. 21-23). This fact, coupled with other considerations, makes it probable that the two expeditions started from different places. It is generally agreed that the first embarked at Boulogne. The same view was widely held about the second, but T. Rice Holmes in an

article in the Classical Review (May 1909) gave strong reasons for preferring Wissant, 4 m. east of Grisnez. The chief reason is that Caesar, having found he could not set sail from the small harbour of Boulogne with even 80 ships simultaneously, decided that he must take another point for the sailing of the " more than 800 " ships of the second expedition. Holmes argues that, allowing for change in the foreshore since Caesar's time, 800 specially built ships could have been hauled above the highest spring-tide level, and afterwards launched simultaneously at Wissant, which would therefore have been " commodissimus " (v. 2) or opposed to " brevissimus traiectus " (iv. 21).

See T. R. Holmes in Classical Review (May 1909), in which he partially revises the conclusions at which he arrived in his Ancient Britain (1907), pp. 552-594; that the first expedition started from Boulogne is accepted, e.g. by H. Stuart Jones, in English Historical Review (1909), xxiv. 115; other authorities in Holmes's article.

ITO, HIROBUMI, Prince (1841-1909), Japanese statesman, was born in 1841, being the son of Ito Juzo, and (like his father) began life as a retainer of the lord of Choshu, one of the most powerful nobles of Japan. Choshu, in common with many of his fellow Daimyos, was bitterly opposed to the rule of the shogun or tycoon, and when this rule resulted in the conclusion of the treaty with Commodore M. C. Perry in 1854, the smouldering discontent broke out into open hostility against both parties to the compact. In these views Ito cordially agreed with his chieftain, and was sent on a secret mission to Yedo to report to his lord on the doings of the government. This visit had the effect of causing Ito to turn his attention seriously to the study of the British and of other military systems. As a result he persuaded Choshu to remodel his army, and to exchange the bows and arrows of his men for guns and rifles. But Ito felt that his knowledge of foreigners, if it was to be thorough, should be sought for in Europe, and with the connivance of Choshu he, in company with Inouye and three other young men of the same rank as himself, determined to risk their lives by committing the then capital offence of visiting a foreign country. With great secrecy they made their way to Nagasaki, where they concluded an arrangement with the agent of Messrs Jardine, Matheson & Co. for passages on board a vessel which was about to sail for Shanghai (1863). At that port the adventurers separated, three of their number taking ship as passengers to London, while Ito and Inouye preferred to work their passages before the mast

in the "Pegasus," bound for the same destination. For a year these two friends remained in London studying English methods, but then events occurred in Japan which recalled them to theii country. The treaties lately concluded by the shogun with the foreign powers conceded the right to navigate the strait of Shimonoseki, leading to the Inland Sea. On the northern shores of this strait stretched the feudal state ruled over by Prince Choshu, who refused to recognize the clause opening the strait, and erected batteries on the shore, from which he opened fire on all ships which attempted to force the passage. The shdgun having declared himself unable in the circumstances to give effect to the provision, the treaty powers determined to take the matter into their own hands. Ito, who was better aware than his chief of the disproportion between the fighting powers of Europe and Japan, memorialized the cabinets, begging that hostilities should be suspended until he should have had time to use his influence with

Choshu in the interests of peace. With this object Ito hurried back to Japan. But his efforts were futile. Choshu refused to give way, and suffered the conse- quences of his obstinacy in the destruction of his batteries and in the infliction of a heavy fine. The part played by Ito in these negotiations aroused the animosity of the more reactionary of his fellow-clansmen, who made repeated attempts to assassinate him. On one notable occasion he was pursued by his enemies into a tea-house, where he was concealed by a young lady beneath the floor of her room. Thus began a romantic acquaintance, which ended in the lady becoming the wife of the fugitive. Subsequently (1868) Ito was made governor of Hiogo, and in the course of the following year became vice-minister of finance. In 1 87 1 he accompanied Iwakura on an important mission to Europe, which, though diplomatically a failure, resulted in the enlistment of the services of European authorities on military, naval and educational systems.

After his return to Japan Ito served in several cabinets as head of the bureau of engineering and mines, and in 1886 he accepted office as prime minister, a post which, when he resigned in 1 901, he had held four times. In 1882 he was sent on a mission to Europe to study the various forms of constitutional government; on this occasion he attended the coronation of the tsar Alexander III. On his return to Japan he was entrusted with the arduous duty of drafting a constitution. In 1890 he reaped the fruits of his labours, and nine years later he was destined to witness the abrogation of the old treaties, and the substitution in their place of conventions which place Japan on terms of equality with the European states. In all the great reforms in the Land of the Rising Sun Ito played a leading part. It was mainly due to his active interest in military and naval affairs that he was able to meet Li Hung-chang at the end of the Chinese and Japanese War (1895) as the representative of the conquering state, and the conclusion of the Anglo- Japanese Alliance in 1902 testified to his triumphant success in raising Japan to the first rank among civilized powers. As a reward for his conspicuous services in connexion with the Chinese War Ito was made a marquis, and in 1897 he accompanied Prince Arisu- gawa as a joint representative of the Mikado at the Diamond Jubilee of Queen Victoria. At the close of 1901 he again, though in an unofficial capacity, visited Europe and the United States; and in England he was created a G.C.B. After the Russo- Japanese War (1905) he was appointed resident general in Korea, and in that capacity he was responsible for the steps taken to increase Japanese influence in that country. In September 1907 he was advanced to the rank of prince. He retired from his post in Korea in July 1909, and became president of the privy council in Japan. But on the 26th of October, when on a visit to Harbin, he was shot dead by a Korean assassin.

He is to be distinguished from Admiral Count Yuko Ito (b. 1843), the distinguished naval commander.

ITRI, a town of Campania, Italy, in the province of Caserta, 6 m. by road N.W. of Formia. Pop. (1901) 5797. The town is picturesquely situated 690 ft. above sea-level, in the mountains which the Via Appia traverses between Fondi and Formia.

Interesting remains of the substruction wall supporting the ancient road are preserved in Itri itself; and there are many remains of ancient buildings near it. The brigand Fra Diavolo, the hero of Auber's opera, was a native of Itri, and the place was once noted for brigandage.

ITURBIDE (or Yturbide), AUGUSTIN DE (1783-1824), emperor of Mexico from May 1822 to March 1823, was born on the 27th of September 1783, at Valladolid, now Morelia, in Mexico, where his father, an Old Spaniard from Pampeluna, had settled with his creole wife. After enjoying a better educa- tion than was then usual in Mexico, Iturbide entered the military service, and in 1810 held the post of lieutenant in the provincial regiment of his native city. In that year the insurrection under Hidalgo broke out, and Iturbide, more from policy, it would seem, than from principle, served in the royal army. Possessed of splendid courage and brilliant military talents, which fitted him especially for guerilla warfare, the young Creole did signal service, and rapidly rose in military rank. In December 1813 Colonel Iturbide, along with General Llano, dealt a crushing blow to the revolt by defeating Morelos, the successor of Hidalgo, in the battle of Valladolid; and the former followed it up by another decisive victory at Puruaran in January 1814. Next year Don Augustin was appointed to the command of the army of the north and to the governorship of the provinces of Valladolid and Guanajuato, but in 1816 grave charges of extortion and violence were brought against him, which led to his recall. Although the general was acquitted, or at least although the inquiry was dropped, he did not resume his commands, but retired into private life for four years, which, we are told, he spent in a rigid course of penance for his former excesses. In 1820 Apodaca, viceroy of Mexico, received instructions from the Spanish cortes to proclaim the constitution promulgated in Spain in 181 2, but although obliged at first to submit to an order by which his power was much curtailed, he secretly cherished the design of reviving the absolute power for Ferdinand VII. in Mexico. Under pretext of putting down the lingering remains of revolt, he levied troops, and, placing Iturbide at their head, instructed him to proclaim the absolute power of the king. Four years of reflection, however, had modified the general's views, and now, led both by personal ambition and by patriotic regard for his country, Iturbide resolved to espouse the cause of national

independence. His subsequent proceedings — how he issued the Plan of Iguala, on the 24th of February 1821, how by the refusal of the Spanish cortes to ratify the treaty of Cordova, which he had signed with O'Donoju, he was transformed from a mere champion of monarchy into a candidate for the crown, and how, hailed by the soldiers as Emperor Augustin I. on the 18th of May 1822, he was compelled within ten months, by his arrogant neglect of constitutional restraints, to tender his abdication to a congress which he had forcibly dissolved — will be found detailed under Mexico. Although the congress refused to accept his abdication on the ground that to do so would be to recognize the validity of his election, it permitted the ex-emperor to retire to Leghorn in Italy, while in consideration of his services in 1820 a yearly pension of £5000 was conferred upon him. But Iturbide resolved to make one more bid for power; and in 1824, passing from Leghorn to London, he published a Statement, and on the 1 1 th of May set sail for Mexico. The congress immediately issued an act of outlawry against him, forbidding him to set foot on Mexican soil on pain of death. Ignorant of this, the ex-emperor landed in disguise at Soto la Marina on the 14th of July. He was almost immediately recognized and arrested, and on the 19th of July 1824 was shot at Padilla, by order of the state of Tamaulipas, without being permitted an appeal to the general congress. Don Augustin de Iturbide is described by his contemporaries as being of handsome figure and ingratiating manner. His brilliant courage and wonderful success made him the idol of his soldiers, though towards his prisoners he displayed the most cold-blooded cruelty, boasting in one of his despatches of having honoured Good Friday by shooting three hundred excommuni- cated wretches. Though described as amiable in his private life, he seems in his public career to have been ambitious and

unscrupulous, and by his haughty Spanish temper, impatient of all resistance or control, to have forfeited the opportunity of founding a secure imperial dynasty. His grandson Augustin was chosen by the ill-fated emperor Maximilian as his successor. See Statement of some of the principal events in the public life of Augustin de Iturbide, written by himself (Eng. trans., 1824).

ITZA, an American-Indian people of Mayan stock, inhabiting the country around Lake Peten in northern Guatemala. Chichen- Itza, among the most wonderful of the ruined cities .of Yucatan, was the capital of the Itzas. Thence, according to their traditions they removed, on the breaking up of the Mayan kingdom in 1420, to an island in the lake where another city was built. Cortes met them in 1525, but they preserved their independence till 1697, when the Spaniards destroyed the city and temples, and a library of sacred books, written in hieroglyphics on bark fibre. The Itzas were one of the eighteen semi-independent Maya states, whose incessant internecine

wars at length brought about the dismemberment of the empire of Xibalba and the destruction of Mayan civilization.

ITZEHOE, a town of Germany, in the Prussian province of Schleswig-Holstein, on the Stor, a navigable tributary of the Elbe, 32 m. north-west of Hamburg and 15 m. north of Gliickstadt. Pop. (1900) 15,649. The church of St Lawrence, dating from the 1 2 th century, and the building in which the Holstein estates formerly met, are noteworthy. The town has a convent founded in 1256, a high school, a hospital and other benevolent institutions. Itzehoe is a busy commercial place. Its sugar refineries are among the largest in Germany. Ironfounding, shipbuilding and wool-spinning are also carried on, and the manufactures include machinery, tobacco, fishing-nets, chicory, soap, cement and beer. Fishing employs some of the inhabitants, and the markets for cattle and horses are important. A considerable trade is carried on in agricultural products and wood, chiefly with Hamburg and Altona.

Itzehoe is the oldest town in Holstein. Its nucleus was a castle, built in 809 by Egbert, one of Charlemagne's counts, against the Danes. The community which sprang up around it was diversely called Esseveldoburg, Eselsfleth and Ezeho. In 1201 the town was destroyed, but it was restored in 1224. To the new town the Ltibeck rights were granted by Adolphus IV. in 1238, and to the old town in 1303. During the Thirty Years' War Itzehoe was twice destroyed by the Swedes, in 1644 and 1657, but was rebuilt on each occasion. It passed to Prussia in 1 867, with the duchy of Schleswig-Holstein.

IUKA, the county-seat of Tishomingo county, Mississippi, U.S.A., about 25 m. S.E. of Corinth in the N.E. corner of the state and 8 m. S. of the Tennessee river. Pop. (1900) 882; (1910) 1221. It is served by the Southern railway, and has a considerable trade in cotton and farm products. Its mineral springs make it a health resort. In the American Civil War, a Confederate force under General Sterling Price occupied the town on the 14th of September 1862, driving out a small Union garrison; and on the 19th of September a partial engagement took place between Price and a Federal column commanded by General Rosecrans, in which the Confederate losses were 700 and the Union 790. Price, whose line of retreat was threatened by superior forces under General Grant, withdrew from Iuka on the morning of the 20th of September.

IULUS, in Roman legend: (a) the eldest son of Ascanius and grandson of Aeneas, founder of the Julian gens {gens Iulia), deprived of his kingdom of Latium by his younger brother Silvius (Dion. Halic. i. 70); (b) another name for, or epithet of, Ascanius.

IVAN (John), the name of six grand dukes of Muscovy and tsars of Russia.

Ivan I., called Kalila, or Money-Bag (d. 1341), grand duke of Vladimir, was the first sobiratel, or" gatherer " of the scattered Russian lands, thereby laying the foundations of the future autocracy as a national institution. This he contrived to do by adopting a policy of complete subserviency to the khan of the Golden Horde, who, in return for a liberal and punctual tribute, permitted him to aggrandize himself at the expense of the lesser

grand dukes. Moscow and Tver were the first to fall. The latter j Ivan received from the hand of the khan, after devastating it j with a host of 50,000 Tatars (1327). When Alexander of Tver l fled to the powerful city of Pskov, Ivan, not strong enough to 1 attack Pskov, procured the banishment of Alexander by the aid of the metropolitan, Theognost, who threatened Pskov with an interdict. In 1330 Ivan extended his influence over Rostov by the drastic methods of blackmail and hanging. But Great Novgorod was too strong for him, and twice he threatened that republic in vain. In 1340 Ivan assisted the khan to ravage the domains of Prince Ivan of Smolensk, who had refused to pay the customary tribute to the Horde. Ivan's own domains, at any rate during his reign, remained free from Tatar incursions, and prospered correspondingly, thus attracting immigrants and their wealth from the other surrounding principalities. Ivan was a most careful, not to say niggardly economist, keeping an exact account of every village or piece of plate that his money- bags acquired, whence his nickname. The most important event of his reign was the transference of the metropolitan see from Vladimir to Moscow, which gave Muscovy the pre-eminence over all the other Russian states, and made the metropolitan the ecclesiastical police-superintendent of the grand duke. The Metropolitan Peter built the first stone cathedral of Moscow, and his successor, Theognost, followed suit with three more stone churches. Simultaneously Ivan substituted stone walls for the ancient wooden ones of the Kreml', or citadel, which made Moscow a still safer place of refuge.

See S. M. Solov'ev, History of Russia (Rus.), vol. iii. (St Petersburg, 1895) ; Polezhaev, The Principality of Moscow in the first half of the 14th Century (Rus.) (St Petersburg, 1878).

Ivan II. (1326-1359), grand duke of Vladimir, a younger son of Ivan Kalita, was born in 1326. In 1353 he succeeded his elder brother Simeon as grand duke, despite the competition of Prince Constantine of Suzdal, the

Khan Hanibek preferring to bestow the yarluik, or letter of investiture, upon Ivan rather than upon Constantine. At first the principalities of Suzdal, Ryazan and the republic of Novgorod refused to recognize him as grand duke, and waged war with him till 1354. The authority of the grand duchy sensibly diminished during the reign of Ivan II. The surrounding principalities paid but little attention to Moscow, and Ivan, " a meek, gentle and merciful prince," was ruled to a great extent by the tuisyatsky, or chiliarch, Alexis Khvost, and, after his murder by the jealous boyars in 1357, by Bishop Alexis. He died in 1359. Like most of his predecessors, Ivan, by his last will, divided his dominions among his children.

See Dmitry Ilovaisky, History of Russia (Rus.), vol. ii. (Moscow,

1 876-1 894).

Ivan III. (1440-1505), grand duke of Muscovy, son of Vasily (Basil) Vasilievich the Blind, grand duke of Moscow, and Maria Yaroslavovna, was born in 1440. He was co-regent with his father during the latter years of his life and succeeded him in 1462. Ivan tenaciously pursued the unifying policy of his predecessors. Nevertheless, cautious to timidity, like most of the princes of the house of Rurik, he avoided as far as possible any violent collision with his neighbours until all the circum- stances were exceptionally favourable, always preferring to attain his ends gradually, circuitously and subterraneously. Muscovy had by this time become a compact and powerful state, whilst her rivals had grown sensibly weaker, a condition of things very favourable to the speculative activity of a statesman of Ivan IH.'s peculiar character. His first enterprise was a war with the republic of Novgorod, which, alarmed at the growing dominancy of Muscovy, had placed herself beneath the protection of Casimir IV." king of Poland, an alliance regarded at Moscow as an act of apostasy from orthodoxy. Ivan took the field against Novgorod in 1470, and after his generals had twice defeated the forces of the republic, at Shelona and on the Dvina, during the summer of 1471, the Novgorodians were forced to sue for peace, which they obtained on engaging to abandon for ever the Polish alliance, ceding a considerable portion of their northern colonies, and paying a war indemnity of 15,500 roubles. From henceforth Ivan sought continually a pretext for destroying

Novgorod altogether; but though he frequently violated its ancient privileges in minor matters, the attitude of the republic was so wary that his looked-for opportunity did not come till 1477. In that year the ambassadors of Novgorod played into his hands by addressing him in public audience as " Gosudar " (sovereign) instead of " Gospodin " (" Sir ") as heretofore. Ivan at once seized upon this as a recognition of his sovereignty, and when the Novgorodians repudiated their ambassadors, he marched against them.

Deserted by Casimir IV., and surrounded on every side by the Muscovite armies, which included a Tatar contingent, the republic recognized Ivan as autocrat, and surrendered (January 14, 1478) all her prerogatives and possessions (the latter including the whole of northern Russia from Lapland to the Urals) into his hands. Subsequent revolts (1479-1488) were punished by the removal en masse of the richest and most ancient families of Novgorod to Moscow, Vyatka and other central Russian cities. After this, Novgorod, as an independent state, ceased to exist. The rival republic of Pskov owed the continuance of its own political existence to the readiness with which it assisted Ivan against its ancient enemy. The other principalities were virtually absorbed, by conquest, purchase or marriage contract — Yaroslavl in 1463, Rostov in 1474, Tver in 1485.

Ivan's refusal to share his conquests with his brothers, and his subsequent interference with the internal politics of their inherited principalities, involved him in several wars with them, from which, though the princes were assisted by Lithuania, he emerged victorious. Finally, Ivan's new rule of government, formally set forth in his last will to the effect that the domains of all his kinsfolk, after their deaths, should pass directly to the reigning grand duke instead of reverting, as hitherto, to the princes' heirs, put an end once for all to these semi-independent princelets. The further extension of the Muscovite dominion was facilitated by the death of Casimir IV. in 1492, when Poland and Lithuania once more parted company. The throne of Lithuania was now occupied by Casimir's son Alexander, a weak and lethargic prince so incapable of defending his posses- sions against the persistent attacks of the Muscovites that he attempted to save them by a matrimonial compact, and wedded Helena, Ivan's daughter. But the clear determination of Ivan to appropriate as much of Lithuania as possible at last compelled Alexander in 1499 to take up arms against his father- | in-law. The Lithuanians were routed at Vedrosha (July 14, 1500), and in 1503 Alexander was glad to purchase peace by ceding to Ivan Chernigov, Starodub, Novgorod-Syeversk and sixteen other towns. I It was in the reign of Ivan III. that Muscovy rejected the Tatar yoke. In 1480 Ivan refused to pay the customary tribute to the grand Khan Ahmed. When, however, the grand khan marched against him, Ivan's courage began to fail, and only the stern exhortations of the high-spirited bishop of Rostov, Vassian, could induce him to take the field. All through the autumn the Russian and Tatar hosts confronted each other on opposite sides of the Ugra, till the nth of November, when Ahmed retired into the steppe. In the following year the grand khan, while preparing a second expedition against Moscow, was suddenly attacked, routed and slain by Ivak, the khan of the Nogai Tatars, whereupon the Golden Horde suddenly fell to pieces. In 1487 Ivan reduced the khanate of Kazan (one of the offshoots of the Horde) to the condition of a vassal-state, though in his

later years it broke away from his suzerainty. With the other Mahommedan powers, the khan of the Crimea and the sultan of Turkey, Ivan's relations were pacific and even amicable. The Crimean khan, Mengli Girai, helped him against Lithuania and facilitated the opening of diplomatic intercourse between Moscow and Constantinople, where the first Russian embassy appeared in 1495.

The character of the government of Muscovy under Ivan III. changed essentially and took on an autocratic form which it had never had before. This was due not merely to the natural consequence of the hegemony of Moscow over the other Russian lands, but even more to the simultaneous growth of new and

exotic principles falling upon a soil already prepared for them. After the fall of Constantinople, orthodox canonists were in- clined to regard the Muscovite grand dukes as the successors by the Byzantine emperors. This movement coincided with a change in the family circumstances of Ivan III. After the death of his first consort, Maria of Tver (1467), at the suggestion of Pope Paul II. (1469), who hoped thereby to bind Russia to the holy see, Ivan III. wedded the Catholic Zoe Palaeologa (better known by her orthodox name of Sophia), daughter of Thomas, despot of the Morea, who claimed the throne of Constantinople as the nearest relative of the last Greek emperor. The princess, however, clave to her family traditions, and awoke imperial ideas in the mind of her consort. It was through her influence that the ceremonious etiquette of Constantinople (along with the imperial double-headed eagle and all that it implied) was adopted by the court of Moscow. The grand duke henceforth held aloof from his boyars. The old patriarchal systems of government vanished. The boyars were no longer consulted on affairs of state. The sovereign became sacrosanct, while the boyars were reduced to the level of slaves absolutely de- oendent on the will of the sovereign. The boyars naturally resented so insulting a revolution, and struggled against it, at first with some success. But the clever Greek lady prevailed in the end, and it was her son Vasily, not' Maria of Tver's son, Demetrius, who was ultimately crowned co-regent with his father (April 14, 1502). It was in the reign of Ivan III. that the first Russian " Law Book," or code, was compiled by the scribe Gusev. Ivan did his utmost to promote civilization in his realm, and with that object invited many foreign masters and artificers to settle in Muscovy, the most noted of whom was the Italian Ridolfo di Fioravante, nicknamed Aristotle because of his extraordinary knowledge, who built the cathedrals of the Assumption (Uspenski) and of Saint Michael or the Holy Arch- angels in the Kreml.

See P. Pierling, Manage d'un tsar an Vatican, Ivan III et Sophie Paleologue (Paris, 1891) ; E. I. Kashprovsky. The Struggle of Ivan III. with Sigismund I. (Rus.) (Nizhni, 1899); S. M. Solov'ev, History of Russia (Rus.), vol. v. (St Petersburg, 1895).

Ivan IV., called " the Terrible " (1530-1584), tsar of Muscovy, was the son of Vasily [Basil] III. Ivanovich, grand duke of Muscovy, by his second wife, Helena Glinska. Born on the 25th of August 1530, he was proclaimed grand duke on the death of his father (1533), and took the government into his own hands in 1544, being then fourteen years old. Ivan IV. was in every respect precocious; but from the first there was what we should now call a neurotic strain in his character. His father died when he was three, his mother when he was only seven, and he grew up in a brutal and degrading environment where he learnt to hold human life and human dignity in contempt. He was maltreated by the leading boyars whom successive revolu- tions placed at the head of affairs, and hence he conceived an inextinguishable hatred of their whole order and a corresponding fondness for the merchant class, their natural enemies. At a very early age he entertained an exalted idea of his own divine authority, and his studies were largely devoted to searching ' in the Scriptures and the Slavonic chronicles for sanctions and precedents for the exercise and development of his right divine. He first asserted his power by literally throwing to the dogs the last of his boyar tyrants, and shortly afterwards announced his intention of assuming the title of tsar, a title which his father and grandfather had coveted but never dared to assume publicly. On the 1 6th of January 1547, he was crowned the first Russian tsar by the metropolitan of Moscow; on the 3rd of February in the same year he selected as his wife from among the virgins gathered from all parts of Russia for his inspection, Anastasia Zakharina-Koshkina, the scion of an ancient and noble family better known by its later name of Romanov.

Hitherto, by his own showing, the private life of the young tsar had been unspeakably abominable, but his sensitive con- science (he was naturally religious) induced him, in 1530, to summon a Zemsky Sobor or national assembly, the first of its kind, to whichA made a curious public confession of the sins of his youth, yd at the same time promised that the realm of

Russia (for whose dilapidation he blamed the boyar regents) should henceforth be governed justly and mercifully. In 1551 the tsar submitted to a synod of prelates a hundred questions as to the best mode of remedying existing evils, for which reason the decrees of this synod are generally called stoglav or centuria. The decennium extending from 1550 to 1560 was the good period of Ivan IV. 's reign, when he deliberately broke away from his disreputable past and surrounded himself with good men of lowly origin. It was not only that he hated and distrusted the boyars, but he was

already statesman enough to discern that they could not be fitted into the new order of things which he aimed at introducing. Ivan meditated the regeneration of Muscovy, and the only men who could assist him in his task were men who could look steadily forward to the future because they had no past to look back upon, men who would unflinchingly obey their sovereign because they owed their whole political significance to him alone. The chief of these men of good-will were Alexis Adashev and the monk Sylvester, men of so obscure an origin that almost every detail of their lives is conjectural, but both of them, morally, the best Muscovites of their day. Their in- fluence upon the young tsar was profoundly beneficial, and the period of their administration coincides with the most glorious period of Ivan's reign — the period of the conquest of Kazan and Astrakhan.

In the course of 1551 one of the factions of Kazan offered the whole khanate to the young tsar, and on the 20th of August 1552 he stood before its walls with an army of 150,000 men and 50 guns. The siege was long and costly; the army suffered severely; and only the tenacity of the tsar kept it in camp for six weeks. But on the 2nd of October the fortress, which had been heroically defended, was taken by assault. The conquest of Kazan was an epoch-making event in the history of eastern Europe. It was not only the first territorial conquest from the Tatars, before whom Muscovy had humbled herself for genera- tions; at Kazan Asia, in the name of Mahomet, had fought behind its last trench against Christian Europe marshalled beneath the banner of the tsar of Muscovy. For the first time the Volga became a Russian river. Nothing could now retard the natural advance of the young Russian state towards the east and the south-east. In 1554 Astrakhan fell almost without a blow By 1560 all the Finnic and Tatar tribes between the Oka and the Kama had become Russian subjects. Ivan was also the first tsar who dared to attack the Crimea. In 1555 he sent Ivan Sheremetev against Perekop, and Sheremetev routed the Tatars in a great two days' battle at Sudbishenska. Some of Ivan's advisers, including both Sylvester and Adashev, now advised him to make an end of the Crimean khanate, as he had already made an end of the khanal^s of Kazan and Astrakhan. But Ivan, wiser in his generation, knew that the thing was impossible, in view of the immense distance to be traversed, and the pre- dominance of the Grand Turk from whom it would have to be wrested. It was upon Livonia that his eyes were fixed, which was comparatively near at hand and promised him a seaboard and direct communication with western Europe. Ivan IV., like Peter I. after him, clearly recognized the necessity of raising Muscovy to the level of her neighbours. He proposed to do so by promoting a wholesale immigration into his tsardom of master-workmen and skilled artificers. But all his neighbours, apprehensive of the consequences of a civilized Muscovy, com- bined to thwart him. Charles V. even went so far as to disperse 123 skilled

Germans whom Ivan's agent had collected and brought to Liibeck for shipment to a Baltic port. After this, Ivan was obliged to help himself as best he could. His oppor- tunity seemed to have come when, in the middle of the 16th century, the Order of the Sword broke up, and the possession of Livonia was fiercely contested between Sweden, Poland and Denmark. Ivan intervened in 1558 and quickly captured Narva, Dorpat and a dozen smaller fortresses; then, in 1560, Livonia placed herself beneath the protection of Poland, and King Sigismund II. warned Ivan off the premises.

By this time, Ivan had entered upon the second and eviJ portion of his reign. As early as 1553 he had ceased to trust

Sylvester and Adashev, owing to their extraordinary backward- ness in supporting the claims of his infant son to the throne while he himself lay at the point of death. The ambiguous and ungrateful conduct of the tsar's intimate friends and proteges on this occasion has never been satisfactorily explained, and he had good reason to resent it. Nevertheless, on his recovery, much to his credit, he overlooked it, and they continued to direct affairs for six years longer. Then the dispute about the Crimea arose, and Ivan became convinced that they were mediocre politicians as well as untrustworthy friends. In 1560 both of them disappeared from the scene, Sylvester into a monastery at his own request, while Adashev died the same year, in honour- able exile as a general in Livonia. The death of his deeply beloved consort Anastasia and his son Demetrius, and the desertion of his one bosom friend Prince Kurbsky, about the same time, seem to have infuriated Ivan against God and man. During the next ten years (1 560-1 570) terrible and horrible things happened in the realm of Muscovy. The tsar himself lived in an atmosphere of apprehension, imagining that every man's hand was against him. On the 3rd of December 1564 he quitted Moscow with his whole family. On the 3rd of January 1565 he declared in an open letter addressed to the metropolitan his intention to abdicate. The common people, whom he had always favoured at the expense of the boyars, thereupon im- plored him to come back on his own terms. He consented to do so, but entrenched himself within a peculiar institution, the oprichina or " separate estate." Certain towns and districts all over Russia were separated from the rest of the realm, and their revenues were assigned to the maintenance of the tsar's new court and household, which was to consist of 1000 carefully selected boyars and lower dignitaries, with their families and suites, in the midst of whom Ivan henceforth lived exclusively. The oprichina was no constitutional innovation. The duma, or council, still attended to all the details of the administration; the old boyars still

retained their ancient offices and dignities. The only difference was that the tsar had cut himself off from them, and they were net even to communicate with him except on extraordinary and exceptional occasions. The oprichniki, as being the exclusive favourites of the tsar, naturally, in their own interests, hardened the tsar's heart against all outsiders, and trampled with impunity upon every one beyond the charmed circle. Their first and most notable victim was Philip, the saintly metropolitan of Moscow, who was strangled for condemn- ing the oprichina as an unchristian institution, and refusing to bless the tsar (1569). Ivan had stopped at Tver, to murder St Philip, while on his way to destroy the second wealthiest city in his tsardom — Great Novgorod. A delator of infamous char- acter, one Peter, had accused the authorities of the city to the tsar of conspiracy; Ivan, without' even confronting the Nov- gorodians with their accuser, proceeded at the end of 1569 to punish them. After ravaging the land, his own land, like a wild beast, he entered the city on the 8th of January 1570, and for the next five weeks, systematically and deliberately, day after day, massacred batches of every class of the population. Every monastery, church, manor-house, warehouse and farm within a circuit of 100 m. was then wrecked, plundered and left roofless, all goods were pillaged, all cattle destroyed. Not till the 13th of February were the miserable remnants of the population permitted to rebuild their houses and cultivate their fields once more.

An intermittent and desultory war, with Sweden and Poland simultaneously, for the possession of Livonia and Esthonia, went on from 1560 to 1582. Ivan's generals (he himself rarely took the field) were generally successful at first, and bore down their enemies by sheer numbers, capturing scores of fortresses and towns. But in the end the superior military efficiency of the Swedes and Poles invariably prevailed.. Ivan was also un- fortunate in having for his chief antagonist Stephen Bathory, one of the greatest captains of the age. Thus all his strenuous efforts, all his enormous sacrifices, came to nothing. The West was too strong for him. By the peace of Zapoli (January 15th, 158a) he surrendered Livonia with Polotsk to Bathory, and by

the truce of Ilyusa he at the same time abandoned Ingria to the Swedes. The Baltic seaboard was lost to Muscovy for another century and a half. In his latter years Ivan cultivated friendly relations with England, in the hope of securing some share in the benefits of civilization from the friendship of Queen Elizabeth, one of whose ladies, Mary Hastings, he wished to marry, though his fifth wife, Martha Nagaya, was still alive. Towards the end of his life Ivan was partially consoled foi his failure in the west by the unexpected acquisition of the kingdom of Siberia in the east, which was first subdued by the Cossack hetman Ermak or Yermak in 1581.

In November 1 580 Ivan in a fit of ungovernable fury at some contradiction or reproach, struck his eldest surviving son Ivan, a prince of rare promise, whom he passionately loved, a blow which proved fatal. In an agony of remorse, he would now have abdicated "as being unworthy to reign longer"; but his trembling boyars, fearing some dark ruse, refused to obey any one but himself. Three years later, on the 18th of March 1584, while playing at chess, he suddenly fell backwards in his chair and was removed to his bed in a dying condition. At the last moment he assumed the hood of the strictest order of hermits, and died as the monk Jonah.

Ivan IV. was undoubtedly a man of great natural ability. His political foresight Was extraordinary. He anticipated the ideals of Peter the Great, and only failed in realizing them because his material resources were inadequate. But admiration of his talents must not blind us to his moral worthlessness, nor is it right to cast the blame for his excesses on the brutal and vicious society in which he lived. The same society which produced his infamous favourites also produced St Philip of Moscow, and by refusing to listen to St Philip Ivan sank below even the not very lofty moral standard of his own age. He certainly left Muscovite society worse than he found it, and so prepared the way for the horrors of " the Great Anarchy." Personally, Ivan was tall and well-made, with high shoulders and a broad chest. His eyes were small and restless, his nose hooked, he had a beard and moustaches of imposing length. His face had a sinister, troubled expression; but an enigmatical smile played perpetually around his lips. He was the best educated and the hardest worked man of his age. His memory was astonishing, his energy indefatigable. As far as possible he saw to everything personally, and never sent away a petitioner of the lower orders. See S. M. Solov'ev, History of Russia (Rus.) vol. v. (St Petersburg, 1895); A. Bruckner, Geschichte Russlands bis zum Ende des i8ten Jahrhunderts (Gotha, 1896) ; E. Tikhomirov, The first Tsar of Moscovy, Ivan IV. (Rus.) (Moscow, 1888); L. G. T. Tidander, Kriget mellan Sverige och Ryssland dren 1555-1557 (Vesteras, 1888); P. Pierling, Un Arbitrage pontifical au XVI e siecle entre la Pologne et la Russie (Bruxelles, 1890); V. V. Novodvorsky, The Struggle for Livonia, 1570-1582 (Rus.) (St Petersburg, 1904) ; K. Waliszewski, Ivan le terrible (Paris, 1904) ; R. N. Bain, Slavonic Europe, ch. 5 (Cambridge, 1907).

Ivan V. 1 (1 666-1 696), tsar of Russia, was the son of Tsar Alexius Mikhailovich and his first consort Miloslavzkoya. Physically and mentally deficient, Ivan was the mere tool of the party in Muscovy who would have kept the children of the tsar Alexis, by his second consort Natalia Naruishkina, from the throne. In 1682 the party of progress, headed by Artamon Matvyeev and the tsaritsa Natalia, passed Ivan over and placed his half-brother, the vigorous and promising little tsarevich Peter, on the throne. On the 23rd of May, however, the Naruish- kin faction was

overthrown by the stryeltsi (musketeers), secretly worked upon by Ivan's half-sister Sophia, and Ivan was associ- ated as tsar with Peter. Three days later he was proclaimed " first tsar," in order still further to depress the Naruishkins, and place the government in the hands of Sophia exclusively. In 1689 the name of Ivan was used as a pretext by Sophia in her attempt to oust Peter from the throne altogether. Ivan was made to distribute beakers of wine to his sister's adherents with his own hands, but subsequently, beneath the influence of his uncle Prozorovsky, he openly declared that " even for his sister's 1 Ivan V., if we count from the first grand duke of that name, as most Russian historians do; Ivan II., if, with the minority, we reckon from Ivan the Terrible as the first Russian tsar.

sake, he would quarrel no longer with his dear brother." During the reign of his colleague Peter, Ivan V. took no part whatever in affairs, but devoted himself " to incessant prayer and rigorous fasting." On the 9th of January 1684 he married Praskovia Saltuikova, who bore him five daughters, one of whom, Anne, ultimately ascended the Russian throne. In his last years Ivan was a paralytic. He died on the 29th of January 1696.

See R. Nisbet Bain, The First Romanovs (London, 1905); M. P. Pogodin, The First Seventeen Years of the Life of Peter the Great (Rus.) (Moscow, 1875).

Ivan VI. (1 740-1 764), emperor of Russia, was the son of Prince Antony Ulrich of Brunswick, and the princess Anna Leopoldovna of Mecklenburg, and great-nephew of the empress Anne, who adopted him and declared him her successor on the 5th of October 1 740, when he was only eight weeks old. On the death of Anne (October 17th) he was proclaimed emperor, and on the following day Ernest Johann Biren, duke of Courland, was appointed regent. On the fall of Biren (November 8th), the regency passed to the baby tsar's mother, though the govern- ment was in the hands of the capable vice-chancellor, Andrei Osterman. A little more than twelve months later, a coup d'etat placed the tsesarevna Elizabeth on the throne (December 6, 1741), and Ivan and his family were imprisoned in the fortress of Dunamiinde (Ust Dvinsk) (December 13, 1742) after a preliminary detention at Riga, from whence the new empress had at first decided to send them home to Brunswick. In June 1 744 they were transferred to Kholmogory on the White Sea, where Ivan, isolated from his family, and seeing nobody but his gaoler, remained for the next twelve years. Rumours of his confinement at Kholmogory having leaked out, he was secretly transferred to the fortress of Schliisselburg (1756), where he

was still more rigorously guarded, the very commandant of the fortress not knowing who " a certain arrestant " com- mitted to his care really was. On the accession of Peter III. the condition of the unfortunate prisoner seemed about to be ameliorated, for the kind-hearted emperor visited and sympathized with him; but Peter himself was overthrown a few weeks later. In the instructions sent to Ivan's guardian, Prince Churmtyev, the latter was ordered to chain up his charge, and even scourge him should he become refractory. On the accession of Catherine still more stringent orders were sent to the officer in charge of " the nameless one." If any attempt were made from outside to release him, the prisoner was to be put to death; in no circumstances was he to be delivered alive into any one's hands, even if his deliverers produced, the empress's own sign- manual authorizing his release. By this time, twenty years of solitary confinement had disturbed Ivan's mental equilibrium, though he does not seem to have been actually insane. Never- theless, despite the mystery surrounding him, he was well aware of his imperial origin, and always called himself gosudar(sovereign). Though instructions had been given to keep him ignorant, he had been taught his letters and could read his Bible. Nor could his residence at Schliisselburg remain concealed for ever, and its discovery was the cause of his ruin. A sub-lieutenant of the garrison, Vasily Mirovich, found out all about him, and formed a plan for freeing and proclaiming him emperor. At midnight on the 5th of July 1764, Mirovich won over some of the garrison, arrested the commandant, Berednikov, and demanded the delivery of Ivan, who there and then was murdered by his gaolers in obedience to the secret instructions already in their possession.

See R. Nisbet Bain, The Pupils of Peter the Great (London, 1897); M. Semevsky, Ivan VI. Anlonovich (Rus.) (St Petersburg, 1866); A. Bruckner, The Emperor Ivan VI. and his Family (Rus.) (Moscow, 1874); V. A. Bilbasov, Geschichte Catherine II. (vol. ii., Berlin, 1891-1893). (R. N. B.)

IVANGOROD, a fortified town of Russian Poland, in the government of Lublin, 64 m. by rail S.E. from Warsaw, at the confluence of the Wieprz with the Vistula. It is defended by nine forts on the right bank of the Vistula and by three on the left bank, and, with Warsaw, Novo-Georgievsk and Brest- Litovsk, forms the Polish " quadrilateral. '""*

IVANOVO-VOZNESENSK, a town of middle Russia, in the government of Vladimir, 86 m. by rail N. of the town of Vladimir. Pop. (1887) 22,000; (1900) 64,628. It consists of what were originally two villages — Ivanovo, dating from the 16th century, and Voznesensk, of much more recent date — united into a town in 1 86 1. Of best note among the public buildings are the cathedral, and the church of the Intercession of the Virgin, formerly associated with an important monastery founded in 1579 and abandoned in 1754. One of the colleges of the town contains a public library. Linen-

weaving was introduced in 1751, and in 1776 the manufacture of chintzes was brought from Schliisselburg. The town has cotton factories, calico print-works, iron-works and chemical works.

IVARR . BEINLAUSI (d. 873), son of Ragnar Lothbrok, the great Viking chieftain, is known in English and Continental annals as Inuaer, Ingwar or Hingwar. He was one of the Danish leaders in the Sheppey expedition of 855 and was perhaps present at the siege of York in 867. The chief incident in his life was his share in the martyrdom of St Edmund in 870. He seems to have been the leader of the Danes on that occasion, and by this act he probably gained the epithet " crudelissimus " by which he is usually described. It is probable that he is to be identified with Imhar, king of the Norsemen of all Ireland and Britain, who was active in Ireland between the years 852 and 873, the year of his death.

IVIZA, Ibiza or IvigA, an island in the Mediterranean Sea, belonging to Spain, and forming part of the archipelago known as the Balearic Islands (q.v.). Pop. (1900) 23,524; area 228 sq. m. Iviza lies 50 m. S.W. of Majorca and about 60 m. from Cape San Martin on the coast of Spain. Its greatest length from north-east to south-west is about 25 m. and its greatest breadth about 13 m. The coast is indented by numerous small bays, the principal of which are those of San Antonio on the north-west, and of Iviza on the south-east. Of all the Balearic group, Iviza is the most varied in its scenery and the most fruitful. The hilly parts which culminate in the Pico de Atalayasa (1560 ft.), are richly wooded. The climate is for the most part mild and agreeable, though the hot winds from the African coast are sometimes troublesome. Oil, corn and fruits (of which the most important are the fig, prickly pear, almond and carob-bean) are the principal products; hemp and flax are also grown, but the inhabitants are rather indolent, and their modes of culture are very primitive. There are numerous salt-pans along the coast, which were formerly worked by the Spanish government. Fruit, salt, char- coal, lead and stockings of native manufacture are exported. The imports are rice, flour, sugar, woollen goods and cotton. The capital of the island, and, indeed, the only town of much importance — for the population is remarkably scattered — is Iviza or La Ciudad (6527), a fortified town on the south-east coast, consisting of a lower and upper portion, and possessing a good harbour, a 13th-century Gothic collegiate church and an ancient castle. Iviza was the see of a bishop from 1782 to 1851. South of Iviza lies the smaller and more irregular island of Formentera (pop., 1900, 2243; area, 37 sq. m.), which is said to derive its name from the production of wheat. With Iviza it agrees both in general appearance and in the character of its products, but it is altogether destitute of streams. Goats and sheep are found in the mountains, and the coasts are greatly frequented by flamingoes. Iviza and Formentera are the principal islands of the lesser or western Balearic

group, formerly known as the Pityusae or Pine Islands.

IVORY, SIR JAMES (1765-1842), Scottish mathematician, was born in Dundee in 1765. In 1779 he entered the university of St Andrews, distinguishing himself especially in mathematics. He then studied theology; but, after two sessions at St Andrews and one at Edinburgh, he abandoned all idea of the church, and in 1786 he became an assistant-teacher of mathematics and natural philosoghy in a newly established academy at Dundee. Three years later he became partner in and manager of a flax-spinning company at Douglastown in Forfarshire, still, however, prosecuting in moments of leisure his favourite studies. He was essentially a self-trained mathematician, and was not only deeply

versed in ancient and modern geometry, but also had a full knowledge of the analytical methods and discoveries of the conti- nental mathematicians. His earliest memoir, dealing with an analytical expression for the rectification of the ellipse, is pub- lished in the Transactions of the Royal Society of Edinburgh (1796); and this and his later papers on " Cubic Equations " (1799) and "Kepler's Problem" (1802) evince great facility in the handling of algebraic formulae. In 1804 after the dis- solution of the flax-spinning company of which he was manager, he obtained one of the mathematical chairs in the Royal Military College at Marlow (afterwards removed to Sandhurst); and till the year 1816, when failing health obliged him to resign, he dis- charged his professional duties with remarkable success. During this period he published in the Philosophical Transactions several important memoirs, which earned for him the Copley medal in 1814 and ensured his election as a Fellow of the Royal Society in 1815. Of special importance in the history of attractions is the first of these earlier memoirs (Phil. Trans., 1809), in which the problem of the attraction of a homogeneous ellipsoid upon an external point is reduced to the simpler case of the attraction of another but related ellipsoid upon a corresponding point interior to it. This theorem is known as Ivory's theorem. His later papers in the Philosophical Transactions treat of astronomical refractions, of planetary perturbations, of equilibrium of fluid masses, &c. For his investigations in the first named of these he received a royal medal in 1826 and again in 1839. In 1831, on the recommendation of Lord Brougham, King William IV. granted him a pension of £300 per annum, and conferred on him the Hanoverian Guelphic order of knighthood. Besides being directly connected with the chief scientific societies of his own country, the Royal Society of Edinburgh, the Royal Irish Aca- demy, &c, he was corresponding member of the Royal Academy of Sciences both of Paris and

Berlin, and of the Royal Society of Gottingen. He died at London on the 21st of September 1842.

A list of his works is given in the Catalogue of Scientific Papers of the Royal Society of London.

IVORY (Fr. ivoire, Lat. ebur), strictly speaking a term confined to the material represented by the tusk of the elephant, and for commercial purposes almost entirely to that of the male elephant. In Africa both the male and female elephant produce good-sized tusks; in the Indian variety the female is much less bountifully provided, and in Ceylon perhaps not more than 1 % of either sex have any tusks at all. Ivory is in substance very dense, the pores close and compact and filled with a gelatinous solution which contributes to the beautiful polish which may be given to it and makes it easy to work. It may be placed between bone and horn; more fibrous than bone and therefore less easily torn or splintered. For a scientific definition it would be difficult to find a better one than that given by Sir Richard Owen. He says: ‘ ” The name ivory is now restricted to that modification of den- tine or tooth substance which in transverse sections or fractures shows lines of different colours, or striae, proceeding in the arc of a circle and forming by their decussations minute curvi- linear lozenge-shaped spaces.” These spaces are formed by an immense number of exceedingly minute tubes placed very close together, radiating outwards in all directions. It is to this arrangement of structure that ivory owes its fine grain and almost perfect elasticity, and the peculiar marking resembling the engine-turning on the case of a watch, by which many people are guided in distinguishing it from celluloid or other imitations. Elephants’ tusks are the upper incisor teeth of the animal, which, starting in earliest youth from a semi-solid vascular pulp, grow during the whole of its existence, gathering phosphates and other earthy matters and becoming hardened as in the formation of teeth generally. The tusk is built up in layers, the inside layer being the last produced. A large proportion is embedded in the bone sockets of the skull, and is hollow for some distance up in a conical form, the hollow becoming less and less as it is prolonged into a narrow channel which runs along as a thread or as it is sometimes called, nerve, towards the point of the tooth. The outer layer, or bark, is enamel of similar density to the central ‘Lecture before the Society of Arts (1856).

part. Besides the elephant’s tooth or tusk we recognize as ivory, for commercial purposes, the teeth of the hippopotamus, walrus, narwhal, cachalot or sperm-whale and of some animals of the wild boar class, such as the warthog of South Africa. Practically, however, amongst these the hippo and walrus tusks are the only ones of importance for large work, though boars’ tusks come to the sale-rooms in considerable quantities from India and Africa.

Generally speaking, the supply of ivory imported into Europe comes from Africa; some is Asiatic, but much that is shipped from India is really African, coming by way of Zanzibar and Mozambique to Bombay. A certain amount is furnished by the vast stores of remains of prehistoric animals still existing through- out Russia, principally in Siberia in the neighbourhood of the Lena and other rivers discharging into the Arctic Ocean. The mammoth and mastodon seem at one time to have been common over the whole surface of the globe. In England tusks have been recently dug up — for instance at Dungeness — as long as 12 ft. and weighing 200 lb. The Siberian deposits have been worked for now nearly two centuries. The store appears to be as in- exhaustible as a coalfield. Some think that a day may come when the spread of civilization may cause the utter disappearance of the elephant in Africa, and that it will be to these deposits that we may have to turn as the only source of animal ivory. Of late years in England the use of mammoth ivory has shown signs of decline. Practically none passed through the London sale-rooms during 1 903-1 906. Before that, parcels of 10 to 20 tons were not uncommon. Not all of it is good; perhaps about half of what comes to England is so, the rest rotten; specimens, however, are found as perfect and in as fine condition as if recently killed, instead of having lain hidden and preserved for thousands of years in the icy ground. There is a considerable literature (see Shooting) on the subject of big-game hunting, which includes that of the elephant, hippopotamus and smaller tusk-bearing animals. Elephants until comparatively recent times roamed over the whole of Africa from the northern deserts to the Cape of Good Hope. They are still abundant in Central Africa and Uganda, but civilization has gradually driven them farther and farther into the wilds and impenetrable forests of the interior.

The quality of ivory varies according to the districts whence it is obtained, the soft variety of the eastern parts of the con- tinent being the most esteemed. When in perfect condition African ivory should be if recently cut of a warm, transparent, mellow tint, with as little as possible appearance of grain or mottling. Asiatic ivory is of a denser white, more open in texture and softer to work. But it is apt to turn yellow sooner, and is not so easy to polish. Unlike bone, ivory requires no preparation, but is fit for immediate working. That from the neighbourhood of Cameroon is very good, then ranks the ivory from Loango, Congo, Gabun and Ambriz; next the Gold Coast, Sierra Leone and Cape Coast Castle. That of French Sudan is nearly always " ringy," and some of the Ambriz variety also. We may call Zanzibar and Mozambique varieties soft; Angola and Ambriz all hard. Ambriz ivory was at one time much es- teemed, but there is comparatively little now. Siam ivory is rarely if ever soft. Abyssinian has its soft side, but Egypt is practically the only place where both descriptions are largely distributed. A drawback to Abyssinian ivory is a prevalence of a rather

thick bark. Egyptian is liable to be cracked, from the extreme variations of temperature; more so formerly than now, since better methods of packing and transit are used. Ivory is extremely sensitive to sudden extremes of temperature; for this reason billiard balls should be kept where the temperature is fairly equable.

The market terms by which descriptions of ivory are dis- tinguished are liable to mislead. They refer to ports of shipment rather than to places of origin. For instance, " Malta " ivory is a well-understood term, yet there are no ivory producing animals in that island.

Tusks should be regular and tapering in shape, not very curved or twisted, for economy in cutting; the coat fine, thin, clear and transparent. The substance of ivory is so elastic

and flexible that excellent riding- whips have been cut longi- tudinally from whole tusks. The size to which tusks grow and are brought to market depends on race rather than on size of elephants. The latter run largest in equatorial Africa. Asiatic bull elephant tusks seldom exceed 50 lb in weight, though lengths of 9 ft. and up to 150 lb weight are not entirely un- known. Record lengths for African tusks are the one presented to George V., when prince of Wales, on his marriage (1893), measuring 8 ft. 75 in. and weighing 165 lb, and the pair of tusks which were brought to the Zanzibar market by natives in 1898, weighing together over 450 lb. One of the latter is new in the Natural History Museum at South Kensington ; the other is in Messrs Rodgers & Co.'s collection at Sheffield. For length the longest known are those belonging to Messrs Rowland Ward, Piccadilly, which measure n ft. and n ft. 5 in. respectively, with a combined weight of 293 lb. Osteodentine, resulting from the effects of injuries from spearheads or bullets, is sometimes found in tusks. This formation, resembling stalactites, grows with the tusk, the bullets or iron remaining embedded without trace of their entry.

The most important commercial distinction of the qualities of ivory is that of the hard and soft varieties. The terms are difficult to define exactly. Generally speaking, hard or bright ivory if, distinctly harder to cut with the saw or other tools. It is, as it were, glassy and transparent. Soft contains more moisture, stands differences of climate and temperature better, and does not crack so easily. The expert is guided by the shape of the tooth, by the colour and quality of the bark or skin, and by the transparency when cut, or even before, as at the point of the tooth. Roughly, a line might be

drawn almost centrally down the map of Africa, on the west of which the hard quality prevails, on the east the soft. In choosing ivory for example for knife-handles — people rather like to see a pretty grain, strongly marked; but the finest quality in the hard variety, which is generally used for them, is the closest and freest from grain. The curved or canine teeth of the hippopotamus are valuable and come in considerable quantities to the European markets. Owen describes this variety as " an extremely dense, compact kind of dentine, partially defended on the outside by a thin layer of enamel as hard as porcelain; so hard as to strike fire with steel." By reason of this hardness it is not at all liked by the turner and ivory workers, and before being touched by them the enamel has to be removed by acid, or sometimes by heating and sudden cooling, when it can be scaled off. The texture is slightly curdled, mottled or damasked. Hippo ivory was at one time largely used for artificial teeth, but now mostly for umbrella and stick-handles; whole (in their natural form) for fancy door-handles and the like. In the trade the term is not " riverhorse " but " seahorse teeth." Walrus ivory is less dense and coarser than hippo, but of fine quality — what there is of it, for the oval centre which has more the character of coarse bone unfortunately extends a long way up. At one time a large supply came to the market, but of late years there has been an increasing scarcity, the animals having been almost exterminated by the ruthless persecution to which they have been subjected in their principal haunts in the northern seas. It is little esteemed now, though our ancestors thought highly of it. Comparatively large slabs are to be found in medieval sculpture of the nth and 12th centuries, and the grips of most oriental swords, ancient and modern, are made from it. The ivory from the single tusk or horn of the narwhal is not of much commercial value except as an ornament or curiosity. Some horns attain a length of 8 to 10 ft., 4 in. thick at the base. It is dense in substance and of a fair colour, but owing to the central cavity there is little of it fit for anything larger than napkin-rings. ,

Ivory in Commerce, and its Industrial Applications. — Almost the whole of the importation of ivory to Europe was until recent years confined to London, the principal distributing mart of the world. But the opening up of the Congo trade has placed the port of Antwerp in a position which has equalled and, for a time, may surpass that of London. Other important markets

are Liverpool and Hamburg; and Germany, France and Portu- gal have colonial possessions in Africa, from which it is imported. America is a considerable importer for its own requirements. From the German Cameroon alone, according to Schilling, there were exported during the ten years ending 1905, 452,100 kilos of ivory. Mr Buxton estimates the amount of ivory im- ported into the United Kingdom at about 500 tons. If we give the same to Antwerp we have from these two ports alone no less

than 1000 tons a year to be provided. Allowing a weight so high as 30 ib per pair of tusks (which is far too high, perhaps twice too/ high) we should have here alone between thirty and forty thousand elephants to account for. It is true that every pair of tusks that comes to the market represents a dead elephant, but not necessarily by any means a slain or even a recently killed one, as is popularly supposed and unfortunately too often repeated. By far the greater proportion is the result of stores accumulated by natives, a good part coming from animals which have died a natural death. Not 20% is live ivory or recently killed ; the remainder is known in the trade as dead ivory.

In 1827 the principal London ivory importers imported 3000 cwt.

in 1850, 8000 cwt. The highest price up to 1855 was £55 per cwt.

At the July sales in 1905 a record price was reached for billiard-ball

teeth of £167 per cwt. The total imports into the United Kingdom

were, according to Board of Trade returns, in 1890, 14,349 cwt.;

in 1895, 10,911 cwt.; in 1900, 9889 cwt.; in 1904, 9045 cwt.

From Messrs Hale & Son's (ivory brokers, 10 Fenchurch Avenue)

Ivory Report of the second quarterly sales in London, April 1906,

it appears that the following were offered : —

Tons. From Zanzibar, Bombay, Mozambique and Siam 17

Egyptian 19I

West Coast African 11

Lisbon 1

Abyssinian 6 J

55

Sea horse (hippopotamus teeth) . . . . if

Walrus J

Waste ivory io|

Hard ivory was scarce. West Coast African was principally of the Gabun description, and some of very fine quality. There was very little inquiry for walrus. The highest prices ranged as follows'. Soft East Coast tusks (Zanzibar, Mozambique, Bombay and Siam), 102 to 143 lb. each £66, 10s. to £75, 10s. per cwt. Billiard-ball scrivelloes, £104 per cwt. Cut points for billiard-balls (3! in. to 2| to 3 in.) £114 to £151 per cwt. Seahorse (for best), 3s. 6d. to 4s. id. per lb. Boars' tusks, 6d. to 7d. per lb.

Quantities of ivory offered to Public auction {from Messrs Hale & Son's Reports).

Zanzibar, Bombay, Mozambique and Siam

Egyptian

Abyssinian

Lisbon

Seahorse teeth and Boars' tusks .

1903.

1904.

1905.

Tons.

81

49i

22!

46}

3

Tons.

75

72 f

9f

39j

3

Tons.

8if

231

415

1!

203i

7

200

9f

224!

7

210J

209J

231?

Fluctuations in prices of ivory at the London Sale-Room (from Messrs Hale & Son's Charts, which- show the prices at each quarterly sale from 1870).

Billiard Ball pieces ….

1870.

1880.

1890.

1900.

1905-

£55

£90

£112

£68

£167

Averages —

Hard Egyptian 36 to 50 tb. .

30

38

5°

29

48

Soft East Indian 50 to 70 lb.

67

55

88

57

72

West Coast African 50 to 70 lb.

36

57

6S

48

61

Hard East African 50 to 70 tb. .

37

49

64

48

61

In October 1889 soft East Indian fetched an average of £82 per cwt., but in several instances higher prices were realized, and one lot reached £88 per cwt. At the Liverpool April sales 1906 about 7i tons

were offered from Gabun, Angola, and Cameroon (from the last 5i tons). To the port of Antwerp the imports were 6830 cwt. in 1904 and 6570 cwt. in 1905; of which 5310 cwt. and 4890 cwt. respectively were from the Congo State.

The leading London sales are held quarterly in Mincing Lane, a very interesting and wonderful display of tusks and ivory of all kinds being laid out previously for inspection in the great warehouses known as the " Ivory Floor " in the London docks. The quarterly Liverpool sales follow the London ones, with a short interval.

The important part which ivory plays in the industrial arts not only for decorative, but also for domestic applications is hardly sufficiently recognized. Nothing is wasted of this valuable product. Hundreds of sacks full of cuttings and shavings, and scraps returned by manufacturers after they have used what they require for their particular trade, come to the mart. The dust is used for polishing, and in the preparation of Indian ink, and even for food in the form of ivory jelly. The scraps come in for in-laying and for the numberless purposes in which ivory is used for small domestic and decorative objects. India, which has been called the backbone of the trade, takes enormous quantities of the rings left in the turning of billiard-balls, which serve as women's bangles, "or for making small toys and models, and in other characteristic Indian work. Without endeavouring to enumerate all the applications, a glance may be cast at the most important of those which consume the largest quantity. Chief among these is the manufacture of billiard-balls, of cutlery handles, of piano-keys and of brushware and toilet articles. Billiard-balls demand the highest quality of ivory; for the best balls the soft description is employed, though recently,

through the competition of bonzoline and similar substitutes, the hard has been more used in order that the weight may be assimilated to that of the artificial kind. Therefore the most valuable tusks of all are those adapted for the billiard-ball trade. The term used is " scrivelloes," and is applied to teeth proper for the purpose, weighing not over about 7 lb. The division of the tusk into smaller pieces for subsequent manufacture, in order to avoid waste, is a matter of importance.

The accompanying diagrams (figs. I and 2) show the method; the cuts are made radiating from an imaginary centre of the curve of the tusk. In after processes the various trades have their own particular methods for making the most of the material. In making

a billiard-ball of the English size the first thing to be done is to rough out, from the cylindrical section, a sphere about 2 J in. in diameter, which will eventually be 2 Vis or sometimes for pro- fessional players a lit- tle larger. One hemi- sphereˆ — as shown in the diagrams (fig. 2) — is first turned, and the resulting ring de- tached with a parting tool. The diameter is accurately taken and the subsequent removals taken off in other directions. The ball is then fixed in a wooden chuck, the half cylinder re- versed, and the operation repeated for the other hemisphere. It is now left five years to season and then turned dead true. The rounder and straighter the tusk selected for ball-making the better. Evidently, if the tusk is oval and the ball the size of the least diameter, its sides which come nearer to the bark or rind will be coarser and of a different density from those portions further removed from this outer skin. The matching of billiard-balls is important, for extreme accuracy in weight is essential. It is usual to bleach them, as the purchaser — or at any rate the distributing intermediary — likes to have them of a dead white. But this is a mistake, for bleaching with chemicals takes out the gelatine to some extent, alters the quality and affects the density; it also makes them more liable to crack, and they are not nearly so nice-looking, Billiard- balls should be bought in summer time when the temperature is most equable, and gently used till the winter season. On an average three balls of fine quality are got out of a tooth. The stock of more than one great manufacturer surpasses at times 30,000 in number.

east indian & zanzibar Fig. 1.

But although ball teeth rose in 1905 to £167 a cwt., the price of billiard-balls was the same in 1905 as it was in 1885. Roughly speaking, there are about twelve different qualities and prices of billiard-balls, and eight of pyramid-and pool-balls, the latter ranging from half a guinea to two guineas each.

The ivory for piano-keys is delivered to the trade in the shape of what are known as heads and tails, the former for the parts which come under the fingers, the latter for that running up between the black keys. The two are joined afterwards on the keyboard with extreme accuracy. Piano-keys are bleached, but organists for some reason or other prefer unbleached keys. The soft variety is mostly used for high-class work and preferably of the Egyptian type.

The great centres of the ivory industry for the ordinary objects of common domestic use are in England, for cutlery handles Sheffield, for billiard-balls and piano-keys London. For

Lathe Wood Chuck Metal Ring:

Fig. 2.

cutlery a large firm such as Rodgers & Sons uses an average of some twenty tons of ivory annually, mostly of the hard variety. But for billiard-balls and piano-keys America is now a large producer, and a considerable quantity is made in France and Germany. Brush backs are almost wholly in English hands. Dieppe has long been famous for the numberless little ornaments and useful articles such as statuettes, crucifixes, little book-covers, paper-cutters, combs, serviette-rings and articles de Paris generally. And St Claude in the Jura, and Geislingen in Wiirtemberg, and Erbach in Hesse, Germany, are amongst the most important centres of the industry. India and China supply the multitude of toys, models, chess and draughtsmen, puzzles, workbox fittings and other curiosities.

Vegetable Ivory, &c. — Some allusion may be made to vegetable ivory and artificial substitutes. The plants yielding the vegetable ivory of commerce represent two ormore species of an anomalous genus of palms, and are known to botanists as Phytelephas. They are natives of tropical South America, occurring chiefly on the banks of the river Magdalena, Colombia, always found in damp localities, not only, however, on the lower coast region as in Darien, but also at a considerable elevation above the sea. They are mostly found in separate groves, not mixed with other trees or shrubs. The plant is severally known as the " tagua " by the Indians on the banks of the Magdalena, as the " anta " on the coast of Darien, and as the " pulli- punta " and " homero "in Peru. It is stemless or short-stemmed, and crowned with from twelve to twenty very long pinnatifid leaves. The plants are dioecious, the males forming higher, more erect and robust trunks than the females. The male inflorescence is in the form of a simple fleshy cylindrical spadix covered with flowers; the female flowers are also in a single spadix, which, however, is shorter than in the male. The fruit consists of a conglomerated head composed of six or seven drupes, each containing

from six to nine seeds, and the whole being enclosed in a walled woody covering forming altogether a globular head as large as that of a man. A single plant sometimes bears at the same time from six to eight of these large heads of fruit, each weighing from 20 to 25 lb. In its very young state the seed contains a clear insipid fluid, which travellers take advantage of to allay thirst. As it gets older this fluid becomes milky and of a sweet taste, and it gradually continues to change both in taste and consistence until it becomes so hard as to make it valuable as a substitute for animal ivory. In their youngand fresh state the fruits are eaten with avidity by bears, hogs and other animals. The seeds, or nuts as they are usually called when fully ripe and hard, are used by the American Indians for making small ornamental articles and toys. They are imported into Britain in considerable quantities, frequently under the name of " Corozo " nuts, a name by which the fruits of some species of Attalea (another palm with hard ivory-like seeds) are known in Central America — their uses being chiefly for small articles of turnery. Of vegetable ivory Great Britain imported in 1904 1200 tons, of which about 400 tons were re-exported, principally to Germany. It is mainly and largely used for coat buttons.

Many artificial compounds have, from time to time, been tried as substitutes for ivory ; amongst them potatoes treated with sulphuric

acid. Celluloid is familiar to us nowadays. In the form of bonzoline, into which it is said to enter, it is used largely for billiard balls; and a new French substitute — a caseine made from milk, called gallalith — has begun to be much used for piano keys in the cheaper sorts of instrument. Odontolite is mammoth ivory, which through lapse of time and from surroundings becomes converted into a substance known as fossil or blue ivory, and is used occasionally in jewelry as turquoise, which it very much resembles. It results from the tusks of antediluvian mammoths buried in the earth for thousands of years, during which time under certain conditions the ivory becomes slowly penetrated with the metallic salts which give it the peculiar vivid blue colour of turquoise.

Ivory Sculpture and the Decorative Arts. — The use of ivory as a material peculiarly adapted for sculpture and decoration has been universal in the history of civilization. The earliest examples which have come down to us take us back to pre- historic times, when, so far as our knowledge goes, civilization as we understand it had attained no higher degree than that of the dwellers in caves, or of the most primitive races. Throughout succeeding ages there is continued evidence that no other substance — except perhaps

wood, of which we have even fewer ancient examples — has been so consistently connected with man's art-craftsmanship. It is hardly too much to say that to follow properly the history of ivory sculpture involves the study of the whole world's art in all ages. It will take us back to the most remote antiquity, for we have examples of the earliest dynasties of Egypt and Assyria. Nor is there entire default when we come to the periods of the highest civilization of Greece and Rome. It has held an honoured place in all ages for the adornment of the palaces of the great, not only in sculpture proper but in the rich inlay of panelling, of furniture, chariots and other costly articles. The Bible teems with references to its beauty and value. And when, in the days of 'Pheidias, Greek sculpture had reached the highest perfection, we learn from- ancient writers that colossal statues were constructed — notably the " Zeus of Olympia " and the " Athena of the Parthenon." The faces, hands and other exposed portions of these figures were of ivory, and the question, therefore, of the method of production of such extremely large slabs as perhaps were used has been often debated. A similar difficulty arises with regard to other pieces of considerable size, found, for example, amongst consular diptychs. It has been conjectured that some means of softening and moulding ivory was known to the ancients, but as a matter of fact though it may be softened it cannot be again restored to its original condition. If up to the 4th century we are unable to point to a large number of examples of sculpture in ivory, from that date onwards the chain is unbroken, and during the five or six hundred years of unrest and strife from the decline of the Roman empire in the 5th century to the dawn of the Gothic revival of art in the nth or 12th, ivory sculpture alone of the sculptural arts carries on the preservation of types and traditions of classic times in central Europe. Most import- ant indeed is the role which existing examples of ivory carving play in the history of the last two cen- turies of the consulates of the Western and Eastern empires. Though the evidences of decadence in art may be marked, the close of that period brings us down to the end of the reign of Justinian (527-563). Two centuries later the iconoclastic persecutions in the Eastern empire drive westward and compel to settle there numerous colonies of monks and artificers. Throughout the Carlovingian period, the examples of ivory sculpture which we possess in not inconsiderable quantity are of extreme importance in the history of the early development of Byzantine art in Europe. And when the Western world of art arose from its torpor, freed itself from Byzantine shackles and traditions, and began to think for itself, it is to the sculptures in ivory of the Gothic art of the 13th and 14th centuries that we turn with admiration of their exquisite beauty of expression. Up to about the 14th century the influence of the church was everywhere predominant in all matters relating to art. In ivories, as in mosaics, enamels or miniature painting it would be*

difficult to find a dozen examples, from the age of Constantine onwards, other than sacred ones or of sacred symbolism. But as the period of the Renaissance approached, the influence of romantic literature began to assert itself, and a feeling and style similar to those which are characteristic of the charming series of religious art in ivory, so touchingly conceived and executed, meet us in many objects in ivory destined for ordinary domestic uses and ornament. Mirror cases, caskets for jewelry or toilet purposes, combs, the decoration of arms, or of saddlery or of weapons of the chase, are carved and chased with scenes of real life or illustrations of the romances, which bring home to us in a vivid manner details of the manners and customs, amusements, dresses and domestic life of the times. With the Renaissance and a return to classical ideas, joined with a love of display and of gorgeous magnificence, art in ivory takes a secondary place. There is a want of simplicity and of originality. It is the period of the commencement of decadence. Then comes the period nicknamed rococo, which persisted so long. Ivory carving follows the vulgar fashion, is content with copying or adapting, and until the revival in our own times is, except in rare instances, no longer to be classed as a fine art. It becomes a trade and is in the hands of the mechanic of the workshop. In this necessarily brief and condensed sketch we have been concerned mainly with ivory carving in Europe. It will be necessary to give also, presently, some indications enabling the inquirer to follow the history — or at least to put him on the track of it — not only in the different countries of the West but also in India, China and Japan.

Prehistoric Ivory Carvings. — These are the result of investiga- tions made about the middle of the 19th century in the cave dwellings of the Dordogne in France and also of the lake dwellings of Switzerland. As records they are unique in the history of art. Further than this our wonderment is excited at finding these engravings or sculptures in the round, these chiselled examples of the art of the uncultivated savage, conceived and exe- cuted with a feeling of delicacy and restraint which the most modern artist might envy. Who they were who executed them must be left to the palaeontologist and geologist to decide. We can only be certain that they were contemporary with the period when the mammoth and the reindeer still roved freely in southern France. The most important examples are the sketch of the mammoth (see Painting, Plate I.), on a slab of ivory now in the museum of the Jardin des Plantes, the head and shoulders of an ibex carved in the round on a piece of reindeer horn, and the figure of a woman (instances of representations of the human form are most rare) naked and wearing a necklace and bracelet. Many of the originals are in the museum at St Germain-en-Laye, and casts of a considerable number are in the British Museum.

Ancient Assyrian, Egyptian, Greek and Roman Ivories. — We know from

ancient writers that the Egyptians were skilled in

Fig. 3. — Panel with Cartouche, Nineveh.

ivory carving and that they procured ivory in large quantities from Ethiopia. The Louvre possesses examples of a kind of flat castanets or clappers, in the form of the curve of the tusks themselves, engraved in outline, beautifully modelled hands

forming the tapering points; and large quantities of small objects, including a box of plain form and simple decoration identified from the inscribed praenomen as the fifth dynasty, about 4000 B.C. The British Museum and the museum at Cairo are also comparatively rich. But no other collection in the world contains such an interesting collection of ancient Assyrian ivories as that in the British Museum. Those exhibited number some fifty important pieces, and many other fragments are, on account of their fragility or state of decay, stowed away. The collection is the result of the excavations by Layard about 1840 on the supposed site of Nineveh opposite the modern city of Mosul. When found they were so decomposed from the lapse of time as scarcely to bear touching or the contact of the external air. Layard hit upon the ingenious plan of boiling in a solution of gelatine and thus restoring to them the animal matter which had dried up in the course of centuries. Later, the explorations of Flinders Petrie and others at Abydos brought to light a con- siderable number of sculptured fragments which may be even two thousand years older than those of Nineveh. They have been exhibited in London and since distributed amongst various museums at home and abroad.

Consular and Official and Private Diptychs. — About fifty of the remarkable plaques called " consular diptychs," of the time

of the three last centuries of the consulates of the Roman and Greek empire have been preserved. They range in date from perhaps mid-fourth to mid-sixth cen- turies, and as with two or three exceptions the dates are certain it would be diffi- cult to overestimate their historic or intrinsic value. The earliest of absolutely certain date is the diptych of Aosta (a.d. 408),' the first after the recognition of Christianity; or, if the Monza diptych represents, as some think, the Consul Stilicon, then we may refer back six years earlier. At any rate the edict of Theo- dosius in a.d. 384, concern- ing the restriction of the use of ivory to the diptychs of the regular consuls, is evi- dence that the custom must have been long estab- lished. According

to some authorities the beautiful leaf of diptych in the Liverpool Museum (fig. 4) is a consular one and to be ascribed to Marcus Julius Philippus (a.d. 248). Similarly the From photo by w. A. ManseU & Co. Gherardesca leaf in the

Fig. 4.— Leaf of diptych showing British Museum may be combats with stags; in the Liver- accepted as of the Consul pool Museum. Marcus Aurelius (a.d. 308).

But the whole question of the half dozen earliest examples is conjectural . With a few notable exceptions they show decadence in art. Amongst the finest may be cited the leaf with the combats with stags at Liverpool, the dip- tych of Probianus at Berlin and the two leaves, one of Anas- tasius, the other of Orestes, in the Victoria and Albert Museum. The literature concerning these diptychs is voluminous, from the time of the erudite treatise by Gori published in 1759 to the present day. The latest of certain date is that of Basilius, consul of the East in 541, the last of the consuls. The diptychs of private individuals or of officials number about sixteen, and

in the case of the private ones have a far greater artistic value. Of these the Victoria and Albert Museum possesses the most beautiful leaf of perhaps the finest example of ancient ivory sculpture which has come down to us, diptychon Meleretense. representing a Bacchante (fig. 5). The other half, which is much injured, is in the Cluny Museum. Other important pieces are the Aesculapius and Hygeia at Liverpool, the Hippolytus and Phaedra at Brescia, the Barberini in the Bargello and at Vienna and the Rufius Probianus at Beilin. Besides the diptychs ancient Greek and Roman ivories before the recognition of Christianity are compara tively small in number and are mostly in the great museums of the Vatican, Naples, the British Museum, the Louvre and the Cluny Museum. Amongst them are the statuette of Penthea, perhaps of" the 3rd century (Cluny), a large head of a woman (museum of Vienna) and the Bellerophon (British Museum), nor must those of the Roman occupation in England and other countries be forgotten. Notable instances are the plaque and ivory mask found at Caerleon. Others are now in the Guildhall and British Museums, and most continental European museums have ex- amples connected with their own history.

Early Christian and Early Byzantine Ivories. — The few examples we possess of Christian ivories previous to the time of Constantine are not of great importance from the point of view of the history of art. But after that date the ivories which Fig. 5.— Leaf of Roman dip-

we mav ascribe to the cer,- ^^ representing a Bacchante; we _ may ascriDe

to tne cen in the victoria and Albert

tunes from the end of the Museum.

4th to at least the end of the

9th become of considerable interest, on account of their connexion

with the development of Byzantine art in western Europe.

With regard to exact origins and dates opinions are largely

divergent. In great part they are due to the carrying on of

traditions and styles by which the makers of the sarcophagi

were inspired, and the difficulties of ascription are increased

when in addition to the primitive elements the influence of

Byzantine systems introduced many new ideas derived from

many extraneous sources. The questions involved are of no

small archaeological, iconographical and artistic importance,

but it must be admitted that we are reduced to conjecture in

many cases, and compelled to theorize. And it would seem to be

impossible to be more precise as to dates than within a margin

of sometimes three centuries. Then, again, we are met by the,

question how far these ivories are connected with Byzantine

art; whether they were made in the West by immigrant Greeks,

or indigenous works, or purely imported productions. Some

German critics have endeavoured to construct a system of

schools, and to form definite groups, assigning them to Rome,

Ravenna, Milan and Monza. Not only so, but they claim to be

precise in dating even to a certain decade of a century. But it

is certainly more than doubtful whether there is sufficient

evidence on which to found such assumptions. It is at least

probable that a considerable number of the ivories whose dates

are given by such a number of critics so wide a range as from

the 4th to the 10th century are nothing more than the work of

the monks of the numerous monasteries founded throughout

the Carlovingian empire, copying and adapting from whatever

came into their hands. Many of them were Greek immigrants exiled at the time of the iconoclastic persecutions. To these must be added the Celtic and Anglo-Saxon missionaries, who brought with them and disseminated their own national feeling and technique. We have to take into account also the relations which existed not only with Constantinople but also with the great governing provinces of Syria and Egypt. Where all our information is so vague, and in the face of so much conflicting opinion amongst authorities, it is not unreasonable to hold with regard to very many of these ivories that instead of assigning them to the age of Justinian or even the preceding century we ought rather to postpone their dating from one to perhaps three centuries later and to admit that we cannot be precise even within these limits. It would be impossible to follow here the whole of the arguments relating to this most important period of the development of ivory sculpture or to mention a tithe of the examples which illustrate it. Amongst the most striking the earliest is the very celebrated leaf of a diptych in the British Museum representing an archangel (fig. 6). It is generally

admitted that we have no ivory of the 5th or 6th centuries or in fact of any early medieval period which can compare with it in excellence of design and work- manship. There is no record (it is believed) from whence the museum obtained the ivory. There are at least plausible grounds for surmising that it is identical with the " Angelus longus eburneus " of a book- cover among the books brought to England by St Augustine which is mentioned in a list of things belonging to Christchurch, Canterbury (see Dart, A pp. p. xviii.). The dating of the four Passion plaques, also in the British Museum, varies from the 5th to the 7th century. But although most recent authorities accept the earlier date, the present writer holds strongly that they are not anterior to, at earliest, the 7th century. Even then they

will remain, with the exception of the Monza oil flask and perhaps the St Sabina doors, the earliest known representation of the crucifixion. The ivory vase, with cover, in the British Museum, appears to possess de- fined elements of the farther East, due perhaps to the rela- tions between Syria and Christian India or Ceylon. Other important early Christian ivories are the series of pyxes, the diptych in the treasury of St Ambrogio at Milan, the chair of Maximian at Ravenna (most important as a type piece), the panel with the "Ascension" in the Bavarian National Museum, the Brescia casket, the " Lorsch " bookcovers of the Vatican and Victoria and Albert Museum, the Bodleian and other bookcovers, the St Paul diptych in the Bargello at Florence and the " Annunciation " plaque in the Trivulzio collection. So far as unquestionably oriental specimens of Byzantine art are concerned they are few in number, but we have in the famous Harbaville triptych in the Louvre a super- excellent example.

Gothic Ivories. — The most generally charming period of ivory sculpture is unquestionably that which, coincident with the Gothic revival in art, marked the beginning of a great and lasting change. The formalism imposed by Byzantine traditions gave place to a brighter, more delicate and tenderer conception. XV. 4

From photo by W. A. Mansell & Co.

Fig. 6. — Leaf of Diptych, representing Archangel; in the British Museum.

This golden age of the ivory carver — at its best in the 13 th cen- tury — was still in evidence during the 14th, and although there is the beginning of a transition in style in the 15th century, the period of neglect and decadence which set in about the beginning of the 16th hardly reached the acute stage until well on into the 17th. To review the various developments both of religious art which reigned almost alone until the 14th century, or of the secular side as exemplified in the delightful mirror cases and caskets carved with subjects from the romantic stories which were so popular, would be impossible here. Almost every great museum and famous private collection abounds in examples of the well-known diptychs and triptychs and little portable oratories of this period. Some, as in a famous panel in the British Museum, are marvels of minute workmanship, others of delicate openwork and tracery. Others, again, are remarkable for the wonderful way in which, in the compass of a few inches, whole histories and episodes of the scriptural narratives are expressed in the most vivid and telling manner. Charming above all are the statuettes of the Virgin and Child which French and Flemish art, especially, have handed down to us. Of these the Victoria and Albert Museum possesses a representative collec-

FiG. 7. — Mirror Case, illustrating the Storming of the Castle of Love; in

the Victoria and Albert Museum.

tion. Another series of interest is that of the croziers or pastoral staves, the development of which the student of ivories will be careful to study in connexion with the earlier ones and the tau-headed staves. In addition there are shrines, reliquaries, bookcovers, liturgical combs, portable altars, pyxes, holy water buckets and sprinklers, flabella or liturgical fans, rosaries, memento mori, paxes, small figures and groups, and almost every conceiv- able adjunct of the sanctuary or for private devotion. It is to French or Flemish art that the greater number and the most beautiful must be referred. At the same time, to take one example only — the diptych and triptych of Bishop Grandison in the British Museum — we have evidence that English ivory carvers were capable of rare excellence of design and workman- ship. Nor can crucifixes be forgotten, though they are of extreme rarity before the 17th century. A most beautiful 13th- century figure for one — though only a fragment — is in the Victoria and Albert Museum. Amongst secular objects of this period, besides the mirror cases (fig. 7) and caskets, there are hunting horns (the earlier ones probably oriental, or more or less faith- fully copied from oriental models), chess and draughtsmen (especially the curious set from the isle of Lewis), combs, marriage coffers (at one period remarkable Italian ones of bone), memor- andum tablets, seals, the pommels and cantles of saddles and a

unique harp now in the Louvre. The above enumeration will alone suffice to show that the inquirer must be referred for details to the numerous works which treat of medieval ivory sculpture.

Ivory Sculpture from the 16th to the igth Century. — Compared with the wealth of ivory carving of the two preceding centuries, the 15th, and especially the 16th, centuries are singularly poor in really fine work. But before we arrive at the period of real decadence we shall come across such things as the knife of Diana of Poitiers in the Louvre, the sceptre of Louis XIII. , the Rothschild hunting horn, many Italian powder horns, the German Psyche in the Louvre, or the " Young Girl and Death " in the Munich Museum, in which there is undoubtedly originality and talent of the first order. The practice of ivory carving became extremely popular throughout the 17th and 18th centuries, especially in the Netherlands and in Germany, and the amount of ivory consumed must have been very great. But, with rare exceptions, and these for the most part Flemish, it is art of

an inferior kind, which seems to have been abandoned to second-rate sculptors and the artisans of the workshop. There is little originality, the rococo styles run riot, and we seem to be condemned to wade through an interminable series of gods and goddesses, bacchanalians and satyrs, pseudo-classical copies from the antique and imitations of the schools of Rubens. As a matter of fact few great museums, except the German ones, care to include in their collections examples of these periods. Some exceptions are made in the case of Flemish sculptors of such talent as Francois Duquesnoy (Fiammingo), Gerard van Obstal or Lucas Fayd'herbe. In a lesser degree, in Germany, Christoph Angermair, Leonhard Kern, Bernhaid Strauss, Elhafen, Kruger and Rauchmiller; and, in France, Jean Guiller- min, David le Marchand and Jean Cavalier. Crucifixes were turned out in enormous numbers, some of not inconsiderable merit, but, for the most part, they represent anatomical exercises varying but slightly from a pattern of which a celebrated one atributed to Faistenberger may be taken as a type. Tankards abound, and some, notably the one in the Jones collection, than which perhaps no finer example exists, are also of a high standard. Duquesnoy's work is well illustrated by the charming series of six plaques in the Victoria and Albert Museum known as the " Fiammingo boys." Amongst the crowd of objects in ivory of all descriptions of the early 18th century, the many examples of the curious implements known as rappoirs, or tobacco graters, should be noticed. It may perhaps be necessary to add that although the character of art in ivory in these periods is not of the highest, the subject is not one entirely unworthy of attention and study, and there are a certain number of remarkable and even admirable examples.

Ivory Sculpture of Spain, Portugal, India, China and Japan. — Generally speaking, with regard to Spain and Portugal, there is little reason to do otherwise than confine our attention to a certain class of important Moorish or Hispano-Moresque ivories of the time of the Arab occupation of the Peninsula, from the 8th to the 15th centuries. Some fine examples are in the Victoria and Albert Museum. Of Portuguese work there is little except the hybrid productions of Goa and the Portuguese settlements in the East. Some mention must be made also of the remarkable examples of mixed Portuguese and savage art from Benin, now in the British Museum. Of Indian ivory carving the India Museum at Kensington supplies a very large and varied collection which has no equal elsewhere. But there is little older than the 17th century, nor can it be said that Indian art in ivory can occupy a very high place in the history of the art. What we know of Chinese carving in ivory is confined to those examples which are turned out for the European market, and can hardly be considered as appealing very strongly to cultivated tastes. A brief reference to the well-known delightful netsukes and the characteristic inlaid work must suffice here for the ivories

of Japan (see Japan: Art).

Ivory Sculpture in the igth Century and of the Present Day. — Few people are aware of the extent to which modern ivory sculp- ture is practised by distinguished artists. Year by year, however,

a certain amount is exhibited in the Royal Academy and in most foreign salons, but in England the works — necessarily not very numerous — are soon absorbed in private collections. On the European continent, on the contrary, in such galleries as the Belgian state collections or the Luxembourg, examples are frequently acquired and exhibited. In Belgium the acquisition of the Congo and the considerable import of ivory therefrom gave encouragement to a definite revival of the art. Important exhibitions have been held in Belgium, and a notable one in Paris in 1904. Though ivory carving is as expensive as marble sculpture, all sculptors delight in following it, and the material entails no special knowledge or training. Of 19th-century artists there were in France amongst the best known, besides numerous minor workers of Dieppe and St Claude, Augustin Moreau, Vautier, Soitoux, Belleteste, Meugniot, Pradier, Triqueti and Gerome; and in the first decade of the 20th century, besides such distinguished names in the first rank as Jean Dampt and Theodore Riviere, there were Vever, Gardet, Caron, Barrias, Allouard, Ferrary and many others. Nor must the decorative work of Rene Lalique be omitted. No less than forty Belgian sculptors exhibited work in ivory at the Brussels exhibition of 1887. The list included artists of such distinction as J. Dillens, Constantin Meunier, van der Stappen, Khnopff, P. Wolfers, Samuel and Paul de Vigne, and amongst contemporary Belgian sculptors are also van Beurden, G. Devreese, Vincotte, de Tombay and Lagae. In England the most notable work includes the " Lamia " of George Frampton, the " St Elizabeth " of Alfred Gilbert, the " Mors Janua Vitae " of Harry Bates, the " Launce- lot " of W. Reynolds-Stephens and the use of ivory in the applied arts by Lynn Jenkins, A. G. Walker, Alexander Fisher and others.

Authorities. — See generally A. Maskell, Ivories (1906), and the bibliography there given.

On Early Christian and Early Byzantine ivories, the following works may be mentioned: Abbe Cabrol, Dictionnaire de V archeologie chretienne (in progress); O. M. Dalton, Catalogue of Early Christian Antiquities in British Museum (1902); E. Dobbert, Zur Geschichte der Elfenbeinsculptur (1885); H. Graeven, Antike Schnitzereien (1903) ; R. Kanzler, Gli avori . . . Vaticana (1903) ; Kondakov, V Art byzantin; A. Maskell, Cantor Lectures, Soc. of Arts (1906) (lecture II., "Early Christian and Early Byzantine Ivories"); Strzygowski, Byzantinische Denkmdler (1891); V. Schulze, Archdo- logie der altchristlichen Kunst (1895); G. Stuhlfauth, Die

altchristl. Elfenbeinplastik (1896).

On the consular diptychs, see H. F. Clinton, Fasti Romani (1845- 1850); A. Gori, Thesaurus veterum diptychorum (1759); C. Lenor- mant, Tresor de numismatique et de glyptique (1834-1846) ; F. Pulszky, Catalogue of the Fejervdry Ivories (1856).

On the artistic interest generally, see also C. Alabaster, Catalogue of Chinese Objects in the South Kensington Museum; Sir R. Alcock, Art and Art Industries in Japan (1878) ; Barraud et Martin, Le Bdton pastoral (1856); Bouchot, Les Reliures d'art a la Bibliotheque Natio- nale; Bretagne, Sur les peignes liturgiques; H. Cole, Indian Art at Delhi (1904); R. Garrucci, Storia delV arte Christiana (1881); A. Jacquemart, Histoire du mobilier (1876); J. Labarte, Histoire des arts industriels (1864); C. Lind, fiber den Krummstab (1863); Sir F. Madden, "Lewis Chessmen" (in Archaeologia, vol. xxiv. 1832); W. Maskell, Ivories, Ancient and Medieval in the South Kensington Museum (1872); A. Michel, Histoire de I' art; E. Molinier, Histoire generate des arts (1896); E. Oldfield, Catalogue of Fictile Ivories sold by the Arundel Society (1855); A. H. Pitt Rivers, Antique Works of Art from Benin (1900); A. C. Quatremere de Quincy, Le Jupiter Olympien (1815); Charles Scherer, Elfenbeinplastik seit der Renais- sance (1903) ; E. du Sommerard, Les Arts au moyen age (1838-1846) ; G. Stephens, Runic Caskets (1 866-1 868); A. Venturi, Storia dell' arte Italiana (1901); Sir G. Watt, Indian Art at Delhi (1904); J. O. Wcstwood, Fictile Ivories in the South Kensington Museum (1876). SirM. D. Wyatt, Notices of Sculpture in Ivory (1856). (A. Ml.)

IVORY COAST {Cote d'lvoire), a French West African colony, bounded S. by the Gulf of Guinea, W. by Liberia and French Guinea, N. by the colony of Upper Senegal and Niger, E. by the Gold Coast. Its area is approximately 120,000 sq. m., and its population possibly 2,000,000, of whom some 600 are Europeans. Official estimates (1908) placed the native population as low as

980,000.

Physical Features. — The coast-line extends from 7 30′ to 3° 7′ W. and has a length of 380 m. It forms an arc of a circle of which the convexity turns slightly to the north ; neither bay nor promontory breaks the regularity of its outline. The shore is low, bordered in its

eastern half with lagoons, and difficult of access on account of the submarine bar of sand which stretches along nearly the whole of the coast, and also because of the heavy surf caused by the great Atlantic billows. The principal lagoons, going W. to E. are those of Grand Lahou, Grand Bassam or Ebrie and Assini. The coast plains extend inland about 40 m. Beyond the ground rises in steep slopes to a general level of over 1000 ft., the plateau being traversed in several directions by hills rising 2000 ft. and over, and cut by valleys with a general south-eastern trend. In the north-east, in the district of Kong (q.v.), the country becomes mountainous, Mt. Kommono attaining a height of 4757 ft. In the north-west, by the Liberian frontier, the mountains in the Gon region rise over 6000 ft. Starting from the Liberian frontier, the chief rivers are the Cavalla (or Kavalli), the San Pedro, the Sassandra (240 m. long), the Bandama (225 m.), formed by the White and the Red Bandama, the Komoe (360 m.) and the Bia. All these streams are interrupted by rapids as they descend from the highlands to the plain and are unnavigable by steamers save for a few miles from their mouths. The rivers named all drain to the Gulf of Guinea; the rivers in the extreme north of the colony belong to the Niger system, being affluents of the Bani or Mahel Balevel branch of that river. The watershed runs roughly from9° N. in the west to 10° N. in the east, and is marked by a line of hills rising about 650 ft. above the level of the plateau. The climate is in general very hot and unhealthy, the rainfall being very heavy. In some parts of the plateau healthier conditions prevail. The fauna and flora are similar to those of the Gold Coast and Liberia. Primeval forest extends from the coast plains to about 8° N., covering nearly 50,000 sq. m.

Inhabitants. — The coast districts are inhabited by Negro tribes allied on the one hand to the Krumen (q.v.) and on the other to the people of Ashanti (q.v.). The Assinis are of Ashanti origin, and chiefly of the Ochin and Agni tribes. Farther west are found the " Jack- Jacks " and the " Kwa-Kwas," sobriquets given respectively to the Aradian and Avikom by the early European traders. The Kwa-Kwa are said to be so called because their salutation " resembles the cry of a duck." In the interior the Negro strain predominates but with an admixture of Hamitic or Berber blood. The tribes represented include Jamans, Wongaras and Mandingos (q.v.), some of whom are Moslems. The Mandingos have intermarried largely with the Bambara or Sienuf, an agricultural people of more than average intelligence widely spread over the country, of which they are considered to be the indigenous race. The Bambara themselves are perhaps only a distinct branch of the original Mandingo stock. The Baule, who occupy the central

part of the colony, are of Agni-Ashanti origin. The bulk of the inhabitants are fetish worshippers. On the northern confines of the great forest belt live races of cannibals, whose existence was first made known by Captain d'Ollone in 1899. In general the coast tribes are peaceful. They have the reputation of being neither industrious nor intelligent. The traders are chiefly Fanti, Sierra Leonians, Senegalese and Mandingos.

Towns.— The chief towns on the coast are Grand and Little Bassam, Jackville and Assini in the east and Grand Lahou, Sassandra and Tabu in the west. Grand and Little Bassam are built on the strip of sand which separates the Grand Bassam or Ebrie lagoon from the sea. This lagoon forms a commodious harbour, once the bar has been crossed. Grand Bassam is situated at the point where the lagoon and the river Komoe enter the sea and there is a minimum depth of 12 ft. of water over the bar. The town (pop. 5000, including about 100 Europeans) is the seat of the customs administration and of the judicial department, and is the largest centre for the trade of the colony. A wharf equipped with cranes extends beyond the surf line and the town is served by a light railway. It is notoriously unhealthy; yellow fever is endemic. Little Bassam, renamed by the French Port Bouet, possesses an advantage over the other ports on the coast, as at this point there is no bar. The sea floor is here rent by a chasm, known as the " Bottomless Pit," the waters having a depth of 65 ft. Abijean (Abidjan), on the north side of the lagoon opposite Port Bouet is the starting-point of a railway to the oil and rubber regions. The half-mile of foreshore separating the port from the lagoon was in 1904-1907 pierced by a canal, but the canal silted up as soon as cut, and in 1908 the French decided to make Grand Bassam the chief port of the colony. Assini is an important centre for the rubber trade of Ashanti. On the northern shore of the Bassam lagoon, and 19 m. from Grand Bassam, is the capital of the colony, the native name Adjame having been changed into Binger- ville, in honour of Captain L. G. Binger (see below). The town is built on a hill and is fairly healthy.

In the interior are several towns, though none of any size numeric- ally. The best known are Koroko, Kong and Bona, entrepdts for the trade of the middle Niger, and Bontuku, on the caravan route to Sokoto and the meeting-place of the merchants from Kong and

Timbuktu engaged in the kola-nut trade with Ashanti and the Gold Coast. Bontuku is peopled largely by Wongara and Hausa, and most of the inhabitants, who number some 3000, are Moslems. The town, which was founded in the 15th century or earlier, is walled, contains various mosques and generally presents the appearance of an eastern city.

Agriculture and, Trade. — The natives cultivate maize, plantains, bananas,

pineapples, limes, pepper, cotton, &c, and live easily on the products of their gardens, with occasional help from fishing and hunting. They also weave cloth, make pottery and smelt iron. Europeans introduced the cultivation of coffee, which gives good results. The forests are rich in palm-tree products, rubber and mahogany, which constitute the chief articles of export. The rubber goes almost exclusively to England, as does also the mahogany. The palm-oil and palm kernels are sent almost entirely to France. The value of the external trade of the colony exceeded £1,000,000 for the first time in 1904. About 50% of the trade is with Great Britain. The export of ivory, for which the country was formerly famous, has almost ceased, the elephants being largely driven out of the colony. Cotton goods, by far the most important of the imports, come almost entirely from Great Britain. Gold exists and many native villages have small "placer" mines. In 1901 the government of the colony began the granting of mining concessions, in which British capital was largely invested. There are many ancient mines in the country, disused since the close of the 18th century, if not earlier.

Communications. — The railway from Little Bassam serves the east central part of the colony and runs to Katiola, in Kong, a total distance of 250 m. The line : s of metre gauge. The cutting of two canals, whereby communication is effected by lagoon between Assini and Grand Lahou via Bassam, followed the construction of the railway. Grand and Little Bassam are in regular communication by steamer with Bordeaux, Marseilles, Liverpool, Antwerp and Hamburg. Grand Bassam is connected with Europe by submarine cable via Dakar. Telegraph lines connect the coast with all the principal stations in the interior, with the Gold Coast, and with the other French colonies in West Africa.

Administration, &c. — The colony is under the general superintend- ence of the government general of French West Africa. At the head of the local administration is a lieutenant-governor, who is assisted by a council on which nominated unofficial members have seats. To a large extent the native forms of government are maintained under European administrators responsible for the preservation of order, the colony for this purpose being divided into a number of " circles " each with its local government. The colony has a separate budget and is self-supporting. Revenue is derived chiefly from customs receipts and a capitation tax of frs. 2.50 (2s.), instituted in 1901 and levied on all persons over ten years old. The budget for 1906 balanced at £120,400.

History. — The Ivory Coast is stated to have been visited by Dieppe merchants in the 14th century, and was made known by the Portuguese discoveries towards the end of the 15th century. It was thereafter frequented by traders for ivory, slaves and other commodities. There was a

French settlement at Assini, 1 700-1 704, and a French factory was maintained at Grand Bassam from 1700 to 1707. In the early part of the 19th century several French traders had established themselves along the coast. In 1830 Admiral (then Commandant) Bouet- Willaumez (1808-1871) began a series of surveys and expedi- tions which yielded valuable results. In 1842 he obtained from the native chiefs cessions of territory at Assini and Grand Bassam to France and the towns named were occupied in 1843. From that time French influence gradually extended along the coast, but no attempt was made to penetrate inland. As one result of the Franco-Prussian War, France in 1872 withdrew her garrisons, handing over the care of the establishments to a merchant named Verdier, to whom an annual subsidy of £800 was paid. This merchant sent an agent into the interior who made friendly treaties between France and some of the native chiefs. In 1883, in view of the claims of other European powers to territory in Africa, France again took over the actual administration of Assini and Bassam. Between 1887 and 1889 Captain Binger (an officer of marine infantry, and subsequently director of the African department at the colonial ministry) traversed the whole region between the coast and the Niger, visited Bontuku and the Kong country, and signed protectorate treaties with the chiefs. The kingdom of Jaman, it may be men- tioned, was for a few months included in the Gold Coast hinter- land. In January 1889 a British mission sent by the governor of the Gold Coast concluded a treaty with the king of Jaman at Bontuku, placing his dominions under British protection.

The king had, however, previously concluded treaties of " com- merce and friendship " with the French, and by the Anglo-French agreement of August 1889 Jaman, with Bontuku, was recognized as French territory. In 1892 Captain Binger made further ex- plorations in the interior of the Ivory Coast, and in 1893 he was appointed the first governor of the colony on its erection into an administration distinct from that of Senegal. Among other famous explorers who helped to make known the hinterland was Colonel (then Captain) Marchand. It was to the zone between the Kong states and the hinterland of Liberia that Samory (see Senegal) fled for refuge before he was taken prisoner (1898), and for a short time he was master of Kong. The boundary of the colony on the west was settled by Franco- Liberian agreements of 1892 and subsequent dates; that on the east by the Anglo-French agreements of 1893 and 1898. The northern boundary was fixed in 1899 on the division of the middle Niger territories (up to that date officially called the French Sudan) among the other French West African colonies. The systematic development of the colony, the opening up of the

hinterland and the exploitation of its economic resources date from the appointment of Captain Binger as governor, a post he held for over three years. The work he began has been carried on zealously and effectively by subsequent governors, who have succeeded in winning the co-operation of the natives. In the older books of travel are often found the alternative names for this region, Tooth Coast (Cdte des Dents) or Kwa-Kwa Coast, and, less frequently, the Coast of the Five and Six Stripes (alluding to a kind of cotton fabric in favour with the natives). The term Cote des Dents continued in general use in France until the closing years of the 19th century.

See Dix ans a la Cote d'lvoire (Paris, 1906) by F. J. Clozel, governor of the colony, and Notre colonie de la Cote d'lvoire (Paris, 1903) by R. Villamur and Richaud. These two volumes deal with the history, geography, zoology and economic condition of the Ivory Coast. La Cote d'lvoire by Michellet and Clement describes the administra- tive and land systems, &c. Another volume also called La Cote d'lvoire (Paris, 1908) is an official monograph on the colony. For ethnology consult Coutumes indigenes de la Cote d'lvoire (Paris, 1902) by F. J. Clozel and R. Villamur, and Les Coutumes Agni, by R. Villamur and Delafosse. Of books of travel see Du Niger au Golfe de Guinee par Kong (Paris, 1892) by L. G. Binger, and Mission Hostains-d'Ollone j8qS-i(>oo (Paris, 1901) by Captain d'Ollone. A Carle de la CSte d'lvoire by A. Meunier, on the scale of 1 1500,000 (6 sheets), was published in Paris, 1905. Annual reports on the colony are published by the French colonial and the British foreign offices.

IVREA (anc. Eporedia), a town and episcopal see of Piedmont, Italy, in the province of Turin, from which it is 38 m. N.N.E. by rail and 27 m. direct, situated 770 ft. above sea-level, on the Dora Baltea at the point where it leaves the mountains. Pop. (1901) 6047 (town), 11,696 (commune). The cathedral was built between 973 and 1005; the gallery round the back of the apse and the crypt have plain cubical capitals of this period. The two campanili flanking the apse at each end of the side aisle are the oldest example of this architectural arrangement. The isolated tower, which is all that remains of the ancient abbey of S. Stefano, is slightly later. The hill above the town is crowned by the imposing Castello delle Quattro Torri, built in 1358, and now a prison. One of the four towers was destroyed by lightning in 1676. A tramway runs to Santhia.

The ancient Eporedia, standing at the junction of the roads from Augusta Taurinorum and Vercellae, at the point where the road to Augusta Praetoria enters the narrow valley of the Duria (Dora Baltea), was a military position of considerable importance belonging to the Salassi who inhabited the whole upper valley of the Duria. The importance of the gold-mines of the district led to its seizure by the Romans in 143 B.C. The centre

of the mining industry seems to have been Victumulae (see Ticinum), until in 100 B.C. a colony of Roman citizens was founded at Eporedia itself; but the prosperity of this was only assured when the Salassi were finally defeated in 25 B.C. and Augusta Praetoria founded. There are remains of a theatre of the time cf the Antonines and the Ponte Vecchio rests on Roman foundations. In the middle ages Ivrea was the capital of a Lombard duchy,

and later of a marquisate; both Berengar II. (950) and Arduin (1002) became kings of Italy for a short period. Later it sub- mitted to the marquises of Monferrato, and in the middle of the 14th century passed to the house of Savoy. (T. As.)

IVRY-SUR-SEINE, a town of northern France, in the depart- ment of Seine, near the left bank of the Seine, less than 1 m. S.S.E. of the fortifications of Paris. Pop. (1906) 30,532. Ivry has a large hospital for incurables. It manufactures organs, earthenware, wall-paper and rubber, and has engineering works, breweries, and oil-works, its trade being facilitated by a port on the Seine. The town is dominated by a fort of the older line of defence of Paris.

IVY (A.S. ifig, Ger. Epheu, perhaps connected with apium, &tlov), the collective designation of certain species and varieties of Hedera, a member of the natural order Araliaceae.

Fig. 1.

-Ivy {Hedera Helix) fruiting branch. I. Flower. 2. Fruit.

There are fifty species of ivy recorded in modern books, but they may be reduced to two, or at the most, three. The European ivy, Hedera Helix (fig. 1), is a plant subject to infinite variety in the forms and colours of its leaves, but the tendency of which is always to a three- to five-lobed form when climbing and a regular ovate form of leaf when producing flower and fruit. The African ivy, H. canariensis, often regarded as a variety of H. Helix and known as the Irish ivy, is a native of North Africa and the adjacent islands. It is the com- mon large-leaved climbing ivy, and also varies, but in a less degree than H. Helix, from which its leaves differ in their larger size, rich deep green colour, and a prevailing tendency to a five-lobed outline. When in fruit the leaves are usually three- lobed, but they are sometimes entire and broadly ovate. The Asiatic ivy, H. celchica (fig. 2), now considered to be a form of H. Helix, has ovate, obscurely

three-Iobed leaves of a coriaceous texture and a deep green colour; in the tree or fruiting form the leaves are narrower than in the climbing form, and

without any trace of lobes. Distinctive characters are also to be found in the appendages of the pedicels and calyx, H. Helix having six-rayed stellate hairs, H. canariensis fifteen-rayed hairs and H. colchica yellowish two-lobed scales.

The Australian ivy, H. auslraliana, is a small glabrous shrub

Fig. 2. — Hedera colchica.

Fig. 3. — Climbing Shoot of Ivy.

with pinnate leaves. It is a native of Queensland, and is practically unknown in cultivation.

It is of the utmost importance to note the difference of char- acters of the same species of ivy in its two conditions of climbing and fruiting. The first stage of growth, which we will suppose to be from the seed, is essentially scandent, and the leaves are lobed more or less. This stage is accompanied with a plentiful production of the claspers or modified roots by means of which

the plant becomes at- tached and obtains sup- port. When it has reached the summit of the tree or tower, the stems, being no longer able to maintain a per- pendicular attitude, fall over and become horizontal or pendent. Coincidently with this change they cease to produce claspers, and the leaves are strik- ingly modified in form, being now narrower and less lobed than on the ascending stems. In due time this tree-like growth produces terminal umbels of greenish flowers, which have the parts in fives, with the styles united into a very short one. These flowers are succeeded by smooth black or yellow berries, containing two to five seeds. The yellow-berried ivy is met with in northern India and in Italy, but in northern Europe it is known only as a curiosity of the garden, where, if sufficiently sheltered and nourished, it becomes an exceedingly beautiful and fruitful tree. It is stated in books that some forms of sylvestral ivy never flower, but a negative declaration of this kind is valueless. Sylvestral ivies of great age may be found in woods on the western coasts of Britain that have apparently never flowered, but this is probably to be explained by their inability to surmount the trees supporting them, for until the plant can spread its branches horizontally in full daylight, the flowering or tree-like growth is never formed.

A question of great practical importance arises out of the relation of the

plant to its means of support. A moderate growth of ivy is not injurious to trees; still the tendency is from the first inimical to the prosperity of the tree, and at a certain stage it becomes deadly. Therefore the growth of ivy on trees should be kept within reasonable bounds, more especially in the case of trees that are of special value for their beauty, history, or the ' quality of their timber. In regard to buildings clothed with ivy, there is nothing to be feared so long as the plant does not penetrate the substance of the wall by means of any fissure. Should it thrust its way in, the natural and continuous expansion of its several parts will necessarily hasten the decay of the edifice. But a fair growth of ivy on sound walls that afford no entrance beyond the superficial attachment of the claspers is, without any exception whatever, beneficial. It promotes dryness and warmth, reduces to a minimum the corrosive action of the atmosphere, and is altogether as conservative as it is beautiful. The economical uses of the ivy are not of great importance. The leaves are eaten greedily by horses, deer, cattle and sheep, and in times of scarcity have proved useful. The flowers afford a good supply of honey to bees; and, as they appear in autumn, they occasionally make amends for the shortcomings of the season. The berries are eaten by wood pigeons, blackbirds and thrushes. From all parts of the plant a balsamic bitter may be obtained, and this in the form of hederic acid is the only preparation of ivy known to chemists.

In the garden the uses of the ivy are innumerable, and the least known though not the least valuable of them is the cultiva- tion of the plant as a bush or tree, the fruiting growth being selected for this purpose. The variegated tree forms of H. Helix,

with leaves of creamy white, golden green or rich deep orange yellow, soon prove handsome miniature trees, that thrive almost as well in smoky town gardens as in the pure air of the country, and that no ordinary winter will injure in the least. The tree-form of the Asiatic ivy (H. colchica) is scarcely to be equalled in beauty of leafage by any evergreen shrub known to English gardens, and, although in the course of a few years it will attain to a stature of 5 or 6 ft., it is but rarely we meet with it, or indeed with tree ivies of any kind, but little attention having been given to this subject until recent years. The scandent forms are more generally appreciated, and are now much employed in the formation of marginal lines, screens and trained pyramids, as well as for clothing walls. A very striking example of the capabilities of the commonest ivies, when treated artistically as garden plants, may be seen in the Zoological Gardens of Amsterdam, where several paddocks are enclosed with wreaths, garlands and bands of ivy in a most picturesque manner.

About sixty varieties known in gardens are figured and described in The Ivy, a Monograph, by Shirley Hibberd (1872). To cultivate these is an

extremely simple matter, as they will thrive in a poor soil and endure a considerable depth of shade, so that they may with advantage be planted under trees. The common Irish ivy is often to be seen clothing the ground beneath large yew trees where grass would not live, and it is occasionally planted in graveyards in London to form an imitation of grass turf, for which purpose it is admirably suited.

The ivy, like the holly, is a scarce plant on the American continent. In the northern United States and British America the winters are not more severe than the ivy can endure, but the summers are too hot and dry, and the requirements of the plant have not often obtained attention. In districts where native ferns abound the ivy will be found to thrive, and the varieties of Hedera Helix should have the preference. But in the drier districts ivies might often be planted on the north side of buildings, and, if encouraged with water and careful training for three or four years, would then grow rapidly and train them- selves. A strong light is detrimental to the growth of ivy, but this enhances its value, for we have no hardy plants that may be compared with it for variety and beauty that will endure shade with equal patience.

The North American poison ivy (poison oak), Rhus Toxico- dendron (nat. order Anacardiaceae), is a climber with pinnately compound leaves, which are very attractive in their autumn colour but poisonous to the touch to some persons, while others can handle the plant without injury. The effects are redness and violent itching followed by fever and a vesicular eruption. The ground ivy, Nepeta Glechoma (nat. order Labiatae), is a small creeping plant with rounded crenate leaves and small blue-purpie flowers, occurring in hedges and thickets.

IWAKURA, TOMOMI, Prince (1835-1883), Japanese states- man, was born in Kioto. He was one of the court nobles {kuge) of Japan, and he traced his descent to the emperor Murakami (a.d. 947-967). A man of profound ability and singular force of character, he acted a leading part in the complications preceding the fall of the Tokugawa shogunate, and was obliged to fly from Kioto accompanied by his coadjutor, Prince Sanjo. They took refuge with the Daimyo of Choshu, and, while there, established relations which contributed greatly to the ultimate union of the two great fiefs, Satsuma and Choshu, for the work of the Restora- tion. From 1867 until the day of his death Iwakura was one of the most prominent figures on the political stage. In 1871 he proceeded to America and Europe at the head of an imposing embassy of some fifty persons, the object being to explain to foreign governments the actual conditions existing in Japan, and to pave the way for negotiating new treaties consistent with her sovereign rights. Little success attended the mission. Returning to Japan in 1873, Iwakura found the cabinet divided as to the manner of dealing with

Korea's insulting attitude. He advocated peace, and his influence carried the day, thus removing a difficulty which, though apparently of minor dimen- sions, might have changed the whole course of Japan's modem history.

IXION, in Greek legend, son of Phlegyas, king of the Lapithae in Thessaly (or of Ares), and husband of Dia. According to custom he promised his father-in-law, Deiioneus, a handsome bridal present, but treacherously murdered him when he claimed the fulfilment of the promise. As a punishment, Ixion was seized with madness, until Zeus purified him of his crime and admitted him as a guest to Olympus. Ixion abused his pardon by trying to seduce Hera; but the goddess substituted for herself a cloud, by which he became the father of the Centaurs. Zeus bound him on a fiery wheel, which rolls unceasingly through the air or (according to the later version) in the underworld (Pindar, Pythia, ii. 21; Ovid, Metam. iv. 461; Virgil, Aeneid, vi. 601). Ixion is generally taken to represent the eternally moving sun. Another explanation connects the story with the practice (among certain peoples of central Europe) of carrying a blazing, revolving wheel through fields which needed the heat of the sun, the legend being invented to explain the custom and subsequently adopted by the Greeks (see Mannhardt, Wald- und Feldkulte, ii. 1905, p. 83). In view of the fact that the oak was the sun-god's tree and that the mistletoe grew upon it, it is suggested by A. B. Cook (Class. Rev. xvii. 420) that 'li-luv is derived from t £6s (mistletoe), the sun's fire being regarded as an emanation from the mistletoe. Ixion himself is probably a by-form of Zeus (Usener in Rhein. Mus. liii. 345).

" The Myth of Ixion " (by C. Smith, in Classical Review, June 1895) deals with the subject of a red-figure cantharus in the British Museum.

IXTACCIHUATL, or Iztaccihuatl (" white woman "), a lofty mountain of volcanic origin, 10 m. N. of Popocatepetl and about 40 m. S.S.E of the city of Mexico, forming part of the short spur called the Sierra Nevada. According to Angelo Heilprin (1853-1907) its elevation is 16,960 ft.; other authorities make it much less. Its apparent height is dwarfed somewhat by its elongated summit and the large area covered. It has three summits of different heights standing on a north and south line, the central one being the largest and highest and all three rising above the permanent snow-line. As seen from the city of Mexico the three summits have the appearance of a shrouded human figure, hence the poetic Aztec appellation of " white woman " and the unsentimental Spanish designation " La mujer gorda."

The ascent is difficult and perilous, and is rarely accomplished.

Heilprin says that the mountain is largely composed of trachytic rocks and that it is older than Popocatepetl. It has no crater and no trace of lingering volcanic heat. It is surmised that its crater, if it ever had one, has been filled in and its cone worn away by erosion through long periods of time.

IYRCAE, an ancient nation on the north-east trade route described by Herodotus (iv. 22) beyond the Thyssagetae, some- where about the upper basins of the Tobol and the Irtysh. They were distinguished by their mode of hunting, climbing a tree to survey their game, and then pursuing it with trained horses and dogs. They were almost certainly the ancestors of the modern Magyars, also called Jugra.

The reading TDpicai is an anachronism, and when Pliny (N.H. vi. 19) and Mela (i. 116) speak of Tyrcae it is also probably due to a false correction. (E. H. M.)

IZBARTA, or Sparta [anc. Baris], the chief town of the Hamid-abad sanjak of the Konia vilayet, in Asia Minor, well situated on the edge of a fertile plain at the foot of Aghlasun Dagh. It was once the capital of the Emirate of Hamid. It

suffered severely from the earthquake of the i6th-i7th of January 1885 It is a prosperous place with an enlightened Greek element in its population (hence the numerous families called " Spartali " in Levantine towns); and it is, in fact, the chief inland colony of Hellenism in Anatolia; Pop. 20,000 (Moslems 13,000, Christians 7000). The new Aidin railway extends from Dineir to Izbarta via Buldur.

IZHEVSK, a town of Russia, in the government of Vyatka, 140 m. S.W. of Perm and 22 m. W. from the Kama, on the Izh river. Pop. (1897) 21,500. It has one of the principal steel and rifle works of the Russian crown, started in 1807, The making of sporting guns is an active industry.

IZMAIL, or Ismail, a town of Russia, in the government of Bessarabia, on the left bank of the Kilia branch of the Danube, 35 m. below Reni railway station. Pop. (1866) 31,779, (1900) 33,607, comprising Great and Little Russians, Bulgarians, Jews and Gipsies. There are flour-mills and a trade in cereals, wool, tallow and hides. Originally a Turkish fortified post, Izmail had by the end of the 18th century grown into a place of 30,000 inhabitants. It was occupied by the Russians in 1770, and twenty years later its capture was one of the brilliant achievements of the Russian general, Count A. V. Suvarov. On that occasion the garrison was 40,000 strong, and the assault cost the assailants 10,000 and the defenders

30,000 men. The victory was the theme of one of the Russian poet G. R. Der- zhavin's odes. In 1809 the town was again captured by the Russians; and, when in 181 2 it was assigned to them by the Bucharest peace, they chose it as the central station for their Danube fleet. It was about this time that the town of Tuchkov, with which it was later (1830) incorporated, grew up outside of the fortifications. These were dismantled in accordance with the treaty of Paris (1856), by which Izmail was 'made over to Rumania. The town was again transferred to Russia by the peace of Berlin (1878).

*IZU-NO-SHICHI-TO, the seven (shicki) islands (to) of Izu, included in the empire of Japan. They stretch in a southerly direction from a point near the mouth of Tokyo Bay, and lie between 33° and 34 48′ N. and between 139 and 140 E. Their names, beginning from the north, are Izu-no-Oshima, To-shima, Nii-shima, Kozu-shima, Miyake-shima and Hachijo-shima. There are some islets in their immediate vicinity. Izu-no-Oshima, an island 10 m. long and 5! m. wide, is 15 m. from the nearest point of the Izu promontory. It is known to western cartographers as Vries Island, a name derived from that of Captain Martin Gerritsz de Vries, a Dutch navigator, who is supposed to have discovered the island in 1643. But the group was known to the Japanese from a remote period, and used as convict settlements certainly from the 1 2th century and probably from a still earlier era. Hachijo, the most southerly, is often erroneously written " Fatsisio " on English charts. Izu-no- Oshima is remarkable for its smoking volcano, Mihara-yama (2461 ft.), a conspicuous object to all ships bound for Yokohama. Three others of the islands — Nii-shima, Kozu-shima and Miyake-shima — have active volcanoes. Those on Nii-shima and Kozu-shima are of inconsiderable size, but that on Miyake- shima, namely, Oyama, rises to a height of 2707 ft. The most southerly island, Hachijo-shima, has a still higher peak, Dsubo- take (2838 ft.), but it does not emit any smok**

J— JABLOCHKOV

103

J A letter of the alphabet which, as far as form is concerned, is only a modification of the Latin I and dates back with a separate value only to the 15th century. It was first used as a special form of initial I, the ordinary form being kept for use in other positions. As, however, in many cases initial i had the consonantal value of the English y in iugum (yoke), &c, the symbol came to be used for the value of y, a value which it still retains in German: Jal jung, &c. Initially it is pronounced in English as an affricate dzh. The great majority of English words beginning with j are (1) of foreign (mostly French) origin, as "jaundice," "judge"; (2) imitative of sound, like

" jar " (the verb) ; or (3) influenced by analogy, like " jaw " (influenced by chaw, according to Skeat). In early French g when palatalized by e or i sounds became con- fused with consonantal i (y), and both passed into the sound of j which is still preserved in English. A similar sound-change takes place in other languages, e.g. Lithuanian, where the resulting sound is spelt dz. Modern French and also Provencal and Portuguese have changed j = dzh into z (zh). The sound initially is sometimes represented in English by g: gem, gaol as well as jail. At the end of modern English words the same sound is represented by -dge as in judge, French juge. In this position, however, the sound occurs also in genuine English words like bridge, sedge, singe, but this is true only for the southern dialects on which the literary language is founded. In the northern dialects the pronunciation as brig, seg, sing still survives. (P. Gi.)

JA'ALIN (from Jd'al, to settle, i.e. " the squatters "), an African tribe of Semitic stock. They formerly occupied the country on both banks of the Nile from Khartum to Abu Hamed. They claim to be of the Koreish tribe and even trace descent from Abbas, uncle of the prophet. They are of Arab origin, but now of very mixed blood. According to their own tradition they emigrated to Nubia in the 12th century. They were at one time subject to the Funj kings, but their position was in a measure independent. At the Egyptian invasion in 1820 they were the most powerful of Arab tribes in the Nile valley. They submitted at first, but in 1822 rebelled and massacred the Egyptian garrison at Shendi. The revolt was mercilessly suppressed, and the Ja'alin were thenceforward looked on with suspicion. They were almost the first of the northern tribes to join the mahdi in 1884, and it was their position to the north of Khartum which made communication with General Gordon so difficult. The Ja'alin are now a semi-nomad agricultural people. Many are employed in Khartum as ser- vants, scribes and watchmen. They are a proud religious people, formerly notorious as cruel slave dealers. J. L. Burck- hardt says the true Ja'alin from the eastern desert is exactly like the Bedouin of eastern Arabia.

See The Anglo-Egyptian Sudan, edited by Count Gleichen (London, 1905).

JABIRU, according to Marcgrave the Brazilian name of a bird, subsequently called by Linnaeus Mycteria americana, one of the largest of the storks, Ciconiidae, which occurs from Mexico southwards to the territory of the Argentine Republic. It stands between 4 and 5 ft. in height, and is conspicuous for its massive bill, slightly upturned, and its entirely white plumage; but the head and neck are bare and black, except for about the lower third part of the latter, which is bright red in the living bird. Very nearly allied to Mycteria, and also commonly called jabirus, are the birds of the genera Xenorhynchus and Ephippio- rhynchus — the former containing one or (in the opinion of some) two species, X. auslralis and X.

indicus, and the latter one only, E. senegalensis. These belong to the countries indicated by their names, and differ chiefly by their feathered head and neck, while the last is sometimes termed the saddle- billed stork from the very singular shape of its beak. Somewhat more distantly related are the gigantic birds known to Europeans

in India and elsewhere as adjutant birds, belonging to the genus Leptoptilus, distinguished by their sad-coloured plumage, their black scabrous head, and their enormous tawny pouch, which depends occasionally some 16 in. or more in length from the lower part of the neck, and seems to be connected with the respiratory and not, as commonly believed, with the digestive system. In many parts of India L. dubius, the largest of these birds, the hargila as Hindus call it, is a most efficient scavenger, sailing aloft at a vast height and descending on the discovery of offal, though frogs and fishes also form part of its diet. It familiarly enters the large towns, in many of which an account of its services it is strictly protected from injury, and, having satisfied its appetite, seeks the repose it has earned, sitting with its feet

Jabiru.

extended in front in a most grotesque attitude. A second and smaller species, L. javanicus, has a more southern and eastern range; while a third, L. crumenifer, of African origin, and often known as the marabou-stork, gives its name to the beautifully soft feathers so called, which are the under- tail-coverts; the " marabout " feathers of the plume-trade are mostly supplied by other birds, the term being apparently applied to any downy feathers. (A. N.)

*JABLOCHKOV, PAUL (1847-1*94), Russian electrical engi- neer and inventor, was born at Serdobsk, in the government of Saratov, on the 14th of September 1847, and educated at St Petersburg. In 187 1 he was appointed director of the telegraph lines between Moscow and Kursk, but in 1875 he resigned his position in order to devote himself to his researches on electric lighting by arc lamps, which he had already taken up. In 1876 he settled in Paris, and towards the end of the year brought out his famous " candles," known by his name, which consisted of two carbon parallel rods, separated by a non-conducting par- tition; alternating currents were employed, and the candle was operated by a high-resistance carbon match connecting the tips of the rods, a true arc forming between the parallel carbons when this burnt off, and the separators volatilizing as the carbons burnt away. For a few years his system of electric lighting was widely adopted, but it was gradually superseded*

(see Lighting: Electric) and is no longer in use. Jablochkov made various other electrical inventions, but he died in poverty, having returned to Russia on the 19th of March 1894.

JABLONSKI, DANIEL ERNST (1660-1741), German theo- logian, was born at Nassenhuben, near Danzig, on the 20th of November 1660. His father was a minister of the Moravian Church, who bad taken the name of Peter Figulus on his bap- tism; the son, however, preferred the Bohemian family name of Jablonski. His maternal grandfather, Johann Amos Comenius (d. 1670), was a bishop of the Moravian Church. Having studied at Frankfort-on-the-Oder and at Oxford, Jablonski entered upon his career as a preacher at Magdeburg in 1683, and then from 1686 to 1691 he was the head of the Moravian college at Lissa, a position which had been filled by his grandfather. Still retain- ing his connexion with the Moravians, he was appointed court preacher at Konigsberg in 1691 by the elector of Brandenburg, Frederick III., and here, entering upon a career of great activity, he soon became a person of influence in court circles. In 1693 he was transferred to Berlin as court preacher, and in 1699 he was consecrated a bishop of the Moravian Church. At Berlin Jablonski worked hard to bring about a union between the followers of Luther and those of Calvin; the courts of Berlin, Hanover, Brunswick and Gotha were interested in his scheme, and his principal helper was the philosopher Leibnitz. His idea appears to have been to form a general union between the German, the English and the Swiss Protestants, and thus to establish una eademque sancta catholica et apostolica eademque evangel tea et reformata ecclesia. For some years negotiations were carried on with a view to attaining this end, but eventually it was found impossible to surmount the many difficulties in the way; Jablonski and Leibnitz, however, did not cease to believe in the possibility of accomplishing their purpose. Jablonski's next plan was to reform the Church of Prussia by introducing into it the episcopate, and also the liturgy of the English Church, but here again he was unsuccessful. As a scholar Jablonski brought out a Hebrew. edition of the Old Testament, and translated Bentley's A Confutation of Atheism into Latin (1696). He had some share in founding the Berlin Academy of Sciences, of which he was president in 1733, and he received a degree from the university of Oxford. He died on the 25th of May 1 741.

Jablonski's son, Paul Ernst Jablonski (1693-1757), was pro- fessor of theology and philosophy at the university of Frankfort- on-the-Oder.

Editions of the letters which passed between Jablonski and Leibnitz, relative to the pioposed union, were published at Leipzig in 1747 and at Dorpat ir. 1899.

JABORANDI, a nam' given in a generic manner in Brazil and South America generally to a number of different plants, all of which possess more or less marked sialogogue and sudorific properties. In the year 1875 a drug was introduced under the above name to the notice of medical men in France by Dr Coutinho of Pernambuco, its botanical source being then un- known. Pilocarpus pennatifolius, a member of the natural order Rutaceae, the plant from which it is obtained, is a slightly branched shrub about 10 ft. high, growing in Paraguay and the eastern provinces of Brazil. The leaves, which are placed alternately on the stem, are often i£ ft. long, and consist of from two to five pairs of opposite leaflets, the terminal one having a longer pedicel than the others. The leaflets are oval, lanceolate, entire and obtuse, with the apex often slightly indented, from 3 to 4 in. long and 1 to ij in. broad in the middle. When held up to the light they may be observed to have scattered all over them numerous pellucid dots or receptacles of secretion immersed in the substance of the leaf. The leaves in size and texture bear some resemblance to those of the cherry-laurel (Prunus laurocerasus) , but are less polished on the upper surface. The flowers, which are produced in spring and early summer, are borne on a raceme, 6 or 8 in. long, and the fruit consists of five carpels, of which not more than two or three usually arrive at maturity. The leaves are the part of the plant usually imported, although occasionally the stems and roots are attached to them. The active principle for which the name pilocarpine, suggested by

Holmes, was ultimately adopted, was discovered almost simulta- neously by Hardy in France and Gerrard in England, but was first obtained in a pure state by Petit of Paris. It is a liquid alkaloid, slightly soluble in water, and very soluble in alcohol, ether and chloroform. It strongly rotates the plane of polarization to the right, and forms crystalline salts of which the nitrate is that chiefly used in. rnedicine. The nitrate and phosphate are insoluble in ether, chloroform and benzol, while the hydro- chlorate and hydrobromate dissolve both in these menstrua and in water and alcohol; the sulphate and acetate being deliques- cent are not employed medicinally. The formula of the alkaloid is CnH I6 N 2 2 .

Certain other alkaloids are present in the leaves. They have been named jaborine, jaboridine and pilocarpidine. The first of these is the most important and constant. It is possibly derived from pilocarpine, and has the formula C22H32N4O4. Jaborine resembles atropine pharmacologically, and is there- fore antagonistic to pilocarpine. The various preparations of

Jaborandi — a, leaf (reduced) ; b, leaflet (natural size) ; c, flower; d, fruit (natural size). jaborandi leaves are therefore undesirable for therapeutic pur- poses, and only the nitrate of pilocarpine itself should be used. This is a white crystalline powder, soluble in the ratio of about one part in ten of

*cold water. The dose is -5*5-5 grain by the mouth, and up to one-third of a grain hypodermically, in which fashion it is usually given.*

The action of this powerful alkaloid closely resembles that of physostigmine, but whereas the latter is specially active in influ- encing the heart, the eye and the spinal cord, pilocarpine exerts its greatest power on the secretions. It has no external action. When taken by the mouth the drug is rapidly absorbed and stimulates the secretions of the entire alimentary tract, though not of the liver. The action on the salivary glands is the most marked and the best understood. The great flow of saliva is due to an action of the drug, after absorption, on the terminations of the chorda tympani, sym- pathetic and other nerves of salivary secretion. The gland cells themselves are unaffected. The nerves are so violently excited that direct stimulation of them by electricity adds nothing to the rate of salivary flow. The action is antagonized by atropine, which paralyses the nerve terminals. About jˆjth of a grain of atropine

antagonizes half a grain of pilocarpine. The circulation is depressed by the drug, the pulse being slowed and the blood pressure falling. The cardiac action is due to stimulation of the vagus, but the dilata- tion of the blood-vessels does not appear to be due to a specific action upon them. The drug does not kill by its action on the heart. Its dangerous action is upon the bronchial secretion, which is greatly increased. Pilocarpine is not only the most powerful sialogogue but also the most powerful diaphoretic known. One dose may cause the flow of nearly a pint of sweat in an hour. The action is due, as in the case of the salivation, to stimulation of the terminals of the sudorific nerves. According to K. Binz there is also in both cases an action on the medullary centres for these secretions. Just as the saliva is a true secretion containing a high proportion of ptyalin and salts, and is not a mere transudation of water, so the perspiration is found to contain a high ratio of urea and chlorides. The great diaphoresis and the depression of the circulation usually cause a fall in temperature of about 2° F. The drug is excreted unchanged in the urine. It is a mild diuretic. When given internally or applied locally to the eye it powerfully stimulates the terminals of the oculomotor nerves in the iris and ciliary muscle, causing ext eme contraction of the pupil and spasm of accommodation. The tension of the eyeball is at first raised but afterwards lowered.

The chief therapeutic use of the drug is as a diaphotetic in chronic Bright's disease. It is also used to aid the growth of the hair — in which it is sometimes successful; in cases of inordinate thirst, when one-tenth of a

grain with a little bismuth held in the mouth may be of much value; in cases of lead and mercury poisoning, where it aids the elimination of the poison in the secretions; as a galactagogue ; and in cases of atropine poisoning (though here it is of doubtful value). ,

JACA, a city of northern Spain, in the province of Huesca, 114 m. by rail N. by W. of Saragossa, on the left bank of the river Aragon, and among the southern slopes of the Pyrenees, 2380 ft. above the sea. Pop. (1900), 4934. Jaca is an episcopal see, and was formerly the capital of the Aragonese county of Sobrarbe. Its massive Gothic cathedral dates at least from the nth century, and possibly from the 9th. The city derives some importance from its position on the ancient frontier road from Saragossa to Pau. In August 1904 the French and Spanish governments agreed to supplement this trade-route by building a railway from Oloion in the Basses Pyren6es to Jaca. Various frontier defence works were constructed in the neighbourhood at the close of the 19th century.

The origin of the city is unknown. The Jaccetani (‘laKKfiravol) are mentioned as one of the most celebrated of the numerous small tribes inhabiting the basin of the Ebro by Strabo, who adds that their territory was the theatre of the wars which took place in the 1st century B.C. between Sertorius and Pompey. They are probably identical with the Lacetani of Livy (xxi. 60, 61) and Caesar (B.C. i. 60). Early in the 8th century Jaca fell into the possession of the Moors, by whose writers it is referred to under the name of Dyaka as one of the chief places in the province of Sarkosta (Saragossa). The date of its reconquest is uncertain, but it must have been before the time of Ramiro I. of Aragon (1035-1063), who gave it the title of ” city,” and in 1063 held within its walls a council, which, inasmuch as the people were called in to sanction its decrees, is regarded as of great impor- tance in the history of the parliamentary institutions of the Peninsula. In 1705 Jaca supported King Philip V. from whom, in consequence, it received the title of muy noble, muy leal y vencedora, ” most noble, most loyal and victorious.” During the Peninsular War it surrendered to the French in 1809, and was recaptured in 18 14.

JACAMAR, a word formed by Brisson from Jacameri, the Brazilian name of a bird, as given by Marcgrave, and since adopted in most European tongues for the species to which it was first applied and others allied to it, forming the family Galbulidae 1 of ornithologists, the precise position of which is uncertain, since the best authorities differ. All will agree that the jacamars belong to the great heterogeneous group called by Nitzsch Picariae, but further into detail it is hardly safe to go. The Galbulidae have zygodactylous or pair-toed feet, like the Cuculidae, Bucconidae and Picidae, they also resemble both the latter in laying glossy white eggs, but in this respect they bear the same resemblance to the Momolidae, Alcedinidae,

Meropidae

1 Galbula was first applied to Marcgrave's bird by Moehring. It is another form of Galgulus, and seems to have been one of the many names of the golden oriole. See Icterus.

and some other groups, to which affinity has been claimed for them. In the opinion of Sclater (A Monograph of the Jacamars and Puff-birds) the jacamars form two groups — one consisting of the single genus and species Jacamerops aureus (J. grandis of most authors), and the other including all the rest, viz. Urogalba with two species, Galbula with nine, Brachygalba with five, and Jaca- maralcyon and Galbalcyrhynchus with one each. They are all rather small birds, the largest known being little over 10 in. in length, with long and sharply pointed bills, and the plumage more or less resplendent with golden or bronze reflections, but at the same time comparatively soft. Jacamaralcyon tridaclyla differs from all the rest in possessing but three toes (as its name indicates), on each foot, the hallux being deficient. With the exception of Galbula melanogenia, which is found also in Central America and southern Mexico, all the jacamars inhabit the tropical portions of South America eastward of the Andes, Galbula ruficauda, however, extending its range to the islands of Trinidad and Tobago. 2 Very little is known of the habits of any of the species. They are seen sitting motionless on trees, some- times solitarily, at other times in companies, whence they suddenly dart off at any passing insect, catch it on the wing, and return to their perch. Of their nidification almost nothing has been recorded, but the species occurring in Tobago is said by Kirk to make its nest in marl-banks, digging a hole about an inch and a half in diameter and some 18 in. deep. (A. N.)

JAQANA, the Brazilian name, according to Marcgrave, of certain birds, since found to have some allies in other parts of the world, which are also very generally called by the same appella- tion. They have been most frequently classed with the water- hens or rails {Rallidae), but are now recognized by many system- atists as forming a separate family, Parridae, 3 whose leaning seems to be rather towards the Limicolae, as apparently first

Pheasant-tailed Jacana.

suggested by Blyth, a view which is supported by the osteological observations of Parker (Proc. Zool. Society, 1863, p. 513), though denied by A. Milne-Edwards (Ois. foss. de la France, ii. p. no). The most obvious characteristic of this group of birds is the extraordinary length of their toes and claws, whereby they are enabled to walk with ease over water-lilies and other aquatic plants growing in rivers and lakes. The family has been

divided into four genera — of which Parra, as now restricted, inhabits South America; Metopidius, hardly differing from it, has representatives in Africa, Madagascar and the Indian region; Hydralector, also very nearly allied to Parra, belongs to the

2 The singular appearance, recorded by Canon Tristram (Zoologist, p. 3906), of a bird of this species in Lincolnshire seems to require notice. No instance seems to be known of any jacamar having been kept in confinement or brought to this country alive; but expert aviculturists are often not communicative, and many importations of rare birds have doubtless passed unrecorded.

3 The classic Parra is by some authors thought to have been the golden oriole (see Icterus), while others suppose it was a jay or pie. The word seems to have been imported into ornithology by Aldrovandus, but the reason which prompted Linnaeus to apply it, as he seems first to have done, to a bird of this group, cannot be satisfactorily stated.

northern portion of the Australian region; and Hydrophasianus, the most extravagant form of the whole, is found in India, Ceylon and China. In habits the jaf anas have much in common with the water-hens, but that fact is insufficient to warrant the affinity asserted to exist between the two groups; for in their osteological structure there is much difference, and the resemblance seems to be only that of analogy. The Parridae lay very peculiar eggs of a rich olive-brown colour, in most cases closely marked with dark lines, thus presenting an appearance by which they may be readily known from those of any other birds, though an approach to it is occasionally to be noticed in those of certain Limicolae, and especially of certain Charadriidae. (A. N.)

JACINI, STEFANO, Count (1827-1801), Italian statesman and economist, was descended from an old and wealthy Lombard family. He studied in Switzerland, at Milan, and in German universities. During the period of the Austrian restoration in Lombardy (1849-1859) he devoted himself to literary and economic studies. For his work on La Propriety fondiaria in Lombardia (Milan, 1856) he received a prize from the Milanese Sociela d'incoraggiamento di scienze e leltere and was made a member of the Istituto Lombardo. In another work, Sulle condizioni economiche della Valtellina (Milan, 1858, translated into English by W. E. Gladstone), he exposed the evils of Austrian rule, and he drew up a report on the general conditions of Lombardy and Venetia for Cavour. He was minister of Public

Works under Cavour in 1 860-1 861, in 1864 under La Marmora, and down to 1867 under Ricasoli. In 1866 he presented a bill favouring Italy's participation in the construction of the St Gotthard tunnel. He was instrumental in bringing about the alliance with Prussia for the war of 1866 against Austria, and in the organization of the Italian railways. From 1881 to 1886 he was president of the commission to inquire into the agricultural conditions of Italy, and edited the voluminous report on the subject. He was created senator in 1870, and given the title of count in 1880. He died in 1891.

L. Carpi's Risorgimento italiano, vol. iv. (Milan, 1888), contains a «hort sketch of Jacini's life.

JACK, a word with a great variety of meanings and appli- cations, all traceable to the common use of the word as a by-name of a man. The question has been much discussed whether " Jack " as a name is an adaptation of Fr. Jacques, i.e. James, from Lat. Jacobus, Gr. 'laKwfios, or whether it is a direct pet formation from John, which is its earliest and universal use in English. In the History of the Monastery of St Augustine at Canterbury, 1414, Jack is given as a form of John — Mos est Saxonum . . . verba et nomina transformare . . . . ut . . . pro Johanne Jankin sive Jacke (see E.W. B. Nicholson, The Pedigree of Jack and other Allied Names, 1892). " Jack " was early used as a general term for any man of the common people, especially in combination with the woman's name Jill or Gill, as in the nursery rhyme. The New English Dictionary quotes from the Coventry Mysteries, 1450: " And I wole kepe the feet this tyde Thow ther come both Iakke and Gylle." Familiar examples of this generic application of the name are Jack or Jack Tar for a sailor, which seems to date from the 17 th century, and such compound uses as cheap-jack and steeple-jack, or such expres- sions as " jack in office," " jack of all trades," &c. It is a further txtension of this that gives the name to the knave in a pack of cards, and also to various animals, as jackdaw, jack-snipe, jack- rabbit (a species of large prairie-hare) ; it is also used as a general name for pike.

The many applications of the word " jack " to mechanical devices and other objects follow two lines of reference, one to objects somewhat smaller than the ordinary, the other to appli- ances which take the place of direct manual labour or assist or save it. Of the first class may be noticed the use of the term for the small object bowl in the game of bowls or for jack rafters, those rafters in a building shorter than the main rafters, espe- cially the end rafters in a hipped roof. The use of jack as the name for a particular form of ship's flag probably arose thus, for it is always a smaller flag than the ensign. The jack is flown on a staff on the bowsprit of a vessel. In the British navy the jack

is a small Union flag. (The Union flag should not be styled a Union Jack except when it is flown as a jack.) The jack of other nations is usually the canton of the ensign, as in the German and the United States navies, or else is a smaller form of the national ensign, as in France. (See Flag.)

The more common use of " jack " is for various mechanical and other devices originally used as substitutes for men or boys. Thus the origin of the boot-jack and the meat-jack is explained in Isaac Watts's Logic, 1724: " So foot boys, who had fre- quently the common name of Jack given them, were kept to turn the spit or pull off their masters' boots, but when instruments were invented for both these services, they were both called jacks." The New English Dictionary finds a transitional sense in the use of the name " jack " for mechanical figures which strike the hours on a bell of a clock. Such a figure in the clock of St Lawrence Church at Reading is called a jack in the parish accounts for 1498-1499. There are many different applications of " jack," to certain levers and other parts of textile machinery, to metal plugs used for connecting lines in a telephone exchange, to wooden uprights connecting the levers of the keys with the strings in the harpsichord and virginal, to a framework form- ing a seat or staging which can be fixed outside a window for cleaning or painting purposes, and to many devices contain- ing a roller or winch, as in a jack towel, a long towel hung on a roller. The principal mechanical application of the word, however, is to a machine for raising weights from below. A jack chain, sc called from its use in meat-jacks, is one in which the links, formed each in a figure of eight, are set in planes at right angles to each other, so that they are seen alternately flat or edgeways.

In most European languages the word " jack " in various forms appears for a short upper outer garment, particularly in the shape of a sleeveless (quilted) leather jerkin, sometimes with plates or rings of iron sewn to it. It was the common coat of defence of the infantry of the middle ages. The word in this case is of French origin and was an adaptation of the common name Jacques, as being a garment worn by the common people. In French the word is jaque, and it appears in Italian as giaco, or giacco, in Dutch jak, Swedish jacka and German Jacke, still the ordinary name for a short coat, as is the English jacket, from the diminutive French jaquette. It was probably from some resemblance to the leather coat that the well-known leather vessels for holding liquor or for drinking were known as jacks or black jacks. These drinking vessels, which are often of great size, were not described as black jacks till the 16th century, though known as jacks much earlier. Among the important specimens that have survived to this day is one with the initials and crown of Charles I. and the date, 1646, which came from Kensington Palace and is now in the British Museum ; one each at Queen's College and New College, Oxford; two at Winchester College; one at Eton College; i\nd six at the Chelsea Hospital. Many specimens are

painted with shields of arms, initials and other devices; they are very seldom mounted in silver, though spurious specimens with silver medallions of Cromwell and other prominent personages exist. At the end of the 17th century a smaller jack of a different form, like an ordinary drinking mug with a tapering cylindrical body, often mounted in silver, came into vogue in a limited degree. The black jack is a distinct type of drinking vessel from the leather botel and the bombard. The jack-boot, the heavy riding boot with long flap covering the knee and part of the thigh, and worn by troopers first during the 17th century, was so called probably from association with the leather jack or jerkin. The jack-boot is still worn by the Household Cavalry, and the name is applied to a high riding boot reaching to the knee as distinguished from the riding boot with tops, used in full hunting-kit or by grooms or coachmen.

Jack, sometimes spelled jak, is the common name for the fruit of the tree Artiocarpus integrifolia, found in the East Indies. The word is an adaptation of the Portuguese jaca from the Malay name chakka. (See Bread Fruit.)

The word " jackanapes," now used as an opprobrious term for a swaggering person with impertinent ways and affected airs

and graces, has a disputed and curious history. According to the New English Dictionary it first appears in 1450 in reference to William de la Pole, duke of Suffolk (Political Poems, " Rolls Series," II. 224), " Jack Napys with his clogge hath tiede Talbot oure gentille dogge." Suffolk's badge was a clog and chain, such as was often used for an ape kept in captivity, and he is alluded to (ibid. 222) as " Ape clogge." Jack Napes, Jack o' Napes, Jackanapes, was a common name for a tame ape from the 16th century, and it seems more likely that the word is a fanciful name for a monkey than that it is due to the nickname of Suffolk.

JACKAL (Turk, chakdl), a name properly restricted to Canis aureus, a wolf-like wild member of the dog family inhabiting eastern Europe and southern Asia, but extended to include a number of allied species. Jackals resemble wolves and dogs in their dentition, the round eye-pupils, the period of gestation, and to a large extent also in habits. The European species grows to a height of 15 in. at the shoulders, and to a length of about 2 ft., exclusive of its bushy tail. Typically the fur is greyish- yellow, darker on the back and lighter beneath. The range of the common jackal (C. aureus) extends from Dalmatia to India, the species being represented

by several local races. In Senegal this species is replaced by C. anthus, while in Egypt occurs the much larger C. lupaster, commonly known as the Egyptian wolf. Nearly allied to the last is the so-called Indian wolf (C. pallipes). Other African species are the black-backed jackal (C. mesomelas) ,

Egyptian Jackal (Canis lupaster).

the variegated jackal (C. variegatus), and the dusky jackal (C. adustus). Jackals are nocturnal animals, concealing them- selves until dusk in woody jungles and other natural lurking places, and then sallying forth in packs, which sometimes number two hundred individuals, and visiting farmyards, villages and towns in search of food. This consists for the most part of the smaller mammals and poultry; although the association in packs enables these marauders to hunt down antelopes and sheep. When unable to obtain living prey, they feed on carrion and refuse of all kinds, and are thus useful in removing putrescent matter from the streets. They are also fond of grapes and other fruits, and are thus the pests of the vineyard as well as the poultry- yard. The cry of the jackal is even more appalling than that of the hyena, a shriek from one member of a pack being the signal for a general chorus of screams, which is kept up during the greater part of the night. In India these animals are hunted with foxhounds or greyhounds, and from their cunning and pluck

afford excellent sport. Jackals are readily tamed; and domesti- cated individuals are said, when called by their masters, to wag their tails, crouch and throw themselves on the ground, and otherwise behave in a dog-like fashion. The jackal, like the fox, has an offensive odour, due to the secretion of a gland at the base of the tail.

JACKDAW, or simply Daw (Old Low German, Daha; Dutch, Kaauw), one of the smallest species of the genus Corvus (see Crow), and a very well known inhabitant of Europe, the C. monedula of ornithologists. In some of its habits it much resembles its congener the rook, with which it constantly associates during a great part of the year ; but, while the rook only exceptionally places its nest elsewhere than on the boughs of trees and open to the sky, the daw almost invariably chooses holes, whether in rocks, hollow trees, rabbit-burrows or buildings. Nearly every church-tower and castle, ruined or not, is more or less numerously occupied by daws. Chimneys frequently give them the accommodation they desire, much to the annoyance of the householder, who finds the funnel choked by the quantity of sticks brought together by the birds, since their industry in collecting materials for their nests is as marvellous as it often is futile. In some cases the stack of loose sticks piled up by daws in a belfry or tower has been known to form a structure 10 or 12 ft. in height, and hence this species

may be accounted one of the greatest nest-builders in the world. The style of architecture practised by the daw thus brings it more than the rook into contact with man, and its familiarity is increased by the boldness of its disposition which, though tempered by discreet cunning, is hardly surpassed among birds. Its small size, in comparison with most of its congeners, alone incapaci- tates it from inflicting the serious injuries of which some of them are often the authors, yet its pilferings are not to be denied, though on the whole its services to the agriculturist are great, for in the destruction of injurious insects it is hardly inferior to the rook, and it has the useful habit of ridding sheep, on whose backs it may be frequently seen perched, of some of their parasites.

The daw displays the glossy black plumage so characteristic of the true crows, varied only by the hoary grey of the ear- coverts, and of the nape and sides of the neck, which is the mark of the adult ; but examples from the east of Europe and western Asia have these parts much lighter, passing into a silvery white, and hence have been deemed by some authorities to constitute a distinct species (C. collaris, Drumm.). Further to the east- ward occurs the C. dauuricus of Pallas, which has not only the collar broader and of a pure white, but much of the lower parts of the body white also. Japan and northern China are inhabited also by a form resembling that of western Europe, but wanting the grey nape of the latter. This is the C. neglectus of Professor Schlegel, and is said by Dresser, en the authority of Swinhoe, to interbreed frequently with C. dauuricus. These are all the birds that seem entitled to be considered daws, though Dr Bowdler Sharpe (Cat. B. Brit. Museum, iii. 24) associates with them (under the little-deserved separate generic distinction Coloeus) the fish-crow of North America, which appears both in structure and in habits to be a true crow. (A. N.)

JACKSON, ANDREW (1767-1845), seventh president of the United States, was born on the 15th of March 1767, at the Waxhaw or Warsaw settlement, in Union county, North Carolina, or in Lancaster county, South Carolina, whither his parents had immigrated from Carrickfergus, Ireland, in 1765. He played a slight part in the War of Independence, and was taken prisoner in 1781, his treatment resulting in a lifelong dislike of Great Britain. He studied law at Salisbury, North Carolina, was admitted to the bar there in 1787, and began to practise at McLeansville, Guilford county, North Carolina, where for a time he was a constable and deputy-sheriff. In 1788, having been appointed prosecuting attorney of the western district of North Carolina (now the state of Tennessee), he removed to Nash- ville, the seat of justice of the district. In 1791 he married Mrs Rachel Robards (nee Donelson), having heard that her husband had obtained a divorce through the legislature of Virginia. The

legislative act, however, had only authorized the courts to determine whether or not there were sufficient grounds for a divorce and to grant or withhold it accordingly. It was more than two years before the divorce was actually granted, and only on the basis of the fact that Jackson and Mrs Robards were then living together. On receiving this information, Jackson had the marriage ceremony performed a second time.

In 1796 Jackson assisted in framing the constitution of Tennessee. From December 1796 to March 1797 he represented that state in the Federal House of Representatives, where he distinguished himself as an irreconcilable opponent of President Washington, and was one of the twelve representatives who . voted against the address to him by the House. In 1797 he was elected a United States senator; but he resigned in the following year. He was judge of the supreme court of Tennessee from 1798 to 1804. In 1804-1805 he contracted a friendship with Aaron Burr; and at the latter's trial in 1807 Jackson was one of his conspicuous champions. Up to the time of his nomination for the presidency, the biographer of Jackson finds nothing to record but military exploits in which he displayed perseverance, energy and skill of a very high order, and a succession of personal acts in which he showed himself ignorant, violent, perverse, quarrel- some and astonishingly indiscreet. His combative disposition led him into numerous personal difficulties. In 1795 he fought a duel with Colonel Waitstill Avery (1745-1821), an opposing counsel, over some angry words uttered in a court room; but both, it appears, intentionally fired wild. In 1806 in another duel, after a long and bitter quarrel, he killed Charles Dickinson, and Jackson himself received a wound from which he never fully recovered. In 1813 he exchanged shots with Thomas Hart Benton and his brother Jesse in a Nashville tavern, and received a second wound. Jackson and Thomas Hart Benton were later reconciled.

In 1813-1814, as major-general of militia, he commanded in the campaign against the Creek Indians in Georgia and Alabama, defeated them (at Talladega, on the 9th of November 1813, and at Tohopeka, on the 29th of March 1814), and thus first attracted public notice by his talents. In May 1814 he was commissioned as major-general in the regular army to serve against the British; in November he captured Pensacola, Florida, then owned by Spain, but used by the British as a base of operations; and on the 8th of January 181 5 he inflicted a severe defeat on the enemy before New Orleans, the contestants being unaware that a treaty of peace had already been signed. During his stay in New Orleans he proclaimed martial law, and carried out his measures with unrelenting sternness, banishing from the town a judge who attempted resistance. When civil law was restored, Jackson was fined $icoo for contempt of court; in 1844 Congress ordered

the fine with interest ($2700) to be repaid. In 1818 Jackson received the command against the Seminoles. His conduct in following them up into the Spanish territory of Florida, in seizing Pensacola, and in arresting and executing two British subjects, Alexander Arbuthnot and Robert Ambrister, gave rise to much hostile comment in the cabinet and in Congress; but the negotiations for the purchase of Florida put an end to the diplomatic difficulty. In 182 1 Jackson was military governor of the territory of Florida, and there again he came into collision with the civil authority. From this, as from previous troubles, John Quincy Adams, then secretary of state, extricated him.

In July 1822 the general assembly of Tennessee nominated Jackson for president; and in 1823 he was elected to the United States Senate, from which he resigned in 1825. The rival candidates for the office of president in the campaign of 1824 were Jackson, John Quincy Adams, W. H. Crawford and Henry Clay. Jackson obtained the largest number of votes (99) in the electoral college (Adams receiving 84, Crawford 41 and Clay 37) ; but no one had an absolute majority, and it thus became the duty of the House of Representatives to choose one of the three candidates — Adams, Jackson and Crawford — who had received the greatest numbers of electoral votes. At the election by the house (February 9, 1825) Adams was chosen,

receiving the votes of 13 states, while Jackson received the votes of 7 and Crawford the votes of 4. Jackson, however, was recognized by the abler politicians as the coming man. Martin Van Buren and others, going into opposition under his banner, waged from the first a relentless and factious war on the admin- istration. Van Buren was the most adroit politician of his time; and Jackson was in the hands of very astute men, who advised and controlled him. He was easy to lead when his mind was in solution; and he gave his confidence freely where he had once placed it. He was not suspicious, but if he withdrew his con- fidence he was implacable. When his mind crystallized on a notion that had a personal significance to himself, that notion became a hard fact that filled his field of vision. When he was told that he had been cheated in the matter of the presidency, 1 he was sure of it, although those who told him were by no means so.

There was great significance in the election of Jackson in 1828. A new generation was growing up under new economic and social conditions. They felt great confidence in themselves and great independence. They despised tradition and Old World ways and notions; and they accepted the Jeffersonian dogmas, not only as maxims, but as social forces — the causes of the material prosperity of the country. By this generation, therefore, Jackson was recognized as a man after their own heart. They liked him because he was vigorous, brusque, uncouth, relentless, straightforward

and open. They made him president in 1828, and he fulfilled all their expectations. He had 178 votes in the electoral college against 83 given for Adams. Though the work of redistribution of offices began almost at his inaugu- ration, it is yet an incorrect account of the matter to say that Jackson corrupted the civil service. His administration is rather the date at which a system of democracy, organized by the use of patronage, was introduced into the federal arena by Van Buren. It was at this time that the Democratic or Repub- lican party divided, largely along personal lines, into Jacksonian Democrats and National Republicans, the latter led by such men as Henry Clay and J. Q. Adams. The administration itself had two factions in it from the first, the faction of Van Buren, the secretary of state in 1829-1831, and that of Calhoun, vice-president in 1829-1832. The refusal of the wives of the cabinet and of Mrs Calhoun to accord social recognition to Mrs J. H. Eaton brought about a rupture, and in April 1831 the whole cabinet was re- organized. Van Buren, a widower, sided with the president in this affair and grew in his favour. Jackson in the meantime had learned that Calhoun as secretary of war had wished to censure him for his actions during the Seminole war in Florida in 181 8, and henceforth he regarded the South Carolina statesman as his enemy. The result was that Jackson transferred to Van Buren his support for succession in the presidency. The relations between Jackson and his cabinet were unlike those existing under his predecessors. Having a military point of view, he was inclined to look upon the cabinet members as inferior officers, and when in need of advice he usually consulted a group of personal friends, who came to be called the " Kitchen Cabinet." The principal members of this clique were William B. Lewis (1 784-1866), Amos Kendall and Duff Green, the last named being editor of the United Stales Telegraph, the organ of the administration.

In 1832 Jackson was re-elected by a large majority (219 electoral votes to 49) over Henry Clay, his chief opponent. The battle raged mainly around the re-charter of the Bank of the United States. It is probable that Jackson's advisers in 1828 had told him, though erroneously, that the bank had worked against him, and then were not able to control him. The first message of his first presidency had contained a severe reflection on the bank; and in the very height of this second campaign (July 1832) he vetoed the re-charter, which had been passed in

1 The charge was freely made then and afterwards (though, it is now believed, without justification) that Clay had supported Adams and by influencing his followers in the house had been instrumental in securing his election, as the result of a bargain by which Adams had agreed to pay him for his support by appointing him secretary of state.

JACKSON, CYRIL

the session of 1831-1832. Jackson interpreted his re-election as an approval by the people of his war on the bank, and he pushed it with energy. In September 1833 he ordered the public deposits in the bank to be transferred to selected local banks, and entered upon the " experiment " whether these could not act as fiscal agents for the government, and whether the desire to get the deposits would not induce the local banks to adopt sound rules of currency. During the next session the Senate passed a resolution condemning his conduct. Jackson protested, and after a hard struggle, in which Jackson's friends were led by Senator Thomas Hart Benton, the resolution was ordered to be expunged from the record, on the 16th of January 1837.

In 1832, when the state of South Carolina attempted to " nullify " the tariff laws, Jackson at once took steps to enforce the authority of the federal government, ordering two war vessels to Charleston and placing troops within convenient distance. He also issued a proclamation warning the people of South Carolina against the consequences of their conduct. In the troubles between Georgia and the Cherokee Indians, however, he took a different stand. Shortly after his first election Georgia passed an act extending over the Cherokee country the civil laws of the state. This was contrary to the rights of the Cherokees under a federal treaty, and the Supreme Court consequently declared the act void (1832). Jackson, however, having the frontiersman's contempt for the Indian, refused to enforce the decision of the court (see Nullification; Georgia: History).

Jackson was very successful in collecting old claims against various European nations for spoliations inflicted under Napoleon's continental system, especially the French spoliation claims, with reference to which he acted with aggressiveness and firmness. Aiming at a currency to consist largely of specie, he caused the payment of these claims to be received and imported in specie as far as possible; and in 1836 he ordered land-agents to receive for land nothing but specie. About the same time a law passed Congress for distributing among the states some $35,000,000 balance belonging to the United States, the public debt having all been paid. The eighty banks of deposit in which it was lying had regarded this sum almost as a permanent loan, and had inflated credit on the basis of it. The necessary calling in of their loans in order to meet the drafts in favour of the states, combining with the breach of the overstrained credit between America and Europe and the decline in the price of cotton, brought about a crash which prostrated the whole financial, industrial and commercial system of the country for six or seven years. The crash came just as Jackson was leaving office; the whole burden fell on his successor, Van Buren.

In the 1 8th century the influences at work in the American colonies developed democratic notions. In fact, the circum- stances were those which create equality of wealth and condition, as far as civilized men ever can be equal. The War of Indepen- dence was attended by a grand outburst of political dogmatism of the democratic type. A class of men were produced who believed in very broad dogmas of popular power and rights. There were a few rich men, but they were almost ashamed to differ from their neighbours and, in some known cases, they affected democracy in order to win popularity. After the 19th century began the class of rich men rapidly increased. In the first years of the century a little clique at Philadelphia became alarmed at the increase of the " money power," and at the grow- ing perils to democracy. They attacked with some violence, but little skill, the first Bank of the United States, and they prevented its re-charter. The most permanent interest of the history of the United States is the picture it offers of a primitive democratic society transformed by prosperity and the acquisi- tion of capital into a great republican commonwealth. The denunciations of the " money power " and the reiteration of democratic dogmas deserve earnest attention. They show the development of classes or parties in the old undifferentiated mass. Jackson came upon the political stage just when a wealthy class first existed. It was an industrial and commercial class greatly interested in the tariff, and deeply interested also in the then current forms of issue banking. The southern planters also

were rich, but were agriculturists and remained philosophical Democrats. Jackson was a man of low birth, uneducated, prejudiced, and marked by strong personal feeling in all his beliefs and disbeliefs. He showed, in his military work and in his early political doings, great lack of discipline. The proposal to make him president won his assent and awakened his ambi- tion. In anything which he undertook he always wanted to carry his point almost regardless of incidental effects on himself or others. He soon became completely engaged in the effort to be made president. The men nearest to him understood his character and played on it. It was suggested to him that the money power was against him. That meant that, to the educated or cultivated class of that day, he did not seem to be in the class from which a president should be chosen. He took the idea that the Bank of the United States was leading the money power against him, and that he was the champion of the masses of democracy and of the common people. The opposite party, led by Clay, Adams, Biddle, &c, had schemes for banks and tariffs, enterprises which were open to severe criticism. The political struggle was very intense and there were two good sides to it. Men like Thomas H. Benton, Edward Livingston, Amos Kendall, and the southern statesmen, found material for strong attacks on the Whigs. The great mass of voters felt the issue as Jackson's managers stated it. That meant that the masses recognized Jackson as their champion. Therefore, Jackson's

personality and name became a power on the side opposed to banks, corporations and other forms of the new growing power of capital. That Jackson was a typical man of his generation is certain. He represents the spirit and temper of the free American of that day, and it was a part of his way of thinking and acting that he put his whole life and interest into the con- flict. He accomplished two things of great importance in the history: he crushed excessive state-rights and established the contrary doctrine in fact and in the political orthodoxy of the democrats; he destroyed the great bank. The subsequent history of the bank left it without an apologist, and prejudiced the whole later judgment about it. The way in which Jackson accomplished these things was such that it cost the country ten years of the severest liquidation, and left conflicting traditions of public policy in the Democratic party. After he left Washing- ton, Jackson fell into discord with his most intimate old friends, and turned his interest to the cause of slavery, which he thought to be attacked aud in danger.

Jackson is the only president of whom it may be said that he went out of office far more popular than he was when he entered. When he went into office he had no political opinions, only some popular notions. He left his party strong, perfectly organized and enthusiastic on a platform of low expenditure, payment of the debt, no expenditure for public improvement or for glory or display in any form and low taxes. His name still remained a spell to conjure with, and the politicians sought to obtain the assistance of his approval for their schemes; but in general his last years were quiet and uneventful. He died at his residence, " The Hermitage," near Nashville, Tennessee, on the 8th of June 1845.

Bibliography. — Of the early biographies, that by J. H. Eaton (Philadelphia, 1824) is a history of Jackson's early military exploits, written for political purposes. Amos Kendall's Life (New York, 1843) is incomplete, extending only to 1814. James Parton's elaborate work (3 vols., New York, i860) is still useful. Parton prepared a shorter biography for the " Great Commanders Series " (New York, 1893), which emphasizes Jackson's military career. W. G. Sumner's Andrew Jackson in the " American Statesmen Series " (Boston, 1882; revised, 1899) combines the leading facts of Jackson's life with a history of his times. W. G. Brown wrote an appreciative sketch (Boston, 1900) for the " Riverside Biographical Series." Of more recent works the most elaborate are the History of Andrew Jackson, by A. C. Buell (New York, 1904), marred by numerous errors, and the Life and Times of Andrexv Jackson, by A. S. Colyar (Nashville, 1904). Charles H. Peck's The Jacksonian Epoch (New York, 1899) is an account of national politics from 1815 to 1840, in which the antagonism of Jackson and Clay is emphasized. (W. G. S.)

JACKSON, CYRIL (1746-1819), dean of Christ Church, Oxford, was born

in Yorkshire, and educated at Westminster

no

and Oxford. In 1771 he was chosen to be sub-preceptor to the two eldest sons of George III., but in 1776 he was dismissed, probably through some household intrigues. He then took orders, and was appointed in 1779 to the preachership at Lincoln's Inn and to a canonry at Christ Church, Oxford. In 1783 he was elected dean of Christ Church. His devotion to the college led him to decline the bishopric of Oxford in 1 799 and the primacy of Ireland in 1800. He took a leading part in framing the statute which, in 1802, launched the system of public examinations at Oxford, but otherwise he was not prominent in university affairs. On his resignation in 1809 he settled at Felpham, in Sussex, where he remained till his death.

JACKSON, FREDERICK GEORGE (i860-), British Arctic explorer, was educated at Denstone College and Edinburgh University. His first voyage in Arctic waters was on a whaling- cruise in 1886-1887, and in 1893 he made a sledge-journey of 3000 miles across the frozen tundra of Siberia lying between the Ob and the Pechora. His narrative of this journey was published under the title of The Great Frozen Land (1895). On his return, he was given the command of the Jackson-Harmsworth Arctic expediton (1894-1897), which had for its objective the general exploration of Franz Josef Land. In recognition of his services he received a knighthood of the first class of the Danish Royal Order of St Olaf in 1898, and was awarded the gold medal of the Paris Geographical Society in 1899. His account of the expedition was published under the title of A Thousand Days in the Arctic (1899). He served in South Africa during the Boer War, and obtained the rank of captain. His travels also include a journey across the Australian deserts.

JACKSON, HELEN MARIA (1831-1885), American poet and novelist, who wrote under the intials of " H. H." (Helen Hunt), was born in Amherst, Massachusetts, on the 18th of October 1831, the daughter of Nathan Welby Fiske (1798-1847), who was a professor in Amherst College. In October 1852 she married Lieutenant Edward Bissell Hunt (1822-1863), of the U.S. corps of engineers. In 1870 she published a little volume of meditative Verses, which was praised by Emerson in the preface to his Parnassus (1874). In 1875 she married William S. Jackson, a banker, of Colorado Springs. She became a prolific writer of prose and verse, including juvenile tales, books of travel, household hints and novels, of which the best is Ramona (1884), a defence of the Indian character. In 1883, as a special commissioner with Abbot Kinney (b. 1850), she

investigated the condition and needs of the Mission Indians in California. A Century of Dishonor (1881) was an arraignment of the treatment of the Indians by the United States. She died on the 12th of August 1885 in San Francisco.

In addition to her publications referred to above, Mercy Phil- brick's Choice (1876), Hetty's Strange History (1877), Zeph (1886), and Sonnets and Lyrics (1886) may be mentioned.

JACKSON, MASON (c. 1820-1903), British engraver, was born at Berwick-on-Tweed about 1820, and was trained as a wood engraver by his brother, John Jackson, the author of a history of this art. In the middle of the 19th century he made a considerable reputation by his engravings for the Art Union of London, and for Knight's Shakespeare and other standard books; and in i860 he was appointed art editor of the Illustrated London News, a post which he held for thirty years. He wrote a history of the rise and progress of illustrated journalism. He died in December 1903.

JACKSON, THOMAS (1 570-1640), president of Corpus Christi College, Oxford, and dean of Peterborough, was born at Witton- le-Wear, Durham, and educated at Oxford. He became a probationer fellow of Corpus in 1606, and was soon afterwards elected vice-president. In 1623 he was presented to the living of St Nicholas, Newcastle, and about 1625 to the living of Winston, Durham. Five years later he was appointed president of Corpus, and in 1632 the king presented him to the living of Witney, Oxfordshire. He was made a prebendary of Winchester in 1635, and was dean of Peterborough in 1635-1639. Although originally a Calvinist, he became in later life an Arminian.

His chief work was a series of commentaries on the Apostles' Creed, the first complete edition being entitled The Works of Thomas Jackson, D.D. (London, 1673). The commentaries were, however, originally published in 1613-1657, as twelve books with different titles, the first being The Eternal Truth of Scriptures (London,

1613).

JACKSON, THOMAS JONATHAN (1824-1863), known as " Stonewall Jackson," American general, was born at Clarks- burg, Virginia (now West Viginia), on the 21st of January 1824, and was descended from an Ulster family. At an early age he was left a penniless orphan, and his education was acquired in a small country school until he procured, mainly by his own energy, a nomination to the Military Academy. Lack of social graces and the deficiencies of his early education impeded him at first, but "in the end 'Old Jack,' as he was always called, with his desperate earnestness, his

unflinching straightforwardness, and his high sense of honour, came to be regarded with something like affection." Such qualities he displayed not less amongst the light-hearted cadets than afterwards at the head of troops in battle. After graduating he took part, as second lieutenant in the 1st U.S. Artillery, in the Mexican War. At Vera Cruz he won the rank of first lieutenant, and for gallant conduct at Contreras and Chapultepec respectively he was brevetted captain and major, a rank which he attained with less than one year's service. During his stay in the city of Mexico his thoughts were seriously directed towards religion, and, eventually entering the Presbyterian communion, he ruled every subsequent action of his life by his faith. In 1851 he applied for and obtained a professorship at the Virginia military institute, Lexington; and here, except for a short visit to Europe, he remained for ten years, teaching natural science, the theory of gunnery and battalion drill. Though he was not a good teacher, his influence both on his pupils and on those few intimate friends for whom alone he relaxed the gravity of his manner was profound, and, little as he was known to the white inhabitants of Lexington, he was revered by the slaves, to whom he showed uniform kindness, and for whose moral instruction he worked unceasingly. As to the great question at issue in 1861, Major Jackson's ruling motive was devotion to his state, and when Virginia seceded, on the 17th of April, and the Lexington cadets were ordered to Richmond, Jackson went thither in command of the corps. His intimate friend, Governor Letcher, appreciating his gifts, sent him as a colonel of infantry to Harper's Ferry, where the first collision with the Union forces was hourly expected. In June he received the command of a brigade, and in July promo- tion to the rank of brigadier-general. He had well employed the short time at his disposal for training his men, and on the first field of Bull Run they won for themselves and their brigadier, by their rigid steadiness at the critical moment of the battle, the historic name of " Stonewall."

After the battle of Bull Run Jackson spent some time in the further training of his brigade which, to his infinite regret, he was compelled to leave behind him when, in October, he was assigned as a major-general to command in the Shenandoah Valley. His army had to be formed out of local troops, and few modern weapons were available, but the Valley regiments retained the impress of Jackson's training till the days of Cedar Creek. Discipline was not acquired at once, however, and the first ventures of the force were not very successful. At Kerns- town, indeed, Jackson was tactically defeated by the Federals under Shields (March 23, 1862). But the Stonewall brigade had been sent to its old leader in November, and by the time that the famous Valley Campaign (see Shenandoah Valley Campaigns) began, the forces under Jackson's command had acquired cohesion and power of manoeuvre. On the 8th of May 1862 was fought the

combat of McDowell, won by Jackson against the leading troops of Fremont's command from West Virginia. Three weeks later the forces under Banks were being driven over the Potomac at Harper's Ferry, and Jackson was master of the Valley. Every other plan of campaign in Virginia was at once subordinated to the scheme of " trapping Jackson." But the Confederates, marching swiftly up the Valley, slipped between the converging columns of Fremont from the west and

in

McDowell from the east, and concluded a most daring campaign by the victorious actions of Cross Keys and Port Republic (8th and qth of June). While the forces of the North were still scattered, Jackson secretly left the Valley to take a decisive part in Lee's campaign before Richmond. In the " Seven Days " Jackson was frequently at fault, but his driving energy bore no small part in securing the defeat of McClellan's advance on Richmond. Here he passed for the first time under the direct orders of Robert Lee, and the rest of his career was spent in command of the II. corps of the Army of Northern Virginia. As Lee's chief and most trusted subordinate he was throughout charged with the execution of the more delicate and difficult operations of his commander's hazardous strategy. After his victory over Banks at Cedar Mountain, near Culpeper, Virginia, Jackson led the daring march round the flank of General Pope's army, which against all theoretical rules ended in the great victory of second Bull Run. In the Maryland campaign Lieut. General Jackson was again detached from the main army. Eleven thousand Federals, surrounded in Harper's Ferry, were forced to surrender, and Jackson rejoined Lee just in time to oppose McClellan's advance. At the Antietam his corps bore the brunt of the battle, which was one of the most stubborn of modern warfare. At Fredericksburg his wing of Lee's line of battle was heavily engaged, and his last battle, before Chancellorsville, in the thickets of the Wilderness, was his greatest triumph. By one of his swift and secret flank marches he placed his corps on the flank of the enemy, and on the 2nd of May flung them against the Federal XL corps, which was utterly routed. At the close of a day of victory he was reconnoitring the hostile positions when suddenly the Confederate outposts opened fire upon his staff, whom they mistook in the dark and tangled forest for Federal cavalry. Jackson fell wounded, and on the 10th of May he died at Guinea's station. He was buried, according to his own wish, at Lexington, where a statue and a memorial hall commemorate his connexion with the place; and on the spot where he was mortally wounded stands a plain granite pillar. The first contribution towards the bronze statue at Richmond was made by the negro Baptist congregation for which Jackson had laboured so earnestly in his Lexington years. He was twice

married, first to Eleanor (d. 1854), daughter of George Junkin, president of Washington College, Virginia, and secondly in 1857 to Mary Anna Morrison, daughter of a North Carolina clergyman. That Jackson's death, at a critical moment of the fortunes of the Confederacy, was an irreparable loss was disputed by no one. Lee said that he had lost his right arm, and, good soldiers as were the other generals, not one amongst them was comparable to Jackson, whose name was dreaded in the North like that of Lee himself. His military character was the enlargement of his personal character — " desperate earnestness, unflinching straightforwardness," and absolute, almost fatalist, trust in the guidance of providence. At the head of his troops, who idolized him, he was a Cromwell, adding to the zeal of a fanatic and the energy of the born leader the special military skill and trained soldierly spirit which the English commander had to gain by experience. His Christianity was conspicuous, even amongst deeply religious men like Lee and Stuart, and pene trated every part of his character and conduct.

See lives by R. L. Dabney (New York, 1883), J. E. Cooke (New York, 1866), M. A. Jackson (General Jackson's widow) (New York, 1892) ; and especially G. F. R. Henderson, Stonewall J 'ack son (London, 1898), and H. A. White, Stonewall Jackson (Philadelphia, 1909).

JACKSON, WILLIAM (1 730-1 803), English musician, was born at Exeter on the 29th of May 1730. His father, a grocer, bestowed a liberal education upon him, but, on account of the lad's strong predilection for music, was induced to place him under the care of John Silvester, the organist of Exeter Cathedral, with whom he remained about two years. In 1748 he went to London, and studied under John Travers, organist of the king's chapel. Returning to Exeter, he settled there as a teacher and composer, and in 1777 was appointed subchanter, organist, lay- vicar and master of the choristers of the cathedral. In 1755 he published his first work. Twelve Songs, which became at once

highly popular. His next publication, Six Sonatas for the Harp- sichord, was a failure. His third work, Six Elegies for three voices, preceded by an Invocation, with an Accompaniment, placed him among the first composers of his day. His fourth work was another set of Twelve Songs, now very scarce; and his fifth work was again a set of Twelve Songs, all of which are now forgotten. He next published Twelve Hymns, with some good remarks upon that style of composition, although his precepts were better than his practice. A set of Twelve Songs followed, containing some good compositions. Next came an Ode to Fancy, the words by Dr Warton. Twelve Canzonets for two voices formed his ninth work; and one of them — " Time has not thinned my Flowing Hair " — long held a place at public and private con- certs. His tenth work was Eight Sonatas for the

Harpsichord, some of which were novel and pleasing. He composed three dramatic pieces, — Lycidas (1767), The Lord of the Manor, to General Burgoyne's words (1780), and The Metamorphoses, a comic opera produced at Drury Lane in 1783, which did not succeed. In the second of these dramatic works, two airs — ■ " Encompassed in an Angel's Form " and " When first this Humble Roof I knew " — were great favourites. His church music was published after his death by James Paddon (1820); most of it is poor, but " Jackson in F" was for many years popular. In 1782 he published Thirty Letters on Various Subjects, in which he severely attacked canons, and described William Bird's Non nobis Domine as containing passages not to be endured. But his anger and contempt were most strongly expressed against catches of all kinds, which he denounced as barbarous. In 1791 he put forth a pamphlet, Observations on the Present State of Music in London, in which he found fault with everything and everybody. He published in 1798 The Four Ages, together with Essays on Various Subjects, — a work which gives a favourable idea of his character and of his literary acquirements. Jackson also cultivated a taste for landscape painting, and imitated, not unsuccessfully, the style of his friend Gainsborough. He died on the 5th of July 1803.

JACKSON, a city and the county-seat of Jackson county, Michigan, U.S.A., on both sides of the Grand River, 76 m. W. of Detroit. Pop. (1890), 20,798; (1900), 25,180, of whom 3843 were foreign-born (1004 German, 941 English Canadian); (1910 census) 31,433. It is served by the Michigan Central, the Lake Shore & Michigan Southern, the Grand Trunk and the Cincinnati Northern railways, and by inter-urban electric lines. It is the seat of the state prison (established 1839). Coal is mined in the vicinity; the city has a large trade with the surrounding agricultural district (whose distinctive product is beans); the Michigan Central railway has car and machine shops here; and the city has many manufacturing establishments. The total factory product in 1904 was valued at $8,348,125, an increase of 24-4 % over that of 1900. The muni- cipality owns and operates its water-works. The place was formerly a favourite camping ground of the Indians, and was settled by whites in 1829. In 1830 it was laid out as a town, selected for the county-seat, and named Jacksonburg in honour of Andrew Jackson; the present name was adopted in 1838. Jackson was incorporated as a village in 1843, and in 1857 was chartered as a city. It was at a convention held at Jackson on the 6th of July 1854 that the Republican party was first organized and so named by a representative state body.

JACKSON, a city and the county-seat of Hinds county, Mississippi, U.S.A., and the capital of the state, on the W. bank of the Pearl River, about 40 m. E. of Vicksburg and 185 m. N. of New Orleans, Louisiana. Pop. (1890), 5920; (1900), 7816, of whom 4447 were negroes. According to the

Federal census taken in 1910 the population had increased to 21,262. Jackson is served by the Illinois Central, the Alabama & Vicksburg, the Gulf & Ship Island, New Orleans Great Northern, and the Yazoo & Mississippi Valley railways, and during the winter by small freight and passenger steamboats on the Pearl River. In Jackson is the state library, with more than 80,000 volumes. The new state capitol was finished in ˆ03. The old state capitol, dating from 1839, is of considerable interest; in it were held the secession

convention (1861), the " Black and Tan Convention " (1868), and the constitutional convention of 1890, and in it Jefferson Davis made his last speech (1884). Jackson is the seat of Mill- saps College, chartered in 1890 and opened in 1892 (under the control of the Methodist Episcopal Church, South), and having, in 1907-1908, 12 instructors and 297 students; of Belhaven College (non-sectarian, 1894), for girls; and of Jackson College (founded in 1877 at Natchez by the American Baptist Home Mission Society; in 1883 removed to Jackson), for negroes, which had 356 students in 1907-1908. The city is a market for cotton and farm products, and has a number of manufactories. In 1821 the site was designated as the seat of the state government, and early in the following year the town, named in honour of Andrew Jackson, was laid out. The legislature first met here in December 1822. It was not until 1840 that it was chartered as a city. During the Civil War Jackson was in the theatre of active campaigning. On the 14th of May 1863 Johnston who then held the city, was attacked on both sides by Sherman and McPherson with two corps of Grant's army, which, after a sharp engagement, drove the Confederates from the town. After the fall of Vicksburg Johnston concentrated his forces at Jackson, which had been evacuated by the Federal troops, and prepared to make a stand behind the intrenchments. On the 9th of July Sherman began an investment of the place, and during the succeeding week a sharp bombardment was carried on. In the night of the 16th Johnston, taking advantage of a lull in the firing, withdrew suddenly from the city. Sherman's army entered on the 17th and remained five days, burning a considerable part of the city and ravaging the surrounding country.

JACKSON, a city and the county-seat of Madison county, Tennessee, U.S.A., situated on the Forked Deer river, about 85 m. N.E. of Memphis. Pop. (1890), 10,039; (i9°°) > 14,511, of whom 6108 were negroes; (1910 census), 15,779. It is served by the Mobile & Ohio, the Nashville, Chattanooga & St Louis and the Illinois Central railways. The state supreme court holds its sessions here for the western district of Ten- nessee.

The city is the seat of Union University (co-educational) , chartered in 1875 as Southwestern Baptist University, and con- ducted under that name at Jackson until 1907, when the present name was adopted. In 1 907-1 908 the university had 17 instruc- tors and 280 students. At Jackson, also, are St Mary's Academy (Roman Catholic); the Memphis Conference Female Institute (Methodist Episcopal, South, 1843), and Lane College (for negroes), under the control of the Colored Methodist Episcopal Church. Jackson is an important cotton market, and is a shipping point for the farm products and fruits of the surround- ing country. It has also numerous manufactures and railway shops. The total value of the factory product in 1905 was $2,317,715. The municipality owns and operates the electric-lighting plant and the water-works. There is in the city an electro-chalybeate well with therapeutic properties. Jackson was settled about 1820, incorporated as a town in 1823, chartered as a city in 1854, and in 1907 received a new charter by which the sale of intoxicating liquors is forever prohibited. After General Grant's advance into Tennessee in 1862 Jackson was fortified and became an important base of operations for the Federal army, Grant himself establishing his headquarters here in October.

JACKSONVILLE, a city and the county-seat of Duval county, Florida, U.S.A., in the N.E. part of the state, on the left bank of the St John's River, 14 m. from the Atlantic Ocean as the crow flies and about 27 m. by water. Pop. (1890), 17,201; (1900), 28,429, of whom 16,236 were negroes and 1166 foreign-born; (1910 census) 57,699; the city being the largest in the state. It is served by the Southern, the Atlantic Coast Line, the Sea- board Air Line, the Georgia Southern & Florida and the Florida East Coast railways, and by several steamship lines. 1

1 Shoals in the river and sand rock at its mouth long prevented the development of an extensive water trade, but in 1896 the United States Government made an appropriation (supplemented in 1902, 1903 and 1904) for deepening, for a width of 300 ft., the channel connecting the city and the ocean to 24 ft., and on the bar 27 ft.

It is the largest railway centre in the state, and is popularly known as the Gate City of Florida. In appearance Jacksonville is very attractive. It has many handsome buildings, and its residential streets are shaded with live-oaks, water oaks and bitter-orange trees. Jacksonville is the seat of two schools for negroes, the Florida Baptist Academy and Cookman Institute (1872; Methodist Episcopal). Many winter visitors are annually attracted by the excellent climate, the mean temperature for the winter months being about 55 F. Among the places of interest in the vicinity is the large Florida ostrich farm. There are numerous municipal and other parks. The city owns and operates its electric-lighting plant and its water-works system. The capital invested in manufacturing increased from $1,857,844 in 1900

to $4,837,281 in 1905, or 160-4%, and the value of the factory product rose from $1,798,607 in 1900 to $5,340,264 in 1905, or 196-9 %. Jacksonville is the most important distributing centre in Florida, and is a port of entry. In 1909 its foreign im- ports were valued at $513,439; its foreign exports at $2,507,373.

The site of Jacksonville was called Cow Ford (a version of the Indian name, Wacca Pilatka), from the excellent ford of the St John's River, over which went the King's Road, a highway built by the English from St Augustine to the Georgia line. The first settlement was made in 1816. In 1822 a town was laid out here and was named in honour of General Andrew Jackson; in 1833 Jacksonville was incorporated. During the Civil War the city was thrice occupied by Federal troops. In 1888 there was an epidemic of yellow fever. On the 3rd of May 1901 a fire destroyed nearly 150 blocks of buildings, constituting nearly the whole of the business part of the city, the total loss being more than $15,000,000; but within two years new buildings greater in number than those destroyed were constructed, and up to December 1909 about 9000 building permits had been granted.

JACKSONVILLE, a city and the county-seat of Morgan county, Illinois, U.S.A., on Mauvaiseterre Creek, about ^^ m. W. of Springfield. Pop. (1890), 12,935; (1900), 15,078, of whom 1497 were foreign-born; (1910 census), 15,326. It is served by the Chicago, Burlington & Quincy, the Chicago & Alton, the Chicago, Peoria & St Louis and the Wabash railways. It is the seat of several educational and philanthropic institutions. Illinois College (Presbyterian), founded in 1829 through the efforts of the Rev. John Millot Ellis (1793-1855), a missionary of the American Home Missionary Society and of the so-called Yale Band (seven Yale graduates devoted to higher education in the Middle West), is one of the oldest colleges in the Central States of the United States. The Jacksonville Female Academy (1830) and the Illinois Conservatory of Music (1871) were ab- sorbed in 1903 by Illinois College, which then became co-educa- tional. The college embraces, besides the collegiate department, Whipple Academy (a preparatory department), the Illinois Conservatory of Music and a School of Art, and in 1 908-1 909 had 21 instructors and 173 students. The Rev. Edward Beecher was the first president of the college (from 1830 to 1844), and among its prominent graduates have been Richard Yates, jun., the Rev. Thomas K. Beecher, Newton Bateman (1822-1897), superintendent of public instruction of Illinois from 1865 to 1875 and president of Knox College in 1875-1893, Bishop Theodore N. Morrison (b. 1850), Protestant Episcopal Bishop of Iowa after 1898, and William J. Bryan. The Illinois Woman's College (Methodist Episcopal; chartered in 1847 as the Illinois Confer- ence Female Academy) received its present name in 1899. The State Central Hospital for the Insane (opened in 1851),

the State School for the deaf (established in 1839, opened in 1845, and the first charitable institution of the state) and the State School for the Blind (1849) are also in Jacksonville. Morgan Lake and Duncan Park are pleasure resorts. The total value of the factory product in 1905 was $1,981,582, an increase of 17-7% since 1900. Jacksonville was laid out in 1825 as the county-seat of Morgan county, was named probably in honour of Andrew Jackson, and was incorporated as a town in 1840, chartered as a

(mean low water), and by 1909 the work had been completed; further dredging to a 24 ft. depth between the navigable channel and pierhead lines was authorized in 1907 and completed by 1910.

JACOB— JACOB OF EDESSA

n 3

~ity in 1867, and re-chartered in 1887. The majority of the early settlers came from the southern and border states, princi- pally from Missouri and Kentucky; but subsequently there was a large immigration of New England and Eastern people, and these elements were stronger in the population of Jacksonville than in any other city of southern Illinois. The city was a station of the " Underground Railroad."

JACOB (Hebrew y&'&qob, derived, according to Gen. xxv. 26, xxvii. 36, from a root meaning " to seize the heel " or " sup- plant "), son of Isaac and Rebekah in the Biblical narrative, and the father of the twelve tribes of Israel. Jacob and his twin brother Esau are the eponyms of the Israelites and Edomites. It was said of them that they would be two nations, and that the elder would serve the younger. Esau was born first, but lost his superiority by relinquishing his birthright, and Jacob by an act of deceit gained the paternal blessing intended for Esau (Gen. xxvii., J and E). 1 The popular view regarding Israel and Edom is expressed when the story makes Jacob a tent-dweller, and Esau a hunter, a man of the field. But whilst Esau married among the Canaanite " daughters of the land " (P in xxvi. 34; xxviii. 8 seq.) , Jacob was sent, or (according to a variant tradition) fled from Beer-sheba, to take a wife from among his Syrian kinsfolk at Haran. On the way he received a revelation at Bethel (" house of God ") promising to him and to his descen- dants the whole extent of the land. The beautiful story of Jacob's fortunes at Haran is among the best examples of Hebrew narrative: how he served seven years for Rachel, "and they seemed a few days for the love he had to her," and was tricked by receiving the elder sister Leah, and how he served yet another seven years, and at last won his love. The patriarch's increasing wealth caused him to incur the jealousy of his father-in-law, Laban, and he was forced to flee in

secret with his family. They were overtaken at Gilead, 2 whose name (interpreted " heap of witness ") is explained by the covenant into which Jacob and Laban entered (xxxi. 47 sqq.). Passing Mahanaim (" camps "), where he saw the camps of God, Jacob sent to Esau with friendly overtures. At the Jabbok he wrestled with a divine being and prevailed (cf. Hos. xii. 3 sqq.), hence he called the place Peniel or Penuel (" the face of God "), and received the new name Israel. He then effected an unexpected reconciliation with Esau, passed to Succoth, where he built " booths " for his cattle (hence its name), and reached Shechem. Here he purchased ground from the clan Hamor (cf. Judg. ix. 28), and erected an altar to " God (El) the God of Israel." This was the scene of the rape of Dinah and of the attack of Simeon and Levi which led to their ruin (xxxiv.; see Dan, Levites, Simeon). Thence Jacob went down south to Bethel, where he received a divine revelation (P), similar to that recorded by the earlier narrator (J), and was called Israel (xxxv. 9-13, 15). Here Deborah, Rebekah's nurse, died, on the way to Ephrath. Rachel died in giving birth to Benjamin (q.v.), and further south Reuben was guilty of a grave offence (cf. xlix. 4). According to P, Jacob came to Hebron, and it was at this juncture that Jacob and Esau separated (a second time) and the latter removed to Mount Seir (xxxvi. 6 sqq.; cf. the parallel in xiii. 5 sqq.). Compelled by circumstances, described with much fullness and vividness, Jacob ultimately migrated to Egypt, receiving on the way the promise that God would make of him a great nation, which should come again out of Egypt (see Joseph). After an inter- view with the Pharaoh (recorded only by P, xlvii. 5-11), he dwelt with his sons in the land of Goshen, and as his death drew near pronounced a formal benediction upon the two sons of Joseph (Manasseh and Ephraim), intentionally exalting the younger. Then he summoned all the " sons " to gather round his bed, and told them "what shall befall in the latter days" (xlix.). He died at the age of 147 (so P), and permission was given to carry his body to Canaan to be buried.

1 For the symbols J, E, P, as regards the sources of the book of Genesis, see Genesis ; Bible : Old Test. Criticism.

2 Since it is some 300 m. from Haran to Gilead it is probable that Laban's home, only seven days' journey distant, was nearer Gilead than the current tradition allows (Gen. xxxi. 22 sqq.).

These narratives are full of much valuable evidence regarding marriage customs, pastoral life and duties, popular beliefs and traditions, and are evidently typical of what was currently re- tailed. Their historical value has been variously estimated. The name existed long before the traditional date of Jacob, and the Egyptian phonetic equivalent of Jacob-el (cf .Isra-el, Ishma-el) appears to be the name of a district of central Palestine (or possibly east of Jordon) about 1500 B.C. But the stories in their present

form are very much later. The close relation between Jacob and Aramaeans confirms the view that some of the tribes of Israel were partly of Aramaean origin; his entrance into Palestine from beyond the Jordan is parallel to Joshua's invasion at the head of the Israelites; and his previous journey from the south finds independent support in traditions of another distinct movement from this quarter. Consequently, it would appear that these extremely elevated and richly deve- loped narratives of Jacob-Israel embody, among a number of other features, a recollection of two distinct traditions of migra- tion which became fused among the Israelites. See further Genesis; Jews. (S. A. C.)

JACOB, JOHN (181 2-1858), Indian soldier and administrator, was born on the nth of January 1812, educated at Addiscombe, and entered the Bombay artillery in 1828. He served' in the first Afghan War under Sir John Keane, and afterwards led his regiment with distinction at the battles of Meeanee, Shahdadpur, and Umarkot; but it is as commandant of the Sind Horse and political superintendent of Upper Sind that he was chiefly famous. He was the pacificator of the Sind frontier, reducing the tribes to quietude as much by his commanding personality as by his ubiquitous military measures. In 1853. he foretold the Indian Mutiny, saying: " There is more danger to our Indian empire from the state of the Bengal army, from the feeling which there exists between the native and the European, and thence, spreads throughout the length and breadth of the land, than from all other causes combined. Let government look to this; it is a serious and most important truth "; but he was only rebuked by Lord Dalhousie for his pains. He was a friend of Sir Charles Napier and Sir James Outram, and resembled them in his out- spoken criticisms and independence of authority. He died at the early age of 46 of brain fever, brought on by excessive heat and overwork. The town of Jacobabad, which has the reputa- tion of being the hottest place in India, is named after him.

See A. I. Shand, General John Jacob (1900).

JACOB BEN ASHER (1 280-1340), codifier of Jewish law, was born in Germany and died in Toledo. A son of Asher ben Yehiel (q.v.), Jacob helped to re-introduce the older elaborate method of legal casuistry which had been overthrown by Maimonides (q.v.). The Asheri family suffered great privations but remained faithful in their devotion to the Talmud. Jacob ben Asher is known as the Ba'al ha-turirn (literally " Master of the Rows ") from his chief work, the four Turim or Rows (the title is derived from the four furim or rows of jewels in the High Priest's breastplate). In this work Jacob ben Asher codified Rabbinic law on ethics and ritual, and it remained a standard work of reference until it was edited with a commentary by Joseph Qaro, who afterwards simplified the code into the more popular Shulhan Aruch. Jacob also wrote two commen- taries on the

Pentateuch.

See Graetz, History of the Jews (Eng. trans.), vol. iv. ch. iii. ; Weiss, Dor dor we-dorashav, v. 1 18-123. . (I. A.)

JACOB OF EDESSA, who ranks with Barhebraeus as the most distinguished for scholarship among Syriac writers, 3 was born at 'En-debha in the province of Antioch, probably about a.d. 640. From the trustworthy account of his life by Barhebraeus (Chron. Ecclcs. i. 289) we learn that he studied first at the famous mon- astery of Ken-neshre (on the left bank of the Euphrates, opposite Jerabis) and afterwards at Alexandria, which had of course been

3 " In the literature of his country Jacob holds much the same place as Jerome among the Latin fathers " (Wright, Short Hist. 0) Syr. Lit. p. 143).

for some time in the hands of the Moslems. 1 On his return he was appointed bishop of Edessa by his friend Athanasius II. (of Balad) , probably in 684, 2 but held this office only for three or four years, as the clergy withstood his strict enforcement of the Church canons and he was not supported by Julian, the successor of Athanasius in the patriarchate. Accordingly, having in anger publicly burnt a copy of the canons in front of Julian's residence, Jacob retired to the monastery of Kaisum near Samosata, and from there to the monastery of Eusebhona, 3 where for eleven years he taught the Psalms and the reading of the Scriptures in Greek. But towards the close of this period he again encountered opposition, this time from monks " who hated the Greeks," and so proceeded to the great convent of Tell "Adda or Teleda (? modern Telladi, N.W. of Aleppo), where he spent nine years in revising and emending the Peshitta version of the Old Testament by the help of the various Greek versions. He was finally recalled to the bishopric of Edessa in 708, but died four months later, on the 5th of June.

In doctrine Jacob was undoubtedly Monophysite. 4 Of the very large number of his works, which are mostly in prose, not many have as yet been published, but much information may be gathered from Assemani's Bibliotheca Orientalis and Wright's Catalogue of Syriac MSS. in the British Museum. (1) Of the Syriac Old Testament Jacob produced what Wright calls " a curious eclectic or patchwork text," of which five volumes survive in Europe (Wright's Catalogue 38). It was " the last attempt at a revision of the Old Testament in the Monophysite Church." Jacob was also the chief

founder of the Syriac Massorah among the Monophysites, which produced such MSS. as the one (Vat. cliii.) described by Wiseman in Horae syriacae, part iii. (2) Jacob was the author both of commentaries and of scholia orr the sacred books ; of these specimens are given by Assemani and Wright. They were largely quoted by later commentators, who often refer to Jacob as " the interpreter of the Scriptures." With the commentaries may be mentioned his Hexahemeron, or treatise on the six days of creation, MSS. of which exist at Leiden and at Lyons. It was his latest work, and being left incomplete was finished by his friend George the bishop of the Arabs. Among apocrypha, the History of the Rechabites composed by Zosimus was translated from Greek into Syriac by Jacob (Wright's Catalogue 1 128, and Nau in Revue semitique vi. 263, vii. 54, 136). (3) Mention has been made above of Jacob's zeal on behalf of ecclesiastical canons. In his letter to the priest Addai we possess a collection of canons from his pen, given in the form of answers to Addai's ques- tions. These were edited by Lagarde in Reliquiae juris eccl. syriace, pp. 117 sqq. and Lamy in Dissert, pp. 98 sqq. Additional canons were given in Wright's Notulae syriacae. The whole have been translated and expounded by Kayser, Die Canones Jacobs von Edessa (Leipzig, 1886). (4) Jacob made many contributions to Syriac liturgy, both original and translated (Wright, Short Hist. p. 145 seq.). (5) To philosophical literature hischief original contribu- tion was his Enchiridion, a tract on philosophical terms (Wright's Catalogue 984). The translations of works of Aristotle which have been attributed to him are probably by other hands (Wright, Short Hist. p. 149; Duval, Litterature syriaque, pp. 255, 258). The treatise De causa omnium causarum, which was the work of a bishop of Edessa, was formerly attributed to Jacob; but the publication of the whole by Kayser 5 has made it clear that the treatise is of much later date.

(6) An important historical work by Jacob — a Chronicle in continua- tion of that of Eusebius— has unfortunately perished all except a few leaves. Of these a full account is given in Wright's Catalogue 1062.

(7) Jacob's fame among his countrymen rests most of all on his labours as a grammarian. In his letter to George, bishop of Serugh, on Syriac orthography (published by Phillips in London 1869, and by Martin in Paris the same year) he sets forth the importance of fidelity by scribes in the copying of minutiae of spelling. In his grammar 6 (of which only some fragments remain), while expressing

1 Merx infers that the fact of Jacob's going to Alexandria as a student tells against the view that the Arabs burned the great library (Hist, artis gramm. apud Syros, p. 35). On this question cf. Krehl in Atti del iv. congr. internaz. degli Orientalisti (Florence, 1880), pp. 433 sqq.

2 Pseudo-Dionysius of Tell-Mahre says 677; but Athanasius was patriarch only 684-687.

3 According to Merx (op. cit. p. 43) this may be the celebrated convent of Eusebius near Apamea.

4 Assemani tried hard to prove him orthodox (B.O. i. 470 sqq.) but changed his opinion on reading his biography by Barhebraeus (ib. ii. 337). See especially Lamy, Dissert.de Syrorum fide, pp. 206 sqq.

6 Text at Leipzig 1889 (Das Buch der Erkenntniss der Wahrheit oder der Ursache alter Ursachen) : translation (posthumously) at Strassburg

l8 93-

6 The surviving fragments were published by Wright (London, 1871) and by Merx, op. cit. p. 73 sqq. of Syriac text.

his sense of the disadvantage under which Syriac labours through its alphabet containing only consonants, he declined to introduce a general system of vowel-signs, lest the change should contribute to the neglect and loss of the older books written without vowels. At the same time he invented, by adaptation of the Greek vowels, such a system of signs as might serve for purposes of grammatical exposition, and elaborated the rules by which certain consonants serve to indicate vowels. He also systematized and extended the use of diacritical points. It is still a moot question how far Jacob is to be regarded as the author of the five vowel-signs derived from Greek which soon after came into use among the Jacobites. 7 In any case he made the most important contribution to Syriac grammar down to the time of Barhebraeus. (8) As a translator Jacob's greatest achievement was his Syriac version of the Homiliae cathedrales of Severus, the monophysite patriarch of Antioch (512-518, 535-536). This important collection is now in part known to us by E. W. Brooks's edition and translation of the 6th book of selected epistles of Severus, according to another Syriac version made by Athanasius of Nisibis in 669. (9) A large number of letters by Jacob to various correspondents have been found in various MSS. Besides those on the canon law to Addai, and on grammar to George of Serugh referred to above, there are others dealing with doctrine, liturgy, &c. A few are in verse.

Jacob impresses the modern reader mainly as an educator of his countrymen, and particularly of the clergy. His writings lack the fervid rhetoric and graceful style of such authors as Isaac of Antioch, Jacob of Serugh and Philoxenus of Mabbog. But judged by the standard of his time he shows the qualities of a truly scientific theologian and scholar. (N. M.)

JACOB OF JUTERBOGK (c. 1381-1465), monk and theologian. Benedict Stolzenhagen, known in religion as Jacob, was born at Jiiterbogk in Brandenburg of poor peasant stock. He became a Cistercian at the monastery of Paradiz in Poland, and was. sent by the abbot to the university of Cracow, where he became master in philosophy and doctor of theology. He returned to his monastery, of which he became abbot. In 1441 , however, dis- contented with the absence of strict discipline in his community, he obtained the leave of the papal legate at the council of Basel to transfer himself to the Carthusians, entering the monastery of Salvatorberg near Erfurt, of which he became prior. He lectured on theology at the university of Erfurt, of which he was rector in 1455. He died on the 30th of April 1465.

Jacob's main preoccupation was the reform of monastic life, the grave disorders of which he deplored, and to this end he wrote his Petitiones religiosorum pro reformatione sui status. Another work, De negligentia praelatorum, was directed against the neglect of their duties by the higher clergy, and he addressed a petition for the re- form of the church (Advisamentum pro reformatione ecclesiae) to Pope Nicholas V. This having no effect, he issued the most outspoken of his works, De septem ecclesiae statibus, in which he reviewed the work of the reforming councils of his time, and, without touching the question of doctrine, championed a drastic reform of life and practice of the church on the lines laid down at Constance and Basel.

His principal works are collected in Walch, Monimenta med. aev. 1. and ii. (1757, 1771), and Engelbert Klupfel, Vetus bibliotheca eccles. (Freiburg-im-Breisgau, 1780).

JACOB OF SERUGH, one of the best Syriac authors, named by one of his biographers " the flute of the Holy Spirit and the harp of the believing church," was born in 451 at Kurtam, a village on the Euphrates to the west of Harran, and was probably edu- cated at Edessa. At an early age he attracted the attention of his countrymen by his piety and his literary gifts, and entered on the composition of the long series of metrical homilies on religious themes which formed the great work of his life. Having been ordained to the priesthood, he became periodeutes or episcopal visitor of Haura, in Serugh, not far from his birthplace. His tenure of this office extended over a time of great trouble to the Christian population of Mesopotamia, due to the fierce war carried on by Kavadh II. of Persia within the Roman borders. When on the 10th of January 503 Amid was captured by the Persians after a three months' siege and all its citizens put to the sword or carried captive, a panic seized the whole district, and the Christian inhabitants of many neighbouring cities planned

7 An affirmative answer is given by Wiseman (Horae syr. pp. 181-8) and Wright (Catalogue n 68; Fragm. of the Syriac Grammar of Jacob of Edessa, preface; Short Hist. p. 151 seq.). But Martin (in Jour. As. May-June 1869, pp. 456 sqq.), Duval (Grammaire syriaque, p. 71) and Merx (op. cit. p. 50) are of theopposite opinion. The date of the intro- duction of the seven Nestorian vowel-signs is also uncertain.

to leave their homes and flee to the west of the Euphrates. They were recalled to a more courageous frame of mind by the letters of Jacob. 1 In 519, at the age of 68, Jacob was made bishop of Batnan, another town in the district of Serugh, but only lived till November 521.

From the various extant accounts of Jacob's life and from the number of his known works, we gather that his literary activity was unceasing. According to Barhebraeus (Chron. Eccles. i. 191) he employed 70 amanuenses and wrote in all 760 metrical homilies, besides expositions, letters and hymns of different sorts. Of his merits as a writer and poet we are now well able to judge from P. Bedjan's excellent edition of selected metrical homilies, of which four volumes havealready appeared (Paris 1 905-1908), containing 146 pieces. 2 They are written throughout in dodecasyllabic metre, and those published deal mainly with biblical themes, though there are also poems on such subjects as the deaths of Christian martyrs, the fall of the idols, the council of Nicaea, &c. 3 Of Jacob's prose works, which are not nearly so numerous, the most interesting are his letters, which throw light upon some of the events of his time and reveal his attachment to the Monophysite doctrine which was then strug- gling for supremacy in the Syrian churches, and particularly at Edessa, over the opposite teaching of Nestorius. 4 (N. M.)

JACOBA, or Jacqueline (1401-1436), countess of Holland, was the only daughter and heiress of William, duke of Bavaria and count of Holland, Zeeland and Hainaut. She was married as a child to John, duke of Touraine, second son of Charles VI., king of France, who on the death of his elder brother Louis became dauphin. John of Touraine died in April 141 7, and two months afterwards Jacoba lost her father. Acknowledged as sovereign in Holland and Zeeland, Jacoba was opposed by her uncle John of Bavaria, bishop of Liege. She had the support of the Hook faction in Holland. Meanwhile she had been married in 1418 by her uncle, John the Fearless, duke of Burgundy, to her cousin John IV., duke of Brabant. By the mediation of John the Fearless, a treaty of partition was concluded in 1419 between Jacoba and John of Bavaria; but it was merely a truce,

and the contest between uncle and niece soon began again and continued with varying success. In 1420 Jacoba fled to England; and there, declaring that her marriage with John of Brabant was illegal, she contracted a marriage with Humphrey, duke of Gloucester, in 1422. Two years later Jacoba, with Humphrey, invaded Holland, where she was now opposed by her former husband, John of Brabant, John of Bavaria having died of poison. In 1425 Humphrey deserted his wife, who found herself obliged to seek refuge with her cousin, Philip V., duke of Bur- gundy, to whom she had to submit, and she was imprisoned in the castle of Ghent. John of Brabant now mortgaged the two counties of Holland and Zeeland to Philip, who assumed their protectorate. Jacoba, however, escaped from prison in dis- guise, and for three years struggled gallantly to maintain herself in Holland against the united efforts of Philip of Burgundy and John of Brabant, and met at first with success. The death of the weak John of Brabant (April 1427) freed the countess from her quondam husband; but nevertheless the pope pronounced Jacoba's marriage with Humphrey illegal, and Philip, putting out his full strength, broke down all opposition. By a treaty, made in July 1428, Jacoba was left nominally countess, but Philip was to administer the government of Holland, Zeeland and Hainaut, and was declared heir in case Jacoba should die without children. Two years later Philip mortgaged Holland and Zeeland to the Borselen family, of which Francis, lord of Borselen, was the head. Jacoba now made her last effort. In 1432 she secretly married Francis of Borselen, and endeavoured to foment a rising in Holland against the Burgundian rule. Philip invaded the coun- try, however, and threw Borselen into prison. Only on condition that Jacoba abdicated her three countships in his favour would he allow her liberty and recognize her marriage with Borselen.

1 See the contemporary Chronicle called that of Joshua the Stylite, chap. 54.

2 Assemani (Bibl. Orient, i. 305-339) enumerates 231 which he had seen in MSS.

3 Some other historical poems M. Bedjan has not seen fit to publish, on account of their unreliable and legendary character (vol. i. p. ix. of preface).

- *A full list of the older editions of works by Jacob is given by Wright in Short History of Syriac Literature, pp. 68-72.*

She submitted in April 1432, retained her title of duchess in Bavaria, and lived on her husband's estates in retirement. She died on the 9th of October 1436, leaving no children.

Bibliography. — F. von Loher, Jakobaa von Bayern und ihre Zeit (2 vols., Nordlingen, 1 862-1 869) ; W. J. F. Nuyens, Jacoba van Beier -en en de eerste helft der X V. eeuw (Haarlem, 1873) ; A. von Overstraten, Jacoba van Beieren (Amsterdam, 1790). (G. E.)

JACOBABAD, a town of British India, the administrative headquarters of the Upper Sind frontier district in Bombay; with a station on the Quetta branch of the North- Western rail- way, 37 m. from the junction at Ruk, on the main line. Pop. (1901), 10,787. It is famous as having consistently the highest temperature in India. During the month of June the thermo- meter ranges between 120 and 127° F. The town was founded on the site of the village of Khangarh in 1847 by General John Jacob, for many years commandant of the Sind Horse, who died here in 1858. It has cantonments for a cavalry regi- ment, with accommodation for caravans from Central Asia. It is watered by two canals. An annual horse show is held in January.

JACOBEAN STYLE, the name given to the second phase of the early Renaissance architecture in England, following the Elizabethan style. Although the term is generally employed of the style which prevailed in England during the first quarter of the 17th century, its peculiar decadent detail will be found nearly twenty years earlier at Wollaton Hall, Nottinghamshire, and in Oxford and Cambridge examples exist up to 1660, not- withstanding the introduction of the purer Italian style by Inigo Jones in 1619 at Whitehall. Already during Queen Elizabeth's reign reproductions of the classic orders had found their way into English architecture, based frequently upon John Shute's The First and Chief Grounds of Architecture, published in 1563, with two other editions in 1579 and 1584. In 1577, three years before the commencement of Wollaton Hall, a copybook of the orders was brought out in Antwerp by Jan Vredeman de Vries. Though nominally based on the description of the orders by Vitruvius, the author indulged freely not only in his rendering of them, but in suggestions of his own, showing how the orders might be employed in various buildings. Those suggestions were of a most decadent type, so that even the author deemed it advisable to publish a letter from a canon of the Church, stating that there was nothing in his architectural designs which was contrary to religion. It is to publications of this kind that Jacobean architecture owes the perversion of its forms and the introduction of strap work and pierced crestings, which appear for the first time at Wollaton (1580); at Bramshill, Hampshire (1607-1612), and in Holland House, Kensington (1624), it receives its fullest development. (R. P. S.)

JACOBI, FRIEDRICH HEINRICH (1743-1819), German philosopher, was born at Diisseldorf on the 25th of January 1743. The second son of a wealthy sugar merchant near Diisseldorf, he was educated for a

commercial career. Of a retiring, medita- tive disposition, Jacobi associated himself at Geneva mainly with the literary and scientific circle of which the most prominent member was Lesage. He studied closely the works of Charles Bonnet, and the political ideas of Rousseau and Voltaire. In 1763 he was called back to Diisseldorf, and in the following year he married and took over the management of his father's busi- ness. After a short period he gave up his commercial career, and in 1770 became a member of the council for the duchies of Jiilich and Berg, in which capacity he distinguished himself by his ability in financial affairs, and his zeal in social reform. Jacobi kept up his interest in literary and philosophic matters by an extensive correspondence, and his mansion at Pempelfort, near Diisseldorf, was the centre of a distinguished literary circle. With C. M. Wieland he helped to found a new literary journal. Der Teutsche Mercur, in which some of his earliest writings, mainly on practical or economic subjects, were published. Here too appeared in part the first of his philosophic works, Edward Allwills Brief sammlung (1776), a combination of romance and speculation. This was followed in 1779 by Woldemar, a philosophic novel, of very imperfect structure, but full of genial

ideas, and giving the most complete picture of Jacobi's method of philosophizing. In 1779 he visited Munich as member of the privy council, but after a short stay there differences with his colleagues and with the authorities of Bavaria drove him back to Pempelfort. A few unimportant tracts on questions of theo- retical politics were followed in 1785 by the work which first brought Jacobi into prominence as a philosopher. A conversation which he had held with Lessing in 1780, in which Lessing avowed that he knew no philosophy, in the true sense of that word, save Spinozism, led him to a protracted study of Spinoza's works. The Briefe ttber die Lehre Spinozas (1785; 2nd ed., much enlarged and with important Appendices, 1789) expressed sharply and clearly Jacobi's strenuous objection to a dogmatic system in philosophy, and drew upon him the vigorous enmity of the Berlin clique, led by Moses Mendelssohn. Jacobi was ridiculed as endeavouring to reintroduce into philosophy the antiquated notion of unreasoning belief, was denounced as an enemy of reason, as a pietist, and as in all probability a Jesuit in disguise, and was especially attacked for his use of the ambiguous term " belief." Jacobi's next important work, David Hume iiber den Glauben, oder Idealismus und Realismus (1787), was an attempt to show not only that the term Glaube had been used by the most eminent writers to denote what he had employed it for in the Letters on Spinoza, but that the nature of the cognition of facts as opposed to the construction of inferences could not be

otherwise expressed. In this writing, and especially in the Appendix, Jacobi came into contact with the critical philosophy, and subjected the Kantian view of knowledge to searching examination.

The outbreak of the war with the French republic induced Jacobi in 1793 to leave his home near Dusseldorf, and for nearly ten years he resided in Holstein. While there he became intimately acquainted with Reinhold (in whose Beitrage, pt. iii., 1 80 1, his important work Uberdas Unternehmen des Kriticismus, die Vernunjt zu Verstande zu bringen was first published), and with Matthias Claudius, the editor of the Wandsbecker Bote. During the same period the excitement caused by the accusation of atheism brought against Fichte at Jena led to the publication of Jacobi's Letter to Fichte (1799), in which he made more precise the relation of his own philosophic principles to theology. Soon after his return to Germany, Jacobi received a call to Munich in connexion with the new academy of sciences just founded there. The loss of a considerable portion of his fortune induced him to accept this offer; he settled in Munich in 1804, and in 1807 became president of the academy. In 1811 appeared his last philosophic work, directed against Schelling specially (Von den gbttlichen Dingen und ihrer Ofenbarung), the first part of which, a review of the Wandsbecker Bote, had been written in 1798. A bitter reply from Schelling was left without answer by Jacobi, but gave rise to an animated controversy in which Fries and Baader took prominent part. In 181 2 Jacobi retired from the office of president, and began to prepare a collected edition of his works. He died before this was completed, on the 10th of March 181 9. The edition of his writings was continued by his friend F. Koppen, and was completed in 1825. The works fill six volumes, of which the fourth is in three parts. To the second is prefixed an introduction by Jacobi, which is at the same time an introduction to his philosophy. The fourth volume has also an important preface.

The philosophy of Jacobi is essentially unsystematic. A certain fundamental view which underlies all his thinking is brought to bear in succession upon those systematic doctrines which appear to stand most sharply in contradiction to it, and any positive philosophic results are given only occasionally. The leading idea of the whole is that of the complete separation between understanding and appre- hension of real fact. For Jacobi understanding, or the logical faculty, is purely formal or elaborative, and its results never transcend the given material supplied to it. From the basis of immediate experi- ence or perception thought proceeds by comparison and abstraction, establishing connexions among facts, but remaining in its nature mediate and finite. The principle of reason and consequent, the necessity of thinking each given fact of perception as conditioned, impels understanding towards an endless series of identical proposi- tions, the records of successive comparisons and abstractions. The

province of the understanding is therefore strictly the region of the conditioned; to it the world must present itself as a mechanism. If, then, there is objective truth at all, the existence of real facts must be made known to us otherwise than through the logical faculty of thought; and, as the regress from conclusion to premises must depend upon something not itself capable of logical grounding, mediate thought implies the consciousness of immediate truth. Philosophy therefore must resign the hopeless ideal of a systematic (i.e. intelligible) explanation of things, and must content itself with the examination of the facts of consciousness. It is a mere prejudice of philosophic thinkers, a prejudice which has descended from Aristotle, that mediate or demonstrated cognition is superior in cogency and value to the immediate perception of truths or facts.

As Jacobi starts with the doctrine that thought is partial and limited, applicable only to connect facts, but incapable of explaining their existence, it is evident that for him any demonstrative system of metaphysic which should attempt to subject all existence to the principle of logical ground must be repulsive. Now in modern philosophy the first and greatest demonstrative system of 'meta- physic is that of Spinoza, and it lay in the nature of things that upon Spinoza's system Jacobi should first direct his criticism. A summary of the results of his examination is thus presented (Werke, i. 216- 223): (1) Spinozism is atheism; (2) the Kabbalistic philosophy, in so far as it is philosophy, is nothing but undeveloped or confused Spinozism; (3) the philosophy of Leibnitz and Wolff is not less fatalistic than that of Spinoza, and carries a resolute thinker to the very principles of Spinoza; (4) every demonstrative method ends in fatalism; (5) we can demonstrate only similarities (agreements, truths conditionally necessary), proceeding always in identical propositions; every proof presupposes something already proved, the principle of which is immediately given (Offenbarung, revelation, is the term here employed by Jacobi, as by many later writers, e.g. Lotze, to denote the peculiar character of an immediate, unproved truth); (6) the keystone (Element) of all human knowledgeand activity is belief (Glaube). Of these propositions only the first and fourth require further notice. Jacobi, accepting the law of reason and consequent as the fundamental rule of demonstrative reasoning, and as the rule explicitly followed by Spinoza, points out that, if we proceed by applying this principle so as to recede from particular and qualified facts to the more general and abstract conditions, we land ourselves, not in the notion of an active, intelligent creator of the system of things, but in the notion of an all-comprehen- sive, indeterminate Nature, devoid of will or intelligence. Our unconditioned is either a pure abstraction, or else the impossible notion of a completed system of conditions. In either case the result is atheism, and this result is necessary if the demonstrative method, the method of understanding, is regarded as the

only possible means of knowledge. Moreover, the same method inevitably lands in fatalism. For, if the action of the human will is to be made intelligible to understanding, it must be thought as a conditioned pheno- menon, having its sufficient ground in preceding circumstances, and, in ultimate abstraction, as the outflow from nature which is the sum of conditions. But this is the fatalist conception, and any philosophy which accepts the law of reason and consequent as the essence of understanding is fatalistic. Thus for the scientific understanding there can be no God and no liberty. It is impossible that there should be a God, for if so he would of necessity be finite. But a finite God, a God that is known, is no God. It is impossible that there should be liberty, for if so the mechanical order of phenomena, by means of which they are comprehensible, would be disturbed, and we should have an unintelligible world, coupled with the requirement that it shall be understood. Cognition, then, in the strict sense, occupies the middle place between sense perception, which is belief in matters of sense, and reason, which is belief in supersensuous fact.

The best introduction to Jacobi's philosophy is the preface to the second volume of the Works, and Appendix 7 to the Letters on Spinoza's Theory. See also J. Kuhn, Jacobi und die Philosophie seiner Zeit (1834) ; F. Deycks, F. H. Jacobi im Verhaltnis zu seinen Zeitgenossen (1848) ; H. Dilntzer, Freundesbilder aus Goeihes Leben (1853); E. Zirngiebl, F. H. Jacobis Leben, Dichten, und Denken, 1867; F. Harms, tSber die Lehre von F, H. Jacobi ,(1876). Jacobi's Auserlesener Briefwechsel has been edited by F. Roth in 2 vols.

(1 825-1 827).

JACOBI, JOHANN GEORG (1740-1814), German poet, elder brother of the philosopher, F. H. Jacobi (1743-1819), was born at Dusseldorf on the 2nd of September 1740. He studied theology at Gottingen and jurisprudence at Helmstedt, and was appointed, in 1766, professor of philosophy in Halle. In this year he made the acquaintance of J. W. L. (" Vater ") Gleim, who, attracted by the young poet's Poetische Versuche (1764), became his warm friend, and a lively literary correspondence ensued between Gleim in Halberstadt and Jacobi in Halle. In order to have Jacobi near him, Gleim succeeded in procuring for him a prebendal stall at the cathedral of Halberstadt in 1769, and here Jacobi issued a number of anacreontic lyrics and sonnets. He

tired, however, of the lighter muse, and in 1774, to Gleim's grief, left

Halberstadt, and for two years (1774-1776) edited at Diisseldorf the Iris, a quarterly for women readers. Meanwhile, he wrote many charming lyrics, distinguished by exquisite taste and true poetical feeling. In 1784 he became professor of literature at the university of Freiburg im Breisgau, a post which he held until his death there on the 4th of January 1814. In addition to the earlier Iris, to which Goethe, his brother F. H. Jacobi, Gleim and other poets contributed, he published, from 1 803- 18 13, another periodical, also called Iris, in which Klopstock, Herder, Jean Paul, Voss and the brothers Stollberg also collaborated.

Jacobi's Sammiliche Werke were published in 1774 (Halberstadt, 3 vols.). Other editions appeared at Zurich in 1807-1813 and 1825. See Ungedruckle Briefe von und an Johann Georg Jacobi (Strassburg, 1874); biographical notice by Daniel Jacoby in Allg. Deutsche Biographie; Longo, Laurence Sterne und Johann Georg Jacobi (Vienna, 1898); and Leben J. G. Jacobis, von einem seiner Freunde

(1822).

JACOBI, KARL GUSTAV JACOB (1804-1851), German mathematician, was born at Potsdam, of Jewish parentage, on the 10th of December 1804. He studied at Berlin University, where he obtained the degree of doctor of philosophy in 1825, his thesis being an analytical discussion of the theory of fractions. In 1827 he became extraordinary and in 1829 ordinary professor of mathematics at Konigsberg, and this chair he filled till 1842, when he visited Italy for a few months to recruit his health. On his return he removed to Berlin, where he lived as a royal pensioner till his death, which occurred on the 18th of February

1851.

His investigations in elliptic functions, the theory of which he established upon quite a new basis, and more particularly his development of the theta-function, as given in his great treatise Fundamenta nova theoriae functionum ellipticarum (Konigsberg, 1829), and in later papers in Crelle's Journal, constitute his grandest analytical discoveries. Second in importance only to these are his researches in differential equations, notably the theory of the last multiplier, which is fully treated in his Vorlesungen uber Dynamik, edited by R. F. A. Clebsch (Berlin, 1866). It was in analytical development that Jacobi's peculiar power mainly lay, and he made many important contributions of this kind to other departments of mathematics, as a glance at the long list of papers that were published by him in Crelle's Journal and elsewhere from 1826 onwards will sufficiently indicate. He was one of the early founders of the theory of determinants; in particular, he invented the func- tional determinant formed of the n 2

differential coefficients of n given functions of n independent variables, which now bears his name (Jacobian), and which has played an important part in many analytical investigations (see Algebraic Forms). Valuable also are his papers on Abelian transcendents, and his investigations in the theory of numbers, in which latter department he mainly supple- ments the labours of K. F. Gauss. The planetary theory and other particular dynamical problems likewise occupied his attention from time to time. He l«ft a vast store of manuscript, portions of which have been published at intervals in Crelle's Journal. His other works include Commentatio de transformation integralis duplicis indefinite informant simpliciorem (1832), Canon arithmeticus (1839), and Opuscula mathemalica (1846-1857). His Gesammelte Werke (1881-1891) were published by the Berlin Academy.

See Lejeune-Dirichiet, " Gedachtnisrede auf Jacobi " in the Abhandlungen der Berliner Akademie (1852).

JACOBINS, THE, the most famous of the political clubs of the French Revolution. It had its origin in the Club Breton, which was established at Versailles shortly after the opening of the States General in 1789. It was at first composed exclu- sively of deputies from Brittany, but was soon joined by others from various parts of France, and counted among its early members Mirabeau, Sieyes, Barnave, Petion, the Abbe Gregoire, Charles and Alexandre Lameth, Robespierre, the due d'Aiguillon, and La Revelliere-Lepeaux. At this time its meetings were secret and little is known of what took place at them. After the emeute of the 5th and 6th of October the club, still entirely composed of deputies, followed the National Assembly to Paris, where it rented the refectory of the monastery of the Jacobins in the Rue St Honore, near the seat of the Assembly. The name " Jacobins," given in France to the Dominicans, because their first house in Paris was in the Rue St Jacques, was first applied to the club in ridicule by its enemies. The title assumed by

the club itself, after the promulgation of the constitution of 1 79 1, was Societe des amis de la constitution slants aux Jacobins & Paris, which was changed on the 21st of September 1792, after the fall of the monarchy, to Societe des Jacobins, amis de la liberie et de I'igalite. It occupied successively the refectory, the library, and the chapel of the monastery.

Once transferred to Paris, the club underwent rapid modifica- tions. The first step was its expansion by the admission as members or associates of others besides deputies; Arthur Young was so admitted on the 18th of January 1790. On the 8th of February the society was formally constituted on this broader basis by the adoption of the rules drawn up by Barnave, which were issued with the signature of the due d'Aiguillon, the presi- dent. The objects of the club were defined as (1) to discuss in advance questions

to be decided by the National Assembly; (2) to work for the establishment and strengthening of the constitution in accordance with the spirit of the preamble {i.e. of respect for legally constituted authority and the rights of man); (3) to correspond with other societies of the same kind which should be formed in the realm. At the same time the rules of order and forms of election were settled, and the constitution of the club determined. There were to be a president, elected every month, four secretaries, a treasurer, and committees elected to super- intend elections and presentations, the correspondence, and the administration of the club. Any member who by word or action showed that his principles were contrary to the constitution and the rights of man was to be expelled, a rule which later on facilitated the " purification " of the society by the expulsion of its more moderate elements. By the 7th article the club decided to admit as associates similar societies in other parts of France and to maintain with them a regular correspondence.

This last provision was of far-reaching importance. By the 10th of August 1790 there were already one hundred and fifty- two affiliated clubs; the attempts at counter-revolution led to a great increase of their number in the spring of 1791, and by the close of the year the Jacobins had a network of branches all over France. It was this widespread yet highly centralized organiza- tion that gave to the Jacobin Club its formidable power.

At the outset the Jacobin Club was not distinguished by extreme political views. The somewhat high subscription confined its membership to men of substance, and to the last it was — so far as the central society in Paris was concerned — composed almost entirely of professional men, such as Robes- pierre, or well-to-do bourgeois, like Santerre. From the first, however, other elements were present. Besides Louis Philippe, due de Chartres (afterwards king of the French), liberal aristo- crats of the type of the due d'Aiguillon, the prince de Broglie, or the vicomte de Noailles, and the bourgeois who formed the mass of the members, the club contained such figures as " Pere " Michel Gerard, a peasant proprietor from Tuel-en-Montgermont, in Brittany, whose rough common sense was admired as the oracle of popular wisdom, and whose countryman's waistcoat and plaited hair were later on to become the model for the Jacobin fashion. 1 The provincial branches were from the first far more democratic, though in these too the leadership was usually in the hands of» members of the educated or propertied classes. Up to the very eve of the republic, the club ostensibly supported the monarchy; it took no part in the petition of the 17th of July 1790 for the king's dethronement; nor had it any official share even in the insurrections of the 20th of June and the 10th of August 1792; it only formally recognized the republic on the 21st of September. But the character and extent of the club's influence cannot be gauged by its official acts alone, and long before it emerged as the principal focus of the

Terror, its charac- ter had been profoundly changed by the secession of its more moderate elements, some to found the Club of 1789, some in 1791 — among them Barnave, the Lameths, Duport and Bailly —

1 " When I first sat among you I heard so many beautiful speeches that I might have believed myself in heaven, had there not been so many lawyers present." Instead of practical questions " we have become involved in a galimatias of Rights of Man of which I under- stand mighty little but that it is worth nothing." Motion du Pere Gerard in the Jacobins of the 27th of April 1790 (Aulard i. 63).

to found the club of the Feuillants scoffed at by their former friends as the club monarchique. The main cause of this change was the admission of the public to the sittings of the club, which began on the 14th of October 1791. The result is described in a report of the Department of Paris on " the state of the empire," presented on the 12th of June 1792, at the request of Roland, the minister of the interior, and signed by the due de La Rochefoucauld, which ascribes to the Jacobins all the woes of the state. " There exists," it runs, " in the midst of the capital committed to our care a public pulpit of defamation, where citizens of every age and both sexes are admitted day by day to listen to a criminal propaganda. . . . This establishment, situated in the former house of the Jacobins, calls itself a society; but it has less the aspect of a private society than that of a public spectacle: vast tribunes are thrown open for the audience; all the sittings are advertised to the public for fixed days and hours, and the speeches made are printed in a special journal and lavishly distributed." 1 In this society — the report continues — murder is counselled or applauded, all authorities are calumniated and all the organs of the law bespattered with abuse; as to its power, it exercises " by its influence, its affiliations and its correspondence a veritable ministerial authority, without title and without responsibility, while leaving to the legal and responsible authorities only the shadow of power " (Schmidt, Tableaux i. 78, &c).

The constituency to which the club was henceforth responsible, and from which it derived its power, was in fact the peuple bete of Paris; the sans-culottes — decayed lackeys, cosmopolitan ne'er-do-weels, and starving workpeople— who crowded its tribunes. To this audience, and not primarily to the members of the club, the speeches of the orators were addressed and by its verdict they were judged. In the earlier stages of the Revolution the mob had been satisfied with the fine platitudes of the philosophes and the vague promise of a political millen- nium; but as the

chaos in the body politic grew, and with it the appalling material misery, it began to clamour for the blood of the " traitors " in office by whose corrupt machinations the millennium was delayed, and only those orators were listened to who pandered to its suspicions. Hence the elimination of the moderate elements from the club; hence the ascendancy of Marat, and finally of Robespierre, the secret of whose power was that they really shared the suspicions of the populace, to which they gave a voice and which they did not shrink from translating into action. After the fall of the monarchy Robespierre was in effect the Jacobin Club; for to the tribunes he was the oracle of political wisdom, and by his standard all others were judged. 2 With his fall the Jacobins too came to an end.

Not the least singular thing about the Jacobins is the very slender material basis on which their overwhelming power rested. France groaned under their tyranny, which was compared to that of the Inquisition, with its system of espionage and denuncia- tions which no one was too illustrious or too humble to escape. Yet it was reckoned by competent observers that, at the height of the Terror, the Jacobins could not command a force of more than 3000 men in Paris. But the secret of their strength was that, in the midst of the general disorganization, they alone were organized. The police agent Dutard, in a report to the minister Garat (April 30, 1.793), describing an episode in the Palais Egalite (Royal), adds: " Why did a dozen Jacobins strike terror into two or three hundred aristocrats? It is that the former have a rallying-point and that the latter have none." When the jeunesse doree did at last organize themselves, they had little difficulty in flogging the Jacobins out of the cafes into compara- tive silence. Long before this the Girondin government had been urged to meet organization by organization, force by force; and it is clear from the daily reports of the police agents that even

1 i.e. Journal des dibats et de la correspondance de la Sociite', &c. For the various newspapers published under the auspices of the Jacobins see Aulard i. p. ex., &c.

2 In the published reports only the speeches of members are given, not the interruptions from the tribunes. But see the report (May 1 8, 1793) of Dutard to Garat on a meeting of the Jacobins (Schmidt, Tableaux ii. 242).

a moderate display of energy would have saved the National Convention from the humiliation of being dominated by a club, and the French Revolution from the blot of the Terror. But though the Girondins were fully conscious of the evil, they were too timid, or too convinced of the ultimate triumph of their own persuasive eloquence, to act. In the session of the 30th of April 1793 a proposal was made to move the Convention to Versailles out of reach of the Jacobins, and Buzot declared that it was "

impossible to remain in Paris " so long as " this abomin- able haunt " should exist; but the motion was not carried, and the Girondins remained to become the victims of the Jacobins. Meanwhile other political clubs could only survive so long as they were content to be the shadows of the powerful organization of the Rue St Honore. The Feuillants had been suppressed on the 18th of August 1792. The turn of the Cordeliers came so soon as its leaders showed signs of revolting against Jacobin supremacy, and no more startling proof of this ascendancy could be found than the ease with which Hebert and his fellows were condemned and the readiness with which the Cordeliers, after a feeble attempt at protest, acquiesced in the verdict. It is idle to speculate on what might have happened had this ascendancy been overthrown by the action of a strong govern- ment. No strong government existed, nor, in the actual condi- tions of the country, could exist on the lines laid down by the constitution. France was menaced by civil war within, and by a coalition of hostile powers without; the discipline of the Terror was perhaps necessary if she was to be welded into a united force capable of resisting this double peril; and the revolutionary leaders saw in the Jacobin organization the only instrument by which this discipline could be made effective. This is the apology usually put forward for the Jacobins by republican writers of later times; they were, it is said (and of some of them it is certainly true), no mere doctrinaires and visionary sectaries, but practical and far-seeing politicians, who realized that " desperate ills need desperate remedies," and, by having the courage of their convictions, saved the gains of the Revolution for France.

The Jacobin Club was closed after the fall of Robespierre on the 9th of Thermidor of the year III., and some of its members were executed. An attempt was made to re-open the club, which was joined by many of the enemies of the Thermidorians, but on the 21st of Brumaire, year III. (Nov. n, 1794), it was definitively closed. Its members and their sympathizers were scattered among the cafes, where a ruthless war of sticks and chairs was waged against them by the young " aristocrats " known as the jeunesse dorie. Nevertheless the " Jacobins " survived, in a somewhat subterranean fashion, emerging again in the club of the Pantheon, founded on the 25th of November 1795, and suppressed in the following February (see Babeuf; Franqois Noel). The last attempt to reorganize them was the foundation of the Reunion d'amis de V&galite' el de la liberti, in July 1799, which had its headquarters in the Salle du Manege of the Tuileries, and was thus known as the Club du Manege. It was patronized by Barras, and some two hundred and fifty members of the two councils of the legislature were enrolled as members, including many notable ex- Jacobins. It published a newspaper called the Journal des Libres, proclaimed the apothe- osis of Robespierre and Babeuf, and attacked the Directory as a royaute pentarchique. But public opinion was now preponder- atingly moderate or

royalist, and the club was violently attacked in the press and in the streets, the suspicions of the government were aroused; it had to change its meeting-place from the Tuileries to the church of the Jacobins (Temple- of Peace) in the Rue du Bac, and in August it was suppressed, after barely a month's existence. Its members revenged themselves on the Directory by supporting Napoleon Bonaparte.

Long before the suppression of the Jacobin Club the name of " Jacobins " had been popularly applied to all promulgators of extreme revolutionary opinions. In this sense the word passed beyond the borders of France and long survived the Revolution. Canning's paper, The Anti- Jacobin, directed against the Eriglish Radicals, consecrated its use in England; and in the

correspondence of Metternich and other leaders of the repressive policy which followed the second fall of Napoleon, " Jacobin " is the term commonly applied to anyone with Liberal tendencies, even to so august a personage as the emperor Alexander I. of Russia.

The most important source of information for the history of the Jacobins is F. A. Aulard's La societe des Jacobins, Recueil de docu- ments (6 vols., Paris, 1889, &c), where a critical bibliography will be found. This collection does not contain all the printed sources — notably the official Journal of the Club is omitted — but these sources, when not included, are indicated. The documents pub- lished are furnished with valuable explanatory notes. See also W. A. Schmidt, Tableaux de la revolution francaise (3 vols., Leipzig, 1867-1870), notably for the reports of the secret police, which throw much light on the actual working of the Jacobin propaganda.

(W. A. P.)

JACOBITE CHURCH. The name of " Jacobites " is first found in a synodal decree of Nicaea a.d. 787, and was invented by hostile Greeks for the Syrian Monophysite Church as founded, or rather restored, by Jacob or James Baradaeus, who was ordained its bishop a.d. 54 1 or 543 . The Monophysites, who like the Greeks knew themselves simply as the Orthodox, were grievously persecuted by the emperor Justinian and the graeciz- ing patriarchs of Antioch, because they rejected the decrees of the council of Chakedon, in which they — not without good reason — saw nothing but a thinly veiled relapse into those opinions of Nestorius which the previous council of Ephesus had condemned. James was born a little

before a.d. 500 at Telia or Tela, 55 m. east of Edessa, of a priestly family, and entered the convent of Phesilta on Mount Isla. About 528 he went with a fellow-monk Sergius to Constantinople to plead the cause of his co-religionists with the empress Theodora, and livid there fifteen years. Justinian during those years imprisoned, deprived or exiled most of the recalcitrant clergy of Syria, Mesopotamia, Cilicia, Cappadocia, and the adjacent regions. Once ordained bishop of Edessa, with the connivance of Theodora, James, disguised as a ragged beggar (whence his name Baradaeus, Syriac Burdldnd, Arabic al- Bar ddia), traversed these regions preaching, teaching and ordaining new clergy to the number, it is said, of 80,000. His later years were embittered by squabbles with his own clergy, and he died in 578. His work, however, endured, and in the middle ages the Jacobite hierarchy numbered 150 archbishops and bishops under a patriarch and his maphrian. About the year 7 28 six Jacobite bishops present at the council of Manazgert established communion with the Armenians, who equally rejected Chakedon; they were sent by the patriarch of Antioch, and among them were the metropolitan of Urha (Edessa) and the bishops of Qarhan, Gardman, Nferkert and Amasia. How long .this union lasted is not known. In 1842, when the Rev. G. P. Badger visited the chief Jacobite centres, their numbers in all Turkey had dwindled to about 100,000 souls, owing to vast secessions to Rome. At Aleppo at that date only ten families out of several hundred remained true to their old faith, and something like the same proportion at Damascus and Bagdad. Badger testifies that the Syrian proselytes to Rome were superior to their Jacobite brethren, having established schools, rebuilt their churches, increased their clergy, and, above all, having learned to live with each other on terms of peace and charity. As late as 1850 there were 1 so villages of them in the Jebel Toor to the north-east of Mardin, 50 in the district of Uriah and Gawar, and a few in the neighbourhoods of Diarbekr, Mosul and Damascus. From about i860, the seceders to Rome were able, thanks to French consular protection, to seize the majority of the Jacobite churches in Turkey; and this injustice has contri- buted much to the present degradation and impoverishment of the Jacobites.

They used leavened bread in the Eucharist mixed with salt and oil, and like other Monophysites add to the Trisagion the words " Who wast crucified for our sake." They venerate pictures or images, and make the sign of the cross with one finger to show that Christ had but one nature. Deacons, as in Armenia, marry before taking priests' orders. Their patriarch is styled of Antioch, but seldom comes west of Mardin. His

maphrian (fertilizer) since 1089 has lived at Mosul and ordains the bishops. Monkery is common among them, but there are no nuns. Next to the Roman Uniats (whom they term Rassen or Venal) they most hate the Nestorian Syrians of Persia. In 1882, at the instance of the British

government, the Turks began to recognize them as a separate organization.

See M. Klein, Jacobus Baradaeus (Leiden, 1882); Assemani, Bibl. Or. ii. 62-69, 326 and 331; G. P. Badger, The Nestorians (London, 1852); Rubens Duval, La literature syriaque (Paris, 1899); G. Kruger, Monophysitische Streitigkeiten (Jena, 1884) ; Silbernagel, Verfassung der Kirchen des Orients (Landshut, 1865) ; and G. Wright, History of Syriac Literature (London, 1894). (F. C. C.)

JACOBITES (from Lat. Jacobus, James), the name given after the revolution of 1688 to the adherents, first of the exiled English king James II., then of his descendants, and after the extinction of the latter in 1807, of the descendants of Charles I., i.e. of the exiled house of Stuart.

The history of the Jacobites, culminating in the risings of 1715 and 1745, is part of the general history of England (q.v.), and especially of Scotland (q.v.), in which country they were com- paratively more numerous and more active, while there was also a large number of Jacobites in Ireland. They were recruited largely, but not solely, from among the Roman Catholics, and the Protestants among them were often identical with the Non- Jurors. Owing to a variety of causes Jacobitism began to lose ground after the accession of George I. and the suppression of the revolt of 1715; and the total failure of the rising of 1745 may be said to mark its end as a serious political force. In 1765 Horace Walpole said that " Jacobitism, the concealed mother of the latter (i.e. Toryism), was extinct," but as a sentiment it remained for some time longer, and may even be said to exist to-day. In 1750, during a strike of coal workers at Elswick, James III. was proclaimed king; in 1780 certain persons walked out of the Roman Catholic Church at Hexham when George III. was prayed for; and as late as 1784 a Jacobite rising was talked about. Northumberland was thus a Jacobite stronghold; and in Manchester, where in 1777 according to an American observer Jacobitism "is openly professed," a Jacobite rendezvous known as " John Shaw's Club " lasted from 1733 to 1892. North Wales was another Jacobite centre. The " Cycle of the White Rose " — the white rose being the badge of the Stu,arts — composed of members of the principal Welsh families around Wrexham, including the Williams- Wynns of Wynnstay, lasted from 17 10 until some time between 1850 and i860. Jacobite traditions also lingered among the great families of the Scottish Highlands; the last person to suffer death as a Jacobite was Archibald Cameron, a son of Cameron of Lochiel, who was executed in 1753. Dr Johnson's Jacobite sympathies are well known, and on the death of Victor Emmanuel I., the ex-king of Sardinia, in 1824, Lord Liverpool wrote to Canning saying " there are those who think that the ex-king was the lawful king of Great Britain." Until the accession of King Edward VII. finger-bowls were not placed upon the royal dinner-table, because in former times those

who secretly sympathized with the Jacobites were in the habit of drinking to the king over the water. The romantic side of Jacobitism was stimulated by Sir Walter Scott's Waverley, and many Jacobite poems were written during the 19th century.

The chief collections of Jacobite poems are: Charles Mackay's Jacobite Songs and Ballads of Scotland, 1 688-1746, with Appendix of Modern Jacobite Songs (1861) ; G. S. Macquoid's Jacobite Songs and Ballads (1888) ; and English Jacobite Ballads, edited by A. B. Grosart from the Towneley manuscripts (1877).

Upon the death of Henry Stuart, Cardinal York, the last of James II. 's descendants, in 1807, the rightful occupant of the British throne according to legitimist principles was to be found among the descendants of Henrietta, daughter of Charles I., who married Philip I., duke of Orleans. Henrietta's daughter, Anne Marie (1669-1728), became the wife of Victor Amadeus II., duke of Savoy, afterwards king of Sardinia; her son was King Charles Emmanuel III., and her grandson Victor Amadeus III. The latter's son, King Victor Emmanuel I., left no sons, and his eldest daughter, Marie Beatrice, married Francis IV., duke of Modena,

whose son Ferdinand (d. 1849) left an only daughter, Marie Therese (b. 1 849) . This lady, the wife of Prince Louis of Bavaria, was in 1910 the senior member of the Stuart family, and accord- ing to the legitimists the rightful sovereign of Great Britain and Ireland.

Table showing the succession to the crown of Great Britain and Ireland according to Jacobite principles. Charles I. (1600-1649)

Henrietta (1644-1670) = Philip I., duke of Orleans (1640-1701)

Anne Marie (1669-1728) = Victor Amadeus II., king of Sardinia (1666-1732)

Charles Emmanuel III. king of Sardinia (1701-1773)

Victor Amadeus III. king of Sardinia (1 726-1 796)

Victor Emmanuel I. king of Sardinia (1 759-1 824)

Marie Beatrice (c. 1780-1840) = Francis IV., duke of Modena (1779-1846)

Ferdinand (1821-1849)

Marie Therese (b. 1849) = Louis, prince of Bavaria (b. 1845)

Rupert, prince of Bavaria (b. 1869)

Charles (b. 1874)

Francis (b. 1875)

Luitpold Albert Rudplph

(b. 1 901) (b. 1905) (b. 1909) _

Among the modern Jacobite, or legitimist, societies perhaps the most important is the" Order of the White Rose," which has a branch in Canada and the United States. The order holds that sovereign authority is of divine sanction, and that the execution of Charles I. and the revolution of 1688 were national crimes; it exists to study the history of the Stuarts, to oppose all democratic tendencies, and in general to maintain the theory that kingship is independent of all parliamentary authority and popular approval. The order, which was instituted in 1886, was responsible for the Stuart exhibition of 1889, and has a newspaper, the Royalist. Among other societies with similar objects in view are the " Thames Valley Legitimist Club " and the " Legitimist Jacobite League of Great Britain and Ireland."

See Historical Papers relating to the Jacobite Period, edited by J. Allardyce (Aberdeen, 1 895-1 896) ; James Hogg, The Jacobite Relics of Scotland (Edinburgh, 1819-1821) ; and F. W. Head, The Fallen Stuarts (Cambridge, 1901). The marquis de Ruvigny has compiled The Jacobite Peerage (Edinburgh, 1904), a work which purports to give a list of all the titles and honours conferred by the kings of the exiled House of Stuart. (A.

W. H.)*

JACOBS, CHRISTIAN FRIEDRICH WILHELM (1764-1847), German classical scholar, was born at Gotha on the 6th of Octo- ber 1764. After studying philology and theology at Jena and Gottingen,- in 1785 he became teacher in the gymnasium of his native town, and in 1802 was appointed to an office in the public library. In 1807 he became classical tutor in the lyceum of Munich, but, disgusted at the attacks made upon him by the old Bavarian Catholic party, who resented the introduc- tion of " north German " teachsrs, he returned to Gotha in 1 8 10 to take charge of the library and the numismatic cabinet. He remained in Gotha till his death on the 30th of March 1847. Jacobs was an extremely successful teacher; he took great interest in the affairs of his country, and was a publicist of no mean order. But his great work was an edition of the Greek Anthology, with copious notes, in 13 volumes (1798- 1814), supplemented by a revised text from the Codex Palatinus (1814-1817). He published also notes on Horace, Stobaeus, Euripides, Athenaeus and the Iliaca of Tzetzes; translations of Aelian (History of Animals); many of the Greek romances; Philostratus; poetical versions of much of the Greek Anthology; miscellaneous essays on classical subjects; and some very suc- cessful school books. His translation of the political speeches of Demosthenes was undertaken with the express purpose of

rousing his country against Napoleon, whom he regarded as a second Philip of Macedon.

See E. F. Wfistemann, Friderici Jacobsii laudatio (Gotha, 1848); C. Bursian, Geschichte der classischen Philologie in Deutschland; and the appreciative article by C. Regel in Allgemeine deutsche Biographic

JACOBS CAVERN, a cavern in latitude 36° 35′ N., 2 m. E. of Pineville, McDonald county, Missouri, named after its dis- coverer, E. H. Jacobs, of Bentonville, Arkansas. It was scientifically explored by him, in company with Professors Charles Peabody and Warren K. Moorehead, in 1903. The results were published in that year by Jacobs in the Benton County Sun; by C. N. Gould in Science, July 31, 1903; by Peabody in the Am. Anthropologist, Sept. 1903; and in the Am. Journ. Archaeology, 1904; and by Peabody and Moorehead, 1904, as Bulletin I. of the Dept. of Archaeology in Phillips Academy, Andover, Mass., in the museum of which are exhibits, maps and photographs.

Jacobs Cavern is one of the smaller caves, hardly more than a rock-shelter, and is entirely in the " St Joe Limestone " of the sub-carboniferous age. Its roof is a single flat stratum of lime- stone; its walls are well marked by lines of stratification; drip- stone also partly covers the walls, fills a deep

fissure at the end of the cave, and spreads over the floor, where it mingles with an ancient bed of ashes, forming an ash-breccia (mostly firm and solid) that encloses fragments of sandstone, flint spalls, flint im- plements, charcoal and bones. Underneath is the true floor of the cave, a mass of homogeneous yellow clay, one metre in thick- ness. It holds scattered fragments of limestone, and is itself the result of limestone degeneration. The length of the opening is over 21 metres; its depth 14 metres, and the height of roof above the undisturbed ash deposit varied from 1 m. 20 cm. to 2 m. 60 cm. The bone recess at the end was from 50 cm. to 80 cm. in height. The stratum of ashes was from 50 cm. to 1 m. 50 cm. thick.

The ash surface was staked off into square metres, and the substance carefully removed in order. Each stalactite, stalag- mite and pilaster was measured, numbered, and removed in sections. Six human skeletons were found buried in the ashes. Seven-tenths of a cubic metre of animal bones were found : deer, bear, wolf, raccoon, opossum, beaver, buffalo, elk, turkey, wood- chuck, tortoise and hog; all contemporary with man's occupancy. Three stone metates, one stone axe, one celt and fifteen hammer- stones were found. Jacobs Cavern was peculiarly rich in flint knives and projectile points. The sum total amounts to 419 objects, besides hundreds of fragments, cores, spalls and rejects, retained for study and comparison. Considerable numbers of bone or horn awls were found in the ashes, as well as fragments of pottery, but no " ceremonial " objects. .

The rude type of the implements, the absence of fine pottery, and the peculiarities of the human remains, indicate a race of occupants more ancient than the " mound-builders." The deepest implement observed was buried 50 cm. under the stalag- mitic surface. Dr. Hovey has proved that the rate of stalagmitic growth in Wyandotte Cave, Indiana, is .0254 cm. annually; and if that was the rate in Jacobs Cavern, 1968 years would have been needed for the embedding of that implement. Polished rocks outside the cavern and pictographs in the vicinity indicate the work of a prehistoric race earlier than the Osage Indians, who were the historic owners previous to the advent of the white man. – (H. C. H.)

JACOBSEN, JENS PETER (1847-1885), Danish imaginative writer, was born at Thisted in Jutland, on the 7th of April 1847; he was the eldest of the five children of a prosperous merchant. He became a student at the university of Copenhagen in 1868. As a boy he showed a remarkable turn for science, particularly for botany. In 1870, although he was secretly writing verses already, Jacobsen definitely adopted botany as a profession. He was sent by a scientific body in Copenhagen to report on the flora of the islands of Anholt and Lasso. About this time the discoveries of Darwin began to exercise a fascination over him, and finding them little understood in Denmark, he translated into Danish The Origin of Species and The

Descent of Man. In

the autumn of 1872, while collecting plants in a morass near Ordrup, he contracted pulmonary disease. His illness, which cut him off from scientific investigation, drove him to literature. He met the famous critic, Dr Georg Brandes, who was struck by his powers of expression, and under his influence, in the spring °i 1873, Jacobsen began his great historical romance of Marie Grubbe. His method of composition was painful and elaborate, and his work was not ready for publication until the close of 1876. In 1879 he was too ill to write at all; but in 1880 an im- provement came, and he finished his second novel, Niels Lyhne. In 1882 he published a volume of six short stories, most of them written a few years earlier, called, from the first of them, Mogens. After this he wrote no more, but lingered on in his mother's house at Thisted until the 30th of April 1885. In 1886 his posthumous fragments were collected. It was early recognized that Jacobsen was the greatest artist in prose that Denmark has produced. He has been compared with Flaubert, with De Quincey, with Pater; but these parallelisms merely express a sense of the intense individuality of his style, and of his untiring pursuit of beauty in colour, form and melody. Although he wrote so little, and crossed the living stage so hurriedly, his influence in the North has been far-reaching. It may be said that no one in Denmark or Norway has tried to write prose carefully since 1880 whose efforts have not been in some degree modified by the example of Jacobsen's laborious art.

His Samlede Skrifter appeared in two volumes in 1888; in 1899 his letters (Breve) were edited by Edvard Brandes. In 1896 an English translation of part of the former was published under the title of Siren Voices: Niels Lyhne, by Miss E. F. L. Robertson.

(E.G.)

JACOB'S WELL, the scene of the conversation between Jesus and the " woman of Samaria " narrated in the Fourth Gospel, is described as being in the neighbourhood of an other- wise unmentioned " city called Sychar." From the time of Eusebius this city has been identified with Sychem or Shechem (modern Nablus), and the well is still in existence 1ˆ m. E. of the town, at the foot of Mt Gerizim. It is beneath one of the ruined arches of a church mentioned by Jerome, and is reached by a few rough steps. When Robinson visited it in 1838 it was 105 ft. deep, but it is now much shallower and often dry.

For a discussion of Sychar as distinct from Shechem see T. K. Cheyne, art. " Sychar," in Ency. Bibl., col. 4830. It is possible that Sychar should be placed at Tulfll Balata, a mound about \ m. W. of the well [Palestine Exploration Fund Statement, 1907, p. 92 seq.) ; when that village fell into ruin the name may have migrated to 'Askar, a village on the lower slopes of Mt Ebal about if m. E.N.E. from Nablus and i m. N. from Jacob's Well. It may be noted that the difficulty is not with the location of the well, but with the identification of Sychar.

JACOBUS DE VORAGINE (c. 1230-c. 1298), Italian chronicler, archbishop of Genoa, was born at the little village of Varazze, near Genoa, about the year 1230. He entered the order of the friars preachers of St Dominic in 1244, and besides preaching with success in many parts of Italy, taught in the schools of his own fraternity. He was provincial of Lombardy from 1267 till 1286, when he was removed at the meeting of the order in Paris. He also represented his own province at the councils of Lucca (1288) and Ferrara (1290). On the last occasion he was one of the four delegates charged with signifying Nicholas IV.'s desire for the deposition of Munio de Zamora, who had been master of the order from 1285, and was deprived of his office by a papal bull dated the 12th of April 1291. In 1288 Nicholas empowered him to absolve the people of Genoa for their offence in aiding the Sicilians against Charles II. Early in 1292 the same pope, himself a Franciscan, summoned Jacobus to Rome, intending to consecrate him archbishop of Genoa with his own hands. He reached Rome on Palm Sunday (March 30), only to find his patron ill of a deadly sickness, from which he died on Good Friday (April 4). The cardinals, however, "propter honorem Communis Januae," determined to carry out this consecration on the Sunday after Easter. He was a good bishop, and espe- cially distinguished himself by his' efforts to appease the civil discords of Genoa. He died in 1298 or 1299, and was buried

in the Dominican church at Genoa. A story, mentioned by the chronicler Echard as unworthy of credit, makes Boniface VIII., on the first day of Lent, cast the ashes in the archbishop's eyes instead of on his head, with the words, " Remember that thou art a Ghibelline, and with thy fellow Ghibellines wilt return to naught."

Jacobus de Voragine left a list of his own works. Speaking of himself in his Chronicon januense, he says, " While he was in his order, and after he had been made archbishop, he wrote many works. For he compiled the legends of the saints (Legendae sanctorum) in one volume, adding many things from the Historia tripartita et scholastica, and from the chronicles of many writers." The other writings he claims are two anonymous volumes of " Sermons con- cerning all the Saints " whose yearly feasts the church celebrates Of these volumes, he adds, one is very diffuse, but the other

short and concise. Then follow Sermones de omnibus evangeliis dominicalibm for every Sunday in the year; Sermones de omnibus evangeliis, i.e a book of discourses on all the Gospels, from Ash Wednesday to th(Tuesday after Easter; and a treatise called " Marialis, qui totus est de B. Maria compositus," consisting of about 160 discourses on the attributes, titles, &c, of the Virgin Mary. In the same work the archbishop claims to have written his Chronicon januense in the second year of his pontificate (1293), but it extends to 1296 or 1297. To this list Echard adds several other works, such as a defence of, the Dominicans, printed at Venice in 1504, and a Summa virtutum et vitiorum Guillelmi Peraldi, a Dominican who died about 1250. Jacobus is also said by Sixtus of Siena (Biblioth. Sacra, lib. ix.) to have translated the Oid and New Testaments into his own tongue. " But," adds Echard, " if he did so, the version lies so closely hid that there is no recollection of it," and it may be added that it is highly improbable that the man who compiled the Golden Legend ever conceived the necessity of having the Scriptures in the vernacular.

His two chief works are the Chronicon januense and the Golden Legend or Lombardica hystoria. The former is partly printed in Muratori (Scriptores Rtr. Ital. ix. 6). It is divided into twelve parts. The first four deal with the mythical history of Genoa from the time of its founder, Janus, the first king of Italy, and its enlarger, a second Janus "citizen of Troy", till its conversion to Christianity "about twenty-five years after the passion of Christ." Part v. professes to treat of the beginning, the growth and the perfection of the city ; but of the first period the writer candidly confesses he knows nothing except by hearsay. The second period includes the Genoese crusading exploits in the East, and extends to their victory over the Pisans (e. 1 1 30), while the third reaches down to the days of the author's archbishopric. The sixth part deals with the constitution of the city, the seventh and eighth with the duties of rulers and citizens, the ninth with those of domestic life. The tenth gives the ecclesiastical history of Genoa from the time of its first known bishop, St Valentine, " whom we believe to have lived about 530 A.D., " till 1 133, when the city was raised to archiepiscopal rank. The eleventh contains the lives of all the bishops in order, and includes the chief events during their pontificates; the twelfth deals in the same way with the archbishops, not forgetting the writer himself.

The Golden Legend, one of the most popular religious works of the middle ages, is a collection of the legendary lives of the greater saints of the medieval church. The preface divides the ecclesias- tical year into four periods corresponding to the various epochs of the world's history, a time of deviation, of renovation, of reconciliation and of pilgrimage. The book itself, however, falls into five sections: — (a) from Advent to Christmas (cc. 1-5) ; (b) from Christmas to Septuagesima (6-30); (e) from

Septuagesima to Easter (31-53); (d) from Easter Day to the octave of Pentecost (54-76) ; (e) from the octave of Pentecost to Advent (77-180). The saints' lives are full of puerile legend, and in not a few cases contain accounts of 13th- century miracles wrought at special places, particularly with reference to the Dominicans. The last chapter but one (181), " De Sancto Pelagio Papa," contains a kind of history of the world from the middle of the 6th century; while the last (182) is a somewhat allegorical disquisition, " De Dedicatione Ecclesiae."

The Golden Legend was translated into French by Jean Belet de Vigny in the 14th century. It was also one of the earliest books to issue from the press. A Latin edition is assigned to about 1469; and a dated one was published at Lyons in 1473. Many other Latin editions were printed before the end of the century. A French translation by Master John Bataillier is dated 1476; Jean de Vigny 's appeared at Paris, 1488; an Italian one by Nic. Manerbi (? Venice, H75); a Bohemian one at Pilsen, 1475-1479, and at Prague, 1495; Caxton's English versions, 1483, 1487 and 1493; and a German one in 1489. Several 15th-century editions of the Sermons are also known, and the Mariale was printed at Venice in 1497 and at Paris in 1503.

For bibliography see Potthast, Bibliotheca hist. med. aev. (Berlin, 1896), p. 634; U. Chevalier, Repertoire des sources hist. Bio.-bibl. (Paris, 1905), s.v. " Jacques de Voragine."

JACOTOT, JOSEPH (1770-1840), French educationist, author of the method of " emancipation intellectuelle," was born

at Dijon on the 4th of March 1770. He was educated at the university of Dijon, where in his nineteenth year he was chosen professor of Latin, after which he studied law, became advocate, and at the same time devoted a large amount of his attention to mathematics. In 1788 he organized a federation of the youth of Dijon for the defence of the principles of the Revolution; and in 1792, with the rank of captain, he set out to take part in the campaign of Belgium, where he conducted himself with bravery and distinction. After for some time filling the office of secretary of the " commission d'organisation du mouvement des armees," he in 1794 became deputy of the director of the Polytechnic school, and on the institution of the central schools at Dijon he was appointed to the chair of the " method of sciences," where he made his first experiments in that mode of tuition which he afterwards developed more fully. On the central schools being

replaced by other educational institutions, Jacotot occupied successively the chairs of mathematics and of Roman law until the overthrow of the empire. In 18 15 he was elected a representative to the chamber of deputies; but after the second restoration he found it necessary to quit his native land, and, having taken up his residence at Brussels, he was in 1818 nominated by the Government teacher of the French language at the university of Louvain, where he perfected into a system the educational principles which he had already practised with success in France. His method was not only adopted in several institutions in Belgium, but also met with some approval in France, England, Germany and Russia. It was based on three principles: (1) all men have equal intelligence; (2) every man has received from God the faculty of being able to instruct himself; (3) everything is in everything. As regards (1) he maintained that it is only in the will to use their intelligence that men differ; and his own process, depending on (3), was to give any one learning a language for the first time a short passage of a few lines, and to encourage the pupil to study, first the words, then the letters, then the grammar, then the meaning, until a single paragraph became the occasion for learning an entire literature. After the revolution of 1830 Jacotot returned to France, and he died at Paris on the 30th of July 1840.

His system was described by him in Enseignement universel, langue maternelle, Louvain and Dijon, 1823 — which passed through several editions — and in various other works; and he also advocated his views in the Journal de I' emancipation intellectuelle. For a com- plete list of his works and fuller details regarding his career, see Biographie de J. Jacotot, by Achille Guillard (Paris, i860).

JACQUARD, JOSEPH MARIE (1752-1834), French inventor, was born at Lyons on the 7th of July 1752. On the death of his father, who was a working weaver, he inherited two looms, with which he started business on his own account. He did not, however, prosper, and was at last forced to become a lime- burner at Bresse, while his wife supported herself at Lyons by plaiting straw. In 1793 he took part in the unsuccessful defence of Lyons against the troops of the Convention; but afterwards served in their ranks on the Rhone and Loire. After seeing some active service, in which his young son was shot down at his side, he again returned to Lyons. There he obtained a situation in a factory, and employed his spare time in construct- ing his improved loom, of which he had conceived the idea several years previously. In 1801 he exhibited his invention at the industrial exhibition at Paris; and in 1803 he was summoned to Paris and attached to the Conservatoire des Arts et Metiers. A loom by Jacques de Vaucanson (1709-1782), deposited there, suggested various improvements in his own, which he gradually perfected to its final state. Although his invention was fiercely opposed by the silk-weavers, who feared that its introduction, owing to the saving of labour, would deprive them of their

liveli- hood, its advantages secured its general adoption, and by 181 2 there were 11,000 Jacquard looms in use in France. The loom was declared public property in 1806, and Jacquard was rewarded with a pension and a royalty on each machine. He died at Oullins (Rhone) on the 7th of August 1834, and six years later a statue was erected to him at Lyons (see Weaving).

JACQUERIE, THE, an insurrection of the French peasantry which broke out in the lie de France and about Beauvais at the end of May 1358. The hardships endured by the peasants in the Hundred Years' War and their hatred for the nobles who oppressed them were the principal causes which led to the rising, though the immediate occasion was an affray which took place on the 28th of May at the village of Saint-Leu between " bri- gands " (militia infantry armoured in brigandines) and country- folk. The latter having got the upper hand united with the inhabitants of the neighbouring villages and placed Guillaume Karle at their head. They destroyed numerous chateaux in the valleys of the Oise, the Breche and the Therain, where they subjected the whole countryside to fire and sword, committing the most terrible atrocities. Charles the Bad, king of Navarre, crushed the rebellion at the battle of Mello on the 10th of June, and the nobles then took violent reprisals upon the peasants, massacring them in great numbers. See Simeon Luce, Histoire de la Jacquerie (Paris, 1859 and 1895).

(J-V.) JACTITATION (from Lat. jactitare, to throw out publicly), in English law, the maliciously boasting or giving out by one party that he or she is married to the other. In such a case, in order to prevent the common reputation of their marriage that might ensue, the procedure is by suit of jactitation of marriage, in which the petitioner alleges that the respondent boasts that he or she is married to the petitioner, and prays a declaration of nullity and a decree putting the respondent to perpetual silence there- after. Previously to 1857 such a proceeding took place only in the ecclesiastical courts, but by express terms of the Matrimonial Causes Act of that year it can now be brought in the probate, divorce and admiralty division of the High Court. To the suit there are three defences: (1) denial of the boasting; (2) the truth of the representations; (3) allegation (by way of estoppel) that the petitioner acquiesced in the boasting of the respondent. In Thompson v. Rourke, 1893, Prob. 70, the court of appeal laid down that the court will hot make a decree in a jactitation suit in favour of a petitioner who has at any time acquiesced in the assertion of the respondent that they were actually married. Jactitation of marriage is a suit that is very rare.*

JADE, or Jahde, a deep bay and estuary of the North Sea, belonging to the grand-duchy of Oldenburg, Germany. The bay, which was for the most part made by storm-floods in the 13th and 16th centuries, measures 70 sq. m.,

and has communication with the open sea by a fairway, a mile and a half wide, which never freezes, and with the tide gives access to the largest vessels. On the west side of the entrance to the bay is the Prussian naval port of Wilhelmshaven. A tiny stream, about 14 m. long, also known as the Jade, enters the head of the bay.

JADE, a name commonly applied to certain ornamental stones, mostly of a green colour, belonging to at least two distinct species, one termed nephrite and the other jadeite. Whilst the term jade is popularly used in this sense, it is now usually restricted by mineralogists to nephrite. The word jade 1 is derived (through Fr. lejade for Vejade) from Span, ijada (Lat. ilia), the loins, this mineral having been known to the Spanish con- querors of Mexico and Peru under the name of piedra de ijada or yjada (colic stone). The reputed value of the stone in renal diseases is also suggested by the term nephrite (so named by A. G. Werner from Gr. vetjypos, kidney), and by its old name lapis nephriticus.

Jade, in its wide and popular sense, has always been highly prized by the Chinese, who not only believe in its medicinal value but regard it as the symbol of virtue. It is known, with other ornamental stones, under the name of yu or yu-chi (yu- stone). According to Professor H. A. Giles, it occupies in China the highest place as a jewel, and is revered as " the quintessence of heaven and earth." Notwithstanding its toughness or tenacity, due to a dense fibrous structure, it is wrought into complicated

1 The English use of the word for a worthless, ill-tempered horse, a " screw," also applied as a term of reproach to a woman, has been referred doubtfully to the same Spanish source as the O.'Sp. ijadear, meaning to pant, of a broken-winded horse.

forms and elaborately carved. On many prehistoric sites in Europe, as in the Swiss lake-dwellings, celts and other carved objects both in nephrite and in jadeite have not infrequently been found; and as no kind of jade had until recent years been discovered in situ in any European locality it was held, especially by Professor L. H. Fischer, of Freiburg im Breisgau, Baden, that either the raw material or the worked objects must have been brought by some of the early inhabitants from a jade locality probably in the East, or were obtained by barter, thus suggesting a very early trade-route to the Orient. Exceptional interest, therefore, attached to the discovery of jade in Europe, nephrite having been found in Silesia, and jadeite or a similar rock in the Alps, whilst pebbles of jade have been obtained from many localities in Austria and north Germany, in the latter case probably derived from Sweden. It is, therefore, no longer necessary to assign the old jade implements to an exotic origin. Dr A. B. Meyer, of Dresden, always maintained that the Euro- pean jade objects were

indigenous, and his views have become generally accepted. Now that the mineral characters of jade are better understood, and its identification less uncertain, it may possibly be found with altered peridotites, or with amphibo- lites, among the old crystalline schists of many localities.

Nephrite, or true jade, may be regarded as a finely fibrous or com- pact variety of amphibole, referred either to actinolite or to tremolite, according as its colour inclines to green or white. Chemically it is a calcium-magnesium silicate, CaMg3(SiOs)4- The fibres are either more or less parallel or irregularly felted together, rendering the stone excessively tough ; yet its hardness is not great, being only about 6 or 65. The mineral sometimes tends to become schistose, breaking with a splintery fracture, or its structure may be horny. The specific gravity varies from 2-9 to 3-18, and is of determinative value, since jadeite is much denser. The colour of jade presents various shades of green, yellow and grey, and the mineral when polished has a rather greasy lustre. Professor F. W. Clarke found the colours due to com- pounds of iron, manganese and chromium. One of the mosU famous localities for nephrite is on the west side of the South Island of New Zealand, where it occurs as nodules and veins in serpentine and talcose rocks, but is generally found as boulders. It was known to the Maoris as pounamu, or " green stone," and was highly prized, being worked with great labour into various objects, especially the club- like implement known as the mere, or pattoo-pattoo, and the breast ornament called hei-tiki. The New Zealand jade, called by old writers " green talc of the Maoris," is now worked in Europe as an ornamental stone. The green jade-like stone known in New Zealand as tangiwai is bowenite, a translucent serpentine with enclosures of magnesite. The mode of occurrence of the nephrite and bowenite of New Zealand has been described by A. M. Finlayson {Quart. Jour. Geol. Soc, 1909, p. 351). It appears that the Maoris distinguished six varieties of jade. Difference of colour seems due to variations in the proportion of ferrous silicate in the mineral. According to Finlayson, the New Zealand nephrite results from the chemical alteration of serpentine, olivine or pyroxene, whereby a fibrous amphibole is formed, which becomes converted by intense pressure and movement into the dense nephrite.

Nephrite occurs also in New Caledonia, and perhaps in some of the other Pacific islands, but many of the New Caledonian implements reputed to be of jade are really made of serpentine. From its use as a material for axe-heads, jade is often known in Germany as Beilstein (" axe-stone "). A fibrous variety, of specific gravity 3-18, found in New Caledonia, and perhaps in the Marquesas, was dis- tinguished by A. Damour under the name of " oceanic jade."

Much of the nephrite used by the Chinese has been obtained from quarries

in the Kuen-lun mountains, on the sides of the Kara-kash valley, in Turkestan. The mineral, generally of pale colour, occurs in nests and veins running through hornblende-schists and gneissose rocks, and it is notable that when first quarried it is comparatively soft. It appears to have a wide distribution in the mountains, and has been worked from very ancient times in Khotan. Nephrite is said to occur also in the Pamir region, and pebbles are found in the beds of many streams. In Turkestan, jade is known as yashm or yeshm, a word which appears in Arabic as yeshb, perhaps cognate with iaIII. A gigantic mono- lith exists at the tomb of Tamerlane at Samarkand. The occurrence of the Siberian jade has been described by Professor L. von Jaczewski.

Jade implements are widely distributed in Alaska and British Columbia, being found in Indian graves, in old shell-heaps and on the sites of deserted villages. Dr G. M. Dawson, arguing from the dis- covery of some boulders of jade in the Fraser river valley, held that they were not obtained by barter from Siberia, but were of native origin; and the locality was afterwards discovered by Lieut. G. M. Stoney. It is known as the Jade Mountains, and is situated north of Kowak river, about 150 miles from its mouth. The study of a large collection of jade implements by Professor F. W. Clarke and Dr G. P. Merrill proved that the Alaskan jade is true nephrite, not to be distinguished from that of New Zealand.

*Jadeite is a mineral species established by A. Damour in 1863, differing markedly from nephrite in that its relation lies with the pyroxenes rather than with the amphiboles. It is an aluminium sodium silicate, NaAl(Si03)2, related to spodumene. S. L. Pen- field showed, by measurement, that jadeite is monoclinic. Its colour is commonly very pale, and white jadeite, which is the purest variety, is known as " camphor jade." In many cases the mineral shows bright patches of apple-green or emerald-green, due to the presence of chromium. Jadeite is much more fusible than nephrite, and is rather harder (6-5 to 7), but its most readily determined character is found in its higher specific gravity, which ranges from 3-20 to 3*41. Some jadeite seems to be a metamorphosed igneous rock.*

The Burmese jade, discovered by a Yunnan trader in the 13th century, is mostly jadeite. The quarries, described by Dr F. Noet- ling, are situated on the Uru river, about 120 m. from Mogaung, where the jadeite occurs in serpentine, and is partly extracted by fire- setting. It is also found as boulders in alluvium, and when these occur in a bed of laterite they acquire a red colour, which imparts to them peculiar value. According to Dr W. G. Bieeck, who visited the jade country of Upper Burma after Noetling, jadeite occurs at three localities in the Kachin Hills — Tawmaw, Hweka and

Mamon. The jadeite is known as chauk-sen, and is sent either to China or to Mandalay, by way of Bhamo, whence Bhamo has come erroneously to be regarded as a locality for jade. Jadeite occurs in association with the nephrite of Turkestan, and possibly in some other Asiatic localities. In certain cases nephrite is formed by the alteration of jadeite, as shown by Professor J. P. Iddings. The Chinese feits'ui, sometimes called " imperial jade," is a beautiful green stone, which seems generally to be jadeite, but it is said that in some cases it may be chrysoprase. It is named from its resemblance in colour to the plumage of the kingfisher. The resonant character of jade has led to its occasional use as a musical stone.

In Mexico, in Central America and in the northern part of South America, objects of jadeite are common. The Kunz votive adze from Oaxaca, in Mexico, is now in the American Museum of Natural History, New York. At the time of the Spanish conquest of Mexico amulets of green stone were highly venerated, and it is believed that jadeite was one of the stones prized under the name of chalchihuitl. Probably turquoise was another stone included under this name, and indeed any green stone capable of being polished, such as the Amazon stone, now recognized as a green feldspar, may have been numbered among the Aztec amulets. Dr Kunz suggests that the chalchihuitl was jadeite in southern Mexico and Central America, and turquoise in northern Mexico and New Mexico. He thinks that Mexican jadeite may yet be discovered in places {Gems and Precious Stones of Mexico, by G. F. Kunz: Mexico, 1907).

Chloromelanite is Damour's name for a dense, dark mineral which has been regarded as a kind of jade, and was used for the manufac- ture of celts found in the dolmens of France and in certain Swiss lake-dwellings. It is a mineral of spinach-green or dark-green colour, having a specific gravity of 3-4, or even as high as 3-65, and may be regarded as a variety of jadeite rich in iron. Chloro- melanite occurs in the Cyclops Mountains in New Guinea, and is used for hatchets or agricultural implements, whilst the sago-clubs of the island are usually of serpentine. Sillimanite, or fibrolite, is a mineral which, like chloromelanite, was used by the Neolithic occupants of western Europe, and is sometimes mistaken for a pale kind of jade. It is an aluminium silicate, of specific gravity about 3-2, distinguished by its infusibility. The jade tenace of J. R. Haiiy, discovered by H. B. de Saussure in the Swiss Alps, is now known as saussurite. Among other substances sometimes taken for jade may be mentioned prehnite, a hydrous calcium-aluminium silicate, which when polished much resembles certain kinds of jade. Pectolite has been used, like jade, in Alaska. A variety of vesuvianite (idocrase) from California, described by Dr. G. F. Kunz as californite, was at first mistaken for jade. The name jadeolite has been given by Kunz to a green chromiferous syenite from the jadeite mines of Burma. The mineral called bowenite, at one time supposed to be jade, is a hard and tough

variety of serpentine. Some of the common Chinese ornaments imitating jade are carved in steatite or serpentine, while others are merely glass. The pdte de riz is a fine white glass. The so-called " pink jade " is mostly quartz, artificially coloured, and " black jade," though sometimes mentioned, has no existence.

An exhaustive description of jade will be found in a sumptuous work, entitled Investigations and Studies in Jade (New York, 1906). This work, edited by Dr G. F. Kunz, was prepared in illustration of the famous jade collection made by Heber Reginald Bishop, and

presented by him to the Metropolitan Museum of Art, New York. The work, which is in two folio volumes, superbly illustrated, was printed privately, and after 100 copies had been struck off on Ameri- can hand-made paper, the type was distributed and the material used for the illustrations was destroyed. The second volume is a catalogue of the collection, which comprises 900 specimens arranged in three classes: mineralogical, archaeological and artistic. The important section on Chinese jade was contributed by Dr S. W. Bushell, who also translated for the work a discourse on jade — Yii-shuo by T'ang Jung-tso, of Peking. Reference should also be made to Heinrich Fischer's Nephrit und Jadeit (2nd ed., Stuttgart, 1880), a work which at the date of its publication was almost exhaustive. (F. W. R.)*

JAEN, an inland province of southern Spain, formed in 1833 of districts belonging to Andalusia; bounded on the N. by Ciudad Real and Albacete, E. by Albacete and Granada, S. by Granada, and W. by Cordova. Pop. (1900), 474,490; area, 5848 sq. m. Jaen comprises the upper basin of the river Guadalquivir, which traverses the central districts from east to west, and is enclosed on the north, south and east by mountain ranges, while on the west it is entered by the great Andalusian plain. The Sierra Morena, which divides Andalusia from New Castile, extends along the northern half of the province, its most prominent ridges being the Loma de Chiclana and the Loma de # Ubeda; the Sierras de Segura, in the east, derive their name from the river Segura, which rises just within the border; and between the last-named watershed, its continuation the Sierra del Pozo, and the parallel Sierra de Cazorla, is the source of the Guadal- quivir. The loftiest summits in the province are those of the Sierra Magina (7103 ft.) farther west and south. Apart from' the Guadalquivir the only large rivers are its right-hand tribu- taries the Jandula and Guadalimar, its left-hand tributary the Guadiana Menor, and the Segura, which flows east and south to the

Mediterranean.

In a region which varies so markedly in the altitude of its surface, the climate is naturally unequal; and, while the bleak, wind-swept highlands are only available as sheep-walks, the well-watered and fertile valleys favour the cultivation of the vine, the olive and all kinds of cereals. The mineral wealth of Jaen has been known since Roman times, and mining is an important industry, with its centre at Linares. Over 400 lead mines were worked in 1903 ; small quanti- ties of iron, copper and salt are also obtained. There is some trade in sawn timber and cloth ; esparto fabrics, alcohol and oil are manu- factured. The roads, partly owing to the development of mining, are more numerous and better kept than in most Spanish provinces. Railway communication is also very complete in the western dis- tricts, as the main line Madrid-Cordova-Seville passes through them and is joined south of Linares by two important railways — from Algeciras and Malaga on the south-west, and from Almerfa on the south-east. The eastern half of Jaen is inaccessible by rail. In the western half are Jaen, the capital (pop. (1900), 26,434), with Andujar (16,302), Baeza (14,379), Bailen (7420), Linares (38,245), Martos (17,078) and Ubeda (19,913). Other towns of more than 7000 inhabitants are Alcala la Real, Alcaudete, Arjona, La Carolina and Porcuna, in the west; and Cazorla, Quesada, Torredonjimeno, Villacarillo and Villanueva del Arzobispo, in the east.

JAEN, the capital of the Spanish province of Jaen, on the Linares-Puente Genii railway, 1300 ft. above the sea. Pop. (1900), 26,434. Jaen is finely situated on the well- wooded northern slopes of the Jabalcuz Mountains, overlooking the picturesque valleys of the Jaen and Guadalbullon rivers, which flow north into the Guadalquivir. The hillside upon which the narrow and irregular city .streets rise in terraces is fortified with Moorish walls and a Moorish citadel. Jaen is an episcopal see. Its cathedral was founded in 1532; and, although it remained unfinished until late in the 18th century, its main characteristics are those of the Renaissance period. The city contains many churches and convents, a library, art galleries, theatres, barracks and hospitals. Its manufactures include leather, soap, alcohol and linen; and it was formerly celebrated for its silk. There are hot mineral springs in the mountains, 2 m. south.

The identification of Jaen with the Roman Aurinx, which has sometimes been suggested, is extremely questionable. After the Moorish conquest Jaen was an important commercial centre, under the name of Jayyan; and ultimately became capital of a petty king- dom, which was brought to an end only in 1246 by Ferdinand III. of Castille, who transferred hither the bishopric of Baeza in 1248. Ferdinand IV. died at Jaen in 1312. In 1712 the city suffered severely from an earthquake.

JAFARABAD, a state of India, in the Kathiawar agency of Bombay, forming part of the territory of the nawab of Janjira; area, 42 sq. m.; pop. (1901), 12,097; estimated revenue, £4000. The town of Jafarabad (pop. 6038), situated on the estuary of a river, carries on a large coasting trade.

JAFFNA, a town of Ceylon, at the northern extremity of the island. The fort was described by Sir J. Emerson Tennent as " the most perfect little military work in Ceylon — a pentagon built of blocks of white coral." The European part of the town bears the Dutch stamp more distinctly than any other town in the island; and there still exists a Dutch Presbyterian church. Several of the church buildings date from the time of the Portu- guese. In 1901 Jaffna had a population of 33,879, while in the district or peninsula of the same name there were 300,851 persons, nearly all Tamils, the only Europeans being the civil servants and a few planters. Coco-nut planting has not been successful of recent years. The natives grow palmyras freely, and have a trade in the fibre of this palm. They also grow and export tobacco, but not enough rice for their own requirements. A steamer calls weekly, and there is considerable trade. The railway extension from Kurunegala due north to Jaffna and the coast was commenced in 1900. Jaffna is the seat of a govern- ment agent and district judge, and criminal sessions of the supreme court are regularly held. Jaffna, or, as the natives call it, Yalpannan, was occupied by the Tamils about 204 B.C., and there continued to be Tamil rajahs of Jaffna till 16 17, when the Portuguese took possession of the place. As early as 1544 the missionaries under Francis Xavier had made converts in this part of Ceylon, and after the conquest the Portuguese main- tained their proselytizing zeal. They had a Jesuit college, a Franciscan and a Dominican monastery. The Dutch drove out the Portuguese in 1658. The Church of England Missionary Society, began its work in Jaffna in 18 18, and the American Missionary Society in 1822.

JAGER, GUSTAV (1832-), German naturalist and hygienist, was born at Burg in Wtirttemberg on the 23rd of June 1832. After studying medicine at Tubingen he became a teacher of zoology at Vienna. In 1868 he was appointed professor of zoology at the academy of Hohenheim, and subsequently he became teacher of zoology and anthropology at Stuttgart poly- technic and professor of physiology at the veterinary school. In 1884 he abandoned teaching and started practice as a physician in Stuttgart. He wrote various works on biological subjects, including Die Darwinsche Theorie und ihre Stellung zu Moral und Religion (1869), Lehrbuch der allgemeinen Zoologie (1871-1878), and Die Entdeckung der Seele (1878). In 1876 he suggested an hypothesis in explanation of heredity, resembling the germ- plasm theory subsequently elaborated by August Weismann, to the effect that the germinal protoplasm retains its specific properties from generation to generation, dividing in each re- production into an ontogenetic portion, out of which the individual is built up, and a

phylogenetic portion, which is reserved to form the reproductive material of the mature off- spring. In Die N ormalkleidung als Gesundheitsschutz (1880) he advocated the system of clothing associated with his name, objecting especially to the use of any kind of vegetable fibre for clothes.

JAGERNDORF (Czech, Krnov), a town of Austria, in Silesia, 18 m. N.W. of Troppau by rail. Pop. (1900), 14,675, mostly German. It is situated on the Oppa and possesses a chateau belonging to Prince Liechtenstein, who holds extensive estates in the district. Jagerndorf has large manufactories of cloth, woollens, linen and machines, and carries on an active trade. On the neighbouring hill of Burgberg (1420 ft.) are a church, much visited as a place of pilgrimage, and the ruins of the seat of the former princes of Jagerndorf. The claim of Prussia to the principality of Jagerndorf was the occasion of the first Silesian war (1 740-1 742), but in the partition, which followed, Austria retained the larger portion of it. Jagerndorf suffered severely during the Thirty Years' War, and was the scene of engagements between the Prussians and Austrians in May 1745 and in January 1779.

JAGERSFONTEIN, a town in the Orange Free State, 50 m. N.W. by rail of Springfontein on the trunk line from Cape Town to Pretoria. Pop. (1904), 5657 — 1293 whites and 4364 coloured persons. Jagersfontein, which occupies a pleasant situation on the open veld about 4500 ft. above the sea, owes its existence to the valuable diamond mine discovered here in 1870. The first diamond, a stone of 50 carats, was found in August of that year, and digging immediately began. The discovery a few weeks later of the much richer mines at Bultfontein and Du Toits Pan, followed by the great finds at De Beers and Colesberg Kop (Kimberley) caused Jagersfontein to be neglected for several years. Up to 1887 the claims in the mine were held by a large number of individuals, but coincident with the efforts to amalga- mate the interest in the Kimberley mines a similar movement took place at Jagersfontein, and by 1893 all the claims became the property of one company, which has a working arrangement with the De Beers corporation. The mine, which is worked on the open system and has a depth of 450 ft., yields stones of very fine quality, but the annual output does not exceed in value £500,000. In 1909 a shaft 950 ft. deep was sunk with a view to working the mine on the underground system. Among the famous stones found in the mine are the " Excelsior " (weighing 971 carats, and larger than any previously discovered) and the " Jubilee " (see Diamond). The town was created a munici- pality in 1904.

Fourteen miles east of Jagersfontein is Boomplaats, the site of the battle

fought in 1848 between the Boers under A. W. Pretorius and the British under Sir Harry Smith (see Orange Free State: History).

JAGO, RICHARD (1715-1781), English poet, third son of Richard Jago, rector of Beaudesert, Warwickshire, was born in 171 5. He went up to University College, Oxford, in 1732, and took his degree in 1736. He was ordained to the curacy of Snitterfield, Warwickshire, in 1737, and became rector in 1754; and, although he subsequently received other preferments, Snitterfield remained his favourite residence. He died there on the 8th of May 1781. He was twice married. Jago's best- known poem, The Blackbirds, was first printed in Hawkesworth's Adventurer (No. 37, March 13, 1753), and was generally attri- buted to Gilbert West, but Jago published it in his own name, with other poems, in R. Dodsley's Collection of Poems (vol. iv., 1755). In 1767 appeared a topographical poem, Edge Hill, or the Rural Prospect delineated and moralized; two separate sermons were published in 1755; and in 1768 Labour and Genius, a Fable. Shortly before his death Jago revised his poems, and they were published in T784 by his friend, John Scott Hylton, as Poems Moral and Descriptive.

See a notice prefixed to the edition of 1 784; A. Chalmers, English Poets (vol. xvii., 1810); F. L. Colvile, Warwickshire Worthies (1870); some biographical notes are to be found in the letters of Shenstone to Jago printed in vol. iii. of Shenstone's Works (1769). ■

JAGUAR (Felis onca), the largest species of the Felidav found on the American continent, where it ranges from Texas through Central and South America to Patagonia. In the countries which bound its northern limit it is not frequently met with, but in South America it is quite common, and Don Felix de Azara states that when the Spaniards first settled in the district between Montevideo and Santa Fe, as many as two thousand were killed yearly. The jaguar is usually found singly (sometimes in pairs), and preys upon such quadrupeds as the horse, tapir, capybara, dogs or cattle. It often feeds on fresh- water turtles; sometimes following the reptiles into the water to effect a capture, it inserts a paw between the shells and drags out the body of the turtle by means of its sharp claws. Occasionally after having tasted human flesh, the jaguar becomes a confirmed man-eater. The cry of this great cat, which is heard at night, and most frequently during the pairing season, is deep and hoarse in tone, and consists of the sound pu, pu, often repeated. The female brings forth from two to four cubs towards the close of the year, which are able to follow their mother in about fifteen days after birth. The ground colour of the jaguar varies greatly, ranging from white to black, the rosette markings in the extremes being but faintly

visible. The general or typical coloration is, however, a rich tan upon the head, neck, body, outside of legs, and tail near the root. The upper part of

the head and sides of the face are thickly marked with small black spots, and the rest of body is covered with rosettes, formed of rings of black spots, with a black spot in the centre, and ranged lengthwise along the body in five to seven rows on each side. These black rings are heaviest along the back. The lips, throat, breast and belly, the inside of the legs and the lower sides of tail are pure white, marked with irregular spots of black, those on the breast being long bars and on the belly and inside of legs large blotches. The tail has large black spots near the root, some with light centres, and from about midway of its length to the tip it is ringed with black. The ears are black

The Jaguar (Felis onca). behind, with a large buff spot near the tip. The nose and upper lip are light rufous brown. The size varies, the total length of a very large specimen measuring 6 ft. 9 in.; the average length, however, is about 4 ft. from the nose to root of tail. In form the jaguar is thick-set; it does not stand high upon its legs; and in comparison with the leopard is heavily built; but its move- ments are very rapid, and it is fully as agile as its more graceful relative. The skull resembles that of the lion and tiger, but is much broader in proportion to its length, and may be identified by the presence of a tubercle on the inner edge of the orbit. The species has been divided into a number of local forms, regarded by some American naturalists as distinct species, but preferably ranked as sub-species or races.

JAGUARONDI, or Yaguarondi (Felis jaguarondi), a South American wild cat, found in Brazil, Paraguay and Guiana, rang- ing to north-eastern Mexico. This relatively small cat, uniformly coloured, is generally of some shade of brownish-grey, but in some individuals the fur has a rufous coat, while in others grey pre- dominates. These cats are said by Don Felix de Azara to keep to cover, without venturing into open places. They attack tame poultry and also young fawns. The names jaguarondi and eyra are applied indifferently to this species and Felis eyra.

JAHANABAD, a town of British India in Gaya district, Bengal, situated on a branch of the East Indian railway. Pop. (1901), 7018. It was once a flourishing trading town, and in 1760 it formed one of the eight branches of the East India Company's central factory at Patna. Since the introduction of Manchester goods, the trade of the town in cotton cloth has almost entirely ceased; but large numbers of the Jolaha or Mahommedan weaver caste live in the neighbourhood.

JAHANGIR, or Jehangir (1569-1627), Mogul emperor of Delhi, succeeded his father Akbar the Great in 1605. His name was Salim, but he assumed the title of Jahangir, " Conqueror of the World," on his accession. It was in his reign that Sir Thomas Roe came as ambassador of James I., on behalf of the

English company. He was a dissolute ruler, much addicted to drunkenness, and his reign is chiefly notable for the influence enjoyed by his wife Nur Jahan, ” the Light of the World.” At first she influenced Jahangir for good, but surrounding herself with her relatives she aroused the jealousy of the imperial princes; and Jahangir died in 1627 in the midst of a rebellion headed by his son, Khurram or Shah Jahan, and his greatest general, Mahabat Khan. The tomb of Jahangir is situated in the gardens of Shahdera on the outskirts of Lahore.

JAHIZ (Abu ‘Uthman ‘Amr ibn Bahr ul-Jahiz; i.e. ” the man the pupils of whose eyes are prominent “) (d. 869), Arabian writer. He spent his life and devoted himself in Basra chiefly to the study of polite literature. A Mu’tazilite in his religious beliefs, he developed a system of his own and founded a sect named after him. He was favoured by Ibn uz-Zaiyat, the vizier of the caliph Wathiq.

His work, the Kitab ul-Baydn wat-Tabyin, a discursive treatise on rhetoric, has been published in two volumes at Cairo (1895). The Kitab ul-Mahasin wal-Addad was edited by G. van Vloten as Le Livre des beautes et des antitheses (Leiden, 1898) ; the Kitab ul-Bu-hala. Le Livre des avares, ed. by the same (Leiden, 1900) ; two other smaller works, the Excellences of the Turks and the Superiority in Glory of the Blacks over the Whites, also prepared by the same. The Kitab ul-Hayawan, or ” Book of Animals,” a philological and literary, not a scientific, work, was published at Cairo (1906).

(G. W. T.)

JAHN, FRIEDRICH LUDWIG (1778-1852), German peda- gogue and patriot, commonly called Turnvater (” Father of Gymnastics “), was born in Lanz on the nth of August 1778. He studied theology and philology from 1796 to 1802 at Halle, Gottingen and Greifswald. After Jena he joined the Prussian army. In 1809 he went to Berlin, where he became a teacher at the Gymnasium zum Grauen as well as at the Plamann School. Brooding upon the humiliation of his native land by Napoleon, he conceived the idea of restoring the spirits of his countrymen by the development of their physical and moral powers through the practice of gymnastics. The first Turnplatz, or open-air gymnasium, was opened by him at Berlin in 181 1, and the movement spread rapidly, the young gymnasts being taught to regard themselves as members of a kind of gild for the emancipation of their fatherland. This patriotic spirit was nourished in no small degree by

the writings of Jahn. Early in 1813 he took an active part at Breslau in the formation of the famous corps of Liitzow, a battalion of which he commanded, though during the same period he was often employed in secret service. After the war he returned to Berlin, where he was appointed state teacher of gymnastics. As such he was a leader in the formation of the student Burschenschaften (patriotic fraternities) in Jena.

A man of democratic nature, rugged, honest, eccentric and outspoken, Jahn often came into collision with the reactionary spirit of the time, and this conflict resulted in 1819 in the closing of the Turnplatz and the arrest of Jahn himself. Kept in semi- confinement at the fortress of Kolberg until 1824, he was then sentenced to imprisonment for two years; but this sentence was reversed in 1825, though he was forbidden to live within ten miles of Berlin. He therefore took up his residence at Freyburg on the Unstrut, where he remained until his death, with the exception of a short period in 1828, when he was exiled to Colleda on a charge of sedition. In 1840 he was decorated by the Prussian government with the Iron Cross for bravery in the wars against Napoleon. In the spring of 1848 he was elected by the district of Naumburg to the German National Parliament. Jahn died on the 15th of October 1852 in Freyburg, where a monument was erected in his honour in 1859.

Among his works are the following : Bereicherung des hochdeutschen Sprachschatzes (Leipzig, 1 806) , Deutsches Volksthum (Lilbeck, 1810), Runenbldtter (Frankfort, 1814), Neue Runenblatter (Naumburg, 1828), Merke zum deutschen Volksthum (Hildburghausen, 1833), and Selbstvertheidigung (Vindication) (Leipzig, 1863). A complete edition of his works appeared at Hof in 1884-1887. See the biography by Schultheiss (Berlin, 1894), and Jahn als Erzieher, by Friedrich (Munich, 1895).

JAHN, JOHANN (1750-1816), German Orientalist, was born at Tasswitz, Moravia, on the 1 8th of June 1 7 50. He studied philo- sophy at Olmutz, and in 1772 began his theological studies at the Premonstratensian convent of Bruck, near Znaim. Having been ordained in 1775, he for a short time held a cure at Mislitz, but was soon recalled to Bruck as professor of Oriental languages and Biblical hermeneutics. On the suppression of the convent by Joseph II. in 1784, Jahn took up similar work at Olmutz, and in 1789 he was transferred to Vienna as professor of Oriental languages, biblical archaeology and dogmatics. In 1792 he published his Einleitung ins Alte Testament (2 vols.), which soon brought him into trouble; the cardinal-archbishop of Vienna laid a complaint against him for having departed from the traditional teaching of the Church, e.g. by asserting Job, Jonah, Tobit and Judith to be didactic poems, and the cases of demoniacal pos- session in the New Testament to be cases of dangerous disease. An ecclesiastical commission reported that the views themselves were not

necessarily heretical, but that Jahn had erred in showing too little consideration for the views of German Catholic theo- logians in coming into conflict with his bishop, and in raising difficult problems by which the unlearned might be led astray. He was accordingly advised to modify his expressions in future. Although he appears honestly to have accepted this judgment, the hostility of his opponents did not cease until at last (1806) he was compelled to accept a canonry at St Stephen's, Vienna, which involved the resignation of his chair. This step had been preceded by the condemnation of his Introductio in libros sacros veteris foederis in compendium redacta, published in 1804, and also of his Archaeologia biblica in compendium redacta (1805). The only work of importance, outside the region of mere philo- logy, afterwards published by him, was the Enchiridion Hermen- euticae (1812). He died on the 16th of August 1816.

Besides the works already mentioned, he published Hebrdische Sprachlehre fur Anf anger (1792); Aramdische od. Chaldaische u. Syrische Sprachlehre fur Anf anger (1795) ; Arabische Sprachlehre(i7g6) ; Elementarbuch der hebr. Sprache (1799); Chaldaische Chrestomathie (1800) ; Arabische Chrestomathie (1802) ; Lexicon arabico-latinum chrestomathiae accommodatum (1802); an edition of the Hebrew Bible (1806); Grammatica linguae hebraicae (1809); a critical com- mentary on the Messianic passages of the Old Testament (Vaticinia prophetarum de Jesu Messia, 1815). In 1821 a collection of Nach- trdge appeared, containing six dissertations on Biblical subjects. The English translation of the Archaeologia by T. C. Upham (1840) has passed through several editions.

JAHN, OTTO (1813-1869), German archaeologist, philologist, and writer on art and music, was born at Kiel on the 16th of June 1813. After the completion of his university studies at Kiel, Leipzig and Berlin, he travelled for three years in France and Italy; in 1839 he became privatdocent at Kiel, and in 1842 professor-extraordinary of archaeology and philology at Greifs- wald (ordinary professor 1845). In 1847 he accepted the chair of archaeology at Leipzig, of which he was deprived in 1851 for having .taken part in the political movements of 1 848-1 849. In 1855 he was appointed professor of the science of antiquity, and director of the academical art museum at Bonn, and in 1867 he was called to succeed E. Gerhard at Berlin. He died at Gottingen, on the 9th of. September 1869.

The following are the most important of his works: 1. Archaeo- logical: Palamedes (1836); Telephos u. Troilos (1841); Die Gemalde des Polygnot (1841); Pentheus u. die Manaden (1841); Paris u. Oinone (1844); Die hellenische' Kunst (1846); Peitho, die Gbttin der Oberredung (1847); Vber ein'ige Darstellungen des Paris- Urteils (1849); Die Ficoronische Cista (1852); Pausaniae descriptio arcis Athenarum (3rd ed., 1901);

Darstellungen griechischer Dichter auf Vasenbildern (1861). 2. Philological: Critical editions of Juvenal, Persius and Sulpicla (3rd ed. by F. Biicheler, 1893) ; Censorinus (1845); Flcus (1852); Cicero's Brutus (4th ed., 1877); and Orator (3rd ed., 1869); the Periochae of Livy (1853); the Psyche et Cupido of Apuleius (3rd ed., 1884; 5th ed., 1905); Longinus (1867; 3rded. by J. Vahlen, 1905). 3. Biographical and aesthetic: t)eber Mendels- sohn's Paulus (1842); Biographie Mozarts, a work of extraordinary labour, and of great importance for the history of music (3rd ed. by H. Disters, 1889-1891 ; Eng. trans, by P. D. Townsend,i89i) \Ludwig Uhland (1863); Gesammelte Aufsdtze iiber Musik (1866); Biograph- ische A ufsdtze (1 866) . His Griechische Bilderchroniken was published after his death, by his nephew A. Michaelis, who has written an

exhaustive biography in AUgemeine Deutsche Biographie, xiii. ; see also J . Vahlen, Otto John (1870) ; C. Bursian, Geschichte der classischen Philologie in Deutschland.

JAHRUM, a town and district of Persia in the province of Fars, S.E. of Shiraz and S.W. of Darab. The district has thirty-three villages and is famous for its celebrated shdhdn dates, which are exported in great quantities; it also produces much tobacco and fruit. The water supply is scanty, and most of the irrigation is by water drawn from wells. The town of Jahrum, situated about 90 m. S.E. of Shiraz, is surrounded by a mud-wall 3 m. in circuit which was constructed in 1834. It has a population of about 15,000, one half living inside and the other half outside the walls. It is the market for the produce of the surrounding districts, has six caravanserais and a post office. JAINS, the most numerous and influential sect of heretics, or nonconformists to the Brahmanical system of Hinduism, in India. They are found in every province of upper Hindustan, in the cities along the Ganges and in Calcutta. But they are more numerous to the west — in Mewar, Gujarat, and in the upper part of the Malabar coast — and are also scattered throughout the whole of the southern peninsula. They are mostly traders, and live in the towns; and the wealth of many of their community gives them a social importance greater than would result from their mere numbers. In the Indian census of 1901 they are returned as being 1,334,140 in number. Their magnificent series of temples and shrines on Mount Abu, one of the seven wonders of India, is perhaps the most striking outward sign of their wealth and importance.

The Jains are the last direct representatives on the continent of India of

those schools of thought which grew out of the active philosophical speculation and earnest spirit of religious inquiry that prevailed in the valley of the Ganges during the 5th and 6th centuries before the Christian era. For many centuries Jainism was so overshadowed by that stupendous movement, born at the same time and in the same place, which we call Buddhism, that it remained almost unnoticed by the side of its powerful rival. But when Buddhism, whose widely open doors had absorbed the mass of the community, became thereby corrupted from its pristine purity and gradually died away, the smaller school of the Jains, less diametrically opposed to the victorious orthodox creed of the Brahmans, survived, and in some degree took its place.

Jainism purports to be the system of belief promulgated by Vaddhamana, better known by his epithet of Maha-vlra (the great hero), who was a contemporary of Gotama, the Buddha. But the Jains, like the Buddhists, believe that the same system had previously been proclaimed through countless ages by each one of a succession of earlier teachers. The Jains count twenty- four such prophets, whom they call Jinas, or Tirthankaras, that is, conquerors or leaders of schools of thought. It is from this word Jina that the modern name Jainas, meaning followers of the Jina, or of the Jinas, is derived. This legend of the twenty- four Jinas contains a germ of truth. Maha-vlra was not an originator; he merely carried on, with but slight changes, a system which existed before his time, and which probably owes its most distinguishing features to a teacher named Parswa, who ranks in the succession of Jinas as the predecessor of Maha-vlra. Parswa is said, in the Jain chronology, to have been born two hundred years before Maha-vlra (that is, about 760 B.C.); but the only conclusion that it is safe to draw from this statement is that Parswa was considerably earlier in point of time than Maha- vlra. Very little reliance can be placed upon the details reported in the Jain books concerning the previous Jinas in the list of the twenty-four Tirthankaras. The curious will find in them many reminiscences of Hindu and Buddhist legend; and the anti- quary must notice the distinctive symbols assigned to each, in order to recognize the statues of the different Jinas, otherwise identical, in the different Jain temples.

The Jains are divided into two great parties — the Digambaras, or Sky-clad Ones, and the Svetdmbaras, or the White-robed Ones. The latter have only as yet been traced, and that doubt- fully, as far back as the 5th century after Christ; the former are

almost certainly the same as the Niganthas, who are referred to in numerous passages of the Buddhist Pali Pitakas, and must therefore be at least as old as the 6th century B.C. Iri many of these passages the Niganthas are mentioned as contemporaneous with the Buddha; and details

enough are given concerning their leader Nigantha Nata-putta (that is, the Nigantha of the Jfiatrika clan) to enable us to identify him, without any doubt, as the same person as the Vaddhamana Maha-vlra of the Jain books. This remarkable confirmation, from the scriptures of a rival religion, of the Jain tradition is conclusive as to the date of Maha-vlra. The Niganthas are referred to in one of Asoka's edicts (Corpus Inscriptionum, Plate xx.). Unfortunately the account of the teachings of Nigantha Nata-putta given in the Buddhist scriptures are, like those of the Buddha's teachings given in the Brahmanical literature, very meagre.

Jain Literature. — -The Jain scriptures themselves, though based on earlier traditions, are not older in their present form than the 5th century of our era. The most distinctively sacred books are called the forty-five Agamas, consisting of eleven Angas, twelve Upangas, ten Pakinnakas, six Chedas, four Mula-sutras and two other books. Devaddhi Ganin, who occupies among the Jains a position very similar to that occupied among the Buddhists by Buddhaghosa, collected the then existing traditions and teachings of the sect into these forty-five Agamas. Like the Buddhist scriptures, the earlier Jain books are written in a dialect of their own, the so-called Jaina Prakrit; and it was not till between a.d. 1000 and 1 100 that the Jains adopted Sanskrit as their literary language. Considerable progress has been made in the publication and elucidation of these original authorities. But a great deal remains yet to be done. The oldest books now in the possession of the modern Jains purport to go back, not to the foundation of the existing order in the 6th century B.C., but only to the time of Bhad- rabahu, three centuries later. The whole of the still older literature, on which the revision then made was based, the so-called Pumas, have been lost. And the existing canonical books, while preserving a great deal that was probably derived from them, contain much later material. The problem remains to sort out the older from the later, to distinguish between the earlier form of the faith and its subsequent developments, and to collect the numerous data for the general, social, industrial, religious and political history of India. Professor Weber gave a fairly full and carefully-drawn-up analysis of the whole of the more ancient books in the second part of the second volume of his Catalogue of the Sanskrit MSS. at Berlin, published in 1888, and in vols. xvi. and xvii. of his Indische Studien. An English translation of these last was published first in the Indian Antiquary, and then separately at Bombay, 1893. Professor Bhandarkar gave an account of the contents of many later works in his Report on the Search for Sanskrit MSS., Bombay, 1883. Only a small beginning has been made in editing and translating these works. The best pre'eis of a long book can necessarily only deal with the more impor- tant features in it. And in the choice of what should be included the pricis-v/ riter will often omit the points some subsequent investi- gator may most

especially want. All the older works ought there- fore to be edited and translated in full and properly indexed. The Jains themselves have now printed in Bombay a complete edition of their sacred books. But the critical value of this edition, and of other editions of separate texts printed elsewhere in India, leaves much to be desired. Professor Jacobi has edited and translated the Kalpa Sutra, containing a life of the founder of the Jain order; but this can scarcely be older than the 5th century of our era. He has also edited and translated the Ay ar any a Sutta of the Svetambara Jains. The text, published by the Pali Text Society, is of 140 pages octavo. The first part of it, about 50 pages, is a very old document on the Jain views as to conduct, and the remainder consists of appendices, added at different times, on the same subject. The older part may go back as early as the 3rd century B.C., and it sets out more especially the Jain doctrine of tapas or self-mortification, in contradistinction to the Buddhist view, which condemned asceticism. The rules of conduct in this book are for members of the order. Dr Rudolf Hoernle edited and translated an ancient work on the rules of conduct for laymen, the Uvasaga Dasao. 1 Professor Leumann edited another of the older works, the Aupapatika Sutra, and a fourth, entitled the Dasa-vaikalika Satra, both of them published by the German Oriental Society. Professor Jacobi translated two more, the Uttaradhyayana and the Sutra Kritanga? Finally Dr Barnett has translated two others in vol. xvii. of the Oriental Translation Fund (new series, London, 1907). Thus about one-fiftieth part of these interesting and valuable old records is now accessible to the European scholar. The sect of the Svetambaras has preserved the oldest literatures. Dr Hoernle has treated of the early history of

1 Published in the Bibliotheca Indica, Calcutta, 1888.

2 These two, and the other two mentioned above, form vols. i. and ii. of his Jaina Sutras, published in the Sacred Books of the East

(1884, 1895).

the sect in the Proceedings of the Asiatic Society of Bengal for 1898. Several scholars — notably Bhagvanlal Indraji, Mr Lewis Rice and Hofrath Buhler ‘ — have treated of the remarkable archaeological discoveries lately made. These confirm the older records in many details, and show that the Jains, in the centuries before the Christian era, were a wealthy and important body in widely separated parts of India.

Jainism. — The most distinguishing outward peculiarity of Maha-vlra and of his earliest followers was their practice of going quite naked, whence the term Digambara. Against this custom, Gotama, the Buddha, especially warned his followers; and it is referred to in the well-known Greek phrase, Gymnoso- phist, used already by Megasthenes, which applies very aptly to the Niganthas. Even the earliest name Nigantha, which means " free from bonds," may not be without allusions to this curious belief in the sanctity of nakedness, though it also alluded to freedom from the bonds of sin and of transmigration. The statues of the Jinas in the Jain temples, some of which are of enormous size, are still always quite naked; but the Jains themselves have abandoned the practice, the Digambaras being sky-clad at meal-time only, and the Svetambaras being always completely clothed. And even among the Digambaras it is only the re- cluses or Yatis, men devoted to a religious life, who carry out this practice. The Jain laity — the Srdvakas, or disciples — do not adopt it.

The Jain views of life were, in the most important and essen- tial respects, the exact reverse of the Buddhist views. The two orders, Buddhist and Jain, were not only, and from the first, independent, but directly opposed the one to the other. In philosophy the Jains are the most thorough-going supporters of the old animistic position. Nearly everything, according to them, has a soul within its outward visible shape — not only men and animals, but also all plants, and even particles of earth, and of water (when it is cold), and fire and wind. The Buddhist theory, as is well known, is put together without the hypothesis of " soul " at all. The word the Jains use for scful isjiva, which means life; and there is much analogy between many of the expressions they use and the view that the ultimate cells and atoms are all, in a more or less modified sense, alive. They regard good and evil and space as ultimate substances which come into direct contact with the minute souls in everything. And their best-known position in regard to the points most discussed in philosophy is Syad-vada, the doctrine that you may say " Yes " and at the same time " No " to everything. You can affirm the eternity of the world, for instance, from one point of view, and at the same time deny it from another; or, at different times and in different connexions, you may one day affirm it and another day deny it. This position both leads to vagueness of thought and explains why Jainism has had so little influence over other schools of philosophy in India. On the other hand, the Jains are as determined in their views of asceti- cism (tapas) as they were compromising in their views of philo- sophy. Any injury done to the " souls " being one of the worst of iniquities, the good monk should not wash his clothes (indeed, the most austere will reject clothes altogether), nor even wash his teeth, for fear of injuring living things. " Subdue the body, chastise thyself, weaken thyself, just as fire consumes dry wood." It was by suppressing, through such self-torture, the

influence on his soul of all sensations that the Jain could obtain salvation. It is related of the founder himself, the Maha-vira, that after twelve years' penance he thus obtained Nirvana (Jacobi, Jaina Sutras, i. 201) before he entered upon his career as a teacher. And through the rest of his life, till he died at Pava, shortly before the Buddha, he followed the same habit of continual self-mortification. The Buddha, on the other hand, obtained Nirvana in his 35th year, under the Bo tree, after he had abandoned penance; and through the rest of his life he spoke of penance as quite useless from his point of view.

There is no manual of Jainism as yet published, but there is a

1 The Hatthi Gumpha and three other inscriptions at Cuttack ILeyden, 1885); Sravana Belgola inscriptions (Bangalore, 1889); 'Sienna Oriental Journal, vols, ii.-v. ; Epigraphia Indica, vols, i-vii.

great deal of information on various points in the introductions to the works referred to above. Professor Jacobi, who is the best authority on the history of this sect, thus sums up the distinction between the Maha-vira and the Buddha: " Maha-vira was rather of the ordinary class of religious men in India. He may be allowed a talent for religious matters, but he possessed not the genius which Buddha undoubtedly had. . . . The Buddha's philosophy forms a system based on a few fundamental ideas, whilst that of Maha-vlra scarcely forms a system, but is merely a sum of opinions (pannaltis) on various subjects, no fundamental ideas being there to uphold the mass of metaphysical matter. Besides this. . .it is the ethical element that gives to the Buddhist writings their superiority over those of the Jains. Maha-vira treated ethics as corollary and subordinate to his metaphysics, with which he was chiefly concerned."

Additional Authorities. — Bhadrabahu's Kalpa Sutra, the re- cognized and popular manual of the Svetambara Jains, edited with English introduction by Professor Jacobi (Leipzig, 1879); Hema- candra's " Yoga S'astram," edited by Windisch, in the Zeitschrift der deutschen morg. Ges. for 1874; " Zwei Jaina Stotra," edited in the Indische Studien, vol. xv. ; Ein Fragment der Bhagavati, by Professor Weber; Memoires de I' Academic de Berlin (1866); Nirayavaliya Sutta, edited by Dr Warren, with Dutch introduction (Amsterdam, 1879); Over de godsdienstige en wijsgeerige Begrippen der Jainas, by Dr Warren (his doctor-dissertation, Zwolle, 1875); Beitrage zur Grammatik des Jaina-prakrit, by Dr Edward Miiller (Berlin, 1876); Colebrooke's Essays, vol. ii. Mr J. Burgess has an exhaustive account of the Jain Cave Temples (none older than the 7th century) in Fergusson and Burgess's Cave Temples in India (London, 1880).

See also Hopkins' Religions of India (London, 1896), pp. 280-96, and J.

G. Buhler On the Indian Sect of the Jainas, edited by J. Burgess (London, 1904). (T. W. R. D.)

JAIPUR, or Jeypore, a city and native state of India in the Rajputana agency. The city is a prosperous place of com- paratively recent date. It derives its name from the famous Maharaja Jai Singh II., who founded it in 1728. It is built of pink stupco in imitation of sandstone, and is remarkable for the width and regularity of its streets. It is the only city in India that is laid out in rectangular blocks, and it is divided by cross streets into six equal portions. The main streets are 111 ft. wide and are paved, while the city is lighted by gas. The regularity of plan, and the straight streets with the houses all built after the same pattern, deprive Jaipur of the charm of the East, while the painted mud walls of the houses give it the meretricious air of stage scenery. The huge palace of the maharaja stands in the centre of the city. Another noteworthy building is Jai Singh's observatory. The chief industries are in metals and marble, which are fostered by a school of art, founded in 1868. There is also a wealthy and enterprising community of native bankers. The city ■ has three colleges and several hospitals. Pop. (1901), 160,167. The ancient capital of Jaipur was Amber.

The State of Jaipur, which takes its name from the city, has a total area of 15,579 sq. m. Pop. (1901), 2, 658, 666, showing a decrease of 6 % in the decade. The estimated revenue is £430,000, and the tribute £27,000. The centre of the state is a sandy and barren plain 1,600 ft. above sea-level, bounded on the E. by ranges of hills running north and south. On the N. and W. it is bounded by a broken chain of hills, an offshoot of the Aravalli mountains, beyond which lies the sandy desert of Rajputana. The soil is generally sandy. The hills are more or less covered with jungle trees, of no value except for fuel. Towards the S. and E. the soil becomes more fertile. Salt is largely manufactured and exported from the Sambhar lake, which is worked by the government of India under an arrange- ment with the states of Jaipur and Jodhpur. It yields salt of a very high quality. The state is traversed by the Rajputana railway, with branches to Agra and Delhi.

The maharaja of Jaipur belongs to the Kachwaha clan of Rajputs, claiming descent from Rama, king of Ajodhya. The state is said to have been founded about n 28 by Dhula Rai, from Gwalior, who with his Kachwahas is said to have absorbed or driven out the petty chiefs. The Jaipur house furnished to the Moguls some of their most distinguished generals. Among them were Man Singh, who fought in Orissa and Assam; Jai

Singh, commonly known by his imperial title of Mirza Raja, whose name appears in all the wars of Aurangzeb in the Deccan; and Jai Singh II., or

Sawai Jai Singh, the famous mathema- tician and astronomer, and the founder of Jaipur city. Towards the end of the 18th century the Jats of Bharatpur and the chief of Alwar each annexed a portion of the territory of Jaipur. By the end of the century the state was in great confusion, distracted by internal broils and impoverished by the exactions of the Mahrattas. The disputes between the chiefs of Jaipur and Jodhpur had brought both states to the verge of ruin, and Amir Khan with the Pindaris was exhausting the country. By a treaty in 1818 the protection of the British was extended to Jaipur and an annual tribute fixed. In 1835 there was a serious disturbance in the city, after which the British government took measures to insist upon order and to reform the administration as well as to support its effective action; and the state has gradually become well-governed and prosperous. During the Mutiny of 1S57 the maharaja assisted the British in every way that lay in his power. Maharaja Madho Singh, G. C.S.I. ,G.C.V.O. , was born in 1861, and succeeded in 1882. He is distinguished for his enlightened administration and his patronage of art. He was one of the princes who visited England at the time of King Edward's coronation in 1902. It was he who started and endowed with a donation of 15 lakhs, afterwards increased to 20 lakhs, of rupees (£133,000) the " Indian People's Famine Fund." The Jaipur imperial service transport corps saw service in the Chitral and Tirah campaigns.

JAISALMER, or Jeysulmere, a town and native state of India in the Rajputana agency. The town stands on a ridge of yellowish sandstone, crowned by a fort, which contains the palace and several ornate Jain temples. Many of the houses and temples are finely sculptured. Pop. (1901), 7137. The area of the state is 16,062 sq. m. In 1901 the population was 73>37°> showing a decrease of 37% in ten years, as a con- sequence of famine. The estimated revenue is about £6000; there is no tribute. Jaisalmer is almost entirely a sandy waste, forming a part of the great Indian desert. The general aspect of the country is that of an interminable sea of sandhills, of all shapes and sizes, some rising to a height of 150 ft. Those in the west are covered with phog bushes, those in the east with tufts of long grass. Water is scarce, and generally brackish; the average depth of the wells is said to be about 250 ft. There are no perennial streams, and only one small river, the Kakni, which, after flowing a distance of 28 m., spreads over a large surface of flat ground, and forms a lake or jhil called the Bhuj-Jhil. The climate is dry and healthy. Throughout Jaisalmer only rain- crops, such as bajra, joar, moth, til, &c, are grown; spring crops of wheat, barley, &c, are very rare. Owing to the scant rainfall, irrigation is almost unknown.

The main part of the population lead a wandering life, grazing their flocks and herds. Large herds of camels, horned cattle, sheep and goats are kept. The principal trade is in wool, ghi, camels, cattle and sheep. The chief

imports are grain, sugar, foreign cloth, piece-goods, &c. Education is at a low ebb. Jain priests are the chief schoolmasters, and their teaching is elementary. The ruler of Jaisalmer is styled maharawal. The state suffered from famine in 1897, 1900 and other years, to such an extent that it has had to incur a heavy debt for extraordinary expenditure. There are no railways.

The majority of the inhabitants are Bhatti Rajputs, who take their name from an ancestor named Bhatti, renowned as a warrior when the tribe were located in the Punjab. Shortly after this the clan was driven southwards, and found a refuge in the Indian desert, which was thenceforth its home. Deoraj, a famous prince of the Bhatti family, is esteemed the real founder of the present Jaisalmer dynasty, and with him the title of rawal commenced. In 1 156 Jaisal, the sixth in succession from Deoraj, founded the fort and city of Jaisalmer, and made it his capital. In 1294 the Bhattis so enraged the emperor Ala-ud-din that his army captured and sacked the fort and city of Jaisalmer, so that for some time it was quite deserted. After this there is nothing to record till the time of Rawal Sabal Singh, whose reign marks an epoch in Bhatti history in that he acknowledged the supremacy of the Mogul emperor Shah Jahan. The Jaisalmer princes had now arrived at the height of their power, but from this time till the accession of Rawal Mulraj in 1762 the fortunes of the state rapidly declined, and most of its outlying provinces were lost. In 1818 Mulraj entered into political relations XV. 5

with the British. Maharawal Salivahan, born in 1887, succeeded to the chief ship in 1 891.

JAJCE (pronounced Yaitse), a town of Bosnia, situated on the Pliva and Vrbas rivers, and at the terminus of a branch railway from Serajevo, 62 m. S.E. Pop. (1895), about 4000. Jajce occupies a conical hill, overlooking one of the finest waterfalls in Europe, where the Pliva rushes down into the Vrbas, 100 ft. below. The 14th century citadel which crowns this hill is said to have been built for Hrvoje, duke of Spalato, on the model of the Castel del' Uovo at Naples; but the resemblance is very slight, and although both jajce and uovo signify " an egg," the town probably derives its name from the shape of the hill. The ruined church of St Luke, said by legend to be the Evan- gelist's burial place, has a fine Italian belfry, and dates from the 15th century. Jezero, 5 m. W. of Jajce, contains the Turkish fort of Djol-Hissar, or " the Lake-Fort." In this neighbourhood a line of waterfalls and meres, formed by the Pliva, stretches for several miles, enclosed by steep rocks and forest-clad moun- tains. The power supplied by the main fall, at Jajce, is used for industrial purposes, but the beauty of the town

remains unimpaired.

From 1463 to 1528 Jajce was the principal outwork of eastern Christendom against the Turks. Venice contributed money for its defence, and Hungary provided armies; while the pope entreated all Christian monarchs to avert its fall. In 1463 Mahomet II. had seized more than 75 Bosnian fortresses, includ- ing Jajce itself; and the last independent king of Bosnia, Stephen Tomasevic, had been beheaded, or, according to one tradition, flayed alive, before the walls of jajce, on a spot still called Kraljeva Polje, the " King's Field." His coffin and skeleton are still displayed in St Luke's Church. The Hungarians, under KingMatthiasL, came to the rescue, and reconquered the greater part of Bosnia during the same year; and, although Mahomet returned in 1464, he was again defeated at Jajce, and compelled to flee before another Hungarian advance. In 1467 Hungarian bans, or military governors, were appointed to rule in north- west Bosnia, and in 1472 Matthias appointed Nicolaus Ujlaki king of the country, with Jajce for his capital. This kingdom lasted, in fact, for 59 years; but, after the death of Ujlaki, in 1492, its rulers only bore the title of ban, and of vojvod. In 1500 the Turks, under Bajazet II., were crushed at Jajce by the Hungarians under John Corvinus; and several other attacks were repelled between 1520 and 1526. But in 1526 the Hungarian power was destroyed at Moha.cs; and in 1528 Jajce was forced to surrender.

See Brass, " Jajce, die alte Konigstadt Bosniens," in Deutsche geog. Blatter, pp. 71-85 (Bremen, 1899).

JAJPUR, or Jajpore, a town of British India, in Cuttack dis- trict, Bengal, situated on the right bank of the Baitarani river. Pop. (rgoi), 12,111. It was the capital of Orissa under the Kesari dynasty until the nth century, when it was superseded by Cuttack. In Jajpur are numerous ruins of temples, sculptures, &c, and a large and beautiful sun pillar.

JAKOB, LUDWIG HEINRICH VON (1759-1827), German economist, was born at Wettin on the 26th of February 1759. In 1777 he entered the university of Halle. In 1780 he was appointed teacher at the gymnasium, and in 1791 professor of philosophy at the university. The suppression of the university of Halle having been decreed by Napoleon, Jakob betook himself to Russia, where in 1807 he was appointed professor of political economy at Kharkoff, and in 1809 a member of the government commission to inquire into the finances of the empire. In the following year he became president of the commission for the revision of criminal law, and he at the same time obtained an important office in the finance department, with the rank of counsellor of state; but in 1816 he returned to Halle to occupy the chair of political economy. He died at Lauchstadt on

the 22nd of July 1827.

Shortly after his first appointment to a professorship in Halle Jakob had begun to turn his attention rather to the practical than the speculative side of philosophy, and in 1805 he published at Halle Lehrbuch der Nationalokonomie, in which lie was the first to

advocate in Germany the necessity of a distinct science dealing specially with the subject of national wealth. His principal other vforksareGrundrissderallgemeinenLogik (Halle, 1788) ; Grundsdtze der Polizeigesctzgebung und Polizeianstalten (Leipzig, 1809); Einleitung in das Stadium der Staatswissenschaften (Halle, 1819); Entwurf eines Criminalgesetzbuchs fiir das russtsche Reich (Halle, 1818) and Staatsfinanzwissenschaft (2 vols., Halle, 1821).

JAKOVA (also written Diakova, Gyakovo and Gjako- vica), a town of Albania, European Turkey, in the vilayet of Kossovo; on the river Erenik, a right-hand tributary of the White Drin. Pop. (1905) about 12,000. Jakova is the chief town of the Alpine region which extends from the Montenegrin frontier to the Drin and White Drin. This region has never been thoroughly explored, or brought under effective Turkish rule, on account of the inaccessible character of its mountains and forests, and the lawlessness of its inhabitants — a group of two Roman Catholic and three Moslem tribes, known collectively as the Malsia Jakovs, whose official representative resides in Jakova.

JAKUNS, an aboriginal race of the Malay Peninsula. They have become much mixed with other tribes, and are found throughout the south of the peninsula and along the coasts. The purest types are straight-haired, exhibit marked Mongolian characteristics and are closely related to the Malays. They are probably a branch of the Pre-Malays, the ” savage Malays ” of A. R. Wallace. They are divided into two groups: (1) Jakuns of the jungle, (2) Jakuns of the sea or Orang Laut. The latter set of tribes now comprise the remnants of the pirates or ” sea- gipsies ” of the Malaccan straits. The Jakuns, who must be studied in conjunction with the other aboriginal peoples of the Malay Peninsula, the SemangsandtheSakais,arenot so dwarfish as those. The head is round; the skin varies from olive-brown to dark copper; the face is flat and the lower jaw square. The nose is thick and short, with wide, open nostrils. The cheek- bones are high and well marked. The hair has a blue-black tint, eyes are black and the beard is scanty. The Jakuns live a wild forest life, and in general habits much

resemble the Sakai, being but little in advance of the latter in social conditions except where they come into close contact with the Malay peoples.

JALALABAD, or Jellalabad, a town and province of Afghanistan. The town lies at a height of 1950 ft. in a plain on the south side of the Kabul river, 96 m. from Kabul and 76 from Peshawar. Estimated pop., 4000. Between it and Peshawar intervenes the Khyber Pass, and between it and Kabul the passes of Jagdalak, Khurd Kabul, &c. The site was chosen by the emperor Baber, and he laid out some gardens here; but \he town itself was built by his grandson Akbar in a.d. 1560. It resembles the city of Kabul on a smaller scale, and has one central bazaar, the streets generally being very narrow. The most notable episode in the history of the place is the famous defence by Sir Robert Sale during the first Afghan war, when he held the town from November 1841 to April 1842. On its evacuation in 1842 General Pollock destroyed the defences, but they were rebuilt in 1878. The town is now fortified, surrounded by a high wall with bastions and loopholes. The province of Jalalabad is about 80 m. in length by 35 in width, andincludes the large district of Laghman north of the Kabul river, as well as that on the south called Ningrahar. The climate of Jalalabad is similar to that of Peshawar. As a strategical centre Jalalabad is one of the most important positions in Afghanistan, for it dominates the entrances to the Laghman and the Kunar valleys; commanding routes to Chitral or India north of the Khyber, as well as the Kabul-Peshawar road.

JALAP, a cathartic drug consisting of the tuberous roots of Ipomaea Purga, a convolvulaceous plant growing on the eastern declivities of the Mexican Andes at an elevation of 5000 to 8000 ft. above the level of the sea, more especially about the neighbourhood of Chiconquiaco, and near San Salvador on the eastern slope of the Cofre de Perote. ‘ Jalap has been known in Europe since the beginning of the 17th century, and derives its name from the city of Jalapa in Mexico, near which it grows, but its botanical source was not accurately determined until 1829, when Dr. J. R. Coxe of Philadelphia published a description

and coloured figure taken from living plants sent him two years previously from Mexico. The jalap plant has slender herbaceous twining stems, with alternately placed heart-shaped pointed leaves and salver-shaped deep purplish-pink flowers. The underground stems are slender and creeping; their vertical roots enlarge and form turnip-shaped tubers. The roots are dug up in Mexico throughout the year, and are suspended to dry in a net over the hearth of the Indians’ huts, and hence acquire a smoky odour. The large tubers are often gashed to cause them to dry more quickly. In their form they vary from spindle- shaped to ovoid or globular, and in size from a pigeon’s egg to a man’s fist. Externally they are brown and marked with

small transverse paler scars, and internally they present a dirty white

Jalap {Ipomaea Purga) ; about half natural size.

resinous or starchy fracture. The ordinary drug is distinguished in commerce as Vera Cruz jalap, from the name of the port whence it is shipped.

Jalap has been cultivated for many years in India, chiefly at Ootacamund, and grows there as easily as a yam, often producing clusters of tubers weighing over 9 lb; but these, as they differ in appearance from the commercial article, have not as yet obtained a place in the English market. They are found, however, to be rich in resin, containing 18%. In Jamaica also the plant has been grown, at first amongst the cinchona trees, but more recently in new ground, as it was found to exhaust the soil.

Besides Mexican or Vera Cruz jalap, a drug called Tampico jalap has been imported for some years in considerable quantity. It has a much more shrivelled appearance and paler colour than ordinary jalap, and lacks the small transverse scars present in the true drug. This kind of jalap, the Purga de Sierra Gorda of the Mexicans, was traced by Hanbury to Ipomaea simulans.

It grows in Mexico along the mountain range of the Sierra Gorda in the neighbourhood of San Luis de la Paz, from which district it is carried down to Tampico, whence it is exported. A third variety of jalap known as woody jalap, male jalap, or Orizaba root, or by the Mexicans as Purgo macho, is derived from Ipomaea orizabensis, a plant of Orizaba. The root occurs in fibrous pieces, which are usually rectangular blocks of irregular shape, 2 in. or more in diameter, and are evidently portions of a large root. It is only occasionally met with in commerce.

The dose of jalap is from five to twenty grains, the British Phar- macopeia directing that it must contain from 9 to 11 % of the resin, which is given in doses of two to five grains. One preparation of this drug is in common use, the Pulvis Jalapae Compositus, which consists of 5 parts of jalap, 9 of cream of tartar, and 1 of ginger. The dose is from 20 grains to a drachm. It is best given in the maximum dose which causes the minimum of irritation.

The chief constituents of jalap resin are two glucosides — convol- vulin and jalapin — sugar, starch and gum. Convolvulin constitutes nearly 20 % of the resin. It is insoluble in ether, and is more active than jalapin. It is not

used separately in medicine. Jalapin is present in about the same proportions. It dissolves readily in ether, and has a soft resinous consistence. It may be given in half-grain doses. It is the active principle of the allied drug scammony. According to Mayer, the formula of convolvulin is C34H60O16, and that of jalapin C31H50O16.

Jalap is a typical hydragogue purgative, causing the excretion of more fluid than scammony, but producing less stimulation of the muscular wall of the bowel. For both reasons it is preferable to scammony. It was shown by Professor Rutherford at Edinburgh to be a powerful secretory cholagogue, an action possessed by few hydragogue purgatives. The stimulation of the liver is said to depend upon the solution of the resin by the intestinal secretion. The drug is largely employed in cases of Bright's disease and dropsy from any cause, being especially useful when the liver shares in the general venous congestion. It is not much used in ordinary constipa- tion.

JALAPA, Xalapa, or Halapa, a city of the state of Vera Cruz, Mexico, 70 m. by rail N.W. of the port of Vera Cruz. Pop. (1900), 20,388. It is picturesquely situated on the slopes of the sierra which separates the central plateau from the tierra caliente of the Gulf Coast, at an elevation of 4300 ft., and with the Cofre de Perote behind it rising to a height of 13,419 ft. Its climate is cool and healthy and the town is frequented in the hot season by the wealthier residents of Vera Cruz. The city is well built, in the old Spanish style. Among its public buildings are a fine old church, a Franciscan convent founded by Cortez in 1556, and three hospitals, one of which, that of San Juan de Dios, dates from colonial times. The neighbouring valleys and slopes are fertile, and in the forests of this region is found the plant (jalap), which takes its name from the place. Jalapa was for a time the capital of the state, but its political and commercial importance has declined since the opening of the railway between Vera Cruz and the city of Mexico. It manufactures pottery and leather.

JALAUN, a town and district of British India, in the Allahabad division of the United Provinces. Pop. of town (1901), 8573. Formerly it was the residence of a Mahratta governor, but never the headquarters of the district, which are at Orai.

The District of Jalaun has an area of 1477 sq. m. It lies entirely within the level plain of Bundelkhand, north of the hill country, and is almost surrounded by the Jumna and its tribu- taries the Betwa and Pahuj. The central region fjius enclosed is a dead level of cultivated land, a'most destitute of trees, and sparsely dotted with villages. The southern portion presents almost one unbroken sheet of cultivation. The boundary rivers form the only interesting feature in Jalaun. The river Non flows through the centre of the district, which it drains by innumerable small ravines instead

of watering. Jalaun has suffered much from the noxious kans grass, owing to the spread of which many villages have been abandoned and their lands thrown out of cultivation. Pop. (1901), 399,726, showing an increase of 1%. The two largest towns are Kunch (15,888), and Kalpi (10,139). The district is traversed by the line of the Indian Midland railway from Jhansi to Cawnpore. A small part of it is watered by the Betwa canal. Grain, oil-seeds, cotton and ghi are exported.

In early times Jalaun seems to have been the home of two Rajput clans, the Chandels in the east and the Kachwahas in the west. The town of Kalpi on the Jumna was conquered for the princes of Ghor as early as 1196. Early in the 14th century the Bundelas occupied the greater part of Jalaun, and even succeeded in holding the fortified post of Kalpi. That important possession was soon recovered by the Mussulmans, and passed under the sway of the Mogul emperors. Akbar's governors at Kalpi maintained a nominal authority over the surrounding district; and the Bundela chiefs were in a state of chronic revolt, which culminated in the war of independence under Chhatar Sal. On the outbreak of his rebellion in 167 1 he occupied a large province to the south of the Jumna. Setting out from this basis, and assisted by the Mahrattas, he reduced the whole of Bundelkhand. On his death he bequeathed one-third of his dominions to his Mahratta allies, who before long succeeded in annexing the whole of Bundelkhand. Under Mahratta rule the country was a prey to constant anarchy and intestine strife. To this period must be traced the origin of the poverty and desolation which are still conspicuous throughout the district. In 1806 Kalpi was made over to the British, and in 1840, on the death of Nana Gobind Ras, his possessions lapsed to them also. Various interchanges of territory took place, and in 1856 the present boundaries were substantially settled. Jalaun had a bad reputation during the Mutiny. When the news of the rising at Cawnpore reached Kalpi, the men of the 53rd native infantry deserted their officers, and in June the Jhansi mutineers reached the district, and began their murder of Europeans. The inhabitants everywhere revelled in the licence of plunder and murder which the Mutiny had spread through all Bundelkhand, and it was not till Septem- ber 1858 that the rebels were finally defeated.

JALISCO, Xalisco, or Guadalajara, a Pacific coast state of Mexico, of very irregular shape, bounded, beginning on the N., by the territory of Tepic and the states of Durango, Zacatecas, Aguas Calientes, Guanajuato, Michoacan, and Colima. Pop. (1900), 1,153,891. Area, 31,846 sq. m. Jalisco is traversed from N.N.W. to S.S.E. by the Sierra Madre, locally known as the Sierra de Nayarit and Sierra de Jalisco, which divides the state into a low heavily forested coastal plain and a high plateau region, part of the great Anahuac table-land, with an average elevation of about 5000 ft., broken by spurs and flanking ranges of moderate height. The

sierra region is largely volcanic and earthquakes are frequent; in the S. are the active volcanoes of Colima (12,750 ft.) and the Nevado de Colima (14,363) ft.). The tierra caliente zone of the coast is tropical, humid, and unfavour- able to Europeans, while the inland plateaus vary from sub-tropical to temperate and are generally drier and healthful. The greater part of the state is drained by the Rio Grande de Lerma (called the Santiago on its lower course) and its tribu- taries, chief of which is the Rio Verde. Lakes are numerous; the largest are the Chapala, about 80 m. long by 10 to 35 m. wide, which is considered one of the most beautiful inland sheets of water in Mexico, the Sayula and the Magdalena, noted for their abundance of fish. The agricultural products of Jalisco include Indian corn, wheat and beans on the uplands, and sugar-cane, cotton, rice, indigo and tobacco in the warmer districts. Rubber and palm oil are natural forest products of the coastal zone. Stock-raising is an important occupation in some of the more elevated districts. The mineral resources include silver, gold, cinnabar, copper, bismuth, and various precious stones. There are reduction works of the old-fashioned type and some manu- factures, including cotton and woollen goods, pottery, refined sugar and leather. The commercial activities of the state contribute much to its prosperity. There is a large percentage of Indians and mestizos in the population. The capital is Guadalajara, and other important towns with their populations in 1900 (unless otherwise stated) are: Zapotlanejo (20,275), 21 m. E. by N. of Guadalajara; Ciudad Guzman (17,374 in 1895), 60 m. N.E. of Colima; Lagos (14,716 in 1895), a mining town 100 m. E.N.E. of Guadalajara on the Mexican Central railway; Tamazula (8.783 in 1895); Sayula (7883); Autlan (7715); Teocaltiche (8881); Ameca (7212 in 1895), in a fertile agricultural

region on the western slopes of the sierras; Cocula (7090 in 1895); and Zacoalco (6516). Jalisco was first invaded by the Spaniards about 1526 and was soon afterwards conquered by Nuno de Guzman. It once formed part of the reyno of Nueva Galicia, which also included Aguas Calientes and Zacatecas. In 1889 its area was much reduced by a subdivision of its coastal zone, which was set apart as the territory of Tepic.

JALNA, or Jaulna, a town in Hyderabad state, India, on the Godavari branch of the Nizam's railway, and 210 m. N.E. of Bombay. Pop. (1901), 20,270. Until 1903 it was a cantonment of the Hyderabad contingent, originally established in 1827. Its gardens produce fruit, which is largely exported. On the opposite bank of the river Kundlika is the trading town of Kadirabad; pop. (1901), 11,159.

JALPAIGURI, or Julpigoree, a town and district of British India, in the Rajshahi division of Eastern Bengal and Assam. The town is on the right bank of the river Tista, with a station on the Eastern Bengal railway about 300 m. due N. of Calcutta. Pop. (1901), 9708. It is the headquarters of the commissioner of the division.

The District of Jalpaiguri (organized in 1869) occupies an irregularly shaped tract south of Darjeeling and Bhutan and north of the state of Kuch Behar. It includes the Western Dwars, annexed from Bhutan after the war of 1864-1865. Area, 2,962 sq. m. Pop. (1901), 787,380, an increase of 16% in the decade. The district is divided into a " regulation " tract, lying towards the south-west, and a strip of country, about 22 m. in width, running along the foot of the Himalayas u and known as the Western Dwars. The former is a continuous expanse of level paddy fields, only broken by groves of bamboos, palms, and fruit-trees. The frontier towards Bhutan is formed by the Sinchula mountain range, some peaks of which attain an elevation of 6000 ft. It is thickly wooded from base to summit. The principal rivers, proceeding from west to east, are the Mahan- anda, Karatoya, Tista, Jaldhaka, Duduya, Mujnai, Tursa, Kaljani, Raidak, and Sankos. The most important is the Tista, which forms a valuable means of water communication. Lime is quarried in the lower Bhutan hills. The Western Dwars are the principal centre of tea cultivation in Eastern Bengal. The other portion of the district produces jute. Jalpaiguri is traversed by the main line of the Eastern Bengal railway to Darjeeling. It is also served by the Bengal Dwars railway.

JAMAICA, the largest island in the British West Indies. It lies about 80 m. S. of the eastern extremity of Cuba, between 17 43′ and 18 32′ N. and 76 10′ and 78° 20′ W., is 144 m. long, 50 m. in extreme breadth, and has an area of 4207 sq. m. The coast-line has the form of a turtle, the mountain ridges repre- senting the back. A mountainous backbone runs through the island from E. to W., throwing off a number of subsidiary ridges, mostly in a north-westerly or south-easterly direction. In the east this range is more distinctly marked, forming the Blue Mountains, with cloud-capped peaks and numerous bifurcating branches. They trend W. by N., and are crossed by five passes at altitudes varying from 3000 to 4000 ft. They culminate in Blue Mountain Peak (7360 ft.), after which the heights gradually decrease until the range is merged into the hills of the western plateau. Two-thirds of the island are occupied by this limestone plateau, a region of great beauty broken by innumerable hills, valleys and sink-holes, and covered with luxuriant vegetation. The uplands usually terminate in steep slopes or bluffs, separated from the sea, in most cases, by a strip of level land. On the south coast, especially, the plains are often large, the Liguanea plain, on which Kingston stands, having an area of 200 sq. m. Upwards of a hundred rivers and streams find their way to the sea, besides the numerous

tribu- taries which issue from every ravine in the mountains. These streams for the most part are not navigable, and in times of flood they become devastating torrents. In the parish of Portland, the Rio Grande receives all the smaller tributaries from the west. In St Thomas in the east the main range is drained by the Plantain Garden river, the tributaries of which form deep ravines and narrow gorges. The valley of the Plantain Garden

expands into a picturesque and fertile plain. The Black river flows through a level country, and is navigable by small craft for about 30 m. The Salt river and the Cabaritta, also in the south, are navigable by barges. Other rivers of the south are the Rio Cobre (on which are irrigation works for the sugar and fruit plantations), the Yallahs and the Rio Minho; in the north are the Martha Brae, the White river, the Great Spanish river, and the Rio Grande. Vestiges of intermittent volcanic action occur, and there are several medicinal springs. Jamaica has 16 harbours, the chief of which are Port Morant, Kingston, Old Harbour, Montego Bay, Falmouth, St Ann's Bay, Port Maria and Port Antonio.

Geology. — The greater part of Jamaica is covered by Tertiary deposits, but in the Blue Mountain and some of the other ranges the older rocks rise to the surface. The foundation of the island is formed by a series of stratified shales and conglomerates, with tuffs and other volcanic rocks and occasional bands of marine limestone. The limestones contain Upper Cretaceous fossils, and the whole series has been strongly folded. Upon this foundation rests un- conformably a series of marls and limestones of Eocene and early Oligocene age. Some of the limestones are made of Foraminifera, together with Radiolaria, and indicate a subsidence to abyssal depths. Nevertheless, the higher peaks of the island still remained above the sea. Towards the middle of the Oligocene period, mountain folding took place on an extensive scale, and the island was raised far above its present level and was probably connected with the rest of the Greater Antilles and perhaps with the mainland also. At the same time plutonic rocks of various kinds were intruded into the deposits already formed, and in some cases produced considerable meta- morphism. During the Miocene and Pliocene periods the island again sank, but never to the depths which it reached in the Eocene period. The deposits formed were shallow-water conglomerates, marls and limestones, with mollusca, brachiopoda, corals, &c. Finally, a series of successiveˆ elevations of small amount, less than 500 ft. in the aggregate, raised the island to its present level. The terraces which mark the successive stages in this elevation are well shown in Montego Bay and elsewhere. The remarkable depressions of the Cockpit country and the closed basin of the Hector river are similar in origin to swallow-holes, and "were formed by the solution of a limestone layer resting upon insoluble rocks. The island produces a great variety of marbles, porphyrites, granite and ochres. Traces of gold have been found

associated with some of the oxidized copper ores (blue and green carbonates) in the Clarendon mines. Copper ores are widely diffused but are very expensive to work; as are the lead and cobalt which are also found. Manganese iron ores and a form of arsenic occur.

Climate. — The climate is one of the island's chief attractions. Near the coast it is warm and humid, but that of the uplands is delightfully mild and equable. At Kingston the temperature ranges from 70-7° to 87-8° F., and this is generally the average of all the low-lying coast land. At Cinchona, 4907 ft. above the sea, it varies from 57-5° to 68-5°. The vapours from the rivers and the ocean produce in the upper regions clouds saturated with moisture which induce vegetation belonging to a colder climate. During the rainy seasons there is such an accumulation of these vapours as to cause a general ' coolness and occasion sudden heavy showers, and sometimes destructive floods. The rainy seasons, in May and October, last for about three weeks, although, as a rule no month is quite without rain. The fall varies greatly; while the annual average for the island is 66-3 in., at Kingston it is 32-6 in., at Cinchona 105-5 m -, and at some places in the north-east it exceeds 200 in. The climate of the Santa Cruz Mountains is extremely favourable to sufferers from tubercular and rheumatic diseases. Excepting near morasses and lagoons, the island is very healthy, and yellow fever, once prevalent, now rarely occurs. In the early part of the 19th century, hurricanes often devastated Jamaica, but now, though they pass to the N.E. and S.W. with comparative frequency, they rarely strike the island itself.

Flora. — The flora is remarkable, showing types from North, Central, and South America, with a few European forms, besides the common plants found everywhere in the tropics. Of flowering plants there are 2180 distinct species, and of ferns 450 species, several of both being indigenous. The largeness of these numbers may be to some extent accounted for by differences of altitude, temperature and humidity. There are many beautiful flowers, such as the aloe, the yucca, the datura the mountain pride and the Victoria regia ; and the cactus tribe is well represented. The Sensitive Plant grows in pastures, and orchids in the woods. There are forest

trees fit for every purpose; including the ballata, rosewood, satin- wood, mahogany, lignum vitae, lancewood and ebony. The logwood and fustic are exported for dyeing. There are also the Jamaica cedar, and the silk cotton tree (Ceiba Bombax). Pimento (peculiar to Jamaica) is indigenous, and furnishes the allspice. The bamboo, coffee and cocoa are well known. Several species of palm abound, — the macaw, the fan palm, screw palm,

and palmetto royal. There are plantations of coco-nut palm. The other noticeable trees and plants are the mango, the breadfruit tree, the papaw, the lacebark tree, and the guava. The Palma Christi, from which castor oil is made, is a very abundant annual. English vegetables grow in the hills, and the plains produce plantains, cocoa, yams, cassava, ochra, beans, pease, ginger and arrowroot. Maize and guinea-corn are cultivated, and the guinea-grass, accidentally introduced in 1750, is very valuable for horses and cattle, — so much so that pen-keeping or cattle farming is a highly profitable occupation. Among the principal fruits are the orange, shaddock, lime, grape or cluster fruit, pine-apple, mango, banana, grapes, melons, avocado pear, breadfruit, and tamarind.

Fauna. — There are fourteen sorts of lampyridae or fireflies, besides the elateridae or lantern beetles. There are no venomous serpents, but numerous harmless snakes and lizards exist. The land- crab is considered a table delicacy, and the land-turtle also is eaten. The scorpion and centipede, though poisonous, are not very danger- ous. Ants, sandflies and mosquitoes swarm in the lowlands. There are twenty different song-birds, and forty-three varieties of birds are presumed to be peculiar to the island. The sea and the rivers swarm with fish. Turtles abound, and the seal, the manatee and the crocodile are sometimes found. The coral reefs, with their varied polyps and anemones, the numerous alcyonarians and diverse coral-dwelling animals are readily accessible to the student, and the island is also celebrated for the number of species of its land-shells.

People. — The population of the island was estimated in 1905 at 806,690. Jamaica is rich in traces of its former Arawak inhabitants. Aboriginal pefaloid celts and other implements, flattened skulls and vessels are common, and images are some- times found in the large limestone caverns of the island. The present inhabitants, of whom only 2 % are white, include Maroons, the descendants of the slaves of the Spaniards who fled into the interior when the island was captured by the British; descendants of imported African slaves; mixed race of British and African blood; coolies from India; a few Chinese, and the British officials and white settlers. The Maroons live by them- selves and are few in number, while the half-castes enter into trade and sometimes into the professions. The number of white inhabitants other than British is very small. A negro peasant population is encouraged, with a view to its being a support to the industries of the island; but, in many cases a field negro will not work for his employer more than four days a week. He may till his own plot of ground on one of the other days or not, as the spirit moves him, but four days' work a week will keep him easily. He has little or no care for the future. He has probably squatted on someone's land, and has no rent to pay. Clothes he need hardly buy, fuel he needs only for cooking, and food is ready to his hand for the picking. Unfortunately a widespread indulgence in predial

larceny is a great hindrance to agriculture as well as to moral progress. But that habits of thrift are being inculcated is shown by the steady increase in the accounts in the government savings banks. That gross superstition is still prevalent is shown by the cases of obeqh or witchcraft that come before the courts from time to time. Another indication of the status of the negro may be found in the fact that more than 60% of the births are illegitimate, a percentage that shows an unfortunate tendency to increase rather than diminish.

The capital, Kingston, stands on the south-east coast, and near it is the town of Port Royal. Spanish Town (pop. 5019), the former capital, is in the parish of St Catherine, Middlesex, I if m. by rail west of Kingston. Since the removal of the seat of government to Kingston, the town has gradually sunk in importance. In the cathedral many of the governors of the island are buried. A marble statue of Rodney commemorates his victory over the count de Grasse off Dominica in 1782. Montego Bay (pop. 4803), on the north-west coast, is the second town on the island, and is also a favourite bathing resort. Port Antonio (1784) lies between two secure harbours on the north-east, and owes its prosperity mainly to the development of the trade in fruit, for which it is the chief place of shipment.

Industries. ~-&.gr\cu\t\xti\ enterprise falls into two classes—plant- ing and pen-keeping, i.e. the breeding of horses, mules, cattle and sheep. The chief products are bananas, oranges, coffee, sugar,

rum, logwood, cocoa, pimento, ginger, coco-nuts, limes, nutmegs, pineapples, tobacco, grape-fruit and mangoes. There is a board of agriculture, with an experimental station at Hope; there is also an agricultural society with 26 branches throughout the colony. Bee- keeping is a growing industry, especially among the peasants. The land as a rule is divided into small holdings, the vast majority consisting of five acres and less. The manufactures are few. In addition to the sugar and coffee estates and cigar factories, there are tanneries, distilleries, breweries, electric light and gas works, ironfoundries, potteries and factories for the production of coco- nut oil, essential oils, ice, matches and mineral waters. There is an important establishment at Spanish Town for the production of logwood extract. The exports, more than half of which go to the United States, mostly comprise fruit, sugar and rum. The United States also contributes the majority of the imports. More than half the revenue of the colony is derived from import duties, the remainder is furnished by excise, stamps and licences. With the exception of that of the parish boards, there is no direct taxation.

Communications.— In 1900 an Imperial Direct West India Line of steamers was started by Elder, Dempster & Co., to encourage the fruit trade with England; it had a subsidy of £40,000, contri- buted jointly by the Imperial and Jamaican governments. Two steamers go round the island once a week, calling at the principal ports, the circuit occupying about 120 hours. A number of sailing " droghers " also ply from port to port. Jamaica has a number of good roads and bridle paths; the main roads, controlled by the public works department, encircle the island, with several branches from north to south. The parochial roads are maintained by the parish boards. A railway traverses the island from Kingston in the south-east to Montego Bay in the north-west, and also branches to

Countj/ Boundaries » Parish Baunaarits Hallways. ■

JAMAICA

English ATiles o g 10 15 20 gg 30

Vegrit,

*Longitude West 7JS*of Greenwich t&*

*Tr 1 * Emery Walfccrsc.*

Port Antonio and to Ewarton. Jamaica is included in the Postal Union and in the Imperial penny post, and there is a weekly mail service to and from England by the Royal Mail Line, but mails are also carried by other companies. The island is connected by cable with the United States via Cuba, and with Halifax, Nova Scotia via Bermuda.

There is a government savings bank at Kingston with branches throughout the island, and there are also branches of the Colonial Bank of London and the Bank of Nova Scotia. The coins in cir- culation are British gold and silver, but not bronze, instead of which local nickel is used. United States gold passes as currency. English weights and measures are used.

A dministration, &c. — The island is divided into three counties, Surrey in the east, Middlesex in the centre, and Cornwall in the west, and each of these is subdivided into five parishes. The parish is the unit of local government, and has jurisdic- tion over roads, markets, sanitation, poor relief and water- works. The management is vested in a parish board, the members of which are elected. The chairman or custos is appointed by the governor. The island is administered by a governor, who bears the old Spanish title of captain-general, assisted by a legislative council of five ex officio members, not more than ten nominated members, and fourteen members elected on a limited suffrage. There is also a privy council of three

ex officio and not more than eight nominated members. There is an Imperial garrison of about 2000 officers and men, with headquarters at Newcastle, consisting of Royal Engineers, Royal Artillery, infantry and four companies of the West India Regiment. There is a naval station at Port Royal, and the entrance to its harbour is strongly fortified. In addition there is a militia of infantry and artillery, about 800 strong.

Previous to 1870 the Church of England was established in Jamaica, but in that year a disestablishment act was passed which provided for gradual disendowment. It is still the most numerous body, and is presided over by the bishop of Jamaica, who is also archbishop of the West Indies. The Baptists,

Wesleyans, Presbyterians, Moravians and Roman Catholics are all represented; there is a Jewish synagogue at Kingston, and the Salvation Army has a branch on the island. The Church of England maintains many schools, a theological college, a deacon- esses' home and an orphanage. The Baptists have a theological college; and the Roman Catholics support a training college for teachers, two industrial schools and two orphanages. Elemen- tary education is in private hands, but fostered, since 1867, by government grants; it is free but not compulsory, although the governor has the right to compel the attendance of all children from 6 to 14 years of age in such towns and districts as he may designate. The teachers in these schools are for the most part trained in the government-aided training colleges of the various denominations. For higher education there are the University College and high school at Hope near Kingston, Potsdam School in St Elizabeth, the Mico School and Wolmer's Free School in Kingston, founded (for boys and girls) in 1729, the Montego Bay secondary school, and numerous other endowed and self- supporting establishments. The Cambridge Local Examinations have been held regularly since 1882.

History. — Jamaica was discovered by Columbus on the 3rd of May 1494. Though he called it Santiago, it has always been known by its Indian name Jaymaca, " the island of springs," modernized in form and pronunciation into Jamaica. Except- ing that in 1505 Columbus once put in for shelter, the island remained unvisited until 1509, when Diego, the discoverer's son, sent Don Juan d'Esquivel to take possession, and thence- forward it passed under Spanish rule. Sant' Iago de la Vega, or Spanish Town, which remained the capital of the island until 1872, was founded in 1523. Sir Anthony Shirley, a British admiral, attacked the island in 1596, and plundered and burned the capital, but did not follow up his victory. Upon

his retire- ment the Spaniards restored their capital and were unmolested until 1635, when the island was again raided by the British under Colonel Jackson. The period of the Spanish occupation is mainly memorable for the annihilation of the gentle and peaceful Arawak Indian inhabitants; Don Pedro d'Esquivel was one of their cruellest oppressors. The whole island was divided among eight noble Spanish families, who discouraged immigration to such an extent that when Jamaica was taken by the British the white and slave population together did not exceed 3000. Under the vigorous foreign policy of Cromwell an attempt was made to crush the Spanish power in the West Indies, and an expedition under Admirals Penn and Venables succeeded in capturing and holding Jamaica in 1655. The Spanish were entirely expelled in 1658.' Their slaves then took to the mountains, and down to the end of the 18th century the disaffection of these Maroons, as they were called, caused constant trouble. Jamaica con- tinued to be governed by military authority until 1 661, when Colonel D'Oyley was appointed captain-general and governor- in-chief with an executive council, and a constitution was introduced resembling that of England. He was succeeded in the next year by Lord Windsor, under whom a legislative council was established. Jamaica soon became the chief resort of the buccaneers, who not infrequently united the characters of merchant or planter with that of pirate or privateer. By the Treaty of Madrid, 1670, the British title to the island was recognized, and the buccaneers were suppressed. The Royal African Company was formed in 1672 with a monopoly of the slave trade, and from this time Jamaica was one of the greatest slave marts in the world. The sugar-industry was introduced about this period, the first pot of sugar being sent to London in 1673. An attempt was made in 1678 to saddle the island with a yearly tribute to the Crown and to restrict the free legisla- ture. The privileges of the legislative assembly, however, were restored in 1682; but not till 46 years later was the question of revenue settled by a compromise by which Jamaica undertook to settle £8000 (an amount afterwards commuted to £6000) per annum on the Crown, provided that English statute laws were made binding in Jamaica.

During these years of political struggle the colony was thrice afflicted by nature. A great earthquake occurred in 1692, when

the chief part of the town of Port Royal, built on a shelving bank of sand, slipped into the sea. Two dreadful hurricanes devastated the island in 171 2 and 1722, the second of which did so much damage that the seat of commerce had to be transferred from Port Royal to Kingston.

The only prominent event in the history of the island during the later years of the 18th century, was the threatened invasion by the French and Spanish in 1782, but Jamaica was saved by the victory of Rodney and Hood off

Dominica. The last attempt at invasion was made in 1806, when the French were defeated by Admiral Duckworth. When the slave trade was abolished the island was at the zenith of its prosperity; sugar, coffee, cocoa, pimento, ginger and indigo were being produced in large quantities, and it was the dep6t of a very lucrative trade with the Spanish main. The anti-slavery agitation in Great Britain found its echo in the island, and in 1832 the negroes revolted, believing that emancipation had been granted. They killed a number of whites and destroyed a large amount of valuable property. Two years later the Emancipation Act was passed, and, subject to a short term of apprenticeship, the slaves were free. Emancipation left the planters in a pitiable condition financially. The British government awarded them conpensa- tion at the rate of £19 per slave, the market value of slaves at the time being £35, but most of this compensation went into the hands of the planters' creditors. They were left with over- worked estates, a poor market and a scarcity of labour. Nor was this the end of their misfortunes. During the slavery times the British government had protected the planter by imposing a heavy differential duty on foreign sugar; but on the introduc- tion of free trade the price of sugar fell by one-half and reduced the profits of the already impoverished planter. Many estates, already heavily mortgaged, were abandoned, and the trade of the island was at a standstill. Differences between the executive, the legislature, and the home government, as to the means of retrenching the public expenditure, created much bitterness. Although some slight improvement marked the administration of Sir Charles Metcalfe and the earl of Elgin, when coolie immi- gration was introduced to supply the scarcity and irregularity of labour and the railway was opened, the improvement was not permanent. In 1865 Edward John Eyre became governor. Financial affairs were at their lowest ebb and the colonial treasury showed a deficit of £80,000. To meet this difficulty new taxes were imposed and discontent was rife among the negroes. Dr Undernill, the secretary of a Baptist organization known as the British Union, wrote to the colonial secretary in London, pointing out the state of affairs. This letter became public in Jamaica, and in the opinion of the governor added in no small measure to the popular excitement. On the nth of October 1865 the negroes rose at Morant Bay and murdered the custos and most of the white inhabitants. The slight encounter which followed filled the island with terror, and there is no doubt that many excesses were committed on both sides. The assembly passed an act by which martial law was proclaimed, and the legislature passed an act abrogating the constitution.

The action of Governor Eyre, though generally approved throughout the West Indies, caused much controversy in Eng- land, and he was recalled. A prosecution was instituted against him, resulting in an elaborate exposition of martial law by Chief Justice Cockburn, but the jury threw out the bill

and Eyre was discharged. He was succeeded in the government of Jamaica by Sir Henry Storks, and under the crown colony system of government the state of the island made slow but steady progress. In 1868 the first fruit shipment took place from Port Antonio, the immigration of coolies was revived, and cinchona planting was introduced. The method of government was changed in 1884, when a new constitution, slightly modified in 1895, was granted to the island.

In the afternoon of the 14th of January 1907 a terrible earth- quake visited Kingston. Almost every building in the capital and in Port Royal, and many in St Andrews, were destroyed or seriously injured. The loss of life was variously estimated, but probably exceeded one thousand. Among those killed was

Sir James Fergusson, 6th baronet (b. 1 83 2) . The principal shock was followed by many more of slighter intensity during the ensuing fortnight and later. On the 1 7th of January assistance was brought by three American war-ships under Rear-Admiral Davis, who however withdrew them on the 19th, owing to a misunderstanding with the governor of the island, Sir Alexander Swettenham, on the subject of the landing of marines from the vessels with a view to preserving order. The incident caused considerable sensation, and led to Sir A. Swettenham's resigna- tion in the following March, Sir Sydney Olivier, K.C.M.G., being appointed governor. Order was speedily restored; but the destructive effect of the earthquake was a severe check to the prosperity of the island.

See Bryan Edwards, History of the West Indies (London, 1809, and appendix, 1819) ; P. H. Gosse, Journal of a Naturalist in Jamaica (London, 1851) and Birds of Jamaica (1847); Jamaica Handbook (London, annual); Bacon and Aaron, New Jamaica (1890); W. P. Livingstone, Black Jamaica (London, 1900), F. Cundall, Bibliotheca Jamaicensis . (Kingston, 1895), anc ' Studies in Jamaica History (1900); W. J. Gardner, History of Jamaica (New York, 1909). For geology, see R. T. Hill, " The Geology and Physical Geography of Jamaica," Bull. Mus. Com. Zool. Harvard, xxxiv. (1899).

JAMAICA, formerly a village of Queens county, Long Island, New York, U.S.A., but after the 1st of January 1898 a part of the borough of Queens, New York City. Pop. (1890) 5361. It is served by the Long Island railroad, the lines of which from Brooklyn and Manhattan meet here and then separate to serve the different regions of the island. 1 King's Park (about 10 acres) comprises the estate of John Alsop King (1788-1867), governor of New York in 1857-1859, from whose heirs in 1897 the land was

purchased by the village trustees. In South Jamaica there is a race track, at which meetings are held in the spring and autumn. The headquarters of the Queens Borough Department of Public Works and Police are in the Jamaica town-hall, and Jamaica is the seat of a city training school for teachers (until 1905 one of the New York State normal schools). For two guns, a coat, and a quantity of powder and lead, several New Englanders obtained from the Indians a deed for a tract of land here in September 1655. In March 1657 they received permission from Governor Stuyvesant to found a town, which was chartered in 1660 and was named Rustdorp by Stuyvesant, but the English called it Jamaica; it was rechar- tered in 1666, 1686 and 1788. The village was incorporated in 1814 and reincorporated in 1855. In 1665 it was made the seat of justice of the north riding; in 1683-1788 it was the shire town of Queens county. With Hempstead, Gravesend, Newtown and Flushing, also towns of New England origin and type, Jamaica was early disaffected towards the provincial government of New York. In 1669 these towns complained that they had no representation in a popular assembly, and in 1670 they pro- tested against taxation without representation. The founders of Jamaica were mostly Presbyterians, and they organized one of the first Presbyterian churches in America. At the begin- ning of the War of Independence Jamaica was under the control of Loyalists; after the defeat of the Americans in the battle of Long Island (27th August 1776) it was occupied by the British; and until the end of the war it was the headquarters of General Oliver Delancey, who had command of all Long Island.

JAMB (from Fr. jambe, leg), in architecture, the side-post or lining of a doorway or other aperture. The jambs of a window outside the frame are called " reveals." Small shafts to doors and windows with caps and bases are known as " jamb-shafts "; when in the inside arris of the jamb of a window they are some- times called " scoinsons."

JAMES (a variant of the name Jacob, Heb. sfrC, one who holds by the heel, outwitter, through O. Fr. James, another form of Jacques, Jaques, from Low Lat. Jacobus; cf. Ital. Jacopo

' In June 1908 the subway lines of the interborough system of New York City were extended to the Flatbush (Brooklyn) station of the Long Island railroad, thus bringing Jamaica into direct connexion with Manhattan borough by way of the East river tunnel, completed in the same year.

[Jacob], Giacomo [James], Prov. Jacme, Cat. Jaume, Cast. Jaime), a masculine proper name popular in Christian countries as having been that of two of Christ's apostles. It has been borne by many sovereigns and other

princes, the most important of whom are noticed below, after the heading devoted to the characters in the New Testament, in the following order: (1) kings of England and Scotland, (2) other kings in the alpha- betical order of their countries, (3) the " Old Pretender." The article on the Epistle of James in the New Testament follows after the remaining biographical articles in which James is a surname.

JAMBS (Gr. 'Id-Koifios, the Heb. Ya'akob or Jacob), the name of several persons mentioned in the New Testament.

1. James, the son of Zebedee. He was among the first who were called to be Christ's immediate followers (Mark i. 19 seq.; Matt. iv. 2i seq. , and perhaps Luke v. 10), and afterwards obtained an honoured place in the apostolic band, his name twice occupy- ing the second place after Peter's in the lists (Mark iii. 17; Acts i. 13), while on at least three notable occasions he was, along with Peter and his brother John, specially chosen by Jesus to be with him (Mark v. 37; Matt. xvii. i, xxvi. 37). This same prominence may have contributed partly to the title " Boanerges " or " sons of thunder " which, according to Mark iii. 17, Jesus himself gave to the two brothers. But its most natural inter- pretation is to be found in the impetuous disposition which would have called down fire from heaven on the offending Samaritan villagers (Luke ix. 54), and afterwards found expression, though in a different way, in the ambitious request to occupy the places of honour in Christ's kingdom (Mark x. 3 5 seq.) . James is included among those who after the ascension waited at Jerusalem (Acts i. 13) for the descent of the Holy Ghost on the day of Pentecost. And though on this occasion only his name is mentioned, he must have been a zealous and prominent member of the Christian community, to judge from the fact that when a victim had to be chosen from among the apostles, who should be sacrificed to the animosity of the Jews, it was on James that the blow fell first. The brief notice is given in Acts xii. r, 2. Eusebius (Hist. Eccl. ii. 9) has preserved for us from Clement of Alexandria the additional information that the accuser of the apostle " beholding his confession and moved thereby, confessed that he too was a Christian. So they were both led away to execution together; and on the road the accuser asked James for forgiveness. Gazing on him for a little while, he said, ' Peace be with thee,' and kissed him. And then both were beheaded together."

The later, and wholly untrustworthy, legends which tell of the apostle's preaching in Spain, and of the translation of his body to Santiago de Compostela, are to be found in the Acta Sanctorum (July 25), vi. 1-124; see also Mrs Jameson's Sacred and Legendary Art, i. 230-241. """""".■

2. James, the son of Alphaeus. He also was one of the apostles, and is mentioned in all the four lists (Matt. x. 3 ; Mark iii. 18; Luke vi. 15; Acts

i. 13) by this name. We know nothing further regarding him, unless we believe him to be the same as James " the little."

3. James, the little. He is described as the son of a Mary (Matt, xxvii. 56; Mark xv. 40), who was in all prpbability the wife of Clopas (John xix. 25). And on the ground that Clopas is another form of the name Alphaeus, this James has been .thought by some to be the same as 2. But the evidence of the Syriac versions, which render Alphaeus by Chalphai, while Clopas is simply transliterated Kleopha, makes it extremely improbable that the two names are to be identified. And as we have no better ground for finding in Clopas the Cleopas of Luke xxiv. 18, we must be content to admit that James the little is again an almost wholly unknown personality, and has no connexion with any of the other Jameses mentioned in the New Testament.

4. James, the father of Judas. There can be no doubt that in the mention of " Judas of James " in Luke vi. 16 the ellipsis should be supplied by " the son " and not as in the A.V. by " the brother" (cf. Luke iii. 1, vi. 14; Acts xii. 2, where the word

45eX6s is inserted). This Judas, known as Thaddaeus by Matthew and Mark, afterwards became one of the apostles, and is expressly distinguished by St John from the traitor as " not Iscariot " (John xiv. 22).

5. James, the Lord's brother. In Matt. xiii. 55 and Mark vi. 3 we read of a certain James as, along with Joses and Judas and Simon, a " brother " of the Lord. The exact nature of the relationship there implied has been the subject of much discussion. Jerome's view (de vir. ill. 2), that the " brothers " were in reality cousins, " sons of Mary the sister of the Lord's mother," rests on too many unproved assumptions to be entitled to much weight, and may be said to have been finally disposed of by Bishop Lightfoot in his essay on " The Brothers of the Lord " (Galatians, pp. 252 sqq., Dissertations on the Apostolic Age, pp. 1 sqq.). Even however if we understand the word " brethren " in its natural sense, it may be applied either to the sons of Joseph by a former wife, in which case they would be the step-brothers of Jesus, or to sons born to Joseph and Mary after the birth of Jesus. The former of these views, generally known as the Epiphanian view from its most zealous advocate in the 4th century, can claim for its support the preponderating voice of tradition (see the catena of references given by Lightfoot, loc. cit., who himself inclines to this view). On the other hand the Helvidian theory as propounded by Helvidius, and apparently accepted by Ter- tullian (cf. adv. Marc. iv. 29), which makes

James a brother of the Lord, as truly as Mary was his mother, undoubtedly seems more in keeping with the direct statements of the Gospels, and also with the after history of the brothers in the Church (see W. Patrick, James the Brother of the Lord, 1906, p. 5). In any case, whatever the exact nature of James's antecedents, there can be no question as to the important place which he occupied in the early Church. Converted to a full belief in the living Lord, perhaps through the special revelation that was granted to him (1 Cor. xv. 7), he became the recognized head of the Church at Jerusalem (Acts xii. 17, xv. 13, xxi. 18), and is called by St Paul (Gal. ii. 9), along with Peter and John, a "pillar" of the Christian community. He was traditionally the author of the epistle in the New Testament which bears his name (see James, Epistle of). From the New Testament we learn no more of the history of James the Lord's brother, but Eusebius (Hist. Eccl. ii. 23) has preserved for us from Hegesippus the earliest ecclesiastical traditions concerning him. By that authority he is described as having been a Nazarite, and on account of his eminent righteousness called " Just " and " Oblias." So great was his influence with the people that he was appealed to by the scribes and Pharisees for a true and (as they hoped) unfavourable judgment about the Messiahship of Christ. Placed, to give the greater publicity to his words, on a pinnacle of the temple, he, when solemnly appealed to, made confession of his faith, and was at once thrown down and murdered. This happened immedi- ately before the siege. Josephus (Antiq. xx. 9, 1) tells that it was by order of Ananus the high priest, in the interval between the death of Festus and the arrival of his successor Albinus, that James was put to death; and his narrative gives the idea of some sort of judicial examination, for he says that along with some others James was brought before an assembly of judges, by whom they were condemned and delivered to be stoned. Josephus is also cited by Eusebius (Hist. Eccl. ii. 23) to the effect that the miseries of the siege were due to divine vengeance for the murder of James. Later writers describe James as an, iw'uTKoTros (Clem. Al. apud Eus. Hist. Ecc. ii. 1) and even as an €iri<7Koiros kTTUTKoiroiv (Clem. Horn., ad inil.). According to Eusebius (Hist. Eccl. vii. 19) his episcopal chair was still shown at Jerusalem at the time when Eusebius wrote.

Bibliography. — In addition to the relevant literature cited above, see the articles under the heading " James " in Hastings's Dictionary of the Bible (Mayor) and Dictionary of Christ and the Gospels (Fulford), and in the Encycl. Biblica (O. Cone) ; also the introductions to the Commentaries on the Epistle of James by Mayor and Knowling. Zahn has an elaborate essay on Briider und Vettern Jesu (" The Brothers and Cousins of Jesus ") in the Forschungen zur Geschichte des neutestamenllichen Kanons, vi. 2 (Leipzig, 1900).

(G. Mi.)

JAMES I. (1366-1625), king of Great Britain and Ireland, formerly king of Scotland as James VI., was the only child of Mary Queen of Scots, and her second husband, Henry Stewart Lord Darnley. He was born in the castle of Edinburgh on the 19th of June 1566, and was proclaimed king of Scotland on the 24th of July 1567, upon the forced abdication of his mother. Until 1578 he was treated as being incapable of taking any real part in public affairs, and was kept in the castle of Stirling for safety's sake amid the confused fighting of the early years of his minority.

The young king was a very weakly boy. It is said that he could not stand without support until he was seven, and although he lived until he was nearly sixty, he was never a strong man. In after life he was a constant and even a reckless rider, but the weakness in his legs was never quite cured. During a great part of his life he found it necessary to be tied to the saddle. When on one occasion in 162 1 his horse threw him into the New River near his palace of Theobalds in the neighbourhood of London, he had a very narrow escape of being drowned; yet he continued to ride as before. At all times he preferred to lean on the shoulder of an attendant when walking. This feebleness of body, which had no doubt a large share in causing certain corresponding deficiencies of character, was attributed to the agitations and the violent efforts forced on his mother by the murder of her secretary Rizzio when she was in the sixth month of her pregnancy. The fact that James was a bold rider, in spite of this serious disqualification for athletic exercise, should be borne in mind when he is accused of having been a coward.

The circumstances surrounding him in boyhood were not favourable to the development of his character. His immediate guardian or foster-father, the earl of Mar, was indeed an honour- able man, and the countess, who had charge of the nursing of the king, discharged her duty so as to win his lasting confidence. James afterwards entrusted her with the care of his eldest son, Henry. When the earl died in 1572 his place was well filled by his brother, Sir Alexander Erskine. The king's education was placed under the care of George Buchanan, assisted by Peter Young, and two other tutors. Buchanan, who did not spare the rod, and the other teachers, who had more reverence for the royal person, gave the boy a sound training in languages. The English envoy, Sir Henry Killigrew, who saw him in 1574, testified to his proficiency in translating from and into Latin and French. As it was very desirable that he should be trained a Protestant king, he was well instructed in theology. The exceptionally scholastic quality of his education helped to give him a taste for learning, but also tended to make him a pedant.

James was only twelve when the earl of Morton was driven from the regency, and for some time after he can have been no more than a puppet

in the hands of intriguers and party leaders. When, for instance, in 1582 he was seized by the faction of nobles who carried out the so-called raid of Ruthven, which was in fact a kidnapping enterprise carried out in the interest of the Protestant party, he cried like a child. One of the conspirators, the master of Glamis, Sir Thomas Lyon, told him that it was better " bairns should greet [children should cry] than bearded men." It was not indeed till 1583, when he broke away from his captors, that James began to govern in reality.

For the history of his reign reference may be made to the articles on the histories of England and Scotland. James's work as a ruler can be divided, without violating any sound rule of criticism, into black and white — into the part which was a failure and a preparation for future disaster, and the part which was solid achievement, honourable to himself and profit- able to his people. His native kingdom of Scotland had the benefit of the second. Between 1583 and 1603 he reduced the anarchical baronage of Scotland to obedience, and replaced the subdivision of sovereignty and consequent confusion, which had been the very essence of feudalism, by a strong centralized royal authority. In fact he did in Scotland the work which had been done by the Tudors in England, by Louis XL in France, and by Ferdinand and Isabella in Spain. It was the work of all the strong rulers of the Renaissance. But James not only

brought his disobedient and intriguing barons to order — that was a comparatively easy achievement and might well have been performed by more than one of his predecessors, had their lives been prolonged — he also quelled the attempts of the Protestants to found what Hallam has well defined as a " Presbyterian Hildebrandism." He enforced the superiority of the state over the church. Both before his accession to the throne of England (1603) and afterwards he took an intelligent interest in the prosperity of his Scottish kingdom, and did much for the pacifica- tion of the Hebrides, for the enforcement of order on the Borders, and for the development of industry. That he did so much al- though the crown was poor (largely it must be confessed because he made profuse gifts of the secularized church lands), and although the armed force at his disposal was so small that to the very end he was exposed to the attacks of would-be kidnappers (as in the case of the Gowrie conspiracy of 1600), is proof positive that he was neither the mere poltroon nor the mere learned fool he has often been called.

James's methods of achieving ends in themselves honourable and profitable

were indeed of a kind which has made posterity unjust to his real merits. The circumstances in which he passed his youth developed in him a natural tendency to craft. He boasted indeed of his " king-craft " and probably believed that he owed it to his studies. But it was in reality the resource of the weak, the art of playing off one possible enemy against another by trickery, and so deceiving all. The marquis de Fontenay, the French ambassador, who saw him in the early part of his reign, speaks of him as cowed by the violence about him. It iscertainthat James was most unscrupulous in making promises which he never meant to keep, and the terror in which he passed his youth sufficiently explains his preference for guile. He would make promises to everybody, as when he wrote to the pope in 1 584 more than hinting that he would be a goTjd Roman Catholic if helped in his need. His very natural desire to escape from the poverty and insecurity of Scotland to the opulent English throne not only kept him busy in intrigues to placate the Roman Catholics or anybody else who could help or hinder him, but led him to behave basely in regard to the execution of his mother in 1 587. He blustered to give himself an air of courage, but took good care to do nothing to offend Elizabeth. When the time came for fulfilling his promises and half-promises, he was not able, even if he had been willing, to keep his word to everybody. The methods which had helped him to success in Scotland did him harm in England, where his reign prepared the way for the great civil war. In his southern kingdom his failure was in fact complete. Although England accepted him as the alternative to civil war, and although he was received and surrounded with fulsome flattery, he did not win the respect of his English sub- jects. His undignified personal appearance was against him, and so were his garrulity, his Scottish accent, his slovenliness and his toleration of disorders in his court, but, above all, his favour for handsome male favourites, whom he loaded with gifts and caressed with demonstrations of affection which laid him open to vile suspicions. In ecclesiastical matters he offended many, who contrasted his severity and rudeness to the Puritan divines at the Hampton Court conference (1604) with his politeness to the Roman Catholics, whom he, however, worried by fits and starts. In a country where the authority of the state had been firmly established and the problem was how to keep it from degenerating into the mere instrument of a king's passions, his insistence on the doctrine of divine right aroused distrust and hostility. In itself, and in its origin, the doctrine was nothing more than a necessary assertion of the independence of the state in face of the " Hildebrandism " of Rome and Geneva alike. But when Englishmen were told that the king alone had inde- feasible rights, and that all the privileges of subjects were re- vocable gifts, they were roused to hostility. His weaknesses cast suspicion on his best-meant schemes. His favour for his countrymen helped to defeat his wise wish to bring about a full union between England and Scotland. His profusion, which had been bad in the

poverty of Scotland and was boundless amid the wealth of England, keDt him necessitous, and drove, him to

shifts. Posterity can give him credit for his desire to forward religious peace in Europe, but his Protestant subjects were simply frightened when he sought a matrimonial alliance with Spain. Sagacious men among his contemporaries could not see the consistency of a king who married his daughter Elizabeth to the elector palatine, a leader of the German Protestants, and also sought to marry his son to an infanta of Spain. The king's subservience to Spain was indeed almost besotted. He could not see her real weakness, and he allowed himself to be befooled by the ministers of Philip III. and Philip IV. The end of his scheming was that he was dragged into a needless war with Spain by his son Charles and his favourite George Villiers, duke of Buckingham, just before his death on the 5th of March 1625 at his favourite residence, Theobalds.

James married in 1589 Anne, second daughter of Frederick II., king of Denmark. His voyage to meet his bride, whose ship had been driven into a Norwegian port by bad weather, is the only episode of a romantic character in the life of this very prosaic member of a poetic family. By this wife James had three children who survived infancy: Henry Frederick, prince of Wales, who died in 1612; Charles, the future king; and Elizabeth, wife of the elector palatine, Frederick V.

Not the least of James's many ambitions was the desire to excel as an author. Fie left a body of writings which, though of mediocre quality as literature, entitle him to a unique place among English kings since Alfred for width of intellectual interest and literary faculty. His efforts were inspired by his preceptor George Buchanan, whose memory he cherished in later years. His first work was in verse, Essayes of a Prentise in the Divine Art of Poesie (Edin. Vautrollier, 1584), containing fifteen sonnets, " Ane Metaphoricall invention of a tragedie called Phoenix," a short poem " Of Time," translations from Du Bartas, Lucan and the Book of Psalms (" out of Tremellius "), and a prose tract entitled " Ane short treatise, containing some Reulis and Cautelis to be observit and eschewit in Scot tis Poesie." The volume is introduced by commendatory sonnets, including one by Alexander Montgomerie. The chief interest of the book lies in the " Treatise " and the prefatory sonnets " To the Reader " and " Sonnet decifring the perfyte poete." There is little originality in this youthful production. It has been sur- mised that it was compiled from the exercises written when the author was Buchanan's pupil at Stirling, and that it was directly suggested by his preceptor's De Prosodia and his annotations on Vives. On the other hand, it shows intimate acquaintance with the critical reflections of Ronsard and Du Bellay, and of Gas- coigne in his Notes of Instruction (1575). In 1591 James pub- lished Poeticall Exercises at Vacant Houres,

including a transla- tion of the Furies of Du Bartas, his own Lepanto, and Du Bartas's version of it, La Lepanthe. His Daemonologie, a prose treatise denouncing witchcraft and exhorting the civil power to the strongest measures of suppression, appeared in 1599. In the same year he printed the first edition (seven copies) of his Basilikon Doron, strongly Protestant in tone. A French edition, specially translated for presentation to the pope, has a disin- genuous preface explaining that certain phrases {e.g. " papistical doctrine ") are omitted, because of the difficulty of rendering them in a foreign tongue. The original edition was, however, translated by order of the suspicious pope, and was immediately placed on the Index. Shortly after going to England James produced his famous Counterblaste to Tobacco (London, 1604), in which he forsakes his Scots tongue for Southern English. The volume was published anonymously. James's prose works (including his speeches) were collected and edited (folio, 1616) by James Montagu, bishop of Winchester, and were translated into Latin by the same hand in a companion folio, in 1619 (also Frankfort, 1689). A tract, entitled " The True Law of Free Monarchies," appeared in 1603; " An Apology for the Oath of Allegiance " in 1607; and a " Declaration du Roy Jacques I. . . . pour le droit des Rois " in 1615. In 1588 and 1589 James issued two small volumes of Meditations on some verses of (a) Revela- tions and (b) 1 Chronicles. Other two " meditations " were printed posthumously.

138

JAMES II.

See T. F. Henderson, James I. and VI. (London, 1904) ; P. Hume Brown, History of Scotland, vol. ii. (Edinburgh and Cambridge, 1902) ; and Andrew Lang, History of Scotland, vol. ii. (Edinburgh, 1902) and James VI. and the Cowrie Mystery (London, 1902) ; The Register of the Privy Council of Scotland (Edinburgh, 1877, &c), vols. ii. to xiii.; S. R. Gardiner, History of England 1603-1642 (London, 1883-1884). A comprehensive bibliography will be found in the Cambridge Modern Hist. iii. 847 (Cambridge, 1904).

For James's literary work, see Edward Arber's reprint of the Essayes and Counterblaste (" English Reprints," 1869, &c.) ; R. S. Rait's Lusus Regius (1900); G. Gregory Smith's Elizabethan Critical Essays (1904), vol. i., where the Treatise is edited for the first time; A. O. Meyer's " Clemens VIII. und Jacob I. von England " in Quellen und Forschungen (Preuss. Hist. Inst.), VII. ii., for an account of the issues of the Basilikon Doron; P. Hume Brown's George Buchanan (1890), pp. 250-261, fora sketch of James'sassociation with Buchanan.

JAMES II. (1633-1701), king of Great Britain and Ireland, second surviving son of Charles I. and Henrietta Maria, was born at St James's on the 15th of October 1633, and created duke of York in January 1643. During the Civil War James was taken prisoner by Fairfax (1646), but contrived to escape to Holland in 1648. Subsequently he served in the French army under Turenne, and in the Spanish under Conde, and was applauded by both commanders for his brilliant personal courage. Re- turning to England with Charles II. in 1660 he was appointed lord high admiral and warden of the Cinque Ports. Pepys, who was secretary to the navy, has recorded the patient industry and unflinching probity of his naval administration. His victory over the Dutch in 1665, and his drawn battle with De Ruyter in 1672, show that he was a good naval commander as well as an excellent administrator. These achievements won him a repu- tation for high courage, which, until the close of 1688, was amply deserved. His private record was not as good as his public. In December 1660 he admitted to having contracted, under dis- creditable circumstances, a secret marriage with Anne Hyde (1637-167 1), daughter of Lord Clarendon, in the previous Sep- tember. Both before and after the marriage he seems to have been a libertine as unblushing though not so fastidious as Charles himself. In 1672 he made a public avowal of his conversion to Roman Catholicism. Charles II. had opposed this project, but in 1673 allowed him to marry the Catholic Mary of Modena as his second wife. Both houses of parliament, who viewed this uniori with abhorrence, now passed the Test Act, forbidding Catholics to hold office. In consequence of this James was forced to resign his posts. It was in vain that he married his daughter Mary to the Protestant prince of Orange in 1677. Anti-Catholic feeling ran so high that, after the discovery of the Popish Plot, he found it wiser to retire to Brussels (1679), while Shaftesbury and the Whigs planned to exclude him from the succession. He was lord high commissioner of Scotland (1680- 1682), where he occupied himself in a severe persecution of the Covenanters. In 1684 Charles, having triumphed over the Exclusionists, restored James to the office of high admiral by use of his dispensing power.

James ascended the throne on the 16th of February 1685. The nation showed its loyalty by its firm adherence to him during the rebellions of Argyll in Scotland and Monmouth in England (1685). The savage reprisals on their suppression, in especial the " Bloody Assizes " of Jeffreys, produced a revulsion of public feeling. James had promised to defend the existing Church and government, but the people now became suspicious. James was not a mere»tyrant and bigot, as the popular imagination speedily assumed him to be. He was rather a mediocre but not alto- gether obtuse man, who mistook tributary streams for the main currents of national thought. Thus he greatly underrated the strength of the

Establishment, and preposterously exaggerated that of Dissent and Catholicism. He perceived that opinion was seriously divided in the Established Church, and thought that a vigorous policy would soon prove effective. Hence he publicly celebrated Mass, prohibited preaching against Catholi- cism, and showed exceptional favour to renegades from the Establishment. By undue pressure he secured a decision of the judges, in the test case of Godden v. Hale (1687), by which he was allowed to dispense Catholics from the Test Act. Catholics were now admitted to the chief offices in the army, and to some

important posts in the state, in virtue of the dispensing power of James. The judges had been intimidated or corrupted, and the royal promise to protect the Establishment violated. The army had been increased to 20,000 men and encamped at Hounslow Heath to overawe the capital. Public alarm was speedily mani- fested and suspicion to a high degree awakened. In 1687 James made a bid for the support of the Dissenters by advocating a system of joint toleration for Catholics and Dissenters. In April 1687 he published a Declaration of Indulgence — exempting Catholics and Dissenters from penal statutes. He followed up this measure by dissolving parliament and attacking the univer- sities. By an unscrupulous use of the dispensing power he introduced Dissenters and Catholics into all departments of state and into the municipal corporations, which were remodelled in their interests. Then in April 1688 he took the suicidal step of issuing a proclamation to force the clergy and bishops to read the Declaration in their pulpits, and thus personally advocate a measure they detested. Seven bishops refused, were indicted by James for libel, but acquitted amid the indescribable enthu- siasm of the populace. Protestant nobles of England, enraged at the tolerant policy of James, had been in negotiation with William of Orange since 1687. The trial of the seven bishops, and the birth of a son to James, now induced them to send William a definite invitation (June 30, 1688). James remained in a fool's paradise till the last, and only awakened to his danger when William landed at Torbay (November 5, 1688) and swept all before him. James pretended to treat, and in the midst of the negotiations fled to France. He was intercepted at Faversham and brought back, but the politic prince of Orange allowed him to escape a second time (December 23, 1688).

At the end of 1688 James seemed to have lost his old courage. After his defeat at the Boyne (July 1, 1690) he speedily departed from Ireland, wrier? he had so conducted himself that his English followers had been ashamed of his incapacity, while French officers had derided him. His proclamations and policy towards England during these years show unmistakable traces of the same incompetence. On the 1 7th of May 1 692 he saw the French fleet destroyed before his very eyes off Cape La Hogue. He was aware of, though not an open advocate of the " Assassination

Plot," which was directed against William. By its revelation and failure (February 10, 1696) the third and last serious attempt of James for his restoration failed. He refused in the same year to accept the French influence in favour of his candida- ture to the Polish throne, on the ground that it would exclude him from the English. Henceforward he neglected politics, and Louis of France ceased to consider him as a political factor. A mysteri- ous conversion had been effected in him by an austere Cistercian abbot. The world saw with astonishment this vicious, rough, coarse-fibred man of the world transformed into an austere penitent, who worked miracles of healing. Surrounded by this odour of sanctity, which greatly edified the faithful, James lived at St Germain until his death on the 17th of September 1701.

The political ineptitude of James is clear; he often showed firmness when conciliation was needful, and weakness when resolution alone could have saved the day. Moreover, though he mismanaged almost every political problem with which he personally dealt, he was singularly tactless and impatient of advice. But in general political morality he was not below his age, and in his advocacy of toleration decidedly above it. He was more honest and sincere than Charles II., more genuinely patriotic in his foreign policy, and more consistent in his religious attitude. That his brother retained the throne while James lost it is an ironical demonstration that a more pitiless fate awaits the ruler whose faults are of the intellect, than one whose faults are of the heart.

By Anne Hyde James had eight children, of whom two only, Mary and Anne, both queens of England, survived their father. By Mary of Modena he had seven children, among them being James Francis Edward (the Old Pretender) and Louisa Maria Theresa, who died at St Germain in 1712. By one mistress, Arabella Churchill (1648-1730), he had two sons, James, duke of Berwick, and Henry (1673-1702), titular duke of Albemarle and

grand prior of France, and a daughter, Henrietta (1667-1730), who married Sir Henry Waldegrave, afterwards Baron Walde- grave; and by another, Catherine Sedley, countess of Dorchester (1657-1717), a daughter, Catherine (d. 1743), who married James Annesley, 5th earl of Anglesey, and afterwards John Sheffield, duke of Buckingham and Normanby.

Bibliography. — Original Authorities: J. S. Clarke, James II. Life (London, 1816); James Macpherson, Original Papers (2 vols., London, 1775);

Gilbert Burnet, Supplement to History, ed. H. C. Foxcroft (Oxford, 1902) ; Earl of Clarendon and Earl of Rochester, Correspondence, vol. ii. (London, 1828) ; John Evelyn, Diary and Cor- respondence and Life, edited by Bray and Wheatley (London, 1906) ; Sir John Reresby, Memoirs, ed. A. Ivatt (1904) ; Somers Tracts, vols, ix.-xi. (London, 1823). Modern Works: Lord Acton, Lectures on Modern History, pp. 195-276 (London, 1906); Moritz Brosch, Geschichte von England, Bd. viii. (Gotha, 1903) ; Onno Klopp, Der Fall des Hauses Stuart, Bde. i.-ix. (Vienna, 1875-1878); L. von Ranke, History of England, vols, iv.-vi. (Oxford, 1875); and Allan Fea, James II. and his Wives (1908).

JAMES I. (1394-1437), king of Scotland and poet, the son of King Robert III., was born at Dunfermline in July 1394. After the death of his mother, Annabella Drummond of Stobhall, in 1402, he was placed under the care of Henry Wardlaw (d. 1440) , who became bishop of St Andrews in 1403, but soon his father resolved to send him to France. Robert doubtless decided upon this course owing to the fact that in 1402 his elder son, David, duke of Rothesay, had met his death in a mysterious fashion, being probably murdered by his uncle, Robert, duke of Albany, who, as the king was an invalid, was virtually the ruler of Scot- land. On the way to France, however, James fell into the hands of some English sailors and was sent to Henry IV., who refused to admit him to ransom. The chronicler Thomas Walsingham, says that James's imprisonment began in 1406, while the future king himself places it in 1404; February 1406 is probably the correct date. On the death of Robert III. in April 1406 James became nominally king of Scotland, but he remained a captive in England, the government being conducted by his uncle, Robert of Albany, who showed no anxiety to procure his nephew's release. Dying in 1420, Albany was succeeded as regent by his son, Murdoch. At first James was confined in the Tower of London, but in June 1407 he was removed to the castle at Nottingham, whence about a month later he was taken to Evesham. His education was continued by capable tutors, and he not only attained excellence in all manly sports, but became perhaps more cultured than any other prince of his age. In person he was short and stout, but well-proportioned and very strong. His agility was not less remarkable than his strength; he excelled in all athletic feats which demanded suppleness of limb and quickness of eye. As regards his intellectual attain- ments he is reported to have been acquainted with philosophy, and it is evident from his subsequent career that he had studied jurisprudence; moreover, besides being proficient in vocal and instrumental music, he cultivated the art of poetry with much success. When Henry V. became king in March 1413, James was again imprisoned in the Tower of London, but soon after- wards he was taken to Windsor and was treated with great con- sideration by the English king. In 1420, with the intention of detaching the Scottish auxiliaries from the

French standard, he was sent to take part in Henry's campaign in Fraijce; this move failed in its immediate object and he returned to England after Henry's death in 1422. About this time negotiations for the release of James were begun in earnest, and in September 1423 a treaty was signed at York, the Scottish nation undertaking to pay a ransom of 60,000 marks " for his maintenance in England." By the terms of the treaty James was to wed a noble English lady, and on the 12th of February 1424 he was married at Southwark to Jane, daughter of John Beaufort, earl of Somerset, a lady to whom he was faithful through life. Ten thousand marks of his ransom were remitted as Jane's dowry, and in April 1424 James and his bride entered Scotland.

With the reign of James I., whose coronation took place at Scone on the 21st of May 1424, constitutional sovereignty may be said to begin in Scotland. By the introduction of a system of statute law, modelled to some extent on that of England, and

by the additional importance assigned to parliament, the leaven was prepared which was to work towards the destruction of the indefinite authority of the king,and of the unbridled licence of the nobles. During the parliament held at Perth in March 1425 James arrested Murdoch, duke of Albany, and his son, Alexander; together with Albany's eldest son, Walter, and Duncan, earl of Lennox, who had been seized previously; they were sentenced to death, and the four were executed at Stirling. In a parliament held at Inverness in 1427 the king arrested many turbulent northern chiefs, and his whole policy was directed towards crushing the power of the nobles. In this he was very successful. Expeditions reduced the Highlands to order; earldom after earldom was forfeited; but this vigour aroused the desire for revenge, and at length cost James his life. Having been warned that he would never again cross the Forth, the king went to reside in Perth just before Christmas 1436. Among those whom he had angered was Sir Robert Graham (d. 1437), who had been banished by his orders. Instigated by the king's uncle, Walter Stewart, earl of Atholl (d. 1437), and aided by the royal chamber- lain, Sir Robert Stewart, and by a band of Highlanders, Graham burst into the presence of James on the night of the 20th of February 1437 and stabbed the king to death. Graham and Atholl were afterwards tortured and executed. James had two sons: Alexander, who died young, and James II., who suc- ceeded to the throne; and six daughters, among them being Margaret, the queen of Louis XL of France. His widow, Jane, married Sir James Stewart, the " black knight of Lome," and died on the 15th of July 1445.

During the latter part of James's reign difficulties arose be- tween Scotland and England and also between Scotland and the papacy. Part of the king's ransom was still owing to England; other causes of discord between the two

nations existed, and in 1436 these culminated in a short war. In ecclesiastical matters James showed himself merciless towards heretics, but his desire to reform the Scottish Church and to make it less dependent on Rome brought him into collision with Popes Martin V. and Eugenius IV.

James was the author of two poems, the Kingis Quair and Good Counsel (a short piece of three stanzas). The Song of Absence, Peblis to the Play and Christis Kirk on the Greene have been ascribed to him without evidence. The Kingis Quair (preserved in the Selden MS. B. 24 in the Bodleian) is an allego- rical poem of the cours d'amour type, written in seven-lined Chaucerian stanzas and extending to 1379 lines. It was com- posed during James's captivity in England and celebrates his courtship of Lady Jane Beaufort. Though in many respects a Chaucerian pastiche, it not rarely equals its model in verbal and metrical felicity. Its language is an artificial blend of northern and southern (Chaucerian) forms, of the type shown in Lancelot of the Laik and the Quair of Jelusy.

Bibliography. — The contemporary authorities for the reign of James I. are Andrew of Wyntoun, The Orygynale Cronykil of Scotland, edited by D. Laing (Edinburgh, 1872-1879); and Walter Bower's continuation of John of Fordun's Scotichronicon, edited by T. Hearne (Oxford, 1722). See also J. Pinkerton, History of Scotland (1797); A. Lang, History of Scotland, vol. i. (1900) ; and G. Burnett, Introduc- tion to the Exchequer Rolls of Scotland (Edinburgh, 1878-1901). The Kingis Quair was first printed in the Poetical Remains of James the First, edited by William Tytler (1783). Later editions are Morison's reprint (Perth, 1786); J. Sibbald's, in his Chronicle of Scottish Poetry (1802, vol. i.); Thomson's in 1815 and 1824; G. Chalmers's, in his Poetic Remains of some of the Scottish Kings (1824) ; Rogers's Poetical Remains of King James the First (1873) ; Skeat's edition published by the Scottish Text Society (1884). An attempt has been made to dispute James's authorship of the poem, but the arguments elabor- ated by J. T. T. Brown (The Authorship of the Kingis Quair, Glasgow, 1 896) _have been convincingly answered by Jusserand in his Jacques I" d'Ecossefut-il poete ? Elude surl'authenticite du cahier du roi (Paris, 1 897, reprinted from the Revue historique, vol. lxiv.) . See also the full correspondence in the Athenaeum (July-Aug. 1896 and Dec. 1899); W. A. Neilson, Origins and Sources of the Court of Love (Boston, 1899) pp. 152 &c, 235 &c. ; and Gregory Smith, Transition Period (1900), pp. 40, 41.

JAMES II. (1430-1460), king of Scotland, the only surviving son of James I. and his wife, Jane, daughter of John Beaufort, earl of Somerset, was born on the 16th of October 1430. Crowned

king at Holyrood in March 1437, shortly after the murder of his father, he was at first under the guardianship of his mother, while Archibald, 5th earl of Douglas, was regent of the kingdom, and considerable power was possessed by Sir Alexander Living- stone and Sir William Crichton (d. 1454). When about 1439 Queen Jane was married to Sir James Stewart, the knight of Lome, Livingstone obtained the custody of the young king, whose minority was marked by fierce hostility between the Douglases and the Crichtons, with Livingstone first on one side and then on the other. About 1443 the royal cause was espoused by William, 8th earl of Douglas, who attacked Crichton in the king's name, and civil war lasted until about 1446. In July 1449 James was married to Mary (d. 1463), daughter of Arnold,, duke of Gelderland, and undertook the government himself; and almost immediately Livingstone was arrested, but Douglas retained the royal favour for a few months more. In 1452, how- ever, this powerful earl was invited to Stirling by the king, and, charged with treachery, was stabbed by James and then killed by the attendants. Civil war broke out at once between James and the Douglases, whos,e lands were ravaged; but after the Scots parliament had exonerated the king, James, the new earl of Douglas, made his submission. Early in 1455 this struggle was renewed. Marching against the rebels James gained several victories, after which Douglas was attainted and his lands for- feited. Fortified by this success and assured of the support of the parliament and of the great nobles, James, acting as an absolute king, could view without alarm the war which had broken out with England. After two expeditions across the borders, a truce was made in July 1457, and the king employed the period of peace in strengthening his authority in the High- lands. During the Wars of the Roses he showed his sympathy with the Lancastrian party after the defeat of Henry VI. at Northampton by attacking the English possessions to the south of Scotland. It was while conducting the siege of Roxburgh Castle that James was killed, through the bursting of a cannon, on the 3rd of August 1460. He left three sons, his successor, James III., Alexander Stewart, duke of 'Albany, and John Stewart, earl of Mar (d. 1479) ; and two daughters. James, who is sometimes called " Fiery Face," was a vigorous and popular prince, and, although not a scholar like his father, showed interest in education. His reign is a period of some importance in the legislative history of Scotland, as measures were passed with regard to the tenure of land, the reformation of the coinage, and the protection of the poor, while the organization for the administration of justice was greatly improved.

JAMES III. (1451-1488), king of Scotland, eldest son of James II., was born on the 10th of July 1451. Becoming king in 1460 he was crowned at Kelso. After the death of his mother in 1463, and of her principal supporter, James Kennedy, bishop of St Andrews, two years later, the

person of the young king, and with it the chief authority in the kingdom, were seized by Sir Alexander Boyd and his brother Lord Boyd, while the latter's son, Thomas, was created earl of Arran and married to the king's sister, Mary. In July 1469 James himself was married to Margaret (d. i486) , daughter of Christian I. , king of Denmark and Norway, but before the wedding the Boyds had lost their power. Having undertaken the government in person, the king received the submission of the powerful earl of Ross, and strengthened his authority in other ways. But his preference for a sedentary and not for an active life and his increasing attachment to favourites of humble birth diminished his popularity, and he had some differences with his parliament. About 1479, probably with reason both suspicious and jealous, James arrested his brothers, Alexander, duke of Albany, and John, earl of Mar; Mar met his death in a mysterious fashion at Craigmillar, but Albany escaped to France and then visited England, where in 1482 Edward IV. recognized him as king of Scotland by the gift of the king of England. War broke out with England, but James, made a prisoner by his nobles, was unable to prevent Albany and his ally, Richard, duke of Gloucester (afterwards Richard III.), from taking Berwick and marching to Edinburgh. Peace with Albany followed, but soon afterwards the duke was again in

communication with Edward, and was condemned by the parlia- ment after the- death of the English king in April 1483. Albany's death in France in 1485 did not end the king's troubles. His policy of living at peace with England and of arranging marriages between the members of the royal families of the two countries did not commend itself to the turbulent section of his nobles; his artistic tastes and lavish expenditure added to the discontent, and a rebellion broke out. Fleeing into the north of his kingdom James collected an army and came to terms with his foes; but the rebels, having seized the person of the king's eldest son, afterwards James IV., renewed the struggle. The rival armies met at the Sauchieburn near Bannockburn, and James soon fled. Reaching Beaton's Mill he revealed his iden- tity, and, according to the popular story, was killed on the nth of June 1488 by a soldier in the guise of a priest who had been called in to shrive him. He left three sons — his successor, James IV.; James Stewart, duke of Ross, afterwards archbishop of St Andrews, and John Stewart, earl of Mar. James was a cultured prince with a taste for music and architecture, but was a weak and incapable king. His character is thus described by a chroni- cler: " He was ane man that loved solitude, and desired nevir to hear of warre, bot delighted more in musick and policie and building nor he did in the government of the realme."

JAMES IV. (1473-1513), king of Scotland, eldest son of James III., was born on the 17th of March 1473. He was nomi- nally the leader of the rebels who defeated the troops of James III. at the Sauchieburn in June

1488, and became king when his father was killed. As he adopted an entirely different policy with the nobles from that of his father, and, moreover, showed great affability towards the lower class of his subjects, among whom he delighted to wander incognito, few if any of the kings of Scotland have won such general popularity, or passed a reign so untroubled by intestine strife. Crowned at Scone a few days after his accession, James began at once to take an active part in the business of government. A slight insurrection was easily suppressed, and a plot formed by some nobles to hand him over to the English king, Henry VII., came to nothing. In spite of this proceeding Henry wished to live at peace with his northern neighbour, and soon contemplated marrying his daughter to James, but the Scottish king was not equally pacific. When, in 1495, Perkin Warbeck, pretending to be the duke of York, Edward IV. 's younger son, came to Scotland, James bestowed upon him both an income and a bride, and prepared to invade England in his interests. For various reasons the war was confined to a few border forays. After Warbeck left Scotland in 1497, the Spanish ambassador negotiated a peace, and in 1502 a marriage was definitely arranged between James and Henry's daughter Margaret (1489-1541). The wedding took place at Holyrood in August 1503, and it was this union which led to the accession of the Stewart dynasty to the English throne.

About the same time James crushed a rebellion in the western isles, into which he had previously led expeditions, and parlia- ment took measures to strengthen the royal authority therein. At this date too, or a little earlier, the king of Scotland began to treat as an equal with the powerful princes of Europe, Maximilian I., Louis XIL.and others; sending assistance to his uncle Hans, king of Denmark, and receiving special marks of favour from Pope Julius II., anxious, to obtain his support. But his position was weakened when Henry VIII. followed Henry VII. on the English throne in 1509. Causes of quarrel already existed, and other causes, both public and private, soon arose between the two kings; sea-fights took place between their ships, while war was brought nearer by the treaty of alliance which James con- cluded with Louis XII. in 1512. Henry made a vain effort to prevent, or to postpone, the outbreak of hostilities; but urged on by his French ally and his queen, James declared for war, in spite of the counsels of some of his advisers, and (it is said) of the warning of an apparition. Gathering a large and well-armed force, he took Norham and other castles in August 1513, spending some time at Ford Castle, where, according to report, he was en- gaged in an amorous intrigue with the wife of its owner. Then,

he moved out to fight the advancing English army under Thomas Howard, earl of Surrey. The battle, which took place at Flodden, or more correctly, at the foot of Brankston Hill, on Friday the 9th of September 1 513, is among the most famous and disastrous, if not among the most momentous, in the history of Scotland. Having led his troops from their position of vantage, the king himself was killed while fighting on foot, together with nearly all his nobles; there was no foundation for the rumour that he had escaped from the carnage. He left one legitimate child, his successor James V., but as his gallantries were numer- ous he had many illegitimate children, among them (by Marion Boyd) Alexander Stewart, archbishop of St Andrews and chan- cellor of Scotland, who was killed at Flodden, and (by Janet Kennedy) James Stewart, earl of Moray (d. 1544). One of his other mistresses was Margaret Drummond (d. 1501).

James appears to have been a brave and generous man, and a wise and energetic king. According to one account, he was possessed of considerable learning; during his reign the Scottish court attained some degree of refinement, and Scotland counted in European politics as she had never done before. Literature flourished under the royal patronage, education was encouraged, and the material condition of the country improved enormously. Prominent both as an administrator and as a lawgiver, the king by his vigorous rule did much to destroy the tendencies to inde-

pendence which existed in the Highlands and Islands; but, on the other hand, his rash conduct at Flodden brought much misery upon his kingdom. He was specially interested in his navy. The tournaments which took place under his auspices were worthy of the best days of chivalry in France and England. James shared to the full in the superstitions of the age which was quickly passing away. He is said to have worn an iron belt as penance for his share in his father's death; and by his frequent visits to shrines, and his benefactions to religious foundations, he won a reputation for piety.

JAMES V. (1512-1542), king of Scotland, son of James IV., was born at Linlithgow on the 10th of April 151 2, and became king when his father was killed at Flodden in 15 13. The regency was at first vested in his mother, but after Queen Margaret's second marriage, with Archibald Douglas, 6th earl of Angus, in August 1 5 14, it was transferred by the estates to John Stewart, duke of Albany. Henceforward the minority of James was dis- turbed by constant quarrels between a faction, generally favour- able to England, under Angus, and the partisans of France under Albany; while the queen-mother and the nobles struggled to gain and to regain possession of the king's person. The English had not followed up their victory at Flodden, although there were as usual forays on the borders, but Henry VIII. was watching affairs in Scotland with an observant eye, and other European sovereigns were not indifferent to the possibility of a Scotch alliance. In 1524, when Albany had retired to France, the parliament declared that James was fit to govern, but that he must be advised by his mother and a council. This " erec- tion " of James as king was mainly due to the efforts of Henry VIII. In 1 526 Angus obtained control of the king, and kept him in close confinement until 1528, when James, escaping from Edinburgh to Stirling, put vigorous measures in execution against the earl, and compelled him to flee to England. In 1529 and 1 530 the king made a strong effort to suppress his turbulent vassals in the south of Scotland; and after several raids and counter-raids negotiations for peace with England were begun, and in May 1 534 a treaty was signed. At this time, as on pre- vious occasions, Henry VIII. wished James to marry his daughter Mary, while other ladies had been suggested by the emperor Charles V.; but the Scottish king, preferring a French bride, visited France, and in January 1537 was married at Paris to Madeleine, daughter of King Francis I. Madeleine died soon after her arrival in Scotland, and in 1538 James made a much more important marriage, being united to Mary (15 15-1560), daughter of Claude, duke of Guise, and widow of Louis of Orleans, duke of Longueville. It was this connexion, probably, which finally induced James to forsake his vacillating foreign policy, and to range himself definitely among the enemies of England. In

1536 he had refused to meet Henry VIII. at York, and in the following year

had received the gift of a cap and sword from Pope Paul III., thus renouncing the friendship of his uncle. Two plots to murder the king were now discovered, and James also foiled the attempts of Henry VIII. to kidnap him. Although in 1540 the English king made another attempt to win the sup- port, or at least the neutrality, of James for his religious policy, the relations between the two countries became very unfriendly, and in 1542 Henry sent an army to invade Scotland. James was not slow to make reprisals, but his nobles were angry or indifferent, and on the 25th of November 1542 his forces were easily scattered at the rout of Solway Moss. This blow preyed upon the king's mind, and on the 14th of December he died at Falkland, having just heard of the birth of his daughter. His two sons had died in infancy, and his successor was his only legitimate child, Mary. He left several bastards, among them James Stewart, earl of Murray (the regent Murray), Lord John Stewart (1531-1563) prior of Coldingham, and Lord Robert Stewart, earl of Orkney (d. 1592).

Although possessing a weak constitution, which was further impaired by his irregular manner of life, James showed great vigour and independence as a sovereign, both in withstanding the machinations of his uncle, Henry VIII., and in opposing the influence of the nobles. The persecutions to which heretics were exposed during this reign were due mainly to the excessive influence exercised by the ecclesiastics, especially by David Beaton, archbishop of St Andrews. The king's habit of mingling with the peasantry secured for him a large amount of popularity, and probably led many to ascribe to him the authorship of poems describing scenes in peasant life, Christis Kirk on the Grene, The Gaberlunzie Man and The Jolly Beggar. There is no proof that he was the author of any of these poems, but from expressions in the poems of Sir David Lindsay, who was on terms of intimacy with him, it appears that occasionally he wrote verses.

JAMES I., the Conqueror (1 208-1 276), king of Aragon, son of Peter II., king of Aragon, and of Mary of Montpellier, whose mother was Eudoxia Comnena, daughter of the emperor Manuel, was born at Montpellier on the 2nd of February 1208. His father, a man of immoral life, was with difficulty persuaded to cohabit with his wife. He endeavoured to repudiate her, and she fled to Rome, where she died in April 12 13. Peter, whose possessions in Provence entangled him in the wars between the Albigenses and Simon of Montfort, endeavoured to placate the northern crusaders by arranging a marriage between his son James and Simon's daughter. In 121 1 the boy was entrusted to Montfort's care to be educated, but the aggressions of the crusaders on the princes of the south forced Peter to take up arms against them, and he was slain at Muret on the 12th of Sep- tember 1 213. Montfort would willingly have used James as a means of extending his own power. The Aragonese and Cata- lans, however, appealed to the pope, who forced Montfort to surrender him in May or

June 1214. James was now entrusted to the care of Guillen de Monredon, the head of the Templars in Spain and Provence. The kingdom was given over to confusion till in 1 2 16 the Templars and some of the more loyal nobles brought the young king to Saragossa. At the age of thirteen he was married to Leonora, daughter of Alphonso VIII. of Castile, whom he divorced later on the ground of consanguinity. A son born of the marriage, Alphonso, was recognized as legitimate, but died before his father, childless. It was only by slow steps that the royal authority was asserted, but the young king, who was of gigantic stature and immense strength, was also astute and patient. By 1228 he had so far brought his vassals to obedience, that he was able to undertake the conquest of the Balearic Islands, which he achieved within four years. At the same time he endeavoured to bring about a union of Aragon with Navarre, by a contract of mutual adoption between himself and the Navarrese king, Sancho, who was old enough to be his grand- father. The scheme broke down, and James abstained from a policy of conquest. He wisely turned to the more feasible course of extending his dominions at the expense of the decadent

Mahommedan princes of Valencia. On the 28th of September 1238 the town of Valencia surrendered, and the whole territory was conquered in the ensuing years. Like all the princes of his house, James took part in the politics of southern France. He endeavoured to form a southern state on both sides of the Pyre- nees, which should counterbalance the power of France north of the Loire. Here also his policy failed against physical, social and political obstacles. As in the case of Navarre, he was too wise to launch into perilous adventures. By the Treaty of Corbeil, with Louis IX., signed the nth of May 1258, he frankly withdrew from conflict with the French king, and contented himself with the recognition of his position, and the surrender of antiquated French claims to the overlordship of Catalonia. During the remaining twenty years of his life, James was much concerned in warring with the Moors in Murcia, not on his own account, but on behalf of his son-in-law Alphonso the Wise of Castile. As a legislator and organizer he occupies a high place among the Spanish kings. He would probably have been more successful but for the confusion caused by the disputes in his own household. James, though orthodox and pious, had an ample share of moral laxity. After repudiating Leonora of Castile he married Yolande (in Spanish Violante) daughter of Andrew II. of Hungary, who had a considerable influence over him. But she could not prevent him from continuing a long series of intrigues. The favour he showed his bastards led to protest from the nobles, and to conflicts between his sons legitimate and illegitimate. When one of the latter, Fernan Sanchez, who had behaved with gross ingratitude and treason to his father, was slain by the legitimate son Pedro, the old king recorded his grim satisfaction. At the

close of his life King James divided his states between his sons by Yolande of Hungary, Pedro and James, leaving the Spanish possessions on the mainland to the first, the Balearic Islands and the lordship of Montpellier to the second — a division which inevitably produced fratricidal con- flicts. The king fell very ill at Alcira, and resigned his crown, intending to retire to the monastery of Poblet, but died at Valencia on the 27th of July 1276.

King James was the author of a chronicle of his own life, written or dictated apparently at different times, which is a very fine example of autobiographical literature. A translation into English by J. Forster, with notes by Don Pascual de Gayangos, was published in London in 1883. See also James I. of Aragon, by F. Darwin Swift (Clarendon Press, 1894), in which are many references to authorities.

JAMES II. (c. 1 260-1327), king of Aragon, grandson of James I., and son of Peter III. by his marriage with Constance, daughter of Manfred of Beneventum, was left in 1285 as king of Sicily by his father. In 129T, on the death of his elder brother, Alphonso, to whom Aragon had fallen, he resigned Sicily and endeavoured to arrange the quarrel between his own family and the Angevine House, by marriage with Blanca, daughter of Charles of Anjou, king of Naples.

JAMES II. (1243-13 n), king of Majorca, inherited the Balearic Islands from his father James I. of Aragon. He was engaged in constant conflict with his brother Pedro III. of Aragon, and in alliance with the French king against his own kin.

JAMES III. (1 3 1 S-1340) , king of Majorca, grandson of James II. , was driven out of his little state and finally murdered by his cousin Pedro IV. of Aragon, who definitely reannexed the Balearic Islands to the crown.

JAMES (James Francis Edward Stuart) (1688-1766), prince of Wales, known to the Jacobites as James III. and to the Hanoverian party as the Old Pretender, the son and heir of James II. of England, was born in St James's Palace, London, on the 10th of June 1688. The scandalous story that he was a supposititious child, started and spread abroad by interested politicians at the time of his birth, has been completely dis- proved, and most contemporary writers allude to his striking family likeness to the Royal Stuarts. Shortly before the flight of the king to Sheerness, the infant prince together with his mother was sent to France, and afterwards he continued to reside with his father at the court of St Germain. On the death of his father, on the 16th of September 1701, he was

immediately proclaimed king by Louis XIV. of France, but a fantastic attempt to perform a similar ceremony in London so roused the anger of

the populace that the mock pursuivants barely escaped with their lives. A bill of attainder against him received the royal assent a few days before the death of William III. in 1702, and the Princess Anne, half-sister of the Pretender, succeeded William on the throne. An influential party still, however, continued to adhere to the Jacobite cause; but an expedition from Dunkirk planned in favour of James in the spring of 1708 failed of success, although the French ships under the comte de Fourbin, with James himself on board, reached the Firth of Forth in safety. At the Peace of Utrecht James withdrew from French territory to Bar-le-Duc in Lor- raine. A rebellion in the Highlands of Scotland was inaugurated in September 1715 by the raising of the standard on the braes of Mar, and by the solemn proclamation of James Stuart, " the chevalier of St George," in the midst of the assembled clans, but its progress was arrested in November by the indecisive battle of Sheriffmuir and by the surrender at Preston. Un- aware of the gloomy nature of his prospects, the chevalier landed in December 1715 at Peterhead, and advanced as far south as Scone, accompanied by a small force under the earl of Mar; but on learning of the approach of the duke of Argyll, he retreated to Montrose, where the Highlanders dispersed to the mountains, and he embarked again for France. A Spanish expedition sent out in his behalf in 17 19, under the direction of Alberoni, was scattered by a tempest, only two frigates reaching the appointed rendezvous in the island of Lewis.

In 1 7 18 JameS had become affianced to the young princess Maria Clementina Sobieski, grand-daughter of the warrior king of Poland, John Sobieski. The intended marriage was forbidden by the emperor, who in consequence kept the princess and her mother in honourable confinement at Innsbruck in Tirol. An attempt to abduct the princess by means of a ruse contrived by a zealous Jacobite gentleman, Charles Wogan, proved successful; Clementina reached Italy in safety, and she and James were ultimately married at Montefiascone on the 1st of September 1 7 19. James and Clementina were now invited to reside in Rome at the special request of Pope Clement XL, who openly acknowledged their titles of British King and Queen, gave them a papal guard of troops, presented them with a villa at Albano and a palace (the Palazzo Muti in the Piazza dei Santi Apostoli) in the city, and also made them an annual allowance of 12,000 crowns out of the papal treasury. At the Palazzo Muti, which remained the chief centre of Jacobite intriguing, were born James's two sons, Charles Edward (the Young Pretender) and Henry Benedict Stuart. James's married life proved turbulent and unhappy, a circumstance that was principally due to the hot temper and jealous nature of Clementina, who soon after Henry's birth in 1725 left her husband and spent over two years in a Roman convent. At length a reconciliation was effected, which Clementina did not long survive, for she died at the early age of 32 in February 1735. Full regal honours

were paid to the Stuart queen at her funeral, and the splendid but tasteless monument by Pietro Bracchi (1700-17 73) in St Peter's was erected to her memory by order of Pope Benedict XIV.

His wife's death seems to have affected James's health and spirits greatly, and he now began to grow feeble and indifferent, so that the political adherents of the Stuarts were gradually led to fix their hopes upon the two young princes rather than upon their father. Travellers to Rome at this period note that James appeared seldom in public, and that much of his time was given up to religious exercises; he was divot a I'exces, so Charles de Brosses, an unprejudiced Frenchman, informs us. It was with great reluctance that James allowed his elder son to leave Italy for France in 1744; nevertheless in the following year, he per- mitted Henry to follow his brother's example, but with the news of Culloden he evidently came to regard his cause as definitely lost. The estrangement from his elder and favourite son, which arose over Henry's adoption of an ecclesiastical career, so embittered his last years that he sank into a moping invalid and I rarely left his chamber. With the crushing failure of the

" Forty-five " and his quarrel with his heir, the once-dreaded James soon became a mere cipher in British politics, and his death at Rome on the 2nd of January 1766 passed almost unnoticed in London. He was buried with regal pomp in St Peter's, where Canova's famous monument, erected by Pius VII. in 1819, commemorates him and his two sons. As to James's personal character, there is abundant evidence to show that he was grave, high-principled, industrious, abstemious and dignified, and that the unflattering portrait drawn of him by Thackeray in Esmond is utterly at variance with historical facts. Although a fervent Roman Catholic, he was far more reasonable and liberal in his religious views than his father, as many extant letters testify.

See Earl Stanhope, History of England and Decline of the Last Stuarts (1853); Calendar of the Stuart Papers at Windsor Castle; T. H. Jesse, Memories of the Pretenders and their Adherents (1845); Dr John Doran, " Mann " and Manners at the Court of Florence (1876); Relazione delta morte di Giacomo III., Re d'Inghilterra; and Charles de Brosses, Lettres sur Vltalie (1885). (H. M. V.)

JAMES, DAVID (1839-1893), English actor, was born in London, his real name being Belasco. He began his stage career at an early age, and after 1863 gradually made his way in humorous parts. His creation, in 1875, of

the part of Perkyn Middlewick in Our Boys made him famous as a comedian, the performance obtaining for the piece a then unprecedented run from the 16th of January 1875 till the 18th of April 1879. In 1885 he had another notable success as Blueskin in Little Jack Sheppard at the Gaiety Theatre, his principal associates being Fred Leslie and Nellie Farren. His song in this burlesque, " Botany Bay," became widely popular. In the part of John Dory in Wild Oats he again made a great hit at the Criterion Theatre in 1886; and among his other most successful imper- sonations were Simon Ingot in David Garrick, Tweedie in Tweedie's Rights, Macclesfield in The Guv'nor, and Eccles in Caste. His unctuous humour and unfailing spirits made him a great favourite with the public. He died on the 2nd of October

1893.

JAMES, GEORGE PAYNE RAINSFORD (1 799-1860), English novelist, son of Pinkstan James, physician, was born in George Street, Hanover Square, London, on the 9th of August 1799. He was educated at a private school at Putney, arid afterwards in France. He began to write early, and had, according to his own account, composed the stories afterwards published as A String of Pearls before he was seventeen. As a contributor to newspapers and magazines, he came under the notice of Washington Irving, who encouraged him to produce his Life of Edward the Black Prince (1822). Richelieu was finished in 1825, and was well thought of by Sir Walter Scott (who apparently saw it in manuscript), but was not brought out till 1829. Per- haps Irving and Scott, from their natural amiability, were rather dangerous advisers for a writer so inclined by nature to abundant production as James. But he took up historical romance writing at a lucky moment. Scott had firmly estab- lished the popularity of the style, and James in England, like Dumas in France, reapedthe reward of their master's labours as well as of their own. For thirty years the author of Richelieu continued to pour out novels of the same kind though of varying merit. His works in prose fiction, verse narrative, and history of an easy kind are said to number over a hundred, most of them being three-volume novels of the usual length. Sixty-seven are catalogued in the British Museum. The best examples of his style are perhaps Richelieu (1829); Philip Augustus (1831); Henry Masterlon, probably the best of all (1832); Mary of Burgundy (1833); Darnley (1839); Corse de Leon (1841); The Smuggler (1845). His poetry does not require special mention, nor does his history, though for a short time during the reign of William IV. he held the office of historiographer royal. After writing copiously for about twenty years, James in 1850 went to America as British Consul for Massachusetts. He was

consul at Richmond, Virginia, from 1852 to 1856, when he was

appointed to a similar post at Venice, where he died on the 9th

of June i860.

James has been compared to Dumas, and the comparison holds good in respect of kind, though by no means in respect of merit. Both had a certain gift of separating from the picturesque parts of history what could without much difficulty be worked up into picturesque fiction, and both were possessed of a ready pen. Here, however, the likeness ends. Of purely literary talent James had little. His plots are poor, his descrip- tions weak, his dialogue often below even a fair average, and he was deplorably prone to repeat himself. The " two cavaliers " who in one form or another open most of his books have passed into a proverb, and Thackeray's good-natured but fatal parody of Barbazure is likely to outlast Richelieu and Darnley by many a year. Nevertheless, though James cannot be allowed any very high rank among novelists, he had a genuine narrative gift, and, though his very best books fall far below Les trois mousquetaires and La reine Margot, there is a certain even level of interest to be found in all of them. James never resorted to illegitimate methods to attract readers, and deserves such credit as may be due to a purveyor of amusement who never caters for the less creditable tastes of his guests.

His best novels were published in a revised form in 21 volumes

(1844-1849).

JAMES, HENRY (1843-), American author, was born in New York on the 1 5th of April 1843. His father was Henry James (1811-1882), a theological writer of great originality, from whom both he and his brother Professor William James derived their psychological subtlety and their idiomatic, picturesque English. Most of Henry's boyhood was spent in Europe, where he studied under tutors in England, France and Switzerland. In i860 he returned to America, and began reading law at Harvard, only to find speedily that literature, not law, was what he most cared for. His earliest short tale, " The Story of a Year," appeared in 1865, in the Atlantic Monthly, and frequent stories and sketches followed. In 1869 he again went to Europe, where he subsequently made his home, for the most part living in London, or at Rye in Sussex. Among his specially noteworthy works are the following: Watch and Ward (1871); Roderick Hudson (1875); The American (1877); Daisy Miller (1878); French Poets and Novelists (1878); A Life of Hawthorne (1879); The Portrait of a Lady (1881); Portraits of Places (1884); The Boslonians (1886); Partial Portraits (1888); The Tragic Muse (1890); Essays in London (1893) ; The Two Magics (1898) ; The Awkward Age (1898); The Wings of the Dove (1902); The Ambassadors (1903); The Golden Bowl (1904); English

Hours (1905); The American Scene (1907); The High Bid (1909); Italian Hours

(1909).

As a novelist, Henry James is a modern of the moderns both in subject matter and in method. He is entirely loyal to contem- porary life and reverentially exact in his transcription of the phase. His characters are for the most part people of the world who conceive of life as a fine art and have the leisure to carry out their theories. Rarely are they at close quarters with any ugly practical task. They are subtle and complex with the subtlety and the complexity that come from conscious preoccupation with themselves. They are specialists in conduct and past masters in casuistry, and are full of variations and shadows of turning. Moreover, they are finely expressive of milieu; each belongs unmistakably tp his class and his race; each is true to inherited moral traditions and delicately illustrative of some social code. To reveal the power and the tragedy of life through so many minutely limiting and apparently artificial conditions, and by means of characters who are somewhat self-conscious and are apt to make of life only a pleasant pastime, might well seem an impossible task. Yet it is precisely in this that Henry James is pre-eminently successful. The essentially human is what he really cares for, however much he may at times seem preoccupied with the technique of his art or with the mask of conventions through which he makes the essentially human reveal itself. Nor has " the vista of the spiritual been denied him." No more poignant spiritual tragedy has been recounted in recent fiction than the story of Isabel Archer in The Portrait of a Lady. His method, too, is as modern as his subject matter. He early

fell in love with the " point of view," and the good and the bad qualities of his work all follow from this literary passion. He is a very sensitive impressionist, with a technique that can fix the most elusive phase of character and render the most baffling surface. The skill is unending with which he places his char- acters in such relations and under such lights that they flash out in due succession their continuously varying facets. At times he may seem to forget that a character is something incalculably more than the sum of all its phases; and then his characters tend to have their existence, as Positivists expect to have their immortality, simply and solely in the minds of other people. But when his method is at its best, the delicate phases of char- acter that he transcribes coalesce perfectly into clearly defined and suggestive images of living, acting men and women. Doubt-

less, there is a certain initiation necessary for the enjoyment of Mr James. He presupposes a cosmopolitan outlook, a certain interest in art and in social artifice, and no little abstract curiosity about the workings of the human mechanism. But for speculative readers, for readers who care for art in life as well as for life in art, and for readers above all who want to encounter and comprehend a great variety of very modern and finely modulated characters, Mr James holds a place of his own, unrivalled as an interpreter of the world of to-day.

For a list of the short stories of Mr Henry James, collections of them in volume form, and other works, see bibliographies by F. A. King, in The Novels of Henry James, by Elisabeth L. Cary (New York and London, 1905), and by Le Roy Phillips, A Bibliography of the Writings of Henry James (Boston, Mass., 1906). In 1909 an edition de luxe of Henry James's novels was published in 24 volumes.

JAMES, JOHN ANGELL (1785-1859), English Nonconformist divine, was born at Blandford, Dorsetshire, on the 6th of June 1785. At the close of his seven years' apprenticeship to a linen- draper at Poole he decided to become a preacher, and in 1802 he went to David Bogue's training institution at Gosport. A year and a half later, on a visit to Birmingham, his preaching was so highly esteemed by the congregation of Carr's Lane Independent chapel that they invited him to exercise his ministry amongst them; he settled there in 1805, and was or- dained in May 1806. For several years his success as a preacher was comparatively small; but he jumped into popularity about 1814, and began to attract large crowds wherever he officiated. At the same time his religious writings, the best known of which are The Anxious Inquirer and An Earnest Ministry, acquired a wide circulation. James was a typical Congregational preacher of the early 19th century, massive and elaborate rather than original. His preaching displayed little or nothing of Calvinism, the earlier severity of which had been modified in Birmingham by Edward Williams, one of his predecessors. He was one of the founders of the Evangelical Alliance and of the Congrega- tional Union of England and Wales. Municipal interests appealed strongly to him, and he was also for many years chairman of Spring Hill (afterwards Mansfield) College. He died at Birming- ham on the 1st of October 1859.

A collected edition of James's works appeared in 1 860-1 864. See A Review of the Life and Character of J. Angell James (i860), by J. Campbell, and Life and Letters of J . A. James (1861), edited by his successor, R. W. Dale, who also contributed a sketch of his predecessor to Pulpit Memorials (1878).

JAMES, THOMAS (c. 1 573-1629), English librarian, was born at

Newport, Isle of Wight. He was educated at Winchester and New College, Oxford, and became a fellow of New College in 1593. His wide knowledge of books, together with his skill in deciphering manuscripts and detecting literary forgeries, secured him in 1602 the post of librarian to the library founded in that year by Sir Thomas Bodley at Oxford. At the same time he was made rector of St Aldate's, Oxford. In 1605 he compiled a classified catalogue of the books in the Bodleian Library, but in 1620 substituted for it an alphabetical catalogue. The arrange- ment in 1610, whereby the Stationers' Company undertook to supply the Bodleian Library with every book published, was James's suggestion. Ill health compelled him to resign his post in 1620, and he died at Oxford in August 1629.

JAMES, WILLIAM (d. 1827), English naval historian, author of the Naval History of Great Britain from the Declaration of War by France in 1793 to the Accession of George IV., practised as a proctor in the admiralty court of Jamaica between 1801 and 1813. He was in the United States when the war of 1812 broke out, and was detained as a prisoner, but escaped to Halifax. His literary career began by letters to the Naval Chronicle over the signature of " Boxer." In 1816 he published An Inquiry into the Merits of the Principal Naval Actions between Great Britain and the United States. In this pamphlet, which James reprinted in 181 7, enlarged and with a new title, his object was to prove that the American frigates were stronger than their British opponents nominally of the same class. In 1819 he began his Naval History, which appeared in five volumes (182 2-1824), and was reprinted in six volumes (1826). It is a monument of pains- taking accuracy in all such matters as dates, names, tonnage, armament and movements of ships, though no attempt is ever made to show the connexion between the various movements. James died on the 28th of May 1827 in London, leaving a widow who received a civil list pension of £100.

An edition of the Naval History in six volumes, with additions and notes by Capt. F. Chamier, was published in 1837, and a further one in 1886. An edition epitomized by R. O'Byrne appeared in 1888, and an Index by C. G. Toogood was issued by the Navy Records Society in 1895.

JAMES, WILLIAM (1842-1910), American philosopher, son of the Swedenborgian theologian Henry James, and brother of the novelist Henry James, was born on the nth of January 1842 at New York City. He graduated M.D. at Harvard in 1870. Two years after he was appointed a lecturer at Harvard in anatomy and physiology, and later in psychology and philosophy. Subse- quently he became assistant professor of philosophy (1880-1885), professor (1885-1889), professor of psychology (1889-1897) and professor of philosophy (1897-1907). In 1899-1901 he delivered the Gifford lectures on natural religion at the university of Edinburgh, and in 1908 the Hibbert lectures at Manchester College,

Oxford. With the appearance of his Principles of Psychology (2 vols., 1890), James at once stepped into the front rank of psychologists as a leader of the physical school, a position which he maintained not only by the brilliance of his analo- gies but also by the freshness and unconventionality of his style. In metaphysics he upheld the idealist position from the empirical standpoint. Beside the Principles of Psychology, which appeared in a shorter form in 1892 (Psychology), his chief works are: The Will to Believe (1897); Human Immortality (Boston, 1898); Talks to Teachers (1899); The Varieties of Religious Experience (New York, 1902); Pragmatism — a New Name for some Old Ways of Thinking (1907); A Pluralistic Universe (1909; Hibbert lectures), in which, though he still attacked the hypothesis of absolutism, he admitted it as a legitimate alternative. He received honorary degrees from Padua (1893), Princeton (1896), Edinburgh (1902), Harvard (1905). He died on the 27th of August 1910.

JAMES OF HEREFORD, HENRY JAMES, ist Baron (1828-), English lawyer and statesman, son of P. T. James, surgeon, was born at Hereford on the 30th of October 1828, and educated at Cheltenham College. A prizeman of the Inner Temple, he was called to the bar in 1852 and joined the Oxford circuit, where he soon came into prominence. In 1867 he was made " postman " of the court of exchequer, and in 1869 became a Q.C. At the general election of 1868 he obtained a seat in parliament for Taunton as a Liberal, by the unseating of Mr Serjeant Cox on a scrutiny in March 1869, and he kept the seat till 1885, when he was returned for Bury. He attracted atten- tion in parliament by his speeches in 1872 in the debates on the Judicature Act. In 1873 (September) he was made solicitor-general, and in November attorney-general, and knighted; and when Gladstone returned to power in 1880 he resumed his office. He was responsible for carrying the Corrupt Practices Act of 18S3. On Gladstone's conversion to Home Rule, Sir Henry James parted from him and became one of the most influential of the Liberal Unionists: Gladstone had offered him the lord chancellorship in 1886, but he declined it; and the knowledge

of the sacrifice he had made in refusing to follow his old chief in his new departure lent great weight to his advocacy of the Unionist cause in the country. He was one of the leading counsel for The Times before the Parnell Commission, and from 1892 to 1895 was attorney-general to the prince of Wales. From 1895 to 1902 he was a member of the Unionist ministry as chancellor for the duchy of Lancaster, and in 1895 he was made a peer as Baron James of Hereford. In later years he was a prominent opponent of the Tariff Reform movement, adhering to the section of Free Trade Unionists.

JAMES, EPISTLE OF, a- book of the New Testament. The superscription (Jas. i. 1) ascribes it to that pre-eminent " pillar " (Gal. ii. 9) of the original mother church who later came to be regarded in certain quarters as the " bishop of bishops " (Epist. of James to Clement, ap. Clem. Horn. Superscription). As such he appears in a position to address an encyclical to " the twelve tribes of the dispersion "; for the context (i. 18, v. 7 seq.) and literary relation (cf. 1 Pet. i. 1, 3, 23-25) prove this to be a figure for the entire new people of God, without the distinction of carnal birth, as Paul had described " the Israel of God " (Gal. vi. 16), spiritually begotten, like Isaac, by the word received in faith (Gal. iii. 28 seq., iv. 28; Rom.ix. 6-9, iv. 16-18). This idea of the spiritually begotten Israel becomes current after 1 Pet., as appears in John i. n-13, iii. 3-8; Barn. iv. 6, xiii. 13; 2 Clem, ii. 2, &c.

The interpretation which takes the expression " the twelve tribes " literally, and conceives the brother of the Lord as sending an epistle written in the Greek language throughout the Christian world, but as addressing Jewish Christians only (so e.g. Sieffert, s.v. " Jacobus im N.T." in Hauck, Realencykl. ed. 1900, vol. viii.), assumes not only such divisive interference as Paul might justly resent (cf. Gal. ii. 1— 10), but involves a strange idea of conditions. Were worldliness, tongue religion, moral indifference, the distinctive marks of the Jewish element? Surely the rebukes of James apply to conditions of the whole Church and not sporadic Jewish- Christian conventicles in the Greek-speaking world, if any such existed.

It is at least an open question whether the superscription (connected with that of Jude) be not a later conjecture prefixed by some compiler of the catholic epistles, but of the late date implied in our interpretation of ver. 1 there should be small dispute. Whatever the currency in classical circles of the epistle as a literary form, it is irrational to put first in the development of Christian literature a general epistle, couched in fluent, even rhetorical, Greek, and afterwards the Pauline letters, which both as to origin and subsequent circulation were a product of urgent conditions. The order consonant with history is (1) Paul's "letters" to "the churches of " a province (Gal. i. 2; 2 Cor. i. 1); (2) the address to " the elect of the dispersion " in a group of the Pauline provinces (1 Pet. i. 1); (3) the address to " the twelve tribes of the dispersion " everywhere (Jas. i. 1; cf. Rev. vii. 2-4). James, like 1 John, is a homily, even more lacking than 1 John in every epistolary feature, not even supplied with the customary epistolary farewell. The superscription, if original, compels us to treat the whole writing as not only late but pseudonymous. If prefixed by conjecture, to secure recognition and authority for the book, even this was at first a failure. The earliest trace of any recognition of it is in Origen (a.d. 230) who refers to it as " said to be from' James " ((fcpojueyrj ^ 'laK&fiov

'EirtcrroXii), seeming thus to regard ver. 1 as superscription rather than part of the text. Eusebius (a.d. 325) classifies it among the disputed books, declaring that it is regarded as spurious, and that not many of the ancients have mentioned it. Even Jerome (a.d. 390), though personally he accepted it, admits that it was " said to have been published by another in the name of James." The Syrian canon of the Peshitta was the first to admit it.

Modern criticism naturally made the superscription its starting- point, endeavouring first to explain the contents of the writing on this theory of authorship, but generally reaching the conclusion that the two do not agree. Conservatives as a rule avoid the implication of a direct polemic against Paul in ii. J4~ 2 6, which would lay open the author to the bitter accusations launched against the interlopers of 2 Cor. x.-xiii., by dating before the Judaistic controversy. Other

critics regard the very language alone as fatal to such a theory of date, authorship and circle addressed. The contents, ignoring the conflict of Jew and Gentile, complaining of worldiness and tongue- religion (cf. I John iii. 17 seq. with James ii. 14-16) suggest a much later date than the death of James (a.d. 62-66). They also require a different character in the author, if not also a different circle of readers from those addressed in i. 1.

The prevalent conditions seem to be those of the Greek church of the post-apostolic period, characterized by worldiness of life, pro- fession without practice, and a contentious garrulity of teaching (1 John iii. 3-10, 18; I Tim. i. 6 seq., vi. 3-10; 2 Tim. iii. 1-5, iv. 3 seq.). The author meets these with the weapons commanded for the pur- pose in 1 Tim. vi. 3, but quite in the spirit of one of the " wise men " of the Hebrew wisdom literature. His gospel is completely denation- alized, humanitarian; but, while equally universalistic, is quite unsympathetic towards the doctrine and the mysticism of Paul. He has nothing whatever to say of the incarnation, life, example, suffering or resurrection of Jesus, and does not interest himself in the doctrines of Christ's person, which were hotly debated up to this time. The absence of all mention of Christ (with the single exception of ii. I, where there is reason to think the words r\y.S>v 'IijtroD XpurroO interpolated) has even led to the theory, ably but unconvincingly maintained by Spitta, that the writing is a mere recast of a Jewish moralistic writing like the Two Ways. The thoughts are loosely strung together: yet the following seems to be the general framework on which the New Testament preacher has collected his material.

1. The problem of evil (i. I-I9a). Outward trials are for our development through aid of divinely given "wisdom" (2-1 1). Inward (moral) trials are

not to be imputed to God, the author of all good, whose purpose is the moral good of his creation (1 2-1 9a; cf. I John i. 5).

2. The righteousness God intends is defined in the eternal moral law. It is a product of deeds, not words (i. i9b-27).

3. The " royal law " of love is violated by discrimination against the poor (ii. 1-13) ; and by professions of faith barren of good works

(14-26).

4. The true spirit of wisdom appears not in aspiring to teach, but in goodness and meekness of life (ch. iii.). Strife and self -exaltation are fruits of a different spirit, to be resisted and overcome by humble prayer for more grace (iv. 1-10).

5- God's judgment is at hand. The thought condemns censori- ousness (iv. 11 et seq.), presumptuous treatment of life (13-17), and the tyranny of the rich (v. 1-6). It encourages the believer to patient endurance to the end without murmuring or imprecations (7-12). It impels the church to diligence in its work of worship, care and prayer (13-18), and in the reclamation of the erring (19-20).

The use made by James of earlier material is as important for determining the terminus a quo of its own date as the use of it by later writers for the terminus ad quern. Acquaintance with the evangelic tradition is apparent. It is conceived, however, more in the Matthaean sense of " commandments to be observed " (Matt. xxviii. 20) than the Pauline, Markan and Johannine of the drama of the incarnation and redemption. There is no traceable literary contact with the synoptic gospels. Acquaintance, however, with some of the Pauline epistles " must be regarded as incontestably established " (O. Cone, Ency. Bibl. ii. 2323). Besides scattered reminiscences of Romans, 1 Corinthians and Galatians, enumerated in the article referred to, the section devoted to a refutation of the doctrine of "justification by faith apart from works " undeniably presupposes the Pauline terminology. Had the author been con- sciously opposing the great apostle to the Gentiles he would probably have treated the subject less superficially. What he really opposes is the same ultra-Pauline moral laxity which Paul himself had found occasion to rebuke among would-be adherents in Corinth (1 Cor. vi. I2;viii. 1-3, II, 12 ; x. 23 seq., 32 seq.) and which appears still more marked in the pastoral epistles and 1 John. In rebuking it James unconsciously retracts the misapplied Pauline principle itself. To suppose that the technical terminology of Paul, including even his classic example of the faith of Abraham, could be employed here independently of Rom. ii. 21-23, ii'- 28, iv. I ; Gal. ii. 16,

iii. 6, is to pass a judgment which in every other field of literary criticism would be at once repudiated. To imagine it current in pre-Pauline Judaism is to misconceive the spirit of the synagogue. x To make James the coiner and Paul the borrower not only throws back James to a date incompatible with the other phenomena, but implies a literary polemic tactlessly waged by Paul against the head of the Jerusalem church. Acquaintance with Hebrews is only slightly less probable, for James ii. 25 adds an explication of the case of Rahab also, cited in Heb. xi. 31 along with Abraham as an example of justification by faith only, to his correction of the Pauline scriptural argument. The question whether James is dependent on I Peter or conversely is still actively disputed. As regards the superscription

1 Nothing adduced by Lightfoot (Comm. on Gal. Exc. " The faith of Abraham ") justifies the unsupported and improbable assertion that the quotation James ii. 21 seq. " was probably in common use among the Jews to prove that orthodoxy of doctrine sufficed for salvation " (Mayor, s.v. " James, Epistle of " in Hasting's Diet. Bible, p. 546).

the relation has been defined above. Dependence on Revelation (A.D. 95) is probable (cf. i. 12 and ii. 5 with Rev. ii. 9, 10 and v. 9 with Rev. iii. 20), but the contacts with Clement of Rome (a.d. 95-120) indicate the reverse relation. James iv. 6 and v. 20 = I Clem. xlix. 5 and xxx. 2 ; but as both passages are also found in I Peter (iv. 8, v. 5) , the latter may be the common source. Clement's further development of the cases of Abraham and Rahab, however, adding as it does to the demonstration of James from Scripture of their justification " by works and not by faith only," that the particular good work which " wrought with the faith " of Abraham and Rahab to their justification was " hospitality " (1 Clem, x.-xii.) seems plainly to presuppose James. Priority is more difficult to establish in the case of Hermas (a.d. 120-140), where the contacts are undisputed (cf. James iv. 7, 12 with Mand. xii, 5, 6; Sim. ix. 23). 1

The date (a.d. 95-120) implied by the literary contacts of James of course precludes authorship by the Lord's brother, though this does not necessarily prove the superscription later still. The question whether the writing as a whole is pseudony- mous, or only the superscription a mistaken conjecture by the scribe of Jude 1 is of secondary importance. A date about 100-120 for the substance of the writing is accepted by the majority of modern scholars and throws real light upon the author's endeavour. Pfleiderer in pointing out the similarities of James and the Shepherd of Hermas declares it to be " certain that both writings presuppose like historical circumstances,

and, from a similar point of view, direct their admonitions to their contemporaries, among whom a lax worldly-mindedness and unfruitful theological wrangling threatened to destroy the religious life." 2 Holtzmann has characterized this as " the right visual angle " for the judgment of the book. Questions as to the obligation of Mosaism and the relations of Jew and Gentile have utterly disappeared below the horizon. Neither the attachment to the religious forms of Judaism, which we are informed was characteristic of James, nor that personal relation to the Lord which gave him his supreme distinction are indicated by so much as a single word. Instead of being written in Aramaic, as it would almost necessarily be if antecedent to the Pauline epistles, or even in the Semitic style characteristic of the older and more Palestinian elements of the New Testament we have a Greek even more fluent than Paul's and metaphors and allusions (i. 17, iii. 1-12) of a type more like Greek rhetoric than anything else in the New Testament. Were we to judge by the contacts with Hebrews, Clement of Rome and Hermas and the similarity of situation evidenced in the last-named, Rome would seem the most natural place of origin. The history of the epistle's reception into the canon is not opposed to this; for, once it was attributed to James, Syria would be more likely to take it up, while the West, more sceptical, if not better informed as to its origin, held back; just as happened in the case of Hebrews.

It is the author's conception of the nature of the gospel which mainly gives us pause in following this pretty general disposition of modern scholarship. With all the phenomena of vocabulary and style which seem to justify such conceptions as von Soden's that c. iii. and iv. n-v. 6 represent excerpts respectively from the essay of an Alexandrian scribe, and a triple fragment of Jewish apocalypse, the analysis above given will be found the exponent of a real logical sequence. We might almost admit a resemblance in form to the general literary type which Spitta adduces. The term " wisdom " in particular is used in the special and technical sense of the " wise men " of Hebrew literature (Matt, xxiii. 34), the sense of " the wisdom of the just " of Luke i. 17. True, the mystical sense given to the term in one of the sources of Luke, by Paul and some of the Church fathers, is not present. While the gospel is pre-eminently the divine gift of " wisdom," " wisdom " is not personified, but conceived pri- marily as a system of humanitarian ethics, i. 21-25, and only secondarily as a spiritual effluence, imparting the regenerate disposition, the " mind that was in Christ Jesus," iii. 13-18. And yet for James as well as for Paul Christ is " the wisdom of

1 On the contacts in general see Moffat, Hist. NT. 2 p. 578, on relation to Clem. R. see Bacon, " Doctrine of Faith in Hebrews, James and Clement of Rome," in Jour, of Bib. Lit., 1900, pp. 12-21.

1 Das Urchristenthum, 868, quoted by Cone, loc. cit.

God." The difference in conception of the term is similar to that between Ecclesiasticus and the Wisdom of Solomon. Our author, like Paul, expects the hearers of the word to be " a kind of first-fruits to God of his creation." (i. 18 cf. 1 Pet. i. 23), and bids them depend upon the gift of grace (i.5, iv. 5 seq.), but for the evils of the world he has no remedy but the patient endurance of the Christian philosopher (i. 2-18). For the faithlessness (diipvxla- i- 6-8; cf. Didache and Hermas), worldliness (ii. 1-13) and hollow profession (ii. 14-26) of the church life of his time, with its " theological wrangling " (iii. 1-12), his remedy is again the God-given, peaceable spirit of the Christian philosopher (iii. 13-18), which is the antithesis of the spirit of self-seeking and censoriousness (iv. 1-12), and which appreciates the pettiness of earthly life with its sordid gains and its unjust distribution of wealth (iv. 13-v. 6). This attitude of the Christian stoic will maintain the individual in his. patient waiting for the expected " coming of the Lord " (v. 7-1 1); while the church sustains its official functions of healing and prayer, and reclamation of the erring (v. 13-20) . 3 For this conception of the gospel and of the officially organized church, our nearest analogy is in Matthew, or rather in the blocks of precepts of the Lord which after subtraction of the Markan narrative framework are found to underlie our first gospel. It may be mere coincidence that the material in Matthew as well as in the Didache seems to be arranged in five divisions, beginning with a commendation of the right way, and ending with warnings of the judgment, while the logical analysis of James yields something similar; but of the affinity of spirit there can be no doubt.

The type of ethical thought exemplified in James has been called Ebionite (Hilgenfeld). It is clearly manifest in the humanitarianism of Luke also. But with the possible exception of the prohibition of oaths there is nothing which ought to suggest the epithet. The strong sense of social wrongs, the impatience with tongue-religion, the utter ignoring of ceremonialism, the reflection on the value and significance of " life," are distinctive simply of the " wisdom " writers. Like these our author holds himself so far aloof from current debate of ceremonial or doctrine as to escape our principal standards of measurement regarding place and time. Certain general considerations, however, are fairly decisive. The prolonged effort, mainly of English scholar- ship, to vindicate the superscription, even on the condition of assuming priority to the Pauline epistles, grows only increasingly hopeless with increasing knowledge of conditions, linguistic and other, in that early period. The moralistic conception of the gospel as a " law of liberty," the very phrase recalling the expression of Barn, ii., " the new law of Christ, which is without the yoke of constraint," the conception of the church as primarily an ethical society, its functions already officially dis- tributed, suggest the period of the Didache, Barnabas and Clement of Rome. Independently of the literary contacts we should judge the period to

be about a.d. 100-120. The con- nexions with the Pauline epistles are conclusive for a date later than the death of James; those with Clement and Hermas are perhaps sufficient to date it as prior to the former, and suggest Rome as the place of origin. The connexions with wisdom- literature favour somewhat the Hellenistic culture of Syria, as represented for example at Antioch.

The most important commentaries on the epistle are those of Matt. Schneckenburger (1832), K. G. W. Theile (1833), J. Kern (1838), G. H. Ewald (1870), C. F. D. Erdmann (1881), H. v. Soden (1898), J. B. Mayor (1892) and W. Patrick (1906). The pre-Pauline date is championed by B. Weiss (Introd.), W. Beyschlag (Meyer's Commentary), Th. Zahn (Introd.), J. B. Mayor and W. Patrick. J. V. Bartlet (Ap. Age, pp. 217-250) pleads for it, and the view is still common among English interpreters. F. K. Zimmer (Z. w. Th., 1893) showed the priority of Paul, with many others. A. Hilgenfeld (Einl.)

3 The logical relation of v. 12 to the context is problematical. Perhaps it may be accounted for by the order of the compend ol Christian ethics the writer was following. Cf. Matt. v. 34-37 in relation to Matt. v. 12 (cf. ver. 10) and vi. 19 sqq. ˆcf. ver. 2, and iv. 13 seq.). The non-charismatic conception of healing, no longer the " gift " of some layman in the community (1 Cor. xii. 9 seq.) but a function of " the elders " (1 Tim. iv. 14), is another indication of comparatively late date.

and A. C. McGiffert (Ap. Age) place it in the period of Domitian ; Baur (Ch. History), Schwegler (Nachap. Zeitalt.), Zeller, Volkmar (Z. w. Th.), Hausrath (Ap. Age), H. J. Holtzmann (EM.), Jiilicher (EM.), Usteri (St. u. Kr., 1889), W. Bruckner (Chron.), H. v. Soden (Hand- comm.) and A. Harnack (Chron.) under Hadrian. A convenient synopsis of results will be found in J. Moffat, Historical New Test. 2 (pp. 576-581), and in the articles s.v. " James " in Encycl. Bibl. and the Bible Dictionaries. (B. W. B.)

JAMESON, ANNA BROWNELL (1 794-1860), British writer, was born in Dublin on the 17th of May 1794. Her father, Denis Brownell Murphy (d. 1842), a miniature and enamel painter, removed to England in 1798 with his family, and eventually settled at Hanwell, near London. At sixteen years of age Anna became governess in the family of the marquis of Winchester. In 1821 she was engaged to Robert Jameson. The engagement was broken off, and Anna Murphy accompanied a young pupil to Italy,

writing in a fictitious character a narrative of what she saw and did. This diary she gave to a bookseller on condition of receiving a guitar if he secured any profits. Colburn ulti- mately published it as The Diary of an Ennuyee (1826), which attracted much attention. The author was governess to the children of Mr Littleton, afterwards Lord Hatherton, from 182 1 to 1825, when she married Robert Jameson. The marriage proved unhappy; when, in 1829, Jameson was appointed puisne judge in the island of Dominica the coupte separated without regret, and Mrs Jameson visited the Continent again with her father.

The first work which displayed her powers of original thought was her Characteristics of Women (1832). These analyses of Shakespeare's heroines are remarkable for delicacy of critical insight and fineness of literary touch. They are the result of a penetrating but essentially feminine mind, applied to the study of individuals of its own sex, detecting characteristics and defining differences not perceived by the ordinary critic and en- tirely overlooked by the general reader. German literature and art had aroused much interest in England, and Mrs Jameson paid her first visit to Germany in 1833. The conglomerations of hard lines, cold colours and pedantic subjects which decorated Munich under the patronage of King Louis of Bavaria, were new to the world, and Mrs Jameson's enthusiasm first gave them an English reputation.

In 1 836 Mrs Jameson wa s summoned to Canada by her husband, who had been appointed chancellor of the province of Toronto. He failed to meet her at New York, and she was left to make her way alone at the worst season of the year to Toronto. After six months' experiment she felt it useless to prolong a life far from all ties of family happiness and opportunities of usefulness. Before leaving, she undertook a journey to the depths of the Indian settlements in Canada; she explored Lake Huron, and saw much of emigrant and Indian life unknown to travellers, which she afterwards embodied in her Winter Studies and Summer Rambles. She returned to England in 1838. At this period Mrs Jameson began making careful notes of the chief private art collections in and near London. The result appeared in her Companion to the Private Galleries (1842), followed in the same year by the Handbook to the Public Galleries. She edited the Memoirs of the Early Italian Painters in 1845. In the same year she visited her friend Ottilie von Goethe. Her friendship with Lady Byron dates from about this time and lasted for some seven years; it was brought to an end apparently through Lady Byron's unreasonable temper. A volume of essays published in 1846 contains one of Mrs Jameson's best pieces of work, The House of Titian. In 1847 she went to Italy with her niece and subsequent biographer (Memoirs, 1878), Geraldine Bate (Mrs Macpherson), to collect materials for the work on which her reputation rests — her series of Sacred and Legendary Art. The time was ripe for such contributions to the

traveller's library. The Ada Sanctorum and the Book of the Golden Legend had had their readers, but no one had ever pointed out the connexion between these tales and the works of Christian art. The way to these studies had been pointed out in the preface to Kugler's Handbook of Italian Painting by Sir Charles Eastlake, who had intended pursuing the subject himself. Eventually he made

over to Mrs Jameson the materials and references he had collected. She recognized the extent of the ground before her as a mingled sphere of poetry, history, devotion and art. She infected her readers with her own enthusiastic admiration; and, in spite of her slight technical and historical equipment, Mrs. Jameson produced a book which thoroughly deserved its great success.

She also took a keen interest in questions affecting the educa- tion, occupations and maintenance of her own sex. Her early essay on The Relative Social Position of Mothers and Governesses was the work of one who knew both sides; and in no respect does she more clearly prove the falseness of the position she describes than in the certainty with which she predicts its eventual reform. To her we owe the first popular enunciation of the principle of male and female co-operation in works of mercy and education. In her later years she took up a succession of subjects all bearing on the same principles of active benevolence and the best ways of carrying them into practice. Sisters of charity, hospitals, penitentiaries, prisons and workhouses all claimed her interest — all more or less included under those definitions of " the com- munion of love and communion of labour " which are inseparably connected with her memory. To the clear and temperate forms in which she brought the results of her convictions before her friends in the shape of private lectures — published as Sisters of Charity (1855) and The Communion of Labour (1856) — may be traced the source whence later reformers and philanthropists took counsel and courage.

Mrs Jameson died on the 17th of March i860. She left the last of her Sacred and Legendary Art series in preparation. It was completed, under the title of The History of Our Lord in Art, by Lady Eastlake.

JAMESON (or Jamesone), GEORGE (c. 1587-1644), Scottish portrait-painter, was born at Aberdeen, where his father was architect and a member of the guild. After studying painting under Rubens at Antwerp, with Vandyck as a fellow pupil, he returned in 1620 to Aberdeen, where he was married in 1624 and remained at least until 1630, after which he took up his residence in Edinburgh. He was employed by the magistrates of Edin- burgh to copy several portraits of the Scottish kings for presen- tation to Charles I. on his first visit to Scotland in 1633, and the king rewarded him

with a diamond ring from his own finger. This circumstance at once established Jameson's fame, and he soon found constant employment- in painting the portraits of the Scottish nobility and gentry. He also painted a portrait of Charles, which he declined to sell to the magistrates of Aberdeen for the price they offered. He died at Edinburgh in

1644.

JAMESON, LEANDER STARR (1853-), British colonial statesman, son of R. W. Jameson, a writer to the signet in Edin- burgh, was born at Edinburgh in 1853, and was educated for the medical profession at University College Hospital, London (M.R.C.S. 1875; M.D. 1877). After acting as house physician, house surgeon and demonstrator of anatomy, and showing promise of a successful professional career in London, his health broke down from overwork in 1878, and he went out to South Africa and settled down in practice at Kimberley. There he rapidly acquired a great reputation as a medical man, and, besides numbering President Kruger and the Matabele chief Lobengula among his patients, came much into contact with Cecil Rhodes. In 1888 his influence with Lobengula was successfully exerted to induce that chieftain to grant the concessions to the agents of Rhodes which led to the formation of the British South Africa Company; and when the company proceeded to open up Mashonaland, Jameson abandoned his medical practice and joined the pioneer expedition of 1890. From this time his fortunes were bound up with Rhodes's schemes in the north. Imme- diately after the pioneer column had occupied Mashonaland, Jameson, with F. C. Selous and A. R. Colquhoun, went east to Manicaland and was instrumental in securing the greater part of that country, to which Portugal was laying claim, for the Chartered Company. In 1891 Jameson succeeded Colquhoun I as administrator of Rhodesia. The events connected with his

vigorous administration and the wars with the Matabele are narrated under Rhodesia. At the end of 1894 " Dr Jim " (as he was familiarly called) came to England and was feted on all sides; he was made a C.B., and returned to Africa in the spring of 1895 with enhanced prestige. On the last day of that year the world was startled to learn that Jameson, with a force of 600 men, had made a raid into the Transvaal from Mafeking in support of a projected rising in Johannesburg, which had been connived at by Rhodes at the Cape (see Rhodes and Trans- vaal). Jameson's force was compelled to surrender at Doorn- kop, receiving a guarantee that the lives of all would be spared; he and his officers were sent to Pretoria, and, after

a short delay, during which time sections of the Boer populace clamoured for the execution of Jameson, President Kruger on the surrender of Johannesburg (January 7) handed them over to the British government for punishment. They were tried in London under the Foreign Enlistment Act in May 1896, and Dr Jameson was sentenced to fifteen months' inprisonment at Holloway. He served a year in prison, and was then released on account of ill health. He still retained the affections of the white popula- tion of Rhodesia, and subsequently returned there in an un- official capacity. He was the constant companion of Rhodes on his journeys up to the end of his life, and when Rhodes died in May 1902 Jameson was left one of the executors of his will. In 1903 Jameson came forward as the leader of the Progressive (British) party in Cape Colony; and that party being victorious at the general election in January-February 1904, Jameson formed an administration in which he took the post of prime minister. He had to face a serious economic crisis and strenu- ously promoted the development of the agricultural and pastoral resources of the colony. He also passed a much needed Redis- tribution Act, and in the session of 1906 passed an Amnesty Act restoring the rebel voters to the franchise. Jameson, as prime minister of Cape Colony, attended the Colonial conference held in London in 1907. In September of that year the Cape parlia- ment was dissolved, and as the elections for the legislative council went in favour of the Bond, Jameson resigned office, 31st of January 1908 (see Cape Colony: History). In 1908 he was chosen one of the delegates from Cape Colony to the inter-colonial convention for the closer union of the South African states, and he took a prominent part in settling the terms on which union was effected in 1909. It was at Jameson's sugges- tion that the Orange River Colony was renamed Orange Free State Province.

JAMESON, ROBERT (1774-1854), Scottish naturalist and mineralogist, was born at Leith on the nth of July 1774. He became assistant to a surgeon in his native town; but, having studied natural history under Dr John Walker in 1792 and 1793, he felt that his true province lay in that science. He went in 1800 to Freiberg to study for nearly two years under Werner, and spent two more in continental travel. In 1804 he succeeded Dr Walker as regius professor of natural history in Edinburgh university, and became perhaps the first eminent exponent in Great Britain of the Wernerian geological system; but when he found that theory untenable, he frankly announced his conver- sion to the views of Hutton. As a teacher, Jameson was remark- able for his power of imparting enthusiasm to his students, and from his class-room there radiated an influence which gave a marked impetus to the study of geology in Britain. His energy also, by means of government aid, private donation and personal outlay, amassed a great part of the splendid collection which nc w occupies the natural history department of the Royal Scottish Museum in Edinburgh. In 1819 Jameson,

with Sir David Brewster, started the Edinburgh Philosophical Journal, which after the tenth volume remained under his sole conduct till his death, which took place in Edinburgh on the 19th of April 1854. His bust now stands in the hall of the Edinburgh University library.

Jameson was the author of Outline of the Mineralogy of the Shetland Islands and of the Island of Arran (1798), incorporated with Miner- alogy of the Scottish Isles (1800) ; Mineralogical Description of Scotland, vol. i. pt. 1. (Dumfries, 1805); this was to have been the first of a series embracing all Scotland ; System of Mineralogy (3 vols. , 1 804-

1808; 3rd ed., 1820); Elements of Geognosy (1809); Mineralogical Travels through the Hebrides, Orkney and Shetland Islands (2 vols., 1813); and Manual of Mineralogy (1821); besides a number of occasional papers, of which a list will be found in the Edinburgh New Philosophical Journal for July 1854, along with a portrait and bio- graphical sketch of the author.

JAMESTOWN, a city and the county-seat of Stutsman county, North Dakota, U.S.A., on the James River, about 93 m. W. of Fargo. Pop. (1900), 2853, of whom 587 were foreign-barn; (1905) 5093; (1910^ 435° Jamestown is served by the Northern Pacific railway, of which it is a division head- quarters. At Jamestown is St John's Academy, a school for girls, conducted by the Sisters of St Joseph. The state hospital for the insane is just beyond the city limits. The city is the commercial centre of a prosperous farming and stock- raising region in the James River valley, and has grain-elevators and flour-mills. Jamestown was first settled in 1873, near Fort Seward, a U.S. military post established in 1872 and abandoned in 1877, and was chartered as a city in 1883.

JAMESTOWN, a city of Chautauqua county, New York, U.S.A., at the S. outlet of Chautauqua Lake, 68 m. S. by W. of Buffalo. Pop. (1900), 22,892, of whom 7270 were foreign-born, mostly Swedish; (1910 census) 31,297. It is served by the Erie and the Jamestown, Chautauqua & Lake Erie railways, by electric lines extending along Lake Chautauqua to Lake Erie on the N. and to Warren, Pennsylvania, on the S., and by summer steamboat lines en Lake Chautauqua. Jamestown is situated among the hills of Chautauqua county, and is a popular summer resort. There is a free public library. A supply of natural gas (from Pennsylvania) and a fine water-power combine to render Jamestown a manufacturing centre of considerable importance. In 1905 the value of its factory products was $10,349,752, an increase of 33-9% since 1900. The city owns and operates its electric-lighting plant and its water-supply system, the water, of exceptional purity, being obtained from artesian wells 4 m. distant. Jamestown was settled in 18 10, was incorporated in 1827, and was

chartered as a city in 1886. The city was named in honour of James Prendergast, an early settler.

JAMESTOWN, a former village in what is now James City county, Virginia, U.S.A., on Jamestown Island, in the James River, about 40 m. above Norfolk. It was here that the first permanent English settlement in America was founded on the 13th of May 1607, that representative government was inau- gurated on the American Continent in 1619, and that negro servitude was introduced into the original thirteen colonies, also in 1619. In Jamestown was the first Anglican church built in America. The settlement was in a low marshy district which proved to be unhealthy; it was accidentally burned in January 1608, was almost completely destroyed by Nathaniel Bacon in September 1676, the state house and other buildings were again burned in 1698, and after the removal of the seat of government of Virginia from Jamestown to the Middle Plantations (now Williamsburg) in 1699 the village fell rapidly into decay. Its population had never been large: it was about 490 in 1609, and 1.83 in 1623; the mortality was always very heavy. By the middle of the 19th century the peninsula on which Jamestown had been situated had become an island, and by 1900 the James River had worn away the shore but had hardly touched the territory of the " New Towne " (1619), immediately E. of the first settlement; almost the only visible remains, however, were the tower of the brick church and a few gravestones. In 1900 the association for the preservation of Virginia antiquities, to which the site was deeded in 1893, induced the United States government to build a wall to prevent the further encroachment of the river; the foundations of several of the old buildings have since been uncovered, many interesting relics have been found, and in 1907 there were erected a brick church (which is as far as possible a reproduction of the fourth one built in 1639-1647), a marble shaft marking the site of the first settlement, another shaft commemorating the first house of burgesses, a bronze monument to the memory of Captain John Smith, and another monument to the memory of Pocahontas. At the head of

Jamestown peninsula Cornwallis, in July 1781, attempted to trick the Americans under Lafayette and General Anthony Wayne by displaying a few men on the peninsula and concealing the principal part of his army on the mainland; but when Wayne discovered the trap he made first a vigorous charge, and then a retreat to Lafayette's line. Early in the Civil War the Con- federates regarded the site (then an island) as of such strategic importance that (near the brick church tower and probably near

the site of the first fortifications by the original settlers) they erected heavy earthworks upon it for defence. (For additional details concerning the early history of Jamestown, see Virginia: History.)

The founding at Jamestown of the first permanent English- speaking settlement in America was celebrated in 1907 by the Jamestown tercentennial exposition, held on grounds at Sewell's Point on the shore of Hampton Roads. About twenty foreign nations, the federal government, and most of the states of the union took part in the exposition.

See L. G. Tyler, The Cradle of the Republic: Jamestown and James River (Richmond, 2nd ed., 1906); Mrs R. A. Pryor, The Birth of the Nation: Jamestown, 1607 (New York, 1907); and particularly S. H. Yonge, The Site of Old " James Towne," 1607-1698 (Richmond, 1904), embodying the results of the topographical investigations of the engineer in charge of the river-wall built in 1900-1901.

JAMI (NCr-ed-din 'Abd-ur-rahman Ibn Ahmad) (1414- 1492), Persian poet and mystic, was born at Jam in Khorasan, whence the name by which he is usually known. In his poems he mystically utilizes the connexion of the name with the same word meaning " wine-cup." He was the last great classic poet of Persia, and a pronounced mystic of the Sufic philosophy. His three divans (1479-1491) contain his lyrical poems and odes; among his prose writings the chief is his Bahdristdn ("Spring-garden") (1487); and his collection of romantic poems, Haft Aurang (" Seven Thrones "), contains the Salaman via A bsdl and his YUsuf wa Zalikha (Joseph and Potiphar's wife).

On Jami's life and works see V. von Rosenzweig, Biographische Notizen iiber Mewlana Abdurrahman Dschami (Vienna, 1840); Gore Ouseley, Biographical Notices of Persian Poets (1846); W. N. Lees, A Biographical Sketch of the Mystic Philosopher and Foet Jami (Calcutta, 1859); E. Beauvois s.v. Djami in Nouvelle Biographie generate; and H. Ethe in Geigerand Kuhn's Grundriss der iranischen Philologic, ii. There are English translations of the Baharistan by E. Rehatsek (Benares, 1887) and Sorabji Fardunji (Bombay, 1899); of Salaman iva Absal by Edward FitzGerald (1856, with a notice ot Jami's life); of YUsuf wa Zalikha by R. T. H. Griffith (1882) and A. Rogers (1892); also selections in English by F. Hadland Davis, The Persian Mystics: Jami (1908). (See also Persia : Literature.)

JAMIESON, JOHN (1759-1838), Scottish lexicographer, son of a minister, was born in Glasgow, on the 3rd of March 1759. He was educated at Glasgowˆ "University, and subsequently attended classes in Edinburgh. After six years' theological study, Jamieson was licensed to preach in 1789*

and became pastor of an Anti-burgher congregation in Forfar; and in 1797 he was called to the Anti-burgher church in Nicolson Street, Edinburgh. The union of the Burgher and Anti-burgher sections of the Secession Church in 1820 was largely due to his exertions. He retired from the ministry in 1830 and died in Edinburgh on the 1 2th of July 1838.

Jamieson's name stands at che head of a tolerably long list of works in the Biblioiheca britannica; but by far his most important book is the laborious and erudite compilation, best described by its own title-page: An Etymological Dictionary of the Scottish Lan- guage; illustrating the words in their different significations by examples from Ancient and Modern Writers; shewing their Affinity to those of other Languages, and especially the Northern; explaining many terms which though now obsolete in England were formerly common to both countries; and elucidating National Rites, Customs and Institutions in their Analogy to those of other nations; to which is prefixed a Disserta- tion on the Origin of the Scottish Language. This appeared in 2 vols., 4to, at Edinburgh in 1808, followed in 1825 by a Supplement, in 2 vols., 4to, in which he was assisted by scholars in all parts of the country. A revised edition by Longmuir and Donaldson was issued in 1879-1887.

JAMIESON, ROBERT (c. 1780-1844), Scottish antiquary, was born in Morayshire. In 1806 he published a collection of Popular Ballads and Songs from Tradition, Manuscript and

Scarce Editions. Two pleasing lyrics of his own were included. Scott, through whose assistance he received a government post at Edinburgh, held Jamieson in high esteem and pointed out his skill in discovering the connexion between Scandinavian and Scottish legends. Jamieson's work preserved much oral tradition which might otherwise have been lost. He was associated with Henry Weber and Scott in Illustrations of Northern Antiquities (1814). He died on the 24th of September

1844.

JAMKHANDI, a native state of India, in the Deccan division of Bombay, ranking as one of the southern Mahratta Jagirs. Area, 524 sq. m. Pop. (1901), 105,357; estimated revenue, £37,000; tribute, £1300. The chief is a Brahman of the Patwardhan family. Cotton, wheat and millet are produced, and cotton and silk cloth are manufactured, though not exported. The town of Jamkhandi, the capital, is situated 68 m. E. of Kolhapur. Pop. (1901), 13,029.

JAMMU, or Jummoo, the capital of the state of Jammu and Kashmir in Northern India, on the river Tavi (Ta-wi), a tributary of the Chenab. Pop.

(1901), 36,130. The town and palace stand upon the right bank of the river; the fort overhangs the left bank at an elevation of 150 ft. above the stream. The lofty whitened walls of the palace and citadel present a striking appearance from the surrounding country. Extensive pleasure grounds and ruins of great size attest the former prosperity of the city when it was the seat of a Rajput dynasty whose dominions extended into the plains and included the modern district of Sialkot. It was afterwards conquered by the Sikhs, and formed part of Ran jit Singh's dominions. After his death it was acquired by Gulab Singh as the nucleus of his dominions', to which the British added Kashmir in 1846. It is connected with Sialkot in the Punjab by a railway 16 m. long. In 1898 the town was devastated by a fire, which destroyed most of the public offices.

The state of Jammu proper, as opposed to Kashmir, consists of a submontane tract, forming the upper basin of the Chenab. Pop. (1901), 1,521,307, showing an increase of 5% in the decade. A land settlement has recently been introduced under British supervision.

JAMNIA ('lanvla or 'Ia/weia), the Greek form of the Hebrew name Jabneel — i.e. " God causeth to build " (Josh. xv. n) — or Jabneh (2 Chron. xxvi. 6), the modern Arabic Yebna, a town of Palestine, on the border between Dan and Judah, situated 13 m. S. of Jaffa, and 4 m. E. of the seashore. The modern village stands on an isolated sandy hillock, surrounded by gardens with olives to the north and sand-dunes to the west. It con- tains a small crusaders' church, now a mosque. Jamnia belonged to the Philistines, and Uzziah of Judah is said to have taken it (2 Chron. xxvi. 6). In Maccabean times Joseph and Azarias attacked it unsuccessfully (1 Mace. v. 55-62; 2 Mace, xii. 8 seq. is untrustworthy). Alexander Jannaeus subdued it, and under Pompey it became Roman. It changed hands several times, is mentioned by Strabo (xvi. 2) as being once very populous, and in the Jewish war was taken by Vespasian. The population was mainly Jewish (Philo, Leg. ad Gaium, § 30), and the town is principally famous as having been the seat of the Sanhedrin and the religious centre of Judaism from a.d. 70 to 135. It sent a bishop to Nicaea in 325. In 1144 a crusaders' fortress was built on the hill, which is often mentioned under the name Ibelin. There was also a Jabneel in Lower Galilee (Josh. xix. 33), called later Caphar Yama, the present village Yemma, 8 m. S. of Tiberias; and another fortress in Upper Galilee was named Jamnia (Josephus, Vita, 37). Attempts have been made to unify these two Galilean sites, but without success.

JAMRUD, a fort and cantonment in India, just beyond the border of Peshawar district, North- West Frontier Province, situated at the mouth of the Khyber Pass, io| m. W. of Peshawar city, with which it is connected by a branch railway. It was occupied by Hari Singh, Ranjit Singh's

commander in 1836; but in April 1837 Dost Mahommed sent a body of Afghans to attack it. The Sikhs gained a doubtful victory, with the loss of

1 So

their general. During the military operations of 1878-79 Jamrud became a place of considerable importance as the frontier outpost on British territory towards Afghanistan, and it was also the base of operations for a portion of the Tirah campaign in 1897-1898. It is the headquarters of the Khyber Rifles, and the collecting station for the Khyber tolls. Pop.

(1901), 1848.

JAMS AND JELLIES. In the article Food Preservation it is pointed out that concentrated sugar solution inhibits the growth of organisms and has, therefore, a preservative action. The preparation of jams and jellies is based upon that fact. All fresh and succulent fruit contains a large percentage of water, amounting to at least four-fifths of the whole, and a compara- tively small proportion of sugar, not exceeding as a rule from 10 to 15%. Such fruit is naturally liable to decomposition unless the greater proportion of the water is removed or the percentage of sugar is greatly increased. The jams and jellies of commerce are fruit preserves containing so much added sugar that the total amount of sugar forms about two-thirds of the weight of the articles. All ordinary edible fruit can be and is made into jam. The fruit is sometimes pulped and stoned, sometimes used whole and unbroken; oranges are sliced or shredded. For the preparation of jellies only certain fruit is suitable, namely such as contains a peculiar material which on boiling becomes dissolved and on cooling solidifies with the formation of a gelatinous mass. This material, often called pectin, occurs mainly in comparatively acid fruit like goose- berries, currants and apples, and is almost absent from straw- berries and raspberries. It is chemically a member of the group of carbohydrates, is closely allied with vegetable gums abun- dantly formed by certain sea-weeds and mosses (agar-agar and Iceland moss), and is probably a mixture of various pentoses. Pentoses are devoid of food-value, but, like animal gelatine, with which they are in no way related, can form vehicles for food material. Some degree of gelatinization is aimed at also in jams; hence to such fruits as have no gelatinizing power an addition of apple or gooseberry juice, or even of Iceland moss or agar-agar, is made. Animal gelatin is very rarely used.

The art of jam and jelly making was formerly domestic, but has become a very large branch of manufacture. For the production of a thoroughly satisfactory conserve the boiling- down must be carried out very rapidly, so

that the natural colour of the fruit shall be little affected. Considerable experi- ence is required to stop at the right point; too short boiling leaves an excess of water, leading to fermentation, while over- concentration promotes crystallization of the sugar. The manufactured product is on that account, as a rule,more uniform and bright than the domestic article. The finish of the boiling is mostly judged by rule of thumb, but in some scientifically conducted factories careful thermometric observation is em- ployed. Formerly jams and jellies consisted of nothing but fruit and sugar; now starch-glucose is frequently used by manufacturers as an ingredient. This permits of the production of a slightly more aqueous and gelatinous product, alleged also to be devoid of crystallizing power, as compared with the home- made article. The addition of starch-glucose is not held to be an adulteration. Aniline colours are very frequently used by manufacturers to enhance the colour, and the effect of an excess of water is sought to be counteracted by the addition of some salicylic acid or other preservative. There has long been, and still exists to some extent, a popular prejudice in favour of sugar obtained from the sugar-cane as compared with that of the sugar-beet. This prejudice is absolutely baseless, and enormous quantities of. beet-sugar are used in the boiling of jam. Adul- teration in the gross sense, such as a substantial addition of coarse pulp, like that of turnips or mangolds,very rarely occurs; but the pulp of apple and other cheap fruit is often admixed without notice to the purchaser. The use of colouring matters and preservatives is discussed at length in the article Adulteration. (O. H.)*

JANESVILLE, a city and the county-seat of Rock County, Wisconsin, U.S.A., situated on both sides of the Rock river,

70 m. S.W. of Milwaukee and 90 m. N.W. of Chicago. Pop. (1900), 13,185, of whom 2409 were foreign-born; (rgio census), 13,894. It is served by the Chicago & North-Western and the Chicago, Milwaukee & St Paul railways, and by electric lines connecting with Madison and Beloit, Wis., and Rockford, Illinois. The Rock river is not commercially navigable at this point, but furnishes valuable water-power for manufacturing purposes. The city is picturesquely situated on bluffs above the river. Janesville is the centre of the tobacco trade of the state, and has various manufactures. The total value of the city's factory product in 1905 was $3,846,038, an increase of 20-8 % since 1900. Its public buildings include a city hall, court house, post office, city hospital and a public library. It is the seat of a school for the blind, opened as a private institu- tion in 1849 and taken over by the state in 1850, the first charitable institution controlled by the state, ranking as one of the most successful of its kind in the United States. The first settlement was made here about 1834. Janesville was named in honour of Henry F. Janes, an early settler, and was chartered as a city in 1853.

JANET, PAUL (1823-1899), French philosophical writer, was born in Paris on the 30th of April 1823. He was professor of moral philosophy at Bourges (1845-1848) and Strassburg (1848— 1857), and of logic at the ly cee Louis-le- Grand, Paris(i857-i864). In 1864 he was appointed to the chair of philosophy at the Sor- bonne, and elected a member of the academy of the moral and political sciences. He wrote a large number of books and articles upon philosophy, politics and ethics, on idealistic lines : La Famille, Histoire de la philosophic dans I'antiquite et dans le temps moderne, Histoire de la science politique, Philosophic de la Revolution Franqaise, &c. They are not characterized by much originality of thought. In philosophy he was a follower of Victor Cousin, and through him of Hegel. His principal work in this line, Theorie de la morale, is little more than a somewhat patronizing reproduction of Kant. He died in October 1899.

JANGIPUR, or Jahangirpur, a town of British India, in Murshidabad district, Bengal, situated on the Bhagirathi. Pop. (1901), 10,921. The town is said to have been founded by the Mogul emperor Jahangir. During the early years of British rule it was an important centre of the silk trade, and the site of one of the East India Company's commercial residencies. Jangi- pur is now best known as the toll station for registering all the traffic on the Bhagirathi. The number of boats registered annually is about 10,000.

JANIN, JULES GABRIEL (1804-1874), French critic, was born at St Etienne (Loire) on the 16th of February 1804, and died near Paris on the 19th of June 1874. His father was a lawyer, and he was well educated, first at St Etienne, and then at the lycee Louis-le-Grand in Paris. He betook himself to journalism very early, and worked on the Figaro, the Quotidienne, &c, until in 1830 he became dramatic critic of the Journal des DSbats. Long before this, however, he had made a considerable literary reputation, for which indeed his strange novel L'Ane mort et la jemme guillotinee (1829) would have sufficed. La Confession (1830), which followed, was less remarkable in substance but even more so in style; and in Barnave (1831) he attacked the Orleans family. From the day, however, when Janin became the theatrical critic of the Dibats, though he continued to write books indefatigably, he was to most Frenchmen a dramatic critic and nothing more. He was outrageously inconsistent, and judged thirigs from no general point of view whatsoever, though his judgment was usually good-natured. Few journalists have ever been masters of a more attractive fashion of saying the first thing that came into their heads. After many years of feuilleton writing he collected some of his articles in the work called Histoire de la littirature dramatique en France (1853-1858), which by no means deserves its title. In 1865 he made his first attempt upon the Academy, but was not successful till five years later. Meanwhile he had not been content with his feuilletons, written persistently about all manner of

things. No one was more in request with the Paris publishers for prefaces, letterpress to illustrated books and such trifles. He travelled (picking up in

one of his journeys a curious windfall, a country house at Lucca, in a lottery), and wrote accounts of his travels; he wrote numer- ous tales and novels, and composed many other works, of which by far the best is the Fin d'un monde et du neveu de Rameau (1861), in which, under the guise of a sequel to Diderot's master- piece, he showed his great familiarity with the late 18th century. He married in 1841; his wife had money, and he was always in easy circumstances. In the early part of his career he had many quarrels, notably one with Felix Pyat (1810-1889), whom he prosecuted successfully for defamation of character. For the most part his work is mere improvisation, and has few ele- ments of vitality except a light and vivid style. His GLuvres choisies (12 vols., i87S-i8y8)were edited by A. de la Fitzeliere.

A study on Janin with a bibliography was published by A. Piedag- nel in 1874. See also Sainte-Beuve, Causeries du lundi, ii. and v., and Gustave Planche, Portraits litteraires.

JANISSARIES (corrupted from Turkish yeni cMri, new troops), an organized military force constituting until 1826 the standing army of the Ottoman empire. At the outset of her history Turkey possessed no standing army. All Moslems capable of bearing arms served as a kind of volunteer yeomanry known as akinjis; they were summoned by public criers, or, if the occasion required it, by secret messengers. It was under Orkhan that a regular paid army was first organized: the soldiers were known as yaya or piyade. The result was unsatisfactory, as the Turcomans, from whom these troops were recruited, were unaccustomed to fight on foot or to submit to military discipline. Accordingly in 1330, on the advice of Chendereli Kara Khalil, the system known as devshurme or forced levy, was adopted, whereby a certain number of Christian youths (at first 1000) were every year taken from their parents and, after undergoing a period of apprenticeship, were enrolled as yeni cheri or new troops. The venerable saint Haji Bektash, founder of the Bek- tashi dervishes, blessed the corps and promised them victory; he remained ever after the patron saint of the janissaries.

At first the corps was exclusively recruited by the forced levy of Christian children, for which purpose the officer known as tournaji-bashi, or head-keeper of the cranes, made periodical tours in the provinces. The fixed

organization of the corps dates only from Mahommed II., and its regulations were subse- quently modified by Suleiman I. In early days all Christians were enrolled indiscriminately; later those from Albania, Bosnia and Bulgaria were preferred. The recruits while serving their apprenticeship were instructed in the principles of the faith by khojas, but according to D'Ohsson (vii. 327) they were not obliged to become Moslems.

The entire corps, commanded by the aga of the janissaries, was known as the ojak (hearth) ; it was divided into ortas or units of varying numbers; the oda (room) was the name given to the barracks in which the janissaries were lodged. There were, after the reorganization of Suleiman I., 196 ortas of three classes, viz. the jemaat, comprising 101 ortas, the beuluk, 61 ortas, and the sekban, or seimen, 34 ortas; to these must be added 34 ortas of ajami or apprentices. The strength of the orta varied greatly, sometimes being as low as 100, sometimes rising considerably beyond its nominal war strength of 500. The distinction between the different classes seems to have been principally in name; in theory the jemaat, or yaya better, were specially charged with the duty of frontier-guards; the beuluks had the privilege of serving as the sultan's guards and of keeping the sacred banner in their custody.

Until the accession of Murad III. (1574) the total effective of the janissaries, including the ajami or apprentices, did not exceed 20,000. In 1582 irregularities in the mode of admission to the ranks began. Soon parents themselves begged to have their children enrolled, so great were the privileges attaching to the corps; later the privilege of enlistment was restricted to the children or relatives of former janissaries; eventually the regulations were much relaxed, and any person was admitted, only negroes being excluded. In 1591 the ojak numbered 48,688 men. Under Ibrahim (1640-1648) it was reduced by Kara Mustafa to 17,000; but it soon rose again, and at the

accession of Mahommed IV. (1648), the accession-bakshish was distributed to 50,000 janissaries. During the war of 1 683-1 698 the rules for admission were suspended, 30,000 recruits being received at one time, and the effective of the corps rising to 70,000; about 1805 it numbered more than 112,000; it went on increasing until the destruction of the janissaries, when it reached 135,000. It would perhaps be more correct to say that these are the numbers figuring on the pay-sheets, and that they doubtless largely exceed the total of the men actually serving in the ranks.

Promotion to the rank of warrant officer was obtained by long or distinguished service; it was by seniority up to the rank of odabashi, but odabashis were promoted to the rank of chorbaji (commander of an orta) solely by selection. Janissaries advanced in thejr own orta, which they left

only to assume the command of another. Ortas remained permanently stationed in the fortress towns in which they were in garrison, being displaced in time of peace only when some violent animosity broke out between two companies. There were usually 12 in garrison at Belgrade, 14 at Khotin, 16 at Widdin, 20 at Bagdad, &c. The commander was frequently changed. A new chorbaji was usually appointed to the command of an orta stationed at a frontier post; he was then transferred elsewhere, so that in course of time he passed through different provinces.

In time of peace the janissary received no pay. At first his war pay was limited to one aspre per diem, but it was eventually raised to a minimum of three aspres, while veterans received as much as 29 aspres, and retired officers from 30 to 120. The aga received 24,000 piastres per annum; the ordinary pay of a commander was 120 aspres per diem. The aga and several of his subordinates received a percentage of the pay and allowance of the troops; they also inherited the property of deceased janissaries. Moreover, the officers profited largely by retaining the names of dead or fictitious janissaries on the pay-rolls. Rations of mutton, bread and candles were furnished by the government, the supply of rice, butter and vegetables being at the charge of the commandant. The rations would have been entirely inadequate if the janissaries had not been allowed, contrary to the regulations, to pursue different callings, such as those of baker, butcher, glazier, boatman, &c. At first the janissaries bore no other distinctive mark save the white felt cap. Soon the red cap with gold embroidery was substituted. Later a uniform was introduced, of which the distinctive mark was less the colour than the cut of the coat and the shape of the head-dress and turban. The only distinction in the costume of commanding officers was in the colour of their boots, those of the beuluks being red while the others were yellow; subordinate officers wore black boots.

The fundamental laws of the janissaries, which were very early infringed, were as follows: implicit obedience to their officers; perfect accord and union among themselves; abstinence from luxury, extravagance and practices unseemly for a soldier and a brave man; observance of the rules of Haji Bektash and of the religious law; exclusion from the ranks of all save those properly levied; special rules for the infliction of the death-penalty; promotion to be by seniority; janissaries to be admonished or punished by their own officers only; the infirm and unfit to be pensioned; janissaries were not to let their beards grow, not to marry, nor to leave their barracks, nor to engage in trade; but were to spend their time in drill and in practising the arts of war.

In time of peace the state supplied no arms, and the janissaries on service in the capital were armed only with clubs; they were forbidden to carry any arm save a cutlass, the only exception being at the frontier-posts. In time of

war the janissaries provided their own arms, and these might be any which took their fancy. However, they were induced by rivalry to procure the best obtainable and to keep them in perfect order. The banner of the janissaries was of white silk on which verses from the Koran were embroidered in gold. This banner was planted beside the aga's tent in camp, with four other flags in red cases, and his three horse-tails. Each orta had its flag, half-red and

half-yellow, placed before the tent of its commander. Each orta had two or three great caldrons used for boiling the soup and pilaw; these were under the guard of subordinate officers. A particular superstition attached to them: if they were lost in battle all the officers were disgraced, and the orta was no longer allowed to parade with its caldrons in public ceremonies. The janissaries were stationed in most of the guard-houses of Constantinople and other large towns. No sentries were on duty, but rounds were sent out two or three times a day. It was customary for the sultan or the grand vizier to bestow largess on an orta which they might visit.

The janissaries conducted themselves with extreme violence and brutality towards civilians. They extorted money from them on every possible pretext: thus, it was their duty to sweep the streets in the immediate vicinity of their barracks, but they forced the civilians, especially if rayas, to perform this task or to pay a bribe. They were themselves subject to severe corporal punishments; if these were to take place publicly the ojak was first asked for its consent.

At first a source of strength to Turkey as being the only well- organized and disciplined force in the country, the janissaries soon became its bane, thanks to their lawlessness and exactions. One frequent means of exhibiting their discontent was to set fire to Constantinople; 140 such fires are said to have been caused during the 28 years of Ahmed III.'s reign. The janissaries were at all times distinguished for their want of respect towards the sultans; their outbreaks were never due to a real desire for reforms of abuses or of misgovernment, but were solely caused to obtain the downfall of some obnoxious minister.

The first recorded revolt of the janissaries is in 1443, on the occasion of the second accession of Mahommed II., when they broke into rebellion at Adrianople. A similar revolt happened at his death, when Bayazid II. was forced to yield to their demands and thus the custom of the accession-bakshish was established; at the end of his reign it was the janissaries who

forced Bayazid to summon Prince Selim and to hand over the reins of power to him. During the Persian campaign of Selim I. they mutinied more than once. Under Osmanll. their disorders reached their greatest height and led to the dethronement and murder of the sultan. It would be tedious to recall all their acts of insubordination. Throughout Turkish history they were made use of as instruments by unscrupulous and ambitious statesmen, and in the 17th century they had become a praetorian guard in the worst sense of the word. Sultan Selim III. in despair endeavoured to organize a properly drilled and disciplined force, under the name of nizam-i-jedid, to take their place; for some time the janissaries regarded this attempt in sullen silence; a curious detail is that Napoleon's ambassador Sebastiani strongly dissuaded the sultan from taking this step. Again serving as tools, the janissaries dethroned Selim III. and obtained the abolition of the nizam-i-jedid. But after the successful revo- lution of Bairakdar Pasha of Widdin the new troops were re- established and drilled: the resentment of the janissaries rose to such a height that they attacked the grand vizier's house, and after destroying it marched against the sultan's palace. They were repulsed by cannon, losing 600 men in the affair (1806). But such was the excitement and alarm caused at Constantinople that the nizam-i-jedid, or sekbans as they were now called, had to be suppressed. During the next 20 years the misdeeds and tur- bulence of the janissaries knew no bounds. Sultan Mahmud II., powerfully impressed by their violence and lawlessness at his accession, and with the example of Mehemet Ali's method of suppressing the Mamlukes before his eyes, determined to rid the state of this scourge; long biding his time, in 1825 he decided to form a corps of regular drilled troops known as eshkenjis. A Jetva was obtained from the Sheikh-ul-Islam to the effect that it was the duty of Moslems to acquire military science. The imperial decree announcing the formation of the new troops was promulgated at a grand council, and the high dignitaries present (including certain of the principal officers of the janissaries who concurred) undertook to comply with its provisions. But the janissaries rose in revolt, and on the 10th of June 1826, began

to collect on the Et Meidan square at Constantinople; at mid- night they attacked the house of the aga of janissaries, and, finding he had made good his escape, proceeded to overturn the caldrons of as many ortas as they could find, thus forcing the troops of those ortas to join the insurrection. Then they pillaged and robbed throughout the town. Meanwhile the government was collecting its forces; the ulema, consulted by the sultan, gave the following fetva: " If unjust and violent men attack their brethren, fight against the aggressors and send them before their natural judge ! " On this the sacred standard of the prophet was unfurled, and war was formally declared against these disturbers of order. Cannon were brought against the Et Meidan, which was surrounded by troops. Ibrahim Aga, known as Kara

Jehennum, the commander of the artillery, made a last appeal to the janissaries to surrender; they refused, and fire was opened upon them. Such as escaped were shot down as they fled; the barracks where many found refuge were burnt; those who were taken prisoner were brought before the grand vizier and hanged. Before many days were over the corps had ceased to exist, and the janissaries, the glory of Turkey's early days and the scourge of the country for the last two centuries, had passed for ever from the page of her history.

.See M. d'Ohsson, Tableaux de I'empire ottoman (Paris, 1787- 1820); Ahmed Vefyk, Lehje-i-osmanie (Constantinople, 1290-1874); A. Djevad Bey, £tat militaire ottoman (Constantinople, 1885).

JANIUAY, a town of the province of Iloilo, Panay, Philippine Islands, on the Suague river, about 20 m. W.N.W. of Iloilo, the capital. Pop. (1903), 27,399, including Lambunao (6661) annexed to Janiuay in 1903. The town commands delightful views of mountain and valley scenery. An excellent road connects it with Pototan, about 10 m. E. The surrounding country is hilly but fertile and well cultivated, producing rice, sugar, tobacco, vegetables (for the Iloilo market), hemp and Indian corn. The women weave and sell beautiful fabrics of pina, silk, cotton and abaca. The language is Panay- Visayan. Janiuay was founded in 1578; it was first established in the mountains and was subsequently removed to its present site.

JANJIRA, a native state of India, in the Konkan division of Bombay, situated along the coast among the spurs of the Western Ghats, 40 m. S. of Bombay city. Area, 324 sq. m. Pop. (1901), 85,414, showing an increase of 4% in the decade. The estimated revenue is about £37,000; there is no tribute. The chief, whose title is Nawab Sahib, is by descent a Sidi or Abyssinian Mahommedan; and his ancestors were for many generations admirals of the Mahommedan rulers of the Deccan. The state, popularly known as Habsan (= Abyssinian), did not come under direct subordination to the British until 187a. It supplies sailors and fishermen, and also firewood, to Bombay, with which it is in regular communication by steamer.

The Nawab of Janjira is also chief of the state of Jafarabad (q.v.).

JAN MAYEN, an arctic island between Greenland and the north of Norway, about 71° N. 8° W. It is 34 m. long and 9 in greatest breadth, and is divided into two parts by a narrow isthmus. The island is of volcanic formation and mountainous, the highest summit being Beerenberg in the north (8350 ft.). Volcanic eruptions have been observed. Glaciers are fully developed. Henry Hudson discovered the island in 1607 and called it

Hudson's Tutches or Touches. Thereafter it was several times observed by navigators who successively claimed its discovery and renamed it. Thus, in 161 1 or the following year whalers from Hull named it Trinity Island; in 16 12 Jean Vrolicq, a French whaler, called it lie de Richelieu; and in 1614 Joris Carolus named one of its promontories Jan Meys Hoek after the captain of one of his ships. The present name of the island is derived from this, the claim of its discovery by a Dutch navigator, Jan Mayen, in 1611, being unsupportable. The island is not permanently inhabited, but has been frequently visited by explorers, sealers and whalers; and an Austrian station for scientific observations was maintained here for a year in 1882-1883. During this period a mean temperature of 27-8° F. was recorded.

JANSEN, CORNEOUS (1585-1638), bishop of Ypres, and father of the religious revival known as Jansenism, was born of humble Catholic parentage at Accoy in the province of Utrecht on the 28th of October 1585. In 1602 he entered the university of Louvain, then in the throes of a violent conflict between the Jesuit, or scholastic, party and the followers of Michael Baius, who swore by St Augustine. Jansen ended by attaching himself strongly to the latter party, and presently made a momentous friendship with a like-minded fellow-student, Du Vergier de Hauranne, afterwards abbot of Saint Cyran. After taking his degree he went to Paris, partly to recruit his health by a change of scene, partly to study Greek. Eventually he joined Du Vergier at his country home near Bayonne, and spent some years teaching at the bishop's college. All his spare time was spent in studying the early Fathers with Du Vergier, and laying plans for a reformation of the Church. In 1616 he returned to Louvain, to take charge of the college of St Pulcheria, a hostel for Dutch students of theology. Pupils found him a somewhat choleric and exacting master and academic society a great recluse. However, he took an active part in the university's resistance to the Jesuits; for these had established a theological school of their own in Louvain, which was proving a formidable rival to the official faculty of divinity. In the hope of repressing their encroachments, Jansen was sent twice to Madrid, in 1624 and 1626; the second time he narrowly escaped the Inquisition. He warmly supported the Catholic missionary bishop of Holland, Rovenius, in his contests with the Jesuits, who were trying to evangelize that country without regard to the bishop's wishes. He also crossed swords more than once with the Dutch Presby- terian champion, Voetius, still remembered for his attacks on Descartes. Antipathy to the Jesuits brought Jansen no nearer Protestantism; on the contrary, he yearned to beat these by« their own weapons, chiefly by

showing them that Catholics could interpret the Bible in a manner quite as mystical and pietistic as theirs. This became the great object of his lectures, when he was appointed regius professor of scriptural interpre- tation at Louvain in 1630. Still more was it the object of his Augnstinus, a bulky treatise on the theology of St Augustine, barely finished at the time of his death. Preparing it had been his chief occupation ever since he went back to Louvain. But Jansen, as he said, did not mean to be a school-pedant all his life; and there were moments when he dreamed political dreams. He looked forward to a time when Belgium should throw off the Spanish yoke and become an independent Catholic republic on the model of Protestant Holland. These ideas became known to his Spanish rulers, and to assuage them he wrote a philippic called the Mars gallicus (1635), a violent attack on French ambitions generally, and on Richelieu's indifference to inter- national Catholic interests in particular. The Mars gallicus did not do much to help Jansen's friends in France, but it more than appeased the wrath of Madrid with Jansen himself; in 1636 he was appointed bishop of Ypres. Within two years he was cut off by a sudden illness on the 6th of May 1638; the Augustinus, the book of his life, was published posthumously in

1640.

Full details as to Jansen's career will be found in Reuchlin's Ceschickte von Port Royal (Hamburg, 1 839) , vol. i. See also Jansenius by the Abbes Callawaert and Nols (Louvain, 1893). (St C.)

JANSENISM, the religious principles laid down by Cornelius Jansen in his Augustinus. This was simply a digest of the teach- ing of St Augustine, drawn up with a special eye to the needs of the 1 7th century. In Jansen's opinion the church was suffering from three evils. The official scholastic theology was anything but evangelical. Having set out to embody the mysteries of faith in human language, it had fallen a victim to the excellence of its own methods; language proved too strong for mystery. Theology sank into a branch of dialectic; whatever would not fit in with a logical formula was cast aside as useless. But average human nature does not take kindly to a syllogism, and theology had ceased to have any appreciable influence on popular religion. Simple souls found their spiritual pasture in little mincing " devo- tions "; while robuster minds built up for themselves a natural

moralistic religion, quite as close to Epictetus as to Christianity. All these three evils were attacked by Jansen. As against the theologians, he urged that in a spiritual religion experience, not reason, must be our guide. As against the stoical self-sufficiency of the moralists, he dwelt on the helplessness of man and his dependence on his maker. As against the ceremonialists, he maintained that no amount of church-going will save a

man, unless the love of God is in him. But this capacity for love no one can give himself. If he is born without the religious instinct, he can only receive it by going through a process of " conver- sion." And whether God converts this man or that depends on his good pleasure. Thus Jansen's theories of conversion melt into predestination; although, in doing so, they somewhat modify its grimness. Even for the worst miscreant there is hope — for who can say but that God may yet think fit to convert him? Jansen's thoughts went back every moment to his two spiritual heroes, St Augustine and St Paul, each of whom had been " the chief of sinners."

Such doctrines have a marked analogy to those of Calvin; but in many ways Jansen differed widely from the Protestants. He vehemently rejected their doctrine of justification by faith; con- version might be instantaneous, but it was only the beginning of a long and gradual process of justification. Secondly, although the one thing necessary in religion was a personal relation of the human soul to its maker, Jansen held that that relation was only possible in and through the Roman Church. Herein he was following Augustine, who had managed to couple together a high theory of church authority and sacramental grace with a strongly personal religion. But the circumstances of the 17th century were not those of the 5th; and Jansen landed his follow- ers in an inextricable confusion. What were they to do, when the outward church said one thing, and the inward voice said another? Some time went by, however, before the two authori- ties came into open conflict. Jansen's ideas were popularized in France by his friend Du Vergier, abbot of St Cyran; and he dwelt mainly on the practical side of the matter — on the necessity of conversion and love of God, as the basis of the religious life. This brought him into conflict with the Jesuits, whom he accused of giving absolution much too easily, without any serious inquiry into the dispositions of their penitent. His views are expounded at length by his disciple, Antoine Arnauld, in a book on Frequent Communion (1643). This book was the first manifestation of Jansenism to the general public in France, and raised a violent storm. But many divines supported Arnauld; and no official action was taken against his party till 1649. In that year the Paris University condemned five propositions from Jansen's Augustinus, all relative to predestination. This censure, backed by the signatures of eighty-five bishops, was sent up to Rome for endorsement; and in 1653 Pope Innocent X. declared all five propositions heretical.

This decree placed the Jansenists between two fires; for although the five propositions only represented one side of Jansen's teaching, it was recognized by both parties that the whole question was to be fought out on this issue. Under the leadership of Arnauld, who came of a great family of lawyers, the Jansenists accordingly took refuge in a series of legal tactics. Firstly, they denied that Jansen had meant the propositions in the sense condemned. Alexander VII. replied (1656) that his predecessor had

condemned them in the sense intended by their author. Arnauld retorted .that the church might be infallible in abstract questions of theology; but as to what was passing through an author's mind it knew no more than any one else. However, the French government supported the pope. In 1656 Arnauld was deprived of his degree, in spite of Pascal's Provincial Letters (1656-1657), begun in an attempt to save him (see Pascal; Casuistry). In 1661 a formulary, or solemn renunciation of Jansen, was imposed on all his suspected followers; those who would not sign it went into hiding, or to the Bastille. Peace was only restored under Clement IX. in 1669. This peace was treated by Jansenist writers as a triumph; I really it was the beginning of their downfall. They had set out

to reform the Church of Rome; they ended by having to fight hard for a doubtful foothold within it. Even that foothold soon gave way. Louis XIV. was a fanatic for uniformity, civil and religious; the last thing he was likely to tolerate was a handful of eccentric recluses, who believed themselves to be in special touch with Heaven, and therefore might at any moment set their conscience up against the law. During the lifetime of his cousin, Madame de Longueville, the great protectress of the Jansenists, Louis stayed his hand; on her death (1679) the reign of severity began. That summer Arnauld, who had spent the greater part of his life in hiding, was forced to leave France for good.

Six years later he was joined in exile by Pasquier Quesnel who succeeded him as leader of the party. Long before his flight from France Quesnel had published a devotional commen- tary — Reflexions morales sur le Nouveau Testament — which had gone through many editions without exciting official suspicion. But in 1695 Louis Antoine de Noailles, bishop of Chalons, was made archbishop of Paris. He was known to be very hostile to the Jesuits, and at Chalons had more than once expressed official approval of Quesnel's Reflexions. So the Jesuit party determined to wreck archbishop and book at the same time. The Jansenists played into their hands bysuddenlyraising(i7oi) in the Paris divinity school the question whether it was necessary to accept the condemnation of Jansen with interior assent, or whether a " respectful silence " was enough. Very soon ecclesi- astical France was in a blaze. In 1703 Louis XIV. wrote to Pope Clement XL, proposing that they should take joint action to make an end of Jansenism for ever. Clement replied in 1705 with a bull condemning respectful silence. This measure only whetted Louis's appetite. He was growing old and increasingly superstitious; the affairs of his realm were going from bad to worse; he became frenziedly anxious to propitiate the

wrath of his maker by making war on the enemies of the Church. In 1 7 1 1 he asked the pope for a second, and still stronger bull, that would tear up Jansenism by the roots. The pope's choice of a book to condemn fell on Quesnel's Reflexions; in 17 13 appeared the bull Unigenitus, anathematizing no less than one-hundred- and-one of its propositions. Indeed, in his zeal against the Jansenists the pope condemned various practices in no way peculiar to their party; thus, for instance, many orthodox Catholics were exasperated at the heavy blow he dealt at popular Bible reading. Hence the bull met with much opposition from Archbishop de Noailles and others who did not call themselves Jansenists. In the midst of the conflict Louis XIV. died (September 1715); but the freethinking duke of Orleans, who succeeded him as regent, continued after some wavering to support the bull. Thereupon four bishops appealed against it to a general council; and the country became divided into " appellants " and " acceptants " (1717). The regent's disrepu- table minister, Cardinal Dubois, patched up an abortive truce in 1720, but the appellants promptly "re-appealed" against it. During the next ten years, however, they were slowly crushed, and in 1730 the Unigenitus was proclaimed part and parcel of the law of France. This led to a great quarrel with the judges, who were intensely Gallican in spirit (see Gallic anism), and had always regarded the Unigenitus as a triumph of ultramontanism. The quarrel dragged indefinitely on through the 18th century, though the questions at issue were really constitutional and political rather than religious.

Meanwhile the most ardent Jansenists had followed Quesnel to Holland. Here they met with a warm welcome from the Dutch Catholic body, which had always been in close sympathy with Jansenism, although without regarding itself as formally pledged to the Augustinus. But it had broken loose from Rome in 1702, and was now organizing itself into an independent church (see Utrecht). The Jansenists who remained in France had meanwhile fallen on evil days. Persecution usually begets hysteria in its victims; and the more extravagant members of the party were far advanced on the road which leads to apocalyptic prophecy and "speaking with tongues." About 1728 the " miracles of St Medard " became the talk of Paris. This was the cemetery where was buried Francois de Paris, a young

Jansenist deacon of singularly holy life, and a perfervid opponent of the Unigenitus. All sorts of miraculous cures were believed to have been worked at his tomb, until the government closed the cemetery in 1732. This gave rise to the famous epigram:

De par le roi, defense & Dieu

De faire miracle en ce lieu.

On the miracles soon followed the rise of the so-called Convul- sionaries. These worked themselves up, mainly by the use of frightful self-tortures, into a state of frenzy, in which they prophesied and cured diseases. They were eventually disowned by the more reputable Jansenists, and were severely repressed by the police. But in 1772 they were still important enough for Diderot to enter the field against them. Meanwhile genuine Jansenism survived in many country parsonages and convents, and led to frequent quarrels with the authorities. Only one of its latter-day disciples, however, rose to real eminence; this was the Abbe Henri Gregoire, who played a considerable part in the French Revolution. A few small Jansenist congregations still survive in France; and others have been started in connexion with the Old Catholic Church in Holland.

Literature. — For the 17th century see the Port Royal of Sainte-Beuve (5th ed., Paris, 1888) in six volumes. See also H. Reuchlin, Geschichte von Port Royal (2 vols., Hamburg, 1839-1844), and C. Beard, Port Royal (2 vols., London, 1861). No satisfactory Roman Catholic history of the subject exists, though reference may be made to Count Joseph de Maistre's De I'eglise gallicane (last ed., Lyons, 1881). On the Jansenism of the 18th century no single work exists, though much information will be found in the Gallican Church of Canon Jervis (2 vols., London, 1872). For a series of excellent sketches see also Seche, Les Derniers Jansenistes (3 vols., Paris, 1891). A more detailed list of books bearing on the subject will be found in the 5th volume of the Cambridge Modem History; and J. Paquier's Le Jansenisme (Paris, 1909) may also be consulted.

(St C.)

JANSSEN, or Jansen (sometimes Johnson), CORNELIUS (1593-1664), Flemish painter, was apparently born in London, and baptized on the 14th of October 1593. There seems no reason to suppose, as was formerly stated, that he was born at Amsterdam. He worked in England from 1618 to 1643, and afterwards retired to Holland, working at Middelburg, Amsterdam, The Hague and Utrecht, and dying at one of the last two places about 1664. In England he was patronized by James I. and the court, and under Charles I. he continued to paint the numerous portraits which adorn many English mansions and collections. Janssen's pictures, chiefly portraits, are dis- tinguished by clear colouring, delicate touch, good taste and careful finish. He generally painted upon panel, and often worked on a small scale, sometimes producing replicas of his larger works. A characteristic of his style is the very dark background, which throws the carnations of his portraits into rounded relief. In all probability his earliest portrait (1618) was that of John Milton as a boy of ten.

JANSSEN, JOHANNES (1 829-1 891), German historian, was born at

Xanten on the 10th of April 1829, and was educated as a Roman Catholic at Miinster, Louvain, Bonn and Berlin, afterwards becoming a teacher of history at Frankfort-on-the- Main. He was ordained priest in i860; became a member of the Prussian Chamber of Deputies in 1875 ; and in 1880 was made domestic prelate to the pope and apostolic pronotary. He died at Frankfort on the 24th of December 1891. Janssen was a stout champion of the Ultramontane party in the Roman Catholic Church. His great work is his Geschichte des deutschen Volkes sett dem Ausgang des Mittelalters (8 vols., Freiburg, 1878- 1 894) . In this book he shows himself very hostile to the Reforma- tion, and attempts to prove that the Protestants were responsible for the general unrest in Germany during the 16th and 17th centuries. The author's partisanship led to some controversy, and Janssen wrote An meine Kritiker (Freiburg, 1882) and Ein zweites Wort an meine Kritiker (Freiburg, 1883) in reply to the Janssens Geschichle des deutschen Volkes (Munich, 1883) of M. Lenz, and other criticisms.

The Geschichte, which has passed through numerous editions, has been continued and improved by Ludwig Pastor, and the greater part of it has been translated into English by M. A. Mitchell and A. M.

Christie (London, 1896, fol.). Of his other works perhaps the most important are: the editing of Frankfurts Reichskorrespondenz, 1376- 1519 (Freiburg, 1863-1872); and of the Leben, Briefe und kleinere Schrijten of his friend J. F. Bohmer (Leipzig, 1868); a monograph, Schiller als Historiker (Freiburg, 1863); and Zeit- und Lebensbilder (Freiburg, 1875).

See L. Pastor, Johannes Janssen (Freiburg, 1893) ; F. Meister, Erinnerung an Johannes Janssen (Frankfort, 1896); Schwann, Johannes Janssen und die Geschichte der deutschen Reformation (Munich, 1892).

JANSSEN, PIERRE JULES CfiSAR (1824-1907), French astronomer, was born in Paris on the 22nd of February 1824, and studied mathematics and physics at the faculty of sciences. He taught at the lycee Charlemagne in 1853, and in the school of architecture 1865-1871, but his energies were mainly devoted to various scientific missions entrusted to him. Thus in 1857 he went to Peru in order to determine the magnetic equator; in 1 861-1862 and 1864, he studied telluric absorption in the solar spectrum in Italy and Switzerland; in 1867 he carried out optical and magnetic experiments at the Azores; he successfully observed both transits of Venus, that of 1874 in Japan, that of 1882 at Oran in Algeria; and he took part in a long series of solar eclipse-expeditions, e.g. to Trani (1867), Guntoor

(1868), Algiers (1870), Siam (1875), the Caroline Islands (1883), and to Alcosebre in Spain (1905). To see the eclipse of 1870 he escaped from besieged Paris in a balloon. At the great Indian eclipse of 1868 he demonstrated the gaseous nature of the red promi- nences, and devised a method of observing them under ordinary daylight conditions. One main purpose of his spectroscopic inquiries was to answer the question whether the sun contains oxygen or not. An indispensable preliminary was the virtual elimination of oxygen-absorption in the earth's atmosphere, and his bold project of establishing an observatory on the top of Mont Blanc was prompted by a perception of the advantages to be gained by reducing the thickness of air through which observations have to be made. This observatory, the founda- tions of which were fixed in the snow that appears to cover the summit to a depth of ten metres, was built in September 1893, and Janssen, in spite of his sixty-nine years, made the ascent and spent four days taking observations. In 1875 he was appointed director of the new astrophysical observatory estab- lished by the French government at Meudon, and set on foot there in 1876 the remarkable series of solar photographs collected in his great Atlas de photographies solaires (1904). The first volume of the Annales de I'observatoire de Meudon was published by him in 1896. He died at Paris on the 23rd of December 1907.

See A. M. Clerke, Hist, of Astr. during the 19th Century (1903); H. Macpherson, Astronomers of To-Day (1905).

JANSSENS (or Jansens), VICTOR HONORIUS (1664-1739), Flemish painter, was born at Brussels. After seven years in the studio of an obscure painter named Volders, he spent four years in the household of the duke of Holstein. The next eleven years Janssens passed in Rome, where he took eager advantage of all the aids to artistic study, and formed an intimacy with Tempesta, in whose landscapes he frequently inserted figures. Rising into popularity, he painted a large number of cabinet historical scenes; but, on his return to Brussels, the claims of his increasing family restricted him almost entirely to the larger and more lucrative size of picture, of which very many of the churches and palaces of the Netherlands contain examples. In 1 7 18 Janssens was invited to Vienna, where he stayed three years, and was made painter to the emperor. The statement that he visited England is based only upon the fact that certain fashionable interiors of the time in that country have been attributed to him. Janssen's colouring was good, his touch delicate and his taste refined.

JANSSENS (or Jansens) VAN NUYSSEN, ABRAHAM (1567- 1632), Flemish painter, was born at Antwerp in 1567. He studied under Jan Snellinck, was a " master " in 1602, and in 1607 was dean of the master-painters. Till the appearance of Rubens he was considered perhaps the best historical painter of his time. The styles of the two artists are not unlike. In

correctness of drawing Janssens excelled his great contemporary;

in bold composition and in treatment of the nude he equalled him; but in faculty of colour and in general freedom of dis- position and touch he fell far short. A master of chiaroscuro, he gratified his taste for strong contrasts of light and shade in his torchlights and similar effects. Good examples of this master are to be seen in the Antwerp museum and the Vienna gallery. The stories of his jealousy of Rubens and of his dissolute life are quite, unfounded. He died at Antwerp in

1632.

JANUARIUS, ST, or San Gennaro, the patron saint of Naples. According to the legend, he was bishop of Benevento, and flourished towards the close of the 3rd century. On the outbreak of the persecution by Diocletian and Maximian, he was taken to Nola and brought before Timotheus, governor of Campania, on account of his profession of the Christian religion. After various assaults upon his constancy, he was sentenced to be cast into the fiery furnace, through which he passed wholly unharmed. On the following day, along with a number of fellow martyrs, he was exposed to the fury of wild beasts, which, however, laid themselves down in tame submission at his feet. Timotheus, again pronouncing sentence of death, was struck with blindness, but immediately healed by the powerful inter- cession of the saint, a miracle which converted nearly five thousand men on the spot. The ungrateful judge, only roused to further fury by these occurrences, caused the execution of Januarius by the sword to be forthwith carried out. The body was ultimately removed by the inhabitants of Naples to that city, where the relic became very famous for its miracles, espe- cially in counteracting the more dangerous eruptions of Vesuvius. Whatever the difficulties raised by his Acta, the cult of St Januarius, bishop and martyr, is attested historically at Naples as early as the 5th century (Biblioth. hagiog. latina, No. 6558). Two phials preserved in the cathedral are believed to contain the blood of the martyr. The relic is shown twice a year — in May and September. On these occasions the substance contained in the phial liquefies, and the Neapolitans see in this phenomenon a supernatural manifestation. The " miracle of St Januarius " did not occur before the middle of the 1 5th century.

A great number of saints of the name of Januarius are mentioned in the martyrologies. The best-known are the Roman martyr (festival, the 10th of July), whose epitaph was written by Pope Damasus (De Rossi, Bullettino, p. 17, 1863), and the martyr of Cordova, who forms along with Faustus and Martialis the group designated by Prudentius (Peristephanon, iv. 20) by the name of tres coronae. The festival of these martyrs is celebrated on the 13th of October.

See Acta sanctorum, September, vi. 761-891; G. Scherillo, Esame di un codice greco pubblicato nel tomo secondo delta bibliotheca casinensis (Naples, 1876); G. Taglialatela, Memorie storico-critiche del cullo del sangue di S. Gennaro (Naples, 1893), which contains many facts, but little criticism; G. Albini, Sulla mobility dei liquidi viscosi non omogenei {Societa reale di Napoli, Rendiconti, 2nd series, vol. iv., 1890) ; Acta sanctorum, October, vi. 187-193. (H. De.)

JANUARY, the first month in the modern calendar, consisting of thirty-one days. The name (Lat. Januarius) is derived from the two-faced Roman god Janus, to whom the month was dedicated. As doorkeeper of heaven, as looking both into the past and the future, and as being essentially the deity who busied himself with the beginnings of all enterprises, he was appropriately made guardian of the fortunes of the new year. The consecration of the month took place by an offering of meal, salt, frankincense and wine, each of which was new. The Anglo-Saxons called January Wulfmonath, in allusion to the fact that hunger then made the wolves bold enough to come into the villages. The principal festivals of the month are: New Year's Day; Feast of the Circumcision; Epiphany; Twelfth-Day; and Conversion of St Paul (see Calendar).

JANUS, in Roman mythology one of the principal Italian deities. The name is generally explained as the masculine form of Diana (Jana), and Janus as originally a god of light and day, who gradually became the god of the . beginning and origin of all things. According to some, however, he is simply the god

of doorways (januae) and in this connexion is the patron of all entrances and beginnings. According to Mommsen, he was " the spirit of opening," and the double-head was connected with the gate that opened both ways. Others, attributing to him an Etruscan origin, regard him as the god of the vault of heaven, which the Etruscan arch is supposed to resemble. The rationalists explained him as an old king of Latium, who built a citadel for himself on the Janiculum. It was believed that his worship, which was said to have existed as a local cult before the foundation of Rome, was introduced there by Romulus, and that a temple was dedicated to him by Numa. This temple, in reality only an arch or gateway (Janus geminus) facing east and west, stood at the north-east end of the forum. It was open during war and closed during peace (Livy i. 10) ; it was shut only four

times before the Christian era. A possible explanation is, that it was considered a bad omen to shut the city gates while the citizens were outside fighting for the state; it was necessary that they should have free access to the city, whether they returned victorious or defeated. Similarly, the door of a private house was kept open while the members of the family were away, but when all were at home it was closed to keep out intruders. There was also a temple of Janus near the theatre of Marcellus, in the forum olitorium, erected by Gaius Duilius (Tacitus, Ann. ii. 49), if not earlier.

The beginning of the day (hence his epithet Matutinus), of the month, and of the year (January) was sacred to Janus; on the 9th of January the festival called Agonia was celebrated in his honour. He was invoked before any other god at the beginning of any important undertaking; his priest was the Rex Sacrorum, the representative of the ancient king in his capacity as religious head of the state. All gateways, housedoors and entrances generally, were under his protection; he was the inventor of agriculture (hence Consivius, " he who sows or plants "), of civil laws, of the coining of money and of religious worship. He was worshipped on the Janiculum as the protector of trade and shipping; his head is found on the as, together with the prow of a ship. He is usually represented on the earliest coins with two bearded faces, looking in opposite directions; in the time of Hadrian the number of faces is in- creased to four. In his capacity as porter or doorkeeper he holds a staff in his right hand, and a key (or keys) in his left; as such he is called Patulcius (opener) and Clusius (closer). His titles Curiatius, Patricius, Quirinus originate in his worship in the gentes, the curiae and the state, and have no reference to any special functions or characteristics. In late times, he is both bearded and unbearded; in place of the staff and keys, the fingers of his right hand show the number 300 (CCC), those of his left the number of the remaining days of the year (LXV.). According to A. B. Cook (Classical Review, xviii. 367), Janus is only another form of Jupiter, the name under which he was worshipped by the pre-Latin (aboriginal) inhabitants of Rome; after their conquest by the Italians, Janus and Jana took their place as independent divinities by the side of the Italian Jupiter and Juno. He considers it probable that the three-headed Janus was a triple oak-god worshipped in the form of two vertical beams and a cross-bar (such as the tigillum sororium, for which see Horatii); hence also the door, consisting of two lintels and side-posts, was sacred to Janus. The three-headed type may have been the original, from which the two-headed and four-headed types were developed. J. G. Frazer (The Early History of the Kingship, pp. 214, 285), who also identifies Janus with Jupiter, is of opinion that Janus was not originally a doorkeeper, but that the door was called after him, not vice versa. Janua may be an adjective, janua forts meaning a door with a symbol of Janus close by the chief entrance, to serve as a protection for the house; then

janua alone came to mean a door generally, with or without the symbol of Janus. The double head may have been due to the desire to make the god look both ways for greater protection. By J. Rhys (Hibbert Lectures, 1886, pp. 82, 94) Janus is identified with the three-faced (some- times three-headed) Celtic god Cernunnus, a chthonian divinity, compared by Rhys with the Teutonic Heimdal, the warder of

the gods of the under- world; like Janus, Cernunnus and Heimdal were considered to be the fons et origo of all things.

See S. Linde, De Jano summo romanorum deo (Lund, 1891); J. S. Speyer, " Le Dieu romain Janus," in Revue de Vhistoire des religions (xxvi., 1892); G. Wissowa, Religion und Kultus der Rbmer (1902); W. Deecke, Etruskische Forschungen, vol. ii. ; W. Warde Fowler, The Roman Festivals of the Period of the Republic (1899), pp. 282-290; articles in W. H. Roscher's Lexikon der Mythologie and Daremberg and Saglio's Dictionnaire des Anliquites; J. Toutain, Etudes de Mythologie (1909). On other jani (arched passages) in Rome, frequented by business men and money changers, see O. Richter, Topographie der Stadt Rom (1901). (j. H. F.)

JAORA, a native state of Central India, in the Malwa agency. It consists of two isolated tracts, between Ratlam and Neemuch. Area,' with the dependencies of Piplauda and Pant Piplauda, 568 sq. m. Pop. (1901), 84,202. The estimated revenue is £57,000; tribute, £9000. The chief, whose title is nawab, is a Mahommedan of Afghan descent. The state was confirmed by the British government in 1818 by the Treaty of Mandsaur. Nawab Mahommed Ismail, who died in 1895, was an honorary major in the British army. His son, Iftikhar Ali Khan, a minor at his accession, was educated in the Daly College at Indore, with a British officer for his tutor, and received powers of administra- tion in 1906. The chief crops are millets, cotton, maize and poppy. The last supplies a large part of the Malwa opium of commerce. The town of Jaora is on the Rajputana-Malwa railway, 20 m. N. of Ratlam. Pop. (1901), 23,854. It is well laid out, with many good modern buildings, and has a high school and dispensary. To celebrate Queen Victoria's Diamond Jubilee, the Victoria Institute and a zenana dispensary were opened in 1898.

JAPAN, an empire of eastern Asia, and one of the great powers of the world. The following article is divided for convenience into ten sections: — I. Geography; II. The People; III. Language and Literature; IV. Art; V. Economic Condi- tions; VI. Government and Administration; VII. Religion; VIII. Foreign Intercourse; IX. Domestic History; X. The Claim of Japan.

I. — Geography The continent of Asia stretches two arms into the Pacific Ocean, Kamchatka in the north and Malacca in the south, between which

lies a long cluster of islands constituting the Japanese empire, which covers gn j Extent 37° 14′ of longitude and 29 11′ of latitude. On the extreme north are the Kuriles (called by the Japanese Chishima, or the "myriad isles"), which extend to 156° 32′ E. and to 50 56′ N. ; on the extreme south is Formosa (called by the Japanese Taiwan), which extends to 122° 6′ E., and to 21 45′ N. There are six large islands, namely Sakhalin (called by the Japanese Karafuto); Yezo or Ezo (which with the Kuriles is designated Hokkaido, or the north-sea district); Nippon (the "origin of the sun"), which is the main island; Shikoku (the " four provinces "), which lies on the east of Nippon; Kiushiu or Kyushu (the " nine provinces "), which lies on the south of Nippon, and Formosa, which forms the most southerly link of the chain. Formosa and the Pescadores were ceded to Japan by China after the war of 1894-1895, and the southern half of Sakhalin — the part south of 50 N. — was added to Japan by cession from Russia in 1905. Korea, annexed in August 1910, is separately noticed.

Coast-line. — The following table shows the numbers, the lengths of coast-line, and the areas of the various groups of islands, only those being indicated that have a coast-line of at least 1 ri (i\ m.), or that, though smaller, are inhabited ; except in the case of Formosa and the Pescadores, where the whole numbers are given : —

Length of Area

Number. coast in in square miles. miles.

Nippon 1 4.7 6 5-03 99.373-57

Isles adjacent to Nippon . . . 167 1,275-09 470-30

Shikoku I 1,10085 6,461-39

Isles adjacent to Shikoku … 75 54 8-I 2 I75'40

Kiushiu 1 2,101-28 13,778-68

Isles adjacent to Kiushiu … 150 2,405-06 1,821-85

GEOGRAPHY]

JAPAN

i57

Yezo

Isles adjacent to Yezo . Sakhalin (Karafuto)

Sado

Okishima

Isles adjacent to Okishima

Awaji

Isles adjacent to Awaji Iki .....

Isles adjacent to Iki Tsushima .....

Isles adjacent to Tsushima Riukiu (or Luchu) Islands Kuriles (Chishima) . Bonin (Ogasawara Islands) Taiwan (Formosa) . Isles adjacent to Formosa . Pescadores (Hoko-t6) .

Totals

Length of

Area

ber.

coast in

in square

miles.

miles.

1

1,423-32

30,148-41

13

110-24

30-51

1

Unsurveyed

12,487-64

1

130-05

335-92

1

182-27

130-40

1

3-°9

0-06

1

94-43

217-83

1

5-32

0-83

1

86-47

50-96

1

4-41

0-47

1

409-23

261-72

5

118-80

4-58

55

768-74

935-18

3i

1,496-23

6,15942

20

174-65

26-82

1

73I-3I

i3,429-3i

7

i28-32Not surveyed

12

98-67

85-50

549

18,160-98 i73,786-75

If the various smaller islands be included, a total of over 3000 is reached, but there has not been any absolutely accurate enumeration. It will be observed that the coast-line is very long in proportion to the area, the ratio being I m. of coast to every 9-5 m. of area. The Pacific Ocean, which washes the eastern shores, moulds their outline into much greater diversity than does the Sea of Japan which washes the western shores. Thus the Pacific sea-board measures 10,562 m. against 2887 m. for that of the Japan Sea. In depth of water, too, the advantage is on the Pacific side. There the bottom slopes very abruptly, descending precipitously at a point not far from the north-east coast of the main island, where soundings have shown 4655 fathoms. This, the deepest sea-bed in the world, is called the Tuscarora Deep, after the name of the United States' man-of-war which made the survey. The configuration seems to point to a colossal crater under the ocean, and many of the earth- quakes which visit Japan appear to have their origin in this sub- marine region. On the other hand, the average depth of the Japan Sea is only 1200 fathoms, and its maximum depth is 3200. The east coast, from Cape Shiriya (Shiriyazaki) in the north to Cape Inuboye (Inuboesaki) near Tokyo Bay, though abounding in small indentations, has only two large bays, those of Sendai and Matsu- shima; but southward from Tokyo Bay to Cape Satta (Satanomisaki) in Kiushiu there are many capacious inlets which offer excellent anchorage, as the Gulf of Sagami (Sagaminada), the Bays of Suruga (Surugawan), Ise (Isenumi) and Osaka, the Kii Channel, the Gulf of Tosa (Tosonada), &c. Opening into both the Pacific and the Sea of Japan and separating Shikoku and Kiushiu from the main island as well as from each other, is the celebrated Inland Sea, one of the most picturesque sheets of water in the world. Its surface measures 1325 sq. m. ; it has a length of 255 m. and a maximum width of 56 m. ; its coast-lines aggregate 700 m. ; its depth is nowhere more than 65 fathoms, and it is studded with islands which present scenery of the most diverse and beautiful character. There are four narrow avenues connecting this remarkable body of water with the Pacific and the Japan Sea; that on the west, called Shimonoseki Strait, has a width of 3000 yds., that on the south, known as Hayamoto Strait, is 8 m. across; and the two on the north, Yura and Naruto Straits, measure 3000 and 1500 yds. respectively. It need scarcely be said that these restricted approaches give little access to the storms which disturb the seas outside. More broken into bays and inlets than any other part of the coast is the western shore of Kiushifl. Here three promontories — Nomo, Shimabara and Kizaki — enclose a large bay having on its shores Nagasaki, the great naval port of Sasebo, and other anchorages. On the south of Kiushiu the Bay of Kagoshima has historical interest, and on the west are the bays of Ariakeno-ura and Yatsushiro. To the north of Nagasaki are the bays of Hakata, Karatsu and Imari. Between this coast and the southern extremity of the Korean peninsula are situated the islands of Iki and Tsushima, the

latter being only 30 m. distant from the peninsula. Passing farther north, the shore- line of the main island along the Japan Sea is found to be compara- tively straight and monotonous, there being only one noteworthy indentation, that of Wakasa-wan, where are situated the naval port of Maizuru and the harbour of Tsuruga, the Japanese point of communication with the Vladivostok terminus of the Trans-Asian railway. From this harbour to Osaka Japan's waist measures only 77 m., and as the great lake of Biwa and some minor sheets of water break the interval, a canal may be dug to join the Pacific and the Sea cl Japan. Yezo is not rich in anchorages. Uchiura (Volcano Bay), Nemuro (Walfisch) Bay and Ishikari Bay are the only remark- able inlets. As for Formosa, the peculiarity of its outline is that the eastern coast falls precipitously into deep water, while the western =lopes slowly to shelving bottoms and shoals. The Pescadores Inlands afford the best anchorage in this part of Japan.

Mountains. — The Japanese islands are traversed from north to south by a range of mountains which sends out various lateral

The

Japanese

Alps.

branches. Lofty summits are separated by comparatively low passes, which lie at the level of crystalline rocks and schists consti- tuting the original uplands upon which the summits have been piled by volcanic action. The scenery among the mountains is generally soft. Climatic agencies have smoothed and modified everything rugged or abrupt, until an impression of gentle undulation rather than of grandeur is suggested. Nowhere is the region of eternal snow reached, and masses of foliage enhance the gentle aspect of the scenery and glorify it in autumn with tints of striking brilliancy. Mountain alternates with valley, so that not more than one-eighth of the country's entire area is cultivable.

The king of Japanese mountains is Fuji-yama or Fuji-san (peer- less mount), of which the highest point (Ken-ga-mine) is 12,395 ft. above sea-level. The remarkable grace of this moun- ptffl.

tain's curve — an inverted catenary — makes it one of the most beautiful in the world, and has obtained for it a prominent place in Japanese decorative art. Great streams of lava flowed from the crater in ancient times. The course of one is still visible to a distance of 15 m. from the summit, but the rest are covered, for the most part, with deep deposits of ashes and scoriae. On the south Fuji slopes unbroken to the sea, but on the

other three sides the plain from which it rises is surrounded by mountains, among which, on the north and west, a series of most picturesque lakes has been formed in consequence of the rivers having been dammed by ashes ejected from Fuji's crater. To a height of some 1500 ft. the slopes of the mountain are cultivated; a grassy moor- land stretches up the next 2500 ft. ; then follows a forest, the upper edge of which climbs to an altitude of nearly 8000 ft., and finally there is a wide area of ashes and scoriae. There is entire absence of the Alpine plants found abundantly on the summits of other high mountains in Japan, a fact due, doubtless, to the comparatively recent activity of the volcano. The ascent of Fuji presents no difficulties. A traveller can reach the usual point of departure, Gotemba, by rail from Yokohama, and thence the ascent and descent may be made in one day by a pedestrian.

The provinces of Hida and Etchiu are bounded on the east by a chain of mountains including, or having in their immediate vicinity, the highest peaks in Japan after Fuji. Six of these summits rise to a height of 9000 f c. or upwards, and constitute the most imposing assemblage of mountains in the country. The ridge runs due north and south through 60 to 70 m., and has a width of 5 to 10 m. It is mostly of granite, only cwo of the mountains — Norikura and Tateyama — showing clear traces of volcanic origin. Its lower flanks are clothed with forests of beech, conifers and oak. Farther south, in the same range, stands Ontake (10,450 ft.), the second highest mountain in Japan proper (as distinguished from Formosa) ; and other remarkable though not so lofty peaks mark the same regions. This grand group of mountains has been well called the " Alps of Japan," and a good account of them may be found in The Japanese Alps (1896) by the Rev. W. Weston. On the summit of Ontake are eight large and several small craters, and there also may be seen displays of trance and " divine possession," such as are described by Mr Percival Lowell in Occult Japan (1895).

Even more picturesque, though less lofty, than the Alps of Japan t are the Nikko mountains, enclosing the mausolea of the two greatest of the Tokugawa shoguns. The highest of these are Shirane-san (7422 ft.), Nantai-san (8169 ft.), Nyoh6- The Nikko zan (8100 ft.), and Omanago (7546 ft.). They are Mountains. clothed with magnificent vegetation, and everywhere they echo the voices of waterfalls and rivulets.

In the north of the main island there are no peaks of remarkable height. The best known are Chiokai-zan, called " Akita-Fuji " (the Fuji of the Akita province), a volcano 7077 ft. high, which was active as late as 1861; Ganju-san Mountains (6791 ft.), called also " Nambu-Fuji " or Iwate-zan, of the North. remarkable for the beauty of its logarithmic curves; Iwaki-san (5230 ft.), known as Tsugaru-Fuji, and said by some to be even more

imposing than Fuji itself; and the twin mountains Gassan (6447 ft.) and Haguro-san (5600 ft.). A little farther south, enclosing the fertile plain of Aizu (Aizu-taira, as it is called) several important peaks are found, among them being Iide-san (6332 ft.); Azuma-yama (7733 ft.), which, after a long interval of quiescence, has given many evidences of volcanic activity during recent years; Nasu-dake (6296 ft.), an active volcano; and Bandai-san (6037 ft.). A terrible interest attaches to the last-named mountain, for, after having remained quiet so long as to lull the inhabitants of the neighbouring district into complete security, it suddenly burst into fierce activity on the 15th of July 1888, discharging a vast avalanche of earth and rock, which dashed down its slopes like an inundation, burying four hamlets, partially destroying seven villages, killing 461 people and devastating an area of 27 sq. m.

In the province of Kozuke, which belongs to the central part of the main island, the noteworthy mountains are Asama-yama (8136

ft.), one of the best known and most violently active „ ,_,„„„

i ‘ f T ,, . . J r Mountains of

volcanoes of Japan; Akagi-san, a circular range 01 ˆg zo jte Kai peaks surrounding the basin of an old crater and rising an ashlnano. to a height of 6210 ft.; the Haruna group, celebrated for scenic beauties, and Myogi-san, a cluster of pinnacles which, though not rising higher than 3880 ft., offer scenery which dispels

the delusion that nature as represented in the classical pictures (bunjingwa) of China and Japan exists only in the artist’s imagina- tion. Farther south, in the province of Kai (Koshiu), and separating two great rivers, the Fuji-kawa and the Tenriu-gawa, there lies a range of hills with peaks second only to those of the Japanese Alps spoken of above. The principal elevations in this range are Shirane- san — with three summits, N6dori (9970 ft.), Ai-no-take (10,200 ft.) and Kaigane (10,330 ft.) — and Hoozan (9550 ft.). It will be observed that all the highest mountains of Japan form a species of belt across the widest part of the main island, beginning on the west with the Alps of Etchiu, Hida and Shinano, and ending on the east with Fuji-yama. In all the regions of the main island southward of this belt the only mountains of conspicuous altitude are Omine (6169 ft.) and Odai-gaharazan (5540 ft.) in Yamato and Daisen

or Oyama (5951 ft.) in Hoki.

Mo ntalns of ˆ ne ■ s ‘ anc ‘ °ˆ Shikoku has no mountains of notable

Shlkoka. magnitude. The highest is Ishizuchi-zan (7727 ft.), but

there are several peaks varying from 3000 to 6000 ft.

Kiushiu, though abounding in mountain chains, independent or connected, is not remarkable for lofty peaks. In the neighbourhood of Mountains of Nagasaki, over the celebrated solfataras of Unzen-take Kasha (called also Onsen) stands an extinct volcano, whose

summit, Fugen-dake, is 4865 ft. high. More notable is Aso-take, some 20 m. from Kumamoto; for, though the highest of its five peaks has an altitude of only 5545 ft., it boasts the largest crater in the world, with walls nearly 2000 ft. high and a basin from 10 to 14 m. in diameter. Aso-take is still an active volcano, but its eruptions during recent years have been confined to ashes and dust. Only two other mountains in Kiushiu need be mentioned — a volcano (3.743 ft-) on the island Sakura-jima, in the extreme south; and Kirishima-yama (5538 ft.), on the boundary of Hiuga, a mountain specially sacred in Japanese eyes, because on its eastern peak (Takachiho-dake) the god Ninigi descended as the forerunner of the first Japanese sovereign, Jimmu.

Among the mountains of Japan there are three volcanic ranges, namely, that of the Kuriles, that of Fuji, and that of Kirishima. Volcanoes. ˆ u]1 ls t ˆ le most remarkable volcanic peak. The Japanese regard it as a sacred mountain, and numbers of pilgrims make the ascent in midsummer. From 500 to 600 ft. is supposed to be the depth of the crater. There are neither sul- phuric exhalations nor escapes of steam at present, and it would seem that this great volcano is permanently extinct. But experience in other parts of Japan shows that a long quiescent crater may at any moment burst into disastrous activity. Within the period of Japan’s written history several eruptions are recorded the last having been in 1707, when the whole summit burst into flame, rocks were shattered, ashes fell to a depth of several inches even in Yedo (Tokyo), 60 m. distant, and the crater poured forth streams of lava. Among still active volcanoes the following are the best known : —

Name of Volcano.

Height in feet. Remarks.

Tarumai (Yezo) 2969. Forms southern wall of a large ancient crater now occupied by a lake (Shikotsu). A little steam still issues from several

smaller cones on the summit of the ridge, as well as from one, called Eniwa, on the northern side.

Noboribetsu (Yezo) In a state of continuous activity, with 1 148. frequent detonations and rumblings. The

crater is divided by a wooded rock-wall. The northern part is occupied by a steaming lake, while the southern part contains numerous solfataras and boiling springs.

Komagatake (Yezo) The ancient crater- wall, with a lofty 3822. pinnacle on the western side, contains a

low new cone with numerous steaming rifts and vents. In a serious eruption in 1856 .the S.E. flank of the mountain and the country side in that direction were denuded of trees.

Esan 2067. A volcano-promontory at the Pacific end

of the Tsugaru Strait : a finely formed cone surrounded on three sides by the sea, the crater breached on the land side. The central vent displays considerable activity, while the rocky walls are stained with red, yellow and white deposits from numerous minor vents.

Agatsuma (Iwaki) Erupted in 1903 and killed two geolo-

5230. gists.

Bandai-san (Iwashiro) Erupted in 1888 after a long period of 6037. quiescence. The outbreak was preceded

By an earthquake of some severity, after which about 20 explosions took place. A huge avalanche of earth and rocks buried the Nagase Valley with its villages and inhabitants, and devastated an area of over 27 sq. m. The number of lives lost was 461 ; four hamlets were completely

Bandai-san (Iwashiro) entombed with their inhabitants and cattle ; 6037 — (cont.). seven villages were partially wrecked;

forests were levelled or the trees entirely denuded of bark; rivers were blocked up, and lakes were formed. The lip of the fracture is now marked by a line of steaming vents. Azuma-yama (Fuku- Long considered extinct, but has erupted

shima) 7733. several times since 1893, the last explosion

having been in 1900, when 82 sulphur- diggers were killed or injured;

ashes were thrown to a distance of 5 m., accumulating in places to a depth of 5 ft. ; and a crater 300 ft. in diameter, and as many in depth, was formed on the E. side of the mountain. This crater is still active. The summit-crater is occupied by a beautiful lake. On the Fukushima (E.) side of the volcano rises a large parasitic cone, extinct.

Nasu (Tochigi) 6296. Has both a summit and a lateral crater,

which are apparently connected and per- petually emitting steam. At or about the main vents are numerous solfataras. The whole of the upper part of the cone consists of grey highly acidic lava. At the base is a thermal spring, where baths have existed since the 7th century.

Shirane (Nikko) 7422. The only remaining active vent of the once highly volcanic Nikko district. Erup- tion in 1889.

Shirane (Kai) 10,330. Eruption in 1905, when the main crater

was enlarged to a length of 3000 ft. It is divided into three parts, separated by walls, and each containing a lake, of which the middle one emits steam and the two others are cold. The central lake, during the periods of eruption (which are frequent), displays a geyser-like activity. These lakes contain free sulphuric acid, mixed with iron and alum.

Unzen (Hizen) 4865. A triple-peaked volcano in the solfatara

stage, extinct at the summit, but displaying considerable activity at its base in the form of numerous fumaroles and boiling sulphur springs.

Aso-take (Higo) 5545. Remarkable for the largest crater in the

world. It measures 10 m. by 15, and rises almost symmetrically to a height of about 2000 ft., with only one break through which the river Shira flows. The centre is occupied by a mass of peaks, on the W. flank of which lies the modern active crater. Two of the five compartments into which it is divided by walls of deeply striated volcanic ash are constantly emitting steam, while a new vent displaying great activity has been opened at the base of the cone on the south side. Eruptions have been recorded since the earliest days of Japanese history. In 1884 the ejected dust and ashes devastated farmlands through large areas. An outbreak in 1894 produced numerous rifts in the inner walls from which steam and smoke have issued ever since.

Kaimon (Kagoshima One of the most beautiful volcanoes of

Bay) 3041. Japan, known as the Satsuma-Fuji. The

symmetry of the cone is marred by a con- vexity on the seaward (S.) side. This volcano is ail but extinct.

Sakura-jima (Kago- An island-volcano, with several parasitic

shima Bay) 3743. cones (extinct), on the N. and E. sides. At the summit are two deep craters, the southern of which emits steam. Grass grows, however, to the very edges of the crater. The island is celebrated for ther- mal springs, oranges and daikon (radishes), which sometimes grow to a weight of 70 lb.

Kiri-shima (Kagoshima A volcanic range of which Takachiho, Bay) 5538. the only active cone, forms, the terminal

(S.E.) peak. The crater.situatedxm the S.W. side of the volcano, lies some 500 ft. below the summit-peak. It is of remarkably regular formation, and the floor is pierced by a number of huge fumaroles whence issue immense volumes of steam.

Izuno Oshima (Vries The volcano on this island is called

Island) (Izu) 2461. Mihara. There is a double crater, the outer

being almost complete. The diameter of

the outer crater, within which rises the

modern cone to a height of 500 ft. above

the surrounding floor, is about 2 m. ; while the present crater, which displays incessant activity, has itself a diameter of \ m.

The largest active volcano in Japan. An eruption in 1783, with a deluge of lava, destroyed an extensive forest and overwhelmed several villages. The present cone is the third, portions of two concentric crater rings remaining. The present crater is remarkable for the absolute perpendicu- larity of its walls, and has an immense depth — from 600 to 800 ft. It is circular, f m. in circumference, with sides honeycombed and burned to a red hue.

Some of the above information is based upon Mr. C. E. Bruce- Mitford's valuable work (see Geog. Jour., Feb. 1908, &c).

Earthquakes. — Japan is subject to marked displays of seismic violence. One steadily exercised influence is constantly at work, for the shores bordering the Pacific Ocean are slowly though appre- ciably rising, while on the side of the Japan Sea a corresponding sub- sidence is taking place. Japan also experiences a vast number of petty vibrations not perceptible without the aid of delicate instru- ments. But of earthquakes proper, large or small, she has an excep- tional abundance. Thus in the thirteen years ending in 1897 — that is to say, the first period when really scientific apparatus for recording purposes was available — she was visited by no fewer than 17,750 shocks, being an average of something over 3 § daily. The frequency of these phenomena is in some degree a source of security, for the minor vibrations are believed to exercise a binding effect by removing weak cleavages. Nevertheless the annals show that during the three centuries before 1897 there were 108 earthquakes sufficiently disastrous to merit historical mention. If the calculation be carried farther back — as has been done by the seismic disaster investigation committee of Japan, a body of scientists constantly engaged in studying these phenomena under government auspices, — it is found that, since the country's history began to be written in the 8th cen- tury A.D., there have been 2006 major disturbances; but inasmuch as 1489 of these occurred before the beginning of the Tokugawa administration (early in the 17th century, and therefore in an era when methods of recording were comparatively defective), exact details are naturally lacking. The story, so far as it is known, may be gathered from the following table : —

Date a.d.

Region.

5,500

Houses destroyed.

684 . . Southern part of Tosa … —

869 . Mutsu —

1361 . . Kioto —

1498 . . Tokaido —

1569 . . Bungo —

1596 . Kioto —

1605 (31/1) . Pacific Coast —

161 1 (27/9) . Aizu —

1614 (2/12) . Pacific Coast (N.E.) ... —

1662 (16/6) . Kioto

1666 (2/2) . Echigo

1694 (19/2) . Ugo 2,760

1703 (30/12) . Tokyo 20,162

1707 (28/10) . Pacific Coast of Kiushiu and

Shikoku 29,000

1751 (20/5) . Echigo 9,100

1766 (8/3) . Hirosaki 7, 500

1792 (10/2) . Hizen and Higo 12,000

1828 (18/2) . Echigo H,750

1844 (8/5) . Echigo 34.000

1854 (6/7) . Yamato, Iga, Ise 5,000

1854 (2 3/ I 2) . Tokaido (Shikoku) . . . 60,000

1855 (11/11) . Yedo (Tokyo) 50,000

1891 (28/10) . Mino, Owari 222,501

1894 (22/10) . Shonai 8,403

1896 (15/6) . Sanriku 13,073

1896 (31/8) . Ugo, Rikuchu 8,996

1906 (12/2) . Formosa 5,556

(1) An area of over 1,200,000 acres swallowed up by

(2) Tidal wave killed thousands of people.

(3) Hamana lagoon formed.

In the capital (Tokyo) the average yearly number of shocks throughout the 26 years ending in 1906 was 96, exclusive of minor vibrations, but during the 50 years then ending there were only two severe shocks (1884 and 1894), and they were not directly responsible for any damage to life or limb. The Pacific coast of the Japanese islands is more liable than the western shore to shocks disturbing a wide area. Apparent proof has been obtained that the shocks occurring in the Pacific districts originate at the bottom of the sea — the Tuscarora Deep is supposed to be the centre of seismic activity — and they are accompanied in most cases by tidal waves. It would seem that of late years Tajima, Hida, Kozuke and some other regions in central Japan have enjoyed the greatest immunity, while Musashi

Deaths.

-0)

z (2)

2,000

700 2,000 5,000 3,700 1,700

500 1,500

390 5,233

4,900 1,700

1,335 15,000

1,443 12,000 2,400 3,000 6,700

7,273 726

27,122 209

1,228

the sea.

**59*

(in which province Tokyo is situated) and Sagami have been most subject to disturbance.

Plains. — Japan, though very mountainous, has many extensive plains. The northern island — Yezo — contains seven, and there are as many more in the main and southern islands, to say nothing of flat lands of minor dimensions. The principal are given in the following table : —

Name.

Situation.

Area: Remarks.

Tokachi

plain

Yezo.

744,000 acres. —

Ishikari

,,

do.

480,000 ,, —

Kushiro

do.

1,229,000 ,, —

Nemuro

do.

320,000 ,, —

Kitami

do.

230,000 ,, —

Hidaka

do.

200,000 ,, —

Teshio

do.

180,000 ,, —

Echigo

. Main Island.

Unascertained. —

Sendai

do.

do. —

Kwanto

,,

do.

do. In this plain lie the capital, Tokyo, and the town of Yokohama. It supports about 6 mil- lions of people.

Mino-Owari,,

do.

do. Has 1 J million inhabi-

tants.

Kinai

”

do.

do. Has the cities ol Osaka, Kioto and Kobe, and 2| million people.

Tsukushi

”

. . Kiushiu.

do. The chief coalfield of Japan.

Rivers. — Japan is abundantly watered. Probably no country in the world possesses a closer network of streams, supplemented by canals and lakes. But the quantity of water carried seawards varies within wide limits; for whereas, during the rainy season in summer and while the snows of winter are melting in spring, great volumes of water sweep down from the mountains, these broad rivers dwindle at other times to petty rivulets trickling among a waste of pebbles and boulders. Nor are there any long rivers, and all are so broken by shallows and rapids that navigation is generally impossible except by means of flat-bottomed boats drawing only a few inches. The chief rivers are given in the follow- ing table: —

Ishikari-gawa . Shinano-gawa . Teshio-gawa Tone-gawa

Mogami-gawa . Yoshino-gawa .

Kitakami-gawa

Tenriu-gawa Go-gawa or Iwa-

megawa . Abukuma-gawa Tokachi-gawa . Sendai-gawa

Oi-gawa Kiso-gawa . Ara-kawa . Naga-gawa .

Length in miles.

• 275

• 215

. 192

• 177

Mouth. Otaru. Niigata. Sea of Japan.

Choshi ” (Shi- mosa). 151 Dainichi-dake(Uzen). Sakata. 149 Yahazu-yama (Tosa). Tokushima

(Awa). 146 Nakayama-dake Ishinomaki

(Rikuchiu) (Rikuzen).

136 Suwako (Shinano) . Totomi Bay.

122 Maruse-yama (Bingo) Iwami Bay.

122 Asahi-take (Iwashiro) Matsushima Bay.

120 Tokachi-dake . . . Tokachi Bay.

112 Kunimi-zan (Hiuga) . Kumizaki (Sat-

suma).

112 Shirane-san (Kai). . Suruga Bay.

112 Kiso-zan (Shinano) . Bay of Isenumi.

104 Chichibu-yama . Tokyo Bay.

102 Nasu-yama (Shimo- Naka-no-minato tsuke) .... (Huachi).

Lakes and Waterfalls. — Japan has many lakes, remarkable for the beauty of their scenery rather than for their extent. Some are contained in alluvial depressions in the river valleys ; others have been formed by volcanic eruptions, the ejecta damming the rivers until exits were found over cliffs or through gorges. Some of these lakes have become favourite summer resorts for foreigners. To that category belong especially the lakes of Hakone, of Chiuzenji, of Shoji, of Inawashiro, and of Biwa. Among these the highest is Lake Chiuzenji, which is 4375 ft. above sea-level, has a maximum depth of 93 fathoms, and empties itself at one end over a fall (Kegon) 250 ft. high. The Shoji lakes lie at a height of 3160 ft:, and their neigh- bourhood abounds in scenic charms. Lake Hakone is at a height of 2428 ft.; Inawashiro, at a height of 1920 ft. and Biwa at a height of 328 ft. The Japanese associate Lake Biwa (Omi) with eight views of special loveliness (Omi-no-hakkei). Lake Suwa, in Shi- nano, which is emptied by the Tenriu-gawa, has a height of 2624 ft. In the vicinity of many of these mountain lakes thermal springs, with remarkable curative properties, are to be found. (F. By.)

Geology. — It is a popular belief that the islands of Japan consist for the most part of volcanic rocks. But although this conception might reasonably be suggested by the presence of many active and

extinct volcanoes, Professor J. Milne has pointed out that it is literally true of the Kuriles alone, partially true for the northern halt ot the Main Island and for Kiushiu, and quite incorrect as applied to the southern half of the Main Island and to Shikoku This authority sums up the geology of Japan briefly and succinctly as follows (in Things Japanese, by Professor Chamberlain) : " The backbone of the country consists of primitive gneiss and schists Amongst the latter, in Shikoku, there is an extremely interesting rock consisting largely of piedmontite. Overlying these amongst the Palaeozoic rocks, we meet in many parts of Japan with slates and other rocks possibly of Cambrian or Silurian age. Trilobites have been discovered in Rikuzen. Carboniferous rocks are repre- sented by mountain masses of Fusulina and other limestones. There is also amongst the Palaeozoic group an interesting series of red s ates containing Radiolaria. Mesozoic rocks are represented by slates containing Ammonites and Monotis, evidently of Triassic age rocks containing Ammonitesˆ Bucklandi of Liassic age, a series of beds rich in plants of Jurassic age, and beds of Cretaceous age containing Tngonm and many other fossils. The Cainozoic Sr iertiary system forms a fringe round the coasts of many portions ot the empire. It chiefly consists of stratified volcanic tuffs rich in coal, lignite, fossilized plants and an invertebrate fauna. Diatoma- ceous earth exists at several places in Yezo. In the alluvium which covers all, the remains have been discovered of several species of elephant which, according to Dr Edmund Naumann, are of Indian origin. 1 he most common eruptive rock is andesite. Such rocks as basalt, diorite and trachyte are comparatively rare. Quartz porphyry quartzless porphyry, and granite are largely developed." Drs von Richthofen and Rein discuss the subject in greater detail. I hey have pointed out that in the mountain system of Japan there are three main lines. One runs from S.W. to N.E.; another from S.S.W. to N.N.E., and the- third is meridional. These they call respectively the southern schist range," the " northern schist range, and the snow range," the last consisting mainly of old crystalline massive rocks. The rocks predominating in Japan fall also into three groups They are, first, plutonic rocks, especially granite; secondly, volcanic rocks, chiefly trachyte and dolerite- and thirdly, palaeozoic schists. On the other hand, limestone and sandstone, especially of the Mesozoic strata, are strikingly deficient The strike of the old crystalline rocks follows, in general, the main direction of the islands (S.W. to N.E.). They are often overlain by schists and quartzites, or broken through by volcanic masses. 1 he basis of the is lands consist of granite, syenite, diorite, dia- base and related kinds of rock, porphyry appearing comparatively seldom. Now the granite, continuing for long distances, forms the prevailing rock; then, again, it forms the foundation for thick strata of schist and sandstone, itself only appearing in valleys of erosion and river boulders, in rocky projections on the coasts or in the ridges of the mountains. . . In the composition of many moun- tains in Hondo (the main

island) granite plays a prominent part It appears to form the central mass which crops up in hundreds of places towards the coast and in the interior. Old schists, free from fossils and rich in quartz, overlie it in parallel chains through the whole length of the peninsula, especially in the central and highest ridges, and bear the ores of Chu-goku (the central provinces) principally copper pyrites and magnetic pyrites. These schist ridges rich in quartz show, to a depth of 20 metres, considerable disintegration. The resulting pebble and quartz-sand is very un- productive, and supports chiefly a poor underwood and crippled pines with widely spreading roots which seek their nourishment afar In the province of Settsu granite everywhere predominates, which may be observed also in the railway cuttings between Hiogo and Osaka as well as in the temples and walls of these towns The waterfalls near Kobe descend over granite walls and the mikageishi (stone of Mikage), famous throughout Japan, is granite from Settsu. ... In the hill country on the borders of Ise, Owari Mikawa and Totomi, on the one side, and Omi, Mino and Shinano on the other, granite frequently forms dark grey and much dis- integrated rock-projections above schist and diluvial quartz pebbles I he feldspar of a splendid pegmatite and its products of disintegra- tion on the borders of Owari, Mino and Mikawa form the raw material of the very extensive ceramic industry of this district, with its chief place, Seto. Of granite are chiefly formed the meridional mountains of Shinano. Granite, diorite and other plutonic rocks hem in the winding upper valleys of the Kisogawa, the Saigawa (Shinano river) and many other rivers of this province, their clear water running over granite. Also in the hills bordering on the plain of Kwanto these old crystalline rocks are widely spread. Farther northwards they give way again, as in the south, to schists and erup- tive rocks. Yet even here granite may be traced in many places Ut course it is not always a pure granite; even hablit and granite- porphyry are found here and there. Thus, for instance, near Nikko in the upper valley of the Daiya-gawa, and in several other places in the neighbouring mountains, a granite-porphyry appears with large, pale, flesh-coloured crystals of orthoclase, dull triclinic felspar quartz and hornblende." "From the mine of Ichinokawa in bhikoku come the wonderful crystals of antimonite, which form such conspicuous objects in the mineralogical cabinets of Europe " (Kein s Japan and Milne in Things Japanese.) The above con- ditions suggest the presence of tertiary formations, yet only the

[GEOGRAPHY

younger groups of that formation appear to be developed. Nor is [here any sign of moraines, glacier-scorings or other traces of the

hnlll ?! de ,f "?? dS u Wl ?i ch ha I e gelded fossils in any abundance belong to the Carboniferous System. The Trias proper is repre- sented by

*truly marine dep*its while the Rhaetic beds contain plant remains. The Jurassic and Cretaceous beds are also in part marine and m part terrestrial. During the whole of the Mesozoic era Japan appears to have lain on or near the margin of the Asiatic continent and the marine deposits are confined for the most part to the eastern side of the islands. F*

The igneous rocks occur at several geological horizons, but the great volcanic eruptions did not begin until the Tertiary period The existing volcanoes belong to four separate arcs or chains. On

Kfn'sMfl 1S T ^^ °i the u Luchu ands, which penetrates into Km Shiu In the centre there is the arc of the Izu-no-Shichito M i S b Wh !4 Ch 't contmue d mto Hondo along the Fossa Magna. In s I *° p r (th Il Ho . nd ° $ e S Bandai arc forms the axis of the island and stretches into Yezo (Hokkaido). Finally in the east of Yezo rise ˆL m ° ˆterly. volcanoes of the Kurile chain. The lavas and and oasak volcanoes consist of liparite, dacite, andesite*

ˆh S P tr " C F UralIy J apan I s 4 iv ,J T ded into N tw o regions by a depression fianrf Jh 8 ˆ M f agna c > f N au mann) which stretches across the island of Hondo from Shimoda to Nagano. The depression is marked by a line of volcanoes, including Fuji, and is in part buried beneath the products of their eruptions. It is supposed to be due to a great fault along its western margin. South and west of the Fossa Magna the beds are thrown into folds which run approximately parallel to the general direction of the coast, and two zones may be recog nized— an outer, consisting of Palaeozoic and Mesozoic beds and an inner, consisting of Archaean and Palaeozoic rocks, with granitic intrusions Nearly along the boundary between the two zones lie the inland seas of south Japan. Towards the Fossa Magna the folds bend northwards. s

North and east of the Fossa Magna the structure is concealed to a very large extent, by the outpourings of the volcanoes which form so marked a feature in the northern part of Hondo. But the founda- Hnl?« rrt £ e vo l canoes , rest is exposed along the east coast of fu t T t h £ Kwan ,to. Abukuma and Kitakami hills), and also in JIVm ■ k Z °- T, h ; s foundation consists of Archean, Palaeozoic

and Mesozoic beds folded together, the direction of the folds being N. by W. to S by E., that is to say, slightly oblique to the general direction of this part of the island. Towards the Fossa Magˆthe folds bend sharply round until they are nearly parallel to the Fossa

llSClt. y-rj -j ˆ

thlt ˆ}jt n abundan T tl y demonstrated by careful observations that the east coasts of Japan are slowly rising. This phenomenon- was first noticed

*in the case of the plain on which stands the capital, Tokyo. Maps of sufficiently trust- Seca,a r worthy accuracy show that in the nth century Movem <»' t th£*A? P enetrat ed much more deeply in a northern direction rLl;S n °T ; th 2 P ° lnt Where t¥ city's main river (Sumida or Arakawa) enters the sea was considerably to the north of its present position, and low-lying districts, to-day thickly populated were under water. Edmund Naumann was the discoverer of these tacts and his attention was first drawn to them by learning that an nori frn a m W t e h d ' whlch .nourishes only in salt water, is called La W* non from the place Asakusa) of its original provenance, which sSLlS rfTt, 3 - m ; m > nd Similar phenomena were found”” S S * a K d ?■” f he , n ° rth -east coast of the main island by Rem, and there can be little doubt that they exist at other places also Naumann has concluded that ” formerly Tokyo Bay stretched “*: over the whole level country of Shimosa Ld Hitachi and northwards as far as the plain of Kwanto extends;” that “the mountain country of Kasusa-Awa emerged from it an island, and that a current ran in a north-westerly direction between this island and the northern mountain margin of the present plain toward the north-east into the open ocean.”*

*™*tu Tal S l> rin Z s —’ T^ presence of so many active volcanoes is partially compensated by a wealth of mineral springs. Since manv ot these thermal springs possess great medicinal value, Japan may become one of the world’s favourite health-resorts. There are more than a hundred spas, some hot, some cold, which, being easily accessible and highly efficacious, are largely visited by the Japanese The most noteworthy are as follows:— jF*

Name of Spa. Arima . Asama . Asamushi . Atami . Beppu . Bessho . Dogo Hakone . Higashi-yama . Ikao

Isobe … Kusatsu .

Prefecture. Hiogo .

Nagano

Aomori

Shizuoka .

Oita . .

Nagano

Ehime

Kanagawa

Fukushima

Gumma

do.

do.

Salt Pure

Quality.

Temp., F°.

100

in — 127

S alt I34 _ id8

do. Carbonic Acid . Pure or Sulphurous .

Pure

Pure, Salt or Sulphurous Pure or Salt Salt ….

do ; ;

Sulphurous . . . .

131 — 226

109 — 132

108 — 113

70 — no

98—168

117— 144 in — 127

Cold 127 — 148

JAPAN

Quality. Sulphurous

do. …

Salt

Carbonate of Soda and Sulphvjr …. Carbonic Acid

do. . .

Sulphurous

Salt

do

do

Temp., F°. 162ˆ172

125

98—115

114— 185

Cold

230

158—204

180

165

104—134

GEOGRAPHY]

Name of Spa. Prefecture.

Nasu . Tochigi

Noboribetsu . Ishikari

Shibu . . Nagano

Chiuzenji . . Shizuoka

Takarazuka . Hiogo

Ureshino . . Saga

Unzen . . . Nagasaki

VVagura . . . Ishikawa

Yamashiro . . do.

Yunoshima . . Hiogo

Climate. — The large extension of the Japanese islands in a northerly and southerly direction causes great varieties of climate. General characteristics are hot and humid though short summers, and long, cold and clear winters. The equatorial currents produce conditions differing from those existing at corresponding latitudes on the neighbouring continent. In Kiushiu, Shikoku and the southern half of the main island, the months of July and August alone are marked by oppressive heat at the sea-level, while in ele- vated districts a cool and even bracing temperature may always be found, though

the direct rays of the sun retain distressing power. Winter in these districts does not last more than two months, from the end of December to the beginning of March; for although the latter month is not free from frost and even snow, the balminess of spring makes itself plainly perceptible. In the northern half of the main island, in Yezo and in the Kuriles, the cold is severe during the winter, which lasts for at least four months, and snow falls some- times to great depths. Whereas in Tokyo the number of frosty nights during a year does not average much over 60, the corresponding number in Sapporo on the north-west of Yezo is 145. But the variation of the thermometer in winter and summer being con- siderable — as much as 72 ° F. in Tokyo — the climate proves some- what trying to persons of weak constitution. On the other hand, the mean daily variation is in general less than that in other countries having the same latitude: it is greatest in January, when it reaches 18 F., and least in July, when it barely exceeds 9° F. The monthly variation is very great in March, when it usually reaches 43 ° F.

During the first 40 years of the Meiji era numerous meteorological stations were established. Reports are constantly forwarded by Meteorology. telegraph to the central observatory in Tokyo, which issues daily statements of the climatic conditions during the previous twenty-four hours, as well as forecasts for the next twenty-four. The whole country is divided into districts for meteorological purposes, and storm-warnings are issued when necessary. At the most important stations observations are taken every hour ; at the less important, six observations daily ; and at the least important, three observations. From the record of three de- cades the following yearly averages of temperature are obtained : —

F°.

Taihoku (in Formosa) 71

Nagasaki (Kiushiu) 60

Kobe (Main Island) 59

Osaka (Main Island) 59

Okayama (Main Island) 58

Nagoya (Main Island) 58

Sakai (Main Island) 58

Tokyo (Capital) 57

Kioto (Main Island) 57

Niigata (Main Island) 55

Ishinomaki (Main Island) 52

Aomori (Main Island) 50

Sapporo (Yezo) 44

The following table affords data for comparing the climates of Peking, Shanghai, Hakodate, Tokyo and San Francisco: —

l6l

Peking

Shanghai

Hakodate

Tokyo

San Francisco

Longitude. u6°29′ E. 121° 20′ E. 1 40° 45′ E. 138° 47′ E. 122° 25′ E.

Latitude.

39° 57′ N. 31° 12′ N. 4-1° 46′ N. 35° 41′ N. 37° 48′ N.

Mean Temp., F°.

53 59 47 57 56

Mean Temp, of Hottest Month.

. . 80

. . 84 71

Hottest Month.

Peking July .

Shanghai do. .

Hakodate August .

Tokyo do 79

San Francisco …. September 63

Mean Temp, of Coldest Month. Coldest Month.

Peking. January

Shanghai

Hakodate

Tokyo

San Francisco

xv. 5

There are three wet seasons in Japan : the first, from the middle of April to the beginning of May; the second, from the middle of June to the beginning of July; and the third, from early in Rainfall September to early in October. The dog days (doyo) are from the middle of July till the second half of August. Septem- ber is the wettest month; January the driest. During the four months from November to February inclusive only about 18% of the whole rain for the year falls. In the district on the east of the main island the snowfall is insignificant, seldom attaining a depth of more than four or five inches and generally melting in a few days, while bright, sunny skies are usual. But in the mountainous provinces of the interior and in those along the western coast, deep snow covers the ground throughout the whole winter, and the sky is usually wrapped in a veil of clouds. These differences are due to the action of the north-westerly wind that blows over Japan from Siberia. The intervening sea being comparatively warm, this wind arrives at Japan having its temperature increased and carrying moisture which it deposits as snow on the western faces of the Japanese mountains. Crossing the mountains and descending their eastern slopes, the wind becomes less saturated and warmer, so that the formation of clouds ceases. Japan is emphatically a wet country so far as quantity of rainfall is concerned, the average for the whole country being 1570 mm. per annum. Still there are about four sunny days for every three on which rain or snow falls, the actual figures being 150 days of snow or rain and 215 days of sunshine. During the cold season, which begins in October and ends in April, northerly and westerly winds prevail throughout Japan. They come from the adjacent continent of Asia, and they de- „_ .

velop considerable strength owing to the fact that ”””<»•

there is an average difference of some 22 mm. between the atmospheric pressure (750 mm.) in the Pacific and that (772 mm.) in the Japanese islands. But during the warm season, from May to September, these conditions of atmospheric pressure are reversed, that in the Pacific rising to 767 mm. and that in Japan falling to 750 mm. Hence throughout this season the prevailing winds are light breezes from the west and south. A comparison of the force habitually developed by the wind in various parts of the islands shows that at Suttsu in Yezo the average strength is 9 metres per second, while Izuhara in the island Tsu-shima, Kumamoto in Kiushiu and Gifu in the east centre of the main island stand at the bottom of the list with an average wind velocity of only 2 metres. A calamitous atmospheric feature is the periodical arrival of storms called " typhoons " (Japanese tai-fu or " great wind "). These have their origin, for the most part, in the China Sea, especially in the vicinity of Luzon. Their season is from June to October, but they occur in other months also, and they develop a velocity of 5 to 75 m. an hour. The meteorological record for ten years ended 1905 shows a total of 120 typhoons, being an average of 12 annually. September had 14 of these phenomena, March 11 and April 10, leaving 85 for the remaining 9 months. But only 65 out of the whole number developed disastrous force. It is particu- larly unfortunate that September should be the season of greatest typhoon frequency, for the earlier varieties of rice flower in that month and a heavy storm does much damage. Thus, in 1902 — by no means an abnormal year — statistics show the following disasters owing to typhoons: casualties to human life, 3639; ships and boats lost, 3244; buildings destroyed wholly or partially, 695,062; land inundated, 1,071,575 acres; roads destroyed, 1236 m. ; bridges washed away, 13, 685 ; embankments broken, 705 m. ; crops damaged, 8,712,655 bushels. The total loss, including cost of repairs, was estimated at nearly 3 millions sterling, which may be regarded as an annual average.

Flora. — The flora of Japan has been carefully studied by many scientific men from Siebold downwards. Foreigners visiting Japan are immediately struck by the affection of the people for flowers, trees and natural beauties of every kind. In actual wealth of blossom or dimensions of forest trees the Japanese islands cannot claim any special distinction. The spectacles most admired by all classes are the tints of the foliage in autumn and the glory of flowering trees in the spring. In beauty and variety of pattern and colour the autumnal tints are unsurpassed. The colours pass from deep brown through purple to yellow and white, thrown into relief by the dark green of non-deciduous shrubs and trees. Oaks and wild prunus, wild vines and sumachs, various kinds of maple, the dodan (Enkianthus Japonicus Hook.) — a wonderful bush which in autumn develops a hue of ruddy red — birches and other trees, all add multitudinous colours to the brilliancy of a spectacle which is further enriched by masses of feathery bamboo. The one

defect is lack of green sward. The grass used for Japanese lawns loses its verdure in autumn and remains from November to March a greyish- brown blot upon the scene. Spring is supposed to begin in February when, according to the old calendar, the new year sets in, but the only flowers then in bloom are the camellia japonica and some kinds of daphne. The former — called by the Japanese tsubaki — may often be seen glowing fiery red amid snow, but the pink (qtome tsubaki), white {shiro-tsubaki) and variegated (shibori-no-tsubaki) kinds do not bloom until March or April. Neither the camellia nor the daphne is regarded as a refined flower: their manner of shedding their blossoms is too unsightly. Queen of spring flowers is the plum (ume). The tree lends itself with peculiar readiness to the skilful

manipulation of- the gardener, and is by him trained into shapes of remarkable grace. Its pure white or rose-red blossoms, heralding the first approach of genial weather, are regarded with special favour and are accounted the symbol of unassuming hardihood. The cherry (sakura) is even more esteemed. It will not suffer any training, nor does it, like the plum, improve by pruning, but the sunshine that attends its brief period of bloom in April, the magni- ficence of its flower-laden boughs and the picturesque flutter of its falling petals, inspired an ancient poet to liken it to the " soul, of Yamato " (Japan), and it has ever since been thus regarded. The wild peach (motno) blooms at the same time, but attracts little atten- tion. All these trees — the plum, the cherry and the peach — bear no fruit worthy of the name, nor do they excel their Occidental repre- sentatives in wealth of blossom, but the admiring affection they inspire in Japan is unique. Scarcely has the cherry season passed when that of the wistaria (fuji) comes, followed by the a.za\ea.(tsutsuji) and the iris (shobu), the last being almost contemporaneous with the peony (botan), which is regarded by many Japan se as the king of flowers and is cultivated assiduously. A species of weeping maple (shidare-momiji) dresses itself in peachy-red foliage and is trained into many picturesque shapes, though not without detriment to its longevity. Summer sees the lotus (renge) convert wide expanses of lake and river into sheets of white and red blossoms; a compara- tively flowerless interval ensues until, in October and November, the chrysanthemum arrives to furnish an excuse for fashionable gatherings. With the exception of the dog-days and the dead of winter, there is no

season when flowers cease to be an object of attention to the Japanese, nor does any class fail to participate in the sentiment. There is similar enthusiasm in the matter of gardens. From the loth century onwards the art of landscape gardening steadily grew into a science, with esoteric as well as exoteric aspects, and with a special vocabulary. The underlying principle is to reproduce nature's scenic beauties, all the features being drawn to scale, so that however restricted the space, there shall be no violation of proportion. Thus the artificial lakes and hills, the stones forming rockeries or simulating solitary crags, the trees and even the bushes are all selected or manipulated so as to fall congruously into the general scheme. If, on the one hand, huge stones are transported hundreds of miles from sea-shore or river-bed where, in the lapse of long centuries, waves and cataracts have hammered them into strange shapes, and if the harmonizing of their various colours and the adjustment of their forms to environment are studied with pro- found subtlety, so the training and tending of the trees and shrubs that keep them company require much taste and much toil. Thus the red pine (aka-matsu or pinus densiflora), which is the favourite garden tree, has to be subjected twice a year to a process of spray- dressing which involves the careful removal of every weak or aged needle. One tree occupies the whole time of a gardener for about ten days. The details are endless, the results delightful. But it has to be clearly understood that there is here no mention of a flower- garden in the Occidental sense of the term. Flowers are cultivated , but for their own sakes, not as a feature of the landscape garden. If they are present, it is only as an incident. This of course does not apply to shrubs which blossom at their seasons and fall always into the general scheme of the landscape. Forests of cherry-trees, plum- trees, magnolia trees, or hiyaku-jikko (Lager stroemia indica), banks of azalea, clumps of hydrangea, groups of camellia — such have their permanent places and their foliage adds notes of colour when their flowers have fallen. But chrysanthemums, peonies, roses and so forth, are treated as special shows, and are removed or hidden when out of bloom. There is another remarkable feature of the Japanese gardener's art. He dwarfs trees so that they remain measurable only by inches after their age has reached scores, even hundreds, of years, and the proportions of leaf, branch and stem are preserved with fidelity. The pots in which these wonders of patient skill are grown have to be themselves fine specimens of the keramist's craft, and as much as £200 is sometimes paid for a notably well trained tree. There exists among many foreign observers an impression that Japan is comparatively poor in wild-flowers; an impression probably due to the fact that there are no flowery meadows or lanes. Besides, the flowers are curiously wanting in fragrance. Almost the only nota- ble exceptions are the mokusei (Osmanthus fragrans) , the daphne and the magnolia. Missing the perfume-laden air of the Occident, a visitor is prone to infer paucity of blossoms. But if some familiar European flowers are absent, they are

replaced by others strange to Western eyes — a wealth of lespedeza and Indigo-fcra ; a vast variety of lilies; graceful grasses like the eulalia and the ominameshi (Patrina scabio- saefolia) ; the richly-hued Pyrus japonica ; azaleas, diervillas and deutzias; the kikyo (Platycodon grandiflorum) , the giboshi (Funkia ovaia), and many another. The same is true of Japanese forests. It has been well said that " to enumerate the constituents and inhabitants of the Japanese mountain-forests would be to name at least half the entire flora."

According to Franchet and Savatier Japan possesses : —

Families. Genera. Dicotyledonous plants 121 795

Monocotyledonous plants … 28 202

Higher Cryptogamous plants 5 38

Vascular plants 154

1035

2743

The investigations of Japanese botanists are adding constantly to the above number, and it is not likely that finality will be reached for some time. According to a comparison made by A. Gray with regard to the numbers of genera and species respectively represented in the forest trees of four regions of the northern hemisphere, the following is the case : —

Atlantic Forest-region of N. America . 66 genera and 155 species.

Pacific Forest-region of N. America . 31 genera and 78 species.

Japan and Manchuria Forest-region . 66 genera and 168 species.

Forests of Europe 33 genera and 85 species.

While there can be no doubt that the luxuriance of Japan's flora is due to rich soil, to high temperature and to rainfall not only plentiful but well distributed over the whole year, the wealth and variety of her trees and shrubs must be largely the result of immi- gration. Japan has four insular chains which link her to the neighbouring continent. On the south, the Riukiu Islands bring her within reach of Formosa and the Malayan archipelago; on the west, Oki, Iki, and Tsushima bridge the sea between her and Korea; on the north-west Sakhalin connects her with the Amur region; and on the north, the Kuriles form an almost continuous route to

Kamchatka. By these paths the germs of Asiatic plants were carried over to join the endemic flora of the country, and all found suitable homes amid greatly varying conditions of climate and physiography. Fauna. — Japan is an exception to the general rule that continents are richer in fauna than are their neighbouring islands. It has been said with truth that " an industrious collector of beetles, butterflies, neuroptera, &c, finds a greater number of species in a circuit of some miles near Tokyo than are exhibited by the whole British Isles."

Of mammals 50 species have been identified and catalogued. Neither the lion nor the tiger is found. The true Carnivora are three only, the bear, the dog and the marten. Three species of bears are scientifically recognized, but one of them, the ice-bear (Ursus maritimus), is only an accidental visitor, carried down by the Arctic current. In the main island the black bear (kuma, Ursus japonicus) alone has its habitation, but the island of Yezo has the great brown bear (called shi-guma, oki-kuma or aka-kuma), the " grisly " of North America. The bear does not attract much popular interest in Japan. Tradition centres rather upon the fox (kitsune) and the badger (mujina), which are credited with supernatural powers, the former being worshipped as the messenger of the harvest god, while the latter is regarded as a mischievous rollicker. Next to these comes the monkey (saru), which dwells equally among the snows of the north and in the mountainous regions of the south. Saru enters into the composition of many place-names, an evidence of the people's familiarity with the animal. There are ten species of bat (komori) and seven of insect-eaters, and prominent in this class are the mole (mugura) and the hedgehog (hari-nezumi). Among the martens there is a weasel (itachi), which, though useful as a rat- killer, has the evil repute of being responsible for sudden and mysterious injuries to human beings; there is a river-otter (kawa- uso), and there is a sea-otter (rakko) which inhabits the northern seas and is highly valued for its beautiful pelt. The rodents are represented by an abundance of rats, with comparatively few mice, and by the ordinary squirrel, to which the people give the name of tree-rat (ki-nezumi) , as well as the flying squirrel, known as the momo-dori (peach-bird) in the north, where it hides from the light in hollow tree-trunks, and in the south as the ban-tori (or bird of evening). There are no rabbits, but hares (usagi) are to be found in very varying numbers, and those of one species put on a white coat during winter. The wild boar (shishi or ii-no-shishi) does not differ appreciably from its European congener. Its flesh is much relished, and for some unexplained reason is called by its vendors " mountain-whale " (yama-hujira) . A very beautiful stag (shika), ■ with eight-branched antlers, inhabits the remote woodlands, and there are five species of antelope (kamo-shika) which are found in the highest and least accessible parts of the mountains. Domestic animals have for representatives the horse (uma), a small beast with little

beauty of form though possessing much hardihood and endu- rance; the ox (ushi) K mainly a beast of burden or draught; the pig (buta), very occasionally; the dog (inu), an unsightly and useless brute; the cat (neko), with a stump in lieu of a tail; barndoor fowl (niwa-tori) , ducks (ahiro) and pigeons (hato). The turkey (shichi- mencho) and the goose (gacho) have been introduced but are little appreciated as yet.

Although so-called singing birds exist in tolerable numbers, those worthy of the name of songster are few. Eminently first is a species of nightingale (uguisu), which, though smaller than its congener of the West, is gifted with exquisitely modulated flute-like notes of considerable range. The uguisu is a dainty bird in the matter of temperature. After May it retires from the low-lying regions and gradually ascends to higher altitudes as midsummer approaches. A variety of the cuckoo called hototogisu (Cuculus poliocephalus) in imitation of the sound of its voice, is heard as an accompaniment of the uguisu, and there are also three other species, the kakkodori (Cuculus canorus), the tsutsu-dori (C. himalayanus) , and the masu- hakari, or juichi (C. hyperythrus). To these the lark, hibari (Alauda japonica), joins its voice, and the cooing of the pigeon (hato) is supplemented by the twittering of the ubiquitous sparrow (suzume),

while over all are heard the raucous caw of the raven (karasu) and the harsh scream of the kite (tombi), between which and the raven there is perpetual feud. The falcon (taka), always an honoured bird in Japan, where from time immemorial hawking has been an aristo- cratic pastime, is common enough, and so is the sparrow-hawk (hai-taka), but the eagle iwashi) affects solitude. Two English ornithologists, Blakiston and Pryer, are the recognized authorities on the birds of Japan, and in a contribution to the Transactions of the Asiatic Society of Japan (vol. x.) they have enumerated 359 species. Starlings (muku-dori) are numerous, and so are the wag- tail (se.kirei), the swallow (tsubame) the martin {ten), the woodchat (mozu) and the jay (kakesu or kashi-dori), but the magpie (togarasu), though common in China, is rare in Japan. Blackbirds and thrushes are not found, nor any species of parrot, but on the other hand, we have the hoopoe (yatsugashira), the red-breast (komadori), the blue-bird (ruri), the wren (miso-sazai) , the golden-crested wren (itadaki), the golden-eagle (inu-washi) , the finch (hiwa), the longtailed rose- finch (benimashiko) , the ouzel — brown (akahara), dusky (tsugumi) and water (kawa-garasu) — the kingfisher (kawasemi), the crake (kuina) and the

tomtit (kara). Among game-birds there are the quail (uzura), the heathcock (ezo-racho), the ptarmigan (ezo-raicho or ezo-yama-dori) , the woodcock (hodo-shigi), the snipe (ta-shigi) — ■ with two special species, the solitary snipe (yama-shigi) and the painted snipe (tama-shigi) — and the pheasant (kiji). Of the last there are two species, the kiji proper, a bird presenting no remark- able features, and the copper pheasant, a magnificent bird with plumage, of dazzling beauty. Conspicuous above all others, not only for grace of form but also for the immemorial attention paid to them by Japanese artists, are the crane (tsuru) and the heron (sagi). Of the crane there are seven species, the stateliest and most beautiful being the Grus japonensis (lancho or tancho-zuru) , which stands some 5 ft. high and has pure white plumage with a red crown, black tail-feathers and black upper neck. It is a sacred bird, and it shares with the tortoise the honour of being an emblemof longevity. The other species are the demoiselle crane (anewa-zuru) , the black crane (kuro-zuru or nezumi-zuru, i.e. Grus cinerea) , the Grus leucauchen (mana-zuru), the Grus monachus (nabe-zuru), and the white crane (shiro-zuru). The Japanese include in this category the 'stork (kozuru), but it may be said to have disappeared from the island. The heron (sagi) constitutes a charming feature in a Japanese land- scape, especially the silver heron (shira-sagi) , which displays its brilliant white plumage in the rice-fields from spring to early autumn. The night-heron (goi-sagi) is very common. Besides these waders there are plover (chidori) ; golden (muna-guro or ai- guro) ; gray (daizen) ; ringed (shiro-chidori) ; spur-winged (keri) and Harting's sand-plover (ikaru-chidori) ; sand-pipers — green (ashiro- shigi) and spoon-billed (hera-shigi) — and water-hens (ban). Among swimming birds the most numerous are the gull (kamome), of which many varieties are found; the cormorant (u) — which is trained by the Japanese for fishing purposes — and multitudinous flocks of wild-geese (gan) and wild-ducks (kamo), from the beautiful mandarin- duck (oshi-dori), emblem of conjugal fidelity, to teal (kogamo) and widgeon (hidori-gamo) of several species. Great preserves of wild- duck and teal used to be a frequent feature in the parks attached to the feudal castles of old Japan, when a peculiar method of netting the birds or striking them with falcons was a favourite aristocratic pastime. A few of such preserves still exist, and it is noticeable that in the Palace-moats of Tokyo all kinds of water-birds, attracted by the absolute immunity they enjoy there, assemble in countless numbers at the approach of winter and remain until the following spring, wholly indifferent to the close proximity of the city.

Of reptiles Japan has only 30 species, and among them is included the marine turtle (umi-game) which can scarcely be said to frequent her waters, since it is seen only at rare intervals on the southern coast. This is even truer of the larger species (the shogakubo, i.e. Chelonia cephalo).

Both are highly valued for the sake of the shell, which has always been a favourite material for ladies' combs and hairpins. By carefully selecting certain portions and welding them together in a perfectly flawless mass, a pure amber-coloured object is obtained at heavy cost. Of the fresh-water tortoise there are two kinds, the suppon (Trionyx japonica) and the kame-no-ko (Emys vulgaris japonica) . The latter is one of the Japanese emblems of longevity. It is often depicted with a flowing tail, which appendix attests close observation of nature ; for the mino-game, as it is called, represents a tortoise to which, in the course of many scores of years, confervae have attached themselves so as to form an appendage of long green locks as the creature swims about. Sea-snakes occasion- ally make their way to Japan, being cairied thither by the Black Current (Kuro Shiwo) and the monsoon, but they must be regarded as merely fortuitous visitors. There are 10 species of land-snakes (hebi), among which one only (the mamushi, or Trigonocephalus Blomhoffi) is venomous. The others for the most part frequent the rice-fields and live upon frogs. The largest is the aodaisho (Elaphis virgatus), which sometimes attains a length of 5 ft., but is quite harmless. Lizards (tokage), frogs (kawazu or kaeru), toads (ebogayeru) and newts (imori) are plentiful, and much curiosity attaches to a giant salamander (sansho-uwo, called also hazekai and other names according to localities), which reaches to a length of 5 ft., and (according to Rein) is closely related to the Andrias Scheuchzeri of the Oeningen strata.

The seas surrounding the Japanese islands may be called a resort of fishes, for, in addition to numerous species which abide there permanently, there are migatory kinds, coming and going with the monsoons and with the great ocean streams that set to and from the shores. In winter, for example, when the northern monsoon begins to blow, numbers of denizens of the Sea of Okhotsk swim southward to the more genial waters of north Japan ; and in summer the Indian Ocean and the Malayan archipelago send to her southern coasts a crowd of emigrants which turn homeward again at the approach of winter. It thus falls out that in spite of the enormous quantity of fish consumed as food or used as fertilizers year after year by the Japanese, the seas remain as richly stocked as ever. Nine orders of fishes have been distinguished as the piscifauna of Japanese waters. They may be found carefully catalogued with all their included species in Rein's Japan, and highly interesting researches by Japan- ese physiographists are recorded in the Journal of the College of Science of the Imperial University of Tokyo. Briefly, the chief fish of Japan are the bream (tai), the perch (suzuki), the mullet (bora), the rock-fish (hataiate), the grunter (oni-o-koze), the mackerel (saba), the sword-fish (tachi-uwo) , the wrasse (kusabi), the haddock (tara), the flounder (karei), and its congeners the sole (hirame) and the turbot (ishi-garei), the shad (namazu), the salmon (shake), the masu, the carp (koi), the j una, the gold fish (kingyo), the

gold carp (higoi), the loach (dojo), the herring (nishin),the iwashi (Clupea melanosticta) , the eel (unagi), the conger eel (anago), the coffer-fish (hako-uwo) , the fugu (Tetrodon) , the ai (Plecoglossus altiveiis) , the sayori (Hemir- amphus sayori), the shark (same), the dogfish (manuka-zame) , the ray (e), the sturgeon (cho-zame) and the maguro (Thynnus sibi).

The insect life of Japan broadly corresponds with that of temperate regions in Europe. But there are also a number of tropical species, notably among butterflies and beetles. The latter — for which the generic term in Japan is mushi or kaichu — include some beautiful species, from the " jewel beetle " (tama-mushi), the " gold beetle " (kogane-mushi) and the Chrysochroa fulgidissima, which glow and sparkle with the brilliancy of gold and precious stones, to the jet black Melanauster chinensis, which- seems to have been fashioned out of lacquer spotted with white. There is also a giant nasicornous beetle. Among butterflies (chocho) Rein gives prominence to the broad-winged kind (Papilio), which recall tropical brilliancy. One (Papilio macilentus) is peculiar to Japan. Many others seem to be practically identical with European species. That is especially true of the moths (yacho), 100 species of which have been identified with English types. There are seven large silk-moths, of which two only (Bombyx mori and Antheraea yama-mai) are employed in producing silk. Fishing lines are manufactured from the cocoons of the genjiki-mushi (Caligula japonica), which is one of the commonest moths in the islands. _ Wasps, bees and hornets, generically known as hachi, differ little from their European types, except that they are somewhat larger and more sluggish. The gad-fly (abu), the house- fly (hat), the mosquito (ka), the flea (nomi) and occasionally the bed- bug (called by the Japanese kara-rnushi because it is believed to be imported from China), are all fully represented, and the dragon-fly (tombo) presents itself in immense numbers at certain seasons. Grasshoppers (batta) are abundant, and one kind (inago), which frequent the rice-fields when the cereal is .ripening, are caught and fried in oil as an article of food. On the moors in late summer the mantis (kama-kiri-mushi) is commonly met with, and the cricket (kiirogi) and the cockroach, abound. Particularly obtrusive is the cicada (semi), of which there are many species. Its strident voice is heard most loudly at times of great heat, when the song of the birds is hushed. The dragon-fly and the cicada afford ceaseless entertainment to the Japanese boy. He catches them by means of a rod smeared with bird-lime, and then tying a fine string under their wings, he flies them at its end. Spiders abound, from a giant species to one of the minutest dimensions, and the tree-bug is always ready to make a destructive lodgment in any sickly tree-stem. The scorpion (sasori). exists but is not poisonous.

Japanese rivers and lakes are the habitation of several — seven or eight—

species of freshwater crab (kani), which live in holes on the shore and emerge in the day-time, often moving to considerable distances from their homes. Shrimps (kawa-ebi) also are found in the rivers and rice-fields. These shrimps as well as a large species of crab — mokuzo-gani — serve the people as an article of food, but the small crabs which live in holes have no recognized raison d' etre. In Japan, as elsewhere, the principal Crustacea are found in the sea. Flocks of lupa and other species swim in the wake of the tropical fishes which move towards Japan at certain seasons. Naturally these migratory crabs are not limited to Japanese waters. Milne Edwards has identified ten species which occur in Australian seas also, and Rein mentions, as belonging to the same category, the " helmet-crab " or " horse-shoe crab " (kabuto-gani; Limulus longispina Hoeven). ' Very remarkable is the giant Taka-ashi — long legs (Macrocheirus Kaempferi), which has legs l\ metres long and is found in the seas of Japan and the Malay archipelago. There is no lobster on the coasts of Japan, but there are various species of cray-fish (Palinurus and Scyllarus) the principal of which, under the names of ise-ebi (Palinurus japonicus) and kuruma-ebi (Penaeus canaliculars) are greatly prized as an article of diet.

Already in 1882, Dunker in his Index Molluscorum Maris Japonici enumerated nearly 1200 species of marine molluscs found in the

Japanese archipelago, and several others have since then been added to the list. As for the land and fresh-water molluscs, some 200 of which are known, they are mainly kindred with those of China and Siberia, tropical and Indian forms being exceptional. There are 57 species of Helix (maimaitsuburi, dedemushi, katatsumuri orkwagyii) and 25 of Clausilia (kiseru-gai or pipe-snail), including the two largest snails in Japan, namely the CI. Martensi and the CI. Yoko- hamensis, which attain to a length of 58 mm. and 44 mm. respec- tively. The mussel (i-no-kai) is well represented by the species numa-gai (marsh-mussel), karasu-gai (raven-mussel), kamisori-gai (razor-mussel), shijimi-no-kai (Corbicula), of which there are nine species, &c. Unlike the land-molluscs, the great majority of Japanese sea-molluscs are akin to those of the Indian Ocean and the Malay archipelago. Some of them extend westward as far as the Red Sea. The best known and most frequent forms are the asari (Tapes philippinarum) , the hamaguri (Meretrix lusoria), the baka (Mactra sulcataria), the aka-gai (Scapharca inflata), the kaki (oyster), the awabi (Haliotis japonica), the

sazae (Turbo cornutus), the hora-gai (Tritonium tritonius), &c. Among the cephalopods several are of great value as articles of food, e.g. the surume (Onychotheuthis Banksii), the tako (octopus), the shidako (Eledone), the ika (Sepia) and the tako-fune (Argonauta).

Greeff enumerates, as denizens of Japanese seas, 26 kinds of sea- urchins (gaze or uni) and 12 of starfish (hitode or tako-no-makura) . These, like the mollusca, indicate the influence of the Kuro Shiwo and the south-west monsoon, for they have close affinity with species found in the Indian and Pacific Oceans. For edible purposes the most valuable of the Japanese echinoderms is the sea-slug or beche de mer (namako) .which is greatly appreciated and forms an important staple of export to China. Rem writes: " Very remarkable in con- nexion with the starfishes is the occurrence of Asterias rubens on the Japanese coast. This creature displays an almost unexampled frequency and extent of distribution in the whole North Sea, in the western parts of the Baltic, near the Faroe Islands, Iceland, Green- land and the English coasts, so that it may be regarded as a charac- teristic North Sea echinoderm form. Towards the south this star- fish disappears, it seems, completely; for it is not yet known with certainty to exist either in the Mediterranean or in the southern parts of the Atlantic Ocean. In others also Asterias rubens is not known — and then it suddenly reappears in Japan. Ar chaster typicus has a pretty wide distribution over the Indian Ocean ; other Asteridae of Japan, on the other hand, appear to be confined to its shores."

Japan is not rich in corals and sponges. Her most interesting contributions are crust-corals (Gorgontdae, Corallium, Isis, &c), and especially flint-sponges, called by the Japanese hoshi-gai and known as " glass-coral " (Hyalonema sieboldi). These last have not been found anywhere except at the entrance 'of the Bay of Tokyo at a depth of some 200 fathoms.

Population. December 1907:

Population. Japan proper . . Formosa (Taiwan) Sakhalin . .

Totals . .

II. — The People,

The population was as follows on the 31st of

Population

per

sq. m.

330

224

O'l

Males. Females. Totals.

24,6oi ; 6s8 24,172ˆ27 48,774,285

1,640,778 1,476,137 3,116,915

7.I7S 3,631 10,806

26,249,611 25,652,395 51,902,006

The following table shows the quadrennial periods between 1891

Year.

Males.

Females.

rate of increase in the four and 1907 in Japan proper: —

Average Population Totals, increase per

per cent. sq. m.

1891 .

• 20,563,416

20,155,261

40,718,677

1-09

272

1895 .

■ 21,345,750

20,904,870

42,270,620

1-09

286

1899 .

• 22,330,112

21,930,540

44,260,652

1-14

299

1903 •

. 23,601,640

23,131,236

46,732,876

1-54

316

1907 .

. 24,601,658

24,172,627

48,774,285

I-I3

330

The population of Formosa (Taiwan) during the ten-year period 1898-1907 grew as follows: —

Average Population Females. ”” ‘

Year.

1898 1902 1907

Males.

1,307,428 1,513,280 1,640,778

1, iS7,S39

1,312,067

i,476,i37

Totals, increase per cent.

2,464,967 —

2,825,347 2-70 3,116,915 2-37

per sq. m.

182 209 224

According to quasi-historical records, the population of the empire in the year a.d. 610 was 4,988,842, and in 736 it had grown to 8,631,770. It is impossible to say how much reliance may be placed on these figures, but from the 18th century, when the name of every subject had to be inscribed on the roll of a temple as a measure against his adoption of Christianity, a tolerably trustworthy census could always be taken. The returns thus obtained show that from the year 1723 until 1846 the population remained almost stationary, the figure in the former year being 26,065,422, and that in the latter year 26,907,625. There had, indeed, been five periods of declining population in that interval of 124 years, namely, the periods 1738- I 744. I759-I762, 1773-1774, 1791-1792, and 1844-1846. But after 1872, when the census showed a total of 33,110,825, the population grew steadily, its increment between 1872 and 1898 inclusive, a period of 27 years, being 10,649,990. Such a rate of increase invests the question of subsistence with great importance. In former times the area of land under cultivation increased in a marked degree. Returns prepared at the beginning of the 10th century showed 2| million acres under crops, whereas the figure in 1 834 was over 8 million acres. But the development of means of subsistence has been outstripped by the growth of population in recent years. Thus, during the period between 1899 and 1907 the population received an increment of 1 1 -6% whereas the food-producing area increased by only 4-4%. This discrepancy caused anxiety at one time, but large fields suitable for colonization have been opened in Sakhalin, Korea, Manchuria and Formosa, so that the problem

of subsistence has ceased to be troublesome. The birth-rate, taking the average of the decennial period ended 1907, is 3-05% of the population, and the death-rate is 2-05. Males exceed females in the ratio of 2% approximately. But this rule does not hold after the age of 65, where for every 100 females only 83 males are found. The Japanese are of low stature as compared with the inhabitants of Western Europe: about 16% of the adult males are below 5 ft. But there are evidences of steady improvement in this respect. Thus, during the period of ten years between 1893 and 1902, it was found that the percentage of recruits of 5 ft. 5 in. and upward grew from 10-09 to 12-67, the rate of increase having been remarkably steady ; and the percentage of those Under ft. declined from 20-21 to 16-20.*

Towns. — There are in Japan 23 towns having a population of over 50,000, and there are 76 having a population of over 20,000. The larger towns, their populations and the growth of the latter during the five-year period commencing with 1898 were as follow: —

Urban Populations

1898.

Tokyo 1,440,121

Osaka 821,235

Kioto 353,139

Nagoya 244,145

Kobe 215,780

Yokohama 193,762

Hiroshima 122,306

Nagasaki 107,422

Kanazawa ….

Sendai

Hakodate

Fukuoka

Wakayama …. Tokushima …. Kumamoto ….

Toyama

Okayama

Otaru

Kagoshima ….

Niigata „„„„-

Sakai 50J203

Sapporo

Kure

Sasebo

83,595 83,325 78,040 66,190 63,667 61,501 61,463 59,558 58,025 56,961

53,48i

53,366

1903. 1,795,128 988,200

379.404 284,829

283,839

324,776

H3,545

151,727

97.548

93,773

84,746

70,107

67,908

62,998

55,277 86,276 80,140 79-746 58,384 58,821

55.304 62,825 52,607

The growth of Kure and Sasebo is attributable to the fact that they have become the sites of large ship-building yards, the property of the state.

The number of houses in Japan at the end of 1903, when the census was last taken, was 8,725,544, the average number of inmates in each house being thus 5-5.

Physical Characteristics. — The best authorities are agreed that the Japanese people do not differ physically from their Korean and Chinese neighbours as much as the inhabitants of northern Europe differ from those of southern Europe. It is true that the Japanese are shorter in stature than either the Chinese or the Koreans. Thus the average height of the Japanese male is only 5 ft. 3ˆ in., and that of the female 4 ft. io£ in., whereas in the case of the Koreans and the northern Chinese the correspond- ing figures for males are 5 ft. 5J in. and 5 ft. 7 in. respectively. Yet in other physical characteristics the Japanese, the Koreans

and the Chinese resemble each other so closely that, under similar conditions as to costume and coiffure, no appreciable difference is apparent. Thus since it has become the fashion for Chinese students to flock to the schools and colleges of Japan, there adopting, as do their Japanese fellow-students, Occidental garments and methods of hairdressing, the distinction of nation- ality ceases to be perceptible. The most exhaustive anthro- pological study of the Japanese has been made by Dr E. Baelz (emeritus professor of medicine in the Imperial University of Tokyo), who enumerates the following sub-divisions of the race inhabiting the Japanese islands. The first and most important is the Manchu-Korean type; that is to say, the type which prevails in north China and in Korea. This is seen specially among the upper classes in Japan. Its characteristics are exceptional tallness combined with slenderness and elegance of figure; a face somewhat long, without any special prominence of the cheek- bones but having more or less oblique eyes; an aquiline nose; a slightly receding chin; largish upper teeth; a long neck; a narrow chest; a long trunk, and delicately shaped, small hands with long, slender fingers. The most plausible hypothesis is that men of this type are descendants of Korean colonists who, in prehistoric times, settled in the province of Izumo, on the

west coast of Japan, having made their way thither from the Korean peninsula by the island of Oki, being carried by the cold current which flows along the eastern coast of Korea. The second type is the Mongol. It is not very frequently found in Japan, per- haps because, under favourable social conditions, it tends to pass into the Manchu-Korean type. Its representative has a broad face, with prominent cheek-bones, oblique eyes, a nose more or less flat and a wide mouth. The figure is strongly and squarely built, but this last characteristic can scarcely be called typical. There is no satisfactory theory as to the route by which the Mongols reached Japan, but it is scarcely possible to doubt that they found their way thither at one time. More important than either of these types as an element of the Japanese nation is the Malay. Small in stature, with a well-knit frame, the cheek- bones prominent, the face generally round, the nose and neck short, a marked tendency to prognathism, the chest broad and well developed, the trunk long, the hands small and delicate — this Malay type is found in nearly all the islands along the east coast of the Asiatic continent as well as in southern China and in the extreme south-west of Korean peninsula. Carried northward by the warm current known as the Kuro Shiwo, the Malays seem to have landed in Kiushiu — the most southerly of the main Japanese islands — whence they ultimately pushed northward and conquered their Manchu-Korean predecessors, the Izumo colonists. None of the above three, however, can be regarded as the earliest settlers in Japan. Before them all was a tribe of immigrants who appear to have crossed from north- eastern Asia at an epoch when the sea had not yet dug broad channels between the continent and the adjacent islands. These people — the Ainu — are usually spoken of as the aborigines of Japan. They once occupied the whole country, but were gradually driven northward by the Manchu-Koreans and the Malays, until only a mere handful of them survived in the northern island of Yezo. Like the Malay and the Mongol types they are short and thickly built, but unlike either they have prominent brows, bushy locks, round deep-set eyes, long diver- gent lashes, straight noses and much hair on the face and the body. In short, the Ainu suggest much closer affinity with Europeans than does any other of the types that go to make up the population of Japan. It is not to be supposed, however, that these traces of different elements indicate any lack of homo- geneity in the Japanese race. Amalgamation has been com- pletely effected in the course of long centuries, and even the Ainu, though the small surviving remnant of them now live apart, have left a trace upon their conquerors.

The typical Japanese of the present day has certain marked physical peculiarities. In the first place, the ratio of the height of his head to the length of his body is greater than it is in Euro- peans. The Englishman's head is often one-eighth of the length of his body or even less, and in

continental Europeans, as a rule,

the ratio does not amount to one-seventh; but in the Japanese it exceeds the latter figure. In all nations men of short stature have relatively large heads, but in the case of the Japanese there appears to be some racial reason for the phenomenon. Another striking feature is shortness of legs relatively to length of trunk. . In northern Europeans the leg is usually much more than one- half of the body's length, but in Japanese the ratio is one-half or even less; so that whereas the Japanese, when seated, looks almost as tall as a European, there may be a great difference between their statures when both are standing. This special feature has been attributed to the Japanese habit of kneeling instead of sitting, but investigation shows that it is equally marked in the working classes who pass most of their time stand- ing. In Europe the same physical traits — relative length of head and shortness of legs — distinguish the central race (Alpine) from the Teutonic, and seem to indicate an affinity between the former and the Mongols. It is in the face, however, that we find specially distinctive traits, namely, in the eyes, the eye- lashes, the cheekbones and the beard. Not that the eyeball itself differs from that of an Occidental. The difference consists in the fact that " the socket of the eye is comparatively small and shallow, and the osseous ridges at the brows being little marked, the eye is less deeply set than in the European. In fact, seen in profile, forehead and upper lip often form an unbroken line." Then, again, the shape of the eye, as modelled by the lids, shows a striking peculiarity For whereas the open eye is almost invariably horizontal in the European, it is often oblique in the Japanese on account of the higher level of the upper corner. " But even apart from obliqueness, the shape of the corners is peculiar in the Mongolian eye. The inner corner is partly or entirely covered by a fold of the upper lid continuing more or less into the lower lid. This fold often covers also the whole free rim of the upper lid, so that the insertion of the eye- lashes is hidden " and the opening between the lids is so narrowed as to disappear altogether at the moment of laughter. As for the eye-lashes, not only are they comparatively short and sparse, but also they converge instead of diverging, so that whereas in a European the free ends of the lashes are further distant from each other than their roots, in a Japanese they are nearer to- gether. Prominence of cheekbones is another special feature, but it is much commoner in the lower than in the upper classes, where elongated faces may almost be said to be the rule. Finally, there is marked paucity of hair on the face of the average Japan- ese — apart from the Ainu — and what hair there is is nearly always straight. It is not to be supposed, however, that because the Japanese is short of stature and often finely moulded, he lacks either strength or endurance. On the contrary, he possesses both in a marked degree, and his deftness of finger is not less remarkable than the suppleness and activity of his body.

Moral Characteristics. — The most prominent trait of Japanese disposition is gaiety of heart. Emphatically of a laughter- loving nature, the Japanese passes through the world with a smile on his lips. The petty ills of life do not disturb his equa- nimity. He takes them as part of the day's work, and though he sometimes grumbles, rarely, if ever, does he repine. Excep- tional to this general rule, however, is a mood of pessimism which sometimes overtakes youths on the threshold of manhood. Finding the problem of life insolvable, they abandon the attempt to solve it and take refuge in the grave. It seems as though there were always a number of young men hovering on the brink of such suicidal despair. An example alone is needed finally to destroy the equilibrium. Some one throws himself over a cataract or leaps into the crater of a volcano, and immediately a score or two follow. Apparently the more picturesquely awful the manner of the demise, the greater its attractive force. The thing is not a product of insanity, as the term is usually interpreted; letters always left behind by the victims prove them to have been in full possession of their reasoning faculties up to the last moment. Some observers lay the blame at the door of Buddhism, a creed which promotes pessimism by beget- ting the anchorite, the ascetic and the shuddering believer in seven hells. But Buddhism did not formerly produce such

incidents, and, for the rest, the faith of Shaka has little sway over the student mind in Japan. The phenomenon is modern: it is not an outcome of Japanese nature nor yet of Buddhist teaching, but is due to the stress of endeavouring to reach the standards of Western acquirement with grievously inadequate equipment, opportunities and resources. In order to support himself and pay his academic fees many a Japanese has to fall into the ranks of the physical labourer during a part of each day or night. Ill-nourished, over-worked and, it may be, disap- pointed, he finds the struggle intolerable and so passes out into the darkness. But he is not a normal type. The normal type is light-hearted and buoyant. One naturally expects to find, and one does find, that this moral sunshine is associated with good temper. The Japanese is exceptionally serene. Irascibility is regarded as permissible in sickly children only: grown people are supposed to be superior to displays of impatience. But there is a limit of imperturbability, and when that limit is reached, the subsequent passion is desperately vehement. It has been said that these traits go to make the Japanese soldier what he is. The hardships of a campaign cause him little suffer- ing since he never frets over them, but the hour of combat finds him forgetful of

everything save victory. In the case of the military class — and prior to the Restoration of 1867 the term " military class " was synonymous with " educated class " — this spirit of stoicism was built up by precept on a solid basis of heredity. The samurai (soldier) learned that his first charac- teristic must be to suppress all outward displays of emotion. Pain, pleasure, passion and peril must all find him unperturbed. The supreme test, satisfied so frequently as to be commonplace, was a shocking form of suicide performed with a placid mien. This capacity, coupled with readiness to sacrifice life at any moment on the altar of country, fief or honour, made a remark- ably heroic character. On the other hand, some observers hold that the education of this stoicism was effected at the cost of the feelings it sought to conceal. In support of that theory it is pointed out that the average Japanese, man or woman, will re- count a death or some other calamity in his own family with a perfectly calm, if not a smiling, face. Probably there is a measure of truth in the criticism. Feelings cannot be habitually hidden without being more or less blunted. But here another Japanese trait presents itself — politeness. There is no more polite nation in the world than the Japanese. Whether in real courtesy of heart they excel Occidentals may be open to doubt, but in all the forms of comity they are unrivalled. Now one of the car- dinal rules of politeness is to avoid burdening a stranger with the weight of one's own woes. Therefore a mother, passing from the chamber which has just witnessed her paroxysms of grief, will describe calmly to a stranger — especially a foreigner — the death of her only child. The same suppression of emotional display in public is observed in all the affairs of life. Youths and maidens maintain towards each other a demeanour of reserve and even indifference, from which it has been confidently affirmed that love does not exist in Japan. The truth is that in no other country do so many dual suicides occur — suicides of a man and woman who, unable to be united in this world, go to a union beyond the grave. It is true, nevertheless, that love as a prelude to marriage finds only a small place in Japanese ethics. Mar- riages in the great majority of cases are arranged with little reference to the feelings of the parties concerned. It might be supposed that conjugal fidelity must suffer from such a custom. It does suffer seriously in the case of the husband, but emphati- cally not in the case of the wife. Even though she be cog- nisant — as she often is — of her husband's extra-marital relations, she abates nothing of the duty which she has been taught to regard as the first canon of female ethics. From many points of view, indeed, there is no more beautiful type of character than that of the Japanese woman. She is entirely unselfish; exqui- sitely modest without being anything of a prude; abounding in intelligence which is never obscured by egoism; patient in the hour of suffering; strong in time of affliction; a faithful wife; a loving mother; a good daughter; and capable, as history shows, of heroism rivalling that of the stronger sex. As to the question

of sexual virtue and morality in Japan, grounds for a conclusive verdict are hard to find. In the interests of hygiene prostitution is licensed, and that fact is by many critics construed as proof of tolerance. But licensing is associated with strict segregation, and it results that the great cities are conspicuously free from evidences of vice, and that the streets may be traversed by women at all hours of the day and night with perfect impunity and with- out fear of encountering offensive spectacles. The ratio of marriages is approximately 8-46 per thousand units of the popu- lation, and the ratio of divorces is 1-36 per thousand. There are thus about 16 divorces for every hundred marriages. Divorces take place chiefly among the lower orders, who frequently treat marriage merely as a test of a couple's suitability to be helpmates in the struggles of life. If experience develops incompatibility of temper or some other mutually repellent characteristic, separation follows as a matter of course. On the other hand, divorces among persons of the upper classes are comparatively rare, and divorces on account of a wife's unfaithfulness are almost unknown.

Concerning the virtues of truth and probity, extremely con- flicting opinions have been expressed. The Japanese samurai always prided himself on having " no second word." He never drew his sword without using it ; he never gave his word without keeping it. Yet it may be doubted whether the value attached in Japan to the abstract quality, truth, is as high as the value attached to it in England, or whether the consciousness of having told a falsehood weighs as heavily on the heart. Much depends upon the motive. Whatever may be said of the upper class, it is probably true that the average Japanese will not sacrifice expediency oh the altar of truth. He will be veracious only so long as the consequences are not seriously injurious. Perhaps no more can be affirmed of any nation. The "white lie " of the Anglo-Saxon and the hoben no uso of The Japanese are twins. In the matter of probity, however, it is possible to speak with more assurance. There is undoubtedly in the lower ranks of Japanese tradesmen a comparatively large fringe of persons whose standard of commercial morality is defective. They are descendants of feudal days when the mercantile element, being counted as the dregs of the population, lost its self-respect. Against this blemish — which is in process of gradual correction • — the fact has to be set that the better class of merchants, the whole of the artisans and the labouring classes in general, obey canons of probity fully on a level with the best to be found else- where. For the rest, frugality, industry and patience charac- terize all the bread-winners; courage and burning patriotism are attributes of the whole nation.

There are five qualities possessed by the Japanese in a marked degree. The first is frugality. From time immemorial the great mass of the people have lived in absolute ignorance of luxury in any form and in the perpetual presence of a necessity to economize. Amid these circumstances there has

emerged capacity to make a little go a long way and to be content with the most meagre fare. The second quality is endurance. It is born of causes cognate with those which have begotten frugality. The average Japanese may be said to live without artificial heat; his paper doors admit the light but do not exclude the cold. His brazier barely suffices to warm his hands and his face. Equally is he a stranger to methods of artificial cooling. He takes the frost that winter inflicts and the fever that summer brings as unavoidable visitors. The third quality is obedience; the offspring of eight centuries passed under the shadow of mili- tary autocracy. Whatever he is authoritatively bidden to do, that the Japanese will do. The fourth quality is altruism. In the upper classes the welfare of the family has been set above the interests of each member. The fifth quality is a genius for detail. Probably this is the outcome of an extraordinarily elaborate system of social etiquette. Each generation has added some- thing to the canons of its predecessor, and for every ten points preserved not more than one has been discarded. An instinctive respect for minutiae has thus been inculcated, and has gradually extended to all the affairs of life. That this accuracy may some- times degenerate into triviality, and that such absorption in trifles may occasionally hide the broad horizon, is conceivable.

But the only hitherto apparent evidence of such defects is an excessive clinging to the letter of the law; a marked reluctance to exercise discretion; and that, perhaps, is attributable rather to the habit of obedience. Certainly the Japanese have proved them- selves capable of great things, and their achievements seem to have been helped rather than retarded by their attention to detail.

III. — Language and Literature Language. — Since the year 1820, when Klaproth concluded that the Japanese language had sprung from the Ural-Altaic stock, philologists have busied themselves in tracing its affinities. If the theories hitherto held with regard to the origin of the Japanese people be correct, close relationship should exist between the Japanese and the Korean tongues, and possibly between the Japanese and the Chinese. Aston devoted much study to the former question, but although he proved that in construction the two have a striking similarity, he could not find any correspond- ing likeness in their vocabularies. As far back as the beginning of the Christian era the Japanese and the Koreans could not hold intercourse without the aid of interpreters. If then the languages of Korea and Japan had a common stock, they must have branched off from it at a

date exceedingly remote. As for the languages of Japan and China, they have remained essentially different throughout some twenty centuries in spite of the fact that Japan adopted Chinese calligraphy and assimilated Chinese literature. Mr K. Hirai has done much to establish his theory that Japanese and Aryan had a common parent. But nothing has yet been substantiated. Meanwhile an inquirer is confronted by the strange fact that of three neighbouring countries between which frequent communication existed, one (China) never deviated from an ideographic script; another (Korea) invented an alphabet, and the third (Japan) devised a syllabary. Anti- quaries have sought to show that Japan possessed some form of script before her first contact with either Korea or China. But such traces of prehistoric letters as are supposed to have been found seem to be corruptions of the Korean alphabet rather than independent symbols. It is commonly believed that the two Japanese syllabaries — which, though distinct in form, have identical sounds — were invented by Kukai (790) and Kibi Daijin (760) respectively. But the evidence of old documents seems to show that these syllabaries had a gradual evolution and that neither was the outcome of a single scholar's inventive genius.

The sequence of events appears to have been this: — Japan's earliest contact with an oversea people was with the Koreans, and she made some tentative efforts to adapt their alphabet to the expression of her own language. Traces of these efforts survived, and inspired the idea that the art of writing was practised by the Japanese before the opening of intercourse with their continental neighbours. Korea, however, had neither a literary nor an ethical message to deliver, and thus her script failed to attract much atten- tion. Very different was the case when China presented her noble code of Confucian philosophy and the literature embodying it. The Japanese then recognized a lofty civilization and placed them- selves as pupils at its feet, learning its script and deciphering its books. Their veneration extended to ideographs. At first they adapted them frankly to their own tongue. For example, the ideographs signifying rice or metal or water in Chinese were used to convey the same ideas in Japanese. Each ideograph thus came to have two sounds, one Japanese, the other Chinese — e.g. the ideo- graph for rice had for Japanese sound kome and for Chinese sound bei. Nor was this the whole story. There were two epochs in Japan's study of the Chinese language: first, the epoch when she received Confucianism through Korea; and, secondly, the epoch when she began to study Buddhism direct from China. Whether the sounds that came by Korea were corrupt, or whether the interval separating these epochs had sufficed to produce a sensible difference of pronun- ciation in China itself, it would seem that the students of Buddhism who flocked from Japan to the Middle Kingdom during the Sui era (a.d. 589-619) insisted on the accuracy of the pronunciation ac- quired there, although it diverged

perceptibly from the pronuncia- tion already recognized in Japan. Thus, in fine, each word came to have three sounds — two Chinese, known as the kan and the go, and one Japanese, known as the kun. For example : —

As to which of the first two methods of pronunciation had chro- nological precedence, the weight of opinion is that the kan came later than the go. Evidently this triplication of sounds had many dis- advantages, but, on the other hand, the whole Chinese language may be said to have been grafted on the Japanese. Chinese has the widest capacity of any tongue ever invented. It consists of thou- sands of monosyllabic roots, each having a definite meaning. These monosyllables may be used singly or combined, two, three or four at a time, so that the resulting combinations convey almost any conceivable shades of meaning. Take, for example, the word " electricity." The very idea conveyed was wholly novel in Japan. But scholars were immediately able to construct the following :—

Den.

Ki

Denki.

Dempo.

Dento.

Indenki.

Yodenki.

Netsudenki.

Ryudo-denki.

Denwa.

Ho = tidings.

To = lamp.

ire = the negative principle.

Yo = the positive principle.

Netsu = heat.

Ryudo = fluid.

Wa = conversation.

Lightning.

Exhalation.

Electricity.

Telegram.

Electric light.

Negative electricity.

Positive electricity.

Thermo-electricity.

Dynamic-electricity.

Telephone.

Every branch of learning can thus be equipped with a vocabulary. Potent, however, as such a vehicle is for expressing thought, its ideographic script constitutes a great obstacle to general acquisition, and the Japanese soon applied themselves to minimizing the difficulty by substituting a phonetic system. Analysis showed that all the required sounds could be conveyed with 47 syllables, and having selected the ideographs that corresponded .to those sounds, they reduced them, first, to forms called hiragana, and, secondly, to still more simplified forms called katakana.

Such, in brief, is the story of the Japanese language. When we come to dissect it, we find several striking characteristics. First, the construction is unlike that of any European tongue: all qualifiers precede the words they qualify, except prepositions which become postpositions. Thus instead of saying " the house of Mr Smith is in that street," a Japanese says " Smith Mr of house that street in is." Then there is no relative pronoun, and the resulting com- plication seems great to an English-speaking person, as the following illustration will show: —

English. The unique standard which is used for judging virtue or vice is benevolent conduct solely.

KAN

" GO "

JAPANESE

SOUND.

SOUND.

SOUND.

MEANING.

Sei

Jo

Koe

Voice

Nen

Zen

Toshi

Year

Jinkan

Ningen

IJito no aida

Human being.

Japanese. Zenaku wo saiban suru tame no Virtue vice-judging sake of mochiitaru yuitsu no hyojun wa used unique standard

jiai no koi tada

benevolence of conduct only kore nomi. this alone.

It will be observed that in the above sentence there are two untrans- lated words, wo and wa. These belong to a group of four auxiliary particles called te ni wo ha (or wa) , which serve to mark the cases of nouns, te (or de) being the sign of the instrumental ablative; ni that of the dative ; wo that of the objective, and wa that of the nomina- tive. These exist in the Korean language also, but not in any other tongue. There are also polite and ordinary forms of expression, often so different as to constitute distinct

languages; and there are a number of honorifics which frequently discharge the duty of pronouns. Another marked peculiarity is that active agency is never attributed to neuter nouns. A Japanese does not say " the poison killed him " but " he died on account of the poison;" nor does he say " the war has caused commodities to appreciate," but " commodities have appreciated in consequence of the war." That the language loses much force owing to this limitation cannot be denied : metaphor and allegory are almost completely banished.

The difficulties that confront an Occidental who attempts to learn Japanese are enormous. There are three languages to be acquired : first, the ordinary colloquial; second, the polite colloquial; and, third, the written. The ordinary colloquial differs materially from its polite form, and both are as unlike the written form as modern Italian is unlike ancient Latin. "Add to this," writes Professor B. H. Chamberlain, " the necessity of committing to memory two syllabaries, one of which has many variant forms, and at least two or three thousand Chinese ideographs, in forms standard and cursive — ideographs, too, most of which are susceptible of three or four different readings according to circumstance, — add, further, that all these kinds of written symbols are apt to be encountered pell mell on the same page, and the task of mastering Japanese becomes almost Herculean." In view of all this there is a strong movement in favour of romanizing the Japanese script : that is to say, abolishing the ideograph and adopting in its place the Roman alphabet. But while every one appreciates the magnitude of the relief that would thus be afforded, there has as yet been little substantial progress. A language which has been adapted from its infancy to ideographic transmission cannot easily be fitted to phonetic uses.

Dictionaries. — F. Brinkley, An Unabridged Japanese-English Dictionary (Tokyo, 1896) ; Y. Shimada, English- Japanese Dictionary, (Tokyo, 1897); Webster's Dictionary, trans, into Japanese, (TokyS,

1899) ; J. H. Gubbins, Dictionary of Chinese- Japanese Words (3 vols., London, 1889); J. C. Hepburn, Japanese-English and English- Japanese Dictionary (London, 1903) ; E. M. Satow and I. Masakata, English-Japanese Dictionary (London, 1904).

Literature. — From the neighbouring continent the Japanese derived the art of transmitting ideas to paper. But as to the date of that acquisition there is

doubt. An authenticated work compiled a.d. 720 speaks of historiographers having been appointed to collect local records for the first time in 403, from which it is to be inferred that such officials had already existed at the court. There is also a tradition that some kind of general history was compiled in 620 but destroyed by fire in 645. At all events, the earliest book now extant dates from 712. Its origin is described in its preface. When the emperor Temmu (673-686) ascended the throne, he found that there did not exist any revised collection of the fragmentary annals of the chief families. He therefore caused these annals to be collated. There happened to be among the court ladies one Hiyeda no Are, who was gifted with an extraordinary memory. Measures were taken to instruct her in the genuine traditions and the old lan- guage of former ages, the intention being to have the whole ulti- mately dictated to a competent scribe. But the emperor died before the project could be consummated, and for twenty-five years Are's memory remained the sole depository of the collected annals. Then, under the auspices of the empress Gemmyo, the original plan was carried out in 712, Yasumaro being the scribe. The work that resulted is known as the Kojiki {Record of Ancient Matters). It has been accurately translated by Professor B. H. Chamberlain {Transactions of the Asiatic Society of Japan, vol.x.), who, in a preface justly regarded by students of Japan as an exegetical classic, makes the pertinent comment: " Taking the word Altaic in its usual acceptation, viz. as the generic name of all the languages belonging to the Manchu, Mongolian, Turkish and Finnish groups, not only the archaic, but the .classical, literature of Japan carries us back several centuries beyond the earliest extant documents of any other Altaic tongue." By the term " archaic " is to be understood the pure Japanese language of earliest times, and by the term " classical " the quasi-Chinese language which came into use for literary purposes when Japan appropriated the civilization of her great neighbours. The Kojiki is written in the archaic form: that is to say, the language is the language of old Japan, the script, although ideographic, is used phonetically only, and the case-indicators are represented by Chinese characters having the same»sounds. It is a species of saga, setting forth not only the heavenly beginnings of the Japan- ese race, but also the story of creation, the succession of the various sovereigns and the salient events of their reigns, the whole interspersed with songs, many of which may be attributed to the 6th century, while some doubtless date from the fourth or even the third. This Kojiki marks the parting of the ways. Already by the time of its compilation the influence of Chinese civilization and Chinese literature had prevailed so greatly in Japan that the next authentic work, composed only eight years later, was completely Chinese in style and embodied Chinese traditions and Chinese philosophical doctrines, not distinguishing them from their Japanese context. This volume was called the Nihongi {Chronicles of Japan). It may be said to have wholly supplanted its

predecessor in popular favour, for the classic style — that is to say, the Chinese — had now come to be regarded as the only erudite script. The Chronicles re-traversed much of the ground already gone over by the Record, preserving many of the songs in occasionally changed form, omitting some portions, supplementing others, and imparting to the whole such an exotic character as almost to disqualify the work for a place in Japanese literature. Yet this was the style which thenceforth prevailed among the litterati of Japan. " Standard Chinese soon became easier to understand than archaic Japanese, as the former alone was taught in the schools, and the native language changed rapidly during the century or two that followed the diffusion of the foreign tongue and civilization" (Chamberlain). The neglect into which the Kojiki fell lasted until the 17th century. Almost simultaneously with its appearance in type (1644)

and its consequent accessibility, there arose a galaxy of scholars under whose influence the archaic style and the ancient Japanese traditions entered a period of renaissance. The story of this period and of its products has been admirably told by Sir Ernest Satow (" Revival of Pure Shinto," Proceedings of the Asiatic Society of Japan, vol. iii.), whose essay, together with Professor Chamberlain's Kojiki, the same author's introduction to The Classical Poetry of the Japanese, and Mr W. G. Aston's Nihongi, are essential to every student of Japanese literature. To understand this 17 th century renaissance, knowledge of one fact is necessary, namely, that about the year a.d. 810, a cele- brated Buddhist priest, Kukai, who had spent several years studying in China, compounded out of Buddhism, Confucianism and Shinto a system of doctrine called Ryobu Shinto (Dual Shinto), the prominent tenet of which was that the Shinto deities were merely transmigrations of Buddhist divinities. By this device Japanese conservatism was effectually conciliated, and Buddhism became in fact the creed of the nation, its positive and practical precepts entirely eclipsing the agnostic intuition- alism of Shinto. Against this hybrid faith several Japanese scholars arrayed themselves in the 17 th and 18th centuries, the greatest of them being Mabuchi and Motoori. The latter's magnum opus, Kojikiden {Exposition of the Record of Ancient Matters), declared by Chamberlain to be " perhaps the most admirable work of which Japanese erudition can boast," con- sists of 44 large volumes, devoted to elucidating the Kojiki and resuscitating the Shinto cult as it existed in the earliest days. This great work of reconstruction was only one feature of the literary activity which marked the 17th and 18th centuries, when, under Tokugawa rule, the blessing of long-unknown peace came to the nation. Iyeyasu himself devoted the last years of his life to collecting ancient manuscripts. In his country retreat at Shizuoka he formed one of the richest libraries ever brought together in Japan, and by will he bequeathed the Japanese section of it to his eighth son, the feudal chief of Owari, and the Chinese

section to his ninth son, the prince of Kishu, with the result that under the former feudatory's auspices two works of considerable merit were produced treating of ancient ceremonials and supplementing the Nihongi. Much more memorable, however, was a library formed by Iyeyasu's grand- son the feudal chief of Mito (1662-1700), who not only collected a vast quantity of books hitherto scattered among Shinto and Buddhist monasteries and private houses, but also employed a number of scholars to compile a history unprecedented in magnitude, the Dai-Nihon-shi. It consisted of 240 volumes, and it became at once the standard in its own branch of literature. Still more comprehensive was a book emanating from the same source and treating of court ceremonials. It ran to more than 500 volumes, and the emperor honoured the work by bestowing on it the title Reigi Ruiten {Rules of Ceremonials). These com- pilations together with the Nihon Gwaishi {History of Japan Outside the Court), written by Rai Sanyo and published in 1827, constituted the chief sources of historical knowledge before the Meiji era. Rai Sanyo devoted twenty years to the preparation of his 22 volumes and took his materials from 259 Japanese and Chinese works. But neither he nor his predecessors recognized in history anything more than a vehicle for recording the mere sequence of events and their relations, together with some account of the personages concerned. Their volumes make profoundly dry reading. Vicarious interest, however, attaches to the pro- ductions of the Mito School on account of the political influence they exercised in rehabilitating the nation's respect for the throne by unveiling the picture of an epoch prior to. the usurpations of military feudalism. The struggles of the great rival clans, replete with episodes of the most tragic and stirring character, inspired quasi-historical narrations of a more popular character, which often took the form of illuminated scrolls. But it was not until the Meiji era that history, in the modern sense of the term, began to be written. During recent times many students have turned their attention to this branch of literature. Works of wide scope and clear insight have been produced, and the Historiographers' section in the Imperial University of Tokyo

LITERATURE]

JAPAN

i6g

has been for several years. engaged in collecting and collating materials for a history which will probably rank with anything of the kind in existence.

In their poetry above everything the Japanese have remained impervious to alien influences. It owes this conservation to its _ , prosody. Without rhyme, without variety of metre,

e ry ‘ without elasticity of dimensions, it is also without known counterpart. To alter it in any way would be to deprive it of all distinguishing characteristics. At »ome remote date a Japanese maker of songs seems to have discovered that a peculiar and very fascinating rhythm is produced by lines containing 5 syllables and 7 syllables alternately. That is Japanese poetry (uta or tanka). There are generally five lines: the first and third consisting of 5 syllables, the second, fourth and fifth of 7, making a total of 31 in all. The number of lines is not compulsory : sometimes they may reach to thirty, forty or even more, but the alternation of 5 and 7 syllables is compulsory. The most attenuated form of all is the hokku (or haikai) which consists of only three lines, namely, 17 syllables. Necessarily the ideas embodied in such a narrow vehicle must be fragmentary. Thus it results that Japanese poems are, for the most part, impressionist; they suggest a great deal more than they actually express. Here is an example : —

Momiji-ha wo Kaze ni makasete Miru yori mo Hakanaki mono wa Inochi nari keri

More fleeting than the glint of [-withered leaf wind-blown, the thing called life.

There is no English metre with this peculiar cadence.

It is not to be inferred that the writers of Japan, enamoured as they were of Chinese ideographs and Chinese style, deliberately ex- cluded everything Chinese from the realm of poetry. On the contrary, many of them took pleasure in composing versicles to which Chinese words were admitted and which showed something of the ” parallel- ism ” peculiar to Chinese poetry, since the first ideograph of the last line was required to be identical with the final ideograph. But rhyme was not attempted, and the syllabic metre of Japan was preserved, the alternation of 5 and 7 being, however, dispensed with. Such couplets were called shi to distinguish them from the pure Japanese uta or tanka. The two greatest masters of Japanese poetry were Hitomaro and Akahito, both of the early 8th century, and next to them stands Tsurayuki, who flourished at the beginning of the 10th century, and is not supposed to have transmitted his mantle to any successor. The choicest productions of the former two with those of many other poets were brought together in 756 and embodied in a book called the Manyoshu {Collection of a Myriad Leaves). The volume remained unique until the beginning of the 10th century, when (a.d. 905) Tsurayuki and three coadjutors compiled the Kokinshu {Collection of Odes Ancient and Modern), the first of twenty-one similar anthologies between the nth and the 15th centuries, which con- stitute the Niju-ichi Dai-shu (Anthologies of the One-and-Twenty Reigns). If to these we add the Hyaku-

ninshu (Hundred Odes by a Hundred Poets) brought together by Teika Kyo in the 13th century, we have all the classics of Japanese poetry. For the composition of the uta gradually deteriorated from the end of the 9th century, when a game called uta-awase became a fashionable pastime, and aristocratic men and women tried to string together versicles of 31 syllables, careful of the form and careless of the thought. The uta-awase, in its later developments, may not unjustly be compared to the Occidental game of bouts-rim&s. The poetry of the nation remained immovable in the ancient groove until very modern times, when, either by direct access to the originals or through the medium of very defective translations, the nation became acquainted with the masters of Occidental song. A small coterie of authors, headed by Professor Toyama, then attempted to revolutionize Japanese poetry by recasting it on European lines. But the project failed signally, and indeed it may well be doubted whether the Japanese language can be adapted to such uses.

It was under the auspices of an empress (Suiko) that the first historical manuscript is said to have been compiled in 620. It was

_ under the auspices of an empress (Gemmyo) that the

Influence R ecc , r d of Ancient Matters was transcribed (712) from the

*of Women jj ps Q j a ” court lady. And it was under the auspices of an // JJ£to« * empress that the Chronicles of Japan were composed (720). To women, indeed, from the 8th century onwards may be said to’ have been entrusted the guardianship of the pure Japanese language, the classical, or Chinese, form being adopted by men. The distinction continued throughout the ages. To this day the spoken language of Japanese women is appreciably simpler and softer than that of the men, and to this day while the educated woman uses the hiragana syllabary in writing, eschews Chinese .yords and rarely pens an ideograph, the educated man employs the ideograph entirely, and translates his thoughts as far as possible into the mispronounced Chinese words without recourse -to which it would be impossible for him to discuss any scientific subject, or even to refer to the details of his daily business. Japan was thus enriched with two works of very high merit, the Genji Monogatari (c. 1004) and the Makura no Zoshi (about the same date). The former, by*

The Dark

Age.

Murasaki no Shikibu — probably a pseudonym — was the first novel composed in Japan. Before her time there had been many mono- gatari

(narratives), but all consisted merely of short stories, mythical or quasi-historical, whereas Murasaki no Shikibu did for Japan what Fielding and Richardson did for England. Her work was " a prose epic of real life," the life of her hero, Genji. Her language is graceful and natural, her sentiments are refined and sober; and, as Mr Aston well says, her " story flows on easily from one scene of real life to another, giving us a varied and minutely detailed picture of life and society in Kioto, such as we possess for no other country at the same period." The Makura no Zoshi (Pillow Sketches), like the Genji Monogatari, was by a noble lady — Sei Shonagon — but it is simply a record of daily events and fugitive thoughts, though not in the form of a diary. The book is one of the most natural and unaffected compositions ever written. Undesignedly it conveys a wonderfully realistic picture of aristocratic life and social ethics in Kioto at the beginning of the nth century. " If we compare it with anything that Europe has to show at this period, it must be admitted that it is indeed a remarkable work. What a revelation it would be if we had the court life of Alfred's or Canute's reign depicted to us in a similar way ? "

The period from the early part of the 14th century to the opening of the 17th is generally regarded as the dark age of Japanese litera- ture. The constant wars of the time left their impress upon everything. To them is due the fact that the two principal works compiled during this epoch were, one political, the other quasi-historical. In the former, Jinkoshoto- ki (History of the True Succession of the Divine Monarchs) , Kitabatake Chikafusa (1340) undertook to prove that of the two sovereigns then disputing for supremacy in Japan, Go-Daigo was the rightful monarch; in the latter, Taihei-ki (History of Great Peace), Kojima (1370) devoted his pages to describing the events of contempo- raneous history. Neither work can be said to possess signal literary merit, but both had memorable consequences. For the Jinkoshoto-ki, by its strong advocacy of the mikado's administrative rights as against the usurpations of military feudalism, may be said to have sowed the seeds of Japan's modern polity; and the Taihei-ki, by its erudite diction, skilful rhetoric, simplification of old gram- matical constructions and copious interpolation of Chinese words, furnished a model for many imitators and laid the foundations of Japan's 19th-century style. The Taihei-ki produced another notable effect; it inspired public readers who soon developed into historical raconteurs; a class of professionals who are almost as much in vogue to-day as they were 500 years ago. Belonging to about the same period as the Jinkoshoto-ki, another classic occupies a leading place in Japanese esteem. It is the Tsure-zure-gusa (Materials for Dispelling Ennui), by Kenko-boshi, described by Mr Aston as one of the most delightful oases in Japanese literature; a collection of short sketches, anecdotes and essays on all imaginable subjects, something in the manner of Selden's Table Talk."

The so-called dark age of Japanese literature was not entirely unproductive : it gave the drama (No) to Japan. Tradition ascribes the origin of the drama to a religious dance of a panto- The Drama mimic character, called Kagura and associated with Shinto ceremonials. The No, however, owed its development mainly to Buddhist influence. During the medieval era of inter- necine strife the Buddhist priests were the sole depositaries of literary talent, and seeing that, from the close of the 14th century, the Shinto mime (Kagura) was largely employed by the military class to invoice or acknowledge the assistance of the gods, the monks of Buddha set themselves to compose librettos for this mime, and the performance, thus modified, received the name of No. Briefly speaking, the No was a dance of the most stately character, adapted to the incidents of dramas " which embrace within their scope a world of legendary lore, of quaint fancies and of religious sentiment." Their motives were chiefly confined to such themes as the law of retribution to which all human beings are subjected, the transitori- ness of life and the advisability of shaking off from one's feet the dust of this sinful world. But some were of a purely martial nature. This difference is probably explained by the fact that the idea of thus modifying the Kagura had its origin in musical recitations from the semi-romantic semi-historical narratives of the 14th cen- tury. Such recitations were given by itinerant Bonzes, and it is easy to understand the connexion between them and the No. Very soon the No came to occupy in the estimation of the military class a position similar to that held by the tanka as a literary pursuit, and the gagaku as a musical, in the Imperial court. All the great aristo- crats not only patronized the No but were themselves ready to take part in it. Costumes of the utmost magnificence were worn, and the chiselling of masks for the use of the performers occupied scores of artists and ranked as a high glyptic accomplishment. There are 335 classical dramas of this kind in a compendium called the Yokyoka Tsuge, and many of them are inseparably connected with the names of Kwanami Kiyotsugu (1406) and his son Motokiyo (1455), who are counted the fathers of the art. For a moment, when the tide of Western civilization swept over Japan, the No seemed likely to be permanently submerged. But the renaissance of nationalism (kokusui hoson) saved the venerable drama, and owing to the exertions of Prince Iwakura, the artist Hosho Kuro and Umewaka Minoru, it stands as high as ever in popular favour. Concerning the

five schools into which the No is divided, their characteristics and their differences — these are matters of interest to the initiated alone. The Japanese are essentially a laughter-loving people. They are highly susceptible of tragic emotions, but they turn gladly to, the _. p brighter phases of life. Hence a need was soon felt

The Farce. Q £ some t n jng to dispel the pessimism of the N5, and that something took the form of comedies played in the interludes of the No and called Kyogen (mad words). The Kyogen needs no elaborate description : it is a pure farce, never immodest or vulgar. The classic drama No and its companion the Kyogen had two children, the Joruri and the Kabuki. They were born at the close Th Th t °^ (-^ le Iotn century and they owed their origin to the e ea rc -g row ; n g influence of the commercial class, who asserted a right to be amused but were excluded from enjoyment of the aristocratic No and the Kyogen. The Joruri is a dramatic ballad, sung or recited to the accompaniment of the samisen and in unison with the movements of puppets. It came into existence in Kioto and was thence transferred to Yedo (Tokyo), where the greatest of Japanese playwrights, Chikamatsu Monzaemon (1653-1724), and a musician of exceptional talent, Takemoto Gidayu, collaborated to render this puppet drama a highly popular entertainment. It flourished for nearly 200 years in Yedo, and is still occasionally performed in Osaka. Like the No the Joruri dealt always with sombre themes, and was supplemented by the Kabuki (farce). This last owed its inception to a priestess who, having abandoned her holy vocation at the call of love, espoused dancing as a means of livelihood and trained a number of girls for the purpose. The law presently interdicted these female comedians (onna-kabuki) in the interests of public morality, and they were succeeded by " boy comedians " (wakashu-kabuki) who simulated women's ways and were vetoed in their turn, giving place to yaro-kabuki (comedians with queues). Gradually the Kabuki developed the features of a genuine theatre; the actor and the playwright were discriminated, and, the performances taking the form of domestic drama (Wagoto and Sewamono) or historical drama (Aragoto or Jidaimono) , actors of perpetual fame sprang up, as Sakata Tojuro and Ichikawa Danjinro (1660-1704). Mimetic posture-dances (Shosagoto) were always introduced as interludes ; past and present indiscriminately contributed to the playwright's subjects; realism was carried to extremes; a revolving stage and all mechanical accessories were supplied ; female parts were invariably taken by males, who attained almost incredible skill in these simulations; a chorus — relic of the No — chanted expositions of profound sentiments or thrilling inci- dents; and histrionic talent of the very highest order was often displayed. But the Kabuki-za and its yakusha (actors) remained always a plebeian institution. No samurai frequented the former or associated with the latter. With the introduction of Western civilization in modern times, however, the theatre ceased to be tabooed by the aristocracy. Men and women of all ranks began to visit it; the emperor himself consented (1887) to witness a perform- ance by the great stars of the stage at the private residence of Marquis Inouye ; a dramatic reform association was organized by a number of prominent noblemen and scholars; drastic efforts were made to purge the old historical dramas of anachronisms and

inconsistencies, and at length a theatre (the Yurahu-za) was built on purely European lines, where instead of sitting from morning to night witnessing one long-drawn-out drama with interludes of whole farces, a visitor may devote only a few evening-hours to the pastime. The Shosa- goto has not been abolished, nor is there any reason why it should be. It has graces and beauties of its own. There remains to be noted the incursion of amateurs into the histrionic realm. In former times the actor's profession was absolutely exclusive in Japan. Children were trained to wear their fathers' mantles, and the idea that a non- professional could tread the hallowed ground of the stage did not enter any imagination. But with the advent of the new regimen in Meiji days there arose a desire for social plays depicting the life of the modern generation, and as these " croppy dramas " (zampatsu- mono) — so called in allusion to the European method of cutting the hair close — were not included in the repertoire of the orthodox theatre, amateur troupes (known as soshi-yakusha) were organized to fill the void. Even Shakespeare has been played by these ama- teurs, and the abundant wit of the Japanese is on the way to enrich the stage with modern farces of unquestionable merit.

The Tokugawa era (1603-1867), which popularized the drama, had other memorable effects upon Japanese literature. Yedo, the sho- gun's capital, displaced Kioto as the centre of literary activity. Its population of more than a million, includ- ing all sorts and conditions of men — notably wealthy merchants and mechanics — constituted a new audience to which authors had to address themselves; and an unparalleled development of mental activity necessitated wholesale drafts upon the Chinese vocabulary. To this may be attributed the appearance of a group of men known as kangakusha (Chinese scholars). The most celebrated among them were: Fujiwara Seikwa (1560ˆ- 1619), who introduced his countrymen to the philosophy of Chu-Hi; Hayashi Rasan (1583-1657), who wrote 170 treatises on scholastic and moral subjects; Kaibara Ekken (1630-1714), teacher of a fine system of ethics; Arai Hakuseki (1657-1725), historian, philosopher, statesman and financier : and Muro Kiuso, the second great exponent of Chu-Hi's philosophy. " Japan owes a profound debt of gratitude

Literature of the Tokugawa Era.

[LITERATURE

to the kangakusha of that time. For their day and country they were emphatically the salt of earth." But naturally not all were believers in the same philosophy. The fervour of the followers of Chu-Hi (the orthodox school) could not fail to provoke opposition. Thus some arose who declared allegiance to the idealistic intuitionalism of Wang Yang-ming, and others

advocated direct study of the works of Confucius and Mencius. Connected with this rejection of Chu- Hi were such eminent names as those of Ito Junsai (1627-1718), Ito Togai (1617-1736), Ogyu Sorai (1666-1728) and Dazai Shuntai (1679-1747). These. Chinese scholars made no secret of their contempt for Buddhism, and in their turn they were held in aversion by the Buddhists and the Japanese scholars (wagakusha), so that the second half of the 18th century was a time of perpetual wrangling and controversy. The worshippers at the shrine of Chinese philo- sophy evoked a reactionary spirit of nationalism, just as the excessive worship of Occidental civilization was destined to do in the 19th century.

Apart from philosophical researches and the development of the drama, as above related, the Tokugawa era is remarkable for folk-lore, moral discourses, fiction and a peculiar form of poetry. This last does not demand much attention. Its principal variety is the haikai, which is nothing more than a tanka shorn of its con- cluding fourteen syllables, and therefore virtually identical with the hokku, already described. The name of Basho is immemorially associated with this kind of lilliputian versicle, which reached the extreme of impressionism. A more important addition to Japanese literature was made in the 17th century in the form of children's tales (Otogibanashi). They are charmingly simple and graceful, and they have been rendered into English again and again since the beginning of the Meiji era. But whether they are to be regarded as genuine folk-lore or merely as a branch of the fiction of the age when they first appeared in book form, remains uncertain. Of fiction proper there was an abundance. The pioneer of this kind of litera- ture is considered to have been Saikaku (1641-1693), who wrote sketches of every-day life as he saw it, short tales of some merit and novels which deal with the most disreputable phases of human existence. His notable successors in the same line were two men of Kioto, named Jisho (1675-1745) and Kiseki (1666-1716). They had their own publishing house, and its name Hachimonji-ya (figure-of- eight store) came to be indelibly associated with this kind of litera- ture. But these men did little more than pave the way for the true romantic novel, which first took shape under the hand of Santo Kyoden (1761-1816), and culminated in the works of Bakin, Tane- hiko, Samba, Ikku, Shunsui and their successors. Of nearly all the books in this class it may be said that they deal largely in sensation- alism and pornography, though it does not follow that their language is either coarse or licentious. The life of the virtuous Japanese woman being essentially uneventful, these romancists not unnatur- ally sought their female types among dancing-girls and courtesans. The books were profusely illustrated with wood-cuts and chromo- xylographs from pictures of the ukiyoe masters, who, like the play-wright, the actor and the romancer, ministered to the pleasure of the " man in the street." Brief mention must also be made of two other kinds of books

belonging to this epoch ; namely, the Shingaku- sho (ethical essays) and the Jitsuroku-mono (true records). The latter were often little more than historical novels founded on facts ; and the former, though nominally intended to engraft the doctrines of Buddhism and Shinto upon the philosophy of China, were really of rationalistic tendency.

Although the incursions made into Chinese philosophy and the revival of Japanese traditions during the Tokugawa Epoch contri- buted materially to the overthrow of feudalism and the restoration of the Throne's administrative power, The Meljl the immediate tendency of the last two events was to £ra " divert the nation's attention wholly from the study of either Confucianism or the Record of Ancient Matters. A universal thirst set in for Occidental science and literature, so that students occupied themselves everywhere with readers and grammars modelled on European lines rather than with the Analects or the Kojiki. English at once became the language of learning. Thus the three colleges which formed the nucleus of the Imperial Univer- sity of Tokyo were presided over by a graduate of Michigan College (Professor Toyama), a member of the English bar (Professor Hozumi) and a graduate of Cambridge (Baron Kikuchi). If Japan was eminently fortunate in the men who directed her political career at that time, she was equally favoured in those that presided over her literary culture. Fukuzawa Yukichi, founder of the Keio Giiuku, now one of Japan's four universities, did more than any of his contemporaries by writing and speaking to spread a knowledge of the West, its ways and its thoughts, and Nakamura Keiu laboured in the same cause by translating Smiles's Self-help and Mill's Representative Government. A universal geography (by Uchida Masao) ; a history of nations (by Mitsukuri Rinsho) ; a translation of Chambers's Encyclopaedia by the department of education ; Japanese renderings of Herbert Spencer and of Guizot and Buckle — all these made their appearance duringthe first fourteen years of the epoch. The influence of politics may be strongly traced in the literature of that time, for the first romances produced by the new school were all of a political character: Keikoku Bidan {Model for Statesmen, with Epaminondas for hero) by Yano Fumio;

NEWSPAPERS]!

JAPAN

17!

Setchubai {Plum-blossoms in snow) a nd Kwakwan-o(Nightingale Among Flowers) by Suyehiro. This idea of subserving literature to political ends is said to have been suggested by NakaeTokusuke's translation of Rousseau's Contrat social. The year 1882 saw Julius Caesar in a Japanese dress. The

translator was Tsubouchi Shoyo, one of the greatest writers of the Meiji era. His Shosetsu Shinsui (Essentials of a Novel) was an eloquent plea for realism as contrasted with the artificiality of the characters depicted by Bakin, and his own works illustrative of this theory took the public by storm. He also brought out the first literary periodical published in Japan, namely, the Waseda Bungaku, so called because Tsubouchi was professor of literature in the Waseda University, an institution founded by Count Okuma, whose name cannot be omitted from any history of Meiji literature, not as an author but as a patron. As illustrating the rapid development of familiarity with foreign authors, a Japanese retrospect of the Meiji era notes that whereas Macaulay's Essays were in the curriculum of the Imperial University in 1881-1882, they were studied, five or six years later, in secondary schools, and pupils of the latter were able to read with understanding the works of Goldsmith, Tennyson and Thackeray. Up to Tsubouchi's time the Meiji literature was all in the literary language, but there was then formed a society calling itself Kenyusha, some of whose associates — as Bimyosai — used the colloquial language in their works, while others — as Koyo, Rohan, &c. — went back to the classical diction of theGenrokuera(i655-i703). Rohan is one of the most renowned of Japan's modern authors, and some of his historical romances have had wide vogue. Meanwhile the business of translating went on apace. Great numbers of European and American authors were rendered into Japanese — Calderon, Lytton, Disraeli, Byron, Shake- speare, Milton, Turgueniev, Carlyle, Daudet, Emerson, Hugo, Heine, De Quincey, Dickens, Korner, Goethe — their name is legion and their influence upon Japanese literature is conspicuous. In 1888 a special course of German literature was inaugurated at the Imperial University, and with it is associated the name of Mori Ogai, Japan's most faithful interpreter of German thought and speech. Virtually every literary magnate of the Occident has found one or more inter- preters in modern Japan. Accurate reviewers of the era have divided it into periods of two or three years each, according to the various groups of foreign authors that were in vogue, and every year sees a large addition to the number of Japanese who study the masterpieces of Western literature in the original.

Newspapers, as the term is understood in the West, did not exist in old Japan, though block-printed leaflets were occasionally issued to describe some specially stirring event. Yet the Newspapers Japanese were not entirely unacquainted with and journalism. During the last decades of the factory at

Periodicals. Deshima the Dutch traders made it a yearly custom to submit to the governor of Nagasaki selected extracts from newspapers arriving from Batavia, and these extracts, having been translated into Japanese, were forwarded to the court in Yedo together with their originals. To such

compilations the name of Oranda fusetsu-sho (Dutch Reports) was given. Immediately after the conclusion of the first treaty in 1857, the Yedo authorities instructed the office for studying foreign books (Bunsho toriskirabe- dokoro) to translate excerpts from European and American journals. Occasionally these translations were copied for circulation among officials, but the bulk of the people knew nothing of them. Thus the first real newspaper did not see the light until 1861, when aYedo publisher brought out the Batavia News, a compilation of items from foreign newspapers, printed on Japanese paper from wooden blocks. Entirely devoid of local interest, this journal did hot survive for more than a few months. It was followed, in 1864, by the Shimbun-shi (News), which was published in Yokohama, with Kishida Ginko for editor and John Hiko for sub-editor. The latter had been cast away, many years previously, on the coast of the United States and had become a naturalized American citizen. He retained a knowledge of spoken Japanese, but the ideographic script was a sealed book to him, and his editorial part was limited to oral translations from American journals which the editor committed to writing. The Shimbun-shi essayed to collect domestic news as well as foreign. It was published twice a month and might possibly have created a demana for its wares had not the editor and sub- editor left for America after the issue of the 10th number. The example, however, had now been set. During the three years that separated the death of the Shimbun-shi from the birth of the Meiji era (October 1867) no less than ten quasi-journals made their appearance. They were in fact nothing better than inferior maga- zines, printed from wood-blocks, issued weekly or monthly, and giving little evidence of enterprise or intellect, though connected with them were the names of men destined to become famous in the world of literature, as Fukuchi Genichiro, Tsuji Shinji (afterwards Baron Tsiiji) and Suzuki Yuichi. These publications attracted little interest and exercised no influence. Journalism was regarded as a mere pastime. The first evidence of its potentialities was furnished by the Koko Shimbun (The. World) under the editorship of Fukuchi Genichiro and Sasano Dempei. To many Japanese observers it seemed that the restoration of 1867 had merely transferred the ad- ministrative authority from the Tokugawa Shogun to the clans of Satsuma and Choshu. The Koko Shimbun severely attacked the two clans as specious usurpers. It was not in the mood of Japanese

officialdom at that time to brook such assaults. The Koko Shimbun was suppressed; Fukuchi was thrust into prison, and all journals or periodicals except those having official sanction were vetoed. At the beginning of 1868 only two newspapers remained in the field. Very soon, however, the enlightened makers of modern Japan appreciated the importance of journalism, and in 1871 the Shimbun Zasshi (News Periodical) was started under the auspices of the illustrious Kido. Shortly afterwards there

appeared in Yokohama — whence it was subsequently transferred to Tokyo — the Mainichi Shimbun (Daily News), the first veritable daily and also the first journal printed with movable types and foreign presses. Its editors were Numa Morikage, Shimada Saburo and Koizuka Ryu, all destined to become celebrated not only in the field of journalism but also in that of politics. It has often been said of the Japanese that they are slow in forming a decision but very quick to act upon it. This was illustrated in the case of journalism. In i870the country possessed only two quasi-journals, both under official auspices. In 1875 it possessed over 100 periodicals and daily newspapers. The most conspicuous were the Nichi Nichi Shimbun (Daily News), the Yubin Hochi (Postal Intelligence), the Choya Shimbun (Government and People News), the Akebono Shimbun (The Dawn), a'nd the Mainichi Shimbun (Daily News). These were called " the five great journals." The Nichi Nichi Shimbun had an editor of con- spicuous literary ability in Fukuchi Genichiro, and the Hochi Shim- bun, its chief rival, received assistance from such men as Yano Fumio, Fujita Makichi, Inukai Ki and Minoura Katsundo. Japan had not yet any political parties, but the ferment that preceded their birth was abroad. The newspaper press being almost entirely in the hands of men whose interests suggested wider opening of the door to official preferment, nearly all editorial pens were directed against the government. So strenuous did this campaign become that, in 1875, a press law was enacted empowering the minister of home affairs and the police to suspend or suppress a journal and to fine or imprison its editor without public trial. Many suffered under this law, but the ultimate effect was to invest the press with new popularity, and very soon the newspapers conceived a device which effectually protected their literary staff, for they employed " dummy editors " whose sole function was to go to prison in lieu of the true editor.

Japanese journalistic writing in these early years of Meiji was marred by extreme and pedantic classicism. There had not yet been any real escape from the tradition which assigned the crown of scholarship to whatever author drew most largely upon the resources of the Chinese language and learning. The example set by the Imperial court, and still set by it, did not tend to correct this style. The sovereign, whether speaking by rescript or by ordinance, never addressed the bulk of his subjects. His words were taken from sources so classical as to be intelligible to only the highly educated minority. The newspapers sacrificed theiraudience to their erudition and preferred classicism to circulation. Their columns were thus a sealed book to the whole of the lower middle classes and to the entire female population. The Yomiuri Shimbun (Buy and Read News) was the first to break away from this perni- cious fashion. Established in 1875, it adopted a style midway between the classical and the colloquial, and it appended the syllabic characters to each ideograph, so that its columns became

intelligible to every reader of ordinary education. It was followed by the Yeiri Shimbun (Pictorial Newspaper), the first to insert illus- trations and to publish feuilleton romances. Both of these journals devoted space to social news, a radical departure from the austere restrictions observed by their aristocratic contemporaries.

The year 1881 saw the nation divided into political parties and within measured distance of constitutional government. Thence- forth the great majority of the newspapers and perio- dicals ranged themselves under the flag of this or that Bra of party. An era of embittered polemics ensued. The Political journals, while fighting continuously against each Parties. other's principles, agreed in attacking the ministry, and the latter found it necessary to establish organs of its own which preached the German system of state autocracy. Editors seemed to be incapable of rising above the dead level of political strife, and their utterances were not relieved even by a semblance of fairness. Readers turned away in disgust, and journal after journal passed out of existence. The situation was saved by a newspaper which from the outset of its career obeyed the best canons of journalism. Born in 1882, the Jiji Shimpo (Times) enjoyed the immense advan- tage of having its policy controlled by one of the greatest thinkers of modern Japan, Fukuzawa Yukichi. Its basic principle was liberty of the individual, liberty of the family and liberty of the nation; it was always found on the side of broad-minded justice, and it derived its materials from economic, social and scientific sources. Other newspapers of greatly improved character followed the Jiji Shimpo, especially notable among them being the Kokumin Shimbun. I n the meanwhile Osaka, always pioneer in matters of commercial enterprise, had set the example of applying the force of capital to journalistic development. Tokyo journals were all on a literary or political basis, but the Osaka Asahi Commercial Shimbun (Osaka Rising Sun News) was purely a Journalism. business undertaking. Its proprietor, Maruyama Ryuhei, spared no expense to obtain news from all quarters of the

world, and for the first time the Japanese public learned what stores of information may be found in the columns of a really enterprising journal. Very soon the Asahi had a keen competitor in the Osaka Mamichi Shimbun {Osaka Daily News) and these papers ultimately crushed all rivals in Osaka. In 1888 Maruyama established another Asahi in Tokyo, and thither he was quickly followed by his Osaka rival, which in Tokyo took the name of Mainichi Dempo (Daily Telegraph). These two newspapers now stand alone as purveyors of copious telegraphic news, and in the next rank, not greatly lower, comes the Jiji Shimpo.

With the opening of the diet in 1890, politics again obtruded themselves into newspaper columns, but as practical living issues now occupied attention, readers were no longer wearied by the abstract homilies of former days. Moreover, freedom of the press was at length secured. Already (1887) the government had volun- tarily made a great step in advance by divesting itself of the right to imprison or fine editors by executive order. But it reserved the power of suppressing or suspending a newspaper, and against that reservation a majority of the lower house voted, session after session only to see the bill rejected by the peers, who shared the govern- ment s opinion that to grant a larger measure of liberty would certainly encourage licence. Not until 1897 was this opposition tully overcome. A new law, passed by both houses and confirmed by the emperor, took from the executive all power over journals except in pses of lese majeste, and nothing now remains of the former arbitrary system except that any periodical having a political complexion is required to deposit security varying from 175 to 1000 yen I he result has falsified all sinister forebodings. A much more moderate tone pervades the writings of the press since restrictions were entirely removed, and although there are now 1775 journals and periodicals published throughout the empire, with a total annual circulation of some 700 million copies, intemperance of language such as in former times would, have provoked official interference is practically unknown to-day. Moreover, the best Japanese editors have caught with remarkable aptitude the spirit of modern journalism But a few years ago they used to compile laborious essays, in which the inspiration was drawn from Occidental text-books, and the alien character of the source was hidden under a veneer of Chinese aphorisms To-day they write terse, succinct, closely-reasoned articles, seldom diffuse, often witty; and generally free from extra- vagance of thought or diction. Incidentally they are hastening the assimilation of the written and the spoken languages {genbun ttchi) which may possibly prelude a still greater reform, abolition of the ideographic script. Yet, with few exceptions, the profession of journalism is not remunerative. Very low rates of subscription, and almost prohibitory charges for advertising, are chiefly to blame l 1 he vicissitudes of the enterprise may be gathered from the fact that, whereas 2767 journals and periodicals were started between 1889 and 1894 (inclusive), no less than 2465 ceased publishing The T. S u c J rculatl °" recorded in 1908 was about 150,000 copies daily, and the honour of attaining that exceptional figure belonged to the Osaka Asahi Shimbun. ? F> g y V

IV. — Japanese Art Painting and Engraving.— In Japanese art the impressionist element is predominant. Pictures, as the term is understood in Europe, can scarcely be said to have existed at any time in Japan. The artist did not depict emotion: he depicted the subjects that produce emotion. Therefore he took his motives from nature rather than from history; or, if

he borrowed from the latter what he selected was a scene, not the pains or the passions' of its actors. Moreover, he never exhausted his subject, but was always careful to leave a wide margin for the imagination of the spectator. This latter consideration sometimes impelled him to represent things which, to European eyes, seem trivial or insig- nificant, but which really convey hints of deep significance. In short, Japanese pictures are like Japanese poetry: they do not supply thought but only awaken it. Often their methods show conventionalism, but it is conventionalism so perfect and free in its allurements that nature seems to suggest both the motive and the treatment. Thus though neither botanically nor orni- thologically correct, their flowers and their birds show a truth to nature, and a habit of minute observation in the artist which cannot be too much admired. Every blade of grass, each leaf" and feather, has been the object of loving and patient study.

It has been rashly assumed by some writers that the Japanese do not study from nature. All their work is an emphatic pro- test against this supposition. It can in fact be shown con- clusively that the Japanese have derived all their fundamental 1 The highest rate of subscription to a daily journal is twelve shillings per annum, and the usual charge for advertisement is from 7 d. to one shilling per line of 22 ideographs (about nine words

ideas of symmetry, so different from ours, from a close study of nature and her processes in the attainment of endless variety. A special feature of their art is that, while often closely and minutely imitating natural objects, such as birds, flowers and fishes, the especial objects of their predilection and study, they frequently combine the facts of external nature with a conven- tional mode of treatment better suited to their purpose. During the long apprenticeship that educated Japanese serve to acquire the power of writing with the brush the complicated charac- ters borrowed from Chinese, they unconsciously cultivate the habit of minute observation and the power of accurate imitation, and with these the delicacy of touch and freedom of hand which only long practice can give. A hair's-breadth devia- tion in a line is fatal to good calligraphy, both among the Chinese and the Japanese. When they come to use the pencil in drawing, they already possess accuracy of eye and free command of the brush. Whether a Japanese art-worker sets himself to copy what he sees before him or to give play to his fancy in combining what he has seen with some ideal in his mind, the result shows perfect facility of execution and easy grace in all the lines.

The beauties of the human form never appealed to the Jap- anese artist. Associating the nude solely with the performance of menial tasks, he deemed it worse than a solecism to transfer such subjects to his canvas, and thus a wide field of- motive was closed to him. On the other hand, the draped figure received admirable treatment from his brush, and the naturalistic school of the 17th, 18th and 19th centuries reached a high level of skill in depicting men, women and children in motion. Nor has there ever been a Japanese Landseer. Sosen's monkeys and badgers constitute the one possible exception, but the horses, oxen, deer, tigers, dogs, bears, foxes and even cats of the best Japanese artists were ill drawn and badly modelled. In the field of land- scape the Japanese painter fully reached the eminence on which his great Chinese masters stood. He did not obey the laws of linear perspective as they are formulated in the Occident, nor did he show cast shadows, but his aerial perspective and his foreshortening left nothing to be desired. It has been suggested that he deliberately eschewed chiaroscuro because his pictures, destined invariably to hang in an alcove, were required to be equally effective from every aspect and had also to form part of a decorative scheme. But the more credible explanation is that he merely followed Chinese example in this matter, as he did also in linear perspective, accepting without question the curious canon that lines converge as they approach the spectator.

It is in the realm of decorative art that the world has chiefly benefited by contact with Japan. Her influence is second only to that of Greece. Most Japanese decorative designs consist of natural objects, treated sometimes in a more ˆ ratlre or less conventional manner, but always distinguished by delicacy of touch, graceful freedom of conception and delight- fully harmonized tints. Perhaps the admiration which the Japanese artist has won in this field is due not more to his wealth of fancy and skilful adaptation of natural forms, than to his individuality of character in treating his subjects. There is complete absence of uniformity and monotony. Repetition Without any variation is abhorrent to every Japanese. He will not tolerate the stagnation and tedium of a dull uniformity by mechanical reproduction. His temperament will not let him endure the labour of always producing the same pattern. Hence the repetition of two articles exactly like each other, and, generally, the division of any space into equal parts are instinctively avoided, as nature avoids the production of any two plants, or even any two leaves of the same tree, which in all points shall be exactly alike.

The application of this principle in the same free spirit is the secret of much of the originality and the excellence of the decora- tive art of Japan. Her artists and artisans alike aim at symmetry, not by an equal division of parts, as we do, but rather by a cer- tain balance of corresponding parts, each different from the other, and not numerically even, with an effect of

variety and freedom from formality. They seek it, in fact, as nature attains the same end. If we take for instance the skins of animals that

JAPAN

PAINTING

(These illustrations are reproduced by permission of the Kokka Company, Tokyo, Japan.)

Plate I.

Plate II.

JAPAN

PAINTING

M v

HcN jW ^^s

*‘^*

v^-

‘«-■-‘■

£ (

^s

\k^r>fcv[

ART]

JAPAN

are striped or spotted, we have the best possible illustration of nature’s methods in this direction. Examining the tiger or the leopard, in all the beauty of their symmetrical adornment, we do not see in any one example an exact repetition of the same stripes or spots on each side of the mesial line. They seem to be alike, and yet are all different. The line of division along the spine, it will be observed, is not perfectly continuous or defined, but in part suggested; and each radiating stripe on either side is full of variety in size, direction, and to some extent in colour and depth of shade. Thus nature works, and so, following in her footsteps, works the Japanese

artist. The same law pre- vailing in all nature's creation, in the plumage of birds, the paint- ing of butterflies' wings, the marking of shells, and in all the infinite variety and beauty of the floral kingdom, the lesson is constantly renewed to the observant eye. Among flowers the orchids, with all their fantastic extravagance and mimic imita- tions of birds and insects, are especially prolific in examples of symmetrical effects without any repetition of similar parts or divisions into even numbers.

The orchids may be taken as offering fair types of the Japanese artist's ideal in all art work. And thus, close student of nature's processes, methods, and effects as the Japanese art workman is, he ever seeks to produce humble replicas from his only art master. Thus he proceeds in all his decorative work, avoiding studiously the exact repetition of any lines and spaces, and all diametrical divisions, or, if these be forced upon him by the shape of the object, exercising the utmost ingenuity to disguise the fact, and train away the eye from observing the weak point, as nature does in like circumstances. Thus if a lacquer box in the form of a parallelogram is the object, Japanese artists will not divide it in two equal parts by a perpendicular line, but by a diagonal, as offering a more pleasing line and division. If the box be round, they will seek to lead the eye away from the naked regularity of the circle by a pattern distracting attention, as, for example, by a zigzag breaking the circular outline, and sup- ported by other ornaments. A similar feeling is shown by them as colourists, and, though sometimes eccentric and daring in their contrasts, they never produce discords in their chromatic scale. They have undoubtedly a fine sense of colour, and a similarly delicate and subtle feeling for harmonious blending of brilliant and sober hues. As a rule they prefer a quiet and refined style, using full but low-toned colours. They know the value of bright colours, however, and how best to utilize them, both supporting and contrasting them with their secondaries and complementaries.

The development of Japanese painting may be divided into the following six periods, each signalized by a wave of progress, (i) From the middle of the 6th to the middle of the Division g tn cen t ur y ; the naturalization of Chinese and Chino- Pe riods. Buddhist art. (2) From the middle of the 9th to the middle of the 15th century: the establishment of great native schools under Kose no Kanaoka and his descendants and followers, the pure Chinese school gradually falling into neglect. (3) From the middle of the 15th to the latter part of the 17th century: the revival of the Chinese style. (4) From the latter part of the 17th to the latter part of the 18th century: the estab- lishment of a popular school. (5) From the latter part of the 18th to the latter part of the 19th century: the foundation of a naturalistic school, and the first introduction of European influ- ence into Japanese painting; the acme and decline of the popular school. (6) From about 1875 to the present time: a period of transition.

Tradition refers to the advent of a Chinese artist named Nanriu, invited to Japan in the 5th century as a painter of the Imperial banners, but of the labours and influence of this man and of his descendants we have no record. The real beginnings of the study of painting and sculp- ture in their higher branches must be dated from the introduction of Buddhism from China in the middle of the 6th century, and for three centuries after this event there is evidence that the practice of the arts was carried on mainly by or under the instruction of Korean and Chinese immigrants.

First Period.

Second Period.

173

The paintings of which we have any mention were almost limited to representations of Buddhist masters of the Tang dynasty (618- 905), notably Wu Tao-zu (8th century), of whose genius romantic stories are related. The oldest existing work of this period is a mural decoration in the hall of the temple of Horyu-ji, Nara, attributed to a Korean priest named Donchd, who lived in Japan in the 6th century; and this painting, in spite of the destructive effects of time and exposure, shows traces of the same power of line, colour and composition that stamps the best of the later examples of Buddhist art.

The native artist who crested the first great wave of Japanese painting was a court noble named Kose no Kanaoka, living under the patronage of the emperor Seiwa (850-859) and his successors down to about the end of the 9th century, in the midst of a period of peace and culture. Of his own work few, if any, examples have reached us; and those attributed with more or less probability to his hand are all representations of Buddhist divinities, showing a somewhat formal and conventional design, with a masterly calligraphic touch and perfect harmony of colouring. Tradition credits him with an especial genius for 'the delineation of animals and land- scape, and commemorates his skill by a curious anecdote of a painted horse which left its frame to ravage the fields, and was reduced to pictorial stability only by the sacrifice of its eyes. He left a line of descendants extending far into the 15th century, all famous for Buddhist pictures, and some engaged in establishing a native style, the Wa-gwa-ryu.

At the end of the 9th century there were two exotic styles of painting, Chinese and Buddhist, and the beginning of a native style founded upon these. All three were practised by the same artists, and it was not until a later period that each became the badge of a school.

*The Chinese style (Kara-ryu), the fundamental essence of all Japanese art, has a fairly distinct history, dating back to the introduction of Buddhism into China (a. d. 62), and it _. is said to have been chiefly from the works of Wu ?? tnese Tao-zu, the master of the 8th century, that Kanaoka *0™» drew his inspiration. This early Chinese manner, which lasted in the parent country down to the end of the 13th century, was characterized by a virile grace of line, a grave dignity of composi- tion, striking simplicity of technique, and a strong but incomplete naturalistic ideal. The colouring, harmonious but subdued in tone, held a place altogether secondary to that of the outline, and was frequently omitted altogether, even in the most famous works. Shadows and reflections were ignored, and perspective, approximately correct for landscape distances, was isometrical for near objects, while the introduction of a symbolic sun or moon lent the sole distinction between a day and a night scene. The art was one of imperfect evolution, but for thirteen centuries it was the only living pictorial art in the world, and the Chinese deserve the honour of having created landscape painting. The materials used were water-colours, brushes, usually of deer-hair, and a surface of unsized paper, translucid silk or wooden panel. The chief motives were landscapes of a peculiarly wild and romantic type, animal life, trees and flowers, and figure compositions drawn from Chinese and Buddhist history and Taoist legend; and these, together with the grand aims and strange shortcomings of its principles and the limited range of its methods, were adopted almost without change by Japan. It was a noble art, but unfortunately the rivalry of the Buddhist and later native styles permitted it to fall into comparative neglect, and it was left for a few of the faithful, the most famous of whom was a priest of the 14th century named Kawo, to preserve it from inanition till the great Chinese renaissance that lent its stamp to the next period. The reputed founder of Japanese caricature may also be added to the list. He was a priest named Kakuyu, but better known as the abbot of Toba, who lived in the 12th century. An accomplished artist in the Chinese manner, he amused himself and his friends by burlesque sketches, marked by a grace and humour that his imitators never equalled. Later, the motive of the Toba pictures, as such caricatures were called, tended to degenerate, and the elegant figures of Kakuyu were replaced by scrawls that often substituted indecency and ugliness for art and wit. Some of the old masters of the Yamato school were, however, admirable in their rendering of the burlesque, and in modern times Kyosai, the last of the Hokusai school, outdid all his predecessors in the riotous origin- ality of his weird and comic fancies. A new phase of the art now lives in the pages of the newspaper press.*

The Buddhist style was probably even more ancient than the Chinese, for the scheme of colouring distinctive of the Buddhist picture was almost certainly of Indian origin; brilliant „ .,., . and decorative, and heightened

by a lavish use of _" . gold, it was essential to the effect of a picture destined ye ' for the dim light of the Buddhist temple. The style was applied only to the representations of sacred personages and scenes, and

Native Style.

as the traditional forms and attributes of the Brahmanic and Buddhist divinities were mutable only within narrow limits, the subjects seldom afforded scope for originality of design or observation of nriture. The principal Buddhist painters down to the 14th century were members of the Kose, Takuma and Kasuga lines, the first descended from Kanaoka, the second from Takuma Tameuji (ending 10th century), and the third from Fujiwara no Motomitsu (nth century). The last and greatest master of the school was a priest named Meicho, better known as Cho Densu, the Japanese Fra Angelico. It is to him that Japan owes the possession of some of the most stately and most original works in her art, sublime in conception, line and colour, and deeply instinct with the religious spirit. He died in 1427, at the age of seventy-six, in the seclusion of the temple where he had passed the whole of his days. The native style, Yamato or Wa-gwa-ryu, was an adaptation of Chinese art canons to motives drawn from the court life, poetry and stories of old Japan. It was undoubtedly prac- tised by the Kose line, and perhaps by their prede- cessors, but it did not take shape as a school until the beginning of the nth century under Fujiwara no Motomitsu, who was a pupil of Kose no Kinmochi; it then became known as Yamato-ryu, a title which two centuries later was changed to that of Tosa, on the occasion of one of its masters, Fujiwara no Tsunetaka, assuming that appellation as a family name. The Yamato-Tosa artists painted in all styles, but that which was the speciality of the school, to be found in nearly all the historical rolls bequeathed to us by their leaders, was a lightly-touched outline filled in with flat and bright body-colours, in which verdigris-green played a great part. The originality of the motive did not prevent the adoption of all the Chinese conventions, and of some new ones of the artist's own. The curious expedient of spiriting away the roof of any building of which the artist wished to show the interior was one of the most remarkable of these. Amongst the foremost names of the school are those of Montomitsu (nth century), No- buzane (13th century), Tsunetaka (13th century), Mitsunobu (15th and 16th centuries), his son Mitsushige, and Mitsuoki (17th century). The struggle between the Taira and Minamoto clans for the power that had long been practically abandoned by

the Imperial line lasted through the nth and the greater part of the 12th centuries, ending only with the rise of Yoritomo to the shogunate in 1185. These internecine disturbances had been unfavourable to any new departure in art, except in matters appertaining to arms and armour, and the strife between two puppet emperors for a shadow of authority in the 14th century brought another distracting element. It was not until the triumph of the northern dynasty was achieved through the prowess of an interested champion of the Ashikaga clan that the culture of ancient Japan revived. The palace of the Ashikaga shoguns then replaced the Imperial court as the centre of patronage of art and literature and established a new era in art history.

Towards the close of the Ashikaga shogunate painting entered on a new phase. Talented representatives of the Kose, Takuma and Tosa lines maintained the reputation of the native and Buddhist schools, and the long-neglected Chinese school was destined to undergo a vigorous revival. The initiation of the new movement is attributed to a priest named Josetsu, who lived in the early part of the 15th century, and of whom little else is known. It is not even certain whether he was of Chinese or Japanese birth; he is, however, believed by some authorities to have been the teacher of three great artists — Shubun, Sesshu and Kano Masanobu — who became the leaders of three schools: Shubun, that of the pure Chinese art of the Sung and Yuan dynasties (10th and 13th centuries); Sesshu, that of a modified school bearing his name; and Masanobu, of the great Kano school, which has reached to the present day. The qualities of the new Chinese schools were essentially those of the older dynasties: breadth, simplicity, a daringly calligraphic play of brush that strongly recalled the accomplishments of the famous scribes, and a colouring that varied between sparing washes of flat local tints and a strength and brilliancy of decorative effort that rivalled even that of the Buddhist pictures. The motives remained almost identical with those of the Chinese masters, and so imbued with the foreign spirit were many of the Japanese disciples that it i? said they found it difficult to avoid introducing Chinese accessories even into pictures of native scenery.

Sesshu (1421-1507) was a priest who visited China and studied painting there for several years, at length returning in 1469, dis- appointed with the living Chinese artists, and resolved to strike out a style of his own, based upon that of the old masters. He was the boldest and most original of Japanese landscape artists, leaving powerful and poetic records of the scenery of his own land as well

Third Period.

as that of China, and trusting more to the sure and sweeping stroke of the

brush than to colour. Shubun was an artist of little less power, but he followed more closely his exemplars, the Chinese masters of the 12th and 13th centuries; while Kano Masanobu (1424-1520), trained in the love of Chinese art, departed little from the canons he had learned from Josetsu or Oguri Sotan. It was left to his more famous son, Motonobu, to establish the school which bears the family name. Kano Motonobu (1477-1559) was one of the greatest Japanese painters, an eclectic of genius, who excelled in every style and every branch of his art. His variety was in- exhaustible, and he remains to this day a model whom the most distinguished artists are proud to imitate. The names of the cele- brated members of this long line are too many to quote here, but the most accomplished of his descendants was Tanyu, who died in 1674, at the age of seventy-three. The close of this long period brought a new style of art, that of the Korin school. Ogata Korin (1653- 1716) is claimed by both the Tosa and Kano schools, but his work bears more resemblance to that of an erratic offshoot of the Kano line named Sotatsu than to the typical work of the academies. He was an artist of eccentric originality, who achieved wonders in bold decorative effects in spite of a studied contempt for detail. As a lacquer painter he left a strong mark upon the work of his con- temporaries and successors. His brother and pupil, Kenzan, adopted his style, and left a reputation as a decorator of pottery hardly less brilliant than Korin's in that of lacquer; and a later follower, Hoitsu (1762-1828), greatly excelled the master in delicacy and refinement, although inferior to him in vigour and invention. Down to the end of this era painting was entirely in the hands of a patrician caste — courtiers, priests, feudal nobles and their military retainers, all men of high education and gentle birth, living in a polished circle. It was practised more as a phase of aesthetic culture than with any utilitarian views. It was a labour of loving service, untouched by the spirit of material gain, conferring upon the work of the older masters a dignity and poetic feeling which we vainly seek in much of the later work. Unhappily, but almost inevit- ably, over-culture led to a gradual falling-off from the old virility. The strength of Meicho, Sesshu, Motonobu and Tanyu gave place to a more or less slavish imitation of the old Japanese painters and their Chinese exemplars, till the heirs to the splendid traditions of the great masters preserved little more than their conventions and shortcomings. It was time for a new departure, but there seemed to be no sufficient strength left within the charmed circle of the orthodox schools, and the new movement was fated to come from the masses, whose voice had hitherto been silent in the art world.

A new era in art began in the latter half of the 17th century with the establishment of a popular school under an embroiderer's draughtsman named Hishigawa Moronobu (c. 1646- Fourth 1713). Perhaps no great change is ever entirely a Period: novelty. The old painters of the Yamato-Tosa line ?°f u7 1 r had frequently shown something of the daily life

around them, and one of the later scions of the school, named Iwasa Matahei, had even made a speciality of this class of motive; but so little is known of Matahei and his work that even his period is a matter of dispute, and the few pictures attributed to his pencil are open to question on grounds of authenticity. He probably worked some two generations before the time of Moronobu, but there is no reason to believe that his labours had any material share in determining the creation and trend of the new school.

Moronobu was a consummate artist, with all the delicacy and calligraphic force of the best of the Tosa masters, whom he un- doubtedly strove to emulate in style; and his pictures are not only the most beautiful but also the most trustworthy records of the Kfe of his time. It was not to his paintings, however, that he owed his greatest influence, but to the powerful impulse he gave to the illustration of books and broadsides by wood-engravings. It is true that illustrated books were known as early as 1608, if not before, but they were few and unattractive, and did little to inaugurate the great stream of ehon, or picture books, that were to take so large a share in the education of his own class. It is to Moronobu that Japan owes the popularization of artistic wood-engravings, for nothing before his series of xylographic albums approached his best work in strength and beauty, and nothing since has surpassed it. Later there came abundant aid to the cause of popular art, partly from pupils of the Kano and Tosa schools, but mainly from the artisan class. Most of these artists were designers for books and broadsides by calling, painters only on occasion, but a few of them did nothing for the engravers. Throughout the whole of this period, embracing about a hundred years, there still continued to work, altogether apart from the men who were making the success of popular art, a large number of able painters of the Kano, Tosa and Chinese schools, who multiplied pictures that had every merit except that of originality. These men, living in the past, paid little attention to the great popular movement, which seemed to be quite outside their social and artistic sphere and scarcely worthy of

cultured criticism. It was in the middle of the 18th century that the decorative, but relatively feeble, Chinese art of the later Ming period found favour in Japan and a clever exponent in a painter named Ryurikyo It must be regarded as a sad decadence from the old Chinese ideals, which was further hastened, from about 1765, by the popularity of the southern Chinese style. This was a weak; affectation that found its chief votaries amongst literary men ambitious of an easily earned artistic reputation. The

principal Japanese supporter of this school was Taigado (1722-1775), but the volume of copies of his sketches, Taigado sansui juseki, published about 1870, is one of the least attractive albums ever printed in Japan.

The fifth period was introduced by a movement as momentous as that which stamped its predecessor — the foundation of a naturalistic school under a group of men outside the Period: orthodox academical circles. The naturalistic principle Natural- was by no means a new one; some of the old Chinese lstlc masters were naturalistic in a broad and noble manner,

00 ‘ and their Japanese followers could be admirably and minutely accurate when they pleased; but too many of the latter were content to construct their pictures out of fragmentary reminiscences of ancient Chinese masterpieces, not presuming to see a rock, a tree, an ox, or a human figure, except through Chinese spectacles. It was a farmer’s son named Okyo, trained in his youth to paint in the Chinese manner, who was first bold enough to adopt as a canon what his predecessors had only admitted under rare exceptions, the principle of an exact imitation of nature. Unfortunately, even he had not all the courage of his creed, and while he would paint a bird or a fish with perfect realism, he no more dared to trust his eyes in larger motives than did the most devout follower of Shubun or Motonobu. He was essentially a painter of the classical schools, with the speciality of elaborate reproduction of detail in certain sections of animal life, but fortunately this partial concession to truth, emphasized as it was by a rare sense of beauty, did large service.

Okyo rose into notice about 1775, and a number of pupils flocked to his studio in Shijo Street, Kioto (whence Shijo school). Amongst these the most famous were Goshun (1742-1811), who is sometimes regarded as one of the founders of the school; Sosen (1757-1821), an animal painter of remarkable power, but especially celebrated for pictures of monkey life; Shuho, the younger brother of the last, also an animal painter; Rosetsu (1755-1799), the best landscape painter of his school; Keibun, a younger brother of Goshun, and some later followers of scarcely less fame, notably Hoyen, a pupil of Keibun; Tessan, an adopted son of Sosen; Ippo and Yosai (1788-1878), well known for a remarkable set of volumes, the Zenhen kojitsu, con- taining a long series of portraits of ancient Japanese celebrities. Ozui and Ojyti, the sons of Okyo, painted in the style of their father, but failed to attain great eminence. Lastly, amongst the associates of the Shijo master was the celebrated Ganku (1798- 1837), who developed a special style of his own, and is sometimes regarded as the founder of a distinct school. He was, however, greatly influenced by Okyo’s example, and his sons, Gantai, Ganryo, and Gantoku or Renzan, drifted into a manner almost indistin- guishable from that of the Shijo school.

It remains only to allude to the European school, if school it can be called, founded by Kokan and Denkichi, two contem- poraries of Okyo. These artists, at first educated in European Q £ ˆ native schools, obtained from a Hollander

School. ... , ... , , . .

in Nagasaki some training in the methods and prin- ciples of European painting, and left a few oil paintings in which the laws of light and shade and perspective were correctly observed. They were not, however, of sufficient capacity to render the adopted manner more than a subject of curiosity, except to a few followers who have reached down to the present generation. It is possible that the essays in perspective found in the pictures of Hokusai, Hiroshige, and some of the popular artists of the 19th century, were suggested by Kokan's drawings and writings.

The sixth period began about 1875, when an Italian artist was engaged by the government as a professor of painting in the Engineering College at Tokyo. Since that time some Period distinguished European artists have visited Japan, and several Japanese students have made a pilgrim- age to Europe to see for themselves what lessons may be gained from Western art. These students, confronted by a

strong reaction in favour of pure Japanese art, have fought man- fully to win public sympathy, and though their success is not yet crowned, it is not impossible that an Occidental school may ulti- mately be established. Thus far the great obstacle has been that pictures painted in accordance with Western canons are not suited to Japanese interiors and do not appeal to the taste of the most renowned Japanese connoisseurs. Somewhat more successful has been an attempt — inaugurated by Hashimoto Gaho and Kawabata Gyokusho — to combine the art of the West with that of Japan by adding to the latter the chiaroscuro and the linear perspective of the former. If the disciples of this school could shake off the Sesshu tradition of strong outlines and adopt the Kano Motonobu revelation of modelling by mass only, their work would stand on a high place. But they, too, receive little encouragement. The tendency of the time is conservative in art matters.

A series of magnificent publications has popularized art and its best products in a manner such as could never have been anticipated. The Kokka, a monthly magazine richly and beautifully illustrated and edited by Japanese students, has reached its 223rd number; the Shimbi Daikan, a colossal album containing chromoxylographic facsimiles of celebrated examples in every branch of art, has been completed in 20 volumes; the masterpieces of Korin and Motonobu have been reproduced in similar

albums; the masterpieces of the Ukiyo-e are in process of publication, and it seems certain that the Japanese nation will ultimately be educated to such a knowledge of its own art as will make for permanent appreciation. Meanwhile the intrepid group of painters in oil plod along unflinchingly, having formed themselves into an association (the hakuba-kai) which gives periodical exhibitions, and there are, in Tokyo and Kioto, well- organized and flourishing art schools which receive a substantial measure of state aid, as well as a private academy founded by Okakura with a band of seceders from the hybrid fashions of the Gaho system. Altogether the nation seems to be growing more and more convinced that its art future should not wander far from the lines of the past. (W. An.; F. By.)

Although a little engraving on copper has been practised in Japan of late years, it is of no artistic value, and the only branch of the art which calls for recognition is the ˆnirravinx. cutting of wood-blocks for use either with colours or without. This, however, is of supreme importance, and as its technique differs in most respects from the European practice, it demands a somewhat detailed description.

The wood used is generally that of the cherry-tree, sakura, which has a grain of peculiar evenness and hardness. It is worked plank- wise to a surface parallel with the grain, and not across it. A design is drawn by the artist, to whom the whole credit of the production generally belongs, with a brush on thin paper, which is then pasted face downwards on the block. The engraver, who is very rarely the designer, then cuts the outlines into the block with a knife, afterwards removing the superfluous wood with gouges and chisels. Great skill is shown in this operation, which achieves perhaps the finest facsimile reproduction of drawings ever known without the aid of photographic processes. A peculiar but highly artistic device is that of gradually rounding off the surfaces where necessary, in order to obtain in printing a soft and graduated mass of colour which does not terminate too abruptly. In printing with colours a separate block is made in this manner for each tint, the first con- taining as a rule the mere lines of the composition, and the others providing for the masses of tint to be applied. In all printing the paper is laid on the upper surface of the block, and the impres- sion rubbed off with a circular pad, composed of twisted cord within a covering of paper cloth and bamboo-leaf, and called the baren. In colour-printing, the colours, which are much the same as those in use in Europe, are mixed, with rice-paste as a medium, on the block for each operation, and the power of regulating the result given by this custom to an intelligent craftsman (who, again, is neither the artist nor the engraver) was productive in the best period of very beautiful and artistic effects, such as could never have been obtained by any mechanical device. A wonderfully accurate register, or successive superposition of each block, is got mainly by the skill of the printer, who is assisted only by a mark

defining one corner and another mark showing the opposite side limit.

The origins of this method of colour-printing are obscure. It has been practised to some extent in China and Korea, but there is no evidence of its antiquity in these countries. It appears to be one of the few indigenous arts of Japan. But before accepting this conclusion as final, one must not lose sight of the fact that the so-called chiaroscuro engraving was at the height of its use in Italy at the same time that embassies from the Christians in Japan visited Rome, and that it is thus possible

that the suggestion at least may have been derived from Europe. The fact that no traces of it have been discovered in Japan would be easily accounted for, when it is remembered that the examples taken home would almost certainly have been religious pictures, would have been preserved in well-known and accessible places, and would thus have been entirely destroyed in the terrible and minute extermination of Christianity by Hideyoshi at the begin- ning of the 17th century. Japanese tradition ascribes the inven- tion of colour-printing to Idzumiya Gonshiro, who, about the end of the 17 th century, first made use of a second block to apply a tint of red (bent) to his prints. Sir Ernest Satow states more definitely that " Sakakibara attributes its origin to the year 1695, when portraits of the actor Ichikawa Danjiuro, coloured by this process, were sold in the streets of Yedo for five cash apiece." The credit. of the invention is also given to Torii Kiyonobu, who worked at about this time, and, indeed, is said to have made the prints above mentioned. But authentic examples of his work now remaining, printed in three colours, seem to show a tech- nique too complete for an origin quite so recent. However, he is the first artist of importance to have produced the broadsheets — for many years chiefly portraits of notable actors, historical characters and famous courtesans — which are the leading and characteristic use to which the art was applied. Pupils, the chief of whom were Kiyomasa, Kiyotsume, Kiyomitsu, Kiyonaga and Kiyomine, carried on his tradition until the end of the 18th century, the three earlier using but few colours, while the works of the two last named show a technical mastery of all the capa- bilities of the process.

The next artist of importance is Suzuki Harunobu (worked c. 1760- 1780), to whom the Japanese sometimes ascribe the invention of the process, probably on the grounds of an improvement in his technique, and the fact

*that he seems to have been one of the first of the colour- print makers to attain great popularity. Katsukawa Shunsho (d. 1792) must next be mentioned, not only for the beauty of his own work, but because he was the first master of Hokusai; then Yeishi (worked c. 1781-1800), the founder of the Hosoda school; Utamaro (1754-1806), whose prints of beautiful women were col- lected by Dutchmen while he was still alive, and have had in our own day a vogue greater, perhaps, than those of any other of his fellows; and Toyokuni I. (1768-1825), who especially devoted himself to broadsheet portraits of actors and dramatic scenes. The greatest of all the artists of the popular school was, however, Hokusai (1760-1849). His most famous series of broadsheets is the Thirty-six Views of Mount Fuji (1823-1829), which, in spite of the conventional title, includes at least forty-six. His work is catalogued in detail by E. de Goncourt. At the beginning of the 19th century the process was technically at its greatest height, and in the hands of the great landscape artist, Hiroshige I., as well as the pupils of Toyokuni I. — Kunisada and Kuniyoshi — and those of Hokusai, it at first kept up an excellent level. But an undue increase in the number of blocks used, combined with the inferiority of the im- ported colours and carelessness or loss of skill in printing, brought about a rapid decline *oon after 1840. This continued until the old traditions were well-nigh exhausted, but since 1880 there has been a distinct revival. The prints of the present day are cut with great skill, and the designs are excellent, though both these branches seem to lack the vigour of conception and breadth of execution of the older masters. The colours now used arc almost invariably of cheap German origin, and though they have a certain prettiness — ephemeral, it is to be feared — they again can not compare with the old native productions. Among workers in this style, Yoshitoshi (d. c. 1898) was perhaps the best. Living artists in 1908 included Toshihide, Miyagawa Shuntei, Yoshiu Chikanobu — one of the elder generation — Tomisuka Yeishu, Toshikata and Gekko. Formerly the colour-print artist was of mean extraction and low social position, but he now has some recognition at the hands of the professors of more esteemed branches of art. This change is doubtless due in part to Occidental appreciation of the products of his art, which were formerly held in little honour by his own countrymen, the place assigned to them being scarcely higher than that accorded to magazine illustrations in Europe and America. But it is also largely due to his displays of unsurpassed skill in preparing xylo- graphs for the beautiful art publications issued by the Shimbi Shoin and the Kokka company. These xylographs prove that the Japanese art-artisan of the present day was not surpassed by the greatest of his predecessors in this line. (E. F. S. ; F. By.)*

The history of the illustrated book in Japan may be said to begin with the Ise monogatari, a romance first published in the 10th century, of which an

edition adorned with woodcuts appeared in 1608. In the course of the 17th century many other works of the same nature were issued, including some in which

*the cuts were roughly coloured by hand; but the execution of these is not as good as contemporary European work. The date of the first use of colour-printing in Japanese book illus- tration is uncertain. In 1667 a collection of designs for t ° at j on , ” S * kimono (garments) appeared, in which inks of several colours were made use of; but these were only employed in turn for single printings, and in no case were two of them used on the same print. It is certain, however, that the mere use of coloured inks must soon have suggested the combination of two or more of them, and it is probable that examples of this will be discovered much earlier in date than those known at present.*

About the year 1680 Hishigawa Moronobu achieved a great popu- larity for woodcut illustration, and laid the foundations of the splendid school which followed. The names of the engravers who cut his designs are not known, and in fact the reputation of these craftsmen is curiously subordinated to that of the designers in all Japanese work of the kind. With Moronobu must be associated Okumura Masanobu, a little later perhaps in date, whose work is also of considerable value. During the ensuing thirty years numerous illustrated books appeared, including the earliest yet known which are illustrated by colour-printing. Nishikawa Sukenobu (1671- 1751) illustrated a very large number of books, many of which were not published until after his death. With him may be associated Ichio Shumboku (d. c. 1773) and Tsukioka Tange (171 7-1786), the latter of whom made the drawings for many of the meisho or guide- books which form so interesting and distinctive a branch of Japanese illustration. The work of Tachibana Morikuni (1670-1748) is also of great importance. The books illustrated by the men of this school were mainly collections of useful information, guide-books, romances and historical and religious compilations; but much of the best of their work is to be found in the collections of pictorial designs, very often taken from Chinese sources, which were produced for the use of workers in lacquer, pottery and similar crafts. These, both for design and for skill of cutting, hold their own with the best work of European wood-cutting of any period. The development of the art of Japanese colour-printing naturally had its effect on book-illustration, and the later years of the 1 8th and the earlier of the 19th century saw a vast increase of books illustrated by this process. The subjects also now include a new series of landscapes and views drawn as seen by the designers, and not reproductions of the work of other men; and also sketches of scenes and characters of every-day life and of the folk-lore in which Japan is so rich. Among the artists of this period, as of all others in Japan, Hokusai (1760-1849) is absolutely pre-eminent. His greatest

production in book-illustration was the Mangwa, a collection of sketches which cover the whole ground of Japanese life and legend, art and handicraft. It consists of fifteen volumes, which appeared at intervals from 1812 to 1875, twelve being published during his life and the others from material left by him. Among his many other works may be mentioned the Azuma Asobi {Walks round Yedo, 1799). Of his pupils, Hokkei (1 780-1 856) and Kyosai were the greatest. Most of the artists, whose main work was the designing of broadsheets, produced elaborately illustrated books; and this series includes specimens of printing in colours from wood-blocks, which for technique have never been excelled. Among them should be men- tioned Shunsho {Seiro bijin awase kagami, 1776); Utamaro {Seiro nenjyu gyoji, 1804) ; Toyokuni I. (Yakusha kono leikishiwa, 1801) ; as well as Harunobu Yeishi (Onna sanjyu rokkasen, 1798), Kitao Masan- obu and Tachibana Minko, each of whom produced beautiful work of the same nature. In the period next following, the chief artists were Keisai Yeisen (Keisai so-gwa, 1832) and Kikuehi Yosai (Zenken kojitsu), the latter of whom ranks perhaps as highly as any of the artists who confined their work to black and white. The books produced in the period 1880-1908 in Japan are still of high technical excellence. The colours are, unfortunately, of cheap European manufacture ; and the design, although quite characteristic and often beautiful, is as a rule. merely pretty. The engraving is as good as ever. Among the book-illustrators of our own generation must be again mentioned Kyosai; Kono Bairei (d. 1895), whose books of birds — the Bairei hyakucho gwafu (1881 and 1884) and Yuaka-no- tsuki (1889) — are unequalled of their kind; Imao Keinen, who also issued a beautiful set of illustrations of birds and flowers (Keinen kwacho gwafu), engraved by Tanaka Jirokichi and printed by Miki Nisaburo (1891-1892) ; and Watanabe Seitei, whose studies of similar subjects have appeared in Seitei kwacho gwafu (1890-1891) and the Bijutsu sekai (1894), engraved by Goto Tokujiro. Mention should also be made of several charming series of fairy tales, of which that published in English by the Kobunsha in Tokyo in 1885 is perhaps the best. In their adaptation of modern processes of illustration the Japanese are entirely abreast of Western nations, the chromo- lithographs and other reproductions in the Kokka, a periodical record of Japanese works of art (begun in 1889), in the superb albums of the Shimbi Shoin, and in the publications of Ogawa being of quite a high order of merit. (E. F. S. ; E. By.)

Sculpture and Carving, — Sculpture in wood and metal is of

JAPAN

Plate III.

fui» rv.

Fig. 9.— PLUM TREES AND STREAM— SCREEN ON GOLD GROUND. By Korin (1661-1716),

A,

Fig, 10.— PEACOCKS. By Ganku (1749-1838)-

First Period.

ancient date in Japan. Its antiquity is not, indeed, comparable to that of ancient Egypt or Greece, but no country besides Japan can boast a living and highly developed art that has steteA numbered upwards of twelve centuries of unbroken and brilliant productiveness. Setting aside rude prehistoric essays in stone and metal, which have special interest for the antiquary, we have examples of sculpture in wood and metal, magnificent in conception and technique, dating from the earliest periods of what we may term historical Japan; that is, from near the beginning of the great Buddhist propaganda under the emperor Kimmei (540-571) and the princely hierarch, Shotoku Taishi (573-621). Stone has never been in favour in Japan as a material for the higher expression of the sculptor's art.

The first historical period of glyptic art in Japan reaches from the end of the 6th to the end of the 12th century, culminating in the work of the great Nara sculptors, Unkei and his pupil Kwaikei. Happily, there are still preserved in the great temples of Japan, chiefly in the ancient capital of Nara, many noble relics of this period.

The place cf honour may perhaps be conferred upon sculptures in wood, representing the Indian Buddhists, Asangha and Vasa- bandhu, preserved in the Golden Hall of Kofuku-ji, Nara. These are attributed to a Kamakura sculptor of the 8th or 9th century, and in simple and realistic dignity of pose and grand lines of com- position are worthy of comparison with the works of ancient Greece. With these may be named the demon lantern-bearers, so perfect in the grotesque treatment of the diabolical heads and the accurate anatomical forms of the sturdy body and limbs; the colossal

temple guardians of the great gate of Todai-ji, by Unkei and Kwaikei (nth century), somewhat conventionalized, but still bearing evidence of direct study from nature, and inspired with intense energy of action; and the smaller but more accurately modelled temple guardians in the Saikondo, Nara, which almost compare with the " fighting gladiator " in their realization of menacing strength. The " goddess of art " of Akishino-dera, Nara, attributed to the 8th century, is the most graceful and least conventional of female sculptures in Japan, but infinitely remote from the feminine conception of the Greeks. The wooden portrait of Vimalakirtti, attributed to Unkei, at Kofuku-ji, has some of the qualities of the images of the two Indian Buddhists. The sculptures attributed to Jocho, the founder of the Nara school, although powerful in pose and masterly in execution, lack the truth of observation seen in some of the earlier and later masterpieces.

The most perfect of the ancient bronzes is the great image of Bhaicha-djyaguru in the temple of Yakushi-ji, Nara, attributed to a Korean monk of the 7th century, named Giogi. The bronze image of the same divinity at Horyu-ji, said to have been cast at the beginning of the 7th century by Tori Busshi, the grandson of a Chinese immigrant, is of good technical quality, but much inferior in design to the former. The colossal Nara Daibutsu (Vairocana) at Todai-ji, cast in 749 by a workman of Korean descent, is the largest of the great bronzes in Japan, but ranks far below the Yakushi-ji image in artistic qualities. The present head, however, is a later substitute for the original, which was destroyed by fire.

The great Nara school of sculpture in wood was founded in the early part of the nth century by a sculptor of Imperial, descent named Jocho, who is said to have modelled his style upon that of the Chinese wood-carvers of the Tang dynasty; his traditions were maintained by descendants and followers down to the beginning of the 13th century. All the artists of this period were men of aristo- cratic rank and origin, and were held distinct from the carpenter- architects of the imposing temples which were to contain their works.

Sacred images were not the only specimens of glyptic art pro- duced in these six centuries; reliquaries, bells, vases, ince.nse- burners, candlesticks, lanterns, decorated arms and armour, and many other objects, showing no less mastery of design and execution, have reached us. Gold and silver had been applied to the adornment of helmets and breastplates from the 7th century, but it was in the 12th century that the decoration reached the high degree of elabo- ration shown us in the armour of the Japanese Bayard, Yoshitsune, which is still preserved at Kasuga, Nara.

Wooden masks employed in the ancient theatrical performances were made

from the 7th century, and offer a distinct and often grotesque phase of wood-carving. Several families of experts have been associated with this class of sculpture, and their designs have been carefully preserved and imitated down to the present day.

The second period in Japanese glyptic art extends from the beginning of the 13th to the early part of the 17th century. The great struggle between the Taira and Minamoto clans had ended, but the militant spirit was still strong, and brought work for the artists who made and ornamented arms and armour.

The Miyochins, a line that claimed ancestry from the 7th century, were at the head of their calling, and their work in iron breast- plates and helmets, chiefly in repousse, is still un- rivalled. It was not until the latter half of the 15th period. century that there came into vogue the elaborate decor- ation of the sword, a fashion that was to last four hundred years.

The metal guard {tsuba), made of ironorpreciousalloy, wasadorned with engraved designs, often inlaid with gold and silver. The free end of the hilt was crowned with a metallic cap or pommel (kashira), the other extremity next the tsuba was embraced by an oval ring (fuchi), and in the middle was affixed on each side a special ornament called the menuki, all adapted in material and workmanship to harmonize with the guard. The kodzuka, or handle of a little knife implanted into the sheath of the short sword or dagger, was. also of metal and engraved with like care. The founder of the first great line of tsuba and menuki artists was Goto Yujo (1440-1512), a friend of the painter Kano Motonobu, whose designs he adopted. Many families of sword artists sprang up at a later period, furnishing treasures for the collector even down to the present day, and their labours reached a level of technical mastery and refined artistic judgment almost without parallel in the art industries of Europe. Buddhist sculpture was by no means neglected during this period, but there are few works that call for special notice. The most noteworthy effort was the casting by Ono Goroy6mon in 1252 of the well-known bronze image, the Kamakura Daibutsu.

The third period includes the 17th, 18th and the greater part of the 19th centuries. It was the era of the artisan artist. The makers of Buddhist images and of sword ornaments carried on their work with undiminished industry period. and success, and some famous schools of the latter arose during this period. The Buddhist sculptors, however, tended to grow more conventional and the metal-workers more naturalistic as the 18th century began to wane. It was in con- nexion with architecture that the great artisan movement began. The initiator was Hidari Jingoro (1594-1652), at first a simple carpenter, afterwards one of the most famous sculptors in the

land of great artists. The gorgeous decoration of the mausoleum of Iyeyasu at Nikko, and of the gateway of the Nishi Hongwan temple at Kioto, are the most striking instances of his handiwork or direction.

The pillars, architraves, ceilings, panels, and almost every avail- able part of the structure, are covered with arabesques and sculp- tured figures of dragons, lions, tigers, birds, flowers, and even pic- torial compositions with landscapes and figures, deeply carved in solid or open work — the wood sometimes plain, sometimes overlaid with pigment and gilding, as in the panelled ceiling of the chapel of Iyeyasu in Tokyo. The designs for these decorations, like those of the sword ornaments, were adopted from the great schools of paint- ing, but the invention of the sculptor was by no means idle. From this time the temple carvers, although still attached to the carpen- ters' guild, took a place apart from the rest of their craft, and the genius of Hidari Jingoro secured for one important section of the artisan world a recognition like that which Hishigawa Moronobu, the painter and book-illustrator, afterwards won for another.

A little later arose another art industry, also emanating from the masses. The use of tobacco, which became prevalent in the 17th century, necessitated the pouch. In order to suspend this from the girdle there was employed a kind of button or toggle — the netsuke. The metallic bowl and mouthpiece of the pipe offered a tempting surface for embellishment, as well as the clasp of the pouch; and the netsuke, being made of wood, ivory or other material susceptible of carving, also gave occasion for art and ingenuity.

The engravers of pipes, pouch clasps, and the metallic discs (kagami-buta) attached to certain netsuke, sprang from the same class and were not less original. They worked, too, with a skill little inferior to that of the Gotos, Naras, and other aristocratic sculptors of sword ornaments, and often with a refinement which their relative disadvantages in education and associations render especially remark- able. The netsuke and the pipe, with all that pertained to it, were for the commoners what the sword-hilt and guard were for the gentry. Neither class cared to bestow jewels upon their persons, but neither spared thought or expense in the embellishment of the object they most loved. The final manifestation of popular glyptic art was the okimono, an ornament pure and simple, in which utility was alto- gether secondary in intention to decorative effect. Its manufacture as a special branch of art work dates from the rise of the naturalistic school of painting and the great expansion of the popular school under the Katsugawa, but the okimono formed an occasional amuse- ment of the older glyptic artists. Some of the most exquisite and

most ingenious of these earlier productions, such as the magnificent iron eagle in the South Kensington Museum, the wonderful articu- lated models of crayfish, dragons, serpents, birds, that are found in many European collections, came from the studios of the Miyochins ; but these were the play of giants, and were not made as articles of commerce. The new artisan makers of the okimono struck out a line for themselves, one influenced more by the naturalistic and popular schools than by the classical art, and the quails of Kamejo, the tortoises of Seimin, the dragons of Toun and Toryu, and in recent years the falcons and the peacocks of Suzuki Chokichi, are the joy of the European collector. The best of these are exquisite in workman- ship, graceful in design, often strikingly original in conception, and usually naturalistic in ideal. They constitute a phase of art in which Japan has few rivals.

The present generation is more systematically commercial in its glyptic produce than any previous age. Millions of commer- cial articles in metal-work, wood and ivory flood the European markets, and may be bought in any street in Europe at a small price, but they offer a variety of design and an excellence of workmanship which place them almost beyond Western compe- tition. Above all this, however, the Japanese sculptor is a force in art. He is nearly as thorough as his forefathers, and maintains the same love of all things beautiful; and if he cannot show any epoch-making novelty, he is at any rate doing his best to support unsurpassed the decorative traditions of the past.

History has been eminently careful to preserve the names and records of the men who chiselled sword furniture. The Sword- sword being regarded as the soul of the samurai, making every one who contributed to its manufacture, Families. wn ether as forger of the blade or sculptor of the furniture, was held in high repute. The Goto family worked steadily during 14 generations, and its 19th century representa- tive — Goto Ichijo — will always be remembered as one of the family's greatest experts. But there were many others whose productions fully equalled and often excelled the best efforts of the Goto. The following list gives the names and periods of the most renowned families: —

(It should be noted that the division by centuries indicates the time of a family's origin. In a great majority of cases the represen- tatives of each generation worked on through succeeding centuries). IS th and 1 6th Centuries. Miyochin ; Goto ; Umetada ; Muneta ; Aoki ; Soami ; Nakai. 17th Century. Kuwamura ; Mizuno ; Koichi ; Nagayoshi ; Kuninaga;

Yoshishige; Katsugi; Tsuji; Muneyoshi; Tadahira; Shoami; Hosono; Yokoya; Nara; Okada; Okamoto; Kinai; Akao; Yoshioka; Hirata; Nomura; Wakabayashi; Inouye; Yasui; Chiyo; Kaneko; Uemura; Iwamoto. 18th Century. Gorobei; Shoemon; Kikugawa; Yasuyama; Noda; Tamagawa; Fujita; Kikuoka; Kizaemon; Hamano; Omori; Okamoto; Kashi- waya; Kusakari; Shichibei; Ito.

1 Qt h Century. Natsuo; Ishiguro; Yanagawa; Honjo; Tanaka; Okano; Kawara- bayashi; Oda; and many masters of the Omori, Hamano and Iwamoto families, as well as the five experts, Shuraku, Temmin, Ryumin, Minjo and Minkoku. (W. An.; F. By.)

There is a radical difference between the points of view of the Japanese and the Western connoisseur in estimating the Japanese merits of sculpture in metal. The quality of the Point of chiselling is the first feature to which the Japanese view. directs his attention; the decorative design is the

prime object of the Occidental's attention. With very rare exceptions, the decorative motives of Japanese sword furniture were always supplied by painters. Hence it is that the Japanese connoisseur draws a clear distinction between the decorative design and its technical execution, crediting the former to the pictorial artist and the latter to the sculptor. He detects in the stroke of a chisel and the lines of a graving tool subjective beauties which appear to be hidden from the great majority of Western dilettanti. He estimates the rank of a specimen by the quality of the chisel-work. The Japanese kinzoku-shi (metal sculptor) uses thirty-six principal classes of chisel, each with its distinctive name, and as most of these classes comprise from five to ten sub-varieties, his cutting and graving tools aggregate about two hundred and fifty.

Scarcely less important in Japanese eyes than the chiselling

of the decorative design itself is the preparation of the field to

which it is applied. There used to be a strict canon The Fle[a

with reference to this in former times. Namako tor

(fish-roe) grounds were essential for the mountings Scu/pfcired . j . , ,, . , . Decoration.

of swords worn on ceremonial occasions, the isnime

(stone-pitting) or jimigaki (polished) styles being considered less

aristocratic.

Namako is obtained by punching the whole surface — except the portion carrying the decorative design — into a texture of micro- scopic dots. The first makers of namako did not aim at regularity in the distribution of these dots; they were content to produce the effect of millet-seed sifted haphazard over the surface. But from the 15th century the punching of the dots in rigidly straight lines came to be considered essential, and the difficulty involved was so great that namako-making took its place among the highest technical achievements of the sculptor. When it is remembered that the punching tool was guided solely by the hand and eye, and that three or more blows of the mallet had to be struck for every dot, some conception may be formed of the patience and accuracy needed to produce these tiny protuberances in perfectly straight lines, at exactly equal intervals and of absolutely uniform size. Namako disposed in straight parallel lines originally ranked at the head of this kind of work. But a new kind was introduced in the 16th century. It was obtained by punching the dots in intersecting lines, so arranged that the dots fell uniformly into diamond-shaped groups of five each. This is called go-no-me-namako, because of its resem- blance to the disposition of chequers in the Japanese game of go. A century later, the daimyo namako was invented, in which lines of dots alternated with lines of polished ground. Ishime may be briefly described as diapering. There is scarcely any limit to the inge- nuity and skill of the Japanese expert in diapering a metal surface. It is not possible to enumerate here even the principal styles of ishime, but mention may be made of the mra-maki (broad-cast), in which the surface is finely but irregularly pitted after the manner of the face of a stone; the nashi-ji (pear-ground), in which we have a surface like the rind of a pear; the hari-ishime (needle ishime), where the indentations are so minute that they seem to have been made with the point of a needle ; the gama-ishime, which is intended to imitate the skin of a toad; the tsuya-ishime, produced with a chisel sharpened so that its traces have a lustrous appearance; the ore-kuchi (broken-tool), a peculiar kind obtained with a jagged tool; and the gozami, which resembles the plaited surface of a fine straw mat.

Great importance has always been attached by Japanese experts to the patina of metal used for artistic chiselling. It was mainly for the sake of their patina that value attached to the patina remarkable alloys shakudo (3 parts of gold to 97 of copper) and shibuichi (1 part of silver to 3 of copper). Neither metal, when it emerges from the furnace, has any beauty, shakudo being simply dark-coloured copper and shibuichi pale gun-metal. But after proper treatment 1 the former develops a glossy black patina with violet sheen, and the latter shows beautiful shades of grey with silvery lustre. Both these compounds afford delicate, unobtrusive and effective grounds for inlaying with gold, silver and other metals, as well as for sculpture, whether incised or in relief. Copper, too, by patina-producing

treatment, is made to show not merely a rich golden sheen with pleasing limpidity, but also red of various hues, from deep coral to light vermilion, several shades of grey, and browns of numerous tones from dead-leaf to chocolate. Even greater value has always been set upon the patina of iron, and many secret recipes were preserved in artist families for producing the fine, satin-like texture so much admired by all connoisseurs.

In Japan, as in Europe, three varieties of relief carving are distin- guished — alto (taka-bori), mezzo (chilniku-bori) and basso (usuniku- bori). In the opinion of the Japanese expert, these styles ju e t aot / s / hold the same respective rank as that occupied by the chlsettlnir, three kinds of ideographic script in caligraphy. High relief carving corresponds to the kaisho, or most classical form of writing; medium relief to the gyosho, or semi-cursive style; and low relief to the sosho or grass character. With regard to incised chiselling, the commonest form is kebori (hair-carving), which may be called engrav- ing, the lines being of uniform thickness and depth. Very beautiful results are obtained by the kebori method, but incomparably the finest work in the incised class is that known as kata-kiri-bori. In this kind of chiselling the Japanese artist can claim to be unique as well as unrivalled. Evidently the idea of the great Yokoya experts, the originators of the style, was to break away from the somewhat formal monotony of ordinary engraving, where each line performs exactly the same function, and to convert the chisel into an artist's

1 It is first boiled in a lye obtained by lixiviating wood ashes ; it is next polished with charcoal powder; then immersed in plum vinegar and salt ; then washed with weak lye and placed in a tub of water to remove all traces of alkali, the final step being to digest in a boiling solution of copper sulphate, verdigris and water.

brush instead of using it as a common cutting tool. They succeeded admirably. In the kata-kiri-bori every line has its proper value in the pictorial design, and strength and directness become cardinal elements in the strokes of the burin just as they do in the brush- work of the picture-painter. The same fundamental rule applied, too, whether the field of the decoration was silk, paper or metal. The artist's tool, be it brush or burin, must perform its task by one effort. There must be no appearance of subsequent deepening, or extending, or re-cutting or finishing. Kata-kiri-bori by a great expert is a delight. One is lost in astonishment at the nervous yet perfectly regulated force and the unerring fidelity of every trace of the chisel. Another variety of carving much affected by artists of the 17th century, and now largely used, is called shishi-ai-bori or niku-ai-bori. In this style the surface of the design is not raised above the general plane

of the field, but an effect of projection is obtained either by recessing the whole space immediately surround- ing the design, or by enclosing the latter in a scarped frame. Yet another and very favourite method, giving beautiful results, is to model the design on both faces of the metal so as to give a sculpture in the round. The fashion is always accompanied by chiselling d jour (sukashi-bori) , so that the sculptured portions stand out in their entirety.

Inlaying with gold or silver was among the early forms of decoration in Japan. The skill developed in modern times is at ... least equal to anything which the past can show, and

the results produced are much more imposing. There are two principal kinds of inlaying: the first called hon-zogan (true inlaying), the second nunome-zogan (linen-mesh inlaying). As to the former, the Japanese method does not differ from that seen in the beautiful iron censers and vases inlaid with gold which the Chinese produced from the Szien-te era (1426-1436). In the surface of the metal the workman cuts grooves wider at the base than at the top, and then hammers into them gold or silver wire. Such a process presents no remarkable features, except that it has been carried by the Japanese to an extraordinary degree of elaborateness. The nunome-zogan is more interesting. Suppose, for example, that the artist desires to produce an inlaid diaper. His first business is to chisel the surface in lines forming the basic pattern of the design. Thus, for a diamond-petal diaper the chisel is carried across the face of the metal horizontally, tracing a number of parallel bands divided at fixed intervals by ribs which are obtained by merely straightening the chisel and striking it a heavy blow. The same process is then repeated in another direction, so that the new bands cross the old at an angle adapted to the nature of the design. Several independent chisellings may be necessary before the lines of the diaper emerge clearly, but throughout the whole operation no measurement of any kind is taken, the artist being guided entirely by his hand and eye. The metal is then heated, not to redness, but sufficiently to develop a certain degree of softness, and the workman, taking a very thin sheet of gold (or silver), hammers portions of it into the salient points of the design. In ordinary cases this is the sixth process. The seventh is to hammer gold into the outlines of the diaper; the eighth, to hammer it into the pattern filling the spaces between the lines, and the ninth and tenth to complete the details. Of course the more intricate the design the more numerous the processes. It is scarcely possible to imagine a higher effort of hand and eye than this nunome-zogan displays, for while intricacy and elaborateness are carried to the very extreme, absolute mechani- cal accuracy is obtained. Sometimes in the same design we see gold of three different hues, obtained by varying the alloy. A third kind of inlaying, peculiar to Japan, is sumi-zogan (ink-inlaying), so called because the inlaid design gives the

impression of having been painted with Indian ink beneath the transparent surface of the metal. The difference between this process and ordinary inlaying is that for sumi-zogan the design to be inlaid is fully chiselled out of an indepen- dent block of metal with sides sloping so as to be broader at the base than at the top. The object which is to receive the decoration is then channelled in dimensions corresponding to those of the design block, and the latter having been fixed in the channels, the surface is ground and polished until an intimate union is obtained between the inlaid design and the metal forming its field. Very beautiful effects are thus produced, for the design seems to have grown up to the surface of the metal field rather than to have been planted in it. Shibuichi inlaid with shakudo used to be the commonest combination of metals in this class of decoration, and the objects usually depicted were bamboos, crows, wild-fowl under the moon, peony sprays and so forth.

A variety of decoration much practised by early experts, and carried to a high degree of excellence in modern times, is mokume-ji W d- (wood-grained ground). The process in this case is to

trained take a thin plate of metal and beat it into another plate Grounds. °^ s i m 'l ar metal, so that the two, though welded together, retain their separate forms. The mass, while still hot, is coated with hena-tsuchi (a kind of marl) and rolled in straw ash, in which state it is roasted over a charcoal fire raised to glowing heat with the bellows. The clay having been removed, another plate of the same metal is beaten in, and the same process is repeated. This is done several times, the number depending on the quality of grain- ing that the expert desires to produce. The manifold plate is then heavily punched from one side, so that the opposite face protrudes in

broken blisters, which are then hammered down until each becomes a centre of wave propagation. In fine work the apex of the blister is ground off before the final hammering. Iron was the metal used exclusively for work of this kind down to the 16th century, but various metals began thenceforth to be combined. Perhaps the choicest variety is gold graining in a shakudo field. By repeated hammering and polishing the expert obtains such control of the wood-grain pattern that its sinuosities and eddies seem to have developed symmetry without losing anything of their fantastic grace. There are other methods of producing mokume-ji.

It has been frequently asserted by Western critics that the year (1876) which witnessed the abolition of sword-wearing in Japan, witnessed also the end of her artistic metal- Modern and work. That is a great mistake.

The art has merely Ancient developed new phases in modern times. Not only are SAat its masters as skilled now as they were in the days of the Goto, the Nara, the Yokoya and the Yanagawa celebrities, but also their productions must be called greater in many respects and more interesting than those of their renowned predecessors. They no longer devote themselves to the manufacture of sword ornaments, but work rather at vases, censers, statuettes, plaques, boxes and other objects of a serviceable or ornamental nature. All the processes described above are practised by them with full success, and they have added others quite as remarkable.

Of these, one of the most interesting is called kiribame (insertion). The decorative design having been completely chiselled in the round, is then fixed in a field of a different metal, in which a design of exactly similar outline has been cut out. The result is that the picture has no blank reverse. For example, on the surface of a shibuichi box-lid we see the backs of a flock of geese chiselled in silver, and when the lid is opened, their breasts and the under-sides of their pinions appear. The difficulty of such work is plain. Micro- scopic accuracy has to be attained in cutting out the space for the insertion of the design, and while the latter must be soldered firmly in its place, not the slightest trace of solder or the least sign of junction must be discernible between the metal of the inserted picture and that of the field in which it is inserted. Suzuki Gensuke is the inventor of this method. He belongs to a class of experts called uchimono-shi (hammerers) who perform preparatory work for glyptic artists in metal. The skill of these men is often wonder- ful. Using the hammer only, some of them can beat out an intricate shape as truly and delicately as a sculptor could carve it with his chisels. Ohori Masatoshi, an uchimono-shi of Aizu (d. 1897), made a silver cake-box in the form of a sixteen-petalled chrysanthemum. The shapes of the body and lid corresponded so intimately that, whereas the lid could be slipped on easily and smoothly without any attempt to adjust its curves to those of the body, it always fitted so closely that the box could be lifted by grasping the lid only. Another feat of his was to apply a lining of silver to a shakudo box by shaping and hammering only, the fit being so perfect that the lining clung like paper to every part of the box. Suzuki Gensuke andHirata Soko are scarcely less expert. The latter once exhibited inTokyo a silver game-cock with soft plumage and surface modelling of the most delicate character. It had been made by means of the hammer only. Suzuki's kiribame process is not to be confounded with the kiribame-zogan (inserted inlaying) of Toyoda Koko, also a modern artist. The gist of the latter method is that a design chiselled d jour has its outlines veneered with other metal which serves to emphasize them. Thus, having pierced a spray of flowers in a thin sheet of shibuichi, the artist fits a slender rim of gold, silver or shakudo to the petals, leaves and stalks, so that an effect is produced of transparent blossoms outlined in gold, silver or purple. Another

modern achievement — also due to Suzuki Gensuke — is maze-gane (mixed metals). It is a singular conception, and the results obtained depend largely on chance. Shibuichi and shakudo are melted separately, and when they have cooled just enough not to mingle too intimately, they are cast into a bar which is subse- quently beaten flat. The plate thus obtained shows accidental clouding, or massing of dark tones, and these patches are taken as the basis of a pictorial design to which final character is given by inlaying with gold and silver, and by kata-kiri sculpture. Such pictures partake largely of the impressionist character, but they attain much beauty in the hands of the Japanese artist with his extensive repertoire of suggestive symbols. A process resembling maze-gane, but less fortuitous, is shibuichi-doshi (combined shibui- chi), which involves beating together two kinds of shibuichi and then adding a third variety, after which the details of the picture are worked in as in the case of maze-gane. The charm of these methods is that certain parts of the decorative design seem to float, not on the surface of the metal, but actually within it, an admirable effect of depth and atmosphere being thus produced. Mention must also be made of an extraordinarily elaborate and troublesome process invented by Kajima Ippu, a great artist of the present day. It is called togi-dashi-zogan (ground-out inlaying). In this exquisite and

ingenious kind of work the design appears to be growing up from the depths of the metal, and a delightful impression of atmosphere and water is obtained. All these processes, as well as that of repoussi, in which the Japanese have excelled from a remote period, are now practised with the greatest skill in Tokyo, Kioto, Osaka and Kana- zawa. At the art exhibitions held twice a year in the principal cities there may be seen specimens of statuettes, alcove ornaments, and household utensils which show that the Japanese worker in metals stands more indisputably than ever at the head of the world's artists in that field. The Occident does not yet appear to have full realized the existence of such talent in Japan; partly perhaps because its displays in former times were limited chiefly to sword-furniture, possessing little interest for the average European or American; and partly because the Japanese have not yet learned to adapt their skill to foreign requirements. They confine themselves at present to decorating plaques, boxes and cases for cigars or cigarettes, and an occasional tea or coffee service; but the whole domain of salvers, dessert-services, race-cups and so on remains virtually unexplored. Only within the past few years have stores been established in the foreign settlements for the sale of silver

utensils, and already the workmanship on these objects displays pal- pable signs of the deterioration which all branches of Japanese art have undergone in the attempt to cater for foreign taste. In a general sense the European or American connoisseur is much less exacting than the Japanese. Broad effects of richness and splendour captivate the former, whereas the latter looks for delicacy of finish, accuracy of detail and, above all, evidences of artistic competence. It is nothing to a Japanese that a vase should be covered with pro- fuse decoration of flowers and foliage: he requires that every blossom and every leaf shall be instinct with vitality, and the comparative costliness of fine workmanship does not influence his choice. But if the Japanese sculptor adopted such standards in working for foreign patrons, his market would be reduced to very narrow dimensions. He therefore adapts himself to his circum- stances, and, using the mould rather than the chisel, produces specimens which show tawdry handsomeness and are attractively cheap. It must be admitted, however, that even though foreign appreciative faculty were sufficiently educated, the Japanese artist in metals would still labour under the great difficulty of devising shapes to take the place of those which Europe and America have learned to consider classical.

Bronze is called by the Japanese kara-kane, a term signify- ing " Chinese metal " and showing clearly the source from which knowledge of the alloy was obtained. It is a Castlaz copper-lead-tin compound, the proportions of its con- stituents varying from 72 to 88 % of copper, from 4 to 20 % of lead and from 2 to 8 % of tin. There are also present small quantities of arsenic and antimony, and zinc is found gener- ally as a mere trace, but sometimes reaching to 6 %. Gold is supposed to have found a place in ancient bronzes, but its presence has never been detected by analysis, and of silver not more than 2 % seems to have been admitted at any time. Mr W. Gowland has shown that, whatever may have been the practice of Japanese bronze makers in ancient and medieval eras, their suc- cessors in later days deliberately introduced arsenic and antimony into the compound in order to harden the bronze without impair- ing its fusibility, so that it might take a sharper impression of the mould. Japanese bronze is well suited for castings, not only because of its low melting-point, great fluidity and capacity for taking sharp impressions, but also because it has a particularly smooth surface and readily develops a fine patina. One variety deserves special mention. It is a golden yellow bronze, called senlcku — this being the Japanese pronunciation of Suen-te, the era of the Ming dynasty of China when this compound was invented. Copper, tin, lead and zinc, mixed in various propor- tions by different experts, are the ingredients, and the beautiful golden hues and glossy texture of the surface are obtained by patina-producing processes, in which branch of metal-work the Japanese show altogether unique skill.

From the time when they began to cast bronze statues, Japanese experts understood how to employ a hollow, removable core round which the metal was run in a skin just thick enough for strength without waste of material ; and they also understood the use of wax for modelling purposes. In ordinary circumstances, a casting thus obtained took the form of a shell without any break of continuity. But for very large castings the process had to be modified. The great image of Lochana Buddha at Nara, for example, would measure 138 ft. in height were it standing erect, and its weight is about 550 tons. The colossal Amida at Kamakura has a height only 3 ft. less. It would have been scarcely possible to cast such statues in one piece in situ, or, if cast elsewhere, to transport them and elevate them on their pedestals. The plan pursued was to

build them up gradually in their places by casting segment after segment. Thus, for the Nara Dai-butsu, the mould was constructed in a series of steps ascending 12 in. at a time, until the head and neck were reached, which, of course, had to be cast in one shell, 12 ft. high.

The term " parlour bronzes " serves to designate objects for domestic use, as flower-vases, incense-burners and alcove orna- ments. Bronze-casters began to turn their attention to these objects about the middle of the 17th century. The art of casting bronze reached its culmination in the hands of a group of great experts — Seimin, Toun, Masatune, Teijo, Somin, Keisai, Takusai, Gido, Zenryusai and Hotokusai — who flourished during the second half of the 18th century and the first half of the 19th. Many brilliant specimens of these men's work survive, their general features being that the motives are naturalistic, that the quality of the metal is exceptionally fine, that in addition to beautifully clear casting obtained by highly skilled use of the cera-perduta process, the chisel was employed to impart delicacy and finish to the design, and that modelling in high relief is most successfully introduced. But it is a mistake to assert, as many have asserted, that after the era of the above ten masters — the latest of whom, Somin, ceased to work in 1 87 1 — no bronzes comparable with theirs were cast. Between 1875 and 1879 some of the finest bronzes ever produced in Japan were turned out by a group of experts working under the business name of Sanseisha. Started by two brothers, Oshima Katsujiro (art-name Joun) and Oshima Yasutaro (art- name Shokaku), this association secured the services of a number of skilled chisellers of sword-furniture, who had lost their occupation by the abandonment of sword-wearing. Nothing could surpass the delicacy of the works executed at the Sanseisha's atelier in T6ky5, but unfortunately such productions were above the standard of the customers for whom they were intended. Foreign buyers, who alone stood in the market at that time, failed to distinguish the fine and costly bronzes of Joun, Shokaku and their colleagues from cheap imitations which soon began to compete with them, so that ulti- mately the

Sanseisha had to be closed. This page in the modern history of Japan's bronzes needs little alteration to be true of her applied art in general. Foreign demand has shown so little dis- crimination that experts, finding it impossible to obtain adequate remuneration for first-class work, have been obliged to abandon the field altogether, or to lower their standard to the level of general appreciation, or by forgery to cater for the perverted taste which attaches unreasoning value to age. Joun has produced, and is thoroughly capable of producing, bronzes at least equal to the best of Seimin s masterpieces, yet he has often been induced to put Seimin's name on objects for the sake of attracting buyers who attach more value to cachet than to quality. If to the names of Joun and his bril- liant pupil Ryuki we add those of Suzuki Chokichi, Okazaki Sessei, Hasegawa Kumazo, Kanaya Gorosaburo and Jomi Eisuke, we have a group of modern bronze-casters who unquestionably surpass the ten experts beginning with Seimin and ending with Somin. Okazaki Sessei has successfully achieved the casting of huge panels carrying designs in high relief ; and whether there is question of patina or of workmanship, Jomi Eisuke has never been surpassed.

Occidental influence has been felt, of course, in the field of modern bronze-casting. At a school of art officially established in Tokyo in 1873 under the direction of Italian teachers — a school which owed its signal failure partly to the incompetence and intemperate behaviour of some of its foreign professors, and partly to a strong renaissance of pure Japanese classicism — one of the few accomplish- ments successfully taught was that of modelling in plaster and chiselling in marble after Occidental methods. Marble statues are out of place in the wooden buildings as well as in the parks of Japan, and even plaster busts or groups, though less incongruous perhaps, have not yet found favour. Hence the skill undoubtedly possessed by several graduates of the defunct art school has to be devoted chiefly to a subordinate purpose, namely, the fashioning of models for metal-casters. To this combination of modellers in European style and metal-workers of such force as Suzuki and Okazaki, Japan owes various memorial bronzes and effigies which are gradually finding a place in her parks, her museums, her shrines or her private houses. There is here little departure from the well-trodden paths of Europe. Studies in drapery, prancing steeds, ideal poses, heads with fragments of torsos attached (in extreme violation of true art), crouching beasts of prey — all the stereotyped styles are reproduced. The imitation is excellent.

Among the artists of early times it is often difficult to dis- tinguish between the carver of wood and the caster of bronze. The latter sometimes made his own models in wax, Carving in sometimes chiselled them in wood, and sometimes had Wood and recourse to a specialist in wood-carving. The group lvor y- of splendid sculptors in wood that graced the nth, 12th and

13th centuries left names never to be forgotten, but undoubtedly many other artists of scarcely less force regarded bronze-casting as their principal business. Thus the story of wood-carving is very difficult to trace. Even in the field of architectural

JAPAN

SCULPTURE

Plate V.

Fig. ii.-VAJRA MALLA. By I'nkei (13th cent ury). Fn,. 12.— STATL'E OF ASANGA (12th century, artist unknown).

Fig. 13 —STATUES OF BUDDHA AMI'TABHA AND TWO BODHISATTVAS (7th century).

15 XV. 180.

Plate VI.

JAPAN

METAL WORK AND LACQUER

||WjMpy^^ fc " t ^fa, .

ppSSrskjw/ ■

jwS

^2#si

^{I&nPsKl

^\,

JnBrj&l

■815

^MO§SL

R^a^K 1

JM,-Jn^

flpMti

ttiiv^lffnb AVM

^Dp //?&$£&

1

Bi«flB%v_.#lf J^^^k*

^K5k ! 5Es9$

^^Km ■ H . ^ W. / —

iBfiyR'^^B^p

■n '■h"-^iR *k

Bill

^KS > BB^KH

^■bfVw^SyjIfl

tftv&^fcM

W-5 61

N-j

^

qm q

« a

I I.

*to *0*

K

, .,. ^ . ^ .. . v ._ .,„ . < i: - .'$: Vs; “ > ■^►”” -#*

decoration for interiors, tradition tells us scarcely anything about the masters who carved such magnificent works as those seen in the Kioto temples, the Tokugawa mausolea, and some of the old castles. There are, however, no modern developments of such work to be noted. The ability of former times exists and is exercised in the old way, though the field for its employment has been greatly narrowed.

When Japanese sculpture in wood or ivory is spoken of, the first idea that presents itself is connected with the aetsuke, which, of all the art objects found in Japan, is perhaps the most Netsuke essentially Japanese. If Japan had given us nothing Carvers. but the netsuke, we should still have no difficulty in differentiating the bright versatility of her national genius from the comparatively sombre, mechanic and unimaginative temperament of the Chinese. But the netsuke may now be said to bo a thing of the past. The into (medicine-box), which it mainly served to fix in the girdle, has been driven out of fashion by the new civilization imported from the West, and artists who would have carved netsuke in former times now devote their chisels to statuettes and alcove ornaments. It is not to be inferred, however, though it is a favourite assertion of collectors, that no good netsuke have been made in modern times. That theory is based upon the fact that after the opening of the country to foreign intercourse in 1857, hundreds of inferior specimens of netsuke were chiselled by inexpert hands, purchased wholesale by treaty-port merchants, and sent to New York, London and Paris, where, though they brought profit to the exporter, they also disgusted

the connoisseur and soon earned discredit for their whole class. But in fact the glyptic artists of Tokyo, Osaka and Kioto, though they now devote their chisels chiefly to works of more importance than the netsuke, are in no sense inferior to their predecessors of feudal days, and many beautiful netsuke bearing their signatures are in existence. As for the modern ivory statuette or alcove ornament, of which great numbers are now carved for the foreign market, it certainly stands on a plane much higher than the netsuke, since anatomical defects which escape notice in the latter owing to its diminutive size, become obtrusive in the former.

Ont of the most remarkable developments of figure sculpture in modern Japan was due to Matsumoto Kisaburo (1830-1869). He carved human figures with as much accuracy as though „ ,. /fc they were destined for purposes of surgical demonstra- Kealtatic t ; on Considering that this man had neither art educa- P arture – tion nor anatomical instruction, and that he never enjoyed an opportunity of studying from a model in a studio, his achievements were remarkable. He and the craftsmen of the school he established completely refute the theory that the anatomi- cal solecisms commonly seen in the works of Japanese sculptors are due to faulty observation. Without scientific training of any kind Matsumoto and his followers produced works in which the eye of science cannot detect any error. But it is impossible to admit within the circle of high-art productions these wooden figures of everyday men and women, unrelieved by any subjective element, and owing their merit entirely to the fidelity with which their con- tours are shaped, their muscles modelled, and their anatomical proportions preserved. They have not even the attraction of being cleanly sculptured in wood, but are covered with thinly lacquered muslin, which, though doubtless a good preservative, accentuates their puppet-like character. Nevertheless, Matsumoto's figures marked an epoch in Japanese wood sculpture. Their vivid realism appealed strongly to the taste of the average foreigner. A consider- able school of carvers soon began to work in the Matsumoto style, and hundreds of their productions have gone to Europe and America, finding no market in Japan.

Midway between the Matsumoto school and the pure style approved by the native taste in former times stand a number of wood-carvers headed by Takamura Koun, who The Semi- occu pi es ; n ˆjje field of sculpture much the same place ˆ7? as that held by Hashimoto Gaho in the realm of 00 ' painting. Koun carves figures in the round which not only display great power of chisel and breadth of style, but also tell a story not necessarily drawn from the motives of the classical school. This departure from established canons must be traced to the influence of the short-lived academy of Italian art established by the Japanese government early in the Meiji era. In the fore- front of the new movement are to be found men like Yoneharu Unkai and Shinkai Taketaro; the former chiselled a figure of*

Jenner for the Medical Association of Japan when they celebrated the centenary of the great physician, and the latter has carved life-size effigies of two Imperial princes who lost their lives in the war with China (1894-95). The artists of the Koun school, however, do much work which appeals to emotions in general rather than to individual memories. Thus Arakawa Reiun, one of Koun's most brilliant pupils, has exhibited a figure of a swordsman in the act of driving home a furious thrust. The weapon is not shown. Reiun sculptured simply a man poised on the toes of one foot, the other foot raised, the arm extended, and the body straining forward in strong yet elastic muscular effort. A more imaginative work by the same

artist is a figure of a farmer who has just shot an eagle that swooped upon his grandson. The old man holds his bow still raised. Some of the eagle's feathers, blown to his side, suggest the death of the bird; at his feet lies the corpse of the little boy, and the horror, grief and anger that such a tragedy would inspire are depicted with striking realism in the farmer's face. Such work has very close affinities with Occidental conceptions. The chief distinguishing feature is that the glyptic character is preserved at the expense of surface finish. The undisguised touches of the chisel tell a story of technical force and directness which could not be suggested by perfectly smooth surfaces. To subordinate process to result is the European canon; to show the former without marring the latter is the Japanese ideal. Many of Koun's sculptures appear unfinished to eyes trained in Occidental galleries, whereas the Japanese connoisseur detects evidence of a technical feat in their seeming roughness.

Architecture. — From the evidence of ancient records it appears that before the 5th century the Japanese resided in houses of a very rude character. The sovereign's palace itself was merely a wooden hut. Its pillars were thrust D we iuags, into the ground and the whole framework — con- sisting of posts, beams, rafters, door-posts and window-frames — was tied together with cords made by twisting the long fibrous stems of climbing plants. The roof was thatched, and perhaps had a gable at each end with a hole to allow the smoke of the wood fire to escape. Wooden doors swung on a kind of hook; the windows were mere holes in the walls. Rugs of skins or rush matting were used for sitting on, and the whole ' was surrounded with a palisade. In the middle of the 5th century two-storeyed houses seem to have been built, but the evidence on the subject is slender. In the 8th century, however, when the court was moved to Nara, the influence of Chinese civilization made itself felt. Architects, turners, tile- makers, decorative artists and sculptors, coming from China and from Korea, erected grand temples for the worship of Buddha enshrining images of much beauty and adorned with paintings and carvings of considerable merit. The plan of the city itself was taken from that of the Chinese metropolis. A broad central avenue led straight to the palace, and on either

side of it ran four parallel streets, crossed at right angles by smaller thoroughfares. During this century the first sumptuary edict ordered that the dwellings of all high officials and opulent civilians should have tiled roofs and be coloured red, the latter injunction being evi- dently intended to stop the use of logs carrying their bark. Tiles thenceforth became the orthodox covering for a roof, but vermilion, being regarded as a religious colour, found no favour in private dwellings. In the 9th century, after the capital had been established at Kioto, the palace of the sovereigns and the mansions of ministers and nobles were built on a scale of unpre- cedented grandeur. It is true that all the structures of the time had the defect of a box-like appearance. Massive, towering roofs, which impart an air of stateliness even to a wooden build- ing and yet, by their graceful curves, avoid any suggestion of ponderosity, were still confined to Buddhist edifices. The architect of private dwellings attached more importance to satin-surfaced boards and careful joinery than to any appearance of strength or solidity.

Except for the number of buildings composing it, the palace had little to distinguish it from a nobleman's mansion. The latter consisted of a principal hall, where the master of the house lived, ate and slept, and of three suites of chambers, disposed on the north, the east and the west of the principal hall. In the northern suite the lady of the house dwelt, the eastern and western suites being allotted to other members of the family. Corridors joined the prin- cipal hall to the subordinate edifices, for as yet the idea had not been conceived of having more than one chamber under the same roof. The principal hall was usually 42 ft. square. Its centre was occupied by a " parent chamber," 30 ft. square, around which ran an ambulatory and a veranda, each 6 ft. wide. The parent chamber and the ambulatory were ceiled, sometimes with interlacing strips of bark or broad laths, so as to produce a plaited effect; sometimes with plain boards. The veranda had no ceiling. Sliding doors, a characteristic feature of modern Japanese houses, had not yet come into use, and no means were provided for closing the veranda, but the ambulatory was surrounded by a wall of latticed timber or plain boards, the lower half of which could be removed altogether, whereas the upper half, suspended from hooks, could be swung upward and outward. Privacy was obtained by blinds of

split bamboo, and the parent chamber was separated from the ambulatory by similar bamboo blinds with silk cords for raising or lowering them, or by

curtains. The thick rectangular mats of uniform size which, fitting together so as to present a level unbroken surface, cover the floor of all modern Japanese houses, were not yet in use: floors were boarded, having only a limited space matted. This form of mansion underwent little modification until the I2th century, when the introduction of the Zen sect of Buddhism with its contemplative practice called for greater privacy. Interiors were then divided into smaller rooms by means of sliding doors covered with thin rice-paper, which permitted the passage of light while obstructing vision; the hanging lattices were replaced by wooden doors which could be slid along a groove so as to be removable in the daytime, and an alcove was added in the principal chamber for a sacred picture or Buddhist image to serve as an object of contemplation for a devotee while practising the rite of abstraction. Thus the main features of the Japanese dwelling-house were evolved, and little change took place subsequently, except that the brush of the painter was freely used for decorating partitions, and in aristocratic mansions unlimited care was exercised in the choice of rare woods.

The Buddhist temple underwent little change at Japanese hands except in the matter of decoration. Such as it was in Buddhist outline when first erected in accordance with Chinese Tempk models, such it virtually remained, though in later Architecture. tj mes a jj t jj e resources of the sculptor and the painter were employed to beautify it externally and internally.

" The building, sometimes of huge dimensions, is invariably sur- rounded by a raised gallery, reached by a flight of steps in the centre of the approach front, the balustrade of which is a continuation of the gallery railing. This gallery is sometimes supported upon a deep system of bracketing, corbelled out from the feet of the main pillars. Within this raised gallery, which is sheltered by the over- sailing eaves, there is, in the larger temples, a columned loggia passing round the two sides and the front of the building, or, in some cases, placed on the facade only. The ceilings of the loggias are generally sloping, with richly carved roof-timbers showing below at intervals ; and quaintly carved braces connect the outer pillars with the main posts of the building. Some temples are to be seen in which the ceiling of the loggia is boarded flat and decorated with large paintings of dragons in black and gold. The intercolumniation is regulated by a standard of about six or seven feet, and the general result of the treatment of columns, wall-posts, &c, is that the whole mural space, not filled in with doors or windows, is divided into regular oblong panels, which sometimes receive plaster, sometimes boarding and sometimes rich framework and carving or painted panels, Diagonal bracing or strutting is nowhere to be found, and in many cases mortises and other joints are such as very materially to weaken the timbers at their points of connexion. It would seem that only the immense weight of the roofs and their heavy projec-

tions prevent a collapse of some of these structures in high winds. The principal facade of the temple is filled in one, two or three com- partments with hinged doors, variously ornamented and folding outwards, sometimes in double folds. From these doorways, gener- ally left open, the interior light is principally obtained, windows, as the term is generally understood, being rare. An elaborate cornice of wooden bracketing crowns the walls, forming one of the principal ornaments of the building. The whole disposition of pillars, posts, brackets and rafters is harmonically arranged according to some measure of the standard of length. A very important feature of the fagade is the portico or porch-way, which covers the principal steps and is generally formed by producing the central portion of the main roof over the steps and supporting such projection upon isolated wooden pillars braced together near the top with horizontal ties, carved, moulded and otherwise fantastically decorated. Above these ties are the cornice brackets and beams, corresponding in general design to the cornice of the walls, and the intermediate space is filled with open carvings of dragons or other characteristic designs. The forms of roof are various, but mostly they commence in a steep slope at the top, gradually flattening towards the eaves so as to produce a slightly concave appearance, this concavity being ren- dered more emphatic by the tilt which is given to the eaves at the four corners. The appearance of the ends of the roof is half hip, haff gable. Heavy ribs of tile-cresting with large terminals are carried along the ridge and the slope of the gable. The result of the whole is very picturesque, and has the advantage of looking equally satisfactory from any point of view. The interior arrange- ment of wall columns, horizontal beams and cornice bracketing corresponds with that on the outside. The ceiling is invariably boarded and subdivided by ribs into small rectangular coffers. Sometimes painting is introduced into these panels and lacquer and metal clasps are added to the ribs. When the temple is of very large dimensions an interior peristyle of pillars is introduced to assist in supporting the roof, and in such cases each pillar carries profuse bracketing corresponding to that of the cornice. The construction of the framework of the Japanese roof is such that the weights all act vertically; there is no thrust on the outer walls,

and every available point of the interior is used as a means of support.

" The floor is partly boarded and partly matted. The shrines, altars and oblatory tables are placed at the back in the centre, and there are often other secondary shrines at the sides. In temples of the best class the floor of the gallery and of the central portion of the main building from entrance to altar are richly lacquered; in those of inferior class they are merely polished by continued rubbing." — (J. Conder, in the Proceedings of the Royal Institute of British Architects.)

*None of the magnificence of the Buddhist temple belongs to the Shinto shrine. In the case of the latter conservatism has been absolute from time immemorial. The shrines Shinto of Ise, which may be called the Mecca of Shinto Architec- devotees, are believed to present to-day precisely the ””**• appearance they presented in 478, when they were moved thither in obedience to a revelation from the Sun-goddess. It has been the custom to rebuild them every twentieth year, alternately on each of two sites set apart for the purpose, the features of the old edifice being reproduced in the new with scrupulous accuracy.*

They are enlarged replicas of the primeval wooden hut described above, having rafters with their upper ends crossed; thatched or shingled roof ; boarded floors, and logs laid on the roof-ridge at right angles for the purpose of binding the ridge and the rafters firmly together. A thatched roof is imperative in the orthodox shrine, but in modern days tiles or sheets of copper are sometimes substi- tuted. At Ise, however, no such novelties are tolerated. The avenue of approach generally passes under a structure called torii. Originally designed as a perch for fowls which sang to the deities at daybreak, this torii subsequently came to be erroneously regarded as a gateway characteristic of the Shinto shrine. It consists of two thick trunks placed upright, their upper ends mortised into a hori- zontal log which projects beyond them at either side. The structure derives some grace from its extreme simplicity.

Textile Fabrics and Embroidery. — In no branch of applied art does the decorative genius of Japan show more attractive results than in that of textile fabrics, and in none has there been more conspicuous progress during recent years. Her woven and em- broidered stuffs have always been beautiful ; but in former times few pieces of size and splendour were produced, if we except the curtains used for draping festival cars and the hangings of temples. Tapestry, as it is employed in Europe, was not thought of, nor indeed could the small hand-looms of the period be easily adapted to such work. All that has been changed, however. Arras of large dimensions, showing remarkable workmanship and grand combinations of colours, is now manu- factured in Kioto, the product of years of patient toil on the part of weaver and designer alike. Kawashima of Kioto has acquired high reputation for work of this kind. He inaugurated the new departure a few years ago by copying a Gobelin, but it may safely be asserted that no Gobelin will bear comparison with the pieces now produced in Japan.

The most approved fashion of weaving is called tsuzure-ori (linked-weaving) ; that is to say, the cross threads; are laid in with the fingers and pushed into their places with a comb by hand, very little machinery being used. The threads extend only to the outlines of each figure, and it follows that every part of the pattern has a rim of minute holes like pierced lines

separating postage stamps in a sheet, the effect being that the design seems to hang suspended in the ground — linked into it, as the Japanese term implies. 1 A specimen of this nature recently manufactured by Kawashima's weavers measured 20 ft. by 13, and represented the annual festival at the Nikko mausolea. The chief shrine was shown, as were also the gate and the long flight of stone steps leading up to it, several other buildings, the groves of cryptomeria that surround the mausolea, and the festival procession. All the architectural and decorative details, all the carvings and colours, all the accessories — everything was wrought in silk, and each of the 1 500 figures forming the procession wore exactly appropriate costume. Even this wealth of detail, remarkable as it was, seemed less surprising than the fact that the weaver had succeeded in producing the effect of atmosphere and aerial perspective. Through the graceful cryptomerias distant mountains and the still more distant sky could be seen, and between the buildings in the foreground and those in the middle distance atmosphere appeared to be perceptible. Two years of incessant labour with relays of artisans working steadily throughout the twenty-four hours were required to finish this piece. Naturally

1 This method is some 300 years old. It is by no means a modern invention, as some writers have asserted.

such specimens are not produced in large numbers. Next in decora- tive importance to tsuzure-ori stands yiizen birodo, commonly known among English-speaking people as cut velvet. Dyeing by the yiizen process is an innovation of modern times. The design is painted on the fabric, after which the latter is steamed, and the picture is ultimately fixed by methods which are kept secret. The soft silk known as habutaye is a favourite ground for such work, but silk crape also is largely employed. No other method permits the decorator to achieve such fidelity and such boldness of draughtsman- ship. The difference between the results of the ordinary and the yuzen processes of dyeing is, in fact, the difference between a sten- cilled sketch and a finished picture. In the case of cut velvet, the yuzen process is supplemented as follows: The cutter, who works at an ordinary wooden bench, has no tool except a small sharp chisel with a V-shaped point. This chisel is passed into an iron pencil having at the end guards, between which the point of the chisel projects, so that it is impossible for the user to cut beyond a certain depth. When the velvet comes to him, it already carries a coloured picture permanently fixed by the yuzen process,

but the wires have not been withdrawn. It is, in fact, velvet that has passed through all the usual stages of manufacture except the cutting of the thread along each wire and the withdrawal of the wires. The cutting artist lays the piece of unfinished velvet on his bench, and proceeds to carve into the pattern with his chisel, just as though he were shading the lines of the design with a steel pencil. When the pattern is lightly traced, he uses his knife delicately ; when the lines are strong and the shadows heavy, he makes the point pierce deeply. In short, the little chisel becomes in his fingers a painter's brush, and when it is remembered that, the basis upon which he works being simply a thread of silk, his hand must be trained to such delicacy of muscular effort as to be capable of arresting the edge of the knife at varying depths within the diameter of the tiny filament, the difficulty of the achievement will be understood. Of course it is to be noted that the edge of the cutting tool is never allowed to trespass upon a line which the exigencies of the design require to be solid. The veining of a cherry petal, for example, the tessellation of a carp's scales, the serration of a leaf's edge — all these lines remain intact, spared by the cutter's tool, while the leaf itself, or the petal, or the scales of the fish, have the threads forming them cut so as to show the velvet nap and to appear in soft, low relief. In one variety of this fabric, a slip of gold foil is laid under each wire, and left in position after the wire is withdrawn, the cutting tool being then used with freedom in some parts of the design, so that the gold gleams through the severed thread, producing a rich and suggestive effect. Velvet, however, is not capable of being made the basis for pictures so elaborate and microscopically accurate as those produced by the yuzen process on silk crape or habutaye. The rich-toned, soft plumage of birds or the magnificent blending of colours in a bunch of peonies or chrysanthemums cannot be obtained with absolute fidelity on the ribbed surface of velvet.

The embroiderer's craft has been followed for centuries in Japan with eminent success, but whereas it formerly ranked with dyeing and weaving, it has now come to be regarded as an art. Formerly the embroiderer was content to produce a pattern with his needle, now he paints a picture. So perfectly does the modern Japanese embroiderer elaborate his scheme of values that all the essential elements of pictorial effects — chiaroscuro, aerial perspective and atmosphere are present in his work. Thus a graceful and realistic school has replaced the comparatively stiff and conventional style of former times.

Further, an improvement of a technical character was recently made, which has the effect of adding greatly to the durability of these embroideries. Owing to the use of paper among the threads of the embroidery and sizing in the preparation of the stuff forming the ground, every operation of folding used to cause perceptible injury to a piece, so that after a few years it acquired a crumpled and dingy appearance. But by

the new method embroiderers now succeed in producing fabrics which defy all destructive influences — except, of course, dirt and decay.

Ceramics. — All research proves that up to the 1 2th century of the Christian era the ceramic ware produced in Japan was of a very rude character. The interest attaching to it is historical rather than technical. Pottery was certainly manufactured from an early date, and there is evidence that kilns existed in some fifteen provinces in the 10th century. But although the use of the potter's wheel had long been understood, the objects produced were simple utensils to contain offerings of rice, fruit and fish at the austere ceremonials of the Shinto faith, jars for storing seeds, and vessels for common domestic use. In the 13th century, however, the introduction of tea from China, together with vessels for infusing and serving it, revealed to the Japanese a new conception of ceramic possibilities,

Embroidery.

Early Period.

for the potters of the Middle Kingdom had then (Sung dynasty) fully entered the road which was destined to carry them ulti- mately to a high pinnacle of their craft. It had long been cus- tomary in Japan to send students to China for the purpose of studying philosophy and religion, and she now (1223) sent a potter, Kato Shirozaemon, who, on his return, opened a kiln at Seto in the province of Owari, and began to produce little jars for preserving tea and cups for drinking it. These were conspicuously superior to anything previously manufac- tured. Kato is regarded as the father of Japanese ceramics. But the ware produced by him and his successors at the Seto kilns, or by their contemporaries in other parts of the country, had no valid claim to decorative excellence. Nearly three centuries elapsed before a radically upward movement took place, and on this occasion also the inspiration came from China. In 1520 a potter named Gorodayu Goshonzui (known to posterity as Shonzui) made his way to Fuchow and thence to King-te-chen, where, after five years' study, he acquired the art of manufacturing porcelain, as distinguished from pottery, together with the art of applying decoration in blue under the glaze. He established his kiln at Arita in Hizen, and the event marked the opening of the second epoch of Japanese ceramics. Yet the new departure then made did not lead far. The exis- tence of porcelain clay in Hizen was not discovered for many years, and Shonzui's pieces being made entirely with kaolin imported from China, their manufacture ceased after his death, though knowledge of the processes learned by him survived and was used in the production of greatly inferior wares. The third clearly differentiated epoch was inaugurated by the discovery of true kaolin at Izumi-yama in

Hizen, the discoverer being one of the Korean potters who came to Japan in the train of Hide- yoshi's generals returning from the invasion of Korea, and the date of the discovery being about 1605. Thus much premised, it becomes possible to speak in detail of the various wares for which Japan became famous.

The principal kinds of ware are Hizen, Kioto, Satsuma, Kutani, Owari, Bizen, Takatori, Banko, Izumo and Yatsushiro.

There are three chief varieties of Hizen ware, namely, (1) the enamelled porcelain of Arita — the " old Japan " of European collec- tors; (2) the enamelled porcelain of Nabeshima; and Hizen (3) the blue and white, or plain white, porcelain of Hirado. The earliest manufacture of porcelain — as distinguished from pottery — began in the opening years of the 16th century, but its materials were exotic. Genuine Japanese porcelain dates from about a century later. The decoration was confined to blue under the glaze, and as an object of art the ware possessed no special merit. Not until the year 1620 do we find any evidence of the style for which Arita porcelain afterwards became famous, namely, decora- tion with vitrifiable enamels. The first efforts in this direction were comparatively crude; but before the middle of the 17th century, two experts — Goroshichi and Kakiemon — carried the art to a point of considerable excellence. From that time forward the Arita factories turned out large quantities of porcelain profusely decorated with blue under the glaze and coloured enamels over it. Many pieces were exported by the Dutch, and some also were specially manufactured to their order. Specimens of the latter are still preserved in European collections, where they are classed as genuine examples of Japanese ceramic art, though beyond question their style of decoration was greatly influenced by Dutch interference. The porcelains of Arita were carried to the neighbouring town of I man for sale and shipment. Hence the ware came to be known to Japanese and foreigners alike as Imari-yaki (yaki = anything baked ; hence ware).

The Nabeshima porcelain — so called because of its production at private factories under the special patronage of Nabeshima Naoshige, feudal chief of Hizen — was produced at Okawachiyama. It differed from Imari-yaki in the milky whiteness and Nabeshima. softness of its glaze, the comparative sparseness of its enamelled decoration, and the relegation of blue sous couverte to an entirely secondary place. This is undoubtedly the finest jewelled porcelain in Japan; the best examples leave nothing to be desired. The factory's period of excellence began about the year 1680, and culminated at the close of the 18th century.

The Hirado porcelain — so called because it enjoyed the special patronage of Matsuura, feudal chief of Hirado — was produced at Mikawa-uchi-

yama, but did not attain excellence until . Hi ra a the middle of the 1 8th century, from which time until about 1830 specimens of rare beauty were produced. They were decorated with blue under the glaze, but some were pure white with exquisitely chiselled designs incised or in relief. The production

was always scanty, and, owing to official prohibitions, the ware did not find its way into the general market.

The history of Kioto ware — which, being for the most part faience, belongs to an entirely different category from the Hizen porcelains „.-. spoken of above — is the history of individual ceramists

”’ rather than of special manufactures. Speaking broadly,

however, four different varieties are usually distinguished. They are raku-yaki, awata-yaki, iwakura-yaki and kiyomizu-yaki.

Raku-yaki is essentially the domestic faience of Japan; for, being entirely hand-made and fired at a very low temperature, Raku ‘ s manu f a cture offers few difficulties, and has conse-*

quently been carried on by amateurs in their own homes at various places throughout the country. The raku-yaki of Kioto is the parent of all the rest. It was first produced by a Korean who emigrated to Japan in the early part of the 16th cen- tury. But the term raku-yaki did not come into use until the close of the century, when Chojiro (artistic name, Choryu) received from Hideyoshi (the Taiko) a seal bearing the ideograph raku, with which he thenceforth stamped his productions. Thirteen generations of the same family carried on the work, each using a stamp with the same ideograph, its calligraphy, however, differing sufficiently to be identi- fied by connoisseurs. The faience is thick and clumsy, having soft, brittle and very light pdte. The staple type has black glaze showing little lustre, and in choice varieties this is curiously speckled and pitted with red. Salmon-coloured, red, yellow and white glazes are also found, and in late specimens gilding was added. The raku faience owed much of its popularity to the patronage of the tea clubs. ‘The nature of its paste and glaze adapted it for the infusion of powdered tea, and its homely character suited the austere canons of the tea ceremonies.

Awata-yaki is the best known among the ceramic productions of Kioto. There is evidence to show that the art of decoration with enamels over the glaze reached Kioto from Hizen in Awata. the mjddig f tne I7t h cen tury. Just at that time there flourished in the Western capital a potter of remarkable ability, called Nomura Seisuke. He immediately utilized the new method, and produced many beautiful examples of jewelled faience, having close, hard pdte, yellowish-white, or brownish-white, glaze covered with a network of fine crackle, and sparse decoration in pure full- bodied colours — red, green, gold and silver. He worked chiefly at Awata, and thus brought that factory into prominence. Nomura Seisuke, or Ninsei as he is commonly called, was one of Japan's greatest ceramists. Genuine examples of his faience have always been highly prized, and numerous imitations were subsequently produced, all stamped with the ideograph Ninsei. After Ninsei's time, the most renowned ceramists of the Awata factories were Kenzan (1688-1740); Ebisei, a contemporary of Kenzan; Dohachi (1751-1763), who subsequently moved to Kiyomizu-zaka, another part of Kioto, the faience of which constitutes the Kiyomizu-yaki mentioned above; Kinkozan (1745-1760); Hozan (1690-71721); Taizan , (1760-1800); Bizan (1810-1838); and Tanzan, who was still living in 1909. It must be noted that several of these names, as Kenzan, Dohachi, Kinkozan, Hozan and Taizan, were not limited to one artist. They are family names, and though the dates we have given indicate the eras of the most noted ceramists in each family, amateurs must not draw any chronological conclusion from the mere fact that a specimen bears such and such a name.

The origin of the Iwakura-yaki is somewhat obscure, and its Iwakura history, at an early date, becomes confused with that of the Awata yaki, from which, indeed, it does not materi- ally differ.

In the term Kiyomizu-yaki may be included roughly all the faience of Kioto, with the exception of the three varieties described above. Kiyomizu ˆhe distinction between Kiyomizu, Awata and Iwa- ' kura is primarily local. They are parts of the same city, and if their names have been used to designate particular classes of pottery, it is not because the technical or decorative features of each class distinguish it from the other two, but chiefly for the purpose of identifying the place of production. On the slopes called Kiyomizu-zaka and Gojo-zaka lived a number of ceramists, all following virtually the same models with variations due to individual genius. The principal Kiyomizu artists were: Ebisei, who moved from Awata to Gojo-zaka in 1688; Eisen and Rokubei, pupils of Ebisei; Mokubei, a pupil of Eisen, but more celebrated than his master; Shuhei (1790-1810), Kentei (1782- 1820), and Zengoro Hozen, generally known as Eiraku (1790-1850). Eisen was the first to manufacture porcelain (as distinguished from faience) in Kioto, and this branch of the art was carried

to a high standard of excellence by Eiraku, whose speciality was a rich coral- red glaze with finely executed decoration in gold. The latter ceramist excelled also in the production of purple, green and yellow glazes, which he combined with admirable skill and taste. Some choice ware of the latter type was manufactured by him in KishQ, by order of the feudal chief of that province. It is known as Kaira- ku-yen-yaki (ware of the Kairaku park).

No phrase is commoner in the mouths of Western collectors than

"Old Satsuma"; no ware is rarer in Western collections. Nine

Sat ma hundred and ninety-nine pieces out of every thousand

8U ' that do duty as genuine examples of this prince of

faiences are simply examples of the skill of modern forgers. In

point of fact, the production of faience decorated with gold and coloured enamels may be said to have commenced at the beginning of the 19th century in Satsuma. Some writers maintain that it did actually commence then, and that nothing of the kind had existed there previously. Setting aside, however, the strong improb- ability that a style of decoration so widely practised and so highly esteemed could have remained unknown during a century and a half to experts working for one of the most puissant chieftains in Japan, we have the evidence of trustworthy traditions and written records that enamelled faience was made by the potters at Tatsumonji — the principal factory of Satsuma-ware in early days — as far back as the year 1676. Mitsuhisa, then feudal lord of Satsuma, was a munificent patron of art. He summoned to his fief the painter Tangen — a pupil of the renowned Tanyu, who died in 1674 — and employed him to paint faience or to furnish designs for the ceramists of Tatsumonji. The ware produced under these circumstances is still known by the name of Satsuma Tangen. But the number of specimens was small. Destined chiefly for private use or for pre- sents, their decoration was delicate rather than rich, the colour chiefly employed being brown, or reddish brown, under the glaze, and the decoration over the glaze being sparse and chaste. Not until the close of the 18th century or the beginning of the 19th did the more profuse fashion of enamelled decoration come to be largely employed. It was introduced by two potters who had visited Kioto, and there observed the ornate methods so well illustrated in the wares of Awata and Kiyomizu. At the same time a strong impetus was given to the production of faience at Tadeno — then the chief factory in Satsuma — owing to the patronage of Shimazu Tamanobu, lord of the province. To this increase in production and to the more elaborate application of verifiable enamels may be

attributed the erroneous idea that Satsuma faience decorated with gold and coloured enamels had its origin at the close of the 18th century. For all the purposes of the ordinary collector it may be said to have commenced then, and to have come to an end about i860; but for the purposes of the historian we must look farther back. The ceramic art in Satsuma owed much to the aid of a number of Korean experts who settled there after the return of the Japanese forces from Korea. One of these men, Boku Heii, discovered (1603) clay fitted for the manufacture of white craquele faience. This was the subsequently celebrated Satsuma-yaki. But in Boku's time, and indeed as long as the factories flourished, many other kinds of faience were produced, the principal having rich black or flambe' glazes, while a few were green or yellow monochromes. One curious variety, called same-yaki, had glaze chagrined like the skin of a shark. Most of the finest pieces of enamelled faience were the work of artists at the Tadeno factory, while the best speci- mens of other kinds were by the artists of Tatsumonji.

The porcelain of Kutani is among those best known to Western collectors, though good specimens of the old ware have always been scarce. Its manufacture dates from the close of the 17th „ . . century, when the feudal chief of Kaga took the industry '

under his patronage. There were two principal varieties of the ware : ao-Kutam, so called because of a green (ao) enamel of great brilliancy and beauty which was largely used in its decoration, and Kutani with painted and enamelled pdte varying from hard porcelain to pottery. Many of the pieces are distinguished by a peculiar creamy whiteness of glaze, suggesting the idea that they were intended to imitate the soft-paste wares of China. The enamels are used to delineate decorative subjects and are applied in masses, the principal colours being green, yellow and soft Prussian blue, all brilliant and transparent, with the exception of the last which is nearly opaque. In many cases we find large portions of the surface completely covered with green or yellow enamel overlying black diapers or scroll patterns. The second variety of Kutani ware may often be mistaken for " old Japan " (i.e. Imari porcelain). The most charac- teristic examples of it are distinguishable, however, by the prepon- derating presence of a peculiar russet red, differing essentially from the full-bodied and comparatively brilliant colour of the Arita pottery. Moreover, the workmen of Kaga did not follow the Arita precedent of massing blue under the glaze. In the great majority of cases they did not use blue at all in this position, and when they did, its place was essentially subordinate. They also employed silver freely for decorative purposes, whereas we rarely find it thus used on " old Japan " porcelain.

About the time (1843) of the ao-Kutani revival, a potter called Iida Hachiroemon introduced a style of decoration which subse- quently came

to be regarded as typical of all Kaga procelains. Taking the Eiraku porcelains of Kioto as models, Hachiroemon employed red grounds with designs traced on them in gold. The style was not absolutely new in Kaga. We find similar decoration on old and choice examples of Kutani-yaki. But the character of the old red differs essentially from that of the modern manufacture — the former being a soft, subdued colour, more like a bloom than an enamel; the latter a glossy and comparatively crude pigment. In Hachiroemon's time and during the twenty years following the date of his innovation, many beautiful examples of elaborately decorated Kutani porcelain were produced. The richness, profusion and microscopic accuracy of their decoration could scarcely have been surpassed ; but, with very rare exceptions, their lack of delicacy of technique disqualifies them to rank as fine porcelains.

JAPAN

LACQUER

Plate VII.

Plate VIII.

JAPAN POTTERY AND PORCELAIN

CERAMICS]

JAPAN

185

It was at the little village of Seto, some five miles from Nagoya, the chief town of the province of Owari, or Bishu, that the celebrated Kato Shirozaemon made the first Japanese faience Owari. worthy to be considered a technical success. Shiro- zaemon produced dainty little tea-jars, ewers and other cha-no- yu utensils. These, being no longer stoved in an inverted posi- tion, as had been the habit before Shirozaemon's time, were not disfigured by the bare, blistered lips of their predecessors. Their pdte was close and well-manufactured pottery, varying in colour from dark brown to russet, and covered with thick, lustrous glazes — black, amber-brown, chocolate and yellowish grey. These glazes were not monochromatic: they showed differences of tint, and sometimes marked varieties of colour; as when chocolate-brown passed into amber, or black was relieved by streaks and clouds of grey and dead-leaf red. This ware came to be known as Toshirn- yaki, a term obtained by combining the second syllable of Kato with the two first of Shirozaemon. A genuine example of it is at present worth many times its weight in gold to Japanese

dilettanti, though in foreign eyes it is little more than interesting. Shirozaemon was succeeded at the kiln by three generations of his family, each representative retaining the name of Toshiro, and each distinguish- ing himself by the excellence of his work. Thenceforth Seto became the headquarters of the manufacture of cha-no-yu utensils, and many of the tiny pieces turned out there deserve high admiration, their technique being perfect, and their mahogany, russet-brown, amber and buff glazes showing wonderful lustre and richness. Seto, in fact, acquired such a widespread reputation for its ceramic pro- ductions that the term seto-mono (Seto article) came to be used generally for all pottery and porcelain, just as " China " is in the West. Seto has now ceased to be a pottery-producing centre, and has become the chief porcelain manufactory of Japan. The porce- lain industry was inaugurated in 1807 by Tamikichi, a local cera- mist, who had visited Hizen and spent three years there studying the necessary processes. Owari abounds in porcelain stone; but it does not occur in constant or particularly simple forms, and as the potters have not yet learned to treat their materials scientifically, their work is often marred by unforeseen difficulties. For many years after Tamikichi's processes had begun to be practised, the only decoration employed was blue under the glaze. Sometimes Chinese cobalt was used, sometimes Japanese, and sometimes a mixture of both. To Kawamoto Hansuke, who flourished about 1 830- 1 845, belongs the credit of having turned out the richest and most attractive ware of this class. But, speaking generally, Japanese blues do not rank on the same decorative level with those of China. At Arita, although pieces were occasionally turned out of which the colour could not be surpassed in purity and brilliancy, the general character of the blue sous couverte v/as either thin or dull. At Hirado the ceramists affected alighter and more delicate tone than that of the Chinese, and, in order to obtain it, subjected the choice pigment of the Middle Kingdom to refining processes of great severity. The Hirado blue, therefore, belongs to a special aesthetic category. But at Owari the experts were content with an inferior colour, and their blue-and-white porcelains never enjoyed a distinguished reputation, though occasionally we find a specimen of great merit. Decoration with vitrifiable enamels over the glaze, though it began to be practised at Owari about the year 1840, never became a speciality of the place. Nowadays, indeed, numerous examples of porcelains decorated in this manner are classed among Owari products. But they receive their decoration, almost without exception, in Tokyo or Yokohama, where a large number of artists, called e-tsuke-shi, devote themselves entirely to porcelain-painting. These men seldom use vitrifiable enamels, pigments being much more tractable and less costly. The dominant feature of the designs is pictorial. They are frankly adapted to Western taste. Indeed, of this porcelain it may be said that, from the monster pieces of blue-and-white manufactured at Seto — vases six feet high and garden pillar-lamps

half as tall again do not dismay the Bishu ceramist — to tiny coffee-cups decorated in T5kyo, with their delicate miniatures of birds, flowers, insects, fishes and so forth, everything indicates the death of the old severe aestheticism. To such a depth of debasement had the ceramic art fallen in Owari, that before the happy renaissance of the past ten years, Nagoya dis-credited itself by employing porcelain as a base for cloisonn? enamel- ling. Many products of this vitiated industry have found their way into the collections of foreigners.

Pottery was produced at several hamlets in Bizen as far back as the 14th century, but ware worthy of artistic notice did not make its appearance until the close of the 16th century, when Bizen. ˆ e -p a ;i {0 himself paid a visit to the factory at Imbe.

Thenceforth utensils for the use of the tea clubs began to be manufactured. This Bizen-yaki was red stoneware, with thin diaphanous glaze. Made of exceedingly refractory clay, it under- went stoving for more than three weeks, and was consequently remarkable for its hardness and metallic timbre. Some fifty years later, the character of the choicest Bizen-yaki underwent a marked change. It became slate-coloured or bluish-brown faience, with pdte as fine as pipe-clay, but very hard. In the ao-Bizen (blue Bizen), as well as in the red variety, figures of mythical beings and animals, birds, fishes and other natural objects, were modelled with a degree of plastic ability that can scarcely be spoken of in too high

terms. Representative specimens are truly admirable — every line, every contour faithful. The production was very limited, and good pieces soon ceased to be procurable except at long intervals and heavy expense. The Bizen-yaki familiar to Western collectors is comparatively coarse brown or reddish brown, stoneware, modelled rudely, though sometimes redeemed by touches of the genius never entirely absent from the work of the Japanese artisan-artist. Easy to be confounded with it is another ware of the same type manu- factured at Shidoro in the province of Totomi.

The Japanese potters could never vie with the Chinese in the production of glazes : the wonderful monochromes and polychromes of the Middle Kingdom had no peers anywhere. In Japan they were most closely approached by the faience ‘ˆkatorL of Takatori in the province of Chikuzen. In its early days the ceramic industry of this province owed something to the assistance of Korean experts who settled there after the expedition of 1592. But its chief development took place under the direction of Igarashi Jizaemon, an amateur ceramist, who, happening to visit Chikuzen about 1620, was taken under the protection of the chief of the fief and munificently treated. Taking the renowned yao-pien-yao, or ” transmutation ware ” of China as a model, the Takatori potters

endeavoured, by skilful mixing of colouring materials, to reproduce the wonderful effects of oxidization seen in the Chinese ware. They did not, indeed, achieve their ideal, but they did succeed in producing some exquisitely lustrous glazes of the flambe type, rich transparent brown passing into claret colour, with flecks or. streaks of white and clouds of " iron dust." The pate of this faience was of the finest description, and the technique in every respect faultless. Unfortunately, the best experts confined them- selves to working for the tea clubs, and consequently produced only insignificant pieces, as tea-jars, cups and little ewers. During the 18th century, a departure was made from these strict canons. From this period date most of the specimens best known outside Japan — cleverly modelled figures of mythological beings and animals covered with lustrous variegated glazes, the general colours being grey or buff, with tints of green, chocolate, brown and sometimes blue.

A ware of which considerable quantities have found their way westward of late years in the Awaji-yaki, so called from the island of Awaji where it is manufactured in the village of Iga. It was first produced between the years 1830 and 1840 Awa/I. by one Kaju Mimpei, a man of considerable private means who devoted himself to the ceramic art out of pure enthusiasm. His story is full of interest, but it must suffice here to note the results of his enterprise. Directing his efforts at first to reproducing the deep green and straw-yellow glazes of China, he had exhausted almost his entire resources before success came, and even then the public was slow to recognize the merits of his ware. Nevertheless he persevered, and in 1838 we find him producing not only green and yellow monochromes, but also greyish white and mirror-black glazes of high excellence. So thoroughly had he now mastered the management of glazes that he could combine yellow, green, white and claret colour in regular patches to imitate tortoise-shell. Many of his pieces have designs incised or in relief, and others are skilfully decorated withhold and silver. Awaji-yaki, or Mimpei-yaki as it is, often called, is generally porcelain, but we occasionally find speci- mens which may readily be mistaken for Awata faience.

Banko faience is a universal favourite with foreign collectors. The type generally known to them is exceedingly light ware, for the most part made of light grey, unglazed clay, and having hand-modelled decoration in relief. But there are Baako. numerous varieties. Chocolate or dove-coloured grounds with deli- cate diapers in gold and engobe • brown or black faience with white, yellow and pink designs incised or in relief; pottery curiously and deftly marbled by combinations of various coloured clays — these and many other kinds are to be found, all, however, presenting one common feature, namely, skilful finger-moulding and a slight roughening of the surface as though it had received the. impression of coarse linen or crape before baking. This modern banko-yaki is produced chiefly at Yokkaichi in

the province of Ise. It is entirely different from the original banko-ware made in Kuwana, in the same province, by Numanami Gozaemon at the close of the 18th century. Gozaemon was an imitator. He took for his models the raku faience of Kioto, the masterpieces of Ninsei and Kenzan, the rococo wares of Korea, the enamelled porcelain of China, and the blue-and- white ware of Delft. He did not found a school, simply because he had nothing new to teach, and the fact that a modern ware goes by the same name as_ his productions is simply because his seal — the inscription on which {banko, everlasting) suggested the name of the ware — subsequently (1830) fell into the hands of one Mori Yusetsu, who applied it to his own ware. Mori Yusetsu, however, had more originality than Numanami. He conceived the idea of shaping his pieces by putting the mould inside and pressing the clay with the hand into the matrix. Tiie consequence was that his wares received the design on the inner as well as the outer surface, and were moreover thumb-marked — essential characteristics of the banko-yaki now so popular.

Among a multitude of other Japanese wares, space allows us to mention only two, those of Izumo and Yatsushiro. The chief of the former is faience, having light grey, close uamo. pdte and yellow or straw-coloured glaze, with or without crackle.

to which is applied decoration in gold and green enamel. Another variety has chocolate glaze, clouded with amber and flecked with gold dust. The former faience had its origin at the close of the 17th century, the latter at the close of the 1 8th; but the Izumo- yaki now procurable is a modern production.

The Yatsushiro faience is a production of the province of Higo, where a number of Korean potters settled at the close of the y .. 17th century. It is the only Japanese ware in which the a sus ro. characteristics of a Korean original are unmistakably pre- served. Its diaphanous, pearl-grey glaze, uniform, lustrous and finely crackled, overlying encaustic decoration in white slip, the fineness of its warm reddish pdte, and the general excellence of its technique, have always commanded admiration. It is produced now in con- siderable quantities, but the modern ware falls far short of its predecessor.

Many examples of the above varieties deserve the enthusiastic admiration

they have received, yet they unquestionably belong to a lower rank of ceramic achievements than the choice produc- tions of Chinese kilns. The potters of the Middle Kingdom, from the early eras of the Ming dynasty down to the latest years of the 1 8th century, stood absolutely without rivals as makers of porcelain. Their technical ability was incomparable — though in grace of decorative conception they yielded the palm to the Japanese — and the representative specimens they bequeathed to posterity remained, until quite recently, far beyond the imita- tive capacity of European or Asiatic experts. As for faience and pottery, however,, the Chinese despised them in all forms, with one notable exception, the yi-hsing-yao, known in the Occident as boccaro. Even the yi-hsing-yao, too, owed much of its popularity to special utility. It was essentially the ware of the tea-drinker. If in the best specimens exquisite modelling, wonderful accuracy of finish and pdtes of interesting tints are found, such pieces are, none the less, stamped prominently with the character of utensils rather than with that of works of art. In short, the artistic output of Chinese kilns in their palmiest days was, not faience or pottery,, but porcelain, whether of soft or hard paste. Japan, on the contrary, owes her ceramic distinc- tion in the main to her faience. A great deal has been said by enthusiastic writers about the famille chrysanlhemo-pionienne of Imari and the genre Kakiemon of Nabeshima, but these porce- lains, beautiful as they undoubtedly are, cannot be placed on the same level with the kwan-yao and famille rose of the Chinese experts. The Imari ware, even though its thick biscuit and generally ungraceful shapes be omitted from the account, shows no enamels that can rival the exquisitely soft, broken tints of the famille rose; and the Kakiemon porcelain, for all its rich though chaste contrasts, lacks the delicate transmitted tints of the shell-like kwan-yao. So, too, the blue-and-white porcelain of Hirado, though assisted by exceptional tenderness of sous-pale colour, by milk-white glaze, by great beauty of decorative design, and often by an admirable use of the modelling or graving tool, represents a ceramic achievement palpably below the soft paste kai-pien-yao of King-te-chen. It is a curious and inter- esting fact that this last product of Chinese skill remained unknown in Japan down to very recent days. In the eyes of a Chinese connoisseur, no blue-and-white porcelain worthy of consideration exists, or ever has existed, except the kai-pien-yao, with its imponderable pdte, its wax-like surface, and its rich, glowing blue, entirely free from superficiality or garishness and broken into a thousand tints by the microscopic crackle of the glaze. The Japanese, although they obtained from their neigh- bour almost everything of value she had to give them, did not know this wonderful ware, and their ignorance is in itself sufficient to prove their ceramic inferiority. There remains, too, a wide domain in which the Chinese developed high skill, whereas the Japanese can scarcely be said to have entered it at all; namely, the domain of monochromes and polychromes, striking every note of colour

from the richest to the most delicate; the domain of truiU and flambe' glazes, of yo-pien-yao (transmutation ware), and of egg-shell with incised or translucid decoration. In all that region of achievement the Chinese potters stood alone and seemingly unapproachable. The Japanese, on the contrary, made a specialty of faience, and in that particular line they reached a high standard of excellence. No faience produced

either in China or any other Oriental country can dispute the palm with really representative specimens of Satsuma ware. Not without full reason have Western connoisseurs lavished panegyrics upon that exquisite production. The faience of the Kioto artists never reached quite to the level of the Satsuma in quality of pdte and glowing mellowness of decoration; their materials were slightly inferior. But their skill as decorators was as great as its range was wide, and they produced a multi- tude of masterpieces on which alone Japan's ceramic fame might safely be rested.

When the mediatization of the fiefs, in 1871, terminated the local patronage hitherto extended so munificently to artists, the Japanese ceramists gradually learned change of that they must thenceforth depend chiefly upon the style after markets of Europe and America. They had to theRestora- appeal, in short, to an entirely new public, and "' how to secure its approval was to them a perplexing problem. Having little to guide them, they often interpreted Western taste incorrectly, and impaired their own reputation in a corresponding degree. Thus, in the early years of the Meiji era, there was a period of complete prostitution. No new skill was developed, and what remained of the old was expended chiefly upon the manufacture of meretricious objects, disfigured by excess of decoration and not relieved by any excellence of technique. In spite of their artistic defects, these specimens were exported in considerable numbers by merchants in the foreign settlements, and their first cost being very low, they found a not unremunerative market. But as European and American collectors became better ac- quainted with the capacities of the pre-Meiji potters, the great inferiority of these new specimens was recognized, and the prices commanded by the old wares gradually appreciated. What then happened was very natural: imitations of the old wares were produced, and having been sufficiently disfigured by staining and other processes calculated to lend an air of rust and age, they were sold to ignorant persons, who laboured under the singu- lar yet common hallucination that the points to be looked for in specimens from early kilns were, not technical excellence, deco- rative tastefulness and richness of colour, but dinginess, imper- fections and dirt; persons who imagined, in short, that defects which they would condemn at once in new porcelains ought to be regarded as merits in old. Of course a trade of that kind, based on deception, could not have permanent success. One of the imitators of " old Satsuma " was among the first to perceive that a new line must be struck out. Yet the earliest results

of his awakened perception helped to demonstrate still further the depraved spirit that had come over Japanese art. For he applied himself to manufacture wares having a close affinity with the shocking monstrosities used for sepulchral purposes in ancient Apulia, where fragments of dissected satyrs, busts of nymphs or halves of horses were considered graceful excrescences for the adornment of an amphora or a pithos. This Makuzu faience, produced by the now justly celebrated Miyagawa Shozan of Ota (near Yokohama) , survives in the form of vases and pots having birds, reptiles, flowers, Crustacea and so forth plastered over the surface — specimens that disgrace the period of their manu- facture, and represent probably the worst aberration of Japanese ceramic conception.

A production so degraded as the early Makuzu faience could not possibly have a lengthy vogue. Miyagawa soon began to cast about for a better inspiration, and found it in Adoption of the monochromes and polychromes of the Chinese Chinese Kang-hsi and Yung-cheng kilns. The extraordinary Mode,s – value attaching to the incomparable red glazes of China, not only in the country of their origin but also in the United States, where collectors showed a fine instinct in this matter, seems to have suggested to Miyagawa the idea of imitation. He took for model the rich and delicate ” liquid-dawn ” monochrome, and succeeded in producing some specimens of considerable merit. Thenceforth his example was largely followed, and it may now be said that the tendency of many of the best Japanese ceramists is to copy Chinese chefs-d'oeuvre. To find them thus renewing

their reputation by reverting to Chinese models, is not only another tribute to the perennial supremacy of Chinese porce- lains, but also a fresh illustration of the eclectic genius of Jap- anese art. All the products of this new effort are porcelains proper. Seven kilns are devoted, wholly or in part, to the new wares: belonging to Miyagawa Shozan of Ota, Seifu Yohei of Kioto, Takemoto Hayata and Kato Tomojiro of Tokyo, Higuchi Haruzane of Hirado, Shida Yasukyo of Kaga and Kato Masukichi of Seto.

Among the seven ceramists here enumerated, Seifu of Kioto probably enjoys the highest reputation. If we except the ware of Satsuma, it may be said that nearly all the fine faience 5e//u of Q f j apan was manufactured formerly in Kioto. Nomura Kioto. Ninsei, in the middle of the 17th century, inaugurated

a long era of beautiful productions with his cream-like " fish-roe " craquele glazes, carrying Jrich decoration of clear and brilliant vitrifiable enamels. It was he who gave their first really artistic impulse to the kilns of Awata, Mizoro and Iwakura, whence so many delightful specimens of faience issued almost without inter- ruption until the middle of the 19th century and continue to issue co-day. The three Kenzan, of whom the third died in 1820; Ebisei; the four Dohachi, of whom the fourth was still alive in 1909; the Kagiya family, manufacturers of the celebrated Kinkozan ware; Hozan, whose imitations of Delft faience and his pdte-sur-pdte pieces with fern-scroll decoration remain incomparable ; Taizan Yohei, whose ninth descendant of the same name now pro- duces fine specimens of Awata ware for foreign markets; Tanzan Yoshitaro and his son Rokuro, to whose credit stands a new departure in the form of faience having pdte-sur-pdte decoration of lace patterns, diapers and archaic designs executed in low relief with admirable skill and minuteness; the two Bizan, renowned for their represen- tations of richly apparelled figures as decorative motives; Rokubei, who studied painting under Maruyama Okyo and followed the naturalistic style of that great artist; Mokubei, the first really expert manufacturer of translucid porcelain in Kioto; Shuhei, Kintei, and above all, Zengoro Hozen, the celebrated potter of Eiraku wares — these names and many others give to Kioto ceramics an eminence as well as an individuality which few other wares of Japan can boast. Nor is it to be supposed that the ancient capital now lacks great potters. Okamura Yasutaro, commonly called Shozan, produces specimens which only a very acute connoisseur can distinguish from the work of Nomura Ninsei ; Tanzan Rokuro's half-tint enamels and soft creamy glazes would have stood high in any epoch ; Taizan Yohei produces Awata faience not inferior to that of former days; Kagiya Sobei worthily supports the reputation of the Kinkozan ware; Kawamoto Eijiro has made to the order of a well-known Kioto firm many specimens now figuring in foreign collections as old masterpieces; and Ito Tozan succeeds in decorating faience with seven colours sous couverte (black, green, blue, russet- red, tea-brown, purple and peach), a feat never before accomplished. It is therefore an error to assert that Kioto has no longer a title to be called a great ceramic centre. Seifu Yohei, however, has the special faculty of manufacturing monochromatic and jewelled porcelain and faience, which differ essentially from the traditional Kioto types, their models being taken directly from China. But a sharp distinction has to be drawn between the method of Seifu and that of the other six ceramists mentioned above as following Chinese fashions. It is this, that whereas the latter produce their chromatic effects by mixing the colouring matter with the glaze, Seifu paints the biscuit with a pigment over which he runs a translucid colourless glaze. The Kioto artist's process is much easier than that of his rivals, and although his monochromes are often of most pleasing delicacy and fine

tone, they do not belong to the same category of technical excellence as the wares they imitate. From this judg- ment must be excepted, however, his ivory-white and ciladon wares, as well as his porcelains decorated with blue, or blue and red sous couverte, and with vitrifiable enamels over the glaze. In these five varieties he is emphatically great. It cannot be said, indeed, that his celadon shows the velvety richness of surface and tenderness of colour that distinguished the old Kuang-yao and Lungchuan-yao of China, or that he has ever essayed the moss-edged crackle of the beautiful Ko-yao. But his celadon certainly equals the more modern Chinese examples from the Kang-hsi and Yung-cheng kilns. As for his ivory-white, it distinctly surpasses the Chinese Ming Chen-yao in every quality except an indescribable intimacy of glaze and p&te which probably can never be obtained by either Japanese or European methods.

Miyagawa Shozan, or Makuzu, as he is generally called, has never followed Seifu's example in descending from the difficult manipu- „. lation of coloured glazes to the comparatively simple

*Skb S aa Process of painted biscuit. This comment does not * ' refer to the use of blue and red sous couverte. In that class of beautiful ware the application of pigment to the unglazed pdte is inevitable, and both Seifu and Miyagawa, working on the same lines as their Chinese predecessors, produce porcelains that almost rank with choice Kang-hsi specimens, though they have not yet mastered the processes sufficiently to employ*

them in the manufacture of large imposing pieces or wares of moderate price. But in the matter of true monochromatic and polychromatic glazes, to Shozan belongs the credit of having inaugurated Chinese fashions, and if he has never fully succeeded in achieving lang-yao (sang-de-bceuf), chi-hung (liquid-dawn red), chiang-tou-hung (bean-blossom red, the " peach-blow " of American collectors), or above all pin-kwo-tsing (apple-green with red bloom), his efforts to imitate them have resulted in some very interesting pieces.

Takemoto and Kato of Tokyo entered the field subsequently to Shozan, but followed the same models approximately. Takemoto, however, has made a speciality of black glazes, his „ _ aim being to rival the Sung_ Chien-yao, with its glaze 3r °, t of mirror-black or raven's'-wing green, and its leveret K,eramis s – fur streaking or russet-moss dappling, the prince of all wares in the estimation of the Japanese tea-clubs. Like Shozan, he is still very far from his original, but, also like Shozan, he produces highly meritorious pieces in his efforts to reach an ideal that will probably continue to elude him for ever. Of Kato there is not much to be said. He has not succeeded in winning great distinction, but he manu f actures some very delicate monochromes, fully deserving to be classed among prominent evidences of

the new departure. Toky5 was never a centre of ceramic production. Even during the 300 years of its conspicuous prosperity as the administrative capital of the Toku- gawa shoguns, it had no noted factories, doubtless owing to the absence of any suitable potter's clay in the immediate vicinity. Its only notable production of a ceramic character was the work of Miura Kenya (1830-1843), who followed the methods of the cele- brated Haritsu (1688-1704) of Kioto in decorating plain or lacquered wood with mosaics of raku faience having coloured glazes. Kenya was also a skilled modeller of figures, and his factory in the Imado suburb obtained a considerable reputation for work of that nature. He was succeeded by Tozawa Benshi, an old man of over seventy in 1909, who, using clay from Owari or Hizen, has turned out many porcelain statuettes of great beauty. But although the capital of Japan formerly played only an insignificant part in Japanese ceramics, modern Tokyo has an important school of artist-artisans. Every year large quantities of porcelain and faience are sent from the provinces to the capital to receive surface decoration, and in wealth of design as well as carefulness of execution the results are praiseworthy. But of the pigments employed nothing very lauda- tory could be said until very recent times. They were generally crude, of impure tone, and without depth or brilliancy. Now, how- ever, they have lost these defects and entered a period of consider- able excellence. Figure-subjects constitute the chief feature of the designs. A majority of the artists are content to copy old pictures of Buddha's sixteen disciples, the seven gods of happiness, and other similar assemblages of mythical or historical personages, not only because such work offers large opportunity for the use of striking colours and the production of meretricious effects, dear to the eye of the average Western householder and tourist, but also because a complicated design, as compared with a simple one, has the advan- tage of hiding the technical imperfections of the ware. Of late there have happily appeared some decorators who prefer to choose their subjects from the natural field in which their great predecessors excelled, and there is reason to hope that this more congenial and more pleasing style will supplant its modern usurper. The best known factory in Tokyo for decorative purposes is the Hyochi-en. It was established in the Fukagawa suburb in 1875, with the imme- diate object of preparing specimens for the first Tokyo exhibition held at that time. Its founders obtained a measure of official aid, and were able to secure the services of some good artists, among whom may be mentioned Obanawa and Shimauchi. The porcelains of Owari and Arita naturally received most attention at the hands of the Hyochi-en decorators, but there was scarcely one of the principal wares of Japan upon which they did not try their skill, and if a piece of monochromatic Minton or Sevres came in their way, they under- took to improve it by the addition of designs copied from old masters or suggested by modern taste. The cachet of the Fukagawa atelier was indiscriminately applied to all such pieces, and has

probably proved a source of confusion to collectors. Many other factories for decoration were established from time to time in Tokyo. Of these some still exist; others, ceasing to be profitable, have been abandoned. On the whole, the industry may now be said to have assumed a domestic character. In a house, presenting no distinctive features whatsoever, one finds the decorator with a cupboard full of bowls and vases of glazed biscuit, which he adorns, piece by piece, using the simplest conceivable apparatus and a meagre supply of pigments. Sometimes he fixes the decoration himself, employing for that purpose a small kiln which stands in his back garden; sometimes he entrusts this part of the work to a factory. As in the case of everything Japanese, there is no pretence, no useless expenditure about the process. Yet it is plain that this school of Tokyo decorators, though often choosing their subjects badly, have contributed much to the progress of the ceramic art during the past few years. Little by little there has been developed a degree of skill which compares not unfavourably with the work of the old masters. Table services of Owari porcelain — the ware itself excellently manipulated and of almost egg-shell fineness — pre now decorated with floral scrolls, landscapes, insects, birds, figure-subjects and all

sorts of designs, chaste, elaborate or quaint; and these services, representing so much artistic labour and originality, are sold for prices that bear no due ratio to the skill required in their manu- facture.

There is only one reservation to be made in speaking of the modern decorative industry of Japan under its better aspects. In Tokyo, Kioto, Yokohama and Kobe — in all of which places decorating ateliers (etsuke-dokoro) , similar to those of Tokyo, have been established in modern times — the artists use chiefly pigments, seldom venturing to employ vitrifiable enamels. That the results achieved with these different materials are not comparable is a fact which every connoisseur must admit. The glossy surface of a porce- lain glaze is ill fitted for rendering artistic effects with ordinary colours. The proper field for the application of these is the biscuit, in which position the covering glaze serves at once to soften and to preserve the pigment. It can scarcely be doubted that the true instincts of the ceramist will ultimately counsel him to confine his decoration over the glaze to vitrifiable enamels, with which the Chinese and Japanese potters of former times obtained such brilliant results. But to employ enamels successfully is an achievement demanding special training and materials

not easy to procure or to prepare. The Tokyo decorators are not likely, therefore, to change their present methods immediately.

An impetus was given to ceramic decoration by the efforts of a new school, which owed its origin to Dr G. Wagener, an eminent German expert formerly in the service of the Japanese government. Dr Wagener conceived the idea of developing the art of decoration under the glaze, as applied to faience. Faience thus decorated has always been exceptional in Japan. Rare specimens were produced in Satsuma and Kioto, the colour employed being chiefly blue, though brown and black were used in very exceptional instances. The difficulty of obtaining clear, rich tints was nearly prohibitive, and though success, when achieved, seemed to justify the effort, this class of ware never received much attention in Japan. By careful selection and preparation of pdte, glaze and pigments, Dr Wagener proved not only that the manufacture was reasonably feasible, but also that decoration thus applied to pottery possesses unique delicacy and softness. Ware manufactured by his direction at the Tokyo school of technique (shokkd gakkd), under the name of asahi-yaki, ranks among the interesting productions of modern Japan. The decorative colour chiefly employed is chocolate brown, which harmonizes excellently with the glaze. But the ware has never found favour in Japanese eyes, an element of unpleasant garishness being imparted to it by the vitreous appearance of the glaze, which is manufactured according to European methods. The modern faience of Ito Tozan of Kioto, decorated with colour under the glaze, is incomparably more artistic than the Tokyo asahi-yaki, from which, nevertheless, the Kioto master doubtless borrowed some ideas. The decorative industry in Tokyo owed much also to the kosho-kaisha, an institution started by Wakai and Matsuo in 1873, with official assistance. Owing to the intelligent patronage of this company, and the impetus given to the ceramic trade by its enterprise, the style of the Tokyo etsuke was much im- proved and the field of their industry extended. It must be acknow- ledged, however, that the Tokyo artists often devote their skill to purposes of forgery, and that their imitations, especially of old Satsuma-yaki, are sometimes franked by dealers whose standing should forbid such frauds. In this context it may be mentioned that, of late years, decoration of a remarkably microscopic character has been successfully practised in Kioto, Osaka and Kobe, its originator being Meisan of Osaka. Before dismissing the subject of modern Tokyo ceramics, it may be added that Kato Tomataro, mentioned above in connexion with the manufacture of special glazes, has also been very successful in producing porcelains deco rated with blue sous couverte at his factory in the Koishikawa suburb.

Higuchi of Hirado is to be classed with ceramists of the new school on account of one ware only, namely, porcelain having translucid „ . decoration, the so-called ” grains of rice ‘ of American

Wnisf co ” ectors i designated hotaru-de (firefly style) in Japan. Hirado” That, however, is an achievement of no small con- sequence, especially since it had never previously been essayed outside China. The Hirado expert has not yet attained technical skill equal to that of the Chinese. He cannot, like them, cover the greater part of a specimen’s surface with a lacework of transparent decoration, exciting wonder that pdte deprived so greatly of continuity could have been manipulated without accident. But his artistic instincts are higher than those of the Chinese, and there is reasonable hope that in time he may excel their best works. In other respects the Hirado factories do not produce wares nearly so beautiful as those manufactured there between 1759 and 1840, when the Hirado-yaki stood at the head of all Japanese porcelain on account of its pure, close-grained pdte, its lustrous milk-white glaze, and the soft clear blue of its carefully executed decoration.

The Owari potters were slow to follow the lead of Miyagawa Shozan and Seifu Yohei. At the industrial exhibition in Kioto Ware of (J 895) tne nrst res ults of their efforts were shown, Owari. attracting attention at once. In medieval times Owari was celebrated for faience glazes of various colours, much affected by the tea-clubs, but its staple manufacture from the

beginning of the 19th century was porcelain decorated with blue under the glaze, the best specimens of which did not approach their Chinese prototypes in fineness of pdte, purity of glaze or richness of colour. During the first twenty-five years of the Meiji era the Owari potters sought to compensate the technical and artistic defects of their pieces by giving them magnificent dimensions; but at the Tokyo industrial exhibition (1891) they were able to contribute some specimens showing decorative, plastic and graving skill of no mean order. Previously to that time, one of the Seto experts, Kato Gosuke, had developed remarkable ability in the manufacture of celadon, though in that field he was subsequently distanced by Seifu of Kioto. Only lately did Owari feel the influence of the new movement towards Chinese types. Its potters took flamM glazes for models, and their pieces possessed an air of novelty that attracted connoisseurs. But the style was not calculated to win general popularity, and the manufacturing processes were too easy to occupy the attention of great potters. On a far higher level stood egg-shell porcelain, remarkable examples of which were sent from Seto to the Kioto industrial exhibition of 1895. Chinese potters of the Yung-lo era (1403-1414) enriched their country with a quantity of ware to which the name of totai-ki (bodiless utensil) was given on account of its wonderfully attenuated pdte. The finest specimens of this porcelain had incised decoration, sparingly employed but adding much to the beauty of the piece. In subsequent eras the potters of King-te-chen did not fail to continue this remarkable manufacture, but its only Japanese representative was a porcelain distinctly inferior in more than one respect, namely, the

egg-shell utensils of Hizen and Hirado, some of which had finely woven basket-cases to protect their extreme fragility. The Seto experts, however, are now making bowls, cups and vases that rank nearly as high as the celebrated Yung-lo totai-ki. In purity of tone and velvet- like gloss of surface there is distinct inferiority on the side of the Japanese ware, but in thinness of pdte it supports comparison, and in profusion and beauty of incised decoration it excels its Chinese original.

*Latest of all to acknowledge the impulse of the new departure have been the potters of Kaga. For many years their ware enjoyed the credit, or discredit, of being the most lavishly deco- Ware at rated porcelain in Japan. It is known to Western collectors »>_ as a product blazing with red and gold, a very degenerate **

offspring of the Chinese Ming type, which Hozen of Kioto reproduced so beautifully at the beginning of the 19th century under the name of eiraku-yaki. Undoubtedly the best specimens of this kinran-de (brocade) porcelain of Kaga merit praise and admiration; but, on the whole, ware so gaudy could not long hold a high place in public esteem. The Kaga potters ultimately appreciated that defect. They still manufacture quantities of tea and coffee sets, and dinner or dessert services of red-and-gold porcelain for foreign markets; but about 1885 some of them made zealous and patient efforts to revert to the processes that won so much fame for the old Kutani-yaki, with its grand combinations of rich, lustrous, soft-toned glazes. The attempt was never entirely successful, but its results restored something of the Kaga kilns' reputation. Since 1895, again, a totally new departure has been made by Morishita Hachizaemon, a ceramic expert, in conjunction with Shida Yasukyo, president of the Kaga products joint stock company (Kaga bussan kabushiki kaisha) and teacher in the Kaga industrial school. The line chosen by these ceramists is purely Chinese. Their great aim seems to be the production of the exquisite Chinese monochromes known as u-kwo-tien-tsing (blue of the sky after rain) and yueh-peh (clair-de- lune). But they also devote much attention to porcelains decorated with blue or red sous couverte. Their work shows much promise, but like all fine specimens of the Sino-Japanese school, the prices are too high to attract wide custom.

The sum of the matter is that the modern Japanese ceramist, after many efforts to cater for the taste of the Occident, evidently concludes that his best hope consists in s devoting all his technical and artistic resources to reproducing the celebrated wares of China. In explanation of the fact that he did not essay this route in former times, it may be noted, first, that he had only a limited acquaintance with the wares in question; secondly, that Japanese connoisseurs never attached any value to their countrymen's imitation of Chinese porcelains so long as the originals were obtainable;

thirdly, that the ceramic art of China not having fallen into its present state of decadence, the idea of competing with it did not occur to out- siders; and fourthly, that Europe and America had not deve- loped their present keen appreciation of Chinese masterpieces. Yet it is remarkable that China, at the close of the 19th century, should have again furnished models to Japanese eclecticism.

Lacquer.— Japan derived the art of lacquering from China (probably about the beginning of the 6th century), but she ultimately carried it far beyond Chinese conception. At first her experts confined themselves to plain black lacquer. From

the early part of the 8th century they began to ornament it with dust of gold or mother-of-pearl, and throughout the Heian epoch (9th to 1 2th century) they added pictorial designs, though of a formal character, the chief motives being floral subjects, arabesques and scrolls. All this work was in the style known as hira-makie (flat decoration) ; that is to say, having the decorative design in the same plane as the ground. In the days of the great dilettante Yoshimasa (1449-1490), lacquer experts devised a new style, taka-makie, or decoration in relief, which immensely augmented the beauty of the ware, and constituted a feature altogether special to Japan. Thus when, at the close of the 1 6th century, the Taiko inaugurated the fashion of lavishing all the resources of applied art on the interior decoration of castles and temples, the services of the lacquerer were employed to an extent hitherto unknown, and there resulted some magnificent work on friezes, coffered ceilings, door panels, altar-pieces and cenotaphs. This new departure reached its climax in the Toku- gawa mausolea of Yedo and Nikko, which are enriched by the possession of the most splendid applications of lacquer decora- tion the world has ever seen, nor is it likely that anything of comparable beauty and grandeur will be again produced in the same line. Japanese connoisseurs indicate the end of the 17th century as the golden period of the art, and so deeply rooted is this belief that whenever a date has to be assigned to any specimen of exceptionally fine quality, it is unhesitatingly referred to the time of Joken-in (Tsunayoshi) .

Among the many skilled artists who have practised this beautiful craft since the first on record, Kiyohara Norisuye (c. 1 169), may be mentioned Koyetsu (1558-1637) and his pupils, who are especially noted for their

inro (medicine-cases worn as part of the costume) ; Kajikawa Kinjiro (c. 1680), the founder of the great Kajikawa family, which continued up to the 19th century ; and Koma Kyuhaku (d. 1715), whose pupils and descendants maintained his traditions for a period of equal length. Of individual artists, perhaps the most notable is Ogata Korin (d. 1716), whose skill was equally great in the arts of painting and pottery. He was the eldest son of an artist named Ogato Soken, and studied the styles of the Kano and Tosa schools successively. Among the artists who influenced him were Kano Tsunenobu, Nomura Sotatsu and Koyetsu. His lacquer-ware is distinguished for a bold and at times almost eccentric impressionism, and his use of inlay is strongly characteristic. Ritsuo (1 663-1 747), a pupil and contemporary of Korin, and like him a potter and painter also, was another lacquerer of great skill. Then followed Hanzan, the two Shiome, Yamamoto Shunsho and his pupils, Yamada Joka and Kwanshosai Toyo (late 18th century). In the beginning of the 19th century worked Shokwasai, who frequently collaborated with the metal-worker Shibayama, encrusting his lacquer with small decorations in metal by the latter.

No important new developments have taken place during modern times in Japan's lacquer manufacture. Her artists follow the old Modem ways faithfully ; and indeed it is not easy to see how Work. tney cou 'd do better. On the other hand, there has

not been any deterioration ; all the skill of former days is still active. The contrary has been repeatedly affirmed by foreign critics, but no one really familiar with modern productions can entertain such a view. Lacquer-making, however, being essentially an art and not a mere handicraft, has its eras of great masters and its seasons of inferior execution. Men of the calibre of Koyetsu Korin, Ritsuo, Kajikawa and Mitsutoshi must be rare in any age, and the epoch when they flourished is justly remembered with enthusiasm. But the Meiji era has had itsZeshin, and it had in 1909 Shirayaraa Fukumatsu, Kawanabe Itcho, Ogawa Shomin, Uematsu Homin, Shibayama Soichi, Morishita Morihachi and other lesser experts, all masters in designing and execution. Zeshin, shortly before he died, indicated Shirayama Fukumatsu as the man upon whom his mantle should descend, and that the judgment of this really great craftsman was correct cannot be denied by any one who has seen the works of Shirayama. He excels in his representations of landscapes and waterscapes, and has succeeded in transferring to gold-lacquer panels tender and delicate pictures of nature's softest moods — pic- tures that show balance, richness, harmony and a fine sense of decorative proportion. Kawanabe Itcho is celebrated for his representations of flowers and foliage, and Morishita Morihachi and Asano Saburo (of Kaga) are admirable in all styles, but especially, perhaps, in the charming variety called togi-dashi (ground down), which is pre-eminent for its satin-like texture and for the

atmosphere of dreamy softness that pervades the decoration. The togi-dashi design, when finely executed, seems to hang suspended in the velvety lacquer or to float under its siiky surface. The magnificent sheen and richness of the pure kin-makie (gold lacquer) are wanting, but in their place we have inimitable tenderness and delicacy.

The only branch of the lacquerer's art that can be said to have

*shown any marked development in the Meiji era is that in which parts of the decorative scheme consist of objects in gold, silver, shakudo, shibuichi, iron, or, above all, ivory or mother- v of pearl. It might indeed be inferred, from some of „ w . the essays published in Europe on the subject of Japan's ueve °/>- ornamental arts, that this application of ivory and menu mother-of-pearl holds a place of paramount importance. Such is not the case. Cabinets, fire-screens, plaques and boxes resplen- dent with gold lacquer grounds carrying elaborate and profuse decoration of ivory and mother-of-pearl * are not objects that appeal to Japanese taste. They belong essentially to the catalogue of articles called into existence to meet the demand of the foreign market, being, in fact, an attempt to adapt the lacquerer's art to decorative furniture for European houses. On the whole it is a successful attempt. The plumage of gorgeously-hued birds, the blossoms of flowers (especially the hydrangea), the folds of thick brocade, microscopic diapers and arabesques, are built up with tiny fragments of iridescent shell, in combination with silver-foil, gold- lacquer and coloured bone, the whole producing a rich and sparkling effect. In fine specimens the workmanship is extraordinarily minute, and every fragment of metal, shell, ivory or bone, used to construct the decorative scheme, is imbedded firmly in its place. But in a majority of cases the work of building is done by means of paste and glue only, so that the result lacks durability. The employ- ment of mother-of-pearl to, ornament lacquer grounds dates from a period as remote as the 8th century, but its use as a material for constructing decorative designs began in the 17th century, and was due to an expert called Shibayama, whose descendant, Shibayama Soichi, has in recent years been associated with the same work in Tokyo.*

In the manufacture of Japanese lacquer there are three processes. The first is the extraction and preparation of the lac; the second, its application; and the third, the decoration of the „ lacquered surface. The lac, when taken from an incision Hrocesses – in the trunk of the Rhus vernicifera {urushi-no-ki) , contains approxi- mately 70 % of lac acid, 4 % of gum arabic, 2 % of albumen, and 24 % of water. It is strained, deprived of its moisture, and receives an admixture of gamboge, cinnabar, acetous protoxide or some other colouring matter. The object to be lacquered, which is generally made of thin white pine, is subjected to singularly thorough and painstaking treatment, one of the processes being to cover it with a layer of

Japanese paper or thin hempen cloth, which is fixed by means of a pulp of rice-paste and lacquer. In this way the danger of warping is averted, and exudations from the wooden surface are prevented from reaching the overlaid coats of lacquer. Numerous operations of luting, sizing, lacquering, polishing, drying, rubbing down, and so on, are performed by the nurimono-shi, until, after many days' treatment, the object emerges with a smooth, lustre- like dark-grey or coloured surface, and is ready to pass into the hands of the makie-shi, or decorator. The latter is an artist ; those who have performed the preliminary operations are merely skilled arti- sans. The makie-shi may be said to paint a picture on the surface of the already lacquered object. He takes for subject a landscape, a seascape, a battle-scene, flowers, foliage, birds, fishes, insects — in short, anything. This he sketches in outline with a paste of white lead, and then, having filled in the details with gold and colours, he superposes a coat of translucid lacquer, which is finally subjected to careful polishing. If parts of the design are to be in relief, they are built up with a putty of black lacquer, white lead, camphor and lamp-black. In all fine lacquers gold predominates so largely that the general impression conveyed by the object is one of glow and richness. It is also an inviolable rule that every part must show beautiful and highly finished work, whether it be an external or an internal part. The makie-shi ranks almost as high as the pictorial artist in Japanese esteem. He frequently signs his works, and a great number of names have been thus handed down during the past two centuries.

Cloisonne Enamel. — Cloisonne enamel is essentially of modern development in Japan. The process was known at an early period, and was employed for the purpose of subsidiary decoration from the close of the 16th century, but not until the 19th century did Japanese experts begin to manufacture the objects known in Europe as "enamels;" that is to say, vases, plaques, censers, bowls, and so forth, having their surface covered with vitrified pastes applied either in the champlevS or the cloisonne style. It is necessary to insist upon this fact, because it has been stated with apparent authority that numerous speci- mens which began to be exported from 1865 were the outcome of industry commencing in the 16th century and reaching its point of culmination at the beginning of the 18th. There is not the slenderest ground for such a theory. The work began in 1838, and Kaji Tsunekichi of Owari was its originator. During 20 years previously to the reopening of the country in 1858,

1 Obtained from the shell of the Halictis.

cloisonne enamelling was practised in the manner now understood by the term; when foreign merchants began to settle in Yoko- hama, several experts were working skilfully in Owari after the methods of Kaji Tsunekichi. Up to that time there had been little demand for enamels of large dimensions, but when the foreign market called for vases, censers, plaques and such things, no difficulty was found in supplying them. Thus, about the year 1865, there commenced an export of enamels which had no prototypes in Japan, being destined frankly for European and American collectors. From a technical point of view these specimens had much to recommend them. The base, usually of copper, was as thin as cardboard; the cloisons, exceedingly fine and delicate, were laid on with care and accuracy; the colours were even, and the designs showed artistic judgment. Two faults, however, marred the work — first, the shapes were clumsy and unpleasing, being copied from bronzes whose solidity justified forms unsuited to thin enamelled vessels; secondly, the colours, sombre and somewhat impure, lacked the glow and mellowness that give decorative superiority to the technically inferior Chinese enamels of the later Ming and early Tsing eras. Very soon, however, the artisans of Nagoya (Owari), Yokohama and Tokyo — where the art had been taken up — found that faithful and fine workmanship did not pay. The foreign mer- chant desired many and cheap specimens for export, rather than few and costly. There followed then a period of gradual decline, and the enamels exported to Europe showed so much inferiority that they were supposed to be the products of a widely different era and of different makers. The industry was threatened with extinction, and would certainly have dwindled to insignificant dimensions had not a few earnest artists, working in the face of many difficulties and discouragements, succeeded in striking out new lines and establishing new standarˆ for excellence.

Three clearly differentiated schools now (1875) came into existence. One, headed by Namikawa Yasuyuki of Kioto, took for its objects N the utmost delicacy and perfection of technique, rich-

Jˆ . ngss of decoration, purity of design and harmony of 00 5 * colour. The thin clumsily-shaped vases of the Kaji school, with their uniformly distributed decoration of diapers, scrolls and arabesques in comparatively dull colours, ceased alto- gether to be produced, their place being taken by graceful specimens, technically flawless, and carrying designs not only free from stiffness, but also executed in colours at once rich and soft. This school may be subdivided, Kioto representing one branch, Nagoya, Toky5 and Yokohama the other. In the products of the Kioto branch the decoration generally covered the whole surface of the piece ; in the products of the other branch the artist aimed rather at pictorial effect,

placing the design in a monochromatic field of low tone. It is plain that such a method as the latter implies great command of coloured pastes, and, indeed, no feature of the manufacture is more conspicuous than the progress made during the period 1880-1900 in compounding and firing vitrifiable enamels. Many excellent examples of cloisonne enamel have been produced by each branch of this school. There has been nothing like them in any other country, and they stand at an immeasurable distance above the works of the early Owari school represented by Kaji Tsunekichi and his pupils and colleagues.

The second of the modern schools is headed by Namikawa Sosuke of Tokyo. It is an easily traced outgrowth of the second branch of the Clolsoaless ˆ rst sc h°°l J ust described, for one can readily under- Eaamels stan d that from placing the decorative design in a monochromatic field of low tone, which is essentially a pictorial method, development would proceed in the direction of concealing the mechanics of the art in . order to enhance the pictorial effect. Thus arose the so-called ” cloisonless enamels ” (musenjippo). They are not always without cloisons. The design is generally framed at the outset with a ribbon of thin metal, precisely after the manner of ordinary cloisonne ware. But as the work proceeds the cloisons are hidden — unless their presence is necessary to give emphasis to the design — and the final result is a picture in vitrified enamels.

The characteristic productions of the third among the modern

schools are monochromatic and translucid enamels. All students

of the ceramic art know that the monochrome porce-

Mooocbro.]ains of china owe their beauty to the fact that the

2 a c . colour is in the glaze, not under it. The ceramist*

names. g n(j g no difficulty i n applying a uniform coat of pig- ment to porcelain biscuit, and covering the whole with a diaphanous glaze. The colour is fixed and the glaze set by secondary firing at a lower temperature than that necessary for hardening the pale. Such porcelains, however, lack the velvet-like softness and depth of tone so justly prized in the genuine monochrome, where the glaze

itself contains the colouring matter, pdte and glaze being fired simultaneously at the same high temperature. It is apparent that a vitrified enamel may be made to perform, in part at any rate, the function of a porcelain glaze. Acting upon that theory, the experts of Tokyo and Nagoya have produced many very beautiful speci- mens of monochrome enamel — yellow (canary or straw), rose du Barry, liquid-dawn, red, aubergine

purple, green (grass or leaf), dove-grey and lapis lazuli blue. The pieces do not quite reach the level of Chinese monochrome porcelains, but their inferiority is not marked. The artist's great difficulty is to hide the metal base completely. A monochrome loses much of its attractiveness when the colour merges into a metal rim, or when the interior of a vase is covered with crude unpolished paste. But to spread and fix the enamel so that neither at the rim nor in the interior shall there be any break of continuity, or any indication that the base is copper, not porcelain, demands quite exceptional skill.

The translucid enamels of the modern school are generally associated with decorative bases. In other words, a suitable design is chiselled in the metal base so as to be visible through fransludd the diaphanous enamel. Very beautiful effects of broken p aame j and softened lights, combined with depth and delicacy of colour, are thus obtained. But the decorative designs which lend themselves to such a purpose are not numerous. A gold base deeply chiselled in wave-diaper and overrun with a paste of aubergine purple is the most pleasing. A still higher achievement is to apply to the chiselled base designs executed in coloured enamels, finally covering the whole with translucid paste. Admirable results are thus produced ; as when, through a medium of cerulean blue, bright goldfish and blue-backed carp appear swimming in silvery waves, or brilliantly plumaged birds seem to soar among fleecy clouds. (The artists of this school show also much skill in using enamels for the purposes of subordinate decoration — suspending enamelled butter- flies, birds or floral sprays, among the reticulations of a silver vase chiselled a jour ; or filling with translucid enamels parts of a decorative scheme sculptured in iron, silver, gold or shakudo.

V. — Economic Conditions

Communications. — From the conditions actually existing in the 8th century after the Christian era the first compilers of Japanese history inferred the conditions whicii might # oa(f s aaa ~ have existed in the 7th century before that era. One Posts in of their inferences was that, in the early days, com- Batfy munication was by water only, and that not until mes ' 540 B.C. did the most populous region of the empire — the west coast — come into possession of public roads. Six hundred years later, the local satraps are represented as having received instructions to build regular highways, and in the '3rd century the massing of troops for an over-sea expedition invested roads with new value. Nothing is yet heard, however, about posts. These evidences of civilization did not make their appearance until the first great era of Japanese reform, the Taika period (645-650), when stations were established along the principal highways, provision was made of post-horses, and a system of bells and checks was devised for distinguishing official carriers. In those days ordinary travellers

were required to carry passports, nor had they any share in the benefits of the official organization, which was entirely under the control of the minister of war. Great difficulties attended the movements of private persons. Even the task of transmitting to the central government provincial taxes paid in kind had to be dis- charged by specially organized parties, and this journey from the north-eastern districts to the capital generally occupied three months. At the close of the 7th century the emperor Mommu is said to have enacted a law that wealthy persons living near the highways must supply rice to travellers, and in 745 an empress (Koken) directed that a stock of medical necessaries must be kept at the postal stations. Among the benevolent acts attri- buted to renowned Buddhist priests posterity specially remembers their efforts to encourage the building of roads and bridges. The great emperor Kwammu (782-806) was constrained to devote a space of five years to the reorganization of the whole system of post-stations. Owing to the anarchy which prevailed during the 10th, nth and 12th centuries, facilities of communication disappeared almost entirely, even for men of rank a long journey involved danger of starvation or fatal exposure, and the pains and perils of travel became a household word among the people.

Yoritomo, the founder of feudalism at the close of the 1 2th century, was too great a statesman to underestimate the value of roads and

posts. The highway between his stronghold, Kamakura, and the imperial city, Kioto, began in his time to develop features which ultimately entitled it to be called one of the finest roads in the world. But after Yoritomo's death the land became once more an armed camp, in which the rival barons discouraged travel beyond the limits of their own domains. Not until the Tokugawa family obtained military control of the whole empire (1603), and, fixing its capital at Yedo, required the feudal chiefs to reside there every second year, did the problem of roads and post-stations force itself once more on official attention. Regulations were now strictly enforced, fixing the number of horses and carriers available at each station, the loads to be carried by them and their charges, as well as the transport services that each feudal chief was entitled to demand and the fees he had to pay in return. Tolerable hostelries now came into existence, but they furnished only shelter, fuel and the coarsest kind of food. By degrees, however, the progresses of the feudal chiefs to and from Yedo, which at first were simple and economical, developed features of competitive magnificence, and the

importance of good roads and suitable accommodation received increased attention. This found expression in practice in 1663. A system more elaborate than anything antecedent was then introduced under the name of " flying transport." Three kinds of couriers operated. The first class were in the direct employment of the shogunate. They carried official messages between Yedo and Osaka — a distance of 348 miles — in four days by means of a well organized system of relays. The second class maintained communications between the fiefs and the Tokugawa court as well as their own families in Yedo, for in the alternate years of a feudatory's compulsory residence in that city his family had to live there. The third class were main- tained by a syndicate of 13 merchants as a private enterprise for transmitting letters between the three great cities of Kioto, Osaka and Yedo and intervening places. This syndicate did not undertake to deliver a letter direct to an addressee. The method pursued was to expose letters and parcels at fixed places in the vicinity of their destination, leaving the addressees to discover for themselves that such things had arrived. Imperfect as this system was, it represented a great advance from the conditions in medieval times.

*The nation does not seem to have appreciated the deficiencies of the syndicate's service, supplemented as it was by a network of waterways which greatly increased the facilities for transport. After the cessation of civil wars under the sway of the Tokugawa, the building and improvement of roads went on steadily. It is not too much to say, indeed, that when Japan opened her doors to foreigners in the middle of the 19th century, she possessed a system of roads some of which bore striking testimony to her medieval greatness. The most remarkable was the Tokaido (eastern-seaway), so called because it ran eastward along the coast from Kioto. This great highway, 345 m. long, connected Osaka and Kioto with Yedo. The date of its construction is not recorded, but it certainly underwent signal improvement in the 12th and 13th centuries, and during the two and a half centuries of Tokugawa sway in Yedo. A wide, well-made and well-kept avenue, it was lined throughout the greater part of its length by giant pine-trees, render- ing it the most picturesque 'highway in the world. Iyeyasu, the founder of the Tokugawa dynasty of shoguns, directed that his body should be interred at Nikko, a place of exceptional beauty, consecrated eight hundred years previously. This meant an exten- sion of the Tokaido (under a different name) nearly a hundred miles northward, for the magnificent shrines erected then at Nikko and the periodical ceremonies thenceforth performed there demanded a correspondingly fine avenue of approach. The original Tokaido was taken for model, and Yedo and Nikko were joined by a highway flanked by rows of cryptomeria. Second only to the Tokaido is the Nakasendo (mid-mountain road), which also was * .- constructed to join Kioto with Yedo, but follows an sea 'inland course*

through the provinces of Yamashiro, Omi, Mino, Shinshu, Kotzuke and Musashi. Its length is 340 m., and though not flanked by trees or possessing so good a bed as the Tokaido, it is nevertheless a sufficiently remarkable highway. A third road, the Oshukaido runs northward from Yedo ,_ (now Tokyo) to Aomori on the extreme north of the ”’ main island, a distance of 445 m., and several lesser highways give access to other regions.

The question of road superintendence received early attention from the government of the restoration. At a general assembly Modem °^ ‘ oca l prefects held at Tokyo in June 1875 it was Super- decided to classify the different roads throughout the inteadence empire, and to determine the several sources from of Roads, wn ; c h t j, e sums necessary for their maintenance and repair should be drawn. After several days’ discussion all roads were eventually ranged under one or other of the following heads: —

I. National roads, consisting of —

Class 1. Roads leading from Tokyo to the various treaty ports.

The TokaldS.

The Oshukaido. .

Class 2. Roads leading from Tokyo to the ancestral shrines

in the province of Ise, and also to the cities or to

military stations. Class 3. Roads leading from Tokyo to the prefectural offices,

and those forming the lines of connexion between

cities and military stations.

II. Prefectural roads, consisting of — ■

Class 1. Roads connecting different prefectures, or leading

from military stations to their outposts. Class 2. Roads connecting the head offices of cities and

prefectures with their branch offices. Class 3. Roads connecting noted localities with the chief

town of such neighbourhoods, or leading to seaports

convenient of access.

III. Village roads, consisting of —

Class 1. Roads passing through several localities in succession, or merely leading from one locality to another.

Class 2. Roads specially constructed for the convenience of irrigation, pasturage, mines, factories, &c., in accordance with measures determined by the people of the locality.

Class 3. Roads constructed for the benefit of Shinto shrines, Buddhist temples, or to facilitate the culti- vation of rice-fields and arable land.

Of the above three headings, it was decided that all national roads should be maintained at the national expense, the regu- lations for their up-keep being entrusted to the care of the prefec- tures along the line of route, and the cost incurred being paid from the Imperial treasury. Prefectural roads are maintained by a joint contribution from the government and from the par- ticular prefecture, each paying one-half of the sum needed. Village roads, being for the convenience of local districts alone, are maintained at the expense of such districts under the general supervision of the corresponding prefecture. The width of national roads was determined at 42 ft. for class 1, 36 ft. for class 2, and 30 ft. for class 3 ; the prefectural roads were to be from 24 to 30 ft., and the dimensions of the village roads were optional, according to the necessity of the case.

The vehicles chiefly employed in ante-Meiji days were ox-carriages, norimono, hago and carts drawn by hand. Ox-carriages were used only by people of the highest rank. They were often v … constructed of rich lacquer; the curtains suspended in e es ‘ front were of the finest bamboo workmanship, with thick cords and tassels of plaited silk, and the draught animal, an ox of handsome proportions, was brilliantly caparisoned. The care and expense lavished upon these highly ornate structures would have been deemed extravagant even in medieval Europe. They have passed entirely out of use, and are now to be seen in museums only, but the type still exists in China. The norimono resembled a miniature house slung by its roof-ridge from a massive pole which projected at either end sufficiently to admit the shoulders of a carrier. It, too, was frequently of very ornamental nature and served to carry aristocrats or officials of high position. The kago was the humblest of all conveyances recognized as usable by the upper classes. It was an open palanquin, V-shaped in cross section, slung from a pole which rested on the shoulders of twe bearers. Extraordinary skill and endurance were shown by the men who carried the norimono and the kago, but none the less these vehicles were both profoundly un- comfortable. They have now been relegated to the warehouses of undertakers, where they serve as bearers for folks too poor to employ

catafalques, their place on the roads and in the streets having been completely taken by the jinrikisha, a two-wheeled _ vehicle pulled by one or two men who think nothing of running 20 m. at the rate of 6 m. an hour. The Jia ” klsha ‘ jinrikisha was devised by a Japanese in 1870, and since then it has come into use throughout the whole of Asia eastward of the Suez Canal. Luggage, of course, could not be carried by norimono or kago. It was necessary to have recourse to packmen, packhorses or baggage-carts drawn by men or horses. All these still exist and are as useful as ever within certain limits. In the cities and towns horses used as beasts of burden are now shod with iron, but in rural or mountainous districts straw shoes are substituted, a device which enables the animals to traverse rocky or precipitous roads with safety.

Railways. — It is easy to understand that an enterprise like railway construction, requiring a great outlay of capital with returns long delayed, did not at first commend itself to the Jap- anese, who were almost entirely ignorant of co-operation as a factor of business organization. Moreover, long habituated to snail-like modes of travel, the people did not rapidly appreciate the celerity of the locomotive. Neither the ox-cart, the norimono, nor the kago covered a daily distance of over 20 m. on the average,

and the packhorse was even slower. Amid such conditions the idea of railways would have been slow to germinate had not a catastrophe furnished some impetus. In 1869 a rice-famine occurred in the southern island, Kiushiu, and while the cereal was procurable abundantly in the northern provinces, people in the south perished of hunger owing to lack of transport facilities. Sir Harry Parkes, British representative in Tokyo, seized this occasion to urge the construction of railways. Ito and Okuma, then influential members of the government, at once recognized the wisdom of his advice. Arrangements were made for a loan of a million sterling in London on the security of the customs revenue, and English engineers were engaged to lay a line between Tokyo and Yokohama (18 m.). Vehement voices of opposition were at once raised in private and official circles alike, all persons engaged in transport business imagined themselves threatened with ruin, and conservative patriots detected loss of national independence in a foreign loan. So fierce was the an- tagonism that the military authorities refused to permit opera- tions of survey in the southern suburb of Tokyo, and the road had to be laid on an embankment constructed in the sea. Ito and Okuma, however, never flinched, and they were ably sup-

ported by Marquis M. Inouye and M. Mayejima. The latter published, in 1870, the first Japanese work on railways, advoca- ting the building of lines from Tokyo to Kioto and Osaka; the. former, appointed superintendent of the lines, held that post for 30 years, and is justly spoken of as " the father of Japanese railways."

September 1872 saw the first official opening of a railway (the Tokyo-Yokohama line) in Japan, the ceremony being performed by the emperor himself, a measure which effectually silenced all further opposition. Eight years from the time of turning the first sod saw 71 m. of road open to traffic, the northern section being that between Tokyo and Yokohama, and the southern that between Kioto and Kobe. A period of interruption now ensued, owing to domestic troubles and foreign complications, and when, in 1878, the govern- ment was able to devote attention once again to railway problems, it found the treasury empty. Then for the first time a public works loan was floated in the home market, and about £300,000 of the total thus obtained passed into the hands of the railway bureau, which at once undertook the building of a road from Kioto to the shore of Lake Biwa, a work memorable as the first line built in Japan without foreign assistance. 1 During all this time private enterprise had remained wholly inactive in the matter of railways, and it became a matter of importance to rouse the people from this apathetic attitude. For the ordinary process of organizing a joint-stock company and raising share-capital the nation was not yet prepared. But shortly after the abolition of feudalism there had come into the possession of the former feudatories state loan-bonds amounting to some 18 millions sterling, which represented the sum granted by the treasury in commutation of the revenues formerly accruing to these men from their fiefs. Already events had shown that the feudatories, quite devoid of business experience, were not unlikely to dispose of these bonds and devote the proceeds to unsound enter- prises. Prince Iwakura, one of the leaders of the Meiji statesmen, persuaded the feudatories to employ a part of the bonds as capital for railway construction, and thus the first private railway company was formed in Japan under the name Nippon telsudo kaisha (Japan railway company), the treasury guaranteeing 8% on the paid-up capital for a period of 15 years. Some time elapsed before this example found followers, but ultimately a programme was elaborated and carried out having for its basis a grand trunk line extending the whole length of the main island from Aomori on the north to Shimonoseki on the south, a distance of 1 153 m. ; and a continuation of the same line throughout the length of the southern island of Kiushifl, from Moji on the north — which lies on the opposite side of the strait from Shimonoseki — to Kagoshima on the south, a distance of 232} m.; as well as a line from Moji to Nagasaki, a distance of 163J m. Of this main road the state undertook to build the central section (376 m.), between Toky5 and Kobe

(via Kioto); the Japan railway company undertook the portion (457 m.) north ward of Tokyo to Aomori ; the Sanyo railway company undertook . the portion (320 m.) southward of Tokyo to Shimonoseki ; and the Kiushiu railway company undertook the lines in Kiiishiu. The whole line is now in operation. The first project was to carry the Tokyo-Kioto line through the interior of the island so as to secure • it against enterprises on the part of a maritime enemy. Such engineering difficulties presented themselves, however, that the coast route was ultimately chosen, and though the line through the

1 In 1877 there were 120 English engineers, drivers and foremen in the service of the railway bureau. Three years later only three advisers remained.

interior was subsequently constructed, strategical considerations were not allowed completely to govern its direction.

When this building of railways began in Japan, much discussion was taking place in England and India as to the relative advantages of the wide and narrow gauges, and so strongly did the arguments in favour of the latter appeal to the English advisers of the Japanese government that the metre gauge was chosen. Some fitful efforts made in later years to change the system proved unsuccessful. The lines are single, for the most part; and as the embankments, the cuttings, the culverts and the bridge-piers have not been constructed for a double line, any change now would be very costly. The average speed of passenger trains in Japan is 18 m. an hour, the corresponding figure over the metre-gauge roads in India being 16 m., and the figure for English parliamentary trains from 19 to 28 m. British engineers surveyed the routes for the first lines and superintended the work of construction, but within a few years the Japanese were able to dispense with foreign aid altogether, both in building and operating their railways. They also construct carriages, wagons and locomotives, and they may therefore be said to have become entirely independent in the matter of railways, for a government iron-foundry at Wakamatsu in Kiushiu is able to manufacture steel rails.

The total length of lines open for traffic at the end of March 1906 was 4746 m., 1470 m. having been built by the state and 3276 by private companies; the former at a cost of 16 millions sterling for construction and equipment, and the latter at a cost of 25 millions. Thus the expenditure by the state averaged £10,884 per mile, and that by private companies, £7631. This difference is explained by the facts that the state lines having been the pioneers, portions of them were built before experience had indicated cheap methods; that a very large and costly foreign staff was employed on these roads in the early days, whereas no such item appeared

in the accounts of private lines; that extensive works for the building of locomotives and rolling stock are connected with the government's roads, and that it fell to the lot of the state to undertake lines in districts presenting exceptional engineering difficulties, such dis- tricts being naturally avoided by private companies. The gross earnings of all the lines during the fiscal year 1905-1906 were 7 mil- lions sterling, approximately, and the gross expenses (including the payment of interest on loans and debentures) were under 3 J millions, so that there remained a net profit of 3J millions, being at the rate of a little over 8J% on the invested capital. The facts that the outlays averaged less than 47% of the gross income, and that accidents and irregularities are not numerous, prove that Japanese management in this kind of enterprise is efficient.

When the fiscal year 1906-1907 opened, the number of private companies was no less than 36, owning and operating 3276 m. of railway. To say that this represented an average iy a y ona /. of 91 m. per company is to convey an over- favourable «-_«„_ „/ idea, for, as a matter of fact, 15 of the companies p r j v9 f e averaged less than 24 m. Anything like efficient co- Railways, operation was impossible in such circumstances, and constant complaints were heard about delays in transit and undue expense. The defects of divided ownership had long suggested the expediency of nationalization, but not until 1906 could the diet be induced to give its consent. On March 31 of that year, a railway nationalization law was promulgated. It enacted that, within a period of 10 years from 1906 to 1915, the state should purchase the 17 principal private roads, which had a length of 2812 m., and whose cost of construction and equipment had been 23J millions sterling. The original scheme included 15 other railways, with an aggregate mileage of only 353 m. ; but these were eliminated as being lines of local interest only. "The actual purchase price of the 17 lines was calculated at 43 millions sterling (about double their cost price), on the following basis: (a) An amount equal to 20 times the sum obtained by multiplying the cost of construction at the date of purchase by the average ratio of the profit to the cost of construction during the six business terms of the company from the second half-year of 1902 to the first half-year of 1905. (b) The amount of the actual cost of stored articles converted according to current prices thereof into public loan-bonds at face value, except in the case of articles which had been purchased with borrowed money. The government agreed to hand over the purchase money within 5 years from the date of the acquisition of the lines, in public loan-bonds bearing 5 % interest calculated at their face value; the bonds to be redeemed out of the net profits accruing from the purchased railways. It was calculated that this redemption would be effected in a period of 32 years, after which the annual profit accruing to the state from the lines would be 5I millions sterling. But the nationalization scheme, though

apparently the only effective method of linking together and co-ordinating an excessively subdivided system of lines, has proved a source of considerable financial embarrassment. For when the state constituted itself virtually the sole owner of railways, it necessarily assumed responsibility for extending them so that they should 'suffice to meet the wants of a nation numbering some 50 millions. Such extension could be effected only by borrowing money. Now the government was pledged by the diet in 1907 to an expendi- ture of Iij millions (spread over 8 years) for extending the old state system of roads, and an expenditure of 6{ millions (spread over 12 years) for improving them. But from the beginning of that year, a

period of extreme commercial and financial depression set in, and the treasury had to postpone all recourse to loans for whatever purpose, so that railway progress was completely checked in the field alike of the original and the acquired state lines. Moreover, all securities underwent such sharp depreciation that, on the one hand, the government hesitated to hand over the bonds representing the purchase-price of the railways, lest such an addition to the volume of stocks should cause further depreciation, and, on the other, the former owners of the nationalized lines found the character of their bargain greatly changed. In these circumstances the govern- ment decided to take a strong step, namely, to place the whole of the railways owned T>y it — the original state lines as well as those nationalized— in an account independent of the regular budget, and to devote their entire profits to works of extension and improve- ment, supplementing the amount with loans from the treasury when necessary.

In the sequel of the war of 1904-5 Japan, with China's consent, acquired from Russia the lease of the portion of the South-Manchuria South railway (see Manchuria) between Kwang-cheng-tsze

Manchuria (Chang-chun) on the north and Tairen (Dalny), Port Railway. Artnur and Niuchwang on the south — a total length of 470 m. At the close of 1906 this road was handed over to a joint-stock company with a capital of 20 millions sterling, the government contributing 10 millions in the form of the road and its associated properties; the public subscribing 2 millions, and the company being entitled to issue debentures to the extent of 8 millions, the principal and interest of these debentures being officially guar- anteed. Four millions' worth of debentures were issued in London in 1907 and 4 millions in 1908. This company's programme is not limited to operating the railway. It also works coal-fields at Yentai and Fushun; has a line of steamers plying between Tairen and Shanghai; and engages in

enterprises of electricity, warehousing and the management of houses and lands within zones 50 li (17 m.) wide on either side of the line. The government guarantees 6% interest on the capital paid up by the general public.

Not until 1905 did Japan come into possession of an electric railway. It was a short line of 8 m., built in Kioto for the purposes Electric °^ a domest ic exhibition held in that city. Thence- Rallways. f° rtn this class of enterprise grew steadily in favour, so that, in 1907, there were 16 companies with an aggregate capital of 8 millions sterling, having 165 m. open to traffic and 77 m. under construction. Fifteen other companies with an aggregate capital of 3 millions had also obtained charters. The principal of these is the Tokyo railway company, with a subscribed capital of 6 millions (3J paid up), 90! m. of line open and 149 m. under construction. In 1907 it carried 153 million passengers, and its net earnings were £300,000.

The traditional story of prehistoric Japan indicates that the first recorded emperor was an over-sea invader, whose followers

must therefore have possessed some knowledge of cUmm™!- shi P- buildin g and navigation. But in what kind of cations. cralt tnev sailed and how they handled them, there is

nothing to show clearly. Nine centuries later, but still 500 years before the era of surviving written annals, an empress is said to have invaded Korea, embarking her forces at Kobe (then called Takekura) in 500 vessels. In the middle of the 6th century we read of a general named Abe-no-hirafu who led a flotilla up the Amur river to the invasion of Manchuria (then called Shukushin). All these things show that the Japanese of the earliest era navigated the high sea with some skill, and at later dates down to medieval times they are found occasionally sending forces to Korea and constantly visiting China in vessels which seem to have experienced no difficulty in making the voyage. The 16th century was a period of maritime activity so marked that, had not artificial checks been applied, the Japan- ese, in all probability, would have obtained partial command of Far-Eastern waters. They invaded Korea; their corsairs harried the coasts of China; two hundred of their vessels, sailing under authority of the Taiko's vermilion seal, visited Siam, Luzon, Cochin China and Annam, and they built ships in European style which crossed the Pacific to Acapulco. But this spirit of adventure was chilled at the close of the 16th century and early in the 17th, when events connected with the propagation of Christianity taught the Japanese to believe that national safety could not be secured without international isolation. In 1638 the ports were closed to all foreign ships except those flying the flag of Holland or of China, and a strictly enforced

edict forbade the building of any vessel having a capacity of more than 500 koku (150 tons) or constructed for purposes of ocean naviga- tion. Thenceforth, with rare exceptions, Japanese craft confined xv. 7

themselves to the coastwise trade, ceased altogether.

Things remained thus until the middle of the 19th century, when a growing knowledge of the conditions existing in the West warned the Tokugawa administration that continued isolation would be suicidal. In 1853 the law prohibiting the construction of sea-going ships was revoked and the Yedo government built at Uraga a sailing vessel of European type aptly called the " Phoenix " (" Howo Maru "). Just 243 years had elapsed since the founder of the Tokugawa dynasty constructed Japan's first ship after a foreign model, with the aid of an English pilot, Will Adams. In 1853 Commodore M. C. Perry made his appearance, and thenceforth everything conspired to push Japan along the new path. The Dutch, who had been proximately responsible for the adoption of the seclusion policy in the 17th century, now took a prominent part in promoting a liberal view. They sent to the Tokugawa a present of a man-of-war and urged the vital necessity of equipping the country with a navy. Then followed the establishment of a naval college at Tsukiji in Yedo, the building of iron-works at Nagasaki, and the construction at Yokosuka of a dockyard destined to become one of the greatest enterprises of its kind in the East. This last undertaking bore witness to the patriotism of the Tokugawa rulers, for they reso- lutely carried it to completion during the throes of a revolution which involved the downfall of their dynasty. Their encourage- ment of maritime enterprise had borne fruit, for when, in 1867, they restored the administration to the Imperial court, 44 ocean-going ships were found among their possessions and 94 were in the hands of the feudatories, a steamer and 20 sailing vessels having been constructed in Japan and the rest purchased abroad.

If the Tokugawa had been energetic in this respect, the new government was still more so. It caused the various maritime carriers to amalgamate into one association called the Nippon- koku yubinjokisen kaisha (Mail SS. Company of Japan), to which were transferred, free of charge, the steamers, previously the property of the Tokugawa or the feudatories, and a substantial subsidy was granted by the state. This, the first steamship com- pany ever organized in Japan, remained in existence only four years. Defective management and incapacity to compete with foreign-owned vessels plying between the open ports caused its downfall (1875). Already, however, an independent company had appeared upon the scene.

Organized and controlled by a man (Iwasaki Yataro) of exceptional enterprise and business faculty, this Mitsubishi kaisha (three lozenge company, so called from the design on its flag), working with steamers chartered from the former feudatory of Tosa, to which clan Iwasaki belonged, proved a success from the outset, and grew with each vicissitude of the state. For when (1874) the Meiji government's first complications with a foreign country necessitated the des- patch of a military expedition to Formosa, the administration had to purchase 63 foreign steamers for transport purposes, and these were subsequently transferred to the mitsubishi company together with all the vessels (17) hitherto in the possession of the Mail SS. Company, the Treasury further granting to the mitsubishi a subsidy of £50,000 annually. Shortly afterwards it was decided to purchase a service maintained by the Pacific Mail SS. Company with 4 steamers between Yokohama and Shanghai, and money for the purpose having been lent by the state to the mitsubishi, Japan's first line of steamers to a foreign country was firmly established, just 20 years after the law interdicting the construction of ocean-going vessels had been rescinded.

The next memorable event in this~chapter of history occurred in 1877, when the Satsuma clan, eminently the most powerful and most warlike among all the former feudatories, took the field in open rebellion. For a time the fate of the government hung in the balance, and only by a flanking movement over-sea was the rebellion crushed. This strategy compelled the purchase of 10 foreign steamers, and these too were subsequently handed over to the mitsubishi company, which, in 1880, found itself possessed of 32 ships aggregating 25,600 tons, whereas all the other vessels of foreign type in the country totalled only 27 with a tonnage of 6500. It had now become

apparent that the country could not hope to meet emergencies which might at any moment arise, especially in connexion with Korean affairs, unless the development of the mercantile marine proceeded more rapidly. Therefore in 1 88 1 the formation of a new company was officially promoted. It had the name of the kyodo unyu kaisha (Union Transport Company) ; its capital was about a million sterling ; it received a large subsidy from the state, and its chief purpose was to provide vessels for military uses and as commerce-carriers. Japan had now definitely embraced the policy of entrusting to private companies rather than to the state the duty of acquiring a fleet of vessels capable of serving as transports or auxiliary cruisers in time of war. But there was now seen the curious spectacle of two companies (the Mitsubishi and the Union Transport) com- peting in the same waters and both subsidized by the treasury. After this had gone on for four years, the two companies were amal- gamated

(1885) into the Nippon yusen kaisha (Japan Mail SS. Com- pany) with a capital of £1,100,000 and an annual subsidy of £88,000, fixed on the basis of 8% of the capital. Another company had come into existence a few months earlier. Its fleet consisted of 100 small steamers, totalling 10,000 tons, which had hitherto been competing in the Inland Sea.

Japan now possessed a substantial mercantile marine, the rate of whose development is indicated by the following figures : —

[MARITIME COMMUNICATIONS

27,000 tons at home and bought 177,000 abroad, so that the net increase to her mercantile fleet of steamers was 133,000 tons. The following table shows the growth of her marine during the ten years ending 1907: —

Steamers.

Number. Tons.

• 35 15.498

. 642 122,300

Sailing Vessels.

Number. Tons. . II.. 2,454

. 780 46,065

Totals.

Number. Tons.

46 17,952 1,422 168,365

Steamers.

Sailing

Vessels.

Totals.

Year.

Number.

Gross Tonnage.

Number.

Gross Tonnage.

Number.

Gross Tonnage.

1898 .

. • 1130

477430

1914

170,194

3044

648,324

1899 .

. 1221

510,007

3322

286,923

4543

467,930

1900 .

• • 1329

543,365

3850

320,572

5179

863,937

1901 .

• • 1395

583.532

4026

336,528

5471

920,060

1902 .

• ■ H4I

610,445

3907

336,154

5348

946,600

1903 .

■ • 1570

663,220

3934

328,953

5504

992,173

1904

■ • I8I5

798,240

394°

329.125

5755

1,127,365

1905 ■

. . 1988

939,749

4132

336,571

6170

1,276,320

1906 .

. . 2103

1,041,569

4547

353.356

6700

1.395.925

1907 .

■ • 2139

1,115,880

4728

365.559

6867

1,481,439

Year.

1870 . . 1892 . .

Nevertheless, only 23 % of the exports and imports was transported in Japanese bottoms in 1892, whereas foreign steamers took 77%. This discrepancy was one of the subjects discussed in the first session of the diet, but a bill presented by the government for encouraging navigation failed to obtain parliamentary consent, and in 1893 the Japan Mail SS. Company, without waiting for state assistance, opened a regular service to Bombay mainly for the purpose of carrying raw cotton from India to supply the spinningindustry which had now assumed great importance in Japan. Thus the rising sun flag flew for the first time outside Far-Eastern waters. Almost immediately after the establishment of this line, Japan had to engage in war with China, which entailed the despatch of some two hundred thousand men to the neighbouring continent and their maintenance there for more than a year. All the country's available shipping resources did not suffice for this task. Additional vessels had to be purchased or chartered, and thus, by the beginning of 1896, the mercantile marine of Japan had grown to 899 steamers of 373,588 tons, while the sailing vessels had diminished to 644 of 44,000 tons.

In 1897 there occurred an event destined to exercise a potent influence on the fortunes not only of Japan herself but also of her mercantile marine. No sooner had she exchanged with China ratifications of a treaty of peace which seemed to prelude a long period of tranquillity, than Russia, Germany and France ordered her to restore all the continental territory ceded to her by China. Japan then recognized that her hope of peace was delusive, and that she must be prepared to engage in a struggle incomparably more serious than the one from which she had just emerged. Determined that when the crucial moment came she should not be found without ample means for transporting her armies, the government, under the leadership of Prince Ito and with the consent of the diet, enacted, in March 1896 laws liberally encouraging ship-building and naviga- tion. Under the navigation law " any Japanese subject or any commercial company whose partners or shareholders were all Japan- ese subjects, engaged in carrying passengers and cargo between Japan and foreign countries or between foreign ports, in their own vessels, which must be of at least 1000 tons and registered in the shipping list of the Empire, became entitled to subsidies propor- tionate to the distance run and the tonnage of the vessels "; and under the ship-building law, bounties were granted for the

construc- tion of iron or steel vessels of not less than 700 tons gross by any Japanese subject or any commercial company whose partners and shareholders were all Japanese. The effect of this legislation was marked. In the period of six years ended 1902, no less than 835 vessels of 455,000 tons were added to the mercantile marine, and the treasury found itself paying encouragement money which totalled six hundred thousand pounds annually. Ship-building underwent remarkable development. Thus, while in 1870 only 2 steamers aggregating 57 tons had been constructed in Japanese yards, 53 steamers totalling 5380 tons and 193 sailing vessels of 17,873 tons were launched in 1900. By the year 1907 Japan had 216 private ship yards and 42 private docks, 1 and while the government yards were able to build first-class line-of-battle ships of the largest size, the private docks were turning out steamers of 9000 tons burden. When war broke out with Russia in 1904, Japan had 567,000 tons. of steam shipping, but that stupendous struggle obliged her to materially augment even this great total. In operations connected with th« war she lost 71,000 tons, but on the other hand, she built

1 The largest is the mitsubishi at Nagasaki. It has a length of 722 ft. Next stands the kawasaki at Kobe, and in the third place is the uraga.

Built

in Japan.

amers

Sailing Ves

479

1301

554

2771

653

3302

754

3559

813

3585

855

5304

947

3324

1028

3508

IIOO

3859

1 150

4033

imers.

Sailing Vessels

194

9

199

12

206

7

215

6

220

6

233

8

277

8

357

11

387

11

419

12

With regard to the development of ship-building in Japanese yards the following figures convey information : —

Numbers of Vessels built in Japan and Numbers Purchased Abroad

Purchased abroad.

Year.

1898

1899

1900

1901

1902

1903

1904

1905 1906 1907

In the building of iron and steel ships the Japanese are obliged to import much of the material used, but a large steel-foundry has been established under government auspices at Wakamatsu in Kiushiu, that position having been chosen on account of comparative proximity to the Taiya iron mine in China, where the greater part of the iron ore used for the foundry is

procured.

Simultaneously with the growth of the mercantile marine there has been a marked development in the number of licensed mariners ; that is to say, seamen registered by the government „ as having passed the examination prescribed by law. seamen. In 1876 there were only 4 Japanese subjects who satisfied that definition as against 74 duly qualified foreigners holding responsible positions. In 1895 the numbers were 4135 Japanese and 835 foreigners, and ten years later the corresponding figures were 16,886 and 349 respectively. In 1904 the ordinary seamen of the mercan- tile marine totalled 202,710.

There are in Japan various institutions where the theory and practice of navigation are taught. The principal of these is the Tokyo shosen gakko (Tokyo mercantile marine college, _ ,

established in 1875), where some 600 of the men now ™”^ aMon °’ serving as officers arid engineers have graduated. Well araers – equipped colleges exist also in seven other places, all having been established with official co-operation. Mention must be made of a mariners’ assistance association {kaiin ekizai-kai, established in 1800) which acts as a kind of agency for supplying mariners to ship- owners, and of a distressed mariners’ relief association (suinan kyusai-kai) which has succoured about a hundred thousand seamen since its establishment in 1899.

The duty of overseeing all matters relating to the maritime carrying trade devolves on the department of state for communica- tions, and is delegated by the latter to one of its „ , . bureaus (the Kwansen-kyoku, or ships superintendence . f r , “j e t bureau), which, again, is divided into three sections: ,. one for inspecting vessels, one for examining mariners, and one for the general control of all shipping in Japanese waters. For the better discharge of its duties this bureau parcels out the empire into 4 districts, having their headquarters at Tokyo, Osaka, Nagasaki and Hakodate; and these four districts are in turn sub- divided into 18 sections, each having an office of marine affairs (kwaiji-kyoku).

Competition between Japanese and foreign ships in the carriage of the country’s over-sea trade soon began to assume appreciable dimensions. Thus, whereas in 1891 the portion carried in Japanese bottoms was only ij millions sterling ^““Peunon against 12J millions carried by foreign vessels, the J weea corresponding figures in 1902 were 205 millions against a ad Foreirn 32! millions. In other words, Japanese steamers carried <;f,/_ s only 1 1 % of the total trade in 1891, but their share rose to 39% in 1902. The prospect suggested by this record caused some uneasiness, which was not allayed by observing that while the tonnage of Japanese vessels in

Chinese ports was only 2 %

POSTS AND TELEGRAPHS]

JAPAN

195

in 1896 as compared with foreign vessels, the former figure grew to 16 % in 1902; while in Korean ports Japanese steamers almost monopolized the carrying trade, leaving only 18% to their foreign rivals, and even in Hong-Kong the tonnage of Japanese ships increased from 3% in 1896 to 13% in 1900. In 1898 Japan stood eleventh on the list of the thirteen principal maritime countries of the world, but in 1907 she rose to the fifth place. Her principal company, the Nippon yusen kaisha, though established as lately as 1885, now ranks ninth in point of tonnage among the 21 leading maritime companies of the world. This company was able to supply 55 out of a total fleet of 207 transports furnished by all the steamship com- panies of Japan for military and naval purposes during the war with Russia in 1904-5. It may be noted in conclusion that the development of Japan's steam-shipping during the five decades ended 1907 was as follows: —

Tons.

At the end of 1868 17,952

At the end of 1878 63,468

At the end of 1888 197,365

At the end of 1898 648,324

At the end of 1907 1,115,880

There are 33 ports in Japan open as places of call for foreign

steamers. Their names with the dates of their open-

Date of Opening.

Situation.

■ ■ *1859*

Main Island

1868

do.

1867

do.

1899

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

do.

1906

do.

i«59

Kiushiu.

1899

do.

do.

do.

do.

do.

do.

do.

do.

do.

1906

do.

• *1899*

Tsushima.

do.

do.

. *do.*

do.

do.

Riukiu.

. do.

Yezo.

. do.

do.

. do.

do.

. 1865

do.

1899

Formosa.

do.

do.

do.

do.

. do.

do.

Place. United States of America

Canada

Mexico

S. America

Philippines

Hawaii 65,008

Australasia 7 I ,t29

Number in

1904.

• 33,849

• 3,838

456

1,496 2,652

Number in

1906.

130,228

5,088

1,294

2,500

2,185

64,310

3,274

Foreign Residents. — The number of foreigners residing in Japan and their nationalities in 1889, 1899 and 1906, respec- tively, were as follow: —

Ope a Ports, r …

ing are as follow :-

Name. Yokohama Kobe Niigata . Osaka Yokkaichi Shimonoseki Itozaki Taketoyo Shimizu . Tsuruga . Nanao Fushiki Sakai Hamada Miyazu . Aomori Nagasaki, Moji Hakata Karatsu . Kuchinotsu Misumi Suminoye Izuhara Sasuna Shikami . Nafa Otaru Kushiro . Mororan . Hakodate Kelung . Tamsui Takow Anping

Emigration. — Characteristic of the Japanese is a spirit of adventure: they

readily emigrate to foreign countries if any inducement offers. A strong disposition to exclude them has displayed itself in the United States of America, in Australasia and in British Columbia, and it is evident that, since one nation cannot force its society on another at the point of the sword, this anti-Asiatic prejudice will have to be respected, though it has its origin in nothing more respectable than the jealousy of the labouring classes. One result is an increase in the number of Japanese emigrating to Korea, Manchuria and S. America. The following table shows the numbers residing at various places outside Japan in 1904 and 1906 respectively: —

Number in Number in

Place. 1904.

China 9,417

Korea 3 I >°93

Manchuria —

Hong-Kong 600

Singapore 1,292

British India Europe

413 183

1906.

27,1.26

100,000

43,823

756

1,428

53°

697

Americans

899

British .

1,701

Russians .

63

French

335

Portuguese

108

Germans .

550

Chinese .

4,975

Koreans .

8

1899.

1906.

1,296

1,650

2,013

2,155

134

211

463

540

158

165

532

670

6,372

12,425

188

254

There are also small numbers of Dutch, Peruvians, Belgians, Swiss, Italians, Danes, Swedes, Austrians, Hungarians, &c. This slow growth of the foreign residents is remarkable when contrasted with the fact that the volume of the country's foreign trade, which constitutes their main business, grew in the same period from 13J millions sterling to 92 millions.

Posts and Telegraphs. — The government of the Restoration did not wait for the complete abolition of feudalism before organizing a new system of posts in accordance with modern needs. At first, letters only were carried, but before the close of 1 87 1 the service was extended so as to include newspapers, printed matter, books and commercial samples, while the area was extended so as to embrace all important towns between Hakodate in the northern island of Yezo and Nagasaki in the southern island of Kiushiu. Two years later this field was closed to private enterprise, the state assuming sole charge of the business. A few years later saw Japan in possession of an organization comparable in every respect with the systems existing in Europe. In 1892 a foreign service was added. Whereas in 1871 the number of post-offices throughout the empire was only 179, it had grown to 6449 in 1907, while the mail matter sent during the latter year totalled 1254 millions (including 15 millions of parcels), and 67,000 persons were en- gaged in handling it. Japan labours under special difficulties for postal purposes, owing to the great number of islands

included in the empire, the exceptionally mountainous nature of the country, and the wide areas covered by the cities in proportion to the number of their inhabitants. It is not surprising to find, therefore, that the means of distribution are varied. The state derives a net revenue of 5 million yen approximately from its postal service. It need scarcely be added that the system of postal money-orders was developed pari passu with that of ordinary correspondence, but in this context one interesting fact may be noted, namely, that while Japan sends abroad only some £25,000 annually to foreign countries through the post, she receives over £450,000 from her over-sea emigrants.

*Japan at the time of the Restoration (1867) was not entirely with- out experience which prepared her for the postal money-order system. Some 600 years ago the idea of the bill of exchange was born in the little town of Totsugawa b°*j (Yamato province), though it did not obtain much «* V ** development before the establishment of the Tokugawa aa s '*

shogunate in the 17th century. The feudal chiefs, having then to transmit large sums to Yedo for the purposes of their compulsory residence there, availed themselves of bills of exchange, and the shogun's government, which received considerable amounts in Osaka, selected ten brokers to whom the duty of effecting the transfer of these funds was entrusted. Subsequently the 10 chosen brokers were permitted to extend their services to the general public, and a recent Japanese historian notes that Osaka thus became the birth- place of banking business in Japan. Postal money-orders were therefore easily appreciated at the time of their introduction in 1875. This was not true of the postal savings bank, however, an institution which came into existence in the same year. It was

altogether a novel idea that the public at large, especially the lower sections of it, should entrust their savings to the government for safe keeping, especially as the minimum and maximum deposited at one time were fixed at such petty sums as 10 sen (2|d.) and 50 sen (is.), respectively. Indeed, in the circumstances, the fact that £1500 was deposited in the first year must be regarded as notable. Subsequently deposits were taken in postage stamps, and arrange- ments were effected for enabling depositors to pay money to distant creditors through the bank by merely stating the destination and the amount of the nearest post office. In 1908 the number of depositors in the post office savings bank was 8217, and their deposits

exceeded 10 millions sterling. Thirty per cent, of the depositors belonged to the agricultural classes, 13 to the commercial and only 6 to the industrial.

Rapid communication by means of beacons was not unknown in ancient Japan, but code-signalling by the aid of flags was not T 1 vraah introduced until the 17th century and was probably e egr p s. guggled by observing the practice of foreign mer- chantmen. Its use, however, was peculiar. The central office stood at Osaka, between which city and many of the principal provincial towns rudely constructed towers were placed at long distances, and from one to another of these intelligence as to the market price of rice was flashed by flag-shaking, the signals being read with tele- scopes. The Japanese saw a telegraph for the first time in 1854, when Commodore Perry presented a set of apparatus to the shogun, and four years later the feudal chief of Satsuma (Shimazu Nariakira) caused wires to be erected within the enclosure of his castle. The true value of electric telegraphy was first demonstrated to the Japanese in connexion with an insurrection in 1877, under the leader- ship of Saigo, the favourite of this same Shimazu Nariakira. Before that time, however, a line of telegraph had been put up between Tokyo and Yokohama (18 m.) and a code of regulations had been enacted. Sudden introduction to such a mysterious product of foreign science created superstitious dread in the minds of a few of the lower orders, and occasional attempts were made at the outset to wreck the wires. In 1886 the postal and telegraph offices were amalgamated and both systems underwent large development. Whereas the length of wires at the end of the fourth year after the introduction of the system was only 53 m., and the number of messages 20,000, these figures had grown in 1907 to 95,623 and 25 millions, respectively. Several cables are included in these latter figures, the longest being that to Formosa (1229 m.). Wireless telegraphy began to come into general use in 1908, when several vessels belonging to the principal steamship companies were equipped with the apparatus. It had already been employed for some years by the army and navy, especially during the war with Russia, when the latter service installed a new system, the joint invention of Captain Tonami of the navy, Professor S. Kimura of the naval college and Mr M. Matsushiro of the department of com- munications. The telegraph service in Japan barely pays the cost of operating and maintenance.

The introduction of the telephone into Japan took place in 1877, but it served official purposes solely during 13 years, and even when Telenhoaes t 1 ˆ) ' was placed at the disposal of the general p ' public its utilities found at first few appreciators.*

But this apathy soon yielded to a mood of eager employment, and the resources of the government (which monopolized the enterprise) proved inadequate to satisfy public demand. Automatic telephones were ultimately

set up at many places in the principal towns and along the most frequented highways. The longest distance covered was from Tokyo to Osaka (348 m.). In 1907 Japan had 140,440 m. of telephone wires, 262 exchanges, 159 automatic telephones, and the approximate number of messages sent was 160 millions. The telephone service pays a net revenue of about £100,000 annually.

Agriculture. — The gross area of land in Japan — excluding Formosa and Sakhalin — is 89,167,880 acres, of which 53,487,022 acres represent the property of the crown, the state and the communes, the rest (35,680,868 acres) being owned by private persons. Of the grand total the arable lands represent 1 5,301 ,297 acres. With regard to the immense expanse remaining unpro- ductive, experts calculate that if all lands inclined at less than 15 be considered cultivable, an area of 10,684,517 acres remains to be reclaimed, though whether the result would repay the cost is a question hitherto unanswered. The cultivated lands are thus classified, namely, wet fields (called also paddy fields or rice lands), 6,871,437 acres; dry fields (or upland farms), 5,741,745 acres, and others, 2,688,115 acres.

Paddy fields are to be seen in every valley or dell where farming is practicable; they are divided into square, oblong or triangular Rke plots by grass-grown ridges a few inches in height

and on an average a foot in breadth — the rice being planted in the soft mud thus enclosed. Narrow pathways intersect these rice-valleys at intervals, and rivulets (generally flowing between low banks covered with clumps of bamboo) feed ditches cut for purposes of irrigation. The fields are generally kept

under water to a depth of a few inches while the crops are young, but are drained immediately before harvesting. They are then dug up, and again flooded before the second crop is planted out. The rising grounds which skirt the rice-land are tilled by the hoe, and produce Indian corn, millet and edible roots. The well-wooded slopes supply the peasants with timber and firewood. Thirty-six per cent, of the rice-fields yield two crops yearly. The seed is sown in small beds, and the seedlings are planted out in the fields after attaining the height of about 4 in. The finest rice is produced in the fertile plains watered by the Tonegawa in the province of Shimosa, but the grain of Kaga and of the two central provinces of Settsu and Harima is also very good.

Not only does rice form the chief food of the Japanese but also the national beverage, called sake, is brewed from it. In colour the best sake resembles very pale sherry; the taste „ .

is rather acid. None but the finest grain is used in a e ‘

its manufacture. Of sake there are many varieties, from the best quality down to shiro-zake or ” white sake,” and the turbid sort, drunk only in the poorer districts, known as nigori-zake; there is also a sweet sort, called mirin.

The various cereal and other crops cultivated in Japan, the areas devoted to them and the annual production are shown in the following table : —

1898. 1902. 1906.

Acres. Acres. Acres.

Rice 7,044,060 7,117,990 7,246,982

Barley 1,649,240 1,613,270 1,674,595

Rye 1,703,410 1,688,635 1,752,095

Wheat 1,164.020 1,210,435 1,107,967

Millet 693,812 652,492 594,280

Beans 1, 503,395 1,488,600 1,478,345

Buckwheat …. 450,100 414.375 4°2,575

Rape-seed …. 377,070 392,612 352,807

Potatoes 92,297 105,350 140,197

Sweet Potatoes . . . 668,130 693,427 717,620

Cotton 100,720 51,750 24,165

Hemp 62,970 42,227 34,845

Indigo (leaf) . . . 122,180 92,982 40,910

Sugar Cane

1903.

4!-75o

1905. 43.308

1906.

45.o87

It is observable that no marked increase is taking place in the area under cultivation, and that the business of growing cotton, hemp and indigo is gradually diminishing, these staples being sup- plied from abroad. In Germany and Italy the annual additions made to the arable area average 8 % whereas in Japan the figure is only 5 %• Moreover, of the latter amount the rate for paddy fields is only 3ˆ3 % against 7-9 % in the case of upland farms. This means that the population is rapidly outgrowing its supply of home- produced rice, the great food-stuff of the nation, and the price of that cereal consequently shows a steady tendency to appreciate. Thus whereas the market value was 5s. 5d. per bushel in 1901, it rose to 6s. 9d. in 1906.

*Scarcely less important to Japan than the cereals she raises are her silk and tea, both of which find markets abroad. Her production of the latter staple does not show any sign of marked _„. . development, for though tea is almost as essential an * aB article of diet in Japan as rice, its foreign consumers are ea * practically limited to the United States and their demand does not increase. The figures for the 10-year period ended 1906 are as follow : —*

Area under cultiva- Tea produced tion (acres). (lb av.).

1897 H7,230 70,063,076

1901 122,120 57.075.486

1906 126,125 58,279,286

Sericulture, on the contrary, shows steady development year by year. The demand of European and American markets has very elastic limits, and if Japanese growers are content with moderate, but still substantial, gains they can find an almost unrestricted sale in the West. The development from 1886 to 1906 was as follows: —

Raw silk produced yearly (lb).

■ • *8.739.273* • *19.087,310*

. . *20,705,644* . *21,630,829*

■ • *24,215,324*

Average from 1886 to 1889

1895

1900

1905

1906

The chief silk-producing prefectures in Japan, according to the order of production, are Nagano, Gumma, Yamanashi, Fukushima, Aichi and Saitama. At the close of 1906 there were 3843 filatures throughout the country, and the number of families engaged in sericulture was 397,885.

Lacquer, vegetable wax and tobacco are also important staples of production. The figures for the ten-year period, 1897 to 1906, are as follow : —

MINERALS]

JAPAN

197

Improve- ments,

Lacquer Vegetable Tobacco (lb). wax (lb). (lb).

1897 344.267 25,850,790 110,572,925

1906 668,266 39,714,661 101,718,592

While the quantity of certain products increases, the number of filatures and factories diminishes, the inference being that industries are coming to be conducted on a larger scale than was formerly the case. Thus in sericulture the filatures diminished from 4723 in 1897 to 3843 in 1906; the number of lacquer factories from 1637 to 1 123 at the same dates, and the number of wax factories from 2619 to 1929.

It is generally said that whereas more than 60% of Japan's

entire population is engaged in agriculture, she remains far behind

the progressive nations of Europe in the application

^?2!™ of scientific principles to farming. Nevertheless if we

—”~””- take for unit the average value of the yield per hectare

in Italy, we obtain the following figures: —

Yield per hectare

Italy 100

India 51

Germany 121

France 122

Egypt 153

Japan 213

In the realm of agriculture, as in all departments of modern Japan’s material development, abundant traces are found of official activity. Thus, in the year 1900, the government enacted laws designed to correct the excessive subdivision of farmers’ holdings; to utilize unproductive areas lying between cultivated fields; to straighten roads; to facilitate irrigation; to promote the use of machinery; to make known the value of artificial fertilizers; to conserve streams and to prevent inundations. Further, in order to furnish capital for the purposes of farming, 46 agricultural and commercial banks — one in each prefecture — were established with a central institution called the hypothec bank which assists them to collect funds. A Hokkaido colonial bank and subsequently a bank of Formosa were also organized, and a law was framed to encourage the formation of co-operative societies which should develop a system of credit, assist the business of sale and purchase and concentrate small capitals. Experimental stations were another official creation. Their functions were to carry on investigations relating to seeds, diseases of cereals, insect pests, stock-breeding, the use of implements, the manufacture of agricultural products and cognate matters. Encouragement by grants in aid was also given to the establishment of similar experi- mental farms by private persons in the various prefectures, and such farms are now to be found everywhere. This official initiative, with equally successful results, extended to the domain of sericulture and tea-growing. There are two state sericultural training institutions where not only the rearing of silk-worms and the management of filatures are taught, but also experiments are made; and these institutions, like the state agricultural stations, have served as models for institutes on the same lines under private auspices. A silk- conditioning house at Yokohama; experimental tea-farms; laws to prevent and remove diseases of plants, cereals, silkworms and cattle, and regulations to check

dishonesty in the matter of fertilizers, complete the record of official efforts in the realm of agriculture during the Meiji era.

One of the problems of modern Japan is the supply of cattle. With a rapidly growing taste for beef — which, in former days, was not an article of diet— there is a slow but steady diminution in the stock of cattle. Thus while the num- ber of the latter in 1897 was 1.214,163, out of which total 158,504 were slaughtered, the corresponding figures in 1906 were 1,190,373 and 167,458, respectively. The stock of sheep (3500 in 1906) increases slowly, and the stocks of goats (58,694 in 1897 and 74,750 in 1906) and swine (206,217 in 1897 and 284,708 in 1906) grow with somewhat greater rapidity, but mutton and pork do not suit Japanese taste, and goats are kept mainly for the sake of their milk. The government has done much towards the improve- ment of cattle and horses by importing bulls and sires, but, on the whole, the mixed breed is not a success, and the war with Russia in 1904-5 having clearly disclosed a pressing need of heavier horses for artillery and cavalry purposes, large importations of Australian, American and European cattle are now made, and the organization of race-clubs has been encouraged throughout the country.

Forests. — Forests occupy an area of 55 millions of acres, or 60 % of the total superficies of Japan, and one-third of that expanse, namely, 18 million acres, approximately, is the property of the state. It cannot be said that any very practical attempt has yet been made to develop this source of wealth. The receipts from forests stood at only 13 million yen in the budget for I 907-1908, and even that figure compares favourably with the revenue of only 3 millions derived from the same source in the fiscal year 1904-1905. This failure to utilize a valuable asset is chiefly due to defective communi- cations, but the demand for timber has already begun to increase. In 1907 a revised forestry law was promulgated, according to which the administration is competent to prevent the destruction of forests and to cause the planting of plains and waste-lands, or the

Stock- breedlng.

re-planting of denuded areas. A plan was also elaborated for systematically turning the state forests to valuable account, while, at the same time, providing for their conservation.

Fisheries. — From ancient times the Japanese have been great fishermen. The seas that encircle their many-coasted islands teem with fish and aquatic products, which have always constituted an essential article of diet. Early in the 18th century, the Tokugawa administration, in pursuance of a policy of isolation, interdicted the construction of ocean-going ships, and the people's enterprise in the matter of deep-sea fishing suffered a severe

check. But shortly after the Restoration in 1867, not only was this veto rescinded, but also the government, organizing a marine bureau and a marine products examination office, took vigorous measures to promote pelagic industry. Then followed the formation of the marine products association under the presidency of an imperial prince. Fishery training schools were the next step; then periodical exhibitions of fishery and marine products ; then the introduction and improvement of fishing implements ; and then by rapid strides the area of opera- tions widened until Japanese fishing boats of improved types came to be seen in Australasia, in Canada, in the seas of Sakhalin, the Maritime Province, Korea and China ; in the waters of Kamchatka and in the Sea of Okhotsk. No less than 9000 fishermen with 2000 boats capture yearly about £300,000 worth of fish in Korean waters ; at least 8000 find a plentiful livelihood off the coasts of Sakhalin and Siberia, and 200 Japanese boats engage in the salmon-fishing of the Fraser River. In 1893, the total value of Japanese marine products and fish captured did not exceed ii millions sterling, whereas in 1906 the figure had grown to 5§ millions, to which must be added 3J millions of manufactured marine products. Fourteen kinds of fish represent more than 50 % of the whole catch, namely, (in the order of their importance) bonito (katsuo), sardines (iwashi), pagrus (tai), cuttle-fish and squid (tako and ika), mackerel (saba), yellow tail (buri), tunny-fish (maguro), prawns (ebi), sole (karei), grey mullet {bora), eels (unagi), salmon (shake), sea-ear (awabi) and carp (koi). Altogether 700 kinds of aquatic products are known in Japan, and 400 of them constitute articles of diet. Among manu- factured aquatic products the chief are (in the order of their impor- tance) dried bonito, fish guano, dried cuttle-fish, dried and boiled sardines, dried herring and dried prawns. The export of marine products amounted to £900,000 in 1906 against £400,000 ten years previously; China is the chief market. As for imports, they were insignificant at the beginning of the Meiji era, but by degrees a demand was created for salted fish, dried sardines (for fertilizing), edible sea-weed, canned fish and turtle-shell, so that whereas the total imports were only £1600 in 1868, they grew to over £400,000 in 1906.

Minerals. — Crystalline schists form the axis of Japan. They run in a general direction from south-west to north-east, with chains starting east and west from Shikoku. On these schists rocks of every age are superimposed, and amid these somewhat complicated geological conditions numerous minerals occur. Precious stones, however, are not found, though crystals of quartz and antimony as well as good specimens of topaz and agate are not infrequent.

Gold occurs in quartz veins among schists, paleozoic or volcanic rocks and in placers. The quantity obtained is not large, but it shows tolerably steady development, and may possibly be much increased by more generous use of

capital and larger recourse to modern methods.

The value of the silver mined is approximately equal to that of the gold. It is found chiefly in volcanic rocks (especially tuff), in the form of sulphide, and it is usually associated with „„ gold, copper, lead or zinc. ver ‘

Much more important in Japan’s economics than either of the precious metals is copper. Veins often showing a thickness of from 70 to 80 ft., though of poor quality (2 to 8%), are found c bedded in crystalline schists or paleozoic sedimentary opper.

rocks, but the richest (10 to 30%) occur in tuff and other volcanic rocks.

There have not yet been found any evidences that Japan is rich in iron ores. Her largest known deposit (magnetite) occurs at Kamaishi in Iwate prefecture, but the quantity of pig- iron produced from the ore mined there does not exceed , ”’ 37,000 tons annually, and Japa,n is obliged to import from the neighbouring continent the greater part of the iron needed by her for ship-building and armaments.

Considerable deposits of coal exist, both anthracite and bituminous. The former, found chiefly at Amakusa, is not greatly inferior to the Cardiff mineral; and the latter — obtained in abundance _ ,

in Kiushiu and Yezo — is a brown coal of good medium a ‘

quality. Altogether there are 29 coal-fields now actually worked in Japan, and she obtained an important addition to her sources of supply in the sequel to the war with Russia, when the Fushun mines near Mukden, Manchuria, were transferred to her. During the 10 years ending in 1906, the market value of the coal mined in Japan grew from less than 2 millions sterling to over 6 millions.

Petroleum also has of late sprung into prominence on the list of her mineral products. The oil-bearing strata — which occur mainly in tertiary rocks — extend from Yezo to Formosa, but _. . the principal are in Echigo, which yields the greater ™ vroleum – part of the petroleum now obtained, the Yezo and Formosa wells

Gold.

being still little exploited. The quantity of petroleum obtained in Japan in 1897 was 9 million gallons, whereas the quantity obtained in 1906 was 55 millions.

Japanese mining enterprise was more than trebled during the decade 1897 to 1906, for the value of the minerals taken out in the former year was only 3! millions sterling, whereas the corresponding figure for 1906 was 11 millions. The earliest mention of gold- mining in Japan takes us back to the year a.d. 696, and by the 16th century the country had acquired the reputation of being rich in gold. During the days of her medieval intercourse with the outer world, her stores of the precious metals were largely reduced, for between the years 1602 and 1766, Holland, Spain, Portugal and China took from her 313,800 lb (troy) of gold and 11,230,000 lb of silver.

Copper occupied a scarcely less important place in Old Japan. From a period long anterior to historic times this metal was employed to manufacture mirrors and swords, and the introduction of Buddhism in the 6th century was quickly followed by the casting of sacred images, many of which still survive. Finding in the 1 8th century that her foreign intercourse not only had largely denuded her of gold and silver, but also threatened to denude her of copper, Japan set a limit (3415 tons) to the yearly export of the latter metal. After the resumption of administrative power by the emperor in 1867, attention was quickly directed to the question of mineral resources; several Western experts were employed to conduct surveys and introduce Occidental mining methods, and ten of the most important mines were worked under the direct auspices of the state in order to serve as object lessons. Subsequently these mines were all transferred to private hands, and the government now retains possession of only a few iron and coal mines whose products are needed for dockyard and arsenal purposes. The following table shows the recent progress and present condition of mining industry in Japan: —

1897 1901 1906

1897 1901 1906

Gold

Quantity. Value.

oz. £

34.553 136,834

82,517 330.076

90,842 363.715

Iron

Quantity. Value.

Tons. £

35,178 103,559

46,456 123,701

85,203 268,911

Antimony

Silver

Quantity. Value.

oz. £

1,809,805 208,200″

1,824,842 211,682

2,623,212 243,914

Coal Value.

Quantity. Tons.

5,229,662 9,025,325

12,980,103

£

1.899,592 3,060,931 6,314,400

Copper Quantity. Value. Tons. £

19,722 869,266 26,495 1,625,244 37.254 3.007,992

Petroleum Quantity. Value. Gallons. £

9,248,800 44.389

39.35i,96o 227,841 55.i35.88o

century luxurious habits prevailed in Kioto under the sway of the Fujiwara regents, and the imperial city's munificent patron- age drew to its precincts a crowd of artisans. But these were not industrials, in the Western sense of the term, and, further, their organization was essentially domestic, each family select- ing its own pursuit and following it from generation to genera- tion without co-operation or partnership with any outsider. The establishment of military feudalism in the 12th century brought a reaction from the effeminate luxury of the metropolis, and during nearly 300 years no industry enjoyed large popularity except that of the armourer and the sword-smith. No sooner, however, did the prowess of Oda Nobunaga and, above all, of Hideyoshi, the taiko, bring within sight a cessation of civil war and the unification of the country, than the taste for beautiful objects and artistic utensils recovered vitality. By degrees there grew up among the feudal barons a keen rivalry in art industry, and the shogun's court in Yedo set a standard which the feuda- tories constantly strove to attain. Ultimately, in the days immediately antecedent to its fall, the shogun's administration sought to induce a more logical system by encouraging local manufacturers to supply local needs only, leaving to Kioto and Yedo the duty of catering to general wants.

But before this reform had approached maturity, the second advent of Western nations introduced to Japan the products of an industrial civilization centuries in advance of her own from the point of view of utility, though nowise superior in the

application of art. Immediately Lead the nation became alive to the

Quantity. Value, necessity of correcting its own in- Tons. £ feriority in this respect. But the

746 10,343 people being entirely without 4.q'.6qo m °dels for organization, without financial machinery and with- out the idea of

3H.550

Quantity.

Tons.

1,133

529

293

Value.

£

27,362 13.481 22,862

Quantity. Tons.

13.175 15.738 12,322

Manganese

Value.

Quantity.

Tons.

13,138

16,007

27,406

Others

stock

£

8,758

10,846

51.365

1897 . 1901 . 1906 .

The number of mine employees in 1907 was 190,000, in round numbers; the number of mining companies, 189; and the aggregate paid-up capital, 10 millions sterling.

Industries.— -In the beginning of the Meiji era Japan was practically without any manufacturing industries, as the term is understood in the Occident, and she had not so much as one joint-stock company. At the end of 1906, her joint-stock com- panies and partnerships totalled 9329, their paid up capital exceeded 100 millions sterling, and their reserves totalled 26 millions. It is not to be inferred, however, from the absence of

manufacturing organizations 50 years ago that such pursuits were deliberately eschewed or despised in Japan. On the con- trary, at the very dawn of the historical epoch we find that sec- tions of the people took their names from the work carried on by them, and that specimens of expert industry were preserved in the sovereign's palace side by side with the imperial insignia. Further, skilled artisans from the neighbouring continent always found a welcome in Japan, and when Korea was success- fully invaded in early times, one of the uses which the victors made of their conquest was to import Korean weavers and .dyers. Subsequently the advent of Buddhism, with its demand for images, temples, gorgeous vestments and rich paraphernalia, gave a marked impulse to the development of artistic industry, which at the outset took its models from China, India and Greece, but gradually, while assimilating many of the best features of the continental schools, subjected them to such great modifi- cations in accordance with Japanese genius that they ceased to retain more than a trace of their originals. From the 9th

Value. £

3.863 3,450

4L338

1.744

2,721 49,690

Sulphur , ... , . . .

v . out the idea of joint

£ ' enterprise, the government had 33,588 to choose between entering the 38,612 field as an instructor, and leaving 61,386 tne na t;on to struggle along an arduous and expensive way Total Values, to tardy development. There „ could be no question as to which s'670508 course would conduce more to 10I839I783 the general advantage, and thus, in days immediately subse- quent to the resumption of administrative power by the emperor, the spectacle was seen of official excursions into the domains of silk-reeling, cement-making, cotton and silk spinning, brick-, burning, printing and book-binding, soap-boiling, type-casting and ceramic decoration, to say nothing of their establishing colleges and schools where all branches of applied science were taught. Domestic exhibitions also were organized, and speci- mens cf the country's products and manufactures were sent under government auspices to exhibitions abroad. On the other hand, the effect of this new departure along Western lines could not but be injurious to the old domestic industries of the country, especially to those which owed their

existence to tastes and tra- ditions now regarded as obsolete. Here again the government came to the rescue by establishing a firm whose functions were to familiarize foreign markets with the products of Japanese artisans, and to instruct the latter in adaptations likely to appeal to Occidental taste. Steps were also taken for training women as artisans, and the government printing bureau set the example of employing female labour, an innovation which soon developed large dimensions. In short, the authorities applied themselves to educate an industrial disposition throughout the country, and as soon as success seemed to be in sight, they gradually trans- ferred from official to private direction the various model enter- prises, retaining only such as were required to supply the needs of the state.

The result of all this effort was that whereas, in the beginning of the Meiji era, Japan had virtually no industries worthy of the name, she possessed in 1896 — that is to say, after an interval of 25 years

of effort — no less than 4595 industrial and commercial companies, joint stock or partnership, with a paid-up capital of 40 millions sterling. Her development during the decade ending in 1906 is shown in the following table : —

Number of companies.

1897 6.H3

1901 8,602

1906 9,329

Paid-up capital (millions sterling).

53

83

107

Reserves

(millions

sterling).

6

12

26

What effect this development exercised upon the country's over-sea trade may be inferred from the fact that, whereas the manufactured goods exported in 1870 were nil, their value in 1901 was 8 millions sterling, and in 1906 the figure rose to over 20 millions. In the following table are given some facts relating to the principal in- dustries in which foreign markets are interested : —

Cotton Yarns'

Spindles.

Operatives.

Quantity produced.

Remarks.

Male.

Female.

1897

1901 1906

768,328 1,181,762 1,425,406

9.933 13,481 13.032

35.059 49.540 59.281

lb

216,913,196 274,861,380

383.359.n3

This is a wholly new industry in Japan. It had no existence be- fore the Meiji era.

Woven Goods

Looms.

Operatives.

Market value of products.

Remarks.

Male.

Female.

1897

1901 1906

947.134 719.550 736,828

54.“9 43.172 40,886

987,110 747.946 751.605

Millionssterling.

19 24 36

It is observable that a decrease in the number of operativesiscon- current with an increase of pro- duction.

Matches

Foreign Paper (as distinguished from Japanese)

~ be 1? c

Operatives.

Quantity produced.

Value.

Remarks.

Male.

Female.

1897

1901 1906

269 261 250

21,447 5.656 5.468

26,277 16,504 18,721

Gross.

24,038,960 32,901,319 54,802,293

£

654.849

926,689

1,551.698

This is an altogether new indus- try. Japan- ese matches now hold the leading place in all Far- Eastern mar- kets.

O U

Operatives.

Quantity produced.

Value.

Remarks.

Male.

Female.

1897 1901 1906

9 13 22

164 2.635 3.774

109 1.397 1.778

lb

46,256,649

113,348,340

218,022,434

£

300,662 714,094 1. 415.778

Had not Japanese fac- tories been established all thispapermust have been im- ported.

In the field of what may be called minor manufactures — as ceramic wares, lacquers, straw-plaits, &c. — there has been corresponding growth, for the value of these productions increased from I J millions sterling in 1897 to 3 J millions in 1906. But as these manufactures do not enter into competition with foreign goods in either Eastern or Western markets, they are interesting only as showing the development of Japan's producing power. They contribute nothing to the solution of the problem whether Japanese industries are destined ultimately to drive their foreign rivals from the markets of Asia, if not to compete injuriously with them even in Europe and

America. Japan seems to have one great advantage over Occidental countries: she possesses an abundance of dexterous and exception- ally cheap labour. It has been said, indeed, that this latter advan- tage is not likely to be permanent, since the wages of labour and the cost of living are fast increasing. The average cost of labour doubled in the interval between 1895 and 1906, but, on the other hand, the number of manufacturing organizations doubled in the same time, while the amount of their paid-up capital nearly trebled. As to the necessaries of life, if those specially affected by government mono- polies be excluded, the rate of appreciation between 1900 and 1906 averaged about 30%, and it thus appears that the cost of living is not increasing with the same rapidity as the remuneration earned by labour. The manufacturing progress of the nation seems, there- fore, to have a bright future, the only serious impediment being deficient capital. There is abundance of coal, and steps have been taken on a large scale to utilize the many excellent opportunities which the country offers for developing electricity by water-power.

The fact that Japan's exports of raw silk amount to more than 12 millions sterling, while she sends over-sea only 3 J millions' worth of silk fabrics, suggests some marked inferiority Si/i- on the part of her weavers. But the true explanation wearing. seems to be that her distance from the Occident handicaps her in catering for the changing fashions of the West. There

cannot be any doubt that the skill of Japanese weavers was at one time eminent. The sun goddess herself, the predominant figure in the Japanese pantheon, is said to have practised weaving; the names of four varieties of woven fabrics were known in pre- historic times; the 3rd century of the Christian era saw the arrival of a Korean maker of cloth; after him came an influx of Chinese who were distributed throughout the country to improve the arts of sericulture and silk-weaving; a sovereign (Yuriaku) of the 5th century employed 92 groups of naturalized Chinese for similar purposes; in 421 the same emperor issued a decree encouraging the cul- ture of mulberry trees and calling for taxes on silk and cotton; the manufacture of textiles was directly supervised by the consort of this sovereign; in 645 a bureau of weaving was established; many other evidences are conclusive as to the great antiquity of the art of silk and cotton weaving in Japan.

The coming of Buddhism in the 6th century contributed not a little to the development of the art, since not only did the priests require for their own vestments and for the decoration of temples silken fabrics of more and more gorgeous description, but also these holy men themselves, careful always to keep touch with the continental developments of their faith, made frequent voyages to China, whence they brought back to Japan a knowledge of whatever technical or artistic improvements the Middle Kingdom could show. When Kioto became the permanent metropolis of the empire, at the close of the 8th century, a bureau was established for weaving brocades and rich silk stuffs to be used in the palace. This preluded an era of some three centuries of steadily developing luxury in Kioto; an era when an essential part of every aristocratic mansion's furniture was a collection of magnificent silk robes for use inthesumptuous No. Then, in the 15th century came the " Tea Ceremonial," when the brocade mountings of a picture or the wrapper of a tiny tea-jar possessed an almost incredible value, and such skill was attained by weavers and dyers that even fragments of the fabrics produced by them command extravagant prices to-day. Kioto always remained, and still remains, the chief producing centre, and to such a degree has the science of colour been developed there that no less than 4000 varieties of tint are distinguished. The sense of colour, indeed, seems to have been a special endowment of the Japanese people from the earliest times, and some of the combinations handed down from medieval times are treasured as incomparable examples. During the long era of peace under the Tokugawa administration the cos- tumes of men and women showed an increasing tendency to richness and beauty. This culminated in the Genroku epoch (1688-1700), and the aristocracy of the present day delight in viewing histrionic performances where the costumes of that age and of its rival, the Momoyama (end of the 16th century) are reproduced.

It would be possible to draw up a formidable catalogue of the various kinds

of silk fabrics manufactured in Japan before the open- ing of the Meiji era, and the signal ability of her weavers has derived a new impulse from contact with the Occident. Machinery has been largely introduced, and though the products of hand looms still enjoy the reputation of greater durability, there has unquestion ably been a marked development of producing power. Japanese looms now turn out about 17 millions sterling of silk textiles, of which less than 4 millions go abroad. Nor is increased quantity alone to be noted, for at the factory of Kawashima in Kioto Gobelins are produced such as have never been rivalled elsewhere.

Commerce in Tokugawa Times. — The conditions existing in Japan during the two hundred and fifty years prefatory to the modern opening of the country were unfavourable to the develop- ment alike of national and of international trade. As to the former, the system of feudal government exercised a crippling influence, for each feudal chief endeavoured to check the exit of any kind of property from his fief, and free interchange of

commodities was thus prevented so effectually that cases are recorded of one feudatory's subjects dying of starvation while those of an adjoining fief enjoyed abundance. International commerce, on the other hand, lay under the veto of the central government, which punished with death anyone attempting to hold intercourse with foreigners. Thus the fiefs practised a policy of mutual seclusion at home, and united to maintain a policy of general seclusion abroad. Yet it was under the feudal system that the most signal development of Japanese trade took place, and since the processes of that development have much historical interest they invite close attention.

As the bulk of a feudal chief's income was paid in rice, arrange- ments had to be made for sending the grain to market and trans- mitting its proceeds. This was effected originally by establishing in Osaka stores (kura-yashiki) , under the charge of samurai, who received the rice, sold it to merchants in that city and remitted the proceeds by official carriers. But from the middle of the 17th century these stores were placed in the charge of tradesmen to whom was given the name of kake-ya (agent). They disposed of the products entrusted to them by a fief and held the money, sending it by monthly instalments to an appointed place, rendering yearly accounts and receiving commission at the rate of from 2 to 4%. They had no special licence, but they were honourably regarded and often distinguished by an official title or an hereditary pension. In fact a kake-ya, of such standing

as the Mitsui and the Konoike families, was, in effect, a banker charged with the finances of several fiefs. In Osaka the method of sale was uniform. Tenders were invited, and these having been opened in the presence of all the store officials and kake-ya, the successful tenderers had to deposit bargain- money, paying the remainder within ten days, and thereafter becom- ing entitled to take delivery of the rice in whole or by instalments within a certain time, no fee being charged for storage. A similar system existed in Yedo, the shogun's capital. Out of the custom of deferred delivery developed the establishment of exchanges where advances were made against sale certificates, and purely speculative transactions came into vogue. There followed an experience common enough in the West at one time: public opinion rebelled against these transactions in margins on the ground that they tended to enhance the price of rice. Several of the brokers were arrested and brought to trial ; marginal dealings were thenceforth forbidden, and a system of licences was inaugurated in Yedo, the number of licensed dealers ' being restricted to 108.

The system of organized trading companies had its origin in the 1 2th century, when, the number of merchants admitted within the confines of Yedo being restricted, it became necessary for those not obtaining that privilege to establish some mode of co-operation, and there resulted the formation of companies with representatives stationed in the feudal capital and share-holding members in the provinces. The Ashikaga shoguns developed this restriction by selling to the highest bidder the exclusive right of engaging in a particular trade, and the Tokugawa administration had recourse to the same practice. But whereas the monopolies instituted by the Ashikaga had for sole object the enrichment of the exchequer, the Tokugawa regarded it chiefly as a means of obtaining worthy representatives in each branch of trade. The first licences were issued in Yedo to keepers of bath-houses in the middle of the 17th century. As the city grew in dimensions these licences increased in value, so that pawnbrokers willingly accepted them in pledge for loans. Subsequently almanack-sellers were obliged to take out licences, and the system was afterwards extended to money- changers.

It was to the fishmongers, however, that the advantages of commercial organization first presented themselves vividly. The greatest fish-market in Japan is at Nihon-bashi in Tokyo (formerly Yedo). It had its origin in the needs of the Tokugawa court. When Iyeyasu (founder of the Tokugawa dynasty) entered Yedo in 1590, his train was followed by some fishermen of Settsu, to whom he granted the privilege of plying their. trade in the adjacent seas, on condition that they furnished a supply of their best fish for the use of the garrison. The remainder they offered for sale at Nihon-bashi. Early in the 17th century one Sukegoro of Yamato province (hence called Yamato-ya) went to Yedo and organized the fishmongers into a

great gild. Nothing is recorded about this man's antecedents, though his mercantile genius entitles him to historical notice. He contracted for the sale of all the fish obtained in the neighbouring seas, advanced money to the fishermen on the security of their catch, constructed preserves for keeping the fish alive until they were exposed in the market, and enrolled all the dealers in a confederation which ultimately consisted of 39 T whole-sale merchants and 246 brokers. The main purpose of Sukegoro's system was to prevent the consumer from dealing direct with the producer. Thus in return for the pecuniary accommodation

1 They were called fuda-sashi (ticket -holders), a term derived from the fact that rice-vouchers were usually held in a split bamboo which was thrust into a pile of rice-bags to indicate their buyer.

granted to fishermen to buy boats and nets they were required to give every fish they caught to the wholesale merchant from whom they had received the advance; and the latter, on his side, had to sell in the open market at prices fixed by the confederation. A somewhat similar system applied to vegetables, though in this case the monopoly was never so close.

It will be observed that this federation of fishmongers approxi- mated closely to a trust, as the term is now understood; that is to say, an association of merchants engaged in the same branch of trade and pledged to observe certain rules in the conduct of their business as well as to adhere to fixed rates. The idea was extended to nearly every trade, 10 monster confederations being organized in Yedo and 24 in Osaka. These received official recognition, and contributed a sum to the exchequer under the euphonious name of " benefit money," amounting to nearly £20,000 annually. They attained a high state of prosperity, the whole of the cities' supplies passing through their hands. 2 No member of a confedera- tion was permitted to dispose of his licence except to a near relative, and if anyone not on the "roll of a confederation engaged in the same business he became liable to punishment at the hands of the officials. In spite of the limits thus imposed on the transfer of licences, one of these documents commanded from £80 to £6,400, and in the beginning of the 19th century the confederations, or gilds, had increased to 68 in Yedo, comprising 1195 merchants. The gild system extended to maritime enterprise also. In the beginning of the 17th century a merchant of Sakai (near Osaka) established a junk service between Osaka and Yedo, but this kind of business did not attain any considerable development until the close of that century, when 10 gilds of Yedo and 24 of Osaka combined to organize a marine-transport company for the purpose of conveying their own merchandise. Here also the principle of monopoly was strictly observed, no goods being shipped for unaffiliated merchants. This carrying trade rapidly assumed large dimensions. The number of junks entering Yedo rose to over

1500 yearly. They raced from port to port, just as tea-clippers from China to Europe used to race in recent times, and troubles incidental to their rivalry became so serious that it was found necessary to enact stringent rules. Each junk-master had to subscribe a written oath that he would comply strictly with the regulations and observe the sequence of sailing as determined by lot. The junks had to call en route at Uraga for the purpose of undergoing official examination. The order of their arrival there was duly registered, and the master making the best record throughout the year received a present in money as well as a complimentary garment, and became the shippers' favourite next season.

Operations relating to the currency also were brought under the control of gilds. The business of money-changing seems to have been taken up as a profession from the beginning of the 15th century, but it was then in the hands of pedlars who carried strings of copper cash which they exchanged for gold or silver coins, then in rare circulation, or for parcels of gold dust. From the early part of the 17th century exchanges were opened in Yedo, and in 1718 the men engaged in this business formed a gild after the fashion of the time. Six hundred of these received licences, and no unlicensed person was permitted to purchase the avocation. Four representatives of the chief exchange met daily and fixed the ratio between gold and silver, the figure being then communicated to the various exchanges and to the shogun's officials. As for the prices of gold or silver in terms of copper or bank-notes, 24 representatives of the exchanges met every evening, and, in the presence of an official censor, settled the figure for the following day and recorded the amount of transactions during the past 24 hours, full information on these points being at once sent to the city governors and the street elders.

The exchanges in their ultimate form approximated very closely to the Occidental idea of banks. They not only bought gold, silver and copper coins, but they also received money on deposit, made loans and issued vouchers which played a very important part in commercial transactions. The voucher seems to have come into existence in Japan in the 14th century. It originated in the Yoshino market of Yamato province, where the hilly nature of the district rendered the carriage of copper money so arduous that rich mer- chants began to substitute written receipts and engagements which quickly became current. Among these documents there was a " joint voucher " (kumiai-fuda) , signed by several persons, any one of whom might be held responsible for its redemption. This had large vogue, but it did not obtain official recognition until 1636, when the third Tokugawa shogun selected 30 substantial merchants and divided them into 3 gilds, each authorized to issue vouchers, provided that a certain sum was deposited by way of security. Such vouchers were obviously a form of bank-note. Their circulation by the exchange came about in a similar

manner. During many years the treasure of the shogun and of the feudal

2 In 1725, when the population of Yedo was about three-quarters of a million, the merchandise that entered the city was 861,893 bags of rice; 795,856 casks of sake; 132,892 casks of soy (fish-sauce); 18,209,987 bundles of fire-wood; 809,790 bags of charcoal; 90,811 tubs of oil; 1,670,850 bags of salt and 3,613,500 pieces of cotton cloth.

chiefs was carried to Yedo by pack-horses and coolies of the regular postal service. But the costliness of such a method led to the selec- tion in 1691 of 10 exchange agents who were appointed bankers to the Tokugawa government and were required to furnish money within 30 days of the date of an order drawn on them. These agents went by the name of the " ten-men gild." Subsequently the firm of Mitsui was added, but it enjoyed the special privilege of being allowed 150 days to collect a specified amount. The gild received moneys on account of the Tokugawa or the feudal chiefs at provincial centres, and then made its own arrangements for cashing the cheques drawn upon it by the shogun or the daimy5 in Yedo. If coin happened to be immediately available, it was employed to cash the cheques; otherwise the vouchers of the gild served instead. It was in Osaka, however, that the functions of the exchanges acquired fullest development. That city has exhibited, in all eras, a remark- able aptitude for trade. Its merchants, as already shown, were not only entrusted with the duty of selling the rice and other products of the surrounding fiefs, but also they became depositories of the proceeds, which they paid out on account of the owners in whatever sums the latter desired. Such an evidence of official confidence greatly strengthened their credit, and they received further en-couragement from the second Tokugawa shogun (1605-1623) and from Ishimaru Sadatsugu, governor of the city in 1661. He fostered wholesale transactions, sought to introduce a large element of credit into commerce by instituting a system of credit sales; took measures to promote the circulation of cheques; inaugurated market sales of gold and silver and appointed ten chiefs of exchange who were empowered to oversee the business of money-exchanging in general. These ten received exemption from municipal taxation and were permitted to wear swords. Under them were 22 exchanges forming a gild, whose members agreed to honour one another's vouchers and mutually to facilitate business. Gradually they elaborated a regular system of banking, so that, in the middle of the 18th century, they issued various descriptions of paper-orders for fixed sums

payable at certain places within fixed periods; deposit notes redeemable on the demand of an indicated person or his order; bills of exchange drawn by A upon B in favour of C (a common form for use in monthly or annual settlements) ; promissory notes to be paid at a future time, or cheques payable at sight, for goods purchased; and storage orders engaging to deliver goods on account of which earnest money had been paid. These last, much employed in transactions relating to rice and sugar, were generally valid for a period of 3 years and 3 months, were signed by a confederation of exchanges or mer- chants on joint responsibility," and guaranteed the delivery of the indicated merchandise independently of all accidents. They passed current as readily as coin, and advances could always be obtained against them from pawnbrokers.

All these documents, indicating a well-developed system of credit, were duly protected by law, severe penalties being inflicted for any failure to implement the pledges they embodied. The merchants of Yedo and Osaka, working on the system of trusts here described, gradually acquired great wealth and fell into habits of marked luxury. It is recorded that they did not hesitate to pay £5 for the first bonito of the season and £11 for the-first egg-fruit. Naturally the spectacle of such extravagance excited popular dis- content. Men began to grumble against the so-called " official merchants " who, under government auspices, monopolized every branch of trade; and this feeling grew almost uncontrollable in 1836, when rice rose to an unprecedented price owing to crop failure. Men loudly ascribed that state of affairs to regrating on the part of the wholesale companies, and murmurs similar to those raised at the close of the 19th century in America against the trust system began to reach the ears of the authorities perpetually. The cele- brated Fujita Toko of Mito took up the question. He argued that the monopoly system, since it included Osaka, exposed the Yedo market to all the vicissitudes of the former city, which had then lost much of its old prosperity.

Finally, in 1841, the shogun's chief minister, Mizuno Echizen-no- Kami, withdrew all trading licences, dissolved the gilds and pro- claimed that every person should thenceforth be free to engage in any commerce without let or hindrance. This recklessly drastic measure, vividly illustrating the arbitrariness of feudal officialdom, not only included the commercial gilds, the shipping gilds, the exchange gilds and the land transport gilds, but was also carried to the length of forbidding any company to confine itself to wholesale dealings. The authorities further declared that in times of scarcity wholesale transactions must be abandoned altogether and retail business alone carried on, their purpose being to bring retail and wholeSrfe prices to the same level. The custom of advancing money to fishermen or to producers in the provincial districts was inter- dicted ; even the f uda-sashi might no longer ply their calling, and neither bath-house keepers nor

hairdressers were allowed to combine for the purpose of adopting uniform rates of charges. But this ill- judged interference produced evils greater than those it was intended to remedy. The gilds had not really been exacting. Their organi- zation had reduced the cost of distribution, and they had provided facilities of transport which brought produce within quick and cheap reach of central markets.

Ten years' experience showed that a modified form of the old system would conduce to public interests. The gilds were re-

established, licence fees, however, being abolished, and no limit set to the number of firms in a gild. Things remained thus until the beginning of the Meiji era (1867), when the gilds shared the cataclysm that overtook all the country's old institutions.

Japanese commercial and industrial life presents another feature which seems to suggest special aptitude for combination. In mercan- tile or manufacturing families, while the eldest son always succeeded to his father's business, not only the younger sons but also the appren- tices and employees, after they had served faithfully for a number of years, expected to be set up as branch houses under the auspices of the principal family, receiving a place of business, a certain amount of capital and the privilege of using the original house-name. Many an old-established firm thus came to have a plexus of branches all serving to extend its business and strengthen its credit, so that the group held a commanding position in the business world. It will be apparent from the above that commercial transactions on a large scale in pre-Meiji days were practically limited to the two great cities of Yedo and Osaka, the people in the provincial fiefs having no direct association with the gild system, confining themselves, for the most part, to domestic industries on a small scale, and not being allowed to extend their business beyond the boundaries of the fief to which they belonged.

Foreign Commerce during the Meiji Era. — If Japan's industrial development in modern times has been remarkable, the same may be said even more emphatically about the development of her over-sea commerce. This was checked at first not only by the unpopularity attaching to all intercourse with out- side nations, but also by embarrassments resulting from the difference between the silver price of gold in Japan and its silver price in Europe, the precious metals being connected in Japan by a ratio of 1 to 8, and in Europe by a ratio of 1 to 15. This latter fact was the cause of a sudden and violent appreciation of values; for the government, seeing the country threatened with loss of all its gold, tried to avert the catastrophe by altering and reducing the weights of the silver coins without altering their denominations, and a corresponding difference exhibited

itself, as a matter of course, in the silver quotations of commodities. Another difficulty was the attitude of officialdom. During several centuries Japan's over-sea trade had been under the control of officialdom, to whose coffers it contributed a substantial revenue. But when the foreign exporter entered the field under the con- ditions created by the new system, he diverted to his own pocket the handsome profit previously accruing to the government ; and since the latter could not easily become reconciled to this loss of revenue, or wean itself from its traditional habit of interference in affairs of foreign commerce, and since the foreigner, on his side, not only desired secrecy in order to prevent competition, but was also tormented by inveterate suspicions of Oriental espionage, not a little friction occurred from time to time. Thus the scanty records of that early epoch suggest that trade was beset with great difficulties, and that the foreigner had to contend against most adverse circumstances, though in truth his gains amounted to 40 or 50 %.

The chief staples of the early trade were tea and silk. It happened that just before Japan's raw silk became available for export, the production of that article in France and Teaaad Italy had been largely curtailed owing to a novel sl,k – disease of the silkworm. Thus, when the first bales of Japanese silk appeared in London, and when it was found to possess qualities entitling it to the highest rank, a keen demand sprang up. Japanese green tea also, differing radically in flavour and bouquet from the black tea of China, appealed quickly to American taste, so that by the year 1907 Japan found herself selling to foreign countries tea to the extent of ij millions ster- ling, and raw silk to the extent of i2j millions. This remarkable development is typical of the general history of Japan's foreign trade in modern times. Omitting the first decade and a half, the statistics for which are imperfect, the volume of the trade grew from 5 millions sterling in 1873 — 3 shillings per head of the population — to 93 millions in 1907 — or 38 shillings per head. It was not a uniform growth. The period of 3 5 years divides itself conspicuously into two eras: the first, of 15 years (1873-1887), during which the development was from 5 millions to 9-7 mil- lions, a ratio of 1 to 2, approximately; the second, of 20 years (1887-1907), during which the development was from 9-7 millions to 93 millions, a ratio of 1 to i&.

That a commerce which scarcely doubled itself in the first fifteen years should have grown nearly tenfold in the next twenty is a fact inviting

attention. There are two principal causes: one general, the other special. The general cause was that several years necessarily elapsed before the nation's material condition began to respond perceptibly to the improvements effected by the Meiji government in matters of administration, taxation and transport facilities. Fiscal burdens had been reduced and security of life and property obtained, but railway building and road-making, harbour construction, the growth of posts, telegraphs, exchanges and banks, and the development of a mercantile marine did not exercise a sensible influence on the nation's prosperity until 1884 or 1885. From that time the country entered a period of steadily growing prosperity, and from that time private enterprise may be said to have finally started upon a career of independent activity. The special cause which, from 1885, contributed to a marked growth of trade was the resumption of specie payments. Up to that time the treasury's fiat notes had suffered such marked fluctuations of specie value that sound or successful commerce became very difficult. Against the importing merchant the currency trouble worked with double potency. Not only did the gold with which he purchased goods appreciate constantly in terms of the silver for which he sold them, but the silver itself appreciated sharply and rapidly in terms of the fiat notes paid by Japanese con- sumers. Cursory reflection may suggest that these factors should have stimulated exports as much as they depressed imports. But such was not altogether the case in practice. For the exporter's transactions were hampered by the possibility that a delay of a week or even a day might increase the pur- chasing power of his silver in Japanese markets by bringing about a further depreciation of paper, so that he worked timidly and hesitatingly, dividing his operations as minutely as possible in order to take advantage of the downward tendency of the fiat notes. Not till this element of pernicious disturbance was removed did the trade recover a healthy tone and grow so lustily as to tread closely on the heels of the foreign commerce of China, with her 300 million inhabitants and long-established international relations.

Japan's trade with the outer world was built up chiefly by the energy and enterprise of the foreign middleman. He acted the The Foreign part of an almost ideal agent. As an exporter, Middleman. jjj s command of cheap capital, his experience, his knowledge of foreign markets, and his connexions enabled him to secure sales such as must have been beyond reach of the Japanese working independently. Moreover, he paid to native consumers ready cash for their staples, taking upon his own shoulders all the risks of finding markets abroad. As an importer, he enjoyed, in centres of supply, credit which the Japanese lacked, and he offered to native consumers foreign produce brought to their doors with a minimum of responsibility on their part. Finally, whether as exporters or importers, foreign middlemen always competed with each other so keenly that their

Japanese clients obtained the best possible terms from them. Yet the ambition of the Japanese to oust them cannot be re- garded as unnatural. Every nation must desire to carry on its own commerce independently of alien assistance; and moreover, the foreign middleman's residence during many years within Japanese territory, but without the pale of Japanese sovereignty, invested him with an aggressive character which the anti-Oriental exclusiveness of certain Occidental nations helped to accentuate. Thus from the point of view of the average Japan- ese there are several reasons for wishing to dispense with alien middlemen, and it is plain that these reasons are operative; for whereas, in 1888, native merchants carried on only 12% of the country's over-sea trade without the intervention of the foreign middlemen, their share rose to 35% in 1899 and has since been slowly increasing.

Analysis of Japan's foreign trade during the Meiji era shows that

Bala cr duringthe35-yearperiodendingin 1907, imports exceeded

ot Trade exports in 21 years and exports exceeded imports in 14

years. This does not suggest a very badly balanced

trade. But closer examination accentuates the difference, for

when the figures are added, it is found that the excesses of exports

aggregated only 1 1 millions sterling, whereas the excesses of imports

totalled 71 millions, there being thus a so-called " unfavourable

balance " of 60 millions over all. The movements of specie do not

throw much light upon this subject, for they are complicated by

large imports of gold resulting from war indemnities and foreign

loans, Undoubtedly the balance is materially redressed by the

expenditures of the foreign communities in the former settlements,

of foreign tourists visiting Japan and of foreign vessels engaged in

the carrying trade, as well as by the earnings of Japanese vessels

and the interest on investments made by foreigners. Nevertheless

there remains an appreciable margin against Japan, and it is probably

to be accounted for by the consideration that she is still engaged equipping herself for the industrial career evidently lying before her.

The manner in which Japan's over-sea trade was divided in 1907 among the seven foreign countries princi- pally engaged in it may be seen from the following table: —

Trade with Various Countries.

	Exports to £ (millions).	*Imports from £ (millions).*	*Total £ (millions).*
United States	*13I*	*8| 22*	
China	*8|*	*6} 15*	
Great Britain	*2j*	*11 J 14*	
British India	*ij*	*7! 9*	
Germany	*if*	*4I 6*	
France	*4J*	*f 5*	
Korea	*3$*	*if 5*	

Among the 33 open ports of Japan, the first place belongs to Yokohama in the matter of foreign trade, and Kobe ranks second. The former far outstrips the latter in exports, but the case is reversed when imports are considered. As to the percentages of the whole trade standing to the credit of the five principal ports, the following figures may be consulted: — Yokohama, 40%; Kobe, 35-6; Osaka, 10; Moji, 5; and Nagasaki, 2.

VI. — Government, Administration, &c.

Emperor and Princes. — At the head of the Japanese State stands the emperor, generally spoken of by foreigners as the mikado (honourable gate 1), a title comparable with sublime porte and by his own subjects as tenshi (son of heaven) or tenno (heavenly king). The emperor Mutou Hito (q.v.) was the 121st of his line, according to Japanese history, which reckons from 660 B.C., when Jimmu ascended the throne. But as written records do not carry us back farther than a.d. 712, the reigns and periods of the very early monarchs are more or less apocry- phal. Still the fact remains

that Japan has been ruled by an unbroken dynasty ever since the dawn of her history, in which respect she is unique among all the nations in the world. There are four families of princes of the blood, from any one of which a successor to the throne may be taken in default of a direct heir: Princes Arisugawa, Fushimi, Kanin and Higashi Fushimi. These families are all direct descendants of emperors, and their heads have the title of shinno (prince of the blood), whereas the other imperial princes, of whom there are ten, have only the second syllable of shinno (pronounced wo when separated from shin). Second and younger sons of a shinno are all wo, and eldest sons lose the title shin and become wo from the fifth generation.

The Peerage. — In former times there were no Japanese titles of nobility, as the term is understood in the Occident. Nobles there were, however, namely, kuge, or court nobles, descendants of younger sons of emperors, and daimyo (great name), some of whom could trace their lineage to mikados; but all owed their exalted position as feudal chiefs to military prowess. The Meiji restoration of 1867 led to the abolition of the daimyos as feudal chiefs, and they, together with the kuge, were merged into one class called kwazoku (flower families), a term correspond- ing to aristocracy, all inferior persons being heimin (ordinary folk). In 1884, however, the five Chinese titles of ki (prince), ko (marquis), haku (count), shi (viscount) and dan (baron) were introduced, and patents were not only granted to the ancient nobility but also conferred on men who had rendered conspicuous public service. The titles are all hereditary, but they descend to the firstborn only, younger children having no distinguishing appellation. The first list in 1884 showed 11 princes, 24 mar- quises, 76 counts, 324 viscounts and 74 barons. After the war with China (1894-95) the total grew to 716, and the war with

1 Some derive this term from mika, an ancient Japanese term for " great," and to, " place."

Russia (1904-5) increased the number to 912, namely, 15 princes, 39 marquises, 100 counts, 376 viscounts and 382 barons.

Household Department. — The Imperial household department is completely differentiated from the administration of state affairs. It includes bureaux of treasury, forests, peerage and hunting, as well as boards of ceremonies and chamberlains, officials of the empress's

household and officials of the crown prince's household. The annual allowance made to the throne is £300,000, and the Imperial estate comprises some 12,000 acres of building land, 3,850,000 acres of forests, and 300,000 acres of miscellaneous lands, the whole valued at some 19 millions sterling, but probably not yielding an income of more than £200,000 yearly. Further, the household owns about 3 millions sterling (face value) of bonds and shares, from which a revenue of some £250,000 is derived, so that the whole income amounts to three-quarters of a million sterling, approximately. Out of this the households of the crown prince and all the Imperial princes are supported; allowances are granted at the time of conferring titles of nobility; a long list of charities receive liberal contributions, and considerable sums are paid to encourage art and education. The emperor himself is probably one of the most frugal sovereigns that ever occupied a throne.

Departments of State. — There are nine departments of state presided over by ministers— foreign affairs, home affairs, finance, war, navy, justice, education, agriculture and commerce, com- munications. These ministers form the cabinet, which is presided over by the minister president of state, so that its members number ten in all. Ministers of state are appointed by the emperor and are responsible to him alone. But between the cabinet and the crown stand a small body of men, the survivors of those by whose genius modern Japan was raised to her present high position among the nations. They are known as " elder statesmen " (genro). Their proved ability constitutes an invalu- able asset, and in the solution of serious problems their voice may be said to be final. At the end of 1909 four of these renowned statesmen remained — Prince Yamagata, Marquises Inouye and Matsukata and Count Okuma. There is also a privy council, which consists of a variable number of distinguished men — in 1909 there were 29, the president being Field-Marshal Prince Yamagata. Their duty is to debate and advise upon all matters referred to them by the emperor, who sometimes attends their meetings in person. •

Civil Officials. — The total number of civil officials was 137,819 in 1906. It had been only 68,876 in 1898, from which time it grew regularly year by year. The salaries and allowances paid out of the treasury every year on account of the civil service are 4 millions sterling, approximately, and the annual emoluments of the principal officials are as follow : — Prime minister, £960 ; minister of a depart- ment, £600; ambassador, £500, with allowances varying from £2200 to £3000; president of privy council, £500; resident-general in Seoul, £600; governor-general of Formosa, £600; vice-minister, £400; minister plenipotentiary, £400, with allowances from £1000 to £1700; governor of prefecture, £300 to £360; judge of the court of cassation, £200 to £500; other judges, £60 to £400; professor of imperial university, from £80 to £160, with allowances from £40 to £120;

privy councillor, £400; director of a bureau, £300; &c.

Legislature. — The first Japanese Diet was convoked the 29th of November, 1890. There are two chambers, a house of peers (kizoku-in) and a house of representatives (shugi-in). Each is invested with the same legislative power.

The upper chamber consists of four classes of members. They are, first, hereditary members, namely, princes and mar- quises, who are entitled to sit when they reach the age of 25; secondly, counts, viscounts and barons, elected — after they have attained their 25th year — by their respective orders in the maxi- mum ratio of one member to every five peers; thirdly, men of education or distinguished service who are nominated by the emperor; and, fourthly, representatives of the highest tax- payers, elected, one for each prefecture, by their own class. The minimum age limit for non-titled members is 30, and it is provided that their total number must not exceed that of the titled members. The house was composed in 1909 of 14 princes of the blood, 15 princes, 39 marquises, 17 counts, 69 viscounts, 56 barons, 124 Imperial nominees, and 45 representatives of the highest tax-payers — that is to say, 210 titled members and 169 non-titled.

The lower house consists of elected members only. Origin- ally the property qualification was fixed at a minimum annual payment of 30s. in direct taxes (i.e. taxes imposed by the central

government), but in 1900 the law of election was amended, and the property qualification for electors is now a payment of £1 in direct taxes, while for candidates no qualification is required either as to property or as to locality. Members are of two kinds, namely, those returned by incorporated cities and those returned by prefectures. In each case the ratio is one member for every 130,000 electors, and the electoral district is the city or prefecture.

Voting is by ballot, one man one vote, and a general election must take place once in 4 years for the house of represen- tatives, and once in 7 years for the house of peers. The house of representatives, however, is liable to be dissolved by order of the sovereign as a disciplinary measure, in which event a general election must be held within 5 months from the date of disso- lution, whereas the house of peers is not liable to any such treat- ment. Otherwise the two houses enjoy equal rights and privi- leges, except that the budget must first be submitted to the representatives. Each member receives a salary of £200; the president receives £500, and the vice-president £300. The presidents are nominated by the sovereign from three names submitted by each house, but the appointment of a vice-presi- dent is within the independent right of each chamber. The lower house consists of

379 members, of whom 75 are returned by the urban population and 304 by the rural. Under the original property qualification the number of franchise-holders was only 453,474, or ii‘5 to every 1000 of the nation, but it is now 1,676,007, or 15-77 to every 1000. By the constitution which created the diet freedom of conscience, of speech and of public meeting, inviolability of domicile and correspondence, security from arrest or punishment except by due process of law, perma- nence of judicial appointments and all the other essential ele- ments of civil liberty were granted. In the diet full legislative authority is vested: without its consent no tax can be imposed, increased or remitted; nor can any public money be paid out except the salaries of officials, which the sovereign reserves the right to fix at will. In the emperor are vested the prerogatives of declaring war and making peace, of concluding treaties, of appointing and dismissing officials, of approving and promul- gating laws, of issuing urgent ordinances to take the temporary place of laws, and of conferring titles of nobility.

Procedure of the Diet. — It could scarcely have been expected that neither tumult nor intemperance would disfigure the proceed- ings of a diet whose members were entirely without parliamentary experience, but not without grievances to ventilate, wrongs (real or fancied) to avenge, and abuses to redress. On the whole, however, there has been a remarkable absence of anything like disgraceful licence. The politeness, the good temper, and the sense of dignity which characterize the Japanese, generally saved the situation when it threatened to degenerate into a " scene." Foreigners entering the house of representatives in Tokyo for the first time might easily misinterpret some of its habits. A number distinguishes each member. It is painted in white on a wooden indicator, the latter being fastened by a hinge to the face of the member's desk. When present he sets the indicator standing upright, and lowers it when leaving the house. Permission to speak is not obtained by catching the president's eye, but by calling out the aspirant's number, and as members often emphasize their calls by hammering their desks with the indicators, there are moments of decided din. But, for the rest, orderliness and decorum habitually prevail. Speeches have to be made from a rostrum. There are few displays of oratory oreloquence. The Japanese formulates his views with remarkable facility. He is absolutely free from gaucherie or self-consciousness when speaking in public : he can think on his feet. But his mind does not usually busy itself with abstract ideas and subtleties of philosophical or religious thought. Flights of fancy, impassioned bursts of sentiment, appeals to the heart rather than to the reason of an audience, are devices strange to his mental habit. He can be rhetorical, but not eloquent. Among all the speeches hitherto delivered in the Japanese diet it would be difficult to find a passage deserving the latter epithet. From the first the debates were

recorded verbatim. Years before the date fixed for the promulgation of the constitution, a little band of students elaborated a system of stenography and adapted it to the Japanese syllabary. Their labours remained almost without recognition or remuneration until the diet was on the eve of meeting, when it was discovered that a competent staff of shorthand reporters could be organized at an hour's notice. Japan can thus boast that, alone among the countries of the world, she possesses an exact record of the proceedings of her Diet from the moment when the first word I was spoken within its walls.

A special feature of the Diet's procedure helps to discourage oratorical displays. Each measure of importance has to be submitted to a committee, and not until the latter's report has been received does serious debate take place. But in ninety-nine cases out of every hundred the committee's report determines the attitude of the house, and speeches are felt to be more or less superfluous. One result of this system is that business is done with a degree of celerity scarcely known in Occidental legislatures. For example, the meetings of the house of representatives during the session 1 896-1 897 were 32, and the number of hours occupied by the sittings aggregated 116: Yet the result was 55 bills debated and passed, several of them measures of prime importance, such as the gold standard bill, the budget and a statutory tariff law. It must be remembered that although actual sittings of the houses are comparatively few and brief, the committees remain almost constantly at work from morning to evening throughout the twelve weeks of the session's duration.

Divisions of the Empire. — The earliest traditional divisions of Japan into provinces was made by the emperor Seimu (131-190), in whose time the sway of the throne did not extend farther north than a line curving from Sendai Bay, on the north-east coast of the main island, to the vicinity of Niigata (one of the treaty ports)) on the north-west coast. The region northward of this line was then occupied by barbarous tribes, of whom the Ainu (still to be found in Yezo) are probably the remaining descendants. The whole country was then divided into thirty-two provinces. In the 3rd century the empress Jingo, on her return from her victorious expedi- tion against Korea, portioned out the empire into five home provinces and seven circuits, in imitation of the Korean system. By the emperor Mommu (696-707) some of the provinces were subdivided so as to increase the whole number to sixty-six, and the boundaries then fixed by him were re-surveyed in the reign of the emperor Shomu (723-756). The old division is as follows ' : —

1. The Go-kinai or ” five home provinces ” i.e. those lying imme- diately around Kyoto, the capital, viz.: —

Yamashiro, also called Joshu Yamato ,, Washu

Kawachi „ Kashu

II. The seven circuits, as follow: — I. The Tokaido, or ” eastern-s fifteen provinces, viz. : —

Izumi, also called Senshu Settsu „ Sesshu

Iga

Ise

Shima

Owari

M ikawa

Totomi

Suruga

Izu

2.

Omi Mino Hida Shinano

3-

Wakasa Echtzen Kaga Noto

sea circuit,’

‘ which comprised

Kai

or

Koshyu

Sagami

,,

Soshyu

Musashi

,,

Bushyu

Awa

Boshu

Kazusa

Soshu

Shimosa

Soshu

Hitachi

,.

Joshu

or Ishu Seishu Shinshu Bishu Sanshii Enshit Sunshu Dzushu

The Tozando, or "eastern-mountain circuit," which com- prised eight provinces, viz. : —

Joshu Yashu Oshu Ushu

The Hokurikudo, or " northern-land circuit," which com- prised seven provinces, viz. : —

or Jakushil Etchiu or Esshu

,, Esshu Echigo „ Esshu

,, Kashu Sado (island) ,, Sashu

„ Noshu

The Sanindo, or " mountain-back circuit," which com- prised eight provinces, viz. : —

Goshu

Kozuke

Noshu

Shimotsuke

Hishu

Mutsu

Shinshu

Dewa

Tamba or Tanshu

Hoki or Hakushu

Tango ,, Tanshu

Izumo ,, Unshu

Tajima ,, Tanshu

Iwami ,, Sekishu

Inaba „ Inshu

Oki (group of islands)

5. The Sanyodo, or " mountain-front circuit," which com-

prised eight provinces, viz. : —

Harima or Banshu

Bingo or Bishu

Mimasaka ,, Sakushu

Aki ,, Geishu

Bizen „ Bishu

Suwo „ Boshu

Bitcniu ,, Bishu

Nagato „ Chashu

6. The Nankaido, or ” southern-sea circuit,” which com-

prised six provinces, viz. : —

Kii or Kishu

Sanuki or SanshQ

Awaji (island) ,, Tanshu

lyo ,, Yoshu

Awa ,, Ashu

Tosa „ Toshu

1 The names given in italics are those more commonly used. Those in the first column are generally of pure native derivation; those in the second column are composed of the Chinese word shu, a ” province,” added to the Chinese pronunciation of one of the characters with which the native name is written. In a few cases both names are used.

The Saikaido, or ” western-sea circuit,’ nine provinces, viz: —

Chikuzen or Chikushu

Chikugo ,, Chikushu

Buzen „ Hoshu

Bungo ,, Hoshu

Hizen „ Hishu

III. The two islands, viz.: — 1. Tsushima or Taishu

Higo Hiuga Osumi Satsuma

I 2. Iki

[DIVISIONS

which comprised

or Hishu

„ Nisshu

,, Gushu

,, Sasshii

or Ishu

Upon comparing the above list with a map of Japan, it will be seen that the main island contains the Go-kinai, Tokaido, Tozando, Hokurikudo, Sanindo, Sanyodo, and one province (Kishu) of the Nankaido. Omitting also the island of Awaji, the remaining provinces of the Nankaido give the name Shikoku (the " four provinces ") to the island in which they lie ; while Saikaido coincides exactly with the large island Kiushiu (the '|_nine provinces ").

In 1868, when the rebellious nobles of Oshu and Dewa, in the TSzando, had submitted to the emperor, those two provinces were subdivided, Dewa into Uzen and Ugo, and Oshu into Iwaki, Iwashiro, Rikuzen, Rikuchu and Michinoku (usually called Mutsu). This increased the old number of provinces from sixty-six to seventy-one. At the same time there was created a new circuit, called the Hokkaido, or " northern-sea circuit," which comprised the eleven provinces into which the large island of Yezo was then divided (viz. Oshima, Shiribeshi, Ishikari, Teshibo, Kitami, Iburi, Hiaka, Tokachi, Kushiro, and Nemuro) and the Kurile Islands (Chishima).

Another division of the old sixty-six provinces was made by taking as a central point the ancient barrier of Osaka on the frontier of Omi and Yamashiro, — the region lying on the east, which consisted of thirty-three provinces, being called Kwanto, or " east of the barrier," the remaining thirty-three provinces on the west being styled Kwansei, or " west of the barrier." At the present time, however, the term Kwanto is applied to only the eight provinces of Musashi, Sagami, Kozuke, Shimotsuke, Kazusa, Shimosa, Awa and Hitachi, — all lying immediately to the east of the old barrier of Hakone, in Sagami.

Chu-goku, or " central provinces," is a name in common use for the Sanindo and Sanyodo taken together. Saikoku, or " western provinces," is another name for Kiushiu, which in books again is frequently called Chinsei.

Local Administrative Divisions. — For purposes of local admin- istration Japan is divided into 3 urban prefectures (/«), 43 rural prefectures (ken), and 3 special dominions (cho), namely Formosa; Hokkaido and South

Sakhalin. Formosa and Sakhalin not having been included in Japan's territories until 1895 and 1905, respectively, are still under the military control of a governor-general, and belong, therefore, to an administrative system different from that prevailing throughout the rest of the country. The prefectures and Hokkaido are divided again into 638 sub-prefectures (gun or kori) ; 60 towns (shi); 125 urban districts (cho) and 12,274 rural districts (son). The three urban prefectures are Tokyo, Osaka and Kioto, and the urban and rural districts are distinguished according to the number of houses they contain. Each prefecture is named after its chief town, with the exception of Okinawa, which is the appellation of a group of islands called also Riukiu (Luchu). The following table shows the names of the prefectures, their areas, populations, number of sub-prefectures, towns and urban and rural divisions : —

Area in

•5 "8

a

•5

to -jr 1

§3

Prefecture

sq. m.

Population,

3 s co a

O

&

*c**

Tokyo .

" 749-76

1,795,128 2

8

1

20

157

Kanagawa .

927-79

776,642

11

1

19

202

Saitama

I.585-30

1,174,094

9

—

42

343

Chiba .

1.943-85

1,273,387

12

—

69

286

Ibaraki

2,235-67

i,i3 T ,556

H

1

45

335

Tochigi

2,854-14

788,324

8

1

30

145

Gumma

2,427-21

774,654

11

2

38

169

Nagano

5,088-41

1,237,584

16

1

22

371

Yamanashi

1,727-50

498,539

9

1

7

235

Shizuoka .

3,002-76

1,199,805

13

1

38

306

Aichi .

1,864-17

1,591,357

19

1

74

592

Miye

2,196-56

495,389

15

2

19

325

Gifu . .

4,001-84

996,062

18

1

42

299

Shiga .

1,540-30

712,024

12

1

12

190

Fukui .

1,621-50

633,840

11

1

9

171

Ishikawa .

1,611-59

392,905

8

1

16

259

Toyama

1,587-80

785,554

8

2

31

239

The above 1 7 prefectures form Central Japan.

Niigata

4.9H-55

1,812,289

16

1

47

401

Fukushima

5,042-57

1,057,971

17

1

37

388

Miyagi.

3,223-11

835,830

16

1

31

172

Yamagata

3,576-89

829,210

11

2

24

206

Akita . .

4,493-84

775,077

9

1

42

197

2 This is

not the population of the city proper, but that of the

urban prefecture.

ARMY]

JAPAN

±1

to

C5

3 D.

U.

t/J

H

£

Pi

13

1

23

217

8

2

9

159

Shimane Tottori

Area in

Prefecture. sq. m. Population. Iwate . . 5,359-17 726,380

Aomon . 3,617-89 612,171

The above 7 prefectures form Northern Japan.

Kioto . . 1,767-43 93I-576 1 18 1 20 260

Osaka . . 68969 1,311,909! 9 2 13 289

Nara . . 1,200-46 538,507 10 1 18 142

Wakayama 1,851-29 681,572 7 1 16 215

Hiogo . . 3,318-31 1,667,226 25 2 29 403

Okayama 2,509-04 1,132,000 19 1 29 383

Hiroshima . 3,103-84 1,436,415 16 3 27 420

Yamaguchi 1,324-34 986,161 11 1 10 215

2,597-48 721,448 16 1 14 276

• *!.335-99 418,929 61 8 227 The above 10 prefectures form Southern Japan.*

Tokushima . 1,616-82 699,398 10 1 2 137

Kagawa 976-46 700,462 7 2 12 166

Ehime . . 2,033-57 997,48i 12 1 18 283

Kochi . . 2,720-13 61ˆ,549 6 1 14 183

The above 4 prefectures form the island of Shikoku.

Nagasaki . 1,401-49 821,323 9 2 15 288

Saga 984-07 621,011 817 127

Fukuoka . 1,894-14 1,362,743 19 4 38 340

Kumamoto 2,774-20 1,151,401 12 1 33 331

Oita . . . 2,400-27 839,485 12 — 28 251

Miyazaki . 2,904-54 454.707 8 — 9 91

Kagoshima . 3,589-76 1,104,631 12 1 — 380

Okinawa 935'i8 469.203 52 — 52

The above 8 prefectures form Kiushiu.

Hokkaido . 36,328-34 610,155 88 3 19 456

Local Administrative System. — In the system of local administration full effect is given to the principle of popular representation. Each prefecture (urban or rural), each sub- prefecture, each town and each district (urban or rural) has its local assembly, the number of members being fixed in proportion to the population. There is no superior limit of number in the case of a prefectural assembly, but the inferior limit is 30. For a town assembly, however, the superior limit is 60 and the inferior 30; for a sub-prefectural assembly the corresponding figures are 40 and 15, and for a district assembly, 30 and 8. These bodies are all elective. The property qualification for the franchise in the case of prefectural and sub-prefectural assemblies is an annual payment of direct national taxes to the amount of 3 yen; and in the case of town and district assem- blies, 2 yen; while to be eligible for election to a prefectural assembly a yearly payment of 10 yen of direct national taxes is necessary ; to a sub-prefectural assembly, 5 yen, and to a town or district assembly, 2 yen. Under these qualifications the electors aggregate 2,009,745, and those eligible for election total 919,507. In towns and districts franchise-holders are further divided into classes with regard to their payment of local taxes. Thus for town electors there are three classes, differentiated by the following process: On the list of ratepayers the highest are checked off until their aggregate payments are equal to one- third of the total taxes. These persons form the first class. Next below them the persons whose aggregate payments repre- sent one-third of the total amount are checked off to form the second class, and all the remainder form the third class. Each class elects one-third of the

members of assembly. In the districts there are only two classes, namely, those whose payments, in order from the highest, aggregate one- half of the total, the remaining names on the list being placed in the second class. Each class elects one-half of the members. This is called the system of o-jinushi (large landowners) and is found to work satisfactorily as a device for conferring represen- tative rights in proportion to property. The franchise is with- held from all salaried local officials, from judicial officials, from ministers of religion, from persons who, not being barristers by profession, assist the people in affairs connected with law courts or official bureaux, and from every individual or member of a

1 This is not the population of the city proper, but that of the urban prefecture.

company that contracts for the execution of public works or the supply of articles to a local administration, as well as from persons unable to write their own names and the name of the candidate for whom they vote. Members of assembly are not paid. For prefectural and sub-prefectural assemblies the term is four years; for town and district assemblies, six years, with the pro- vision that one-half of the members must be elected every third year. The prefectural assemblies hold one session of 30 days yearly; the sub-prefectural assemblies, one session of not more than 14 days. The town and district assemblies have no fixed session; they are summoned by the mayor or the head-man when their deliberations appear necessary, and they continue in session till their business is concluded.

The chief function of the assemblies is to deal with all questions of local finance. They discuss and vote the yearly budgets ; they pass the settled accounts; they fix the local taxes within a maximum limit which bears a certain ratio to the national taxes; they make representations to the minister for home affairs; they deal with the fixed property of the locality; they raise loans, and so on. It is necessary, however, that they should obtain the consent of the minister for home affairs, and sometimes of the minister of finance also, before disturbing any objects of scientific, artistic or historical importance; before contracting loans; before imposing special taxes or passing the normal limits of taxation ; before enacting new local regulations or changing the old ; before dealing with grants in aid made by the central treasury, &c. The governor of a prefecture, who is appointed by the central administration, is invested with considerable power. He oversees the carrying out of all works undertaken at the public expense; he causes bills to be drafted for discussion by an assembly; he is responsible for the administration of the funds and property of the prefecture; he orders payments and receipts ; he directs the machinery for collecting taxes and

fees ; he summons a prefectural assembly, opens it and closes it, and has competence to suspend its session should such a course seem necessary. Many of the functions performed by the governor with regard to prefectural assemblies are discharged by a head-man (gun-cho) in the case of sub-prefectural assemblies. This head-man is a salaried official appointed by the central administration. He convenes, opens and closes the sub-prefectural assembly; he may require it to reconsider any of its financial decisions that seem improper, explaining his reasons for doing so, and should the assembly adhere to its original view, he may refer the matter to the governor of the prefecture. On the other hand, the assembly is competent to appeal to the home minister from the governor's decision. The sub-prefectural head-man may also take upon him- self, in case of emergency, any of the functions falling within the competence of the sub-prefectural assembly, provided that he reports the fact to the assembly and seeks its sanction at the earliest possible opportunity. In each district also there is a head-man, but his post is always elective and generally non-salaried. He occupies towards a district assembly the same position that the sub- prefecture head-man holds towards a sub-prefectural assembly. Over the governors stands the minister for home affairs, who dis- charges general duties of superintendence and sanction, has com- petence to delete any item of a local budget, and may, with the emperor's consent, order the dissolution of a local assembly, provided that steps are taken to elect and convene another within three months.

The machinery of local administration is completed by councils, of which the governor of a prefecture, the mayor 2 of a town, or the head-man of a sub-prefecture or district, is ex officio president, and the councillors are partly elective, partly nominated by the central government. The councils may be said to stand in an executive position towards the local legislatures, namely, the assemblies, for the former give effect to the measures voted by the latter, take their place in case of emergency and consider questions submitted by them. This system of local government has now been in operation since 1885, and has been found to work well. It con- stitutes a thorough method of political education for the people. In feudal days popular representation had no existence, but a very effective chain of local responsibility was manufactured by dividing the people— apart from the samurai — into groups of five families, which were held jointly liable for any offence committed by one of their members. Thus it cannot be said that the people were altogether unprepared for this new system.

The Army. — The Japanese — as distinguished from the abori- ginal inhabitants of Japan — having fought their way into the country, are naturally described in their annals as The Ancient a nation of soldiers. The sovereign is said to have System. been the commander-in-chief and his captains were known as o-omi and o-muraji, while the duty of serving in

the ranks devolved on all subjects alike. This information is indeed

2 The- mayor of a town (shicho) is nominated by the minister for home affairs from three men chosen by the town assembly.

derived from tradition only, since the first written record goes back no further than 712. We are justified, however, in believing that at the close of the 7th century of the Christian era, when the empress Jito sat upon the throne, the social system of the Tang dynasty of China commended itself for •adoption; the distinc- tion of civil and military is said to have been then established for the first time, though it probably concerned officials only. Cer- tain officers received definitely military commissions, as generals, brigadiers, captains and so on; a military office (hydbu-sho) was organized, and each important district throughout the empire had its military division (gundan). One-third— some say one- fourth — of the nation's able-bodied males constituted the army. Tactically there was a complete organization, from the squad of 5 men to the division of 600 horse and 400 foot. Service was for a defined period, during which taxes were remitted, so that military duties always found men ready to discharge them. Thus the hereditary soldier — afterwards known as the samurai or bushi — did not yet exist, nor was there any such thing as an exclusive right to carry arms. Weapons of war, the property of the state, were served out when required for fighting or for training purposes.

At the close of the 8th century stubborn insurrections on the part of the aborigines gave new importance to the soldier. The conscription list had to be greatly increased, and it came to be a recognized principle that every stalwart man should bear arms, every weakling become a bread-winner. Thus, for the first time, the distinction between " soldier " and " working man " 1 received official recognition, and in consequence of the circumstances attending the distinction a measure of contempt attached to the latter. The next stage of development had its origin in the assumption of high offices of state by great families, who encroached upon the imperial prerogatives, and appropri- ated as hereditary perquisites posts which should have remained in the gift of the sovereign. The Fujiwara clan, taking all the civil offices, resided in the capital, whereas the military posts fell to the lot of the Taira and the Minamoto, who, settling in the provinces and being thus required to guard and police the out- lying districts, found it expedient to surround themselves with men who made soldiering a

profession. These latter, in their turn, transmitted their functions to their sons, so that there grew up in the shadow of the great houses a number of military families devoted to maintaining the power and promoting the interests of their masters, from whom they derived their own privileges and emoluments.

From the middle of the 10th century, therefore, the terms samurai and bushi acquired a special significance, being applied to themselves and their followers by the local magnates, whose power tended more and more to eclipse even that of the throne, and finally, in the 1 2th century, when the Minamoto brought the whole country under the sway of military organization, the privilege of bearing arms was restricted to the samurai. Thence- forth the military class entered upon a period of administrative and social superiority which lasted, without serious interruption, until the middle of the 19th century. But it is to be observed that the distinction between soldier and civilian, samurai and commoner, was not of ancient existence, nor did it arise from any question of race or caste, victor or vanquished, as is often supposed and stated. It was an outcome wholly of ambitious usurpations, which, relying for success on force of arms, gave practical importance to the soldier, and invested his profession with factitious honour.

The bow was always the chief weapon of the fighting-man in Japan. " War " and " bow-and-arrow " were synonymous terms. Weaooas Tradition tells how Tametomo shot an arrow through p ‘ the crest of his brother’s helmet, in order to recall the youth’s allegiance without injuring him; how Nasuno Michitaka discharged a shaft that severed the stem of a fan swayed by the

‘The term hyaku-sho, here translated “working man,” means literally " one engaged in any of the various callings " apart from military service. In a later age a further distinction was established between the agriculturist, the artisan, and the trader, and the word hyaku-sho then came to carry the signification of " husbandman " only.

wind; how Mutsuru, ordered by an emperor to rescue a fish from the talons of an osprey without killing bird or fish, cut off the osprey’s feet with a crescent-headed arrow so that the fish dropped into the palace lake and the bird continued its flight; and there are many similar records of Japanese skill with the weapon. Still better authenticated were the feats performed at the " thirty-three-span halls " in Kioto and Yedo, where the archer had to shoot an arrow through the whole length of a corridor 128 yards long and only 16 ft. high. Wada Daihachi, in the 17th century, succeeded in sending 8133 arrows from end to end of the corridor in 24 consecutive hours, being an average of over 5 shafts per minute; and Masatoki, in 1852, made 5383 successful shots in 20 hours, more than 4 a minute. The lengths of

the bow and arrow were determined with reference to the capacity of the archer. In the case of the bow, the unit of measure- ment was the distance between the tips of the thumb and the little finger with the hand fully stretched. Fifteen of these units gave the length of the bow — the maximum being about 7J ft. The unit for the arrow was from 12 to 15 hand-breadths, or from 3 ft. to 3J ft. Originally the bow was of unvarnished boxwood or zelkowa; but subsequently bamboo alone came to be employed. Binding with cord or rattan served to strengthen the bow, and for precision of flight the arrow had three feathers, an eagle's wing being most esteemed for that purpose, and after it, in order, that of the copper pheasant, the crane, the adjutant and the snipe.

Next in importance to the bow came the sword, which is often spoken of as the samurai's chief weapon, though there can be no doubt that during long ages it ranked after the bow. It was a single-edged weapon remarkable for its three exactly similar curves — edge, face-line and back; its almost imperceptibly convexed blade; its admirable tempering; its consummately skilled forging; its razor-like sharpness; its cunning distribution of weight, giving a maximum efficiency of stroke. The 10th century saw this weapon carried to perfection, and it has been inferred that only from that epoch did the samurai begin to esteem his sword as the greatest treasure he possessed, and to rely on it as his best instrument of attack and defence. But it is evident that the evolution of such a blade must have been due to an urgent, long-existing demand, and that the katana came as the sequel of innumerable efforts on the part of the sword-smith and generous encouragement on that of the soldier. Many pages of Japanese annals and household traditions are associated with its use. In every age numbers of men devoted their whole lives to acquiring novel skill in swordsmanship. Many of them invented systems of their own, differing from one another in some subtle details unknown to any save the master himself and his favourite pupils. Not merely the method of handling the weapon had to be studied. Associated with sword-play was an art variously known as shinobi, yawara, and jujutsu, names which imply the exertion of muscular force in such a manner as to produce a maximum of effect with a minimum of effort, by directing an adversary's strength so as to become auxiliary to one's own. It was an essential element of the expert's art not only that he should be competent to defend himself with any object that happened to be within reach, but also that without an orthodox weapon he should be capable of inflicting fatal or disabling injury on an assailant. In the many records of great swordsmen instances are related of men seizing a piece of firewood, a brazier-iron, or a druggist's pestle as a weapon of offence, while, on the other side, an umbrella, an iron fan or even a pot-lid served for protection. The samurai had to be prepared for every emergency. Were he caught weaponless by a number of assailants, his art of yawara was

supposed to supply him with expedients for emerging unscathed. Nothing counted save the issue. The methods of gaining victory or the circumstances attend- ing defeat were scarcely taken into consideration. The true samurai had to rise superior to all contingencies. Out of this perpetual effort on the part of hundreds of experts to discover and perfect novel developments of swordsmanship, there grew a habit which held its vogue down to modern times, namely, that when a man had mastered one style of sword-play in the school of a teacher, he set himself to study all others, and for that purpose undertook a tour throughout the provinces, challenging every expert, and, in the event of defeat, constituting himself the victor's pupil. The sword exercised a potent influence on the life of the Japanese nation. The distinction of wearing it, the rights that it conferred, the deeds wrought with it, the fame attaching to special skill .in its use, the superstitions connected with it, the incredible value set upon a fine blade, the honours bestowed on an expert sword-smith, the tradi- tions that had grown up around celebrated weapons, the profound study needed to be a competent judge of a sword's qualities — all these things conspired to give the katana an importance beyond the limits of ordinary comprehension. A samurai carried at least two swords, a long and a short. Their scabbards of lacquered wood were thrust into his girdle, not slung from it, being fastened in their place by cords of plaited silk. Sometimes he increased the number of swords to three, four or even five, before going into battle, and this array was supplemented by a dagger carried in the bosom. The short sword was not employed in the actual combat. Its use was to cut off an enemy's head after overthrowing him, and it also served a defeated soldier in his last resort — suicide. In general the long sword did not measure more than 3 ft., including the hilt; but some were 5 ft. long, and some 7. Considering that the scabbard, being

fastened to the girdle, had no play, the feat of drawing one of these very long swords demanded extraordinary aptitude.

Spear and glaive were also ancient Japanese weapons. The oldest form of spear was derived from China. Its handle measured about 6 ft. and its blade 8 in., and it had sickle-shaped horns at the junction of blade and hilt (somewhat resembling a European ranseur). This weapon served almost exclusively for guarding palisades and gates. In the 14th century a true lance came into use. Its length varied greatly, and it had a hog-backed blade tempered almost as finely as the sword itself. This, too, was a

Chinese type, as was also the glaive. The glaive (naginata, long sword) was a scimitar-like blade, some 3 ft. in length, fixed on a slightly longer haft. Originally the warlike monks alone employed this weapon, but from the 12th century it found much favour among military men. Ultimately, however, its use may be said to have been limited to women and priests. The spear, however, formed a useful adjunct of the sword, for whereas the latter could not be used except by troops in very loose formation, the former served for close-order fighting.

Japanese armour (gusoku) may be broadly described as plate armour, but the essential difference between it and the European Armour. type was that, whereas the latter took its shape from the body, the former neither resembled nor was intended to resemble ordinary garments. Hence the only changes that occurred in Japanese armour from generation to generation had their origin in improved methods of construction. In general appearance it differed from the panoply of all other nations, so that, although to its essential parts we may apply with propriety the European terms — helmet, corselet, &c. — individually and in combination these parts were not at all like the originals of those names. Perhaps the easiest way of describing the difference is to say that whereas a European knight seemed to be clad in a suit of metal clothes, a Japanese samurai looked as if he wore protective curtains. The Japanese armour was, in fact, suspended from, rather than fitted to, the person. Only one of its elements found a counterpart in the European suit, namely, a tabard, which, in the case of men of rank, was made of the richest brocade. Iron and leather were the chief materials, and as the laminae were strung together with a vast number of coloured cords — silk or leather — an appearance of considerable brilliancy was produced. Ornamentation did not stop there. Plating and inlaying with gold and silver, and finely wrought decoration in chiselled, inlaid and repousse work were freely applied. On the whole, however, despite the highly artistic character of its ornamentation, the loose, pendulous nature of Japanese armour detracted greatly from its workmanlike aspect, especially when the horo was added — a curious appendage in the shape of a curtain of fine transparent silk, which was either stretched in front between the horns of the helmet and the tip of the bow, or worn on the shoulders and back, the purpose in either case being to turn the point of an arrow. A true samurai observed strict rules of etiquette with regard even to the garments worn under his armour, and it was part of his soldierly capacity to be able to bear the great weight of_ the whole without loss of activity, a feat impossible to any untrained man of modern days. Common soldiers were generally content with a comparatively light helmet and a corselet.

The Japanese never had a war-horse worthy to be so called. The misshapen ponies which carried them to battle showed qualities of War-horses,

hardiness and endurance, but were so deficient in ‘ stature and massiveness that when mounted by a man in voluminous armour they looked painfully puny. Nothing is known of the early Japanese saddle, but at the beginning of historic times it approximated closely to the Chinese type. Subse- quently a purely Japanese shape was designed. It consisted of a wooden frame so constructed that a padded numnah could be fastened to it. Galled backs or withers were unknown with such a saddle: it fitted any horse. The stirrup, originally a simple affair resembling that of China and Europe, afterwards took the form of a shoe-sole with upturned toe. Both stirrups and saddle-frame were often of beautiful workmanship, the former covered with rich gold lacquer, the latter inlaid with gold or silver. In the latter part of the military epoch chain-armour was adopted for the horse, and its head was protected by a monster-faced mask of iron.

Flags were used in battle as well as on ceremonial occasions. Some were monochrome, as the red and white flags of the Taira Early and the Minamoto clans in their celebrated struggle

strategy during the 12th century; and some were streamers and Tactics. ern blazoned with figures of the sun, the moon, a dragon, a tiger and so forth, or with religious legends. Fans with iron ribs were carried by commanding officers, and signals to advance or retreat were given by beating drums and metal gongs and blow- ing conches. During the military epoch a campaign was opened or a contest preluded by a human sacrifice to the god of war, the victim at this rite of blood (chi-matsuri) being generally a prisoner or a condemned criminal. Although ambuscades and surprises played a large part in all strategy, pitched battles were the general rule, and it was essential that notice of an intention to attack should be given by discharging a singing arrow. Thereafter

the assaulting army, taking the word from its commander, raised a shout of ” Ei ! Ei ! ” to which the other side replied, and the formalities having been thus satisfied, the fight commenced. In early medieval days tactics were of the crudest descrip- tion. An army consisted of a congeries of little bands, each under the order of a chief who considered himself independent, and instead of subordinating his movements to a general plan, struck a blow wherever he pleased. From time immemorial a romantic value has attached in Japan to the first of anything: the first snow of winter; the first water drawn from the well on New Year’s Day; the first blossom of the spring; the first note of the nightingale. So in war the first to ride up to the foe or the wieider of the first spear was held in high honour, and a samurai strove for that distinction as his principal duty. It necessarily resulted, too, not only from the nature of the weapons employed, but also from the immense labour devoted by the true samurai to perfecting himself in their use, that displays of individual prowess were deemed the chief object in a battle.

Some tactical formations borrowed from China were familiar in Japan, but their intelligent use and their modification to suit the circumstances of the time were inaugurated only by the great captains of the 15th and 16th centuries. Prior to that epoch a battle resembled a gigantic fencing match. Men fought as individuals, not as units of a tactical formation, and the engage- ment consisted of a number of personal duels, all in simultaneous progress. It was the samurai's habit to proclaim his name and titles in the presence of the enemy, sometimes adding from his own record or his father's any details that might tend to dispirit his hearers. Then some one advancing to cross weapons with him would perform the same ceremony of self-introduction, and if either found anything to upbraid in the other's ante- cedents or family history, he did not fail to make loud reference to it, such a device being counted efficacious as a means of dis- turbing an adversary's sang-froid, though the principle under- lying the mutual introduction was courtesy. The duellists could reckon on finishing their fight undisturbed, but the victor frequently had to endure the combined assault of a number of the comrades or retainers of the vanquished. Of course a skilled swordsman did not necessarily seek a single combat; he was equally ready to ride into the thick of the fight without dis- crimination, and a group of common soldiers never hesitated to make a united attack upon a mounted officer if they found him disengaged. But the general feature of a battle was individual contests, and when the fighting had ceased, each samurai pro- ceeded to the tent 1 of the commanding officer and submitted for inspection the heads of those whom he had killed.

The disadvantage of such a mode of fighting was demonstrated for the first time when the Mongols invaded Japan in 1274.

The invaders moved in phalanx, guarding themselves

t • i-i -ii Change ot

with pavises, and covering their advance with a xactlcs.

host of archers shooting clouds of poisoned arrows. 2 When a Japanese samurai advanced singly and challenged one of them to combat, they opened their ranks, enclosed the chal- lenger and cut him to pieces. Many Japanese were thus slain, and it was not until they made a concerted movement of attack that they produced any effect upon the enemy. But although the advantage of massing strength seems to have been recognized, the Japanese themselves did not adopt the formation which the Mongols had shown to be so formidable. Individual prowess continued to be the prominent factor in battles down to a com- paratively recent period. The great captains Takeda Shingen and Uyesugi Kenshin are supposed to have been Japan's pioneer tacticians. They certainly appreciated the value of a

formation in which the action of the individual should be subordinated to the unity of the whole. But when it is remembered that fire- arms had already been in the hands of the Japanese for several years, and that they had means of acquainting themselves with

1 A tent was simply a space enclosed with strips of cloth or silk, on which was emblazoned the crest of the commander. It had no covering.

2 The Japanese never at any time of their history used poisoned arrows ; they despised them as depraved and inhuman weapons.

the tactics of Europe through their intercourse with the Dutch, it is remarkable that the changes attributed to Takeda and Uyesugi were not more drastic. Speaking broadly, what they did was to organize a column with the musqueteers and archers in front; the spearmen and swordsmen in the second line; the cavalry in the third line; the commanding officer in the rear, and the drums and standards in the centre. At close quarters the spear proved a highly effective weapon, and in the days of Hideyoshi (1536-1598) combined flank and front attacks by bands of spearmen became a favourite device. The importance of a strong reserve also received recognition, and in theory, at all events, a tolerably intelligent system of tactics was adopted. But not until the close of the 17th century did the doctrine of strictly disciplined action obtain practical vogue. Yamaga Soko is said to have been the successful inculcator of this prin- ciple, and from his time the most approved tactical formation was known as the Yamagaryu (Yamaga style), though it showed no other innovation than strict subordination of each unit to the general plan.

Although, tactically speaking, the samurai was everything and the system nothing before the second half of the 17 th century, and although strategy was chiefly a matter of decep- Princ/pfcs. tion, surprises and ambushes, it must not be supposed that there were no classical principles. The student of European military history searches in vain for the rules and maxims of war so often invoked by glib critics, but the student of Japanese history is more successful. Here, as in virtually every field of things Japanese, retrospect discovers the ubi- quitous Chinaman. The treatises of Sung and 'Ng (called in Japan Son and Go) Chinese generals of the third century after Christ, were the classics of Far-Eastern captains through all generations. (See The Book of War, tr. E. F. Calthrop, 1908.) Yoshitsune, in the 1 2th century,

deceived a loving girl to obtain a copy of Sung's work which her father had in his possession, and Yamaga, in the 17th century, when he set himself to compose a book on tactics, derived his materials almost entirely from the two Chinese monographs. These treatises came into the hands of the Japanese in the 8th century, when the celebrated Kibi no Mabi went to study civilization in China, just as his successors of the 19th century went to study a new civilization in Europe and America. Thenceforth Son and Go became household words among Japanese soldiers. Their volumes were to the samurai what the Mahayana was to the Buddhist. They were believed to have collected whatever of good had preceded them, and to have forecast whatever of good the future might produce. The character of their strategic methods, somewhat analogous to those of 18th-century Europe, may be gathered from the following: —

" An army undertaking an offensive campaign must be twice as numerous as the enemy. A force investing a fortress should be numerically ten times the garrison. When the adversary holds high ground, turn his flank; do not deliver a frontal attack. When he has a mountain or a river behind him, cut his lines of communica- tion. If he deliberately assumes a position from which victory is his only escape, hold him there, but do not molest him. If you can surround him, leave one route open for his escape, since desperate men fight fiercely. When you have to cross a river, put your advance-guard and your rear-guard at a distance from the banks. When the enemy has to cross a river, let him get well engaged in the operation before you strike at him. In a march, make celerity your first object. Pass no copse, enter no ravine, nor approach any thicket until your scouts have explored it fully."

Such precepts are multiplied; but when these ancient authors discuss tactical formations, they do not seem to have contem- plated anything like rapid, well-ordered changes of mobile, highly trained masses of men from one formation to another, or their quick transfer from point to point of a battlefield. The basis of their tactics is The Book of Changes. Here again is encountered the superstition that underlies nearly all Chinese and Japanese institutions: the superstition that took captive even the great mind of Confucius. The positive and the nega- tive principles; the sympathetic and the antipathetic elements; cosmos growing out of chaos; chaos re-absorbing cosmos — on such fancies they founded their tactical system. The result was

a phalanx of complicated organization, difficult to manoeuvre and liable to be easily thrown into confusion. Yet when Yamaga in the 17 th century interpreted these ancient Chinese treatises, he detected in them suggestions for a very shrewd use of the principle of echelon, and applied it to devise formations which combined much of the frontal expansion of the line with

the solidity of the column. More than that cannot be said for Japanese tactical genius. The samurai was the best fighting unit in the Orient — probably one of the best fighting units the world ever produced. It was perhaps because of that excellence that his captains remained indifferent tacticians.

In estimating the military capacity of the Japanese, it is essential to know something of the ethical code of the samurai, the bushido (way of the warrior) as it was called. A Ethics typical example of the rules of conduct prescribed of the by feudal chieftains is furnished in the code of Kato Samurai, Kiyomasa, a celebrated general of the 16th century: —

Regulations for Samurai of every Rank; the Highest and Lowest alike.

1. The routine of service must be strictly observed. From 6 a.m. military exercises shall be practised. Archery, gunnery and horsemanship must not be neglected. If any man shows excep- tional proficiency he shall receive extra pay.

2. Those that desire recreation may engage in hawking, deer- hunting or wrestling.

3. With regard to dress, garments of cotton or pongee shall be worn. Any man incurring debts owing to extravagance of costume or living shall be considered a law-breaker. If, however, being zealous in the practice of military arts suitable to his rank, he desires to hire instructors, an allowance may be granted to him for that purpose.

4. The staple of diet shall be unhulled rice. At social entertain- ments one guest for one host is the proper limit. Only when men are assembled for military exercises shall many dine together.

5. It is the duty of every samurai to make himself acquainted with the principles of his craft. Extravagant displays of adornment are forbidden in battle.

6. Dancing or organizing dances is unlawful ; it is likely to betray sword-carrying men into acts of violence. Whatever a man does should be done with his heart. Therefore for the soldier military amusements alone are suitable. The penalty for violating this provision is death by suicide.

7. Learning shall be encouraged. Military books must be read. The spirit of loyalty and filial piety must be educated before all things. Poem-composing pastimes are not to be engaged in by samurai. To be addicted to such amusements is to resemble a woman. A man born a samurai should live and die sword in hand. Unless he is thus trained in time of peace, he will

be useless in the hour of stress. To be brave and warlike must be his invariable condition.

8. Whosoever finds these rules too severe shall be relieved from service. Should investigation show that any one is so unfortunate as to lack manly qualities, he shall be singled out and dismissed forthwith. The imperative character of these instructions must not be doubted.

The plainly paramount purpose of these rules was to draw a sharp line of demarcation between the samurai and the courtiers living in Ki5to. The dancing, the couplet-composing, the sump- tuous living and the fine costumes of the officials frequenting the imperial capital were strictly interdicted by the feudatories. Frugality, fealty and filial piety — these may be called the funda- mental virtues of the samurai. Owing to the circumstances out of which his caste had grown, he regarded all bread-winning pursuits with contempt, and despised money. To be swayed in the smallest degree by mercenary motives was despicable in his eyes. Essentially a stoic, he made self-control the ideal of his existence, and practised the courageous endurance of suffering so thoroughly that he could without hesitation inflict on his own body pain of the most horrible description. Nor can the courage of the samurai justly be ascribed to bluntness of moral sensibility resulting from semi-savage conditions of life. From the 8th century onwards the current of existence in Japan set with general steadiness in the direction of artistic refinement and voluptuous luxury, amidst which men could scarcely fail to acquire habits and tastes inconsistent with acts of high courage and great endurance. The samurai's mood was not a product of semi-barbarism, but rather a protest against emasculating civilization. He schooled himself to regard death by his own hand as a normal eventuality. The story of other nations shows

epochs when death was welcomed as a relief and deliberately invited as a refuge from the mere weariness of living. But wherever there has been liberty to choose, and leisure to employ, a painless mode of exit from the world, men have invariably selected it. The samurai, however, adopted in harakiri (dis- embowelment) a mode of suicide so painful and so shocking that to school the mind to regard it with indifference and perform it without flinching was a feat not easy to conceive. Assistance was often rendered by a friend who stood ready to decapitate the victim immediately after the stomach had been gashed; but there were innumerable examples

of men who con- summated the tragedy without aid, especially when the sacrifice of life was by way of protest against the excesses of a feudal chief or the crimes of a ruler, or when some motive for secrecy existed. It must be observed that the suicide of the samurai was never inspired by any doctrine like that of Hegesias. Death did not present itself to him as a legitimate means of escaping from the cares and disappointments of life. Self- destruction had only one consolatory aspect, that it was the soldier's privilege to expiate a crime with his own sword, not under the hand of the executioner. It rested with his feudal chief to determine his guilt, and his peremptory duty was never to question the justice of an order to commit suicide, but to obey without murmur or protest. For the rest, the general motives for suicide were to escape falling into the hands of a victorious enemy, to remonstrate against some official abuse which no ordinary complaint could reach, or, by means of a dying protest, to turn a liege lord from pursuing courses injurious to his reputation and his fortune. This last was the noblest and by no means the most infrequent reason for suicide. Scores of examples are recorded of men who, with everything to make existence desirable, deliberately laid down their lives at the prompting of loyalty. Thus the samurai rose to a remarkable height of moral nobility. He had no assurance that his death might not be wholly fruitless, as indeed it often proved. If the sacrifice achieved its purpose, if it turned a liege lord from evil courses, the samurai could hope that his memory would be honoured. But if the lord resented such a violent and con- spicuous mode of reproving his excesses, then the faithful vassal's retribution would be an execrated memory and, perhaps, suffering for his family and relatives. Yet the deed was per- formed again and again. It remains to be noted that the samurai entertained a high respect for the obligations of truth; " A bushi has no second word," was one of his favourite mottoes. However, a reservation is necessary here. The samurai's doctrine was not truth for truth's sake, but truth for the sake of the spirit of uncompromising manliness on which he based all his code of morality. A pledge or a promise must never be broken, but the duty of veracity did not override the interests or the welfare of others. Generosity to a defeated foe was also one of the tenets of the samurai's ethics. History contains many instances of the exercise of that quality.

Something more, however, than a profound conception of duty was needed to nerve the samurai for sacrifices such as he seems to have been always ready to make. It is true /nfluence. tnat Japanese parents of the military class took pains to familiarize their children of both sexes from very tender years with the idea of self-destruction at any time. But superadded to the force of education and the incentive of tradition there was a transcendental influence. Buddhism supplied it. The tenets of that creed divided themselves, broadly speaking, into two doctrines, salvation by faith and

salvation by works, and the chief exponent of the latter prin- ciple is the sect which prescribes meditation as the vehicle of enlightenment. Whatever be the mental processes induced by this rite, those who have practised it insist that it leads finally to a state of absorption, in which the mind is flooded by an illu- mination revealing the universe in a new aspect, absolutely free from all traces of passion, interest or affection, and showing, written across everything in naming letters, the truth that for him who has found Buddha there is neither birth nor death, growth nor decay. Lifted high above his surroundings, he is

prepared to meet every fate with indifference. The attainment of that state seems to have been a fact in the case both of the samurai of the military epoch and of the Japanese soldier to-day. The policy of seclusion adopted by the Tokugawa adminis- tration after the Shimabara insurrection included an order that no samurai should acquire foreign learning. Abolition at Nevertheless some knowledge could not fail to the Samurai. filter in through the Dutch factory at Deshima, and thus, a few years before the advent of the American ships, Takashima Shuhan, governor of Nagasaki, becoming persuaded of the fate his country must invite if she remained oblivious of the world's progress, memorialized the Yedo government in the sense that, unless Japan improved her weapons of war and reformed her military system, she could not escape humiliation such as had just overtaken China. He obtained small arms and field-guns of modern type from Holland, and, repairing to Yedo with a company of men trained according to the new tactics, he offered an object lesson for the consideration of the conservative officials. They answered by throwing him into prison. But Egawa, one of his retainers, proved a still more zealous reformer, ' and his foresight being vindicated by the appearance of the American war-vessels in 1853, he won the government's confi- dence and was entrusted with the work of planning and building forts at Shinagawa and Shimoda. At Egawa's instance rifles and cannon were imported largely from Europe, and their manu- facture was commenced in Japan, a powder-mill also being estab- lished with machinery obtained from Holland. Finally, in 1862, the shogun's government adopted the military system of the West, and organized three divisions of all arms, with a total strength of 13,600 officers and men. Disbanded at the fall of the shogunate in 1867, this force nevertheless served as a model for a similar organization under the imperial government, and in the meanwhile the principal fiefs had not been idle, some — as Satsuma — adopting English tactics, others following France or Germany, and a few choosing Dutch. There appeared upon the stage at this juncture a great figure in the person of Omura Masujiro, a samurai of the Choshu clan. He established Japan's first military school at Ki5to in 1868; he attempted to substitute for the hereditary soldier conscripts taken from all classes of the people, and he conceived the plan of

dividing the whole empire into six military districts. An assassin's dagger removed him on the threshold of these great reforms, but his statue now stands in Tokyo and his name is spoken with reverence by all his countrymen. In 1870 Yamagata Aritomo (afterwards Field-Marshal Prince Yamagata) and Saigo Tsugumichi (after- wards Field-Marshal Marquis Saigo) returned from a tour of military inspection in Europe, and in 1872 they organized a corps of Imperial guards, taken from the three clans which had been conspicuous in the work of restoring the administrative power to the sovereign, namely, the clans of Satsuma, Choshu and Tosa. They also established garrisons in Tokyo, Sendai, Osaka and Kumamoto, thus placing the military authority in the hands of the central government. Reforms followed quickly. In 1872, the hydbusho, an office which controlled all matters relating to war, was replaced by two departments, one of war and one of the navy, and, in 1873, an imperial decree substituted universal conscription for the system of hereditary militarism. Many persons viewed this experiment with deep misgiving. They feared that it would not only alienate the samurai, but also entrust the duty of defending the country to men unfitted by tradition and custom for such a task, namely, the farmers, artisans and tradespeople, who, after centuries of exclusion from the military pale, might be expected to have lost all martial spirit. The government, however, was not deterred by these apprehensions. It argued that since the distinction of samurai and commoner had not originally existed, and since the former was a product simply of accidental conditions, there was no valid reason to doubt the military capacity of the people at large. The justice of this reasoning was put to a conclusive test a few years later. Originally the period of service with the colours was fixed at 3 years, that of service with the first and second reserves being 2 years each. One of the serious difficulties

encountered at the outset was that samurai conscripts were too proud to stand in the ranks with common rustics or artisans, and above all to obey the commands of plebeian officers. But patriotism soon overcame this obstacle. The whole country — with the exception of the northern island, Yezo — was parcelled out into six military districts (headquarters Tokyo, Osaka, Nagoya, Sendai, Hiroshima and Kumamoto) each furnishing a division of all arms and services. There was also from 1876 a guards division in Tokyo. The total strength on a peace footing was 3 1 ,680 of all arms, and on a war footing, 46,3 50. The defence of Yezo was entrusted to a colonial militia. It may well be supposed that to find competent officers

for this army greatly perplexed its organizers. The military school — now in Tokyo but originally founded by Omura in Kioto — had to turn out graduates at high pressure, and private soldiers who showed any special aptitude were rapidly promoted to positions of command. French military instructors were engaged, and the work of translating manuals was carried out with all celerity. In 1877, this new army of conscripts had to endure a crucial test: it had to take the field against the Satsuma samurai, the very flower of their class, who in that year openly rebelled against the Tokyo government. The campaign lasted eight months; as there had not yet been time to form the reserves, the Imperial forces were soon seriously reduced in number by casualties in the field and by disease, the latter claiming many victims owing to defective commissariat. It thus became necessary to have recourse to volunteers, but as these were for the most part samurai, the expectation was that their hereditary instinct of fighting would compensate for lack of training. That expectation was not fulfilled. Serving side by side in the field, the samurai volun- teer and the heimin 1 regular were found to differ by precisely the degree of their respective training. The fact was thus finally established that the fighting qualities of the farmer and artisan reached as high a standard as those of the bushi.

Thenceforth the story of the Japanese army is one of steady pro- gress and development. In 1878, the military duties of the empire were divided among three offices: namely, the army department, the general staff and the inspection department, while the six divisions of troops were organized into three army corps.

In 1879, the total period of colour and reserve service became 10 years. In 1883 the period was extended to 12 years, the list of exemptions was abbreviated, and above all substitution was no longer allowed. Great care was devoted to the training of officers ; promotion went by merit, and at least ten of the most promising officers were sent abroad every year to study. A comprehensive system of education for the rank and file was organized. Great difficulty was experienced in procuring horses suitable for cavalry, and indeed the Japanese army long remained weak in this arm. In 1886, the whole littoral of the empire was divided into five districts, each with its admiralty and its naval port, and the army being made responsible for coast defence, a battery construction corps was formed. Moreover, an exhaustive scheme was elaborated to secure full co-operation between the army and navy. In 1888 the seven divisions of the army first found themselves prepared to take the field, and, in 1893, a revised system of mobilization was sanctioned, to be put into operation the following year, for the Chino- Japanese War (q.v.). At this period the division, mobilized for service in the field, consisted of 12 battalions of infantry, 3 troops of cavalry, 4 batteries of field and 2 of mountain artillery, 2 companies of sappers and train, totalling 18,492 of all arms with 5633 horses. The

guards had only 8 battalions and 4 batteries (field). The field army aggregated over 120,000, with 168 field and 72 mountain guns, and the total of all forces, field, garrison and dep6t, was 220,580 of all arms, with 47,220 horses and 294 guns. Owing, however, to various modifications necessitated by circumstances, the numbers actually on duty were over 240,000, with 6495 non-combatant employees and about 100,000 coolies who acted as carriers. The infantry were armed with the Murata single-loader rifle, but the field artillery was inferior, and the only two divisions equipped with magazine rifles and smokeless powder never came into action. The experiences gained in this war bore large fruit. The total term of service with the colours and the reserves was slightly increased ; the colonial militia of Yezo (Hokkaido) was organized as a seventh line division ; 5 new divisions were added, bringing the whole number of divisions to 13 (including the guards); a mixed brigade was stationed in Formosa (then newly added to Japan's dominions) ; a high military council composed of field-marshals was created; the cavalry was brigaded ; the garrison artillery was increased ; strenuous efforts were made to improve the education of officers and

1 The general term for commoners as distinguished from samurai.

men ; and lastly, sanitary arrangements underwent much modification. An arsenal had been established in Tokyo, in 1868, for the manufac- ture of small_ arms and small-arm ammunition ; this was followed by an arsenal in Osaka for the manufacture of guns and gun-ammuni- tion ; four powder factories were opened, and in later years big-gun factories at Kure and Mororan. Japan was able to make 12-inch guns in 1902, and her capacity for this kind of work was in 1909 second to none. She has her own patterns of rifle and field gun, so that she is independent of foreign aid so far as armaments are concerned. In 1900, she sent a force to North China to assist in. the campaign for the relief of the foreign legations in Peking, and on that occasion her troops were able to observe at first hand the qualities and methods of European soldiers. In 1904 took place the great war with Russia (see Russo-Japanese War). After the war important changes were made in the direction of augmenting and improving the armed forces. The number of divisions was increased to 19 (including the guards), of which one division is for service in Korea and one for service in Manchuria. Various technical corps were organized, as well as horse artillery, heavy field artillery and machine-gun units. The field-gun was replaced by a quick- firer manufactured at Osaka, and much attention was given to the question of remounts — for, both in the war with China and in that with Russia, the horsing of the cavalry had been poor. Perhaps the most far-reaching change in all armies of late years is the shortening of the term of service with the colours to 2 years for the infantry, 3 years remaining the rule for other arms. This was adopted by Japan after the

war, the infantry period of service with the reserves being extended to 14J years, and of course has the effect of greatly augmenting the potential war strength. As to this, figures are kept secret, nor can any accurate approximation be attempted without danger of error. Rough estimates of Japan's war strength have, how- ever, been made, giving 550,000 as the war strength of the first line army, plus 34,000 for garrisons overseas and 150,000 special reserves (hojii) ; 370,000 second line or kobi, and 1 10,000 for the fully trained portion of the territorial forces, or Kokumin-hei. All these branches can further draw upon half-trained elements to the number of about 800,000 to replace losses. Japan's available strength in the last resort for home defence was recently (1909) stated by the Russian Novoye Vremya at 3,000,000. In 20 years, when the present system has produced its full effect, the first line should be 740,000 strong, the second line 780,000, and the third line about 3,850,000 (3,000,000 untrained and 850,000 partly trained). Details can be found in Journal of the R. United Service Institution, Dec. 1909-Jan. 1910.

*At 20 years of age every Japanese subject, of whatever status, becomes liable for military service. But the difficulty of making service universal in the case of a growing population is „ felt here as in Europe, and practically the system has « ecru " /n * elements of the old-fashioned conscription. The minimum height is 5-2 ft. (artillery and engineers, 5-4 ft.). There are four principal kinds of service, namely, service with the colours {genyeki), for two years; service with the first reserves (yobi), for 7 J years; service with the second reserves (kobi), for 7 years; and service with the territorial troops (ko kumin-hei) up to the age of 40. Special reserve (hojii) takes up men who, though liable for conscription and medically quali- fied, have escaped the lot for service with the colours. It consists of two classes, one of men remaining in the category of hojii for 7$ years, the other for I J year, before passing into the territorial army. Their purpose is similar to that of special or ersatz reserves elsewhere. The first class receives the usual short initial training. Men of the second class, in ordinary circumstances, pass, after their i| year's inability, to the territorial army untrained. As for the first and second general reserves [yobi and kobi) , each is called out twice during its full term for short "refresher" courses. After reaching the territorial army a man is relieved from all further training. The total number of youths eligible for conscription each year is about 435> 00O > but the annual contingent for full service is not much more than 100,000. Conscripts in the active army may be discharged before the expiration of two years if their conduct and aptitude are exceptional.*

A youth is exempted if it be clearly established 2 that his family is dependent upon his earnings. Except for permanent deformities men are put back for one year before being finally rejected on medical grounds. Men who have been convicted of crime are disqualified, but those who have

been temporarily deprived of civil rights must present themselves for conscription at the termination of their sentence. Educated men may enrol themselves as one-year volun- teers instead of drawing lots, this privilege of entry enduring up to the age of 28, after which, service for the full term without drawing lots is imposed. Residence in a foreign country secures exemption up to the age of 32 — provided that official permission to go abroad has been obtained. A man returning after the age of 32 is drafted into the territorial army, but if he returns before that age he must volunteer to receive training, otherwise he is taken without lot for service with the colours. The system of volunteering is largely resorted to by persons of the better classes. Any youth who

- *The privilege at first led to great abuses. It became a common thing to employ some aged and indigent person, set him up as the head of a " branch family," and give him for adopted son a youth liable to conscription.*

possesses certain educational qualifications is entitled to volunteer for training. If accepted after medical inspection, he serves with the colours for one year, during three months of which time he must live in barracks — unless a special permit be granted by his com- manding officer. A volunteer has to contribute to his maintenance and equipment, although youths who cannot afford the full expense, if otherwise qualified, are assisted by the state. At the conclusion of a year's training the volunteer is drafted into the first reserve for 6{ years, and then into the second reserve for 5 years, so that his total period (12 j years) of service before passing into the territorial army is the same as that of an ordinary conscript. The main purpose of the one-year voluntariat, as in Germany, is to provide officers for the reserves to territorial troops. Qualified teachers in the public service are only liable to a very short initial training, after which they pass at once into the territorial army. But if a teacher abandons that calling before the age of 28, he becomes liable, without lot, 1 to two years with the colours, unless he adopts the alternative of volunteering.

Officers are obtained in two ways. There are six local preparatory cadet schools (yonen-gakko) in various parts of the empire, for

*Oflkxrs k° ys °^ * rom I3 t0 l $' After 3 Y ears at one of these schools 2 a graduate spends 21 months at the central preparatory school (chuo-yonen-*

gakko), Tokyo, and if he graduates with sufficient credit at the latter institution, he becomes eligible for admission to the officers' college (shikan-gakko) without further test of proficiency. The second method of obtaining officers is by competitive examination for direct admission to the officers' college. In either case the cadet is sent to serve with the colours for 6 to 12 months as a private and non-commissioned officer, before commencing his course at the officers' college. The period of study at the officers' college is one year, and after graduating successfully the cadet serves with troops for 6 months on probation. If at the end of that time he is favourably reported on, he is commissioned as a sub-lieutenant. Young officers of engineers and artillery receive a year's further training at a special college. Officers' ranks are the same as in the British army, but the nomenclature is more simple. The terms, with their English equivalents, are shoi (second lieutenant), chui (first lieutenant), tai (captain), shosa (major), chusa (lieut. -colonel), taisa (colonel), shosho (major-general), chujo (lieut. -general), taisho (general), gensui (field-marshal). All these except the last apply to the same relative ranks in the navy. Pro- motion of officers in the junior grades is by seniority or merit, but after the rank of captain all promotion is by merit, and thus many officers never rise higher than captain, in which case retirement is compulsory at the age of 48. Except in the highest ranks, a certain minimum period has to be spent in each rank before promotion to the next.

There are three grades of privates: upper soldiers (jolo-hei), first- class soldiers (itto-sotsu), and second-class soldiers (nito-sotsu). A Soldiers P r ' vate on joining is a second-class soldier. For proficiency and good conduct he is raised to the rank of first-class soldier, and ultimately to that of upper soldier. Non- commissioned officers are obtained from the ranks, or from those who wish to make soldiering a profession, as in European armies. The grades are corporal (gocho), sergeant (gunso), sergeant-major (socho) and special sergeant-major (tokumu-socho) .

The pay of the conscript is, as it is everywhere, a trifle (is. iod.- 3s. ojd. per month). The professional non-commissioned officers are better paid, the lowest grade receiving three times as much as an upper soldier. Officers' pay is roughly at about three-quarters of the rates prevailing in Germany, sub-lieutenants receiving about £34, captains £71, colonels £238 per annum, &c. Pensions for officers and non-commissioned officers, according to scale, can be claimed after 1 1 years' colour service.

The emperor is the commander-in-chief of the army, and theoreti- cally the sole source of military authority, which he exercises through a general staff and a war department, with the assistance of a board of field-marshals (gensuifu). The general staff has for chief a field- marshal, and for vice-chief a general or lieutenant-general. It includes besides the usual general

staff departments, various survey and topographical officers, and the military college is under its direc- tion. The war department is presided over by a general officer on the active list, who is a member of the cabinet without being necessarily affected by ministerial changes. There are, further, artillery and engineer committees, and a remount bureau. The headquarters of coast defences under general officers are Tokyo, Yokohama, Shimono- seki and Yura. The whole empire is divided into three military districts — eastern, central and western — each under the command of a general or lieutenant-general. The divisional headquarters are as follows: — Guard Toky5, I. Tokyo, II. Sendai, III. Nagoya, IV. Wakayama, V. Hiroshima, VI. Kumamoto, VII. Asahikawa, VIII. Hirosaki, IX. Kasanava, X. Himeji, XI. Senzui, XII. Kokura, XIII. Takata, XIV. Utsonomia, XV. Fushimi, XVI. Kioto, XVII. Okayama, XVIII. Kurume. Some of these divisions are permanently

1 Conscription without lot is thus the punishment for all failures to comply with and attempts to evade the military laws.

1 Sons of officers' widows, or of officers in reduced circumstances, are educated at these schools either free or at reduced charges, but are required to complete the course and to graduate.

on foreign service, but their recruiting areas in Japan are maintained. There are also four cavalry brigades, and a number of unassigned regiments of field and mountain artillery, as well as garrison artillery and army technical troops. The organization of the active army by regiments is 176 infantry regiments of 3 battalions; 27 cavalry regiments; 30 field artillery regiments each of 6 and 3 mountain artillery regiments each of 3 batteries; 6 regiments and 6 battalions of siege, heavy field and fortress artillery; 20 battalions engineers; 19 supply and transport battalions.

*The medical service is exceptionally well organized. It received unstinted praise from European and American experts who observed it closely during the wars of 1900 and 1904-5. The „ „ establishment of surgeons to each division is approxi- * *!! mately 100, and arrangements complete in every detail «"'*• are made for all lines of medical assistance. Much help is rendered by the red cross society of Japan, which has an income of 2,000,000 yen annually, a fine hospital in Tokyo, a large nursing staff and two specially built and equipped hospital ships. During the early part of the campaign in Pechili, in 1900, the French column entrusted its wounded to the care of the Japanese.*

The staple article of commissariat for a Japanese army in the field 13 hoshii (dried rice), of which three days' supply can easily be carried in a bag by the soldier. When required for use the rice, _ ˆ being placed in

water, swells to its original bulk, and is eaten with a relish of salted fish, dried sea-weed or pickled plums. The task of provisioning an army on these lines is comparatively simple. The Japanese soldier, though low in stature, is well set up, muscular and hardy. He has great powers of endurance, and manoeuvres with remarkable celerity, doing everything at the run, if necessary, and continuing to run without distress for a length of time astonishing to European observers. He is greatly subject, however, to attacks of kakke (beri-beri), and if he has recourse to meat diet, which appears to be the best preventive, he will probably lose something of his capacity for prolonged rapid movement. He attacks with apparent indifference to danger, preserves his cheerful- ness amid hardships, is splendidly patriotic and has always shown himself thoroughly amenable to discipline.

Of the many educational and training establishments, the most important is the rikugun daigakko, or army college, where officers, (generally subalterns), are prepared for service in the Mlm upper ranks and for staff appointments, the course of ˆhT study extending over three years. The Toyama school icnoo ‘ s – stands next in importance. The courses pursued there are attended chiefly by subaltern officers of dismounted branches, non-commis- sioned officers also being allowed to take the musketry course. The term of training is five months. Young officers of the scientific branches are instructed at the hokogakko (school of artillery and engineers). There are, further, two special schools of gunnery — one for field, the other for garrison artillery, attended chiefly by captains and senior subalterns of the two branches. There is an inspection department of military education, the inspector-general being a lieutenant-general, under whom are fifteen field and general officers, who act as inspectors of the various schools and colleges and of military educational matters in general.

The Japanese officer’s pay is small and his mode of life frugal. He lives out of barracks, frequently with his own family. His uniform is plain and inexpensive, 3 and he has no desire to exchange it for mufti. He has no mess expenses, contribution to a band, or luxuries of any kind, and as he is nearly always without private means to supplement his pay, his habits are thoroughly economical. He devotes himself absolutely to his profession, living for nothing else, and since he is strongly imbued with an effective conception of the honour of his cloth, instances of his incurring disgrace by debt or dissipation are exceptional. The samurai may be said to have been revived in the officers of the modern army, who preserve and act up to all the old traditions. The system of promotion has evidently much to do with this good result, for no Japanese officer can hope to rise above the rank of captain unless, by showing himself really zealous and capable, he obtains from his commanding officer the recommendation without which all higher educational opportunities are closed to him. Yet promotion by merit has

not degenerated into promotion by favour, and corruption appears to be virtually absent. In the stormiest days of parliamentary warfare, when charges of dishonesty were freely preferred by party politicians against all departments of officialdom, no whisper ever impeached the integrity of army officers.

The training of the troops is thorough and strictly progressive, the responsibility of the company, squadron and battery commanders for the training of their commands, and the latitude granted them in choice of means being, as in Germany, the keystone of the system.

Originally the government engaged French officers to assist in

3 Uniform does not vary according to regiments or divisions. There is only one type for the whole of the infantry, one for the cavalry, and so on (see Uniforms, Naval and Military). Officers largely obtain their uniforms and equipment, as well as their books and technical literature through the Kai-ko-sha, which is a combined officers' club, benefit society and co-operative trading association to which nearly all belong.

organizing the army and elaborating its system of tactics and strategy, and during several years a military mission of French Forelrn ˚m cer s resided in Tokyo and rendered valuable aid to the Assistance J a P anese – Afterwards German officers were employed, with Jakob Meckel at their head, and they left a perpetually grateful memory. But ultimately the services of foreigners were dispensed with altogether, and Japan now adopts the plan of sending picked men to complete their studies in Europe. Up to 1904 she followed Germany in military matters almost implicitly, but since then, having the experience of her own great war to guide her, she has, instead of modelling herself on any one foreign system, chosen from each whatever seemed most desirable, and also, in many points, taken the initiative herself.

When the power of the sword was nominally restored to the Imperial government in 1868, the latter planned to devote one-fourth of the state's ordinary revenue to the army and navy. military H a d the estimated revenue accrued , this would have given aance ' a sum of about 3 millions sterling for the two services. But not until 1871, when the troops of the fiefs were finally dis- banded, did.the government find itself in a position to include in the annual budgets an adequate appropriation on account of

armaments. Thenceforth, from 1872 to 1896, the ordinary expenditures of the army varied from three-quarters of a million sterling to l| millions, and the extraordinary outlays ranged from a few thousands of pounds to a quarter of a million. Not once in the whole period of 25 years — if 1877 (the year of the Satsuma rebellion) be excepted — did the state's total expenditures on account of the army exceed l| millions sterling, and it redounds to the credit of Japan's financial manage- ment that she was able to organize, equip and maintain such a force at such a small cost. In 1896, as shown above, she virtually doubled her army, and a proportionate increase of expenditure ensued, the outlays for maintenance jumping at once from an average of about I J millions sterling to 2\ millions, and growing thenceforth with the organization of the new army, until in the year (1903) preceding the outbreak of war with Russia, they reached the figure of 4 millions. Then again, in 1906, six divisions were added, and additional expenses had to be incurred on account of the new over- seas garrisons, so that, in 1909, the ordinary outlays reached a total of 7 millions, or about one-seventh of the ordinary revenue of the state. This takes no account of extraordinary outlays incurred for building forts and barracks, providing new patterns of equipment, &c. In 1909 the latter, owing to the necessity of replacing the weapons used in the Russian War, and in particular the field artillery gun (which was in 1905 only a semi-quickfirer), involved a relatively large outlay.

The Navy. — The traditions of Japan suggest that the art of navigation was not unfamiliar to the inhabitants of a country Early consisting of hundreds of islands and abounding in

Japanese bays and inlets. Some interpreters of her cosmo- Warm graphy discover a great ship in the " floating bridge

vesse Q £ neaven 11 f rom which the divine procreators of the

islands commenced their work, and construe in a similar sense other poetically named vehicles of that remote age. But though the seas were certainly traversed by the early invaders of Japan, and though there is plenty of proof that in medieval times the Japanese flag floated over merchantmen which voyaged as far as Siam and India, and over piratical craft which harassed the coasts of Korea and China, it is unquestionable that in the matter of naval architecture Japan fell behind even her next-door neighbours. Thus, when a Mongol fleet came to Kiushiu in the 13th century, Japan had no vessels capable of contending against the invaders, and when, at the close of the 16th century, a Japanese army was fighting in Korea, repeated defeats of Japan's squadrons by Korean war- junks decided the fate of the campaign on shore as well as on sea. It seems strange that an enterprising nation like the Japanese should not have taken

for models the great galleons which visited the Far East in the second half of the 16th century under the flags of Spain, Portugal, Holland and England. With the exception, however, of two ships built by a castaway English pilot to order of Iyeyasu, no effort in that direction appears to have been made, and when an edict vetoing the construction of sea-going vessels was issued in 1636 as part of the Tokugawa policy of isolation, it can scarcely be said to have checked the growth of Japan's navy, for she possessed nothing worthy of the name. It was to the object lesson furnished by the American ships which visited Yedo bay in 1853 and to the urgent counsels of the Dutch that Japan owed the inception of a naval policy. A seamen's training station was opened under Dutch instructors in 1855 at Nagasaki, a building-slip was constructed and an iron factory established at the same place, and shortly afterwards a naval

school was organized at Tsukiji in Yedo, a war-ship the " Kwanko Maru "'—presented by the Dutch to the shogun's government — being used for exercising the cadets. To this vessel two others, purchased from the Dutch, were added in 1857 and 1858, and these, with one given by Queen Victoria, formed the nucleus of Japan's navy. In i860, we find the Pacific crossed for the first time by a Japanese war-ship — the " Kwanrin Maru " — and subsequently some young officers were sent to Holland for instruction in naval science. In fact the Tokugawa statesmen had now thoroughly appreciated the im- perative need of a navy. Thus, in spite of domestic unrest which menaced the very existence of the Yedo government, a dock-yard was established and fully equipped, the place chosen as its site being, by a strange coincidence, the village of Yoko- suka where Japan's first foreign ship-builder, Will Adams, had lived and died 250 years previously. This dockyard was planned and its construction superintended by a Frenchman, M. Bertin. But although the Dutch had been the first to advise Japan's acquisition of a navy, and although French aid was sought in the case of the important and costly work at Yokosuka, the shogun's government turned to England for teachers of the art of mari- time warfare. Captain Tracey, R.N., and other British officers and warrant-officers were engaged to organize and superintend the school at Tsukiji. They arrived, however, on the eve of the fall of the Tokugawa shogunate, and as the new administra- tion was not prepared to utilize their services immediately, they returned to England. It is not to be inferred that the Im- perial government underrated the importance of organizing a naval force. One of the earliest Imperial rescripts ranked a navy among " the country's most urgent needs " and ordered that it should be " at once placed on a firm foundation." But during the four years immediately subsequent to the restoration, a semi-interregnum existed in military affairs, the power of the sword being partly transferred to the hands of the sovereign and partly retained by the feudal chiefs. Ultimately, not only the vessels which had been in the possession of

the shogunate but also several obtained from Europe by the great feudatories had to be taken over by the Imperial government, which, on reviewing the situation, found itself owner of a motley squadron of 17 war-ships aggregating 13,812 tons displacement, of which two were armoured, one was a composite ship, and the rest were of wood. Steps were now taken to establish and equip a suitable naval college in Tsukiji, and application having been made to the British government for instructors, a second naval mission was sent from England in 1873, consisting of 30 officers and warrant- officers under Commander (afterwards Vice-Admiral Sir) Archi-bald Douglas. At the very outset occasions for active service afloat presented themselves. In 1868, the year after the fall of the shogunate, such ships as could be assembled had to be sent to Yezo to attack the main part of the Tokugawa squadron which had raised the flag of revolt and retired to Hakodate under the command of the shogun's admiral, Enomoto. Then in 1874 the duty of convoying a fleet of transports to Formosa had to be undertaken; and in 1877 sea power played its part in crushing the formidable rebellion in Satsuma. Meanwhile the work of increasing and organizing the navy went on steadily. The first steam war-ship constructed in Japan had been a gun- boat (138 tons) launched in 1866 from a building-yard estab- lished at Ishikawajima, an island near the mouth of the Sumida river on which Tokyo stands. At this yard and at Yokosuka two vessels of 897 tons and 1450 tons, respectively, were launched in 1875 and 1876, and Japan now found herself com- petent not only to execute all repairs but also to build ships of considerable size. An order was placed in England in 1875, which produced, three years later, the " Fuso," Japan's first ironclad (3717 tons) and the "Kongo" and " Hiei," steel-frame sister-cruisers of 2248 tons. Meanwhile training, prac- tical and theoretical, in seamanship, gunnery, torpedo-practice and naval architecture went on vigorously, and in 1878 the Japanese flag was for the first time seen in European waters,

I 1 The term maru subsequently became applicable to merchantmen only, war-ships being distinguished as kan.

floating over the cruiser " Seiki " (1897 tons) built in Japan and navigated solely by Japanese. The government, constantly solicitous of increasing the fleet, inaugurated, in 1882, a pro- gramme of 30 cruisers and 12 torpedo-boats, and in 1886 this was extended, funds being obtained by an issue of naval loan- bonds. But the fleet did not yet include a single battleship.

When the diet opened for the first time in 1890, a plan for the construction of two battleships encountered stubborn opposition in the lower house, where the majority attached much less im- portance to voting money for war-ships than to reducing the land tax. Not until 1892 was this opposition overcome in deference to an order from the throne that thirty thousand pounds sterling should be contributed yearly from the privy purse and that a tithe of all official salaries should be devoted during the same interval to naval needs. Had the house been more prescient, Japan's position at the outbreak of war with China in 1894 would have been very different. She entered the contest with 28 fighting craft, aggregating 57)°°° tons, and 24 torpedo-boats, but among them the most powerful was a belted cruiser of 4300 tons. Not one battleship was included, whereas China had two ironclads of nearly 8000 tons each. Under these conditions the result of the naval conflict was awaited with much anxiety in Japan. But the Chinese suffered signal defeats (see Chino- Japanese War) off the Yalu and at Wei-hai-wei, and the victors took possession of 17 Chinese craft, including one battleship. The resulting addition to Japan's fighting force was, however, insignificant. But the naval strength of Japan did not depend on prizes. Battleships and cruisers were ordered and launched in Europe one after the other, and when the Russo- Japanese War (q.v.) came, the fleet promptly asserted its physical and moral superiority in the surprise of Port Arthur, the battle of the 10th of August 1904, and the crowning victory of Tsushima.

As to the development of the navy from 1903 onwards, it is not possible to detail with absolute accuracy the plans laid down by the admiralty in Tokyo, but the actual state of the fleet in the year 1909 will be apparent from the figures given below.

Japan's naval strength at the outbreak of the war with Russia in 1904 was: —

Number. Displacement.

Tons.

Battleships 6 84,652

Armoured cruisers …. 8 . . . . 73.982

Other cruisers 44 … . 111,470

Destroyers 19 … 6,519

Torpedo-boats 80 … 7.U9

Totals 157

Losses during the war were : —

Battleships 2

Cruisers (second and smaller

classes) 8

Destroyers 2

Torpedo-boats 7

. . . 283,742

. . . 27,300

18,009

... 705

... 557

Totals 19 … . 46,571

The captured vessels repaired and added to the fleet were : —

Battleships 5 62,524

Cruisers II … . 71.276

Destroyers 5 • r .74°

Totals 21 … . 135,530

The vessels built or purchased after the war and up to the close of 1908 were: —

Battleships 4 71,500

Armoured cruisers …. 4

Other cruisers 5

Destroyers 33

Torpedo-boats 5

56,700 7,000

12,573 760

To the foregoing must be added two armoured cruisers — the ” Kurama ” (14,000) launched at Yokosuka in October 1907, and the ” Ibuki ” (14,700) launched at Kure in November 1907, but no other battleships or cruisers were laid down in Japan or ordered abroad up to the close of 1908.

There are four naval dockyards, namely, at Yokosuka, Kure, Sasebo and Maizuru. Twenty-one vessels built at Yokosuka since 1876 included a battleship (19,000 tons) and „ . an armoured cruiser (14,000 tons) ; seven built at Kure Dockyards. since 1898 included a battleship (19,000 tons) and an armoured cruiser (14,000 tons). The yards at Sasebo and Maizuru had not yet been used in 1909 for constructing large vessels. Two private yards — the Mitsubishi at Nagasaki and Kobe, and the Kawa- saki at the latter place — have built several cruisers, gunboats and torpedo craft, and are competent to undertake more important work. Nevertheless in 1909 Japan did not yet possess complete independ- ence in this matter, for she was obliged to have recourse to foreign countries for a part of the steel used in ship-building. Kure manu- factures practically all the steel it requires, and there is a government steel-foundry at Wakamatsu on which more than 3 millions sterling had been spent in 1909, but it did not yet keep pace with the country’s needs. When this independence has been attained, it is hoped to effect an economy of about 18 % on the outlay for naval construc- tion, owing to the cheapness of manual labour and the disappearance both of the manufacturer’s profit and of the expenses of transfer from Europe to Japan.

There are five admiralties — Yokosuka, Kure, Sasebo, Maizuru and Port Arthur; and four naval stations — Takeshiki (in Tsushima), Mekong (in the Pescadores), Ominato and Chinhai (in southern Korea).

The navy is manned partly by conscripts and partly by volunteers. About 5500 are taken every year, and the ratio is, approximately, 55% of volunteers and 45% of conscripts. The period pg noa nel of active service is 4 years and that of service with the reserve 7 years. On the average 200 cadets are admitted yearly, of whom 50 are engineers, and in 1906 the personnel of the navy con- sisted of the following : —

Admirals, combative and non-combative … 77 Officers, combative and non-combative, below the

rank of admiral 2,867

Warrant officers 9,075

Bluejackets 29,667

Cadets 721

Total 42,407

Totals 51 … . 148.533

Some of the above have been superannuated, and the serviceable fleet in 1909 was; —

Battleships 13 … . 191,380

Armoured cruisers …. 12 … . 130,683 Other cruisers, coast-defence

ships and gun-boats . . . 47 165,253

Destroyers 55 • • ■ • 20,508

Torpedo-boats 77 … • 7.25°

Totals 204

515,082

The highest educational institution for the navy is the naval staff college, in which there are five courses for officers alone. The gunnery and torpedo schools are attended by officers, and also by selected warrant-officers and bluejackets, g2u^/ oa . who consent to extend their service. There is also a mechanical school for junior engineers, warrant-officers and ordi- nary artificers.

At the naval cadet academy — originally situated in Tkoyo but now at Etajima near Kure — aspirants for service as naval officers receive a 3 years' academical course and 1 year's training at sea ; and, finally, there is a naval engineering college collateral to the naval cadet academy.

Since 1882, foreign instruction has been wholly dispensed with in the Japanese navy; since 1886 she has manufactured her own prismatic powder; since 1891 she has been able to make quick-firing guns and Schwartzkopf torpedoes, and in 1892 one of her officers invented a particularly potent explosive, called (after its inventor) Shimose powder.

Finance. — Under the feudal system of the Tokugawa (1603- 1871), all land in Japan was regarded as state property, and parcelled out into 276

fiefs, great and small, which were assigned to as many feudatories. These were em- p£rio£'" ,at powered to raise revenue for the support of their households, for administrative purposes, and for the maintenance of troops. The basis of taxation varied greatly in different dis- tricts, but, at the time of the Restoration in 1867, the general principle was that four-tenths of the gross produce should go to the feudatory, six-tenths to the farmer. In practice this rule was applied to the rice crop only, the assessments for other kinds of produce being levied partly in money and partly in manufactured goods. Forced labour also was exacted, and arti- sans and tradesmen were subjected to pecuniary levies. The yield of rice in 1867 was about 154 million bushels, 1 of which the market value at prices then ruling was £24,000,000, or

1 The reader should be warned that absolute accuracy cannot be claimed for statistics compiled before the Meiji era.

Paper Money.

240,000,000 yen. 1 Hence the grain tax represented, at the lowest calculation, 96,000,000 yen. When the administration reverted to the emperor in 1867 the central treasury was empty, and the funds hitherto employed for governmental purposes in the fiefs continued to be devoted to the support of the feudatories, to the payment of the samurai, and to defraying the expenses of local administration, the central treasury receiving only whatever might remain after these various outlays.

The shogun himself, whose income amounted to about £3,500,000, did not, on abdicating, hand over to the sovereign either the contents of his treasury or the lands from which he derived his revenues. He contended that funds for the govern- ment of the nation as a whole should be levied from the people at large. Not until 1871 did the feudal system cease to exist. The fiefs being then converted into prefectures, their revenues became an asset of the central treasury, less 10 % allotted for the support of the former feudatories. 2

But during the interval between 1867 and 1871, the men on whom had devolved the direction of national affairs saw no relief from crippling impecuniosity except an issue of paper money. This was not a novelty in Japan. Paper money had been known to the people since the middle of the 17th century, and in the era of which we are now writing no less than

1694 varieties of notes were in circulation. There were gold notes, silver notes, cash-notes, rice-notes, umbrella- notes, ribbon-notes, lathe-article-notes, and so on through an interminable list, the circulation of each kind being limited to the issuing fief. Many of these notes had almost ceased to have any purchasing power, and nearly all were regarded by the people as evidences of official greed. The first duty of a centralized progressive administration should have been to reform the currency. The political leaders of the time appreciated that duty, but saw themselves compelled by stress of circumstances to adopt the very device which in the hands of the feudal chiefs had produced such deplorable results. The ordinary revenue amounted to only 3,000,000 yen, while the extraordinary aggregated 29,000,000, and was derived wholly from issues of paper money or other equally unsound sources.

Even on the abolition of feudalism in 1871 the situation was not immediately relieved. The land tax, which constituted nine-tenths of the feudal revenues, had been as- sessed by varying methods and at various rates by the different feudatories, and re-assessment of all the land became a preliminary essential to establishing a uniform system. Such a task, on the basis of accurate surveys, would have involved years of work, whereas the financial needs of the state had to be met immediately. Under the pressure of this imperative necessity a re-assessment was roughly made in two years, and being continued thereafter with greater accuracy, was completed in 1 88 1. This survey, eminently liberal to the agriculturists, assigned a value of 1,200,000,000 yen to the whole of the arable land, and the treasury fixed the tax at 3 % of the assessed value of the land, which was about one-half of the real market value. Moreover, the government contemplated a gradual reduction of this already low impost until it should ultimately fall to 1 %. Circumstances prevented the consummation of that purpose. The rate underwent only one reduction of 5 %, and thereafter had to be raised on account of war expenditures. On the whole, however, no class benefited more conspicuously from the change of administration than the peasants, since not only was their burden of taxation light, but also they were converted from mere tenants into actual proprietors. In brief, they acquired the fee-simple of their farms in consideration of paying an annual rent equal to about one sixty-sixth of the market value of the land.

In 1873, when these changes were effected, the ordinary

1 The yen is a silver coin worth about 2s. : 10 yen — £i.

2 In addition to the above grant, the feudatories were allowed to retain the reserves in their treasuries; thus many of the feudal nobles found themselves possessed of substantial fortunes, a consider- able part of which

they generally devoted to the support of their former vassals.

Land Tax.

revenue of the state rose from 24,500,000 yen to 70,500,000 yen. But seven millions sterling is a small income for a country confronted by such problems as Japan had to solve. She had to build railways; to create an army and R eve nue. a navy; to organize posts, telegraphs, prisons, police and education; to construct roads, improve harbours, light and buoy the coasts; to create a mercantile marine; to start under official auspices numerous industrial enterprises which should serve as object lessons to the people, as well as to lend to private persons large sums in aid of similar projects. Thus, living of necessity beyond its income, the government had recourse to further issues of fiduciary notes, and in propor- tion as the volume of the latter exceeded actual currency requirements their specie value depreciated.

This question of paper currency inaugurates the story of bank- ing; a story on almost every page of which are to be found inscribed the names of Prince Ito, Marquis Inouye, Banks Marquis Matsukata, Count Okuma and Baron Shibusawa, the fathers of their country's economic and financial progress in modern times. The only substitutes for banks in feudal days were a few private firms — " households " would, perhaps, be a more correct expression — which received local taxes in kind, converted them into money, paid the proceeds to the central government or to the feudatories, gave accommo- dation to officials, did some exchange business, and occasionally extended accommodation to private individuals. They were not banks in the Occidental sense, for they neither collected funds by receiving deposits nor distributed capital by making loans. The various fiefs were so isolated that neither social nor financial intercourse was possible, and moreover the mercan- tile and manufacturing classes were regarded with some disdain by the gentry. The people had never been familiarized with combinations of capital for productive purposes, and such a thing as a joint-stock company was unknown. In these circum- stances, when the administration of state affairs fell into the hands of the men who had made the restoration, they not only lacked the first essential of rule, money, but were also without means of obtaining any, for they could not collect taxes in the fiefs, these being still under the control of the feudal barons; and in the absence of widely organized commerce or finance, no access to funds presented itself. Doubtless the minds of these men were sharpened by the necessities confronting them, yet it speaks eloquently for their discernment that, samurai as they were, without any business training whatever, one of their first essays was to establish organizations which should take charge of the national revenue, encourage industry and promote trade and production by lending money at comparatively low rates

of interest. The tentative character of these attempts is evidenced by frequent changes. There was first a business bureau, then a trade bureau, then commercial companies, and then exchange companies, these last being established in the principal cities and at the open ports, their personnel consisting of the three great families — Mitsui, Shimada and Ono — houses of ancient repute, as well as other wealthy merchants in Kioto, Osaka and elsewhere. These exchange companies were partnerships, though not strictly of the joint-stock kind. They formed the nucleus of banks in Japan, and their functions included, for the first time, the receiving of deposits and the lending of money to merchants and manufacturers. They had power to issue notes, and, at the same time, the government issued notes on its own account. Indeed, in this latter fact is to be found one of the motives for organizing the exchange companies, the idea being that if the state's notes were lent to the companies, the people would become familiarized with the use of such currency, and the companies would find them convenient capital. But this system was essentially unsound: the notes, alike of the treasury and of the companies, though nominally convertible, were not secured by any fixed stock of specie. Four years sufficed to prove the unpracticality of such an arrangement, and in 1872 the exchange companies were swept away, to be succeeded in July 1873 by the establishment of national banks on a system which combined some of the features of English banking with the general

FINANCE]

bases of American. Each bank had to pay into the treasury 60 % of its capital in government notes. It was credited in return with interest-bearing bonds, which bonds were to be left in the treasury as security for the issue of bank-notes to an equal amount, the banks being required to keep in gold the remaining 40 % of their capital as a fund for converting the notes, which conversion must always be effected on application. The elabora- tors of this programme were Ito, Inouye, Okuma and Shibusawa. They added a provision designed to prevent the establishment of too small banks, namely, that the capital of each bank must bear a fixed ratio to the population of its place of business. Evidently the main object of the treasury was gradually to replace its own fiat paper with convertible bank-notes. But experience quickly proved that the scheme was unworkable. The treasury notes had been issued in such large volume that sharp depreciation had ensued; gold could not be procured except at a heavy cost, and the balance of foreign trade being against Japan, some 300,000,000 yen in specie flowed out of the country between 1872 and 1874.

It should be noted that at this time foreign trade was still invested with a perilous character in Japanese eyes. In early days, while the Dutch had free access to her ports, they sold her so much and bought so little in return that

an immense quantity of the precious metals flowed out of her coffers. Again, when over-sea trade was renewed in modern times, Japan's exceptional financial condition presented to foreigners an opportunity of which they did not fail to take full advantage. For, during her long centuries of seclusion, gold had come to hold to silver in her coinage a ratio of I to 8, so that gold cost, in terms of silver, only one-half of what it cost in the West. On the other hand, the treaty gave foreign traders the right to exchange their own silver coins against Japanese, weight for weight, and thus it fell out that the foreigner, going to Japan with a supply of Mexican dollars, could buy with them twice as much gold as they had cost in Mexico. Japan lost very heavily by this system, and its effects accentuated the dread with which her medieval experience had invested foreign commerce. Thus, when the balance of trade swayed heavily in the wrong direction between 1872 and 1874, the fact created undue consternation, and moreover there can be no doubt that the drafters of the bank regulations had over-estimated the quantity of available gold in the country.

All these things made it impossible to keep the bank-notes long in circulation. They were speedily returned for conversion; no deposits came to the aid of the banks, nor did the public make any use of them. Disaster became inevitable. The two great firms of Ono and Shimada, which had stood high in the nation's estimation alike in feudal and in imperial days, closed their doors in 1874; a panic ensued, and the circulation of money ceased almost entirely.

Evidently the banking system must be changed. The government bowed to necessity. They issued a revised code of banking regula- _. tions which substituted treasury notes in the place of

*aD ** specie. Each bank was thenceforth required to invest 80% of its capital in 6% state bonds, and these being lodged with the treasury, the bank became competent to issue an equal quantity of its own notes, forming with the remainder of its capital a reserve of treasury notes for purposes of redemption. This was a complete subversion of the government's original scheme. But no alternative offered. Besides, the situation presented a new feature. The hereditary pensions of the feudatories had been commuted with bonds aggregating 174,000,000 yen. Were this large volume of bonds issued at once, their heavy depreciation would be likely to follow, and moreover their holders, unaccustomed to dealing with financial problems, might dispose of the bonds and invest the proceeds in hazardous enterprises. To devise some opportunity for the safe and profitable employment of these bonds seemed, therefore, a pressing necessity, and the newly organized national banks offered such an opportunity. For bond-holders, combining to form a bank, continued to*

draw from the treasury 6 % on their bonds, while they acquired power to issue a corresponding amount of notes which could be lent at profit- able rates. The programme worked well. Whereas, up to 1876, only five banks were established under the original regulations, the number under the new rule was 151 in 1879, their aggregate capital having grown in the same interval from 2,000,000 yen to 40,000,000 yen, and their note issues from less than 1,000,000 to over 34,000,000. Here, then, was a rapidly growing system resting wholly on state credit. Something like a mania for bank-organizing declared itself, and in 1878 the government deemed it necessary to legislate against the establishment of any more national banks, and to limit to 34,000,000 yen the aggregate note issues of those already in existence.

It is possible that the conditions which prevailed immediately after the establishment of the national banks might have developed some permanency had not the Satsuma rebellion broken out in 1877. Increased taxation to meet military outlay being impossible in such circumstances, nothing offered except recourse to further note

otthe

Banking

System.

issues. The result was that by 1881, fourteen years after the Restor- ation, notes whose face value aggregated 164,000,000 yen had been put into circulation; the treasury possessed specie amounting to only 8,000,000 yen, and 18 paper yen could be purchased with 10 silver ones.

Up to 1 88 1 fitful efforts had been made to strengthen the specie value of fiat paper by throwing quantities of gold and silver upon the market from time to time, and 23,000,000 yen had „ been devoted to the promotion of industries whose t! V n U ˆf products, it was hoped, would go to swell the list of c oec » e exports, and thus draw specie to the country. But pa ymea ts these devices were now finally abandoned, and the government applied itself steadfastly to reducing the volume of the fiduciary currency on the one hand, and accumulating a specie reserve on the other. The steps of the programme were simple. By cutting down administrative expenditure; by transferring certain charges from the treasury to the local communes; by sus- pending all grants in aid of provincial public works and private enterprises, and by a moderate increase of the tax on alcohol, an annual surplus of revenue, totalling 7,500,000 yen, was secured. This was applied

to reducing the volume of the notes in circulation. At the same time, it was resolved that all officially conducted industrial and agricultural works should be sold — since their purpose of instruction and example seemed now to have been sufficiently achieved — and the proceeds, together with various securities (aggre- gating 26,000,000 yen in face value) held by the treasury, were applied to the purchase of specie. Had the government entered the market openly as a seller of its own fiduciary notes, its credit must have suffered. There were also ample reasons to doubt whether any available stores of precious metal remained in the country. In obedience to elementary economical laws, the cheap money had steadily driven out the dear, and although the government mint at Osaka, founded in 1871, had struck gold and silver coins worth 80,000,000 yen between that date and 1881, the customs returns showed that a great part of this metallic currency had flowed out of the country. In these circumstances Japanese financiers decided that only one course remained : the treasury must play the part of national banker. Produce and manufactures destined for export must be purchased by the state with fiduciary notes, and the metallic proceeds of their sales abroad must be collected and stored in the treasury. This programme required the establishment of consulates in the chief marts of the Occident, and the organization of a great central bank — the present Bank of Japan — as well as of a secondary bank — the present Specie Bank of Yokohama — the former to conduct transactions with native producers and manufacturers, the latter to finance the business of exportation. The outcome of these various arrangements was that, by the middle of 1885, the volume of fiduciary notes had been reduced to 119,000,000 yen, their depreciation had fallen to 3 %, and the metallic reserve of the treasury had increased to 45,000,000 yen. The resumption of specie payments was then announced, and became, in the autumn of that year, an accomplished fact. From the time when this programme began to be effective, Japan entered a period of favourable balance of trade. According to accepted economic theories, the influence of an appreciating currency should be to encourage imports; but the converse was seen in Japan's case, for from 1882 her exports annually exceeded her imports, the maximum excess being reached in 1886, the very year after the resumption of specie payments.

The above facts deserve to figure largely in a retrospect of Japanese finance, not merely because they set forth a fine economic feat, indicating clear insight, good organizing capacity, and courageous energy, but also because volumes of adverse foreign criticism were written in the margin of the story during the course of the incidents it embodies. Now Japan was charged with robbing her own people because she bought their goods with paper money and sold them for specie; again, she was accused of an official conspiracy to ruin the foreign local banks because she purchased

exporters' bills on Europe and America at rates that defied ordinary competition; and while some declared that she was plainly without any understanding of her own doings, others predicted that her heroic method of dealing with the problem would paralyze industry, interrupt trade and produce widespread suffering. Undoubtedly, to carry the currency of a nation from a discount of 70 or 80% to par in the course of four years, reducing its volume at the same time from 160 to 119 million yen, was a financial enterprise violent and daring almost to rashness. The gentler expedient of a foreign loan would have commended itself to the majority of economists. But it may be here stated, once for all, that until her final adoption of a gold standard in 1897, the foreign money market was practically closed to Japan. Had she borrowed abroad it must have been on a sterling basis. Receiving a fixed sum in silver, she would have had to discharge her debt in rapidly appreciating gold. Twice, indeed, she had recourse to London for small sums, but when she came to cast up her accounts the cost of the accommodation stood out in deterrent proportions. A 9% loan, placed in England in 1868 and paid off in 1889, produced 3,750,000 yen, and cost altogether 11,750,000 yen in round figures; and a 7% loan, made in 1872 and paid off in 1897, produced 10,750,000 yen, and cost 36,000,000 yen. These consider- ations were supplemented by a strong aversion from incurring pecuniary obligations to Western states before the latter had consented

the National Banks.

to restore Japan's judicial and tariff autonomy. The example of Egypt showed what kind of fate might overtake a semi-independent state falling into the clutches of foreign bond-holders. Japan did not wish to fetter herself with foreign debts while struggling to emerge from the rank of Oriental powers.

After the revision of the national bank regulations, semi-official banking enterprise won such favour in public eyes that the govern- ment found it necessary to impose limits. This Closing of conservative policy proved an incentive to private banks and banking companies, so that, by the year 1883, no less than 1093 banking institutions were in existence throughout Japan with an aggregate capital of 900,000,000 yen. But these were entirely lacking in arrangements for com- bination or for equalizing rates of interest, and to correct such defects, no less than ultimately to constitute

the sole note-issuing institution, a central bank (the Bank of Japan) was organized on the model of the Bank of Belgium, with due regard to correspond- ing institutions in other Western countries and to the conditions existing in Japan. Established in 1882 with a capital of 4,000,000 yen, this bank has now a capital of 30 millions, a security reserve of 206 millions, a note-issue of 266 millions, a specie reserve of 160 millions, and loans of 525 millions.

The banking machinery of the country being now complete, in a general sense, steps were taken in 1883 for converting the national banks into ordinary joint-stock concerns and for the redemption of all their note-issues. Each national bank was required to deposit with the treasury the government paper kept in its strong room as security for its own notes, and further to take from its annual profits and hand to the treasury a sum equal to 2|% of its notes in circulation. With these funds the central bank was to purchase state bonds, devoting the interest to redeeming the notes of the national banks. Formed with the object of disturbing the money market as little as possible, this programme encountered two obstacles. The first was that, in view of the Bank of Japan's pur- chases, the market price of state bonds rose rapidly, so that, whereas official financiers had not expected them to reach par before 1897, they were quoted at a considerable premium in 1886. The second was that the treasury having in 1886 initiated the policy of con- verting its 6 % bonds into 5 % consols, the former no longer produced interest at the rate estimated for the purposes of the banking scheme'. The national banks thus found themselves in an embarrassing situation and began to clamour for a revision of the programme. But the government, seeing compensations for them in other directions, adhered firmly to its scheme. Few problems have caused greater controversy in modern Japan than this question of the ultimate fate of the national banks. Not until 1896 could the diet be induced to pass a bill providing for their dissolution at the close of their charter terms, or their conversion into ordinary joint- stock concerns without any note-issuing power, and not until 1899 did their notes cease to be legal tender. Out of a total of 153 of these banks, 132 continued business as private institutions, and the rest were absorbed or dissolved. Already (1890 and 1893) minute regulations had been enacted bringing all the banks and banking institutions — except the special banks to be presently described — within one system of semi-annual balance-sheets and official auditing, while in the case of savings banks the directors' responsibility was declared unlimited and these banks were required to lodge security with the treasury for the protection of their depositors.

Just as the ordinary banks were all centred on the Bank of Japan l and more or less connected with it, so in 1895, a group of special rf institutions, called agricultural and commercial banks,

Banks were organized and centred on a hypothec bank, the

object of this system being to supply cheap capital to farmers and manufacturers on the security of real estate. The hypothec bank had its head office in Tokyo and was authorized to obtain funds by issuing premium-bearing bonds, while an agricul- tural and industrial bank was established in each prefecture and received assistance from the hypothec bank. Two years later (1900), an industrial bank— sometimes spoken of as the credit mobilier of Japan — was brought into existence under official auspices, its purpose being to lend money against bonds, debentures and shares, as well as to public corporations. These various institutions, together with clearing houses, bankers' associations, the Hokkaido colonial bank, the bank of Formosa, savings banks (including a post-office savings bank), and a mint complete the financial machi- nery of modern Japan.

Reviewing this chapter of Japan's material development, we find Review of that whereas, at the beginning of the Meiji era (1867), Banking the nation did not possess so much as one banking Develop- institution worthy of the name, forty years later it ment. had 221 1 banks, with a paid-up capital of £40,000,000,

reserves of £12,000,000, and deposits of £147,000,000; and whereas

1 The Bank of Japan was established as a joint-stock company in 1882. The capital in 1909 was 30,000,000 yen. In it alone is vested note-issuing power. There is no limit to its issues against gold or silver coins and bullion, but on other securities (state bonds, treasury bills and other negotiable bonds or commercial paper) its issues are limited to 120 millions, any excess over that figure being subject to a tax of 5 % per annum.

there was not one savings bank in 1867, there were 487 in 1906 with deposits of over £50,000,000. The average yearly dividends of these banks in the ten years ending 1906 varied between 9-1 and 9-9%.

Necessarily the movement of industrial expansion was accom- panied by a development of insurance business. The beginnings of this kind of enterprise did not become visible, how- . ever, until 188 1, and even at that comparatively " ,saraace – recent date no Japanese laws had yet been enacted for the control of such operations. The commercial code, published in March 1890, was the earliest legislation which met the need, and from that time the number of insurance companies and the volume of their trans- actions grew rapidly. In 1897, there were 35 companies with a total paid- up capital of 7,000,000 yen and policies aggregating 971,000,000 yen, and in 1906 the corresponding figures were 65 companies, 22,000,000 yen paid up and policies of 4,149,000,000 yen. The premium reserves grew in

the same period from 7,000,000 to 108,000,000. The net profits of these companies in 1906 were (in round numbers) 10,000,000 yen.

The origin of clearing houses preceded that of insurance companies in Japan by only two years (1879). Osaka set the example, which was quickly followed by Tokyo, Kobe, Yokohama, _, Kioto and Nagoya. In 1898 the bills handled at Clearing these institutions amounted to 1,186,000,000 yen, and ouses.

in 1907 to 7,484,000,000 yen. Japanese clearing houses are modelled after those of London and New York.

Exchanges existed in Japan as far back as the close of the 17th century. At that time the income of the feudal chiefs consisted almost entirely of rice, and as this was sold to brokers, _ the latter found it convenient to meet at fixed times oarses.

and places for conducting their business. Originally their trans- actions were all for cash, but afterwards they devised time bargains which ultimately developed into a definite form of exchange. The reform of abuses incidental to this system attracted the early attention of the Meiji government, and in 1893 a law was promul- gated for the control of exchanges, which then numbered 146. Under this law the minimum share capital of a bourse consti- tuted as a joint-stock company was fixed at 100,000 yen, and the whole of its property became liable for failure on the part of its brokers to implement their contracts. There were 51 bourses in

1908.

Not less remarkable than this economic development was the large part acted in it by officialdom. There were two reasons for this. One was that a majority of the men gifted with originality and foresight were drawn into the ranks of The Govern- the administration by the great current of the revolu- ment and tion; the other, that the feudal system had tended to Economic check rather than to encourage material development, Development since the limits of each fief were also the limits of economical and industrial enterprise. Ideas for combination and co-operation had been confined to a few families, and there was nothing to suggest the organization of eompanies nor any law to protect them if organized. Thus the opening of the Meiji era found the Japanese nation wholly unqualified for the commercial and manufacturing competition in v/hich it was thenceforth required to engage, and therefore upon those who had brought the country out of its isolation there devolved the responsibility of speedily preparing their fellow countrymen for the new situation. To these leaders banking facilities seemed to be the first need, and steps were accordingly

taken in the manner already described But how to educate men of affairs at a moment's notice? How to replace by a spirit of intelligent progress the ignorance and conservatism of the hitherto despised traders and artisans? When the first bank was organized, its two founders — men who had been urged, nay almost compelled, by officialdom to make the essay — were obliged to raise four-fifths of the capital themselves, the general public not being willing to subscribe more than one-fifth — a petty sum of 500,000 yen — and when its staff commenced their duties, they had not the most shadowy conception of what to do. That was a faithful reflection of the condition of the business world at large. If the initiative of the people themselves had been awaited, Japan's career must have been slow indeed.

Only one course offered, namely, that the government itself should organize a number of productive enterprises on modern lines, so that they might serve as schools and also as models. Such, as already noted under Industries, was the programme adopted. It provoked much hostile criticism from foreign onlookers, who had learned to decry all official incursions into trade and industry, but had not properly appreciated the special conditions existing in Japan. The end justified the means. At the outset of its administration we find the Meiji government not only forming plans for the circulation of money, building railways and organizing posts and telegraphs, but also establishing dockyards, spinning mills, printing-houses, silk-reeling filatures, paper-making factories and so forth, thus by example encouraging these kinds of enterprise and by legislation

Croviding for their safe prosecution. Yet progress was slow. One y one and at long intervals joint-stock companies came into existence, nor was it until the resumption of specie payments in 1886 that a really effective spirit of enterprise manifested itself I among the people. Railways, harbours, mines, spinning, weaving,

paper-making, oil-refining, brick-making, leather-tanning, glass- making and other industries attracted eager attention, and whereas the capital subscribed for such works aggregated only 50,000,000 yen in 1886, it exceeded 1,000,000,000 yen in 1906.

When specie payments were resumed in 1885, the notes issued by the Bank of Japan were convertible into silver on demand, the .silver standard being thus definitely adopted, a com- th a °ld° P' ete reversal of the system

inaugurated at the Standard esta blishment of the national banks on Prince Ito's return from the United States. Japanese financiers believed from the outset in gold monometallism. But, in the first place, the country's stock of gold was soon driven out by her depre- ciated fiat currency; and, in the second, not only were all other Oriental nations silver-using, but also the Mexican silver dollar had long been the unit of account in Far-Eastern trade. Thus Japan ultimately drifted into silver monometallism, the silver yen becoming her unit of currency. So soon, however, as the indemnity that she received from China after the war of 1894-95 had placed her in possession of a stock of gold, she determined to revert to the gold standard. Mechanically speaking, the operation was very easy. Gold having appreciated so that its value in terms of silver had exactly doubled during the first 30 years of the Meiji era, nothing was necessary except to double the denominations of the gold coins in terms of yen, leaving the silver subsidiary coins unchanged. Thus the old 5-yen gold piece, weighing 2-22221 momme of 900 fine- ness, became a 10-yen piece in the new currency, and a new 5-yen piece of half the weight was coined. No change whatever was required in the reckonings of the people. The yen continued to be their coin of account, with a fixed sterling value of a small fraction over two shillings, and the denominations of the gold coins were doubled. Gold, however, is little seen in Japan; the whole duty of currency is done by notes.

It is not to be supposed that all this economic and financial development was unchequered by periods of depression and severe panic. There were in fact six such seasons: in 1874, 1881, 1889, 1897, 1900 and 1907. But no year throughout the whole period failed to witness an increase in the number of Japan's industrial and commercial companies, and in the amount of capital thus invested.

To obtain a comprehensive idea of Japan's state finance, the simplest method is to set down the annual revenue at quinquennial _ periods, commencing with the year 1878-1879, because

p it was not until 1876 that the system of duly compiled

Ke venue. ^^ published budgets came into existence.

Revenue (omitting fractions)

Year. 1

Ordinary Revenue

Extraordinary Revenue

Total Revenue

(millions of yen).

(millions of yen).

(millions of yen).

1878-9

53

9

62

1883-4

76

7

83

1888-9

74

18

92

1893-4

86

28

114

1898-9

133

87

220

1903-4

224

36

260

1908-9

476

144

620

The most striking feature of the above table is the rapid growth of revenue during the last three periods. So signal was the growth that the revenue may be said to have sextupled in the 15 years ended 1909. This was the result of the two great wars in which Japan was involved, that with China in 1894-95 an d that with Russia in 1904-5. The details will be presently shown.

Turning now to the expenditure and pursuing the same plan, we have the following figures : —

Expenditure (omitting fractions)

The sources from which revenue is obtained are as follow :- Ordinary Revenue

1894-5.

1898-9.

1903-4.

1908-9.

millions of yen.

millions of yen.

millions of yen.

millions of yen.

Taxes

Receipts from stamps and Public Under- takings

Various Receipts

70-50

14-75 4-58

96-20

33-oo

3-67

146-10

96-87 8-15

299-61

164-66 11-48

Ordinary

Extraordinary

Total

Year.

Expenditures

Expenditures

Expenditures

(millions of yen).

(millions of yen).

(millions of yen) .

1878-9

56

5

61

1883-4

68

15

83

1888-9

66

15

81

1893-4

64

20

84

1898-9

119

IOI

220

1903-4

170

80

250

1908-9

427

193

620

It may be here stated that, with three exceptions, the working of the budget showed a surplus in every one of the 41 years between 1867 and 1908.

1 The Japanese fiscal year is from April 1 to March 31.

It appears from the above that during 15 years the weight of taxation increased fourfold. But a correction has to be applied, first, on account of the tax on alcoholic liquors and, secondly, on account of customs dues, neither of which can properly be called general imposts. The former grew from 16 millions in 1894-1895 to 72 millions in 1908-1909, and the latter from 5J millions to 41 J millions. If these increases be deducted, it is found that taxes, properly so called, grew from 70-5 millions in 1894-1895 to 207-86 millions in 1908-1909, an increase of somewhat less than three-fold. Otherwise stated, the burden per unit of population in 1894-1895 was 3s. 6d., whereas in 1908-1909 it was 8s. 4d. To understand the principle of Japanese taxation and the manner in which the above development took place, it is necessary to glance briefly at the chief, taxes separately. The land tax is the principal source of revenue. It was originally fixed at 3% of the assessed value of the land, but in 1877 this ratio was reduced to 2§%, on which basis the tax yielded LandT from 37 to 38 million yen annually. After the war with ax '

China (1894-1895) the government proposed to increase this impost in order to obtain funds for an extensive programme of useful public works and expanded armaments (known subsequently as the " first post helium programme "). By that time the market value of agricultural land had largely appreciated owing to improved communications, and urban land commanded greatly enhanced prices. But the lower house of the diet, considering itself guardian of the farmers' interests, refused to endorse any increase of the tax. Not until 1889 could this resistance be overcome, and then only on condition that the change should not be operative for more than 5 years. The amended rates were 3-3% on rural lands and 5% on urban building sites. Thus altered, the tax produced 46,000,000 yen, but

at the end of the five-year period it would have reverted to its old figure, had not war with Russia broken out. An increase was then made so that the impost varied from 3 % to 17ˆ % accord- ing to the class of land, and under this new system the tax yielded 85 millions. Thus the exigencies of two wars had augmented it from 38 millions in 1889 to 85 millions in 1907.

The income tax was introduced in 1887. It was on a graduated scale, varying from I % on incomes of not less than 300 yen, to 3 % on incomes of 30,000 yen and upwards. At these. _

rates the tax yielded an insignificant revenue of about acome ax ‘ 2,000,000 yen. In 1899, a revision was effected for the purposes of the first post bellum programme. This revision increased the number of classes from five to ten, incomes of 300 yen standing at the bottom and incomes of 100,000 yen or upwards at the top, the minimum and maximum rates being 1 % and 5 J %. The tax now produced approximately 8,000,000 yen. Finally in 1904, when war broke out with Russia, these rates were again revised, the minimum now becoming 2 %, and the maximum 82 %. Thus revised, the tax yields a revenue of 27,000,000 yen.

The business tax was instituted in 1896, after the war with China, and the rates have remained unchanged. For the purposes of the tax all kinds of business are divided into nine classes, _ . and the tax is levied on the amounts of sales (wholesale • uslness and retail), on rental value of buildings, on number of ax ‘ employees and on amount of capital. The yield from the tax grows steadily. It was only 4,500,000 yen in 1897, but it figured at 22,000,000 yen in the budget for 1908-1909.*

The above three imposts constitute the only direct taxes in Japan. Among indirect taxes the most important is that upon alcoholic liquors. It was inaugurated in 1871; doubled, roughly _, speaking, in 1878; still further increased thenceforth at Jfˆf/i. intervals of about 3 years, until it is now approximately , to aors twenty times as heavy as it was originally. The liquor taxed is mainly sake; the rate is about 50 sen (one shilling) per gallon, and the annual yield is 72,000,000 yen.

In 1859, when Japan re-opened her ports to foreign commerce, the customs dues were fixed on a basis of 10% ad valorem, but this was 1 almost immediately changed to a nominal 5 % and a real 3 %. The customs then yielded a very petty return — not more than three or four million yen — and the Japanese government had no discretionary power to alter the rates. Strenuous efforts to change this system were at length successful, and, in 1899, the tariff was divided into two sections, conventional and statutory; the rates in the former being governed by a treaty valid for 1 2 years ;

those in the latter being fixed at Japan's will. Things remained thus until the war with Russia

Customs Duties.

Other Taxes.

compelled a revision of the statutory tariff. Under this system

the ratio of the duties to the value of the dutiable goods was about

15-65 %. The customs yield a revenue of about 42,000,000 yen.

In addition to the above there are eleven taxes, some in existence

before the war of 1904-5, and some created for the purpose

of carrying on the war or to meet the expenses of a post

bellum programme.

Taxes in existence before 1904-1905 : —

Yield Name. (millions of yen).

Tax on soy 4

Tax on sugar 161

Mining tax 2

Tax on bourses 2

Tax on issue of bank-notes 1

Tonnage dues J

Taxes created on account of the war (1904-5) or in its immediate sequel : —

Yield Name. (millions of yen).

Consumption tax on textile fabrics 19!

Tax on dealers in patent medicines 1

Tax on communications 2|

Consumption tax on kerosene ij

Succession tax ij

Also, as shown above, the land tax was increased by 39 millions; the income tax by 19 millions; the business tax by 15 millions; and the tax on alcoholic liquors by 15 millions. On the whole, if taxes of general incidence and those of special incidence be lumped to- gether, it appears that the burden swelled from 160,000,000 yen before the war to 320,000,000 after it.

*The government of Japan carries on many manufacturing under- takings for purposes of military and naval equipment, for ship- building, for the construction of railway rolling stock, st *te f or t jj e manufacture of telegraph and light-house*

Monopolies ma (;er i a l S) f or iron-founding and steel-making, forprinting, "ftthi ,"""" f° r paper-making and so forth. There are 48 of these factures. institutions, giving employment to 108,000 male opera- tives and 23,000 female, together with 63,000 labourers. But the financial results do not appear independently in the general budget. Three other government undertakings, however, constitute important budgetary items: they are, the profits derived from the postal and telegraph services, 39,000,000 yen; secondly, from forests, 13,000,000 yen; and thirdly, from railways, 37,000,000 yen. The government further exercises a monopoly of three important staples, tobacco, salt and camphor. In each case the crude article is pro- duced by private individuals from whom it is taken over at a fair price by the government, and, having been manufactured (if neces- sary), it is resold by government agents at fixed prices. The tobacco monopoly yields a profit of some 33,000,000 yen; the salt monopoly a profit of 12,000,000 yen, and the camphor monopoly a profit of 1,000,000 yen. Thus the ordinary revenue of the state consisted in 1 908- 1 909 of: —

Yen.

Proceeds of taxes 320,000,000

Proceeds of state enterprises (posts and tele- graphs, forests and railways) 89,000,000

Proceeds of monopolies 56,000,000

Sundries 11,000,000

Total 476,000,000

The ordinary expenditures of the nine departments of state aggre- gated — in 1908-1909 — 427,000,000 yen, so that there was a surplus revenue of 49,000,000 yen.

Japanese budgets have long included an extraordinary section, so called because it embodies outlays of a special and terminable character as distinguished from ordinary and perpetu- Extraordlaary a ˆ recurring expenditures. The items in this extra- Expeadltures. on 3j narv section possessed deep interest in the years 1896 and 1907, because they disclosed the special programmes mapped out by Japanese financiers and statesmen after the wars with China and Russia. Both programmes had the same bases — expansion of armaments and development of the country's material resources. After her war with China, Japan received a plain intimation that she must either fight again after a few years or resign herself to a career of insignificance on the confines cf the Far East. No other inter- pretation could be assigned to the action of Russia, Germany and France in requiring her to retrocede the territory which she had acquired by right of conquest. Japan therefore made provision for the doubling of her army and her navy, for the growth of a mercantile marine qualified to supply a sufficiency of troop-ships, and for the development of resources which should lighten the burden of these outlays.

The war with Russia ensued nine years after these preparations had begun, and Japan emerged victorious. It then seemed to the onlooking nations that she would rest from her warlike efforts. On the contrary, just as she had behaved after her war with China, so she now behaved after her war with Russia — made arrange-

ments to double her army and navy and to develop her material resources. The government drafted for the year 1907-1908 a budget with three salient features. First, instead of proceeding to deal in a leisurely manner with the greatly increased national debt, Japan's financiers made dispositions to pay it off completely in the space of 30 years. Secondly, a total outlay of 422,000,000 yen was set down for improving and expanding the army and the navy. Thirdly, expenditures aggregating 304,000,000 yen were estimated for produc- tive purposes. All these outlays, included in the extraordinary section of the budget, were spread over a series of years commencing in 1907 and ending in 1913, so that the disbursements would reach their maximum in the fiscal year 1 908-1 909 and would

thenceforth decline with growing rapidity. To finance this programme three constant sources of annual revenue were provided, namely, increased taxation, yielding some 30 millions yearly ; domestic loans, varying from 30 to 40 millions each year; and surpluses of ordinary revenue amounting to from 45 to 75 millions. There were also some excep- tional and temporary assets: such as 100,000,000 yen remaining over from the war fund ; 50 millions paid by Russia for the main- tenance of her officers and soldiers during their imprisonment in Japan; occasional sales of state properties and so forth. But the backbone of the scheme was the continuing revenue detailed above. The house of representatives unanimously approved this pro- gramme. By the bulk of the nation, however, it was regarded with something like consternation, and a very short time sufficed to demonstrate its impracticability. From the beginning of 1 907 a cloud of commercial and industrial depression settled down upon Japan, partly because of so colossal a programme of taxes and expenditures, and partly owing to excessive speculation during the year 1906 and to unfavourable financial conditions abroad. To float domestic loans became a hopeless task, and thus one of the three sources of extraordinary revenue ceased to be available. There remained no alternative but to modify the programme, and this was accomplished by extending the original period of years so as cor- respondingly to reduce the annual outlays. The nation, however, as represented by its leading men of affairs, clamoured for still more drastic measures, and it became evident that the government must study retrenchment, not expansion, eschewing above all things any increase of the country's indebtedness. A change of ministry took place, and the new cabinet drafted a programme on five bases : first, that all expenditures should be brought within the margin of actual visible revenue, loans being wholly abstained from ; secondly, that the estimates should not include any anticipated surpluses of yearly revenue ; thirdly, that appropriations of at least 50,000,000 yen should be annually set aside to form a sinking fund, the whole of the foreign debt being thus extinguished in 27 years; fourthly, that the state railways should be placed in a separate account, all their profits being devoted to extensions and repairs; and fifthly, that the period for completing the post bellum programme should be extended from 6 years to 1 1. This scheme had the effect of restoring confidence in the soundness of the national finances.

National Debt. — When the fiefs were surrendered to the sovereign at the beginning of the Meiji era, it was decided to provide for the feudal nobles and the samurai by the payment of lump sums in commutation, or by handing to them public bonds, the interest on which should constitute a source of income. The result of this trans- action was that bonds having a total face value of 191,500,000 yen were issued, and ready-money payments were made aggregating 21,250,000 yen. 1 This was the

foundation of Japan's national debt. Indeed, these public bonds may be said to have represented the bulk of the state's liabilities during the first 25 years of the Meiji period. The government had also to take over the debts of the fiefs, amounting to 41,000,000 yen, of which 21,500,000 yen were paid with interest-bearing bonds, the remainder with ready money. If to the above figures be added two foreign loans aggregating 16,500,000 yen (completely repaid by the year 1897); a loan of 15,000,000 yen incurred on account of the Satsuma revolt of 1877 ˆ loans of 33,000,000 yen for public works, 13,000,000 yen for naval construction, and 14,500,000 yew 2 in connexion with the fiat currency, we have a total of 305,000,000 yen, being the whole national debt of Japan during the first 28 years of her new era under Imperial administration.

The second epoch dates from the war with China in 1894-95. The direct expenditures on account of the war aggregated 200,000,000

1 The amounts include the payments made in connexion with what may be called the disestablishment of the Church. There were 29,805 endowed temples and shrines throughout the empire, and their estates aggregated 354,481 acres, together with if million bushels of rice (representing 2,500,000 yen). The government resumed possession of all these lands and revenues at a total cost to the state of a little less than 2,500,000 yen, paid out in pensions spread over a period of fourteen years. The measure sounds like wholesale con- fiscation. But some extenuation is found in the fact that the temples and shrines held their lands and revenues under titles which, being derived from the feudal chiefs, depended for their validity on the maintenance of feudalism.

2 This sum represents interest-bearing bonds issued in exchange for fiat notes, with the idea of reducing the volume of the latter. It was a tentative measure, and proved of no value.

yen, of which 135,000,000 yen were added to the national debt, the remainder being defrayed with accumulations of surplus revenue, with a part of the indemnity received from China, and with voluntary contributions from patriotic subjects. As the immediate sequel of the war, the government elaborated a large programme of armaments and public works. The expenditure for these unproductive purposes, as well as for coast fortifications, dockyards, and so on,- came to 314,000,000 yen, and

the total of the productive expenditures included in the programme was 190,000,000 yen — namely, 120 millions for railways, telegraphs and telephones; 20 millions for riparian improvements; 20 millions in aid of industrial and agri- cultural banks and so forth — the whole programme thus involving an outlay of 504,000,000 yen. To meet this large figure, the Chinese indemnity, surpluses of annual revenue and other assets, furnished 300 millions; and it was decided that the remaining 204 millions should be obtained by domestic loans, the programme to be carried completely into operation — with trifling exceptions — by the year 1905. In practice, however, it was found impossible to obtain money at home without paying a high rate of interest. The govern- ment, therefore, had recourse to the London market in 1899, raising a loan of £10,000,000 at 4%, and selling the £100 bonds at 90. In 1902, it was not expected that Japan would need any further immediate recourse to foreign borrowing. According to her finan- ciers' forecast at that time, her national indebtedness would reach its maximum, namely, 575,000,000 yen, in the year 1903, and would thenceforward diminish steadily. All Japan's domestic loans were by that time placed on a uniform basis. They carried 5% interest, ran for a period of 5 years without redemption, and were then to be redeemed within 50 years at latest. The treasury had power to expedite the operation of redemption according to financial convenience, but the sum expended on amortization each year must receive the previous consent of the diet. Within the limit of that sum redemption was effected either by purchasing the stock of the loans in the open market or by drawing lots to determine the bonds to be paid off. During the first two periods (1867 to 1897) of the Meijiera, owing to the processes of conversion, consolida- tion, &c, and to the various requirements of the state's progress, twenty-two different kinds of national bonds were issued ; they aggregated 673,215,500 yen; 269,042,198 yen of that total had been paid off at the close of 1897, and the remainder was to be redeemed by 1946, according to these programmes.

But at this point the empire became involved in war with Russia, and the enormous resulting outlays caused a signal change in the financial situation. Before peace was restored in the autumn of 1905, Japan had been obliged to borrow 405,000,000 yen at home and 1,054,000,000 abroad, so that she found herself in 1908 with a total debt of 2,276,000,000 yen, of which aggregate her domestic indebtedness stood for 1,110,000,000 and her foreign borrowings amounted to 1,166,000,000. This meant that her debt had grown from 561,000,000 yen in 1904 to 2,276,000,000 yen 1 in 1908; or from 113 yen to 43-8 yen per head of the population. Further, out of the grand total, the sum actually spent on account of war and arma- ments represented 1,357,000,000 yen. The debt carried interest varying from 4 to 5 %.

It will be observed that the country's indebtedness grew by 1 ,700,000,000 yen, in round numbers, owing to the war with Russia. This added obligation the government resolved to discharge within the space of 30 years, for which purpose the diet was asked to approve the establishment of a national debt consolidation fund, which should be kept distinct from the general accounts of revenue and expenditure, and specially applied to payment of interest and redemption of principal. The amount of this fund was never to fall below 110,000,000 yen annually. Immediately after the war, the diet approved a cabinet proposal for the nationalization of 17 private railways, at a cost of 500,000,000 yen, and this brought the state's debts to 2,776,000,000 yen in all. The people becoming impatient of this large burden, a scheme was finally adopted in 1908 for appropriating a sum of at least 50,000,000 yen annually to the purpose of redemption.

Local Finance. — Between 1878 and 1888 a system of local auto- nomy in matters of finance was fully established. Under this system the total expenditures of the various corporations in the last year of each quinquennial period commencing from the fiscal year 1889- 1 890 were as follow : —

Total Expenditure Year. (millions of yen).

1889-1890 22

1893-1894 52

1898-1899 97

1903-1904 2 158

1907-1908 167

1 In this is included a sum of 1 10,000,000 yen distributed in the form of loan-bonds among the officers and men of the army and navy by way of reward for their services during the war of 1904-5.

2 When war broke out in 1904 the local administrative districts took steps to reduce their outlays, so that whereas the expenditures totalled 158,000,000 yen in 1903-1904, they fell to 122,000,000 and 126,000,000 in 1904-1905 and 1905-1906 respectively. Thereafter however, they expanded once more.

In the same years the total indebtedness of the corporations was :-

Debts Year. (millions of yen).

1890.

10 32 65

1894. 1899. 1904. 1907.

The chief purposes to which the proceeds of these loans were applied

are as follow : —

Millions of yen.

Education 5

Sanitation 12

Industries 13

Public works 52

Local corporations are not competent to incur unrestricted indebted- ness. The endorsement of the local assembly must be secured ; redemption must commence within 3 years after the date of issue and be completed within 30 years; and, except in the case of very small loans, the sanction of the minister of home affairs must be obtained.

Wealth of Japan. — With reference to the wealth of Japan, there is no official census. So far as can be estimated from statistics for the year 1904-1905, the wealth of Japan proper, excluding Formosa, Sakhalin and some rights in Manchuria, amounts to about 19,896,000,000 yen, the items of which are as follow: —

Yen (10 yen = £i). Lands 12,301,000,000

Buildings

Furniture and fittings

Live stock

Railways, telegraphs and telephones .

Shipping

Merchandise

Specie and bullion

2,331,000,000 1 ,080,000,000 109,000,000 707,000,000 376,000,000 873,000,000

. .. ._ 310,000,000

Miscellaneous 1,809,000,000

Grand total . .”. . . . 19,896,000,000

Education. — There is no room to doubt that the literature and learning of China and Korea were transported to Japan in very ancient times, but tradition is the sole authority Early for current statements that in the 3rd century a Education. Korean immigrant was appointed historiographer to the Imperial court of Japan and another learned man from the same country introduced the Japanese to the treasures of Chinese literature. About the end of the 6th century the Japanese court began to send civilians and religionists direct to China, there to study Con- fucianism and Buddhism, and among these travellers there were some who passed as much as 25 or 30 years beyond the sea. The knowledge acquired by these students was crystallized into a body of laws and ordinances based on the administrative and legal systems of the Sui dynasty in China, and in the middle of the 7th century the first Japanese school seems to have been established by the emperor Tenchi, followed some 50 years later by the first university. Nara was the site of the latter, and the subjects of study were ethics, law, history and mathematics.

Not until 794, the date of the transfer of the capital to Kioto, however, is there any evidence of educational organization on a considerable scale. A university was then opened in the capital, with affiliated colleges; and local schools were built and endowed by noble families, to whose scions admittance was re- stricted, but for general education one institution only appears to have been provided. In this Kioto university the curriculum included the Chinese classics, calligraphy, history, law, etiquette, arithmetic and composition; while in the affiliated colleges special subjects were taught, as medicine, herbalism, acupunc- ture, shampooing, divination, the almanac and languages. Admission was limited to youths of high social grade; the stu- dents aggregated some 400, from 13 to 16 years of age; the faculty included professors and teachers, who were known by the same titles (hakase and shi) as those applied to their successors to-day; and the government supplied food and clothing as well as books. The family schools numbered five, and their patrons were the Wage, the Fujiwara, the Tachibana (one school each) and the Minamoto (two). At the one institution — opened in 828 — where youths in general might receive instruction, the course 8 This includes 22! millions of loans raised abroad.

embraced only calligraphy and the precepts of Buddhism and Confucianism.

The above re :rospect suggests that Japan, in those early days, borrowed her educational system and its subjects of C biaa- stu d v entirely from China. But closer scrutiny shows tloa of that the national factor was carefully preserved. Native and The ethics of administration required a combination Foreign f two e i emen t S; uiakon, or the soul of Japan, and kwansai, or the ability of China; so that, while adopt- ing from Confucianism the doctrine of filial piety, the Japanese grafted on it a spirit of unswerving loyalty and patriotism; and while accepting Buddha's teaching as to three states of existence, they supplemented it by a belief that in the life beyond the grave the duty of guarding his country would devolve on every man. Great academic importance attached to proficiency in literary composition, which demanded close study of the ideographic script, endlessly perplexing in form and infinitely delicate in sense. To be able to compose and indite graceful couplets constituted a passport to high office as well as to the favour of great ladies, for women vied with men in this accomplishment. The early years of the nth century saw, grouped about the empress Aki, a galaxy of female authors whose writings are still accounted their country's classics — Murasaki no Shikibu, Akazome Emon, Izumi Shikibu, Ise Taiyu and several lesser lights. To the first two Japan owes the Genji monogatari and the Eiga monogatari, respectively, and from the Imperial court of those remote ages she inherited admirable models of paint- ing, calligraphy, poetry, music, song and dance. But it is to be observed that all this refinement was limited virtually to the noble families residing in Kioto, and that the first object of education in that era was to fit men for office and for society.

Meanwhile, beyond the precincts of the capital there were rapidly growing to maturity numerous powerful military mag- Edacatioa nates who despised every form of learning that did in the not contribute to martial excellence. An illiterate era

Middle ensued which reached its climax with the establish- A * es " ment of feudalism at the close of the 12th century.

It is recorded that, about that time, only one man out of a force of five thousand could decipher an Imperial mandate addressed to them.

Kamakura, then the seat of feudal government, was at first distinguished for absence of all intellectual training, but subsequently the course of political events brought thither from Kioto a number of court nobles whose erudition and refine- ment acted as a potent leaven. Buddhism, too, had been from the outset a strong educating influence. Under its auspices the first great public library was established (1270) at the temple Shomyo-ji in Kanazawa. It is said to have contained practi- cally all the Chinese and Japanese books then existing, and they were open for perusal by every class of reader. To Buddhist priests, also, Japan owed during many years all the machinery she possessed for popular education. They organized schools at the temples scattered about in almost every part of the empire, and at these lera-koya, as they were called, lessons in ethics, calligraphy, reading and etiquette were given to the sons of samurai and even to youths of the mercantile and manu- facturing classes.

When, at the beginning of the 17th century, administrative supremacy fell into the hands of the Tokugawa, the illustrious Education founder of that dynasty of shoguns, Iyeyasu, in the pre- showed himself an earnest promoter of erudition. MeijiBra. jj e employed a number of priests to make copies of Chinese and Japanese books; he patronized men of learning and he endowed schools. It does not appear to have occurred to him, however, that the spread of knowledge was hampered by a restriction which, emanating originally from the Imperial court in Kioto, forbade any one outside the ranks of the Buddhist priesthood to become a public teacher. To his fifth successor Tsunayoshi (1680-1709) was reserved the honour of abolishing this veto. Tsunayoshi, whatever his faults, was profoundly attached to literature. By his command a pocket edition of the Chinese classics was prepared, and the example he himself set

in reading and expounding rare books to audiences of feudatories and their vassals produced something like a mania for erudition, so that feudal chiefs competed in engaging teachers and founding schools. The eighth shogun, Yoshimune (1 716-1749), was an even more enlightened ruler. He caused a geography to be compiled and an astronomical observatory to be constructed; he revoked the veto on the study of foreign books; he conceived and carried out the idea of imparting moral education through the medium of calligraphy by preparing ethical primers whose precepts were embodied in the head-lines of copy-books, and he encouraged private schools. Iyenari (1787-1838), the eleventh shogun, and his immediate successor, Iyeyoshi (1838-1853), patronized learning no less ardently, and it was under the auspices of the latter that Japan acquired her five classics, the primers of True Words, of Great Learning, of Lesser Learning, of Female Ethics and of Women's Filial Piety.

Thus it may be said that the system of education progressed steadily

throughout the Tokugawa era. From the days of Tsunayoshi the number of fief schools steadily increased, and as students were admitted free of all charges, a duty of grateful fealty as well as the impulse of interfief competition drew thither the sons of all samurai. Ultimately the number of such schools rose to over 240, and being supported entirely at the expense of the feudal chiefs, they did no little honour to the spirit of the era. From 7 to 15 years of age lads attended as day scholars, being thereafter admitted as boarders, and twice a year exami- nations were held in the presence of high officials of the fief. There were also several private schools where the curriculum consisted chiefly of moral philosophy, and there were many temple schools, where ethics, calligraphy, arithmetic, etiquette and, sometimes, commercial matters were taught. A prominent feature of the system was the bond of reverential affection uniting teacher and student. Before entering school a boy was conducted by his father or elder brother to the home of his future teacher, and there the visitors, kneeling before the teacher, pledged themselves to obey him in all things and to submit unquestioningly to any discipline he might impose. Thus the teacher came to be regarded as a parent, and the veneration paid to him was embodied in a precept: " Let not a pupil tread within three feet of his teacher's shadow." In the case of the temple schools the priestly instructor had full cognisance of each student's domestic circumstances and was guided by that know- ledge in shaping the course of instruction. The universally underlying principle was, " serve the country and be diligent in your respective avocations." Sons of samurai were trained in military arts, and on attaining proficiency many of them travelled about the country, inuring their bodies to every kind of hardship and challenging all experts of local fame.

Unfortunately, however, the policy of national seclusion pre- vented for a long time all access to the stores of European know- ledge. Not until the beginning of the 18th century did any authorized account of the great world of the West pass into the hands of the people. A celebrated scholar (Arai Hakuseki) then compiled two works — Saiyo kibun {Record of Occidental Hearsay), and S air an igen (Renderings of Foreign Languages) — which embodied much information, obtained from Dutch sources, about Europe, its conditions and its customs. But of course the light thus furnished had very restricted influence. It was not extinguished, however. Thenceforth men's interest centred more and more on the astronomical, geographical and medical sciences of the West, though such subjects were not included in academical studies until the renewal of foreign intercourse in modern times. Then (1857), almost immediately, the nation turned to Western learning, as it had turned to Chinese thirteen centuries earlier. The Tokugawa government established in Yedo an institution called Bansho-shirabe-dokoro (place for studying foreign books) , where Occidental

languages were learned and Occidental works translated. Simultaneously a school for acquiring foreign medical art (Seiyo igaku-sho) was opened, and, a little later (1862), the Kaisei-jo (place of liberal culture), a college for studying European sciences, was added to the list of new institutions. Thus the eve of the Restoration saw the

Japanese people already appreciative of the stores of learning rendered accessible to them by contact with the Occident.

Commercial education was comparatively neglected in the schools. Sons of merchants occasionally attended the tera-koya, Commercial ˆ ut the instruction they received there had seldom Education in any bearing upon the conduct of trade. Mercan- Tokugawa tile knowledge had to be acquired by a system of Times. apprenticeship. A boy of 9 or 10 was apprenticed for a period of 8 or 9 years to a merchant, who undertook to support him and teach him a trade. Generally this young apprentice could not even read or write. He passed through all the stages of shop menial, errand boy, petty clerk, salesman and senior clerk, and in the evenings he received instruction from a teacher, who used for textbooks the manual of letter-writing {Shosoku oral) and the manual of commerce (Shobai oral). The latter contained much useful information, and a youth thoroughly versed in its contents was competent to discharge responsible duties. When an apprentice, having attained the position of senior clerk, had given proof of practical ability, he was often assisted by his master to start business independently, but under the same firm-name, for which purpose a sum ©f capital was given to him or a section of his master's customers were assigned.

When the government of the Restoration came into power, the emperor solemnly announced that the administration should be Education conducted on the principle of employing men of capa- in Modern city wherever they could be found. This amounted Japan. t0 a declaration that in choosing officials scholastic acquirements would thenceforth take precedence of the claims of birth, and thus unprecedented importance was seen to attach to education. But so long as the feudal system survived, even in part, no general scheme of education could be thoroughly enforced, and thus it was not until the conversion of the fiefs into prefec- tures in 1871 that the government saw itself in a position to take drastic steps. A commission of investigation was sent to Europe and America, and on its

return a very elaborate and extensive plan was drawn up in accordance with French models, which the commissioners had found conspicuously complete and sym- metrical. This plan subsequently underwent great modifica- tions. It will be sufficient to say that in consideration of the free education hitherto provided by the feudatories in their various fiefs, the government of the restoration resolved not only that the state should henceforth shoulder the main part of this burden, but also that the benefits of the system should be extended equally to all classes of the population, and that the attendance at primary schools should be compulsory. At the outset the sum to be paid by the treasury was fixed at 2,000,000 yen, that having been approximately the expenditure incurred by the feudatories. But the financial arrangements suffered many changes from time to time, and finally, in 1877, the cost of main- taining the schools became a charge on the local taxes, the central treasury granting only sums in aid.

Every child, on attaining the age of six, must attend a common elementary school, where, during a six-years' course, instruction is given in morals, reading, arithmetic, the rudiments of technical work, gymnastics and poetry. Year by year the attendance at these schools has increased. Thus, whereas in the year 1900, only 81-67 % of the school-age children of both sexes received the prescribed elementary instruction, the figure in 1905 was 94-93%. The desire for instruction used to be keener among boys than among girls, as was natural in view of the difference of inducement; but ultimately this discrepancy disappeared almost completely. Thus, whereas the percentage of girls attending school was 75-90 in 1900, it rose to 91-46 in 1905, and the corresponding figures for boys were 90-55 and 97-10 respectively. The tuition fee paid at a common elemen- tary school in the rural districts must not exceed 5s. yearly, and in the urban districts, 10s. ; but in practice it is much smaller, for these elementary schools form part of the communal system, and such portion of their expenses as is not covered by tuition fees, income from school property and miscellaneous sources, must be defrayed out of the proceeds of local taxation. In 1909 there were 18,160 common elementary schools, and also 9105 schools classed as elementary but having sections where, subsequently to the comple- tion of the regular curriculum, a special supplementary course of study might be pursued in agriculture, commerce or industry (needle-work in the case of girls). The time devoted to these special courses is two, three or four years, according to the degree

of proficiency contemplated, and the maximum fees are isd. per month in urban districts and one-half of that amount in rural dis- tricts.

There are also 294 kindergartens, with an attendance of 26,000 infants, whose parents pay 3d. per month on the average for each child. In general the kindergartens are connected with elementary schools or with normal

schools.

If a child, after graduation at a common elementary school, desires to extend its education, it passes into a common middle school, where training is given for practical pursuits or for admission to higher educational institutions. The ordinary curriculum at a common middle school includes moral philosophy, English language, history, geography, mathematics, natural history, natural philosophy, chemistry, drawing and the Japanese language. Five years are required to graduate, and from the fourth year the student may take up a special technical course as well as the main course; or, in accordance with local requirements, technical subjects may be taught conjointly with the regular curriculum throughout the whole time. The law provides that there must be at least one common middle school in each prefecture. The actual number in 1909 was 216. Great inducements attract attendance at a common middle school. Not only does the graduation certificate carry considerable weight as a general qualification, but it also entitles a young man to volunteer for one year's service with the colours, thus escaping one of the two years he would have to serve as an ordinary conscript. The graduate of a common middle school can claim admittance, without examination, to a high school, where he spends three years preparing to pass to a university, or four years studying a special subject, as law, engineering or medicine. By following the course in a high school, a youth obtains exemption from conscription until the age of 28, when one year as a volunteer will free him from all service with the colours. A high-school certificate of graduation entitles its holder to enter a university without examination, and qualifies him for all public posts.

For girls also high schools are provided, the object being to give a general education of higher standard. Candidates for admission must be over 12 years of age, and must have completed the second- year course of a higher elementary school. The regular course of study requires 4 years, and supplementary courses as well as special art courses may be taken.

In addition to the schools already enumerated, which may be said to constitute the machinery of general education, there are special schools, generally private, and technical schools (including a few private), where instruction is given in medicine and surgery, agriculture, commerce, mechanics, applied chemistry, navigation, electrical engineering, art (pictorial and applied), veterinary science, sericulture and various other branches of industry. There are also apprentices' schools, classed under the heading of elementary, where a course of not less than six months, and not more than four years, may be taken in dyeing and weaving, embroidery, the making of artificial flowers, tobacco manufacture, sericulture, reeling silk, pottery, lacquer, woodwork, metal-work or brewing. There are also schools— nearly all supported by private enterprise — for the blind and the

dumb.

Normal schools are maintained for the purpose of training teachers, a class of persons not plentiful in Japan, doubtless because of an exceptionally low scale of emoluments, the yearly pay not exceeding £60 and often falling as low as £15.

There are two Imperial universities, one in Tokyo and one in Kioto. In 1909 the former had about 220 professors and instructors and 2880 students. Its colleges number six: law, medicine, engineering, literature, science and agriculture. It has a university hall where post-graduate courses are studied, and it publishes a quarterly journal giving accounts of scientific researches, which indicate not only large erudition, but also original talent. The university of Kioto is a comparatively new institution and has not given any signs of great vitality. In 1909 its colleges numbered four: law, medicine, literature and science; its faculty consisted of about 60 professors with 70 assistants, and its students aggregated about 1 1 00.

Except in the cases specially indicated, all the figures given above are independent of private educational institutions. The system pursued by the state does not tend to encourage private education, for unless a private school brings its curriculum into exact accord with that prescribed for public institutions of corresponding grade, its students are denied the valuable privilege of partial exemption from conscription, as well as other advantages attaching to state recognition. Thus the quality of the instruction being nominally the same, the rate of fees must also be similar, and no margin offers to tempt private enterprise.

Public education in Japan is strictly secular: no religious teaching of any kind is permitted in the schools. There are about 100 libraries. Progress is marked in this branch, the rate of growth having been from 43 to 100 in the five-year period ended 1905. The largest library is the Imperial, in Tokyo. It had about half a million volumes in 1909, and the daily average of visitors was about 430.

Apart from the universities, the public educational institutions in Japan involve an annual expenditure of 3J millions sterling, out of which total a little more than half a million is met by students" fees; 2f millions are paid by the communes, and the remainder is

defrayed from various sources, the central government contributing only some £28,000. It is estimated that public school property — in land, buildings, books, furniture, &c, aggregates 11 millions sterling.

VII. — Religion

The primitive religion of Japan is known by the name

of Shinto, which signifies ' the divine way," but the Japanese*

„., .. maintain that this term is of comparatively Shinto. , ... ml r.i . – 1 •

modern application. The term Shinto being

obviously of Chinese origin, cannot have been used in Japan before she became acquainted with the Chinese language. Now Buddhism did not reach Japan until the 6th century, and a knowledge of the Chinese language had preceded it by only a hundred years. It is therefore reasonable to conclude that the primitive religion of Japan had no name, and that it did not begin to be called Shinto until Buddhism had entered the field. The two creeds remained distinct, though not implacably antagonistic, until the beginning of the 9th century, when they were welded together into a system of doctrine to which the name Ryobu-Shinto (dual Shinto) was given. In this new creed the ShintS deities were regarded as avatars of Buddhist divinities, and thus it may be said that Shint8 was absorbed into Buddhism. Probably that would have been the fate of the indigenous creed in any circumstances, for a religion without a theory as to a future state and without any code of moral duties could scarcely hope to survive contact with a faith so well equipped as Buddhism in these respects. But Shinto, though absorbed, was not obliterated. Its beliefs survived; its shrines survived; its festivals survived, and something of its rites survived also.

Shinto, indeed, may be said to be entwined about the roots of Japan's national existence. Its scripture — as the Kojiki must be considered — resembles the Bible in that both begin with the cosmogony. But it represents the gods as peopling the newly created earth with their own offspring instead of with human beings expressly made for the purpose. The actual work of creation was done by a male deity, Izanagi, and a female deity, Izanami. From the right eye of the former was born Amaterasu, who became goddess of the sun; from his left eye, the god of the moon; and from his nose, a species of Lucifer. The grandson of the sun goddess was the first sovereign of Japan, and his descen- dants have ruled the land in unbroken succession ever since, the 121st being on the throne in 1909. Thus it is to Amaterasu (the heaven-illuminating goddess) that the

Japanese pay reverence above all other deities, and it is to her shrine at Ise that pilgrims chiefly flock.

The story of creation, as related in the Kojiki, is obviously based on a belief that force is indestructible, and that every exercise of it is productive of some permanent result. Thus by the motions of the creative spirit there spring into existence all the elements that go to make up the universe, and these, being of divine origin, are worshipped and propitiated. Their number becomes immense when we add the deified ghosts of ancestors who were descended from the gods and whose names are asso- ciated with great deeds. These ancestors are often regarded as the tutelary deities of districts, where they receive special homage and where shrines are erected to them. The method of worship consists in making offerings and in the recital of rituals (norito). Twenty-seven of these rituals were reduced to writing and em- bodied in a work called Engishiki (927). Couched in antique language, these liturgies are designed for the dedication of shrines, for propitiating evil, for entreating blessings on the harvest, for purification, for obtaining household security, for bespeaking protection during a journey, and so forth. Nowhere is any reference found to a future state of reward or punishment, to deliverance from evil, to assistance in the path of virtue. One ceremonial only is designed to avert the consequences of sin or crime; namely, the rite of purification, which, by washing with water and by the sacrifice of valuables, removes the pollu- tion resulting from all wrong-doing. Originally performed on behalf of individuals, this o-barai ultimately came to be a semi- annual ceremony for sweeping away the sins of all the people.

Shinto is thus a mixture of ancestor-worship and of nature- worship without any explicit code of morals. It regards human beings as virtuous by nature; assumes that each man's conscience is his best guide; and while believing in a continued existence beyond the grave, entertains no theory as to its pleasures or pains. Those that pass away become disembodied spirits, inhabiting the world of darkness (yomi-no-yo) and possessing power to bring sorrow or joy into the lives of their survivors, on which account they are worshipped and propitiated. Purity and simplicity being essential characteristics of the cult, its shrines are built of white wood, absolutely without decorative features of any kind, and fashioned as were the original huts of the first Japanese settlers. There are no graven images — a fact attributed by some critics to ignorance of the glyptic art on the part of the original worshippers — but there is an emblem of the deity, which generally takes the form of a sword, a mirror or a so-called jewel, these being the insignia handed by the sun god- dess to her grandson, the first ruler of Japan. This emblem is not exposed to public view: it is enveloped in silk and brocade and enclosed in a box at the back of the shrine. The mirror sometimes prominent is a Buddhist innovation and has nothing to do with

the true emblem of the creed.

From the 9th century, when Buddhism absorbed Shinto, the two grew together so intimately that their differentiation seemed hopeless. But in the middle of the 17th century a strong revival of the indigenous faith was effected by the efforts of a group of illustrious scholars and politicians, at whose head stood Mabuchi, Motoori and Hirata. These men applied themselves with great diligence and acumen to reproduce the pure Shinto of the Kojiki and to restore it to its old place in the nation's reverence, their political purpose being to educate a spirit of revolt against the feudal system which deprived the emperor of administrative power. The principles thus revived became the basis of the restoration of 1867; Shinto rites and Shinto rituals were re- adopted, and Buddhism fell for a season into comparative disfavour, Shinto being regarded as the national religion. But Buddhism had twined its roots too deeply around the heart of the people to be thus easily torn up. It gradually recovered its old place, though not its old magnificence, for its disestablish- ment at the hands of the Meiji government robbed it of a large part of its revenues.

Buddhism entered China at the beginning of the Christian era, but not until the 4th century did it obtain any strong footing. Thence, two centuries later (522), it reached Japan Buaanism . through Korea. The reception extended to it was not encouraging at first. Its images and its brilliant appur- tenances might well deter a nation which had never seen an idol nor ever worshipped in a decorated temple. But the ethical teachings and the positive doctrines of the foreign faith presented an attractive contrast to the colourless Shinto. After a struggle, not without bloodshed, Buddhism won its way. It owed much to the active patronage of Shotoku taishi, prince-regent during the reign of the empress Suiko (593-62 1) . At his command many new temples were built; the country was divided into dioceses under Buddhist prelates; priests were encouraged to teach the arts of road-making and bridge-building, and students were sent to China to investigate the mysteries of the faith at its supposed fountain-head. Between the middle of the 7th century and that of the 8th, six sects were introduced from China, all imperfect and all based on the teachings of the Hinayana system. Up to this time the propagandists of the creed had been chiefly Chinese and Korean teachers. But from the 8th century on- wards, when Kioto became the permanent capital of the empire, Japanese priests of lofty intelligence and profound piety began to repair to China and bring thence modified forms of the doctrines current there. It was thus that Dengyo daishi (c. 800) became the founder of the Tendai (heavenly tranquillity) sect and Kobo daishi (774-834) the apostle of the Shingon (true word). Other sects followed, until the country possessed six principal sects in all with thirty-seven sub-sects. It must be remembered that Buddhism offers an almost limitless field for eclecticism. There is not in the world any literary*

of such magnitude as the Chinese scriptures of the Mahayana. "The canon is seven hundred times the amount of the New Testament. Hsiian Tsang's translation of the Prajna paramita is twenty-five times as large as the whole Christian Bible."

It is natural that out of such a mass of doctrine different systems should be elaborated. The Buddhism that came to Japan prior to the days of Dengyo daishi was that of the Vai- pulya school, which seems to have been accepted in its entirety. But the Tendai doctrines, introduced by Dengyo, Iikaku and other fellow-thinkers, though founded mainly on the Saddharma • pundarika, were subjected to the process of eclecticism which all foreign institutions undergo at Japanese hands. Dengyo studied it in the monastery of Tientai which " had been founded towards the close of the 6th century of our era on a lofty range of mountains in the province of Chehkiang by the celebrated preacher Chikai " (Lloyd, " Developments of Japanese Budd- hism," Transactions of the Asiatic Society of Japan, vol. xxii.), and carrying it to Japan he fitted its disciplinary and meditative methods to the foundations of the sects already existing there.

This eclecticism was even more marked in the case of the Shingon (true word) doctrines, taught by Dengyo's illustrious contemporary, Kobo daishi, who was regarded as the incarnation of Vairocana. He led his countrymen, by a path almost wholly his own, from the comparatively low platform of Hinayana Buddhism, whose sole aim is individual salvation, to the Maha-yana doctrine, which teaches its devotee to strive after perfect enlightenment, not for his own sake alone, but also that he may help his fellows and intercede for them. Then followed the Jodo (Pure Land) sect, introduced in n 53 by a priest, Senku, who is remembered by later generations as Honen shonin. He taught salvation by faith ritualistically expressed. The virtue that saves comes, not from imitation of and conformity to the person and character of the saviour Amida, but from blind trust in his efforts and ceaseless repetition of pious formulae. It is really a religion of despair rather than of hope, and in that respect it reflects the profound sympathy awakened in the bosom of its teacher by the sorrows and sufferings of the troublous times in which he lived.

A favourite pupil of Honen shonin was Shinran (1173-1262). He founded

the Jodo Shinshu (true sect of jodo), commonly called simply Shinshu and sometimes Monto, which subse- quently became the most influential of Japanese sects, with its splendid monasteries, the two Hongwana-ji in Kioto. The differences between the doctrines of this sect and those of its predecessors were that the former " divested itself of all meta- physics "; knew nothing of a philosophy of religion, dispensed with a multiplicity of acts of devotion and the keeping of many commandments; did not impose any vows of celibacy or any renunciation of the world, and simply made faith in Amida the all in all. In modern days the Shinshu sect has been the most progressive of all Buddhist sects and has freely sent forth its promising priests to study in Europe and America. Its devotees make no use of charms or spells, which are common among the followers of other sects.

Anterior by a few years to that introduction of the Shinshu was the Zen sect, which has three main divisions, the Rinzai (11 68), the Soto (1223) andtheObaku (1650). This is essentially a contemplative sect. Truth is reached by pure contemplation, and knowledge can be transmitted from heart to heart without the use of words. In that simple form the doctrine was accepted by the Rinzai believers. But the founders of the Soto branch — Shoyo taishi and Butsuji zenshi — added scholarship and re- search to contemplation, and taught that the " highest wisdom and the most perfect enlightenment are attained when all the elements of phenomenal existence are recognized as empty, vain and unreal." This creed played an important part in the development of BushidQ, and its priests have always been dis- tinguished for erudition and indifference to worldly possessions. Last but not least important among Japanese sects of Buddhism is the Nichiren or Hokke, called after its founder, Nichiren (1 222-1 282). It was based on the Saddharma pundarika, and it taught that there was only one true Buddha — the moon in the

heavens — the other Buddhas being like the moon reflected in the waters, transient, shadowy reflections of the Buddha of truth. It is this being who is the source of all phenomenal existence, and in whom all phenomenal existence has its being. The imperfect Buddhism teaches a chain of cause and effect; true Buddhism teaches that the first link in this chain of cause and effect is the Buddha of original enlightenment. When this point has been reached true wisdom has at length been attained. Thus the monotheistic faith of Christianity was virtually reached in one God in whom all creatures " live, move and have their being." It will readily be conceived that these varied doctrines caused dissension and strife among the sects professing them. Sectarian controversies and squabbles were nearly as prominent among Japanese Buddhists as they were among European Christians, but to the credit of Buddhism it has to be recorded that the stake and the rack never found a place among its instru- ments of self-assertion. On the other hand, during the wars that devastated Japan

from the 12th to the end of the 16th century, many of the monasteries became military camps, and the monks, wearing armour and wielding glaives, fought in secular as well as religious causes.

The story of the first Christian missionaries to Japan is told else- where (see § VIII. Foreign Intercourse). Their work suffered an interruption for more than 200 years until, in 1858, _. . ,. H almost simultaneously with the conclusion of the . „ s J^.„ y treaties, a small band of Catholic fathers entered Japan #_„.„ from the RiOkiQ islands, where they had carried on their ministrations since 1846. They found that, in the neighbour- hood of Nagasaki, there were some small communities where Christian worship was still carried on. It would seem that these communities had not been subjected to any severe official scrutiny. But the arrival of the fathers revived the old question, and the native Christians, or such of them as refused to – apostatize, were removed from their homes and sent into banishment. This was the last example of religious intolerance in Japan. At the instance of the foreign representatives in Tokyo the exiles were set at liberty in 1873, and from that time complete freedom of conscience existed in fact, though it was not declared by law until the promulgation of the constitution in 1889. In 1905 there were 60,000 Roman Catholic converts in Japan forming 360 congregations, with 130 missionaries and 215 teachers, including 145 nuns. These were all European. They were assisted by 32 Japanese priests, 52 Japanese nuns, 280 male catechists and 265 female catechists and nurses. Three semi- naries for native priests existed, together with 58 schools and orphan- ages and two lepers' homes. The whole was presided over by an archbishop and three bishops.

The Anglican Church was established in Japan in 1859 by two American clergymen who settled in Nagasaki, and now, in con- junction with the Episcopal Churches of America and Canada, it has missions collectively designated Nihon Sei-Kokai. There are 6 bishops — 2 American and 4 English — with about 60 foreign and 50 Japanese priests and deacons, besides many foreign lay workers of both sexes and Japanese catechists and school teachers. The converts number 11,000. The Protestant missions include Presby- terian (Nihon Kirisuto Kyokai) , Congregational (Kumi-ai), Metho- dist, Baptist and the Salvation Army (Kyusei-gun). The pioneer Protestant mission was founded in 1 859 by representatives of the American Presbyterian and Dutch Reformed Churches. To this mission belongs the credit of having published, in 1880, the first complete Japanese version of the New Testament, followed by the Old Testament in 1887. The Presbyterians, representing 7 religious societies, have over a hundred missionaries; 12,400 converts; a number of boarding schools for boys and girls and day schools. The Congregational churches are associated exclusively with the mission of the American board of commissioners for foreign missions. They have about 11,400 converts, and the largest

Christian educa- tional institution in japan, namely, the Doshisha in Kioto. The Methodists represent 6 American societies and I Canadian. They have 130 missionaries and 10,000 converts; boarding schools, day schools, and the most important Christian college in Tokyo, namely, the Awoyama Gaku-in. The Baptists represent 4 American societies; have 60 missionaries, a theological seminary, an academy for boys, boarding schools for girls, day schools and 3500 converts. The Salvation Army, which did not enter Japan until 1895, has organized 15 corps, and publishes ten thousand copies of a fort- nightly magazine, the War Cry (Toki no Koe). Finally, the Society of Friends, the American and London Religious Tract Societies and the Young Men's Christian Association have a number of missions. It will be seen from the above that the missionaries in Japan, in the space of half a century (1858 to 1908), had won 110,000 converts, in round numbers. To these must be added the Orthodox Russian Church, which has a fine cathedral in Tokyo, a staff of about 40 Japanese priests and deacons and 27,000 converts, the whole I presided over by a bishop. Thus the total number of converts

becomes 137,000. In spite of the numerous sects represented in Japan there has been virtually no sectarian strife, and it may be said of the Japanese converts that they concern themselves scarcely at all about the subtleties of dogma which divide European Chris- tianity. Their tendency is to consider only the practical aspects of the faith as a moral and ethical guide. They are disposed, also, to adapt the creed to their own requirements just as they adapted Buddhism, and this is a disposition which promises to grow.

VIII. — Foreign Intercourse

Foreign Intercourse in Early and Medieval Times. — There can be no doubt that commerce was carried on by Japan with China and Korea earlier that the 8th century of the Christian era. It would appear that from the very outset over-sea trade was regarded as a government monopoly. Foreigners were allowed to travel freely in the interior of the country provided that they submitted their baggage for official in- spection and made no purchases of weapons of war, but all imported goods were bought in the first place by official ap- praisers who subsequently sold them to the people at arbitrarily fixed prices. Greater importance attached to the trade with China under the Ashikaga shoguns (14th, 1 5th and 1 6th centuries), who were in constant need of funds to defray the cost of inter- minable military operations caused by civil disturbances. In this distress they turned to the neighbouring empire as a source from which money might be obtained. This idea seems to have been suggested to the shogun Takauji by a Buddhist priest, when he undertook the construction of the temple Tenryii-ji. Two

ships laden with goods were fitted out, and it was decided that the enterprise should be repeated annually. Within a few years after this development of commercial relations between the two empires, an interruption occurred owing partly to the overthrow of the Yuen Mongols by the Chinese Ming, and partly to the activity of Japanese pirates and adventurers who raided the coasts of China. The shogun Yoshimitsu (1368-1394), however, succeeded in restoring commercial intercourse, though in order to effect his object he consented that goods sent from Japan should bear the character of tribute and that he himself should receive investiture at the hands of the Chinese emperor's ambassador. The Nanking government granted a certain number of commercial passports, and these were given by the shogun to Ouchi, feudal chief of Cho-shu, which had long been the principal port for trade with the neighbouring empire. Tribute goods formed only a small fraction of a vessel's cargo: the bulk consisted of articles which were delivered into the govern- ment's stores in China, payment being received in copper cash. It was from this transaction that the shOgun derived a consider- able part of his profits, for the articles did not cost him anything originally, being either presents from the great temples and pro- vincial governors or compulsory contributions from the house of Ouchi. As for the gifts by the Chinese government and the goods shipped in China, they were arbitrarily distributed among the noble families in Japan at prices fixed by the shogun's assessor. Thus, so far as the sh5gun was concerned, these enterprises could not fail to be lucrative. They also brought large profits to the Ouchi family, for, in the absence of competition, the pro- ducts and manufactures of each country found ready sale in the markets of the other. The articles found most suitable in China were swords, fans, screens, lacquer wares, copper and agate, and the goods brought back to Japan were brocade and other silk fabrics, ceramic productions, jade and fragrant woods. The Chinese seem to have had a just appreciation of the wonder- ful swords of Japan. At first they were willing to pay the equivalent of 1 2 guineas for a pair of blades, but by degrees, as the Japanese began to increase the supply, the price fell, and at the beginning of the 16th century all the diplomacy of the Japan- ese envoys was needed to obtain good figures for the large and constantly growing quantity of goods that they took over by way of supplement to the tribute. Buddhist priests generally enjoyed the distinction of being selected as envoys, for experi- ence showed that their subtle reasoning invariably overcame the economical scruples of the Chinese authorities and secured a fine profit for their master, the shogun. In the middle of the

1 6th century these tribute-bearing missions came to an end with the ruin of the Ouchi family and the overthrow of the Ashikaga shoguns, and they were never renewed.

Japan's medieval commerce with Korea was less ceremonious than that with China. No passports had to be obtained from the Korean government. A trader was sufficiently equipped when he carried a permit from the So Korea. family, which held the island of Tsushima in fief. Fifty vessels were allowed to pass yearly from ports in Japan to the three Japanese settlements in Korea. Little is recorded about the nature of this trade, but it was rudely inter- rupted by the Japanese settlers, who, offended at some arbitrary procedure on the part of the local Korean authorities, took up arms (a.d. 15 10) and at first signally routed the Koreans. An army from Seoul turned the tables, and the Japanese were compelled to abandon the three settlements. Subsequently the shogun's government— which had not been concerned in the struggle — approached Korea with amicable proposals, and it was agreed that the ringleaders of the raiders should be decapitated and their heads sent to Seoul, Japan's compliance with this condition affording, perhaps, a measure of the value she attached to neighbourly friend:hip. Thenceforth the number of vessels was limited to 25 annually and the settle- ments were abolished. Some years later, the Japanese again resorted to violent acts of self-assertion, and on this occasion, although the offenders were arrested by order of the shogun Yoshiharu, and handed over to Korea for punishment, the Seoul court persisted in declining to restore the system of settlements or to allow the trade to be resumed on its former basis. Fifty years afterwards the taiko's armies invaded Korea, overrunning it for seven years, and leaving, when they retired in 1598, a country so impoverished that it no longer offered any attraction to commercial enterprise from beyond the sea.

The Portuguese discovered Japan by accident in 1542 or 1543 — the exact date is uncertain. On a voyage to Macao from Siam, a junk carrying three Portuguese was blown from wk her course and fetched Tanegashima, a small Occidental island lying south of the province of Satsuma. Nations. The Japanese, always hospitable and inquisitive, welcomed the newcomers and showed special curiosity about the arquebuses carried by the Portuguese, fire-arms being then a novelty in Japan and all weapons of war being in great request. Conversa- tion was impossible, of course, but, by tracing ideographs upon the sand, a Chinese member of the crew succeeded in explaining the cause of the junk's arrival. She was then piloted to a more commodious harbour, and the Portuguese sold two arque- buses to the local feudatory, who immediately ordered his armourer to manufacture similar weapons. Very soon the news of the discovery reached all the Portuguese settlements in the East, and at least seven expeditions were fitted out during the next few years to exploit this new market. Their objective points were all in the island of Kiushifi — the principal stage where the drama — ultimately converted into a tragedy — of Christian propagandism and European commercial intercourse was acted in the interval between 1542*

and 1637.

It does not appear that the Jesuits at Macao, Goa or other centres of Portuguese influence in the East took immediate advantage of the discovery of Japan. The pioneer Arrival of propagandist was Francis Xavier, who landed at the Jesuits. Kagoshima on the 15th of August 1549. During the interval of six (or seven) years that separated this event from the drifting of the junk to Tanegashima, the Portuguese had traded freely in the ports of Kiushiu, had visited Kioto, and had reported the Japanese capital to be a city of 96,000 houses, therefore larger than Lisbon. Xavier would certainly have gone to Japan even though he had not been specially encouraged, for the reports of his countrymen depicted the Japanese as " very desirous of being instructed," and he longed to find a field more promising than that inhabited by " all these Indian nations, barbarous, vicious and without inclination to virtue." There were, however, two special determinants. One was a request addressed by a feudatory, supposed to have been the chief of the

Bungo fief, to the viceroy of the Indies at Goa; the other, an appeal made in person by a Japanese named Yajiro, whom the fathers spoke of as Anjiro, and who subsequently attained celebrity under his baptismal name, Paul of the holy faith. No credible reason is historically assigned for the action of the Japanese feudatory. Probably his curiosity had been excited by accounts which the Portuguese traders gave of the noble devotion of their country's missionaries, and being entirely without bigotry, as nearly all Japanese were at that epoch, he issued the invitation partly out of curiosity and partly from a sincere desire for progress. Anjiro's case was very different. Labouring under stress of repentant zeal, and fearful that his evil acts might entail murderous consequences, he sought an asylum abroad, and was taken away in 1548 by a Portuguese vessel whose master advised him to repair to Malacca for the purpose of confessing to Xavier. This might well have seemed to the Jesuits a providential dispensation, for Anjiro, already able to speak Portuguese, soon mastered it sufficiently to inter- pret for Xavier and his fellow-missionaries (without which aid they must have remained long helpless in the face of the immense difficulty of the Japanese language), and to this linguistic skill he added extraordinary gifts of intelligence and memory. Xavier, with two Portuguese companions and Anjiro, were excellently received by the feudal chiefs of Satsuma and obtained permission to preach their doctrine in any part of the fief. This

permit is not to be construed as an evidence of official sympathy with the foreign creed. Commercial considerations alone were in ques- tion. A Japanese feudal chief in that era had sedulously to foster every source of wealth or strength, and as the newly opened trade with the outer world seemed full of golden promise, each feudatory was not less anxious to secure a monopoly of it in the 16th century than the Ashikaga shoguns had been in the 1 5th. The Satsuma daimyo was led to believe that the presence of the Jesuits in Kagoshima would certainly prelude the advent of trading vessels. But within a few months one of the expected merchantmen sailed to Hirado without touching at Kagoshima, and her example was followed by two others in the following year, so that the Satsuma chief saw himself flouted for the sake of a petty rival, Matsudaira of Hirado. This fact could not fail to provoke his resentment. But there was another influence at work. Buddhism has always been a tolerant religion, eclectic rather than exclusive. Xavier, however, had all the bigoted intolerance of his time. The Buddhist priests in Kagoshima received him with courtesy and listened respectfully to the doc- trines he expounded through the mouth of Anjiro. Xavier rejoined with a display of aggressive intolerance which shocked and alienated the Buddhists. They represented to the Satsuma chief that peace and good order were inconsistent with such a display of militant propagandism, and he, already profoundly chagrined by his commercial disappointment, issued in 1550 an edict making it a capital offence for any of his vassals to embrace Christianity. Xavier, or, more correctly speaking, Anjiro, had won 150 converts, who remained without molestation, but Xavier himself took ship for Hirado. There he was received with salvoes of artillery by the Portuguese merchantmen lying in the harbour and with marks of profound respect by the Portuguese traders, a display which induced the local chief to issue orders that courteous attention should be paid to the teaching of the foreign missionaries. In ten days a hundred baptisms took place; another significant index of the mood of the Japanese in the early era of Occidental intercourse: the men in authority always showed a complaisant attitude towards Christianity where trade could be fostered by so doing, and wherever the men in authority showed such an attitude, con- siderable numbers of the lower orders embraced the foreign faith. Thus, in considering the commercial history of the era, the element of religion constantly thrusts itself into the foreground. Xavier next resolved to visit Kioto. The first town of impor- Pint visit tance he reached on the way was Yamaguchi, capital of Europeans f the Choshu fief, situated on the northern shore to Kioto. of the shimonoseki Strait. There the feudal chief, Ouchi, though sufficiently courteous and inquisitive, showed xv 8

no special cordiality towards humble missionaries unconnected with commerce, and the work of proselytizing made no progress, so that Xavier and his companion, Fernandez, pushed on to Kioto. The time was mid-

winter; the two fathers suffered terrible privations during their journey of two months on foot, and on reaching Kioto they found a city which had been almost wholly reduced to ruins by internecine war. Necessarily they failed to obtain audience of either emperor or shogun, at that time the most inaccessible potentates in the world, the Chinese " son of heaven " excepted, and nothing remained but street preaching, a strange resource, seeing that Xavier, constitutionally a bad linguist, had only a most rudimen- tary acquaintance with the profoundly difficult tongue in which he attempted to expound the mysteries of a novel creed. A fortnight sufficed to convince him that Kioto was unfruitful soil. He therefore returned to Yamaguchi. But he had now learned a lesson. He saw that propagandism without scrip or staff and without the countenance of those sitting in the seats of power would be futile in Japan. So he obtained from Hirado his canonicals, together with a clock and other novel products of European skill, which, as well as credentials from the viceroy of India, the governor of Malacca and the bishop of Goa, he presented to the ChoshQ chief. His prayer for permission to preach Christianity was now readily granted, and Ouchi issued a proclamation announcing his approval of the introduction of the new religion and according perfect liberty to embrace it. Xavier and Fernandez now made many converts. They also gained the valuable knowledge that the road to success in Japan lay in associating themselves with over-sea commerce and its directors, and in thus winning the co-operation of the feudal chiefs.

Nearly ten years had now elapsed since the first Portuguese landed in Kagoshima, and during that time trade had gone on steadily and prosperously. No attempt was made Christian to find markets in the main island: the Portuguese Propagamlbu. confined themselves to Kiushiu for two reasons: one, that having no knowledge of the coasts, they hesitated to risk their ships and their lives in unsurveyed waters; the other, that whereas the main island, almost from end to end, was seething with inter- necine war, Kiushiu remained beyond the pale of disturbance and enjoyed comparative tranquillity. At the time of Xavier's second sojourn in Yamaguchi, a Portuguese ship happened to be visiting Bungo, and at its master's suggestion the great mission- ary proceeded thither, with the intention of returning tempo- rarily to the Indies. At Bungo there was then ruling Otomo, second in power to only the Satsuma chief among the feuda- tories of Kiushiu. By him the Jesuit father was received with all honour. Xavier did not now neglect the lesson he had learned in Yamaguchi. He repaired to the Bungo chieftain's court, escorted by nearly the whole of the Portuguese crew, gorgeously bedizened, carrying their arms and with banners flying. Otomo, a young and ambitious ruler, was keenly anxious to attract foreign traders with their rich cargoes and puissant weapons of war. Witnessing the reverence paid to Xavier by the Portu- guese traders, he

appreciated the importance of gaining the goodwill of the Jesuits, and accordingly not only granted them full freedom to teach and preach, but also enjoined upon his younger brother, who, in the sequel of a sudden rebellion, had succeeded to the lordship of Yamaguchi, the advisability of extending protection to Torres and Fernandez, then sojourning there. After some four months' stay in Bungo, Xavier set sail for Goa in February 1552. Death overtook him in the last month of the same year.

Xavier's departure from Japan marked the conclusion of the first epoch of Christian propagandism. His sojourn in Japan extended to 27 months. In that time he and his coadjutors won about 760 converts. In Satsuma more than a year's labour produced 150 believers. There Xavier had the assistance of Anjiro to expound his doctrines. No language lends itself with greater difficulty than Japanese to the dis- cussion of theological questions. The terms necessary for such a purpose are not current among laymen, and only by special

study, which, it need scarcely be said, must be preluded by an accurate acquaintance with the tongue itself, can a man hope to become duly equipped for the task of exposition and dissertation. It is open to grave doubt whether any foreigner has ever attained the requisite proficiency. Leaving Anjiro in Kagoshima to care for the converts made there, Xavier pushed on to Hirado, where he baptized a hundred Japanese in a few days. Now we have it on the authority of Xavier himself that in this Hirado campaign " none of us knew Japanese." How then did they proceed ? "By reciting a semi- Japanese volume " (a translation made by Anjiro of a treatise from Xavier's pen) " and by delivering sermons, we brought several over to the Christian cult." Sermons preached in Por- tuguese or Latin to a Japanese audience on the island of Hirado in the year 1550 can scarcely have attracted intelligent interest. On his first visit to Yamaguchi, Xavier's means of access to the understanding of his hearers was confined to the rudimentary knowledge of Japanese which Fernandez had been able to acquire in 14 months, a period of study which, in modern times, with all the aids now procurable, would not suffice to carry a student beyond the margin of the colloquial. No converts were won. The people of Yamaguchi probably admired the splendid faith and devotion of these over-sea philosophers, but as for their doctrine, it was unintelligible. In Kioto the

same experience was repeated, with an addition of much physical hardship. But when the Jesuits returned to Yamaguchi in the early autumn of 1551, they baptized 500 persons, including several members of the military class. Still Fernandez with his broken Japanese was the only medium for communicating the profound doctrines of Christianity. It must be concluded that the teachings of the missionaries produced much less effect than the attitude of the local chieftain.

Only two missionaries, Torres and Fernandez, remained in Japan after the departure of Xavier, but they were soon joined Second by three others. These newcomers landed at Kago- Periodof shima and found that, in spite of the official veto Christian against the adoption of Christianity, the feudal chief

pr °P' had lost nothing of his desire to foster foreign trade. gaadlstn. ° ,. . _ . . T °*

Two years later, all the Jesuits in Japan were

assembled in Bungo. Their only church stood there; and they had also built two hospitals. Local disturbances had compelled them to withdraw from Yamaguchi, not, however, before their violent disputes with the Buddhist priests in that town had induced the feudatory to proscribe the foreign religion, as had previously been done in Kagoshima. From Funai, the chief town of Bungo, the Jesuits began in 1579 to send yearly reports to their Generals in Rome. These reports, known as the Annual Letters, comprise some of the most valuable information available about the conditions then existing in Japan. They describe a state of abject poverty among the lower orders; poverty so cruel that the destruction of children by their famishing parents was an everyday occurrence, and in some instances choice had to be made between cannibalism and starvation. Such suffer- ing becomes easily intelligible when the fact is recalled that Japan had been racked by civil war during more than 200 years, each feudal chief fighting for his own hand, to save or to extend his territorial possessions. From these Annual Letters it is possible also to gather a tolerably clear idea of the course of events during the years immediately subsequent to Xavier's departure. There was no break in the continuity of the newly inaugurated foreign trade. Portuguese ships visited Hirado as well as Bungo, and in those days their masters and crews not only attended scrupulously to their religious duties, but also showed such profound respect for the missionaries that the Japanese received constant object lessons in the influence wielded over the traders by the Jesuits. Thirty years later, this orderly and reverential demeanour was exchanged for riotous excesses such as had already made the Portuguese sailor a by- word in China. But in the early days of intercourse with Japan the crews of the merchant vessels seem to

have preached Chris- tianity by their exemplary conduct. Just as Xavier had been induced to visit Bungo by the anxiety of a ship-captain for

Christian ministrations, so in 1557 two of the fathers repaired to Hirado in obedience to the solicitations of Portuguese sailors. There the fathers, under the guidance of Vilela, sent brothers to parade the streets ringing bells and chaunting litanies; they organized bands of boys for the same purpose; they caused the converts, and even children, to flagellate themselves at a model of Mount Calvary, and they worked miracles, healing the sick by contact with scourges or with a booklet in which Xavier had written litanies and prayers. It may well be imagined that such doings attracted surprised attention in Japan. They were supplemented by even more striking practices. For a sub- feudatory of the Hirado chief, having been converted, showed his zeal by destroying Buddhist temples and throwing down the idols, thus inaugurating a campaign of violence destined to mark the progress of Christianity throughout the greater part of its history in Japan. There followed the overthrowing of a cross in the Christian cemetery, the burning of a temple in the town of Hirado, and a street riot, the sequel being that the Jesuit fathers were compelled to return once more to Bungo. It is essential to follow all these events, for not otherwise can a clear understanding be reached as to the aspects under which Christianity presented itself originally to the Japanese. The Portuguese traders, reverent as was their demeanour towards Christianity, did not allow their commerce to be interrupted by vicissitudes of propagandism. They still repaired to Hirado, and rumours of the wealth-begetting effects of their presence having reached the neighbouring fief of Omura, its chief, Sumi- tada, made overtures to the Jesuits in Bungo, offering a port free from all dues for ten years, a large tract of land, a residence for the missionaries and other privileges. The Jesuits hastened to take advantage of this proposal, and no sooner did the news reach Hirado than the feudatory of that island repented of having expelled the fathers and invited them to return. But while they hesitated, a Portuguese vessel arrived at Hirado, and the feudal chief declared publicly that no need existed to conciliate the missionaries, since trade went on without them. When this became known in Bungo, Torres hastened to Hirado, was re- ceived with extraordinary honours by the crew -of the vessel, and at his instance she left the port, her master declaring that " he could not remain in a country where they maltreated those who professed the same religion as himself." Hirado remained a closed port for some years, but ultimately the advent of three merchantmen, which intimated their determination not to put in unless the anti-Christian ban was removed, induced the feudal chief to receive the Jesuits, once more. This incident was paralleled a few years later in the island of Amakusa, where a petty feudatory, in order to attract foreign trade, as the mission- aries themselves frankly explain, embraced

Christianity and ordered all his vassals to follow his example; but when no Portu- guese ship appeared, he apostatized, required his subjects to revert to Buddhism and made the missionaries withdraw. In fact, the competition for the patronage of Portuguese traders was so keen that the Hirado feudatory attempted to burn several of their vessels because they frequented the territorial waters of his neighbour and rival, Sumitada. The latter became a most stalwart Christian when his wish was gratified. He set himself to eradicate idolatry throughout his fief with the strong arm, and his fierce intolerance provoked results which ended in the destruction of the Christian town at the newly opened free port. Sumitada, however, quickly reasserted his authority, and five years later (1567), he took a step which had far-reaching consequences, namely, the building of a church at Nagasaki, in order that Portuguese commerce might have a centre and the Christians an assured asylum. Nagasaki was then a little fishing village. In five years it grew to be a town of thirty thousand inhabitants, and Sumitada became one of the richest of the Kiushiu feudatories. When in 1573 successful conflicts with the neighbouring fiefs brought him an access of territory, he declared that he owed these victories to the influence of the Christian God, and shortly afterwards he publicly proclaimed banishment for all who would not accept the foreign faith. There were then no Jesuits by his side, but immediately two

hastened to join him, and " these, accompanied by a strong guard, but yet not without danger of their lives, went round causing the churches of the Gentiles, with their idols, to be thrown to the ground, while three Japanese Christians went preaching the law of God everywhere. Three of us who were in the neigh- bouring kingdoms all withdrew therefrom to work in this abun- dant harvest, and in the space of seven months twenty thousand persons were baptized, including the bonzes of about sixty monasteries, except a few who quitted the State." In Bungo, however, where the Jesuits were originally so well received, it is doubtful whether Christian propagandism would not have ended in failure but for an event which occurred in 1576, namely, the conversion of the chieftain's son, a youth of some 16 years. Two years later Otomo himself came over to the Christian faith. He rendered inestimable aid, not merely within his own fief, but also by the influence he exercised on others. His intervention, supported by recourse to arms, obtained for the Jesuits a footing on the island of Amakusa, where one of the feudatories gave his vassals the choice of con- version or exile, and announced to the Buddhist priests that unless they

accepted Christianity their property would be confiscated and they themselves banished. Nearly the whole population of the fief did violence to their conscience for the sake of their homes. Christianity was then becoming estab- lished in Kiushiu by methods similar to those of Islam and the inquisition. Another notable illustration is furnished by the story of the Arima fief, adjoining that of Sumitada (Omura), where such resolute means had been adopted to force Christianity upon the vassals. Moreover, the heads of the two fiefs were brothers. Accordingly, at the time of Sumitada's very dramatic conversion, the Jesuits were invited to Arima and encouraged to form settlements at the ports of Kuchinotsu and Shimabara, which thenceforth began to be frequented by Portuguese mer- chantmen. The fief naturally became involved in the turmoil resulting from Sumitada's iconoclastic methods of propagandism; but, in 1576, the then ruling feudatory, influenced largely by the object lesson of Sumitada's prosperity and puissance, which that chieftain openly ascribed to the tutelary aid of the Christian deity, accepted baptism and became the " Prince Andrew " of missionary records. It is written in those records that " the first thing Prince Andrew did after his baptism was to convert the chief temple of his capital into a church, its revenues being assigned for the maintenance of the building and the support of the missionaries. He then took measures to have the same thing done in the other towns of his fief, and he seconded the preachers of the gospel so well in everything else that he could flatter himself that he soon would not have one single idolater in his states." Thus in the two years that separated his baptism from his death, twenty thousand converts were won in Arima. But his successor was an enemy of the alien creed. He ordered the Jesuits to quit his dominions, required the converts to return to their ancestral faith, and caused " the holy places to be destroyed and the crosses to be thrown down." Nearly one-half of the converts apostatized under this pressure, but others had recourse to a device of proved potency. They threatened to leave Kuchinotsu en masse, and as that would have involved the loss of foreign trade, the hostile edict was materially modified. To this same weapon the Christians owed a still more signal victory. For just at that time the great ship from Macao, now an annual visitor, arrived in Japanese waters carrying the visitor-general, Valegnani. She put into Kuchinotsu, and her presence, with its suggested eventualities, gave such satisfaction that the feudatory offered to accept baptism and to sanction its acceptance by his vassals. This did not satisfy Valegnani, a man of profound political sagacity. He saw that the fief was menaced by serious dangers at the hands of its neighbours, and seizing the psychological moment of its extreme peril, he used the secular arm so adroitly that the fief's chance of survival seemed to be limited to the unreserved adoption of Christianity. Thus, in 1580, the chieftain and his wife were baptized; " all the city was made Christian; they burned their idols and destroyed 40 temples, reserving some materials to build

churches."

Christian propagandism had now made substantial progress. The Annual Letter of 1582 recorded that at the close of 1581, thirty-two years after the landing of Xavier in Japan, there were about 150,000 converts, of whom some 125,000 were in Kiushiu and the remainder in Yamaguchi, Kioto and the neighbourhood of the latter city. The Jesuits in the empire then numbered 75, but down to the year 1563 there had never been more than 9, and down to 1577, not more than 18. The harvest was certainly great in proportion to the number of sowers. But it was a har- vest mainly of artificial growth; forced by the despotic insistence of feudal chiefs who possessed the power of life and death over their vassals, and were influenced by a desire to attract foreign trade. To the Buddhist priests ..this movement of Christian propagandism had brought an experience hitherto unknown to them, persecution on account of creed. They had suffered for interfering in politics, but the fierce cruelty of the Christian fanatic now became known for the first time to men themselves conspicuous for tolerance of heresy and receptivity of instruc- tion. They had had no previous experience of humanity in the garb of an Otomo of Bungo, who, in the words of Crasset, " went to the chase of the bonzes as to that of wild beasts, and made it his singular pleasure to exterminate them from his states."

In 1582 the first Japanese envoys sailed from Nagasaki for Europe. The embassy consisted of four youths, the oldest not more than 16, representing the fiefs of Arima, Omura p„. st and Bungo. They visited Lisbon, Madrid and Rome, Japanese and in all these cities they were received with Embassy displays of magnificence such as 16th century oEuT °P e – Europe delighted to make. That, indeed, had been the motive of Valegnani in organizing the mission: he desired to let the Japanese see with their own eyes how great were the riches and might of Western states.

In the above statistics of converts at the close of 1581 mention is made of Christians in Kioto, though we have already seen that the visit by Xavier and Fernandez to that city was second wholly barren of results. A second visit, however, visit ot made by Vilela in 1559, proved more successful. Jesuits He carried letters of recommendation from the ° ° "' Bungo chieftain, and the proximate cause of his journey was an invitation from a Buddhist priest in the celebrated monastery of Hiei-zan, who sought information about Christianity. This was before the razing of temples and the overthrow of idols had commenced in Kiushiu. On arrival at Hiei-zan, Vilela found that the Buddhist prior who had invited him was dead and that only a portion of the old man's authority had descended to his successor. Nevertheless the Jesuit obtained an opportunity to expound his doctrines to a party of bonzes at the monastery. Subsequently, through the

good offices of a priest, described as " one of the most respected men in the city," and with the assist- ance of the Bungo feudatory's letter, Vilela enjoyed the rare honour of being received by the sbogun in Kioto, who treated him with all consideration and assigned a house for his residence. It may be imagined that, owing such a debt of gratitude to Buddhist priests, Vilela would have behaved towards them and their creed with courtesy. But the Jesuit fathers were proof against all influences calculated to impair their stern sense of duty. Speaking through the mouth of a Japanese convert, Vilela attacked the bonzes in unmeasured terms and denounced their faith. Soon the bonzes, on their side, were seeking the destruction of these uncompromising assailants with insistence inferior only to that which the Jesuits themselves would have shown in similar circumstances. Against these perils Vilela was protected by the goodwill of the shogun, who had already issued a decree threatening with death any one who injured the missionaries or obstructed their work. In spite of all difficulties and dangers these wonderful missionaries, whose courage, zeal and devotion are beyond all eulogy, toiled on resolutely and even recklessly, and such success attended their efforts that by 1564 many converts had been won and churches had been established in five walled towns within a distance of 50 miles from Kioto. Among the converts were two Buddhist priests, notoriously

hostile at the outset, who had been nominated as official commissioner to investigate and report upon the doctrine of Christianity. The first conversion en masse was due to pressure from above. A petty feudatory, Takayama, whose fief lay at Takatsuki in the neighbourhood of the capital, challenged Vilela to a public controversy, the result of which was that the Japanese acknowledged himself vanquished, embraced Christianity and invited his vassals as well as his family to follow his example. This man's son— Takayama Ytisho— proved one of the stanch- est supporters of Christianity in all Japan, and has been immor- talized by the Jesuits under the name of Don Justo Ucondono. Incidentally this event furnishes an index to the character of the Japanese samurai: he accepted the consequences of defeat as frankly as he dared it. In the same year (1564) the feudatory of Sawa, a brother of Takayama, became a Christian and imposed the faith on all his vassals, just as Sumitada and other feudal chiefs had done in Kiushiu. But the Kioto record differs from that of Kiushiu in one important respect— the former is free from any intrusion of commercial motives.*

Kioto was at that time the scene of sanguinary tumults, which culminated in the murder of the shogun (1565), and led to Nobunaga the issue of a decree by the emperor proscribing "sVte Christianity – In J a P an ese

medieval history this is one of the only two instances of Imperial interference with Christian propagandism. There is evidence that the edict was obtained at the instance of one of the shogun 's assassins and certain Buddhist priests. The Jesuits— their number had been increased to three— were obliged to take refuge in Sakai, now little more than a suburb of Osaka, but at that time a great and wealthy mart, and the only town in Japan which did not acknowledge the sway of any feudal chief. Three years later they were summoned thence to be presented to Oda Nobunaga, one of the greatest captains Japan has ever produced. In the very year of Xavier's landing at Kagoshima, Nobunaga had succeeded to his father's fief, a comparatively petty estate in the province of Owari. In 1568 he was seated in Kioto, a maker of shoguns and acknowledged ruler of 30 among the 66 provinces of Japan. Had Nobunaga, wielding such immense power, adopted a hostile attitude towards Christianity, the fires lit by the Jesuits in Japan must soon have been extinguished. Nobunaga, however, to great breadth and liberality of view added strong animosity towards Buddhist priests. Many of the great monasteries had become armed camps, their inmates skilled equally in field-attacks and in the defence of ramparts. One sect (the Nichiren), which was specially affected by the samurai, had lent powerful aid to the murderers of the shogun three years before Nobunaga's victories carried him to Kioto, and the armed monasteries constituted imperia in imperio which assorted ill with his ambition of complete supremacy. He therefore welcomed Christianity for the sake of its opposition to Buddhism, and when Takayama conducted Froez from Sakai to Nobunaga's presence, the reception accorded to the Jesuit was of the most cordial character. Throughout the fourteen years of life that remained to him, Nobunaga continued to be the constant friend of the missionaries in particular and of foreigners visiting Japan in general. He stood between the Jesuits and the Throne when, in reply to an appeal from the Buddhist priests, the emperor, for the second time, issued an anti-Christian decree (1568); he granted a site for a church and residence at Azuchi on Lake Biwa, where his new fortress stood; he addressed to various powerful feudatories letters signifying a desire for the spread of Christianity; he frequently made handsome presents to the fathers, and whenever they visited him he showed a degree of accessibility and graciousness very foreign to his usually haughty and imperious demeanour. The Jesuits themselves said of him: " This man seems to have been chosen by God to open and prepare the way for our faith." Nevertheless they do not appear to have entertained much hope at any time of converting Nobunaga. They must have under- stood that their doctrines had not made any profound impression on a man who could treat them as this potentate did in 1579, when he plainly showed that political exigencies might at anv

moment induce him to sacrifice them. 1 His last act, too, proved that sacrilege was of no account in his eyes, for he took steps to have himself apotheosized at Azuchi with the utmost pomp and circumstance. Still nothing can obscure the benefits he heaped upon the propagandists of Christianity.

The terrible tumult of domestic war through which Japan passed in the 15th and 16th centuries brought to her ser- vice three of the greatest men ever produced in Hideyoshi Occident or Orient. They were Oda Nobunaga, and the Toyotomi Hideyoshi and Tokugawa Iyeyasu. Christians. Hideyoshi, as Nobunaga's lieutenant, contributed largely to the building of the latter's fortunes, and, succeeding him in 1582 brought the whole 66 provinces of the empire under his own administrative sway. For the Jesuits now the absorbing question was, what attitude Hideyoshi would assume towards their propagandism. His power was virtually limitless. With a word he could have overthrown the whole edifice created by them at the cost of so much splendid effort and noble devotion They were very quickly reassured. In this matter Hideyoshi walked in Nobunaga's footsteps. He not only accorded a friendly audience to Father Organtino, who waited on him as representative of the Jesuits, but also he went in person to assign to the company a site for a church and a residence in Osaka, where there was presently to rise the most massive fortress ever built in the East. At that time many Christian converts were serving in high positions, and in 1584 the Jesuits placed it on record that " Hideyoshi was not only not opposed to the things of God, but he even showed that he made much account of them and preferred them to all the sects of the bonzes. ... He is entrusting to Christians his treasures, his secrets and his for- tresses of most importance, and shows himself well pleased that the sons of the great lords about him should adopt our customs and our law." Two years later in Osaka he received with every mark of cordiality and favour a Jesuit mission which had come from Nagasaki seeking audience, and on that occasion his visitor recorded that he spoke of an intention of christianizing one half of Japan. Nor did Hideyoshi confine himself to words. He actually signed a patent licensing the missionaries to preach throughout all Japan, and exempting not only their houses and churches from the billeting of soldiers but also the priests them- selves from local burdens. This was in 1586, on the eve of Hideyoshi's greatest military enterprise, the invasion of Kiushiu and its complete reduction. He carried that difficult campaign to completion by the middle of 1587, and throughout its course he maintained a uniformly friendly demeanour towards the Jesuits. But suddenly, when on the return journey he reached Hakata in the north of the island, his policy underwent a radical metamorphosis. Five questions were by his order propounded to the vice-provincial of the Jesuits: " Why and by what autho- rity he and his fellow-propagandists had constrained Japanese subjects to become

Christians ? Why they had induced their disciples and their sectaries to overthrow temples? Why they persecuted the bonzes? Why they and other Portuguese ate animals useful to men, such as oxen and cows? Why the vice-provincial allowed merchants of his nation to buy Japanese to make slaves of them in the Indies?" To these queries Coelho, the vice-provincial, made answer that the missionaries had never themselves resorted, or incited, to violence in their propagandism or persecuted bonzes; that if their eating of beef were considered inadvisable, they would give up the practice- and that they were powerless to prevent or restrain the outrages perpetrated by their countrymen. Hideyoshi read the vice- provincial's reply and, without comment, sent him word to retire to Hirado, assemble all his followers there, and quit the country within six months. On the next day (July 25, 1587) the following edict was published:—

'The problem was to induce the co-operation of a feudatory whose castle served for frontier guard to the net of a powerful chief, his suzerain. The feudatory was a Christian. Nobunaga seized the Jesuits in Kioto, and threatened to suppress their religion altogether unless they persuaded the feudatory to abandon the cause of his suzerain.

" Having learned from our faithful councillors that foreign priests have come into our estates, where they preach a law contrary to that of Japan, and that they even had the audacity to destroy temples dedicated to our Kami and Hotoke; although the outrage merits the most extreme punishment, wishing nevertheless to show them mercy, we order them under pain of death to quit Japan within twenty days. During that space no harm or hurt will be done to them. But at the expiration of that term, we order that if any of them be found in our states, they should be seized and punished as the greatest criminals. As for the Portuguese mer- chants, we permit them to enter our ports, there to continue their accustomed trade, and to remain in our states provided our affairs need this. But we forbid them to bring any foreign priests into the country, under the penalty of the confiscation of their ships and goods."

How are we to account for this apparently rapid change of mood on the part of Hideyoshi? Some historians insist that from the very outset he conceived the resolve of suppressing Christianity and expelling its propagandists, but that he con- cealed his design pending the subjugation of Kiushiu, lest, by premature action, he might weaken his hand for that

enterprise. This hypothesis rests mainly on conjecture. Its formulators found it easier to believe in a hidden purpose than to attribute to a statesman so shrewd and far-seeing a sudden change of mind. A more reasonable theory is that, shortly before leaving Osaka for Kiushiu, Hideyoshi began to entertain doubts as to the expediency of tolerating Christian propagandism, and that his doubts were signally strengthened by direct observation of the state of affairs in Kiushiu. While still in Osaka, he one day remarked publicly that " he feared much that all the virtue of the European priests served only to conceal pernicious designs against the empire." There had been no demolishing of temples or overthrowing of images at Christian instance in the metro- politan provinces. In Kiushiu, however, very different condi- tions prevailed. There Christianity may be said to have been preached at the point of the sword. Temples and images had been destroyed wholesale; vassals in thousands had been com- pelled to embrace the foreign faith; and the missionaries them- selves had come to be treated as demi-gods whose nod was worth conciliating at any cost of self-abasement. Brought into direct contact with these evidences of the growth of a new power, temporal as well as spiritual, Hideyoshi may well have reached the conclusion that a choice had to be finally made between his own supremacy and that of the alien creed, if not between the independence of Japan and the yoke of the great Christian states of Europe.

Hideyoshi gauged the character of the medieval Christians with sufficient accuracy to know that for the sake of their Sequel of faith they would at any time defy the laws of the Edict the island. His estimate received immediate veri- of Banish- g ca t; n, for when the Jesuits, numbering 120, mc " ' assembled at Hirado a'nd received his order to

embark at once they decided that only those should sail whose services were needed in China. The others remained and went about their duties as usual, under the protection of the converted feudatories. Hideyoshi, however, saw reason to wink at this disregard of his authority. At first he showed uncompromising resolution. All the churches in Kioto, Osaka and Sakai were demolished, while troops were sent to raze the Christian places of worship in Kiushiu and seize the port of Nagasaki. These troops were munificently dissuaded from their purpose by the Christian feudatories. But Hide- yoshi did not protest, and in 1588 he allowed himself to be con- vinced by a Portuguese envoy that in the absence of missionaries foreign trade must cease, since without the intervention of the fathers peace and good order could not be maintained among the merchants. Rather than suffer the trade to be interrupted Hideyoshi agreed to the coming of priests, and thenceforth, during some years, Christianity not only continued to flourish and grow in Kiushiu but also found a favourable field of opera- tions in Kioto itself. Care was taken that Hideyoshi's attention should not

be attracted by any salient evidences of what he had called a " diabolical religion," and thus for a time all went well. There is evidence that, like the feudal chiefs in Kiushiu, Hideyoshi

set great store by foreign trade and would even have sacri- ficed to its maintenance and expansion something of the aversion he had conceived for Christianity. He did indeed make one very large concession. For on being assured that Portuguese traders could not frequent Japan unless they found Christ'-an priests there to minister to them, he consented to sanction the presence of a limited number of Jesuits. The statistics of 1595 show how Christianity fared under even this partial tolerance, for there were then 137 Jesuits in Japan with 300,000 converts, among whom were 17 feudal chiefs, to say nothing of many men of lesser though still considerable note, and even not a few bonzes.

For ten years after his unlooked-for order of expulsion, Hide- yoshi preserved a tolerant mien. But in 1507 his forbearance gave place to a mood of uncompromising severity. ma eyosn p s The reasons of this second change are very clear, Final though diverse accounts have been transmitted. Attitude Up to 1593 the Portuguese had possessed a monopoly Tf 8 „ of religious propagandism and over-sea commerce in Japan. The privilege was secured to them by agreement between Spain and Portugal and by a papal bull. But the Spaniards in Manila had long looked with somewhat jealous eyes on this Jesuit reservation, and when news of the disaster of 1587 reached the Philippines, the Dominicans and Franciscans residing there were fired with zeal to enter an arena where the crown of martyrdom seeme'd to be the least reward within reach. The papal bull, however, demanded obedience, and to overcome that difficulty a ruse was necessary: the governor of Manila agreed to send a party of Franciscans as ambassadors to Hideyoshi. In that guise the friars, being neither traders nor propagandists, considered that they did not violate either the treaty or the bull. It was a technical subterfuge very unworthy of the object contemplated, and the friars supplemented it by swearing to Hideyoshi that the Philippines would submit to his sway. Thus they obtained permission to visit Kioto, Osaka and Fushimi, but with the explicit proviso that they must not preach. Very soon they had built a church in Kioto, consecrated it with the. utmost pomp, and were preaching sermons and chaunting litanies there in flagrant defiance of Hideyoshi's veto. Presently their number received an access of three friars who came bearing gifts from the governor at Manila, and now they not only established a convent in Osaka, but also seized a Jesuit church in Nagasaki and converted the circumspect worship hitherto conducted there by the fathers into services of the most public character. Officially checked in Nagasaki, they charged the Jesuits in Kioto with having intrigued to impede them, and they further vaunted the courageous openness of their own ministrations as compared with the clandestine

timidity of the methods which wise pru- dence had induced the Jesuits to adopt. Retribution would have followed quickly had not Hideyoshi's attention been engrossed by an attempt to invade China through Korea. At this stage, however, a memorable incident occurred. Driven out of her course by a storm, a great and richly laden Spanish galleon, bound for Acapulco from Manila, drifted to the coast of Tosa province, and running — or being purposely run — on a sand-bank as she was being towed into port by Japanese boats, broke her back. She carried goods to the value of some 600,000 crowns, and certain officials urged Hideyoshi to confiscate her as derelict, conveying to him at the same time a detailed account of the doings of the Franciscans and their open flouting of his orders. Hideyoshi, much incensed, commanded the arrest of the Franciscans and despatched officers to Tosa to confiscate the " San Felipe." The pilot of the galleon sought to intimidate these officers by showing them on a map of the world the vast extent of Spain's dominions, and being asked how one country had acquired such extended sway, replied: " Our kings begin by sending into the countries they wish to conquer missionaries who induce the people to embrace our religion, and when they have made considerable progress, troops are sent who combine with the new Christians, and then our kings have not much trouble in accomplishing the rest."

On learning of this speech Hideyoshi was overcome with fury. He condemned the Franciscans to have their noses and ears The First cut °S, to be promenaded through Kioto, Osaka Execution of and Sakai, and to be crucified at Nagasaki. " I Christians. nave ordered these foreigners to be treated thus, because they have come from the Philippines to Japan, calling themselves ambassadors, although they were not so; because they have remained here far too long without my permission; because, in defiance of my prohibition, they have built churches, preached their religion and caused disorders." Twenty-six suffered under this sentence — six Franciscans, three Japanese Jesuits and seventeen native Christians, chiefly domestic ser- vants of the Franciscans. 1 They met their fate with noble fortitude. Hideyoshi further issued a special injunction against the adoption of Christianity by a feudal chief, and took steps to give practical effect to his expulsion edict of 1 587. The governor of Nagasaki received instructions to send away all the Jesuits, permitting only two or three to remain for the service of the Portuguese merchants. But the Jesuits were not the kind of men who, to escape personal peril, turn their back upon an unaccomplished work of grace. There were 1 2 5 of them in Japan at that

time. In October 1597 a junk sailed out of Nagasaki harbour, her decks crowded with seeming Jesuits. In reality she carried n of the company, the apparent Jesuits being dis- guised sailors. It is not to be supposed that such a manoeuvre could be hidden from the local authorities. They winked at it, until rumour became insistent that Hideyoshi was about to visit Kitishiu in person, and all Japanese in administrative posts knew how Hideyoshi visited disobedience and how hopeless was any attempt to deceive him. Therefore, early in 1598, really drastic steps were taken. Churches to the number of 137 were demolished in Kiushiti, seminaries and residences fell, and the governor of Nagasaki assembled there all the fathers of the company for deportation to Macao by the great ship in the following year. But while they waited, Hideyoshi died. It is not on record that the Jesuits openly declared his removal from the earth to have been a special dispensation in their favour. But they pronounced him an execrable tyrant and consigned his " soul to hell for all eternity." Yet no impartial reader of history can pretend to think that a 16th-century Jesuit general in Hideyoshi's place would have shown towards an alien creed and its propagandists even a small measure of the tolerance exercised by the Japanese statesman towards Christianity and the Jesuits. . – ■

Hideyoshi's death occurred in 1598. Two years later, his authority as administrative ruler of all Japan had passed into Foreign the hands of Iyeyasu, the Tokugawa chief , and thirty- Poiicyotthe nine years later the Tokugawa potentates had not Tokugawa on [y exterminated Christianity in Japan but had also condemned their country to a period of interna- tional isolation which continued unbroken until 1853, an inter- val of 214 years. It has been shown that even when they were most incensed against Christianity, Japanese administrators sought to foster and preserve foreign trade. Why then did they close the country's doors to the outside world and suspend a commerce once so much esteemed? To answer that question some retrospect is needed. Certain historians allege that from the outset Iyeyasu shared Hideyoshi's misgivings about the real designs of Christian potentates and Christian propagandists. But that verdict is not supported by facts. The first occasion of the Tokugawa chief's recorded contact with a Christian propa- gandist was less than three months after Hideyoshi's death. There was then led into his presence a Franciscan, by name Jerome de Jesus, originally a member of the fictitious embassy from Manila. This man's conduct constitutes an example of the invincible zeal and courage inspiring a Christian priest in those days. Barely escaping the doom of crucifixion which overtook his companions, he had been deported from Japan to

1 The mutilation was confined to the lobe of one ear. Crucifixion, according to the Japanese method, consisted in tying to a cross and piercing the heart with two sharp spears driven from either side. Death was

alwavs instantaneous.

Manila at a time when death seemed to be the certain penalty of remaining . But no sooner had he been landed at Manila than he took passage in a Chinese junk, and, returning to Nagasaki, made his way secretly from the far south of Japan to the province of Kii. There arrested, he was brought into the presence of Iyeyasu, and his own record of what ensued is given in a letter subsequently sent to Manila: —

" When the Prince saw me he asked how I had managed to escape the previous persecution. I answered him that at that date God had delivered me in order that I might go to Manila and bring back new colleagues from there — preachers of the divine law — and that 1 had returned from Manila to encourage the Christians, cherishing the desire to die on the cross in order to go to enjoy eternal glory like my former colleagues. On hearing these words the Emperor began to smile, whether in his quality of a pagan of the sect of Shaka, which teaches that there is no future life, or whether from the thought that I was frightened at having to be put to death. Then, looking at me kindly, he said, ' Be no longer afraid and no longer conceal yourself, and'no longer change your habit, for I wish you well; and as for the Christians who every year pass within sight of the Kwanto where my domains are, when they go to Mexico with their ships, I have a keen desire for them to visit the harbours of this island, to refresh themselves there, and to take what they wish, to trade with my vassals and to teach them how to develop silver mines ; and that my intentions may be accomplished before my death, I wish you to indicate to me the means to take to realize them.' I answered that it was necessary that Spanish pilots should take the soundings of his harbours, so that ships might not be lost in future as the ' San Felipe ' had been, and that he should solicit this service from the governor of the Philippines. The Prince approved of my advice, and accordingly he has sent a Japanese gentleman, a native of Sakai, the bearer of this message. ... It is essential to oppose no obstacle to the complete liberty offered by the Emperor to the Spaniards and to our holy order, for the preaching of the holy gospel. . . . The same Prince (who is about to visit the Kwanto) invites me to accom- pany him to make choice of a house, and to visit the harbour which he promises to open to us ; his desires in this respect are keener than I can express."

The above version of the Tokugawa chief's mood is confirmed by events, for not only did he allow the contumelious Franciscan to build a church — the first — in Yedo and to celebrate Mass there, but also he sent three embassies to the Philippines, proposing reciprocal freedom of commerce, offering to open ports in the Kwanto and asking for competent naval architects. He never obtained the architects, and though the trade came, its volume was small in comparison with the abundance of friars that

accompanied it. There is just a possibility that Iyeyasu saw in these Spanish monks an instrument of counteracting the influence of the Jesuits, for he must have known that the Franciscans opened their mission in Yedo by " declaiming with violence against the fathers of the company of Jesus." In short, the Spanish monks assumed towards the Jesuits in Japan the same intolerant and abusive tone that the Jesuits themselves had previously assumed towards Buddhism.

At that time there appeared upon the scene another factor destined greatly to complicate events. It was a Dutch merchant ship, the " Liefde." Until the Netherlands revolted from Spain, the Dutch had been the principal distributors of all goods arriving at Lisbon from the Far East; but in 1 594 Philip II. closed the port of Lisbon to these rebels, and the Dutch met the situa- tion by turning their prows to the Orient to invade the sources of Portuguese commerce. One of the first expeditions despatched for that purpose set out in 1598, and of the five vessels composing it one only was ever heard of again. This was the " Liefde." She reached Japan during the spring of 1600, with only four- and- twenty alive out of her original crew of no. Towed into the harbour at Funai, the " Liefde " was visited by Jesuits, who, on discovering her nationality, denounced her to the local authorities as a pirate and endeavoured to incense the Japanese against them. The " Liefde " had on board in the capacity of " pilot major " an Englishman, Will Adams of Gillingham in • Kent, whom Iyeyasu summoned to Osaka, where there com- menced between the rough British sailor and the Tokugawa chief a curiously friendly intercourse which was not interrupted until the death of Adams twenty years later. The Englishman became master ship-builder to the Yedo government; was employed as diplomatic agent when other traders from his own country

and from Holland arrived in Japan, received in perpetual gift a substantial estate, and from first to last possessed the implicit confidence of the shogun. Iyeyasu quickly discerned the man's honesty, perceived that whatever benefits foreign commerce might confer would be increased by encouraging competition among the foreigners, and realized that English and Dutch trade presented the wholesome feature of complete dissociation from religious propagandism. On the other hand, he showed no intolerance to either Spaniards or Portuguese. He issued (1601) two official patents sanctioning the residence of the fathers in Kioto, Osaka and Nagasaki; he employed Father Rodriguez as interpreter to the court at Yedo; and in

1603 he gave munificent succour to the Jesuits who were reduced to dire straits owing to the capture of the great ship from Macao by the Dutch and the consequent loss of several years' supplies for the mission in Japan.

It is thus seen that each of the great trio of Japan's 16th-cen- tury statesmen — Nobunaga, Hideyoshi and Iyeyasu — adopted at the outset a most tolerant demeanour towards Christianity. The reasons of Hideyoshi's change of mood have been set forth. We have now to examine the reasons that produced a similar metamorphosis in the case of Iyeyasu. Two causes present themselves immediately. The first is that, while tolerating Christianity, Iyeyasu did not approve of it as a creed; the second, that he himself, whether from state policy or genuine piety, strongly encouraged Buddhism. Proof of the former proposi- tion is found in an order issued by him in 1602 to insure the safety of foreign merchantmen entering Japanese ports: it concluded with the reservation, " but we rigorously forbid them " (foreigners coming in such ships) " to promulgate their faith." Proof of the latter is furnished by the facts that he invariably carried about with him a miniature Buddhist image which he regarded as his tutelary deity, and that he fostered the creed of Shaka as zealously as Oda Nobunaga had suppressed it. There is much difficulty in tracing the exact sequence of events which gradually educated a strong antipathy to the Christian faith in the mind of the Tokugawa chief. He must have been influenced in some degree by the views of his great predecessor, Hideyoshi. But he did not accept those views implicitly. At the end of the 16th century he sent a trusted emissary to Europe for the purpose of directly observing the conditions in the home of Christianity, and this man, the better to achieve his aim, embraced the foreign faith, and studied it from within as well as from without. The story that he had to tell on his return could not fail to shock the ruler of a country where freedom of conscience had existed from time immemorial. It was a story of the inquisition and of the stake; of unlimited aggression in the name of the cross; of the pope's overlordship which entitled him to confiscate the realm of heretical sovereigns ; of religious wars and of wellnigh incredible fanaticism. Iyeyasu must have received an evil impression while he listened to his emissary's statements. Under his own eyes, too, were abundant evidences of the spirit of strife that Christian dogma engendered in those times. From the moment when the Franciscans and Dominicans arrived in Japan, a fierce quarrel began between them and the Jesuits; a quarrel which even community of suffering could not compose. Not less repellent was an attempt on the part of the Spaniards to dictate to Iyeyasu the expulsion of all Hollanders from Japan, and on the part of the Jesuits to dictate the expulsion of the Spaniards. The former proposal, couched almost in the form of a demand, was twice formulated, and accompanied on the second occasion by a scarcely less insulting offer, namely, that Spanish men-of-war would be sent to Japan to

burn all Dutch ships found in the ports of the empire. If in the face of proposals so contumelious of his sovereign authority Iyeyasu preserved a calm and dignified mien, merely replying that his country was open to all comers, and that, if other nations had quarrels among themselves, they must not take Japan for battle-ground, it is nevertheless unimaginable that he did not strongly resent such interference with his own independent foreign policy and that he did not interpret it as foreshadowing a disturbance of the realm's peace by sec-*

tarian quarrels among Christians. These experiences, predis- posing Iyeyasu to dislike Christianity as a creed and to distrust it as a political influence, were soon supplemented by incidents of an immediately determinative character. The first was an act of fraud and forgery committed in the interests of a Christian feudatory by a trusted official, himself a Christian. Thereupon Iyeyasu, conceiving it unsafe that Christians should fill offices at his court, dismissed all those so employed, banished them from Yedo and forbade any feudal chief to harbour them. The second incident was an attempted survey of the coast of Japan by a Spanish mariner and a Franciscan friar. Permission to take this step had been obtained by an envoy from New Spain, but no deep consideration of reasons seems to have preluded the per- mission on Japan's side, and when the mariner (Sebastian) and the friar (Sotelo) hastened- to carry out the project, Iyeyasu asked Will Adams to explain this display of industry. The Englishman replied that such a proceeding would be regarded in Europe as an act of hostility, especially on the part of the Spaniards or Portuguese, whose aggressions were notorious. He added, in reply to further questions, that " the Roman priest- hood had been expelled from many parts of Germany, from Sweden, Norway, Denmark, Holland and England, and that although his own country preserved the pure form of the Christian faith from which Spain and Portugal had deviated, yet neither English nor Dutch considered that that fact afforded them any reason to war with, or to annex, States which were not Christian solely for the reason that they were non- Christian." Iyeyasu reposed entire confidence in Adams. Hearing the Englishman's testimony, he is said to have exclaimed, " If the sovereigns of Europe do not tolerate these priests, I do them no wrong if I refuse to tolerate them." Japanese historians add that Iyeyasu discovered a conspiracy on the part of some Japanese Christians to overthrow his government by the aid of foreign troops. It was not a widely ramified plot, but it lent additional importance to the fact that the sympathy of the fathers and their converts was plainly with the only magnate in the empire who continued to dispute the Tokugawa supremacy, Hideyori, the son of Hideyoshi. Never- theless Iyeyasu shrank from proceeding to extremities in the case of any foreign priest, and this attitude he maintained until his death (16 16). Possibly he might have been not less tolerant towards native

Christians also had not the Tokugawa authority been openly defied by a Franciscan father — the Sotelo mentioned above — in Yedo itself. Then (1613) the first execution of Japan- ese converts took place, though the monk himself was released after a short incarceration. At that time, as is still the case even in these more enlightened days, insignificant differences of custom sometimes induced serious misconceptions. A Christiafi who had violated the secular law was crucified in Nagasaki. Many of his fellow-believers kneeled around his cross and prayed for the peace of his soul. A party of converts were afterwards burned to death in the same place for refusing to apostatize, and their Christian friends crowded to carry off portions of their bodies as holy relics. When these things were reported to Iyeyasu, he said, " Without doubt that must be a diabolic faith which persuades people not only to worship criminals condemned to death for their crimes, but also to honour those who have been burned or cut in pieces by the order of their lord " (feudal chief) .

The fateful edict ordering that all foreign priests should be collected in Nagasaki preparatory to removal from Japan, that all churches should be demolished, and that the Suppression converts should be compelled to abjure Christianity, of was issued on the 27th of January 1614. There were Car, stlanlty. then in Japan 122 Jesuits, 14 Franciscans, 9 Dominicans, 4 Augustins and 7 secular priests. Had these men obeyed the orders of the Japanese authorities by leaving the country finally, not one foreigner would have suffered for his faith in Japan, except the 6 Franciscans executed at Nagasaki by order of Hideyoshi in 1 597. But suffering and death counted for nothing with the missionaries as against the possibility of winning or I keeping even one convert. Forty-seven of them evaded the

edict, some by concealing themselves at the time of its issue, the rest by leaving their ships when the latter had passed out of sight of the shore of Japan, and returning by boats to the scene of their former labours. Moreover, in a few months, those that had actually crossed the sea re-crossed it in' various disguises, and soon the Japanese government had to consider whether it would suffer its authority to be thus flouted or resort to extreme measures.

During two years immediately following the issue of the anti- Christian decree, the attention of the Tokugawa chief and in- deed of all Japan was

concentrated on the closing episode of the great struggle which assured to Iyeyasu final supremacy as .administrative ruler of the empire. That episode was a terrible battle under the walls of Osaka castle between the adherents of the Tokugawa and the supporters of Hideyori. In this struggle fresh fuel was added to the fire of anti-Christian resent- ment, for many Christian converts threw in their lot with Hide- yori, and in one part of the field the Tokugawa troops found themselves fighting against a foe whose banners were emblazoned with the cross and with images of the Saviour and St James, the patron saint of Spain. But the Christians had protectors. Many of the feudatories showed themselves strongly averse from inflicting the extreme penalty on men and women whose adop- tion of an alien religion had been partly forced by the feudatories themselves. As for the people at large, their liberal spirit is attested by the fact that five fathers who were in Osaka castle at the time of its capture made their way to distant refuges without encountering any risk of betrayal. During these events the death of Iyeyasu took place (June i, 1616), and pending the dedication of his mausoleum the anti-Christian crusade was virtually suspended.

In September 1616 a new an ti- Christian edict was promulgated by Hidetada, son and successor of Iyeyasu. It pronounced sentence of exile against all Christian priests, including even those whose presence had been sanctioned for ministering to the Portuguese merchants: it forbade the Japanese, under the penalty of being burned alive and of having all their property confiscated, to have any connexion with the ministers of religion or to give them hospitality. It was forbidden to any prince or lord to keep Christians in his service or even on his estates, and the edict was promulgated with more than usual solemnity, though its enforcement was deferred until the next year on account of the obsequies of Iyeyasu. This edict of 1616 differed from that issued by Iyeyasu in 1614, since the latter did not prescribe the death penalty for converts refusing to apostatize. But both agreed in indicating expulsion as the sole manner of dealing with the foreign priests. As for the shogun and his Etdvisers, it is reasonable to assume that they did not anticipate much necessity for recourse to violence. They must have known that a great majority of the converts had joined the Christian church at the instance or by the command of their local rulers, and nothing can have seemed less likely than that a creed thus lightly embraced would be adhered to in defiance of torture and death. It is moreover morally certain that had the foreign propagandists obeyed the Government's edict and left the country, not one would have been put to death. They suffered because they defied the laws of the land. Some fifty mission- aries happened to be in Nagasaki when Hidetada's edict was issued. A number of these were apprehended and deported, but several of them returned almost immediately. This hap- pened under the jurisdiction

of Omura, who had been specially charged with the duty of sending away the bateren (padres). He appears to have concluded that a striking example must be fur- nished, and he therefore ordered the seizure and decapitation of two fathers, De 1′ Assumpcion and Machado. The result completely falsified his calculations, and presaged the cruel struggle now destined to begin.

The bodies, placed in different coffins, were interred in the same grave. Guards were placed over it, but the concourse was immense. The sick were carried to the sepulchre to be restored to health. The Christians found new strength in this martyrdom; the pagans them- selves were full of admiration for it. Numerous conversions and numerous returns of apostates took place everywhere.

In the midst of all this, Navarette, the vice-provincial of the Dominicans, and Ayala, the vice-provincial of the Augustins, came out of their retreat, and in full priestly garb started upon an open propaganda. The two fanatics — for so even Charlevoix considers them to have been — were secretly conveyed to the island Takashima and there decapitated, while their coffins were weighted with big stones and sunk in the sea. Even more directly defiant was the attitude of the next martyred priest, an old Franciscan monk, Juan de Santa Martha. He had for three years suffered all the horrors of a medieval Japanese prison, when it was proposed to release him and deport him to New Spain. His answer was that, if released, he would stay in Japan and preach there. He laid his head on the block in August 1618. But from that time until 1622 no other foreign missionary suffered capital punishment in Japan, though many of them arrived in the country and continued their propa- gandism there. During that interval, also, there occurred another incident eminently calculated to fix upon the Christians still deeper suspicion of political designs. In a Portuguese ship captured by the Dutch a letter was found instigating the Japan- ese converts to revolt, and promising that, when the number of these disaffected Christians was sufficient, men-of-war would be sent to aid them. Not the least potent of the influences operat- ing against the Christians was that pamphlets were written by apostates attributing the zeal of the foreign propagandists solely to political motives. Yet another indictment of Spanish and Portuguese propagandists was contained in a despatch addressed to Hidetada in 1620 by the admiral in command of the British and Dutch fleet then cruising in Far-Eastern waters. In that document the friars were flatly accused of treacherous practices, and the Japanese ruler was warned against the aggres- sive designs of Philip of Spain. In the face of all this evidence the Japanese ceased to hesitate, and a time of terror ensued for the fathers and their converts. The measures adopted towards the missionaries gradually increased in severity. In 161 7 the first two fathers put to death (De 1′ Assumpcion and Machado) were beheaded, ” not by

the common executioner, but by one of the first officers of the prince." Subsequently Navarette and Ayala were decapitated by the executioner. Then, in 1618, Juan de Santa Martha was executed like a common criminal, his body being dismembered and his head exposed. Finally, in 1622, Zufiiga and Flores were burnt alive. The same year was marked by the " great martyrdom " at Nagasaki when 9 foreign priests went to the stake with 19 Japanese converts. The shogun seems to have been now labouring under vivid fear of a foreign invasion. An emissary sent by him to Europe had returned on the eve of the " great martyrdom " after seven years abroad, and had made a report more than ever unfavourable to Christianity. Therefore Hidetada deemed it necessary to refuse audience to a Philippine embassy in 1624 and to deport all Spaniards from Japan. Further, it was decreed that no Japanese Christian should thenceforth be suffered to go abroad for com- merce, and that though non-Christians or men who had aposta- tized might travel freely, they must not visit the Philippines. Thus ended all intercourse between Japan and Spain. It had continued for 32 years and had engendered a widespread conviction that Christianity was an instrument of Spanish aggression.

Iyemitsu, son of Hidetada, now ruled in Yedo, though Hide- tada himself remained the power behind the throne. The year (1623) of the former's accession to power had been marked by the re-issue of anti-Christian decrees, and by the martyrdom of some 500 Christians within the Tokugawa domains, whither the tide of persecution now flowed for the first time. Thenceforth the campaign was continuous. The men most active and most relentless in carrying on the persecution were Mizuno and Takenaka, governors of Nagasaki, and Matsukura, feudatory of Shimabara. By the latter were invented the punishment of throwing converts into the solfataras at Unzen and the torture of the fosse, which consisted in suspension by the feet, head downwards, in a pit until blood oozed from the mouth, nose and ears. Many endured this latter torture for days, until death

came to their relief, but a few— notably the Jesuit provincial Ferreyra — apostatized. Matsukura and Takenaka were so strongly obsessed by the Spanish menace that they contemplated the conquest of the Philippines in order to deprive the Spaniards of a Far-Eastern base. But timid counsels then prevailed in Yedo, where the spirit of a Nobunaga, a Hideyoshi or an Iyeyasu no longer presided. Of course the measures of repression grew in severity as the fortitude of the Christians became more ob- durate. It is not possible to state the exact number of victims. Some historians say that, down to 1635, no fewer than 280,000 were punished, but that figure is probably exaggerated, for the most trustworthy records indicate that the converts never aggre- gated more than 300,000, and many of these, if not

a great majority, having accepted the foreign faith very lightly, doubt- less discarded it readily under menace of destruction. Every opportunity was given for apostatizing and for escaping death. Immunity could be secured by pointing out a fellow-convert, and when it is "observed that among the seven or eight feudatories who embraced Christianity only two or three died in that faith, we must conclude that not a few cases of recanting occurred among the commoners. Remarkable fortitude, however, is said to have been displayed. If the converts were intrepid their teachers showed no less courage. Again and again the latter defied the Japanese authorities by coming to the country or returning thither after having been deported. Ignoring the orders of the governors of Macao and Manila and even of the king of Spain himself, they arrived, year after year, to be cer- tainly apprehended and sent to the stake after brief periods of propagandism. In 1626 they actually baptized over 3000 converts. Large rewards were paid to anyone denouncing a propagandist, and as for the people, they had to trample upon a picture of Christ in order to prove that they were not Christians.

Meanwhile the feuds between the Dutch, the Spaniards and the Portuguese never ceased. In 1636, the Dutch found on a captured Portuguese vessel a report of the governor of Macao describing a two days' festival which had been held there in honour of Vieyra, the vice-provincial whose martyrdom had just taken place in Japan. This report the Dutch handed to the Japanese authorities " in order that his majesty may see more clearly what great honour the Portuguese pay to those he has forbidden his realm as traitors to the state and to his crown." Probably the accusation added little to the resentment and dis- trust already harboured by the Japanese against the Portuguese. At all events the Yedo government took no step distinctly hostile to Portuguese laymen until 1637, when an edict was issued for- bidding any foreigners to travel in the empire, lest Portuguese with passports bearing Dutch names might enter it. This was the beginning of the end. In the last month of 1637 a rebellion broke out, commonly called the " Christian revolt of Shimabara," which sealed the fate of Japan's foreign intercourse for over 200 years.

The promontory of Shimabara and the island of Amakusa enclose the gulf of Nagasaki on the west. Among all the fiefs in Japan, Shimabara and Amakusa had been the two bars Revolt, most thoroughly christianized in the early years of Jesuit propagandism. Hence in later days they were naturally the scene of the severest persecutions. Still the people would probably have suffered in silence had they not been taxed beyond all endurance to supply funds for an extravagant chief who employed savage methods of, extortion. Japanese annals, however, relegate the taxation grievance to an altogether secondary place, and attribute the revolt solely to the instigation of five samurai who led a roving life to avoid persecution

for their adherence to Christianity. Whichever version be correct, it is certain that the outbreak ultimately attracted all the Chris- tians from the surrounding regions, and was regarded by the authorities as in effect a Christian rising. The Amakusa in- surgents passed over to Shimabara, and on the 27th of January 1638 the whole body — numbering, according to some authorities, 20,000 fighting men with 1 7,000 women and children ; according to others, little more than one-half of these figures — took possession

of the dilapidated castle of Hara, which stood on a plateau with three sides descending perpendicularly to the sea, a hundred feet beneath, and with a swamp on its fourth front. There the insurgents, who fought under flags with red crosses and whose battle cries were " Jesus," " Maria " and " St Iago," successfully maintained themselves against the repeated assaults of strong forces until the 12th of April, when, their ammunition and their provisions alike exhausted, they were overwhelmed and put to the sword, with the exception of 105 prisoners. During the siege the Dutch were enabled to furnish a vivid proof of enmity to the Christianity of the Spaniards and the Portuguese. For the guns in possession of the besiegers being too light to accom- plish anything, Koeckebacker, the factor at Hirado, was invited to send ships carrying heavier metal. He replied with the " de Ryp " of 20 guns, which threw 426 shot into the castle in 1 5 days. Probably the great bulk of the remaining Japanese Christians perished at the massacre of Hara. Thenceforth there were few martyrs. 1

It has been clearly shown that Nobunaga, Hideyoshi and Iyeyasu were all in favour of foreign intercourse and trade, and that the Tokugawa chief, even more than his prede- Foreign cessor Hideyoshi, made strenuous efforts to differ- Trade in entiate between Christianity and commerce, so that J? e 1Tth the latter might not be involved in the former's fate. e ' In fact the three objects which Iyeyasu desired most earnestly to compass were the development of foreign commerce, the acqui- sition of a mercantile marine and the exploitation of Japan's mines. He offered the Spaniards, Portuguese, English and Dutch a site for a settlement in Yedo, and had they accepted the offer the country might never have been closed. In his time Japan was virtually a free-trade country. Importers had not to pay any duties. It was expected, however, that they should make presents to the feudatory into whose port they carried their goods, and these presents were often very valuable. Naturally the Tokugawa chief desired to attract such a source of wealth to his own domains. He sent more than one envoy to Manila to urge the opening of commerce direct with the regions about Yedo, and to ask the Spaniards for competent naval architects. Perhaps the truest exposition of his attitude is given in a law enacted in 1602: —

" If any foreign vessel by stress of weather is obliged to touch at any principality or-to put into any harbour of Japan, we order that, whoever these foreigners may be, absolutely nothing whatever that belongs to them or that they may have brought in their ship, shall be taken from them. Likewise we rigorously prohibit the use of any violence in the purchase or the sale of any of the commodities brought by their ship, and if it is not convenient for the merchants of the ship to remain in the port they have entered, they may pass to any other port that may suit them, and therein buy and sell in full freedom. Likewise we order in a general manner that foreigners may freely reside in any part of Japan they choose, but we rigorously forbid them to promulgate their faith."

It was in that mood that he granted (1605) a licence to the Dutch to trade in Japan, his expectation doubtless being that the ships which they promised to send every year would make their dep6t at Uraga or in some other place near Yedo. But things were ordered differently. The first Hollanders that set foot in Japan were the survivors of the wrecked " Liefde." Thrown into prison for a time, they were approached by emis- saries from the feudatory of Hirado, who engaged some of them to teach the art of casting guns and the science of gunnery to his vassals, and when two of them were allowed to leave Japan, he furnished them with the means of doing so, at the same time making promises which invested Hirado with attractions as a port of trade, though it was then and always remained an insig- nificant fishing village. The Dutch possessed precisely the qualifications suited to the situation then existing in Japan: they had commercial potentialities without any religious asso- ciations. Fully appreciating that fact, the shrewd feudatory of Hirado laid himself out to entice the Dutchmen to his fief, and he succeeded. Shortly afterwards, an incident occurred which clearly betrayed the strength of the Tokugawa chief's desire to

1 See A History of Christianity in Japan (1910), by Otis Cary.

exploit Japan's mines. The governor-general of the Philippines (Don Rodrigo Vivero y Velasco), his ship being cast away on the Japanese coast on a voyage to Acapulco, was received by Iyeyasu, and in response to the latter's request for fifty miners, the Spaniard formulated terms to which Iyeyasu actually agreed: that half the produce of the mines should go to the miners; that the other half should be divided between Iyeyasu and the king of Spain; th?.t the latter might send commissioners to Japan to look after his mining interests, and that these commissioners might be accompanied by priests who would be entitled to have public churches for holding services. This was in 1609, when the Tokugawa chief had again and again

imposed the strictest veto on Christian propagandism. There can be little doubt that he understood the concession made to Don Rodrigo in the sense of Hideyoshi's mandate to the Jesuits in Nagasaki, namely, that a sufficient number might remain to minister to the Portuguese traders frequenting the port. Iyeyasu had confidence in himself and in his countrymen. He knew that emergencies could be dealt with when they arose and he sacrificed nothing to timidity. But his courageous policy died with him and the miners did not come. Neither did the Spaniards ever devote any successful efforts to establishing trade with Japan. Their vessels paid fitful visits to Uraga, but the Portuguese continued to monopolize the commerce.

In 161 1 a Dutch merchantman (the " Brach ") reached Hirado with a cargo of pepper, cloth, ivory, silk and lead. She carried Opening of two envoys, Spex and Segerszoon, and in the very D-tch and face of a Spanish embassy which had just arrived Trade from ManiIa expressly for the purpose of "settling the matter regarding the Hollanders," the Dutchmen obtained a liberal patent from Iyeyasu. Twelve years pre- viously, the merchants of London, stimulated generally by the success of the Dutch in trade with the East, and specially by the fact that " these Hollanders had raised the price of pepper against us from 3 shillings per pound to 6 shillings and 8 shillings " organized the East India Company which immediately began to send ships eastward. Of course the news that the Dutch were about to establis-h a trading station in Japan reached London speedily, and the East India Company lost no time in ordering one of their vessels, the " Clove," under Captain Saris to proceed to the Far-Eastern islands. She carried a quantity of pepper, and on the voyage she endeavoured to procure some spices at the Moluccas. But the Dutch would not suffer any poaching on their valuable monopoly. The " Clove "entered Hirado on the nth of June 1613. Saris seems to have been a man self-opinionated, of shallow judgment and suspicious Though strongly urged by Will Adams to make Uraga the seat of the new trade, though convinced of the excellence of the har- bour there, and though instructed as to the great advantage of proximity to the shogun's capital, he appears to have conceived some distrust of Adams, for he chose Hirado. From Iyeyasu Captain Saris received a most liberal charter, which plainly dis- played the mood of the Tokugawa shogun towards foreign ir3,dci' — —

1. The ship that has now come for the first time from England oyer the sea to Japan may carry on trade of all kinds without hindrance. With regard to future visits (of English ships) permis- sion will be given in regard to all matters.

2 With regard to the cargoes of ships, requisition will be made by list according to the requirements of the shogunate

3. English ships are free to visit any port in Japan. If disabled by storms they may put into any harbour. uisauica

• 4 ” (? r °.‘i nCl ir m ?l d ° ‘5 l he place which thev ma y desire shall be given to the English and they may erect houses and reside and trade there. They shall be at liberty to return to their country whenever

*have Trwted S °’ *° P ° SC aS they Hke ° f the houses thev*

5- If an Englishman dies in Japan of disease, or any other cause

his effects shall be handed over without fail. > < -»«■ cause,

6. Forced sales of cargo, and violence, shall not take place

7. It one of the English should- commit an offence, he should be

Xnc”e ˆ the EngHsh Gene ˆ’ aCC ,° rdin S to the’gravi?y of hit onence – (Translated by Professor Riess.)

The terms of the 4 th article show that the shogun expected the English to make Yedo their headquarters. Had Saris done

JAPAN [FOREIGN INTERCOURSE

so, he would have been free from all competition, would have had an immense market at his very doors, would have economized the expense of numerous overland journeys to the Tokugawa court, and would have saved the payment of many " considera- tions. The result of his mistaken choice and subsequent bad management was that, ten years later (1623), the English factory at Hirado had to be closed, having incurred a total loss of about £2000. In condonation of this failure it must be noted that a few months after the death of Iyeyasu, the charter he had granted to Sans underwent serious modification. The original document threw open to the English every port in Japan; the revised document limited them to Hirado. But this restriction may be indirectly traced to the blunder of not accepting a settlement in Yedo and a port at Uraga. For the Tokugawa's foreign policy was largely swayed by an apprehension lest the Kiushiu feuda- tories over whom the authority of Yedo had never been fully established, might, by the presence of foreign traders, come into possession of such a fleet and such an armament as would ulti- mately enable them to wrest the administration of the empire from Tokugawa hands. Hence the precaution of confining the English and the Dutch to Hirado, the fief of a daimyo too petty to become formidable, and to Nagasaki which was an imperial city. 1 But evidently an English factory in Yedo and English ships at Uraga would have strengthened the Tokugawa ruler's hand instead of supplying engines of war to his political foes It must_ also be noted that the question of locality had another injurious outcome. It exposed the English— and the Dutch also— to crippling competition at the hands of a company of rich Osaka monopolists, who, as representing an Imperial city and therefore being pledged to the Tokugawa inteiests, enjoyed Yedo s favour and took full advantage of it. These shrewd traders not only drew a ring round Hirado, but also sent vessels on their own account to Cochin China, Siam, Tonkin, Cambodia and other places, where they obtained many of the staples in which the English and the Dutch dealt. Still the closure of the English .factory at Hirado was purely voluntary. From first to last there had been no serious friction between the English and the Japanese. The company's houses and godowns were not sold. These as well as the charter were left in the hands of the daimyo of Hirado, who promised to restore them should the English re-open business in Japan. The company did think of doing so on more than one occasion, but no practical step was taken until the year 1673, when a merchantman, aptly named the Return," was sent to seek permission. The Japanese after mature reflection, made answer that as the king of England was married to a Portuguese princess, British subjects could not be permitted to visit Japan. That this reply was suggested by the Dutch is very probable; that it truly reflected the feeling of the Japanese government towards Roman Catholics is certain. Ihe Spaniards were expelled from Japan in 1624, the Portu- guese in 1638. Two years

before the latter event, the Yedo government took a signally retrogressive step. They The Last ordained that no Japanese vessel should go abroad; Days of the that no Japanese subject should leave the country Portuguese and that, if detected attempting to do so, he ,aJapan – should be put to death, the vessel that carried him and her crew being seized "to await our pleasure "; that any Japanese resident abroad should be executed if he returned; that the children and descendants of Spaniards together with those who had adopted such children should not be allowed to remain on pain of death; and that no ship of ocean-going dimensions should be built in Japan. Thus not only were the very children of the Christian, propagandists driven completely from the land, but the Japanese people also were sentenced to imprisonment within the limits of their islands, and the country was deprived of all hope of acquiring a mercantile marine. The descendants of the Spaniards, banished by the edict, were taken to Macao in two Portuguese galleons. They numbered 287 and the property The Imperial cities were Yedo, Kioto, Osaka and Nagasaki. lo this last the English were subsequently admitted. They were also invited to Kagoshima by the Shimazu chieftain, and, had not

Jl< uv X i?T en r Ce at Hlrado P rov ed so deterrent, they might have established a factory at Kagoshima.

they carried with them aggregated 6,607,500 florins. But if the Portuguese derived any gratification from this sweeping out of their much-abused rivals, the feeling was destined to be short- lived. Already they were subjected to humiliating restrictions. " From 1623 the galleons and their cargoes were liable to be burnt and their crews executed if any foreign priest was found on board of them. An official of the Japanese government was stationed in Macao for the purpose of inspecting all intending passengers, and of preventing any one that looked at all suspicious from proceeding to Japan. A complete list and personal description of every one on board was drawn up by this officer, a copy of it was handed to the captain and by him it had to be delivered to the authorities who met him at Nagasaki before he was allowed to anchor. If in the subsequent inspection any discrepancy between the list and the persons actually carried by the vessel appeared, it would prove very awkward for the captain. Then in the inspection of the vessel letters were opened, trunks and boxes ransacked, and all crosses, rosaries or objects of religion of any kind had to be thrown over- board. In 1635 Portuguese were forbidden to employ Japanese to

carry their umbrellas or their shoes, and only their chief men were allowed to bear arms, while they had to hire fresh servants every year. It was in the following year (1636) that the artificial islet of Deshima was constructed for their special reception, or rather imprisonment. It lay in front of the former Portuguese factory, with which it was connected by a bridge, and henceforth the Portu- guese were to be allowed to cross this bridge only twice a year — at their arrival and at their departure. Furthermore, all their cargoes had to be sold at a fixed price during their fifty days' stay to a ring of licensed merchants from the imperial towns." '

The imposition of such irksome conditions did not deter the Portuguese, who continued to send merchandise-laden galleons to Nagasaki. But in 1638 the bolt fell. The Shimabara rebellion was directly responsible. Probably the fact of a revolt of Christian converts, in such numbers and fighting with such resolution, would alone have sufficed to induce the weak govern- ment in Yedo to get rid of the Portuguese altogether. But the Portuguese were suspected of having instigated the Shimabara insurrection, and the Japanese authorities believed that they had proof of the fact. Hence, in 1638, an edict was issued pro- claiming that as, in defiance of the government's order, the Portuguese had continued to bring missionaries to Japan; as they had supplied these missionaries with provisions and other necessaries, and as they had fomented the Shimabara rebellion, thenceforth any Portuguese ship coming to Japan should be burned, together with her cargo, and every one on board of her should be executed. Ample time was allowed before enforcing this edict. Not only were the Portuguese ships then at Nagasaki permitted to close Up their commercial transactions and leave the port, but also in the following year when two galleons arrived from Macao, they were merely sent away with a copy of the edict and a stern warning. But the Portuguese could not easily become reconciled to abandon a commerce from which they had derived splendid profits prior to the intrusion of the Spaniards, the Dutch and the English, and from which they might now hope further gains, since, although the Dutch continued to be formid- able rivals, the Spaniards had been excluded, the English had withdrawn, and the Japanese, by the suicidal policy of their own rulers, were no longer able to send ships to China. Therefore they took a step which resulted in one of the saddest episodes of the whole story. Four aged men, the most respected citizens of Macao, were despatched (1640) to Nagasaki as ambassadors in a ship carrying no cargo but only rich presents. They bore a petition declaring that for a long time no missionaries had entered Japan from Macao, that the Portuguese had not been in any way connected with the Shimabara revolt, and that inter- ruption of trade would injure Japan as much as Portugal. These envoys arrived at Nagasaki on the 1st of July 1640, and 24 days sufficed to bring from Yedo, whither their petition had been sent, peremptory orders for their execution as well

as executioners to carry out the orders. There was no possibility of resistance. The Japanese had removed the ship's rudder, sails, guns and ammunition, and had placed the envoys, their suite and the crews under guard in Deshima. On the 2nd of August they were all summoned to the governor's hall of audi- ence, where, after their protest had been heard that ambassadors 1 A History of Japan (Murdoch and Yamagata).

should be under the protection of international law, the sentence written in Yedo 13 days previously was read to them. The following morning the Portuguese were offered their lives if they would apostatize. Every one rejected the offer, and being then led out to the martyrs' mount, the heads of the envoys and of 57 of their companions fell. Thirteen were saved to carry the news to Macao. These thirteen, after witnessing the burning of the galleon, were conducted to the governor's residence who gave them this message: —

" Do not fail to inform the inhabitants of Macao that the Japanese wish to receive .from them neither gold nor silver, nor any kind of presents or merchandise ; in a word, absolutely nothing which comes from them. You are witnesses that I have caused even the clothes of those who were executed yesterday to be burned. Let them do the same with respect to us if they find occasion to do so ; we consent to it without difficulty. Let them think no more of us, just as .if we were no longer in the world."

Finally the thirteen were taken to the martyrs' mount where, set up above the heads of the victims, a tablet recounted the story of the embassy and the reasons for the execution, and concluded with the words: —

" So long as the sun warms the earth, let no Christian be so bold as to come to Japan, and let all know that if King Philip himself, or even the very God of the Christians, or the great Shaka contravene this prohibition, they shall pay for it with their heads."

Had the ministers of the shogun in Yedo desired to make clear to future ages that to Christianity alone was due the expulsion of Spaniards and Portuguese from Japan and her adoption of the policy of seclusion they could not have placed on record more conclusive testimony. Macao received the news with rejoicing in that its " earthly ambassadors had been made ambas- sadors of heaven," but it did not abandon all hope of over- coming Japan's obduracy. When Portugal recovered her independence in 1640, the people of Macao requested Lisbon to send an ambassador to Japan, and on the 16th of July 1647 Don Gonzalo de Siqueira arrived in Nagasaki with two vessels. He carried a letter from King John IV., setting forth the severance of all connexion between Portugal and Spain, which countries were now actually at war, and urging that commercial relations

should be re-established. The Portuguese, having refused to give up their rudders and arms, soon found themselves menaced by a force of fifty thousand samurai, and were glad to put out of port quietly on the 4th of September. This was the last episode in the medieval history of Portugal's intercourse with Japan.

When (1609) the Dutch contemplated forming a settlement in Japan, Iyeyasu gave. them a written promise that "no man should do them any wrong and that he would ■■

maintain and defend them as his own subjects." b t Deshima. Moreover, the charter granted to them contained a clause providing that, into whatever ports their ships put, they were not to be molested or hindered in any way, but, " on the contrary, must be shown all manner of help, favour and assist- ance." They might then have chosen any port in Japan for their headquarters, but they had the misfortune to choose Hirado. For many years they had no cause to regret the choice. Their exclusive possession of the Spice Islands and their own enterprise and command of capital gave them the leading place in Japan's over-sea trade. Even when things had changed greatly for the worse and when the English closed their books with a large loss, it is on record that the Dutch were reaping a profit of 76% annually. Their doings at Hirado were not of a purely commercial character. The Anglo-Dutch " fleet of defence " made that port its basis of operations against the Spaniards and the Portuguese. It brought its prizes into Hirado, the profits to be equally divided between the fleet and the factories, Dutch and English, which arrangement involved a sum of a hundred thousand pounds in 1622. But after the death of Iyeyasu there grew up at the Tokugawa court a party which advocated the expulsion of all foreigners on the ground that, though some professed a different form of Christianity from that of the Castilians and Portuguese, it was nevertheless one and the same creed. This policy was not definitely adopted,

but it made itself felt in a discourteous reception accorded to the commandant of Fort Zelandia when he visited Tokyo in 1627. He attempted to retaliate upon the Japanese vessels which put into Zelandia in the following year, but the Japanese managed to seize his person, exact reparation for loss of time and obtain five hostages whom they carried to prison in Japan. The Japanese government of that time was wholly intolerant of any injury done to its subjects by foreigners. When news of

the Zelandia affair reached Yedo, orders were immediately issued for the sequestration of certain Dutch vessels and for the suspension of the Hirado factory, which veto was not removed for four years. Commercial arrangements, also, became less favourable. The Dutch, instead of selling their silk — which generally formed the principal staple of import — in the open market, were required to send it to the Osaka gild of licensed merchants at Nagasaki, by which means, Nagasaki and Osaka being Imperial cities, the Yedo government derived advantage from the transaction. An attempt to evade this onerous system provoked a very stern rebuke from Yedo, and shortly afterwards all Japanese subjects were forbidden to act as ser- vants to the Dutch outside the latter's dwellings. The co- operation of the Hollanders in bombarding the castle of Hara during the Shimabara rebellion (1638) gave them some claim on the shogun's government, but in the same year the Dutch received an imperious warning that the severest penalties would be inflicted if their ships carried priests or any religious objects or books. So profound was the dislike of everything relating to Christianity that the Dutch nearly caused the ruin of their factory and probably their own destruction by inscribing on some newly erected warehouses the date according to the Christian era. The factory happened to be then presided over by Caron, a man of extraordinary penetration. Without a moment's hesitation he set 400 men to pull down the warehouses, thus depriving the Japanese of all pretext for recourse to violence. He was compelled, however, to promise that there should be no observance of the Sabbath hereafter and that time should no longer be reckoned by the Christian era. In a few months, further evidence of Yedo's ill will was furnished. An edict appeared ordering the Dutch to dispose of all their imports during the year of their arrival, without any option of carrying them away should prices be low. They were thus placed at the mercy of the Osaka gild. Further, they were forbidden to slaughter cattle or carry arms, and altogether it seemed as though the situation was to be rendered impossible for them. An envoy despatched from Batavia to remonstrate could not obtain audience of the shSgun, and though he presented, by way of re aonstrance, the charter originally granted by Iyeyasu, the reply he received was: —

" His Majesty charges us to inform you that it is of but slight importance to the Empire of Japan whether foreigners come or do not come to trade. But in consideration of the charter granted to them by Iyeyasu, he is pleased to allow the Hollanders to continue their operations, and to leave them their commercial and other privileges, on the condition that they evacuate Hirado and establish themselves with their vessels in the port of Nagasaki."

The Dutch did not at first regard this as a calamity. During their residence of 31 years at Hirado they had enjoyed full free- dom, had been on excellent terms with the feudatory and his samurai, and had prospered in

their business. But the pettiness of the place and the inconvenience of the anchorage having always been recognized, transfer to Nagasaki promised a splen- did harbour and much larger custom. Bitter, therefore, was their disappointment when they found that they were to be imprisoned in Deshima, a quadrangular island whose longest face did not measure 300 yds., and that, so far from living in the town of Nagasaki, they would not be allowed even to enter it. Siebold writes: —

*" A guard at the gate prevented all communications with the city of Nagasaki; no Dutchman without weighty reasons and without the permission of the governor might pass the gate; no Japanese (unless public women) might live in a Dutchman's house. As if this were not enough, even within Deshima itself our state prisoners were keenly watched. No Japanese might speak with them in his i*n language unless in the presence of a witness (a government spy)*

or visit them in their houses. The creatures of the governor had the warehouses under key and the Dutch traders ceased to be masters of their property."

There were worse indignities to be endured. No Dutchman might be buried in Japanese soil: the dead had to be committed to the deep. Every Dutch ship, her rudder, guns and ammuni- tion removed and her sails sealed, was subjected to the strictest search. No religious service could be held. No one was suffered to pass from one Dutch ship to another without the governor's permit. Sometimes the officers and men were wantonly cudgelled by petty Japanese officials. They led, in short, a life of extreme abasement. Some relaxation of this extreme severity was afterwards obtained, but at no time of their sojourn in Deshima, a period of 217 years, were the Dutch relieved from irksome and humiliating restraints. Eleven years after their removal thither, the expediency of consulting the national honour by finally abandoning an enterprise so derogatory was gravely discussed, but hopes of improvement supplementing natural reluctance to surrender a monopoly which still brought large gains, induced them to persevere. At that time this Nagasaki over-sea trade was considerable. From 7 to 10 Dutch ships used to enter the port annually, carrying cargo valued at some 80,000 lb of silver, the chief staples of import being silk and piece-goods, and the government levying 5% by way of customs dues. But this did not represent the whole of the charges imposed. A rent of 459 lb of silver had to be paid each year for the little island of Deshima and the houses standing on it; and, further, every spring, the Hollanders were required to send to Yedo a mission bearing for the shogun, the heir-apparent and the court officials presents representing an aggregate value of about 550 lb of silver. They found their account, nevertheless, in buying gold and copper — especially the latter — for exportation, until the Japanese authorities, becoming

alarmed at the great quantity of copper thus carried away, adopted the policy of limiting the number of vessels, as well as their inward and outward cargoes, so that, in 1 790, only one ship might enter annually, nor could she carry away more than 350 tons of copper. On the other hand, the formal visits of the captain of the factory to Yedo were reduced to one every fifth year, and the value of the presents carried by him was cut down to one half.

*Well-informed historians have contended that, by thus segregating herself from contact with the West, Japan's direct losses were small. Certainly it is true that she could . not have learned much from European nations m JtpaBby the 17th century. They had little to teach her in adopting the way of religious tolerance; in the way of inter- tbePoikyot national morality; in the way of social amenities x * on ' and etiquette; in the way of artistic conception and execution; or in the way of that notable shibboleth of modern civilization, the open door and equal opportunities. Yet when all this is admitted, there remains the vital fact that Japan was thus shut off from the atmosphere of competition, and that for nearly two centuries and a half she never had an opportunity of warming her intelligence at the fire of international rivalry or deriving in- spiration from an exchange of ideas. She stood comparatively still while the world went on, and the interval between her and the leading peoples of the Occident in matters of material civili- zation had become very wide before she awoke to a sense of its existence. The sequel of this page of her history has been faithfully summarized by a modern writer: —*

" A more complete metamorphosis of a nation's policy could scarcely be conceived. In 1541 we find the Japanese celebrated, or notorious, throughout the whole of the Far East for exploits abroad ; we find them known as the ' kings of the sea ' ; we find themj welcoming foreigners with cordiality and opposing no obstacles to foreign commerce or even to the propagandism of foreign creeds ; we find them so quick to recognize the benefits of foreign trade and so apt to pursue them that, in the space of a few years, they establish commercial relations with no less than twenty over-sea markets; we find them authorizing the Portuguese, the Dutch and the English to trade at every port in the empire ; we find, in short, all the elements requisite for a career of commercial enterprise, ocean-going adven- ture and industrial liberality. In 1641 everything is reversed. Trade is interdicted to all Western peoples except the Dutch, ?nd

they are confined to a little island 200 yards in length by 80 in width ; the least symptom of predilection for any alien creed exposes a Japanese subject to be punished with awful rigour; any attempt to leave the limits of the realm involves decapitation; not a ship large enough to pass beyond the shadow of the coast may be built. How- ever unwelcome the admission, it is apparent that for all these changes Christian propagandism was responsible. The policy of seclusion adopted by Japan in the early part of the 17th century and resolutely pursued until the middle of the 19th, was anti-Christian, not anti-foreign. The fact cannot be too clearly recognized. It is the chief lesson taught by the events outlined above. Throughout the whole of that period of isolation, Occidentals were not known to the Japanese by any of the terms now in common use, as gwaikoku-jin, seiyo-jin, or i-jin, which embody the simple meanings ‘ foreigner,’ ‘ Westerner ‘ or ‘ alien ‘ : they were popularly called bateren (padres). Thus completely had foreign intercourse and Christian propagandism become identified in the eyes of the people. And when it is remem- bered that foreign intercourse, associated with Christianity, had come to be synonymous in Japanese ears with foreign aggression, with the subversal of the mikado’s ancient dynasty, and with the loss of the in- dependence of the ‘ country of the gods,’ there is no difficulty in under- standing the attitude of the nation’s mind towards this question.”

Foreign Intercourse in Modern Times. — From the middle of the 17 th century to the beginning of the 19th, Japan succeeded Dutch and in rigorously enforcing her policy of seclusion. But Russian in the concluding days of this epoch two influences influence, began to disturb her self-sufficiency. One was the gradual infiltration of light from the outer world through the narrow window of the Dutch prison at Deshima; the other, frequent apparitions of Russian vessels on her northern coasts. The former was a slow process. It materialized first in the study of anatomy by a little group of youths who had acquired acci- dental knowledge of the radical difference between Dutch and Japanese conceptions as to the structure of the human body. The work of these students reads like a page of romance. With- out any appreciable knowledge of the Dutch language, they set themselves to decipher a Dutch medical book, obtained at enor- mous cost, and from this small beginning they passed to a vague but firm conviction that their country had fallen far behind the material and intellectual progress of the Occident. They laboured in secret, for the study of foreign books was then a criminal offence; yet the patriotism of one of their number out- weighed his prudence, and he boldly published a brochure advocating the construction of a navy and predicting a descent by the Russians on the northern borders of the empire. Before this prescient man had lain five months in prison, his foresight was verified by events. The Russians simulated at the outset a desire to establish commercial relations

by peaceful means. Had the Japanese been better acquainted with the history of nations, they would have known how to interpret the idea of a Russian quest for commercial connexions in the Far East a hundred years ago. But they dealt with the question on its superficial merits, and, after imposing on the tsar's envoys a wearisome delay of several months at Nagasaki, addressed to them a peremptory refusal together with an order to leave that port forthwith. Incensed by such treatment, and by the sub-sequent imprisonment of a number of their fellow countrymen who had landed on the island of Etorofu in the Kuriles, the Russians resorted to armed reprisals. The Japanese settle- ments in Sakhalin and Etorofu were raided and burned, other places were menaced and several Japanese vessels were de- stroyed. The lesson sank deep into the minds of the Yedo officials. They withdrew their veto against the study of foreign books, and they arrived in part at the reluctant conclusion that to offer armed opposition to the coming of foreign ships was a task somewhat beyond Japan's capacity. Japan ceased, however, to attract European attention amid the absorbing interest of the Napoleonic era, and the shogun's government, misinterpreting this respite, reverted to their old policy of stalwart resistance to foreign intercourse.

Meanwhile another power was beginning to establish close

contact with Japan. The whaling industry in Russian waters off

the coast of Alaska and in the seas of China and Japan

Enterprise. na(ˆ attracted large investments of American capital

and was pursued yearly by thousands of American

citizens. In one season 86 of these whaling vessels passed within

easy sight of Japan's northern island, Yezo, so that the aspect of foreign ships became quite familiar. From time to time Ameri- can schooners were cast away on Japan's shores. Generally the survivors were treated with tolerable consideration and ulti- mately sent to Deshima for shipment to Batavia. Japanese sailors, too, driven out of their route by hurricanes and caught in the stream of the " Black Current," were occasionally carried to the Aleutian Islands, to Oregon or California, and in several instances these shipwrecked mariners were taken back to Japan with all kindness by American vessels. On such an errand of mercy the " Morrison " entered Yedo Bay in 1837, proceeding thence to Kagoshima, only to be driven away by cannon shot; and on such an errand the " Manhattan " in 184s lay for four days at Uraga while her master (Mercater Cooper) collected books and charts. It would seem that his experience induced the

Washington government to attempt the opening of Japan. A ninety-gun ship and a sloop were sent on the errand. They anchored off Uraga (July 1846) and Commodore Biddle made due application for trade. But he received a positive refusal, and having been instructed by his government to abstain from any act calculated to excite hostility or distrust, he quietly weighed anchor and sailed away.

In this same year (1846) a French ship touched at the Riukiu (Luchu) archipelago and sought to persuade the islanders that their only security against British aggression was to great place themselves under the protection of France. In Britain fact Great Britain was now beginning to interest herself reappears in south China, and more than one warning reached "·/ ie Yedo from Deshima that English war-ships might at any moment visit Japanese waters. The Dutch have been much blamed for thus attempting to prejudice Japan against the Occi- dent, but if the dictates of commercial rivalry, as' it was then practised, do not constitute an ample explanation, it should be remembered that England and Holland had recently been enemies, and that the last British vessel, 1 seen at Nagasaki had gone there hoping to capture the annual Dutch trading-ship from Batavia. Deshima's warnings, however, remained unfulfilled, though they doubtless contributed to Japan's feeling of uneasi- ness. Then, in 1847, the king of Holland himself intervened. He sent to Yedo various books, together with a map of the world and a despatch advising Japan to abandon her policy of isolation. Within a few months (1849) 0I the receipt of his Dutch majesty's recommendation, an American brig, the " Preble," under Commander J. Glynn, anchored in Nagasaki harbour and threatened to bombard the town unless immediate delivery were made of 18 seamen who, having been wrecked in northern waters, were held by the Japanese preparatory to shipment for Batavia. In 1849 another despatch reached Yedo from the king of Holland announcing that an American fleet might be expected in Japanese waters a year later, and that, unless Japan agreed to enter into friendly commercial relations, war must ensue. Appended to this despatch was an approximate draft of the treaty which would be presented for signature, together with a copy of a memorandum addressed by the Washington govern- ment to European nations, justifying the contemplated expedi- tion onthe ground that it would inure to the advantage of Japan as well as to that of the Occident.

In 1853, Commodore Perry, with a squadron of four ships-of- war and 560 men, entered Uraga Bay. So formidable a foreign force had not been seen in Japanese waters since the coming of the Mongol Armada. A panic ensued among p erry , the people — the same people who, in the days of Hideyoshi or Iyeyasu, would have gone out to encounter these ships with assured confidence of victory. The contrast did not stop there. The shogun, whose ancestors had administered the country's affairs with absolutely

autocratic authority, now sum- moned a council of the feudatories to consider the situation; and the Imperial court in Kioto, which never appealed for heaven's aid except in a national emergency such as had never been witnessed since the creation of the shogunate, now directed that at the seven principal shrines and at all the great temples special »H.M.S. " Phaeton." which entered that port in 1808.

prayers should be offered for the safety of the land and for the destruction of the aliens. Thus the appearance of the American squadron awoke in the cause of the country as a whole a spirit of patriotism hitherto confined to feudal interests. The shogun does not seem to have had any thought of invoking that spirit: his part in raising it was involuntary and his ministers behaved with perplexed vacillation. The infirmity of the Yedo Administration's purpose presented such a strong contrast to the single- minded resolution of the Imperial court that the prestige of the one was largely impaired and that of the other correspondingly enhanced. Perry, however, was without authority to support his proposals by any recourse to violence. The United States government had relied solely on the moral effect of his display of force, and his countrymen had supplied him with a large collection of the products of peaceful progress, from sewing machines to miniature railways. He did not unduly press for a treaty, but after lying at anchor off Uraga during a period of ten days and after transmitting the president's letter to the sovereign of Japan, he steamed away on the 17 th of July, announcing his return in the ensuing spring. The conduct of the Japanese subsequently to his departure showed how fully and rapidly they had acquired the conviction that the appliances of their old civilization were powerless to resist the resources of the new. Orders were issued rescinding the long-enforced veto against the construction of sea-going ships; the feudal chiefs were invited to build and arm large vessels; the Dutch were commissioned to furnish a ship of war and to procure from Europe all the best works on modern military science ; every one who had acquired any expert know- ledge through the medium of Deshima was taken into official favour; forts were built; cannon were cast and troops were drilled. But from all this effort there resulted only fresh evidence of the country's inability to defy foreign insistence, and on the 2nd of December 1853, instructions were issued that if the Americans returned, they were to be dealt with peacefully. The sight of Perry's steam-propelled ships, their powerful guns and all the specimens they carried of western wonders, had practically broken down the barriers of Japan's isolation

without any need of treaties or conventions. Perry returned in the following February, and after an interchange of courtesies and formalities extending over six weeks, obtained a treaty pledging Japan to accord kind treatment to shipwrecked sailors; to permit foreign vessels to obtain stores and provisions within her territory, and to allow American ships to anchor in the ports at Shimoda and Hakodate. On this second occasion Perry had 10 ships with crews numbering two thousand, and when he landed to sign the treaty, he was escorted by a guard of honour mustering 500 strong in 27 boats. Much has been written about his judicious display of force and his sagacious tact in dealing with the Japanese, but it may be doubted whether the consequences of his exploit have not invested its methods with extravagant lustre. Standing on the threshold of modern Japan's wonderful career, his figure shines by the reflected light of its surroundings.

Russia, Holland and England speedily secured for themselves treaties similar to that concluded by Commodore Perry in 1854. pint But Japan's doors still remained closed to foreign

Treaty ot commerce, and it was reserved for another, citizen Commerce. f tne g rea t republic to open them. This was Town- send Harris (1803-1878), the first U.S. consul-general in Japan. Arriving in August 1856, he concluded, in June of the following year, a treaty securing to American citizens the privilege of per- manent residence at Shimoda and Hakodate, the opening of Nagasaki, the right of consular jurisdiction and certain minor concessions. Still, however, permission for commercial inter- course was withheld, and Harris, convinced that this. great goal could not be reached unless he made his way to Yedo and con- ferred direct with the shogun's ministers, pressed persistently for leave to do so. Ten months elapsed before he succeeded, and such a display of reluctance on the Japanese side was very unfavourably criticized in the years immediately subsequent. Ignorance of the country's domestic politics inspired the critics. The Yedo administration, already weakened by the growth of a strong public sentiment in favour of abolishing the dual system

of government — that of the mikado in Kioto and that of the shogun in Yedo— had been still further discredited by its own timid policy as compared with the stalwart mien of the throne towards the question of foreign intercourse. Openly to sanction commercial relations at such a time would have been little short of reckless. The Perry convention and the first Harris conven- tion could be construed, and were purposely construed, as mere acts of benevolence towards strangers; but a commercial treaty would not have lent itself to any such construction, and naturally the shogun's ministers hesitated to agree to an apparently suicidal step. Harris carried his point, however. He was received by the shogun in Yedo in November 1857, and on the 29th of July 1858 a treaty was signed in Yedo, engaging

that Yokohama should be opened on the 4th of July 1859 and that commerce between the United States and Japan should thereafter be freely carried on there. This treaty was actually concluded by the shogun's Ministers in defiance of their failure tp obtain the sanction of the sovereign in Kioto. Foreign historians have found much to say about Japanese duplicity in concealing the subordinate position occupied by the Yedo administration towards the Kioto court. Such condemnation is not consistent with fuller knowledge. The Yedo authorities had power to solve all problems of foreign intercourse without reference to Kioto. Iyeyasu had not seen any occasion to seek imperial assent when he granted unrestricted liberty of trade to the representatives of the East India Company, nor had Iyemitsu asked for Kioto's sanction when he issued his decree for the expulsion of all foreigners. If, in the 19th century, Yedo shrank from a responsibility which it had unhesitatingly assumed in the 17th, the cause was to be found, not in the shogun's simulation of autonomy, but in his desire to associate the throne with a policy which, while recognizing it to be unavoidable, he distrusted his own ability to make the nation accept. But his ministers had promised Harris that the treaty should be signed, and they kept their word, at a risk of which the United States' consul-general had no conception. Throughout these negotiations Harris spared no pains to create in the minds of the Japanese an intelligent conviction that the world could no longer be kept at arm's length, and though it is extremely prob- lematical whether he would have succeeded had not the Japan- ese themselves already arrived at that very conviction, his patient and lucid expositions coupled with a winning personality undoubtedly produced much impression. He was largely assisted, too, by recent events in China, where the Peiho forts had been captured and the Chinese forced to sign a treaty at Tientsin. Harris warned the Japanese that the British fleet might be expected at any moment in Yedo Bay, and that the best way to avert irksome demands at the hands of the English was to establish a comparatively moderate precedent by yielding to America's proposals.

This treaty could not be represented, as previous conventions . had been, in the light of a purely benevolent concession. It definitely provided for the trade and residence of foreign merchants, and thus finally terminated the Treaty. Japan's traditional isolation. Moreover, it had been concluded in defiance of the Throne's refusal to sanction anything of the kind. Much excitement resulted. The nation ranged itself into three parties. One comprised the advocates of free intercourse and progressive liberality; another, while insisting that only the most limited privileges should be accorded to aliens, was of two minds as to the advisability of offering armed resistance at once or temporizing so as to gain time for prepara- tion; the third advocated uncompromising seclusion. Once again the shogun convoked a meeting of the feudal barons, hoping to secure their co-

operation. But with hardly an excep- tion they pronounced against yielding. Thus the shogunate saw itself compelled to adopt a resolutely liberal policy: it issued a decree in that sense, and thenceforth the administrative court at Yedo and the Imperial court in Kioto stood in unequivo- cal opposition to each other, the Conservatives ranging them- selves on the side of the latter, the Liberals on that of the former. It was a situation full of perplexity to outsiders, and the foreign

representatives misinterpreted it. They imagined that the shogun's ministers sought only to evade their treaty obligations and to render the situation intolerable for foreign residents, whereas in truth the situation threatened to become intolerable for the shogunate itself. Nevertheless the Yedo officials can- not be entirely acquitted of duplicity. Under pressure of the necessity of self-preservation they effected with Kioto a com- promise which assigned to foreign intercourse a temporary character. The threatened political crisis was thus averted, but the enemies of the dual system of government gained strength daily. One of their devices was to assassinate foreigners in the hope of embroiling the shogunate with Western powers and thus either forcing its hand or precipitating its downfall. It is not wonderful, perhaps, that foreigners were deceived, especially as they approached the solution of Japanese problems with all the Occidental's habitual suspicion of everything Oriental. Thus when the Yedo government, cognisant that serious dangers menaced the Yokohama settlement, took precautions to guard it, the foreign ministers convinced themselves that a deliberate piece of chicanery was being practised at their expense; that statecraft rather than truth had dictated the representations made to them by the Japanese authorities; and that the alarm of the latter was simulated for the purpose of finding a pretext to curtail the liberty enjoyed by foreigners. Therefore a sugges- tion that the inmates of the legations should show themselves as little as possible in the streets of the capital, where at any moment a desperado might cut them down, was treated almost as an insult. Then the Japanese authorities saw no recourse except to attach an armed escort to the person of every foreigner when he moved about the city. But even this precaution, which certainly was not adopted out of mere caprice or with any sinister design, excited fresh suspicions. The British representa- tive, in reporting the event to his government, said that the Japanese had taken the opportunity to graft upon the establish- ment of spies, watchmen and police-officers at the several legations, a mounted escort to accompany the members whenever they moved about.

Just at this time (1861) the Yedo statesmen, in order to reconcile the divergent views of the two courts, negotiated a marriage between the emperor's sister and the shogun. upon But in order to bring the union

about, they had to

Foreigners placate the Kioto Conservatives by a promise to expel and their f ore ig n ers from the country within ten years. When this became known, it strengthened the hands of the reactionaries, and furnished a new weapon to Yedo's enemies, who interpreted the marriage as the beginning of a plot to dethrone the mikado. Murderous attacks upon foreigners became more frequent. Two of these assaults had momentous consequences. Three British subjects attempted to force their way through the cortege of the Satsuma feudal chief on the highway between Yokohama and Yedo. One of them was killed and the other two wounded. This outrage was not in- spired by the " barbarian-expelling " sentiment: to any Japanese subject violating the rules of etiquette as these Englishmen had violated them, the same fate would have been meted out. Nevertheless, as the Satsuma daimyo refused to surrender his implicated vassals, and as the shogun's arm was not long enough to reach the most powerful feudatory in Japan, the British government sent a squadron to bombard his capital, Kagoshima. It was not a brilliant exploit in any sense, but its results were invaluable; for the operations of the British ships finally convinced the Satsuma men of their impotence in the face of Western armaments, and converted them into advocates of liberal progress. Three months previously to this bombard- ment of Kagoshima another puissant feudatory had thrown down the gauntlet. The Choshu chief, whose batteries com- manded the entrance to the inland sea at Shimonoseki, opened fire upon ships flying the flags of the United States, of France and of Holland. In thus acting he obeyed an edict obtained by the extremists from the mikado without the knowledge of the shogun, which edict fixed the nth of May 1863 as the date for practically inaugurating the foreigners-expulsion policy.

Conse- quences.

Again the shogun's administrative competence proved inade- quate to exact reparation, and a squadron, composed chiefly of British men-of-war, proceeding to Shimonoseki, demolished Choshu's forts, destroyed his ships and scattered his samurai. In the face of the Kagoshima bombardment and the Shimono- seki expedition, no Japanese subject could retain any faith in his country's ability to oppose Occidentals by force. Thus the year 1863 was memorable in Japan's history. It saw the " barbarian-expelling " agitation deprived of the emperor's sanction; it saw the two principal clans, Satsuma and Choshu, convinced of their country's impotence to defy the Occident; it saw the nation almost fully roused to the disintegrating and weakening effects of the feudal system; and it saw the tradi- tional antipathy to foreigners beginning to be exchanged for a desire to study their

civilization and to adopt its best features. The treaty concluded between the shogun's government and the United States in 1858 was of course followed by similar compacts with the principal European powers. Ratification From the outset these states agreed to co-operate of the for the assertion of their conventional privileges, Treatles – and they naturally took Great Britain for leader, though such a relation was never openly announced. The treaties, however, continued during several years to lack imperial ratification, and, as time went by, that defect obtruded itself more and more upon the attention of their foreign signatories. The year 1865 saw British interests entrusted to the charge of Sir Harry Parkes, a man of keen insight, indomitable courage and some- what peremptory methods, learned during a long period of service in China. It happened that the post of Japanese secre- tary at the British legation in Yedo was then held by a remark- ably gifted young Englishman, who, in a comparatively brief interval, had acquired a good working knowledge of the Japanese language, and it happened also that the British legation in Yedo was already — as it has always been ever since — the best equipped institution of its class in Japan. Aided by these facilities and by the researches of Mr Satow (afterwards Sir Ernest Satow) Parkes arrived at the conclusions that the Yedo government was tottering to its fall; that the resumption of administrative authority by the Kioto court would make for the interests not only of the West but also of Japan; and that the ratification of the treaties by the mikado would elucidate the situation for foreigners while being, at the same time, essential to the validity of the documents. Two other objects also presented themselves, namely, that the import duties fixed by the conventions should be reduced from 15 to 5% ad valorem, and that the ports of Hiogo and Osaka should be opened at once, instead of at the expiration of twc years as originally fixed. It was not proposed that these concessions should be entirely gratuitous. When the four-power flotilla destroyed the Shimonoseki batteries and sank the vessels lying there, a fine of three million dollars (some £750,000) had been imposed upon the daimyo of Choshu by way of ransom for, his capital, which lay at the mercy of the invaders. The daimyo of Choshu, however, was in open rebellion against the shogun, and as the latter could not collect the debt from the recalcitrant clansmen, while the four powers insisted on being paid by, some one, the Yedo treasury was finally compelled to shoulder the obligation. Two out of the three millions were still due, and Parkes conceived the idea of remitting this debt in exchange for the ratification of the treaties, the reduction of the customs tariff from is to 5% ad valorem and the immediate opening of Hiogo and Osaka. He took with him to the place of negotia- tion (Hiogo) a fleet of British, French and Dutch war-ships, for, while announcing peaceful intentions, he had accustomed himself to think that a display of force should occupy the fore- ground in all negotiations with Oriental states. This coup may be said to have sealed the fate of the shogunate. For here again

was produced in a highly aggravated form the drama which had so greatly startled the nation eight years previously. Perry had come with his war-ships to the portals of Yedo, and now a foreign fleet, twice as strong as Perry's, had anchored at the vestibule of the Imperial city itself. No rational Japanese

could suppose that this parade of force was for purely peaceful purposes, or that rejection of the amicable bargain proposed by Great Britain's representative would be followed by the quiet withdrawal of the menacing fleet, whose terrible potentialities had been demonstrated at Kagoshima and Shimonoseki. The seclusionists, whose voices had been nearly silenced, raised them in renewed denunciation of the shogun's incompetence to guarantee the sacred city of Kioto against such trespasses, and the emperor, brought once more under the influence of the anti-foreign party, inflicted a heavy disgrace on the shogun by dismissing and punishing the officials to whom the latter had entrusted the conduct of negotiations at HiQgo. Such procedure on the part of the throne amounted to withdrawing the administrative commission held by the Tokugawa family since the days of Iyeyasu. The shogun resigned. But his adversaries not being yet ready to replace him, he was induced to resume office, with, however, fatally damaged prestige. As for the three-power squadron, it steamed away successful. Parkes had come prepared to write off the indemnity in exchange for three concessions. He obtained two of the concessions without remitting a dollar of the debt.

The shogun did not long survive the humiliation thus inflicted on him. He died in the following year (1866), and Final Adoo- wa,s succee ded by Keiki, destined to be the last of tion of the Tokugawa rulers. Nine years previously this Western same Keiki had been put forward by the seclusionists Civilization.ˆ canc jidate for the shogunate. Yet no sooner did he attain that distinction in 1866 than he remodelled the army on French lines, engaged English officers to organize a navy, sent his brother to the Paris Exhibition, and altered many of the forms and ceremonies of his court so as to bring them into accord with Occidental fashions. The contrast between the politics he represented when a candidate for office in 1857 and the practice he adopted on succeeding to power in 1866 furnished an apt illustration of the change that had come over the spirit of the time. The most bigoted of the exclusionists were now beginning to abandon all idea of expelling foreigners and to think mainly of acquiring

the best elements of their civilization. The Japanese are slow to reach a decision but very quick to act upon it when reached. From 1866 onwards the new spirit rapidly permeated the whole nation; progress became the aim of all classes, and the country entered upon a career of intelli- gent assimilation which, in forty years, won for Japan a uni- versally accorded place in the ranks of the great Occidental powers.

After the abolition of the shogunate and the resumption of administrative functions by the Throne, one of the first acts Japan's °^ l ^ e new ty organized government was to invite Claim tor the foreign representatives to Kioto, where they Judicial had audience of the mikado. Subsequently a Autonomy. (j ecree was issued, announcing the emperor's resolve to establish amicable relations with foreign countries, and " declaring that any Japanese subject thereafter guilty of violent behaviour towards a foreigner would not only act in opposition to the Imperial command, but would also be guilty of impairing the dignity and good faith of the nation in the byes of the powers with which his majesty had pledged himself to maintain friendship." From that time the relations between Japan and foreign states grew yearly more amicable; the nation adopted the products of Western civilization with notable thoroughness, and the provisions of the treaties were carefully observed. Those treaties, however, presented one feature which very soon became exceedingly irksome to Japan. They exempted foreigners residing within her borders from the operation of her criminal laws, and secured to them the privilege of being arraigned solely before tribunals of their own nation- ality. That system had always been considered necessary where the subjects of Christian states visited or sojourned in non-Christian countries, and, for the purpose of giving effect to it, consular courts were established. This necessitated the confinement of foreign residents to settlements in the neighbour- hood of the consular courts, since it would have been imprudent

to allow foreigners to have free access to districts remote from the only tribunals competent to control them. The Japanese raised no objection to the embodiment of this system in the treaties. They recognized its necessity and even its expediency, for if, on the one hand, it infringed their country's sovereign rights, on the other, it prevented complications which must have ensued had they been entrusted with jurisdiction which they were not prepared to discharge satisfactorily. But the consular courts were not free from defects. A few of the powers organized competent tribunals presided over by judicial experts, but a majority of the treaty states, not having suffi- ciently large interests at stake, were content to delegate consular duties to merchants, not only deficient in legal training, but also themselves engaged in the very commercial transactions upon which they might at any moment be required to adjudicate in a magisterial capacity. In any circumstances the dual functions of consul and judge could not be

discharged without anomaly by the same official, for he was obliged to act as advocate in the preliminary stages of complications about which, in his position as judge, he might ultimately have to deliver an impartial verdict. In practice, however, the system worked with tolerable smoothness, and might have remained long in force had not the patriotism of the Japanese rebelled bitterly against the implica- tion that their country was unfit to exercise one of the funda- mental attributes of every sovereign state, judicial autonomy. From the very outset they spared no effort to qualify for the recovery of this attribute. Revision of the country's laws and re-organization of its law courts would necessarily have been an essential feature of the general reforms suggested by contact with the Occident, but the question of consular jurisdiction certainly constituted a special incentive. Expert assistance was obtained from France and Germany; the best features of European jurisprudence were adapted to the conditions and usages of Japan; the law courts were remodelled, and steps were taken to educate a competent judiciary. In criminal law the example of France was chiefly followed; in commercial law that of Germany; and in civil law that of the Occident generally, with due regard to the customs of the country. The jury system was not adopted, collegiate courts being regarded as more conducive to justice, and the order of procedure went from tribunals of first instance to appeal courts and finally to the court of cassation. Schools of law were quickly opened, and a well-equipped bar soon came into existence. Twelve years after the inception of these great works, Japan made formal application for revision of the treaties on the basis of abolishing consular jurisdiction. She had asked for revision in 1871, sending to Europe and America an important embassy to raise the question. But at that time the conditions originally calling for consular jurisdiction had not undergone any change such as would have justified its abolition, and the Japanese govern- ment, though very anxious to recover tariff autonomy as well as judicial, shrank from separating the two questions, lest by prematurely solving one the solution of the other might be unduly deferred. Thus the embassy failed, and though the problem attracted great academical interest from the first, it did not re-enter the field of practical politics until 1883. The negotiations were long protracted. Never previously had an Oriental state received at the hands of the Occident recognition such as that now demanded by Japan, and the West naturally felt deep reluctance to try a wholly novel experiment. The United States had set a generous example by concluding a new treaty (1878) on the lines desired by Japan. But its operation was conditional on a similar act of compliance by the other treaty powers. Ill-informed European publicists ridiculed the Washington statesmen's attitude on this occasion, claiming that what had been given with one hand was taken back with the other. The truth is that the conditional provision was inserted at the request of Japan herself, who appreciated her own unpre- paredness for the concession. From 1883,

however, she was ready to accept full responsibility, and she therefore asked that all foreigners within her borders should thenceforth be subject to her laws and judiciable by her law-courts, supplementing her

application by promising that its favourable reception should be followed by the complete opening of the country and the removal of all restrictions hitherto imposed on foreign trade, travel and residence in her realm. " From the first it had been the habit of Occidental peoples to upbraid Japan on account of the barriers opposed by her to full and free foreign intercourse, and she was now able to claim that these barriers were no longer maintained by her desire, but that they existed because of a system which theoretically proclaimed her unfitness for free association with Western nations, and practically made it impossible for her to throw open her territories completely for the ingress of foreigners." She had a strong case, but on the side of the European powers extreme reluctance was manifested to try the unprecedented experiment of placing their people under the jurisdiction of an Oriental country. Still greater was the reluctance of those upon whom the experiment would be tried. Foreigners residing in Japan naturally clung to consular jurisdiction as a privilege of inestimable value. They saw, indeed, that such a system could not be permanently imposed on a country where the conditions justifying it had nominally disappeared. But they saw, also, that the legal and judicial reforms effected by Japan had been crowded into an extraordinarily brief period, and that, as tyros experimenting with alien systems, the Japanese might be betrayed into many errors.

The negotiations lasted for eleven years. They were begun in 1883 and a solution was not reached until 1894. Finally European Recognition governments conceded the justice of Japan's case, by the and it was agreed that from July 1899 Japanese Powers. tribunals should assume jurisdiction over every person, of whatever nationality, within the confines of Japan, and the whole country should be thrown open to foreigners, all limitations upon trade, travel and residence being removed. Great Britain took the lead in thus releasing Japan from the fetters of the old system. The initiative came from her with special grace, for the system and all its irksome consequences had been originally imposed on Japan by a combination of powers with Great Britain in the van. As a matter of historical sequence the United States dictated the terms of the first treaty providing for consular jurisdiction. But from a very early period the Washington government

showed its willingness to remove all limitations of Japan's sovereignty, whereas Europe, headed by Great Britain, whose preponderating interests entitled her to lead, resolutely refused to make any substantial concession. In Japanese eyes, therefore, British conservatism seemed to be the one serious obstacle, and since the British residents in the settlements far outnumbered all other nationalities, and since they alone had newspaper organs to ventilate their grievances — it was certainly fortunate for the popularity of her people in the Far East that Great Britain saw her way finally to set a liberal example. Nearly five years were required to bring the other Occidental powers into line with Great Britain and America. It should be stated, however, that neither reluctance to make the necessary concessions nor want of sym- pathy with Japan caused the delay. The explanation is, first, that each set of negotiators sought to improve either the terms or the terminology of the treaties already concluded, and, secondly, that the tariff arrangements for the different countries required elaborate discussion.

Until the last of the revised treaties was ratified, voices of protest against revision continued to be vehemently raised by a Reception large section of the foreign community in the settle- given to the ments. Some were honestly apprehensive as to the Revised issue of the experiment. Others were swayed by

"" "' racial prejudice. A few had fallen into an insuper- able habit of grumbling, or found their account in advocating conservatism under pretence of championing foreign interests; and all were naturally reluctant to forfeit the immunity from taxation hitherto enjoyed. It seemed as though the inaugura- tion of the new system would find the foreign community in a mood which must greatly diminish the chances of a happy result, for where a captious and aggrieved disposition

exists, opportunities to discover causes of complaint cannot be wanting. But at the eleventh hour this unfavourable demeanour underwent a marked change. So soon as it became evident that the old system was hopelessly doomed, the sound common sense of the European and American business man asserted itself. The foreign residents let it be seen that they intended to bow cheerfully to the inevitable, and that no obstacles would be willingly placed by them in the path of Japanese juris- diction. The Japanese, on their side, took some promising steps. An Imperial rescript declared in unequivocal terms that it was the sovereign's policy and desire to abolish all distinctions between natives and foreigners, and that by fully carrying out the friendly purpose of the treaties his people would best consult his wishes, maintain the character of the nation, and promote its prestige. The premier and other ministers of state issued instructions to the effect that the responsibility now devolved on the government, and the duty on the people,

of enabling foreigners to reside confidently and contentedly in every part of the country. Even the chief Buddhist prelates addressed to the priests and parishioners in their dioceses injunctions pointing out that, freedom of conscience being now guaranteed by the constitution, men professing alien creeds must be treated as courteously as the followers of Buddhism, and must enjoy the same rights and privileges.

Thus the great change was effected in circumstances of happy augury. Its results were successful on the whole. Foreigners residing in Japan now enjoy immunity of domicile, personal and religious liberty, freedom from official interference, and security of life and property as fully as though they were living in their own countries, and they have gradually learned to look with greatly increased respect upon Japanese law and its administrators.

Next to the revision of the treaties and to the result of the great wars waged by Japan since the resumption of foreign inter- course, the most memorable incident in her modern Anglo- career was the conclusion, first, of an entente, and, Japanese secondly, of an offensive and defensive alliance AU, ance. with Great Britain in January 1902 and September 1905, respectively. The entente set out by disavowing on the part of each of the contracting parties any aggressive tendency in either China or Korea, the independence of which two countries was explicitly recognized; and went on to declare that Great Britain in China and Japan in China and Korea might take indispensable means to safeguard their interests; while, if such measures involved one of the signatories in war with a third power, the other signatory would not only remain neutral but would also endeavour to prevent other powers from joining in hostilities against its ally, and would come to the assistance of the latter in the event of its being faced by two or more powers. The entente further recognized that Japan possessed, in a peculiar degree, political, commercial and industrial interests in Korea. This agreement, equally novel for each of the contracting parties, evidently tended to the benefit of Japan more than to that of Great Britain, inasmuch as the interests in question were vital from the former power's point of view but merely local from the latter's. The inequality was corrected by an offensive and defensive alliance in 1905. For the scope of the agreement was then extended to India and eastern Asia generally, and while the signatories pledged themselves, on the one hand, to preserve the common interests of all powers in China by insuring her integrity and independence as well as the principle of equal opportunities for the commerce and industry of all nations within her borders, they agreed, on the other, to maintain their own territorial rights in eastern Asia and India, and to come to each other's armed assistance in the event of those rights being assailed by any other power or powers. These agreements have, of course, a close relation to the events which accompanied or immediately preceded them,

but they also present a vivid and radical con- trast between a country which, less than half a century previ- ously, had struggled vehemently to remain secluded from the world, and a country which now allied itself with one of the most liberal and progressive nations for the purposes of a policy

extending over the whole of eastern Asia and India. This contrast was accentuated two years later (1907) when France and Russia concluded ententes with Japan, recognizing the in- dependence and integrity of the Chinese Empire, as well as the principle of equal opportunity for all nations in that country, and engaging to support each other for assuring peace and security there. Japan thus became a world power in the most unequivocal sense.

Japan's Foreign Wars and Complications.— The earliest foreign war conducted by Japan is said to have taken place at the

beginning of the 3rd century, when the empress Jingo Korea. kd an arm y to the conquest of Korea. But as the

event is supposed to have happened more than 500 years before the first Japanese record was written, its traditional details cannot be seriously discussed. There is, however, no room to doubt that from time to time in early ages Japanese troops were seen in Korea, though they made no permanent impression on the country. It was reserved for Hideyoshi, the taiko, to make the Korean peninsula the scene of a great over-sea campaign. Hideyoshi, the Napoleon of Japan, having brought the whole empire under his sway as the sequel of many years of incomparable generalship and statecraft, conceived the project of subjugating China. By some historians his motive has been described as a desire to find employment for the immense mob of armed men whom four centuries of almost continuous fighting had called into existence in Japan: he felt that domestic peace could not be permanently restored unless these restless spirits were occupied abroad. But although that object may have reinforced his purpose, his ambition aimed at nothing less than the conquest of China, and he regarded Korea merely as a stepping-stone to that aim. Had Korea consented to be put to such a use, she need not have fought or suffered. The Koreans, however, counted China invincible. They considered that Japan would be shattered by the first contact with the great empire, and therefore although, in the 13th century, they had given the use of their

harbours to the Mongol invaders of Japan, they flatly refused in the 16th to allow their territory to be used for a Japanese invasion of China. On the 24th of May 1592 the wave of invasion rolled against Korea's southern coast. Hideyoshi had chosen Nagoya in the province of Hizen as the home-base of his operations. There the sea separating Japan from the Korean peninsula narrows to a strait divided into two channels of almost equal width by the island of Tsushima. To reach this island from the Japanese side was an easy and safe task, but in the 56-mile channel that separated Tsushima from the peninsula an invading flotilla had to run the risk of attack by Korean war- ships. At Nagoya Hideyoshi assembled an army of over 300,000 men, of whom some 70,000 constituted the first fighting line, 87,000 the second, and the remainder formed a reserve to be subsequently drawn on as occasion demanded. The question of transport presented some difficulty, but it was solved by the simple expedient of ordering every feudatory to furnish two ships for each 100,000 koku of his fief's revenue. These were not fighting vessels but mere transports. As for the plan of campaign, it was precisely in accord with modern principles of strategy, and bore witness to the daring genius of Hideyoshi. The van, consisting of three army corps and mustering in all 51,000 men, was to cross rapidly to Fusan, on the south coast of the peninsula, and immediately commence a movement northward towards the capital, Seoul, one corps moving by the eastern coast-road, one by the central route, and one by the western coast-line. Thereafter the other four corps, which formed the first fighting line, together with the corps under the direct orders of the commander-in-chief, Ukida Hideiye, were to cross, for the purpose of effectually subduing the regions through which the van had passed; and, finally, the two remaining corps of the second line were to be transported by sea up the west coast of the peninsula, to form a junction with the van which, by that time, should be preparing to pass into China over the northern boundary of Korea, namely, the Yalu River. For the landing place of these reinforcements the town of Phyong-yang was adopted, being easily accessible by the Taidon'g River from the

coast. In later ages Japanese armies were destined to move twice over these same regions, once to the invasion of China, once to the attack of Russia, and they adopted almost the same strategical plan as that mapped out by Hideyoshi in the year 1592. The forecast was that the Koreans would offer their chief resistance, first, at the capital, Seoul; next at Phyong-yang, and finally at the Yalu, as the approaches to all these places offered positions capable of being utilized to great advantage for defensive purposes.

On the 24th of May 1592 the first army corps, under the command of Konishi Yukinaga, crossed unmolested to the peninsula; next day the castle of Fusan was carried i aaalntln by storm, which same fate befell, on the 27th, Korea and another and stronger fortress lying 3 miles inland

*Advance and garrisoned by 20,000 picked soldiers. The ° tth * invaders were irresistible. From the landing-place at Fusan to the gates of Seoul the distance is 267 miles. Konishi's corps covered that interval in 19 days, storming two forts, carrying two positions and fighting one pitched battle en route. On the 12 th of June the Korean capital was in Japanese hands, and by the 16th four army corps had assembled there, while four others had effected a landing at Fusan. After a rest of 15 days the northward advance was resumed, and July 15th saw Phyong-yang in Japanese possession. The distance of 130 miles from Seoul to the Taidong had been traversed in 18 days, 10 having been occupied in forcing the passage of a river which, if held with moderate resolution and skill, should have stopped the Japanese altogether. At this point, however, the invasion suffered a check owing to a cause which in modern times has received much attention, though in Hideyoshi's days it had been little considered; the Japanese lost the command of the sea.*

The Japanese idea of sea-fighting in those times was to use open boats propelled chiefly by oars. They closed as quickly as possible with the enemy, and then fell on with the trenchant swords which they used so skilfully. JtSea^* Now during the 15th century and part of the 16th the Chinese had been so harassed by Japanese piratical raids that their inventive genius, quickened by suffering, suggested a device for coping with these formidable adversaries. Once allow the Japanese swordsman to come to close quarters and he carried all before him. To keep him at a distance, then, was the great desideratum, and the Chinese compassed this in maritime warfare by completely covering their boats with roofs of solid timber, so that those within were protected against missiles, while loop-holes and ports enabled them to pour bullets and arrows on a foe. The Koreans learned this device from the Chinese and were the first to employ it in actual warfare. Their own history alleges that they improved upon the Chinese model by nailing sheet iron over the roofs and sides of the " turtle-shell" craft and studding the whole surface with chevaux de frise, but Japanese annals indicate that in the great majority of cases solid timber alone was used. It seems strange that the Japanese should have been without any clear perception of the immense fighting superiority possessed by such protected war-vessels over small open boats. But certainly they were either ignorant or indifferent. The fleet which they provided to hold the command of Korean waters did not include one vessel of any magnitude;. it consisted simply of some hundreds of row-boats manned by 7000 men. Hideyoshi himself was perhaps not without mis- givings. Six years previously he had endeavoured to obtain two war-galleons from the Portuguese, and had he succeeded, the history of the Far East might have been radically different. Evidently, however, he committed a blunder which his country- men in modern times have conspicuously avoided; he drew the

sword without having fully investigated his adversary's resources. Just about the time when the van of the Japanese army was entering Seoul, the Korean admiral, Yi Sun-sin, at the head of a fleet of 80 vessels, attacked the Japanese squadron which lay at anchor near the entrance to Fusan harbour, set 26 of the vessels on fire and dispersed the rest. Four other engagements ensued in rapid succession. The last and most important took place shortly after the Japanese troops had seized Phyong-yang. It

resulted in the sinking of over 70 Japanese vessels, transports and fighting ships combined, which formed the main part of a flotilla carrying reinforcements by sea to the van of the invading army. This despatch of troops and supplies by water had been a leading feature of Hideyoshi's plan of campaign, and the destruction of the flotilla to which the duty was entrusted may be said to have sealed the fate of the war by isolating the army in Korea from its home base. It is true that Konishi Yukinaga, who commanded the first division, would have continued his northward march from Phyong-yang without delay. He argued that China was wholly unprepared, and that the best hope of ultimate victory lay in not giving her time to collect her forces. But the commander-in-chief, Ukida Hideiye, refused to endorse this plan. He took the view that since the Korean provinces were still offering desperate resistance, supplies could not be drawn from them, neither could the troops engaged in subju- gating them be freed for service at the front. Therefore it was essential to await the consummation of the second phase of Hideyoshi's plan, namely, the despatch of reinforcements and munitions by water to Phyong-yang. The reader has seen how that second phase fared. The Japanese commander at Phyong- yang never received any accession of strength. His force suffered constant diminution from casualties, and the question of commissariat became daily more difficult. It is further plain to any reader of history — and Japanese historians themselves admit the fact — that no wise effort was made to conciliate the Korean people. They were treated so harshly that even the humble peasant took up arms, and thus the peninsula, instead of serving as a basis of supplies, had to be garrisoned perpetually by a strong army.

The Koreans, having suffered for their loyalty to China, naturally looked to her for succour. Again and again appeals Chinese were made to Peking, and at length a force of 5000 latervea- men, which had been mobilized in the Liaotung tioa ' peninsula, crossed the Yalu and moved south to

Phyong-yang, where the Japanese van had been lying idle for over two months. This was early in October 1592. Memorable as the first encounter between Japanese and Chinese, the incident also illustrated China's supreme confidence in her own ineffable superiority. The whole of the Korean forces had been driven northward throughout the entire length of the peninsula by the Japanese armies, yet Peking considered that 5000 Chinese " braves " would suffice to roll back this tide of invasion. Three thousand of the Chinese were killed and the remainder fled pell-mell across the Yalu. China now began to be seriously alarmed. She collected an army variously estimated at from 51,000 to 200,000 men, and marching it across Manchuria in the dead of winter, hurled it against Phyong-yang during the first week of February 1593. The Japanese garrison did not exceed 20,000, nearly one-half of its original number having been de- tached to hold a line of forts which guarded the communications with Seoul. Moreover, the Chinese, though their swords were much inferior to the Japanese weapon, possessed great superiority in artillery and cavalry, as well as in the fact that their troopers wore iron mail which defied the keenest blade. Thus, after a severe fight, the Japanese had to evacuate Phyong-yang and fall back upon Seoul. But this one victory alone stands to China's credit. In all subsequent encounters of any magnitude her army suffered heavy defeats, losing on one occasion some 10,000 men, on another 4000, and on a third 39,000. But the presence of her forces and the determined resistance offered by the Koreans effec- tually saved China from invasion. Indeed, after the evacuation of Seoul, on the 9th of May 1593, Hideyoshi abandoned all idea of carrying the war into Chinese territory, and devoted his attention to obtaining honourable terms of peace, the Japanese troops meanwhile holding a line of forts along the southern coast of Korea. He died before that end had been accomplished. Had he lived a few days longer, he would have learned of a crushing defeat inflicted on the Chinese forces (at So-chhon, October 30, T598), when the Satsuma men under Shimazu Yoshihiro took 38,700 Chinese heads and sent the noses and ears to Japan, where they now lie buried under a tumulus (mimizuka,

ear-mound) near the temple of Daibutsu in Kioto. Thereafter the statesmen to whom the regent on his death-bed had entrusted the duty of terminating the struggle and recalling the troops, intimated to the enemy that the evacuation of the peninsula might be obtained if a Korean prince repaired to Japan as envoy, and if some tiger-skins and ginseng were sent to Kioto in token of amity. So ended one of the greatest over-sea campaigns recorded in history. It had lasted 65 years, had seen 200,000 Japanese troops at one time on Korean soil, and had cost some- thing like a quarter of a million lives.

From the recall of the Korea expedition in 1 598 to the resump- tion of

intercourse with the Occident in modern times, Japan enjoyed uninterrupted peace with foreign nations. Thereafter she had to engage in four wars. It is a£jj£f™' striking contrast. During the first eleven centuries Foreign of her historical existence she was involved in only Relationsia one contest abroad ; during the next half century she ' Me ?w V ^ fought four times beyond the sea and was confronted Times. by many complications. Whatever material or moral advantages her association with the West conferred on her, it did not bring peace.*

The first menacing foreign complication with which the Japanese government of the Meiji era had to deal was connected with the traffic in Chinese labour, an abuse not yet The " Maria wholly eradicated. In 1872, a Peruvian ship, the Lux " Com- " Maria Luz," put into port at Yokohama, carrying pBcatfofl- 200 contract labourers. One of the unfortunate men succeeded in reaching the shore and made a piteous appeal to the Japanese authorities, who at once seized the vessel and released her freight of slaves, for they were little better. The Japanese had not always been so particular. In the days of early foreign inter- course, before England's attitude towards slavery had established a new code of ethics, Portuguese ships had been permitted to carry away from Hirado, as they did from Macao, cargoes of men and women, doomed to a life of enforced toil if they survived the horrors of the voyage. But modern Japan followed the tenets of modern morality in such matters. Of course the Peruvian government protested, and for a time relations were strained almost to the point of rupture; but it was finally agreed that the question should be submitted to the arbitration of the tsar, who decided in Japan's favour. Japan's attitude in this affair elicited applause, not merely from the point of view of humanity, but also because of the confidence she showed in Occidental justice.

Another complication which occupied the attention of the Tokyo government from the beginning of the Meiji era was in truth a legacy from the days of feudalism. In The those days the island of Yezo, as well as Sakhalin Sakhalin on its north-west and the Kurile group on its north, Complica- could scarcely be said to be in effective Japanese ' °"" occupation. It is true that the feudal chief of Matsumae (now Fuku-yama), the remains of whose castle may still be seen on the coast at the southern extremity of the island of Yezo, exercised nominal jurisdiction; but his functions did not greatly exceed the levying of taxes on the aboriginal inhabitants of Yezo, the Kuriles and southern Sakhalin. Thus from the beginning of the 18th century Russian fishermen began to settle in the Kuriles and Russian ships menaced Sakhalin. There can be no doubt that the first explorers of Sakhalin were Japanese. As early as 1620, some vassals of the feudal chief of Matsumae visited the place and passed a winter there. It was then supposed to be a peninsula forming part of the Asiatic mainland, but in 1806 a daring Japanese traveller, by name

Mamiya Rinzo, made his way to Manchuria, voyaged up and down the Amur, and, crossing to Sakhalin, discovered that a narrow strait separated it from the mainland. There still prevails in the minds of many Occidentals a belief that the discovery of Sakhalin's insular character was reserved for Captain Nevelskoy, a Russian, who visited the place in 1849, but in Japan the fact had then been known for 43 years. Muravief, the great Russian empire-builder in East Asia, under whose orders Nevelskoy acted, quickly appreciated the necessity of acquiring Sakhalin, which commands the estuary of the Amur.

After the conclusion of the treaty of Aigun (1857) he visited Japan with a squadron, and required that the strait of La Perouse, which separates Sakhalin from Yezo, should be regarded as the frontier between Russia and Japan. This would have given the whole of Sakhalin to Russia. Japan refused, and Muravief immediately resorted to the policy he had already pursued with signal success in the Usuri region: he sent emigrants to settle in Sakhalin. Twice the shogunate attempted to frustrate this process of gradual absorption by proposing a division of the island along the 50th parallel of north latitude, and finally, in 1872, the Meiji government offered to purchase the Russian portion for 2,000,000 dollars (then equivalent to about £400,000). St Petersburg, having by that time discovered the comparative worthlessness of the island as a wealth-earning possession, showed some signs of acquiescence, and possibly an agreement might have been reached had not a leading Japanese statesman — afterwards Count Kuroda — opposed the bargain as disadvantageous to Japan. Finally St Petersburg's perseve- rance won the day. In 1875 Japan agreed to recognize Russia's title to the whole island on condition that Russia similarly recognized Japan's title to the Kuriles. It was a singular com- pact. Russia purchased a Japanese property and paid for it with a part of Japan's belongings. These details form a curious preface to the fact that Sakhalin was destined, 30 years later, to be the scene of a Japanese invasion, in the sequel of which it was divided along the 50th parallel as the shogun!s administration had originally proposed.

The first of Japan's four conflicts was an expedition to Formosa in 1874. Insignificant from a military point of Military view, this affair derives vicarious interest from its Expedition effect upon the relations between China and Japan,

Had Japan needed any confirmation of her belief that the Riukiu islands belonged to her, the incidents and settlement of TheRIBklB the Formosan complication would have constituted Compttca- conclusive evidence. Thus in 1876 she did not "°°" hesitate to extend her newly organized system of

prefectural government to Rhikiu, which thenceforth became the Okinawa prefecture, the former ruler of the islands being pensioned, according to the system followed in the case of the feudal chiefs in Japan proper. China at once entered an objection. She claimed that Riukiu had always been a tributary of her empire, and she was doubtless perfectly sincere in the contention. But China's interpretation of tribute did not

seem reducible to a working theory. So long as her own advan- tage could be promoted, she regarded as a token of vassalage the presents periodically carried to her court from neighbouring states. So soon, however, as there arose any question of dis- charging a suzerain's duties, she classed these offerings as insigni- ficant interchanges of neighbourly courtesy. It was true that Riukiu had followed the custom of despatching gift-bearing envoys to China from time to time, just as Japan herself had done, though with less regularity. But it was also true that Riukiu had been subdued by Satsuma without China stretching out a hand to help her; that for two centuries the islands had been included in the Satsuma fief, and that China, in the sequel to the Formosan affair, had made a practical acknowledgment of Japan's superior title to protect the islanders. Each empire positively asserted its claims; but whereas Japan put hers into practice, China confined herself to remonstrances. Things remained in that state until 1880, when General Grant, visiting the East, suggested the advisability of a compromise. A con- ference met in Peking, and the plenipotentiaries agreed that the islands should be divided, Japan taking the northern group, China the southern. But on the eve of signature the Chinese plenipotentiary drew back, pleading that he had no authority to conclude an agreement without previously referring it to certain other dignitaries. Japan, sensible that she had been flouted, retired from the discussion and retained the islands, China's share in them being reduced to a grievance.

From the 16th century, when the Korean peninsula was over- run by Japanese troops, its rulers made a habit of sending a present-bearing embassy to Japan to felicitate the The Korean accession of each shogun. But after the fall of CompUca- the Tokugawa shogunate, the Korean court de- " on " sisted from this custom, declared a determination to have no further relations with a country embracing Western civilization, and refused even to receive a Japanese embassy. This conduct caused deep umbrage in Japan. Several prominent politicians cast their votes for war, and undoubtedly the sword would have been drawn had not the leading statesmen felt that a struggle with Korea, involving probably a rupture with China, must fatally check the progress of the administrative reforms then (1873) in their infancy. Two years later, however, the Koreans crowned their defiance by firing on the boats of a Japanese war- vessel engaged in

the operation of coast-surveying. No choice now remained except to despatch an armed expedition against the truculent kingdom. But Japan did not want to fight. In this matter she showed herself an apt pupil of Occidental methods such as had been practised against herself in former years. She assembled an imposing force of war-ships and transports, but instead of proceeding to extremities, she employed the squadron — which was by no means so strong as it seemed — to intimidate Korea into signing a treaty of amity and commerce, and opening three ports to foreign trade (1876). That was the beginning of Korea's friendly relations with the outer world, and Japan naturally took credit for the fact that, thus early in her new career, she had become an instrument for extending the principle of universal intercourse opposed so strenuously by herself in the past.

From time immemorial China's policy towards the petty states on her frontiers had been to utilize them as buffers for softening the shock of foreign contact, while contriving, at the same time, that her relations with them should china. involve no inconvenient responsibilities for herself. The aggressive impulses of the outside' world were to be checked by an unproclaimed understanding that the territories of these states partook of the inviolability of China, while the states, on their side, must never expect their suzerain to bear the conse- quences of their acts. This arrangement, depending largely on sentiment and prestige, retained its validity in the atmosphere of Oriental seclusion, but quickly failed to endure the test of modern Occidental practicality. Tongking, Annam, Siam and Burma were withdrawn, one by one, from the fiction of depen- dence on China and independence towards all other countries. But with regard to Korea, China proved more tenacious. The

possession of the peninsula by a foreign power would have threatened the maritime route to the Chinese capital and given easy access to Manchuria, the cradle of the dynasty which ruled China. Therefore Peking statesmen endeavoured to preserve the old-time relations with the little kingdom. But they could never persuade themselves to modify the indirect methods sanctioned by tradition. Instead of boldly declaring Korea a dependency of China, they sought to keep up the romance of ultimate dependency and intermediate sovereignty. Thus in 1876 Korea was suffered to conclude with Japan a treaty of which the first article declared her " an independent state enjoying the same rights as Japan, " and subsequently to make with the United States (1882), Great Britain (1883) and other powers, treaties

in which her independence was constructively admitted. China, however, did not intend that Korea should exercise the independence thus conventionally recognized. A Chinese resident was placed in Seoul, and a system of steady though covert interference in Korea's affairs was inaugurated. The chief sufferer from these anomalous conditions was Japan. In all her dealings with Korea, in all complications that arose out of her comparatively large trade with the peninsula, in all questions connected with her numerous settlers there, she found herself negotiating with a dependency of China, and with officials who took their orders from the Chinese representative. China had long entertained a rooted apprehension of Japanese aggression in Korea — an apprehension not unwarranted by history — and that distrust tinged all the influence exerted by her agents there. On many occasions Japan was made sensible of the discrimination thus exercised against her. Little by little the consciousness roused her indignation, and although no single instance constituted a ground for strong international protest, the Japanese people gradually acquired a sense of being perpetually baffled, thwarted and humiliated by China's interference in Korean affairs. For thirty years China had treated Japan as a contemptible deserter from the Oriental standard, and had regarded her progressive efforts with openly disdainful aversion; while Japan, on her side, had chafed more and more to furnish some striking evidence of the wisdom of her preference for Western civilization. Even more serious were the conse- quences of Chinese interference from the point of view of Korean administration. The rulers of the country lost all sense of national responsibility, and gave unrestrained sway to selfish ambition. The functions of the judiciary and of the executive alike came to be discharged by bribery only. Family interests predominated over those of the state. Taxes were imposed in proportion to the greed of local officials. No thought whatever was taken for the welfare of the people or for the development of the country's resources. Personal responsibility was unknown among officials. To be a member of the Min family, to which the queen belonged, was to possess a passport to office and an indemnity against the consequences of abuse of power. From time to time the advocates of progress or the victims of oppres- sion rose in arms. They effected nothing except to recall to the world's recollection the miserable condition into which Korea had fallen. Chinese military aid was always furnished readily for the suppression of thess risings, and thus the Min family learned to base its tenure of power on ability to conciliate China and on readiness to obey Chinese dictation, while the people at large fell into the apathetic condition of men who possess neither security of property nor national ambition.

As a matter of state policy the Korean problem caused much anxiety to Japan. Her own security being deeply concerned in preserving Korea from the grasp of a Western power, she could not suffer the little kingdom to

drift into a condition of such administrative incompetence and national debility that a strong aggressor might find at any moment a pretext for interference. On two occasions (1882 and 1884) when China's armed interven- tion was employed in the interests of the Min to suppress move- ments of reform, the partisans of the victors, regarding Japan as the fountain of progressive tendencies, destroyed her legation in Seoul and compelled its inmates to fly from the city. Japan behaved with forbearance at these crises, but in the consequent

negotiations she acquired conventional titles that touched the core of China's alleged suzerainty. In 1882 her right to main- tain troops in Seoul for the protection of her legation was admitted; in 1885 she concluded with China a convention by which each power pledged itself not to send troops to Korea without notifying the other.

In the spring of 1894 a serious insurrection broke out in Korea, and the Min family appealed for China's aid. On the 6th of July 2500 Chinese troops embarked at Tientsin and The Rap- were transported to the peninsula, where they went tare with into camp at Ya-shan (Asan), on the south-west Chlaa – coast, notice of the measure being given by the Chinese govern- ment to the Japanese representative at Peking, according to treaty. During the interval immediately preceding these events, Japan had been rendered acutely sensible of China's arbitrary and unfriendly interference in Korea. Twice the efforts of the Japanese government to obtain redress for unlawful and ruinous commercial prohibitions had been thwarted by the Chinese representative in Seoul; and an ultimatum addressed from Tokyo to the Korean government had elicited from the viceroy Li in Tientsin a thinly veiled threat of Chinese armed opposition. Still more provocative of national indignation was China's procedure with regard to the murder of Kim Ok-kyun, the leader of progress in Korea, who had been for some years a refugee in Japan. Inveigled from Japan to China by a fellow-countryman sent from Seoul to assassinate him, Kim was shot in a Japanese hotel in Shanghai; and China, instead of punishing the murderer, conveyed him in a war-ship of her own to Korea to be publicly honoured. When, therefore, the Korean insurrection of 1894 induced the Min family again to solicit China's armed interven- tion, the Tokyo government concluded that, in the interests of Japan's security and of civilization in the Orient, steps must be taken to put an end to the misrule which offered incessant invi- tations to foreign aggression, and checked Korea's capacity to maintain its own independence. Japan did not claim for herself any rights or interests in the peninsula superior to those possessed there by China. But there was not the remotest probability that China, whose face had been contemptuously set against all the progressive measures adopted by Japan during the preced- ing twenty-five years, would join in forcing upon a neighbouring kingdom the very reforms she herself despised, were

her co- operation invited through ordinary diplomatic channels only. It was necessary to contrive a situation which would not only furnish clear proof of Japan's resolution, but also enable her to pursue her programme independently of Chinese endorsement, should the latter be finally unobtainable. She therefore met China's notice of a despatch of troops with a corresponding notice of her own, and the month of July 1894 found a Chinese force assembled at Asan and a Japanese force occupying positions in the neighbourhood of Seoul. China's motive for sending troops was nominally to quell the Tonghak insurrection, but really to re-affirm her own domination in the peninsula. Japan's motive was to secure such a – position as would enable her to insist upon the radically curative treatment of Korea's malady. Up to this point the two empires were strictly within their con- ventional rights. Each was entitled by treaty to send troops to Korea, provided that notice was given to the other. But China, in giving notice, described Korea as her "tributary state," thus thrusting into the forefront of the discussion a contention which Japan, from conciliatory motives, would have kept out of sight. Once formally advanced, however, the claim had to be challenged. In the treaty of amity and commerce concluded in 1876 between Japan and Korea, the two high contracting parties were explicitly declared to possess the same national status. Japan could not agree that a power which for nearly two decades she had acknowledged and treated as her equal should be openly classed as a tributary of China. She protested, but the Chinese statesmen took no notice of her protest. They continued to apply the disputed appellation to Korea, and they further asserted their assumption of sovereignty in the peninsula by seek' ing to set limits to the number of troops sent by Japan, as well as to the sphere of their employment. Japan then proposed that

the two empires should unite their efforts for the suppression of disturbances in Korea, and for the subsequent improvement of that kingdom's administration, the latter purpose to be pursued by the despatch of a joint commission of investigation. But China refused everything. Ready at all times to interfere by force of arms between the Korean people and the dominant political faction, she declined to interfere in any way for the promotion of reform. She even expressed supercilious surprise that Japan, while asserting Korea's independence, should suggest the idea of peremptorily reforming its administration. In short, for Chinese purposes the Peking statesmen openly declared Korea a tributary state; but for Japanese purposes they insisted that it must be held independent. They

believed that their island neighbour aimed at the absorption of Korea into the Japanese empire. Viewed in the light of that suspicion, China's attitude became comprehensible, but her procedure was inconsistent, illogical and unpractical. The Tokyo cabinet now declared its resolve not to withdraw the Japanese troops without " some understanding that would guarantee the future peace, order, and good government of Korea," and since China still declined to come to such an understanding, Japan undertook the work of reform single-handed.

The Chinese representative in Seoul threw his whole weight into the scale against the success of these reforms. But the de- Outbreak termining cause of rupture was in itself a belligerent ofHostili- operation. China's troops had been sent originally for ""• the purpose of quelling the Tonghak rebellion. But

the rebellion having died of inanition before the landing of the troops, their services were not required. Nevertheless China kept them in Korea, her declared reason for doing so being the presence of a Japanese military force. Throughout the subse- quent negotiations the Chinese forces lay in an entrenched camp at Asan, while the Japanese occupied Seoul. An attempt on China's part to send reinforcements could be construed only as an unequivocal declaration of resolve to oppose Japan's proceedings by force of arms. Nevertheless China not only despatched troops by sea to strengthen the camp at Asan, but also sent an army overland across Korea's northern frontier. At this stage an act of war occurred. Three Chinese men-of-war, convoying a transport with 1200 men encountered and fired on three Japanese cruisers. One of the Chinese ships was taken; another was so shattered that she had to be beached and abandoned; the third escaped in a dilapidated condition; and the transport, refusing to surrender, was sunk. This happened on the 25th of July 1894, and an open declaration of war was made by each empire six days later.

From the moment when Japan applied herself to break away from Oriental traditions, and to remove from her limbs the Remote fetters of Eastern conservatism, it was inevitable Origin that a widening gulf should gradually grow between of the herself and China. The war of 1894 was really on ' a contest between Japanese progress and Chinese stagnation. To secure Korean immunity from foreign — espe- cially Russian — aggression was of capital importance to both empires. Japan believed that such security could be attained by introducing into Korea the civilization which had con- tributed so signally to the development of her own strength and resources. China thought that she could guarantee it without any departure from old-fashioned methods, and by fhe same process of capricious protection which had failed so signally in the cases of Annam, Tongking, Burma and Siam. The issue really at stake was whether Japan should be suffered to act as

the Eastern propagandist of Western progress, or whether her efforts in that cause should be held in check by Chinese conservatism.

The war itself was a succession of triumphs for Japan. Four days after the first naval encounter she sent from Seoul a column of troops who routed the Chinese entrenched at Asan. Many of the fugitives effected their escape to Phyong-yang, a town on the Taidong River, offering excellent facilities for defence, and historically interesting as the place where a Japanese army of invasion had its first encounter

Events of the War.

with Chinese troops in 1 592. There the Chinese assembled a force of 17,000 men, and made leisurely preparations for a decisive contest. Forty days elapsed before the Japanese columns con- verged upon Phyong-yang, and that interval was utilized by the Chinese to throw up parapets, mount Krupp guns and otherwise strengthen their position. Moreover, they were armed with repeating rifles, whereas the Japanese had only single-loaders, and the ground offered little cover for an attacking force. In such circumstances, the advantages possessed by the defence ought to have been wellnigh insuperable; yet a day's fighting sufficed to carry all the positions, the assailants' casualties amounting to less than 700 and the defenders losing 6000 in killed and wounded. This brilliant victory was the prelude to an equally conspicuous success at sea. For on the 17th of September, the very day after the battle at Phyong-yang, a great naval fight took place near the mouth of the Yalu River, which forms the northern boundary of Korea. Fourteen Chinese war- ships and six torpedo-boats were returning to home ports after convoying a fleet of transports to the Yalu, when they encountered eleven Japanese men-of-war cruising in the Yellow Sea. Hitherto the Chinese had sedulously avoided a contest at sea. Their fleet included two armoured battleships of over 7000 tons displacement, whereas the biggest vessels on the Japanese side were belted cruisers of only 4000 tons. In the hands of an admiral appreciating the value of sea power, China's naval force would certainly have been led against Japan's maritime communications, for a suc- cessful blow struck there must have put an end to the Korean campaign. The Chinese, however, failed to read history. They employed their war-vessels as convoys only, and, when not using them for that purpose, hid them in port. Everything goes to show that they would have avoided the battle off the Yalu had choice been possible, though when forced to fight they fought bravely. Four of their ships were sunk, and the remainder escaped to Wei-hai-wei, the vigour of the Japanese pursuit being greatly impaired by the presence of torpedo-boats in the retreating squadron.

The Yalu victory opened the over-sea route to China. Japan could now

strike at Talien, Port Arthur, and Wei-hai-wei, naval stations on the Liaotung and Shantung peninsulas, where power- ful permanent fortifications, built after plans prepared by European experts and armed with the best modern weapons, were regarded as almost impregnable; They fell before the assaults of the Japanese troops as easily as the comparatively rude forti- fications at Phyong-yang had fallen. The only resistance of a stubborn character was made by the Chinese fleet at Wei-hai- wei; but after the whole squadron of torpedo-craft had been destroyed or captured as they attempted to escape, and after three of the largest vessels had been sunk at their moorings by Japanese torpedoes, and one by gun-fire, the remaining ships surrendered, and their brave commander, Admiral Ting, com- mitted suicide. This ended the war. It had lasted seven and a half months, during which time Japan put into the field five columns, aggregating about 120,000 of all arms. One of these columns marched northward from Seoul, won the battle of Phyong-yang, advanced to the Yalu, forced its way into Man- churia, and moved towards Mukden by Feng-hwang, fighting several minor engagements, and conducting the greater part of its operations amid deep snow in midwinter. The second column diverged westwards from the Yalu, and, marching through southern Manchuria, reached Hai-cheng, whence it advanced to the capture of Niuchwang and Ying-tse-kow. The third landed on the Liaotung peninsula, and, turning southwards, carried Talien and Port Arthur by assault. The fourth moved up the Liaotung peninsula, and, having seized Kaiping, advanced against Ying-tse-kow, where it joined hands with the second column. The fifth crossed from Port Arthur to Wei-hai-wei, and captured the latter. In all these operations the total Japanese casualties were 1005 killed and 4922 wounded — figures which sufficiently indicate the inefficiency of the Chinese" fighting. The deaths from disease totalled 16,866, and the total monetary expenditure was £20,000,000 sterling.

The Chinese government sent Li Hung-chang, viceroy of Pechili and senior grand secretary of state, and Li Ching-fong, to discuss terms of peace with Japan, the latter being of Peace?" represented by Marquis (afterwards Prince) ltd and Count Mutsu, prime minister and minister for foreign affairs, respectively. A treaty was signed at Shimonoseki on the 17th of April 1895, and subsequently ratified by the sove- reigns of the two empires. It declared the absolute independence of Korea; ceded to Japan the part of Manchuria lying south of a line drawn from the mouth of the river Anping to the mouth of the Liao, through Feng-hwang, Hai-cheng and

Ying-tse-kow, as well as the islands of Formosa and the Pescadores; pledged China to pay an indemnity of 200,000,000 taels; provided for the occupation of Wei-hai-wei by Japan pending payment of the indemnity; secured some additional commercial privileges, such as the opening of four new places to foreign trade and the right of foreigners to engage in manufacturing enterprises in China, and provided for the conclusion of a treaty of commerce and amity between the two empires, based on the lines of China's treaties with Occidental powers.

No sooner was this agreement ratified than Russia, Germany and France presented a joint note to the Tokyo government, foreign recommending that the territories ceded to Japan on later- the mainland of China should not be permanently

tereace. occupied, as such a proceeding would be detrimental to peace. The recommendation was couched in the usual terms of diplomatic courtesy, but everything indicated that its signatories were prepared to enforce their advice by an appeal to arms. Japan found herself compelled to comply. Exhausted by the Chinese campaign, which had drained her treasury, consumed her supplies of warlike material, and kept her squadrons constantly at sea for eight months, she had no residue of strength to oppose such a coalition. Her resolve was quickly taken. The day that saw the publication of the ratified treaty saw also the issue of an Imperial rescript in which the mikado, avowing his unalterable devotion to the cause of peace, and recognizing that the counsel offered by the European states was prompted by the same sentiment, " yielded to the dictates of magnanimity, and accepted the advice of the three Powers." The Japanese people were shocked by this incident. They could understand the motives influencing Russia and France, for it was evidently natural that the former should desire to exclude warlike and progressive people like the Japanese from territories contiguous to her borders, and it was also natural that France should remain true to her alliance with Russia. But Germany, wholly uninterested in the ownership of Manchuria, and by profession a warm friend of Japan, seemed to have joined in robbing the latter of the fruits of her victory simply for the sake of estab- lishing some shadowy title to Russia's goodwill. It was not known until a later period that the German emperor enter- tained profound apprehensions about the " yellow peril," an irruption of Oriental hordes into the Occident, and held it a sacred duty to prevent Japan from gaining a position which might enable her to construct an immense military machine out of the countless millions of China.

Japan's third expedition over-sea in the Meiji era had its origin in causes which belong to the history of China (q.v.). Chinese In the second half of 1900 an anti-foreign and anti- Crisis of dynastic rebellion, breaking out in Shantung, spread 1900. t0 t h e metropolitan province of Pechili, and

resulted

in a situation of extreme peril for the foreign communities of Tientsin and Peking. It was impossible for any European power, or for the United States, to organize sufficiently prompt measures of relief. Thus the eyes of the world turned to Japan, whose proximity to the scene of disturbance rendered interven- tion comparatively easy for her. But Japan hesitated. Know- ing now with what suspicion and distrust the development of her resources and the growth of her military strength were regarded by some European peoples, and aware that she had been admitted to the comity of Western nations on sufferance, she shrank, on the one hand, from seeming to grasp at an opportunity for armed display, and, on the other, from the solecism of obtru-

siveness in the society of strangers. Not until Europe and America made it quite plain that they needed and desired her aid did she send a division (21,000) men to Pechili. Her troops played a fine part in the subsequent expedition for the relief of Peking, which had to be approached in midsummer under very trying conditions. Fighting side by side with European and American soldiers, and under the eyes of competent military critics, the Japanese acquitted themselves in such a manner as to establish a high military reputation. Further, after the relief of Peking they withdrew a moiety of their forces, and that step, as well as their unequivocal co-operation with Western powers in the sub- sequent negotiations, helped to show the injustice of the suspicions with which they had been regarded.

From the time (1895) when Russia, with the co-operation of Germany and France, dictated to Japan a cardinal alteration of the Shimonoseki treaty, Japanese statesmen seem to have concluded that their country must one day nusslL. cross swords with the great northern power. Not a few European and American publicists shared that view. But the vast majority, arguing that the little Eastern empire would never invite annihilation by such an encounter, believed that sufficient forbearance to avert serious trouble would always be forthcoming on Japan's side. Yet when the geographical and historical situation was carefully considered, little hope of an ultimately peaceful settlement presented itself.

Japan along its western shore, Korea along its southern and eastern, and Russia along the eastern coast of its maritime province, are washed by the Sea of Japan. The communica- tions between the sea and the Pacific Ocean are practically two only. One is on the north-east, namely, Tsugaru Strait; the other is on the south, namely, the channel between the extremity of the Korean peninsula and the Japanese island of the nine provinces. Tsugaru Strait is entirely under Japan's control. It is between her main island and her island of Yezo, and in case of need she can close it with mines. The channel between the southern extremity of Korea and Japan has a width of 102 m. and would therefore be a fine open sea-way were it free from islands. But almost mid-way in this channel lie the twin islands of Tsushima, and the space of 56 m. that separates them from Japan is narrowed by another island, Iki. Tsushima and Iki belong to the Japanese empire. The former has some ex- ceptionally good harbours, constituting a naval base from which the channel on either side could easily be sealed. Thus the avenues from the Pacific Ocean to the Sea of Japan are con- trolled by the Japanese empire. In other words, access to the Pacific from Korea's eastern and southern coasts and access to the Pacific from Russia's maritime province depend upon Japan's goodwill. So far as Korea was concerned this ques- tion mattered little, it being her fate to depend upon the good- will of Japan in affairs of much greater importance. But with Russia the case was different. Vladivostok, which until recent times was her principal port in the Far East, lies at the southern extremity of the maritime province; that is to say, on the north-western shore of the Japan Sea. It was therefore necessary for Russia that freedom of passage by the Tsushima channel should be secured, and to secure it one of two things was essential, namely, either that she herself should possess a fortified port on the Korean side, or that Japan should be bound neither to acquire such a port nor to impose any restriction upon the navigation of the strait. To put the matter briefly, Russia must either acquire a strong foothold for herself in southern Korea, or contrive that Japan should sot acquire one. There was here a strong inducement for Russian aggression in Korea.

Russia's eastward movement through Asia has been strikingly illustrative of her strong craving for free access to southern seas and of the impediments she had experienced in gratifying that wish. An irresistible impulse had driven her oceanward. Checked again and again in her attempts to reach the Mediter- ranean, she set out on a five-thousand-miles march of conquest right across the vast Asiatic continent towards the Pacific. Eastward of Lake Baikal she found her line of least resistance along the Amur, and when, owing to the restless perseverance

of Muravief, she reached the mouth of that great river, the acquisition of Nikolayevsk for a naval basis was her immediate reward. But Nikolayevsk could not possibly satisfy her. Situated in an inhospitable region far away from all the main routes of the world's commerce, it offered itself only as a stepping- stone to further acquisitions. To push southward from this new port became an immediate object to Russia. There lay an obstacle in the way, however; the long strip of sea-coast from the mouth of the Amur to the Korean frontier — an area then called the Usuri region because the Usuri forms its western boundary — belonged to China, and she, having conceded much to Russia in the matter of the Amur, showed no disposition to make fur- ther concessions in the matter of the Usuri. In the presence of menaces, however, she agreed that the region should be regarded as common property pending a convenient opportunity for clear delimitation. That opportunity came very soon. Seizing the moment (i860) when China had been beaten to her knees by England and France, Russia secured final cession of the Usuri region, which now became the maritime province of Siberia. Then Russia shifted her naval base on the Pacific from Nikola- yevsk to Vladivostok. She gained ten degrees in a southerly direction.

From the mouth of the Amur, where Nikolayevsk is situated, to the southern shore of Korea there rests on the coast of eastern Asia an arch of islands having at its northern point Sakhalin and at its southern Tsushima, the keystone of the arch being the main island of Japan. This arch embraces the Sea of Japan and is washed on its convex side by the Pacific Ocean. Immediately after the transfer of Russia's naval base from Nikolayevsk to Vladivostok, an attempt was made to obtain possession of the southern point of the arch, namely, Tsushima. A Russian man-of-war proceeded thither and quietly began to establish a settlement, which would soon have constituted a title of ownership had not Great Britain interfered. The Russians saw that Vladivostok, acquired at the cost of so much toil, would be comparatively useless unless from the sea on whose shore it was situated an avenue to the Pacific could be opened, and they therefore tried to obtain command of the Tsushima channel. Immediately after reaching the mouth of the Amur the same instinct had led them to begin the colonization of Sakhalin. The axis of this long narrow island is inclined at a very acute angle to the Usuri region, which its northern extre- mity almost touches, while its southern is separated from Yezo by the strait of La Perouse. But in Sakhalin the Russians found Japanese subjects. In fact the island was a part of the Japanese empire. Resorting, however, to the Usuri fiction of joint occupation, they succeeded by 187 5 in transferring the whole of Sakhalin to Russia's dominion. Further encroachments upon

Japanese territory could not be lightly essayed, and the Russians held their hands. They had been trebly checked: checked in trying to push southward along the coast of the mainland; checked in trying to secure an avenue from Vladivostok to the Pacific; and checked in their search for an ice-free port, which definition Vladivostok did not fulfil. Enterprise in the direction of Korea seemed to be the only hope of saving the maritime results of the great Trans-Asian march.

Was Korea within safe range of such enterprises ? Everything seemed to answer in the affirmative. Korea had all the quali- fications desired by an aggressor. Her people were unprogres- sive, her resources undeveloped, her self-defensive capacities insignificant, her government corrupt. But she was a tributary of China, and China had begun to show some tenacity in pro- tecting the integrity of her buffer states. Besides, Japan was understood to have pretensions with regard to Korea. On the whole, therefore, the problem of carrying to full fruition the work of Muravief and his lieutenants demanded strength greater than Russia could exercise without some line of communications supplementing the Amur waterway and the long ocean route. Therefore she set about the construction of a railway across Asia.

The Amur being the boundary of Russia's east Asian terri- tory, this railway had to be carried along its northern bank where

many engineering and economic obstacles presented themselves. Besides, the river, from an early stage in its course, makes a huge semicircular sweep northward, and a railway following its bank to Vladivostok must make the same d6tour. If, on the con- trary, the. road could be carried over the diameter of the semi- circle, it would be a straight and therefore shorter line, technically easier and economically better. The diameter, however, passed through Chinese territory, and an excuse for extorting China's permission was not in sight. Russia ' therefore proceeded to build each end of the road, deferring the construction of the Amur section for the moment. She had not waited long when, in 1894, war broke out between China and Japan, and the latter, completely victorious, demanded as the price of peace the southern littoral of Manchuria from the Korean boundary to the Liaotung peninsula at the entrance to the Gulf of Pechili. This was a crisis in Russia's career. She saw that her maritime extension could never get nearer to the Pacific than Vladivostok were this claim of Japan's established. For the proposed arrangement would place the littoral of Manchuria in Japan's direct occupation and the littoral of Korea in her constructive control, since not only had she fought to rescue Korea from Chinese suzerainty, but also her object in demanding a slice of the Manchurian coast-line was to protect Korea against aggres- sion from the north; that is to say, against aggression from Russia. Muravief 's enterprise

had carried his country first to the mouth of the Amur and thence southward along the coast to Vladivostok and to Possiet Bay at the north-eastern extremity of Korea. But it had not given to Russia free access to the Pacific, and now she was menaced with a perpetual barrier to that access, since the whole remaining coast of east Asia as far as the Gulf of Pechili was about to pass into Japan's possession or under her domination.

Then Russia took an extraordinary step. She persuaded Germany and France to force Japan out of Manchuria. It is not to be supposed that she frankly exposed her own aggressive designs and asked for assistance to prosecute them. Neither is it to be supposed that France and Germany were so curiously deficient in perspicacity as to overlook those designs. At all events these three great powers served on Japan a notice to quit, and Japan, exhausted by her struggle with China, had no choice but to obey.

The notice was accompanied by an exposi of reasons. Its signatories said that Japan's tenure of the Manchurian littoral would menace the security of the Chinese capital, would render the independence of Korea illusory, and would constitute an obstacle to the peace of the Orient..

By way of saving the situation in some slight degree Japan sought from China a guarantee that no portion of Manchuria should thereafter be leased or ceded to a foreign state. But France warned Japan that to press such a demand would offend Russia, and Russia declared that, for her part, she had no inten- tion of trespassing in Manchuria. Japan, had she been in a position to insist on the guarantee, would also have been in a position to disobey the mandate of the three powers. Unable to do either the one or the other, she quietly stepped out of Manchuria, and proceeded to double her army and treble her navy.

As a reward for the assistance nominally rendered to China in this matter, Russia obtained permission in Peking to divert her Trans-Asian railway from the huge bend of the Amur to the straight line through Manchuria. Neither Germany nor France received any immediate recompense. Three years later, by way of indemnity for the murder of two missionaries by a mob, Germany seized a portion of the province of Shantung. Imme- diately, on the principle that two wrongs make a right, Russia obtained a lease of the Liaotung peninsula, from which she had driven Japan in 1895. This act she followed by extorting from China permission to construct a branch of the Trans-Asian railway through Manchuria from north to south.

Russia's maritime aspirations had now assumed a radically altered phase. Instead of pushing southward from Vladivostok and Possiet Bay along the coast of Korea, she had suddenly

leaped the Korean peninsula and found access to the Pacific in Liaotung. Nothing was wanting to establish her as practical mistress of Manchuria except a plausible excuse for garrisoning the place. Such an excuse was furnished by the Boxer rising in 1000. Its conclusion saw her in military occupation of the whole region, and she might easily have made her occupation permanent by prolonging it until peace and order should have been fully restored. But here she fell into an error of judgment. Imagining that the Chinese could be persuaded or intimidated to any concession, she proposed a convention virtually recognizing her title to Manchuria.

Japan watched all these things with profound anxiety. If there were any reality in the dangers which Russia, Germany and France had declared to be incidental to Japanese occupation of a part of Manchuria, the same dangers must be doubly inci- dental to Russian occupation of the whole of Manchuria — the security of the Chinese capital would be threatened, and an obstacle would be created to the permanent peace of the East. The independence of Korea was an object of supreme solicitude to Japan. Historically she held towards the little state a relation closely resembling that of suzerain, and though of her ancient conquests nothing remained except a settlement at Fusan on the southern coast, her national sentiment would have been deeply wounded by any foreign aggression in the peninsula. It was to establish Korean independence that she waged war with China in 1894; and her annexation of the Man- churian littoral adjacent to the Korean frontier, after the war, was designed to secure that independence, not to menace it as the triple alliance professed to think. But if Russia came into possession of all Manchuria, her subsequent absorption of Korea would be almost inevitable. For the consideration set forth above as to Vladivostok's maritime avenues would then acquire absolute cogency. Manchuria is larger than France and the United Kingdom lumped together. The addition of such an immense area to Russia's east Asiatic dominions, together with its littoral on the Gulf of Pechili and the Yellow Sea, would neces- sitate a corresponding expansion of her naval forces in the Far East. With the one exception of Port Arthur, however, the Manchurian coast does not offer any convenient naval base. It is only in the splendid harbours of southern Korea that such bases can be found. Moreover, there would be an even stronger motive impelling Russia towards Korea. Neither the Usuri region nor the Manchurian littoral possesses so much as one port qualified to satisfy her perennial longing for free access to the ocean in a temperate zone. Without Korea, then, Russia's east Asian expansion,

though it added huge blocks of territory to her dominions, would have been commercially incomplete and strategically defective.

If it be asked why, apart from history and national sentiment, Japan should object to a Russian Korea, the answer is, first, because there would thus be planted almost within cannon- shot of her shores a power of enormous strength and insatiable ambition; secondly, because, whatever voice in Manchuria's destiny Russia derived from her railway, the same voice in Korea's destiny was possessed by Japan as the sole owner of railways in the peninsula; thirdly, that whereas Russia had an altogether insignificant share in the foreign commerce of Korea and scarcely ten bona-fide settlers, Japan did the greater part of the over-sear trade and had tens of thousands of settlers; fourthly, that if Russia's dominions stretched uninterruptedly from the Sea of Okhotsk to the Gulf of Pechili, her ultimate absorption of north China would be as certain as sunrise; and fifthly, that such domination and such absorption would involve the practical closure of all that immense region to Japanese commerce and industry as well as to the commerce and industry of every Western nation except Russia. This last proposition did not rest solely on the fact that to oppose artificial barriers to free competition is Russia's sole hope of utilizing to her own benefit any commercial opportunities brought within her reach. It rested also on the fact that Russia had objected to foreign settlements at the marts recently opened by treaty with China to American and Japanese subjects. Without settlements,

trade at those marts would be impossible, and thus Russia had constructively announced that there should be no trade but Russian, if she could prevent it.

Against such dangers Japan would have been justified in adopting any measure of self-protection. She had foreseen them for six years, and had been strengthening herself to avert them. But she wanted peace. She wanted to develop her material resources and to accumulate some measure of wealth, without which she must remain insignificant among the nations. Two pacific devices offered, and she adopted them both. Russia, instead of trusting time to consolidate her tenure of Manchuria, had made the mistake of pragmatically importuning China for a conventional title. If then Peking could be strengthened to resist this demand, some arrangement of a distinctly terminable nature might be made. The United States, Great Britain and Japan, joining hands for that purpose, did succeed in so far stiffening China's backbone that her show of resolution finally induced Russia to sign a treaty pledging herself to withdraw her troops from Manchuria in three instalments, each step of evacuation to be accomplished by a fixed date. That was one of the pacific devices. The other suggested itself in connexion with the new commercial treaties which China had

promised to negotiate in the sequel of the Boxer troubles. In these documents clauses provided for the opening of three places in Man- churia to foreign trade. It seemed a reasonable hope that, having secured commercial access to Manchuria by covenant with its sovereign, China, the powers would not allow Russia arbitrarily to restrict their privileges. It seemed also a reason- able hope that Russia, having solemnly promised to evacuate Manchuria at fixed dates, would fulfil her engagement.

The latter hope was signally disappointed. When the time came for evacuation, Russia behaved as though no promise had ever been given. She proposed wholly new conditions, which would have strengthened her grasp of Manchuria instead of loosening it. China being powerless to offer any practical protest, and Japan's interests ranking next in order of importance, the TSkyo government approached Russia direct. They did not ask for anything that could hurt her pride or injure her position. Appreciating fully the economical status she had acquired in Manchuria by large outlays of capital, they offered to recognize that status, provided that Russia would extend similar recognition to Japan's status in Korea, would promise, in common with Japan, to respect the sovereignty and the territorial integrity of China and Korea, and would be a party to a mutual engagement that all nations should have equal industrial and commercial opportunities in Manchuria and the Korean peninsula. In a word, they invited Russia to subscribe the policy enunciated by the United States and Great Britain, the policy of the open door and of the integrity of the Chinese and Korean empires.

Thus commenced a negotiation which lasted five and a half months. Japan gradually reduced her demands to a minimum. Russia never made the smallest appreciable concession. She refused to listen to Japan for one moment about Manchuria. Eight years previously Japan had been in military possession of Manchuria, and Russia with the assistance of Germany and France had expelled her for reasons which concerned Japan incomparably more than they concerned any of the three powers — the security of the Chinese capital, the independence of Korea, the peace of the East. Now, Russia had the splendid assurance to declare by implication that none of these things concerned Japan at all. The utmost she would admit was Japan's partial right to be heard about Korea. And at the same time she herself commenced in northern Korea a series of aggres- sions, partly perhaps to show her potentialities, partly by way of counter-irritant. That was not all. Whilst she studiously deferred her answers to Japan's proposals and protracted the negotiations to an extent which was actually contumelious, she hastened to send eastward a big fleet of war-ships and a new army of soldiers. It was impossible for the dullest politician to mistake her purpose. She intended to yield nothing, but to prepare such a parade of force that her obduracy would

command submission. The only alternatives for Japan were war or total and permanent effacement in Asia. She chose war, and in fighting it she fought the battle of free and equal oppor- tunities for all without undue encroachment upon the sovereign rights or territorial integrity of China or Korea, against a military dictatorship, a programme of ruthless territorial aggrandize- ment and a policy of selfish restrictions.

The details of the great struggle that ensued are given else- where (see Russo-Japanese War). After the battle of Mukden the belligerents found themselves in a position which p he f must either prelude another stupendous effort on the War. both sides or be utilized for the purpose of peace negotiations. At this point the president of the United States of America intervened in the interests of humanity, and on the 9th of June 1905 instructed the United States' representative in Tokyo to urge that the Japanese government should open direct negotiations with Russia, an exactly corresponding note being simultaneously sent to the Russian government through the United States' representative in St Petersburg. Japan's reply was made on the 10th of June. It intimated frank acquiescence, and Russia lost no time in taking a similar step. Nevertheless two months elapsed before the plenipotentiaries of the belligerents met, on the 10th of August, at Portsmouth, New Hampshire, U.S.A. Russia sent M. (afterwards Count) de Witte and Baron Rosen; Japan, Baron (afterwards Count) Komura, who had held the portfolio of foreign affairs throughout the war, and Mr. (afterwards Baron) Takahira. In entering this conference, Japanese statesmen, as was subsequently known, saw clearly that a great part of the credit accruing to them for their successful conduct of the war would be forfeited in the sequel of the negotiations. For the people of Japan had accustomed themselves to expect that Russia would assuredly recoup the expenses incurred by their country in the contest, whereas the cabinet in Tokyo understood well that to look for payment of indemnity by a great state whose territory had not been invaded effectively nor its existence menaced must be futile. Nevertheless, diplomacy required that this conviction should be concealed, and thus Russia carried to the conference a belief that the financial phase of the discussion would be crucial, while, at the same time, the Japanese nation reckoned fully on an indemnity of 150 millions sterling. Baron Komura's mandate was, however, that the only radically essential terms were those formulated by Japan prior to the war. She must insist on securing the ends for which she had fought, since she believed them to be indispensable to the peace of the Far East, but she

would not demand anything more. The Japanese plenipotentiary, therefore, judged it wise to marshal his terms in the order of their importance, leaving his Russian colleague to imagine, as he probably would, that the converse method had been adopted, and that everything preliminary to the questions of finance and territory was of minor conse- quence. The negotiations, commencing on the 10th of August, were not concluded until the 5th of September, when a treaty of peace was signed. There had been a moment when the onlooking world believed that unless Russia agreed to ransom the island of Sakhalin by paying to Japan a sum of 120 millions sterling, the conference would be broken off; nor did such an exchange seem unreasonable, for were Russia expelled from the northern part of Sakhalin, which commands the estuary of the Amur River, her position in Siberia would have been compromised. But the statesmen who directed Japan's affairs were not dis- posed to make any display of earth-hunger. The southern half of Sakhalin had originally belonged to Japan and had passed into Russia's possession by an arrangement which the Japanese nation strongly resented. To recover that portion of the island seemed, therefore, a legitimate ambition. Japan did not contemplate any larger demand, nor did she seriously insist on an indemnity. Therefore the negotiations were never in real danger of failure. The treaty of Portsmouth recog- nized Japan's " paramount political, military and economic interests " in Korea; provided for the simultaneous evacuation

of Manchuria by the contracting parties; transferred to Japan the lease of the Liaotung peninsula held by Russia from China together with the Russian railways south of Kwang-Cheng-tsze and all collateral mining or other privileges; ceded to Japan the southern half of Sakhalin, the 50th parallel of latitude to be the boundary between the two parts; secured fishing rights for Japanese subjects along the coasts of the seas of Japan, Okhotsk and Bering; laid down that the expenses incurred by the Japanese for the maintenance of the Russian prisoners during the war should be reimbursed by Russia, less the outlays made by the latter on account of Japanese prisoners — by which arrangement Japan obtained a payment of some 4 millions sterling — and provided that the contracting parties, while withdrawing their military forces from Manchuria, might maintain guards to protect their respective railways, the number of such guards not to exceed 15 per kilometre of line. There were other important restrictions: first, the con- tracting parties were to abstain from taking, on the Russo-Korean frontier, any military measures which might menace the security of Russian or Korean territory; secondly, the two powers pledged themselves not to exploit the Manchurian railways for strategic purposes; and thirdly, they promised not to build on Sakhalin or its adjacent islands any fortifications or other similar military works, or to take any military measures which might impede the free navigation of the straits of La

Perouse and the Gulf of Tartary. The above provisions con- cerned the two contracting parties only. But China's interests also were considered. Thus it was agreed to " restore entirely and completely to her exclusive administration " all portions of Manchuria then in the occupation, or under the control, of Japanese or Russian troops, except the leased territory; that her consent must be obtained for the transfer to Japan of the leases and concessions held by the Russians in Manchuria; that the Russian government would disavow the possession of " any territorial advantages or preferential or exclusive concessions in impairment of Chinese sovereignty or inconsistent with the principle of equal opportunity in Manchuria "; and that Japan and Russia " engaged reciprocally not to obstruct any general measures common to all countries which China might take for the development of the commerce and industry of Man- churia." This distinction between the special interests of the contracting parties and the interests of China herself as well as of foreign nations generally is essential to clear understanding of a situation which subsequently attracted much attention. From the time of the opium war (1857) to the Boxer rising (1900) each of the great Western powers struggled for its own hand in China, and each sought to gain for itself exclusive concessions and privileges with comparatively little regard for the interests of others, and with no regard whatever for China's sovereign rights. The fruits of this period were: permanently ceded terri- tories (Hong-Kong and Macao) ; leases temporarily establishing foreign sovereignty in various districts (Kiaochow, Wei-hai-wei and Kwang-chow); railway and mining concessions; and the establishment of settlements at open ports where foreign jurisdiction was supreme. But when, in 1900, the Boxer rising forced all the powers into a common camp, they awoke to full appreciation of a principle which had been growing current for the past two or three years, namely, that concerted action on the lines of maintaining China's integrity and securing to all aHke equality of opportunity and a similarly open door, was the only feasible method of preventing the partition of the Chinese Empire and averting a clash of rival interests which might have disastrous results. This, of course, did not mean that there was to be any abandonment of special privileges already acquired or any surrender of existing concessions. The arrangement was not to be retrospective in any sense. Vested interests were to be strictly guarded until the lapse of the periods for which they had been granted, or until the maturity of China's competence to be really autonomous. A curious situation was thus created. International professions of respect for China's sovereignty, for the integrity of her empire and for the enforcement of the open door and equal opportunity,

FOREIGN WARS]

JAPAN

coexisted with legacies from an entirely different past. Russia endorsed this new policy, but not unnaturally declined to abate any of the advantages previously enjoyed by her in Manchuria, Those advantages were very substantial. They included a twenty-five years' lease — with provision for renewal — of the Liaotung peninsula, within which area of 1220 sq. m. Chinese troops might not penetrate, whereas Russia would not only exercise full administrative authority, but also take military and naval action of any kind; they included the creation of a neutral territory in the immediate north of the former and still more extensive, which should remain under Chinese administration, but where neither Chinese nor Russian troops might enter, nor might China, without Russia's consent, cede land, open trading marts or grant concessions to any third nationality; and they included the right to build some 1600 m. of railway (which China would have the oppor- tunity of purchasing at cost price in the year 1938 and would be entitled to receive gratis in 1982), as well as the right to hold extensive zones on either side of the railway, to administer these zones in the fullest sense, and to work all mines lying along the lines. Under the Portsmouth treaty these advantages were transferred to Japan by Russia, the railway, however, being divided so that only the portion (5215 m.) to the south of Kwang-Cheng-tsze fell to Japan's share, while the portion (1077 m.) to the north of that place remained in Russia's hands. China's consent to the above transfers and assignments was obtained in a treaty signed at Peking on the 22nd of December 1905. Thus Japan came to hold in Manchuria a position somewhat contradictory. On the one hand, she figured as the champion of the Chinese Empire's integrity and as an exponent of the new principle of equal opportunity and the open door. On the other, she appeared as the legatee of many privileges more or less inconsistent with that principle. But, at the same time, nearly all the great powers of Europe were similarly circumstanced. In their cases also the same in- congruity was observable between the newly professed policy and the aftermath of the old practice. It was scarcely to be expected that Japan alone should make a large sacrifice on the altar of a theory to which no other state thought of yielding any retrospective obedience whatever. She did, indeed, furnish a clear proof of deference to the open-door doctrine, for instead of reserving the railway zones to her own exclusive use, as she was fully entitled to do, she sought and obtained from China a pledge to open to foreign trade 16 places within those zones. For the rest, however, the inconsistency between the past and the present, though existing throughout the whole of China, was nowhere so conspicuous as in the three eastern provinces (Manchuria); not because there was any real difference of degree, but because Manchuria had been the scene of the greatest war of modern times; because that war had been fought by Japan in the cause of

the new policy, and because the principles of the equally open door and of China's integrity had been the main bases of the Portsmouth treaty, of the Anglo- Japanese alliance, and of the subsequently concluded ententes with France and Russia. In short, the world's eyes were fixed on Manchuria and diverted from China proper, so that every act of Japan was subjected to an exceptionally rigorous scrutiny, and the nations behaved as though they expected her to live up to a standard of almost ideal altitude. China's mood, too, greatly complicated the situation. She had the choice between two moderate and natural courses: either to wait quietly until the various concessions granted by her to foreign powers in the evil past should lapse by maturity, or to qualify herself by earnest reforms and industrious development for their earlier recovery. Nominally she adopted the latter course, but in reality she fell into a mood of much impatience. Under the name of a " rights-recovery campaign " her people began to protest vehemently against the continuance of any conditions which impaired her sovereignty, and as this temper coloured her attitude towards the various questions which inevitably grew out of the situation in Manchuria, her relations with Japan became somewhat strained in the early part of 1909.

*Having waged two wars on account of Korea, Japan emerged from the second conflict with the conviction that the policy of maintaining the independence of Korea must be JaDan lB modified, and that since the identity of Korean and Korea after Japanese, interests in the Far East and the paramount **e War character of Japanese interests in Korea would not n ft *. permit Japan to leave Korea to the care of any third power, she must assume the charge herself. Europe and America also recognized that view of the situation, and consented to withdraw their legations from Seoul, thus leaving the control of Korean foreign affairs entirely in the hands of Japan, who further undertook to assume military direction in the event of aggression from without or disturbance from within. But in the matter of internal administration she continued to limit herself to advisory supervision. Thus, though a Japanese resident-general in Seoul, with subordinate residents throughout the provinces, assumed the functions hitherto discharged by foreign representatives and consuls, the Korean government was merely asked to employ Japanese experts in the position of counsellors, the right to accept or reject their counsels being left to their employers. Once again, however, the futility of looking for any real reforms under this optional system was demon- strated. Japan sent her most renowned statesman, Prince Ito, to discharge the duties of resident-general; but even he, in spite of profound patience and tact, found that some less optional methods must be resorted to. Hence on the 24th of July 1907 a new agreement was signed, by which the resident-general acquired initiative as well as consultative competence to enact and enforce laws and ordinances, to appoint and remove Korean officials, and to place capable*

Japanese subjects in the ranks of the administration. That this constituted a heavy blow to Korea's independence could not be gainsaid. That it was inevitable seemed to be equally obvious. For there existed in Korea nearly all the worst abuses of medieval systems. The administration of justice depended solely on favour or interest. The police contributed by corruption and incompetence to the insecurity of life and property. The troops were a body of use- less mercenaries. Offices being allotted by sale, thousands of incapables thronged the ranks of the executive. The emperor's court was crowded by diviners and plotters of all kinds, male and female. The finances of the throne and those of the state were hopelessly confused. There was nothing like an organized judiciary. A witness was in many cases considered particeps criminis; torture was commonly employed to obtain evidence, and defendants in civil cases were placed under arrest. Imprisonment meant death or permanent disablement for a man of small means. Flogging so severe as to cripple, if not to kill, was a common punishment; every major offence from robbery upward was capital, and female criminals were frequently exe- cuted by administering shockingly painful poisons. The currency was in a state of the utmost confusion. Extreme corruption and extortion were practised in connexion with taxation. Finally, while nothing showed that the average Korean lacked the elementary virtue of patriotism, there had been repeated proofs that the safety and independence of the empire counted for little in the estimates of political intriguers. Japan must either step out of Korea altogether or effect drastic reforms there. She necessarily chose the latter alternative, and the things which she accomplished between the beginning of 1906 and the close of 1908 may be briefly described as the elaboration of a proper system of taxation; the organization of a staff to administer annual budgets; the reassessment of taxable pro- perty; the floating of public loans for productive enterprises; the reform of the currency; the establishment of banks of various kinds, including agricultural and commercial; the creation of associations for putting bank-notes into circulation; the introduction of a warehousing system to supply capital to farmers; the lighting and buoying of the coasts; the provision of posts, telegraphs, roads and railways ; the erection of public buildings; the starting of various industrial enterprises (such as printing, brick-making, forestry and coal-mining); the laying out of model farms; the beginning of cotton cultivation; the

building and equipping of an industrial training school; the inauguration of sanitary works; the opening of hospitals and medical schools; the

organization of an excellent educational system; the construction of waterworks in several towns; the complete remodelling of the central government; the differentia- tion of the court and the executive, as well as of the administra- tion and the judiciary; the formation of an efficient body of police; the organization of law courts with a majority of Japan- ese jurists on the bench; the enactment of a new penal code; drastic reforms in the taxation system. In the summer of 1907 the resident-general advised the Throne to disband the standing army as an unserviceable and expensive force. The measure was doubtless desirable, but the docility of the troops had been over- rated. Some of them resisted vehemently, and many became the nucleus of an insurrection which lasted in a desultory manner for nearly two years; cost the lives of 21,000 insurgents and 1300 Japanese; and entailed upon Japan an outlay of nearly a million sterling. Altogether Japan was 1 5 millions sterling out of pocket on Korea's account by the end of 1909. She had also lost the veteran statesman Prince Ito, who was assassinated at Harbin by a Korean fanatic on the 26th of October 1909. Finally an end was put to an anomalous situation by the an- nexation of Korea to Japan on the 29th of August 1910. (See further Korea.)

IX. — Domestic History

•Cosmography. — Japanese annals represent the first inhabitant of earth as a direct descendant of the gods. Two books describe the events of the " Divine age." One, compiled in 712, is called the Kojiki (Records of Ancient Matters); the other, compiled in 720, is called the Nihongi (Chronicles of Japan). Both describe the processes of creation, but the author of the Chronicles drew largely upon Chinese traditions, whereas the compilers of the Records appear to have limited themselves to materials which they believed to be native. The Records, therefore, have always been regarded as the more trustworthy guide to pure Japanese conceptions. They deal with the creation of Japan only, other countries having been apparently judged unworthy of attention. At the beginning of all things a primordial trinity is represented as existing on the " plain of high heaven." There- after, during an indefinite time and by an indefinite process, other deities come into existence, their titles indicating a vague connexion with constructive and fertilizing forces. They are not immortal: it is explicitly stated that they ultimately pass away, and the idea of the cosmographers seems to be that each deity marks a gradual approach to human methods of pro- creation. Meanwhile the earth is "young and, like floating oil, drifts about after the manner of a jelly-fish." At last there are born two deities, the creator and the creatress, and these receive the mandate of all the heavenly beings to " make, consolidate and give birth to the drifting land." For use in that work a jewelled spear is given to them, and, standing upon the bridge that connects heaven and earth, they thrust down- wards with the weapon, stir the brine below and draw up the spear, whert from its point fall drops

which, accumulating, form the first dry land. Upon this land the two deities descend, and, by ordinary processes, beget the islands of Japan as well as numerous gods representing the forces of nature. But in giving birth to the god of fire the creatress(Izanami) perishes, and the creator (Izanagi) makes his way to the under-world in search of her — an obvious parallel to the tales of Ishtar and Orpheus. With difficulty he returns to earth, and, as he washes himself from the pollution of Hades, there are born from the turbid water a number of evil deities succeeded by a number of good, just as in the Babylonian cosmogony the primordial ocean, Tiamat, brings forth simultaneously gods and imps. Finally, as Izanagi washes his left eye the Goddess of the Sun comes into existence; as he washes his right, the God of the Moon; and as he washes his nose, the God of Force. To these three he assigns, respec- tively, the dominion of the sun, the dominion of the moon, and the dominion of the ocean. But the god of force (Sosanoo), like Lucifer, rebels against this decree, creates a commotion in

heaven, and after having been the cause of the temporary seclusion of the sun goddess and the consequent wrapping of the world in darkness, kills the goddess of food and is permanently banished from heaven by the host of deities. He descends to Izumo on the west of the main island of Japan, and there saves a maiden from an eight-headed serpent. Sosanoo himself passes to the under-world and becomes the deity of Hades, but he invests one of his descendants with the sovereignty of Japan, and the title is established after many curious adventures. To the sun goddess also, whose feud with her fierce brother sur- vives the latter's banishment from heaven, the idea of making her grandson ruler of Japan presents itself. She despatches three embassies to impose her will upon the descendants of Sosanoo, and finally her grandson descends, not, however, in Izumo, where the demi-gods of Sosanoo's race hold sway, but in Hiuga in the southern island of Kiushhl. This grandson of Amaterasu (the goddess of the sun) is called Ninigi, whose great-grandson figures in Japanese history as the first human sovereign of the country, known during life as Kamu-Yamato-Iware-Biko, and given the name of Jimmu tenno (Jimmu, son of heaven) fourteen centuries after his death. Japanese annalists attribute the accession of Jimmu to the year 660 B.C. Why that date was chosen must remain a matter of conjecture. The Records of Ancient Matters has no chronology, but the more pretentious writers of the Chronicles of Japan, doubtless in imitation of their Chinese models, considered it necessary to assign a year, a month, and even a day for each event of importance. There is abundant reason, however, to question the accuracy of all Japanese chronology prior to the 5th century. The first date corroborated by external evidence is 461, and Aston, who has made a special study of the subject, concludes that the year 500 may be taken as the time when the chronology of the Chronicles begins to be trustworthy. Many Japanese,

however, are firm believers in the Chronicles, and when assigning the year of the empire they invariably take 660 B.C. for starting- point, so that 1909 of the Gregorian calendar becomes for them 2569.

Prehistoric Period. — Thus, if the most rigid estimate be accepted, the space of 1160 years, from 660 B.C. to a.d. 500, may be called the prehistoric period. During that long interval the annals include 24 sovereigns, the first 17 of whom lived for over a hundred years on the average. It seems reasonable to conclude that the so-called assignment of the sovereignty of Japan to Sosanoo's descendants and the establishment of their kingdom in Izumo represent an invasion of Mongolian immigrants coming from the direction of the Korean peninsula — indeed one of the Nihongi's versions of the event actually indicates Korea as the point of departure — and that the subse- quent descent of Ninigi on Mount Takachiho in Hiuga indicates the advent of a body of Malayan settlers from the south sea. Jimmu, according to the Chronicles, set out from Hiuga in 667 B.C. and was not crowned at his new palace in Yamato until 660. This campaign of seven years is described in some detail, but no satisfactory information is given as to the nature of the craft in which the invader and his troops voyaged, or as to the number of men under his command. The weapons said to have been carried were bows, spears and swords. A super- natural element is imported into the narrative in the form of the three-legged crow of the sun, which Amaterasu sends down to act as guide and messenger for her descendants. Jimmu died at his palace of Kashiwa-bara in 585 B.C., his age being 127 according to the Chronicles, and 137 according to the Records. He was buried in a kind of tomb called misasagi, which seems to have been in use in Japan for some centuries before the Christian era — " a highly specialized form of tumulus, consisting of two mounds, one having a circular, the other a triangular base, which merged into each other, the whole being surrounded by a moat, or sometimes by two concentric moats with a narrow strip of land between. In some, perhaps in most, cases the misasagi contains a large vault of great unhewn stones without mortar. The walls of this vault converge gradually towards the top, which is roofed in by enormous slabs of stone weighing

many tons each. The entrance is by means of a gallery roofed with similar stones." Several of these ancient sepulchral mounds have been examined during recent years, and their contents have furnished information of much antiquarian interest, though there is a complete absence of inscriptions. The

reigns of the eight sovereigns who succeeded Jimmu were absolutely uneventful. Nothing is set down except the genea- logy of each ruler, the place of his residence and his burial, his age and the date of his death. It was then the custom — and it remained so until the 8th century of the Christian era — to change the capital on the accession of each emperor; a habit which effectually prevented the growth of any great metropolis. The reign of the 10th emperor, Sujin, lasted from 98 to 30 B.C. During his era the land was troubled by pestilence and the people broke out in rebellion; calamities which were supposed to be caused by the spirit of the ancient ruler of Izumo to avenge a want of consideration shown to his descendants by their supplanters. Divination — by a Chinese process — and visions revealed the source of trouble; rites of worship were performed in honour of the ancient ruler, his descendant being entrusted with the duty, and the pestilence ceased. We now hear for the first time of vigorous measures to quell the aboriginal savages, doubtless the Ainu. Four generals are sent out against them in different directions. But the expedition is interrupted by an armed attempt on the part of the emperor's half-brother, who, utilizing the opportunity of the troops' absence from Yamato, marches from Yamashiro at the head of a powerful army to win the crown for himself. In connexion with these incidents, curious evidence is furnished of the place then assigned to woman by the writers of the Chronicles. It is a girl who warns one of the emperor's generals of the plot; it is the sovereign's aunt who interprets the warning; and it is Ata, the wife of the rebellious prince, who leads the left wing of his army. Four other noteworthy facts are recorded of this reign: the taking of a census; the imposition of a tax on animals' skins and game to be paid by men, and on textile fabrics by women; the building of boats for coastwise transport, and the digging of dikes and reservoirs for agricultural purposes. All these things rest solely on the testimony of annalists writing eight centuries later than the era they discuss and compiling their narrative mostly from tradition. Careful investigations have been made to ascertain whether the histories of China and Korea corroborate or contradict those of Japan. Without entering into detailed evidence, the inference may be at once stated that the dates given in Japanese early history are just 1 20 years too remote; an error very likely to occur when using the sexagenary cycle, which constituted the first method of reckoning time in Japan. But although this correction suffices to reconcile some contradictory features of Far-Eastern history, it does not consti- tute any explanation of the incredible longevity assigned by the Chronicles to several Japanese sovereigns, and the conclusion is that when a consecutive record of reigns came to be compiled in the 8th century, many lacunae were found which had to be filled up from the imagination of the compilers. With this parenthesis we may pass rapidly over the events of the next two centuries (29 B.C. to a.d. 200). They are remarkable for vigorous measures to subdue the aboriginal Ainu, who in the southern

island of Kiushiu are called Kuma-so (the names of two tribes) and sometimes earth-spiders (i.e. cave-dwellers), while in the north-eastern regions of the main island they are desig- nated Yemishi. Expeditions are led against them in both regions by Prince Yamato-dake, a hero revered by all succeeding generations of Japanese as the type of valour and loyalty. Dying from the effects of hardship and exposure, but declaring with his last breath that loss of life was as nothing compared with the sorrow of seeing his father's face no more, his spirit ascends to heaven as a white bird, and when his son, Chuai, comes to the throne, he causes cranes to be placed in the moat surrounding his palace in memory of his illustrious sire.

The sovereign had partly ceased to follow the example of Jimmu, who led his armies in person. The emperors did not, however, pass a sedentary life. They frequently made pro-

gresses throughout their dominions, and on these occasions a not uncommon incident was the addition of some local beauty to the Imperial harem. This licence had a far-reaching effect, since to provide for the sovereign's numerous offspring — the emperor Keiko (71-130) had 80 children — no better way offered than to make grants of land, and thus were laid the foundations of a territorial nobility destined profoundly to influence the course of Japanese history. Woman continues to figure conspicuously in the story. The image of the sun goddess, enshrined in Ise (5 B.C.), is entrusted to the keeping of a princess, as are the mirror, sword and jewel inherited from the sun goddess; a woman (Tachibana) accompanies Prince Yamato-dake in his campaign against the Yemishi, and sacrifices her life to quell a tempest at sea; Saho, consort of Suinin, is the heroine of a most tragic tale in which the conflict between filial piety and conjugal loyalty leads to her self-destruction; and a woman is found ruling over a large district in Kiushiu when the Emperor Keiko is engaged in his campaign against the aborigines. The reign of Suinin saw the beginning of an art destined to assume extraordinary importance in Japan — the art of wrestling — and the first cham- pion, Nomi no Sukune, is honoured for having suggested that clay figures should take the place of the human sacrifices hitherto offered at the sepulture of Imperial personages. The irrigation works commenced in the time of Sujin were zealously continued under his two immediate successors, Suinin and Keik5. More than 800 ponds and channels are described as having been con- structed under the former's rule. We find evidence also that the sway of the throne had been by this time widely extended, for in 125 a governor-general of 15 provinces is nominated, and two years later, governors (miyakko) are appointed in every province and mayors (inaki) in every village. The number or names of these local divisions are not given, but it is explained that mountains and rivers were taken as boundaries of provinces, the limits of towns and villages being marked by roads running respectively east and west, north

and south.

An incident is now reached which the Japanese count a land- mark in their history, though foreign critics are disposed to regard it as apocryphal. It is the invasion of Korea by a Japanese army under the command of the empress 'otKonL. Jingo, in 200. The emperor Chuai, having proceeded to Kiushiu for the purpose of conducting a campaign against the Kuma-so, is there joined by the empress, who, at the inspiration of a deity, seeks to divert the Imperial arms against Korea. But the emperor refuses to believe in the existence of any such country, and heaven punishes his incredulity with death at the hands of the Kuma-so, according to one account; from the effects of disease, according to another. The calamity is concealed; the Kuma-so are subdued, and the empress, having collected a fleet and raised an army, crosses to the state of Silla (in Korea), where, at the spectacle of her overwhelming strength, the Korean monarch submits without fighting, and swears that until the sun rises in the west, until rivers run towards their sources, and until pebbles ascend to the sky and become stars, he will do homage and send tribute to Japan. His example is followed by the kings of the two other states constituting the Korean peninsula, and the warlike empress returns triumphant. Many supernatural elements embellish the tale, but the features which chiefly discredit it are that it abounds in anachronisms, and that the event, despite its signal importance, is not mentioned in either Chinese or Korean history. It is certain that China then possessed in Korea territory administered by Chinese governors. She must therefore have had cognisance of such an invasion, had it occurred. Moreover, Korean history mentions twenty-five raids made by the Japanese against Silla during the first five centuries of the Christian era, but not one of them can be indentified with Jingo's alleged expedition. There can be no doubt that the early Japanese were an aggressive, enterprising people, and that their nearest over-sea neighbour suffered much from their activity. Nor can there be any reasonable doubt that the Jingo tale contains a large germ of truth, and is at least an echo of the relations that existed between Japan and Korea in the 3rd and 4th centuries. The records of the 69 years comprising

Jingo's reign are in the main an account of intercourse, some- times peaceful, sometimes stormy, between the neighbouring countries. Only one other episode occupies a prominent place: it is an attempt on the part of Jingo's step-brothers to oppose her return to Yamato and to prevent the

accession of her son to the throne. It should be noted here that all such names as Jimmu, Sujin, Chuai, &c, are posthumous, and were invented in the reign of Kwammu (782-806), the fashion being taken from China and the names themselves being purely Chinese translations of the qualities assigned to the respective monarchs. Thus Jimmu signifies " divine valour "; Sujin, " deity-honour- ing "; and Chuai, "sad middle son." The names of these rulers during life were wholly different from their posthumous appellations.

Chinese history, which is incomparably older and more precise than Korean, is by no means silent about Japan. Long notices Earliest occur in the later Han and Wei records (25 to 265). Notices la The Japanese are spoken of as dwarfs (Wa), and Chinese their islands, frequently called the queen country, are H story. - tQ ˆ moun t amouS) w ith soil suitable for growing grain, hemp, and the silk- worm mulberry. The climate is so mild that vegetables can be grown in winter and summer; there are neither oxen, horses, tigers, nor leopards; the people understand the art of weaving; the men tattoo their faces and bodies in pat- terns indicating differences of rank; male attire consists of a single piece of cloth; females wear a gown passed over the head, and tie their hair in a bow; soldiers are armed with spears and shields, and also with bows, from which they discharge arrows tipped with bone or iron; the sovereign resides in Yamato ; there are stockaded forts and houses; food is taken with the fingers but is served on bamboo trays and wooden trenchers; foot-gear is not worn; when men of the lower classes meet a man of rank, they leave the road and retire to the grass, squatting or kneeling with both hands on the ground when they address him; intoxicating liquor is much used; the people are long-lived, many reaching the age of 100; women are more numerous than men; there is no theft, and liti- gation is infrequent; the women are faithful and not jealous; all men of high rank have four or five wives, others two or three; wives and children of law-breakers are confiscated, and for grave crimes the offender's family is extirpated; divination is practised by burning bones; mourning lasts for some ten days and the rites are performed by a " mourning-keeper"; after a funeral the whole family perform ablutions; fishing is much practised, and the fishermen are skilled divers; there are distinctions of rank and some are vassals to others; each province has a market where goods are exchanged; the country is divided into more than 100 provinces, and among its products are white pearls, green jade and cinnabar. These annals go on to say that between 147 and 190 civil war prevailed for several years, and order was finally restored by a female sovereign, who is described as having been old and unmarried; much addicted to magic arts; attended by a thousand females; dwelling in a palace with lofty pavilions surrounded by a stockade and guarded by soldiers; but leading such a secluded life that few saw her face except one

man who served her meals and acted as a medium of communica- tion. There can be little question that this queen was the empress Jingo who, according to Japanese annals, came to the throne in the year a.d. 200, and whose every public act had its inception or promotion in some alleged divine interposition. In one point, however, the Chinese historians are certainly incorrect. They represent tattooing as universal in ancient Japan, whereas it was confined to criminals, in whose case it played the part that branding does elsewhere. Centuries later, in feudal days, the habit came to be practised, by men of the lower orders whose avocations involved baring the body, but it never acquired vogue among educated people. In other respects these ancient Chinese annals must , be credited with remarkable accuracy in their description of Japan and the Japanese. Their account may be advantageously compared with Professor Chamberlain's analysis of the manners and customs of the early Japanese, in the preface to his translation of the Kqjiki.

" The Japanese of the mythical period, as pictured in the legends preserved by the compiler of the Records of Ancient Matters, were a race who had long emerged from the savage stage and had attained to a high level of barbaric skill. The Stone Age was forgotten by them — or nearly so — and the evidence points to their never having

Cassed through a genuine Bronze Age, though the knowledge of ronze was at a later period introduced from the neighbouring continent. They used iron for manufacturing spears, swords and knives of various shapes, and likewise for the more peaceful purpose of making hooks wherewith to angle or to fasten the doors of their huts. Their other warlike and hunting implements (besides traps and gins, which appear to have been used equally for catching beasts and birds and for destroying human enemies) were bows and arrows, spears and elbow-pads — the latter seemingly of skin, while special allusion is made to the fact that the arrows were feathered. Perhaps clubs should be added to the list. Of the bows and arrows, swords and knives, there is perpetual mention, but nowhere do we hear of the tools with which they were manufactured, and there is the same remarkable silence regarding such widely spread domestic implements as the saw and the axe. We hear, however, of the pestle and mortar, of the fire-drill, of the wedge, of the sickle, and of the shuttle used in weaving. Navigation seems to have been in a very elementary state. Indeed the art of sailing was but little practised in Japan even so late as the middle of the 10th century of our era, subsequent to the general diffusion of Chinese civilization, though rowing and punting are often mentioned by the early poets. To what we should call towns or villages very little reference is made anywhere in the Records or in that part of the Chronicles which con- tain the account of the so-called Divine Age. But from what we learn incidentally it would seem that the scanty population Was chiefly

distributed in small hamlets and isolated dwellings along the coast and up the course of the larger streams. Of house-building there is frequent mention. Fences were in use. Rugs of skins and rush-matting were occasionally brought in to sit on, and we even hear once or twice of silk rugs being used for the same purpose by the noble and wealthy. The habits of personal cleanliness which so pleasantly distinguish the modern Japanese from their neighbours, in continental Asia, though less fully developed than at present would seem to have existed in the germ in early times, as we read more than once of bathing in rivers, and are told of bathing women being specially attached to the person of a certain Imperial infant. Lustrations, too, formed part of the religious practices of the race. Latrines are mentioned several times. They would appear to have been situated away from the houses and to have been generally placed over a running stream, whence doubtless the name for latrine in the archaic dialect — kawaya (river-house). A peculiar sort of dwelling-place which the two old histories bring prominently under our notice is the so-called parturition house — a one-roomed hut without windows, which a woman was expected to build and retire into for the purpose Of being delivered unseen. Castles are not distinctly spoken of until a time which coincides, according to the received chronology, with the first century B.C. We then first meet with the curious term rice-castle, whose precise signification is a matter of dispute among the native commentators, but which, on comparison with Chinese descriptions of the early Japanese, should probably be understood to mean a kind of palisade serving the pur- pose of a redoubt, behind which the warriors could ensconce them- selves. The food of the early Japanese consisted of fish and of the flesh of the wild creatures which fell by the hunter's arrow or were taken in the trapper's snare. Rice is the only cereal of which there is such mention made as to place it beyond a doubt that its cultiva- tion dates back to time immemorial. Beans, millet and barley are indeed named once, together with silkworms, in the account of the Divine Age. But the passage has every aspect of an interpolation in the legend, perhaps not dating back long before the time of the eighth-century compiler. A few unimportant vegetables and fruits; of most of which there is but a single .mention, are found. The intoxicating liquor called sake was known in Japan during the mythi- cal period, and so were chopsticks for eating food with. Cooking pots and cups and dishes — the latter both of earthenware and of leaves of trees — are also mentioned ; but of the use of fire for warming purposes we hear nothing. Tables are named several times, but never in connexion with food : they would seem to have > been used exclusively for the purpose of presenting offerings on, and were probably quite small and low — in fact, rather trays than tables, according to European ideas. In the use of clothing and the specialization of garments the early Japanese had reached a high level. We read in the most ancient legends of upper garments, skirts, trowsers, girdles, veils and

hats, while both sexes adorned themselves with necklaces, bracelets and head ornaments of stones considered precious — in this respect offering a striking contrast t6 their descendants in modern times, of whose attire jewelry forms no part. The material of their clothes was hempen cloth and paper — mulberry bark, coloured by being rubbed with madder, and .probably with woad and other tinctorial plants. All the garments, so far as we may judge, were woven, sewing being nowhere mentioned. From the great place which the chase occupied in daily life, we are led to suppose that skins also were used to make garments of. There is in the Records at least one passage which favours this supposition,

and the Chronicles in one place mention the straw rain-coat and broad-brimmed hat, which still form the Japanese peasant's effectual protection against the inclemencies of the weather. The tendrils of creeping plants served the purposes of strings, and bound the -varrior's sword round his waist. Combs are mentioned, and it is evident that much attention was devoted to the dressing of the hair. The men seem to have bound up their hair in two bunches, one on each side of the head, while the young boys tied theirs in a top-knot, the unmarried girls let their locks hang down over their necks, and the married women dressed theirs after a fashion which apparently combined the two last-named methods. There is no mention in any of the old books of cutting the hair or beard except in token of disgrace ; neither do we gather that the sexes, but for the matter of the head-dress, were distinguished by a diversity of apparel and ornamentation. With regard to the precious stones mentioned above as having been used as ornaments for the head, neck and arms, we know from the specimens which have rewarded the labours of archaeological research in Japan that agate, crystal, glass, jade, serpentine and steatite were the most used materials, and carved and pierced cylindrical shapes the commonest forms. The horse — which was ridden, but not driven — the barn-door fowl and the cor- morant used for fishing, are the only domesticated creatures mentioned in the earlier traditions, with the doubtful exception of the silkworm. In the later portions of the Records and Chronicles dogs and cattle are alluded to, but sheep, swine and even cats were apparently not yet introduced."

As the prehistoric era draws to its end the above analyses of Japanese civilization have to be modified. Thus, towards the close of the 3rd century, ship-building made great progress, and instead of the small boats hitherto

in use, a vessel 100 ft. long was constructed. Notable above all is the fact that Japan's turbulent relations with Korea were replaced by friendly inter- course, so that she began to receive from her neighbour instruc- tion in the art of writing. The date assigned by the Chronicles for this important event is a.d. 285, but it has been proved almost conclusively that Japanese annals relating to this period are in error to the extent of 1 20 years. Hence the introduction of calligraphy must be placed in 405. Chinese history shows that between 57 and 247 Japan sent four embassies to the courts of the Han and the Wei, and this intercourse cannot have failed to disclose the ideograph. But the knowledge appears to have been confined to a few interpreters, and not until the year 405 were steps taken to extend it, with the aid of a learned Korean, Wang-in. Korea herself began to study Chinese learning only a few years before she undertook to impart it to Japan. We now find a numerous colony of Koreans passing to Japan and settling there; a large number are also carried over as prisoners of war, and the Japanese obtain seamstresses frorn both of their conti- nental neighbours. One fact, related with much precision, shows that the refinements of life were in an advanced condition: an ice-house is described, and we read that from 374 (? 494) it became the fashion to store ice in this manner for use in the hot months by placing it in water or sake. The emperor, Nintoku, to whose time this innovation is attributed, is one of the romantic figures of Japanese history. He commenced his career by refus- ing to accept the sovereignty from his younger brother, who pressed him earnestly to do so on the ground that the proper order of succession had been disturbed by their father's par- tiality — though the rights attaching to primogeniture did not receive imperative recognition in early Japan. After three years of this mutual self-effacement, during which the throne remained vacant, the younger brother committed suicide, and Nintoku reluctantly became sovereign. He. chose Naniwa (the modern Osaka) for his capital, but he would not take the farmers from their work to finish the building of a palace, and subse- quently, inferring from the absence of smoke over the houses of the people that the country was impoverished, he remitted all taxes and suspended forced labour for a term of three years, during which his palace fell into a state of ruin and he himself fared in the coarsest manner. Digging canals, damming rivers, construct- ing roads and bridges, and establishing granaries occupied his attention when love did not distract it. But in affairs of the heart he was most unhappy. He figures as the sole wearer of the Japanese crown who was defied by his consort; for when he took a concubine in despite of the empress, her jealousy was so bitter that, refusing to be placated by any of his majesty's verses or other overtures, she left the palace altogether; and

when he sought to introduce another beauty into the inner chamber, his own half-brother, who carried his proposals, won the girl for himself. One*

other fact deserves to be remembered in connexion with Nintoku's reign: Ki-no-tsuno, representative of a great family which had filled the highest administrative and military posts under several sovereigns, is mentioned as " the first to commit to writing in detail the productions of the soil in each locality." This was in 353 (probably 473). We shall err little if we date the commencement of Japanese written annals from this time, though no compilation earlier than the Kojiki has survived.

Early Historical Period. — With the emperor Richu, who came to the throne a.d. 400, the historical period may be said to commence; for though the chronology of the records is still questionable, the facts are generally accepted as credible. Conspicuous loyalty towards the sovereign was not an attribute of the Japanese Imperial family in early times. Attempts to usurp the throne were not uncommon, though there are very few instances of such essays on the part of a subject. Love or lust played no insignificant part in the drama, and a common method of placating an irate sovereign was to present a beautiful damsel for his delectation. The veto of consanguinity did not receive very strict respect in these matters. Children of the same father might intermarry, but not those of the same mother; a canon which becomes explicable on observing that as wives usually lived apart from their husbands and had the sole custody of their offspring, two or more families often remained to the end unconscious of the fact that they had a common sire. There was a remarkable tendency to organize the nation into groups of persons following the same pursuit or charged with the same functions. A group thus composed was called be. The heads of the great families had titles — as omi, muraji, miakko, wake, &c. — and affairs of state were administered by the most renowned of these nobles, wholly subject to the sovereign's ultimate will. The provincial districts were ruled by scions of the Imperial family, who appear to have been, on the whole, entirely subservient to the Throne. There were no tribunals of justice: the ordeal of boiling water or heated metal was the sole test of guilt or innocence, apart, of course, from confession, which was often exacted under menace of torture. A celebrated instance of the ordeal of boiling water is recorded in 415, when this device was employed to correct the genealogies of families suspected of falsely claiming descent from emperors or divine beings. The test proved efficacious, for men conscious of forgery refused to undergo the ordeal. Deprivation of rank was the lightest form of punishment; death the commonest, and 1 occasionally the whole family of an offender became serfs of the house against which the offence had been committed or which had been instrumental in disclosing a crime. There are, however, frequent examples of wrong-doing expiated by the voluntary surrender of lands or other property. We find several instances of that extreme type of loyalty which became habitual in later ages — suicide in preference to surviving a deceased lord. On the whole the successive

sovereigns of these early times appear to have ruled with clemency and consideration for the people's welfare. But there were two notable exceptions— Yuriaku (457-479) and Muretsu (499-506). The former slew men ruthlessly in fits of passion or resentment, and the latter was the Nero of Japanese history, a man who loved to witness the agony of his fellows and knew no sentiment of mercy or remorse. Yet even Yuriaku did not fail to promote industrial pursuits. Skilled artisans were obtained from Korea, and it is related that, in 462, this monarch induced the empress and the ladies of the palace to plant mulberry trees with their own hands in order to encourage sericulture. Throughout the 5th and 6th centuries many instances are recorded of the acquisition of landed estates by the Throne, and their occasional bestowal upon princes or Imperial consorts, such gifts being frequently accompanied by the assignment of bodies of agriculturists who seem to have accepted the position of serfs. Meanwhile Chinese civilization was ; gradually becoming known, either by direct contact or through Korea. Several immigrations of Chinese

or Korean settlers are on record. No less than 7053 householders of Chinese subjects came, through Korea, in 540, and one of their number received high rank together with the post, of director of the Imperial treasury. From these facts, and from a national register showing the derivation of all the principal families in Japan, it is clearly established that a considerable strain of Chinese and Korean blood runs in the veins of many Japanese subjects.

The most signal and far-reaching event of this epoch was the importation of the Buddhist creed, which took place in 552. latroduc- A Korean monarch acted as propagandist, sending a Hon 0/ special envoy with a bronze image of the Buddha and Buddhism, ˆifr several volumes of the Sutras. Unfortunately the coming of the foreign faith happened to synchronize with an epidemic of plague, and conservatives at the Imperial court were easily able to attribute this visitation to resentment on the part of the ancestral deities against the invasion of Japan by an alien creed. Thus the spread of Buddhism was checked; but only for a time. Thirty-five years after the coming_ of the Sutras, the first temple was erected to enshrine a wooden image of the Buddha 16 ft. high. It has often been alleged that the question between the imported and the indigenous cults had to be decided by the sword. The statement is misleading. That the final adoption of Buddhism resulted from a war is true, but its adoption or rejection did not constitute

the motive of the combat. A con- test for the succession to the throne at the opening of Sujun's reign (588-592) found the partisans of the Indian faith ranged on one side, its opponents on the other, and in a moment of stress the leaders of the former, Soma and Prince Umayado, vowed to erect Buddhist temples should victory rest on their arms. From that time the future of Buddhism was assured. In 588 Korea sent Buddhist relics, Buddhist priests, Buddhist ascetics, architects of Buddhist temples, and casters of Buddhist images. She had already sent men learned in divination, in medicine, and in the calendar. The building of temples began to be fashionable in the closing years of the 6th century, as did also abdication of the world by people of both sexes; and a census taken in 623, during the reign of the empress Suiko (583-628), showed that there were then 46 temples, 816 priests and 569 nuns in the empire. This rapid growth of the alien faith was due mainly to two causes: first, that the empress Suiko, being of the Soga family, naturally favoured a creed which had found its earliest Japanese patron in the great states- man and general, Soga no Umako; secondly, that one of the most illustrious scholars and philosophers ever possessed by Japan, Prince Shotoku, devoted all his energies to fostering Buddhism. The adoption of Buddhism meant to the Japanese much more than the acquisition of a practical religion with a code of clearly defined morality in place of the amorphous and jejune cult of Shinto. It meant the introduction of Chinese civilization. Priests and scholars crossed in numbers from China, and men passed over from Japan to study the Sutras at what was then regarded as the fountain-head of Buddhism. There was also a constant stream of immigrants from China and Korea, and the result may be gathered from the fact that a census taken of the Japanese nobility in 814 indicated 382 Korean and Chinese families against only 796 of pure Japanese origin. The records show that in costume and customs a signal advance was made towards refinement. Hair-ornaments of gold or silver chiselled in the form of flowers; caps of sarcenet in twelve special tints, each indicating a different grade; garments of brocade and embroidery with figured thin silks of various colours — all these were worn on ceremonial occasions; the art of painting was introduced; a recorder's office was established; perfumes were largely employed; court picnics to gather medicinal herbs were instituted, princes and princesses attending in brilliant raiment ; Chinese music and dancing were introduced; cross bows and catapults were added to the weapons of war; domestic architec- ture made signal strides in obedience to the examples of Buddhist sacred edifices, which, from the first, showed magnificence of dimension and decoration hitherto unconceived in Japan; the arts of metal-casting and sculpture underwent great improve-

ment; Prince Shotoku compiled a code, commonly spoken of as the first written laws of Japan, but in reality a collection of maxims evincing a

moral spirit of the highest type. In some respects, however, there was no improvement. The succession to the throne still tended to provoke disputes among the Imperial princes; the sword constituted the principal weapon of punish- ment, and torture the chief judicial device. Now, too, for the first' time, a noble family is found seeking to usurp the Imperial authority. The head of the Soga house, Umako, having com- passed the murder of the emperor Sujun and placed on the throne his own niece (Suiko), swept away all opposition to the latter's successor, Jomei, and controlled the administration of state affairs throughout two reigns. In all this he was strongly seconded by his son, Iruka, who even surpassed him in contu- melious assumption of power and parade of dignity. Iruka was slain in the presence of the empress Kogyoku by Prince Naka with the assistance of the minister of the interior, Kamako, and it is not surprising to find the empress (Kogyoku) abdicating immediately afterwards in favour of Kamako's protege, Prince Karu, who is known in history as Kotoku. This Kamako, planner and leader of the conspiracy which overthrew the Soga, is remembered by posterity under the name of Kamatari and as the founder of the most illustrious of Japan's noble houses, the Fujiwara. At this time (645), a habit which afterwards contributed materially to the effacement of the Throne's practical authority was inaugurated. Prince Furubito, pressed by his brother, Prince Karu, to assume the sceptre in accordance with his right of primogeniture, made his refusal peremptory by aban- doning the world and taking the tonsure. This retirement to a monastery was afterwards dictated to several sovereigns by ministers who found that an active occupant of the throne impeded their own exercise of administrative autocracy. Furu- bito's recourse to the tonsure proved, however, to be merely a cloak for ambitious designs. Before a year had passed he con- spired to usurp the throne and was put to death with his chil- dren, his consorts strangling themselves. Suicide to escape the disgrace of defeat had now become a common practice. Another prominent feature of this epoch was the prevalence of supersti- tion. The smallest incidents — the growing of two lotus flowers on one stem; a popular ballad; the reputed song of a sleeping monkey; the condition of the water in a pond; rain without clouds — all these and cognate trifles were regarded as omens; wizards and witches deluded the common people; a strange form of caterpillar was worshipped as the god of the everlasting world, and the peasants impoverished themselves by making sacrifices to it.

An interesting epoch is now reached, the first legislative era of early Japanese history. It commenced with the reign of the emperor Kotoku (645), of whom the Chronicles say First that he " honoured the religion of Buddha and de- Legislative spised Shinto "; that "he was of gentle disposition; E P° cb – loved men of learning; made no distinction of noble and mean, and continually dispensed beneficent edicts." The customs

calling most loudly for reform in his time were abuse of the system of forced labour; corrupt administration of justice; spoliation of the peasant class; assumption of spurious titles to justify oppression; indiscriminate distribution of the families of slaves and serfs; diversion of taxes to the pockets of collectors; formation of great estates, and a general lack of administrative centralization. The first step of reform consisted in ordering the governors of provinces to prepare registers showing the numbers of freemen and serfs within their jurisdiction as well as the area, of cultivated land. It was further ordained that the advantages of irrigation should be shared equally with the common people; that no local governor might try and decide criminal cases while in his province; that any one convicted of accepting bribes should be liable to a fine of double the amount as well as to other punishment; that in the Imperial court a box should be placed for receiving petitions and a bell hung to be sounded in the event of delay in answering them or unfairness in dealing with them; that all absorption of land into great estates should cease; that barriers, outposts, guards and post-horses should be

provided; that high officials should be dowered with hereditary estates by way of emolument, the largest of such grants being 3000 homesteads; that men of unblemished character and proved capacity should be appointed aldermen for adjudicating criminal matters; that there should be chosen as clerks for gover- nors and vice-governors of provinces men of solid competence " skilled in writing and arithmetic " ; that the land should be parcelled out in fixed proportions to every adult unit of the popu- lation with right of tenure for a term of six years; that forced labour should be commuted for taxes of silk and cloth; and that for fiscal and administrative purposes households should be organized in groups of five, each group under an elder, and ten groups forming a township, which, again, should be governed by an elder. Incidentally to these reforms many of the evil customs of the time are exposed. Thus provincial governors when they visited the capital were accustomed to travel with great retinues who appear to have constituted a charge on the regions through which they passed. The law now limited the number of a chief governor's attendants to nine, and forbade him to use official houses or to fare at public cost unless journey- ing on public business. Again, men who had acquired some local distinction, though they did not belong to noble families, took advantage of the absence of historical records or official registers, and, representing themselves as descendants of magnates to whom the charge of public granaries had been entrusted, suc- ceeded in usurping valuable privileges. The office of provincial governor had in many cases become hereditary, and not only were governors largely independent of Imperial control, but also, since every free man carried arms, there had grown up about these

officials a population relying largely on the law of force. Kotoku's reforms sought to institute a system of temporary governors, and directed that all arms and armour should be stored in arsenals built in waste places, except in the case of provinces adjoining lands where unsubdued aborigines (Yemishi) dwelt. Punishments were drastic, and in the case of a man convicted of treason, all his children were executed with him, his' wives and consorts committing suicide. From a much earlier age suicide had been freely resorted to as the most honourable exit from pending disgrace, but as yet the samurai's method of disembowelment was not employed, strangulation or cutting the throat being the regular practice. Torture was freely employed and men often died under it. Signal abuses prevailed in regions beyond the immediate range of the central govern- ment's observation. It has been shown that from early days the numerous scions of the Imperial family had generally been provided for by grants of provincial estates. Gradually the descendants of these men, and the representatives of great families who held hereditary rank, extended their domains unscrupulously, employing forced labour to reclaim lands, which they let to the peasants, not hesitating to appropriate large slices of public property, and remitting to the central treasury only such fractions of the taxes as they found con- venient. So prevalent had the exaction of forced labour become that country-folk, repairing to the capital to seek redress of grievances, were often compelled to remain there for the purpose of carrying out some work in which dignitaries of state were interested. The removal of the capital to a new site on each change of sovereign involved a vast quantity of unproductive toil. It is recorded that in 656, when the empress Saimei occu- pied the throne, a canal was dug which required the work of 30,000 men and a wall was built which had employed 70,000 men before its completion. The construction of tombs for grandees was another heavy drain on the people's labour. Some of these sepulchres attained enormous dimensions — that of the emperor Ojin (270-310) measures 2312 yds. round the outer moat and is some 60 ft. high; the emperor Nintoku's (313-390) is still larger, and there is a tumulus in Kawachi on the flank of which a good-sized village has been built. Kotoku's laws provided that the tomb of a prince should not be so large as to require the work of more than 1000 men for seven days, and that the grave of a petty official must be completed by 50 men in one day. More- over, it was forbidden to bury with the body gold, silver, xv. 9

copper, iron, jewelled shirts, jade armour or silk brocade. It appears that the custom of suicide or sacrifice at the tomb of grandees still survived, and that people sometimes cut off their hair or stabbed their thighs preparatory to declaiming a threnody. All these practices were vetoed. Abuses had grown up even in connexion with the Shinto rite of purgation. This rife

required not only the reading of rituals but also the offering of food and fruits. For the sake of these edibles the rite was often harshly enforced, especially in connexion with pollution from contact with corpses; and thus it fell out that when of two brothers, returning from a scene of forced labour, one lay down upon the road and died, the other, dreading the cost of compulsory purga- tion, refused to take up the body. Many other evil customs came into existence in connexion with this rite, and all were dealt with in the new laws. Not the least important of the reforms then introduced was the organization of the ministry after the model of the Tang dynasty of China. Eight depart- ments of state were created, and several of them received names which are similarly used to this day. Not only the institutions of China were borrowed but also her official costumes. During Kotoku's reign 19 grades of head-gear were instituted, and in the time of Tenchi (668-671) the number was increased to 26, with corresponding robes. Throughout this era intercourse was frequent with China, and the spread of Buddhism continued steadily. The empress Saimei (6 5 5-66 1) , who succeeded Kotoku, was an earnest patron of the faith. By her command several public expositions of the Sutras were given, and the building of temples went on in many districts, estates being liberally granted for the maintenance of these places of worship.

The Fujiwara Era. — In the Chronicles of Japan the year 672 is treated as a kind of interregnum. It was in truth a year of something like anarchy, a great part of it being occupied by a conflict of unparalleled magnitude between Prince Otomo (called in history Emperor Kobun) and Prince Oama, who emerged victorious and is historically entitled Temmu(673~686). The four centuries that followed are conveniently designated the Fujiwara era, because throughout that long interval affairs of state were controlled by the Fujiwara family, whose daughters were given as consorts to successive sovereigns and whose sons filled all the high administrative posts. It has been related above that Kamako, chief of the Shinto officials, inspired the assassination of the Soga chief, Iruka, and thus defeated the latter's designs upon the throne in the days of the empress Kogyoku. Kamako, better known to subsequent generations as Kamatari, was thenceforth regarded with unlimited favour by successive sovereigns, and just before his death in 670, the family name of Fujiwara was bestowed on him by the emperor Tenchi. Kamatari himself deserved all the honour he received, but his descendants abused the high trust reposed in them, reduced the sovereign to a mere puppet, and exercised Imperial authority without openly usurping it. Much of this was due to the adoption of Chinese administrative systems, a process which may be said to have commenced during the reign of Kotoku (645-654) and to have continued almost uninterruptedly until the nth century. Under these systems the emperor ceased directly to exercise supreme civil or military power: he

became merely the source of authority, not its wielder, the civil functions being delegated to a bureaucracy and the military to a soldier class. Possibly had the custom held of transferring the capital to a new site on each change of sovereign, and had the growth of luxuri- ous habits been thus checked, the comparatively simple life of early times might have held the throne and the people in closer contact. But from the beginning of the 8th century a strong tendency to avoid these costly migrations developed itself. In 709 the court took up its residence at Nara, remaining there until 784; ten years after the latter date Kioto became the permanent metropolis. The capital at Nara — established during the reign of the empress Gemmyo (708-715) — was built on the plan of the Chinese metropolis. It had nine gates and nine avenues, the palace being situated in the northern section and approached by a broad, straight avenue, which divided the city into two perfectly equal halves, all the other streets running parallel to this main

avenue or at right angles to it. Seven sovereigns reigned at Heijo (castle of peace), as Nara is historically called, and, during this period of 75 years, seven of the grandest temples ever seen in Japan were erected; a multitude of idols were cast, among them a colossal bronze Daibutsu 535 ft. high; large temple-belfs were founded, and all the best artists and artisans of the era devoted their services to these works. This religious mania reached its acme in the reign of the emperor Shomu (724- 748), a man equally superstitious and addicted to display. In Temmu's time the custom had been introduced of compelling large numbers of persons to enter the Buddhist priesthood with the object of propitiating heaven's aid to heal the illness of an illustrious personage. In Shomu's day every natural calamity or abnormal phenomenon was regarded as calling for religious services on a large scale, and the great expense involved in all these buildings and ceremonials, supplemented by lavish outlays on court pageants, was severely felt by the nation. The con- dition of the agricultural class, who were the chief tax-payers, was further aggravated by the operation of the emperor Kotoku's land system, which rendered tenure so uncertain as to deter improvements. Therefore, in the Nara epoch, the principle of private ownership of land began to be recognized. Attention was also paid to road-making, bridge-building, river control and house construction, a special feature of this last being the use of tiles for roofing purposes in place of the shingles or thatch hitherto employed. In all these steps of progress Buddhist

priests took an active part. Costumes were now governed by purely Chinese fashions. This change had been gradually intro- duced from the time of Kotoku's legislative measures — generally called the Taikwa reforms after the name of the era (645-650) of their adoption — and was rendered more thorough by supplemen- tary enactments in the period 701-703 while Mommu occupied the throne. Ladies seem by this time to have abandoned the strings of beads worn in early eras round the neck, wrists and ankles. They used ornaments of gold, silver or jade in their hair, but in other respects their habiliments closely resembled those of men, and to make the difference still less conspicuous they straddled their horses when riding. Attempts were made to facilitate travel by establishing stores of grain along the principal highways, but as yet there were no hostelries, and if a wayfarer did not find shelter in the house of a friend, he had to bivouac as best he could. Such a state of affairs in the provinces offered a marked contrast to the luxurious indulgence which had now begun to prevail in the capital. There festivals of various kinds, dancing, verse-composing, flower picnics, archery, polo, football — of a very refined nature — hawking, hunting and gam- bling absorbed the attention of the aristocracy. Nothing dis- turbed the serenity of the epoch except a revolt of the northern Yemishi, which was temporarily subdued by a Fujiwara general, for the Fujiwara had not yet laid aside the martial habits of their ancestors. In 794 the Imperial capital was transferred from Nara to Kioto by order of the emperor Kwammu, one of the greatest of Japanese sovereigns. Education, the organiza- tion of the civil service, riparian works, irrigation improvements, the separation of religion from politics, the abolition of sinecure offices, devices for encouraging and assisting agriculture, all received attention from him. But a twenty-two years' campaign against the northern Yemishi ; the building of numerous temples ; the indulgence of such a passionate love of the chase that he organized 140 hunting excursions during his reign of 25 years; profuse extravagance on the part of the aristocracy in Kioto and the exactions of provincial nobles, conspired to sink the working classes into greater depths of hardship than ever. Farmers had to borrow money and seed-rice from local officials or Buddhist temples, hypothecating their land as security; thus the temples and the nobles extended their already great estates, whilst the agricultural population gradually fell into a position of practical serfdom.

Meanwhile the Fujiwara family were steadily developing their Rise ot the influence in Kioto. Their methods were simple but Fupwara. thoroughly effective. " By progressive exercises of arbitrariness they gradually contrived that the choice of a

consort for the sovereign should be legally limited to a daughter of their family, five branches of which were specially designated to that honour through all ages. When a son was born to an emperor, the Fujiwara took

the child into one of their palaces, and on his accession to the throne, the particular Fujiwara noble that happened to be his maternal grandfather became regent of the empire. This office of regent, created towards the close of the 9th century, was part of the scheme; for the Fujiwara did not allow the purple to be worn by a sovereign after he had attained his majority, or, if they suffered him to wield the sceptre during a few years of manhood, they compelled him to abdicate so soon as any independent aspira- tions began to impair his docility; and since for the purposes of administration in these constantly recurring minorities an office more powerful than that of prime minister (dajo daijin) was needed, they created that of regent (kwambaku), making it hereditary in their own family. In fact the history of Japan from the 9th to the 19th century may be described as the history of four families, the Fujiwara, the Taira, the Minamoto and the Tokugawa. The Fujiwara governed through the emperor; the Taira, the Minamoto and the Tokugawa governed in spite of the emperor. The Fujiwara based their power on matrimonial alli- ances with the Throne ; the Taira, the Minamoto and the Tokugawa based theirs on the possession of armed strength which the throne had no competence to control. There another broad line of cleav- age is seen. Throughout the Fujiwara era the centre of political gravity remained always in the court. Throughout the era ol the Taira, the Minamoto and the Tokugawa the centre of political gravity was transferred to a point outside the court, the head- quarters of a military feudalism." The process of transfer was of course gradual. It commenced with the granting of large tracts of tax-free lands to noblemen who had wrested them from the aborigines (Yemishi) or had reclaimed them by means of serf- – labour. These tracts lay for the most part in the northern and eastern parts of the main island, at such a distance from the capital that the writ of the central government did not run there; and since such lands could be rented at rates considerably less than the tax levied on farms belonging to the state, the peasants by degrees abandoned the latter and settled on the former, with the result that the revenues of the Throne steadily dimin- ished, while those of the provincial magnates correspondingly increased. Moreover, in the 7th century, at the time of the adoption of Chinese models of administration and organization, the court began to rely for military protection on the services of guards temporarily drafted from the provincial troops, and, during the protracted struggle against the Yemishi in the north and east in the 8th century, the fact that the power of the sword lay with the provinces began to be noted.

Kioto remained the source of authority. But with the growth of luxury and effeminacy in the capital the Fujiwara became more and more averse from the hardships of campaign- The Taira ing, and in the 9th and 10th centuries, respectively, ana the the Taira and the Minamoto 1 families came into promi- Minamoto. nence as military leaders, the field of the

Taira operations being the south and west, that of the Minamoto the north and east. Had the court reserved to itself and munificently exercised the privilege of rewarding these services, it might still have retained power and wealth. But by a niggardly and contemptuous policy on the part of Kioto not only were the Minamoto leaders estranged but also they assumed the right of recompensing their followers with tax-free estates, an example which the Taira leaders quickly followed. By the early years of the 1 2th century these estates had attracted the great majority of the farming class, whereas the public land was left wild and uncultivated. In a word, the court and the Fujiwara found themselves without revenue, while the coffers of the Taira and the Minamoto were full: the power of the purse and the power of the sword had passed effectually to the two military families. Prominent features of the moral condi- tion of the capital at this era (12th century) were superstition, re- finement and effeminacy. A belief was widely held that calamity

1 The Taira and the Minamoto both traced their descent from imperial princes; the Tokugawa were a branch of the Minamoto.

could not be averted or success insured without recourse to Buddhist priests. Thus, during a reign of only 13 years at the close of the nth century, the emperor Shirakawa caused 5420 religious pictures to be painted, ordered the casting of 127 statues of Buddha, each n ft. high, of 3150 life-sized images and of 2930 smaller idols, and constructed 21 large temples as well as 446,630 religious edifices of various kinds. Side by side with this faith in the supernatural, sexual immorality prevailed widely, never accompanied, however, by immodesty. Literary profi- ciency ranked as the be-all and end-all of existence. " A man estimated the conjugal qualities of a young lady by her skill in finding scholarly similes and by her perception of the cadence of words. If a woman was so fortunate as to acquire a reputation for learning, she possessed a certificate of universal virtue and amiability." All the pastimes of the Nara epoch were pursued with increased fervour and elaboration in the Heian (Kioto) era. The building of fine dwelling-houses and the laying out of landscape gardens took place on a considerable scale, though in these respects the ideals of later ages were not yet reached. As to costume, the close-fitting, business-like and comparatively simple dress of the 8th century was exchanged for a much more elaborate style. During the Nara epoch the many-hued hats of China had been abandoned for a sober head- gear of silk gauze covered

with black lacquer, but in the Heian era this was replaced by an imposing structure glistening with jewels: the sleeves of the tunic grew so long that they hung to the knees when a man's arms were crossed, and the trowsers were made so full and baggy that they resembled a divided skirt. From this era may be said to have commenced the manufacture of the tasteful and gorgeous textile fabrics for which Japan after- wards became famous. " A fop's ideal was to wear several suits, one above the other, disposing them so that their various colours showed in harmoniously contrasting lines at the folds on the bosom and at the edges of the long sleeves. A successful costume created a sensation in court circles. Its wearer became the hero of the hour, and under the pernicious influence of such ambition men began even to powder their faces and rouge their cheeks like women. As for the fair sex, their costume reached the acme of unpracticality and extravagance in this epoch. Long flowing hair was essential, and what with developing the volume and multiplying the number of her robes, and wearing above her trowsers a many- plied train, a grand lady of the time always seemed to be struggling to emerge from a cataract of habiliments." It was fortunate for Japan that circumstances favoured the growth of a military class in this age of her career, for had the conditions existing in Kioto during the Heian epoch spread throughout the whole country, the penalty never escaped by a demoralized nation must have overtaken her. But by the middle of the 12th century the pernicious influence of the Fuji-wara had paled before that of the Taira and the Minamoto, and a question of succession to the throne marshalled the latter two families in opposite camps, thus inaugurating an era of civil war which held the country in the throes of almost continuous battle for 450 years, placed it under the administration of a military feudalism, and educated a nation of warriors. At first the Mina- moto were vanquished and driven from the capital, Kiyomori, the Taira chief, being left complete master of the situation. He established his headquarters at Rokuharu, in Kioto, appropriated the revenues of 30 out of the 66 provinces forming the empire, and filled all the high offices of state with his own relatives or connexions. But he made no radical change in the adminis- trative system, preferring to follow the example of the Fujiwara by keeping the throne in the hands of minors. And he com- mitted the blunder of sparing the lives of two youthful sons of his defeated rival, the Minamoto chief. They were Yoritomo and Yoshitsune; the latter the greatest strategist Japan ever pro- duced, with perhaps one exception; the former, one of her three greatest statesmen, the founder of. military feudalism. By these two men the Taira were so completely overthrown that they never raised their heads again, a sea-fight at Dan-no-ura (1155) giving them the coup de grdce. Their supremacy had lasted 22 years.

The Feudal Era. — Yoritomo, acting largely under the advice of an astute

counsellor, Oye no Hiromoto, established bis seat of power at Kamakura, 300 m. from Kioto. He saw that, effectively to utilize the strength of the military class, propin- quity to the military centres in the provinces was essential. At Kamakura he organized an administrative bodysimilarinmechan- ism to that of the metropolitan government but studiously dif- ferentiated ki the matter of nomenclature. As to the country at large, he brought it effectually under the sway of Kamakura by placing the provinces under the direct control of military governors, chosen and appointed by himself. No attempt was made, however, to interfere in any way with the polity in Kioto: it was left intact, and the nobles about the Throne — kuge (courtly houses), as they came to be called in contradistinction to the buke (military houses) — were placated by renewal of their property titles. The Buddhist priests, also, who had been treated most harshly during the Taira tenure of power, found their fortunes restored under Kamakura's sway. Subsequently Yoritomo obtained for himself the title of sei-itai-shogun (barbarian-subduing generalissimo), and just as the office of regent (kwambaku) had long been hereditary in the Fujiwara family, so the office of shogun became thenceforth hereditary in that of the Minamoto. These changes were radical. They signified a complete shifting of the centre of power. During eighteen centuries from the time of Jimmu's invasion — as Japanese historians reckon — the country had been ruled from the south; now the north became supreme, and for a civilian administration a purely military was substituted. But there was no contumely towards the court in Kioto. Kamakura made a show of seeking Imperial sanction for every one of its acts, and the whole of the military administration was carried on in the name of the emperor by a shogun who called himself the Imperial deputy. In this respect things changed materially after the death of Yoritomo (1198). Kamakura then became, the scene of a drama analogous to that acted in Kioto from the 10th century.

The Ho jo family, to which belonged Masa, Yoritomo's consort, assumed towards the Kamakura shogun an attitude similar to that previously assumed by the Fujiwara family towards the emperor in Kioto. A child, who on tbe h„js. state occasions was carried to the council chamber in Masa's arms, served as the nominal repository of the shogun's power, the functions of administration being discharged in reality by the Hojo family, whose successive heads took the name of shikken (constable). At first care was taken to have the shogun's office filled by a near relative of Yoritomo; but after the death of that great statesman's two sons and his nephew, the puppet shoguns were taken from the ranks of tbe Fujiwara or of the Imperial princes, and were deposed so soon as they attempted to assert themselves. What this meant becomes apparent when we note that in the interval of 83 years between 1220 and 1308, there were six shoguns whose ages at the time of appointment ranged from 3 to 16. Whether, if events

had not forced their hands, the Hojo constables would have maintained towards the Throne the reverent demeanour adopted by Yoritomo must remain a matter of conjecture. What actually happened was that the ex-emperor, Go-Toba, made an ill-judged attempt (12 21) to break the power of Kamakura. He issued a call to arms which was responded to by some thousands of cenobites and as many soldiers of Taira extraction. In the brief struggle that ensued the Imperial partisans were wholly shattered, and the direct consequences were the dethronement and exile of the reigning emperor, the banishment of his predecessor together with two princes of the blood, and the compulsory adoption of the tonsure by Go-Toba; while the indirect consequence was that the succession to the throne and the tenure of Imperial power fell under the dictation of the Hojo as they had formerly fallen under the direction of the Fujiwara. Yoshitoki, then head of the Hojo family, installed his brother, Tokifusa, as military governor of Kioto, and confiscating about 3000 estates, the property of those who had espoused the Imperial cause, distri- buted these lands among the adherents of his own family, thus

greatly strengthening the basis of the feudal system. " It fared with the Hdjo as it had fared with all the great families that preceded them: their own misrule ultimately wrought their ruin. Their first eight representatives were talented and up- right administrators. They took justice, simplicity and truth for guiding principles; they despised luxury and pomp; they never aspired to high official rank; they were content with two provinces for estates, and they sternly repelled the effeminate, depraved customs of Kioto." Thus the greater part of the 13th century was, on the whole, a golden era for Japan, and the lower orders learned to welcome feudalism. Nevertheless no century furnished more conspicuous illustrations of the peculiarly Japanese system of vicarious government. Children occupied the position of shogun in Kamakura under authority emanating from children on the throne in Kioto; and members of the Hojo family as shikken administered affairs at the mandate of the child shoguns. Through all three stages in the dignities of mikado, shogun and shikken, the strictly regulated principle of heredity was maintained, according to which no Hojo shikken could ever become shogun; no Minamoto or Fujiwara could occupy the throne. At the beginning of the 14th century, how- ever, several causes combined to shake the supremacy of the Hojo. Under the sway of the ninth shikken (Takatoki), the austere simplicity of life and earnest discharge of executive duties which had distinguished the early chiefs of the family were

exchanged for luxury, debauchery and perfunctory government. Thus the management of fiscal affairs fell into the hands of Takasuke, a man of usurious instincts. It had been the wise custom of the H6jo constables to store grain in seasons of plenty, and distribute it at low prices in times of dearth. There occurred at this epoch a succession of bad harvests, but instead of opening the state granaries with benevolent liberality, Takasuke sold their contents at the highest obtainable rates; and, by way of contrast to the prevailing indigence, the people saw the constable in Kamakura affecting the pomp and extravagance of a sovereign waited upon by 37 mistresses, supporting a band of 2000 dancers, and keeping a pack of 5000 fighting dogs. The throne happened to be then occupied (1319-1338) by an emperor, Go-Daigo, who had reached full maturity before his accession, and was cor- respondingly averse from acting the puppet part assigned to the sovereigns of his time. Female influence contributed to his impatience. One of his concubines bore a son for whom he sought to obtain nomination as prince imperial, in defiance of an arrangement made by the Hojo that the succession should pass alternately to the senior and junior branches of the Imperial family. Kamakura refused to entertain Go-Daigo's project, and thenceforth the child's mother importuned her sovereign and lover to overthrow the Hojo. The entourage of the throne in Kioto at this time was a counterpart of former eras. The Fujiwara, indeed, wielded nothing of their ancient influence. They had been divided by the Hojo into five branches, each endowed with an equal right to the office of regent, and their strength was thus dissipated in struggling among themselves for the possession of the prize. But what the Fujiwara had done in their days of greatness, what the Taira had done during their brief tenure of power, the Saionji were now doing, namely, aspiring to furnish prime ministers and empresses from their own family solely. They had already given consorts to five emperors in succession, and jealous rivals were watching keenly to attack this clan which threatened to usurp the place long held by the most illustrious family in the land. A petty incident disturbed this state of very tender equilibrium before the plan of the Hojo's enemies had fully matured, and the emperor presently found himself an exile on the island of Oki. But there now appeared upon the scene three men of great prowess: Kusunoki Masashige, Nitta Yoshisada and Ashikaga Takauji. The first espoused from the outset the cause of the Throne and, though commanding only a small force, held the Hojo troops in check. The last two were both of Minamoto descent. Their common ancestor was Minamoto Yoshiiye, whose exploits against the northern Yemishi in the second half of the nth century had so impressed his countrymen that they gave him tne title of Hachiman Taro (first-

born of the god of war). Both men took the field originally in the cause of the Hojo, but at heart they desired to be avenged upon the latter for

disloyalty to the Minamoto. Nitta Yoshisada marched suddenly against Kamakura, carried it by storm and committed the city to the flames. Ashikaga Takauji occupied Kioto, and with the suicide of Takatoki the Hojo fell finally from rule after 115 years of supremacy (1219-1334). The emperor now returned from exile, and his son, Prince Moriyoshi, having been appointed to the office of shogun at Kamakura, the restoration of the administrative power to the Throne seemed an accomplished fact.

Go-Daigo, however, was not in any sense a wise sovereign. The extermination of the Hojo placed wide estates at his disposal, but instead of rewarding those who had deserved The well of him, he used a great part of them to enrich Ashikaga his favourites, the companions of his dissipation. Shoguns. Ashikaga Takauji sought just such an opportunity. The follow- ing year (1335) saw him proclaiming himself shogun at Kama- kura, and after a complicated pageant of incidents, the emperor Go-Daigo was obliged once more to fly from Kioto. He carried the regalia with him, refused to submit to Takauji, and declined to recognize his usurped title of shogun. The Ashikaga chief solved the situation by deposing Go-Daigo and placing upon the throne another scion of the imperial family who is known in history «.s Komyo (1336-1348), and who, of course, confirmed Takauji in the office of shogun. Thus commenced the Ashikaga line of shoguns, and thus commenced also a fifty-six-year period of divided sovereignty, the emperor Go-Daigo and his descen- dants reigning in Yoshino as the southern court (nancho), and the emperor Komyo and his descendants reigning in Kioto as the northern court (hokucho). It was by the efforts of the shogun Yoshimitsu, one of the greatest of the Ashikaga potentates, that this quarrel was finally composed, but during its progress the country had fallen into a deplorable condition. " The constitu- tional powers had become completely disorganized, especially in regions at a distance from the chief towns. The peasant was impoverished, his spirit broken, his hope of better things com- pletely gone. He dreamed away his miserable existence and left the fields untitled. Bands of robbers followed the armies through the interior of the country, and increased the feeling of lawlessness and insecurity. The coast population, especially that of the island of Kiushiu, had given itself up in a great measure to piracy. Even on the shores of Korea and China these enterprising Japanese corsairs made their appearance." The shogun Yoshimitsu checked piracy, and there ensued between Japan and China a renewal of cordial intercourse which, upon the part of the shogun, developed phases plainly suggesting an admission of Chinese suzerainty.

For a brief moment during the sway of Yoshimitsu the country had rest from internecine war, but immediately after his death (1394) the struggle began afresh. Many of the great territorial lords had now grown too puissant to concern themselves about either mikado or shogun. Each fought for his own hand, think- ing only of extending his sway and his territories.

By the middle of the 1 6th century Kioto was in ruins, and little vitality remained in any trade or industry except those that ministered to the wants of the warrior. Again in the case of the Ashikaga shoguns the political tendency to exercise power vicariously was shown, as it had been shown in the case of the mikados in Kioto and in the case of the Minamoto in Kamakura. What the regents had been to the emperors and the constables to the Minamoto shoguns, that the wardens (kwanryo) were to the Ashikaga shoguns. Therefore, for possession of this office of kwanryo vehement conflicts were waged, and at one time five rival shoguns were used as figure-heads by contending factions. Yoshimitsu had apportioned an ample allowance for the support of the Imperial court, but in the continuous warfare following his death the estates charged with the duty of paying this allowance ceased to return any revenue; the court nobles had to seek shelter and sustenance with one or other of the feudal chiefs in the provinces, and the court itself was reduced to such a state of indigence that when the emperor Go-Tsuchi died (150°),

his corpse lay for forty days awaiting burial, no funds being available for purposes of sepulture.

Alone among the vicissitudes of these troublous times the strength and influence of Buddhism grew steadily. The great monasteries were military strongholds as well as places of worship. When the emperor Kwammu chose Kioto for his capital, he established on the hill of Hiyei-zan, which lay north-east of the city, a magnificent temple to ward off the evil influences supposed to emanate from that quarter. Twenty years later, Kobo, the most famous of all Japanese Buddhist saints, founded on Koya-san in Yamato a monastery not less important than that of Hiyei-zan. These and many other temples had large tax-free estates, and for the protection of their property they found it expedient to train and arm the cenobites as soldiers. From that to taking active part in the political struggles of the time was but a short step, especially as the great temples often became refuges of sovereigns and princes who, though nominally forsaking the world, retained all their interest, and even continued to take an active part, in its vicissitudes. It is recorded of the emperor Shirakawa (1073-1086) that the three things which he declared his total inability to control were the waters of the river Kamo, the fall of the dice, and the monks of Buddha. His successors might have confessed equal inability. Kiyomori, the puissant chief of the Taira family, had fruitlessly essayed to

defy the Buddhists; Yoritomo, in the hour of his most signal triumph, thought it wise to placate them. Where these representatives of centralized power found themselves impotent, it may well be supposed that the comparatively petty chieftans who fought each for his own hand in the 15th and 16th centuries were in- capable of accomplishing anything. In fact, the task of central- izing the administrative power, and thus restoring peace and order to the distracted empire, seemed, at the middle of the 16th century, a task beyond achievement by human capacity.

But if ever events create the men to deal with them, such was the case in the second half of that century. Three of the n b a a greatest captains and statesmen in Japanese history Hideyoshi appeared upon the stage simultaneously, and more- and over worked in union, an event altogether incon-

tyeyasu. s i s tent with the nature of the age. They were Oda Nobunaga, Hideyoshi (the taiko) and Tokugawa Iyeyasu. Nobunaga belonged to the Taira family and was originally ruler of a small fief in the province of Owari. Iyeyasu, a sub-feudatory of Nobunaga's enemy, the Rowerful daimyo 1 of Mikawa and two other provinces, was a scion of the Minamoto and therefore eligible for the shogunate. Hideyoshi was a peasant's son, equally lacking in patrons and in personal attrac- tions. No chance seemed more remote than that such men, above all Hideyoshi, could possibly rise to supreme power. On the other hand, one outcome of the commotion with which the country had seethed for more than four centuries was to give special effect to the principle of natural selection. The fittest alone surviving, the qualities that made for fitness came to take precedence of rank or station, and those qualities were prowess in the battle-field and wisdom in the statesman's closet. " Any plebeian that would prove himself a first-class fighting man was willingly received into the armed comitatus which every feudal potentate was eager to attach to himself and his flag." It was thus that Hideyoshi was originally enrolled in the ranks of Nobunaga's retainers.

Nobunaga, succeeding to his small fief in Owari in 1542, added to it six whole provinces within 25 years of continuous endeavour. Being finally invited by the emperor to undertake the pacifica- tion of the country, and appealed to by Yoshiaki, the last of the Ashikaga chiefs, to secure for him the shogunate, he marched into Kioto at the head of a powerful army (1568), and, having accom- plished the latter purpose, was preparing to complete the former when he fell under the sword of a traitor. Throughout his brilliant career he had the invaluable assistance of Hideyoshi, who would have attained immortal fame on any stage in any era. Hideyoshi entered Nobunaga's service as a groom and ended by administering the whole empire. When he accompanied 1 Daimyo ("great name") was the

title given to a feudal chief.

Nobunaga to Kioto in obedience to the invitation of the mikado, Okimachi, order and tranquillity were quickly restored in the capital and its vicinity. But to extend this blessing to the whole country, four powerful daimyos as well as the militant monks had still to be dealt with. The monks had from the outset sheltered and succoured Nobunaga's enemies, and one great prelate, Kenryo, hierarch of the Monto sect, whose headquarters were at Osaka, was believed to aspire to the throne itself. In 1571 Nobunaga attacked and gave to the flames the celebrated monastery of Hiyei-zan, established nearly eight centuries pre- viously; and in 1580 he would have similarly served the splendid temple Hongwan-ji in Osaka, had not the mikado sought and obtained grace for it. The task then remained of subduing four powerful daimyos, three in the south and one in the north-east, who continued to follow the bent of their own warlike ambitions without paying the least attention to either sovereign or shogun. The task was commenced by sending an army under Hideyoshi against Mori of Choshu, whose fief lay on the northern shore of the Shimonoseki strait. This proved to be the last enterprise planned by Nobunaga. On a morning in June 1582 one of the corps intended to reinforce Hideyoshi's army marched out of Kameyama under the command of Akechi Mitsuhide, who either harboured a personal grudge against Nobunaga or was swayed by blind ambition. Mitsuhide suddenly changed the route of his troops, led them to Kioto, and attacked the temple Honn6-ji where Nobunaga was sojourning all unsuspicious of treachery. Rescue and resistance being alike hopeless, the great soldier committed suicide. Thirteen days later, Hideyoshi, having concluded peace with Mori of Choshu, fell upon Mitsuhide's forces and shattered them, Mitsuhide himself being killed by a peasant as he fled from the field.

Nobunaga's removal at once made Hideyoshi the most con- spicuous figure in the empire, the only man with any claim to dispute that title being Tokugawa Iyeyasu. These two had hitherto worked in concert. But the ques- y tion of the succession to Nobunaga's estates threw the country once more into tumult. He left two grown-up sons and a baby grandson, whose father, Nobunaga's first-born, had perished in the holocaust at Honno-ji. Hideyoshi, not unmindful, it may be assumed, of the privileges of a guardian, espoused the cause of the infant, and wrested from Nobunaga's three other great captains a reluctant endorsement of bis choice. Nobutaka, third son of Nobunaga, at once drew the sword, which he presently had to turn against his own person; two years later (1584), his elder brother, Nobuo, took the field under the aegis of Tokugawa Iyeyasu. Hideyoshi and Iyeyasu, now pitted against each other for the first time, were found to be of equal prowess, and being too wise to prolong a useless war, they reverted to their old alliance, subsequently confirming it by a family union, the son

of Iyeyasu being adopted by Hideyoshi and the latter's daughter being given in marriage to Iyeyasu. Hideyoshi had now been invested by the mikado with the post of regent, and his position in the capital was omnipotent. He organized in Ki5to a mag- nificent pageant, in which the principal figures were himself, Iyeyasu, Nobuo and twenty-seven daimyos. The emperor was present. Hideyoshi sat on the right of the throne, and all the nobles did obeisance to the sovereign. Prior to this event Hideyoshi had conducted against the still defiant daimyos of Kiushiu, especially Shimazu of Satsuma, the greatest army ever massed by any Japanese general, and had reduced the island of the nine provinces, not by weight of armament only, but also by a signal exercise of the wise clemency which distinguished him from all the statesmen of his era.

The whole of Japan was now under Hideyoshi's sway except the fiefs in the extreme north and those in the region known as the KwantO, namely, the eight provinces forming the eastern elbow of the main island. Seven of these provinces were virtu- ally under the sway of Hojo Ujimasa, fourth representative of a family established in 1476 by a brilliant adventurer of Ise, not related in any way to the great but then extinct house of Kama-kura HojSs. The daimyos in the north were comparatively powerless to resist Hideyoshi, but to reach them the Kwanto had

to be reduced, and not only was its chief, Ujimasa, a formidable foe, but also the topographical features of the district represented fortifications of immense strength. After various unsuccessful overtures, having for their purpose to induce Ujimasa to visit the capital and pay homage to the emperor, Hideyoshi marched from Kioto in the spring of 1590 at the head of 170,000 men, his colleagues Nobuo and Iyeyasu having under their orders 80,000 more. The campaign ended as did all Hideyoshi's enterprises, except that he treated his vanquished enemies with unusual severity. During the three months spent investing Odawara, the northern daimyos surrendered, and thus the autumn of 1 590 saw Hideyoshi master of Japan from end to end, and saw Tokugawa Iyeyasu established at Yedo as recognized ruler of the eight provinces of the Kwanto. These two facts should be bracketed together, because Japan's emergence from the deep gloom of long-continued civil strife was due not more to the brilliant qualities of Hideyoshi and Iyeyasu individually than to the fortunate synchronism of their careers, so that the one was able to carry the other's work to completion and permanence. The last eight years of Hideyoshi's

life— he died in 1598 — were chiefly remarkable for his attempt to invade China through Korea, and for his attitude towards Christianity (see § VIII.: Foreign Intercourse).

The Tokugawa Era. — When Hideyoshi died he left a son, Hideyori, then only six years of age, and the problem of this child's future had naturally caused supreme solicitude to the peasant statesman. He finally entrusted the care of the boy and the management of state affairs to five regents, five ministers, and three intermediary councillors. But he placed chief reliance upon Iyeyasu, whom he appointed president of the board of regents. Among the latter was one, Ishida Mitsunari, who to insatiable ambition added an extraordinary faculty for intrigue and great personal magnetism. These qualities he utilized with such success that the dissensions among the daimyos, which had been temporarily composed by Hideyoshi, broke out again, and the year 1600 saw Japan divided into two camps, one composed of Tokugawa Iyeyasu and his allies, the other of Ishida Mitsunari and his partisans.

The situation of Iyeyasu was eminently perilous. From his position in the east of the country, he found himself menaced Iyeyasu. by tw0 P ow erful enemies on the north and on the south, respectively, the former barely contained by a greatly weaker force of his friends, and the latter moving up in seemingly overwhelming strength from Kioto. He decided to hurl himself upon the southern army without awaiting the result of the conflict in the north. The encounter took place at Sekigahara in the province of Mino on the 21st of October 1600. The army of Iyeyasu had to move to the attack in such a manner that its left flank and its left rear were threatened by divisions of the enemy posted on commanding eminences. But with the leaders of these divisions Iyeyasu had come to an under- standing by which they could be trusted to abide so long as victory did not declare against him. Such incidents were naturally common in an era when every man fought for his own hand. The southerners suffered a crushing defeat. The survivors fled pell-mell to Osaka, where in a colossal fortress, built by Hideyoshi, his son, Hideyori, and the latter's mother, Yodo, were sheltered behind ramparts held 80,000 men. Hideyori's cause had been openly put forward by Ishida Mit- sunari and his partisans, but Iyeyasu made no immediate attempt to visit the sin upon the head of his deceased benefac- tor's child. On the contrary, he sent word to the lady Yodo and her little boy that he absolved them of all complicity. The battle of Sekigahara is commonly spoken of as having terminated the civil war which had devastated Japan, with brief intervals, from the latter half of the 12th century to the beginning of the 17th. That is incorrect in view of the fact that Sekigahara was followed by other fighting, especially by the terrible conflict at Osaka in 161 5 when Yodo and her son perished. But Seki- gahara's importance cannot be over-rated. For had Iyeyasu been finally

crushed there, the wave of internecine strife must have rolled again over the empire until providence provided another

Hideyoshi and another Iyeyasu to stem it. Sekigahara, there- fore, may be truly described as a turning-point in Japan's career and as one of the decisive battles of the world. As for the fact that the Tokugawa leader did not at once proceed to extremities in the case of the boy Hideyori, though the events of the Sekigahara campaign had made it quite plain that such a course would ultimately be inevitable, we have to remember that only two years had elapsed since Hideyoshi was laid in his grave. His memory was still green and the glory of his achieve- ments still enveloped his family. Iyeyasu foresaw that to carry the tragedy to its bitter end at once must have forced into Hide- yori's camp many puissant daimyos whose sense of allegiance would grow less cogent with the lapse of time. When he did lay siege to the Osaka castle in 161 5, the power of the Tokugawa was wellnigh shattered against its ramparts; had not the onset been aided by treachery, the stronghold would probably have proved impregnable.

But signal as were the triumphs of the Tokugawa chieftain in the field, what distinguishes him from all his predecessors is the ability he displayed in consolidating his conquests. The im- mense estates that fell into his hands he parcelled out in such a manner that all important strategical positions were held by daimyos whose fidelity could be confidently trusted, and every feudatory of doubtful loyalty found his fief within touch of a Tokugawa partisan. This arrangement, supplemented by a system which required all the great daimyos to have mansions in the shogun's capital. Yedo, to keep their families there always and to reside there themselves in alternate years, proved so potent a check to disaffection that from 1615, when the castle of Osaka fell, until 1864, when the Choshu ronin attacked Kioto, Japan remained entirely free from civil war.

It is possible to form a clear idea of the ethical and adminis- trative principles by which Iyeyasu and the early Tokugawa chiefs were guided in elaborating the system which gave to Japan an unprecedented era of peace and prosperity. Evidence is furnished not only by the system itself but also by the con- tents of a document generally called the Testament of Iyeyasu, though probably it was not fully compiled until the time of his grandson, Iyemitsu (1623-1650). The great Tokugawa chief, though he munificently patronized Buddhism and though he carried constantly in his bosom a miniature Buddhist image to which he ascribed all his success in the field and his safety in battle, took his ethical code from Confucius. He held that the basis of all legislation and administration should be the five relations of sovereign and subject, parent and child, husband and wife, brother and sister, friend and friend. The family was, in his eyes, the essentia] foundation of society, to be main- tained at all sacrifices. Beyond these

broad outlines of moral duty it was not deemed necessary to instruct the people. There- fore out of the hundred chapters forming the Testament only 22 contain what can be called legal enactments, while 55 relate to administration and politics; 16 set forth moral maxims and reflections, and the remainder record illustrative episodes in the career of the author. " No distinct line is drawn between law and morals, between the duty of a citizen and the virtues of a member of a family. Substantive law is entirely wanting, just as it was wanting in the so-called constitution of Prince Shotoku. Custom, as sanctioned by public observance, must be complied with in the civil affairs of life. What required minute exposition was criminal law, the relations of social classes, etiquette, rank, precedence, administration and government.

Society under feudalism had been moulded into three sharply defined groups, namely, first, the Throne and the court nobles (kuge) ; secondly, the military class (buke or samurai) ; social dls- and thirdly, the common people (heimin). These lines tinctioasln of cleavage were emphasized as much as possible tbe Toku- by the Tokugawa rulers. The divine origin of the gawa "" mikado was held to separate him from contact with mundane affairs, and he was therefore strictly secluded in the palace at Kioto, his main function being to mediate between his heavenly ancestors and his subjects, entrusting to the shogun and the samurai the duty of transacting all worldly business on behalf

Dalmybs.

of the state. In obedience to this principle the mikado became a kind of sacrosanct abstraction. No one except his consorts and his chief ministers ever saw his face. In the rare cases when he gave audience to a privileged subject, he sat behind a curtain, and when he went abroad, he rode in a closely shut car drawn by oxen. A revenue of ten thousand koku of rice — the equivalent of about as many guineas — was apportioned for his support, and the right was reserved to him of conferring empty titles upon the living and rank upon the dead. His majesty had one wife, the empress (kogo), necessarily taken from one of the five chosen families (go-sekke) of the Fujiwara, but he might also have twelve consorts, and if direct issue failed, the succession passed to one of the two princely families of Arisugawa and Fushimi, adoption, however, being possible in the last resort. The kuge constituted the court nobility, consisting of 155 families all

of whom traced their lineage to ancient mikados; they ranked far above the feudal chiefs, not excepting even the shogun; filled by right of heredity nearly all the offices at the court, the emoluments attached being, however, a mere pittance; were entirely without the great estates which had belonged to them in ante-feudal times, and lived lives of proud poverty, occupying themselves with the study of literature and the practice of music and art. After the kuge and at a long distance below them in theoretical rank came the military families, who, as a class, were called buke or samurai. They had hereditary revenues, and they filled the administrative posts, these, too, being often hereditary. The third, and by far the most numerous, section of the nation were the commoners {heimin). They had no social status; were not allowed to carry swords, and possessed no income except what they could earn with their hands. About 55 in every 1000 units of the nation were samurai, the latter's wives and children being included in this estimate.

Under the Hojo and the Ashikaga shoguns the holders of the great estates changed frequently according to the vicissi- tudes of those troublesome times, but under the Tokugawa no change took place, and there thus grew up a landed nobility of the most permanent character. Every one of these estates was a feudal kingdom, large or small, with its own usages and its own laws, based on the general principles above indicated and liable to be judged according to those principles by the shogun's government (baku-fu) inYedo. A daimyo or feudal chief drew from the peasants on his estate the means of subsistence for himself and his retainers. For this purpose the produce of his estate was assessed by the shogun's officials in koku (one koku = 180-39 litres, worth about £1), and about one-half of the assessed amount went to the feudatory, the other half to the tillers of the soil. The richest daimyo was Mayeda of Kaga, whose fief was assessed at a little over a million koku, his revenue thus being about half a million sterling. Just as an empress had to be taken from one of five families designated to that distinction for all time, so a successor to the shogunate, failing direct heir, had to be selected from three families (sanke), namely, those of the daimyos of Owari, Kii and Mito, whose first representatives were three sons of Iyeyasu. Out of the total body of 255 daimyos existing in the year 1862, 141 were specially distinguished as fudai, or hereditary vassals of the Tokugawa house, and to 18 of these was strictly limited the perpetual privilege of filling all the high offices in the Yedo administration, while to 4 of them was reserved the special honour of supplying a regent (go-tairo) during the minority of the shogun. Moreover, a fudai daimyo was of necessity appointed to the command of the fortress of Nijo in Kioto as well as of the great castles of Osaka and Fushimi, which Iyeyasu designated the keys of the country. No intermarriage might take place between members of the court nobility and the feudal houses without the consent of Yedo; no

daimyo might apply direct to the emperor for an official title, or might put foot within the imperial district of Kioto without the shogun's permit, and at all entrances to the region known as the Kwanto there were established guard- houses, where every one, of whatever rank, must submit to be examined, in order to prevent the wives and children of the

daimyos from secretly leaving Yedo for their own provinces. In their journeys to and from Yedo every second year the feudal chiefs had to travel by one of two great highways, the Tokaido or the Nakasendo, and as they moved with great retinues, these roads were provided with a number of inns and tea-houses equipped in a sumptuous manner, and having an abundance of female servants. A puissant daimyo's procession often numbered as many as 1000 retainers, and nothing illustrates more forcibly the wide interval that separated the soldier and the plebeian than the fact that at the appearance of the heralds who preceded these progresses all commoners who happened to be abroad had to kneel on the ground with bowed and uncovered heads; all wayside houses had to close the shutters of windows giving on the road, and none might venture to look down from a height on the passing magnate. Any violation of these rules of etiquette exposed the violator to instant death at the hands of the daimyo's retinue. Moreover, the samurai and the heimin lived strictly apart. A feudal chief had a castle which generally occupied a commanding position. It was surrounded by from one to three broad moats, the innermost crowned with a high wall of huge cut stones, its trace arranged so as to give flank defence, which was further provided by pagoda-like towers placed at the salient angles. Inside this wall stood the houses of the high officials on the outskirts of a park surrounding the residence of the daimyo himself, and from the scarps of the moats or in the intervals between them rose houses for the military retainers, barrack-like structures, provided, whenever possible, with small but artistically arranged and carefully tended gardens. All this domain of the military was called yashiki in distinction to the machi (streets) where the despised commoners had their habitat.

The general body of the samurai received stipends and lived frugally. Their pay was not reckoned in money: it took the form of so many rations of rice delivered from their chief's granaries. A few had landed estates, usually bestowed in recognition of conspicuous merit. They were probably the finest type of hereditary soldiers the world ever produced. Money and all devices for earning it they pro- foundly despised. The right of wearing a sword was to them the highest conceivable privilege. They counted themselves the guardians of their fiefs' honour and of their country's welfare. At any moment they were prepared cheerfully to sacrifice their lives on the altar of loyalty. Their word, once given, must never be violated. The slightest insult to their honour might not be condoned. Stoicism was a quality which they esteemed next to courage : all outward display of emotion must be

suppressed. The sword might never be drawn for a petty cause, but, if once drawn, must never be returned to its scabbard until it had done its duty. Martial exercises occupied much of their attention, but book learning also they esteemed highly. They were pro- foundly courteous towards each other, profoundly contemptuous towards the commoner, whatever his wealth. Filial piety ranked next to loyalty in their code of ethics. Thus the Confucian maxim, endorsed explicitly in the Testament of Iyeyasu, that a man must not live under the same sky with his father's mur- derer or his brother's slayer, received most literal obedience, and many instances occurred of vendettas pursued in the face of apparently insuperable difficulties and consummated after years of effort. By the standard of modern morality the Japanese samurai would be counted cruel. Holding that death was the natural sequel of defeat and the only certain way of avoiding disgrace, he did not seek quarter himself or think of extending it to an enemy. Yet in his treatment of the latter he loved to dis- play courtesy until the supreme moment when all considerations of mercy were laid aside. It cannot be doubted that the prac- tice of employing torture judicially tended to educate a mood of callousness towards suffering, or that the many idle hours of a military man's life in time of peace encouraged a measure of dissipation. But there does not seem to be any valid ground for concluding that either of these defects was conspicuous in the character of the Japanese samurai. Faithlessness towards women was the greatest fault that can be laid to his door. The

tielmln.

samurai lady claimed no privilege of timidity on account of her sex. She knew how to die in the cause of honour just as readily as her husband, her father or her brother died, and conjugal fidelity did not rank as a virtue in her eyes, being regarded as a simple duty. But her husband held marital faith in small esteem and ranked his wife far below his sword. It has to be remembered that when we speak of a samurai's suicide, there is no question of poison, the bullet, drowning or any comparatively painless manner of exit from the world. The invariable method was to cut open the abdomen (hara-kiri or seppuku) and after- wards, if strength remained, the sword was turned against the throat. To such endurance had the samurai trained himself that he went through this cruel ordeal without flinching in the smallest degree.

The heimin or commoners were divided into three classes — husbandmen, artisans and traders. The farmer, as the nation lived by his labour, was counted the most respect- able among the bread-winners, and a cultivator of his own estate might even carry one sword but never two, that privilege being strictly reserved to a samurai. The artisan, too, received much consideration, as is easily understood when we remember that included in his ranks were artists, sword- smiths, armourers, sculptors of sacred images or sword-furniture, ceramists and lacquerers. Many artisans were in the permanent service of feudal chiefs from whom they received fixed salaries. Tradesmen, however, were regarded with disdain and stood lowest of all in the social organization. Too much despised to be even included in that organization were the eta (defiled folks) and the hinin (outcasts). The exact origin of these latter pariahs is uncertain, but the ancestors of the eta would seem to have been prisoners of war or the enslaved families of criminals. To such people were assigned the defiling duties of tending tombs, disposing of the bodies of the dead, slaughtering animals or tanning hides. The hinin were mendicants. On them devolved the task of removing and burying the corpses of executed crimi- nals. Living in segregated hamlets, forbidden to marry with heimin, still less with samurai, not allowed to eat, drink or associate with persons above their own class, the eta remained under the ban of ostracism from generation to generation, though many of them contrived to amass much wealth. They were governed by their own headmen, and they had three chiefs, one residing in each of

the cities of Yedo, Osaka and Kioto. All these members of the submerged classes were relieved from proscription and admitted to the ranks of the commoners under the enlightened system of Meiji. The 12th of October 1871 saw their enfranchisement, and at that date the census showed 287,111 eta and 695,689 hinin.

Naturally, as the unbroken peace of the Tokugawa regime

became habitual, the mood of the nation underwent a change.

Dec/toe and The samurai, no longer required to lead the frugal

Fallot the life of camp or barracks, began to live beyond their

ShSpinate. ; ncomes » They found difficulty in meeting the

pecuniary engagements of everyday existence, so that money

acquired new importance in their eyes, and they gradually

forfeited the respect which their traditional disinterestedness

had won for them in the past." At the same time the

abuses of feudalism were thrown into increased salience. A

large body of hereditary soldiers become an anomaly when

fighting has passed even out of memory. On the other

hand, the agricultural and commercial classes acquired new

importance. The enormous sums disbursed every year in

Yedo, for the maintenance of the great establishments

which the feudal chiefs vied with each other in keeping there,

enriched the merchants and traders so greatly that their

scale of living underwent radical change. Buddhism was a

potent influence, but its ethical restraints were weakened by

the conduct of its priests, who themselves often yielded to the

temptation of the time. The aristocracy adhered to its refined

pastimes — performances of the No ; tea reunions; poem

composing; polo; football; equestrian archery; fencing and

gambling— but the commoner, being excluded from all this

realm and, at the same time, emerging rapidly from his old

position of penury and degradation, began to develop luxurious proclivities and to demand corresponding amusements. Thus the theatre came into existence; the dancing girl and the jester found lucrative employment; a popular school of art was founded and quickly carried to perfection; the lupanar assumed unprecedented dimensions; rich and costly costumes acquired wide vogue in despite of sumptuary laws enacted from time to time; wrestling became an important institution, and plutocracy asserted itself in the face of caste distinctions.

Simultaneously with the change of social conditions thus taking place, history repeated itself at the shogun's court. The substance of administrative power passed into the hands of a minister, its shadow alone remaining to the shogun. During only two generations were the successors of Iyeyasu able to resist this traditional tendency. The representative of the third — Iyetsuna (1 661- 1680) — succumbed to the machinations of an ambitious minister, Sakai Takakiyo, and it may be said that from that time the nominal repository of administrative authority in Yedo was generally a species of magnificent recluse, secluded from contact with the outer world and seeing and hearing only through the eyes and ears of the ladies of his household. In this respect the descendants of the great Tokugawa statesman found themselves reduced to a position precisely analogous to that of the emperor in Kioto. Sovereign and shogun were alike mere abstractions so far as the practical work of government was concerned. With the great mass of the feudal chiefs things fared similarly. These men who, in the days of Nobunaga, Hideyoshi and Iyeyasu, had directed the policies of their fiefs and led their armies in the field, were gradually trans- formed, during the long peace of the Tokugawa era, into volup- tuous faineants or, at best, thoughtless dilettanti, willing to abandon the direction of their affairs to seneschals and mayors, who, while on the whole their administration was able and loyal, found their account in contriving and perpetuating the effacement of their chiefs. Thus, in effect, the government of the country, taken out of the hands of the shSgun and the feudatories, fell into those of their vassals. There were excep- tions, of course, but so rare as to be merely accidental.

Another important factor has to be noted. It has been shown above that Iyeyasu bestowed upon his three sons the rich fiefs of Owari, Kii (Kishu)

and Mito, and that these three families exclusively enjoyed the privilege of furnishing an heir to the shogun should the latter be without direct issue. Mito ought therefore to have been a most unlikely place for the conception and propagation of principles subversive of the shOgun's administrative autocracy. Nevertheless, in the days of the second of the Mito chiefs at the close of the 17th century, there arose in that province a school of thinkers who, revolting against the ascendancy of Chinese literature and of Buddhism, devoted themselves to compiling a history such as should recall the attention of the nation to its own annals and revive its allegiance to Shinto. It would seem that in patronizing the compilation of this great work the Mito chief was swayed by the spirit of pure patriotism and studentship, and that he discerned nothing of the goal to which the new researches must lead the litterati of his fief. " He and they, for the sake of history and without any thought of politics, undertook a retroˆ spect of their country's annals, and their frank analysis furnished conclusive proof that the emperor was the prime source of administrative authority and that its independent exercise by a shogun must be regarded as a usurpation. They did not attempt to give practical effect to their discoveries; the era was essentially academical. But this galaxy of scholars projected into the future a light which burned with growing force in each succeeding generation and ultimately burst into a flame which consumed feudalism and the shogunate," fused the nation into one, and restored the governing authority to the emperor. Of course the Mito men were not alone in this matter: many students subsequently trod in their footsteps and many others sought to stem the tendency; but the net result was fatal to faith in the dual system of government. Possibly had nothing occurred to furnish signal proof of the system's practical defects,

it might have long survived this theoretical disapproval. But the crisis caused by the advent of foreign ships and by the forceful renewal of foreign intercourse in the 19th century afforded convincing evidence of the shogunate's incapacity to protect the state's supposed interests and to enforce the tradi- tional policy of isolation which the nation had learned to con- sider essential to the empire's integrity.

Another important factor made for the fall of the shSgunate. That factor was the traditional disaffection of the two great southern fiefs, Satsuma and Choshu. When Iyeyasu parcelled out the empire, he deemed it the wisest policy to leave these chieftains in full possession of their large

estates. But this measure, construed as an evidence of weakness rather than a token of liberality, neither won the allegiance of the big feudatories nor cooled their ambition. Thus no sooner did the nation divide into two camps over the question of renewed foreign intercourse than men of the above clans, in concert with representatives of certain of the old court nobles, placed themselves at the head of a movement animated by two loudly proclaimed purposes: restoration of the administration to the emperor, and expulsion of aliens. This latter aspiration under- went a radical change when the bombardment of the Satsuma capital, Kagoshima, and the destruction of the Choshu forts and ships at Shimonoseki proved conclusively to the Satsuma and Choshu clans that Japan in her unequipped and backward condition could not hope to stand for a moment against the Occident in arms. But the unwelcome discovery was accompanied by a conviction that only a thoroughly united nation might aspire to preserve its independence, and thus the abolition of the dual form of government became more than ever an article of public faith. It is unnecessary to recount the suc- cessive incidents which conspired to undermine the shogun's authority, and to destroy the prestige of the Yedo administration. Both had been reduced to vanishing quantities by the year 1866 when Keiki succeeded to the shogunate.

Keiki, known historically as Yoshinobu, the last of the shoguns, was a man of matured intellect and high capacities. He had been put forward by the anti-foreign Conservatives for the succession to the shogunate in 1857 when the complica- tions of foreign intercourse were in their first stage of acuteness. But, like many other intelligent Japanese, he had learned, in the interval between 1857 and 1866, that to keep her doors closed was an impossible task for Japan, and very quickly after taking the reins of office he recognized that national union could never be achieved while power was divided between Kioto and Yedo. At this juncture there was addressed to him by Yodo, chief of the great Tosa fief, a memorial setting forth the hopelessness of the position in which the Yedo court now found itself, and urging that, in the interests of good government and in order that the nation's united strength might be available to meet the exigencies of its new career, the administration should be restored to the emperor. Keiki received this memorial in Kioto. He immediately summoned a council of all the feudatories and high officials then in the Imperial city, announced to them his intention to lay down his office, and, the next day, presented his resignation to the sovereign. This happened on the 14th of October 1867. It must be ranked among the signal events of the world's history, for it signified the voluntary surrender of kingly authority wielded uninterruptedly for nearly three centuries. That the shogun's resignation was tendered in good faith there can be no doubt, and had it been accepted in the same spirit, the great danger it involved might have been consum-

mated without bloodshed or disorder. But the clansmen of Satsuma and Chdshu were distrustful. One of the shogun's first acts after assuming office had been to obtain from the throne an edict for imposing penalties on Ch6shQ, and there was a precedent for suspecting that the renunciation of power by the shogun might merely prelude its resumption on a firmer basis. Therefore steps were taken to induce the emperor, then a youth of fifteen, to issue a secret rescript to Satsuma and Choshu, denouncing the shogun as the nation's enemy and

enjoining his destruction. At the same time all officials con- nected with the Tokugawa or suspected of sympathy with them were expelled from office in Kioto, and the shogun's troops were deprived of the custody of the palace gates by methods which verged upon the use of armed force. In the face of such provocation Keiki 's earnest efforts to restrain the indignation of his vassals and adherents failed. They marched against Kioto and were defeated, whereupon Keiki left his castle at Osaka and retired to Yedo, where he subsequently made unconditional surrender to the Imperial army. There is little more to be set down on this page of the history. The Yedo court consented to lay aside its dignities and be stripped of its administrative authority, but all the Tokugawa vassals and adherents did not prove equally placable. There was resist- ance in the northern provinces, where the Aizu feudatory refused to abandon the Tokugawa cause; there was an attempt to set up a rival candidate for the throne in the person of an Imperial prince who presided over the Uyeno Monastery in Yedo; and there was a wild essay on the part of the admiral of the shogun's fleet to establish a republic in the island of Yezo. But these were mere ripples on the surface of the broad stream which set towards the peaceful overthrow of the dual system of government and ultimately towards the fall of feudalism itself. That this system, the outcome of five centuries of nearly continuous warfare, was swept away in almost as many weeks with little loss of life or destruction of property consti- tutes, perhaps, the most striking incident, certainly the most momentous, in the history of the Japanese nation.

The Meiji Era. — It must be remembered that when refer- ence is made to the Japanese nation in connexion with these radical changes, only the nobles and the samurai are indicated — in other words, a section of the population representing about one-sixteenth of the whole. The bulk of the people — the agricultural, the industrial and the mercantile classes — remained outside the sphere of politics, not sharing the anti-foreign preju- dice, or taking any serious interest in the great questions of the time. Foreigners often noted with surprise the contrast be- tween the fierce antipathy displayed towards them by certain samurai on the one hand, and the genial, hospitable reception given to them by the common people on the other. History teaches that the latter was the natural disposition of the

Japanese, the former a mood educated by special experiences. Further, even the comparatively narrow statement that the restoration of the administrative power to the emperor was the work of the nobles and the samurai must be taken with limitations. A majority of the nobles entertained no idea of any necessity for change. They were either held fast in the vice of Tokugawa authority, or paralyzed by the sensuous seductions of the lives provided for them by the machinations of their retainers, who transferred the administrative authority of the fiefs to their own hands, leaving its shadow only to their lords. It was among the retainers that longings for a new order of things were gene- rated. Some of these men were sincere disciples of progress — a small band of students and deep thinkers who, looking through the narrow Dutch window at Deshima, had caught a glimmering perception of the realities that lay beyond the horizon of their country's prejudices. But the influence of such Liberals was comparatively insignificant. Though they showed remarkable moral courage and tenacity of purpose, the age did not furnish any strong object lesson to enforce their propaganda of progress. The factors chiefly making for change were, first, the ambition of the southern clans to oust the Tokugawa, and, secondly, the samurai's loyal instinct, reinforced by the teachings of his country's history, by the revival of the Shint5 cult, by the promptings of national enterprise, and by the object-lessons of foreign intercourse.

*But though essentially imperialistic in its prime purposes, the revolution which involved the fall of the shSgunate, and ultimately of feudalism, may be called democratic with cturmcter regard to the personnel of those who planned and""** directed it. They were, for the most part, men with- ° "" out either official rank or social standing. That is a point essential*

to a clear understanding of the issue. Fifty-five individuals may be said to have planned and carried out the overthrow of the Yedo administration, and only five of them were territorial nobles. Eight, belonging to the court nobility, laboured under the traditional disadvantages of their class, poverty and political insignificance; and the remaining forty-two, the hearts and hands of the movement, may be described as ambitious youths, who sought to make a career for themselves in the first place, and for their country in the second. The average age of the whole did not exceed thirty. There was another element for which any student of Japanese history might have been prepared: the Satsuma samurai aimed originally not

merely at overthrowing the Tokugawa but also at obtaining the shogunate for their own chief. Possibly it would be unjust to say that all the leaders of the great southern clan harboured that idea. But some of them certainly did, and not until they had consented to abandon the project did their union with Choshu, the other great southern clan, become possible— a union without which the revolution could scarcely have been accomplished. This ambition of the Satsuma clansmen deserves special mention, because it bore remarkable fruit; it may be said to have laid the foundation of constitutional government in Japan. For, in consequence of the distrust engendered by such aspirations, the authors of the Restoration agreed that when the emperor assumed the reins of power, he should solemnly pledge himself to convene a deliber- ative assembly, to appoint to administrative posts men of intellect and erudition wherever they might be found, and to decide all measures in accordance with public opinion. This promise, referred to frequently in later times as the Imperial oath at the Restoration, came to be accounted the basis of repre- sentative institutions, though in reality it was intended solely as a guarantee against the political ascendancy of any one clan. At the outset the necessity of abolishing feudalism did not present itself clearly to the leaders of the revolution. Their sole idea was the unification of the nation. But feudaUdea. wnen tne y came to consider closely the practical side of the problem, they understood how far it would lead them. Evidently that one homogeneous system of law should replace the more or less heterogeneous systems operative in the various fiefs was essential, and such a substitution meant that the feudatories must be deprived of their local autonomy and, incidentally, of their control of local finances. That was a stupendous change. Hitherto each feudal chief had collected the revenues of his fief and had em- ployed them at will, subject to the sole condition of maintaining a body of troops proportionate to his income. He had been, and was still, an autocrat within the limits of his territory. On the other hand, the active authors of the revolution were a small band of men mainly without prestige or territorial influence. It was impossible that they should dictate any measure sensibly impairing the local and fiscal autonomy of the feudatories. No power capable of enforcing such a measure existed at the time. All the great political changes in Japan had formerly been preceded by wars culminating in the accession of some strong clan to supreme authority, whereas in this case there had been a displacement without a substitution — the Tokugawa had been overthrown and no new administrators had been set up in their stead. It was, moreover, certain that an attempt on the part of any one clan to constitute itself executor of the sovereign's mandates would have stirred the other clans to vehement resist- ance. In short, the leaders of the revolution found themselves pledged to a new theory of government without any machinery for carrying it into effect, or any means of abolishing the old practice. An ingenious exit from

this curious dilemma was devised by the young reformers. They induced the feudal chiefs of Satsuma, Ch5shu, Tosa and Hizen, the four most powerful clans in the south, publicly to surrender their fiefs to the emperor, praying his majesty to reorganize them and to bring them all under the same system of law. In the case of Shimazu, chief of Satsuma, and Yodo, chief of Tosa, this act must stand to their credit as a noble sacrifice. To them the exercise of power had been a reality and the effort of surrendering it must have

been correspondingly costly. But the chiefs of Choshu and Hizen obeyed the suggestions of their principal vassals with little, if any, sense of the probable cost of obedience. The same remark applies to all the other feudatories, with exceptions so rare as to emphasize the rule. They had long been accustomed to abandon the management of their affairs to their leading clansmen, and they allowed themselves to follow the same guidance at this crisis. Out of more than 250 feudatories, only 17 hesitated to imitate the example of the four southern fiefs.

An explanation of this remarkable incident has been sought by supposing that the samurai of the various clans, when they advised a course so inconsistent with fidelity to Motives the interests of their feudal chiefs, were influenced of the by motives of personal ambition, imagining that Retormers – they themselves might find great opportunities under the new regime. Some hope of that kind may fairly be assumed, and was certainly realized, in the case of the leading samurai of the four southern clans which headed the movement. But it is plain that no such expectations can have been generally entertained. The simplest explanation seems to be the true one: a certain course, indicated by the action of the four southern clans, was conceived to be in accord with the spirit of the Restoration, and not to adopt it would have been to shrink publicly from a sacrifice dictated by the principle of loyalty to the Throne — a principle which had acquired supreme sanctity in the eyes of the men of that era. There might have been some uncertainty about the initial step; but so soon as that was taken by the southern clans their example acquired compelling force. History shows that in political crises the Japanese samurai is generally ready to pay deference to certain canons of almost romantic morality. There was a fever of loyalty and of patriotism in the air of the year 1869. Any one hesitating, for obviously selfish reasons, to adopt a precedent such as that offered by the procedure of the great southern clans, would have seemed to forfeit the right of calling himself a samurai. But although the leaders of this remarkable movement now understood that they must contrive the total abolition of feudalism and build up a new administrative edifice on foundations of constitutional monarchy, they appreciated the necessity of advancing slowly towards a goal which still lay beyond the range of their followers' vision. Thus the first steps taken after the surrender of the fiefs were to appoint the feuda- tories to the position of governors in the districts

over which they had previously ruled; to confirm the samurai in the possession of their incomes and official positions; to put an end to the dis^ tinction between court nobles and territorial nobles, and to organize in Kioto a cabinet consisting of the leaders of the restoration. Each new governor received one-tenth of the income of the fief by way of emoluments; the pay of the officials and the samurai, as well as the administrative expenses of the district, was defrayed from the same source, and the residue, if any, was to pass into the treasury of the central government.

The defects of this system from a monarchical point of view soon became evident. It did not give the power of either the purse or the sword to the sovereign. The Defects of revenues of the administrative districts continued the First to be collected and disbursed by the former Measures – feudatories, who also retained the control of the troops, the right of appointing and dismissing officials, and almost com- plete local autonomy. A further radical step had to be taken, and the leaders of reform, seeing nothing better than to continue the method of procedure which had thus far proved so successful, contrived, first, that several of the administrative districts should send in petitions offering to surrender their local autonomy and be brought under the direct rule of the central government; secondly, that a number of samurai should apply for permission to lay aside their swords. While the nation was digesting the principles embodied in these petitions, the govern- ment made preparations for further measures of reform. The ex-chief of Satsuma, who showed some umbrage because the services of his clan in promoting the restoration had not been more fully recognized, was induced to take high ministerial office, as were also the ex-chiefs of Choshu and Tosa. Eachof the four

great clans had now three representatives in the ministry. These clans were further persuaded to send to Tokyo — whither the emperor had moved his court — contingents of troops to form the nucleus of a national army. Importance attaches to these details because the principle of clan representation, illustrated in the organization of the cabinet of 1871, continued to be approximately observed for many years in forming ministries, and ultimately became a target for the attacks of party politicians.

On the 29th of August 1871 an Imperial decree announced the abolition of

the system of local autonomy, and the removal Adoption o/of the territorial nobles from the posts of governor. Radical The taxes of the former fiefs were to be paid thence- Measures. fo^ mt0 t he central treasury; all officials were to be appointed by the Imperial government, and the feudatories, retaining permanently an income of one-tenth of their original revenues, were to make Tokyo their place of residence. As for the samurai, they remained for the moment in possession of their hereditary pensions. Radical as these changes seem, the disturbance caused by them was not great, since they left the incomes of the military class untouched. Some of the incomes were for life only, but the majority were hereditary, and all had been granted in consideration of their holders devoting them- selves to military service. Four hundred thousand men approxi- mately were in receipt of such emoluments, and the total amount annually taken from the taxpayers for this purpose was about £2,000,000. Plainly the nation would have to be relieved of this burden sooner or later. The samurai were essentially an element of the feudal system, and that they should survive the latter's fall would have been incongruous. On the other hand, suddenly and wholly to deprive these men and their families — a total of some two million persons — of the means of subsistence on which they had hitherto relied with absolute confidence, and in return for which they and their forefathers had rendered faithful service, would have been an act of inhumanity. It may easily be conceived that this problem caused extreme perplexity to the administrators of the new Japan. They left it unsolved for the moment, trusting that time and the loyalty of the samurai them- selves would suggest some solution. As for the feudal chiefs, who had now been deprived of all official status and reduced to the position of private gentlemen, without even a patent of nobility to distinguish them from ordinary individuals, they did not find anything specially irksome or regrettable in their altered position. No scrutiny had been made into the contents of their treasuries. They were allowed to retain unquestioned possession of all the accumulated funds of their former fiefs, and they also became public creditors for annual allowances equal to one-tenth of their feudal revenues. They had never previously been so pleasantly circumstanced. It is true that they were entirely stripped of all administrative and military authority; but since their possession of such authority had been in most cases merely nominal, they only felt the change as a relief from responsibility. By degrees public opinion began to declare itself with regard to the samurai. If they were to be absorbed into the bulk of Treatment the people and to lose their fixed revenues, some of the capital must be placed at their disposal to begin

Samurai. t jj e wor icj aga i n . The samurai themselves showed a noble faculty of resignation. They had been a privileged class, but they had purchased their privileges with their blood and by serving as patterns of all

the qualities most prized among Japanese national characteristics. The record of their acts and the recognition of the people entitled them to look for munificent treatment at the hands of the government which they had been the means of setting up. Yet none of these considerations blinded them to the painful fact that the time had passed them by; that no place existed for them in the new polity. Many of them voluntarily stepped down into the company of the peasant or the tradesman, and many others signified their willingness to join the ranks of common bread-winners if some aid was given to equip them for such a career. After two years' consideration the government took action. A decree announced, in 1873, that the treasury was prepared to commute the pensions of the

samurai at the rate of six years' purchase for hereditary pensions and four years for life pensions — one-half of the commutation to be paid in cash, and one-half in bonds bearing interest at the rate of 8%. It will be seen that a perpetual pension of £10 would be exchanged for a payment of £30 in cash, together with securities giving an income of £2, 8s.; and that a £10 life pensioner received £20 in cash and securities yielding £1, 12s. annually. It is scarcely credible that the samurai should have accepted such an arrangement. Something, perhaps, must be ascribed to their want of business knowledge, but the general explanation is that they made a large sacrifice in the interests of their country. Nothing in all their career as soldiers became them better than their manner of abandoning it. They were told that they might lay aside their swords, and many of them did so, though from time immemorial they had cherished the sword as the mark of a gentleman, the most precious possession of a warrior, and the one outward evidence that distinguished men of their order from common toilers after gain. They saw themselves deprived of their military employment, were invited to surrender more than one-half of the income it brought, and knew that they were unprepared alike by education and by tradition to earn bread in any calling save that of arms. Yet, at the invitation of a government which they had helped to establish, many of them bowed their heads quietly to this sharp reverse of fortune. It was certainly a striking instance of the fortitude and resignation which the creed of the samurai required him to display in the presence of adversity. As yet, however, the government's measures with regard to the samurai were not compulsory. Men laid aside their swords and commuted their pensions at their own option.

Meanwhile differences of opinion began to occur among the leaders of progress themselves. Coalitions formed for destruc- tive purposes are often found unable to endure the strain of constructive efforts. Such lack of cohesion xaJˆmorii might easily have been foreseen in the case of the Japanese reformers. Young men without experience of public affairs, or special education to fit them for responsible posts, found the duty suddenly

imposed on them not only of devising administrative and fiscal systems universally applicable to a nation hitherto divided into a congeries of semi-independent prin- cipalities, but also of shaping the country's demeanour towards novel problems of foreign intercourse and alien civilization. So long as the heat of their assault upon the shogunate fused them into a homogeneous party they worked together successfully. But when they had to build a brand-new edifice on the ruins of a still vivid past, it was inevitable that their opinions should vary as to the nature of the materials to be employed. In this divergence of views many of the capital incidents of Japan's modern history had their origin. Of the fifty-five men whose united efforts had compassed the fall of the shogunate, five stood conspicuous above their colleagues. They were Iwakura and Sanjo, court nobles; Saigo and Okubo, samurai of Satsuma, and Kido, a samurai of Choshti. In the second rank came many men of great gifts, whose youth alone disqualified them for prominence — Ito, the constructive statesman of the Meiji era, who inspired nearly all the important measures of the time, though he did not openly figure as their originator; Inouye, who never lacked a resource or swerved from the dictates of loyalty; Okuma, a politician of subtle, versatile and vigorous intellect; Itagaki, the Rousseau of his era; and a score of others created by the extraordinary circumstances with which they had- to deal. But the five first mentioned were the captains, the rest only lieutenants. Among the five, four were sincere reformers — not free, of course, from selfish motives, but truthfully bent upon promoting the interests of their country before all other aims. The fifth, Saigo Takamori, was a man in whom bound- less ambition lay concealed under qualities of the noblest and most enduring type. His absolute freedom from every trace of sordidness gave currency to a belief that his aims were of the simplest; the story of his career satisfied the highest canons of the samurai; his massive physique, commanding presence and sunny aspect impressed and attracted even those who had np

opportunity of admiring his life of self-sacrificing effort or appre- ciating the remarkable military talent he possessed. In the first part of his career, the elevation of his clan to supreme power seems to have been his sole motive, but subsequently personal ambition appears to have swayed him. To the consummation of either object the preservation of the military class was essen- tial. By the swords of the samurai alone could a new imperium in imperio be carved out. On the other hand, Saigo's colleagues in the ministry saw clearly not only that the samurai were an unwarrantable

burden on the nation, but also that their con- tinued existence after the fall of feudalism would be a menace to public peace as well as an anomaly. Therefore they took the steps already described, and followed them by a conscription law, making every adult male liable for military service without regard to his social standing. It is easy to conceive how pain- fully unwelcome this conscription law proved to the samurai. Many of them were not unwilling to commute their pensions, since their creed had always forbidden them to care for money. Many of them were not unwilling to abandon the habit of carrying swords, since the adoption of foreign costume rendered such a custom incongruous and inconvenient. But very few of them could readily consent to step down from their cherished position as the military class, and relinquish their traditional title to bear the whole responsibility and enjoy the whole honour of fighting their country's battles. They had supposed, not unreasonably, that service in the army and navy would be reserved exclusively for them and their sons, whereas now the commonest rustic, mechanic or tradesman would be equally eligible.

While the pain of this blow was still fresh there occurred a trouble with Korea. The little state had behaved with insulting SpBt contumely, and when Japan's course came to be

among the debated in Tokyo, a disruption resulted in the Reformers. ran k s f t ne reformers. Saigo saw in a foreign war the sole remaining chance of achieving his ambition by lawful means. The government's conscription scheme, yet in its infancy, had not produced even the skeleton of an army. If Korea had to be conquered, the samurai must be employed; and their employment would mean, if not their rehabilitation, at least their organization into a force which, under Saigo's leader- ship, might dictate a new policy. Other members of the cabinet believed that the nation would be disgraced if it tamely endured Korea's insults. Thus several influential voices swelled the clamour for war. But a peace party offered strenuous opposi- tion. Its members saw the collateral issues of the problem, and declared that the country must not think of taking up arms during a period of radical transition. The final discussion took place in the emperor's presence. The advocates of peace under- stood the national significance of the issue and perceived that they were debating, not merely whether there should be peace or war, but whether the country should halt or advance on its newly adopted path of progress. They prevailed, and four members of the cabinet, including Saigo, resigned. This rupture was destined to have far-reaching consequences. One of the seceders immediately raised the standard of revolt. Among the devices employed by him to win adherents was an attempt to fan into flame the dying embers of the anti-foreign sentiment. The government easily crushed the insurrection. Another seceder was Itagaki Taisuke. The third and most prominent was Saigo, who seems

to have concluded from that moment that he must abandon his aims or achieve them by force. He retired to his native province of Satsuma, and applied his whole re- sources, his great reputation and the devoted loyalty of a number of able followers to organizing and equipping a strong body of samurai. Matters were facilitated for him by the conservatism of the celebrated Shimazu Saburo, former chief of Satsuma, who, though not opposed to foreign intercourse, had been revolted by the wholesale iconoclasm of the time, and by the indis- criminate rejection of Japanese customs in favour of foreign. He protested vehemently against what seemed to him a slavish abandonment of the nation's individuality, and finding his protest fruitless, he set himself to preserve in his own distant

province, where the writ of the Yedo government had never run, the fashions, institutions and customs which his former colleagues in the administration were ruthlessly rejecting. Satsuma thus became a centre of conservative influences, among which Saigo and his constantly augmenting band of samurai found a congenial environment. During four years this breach between the central government and the southern clan grew constantly.

*In the meanwhile (1876) two extreme measures were adopted by the government : a veto on the wearing of swords, and an edict ordering the compulsory commutation of the _. . pensions and allowances received by the nobles and Abolition of the samurai. Three years previously the discarding Sword- of swords had been declared optional, and a scheme of wj»«*w»* voluntary commutation had been announced. Many had bowed quietly to the spirit of these enactments. But many still retained their swords and drew their pensions as of old, obstructing, in the former respect, the government's pro- jects for the reorganization of society, and imposing, in the latter, an intolerable burden on the resources of the treasury. The government thought that the time had come, and that its own strength sufficed, to substitute compulsion for persuasion. The financial measure — which was contrived so as to affect the smallest pension-holders least injuriously — evoked no complaint. The samurai remained faithful to the creed which forbade them to be concerned about money. But the veto against sword- wearing overtaxed the patience of the extreme Conservatives. It seemed to them that all the most honoured traditions of their country were being ruthlessly sacrificed on the altar of alien innovations. Armed protests ensued. A few score of samurai, equipping themselves with the hauberks and weapons of old times, fell upon the garrison of a castle, killed or wounded some 300, and then, retiring to an adjacent mountain, died by their own hands. Their example found imitators in two other places, and finally the Satsuma samurai rose in arms under Saigo.*

*This was an insurrection very different in dimensions and motives from the outbreaks that had preceded it. During four years the preparations of the Satsuma men had been Satsuma unremitting. They were equipped with rifles and Inswrec- cannon; they numbered some 30,000; they were all of *”• the military class, and in addition to high training in western tactics and in the use of modern arms of precision, they knew how to wield that formidable weapon, the Japanese sword, of which their opponents were for the most part ignorant. Ostensibly their object was to restore the samurai to their old supremacy, and to secure for them all the posts in the army, the navy and the administration. But although they doubtless entertained that intention, it was put forward mainly with the hope of winning the co-operation of the military class throughout the empire. The real purpose of the revolt was to secure the governing power for Satsuma. A bitter struggle ensued. Beginning on the 29th of January 1877, it was brought to a close on the 24th of September by the death, voluntary or in battle, of all the rebel leaders. During that period the number of men engaged on the government’s side had been 66,000 and the number on the side of the rebels 40,000, out of which total the killed and wounded aggregated 35,000, or 33% of the whole. Had the government’s troops been finally defeated, there can be no doubt that the samurai’s exclusive title to man and direct the army and navy would have been re-established, and Japan would have found herself permanently saddled with a military class, heavily burdening her finances, seriously impeding her progress towards constitutional government, and perpetuating all the abuses incidental to a policy in which the power of the sword rests entirely in the hands of one section of the people. The nation scarcely appreciated the great issues that were at stake. It found more interest in the struggle as furnishing a conclusive test of the efficiency of the new military system com- pared with the old. The army sent to quell the insurrection consisted of recruits drawn indiscriminately from every class of the people. Viewed in the light of history, it was an army of commoners, deficient in the fighting instinct, and traditionally*

demoralized for all purposes of resistance to the military class. The Satsuma insurgents, on the contrary, represented the flower of the samurai, long trained for this very struggle, and led by men whom the nation regarded as its bravest captains. The result dispelled all doubts about the fighting quality of the people at large.

Concurrently with these events the government diligently endeavoured to equip the country with all the paraphernalia of Occidental civilization. It is easy to understand that Progress. the master-minds of the «ra, who had planned and carried out the Restoration, continued to take the lead in all paths of progress. Their intellectual superiority entitled them to act as guides; they had enjoyed exceptional opportunities of acquiring enlightenment by visits to Europe and America, and the Japanese people had not yet lost the habit of looking to officialdom for every initiative. But the spectacle thus pre- sented to foreign onlookers was not altogether without dis- quieting suggestions. The government's reforms seemed to outstrip the nation's readiness for them, and the results wore an air of some artificiality and confusion. Englishmen were employed to superintend the building of railways, the erection of telegraphs, the construction of lighthouses and the organiza- tion of a navy. To Frenchmen was entrusted the work of re- casting the laws and training the army in strategy and tactics. Educational affairs, the organization of a postal service, the improvement of agriculture and the work of colonization were supervised by Americans. The teaching of medical science, the compilation of a commercial code, the elaboration of a system of local government, and ultimately the training of military officers were assigned to Germans. .For instruction in sculpture and painting Italians were engaged. Was it possible that so many novelties should be successfully assimilated, or that the nation should adapt itself to systems planned by a motley band of aliens who knew nothing of its character and customs? These questions did not trouble the Japanese nearly so much as they troubled strangers. The truth is that conservatism was not really required to make the great sacrifices suggested by appearances. Among all the innovations of the era the only one that a Japanese could not lay aside at will was the new fashion of dressing the hair. He abandoned the queue irrevo- cably. But for the rest he lived a dual life. During hours of duty he wore a fine uniform, shaped and decorated in foreign style. But so soon as he stepped out of office or off parade, he reverted to his own comfortable and picturesque costume. Handsome houses were built and furnished according to Western models. But each had an annex where alcoves, verandas, matted floors and paper sliding doors continued to do traditional duty. Beefsteaks, beer, " grape-wine," knives and forks came into use on occasion. But rice-bowls and chopsticks held their everyday place as of old. In a word, though the Japanese adopted every convenient and serviceable attribute of foreign civilization, such as railways, steamships, telegraphs, post- offices, banks and machinery of all kinds; though they accepted Occidental sciences, and, to a large extent, Occidental philo- sophies; though they recognized the superiority of European jurisprudence and set themselves to bring their laws into accord with it, they nevertheless preserved the essentials of their own mode of life and never lost their individuality. A remarkable spirit of

liberalism and a fine eclectic instinct were needed for the part they acted, but they did no radical violence to their own traditions, creeds and conventions. There was indeed a certain element of incongruity and even grotesqueness in the nation's doings. Old people cannot fit their feet to new roads without some clumsiness. The Japanese had grown very old in their special paths, and their novel departure was occasionally dis- figured by solecisms. The refined taste that guided them un- erringly in all the affairs of life as they had been accustomed to live it, seemed to fail them signally when they emerged into an alien atmosphere. They have given their proofs, however. It is now seen that the apparently excessive rapidity of their pro- gress did not overtax their capacities; that they have emerged safely from their destructive era and carried their constructive

career within reach of certain success, and that while they have still to develop some of the traits of their new civilization, there is no prospect whatever of its proving ultimately unsuited to them.

*After the Satsuma rebellion, nothing disturbed the even tenor of Japan's domestic politics except an attempt on the part of some of her people to force the growth of parlia- oeveioo. mentary government. It is evident that the united meat of effort made by the fiefs to overthrow the system Repro- of dual government and wrest the administrative *? n*

equally on the whole military class, the official prizes under the new system were monopolized by a small coterie of men belonging to the four principal clans. It is on record that Itagaki would have been content originally with an assembly consisting half of officials, half of non-official samurai, and not including any popular element whatever.

But the government did not believe that the time had come even for a measure such as the Tosa Liberals advocated. The statesmen in power conceived that the nation must be educated up to constitutional standards, and that the first step should be to provide an official model. Accordingly, in 1874, arrange- ments were made for periodically convening an assembly of prefectural governors, in order that they might act as channels of communication between the central authorities and the provincial population, and mutually exchange ideas as to the safest and most effective methods of encouraging progress within the limits of their jurisdictions. This was intended to be the embryo of representative institutions. But the

governors, being officials appointed by the cabinet, did not bear in any sense the character of popular nominees, nor could it even be said that they reflected the public feeling of the districts they adminis- tered, for their habitual and natural tendency was to try, by means of heroic object lessons, to win the people's allegiance to the government's progressive policy, rather than to convince the government of the danger of overstepping the people's capacities.

These conventions of local officials had no legislative power whatever. The foundations of a body for discharging that function were laid in 1875, when a senate (genro-in) was organized. It consisted of official nominees, and its duty was to discuss and revise all laws and ordinances prior to their promulgation. It is to be noted, however, that expediency not less than a spirit of progress presided at the creation of the senate. Into its ranks were drafted a number of men for whom no places could be found in the executive, and who, without some official employ- ment, would have been drawn into the current of disaffection. From that point of view the senate soon came to be regarded as a kind of hospital for administrative invalids, but undoubtedly its discharge of quasi-legislative functions proved suggestive, useful and instructive.

The second meeting of the provincial governors had just been prorogued when, in the spring of 1878, the great minister, Okubo Assassins-Toshimitsu, was assassinated. Okubo, uniformly tioaof ready to bear the heaviest burden of responsibility Okubo. ; n ever y political complication, had stood promi- nently before the nation as Saigo's opponent. He fell under the swords of Saigo's sympathizers. They immediately surrendered themselves to justice, having taken previous care to circulate a statement of motives, which showed that they ranked the government's failure to establish representative institutions as a sin scarcely less heinous than its alleged abuses of power. Well- informed followers of Saigo could never have been sincere believers in representative institutions. These men belonged to a province far removed from the scene of Saigo's desperate struggle. But the broad fact that they had sealed with their life-blood an appeal for a political change indicated the exist ence of a strong public conviction which wduld derive further strength from their act. The Japanese are essentially a brave people. Throughout the troublous events that preceded and followed the Restoration, it is not possible to point to one man whose obedience to duty or conviction was visibly weakened by prospects of personal peril. Okubo's assassination did not alarm any of his colleagues; but they understood its suggestive- ness, and hastened to give effect to a previously formed resolve. Two months after Okubo's death, an edict announced that elective assemblies should forthwith be established in various Local prefectures and cities. These assemblies were to con-

Govern- sist of members having a high property qualification, meat. elected by voters having one-half of that qualifica-

tion; the voting to be by signed ballot, and the session to last for one month in the spring of each year. As to their functions, they were to determine the method of levying and spending local

taxes, subject to approval by the minister of state for home affairs; to scrutinize the accounts for the previous year, and, if necessary, to present petitions to the central government. Thus the foundations of genuine representative institutions were laid. It is true that legislative power was not vested in the local assemblies, but in all other important respects they dis- charged parliamentary duties. Their history need not be related at any length. Sometimes they came into violent collision with the governor of the prefecture, and unsightly struggles resulted. The governors were disposed to advocate public works which the people considered extravagant; and further, as years went by, and as political organizations grew stronger, there was found in each assembly a group of men ready to oppose the governor simply because of his official status. But on the whole the system worked well. The local assemblies served as training schools for the future parliament, and their members showed devotion to public duty as well as considerable aptitude for debate.

This was not what Itagaki and his followers wanted. Their purpose was to overthrow the clique of clansmen who, holding the reins of administrative power, monopolized the The Liberal prizes of officialdom. Towards the consummation Party. of such an aim the local assemblies helped little. Itagaki re- doubled his agitation. He organized his fellow- thinkers into an association called jiyuto (Liberals), the first political party in Japan, to whose ranks there very soon gravitated several men who had been in office and resented the loss of it; many that had never been in office and desired to be; and a still greater number who sincerely believed in the principles of political liberty, but had not yet considered the possibility of immediately adapting such principles to Japan's case. It was in the nature of things that an association of this kind, professing such doctrines, should present a picturesque aspect to the public, and that its collisions with the authorities should invite popular sympathy. Nor were collisions infrequent. For the government, arguing that if the nation was not ready for representative institutions, neither was it ready for full freedom of speech or of public meeting, legislated consistently with that theory, and entrusted to the police large powers of conrol over the press and the plat- form. The exercise of these powers often created situations in which the Liberals were able to pose as victims of official tyranny, so that they grew in popularity and the contagion of political agitation spread.

Three years later (1881) another split occurred in the ranks of the ruling oligarchy. Okuma Shigenobu (afterwards Count Okuma) seceded from the administration, and was The Pro- followed by a number of able men who had owed gressist their appointments to his patronage, or who, during Party. his tenure of office as minister of finance, had passed under the influence of his powerful personality. If Itagaki be called the Rousseau of Japan, Okuma may be regarded as the Peel. To remarkable financial ability and a lucid, vigorous judgment he added the faculty of placing himself on the crest of any wave which a genuine aura popularis had begun to swell. He, too, inscribed on his banner of revolt against the oligarchy the motto " constitutional government," and it might have been expected that his followers would join hands with those of Itagaki, since the avowed political purpose of both was identical. They did nothing of the kind. Okuma organized an inde- pendent party, calling themselves Progressists (shimpoto), who not only stood aloof from the Liberals but even assumed an attitude hostile to them. This fact is eloquent. It shows that Japan's first political parties were grouped, not about principles, but about persons. Hence an inevitable lack of cohesion among their elements and a constant tendency to break up into caves and coteries. These are the characteristics that render the story of political evolution in Japan so perplexing to a foreign student. He looks for differences of platform and finds none. Just as a true Liberal must be a Progressist, and a true Progressist a Liberal, so, though each may cast his profession of faith in a mould of different phrases, the ultimate shape must be the same. The mainsprings of early political agitation in; Japan were personal

grievances and a desire to wrest the administrative power from the hands of the statesmen who had held it so long as to overtax the patience of their rivals. He that searches for profound moral or ethical bases will be disappointed. There were no Conservatives. Society was permeated with the spirit of progress. In a comparative sense the epithet " Conservative " might have been applied to the statesmen who proposed to defer parliamen- tary institutions until the people, as distinguished from the former samurai, had been in some measure prepared for such an innovation. But since these very statesmen were the guiding spirits of the whole Meiji revolution, it was plain that their convictions must be radical, and that, unless they did violence to their record, they must finally lead the country to representa- tive institutions, the logical sequel of their own reforms.

Okubo's assassination had been followed, in 1878, by an edict announcing the establishment of local assemblies. Okuma's secession in 1881 was followed by an edict announcing that a national assembly would be convened in 1891.

The political parties, having now virtually attained their object, might have been expected to desist from further agita- Anti- tion. But they had another task to perform —

Govern- that of disseminating anti-official prejudices among ment the future electors. They worked diligently, and

Agitation. t ˆ e y ˆd an undisputed field, for no one was put forward to champion the government's cause. The campaign was not always conducted on lawful lines. There were plots to assassinate ministers; there was an attempt to employ dynamite, and there was a scheme to foment an insurrection in Korea. On the other hand, dispersals of political meetings by order of police inspectors, and suspension or suppression of newspapers by the unchallengeable verdict of a minister for home affairs, were common occurrences. The breach widened steadily. It is true that Okuma rejoined the cabinet for a time in 1887, but he retired again in circumstances that aggravated his party's hostility to officialdom. In short, during the ten years imme- diately prior to the opening of the first parliament, an anti-government propaganda was incessantly preached from the platform and in the press.

Meanwhile the statesmen in power resolutely pursued their path of progressive reform. They codified the civil and penal laws, remodelling them on Western bases; they brought a vast number of affairs within the scope of minute regulations; they rescued the finances from confusion and restored them to a sound condition; they recast the whole framework of local government; they organized a great national bank, and established a network of subordinate institutions throughout the country; they pushed on the work of railway construction, and successfully enlisted private enterprise in its cause; they steadily extended the postal and telegraphic services; they economized public expenditures so that the state's income always exceeded its outlays; they laid the foundations of a strong mercantile marine; they instituted a system of postal savings-banks; they under- took large schemes of harbour improvement and road-making; they planned and put into operation an extensive programme of riparian improvement; they made civil service appointments depend on competitive examination; they sent numbers of students to Europe and America to complete their studies; and by tactful, persevering diplomacy they gradually introduced a new tone into the empire's relations with foreign powers. Japan's affairs were never better administered.

In 1890 the Constitution was promulgated. Imposing cere- monies marked the event. All the nation's notables were The Consti- summoned to the palace to witness the delivery tution of of the important document by the sovereign to the 1890. prime minister; salvos of artillery were fired; the

cities were illuminated, and the people kept holiday. Marquis (afterwards Prince) Ito directed the framing of the Constitution. He had visited the Occident for the purpose of investigating the development of parliamentary institutions and studying their practical working. His name is connected with nearly every great work of constructive statesmanship in the history of new Japan, and perhaps the crown of his legislative career was

the drafting of the Constitution, to which the Japanese people point proudly as the only charter of the kind voluntarily given by a sovereign to his subjects. In other countries such conces- sions were always the outcome of long struggles between ruler and ruled. In Japan the emperor freely divested himself of a portion of his prerogatives and transferred them to the people. That view of the case, as may be seen from the story told above, is not untinged with romance; but in a general sense it is true. No incident in Japan's modern career seemed more hazard- ous than this sudden plunge into parliamentary institutions. There had been some preparation. Provincial as- working semblies had partially familiarized the people with ofthe the methods of deliberative bodies. But provin- System. cial assemblies were at best petty arenas — places where the making or mending of roads, and the policing and sanitation of villages came up for discussion, and where political parties exercised no legislative function nor found any opportunity to attack the government or to debate problems of national interest. Thus the convening of a diet and the sudden transfer of financial and legislative authority from the throne and its entourage 0/ tried statesmen to the hands of men whose qualifications foi public life rested on the verdict of electors, themselves apparently devoid of all light to guide their choice — this sweeping innovation seemed likely to tax severely, if not to overtax completely, the progressive capacities of the nation. What enhanced the inter- est of the situation was that the oligarchs who held the adminis- trative power had taken no pains to win a following in the political field. Knowing that the opening of the diet would be a veritable letting loose of the dogs of war, an unmuzzling of the agitators whose mouths had hitherto been partly closed by legal restrictions upon free speech, but who would now enjoy complete immunity within the walls of the assembly whatever the nature of their utterances — foreseeing all this, the statesmen of the day nevertheless stood severely aloof from alliances of every kind, and discharged their administrative functions with apparent indifference to the changes that popular representation could not fail to induce. This somewhat inexplicable display of unconcern became partially intelligible when the constitution was promul- gated, for it then appeared*

that the cabinet's tenure of office was to depend solely on the emperor's will; that ministers were to take their mandate from the Throne, not from parliament. This fact was merely an outcome of the theory underlying every part of the Japanese polity. Laws might be redrafted, institu- tions remodelled, systems recast, but amid all changes and mutations one steady point must be carefully preserved, the Throne. The makers of new Japan understood that so long as the sanctity and inviolability of the imperial prerogatives could be preserved, the nation would be held by a strong anchor from drifting into dangerous waters. They laboured under no mis- apprehension about the inevitable issue of their work in framing the constitution. They knew very well that party cabinets are an essential outcome of representative institutions, and that to some kind of party cabinet Japan must come. But they regarded the Imperial mandate as a conservative safeguard, pending the organization and education of parties competent to form cabinets. Such parties did not yet exist, and until they came into unequivocal existence, the Restoration statesmen, who had so successfully managed the affairs of the nation during a quarter of a century, resolved that the steady point furnished by the throne must not be abandoned.

On the other hand, the agitators found here a new platform. They had obtained a constitution and a diet, but they had not obtained an instrument for pulling down the " clan " adminis- trators, since these stood secure from attack under the aegis of the sovereign's mandate. They dared not raise their voices against the unfettered exercise of the mikado's prerogative. The nation, loyal to the core, would not have suffered such a protest, nor could the agitators themselves have found heart to formulate it. But they could read their own interpretation into the text of the Constitution, and they could demonstrate practically that a cabinet not acknowledging responsibility to the legislature was virtually impotent for law-making purposes.

*These are the broad outlines of the contest that began in the first session of the Diet and continued for several years. It is un- The Diet necessary to speak of the special points of controversy. and the Just as the political parties had been formed on the Govern- ij nes f persons, not principles, so the opposition "**■*■ in the Diet was directed against men, not measures.*

The struggle presented varying aspects at different times, but the

fundamental question at issue never changed. Obstruction was the Weapon of the political parties. They sought to render legislation and finance impossible for any ministry that refused to take its mandate from the majority in the lower house, and they imparted an air of respectability and even patriotism to their destructive campaign by making " anti-clannism " their war-cry, and industriously fostering the idea that the struggle lay between administration guided by public opinion and admin- istration controlled by a clique of clansmen who separated the throne from the nation. Had not the House of Peers stood stanchly by the government throughout this contest, it is possible that the nation might have suffered severely from the rashness of the political parties.

There was something melancholy in the spectacle. The Restor- ation statesmen were the men who had made Modern Japan; the men who had raised her, in the face of immense obstacles, from the position of an insignificant Oriental state to that of a formidable unit in the comity of nations; the men, finally, who had given to her a constitution and representative institu- tions. Yet these same men were now fiercely attacked by the arms which they had themselves nerved; were held up to public obloquy as self-seeking usurpers, and were declared to be im- peding the people's constitutional route to administrative privi- leges, when in reality they were only holding the breach until the people should be able to march into the citadel with some show of orderly and competent organization. That there was no corruption, no abuse of position, is not to be pretended; but on the whole the conservatism of the clan statesmen had only one object — to provide that the newly constructed representa- tive machine should not be set working until its parts were duly adjusted and brought into proper gear. On both sides the leaders understood the situation accurately. The heads of the parties, while publicly clamouring for parliamentary cabinets, privately confessed that they were not yet prepared to assume administrative responsibilities; 1 and the so-called "clan states- men," while refusing before the world to accept the Diet's mandates, admitted within official circles that the question was one of time only. The situation did not undergo any marked change until, the country becoming engaged in war with China (1894-95), domestic squabbles were forgotten in the presence of foreign danger. From that time an era of coalition commenced. Both the political parties joined hands to vote funds for the prosecution of the campaign, and one of them, the Liberals, subsequently gave support to a cabinet under the presidency of Marquis Ito, the purpose of the union being to carry through the diet an extensive scheme of enlarged armaments and public works planned in the sequel of the war. The Progressists, how- ever, remained implacable, continuing their opposition to the thing called bureaucracy quite irrespective of its measures.

The next phase (1898) was a fusion of the two parties into one large

organization which adopted the name " Constitutional Fusion of Party" (kensei-to). By this union the chief ob- the Two stacles to parliamentary cabinets were removed. Parties. ˆ (- on jy (jid. the Constitutionalists command a large majority in the lower house, but also they possessed a sufficiency of men who, although lacking ministerial experience, might still advance a reasonable title to be entrusted with port- folios. Immediately the emperor, acting on the advice of Marquis It5, invited Counts Okuma and Itagaki to form a cabinet. It was essentially a trial. The party politicians were required to demonstrate in practice the justice of the claim they had been so long asserting in theory. They had worked

1 Neither the Liberals nor the Progressists had a working majority in the house of representatives, nor could the ranks of either have furnished men qualified to fill all the administrative posts.

in combination for the destructive purpose of pulling down the so-called " clan statesmen "; they had now to show whether they could work in combination for the constructive purposes of administration. Their heads, Counts Okuma and Itagaki, accepted the Imperial mandate, and the nation watched the result. There was no need to wait long. In less than six months these new links snapped under the tension of old enmities, and the coalition split up once more into its original elements. It had demonstrated that the sweets of power, which the " clan statesmen " had been so vehemently accused of covet- ing, possessed even greater attractions for their accusers. The issue of the experiment was such a palpable fiasco that it effec- tually rehabilitated the " clan statesmen," and finally proved, what had indeed been long evident to every close observer, that without the assistance of those statesmen no political party could hold office successfully.

Thenceforth it became the unique aim of Liberals and Pro- gressists alike to join hands permanently with the men towards whom they had once displayed such implacable p„ rolmeat hostility. Prince Ito, the leader of the so-called f tae ciaa " elder statesmen," received special solicitations, for Statesmen it was plain that he would bring to any political '"Political party an overwhelming access of strength alike in ˆ ssocla ' his own person and in the number of friends and disciples certain to follow him. But Prince Ito declined to be absorbed into any existing party, or to adopt the principle of parliamentary cabinets. He would consent to form a new association, but it must consist of men sufficiently disciplined to obey him implicitly, and sufficiently docile to accept their programme from his hand. The Liberals agreed to these terms. They dissolved their party (August 1900) and enrolled them- selves in the ranks of a new organization, which did not even call itself a party, its designation being rikken seiyu-kai (association of friends of the constitution), and which had for the cardinal plank in its platform a declaration of ministerial irresponsibility to the Diet. A singular

page was thus added to the story of Japanese political development; for not merely did the Liberals enlist under the banner of the statesmen whom for twenty years they had fought to overthrow, but they also tacitly consented to erase from their profession of faith its essential article, parliamentary cabinets, and, by resigning that article to the Progressists, created for the first time an opposition with a solid and intelligible platform. Nevertheless the seiyu-kai grew steadily in strength whereas the number of its opponents declined correspondingly. At the general elections in May 1908 the former secured 195 seats, the four sections of the opposition winning only 184. Thus for the first time in Japanese parliamentary history a majority of the lower chamber found themselves marching under the same banner. Moreover, the four sections of the opposition were independently organized and differed nearly as much from one another as they all differed from the seiyti-kai. Their impotence to make head against the solid phalanx of the latter was thus conspicuous, especially during the 1908-1909 session of the Diet. Much talk then began to be heard about the necessity of coalition, and that this talk will materialize eventually cannot be doubted. Reduction of armaments, abolition of taxes specially imposed for belligerent purposes, and the substitution of a strictly constitutional system for the existing bureaucracy — these objects constitute a sufficiently solid platform, and nothing is wanted except that a body of proved administrators should join the opposition in occupying it. There were in 1909 no signs, however, that any such defection from the ranks of officialdom would take place. Deference is paid to public opinions inasmuch as even a seiyu-kai ministry will not remain in office after its popularity has begun to show signs of waning. But no deference is paid to the doctrine of party cabinets. Prince It5 did not continue to lead the seiyu-kai for more than three years. In July 1903 he delegated that function to Marquis Saionji, representative of one of the very oldest families of the court nobility and a personal friend of the emperor, as also was Prince Ito. The Imperial stamp is thus vicariously set upon the principle of

political combinations for the better practical conduct of parliamentary business, but that the seiyu-kal, founded by Prince Ito and led by Marquis Saionji, should ever hold office in defiance of the sovereign's mandate is unthinkable. Con- stitutional institutions in Japan are therefore developing along lines entirely without precedent. The storm and stress of early parliamentary days have given place to comparative calm. During the first twelve sessions of the Diet, extending over 8 years, there were five

dissolutions of the lower house. During the next thirteen sessions, extending over n years, there were two dissolutions. During the first 8 years of the Diet's existence there were six changes of cabinet; during the next n years there were five changes. Another healthy sign was that men of affairs were beginning to realize the importance of parliamentary representation. At first the constituencies were contested almost entirely by professional politicians, barristers and journalists. In 1909 there was a solid body (the boshin club) of business men commanding nearly 50 votes in the lower house; and as the upper chamber included 45 representatives of the highest tax-payers, the interests of commerce and industry were intelligently debated. (F. By.)

X. — The Claim or Japan: by a Japanese Statesman 1

It has been said that it is impossible for an Occidental to understand the Oriental, and vice versa; but, admitting that the mutual understanding of two different races or peoples is a difficult matter, why should Occidentals and Orientals be thus set in opposition ? No doubt, different peoples of Europe understand each other better than they do the Asiatic; but can Asiatic peoples understand each other better than they can Europeans or than the Europeans can understand any of them ? Do Japanese understand Persians or even Indians better than English or French? It is true perhaps that Japan- ese can and do understand the Chinese better than Europeans; but that is due not only to centuries of mutual intercourse, but to the wonderful and peculiar fact that they have adopted the old classical Chinese literature as their own, somewhat in the way, but in a much greater degree, in which the European nations have adopted the old Greek and Latin literatures. What is here contended for is that the mutual understanding of two peoples is not so much a matter of race, but of the know- ledge of each other's history, traditions, literature, &c.

The Japanese have, they think, suffered much from the misunderstanding of their motives, feelings and ideas; what they want is to be understood fully and to be known for what they really are, be it good or bad. They desire, above all, not to be lumped as Oriental, but to be known and judged on their own account. In the latter half of the 19th century, in fact up to the Chinese War, it irritated Japanese travelling abroad more than anything else to be taken for Chinese. Then, after the Chinese War, the alarm about Japan leading Eastern Asia to make a general attack upon Europe — the so-called Yellow Peril — seemed so ridiculous to the Japanese that the bad effects of such wild talk were not quite appreciated by them. The aim of the Japanese nation, ever since, at the time of the Restoration (1868), they laid aside definitively all ideas of seclusion and entered into the comity of nations, has been that they should rise above the level of the Eastern peoples to an equality with the Western and should be in the foremost rank of the brother- hood of nations; it was not their

ambition at all to be the champion of the East against the West, but rather to beat down the barriers between themselves and the West.

The intense pride of the Japanese in their nationality, their patriotism and loyalty, arise from their history, for what other nation can point to an Imperial family of one unbroken lineage reigning over the land for twenty-five centuries ? Is it not a glorious tradition for a nation, that its emperor should be de- scended directly from that grandson of " the great heaven-

1 The following expression of the Japanese point of view, by a statesman of the writer's authority and experience, may well supple- ment the general account of the progress of Japan and its inclusion among the great civilized powers of the world. — (Ed. E. B.)

illuminating goddess," to whom she said, " This land (Japan) is the region over which my descendants shall be the lords. Do thou, my august child, proceed thither and govern it- Go! The prosperity of thy dynasty shall be coeval with heaven and earth." Thus they call their country the land of kami (ancient gods of tradition). With this spirit, in the old days when China held the hegemony of the East, and all neighbouring peoples were regarded as its tributaries, Japan alone, largely no doubt on account of its insular position, held itself quite aloof; it set at defiance the power of Kublai and routed utterly the combined Chinese and Korean fleets with vast forces sent by him to conquer Japan, this being the only occasion that Japan was threatened with a foreign invasion.

With this spirit, as soon as they perceived the superiority of the Western civilization, they set to work to introduce it into their country, just as in the 7th and 8th centuries they had adopted and adapted the Chinese civilization. In 1868, the first year of the era of Meiji, the emperor swore solemnly the memor- able oath of five articles, setting forth the policy that was to be and has been followed thereafter by the government. These five articles were: —

1. Deliberative assemblies shall be established and all measures of government shall be decided by public opinion.

2. All classes, high and low, shall unite in vigorously carrying out the plan of government.

3. Officials, civil and military, and all common people shall as far as possible be allowed to fulfil their just desires so that there may not be any discontent among them.

4. Uncivilized customs of former times shall be broken through, and everything shall be based upon just and equitable principles of heaven and

earth (nature).

5. Knowledge shall be sought for throughout the world, so that the welfare of the empire may be promoted.

(Translation due to Prof. N. Hozumi of Tokyo Imp. Univ.)

It is interesting, as showing the continuity of the policy of the empire, to place side by side with these articles the words of the Imperial rescript issued in 1908, which are as follows: —

" We are convinced that with the rapid and unceasing advance of civilization, the East and West, mutually dependent and helping each other, are bound by common interests. It is our sincere wish to continue to enjoy for ever its benefits in common with other powers by entering into closer and closer relations and strengthening our friendship with them. Now in order to be able to move onward along; with the constant progress of the world and to share in the blessings of civilization, it is obvious that we must develop our internal resources; our nation, but recently emerged from an ex- hausting war, must put forth increased activity in every branch of administration. It therefore behoves our people to endeavour with one mind, from the highest to the lowest, to pursue their callings honestly and earnestly, to be industrious and thrifty, to abide in faith and righteousness, to be simple and warm-hearted, to put away ostentation and vanity and strive after the useful and solid, to avoid idleness and indulgence, and to apply themselves incessantly to strenuous and arduous tasks …"

The ambition of the Japanese people has been, as already stated, to be recognized as an equal by the Great Powers. With this object in view, they have spared no efforts to introduce what they considered superior in the Western civilization, although it may perhaps be doubted whether in their eagerness they have always been wise. They have always resented any discrimination against them as an Asiatic people, not merely protesting against it, knowing that such would not avail much, but making every endeavour to remove reasons or excuses for it. Formerly there were troops stationed to guard several legations; foreign postal service was not entirely in the hands of the Japanese government for a long time; these and other indignities against the sove- reignty of the nation were gradually removed by proving that they were not necessary. Then there was the question of the extra-territorial jurisdiction; an embassy was sent to Europe and America as early as 1871 with a view to the revision of treaties in order to do away with this imperium in imperio, that being the date originally fixed for the revision; the embassy, however, failed in its object but was not altogether fruitless, for it was then clearly seen that it would be necessary to revise thoroughly the system of laws and entirely to reorganize the law courts

before Occidental nations could be induced to forgo

this privilege. These measures were necessary in any case as a consequence of the introduction of the Western methods and ideas, but they were hastened by the fact of their being a necessary preliminary to the revision of treaties. When the new code of laws was brought before the Diet at its first session, and there was a great opposition against it in the House of Peers on account of its many defects and especially of its ignoring many established usages, the chief argument in its favour, or at least one that had a great influence with many who were unacquainted with tech- nical points, was that it was necessary for the revision of treaties and that the defects, if any, could be afterwards amended at leisure. These preparations on the part of the government, however, took a long time, and in the meantime the whole nation, or at least the more intelligent part of it, was chafing impatiently under what was considered a national indignity. The United States, by being the first to agree to its abandonment, although this agreement was rendered nugatory by a conditional clause, added to the stock of goodwill with which the Japanese have always regarded the Americans on account of their attitude towards them. When at last the consummation so long and ardently desired was attained, great was the joy with which it was greeted, for now it was felt that Japan was indeed on terms of equality with Occidental nations. Great Britain, by being the first to conclude the revised treaty — an act due to the remarkable foresight of her statesmen in spite of the opposition of their countrymen in Japan — did much to bring about the cordial feeling of the Japanese towards the British, which made them welcome with such enthusiasm the Anglo-Japanese alliance. The importance of this last as a powerful instrument for the preservation of peace in the extreme East has been, and always will be, appreciated at its full value by the more intelligent and thoughtful among the Japanese; but by the mass of the people it was received with great acclamation, owing partly to the already existing good feeling towards the British, but also in a large, measure because it was felt that the fact that Great Britain should leave its " splendid isolation " to enter into this alliance proclaimed in the clearest possible way that Japan had entered on terms of full equality among the brotherhood of nations, and that thenceforth there could be no ground for that discrimination against them as an Asiatic nation which had been so galling to the Japanese people.

There have been, and there still are being made, many charges against the

Japanese government and people. While admitting that some of them may be founded on facts, it is permissible to point out that traits and acts of a few individuals have often been generalized to be the national characteristic or the result of a fixed policy, while in many cases such charges are due to mis- understandings arising from want of thorough knowledge of each other's language, customs, usages, ideas, &c. Take the principle of " the open door," for instance; the Japanese government has been charged in several instances with acting contrary to it. It is natural that where (as in China) competition is very keen between men of different nationalities, individuals should some- times feel aggrieved and make complaints of unfairness against the government of their competitors; it is also natural that people at home should listen to and believe in those charges made against the Japanese by their countrymen in the East, while unfortunately the Japanese, being so far away and often unaware of them, have not a ready means of vindicating themselves; but subsequent investigations have always shown those charges to be either groundless or due to misunderstandings, and it may be asserted that in no case has the charge been substantiated that the Japanese government has knowingly, deliberately, of malice prepense been guilty of breach of faith in violating the principle of "the open door" to which it has solemnly pledged itself. That it has often been accused by the Japanese subjects of weakness vis-d-vis foreign powers to the detriment of their interests, is perhaps a good proof of its fairness.

The Japanese have often been charged with looseness of com- mercial morality. This charge is harder to answer than the last, for it cannot be denied that there have been many instances of dishonesty on the part of Japanese tradesmen or employees; tu

quoque is never a valid argument, but there are black sheep every- where, and there were special reasons why foreigners should have come in contact with many such in their dealings with the Japanese. In days before the Restoration, merchants and tradesmen were officially classed as the lowest of four classes, the samurai, the farmers, the artisans and the merchants; practically, however, rich merchants serving as bankers and employers of others were held in high esteem, even by the samurai. Yet it cannot be denied that the position of the last three was low compared with that of the samurai ; their education was not so high, and although of course there was the same code of morality for them all, there was no such high standard of honour as was enjoined upon the samurai by the bushido or " the way of samurai." Now, when foreign trade was first opened, it was naturally not firms with long-established credit and methods that first ventured upon the new field of business — some few that did failed owing to their want of experience — it was rather enter- prising and adventurous spirits with little capital or credit who eagerly flocked to the newly opened

ports to try their fortune. It was not to be expected that all or most of those should be very scrupulous in their dealings with the foreigners; the majority of those adventurers failed, while a few of the abler men, generally those who believed in and practised honesty as the best policy, succeeded and came to occupy an honourable posi- tion as business men. It is also asserted that foreigners, or at least some of them, did not scruple to take unfair advantage of the want of experience on the part of their Japanese customers to impose upon them methods which they would not have followed except in the East ; it may be that such methods were necessary or were deemed so in dealing with those adventurers, but it is a fact that it afterwards took a long time and great effort on the part of Japanese traders to break through some usages and customs which were established in earlier days and which they deemed derogatory to their credit or injurious to their in- terests. Infringement of patent rights and fraudulent imitation of trade-marks have with some truth also been charged against the Japanese; about this it is to be remarked that although the principles of morality cannot change, their applications may be new; patents and trade-marks are something new to the Japanese, and it takes time to teach that their infringement should be regarded with the same moral censure as stealing. The government has done everything to prevent such practices by enacting and enforcing laws against them, and nowadays they are not so common. Be that as it may, such a state of affairs as that mentioned above is now passing away almost entirely; commerce and trade are now regarded as highly honourable pro- fessions, merchants and business men occupy the highest social positions, several of them having been lately raised to the peerage, and are as honourable a set of men as can be met anywhere. It is however to be regretted that in introducing Western business methods, it has not been quite possible to exclude some of their evils, such as promotion of swindling companies, tampering with members of legislature, and so forth.

The Japanese have also been considered in some quarters to be a bellicose nation. No sooner was the war with Russia over than they were said to be ready and eager to fight with the United States. This is another misrepresentation arising from want of proper knowledge of Japanese character and feelings. Although it is true that within the quarter of a century preceding 1909 Japan was engaged in two sanguinary wars, not to mention the Boxer affair, in which owing to her proximity to the scene of the disturbances she had to take a prominent part, yet neither of these was of her own seeking; in both cases she had to fight or else submit to become a mere cipher in the world, if indeed she could have preserved her existence as an independent state. The Japanese, far from being a bellicose people, deliberately cut off all intercourse with the outside world in order to avoid inter- national troubles, and remained absolutely secluded from the world

and at profound peace within their own territory for,two centuries and a half. Besides, the Japanese have always re- garded the Americans with a special goodwill, due no doubt to the steady liberal attitude of the American government and

people towards Japan and Japanese, and they look upon the idea of war between Japan and the United States as ridiculous.

Restrictions upon Japanese emigrants to the United States and to Australia are irritating to the Japanese, because it is a discrimination against them as belonging to the " yellow " race, whereas it has been their ambition to raise themselves above the level of the Eastern nations to an equality with the Western nations, although they cannot change the colour of their skin. When a Japanese even of the highest rank and standing has to obtain a permit from an American immigrant officer before he can enter American territory, is it not natural that he and his country- men should resent this discrimination as an indignity? But they have too much good sense to think or even dream of going to war upon such a matter; on the contrary, the Japanese govern- ment agreed in 1008 to limit the number of emigrants in order to avoid complications.

It may be repeated that it has ever been the ambition of the Japanese people to take rank with the Great Powers of the world, and to have a voice in the council of nations; they demand that they shall not be discriminated against because of the colour of their skin, but that they shall rather be judged by their deeds. With this aim, they have made great efforts: where charges brought against them have any foundation in fact, they have endeavoured to make reforms; where they are false or due to misunderstandings they have tried to live them down, trusting to time for their vindication. They are willing to be judged by the intelligent and impartial world: a fair field and no favour is what they claim, and think they have a right to claim, from the world. (K.)

Bibliography. — The latest edition of von Wemckstern's Bibliography of the Japanese Empire contains the names of all important books and publications relating to Japan, which have now become very numerous. A general reference must suffice here to Captain F. Brinkley's Japan (12 vols., 1904); the works of B. H. Chamberlain, Things Japanese (5th ed., 1905, &c); W. G. Aston, Hist, of Jap. Literature, &c, and Lafcadio Hearn, Japan: an Interpretation (1904), &c, as the European authors with intimate knowledge of the country who have done most to give accurate

and illuminating expression to its development. See also Fifty Years of New Japan, an encyclopaedic account of the national development in all its aspects, compiled by Count Shigenobu Okuma (2 vols., 1907, 1908; Eng. ed. by Marcus B. Huish, 1909).

JAPANNING, the art of coating surfaces of metal, wood, &c, with a variety of varnishes, which are dried and hardened on in stoves or hot chambers. These drying processes constitute the main distinguishing features of the art. The trade owes its name to the fact that it is an imitation of the famous lacquering of Japan (see Japan: Art), which, however, is prepared with entirely different materials and processes, and is in all respects much more brilliant, durable and beautiful than any ordinary japan work. Japanning is done in clear transparent varnishes, in black and in body colours; but black japan is the most characteristic and common style of work. The varnish for black japan consists essentially of pure natural asphaltum with a pro- portion of gum anime dissolved in linseed oil and thinned with turpentine. In thin layers such a japan has a rich dark brown colour; it only shows a brilliant black in thicker coatings. For fine work, which has to be smoothed and polished, several coats of black are applied in succession, each being separately dried in the stove at a heat which may rise to about 300° F. Body colours consist of a basis of transparent varnish mixed with the special mineral paints of the desired colours or with bronze powders. The transparent varnish used by japanners is a copal varnish which contains less drying oil and more turpentine than is contained in ordinary painters' oil varnish. Japanning pro- duces a brilliant polished surface which is much more durable and less easily affected by heat, moisture or other influences than any ordinary painted and varnished work. It may be regarded as a process intermediate between ordinary painting and enamelling. It is very extensively applied in the finishing of ordinary iron-mongery goods and domestic iron-work, deed boxes, clock dials and papier-mache articles. The process is also applied to blocks of slate for making imitation of black and other marbles for

chimneypieces, &c, and in a modified form is employed for preparing enamelled, japan or patent leather.

JAPHETH (n$g), in the Bible, the youngest son of Noah 1 according to the Priestly Code (c. 450 B.C.) ; but in the earlier tradition 2 the second son, also the " father " of one of the three groups into which the nations of the world are divided. 3 In Gen. ix. 27, Noah pronounces the following blessing on Japheth —

" God enlarge (Heb. yapht) Japheth (Heb. yepheth), And let him dwell in the tents of Shem ; And let Canaan be his servant."

This is probably an ancient oracle independent alike of the flood story and the genealogical scheme in Gen. x. Shem is probably Israel; Canaan, of course, the Canaanites; by analogy, Japheth should be some third element of the population of Palestine — the Philistines or the Phoenicians have been suggested. The sense of the second line is doubtful, it may be " let God dwell " or " let Japheth dwell"; on the latter view Japheth appears to be in friendly alliance with Shem. The words might mean that Japheth was an intruding invader, but this is not consonant with the tone of the oracle. Possibly Japheth is only present in Gen. ix. 20-27 through corruption of the text, Japheth may be an accidental repetition of yapht " may he enlarge," misread as a pToper name.

In Gen. x. Japheth is the northern and western division of the nations; being perhaps used as a convenient title under which to group the more remote peoples who were not thought of as stand- ing in ethnic or political connexion with Israel or Egypt. Thus of his descendants, Gomer, Magog, 4 Tubal, Meshech, Ashkenaz, Riphath and Togarmah are peoples who are located with more or less certainty in N.E. Asia Minor, Armenia and the lands to the N.E. of the Black Sea; Javan is the Ionians, used loosely for the seafaring peoples of the West, including Tarshish (Tartessus in Spain); Kittim (Cyprus), Rodanim 5 (Rhodes). There is no certain identification of Tiras and Elishah. ,

The similarity of the name Japheth to the Titan Iapetos of Greek mythology is probably a mere accident. A place Japheth is men- tioned in Judith ii. 25, but it is quite unknown.

In addition to commentaries and dictionary articles, see E. Meyer, Die Israeliten und ihre Nachbarstamme, pp. 219 sqq. (W. H. Be.)

JAR, a vessel of simple form, made of earthenware, glass, &c, with a spoutless mouth, and usually without handles. The word came into English through Fr. jarre or Span, jarra, from Arab, jarrah, the earthenware vessel of Eastern countries, used to contain water, oil, wine, &c. The simple electrical condenser known as a Leyden Jar (q.v.) was so called because of the early experiments made in the science of electricity at Leiden. In the sense of a harsh vibrating sound, a sudden shock or vibrating movement, hence dissension, quarrel or petty strife, " jar " is onomatopoeic in origin; it is also seen in the name of the bird night-jar (also known as the goat-sucker). In the' expression " on the jar " or " ajar," of a door or window partly open, the word is another form of chare or char, meaning turn or turning, which survives in charwoman, one who works at a turn, a job and chore, a job, spell of work.

JARGON, in its earliest use a term applied to the chirping and twittering of

birds, but since the 1 5th century mainly confined to any language, spoken or written, which is either unintelligible to the user or to the hearer. It is particularly applied by unin- structed hearers or readers to the language full of technical terminology used by scientific, philosophic and other writers. The word is 0. Fr., and Cotgrave defines it as " gibridge (gibberish), fustian language." It is cognate with Span, geri- gonza, and Ital. gergo, gergone, and probably related to the onomatopoeic O. Fr. jargouiller, to chatter. The root is probably seen in Lat. garrire, to chatter.

1 Gen. v, 32, vi. 10, vii. 13, x. 1 ; cf . 1 Chron. i. 4.

2 Gen. ix. 27, x. 2, J. c. 850-750 B.C. In ix, 18 Ham is an editorial addition.

3 Gen. x. 1-5; cf. I Chron. i. 5-7. For the significance of the genealogies in Gen. x. see Ham.

4 See Gomer, Gog.

5 So we should read with 1 Chron. i. 7 (LXX.) for Dodanim.

JARGOON, or Jargon (occasionally in old writings jargounce and jacounce), a name applied by modern mineralogists to those zircons which are fine enough to be cut as gem-stones, but are not of the red colour which characterizes the hyacinth or jacinth. The word is related to Arab zargun (zircon). Some of the finest jargoons are green, others brown and yellow, whilst some are colourless. The colourless jargoon may be obtained by heating certain coloured stones. When zircon is heated it sometimes changes in colour, or altogether loses it, and at the same time usually increases in density and brilliancy. The so-called Matura diamonds, formerly sent from Matara (or Matura), in Ceylon, were decolorized zircons. The zircon has strong re- fractive power, and its lustre is almost adamantine, but it lacks the fire of the diamond. The specific gravity of zircon is subject to considerable variation in different varieties; thus Sir A. H. Church found the sp. gr. of a fine leaf-green jargoon to be as low as 3-982, and that of a pure white jargoon as high as 4-705. Jargoon and tourmaline, when cut as gems, are sometimes mis- taken for each other, but the sp. gr. is distinctive, since that of tourmaline is only 3 to 3 ■ 2 . Moreover, in tourmaline the dichro- ism is strongly marked, whereas in jargoon it is remarkably feeble. The refractive indices of jargoon are much higher than those of tourmaline (see Zircon). (F. W. R.)*

JARlR IBN 'ATlYYA UL-KHATFl (d. 728), Arabian poet, was born in the reign of the caliph 'Ah, was a member of the tribe Kulaib, a part of the Tamim, and lived in Irak. Of his early life little is known, but he succeeded in winning the favour of Haj jaj , the governor of Irak (see Caliphate) . Already famous for his verse, he became more widely known by his feud with Farazdaq and Akhtal. Later he went to Damascus and visited the court of Abdalmalik (' Abd ul-Malik) and that of his successor, Walid. From neither of these did he receive a warm welcome. He was, however, more successful with Omar II., and was the only poet received by the pious caliph.

His verse, which, like that of his contemporaries, is largely satire and eulogy, was published in 2 vols. (Cairo, 1896). (G. W. T.)

JARKENT, a town of Russian Central Asia, in the province of Semiryechensk, 70 m. W.N.W. of Kulja and near to the Ili river. Pop. (1897), 16,372.

JARNAC, a town of western France in the department of Charente, on the right bank of the river Charente, and on the rail- way 23 m. W. of Angouleme, between that city and Cognac. Pop. (1906), 4493. The town is well built; and an avenue, planted with poplar trees, leads to a handsome suspension bridge. The church contains an interesting ogival crypt. There are communal colleges for both sexes. Brandy, wine and wine-casks are made in the town. Jarnac was in 1569 the scene of a battle in which the Catholics defeated the Protes- tants. A pyramid marks the spot where Louis, Prince de CondeV one of the Protestant generals, was slain. Jarnac gave its name to an old French family, of which the best known member is Gui Chabot, comte de Jarnac (d. c. 1575), whose lucky back- stroke in his famous duel with Chateigneraie gave rise to the proverbial phrase coup de jarnac, signifying an unexpected blow.

JARO, a town of the province of Iloilo, Panay, Philippine Islands, on the Jaro river, 2 m. N.W. of the town of Iloilo, the capital. Pop. (1903), 10,681. It lies on a plain in the midst of a rich agricultural district, has several fine residences, a cathedral, a curious three-tiered tower, a semi-weekly paper and a monthly periodical. Jaro was founded by the Spanish in 1584. From 1903 until February 1908 it was part of the town or municipality of Iloilo.

JAROSITE, a rare mineral species consisting of hydrous potassium and aluminium sulphate, and belonging to the group of isomorphous rhombohedral minerals enumerated below: —

Alunite $K_2[Al(OH)_2]_6(SO_4)_4$

Jarosite K 2 [Fe(OH) 2] 6 (S0 4) 4

Natrojarosite Na 2 [Fe(OH) 2] 6 (S0 4) 4

Plumbo jarosite . . . . Pb [Fe(OH) 2] 8 (S0 4) 4 Jarosite usually occurs as drusy incrustations of minute

indistinct crystals with a yellowish-brown colour and brilliant lustre. Hardness 3; sp. gr. 3-15. The best specimens, con- sisting of crystalline crusts on limonite, are from the Jaroso ravine in the Sierra Almagrera, province of Almeria, Spain, from which locality the mineral receives its name. It has been also found, often in association with iron ores, at a few other localities. A variety occurring as concretionary or mulberry-like forms is known as moronolite (from Gr. nupov, " mulberry," and M0os, " stone "); it is found at Monroe in Orange county, New York. The recently discovered species natrojarosite and plumbojarosite occur as yellowish-brown glistening powders consisting wholly of minute crystals, and are from Nevada and New Mexico respectively. (L. J. S.)

JARRAH WOOD (an adaptation of the native name Jerryhl), the product of a large tree {Eucalyptus marginata) found in south-western Australia, where it is said to cover an area of 14,000 sq. m. The trees grow straight in the stem to a great size, and yield squared timber up to 40 ft. length and 24 in. diameter. The wood is very hard, heavy (sp. gr. i-oio) and close-grained, with a mahogany-red colour, and sometimes sufficient " figure " to render it suitable for cabinet-makers' use. The timber possesses several useful characteristics; and great expectations were at first formed as to its value for shipbuilding and general constructive purposes. These expectations have not, however, been realized, and the exclusive possession of the tree has not proved that source of wealth to western Australia which was at one time expected. Its greatest merit for shipbuilding and marine purposes is due to the fact that it resists, better than any other timber, the attacks of the Teredo navalis and other marine borers, and on land it is equally exempt, in tropical countries, from the ravages of white ants. When felled with the sap at its lowest point and well seasoned, the wood stands exposure in the air, earth or sea remarkably well, on which account it is in request for railway sleepers, telegraph poles and piles in the British colonies and India. The wood, however, frequently shows longitudinal blisters, or lacunae, filled with resin, the same as may be observed in spruce fir timber; and it is deficient in fibre, breaking with a short fracture under comparatively moderate pressure. It has been classed at Lloyds for ship-building purposes in line three, table A, of the registry rules.

JAR ROW, a port and municipal borough in the Jarrow parliamentary division of Durham, England, on the right bank of the Tyne, 65 m. below

Newcastle, and on a branch of the North-Eastern railway. Pop. (1901), 34,295. The parish church of St Paul was founded in 685, and retains portions of pre-Norman work. The central tower is Norman, and there are good Decorated and Perpendicular details in the body of the church. Close by are the scattered ruins of the monastery begun by the pious Biscop in 681, and consecrated with the church by Ceolfrid in 685. Within the walls of this monastery the Venerable Bede spent his life from childhood; and his body was at first buried within the church, whither, until it was removed under Edward the Confessor to Durham, it attracted many pilgrims. The town is wholly industrial, devoted to ship-building, chemical works, paper mills and the neighbouring collieries. It owes its development from a mere pit village very largely to the enterprise of Sir Charles Mark Palmer (q.v.). Jarrow Slake, a river bay, 1 m. long by 5 m. broad, contains the Tyne docks of the North-Eastern railway company. A great quantity of coal is shipped. Jarrow was incorporated in 1875, and the corporation consists of a mayor, 6 aldermen and 18 councillors. Area, 783 acres.

JARRY, NICOLAS, one of the best-known 17th century French calligraphers. He was born at Paris about 1620, and was officially employed by Louis XIV. His most famous work is the Guirlande de Julie (1641). He died some time before

1674.

JARVIS, JOHN WESLEY (1780-1840), American artist, nephew of the great John Wesley, was born at South Shields, England, and was taken to the United States at the age of five. He was one of the earliest American painters to give

serious attention to the study of anatomy. He lived at first in Philadelphia, afterwards establishing himself in New York, where he enjoyed great popularity, though his conviviality and eccentric mode of life affected his work. He visited Baltimore, Charleston and New Orleans, entertaining much and painting portraits of prominent people, particularly in New Orleans, where General Andrew Jackson was one of his sitters. He had for assistants at different times both Sully and Inman. He affected singularity in dress and manners, and his mots were the talk of the day. But his work deteriorated, and he died in great poverty in New York City. Examples of his painting are in the collection of the New York Historical Society.

JASHAR, BOOK OF, in Hebrew Sepher ha-yashar, a Hebrew composition

mentioned as though well-known in Josh. x. 13 and 2 Sam. i. 18. From these two passages it seems to have been a book of songs relating to important events, but no early collection of the kind is now extant, nor is anything known of it. Various speculations have been put forward as to the name: (1) that it means the book of the upright, i.e. Israel or distinguished Israelites, the root being the same as in Jeshurun; (2) that Jashar ('") is a transposition of shir (TE ', song); (3) that it should be pointed Yashir (~v?l, sing; cf. Exod. xv. 1) and was so called after its first word. None of these is very convincing, though support may be found for them all in the versions. The Septuagint favours (1) by its rendering iirl füffHov tov evOovs in Samuel (it omits the words in Joshua); the Vulgate has in libro justorum in both places; the Syriac in Samuel has Ashlr, which suggests a Hebrew reading ha-shlr (the song), and in Joshua it translates " book of praises." The Targum on both passages has " book of the law," an explanation which is fol- lowed by the chief Jewish commentators, making the incidents the fulfilment of passages in the Pentateuch. Since it con- tained the lament of David (2 Sam. i. 18) it cannot have been completed till after his time. If Wellhausen's restoration of 1 Kings viii. 12 be accepted (from Septuagint 1 Kings viii. 53, iv /3i/3Xi cj> rrjs (fdfjs) where the reference is to the building of the Temple, the book must have been growing in the time of Solomon. The attempt of Donaldson 1 to reconstruct it is largely subjective and uncritical.*

In later times when it became customary to compose midrashic works under well-known names, a book of Jashar naturally made its appearance. It need hardly be remarked that this has nothing whatever to do with the older book. It is an anonymous elaboration in Hebrew of the early part of the biblical narrative, probably com- posed in the 12th century. The fact that its legendary material is drawn from Arabic sources, as well as from Talmud, Midrash and later Jewish works, would seem to show that the writer lived in Spain, or, according to others, in south Italy. The first edition appeared at Venice in 1625, and it has been frequently printed since. It was translated into English by (or for) M. M. Noah (New York, 1840). A work called The Book of . . . Jasher, trans- lated . . . by Alcuin (1751; 2nd ed., Bristol, 1829), has nothing to do with this or with any Hebrew original, but is a mere fabrication by the printer, Jacob Hive, who put it forward as the book " mentioned in Holy Scripture."

Bibliography. — M. Heilprin, Historical Poetry of the Ancient Hebrews (New York, 1879), 1. 128-131; Mercati, " Una congettura sopra il libro del Giusto," in Studi e Testi (5, Roma, 1901). On the medieval work see Zunz, Gottesdienstliche Vortrdge der Juden (Frank- furt a. M., 1892), 2nd ed., p. 162.

JASHPUR, a tributary state of India, in the Central Provinces, having been

transferred from Bengal in 1905. The country is divided almost equally into high and low lands. The Uparghat plateau on the east rises 2200 ft. above sea-level, and the hills above it reach their highest point in Ranijula (3527 ft.). The only river of importance is the lb, in the bed of which diamonds are found, while from time immemorial its sands have been washed for gold. Jashpur iron, smelted by the Kols, is highly prized. Jungles of sdl forests abound, harbouring elephant, bison and other wild beasts. Jungle products include lac, silk cocoons and beeswax, which are exported. Area 1948 sq. m.; pop. (1901), 132,114; estimated revenue £8000.

1 Jashar: fragmenta archetypa carminum Hebraicorum (Berlin, 1854). Cf. Perowne's Remarks on it (Lond. 1855).

JASMIN, JACQUES (1 798-1864), Provencal poet, was born at Agen on the 6th of March 1798, his family name being Boe. His father, who was a tailor, had a certain facility for making doggerel verses, which he sang or recited at fairs and such-like popular gatherings; and Jacques, who used generally to accompany him, was thus early familiarized with the part which he afterwards so successfully filled himself. When sixteen years of age he found employment at a hairdresser's shop, and subsequently started a similar business of his own on the Gravier at Agen. In 1825 he published his first volume of Papillotos (" Curl Papers "), containing poems in French (a language he used with a certain sense of restraint) , and in the familiar Agen patois — the popular speech of the working classes — in which he was to achieve all his literary triumphs. Jasmin was the most famous forerunner in Provencal literature (q.v.) of Mistral and the Felibrige. His influence in rehabilitating, for literary purposes, his native dialect, was particularly exercised in the public recitals of his poems to which he devoted himself. His poetic gift, and his flexible voice and action, fitted him admirably for this double r61e of trouba- dour and jongleur. In 1835 he recited his " Blind Girl of Castel- Cuille " at Bordeaux, in 1836 at Toulouse; and he met with an enthusiastic reception in both those important cities. Most of his public recitations were given for benevolent purposes, the proceeds being contributed by him to the restoration of the church of Vergt and other good works. Four successive volumes of Papillotos were published during his lifetime, and contained amongst others the following remarkable poems, quoted in order: " The Charivari," " My Recollections " (supplemented after an interval of many years), " The Blind Girl," " Francounetto," " Martha the Simple," and " The Twin Brothers." With the exception of " The Charivari," these are all touching pictures of humble life — in most cases real episodes — carefully elaborated by the poet till the graphic descriptions, full of light and colour, and the admirably varied and melodious verse, seem too sponta- neous and easy to have cost an effort. Jasmin was not a prolific writer, and, in spite

of his impetuous nature, would work a long time at one poem, striving to realize every feeling he wished to describe, and give it its most lucid and natural expression. A verse from his spirited poem, "The Third of May," written in honour of Henry IV., and published in the first volume of Papillotos, is engraved on the base of the statue erected to that king at Nerac. In 1852 Jasmin's works were crowned by the Acade- mie Frangaise, and a pension was awarded him. The medal struck on the occasion bore the inscription: Au poete moral et populaire. His title of " Maistre es Jeux" is a distinction only conferred by the academy of Toulouse on illustrious writers. Pius IX. sent him the insignia of a knight of St Gregory the Great, and he was made chevalier of the Legion of Honour. He spent the latter years of his life on a small estate which he had bought near Agen and named " Papillotos," and which he describes in Ma Bigno (" My Vine "). Though invited to repre- sent his native city, he refused to do so, preferring the pleasures and leisure of a country life, and wisely judging that he was no really eligible candidate for electoral honours. He died on the 4th of October 1864. His last poem, an answer to Renan, was placed between his folded hands in his coffin.

JASMINE, or Jessamine, bbtanically Jasminum, a genus of shrubs or climbers constituting the principal part of the tribe Jasminoideae of the natural order Oleaceae, and comprising about 150 species, of which 40 or more occur in the gardens of Britain. The plants of the genus are mostly natives of the warmer regions of the Old World; there is one South American species. The leaves are pinnate or ternate, or sometimes apparently simple, consisting of one leaflet, articulated to the petiole. The flowers, usually white or yellow, are arranged in terminal or axillary panicles, and have a tubular 5- or 8-cleft calyx, a cylin- drical corolla-tube, with a spreading limb, two included stamens and a two-celled ovary.

*The name is derived from the Persian ydsmin. Linnaeus obtained a fancied etymology from la, violets, and 607*17, smell, but the odour of its flowers bears no resemblance to that of the violet. The common white jasmine, Jasminum officinale, one*

of the best known and most highly esteemed of British hardy ligneous climbers, is a native of northern India and Persia, intro- duced about the middle of the 16th century. In the centre and south of Europe it is thoroughly acclimatized. Although it grows to the height of 12 and sometimes 20 ft., its stem is feeble and requires support; its leaves are opposite, pinnate and dark green, the leaflets are in three pairs, with an

odd one, and are pointed, the terminal one larger and with a tapering point. The fragrant white flowers bloom from June to October; and, as they are found chiefly on the young shoots, the plant should only be pruned in the autumn. Varieties with golden and silver-edged leaves and one with double flowers are known.

The zambak or Arabian jasmine, J. Sambac, is an evergreen white-flowered climber, 6 or 8 ft. high, introduced into Britain in the latter part of the 17th century. Two varieties introduced somewhat later are respectively 3-leaved and double-flowered, and these, as well as that with normal flowers, bloom throughout the greater part of the

Jasminum grandifiorum; flower, natural size.

year. On account of their exquisite fragrance the flowers are highly esteemed in the East, and are frequently referred to by the Persian and Arabian poets. An oil obtained by boiling the leaves is used to anoint the head for complaints of the eye, and an oil obtained from the roots is used medicinally to arrest the secretion of milk. The flowers of one of the double varieties are held sacred to Vishnu, and used as votive offerings in Hindu religious ceremonies. The Spanish, or Catalonian jasmine, /. grandifiorum, a native of the north-west Himalaya, and cultivated both in the old and new world, is very like J. officinale, but differs in the size of the leaflets; the branches are shorter and stouter, and the flowers very much larger, and reddish underneath. By grafting it on two-year-old plants of J. officinale, an erect bush about 3 ft. high is obtained, requiring no supports. In this way it is very extensively cultivated at Cannes and Grasse, in the south of France; the plants are set in rows, fully exposed to the sun ; they come into full bearing the second year after grafting ; the blossoms, which are very large and intensely fragrant, are produced from July till the end of October, but those of August and September are the most odoriferous.

The aroma is extracted by the process known as enfleurage, i.e. absorption by a fatty body, such as purified lard or olive oil. Square glass trays framed with wood about 3 in. deep are spread over with grease about half an inch thick, in which ridges are made to facilitate absorption, and sprinkled with freshly gathered flowers, which are renewed every morning during the whole time the plant remains in blossom; the trays are piled up in stacks to prevent the evaporation of the aroma ; and finally the pomade is scraped off the

glass, melted at as low a temperature as possible, and strained. When oil is employed as the absorbent, coarse cotton cloths pre- viously saturated with the finest olive oil are laid on wire-gauze frames; and repeatedly covered in the same manner with fresh flowers ; they are then squeezed under a press,

yielding what is termed huile antique au jasmin. Three pounds of flowers will perfume 1 lb of grease — this is exhausted by maceration in I pt. of rectified spirit to form the " extract." An essential oil is distilled from jasmine in Tunis and Algeria, but its high price prevents its being used to any extent. The East Indian oil of jasmine is a compound largely contaminated with sandalwood-oil.

The distinguishing characters of J. odoratissimum, a native of the Canary Islands and Madeira, consist principally in the alternate, obtuse, ternate and pinnate leaves, the 3-flowered terminal peduncles and the 5-cleft yellow corolla with obtuse segments. The flowers have the advantage of retaining when dry their natural perfume, which is suggestive of a mixture of jasmine, jonquil and orange- blossom. In China /. paniculatum is cultivated as an erect shrub, known as sieu-hing-hwa; it is valued for its flowers, which are used with those of /. Sambac, in the proportion of 10 lb of the former to 30 lb of the latter, for scenting tea — 40 lb of the mixture being re- quired for 100 lb of tea. J. angustifolium is a beautiful evergreen climber 10 to 12 ft. high, found in the Coromandel forests, and intro- duced into Britain during the present century. Its leaves are of a bright shining green; its large terminal flowers are white with a faint tinge of red, fragrant and blooming throughout the year.

In Cochin China a decoction of the leaves and branches of /. nervosum is taken as a blood-purifier; and the bitter leaves of /. flortbundum (called in Abyssinia habbez-zelim) mixed with kousso is considered a powerful anthelmintic, especially for tapeworm ; the leaves and branches are added to some fermented liquors to increase their intoxicating quality. In Catalonia and in Turkey the wood of the jasmine is made into long, slender pipe-stems, highly prized by the Moors and Turks. Syrup of jasmine is made by placing in a jar alternate layers of the flowers and sugar, covering the whole with wet cloths and standing it in a cool place ; the perfume is absorbed by the sugar, which is converted into a very palatable syrup. The important medicinal plant known in America as the " Carolina jasmine " is not a true jasmine (see Gelsemium).

Other hardy species commonly cultivated in gardens are the low or Italian yellow-flowered jasmine, J. humile, an East Indian species introduced and now found wild in the south of Europe, an erect shrub 3 or 4 ft. high, with angular branches, alternate and mostly ternate leaves, blossoming from June to September; the common yellow jasmine, /. fruticans, a native of southern Europe and the Mediterranean region, a hardy evergreen shrub, 10 to 12 ft. high, with weak, slender stems requiring support, and bearing yellow, odourless flowers from spring to autumn; and J. nudiflorum (China), which bears its bright yellow flowers in winter before the leaves appear. It thrives in almost any situation and grows rapidly.

JASON (‘lacruv), in Greek legend, son of Aeson, king of Iolcus in Thessaly. He was the leader of the Argonautic expedition (see Argonauts). After he returned from it he lived at Corinth with his wife Medea (g.v.) for many years. At last he put away Medea, in order to marry Glauce (or Creusa), daughter of the Corinthian king Creon. To avenge herself, Medea presented the new bride with a robe and head-dress, by whose magic pro- perties the wearer was burnt to death, and slew her children by Jason with her own hand. A later story represents Jason as reconciled to Medea (Justin, xlii. 2). His death was said to have been due to suicide through grief, caused by Medea’s vengeance (Diod. Sic. iv. 55); or he was crushed by the fall of the poop of the ship ” Argo,” under which, on the advice of Medea, he had laid himself down to sleep (argument of Euripides’ Medea). The name (more correctly Iason) means ” healer,” and Jason is possibly a local hero of Iolcus to whom healing powers were attributed. The ancients regarded him as the oldest navigator, and the patron of navigation. By the moderns he has been variously explained as a solar deity; a god of summer; a god of storm; a god of rain, who carries off the rain-giving cloud (the golden fleece) to refresh the earth after a long period of drought. Some regard the legend as a chthonian myth, Aea (Colchis) being the under-world in the Aeolic religious system from which Jason liberates himself and his betrothed; others, in view of certain resemblances between the story of Jason and that of Cadmus (the ploughing of the field, the sowing of the dragon’s teeth, the fight with the Sparti, who are finally set fighting with one another by a stone hurled into their midst), associate both with Demeter the corn-goddess, and refer certain episodes to practices in use at country festivals, e.g. the stone throwing, which, like the PaWrirvs at the Eleusinia and the Xi0o|3oXia at

Troezen (Pausanias ii. 30, 4 with Frazer’s note) was probably intended to secure a good harvest by driving away the evil spirits of unfruitfulness.

See articles by C. Seeliger in Roscher’s Lexikonder Mythologie and by F. Durrbach in Daremberg and Saglio’s Dictionnaire des anti- quites; H. D. Muller, Mythologie der griechischen Stamme (1861), ii. 328, who explains the name Jason as “wanderer “; W. Mann- hardt, Mythologische Forschungen (1884), pp. 75, 130; O. Crusius, Beitrdge zur griechischen Mythologie und Religionsgeschichte (Leipzig,

1886).

Later Versions of the Legend. — Les fais et prouesses du noble et vaillant chevalier Jason was composed in the middle of the 15th century by Raoul Lefevre on the basis of Benoit’s Roman de Troie, and presented to Philip of

Burgundy, founder of the order of the Golden Fleece. The manners and sentiments of the 1 5th century are made to harmonize with the classical legends after the fashion of the Italian pre-Raphaelite painters, who equipped Jewish warriors with knightly lance and armour. The story is well told; the digressions are few; and there are many touches of domestic life and natural sympathy. The first edition is believed to have been printed at Bruges in 1474.

Caxton translated the book under the title of A Boke of the hoole Lyf of Jason, at the command of the duchess of Burgundy. A Flemish translation appeared at Haarlem in 1495. The Benedictine Bernard de Montfaucon (1 655-1 741) refers to a MS. by Guido delle Colonne, Historia Medeae et Jasonis (unpublished).

The Histoire de la Thoisond'Or (Paris, 1516) by Guillaume Fillastre (1400-1473), written about 1440-1450, is an historical compilation dealing with the exploits of the tr'es chretiennes maisons of France, Burgundy and Flanders.

JASON OF CYRENE, a Hellenistic Jew, who lived about 100 B.C. and wrote a history of the times of the Maccabees down to the victory over Nicanor (175-161 b.c). This work is said to have been in five books and formed the basis of the present 2 Mace, (see ch. ii. 19-32).

JASPER, an opaque compact variety of quartz, variously coloured and often containing argillaceous matter. The colours are usually red, brown, yellow or green, and are due to admixture with compounds of iron, either oxides or silicates. Although the term jasper is now restricted to opaque quartz it is certain that the ancient jaspis or laoTris was a stone of considerable translucency. The jasper of antiquity was in many cases distinctly green, for it is often compared with the emerald and other green objects. Jasper is referred to in the Niebelungen- lied as being clear and green. Probably the jasper of the ancients included stones which would now be classed as chal- cedony, and the emerald-like jasper may have been akin to our chrysoprase. The Hebrew word yashefeh may have designated a green jasper (cf. Assyrian yashpu). Professor Flinders Petrie has suggested that the odem, the first stone on the High Priest's breastplate, translated " sard," was a red jasper, whilst tarshish, the tenth stone, may have been a yellow jasper (Hastings's Diet. Bible, 1902).

Many varieties of jasper are recognized. Riband jasper is a form in which the colours are disposed in bands, as in the well-known ornamental stone from Siberia, which shows a regular alternation of dark red and green stripes. Egyptian jasper is a brown jasper, occurring as nodules in the Lybian desert and in the Nile valley, and characterized by a zonal

arrangement of light and dark shades of colour. Agate-jasper is a variety intermediate between true jasper and chalcedony. Basanite, lydite, or Lydian stone, is a velvet- black flinty jasper, used as a touchstone for testing the purity of precious metals by their streak. Porcelain jasper is a clay indurated by natural calcination. (F. W. R.)*

J ASSY {Iasil), also written Jasii, Jaschi and Yassy, the capital of the department of Jassy, Rumania; situated on the left bank of the river Bahlui, an affluent of the Jijia, about 10 m. W. of the Pruth and the Russian frontier. Pop. (1900), 78,067. Jassy communicates by rail with Galatz on the Danube, Kishinev in Bessarabia, and Czernowitz in Bukowina. The surrounding country is one of uplands and woods, among which rise the monasteries of Cetatuia, Frumoasa, and Galata with its mineral springs, the water-cure establishment of Rapide and the great seminary of Socola. Jassy itself stands pleasantly amid vine- yards and gardens, partly on two hills, partly in the hollow

between. Its primitive houses of timber and plaster were mostly swept away after i860, when brick or stone came into general use, and good streets were cut among the network of narrow, insani- tary lanes. Jassy is the seat of the metropolitan of Moldavia, and of a Roman Catholic archbishop. Synagogues and churches abound. The two oldest churches date from the reign of Stephen the Great (1458-1504) ; perhaps the finest, however, are the 17th- century metropolitan, St Spiridion and Trei Erarchi, the last a curious example of Byzantine art, erected in 1639 or 1640 by Basil the Wolf, and adorned with countless gilded carvings on its outer walls and twin towers. The St Spiridion Foundation (due to the liberality of Prince Gregory Ghika in 1727, and avail- able for the sick of all countries and creeds) has an annual income of over £80,000, and maintains hospitals and churches in several towns of Moldavia, besides the baths at Slanic in Walachia. The main hospital in Jassy is a large building, and possesses a mater- nity institution, a midwifery school, a chemical institute, an inoculating establishment, &c. A society of physicians and naturalists has existed in Jassy since the early part of the 19th century, and a number of periodicals are published. Besides the university, founded by Prince Cuza in 1864, with faculties of literature, philosophy, law, science and medicine, there are a military academy and schools of art, music and commerce; a museum, a fine hall and a theatre; the state library, where the chief records of Rumanian history are preserved; an appeal court, a chamber of commerce and several banks. The city is the headquarters of the 4th army corps. It has an active trade in petroleum, salt, metals, timber, cereals, fruit, wine, spirits, preserved meat, textiles, clothing, leather, cardboard and cigarette paper.

The inscription by which the existence of a Jassiorum muni- cipium in the time of the Roman Empire is sought to be proved, lies open to grave suspicion; but the city is mentioned as early as the 14th century, and probably does derive its name from the Jassians, or Jazygians, who accompanied the Cumanian invaders. It was often visited by the Moldavian court. About 1564, Prince Alexander Lapusneanu, after whom one of the chief streets is named, chose Jassy for the Moldavian capital, instead of Suceava (now Suczawa, in Bukowina). It was already famous as a centre of culture. Between 1561 and 1563 an ex- cellent school and a Lutheran church were founded by the Greek adventurer, Jacob Basilicus (see Rumania: History). In 1643 the first printed book published in Moldavia was issued from a press established by Basil the Wolf. He also founded a school,the first in which the mother-tongue took the place of Greek. Jassy was burned by the Tatars in 1513, by the Turks in 1538, and by the Russians in 1686. By the Peace of Jassy the second Russo- Turkish War was brought to a close in 1792. A Greek insurrec- tion under Ypsilanti in 182 1 led to the storming of the city by the Turks in 1822. In 1844 there was a severe conflagration. For the loss caused to the city in 1861 by the removal of the seat of government to Bucharest the constituent assembly voted £148,150, to be paid in ten annual instalments, but no payment was ever made.

JATAKA, the technical name, in Buddhist literature, for a story of one or other of the previous births of the Buddha. The word is also used for the name of a collection of 547 of such stories included, by a most fortunate conjuncture of circum- stances, in the Buddhist canon. This is the most ancient and the most complete collection of folk-lore now extant in any literature in the world. As it was made at latest in the 3rd century B.C., it can be trusted not to give any of that modern or European colouring which renders suspect much of the folk-lore collected by modern travellers.

Already in the oldest documents, drawn up by the disciples soon after the Buddha's death, he is identified with certain ancient sages of renown. That a religious teacher should claim to be successor of the prophets of old is not uncommon in the history of religions. But the current belief in metempsychosis led, or enabled, the early Buddhists to make a much wider claim. It was not very long before they gradually identified their master with the hero of each of the popular fables and stories of which

they were so fond. The process must have been complete by the middle of the 3rd century B.C.; for we find at that date illustra- tions of the Jatakas in the bas-reliefs on the railing round the Bharahat tope with the titles of the Jataka stories inscribed above them in the characters of that period. 1

The hero of each story is made into a Bodhisatta; that is, a being who is destined, after a number of subsequent births, to become a Buddha. This rapid development of the Bodhisatta theory is the distinguishing feature in the early history of Buddhism, and was both cause and effect of the simultaneous growth of the Jataka book. In adopting the folk-lore and fables already current in India, the Buddhists did not change them very much. The stories as preserved to us, are for the most part Indian rather than Bud- dhist. The ethics they inculcate or suggest are milk for babes; very simple in character and referring almost exclusively to matters common to all schools of thought in India, and indeed elsewhere. Kindness, purity, honesty, generosity, worldly wisdom, perseverance, are the usual virtues praised; the higher ethics of the Path are scarcely mentioned. These stories, popular with all, were especially appreciated by that school of Buddhists that laid stress on the Bodhisatta theory— a school that obtained its chief support, and probably had its origin, in the extreme north-west of India and in the highlands of Asia. That school adopted, from the early centuries of our era, the use of Sanskrit, instead of Pali, as the means of literary expression. It is almost impossible, therefore, that they would have carried the canonical Pali book, voluminous as it is, into Central Asia. Shorter col- lections of the original stories, written in Sanskrit, were in vogue among them. One such collection, the Jataka-mala by Arya Sura (6th century), is still extant. Of the existence of another collection, though the Sanskrit original has not yet been found, we have curious evidence. In the 6th century a book of Sanskrit fables was translated into Pahlavi, that is, old Persian (see B idpai) . In succeeding centuries this work was retranslated into Arabic and Hebrew, thence into Latin and Greek and all the modern languages of Europe. The book bears a close resem- blance to the earlier chapters of a late Sanskrit fable book called, from its having five chapters, the Pancha (antra, or Pentateuch.

The introduction to the old Jataka book gives the life of the historical Buddha. That introduction must also have reached Persia by the same route. For in the 8th century St John of Damascus put the story into Greek under the title of Barlaam and Josaphat. This story became very popular in the West. It was translated into Latin, into seven European languages, and even into Icelandic and the dialect of the Philippine Islands. Its hero, that is the Buddha, was canonized as a Christian saint; and the 27th of November was officially fixed as the date for his adoration as such.

The book popularly known in Europe as Aesop's Fables was not written by Aesop. It was put together in the 14th century at Constantinople by a monk named Planudes, and he drew largely for his stories upon those in the Jataka book that had reached Europe along various channels. The fables of Babrius and Phaedrus written respectively in the 1st century before, and in the 1st century alter, the Christian era, also contain Jataka stories known

in India in the 4th century B.C. A great deal has been written on this curious question of the migration of fables. But we are still very far from being able to trace the complete history of each story in the Jataka book, or in any one of the later collections. For India itself the record is most incomplete. We have the original Jataka book in text and translation. The history of the text of the Pancha tantra, about a thousand years later, has been fairly well traced out But for the intervening centuries scarcely anything has been done I here are illustrations, in the bas-reliefs of the 3rd century B c of jatakas not contained in the Jataka book. Another collection the Cariyd ptfaka, of about the same date, has been edited, but not translated. Other collections both in Pali and Sanskrit are known to be extant in MS,; and a large number of Jataka stories, not included in any formal collection, are mentioned, or told in full in other works. '

Authorities.— V. Fausboll, The Jataka, Pali text (7 vols., London, 1877-1897), (Eng. trans., edited by E. B. Cowell, 6 vols., Cambridge, 1895-1907); Cariyd pijaka, edited by R. Mo rris for the Pali Text

"A complete list of these inscriptions will be found in Rhvs IJavids s Buddhist India, p. 209.

JATH— JATS

Society (London, 1882) ; H. Kern, Jataka-mala, Sanskrit text (Cambridge Mass., 1891), Eng trans, by J. S. Speyer, Oxford, 895™ Rhys Davids, Buddhist Birth Stories (with full bibliographica tables) (London, 1 880) ; Buddhist India (chap. xi. on the Jataka Book) (London, 1903); E Kuhn, Barlaam und Joasaph (Munich, 1893)- A. Cunningham, The Stupa of Bharhut (London, 1879)

(T. W. R. D.) JATH, a native state of India, in the Deccan division of Bombay, ranking as one of the southern Mahratta jagirs. With the small state of Daphlapur, which is an integral part of it, it forms the Bijapur Agency, under the collector of Bijapur district. Area, including Daphlapur, 980 sq. m. Pop. (1901), 68 665 showing a decline of 14% in the decade. Estimated revenue £24,000; tribute £700. Agriculture and cattle-breeding are carried on; there are no important manufactures. The chief, whose title is deshmukh, is a Mahratta of the Daphle family' The town of Jath is 92 m. S.E. of Satara. Pop. (1901), 5404.

JATIVA (formerly written Xativa), or San Felipe de JAtiva, a town of eastern Spain, in the province of Valencia, on the right bank of the river Albaida, a tributary of the Jtkar, and at the junction of the Valencia-Murcia and Valencia-Albacete railways. Pop. (1900), 12,600. Jativa is built on the margin of a fertile and beautiful plain, and on the southern

slopes of the Monte Bernisa, a hill with two peaks, each surmounted by a castle. With its numerous fountains, and spacious avenues shaded with elms or cypresses, the town has a clean and attractive appearance. Its collegiate church, dating from 1414, but rebuilt about a century later in the Renaissance style, was formerly a cathedral, and is the chief among many churches and convents. The town-hall and a church on the castle hill are partly con- structed of inscribed Roman masonry, and several houses date from the Moorish occupation. There is a brisk local trade in grain, fruit, wine, oil and rice.

Jativa was the Roman Saetabis, afterwards Valeria Augusta, of Carthaginian or Iberian origin. Pliny (23-79) and Martial (c. 40-102) mention the excellence of its linen cloth. Under the Visigoths (c. 483-711) it became an episcopal see; but early in the 8th century it was captured by the Moors, under whom it attained great prosperity, and received its present name. It was reconquered by James I. of Aragon (1213-1276). Duringthe 15th and 1 6th centuries, Jativa was the home of many members of the princely house of Borgia or Borja, who migrated hither from the town of Borja in the province of Saragossa. Alphonso Borgia, afterwards Pope Calixtus III., and Rodrigo Borgia, afterwards Pope Alexander VI., were natives of Jativa, born respectively in 1378 and 1431. The painter Jusepe Ribera was also born here in 1 588. Owing to its gallant defence against the troops of the Archduke Charles in the war of the Spanish succes- sion, Jativa received the additional name of San Felipe from Philip V. (1 700-1 746).

JATS, or Juts, a people of north-western India, who numbered altogether more than 7 millions in 1901 . They form a considerable proportion of the population in the Punjab, Rajputana and the adjoining districts of the United Provinces, and are also widely scattered through Sind and Baluchistan. Some writers have iden- tified the Jats with the ancient Getae, and there is strong reason to believe them a degraded tribe of Rajputs, whose Scythic origin has also been maintained. Hindu legends point to a prehistoric occupation of the Indus valley by this people, and at the time of the Mahommedan conquest of Sind (712) they, with a cognate tribe called Meds, constituted the bulk of the population. They enlisted under the banner of Mahommed bin Kasim, but at a later date offered a vigorous resistance to the Arab invaders. In 836 they were overthrown by Amran, who imposed on them a tribute of dogs, and used their arms to vanquish the Meds. In 1025, however, they had gathered audacity, not only to invade Mansura, and compel the abjuration of the Mussulman amir, but to attack the victorious army of Mahmud, laden with the spoil of Somnath. Chastisement duly ensued: a formidable flotilla, collected at Multan, shattered in thousands the comparatively defenceless Jat boats on the Indus, and annihilated their national pretensions. It is not until the decay

of the Mogul Empire that the Jats again appear in history. One branch of them, settled

south of Agra, mainly by bold plundering raids founded two dynasties which still exist at Bharatpur (q.v.) and Dholpur (q.v.). Another branch, settled north-west of Delhi, who adopted the Sikh religion, ultimately made themselves dominant throughout the Punjab (q.v.) under Ranjit Singh, and are now represented in their original home by the Phulkian houses of Patiala (q.v.), Jind (q.v.) and Nabha (q.v.). It is from this latter branch that the Sikh regiments of the Indian army are recruited. The Jats are mainly agriculturists and cattle breeders. In their settlements on the Ganges and Jumna, extending as far east as Bareilly, they are divided into two great clans, the Dhe and the Hele; while in the Punjab there are said to be one hundred different sections. Their religion varies with locality. In the Punjab they have largely embraced Sikh tenets, while in Sind and Baluchistan they are Mahommedans. In appearance they are not ill-favoured though extremely dark; they have good teeth, and large beards, sometimes stained with indigo. Their inferiority of social posi- tion, however, to some extent betrays itself in their aspect, and tends to be perpetuated by their intellectual apathy.

JAUBERT, PIERRE AMEDEE fiMILIEN PROBE (1779- 1847), French Orientalist, was born at Aix in Provence on the 3rd of June 1779. He was one of the most distinguished pupils of Silvestre de Sacy, whose funeral Discours he pro- nounced in 1838. Jaubert acted as interpreter to Napoleon in Egypt in 1 798-1 799, and on his return to Paris held various posts under government. In 1802 he accompanied Sebastiani on his Eastern mission; and in 1804 he was at Constantinople. Next year he was despatched to Persia to arrange an alliance with the shah; but on the way he was seized and imprisoned in a dry cistern for four months by the pasha of Bayazid. The pasha's death freed Jaubert, who successfully accomplished his mission, and rejoined Napoleon at Warsaw in 1807. On the eve of Napoleon's downfall he was appointed charge d'affaires at Constantinople. The restoration ended his diplomatic career, but in 1818 he undertook a journey with government aid to Tibet, whence he succeeded in introducing into France 400 Kashmir goats. The rest of his life Jaubert spent in study, in writing and in teaching. He became professor of Persian in the college de France, and director of the ecole des langues orientales, and in 1830 was elected member of the Academie des Inscriptions. In 1841 he was made a peer of France and councillor of state. He died in Paris on the 28th of January,

1847.

Besides articles in the Journal asiatique, he published Voyage en Armenie et en Perse (1821 ; the edition of i860 has a notice of Jaubert, by M. Sedillot) and Elements de la grammaire turque (1823-1834). See notices in the Journal asiatique, Jan. 1847, and the Journal des debats, Jan. 30, 1847.

JAUCOURT, ARNAIL FRANCOIS, Marquis de (1757-1852), French politician, was born on the 14th of November 1757 at Tournon (Seine-et-Marne) of a Protestant family, protected by the prince de Conde, whose regiment he entered. He adopted revolutionary ideas and became colonel of his regiment. In the Assembly, to which he was returned in 1791 by the depart- ment of Seine-et-Marne, he voted generally with the minority, and his views being obviously too moderate for his colleagues he resigned in 1792 and was soon after arrested on suspicion of being a reactionary. Mme de Stael procured his release from P. L. Manuel just before the September massacres. He accom- panied Talleyrand on his mission to England, returning to France after the execution of Louis XVI. He lived in retirement until the establishment of the Consulate, when he entered the tribunate, of which he was for some time president. In 1803 he entered the senate, and next year became ˆttached to the house- hold of Joseph Bonaparte. Presently his imperialist views cooled, and at the Restoration he became minister of state and a peer of France. At the second Restoration he was for a brief period minister of marine, but held no further office. He devoted himself to the support of the Protestant interest in France. A member of the upper house throughout the reign of Louis Philippe, he was driven into private life by the establish- ment of the Second Republic, but lived to see the Coup d'etat and

to rally to the government of Louis Napoleon, dying in Paris on the 5th of February 1852.

JAUER, a town of Germany, in the Prussian province of Silesia, 13 m. by rail S. of Leignitz, on the Wiithende Neisse. Pop. (1900), 13,024. St Martin's (Roman Catholic) church dates from 1267-1290, and the Evangelical church from 1655. A new town-hall was erected in 1895-1898. Jauer manu- factures leather, carpets, cigars, carriages and gloves, and is specially famous for its sausages. The town was first mentioned in 1242, and was formerly the capital of a principality em- bracing about 1200 sq. m., now occupied by the circles of Jauer, Bunzlau, Loweberg, Hirschberg and Schonau. From 1392 to 1741 it belonged to the kings of Bohemia, being taken from Maria Theresa by Frederick the Great. Jauer was formerly the prosperous seat of the Silesian linen trade, but the troubles of the Thirty Years' War, in the course of which it was burned

down three times, permanently injured this.

See Schonaich, Die alte Furstentumshauptstadt Jauer (Jauer, 1903).

JAUHARI (Abu Nasr Isma'il ibn Hammad ul-Jauhari) (d. 1002 or 1010), Arabian lexicographer, was born at Farab on the borders of Turkestan. He studied language in Farab and Bagdad, and later among the Arabs of the desert. He then settled in Damghan and afterwards at Nlshapur, where he died by a fall from the roof of a house. His great work is the Kitab us-Sahah fil-Lugha, an Arabic dictionary, in which the words are arranged alphabetically according to the last letter of the root. He himself had only partially finished the last recension, but the work was completed by his pupil, Abu Ishaq Ibrahim ibn Salih ul-Warraq.

An edition was begun by E. Scheidius with a Latin translation, but one part only appeared at Harderwijk (1776). The whole has been published at Tebriz (1854) ar >d at Cairo (1865), and many abridgments and Persian translations have appeared ; cf . C. Brockel- mann, Geschichte der arabischen Literatur (Weimar, 1898), i. 128 seq.

(G. W. T.)

JAUNDICE (Fr. jaunisse, from jaune, yellow), or Icterus (from its resemblance to the colour of the golden oriole, of which Pliny relates that if a jaundiced person looks upon it he recovers but the bird dies), a term in medicine applied to a yellow colora- tion of the skin and other parts of the body, depending in most instances on some derangement affecting the liver. This yellow colour is due to the presence in the blood of bile or of some of the elements of that secretion. Jaundice, however, must be re- garded more as a symptom of some morbid condition previously existing than as a disease per se.

Cases with jaundice may be divided into three groups.

1. Obstructive Jaundice. — Any obstruction of the passage of bile from the liver into the intestinal canal is sooner or later followed by the appearance of jaundice, which in such cir- cumstances is due to the absorption of bile into the blood. The obstruction is due to one of the following causes: (1) Obstruction by foreign bodies within the bile duct, e.g. gallstones or parasites; (2) inflammation of the duodenum or the lining membrane of the duct; (3) stricture or obliteration of the duct; (4) a tumour growing from the duct; (5) pressure on the duct from without, from the liver or other organ, or tumours arising from them. Obstructions from these causes may be partial or complete, and the degree of jaundice will vary accordingly, but it is to be noted that extensive organic disease of the liver may exist

without the evidence of obstructive jaundice.

The effect upon the liver of impediments to the outflow of bile such as those above indicated is in the first place an increase in its size, the whole biliary passages and the liver cells being distended with retained bile. This enlargement, however, speedily subsides when the obstruction is removed, but should it persist the liver ultimately shrinks and undergoes atrophy in its whole texture. The bile thus retained is absorbed into the system, and shows itself by the yellow staining seen to a greater or less extent in all the tissues and many of the fluids of the body. The kidneys, which in such circumstances act in some measure vicariously to the liver and excrete a portion of the

retained bile, are apt to become affected in their structure by the long continuance of jaundice.

The symptoms of obstructive jaundice necessarily vary according to the nature of the exciting cause, but there generally exists evidence of some morbid condition before the yellow coloration appears. Thus, if the obstruction be due to an impacted gallstone in the common or hepatic duct, there will probably be the symptoms of intense suffering characterizing hepatic colic (see Colic). In the cases most frequently seen — those, namely, arising from simple catarrh of the bile ducts due to gastro-duodenal irritation spreading through the common duct — the first sign to attract attention is the yellow appearance of the white of the eye, which is speedily followed by a similar colour on the skin over the body generally. The yellow tinge is most distinct where the skin is thin, as on the forehead, breast, elbows, &c. It may be also well seen in the roof of the mouth, but in the lips and gums the colour is not observed till the blood is first pressed from them. The tint varies, being in the milder cases faint, in the more severe a deep saffron yellow, while in extreme degrees of obstruction it may be of dark brown or greenish hue. The colour can scarcely, if at all, be observed in artificial light.

The urine exhibits well marked and characteristic changes in jaundice which exist even before any evidence can be detected on the skin or elsewhere. It is always of dark brown colour resembling porter, but after standing in the air it acquires a greenish tint. Its froth is greenish-yellow, and it stains with this colour any white substance. It contains not only the bile colouring matter but also the bile acids. The former is detected by the play of colours yielded on the addition of nitric acid, the latter by the

purple colour, produced by placing a piece of lump sugar in the urine tested, and adding thereto a few drops of strong sulphuric acid.

The contents of the bowels also undergo changes, being characterized chiefly by their pale clay colour, which is in propor- tion to the amount of hepatic obstruction, and.to their consequent want of admixture with bile. For the same reason they contain a large amount of unabsorbed fatty matter, and have an extremely offensive odour.

Constitutional symptoms always attend jaundice with obstruc- tion. The patient becomes languid, drowsy and irritable, and has generally a slow pulse. The appetite is usually but not always diminished, a bitter taste in the mouth is complained of, while flatulent eructations arise from the stomach. Intolerable itching of the skin is a common accompaniment of jaundice, and cutaneous eruptions or boils are occasionally seen. Yellow vision appears to be present in some very rare cases. Should the jaundice depend on advancing organic disease of the liver, such as cancer, the tinge becomes gradually deeper, and the emaciation and debility more marked towards the fatal termina- tion, which in such cases is seldom long postponed. Apart from this, however, jaundice from obstruction may exist for many years, as in those instances where the walls of the bile ducts are thickened from chronic catarrh, but where they are only partially occluded. In the common cases of acute catarrhal jaundice recovery usually takes place in two or three weeks.

The treatment of this form of jaundice bears reference to the cause giving rise to the obstruction. In the ordinary cases of simple catarrhal jaundice, or that following the passing of gall- stones, a light nutritious diet (milk, soups, &c, avoiding sac- charine and farinaceous substances and alcoholic stimulants), along with counter-irritation applied over the right side and the use of laxatives and cholagogues, will be found to be advanta- geous. Diaphoretics and diuretics to promote the action of the skin and kidneys are useful in jaundice. In the more chronic forms, besides the remedies above named, the waters of Carlsbad are of special efficacy. In cases other than acute catarrhal, operative interference is often called for, to remove the gall- stones, tumour, &c, causing the obstruction.

2. Toxaemic Jaundice is observed to occur as a symptom in certain fevers, e.g. yellow fever, ague, and in pyaemia also as the effect of certain poisons, such as phosphorus, and the venom

of snake-bites. Jaundice of this kind is almost always slight, and neither the urine nor the discharges from the bowels exhibit changes in appearance to such a degree as in the obstructive variety. Grave constitutional symptoms are often present, but they are less to be ascribed to the jaundice than to

the disease with which it is associated.

3. Hereditary Jaundice. — Under this group there are the jaundice of new-born infants, which varies enormously in severity; the cases in which a slight form of jaundice obtains in several members of the same family, without other symptoms, and which may persist for years; and lastly the group of cases with hypertrophic cirrhosis.

The name malignant jaundice is sometimes applied to that very fatal form of disease otherwise termed acute yellow atrophy of the liver (see Atrophy).

JAUNPUR, a city and district of British India, in the Benares division of the United Provinces. The city is on the left bank of the river Gumti, 34 m. N.W. from Benares by rail. Pop. (1901), 42,771. Jaunpur is a very ancient city, the former capital of a Mahommedan kingdom which once extended from Budaun and Etawah to Behar. It abounds in splendid architectural monu- ments, most of which belong to the period when the rulers of Jaunpur were independent of Delhi. The fort of Feroz Shah is in great part completely ruined, but there remain a fine gateway of the 16th century, a mosque dating from 1376, and the ham- mams or baths of Ibrahim Shah. Among other buildings may be mentioned the Atala Masjid (1408) and the ruined Jinjiri Masjid, mosques built by Ibrahim, the first of which has a great clois- tered court and a magnificent facade; the Dariba mosque con- structed by two of Ibrahim's governors; the Lai Darwaza erected by the queen of Mahmud; the Jama Masjid (1438-1478) 01 great mosque of Husain, with court and cloisters, standing on a raised terrace, and in part restored in modern times; and finally the splendid bridge over the Gumti, erected by Munim Ehan, Mogul governor in 1560-1573. During the Mutiny of 1857 Jaunpur formed a centre of disaffection. The city has now lost its im- portance, the only industries surviving being the manufacture of perfumes and papier-mache articles.

The District of Jaunpur has an area of 1 551 sq. m. It forms part of the wide Gangetic plain, and its surface is accordingly composed of a thick alluvial deposit. The whole country is closely tilled, and no waste lands break the continuous prospect of cultivated fields. It is divided into two unequal parts by the sinuous channel of the Gumti, a tributary of the Ganges, which flows past the city of Jaunpur. Its total course within the district is about 90 m., and it is nowhere fordable. It is crossed by two bridges, one at Jaunpur and the other 2 m. lower down. The Gumti is liable to sudden inundations during the rainyseason, owing to the high banks it has piled up at its entrance into the Ganges, which act as dams to prevent the prompt outflow of its flooded waters. These inundations extend to its tributary the Sal. Much damage was thus effected in 1774; but the greatest recorded flood took place in September 187 1, when 4000 houses in the city were swept away, besides 9000 more in villages along its banks. The other rivers are the Sal, Barna, Pili and Basohi. Lakes are numerous in the north and south; the largest has a length of 8 m. Pop. (1901), 1,202,920, showing a decrease of S % in the decade. Sugar-refining is the principal industry. The district is served by the line of the Oudh & Rohilkhand railway from Benares to Fyzabad, and by branches of this and of the Bengal & North-Western systems.

In prehistoric times Jaunpur seems to have formed a portion of the Ajodhya principality, and when it first makes an appear- ance in authentic

history it was subject to the rulers of Benares. With the rest of their dominions it fell under the yoke of the Mussulman invaders in 1194. From that time the district appears to have been ruled by a prince of the Kanauj dynasty, as a tributary of the Mahommedan suzerain. In 1388 Malik Sarwar Khwaja was sent by Mahommed Tughlak to govern the eastern province. He fixed his residence at Jaunpur, made himself independent of the Delhi court, and assumed the title of Sultan-us-Shark, or " eastern emperor." For nearly a century

the Sharki dynasty ruled at Jaunpur, and proved formidable rivals to the sovereigns of Delhi. The last of the dynasty was Sultan Husain, who passed his life in a fierce and chequered struggle for supremacy with Bahlol Lodi, then actual emperor at Delhi. At length, in 1478, Bahlol succeeded in defeating his rival in a series of decisive engagements. He took the city of Jaunpur, but permitted the conquered Husain to reside there, and to complete the building of his great mosque, the Jama Masjid, which now forms the chief ornament of the town. Many other architectural works in the district still bear witness to its great- ness under its independent Mussulman rulers. In 1775 the district was made over to the British by the Treaty of Lucknow. From that time nothing occurred which calls for notice till the Mutiny. On the 5th of June 1857, when the news of the Benares revolt reached Jaunpur, the sepoys mutinied. The district continued in a state of complete anarchy till the arrival of the Gurkha force from Azamgarh in September. In November the surrounding country was lost again, and it was not till May 1858 that the last smouldering embers of disaffection were stifled by the repulse of the insurgent leader at the hands of the people themselves.

See A. Fiihrer, The Shargi Architecture of Jaunpur (1889).

JAUNTING-CAR, a light two-wheeled carriage for a single horse, in its commonest form with seats for four persons placed back to back, with the foot-boards projecting over the wheels. It is the typical conveyance for persons in Ireland (see Car). The first part of the word is generally taken to be identical with the verb " to jaunt," now only used in the sense of to go on a short pleasure excursion, but in its earliest uses meaning to make a horse caracole or prance, hence to jolt or bump up and down. It would apparently be a variant of " jaunce," of the same mean- ing, which is supposed to be taken from O. Fr. jancer. Skeat takes the origin of jaunt and jaunce to be Scandinavian, and connects them with the Swedish dialect word ganta, to romp; and he finds cognate bases in such words as " jump,"

” high jinks.” The word ” jaunty,” sprightly, especially used of any- thing done with an easy nonchalant air, is a corruption of ” janty,” due to confusion with ” jaunt.” ” Janty,” often spelt in the 17th and 18th centuries ” jante ” or ” jantee,” repre- sents the English pronunciation of Fr. gentU, well-bred, neat, spruce.

JAURE6UI, JUAN (1562-1582), a Biscayan by birth, was in 1582 in the service of a Spanish merchant, Gaspar d’Anastro, who was resident at Antwerp. Tempted by the reward of 80,000 ducats offered by Philip II. of Spain for the assassination of William the Silent, prince of Orange, but being himself with- out courage to undertake the task, d’Anastro, with the help of his cashier Venero, persuaded Jauregui to attempt the murder for the sum of 2877 crowns. On Sunday the 18th of March 1582, as the prince came out of his dining-room Jauregui offered him a petition, and William had no sooner taken it into his hand than Jauregui fired a pistol at his head. The ball pierced the neck below the right ear and passed out at the left jaw-bone; but William ultimately recovered. The assassin was killed on the spot.

JAUREGUIBERRY, JEAN BERNARD (181 5-1887), French admiral, was born at Bayonne on the 26th of August 181 5. He entered the navy in 183 1, was made a lieutenant in 1845, com- mander in 1856, and captain in i860. After serving in the Crimea and in China, and being governor of Senegal, he was promoted to rear-admiral in 1869. He served on land during the second part of the Franco-German War of 1870-71, in the rank of auxiliary general of division. He was present at Coul- miers, Villepion and Loigny-Poupry, in command of a division, and in Chanzy’s retreat upon Le Mans and the battle at that place in command of a corps. He was the most distinguished of the many naval officers who did good service in the military operations. On the 9th of December he had been made vice-admiral, and in 1871 he commanded the fleet at Toulon; in 1875 he was a member of the council of admiralty; and in October 1876 he was appointed to command the evolutionary squadron in the Mediterranean. In February 1879 he became minister of

the navy in the Waddington cabinet, and on the 27th of May following was elected a senator for life. He was again minister of the navy in the Freycinet cabinet in 1880. A fine example of the fighting French seaman of his time, Jaureguiberry died at Paris on the 21st of October 1887.

JAUREGUI Y AGUILAR, JUAN MARTfNEZ DE (1583-1641), Spanish poet, was baptized at Seville on the 24th of November 1583. In due course he studied at Rome, returning to Spain shortly before 1610 with a double reputation as a painter and a poet. A reference in the preface to the Novelas exemplares has been taken to mean that he painted the portrait of

Cervantes, who, in the second part of Don Quixote, praises the translation of Tasso's Aminta published at Rome in 1607. Jauregui's Rimas (16 18), a collection of graceful lyrics, is preceded by a controversial preface which attracted much attention on account of its outspoken declaration against culteranismo. Through the influence of Olivares, he was appointed groom of the chamber to Philip IV., and gave an elaborate exposition of his artistic doctrines in the Discurso poelico contra el haUar culto y oscuro (1624), a skilful attack on the new theories, which procured for its author the order of Calatrava. It is plain, however, that the shock of controversy had shaken Jauregui's convictions, and his poem Orfeo (1624) is visibly influenced by Gongora. Jauregui died at Madrid on the nth of January 1641, leaving behind him a translation of the Pharsalia which was not published till 1684. This rendering reveals Jauregui as a complete convert to the new school, and it has been argued that, exaggerating the affinities between Lucan and G6ngora — both of Cordovan descent — he deliberately translated the thought of the earlier poet into the vocabulary of the later master. This is possible; but it is at least as likely that Jauregui unconsciously yielded to the current of popular taste, with no other intention than that of conciliating the public of his own day.

JAURES, JEAN LEON (1859-), French Socialist leader, was born at Castres (Tarn) on the 3rd of September 1859. He was educated at the lycee Louis-le-Grand and the ecole normale superieure, and took his degree as associate in philosophy in 1881. After teaching philosophy for two years at the lycee of Albi (Tarn), he lectured at the university of Toulouse. He was elected republican deputy for the department of Tarn in 1885. In 1889, after unsuccessfully contesting Castres, he returned to his professional duties at Toulouse, where he took an active interest in municipal affairs, and helped to found the medical faculty of the university. He also prepared two theses for his doctorate in philosophy, De primis socialismi germanici linea- mentis apud Lutherum, Kant, Fichte et Hegel (1891), and De la rtalite du monde sensible. In 1902 he gave energetic support to the miners of Carmaux who went out on strike in consequence of the dismissal of a socialist workman, Calvignac; and in the next year he was re-elected to the chamber as deputy for Albi. Although he was defeated at the elections of 1898 and was for four years outside the chamber, his eloquent speeches made him a force in politics as an intellectual champion of socialism. He edited the Petite Republique, and was one of the most energetic defenders of Captain Alfred Dreyfus. He approved of the inclusion of M. Millerand, the socialist, in the Waldeek-Rousseau ministry, though this led to a split with the more revolutionary section led by M. Guesde. In 1902 he was again returned as deputy for Albi, and during the Combes administration his in- fluence secured the coherence of the radical-socialist coalition known as the bloc. In 1904 he

founded the socialist paper, L'HumaniU. The French socialist groups held a congress at Rouen in March 1905, which resulted in a new consolidation; the new party, headed by MM. Jaures and Guesde, ceased to co-operate with the radicals and radical-socialists, and became known as the unified socialists, pledged to advance a collectivist programme. At the general elections of 1906 M. Jaures was again elected for the Tarn. His ability and vigour were now generally recognized; but the strength of the socialist party, and the practical activity of its leader, still had to reckon with the equally practical and vigorous liberalism of M. Clemenceau. The latter was able to appeal to his countrymen (in a notable

speech in the spring of 1906) to rally to a radical programme which had no socialist Utopia in view; and the appearance in him of a strong and practical radical leader had the result of considerably diminishing the effect of the socialist propaganda. M. Jaures, in addition to his daily journalistic activity, published Les preuves; affaire Dreyfus (1900); Action socialiste (1899); Etudes socialistes (1902), and, with other collaborators, Histoire socialiste (1901), &c.

JAVA, one of the larger islands of that portion of the Malay Archipelago which is distinguished as the Sunda Islands. It lies between 105° 12′ 40′ (St Nicholas Point) and 114° 35′ 38″ E. (Cape Seloko) and between 5° 52′ 34″ and 8° 46′ 46″ S. It has a total length of 622 m. from Pepper Bay in the west to Banyu- wangi in the east, and an extreme breadth of 121 m. from Cape Bugel in Japara to the coast of Jokjakarta, narrowing towards the middle to about 55 m. Politically and commercially it is important as the seat of the colonial government of the Dutch East Indies, all other parts of the Dutch territory being distinguished as the Outer Possessions (Buitenbezittungens). According to the triangulation survey (report published in 1901) the area of Java proper is 48,504 sq. m.; of Madura, the large adjacent and associated island, 1732; and of the smaller islands administratively included with Java and Madura 1416, thus

From Sumatra on the W., Java is separated by the Sunda Strait, which at the narrowest is only 14 m. broad, but widens elsewhere to about 50 m. On the E. the strait of Bali, which parts it from the island of that name, is at the northern end not more than i| m. across. Through the former strong currents run for the greater part of the day throughout the year, outwards from the Java Sea to the Indian Ocean. In the strait of Bali the currents are perhaps even stronger and are extremely irregular. Pilots with local knowledge are absolutely necessary for vessels attempting either passage. In

spite of the strength of the currents the Sunda Strait is steadily being diminished in width, and the process if continued must result in a restoration of that junction of Sumatra and Java which according to some authorities formerly existed. 2

In general terms Java may be described as one of the break- water islands of the Indian Ocean — part of the mountainous rim (continuous more or less completely with Sumatra) of the partially submerged plateau which lies between the ocean on the S. and the Chinese Sea on the N., and has the massive island of Borneo as its chief subaerial portion. While the waves and currents of the ocean sweep away most of the products of denudation along the south coast or throw a small percentage back in the shape of sandy downs, the Java Sea on the north —

**VSqpudl*

hipelago

ftailuiaua ..

I C*t*l* ***htrt a rtrtdn'Clf nnrf its oA'****/ town tout (*• mam iwttt. that 0/ (/»« ritiJMCi is*

wdirHifd. ctlnr midenciM:-l. Bantam II. Praangtr III. Kedu IV. Bnuki

making a total of 50,970 sq. m. The more important of these islands are the following: Pulau Panaitan or Princes Island (Prinseneiland) , 47 sq. m., lies in the Sunda Strait, off the south- western peninsula of the main island, from which it is separated by the Behouden Passage. The Thousand Islands are situated almost due N. of Batavia. Of these five were inhabited in 1906 by about 1280 seafarers from all parts and their descendants. The Karimon Java archipelago, to the north of Semarang, numbers twenty-seven islands with an area of 16 sq. m. and a population of about 800 (having one considerable village on the main island). Bavian 1 (Bawian), 100 m. N. of Surabaya, is a ruined volcano with an area of 73 sq. m. and a population of about 44,000. About a third of the men are generally absent as traders or coolies. In Singapore and Sumatra they are known as Boyans. They are devout Mahommedans and many of them make the pilgrimage to Mecca. The Sapudi and Kangean archipelagoes are eastward continuations of Madura. The former, thirteen in all, with an area of 58 sq. m. and 53,000 inhabitants, export cattle, dried fish and trepang; and many of the male popu- lation work as day labourers in Java or as lumbermen in Sum- bawa, Flores, &c. The main island of the Kangians has an area of 19 sq. m.; the whole group 23 sq. m. It is best known for its limestone caves and its buffaloes. Along the south coast the islands are few

and small — Klapper or Deli, Trouwers or Tingal, Nusa Kembangan, Sempu and Nusa Barung.

1 It must be observed that Bavian, &c, are mere conventional appendices to Java.

not more than 50 fathoms deep — allows them to settle and to form sometimes with extraordinary rapidity broad alluvial tracts. 3

It is customary and obvious to divide Java into three divisions, the middle part of the island narrowing into a kind of isthmus, and each of the divisions thus indicated having certain structural characteristics of its own. West Java, which consists of Bantam, Krawang and the Preanger Regencies, has an area of upwards of 18,000 sq. m. In this division the highlands He for the most part in a compact mass to the south and the lowlands form a continuous tract to the north. The main portion of the uplands consists of the Preanger Mountains, with the plateaus of Bandong, Pekalongan, Tegal, Badung and Gurut, encircled with volcanic summits. On the borders of the Preanger, Batavia and Bantam are the Halimon Mountains (the Blue Mountains of the older travellers), reaching their greatest altitudes in the volcanic summits of Gedeh and Salak. To the west lie the highlands of Bantam, which extending northward cut off the northern lowlands from the Sunda Strait. Middle Java is the smallest of the three divisions, having an area of not much more than 13,200 sq. m. It comprises Tegal, Pekalongan, Banyumas, Bagelen, Kedu, Jokjakarta, Surakarta, and thus not only takes in the whole of the isthmus but encroaches on the broad eastern portion of the island. In the isthmus mountains are not so closely massed

8 H. B. Guppy (R. S. G. Soc. Magazine, 1889) holds that there is no sufficient proof of this connexion but gives interesting details of the present movement.

3 See G. F. Tijdeman's map of the depths of the sea in the eastern part of the Indian archipelago in M. Weber's Siboga Expedition, 1903. The details of the coast forms of the island have been studied by J. F. Snelleman and J. F. Niermeyer in a paper in the Veth Feest- tundel, utilizing inter alia Guppy's observations.

in the south nor the plains so continuous on the north. The water- shed

culminating in Slaraet lies almost midway between the ocean and the Java Sea, and there are somewhat extensive lowlands in the south. In that part of middle Java which physically belongs to eastern Java there is a remarkable series of lowlands stretching almost right across the island fromSemarang in the north to Jokjakarta in the south. Eastern Java comprises Rembang, Madiun, Kediri, Sura- baya, Pasuruan and Besuki, and has an area of about 17,500 sq. m. In this division lowlands and highlands are intermingled in endless variety except along the south coast, where the watershed- range forms a continuous breakwater from Jokjakarta to Besuki. The volcanic eminences, instead of rising in lines or groups, are isolated.

For its area Java is one of the most distinctly volcanic regions of the world. Volcanic forces made it, and volcanic forces have con- tinued to devastate and fertilize it. According to R. D. M. Verbeek about 125 volcanic centres can be distinguished, a number which may be increased or diminished by different methods of classi- fication. It is usual to arrange the volcanoes in the following groups : westernmost Java 1 1 (all extinct) ; Preanger 50 (5 active) ; Cheribon 2 (both extinct) ; Slamet 2 (1 active) ; middle Java 16 (2 active) ; Murio 2 (both extinct) ;Lavu 2 (extinct) ; Wilis 2 (extinct) ; east Java 21 (5 active). The active volcanoes of the present time are Gedeh, Tangkuban, Prahu, Gutar, Papandayan, Galung-gung, Slamet, Sendor, Merapi, 1 Kalut (or Klut), Bromo, Semeru, Lamongan, Raung, but the activity of many of these is trifling, consisting of slight ejections of steam and scoriae.

The plains differ in surface and fertility, according to their geologi- cal formation. Built up of alluvium and diluvium, the plains of the north coast-lands in western and middle Java are at their lowest levels, near the mouths of rivers and the sea, in many cases marshy and abounding in lakes and coral remains, but for the rest they are fertile and available for culture. The plains, too, along the south coast of middle Java — of Banyumas and Bagelen — contain many morasses as well as sandy stretches and dunes impeding the outlet of the rivers. They are, nevertheless, available for the cultivation more particularly of rice, and are thickly peopled. In eastern Java, again, the narrow coast plains are to be distinguished from the wider plains lying between the parallel chains of limestone and be- tween the volcanoes. The narrow plains of the north coast are constituted of yellow clay and tuffs containing chalk, washed down by the rivers from the mountain chains and volcanoes. Like the western plains, they, too, are in many cases low and marshy, and fringed with sand and dunes. The plains, on the other hand, at "ome distance from the sea, or lying in the interior of eastern Java, such as Surakarta, Madiun, Kediri, Pasuruan, Probolinggo and Besuki, owe their formation to the volcanoes at whose bases they lie, occupying levels as high as 1640 ft.

down to 328 ft. above the sea, whence they decline to the lower plains of the coast. Lastly, the plains of Lusi, Solo and Brantas, lying between the parallel chains in Japara, Rembang and Surabaya, are in part the product of rivers formerly flowing at a higher level of 30 to 60 or 70 ft., in part the product of the sea, dating from a time when the northern part of the above-named residencies was an island, such as Madura, the mountains of which are the continuation of the north parallel chain, is still.

The considerable rivers of western Java all have their outlets on the north coast, the chief among them being the Chi (Dutch Tji) Tarum and the Chi Manuk. They are navigable for native boats and rafts, and are used for the transport of coffee and salt. On the south coast the Chi Tanduwi, on the east of the Preanger, is the only stream available as a waterway, and this only for a few miles above its mouth. In middle Java, also, the rivers discharging at the north coast — the Pamali, Chomal, &c. — are serviceable for the purposes of irrigation and cultivation, but are navigable only near their mouths. The rivers of the south coast — Progo, Serayu, Bogowonto, and Upak, enriched by rills from the volcanoes — serve abundantly to irrigate the plains of Bagelen, Banyumas, &c. Their stony beds, shallows and rapids; and the condition of their mouths lessen, however, their value as waterways. More navigable are the larger rivers of eastern Java. The Solo is navigable for large praus, or native boats, as far up as Surakarta, and above that town for lighter boats, as is also its affluent the Gentung. The canal constructed in 1893 at the lower part of this river, and alterations effected at its mouth, have proved of important service both in irrigating the plain and facilitating the river's outlet into the sea. The Brantas is also navigable in several parts. The smaller rivers of eastern Java are, however, much in the condition of those of western Java. They serve less as waterways than as reservoirs for the irrigation of the fertile plains through which they flow.

The north coast of Java presents everywhere a low strand covered with nipa or mangrove, morasses and fishponds, sandy stretches and low dunes, shifting river-mouths and coast-lines, ports and roads, demanding continual attention and regulation. The south coast is of a different make. The dunes of Banyumas, Bagelen, and Jokja- karta, ranged in three ridges, rising to 50 ft. high, and varying in breadth from 300 to over 1600 ft., liable, moreover, to transforma-

1 This Merapi must be carefully distinguished from Merapi the Fire Mountain of Sumatra.

tion from tides and the east monsoon, oppose everywhere, also in Preanger and Besuki, a barrier to the discharge of the rivers and the drainage of the coast-lands. They assist the formation of lagoons and morasses. At

intervals in the dune coast, running in the direction of the limestone mountains, there tower up steep inacces- sible masses of land, showing neither ports nor bays, hollowed out by the sea, rising in perpendicular walls to a height of 160 ft. above sea-level. Sometimes two branches project at right angles from the chain on to the coast, forming a low bay between the capes or ends of the projecting branches, from 1000 to 1600 ft. high. Such a formation occurs frequently along the coast of Besuki, presenting a very irregular coast-line. Of course the north coast is of much greater commercial importance than the south coast.

Geology. — With the exception of a few small patches of schist, supposed to be Cretaceous, the whole island, so far as is known, is covered by deposits of Tertiary and Quaternary age. The ancient " schist formation," which occurs in Sumatra, Borneo, &c, does not rise to the surface anywhere in Java itself, but it is visible in the island of Karimon Java off the north coast. The Cretaceous schists have yielded fossils only at Banjarnegara, where a limestone with Orbitolina is interstratified with them.' They are succeeded un- conformably by Eocene deposits, consisting of sandstones with coal-seams and limestones containing Nummulites, Alveolina and Orthophragmina ; and these beds are as limited in extent as the Cre- taceous schists themselves. Sedimentary deposits of Upper Tertiary age are widely spread, covering about 38 % of the surface. They consist of breccias, marls and limestones containing numerous fossils, and are for the most part Miocene but probably include a part of the Pliocene also. They were laid down beneath the sea, but have since been folded and elevated to considerable heights. Fluviatile deposits of late Pliocene age have been found in the east of Java, and it was in these that the remarkable anthropoid ape or ape-like man, Pithecanthropus erectus of Dubois, was discovered. The Quaternary deposits lie horizontally upon the upturned edges of the Tertiary beds. They are partly marine and partly fluviatile, the marine deposits reaching to a height of some 350 ft. above the sea and thus indicating a considerable elevation of the island in recent times.

The volcanic rocks of Java are of great importance and cover about 28% of the island. The eruptions began in the middle of the Tertiary period, but did not attain their maximum until Quaternary times, and many of the volcanoes are still active. Most of the cones seem to lie along faults parallel to the axis of the island, or on short cross fractures. The lavas and ashes are almost everywhere andesites and basalts, with a little obsidian. Some of the volcanoes, however, have erupted leucite rocks. Similar rocks, together with phonolite, occur in the island of Bavian. 2

Climate. — Our knowledge of the climate of Batavia, and thus of that of the lowlands of western Java, is almost perfect; but, rainfall excepted, our information as to the climate of Java as a whole is extremely defective. The

dominant meteorological facts are simple and obvious: Java lies in the tropics, under an almost vertical sun, and thus has a day of almost uniform length throughout the year. 3 It is also within the perpetual influence of the great atmospheric movements passing between Asia and Australia; and is affected by the neighbourhood of vast expanses of sea and land (Borneo and Sumatra). There are no such maxima of temperature as are recorded from the continents. The highest known at Batavia was 96° F. in 1877 and the lowest 66° in the same year. The mean annual temperature is 79°. The warmest months are May and October, registering 79-5° and 79-46° respectively; the coldest January and February with 77-63° and 77-7° respectively. The daily range is much greater; at one o'clock the thermometer has a mean height of 84°; after two o'clock it declines to about 73° at six o'clock; the greatest daily amplitude is in August and the least in January and February. Eastern Java and the inland plains of middle Java are said to be hotter, but scientific data are few. A very slight degree of elevation above the seaboard plains produces a remarkable difference in the climate, not so much in its mere temperature as in its influence on health. The dwellers in the coast towns are surprised at the invigorating effects of a change to health resorts from 300 to 1200 ft. above sea-level; and at greater eleva- tions it may be uncomfortably cold at night, with chilly mists and occasional frosts. The year is divided into two seasons by the pre- vailing winds: the rainy season, that of the west monsoon, lasting from November to March, and the dry season, that of the east mon- soon, during the rest of the year; the transition from one monsoon to another — the " canting " of the monsoons — being marked by

2 R. D. M. Verbeek and R. Fennema, Description geologiquede Java et Madoura (2 vols, and atlas, Amsterdam, 1896; also published in Dutch) — a summary with map was published by Verbeek in Peterm. Mitt. xliv. (1898), 24-33, pi. 3. Also K. Martin, Die Eintheilung der versteinerungsfilhrenden Sed.im.ente von Java, Samml. Geol. Reichsmus. Leiden, ser. i., vol. vi. (1899-1902), 135-245.

3 On the 16th of November the sun rises at 5.32 and sets at 5.57; on the 16th of July it rises at 6.12 and sets at 5.57. The longest day is in December and the shortest in June, while on the_ other hand thesun is highest in February and October and lowest in June and December.

irregularities. On the whole, the east monsoon blows steadily for a longer period than the west. The velocity of the wind is much less than in Europe — not more in the annual mean at Batavia than 3 ft. per second, against 12 to 18 ft. in Europe. The highest velocity ever observed at Batavia was

25 ft. Wind-storms are rare and hardly ever cyclonic. There are as a matter of course a large number of purely local winds, some of them of a very peculiar kind, but few of these have been scientifically dealt with. Thunder-storms are extremely frequent; but the loss of life from lightning is probably diminished by the fact that the palm-trees are excellent conductors. At night the air is almost invariably still. The average rainfall at Batavia is 72-28 in. per annum, of which 51-49 in. are contributed by the west monsoon. The amount varies considerably from year to year: in 1889, 1891 and 1897 there were about 47-24 in.; in 1868 and 1877 nearly 51-17, and in 1872 and 1882 no less than 94-8. There are no long tracts of unbroken rainfall and no long periods of continuous drought. The rainfall is heaviest in January, but it rains only for about one-seventh of the time. Next in order come February, March and December. August, the driest month, has from three to five days of rain, though the amount is usually less than an inch and not more than one and a half inches. The popu- lar description of the rain falling not in drops but streams was proved erroneous by J. Wiesner's careful observations (see Kais. Akad. d. Wiss. Math. Naturw. CI. Bd. xiv., Vienna, 1895), which have been confirmed by A. Woeikof (" Regensintensitat und Regendauer in Batavia " in Z. fur Met., 1907). The greatest rainfall recorded in an hour (4-5 in.) is enormously exceeded by records even in Europe. From observations taken for the meteorological authorities at a very considerable number of stations, J. H. Boeseken constructed a map in 1900 (Tijdschr. v. h. Kon. Ned. Aardr. Gen., 1900; reproduced in Veth, Java, iii. 1903). Among the outstanding facts are the following. The south coasts of both eastern and middle Java have a much heavier rainfall than the north. Maialenka has an annual fall of 175 in. In western Java the maximal district consists of a great ring of mountains from Salak and Gedeh in the west to Galung- gung intheeast, while theenclosed plateau-region of Chanjur Bandung and Garut are not much different from the sea-board. The whole of middle Java, with the exception of the north coast, has a heavy rainfall. At Chilachap the annual rainfall is 151-43 in., 87-8 in. of which is brought by the south-east monsoon. The great belt which in- cludes the Slamet and the Dieng, and the country on the south coast between Chilachap and Parigi, are maximal. In comparison the whole of eastern Java, with the exception of the mountains from Wilis eastward to Ijen, has a low record which reaches its lowest along the north coast. 1

Fauna. — In respect of its fauna Java differs from Borneo, Sumatra and the Malay Peninsula far more than these differ among them- selves; and, at the same time, it shows a close resemblance to the Malay Peninsula, on the one hand, and to the Himalayas on the other. Of the 176 mammals of the whole Indo-Malayan region the greater number occur in Java. Of these 41 are found . on the continent of Asia, 8 are common to Java and Borneo,

and 6 are common to Java and Sumatra (see M. Weber, Das Indo- Malay Archipelago und die Geschichte sein'r Thierwelt, Jena, 1902). No genus and only a few species are confined to the island. Of the land- birds only a small proportion are peculiar. The elephant, the tapir, the bear, and various other genera found in the rest of the region are altogether absent. The Javanese rhinoceros (Rhinoceros sundaicus; sarak in Javanese, badak in Sundanese), the largest of the mammals on the island, differs from that of Sumatra in having one horn instead of two. It ranges over the highest mountains, and its regular paths, worn into deep channels, may be traced up the steepest slopes and round the rims of even active volcanoes. Two species of wild swine, Sus vittatus and Sus verrucosus, are exceedingly abundant, the former in the hot, the latter in the temperate, region; and their depredations are the cause of much loss to the natives, who, however, being Mahommedans, to whom pork is abhorrent, do not hunt them for the sake of their flesh. Not much less than the rhinoceros is the banteng (Bibos banteng or sundaicus) found in all the uninhabited districts between 2000 and 7000 ft. of elevation. The kidang or muntjak (Cervulus muntjac) and the rusa or russa (Rusa hippelaphus or Russa russa) are the representatives of the deer kind. The former is a delicate little creature occurring singly or in pairs both in the mountains and in the coast districts; the latter lives in herds of fifty to a hundred in the grassy opens, giving excellent sport to the native hunters. Another species (Russa kuhlii) exists in Bavian. The kantjil (Tragulus javamcus) is a small creature allied to the musk-deer but forming a genus by itself. It lives in the high woods, for the most part singly, seldom in pairs. It is one of the most peculiar of the Javanese mammals. The royal tiger, the same species as that of India, is still common enough to make a tiger-hunt a characteristic Javanese scene. The leopard (Felis pardus) is frequent in the warm regions and often ascends to considerable altitudes. Black specimens occasionally occur, but the spots are visible on inspection ; and the fact that in the Amsterdam zoological gardens a black leopard had one of its cubs black and the other normally spotted shows that this is only a case of melanism. In the tree-tops the birds find a dangerous enemy in the matjan

- *S. Figei. Regenwaarnemingen in Nederlandsch Indie (1902).*

rembak, or wild cat (Felis minuta), about the size of a common cat. The dog tribe is represented by the fox-like adjag (Cuon or Canis sutilans) which hunts in ferocious packs; and by a wild dog, Canis tenggeranus, if this is not now exterminated. The Cheiroptera hold a prominent place in the fauna, the principal genera being Pteropus, Cynonycteris, Cynopterus and Macroglossus. Remarkable espe- cially for size is the kalong, or flying fox, Pteropus edulis, a fruit- eating bat, which may be seen hanging during the day in black clusters asleep on the trees, and in the evening hastening in long lines to the favourite feeding grounds in the forest. The damage these

do to the young coco-nut trees, the maize and the sugar-palms leads the natives to snare and shoot them; and their flesh is a favourite food with Europeans, who prefer to shoot them by night as, if shot by day, they often cling after death to the branches. Smaller kinds of bats are most abundant, perhaps the commonest being Scotophilus Temminchii. In certain places they congregate in myriads, like sea-fowl on the cliffs, and their" excrement produces extensive guano deposits utilized by the people of Surakarta and Madiun. The creature known to the Europeans as the flying-cat and to the natives as the kubin is the Galeopithecus volans or varia- gatus — a sort of transition from the bats to the lemuroids. Of these last Java has several species held in awe by the natives for their supposed power of fascination. The apes are represented by the wou-wou (Hylobates leuciscus), the lutung, and kowi (Semnopithecus maurus and pyrrhus), the surili (Semnopithecus mitratus), and the munyuk (Cercocebus, or Macacus, cynamolgos), the most generally distributed of all. From sunrise to sunset the wou-wou makes its presence known, especially in the second zone where it congregates in the trees, by its strange cry, at times harsh and cacophonous, at times weird and pathetic. The lutung or black ape also prefers the temperate region, though it is met with as high as 7000 ft. above the sea and as low as 2000. The Cercocebus or grey ape keeps for the most part to the warm coast lands. Rats (including the brown Norway rat, often called Mus javanicus, as if it were a native; a great plague); mice in great variety; porcupines (Acanthion javanicum) ; squirrels (five species) and flying squirrels (four species) represent the rodents. A hare, Lepus nigricollis, originally from Ceylon, has a very limited habitat; the Insectivora comprise a shrew-mouse (Rachyura indica), two species of tupaya and Hylomys suillus peculiar to Java and Sumatra. The nearest relation to the bears is Arctictis binturong. Mydaus meliceps and Helictis orientalis represent the badgers. In the upper part of the mountains occurs Mustela Henrici, and an otter (A onyx leptonyx) in the streams of the hot zone. The coffee rat (Paradoxurus hermaphroditus) , a civet cat (Viverricula indica), the Javanese ichneumon (Herpestes javanicus), and Priodon gracilis may also be mentioned.

In 1820, 176 species of birds were known in Java; by 1900 Vorder- man and O. Finsch knew 410. Many of these are, of course, rare and occupy a limited habitat far from the haunts of man. Others exist in myriads and are characteristic features in the landscape. Water-fowl of many kinds, ducks, geese, storks, pelicans, &c, give life to sea-shore and lake, river and marsh. Snipe-shooting is a favourtie sport. Common night-birds are the owl (Strix flammea) and the goatsucker (Caprimulgus affinis). Three species of hornbill, the year-bird of the older travellers (Buceros plicatus, lunatus and albirostris) live in the tall trees of the forest zone. The Javanese peacock is a distinct species (Pavo muticus or spiciferus), and even exceeds the well-

known Indian species in the splendour of its plumage. Gallus Bankiva is famous as the reputed parent of all barndoor fowls; Gallus fur catus is an exquisitely beautiful bird and can be trained for cock-fighting. Of parrots two species only are known: Palaeornis Alexandri or javanicus and the pretty little grass-green Curyllis pusilla, peculiar to Java. As talkers and mimics they are beaten by the Gracula javanensis, a favourite cage-bird with the natives. A cuckoo, Chrysococcyx basalis, may be heard in the second zone. The grass-fields are the foraging-grounds of swarms of weaver-birds (Plocula javanensis and Ploccus bay a) . They lay nearly as heavy a toll on the rice-fields as the gelatiks (Munia oryzivora), which are everywhere the rice-growers' principal foe. Hawks and falcons make both an easy prey. The Nictuarinas or honey-birds (eight species) take the place of the humming-bird, which they rival in beauty and diminutiveness, ranging from the lowlands to an altitude of 4000 ft. In the upper regions the birds, like the plants, are more like those of Europe, and some of them — notably the kanchilan (Hyloterpe Philomela) — are remarkable for their song. The edible-nest swallow (Collocalia fuciphaga) builds in caves in many parts of the island. 2

As far back as 1859 P. Bleeker credited Java with eleven hundred species of fish ; and naturalists are perpetually adding to the number. 3 In splendour and grotesqueness of colouring many kinds, as is well known, look rather like birds than fish. In the neighbourhood of Batavia about three hundred and eighty species are used as food by the natives and the Chinese, who have added to the number by the introduction of the goldfish, which reaches a great size. The sea fish most prized by Europeans is hates calcarifer (a perch). Of more than one hundred species of snakes about twenty-four species

2 See J. C. Konigsberger, " De vogels Java en hunne oeGonomisehe betukenis," Med. int. s. Lands Plantentuin,

3 See especially M. Weber, Siboga Expedition.

(including the cobra di capella) are poisonous and these are respon- sible for the deaths of between one hundred and two hundred persons per annum. Adders and lizards are abundant. Geckos are familiar visitants in the houses of the natives. There are two species of crocodiles.

As in other tropical-rain forest lands the variety and abundance of insects are amazing. At sundown the air becomes resonant for hours with their myriad voices. The Coleoptera and the Lepidoptera form the glory of all great collections for their size and magnificence. Of butterflies proper five

hundred species are known. Of the beetles one of the largest and handsomest is Chalcosoma atlas. 'Among the spiders (a numerously represented order) the most notable is a bird- killing species, Selene scomia javanensis. In many parts the island is plagued with ants, termites and mosquitoes. Crops of all kinds are subject to disastrous attacks of creeping and winged foes- many still unidentified (see especially Snellen van Hollenhoven, Essai d'une faune entomologique de VArchipel Indo-neerlandais). Of still lower forms of life the profusion is no less perplexing. Among the worms the Perichaeta musica reaches a length of about twenty inches and produces musical sounds. The shell of the Tridacna gigas is the largest anywhere known.

Flora. — For the botanist Java is a natural paradise, affording him the means of studying the effects of moisture and heat, of air- currents and altitudes, without the interference of superincumbent arctic conditions. The botanic gardens of Buitenzorg have long been famous for their wealth of material, the abSity with which their treasures have been accumulated and displayed, their value in connexion with the economic development of the island and the extensive scientific literature published by their directors. 1 There is a special establishment at Chibodas open to students of all nations for the investigation on the spot of the conditions of the primeval forest. Hardly any similar area in the world has a flora of richer variety than Java. It is estimated that the total number of the species of plants is about 5boo; but this is probably under the mark (De Candolle knew of 2605 phanerogamous species), and new genera and species of an unexpected character are from time to time discovered. The lower parts of the island are always in the height of summer. The villages and even the smaller towns are in great measure concealed by the abundant and abiding verdure; and their position in the landscape is to be recognized mainly by their groves, orchards and cultivated fields. The amount and distribution of heat and moisture at the various seasons of the year form the domi- nant factors in determining the character of the vegetation. Thus trees which are evergreen in west Java are deciduous in the east of the island, some dropping their leaves (e.g. Tetrameles nudiflora) at the very time they are in bloom or ripening their fruit. This and other contrasts are graphically described from personal observation by A. F. W. Schimper in his Pflanzen-Geographie auf physiologischer Grundlage (Jena, 1898). The abundance of epiphytes, orchids, pitcher-plants, mosses and fungi is a striking result of the preva- lent humidity; and many trees and plants indeed,, which in drier climates root in the soil, derive sufficient moisture from their stronger neighbours. Of orchids J. J. Smith records 562 species (100 genera), but the flowers of all except about a score are incon- spicuous. This last fact is the more remarkable because, taken generally, the Javanese vegetation differs from that of many other tropical countries by being abundantly and

often gorgeously floriferous. Many of the loftiest trees crown themselves with blossoms and require no assistance from the climbing plants that seek, as it were, to rival them in their display of colour. Shrubs, too, and herbaceous plants often give brilliant effects in the savannahs, the deserted clearings, the edges of the forest and the sides of the highways. The lantana, a verbenaceous alien introduced, it is said, from Jamaica by Lady Raffles, has made itself aggressively conspicuous in many parts of the island, more especially in the Preanger and middle Java, where it occupies areas of hundreds of acres.

The effect of mere altitude in the distribution of the flora was long ago emphasized by Friedrich Junghuhn, the Humboldt of Java, who divided the island into four vertical botanical zones — a division which has generally been accepted by his successors, though, like all such divisions, it is subject to many modifications and exceptions. The forest, or hot zone, extends to a height of 2000 ft. above the sea; the second, that of moderate heat, has its upper limit at about 4500; the third, or cool, zone reaches 7500; and the fourth, or coldest, comprises all that lies beyond. The lowest zone has, of course, the most extensive area; the second is only a fiftieth and the third a five-thousandth of the first; and the fourth is an insignificant remainder. The lowest is the region of the true tropical forest, of rice-fields and sugar-plantations, of coco- nut palms, cotton, sesamum, cinnamon and tobacco (though this last has a wide altitudinal range). Many parts of the coast (especially on the north) are fringed with mangrove {Rhizophora mucronata), &c, and species of Bruguiera; the downs have their characteristic flora — convolvulus and Spinifex squarrosus catching

1 The Annates de Buitenzorg, with their Icones bogorienses, are universally known; the Teysmannia is named after a former director. A history of the gardens was published by Dr Treub, Festboek van's Lands Plantentuin (1891).

the eye for very different reasons. Farther inland along the sea- board appear the nipa dwarf palm (Nipa fruticans), the Alsbonia scholaris (the wood of which is lighter than cork), Cycadacea, tree-ferns, screw pines (Pandanus), &c. In west Java the gebang palm (Corypha gebanga) grows in clumps and belts not far from but never quite close to the coast ; and in east Java a similar position is occupied by the lontar (Borassus flabelliformis) , valuable for its timber, its sago and its sugar, and in former times for its leaves, which were used as a writing-material. The fresh-water lakes and ponds of this region are richly covered with Utricularia and various kinds of lotus (Nymphaea lotus, N. stellata, Nelumbium speciosum, &c.) interspersed with Pista stratiotes and other floating plants. Vast prairies are covered with the silvery alang-alang grass broken by bamboo thickets, clusters of trees and shrubs (Butea frondosa, Emblica officinalis,

&c.) and islands of the taller erigedeh or glagah (Saccharum spontaneum) . Alang-alang (Imperata arundinacea, Cyr. var. Bentham) grows from I to 4 ft. in height. It springs up wherever the ground is cleared of trees and is a perfect plague to the cultivator. It cannot hold its own, however, with the ananas, the kratok (Phaseolus lunatus) or the lantana; and, in the natural progress of events, the forest resumes its sway except where the natives encourage the young growth of the grass by annually setting the prairies on fire. The true forest, which occupies a great part of this region, changes its character as we proceed from west to east. In west Java it is a dense rain-forest in which the struggle of exist- ence is maintained at high pressure by a host of lofty trees and parasitic plants in bewildering profusion. The preponderance of certain types is remarkable. Thus of the Moraceae there are in Java (and mostly here) seven genera with ninety-five species, eighty-three of which are Ficus (see S. H. Koorders and T. Valeton. " Boomsoorten op Java " in Bijdr. Mede. Dep. Landbower (1906)- These include the so-called waringin, several kinds of figs planted as shade-trees in the parks of the nobles and officials. The Magna liaceae and Anonaceae are both numerously represented. In middle Java the variety of trees is less, a large area being occupied by teak, In eastern Java the character of the forest is mainly determined by the abundance of the Casuarina or Chimoro (C. Montana and C. Junghuhniana) . Another species, C. equisetifolia, is planted in West Java as an ornamental tree. These trees are not crowded together and encumbered with the heavy parasitic growths of the rain-forest ,- but their tall stems are often covered with multitudes of small vermilion fungi. Wherever the local climate has sufficient humidity, the true rain-forest claims its own. The second of Junghuhn's zones is the region of, more especially, tea, cinchona and coffee plantations, of maize and the sugar palm (areng). In the forest the trees are richly clad with ferns and enormous fungi ; there is a profusion of underwood (Pavetta macrophylla Javanica and salici- folia; several species of Lasianthus, Boehmarias, Strobilanthus, &c), of woody lianas and ratans, of tree ferns (especially Alsophila). Between the bushes the ground is covered with ferns, lycopods, tradescantias, Bignoniaceae, species of Aeschynanthus. Of the lianas the largest is Plectocomia elongata; one specimen of which was found to have a length of nearly 790 ft. One of the fungi, Telephora princeps, is more than a yard in diameter. The trees are of different species from those of the hot zone even when belonging to the same genus ; and new types appear mostly in limited areas. The third zone, which consists mainly of the upper slopes of volcanic mountains, but also comprises several plateaus (the Dieng, parts of the Tengger, the Ijen) is a region of clouds and mists. There are a considerable number of lakes and swamps in several parts of the region, and these have a luxuriant environment of grasses, Cyper- aceae, Characeae and similar forms. The taller trees of the region — oaks, chestnuts, various Lauraceae, and four or five species of Podocarpus —

with some striking exceptions, Astronia spectabilis, &c, are less floriferous than those of the lower zones; but the shrubs (Rhododendron javanicum, Ardisia javanica, &c), herbs and parasites^ more than make up for this defect. There is little cultivation, except in the Tengger, where the natives grow maize, rye and tobacco, and various European vegetables (cabbage, potatoes, &c), with which they supply the lowland markets. In western Java one of the most striking features of the upper parts of this temperate region is what Schimper calls the " absolute dominion of mosses," associated with the " elfin forest," as he quaintly calls it, a perfect tangle of " low, thick, oblique or even horizontal stems," almost choked to leaflessness by their grey and ghostly burden. Much of the lower vegetation begins to have a European aspect ; violets, primulas, thalictrums, ranunculus, vacciniums, equisetums, rhodo- dendrons (Rhod. retusum). The Primula imperialis, found only on the Pangerango, is a handsome species, prized by specialists. In the fourth or alpine zone occur such distinctly European forms as Artemisia vulgaris, Plantago major, Solanum nigrum, Stellaria media; and altogether the alpine flora contains representatives of no fewer than thirty-three families. A characteristic shrub is Anaphalis javanica, popularly called the Javanese edelweiss, which " often entirely excludes all other woody plants." 2 The tallest and noblest

2 Bertha Hoola van Nooten published Fleurs, fruits et feuillages de laflore et de la pomone de Vile de Java in 1863, but the book is difficult of access. Excellent views of characteristic aspects of the vegeta- tion will be found in Karsten and Schenck, Vegetationsbilder (1903).

of all the trees in the island is the rasamala or liquid-ambar (Altingia excelsa), which, rising with a straight clean trunk, sometimes 6 ft. in diameter at the base, to a height of ioo to 130 ft., spreads out into a magnificent crown of branches and foliage. When by chance a climbing plant has joined partnership with it, the combination of blossoms at the top is one of the finest colour effects of the forest. The rasamala, however, occurs only in the Preanger and in the neighbouring parts of Bantam and Buitenzorg. Of the other trees that may be classified as timber — from 300 to 400 species — many attain noble proportions. It is sufficient to mention Calophyllum inophyllum, which forms fine woods in the south of Bantam, Mimus- ops acuminata, Irna glabra, Dalbergia latifolia (sun wood, English black-wood) in middle and east Java; the rare but splendid Pithe- colobium Junghuhnianum; Schima Noronhae, Bischofia javanica, Pterospermum javanicum (greatly prized for ship-building), and the upas-tree. From the economic point of view all these hundreds of trees are of less importance than Tectona grandis, the jati or teak, which, almost to the exclusion of all others, occupies about a third of the government forest-lands. It grows best

in middle and eastern Java, preferring the comparatively dry and hot climate of the plains and lower hills to a height of about 2000 ft. above the sea, and thriving best in more or less calciferous soils. In June it sheds its leaves and begins to bud again in October. Full-grown trees reach a height of 100 to 150 ft. In 1895 teak (with a very limited quantity of other timber) was felled to the value of about £101,800, and in 1904 the corresponding figure was about £119,935.

That an island which has for so long maintained a dense and grow- ing population in its more cultivable regions should have such extensive tracts of primeval or quasi-primeval forest as have been above indicated would be matter of surprise to one who did not consider the simplicity of the life of the Javanese. They require but little fuel; and both their dwellings and their furniture are mostly constructed of bamboo supplemented with a palm or two. They destroy the forest mainly to get room for their rice-fields and pasture for their cattle. In doing this, however, they are often extremely reckless and wasteful; and if it had not been for the unusual humidity of the climate their annual fires would have resulted in widespread conflagrations. As it is, many mountains are now bare which within historic times were forested to the top; but the Dutch government has proved fully alive to the danger of denudation. The state has control of all the woods and forests of the island with the exception of those of the Preanger, the " particu- lar lands," and Madura; and it has long been engaged in replanting with native trees and experimenting with aliens from other parts of the world — Eucalyptus globulus, the juar, Cassia florida from Sumatra, the surian {Cedrela febrifuga), &c. The greatest success has been with cinchona.

Left to itself Java would soon clothe itself again with even a richer natural vegetation than it had when it was first occupied by man. The open space left by the demolition of the fortifications on Nusa Kambangan was in twenty-eight years densely covered by thousands of shrubs and trees of about twenty varieties, many of the latter 80 ft. high. Resident Snijthoff succeeded about the close of the 19th century in re-afforesting a large part of Mount Muria by the simple expedient of protecting the territory he had to deal with from all encroachments by natives. 1

Population. — The population of Java (including Madura, &c.) was 30,098,008 in 1905. In 1900 it was 28,746,688; in 1890, 23,912,564; and in 1880, 19,794,505. The natives consist of the Javanese proper, the Sundanese and the Madurese. All three belong to the Malay stock. Between Javanese and Sundanese the distinction is mainly due to the influence of the Hindus on the former and the absence of this on the latter. Between Javanese and Madurese the distinction is rather to be ascribed to difference of natural environment. The Sundanese have best retained the Malay type,

both in physique and fashion of life. They occupy the west of the island. The Madurese area, besides the island of Madura and neighbouring isles, includes the eastern part of Java itself. The residencies of Tegal, Pekalongan, Banyumas, Bagelen, Kedu, Semarang, Japara, Surakarta, Jokjakarta, Rembang, Madiun, Kediri and Surabaya have an almost purely Javanese population. The Javanese are the most numerous and civilized of the three peoples.

The colour of the skin in all three cases presents various shades of yellowish-brown; and it is observed that, owing per- haps to the Hindu strain, the Javanese are generally darker than the Sundanese. The eyes are always brown or black, the hair of the head black, long, lank and coarse. Neither breast nor limbs are provided with hair, and there is hardly even the suggestion of a beard. In stature the Sundanese is less than the Javanese

1 It is interesting to compare this with the natural " refloriza- tion " of Krakatoa. See Penzig, Ann. jard. de Buitenzorg, vol. viii. (1902); and W. Botting in Nature (1903).

proper, being little over 5 ft. in average height, whereas the Javanese is nearly 55 ft. ; at the same time the Sundanese is more stoutly built. The Madurese is as tall as the Javanese, and as stout as the Sundanese. The eye is usually set straight in the head in the Javanese and Madurese; among the Sundanese it is often oblique. The nose is generally flat and small, with wide nostrils, although among the Javanese it not infrequently be- comes aquiline. The lips are thick, yet well formed; the teeth are naturally white, but often filed and stained. The cheek-bones are well developed, more particularly with the Madurese. In expressiveness of countenance the Javanese and Madurese are far in advance of the Sundanese. The women are not so well made as the men, and among the lower classes especially soon grow absolutely ugly. In the eyes of the Javanese a golden yellow complexion is the perfection of female beauty. To judge by their early history, the Javanese must have been a warlike and vigorous people, but now they are peaceable, docile, sober, simple and industrious.

One million only out of the twenty-six millions of natives are concentrated in towns, a fact readily explained by their sources of livelihood. The great bulk of the population is distributed over the country in villages usually called by Europeans dessas, from the Low Javanese word disd (High Javanese dusun) . Every dessa, however small (and those containing from 100 to 1000 families are exceptionally large), forms an independent commu- nity; and no sooner does it attain to any considerable size than it sends off a score of families or so to form a new dessa. Each lies in the midst of its own area of cultivation. The general enceinte is formed by an

impervious hedge of bamboos 40 to 70 ft. high. Within this lie the houses, each with its own en- closure, which, even when the fields are the communal property, belongs to the individual householder. The capital of a district is only a larger dessa, and that of a regency has the same general type, but includes several kampongs or villages: The bamboo houses in the strictly Javanese districts are always built on the ground; in the Sunda lands they are raised on piles. Some of the well-to-do, however, have stone houses. The principal article of food is rice; a considerable quantity of fish is eaten, but little meat. Family life is usually well ordered. The upper class practise polygamy, but among the common people a man has generally only one wife. The Javanese are nominally Mahommedans, as in former times they were Buddhists and Brahmins; but in reality, not only such exceptional groups as the Kalangs of Surakarta and Jokjakarta and the Baduwis or nomad tribes of Bantam, but the great mass of the people must be considered as believers rather in the primitive animism of their ancestors, for their belief in Islam is overlaid with super- stition. As we ascend in the social scale, however, we find the name of Mahommedan more and more applicable; and conse- quently in spite of the paganism of the populace the influence of the Mahommedan " priests " (this is their official title in Dutch) is widespread and real. Great prestige attaches to the pilgrim- age to Mecca, which was made by 5068 persons from Java in 1900. In every considerable town there is a mosque. Christian missionary work is not very widely spread.

Languages. — In spite of Sundanese, Madurese and the intrusive Malay, Javanese has a right to the name. It is a rich and cultivated language which has passed through many stages of development and, under peculiar influences, has become a linguistic complex of an almost unique kind. Though it is customary and convenient to distinguish New Javanese from Kavi or Old Javanese, just as it was customary to distinguish English from Anglo-Saxon, there is no break of historical continuity. Kavi (Basa Kavi, i.e. the language of poetry) may be defined as the form spoken and written before the founding of Majapahit; and middle Javanese, still represented by the dialect of Banyumas, north Cheribon, north Krawang and north Bantam, as the form the language assumed under the Maja- pahit court influence; while New Javanese is the language as it has developed since the fall of that kingdom. Kavi continued to be a literary language long after it had become archaic. It contains more Sanskrit than any other language of the archipelago. New Javanese breaks up into two great varieties, so different that some- times they are regarded as two distinct languages. The nobility use one form, Krama; the common people another, Ngoko, the " thouing " language (cf. Fr. tutoyant, Ger. dutzend) ; but each class understands the language of the other class. The aristocrat speaks

to the commonalty in the language of the commoner; the commoner speaks to the aristocracy in the language of the aristocrat; and, according to clearly recognized etiquette, every Javanese plays the part of aristocrat or commoner towards those whom he addresses. To speak Ngoko to a superior is to insult him ; to speak Krama to an equal or inferior is a mark of respect. In this way Dipa Negara showed his contempt for the Dutch General de Kock. The ordinary Javanese thinks in Ngoko ; the children use it to each other, and so on. Between the two forms there is a kind of compromise, the Madya, or middle form of speech, employed by those who stand to each other on equal or friendly footing or by those whofeellittleconstraint of etiquette. For every idea expressed in the language Krama has one vocable, the Ngoko another, the two words being sometimes completely different and sometimes differing only in the termination, the beginning or the middle. Thus every Javanese uses, as it were, two or even three languages delicately differentiated from each other. How this state of affairs came about is matter of speculation. Almost certainly the existence side by side of two peoples, speaking each its own tongue, and occupying towards each other the position intellectually and politically of superior and inferior, had much to do with it. But Professor Kern thinks that some influence must also be assigned to pamela or pantang, word-taboo — certain words being in certain circumstances regarded as of evil omen — a super- stition still lingering, e.g. even among the Shetland fishermen (see G. A. F. Hazeu, De taal pantangs). It has sometimes been asserted that Krama contains more Sanskrit words than Ngoko does; but the total number in Krama does not exceed 20; and sometimes there is a Sanskrit word in Ngoko which is not in Krama. There is a village Krama which is not recognized by the educated classes: Krama inggil, with a vocabulary of about 300 words, is used in addressing the deity or persons of exalted rank. The Basa Kedaton or court language is a dialect used by all living at court except royalties, who use Ngoko. Among themselves the women of the court employ Krama or Madya, but they address the men in Basa Kedaton. 1

Literature. — Though a considerable body of Kavi literature is still extant, nothing like a history of it is possible. The date and author- ship of most of the works are totally unknown. The first place may be assigned to the Brata Yuda (Sansk., Bharata Yudha, the conflict of the Bharatas), an epic poem dealing with the struggle between the Pandawas and the Korawas for the throne of Ngastina celebrated in parwas 5-10 of the Mahabharata. To the conception, however, of the modern Javanese it is a purelv native poem ; its kings and heroes find their place in the native history and serve as ancestors to their noble families. (Cohen Stuart published the modern Javanese version with a Dutch translation and notes, Brdtd-Joedd, &c,

Samarang, 1877. The Kavi text was lithographed at the Hague by S. Lankhout.) Of greater antiquity probably is the Ardiund Wiwdhd (or marriage festival of Ardjuna), which Professor Kern thinks may be assigned to the first half of the nth century of the Christian era. The name indicates its Mahabharata origin. (Frie- derich published the Kavi text from a Bali MS., and Wiwih& Djarwa en Brdtd Joedo Kawi, lithographed facsimiles of two palm-leaf MSS., Batavia, 1878. Djarwa is the name of the poetic diction of modern Javanese.) The oldest poem of which any trace is preserved is probably the mythological Kdndd (i.e. tradition) ; the contents are to some extent known from the modern Javanese version. In the literature of modern Javanese there exists a great variety of so- called babads or chronicles. It is sufficient to mention the " history " . of Baron Sakender, which appears to give an account — often hardly recognizable — of the settlement of Europeans in Java (Cohen Stuart published text and translation, Batavia, 1851 ; J. Veth gives an analysis of the contents), and the Babad Tanah Djawi (the Hague, 1874, 1877), giving the history of the island to 1647 of the Javanese era. Even more numerous are the wayangs or puppet-plays which usually take their subjects from the Hindu legends or from those relating to the kingdoms of Majapahit and Pajajaram (see e.g. H. C. Humme, Abidsd, een Javaansche toneelstuk, the Hague, 1878). In these plays grotesque figures of gilded leather are moved by the performer, who recites the appropriate speeches and, as occasion demands, plays the part of chorus.

Several Javanese specimens are also known of the beast fable, which plays so important a part in Sanskrit literature (W. Palmer van den Broek, Javaansche Vertellingen, bevattende de lotgevallen van een kantjil, een reebok, &c, the Hague, 1878). To the Hindu- Javanese literature there naturally succeeded a Mahommedan- Javanese literature consisting largely of translations or imitations of Arabic originals; it comprises religious romances, moral exhorta- tions and mystical treatises in great variety. 2

Arts. — In mechanic arts the Javanese are in advance of the other peoples of the archipelago. Of thirty different crafts practised among them, the most important are those of the blacksmith or cutler, the carpenter, the kris-sheath maker, the coppersmith, the goldsmith

'See Walbreken, De Taalsvorten in het Javaansh; and G. A. Wilken, Handboek voor de vergelijkende Volkenkunde van Neder- landsch Indie, edited by C. M. Pleyte (1893).

1 See Van den Berg's account of the MSS. of the Batavian Society (the Hague, 1877) ; and a series of papers by C. Poensen in Meded. pan viege het Ned. Zendelinggenootschap (1880).

and the potter. Their skill in the working of the metals is the more noteworthy as they have to import the raw materials. The most esteemed product of the blacksmith's skill is the kris ; every man and boy above the age of fourteen wears one at least as part of his ordi- nary dress, and men of rank two and sometimes four. In the finish- ing and adornment of the finer weapons no expense is spared; and ancient krises of good workmanship sometimes fetch enormous prices. The Javanese gold and silver work possesses considerable beauty, but there is nothing equal to the filigree of Sumatra; the brass musical instruments are of exceptional excellence. Both bricks and tiles are largely made, as well as a coarse unglazed pottery similar to that of Hindustan; but all the finer wares are imported from China. Cotton spinning, weaving and dyeing are carried on for the most part as purely domestic operations by the women. The usual mode of giving variety of colour is by weaving in stripes with a succession of different coloured yarns, but another mode is to cover with melted wax or damar the part of the cloth not intended to receive the dye. This process is naturally a slow one, and has to be repeated according to the number of colours required. As a consequence the battiks, as the cloths thus treated are called, are in request by the wealthier classes. For the most part quiet colours are preferred. To the Javanese of the present day the ancient buildings of the Hindu periods are the work of supernatural power. Except when employed by his European master he seldom builds anything more substantial than a bamboo or timber framework; but in the details of such erections he exhibits both skill and taste. When Europeans first came to the island they found native vessels of large size well entitled to the name of ships; and, though ship- building proper is now carried on only under the direction of Euro- peans, boat-building is a very extensive native industry along the whole of the north coast — the boats sometimes reaching a burde.n of 50 tons. The only one of the higher arts which the Javanese have carried to any degree of perfection is music; and in regard to the value of their efforts in this direction Europeans differ greatly. The orchestra (gamelan) consists of wind, string and percussion instruments, the latter being in preponderancy to the other two. (Details of the instruments will be found in Raffles' Java, and a description of a performance in the Tour du monde,

1880.)

Chief Towns and Places of Note. — The capital of Java and of the Dutch East India possessions is Batavia (q.v.), pop. 115,567. At Meester Cornelis (pop. 33,119), between 6 and 7 m. from Batavia on the railway to Buitenzorg, the battle was fought in 181 1 which placed Java in the hands of the British. In the vicinity lies Depok, originally a Christian settlement of freed slaves, but now with about 3000 Mahommedan inhabitants and only 500 Christians. The other chief towns, from west to east through the island,

are as follows : Serang (pop. 5600) bears the same relation to Bantam, about 6 m. distant, which New Batavia bears to Old Batavia, its slight elevation of 100 ft. above the sea making it fitter for European occupation. Anjer (Angerlor, Anger) lies 96 m. from Batavia by rail on the coast at the narrowest part of the Sunda Strait ; formerly European vessels were wont to call there for fresh provisions and water. Pandeglang (pop. 3644), 787 ft. above sea-level, is known for its hot and cold sulphur springs. About 17 m. west of Batavia lies Tangerang (pop. 13,535), a busy place with about 2800 or 3000 Chinese among its inhabitants. Buitenzorg (q.v.) is the country- seat of the governor-general, and its botanic gardens are famous. Krawang, formerly chief town of the residency of that name — the least populous of all — has lost its importance since Purwakerta (pop. 6862) was made the administrative centre. At Wanyasa in the neighbourhood the first tea plantations were attempted on a large scale.

The Preanger regencies — Bandung,Chanjur,Sukabumi, Sumedang, Garut and Tasikmalaya — constitute the most important of all the residencies, though owing to their lack of harbour on the south and the intractable nature of much of their soil they have not shared in the prosperity enjoyed by many other parts of the island. Ban- dung, the chief town since 1864, lies 2300 ft. above sea-level, 109 m. south of Batavia by rail; it is a well-built and flourishing place (pop. 28,965; Europeans 1522, Chinese 2650) with a handsome resident's house (1867), a large mosque (1867), a school for the sons of native men of rank, the most important quinine factory in the island, and a race-course where in July a good opportunity is afforded of seeing both the life of fashionable and official Java and the customs and costumes of the common people. The district is famous for its waterfalls, one of the most remarkable of which is where the Chi Tarum rushes through a narrow gully to leap down from the Bandung plateau. In the neighbourhood is the great military camp of Chimahi. Chanjur,. formerly the chief town, in spite of its loss of administrative position still has a population of I3>599- From Sukabumi (pop. 12,112; 569 Europeans), a pleasant health resort among the hills at an altitude of 1965 ft., tourists are accustomed to visit Wijnkoopers Bay for the sake of the picturesque shore scenery. Chichalengka became after 1870 one of the centres of the coffee industry. Sumedang has only 8013 inhabitants, having declined since the railway took away the highway traffic : it is exceeded both by Garut (10,647) and by Tasikmalaya (9196), but it is a beautiful place well known to sportsmen for its proximity to the Rancha Ekek swamp, where great snipe-shooting matches are

held every year. For natural beauty few parts of Java can compare with the plain of Tasikmalaya, itself remarkable, in a country of trees, for its magnificent avenues. N.E. of the. Preanger lies the residency of Cheribon 1 (properly Chi Rebon, the shrimp river). The chief town (pop. 24,564) is one of the most important places on the north coast, though the unhealthiness of the site has caused Europeans to settle at Tangkil, 2 m. distant. The church (1842), the regent's residence, and the great prison are among the principal buildings; there are also extensive salt warehouses. The native part of the town is laid out more regularly than is usual, and the Chinese quarter (pop. 3352) has the finest Chinese temple in Java. The palaces of the old sultans of Cheribon are less extensive than those of Surakarta and Jokjakarta. Though the harbour has to be kept open by constant dredging the roadstead is good all the year round. A strange pleasure palace of Sultan Supeh, often described by travellers, lies about 2 m. off near Sunya Raja. Mundu, a village 4 m. south-east of Cheribon, is remarkable as the only spot on the north coast of the island visited by the ikan prut or belly-fish, a species about as large as a cod, caught in thousands and salted by the local fishermen. Indramayu, which lies on both banks of the Chi Manuk about 8 m. from the coast, is mentioned under the name of Dermayo as a port for the rice of the district and the coffee of the Preanger. The coffee trade is extinct but the rice trade is more flourishing than ever, and the town has 13,400 inhabi- tants, of whom 2200 are Chinese. It might have a great commercial future if money could be found for the works necessary to overcome the disadvantage of its position — the roads being safe only during the east monsoon and the river requiring to be deepened and regu- lated. Tegal has long been one of the chief towns of Java: com- merce, native trade and industry, and fisheries are all well repre- sented and the 'sugar factories give abundant employment to the inhabitants. The harbour has been the object of various improve- ments since 1871. The whole district is densely populated (3100 to the sq. m.) and the town proper with its 16,665 inhabitants is surrounded by extensive kampongs (Balapulang, Lebaksiu, &c). In Pekalongan (pop. 38,211) and Batang (21,286) the most important industry is the production of battiks and stamped cloths; there are also iron-works and sugar factories. The two towns are only some 5 m. apart. The former has a large mosque, a Protestant church, an old fort and a large number of European houses. The Chinese quarters consist of neat stone or brick buildings. Peka- longan smoked ducks are well known. Brebes (13,474) on the Pamali is an important trade centre: Banyumas (5000) is the seat of a resident; it is exceeded by Purwokerto (12,610), Purbalinggo (12,094) an d Chilachap (12,000). This last possesses the best harbour on the south coast, and but for malaria would have been an important place. It was chosen as the seat

of a great military establishment but had to be abandoned, the fort being blown up in 1893. Semarang (pop. 89,286, of whom 4800 are Europeans and 12,372 Chinese) lies on the Kali Ngaran. near the centre of the north coast. Up to 1824 the old European town was surrounded by a wall and ditch. It was almost the exact reproduction of a Dutch town without the slightest accommodation to the exigencies of the climate, the streets narrow and irregular. The modern town is well laid out. Among the more noteworthy buildings of Sema- rang are the old Prince of Orange fort, the resident's house, the Roman Catholic church, the Protestant church, the mosque, the military hospital. A new impulse to the growth of the town was given by the opening of the railway to Surakarta and Jokjakarta in 1875. As a seaport the place is unfortunately situated. The river has long been silted up; the roadstead is insecure in the west monsoon. After many delays an artificial canal, begun in 1858, became available as a substitute for the river; but further works are necessary. A second great canal to the east, begun in 1896, helps to prevent inundations and thus improve the healthiness of the town. Demak, 13 m. N.E. of Semarang, though situated in a wretched region of swamps and having only 5000 inhabitants, is famous in ancient Javanese history. The mosque, erected by the first sultan of Demak, was rebuilt in 1845; only a small part of the old structure has been preserved, but as a sanctuary it attracts 6000 or 7000 pilgrims annually. To visit Demak seven times has the same ceremonial value as the pilgrimage to Mecca. The tombs of several of the sultans are still extant. Salatiga (" three stones," with allusion to three temples now destroyed) was in early times one of the resting places of ambassadors proceeding to the court of Mat- aram, and in the European history of Java its name is associated with the peace of 1755 and the capitulation of 181 1. It is the seat of a cavalry and artillery camp. Its population, about 10,000, seems to be declining. Ambarawa with its railway station is, on the other hand, rapidly increasing. Its population of 14,745 includes 459 Europeans. About a mile to the N. lies the fortress of Willem I. which Van den Bosch meant to make the centre of the Javanese system of defensive works ; the Banyubiru military camp is in the neighbourhood. Kendal (15,000) is a centre of the sugar industry. Kudus (31,000; 4300 Chinese) has grown to be one of the most important inland towns. Its cloth and battik pedlars are

1 Cheribon is the form employed by the Dutch : an exception to their usual system, in which Tj- takes the place of the Ch- used in this article.

known throughout the island and the success of their enterprise is evident in the style of their houses. A good trade is also carried on in cattle, kapok, copra, pottery and all sorts of small wares. The mosque in the old town has interesting remains of Majapahit architecture; and the tomb of Pangeran Kudus is a noted Mahom- medan sanctuary. A steam tramway leads northward towards, but does not reach, Japara, which in the 17th century

was the chief port of the kingdom of Mataram and retained its commercial importance till the Dutch Company removed its establishment to Semarang. In 1818 Daendels transferred its resident to Pati. Ungaran, 1026 ft. above the sea, was a place of importance as early as the 17th century, and in modern times has become known as a sanatorium. Rembang, a well-built coast town and the seat of a resident, has grown rapidly to have a population of 29,538 with 210 Europeans. Very similar to each other are Surakarta or Solo and Jokjakarta, the chief towns of the quasi-independent states or Vorstenlanden. Surakarta (pop. 109,459; Chinese 5159, Europeans 1913) contains the palace (Kraton, locally called the Bata bumi) of the susuhunan (which the Dutch translated as emperor), the dalem of Prince Mangku Negara, the residences of the Solo nobles, a small Dutch fort (Vastenburg) , a great mosque, an old Dutch settlement, and a Protestant church. Here the susuhunan lives in Oriental pomp and state. To visitors there are few more interesting entertainments than those afforded by the celebration of the 31st of August (the birthday of the queen of the Netherlands) or of the New Year and the Puasa festivals, with their wayungs, ballet- dancers, and so on. Jokjakarta (35 m. S.) has been a great city since Mangku Bumi settled there in 1755. The Kraton has a circuit of 3$ m., and is a little town in itself with the palace proper, the residences of the ladies of the court and kampongs for the hereditary smiths, carpenters, sculptors, masons, payong-makers, musical instrument makers, &c.,&c, of his highness. The independent Prince Paku Alam has a palace of his own. As in Surakarta there are an old Dutch town and a fort. The Jogka market is one of the most important of all Java, especially for jewelry. The total population is 72,235 with 1424 Europeans. To the south-east lies Pasar Gedeh, a former capital of Mataram, with tombs of the ancient princes in the Kraton, a favourite residence of wealthy Javanese traders. Surabaya (q.v.), on the strait of Madura, is the largest commercial town in Java. Its population increased from 118,000 in 1890 to 146,944 in 1900 (8906 Europeans). To the north lies Grissee or Gresih (25,688 inhabitants) with a fairly good harbour and of special interest in the early European history of Java. Inland is the considerable town of Lamongan (12,485 inhabitants). Fifteen m. S. by rail lies Sidoarjo (10,207; l &5 Europeans), the centre of one of the most densely populated districts and important as a railway junction. In the neighbourhood is the populous village of Mojosari. Pasuruan was until modern times one of the chief commercial towns in Java, the staple being sugar. Since the opening of the railway to Surabaya it has greatly declined, and its warehouses and dwelling-houses are largely deserted. The population is 27,152 with 663 Europeans. Probolinggo (called by the natives Banger) is a place of 13,240 inhabitants. The swampy tracts in the vicinity are full of fishponds. The baths of Banyubiru (blue water) to the south have Hindu remains much visited by devotees. Pasirian in the far south of the residency is a

considerable market town and the terminus of a branch railway. Besuki, the easternmost of all the residencies, contains several places of some importance; the chief town Bondowoso (8289.) ; Besuki, about the same size, but with no foreign trade; Jember, a small but rapidly increasing place t and Banyuwangi (17,559). This last was at one time the seat of the resident, now the eastern terminus of the railway system, and is a seaport on the Bali Strait with an important office of the telegraph company controlling communication with Port Darwin and Singa- pore. It has a very mingled population, besides Javanese and Madurese, Chinese and Arabs, Balinese, Buginese and Europeans. The chief town of Kediri (10,489) is the only residency town in the interior traversed by a navigable river, and is exceeded by Tulunga- gung ; and the residency of Madiun has two considerable centres of population: Madiun (21,168) and Ponorogo (16,765).

Agriculture. — About 40% of the soil of Java is under cultivation. Bantam and Besuki have each 16% of land under cultivation; Krawang, 21% Preanger, 23%; Rembang, 30%; Japara, 62%; Surabaya, 65%; Kedu, 66%; Samarang, 67%. Proceeding along the south coast from its west end, we find that in Bantam all the land cultivated on its south shore amounts to at most but 5 % of that regency; in Preanger and Banyumas, as far as Chilachap, the land under cultivation amounts at a maximum to 20%. East of Surakarta the percentages of land on the south coast under cultiva- tion decline from 30 to 20 and 10. East of the residency of Pro- bolinggo the percentage of land cultivated on the south coast sinks to as low as 2. On the north coast, in Krawang and Rembang, with their morasses and double chains of chalk, there are districts with only 20% and 10% of the soil under cultivation. In the residencies, on the other hand, of Batavia, Cheribon, Tegal, Samarang, Japara, Surabaya and Pasuruan, there are districts having 80 % to 90 % of soil, and even more, under cultivation.

The agricultural products of Java must be distinguished into those raised by the natives for their own use and those raised for the government and private proprietors. The land assigned to the

natives for their own culture and use amounts to about 9,625,000 acres. In western Java the prevailing crop is rice, less prominently cultivated in middle Java, while in eastern Java and Madura other articles of food take the first rank. The Javanese tell strange legends concerning the introduction of rice, and observe various ceremonies in connexion with its planting, paying more regard to them than to the proper cultivation of the cereal. The agricultural produce grown on the lands of the government and private pro- prietors, comprising an area of about 3§ million acres, consists of

sugar, cinchona, coffee, tobacco, tea, indigo, &c. The Javanese possess buffaloes, ordinary cattle, horses, dogs and cats. The buffalo was probably introduced by the Hindus. As in agricultural products, so also in cattle-rearing, western Java is distinguished from middle and eastern Java. The average distribution of buffa- loes is 106 per 1000 inhabitants, but it varies considerably in different districts, being greatest in western Java. The fact that rice is the prevailing culture in the west, while in eastern Java other plants constitute the chief produce, explains the larger number of buffaloes found in western Java, these animals being more in requisition in the culture of rice. The ordinary cattle are of mixed race; the Indian zebu having been crossed with the banting and with European cattle of miscellaneous origin. The horses, though small, are of excellent character, and their masters, according to their own ideas, are extremely particular in regard to purity of race. Riding comes naturally to the Javanese; horse-races and tournays have been in vogue among them from early times.

Coffee is an alien in Java. Specimens brought in 1696 from Cannanore on the Malabar coast perished in an earthquake and floods in 1699; the effective introduction of the precious shrub was due to Hendrik Zwaardekron (see N. P. van den Berg, " Voortbreng- ing en verbruck van koffie," Tijdschrift v. Nijverh. en Landb. 1879; and the article " Koffie " in Encyc.Ned.Ind. Wiji kawih is mentioned in a Kavi inscription of A.D. 856, and the bean-broth in David Tappen's list of Javanese beverages, 1667-1682, may have been coffee). The first consignment of coffee (894 lb) to the Netherlands was made in 171 1-1712, but it was not till after 1721 that the yearly exports reached any considerable amount. The aggregate quantity sold in the home market from 1711 to 1791 was2,o3<5,437 piculs, or on an average about 143 tons per annum; and this probably represented nearly the whole production of the island. By the beginning of the 19th century the annual production was about 7143 tons and after the introduction of the Van den Bosch system of forced culture a further augmentation was effected. The forced culture system was, in 1909, however, of little importance. Official reports show that from 1840 to 1873 the amount ranged from 5226 tons to 7354. During the ten years 1869 to 1878 the average crop of the planta- tions under state control was 5226 tons, that of the private planters about 810. The government has shown a strange reluctance to surrender the old-fashioned monopoly, but the spirit of private enterprise has slowly gained the day. Though the appearance of the coffee blight (HemUeia vastatrix) almost ruined the industry the planters did not give in. An immune variety was introduced from Liberia, and scientific methods of treatment have been adopted in dealing with the plantations. In 1887, a record year, the value of the coffee crop reached £3,083,333, and at its average it was about £1,750,000 between 1886 and 1895. The value was only £1,166,666 in 1896. The greatest

difficulties are the uncertainties both of the crop and of its marketable value. The former is well shown in the figures for 1903 to 1905; government 17,900, 3949 and 3511 tons, and private planters 22,395, 15,311 and 21,395 tons. Liberia coffee is still produced in much smaller quantity than Java coffee; the latter on an average of these three years 21,360 tons; the former

7409.

The cultivation of sugar has been long carried on in Java, and since the decline of the coffee plantations it has developed into the leading industry of the island. There are experimental stations at Pasuruan, Pekalongan and elsewhere, where attempts are made to overcome the many diseases to which the cane is subject. Many of the mills are equipped with high-class machinery and produce sugar of excellent colour and grain. In 1 853-1 857 the average crop was 98,094 tons; in 1869-1873, 170,831, and in 1875-1880, 204,678. By 1899-1900 the average had risen to 787,673 tons; and the crops for 1904 and 1905 were respectively 1,064,935 and 1,028,357 tons. Prices fluctuate, but the value of the harvest of 1905 was estimated at about £15,000,000.

The cultivation of indigo shows a strange vitality. Under the culture system the natives found this the most oppressive of all the state crops. The modern chemist at one time seemed to have killed the industry by his synthetic substitute, but in every year between 1899 and 1904 Java exported between one million and one and a half million pounds of the natural product. Japan and Russia were the largest buyers. As blue is a favourite colour with the Javanese proper a large quantity is used at home.

Tea was first introduced to Java by the Japanese scholar von Siebold in 1826. The culture was undertaken by the state in 1829 with plants from China, but in 1842 they handed it over to con- tractors, whose attempts to increase their profits by delivering an inferior article ultimately led to the abandonment of the contract system in i860. In the meantime the basis of a better state of the industry had been laid by the Dutch tea-taster J. J. L. L. Jacobsen

291

of the Nederlandsch Handel Maatschappij, who introduced not only fresh stock, but expert growers from China in 1852-1853. The tea- planters (often taking possession of the abandoned coffee-planta- tions) have greatly improved the quality of their products. Assam tea was introduced in 1878, and this has rapidly extended its area. The exports increased from 12,110,724 lb in 1898 to 25,772,564 in 1905. More than half the total

goes to the Netherlands; the United Kingdom ranks next, and, far behind both, Russia.

In 1854 the government introduced the culture of cinchona with free labour, and it had considerable success under F. Junghuhn and his successors, though the varieties grown were of inferior quality. Later seed of the best cinchona was obtained, and under skilful management Java has become the chief producer of quinine in the world. Cacao is produced in the Preanger regencies, Pekalongan, Semarang, Pasuruan, Besuki, Kediri and Surakarta. In 1903, a record year, 1,101,835 piculs (about 6540 tons) were produced. Broussonetia papyrifera is grown for the sake of its bark, so well known in Japan (Jap. kodsu) as a paper material. The ground-nut (the widely spread Arachis hypogaea from South America), locally known as kachang china or tanah, is somewhat extensively grown. The oil is exported to Holland, where it is sold as Delft salad oil. Tapioca has long been cultivated, especially in the Preanger. The industry is mainly in the hands of the Chinese, and the principal foreign purchasers are English biscuit manufacturers. The kapok is a tree from tropical America which, growing freely in any soil, is ex- tensively used throughout Java along the highways as a support for telegraph and telephone wires, and planted as a prop in pepper and cubeb plantations. The silky fibre contained in its long capsuloid fruits is known as cotton wool; and among other uses it serves almost as well as cork for filling life-belts; and the oil from its seed is employed to adulterate ground-nut oil. The. quantity of wool exported nearly trebled between 1890 and 1896, in the latter year the total sent to Holland, Australia, Singapore, &c, amounting to 38,586 bales. The rapid exhaustion of the natural supply of india-rubber and gutta-percha began to attract the attention of government in the latter decades of the 19th century. Extensive experiments have been made in the cultivation of Ficus elastica (the karet of the natives), Castilloa elastica, and Hevea brasiliensis. The planting of gutta-percha trees was begun about 1886, and a regular system introduced in the Preanger in 1901. The Palaquium oblongifolium plantations at Blavan, Kemutuk and Sewang in Banyumas have also been brought under official control. Java tobacco, amounting to about 35,200,000 lb a year, is cultivated almost exclusively in eastern Java. Among other products which are of some importance as articles of export may be mentioned nutmegs, mace, pepper, hides, arrack and copra.

Particular Lands. — At different times down to 1 830 the govern- ment disposed of its lands in full property to individuals who, acquiring complete control of the inhabitants as well as of the soil, continued down to the 19th century to act as if they were indepen- dent of all superior authority. In this way more than ij millions of the people were subject not to the state but to " stock companies, absentee landlords and Chinese." According to the

Regeerings Almanak (1906) these " particular lands," as they are called, were distributed as follows: Bantam 21, Batavia 36, Meester Cornelis 163, Tangerang 80, Buitenzorg 61, Semarang 32, Surabaya 46, Krawang and Demak 3 each, Cheribon 2, and Pekalongan, Kendal and Pasuruan I each. In Meester Cornelis no fewer than 297,912 persons were returned in 1905 as living on these lands. Of the 168 estates there are not 20 that grow anything but grass, rice and coco- nuts. In Buitenzorg (thanks probably to the Botanic Gardens) matters are better: tea, coffee, cinchona and india-rubber appearing amQngst the objects of cultivation ; and, in general, it must be noted that these estates have often natural difficulties to contend against far beyond their financial strength.

Minerals. — Of all the great islands of the archipelago Java is the poorest in metallic ores. Gold and silver are practically non- existent. Manganese is found in Jokjakarta and various other parts. A concession for working the magnetic iron sands in the neighbourhood of Chilachap was granted in 1904. Coal occurs in thin strata and small pockets in many parts (Bantam, Rembang, Jokjakarta, &c.) ; and in 1905 a concession was granted to a company to work the coal-beds at Bajah close to the harbour of Wijnkoopers Bay, a port of call of the Koninklijk Paketvaart Maatschappij. The discovery by De Groot in 1863 of petroleum added a most important industry to the list of the resources of Java. The great Dort Petroleum Company, now centred at Amsterdam, was founded in 1887. The production of this company alone rose from 79,179 kisten or cases (each 8-14 gall.) in 1891 to 1,642,780 in 1890, and to 1,967,124 in 1905. In 1904 there were no fewer than 36 conces- sions for petroleum. At the same time there is a larger importation of oil from Sumatra as well as from America and Russia. Sulphur is regularly worked in the Gunong Slamet, G. Sindoro, G. Sumbing, and in the crater of the Tangkuban Prahu as well as in other places in the Preanger regencies and in Pasuruan. Brine-wells exist in various parts. The bledegs (salt-mud wells) of Grobogan in the Solo Valley, Semarang, are best known. They rise from Miocene strata and yield iodine and bromine products as well as common salt. The natives of the district are allowed to extract the salt for their own use, but elsewhere (except in Jokjakarta) the manufacture

of salt is a government monopoly and confined to the districts of Sumenep, Panekasan and Sampang in Madura, where from 3000 to 4000 people are hereditarily engaged in extracting salt from sea water, delivering it to the government at the rate of 10 fl. (nearly 17s.) per koyang (3700 lb). The distribution of this salt (rough- grained, greyish and highly hygroscopic) is extremely unsatisfactory. The waste was so great that in 1901 the government paid a prize of about £835 (10,000 fl.) to Karl Boltz von

Bolzberg for an improved method of packing. Between 1888 and 1892 the annual amount delivered was 71,405 tons; in the next five years it rose to 89,932; and between 1898 and 1902 sank again to 88,856. The evil effects of this monopoly have been investigated by J. E. de Meyer, " Zout als middel van belasting," De Ind. Gids. (1905). The scarcity of salt has led to a great importation of salted fish from Siam (upwards of 6600 tons in 1902).

Communications. — Roads and railways for the most part follow the fertile plains and table-lands along the coast and between the volcanic areas. The principal railways are the Semarang-Jokja- karta and Batavia-Buitenzorg lines of the Netherlands-Indian railway company, and the Surabaya-Pasuruan, Bangil-Mulang, Sidoarjo-Paron, Kertosono-Tulung Agung, Buitenzorg-Chianjur, Surakarta-Madiun, Pasuruan-Probolinggojokjakarta-Chilachapand other lines of the government. The earliest lines, between Batavia and Buitenzorg and between Semarang and the capitals of the sultanates, were built about 1 870 by a private company with a state guarantee. Since 1875, when Dr van Goltstein, then a cabinet minister and afterwards Dutch minister in London, had an act passed for the construction of state railways in Java, their progress has become much more rapid. In addition, several private companies have built either light railways or tramways, such as that between Semarang and Joana, and the total length of all lines was 2460 in 1905. There are some 3500 miles of telegraph line, and cables connect Java with Madura, Bali and Sumatra, and Port Darwin in Australia. Material welfare was promoted by the establishment of lines of steamships between Java and the other islands, all belonging to a Royal Packet Company, established in 1888 under a special statute, and virtually possessing a monopoly on account of the government mail contracts.

Administration. — Each village (dessa) forms an independent community, a group of dessas forms a district, a group of districts a department and a group of departments a residency, of which there are seventeen. At the head of each residency is a resident, with an assistant resident and a controller, all Dutch officials. The officials of the departments and districts are natives appointed by the government; those of the dessa are also natives, elected by the inhabitants and approved by the resident. In the two sultanates of Surakarta and Jokjakarta the native sultans govern under the supervision of the residents. (For the colonial administration of Netherlands India see Malay Archipelago.)

History. — The origin of the name Java is very doubtful. It is not improbable that it was first applied either to Sumatra or to what was known of the Indian Archipelago — the insular character of the several parts not being at once recognized. Jawa Dwipa, or " land of millet," may

have been the original form and have given rise both to the Jaba diu of Ptolemy and to the Je-pho-thi of Fahien, the Chinese pilgrim of the 4th-5th century. The oldest form of the name in Arabic is apparently Zabej. The first epigraphic occurrence of Jawa is in an inscrip- tion of 1343. In Marco Polo the name is the common appella- tion of all the Sunda islands. The Jawa of Ibn Batuta is Sumatra ; Java is his Mul Jawa (i.e. possibly " original Java "). Jawa is the modern Javanese name (in the court speech Jawi), some- times with Nusa, " island," or Tanah, " country," prefixed.

It is impossible to extract a rational historical narrative from the earlier babads or native chronicles, and even the later are destitute of any satisfactory chronology. The first great era in the history is the ascendancy of the Hindus, and that breaks up into three periods — a period of Buddhism, a period of aggressive Sivaism, and a period of apparent compromise. Of the various Hindu states that were established in the island, that of Majapahit was the most widely dominant down to the end of the 15th century; its tributaries were many, and it even extended its sway into other parts of the archipelago. The second era of Javanese history is the invasion of Islam in the beginning of the 15th century; and the third is the establishment of European and more particularly of Dutch influence and authority in the island. About 1520 the Portuguese entered into commercial relationship with the natives, but at the close of the same century the Dutch began to establish themselves. At the time when the Dutch East India company began to fix its trading factories on the coast towns, the chief native state

was Mataram, which had in the 16th century succeeded to the overlordship possessed by the house of Demak — one of the states that rose after the fall of Majapahit. The emperors of Java, as the princes of Mataram are called in the early accounts, had their capital at Kartasura, now an almost deserted place, 6 m. west of Surakarta. At first and for long the company had only forts and little fragments of territory at Jakatra (Batavia), &c; but in 1705 it obtained definite possession of the Preanger by treaty with Mataram; and in 1745 its authority was extended over the whole north-east coast, from Cheribon to Banyuwangi. In 1755 the kingdom of Mataram was divided into the two states of Surakarta and Jokjakarta, which still retain a shadow of independence. The kingdom of Bantam was finally subjugated in 1808. By the English occupation of the island (1811-1818) the European ascendancy was rather strengthened than weak- ened; the great Java war (1825-1830), in which Dipa. Negara, the last Javanese prince, a clever, bold and unscrupulous leader, struggled to maintain his claim to the whole island, resulted in the complete success of the Dutch. To subdue him and his following, however, taxed all the resources of the Dutch Indian army for a period of five years, and cost it the loss of 15,000 officers and soldiers, besides millions of guilders. Nor

did his great influence die with him when his adventurous career came to a close in 1855 at Macassar. Many Javanese, who dream of a restoration of their ancient empire, do not believe even yet that Dipa Negara is dead. They are readily persuaded by fanatical hadjis that their hero will suddenly appear to drive away the Dutch and claim his rightful heritage. Several times there have been political troubles in the native states of central Java, in which Dipa Negara's name was used, notably in 1883, when many rebellious chieftains were exiled. Similar attempts at revolt had been made before, mainly in 1865 and 1870, but none so serious perhaps as that in 1849, in which a son and a brother of Dipa Negara were implicated, aiming to deliver and reinstate him. All such attempts proved as futile there as others in different parts of Java, especially in Bantam, where the trouble of 1850 and 1888 had a religious origin, and in the end they directly contributed to the consolidation of Dutch sway. Being the principal Dutch colony in the Malay Archipelago, Java was the first to benefit from the material change which resulted from the introduction of the Grondwet or Fundamental Law of 1848 in Holland. The main changes were of an economical character, but the political developments were also important. Since 1850 Dutch authority has steadily advanced, principally at the expense of the semi-independent sultanates in central Java, which had been allowed to remain after the capture and exile of Dipa Negara. The power of the sultans of Jokjakarta and Sura- karta has diminished; in 1863 Dutch authority was strengthened in the neighbouring island of Madura, and Bantam has lost every vestige of independence. The strengthening of the Dutch power has largely resulted from a more statesmanlike and more generous treatment of the natives, who have been educated to regard the orang bianda, or white man, as their protector against the native rulers. Thus, in 1866, passports for natives travelling in Java were abolished by the then governor-general, Dr Sloet van de Beele, who also introduced many reforms, reducing the corvie in the government plantations to a minimum, and doing away with the monopoly of fisheries. Six years later a primary education system for the natives, and a penal code, whose liberal provi- sions seemed framed for Europeans, were introduced.

Antiquities. — Ordinary traces of early human occupation are few in Java. The native bamboo buildings speedily perish. Stone weapons are occasionally found. But remains of the temples and monastic buildings of the Hindu period are numerous and splendid, and are remarkable as representing architecture which reached a high standard without the use of mortar, supporting columns or arches. Chandis (i.e. temples, though the word originally meant a depository for the ashes of a saint) are not found in western Java. They exist in two great zones: one in middle Java, one in eastern Java, each with its own distinguishing characteristics, both architectural and religious. The former begins in the Dyeng plateau, in the east

of Banyumas, and extends into the east of Bagelen, Kedu and the neighbouring districts of Semarang, northern Jokja- karta, and the western corner of Surakarta. The latter lies mainly in Surabaya, Kediri and Pasuruan. A considerable number of

ruins also exist in Probolinggo. Farther east they grow scarce. There is none in Madura. The remains of Macham Putih in Banyuwangi are possibly of non-Hindu origin. In the regency of Kendal (Semarang), to the north of Kedu, the place-names show that temples once existed. 1 Some of them are Sivaite, some Buddhist, some astoundingly composite. None of the Buddhist buildings shows traces of the older Himaryana form of the creed. The greatest of all is a perfect sculptural exposition of the Mahayana doctrine. As to the period during which these temples were erected, authorities are not agreed. Ijzerman assigns the central Java groups to between the 8th and the 10th centuries. The seven-storeyed vihara (monas- tery) mentioned in the famous Menang-Kabu inscription (Sumatra) as founded by Maharaja Dhiraya Adityadharma in A.D. 656 is by some supposed to be Boro-Budur. A copper plate of 840 refers to Dyeng (Dehyang) as one of the sacred mountains of Java. One thing seems certain, that the temples of the eastern zone are of much more recent origin than most, at least, of the central zone. They are generally distinguished by the characteristics of a decadent and more voluptuous age, and show that the art of the time had become less Indian and more Javanese, with traces of influences derived from the more eastern East. At the same time it must be noted that even in Boro Budur there are non-Indian elements in the decoration, indicating that the Hindu architect employed native artists and to some extent left them a free hand.

In his standard work on Indian and Eastern Architecture (London, 1876), James Fergusson asserted that the Javanese temples are in the Chalukyan style. But J. W. Ijzerman in an elaborate paper in the Album-Kern contends that the learned historian of architec- ture was misled by basing his opinion mainly on inaccurate drawings reproduced by Raffles. The Javanese temples, with the solitary exception of Chandi Bima in the Dyeng, are Dravidian and not Chalukyan. The very temples quoted by Fergusson, when more carefully examined, disprove his statement : a fact not without its bearing on the history of the Hindu immigration.

The wonderful scenery of the Dyeng plateau was already, in all probability, an object of superstitious awe to the aboriginal inhabi- tants of Java; and thus it would catch the attention of the earliest Hindu settlers. The old

crater floor is full of traces of human occupation ; though, in spite of the tradition of the existence of a considerable town, no sepulchral relics of the inhabitants have been discovered. There still remain five groups of temples — some well preserved, some mere heaps of stone — to prove the devotion their builders bore to Siva, his consort Durga, and Ganesha their son. The Arjuno group, in the middle of the plateau, consists of Chandi Arjuno (with itschapelorpriests' residence, Ch. Semar),Ch.Srikahdi, Ch. Puntadeva and Ch. Sembadro, each a simple square chamber with a portico reached by a flight of steps. The second group, Ch. Daravati and Ch. Parakesit, lies to the north-east. The third, now a ruined mound, lies to the east. The fourth, to the north-west, is a group of seven small temples of which Ch. Sanchaki is the most important, with a square ground plan and an octagon roof with a second circular storey. Of the fifth group, in the south, only one temple remains — the Chandi Bima — a small, beautiful and excep- tionally interesting building, in " the form of a pyramid, the ribs of which stand out much more prominently than the horizontal lines of the niche-shaped ornaments which rest each on its lotus cushion." How this happens' to be the one Chalukyan temple amid hundreds is a problem to be solved. The plateau lies 6500 ft. above the sea, and roads and stairways, locally known as Buddha roads, lead up from the lowlands of Bagelen and Pekalongan. The stairway between Lake Menjur and Lake Chebong alone consisted of 4700 steps. The width of the roadway, however, is only some three or four feet. A remarkable subterranean tunnel still exists, which served to drain the plateau.

Of all the Hindu temples of Java the largest and most magnificent is Boro-Budur, which ranks among the architectural marvels of the world. It lies in the residency of Kedu, a little to the west of the Progo, a considerable stream flowing south to the Indian Ocean. The place is best reached by taking the steam-tram from Magelang or Jokjakarta to the village of Muntilam Passar, where a conveyance may be hired. Strictly speaking, Boro-Budur is not a temple but a hill, rising about 150 ft. above the plain, encased with imposing terraces constructed of hewn lava-blocks and crowded with sculp- tures. The lowest terrace now above ground forms a square, each side 497 ft. long. About 50 ft. higher there is another terrace of similar shape. Then follow four other terraces of more irregular contour. The structure is crowned by a dome or cupola 52 ft. in diameter surrounded by sixteen smaller bell-shaped cupolas. Regarded as a whole, the main design, to quote Mr Sewell, may be described as " an archaic Indian temple, considerably flattened and consisting of a series of terraces, surmounted by a quasi-stupa

1 See R. Verbeek, " Liget der oudheden van Java," in Verhand. v. h. Bat. Gen., xlvi., and his Oudreid kundige kaart van Java. R. Sewell's " Antiquarian notes in Java," in Journal of the Royal Asiatic Society

(1906), give the best conspectus available for English readers. W. B. Worsfold, A Visit to Java (London, 1893), has a

food sketch of what was then known, revised by Professor W. Rhys)avids; but whoever wishes full information must refer to Dutch authorities. These are numerous but difficult of access.

capped by a dagoba." It was discovered by the engineer J. W. Ijzerman in 1885 that the basement of the structure had been earthed up before the building was finished, and that the lowest retaining wall was completely concealed by the embankment. The architects had evidently found that their temple was threatened with a de- structive subsidence; and, while the sculptors were still busy with the decoration of the lower fagades, they had to abandon their work. But the unfinished bas-reliefs were carefully protected by c'ay and blocks of stone and left in position ; and since 1896 they are gradually but systematically being exhumed and photographed by the Dutch archaeologists, who, however, have to proceed with caution, filling up one portion of the embankment before they go on to deal with another. The subjects treated in this lowest enceinte are of the most varied description, forming a picture-gallery of landscapes, scenes of outdoor and domestic life, mingled with mythological and religious designs. Among the genre class appear men shooting birds with blow-pipe or bow and arrow, fishermen with rod or net, a man playing a bagpipe, and so on. It would seem as if the architect had intended gradually to wean the devotees from the things of this world. When once they began to ascend from stage to stage of the temple-hill they were introduced to the realities of religion ; and, Ly the time they reached the dagoba they had passed through a process of instruction and were ready, with enlightened eyes, to enter and behold the image of Buddha, symbolically left imperfect, as beyond the power of human art to realize or portray. From basement to summit the whole hill is a great picture bible of the Mahayana creed.

If the statues and bas-reliefs of Boro-Budur were placed side by side they would extend for 3 m. The eye of the spectator, looking up from the present ground-level, is caught, says Mr Sewell, by the rows of life-size Buddhas that adorn the retaining walls of the several terraces and the cage-like shrines on the circular plat- forms. All the great figures on the east side represent Akshobhya, the Dhyani Buddha of the East. His right hand is in the Chumis- parsa mudra (pose) touching the earth in front of the right knee — " I swear by the earth." All the statues on the south side are Ratnasam Chavu in the varada mudra — the right hand displayed upwards — " I give you all." On the west side the statues represent Amitabha in the dhyana or padinasama mudra, the right hand resting palm upwards on the left, both being on the lap — the attitude of meditation. Those on the north represent Amogasiddhi in the abhaya mudra, the right hand being raised

and displayed, palm outwards — " Fear not, all is well."

Other remarkable groups of Hindu temples exist near the village of Prambanan 2 (less correctly Brambanan) in Surakarta, but not far from the borders of Jokjakarta, with a station on the railway between the two chief towns. The village has been named after the temples, Prambanan signifying the place of teachers. The whole ecclesias- tical settlement was surrounded by three lines of wall, of which only the inmost is now visible above ground. Between the second and third walls are 157 small temples, and in the central enclosure are the ruins of six larger temples in a double row with two smaller ones at the side. The middle temple of the western row is the main building, full of statues of purely Sivaite character— Siva as Guru or teacher, Siva as Kala or Time the Destroyer, Durga, Ganesha, and so on. But, just as many churches in Christendom are called not after the Christ but after the Virgin, so this is known as Lara {i.e. Virgin) Janggrang from the popular name of Durga. In the southern temple of the row is a very fine figure of a four-armed Brahma ; in the northern there was a Vishnu with attendant figures. Of the other row the middle temple is again the largest, with Siva, his nandi or bull, and other symbolic sculptures. To the north lies the extraordinary cluster of temples which, though it does not deserve its popular name of Chandi Sewu, the thousand shrines, consists of at least 240 small buildings gathered round a great central temple, richly adorned, though roofless and partially ruined since the earthquake of 1867. Among the more noteworthy figures are those of the huge and ungainly guardians of the temple kneeling at the four main gateways of each of the principal buildings. Colonel Yule pointed out that there are distinct traces of a fine coat of stucco on the exterior and the interior of the buildings, and he com- pared in this respect " the cave walls of Ellora, the great idols at Bamian, and the Doric order at Selinus." Other temples in the same neighbourhood as Chandi Sewu are Ch. Lumbung, Ch. Kali Bening (Baneng), with a monstrous Kala head as the centre of the design on the southern side, Ch. Kalong and Ch. Plaosan. Tradition assigns these temples to 1266-1296.

Of the temples of the eastern zone the best known is Chandi Jago (or Tumpang), elaborately described in the Archaeological Commis- sion's monograph. According to the Pararaton, a native chronicle (published in the Verhand. v. h. Bat. Gen. v. K. en W., 1896), it belongs to the 13th century, containing the tomb of Rangavuni or Vishnuvardhana, who died in 1272-1273. The shrine proper occupies the third of three platforms, the lowest of which forms a

2 The chief authorities on Prambanan are J. W. Ijzerman, Beschrijving der oudheden nabij de Grens der residenties Soerakarta en Djogjakarta (Batavia, 1891, with photographs and atlas); and J. Groneman, Tjandi

Parambanan op Midden Java; see also Guide t trovers Vexposition des Pays-Bas (The Hague, 1900), No. 174, sqq.

square of 45 to 46 ft. each side. The building fronts the west, and is constructed of an andesitic tuff of inferior quality and dark colour. Of distinctly Buddhistic influence there is no trace. The makara (elephant-fish head) is notably absent. The sculptures which run round the base and along the sides of the platforms or terraces are of the most elaborate and varied description — kings on thrones, dwarfs, elephants, supernatural beings, diabolical and grotesque, tree-monsters, palaces, temples, courtyards, lakes, gar- dens, forests — all are represented. In one place appears a Chinese- or Burmese-looking seven-roofed pagoda; in another, a tall temple strangely split down the centre, with a flight of steps running up the fissure. The inscriptions are in the Devanagari character. In the same neighbourhood are Ch. Singossari, Ch. Kidal, &c. Another of the most beautiful of the eastern temples is Ch. Jabung, mentioned in 1330. It is built of red brick; and its distinctly Javanese origin is suggested by the frequency of the snake-motif still characteristic of modern Javanese art. It may be added that a comparison of the several buildings of the zone affords an interesting study in the development of the pilaster as a decorative rather than structural element.

At Panabaram, near Blitar, Kediri, is another group of stone temples and other buildings. The chief temple is remarkable for the richness of its sculptures, which are peculiarly delicate and spirited in their details, The decoration of the mere robes of one of the free-standing stairway-guardians consists of scroll-work, interspersed with birds and animals rendered in a non-Indian style, reminiscent of Chinese or Japanese work. It has been described as one of the most beautiful pieces of sculpture in all the East.

Sculptures from the temples are scattered far and wide throughout Java, and it is one of the greatest difficulties of the archaeologist to determine the origin of many of the most interesting specimens. This, too, is often the case with those that have found their way to the museums of Java and Europe (Batavia, Leiden, Haarlem, Berlin, &c). Minor relics of the past are to be found alike in the palaces of the nobles and the huts of the highland peasants. Zodiac cups of copper or bronze dating from the 12th or 13th century are in daily use among the Tenggerese. The musical instruments used by the musicians of the native courts are often prized on account of their great antiquity.

As many of the Chinese came from China centuries ago and have not ceased to hold intercourse with their native country, the houses of the wealthier men among them are often rich in ancient specimens of Chinese art. The special exhibition organized by Henri Borel and other enthusiasts showed how much of value in this matter might be brought together in spite of the reluctance of the owners to commit the sacrilege of exposing to public gaze the images of their ancestral gods and heroes. Borel has given exquisite examples of images of Kwan-yin (the Chinese Virgin-Goddess), of Buddhas, of the ghoulish god of literature, of Lie-tai-Peh (the Chinese poet who has gone to live in the planet Venus), &c, in illustration of his papers in L'Art flamand et hollandais, pt. v. (1900), a translation of his monograph published at Batavia.

Authorities. — Besides the special works quoted passim, see Sir Stamford Raffles, History of Java (London, 1830) ; F. Junghuhn, Java: seine Gestalt, Pflanzendecke, und innere Bauart (Ger. trans, by J. K. Hasskarl, Leipzig, 1854-1857); P. J. Veth, Java, Geographisch, ethno- logisch, historisch (2nd ed., Haarlem, 1896-1903), a masterly com- pendium originally based largely on Junghuhn's descriptions; L. van Deventer, Geschiedenis der Nederlanders op Java (2nd ed., Haarlem, 1895) ; L. W. C. van den Berg, Le Hadhramout et les colonies arabes dans I'archipel indien (Batavia, 1886); E. R. Scidmore, Java, the Garden of the East (New York, 1898); J. Chailley-Bert, Java et ses habitants (Paris, 1900) ; C. Day, The Policy and Administration of the Dutch in Java (London, 1904); E. S. de Klerck, De Java-Oorlog van 1825-1830 (Batavia, 1905); Encyclopaedic v. N. Indie, art. " Java;" Guide & travers V Exposition de Paris (The Hague, 1900), with articles by specialists on each department of the Dutch colonies, more particularly Java; Koloniale Verslagen en Regeerings-almanak van N. Indie, being official publications of the Dutch and Dutch East- Indian Government (see also Malay Archipelago).

(H.A.W.; O.J.R.H.)

JAVELIN; a spear, particularly one light enough to be thrown, a dart. The javelin was often provided with a thong to help in casting (see Spear). Javelin-throwing is one of the contests in the athletic section at the international Olympic games. For- merly the sheriff of a county or borough had a body of men armed with javelins, and known as javelin-men, who acted as a bodyguard for the judges when they went on assize. Their duties are now performed by the ordinary police. The word itself is an adaptation of Fr. javeline. There are several words in Celtic and Scandinavian languages and in Old English, meaning a spear or dart, that seem to be connected with javel, the base form in French; thus Welsh gaflach, Irish gabhla, O. Norwegian gaflok, 0. E. gafeluc, later in the form gavelock, cf. O. Norman-Fr. gavelot, javelot, Ital. giavelotto. The origin

seems to be Celtic, and the word is cognate with Ir. gafa, a hook, fork, gaff; the root is seen in " gable " (q.v.), and in the German Gabel, fork. The change in meaning from fork, forked end of a spear, to the spear itself is obscure.

JAW (Mid. Eng. jawe, jowe and geowe, O. Eng. cheowan, con- nected with " chaw " and " chew," and in form with " jowl "), in anatomy, the term for the upper maxillary bone, and the mandible or lower maxillary bone of the skull; it is sometimes loosely applied to all the lower front parts of the skull (q.v.).

JAWAlIqI, Abu Mansur Mauhub ul-Jawaliqi (1073-1145), Arabian grammarian, was born at Bagdad, where he studied philology under TibrizI and became famous for his handwriting. In his later years he acted as imam to the caliph Moqtafi. His chief work is the Kitab ul-Mu'arrab, or " Explanation of Foreign . Words used in Arabic."

The text was edited from an incomplete manuscript by E. Sachau (Leipzig, 1867). Many of the lacunae in this have been supplied from another manuscript by W. Spitta in the Journal of the German Oriental Society, xxxiii. 208 sqq. Another work, written as a supple- ment to the Durrat ul-Ghawwas of Hariri (q.v.), has been published as " Le Livre des locutions vicieuses," by H. Derenbourg in Morgen- landische Forschungen (Leipzig, 1875), pp. 107-166. (G. W. T.)

JAWHAR, a native state of India, in the Konkan division of Bombay, situated among the lower ranges of the western Ghats. Area 310 sq. m. Pop. (1901), 47,538. The estimated revenue is £11,000; there is no tribute. The chief, who is a Koli by caste, traces back his descent to 1343. The leading exports are teak and rice. The principal villageisthat of Jawhar (pop. 3567).

JAWOROW, a town in Galicia, Austria, 30 m. W. of Lemberg. Pop. (1900), 10,090. It has a pottery, a brewery, a distillery and some trade in agricultural produce. Not far from it is the watering-place of Szkto with sulphur springs. The town was a favourite residence of John Sobieski, who there received the congratulations of the pope and the Venetian republic on his success against the Turks at Vienna (1683). At Jawor6w Peter the Great was betrothed to Catherine I.

JAY, JOHN (1 745-1829), American statesman, the descendant of a Huguenot family, and son of Peter Jay, a successful New York merchant, was born in New York City on the 12th of December 1745. On graduating at King's College (now Colum- bia University) in 1764, Jay entered the office of Benjamin Kissam, an eminent New York lawyer. In 1768 he was

admitted to the bar, and rapidly acquired a lucrative practice. In 1774 he married Sarah, youngest daughter of William Livingston, and was thus brought into close relations with one of the most influential families in New York. Like many other able young lawyers, Jay took an active part in the proceedings that resulted in the independence of the United States, identifying himself with the conservative element in the Whig or patriot party. He was sent as a delegate from New York City to the Continental Congress at Philadelphia in September 1774, and though almost the youngest member, was entrusted with drawing up the address to the people of Great Britain. Of the second congress, also, which met at Philadelphia on the 10th of May 1775, Jay was a member; and on its behalf he prepared an address to the people of Canada and an address to the people of Jamaica and Ireland. In April 1776, while still retaining his seat in the Continental Congress, Jay was chosen as a member of the third provincial congress of New York; and his consequent absence from Philadelphia deprived him of the honour of affixing his signature to the Declaration of Independence. As a member of the fourth provincial congress he drafted a resolution by which the delegates of New York in the Continental Congress were authorized to sign the Declaration of Indepen- dence. In 1777 he was chairman of the committee of the con- vention which drafted the first New York state constitution After acting for some time as one of the council of safety (which administered the state government until the new constitution came into effect), he was made chief justice of New York state, in September 1777. A clause in the state constitution pro- hibited any justice of the Supreme Court from holding any other post save that of delegate to Congress on a " special occasion,"

but in November 1778 the legislature pronounced the secession of what is now the state of Vermont from the jurisdiction of New Hampshire and New York to be such an occasion, and sent Jay to Congress charged with the duty of securing a settle- ment of the territorial claims of his state. He took his seat in congress on the 7th of December, and on the 10th was chosen president in succession to Henry Laurens.

On the 27th of September 1779 Jay was appointed minister plenipotentiary to negotiate a treaty between Spain and the United States. He was instructed to endeavour to bring Spain into the treaty already existing between France and the United States by a guarantee that Spain should have the Floridas in case of a successful issue of the war against Great Britain, reserving, however, to the United States the free navigation of the Mississippi. He was also to solicit a subsidy in consideration of the

guarantee, and a loan of five million dollars. His task was one of extreme difficulty. Although Spain had joined France in the war against Great Britain, she feared to imperil her own colonial interests by directly encouraging and aiding the former British colonies in their revolt against their mother country, and she had refused to recognize the United States as an in- dependent power. Jay landed at Cadiz on the 22nd of January 1780, but was told that he could not be received in a formally diplomatic character. In May the king's minister, Count de Florida Blanca, intimated to him that the one obstacle to a treaty was the question of the free navigation of the Mississippi, and for months following this interview the policy of the court was clearly one of delay. In February 1781 Congress instructed Jay that he might make concessions regarding the navigation of the Mississippi, if necessary; but further delays were interposed, the news of the surrender of Yorktown arrived, and Jay decided that any sacrifice to obtain a treaty was no longer advisable. His efforts to procure a loan were not much more successful, and he was seriously embarrassed by the action of Congress in drawing bills upon him for large sums. Although by importuning the Spanish minister, and by pledging his personal responsibility, Jay was able to meet some of the bills, he was at last forced to protest others; and the credit of the United States was saved only by a timely subsidy from France.

In 1 781 Jay was commissioned to act with Franklin, John Adams, Jefferson and Henry Laurens in negotiating a peace with Great Britain. He arrived in Paris on the 23rd of June 1782, and jointly with Franklin had proceeded far with the negotiations when Adams arrived late in October. The in- structions of the American negotiators were as follows: —

" You are to make the most candid and confidential communica- tions upon all subjects to the ministers of our generous ally, the king of France ; to undertake nothing in the negotiations for peace or truce without their knowledge and concurrence; and ultimately to govern yourselves by their advice and opinion, endeavouring in your whole conduct to make them sensible how much we rely on his majesty's influence for effectual support in every thing that may be necessary to the present security, or future prosperity, of the United States of America."

Jay, however, in a letter written to the president of Congress from Spain, had expressed in strong terms his disapproval of such dependence upon France, and, on arriving in Paris, he demanded that Great Britain should treat with his country on an equal footing by first recognizing its independence, although the French minister, Count de Vergennes, contended that an acknowledgment of independence as an effect of the treaty was as much as could reasonably be expected. Finally, owing largely to Jay, who suspected the good faith of France, the American negotiators

decided to treat independently with Great Britain. The provisional articles, which were so favour- able to the United States as to be a great surprise to the courts of France and Spain, were signed on the 30th of November 1782, and were adopted with no important change as the final treaty on the 3rd of September 1783.

On the 24th of July 1784 Jay landed in New York, where he was presented with the freedom of the city and elected a delegate to Congress. On the 7th of May Congress had already chosen him to be secretary for foreign affairs, and in December Jay resigned

his seat in Congress and accepted the secretaryship. He con- tinued to act in this capacity until 1790, when Jefferson became secretary of state under the new constitution. In the question of this constitution Jay had taken a keen interest, and as an advocate of its ratification he wrote over the name " Publius," five (Nos. 2, 3, 4, 5 and 64) of the famous series of papers known collectively as the Federalist (see Hamilton, Alexander) . He published anonymously (though without succeeding in concealing the authorship) An Address to the People of New York, in vindica- tion of the constitution; and in the state convention at Pough- keepsie he ably seconded Hamilton in securing its ratification by New York. In making his first appointments to federal offices President Washington asked Jay to take his choice; Jay chose that of chief justice of the Supreme Court, and held this position from September 1789 to June 1795. The most famous case that came before him was that of Chisolm v. Georgia, in which the question was, Can a state be sued by a citizen of another state ? Georgia argued that it could not be so sued, on the ground that it was a sovereign state, but Jay decided against Georgia, on the ground that sovereignty in America resided with the people. This decision led to the adoption of the eleventh amendment to the federal constitution, which provides that no suit may be brought in the federal courts against any state by a citizen of another state or by a citizen or subject of any foreign state. In 1792 Jay consented to stand for the governorship of New York State, but a partisan returning- board found the returns of three counties technically defective, and though Jay had received an actual majority of votes, his opponent, George Clinton, was declared elected.

Ever since the War of Independence there had been friction between Great Britain and the United States. To the grievances of the United States, consisting principally of Great Britain's refusal to withdraw its troops from the forts on the north- western frontier, as was required by the peace treaty of 1783, her refusal to make compensation for negroes carried away by the British army at the close of the War of Independence, her restrictions on American commerce, and her refusal to enter into any commercial treaty with the United States, were added, after war broke out between France

and Great Britain in 1793, the anti-neutral naval policy according to which British naval vessels were authorized to search American merchantmen and impress American seamen, provisions were treated as contraband of war, and American vessels were seized for no other reason than that they had on board goods which were the property of the enemy or were bound for a port which though not actually blockaded was declared to be blockaded. The anti-British feeling in the House of Representatives became so strong that on the 7th of April 1794 a resolution was introduced to prohibit commercial intercourse between the United States and Great Britain until the north-western posts should be evacuated and Great Britain's anti-neutral naval policy should be abandoned. Thereupon Washington, fearing that war might result, appointed Jay minister extraordinary to Great Britain to negotiate a new treaty, and the Senate confirmed the appointment by a vote of 18 to 8, although the non-intercourse resolution which came from the house a few days later was defeated in the senate only by the casting vote of Vice-President John Adams. Jay landed at Falmouth in June 1794, signed a treaty with Lord Grenville on the 19th of November, and disembarked again at New York on the 28th of May 1795. The treaty, known in history as Jay's Treaty, provided that the north-western posts should be evacuated by the 1st of June 1796, that commissioners should be appointed to settle the north-east and the north-west boundaries, and that the British claims for British debts as well as the American claims for compensation for illegal seizures should be referred to commissioners. More than one-half of the clauses in the treaty related to commerce, and although they con- tained rather small concessions to the United States, they were about as much as could reasonably have been expected in the circumstances. One clause, the operation of which was limited to two years from the close of the existing war, provided that American vessels not exceeding 70 tons burden

might trade with the West Indies, but should carry only American products there and take away to American ports only West Indian products; moreover, the United States was to export in American vessels no molasses, sugar, coffee, cocoa or cotton to any part of the world. Jay consented to this prohibition under the impression that the articles named were peculiarly the products of the West Indies, not being aware that cotton was rapidly becoming an important export from the southern states. The operation of the other commercial clauses was limited to twelve years. By them the United States was granted limited privileges of trade with the British East Indies; some provisions were made for reciprocal freedom of trade between the United States and the British dominions in Europe; some

articles were specified under the head of " contra- band of war"; it was agreed that whenever provisions were seized as contraband they should be paid for, and that in cases of the capture of a vessel carrying contraband goods such goods only and not the whole cargo should be seized; it was also agreed that no vessel should be seized merely because it was bound for a blockaded port, unless it attempted to enter the port after receiving notice of the blockade. The treaty was laid before tne Senate on the 8th of June 1795, and, with the exception of the clause relating to trade with the West Indies, was ratified on the 24th by a vote of 20 to 10. As yet the public was ignorant of its contents, and although the Senate had enjoined secrecy on its members even after the treaty had been ratified, Senator Mason of Virginia gave out a copy for publication only a few days later. The Republican party, strongly sympathizing with France and strongly disliking Great Britain, had been opposed to Jay's mission, and had denounced Jay as a traitor and guillotined him in effigy when they heard that he was actually negotiating. The publication of the treaty only added to their fury. They filled newspapers with articles denouncing it, wrote virulent pamphlets against it, and burned Jay in effigy. The British flag was insulted. Hamilton was stoned at a public meeting in New York while speaking in defence of the treaty, and Washington was grossly abused for signing it. In the House of Representatives the Republicans endeavoured to prevent the execution of the treaty by refusing the necessary appro- priations, and a vote (29th of April, 1795) on a resolution that it ought to be carried into effect stood 49 to 49; but on the next day the opposition was defeated by a vote of 51 to 48. Once i n operation, the treaty grew in favour. Two days before landing on his return from the English mission, Jay had been elected governor of New York state; notwithstanding his temporary unpopularity, he was re-elected in April 1798. With the close of this second term of office in 1801, he ended his public career. Although not yet fifty-seven years old, he refused all offers of office and retiring to his estate near Bedford in Westchester county, N.Y., spent the rest of his life in rarely interrupted seclusion. In politics he was throughout inclined toward Conservatism, and after the rise of parties under the federal government he stood with Alexander Hamilton and John Adams as one of the foremost leaders of the Federalist party, as opposed to the Republicans or Democratic-Republicans. From 1821 until 1828 he was president of the American Bible Society. He died on the 17th of May 1829. The purity and integrity of his life are commemorated in a sentence by Daniel Webster: " When the spotless ermine of the judicial robe fell on John Jay, it touched nothing less spotless than itself."

See The Correspondence and Public Papers of John Jay (4 vols., New York, 1890-1893), edited by H. P. Johnston; William Jay, Life of John Jay with Selections from his Correspondence and Miscel- laneous Papers (2

vols., New York, 1833) ; William Whitelocke, Life and Times of John Jay (New York, 1887); and George Pellew, John Jay (Boston, 1890), in the " American Statesmen Series."

John Jay's son, William Jay (1789-1858), was born in New York City on the 16th of June 1789, graduated from Yale in 1807, and soon afterwards assumed the management of his father's large estate in Westchester county, N.Y. He was actively interested in peace, temperance and anti-slavery move- ments. He took a prominent part in 1816 in founding the

American Bible Society; was a judge of Westchester county from 1 81 8 to 1843, when he was removed from office by the party in power in New York, which hoped, by sacrificing an anti-slavery judge, to gain additional strength in the southern states; joined the American anti-slavery society in 1834, and held several important offices in this organization. In 1840, how- ever, when it began to advocate measures which he deemed too radical, he withdrew his membership, but with his pen he con- tinued his labours on behalf of the slave, urging emancipation in the district of Columbia and the exclusion of slavery from the Territories, though deprecating any attempt to interfere with slavery in the states. He was a member of the American peace society and was its president for several years. His pamphlet, War and Peace: the Evils of the First with a Plan for Securing the Last, advocating international arbitration, was published by the English Peace Society in 1842, and is said to have contributed to the promulgation, by the powers signing the Treaty of Paris in 1856, of a protocol expressing the wish that nations, before resorting to arms, should have recourse to the good offices of a friendly power. Among William Jay's other writings, the most important are The Life of John Jay (2 vols., 1833) and a Review of the Causes and Consequences of the Mexican War (1849). He died at Bedford on the 14th of October 1858.

See Bayard Tuckerman, William Jay and the Constitutional Movement for the Abolition of Slavery (New York, 1893).

William Jay's son, John Jay (1817-1894), also took an active part in the anti-slavery movement. He was a prominent mem- ber of the free soil party, and was one of the organizers of the Republican party in New York. He was United States minister to Austria-Hungary in 1869-1875, and was a member, and for a time president, of the New York civil service commission appointed by Governor Cleveland in 1883.

JAY, WILLIAM (1769-1853), English Nonconformist divine, was born at Tisbury in Wiltshire on the 6th of May 1769. He adopted his father's trade of stone-mason, but gave it up in 1785 in order to enter the Rev. Cornelius Winter's school at Marlborough. During the three years that Jay spent

there, his preaching powers were rapidly developed. Before he was twenty-one he had preached nearly a thousand times, and in 1 788 he had for a while occupied Rowland Hill's pulpit in London. Wishing to continue his reading he accepted the humble pastor- ate of Christian Malford, near Chippenham, where he remained about two years. After one year at Hope chapel, Clifton, he was called to the ministry of Argyle Independent chapel in Bath; and on the 30th of January 1791 he began the work of his life there, attracting hearers of every religious denomination and of every rank, and winning for himself a wide reputation as a brilliant pulpit orator, an earnest religious author, and a friendly counsellor. Sheridan declared him to be the most manly orator he had ever heard. A long and honourable connexion of sixty- two years came to an end in January 1853, and he died on the 27th of December following.

The best-known of Jay's works are his Morning and Evening Exercises: The Christian contemplated: The Domestic Minister's A ssistant ; and his Discourses. He also wrote a Life of Rev. Cornelius Winter, and Memoirs of Rev. John Clarke. An edition of Jay's Works in 12 vols., 8vo, revised by himself, was issued in 1842-1&44, and again in 1856. A new edition, in 8 vols., 8vo, was published in 1876. See Autobiography (1854) ; S. Wilson's Memoir of Jay (1854) ; S. Newth in Pulpit Memorials (1878).

JAY (Fr. giai), a well-known and very beautiful European bird, the Corvus glandarius of Linnaeus, the Garrulus glandarius of modern ornithologists. To this species are • more or less closely allied numerous birds inhabiting the Palaearctic and Indian regions, as well as the greater part of America, but not occurring in the Antilles, in the southern portion of the Neotropical Region, or in the Ethiopian or Austra- lian. All these birds are commonly called jays, and form a group of the crows or Corvidae, which may fairly be considered a sub-family, Garrulinae. Indeed there are, or have been, systematists who would elevate the jays to the rank of a family Garrulidae — a proceeding which seems unnecessary. Some of

them have an unquestionable resemblance to the pies, if the group now known by that name can be satisfactorily severed from the true Corvinae. In structure the jays are not readily differen- tiated from the pies; but in habit they are much more arboreal, delighting in thick coverts, seldom appearing in the open, and seeking their food on or under trees. They seem also never to walk or run when on the ground, but always to hop. The body- feathers are commonly loose and soft; and, gaily coloured as are most of the species, in few of them has the plumage the metallic glossiness

it generally presents in the pies, while the proverbial beauty of the " jay's wing " is due to the vivid tints of blue — turquoise and cobalt, heightened by bars of jet-black, an indica- tion of the same style of ornament being observable in the greater

Fig. 1 — European Jay.

number of the other forms of the group, and in some predomi- nating over nearly the whole surface. Of the many genera that have been proposed by ornithologists, perhaps about nine may be deemed sufficiently well established.

The ordinary European jay, Garrulus glandarius (fig. 1), has suffered so much persecution in the British Islands as to have become in many districts a rare bird. In Ireland it seems now to be indigenous to the southern half of the island only; in England generally, it is far less numerous than formerly; and in Scotland its numbers have decreased with still greater rapidity. There is little doubt that it would have been exterminated but for its stock being supplied in autumn by immigration, and for its shy and wary behaviour, especially at the breeding-season, when it becomes almost wholly mute, and thereby often escapes detection. No truthful man, however much he may love the bird, will gainsay the depredations on fruit and eggs that it at times commits; but the gardeners andˆamekeepers of Britain, instead of taking a few pimple steps to guard their charge from injury, deliberately adopt methods of wholesale destruction — methods that in the case of this species are only too easy and too effectual — by proffering temptation to trespass which it is not in jay-nature to resist, and accordingly the bird runs great chance of total extirpation. Notwithstanding the war carried on against the jay, its varied cries and active gesticulations show it to be a sprightly bird, and at a distance that renders its beauty-spots invisible, it is yet rendered conspicuous by its cinnamon-coloured body and pure white tail-coverts, which contrast with the deep black and rich chestnut that otherwise mark its plumage, and even the young at once assume a dresˆ" closely resembling that of the adult. The nest, generally concealed in a leafy tree or , bush, is carefully built, with a lining formed of fine roots neatly interwoven. Herein from four to seven eggs, of a greenish- white closely freckled, so as to seem suffused with light olive, are laid in March or April, and the young on quitting it accom- pany their parents for some weeks.

Though the common jay of Europe inhabits nearly the whole of this quarter of the globe south of 64 N. lat., its territory in the east of Russia is also occupied by G. brandti, a kindred form, which replaces it on the other side of the Ural, and ranges thence across Siberia to Japan; and again on the lower Danube and

thence to Constantinople the nearly allied G. krynicki (which alone is found in southern Russia, Caucasia and Asia Minor) shares its haunts with it. 1 It also crosses the Mediterranean to Algeria and Morocco; but there, as in southern Spain, it is probably but a winter immigrant. The three forms just named have the widest range of any of the genus. Next to them come G. atricapillus, reaching from Syria to Baluchistan, G. japonicus, the ordinary jay of southern Japan, and G. sinensis, the Chinese bird. Other forms have a much more limited area, as G. cervicalis, the local and resident jay of Algeria, G. hyrcanus, found on the southern shores of the Caspian Sea, and G. taevanus, confined to the island of Formosa. The most aberrant of the true jays is G. lidthi, a very rare species, which seems to come from some part of Japan {vide Salvadori, Atti Accad. Torino, vii. 474), though its exact locality is not known.

Leaving the true jays of the genus Garrulus, it is expedient next to consider those of a group named, in 1831, Perisoreus by Prince C. L. Bonaparte (Saggio, &c, Anim. Vertebrati, p. 43) and Dysornithia by Swainson (F. B.-Americana, ii. 49s). 2

This group contains two species — one the Lanius infaustus of Linnaeus and the Siberian jay of English writers, which ranges throughout the pine-forests of the north of Europe and Asia, and the second the Corvus canadensis of the same author, or Canada jay, occupying a similar station in America. The so-called Siberian jay is one of the most entertaining birds in the world. Its versatile cries and actions, as seen and heard by those who pene- trate the solitude of the northern forests it inhabits, can never be forgotten by one who has had experience of them, any more than the pleasing sight of its rust-coloured tail, which an occasional gleam of sunshine will light up into a brilliancy quite unexpected by those who have only surveyed the bird's otherwise gloomyˆ appearance in the glass-case of a ihuseum. It seems scarcely to know fear, ob- truding itself on the notice of any traveller who in- vades its haunts, and, shoulˆJ he halt, making it-self at once a denizen of his bivouac. In con- finement it speedily becomes friendly, but suit- able food for it is not easily found. Linnaeus seems to have been under a misap- prehension when he applied to it FlG – 2.— American Blue Jay.

the trivial epithet it bears; for by none of his countrymen is it deemed an unlucky bird, but rather the reverse. In fact, no one can listen to the cheery sound of its ordinary calls with any but a hopeful feeling. The Canada jay, or " whisky-jack " (the corruption probably of a Cree name), seems to be of a similar nature, but it presents a still more sombre coloration, its nestling plumage, 3 indeed, being thoroughly corvine in appearance and suggestive of its being a pristine form.

As though to make amends for the dull plumage of the species last mentioned, North America offers some of the most brilliantly

1 Further information will possibly show that these districts are not occupied at the same season of the year by the two forms.

2 Recent writers have preferred the former name, though it was only used sub-generically by its author, who assigned to it no charac- ters, which the inventor of the latter was careful to do, regarding it at the same time as a genus.

3 In this it was described and figured {F. B. Americana, ii. 296, pi. 55) as a distinct species, G. brachyrhynchus.

coloured of the sub-family, and the common blue jay 1 of Canada and the eastern states of the Union, Cyanurus cristatus (fig. 2), is one of the most conspicuous birds of the Transatlantic woods. The account of its habits by Alexander Wilson is known to every student of ornithology, and Wilson's followers have had little to do but supplement his history with unimportant details. In this bird and its many allied forms, coloration, though almost confined to various tints of blue, seems to reach its climax, but want of space forbids more particular notice of them, or of the members of the other genera Cyanocitta, Cyanocorax, Xanthura, Psilorhinus, and more, which inhabit various parts of the Western continent. It remains, however, to mention the genus Cissa, including many beautiful forms belonging to the Indian region, and among them the C. speciosa and C. sinensis, so often represented in Oriental drawings, though doubts may be ex- pressed whether these birds are not more nearly related to the pies than to the jays. (A. N.)

JEALOUSY (adapted from Fr. jalousie, formed from jaloux, jealous, Low Lat. zelosus, Gr. f tjXos, ardour, zeal, from the root seen in £kiv, to boil, ferment; cf. " yeast "), originally a condi- tion of zealous emulation, and hence, in the usual modern sense, of resentment at being (or believing that one is or may be) supplanted or preferred in the love or affection of another, or in the enjoyment of some good regarded as properly one's own. Jealousy is really a form of envy, but implies a feeling of personal claim which in envy or covetousness is wanting. The jealousy of God, as in Exod. xx. 5, " For I, the Lord thy God, am a jealous God," has been defined by Pusey (Minor Prophets, i860) as the attribute " whereby he does not endure the love of his creatures to be transferred from him." " Jealous," by

etymology, is however, only another form of " zealous," and the identity is exemplified by such expressions as " I have been very jealous for the Lord God of Hosts " (1 Kings xix. 10). A kind of glass, thick, ribbed and non-transparent, was formerly known as " jealous-glass," and this application is seen in the borrowed French word jalousie, a blind or shutter, made of slats of wood, which slope in such a way as to admit air and a certain amount of light, while excluding rain and sun and inspection from without.

JEAN D' ARRAS, a 15th-century trouvere, about whose personal history nothing is known, was the collaborator with Antoine du Val and Fouquart de Cambrai in the authorship of a collection of stories entitled Itvangiles de quenouille. They purport to record the narratives of a group of ladies at their spinning, who relate the current theories on a great variety of subjects. The work dates from the middle of the 1 5th century and is of considerable value for the light it throws on medieval manners.

There were many editions of this book in the 15th and 16th cen- turies, one of which was printed by Wynkyn de Worde in English, as The Gospelles of Dystaves. A modern edition (Collection Jannet) has a preface by Anatole France.

Another trouvere, Jean d'Arras who flourished in the second half of the 14th century, wrote, at the request of John, duke of Berry, a long prose romance entitled Chronique de la princesse. It relates with many digressions the antecedents and life of the fairy Melusine (q.v.).

JEAN DE MEUN, or De Meung (c. 1250-c. 1305). "whose original name was Jean Clopinel or Chopinel, was born at Meun- sur-Loire. Tradition asserts that he studied at the university of Paris. At any rate he was, like his contemporary, Rutebeuf , a defender of Guillaume de Saint-Amour and a bitter critic of the mendicant orders. Most of his life seems to have been spent in Paris, where he possessed, in the Rue Saint-Jacques, a house with a tower, court and garden, which was described in 1305 as the house of the late Jean de Meung, and was then bestowed by a certain Adam d'Andely on the Dominicans. Jean de Meun says that in his youth he composed songs that were sung in every public place and school in France. In the enumeration of his own works he places first his continuation of the Roman de la rose of Guillaume de Lorris (q.v.). The date of this second part

1 The birds known as blue jays in India and Africa are rollers (q.v.).

is generally fixed between 1268 and 1285 by a reference in the poem to the death of Manfred and Conradin, executed (1268) by order of Charles of Anjou (d. 1285) who is described as the present king of Sicily. M. F.

Guillon (Jean Clopinel, 1903), however, considering the poem primarily as a political satire, places it in the last five years of the 13th century. Jean de Meun doubtless edited the work of his predecessor, Guillaume de Lorris, before using it as the starting-point of his own vast poem, running to 19,000 lines. The continuation of Jean de Meun is a satire on the monastic orders, on celibacy, on the nobility, the papal see, the excessive pretensions of royalty, and especially on women and marriage. Guillaume had been the servant of love, and the exponent of the laws of " courtoisie "; Jean de Meun added an " art of love," exposing with brutality the vices of women, their arts of deception, and the means by which men may outwit them. Jean de Meun embodied the mocking, sceptical spirit of the fabliaux. He did not share in current superstitions, he had no respect for established institutions, and he scorned the con- ventions of feudalism and romance. His poem shows in the highest degree, in spite of the looseness of its plan, the faculty of keen observation, of lucid reasoning and exposition, and it entitles him to be considered the greatest of French medieval poets. He handled the French language with an ease and precision unknown to his predecessors, and the length of his poem was no bar to its popularity in the 13th and 14th centuries. Part of its vogue was no doubt due to the fact that the author, who had mastered practically all the scientific and literary knowledge of his contemporaries in France, had found room in his poem for a great amount of useful information and for numerous citations from classical authors. The book was attacked by Guillaume de Degulleville in his Pelerinage de la vie humaine (c. 1330), long a favourite work both in England and France; by John Gerson, and by Christine de Pisan in her Epttre au dieu d' amour; but it also found energetic defenders.

Jean de Meun translated in 1284 the treatise, De re militari, of Vegetius into French as Le livre de Vegece de I'art de chevalerie (ed. Ulysse Robert, Soc. des anciens textesfr., 1897). He also produced a spirited version, the first in French, of the letters of Abelard and Heloise. A 14th-century MS. of this translation in the Bibliotheque Nationale has annotations by Petrarch. His translation of the De consolatione philosophiae of Boetius is preceded by a letter to Philip IV. in which he enumerates his earlier works, two of which are lost — De spirituelle amitie from the De spirituals amicitia of Aelred of Rievaulx (d. 1166), and the Livre des merveittes d'Hirlande from the Topographia Hibernica, or De Mirabilibus Hiberniae of Giraldus Cambreflsis (Giraud de Barry). His last poems are doubtless his Testament and Codicille. The Testament is written in quatrains in monorime, and contains advice to the different classes of the community.*

See also Paulin Paris in Hist. lit. de la France, xxviii. 391-439, and E. Langlois in Hist, de la langue et de la lit. francaise, ed. L. Petit de Julleville, ii. 125-161 (1896) ; and editions of the Roman de la rose (q.v.).

JEANNETTE, a borough of Westmoreland county, Pennsyl- vania, U.S.A., about 27 m. E. by S. of Pittsburg. Pop. (1890), 3296; (1900), 5865 (1340 foreign-born); (1910), 8077. It is served by the Pennsylvania railroad, and is connected with Pittsburg and Uniontown by electric railway. It is supplied with natural gas and is primarily a manufacturing centre, its principal manufactures being glass, table-ware and rubber goods. Jeannette was founded in 1888, and was incorporated as a borough in 1889.

JEANNIN, PIERRE (1540-1622), French statesman, was born at Autun. A pupil of the great jurist Jacques Cujas at Bourges, he was an advocate at Dijon in 1569 and became councillor and then president of the parlement of Burgundy. He opposed in vain the massacre of St Bartholomew in his province. As councillor to the duke of Mayenne he sought to reconcile him with Henry IV. After the victory of Fontaine-Francaise (1 595), Henry took Jeannin into his council and in 1602 named him intendant of finances. He took part in the principal events of the reign, negotiated the treaty of Lyons with the duke of Savoy

2 Jean de Meun's translation formed the basis of a rhymed version (1290) by Jean Priorat of Besancon, Li abreyance de I'ordre de cheva- lerie.

(see Henry IV.), and the defensive alliance between France and the United Netherlands in 1608. As superintendent of finances under Louis XIII., he tried to establish harmony between the king and the queen-mother.

See Berger de Xivrey, Lettres missives de Henri IV. (in the Collec- tion inedite pour Vhistoire de France), t. v. (1850) ; P(ierre) S(aumaise), Eloge sur la vie de Pierre Janin (Dijon, 1623) ; Sainte-Beuve, Causeries du lundi, t. x. (May 1854).

JEBB, JOHN (1 736-1 786), English divine, was educated at Cambridge, where he was elected fellow of Peterhouse in 1761, having previously been second wrangler. He was a man of independent judgment and warmly supported the movement of 1 77 1 for abolishing university and clerical subscription to the Thirty-nine Articles. In his lectures on the Greek Testament he is said to have expressed Socinian views. In 1775 he resigned his Suffolk church livings, and two years afterwards graduated M.D. at St Andrews. He practised medicine in London and was elected F.R.S. in 1779.

Another John Jebb (1775-1833), bishop of Limerick, is best known as the author of Sacred Literature (London, 1820).

JEBB, SIR RICHARD CLAVERHOTJSE (1841-1905), English classical scholar, was born at Dundee on the 27th of August 1 84 1. His father was a well-known barrister, and his grand- father a judge. He was educated at Charterhouse and at Trinity College, Cambridge. He won the Porson and Craven scholarships, was senior classic in 1862, and became fellow and tutor of his college in 1863. From 1869 to 1875 he was public orator of the university; professor of Greek at Glasgow from 1875 to 1889, and at Cambridge from 1889 till his death on the 9th of December 1905. In 1891 he was elected member of parliament for Cambridge University; he was knighted in 1900. Jebb was acknowledged to be one of the most brilliant classical scholars of his time, a humanist in the best sense, and his powers of transla- tion from and into the classical languages were unrivalled. A collected volume, Translations into Greek and Latin, appeared in 1873 (ed. 1909). He was the recipient of many honorary degrees from European and American universities, and in 1905 was made a member of the Order of Merit. He married in 1874 the widow of General A. J. Slemmer, of the United States army, who survived him.

Jebb was the author of numerous publications, of which the following are the most important : The Characters of Theophrastus (1870), text, introduction, English translation and commentary (re-edited by J. E. Sandys, 1909) ; The Attic Orators from Anliphon to Isaeus (2nd ed., 1893), with companion volume, Selections from the Attic Orators (2nd ed., 1888) ; Bentley (1882) ; Sophocles (3rd ed., 1893) the seven plays, text, English translation and notes, the pro- mised edition of the fragments being prevented by his death ; Bacchylides { 1 905), text, translation, and notes ; Homer (3rded., 1888), an introduction to the Iliad and Odyssey; Modern Greece (1901); The Growth and Influence of Classical Greek Poetry (1893). His translation of the Rhetoric of Aristotle was published posthumously under the editorship of J. E. Sandys (1909). A selection from his Essays and Addresses, and a subsequent volume, Life and Letters of Sir Richard Claverhouse Jebb (with critical introduction by A. W. Verrall) were published by his widow in 1907 ; see also an appreciative notice by J. E. Sandys, Hist, of Classical Scholarship, iii. (1908).

JEBEIL (anc. Gebal-Byblus), a town of Syria pleasantly situated on a slight eminence near the sea, about 20 m. N. of Beirut. It is surrounded by a wall if m. in circumference, with square towers at the angles, and a castle at the south-east corner. Numerous broken granite columns in the gardens and vineyards that surround the town, with the number of ruined houses within the walls, testify to its former importance. The stele of Jehaw- melek, king of Gebal, found here, is one of the most important of Phoenician monuments. The small port is almost choked up with sand and ruins. Pop. 3000, all Moslems.

The inhabitants of the Phoenician Gebal and Greek Byblus were renowned as stonecutters and ship-builders. Arrian (ii. 20.1) represents Enylus, king of Byblus, as joining Alexander with a fleet, after that monarch had captured the city. Philo of Byblus makes it the most ancient city of Phoenicia, founded by Cronus, i.e. the Moloch who appears from the stele of Jehawmelek to have been with Baalit the chief deity of the city. According to Plutarch (Mor. 357), the ark with the corpse of Osiris was cast

ashore at Byblus, and there found by Isis. The orgies of Adonis in the temple of Baalit (Aphrodite Byblia) are described by Lucian, De Dea Syr., cap. vi. The river Adonis is the Nahr al- Ibrahim, which flows near the town. The crusaders, after failing before it in 1099, captured " Giblet " in 1103, but lost it again to Saladin in 11 89. Under Mahommedan rule it has gradually decayed. (D. G. H.)

JEBEL (plur. jibaT), also written Gebel with hard g (plur. gibdl), an Arabic word meaning a mountain or a mountain chain. It is frequently used in place-names. The French transliteration of the word is djebel. Jebeli signifies a mountaineer. The pro- nunciation with a hard g sound is that used in the Egyptian dialect of Arabic.

JEDBURGH, a royal and police burgh and county-town of Roxburghshire, Scotland. Pop. of police burgh (1901), 3136. It is situated on Jed Water, a tributary of the Teviot, 56J m. S.E. of Edinburgh by the North British railway, via Roxburgh and St Boswells (49 m. by road), and 10 m. from the border at Catcleuch Shin, a peak of the Cheviots, 1742 ft. high. Of the name Jedburgh there have been many variants, the earliest being Gedwearde (800), Jedwarth (1251), and Geddart (1586), while locally the word is sometimes pronounced Jethart. The town is situated on the left bank of the Jed, the main streets running at right angles from each side of the central market-place. Of the renowned group of Border abbeys — Jedburgh, Melrose, Dryburgh and Kelso — that of Jedburgh is the stateliest. In 1118, according to tradition, but more probably as late as 1138, David, prince of Cumbria, here founded a priory for Augustinian monks from the abbey of St Quentin at Beauvais in France, and in 1 147, after he had become king, erected it into an abbey dedicated to the Virgin. Repeatedly damaged in Border warfare, it was ruined in 1544-45 during the English invasion led by Sir Ralph Evers (or Eure). The establishment was suppressed in 1559, the revenues being temporarily annexed to the Crown. After changing owners more than once, the lands were purchased in 1637 by the 3rd earl of Lothian. Latterly five of the bays at the west end had been utilized as the parish church, but in 1873- 1875 the 9th marquess of Lothian built a church for the service of the parish, and presented it to the heritors in exchange for the ruined abbey in order to

prevent the latter from being injured by modern additions and alterations.

The abbey was built of Old Red sandstone, and belongs mostly to the end of the 12th and the beginning of the 13th centuries. The architecture is mixed, and the abbey is a beautiful example of the Norman and Transition styles. The total length is 235 ft., the nave being 133J ft. long and 59J ft. wide. The west front contains a great Norman porch and a fine wheel window. The nave, on each side, has nine pointed arches in the basement storey, nine round arches in the triforium, and thirty-six pointed arches in the clere- story, through which an arcade is carried on both sides. The tower, at the intersection of the nave and transepts, is of unusually massive proportions, being 30 ft. square and fully 100 ft. high; the network baluster round the top is modern. With the exception of the north piers and a small portion of the wall above, which are Norman, the tower dates from the end of the 15th century. The whole of the south transept has perished. The north transept, with early Decorated windows, has been covered in and walled off, and is the burial-ground of the Kerrs of Fernihirst, ancestors of the marquess of Lothian. The earliest tombstone is dated 1524; one of the latest is the recumbent effigy, by G. F. Watts, R.A., of the 8th marquess of Lothian (1832-1870ˆ. All that is left of the choir, which contains some very early Norman work, is two bays with three tiers on each side, corresponding to the design of the nave. It is supposed that the aisle, with Decorated window and groined roof, south of the chancel, formed the grammar school (removed from the abbey in 1751) in which Samuel Rutherford (1600-1661), principal of St Mary's College, St Andrews, and James Thomson, author of The Seasons, were educated. The door leading from the south aisle into a herbaceous garden, formerly the cloister, is an exquisite copy of one which had become greatly decayed. It was designed by Sir Rowand Anderson, under whose superintendence restoration in the abbey was carried out.

The castle stood on high ground at the south end of the burgh, or " town-head." Erected by David I., it was one of the strong- holds ceded to England in 11 74, under the treaty of Falaise, for the ransom of William the Lion. It was, however, so often captured by the English that it became a menace rather than a protection, and the townsfolk demolished it in 1409. It had

occasionally been used as a royal residence, and was the scene, in November 1285, of the revels held in celebration of the marriage (solemnized in the abbey) of Alexander III. to Joleta, or Yolande, daughter

of the count of Dreux. The site was occupied in 1823 by the county prison, now known as the castle, a castellated structure which gradually fell into disuse and was acquired by the corporation in 1890. A house exists in Backgate in which Mary Queen of Scots, resided in 1566, and one in Castlegate which Prince Charles Edward occupied in 1745.

The public buildings include the grammar school (built in 1883 to replace the successor of the school in the abbey), founded by William Turnbull, bishop of Glasgow (d. 1454), the county buildings, the free library and the public hall, which succeeded to the corn exchange destroyed by fire in 1898, a loss that involved the museum and its contents, including the banners captured by the Jethart weavers at Bannockburn and Killiecrankie. The old market cross still exists, and there are two public parks. The chief industry is the manufacture of woollens (blankets, hosiery), but brewing, tanning and iron-founding are carried on, and fruit (especially pears) and garden produce are in repute. Jedburgh was made a royal burgh in the reign of David I., and received a charter from Robert I. and another, in 1566, from Mary Queen of Scots. Sacked and burned time after time during the Border strife, it was inevitable that the townsmen should become keen fighters. Their cry of " Jethart's here ! " was heard wherever the fray waxed most fiercely, and the Jethart axe of their invention — a steel axe on a 4-ft. pole — wrought havoc in their hands.

" Jethart or Jeddart justice," according to which a man was hanged first and tried afterwards, seems to have been a hasty generalization from a solitary fact — the summary execution in James VI. 's reign of a gang of rogues at the instance of Sir George Home, but has nevertheless passed into a proverb.

Old Jeddart, 4 m. S. of the present town, the first site of the burgh, is now marked by a few grassy mounds, and of the great Jedburgh forest, only the venerable oaks, the " Capon Tree " and the "King of the Woods" remain. Dunion Hill (1095 ft.), about 2 m. south-west of Jedburgh, commands a fine view of the capital of the county.

JEEJEEBHOY (Jijibhai), SIR JAMSETJEE (Jamsetji), Bart. (1783-1859), Indian merchant and philanthropist, was born in Bombay in 1783, of poor but respectable parents, and was left an orphan in early life. At the age of sixteen, with a smattering of mercantile education and a bare pittance, he commenced a series of business travels destined to lead him to fortune and fame. After a preliminary visit to Calcutta, he under- took a voyage to China, then fraught with so much difficulty and risk that it was regarded as a venture betokening considerable enterprise and courage; and he subsequently initiated a syste- matic trade with that country, being himself the carrier of his merchant wares on his passages to and fro between

Bombay and Canton and Shanghai. His second return voyage from China was made in one of the East India Company's fleet, which, under the command of Sir Nathaniel Dance, defeated the French squadron under Admiral Linois (Feb. 15, 1804). On his fourth return voyage from China, the Indiaman in which he sailed was forced to surrender to the French, by whom he was carried as a prisoner to the Cafie of Good Hope, then a neutral Dutch possession; and it was only after much delay, and with great difficulty, that he made his way to Calcutta in a Danish ship. Nothing daunted, he undertook yet another voyage to China, which was more successful than any of the previous ones. By this time he had fairly established his reputation as a mer- chant possessed of the highest spirit of enterprise and consider- able wealth, and thenceforward he settled down in Bombay, where he directed his commercial operations on a widely extended scale. By 1836 his firm was large enough to engross the energies of his three sons and other relatives; and he had amassed what at that period of Indian mercantile hist6ry was regarded as fabulous wealth. An essentially self-made man, having experi- enced in early life the miseries of poverty and want, in his days of affluence Jamsetjee Jeejeebhoy developed an active instinct

of sympathy with his poorer countrymen, and commenced that career of private and public philanthropy which is his chief title to the admiration of mankind. His liberality was unbounded, and the absorbing occupation of his later life was the alleviation of human distress. To his own community he gave lavishly, but his benevolence was mainly cosmopolitan. Hospitals, schools, homes of charity, pension funds, were founded or en- dowed by him, while numerous public works in the shape of wells, reservoirs, bridges, causeways, and the like, not only in Bombay, but in other parts of India, were the creation of his bounty. The total of his known benefactions amounted at the time of his death, which took place in 1859, to over £230,000. It was not, however, the amount of his charities so much as the period and circumstances in which they were performed that made his benevolent career worthy of the fame he won. In the first half of the 19th century the various communities of India were much more isolated in their habits and their sympathies than they are now. Jamsetjee Jeejeebhoy's unsectarian philanthropy awak- ened a common understanding and created a bond between them which has proved not only of domestic value but has had a national and political significance. His services were recognized first in 1842 by the bestowal of a knighthood upon him, and in 1858 by that of a baronetcy. These were the very first distinc- tions of their kind conferred by Queen Victoria upon a British subject in India.

His title devolved in 1859 on his eldest son Cursetjee, who, by a special Act of the Viceroy's Council in pursuance of a provision in the letters-patent, took the name of Sir Jamsetjee Jeejeebhoy as second baronet. At his death

in 1877 his eldest son, Menekjee, became Sir Jamsetjee Jeejeebhoy, the third baronet. Both had the advantage of a good English education, and continued the career of benevolent activity and devoted loyalty to British rule which had signalized the life-work of the founder of the family. They both visited England to do homage to their sovereign; and their public services were recognized by their nomination to the order of the Star of India, as well as by appointment to the Legislative Councils of Calcutta and Bombay.

On the death of the third baronet, the title devolved upon his brother, Cowsajee (1853-1908), who became Sir Jamsetjee Jeejeebhoy, fourth baronet, and the recognized leader of the Parsee community all over the world. He was succeeded by his son Rustomjee (b. 1878), who became Sir Jamsetjee Jeejeebhoy, fifth baronet.

Since their emigration from Persia, the Parsee community had never had a titular chief or head, its communal funds and affairs being managed by a public body, more or less democratic in its constitution, termed the Parsee panchayat. The first Sir Jamsetjee, by the hold that he established on the community, by his charities and public spirit, gradually came to be regarded in the light of its chief; and the recognition which he was the first in India to receive at the hands of the British sovereign finally fixed him and his successors in the baronetcy in the posi- tion and title of the official Parsee leader. (M. M. Bh.)

JEFFERIES, RICHARD (1848-1887), English naturalist and author, was born on the 6th of November 1848, at the farmhouse of Coate about 25 m. from Swindon, on the road to Marlborough. He was sent to school, first at Sydenham and then at Swindon, till the age of fifteen or so, but his actual education was at the hands of his father, who gave him his love for Nature and taught him how to observe. For the faculty of observation, as Jefferies, Gilbert White, and H. D. Thoreau have remarked, several gifts are necessary, including the possession of long sight and quick sight, two things which do not always go together. To them must be joined trained sight and the knowledge of what to expect. The boy's father first showed him what there was to look for in the hedge, in the field, in the trees, and in the sky. This kind of training would in many cases be wasted : to one who can under- stand it, the book of Nature will by-and-by offer pages which are blurred and illegible to the city-bred lad, and even to the country lad the power of reading them must be maintained by constant practice. To live amid streets or in the working world destroys

it. The observer must live alone and always in the country; he must not worry himself about the ways of the world; he must be always, from day to day, watching the infinite changes and variations of Nature. Perhaps, even when the observer can actually read this book of Nature, his power of articulate speech may prove inadequate for the expression of what he sees. But Jefferies, as a boy, was more than an observer of the fields; he was bookish, and read all the books that he could borrow or buy. And presently, as is apt to be the fate of a bookish boy who cannot enter a learned profession, he became a journalist and obtained a post on the local paper. He developed literary ambitions, but for a long time to come was as one beating the air. He tried local history and novels; but his early novels, which were published at his own risk and expense, were, deservedly, failures. In 1872, however, he published a remarkable letter in The Times, on " The Wiltshire Labourer," full of original ideas and of facts new to most readers. This was in reality the turning-point in his career. In 1873, after more false starts, Jefferies returned to his true field of work, the life of the country, and began to write for Fraser's Magazine on " Farming and Farmers." He had now found himself. The rest of his history is that of continual advance, from close observation becoming daily more and more close, to that intimate com- munion with Nature with which his later pages are filled. The developments of the later period are throughout touched with the melancholy that belongs to ill-health. For, though in his prose poem called " The Pageant of Summer " the writer seems absolutely revelling in the strength of manhood that be- longs to that pageant, yet, in the Story of My Heart, written about the same time, we detect the mind that is continually turned to death. He died at Goring, worn out with many ailments, on the 14th of August 1887. The best-known books of Richard Jefferies are: The Gamekeeper at Home (1878); The Story of My Heart (1883) ; Life of the Fields (1884), containing the best paper he ever wrote, " The Pageant of Summer"; Amaryllis at the Fair (1884), in which may be found the portraits of his own people; and The Open Air. He stands among the scanty company of men who address a small audience, for whom he read aloud these pages of Nature spoken of above, which only he, and the few like unto him, can decipher.

See Sir Walter Besant, Eulogy of Richard Jefferies (1888) ; H. S. Salt, Richard Jefferies: a Study (1894); Edward Thomas, Richard Jefferies, his Life and Work (1909). (W. Be.)

JEFFERSON, JOSEPH (1820-1905), American actor, was born in Philadelphia on the 20th of February 1829. He was the third actor of this name in a family of actors and managers, and the most famous of all American comedians. At the age of three he appeared as the boy in Kotzebue's Pizarro, and throughout his youth he underwent all the hardships connected with theatrical touring in those early days. After a

miscellaneous experience, partly as actor, partly as manager, he won his first pronounced success in 1858 as Asa Trenchard in Tom Taylor's Our American Cousin at Laura Keene's theatre in New York. This play was the turning-point of his career, as it was of Sothern's. The naturalness and spontaneity of humour with which he acted the love scenes revealed a spirit in comedy new to his contemporaries, long used to a more artificial convention; and the touch of pathos which the part required revealed no less to the actor an unex- pected power in himself. Other early parts were Newman Noggs in Nicholas Nickleby, Caleb Plummer in The Cricket on the Hearth, Dr Pangloss in The Heir at Law, Salem Scudder in The Octoroon, and Bob Acres in The Rivals, the last being not so much an inter- pretation of the character as Sheridan sketched it as a creation of the actor's. In 1859 Jefferson made a dramatic version of the story of Rip Van Winkle on the basis of older plays, and acted it with success at Washington. The play was given its perma- nent form by Dion Boucicault in London,where (1865) it ran 170 nights, with Jefferson in the leading part. Jefferson continued to act with undiminished popularity in a limited number of parts in nearly every town in the United States, his Rip Van Winkle, Bob Acres, and Caleb Plummer being the most popular. He was one of the first to establish the travelling combinations which

superseded the old system of local stock companies. With the exception of minor parts, such as the First Gravedigger in Hamlet, which he played in an " all star combination " headed by Edwin Booth, Jefferson created no new character after 1865; and the success of Rip Van Winkle was so pronounced that he has often been called a one-part actor. If this was a fault, it was the public's, who never wearied of his one masterpiece. Jefferson died on the 23rd of April 1905. No man in his profession was more honoured for his achievements or his character. He was the friend of many of the leading men in American politics, art and literature. He was an ardent fisherman and lover of nature, and devoted to painting. Jefferson was twice married: to an actress, Margaret Clements Lockyer(i832-i86i),in 1850, and in 1867 to Sarah Warren, niece of William Warren the actor.

Jefferson's Autobiography (New York, 1889) is written with admir- able spirit and humour, and,its judgments with regard to the art of the actor and of the playwright entitle it to a place beside Cibber's Apology. See William Winter, The Jeffersons (1881), and Life of Joseph Jefferson (1894); Mrs. E. P. Jefferson, Recollections of Joseph Jefferson (1909).

JEFFERSON, THOMAS (1 743-1826), third president of the United States of America, and the most conspicuous apostle of democracy in America, was born on the 13th of April 1743, at Shadwell, Albemarle county, Virginia. His father, Peter Jefferson (1707-1757), of early Virginian yeoman stock, was a civil engineer and a man of remarkable energy, who

became a justice of the peace, a county surveyor and a burgess, served the Crown in inter-colonial boundary surveys, and married into one of the most prominent colonial families, the Randolphs. Albe- marle county was then in the frontier wilderness of the Blue Ridge, and was very different, socially, from the lowland counties where a few broad-acred families dominated an open-handed, somewhat luxurious and assertive aristocracy. Unlike his Randolph connexions, Peter Jefferson was a whig and a thorough democrat; from him, and probably, too, from the Albemarle environment, his son came naturally by democratic inclinations. Jefferson carried with him from the college of William and Mary at Williamsburg, in his twentieth year, a good knowledge of Latin, Greek and French (to which he soon added Spanish, Italian and Anglo-Saxon), and a familiarity with the higher mathematics and natural sciences only possessed, at his age, by men who have a rare natural taste and ability for those studies. He remained an ardent student throughout life, able to give and take in association with the many scholars, American and foreign, whom he numbered among his friends and correspondents. With a liberal Scotsman, Dr William Small, then of the faculty of William and Mary and later a friend of Erasmus Darwin, and George Wythe (1726-1806), a very accomplished scholar and leader of the Virginia bar, Jefferson was an habitual member, while still in college, of a partie carrie at the table of Francis Fauquier (c. .1720-1768), the accomplished lieutenant-governor of Virginia. Jefferson was an expert violinist, a good singer and dancer, proficient in outdoor sports, and an excellent horseman. Thorough-bred horses always remained to him a necessary luxury. When it is added that Fauquier was a passionate gambler, and that the gentry who gathered every winter at Williamsburg, the seat of government of the province, were ruinously addicted to the same weakness, and that Jefferson had a taste for racing, it does credit to his early strength of character that of his social opportunities he took only the better. He never used tobacco, never played cards, never gambled, and was never party to a personal quarrel.

Soon after leaving college he entered Wythe's law office, and in 1767, after five years of close study, was admitted to the bar. His thorough preparation enabled him to compete from the first with the leading lawyers of the colony, and his success shows that the bar had no rewards that were not fairly within his reach. As an advocate, however, he did not shine; a weakness of voice made continued speaking impossible, and he had neither the ability nor the temperament for oratory. To his legal scholarship and collecting zeal Virginia owed the preservation of a large part of her early statutes. He seems to have lacked interest in litigiousness, which was extraordinarily developed in colonial

Virginia; and he saw and wished to reform the law's abuses. It is probable that he turned, therefore, the more willingly to politics; at any rate, soon after entering public life he abandoned practice (1774).

The death of his father had left him an estate of 1000 acres, the income from which (about £400) gave him the position of an independent country gentleman; and while engaged in the law he had added to his farms after the ambitious Virginia fashion, until, when he married in his thirtieth year, there were 5000 acres all paid for; and almost as much more 1 came to him in 1773 on the death of his father-in-law. On the 1st of January 1772, Jefferson married Martha Wayles Skelton (1740-1 782), a childless widow of twenty-three, very handsome, accomplished, and very fond of music. Their married life was exceedingly happy, and Jefferson never remarried after her early death. Of six children born from their union, two daughters alone survived infancy. Jefferson was emotional and very affectionate in his home, and his generous and devoted relations with his children and grand- children are among the finest features of his character.

Jefferson began his public service as a justice of the peace and parish vestryman; he was chosen a member of the Virginia house of burgesses in 1769 and of every succeeding assembly and con- vention of the colony until he entered the Continental Congress in 1775. His forceful, facile pen gave him great influence from the first; but though a foremost member of several great delibera- tive bodies, he can fairly be said never to have made a speech. He hated the " morbid rage of debate " because he believed that men were never convinced by argument, but only by reflection, through reading or unprovocative conversation; and this belief guided him through life. Moreover it is very improbable that he could ever have shone as a public speaker, and to this fact unfriendly critics have attributed, at least in part, his abstention from debate. The house of burgesses of 1769, and its successors in 1773 and 1774, were dissolved by the governor (see Virginia) for their action on the subject of colonial grievances and inter- colonial co-operation. Jefferson was prominent in all; was a signer of the Virginia agreement of non-importation and economy (1769); and was elected in 1774 to the first Virginia convention, called to consider the state of the colony and advance inter- colonial union. Prevented by illness from attending, Jefferson sent to the convention elaborate resolutions, which he proposed as instructions to the Virginia delegates to the Continental Congress that was to meet at Philadelphia in September. In the direct language of reproach and advice, with no disingenuous loading of the Crown's policy upon its agents, these resolutions attacked the errors of the king, and maintained that " the relation between Great Britain and these colonies was exactly the same as that of England and Scotland after the

accession of James and until the Union; and that our emigration to this country gave England no more rights over us than the emigration of the Danes and Saxons gave to the present authorities of their mother country over England." This was cutting at the common root of allegiance, emigration and colonization; but such radicalism was too thorough-going for the immediate end. The resolutions were published, however, as a pamphlet, entitled A Summary View of the Rights of America, which was widely circulated. In England, after receiving such modifications — attributed to Burke — as adapted it to the purposes of the opposition, this pamphlet ran through many editions, and procured for its author, as he said, " the honour of having his name inserted in a long list of proscriptions enrolled in a bill of attainder commenced in one of the two houses of parliament, but suppressed in embryo by the hasty course of events." It placed Jefferson among the foremost leaders of revolution, and procured for him the honour of drafting, later, the Declaration of Independence, whose historical portions were, in large part, only a revised transcript of the Summary View. In June 1775 he took his seat in the

1 It was embarrassed with a debt, however, of £3749, which, owing to conditions caused by the War of Independence, he really paid three times to his British creditors (not counting destruction on his estates, of equal amount, ordered by Lord Cornwallis). This greatly reduced his income for a number of years.

Continental Congress, taking with him fresh credentials of radicalism in the shape of Virginia's answer, which he had drafted, to Lord North's conciliatory propositions. Jefferson soon drafted the reply of Congress to the same propositions. Reappointed to the next Congress, he signalized his service by the authorship of the Declaration of Independence (q.v.). Again reappointed, he surrendered his seat, and after refusing a proffered election to serve as a commissioner with Benjamin Franklin and Silas Deane in France, he entered again, in October 1776, the Virginia legislature, where he considered his services most needed.

The local work to which Jefferson attributed such importance was a revision of Virginia's laws. Of the measures proposed to this end he says: " I considered four, passed or reported, as forming a system by which every trace would be eradicated of ancient or future aristocracy, and a foundation laid for a government truly republican " — the repeal of the laws of entail; the abolition of primogeniture and the unequal division of inheritances (Jefferson was himself an eldest son); the guarantee of freedom of conscience and relief of the people from supporting, by taxation, an established church; and a system of general education. The first object was embodied in lawin 1776, the second in 1785, the third 2 in 1786 (supplemented 1799, 1801). The last two were parts of a body of

codified laws prepared (1776-1779) by Edmund Pendleton, 3 George Wythe, and Jefferson, and principally by Jefferson. Not so fortunate were Jefferson's ambitious schemes of education. District, grammar and classical schools, a free state library and a state college, were all included in his plan. He was the first American statesman to make education by the state a fundamental article of demo- cratic faith. His bill for elementary education he regarded as the most important part of the code, but Virginia had no strong middle class, and the planters would not assume the burden of educating the poor. At this time Jefferson championed the natural .right of expatriation, and gradual emancipation of the slaves. His earliest legislative effort, in the five-day session of 1769, had been marked by an effort to secure to masters freedom to manumit their slaves without removing them from the state. It was unsuccessful, and the more radical measure he now favoured was even more impossible of attainment; but a bill he introduced to prohibit the importation of slaves was passed in 1778 — the only important change effected in the slave system of the state during the War of Independence. Finally he endeavoured, though unsuccessfully, to secure the introduc- tion of juries into the courts of chancery, and — a generation and more before the fruition of the labours of Romilly and his co- workers in England — aided in securing a humanitarian revision of the penal code, 4 which, though lost by one vote in 1785, was sustained by public sentiment, and was adopted in 1 796. Jeffer- son is of course not entitled to the sole credit for all these services: Wythe, George Mason and James Madison, in parti- cular, were his devoted lieutenants, and — after his departure for France — the principals in the struggle; moreover, an approv- ing public opinion must receive large credit. But Jefferson was throughout the chief inspirer and foremost worker.

In 1 7 79, at almost the gloomiest stage of the war in the southern states, Jefferson succeeded Patrick Henry as the governor of Virginia, being the second to hold that office after the organiza- tion of the state government. In his second term (1780-1781) the state was overrun by British expeditions, and Jefferson, a civilian, was blamed for the ineffectual resistance. Though he cannot be said to have been eminently fitted for the task that devolved upon him in such a crisis, most of the criticism of his

2 The first law of its kind in Christendom, although not the earliest practice of such liberty in America.

3 George Mason and Thomas L. Lee were members of the commis- sion, but they were not lawyers, and did little actual work on the revision.

1 Capital punishment was confined to treason and murder; the former was not to be attended by corruption of blood, drawing, or quartering ; all other felonies were made punishable by confinement and hard labour, save a few

to which was applied, against Jefferson's desire, the principle of retaliation.

administration was undoubtedly grossly unjust. His conduct being attacked, he declined renomination for the governorship, but was unanimously returned by Albemarle as a delegate to the state legislature; and on the day previously set for legislative inquiry on a resolution offered by an impulsive critic, he received, by unanimous vote of the house, a declaration of thanks and confidence. He wished however to retire permanently from public life, a wish strengthened by the illness and death of his wife. At this time he composed his Notes on Virginia, a semi- statistical work full of humanitarian liberalism. Congress twice offered him an appointment as one of the plenipotentiaries to negotiate peace with England, but, though he accepted the second offer, the business was so far advanced before he could sail that his appointment was recalled. During the following winter (1783) he was again in Congress, and headed the committee appointed to consider the treaty of peace. In the succeeding session his service was marked by a report, from which resulted the present monetary system of the United States (the funda- mental idea of its decimal basis being due, however, to Gouverneur Morris); and by the honour of reporting the first definitely formulated plan for the government of the western territories, 1 that embodied in the ordinance of 1784. He was already particularly associated with the great territory north-west of the Ohio; for Virginia had tendered to Congress in 1781, while Jefferson was governor, a cession of her claims to it, and now in 1784 formally transferred the territory by act of Jefferson and bis fellow delegates in congress: a consummation for which he had laboured from the beginning. His anti-slavery opinions grew in strength with years (though he was somewhat inconsis- tent in his attitude on the Missouri question in 1820-1821). Not only justice but patriotism as well pleaded with him the cause of the negroes, 2 for he foresaw the certainty that the race must some day, in some way, be freed, and the dire political dangers involved in the institution of slavery; and could any feasible plan of emancipation have been suggested he would have regarded its cost as a mere bagatelle.

From 1784 to 1789 Jefferson was in France, first under an appointment to assist Benjamin Franklin and John Adams in negotiating treaties of commerce with European states, and then as Franklin's successor (1785-1780) as minister to France. 3 In these years he travelled widely in western Europe. Though the commercial principles of the United States were far too liberal for acceptance, as such, by powers holding colonies in America, Jefferson won some specific concessions to American trade. He

was exceedingly popular as a minister. The criticism is even to-day current with the uninformed that Jefferson took his manners, 4 morals, "irreligion" and political philosophy from his French residence; and it cannot be wholly ignored. It may therefore be said that there is nothing except unsubstantiated scandal to contradict the conclusion, which various evidence

1 This plan applied to the south-western as well as to the north- western territory, and was notable for a provision that slavery should not exist therein after 1800. This provision was defeated in 1784, but was adopted in 1787 for the north-western territory — a step which is very often said to have saved the Union in the Civil War; the south-western territory (out of which were later formed Mississippi, Alabama, &c.) being given over to slavery. Thus the anti-slavery clause of the ordinance of 1784 was not adopted; and it was preceded by unofficial proposals. to the same end; yet to it belongs rightly some special honour as blazoning the way for federal control of slavery in the territories, which later proved of such enormous consequence. Jefferson in the first draft of the Ordinance of 1784, suggested the names to be given to the states eventually to be formed out of the territory concerned. For his suggestions he has been much ridiculed. The names are as follows: Illinoia, Michigaria, Sylvania, Polypotamia, Assenisipia, Charronesus, Pelisipia, Saratoga, Mesopotamia and Washington.

2 He owned at one time above 150 slaves. His overseers were under contract never to bleed them ; but he manumitted only a few at his death.

3 During this time he assisted in negotiating a treaty of amity and commerce with Prussia (1785) and one with Morocco (1789), and negotiated with France a " convention defining and establishing the functions and privileges of consuls and vice-consuls " (1788).

4 Patrick Henry humorously declaimed before a popular audience that J effersdn,, who favoured French wine and cookery, had " abjured his native victuals."

supports, that Jefferson's morals were pure. His religious views and political beliefs will be discussed later. His theories had a deep and broad basis in English whiggism; and though he may well have found at least confirmation of his own ideas in French writers — and notably in Condorcet — he did not read sympa- thetically the writers commonly named, Rousseau and Montes- quieu; besides, his democracy was seasoned, and he was rather a teacher than a student of revolutionary politics when he went to Paris. The Notes on Virginia were widely read in Paris, and undoubtedly had some influence in forwarding the dissolution of the

doctrines of divine rights and passive obedience among the cultivated classes of France. Jefferson was deeply interested in all the events leading up to the French Revolution, and all his ideas were coloured by his experience of the five seething years passed in Paris. On the 3rd of June 1789 he proposed to the leaders of the third estate a compromise between the king and the nation. In July he received the extraordinary honour of being invited to assist in the deliberations of the committee appointed by the national assembly to draft a constitution. This honour his official position compelled him, of course, to decline; for he sedulously observed official proprieties, aad in no way gave offence to the government to which he was accredited.

When Jefferson left France it was with the intention of soon returning; but President Washington tendered him the secretary- ship of state in the new federal government, and Jefferson reluctantly accepted. His only essential objection to the consti- tution—the absence of a bill of rights — was soon met, at least partially, by amendments. Alexander Hamilton (q.v.) was secretary of the treasury. These two men, antipodal in tempera- ment and political belief, clashed in irreconcilable hostility, and in the conflict of public sentiment, first on the financial measures of Hamilton, and then on the questions with regard to France and Great Britain, Jefferson's sympathies being predominantly with the former, Hamilton's with the latter, they formed about themselves the two great parties of Democrats and Federal- ists. The schools of thought for which they stood have since contended for mastery in American politics: Hamilton's gradually strengthened by the necessities of stronger administra- tion, as time gave widening amplitude and increasing weight to the specific powers — and so to Hamilton's great doctrine of the " implied powers " — of the general government of a growing country; Jefferson's rooted in colonial life, and buttressed by the hopes and convictions of democracy.

The most perplexing questions treated by Jefferson as secre- tary of state arose out of the policy of neutrality adopted by the United States toward France, to whom she was bound by treaties and by a heavy debt of gratitude. Separation from European politics — the doctrine of " America for Americans " that was embodied later in the Monroe declaration — was a tenet cherished by Jefferson as by other leaders (not, however, Hamilton) and by none cherished more firmly, for by nature he was peculiarly opposed to war, and peace was a fundamental part of his politics. However deep, therefore, his French sympathies, he drew the same safe line as did Washington between French politics and American politics, 6 and handled the Genet complications to the satisfaction of even the most partisan Federalists. He expounded, as a very high authority has said, " with remarkable clearness and power the nature and scope of neutral duty," and gave a " classic " statement of the doctrine of recognition. 6

But the French question had another side in its reaction on American parties. 7 Jefferson did not read excesses in Paris as warnings against democracy, but as warnings against the abuses

6 Jefferson did not sympathize with the temper of his followers who condoned the zealous excesses of Genet, and in general with the " misbehaviour " of the democratic clubs; but, as a student of Eng- lish liberties, he could not accept Washington's doctrine that for a self-created permanent body to declare " this act unconstitutional, and that act pregnant with mischiefs " was " a stretch of arrogant presumption " which would, if unchecked, " destroy the country."

6 John Basset Moore, American Diplomacy (New York, 1905).

7 Compare C. D. Hazen, Contemporary American opinion of the I French Revolution (Johns Hopkins University, Baltimore, 1897).

*of monarchy; nor did he regard Bonaparte's coup d'itat as revealing the weakness of republics, but rather as revealing the danger of standing armies; he did not look on the war of the coalitions against France as one of mere powers, but as one between forms of government; and though the immediate fruits of the Revolution belied his hopes, as they did those of ardent humanitarians the world over, he saw the broad trend of history, which vindicated his faith that a successful reformation of government in France would insure " a general reformation through Europe, and the resurrection to a new life of their people." Each of these statements could be reversed as regards Hamilton. It is the key to an understanding of the times to remember that the War of Independence had disjointed society; and democracy — which Jefferson had proclaimed in the Declara- tion of Independence, and enthroned in Virginia — after strength- ening its rights by the sword, had run to excesses, particularly in the Shays' rebellion, that produced a conservative reaction. To this reaction Hamilton explicitly appealed in the convention of 1787; and of this reaction various features of the constitution, and Hamiltonian federalism generally, were direct fruits. Moreover, independently of special incentives to the alarmist *nd the man of property, the opinions of many Americans turned again, after the war, into a current of sympathy for England, as naturally as American commerce returned to English ports. Jefferson, however, far from America in these years and unexposed to reactionary influences, came back with un- diminished fervour of democracy, and the talk he heard of praise for England, and fearful recoil before even the beginning of the revolution in France, disheartened him, and filled him with suspicion. 1 Hating as he did feudal class institutions and Tudor-Stuart traditions of arbitrary rule, 2 his attitude can be imagined toward Hamilton's oft-avowed partialities — and Jefferson assumed, his intrigues — for British class-government with its eighteenth-century measure of corruption. In short, Hamilton took from recent years the lesson of the evils of lax government; whereas Jefferson clung to the other lesson, which crumbling colonial governments had illustrated, that govern- ments derived their strength (and the Declaration had proclaimed that they derived their just rights) from the will of the governed. Each built his system accordingly: the one on the basis of order, the other on individualism — which led Jefferson to liberty alike in religion and in politics. The two men and the fate of the parties they led are understandable only by regarding one as the leader of reaction, the other as in line with the American tenden- cies. The educated classes characteristically furnished Federal- ism with a remarkable body of alarmist leaders; and thus it happened that Jefferson, because, with only a few of his great contemporaries, he had a thorough trust and confidence in the people, became the idol of American democracy.*

As Hamilton was somewhat officious and very combative, and Jefferson,

although uncontentious, very suspicious and quite independent, both men holding inflexibly to opinions, cabinet harmony became impossible when the two secretaries had formed parties about them and their differences were carried into the

1 It was at this period of his life that Jefferson gave expression to some of the opinions for which he has been most severely criticized and ridiculed. For the Shays' rebellion he felt little abhor- rence, and wrote: " A little rebellion now and. then is a good thing ... an observation of this truth should render honest republican governors so mild in their punishment of rebellions as not to dis- courage them too much. It is a medicine necessary for the sound health of government " (Writings, Ford ed., iv. 362-363). Again, " Can history produce an instance of rebellion so honorably con- ducted ? . . . God forbid that we should ever be twenty years without such a rebellion. . . . What signify a few lives lost in a century or two ? The tree of liberty must be refreshed from time to time with the blood of patriots and tyrants. _ It is its natural manure " (Ibid. iv. 467). Again he says: " Societies exist under three forms — (1) without government, as among our Indians; (2) under governments wherein the will of every one has a just in- fluence. .-• (3) under governments of force. ... It is a problem not clear in my mind that the first condition is not the best." (Ibid, iv. 362.)

•He turned law students from Blackstone's toryism to Coke on Littleton; and he would not read Walter Scott, so strong was his aversion to that writer's predilection for class and feudalism.

newspapers; 3 and Washington abandoned perforce his idea " if parties did exist to reconcile them." Partly from discontent with a position in which he did not feel that he enjoyed the abso- lute confidence of the president, 4 and partly because of the embarrassed condition of his private affairs, Jefferson repeatedly sought to resign, and finally on the 31st of December 1793, with Washington's reluctant consent, gave up his portfolio and retired to his home at Monticello, near Charlottesville.

Here he remained improving his estate (having refused a foreign mission) until elected vice-president in 1796. Jefferson was never truly happy except in the country. He loved garden- ing, experimented enthusiastically in varieties and rotations of crops and kept meteorological tables with diligence. For eight years he tabulated with painful accuracy the earliest and latest appearance of thirty-seven vegetables in the Washington market. When abroad he sought out varieties of grasses, trees, rice and olives for American experiment, and after his return from France received yearly for twenty-three years, from his old friend the superintendent of the Jardin des plantes, a box of seeds, which he distributed to public and private gardens throughout the United States. Jefferson seems to have been the first dis-

coverer of an exact formula for the construction of mould-boards of least resistance for ploughs. He managed to make practical use of his calculus about his farms, and seems to have been re- markably apt in the practical application of mechanical principles. In the presidential election of 1796 John Adams, the Federalist candidate, received the largest number of electoral votes, and Jefferson, the Republican candidate, the next largest number, and under the law as it then existed the former became president and the latter vice-president. Jefferson re-entered public life with reluctance, though doubtless with keen enough interest and resolution. He had rightly measured the strength of his followers, and was waiting for the government to " drift into unison " with the republican sense of its constituents, predicting that President Adams would be " overborne " thereby. This prediction was speedily fulfilled. At first the reign of terror and the X. Y. Z. disclosures strengthened the Federalists, until these, mistaking the popular resentment against France for a reaction against democracy — an equivalence in their own minds — passed the alien and sedition laws. In answer to those odious measures Jefferson and Madison prepared and procured the passage of the Kentucky and Virginia resolutions. These resolutions later acquired extra- ordinary and pernicious prominence in the historical elaboration of the states'rights doctrine. It is, however, unquestionably true, that as a startling protest against measures " to silence," in Jefferson's words, " by force and not by reason the com plaints or criticisms, just or unjust, of our citizens against the conduct of our agents," they served, in this respect, a useful purpose; and as a counterblast against Hamiltonian principles of centralization they were probably, at that moment, very salutary; while even as pieces of constitutional interpretation it is to be remembered that they did not contemplate nullifica- tion by any single state, and, moreover, are not to be judged by constitutional principles established later by courts and war. The Federalist party had ruined itself, and it lost the presidential election of 1800. The Republican candidates, Jefferson and Aaron Burr (q.v.), receiving equal votes, it devolved upon the House of Representatives, in accordance with the system which then obtained, to make one of the two president, the other vice- president. Party feeling in America has probably never been more dangerously impassioned than in the three years preceding

- *Hamilton wrote for the papers himself ; Jefferson never did. A talented clerk in his department, however, Philip Freneau, set up an anti-administration paper. It was alleged that Jefferson ap- pointed him for the purpose, and encouraged him. Undoubtedly there was nothing in the charge. The Federalist outcry could only have been silenced by removal of Freneau, or by disclaimers or admonitions, which Jefferson did not think it incumbent upon himself — or, since he thought Freneau was doing good, desirable for him — to make.*

4 Contrary to the general belief that Hamilton dominated Washing- ton in the cabinet, there is the president's explicit statement that " there were as many instances " of his deciding against as in favour of the secretary of the treasury.

this election; discount as one will the contrary obsessions of men like Fisher Ames, Hamilton and Jefferson, the time was fateful. Unable to induce Burr to avow Federalist principles, influential Federalists, in defiance of the constitution, contem- plated the desperate alternative of preventing an election, and appointing an extra-constitutional (Federalist) president 'Pro tempore. Better counsels, however, prevailed; Hamilton used his influence in favour of Jefferson as against Burr, and Jefferson became president, entering upon his duties on the 4th of March 1801. Republicans who had affiliated with the Federalists at the time of the X. Y. Z. disclosures returned; very many of the Federalists themselves Jefferson placated and drew over. " Be- lieving," he wrote, " that (excepting the ardent monarchists) all our citizens agreed in ancient whig principles " — or, as he else- where expressed it, in " republican forms " — " I thought it advisable to define and declare them, and let them see the ground on which we can rally." This he did in his inaugural, which, though somewhat rhetorical, is a splendid and famous statement of democracy. 1 His conciliatory policy produced a mild schism in his own party, but proved eminently wise, and the state elections of 1801 fulfilled his prophecy of 1791 that the policy of the Federalists would leave them " all head and no body." In 1804 he was re-elected by 162 out of 176 votes.

Jefferson's administrations were distinguished by the simplicity that marked his conduct in private life. He eschewed the pomp and ceremonies, natural inheritances from English origins, that had been an innocent setting to the character of his two noble predecessors. His dress was of " plain cloth " on the day of his inauguration. Instead of driving to the Capitol in a coach and six, he walked without a guard or servant from his lodgings — or, as a rival tradition has it, he rode, and hitched his horse to a neighbouring fence — attended by a crowd of citizens. Instead of opening Congress with a speech to which a formal reply was expected, he sent in a written message by a private hand. He discontinued the practice of sending ministers abroad in public vessels. Between himself and the governors of states he recog- nized no difference in rank. He would not have his birthday celebrated by state balls. The weekly levee was practically abandoned. Even such titles as " Excellency," " Honourable," " Mr " were distasteful to him. It was formally agreed in cabinet meeting that " when brought together in society,

all are perfectly equal, whether foreign or domestic, titled or untitled, in or out of office." Thus diplomatic grades were ignored in social pre- cedence and foreign relations were seriously compromised by dinner-table complications. One minister who appeared in gold lace and dress sword for his first, and regularly appointed, official call on the president, was received — as he insisted with studied purpose — by Jefferson in negligent undress and slippers down at the heel. All this was in part premeditated system 2 — a part of Jefferson's purpose to republicanize the government and public opinion, which was the distinguishing feature of his administration ; but it was also simply the nature of the man. In the company he chose by preference, honesty and knowledge were his only tests. He knew absolutely no social distinctions in his willingness to perform services for the deserving. He held up to his daughter as an especial model the family of a poor but gifted mechanic as one wherein she would see " the best examples of rational living." " If it be possible," he said, " to be certainly conscic as of anything, I am conscious of feeling no difference between writing to the highest and lowest being on earth."

Jefferson's first administration was marked by a reduction of the army, navy, diplomatic establishment and, to the uttermost, of governmental expenses; some reduction of the civil service, accompanied by a large shifting of offices to Republicans; and, above all, by the Louisiana Purchase (q.v.), following which Meriwether Lewis and William Clark, sent by Jefferson, con-

1 See also Jefferson to E. Gerry, 26th of January 1799 (Writings, vii. 325), and to Dupont de Nemours (x. 23). Cf. Hamilton to J. Dayton, 1799 (Works, x. 329).

2 In 1786 he suggested to James Monroe that the society of friends he hoped to gather in Albemarle might, in sumptuary matters, " set a good example " to a country (i.e. Virginia) that " needed " it.

ducted their famous exploring expedition across the continent to the Pacific (see Lewis, Meriwether). Early in his term he carried out a policy he had urged upon the government when minister to France and when vice-president, by dispatching naval forces to coerce Tripoli into a decent respect for the trade of his country — the first in Christendom to gain honourable im- munity from tribute or piracy in the Mediterranean. The Louisiana Purchase, although the greatest " inconsistency " of his career, was also an illustration, in corresponding degree, of his essential practicality, and one of the greatest proofs of his statesmanship. It was the crowning achievement of his adminis- tration. It is often said that Jefferson established the " spoils system " by his changes in the civil service. He was the inno- vator, because for the first time there was opportunity for inno-

vation. But mere justice requires attention to the fact that incentive to that innovation, and excuse for it, were found in the absolute one-party monopoly maintained by the Federalists. Moreover, Jefferson's ideals were high; his reasons for changes were in general excellent; he at least so far resisted the great pressure for office — producing by his resistance dissatisfaction within his party — as not to have lowered, apparently, the per- sonnel of the service; and there were no such blots on his adminis- tration as President Adams's " midnight judges." Nevertheless, his record here was not clear of blots, showing a few regrettable inconsistencies. 3 Among important but secondary measures of his second administration were the extinguishment of Indian titles, and promotion of Indian emigration to lands beyond the Mississippi; reorganization of the militia; fortification of the seaports; reduction of the public debt; and a simultaneous reduction of taxes. But his second term derives most of its historical interest from the unsuccessful efforts to convict Aaron Burr of treasonable acts in the south-west, and from the efforts made to maintain, without war, the rights of neutrals on the high seas. In his diplomacy with Napoleon and Great Britain Jefferson betrayed a painful incorrigibility of optimism. A national policy of " growling before fighting " — later practised successfully enough by the United States — was not then pos- sible; and one writer has very justly said that what chiefly affects one in the whole matter is the pathos of it — " a philo- sopher and a friend of peace struggling with a despot of super- human genius, and a Tory cabinet of superhuman insolence and stolidity " (Trent). It is possible to regard the embargo policy dispassionately as an interesting illustration of Jefferson's love of peace. The idea — a very old one with Jefferson — was not entirely original; in essence it received other attempted applications in the Napoleonic period — and especially in the continental blockade. 'Jefferson's statesmanship had the limita- tions of an agrarian outlook. The extreme to which he carried his advocacy of diplomatic isolation, his opposition to the creation of an adequate navy, 4 his estimate of cities as " sores upon the body politic," his prejudice against manufactures, trust in farmers, and political distrust of the artisan class, all reflect them.

When, on the 4th of March 1809, Jefferson retired from the presidency, he had been almost continuously in the public service for forty years. He refused to be re-elected for a third time, though requested by the legislatures of five states to be a candidate; and thus, with Washington's prior example, helped

s See C. R. Fish, The Civil Service and the Patronage (Harvard Historical Studies, New York, 1905), ch. 2.

4 Jefferson's dislike of a navy was due to his desire for an economi- cal administration and for peace. Shortly after his inauguration he expressed a

desire to lay up the larger men of war in the eastern branch of the Potomac, where they would require only " one set of plunderers to take care of them." To Thomas Paine he wrote in 1807: " I believe that gunboats are the only water defence which can be useful to us and protect us from the ruinous folly of a navy." (Works, Ford ed., ix. 137.) The gunboats desired by Jefferson were small, cheap craft equipped with one or two guns and kept on shore under sheds until actually needed, when they were to be launched and manned by a sort of naval militia. A large number of these boats were constructed and they afforded some protection to coasting vessels against privateers, but in bad weather, or when employed against a frigate, they were worse than useless, and Jefferson's " gunboat system " was admittedly a failure.

to establish a precedent deemed by him to be of great impor- tance under a democratic government. His influence seemed scarcely lessened in his retirement. Madison and Monroe, his immediate successors — neighbours and devoted friends, whom he had advised in their early education and led in their maturer years — consulted him on all great questions, and there was no break of principles in the twenty-four years of the " Jeffersonian system." Jefferson was one of the greatest political managers his country has known. He had a quick eye for character, was genuinely amiable, uncontentious, tactful, masterful; and it may be assumed from his success that he was wary or shrewd to a degree. It is true, moreover, that, unless tested by a few unchanging principles, his acts were often strikingly inconsis- tent; and even when so tested, not infrequently remain so in appearance. Full explanations do not remove from some impor- tant transactions in his political life an impression of indirect- ness. But reasonable judgment must find very unjust the stigma of duplicity put upon him by the Federalists. Measured by the records of other men equally successful as political leaders, there seems little of this nature to criticize severely. Jefferson had the full courage of his convictions. Extreme as were his principles, his pertinacity in adhering to them and his indepen- dence of expression were quite as extreme. There were philo- sophic and philanthropic elements in his political faith which will always lead some to class him as a visionary and fanatic; but although he certainly indulged at times in dreams at which one may still smile, he was not, properly speaking, a visionary; nor can he with justice be stigmatized as a fanatic. He felt fervently, was not afraid to risk all on the conclusions to which his heart and his mind led him, declared himself with openness and energy; and he spoke and even wrote his conclusions, how ever bold or abstract, without troubling to detail his reasoning or clip his off-hand speculations.

Certain it is that there is much in his utterances for a less robust democracy than his own to cavil at. 1 Soar, however, as he might, he was essentially not a doctrinaire, but an empiricist; his mind was objective. Though he remained, to the end, firm in his belief that there had been an active monarchist party, 2 this obsession did not carry him out of touch with the realities of human nature and of his time. He built with surety on the colonial past, and had a better reasoned view of the actual future than had any of his contemporaries.

Events soon appraised the ultra-Federalist judgment of Ameri- can democracy, so tersely expressed by Fisher Ames as " like death . . . only the dismal passport to a moie dismal hereafter" ; and, with it, appraised Jefferson's word in his first inaugural for those who, "in the full tide of successful experiment," were ready to abandon a government that had so far kept them " free and firm, on the visionary fear that it might by possibility lack energy to preserve itself." Time soon tested, too, his principle that that government must prove the strongest on earth " where every man . . . would meet invasions of the public order as his own personal concern." He summed up as follows the difference between himself and the Hamiltonian group: " One feared most the ignorance of the people; the other the selfishness of rulers independent of them." Jefferson, in short, had unlimited faith in the honesty of the people; a large faith in their common sense; believed that all is to be won

1 See e.g. his letters in 1787 on the Shays' rebellion, and his specula- tions on the doctrine that one generation may not bind another by paper documents. With the latter may be compared present- day movements like the initiative and referendum, and not a few discussions of national debts. Jefferson's distrust of governments was nothing exceptional for a consistent individualist.

2 In his last years he carefully sifted and revised his contemporary notes evidencing, as he believed, the existence of such a party, and they remain as his Ana (chiefly Hamiltoniana). The only just judgment of these notes is to be obtained by looking at them, and by testing his suspicions with the letters of Hamilton, Ames, Oliver Wolcott, Theodore Sedgwick, George Cabot and the other Hamiltonians. Such a comparison measures also the relative judgment, terpper and charity of these writers and Jefferson. It must still ren.uin true, however, that Jefferson's Ana present him in a far from engaging light.

by appealing to the reason of voters; that by education their ignorance can be eliminated; that human nature is indefinitely perfectible; that majorities rule, therefore, not only by virtue of force (which was Locke's ultimate justification of them), but of right. 3 His importance as a maker of modern

America can scarcely be overstated, for the ideas he advocated have become the very foundations of American republicanism. His administration ended the possibility, probability or certainty — measure it as one will — of the development of Federalism in the direction of class government ; and the party he formed, inspired by the creed he gave it, fixed the democratic future of the nation. And by his own labours he had vindicated his faith in the experiment of self-government.

Jefferson's last years were devoted to the establishment of the university of Virginia at Charlottesville, near his home. He planned the buildings, gathered its faculty — mainly from abroad — and shaped its organization. Practically all the great ideas of aim, administration and curriculum that dominated American universities at the end of the 19th century were antici- pated by him. He hoped that the university might be a domi- nant influence in national culture, but circumstances crippled it. His educational plans had been maturing in his mind since 1776. His financial affairs in these last years gave him grave concern. His fine library of over 10,000 volumes was purchased at a low- price by Congress in 1815, and a national contribution ($16,500) just before his death enabled him to die in peace. Though not personally extravagant, his salary, and the small income from his large estates, never sufficed to meet his generous maintenance of his representative position; and after his retirement from public life the numerous visitors to Monticello consumed the remnants of his property. He died on the 4th of July 1826, the fiftieth anniversary of the Declaration of Independence, on the same day as John Adams. He chose for his tomb the epitaph: "Here was buried Thomas Jefferson, author of the Declaration of American Independence, of the statute of Virginia for reli- gious freedom, and father of the university of Virginia."

Jefferson was about 6 ft. in height, large-boned, slim, erect and sinewy. He had angular features, a very ruddy complexion, sandy hair, and hazel-flecked, grey eyes. Age lessened the unattractive- ness of his exterior. In later years he was negligent in dress and loose in bearing. There was grace, nevertheless, in his manners; and his frank and earnest address, his quick sympathy (yet he seemed cold to strangers), his vivacious, desultory, informing talk, gave him an engaging charm. Beneath a quiet surface he was fairly aglow with intense convictions and a very emotional temperament. Yet he seems to have acted habitually, in great and little things, on system. His mind, no less trenchant and subtle than Hamilton's, was the most impressible, the most receptive, mind of his time in America. The range of his interests is remarkable. For many years he was president of the American philosophical society. Though it is a biographical tradition that he lacked wit, Moliere and Don Quixote seem to have been his favourites; and though the utilitarian wholly crowds romanticism out of his writings, he had enough of that quality in youth to prepare to learn Gaelic

in order to translate Ossian, and sent to Macpherson for the originals ! His interest in art was evidently intellectual. He was singularly sweet-tempered, and shrank from the impassioned political bitterness that raged about him ; bore with relative equanimity a flood of coarse and malignant abuse of his motives, morals, religion, 4 personal honesty and decency; cherished very few personal animosities; and better than any of his great antagonists cleared political opposition of ill- blooded personality. In short, his kindness of heart rose above all social, religious or political differences, and nothing destroyed his confidence in men and his sanguine views of life.

Authorities. — See the editions of Jefferson's Writings by H. A. Washington (9 vols., New York, 1853-1854), and — the best — by Paul

3 " Jefferson, in 1789, wrote some such stuff about the will o(majorities, as a New Englander would lose his rank among men of sense to avow."— Fisher Ames (Jan. 1800).

4 He was classed as a " French infidel " and atheist. His attitude toward religion was in fact deeply reverent and sincere, but he insisted that religion was purely an individual matter, " evidenced, as concerns the world by each one's daily life," and demanded absolute freedom of private judgment. He looked on Unitarianism with much sympathy and desired its growth. " I am a Christian," he wrote in 1823, " in the only sense in which he (Jesus) wished any one to be ; sincerely attached to his doctrines in preference to all others; ascribing to himself every human excellence, and believing he never claimed any other."

Leicester Ford (10 vols., New York, 1892-1899) ; letters in Massachusetts Historical Society, Collections, series 7, vol. i.; S. E. Forman, The Letters and Writings of Thomas Jefferson, including all his Important Utterances on Public Questions (1900); J. P. Foley, The Jefferson Cyclopaedia (New York, 1900); the Memoir, Correspondence, &c, by T.J. Randolph (4 vols., Charlottesville, Va., 1829); biographies by James Schouler (" Makers of America Series," New York, 1893); John T. Morse (" American Statesmen Series," Boston, 1883;, George Tucker (2 vols., Philadelphia, 1837); James Parton (Boston, 1874) ; and especially that by Henry S. Randall (3 vols., New York, 1853), a monumental work, although marred by some special pleading, and sharing Jefferson's implacable opinions of the " Mono- crats." See also Henry Adams, History of the United States 1801-1817, vols. 1-4 (New York, 1889-1890); Herbert B. Adams, Thomas Jefferson and the University of Virginia (U. S.

bureau of education, Washington, 1888); Sarah N. Randolph, Domestic Life of Thomas Jefferson (New York, 1871); and an illuminating appreciation by W. P. Trent, in his Southern Statesmen of the Old Regime (New York, 1897); that by John Fiske, Essays, Historical and Literary, vol. i. (New York, 1902), has slighter merits. (F. S. P.)

JEFFERSON CITY (legally and officially the City'of Jefferson) , the capital of Missouri, U.S.A., and the county-seat of Cole county, on the Missouri river, near the geographical centre of the state, about 125 m. W. of St Louis. Pop. (1890), 6742; (1900), 9664, of whom 786 were foreign-born and 1822 were negroes; (iqio census), 11,850. It is served by the Missouri Pacific, the Chicago & Alton, and the Missouri, Kansas & Texas railways. Its site is partly in the bottom-lands of the river and partly on the steep banks at an elevation of about 600 ft. above the sea. A steel bridge spans the river. The state capitol, an imposing structure built on a bluff above the river, was built in 1838-1842 and enlarged in 1887-1888; it was first occupied in 1840 by the legislature, which previously had met (after 1837) in the county court house. Other prominent buildings are the United States court house and post office, the state supreme court house, the county court house, the state penitentiary, the state armoury and the executive mansion. The penitentiary is to a large extent self-supporting; in 1903-1904 the earnings were $3493.80 in excess of the costs, but in 1904-1906 the costs exceeded the earnings by $9044. Employment is furnished for the convicts on the pentitentiary premises by incorporated companies. The state law library here is one of the best of the kind in the country, and the city has a public library. In the city is Lincoln Institute, a school for negroes, founded in 1866 by two regiments of negro infantry upon their discharge from the United States army, opened in 1868, taken over by the state in 1879, and having sub-normal, normal, college, industrial and agricultural courses. Coal and limestone are found near the city. In 1905 the total value of the factory product was $3,926,632, an increase of 28-2% since 1900. The original constitution of Missouri prescribed that the capital should be on the Missouri river within 40 m. of the mouth of the Osage, and a commission selected in 1821 the site of Jefferson City, on which a town was laid out in 1822, the name being adopted in honour of Thomas Jefferson. The legislature first met here in 1826; Jefferson City became the county-seat in 1828, and in 1839 was first chartered as a city. The constitu- tional conventions of 1845 and 1875, and the state convention which issued the call for the National Liberal Republican conven- tion at Cincinnati in 1872, met here, and so for some of its sessions did the state convention of 1861-1863. In June 1861 Jefferson City was occupied by Union forces, and in September- October 1864 it was threatened by Confederate troops under General Sterling Price.

JEFFERSONVILLE, a city and the county-seat of Clark county, Indiana,

U.S.A., situated on the N. bank of the Ohio river, opposite Louisville, Kentucky, with which it is connected by several bridges. Pop. (1890), 10,666; (1900), 10,774, of whom 1818 were of negro descent and 615 were foreign-bom; (1910 census), 10,412. It is served by the Baltimore & Ohio South-western, the Cleveland, Cincinnati, Chicago & St Louis, and the Pittsburg, Cincinnati, Chicago & St Louis railways, and by three inter-urban electric lines. It is attractively situated on bluffs above the river, which at this point has a descent

(known as the falls of the Ohio) of 26 ft. in 2 m. This furnishes

good water power for manufacturing purposes both at Jefferson- ville and at Louisville. The total value of the factory product in 1905 was $4,526,443, an increase of 20 % since 1900. The Indiana reformatory (formerly the Southern Indiana peniten- tiary) and a large supply depot of the United States army are at Jeffersonville. General George Rogers Clark started (June 24, 1778) on his expedition against Kaskaskia and Vincennes from Corn Island (now completely washed away) opposite what is now Jeffersonville. In 1786 the United States government established Fort Finney (built by Captain Walter Finney), after- wards re-named Fort Steuben, on the site of the present city; but the fort was abandoned in 1791, and the actual beginning of Jeffersonville was in 1802, when a part of the Clark grant (the site of the present city) was transferred by its original owner, Lieut. Isaac Bowman, to three trustees, under whose direction a town was laid out. Jeffersonville was incorporated as a town in, 1815, and was chartered as a city in 1839.

JEFFREY, FRANCIS JEFFREY, Lord (i 773-1850), Scottish judge and literary critic, son of a depute-clerk in the Court of Session, was born at Edinburgh on the 23rd of October 1773. After attending the high school for six years, he studied at the university of Glasgow from 1787 to May 1789, and at Queen's College, Oxford, from September 1791 to June 1792. He had begun the study of law at Edinburgh before going to Oxford, and now resumed his studies there. He became a member of the speculative society, where he measured himself in debate with Scott, Brougham, Francis Horner, the marquess of Lans- downe, Lord Kinnaird and others. He was admitted to the Scotch bar in December 1794, but, having abandoned the Tory principles in which he had been educated, he found that his Whig politics seriously prejudiced his legal prospects. In conse- quence of his lack of success at the bar he went to London in 1798 to try his fortune as a journalist, but without success; he also made more than one vain attempt to obtain an office which would have secured him the advantage of a small but fixed salary. His marriage with Catherine Wilson in 1801 made the question of a settled income even more pressing. A project for a new review was brought forward by Sydney Smith in Jeffrey's flat in the presence of H.

P. Brougham (afterwards Lord Brougham), Francis Horner and others; and the scheme resulted in the appearance on the 10th of October 1802 of the first number of the Edinburgh Review. At the outset the Review was not under the charge of any special editor. The first three numbers were, however, practically edited by Sydney Smith, and on his leaving for England the work devolved chiefly on Jeffrey, who, by an arrangement with Constable, the publisher, was eventually appointed editor at a fixed salary. Most of those associated in the undertaking were Whigs; but, although the general bias of the Review was towards social and political reforms, it was at first so little of a party organ that for a time it numbered Sir Walter Scott among its contributors; and no distinct emphasis was given to its political leanings until the publication in 1808 of an article by Jeffrey himself on the work of Don Pedro Cevallos on the French Usurpation of Spain. This article expressed despair of the success of the British arms in Spain, and Scott at once withdrew his subscription, the Quarterly being soon after- wards started in opposition. According to Lord Cockburn the effect ' of the first number of the Edinburgh Review was " elec- trical." The English reviews were at that time practically publishers' organs, the articles in which were written by hack- writers instructed to praise or blame according to the publishers' interests. Few men of any standing consented to write for them. The Edinburgh Review, on the other hand, enlisted a brilliant and independent staff of contributors, guided by the editor, not the publisher. They received sixteen guineas a sheet (sixteen printed pages), increased subsequently to twenty- five guineas in many cases, instead of the two guineas which formed the ordinary London reviewer's fee. Further, the review was not limited to literary criticism. It constituted itself the accredited organ of moderate Whig public opinion. The particu- lar work which provided the starting-point of an article was in many cases merely the occasion for the exposition, always

brilliant and incisive, of the author's views on politics, social subjects, ethics or literature. These general principles and the novelty of the method ensured the success of the undertaking even after the original circle of exceptionally able men who founded it had been dispersed. It had a circulation, great for those days, of 12,000 copies. The period of Jeffrey's editorship extended to about twenty-six years, ceasing with the ninety-eighth number, published in June 1829, when he resigned in favour of Macvey Napier.

Jeffrey's own contributions, according to a list which has the sanction of his authority, numbered two hundred, all except six being written before his

resignation of the editorship. Jeffrey wrote with great rapidity, at odd moments of leisure and with little special preparation. Great fluency and ease of diction, considerable warmth of imagination and moral sentiment, and a sharp eye to discover any oddity of style or violation of the accepted canons of good taste, made his criticisms pungent and effective. But the essential narrowness and timidity of his general outlook prevented him from detecting and estimating latent forces, either in politics or in matters strictly intellectual and moral; and this lack of understanding and sympathy ac- counts for his distrust and dislike of the passion and fancy of Shelley and Keats, and for his praise of the half-hearted and ele- gant romanticism of Rogers and Campbell. (For his treatment of the lake poets see Wordsworth, William.)

A criticism in the fifteenth number of the Review on the morality of Moore's poems led in 1806 to a duel between the two authors at Chalk Farm. The proceedings were stopped by the police, and Jeffrey's pistol was found to contain no bullet. The affair led to a warm friendship, however, and Moore contributed to the Review, while Jeffrey made ample amends in a later article on Lalla Rookh (1817).

Jeffrey's wife had died in 1805, and in 1810 he became ac- quainted with Charlotte, daughter of Charles Wilkes of New York, and great-niece of John Wilkes. When she returned to America, Jeffrey followed her, and they were married in 1813. Before returning to England they visited several of the chief American cities, and his experience strengthened Jeffrey in the conciliatory policy he had before advocated towards the States. Notwithstanding the increasing success of the Review, Jeffrey always continued to look to the bar as the chief field of his ambi- tion. As a matter of fact, his literary reputation helped his professional advancement. His practice extended rapidly in the civil and criminal courts, and he regularly appeared before the general assembly of the Church of Scotland, where his work, though not financially profitable, increased his reputation. As an advocate his sharpness and rapidity of insight gave him a for- midable advantage in the detection of the weaknesses of a witness and the vulnerable points of his opponent's case, while he grouped his own arguments with an admirable eye to effect, especially excelling in eloquent closing appeals to a jury. Jeffrey was twice, in 1820 and 1822, elected lord rector of the university of Glasgow. In 1 8 29 he was chosen dean of the faculty of advocates. On the return of the Whigs to power in 1830 he became lord advocate, and entered parliament as member for the Perth burghs. He was unseated, and afterwards returned for Malton, a borough in the interest of Lord Fitzwilliam. After the passing of the Scottish Reform Bill, which he introduced in parliament, he was returned for Edinburgh in December 1832. His parlia- mentary career, which, though not brilliantly successful, had won him high general esteem, was terminated by his

elevation to the judicial bench as Lord Jeffrey in May 1834. In 1842 he was moved to the first division of the Court of Session. On the disruption of the Scottish Church he took the side of the seceders, giving a judicial opinion in their favour, afterwards reversed by the house of lords. He died at Edinburgh on the 26th of January

1850.

Some of his contributions to the Edinburgh. Review appeared in four volumes in 1844 and 1845. This selection includes the essay on " Beauty " contributed to the Ency. Brit. The Life of Lord Jeffrey, with a Selection from his Correspondence, by Lord Cockburn, appeared in 1852 in 2 vols. See also the Selected Correspondence

of Macvey Napier (1877) ; the sketch of Jeffrey in Carlyle's Reminis- cences, vol. ii. (1881); and an essay by Lewis E. Gates in Three Studies in Literature (New York, 1899).

JEFFREYS, GEORGE JEFFREYS, ist Baron (1648-1689), lord chancellor of England, son of John Jeffreys, a Welsh country gentleman, was born at Acton Park, his father's seat in Denbigh- shire, in 1648. His family, though not wealthy, was of good social standing and repute in Wales; his mother, a daughter of Sir Thomas Ireland of Bewsey, Lancashire, was " a very pious good woman." He was educated at Shrewsbury, St Paul's and Westminster schools, at the last of which he was a pupil of Busby, and at Trinity College, Cambridge; but he left the university without taking a degree, and entered the Inner Temple as a student in May 1663. From his childhood Jeffreys displayed exceptional talent, but on coming to London he occupied himself more with the pleasures of conviviality than with serious study of the law. Though he never appears to have fallen into the licentious immorality prevalent at that period, he early became addicted to hard drinking and boisterous company. But as the records of his early years, and indeed of his whole life, are derived almost exclusively from vehemently hostile sources, the numerous anecdotes of his depravity cannot be accepted without a large measure of scepticism. He was a handsome, witty and attractive boon-companion, and in the taverns of the city he made friends among attorneys with practice in the criminal courts. Thus assisted he rose so rapidly in his profession that within three years of his call to the bar in 1668, he was elected common serjeant of the city of London. Such advancement, however, was not to be attained even in the reign of Charles II. solely by the aid of disreputable friend- ships. Jeffreys had remarkable aptitude for the profession of an advocate — quick intelligence, caustic humour, copious elo- quence. His powers of cross-examination were masterly; and if he was insufficiently grounded in legal principles to become a profound lawyer, nothing but greater application

was needed in the opinion of so hostile a critic as Lord Campbell, to have made him the rival of Nottingham and Hale. Jeffreys could count on the influence of respectable men of position in the city, such as Sir Robert Clayton and his own namesake Alderman Jeffreys; and he also enjoyed the personal friendship of the virtuous Sir Matthew Hale. In 1667 Jeffreys had married in circum- stances which, if improvident, were creditable to his generosity and sense of honour; and his domestic life, so far as is known, was free from the scandal common among his contemporaries. While holding the judicial office of common serjeant, he pursued his practice at the bar. With a view to further preferment he now sought to ingratiate himself with the court party, to which he obtained an introduction possibly through William Chiffinch, the notorious keeper of the king's closet. He at once attached himself to the king's mistress, the duchess of Ports- mouth; and as early as 1672 he was employed in confidential business by the court. His influence in the city of London, where opposition to the government of Charles II. was now be- coming pronounced, enabled Jeffreys to make himself useful to Danby. In September 1677 he received a knighthood, and his growing favour with the court was further marked by his appointment as solicitor-general to James, duke of York; while the city showed its continued confidence in him by electing him to the post of recorder in October 1678.

In the previous month Titus Oates had made his first revela- tions of the alleged popish plot, and from this time forward Jeffreys was prominently identified, either as advocate or judge, with the memorable state trials by which the political conflict between the Crown and the people was waged during the remainder of the 17th century. The popish plot, followed by the growing agitation for the exclusion of the duke of York from the succession, widened the breach between the city and the court. Jeffreys threw in his lot with the latter, display- ing his zeal by initiating the movement of the "abhorrers" (q.v.) against the " petitioners " who were giving voice to the popular demand for the summoning of parliament. He was rewarded with the coveted office of chief justice of Chester on the 30th

of April 1680; but when parliament met in October the House of Commons passed a hostile resolution which induced him to resign his recordership, a piece of pusillanimity that drew from the king the remark that Jeffreys was " not parliament-proof." Jeffreys nevertheless received from the city aldermen a substan- tial token of appreciation for his past services. In 1681 he was created a baronet. In June 1683 the first of the Rye House con- spirators were brought to trial. Jeffreys was briefed for the crown in

the prosecution of Lord William Howard; and, hav- ing been raised to the bench as lord chief justice of the king's bench in September, he presided at the trials of Algernon Sidney in November 1683 and of Sir Thomas Armstrong in the following June. In the autumn of 1684 Jeffreys, who had been active in procuring the surrender of municipal charters to the crown, was called to the cabinet, having previously been sworn of the privy council. In May 1685 he had the satisfaction of passing sentence on Titus Oates for perjury in the plot trials; and about the same time James II. rewarded his zeal with a peerage as Baron Jeffreys of Wem, an honour never before conferred on a chief justice during his tenure of office. Jeffreys had for some time been suffering from stone, which aggravated the irrita- bility of his naturally violent temper; and the malady probably was in some degree the cause of the unmeasured fury he dis- played at the trial of Richard Baxter (q.v.) for seditious libel — if the unofficial ex parte report of the trial, which alone exists, is to be accepted as trustworthy.

In August 1685 Jeffreys opened at Winchester the commission known in history as the " bloody assizes," his conduct of which has branded his name with indelible infamy. The number of persons sentenced to death at these assizes for complicity in the duke of Monmouth's insurrection is uncertain. The official return of those actually executed was 320; many hundreds more were transported and sold into slavery in the West Indies. In all probability the great majority of those condemned were in fact concerned in the rising, but the trials were in many cases a mockery of the administration of justice. Numbers were cajoled into pleading guilty; the case for the prisoners seldom obtained a hearing. The merciless severity of the chief justice did not however exceed the wishes of James II.; for on his return to London Jeffreys received from the king the great seal with the title of lord chancellor. For the next two years he was a strenuous upholder of prerogative, though he was less abjectly pliant than has sometimes been represented. There is no reason to doubt the sincerity of his attachment to the Church of England; for although the king's favour was capricious. Jeffreys never took the easy and certain path to secure it that lay through apostasy; and he even withstood James on occasion, when the latter pushed his Catholic zeal to extremes. Though it is true that he accepted the presidency of the ecclesiastical commission, Burnet's statement that it was Jeffreys who suggested that institution to James is probably incorrect; and he was so far from having instigated the prosecution of the seven bishops in 1688, as has been frequently alleged, that he disapproved of the proceedings and rejoiced secretly at the acquittal. But while he watched with misgiving the king's preferment of Roman Catholics, he made himself the masterful instrument of un- constitutional prerogative in coercing the authorities of Cam- bridge University, who in 1687 refused to confer degrees on a Benedictine monk, and the fellows of Magdalen College,

Oxford, who declined to elect as their president a disreputable nominee of the king.

Being thus conspicuously identified with the most tyrannical measures of James II., Jeffreys found himself in a desperate plight when on the nth of December 1688 the king fled from the country on the approach to London of William of Orange. The lord chancellor attempted to escape like his master; but in spite of his disguise as a common seaman he was recognized in a tavern at Wapping — possibly, as Roger North relates, by an attorney whom Jeffreys had terrified on some occasion in the court of chancery — and was arrested and conveyed to the Tower. The malady from which he had long suffered had recently made fatal progress, and he died in the Tower on

the 1 8th of April 1689. He was succeeded in the peerage by his son, John (2nd Baron Jeffreys of Wem), who died without male issue in 1702, when the title became extinct.

It is impossible to determine precisely with what justice tradition has made the name of " Judge Jeffreys " a byword of infamy. The Revolution, which brought about his fall, handed over his reputation at the same time to the mercy of his bitterest enemies. They alone have recorded his actions and appraised his motives and character. Even the adherents of the deposed dynasty had no interest in finding excuse for one who served as a convenient scapegoat for the offences of his master. For at least half a century after his death no apology for Lord Jeffreys would have obtained a hearing; and none was attempted. With the exception therefore of what is to be gathered from the reports of the state trials, all knowledge of his conduct rests on testimony tainted by undisguised hostility. Innumerable scurrilous lampoons vilifying the hated instrument of James's tyranny, but without a pretence of historic value, flooded the country at the Revolution; and these, while they fanned the undiscriminating hatred of contemporaries who remembered the judge's severities, and perpetuated that hatred in tiadition, have not been sufficiently discounted even by modern historians like Macaulay and Lord Campbell. The name of Jeffreys has therefore been handed down as that of a coarse, ignorant, dissolute, foul-mouthed, inhuman bully, who prostituted the seat of justice. That there was sufficient ground for the execra- tion in which his memory was long held is not to be gainsaid. But the portrait has nevertheless been blackened overmuch. An occasional significant admission in his favour may be gleaned even from the writings of his enemies. Thus Roger North declares that "in matters indifferent," i.e. where politics were not concerned, Jeffreys became the seat of justice better than any other that author had seen in his place. Sir J. Jekyll, master of the rolls, told Speaker Onslow that Jeffreys " had great parts and made a great chancellor in the business of his court. In mere

private matters he was thought an able and upright judge wherever he sat." His keen sense of humour, allied with a spirit of inveterate mockery and an exuberant command of pungent eloquence, led him to rail and storm at prisoners and witnesses in grossly unseemly fashion. But in this he did not greatly surpass most of his contemporaries on the judicial bench, and it was a failing from which even the dignified and virtuous Hale was not altogether exempt. The intemperance of Jeffreys which shocked North, certainly did not exceed that of Saunders; in violence he was rivalled by Scroggs; though accused of political apostasy, he was not a shameless renegade like Williams; and there is no evidence that in pecuniary matters he was personally venal, or that in licentiousness he followed the example set by Charles II. and most of his courtiers. Some of his actions that have incurred the sternest reprobation of posterity were otherwise estimated by the best of his contemporaries. His trial of Algernon Sidney, described by Macaulay and Lord Campbell as one of the most heinous of his iniquities, was warmly commended by Dr William Lloyd, who was soon afterwards to become a popular idol as one of the illustrious seven bishops (see letter from the bishop of St Asaph in H. B. Irving's Life of Judge Jeffreys, p. 184). Nor was the habitual illegality of his procedure on the bench so unquestionable as many writers have assumed. Sir James Stephen inclined to the opinion that no actual abuse of law tainted the trials of the Rye House conspira- tors, or that of Alice Lisle, the most prominent victim of the " bloody assizes." The conduct of the judges in Russell's trial was, he thinks, "moderate and fair in general"; and the trial of Sidney " much resembled that of Russell." The same high authority pronounces that the trial of Lord Pelamere in the House of Lords was conducted by Jeffreys " with propriety and dignity." And if Jeffreys judged political offenders with cruel severity, he also crushed some glaring abuses; conspicuous examples of which were the frauds of attorneys who infested Westminster Hall, and the systematic kidnapping practised by the municipal authorities of Bristol. Moreover, if any value is to be attached to the evidence of physiognomy, the

traditional estimate of the character of Jeffreys obtains no con- firmation from the refinement of his features and expression as depicted in Kneller's portrait in the National Portrait Gallery of London. But even though the popular notion requires to be thus modified in certain respects, it remains incontestable that Jeffreys was probably on the whole the worst example of a period when the administration of justice in England had sunk to the lowest degradation, and the judicial bench had become the too willing tool of an unconstitutional and unscrupulous executive.

Bibliography. — The chief contemporary authorities for the life of Jeffreys are Bishop Burnet's History of my own Time (1724), and see especially the edition " with notes by the Earls of Dartmouth and Hardwick Speaker Onslow and Dean Swift " (Oxford Univ. Press, 1833) ; Roger North's Life of the Right Hon. Francis North, Baron of Guildford (1808) and Autobiography (ed. by Augustus Jesscpp, 1887) ; Ellis Correspondence, Verney Papers (Hist. MSS. Comm.), Hatton Correspondence (Camden Soc. pub.) ; the earl of Ailesbury's Memoirs; Evelyn's Diary. The only trustworthy information as to the judicial conduct and capacity of Jeffreys is to be found in the reports of the Stale Trials, vols, vii.xii.; and cf. Sir J. F. Stephen's History of the Criminal Law of England (1883). For details of the " bloody assizes," see Harl. MSS., 4689; George Roberts, The Life, Progresses and Rebellion of James Duke of Monmouth, vol. ii. (1844); also many pamphlets, lampoons, &c, in the British Museum, as to which see the article on " Sources of History for Monmouth's Rebellion and the Bloody Assizes," by A. L. Humphreys, in Proceedings of the Somerset shire Archaeological and Natural Hist. Soc. (1892). Later accounts are by H. W. Woolrych, Memoirs of the Life of Judge Jeffreys (1827) ; Lord Campbell, The Lives of the Lord Chancellors (1845), 1st series, vol. iii. ; E. Foss, The Judges of England (1864), vol. vii.; Henry Roscoe, Lives of Eminent British Lawyers (1830) ; Lord Macaulay, History of England (1848; and many subsequent editions). Most of these works, and especially those by Macaulay and Campbell, are uncritical in their hostility to Jeffreys, and are based for the most part on untrust- worthy authorities. The best modern work on the subject, though unduly favourable to Jeffreys, is H. B. Irving's Life of Judge Jeffreys (1898), the appendix to which contains a full bibliography.

(R. J. M.)

JEHOIACHIN (Heb. " Yah[weh] establisheth "), in the Bible, son of Jehoiakim and king of Judah (2 Kings xxiv. 8 sqq. ; 2 Chron, xxxvi. 9 seq.). He came to the throne at the age of eighteen in the midst of the Chaldean invasion of Judah, and is said to have reigned three months. He was compelled to sur- render to Nebuchadrezzar and was carried off to Babylon (597 B.C.). This was the First Captivity, and from it Ezekiel (one of the exiles) dates his prophecies. Eight thousand people of the better class (including artisans, &c.) were removed, the Temple was partially despoiled (see Jer. xxvii. 18-20; xxiii.v. 3 seq.), 1 and Jehoiachin's uncle Mattaniah (son of Josiah) was appointed king. Jehoiachin's fate is outlined in Jer. xxii. 20-30 (cf. xxvii. 20). Nearly forty years later, Nebuchad- rezzar II. died (562 B.C.) and Evil-Merodach (Amil-Marduk) his, successor released the unfortunate captive and gave him pre- cedence over the other subjugated kings who were kept prisoners in Babylon. With this gleam of hope for the unhappy Judaeans both the book of Kings and the prophecies

of Jeremiah conclude (2 Kings xxv. 27-30; Jer. Iii. 31-34).

See, further, Jeremiah (especially chaps, xxiv., xxvii. seq.), and Jews, § 17.

JEHOIAKIM (Heb. " Yah[weh] raiseth up "), in the Bible, son of Josiah (q.v.) and king of Judah (2 Kings xxiii. 34-xxiv. 6). On the defeat of Josiah at Me,giddo his younger brother Jehoahaz (or Shallum) was chosen by the Judaeans, but the Egyptian conquerer Necho summoned him to his headquarters at Riblah (south of Hamath on the Orontes) and removed him to Egypt, appointing in his stead Eliakim, whose name (" El[God] raiseth up ") was changed to its better-known synonym, Jehoiakim. For a time Jehoiakim remained under the protection of Necho and paid heavy tribute; but with the rise of the new Chaldean Empire under Nebuchadrezzar II., and the overthrow of Egypt at the battle of Carchemish (605 B.C.) a vital change occurred. After three years of allegiance the king revolted. Invasions follcwed~by Chaldeans, Syrians,_ Moabites and Ammonites, per-

1 2 Kings xxiv. 13 seq. gives other numbers and a view of the disaster which is more suitable for the Second Captivity. (See

ZEDEKiAH.)

haps the advance troops despatched by the Babylonian king; the power of Egypt was broken and the whole land came into the hands of Nebuchadrezzar. It was at the close of Jehoiakim's reign, apparently just before his death, that the enemy appeared at the gates of Jerusalem, and although he himself " slept with his fathers " his young son was destined to see the first captivity of the land of Judah (597 B.C.). (See Jehoiachin.)

Which " three years " (2 Kings xxiv. 1) are intended is disputed; it is uncertain whether Judah suffered in 605 B.C. (Berossus in Jos. c. Ap. i. 19) or was left unharmed (Jos. Ant. x. 6. 1); perhaps Nebuchadrezzar made his first inroad against Judah in 602 B.C. because of its intrigue with Egypt (H. Winckler, Keilinschrift. u. d. alte Test., pp. 107 seq.), and the three years of allegiance extends to 599. The chronicler's tradition (2 Chron. xxxvi. 5-8) speaks of Jehoiakim's captivity, apparently confusing him with Jehoiachin. The Septua- gint, however, still preserves there the record of his peaceful death, in agreement with the earlier source in 2 Kings, but against the prophecy of Jeremiah (xxii. 18 seq., xxxvi. 30), which is accepted by Jos. Ant. x. 6. 3. The different traditions can scarcely be reconciled. Nothing certain is known of the marauding bands sent against Jehoiakim; for Syrians {Aram) one would expect Edomites (Edom), but see Jer. xxxv. 11; some recensions of the Septuagint even

include the " Samaritans "! (For further references to this reign see especially Jeremiah ; see also Jews : History, § 17.) (S. A. C.)

JEHOL (" hot stream "), or Ch'eng-te-fu, a city of China, formerly the seat of the emperor's summer palace, near 11 8° E. and 41 N., about 140 m. N.E. of Peking, with which it is connected by an excellent road. Pop. (estimate), 10,000. It is a flourishing town, and consists of one great street, about 2 m. long, with smaller streets radiating in all directions. The people are well-to-do and there are some fine shops. The palace, called Pi-shu-shan-chuang, or " mountain lodge for avoiding heat," was built in 1703 on the plan of the palace of Yuen-ming-yuen near Peking. A substantial brick wall 6 m. in circuit encloses several well-wooded heights and extensive gardens, rockeries, pavilions, temples, &c. Jehol was visited by Lord Macartney on his celebrated mission to the emperor K'ienlung in 1793; and it was to Jehol that the emperor Hienfeng retired when the allied armies of England and France occupied Peking in i860. In the vicinity of Jehol are numerous Lama monas- teries and temples, the most remarkable being Potala-su, built on the model of the palace of the grand lama of Tibet at Potala.

JEHORAM, or Joram (Heb. " Yah[weh] is high "), the name of two Biblical characters.

1. The son of Ahab, and king of Israel in succession to his brother Ahaziah. 2 He maintained close relations with Judah, whose king came to his assistance against Moab which had re- volted after Ahab's death (2 Kings i. 1 ; Iii.). The king in question is said to have been Jehoshaphat; but, according to Lucian's recension, it was Ahaziah, whilst i. 17 would show that it was Jehoram's namesake (see 2) . The result of the campaign appears to have been a defeat for Israel (see on the incidents Edom, Elisha, Moab). The prophetical party were throughout hos- tile to Jehoram (with his reform iii. 2 contrast x. 27), and the singular account of the war of Benhadad king of Syria against the king of Israel (vi. 24-vii.) shows the feeling against the reigning dynasty. But whether the incidents in which Elisha and the unnamed king of Israel appear originally belonged to the time of Jehoram is very doubtful, and in view of the part which Elisha took in securing the accession of Jehu, it has been urged with much force that they belong to the dynasty of the" latter, when the high position of the prophet would be perfectly natural. 3 The briefest account is given of Jehoram's alliance with Ahaziah (son of 2 below) against Hazael of Syria, at Ramoth-Gilead

2 2 Kings i. 17 seq.; see Lucian's reading (cf. Vulg. and Pesh.). Apart from the allusion I Kings xxii. 49 (see 2 Chron. xx. 35), and the narrative in 2 Kings i. (see Elijah), nothing is known of this Ahaziah. Notwithstanding his

very brief reign (1 Kings xxii. 51 ; 2 Kings iii. 1), the compiler passes the usual hostile judgment (1 Kings xxii. 52 seq.) ; see Kings (Books). The chronology in 1 Kings xxii. 51 is difficult; if Lucian's text (twenty-fourth year of Jeho- shaphat) is correct, Jehoram I and 2 must have come to their respective thrones at almost the same time.

3 In vii. 6 the hostility of Hittites and Mizraim (q.v.) points to a period after 842 B.C. (See Jews, § 10 seq.)

JEHOSHAPHAT— JEHOVAH

(2 Kings viii. 25-29), and the incident — with the wounding of the Israelite king in or about the critical year 842 B.C.— finds a noteworthy parallel in the time of Jehoshaphat and Ahab (1 Kings xxii. 29-36) at the period of the equally momentous events in 854 (see Ahab). See further Jehu.

2. The son of Jehoshaphat and king of Judah. He married Athaliah the daughter of Ahab, and thus was brother-in-law of 1. above, and contemporary with him (2 Kings i. 17). In his days Edom revolted, and this with the mention of Libnah's revolt (2 Kings viii. 20 sqq.) suggests some common action on the part of Philistines and Edomites. The chronicler's account of his life (2 Chron. xxi-xxii. 1) presupposes this, but adds many remarkable details: he began his reign by massacring his breth- ren (cf. Jehu son of Jehoshaphat, and his bloodshed, 2 Kings ix. seq.); for his wickedness he received a communication from Elijah foretelling his death from disease (cf. Elijah and Ahaziah of Israel, 2 Kings i.) ; in a great invasion of Philistines and Arabian tribes he lost all his possessions and family, and only Jehoahaz (i.e. Ahaziah) was saved. 1 ' His son Ahaziah reigned only for a year (cf. his namesake of Israel) ; he is condemned for his Israelite sympathies, and met his end in the general butchery which attended the accession of Jehu (2 Kings viii. 25 sqq.; 2 Chron. xxii. 3 seq., 7; with 2 Kings ix. 27 seq., note the variant tradition in 2 Chron. xxii. 8 seq., and the details which the LXX. (Lucian) appends to 2 Kings x.). .(S. A. C.)

JEHOSHAPHAT (Heb. " Yahweh judges "), in the Bible, son of Asa, and king of Judah, in the 9th century B.C. During his period close relations subsisted between Israel and Judah; the two royal houses were connected by marriage (see Athaliah; Jehokam, 2), and undertook joint enterprise in war and commerce. Jehoshaphat aided Ahab in the battle against Benhadad at Ramoth-Gilead in which Ahab was slain (1 Kings xxii.; 2 Chron. xviii.; cf. the parallel incident in 2 Kings viii. 25-29), and trading journeys to Ophir were undertaken by his fleet in conjunction no doubt with Ahab as well as with his son Ahaziah (2 Chron. xx. 35 sqq.; 1 Kings xxii. 47 sqq.). The chronicler's account of his war against Moab, Amnion

and Edomite tribes (2 Chron, xx.), must rest ultimately upon a tradition which is presupposed in the earlier source (1 Kings xxii. 47), and the disaster to the ships at Ezion-Geber at the head of the Gulf of Akaba preceded, if it was not the introduction to, the great revolt in the days of Jehoshaphat's son Jehoram, where, again, the details in 2 Chron. xxi. must rely in the first instance upon an old source. Apart from what is said of Jehoshaphat's legislative measures (2 Chron. xix. 4 sqq.; cf. the meaning of his name above), an account is preserved of his alliance with Jehoram of Israel against Moab (2 Kings hi.), on which see Jehoram; Moab. The " valley of Jehoshaphat " (Joel iii. 12) has been identified by tradition (as old as Eusebius) with the valley between Jerusalem and the mount of Olives. (S. A. C.)

JEHOVAH (Yahweh 2), in the Bible, the God of Israel. " Jehovah " is a modern mispronunciation of the Hebrew name, resulting from combining the consonants of that name, Jhvh, with the vowels of the word Adonay, " Lord," which the Jews substituted for the proper name in reading the scriptures. In such cases of substitution the vowels of the word which is to be read are written in the Hebrew text with the consonants of the word which is not to be read. The consonants of the word to be substituted are ordinarily written in the margin; but inasmuch as Adonay was regularly read instead of the ineffable name Jhvh, it was deemed unnecessary to note the fact at every occurrence. When Christian scholars began to study the Old Testament in Hebrew, if they were ignorant of this general rule or regarded the substitution as a piece of Jewish superstition, reading what actually stood in the text, they would inevitably pronounce the name Jehovah. It is an unprofitable inquiry who first made this blunder; probably many fell into it independently. The state- ment still commonly repeated that it originated with Petrus

'These details are scarcely the invention of the chronicler; see Chronicles, and Expositor, Aug. 1906, p. 191.

2 This form, Yahweh, as the correct one, is generally used in the separate articles throughout this work.

Galatinus (1518) is erroneous; Jehova occurs in manuscripts at least as early as the 14th century.

The form Jehovah was used in the 16th century by many authors, both Catholic and Protestant, and in the 17th was zealously defended by Fuller, Gataker, Leusden and others, against the criticisms of such scholars as Drusius, Cappellus and the elder Buxtorf . It appeared in the English Bible

in Tyndale's translation of the Pentateuch (1530), and is found in all English Protestant versions of the 16th century except that of Coverdale (1 53 5) • In the Authorized Version of 1 61 1 it occurs in Exod. vi. 3 ; Ps. lxxxiii. 18; Isa. xii. 2; xxvi. 4, beside the compound names Jehovah-jireh, Jehovah-nissi, Jehovah-shalom ; elsewhere, in accordance with the usage of the ancient versions, Jhvh is repre- sented by Lord (distinguished by capitals from the title " Lord," Heb. adonay). In the Revised Version of 1885 Jehovah is retained in the places in which it stood in the A. V., and is intro- duced also in Exod. vi. 2, 6, 7, 8; Ps. lxviii. 20; Isa. xlix. 14; Jer. xvi. 21; Hab. iii. 19. The American committee which co- operated in the revision desired to employ the name Jehovah wherever Jhvh occurs in the original, and editions embodying their preferences are printed accordingly.

Several centuries before the Christian era the name Jhvh had ceased to be commonly used by the Jews. Some of the later writers in the Old Testament employ the appellative Elohim, God, prevailingly or exclusively; a collection of Psalms (Ps. xlii.- lxxxiii.) was revised by an editor who changed the Jhvh of the authors into Elohim (see e.g. xlv. 7; xlviii. 10; 1. 7; li. 14); observe also the frequency of " the Most High," " the God of Heaven," " King of Heaven," in Daniel, and of " Heaven " in First Maccabees. The oldest Greek versions (Septuagint), from the third century B.C., consistently use Kdpios, "Lord," where the Hebrew has Jhvh, corresponding to the substitution of Adonay for Jhvh in reading the original; in books written in Greek in this period (e.g. Wisdom, 2 and 3 Maccabees), as in the New Testament, Kvpios takes the place of the name of God. Josephus, who as a priest knew the pronunciation of the name, declares that religion forbids him to divulge it; Philo calls it ineffable, and says that it is lawful for those only whose ears and tongues are purified by wisdom to hear and utter it in a holy place (that is, for priests in the Temple) ; and in another passage, commenting on Lev. xxiv. 15 seq.: " If anyone, I do not say should blaspheme against the Lord of men and gods, but should even dare to utter his name unseasonably, let him expect the penalty of death." 3

Various motives may have concurred to bring about the sup- pression of the name. An instinctive feeling that a proper name for God implicitly recognizes the existence of other gods may have had some influence; reverence and the fear lest the holy name should be profaned among the heathen were potent reasons; but probably the most cogent motive was the desire to prevent the abuse of the name in magic. If so, the secrecy had the opposite effect; the name of the god of the Jews was one of the great names. in magic, heathen as well as Jewish, and miraculous efficacy was attributed to the mere utterance of it.

In the liturgy of the Temple the name was pronounced in the priestly benediction (Num. vi. 27) after the regular daily sacrifice (in the

synagogues a substitute — probably Adonay — was em- ployed) ; 4 on the Day of Atonement the High Priest uttered the name ten times in his prayers and benediction. In the last generations before the fall of Jerusalem, however, it was pro- nounced in a low tone so that the sounds were lost in the chant of the priests. 5

3 See Josephus, Ant. ii. 12, 4; Philo, Vita Mosis, iii. 11 (ii. §114, ed. Cohn and Wendland) ; ib. iii. 27 (ii. §206). The Palestinian authorities more correctly interpreted Lev. xxiv. 15 seq., not of the mere utterance of the name, but of the use of the name of God in blaspheming God.

_ 4 Siphre, Num. §§ 39, 43; M. Sotah, iii. 7; Sotah, 38a. The tradi- tion that the utterance of the name in the daily benedictions ceased with the death of Simeon the Just, two centuries or more before the Christian era, perhaps arose from a misunderstanding of Mena- hoth, 109b; in any case it cannot stand against the testimony of older and more authoritative texts.

6 Yoma, 39ft ; Jer. Yoma, iii. 7 ; Kiddushin, 71a.

After the destruction of the Temple (a.d. 70) the liturgical use of the name ceased, but the tradition was perpetuated in the schools of the rabbis. 1 It was certainly known in Babylonia in the latter part of the 4th century, 2 and not improbably much later. Nor was the knowledge confined to these pious circles; the name continued to be employed by healers, exorcists and magicians, and has been preserved in many places in magical papyri. The vehemence with which the utterance of the name is denounced in the Mishna — " He who pronounces the Name with its own letters has no part in the world to come!" 3 — suggests that this misuse of the name was not uncommon among Jews.

The Samaritans, who otherwise shared the scruples of the Jews about the utterance of the name, seem to have used it in judicial oaths to the scandal of the rabbis. 4

The early Christian scholars, who inquired what was the true name of the God of the Old Testament, had therefore no great difficulty in getting the information they sought. Clement of Alexandria (d. c. 212) says that it was pronounced Iaoue. 5 Epiphanius (d. 404) , who was born in Palestine and spent a con- siderable part of his life there, gives Yafie (one cod. lave) . 6 Theo- doret (d. c. 457),' born in Antioch, writes that the Samaritans pronounced the name laffe (in another passage, Ia/3

There is no reason to impugn the soundness of this substantially consentient testimony to the pronunciation Yahweh or Jahveh, coming as it does through several independent channels. It is confirmed by grammatical considerations. The name Jhvh enters into the composition of many proper names of persons in the Old Testament, either as the initial element, in the form Jeho- or Jo- (as in Jehoram, Joram), or as the final element, in the form -jahu or jah (as in Adonijahu, Adonijah). These various forms are perfectly regular if the divine name was Yahweh, and, taken altogether, they cannot be explained on any other hypothesis. Recent scholars, accordingly, with but few exceptions, are agreed that the ancient pronunciation of the name was Yahweh (the first h sounded at the end of the syllable). Genebrardus seems to have been the first to suggest the pro nunciation Iahue, n but it was not until the 19th century that it became generally accepted.

Jahveh or Yahweh is apparently an example of a common type of Hebrew proper names which have the form of the 3rd pers. sing, of the verb. e.g. Jabneh (name of a city), Jabln, Jamlek, Jiptah (Jephthah), &c. Most of these really are verbs, the suppressed or implicit subject being 'el, " numen, god," or the name of a god; cf. Jabneh and Jabne-el, Jiptah and Jiptah-el. The ancient explanations of the name proceed from Exod. iii. 14, 15, where "Yahweh 13 hath sent me " in v. 15 corresponds to " Ehyeh hath sent me " in v. 14, thus seeming to connect the name Yahweh with the Hebrew verb hdyah, " to become, to be." The Palestinian interpreters found in this the promise that

1 R. Johanan (second half of the 3rd century), Kiddushin, 71a.

2 Kiddushin, l.c. — Pesahim, 50a.

3 M. Sanhedrin, x. 1 ; Abba Saul, end of 2nd century.

4 Jer. Sanhedrin, x. 1 ; R. Mana, 4th century.

- *Strom, v. 6. Variants: la one, la ovat; cod. L. laov.*

• Panarion, Haer. 40, 5; cf. Lagarde, Psalter juxta Hebraeos, 154.

7 Quaest. 15 in Exod. ; Fab. haeret. compend. v. 3, sub fin.

8 A'ia occurs also in the great magical papyrus of Paris, 1. 3020 (Wessely, Denkschrift. Wien. Akad., Phil. Hist. Kl., XXXVI. p. 120), and in the Leiden Papyrus, xvii. 31.

9 See Deissmann, Bibelstudien, 13 sqq.

10 See Driver, Sludia Biblica, I. 20.

11 See Montgomery, Journal of Biblical Literature, xxv. (1906), 49-51.

12 Chronographia, Paris, 1567 (ed. Paris, 1600, p. 79 seq.).

13 This transcription will be used henceforth.

God would be with his people (cf. v. 1 2) in future oppressions as he was in the present distress, or the assertion of his eternity, or eternal constancy; the Alexandrian translation 'Eyco el/u b &v . . . 'O &v aTrecrraXKiv fit irpbs Vfxds, understands it in the more metaphysical sense of God's absolute being. Both inter- pretations, " He (who) is (always the same)," and " He (who) is (absolutely, the truly existent)," import into the name all that they profess to find in it; the one, the religious faith in God's unchanging fidelity to his people, the other, a philosophical con- ception of absolute being which is foreign both to the meaning of the Hebrew verb and to the force of the tense employed. Modern scholars have sometimes found in the name the expression of the aseity 14 of God; sometimes of his reality, in contrast to the imaginary gods of the heathen. Another explanation, which appears first in Jewish authors of the middle ages and has found wide acceptance in recent times, derives the name from the causative of the verb; He (who) causes things to be, gives them being; or calls events into existence, brings them to pass; with many individual modifications of interpretation — creator, life giver, fulfiller of promises. A serious objection to this theory in every form is that the verb hdyah, " to be," has no causative stem in Hebrew; to express the ideas which these scholars find in the name Yahweh the language employs altogether different verbs.

This assumption that Yahweh is derived from the verb " to be," as seems to be implied in Exod. iii. 14 seq., is not, however, free from difficulty. " To be " in the Hebrew of the Old Testament is not hdwdh, as the derivation would require, but hdyah; and we are thus driven to the further assumption that hawah belongs to an earlier stage of the language, or to some older speech of the forefathers of the Israelites. This hypothesis is not intrinsically improbable — and in Aramaic, a language closely related to Hebrew, " to be " actually is hdwd — but it should be noted that in adopting it we admit that, using the name Hebrew in the his- torical sense, Yahweh is not a Hebrew name. And, inasmuch as nowhere in the Old Testament, outside of Exod. iii., is there the slightest indication that the Israelites connected the name of their God with the idea of " being " in any sense, it may fairly be questioned whether, if the author of Exod. iii. 14 seq., intended to give an etymological interpretation of the name Yahweh, 16 his etymology is any better than many other paronomastic explana- tions of proper names in the

Old Testament, or than, say, the connexion of the name 'AttoWoov with aTroXowv, aToKvuv in Plato's Cratylus, or the popular derivation from cwroXXu/u.

A root hdwdh is represented in Hebrew by the nouns howdh (Ezek., Isa. xlvii. n) and hawwdh (Ps., Prov., Job) " disaster, calamity, ruin." 16 The primary meaning is probably " sink down, fall," in which sense — common in Arabic — the verb appears in Job xxxvii. 6 (of snow falling to earth). A Catholic commentator of the 16th century, Hieronymus ab Oleastro, seems to have been the first to connect the name " Jehova " with howdh interpreting it contritio, sive pernicies (destruction of the Egyptians and Canaanites); Daumer, adopting the same etymology, took it in a more general sense: Yahweh, as well as Shaddai, meant " Destroyer," and fitly expressed the nature of the terrible god whom he identified with Moloch.

The derivation of Yahweh from hdwdh is formally unimpeach- able, and is adopted by many recent scholars, who proceed, however, from the primary sense of the root rather than from the specific meaning of the nouns. The name is accordingly inter- preted, He (who) falls (baetyl, fialrvkos, meteorite); or causes (rain or lightning) to fall (storm god); or casts down (his foes, by his thunderbolts). It is obvious that if the derivation be correct, the significance of the name, which in itself denotes only " He falls " or " He fells," must be learned, if at all, from early Israelitish conceptions of the nature of Yahweh rather than from etymology.

14 A-se-itas, a scholastic Latin expression for the quality of existing by oneself.

15 The critical difficulties of these verses need not be discussed here. See \V. R. Arnold, " The Divine Name in Exodus iii. i4," Journal of Biblical Literature, XXIV. (1905), 107-165.

16 Cf . also hawwdh, " desire," Mic. vii. 3 ; Prov. x. 3.

A more fundamental question is whether the name Yahweh originated among the Israelites or was adopted by them from some other people and speech. 1 The biblical author of the his- tory of the sacred institutions (P) expressly declares that the name Yahweh was unknown to the patriarchs (Exod. vi. 3), and the much older Israelite historian (E) records the first revelation of the name to Moses (Exod. iii. 13-15), apparently following a tradition according to which the Israelites had not been wor- shippers of Yahweh before the time of Moses, or, as he conceived it. had not

worshipped the god of their fathers under that name. The revelation of the name to Moses was made at a mountain sacred to Yahweh (the mountain of God) far to the south of Palestine, in a region where the forefathers of the Israelites had never roamed, and in the territory of other tribes; and long after the settlement in Canaan this region continued to be regarded as the abode of Yahweh (Judg. v. 4; Deut.xxxiii. 2sqq.; 1 Kings xix. 8sqq. &c). Moses is closely connected with the tribes in the vici- nity of the holy mountain; according to one account, he married a daughter of the priest of Midian (Exod. ii. 16 sqq.; iii. 1) ; to this mountain he led the Israelites after their deliverance from Egypt; there his father-in-law met him, and extolling Yahweh as " greater than all the gods," offered (in his capacity as priest of the place?) sacrifices, at which the chief men of the Israelites were his guests; there the religion of Yahweh was revealed through Moses, and the Israelites pledged themselves to serve God according to its prescriptions. It appears, therefore, that in the tradition followed by the Israelite historian the tribes within whose pasture lands the mountain of God stood were worshippers of Yahweh before the time of Moses; and the surmise that the name Yahweh belongs to their speech, rather than to that of Israel, has considerable probability. One of these tribes was Midian, in whose land the mountain of God lay. The Kenites also, with whom another tradition connects Moses, seem to have been worshippers of Yahweh. It is probable that Yahweh was at one time worshipped by various tribes south of Palestine, and that several places in that wide territory (Horeb, Sinai, Kadesh, &c.) were sacred to him; the oldest and most . famous of these, the mountain of God, seems to have lain in Arabia, east of the Red Sea. From some of these peoples and at one of these holy places, a group of Israelite tribes adopted the religion of Yahweh, the God who, by the hand of Moses, had delivered them from Egypt. 2

The tribes of this region probably belonged to some branch of the great Arab stock, and the name Yahweh has, accordingly, been connected with the Arabic kawd, " the void " (between heaven and earth), " the atmosphere," or with the verb hawa, cognate with Heb. hdwdh, " sink, glide down " (through space); hawwd " blow " (wind). " He rides through the air, He blows " (Wellhausen), would be a fit name for a god of wind and storm. There is, however, no certain evidence that the Israelites in his- torical times had any consciousness of the primitive significance of the name.

The attempts to connect the name Yahweh with that of an Indo-European deity (Jehovah-Jove, &c), or to derive it from Egyptian or Chinese, may be passed over. But one theory which has had considerable currency requires notice, namely, that Yahweh, or Yahu, Yaho, 3 is the name of a god worshipped throughout the whole, or a great part, of the area occupied by the Western Semites. In its earlier form this opinion rested chiefly on

certain misinterpreted testimonies in Greek authors about a god Tdco, and was conclusively refuted by Baudissin; re- cent adherents of the theory build more largely on the occurrence in various parts of this territory of proper names of persons

1 See Hebrew Religion.

2 The divergent Judaean tradition, according to which the fore- fathers had worshipped Yahweh from time immemorial, may indicate that Judah and the kindred clans had in fact been worshippers of Yahweh before the time of Moses.

3 The form Yahu, or Yaho, occurs not only in composition, but by itself; see Aramaic Papyri discovered at Assuan, B 4, 6, 11 ; E 14; J 6. This is doubtless the original of 'lhu>, frequently found in Greek authors and in magical texts as the name of the God of the Jews.

and places which they explain as compounds of Yahu or Yah. 4 The explanation is in most cases simply an assumption of the point at issue; some of the names have been misread; others are undoubtedly the names of Jews. There remain, however, some cases in which it is highly probable that names of non- Israelites are really compounded with Yahweh. The most conspicuous of these is the king of Hamath who in the inscrip- tions of Sargon (722-705 B.C.) is called Yaubi'di and Uubi'di (compare Jehoiakim-Eliakim). Azriyau of Jaudi, also, in inscriptions of Tiglath-Pileser (745-728 B.C.), who was for- merly supposed to be Azariah (Uzziah) of Judah, is probably a king of the country in northern Syria known to us from the Zenjirli inscriptions as Ja'di.

Friedrich Delitzsch brought into notice three tablets, of the age of the first dynasty of Babylon, in which he read the names of Ya- a'-ve-ilu, Ya-ve-ilu, and Ya-il-um-ilu (" Yahweh is God "), and which he regarded as conclusive proof that Yahweh was known in Babylonia before 2000 B.C.; he was a god of the Semitic invaders in the second wave of migration, who were, according to Winckler and Delitzsch, of North Semitic stock (Canaanites, in the linguistic sense). 5 We should thus have in the tablets evidence of the worship of Yahweh among the Western Semites at a time long before the rise of Israel. The reading of the names is, however, extremely uncertain, not to say improbable, and the far-reaching inferences drawn from them carry no conviction. In a tablet attributed to the 14th century B.C. which Sellin found in the course of his excavations at Tell Ta'annuk (the Taanach of the O.T.) a name occurs which may be read Ahi-Yawi (equivalent to Hebrew Ahijah); 6 if the reading be correct, this would show that Yahweh was wor- shipped in Central Palestine before the Israelite conquest. The reading is, however, only one of several possibilities.

The fact that the full form Yahweh appears, whereas in Hebrew proper names only the shorter Yahu and Yah occur, weighs somewhat against the interpretation, as it does against Delitzsch's reading of his tablets.

It would not be at all surprising if, in the great movements of populations and shifting of ascendancy which lie beyond our historical horizon, the worship of Yahweh should have been established in regions remote from those which it occupied in historical times; but nothing which we now know warrants the opinion that his worship was ever general among the Western Semites.

Many attempts have been made to trace the West Semitic Yahu back to Babylonia. Thus Delitzsch formerly derived the name from an Akkadian god, I or la; or from the Semitic nominative ending, Yau; 7 but this deity has since disappeared from the pantheon of Assyriologists. The combination of Yah with Ea, one of the great Babylonian gods, seems to have a peculiar fascination for amateurs, by whom it is periodically " discovered." Scholars are now agreed that, so far as Yahu or Yah occurs in Babylonian texts, it is as the name of a foreign god.

Assuming that Yahweh was primitively a nature god, scholars in the 19th century discussed the question over what sphere of nature he originally presided. According to some he was the god of consuming fire; others saw in him the bright sky, or the heaven; still others recognized in him a storm god, a theory with which the derivation of the name from Heb. hdwdh or Arab. hawd well accords. The association of Yahweh with storm and fire is frequent in the Old Testament; the thunder is the voice of Yahweh, the lightning his arrows, the rainbow his bow. The revelation at Sinai is amid the awe-inspiring phenomena of tempest. Yahweh leads Israel through the desert in a pillar of cloud and fire; he kindles Elijah's altar by lightning, and translates the prophet in a chariot of fire. See also Judg. v. 4 seq. ;

1 See a collection and critical estimate of this evidence by Zimmern, Die Keilinschriften und das Alte Testament, 465 sqq.

6 Babel und Bibel, 1902. The enormous, and for the most part ephemeral, literature provoked by Delitzsch's lecture cannot be cited here.

6 Denkschriften d. Wien. Akad., L. iv. p. 115 seq. (1904).

7 Wo lag das Parodies? (1881), pp. 158-166.

Deut. xxxiii. i; Ps. xviii. 7-15; Hab. iii. 3-6. The cherub upon which he rides when he flies on the wings of the wind (Ps. xviii. 10) is not improbably an ancient mythological per- sonification of the storm cloud, the genius of tempest (cf. Ps. civ. 3). In Ezekiel the throne of Yahweh is borne up on Che- rubim, the noise of whose wings is like thunder. Though we may recognize in this poetical imagery the survival of ancient and, if we please, mythical notions, we should err if we inferred that Yahweh was originally a departmental god, presiding specifically over meteorological phenomena, and that this con- ception of him persisted among the Israelites till very late times. Rather, as the god — or the chief god — of a region and a people, the most sublime and impressive phenomena, the control of the mightiest forces of nature are attributed to him. As the God of Israel Yahweh becomes its leader and champion in war; he is a warrior, mighty in battle; but he is not a god of war in the specific sense.

In the inquiry concerning the nature of Yahweh the name Yahweh Sebaoth (E.V., The Lord of Hosts) has had an important place. The hosts have by some been interpreted of the armies of Israel (see 1 Sam. xvii. 45, and note the association of the name in the Books of Samuel, where it first appears, with the ark, or with war) ; by others, of the heavenly hosts, the stars conceived as living beings, later, perhaps, the angels as the court of Yahweh and the instruments of his will in nature and history (Ps. lxxxix.) ; or of the forces of the world in general which do his bidding, cf. the common Greek renderings, Kuptos twv dwafiewv and K. ira.VTOKp6.T03p, Universal Ruler). It is likely that the name was differently understood in different periods and circles; but in the prophets the hosts are clearly superhuman powers. In many passages the name seems to be only a more solemn sub- stitute for the simple Yahweh, and as such it has probably often been inserted by scribes. Finally, Sebaoth came to be treated as a proper name (cf. Ps. lxxx. 5, 8, 20), and as such is very common in magical texts.

Literature. — Reland, Decas exercitationum philologicarum de vera pronuntiatione nominis Jehova, 1707; Reinke, " Philologisch-histo- rische Abhandlung iiber den Gottesnamen Jehova," in Beitrdge zur Erkldrung des Alten Testaments, III. (1855); Baudissin, " Der Ursprung des Gottesnamens 'I&u," in Studien zur semitischen Reli- gionsgeschichte, I. (1876), 179-254; Driver, " Recent Theories on the Origin and Nature of the Tetragrammaton," in Studia Biblica, I. (1885), 1-20; Deissmann, " Griechische Transkriptionen des Tetragrammaton," in Bibelstudien (1895), 1-20; Blau, Das altjudi- sche Zauberwesen, 1898. See also Hebrew Religion. (G. F. Mo.)

JEHU, son of Jehoshaphat? and :; grandson of Nimshi, in the Bible, a general of Ahab and Jehoram, and, later, king of Israel. Ahaziah son of

Jehoram of Judah and Jehoram brother of Ahaziah of Israel had taken joint action against the Aramaeans of Damas- cus who were attacking Ramoth-Gilead under Hazael. Jehoram had returned wounded to his palace at Jezreel, whither Ahaziah had come down to visit him. Jehu, meanwhile, remained at the seat of war, and the prophet Elisha sent a messenger to anoint him king. The general at once acknowledged the call, " drove furiously " to Jezreel, and, having slain both kings, proceeded to exterminate the whole of the royal family (2 Kings ix., x.). A similar fate befell the royal princes of Judah (see Athaliah), and thus, for a time at least, the new king must have had com- plete control over the two kingdoms (cf. 2 Chrbn. xxii. 9). Israelite historians viewed these events as a great religious revolution inspired by Elijah and initiated by Elisha, as the overthrow of the worship of Baal, and as a retribution for the cruel murder of Naboth the Jezreelite (see Jezebel). A vivid description is given of the destruction of the prophets of Baal at the temple in Samaria (2 Kings x. 27; contrast iii. 2). While Jehu was supported by the Rechabites in his reforming zeal, a similar revolt against Baalism in Judah is ascribed to the priest Jehoiada (see Joash). In the tragedies of the period it seems clear that Elisha's interest in both Jehu and the Syrian Hazael (2 Kings viii. 7 sqq.) had some political significance, and in opposition to the " Deuteronomic " the commendation in 2 Kings x. 28 sqq., Hosea's denunciation (i. 4) indicates the judgment which was passed upon Jehu's bloodshed in other circles.

In the course of an expedition against Hazael in 842 Shalma- neser II. of Assyria received tribute of silver and gold from Ya-u-a son of Omri, 1 Tyre and Sidon; another attack followed in 839. For some years after this Assyria was unable to interfere, and war broke out between Damascus and Israel. The Israelite story, which may perhaps be supplemented from Judaean sources (see Joase), records a great loss of territory on the east of the Jordan (2 Kings x. 32 seq.). Under Jehu's successor Jehoahaz there was continual war with Hazael and his son Ben-hadad, but relief was obtained by his grandson Joash, and the land recovered complete independence under Jeroboam.

Jehu is also the name of a prophet of the time of Baasha and Jehoshaphat (1 Kings xvi. ; 2 Chron. xix., xx.). (S. A. C.)

JEKYLL, SIR JOSEPH (1663-1738), English lawyer and mas- ter of the rolls, son of John Jekyll, was born in London, and after studying at the Middle Temple was called to the bar in 1687. He rapidly rose to be chief justice of Chester (1697), serjeant-at- law and king's Serjeant (1700), and a knight. In 1717 he was made master of the rolls. A Whig in politics, he sat in parliament for various constituencies from 1697 to the end of his life, and took an active part there in debating constitutional questions with

much learning, though, according to Lord Hervey (Mem. 1, 474), with little " approbation." He was censured by the House of Commons for accepting a brief for the defence of Lord Halifax in a prosecution ordered by the house. He was one of the managers of the impeachment of the Jacobite earl of Wintoun in 1715, and of Harley (Lord Oxford) in 1717. In later years he supported Walpole. He became very unpopular in 1736 for his introduction of the " gin act," taxing the retailing of spirituous liquors, and his house had to be protected from the mob. Pope has an illusion to " Jekyll or some odd Whig, Who never changed his principle or wig " (Epilogue to the Satires). Jekyll was also responsible for the Mortmain Act of 1736, which was not superseded till 1888. He died without issue in 1738.

His great-nephew Joseph Jekyll (d. 1837) was a lawyer, politician and wit, who excited a good deal of contemporary satire, and who wrote some jeux d' esprit which were well-known in his time. His Letters of the late Ignatius Sancho, an African, was published in 1782. In 1894 his correspondence was edited, with a memoir, by the Hon. Algernon Bourke.

JELLACHICH, JOSEF, Count (1801-1859), Croatian states- man, was born on the 16th of October 1801 at Petervarad. He entered the Austrian army (1819), fought against the Bosnians in 1845, was made ban of Croatia, Slavonia and Dalmatia in 1848 on the petition of the Croatians, and was simultaneously raised to the rank of lieutenant-general by the emperor. As ban, Jellachich's policy was directed to preserving the Slav kingdoms for the Habsburg monarchy by identifying himself with the nationalist opposition to Magyar ascendancy, while at the same time discouraging the extreme " Ulyrism " advocated by Lodovik Gaj (1809-1872). Though his separatist measures at first brought him into disfavour at the imperial court, their true objective was soon recognized, and, with the triumph of the more violent elements of the Hungarian revolution, he was hailed as the most conspicuous champion of the unity of the empire, and was able to bring about that union of the imperial army with the southern Slavs by which the revolution in Vienna and Budapest was overthrown (see Austria-Hungary: History). He began the war of independence in September 1848 by crossing the Drave at the head of 40,000 Croats. After the bloody battle of Buda he concluded a three days' truce with the Hungarians to enable him to assist Prince Windischgratz to reduce Vienna, and subse- quently fought against the Magyars at Schwechat. During the winter campaign of 1848-49 he commanded, under Windisch- gratz, the Austrian right wing, capturing Magyar-Ovar and Raab, and defeating the Magyars at M6r. After the recapture of Buda he was made commander-in-chief of the southern army.

1 I.e. either descendant of, or from the same district as, Omri (see Hogg,

Ency. Bib. col. 2291). The Assyrian king's sculpture, depicting the embassy and its gifts, is the so-called " black obelisk now in the British Museum (Nimroud Central Gallery, No. 98; Guide to Bab. and Ass. Antiq., 1900, p. 24 seq., pi. ii.).

At first he gained some successes against Bern (q-v.), but on the 14th of July 1849 was routed by the Hungarians at Hegyes and driven behind the Danube. He took no part in the remainder of the war, but returned to Agram to administer Croatia. In 1853 he was appointed commander-in-chief of the army sent against Montenegro, and in 1855 was created a count. He died on the 20th of May 1859. His Gedichte were published at Vienna in 1851.

See the anonymous The Croatian Revolution of the Year 1848 (Croat.), Agram, 1898. (R. N. B.)

JELLINEK, ADOLF (1821-1893), Jewish preacher and scholar, was born in Moravia. After filling clerical posts in Leipzig, he became Prediger (preacher) in Vienna in 1856. He was associated with the promoters of the New Learning within Judaism, and wrote on the history of the Kabbala. His bibliographies (each bearing the Hebrew title Qontres) were useful compilations. But his most important work lay in three other directions. (1) Midrashic. Jellinek published in the six parts of his Beth ha-Midrasch (1853-1878) a large number of smaller Midrashi, ancient and medieval homilies and folk-lore records, which have been of much service in the recent revival of interest in Jewish apocalyptic literature. A translation of these collec- tions of Jellinek into German was undertaken by A. Wuensche, under the general title Aus Israels Lehrkalle. (2) Psychological. Before the study of ethnic psychology had become a science, Jellinek devoted attention to the subject. There is much keen analysis and original investigation in his two essays Der jiidische Stamm (1869) and Der jiidische Stamm in nicht-judischen Spriich-wortem (1881-1882). It is to Jellinek that we owe the oft-repeated comparison of the Jewish temperament to that of women in its quickness of perception, versatility and sensibility. (3) Homiletic. Jellinek was probably the greatest synagogue orator of the rgth century. He published some 200 sermons, in most of which are displayed unobtrusive learn- ing, fresh application of old sayings, and a high conception of Judaism and its claims. Jellinek was a powerful apologist and an accomplished homilist, at once profound and ingenious.

His son, George Jellinek, was appointed professor of inter- national law at

Heidelberg in 1891. Another son, Max Hermann Jellinek, was made assistant professor of philology at Vienna in 1892.

A brother of Adolf, Hermann Jellinek (b. 1823), was executed at the age of 26 on account of his association with the Hungarian national movement of 1848. One of Hermann Jellinek's best-known works was Uriel Acosta. Another brother, Moritz Jellinek (1823-1883), was an accomplished econo- mist, and contributed to the Academy of Sciences essays on the price of cereals and on the statistical organization of the country. He founded the Budapest tramway company (1864) and was also president of the corn exchange.

See Jewish Encyclopedia, vii. 92-94. For a character sketch of Adolf Jellinek see S. Singer, Lectures and Addresses (1908), pp. 88-93 ! Kohut, Beruhmte israelitische Manner und Frauen. (I. A.)

JEMAPPES, a town in the province of Hainaut, Belgium, near Mons, famous as the scene of the battle at which Dumouriez, at the head of the French Revolutionary Army, defeated the Austrian army (which was greatly outnumbered) under the duke of Saxe-Teschen and Clerfayt on the 6th of November 1792 (see French Revolutionary Wars).

JENA, a university town of Germany, in the grand duchy of Saxe-Weimar, on the left bank of the Saale, 56 m. S.W. from Leipzig by the Grossberigen-Saalfeld and 12 m. S.E. of Weimar by the Weimar-Gera lines of railway. Pop. (1905), 26,355. Its situation in a broad valley environed by limestone hills is somewhat dreary. To the north lies the plateau, descending steeply to the valley, famous as the scene of the battle of Jena. The town is surrounded by promenades occupying the site of the old fortifications; it contains in addition to the medieval market square, many old-fashioned houses and quaint narrow streets. Besides the old university buildings, the most inter- esting edifices are the 15th-century church of St Michael, with a

tower 318 ft. high, containing an altar, beneath which is a door- way leading to a vault, and a bronze statue of Luther, originally destined for his tomb ; the university library, in which is preserved a curious figure of a dragon; and the bridge across the Saale, as long as the church steeple is high, the centre arch of which is surmounted by a stone carved head of a malefactor. Across the river is the " mountain," or hill, whence a fine view is ob- tained of the town and surroundings, and hard by the Fuchs- Turm (Fox tower) celebrated for student orgies, while in the centre of the town is the house of an astronomer, Weigel, with a deep shaft through which the stars can be seen in the day time. Thus the seven marvels of Jena are summed up in the Latin lines : —

Ara, caput, draco, mons, potts, vulpectda turris,

Weigeliana domus; septem miracula Jenae.

There must also be mentioned the university church, the new university buildings, which occupy the site of the ducal palace (Schloss) where Goethe wrote his Hermann und Dorothea, the Schwarzer Bar Hotel, where Luther spent the night after his flight from the Wartburg, and four towers and a gateway which now alone mark the position of the ancient walls. The town has of late years become a favourite residential resort and has greatly extended towards the west, where there is a colony of pleasant villas. Its chief prosperity centres, however, in the university. In 1547 the elector John Frederick the Magnanimous of Saxony, while a captive in the hands of the emperor Charles V., conceived the plan of founding a university at Jena, which was accordingly established by his three sons. After having obtained a charter from the emperor Ferdinand I., it was inaugurated on the 2nd of February 1558. It was most numerously attended about the middle of the 18th century; but the most brilliant professoriate was under the duke Charles Augustus, Goethe's patron (1787- 1806), when Fichte, Hegel, Schelling, Schlegel and Schiller were on its teaching staff. Founded as a home for the new religious opinions of the 16th century, it has ever been in the forefront of German universities in liberally accepting new ideas. It distances perhaps every other German university in the extent to which it carries out what are popularly regarded as the charac- teristics of German student -life — duelling and the passion for Freiheit. At the end of the 18th and the beginning of the 19th century, the opening of new universities, co-operating with the suspicions of the various German governments as to the demo- cratic opinions which obtained at Jena, militated against the university, which has never regained its former prosperity. In 1905 it was attended by about 1100 students, and its teaching staff (including prhatdocenten) numbered 112. Amongst its numerous auxiliaries may be mentioned the library, with 200,000 volumes, the observatory, the meteorological institute, the botan- ical garden, seminaries of theology, philology and education, and well equipped clinical, anatomical and physical institutes. There are also veterinary and agricultural colleges in connexion with the university. The manufactures of Jena are not consider- able. The book trade has of late years revived, and there are several printing establishments.

Jena appears to have possessed municipal rights in the 13th century. At the beginning of the 14th century it was in the possession of the margraves of Meissen, from whom it passed in 1423 to the elector of Saxony. Since 1485 it has remained in the Ernestine line of the house of Saxony. In 1662 it fell to Bernhard, youngest son of William duke of Weimar, and became the capital of a small separate duchy. Bernhardt line having become extinct

in 1690, Jena was united with Eisenach, and in 1 741 reverted with that duchy to Weimar. In more modern times Jena has been made famous by the defeat inflicted in the vicinity, on the 14th of October 1806, by Napoleon upon the Prussian army under the prince of Hohenlohe (see Napoleonic Campaigns).

See Schreiber and Farber, Jena von seinem Vr sprung bis zur neuesten Zeit (2nd ed., 1858); Ortloff, Jena und Umgegend (3rd ed., 1875); Leonhardt, Jena als Universitat und Stadt (Jena, 1902); Ritter, Fuhrer durch Jena und Vmgebung (Jena, 1901); Biedermann, Die Universitat Jena (Jena, 1858); and the Urkundenbuch der Stadt Jena edited by J. E. A. Martin and O. Devrient (1888-1903).

JENATSCH, GEORG (1596-1639), Swiss political leader, one of the most striking figures in the troubled history of the Grisons in the 17 th century, was born at Samaden (capital of the Upper Engadine). He studied at Zurich and Basel, and in 161 7 became the Protestant pastor of Scharans (near Thusis). But almost at once he plunged into active politics, taking the side of the Venetian and Protestant party of the Salis family, as against the Spanish and Romanist policy supported by the rival family, that of Planta. He headed the " preachers " who in 1618 tor- tured to death the arch-priest Rusca, of Sondrio, and outlawed the Plantas. As reprisals, a number of Protestants were massacred at Tirano (1620), in the Valtellina, a very fertile valley, of considerable strategical importance (for through it the Spaniards in Milan could communicate by the Umbrail Pass with the Austrians in Tirol), which then fell into the hands of the Spanish. Jenatsch took part in the murder (1621) of Pompey Planta, the head of the rival party, but later with his friends was compelled to fly the country, giving up his position as a pastor, and henceforth acting solely as a soldier. He helped in the revolt against the Austrians in the Prattigau (1622), and in the invasion of the Valtellina by a French army (1624), but the peace made (1626) between France and Spain left the Valtellina in the hands of the pope, and so destroyed Jenatsch's hopes. Having killed his colonel, Ruinelli, in a duel, Jenatsch had once more to leave his native land, and took service with the Venetians (1629-1630). In 1631 he went to Paris, and actively supported Richelieu's schemes for driving the Spaniards out of the Val- tellina, which led to the successful campaign of Rohan (1635), one of whose firmest supporters was Jenatsch. But he soon saw that the French were as unwilling as the Spaniards to restore the Valtellina to the Grisons (which had seized it in 1512). So he became a Romanist (1635), and negotiated secretly with the Spaniards and Austrians. He was the

leader of the conspiracy which broke out in 1637, and resulted in the expulsion Of Rohan and the French from the Grisons. This treachery on Jenatsch's part did not, however, lead to the freeing of the Valtellina from the Spaniards, and once more he tried to get French support. But on the 24th of January 1639 he was assassinated at Coire by the Plantas; later in the same year the much coveted valley was restored by Spain to the Grisons, which held it till 1797. Jenatsch's career is of general historical importance by reason of

the long conflict between France and Spain for the possession of the Valtellina, which forms one of the most bloody episodes

in the Thirty Years' War. (W. A. B. C.)

See biography by E. Haffter (Davos, 1894).

JENGHIZ KHAN (1162-1227), Mongol emperor, was born in a tent on the banks of the river Onon. His father Yesukai was absent at the time of his birth, in a campaign against a Tatar chieftain named Temuchin. The fortune of war favoured Yesukai, who having slain his enemy returned to his encampment in triumph. Here he was met by the news that his wife Yulun had given birth to a son. On examining the child be observed in its clenched fist a clot of coagulated blood like a red stone. In the eyes of the superstitious Mongol this circumstance referred to his victory over the Tatar chieftain, and he therefore named the infant Temuchin. The death of Yesukai, which placed Temuchin at the age of thirteen on the Mongol throne, was the signal also for the dispersal of several tribes whose allegiance the old chieftain had retained by his iron rule. When remon- strated with by Temuchin, the rebels replied: " The deepest wells are sometimes dry, and the hardest stone is sometimes broken; why should we cling to thee ? " But Yulun was by no means willing to see her son's power melt away; she led those retainers who remained faithful against the deserters, and suc- ceeded in bringing back fully one half to their allegiance. With this doubtful material, Temuchin succeeded in holding his ground against the plots and open hostilities of the neighbouring tribes, more especially of the Naimans, Keraits and Merkits. With one or other of these he maintained an almost unceasing warfare until 1 206, when he felt strong enough to proclaim him- self the ruler of an empire. He therefore summoned the notables

of his kingdom to an assembly on the banks of the Onon, and at their unanimous request adopted the name and title of Jenghiz Khan (Chinese, Cheng-sze, or " perfect warrior "). At this time there remained to him but one open enemy on the Mongolian steppes, Polo the Naiman khan. Against this chief he now led his troops, and in one battle so completely shattered

his forces that Kushlek, the successor of Polo, who was left dead upon the field, fled with his ally Toto, the Merkit khan, to the river Irtysh.

Jenghiz Khan now meditated an invasion of the empire of the Kin Tatars, who had wrested northern China from the Sung dynasty. As a first step he invaded western Hia, and, having captured several strongholds, retired in the summer of 1 208 to Lung-ting to escape the great heat of the plains. While there news reached him that Toto and Kushlek were preparing for war. In a pitched battle on the river Irtysh he overthrew them completely. Toto was amongst the slain, and Kushlek fled for refuge to the Khitan Tatars. Satisfied with his victory, Jenghiz again directed his forces against Hia. After having defeated the Kin army under the leadership of a son of the sovereign, he captured the Wu-liang-hai Pass in the Great Wall, and pene- trated as far as Ning-sia Fu in Kansuh. With unceasing vigour he pushed on his troops, and even established his sway over the province of Liao-tung. Several of the Kin commanders, seeing how persistently victory attended his banners, deserted to him, and garrisons surrendered at his bidding. Having thus secured a firm footing within the Great Wall, he despatched three armies in the autumn of 1 2 13 to overrun the empire. The right wing, under his three sons, Juji, Jagatai and Ogotai, marched towards the south; the left wing, under his brothers Hochar, Kwang-tsin Noyen and Chow-tse-te-po-shi, advanced eastward towards the sea; while Jenghiz and his son Tule with the centre directed their course in a south-easterly direction. Complete success attended all three expeditions. The right wing advanced as far as Honan, and after having captured upwards of twenty-eight cities rejoined headquarters by the great western road. Hochar made himself master of the country as far as Liao-si; and Jenghiz ceased his triumphal career only when he reached the cliffs of the Shan-tung promontory. But either because he was weary of the strife, or because it was necessary to revisit his Mongolian empire, he sent an envoy to the Kin emperor in the spring of the following year (1214), saying, " All your possessions in Shan- tung and the whole country north of the Yellow River are now mine with the solitary exception of Yenking (the rnodern Peking) . By the decree of heaven you are now as weak as I am strong, but I am willing to retire from my conquests; as a condition of my doing so, however, it will be necessary that you distribute largess to my officers and men to appease their fierce hostility." These terms of safety the Kin emperor eagerly accepted, and as a peace offering he presented Jenghiz with a daughter of the late emperor, another princess of the imperial house, 500 youths and maidens, and 3000 horses. No sooner, however, had Jenghiz passed beyond the Great Wall than the Kin emperor, fearing to remain any longer so near the Mongol frontier, moved his court to K'ai-ffing Fu in Honan. This transfer of capital appearing to Jenghiz to indicate a hostile attitude, he once more marched his troops into the doomed

empire.

While Jenghiz was thus adding city to city and province to province in China, Kushlek, the fugitive Naiman chief, was not idle. With characteristic treachery he requested permission from his host, the Khitan khan, to collect the fragments of his army which had been scattered by Jenghiz at the battle on the Irtysh, and thus having collected a considerable force he leagued himself with Mahommed, the shah of Khwarizm, against the confiding khan. After a short but decisive campaign the allies remained masters of the position, and the khan was compelled to abdicate the throne in favour of the late guest.

With the power and prestige thus acquired, Kushlek prepared once again to measure swords with the Mongol chief. On receiving the news of his hostile preparations, Jenghiz at once took the field, and in the first battle routed the Naiman troops and made Kushlek a prisoner. His ill-gotten kingdom became

an apanage of the Mongol Empire. Jenghiz now held sway up to the Khwarizm frontier. Beyond this he had no immediate desire to go, and he therefore sent envoys to Mahommed, the shah, with presents, saying, " I send thee greeting; I know thy power and the vast extent of thine empire; I regard thee as my most cherished son. On my part thou must know that I have conquered China and all the Turkish nations north of it; thou knowest that my country is a magazine of warriors, a mine of silver, and that I have no need of other lands. I take it that we have an equal interest in encouraging trade between our subjects." This peaceful message was well received by the shah, and in all probability the Mongol armies would never have appeared in Europe but for an unfortunate occurrence. Shortly after the despatch of this first mission Jenghiz sent a party of traders into Transoxiana who were seized and put to death as spies by Inaljuk, the governor of Otrar. As satisfaction for this outrage Jenghiz demanded the extradition of the offending governor. Far from yielding to this summons, however, Mahommed beheaded the chief of the Mongol envoys, and sent the others back without their beards. This insult made war inevitable, and in the spring of 1210 Jenghiz set out from Karakorum on a campaign which was destined to be as startling in its immediate results as its ulterior effects were far-reaching. The invading force was in the first instance divided into two armies: one commanded by Jenghiz's second son Jagatai was directed to march against the Kankalis, the northern defenders of the Khwarizm empire; and the other, led by Juji, his eldest son, advanced by

way of Sighnak against Jand (Jend). Against this latter force Mahommed led an army of 400,000 men, who were completely routed, leaving it is said 160,000 dead upon the field. With the ramnant of his host Mahommed fled to Samarkand. Meanwhile Jagatai marched down upon the Syr Daria (Jaxartes) by the pass of Taras and invested Otrar, the offending city. After a siege of five months the citadel was taken by assault, and Inaljuk and his followers were put to the sword. The conquerors levelled the walls with the ground, after having given the city over to pillage. At the same time a third army besieged and took Khojent on the Jaxartes; and yet a fourth, led by Jenghiz and his youngest son Tule, advanced in the direction of Bokhara. Tashkent and Nur surrendered on their approach, and after a short siege Bokhara fell into their hands. On entering the town Jenghiz ascended the steps of the principal mosque, and shouted to his followers, " The hay is cut; give your horses fodder." No second invitation to plunder was needed; the city was sacked, and the inhabitants either escaped beyond the walls or were compelled to submit to infamies which were worse than death. As a final act of vengeance the town was fired, and before the last of the Mongols left the district, the great mosque and certain palaces were the only buildings left to mark the spot where the " centre of science " once stood. From the ruins of Bokhara Jenghiz advanced along the valley of the Sogd to Samarkand, which, weakened by treachery, sur- rendered to him, as did also Balkh. But in neither case did submission save either the inhabitants from slaughter or the city from pillage. Beyond this point Jenghiz went no farther westward, but sent Tule, at the head of 70,000 men, to ravage Khorasan, and two flying columns under Chepe and Sabutai Bahadar to pursue after Mahommed who had taken refuge in Nishapur. Defeated and almost alone, Mahommed fled before his pursuers to the village of Astara on the shore of the Caspian Sea, where he died of an attack of pleurisy, leaving his empire to his son Jel aleddln (Jalal ud-din) . Meanwhile Tule carried his arms into the fertile province of Khorasan, and after having captured Nessa by assault appeared before Merv. By an act of atrocious treachery the Mongols gained possession of the. city, and, after their manner, sacked and burnt the town. From Merv Tule marched upon Nishapur, where he met with a most deter- mined resistance. For four days the garrison fought desperately on the walls and in the streets, but at length they were over-powered, and, with the exception of 400 artisans who were sent into Mongolia, every man, woman and child was slain. Herat escaped the fate which had overtaken Merv and Nishapur by

opening its gates to the Mongols. At this point of his vic- torious career Tule received an order to join Jenghiz before Talikhan in Badakshan, where that chieftain was preparing to renew his pursuit of Jelaleddin, after a check he had sustained in an engagement fought before Ghazni. As soon as sufficient

reinforcements arrived Jenghiz advanced against Jelaleddin, who had taken up a position on the banks of the Indus. Here the Turks, though far outnumbered, defended their ground with undaunted courage, until, beaten at all points, they fled in confusion. Jelaleddin, seeing that all was lost, mounted a fresh horse and jumped into the river, which flowed 20 ft. below. With admiring gaze Jenghiz watched the desperate venture of his enemy, and even saw without regret the dripping horseman mount the opposite bank. From the Indus Jenghiz sent in pursuit of Jelaleddin, who fled to Delhi, but failing to capture the fugitive the Mongols returned to Ghazni after having ravaged the provinces of Lahore, Peshawar and Melikpur. At this moment news reached Jenghiz that the inhabitants of Herat had deposed the governor whom Tule had appointed over the city, and had placed one of their own choice in his room. To punish this act of rebellion Jenghiz sent an army of 80,000 men against the offending city, which after a siege of six months was taken by assault. For a whole week the Mongols ceased not to kill, burn and destroy, and 1,600,000 persons are said to have been massacred within the walls. Having consummated this act of vengeance, Jenghiz returned to Mongolia by way of Balkh, Bokhara and Samarkand.

Meanwhile Chepe and Sabutai marched through Azerbeijan, and in the spring of 1222 advanced into Georgia. Here they defeated a combined force of Lesghians,, Circassians and Kip- chaks, and after taking Astrakhan followed the retreating Kip- chaks to the Don. The news of the approach of the mysterious enemy of whose name even they were ignorant was received by the Russian princes at Kiev with dismay. At the instigation, however, of Mitislaf , prince of Galicia, they assembled an opposing force on the Dnieper. Here they received envoys from the Mongol camp, whom' they barbarously put to death. " You have killed our envoys," was the answer made by the Mongols; " well, as you wish for war you shall have it. We have done you no harm. God is impartial; He will decide our quarrel." In the first battle, on the river Kaleza, the Russians were utterly routed, and fled before the invaders, who, after ravaging Great Bulgaria retired, gorged with booty, through the country of Saksin, along the river Aktuba, on their way to Mongolia.

In China the same success had attended the Mongol arms as in western Asia. The whole of the country north of the Yellow river, with the exception of one or two cities, was added to the Mongol rule, and, on the death of the Kin emperor Siian Tsung in 1223, the Kin empire virtually ceased to be, and Jenghiz's frontiers thus became conterminous with those of the Sung emperors who held sway over the whole of central and southern China. After his return from Central Asia, Jenghiz once more took the field in western China. While on this cam- paign the five planets appeared in a certain conjunction, which to the superstitiously minded Mongol chief

foretold that evil was awaiting him. With this presentiment strongly impressed upon him he turned his face homewards, and had advanced no farther than the Si-Kiang river in Kansuh when he was seized with an illness of which he died a short time afterwards (1227) at his travelling palace at Ha-lao-tu, on the banks of the river Sale in Mongolia. By the terms of his will Ogotai was appointed his successor, but so essential was it considered to be that his death should remain a secret until Ogotai was proclaimed that, as the funeral procession moved northwards to the great ordu on the banks of the Kerulen, the escort killed every one they met. The body of Jenghiz was then carried successively to the ordus of his several wives, and was finally laid to rest in the valley of Kilien.

Thus ended the career of one of the greatest conquerors the

world has ever seen. Born and nurtured as the chief of a petty

Mongolian tribe, he lived to see his armies victorious from the

I China Sea to the banks of the Dnieper; and, though the empire

which he created ultimately dwindled away under the hands of his degenerate descendants, leaving not a wrack behind, we have in the presence of the Turks in Europe a consequence of his rule, since it was the advance of his armies which drove their Osmanli ancestors from their original home in northern Asia, and thus led to their invasion of Bithynia under Othman, and finally their advance into Europe under Amurath I.

See Sir H. H. Howorth, The History of the Mongols; Sir Robert K. Douglas, The Life of Jenghiz Khan. (R. K. D.)

JENKIN, HENRY CHARLES FLEEMING (1833-1885), British engineer, was born near Dungeness on the 25th of March 1833, his father (d. 1885) being a naval commander, and his mother (d. 1885) a novelist of some literary repute, her best books perhaps being Cousin Stella (1859) and Who breaks, pays (1861). Fleem- ing Jenkin was educated at first in Scotland, but in 1846 the family went to live abroad, owing to financial straits, and he studied at Genoa University, where he took a first-class degree in physical science. In 1851 he began his engineering career as apprentice in an establishment at Manchester, and subsequently he entered Newall's submarine cable works at Birkenhead. In 1859 he began, in concert with Sir William Thomson (afterwards Lord Kelvin), to work on problems respecting the making and use of cables, and the importance of

his researches on the resis- tance of gutta-percha was at once recognized. From this time he was in constant request in connexion with submarine tele- graphy, and he became known also as an inventor. In partner- ship with Thomson, he made a large income as a consulting telegraph engineer. In 1865 he was elected F.R.S., and was appointed professor of engineering at University College, London. In 1868 he obtained the same professorship at Edinburgh Univer- sity, and in 1873 he published a. textbook of Magnetism and Electricity, full of original work. He was author of the article " Bridges " in the ninth edition of this encyclopaedia. His influence among the Edinburgh students was pronounced, and R. L. Stevenson's well-known Memoir is a sympathetic tribute to his ability and character. The meteoric charm of his conver- sation is well described in Stevenson's essay on " Talk and Talkers," under the name of Cockshot. Jenkin's interests were by no means confined to engineering, but extended to the arts and literature; his miscellaneous papers, showing his critical and unconventional views, were issued posthumously in two volumes (1887). In 1882 Jenkin invented an automatic method of electric transport for goods — " telpherage " — but the completion of its details was prevented by his death on the 12th of June 1885. A telpher line on his system was subsequently erected at Glynde in Sussex. He was also well known as a sanitary reformer, and during the last ten years of his life he did much useful work in inculcating more enlightened ideas on the subject both in Edinburgh and other places.

JENKINS, SIR LEOLINE (1623-1685), English lawyer and diplomatist, was the son of a Welsh country gentleman. He was born in 1623 and was educated at Jesus College, Oxford, of which he was elected a fellow at the Restoration in 1660, having been an ardent royalist during the civil war and commonwealth; and in 1 66 1 he became head of the college. In the same year he was made registrar of the consistory court of Westminster; in 1664 deputy judge of the court of arches; about a year later judge of the admiralty court; in 1689 judge of the prerogative court of Canterbury. In these offices Jenkins did enduring work in eluci- dating and establishing legal principles, especially in relation to international law and admiralty jurisdiction. He was selected to draw up the claim of Charles II. to succeed to the property of his mother, Henrietta Maria, on her death in August 1666, and while in Paris for this purpose he succeeded in defeating the rival claim of the duchess of Orleans, being rewarded by a knighthood on his return. In 1673, on being elected member for Hythe, Jenkins resigned the headship of Jesus College. He was one of the English representatives at the congress of Cologne in 1673, and at the more important congress of Nijmwegen in 1676- 1679. He was made a privy councillor in February 1680 and became secretary of state in April of the same year, in which office he was the official leader of the opposition to the Exclusion

Bill, thotfgh he was by no means a pliant tool in the hands of the court. He resigned office in 1684, and died on the 1st of Sep- tember 1685. He left most of his property to Jesus College, Oxford, including his books, which he bequeathed to the college library, built by himself; and he left some important manuscripts to All Souls College, where they are preserved. Jenkins left his impress on the law of England in the Statute of Frauds, and the Statute of Distributions, of which he was the principal author, and of which the former profoundly affected the mercantile law of the country, while the latter regulated the inheritance of the personal property of intestates. He was never married.

See William Wynne, Life of Sir Leoline Jenkins (2 vols., London, 1724), which contains a number of his diplomatic despatches, letters, speeches and other papers. See also Sir William Temple, Works, vol. ii. (4_ vols., 1770); Anthony a Wood, Athenae Oxonienses (Fasti) edited by P. Bliss (4 vols., London, 1813-1820), and History and Antiquities of the University of Oxford, edited by J. Gutch (Oxford,

1792-1796).

JENKINS, ROBERT (fl. 1731-1745), English master mariner, is known as the protagonist of the " Jenkins's ear " incident, which, magnified in England by the press and the opposition, became a contributory cause of the war between England and Spain (1739). Bringing home the brig " Rebecca " from the West Indies in 1731, Jenkins was boarded by a Spanish guarda-costa, whose commander rifled the holds and cut off one of his ears. On arriving in England Jenkins stated his grievance to the king, and a report was furnished by the commander-in-chief in the West Indies confirming his account. At first the case created no great stir, but in 1738 he repeated his story with dramatic detail before a committee of the House of Commons, producing what purported to.be the ear that had been cut off. Afterwards it was suggested that he might have lost tlje ear in the pillory.

Jenkins was subsequently given the command of a ship in the East India Company s service, and later became supervisor of the company's affairs at St Helena. In 1741 he was sent from England to that island to investigate charges of corruption brought against the acting governor, and from May 1741 until March 1742 he admin- istered the affairs of the island. Thereafter he resumed his naval career, and is stated in an action with a pirate vessel to have pre- served his own vessel and three others under his care (see T. H. Brooke, History of the Island of St Helena (London, 2nd ed., 1824), and H. R. Janisch, Extracts from the St Helena Records, 1885).*

JENKS, JEREMIAH WHIPPLE (1856-), American econo- mist, was born

in St Clair, Michigan, on the 2nd of September 1856. He graduated at the university of Michigan in 1878; taught Greek, Latin and German in Mt. Morris College, Illinois; studied in Germany, receiving the degree of Ph.D. from the university of Halle in 1885; taught political science and English literature at Knox College, Galesburg, 111., in 1886-1889; was prof essor of political economy and social science at Indiana State University in 1 889-1891; and was successively professor of politi- cal, municipal and social institutions (1891-1892), professor of political economy and civil and social institutions (1892-1901), and after 1901 professor of political economy and politics at Cornell University. In 1899-1901 he served as an expert agent of the United States industrial commission on investigation of trusts and industrial combinations in the United States and Europe, and contributed to vols, i., viii. and xiii. of this commission's report (1900 and 1901), vol. viii. being a report, written wholly by him, on industrial combinations in Europe. In 1901-1902 he was special commissioner of the United States war department on colonial administration, and wrote a Report on Certain Economic Questions in the English and Dutch Colonies in the Orient, published (1902) by the bureau of insular affairs; and in 1903 he was adviser to the Mexican ministry of finance on pro- jected currency changes. In 1903-1904 he was a member of the United States commission on international exchange, in especial charge of the reform of currency in China; in 1905 he was special representative of the United States with the imperial Chinese special mission visiting the United States. In 1907 he became a member of the United States immigration commission. Best known as an expert oh " trusts," he has written besides on elec- tions, ballot reform, proportional representation, on education (especially as a training for citizenship), on legislation regarding highways. &c.

His principal published works are Henry C. Carey als National- okonom (Halle a. S., 1885) ; The Trust Problem (1900; revised 1903) ; Great Fortunes (1906); Citizenship and the Schools (1906); and Prin- ciples of Politics (1909).

JENN£, a city oL West Africa, formerly the capital of the Songhoi empire, now included in the French colony of Upper Senegal and Niger. Jenne is situated on a marigot or natural canal connecting the Niger and its affluent the Bani or Mahel Balevel, and is within a few miles of the latter stream. It lies 250 m. S.W. of Timbuktu in a straight line. The city is sur- rounded by channels connected with the Bani but in the dry season it ceases to be an island. On the north is the Moorish quarter; on the north-west, the oldest part of the city, stood the citadel, converted by the French since 1893 into

a modern fort. The market-place is midway between the fort and the commercial harbour. The old mosque, partially destroyed in 1830, covered a large area in the south-west portion of the city. It was built on the site of the ancient palace of the Songhoi kings. The architecture of many of the buildings bears a resemblance to Egyptian, the facades of the houses being adorned with great buttresses of pylonic form. There is little trace of the influence of Moorish or Arabian art. The build- ings are mostly constructed of clay made into flat long bricks. Massive clay walls surround the city. The inhabitants are great traders and the principal merchants have representatives at Timbuktu and all the chief places on the Niger. The boats built at Jenne are famous throughout the western Sudan.

Jenne is believed to have been founded by the Songhoi in the 5th century, and though it has passed under the dominion of many races it has never been destroyed. Jenne seems to have been at the height of its power from the 12th to the 16th century, when its merchandise was found at every port along the west coast of Africa. From this circumstance it is conjectured that Jenne (Guinea) gave its name to the whole coast (see Guinea). Subsequently, under the control of Moorish, Tuareg and Fula invaders, the importance of the city greatly declined. With the advent of the French, commerce again began to flourish.

See F. Dubois, Tombouctou la mysterieuse (Paris, 1897), in which several chapters are devoted to Jenne; also Songhoi; Timbuktu; and Senegal.

JENNER, EDWARD (1749-1823), English physician and discoverer of vaccination, was born at Berkeley, Gloucestershire, on the 17th of May 1749. His father, the Rev. Stephen Jenner, rector of Rockhampton and vicar of Berkeley, came of a family that had been long established in that county, and was possessed of considerable landed property; he died when Edward was only six years old, but his eldest son, the Rev. Stephen Jenner, brought his brother up with paternal care and tenderness. Edward received his early education at Wotton-under-Edge and Cirencester, where he already showed a strong taste for natural history. The medical profession having been selected for him, he began his studies under Daniel Ludlow, a surgeon of Sodbury near Bristol; but in his twenty-first year he proceeded to London, where he became a favourite pupil of John Hunter, in whose house he resided for two years. During this period he was employed by Sir Joseph Banks to arrange and prepare the valuable zoological specimens which he had brought back from Captain Cook's first voyage in 1771. He must have acquitted himself satisfactorily in this task, since he was offered the post of naturalist in the second expedition, but declined it as well as other advantageous offers, preferring rather to practise his profession in his native place, and near his eldest brother, to whom he was much attached. He was the principal founder of a local medical society, to which he

contribute several papers of marked ability, in one of which he apparently anticipated later discoveries concerning rheumatic inflammations of the heart. He maintained a correspondence with John Hunter, under whose direction he investigated various points in biology, particularly the hibernation of hedgehogs and habits of the cuckoo; his paper on the latter subject was laid by Hunter before the Royal Society, and appeared in the Phil. Trans, for 1788. He also devoted considerable attention to the*

varied geological character of the district in which he lived, and constructed the first balloon seen in those parts. He was a great favourite in general society, from his agreeable and instructive conversation, and the many accomplishments he possessed. Thus he was a fair musician, both as a part singer and as a per- former on the violin and flute, and a very successful writer, after the fashion of that time, of fugitive pieces of verse. In 1788 he married Catherine Kingscote, and in 1792 he obtained the degree of doctor of medicine from St Andrews.

Meanwhile the discovery that is associated with his name had been slowly maturing in his mind. When only an apprentice at Sodbury, his attention had been directed to the relations between cow-pox and small-pox in connexion with a popular belief which he found current in Gloucestershire, as to the antagon- ism between these two diseases. During his stay in London he appears to have mentioned the thing repeatedly to Hunter, who, being engrossed by other important pursuits, was not so strongly persuaded as Jenner was of its possible importance, yet spoke of it to his friends and in his lectures. After he began practice in Berkeley, Jenner was always accustomed to inquire what his professional brethren thought of it; but he found that, when medical men had noticed the popular report at all, they supposed it to be based on imperfect induction. His first careful investigation of the subject dated from about 1775, and five years elapsed before he had succeeded in clearing away the most per- plexing difficulties by which it was surrounded. He first satisfied himself that two different forms of disease had been hitherto confounded under the term cow-pox, only one of which protected against small-pox, and that many of the cases of failure were to be thus accounted for; and his next step was to ascertain that the true cow-pox itself only protects when communicated at a particular stage of the disease. At the same time he came to the conclusion that " the grease " of horses is the same disease as cow-pox and small-pox, each being modified by the organism in which it was developed. For many years, cow-pox being scarce in his county, he had no opportunity of inoculating the disease, and so putting his discovery to the test, but he did all he could in the way of collecting information and communi- cating what he had ascertained. Thus in 1788 he carried a drawing of the cow-pox, as seen on the hands of a milkmaid, to London, and showed it to Sir E. Home and others, who agreed that it was " an interesting and curious subject." At

length, on the 14th of May 1796, he was able to inoculate James Phipps, a boy about eight years old, with matter from cow-pox vesicles on the hand of Sarah Nelmes. On the 1st of the follow- ing July the boy was carefully inoculated with variolous matter, but (as Jenner had predicted) no small-pox followed. The dis- covery was now complete, but Jenner was unable to repeat his experiment until 1798, owing to the disappearance of cow-pox from the dairies. He then repeated his inoculations with the utmost care, and prepared a pamphlet {Inquiry into the Cause and Effects of the Variolae Vaccinae) which should announce his dis- covery to the world. Before publishing it, however, he thought it well to visit London, so as to demonstrate the truth of his assertions to his friends; but he remained in London nearly three months, without being able to find any person who would submit to be vaccinated. Soon after he had returned home, however, Henry Cline, surgeon of St Thomas's Hospital, inoculated some vaccine matter obtained from him over the diseased hip-joint of a child, thinking the counter-irritation might be useful, and found the patient afterwards incapable of acquiring small-pox. In the autumn of the same year, Jenner met with the first opposition to vaccination; and this was the more formidable because it pro- ceded from J. Ingenhousz, a celebrated physician and man of science. But meanwhile Cline's advocacy of vaccination brought it much more decidedly before the medical profession, of whom the majority were prudent enough to suspend their judgment until they had more ample information. But besides these there were two noisy and troublesome factions, one of which opposed vaccination as a useless and dangerous practice, while the other endangered its success much more by rash and self- seeking advocacy. At the head of the latter was George Pearson,

who in November 1798 published a pamphlet speculating upon the subject, before even seeing a case of cow-pox, and after- wards endeavoured, by lecturing on the subject and supplying the virus, to put himself forward as the chief agent in the cause. The matter which he distributed, which had been derived from cows that were found to be infected in London, was found fre- quently to produce, not the slight disease described by Jenner, but more or less severe eruptions resembling small-pox. Jenner concluded at once that this was due to an accidental contamina- tion of the vaccine with variolous matter, and a visit to London in the spring of 1799 convinced him that this was the case. In the course of this year the practice of vaccination spread over England, being urged principally by non-professional persons of position ; and towards its close attempts were made to found insti- tutions for gratuitous vaccination and for supplying lymph to

all who might apply for it. Pearson proposed to establish one of these in London, without Jenner's knowledge, in which he offered him the post of honorary corresponding physician! On learning of this scheme to supplant him, and to carry on an institution for public vaccination on principles which he knew to be partly erroneous, Jenner once more visited London early in 1800, when he had influence enough to secure the abandonment of the project. He was afterwards presented to the king, the queen and the prince of Wales, whose encouragement materially aided the spread of vaccination in England. Meanwhile it had made rapid progress in the United States, where it was introduced by Benjamin Waterhouse, then professor of physic at Harvard, and on the continent of Europe, where it was at first diffused by De Carro of Vienna. In consequence of the war between England and France, the discovery was later in reaching Paris; but, its importance once realized, it spread rapidly over France, Spain and Italy.

A few of the incidents connected with its extension may be mentioned. Perhaps the most striking is the expedition which was sent out by the court of Spain in 1803, for the purpose of diffusing cow-pox through all the Spanish possessions in the Old and New Worlds, and which returned in three years, [having circumnavigated the globe, and succeeded beyond its utmost expectations. Clergymen in Geneva and Holland urged vacci- nation upon their parishioners from the pulpit; in Sicily, South America and Naples religious processions were formed for the purpose of receiving it ; the anniversary of Jenner's birthday, or of the successful vaccination of James Phipps, was for many years celebrated as a feast in Germany; and the empress of Russia caused the first child operated upon to receive the name of Vaccinov, and to be educated at the public expense. About the close of the year 1801 Jenner's friends in Gloucester- shire presented him with a small service of plate as a testimonial of the esteem in which they held his discovery. This was in- tended merely as a preliminary to the presenting of a petition to parliament for a grant. The petition was presented in 1802, and was referred to a committee, of which the investigations resulted in a report in favour of the grant, and ultimately in a vote of £10,000.

Towards the end of 1802 steps were taken to form a society for the proper spread of vaccination in London, and the Royal Jennerian Society was finally established, Jenner returning to town to preside at the first meeting. This institution began very prosperously, more than twelve thousand persons having been inoculated in the first eighteen months, and with such effect that the deaths from small-pox, which for the latter half of the r8th century had averaged 2018 annually, fell in 1804 to 622. Unfor- tunately the chief resident inoculator soon set himself up as an authority opposed to Jenner, and this led to such dissensions as caused the society to die out in

1808.

Jenner was led, by the language of the chancellor of the ex- chequer when his grant was proposed, to attempt practice in London, but after a year's trial he returned to Berkeley. His grant was not paid until 1804, and then, after the deduction of about £1000 for fees, it did little more than pay the expenses attendant upon his discovery. For he was so thoroughly known every- where as the discoverer of vaccination that, as he himself said, he

was " the vaccine clerk of the whole world." At the same time he continued to vaccinate gratuitously all the poor who applied to him on certain days, so that he sometimes had as many as three hundred persons waiting at his door. Meanwhile honours began to shower upon him from abroad: he \ˆs elected a member of almost all the chief scientific societies on the continent of Europe, the first being that of Gottingen, where he was pro- posed by J. F. Blumenbach. But perhaps the most flattering proof of his influence was derived from France. On one occasion, when he was endeavouring to obtain the release of some of the unfortunate Englishmen who had been detained in France on the sudden termination of the Peace of Amiens, Napoleon was about to reject the petition, when Josephine uttered the name of Jenner. The emperor paused and exclaimed: " Ah, we can refuse nothing to that name." Somewhat later he did the same service to Englishmen confined in Mexico and in Austria; and during the latter part of the great war persons before leaving England would sometimes obtain certificates signed by him which served as passports. In his own country his merits were less Tecognized. His applications on behalf of French prisoners in England were less successful; he never shared in any of the patronage at the disposal of the government, and was even unable to obtain a living for his nephew George.

In 1806 Lord Henry Petty (afterwards the marquess of Lans- downe) became chancellor of the exchequer, and was so con- vinced of the inadequacy of the former parliamentary grant that he proposed an address to the Crown, praying that the college of physicians should be directed to report upon the success of vaccination. Their report being strongly in its favour, the then chancellor of the exchequer (Spencer Perceval) proposed that a sum of £10,000 without any deductions should be paid to Jenner. The anti-vaccinationists found but one advocate in the House of Commons; and finally the sum was raised to £20,000. Jenner, however, at the same time had the mortification of learning that government did not intend to take any steps towards checking small-pox inoculation, which so persistently kept up that disease. About the same time a subscription for his benefit was begun in India, where his discovery had been gratefully received, but the full amount of this (£7383) only reached him in 181 2.

The Royal Jennerian Society having failed, the national vaccine establishment was founded, for the extension of vaccination, in 1808. Jenner spent five months in London for the purpose of organizing it, but was then obliged, by the dangerous illness of one of his sons, to return to Berkeley. He had been appointed director of the institution; but he had no sooner left London than Sir Lucas Pepys, president of the college of physicians, neglected his recommendations, and formed the board out of the officials of that college and the college of surgeons. Jenner at once resigned his post as director, though he continued to give the benefit of his advice whenever it was needed, and this resigna- tion was a bitter mortification to him. In 1810 his eldest son died, and Jenner's grief at his loss, and his incessant labours, materially affected his health. In 1813 the university of Oxford conferred on him the degree of M.D. It was believed that this would lead to his election into the college of physicians, but that learned body decided that he could not be admitted until he had undergone an examination in classics. This Jenner at once refused; to brush up his classics would, he said, " be irksome beyond measure. I would not do it for a diadem. That indeed would be a bauble; I would not do it for John Hunter's museum."

He visited London for the last time in 18 14, when he was presented to the Allied Sovereigns and to most of the principal personages who accompanied them. In the next year his wife's death was the signal for him to retire from public life: he never left Berkeley again, except for a day or two, as long as he lived. He found sufficient occupation for the remainder of his life in collecting further evidence on some points connected with his great discovery, and in his engagements as a physician, a naturalist and a magistrate. In 1818 a severe epidemic of small-pox prevailed, and fresh doubts were thrown on the

efficacy of vaccination, in part apparently owing to the bad quality of the vaccine lymph employed. This caused Jenner much annoyance, which was relieved by an able defence of the practice, written by Sir Gilbert Blane. But this led him, in 1 82 1, to send a circular letter to most of the medical men in the kingdom inquiring into the effect of other skin diseases in modifying the progress of cow-pox. A year later he published his last work, On the Influence of Artificial Eruptions in Certain Diseases; and in 1823 he presented his last paper — " On the Migration of Birds " — to the Royal Society. On the 24th of January 1823 he retired to rest apparently as well as usual, and next morning rose and came down to his library, where he was found insensible on the floor, in a state of apoplexy, and with the right

side paralysed. He never rallied, and died on the following morning.

A public subscription was set on foot, shortly after his death, by the medical men of his county, for the purpose of erecting some memorial in his honour, and with much difficulty a suffi- cient sum was raised to enable a statue to be placed in Gloucester Cathedral. In 1 8 50 another attempt was made to set up a monu- ment to him; this appears to have failed, but at length, in 1858, a statue of him was erected by public subscription in London.

Jenner's life was written by the intimate friend of his later years, Dr John Baron of Gloucester (2 vols., 1827, 1838). See also Vaccination.

JENNER, SIR WILLIAM, Bart. (1815-1808), English physician, was born at Chatham on the 30th of January 1815, and educated at University College, London. He became M.R.C.S. in 1837, and F.R.C.P. in 1852, and in 1844 took the London M.D. In 1847 he began at the London fever hospital investigations into cases of " continued " fever which enabled him finally to make the distinction between typhus and typhoid on which his reputation as a pathologist principally rests. In 1849 he was appointed pro- fessor of pathological anatomy at University College, and also assistant physician to University College Hospital, where he afterwards becamephysician(i854-i876)andconsultingphysician (1879), besides holding similar appointments at other hospitals. He was also successively Holme professor of clinical medicine and professor of the principles and practice of medicine at University College. He was president of the college of physicians (1 881-1888) ; he was elected F.R.S. in 1864, and received honorary degrees from Oxford, Cambridge and Edinburgh. In 1861 he was appointed physician extraordinary, and in 1862 physician in ordinary, to Queen Victoria, and in 1863 physician in ordinary to the prince of Wales; he attended both the prince consort and the prince of Wales in their attacks of typhoid fever. In 1868 he was created a baronet. As a consultant Sir William Jenner had a great reputation, and he left a large fortune when he died, at Bishop's Waltham, Hants, on the nth of December 1898, having then retired from practice for eight years owing to failing health.

JENNET, a small Spanish horse; the word is sometimes applied in English to a mule, the offspring of a she-ass and a stallion. Jennet comes, through Fr. genet, from Span, jinete, a light horseman who rides d la gineta, explained as " with his legs tucked up." The name is taken to be a corruption of the Arabic Zenata, a Berber tribe famed for its cavalry. English and French transferred the word from the rider to his horse, a meaning which the word has only acquired in Spain in modern times.

JENOLAN CAVES, a series of remarkable caverns in Roxburgh county,

New South Wales, Australia; 113 m. W. by N. of Sydney, and 36 m. from Tarana, which is served by railway. They are the most celebrated of several similar groups in the limestone of the country; they have not .yielded fossils of great interest, but the stalactitic formations, sometimes pure white, are of extraordinary beauty. The caves have been rendered easily accessible to visitors and lighted by electricity.

JENSEN, WILHELM (1837-), German author, was born at Heiligenhafen in Holstein on the 15th of February 1837, the son of a local Danish magistrate, who came of old patrician Frisian stock. After attending the classical schools at Kiel and

Liibeck, Jensen studied medicine at the universities of Kiel, Wiirzburg and Breslau. He, however, abandoned the medical profession for that of letters, and after engaging for some years in individual private study proceeded to Munich, where he associated with men of letters. After a residence in Stuttgart (1865-1869), where for a short time he conducted the Schwabische Volks-Zeitung, he became editor in Flensburg of the Norddeutsche Zeitung. In 1872 he again returned to Kiel, lived from 1876 to 1888 in Freiburg im Breisgau, and since 1888 has been resident in Munich.

Jensen is perhaps the most fertile of modern German writers of fiction, more than one hundred works having proceeded from his pen; but only comparatively few of them have caught the public taste; such are the novels, Karin von Schweden (Berlin, 1878); Die braune Erica (Berlin, 1868) ; and the tale, Die Pfeifer von Dusenbach, Eine Geschichte aus dem Elsass (1884). Among others may be mentioned: Barthenia (Berlin, 1877) ; Gotz und Gisela (Berlin, 1886) ; Heimkunft (Dresden, 1894); Aus See und Sand (Dresden, 1897); Luv und Lee (Berlin, 1897) ; and the narratives, Aus den Tagen der Hansa (Leipzig, 1885); Aus stiller Zeit (Berlin, 1881-1885); and Heimath (1901). Jensen also published some tragedies, among which Dido (Berlin, 1870) and Der Kampf fur's Reich (Freiburg im Br., 1884) may be mentioned.

JENYNS, SOAME (1 704-1 787), English author, was born in London on the 1st of January 1704, and was educated at St John's College, Cambridge. In 1742 he was chosen M.P. for Cambridgeshire, in which his property lay, and he afterwards sat for the borough of Dunwich and the town of Cambridge. From 1755 to 1780 he was one of the commissioners of the board of trade. He died on the 18th of December 1787.

For the measure of literary repute which he enjoyed during his life Jenyns was indebted as much to his wealth and social stand- ing as to his accomplishments and talents, though both were' considerable. His poetical works, the Art of Dancing (1727) and Miscellanies (1770), contain many

passages graceful and lively though occasionally verging on licence. The first of his prose works was his Free Inquiry into the Nature and Origin of Evil (1756). This essay was severely criticized on its appearance, especially by Samuel Johnson in the Literary Magazine. John- son, in a slashing review — the best paper of the kind he ever wrote — condemned the book as a slight and shallow attempt to solve one of the most difficult of moral problems. Jenyns, a gentle and amiable man in the main, was extremely irritated by his failure. He put forth a second edition of his work, prefaced by a vindication, and tried to take vengeance on Johnson after his death by a sarcastic epitaph. 1 In 1776 Jenyns published his View of the Internal Evidence of the Christian Religion. Though at one period of his life he had affected a kind of deistic scepticism, he had now returned to orthodoxy, and there seems no reason to doubt his sincerity, questioned at the time, in defending Christianity on the ground of its total variance with the prin- ciples of human reason. The work was deservedly praised in its day for its literary merits, but is so plainly the production of an amateur in theology that as a scientific treatise it is valueless.

A collected edition of the works of Jenyns appeared in 1790, with a biography by Charles Nalson Cole. There are several references to him in Boswell's Johnson.

JEOPARDY, a term meaning risk or danger of death, loss or other injury. The word, in Mid. Eng. juparti, jeupartie, &c, was adapted from O. Fr. ju, later jeu, and parti, even game, in medieval Latin focus partitus. This term was originally used of a problem in chess or of a stage in any other game at which the chances of success or failure are evenly divided between the players. It was thus early transformed to any state of uncertainty.

JEPHSON, ROBERT (1736-1803), British dramatist, was born in Ireland. After serving for some years in the British army, he retired with the rank of captain, and lived in England, where he was the friend of Garrick, Reynolds, Goldsmith, Johnson, Burke, Burney and Charles Townshend. His appoint- ment as master of the horse to the lord-lieutenant of Ireland

1 Two lines will suffice : —

Boswell and Thrale, retailers of his wit,

Will tell you how he wrote, and talk'd, and cough 'd, and spit.

took him back to Dublin. He published, in the Mercury news- paper a series of articles in defence of the lord-lieutenant's administration which were afterwards collected and issued in book form under the title of The Bachelor, or Speculations of Jeojfry Wagstafe. A pension of £300, afterwards doubled, was granted him, and he held his appointment under twelve succeeding viceroys. From 1775 he was engaged in the writing of plays. Among others, his tragedy Braganza was successfully performed at Drury Lane in 1775, Conspiracy in 1796, The Law of Lombardy in 1770, and The Count of Narbonne at Covent Garden in 1781. In 1794 he published an heroic poem Roman Portraits, and The Confessions of Jacques Baptists Couteau, a satire on the excesses of the French Revolution. He died at Blackrock, near Dublin, on the 31st of May 1803.

JEPHTHAH, one of the judges of Israel, in the Bible, was an illegitimate son of Gilead, and, being expelled from his father's house by his lawful brethren, took refuge in the Syrian land of Tob, where he gathered around him a powerful band of homeless men like himself. The Ammonites pressing hard on his country- men, the elders of Gilead called for his help, which he consented to give on condition that in the event of victory he should be made their head (Judg. xi. i-xii. 7). His name is best known in history and literature in connexion with his vow, which led to the sacrifice of his daughter on his successful return. The reluct- ance shown by many writers in accepting the plain sense of the narrative on this point proceeds to a large extent on unwarranted assumptions as to the stage of ethical development which had been reached in Israel in the period of the judges, or at the time when the narrative took shape. The annual lamentation of the women for her death suggests a mythical origin (see Adonis). Attached to the narrative is an account of a quarrel between Jephthah and the Ephraimites. The latter were defeated, and their retreat was cut off by the Gileadites, who had seized the fords of the Jordan. As the fugitives attempted to cross they were bidden to say " shibboleth " (" flood" or " ear of corn"), and those who said " sibboleth " (the Ephraimites apparently being unused to sh), were at once put to death. In this way 42,000 of the tribe were killed. 1

The loose connexion between this and the main narrative, as also the lengthy speech to the children of Ammon (xi. 14-27), which really relates to Moab, has led some writers to infer that two distinct heroes and situations have been combined. See further the com- mentaries on the Book of Judges (q.v.), and Cheyne, Ency. Bib., art. " Jephthah." (S. A. C.)

JERAHMEEL, (Heb. " May God pity"), in the Bible, a clan which with Caleb, the Kenites and others, occupied the southern steppes of Palestine, probably in the district around Arad, about 17 m. S. of Hebron. It was on friendly terms with David during his residence at Ziklag (1 Sam. xxx. 29),

and it was apparently in his reign that the various elements of the south were united and were reckoned to Israel. This is expressed in the chronicler's genealogies which make Jerahmeel and Caleb descendants of Judah (see David; Judah).

On the names in 1 Chron. ii. see S. A. Cook, Ency. Bib., col. 2363 seq. Peieth (v. 33) may be the origin of the Pelethites (2 Sam. viii. 18; xv. 18; xx. 7), and since the name occurs in the revolt of Korah (Num. xvi. 1), it is possible that Jerahmeel, like Caleb and the Kenites, had moved northwards from Kadesh. Samuel (q.v.) was of Jerahmeel (1 Sam. i. 1; Septuagint), and the consecutive Jerahmeelite names Nathan and Zabad (1 Chron. ii. 36) have been associated with the prophet and officer (Zabud, 1 Kings iv. 5) of the times of David and Solomon respectively. The association of Samuel and Nathan with this clan, if correct, is a further illustra- tion of the importance of the south for the growth of biblical history (see Kenites and Rechabites). The Chronicles of Jerahmeel (M. Gaster, Oriental Translation Fund, 1899) is a late production containing a number of apocryphal Jewish legends of no historical value. (S. A. C.)

1 Similarly a Syrian story tells how the Druses came to slay Ibrahim Pasha's troops, and desiring to spare the Syrians ordered the men to say gatnal (camel). As the Syrians pronounce the g soft, and the Egyptians the g, hard, the former were easily identified. Other examples from the East will be found in H. C. Kay, yaman, p. 36, and in S. Lane-Poole, History of Egypt in the Middle Ages, p. 300. Also, at the Sicilian Vespers (March 13, 1282) the French were made to betray themselves by their pronunciation of ceci and ciceri (Ital. c like tch ; Fr. c like s).

JERBA, an island off the coast of North Africa in the Gulf of Gabes, forming part of the regency of Tunisia. It is separated from the mainland by two narrow straits, and save for these channels blocks the entrance to a large bight identified with the Lake Triton of the Romans. The western strait, opening into the Gulf of Gabes, is a mile and a half broad; the eastern strait is wider, but at low water it is possible to cross to the mainland by the Tarik-el-Jemil (road of the camel). The island is irregular in outline, its greatest length and breadth being some 20 m., and its area 425 sq. m. It contains neither rivers nor springs, but is supplied with water by wells and cisterns. It is flat and well wooded with date palms and olive trees. Pop. 35,000 to 40,000, the bulk of the inhabitants being Berbers. Though many of them have adopted Arabic a Berber idiom is commonly spoken. An affinity exists between the Berbers of Jerba and the Beni Mzab. About 3000 Jews live apart in villages of their own, and some 400 Europeans, chiefly Maltese and Greeks, are settled in the island. Jerba has a considerable reputation for the manufacture of the woollen tissues interwoven with silk which are known as burnous stuffs; a market for the

sale of sponges is held from November till March; and there is a considerable export trade in olives, dates, figs and other fruits. – The capital, trading centre and usual landing-place are at Haumt-es-Suk (market quarter) on the north side of the island (pop. 2500). Here are a medieval fort, built by the Spaniards in 1284, and a modern fort, garrisoned by the French. Gallala, to the south, is noted for the manufacture of a kind of white pottery, much prized. At El Kantara (the bridge) on the eastern strait, and formerly con- nected with the mainland by a causeway, are extensive ruins of a Roman city — probably those of Meninx, once a flourishing seaport.

Jerba is the Lotophagitis or Lotus-eaters' Island of the Greek and Roman geographers, and is also identified with the Brachion of Scylax. The modern name appears as early as the 4th' century in Sextus Aurelius Victor. In the middle ages the possession of Jerba was contested by the Normans of Sicily, the Spaniards and the Turks, the Turks proving victorious. In 1560 after the destruction of the Spanish fleet off the coast of the island by Piali Pasha and the corsair Dragut the Spanish garrison at Haumt-es-Suk was exterminated, and a pyramid, 10 ft. broad at the base and 20 ft. high, was built of their skulls and other bones. In 1848 this pyramid was pulled down at the instance of the Christian community, and the bones were buried in the Catholic cemetery. In general, from the Arab invasion in the 7 th century Jerba shared the fortunes of Tunisia.

See H. Barth, Wanderungen durch die Kustenl. des Mittelmeeres (Berlin, 1849); and H. von Maltzan, Reise in Tunis und Tripolis (Leipzig, 1870).

JERBOA, properly the name of an Arabian and North African jumping rodent mammal, Jaculus aegyptius (also known as Jaculus, or Dipus, jaculus) typifying the family Jaculidae (or Dipodidae), but in a wider sense applied to most of the repre sentatives of that family, which are widely distributed over the desert and semi-desert tracts of the Old World, although un- known in Africa south of the Sahara. In all the more typical members of the family the three middle metatarsals of the long hind-legs are fused into a cannon-bone; and in the true jerboas of the genus Jaculus the two lateral toes, with their supporting metatarsals, are lost, although they are present in the alactagas (Alactaga), in which, however, as in certain allied genera, only the three middle toes are functional. As regards the true jerboas, there is a curious resemblance in the structure of their hind-legs to that obtaining among birds. In both groups, for instance, the lower part of the hind-leg is formed by a long, slender cannon-bone, or metatarsus, terminating inferiorly in triple condyles for the three long and sharply clawed toes, the resemblance being increased by the fact that in both cases the small bone of the leg (fibula) is fused with the large one (tibia). It may also be noticed that in mammals and birds which hop on

two legs, such as jerboas, kangaroos, thrushes and

finches, the proportionate length of the thigh-bone or femur to the tibia and foot (metatarsus and toes) is constant, being 2 to 5; in animals, on the other hand, such as hares, horses and frogs, which use all four feet, the corresponding lengths are 4 to 7. The resemblance between the jerboa's and the bird's skeleton is owing to adaptation to a similar mode of existence. In the young jerboa the proportion of the femur to the rest of the leg is the same as in ordinary running animals. Further, at an early stage of development the fibula is a complete and separate bone, while the three metatarsals, which subsequently fuse together to form the cannon-bone, are likewise separate. In addition to their long hind and short fore limbs, jerboas are mostly charac- terized by their silky coats — of a fawn colour to harmonize with their desert surroundings — their large eyes, and long tails and ears. As is always the case with large-eared animals, the tympanic bullae of the skull are of unusually large size; the size varying in the different genera according to that of the ears. (For the characteristics of the family and of its more important generic representatives, see Rodentia.)

In the Egyptian jerboa the length of the body is 8 in., and that of the tail, which is long, cylindrical and covered with short hair terminated by a tuft, 10 in. The five-toed front limbs are ex- tremely short, while the hind pair are six times as long. When about to spring, this jerboa raises its body by means of the hinder extremities, and supports itself at the same time upon its tail, while the fore-feet are so closely pressed to the breast as to be scarcely visible, which doubtless suggested the name Dipus, or two- footed. It then leaps into the air and alights upon its four feet, but instantaneously electing itself, it makes another spring, and so on in such rapid succession as to appear as if rather flying than running. It is a gregarious animal, living in considerable colonies in burrows, which it excavates with its nails and teeth in the sandy soil of Egypt and Arabia. In these it remains during great part of the day, emerging at night in search of the herbs on which it feeds. It is exceedingly shy, and this, together with its extraordinary agility, renders it difficult to capture. The Arabs, however, succeed by closing up all the exits from the burrows with a single exception, by which the rodents are forced to escape, and over which a net is placed for their capture. When confined, they will gnaw through the hardest wood in order to make their escape. The Persian jerboa (Alactaga indica) is also a nocturnal burrowing animal, feeding chiefly on grain, which it stores up in underground repositories, , closing these when full, and only drawing upon them when the supply ' of food above ground is exhausted (see also

Jumping Mouse).

(R. L.)*

JERDAN, WILLIAM (1 782-1860), Scottish journalist, was born on the 16th of April 1782, at Kelso, Scotland. During the years between 1799 and 1806 he spent short periods in a country lawyer's office, a London West India merchant's counting- house, an Edinburgh solicitor's chambers,and held the position of surgeon's mate on board H.M. guardship "Gladiator" in Ports- mouth Harbour, under his uncle, who was surgeon. He went to London in 1806, and became a newspaper reporter. He was in the lobby of the House of Commons on the nth of May 181 2 when Spencer Perceval was shot, and was the first to seize the assassin. By 181 2 he had become editor of The Sun, a semi-official Tory paper; he occasionally inserted literary articles, then quite an unusual proceeding; but a quarrel with the chief proprietor brought that engagement to a close in 181 7. He passed next to the editor's chair of the Literary Gazette, which he conducted with success for thirty-four years. Jerdan's position as editor brought him into contact with many distinguished writers. An account of his friends, among whom Canning was a special intimate, is to be found in his Men I have Known (1866). When Jerdan retired in 1850 from the editorship of the Literary Gazette his pecuniary affairs were far from satisfactory. A testimonial of over £900 was subscribed by his friends; and in 1853 a government pension of 100 guineas was conferred on him by Lord Aberdeen. He published his Autobiography in 1852-1853, and died on the nth of July 1869.

JEREMIAH, in the Bible, the last pre-exilic prophet (fl. 626- 586 B.C. ?), son of Hilkiah.

Early Days of Jeremiah. — There must anciently have existed one or more prose works on Jeremiah and his times, written partly to do honour to the prophet, partly to propagate those views respecting Israel's past with which the name of

Jeremiah was associated. Some fragments of this work (or these works) have come down to us; they greatly add to the popularity of the Book of Jeremiah. Strict historical truth we must not ask of them, but they do give us what was believed concerning Jeremiah in the following age, and we must believe that the personality so honoured was an extraordinary one. We have also a number of genuine prophecies which admit us into Jeremiah's inner nature. These are our best authorities, but they are deficient in concrete facts. By birth Jeremiah was a countryman ; he came of a priestly family whose estate lay at Anathoth "in the land of Benjamin" (xxxii. 3; cf. i. 1). He came forward as a prophet in the thirteenth year of

Josiah (626 B.C.), still young but irresistibly impelled. Unfortunately the account of the call and of the object of the divine caller come to us from a later hand (ch. i.), but we can well believe that the concrete fact which the prophetic call illuminated was an impend- ing blow to the state (i. 13-16; cf.. ch. iv.). What the blow exactly was is disputed, 1 but it is certain that Jeremiah saw the gathering storm and anticipated its result, while the statesmen were still wrrpped in a false security. Five years later came the reform movement produced by the "finding" of the " book of the law " in the Temple in 621 B.C. (2 Kings xxii. 8), and some critics have gathered from Jer. xi. 1-8 that Jeremiah joined the ranks of those who publicly supported this book in Jerusalem and elsewhere. To others this view appears in itself improb- able. How can a man like Jeremiah have advocated any such panacea? He was indeed not at first a complete pessimist, but to be a preacher of Deuteronomy required a sanguine temper which a prophet of the school of Isaiah could not possess. Be- sides, there is a famous passage (viii. 8, see R.V.) in which Jeremiah delivers a vehement attack upon the " scribes " (or, as we might render, " bookmen ") and their " false pen." If, as Wellhausen and Duhm suppose, this refers to Deuteronomy (i.e. the original Deuteronomy), the incorrectness of the theory referred to is proved. And even if we think that the phraseology of viii. 8 applies rather to a body of writings than to a single book, yet there is no good ground (xi. 1-8 and xxxiv. 12 being of doubt- ful origin) for supposing that Jeremiah would have excepted Deuteronomy from his condemnation.

Stages of his Development. — At first our prophet was not alto- gether a pessimist. He aspired to convince the better minds that the only hope for Israelites, as well as for Israel, lay in " returning " to the true Yahweh, a deity who was no mere national god, and was not to be cajoled by the punctual offering of costly sacrifices. When Jeremiah wrote iv. 1-4 he evidently considered that the judgment could even then be averted. After- wards he became less hopeful, and it was perhaps a closer acquaintance with the manners of the capital that served to disillusionize him. He began his work at Anathoth, but v. 1-5 (as Duhm points out) seems to come from one who has just now for the first time "run to and fro in the streets of Jerusalem," observing and observed. And what is the result of his expedi- tion? That he cannot find a single just and honest man; that high and low, rich and poor, are all ignorant of the true method of worshipping God (" the way of Yahweh," v. 4). It would seem as if Anathoth were less corrupt than the capital, the moral state of which so shocked Jeremiah. And yet he does not really go beyond the great city-prophet Isaiah who calls the men of Jerusalem " a people of Gomorrah " (i. 10). With all reverence, an historical student has to deduct something from both these statements. It is true that commercial prosperity had put a severe strain on the old morality,

and that contact with other

1 Davidson (Hast., D.B., ii. 570 b) mentions two views. (1) The foe might be " a creation of his moral presentiment and assigned to the north as the cloudy region of mystery." (2) The more usual view is that the Scythians (see Herod, i. 76, 103-106 ;i v. I) are meant. Neither of these views is satisfactory. The passage v. 15-17 is too definite for (1), and as for (2), the idea of a threatened Scythian inva- sion lacks a sufficient basis. Those who hold (2) have to suppose that original references to the Scythians were retouched under the impres- sionof Chaldean invasions. Hence Cheyne's theory of a north Arabian invasion from the land of Zaphon = Zibeon (Gen. xxxvi. 2, 14), j i.e. Ishmael. Cf. N. Schmidt, Ency. Bib., Zibeon, " Scythians," I § 8 ; Cheyne, Critica Biblica, part i. (Isaiah and Jeremiah).

peoples, as well as the course of political history, had appeared to lower the position of the God of Israel in relation to other gods. Still, some adherents of the old Israelitish moral and religious standards must have survived, only they were not to be found in the chief places of concourse, but as a rule in coteries which handed on the traditions of Amos and Isaiah in sorrowful retirement.

Danger of Book Religion. — Probably, too, even in the highest class there were some who had a moral sympathy with Jeremiah ; otherwise we can hardly account for the contents of Deuteronomy, at least if the book " found " in the Temple at all resembled the cential portion of our Deuteronomy. And the assumption seems to be confirmed by the respectful attitude of certain " elders of the land " in xxvi. 17 sqq., and of the " princes " in xxxvi. 10, 25, towards Jeremiah, which may, at any rate in part, have been due to the recent reform movement. If therefore Jeremiah aimed at Deuteronomy in the severe language of viii.8, he went too far. History shows that book religion has special dangers of its own. 1 Nevertheless the same incorruptible adviser also shows that book religion may be necessary as an educational instrument, and a compromise between the two types of religion is without historical precedent.

Reaction: Opposition to Jeremiah. — This, however, could not as yet be recognized by the friends of prophecy, even though it seemed for a time as if the claims of book religion were rebuffed by facts. The death of the pious king Josiah at Megiddo in 608 B.C. dashed the high hopes of the " book-men," but meant no victory for Jeremiah. Its only result for the majority was a falling back on the earlier popular cultus of the Baals, and on the heathen customs introduced, or reintroduced, by Josiah's grand- father, Manasseh. Would that we possessed the section of the prophet's biography which described his attitude immediately after the news of the battle of Megiddo! Let us, however, be thankful for what we have, and notably for the detailed narra- tives in chs. xxvi. and xxxvi. The former is dated in the beginning of the reign of Jehoiakim, though Wellhausen suspects that the date is a mistake, and that the real occasion was the death of Josiah. The one clear-sighted patriot saw the full meaning of the tragedy of Megiddo, and for " prophesying against this city " — secured, as men thought, by the Temple (vii. 4) — he was accused by " the priests, the prophets, and all the people" of high treason. But the divinity which hedged a prophet saved him. The " princes," supported by certain " elders " and by " the people " (quick to change their leaders), succeeded in quashing the accusation and setting the prophet free. No king, be it observed, is mentioned. The latter narrative is still more exciting. In the fourth year of Jehoiakim (= the first of Nebuchadrezzar, xxv. 1) Jeremiah was bidden to write down " all the words that Yahweh had spoken to him against Jerusalem (so LXX.), Judah

and all the nations from the days of Josiah onwards " (xxxvi. 2). So at least the authors of Jeremiah's biography tell us. They add that in the next year Jeremiah's scribe Baruch read the prophecies of Jeremiah first to the people assembled in the Temple, then to the " princes," and then to the king, who decided his own future policy by burning Baruch's roll in the brazier. We cannot, however, bind ourselves to this tradition. Much more probably the prophecy was virtually a new one (i.e. even if some old passages were repeated yet the setting was new), and the burden of the prophecy was " The king of Babylon shall come and destroy this land." 2 We cannot therefore assent to the judgment that " we have, at least as regards [the] oldest portions [of the book] information con- siderably more specific than is usual in the case of the writings bf the prophets." 5

Fall of the State. — Under Zedekiah the prophet was less fortu- nate. Such was the tension of feeling that the " princes," who

1 Cf. Ewald, The Prophets, Eng. trans., iii. 63, 64.

8 Cheyne, Ency. Brit. (9th ed7), " Jeremiah," suggests after Gratz that the roll simply contained ch. xxv., omitting the most obvious interpolations. Against this view see N. Schmidt, Ency. Bib., " Jeremiah (Book)," § 8, who, however, accepts the negative part of Cheyne' s arguments.

» Driver, Introd. to the Lit. of the O.T. (6), p. 249.

were formerly friendly to Jeremiah, now took up an attitude of decided hostility to him. At last they had him consigned to a miry dungeon, and it was the king who (at the instance of the Cushite Ebed-melech) intervened for his relief, though he re- mained a prisoner in other quarters till the fall of Jerusalem (586 B.C.). Nebuchadrezzar, who is assumed to have heard of Jeremiah's constant recommendations of submission, gave him the choice either of going to Babylon or of remaining in the country (chs. xxxviii. seq.). He chose the latter and resided with Gedaliah, the native governor, at Mizpah. On the murder of Gedaliah he was carried to Mizraim or Egypt, or perhaps to the land of Mizrim in north Arabia — against his will (chs. xl.-xliii.). How far all this is correct we know not. The graphic style of a narrative is no sufficient proof of its truth. Conceivably enough the story of Jeremiah's journey to Egypt (or Mizrim) may have been imagined to supply a background for the artificial prophecies ascribed to Jeremiah in chs. xlvi.-li. A legend in Jerome and Epiphanius states that he was stoned to death at Daphnae, but the biography, though not averse from horrors, does not mention this.

A Patriot? — Was Jeremiah really a patriot? The question has been variously answered. He was not a Phocion, for he never became the tool of

a foreign power. To say with Winckler 4 that he was " a decided adherent of the Chaldean party " is to go beyond the evidence. He did indeed counsel submission, but only because his detachment from party gave him a clearness . of vision (cf. xxxviii. 17, 18) which the politicians lacked. How he suffered in his uphill course he has told us himself (xv. 10-21). In after ages the oppressed people saw in his love for Israel and his patient resignation their own realized ideal. " And Onias said, This is the lover of the brethren, he who prayeth much for the people and the holy city, Jeremiah the prophet of God " (2 Mace. xv. 14). And in proportion as the popular belief in Jeremiah rose, fresh prophecies were added to the book (notably those of the new covenant and of the restoration of the people after seventy years) to justify it. Professor N. Schmidt has gone further into the character of this sympathetic prophet, Ency. Bib. " Jeremiah," § S .

Jeremiah's Prophecies. — It has been said above that our best authorities are Jeremiah's own prophecies. Which may these be? ' Before answering we must again point out (see also Isaiah) that the records of the pre-exilic prophets came down in a fragmentary form, and that these fragments needed much supplementing to adapt them to the use of post-exilic readers. In Jeremiah, as in Isaiah, we must constantly ask to what age do the phraseology, the ideas and the implied circumstances most naturally point? According to Duhm there are many passages in which metre (see also Amos) may also be a factor in our critical conclusions. Jeremiah, he thinks, always uses the same metre. Giesebrecht, on the other hand, maintains that there are passages which are certainly Jeremiah's, but which are not in what Duhm calls Jeremiah's metre; Giesebrecht also, himself rather conservative, considers Duhm remarkably free with his emendations. There has also to be considered whether the text of the poetical passages has not often become corrupt, not only from ordinary causes but through the misunderstanding and misreading of north Arabian names on the part of late scribes and editors, the danger to Judah from north Arabia being (it is held) not less in pre-exilic times than the danger from Assyria and Babylonia, so that references to north Arabia are only to be expected. To bring educated readers into touch with critical workers it is needful to acquaint them with these various points, the neglect of any one of which may to some extent injure the results of criticism. It is a new stage of criticism on which we have entered, so that no single critic can be reckoned as the authority on Jeremiah. But since the results of the higher criticism depend on the soundness and thoroughness of the criticism called " lower," and since Duhm has the advantage of being exceptionally free from that exaggerated respect for the letters of the traditional text which has survived the destruction of the old superstitious veneration for the vowel-points, it may be best to give the student his " higher critical " results, dated 1901. Let us premise, however, that the portions mentioned in the 9th edition of

the Ency. Brit, as having been " entirely or in part denied," to Jeremiah, viz. x. 1-16; xxx. ; xxxiii.; 1. — II. and Hi., are still regarded in their present form as non-Jeremianic. The question which next awaits decision is whether any part of the booklet on foreign nations (xxv., xlvi.-li.) can safely be regarded as Jeremianic. Giesebrecht still asserts the genuineness of xxv. 15-24 (apart from glosses), xlvii. (in the main) and xlix. 7, 8, 10, II. Against these views see N. Schmidt, Ency. Bib., col. 2384.

4 In Helmolt's Weltgeschichte, iii. 211.

Let us now listen to Duhm, who analyses the book into six groups of passages. These are (a) i.-xxv., the " words of Jeremiah." (i. I) ; (b) xxvi.-xxix., passages from Baruch's biography of Jeremiah ; (c) xxx.-xxxi., the book of the future of Israel and Judah; (d) xxxii.-xlv., from Baruch; (e) xlvi.-li., the prophecies "concerning the nations" ;' (f) lii., historical appendix. Upon examining these groups we find that besides a prose letter (ch. xxix.), about sixty poetical pieces may be Jeremiah's. A: Anathoth passages before 621, (a) ii. 2b, 3, 14-28; ii. 29-37; iii. 1-5; iii. 12b, 13, 19, 20; iii. 21-25; iv. I, 3, 4; these form a cycle, (b) xxxi. 2-6; 15-20; 21, 22 ; another cycle, (c) iv. 5-8; 11b, 12a, 13, I$-I7a;"19-2I ; 23-26; 29-31; visions and "auditions" of the impending invasion. B: Jerusalem passages, (d) v. l-6a; 6b~9; 10-17; vi. 1-5; 6b-8; 9-14; 16, 17, 20; 22-26a; 27-30; vii. 28, 29; viii. 4~7a; 81 9» 13; 14-17; viii. 18-23; ix. 1-8; 9 (short song); 16-18; 19-21; x. 19, 20, 22 ; reign of Josiah, strong personal element, (e) xxii. 10 (Jehoahaz). xxii. 13-17; probably too xi. 15, 16; xii. 7-12 (Jehoiakim). xxii. 18, 19, perhaps too xxii. 6b, 7; 20-23; and the cycle xiii. 15, 16; 17; 18, 19; 20, 21a, 22-25a, 26, 27 (later, Jehoiakim). xxii. 24; xxii. 28 (Jehoiachin). (f) Later poems. xiv. 2-10; xv. 5-9; xvi. 5-7; xviii. 13-17; xxiii. 9-12; 13-15; xi. 18-20; xv. 10-12; 15-198, and 20, 21 ; xvii. 9, 10, 14, 16, 17; xviii. 18-20; xx. 7-11 ; xx. 14-18; xiv. 17, 18; xvii. I~4;xxxviii. 24; assigned to the close of Zedekiah's time.

Two Recensions of the Text. — It has often been said that we have virtually two recensions of the text, that represented by the Septua- gint and the Massoretic text, and critics have taken different sides, some for one and some for the other. " Recension," however, is a bad term; it implies that the two texts which undeniably exist were the result of revising and editing according to definite critical principles. Such, however, is not the case. It is true that " there are (in the LXX.) many omissions of words, sentences, verses and whole passages, in fact, that altogether about 2700

words are wanting, or the eighth part of the Massoretic text " (Bleek). It may also be admitted that the scribes who produced the Hebrew basis of the Septuagint version, conscious of the unsettled state of the text, did not shrink from what they considered a justifiable simplification. But we must also grant that those from whom the " written " Hebrew text proceeds allowed themselves to fill up and to repeat without any sufficient warrant. In each case in which there is a genuine difference of reading between the two texts, it is for the critic to decide; often, however, he will have to seek to go behind what both the texts present in order to constitute a truer text than either. Here is the great difficulty of the future. We may add to the credit of the Septuagint that the position given to the prophecies on " the nations " (chs. xlvi.-li. in our Bible) in the Septuagint is probably more original than that in the Massoretic text. On this point see especially Schmidt, Ency. Bib. " Jeremiah (Book) " §§ 6 and 21; Davidson, Hastings's Diet. Bible, ii. 573D-575; Driver, Introduction (8th ed.), pp. 269, 270.

The best German commentary is that of Cornill (1905). A skilful translation by Driver, with notes intended for ordinary students (1906) should also be mentioned. (T. K. C.)

JEREMY, EPISTLE OF, an apocryphal book of the Old Testament. This letter purports to have been written by Jeremiah to the exiles who were already in Babylon or on the way thither. The author was a Hellenistic Jew, and not im- probably a Jew of Alexandria. His work, which shows little literary skill, was written with a serious practical purpose. He veiled his fierce attack on the idol gods of Egypt by holding up to derision the idolatry of Babylon. The fact that Jeremiah (xxix. 1 sqq.) was known to have written a letter of this nature naturally suggested to a Hellenist, possibly of the 1st century B.C. or earlier, the idea of a second epistolary undertaking, and other passages of Jeremiah's prophecy (x. 1-12; xxix. 4-23) may have determined also its general character and contents.

The writer warned the exiles that they were to remain in captivity for seven generations; that they would there see the worship paid to idols, from all participation in which they were to hold aloof; for that idols were nothing save the work of men's hands, without the powers of speech, hearing or self-preserva- tion. They could not bless their worshippers even in the smallest concerns of life; they were indifferent to moral qualities, and were of less value than the commonest household objects, and finally, " with rare irony, the author compared an idol to a scarecrow (v. 70), impotent to protect, but deluding to the imagination " (Marshall).

The date of the epistle is uncertain. It is believed by some scholars to be referred to in 2 Mace. ii. 2, which says that Jeremiah charged the exiles "

not to forget the statutes of the Lord, neither

1 li. 59-64a, however, is a specimen of imaginative " Midrashic " history. See Giesebrecht's monograph.

to be led astray in their minds when they saw images of gold and silver and the adornment thereof." But the reference is disputed by Fritzsche, Gifford, Shiirer and others. The epistle was in- cluded in the Greek canon. There was no question of its canonicity till the time of Jerome, who termed it a pseudepigraph.

See Fritzsche, Handb. zu den Apok., 1851; Gifford, in Speaker's Apoc. ii. 286-303; Marshall, in Hastings' Diet. Bible, ii. 578-579.

(R. H. C.)

JEREZ DE LA FRONTERA (formerly Xeres), a town of southern Spain, in the province of Cadiz, near the right bank of the river Guadalete, and on the Seville-Cadiz railway, about 7 m. from the Atlantic coast. Pop. (1900), 63,473. Jerez is built in the midst of an undulating plain of great fertility. Its whitewashed houses, clean, broad streets, and squares planted with trees extend far beyond the limits formerly enclosed by the Moorish walls, almost entirely demolished. The principal buildings are the 15th-century church of San Miguel, the 17th- century collegiate church with its lofty bell-tower, the 16th- century town-hall, superseded, for official purposes, by a modern edifice, the bull-ring, and many hospitals, charitable institutions and schools, including academies of law, medicine and com- merce. But the most characteristic features of Jerez are the huge bodegas, or wine-lodges, for the manufacture and storage of sherry, and the vineyards, covering more than 150,000 acres, which surround it on all sides. The town is an important market for grain, fruit and livestock, but its staple trade is in wine. Sherry is also produced in other districts, but takes its name, formerly written in English as sherris or xeres, from Jerez. The demand for sherry diminished very greatly during the last quarter of the 19th century, especially in England, which had been the chief consumer. In 1872 the sherry shipped from Cadiz to Great Britain alone was valued at £2,500,000; in 1902 the total export hardly amounted to one-fifth of this sum. The wine trade, however, still brings a considerable profit, and few towns of southern Spain display greater commer- cial activity than Jerez. In the earlier part of the 18th century the neighbourhood suffered severely from yellow fever; but it was rendered comparatively healthy when in 1869 an aqueduct was opened to supply pure water. Strikes and revolutionary disturbances have frequently retarded business in more recent years.

Jerez has been variously identified with the Roman Munici- pium Seriense;

with Asido, perhaps the original of the Moorish Sherish; and with Hasta Regia, a name which may survive in the designation of La Mesa de Asta, a neighbouring hill. Jerez was taken from the Moors by Ferdinand III. of Castile (1217-1252); but it was twice recaptured before Alphonso X. finally occupied it in 1264. Towards the close of the 14th century it received the title de la Frontera, i.e. " of the frontier," common to several towns on the Moorish border.

JEREZ DE LOS CABALLEROS, a town of south-western Spain, in the province of Badajoz, picturesquely situated on two heights overlooking the river Ardila, a tributary of the Guadiana, 12 m. E. of the Portuguese frontier. Pop. (1900), 10,271. The old town is surrounded by a Moorish wall with six gates; the newer portion is well and regularly built, and planted with numerous orange and other fruit trees. Owing to the lack of railway communication Jerez is of little commercial impor- tance; its staple trade is in agricultural produce, especially in ham and bacon from the large herds of swine which are reared in the surrounding oak forests. The town is said to have been founded by Alphonso IX. of Leon in 1229; in 1232 it was ex- tended by his son St Ferdinand, who gave it to the knights templar. Hence the name Jeriz de los Caballeros, " Jerez of the knights."

JERICHO (Wt, irrr, once •■% a word of disputed meaning, whether "fragrant" or "moon god] city"), an important town in the Jordan valley some 5 m. N. of the Dead Sea. The references to it in the Pentateuch are confined to rough geographical indications of the latitude of the trans Jordanic camp of the Israelites in Moab before their crossing of the river. This was the first Canaanite city to be attacked and reduced by the victorious Israelites. The story of its conquest is*

His Sundays were spent in the catacombs in discovering graves of the martyrs and deciphering inscriptions. Pope Liberius baptized him in 360; three years later the news of the death of the emperor Julian came to Rome, and Christians felt relieved from a great dread.

When his student days were over Jerome returned to Strido, but did not stay there long. His character was formed. He was a scholar, with a scholar's tastes and cravings for knowledge, easily excited, bent on scholarly discoveries. From Strido he went to Aquileia, where he formed some friendships among the monks of the large monastery, notably with Rufinus, with whom he was destined to quarrel bitterly over the question of Origen's orthodoxy and worth as a commentator; for Jerome was ' a man

who always sacrificed a friend to an opinion, and when he changed sides in a controversy expected his acquaintances to follow him. From Aquileia he went to Gaul (366-370), visiting in turn the principal places in that country, from Narbonne and Toulouse in the south to Treves on the north-east frontier. He stayed some time at Treves studying and observing, and it was there that he first began to think seriously upon sacred things. From Treves he returned to Strido, and from Strido to Aquileia. He settled down to literary work in Aquileia (370-373) and composed there his first original tract, De muliere septies percussa, in the form of a letter to his friend Innocentius. Some dispute caused him to leave Aquileia suddenly; and with a few companions, Innocentius, Evagrius, and Heliodorus being among them, he started for a long tour in the East. The epistle to Rufinus. (3rd in Vallarsi's enumeration) tells us the route. They went through Thrace, visiting Athens, Bithynia, Galatia, Pontus, Cappadocia and Cilicia, to Antioch, Jerome observing and making notes as they went. He was interested in the theological disputes and schisms in Galatia, in the two languages spoken in Cilicia, &c. At Antioch the party remained some time. Innocentius died of a fever, and Jerome was dangerously ill. This illness induced a spiritual change, and he resolved to renounce whatever kept him back from God. His greatest temptation was the study of the literature of pagan Rome. In a dream Christ reproached him with caring more to be a Ciceronian than a Christian. He disliked the uncouth style of the Scriptures. " Lord," he prayed, " thou knowest that whenever I have and study secular MSS. I deny thee," and he made a resolve henceforth to devote his scholarship to the Holy Scripture. " David was to be henceforth his Simonides, Pindar and Alcaeus, his Flaccus, Catullus and Severus." Fortified by these resolves he betook himself to a hermit life in the wastes of Chalcis, S.E. from Antioch (373-379). Chalcis was the Thebaid of Syria. Great numbers of monks, each in solitary cell, spent lonely lives, scorched by the sun, ill-clad and scantily fed, pondering on portions of Scripture or copying MSS. to serve as objects of meditation. Jerome at once set himself to such scholarly work as the place afforded. He discovered and copied MSS., and began to study Hebrew. There also he wrote the life of St Paul of Thebes, probably an imaginary tale embody- ing the facts of the monkish life around him. Just then the Meletian schism, which arose over the relation of the orthodox to Arian bishops and to those baptized by Arians, distressed the church at Antioch (see Meletius of Antioch) , and Jerome as usual eagerly joined the fray. Here as elsewhere he had but one rule to guide him in matters of doctrine and discipline — the practice of Rome and the West; for it is singular to see how Jerome, who is daringly original in points of scholarly criticism, was a ruthless partisan in all other matters; and, having dis- covered what was the Western practice, he set tongue and pen to work with his usual bitterness (Altercatio luciferiani et orthodoxi) .

At Antioch in 379 he was ordained presbyter. From there he went to Constantinople, where he met with the great Eastern scholar and theologian Gregory of Nazianzus, and with his aid tried to perfect himself in Greek. The result of his studies there was the translation of the Chronicon of Eusebius, with a con- tinuation 1 of twenty-eight homilies of Ongen on Jeremiah and 1 Cf . Schoene' s critical edition (Berlin, 1 866, 1 875) .

Ezekiel, and of nine homilies of Origen on the visions of Isaiah.

In 381 Meletius died, and Pope Damasus interfered in the dispute at Antioch, hoping to end it. Jerome was called to Rome in 382 to give help in the matter, and was made secretary during the investigation. His work brought him into inter- course with this great pontiff, who soon saw what he could best do, and how his vast scholarship might be made of use to the church. Damasus suggested to him to revise the " Old Latin " translation of the Bible; and to this task he henceforth devoted his great abilities. At Rome were published the Gospels (with a dedication to Pope Damasus, an explanatory introduction, and the canons of Eusebius), the rest of the New Testament and the version of the Psalms from the Septuagint known as the Psalterium romanum, which was followed (c. 388) by the Psal- terium gallicanum, based on the Hexaplar Greek text. These scholarly labours, however, did not take up his whole time, and it was almost impossible for Jerome to be long anywhere without getting into a dispute. He was a zealous defender of that monastic life which was beginning to take such a large place in the church of the 4th century, and he found enthusiastic disciples among the Roman ladies. A number of widows and maidens met together in the house of Marcella to study the Scriptures with him; he taught them Hebrew, and preached the virtues of the celibate life. His arguments and exhortations may be gathered from many of his epistles and from his tract Adversus Helvidium, in which he defends the perpetual virginity of Mary against Helvidius, who maintained that she bore children to Joseph. His influence over these ladies alarmed their relatives and excited the suspicions of the regular priesthood and of the populace, but while Pope Damasus lived Jerome remained secure. Damasus died, however, in 384, and was succeeded by Siricius, who did not show much friendship for Jerome. He found it expedient to leave Rome, and set out for the East in 385. His letters (especially Ep. 45) are full of outcries against his enemies and of indignant protestations that he had done nothing un- becoming a Christian, that he had taken no money, nor gifts great nor small, that he had no delight in silken attire, sparkling gems or gold ornaments, that no matron moved him unless by penitence and fasting, &c. His route is given in the third book In Rufinum; he went by Rhegium and Cyprus, where he was enter- tained by Bishop Epiphanius, to Antioch. There he was joined by two wealthy Roman ladies, Paula, a widow, and Eustochium, her daughter, one of Jerome's Hebrew students. They came

accompanied by a band of Roman maidens vowed to live a celibate life in a nunnery in Palestine. Accompanied by these ladies Jerome made the tour of Palestine, carefully noting with a scholar's keenness the various places mentioned in Holy Scripture. The results of this journey may be traced in his translation with emendations of the book of Eusebius on the situation and names of Hebrew places, written probably three years afterwards, when he had settled down at Bethlehem. From Palestine Jerome and his companions went to Egypt, remaining some time in Alexandria, and they visited the con- vents of the Nitrian desert. Jerome's mind was evidently full of anxiety about his translation of the Old Testament, for we find him in his letters recording the conversations he had with learned men about disputed readings and doubtful renderings; the blind Didymus of Alexandria, whom he heard interpreting Hosea, appears to have been most useful. When they returned to Palestine they all settled at Bethlehem, where Paula built four monasteries, three for nuns and one for monks. She was at the head of the nunneries until her death in 404, when Eustochium succeeded her; Jerome presided over the fourth monastery. Here he did most of his literary work and, throwing aside his unfinished plan of a translation from Origen's Hexaplar text, translated the Old Testament directly from the Hebrew, with the aid of Jewish scholars. He mentions a rabbi from Lydda, a rabbi from Tiberias, and above all rabbi Ben Anina, who came to him by night secretly for fear of the Jews. Jerome was not familiar enough with Hebrew to be able to dispense with such assistance, and he makes the synagogue responsible for the

fully narrated in the first seven chapters of Joshua. There must be some little exaggeration in the statement that Jericho was totally destroyed; a hamlet large enough to be enumerated among the towns of Benjamin (Josh, xviii. 21) must have re- mained; but that it was small is shown by the fact that it was deemed a suitable place for David's ambassadors to retire to after the indignities put upon them by Hanun (2 Sam. x. 5; 1 Chron. xix. 5). Its refortification was due to a Bethelite named Hiel, who endeavoured to avert the curse of Joshua by offering his sons as sacrifices at certain stages of the work (1 Kings xvi. 34). After this event it grew again into importance and became the site of a college of prophets (2 Kings ii. 4 sqq.) for whom Elisha " healed " its poisonous waters. The principal spring in the neighbourhood of Jericho still bears (among the foreign residents) the name of Elisha; the natives call it, Ain es-Sultan, or " Sultan's spring." To Jericho the victorious Israelite marauders magnanimously returned their Judahite captives at the bidding of the prophet Oded (2 Chron. xxviii. 15). Here was fought the last fight between the Babylonians and Zede- kiah, wherein the

kingdom of Judah came to an end (2 Kings xxv. 5; Jer. xxxix. 5, lii. 8). In the New Testament Jericho is connected with the well-known stories of Bar-Timaeus (Matt. xx. 29; Mark x. 46; Luke xviii. 35) and Zacchaeus (Luke xix. 1) and with the good Samaritan (Luke x. 30).

The extra-Biblical history of Jericho is as disastrous as are the records preserved in the Scriptures. Bacchides, the general of the Syrians, captured and fortified it (1. Mace. ix. 50), Aristobulus (Jos. Ant. XIV. i. 2) also took it, Pompey (ib. XIV. iv. 1) encamped here on his way to Jerusalem. Before Herod its inhabitants ran away (ib. XIV. xv. 3) as they did before Vespasian (Wars, IV. viii. 2). The reason of this lack of warlike quality was no doubt the enervating effect of the great heat of the depression in which the city lies, which has the same effect on the handful of degraded humanity that still occupies the ancient site.

Few places in Palestine are more fertile. It was the city of palm trees of the ancient record of the Israelite invasion preserved in part in Judg. i. 16; and Josephus speaks of its fruitfulness with enthusiasm (Wars IV. 8, 3). Even now with every possible hindrance in the way of cultivation it is an important centre of fruit-growing.

The modern er-RIha is a poor squalid village of, it is estimated, about 300 inhabitants. It is not built exactly on the ancient site. Indeed, the site of Jericho has shifted several times. The mound of Tell es-Sultan, near " Elisha's Fountain," north of the modern village, no doubt covers the Canaanite town. There are two later sites, of Roman or Herodian date, one north, the other west, of this. It was probably the crusaders who established the modern site. An old tower attributed to them is to be seen in the village, and in the surrounding mountains are many remains of early monasticism. Aqueducts, ruined sugar-mills, and other remains of ancient industry abound in the neighbourhood. The whole district is the private property of the sultan of Turkey. In 1907-8 the Canaanite Jericho was excavated under the direction of Prof. Sellin of Vienna.

See " The German Excavations at Jericho," Pal. Explor. Fund, Quart. Statem. (1910), pp. 54-68.

JERKIN, a short close-fitting jacket, made usually of leather, and without sleeves, the typical male upper garment of the 16th and 17th centuries. The origin of the word is unknown. The Dutch word jurk, a child's frock, often taken as the source, is modern, and represents neither the sound nor the sense of the English word. In architecture the term " jerkin-roofed " is applied, probably with some obscure connexion with the gar- ment, to a particular form of gable end,, the gable being cut off half way up the roof and sloping back like a " hipped roof " to the edge.

JEROBOAM (Heb. yarob'am, apparently " Am ['the clan,' here perhaps a divine name] contends "; LXX. iepo/3oa/i), the name of two kings in the Bible.

1. The first king of (north) Israel after the disruption (see Solomon). According to the traditions of his early life (1 Kings xi. 26 sqq. and LXX.), he was an Ephraimite who for his ability was placed over the forced levy of Ephraim and Manasseh. Having subsequently incurred Solomon's suspicions he fled to Shishak, king of Egypt, and remained with him until Reho- boam's accession. When the latter came to be made king at Shechem, the old religious centre (see Abimelech), hopes were entertained that a more lenient policy would be introduced.

But Rehoboam refused to depart from Solomon's despotic rule, and was tactless enough to send Adoniram, the overseer of the corvee. He was stoned to death, and Rehoboam realizing the temper of the people fled to Jerusalem and prepared for war. Jeroboam became the recognized leader of the northern tribes. 1 Conflicts occurred (1 Kings xiv. 30), but no details are preserved except the late story of Rehoboam's son Abijah in 2 Chron. xiii. Jeroboam's chief achievement was the forti- fication of Shechem (his new capital) and of Penuel in east Jordan. To counteract the influence of Jerusalem he established golden calves at Dan and Bethel, an act which to later ages was as gross a piece of wickedness as his rebellion against the legiti- mate dynasty of Judah. No notice has survived of Shishak's invasion of Israel (see Rehoboam), and after a reign of twenty-two years Jeroboam was succeeded by Nadab, whose violent death two years later brought the whole house of Jeroboam to an end.

The history of the separation of Judah and Israel in the 10th century B.C. was written from a strong religious standpoint at a date considerably later than the event itself. The visit of Ahijah to Shiloh (xi. 29-39), to announce symbolically the rending of the kingdom, replaces some account of a rebellion in which Jeroboam " lifted up his hand " (v. 27) against Solomon. To such an account, not to the incident of Ahijah and the cloak, his flight (v. 40) is the natural sequel. The story of Ahijah's prophecy against Jeroboam (ch. xiv.) is not in the original LXX., but another version of the same narrative appears at xii. 24 (LXX.), in which there is no reference to a previous promise to Jeroboam through Ahijah, but the prophet is introduced as a new character. Further, in this version (xii. 24) the incident of the tearing of the cloak is related of Shemaiah and placed at the convention of Shechem. Shemaiah is the prophet who counselled Rehoboam to refrain from war (xii. 21-24); the in- junction is opposed to xiv. 30, but appears to be intended to explain Rehoboam's failure to overcome north Israel. (See W. R. Smith, Old Test, in Jewish Church (2nd ed.), 117 sqq.; Winckler, Alte Test. Unlersuch. 12 sqq., and J. Skinner,

Century Bible: Kings, pp. 443 sqq.)

2. Jeroboam, son of Joash (2) a contemporary of Azariah king of Judah. He was one of the greatest of the kings of Israel. He succeeded in breaking the power of Damascus, which had long been devastating his land, and extended his kingdom from Hamath on the Orontes to the Dead Sea. The brief summary of his achievements preserved in 2 Kings xiv. 23 sqq. may be supplemented by the original writings of Amos and Hosea. 2 There appears to be an allusion in Amos vi. 13 to the recovery of Ashteroth-Karnaim and Lodebar in E. Jordan, and the conquest of Moab (Isa. xv. seq.) is often ascribed to this reign. After a period of prosperity, internal disturbances broke out and the northern kingdom hastened to its fall. Jeroboam was succeeded by his son Zechariah, who after six months was killed at Ibleam (so read in 2 Kings xv. 10; cp. ix. 27, murder of Ahaziah) by Shallum the son of Jabesh — i.e. possibly of Jabesh-Gilead — who a month later fell to Menahem (q.v.).

(S. A. C.)

See, further, Jews §§ 7, 9 and §§ 12, 13.

JEROME, ST (Hieronymus, in full Eusebius Sophronitjs Hieronymus) (c. 340-420), was born at Strido (modern Strigau ?), a town on the border of Dalmatia fronting Pannonia, destroyed by the Goths in a.d. 377. What is known of Jerome has mostly been recovered from his own writings. He appears to have been born about 340; his parents were Christians, orthodox though living among people mostly Arians and wealthy. He was at first educated at home, Bonosus, a life-long friend, sharing his youthful studies, and was afterwards sent to Rome. Donatus taught him grammar and explained the Latin poets. Victorinus taught him rhetoric. He attended the law-courts, and listened to the Roman advocates pleading in the Forum. He went to the schools of philosophy, and heard lectures on Plato, Diogenes, Clitomachus and Carneades; the conjunction of names show how philosophy had become a dead tradition.

1 On the variant traditions in the Hebrew text and the Septuagint, see the commentaries on Kings.

2 See also Jonah. In 2 Kings xiv. 28, "Hamath, which had belonged to Judah " (R.V.) is incorrect; Winckler (Keilinschrift. u. Alte Test., 2nd ed., 262) suspects a reference to Israel's overlordship in Judah; Burney (Heb. Text of Kings) reads: " how he fought with Damascus and how he turned away the wrath of Yahweh from Israel " ; see also Ency. Bib. col. 2406 n. 4, and the commentaries.

accuracy of his version: ” Let him who would challenge aught in this translation,” he says, ” ask the Jews.” The result of all this labour was the Latin translation of the Scriptures which, in spite of much opposition from the more conservative party in the church, afterwards became the Vulgate or authorized ver- sion; but the Vulgate as we have it now is not exactly Jerome’s Vulgate, for it suffered a good deal from changes made under the influence of the older translations; the text became very corrupt during the middle ages, and in particular all the Apocrypha, except Tobit and Judith, which Jerome translated from the Chaldee, were added from the older versions. (See Bible: O. T. Versions.)

Notwithstanding the labour involved in translating the Scriptures, Jerome found time to do a great deal of literary work, and also to indulge in violent controversy. Earlier in life he had a great admiration for Origen, and translated many of his works, and this lasted after he had settled at Bethlehem, for in 389 he translated Origen’s homilies on Luke; but he came to change his opinion and wrote violently against two admirers of the great Alexandrian scholar, John, bishop of Jerusalem, and his own former friend Rufinus.

At Bethlehem also he found time to finish Didymi despiritu sancto liber, a translation begun at Rome at the request of Pope Damasus, to denounce the revival of Gnostic heresies by Jovin- ianus and Vigilantius (Adv. Jovinianum lib. II. and Contra Vigilanlium liber), and to repeat his admiration of the hermit life in his Vita S. Hilarionis eremitae, in his Vita Malchi monachi captivi, in his translations of the Rule of St Pachomius (the Benedict of Egypt), and in his S. Pachomii et S. Theodorici epistolae et verba mystica. He also wrote at Bethlehem De viris illustribus she de scriptoribus ecclesiasticis, a church history in biographies, ending with the life of the author; De nominibus Hebraicis, compiled from Philo and Origen ; and De situ et nomini- bus locorum Hebraicorum. 1 At the same place, too, he wrote Quaestiones Hebraicae on Genesis, 2 and a series of commentaries on Isaiah, Jeremiah, Ezekiel, Daniel, the Twelve Minor Prophets, Matthew and the Epistles of St Paul. About 394 Jerome came to know Augustine, for whom he held a high regard. He engaged in the Pelagian controversy with more than even his usual bitterness (Dialogi contra pelagianos) ; and it is said that the violence of his invective so provoked his opponents that an armed mob attacked the monastery, and that Jerome was forced to flee and to remain in concealment for nearly two years. He returned to Bethlehem in 418, and after a lingering illness died on the 30th of September 420.

Jerome " is one of the few Fathers to whom the title of Saint appears to have been given in recognition of services rendered to the Church rather than for eminent sanctity. He is the great Christian scholar of his age, rather than the profound theologian or the wise guide of souls." His great work was the Vulgate, but his achievements in other fields would have sufficed to dis- tinguish him. His commentaries are valuable because of his knowledge of Greek and Hebrew, his varied interests, and his comparative freedom from allegory. To him we owe the dis- tinction between canonical and apocryphal writings; in the Prologus Galeatus prefixed to his version of Samuel and Kings, he says that the church reads the Apocrypha " for the edification of the people, not for confirming the authority of ecclesiastical doc- trines." He was a pioneer in the fields of patrology and of bib- lical archaeology. In controversy he was too fond of mingling personal abuse with legitimate argument, and this weakness mars his letters, which were held in high admiration in the early middle ages, and are valuable for their history of the man and his times. Luther in his Table Talk condemns them as dealing only with fasting, meats, virginity, &c. " If he only had insisted upon the works of faith and performed them! But he teaches nothing either about faith, or love, or hope, or the works of faith."

1 Compare the critical edition of these two works in Lagarde's Onomastica sacra (Gotting. 1870).

2 See Lagarde's edition appended to his Genesis Graece (Leipzig,

1868).

Editions of the complete works: Erasmus (9 vols., Basel, 1516- 1520); Mar. Victorius, bishop of Rieti (9 vols., Rome, 1565-1572); F. Calixtus and A. Tribbechovius (12 vols., Frankfort and Leipzig, 1684-1690); J. Martianay (5 vols., incomplete Benedictine ed., Paris, 1693-1706); D. Vallarsi (11 vols., Verona, 1734-1742), the best; Migne, Patrol. Ser. Lat. (xxii.-xxix.). The De viris Must, was edited by Herding in 1879. ˆ selection is given in translation by W.H.Fremantle, " Select Library of Nicene and Post Nicene Fathers," 2nd series, vol. vi. (New York, 1893). Biographies are prefixed to most of the above editions. See also lives by F. Z. Collombet (Paris and Lyons, 1844); O. Zockler (Gotha, 1865); E. L. Cutts (London, 1878); C. Martin (London, 1888); P. Largent (Paris, 1898); F. W. Farrar, Lives of the Fathers, ii. 150-297 (Edinburgh, 1889). Additional literature is cited in Hauck-Herzog's Realencyk. fur prot. Theol. viii. 42.

JEROME, JEROME KLAPKA (1859-), English author, was born on the 2nd of May 1859. He was educated at the philological school, Marylebone, London; and was by turns clerk, schoolmaster and actor, before he settled down to journal- ism. He made his reputation as a humorist in 1889 with

Idle Thoughts of an Idle Fellow and Three Men in a Boat, and from 1892 to 1897 he was co-editor of the Idler with Robert Barr. At the same time he was also the editor of To-Day. A one-act play of his, Barbara, was produced at the Globe theatre in 1886, and was followed by many others, among them Sunset (1888), Wood Barrow Farm (1891), The Passing of the Third Floor Back (1907). Among his later books are Letters to Clorinda (1898), The Second Thoughts of an Idle Fellow (1898), Three Men on the Bummel (1900), Tommy and Co. (1904), They and I (1909).

JEROME OF PRAGUE (d. 1416), an early Bohemian church- reformer and friend of John Hus. Jerome's part in the Hussite movement was formerly much overrated. Very little is known of his early years. He is stated to have belonged to a noble Bohemian family 3 and to have been a few years younger than Hus. After beginning his studies at the university of Prague, where he never attempted to obtain any ecclesiastical office, Jerome proceeded to Oxford in 1398. There he became greatly impressed by the writings of Wycliffe, of whose Dialogus and Trialogus he made copies. Always inclined to a roving life, he soon proceeded to the university of Paris and afterwards con- tinued his studies at Cologne and Heidelberg, returning to Prague in 1407. In 1403 he is stated to have undertaken a journey to Jerusalem. At Paris his open advocacy of the views of Wycliffe brought him into conflict with John Gerson, chan- cellor of the university. In Prague Jerome soon attracted attention by his advanced and outspoken opinions. He gave great offence also by exhibiting a portrait of Wycliffe in his room. Jerome was soon on terms of friendship with Hus, and took part in all the controversies of the university. When in 1408 a French embassy arrived at Kutna Hora, the residence of King Wenceslaus of Bohemia, and proposed that the papal schism should be terminated by the refusal of the temporal authorities further to recognize either of the rival popes, Wenceslaus sum- moned to Kutna Hora the members of the university. The Bohemian magistri spoke strongly in favour of the French pro- posals, while the Germans maintained their allegiance to the Roman pope, Gregory XII. The re-organization of the univer- sity was also discussed, and as Wenceslaus for a time favoured the Germans, Hus and Jerome, as leaders of the Bohemians, incurred the anger of the king, who threatened them with death by fire should they oppose his will.

In 1410 Jerome, who had incurred the hostility of the arch- bishop of Prague by his speeches in favour of Wycliffe's teaching, went to Ofen, where King Sigismund of Hungary resided, and, though a layman, preached before the king denouncing strongly the rapacity and immorality of the clergy. Sigismund shortly afterwards received a letter from the archbishop of Prague con- taining accusations against Jerome. He was imprisoned by order of the king, but does not appear to have been detained long in Hungary. Appearing at Vienna, he was again brought

3 The statement that Jerome's family name was Faulfiss, is founded on a misunderstood passage of Aeneas Sylvius, Historica Bohemica. Aeneas Sylvius names as one of the early Bohemian reformers a man " genere nobilis, ex domo quam Putridi Piscis vacant." This was erroneously believed to refer to Jerome.

before the ecclesiastical authorities. He was accused of spreading Wycliffe's doctrines, and his general conduct at Oxford, Paris, Cologne, Prague and Ofen was censured. Jerome vowed that he would not leave Vienna till he had cleared himself from the accusation of heresy. Shortly afterwards he secretly left Vienna, declaring that this promise had been forced on him. He went first to Vottau in Moravia, and then to Prague. In 141 2 the representatives of Pope Gregory XII. publicly offered indul- gences for sale at Prague, wishing to raise money for the pope's campaign against King Ladislaus of Naples, an adherent of the antipope of Avignon. Contrary to the wishes of the archbishop of Prague a meeting of the members of the university took place, at which both Hus and Jerome spoke strongly against the sale of indulgences. The fiery eloquence of Jerome, which is noted by all contemporary writers, obtained for him greater success even than that of Hus, particularly among the younger students, who conducted him in triumph to his dwelling-place. Shortly afterwards Jerome proceeded to Poland — it is said on the invita- tion of King Wladislaus. His courtly manners and his eloquence here also caused him to become very popular, but he again met with strong opposition from the Roman Church. While travel- ling with the grand-duke Lithold of Lithuania Jerome took part in the religious services of the Greek Orthodox Church.

During his stay in northern Europe Jerome received the news that Hus had been summoned to appear before the council of Constance. He wrote to his friend advising him to do so and adding that he would also proceed there to afford him assistance. Contrary to the advice of Hus he arrived at Constance on the 4th of April 1415. Advised to fly immediately to Bohemia, he succeeded in reaching Hirschau, only 25 m. from the Bohemian frontier. He was here arrested and brought back in chains to Constance, where he was examined by judges appointed by the council. His courage failed him in prison and, to regain his freedom, he renounced the doctrines of Wycliffe and Hus. He declared that Hus had been justly executed and stated in a letter addressed on the 12th of August 1415 to Lacek, lord of Kravaf — the only literary document of Jerome that has been preserved — that " the dead man (Hus) had written many false and harmful things." Full confidence was not placed in Jerome's recantation.

He claimed to be heard at a general meeting of the council, and this was granted to him. He now again maintained all the theo- ries which he had formerly advocated, and, after a trial that lasted only one day, he was condemned to be burnt as a heretic. The sentence was immediately carried out on the 30th of May 1416, and he met his death with fortitude. As Poggio Braccio- lini writes, " none of the Stoics with so constant and brave a soul endured death, which he (Jerome) seemed rather to long for." The eloquence of the Italian humanist has bestowed a not entirely merited aureole on the memory of Jerome of Prague.

See all works dealing with Hus; and indeed all histories of Bohemia contain detailed accounts of the career of Jerome. The Lives of John Wicliffe, Lord Cobham, John Huss, Jerome of Prague and Zizka by William Gilpin (London, 1765) still has a certain value. (L.)

JERROLD, DOUGLAS WILLIAM (1803-1857), English dramatist and man of letters, was born in London on the 3rd of January 1803. His father, Samuel Jerrold, actor, was at that time lessee of the little theatre of Wilsby near Cranbrook in Kent, but in 1807 he removed to Sheerness. There, among the blue- jackets who swarmed in the port during the war with France, Douglas grew into boyhood. He occasionally took a child's part on the stage, but his father's profession had little attraction for the boy. In December 1813 he joined the guardship " Xamur," where he had Jane Austen's brother as captain, and he served as a midshipman until the peace of 181 5. He saw nothing of the war save a number of wounded soldiers from Waterloo; but till his dying day there lingered traces of his early passion for the sea. The peace of 181 5 ruined Samuel Jerrold; there was no more prize money. On the 1st of January 1816 he removed with his family to London, where the ex-midshipman began the world again as a printer's apprentice, and in 1819 became a com- positor in the printing-office of the Sunday Monitor. Several short papers and copies of verses by him had already appeared

in the sixpenny magazines, and one evening he dropped into the editor's box a criticism of the opera Der Freischutz. Next morning he received his own copy to set up, together with a flattering note from the editor, requesting further contributions from the anonymous author. Thenceforward Jerrold was en- gaged in journalism. In 1821 a comedy that he had composed in his fifteenth year was brought out at Sadler's Wells theatre, under the title More Frightened than Hurt. Other pieces followed, and in 1825 he was engaged for a few pounds weekly to produce dramas and farces to the order of Davidge of the Coburg theatre. In the autumn of 1824 the " little Shake- speare in a camlet cloak," as he was called,married Mary Swann; and, while he was engaged with the drama at night, he was steadily pushing his way as a journalist. For a short while he

was part proprietor of a small Sunday newspaper. In 1829, through a quarrel with the exacting Davidge, Jerrold left the Coburg; and his three-act melodrama, Black-eyed Susan; or, All in the Downs, was brought out by R. W. Elliston at the Surrey theatre. The success of the piece was enormous. With its free gallant sea-flavour, it took the town by storm, and " all London went over the water to see it." Elliston made a fortune by the piece; T. P. Cooke, who played William, made his repu- tation; Jerrold received about £60 and was engaged as dramatic author at five pounds a week. But his fame as a dramatist was achieved. In 1830 it was proposed that he should adapt something from the French for Drury Lane. " No," was his reply, " I shall come into this theatre as an original dramatist or not at all." The Bride of Ludgate (December 8, 1831) was the first of a number of his plays produced at Drury Lane. The other patent houses threw their doors open to him also (the Adelphi had already done so); and in 1836 Jerrold became co- manager of the Strand theatre with W. J. Hammond, his brother- in-law. The venture was not successful, and the partnership was dissolved. While it lasted Jerrold wrote his only tragedy, The Painter of Ghent, and himself appeared in the title-role, with- out any very marked success. He continued to write sparkling comedies till 1854, the date of his last piece, The Heart of Gold. Meanwhile he had won his way to the pages of numerous periodicals — before 1830 of the second-rate magazines only, but after that to those of more importance. He was a contributor to the Monthly Magazine, Blackwood's, the New Monthly, and the Athenaeum. To Punch, the publication which of all others is associated with his name, he contributed from its second number in 1841 till within a few days of his death. He founded and edited for some time, though with indifferent success, the Illuminated Magazine, Jerrold' s Shilling Magazine, and Douglas J err old's Weekly Newspaper; and under his editorship Lloyd's Weekly Newspaper rose from almost nonentity to a circulation of 182,000. The history of his later years is little more than a catalogue of his literary productions, interrupted now and again by brief visits to the Continent or to the country. Douglas Jerrold died at his house, Kilburn Priory, in London, on the 8th of June 1857.

Jerrold's figure was small and spare, and in later years bowed almost to deformity. His features were strongly marked and expressive from the thin humorous lips to the keen blue eyes gleaming from beneath the shaggy eyebrows. He was brisk and active, with the careless bluffness of a sailor. Open and sincere, he concealed neither his anger nor his pleasure; to his simple frankness all polite duplicity was distasteful. The cynical side of his nature he kept for his writings; in private life his hand was always open. In politics Jerrold was a Liberal,and he gave eager sympathy to Kossuth, Mazzini and Louis Blanc. In social politics especially he took an eager part; he never tired of de- claiming against the horrors of war, the luxury of

bishops, and the iniquity of capital punishment.

Douglas Jerrold is now perhaps better known from his reputa- tion as a brilliant wit in conversation than from his writings. As a dramatist he was very popular, though his plays have not kept the stage. He dealt with rather humbler forms of social life than had commonly been represented on the boards. He was one of the first and certainly one of the most successful of those

who in defence of the native English drama endeavoured to stem the' tide of translation from the French, which threatened early in the 19th century altogether to drown original native talent. His skill in construction and his mastery of epigram and brilliant dialogue are well exemplified in his comedy, Time Works Wonders (Haymarket, April 26, 1845). The tales and sketches which form the bulk of Jerrold's collected works vary much in skill and interest; but, although there are evident traces of their having been composed from week to week, they are always marked by keen satirical observation and pungent wit.

Among the best known of his numerous works are: Men of Character (1838), including "Job Pippin: The man who couldn't help it," and other sketches of the same kind ; Cakes and Ale (2 vols., 1842), a collection of short papers and whimsical stories; some more serious novels — The Story of a Feather (1844), The Chronicles of Clovernook (1846), A Man made of Money (1849); and 5/ Giles and St James (1851); and various series of papers reprinted from Punch — Punch's Letters to his Son (1843), Punch's Complete Letter-writer (1845), and the famous Mrs Caudle's Curtain Lectures (1846).

See W. B. Jerrold, Life and Remains of Douglas Jerrold (1859). A collected edition of his writings appeared in 1851-1854, and The Works of Douglas Jerrold, with a memoir by his son, W. B. Jerrold, in 1863-1864; but neither is complete. Among the numerous selections from his tales and witticisms are two edited by his grand- son, Walter Jerrold, Bons Mots of Charles Dickens and Douglas Jerrold (new ed. 1904), and The Essays of Douglas Jerrold (1903), illustrated by H . M . Brock. See also The Wit and Opinions of Douglas Jerrold (1858), edited by W. B. Jerrold.

His eldest son, William Blanchard Jerrold (1826-1884), English journalist and author, was born in London on the 23rd of December 1826, and abandoning the artistic career for which he was educated, began newspaper

work at an early age there. He was appointed Crystal Palace commissioner to Sweden in 1853, and wrote A Brage-Beaker with the Swedes (1854) on his return. In 1853 he was sent to the Paris exhibition as corre- spondent for several London papers, and from that time he lived much in Paris. In 1857 he succeeded his father as editor of Lloyd's Weekly Newspaper, a post which he held for twenty-six years. During the Civil War in America he strongly supported the North, and several of his leading articles were reprinted and placarded in New York by the federal government. He was the founder and president of the English branch of the international literary association for the assimilation of copyright laws. Four of his plays were successfully produced on the London stage, the popular farce Cool as a Cucumber (Lyceum 1851) being the best known. His French experiences resulted in a number of books, most important of which is his Life cf Napoleon III. (1874). He was occupied in writing the biography of Gustave Dore, who had illustrated several of his books, when he died on the 10th of March 1884.

Among his books are A Story of Social Distinction (1848), Life and Remains of Douglas Jerrold (1859), Up and Down in the World (1863), The Children of Lutetia (1864), Cent per Cent (1871), At Home in Paris (1871), The Best of all Good .Company (1871-1873), and The Life of George Cruikshank (1882). „

JERRY, a short form of the name Jeremiah, applied to various common objects, and more particularly to a machine for finishing cloth. The expression " jerry-built " is applied to houses built badly and of inferior materials, and run up by a speculative builder. There seems to be no foundation for the assertion that this expression was occasioned by the work of a firm of Liverpool builders named Jerry.

JERSEY, EARLS OF. Sir Edward Villiers (c. 1656-1711), son of Sir Edward Villiers (1620-1689), of Richmond, Surrey, was created Baron Villiers and Viscount Villiers in 1691 and earl of Jersey in 1697. His grandfather, Sir Edward Villiers (c. 1585- 1626), master of the mint and president of Munster, was half- brother of George Villiers, 1st duke of Buckingham, and of Christopher Villiers, 1st earl of Anglesey; his sister was Elizabeth Villiers, the njistress of William III., and after- wards countess of Orkney. Villiers was knight-marshal of the royal household in succession to his father; master of the horse to Queen Mary; and lord chamberlain to William III. and Queen Anne. In 1696 he represented his country at the congress

of Ryswick; he was ambassador at the Hague, and after becoming an earl was ambassador in Paris. In 1699 he was made secretary of state for the southern department, and on three occasions he was one of the lords

justices of England. In 1704 he was dis- missed from office by Anne, and after this event he was concerned in some of the Jacobite schemes. He died on the 25th of August 1711. The 2nd earl was his son William (c. 1682-1721), an adherent of the exiled house of Stuart, and the 3rd earl was the latter's son William (d. 1769), who succeeded his kinsman John Fitzgerald (c. 1692-1766) as 6th Viscount Grandison. The 3rd earl's son, George Bussy, the 4th earl (1 735-1805), held several positions at the court of George III., and on account of his courtly manners was called the " prince of Maccaronies." The 4th earl's son, George, 5th earl of Jersey (1773-1859), one of the most celebrated fox-hunters of his time and a successful owner of racehorses, married Sarah Sophia (1785-1867), daughter of John Fane, 10th earl of Westmorland, and granddaughter of Robert Child, the banker. She inherited her grandfather's great wealth, including his interest in Child's bank, and with her husband took the name of Child- Villiers. Since this time the connexions of the earls of Jersey with Child's bank has been main- tained. Victor Albert George Child- Villiers (b. 1845) succeeded his father George Augustus (1808-1859), 6th earl, who had only held the title for three weeks, as 7th earl of Jersey in 1859. This nobleman was governor of New South Wales from 1890 to 1893.

JERSEY, the largest of the Channel Islands, belonging to Great Britain. Its chief town, St Helier, on the south coast of the island, is in 49° 12′ N., 2° 7′ W., 105 m. S. by E. of Portland Bill on the English coast, and 24 m. from the French coast to the east. Jersey is the southernmost of the more important islands of the group. It is of oblong form with a length of 10 m. from east to west and an extreme breadth of 6J m. The area is 28,717 acres, or 45 sq. m. Pop. (1901), 52,576.

The island reaches its greatest elevation (neafly 500 ft.) in the north, the land rising sharply from the north coast, and displaying bold and picturesque cliffs towards the sea. The east, south and west coasts consist of a succession of large open bays, shallow and rocky, with marshy or sandy shores separated by rocky head- lands. The principal bays are Greve au Lancons, Greve de Lecq, St John's and Bouley Bays on the north coast; St Cathe- rine's and Grouville Bays on the east; St Clement's, St Aubin's and St Brelade's Bays on the south; and St Ouen's Bay, the wide sweep of which occupies nearly the whole of the west coast. The sea in many places has encroached greatly on the land, and sand drifts have been found troublesome, especially on the west coast. The surface of the country is broken by winding valleys having a general direction from north to south, and as they approach the south uniting so as to form small plains. The lofty hedges which bound the small enclosures into which Jersey is divided, the trees and shrubberies which line the roads and cluster round the uplands and in almost every nook of the valleys unutilized for pasturage or tillage, give the island a luxuriant appearance, neutralizing the bare effect of the

few sandy plains and sand-covered hills. Fruits and flowers indigenous to warm climates grow freely in the open air. The land, under careful cultivation, is rich and productive, the soil being generally a deep loam, especially in the valleys, but in the west shallow, light and sandy. The subsoil is usually gravel, but in some parts an unfertile clay. Some two-thirds of the total area is under cultivation, great numbers of cattle being pastured, and much market gardening practised. The potato crop is very large. The peasants take advantage of every bit of wall and every 'isolated nook of ground for growing fruit trees. Grapes are ripened under glass; oranges can be grown in sheltered situations, but the most common fruits are apples, which are used for cider, and pears. A manure of burnt sea-weed (vraic) is generally used. The pasturage is very rich, and is much improved by the application of this manure to the surface. The breed of cattle is kept pure by stringent laws against the importation of foreign animals. The milk is used almost exclusively to manufacture I butter. The cattle are always housed in winter, but remain out

at night from May till October. There was formerly a small black breed of horses peculiar to the island, but horses are now chiefly imported from France or England. Pigs are kept principally for local consumption, and only a few sheep are reared. Fish are not so plentiful as round the shores of Guernsey, but mackerel, turbot, cod, mullet and especially the conger eel are abundant at the Minquiers. There is a large oyster bed between Jersey and France, but partly on account of over- dredging the supply is not so abundant as formerly. There is a great variety of other shell fish. The fisheries, ship-building and boat-building employ many of the inhabitants. Kelp and iodine are manufactured from sea-weed. The principal exports are granite, fruit and vegetables (especially potatoes), butter and cattle; and the chief imports coal and articles of human con- sumption. Communications with England are maintained prin- cipally from Southampton and Weymouth, and there are regular steamship services from Granville and St Malo on the French coast. The Jersey railway runs west from St Helier round St Aubin's Bay to St Aubin, and continues to Corbiereatthe south- western extremity of the island; and the Jersey eastern railway follows the southern and eastern coasts to Gorey. The island is intersected with a network of good roads.

Jersey is under a distinct and in several respects different form of administrative government from Guernsey and the smaller islands included in the bailiwick of Guernsey. For its peculiar constitution, system of justice, ecclesiastical arrangements and finance, see Channel Islands. There are

twelve parishes, namely St Helier, Grouville, St Brelade, St Clement, St John, St Laurence, St Martin, St Mary, St Ouen, St Peter, St Saviour and Trinity. The population of the island nearly doubled between 1821 and 1901, but decreased from 54,518 to 52,576 between 1891 and 1001.

The history of Jersey is treated under Channel Islands. Among objects of antiquarian interest, a cromlech near Mont Orgueil is the finest of several examples. St Brelade's church, probably the oldest in the island, dates from the 12th century; among the later churches St Helier's, of the 14th century, may be mentioned. There are also some very early chapels, con- sidered to date from the 10th century or earlier; among these may be noted the Chapelle-es-Pecheurs at St Brelade's, and the picturesque chapel in the grounds of the manor of Rozel. The castle of Mont Orgueil, of which there are considerable remains, is believed to be founded upon the site of a Roman stronghold, and a " Caesar's fort " still forms a part of it.

JERSEY CITY, a city and the county-seat of Hudson county, New Jersey, U.S.A., on a peninsula between the Hudson and Hackensack rivers at the N. and between New York and Newark bays at the S., opposite lower Manhattan Island. Pop. (1890), 163,003; (1900), 206,433, °f whom 58,424 were foreign-born (19.314 Irish, 17,375 German, 4642 English, 3832 Italian, 1694 Russian, 1690 Scottish, 1643 Russian Poles, 1445 Austrian) and 3704 were negroes; (1910 census) 267,779. It is the eastern terminus of the Pennsylvania, the Lehigh Valley, the West Shore, the Central of New Jersey, the Baltimore & Ohio, the Northern of New Jersey (operated by the Erie), the Erie, the New York, Susquehanna & Western, and the New Jersey & New York (controlled by the Erie) railways, the first three using the Pennsylvania station; and of the little-used Morris canal. Jersey City is served by several inter-urban electric railways and by the tunnels of the Hudson & Manhattan railroad company to Dey St. and to 33rd St. and 6th Ave., New York City, and it also has docks of several lines of Transatlantic and coast steamers. The city occupies a land area of 14-3 sq. m. and has a water-front of about 12 m. Bergen Hill, a southerly extension of the Pali- sades, extends longitudinally through it from north to south. At the north end this hill rises on the east side precipitously to a height of nearly 200 ft.; on the west and south sides the slope is gradual. On the crest of the hill is the fine Hudson County Boulevard, about 19 m. long and 100 ft. wide, extending through the city and county from north to south and passing through West Side Park, a splendid county park containing lakes and a 70-acre playground. The

water-front, especially on the east side, is given up to manu- facturing and shipping establishments. In the hill section are the better residences, most of which are wooden and detached.

The principal buildings are the city hall and the court house. There are nine small city parks with an aggregate area of 39-1 acres. The city has a public library containing (1907) 107,600 volumes and an historical museum. At the corner of Bergen Ave. and Forrest St. is the People's Palace, given in 1904 by Joseph Milbank to the First Congregational church and containing a library and reading- room, a gymnasium, bowling alleys, a billiard-room, a rifle-range, a roof-garden, and an auditorium and theatre ; kindergarten classes are held and an employment bureau is maintained. Among the educational institutions are the German American school, Has- brouck institute, St Aloysius academy (Roman Catholic) and St Peter's college (Roman Catholic) ; and there are good public schools. Grain is shipped to and from Jersey City in large quantities, and in general the city is an important shipping port; being included, however, in the port of New York, no separate statistics are avail- able. There are large slaughtering establishments, and factories for the refining of sugar and for the manufacture of tobacco goods, soap and perfumery, lead pencils, iron and steel, railway cars, chemicals, rubber goods, silk goods, dressed lumber, and malt liquors. The value of the city's manufactured products increased from $37,376,322 in 1890 to $77,225,116 in 1900, or 1066%; in 1905 the factory product alone was valued at $75,740,934, an increase of only 3>9 % over the factory product in 1900, this small rate of increase being due very largely to a decline in the value of the products of the sugar and molasses refining industry. The value of the wholesale slaughtering and meat-packing product decreased from $18,551,783 in 1880 and $11,356,511 in 1890 to $6,243,217 in 1900 — of this $5,708,763 represented wholesale slaughtering alone; in 1905 the wholesale slaughtering product was valued at $7,568,739.

In 1908 the assessed valuation of the city was $267,039,754. The city is governed by a board of aldermen and a mayor (elected biennially), who appoints most of the officials, the street and water board being the principal exception.

Jersey City when first incorporated was a small sandy penin- sula (an island at high tide) known as Paulus Hook, directly opposite the lower end of Manhattan Island. It had been a part of the Dutch patroonship of Pavonia granted to Michael Pauw in 1630. In 1633 the first buildings were erected, and for more than a century the Hook was occupied by a small agricultural and trading community. In 1764 a new post route between New York and Philadelphia passed through what is now the city, and direct ferry communication began with New York. Early in the War of Independence Paulus Hook was fortified by the Americans, but soon after the battle of Long Island they aban- doned it, and on the 23rd of September 1776 it was occupied by the British. On the morning of the 19th of August 1779 the British garrison was surprised by Major Henry Lee ("

Light Horse Harry "), who with about 500 men took 159 prisoners and lost only 2 killed and 3 wounded, one of the most brilliant ex- ploits during the War of Independence. In 1804 Paulus Hook, containing 117 acres and having about 15 inhabitants, passed into the possession of three enterprising New York lawyers, who laid it out as a town and formed an association for its government, which was incorporated as the " associates of the Jersey com- pany." In 1820 the town was incorporated as the City of Jersey, but it remained a part of the township of Bergen until 1838, when it was reincorporated as a distinct municipality. In 1851 the township of Van Vorst, founded in 1804 between Paulus Hook and Hoboken, was annexed. In 1870 there were two annexa- tions: to the south, the town of Bergen, the county-seat, which was founded in 1660; to the north-west, Hudson City, which had been separated from the township of North Bergen in 1852 and incorporated as a city in 1855. The town of Greenville, to the south, was annexed in 1873.

JERUSALEM (Heb. nb&% Yerushalaim, pronounced as a dual), the chief city of Palestine. Letters found at Tell el- Amarna in Egypt, written by an early ruler of Jerusalem, show that the name existed under the form Urusalim, i.e. " City of Salim " or " City of Peace," many years before the Israelites under Joshua entered Canaan. The emperor Hadrian, when he rebuilt the city, changed the name to Aelia Capitolina. The Arabs usually designate Jerusalem by names expressive of

holiness, such as Beit el Makdis and El Mukaddis or briefly El Kuds, i.e. trie Sanctuary.

Natural Topography. — Jerusalem is situated in 31 "47′ N. and 35 ° 15′ E., in the hill country of southern Palestine, close to the watershed, at an average altitude of 2500 ft. above the Mediterranean, and 3800 ft. above the level of the Dead Sea. The city stands on a rocky plateau, which projects southwards from the main line of hills. On the east the valley of the Kidron separates this plateau from the ridge of the Mount of Olives, which is 100 to 200 ft. higher, while the Wadi Er Rababi bounds Jerusalem on the west and south, meeting the Valley of Kidron near the lower pool of Siloam. Both valleys fall rapidly as they approach the point of junction, which lies at a depth of more than 600 ft. below the general valley of the plateau. The latter, which covers an area of about 1000 acres, has at the present time a fairly uniform surface and slopes gradually from the north to the south and east/ Originally, however, its formation was very different, as it was intersected by a deep valley, called Tyropoeon by

Josephus, which, starting from a point N.W. of the Damascus gate, followed a course first south-east and then west of south, and joined the two main valleys of Kidron and Er Rababi at Siloam. Another shorter valley began near the present Jaffa gate and, taking an easterly direction, joined the Tyropoeon; while a third ravine passed across what is now the northern part of the Haram enclosure and fell into the valley of the Kidron. The exact form of these three interior valleys, which had an important influence on the construction and history of the city, is still imperfectly known, as they are to a great extent obliterated by vast accumulations of rubbish, which has filled them up in some places to a depth of more than 100 ft. Their approximate form was only arrived at by excava- tions made during the later years of the 19th century. The limited knowledge which we possess of the original features of the ground within the area of the city makes a reconstruction of the topo- graphical history of the latter a difficult task ; and, as a natural result, many irreconcilable theories have been suggested. The difficulty is increased by the fact that the geographical descriptions given in the Old Testament the Apocrypha and the writings of Josephus are very short, and, having been written for those who were acquainted with the places, convey insufficient information to his- torians of the present day, when the sites are so greatly altered. All that can be done is to form a continuous account in accord with the ancient histories, and with the original formation of the ground, so far as this has been identified by modern exploration. But the progress of exploration and excavation may render this subject to further modification.

The geological formation of the plateau consists of thin beds of hard silicious chalk, locally called misse, which overlie a thick bed of soft white limestone, known by the name of meleke. Both descrip- tions of rock yielded good material for building; while in the soft meleke tanks, underground chambers, tombs, &c, were easily excavated. In ancient times a brook flowed down the valley of the Kidron, and it is possible that a stream flowed also through the Tyropoeon valley. The only known spring existing at present within the limits of the city is the " fountain of the Virgin," on the western side of the Kidron valley, but there may have been others which are now concealed by the accumulations of rubbish. Cisterns were also used for the storage of rain water, and aqueducts, of which the remains still exist (see Aqueducts ad init.), were constructed for the conveyance of water from a distance. Speaking generally, it is probable that the water supply of Jerusalem in ancient times was better than it is at present.

History. — The early history of Jerusalem is very obscure. The Tell el-Amarna letters show that, long before the invasion by Joshua, it was occupied by the Egyptians, and was probably a stronghold of considerable importance, as it formed a good strategical position in the hill country of

southern Palestine. We do not know how the Egyptians were forced to abandon Jerusalem; but, at the time of the Israelite conquest, it was undoubtedly in the hands of the Jebusites, the native inhabitants of the country. The exact position of the Jebusite city is un- known; some authorities locate it on the western hill, now known as Zion; some on the eastern hill, afterwards occupied by the Temple and the city of David; while others consider it was a double settlement, one part being on the western, and the other on the eastern hill, separated from one another by the Tyropoeon valley. The latter view appears to be the most probable, as, according to the Biblical accounts, Jerusalem was partly in Judah and partly in Benjamin, the line of demarcation between the two tribes passing through the city. According to his theory, the part of Jerusalem known as Jebus was situated on the western hill, and the outlying fort of Zion on the eastern hill. The men of Judah and Benjamin did not succeed in getting full possession of the place, and the Jebusites still held it when David became king of Israel. Some years after his accession David succeeded

after some difficulty in taking Jerusalem. He established his royal city on the eastern hill close to the site of the Jebusite Zion, while Jebus, the town on the western side of the Tyropoeon valley, became the civil city, of which Joab, David's leading general, was appointed governor. David surrounded the royal city with a wall and built a citadel, probably on the site of the Jebusite fort of Zion, while Joab fortified the western town. North of the city of David, the king, acting under divine guid- ance, chose a site for the Temple of Jehovah, which was erected with great magnificence by Solomon. The actual site occupied by this building has given rise to much controversy, though all authorities are agreed that it must have stood on some part of the area now known as the Haram. James Fergusson was of opinion that the Temple stood near the south-western corner. As, however, it was proved by the explorations of Sir Charles Warren in 1869-18 70 that the Tyropoeon valley passed under this corner, and that the foundations must have been of enormous depth, Fergusson's theory must be regarded as untenable (see also Sepulchre, Holy). On the whole it is most likely that the Temple was erected by Solomon on the same spot as is now occupied by the Dome of the Rock, commonly known as the Mosque of Omar, and, regard being had to the levels of the ground, it is possible that the Holy of Holies, the most sacred chamber of the Temple, stood over the rock which is still re- garded with veneration by the Mahommedans. Solomon greatly strengthened the fortifications of Jerusalem, and was probably the builder of the line of defence, called by Josephus the first or old wall, which united the cities on the eastern and western hills. The kingdom reached its highest point of importance during the reign of Solomon, but, shortly after his death, it was broken up by the rebellion of Jeroboam, who founded the separate kingdom of Israel with its capital at

Shechem. Two tribes only, Judah and Benjamin, with the descendants of Levi, remained faithful to Rehoboam, the son of Solomon. Jerusalem thus lost much of its importance, especially after it was forced to surrender to Shishak, king of Egypt, who carried off a great part of the riches which had been accumulated by Solomon. The history of Jerusalem during the succeeding three centuries consists for the most part of a succession of wars against the kingdom of Israel, the Moabites and the Syrians. Joash, king of Israel, captured the city from Amaziah, king of Judah, and destroyed part of the fortifications, but these were rebuilt by Uzziah, the son of Amaziah, who did much to restore the city to its original pros- perity. In the reign of Hezekiah, the kingdom of Judah became tributary to the Assyrians, who attempted the capture of Jerusalem. Hezekiah improved the defences and arranged for a good water supply, preparatory to the siege by Sennacherib, the Assyrian general. The siege failed and the Assyrians retired. Some years later Syria was again invaded by the Egyptians, who reduced Judah to the position of a tributary state. In the reign of Zedekiah, the last of the line of kings, Jerusalem was captured by Nebuchadrezzar, king of Babylon, who pillaged the city, destroyed the Temple, and ruined the fortifications (see Jews, § 17). A number of the principal inhabitants were carried captive to Babylon, and Jerusalem was reduced to the position of an insignificant town. Nebuchadrezzar placed in the city a garrison which appears to have been quartered on the western hill, while the eastern hill on which were the Temple and the city of David was left more or less desolate. We have no information regarding Jerusalem during the period of the captivity, but fortunately Nehemiah, who was permitted to return and rebuild the defences about 445 B.C., has given a fairly clear description of the line of the wall which enables us to obtain a good idea of the extent of the city at this period. The Temple had already been partially rebuilt by Zedekiah and his companions, but on a scale far inferior to the magnificent building of King Solomon, and Nehemiah devoted his attention to the reconstruction of the walls. Before beginning the work, he made a preliminary recon- naissance of the fortifications on the south of the town from the Valley Gate, which was near the S.E. corner, to the pool of Siloam and valley of the Kidron. He then allotted the recon- struction of wall and gates to different parties of workmen, and

^

9)

JERUSALEM

in the time of the Kings and Nehemiah

The Tower Piephinus

The Tower Hippicus

Hi n n o m

CO

OJ

•

JERUSALEM

at the time of the Siege by Titus

JERUSALEM

his narrative describes the portion of wall upon which each of these was employed. 1

It is clear from his account that the lines of fortifications included both the eastern and western hills. North of the Temple enclosure there was a gate, known as the Sheep Gate, which must have opened into the third valley mentioned above, and stood somewhere near what is now the north side of the Haram enclosure, but considerably south of the present north wall of the latter. To the west of the Sheep Gate there were two important towers in the wall, called respec- tively Meah and Hananeel. The tower Hananeel is specially worthy of notice as it stood N.W. of the Temple and probably formed the basis of the citadel built by Simon Maccabaeus, which again was succeeded by the fortress of Antonia, constructed by Herod the Great, and one of the most important positions at the time of the siege by Titus. At or near the tower Hananeel the wall turned south along the east side of the Tyropoeon valley, and then again westward, crossing the valley at a point probably near the remarkable construc- tion known as Wilson's arch. A gate in the valley, known as the Fish Gate, opened on a road which, leading from the north, went down the Tyropoeon valley to the southern part of the city. West- ward of this gate the wall followed the south side of the valley which joined the Tyropoeon from the west as far as the north-

western corner of the city at the site of the present Jaffa Gate and the so-called tower of David. In this part of the wall there were apparently two gates facing north, i.e. the Old Gate and the Gate of Ephraim, 400 cubits from the corner. 2 At the corner stood the residence of the Babylonian governor, near the site upon which King Herod afterwards built his magnificent palace. From the corner at the governor's house, the wall went in a southerly direction and turned south-east to the Valley Gate, remains of which were discovered by F. J. Bliss and fully described in his Excavations in Jerusalem in 1894-1897. From the Valley Gate the wall took an easterly course for a distance of 1000 cubits to the Dung Gate, near which on the east was the Fountain Gate, not far from the lower pool of Siloam. Here was the most southerly point of Jerusalem, and the wall turning hence to the north followed the west side of the valley of the Kidron, enclosing the city of David and the Temple enclosure, and finally turning west at some point near the site of the Golden Gate joined the wall, already described, at the Sheep Gate. Nehemiah mentions a number of places on the eastern hill, including the tomb of David, the positions of which cannot with our present knowledge be fixed with any certainty.

After the restoration of the walls of Jerusalem by Nehemiah, a considerable number of Jews returned to the city, but we know practically nothing of its history for more than a century until, in 332 B.C., Alexander the Great conquered Syria. The gates of Jerusalem were opened to him and he left the Jews in peaceful occupation. But his successors did not act with similar leniency; when the city was captured by Ptolemy I., king of Egypt, twelve years later, the fortifications were partially demolished and apparently not again restored until the period of the high priest Simon II., who repaired the defences and also the Temple build- ings. In 168 b.c. Antiochus Epiphanes captured Jerusalem, destroyed the walls, and devastated the Temple, reducing the city to a worse position than it had occupied since the time of the captivity. He built a citadel called the Acra to dominate the town and placed in it a strong garrison of Greeks. The position of the Acra is doubtful, but it appears most probable that it stood on the eastern hill between the Temple and the city of David, both of which it commanded. Some writers place it north of the Temple on the site afterwards occupied by the fortress of Antonia, but such a position is not in accord with the descriptions either in Josephus or in the books of the Maccabees, which are quite consistent with each other. Other writers again have placed the Acra on the eastern side of the hill upon which the church of the Holy Sepulchre now stands, but as this point was probably quite outside the city at the time of Antiochus Epiphanes, and is at too great a distance from the Temple, it can hardly be accepted. But the site which has been already indicated at the N.E. corner of the present Mosque el Aksa meets the accounts of the ancient authorities better than any other. At this point in the Haram

enclosure there is an enormous under- ground cistern, known as the Great Sea, and this may possibly have been the source of water supply for the Greek garrison. The oppression of Antiochus led to a revolt of the Jews under the leadership of the Maccabees," and Judas Maccabaeus succeeded in capturing Jerusalem after severe fighting, but could not get

1 The sites shown on the plan are tentative, and cannot be re- garded as certain; see Nehemiah ii. 12-15, "i- i _ 3 2 i x "- 37~39-

2 See 2 Kings xiv. 13.

possession of the Acra, which caused much trouble to the Jews, who erected a wall between it and the Temple, and another wall to cut it off from the city. The Greeks held out for a consider- able time, but had finally to surrender, probably from want of food, to Simon Maccabaeus, who demolished the Acra and cut down the hill upon which it stood so that it might no longer be higher than the Temple, and that there should be no separation between the latter and the city. Simon then constructed a new citadel, north of the Temple, to take the place of the Acra, and established in Judaea the Asmonean dynasty, which lasted for nearly a century, when the Roman republic began to make its influence felt in Syria. In 65 B.C. Jerusalem was captured by Pompey after a difficult siege. The Asmonean dynasty lasted a few years longer, but finally came to an end when Herod the Great, with the aid of the Romans, took possession of Jerusalem and became the first king of the Idumaean dynasty. Herod again raised the city to the position of an important capital, restoring the fortifications, and rebuilding the Temple from its foundations. He also built the great fortress of Antonia, N.W. of the Temple, on the site of the citadel of the Asmoneans, and constructed a magnificent palace for himself on the western hill, defended by three great towers, which he named Mariamne, Hippicus and Phasaelus. At some period between the time of the Maccabees and of Herod, a second or outer wall had been built outside and north of the first wall, but it is not possible to fix an accurate date to this line of defence, as the references to it in Josephus are obscure. Herod adorned the town with other buildings and constructed a theatre and gymnasium. He doubled the area of the enclosure round the Temple, and there can be little doubt that a great part of the walls of the Haram area date from the time of Herod, while probably the tower of David, which still exists near the Jaffa Gate, is on the same foun- dation as one of the towers adjoining his palace. Archelaus, Herod's successor, had far less authority than Herod, and the real power of government at Jerusalem was assumed by the Roman procurators, in the time of one of whom, Pontius Pilate, Jesus Christ was condemned to death and crucified outside Jerusalem. The places of his

execution and burial are not certainly known (see Sepulchre, Holy).

Herod Agrippa, who succeeded to the kingdom, built a third or outer wall on the north side of Jerusalem in order to enclose and defend the buildings which had gradually been constructed outside the old fortifications. The exact line of this third wall is not known with certainty, but it probably followed approxi- mately the same line as the existing north wall of Jerusalem. Some writers have considered that it extended a considerable distance farther to the north, but of this there is no proof, and no remains have as yet been found which would support the opinion. The wall of Herod Agrippa was planned on a grand scale, but its execution was stopped by the Romans, so that it was not completed at the time of the siege of Jerusalem by Titus. The writings of Josephus give a good idea of the fortifications and buildings of Jerusalem at the time, of the siege, and his accurate personal knowledge makes his account worthy of the most careful perusal. He explains clearly how Titus, beginning his attack from the north, captured the third or outer wall, then the second wall, and finally the fortress of Antonia, the Temple, and the upper city. After the capture, Titus ordered the Temple to be demolished and the fortifications to be levelled, with the exception of the three great towers at Herod's palace. It is, however, uncertain how far the order was carried out, and it is probable that the outer walls of the Temple enclosure were left partially standing and that the defences on the west and south of the city were not completely levelled. When Titus and his army withdrew from Jerusalem, the 10th legion was left as a permanent Roman garrison, and a fortified camp for their occupation was established on the western hill. We have no account of the size or position of this camp, but a consideration of the site, and a comparison with other Roman camps in various parts of Europe, make it probable that it occupied an area of about 50 acres, extending over what is now known as the Armenian quarter of the town, and that it was bounded on the north by the

old or first wall, on the west also by the old wall, on the south by a line of defence somewhat in the same position as the present jouth wall where it passes the Zion Gate, and on the east by an entrenchment running north and south parallel to the existing thoroughfare known as David Street. For sixty years the Roman garrison were left in undisturbed occupation, but in 132 the Jews rose in revolt under the leadership of Bar-Cochebas or Barcochba, and took possession of Jerusalem. After a severe struggle, the revolt was suppressed by the Roman general, Julius Severus, and Jerusalem was recaptured and again destroyed. According to some writers, this

devastation was even more com- plete than after the siege by Titus. About 130 the emperor Hadrian decided to rebuild Jerusalem, and make it a Roman colony. The new city was called Aelia Capitolina. The exact size of the city is not known, but it probably extended as far as the present north wall of Jerusalem and included the northern part of the western hill. A temple dedicated to Jupiter Capitol- inus was erected on the site of the Temple, and other buildings were constructed, known as the Theatre, the Demosia, the Tetranymphon, the Dodecapylon and the Codra. The Jews were forbidden to reside in the city, but Christians were freely admitted. The history of Jerusalem during the period between the foundation of the city of Aelia by the emperor Hadrian and the accession of Constantine the Great in 306 is obscure, but no important change appears to have been made in the size or fortifications of the city, which continued as a Roman colony. In 326 Constantine, after his conversion to Christianity, issued orders to the bishop Macarius to recover the site of the cruci- fixion of Jesus Christ, and the tomb in which his body was laid (see Sepulchre, Holy). After the holy sites had been deter- mined, Constantine gave orders for the construction of two magnificent churches, the one over the tomb and the other over the place where the cross was discovered. The present church of the Holy Sepulchre stands on the site upon which one of the churches of Constantine was built, but the second church, the Basilica of the Cross, has completely disappeared. The next important epoch in building construction at Jerusalem was about 460, when the empress Eudocia visited Palestine and expended large sums oh the improvement of the city. The walls were repaired by her orders, and the line of fortifications appears to have been extended on the south so as to include the pool of Siloam. A church was built above the poof, probably at the same time, and, after having completely disappeared for many centuries, it was recovered by F. J. Bliss when making his exploration of Jerusalem. The empress also erected a large church in honour of St Stephen north of the Damascus Gate, and is believed to have been buried therein. The site of this church was discovered in 1874, and it has since been rebuilt. In the 6th century the emperor Justinian erected a magnificent basilica at Jerusalem, in honour of the Virgin Mary, and attached to it two hospitals, one for the reception of pilgrims and one for the accommodation of the sick poor. The description given by Procopius does not indicate clearly where this church was situated. A theory frequently put forward is that it stood within the Haram area near the Mosque of el Aksa, but it is more probable that it was on Zion, near the traditional place of the Coenaculum or last supper, where the Mahommedan building known as the tomb of David now stands. In 614 Chosroes II., the king of Persia, captured Jerusalem, devastated many of the buildings, and massacred a great number of the inhabitants. The churches at the Holy Sepulchre were much damaged, but were partially restored by the monk Modestus, who devoted himself with great energy to

the work. After a severe struggle the Persians were defeated by the emperor Heraclius, who entered Jerusalem in triumph in 629 bringing with him the holy cross, which had been carried off by Chosroes. At this period the religion of Mahomet was spreading over the east, and in 637 the caliph Omar marched on Jerusalem, which capitulated after a siege of four months. Omar behaved with great moderation, restraining his troops from pillage and leaving the Christians in possession of their churches. A wooden mosque was erected near the site of the Temple, which was replaced by the Mosque*

of Aksa, built by the amir Abdalmalik (Abd el Malek), who also constructed the Dome of the Rock, known as the Mosque of Omar, in 688. The Mahommedans held Jerusalem until 1099, when it was captured by the crusaders under Godfrey of Bouillon, and became the capital of the Latin Kingdom of Jerusalem (see Crusades, vol. viii. p. 401) until 1187, when Saladin re- conquered it, and rebuilt the walls. Since that time, except from 1229 to 1239, and from 1243 to 1244, the city has been held by the Mahommedans. It was occupied by the Egyptian sultans until 1517, when the Turks under Selim I. occupied Syria. Selim's successor, Suleiman the Magnificent, restored the fortifications, which since that time have been little altered.

Modern Jerusalem. — Jerusalem is the chief town of a sanjak,, governed by a mutessartf, who reports directly to the Porte. It has the usual executive and town councils, upon which the recognized religious communities, or millets, have representatives; and it is garrisoned by infantry of the V. army corps. The city is connected with its port, Jaffa, by a carriage road, 41 m., and by a. metre-gauge railway, 54 m., which was completed in 1892, and is worked by a French company. There are also carriage roads to Bethlehem, Hebron and Jericho, and a road to Nablus was in course of construc- tion in 1909. Prior to 1858, when the modern building period com- menced, Jerusalem lay wholly within its 16th-century walls, and even as late as 1875 there were few private residences beyond their limits. At present Jerusalem without the walls covers a larger area than that within them. The growth has been chiefly towards the north and north-west ; but there are large suburbs on the west, and on the south- west near the railway station on the plain of Rephaim. The village of Siloam has also increased in size, and the western slopes of Olivet are being covered with churches, monasteries and houses. Amongst the most marked features of the change that has taken place since 1875 are the growth of religious and philanthropic establishments; the settlement of Jewish colonies from Bokhara, Yemen and Europe; the migration of Europeans, old Moslem families, and Jews from the city to the suburbs; the increased vegetation, due to the numerous gardens and improved methods of cultivation; the substitution of timber and red tiles for the vaulted stone roofs which were

so characteristic of the old city ; the striking want of beauty, grandeur, and harmony with their environment exhibited by most of the new buildings; and the introduction of wheeled transport, which, cutting into the soft limestone, has produced mud and dust to an extent previously unknown. To facilitate communication between the city and its suburbs, the Bab ez-Zahire, or Herod's Gate, and a new gate, near the north-west angle of the walls, have been opened; and a portion of the wall, adjoining the Jaffa Gate, has been thrown down, to allow free access for carriages. Within the city the princi- pal streets have been roughly paved, and iron bars placed across the narrow alleys to prevent the passage of camels. Without the walls carriage roads have been made to the mount of Olives, the railway station, and various parts of the suburbs, but they are kept in bad repair. Little effort has been made to meet the increased sanitary requirements of the larger population and wider inhabited area. There is no municipal water-supply, and the main drain of the city discharges into the lower pool of Siloam, which has become an open cesspit. In several places the deLris within the walls is saturated with sewage, and the water of the Fountain of the Virgin, and of many of the old cisterns, is unfit for drinking. Amongst the more important buildings for ecclesiastical and philanthropic purposes erected to the north of the city since i860 are the Russian cathedral, hospice and hospital; the French hospital of St Louis, and hospice and church of St Augustine; the German schools, orphanages and hospitals ; the new hospital and industrial school of the London mission to the Jews; the Abyssinian church; the church and schools of the Church missionary society ; the Anglican church, college and bishop's house; the Dominican monastery, seminary and church of St Stephen; the Rothschild hospital and girls' school; and the industrial school and workshops of the Alliance Israelite. On the mount of Olives are the Russian church, tower and hospice, near the chapel of the Ascension; the French Paternoster church; the Carmelite nunnery ; and the Russian church of St Mary Magda- lene, near Gethsemane. South of the city are the Armenian monastery of Mount Zion and Bishop Gobat's school. On the west side are the institution of the sisters of St Vincent ; the Ratisbon school; the Montefiore hospice; the British ophthalmic hospital of the knights of St John; the convent and church of the Clarisses; and the .Moravian leper hospital. Within the city walls are the Latin Patriarchal church and residence; the school of the Freres de la Doctrine Chretienne; the schools and printing house of the Franciscans; the Coptic monastery; the German church of the Redeemer, and hospice ; the United Armenian church of the Spasm ; the convent and school of the Sceursde Zion; the Austrian hospice; the Turkish school and museum; the monastery and seminary of the Freres de la Mission Algerienne, with the restored church of St Anne, the church, schools and hospital of the London mission to the Jews; the Armenian seminary and Patriarchal buildings; the Rothschild hospital; and Jewish hospices and

synagogues.

The climate is naturally good, but continued neglect of sanitary precautions has made the city unhealthy. During the summer months the heat is tempered by a fresh sea-breeze, and there is usually a sharp fall of temperature at night; but in spring and autumn the east and south-east winds, which blow across the heated depression of the Ghor, are enervating and oppressive. A dry season, which lasts from May to October, is followed by a rainy season, divided into the early winter and latter rains. Snow falls two years out of three, but soon melts. The mean annual tempera- ture is 62-8° F., the maximum 112°, and the minimum 25V The mean monthly temperature is lowest (47-2°) inFebruary, and highest (76 3) in August. The mean annual rainfall (1861 to 1899) is 2606 in. The most unhealthy period is from 1st May to 31st October, when there are, from time to time, outbreaks of typhoid, small-pox, diphtheria and other epidemics. The unhealthiness of the city is chiefly due to want of proper drainage, impure drinking- water, miasma from the disturbed rubbish heaps, and contaminated dust from the uncleansed roads and streets. The only industry is the manufacture of olive-wood and mother-of-pearl goods for sale to pilgrims and for export. The imports (see Joppa) are chiefly food, clothing and building material. The population in 1905 was about 60,000 (Moslems 7000, Christians 13,000, Jews 40,000). During the pilgrimage season it is increased by about 15,000 travellers and pilgrims.

Authorities. — Pal. Exp. Fund Publications — Sir C. Warren, Jerusalem, Memoir (1884); Clermont-Ganneau, Archaeol. Researches (vol. i., 1 899) ; Bliss, Excavns. at Jerusalem (1 898) ; Conder, Latin King- dom 0} Jerusalem (1897), and The City of Jerusalem (1909), an historical survey over 4000 years; Le Strange, Pal. under the Moslems (1890); Fergusson, Temples of the Jews (1878) ; Hayter Lewis, Holy Places of Jerusalem(i88S) ; Churches of Constantine at Jerusalem (1891) ; Guthe, " Ausgrabungen in Jer.," in Zeitschrift d. D. Pal. Vereins (vol. v.); Tobler, Topographie von Jerusalem (Berlin, 1854); Dritte Wanderung (1859) ;Sepp, Jerusalem und das heilige Land (1873) ; Rohricht, Regesta Regni Hierosolymitani; Bibliotheca Geographica Palaestinae (1890) ; De Vogue, Le Temple de Jerusalem (1864); Sir C. W. Wilson, Golgotha and the Holy Sepulchre (1906) ; publications of the Pal. Pilgrims' Text Society and of the Societi de V Orient latin ; papers in Quarterly Statements of the P. E. Fund, the Zeitschrift a. D. Pal. Vereins, Clermont-Ganneau's Recueil d'archeologie orientate and Etudes d'arch. orientate, and the Revue Biblique ; Baedeker's Handbook to Palestine and Syria (1906); Mommert, Die hi. Grabeskirchezu Jerusalem (1898); Golgotha und das hi. Grab zu Jerusalem (1900) ; Couret, La Prise de Jirusm. par les Perses, 614.

(Orleans, 1896 — Plans, Ordnance Survey, revised ed. ; Ordnance Survey revised by Dr Schick in Z.D.P. V. xviii., 1895). (C. W. W. ; C. M. W.)

JERUSALEM, SYNOD OF (1672). By far the most important of the many synods held at Jerusalem (see Wetzer and Welte, Kirchenlexikon, 2nd ed., vi. 1357 sqq.) is that of 1672; and its confession is the most vital statement of faith made in the Greek Church during the past thousand years'. It refutes article by article the confession of Cyril Lucaris, which appeared in Latin at Geneva in 1629, and in Greek, with the addition of four "questions," in 1633. Lucaris, who died in 1638 as patriarch of Constantinople, had corresponded with Western scholars and had imbibed Calvinistic views. The great opposition which arose during his lifetime continued after his death, and found classic expression in the highly venerated confession of Petrus Mogilas, metropolitan of Kiev (1643). Though this was intended as a barrier against Calvinistic influences, certain Reformed writers, as well as Roman Catholics, persisted in claiming the support of the Greek Church for sundry of their own positions. Against the Calvinists the synod of 1672 therefore aimed its rejection of unconditional predestination and of justification by faith alone, also its advocacy of what are substantially the Roman doctrines of transubstantiation and of purgatory; the Oriental hostility to Calvinism had been fanned by the Jesuits. Against the Church of Rome, however, there was directed the affirmation that the Holy Ghost proceeds from the Father and not from both Father and Son; this rejection of the filioque was not unwelcome to the Turks. Curiously enough, the synod re- fused to believe that the heretical confession it refuted was actually by a former patriarch of Constantinople; yet the proofs of its genuineness seem to most scholars overwhelming. In negotiations between Anglican and Russian churchmen the con- fession of Dositheus 1 usually comes to the front.

Texts. — The confession of Dositheus, or the eighteen decrees of the Synod of Jerusalem, appeared in 1676 at Paris as Synodus

1 Patriarch of Jerusalem (1669-1707), who presided over the synod .

Bethlehemitica; a revised text in 1678 as Synodus Jerosolymitana; Hardouin, Acta conciliorum, vol. xi. ; Kimmel, Monumenta fidei ecclesiae orientalis (Jena, 1850; critical edition); P. Schaff, The Creeds of Christendom, vol. ii. (text after Hardouin and Kimmel, with Latin translation); The Acts and Decrees of the Synod of Jerusalem translated from the Greek, with notes, by J. N. W. B. Robertson (London, 1899) ; J. Michalcescu, Die Bekenntnisse und die wichtigsten Glaubenszeugnisse der griechisch-orientalischen Kirche (Leipzig, 1904; Kim'mel's text with

introductions). Literature. — The Doctrine of the Russian Church . . . translated by R. W. Blackmore (Aberdeen, 1845), p. xxv. sqq. ; Schaff, i. § 17 ;|Wetzer and Welte, Kirchenlexikon (2nd ed.)(vi. 1359 seq. ; Herzog-Hauck, Realencyklopddie (3rd ed.), viii. 703-705; Michalcescu, 123 sqq. (See Councils.) (W. W. R.)*

JESI (anc. Aesis), a town and episcopal see of the Marches, Italy, in the province of Ancona, from which it is 17 m. W. by S. by rail, 318 ft. above sea-level. Pop. (1901), 23,285. The place took its ancient name from the river Aesis (mod. Esino), upon the left bank of which it lies. It still retains its picturesque medieval town walls. The Palazzo del Comune is a fine, simple, early Renaissance building (1487-1503) by Francesco di Giorgio Martini; the walls are of brick and the window and door-frames of stone, with severely restrained ornamentation. The court- yard with its loggie was built by Andrea Sansovino in 1 5 19. The library contains some good pictures by Lorenzo Lotto. The castle was built by Baccio Pontelli (1488), designer of the castle at Ostia (1483-1486). Jesi was the birthplace of the emperor Frederic II. (1194), and also of the musical composer, Giovanni Battista Pergolesi (1710-1736). The river Aesis formed the boundary of Italy proper from about 250 B.C. to the time of Sulla (c. 82 B.C.); and, in Augustus' division of Italy, that between Umbria (the 6th region) and Picenum (the 5th). The town itself was a colony, of little importance, except, apparently, as a recruiting ground for the Roman army.

JESSE, in the Bible, the father of David (q.v.), and as such often regarded as the first in. the genealogy of Jesus Christ (cf . Isa. xi. 1, 10). Hence the phrase " tree of Jesse " is applied to a design representing the descent of Jesus from the royal line of David, formerly a favourite ecclesiastical ornament. From a recumbent figure of Jesse springs a tree bearing in its branches the. chief figures in the line of descent, and terminating in the figure of Jesus, or of the Virgin and Child. There are remains of such a tree in the church Of St Mary at Abergavenny, carved in wood, and supposed to have once stood behind the high altar. Jesse candelabra were also made. At Laon and Amiens there are sculptured Jesses over the central west doorways of the cathedrals. The design was chiefly used in windows. The great east window at Wells and the window at the west end of the nave at Chartres are fine examples. There is a 16th-century Jesse window from Mechlin in St George's, Hanover Square, London. The Jesse window in the choir of Dorchester Abbey, Oxfordshire, is remarkable in that the tree forms the central mullion, and many of the figures are represented as statuettes on the branches of the upper tracery; other figures are in the stained glass; the whole gives a beautiful example of the com- bination of glass and carved stonework in one design.

JESSE, EDWARD (1 780-1 868), English writer on natural history, was

born on the 14th of January 1780, at Hutton Crans- wick, Yorkshire, where his father was vicar of the parish. He became clerk in a government office in 1798, and for a time was secretary to Lord Dartmouth, when president of the Board of Control. In 181 2 he was appointed commissioner of hackney coaches, and later he became deputy surveyor-general of the royal parks and palaces. On the abolition of this office he retired on a pension, and he died at Brighton on the 28th of March 1868.

The result of his interest in the habits and characteristics of animals was a series of pleasant and popular books on natural history, the principal of which are Gleanings in Natural History (1832-1835); An Angler's Rambles (1836); Anecdotes of Dogs (1846); and Lectures on Natural History (1863). He also edited Izaak Walton's Compleat Angler, Gilbert White's Selborne, and L. Ritchie's Windsor Castle, and wrote a number of handbooks to places of interest, including Windsor and Hampton Court.

JESSE, JOHN HENEAGE (1815-1874), English historian, son of Edward Jesse, was educated at Eton, and afterwards

became a clerk in the secretary's department of the admiralty. He died in London on the 7th of July 1874. His poem on Mary Queen of Scots was published about 1831, and was followed by a collection of poems entitled Tales of the Dead. He also wrote a drama, Richard III., and a fragmentary poem entitled London. None of these ventures achieved any success, but his numerous historical works are written with vivacity and interest, and, in their own style, are an important contribution to the history of England. They include Memoirs of the Court of England during the Reign of the Stuarts (1840), Memoirs of the Court of England from the Revolution of 1688 to the Death of George II. (1843), George Selwyn and his Contemporaries (1843, new ed. 1882), Memoirs of the Pretenders and their Adherents (1845), Memoirs of Richard the Third and his Contemporaries (1861), and Memoirs of the Life and Reign of King George the Third (1867). The titles of these works are sufficiently indicative of their character. They are sketches of the principal personages and of the social details of various periods in the history of England rather than complete and com- prehensive historical narratives. In addition to these works Jesse wrote Literary and Historical Memorials of London (1847), London and its Celebrities (1 8 50) , and a new edition of this work as London: its Celebrated Characters and Remarkable Places (1871). His Memoirs of Celebrated Etonians appeared in 1875.

A collected edition containing most of his works in thirty volumes was published in London in 1901.

JESSEL, SIR GEORGE (1824-1883), English judge, was born in London on the 13th of February 1824. He was the son of Zadok Aaron Jessel, a Jewish coral merchant. George Jessel was educated at a school for Jews at Kew, and being prevented by then existing religious disabilities from proceeding to Oxford or Cambridge, went to University College, London. He entered as a student at Lincoln's Inn in 1842, and a year later took his B.A. degree at the university of London, becoming M.A. and gold medallist in mathematics and natural philosophy in 1844. In 1846 he became a fellow of University College, and in 1847 he was called to the bar at Lincoln's Inn. His earnings during his first three years at the bar were 52,346, and 795 guineas, from which it will be seen that his rise to a tolerably large practice was rapid. His work, however, was mainly conveyancing, and for long his income remained almost stationary. By degrees, however, he got more work, and was called within the bar in 1865, becoming a bencher of his Inn in the same year and practising in the Rolls Court. Jessel entered parliament as Liberal member for Dover in 1868, and although neither his intellect nor his oratory was of a class likely to commend itself to his fellow-members, he attracted Gladstone's attention by two learned speeches on the Bankruptcy Bill which was before the house in 1869, with the result that in 1 87 1 he was appointed solicitor-general. His reputation at this time stood high in the chancery courts; on the common law side he was unknown, and on the first occasion upon which he came into the court of Queen's bench to move on behalf of the Crown, there was very nearly a collision between him and the bench. His force- ful and direct method of bringing his arguments home to the bench was not modified in his subsequent practice before it. His great powers were fully recognized; his business in addition to that on behalf of the Crown became very large, and his income for three years before he was raised to the bench amounted to nearly £25,000 per annum. In 1873 Jessel succeeded Lord Romilly as master of the rolls. From 1873 to 1881 Jessel sat as a judge of first instance in the rolls court, being also a member of the court of appeal. In November 1 874 the first Judicature Act came into effect, and in 1881 the Judicature Act of that year made the master of the rolls the ordinary president of the first court of appeal, relieving him of his duties as a judge of first instance. In the court of appeal Jessel presided almost to the day of his death. For some time before 1883 he suffered from diabetes with chronic disorder of the heart and liver, but struggled against it; on the 16th of March 1883 he sat in court for the last time, and on the 2 1 st of March he died at his residence in London, the immediate cause of death being cardiac syncope.

As a judge of first instance Jessel was a revelation to those accustomed to

the proverbial slowness of the chancery courts

and of the master of the rolls who preceded him. He disposed of the business before him with rapidity combined with correctness of judgment, and he not only had no arrears himself, but was frequently able to help other judges to clear their lists. His knowledge of law and equity was wide and accurate, and his memory for cases and command of the principles laid down in them extraordinary. In the rolls court he never reserved a judgment, not even in the Epping Forest case {Commissioners of Sewers v. Glasse, L.R. 19 Eq.; The Times, nth November 1874), in which the evidence and arguments lasted twenty-two days (150 witnesses being examined in court, while the documents went back to the days of King John), and in the court of appeal he did so only twice, and then in deference to the wishes of his colleagues. The second of these two occasions was the case of Robarts v. The Corporation of London (49 Law Times 455; The Times, 10th March 1883), and those. who may read Jessel's judgment should remember that, reviewing as it does the law and cus- tom on the subject, and the records of the city with regard to the appointment of a remembrancer from the 16th century, together with the facts of the case before the court, it occupied nearly an hour to deliver, but was nevertheless delivered without notes — this, too, on the 9th of March 1883, when the judge who uttered it was within a fortnight of his death. Never during the 19th century was the business of any court performed so rapidly, punctually, and satisfactorily as it was when Jessel presided. He was master of the rolls at a momentous period of legal history. The Judicature Acts, completing the fusion of law and equity, were passed while he was judge of first instance, and were still new to the courts when he died. His knowledge and power of assimi- lating knowledge of all subjects, his mastery of every branch of law with which he had to concern himself, as well as of equity, together with his willingness to give effect to the new system, caused it to be said when he died that the success of the Judicature Acts would have been impossible without him. His faults as a judge lay in his disposition to be intolerant of those who, not able to follow the rapidity of his judgment, endeavoured to persist in argument after he had made up his mind; but though he was peremptory with the most eminent counsel, young men had no cause to complain of his treatment of them.

Jessel sat on the royal commission for the amendment of the Medical Acts, taking an active part in the preparation of its report. He actively interested himself in the management of Lon- don University, of which he was a fellow from 1861, and of which he was elected vice-chancellor in 1880. He was one of the commissioners of patents, and trustee of the British Museum. He was also chairman of the committee of judges which drafted the new rules rendered necessary by the Judicature Acts. He was treasurer of Lincoln's Inn in 1883, and vice-president of the council of legal

education. He was also a fellow of the Royal Society. Jessel's career marks an epoch on the bench, owing to the active part taken by him in rendering the Judicature Acts effective, and also because he was the last judge capable of sitting in the House of Commons, a privilege of which he did not avail himself. He was the first Jew who, as solicitor-general, took a share in the executive government of his country, the first Jew who was sworn a regular member of the privy council, and the first Jew who took a seat on the judicial bench of Great Britain; he was also, for many years after being called to the bar, so situated that any one might have driven him from it, because, being a Jew, he was not qualified to be a member of the bar. In person Jessel was a stoutish, square-built man of middle height, with dark hair, somewhat heavy features, a fresh ruddy complexion, and a large mouth. He married in 1856 Amelia, daughter of Joseph Moses, who survived him together with three daughters and two sons, the elder of whom, Charles James (b. i860), was made a baronet shortly after the death of his distinguished father and in recognition of his services.

See The Times, March 23, 1883; E. Manson, Builders of our Law

(1904).

JESSORE, a town and district of British India, in the Presi- dency division of Bengal. The town is on the Bhairab river, r witn a railway station 75 m. N.E. of Calcutta. Pop. (i9oi),8o54.

The District of Jessore has an area of 2925 sq. m. Pop. (1901), 1,813,155, showing a decrease of 4% in the decade. The district forms the central portion of the delta between the Hugli and the united Ganges and Brahmaputra. It is a vast alluvial plain intersected by rivers and watercourses, which in the southern portion spread out into large marshes. The northern part is verdant, with extensive groves of date-palms; villages are numerous and large; and the people are prosperous. In the central portion the population is sparse, the only part suitable for dwellings being the high land on the banks of rivers. The principal rivers are the Madhumati or Haringhata (which forms the eastern boundary of the district), with its tributaries the Nabaganga, Chitra, and Bhairab; the Kumar, Kabadak, Katki, Harihar, Bhadra and Atharabanka. Within the last century the rivers in the interior of Jessore have ceased to be true deltaic rivers; and, whereas the northern portion of the district formerly lay under water for several months every year, it is now reached only by unusual inundations. The tide reaches as far north as the latitude of

Jessore town. Jessore is the centre of sugar manufacture from date palms. The exports are sugar, rice, pulse, timber, honey, shells, &c; the imports are salt, English goods, and cloth. The district is crossed by the Eastern Bengal railway, but the chief means of communi- cation are waterways.

British administration w r as completely established in the district in 1781, when the governor-general ordered the opening of a court at Murali near Jessore. Before that, however, the fiscal administration had been in the hands of the English, having been transferred to the East India company with that of the rest of Bengal in 1765. The changes in jurisdiction in Jessore have been very numerous. After many transfers and rectifications, the district was in 1863 finally constituted as it at present stands. The rajas of Jessore or Chanchra trace their origin to Bhabeswar Rai, a soldier in the army of Khan-i-Azam, an imperial general, who deprived Raja Pratapaditya, the popular hero of the Sundar- bans, of several fiscal divisions, and conferred them on Bhabeswar. But Manohar Rai (1640-1705) is regarded as the principal founder of the family. The estate when he inherited it was of moderate size, but he acquired one pargana after another, until, at his death, the property was by far the largest in the neighbour- hood.

JESTER, a provider of " jests " or amusements, a buffoon, especially a professional fool at a royal court or in a nobleman's household (see Fool). The word " jest," from which " jester " is formed, is used from the 16th century for the earlier " gest," Lat. gesta, or res gestae, things done, from gerere, to do, hence deeds, exploits, especially as told in history, and so used of the metrical and prose romances and chronicles of the middle ages. The word became applied to satirical writings and to any long- winded empty tale, and thence to a joke or piece of fun, the current meaning of the word.

JESUATI, a religious order founded by Giovanni Colombini of Siena in 1360. Colombini had been a prosperous merchant and a senator in his native city, but, coming under ecstatic religious influences, abandoned secular affairs and his wife and daughter (after making provision for them), and with a friend of like temperament, Francesco Miani, gave himself to a life of apostolic poverty, penitential discipline, hospital, service and public preaching. The name Jesuati was given to Colombini and his disciples from the habit of calling loudly on the name of Jesus at the beginning and end of their ecstatic sermons. The senate banished Colombini from Siena for imparting foolish ideas to the young men of the city, and he continued his mission in Arezzo and other places, only to be honourably recalled home on the outbreak of a devastating pestilence. He went out to meet Urban V. on his return from Avignon to Rome in 1367, and craved his sanction for the new order and a distinctive habit. Before this was

granted Colombini had to clear the movement of a sus- picion that it was connected with the heretical sect of Fraticelli, and he died on the 31st of July 1367, soon after the papal approval had been given. The guidance of the new order, whose members (all lay brothers) gave themselves entirely to works of mercy,

devolved upon Miani. Their rule of life, originally a compound of Benedictine and Franciscan elements, was later modified on Augustinian lines, but traces of the early penitential idea persisted, e.g. the wearing of sandals and a daily flagellation. Paul V.ini606 arranged for a small proportion of clerical members, and later in the 17th century the Jesuati became so secularized that the members were known as the Aquavitae Fathers, and the order was dissolved by Clement IX. in 1668. The female branch of the order, the Jesuati sisters, founded by Caterina Colombini (d. 1387) in Siena, and thence widely dispersed, more consistently maintained the primitive strictness of the society and survived the male branch by 200 years, existing until 1872 in small com- munities in Italy.

JESUITS, the name generally given to the members of the Society of Jesus, a religious order in the Roman Catholic Church, founded in 1539. This Society may be defined, in its original conception and well-avowed object, as a body of highly trained religious men of various degrees, bound by the three personal vows of poverty, chastity and obedience, together with, in some cases, a special vow to the pope's service, with the object of labouring for the spiritual good of themselves and their neighbours. They are declared to be mendicants and enjoy all the privileges of the other mendicant orders. They are governed and live by constitutions and rules, mostly drawn up by their founder, St Ignatius of Loyola, and approved by the popes. Their proper title is " Clerks Regulars of the Society of Jesus," the word Societas being taken as synonymous with the original Spanish term, Compania; perhaps the military term Cohors might more fully have expressed the original idea of a band of spiritual soldiers living under martial law and discipline. The ordinary term " Jesuit " was given to the Society by its avowed opponents; it is first found in the writings of Calvin and in the registers of the Parlement of Paris as early as 1552.

Constitution and Character. — The formation of the Society was a masterpiece of genius on the part of a man (see Loyola) who was quick to realize the necessity of the moment. Just before Ignatius was experiencing the call to conversion, Luther had begun his revolt against the Roman Church by burning the papal bull of excommunication on the 10th of December 1520. But while Luther's most formidable opponent was thus being prepared in Spain, the actual formation of the Society was not to take place for eighteen years. Its conception seems to have developed very slowly in the mind of Ignatius. It introduced a new idea into the Church.

Hitherto all regulars made a point of the choral office in choir. But as Ignatius conceived the Church to be in a state of war, what was desirable in days of peace ceased when the life of the cloister had to be exchanged for the discipline of the camp; so in the sketch of the new society which he laid before Paul III., Ignatius laid down the principle that the obligation of the breviary should be fulfilled privately and separately and not in choir. The other orders, too, were bound by the idea of a constitu- tional monarchy based on the democratic spirit. Not so with the Society. The founder placed the general for life in an almost uncontrolled position of authority, giving him the faculty of dispensing individuals from the decrees of the highest legislative body, the general congregations. Thus the principle of military obedience was exalted to a degree higher than that existing in the older orders, which preserved to their members certain constitutional rights.

The soldier-mind of Ignatius can be seen throughout the constitu- tions. Even in the spiritual labours which the Society shares with the other orders, its own ways of dealing with persons and things result from the system of training which succeeds in forming men to a type that is considered desirable. But it must not be thought that in practice the rule of the Society and the high degree of obedi- ence demanded result in mere mechanism. By a system of check and counter check devised in the constitutions the power of local superiors is modified, so that in practice the working is smooth. Ignatius knew that while a high ideal was necessary for every society, his followers were flesh and blood, not machines. He made it clear from the first that the Society was everything and the Individual nothing, except so far as he might prove a useful instru- ment for carrying out the Society's objects. Ignatius said to his

secretary Polanco that " in those who offered themselves he looked less to purely natural goodness than to firmness of character and ability for business, for he was of opinion that those who were not fit for public business were not adapted for filling offices in the Society." He further declared that even exceptional qualities and endowments in a candidate were valuable in his eyes only on the condition of their being brought into play, or held in abeyance, strictly at the command of a superior. Hence his teaching on obedience. His letter on this subject, addressed to the Jesuits of Coimbra in 1553, is still one of the standard formularies of the Society, ranking with those other products of his pen, the Spiritual Exercises and the Constitutions. In this letter Ignatius clothes the general with the powers of a commander-in-chief in time of war, giving him the absolute disposal of all

members of the Society in every place and for every purpose. He pushes the claim even further, requiring, besides entire outward submission to command, also the complete identification of the inferior's will with that of the superior. He lays down that the superior is to be obeyed simply as such and as standing in the place of God, without reference to his personal wisdom, piety or discretion ; that any obedience which falls short of making the superior's will one's own, in inward affection as well as in outward effect, is lax and imperfect; that going beyond the letter of command, even in things abstractly good and praise- worthy, is disobedience, and that the " sacrifice of the intellect " is the third and highest grade of obedience, well pleasing to God, when the inferior not only wills what the superior wills, but thinks what he thinks, submitting his judgment, so far as it is possible for the will to influence and lead the judgment. This Letter on Obedience was written for the guidance and formation of Ignatius's own followers; it was an entirely domestic affair. But when it became known beyond the Society the teaching met with great opposition, especially from members of other orders whose institutes represented the normal days of peace rather than those of war. The letter was condemned by the Inquisitions of Spain and Portugal; and it tasked all the skill and learning of Bellarmine as its apologist, together with the whole influence of the Society , to avert what seemed to be a probable condemnation at Rome.

The teaching of the Letter must be understood in the living spirit of the Society. Ignatius himself lays down the rule that an inferior is bound to make all necessary representations to his superior so as to guide him in imposing a precept of obedience. When a superior knows the views of his inferior and still commands, it is because he is aware of other sides of the question which appear of greater importance than those that the inferior has brought forward. Ignatius distinctly excepts the case where obedience in itself would be sinful: " In all things except sin I ought to do the will of my superior and not my own." There may be cases where an inferior judges that what is commanded is sinful. What is to be done? Ignatius says: " When it seems to me that I am commanded by my superior to do a thing against which my conscience revolts as sinful and my superior judges otherwise, it is my duty to yield my doubts to him unless I am otherwise constrained by evident reasons. ... If submissions do not appease my conscience I must impart my doubts to two or three persons of discretion and abide by their decision." From this it is clear that only in doubtful cases concerning sin should an inferior try to submit his judgment to that of his superior, who ex officio is held to be not only one who would not order what is clearly sinful, but also a competent judge who knows and understands, better than the inferior, the nature and aspect of the command. As the Jesuit obedience is based on the law of God, it is clearly

impossible that he should be bound to obey in what is directly opposed to the divine service. A Jesuit lives in obedience all his life, though the yoke is not galling nor always felt. He can accept no dignity or office which will make him independent of the Society ; and even if ordered by the pope to accept the cardinalate or the episcopate, he is still bound, if not to obey, yet to listen to the advice of those whom the general deputes to counsel him in important matters.

The Jesuits had to find their principal work in the world and in direct and immediate contact with mankind. To seek spiritual perfection in a retired life of contemplation and prayer did not seem to Ignatius to be the best way of reforming the evils which had brought about the revolt from Rome. He withdrew his followers from this sort of retirement, except as a mere temporary preparation for later activity; he made habitual intercourse with the world a prime duty; and to this end he rigidly suppressed all such external peculiarities of dress or rule as tended to put obstacles in the way of his followers acting freely as emissaries, agents or missionaries in the most various places and circumstances. Another change he introduced even more completely than did the founders of the Friars. The Jesuit has no home: the whole world is his parish. Mobility and cosmopolitanism are of the very essence of the Society. As Ignatius said, the ancient monastic communities were the infantry of the Church, whose duty was to stand firmly in one place on the battlefield ; the Jesuits were to be her light horse, capable of going anywhere at a moment's notice, but especially apt and designed for scouting and skirmishing. To carry out this view, it was one of his plans to send foreigners as superiors or officers to the Jesuit houses in each country, requiring of these envoys, however, invariably to use the language of their new place of residence and

to study it both in speaking and writing till entire mastery of it had been acquired — thus by degrees making all the parts of his system mutually interchangeable, and so largely increasing the number of persons eligible to fill any given post without reference to_ locality. But subsequent experience has, in practice, modified this interchange, as far as local government goes, though the central government of the Society is always cosmopolitan.

Next we must consider the machinery by which the Society is constituted and governed so as to make its spirit a living energy and not a mere abstract theory. The Society is distributed into six grades: novices, scholastics, temporal coadjutors (lay brothers), spiritual coadjutors, professed of the three vows, and professed of the four vows. No one can become a postulant for admission to the Society until fourteen years old, unless by special dispensation. The novice is classified according as his destination is the priesthood or lay brotherhood, while a third class of " indifferents " receives such as are reserved for further inquiry before a

decision of this kind is made. The novice has first to undergo a strict retreat, practically in solitary con- finement, during which he receives from a director the Spiritual Exercises and makes a general confession of his whole life; after which the first novitiate of two years' duration begins. In this period of trial the real character of the man is discerned, his weak points are noted and his will is tested. Prayer and the practices of asceticism, as means to an end, are the chief occu- pations of the novice. He may leave or be dismissed at any time during the two years; but at the end of the period if he is approved and destined for the priesthood, he is advanced to the grade of scholastic and takes the following simple vows in the presence of certain witnesses, but not to any person: —

" Almighty Everlasting God, albeit everyway most unworthy in Thy holy sight, yet relying on Thine infinite kindness and mercy and impelled by the desire of serving Thee, before the Most Holy Virgin Mary and all Thy heavenly host, I, N., vow to Thy divine Majesty Poverty, Chastity and Perpetual Obedience to the Society of Jesus, and promise that I will enter the same Society to live in it perpetually, understanding all things according to the Constitutions of the Society. I humbly pray from Thine immense goodness and clemency, through the Blood of Jesus Christ, that Thou wilt deign to accept this sacrifice in the odour of sweetness ; and as Thou hast granted me to desire and to offer this, so wilt Thou bestow abundant grace to fulfil it."

The scholastic then follows the ordinary course of an under- graduate at a university. After passing five years in arts he has, while still keeping up his own studies, to devote five or six years more to teaching the junior classes in various Jesuit schools or colleges. About this period he takes his simple vows in the following terms: —

" I, N., promise to Almighty God, before His Virgin Mother and the whole heavenly host, and to thee, Reverend Father General of the Society of Jesus, holding the place of God, and to thy succes- sors (or to thee, Reverend Father M. in place of the General of the Society of Jesus and his successors holding the place of God), Per- petual Poverty, Chastity and Obedience ; and according to it a peculiar care in the education of boys, according to the manner expressed in the Apostolic Letter and Constitutions of the said Society."

*The lay brothers leave out the clause concerning education. The scholastic does not begin the study of theology until he is twenty-eight or thirty, and then passes through a four or six years' course. Only when he is thirty-four or thirty-six*ean he be ordained a priest and enter on the grade of a spiritual co- adjutor. . A lay brother, before he can become a temporal coadjutor for the discharge of domestic duties, must pass ten years before*

he is admitted to vows. Sometimes after ordina- tion the priest, in the midst of his work, is again called away to a third year's novitiate, called the tertianship, as a prepara- tion for his solemn profession of the three vows. His former vows were simple and the Society was at liberty to dismiss him for any canonical reason. The formula of the famous Jesuit vow is as follows : —

" I, N. t promise to Almighty God, before His Virgin Mother and the whole heavenly host, and to all standing by ; and to thee, Reverend Father General of the Society of Jesus, holding the place of God, and to thy successors (or to thee, Reverend Father M. in place of the General of the Society of Jesus and his successors holding the place of God), Perpetual Poverty, Chastity and Obedience; and according to it a peculiar care in the education of boys according to

the form of life contained in the Apostolic Letters of the Society of Jesus and in its Constitutions."

Immediately after the vows the Jesuit adds the following simple vows: (i) that he will never act nor consent that the provisions in the constitutions concerning poverty should be changed; (2) that he will not directly nor indirectly procure election or promotion for himself to any prelacy or dignity in the Society; (3) that he will not accept or consent to his election to any dignity or prelacy outside the Society unless forced thereunto by obedience; (4) that if he knows of others doing these things he will denounce them to the superiors; (5) that if elected to a bishopric he will never refuse to hear such advice as the general may deign to send him and will follow it if he judges it is better than his own opinion. The professed is now eligible to certain offices in the Society, and he may remain as a professed father of the three vows for the rest of his life. The highest class, who constitute the real core of the Society, whence all its chief officers are taken, are the professed of the four vows. This gtade can seldom be reached until the candidate is in his forty-fifth year, which involves a proba- tion of thirty-one years in the case of those who have entered on the novitiate at the earliest legal age. The number of these select members is small in comparison with the whole Society; the exact proportion varies from time to time, the present ten- dency being to increase the number. The vows of this grade are the same as the last formula, with the addition of the follow- ing important clause: —

" Moreover I promise the special obedience to the Sovereign Pontiff concerning missions, as is contained in the same Apostolic Letter and Constitutions."

These various members of the Society are distributed in its novitiate houses,

its colleges, its professed houses and its mis- sion residences. The question has been hotly debated whether, in addition to these six grades, there be not a seventh answering in some degree to the tertiaries of the Franciscan and Dominican orders, but secretly affiliated to the Society and acting as its emissaries in various lay positions. This class was styled in France " Jesuits of the short robe," and there is some evidence in support of its actual existence under Louis XV. The Jesuits themselves deny the existence of any such body, and are able to adduce the negative disproof that no provision for it is to be found in their constitutions. On the other hand there are clauses therein whic^make the creation of such a class perfectly feasible if thought expedient. An admitted instance is the case of Francisco Borgia, who in 1548, while still duke of Gandia, was received into the Society. What has given colour to the idea is that certain persons have made vows of obedience to individual Jesuits; as Thomas Worthington, rector of the Douai seminary, to Father Robert Parsons; Ann Vaux to Fr. Henry Garnet, who told her that he was not indeed allowed to receive her vows, but that she might make them if she wished and then receive his direction. The archaeologist George Oliver of Exeter was, according to Foley's Records of the English Province, the last of the secular priests of England who vowed obedience to the Society before its suppression.

The general lives permanently at Rome and holds in his hands the right to appoint, not only to the office of provincial over each of the head districts into which the Society is mapped, but to the offices of each house in particular. There is no standard of electoral right in the Society except in the election of the general himself. By a minute and frequent system of official and private reports he is informed of the doings and progress of every member of the Society and of everything that concerns it throughout the world. Every Jesuit has not only the right but the duty in certain cases of communicating, directly and privately, with his general. While the general thus controls everything, he himself is not exempt from supervision on the part of the Society. A consultative council is imposed upon him by the general congregation, consisting of the assistants of the various nations, a socius, or adviser, to warn him of mistakes, and a confessor. These he cannot remove nor select; and he is bound, in certain circumstances, to listen to their advice, although

he is not obliged to follow it: Once elected the general may not refuse the office, nor abdicate, nor accept any dignity or office outside of the Society; on the other hand, for certain definite reasons, he may be suspended or even deposed by the authority of the Society, which can thus preserve itself from destruction. No such instance has occurred, although steps were once taken in this direction in the case of a general who had set himself against

the current feeling.

It is said that the general of the Jesuits is independent of the pope; and his popular name, " the black pope," has gone to confirm this idea. But it is based on an entirely wrong conception of the two offices. The suppression of the Society by Clement XIV. in 1773 was an object-lesson in the supremacy of the pope. The Society became very numerous and, from time to time, received extraordinary privileges from popes, who were warranted by the necessities of the times in granting them. A great number of influential friends, also, gathered round the fathers who, naturally, sought in every way to retain what had been granted. Popes who thought it well to bring about certain changes, or to withdraw privileges that were found to have passed their intentions or to interfere unduly with the rights of other bodies, often met with loyal resistances against their proposed measures. Resistance up to a certain point is lawful and is not disobedience, for every society has the right of self-preservation. In cases where the popes insisted, in spite of the representations of the Jesuits, their commands were obeyed. Many of the popes were distinctly unfavourable to the Society, while others were as friendly, and often what one pope did against them the next pope withdrew. Whatever was done in times when strong divergence of opinion existed, and whatever may have been the. actions of individuals who, even in so highly organized a body as the Society of Jesus, cannot always be successfully controlled by their superiors, yet the ultimate result on the part of the Society has always been obedience to the pope, who authorized, protected and privileged them, and on whom they ultimately depend for their very existence.

Thus constituted, with a skilful union of strictness and freedom, of complex organization with a minimum of friction in working, the Society was admirably devised for its purpose of introducing a new power into the Church and the world. Its immediate services to the Church were great. The Society did much, single-handed, to roll back the tide of Protestant advance when half of Europe, which had not already shaken off its allegiance to the papacy, was threatening to do so. The honours of the reaction belong to the Jesuits, and the reactionary spirit has become their tradition. They had the wisdom to see and to admit, in their correspondence with their superiors, that the real cause of the Reformation was the ignorance neglect and vicious lives of so many priests. They recognized as most earnest men did, that the difficulty was in the higher places, and that these could best be touched by indirect methods. At a time when primary or even secondary education had in most places become a mere effete and pedantic adherence to obsolete methods, they were bold enough to innovate, both in system and material. Putting fresh spirit and devotion into the work, they not merely taught and catechized in a new, fresh and attractive manner, besides establishing free schools of good quality, but provided new school books for

their pupils which were an enormous advance on those they found in use; so that for nearly three centuries the Jesuits were accounted the best schoolmasters in Europe, as they were, till their forcible suppression in 1001, confessedly the best in France. The Jesuit teachers conciliated the goodwill of their pupils by mingled firmness and gentleness. Although the method of the Ratio Studiorum has ceased to be acceptable, yet it played in its time as serious a part in the intellectual development of Europe as did the method of Frederick the Great in modern warfare. Bacon succinctly gives his opinion of the Jesuit teaching in these words: " As for the pedagogical part, the shortest rule would be, Consult the schools of the Jesuits; for nothing better has been put in practice " (De Augmentis, vi. 4). In instruction they were excellent; but in education, or formation of character, deficient. Again, when most of the continental clergy had sunk, more or less, into the moral and intellectual slough which is pictured for us in the writings of Erasmus and the Epistolae obscurorum virorum (see Hutten, Ulrich von), the Jesuits won back respect for the clerical calling by their personal culture

and the unimpeachable purity of their lives. These qualities they have carefully maintained; and probably no large body of men in the world has been so free from the reproach of discreditable members or has kept up, on the whole, an equally high average of intelligence and conduct. As preachers, too, they delivered the pulpit from the bondage of an effete scholasticism and reached at once a clearness and simplicity of treatment such as the English pulpit scarcely begins to exhibit till after the days of Tillotson; while in literature and theology they count a far larger number of respectable writers than any other religious society can boast. It is in the mission field, however, that their achievements have been most remarkable. Whether toiling among the teeming millions in Hindustan and China, labouring amongst the Hurons and Iroquois of North America, govern- ing and civilizing the natives of Brazil and Paraguay in the missions and " reductions," or ministering, at the hourly risk of his life to his fellow-Catholics in England under Elizabeth and the Stuarts, the Jesuit appears alike devoted, indefatigable, cheerful and worthy of hearty admiration and respect.

Nevertheless, two startling and indisputable facts meet the student who pursues the history of the Society. The first is the universal suspicion and hostility it has incurred — not merely from the Protestants whose avowed foe it has been, not yet from the enemies of all clericalism and dogma, but from every Catholic state and nation in the world. Its chief enemies have

been those of the household of the Roman Catholic faith. The second fact is the ultimate failure which seems to dog all its most promising schemes and efforts. These two results are to be observed alike in the provinces of morals and politics. The first cause of the opposition indeed redounds to the Jesuits' credit, for it was largely due to their success. Their pulpits rang with a studied eloquence; their churches, sumptuous and attractive, were crowded; and in the confes- sional their advice was eagerly sought in all kinds of difficulties, for they were the fashionable professors of the art of direction. Full of enthusiasm and zeal, devoted wholly to their Society, they were able to bring in numbers of rich and influential persons to their ranks; for, with a clear understanding of the power of wealth, they became, of set purpose, the apostles of the rich and influential. The Jesuits felt that they were the new men, the men of the time; so with a perfect confidence in themselves they went out to set the Church to rights. It was no wonder that success, so well worked for and so well de- served, failed to win the approval or sympathy of those who found themselves supplanted. Old-fashioned men, to whom the apostles' advice to " do all to the glory of God " seemed sufficient, mistrusted those who professed to go beyond all others and adopted as their motto the famous Ad major em Dei gloriam, " To the greater glory of God." But, besides this, the esprit de corps which is necessary for every body of men was, it was held, carried to an excess and made the Jesuits intolerant of any one or anything if not of " ours." The novelties too which they introduced into the conception of the religious life, naturally, were displeasing to the older orders, who felt like old aristocratic families towards a newly rich or purse-proud up- start. The Society, or rather its members, were too aggressive and self-assertive to be welcomed; and a certain characteristic, which soon began to manifest itself in an impatience of episcopal control, showed that the quality of " Jesuitry," usually associ- ated with the Society, was singularly lacking in their dealings with opponents. Their political attitude also alienated many. Many of the Jesuits could not separate religion from politics. To say this is only to assert that they were not clearer-minded than most men of their age. But unfortunately they invariably took the wrong side and allowed themselves to be made the tools of men who saw farther and more clearly than they did. They had their share, direct or indirect, in the embroiling of states, in concocting conspiracies and in kindling wars. They were also responsible by their theoretical teachings in theological schools, where cases were considered and treated in the abstract, for not a few assassinations of the enemies of the cause. Weak minds heard tyrannicide discussed and defended in the abstract; and

it was no wonder that, when opportunity served, the train that had been heedlessly laid by speculative professors was fired by rash hands. What professors like Suarez taught in the calm atmosphere of the lecture hall,

what writers like Mariana upheld and praised, practical men took as justification for deeds of blood. There is no evidence that any Jesuit took a direct part in political assassinations; however, indirectly, they may have been morally responsible. They were playing with edged tools and often got wounded through their own carelessness. Other grievances were raised by their perpetual meddling in politics, e.g. their large share in fanning the flames of political hatred against the Huguenots under the last two Valois kings; their perpetual plotting against England in the reign of Elizabeth; their share in the Thirty Years' War and in the religious miseries of Bohemia; their decisive influence in causing the revocation of the edict of Nantes and the expulsion of the Protestants from France; the ruin of the Stuart cause under James II., and the establishment of the Protestant succession. In a number of cases where the evidence against them is defective, it is at least an unfortunate coincidence that there is always direct proof of some Jesuit having been in communication with the actual agents engaged. They were the stormy petrels of politics. Yet the Jesuits, as a body, should not be made responsible for the doings of men who, in their political intrigues, were going directly against the distinct law of the Society, which in strict terms, and under heavy penalties, forbade them to have anything to do with such matters. The politicians were comparatively few in number, though unfortunately they held high rank; and their disobedience to the rule besmirched the name of the society and destroyed the good work of the other Jesuits who were faithfully carrying out their own proper duties.

A far graver cause for uneasiness was given by the Jesuits' activity in the region of doctrine and morals. Here the charges against them are precise, early, numerous and weighty. Their founder himself was arrested, more than once, by the Inquisition and required to give account of his belief and conduct. But St Ignatius, with all his powerful gifts of intellect, was entirely practical and ethical in his range, and had no turn whatever for speculation, nor desire to discuss, much less to question, any of the received dogmas of the Church. He gives it as a rule of orthodoxy to be ready to say that black is white if the Church says so. He was therefore acquitted on every occasion, and applied each time for a formally attested certificate of his ortho- doxy, knowing well that, in default of such documents, the fact of his arrest as a suspected heretic would be more distinctly recollected by opponents than that of his honourable dismissal from custody. His followers, however, have not been so for- tunate. On doctrinal questions indeed, though "their teaching on grace, especially in the form given to it by Molina (q.v.), ran contrary to the accepted teaching on the subject by the Augus- tinians, Dominicans and other representative schools; yet by their pertinacity they gained for their views a recognized and established position. A special congregation of cardinals and theologians known as de

auxiliis was summoned by the pope to settle the dispute, for the odium theologicum had risen to a desperate height between the representatives of the old and the new theology; but after many years they failed to arrive at any satisfactory conclusion, and the pope, instead of settling the dispute, was only able to impose mutual silence on all opponents. Among those who held out stiffly against the Jesuits on the subject of grace were the Jansenists, who held that they were following the special teaching of St Augustine, known par excellence as the doctor of grace. The Jesuits and the Jansenists soon became deadly enemies; and in the ensuing conflict both parties accused each other of flinging scruples to the wind. (See Jansenism.)

But the accusations against the Jesuit system of moral theo- logy and their action as guides of conduct have had a more serious effect on their reputation. It is undeniable that some of their moral writers were lax in their teaching; and conscience was strained to the snapping point. The Society was trying to make itself all things to all men. Propositions extracted from

Jesuit moral theologians have again and again been condemned by the pope and declared untenable. Many of these can be found in Viva's Condemned Propositions. As early as 1554 the Jesuits were censured by the Sorbonne, chiefly at the instance of Eustache de Bellay, bishop of Paris, as being dangerous in matters of faith. Melchor Cano, a Dominican, one of the ablest divines of the 16th century, never ceased to lift up his testimony against them, from their first beginnings till his own death in 1560; and, unmollified by the bribe of the bishopric of the Canaries, which their interest procured for him, he succeeded in banishing them from the university of Salamanca. Carlo Borromeo, to whose original advocacy they owed much, especially in the council of Trent, found himself attacked in his own cathe- dral pulpit and interfered with in his jurisdiction. He withdrew his protection and expelled them from his colleges and churches; and he was followed in 1604 in this policy by his cousin and successor Cardinal Federigo Borromeo. St Theresa learnt, in after years, to mistrust their methods, although she was grate- ful to them for much assistance in the first years of her work. The credit of the Society was seriously damaged by the publica- tion, at Cracow, in 1612, of the Manila Secreta. This book, which is undoubtedly a forgery, professes to contain the authori- tative secret instructions drawn up by the general Acquaviva and given by the superiors of the Society to its various officers and members. A bold caricature of Jesuit methods, the book has been ascribed to John Zaorowsky or to Cambilone and Schloss, all ex-Jesuits, and it is stated to have been discovered in manu- script by Christian of Brunswick in the

Jesuit college at Prague. It consists of suggestions and methods for extending the influence of the Jesuits in various ways, for securing a footing in fresh places, for acquiring wealth, for creeping into households and leading silly rich widows captive and so forth, all marked with ambition, craft and unscrupulousness. It had a wide success and popularity, passing through several editions, and even to this day it is used by controversialists as unscrupulous as the original writers. It may, perhaps, represent the actions of some individuals who allowed their zeal to outrun their discretion, but surely no society which exists for good and is marked by so many worthy men could systematically have conducted its operations in such a manner. Later on a formidable assault was made on Jesuit moral theology in the famous Provincial Letters of Blaise Pascal (q.v.), eighteen in number, issued under the pen-name of Louis de Montalte, from January 1656 to March 1657. Their wit, irony, eloquence and finished style have kept them alive as one of the great French classics — a destiny more fortunate than that of the kindred works by Antoine Arnauld, Theologie morale des Jisuites, consisting of extracts from writings of members of the Society, and Morale pratique des J&suites, made up of narratives professing to set forth the manner in which they carried out their own maxims. But, like most controversial writers, the authors were not scrupulous in their quotations, and by giving passages divorced from their contexts often entirely misrepresented their opponents. The immediate reply on the part of the Jesuits, The Discourses of Cleander and Eudoxus by Pere Daniel, could not compete with Pascal's work in brilliancy, wit or style; moreover, it was unfortunate enough to be put upon the Index of prohibited books in 1701. The reply on behalf of the Society to Pascal's charges of lax morality, apart from mere general'denials, is broadly as follows: — • (1) St Ignatius himself, the founder of the Society, had a special aversion from untruthfulness in all its forms, from quibbling, equivocation or even studied obscurity of language, and it would be contrary to the spirit of conformity with his example and institutions for his followers to think and act otherwise. Hence, any who practised equivocation were, so far, unfaithful to the Society. (2) Several of the cases cited by Pascal are mere abstract hypotheses, many of them now obsolete, argued simply as intellectual exercises, but having no practical bearing whatever. (3) Even such as do belong to the sphere of actual life are of the nature ofcounsel to spiritual physicians, how to deal with exceptional maladies; and were never intended to fix the standard of moral obligation for the general public. (4) The theory that they were intended for this latter purpose and do represent the normal teaching of the Society becomes more untenable in exact proportion as this immorality is insisted on, because it is a matter of notoriety that the Jesuits

themselves have been singularly free from personal, as distinguished from corporate, evil repute ; and no _pne pretends that the large num- ber of lay-folk whom they have educated or influenced exhibit greater moral inferiority than others.

The third of these replies is the most cogent as regards Pascal, but the real weakness of his attack lies in that nervous dread of appeal to first principles and their logical result which has been the besetting snare of Gallicanism. Pascal, at his best, has mis- taken the part for the whole; he charges to the Society what, at the most, are the doings of individuals; and from these he asserts the degeneration of the body from its original standard; whereas the stronger the life and the more extensive the natural . development, side by side will exist marks of degeneration; and a society like the Jesuits has no difficulty in asserting its life inde- pendently of such excrescences or, in time, in freeing itself from them.

A charge persistently made against the Society is that it teaches that the end justifies the means. And the words of Busembaum, whose Medulla theologiae has gone through more than fifty editions, are quoted in proof. True it is that Busembaum uses these words: Cui licitus est finis etiam licent media. But on turning to his work (ed. Paris 1729, p. 584, or Lib. vi. Tract vi. cap. ii., De sacramentis, dubium ii.) it will be found that the author is making no universal application of an old legal maxim; but is treating of a particular subject (concerning certain lawful liberties in the marital relation) beyond which his words cannot be forced. The sense in which other Jesuit theologians — e.g. Paul Laymann (1575-1635), in his Theologia moralis (Munich, 1625), and Ludwig Wagemann (1713-1792), in his Synopsis theologiae moralis (Innsbruck, 1762) — quote the axiom is an equally harmless piece of common sense. For instance, if it is lawful to go on a journey by railway it is lawful to take a ticket. No one who put forth that proposition would be thought to mean that it is lawful to defraud the company by stealing a ticket; for the proviso is always to be understood, that the means employed should, in themselves, not be bad but good or at least indifferent. So when Wagemann says tersely Finis determinat probitatem actus he is clearly referring to acts which in themselves are indifferent, i.e. indeterminate. For instance: shooting is an indifferent act, neither good nor bad in itself. The morality of any specified shooting depends upon what is shot, and the circumstances attending that act: shooting a man in self-defence is, as a moral act, on an entirely different plane to shooting a man in murder. It has never been proved, and never can be proved, although the attempt has frequently been made, that the Jesuits ever taught the nefarious proposition ascribed to them, which would be entirely subversive of all morality. Again, the doctrine of probabilism is utterly mis- understood. It is based on an accurate conception of law. Law to bind must be clear and definite ; if it be not so,

its obligation ceases and liberty of action remains. No probable opinion can stand against a clear and definite law; but when a law is doubtful in its application, in certain circumstances, so is the obligation of obedience: and as a doubtful law is, for practical purposes, no law at all, so it superinduces no obligation. Hence a probable opinion is one, founded on reason and held on serious grounds, that the law does not apply to certain specified cases; and that the law-giver therefore did not intend to bind. It is the principle of equity applied to law. In moral matters a probable opinion, that is one held on no trivial grounds but by unprejudiced and solid thinkers, has no place where the voice of conscience is clear, distinct and formed.

Two causes have been at work to produce the universal failure of the great Society in all its plans and efforts. First stands its lack of really great intellects. It has had its golden age. No society can keep up to its highest level. Nothing can be wider of the truth than the popular conception of the ordinary Jesuit as a being of almost superhuman abilities and universal knowledge. The Society, numbering as it does so many thou- sands, and with abundant means of devoting men to special branches of study, has, without doubt, produced men of great intelligence and solid learning. The average member, too, on account of his long and systematic training, is always equal and often superior to the average member of any other equally large body, besides being disciplined by a far more perfect drill. But it takes great men to carry out great plans; and of really great men, as the outside world knows and judges, the Society has been markedly barren from almost the first. Apart from its founder and his early companion, St Francis Xavier, there is none who stands in the very first rank/ Laynez and Acquaviva were able administrators and politicians; the Bollandists (.q.v.) were industrious workers and have developed a critical spirit from which much good can be expected; Francisco Suarez,

Leonhard Lessius and Ca rdinal Franzelin were some of the leading Jesuit theologians; Cornelius a Lapide (1567-1637) represents their old school of scriptural studies, while their new German writers are the most advanced of all orthodox higher critics; the French Louis Bourdaloue (q.v.), the Italian Paolo Segneri (1624-1604), and the Portuguese Antonio Vieyra (1608-1697) represent their best pulpit orators; while of the many mathema- ticians and astronomers produced by the Society Angelo Secchi, Ruggiero Giuseppe Boscovich and G.B. Beccaria are conspicuous, and in modern times Stephen Joseph Perry (1833-18.80), director of the Stonyhurst College observatory, took a high rank among men of science.

Their boldest and most original thinker, Denis Petau, so many years neglected, is now, by inspiring Cardinal Newman's Essay on the Development of Christian Doctrine, pro- ducing a permanent influence over the current of human thought. The Jesuits have produced no Aquinas, no Anselm, no Bacon, no Richelieu. Men whom they trained, and who broke loose from their teaching, Pascal, Descartes, Voltaire, have power- fully affected the philosophical and religious beliefs of great masses of mankind; but respectable mediocrity is the brand on the long list of Jesuit names in the catalogues of Alegambe and De Backer. This is doubtless due in great measure to the destruc- tive process of scooping out the will of the Jesuit novice, to replace it with that of his superior (as a watchmaker might fit a new movement into a case), and thereby tending, in most cases, to annihilate those subtle qualities of individuality and originality which are essential to genius. Men of the higher stamp will either refuse to submit to the process and leave the Society, or run the danger of coming forth from the mill with their finest qualities pulverized and useless. In accordance with the spirit of its founder, who wished to secure uniformity in the judgment of his followers even in points left open by the Church (" Let us all think the same way, let us all speak in the same manner if possible"), the Society has shown itself to be impatient of those who think or write in a way different from what is current in its ranks.

Nor is this all. The Ratio Studiorum, devised by Acquaviva and still obligatory in the colleges of the Society, lays down rules which are incompatible with all breadth and progress in the higher forms of education. True to the anti-speculative and traditional side of the founder's mind, it prescribes that, even where religious topics are not in question, the teacher is not to permit any novel opinions or discussions to be mooted; nor to cite or allow others to cite the opinions of an author not of known repute; nor to teach or suffer to be taught anything contrary to the prevalent opinions of acknow- ledged doctors current in the schools. Obsolete and false opinions are not to be mentioned at all, even for refutation, nor are objections to received teaching to be dwelt on at any length. The result is that the Jesuit emerges from his schools without any real knowledge of any other method of thought than that which his professors have instilled into him. The professor of Biblical Literature is always to support and defend the Vulgate and can never prefer the marginal readings from the Hebrew and Greek. The Septuagint, as far as it is incorrupt, is to be held not less authentic than the Vulgate. In philosophy Aristotle is always to be followed, and St Thomas Aquinas generally, care being taken to speak respectfully of him even when abandoning his opinions, though now it is customary for the Jesuit teachers to explain him in their own sense. De vera mente D. Thomas is no unfamiliar expression in their books. It is not wonderful, under such a method of training, fixed as it

has been in minute detail for more than three hundred years, that highly cultivated commonplaces should be the inevitable average result; and that in proportion as Jesuit power has become dominant in Christendom, especially in ecclesiastical circles, the same doom of intellectual sterility and consequent loss of influence with the higher and thoughtful classes, has separated the part from the whole. The initial mistake in the formation of character is that the Jesuits have aimed at educating lay boys in the same manner as they consider advisable for their own novices, for whom obedience and direction is the one thing necessary; whereas for lay people the right use of liberty and initiative are to be desired.

The second cause which has blighted the efforts of the Society is the lesson, too faithfully learnt and practised, of making its corporate interests the first object at all times and in all places. Men were quick to see that Jesuits did not aim at co-operation with the other members of the Church but directly or indirectly at mastery. The most brilliant exception to this rule is found in some of the missions of the Society and notably in that of St

Francis Xavier (q.v.). But he quitted Europe in 1541 before the new society, especially under Laynez, had hardened into its final mould; and he never returned. His work, so far as can be gathered from contemporary accounts, was not done on true Jesuit lines as they afterwards developed, though the Society has reaped all the credit; and it is even possible that, had he succeeded the founder as general, the institute might not have received that political and self-seeking turn which Laynez, as second general, gave at the critical moment.

It would almost seem that careful selection was made of the men of the greatest piety and enthusiasm, whose unworldliness made them less apt for diplomatic intrigues, to break new ground in the various missions where their success would throw lustre on the Society and their scruples need never come into play. But such men are not to be found easily; and, as they died off, the tendency was to fill their places with more ordinary characters, whose aim was to increase the power and resources of the. body. Hence the conde- scension to heathen rites in Hindustan and China, and the attempted subjugation of the English Catholic clergy. The first successes of the Indian mission were entirely among the lower classes; but when in Madura, in 1606, Robert de Nobili, a nephew of Bellarmine, to win the Brahmins, adopted their dress and mode of life — a step sanctioned by Gregory XV. in 1623 and by Clement XI. in 1707 — the fathers who followed his example pushed the new caste-feeling so far as absolutely to refuse the ministrations and sacraments to the pariahs, lest the Brahmin converts should take offence — an attempt which was reported to Rome and was vainly censured by the breves of Innocent X. in 1645, Clement IX. in 1669, Clement XII. in 1734 and 1739, and Benedict

XIV. in 1745. The Chinese rites, assailed with equal unsuccess by one pope after another, were not finally put down until 1744 by a bull of Benedict XIV. For Japan, where their side of the story is that best known, we have a remarkable letter, printed by Lucas Wadding in the Annates minorum, addressed to Paul V. by Soleto, a Franciscan missionary, who was martyred in 1624, in which he complains to the pope that the Jesuits system- atically postponed the spiritual welfare of the native Christians to their own convenience and advantage; while as regards the test of martyrdom, no such result had followed on their teaching, but only on that of the other orders who had undertaken missionary work in Japan. Yet soon many Jesuit martyrs in Japan were to shed a new glory on the Society (see Japan: Foreign Intercourse). Again, even in Paraguay, the most promising of all Jesuit undertakings, the evidence shows that the fathers, though civilizing the Guarani population just sufficiently to make them useful and docile servants, happier no doubt than they were before or after, stopped there. While the mission was begun on the rational principle of governing races still in ftieir childhood by methods adapted to that stage in their mental development, yet for one hundred and fifty years the " reductions " were conducted in the same manner, and when the hour of trial came the Jesuit civilization fell like a house of cards.

These examples are sufficient to explain the final collapse of so many promising efforts. The individual Jesuit might be, and often was, a hero, saint and martyr, but the system which he was obliged to administer was foredoomed to failure; and the suppression which came in 1773 was the natural result of forces and elements they had set in antagonism without the power of controlling.

The influence of the Society since its restoration in 1814 has not been marked with greater success than in its previous history. It was natural after the restoration that an attempt should be made to pick up again the threads that were dropped; but soon they came to realize the truth of the saying of St Ignatius: " The Society shall adapt itself to the times and not the times to the Society." The political conditions of Europe have com- pletely changed, and constitutionalism is unfavourable to that personal influence which, in former times, the Jesuits were able to bring to bear upon the heads of states. In Europe they confine themselves mainly to educational and ecclesiastical politics, although both Germany and France have followed the example of Portugal and refuse, on political grounds, to allow them to be in these countries. It would appear as though some of the Jesuits had not, even yet, learnt the lesson that meddling with politics has always been their ruin. The main cause of any difficulty that may exist to- day with the Society is that the Jesuits are true to the teaching of that remarkable panegyric, the Imago primi saeculi Societatis (probably written by John Tollenarius in 1 640) , by identifying the Church with their own

body, and being intolerant of all who will not share this view. Their power is still large in certain sections of the ecclesiastical

world, but in secular affairs it is small. Moreover within the church itself there is a strong and growing feeling that the interests of Catholicism may necessitate a second and final suppression of the Society. Cardinal Manning, a keen observer of times and influences, was wont to say: — " The work of 1773 was the work of God: and there is another 1773 coming." But, if this come, it will be due not to the pressure of secular governments, as in the 1 8th century, but to the action of the Church itself. The very nations which have cast out the Society have shown no disposition to accept its own estimate and identify it with the Church; while the Church itself is not conscious of depending upon the Society. To the Church the Jesuits have been what the Janissaries were to the Ottoman Empire, at first its defenders and its champions, but in the end its taskmasters. History. — The separate article on Loyola tells of his early years, his conversion, and his first gathering of companions. It was not until November 1537, when all hope of going to the Holy Land was given up, that any outward steps were taken to form these companions into an organized body. It was on the eve of their going to Rome, for the second time, that the fathers met Ignatius at Vicenza and it was determined to adopt a com- mon rule and, at the suggestion of Ignatius, the name of the Company of Jesus. Whatever may have been his private hopes and intentions, it was not until he, Laynez and Faber (Pierre Lefevre), in the name of their companions, were sent to lay their services at the feet of the pope that the history of the Society really begins.

On their arrival at Rome the three Jesuits were favourably re- ceived by Paul III., who at once appointed Faber to the chair of scripture and Laynez to that of scholastic theology in the university of the Sapienza. But they encountered much opposition and were even charged with heresy ; when this accusation had been disposed of, there were still difficulties in the way of starting any new order. Despite the approval of Cardinal Contarini and the goodwill of the pope (who is said to have exclaimed on perusing the scheme of Ignatius, " The finger of God is here "), there was a strong and general feeling that the regular system had broken down and could not be wisely developed farther. Cardinal Guidiccioni, one of the commission of three appointed to examine the draft constitution, was known to advocate the abolition of all existing orders, save four which were to be remodelled and put under strict control. That very year, 1538, a commission of cardinals, including Reginald I^uie, Contarini, Sadolet, Caraffa (afterwards

Paul IV.), Fregoso and others, had reported that the conventual orders, which they had to deal with, had drifted into such a state that they should all be abolished. Not only so, but, when greater strictness of rule and of enclosure seemed the most needful reforms in communities that had become too secular in tone, the proposal of Ignatius, to make it a first principle that the members of his institute should mix freely in the world and be as little marked off as possible externally from secu- lar clerical life and usages, ran counter to all tradition and prejudice, save that Caraffa's then recent order of Theatines, which had some analogy with the proposed Society, had taken some steps in the same direction.

Ignatius and his companions, however, had but little doubt of •iltimate success, and so bound themselves, on the 15th of April 1539, to obey any superior chosen from amongst their body, and added on the 4th of May certain other rules, the most important of which was a vow of special allegiance to the pope for mission purposes to be taken by all the members of the society. But Guidiccioni, on a careful study of the papers, changed his mind ; it is supposed that the cause of this change was in large measure the strong interest in the new scheme exhibited by John III., king of Portugal, who instructed his ambassador to press it on the pope and to ask Ignatius to send some priests of his Society for mission work in Portugal and its Indian possessions. Francis Xavier and Simon Rodriguez were sent to the king in March 1540. Obstacles being cleared away, Paul III., on the 27th of September 1540, issued his bull Regimini militantis ecclesiae, by which he confirmed the new Society (the term " order " does not belong to it), but limited the members to sixty, a restriction which was removed by the same pope in the buli Injunctum nobis of the 14th of March 1543. In the former bull, the pope gives the text of the formula submitted by Ignatius as the scheme of the proposed society, and in it we get the founder's own ideas: "... This Society, instituted to this special end, namely, to offer spiritual consolation for the advancement of souls in life and Christian doctrine, for the propagation of the faith by public preaching and the ministry of the .word of God, spiritual exercises and works of charity and, especially, by the instruction of children and ignorant people in Christianity, and by the spiritual consolation of the faithful in Christ in hearing confessions. . . . " In this original scheme it is clearly marked out " that this entire

Society and all its members fight for God under the faithful obedience of the most sacred lord, the pope, and the other Roman pontiffs his successors " ; and Ignatius makes particular mention that each mem- ber should " be bound by a special vow," beyond that formal obligation under which all Christians are of obeying the pope, " so that whatsoever the present and other Roman pontiffs for the time being shall ordain, pertaining to the advancement of souls and the propagation of the faith, to whatever

provinces he shall resolve to send us, we are straightway bound to obey, as far as in us lies, without any tergiversation or excuse, whether he send us among the Turks or to any other unbelievers in being, even to those parts called India, or to any heretics or schismatics or likewise to any believers." Obedience to the general is enjoined " in all things pertaining to the institute of the Society . . . and in him they shall acknowledge Christ as though present, and as far as is becoming shall venerate him "; poverty is enjoined, and this rule affects not only the indi- vidual but the common sustentation or care of the Society, except that in the case of colleges revenues are allowed "to be applied to the wants and necessities of the students "; and the private recita- tion of the Office is distinctly mentioned. On the other hand, the perpetuity of the general's office during his life was no part of the original scheme.

On the 7th of April 1541, Ignatius was unanimously chosen general. His refusal of this post was overruled, so he entered on his office on the 13th of April; and two days after, the newly constituted Society took its formal corporate vows in the basilica of San Paolo fuori le mura. Scarcely was the Society launched when its members dispersed in various directions to their new tasks. Alfonso Salmeron and Pasquier-Brouet, as papal dele- gates, were sent on a secret mission to Ireland to encourage the native clergy and people to resist the religious changes introduced by Henry VIII.; Nicholas Bobadilla went to Naples; Faber, first to the diet of Worms and then to Spain; Laynez and Claude le Jay to Germany, while Ignatius busied himself at Rome in good works and in drawing up the constitutions and completing the Spiritual Exercises. Success crowned these first efforts; and the Society began to win golden opinions. The first college was founded at Coimbra in 1542 by John III. of Portugal and put under the rectorship of Rodriguez. It was designed as a training school to feed the Indian mission of which Francis Xavier had already taken the oversight, while a seminary at Goa was the second institution founded outside Rome in connexion with the Society. Both from the original scheme and from the foundation at Coimbra it is clear that the original idea of the colleges was to provide for the education of future Jesuits. In Spain, national pride in the founder aided the Society's cause almost as much as royal patronage did in Portugal; and the third house was opened in Gandia under the protection of its duke, Francisco Borgia, a grandson of Alexander VI. In Germany, the Jesuits were eagerly welcomed as the only persons able to meet the Lutherans on equal terms. Only in France, among the countries which still were united with the Roman Church, was their advance checked, owing to political distrust of their Spanish origin, to- gether with the hostility of the Sorbonne and the bishop of Paris. However, after many difficulties, they succeeded in getting a footing through the help of Guillaume du Prat, bishop of Clermont (d. 1560), who founded a college for them in 1545 in

the town of Billom, besides making over to them his house at Paris, the hotel de Clermont, which became the nucleus of the after- wards famous college of Louis-le-Grand, while a formal legaliza- tion was granted to them by the states-general at Poissy in 1561. In Rome, Paul III.'s favour did not lessen. He bestowed on therri the church of St Andrea and conferred at the same time the valuable privilege of making and altering their own statutes; besides the other points, in 1546, which Ignatius had still more at heart, as touching the very essence of his institute, namely, exemption from ecclesiastical offices and dignities and from the task of acting as directors and confessors to convents of women. The former of these measures effectually stopped any drain of the best members away from the society and limited their hopes within its bounds, by putting them more freely at the general's disposal, especially as it was provided that the final vows could not be annulled, nor could a professed member be dismissed, save by the joint action of the general and the pope. The regulation as to convents seems partly due to a desire to avoid the worry and expenditure of time involved in the discharge of such offices

and partly to a conviction that penitents living in enclosure, as all religious persons then were, would be of no effective use to the Society; whereas the founder, against the wishes of several of his companions, laid much stress on the duty of accepting the post of confessor to kings, queens and women of high rank when opportunity presented itself. And the year 1546 is notable in the annals of the Society as that in which it embarked on its great educational career, especially by the annexation of free day-schools to all its colleges.

The council of Trent, in its first period, seemed to increase the reputation of the Society ; for the pope chose Laynez, Faber and Salmeron to act as his theologians in that assembly, and in this capacity they had no little influence in framing its decrees. When the council reassembled under Pius IV., Laynez and Salmeron again attended in the same capacity. It is sometimes said that the council formally approved of the Society. This is impossible; for as the Society had received the papal approval, that of the council would have been impertinent as well as unnecessary. St Charles Borromeo wrote to the presiding cardinals, on the nth of May 1562, saying that, as France was disaffected to the Jesuits whom the pope wished to see established in every country, Pius IV. desired, when the council was occupying itself about regulars, that it should make some honourable mention of the Society in order to recommend it. This was done in the twenty-fifth session (cap. XVI., d.r.) when the decree was passed that at

the end of the time of probation novices should either be professed or dismissed ; and the words of the council are: " By these things, however, the Synod does not intend to make any innovation or prohibition, so as to hinder the religious order of Clerks of the Society of Jesus from being able to serve God and His Church, in accordance with their pious institute approved of by the Holy Apostolic See."

In 1 548 the Society received a valuable recruit in the person of Francisco Borgia, duke of Gandia, afterwards thrice general, while two important events marked 1550 — the foundation of the Collegio Romano and a fresh confirmation of the Society by Julius III. The German college, for the children of poor nobles, was founded in 1552; and in the same year Ignatius firmly settled the discipline of the Society by putting down, with promptness and severity, some attempts at independent action on the part of Rodriguez at Coimbra — this being the occasion of the famous letter on obedience; while 1553 saw the despatch of a mission to Abyssinia with one of the fathers as patriarch, and the first rift within the lute when the pope thought that the Spanish Jesuits were taking part with the emperor against the Holy See. Paul IV 7 . (whose election alarmed the Jesuits, for they had not found him very friendly as cardinal) was for a time managed with supreme tact by Ignatius, whom he respected personally. In 1556, the founder died and left the Society consisting of forty- five professed fathers and two thousand ordinary members, distributed over twelve provinces, with more than a hundred colleges and houses.

After the death of the first general there was an interregnum of two years, with Laynez as vicar. During this long period he occu- pied himself with completing the constitutions by incorporating certain declarations, said to be Ignatian, which explained and sometimes completely altered the meaning of the original text. Laynez was an astute politician and saw the vast capabilities of the Society over a far wider field than the founder contemplated ; and he prepared to give it the direction that it has since followed. In some senses, this learned and consummately clever man may be looked upon as the real founder of the Society as history knows it. Having carefully prepared the way, he summoned the general congregation from which he emerged as second general in 1556. As soon as Ignatius had died Paul IV. announced his intention of in- stituting reforms in the Society, especially in two points: the public recitation of the office in choir and the limitation of the general's office to a term of three years. Despite all the protests and nego- tiations of Laynez, the pope remained obstinate; and there was nothing but to submit. On the 8th of September 1558, two points were added to the constitutions: that the generalship shou'.d be triennial and not perpetual, although after the three years the general might be confirmed ; and that the canonical hours should be observed in choir after the manner of the other orders, but with that modera- tion which should

seem expedient to the general. Taking advantage of this last clause, Laynez applied the new law to two houses only, namely, Rome and Lisbon, the other houses contenting themselves with singing vespers on feast days; and as soon as Paul IV. died, Laynez, acting on advice, quietly ignored for the future the orders of the late pope. He also succeeded in increasing further the already enormous powers of the general. Laynez took a leading part in the colloquy of Poissy in 1561 between the Catholics and Huguenots;

and obtained a legal footing from the states-general for colleges of the Society in France. He died in 1564, leaving the Society increased to eighteen provinces with a hundred and thirty colleges, and was succeeded by Francisco Borgia. During the third general- ate, Pius V. confirmed all the former privileges, and in the amplest form extended to the Society, as being a mendicant institute, all favours that had been or might afterwards be granted to such mendi- cant bodies. It was a trifling set-off that in 1567 the pope again enjoined the fathers to keep choir and to admit only the professed to priests' orders, especially as Gregory XIII. rescinded both these injunctions in 1573; and indeed, as regards the hours, all that Pius V. was able to obtain was the nominal concession that the bre- viary should be recited in choir in the professed houses only, and that not of necessity by more than two persons at a time. Everard Mercurian, a Fleming, and a subject of Spain, succeeded Borgia in 1573, being forced on the Society by the pope, in preference to Polanco, Ignatius's secretary and the vicar-general, who was re- jected partly as a Spaniard and still more because he was a " New Christian " of Jewish origin and therefore objected to in Spain itself. During his term of office there took place the troubles in Rome concerning the English college and the subsequent Jesuit rule over that institution; and in 1580 the first Jesuit mission, headed by the redoubtable Robert Parsons and the saintly Edmund Campion, set out for England. This mission, on one side, carried on an active propaganda against Elizabeth in favour of Spain ; and on the other, among the true missionaries, was marked with devoted zeal and heroism even to the ghastly death of traitors. Claude Acquaviva, the fifth general, held office from 1581 to 1615, a time almost coinciding with the high tide of the successful reaction, chiefly due to the Jesuits. He was an able, strong-willed man, and crushed what was tantamount to a rebellion in Spain. It was during this struggle that Mariana, the historian and the author of the famous De rege in which he defends tyrannicide, wrote his treatise On the Defects in the Government of the Society. He confessed freely that the Society had faults and that there was a great deal of unrest among the members; and he mentioned among the various points calling for reform the education of the novices and students ; the state of the lay brother and the possessions of the Society; the spying system, which he declared to be carried so far' that, if the general's archives at Rome should be searched, not one Jesuit's character would be

found to escape ; the monopoly of the higher offices by a small clique : and the absence of all encouragement and recompense for the best men of the Society.

It was chiefly during the generalship of Acquaviva that the Society began to gain an evil reputation which eclipsed its good report. In France the Jesuits joined, if they did not originate, the league against Henry of Navarre. Absolution was refused by them to those who would not join in the Guise rebellion, and Acquaviva is said to have tried to stop them, but in vain. The assassination of Henry III. in the interests of the league and the wounding of Henry IV. in 1594 by Chastel, a pupil of theirs, revealed the danger that the whole Society was running by the intrigues of a few men. The Jesuits were banished from France in 1594, but were allowed to return by Henry IV. under condi- tions ; as Sully has recorded, the king declared his only motive to be the expediency of not driving them into a corner with possible disastrous results to his life, and because his only hope of tranquillity lay in appeasing them and their powerful friends. In England the political schemings of Parsons were no small factors in the odium which fell on the Society at large; and his determination to capture the English Catholics as an apanage of the Society, to the exclusion of all else, was an object lesson to the rest of Europe of a restless ambition and lust of domination which were to find many imitators. The political turn which was being given by some to the Society, to the detriment of its real spiritual work, evoked the fears of the wiser heads of the body; and in the fifth general congregation held in 1593-1594 it was decreed: " Whereas in these times of difficulty and danger it has happened through the fault of certain individuals, through ambition and intemperate zeal, that our institute has been ill spoken of in divers places and before divers sovereigns . . . it is severely and strictly forbidden to all members of the Society to interfere in any manner whatever in public affairs even though they be thereto invited; or to deviate from the institute through entreaty, persuasion or any other motive whatever." It would have been well had Acquaviva enforced this decree; but Parsons was allowed to keep on with his work, and other Jesuits in France for many years after directed, to the loss of religion, affairs of state. In 1605 took place in England the Gunpowder Plot, in which Henry Garnet, the superior of the Society in

England, was implicated. That the Jesuits were the instigators of the plot there is no evidence, but they were in close touch with the conspirators, of whose designs Garnet had a general know- ledge. There is now no reasonable doubt that he and other Jesuits were legally accessories, and that the condemnation of Garnet as a traitor was substantially just (see Garnet, Henry). It was during Acquaviva's generalship that Philip II. of Spain complained bitterly of the Society to Sixtus V., and encouraged him in those plans of reform (even to changing the name) which were only cut

short by the pope's death in 1590, and also that the long protracted discussions on grace, wherein the Dominicans contended against the Jesuits, were carried on at Rome with' little practical result, by the Congregation de auxiliis, which sat from 1598 till 1607. The Ratio Studiorum took its shape during this time. The Jesuit in- fluence at Rome was supported by the Spanish ambassador ; but when Henry IV. " went to Mass," the balance inclined to the side of France, and the Spanish monopoly became a thing of the past. Acquaviva saw the expulsion of the Jesuits from Venice in 1606 for siding with Paul V. when he placed the republic under interdict, but did not live to see their recall, which took place at the inter- cession of Louis XIV. in 1657. He also had to banish Parsons from Rome, by order of Clement VIII., who was wearied with the per- petual complaints made against that intriguer. Gregory XIV., by the bull Ecclesiae Christi (July 28, 1591), again confirmed the Society, and granted that Jesuits might, for true cause, be expelled from the body without any form of trial or even documentary pro- cedure, besides denouncing excommunications against every one, save the pope or his legates, who directly or indirectly infringed the constitutions of the Society or attempted to bring about any change therein.

Under Vitelleschi, the next general, the Society celebrated its first centenary on the 25th of September 1639, the hundredth anni- versary of the verbal approbation given to the scheme by Paul III. During this hundred years the Society had grown to thirty-six provinces, with eight hundred houses containing some fifteen thousand members. In 1640 broke out the great Jansenist contro- versy, in which the Society took the leading part on one side and finally secured the victory. In this same year, considering themselves ill-used by Olivarez, prime minister of Philip IV. of Spain, the Jesuits powerfully aided the revolution which placed the duke of Braganza on the throne of Portugal ; and their services were rewarded for nearly one hundred years with the practical control of ecclesiastical and almost of civil affairs in that kingdom.

The Society also gained ground steadily in France; for, though held in check by Richelieu and little more favoured by Mazarin, yet from the moment that Louis XIV. took the reins, their star was in the ascendant, and Jesuit confessors, the most celebrated of whom were Francois de La Chaise (q.v.) and Michel Le Tellier (1643- 1719), guided the policy of the king, not hesitating to take his side in his quarrel with the Holy See, which nearly resulted in a schism, nor to sign the Gallican articles. Their hostility to the Huguenots forced on the revocation of the Edict of Nantes in 1685, and their war against their Jansenist opponents did not cease till the very walls of Port Royal were demolished in 1710, even to the very abbey church itself, and the bodies of the dead taken with every mark of insult from their graves and literally flung to the dogs to devour. But while thus

gaining power in one direction, the Society was losing it in another. The Japanese mission had vanished in blood in 1651 ; and though many Jesuits died with their converts bravely as martyrs for the faith, yet it is impossible to acquit them of a large share in the causes of that overthrow. It was also about this same period that the grave scandal of the Chinese and Malabar rites bggan to attract attention in Europe, and to make thinking men ask seriously whether the Jesuit missionaries in those parts taught anything which could fairly be called Christianity at all. When it was remembered, too, that they had decided, at a council held at Lima, that it was inexpedient to impose any act of Christian devotion except baptism, on the South American converts, without the greatest precautions, on the ground of intellectual difficulties, it is not wonderful that this doubt was not satisfactorily cleared up, notably in face of the charges brought against the Society by Bernardin de Cardonas, bishop of Paraguay, and the saintly Juan de Palafox (q.v.), bishop of Angelopolis in Mexico.

But " the terrible power in the universal church, the great riches and the extraordinary prestige " of the Society, which Palafox complained had raised it " above all dignities, laws, councils and apostolic constitutions," carried with them the seeds of rapid and inevitable decay. A succession of devout but incapable generals, after the death of Acquaviva, saw the gradual secularization of tone by the flocking in of recruits of rank and wealth desirous to share in . the glories and influence of the Society, but not well adapted to in- crease them. The general's supremacy received a shock when the eleventh general congregation appointed Oliva as vicar, with the right of succession and powers that practically superseded those of the general Goswin Nickel, whose infirmities, it is said, did not permit him tc govern with the necessary application and vigour; and an attempt was made to depose Tirso Gonzalez, the thirteenth general, whose views on probabilism diverged from those favoured by the rest

of the Jesuits. Though the political weight of the Society continued to increase in the cabinets of Europe, it was being steadily weakened internally. The Jesuits abandoned the system of free education which had won them so much influence and honour; by attaching themselves exclusively to the interests of courts, they lost favour with the middle and lower classes; and above all, their monopoly of power and patronage in France, with the fatal use they had made of it, drew down the bitterest hostility upon them. It was to their credit, indeed, that the encyclopaedists attacked them as the foremost representatives of Christianity, but they are accountable in no small degree in France, as in England, for alienating the minds of men from the religion for which they professed to work.

But the most fatal part of the policy of the Society was its activity, wealth and importance as a great trading firm with branch houses scattered over the richest countries of the world. Its founder, with a wise instinct, had forbidden the accumulation of wealth; its own constitutions, as revised in the 84th decree of the sixth general congregation, had forbidden all pursuits of a commercial nature, as also had various popes; but nevertheless the trade went on unceasingly, necessarily with the full know- ledge of the general, unless it be pleaded that the system of obligatory espionage had completely broken down. The first muttering of the storm which was soon to break was heard in a breve issued in 1741 by Benedict XIV., wherein he denounced the Jesuit offenders as " disobedient, contumacious, captious and reprobate persons," and enacted many stringent regulations for their better government. The first serious attack came from a country where they had been long dominant. In 1753 Spain and Portugal exchanged certain American provinces with each other, which involved a transfer of sovereign rights over Para- guay; but it was also provided that the populations should severally migrate also, that the subjects of each crown might remain the same as before. The inhabitants of the " reductions," whom the Jesuits had trained in the use of European arms and discipline, naturally rose in defence of their homes, and attacked the troops and authorities. Their previous docility and their entire submission to the Jesuits left no possible doubt as to the source of the rebellion, and gave the enemies of the Jesuits a handle against them that was not forgotten. In 1757 Carvalho, marquis of Pombal, prime minister of Joseph I. of Portugal, and an old pupil of the Jesuits at Coimbra, dismissed the three Jesuit chaplains of the king and named three secular priests in their stead. He next complained to Benedict XIV. that the trading operations of the Society hampered the commercial prosperity of the nation, and asked for remedial measures. The pope, who knew the situation, committed a visitation of the Society to Cardinal Saldanha, an intimate friend of Pombal, who issued a severe decree against the Jesuits and ordered the confiscation of all their merchandise. But at this juncture Benedict XIV., the most learned and able pope of the period, was succeeded by a pope strongly in favour of the Jesuits, Clement XIII. Pombal, finding no help from Rome, adopted other means. The king was fired at and wounded on returning from a visit to his mistress on the 3rd of September 1758. The duke of Aveiro and other high personages were tried and executed for conspiracy; while some of the Jesuits, who had undoubtedly been in communica- tion with them, were charged, on doubtful evidence, with complicity in the attempted assassination. Pombal charged the whole Society with the possible guilt of a few, and, unwilling to wait the dubious issue of an application to the pope for licence to try them in the civil courts, whence they were exempt, issued on the 1 st of September 1759 a decree ordering the immediate deportation of every Jesuit from Portugal and all its

dependencies and their suppression by the bishops in the schools and universi- ties. Those in Portugal were at once shipped, in great misery, to the papal states, and were soon followed by those in the colonies. In France, Madame de Pompadour was their enemy because they had refused her absolution while she remained the king's mistress ; but the immediate cause of their ruin was the bankruptcy of Father Lavalette, the Jesuit superior in Martinique, a daring speculator, who failed, after trading for some years, for 2,400,000 francs and brought ruin upon some French' commercial houses of note. Lorenzo Ricci, then general of the Society, repudiated the debt, alleging lack of authority on Lavalette's part to pledge

the credit of the Society, and he was sued by the creditors. Losing his cause, he appealed to the parlement of Paris, and it, to decide the issue raised by Ricci, required the constitutions of the Jesuits to be produced in evidence, and affirmed the judgment of the courts below. But the publicity given to a document scarcely known till then raised the utmost indignation against the Society. A royal commission, appointed by the due de Choiseul to examine the constitutions, convoked a private assembly of fifty-one arch- bishops and bishops under the presidency of Cardinal de Luynes, all of whom except six voted that the unlimited authority of the general was incompatible with the laws of France, and that the appointment of a resident vicar, subject to those laws, was the only solution of the question fair on all sides. Ricci replied with the historical answer, Sint ut sunt, aut non sint; and after some further delay, during which much interest was exerted in their favour, the Jesuits were suppressed by an edict in November 1764, but suffered to remain on the footing of secular priests, a grace withdrawn in 1767, when they were expelled from the kingdom. In the very same year, Charles III. of Spain, a monarch known for personal devoutness, convinced, on evidence not now forthcoming, that the Jesuits were plotting against his authority, prepared, through his minister D'Aranda, a decree suppressing the Society in every part of his dominions. Sealed despatches were sent to every Spanish colony, to be opened on the same day, the 2nd of April 1767, when the measure was to take effect in Spain itself, and the expulsion was relentlessly carried out, nearly six thousand priests being deported from Spain alone, and sent to the Italian coast, whence, however, they were repelled by the orders of the pope and Ricci himself, finding a refuge at Corte in Corsica, after some months' suffering in over- crowded vessels at sea. The general's object may probably have been to accentuate the harshness with which the fathers had been treated, and so to increase public sympathy, but the actual result of his policy was blame for the cruelty with which he enhanced their misfortunes,

for the poverty of Corsica made even a bare subsistence scarcely procurable for them there. The Bourbon courts of Naples and Parma followed the example of France and Spain; Clement XIII. retorted with a bull launched at the weakest adversary, and declaring the rank and title of the duke of Parma forfeit. The Bourbon sovereigns threatened to make war on the pope in return (France, indeed, seizing on the county of Avignon), and a joint note demanding a retractation, and the abolition of the Jesuits, was presented by the French ambassador at Rome on the 10th of December 1768 in the name of France, Spain and the two Sicilies. The pope, a man of eighty-two, died of apoplexy, brought on by the shock, early in 1769. Cardinal Lorenzo Ganganelli, a conventual Franciscan, was chosen to succeed him, and took the name of Clement XIV. He endea- voured to avert the decision forced upon him, but, as Portugal joined the Bourbon league, and Maria Theresa with her son the emperor Joseph II. ceased to protect the Jesuits, there remained only the petty kingdom of Sardinia in their favour, though the fall of Choiseul in France raised the hopes of the Society for a time. The pope began with some preliminary measures, permitting first the renewal of lawsuits against the Society, which had been suspended by papal authority, and which, indeed, had in no case been ever successful at Rome. He then closed the Collegio Romano, on the plea of its insolvency, seized the houses at Frascati and Tivoli, and broke up the establishments in Bologna and the Legations. Finally on the 21st of July 1773 the famous breve Dominusac Redemptor appeared, suppressing the Society of Jesus. This remarkable document opens by citing a long series of precedents for the suppression of religious orders by the Holy See, amongst which occurs the ill-omened instance of the Templars. It then briefly sketches the objects and history of the Jesuits themselves. It speaks of their defiance of their own constitution, expressly revived by Paul V., forbidding them to meddle in politics; of the great ruin to souls caused by their quarrels with local ordinaries and the other religious orders, their condescension to heathen usages in the East, and the disturbances, resulting in persecutions of the Church, which they had stirred up even in Catholic countries, so that several popes had been

obliged to punish them. Seeing then that the Catholic sove- reigns had been forced to expel them, that many bishops and other eminent persons demanded their extinction, and that the Society had ceased to fulfil the intention of its institute, the pope declares it necessary for the peace of the Church that it should be sup- pressed, extinguished, abolished and abrogated for ever, with all its houses, colleges, schools and hospitals; transfers all the authority of its general or officers to the local ordinaries; forbids the reception of any more novices, directing that such as were actually in probation should be dismissed, and declaring that profession in the Society should not serve as a title to holy orders. Priests of the Society

are given the option of either joining other orders or remaining as secular clergy, under obedience to the ordinaries, who are empowered to grant or withhold from them licences to hear confessions. Such of the fathers as are engaged in the work of education are permitted to continue, on condition of abstaining from lax and questionable doctrines apt to cause strife and trouble. The question of missions is reserved, and the relaxations granted to the Society in such matters as fasting, reciting the hours and reading heretical books, are withdrawn; while the breve ends with clauses carefully drawn to bar any legal exceptions that might be taken against its full validity and obligation. It has been necessary to cite these heads of the breve because the apologists of the Society allege that no motive influenced the pope save the desire of peace at any price, and that he did not believe in the culpability of the fathers. The catego- rical charges made in the document rebut this plea. The pope . followed up this breve by appointing a congregation of cardinals to take possession of the temporalities of the Society, and armed it with summary powers against all who should attempt to retain or conceal any of the property. He also threw Lorenzo Ricci, the general, into prison, first in the English college and then in the castle of St Angelo, where he died in 1775, under the pontificate of Pius VI., who, though not unfavourable to the Society, and owing his own advancement to it, dared not release him, probably because his continued imprisonment was made a condition by the powers who enjoyed a right of veto in papal elections. In September 1774 Clement XIV. died after much suffering, and the question has been hotly debated ever since whether poison was 'the cause of his death. But the latest re- searches have shown that there is no evidence to support the theory of poison. Salicetti, the pope's physician, denied that' the body showed signs of poisoning, and Tanucci, Neapolitan ambassador at Rome, who had a large share in procuring the breve of suppression, entirely acquits the Jesuits, while F. Theiner, no friend to the Society, does the like.

At the date of this suppression, the Society had 41 provinces and 22,589 members, of whom 11,295 were priests. Far from submitting to the papal breve, the ex- Jesuits, after some in- effectual attempts at direct resistance, withdrew into the terri- tories of the, free-thinking sovereigns of Russia and Prussia, Frederick II. and Catherine II., who became their active friends and protectors; and the fathers alleged as a principle, in so far as their theology is concerned, that no papal bull is binding in a .state whose sovereign has not approved and authorized its publi- cation and execution. Russia formed the headquarters of the Society, and two forged breves were speedily circulated, being dated June 9 and June 29, 1774, approving their establishment in Russia, and implying the repeal of the breve of suppression. But these are contradicted by the tenor of five genuine breves issued in September 17 74 to the archbishop of Gnesen, and making certain

assurances to the ex- Jesuits, on condition of their complete obedience to the injunctions already laid on them. The Jesuits also pleaded a verbal approbation by Pius VI., technically known as an Oraculum vivae vocis, but this is invalid for purposes of law unless reduced to writing and duly authenticated.

They elected three Poles successively as generals, taking, how- ever, only the title of vicars, till on the 7th of March 1801 Pius VII. granted them liberty to reconstitute themselves. in north Russia, and permitted Kareu, then vicar, to exercise full authority as general. On the 30th of July 1804 a similar breve restored the Jesuits in the Two Sicilies, at the express desire of Ferdinand IV,

£he pope thus anticipating the further action of 1814, when, by the constitution Sollicitudo omnium Ecclesiarum, he revoked the action of Clement XIV., and formally restored the Society to corporate legal existence, yet not only omitted any censure of his predecessor's conduct, but all vindication of the Jesuits from the heavy charges in the breve Dominus ac Redemptor. In France, even after their expulsion in 1765, they had maintained a pre- carious footing in the country under the partial disguise and names of " Fathers of the Faith " or " Clerks of the Sacred Heart," but were obliged by Napoleon I. to retire in 1804. They re-appeared under their true name in 1814, and obtained formal licence in 1822, but became the objects of so much hostility that Charles X. deprived them by ordinance of the right of in- struction, and obliged all applicants for licences as teachers to make oath that they did not belong to any community unrecog- nized by the laws. They were dispersed again by the revolution of July 1830, but soon reappeared and, though put to much incon- venience during the latter years of Louis Philippe's reign, notably in 1845, maintained their footing, recovered the right to teach freely after the revolution of 1848, and gradually became the leading educational and ecclesiastical power in France, notably under the Second Empire, till they were once more expelled by the Ferry laws of 1880, though they quietly returned since the execution of those measures. They were again expelled by the Law of Associations of 1001. In Spain they came back with Ferdinand VII., but were expelled at the constitutional rising in 1820, returning in 1823, when the duke of Angouleme's army replaced Ferdinand on his throne; they were driven out once more by Espartero in 1835, and have had no legal position since, though their presence is openly tolerated. In Portugal, ranging themselves on the side of Dom Miguel, they fell with his cause, and were exiled in 1834. There are some to this day in Lisbon

under the name of " Fathers of the Faith." Russia, which had been their warmest patron, drove them from St Petersburg and Moscow in 1813, and from the whole empire in 1820, mainly on the plea of attempted proselytizing in the imperial army. HoUand drove them out in 1816, and, by giving them thus a valid excuse for aiding the Belgian revolution of 1830, secured them the strong position they have ever since held in Belgium; but they have succeeded in returning to Holland. They were expelled from Switzerland in 1 847-1 848 for the part they were charged with in exciting the war of the Sonderbund. In south Germany, inclusive of Austria and Bavaria, their annals since their restoration have been uneventful; but in north Germany, owing to the footing Frederick II. had given them in Prussia, they became very powerful, especially in the Rhine provinces, and, gradually moulding the younger generation of clergy after the close of the War of Liberation, succeeded in spreading Ultra- montane views amongst them, and so leading up to the difficul- ties with the civil government which issued in the Falk laws, and their own expulsion by decree of the German parliament (June 19, 1872). Since then many attempts have been made to procure the recall of the Society to the German Empire, but without success, although as individuals they are now allowed in the country. In Great Britain, whither they began to straggle over during the revolutionary troubles at the close of the 18th century, and where, practically unaffected by the clause directed against them in the Emancipation Act of 1829, their chief settle- ment has been at Stonyhurst in Lancashire, an estate conferred on them by Thomas Weld in 1793, they have been unmolested; but there has been little affinity to the order in the British temperament, and the English province has consequently never risen to numerical or intellectual importance in the Society. In Rome itself, its progress after the restoration was at first slow, and it was not till the reign of Leo XII. (1823-1829) that it recovered its place as the chief educational body there. It advanced steadily under Gregory XVI., and, though it was at first shunned by Pius IX., it secured his entire confidence after his return from Gaeta in 1849, and obtained from him a special breve erect- ing the staff of its literary journal, the Civilti Caltolica, into a perpetual college under the general of the Jesuits, for the purpose of teaching and propagating the faith in its pages. How, with

this pope's support throughout his long reign, cne gradual filling of nearly all the sees of Latin Christendom with bishops of their own selection, and their practical capture, directly or indirectly, of the education of the clergy in seminaries, they contrived to stamp out the last remains of independence everywhere, and to crown the Ultramontane triumph with the Vatican Decrees, is matter of familiar knowledge. Leo XIII., while favouring them somewhat, never gave them his full confidence; and by his ad- hesion to the Thomist philosophy and theology, and his active work for the regeneration

and progress of the older orders, he made another suppression possible by destroying much of their prestige. But the usual sequence has been observed under Pius X.,who appeared to be greatly in favour of the Society and to rely upon them for many of the measures of his pontificate.

The Society has been ruled by twenty-five generals and four vicars from its foundation to the present day (r9io). Of all the various nationalities represented in the Society, neither France, its original cradle, nor England, has ever given it a head, while Spain, Italy, Holland, Belgium, Germany and Poland, were all represented. The numbers of the Society are not accurately known, but are estimated at about 20,000, in all parts of the world; and of these the English, Irish and American Jesuits are under 3000.

The generals of the Jesuits have been as follow : —

1. Ignatius de Loyola (Spaniard) 1541-1556

2. Diego Laynez (Spaniard) 1558-1565

3. Francisco Borgia (Spaniard) 1565-1572

4. Everard Mercurian (Belgian) 1573-1580

5. Claudio Acquaviva (Neapolitan) ‘ 1581-1615

6. Mutio Vitelleschi (Roman) 1615-1645

7. Vincenzio Caraffa (Neapolitan) 1646-1649

8. Francesco Piccolomini (Florentine) 1649-1651

9. Alessandro Gottofredi (Roman) 1652

10. Goswin Nickel (German) . . _ 1652-1664

11. Giovanni Paolo Oliva (Genoese) vicar-general and

coadjutor, 1661 ; general 1664-1681

12. Charles de Noyelle (Belgian) 1682-1686

13. Tirso Gonzalez (Spaniard) 1687-1705

14. Michele Angelo Tamburini (Modenese) . 1706-1730

15. Franz Retz (Bohemian) 1 730-1750

16. Ignazio Visconti (Milanese) I75 I_I 755

17. Alessandro Centurioni (Genoese) I755~I757

18. Lorenzo Ricci (Florentine) 1 758-1 775

a. Stanislaus Czerniewicz (Pole), vicar-general 1 782-1 785

b. Gabriel Lienkiewicz (Pole), „ . ‘ 1785-1798

c. Franciscus Xavier Kareu (Pole), (general in

Russia, 7th March 1801) 1799-1802

d. Gabriel Gruber (German) 1802- 1805

19. Thaddaeus Brzozowski (Pole) 1805-1820

20. Aloysio Fortis (Veronese) 1820- 1829

21. Johannes Roothaan (Dutchman) 1 829-1 853

22. Peter Johannes Beckx (Belgian) 1853-1884

23. Antoine Anderledy (Swiss) 1 884-1 892

24. Luis Martin (Spanish) 1892-1906

25. Francis Xavier Wernz (German) 1906-

The bibliography of Jesuitism is of enormous extent, and it is impracticable to cite more than a few of the most important works. They are as follows: Institutum Societatis Jesu (7 vols., Avignon, 1830-1838);

Orlandini, Historic), Societatis Jesu (Antwerp, 1620); Imago primi saeculi Societatis Jesu (Antwerp, 1640) ; Nieremberg, Vida de San Ignacio de Loyola (9 vols., fol., Madrid, 1645-1736); Genelli, Life of St Ignatius of Loyola (London, 1872); Backer, Bibliotheque des ecrivains de la Compagnie de Jesus (7 vols., Paris, 1853-1861) ; Cretineau Joly, Histoire de la Compagnie de Jesus (6 vols., Paris, 1844); Guettee, Histoire des Jesuites (3 vols., Paris, 1 858-1859); Wolff, Allgemeine Geschichte der Jesuiten (4 vols., Zurich, 1789-1792) ; Gioberti, II Gesuita moderno (Lausanne, 1846) ; F. Parkman, Pioneers of France in the New World and The Jesuits in North America (Boston, 1868) ; Lettres edifiantes et curieuses, ecrites des missions etrangeres, avec les Annates de la propagation de la foi (40 vols., Lyons, 1819-1854); Saint-Priest, Histoire de la chute des Jesuites au X VIII" Siecle (Paris, 1844) ; Ranke, R'omische Papste (3 vols., Berlin, 1838); E. Taunton, History of the Jesuits in England (London, 1901) ; Thomas Hughes, S.J., History of the Society of Jesus in North America (London and New York, 1907) ; R. G. Thwaites, Jesuit Relations and Allied Documents (73 vols. Cleveland, 1896-1901).

(R. F. L.; E. Tn.)

JESUP, MORRIS KETCHUM (1830-1908), American banker and philanthropist, was born at Westport, Connecticut, on the 21st of June 1830. In 1842 he went to New York City, where after some experience in business he established a banking house

in 1852. In 1856 he organized the banking firm of M. K. Jesup & Company, which after two reorganizations became Cuyler, Morgan & Jesup. He became widely known as a financier, retiring from active business in 1884. He was best known, however, as a munificent patron of scientific research, a large contributor to the needs of education, and a public-spirited citizen of wide interests, who did much for the betterment of social conditions in New York. He contributed largely to the funds for the Arctic expeditions of Commander Robert E. Peary, becoming president of the Peary Arctic Club in 1899. To the American museum of natural history, in New York City, he gave large sums in his lifetime and bequeathed $1,000,000. He was president of the New York chamber of commerce from 1899 until 1907, and was the largest subscriber to its new building. To his native town he gave a fine public library. He died in New York City on the 22nd of January 1908.

JESUS CHRIST. To write a summary account of the life of Christ, though

always involving a grave responsibility, was until recent years a comparatively straightforward task; for it was assumed that all that was needed, or could be offered, was a chronological outline based on a harmony of the four canonical Gospels. But to-day history is not satisfied by this simple pro- cedure. Literary criticism has analysed the documents, and has already established some important results; and many questions are still in debate, the answers to which must affect our judg- ment of the historical value of the existing narratives. It seems therefore consonant alike with prudence and reverence to re- frain from attempting to combine afresh into a single picture the materials derivable from the various documents, and to endeavour instead to describe the main contents of the sources from which our knowledge of the Lord Jesus Christ as an historical personage is ultimately drawn, and to observe the picture of Him which each writer in turn has offered to us.

The chief elements of the evidence with which we shall deal are the following: —

1. First, because earliest in point of time, the references to the Lord Jesus Christ in the earliest Epistles of St Paul.

2. The Gospel according to St Mark.

3. A document, no longer extant, which was partially incorporated into the Gospels of St Matthew and St Luke.

4. Further information added by St Matthew's Gospel.

5. Further information added by St Luke's Gospel.

6. The Gospel according to St John.

With regard to traditional sayings or doings of our Lord, which were only written down at a later period, it will suffice to say that those which have any claim to be genuine are very scanty, and that their genuineness has to be tested by their correspondence with the great bulk of information which is derived from the sources already enumerated. The fictitious literature of the second and third centuries, known as the Apocryphal Gospels, offers no direct evidence of any historical value at all : it is chiefly valuable for the contrast which it presents to the grave simplicity of the canonical Gospels, and as showing how incapable a later age was of adding anything to the Gospel history which was not palpably absurd.

r. Letters of St Paul. — In the order of chronology we must give the first place to the earliest letters of St Paul. The first piece of Christian literature which has an independent existence and to which we can fix a date is St

Paul's first Epistle to the Thessa- lonians. Lightfoot dates it in 52 or 53; Harnack places it five years earlier. We may say, then, that it was written some twenty years after the Crucifixion. St Paul is not an historian; he is not attempting to describe what Jesus Christ said or did. He is writing a letter to encourage a little Christian society which he, a Jew, had founded in a distant Greek city; and he reminds his readers of many things which he had told them when he was with them. The evidence, to be collected from his epistles generally must not detain us here, but we may glance for a moment at this one letter, because it contains what appears to be the first mention of Jesus Christ in the literature of the world. Those who would get a true history cannot afford to neglect their earliest documents. Now the opening sentence of this letter is as follows: " Paul and Silvanus and Timothy to the Church of the Thessalonians in God the Father and the Lord Jesus Christ: Grace to you, and peace." Three men with Greek or Latin names are writing to some kind of assembly in a city of Mace-

donia. The writers are Jews, to judge by their salutation of " peace," and by their mention of " God the Father," and of the assembly or society as being " in " Him. But what is this new name which is placed side by side with the Divine Name—" in God the Father and the Lord Jesus Christ "? An educated Greek, who knew something (as many at that time did) of the Greek translation of the ancient Hebrew Scriptures, if he had picked up this letter before he had ever heard the name of Jesus Christ, would have been deeply interested in these opening words. He would have known that " Jesus " was the Greek form of Joshua; that " Christ " was the Greek rendering of Messiah, or Anointed, the title of the great King for whom the Jews were looking; he might further have remembered that " the Lord " is the expression which the Greek Old Testament constantly uses instead of the ineffable name of God, which we now call " Jehovah " (q.v.). Who, then, he might well ask is this Jesus Christ who is lifted to this unexampled height? For it is plain that Jesus Christ stands in some close relation to " God the Father," and that on the ground of that relation a society has been built up, apparently by Jews, in a Greek city far distant from Palestine. He would learn something as he read on; for the letter makes a passing reference to the founda- tion of the society, and to the expansion of its influence in other parts of Greece; to the conversion of its members from heathen- ism, and to the consequent sufferings at the hands of their heathen neighbours. The writers speak of themselves as " apostles," or messengers, of Christ; they refer to similar societies " in Christ Jesus," which they call " churches of God," in Judaea, and they say that these also suffer from the Jews there, who had " killed the Lord Jesus " some time before. But they further speak of Jesus as " raised from the dead," and they refer to the belief which they had led the society to entertain, that He would come again " from heaven to deliver them from the coming wrath."

Moreover, they urge them not to grieve for certain members of the society who have al ready died, saying that, "if we believe that Jesus died and rose again," we may also be assured that " the dead in Christ will rise " and will live for ever with Him. Thus the letter assumes that its readers already have considerable knowledge as to " the Lord Jesus Christ," and as to His relation to " God the Father," a knowledge derived from teaching given in person on a former visit. The purpose of the letter is not to give in- formation as to the past, but to stimulate its readers to perse- verance by giving fresh teaching as to the future. Historically it is of great value as showing how widely within twenty or twenty-five years of the Crucifixion a religion which proclaimed developed theological teaching as to " the Lord Jesus Christ " had spread in the Roman Empire. We may draw a further con- clusion from this and other letters of St Paul before we go on. St Paul's missionary work must have created a demand. Those who had heard him and read his letters would want to know more than he had told them of the earthly life of the Lord Jesus. They would wish to be able to picture Him to their minds; and especially to understand what could have led to His being put to death by the Romans at the requisition of the Jews. St Paul had not been one of his personal disciples in Galilee or Jerusalem; he had no memories to relate of His miracles and teaching. Some written account of these was an obvious need. And we may be sure that any such narrative concerning One who was so deeply reverenced would be most carefully scrutinized at a time when many were still living whose memories went back to the period of Our Lord's public ministry. One such narrative we now proceed to describe.

2. St Mark's Gospel. — The Gospel according to St Mark was written within fifteen years of the first letter of St Paul to the Thessalonians — i.e. about 65. It seems designed to meet the requirements of Christians living far away from Palestine. The author was not an eye-witness of what he relates, but he writes with the firm security of a man who has the best authority behind him. The characteristics of his work confirm the early belief that St Mark wrote this Gospel for the Christians of Rome under the guidance of St Peter. It is of the first importance that

we should endeavour to see this book as a whole ; to gain the total impression which it makes on the mind; to look at the picture of Jesus Christ which it offers. That picture must inevitably be an incomplete representation of Him; it will need to be supple- mented by other pictures which other writers have drawn. But it is important to consider it by itself, as showing us what im- press the Master had made on the memory of one disciple who had been almost constantly by His side.

The book opens thus: " The beginning of the Gospel of Jesus Christ." This " beginning " is shown to be itself rooted Beginning in the past. Hebrew prophets had foretold that of Christ's God would send a "messenger"; that a voice Mission. wou i,j b e heard saying, " Prepare the way of the Lord." And so, in fact, John came, baptizing in the wilderness and turning the heart of the nation back to God. But John was only a forerunner. He was himself a prophet, and his prophecy was this, " He that is stronger than I am is coming after me." Then, we read, " Jesus came." St Mark introduces Him quite abruptly, just as he had introduced John; for he is writing for those who already know the outlines of the story. " Jesus came from Nazareth of Galilee." He was baptized by John, and as He came out of the water He had a vision of the opened heavens and the Holy Spirit, like a dove, descending upon' Him; and He heard a Voice saying, "Thou art My Son, the Beloved: in Thee I am well pleased." He then passed away into the wilderness, where He was tempted by Satan and fed by angels. Then He begins His work; and from the very first we feel that He fulfils John's sign: He is strong. His first words are words of strength; " the time is fulfilled " — that is to say, all the past has been leading up to this great moment; " the kingdom of God is at hand " — that is to say, all your best hopes are on the point of being fulfilled; " repent, and believe the Gospel " — that is to say, turn from your sins and accept the tidings which I bring you. It is but a brief summary of what He must have said; but we feel its strength. He does not hesitate to fix all eyes upon Himself. Then we see Him call two brothers who are fishermen. " Come after Me," He says, " and I will make you fishers of men." They dropped their nets and went after Him, and so did two other brothers, their partners ; for they all felt the power of this Master of men: He was strong. He began to teach in the synagogue; they were astonished at His teaching, for he spoke with authority. He was interrupted by a demoniac, but He quelled the evil spirit by a word; He was stronger than the power of evil. When the sun set the Sabbath was at an end, and the people could carry out their sick into the street where He was; and He came forth and healed them all. The demoniacs showed a strange faculty of recognition, and cried that He was " the holy one of God," and " the Christ," but He silenced them at once. The next morning He was gone. He had sought a quiet spot for prayer. Peter, one of those fishermen whom He had called, whose wife's mother had been healed the day before, found Him and tried to bring Him back. " All men are seeking Thee," he pleaded. " Let us go elsewhere " was the quiet reply of one who could not be moved by popular enthusiasm. Once again, we observe, He fulfils John's sign: He is strong. This is our first sight of Jesus Christ. The next shows us that this great strength is united to a most tender sympathy. To touch a leper was forbidden, and the offence involved ceremonial defilement. Yet when a leper declared that Jesus could heal him, if only He would, " He put forth His hand and touched him." The act perfected the leper's faith, and he was

healed immediately. But he disobeyed the command to be silent about the matter, and the result was that Jesus could not openly enter into the town, but remained outside in the country. It is the first shadow that falls across His path; His power finds a check in human wilfulness. Presently He is in Capernaum again. He heals a paralysed man, but not until He has come into touch, as we say, with him also, by reaching his deepest need and declaring the forgiveness of his sins. This declaration disturbs the rabbis, who regard it as a blasphemous usurpation of Divine authority. But He claims that " the Son of Man hath authority on earth to

forgive sins." The title which He thus adopts must be con- sidered later.

We may note, as we pass on, that He has again, in the exercise of His power and His sympathy, come into conflict with the established religious tradition. This free- Attitude dom from the trammels of convention appears yet towards again when he claims as a new disciple a publican, a Religious man whose calling as a tax-gatherer for the Roman ra °"' government made him odious to every patriotic Jew. Publicans were classed with open sinners; and when Jesus went to this man's house and met a company of his fellows the rabbis were scandalized: " Why eateth your Master with publicans and sinners ? " The gentle answer of Jesus showed His sympathy even with those who opposed Him: " The doctor," He said, " must go to the sick." And again, when they challenged His disciples for not observing the regular fasts, He gently reminded them that they themselves relaxed the discipline of fasting for a bride- groom's friends. And He added, in picturesque and pregnant sayings, that an old garment could not bear a new patch, and that old wine-skins could not take new wine. Such language was at once gentle and strong; without condemning the old, it claimed liberty for the new. To what lengths would this liberty go ? The sacred badge of the Jews' religion, which marked them off from other men all the world over, was their observance of the Sabbath. It was a national emblem, the test of religion and patriotism. The rabbis had fenced the Sabbath round with minute commands, lest any Jews should even seem to work on the Sabbath day. Thus, plucking and rubbing the ears of corn was counted a form of reaping and threshing. The hungry disciples had so transgressed as they walked through the fields of ripe corn. Jesus defended them by the example of David, who had eaten the shewbread, which only priests might eat, and had given it to his hungry men. Necessity absolves from ritual restrictions. And he went farther, and proclaimed a principle: " The Sabbath was made for man, and not man for the Sabbath, so that the Son of Man is lord even of the Sabbath." For a second time, in justifying His position, He used the expression " the Son of Man." The words might sound to Jewish ears merely as a synonym for " man." For Himself, and

possibly for some others, they involved a reference, as appears later, to the " one like to a son of man " in Daniel's prophecy of the coming kingdom. They emphasized His relation to humanity as a whole, in contrast to such narrower titles as " Son of Abraham " or " Son of David." They were fitted to express a wider mission than that of a merely Jewish Messiah : He stood and spoke for mankind. The controversy was renewed when a man with a withered hand appeared in the synagogue on the Sabbath, and the rabbis watched to see whether Jesus would heal him. For the first time, we read that Jesus was angry. They were wilfully blind, and they would rather not see good done than see it done in a way that contradicted their teachings and undermined their influence. After a sharp remon- strance, He healed the man by a mere word. And they went out to make a compact with the followers of the worldly Herod to kill Him, and so to stave off a religious revolution which might easily have been followed by political trouble.

Up to this point what have we seen ? On the stage of Palestine, an outlying district of the Roman Empire, the home of the Jewish nation, now subject but still fired with the RecapUu- hope of freedom and even of universal domination '«"< "•• under the leadership of a divinely anointed King, a new figure has appeared. His appearance has been announced by a reforming prophet, who has summoned the nation to return to its God, and promised that a stronger than himself is to follow. In fulfilment of this promise, who is it that has come ? Not a rough prophet in the desert like John, not a leader striking for political freedom, not a pretender aiming at the petty throne of the Herods, not even a great rabbi, building on the patriotic foundation of the Pharisees who had secured the national life by a new devotion to the ancient law. None of these, but, on the contrary, an unknown figure from the remote hills of Galilee, standing on the populous shores of its lake, proclaiming as

a message from God that the highest hopes were about to be fulfilled, fastening attention on Himself by speaking with authority and attaching a few followers to His person, exhibiting wonderful powers of healing as a sign that He has come to fulfil all needs, manifesting at the same time an unparalleled sympathy, and setting quietly aside every religious convention which limited the outflow of this sympathy; and as the result of all this arousing the enthusiasm of astonished multitudes and evoking the opposition and even the murderous resentment of the religious guides of the nation. Of His teaching we have heard nothing, except in the occasional sentences by which He justified some of His unexpected actions. No party is formed, no programme is announced, no doctrine is formulated; without

assuming the title of Messiah, He offers Himself as the centre of expectation, and seems to invite an unlimited confidence in His person. This, then, in brief summary, is what we have seen : the natural development of an historical situation, a march of events leading rapidly to a climax; an unexampled strength and an unexampled sympathy issuing inevitably in an unex- ampled liberty; and then the forces of orthodox religion com- bining with the forces of worldly indifference in order to suppress a dangerous innovator. Yet the writer who in a few pages pre- sents us with so remarkable a representation shows no conscious- ness at all of artistic treatment. He tells a simple tale in the plainest words: he never stops to offer a comment or to point a moral. The wonder of it all is not in the writing, but in the subject itself. We feel that we have here no skilful composi- tion, but a bare transcript of what occurred. And we feel be- sides that such a narrative as this is the worthy commencement of an answer to the question with which its readers would have come to it: What was the beginning of the Gospel? How did the Lord Jesus speak and act? and why did He arouse such malignant enmity amongst His own people?

We have followed St Mark's narrative up to the point at which it became clear that conciliatory argument could have no effect upon the Jewish religious leaders. The controversy about the Sabbath had brought their dissatisfaction to a climax. Henceforth Jesus was to them a revolutionary, who must, by any means, be suppressed. After this decisive breach a new period opens. Jesus leaves Capernaum, never again, it would seem, to appear in its synagogue. Henceforward He was to be found, with His disciples, on the shore of the lake, where vast multitudes gathered round Him, drawn not only from Galilee and Judaea, but also from the farther districts north and east of these. He would take refuge from the crowds in a boat, which carried Him from shore to shore; and His healing activity was now at its height. Yet in the midst of this popular enthusiasm He knew that the time had come to prepare for a very different future, and accordingly a fresh departure was made when He selected twelve of His disciples for a more intimate companion- ship,- with a view to a special mission: "He appointed twelve that they might be with Him, and that He might send them forth to preach and to have power to cast out the devils." The excitement and pressure of the crowds was at this time almost overwhelming, and the relatives of Jesus endeavoured to restrain Him; " for they said, He is mad." The scribes from Jerusalem offered a more sinister explanation, saying that He was possessed by the prince of the devils, and that this was why He was able to control all the evil spirits. He answered them first in figurative language, speaking of the certain downfall of a kingdom or a family divided against itself, and of the strong man's house which could not be looted unless the strong man were first bound. Then followed the tremendous warning, that to assign His work to Satan, and so

to call good evil, was to blaspheme against the Holy Spirit — the one sin which admitted of no forgiveness. Presently, when He was told that His mother and brethren were calling for Him, He disclaimed their interference by pointing to a new circle of family relationship, consisting of all those who " do the will of God."

Again we find Him teaching by the lake, and the pressure of the multitude is still so great that He sits in a boat while they line the shore. For the first time we are allowed to hear how

He taught them. He gives them a parable from nature— the sower's three kinds of failure, compensated by the rich produce of the good soil. At the close He utters the pieg- Christ's nant saying: " He that hath ears to hear let him Teaching. hear." When His disciples afterwards asked for an explanation, He prefaced it by saying that the inner circle only were intended to understand. The disciples might learn that the message would often prove fruitless, but that nevertheless an abundant harvest would result. For the light was intended to shine, and the hidden was meant to be revealed. Another parable compared the kingdom of God to seed which, when once planted, must inevitably germinate; the process was secret and slow, but the harvest was certain. Again, it was like the tiny mustard-seed which grew out of all proportion to its original size, till the birds could shelter in its great branches. These enigmatic speeches were all that the multitudes got, but the disciples in private were taught their lesson of hope. As we review this teaching it is very remarkable. The world of common things is seen to be a lesson-book of the kingdom of God to those who have eyes to read it. What that kingdom is to be we are not told; we are only taught that its coming is secret, slow and certain. If nature in its ordinary processes was thus seen to be full of significance, the disciples were also to learn that it was under His control. As the boat from which He had been teaching passed to the other side, the tired Teacher slept. A sudden storm terrified the disciples, and they roused Him in alarm. He. stilled the storm with a word and rebuked their want of faith. " Who then is this," they whispered with awe, " that even the wind and the sea obey Him? " On the opposite hills a solitary spectator had watched the rise and the lull of the tempest, a fierce demoniac who dwelt among the tombs on the mountain-side. He believed himself to be possessed by a regiment of demons. When Jesus bade them go forth, he begged that they might be allowed to enter into a herd of swine which was hard by. His request was granted, and the swine rushed over a steep place into the lake. It is worth while to note that while most of the cures which Jesus had performed appear to have belonged to this class, this particular case is described as an exceptionally severe one, and the visible effect of the removal of his tormentors may have greatly helped to restore the man's shattered personality.

We must not attempt to trace in detail the whole of St Mark's story. We have followed it long enough to see its directness and simplicity, to observe the naturalness with which one incident succeeds another, and to watch the gradual manifestation of a personality at once strong and sympathetic, wielding extra- ordinary powers, which are placed wholly at the service of others, and refusing to be hindered from helping men by the ordinary restrictions of social or religious custom. And we have seen as the consequence of all this the development of an historical situation in which the leaders of current orthodoxy ally them- selves with the indifferentism which accepts existing political conditions in order to put down a disturber of the peace. We must now be content with a broader survey of the course of events.

Two notable cures were wrought on the western side of the lake — the healing of the woman with the issue and the raising of Jairus's daughter. In each of these cures prominence Healing is given to the requirement and the reward of faith — Powers. that is to say, of personal confidence in the Healer: " Thy faith hath made thee whole." " Fear not, only believe." After this Jesus passed away from the enthusiastic crowds by the lake to visit His own Nazareth, and to find there a strange incredulity in regard to one whom the villagers knew as the carpenter. Once more we come across a mysterious limitation of His powers: " He could not do there any miracle," save the cure of a few sick folk; and He marvelled because of their want of faith. The moment had now come when the twelve disciples were to be entrusted with a share of His healing power and with the proclamation of repentance. While they are journeying two and two in various directions St Mark takes occasion to tell us the current conjectures as to who Jesus really was. Some

thought him Elijah or one of the ancient prophets returned to earth — a suggestion based on popular tradition; others said He was John the Baptist risen from the dead — the superstition of Herod who had put him to death. When the disciples returned, Jesus took them apart for rest; but the crowds re- assembled when they found Him again near the lake, and His yearning compassion for these shepherdless sheep led Him to give them an impressive sign that He had indeed come to supply all human needs. Hitherto His power had gone forth to individuals, but now He fed five thousand men from the scanty stock of five loaves and two fishes. That night He came to His disciples walking upon the waters, and in the period which immediately followed there was once more a great manifestation of healing power.

We have heard nothing for some time of any opposition; but now a fresh conflict arose with certain scribes who had come down Opposition from Jerusalem, and who complained that the dis- otthe ciples neglected the ceremonial washing of their Scribes. hands before meals. Jesus replied with a stern re- buke, addressing the questioners as hypocrites, and exposing the falsity of a system which allowed the breach of fundamental commandments in order that traditional regulations might be observed. He then turned from them to the multitude, and uttered a saying which in effect annulled the Jewish distinction betweea clean and unclean meats. This was a direct attack on the whole Pharisaic position. The controversy was plainly irreconcilable, and Jesus withdrew to the north, actually passing outside the limits of the Holy Land. He desired to remain unknown, and not to extend His mission to the heathen popula- tion, but the extraordinary faith and the modest importunity of a Syrophenician woman induced Him to heal her daughter. Then He returned by a circuitous route to the Sea of Galilee. His return was marked by another miraculous feeding of the multitude, and also by two healing miracles which present unusual features. In both the patient was withdrawn from the multitude and the cure was wrought with the accompaniment of symbolic actions. Moreover, in one case Jesus is described as groaning before He spoke; in the other the cure was at first in- complete ; and both of the men were strictly charged to observe silence afterwards. It cannot be a mere coincidence that these are the last cures which St Mark records as performed in Galilee. In fact the Galilean ministry is now closed. Jesus retires northwards to Caesarea Philippi, and appears henceforth to Messianic devote Himself entirely to the instruction of his dis- Teaching. ciples, who needed to be prepared for the fatal issue which could not long be delayed. He begins by asking them the popular opinion as to His Person. The suggestions are still the same — John the Baptist, or Elijah, or some other of the prophets. But when He asked their own belief, Peter replied, " Thou art the Christ." He warned them not to make this known; and He proceeded to give them the wholly new teaching that the Son of Man must suffer and be killed, adding that after three days He must rise again. Peter took Him aside and urged Him not to speak so. But He turned to the other disciples and openly rebuked Peter. And then, addressing a yet wider circle, He demanded of those who should follow Him a self-sacrifice like His own. He even used the metaphor of the cross which was carried by the sufferer to the place of execution. Life, he declared, could only be saved by voluntary death. He went on to demand an unswerving loyalty to Himself and His teaching in the face of a threatening world; and then He promised that some of those who were present should not die before they had seen the coming of the kingdom of God. We have had no hint of such teaching as this in the whole of the Galilean ministry. Jesus had stood forth as the strong healer and helper of men ; it was bewildering to hear Him speak of dying. He had promised to

fulfil men's highest expectations, if only they would not doubt His willingness and power. He had been enthusiastically reverenced by the common people, though suspected and attacked by the religious leaders. He had spoken of " the will of God " as supreme, and had set aside ceremonial traditions. He had announced the nearness of the kingdom of God, but had

described it only in parables from nature. He had adopted the vague title of the " Son of Man," but had refrained from pro- claiming Himself as the expected Messiah. At last the disciples had expressed their conviction that He was the Christ, and imme- diately He tells them that He goes to meet humiliation and death as the necessary steps to a resurrection and a coming of the Son of Man in the glory of His Father. It was an amazing announce- ment and He plainly added that their path like His own lay through death to life. The dark shadows of this picture of the future alone could impress their minds, but a week later three of them were allowed a momentary vision of the light which shoula overcome the darkness. They saw Jesus transfigured in a radiance of glory: Elijah appeared with Moses, and they talked with Jesus. A cloud came over them, and a Voice, like that of the Baptism, proclaimed " This is My Son, the Beloved: hear ye Him." They were bidden to keep the vision secret till the Son of Man should have risen from the dead. It was in itself a foretaste of resurrection, . and the puzzled disciples remembered that the scribes declared that before the resurrection Elijah would appear. Their minds were confused as to what resurrec- tion was meant. Jesus told them thatElijah had in fact come; and He also said that the Scriptures foretold the sufferings of the Son of Man. But the situation was wholly beyond their grasp, and the very language of St Mark at this point seems to reflect the confusion of their minds.

The other disciples, in the meantime, had been vainly en- deavouring to cure a peculiarly violent case of demoniacal possession. Jesus Himself cast out the demon, but not before the suffering child had been rendered seemingly lifeless by a final assault. Then they journeyed secretly through Galilee towards Judaea and the eastern side of the Jordan. On the way Jesus reinforced the new lesson of self-renunciation. He offered the little children as the type of those to whom the kingdom of God belonged; and He disappointed a young and wealthy aspi- rant to His favour, amazing His disciples by saying that the kingdom of God could hardly be entered by the rich; he who forsook all should have all, and more than all; the world's estimates were to be reversed — the first should be last and the last first. They were now journeying towards Jerusalem, and the prediction of the Passion was repeated. James and John, who had witnessed the Transfiguration, and who were confident of the coming glory, asked for the places nearest to their Master, and professed their readiness to share His sufferings. When the other ten were aggrieved Jesus declared that greatness was measured by service, not by rank; and that the Son of Man had come

not to be served but to serve, and to give His life to ransom many other lives. As they came up from the Jordan valley and passed through Jericho, an incident occurred which signalized the beginning of the final period. A blind man appealed to Jesus as " the Son of David," and was answered by the restoration of his sight; and when, a little later, Jesus fulfilled an ancient prophecy by mounting an ass and riding into Jerusalem, the multitudes shouted their welcome to the returning " kingdom of David." Hitherto He had not permitted any public recognition of His Messiahship, but now He entered David's city in lowly but significant pomp as David's promised heir.

Two incidents illustrate the spirit of judgment with which He approached the splendid but apostate city. On His arrival He had carefully observed the condition of the Temple, Entry into and had retired to sleep outside the city. On the Jemsalew. following morning, finding no fruit on a fig-tree in full leaf, He said, " Let no man eat fruit of thee henceforth for ever." It was a parable of impending doom. Then, when He entered the Temple, He swept away with a fiery zeal the merchants and merchandise which had turned God's House into "a robbers' den." The act was at once an assertion of commanding au- thority and an open condemnation of the religious rulers who had permitted the desecration. Its immediate effect was to make new and powerful enemies; for the chief priests, as well as their rivals the scribes, were now inflamed against Him. At the moment they could do nothing, but the next day they formally

demanded whence He derived His right so to act. When they refused to answer His question as to the authority of John the Baptist He in turn refused to tell them His own. But He uttered a parable which more than answered them. The owner of the vineyard, who had sent his servants and last of all his only son, would visit their rejection and murder on the wicked husbandmen. He added a reminder that the stone which the builders refused was, after all, the Divine choice. They were restrained from arresting Him by fear of the people, to whom the meaning of the parable was plain. They therefore sent a joint deputation of Pharisees and Herodians to entrap Him with a question as to the Roman tribute, in answering which He must either lose His influence with the people or else lay Him- self open to a charge of treason. When they were baffled, the Sadducees, to whose party the chief priests belonged, sought in vain to pose Him with a problem as to the resurrection of the dead; and after that a more honest scribe confessed the truth of His teaching as to the supremacy of love to God and man over all the sacrificial worship of the Temple, and

was told in reply that he was not far from the kingdom of God. Jesus Himself now put a question as to the teaching of the scribes which identified the Messiah with " the Son of David " ; and then He denounced those scribes whose pride and extortion and hypocrisy were preparing for them a terrible doom. Before He left the Temple, never to return, cne incident gave Him pure satisfaction. His own teaching that all must be given for God was illustrated by the devotion of a poor widow who cast into the treasury the two tiny coins which were all that she had. As He passed out He foretold, in words which corresponded to the doom of the fig-tree, the utter demolition of the imposing but profitless Temple; and presently He opened up to four of His disciples a vision of the future, warning them against false Christs, bidding them expect great sorrows, national and personal, declaring that the gospel must be proclaimed to all the nations, and that after a great tribulation the Son of Man should appear, " coming with the clouds of heaven." The day and the hour none knew, neither the angels nor the Son, but only the Father: it was the duty of all to watch.

We now come to the final scenes. The passover was approach- ing, and plots were being laid for His destruction. He Himself Final spoke mysteriously of His burial, when a woman

Scenes. poured a vase of costly ointment upon His head. To some this seemed a wasteful act; but He accepted it as a token of the love which gave all that was in its power, and He promised that it should never cease to illustrate His Gospel. Two of the disciples were sent into Jerusalem to prepare the Passover meal. During the meal Jesus declared that He should be betrayed by one of their number. Later in the evening He gave them bread and wine, proclaiming that these were His body and His blood — the tokens of His giving Himself to them, and of a new covenant with God through His death. As they with- drew to the Mount of Olives He foretold their general flight, but promised that when He was risen He- would go before them into Galilee. Peter protested faithfulness unto death, but was told that he would deny his Master three times that very night. Then coming to a place called Gethsemane, He bade the disciples wait while He should pray; and taking the three who had been with Him at the Transfiguration He told them to tarry near Him and to watch. He went forward, and fell on the ground, praying that " the cup might be taken away " from Him, but resigning Himself to His Father's will. Presently Judas arrived with a band of armed men, and greeted his Master with a kiss — the signal for His arrest. The disciples fled in panic, after one of them had wounded the high priest's servant. Only a nameless young man tried to follow, but he too fled when hands were laid upon him. Before the high priest Jesus was charged, among other accusations, with threatening to destroy the Temple; but the matter was brought to an issue when He was

plainly asked if He were " the Christ, the Son of the Blessed One." He answered that He was, and He predicted that they should see the fulfilment of Daniel's vision of the Son of Man sitting on the right hand of power. Thereupon He was condemned to death

for manifest blasphemy, and a scene of cruel mockery followed. Meanwhile Peter in the court below had been sitting with the servants, and in his anxiety to escape recognition had thrice declared that he did not know Jesus. Thus the night passed, and in the morning Jesus was taken to Pilate, for the Jewish council had no power to execute their decree of death. Pilate's question, " Art Thou the King of the Jews?" shows the nature of the accusation which was thought likely to tell with the Roman governor. He had already in bonds one leader of revolution, whose hands were stained with blood — a striking contrast to the calm and silent figure who stood before him. At this moment a crowd came up to ask the fulfilment of his annual act of grace, the pardon of a prisoner at the Passover. Pilate, discerning that it was the envy of the rulers which sought to destroy an inconvenient rival, offered " the King of the Jews " as the prisoner to be released. But the chief priests succeeded in making the people ask for Barabbas and demand the cruci- fixion of Jesus. Pilate fulfilled his pledge by giving them the man of their choice, and Jesus, whom he had vainly hoped to release on a satisfactory pretext, he now condemned to the shameful punishments of scourging and crucifixion; for the cross, as Jesus had foreseen, was the inevitable fate of a Jewish pretender to sovereignty. The Roman soldiers mocked " the King of the Jews " with a purple robe and a crown of thorns. As they led Him out they forced the cross, which the sufferer commonly carried, upon the shoulders of one Simon of Cyrene, whose son's Alexander and Rufus are here mentioned — probably as being known to St Mark's readers; at any rate, it is interesting to note that, in writing to the Christians at Rome, St Paul a few years earlier had sent a greeting to " Rufus and his mother." Over the cross, which stood between two others, was the con- demnatory inscription, " The King of the Jews." This was the Roman designation of Him whom the Jewish rulers tauntingly addressed as " the King of Israel." The same revilers, with a deeper truth than they knew, summed up the mystery of His life and death when they said, " He saved others, Himself He cannot save."

A great darkness shrouded the scene for three hours, and then, in His native Aramaic, Jesus cried in the words of the Psalm, " My God, My God, why has Thou forsaken Me?" One other cry He uttered, and the end came, and at that moment the veil of the Temple was rent from top to bottom — an omen of fearful import to those who had mocked Him, even on the cross, as the destroyer of the Temple, who in three days should build it anew. The disciples of Jesus do not appear as spectators of the end, but only a group of women who had ministered to His needs in Galilee, and

had followed Him up to Jerusalem. These women watched His burial, which was performed by a Jewish councillor, to whom Pilate had granted the body after the centurion had certified the reality of the unexpectedly early death. The body was placed in a rock-hewn tomb, and a great stone was rolled against the entrance. Sunset brought on the Jewish sabbath, but the next evening the women brought spices to anoint the body, and at sunrise on the third day they arrived at the tomb, and saw that the stone was rolled away. They entered and found a young man in a white robe, who said, " He is risen, He is not here," and bade them say to His disciples and Peter, " He goeth before you into Galilee; there ye shall see Him, as He said unto you." In terror they fled from the tomb, " and they said nothing to any man, for they feared …"

So with a broken sentence the narrative ends. The document is imperfect, owing probably to the accidental loss of its last leaf. In very early times attempts were made to furnish it with a fitting close; but neither of the supplements which we find in manuscripts can be regarded as coming from the original writer. If we ask what must, on grounds of literary probability, have been added before the record was closed, we may content our- selves here with saying that some incident must certainly have been narrated which should have realized the twice-repeated promise that Jesus would be seen by His disciples in Galilee.

3. Document used by St Matthew and St Luke. — We pass on now to compare with this narrative of St Mark another very early

document which no longer exists in an independent form, but which can be partially reconstructed from the portions of it which have been embodied in the Gospels of St Matthew and St Luke.

When we review St Mark's narrative as a whole we are struck, first of all, with its directness and simplicity. It moves straight- forward upon a well-defined path. It shows us the Lord Jesus entering on the mission predicted by the Baptist without de- claring Himself to be the Messiah; attracting the multitudes in Galilee by His healing power and His unbounded sympathy, and at the same time awakening the envy and suspicion of the leaders of religion; training a few disciples till they reach the conviction that He is the Christ, and then, but not till then, admitting them into the secret of His coming sufferings, and preparing them for a mission in which they" also must sacrifice themselves; then journeying to Jerusalem to fulfil the destiny which He foresaw, accepting the responsibility of the Messianic title, only

to be condemned by the religious authorities as a blasphemer and handed over to the Roman power as a pretender to the Jewish throne. That is the story in its barest outline. It is adequate to its presumed purpose of offering to distant Gentile converts a clear account of their Master's earthly work, and of the causes which led to His rejection by His own people and to His death by Roman crucifixion. The writer makes no comment on the wonderful story which he tells. Allusions to Jewish customs are, indeed, explained as they occur, but apart from this the narrative appears to be a mere transcript of remembered facts. The actors are never characterized; their actions are simply noted down; there is no praise and no blame. To this simplicity and directness of narrative we may in large measure attribute the fact that when two later evangelists desired to give fuller accounts of our Lord's life they both made this early book the basis of their work. In those days there was no sense of unfairness in using up existing materials in order to make a more complete treatise. Accordingly so much of St Mark's Gospel has been taken over word for word in the Gospels of St Luke and St Matthew that, if every copy of it had perished, we could stffl reconstruct large portions of it by carefully comparing their narratives. They did not hesitate, however, to alter St Mark's language where it seemed to them rough or obscure, for each of them had a distinctive style of his own, and St Luke was a literary artist of a high order. Moreover, though they both accepted the general scheme of St Mark's narrative, each of them was obliged to omit many incidents in order to find room for other material which was at their disposal, by which they were able to supplement the deficiencies of the earlier book. The most conspicuous deficiency was in regard to our Lord's teaching, of which, as we have seen, St Mark had given surprisingly little. Here they were happily in a position to make a very important contribution.

For side by side with St Mark's Gospel there was current in the earliest times another account of the doings and sayings of Jesus Christ. Our knowledge of it to-day is entirely derived from a comparison of the two later evangelists who embodied large portions of it, working it in and out of the general scheme which they derived from St Mark, according as each of them thought most appropriate. St Luke appears to have taken it over in sections for the most part without much modification; but in St Matthew's Gospel its incidents seldom find an indepen- dent place; the sayings to which they gave rise are often detached from their context and grouped with sayings of a similar character so as to form considerable discourses, or else they are linked on to sayings which were uttered on other occasions recorded by St Mark. It is probable that many passages of St Luke's Gospel which have no parallel in St Matthew were also derived from this early source; but this is not easily capable of distinct proof; and, therefore, in order to gain a secure conception of the docu- ment we must confine

ourselves at first to those parts of it which were borrowed by both writers. We shall, however, look to St Luke in the main as preserving for us the more nearly its original form.

We proceed now to give an outline of the contents of this xv. it

document. To begin with, it contained a fuller account of the teaching of John the Baptist. St Mark tells us only his message of hope; but here we read the severer language with which he called men to repentance. We hear his warning of " the coming wrath": his mighty Successor will baptize with fire; the fruitless tree will be cast into the fire; the chaff will be separated from the wheat and burned with unquenchable fire; the claim to be children of Abraham will not avail, for God can raise up other children to Abraham, if it be from the stones of the desert. Next, we have a narrative of the Temptation, of which St Mark had but recorded the bare fact. It was grounded on the Divine sonship, which we already know was proclaimed at the Baptism. In a threefold vision Jesus is invited to enter upon His inheritance at once; to satisfy His own needs, to accept of earthly dominion, to presume on the Divine protection. The passage stands almost alone as a revelation of inner conflict in a life which outwardly was marked by unusual calm.

Not far from the beginning of the document there stood a remarkable discourse delivered among the hills above the lake. It opens with a startling reversal of the common esti- The Sermon mates of happiness and misery. In the light of the on the coming kingdom it proclaims the blessedness of the AtoanL poor, the hungry, the sad and the maligned; and the wofulness of the rich, the full, the merry and the popular. It goes on to reverse the ordinary maxims of conduct. Enemies are to be loved, helped, blessed, prayed for. No blow is to be returned; every demand, just or unjust, is to be granted: in short, "as ye desire that men should do to you, do in like manner to them." Then the motive and the model of this conduct are adduced: " Love your enemies . . . and ye shall be sons of the Highest; for He is kind to the thankless and wicked. Be merciful, as your Father is merciful; and judge not, and ye shall not be judged." We note in passing that this is the first introduction of our Lord's teaching of the fatherhood of God. God is your Father, He says in effect; you will be His sons if like Him you will refuse to make distinctions, loving without looking for a return, sure that in the end love will not be wholly lost. Then follow grave warnings — generous towards others, you must be strict with yourselves; only the good can truly do good; hearers of these words must be doers also, if they would build on the rock and not on the sand. So, with the parable of the two builders, the discourse reached its formal close.

It was followed by the entry of Jesus into Capernaum, where He was asked

to heal the servant of a Roman officer. This man's unusual faith, based on his soldierly sense of discipline, surprised the Lord, who declared that it had no equal in Israel itself. Somewhat later messengers arrived from the imprisoned Baptist, who asked if Jesus were indeed " the coming One " of whom he had spoken. Jesus pointed to His acts of healing the sick, raising the dead and proclaiming good news for the poor; thereby suggesting to those who could understand that He ful- filled the ancient prophecy of the Messiah. He then declared the greatness of John in exalted terms, adding, however, that the least in the kingdom of God was John's superior. Then He complained of the unreasonableness of an age which refused John as too austere and Himself as too lax and as being " the friend of publicans and sinners." This narrative clearly pre- supposes a series of miracles already performed, and also such a conflict with the Pharisees as we have seen recorded by St Mark. Presently we find an offer of discipleship met by the warning that " the Son of Man " is a homeless wanderer; and then the stern refusal of a request for leave to perform a father's funeral rites.

Close upon these incidents follows a special mission of disciples, introduced by the saying: " The harvest is great, but the labourers are few." The disciples as they journey other are to take no provisions, but to throw themselves Sayiagsot on the bounty of their hearers; they are to heal the Jesus – sick and to proclaim the nearness of the kingdom of God. The city that rejects them shall have a less lenient judgment than Sodom; Tyre and Sidon shall be better off than cities like Chorazin and Bethsaida which have seen His miracles;

Capernaum, favoured above all, shall sink to the deepest depth. If words could be sterner than these, they are those which follow: " He that heareth you heareth Me; and he that rejecteth you rejecteth Me; but He that rejecteth Me rejecteth Him that sent Me." This reference to His own personal mission is strik- ingly expanded in words which He uttered on the return of the disciples. After thanking the Father for revealing to babes what He hides from the wise, He continued in mysterious language: " All things are delivered to Me by My Father; and none knoweth who the Son is but the Father; and who the Father is but the Son, and he to whom the Son chooseth to reveal Him." Happy were the disciples in seeing and hearing what prophets and kings had looked for in vain.

When His disciples, having watched Him at prayer, desired to be taught

how to pray, they were bidden to address God as •' Father "; to ask first for the hallowing of the Father's name, and the coming of His kingdom; then for their daily food, for the pardon of their sins and for freedom from temptation. It was the prayer of a family — that the sons might be true to the Father, and the Father true to the sons; and they were further encouraged by a parable of the family: " Ask and ye shall receive. . . . Every one that asketh receiveth " : for the heavenly Father will do more, not less, than an earthly father would do for his children. After He had cast out a dumb demon, some said that His power was due to Beelzebub. He accordingly asked them by whom the Jews themselves cast out demons; and He claimed that His power was a sign that the kingdom of God was come. But He warned them that demons cast out once might return in greater force. When they asked for a sign from heaven, He would give them no more than the sign of Jonah, explaining that the repentant Ninevites should condemn the present generation: so, too, should the queen of Sheba; for that which they were now rejecting was more than Jonah and more than Solomon. Yet further warnings were given when a Pharisee invited Him to his table, and expressed surprise that He did not wash His hands before the meal. The cleansing of externals and the tithing of garden-produce, He declares, have usurped the place of judgment and the love of God. Woe is pronounced upon the Pharisees: they are successors to the murderers of the prophets. Then citing from Genesis and 2 Chronicles, the first and last books in the order of the Jewish Bible, He declared that all righteous blood from that of Abel to that of Zachariah should be required of that generation. After this the disciples are encouraged not to fear their murderous opponents. The very sparrows are God's care — much more shall they be; the hairs of their head are all counted. In the end the Son of Man will openly own those who have owned Him before men. For earthly needs no thought is to be taken: the birds and the flowers make no provision for their life and beauty. God will give food and raiment to those who are seeking His kingdom. Earthly goods should be given away in exchange for the imperishable treasures. Suddenly will the Son of Man come: happy the servant whom His Master finds at his appointed task. In brief parables the kingdom of God is likened to a mustard- seed and to leaven. When Jesus is asked if the saved shall be few, He replies that the door is a narrow one. Then, changing His illustration, He says that many shall seek entrance in vain; for the master of the house will refuse to recognize them. But while they are excluded, a multitude from all quarters of the earth shall sit down with Abraham, Isaac and Jacob, and the prophets in the kingdom of God.

His eyes are now fixed on Jerusalem, where, like the prophets, He must die. " Jerusalem, Jerusalem, how often have I desired to gather thy children together, as a bird her brood beneath her wings, but ye refused." " Ye shall

not see Me, until ye shall say, Blessed is He that cometh in the name of the Lord." After this we have the healing of a dropsical man on the Sabbath, with a reply to the murmuring Pharisees; and then a parable of the failure of invited guests and the filling of their places from the streets. A few fragmentary passages remain, of which it will be sufficient to cite a word or two to call them to remembrance. There is a warning that he who forsakes not father and mother

cannot be a disciple, nor he who does not bear his cross. Savour- less salt is fit for nothing. The lost sheep is brought home with a special joy. " Ye cannot serve God and Mammon." Scandals must arise, but woe to him through whom they arise. The Son of Man will come with the suddenness of lightning; the days of Noah and the days of Lot will find a parallel in their blind gaiety and their inevitable disaster. He who seeks to gain his life will lose it. " One shall be taken, and the other left." " Where the carcase is, the vultures will gather." Then, lastly, we have a parable of. the servant who failed to employ the money en- trusted to him; and a promise that the disciples shall sit on twelve thrones to judge the twelve tribes of Israel. We cannot say by our present method of determination, how this document closed; for in the narratives of the Passion and the Resurrection St Matthew and St Luke only coincide in passages which they have taken from St Mark.

Now that we have reconstructed in outline this early account of the Lord Jesus, so far as it has been used by both the later evangelists, we may attempt to compare the picture Comparison which it presents to us with that which was offered w# by St Mark. But in doing so we must remember st Mark – that we know it only in fragments. There can be little doubt that much more of it is embedded in St Luke's Gospel, and something more also in St Matthew's; but in order to stand on firm ground we have considered thus far only those portions which both of these writers elected to use in composing their later narratives. To go beyond this is a work of delicate discrimination. It can only be effected by a close examination of the style and language of the document, which may enable us in some instances to identify with comparative security certain passages which are found in St Luke, but which St Matthew did not regard as suitable for his purpose. Among these we may venture, quite tentatively, to mention the sermon at Nazareth which opened with a passage from the Book of Isaiah, the raising of the widow's son at Nain, and the parable of the good Samari- tan. These are found in St Luke, but not in St Matthew. On the other hand, it is not improbable that the wonderful words which begin, " Come unto Me all y5 that labour," were drawn by St Matthew from the same document, though they are not recorded by St Luke. But here we have entered upon a region of less certainty, in which critical scholarship has still much to do; and these passages are mentioned here only as a reminder that the*

document must have contained more than what St Matthew and St Luke each independently determined to borrow from it. Looking, then, at the portions which we have indicated as having this two-fold testimony, we see that in their fragmentary con- dition we cannot trace the clear historical development which was so conspicuous a feature of St Mark's Gospel; yet we need not conclude that in its complete form it failed to present an orderly narrative. Next, we see that wherever we are able to observe its method of relating an incident, as in the case of the healing of the centurion's servant, we have the same charac- teristics of brevity and simplicity which we admired in St Mark. No comment is made by the narrator; he tells his tale in the fewest words and passes on. Again, we note that it supplies just what we feel we most need when we have reached the end of St Mark's story, a fuller account of the teaching which Jesus gave to His disciples and to the people at large. And we see that the substance of that teaching is in complete harmony with the scattered hints that we found in St Mark. If the father- hood of God stands out clearly, we may remember a passage of St Mark also which speaks of " the Heavenly Father " as for- giving those who forgive. If prayer is encouraged, we may also remember that the same passage of St Mark records the saying: " All things whatsoever ye pray for and ask, believe that ye have received them and ye shall have them." If in one myste- rious passage Jesus speaks of " the Father " and " the Son " — terms with which the Gospel of St John has made us familiar —St Mark also in one passage uses the same impressive terms — " the Son " and " the Father." There are, of course, many other parallels with St Mark, and at some points the two docu- ments seem to overlap and to relate the same incidents in

somewhat different forms. There is the same use of parables from nature, the same incisiveness of speech and employment of paradox, the same demand to sacrifice all to Him and for His cause, the same importunate claim made by Him on the human soul.

But the contrast between the two writers is even more impor- tant for our purpose. No one can read through the passages to which we have pointed without feeling the solemn of Waraiag. sternness of the great Teacher, a sternness which can indeed be traced here and there in St Mark, but which does not give its tone to the whole of his picture. Here we see Christ standing forth in solitary grandeur, looking with the eyes of another world on a society which is blindly hastening to its dissolution. It may be that if this document had come down to us in its entirety, we should have gathered from it an exaggerated idea of the seventy of our Lord's charac-

ter. Certain it is that as we read over these fragments we are somewhat startled by the predominance of the element of warn- ing, and by the assertion of rules of conduct which seem almost inconsistent with a normal condition of settled social life. The warning to the nation sounded by the Baptist, that God could raise up a new family for Abraham, is heard again and again in our Lord's teaching. Gentile faith puts Israel to shame. The sons of the kingdom will be left outside, while strangers feast with Abraham. Capernaum shall go to perdition; Jerusalem shall be a desqlate ruin. The doom of the nation is pronounced; its fate is imminent; there is no ray of hope for the existing con- stitution of religion and society. As to individuals within the nation, the despised publicans and sinners will find God's favour before the self-satisfied representatives of the national religion. In such a condition of affairs it is hardly surprising to find that the great and stern Teacher congratulates the poor and has nothing but pity for the rich; that He has no interest at all in comfort or property. If a man asks you for anything, give it him ; if he takes it without asking, do not seek to recover it. Nothing material is worth a thought; anxiety is folly; your Father, who feeds His birds and clothes His flowers, will feed and clothe you. Rise to the height of your sonship to God; love your enemies even as God loves His; and if they kill you, God will care for you still; fear them not, fear only Him who loves you all.

Here is a new philosophy of life, offering solid consolation amid the ruin of a world. We have no idea who the disciple may have been who thus seized upon the sadder elements of the teaching of Jesus; but we may well think of him as one of- those who were living in Palestine in the dark and threatening years of internecine strife, when the Roman eagles were gathering round their prey, and the first thunder was muttering of the storm which was to leave Jerusalem a heap of stones. At such a moment the warnings of our Lord would claim a large place in a record of His teaching, and the strange comfort which He had offered would be the only hope which it would seem possible to entertain.

4. Additions by the Gospel according to St Matthew. — We have now examined in turn the two earliest pictures which have been preserved to us of the life of Jesus Christ. The first Narratives. P° rtravs Him chiefly by a record of His actions, and illustrates His strength, His sympathy, and His freedom from conventional restraints. It shows the disturbing forces of these characteristics, which aroused the envy and appre- hension of the leaders of religion. The first bright days of wel- come and popularity are soon clouded: the storm begins to lower. More and more the Master devotes Himself to the little circle of His disciples, who are taught that they, as well as He, can only triumph through defeat, succeed by failure, and find their life in giving it away. At length, in fear of religious innovations and pretending that He is a political usurper, the Jews deliver Him up to die on

a Roman cross. The last page of the story is torn away, just at the point when it has been declared that He is alive again and about to show Himself to His disciples. The second picture has a somewhat different tone. It is mainly a record of teaching, and the teaching is for the most part stern and paradoxical. It might be described as revolutionary. It is

good tidings to the poor: it sets no store on property and material comfort: it pities the wealthy and congratulates the needy. It reverses ordinary judgments and conventional maxims of con- duct. It proclaims the downfall of institutions, and compares the present blind security to the days of Noah and of Lot : a few only shall escape the coming overthrow. Yet even in this sterner setting the figure portrayed is unmistakably the same. There is the same strength, the same tender sympathy, the same freedom from convention: there is the same promise to fulfil the highest hopes, the same surrender of life, and the same imperious demand on the lives of others. No thoughtful man who examines and compares these pictures can doubt that they are genuine historical portraits of a figure wholly different from any which had hitherto appeared on the world's stage. They are beyond the power of human invention. They are drawn with a simplicity which is their own guarantee. If we had these, and these only, we should have an adequate explanation of the beginnings of Christianity. There would still be a great gap to be filled before we reached the earliest letters of St Paul; but yet we should know what the Apostle meant when he wrote to " the Church of the Thessalo- nians in God the Father and the Lord Jesus Christ," and reminded them how they had " turned from idols to serve the living and true God, and to wait for His Son from heaven, whom He raised from the dead, even Jesus who delivereth us from the wrath to come."

If these two narratives served the first needs of Christian believers, it is easy to see that they would presently stimulate further activity in the same direction. For, to begin with, they were obviously incomplete: many incidents and teachings known to the earliest disciples found no place in them; and they con- tained no account of the life of Jesus Christ before His public ministry, no record of His pedigree, His birth or His childhood. Secondly, their form left much to be desired; for one of them at least was rude in style, sometimes needlessly repetitive and some- times brief to obscurity. Moreover the very fact that there were two challenged a new and combined work which perhaps should supersede both.

Accordingly, some years after the fall of Jerusalem — we cannot tell the exact date or the author's name — the book which we call the Gospel according to St Matthew The Gospel was written to give the Palestinian Christians a of St full account of Jesus Christ, which should present Matthew – Him as. the promised Messiah, fulfilling the ancient Hebrew prophecies, proclaiming the kingdom of heaven, and founding the Christian

society. The writer takes St Mark as his basis, but he incorporates into the story large portions of the teaching which he has found in the other document. He groups his materials with small regard to chronological order; and he fashions out of the many scattered sayings of our Lord continuous discourses, everywhere bringing like to like, with considerable literary art. A wide knowledge of the Old Testament supplies him with a text to illustrate one incident after another; and so deeply is he impressed with the correspondence between the life of Christ and the words of ancient prophecy, that he does not hesitate to introduce his quotations by the formula " that it might be fulfilled which was spoken by the prophet."

His Hebrew instinct leads him to begin with a table of genea- logy, artificially constructed in groups of fourteen generations — from Abraham to David, from David to the Captivity, and from the Captivity to the Christ. The royal descent of the Messiah is thus declared, and from the outset His figure is set against the background of the Old Testament. He then proceeds to show that, though His lineage is traced through Joseph's ancestors, He was but the adopted son of Joseph, and he tells the story of the Virgin-birth. The coming of the Child draws Eastern sages to his cradle and fills the court of Herod with suspicious fears. The cruel tyrant kills the babes of Bethlehem, but the Child has been withdrawn by a secret flight into Egypt, whence he presently returns to the family home at Nazareth in Galilee. All this is necessarily fresh material, for the other records had dealt only with the period of public ministry. We have no knowledge of the source from which it was drawn. From the historical standpoint

its value must be appraised by the estimate which is formed of the writer's general trustworthiness as a narrator, and by the extent to which the incidents receive confirmation from other quarters. The central fact of the Virgin-birth, as we shall presently see, has high attestation from another early writer.

The next addition which St Matthew's Gospel makes to our knowledge is of a different kind. It consists of various important Discourses sayings of our Lord, which are combined with dis- aad courses found in the second document and are worked

Parables. U p mt0 t ˆ e g rea t utterance which we call the Sermon on the Mount. Such grouping of materials is a feature of this Gospel, and was possibly designed for purposes of public in- struction ; so that continuous passages might be read aloud in the services of the Church, just as passages

from the Old Testament were read in the Jewish synagogues. This motive would account not only for the arrangement of the material, but also for certain changes in the language which seem intended to remove difficulties, and to interpret what is ambiguous or obscure. An example of such interpretation meets usat theoutset. The startling saying, " Blessed are ye poor," followed by the woe pronounced upon the rich, might seem like a condemnation of the very principle of property; and when the Christian Church had come to be organ- ized as a society containing rich and poor, the heart of the saying was felt to be more truly and clearly expressed in the words, " Blessed are the poor in spirit." This interpretative process may be traced again and again in this Gospel, which frequently seems to reflect the definite tradition of a settled Church.

Apart from the important parables of the tares, the pearl and the net, the writer adds little to his sources until we come to the remarkable passage in ch. xvi., in which Peter the Rock is declared to be the foundation of the future Church, and is en- trusted with the keys of the kingdom of heaven. The function of " binding and loosing," here assigned to him, is in identical terms assigned to the disciples generally in a passage in ch. xviii. in which for the second time we meet with the word " Church" — a word not found elsewhere in the Gospels. There is no sufficient ground for denying that these sayings were uttered by our Lord, but the fact that they were now first placed upon record harmonizes with what has been said already as to the more settled condition of the Christian society which this Gospel appears to reflect.

The parables of the two debtors, the labourers in the vineyard, the two sons, the ten virgins, the sheep and goats, are recorded only by this evangelist. But by way of incident he has almost nothing to add till we come to the closing scenes. The earth- quake at the moment of our Lord's death and the subsequent appearance of departed saints are strange traditions unattested by other writers. The same is to be said of the soldiers placed to guard the tomb, and of the story that they had been bribed to say that the sacred body had been stolen while they slept. On the other hand, the appearance of the risen Christ to the women may have been taken from the lost pages of St Mark, being the sequel to the narrative which is broken off abruptly in this Gospel : and it is not improbable that St Mark's Gospel was the source of the great commission to preach and baptize with which St Matthew closes, though the wording of it has probably been modified in accordance with a settled tradition.

The work which the writer of this Gospel thus performed received the immediate sanction of a wide acceptance. It met a definite spiritual need. It presented the Gospel in a suitable form for the edification of the Church; and it confirmed its truth by constant appeals to the Old Testament

scriptures, thus mani- festing its intimate relation with the past as the outcome of a long preparation and as the fulfilment of a Divine purpose. No Gospel is so frequently quoted by the early post-apostolic writers : none has exercised a greater influence upon Christianity, and consequently upon the history of the world.

Yet from the purely historical point t>f view its evidential value is not the same as that of St Mark. Its facts for the most part are simply taken over from the earlier evangelist, and the historian must obviously prefer the primary source. Its true importance lies in its attestation of the genuineness of the earlier

portraits to which it has so little to add, in its recognition of the relation of Christ to the whole purpose of God as revealed in the Old Testament, and in its interpretation of the Gospel message in its bearing on the living Church of the primitive days.

5. Additions by St Luke. — While the needs of Jewish be- lievers were amply met by St Matthew's Gospel, a like service was rendered to Gentile converts by a very different writer. St Luke was a physician who had accompanied St Paul on his missionary journeys. He undertook a history of the beginnings of Christianity, two volumes of which have come down to us, entitled the Gospel and the Acts of the Apostles. His Gospel, like St Matthew's, is founded on St Mark, with the incorporation of large portions of the second document of which we have spoken above. But the way in which the two writers have used the same materials is strikingly different. In St Matthew's Gospel the original sources are frequently blended: the incidents of St Mark are rearranged and often grouped afresh according to subject matter: harsh and ambiguous sentences of both documents are toned down or interpreted. St Luke, on the contrary, chooses between parallel stories of his two sources, preferring neither to duplicate nor to combine: he incorporates St Mark in continuous sections, following him alone for a time, then leaving him entirely, and then returning to introduce a new block of his narrative. He modifies St Mark's style very freely, but he makes less change in the recorded words of our Lord, and he adheres more closely to the original language.of the second document.

In his first two chapters he gives an account of the birth and childhood of St John the Baptist and of our Lord Himself, gathered perhaps directly from the traditions of the Holy Family, and written in close imitation of the sacred stories of the Old Testament which were familiar to him in their Greek translation. The whole series of incidents differ from that which we find in St Matthew's Gospel, but there is no direct variance between them. The two narratives are in agreement as to the central fact of the Virgin-birth. St Luke gives a table of genealogy which is irreconcilable with the

artificial table of St Matthew's Gospel, and which traces our Lord's ancestry up to Adam, " which was the son of God."

The opening scene of the Galilean ministry is the discourse at Nazareth, in which our Lord claims to fulfil Isaiah's prophecy of the proclamation of good tidings to the poor. The same prophecy is alluded to in His reply to the Baptist's messengers which is incorporated subsequently from the second document. The scene ends with the rejection of Christ by His own townsfolk, as in the parallel story of St Mark which St Luke does not give. It is probable that St Luke found this narrative in the second document, and chose it after his manner in preference to the less instructive story in St Mark. He similarly omits the Marcan account of the call of the fishermen, substituting the story of the miraculous draught. After that he follows St Mark alone, until he introduces after the call of the twelve apostles the sermon which begins with the beatitudes and woes. This is from the second document, which he continues to use, and that without interruption (if we may venture to assign to it the raising of the widow's son at Nain and the anointing by the sinful woman in the Pharisee's house), until he returns to incorporate another section from St Mark.

This in turn is followed by the most characteristic section of his Gospel (ix. 51-xviii. 14), a long series of incidents wholly independent of St Mark, and introduced as belonging character- to the period of the final journey from Galilee to istic Section Jerusalem. Much of this material is demonstrably of St Luke's derived from the second document; and it is quite ospe ' possible that the whole of it may come from that source. There are special reasons for thinking so in regard to certain passages, as for example the mission of the seventy disciples and the parable of the good Samaritan, although they are not contained in St Matthew's Gospel.

For the closing scenes at Jerusalem St Luke makes considerable additions to St Mark's narrative: he gives a different account of the Last Supper, and he adds the trial before Herod and the

incident of the penitent robber. He appears to have had no information as to the appearance of the risen Lord in Galilee, and he accordingly omits from his reproduction of St Mark's narrative the twice-repeated promise of a meeting with the disciples there. He supplies, however, an account of the appearance to the two disciples at Emmaus and to the whole body of the apostles in Jerusalem.

St Luke's use of his two main sources has preserved the characteristics of both of them. The sternness of certain passages, which has led some critics to imagine that he was an Ebionite, is mainly, if not entirely, due to his faithful reproduction of the language of the second document. The key-note of his Gospel is universality: the mission of the Christ embraces the poor, the weak, the despised, the heretic and the sinful: it is good tidings to all mankind. He tells of the devotion of Mary and Martha, and of the band of women who ministered to our Lord's needs and followed Him to Jerusalem: he tells also of His kindness to more than one sinful woman. Zacchaeus the publican and the grateful Samaritan leper further illustrate this characteristic. Writing as he does for Gentile believers he omits many details which from their strongly Jewish cast might be unintelligible or uninteresting. He also modifies the harshness of St Mark's style, and frequently recasts his language in reference to diseases. From an historical point of view his Gospel is of high value. The proved accuracy of detail elsewhere, as in his narration of events which he witnessed in company with St Paul, enhances our general estimation of his work. A trustworthy observer and a literary artist, the one non- Jewish evangelist has given us — to use M. Renan's words — " the most beautiful book in the world."

6. Additions by St John. — We come lastly to consider what addition to our knowledge of Christ's life and work is made by the Fourth Gospel. St Mark's narrative of our Lord's ministry and passion is so simple and straightforward that it satisfies our historical sense. We trace a natural development in it: we seem to see why with such power and such sympathy He necessarily came into conflict with the religious leaders of the people, who were jealous of the influence which He gained and were scan- dalized by His refusal to be hindered in His mission of mercy by rules and conventions to which they attached the highest importance. The issue is fought out in Galilee, and when our Lord finally journeys to Jerusalem He knows that He goes there to die. The story is so plain and convincing in itself that it gives at first sight an impression of completeness. This impression is confirmed by the Gospels of St Matthew and St Luke, which though they add much fresh material do not disturb the general scheme presented by St Mark. But on reflection we are led to question the sufficiency of the account thus offered to us. Is it probable, we ask, that our Lord should have neglected the sacred custom in accordance with which the pious Jew visited Jerusalem several times each year for the observance of the divinely appointed feasts ? It is true that St Mark does not break his narrative of the Galilean ministry to record such visits: but this does not prove that such visits were not made. Again, is it probable that He should have so far neglected Jerusalem as to give it no opportunity of seeing Him and hearing His message until the last week of His life ? If the writers of the other two Gospels had no means at their disposal for enlarging the

narrow framework of St Mark's narrative by recording definite visits to Jerusalem, at least they preserve to us words from the second document which seem to imply such visits: for how else are we to explain the pathetic complaint, " Jerusalem, Jerusalem, how often would I have gathered thee, as a hen gathereth her chickens under her wings; but ye would not"?

St John's Gospel meets our questionings by a wholly new series of incidents and by an account of a ministry which is con- cerned mainly not with Galileans but with Judaeans, and which centres in Jerusalem. It is carried on to a large extent con- currently with the Galilean ministry : it is not continuous, but is taken up from feast to feast as our Lord visits the sacred city at the times of its greatest religious activity. It differs in character from the Galilean ministry: for among the simple, unsophisticated folk of Galilee Jesus presents Himself as a healer

and helper and teacher, keeping in the background as far as possible His claim to be the Messiah ; whereas in Jerusalem His authority is challenged at His first appearance, the element of controversy is never absent, His relation to God is from the out- set the vital issue, and consequently His Divine claim is of neces- sity made explicit. Time after time His life is threatened before the feast is ended, and when the last passover has come we can well understand, what was not made sufficiently clear in the brief Marcan narrative, why Jerusalem proved so fatally hostile to His Messianic claim.

The Fourth Gospel thus offers us a most important supplement to the limited sketch of our Lord's life which we find in the Synoptic Gospels. Yet this was not thepurpose which The Purpose led to its composition. That purpose is plainly stated ofst John's by the author himself: "These things have been a ° spel written that ye may believe that Jesus Christ is the Son of God, and that believing ye may have life in His name." His avowed aim is, not to write history, but to produce conviction. He desires to interpret the coming of Jesus Christ into the world, to declare whence and why He came, and to explain how His coming, as light in the midst of darkness, brought a crisis into the lives of all with whom He came in contact. The issue of this crisis in His rejection by the Jews at Jerusalem is the main theme of the book.

St John's prologue prepares us to find that he is' not writing for persons who require a succinct narrative of facts, but for those who having such already in familiar use are asking deep questions as to our Lord's mission. It goes back far behind human birth or lines of ancestry. It begins, like the sacred story of creation, " In the beginning." The Book of Genesis had told how all things were called into existence by a Divine utterance: " God said, Let there be . . . and there was." The creative Word had been long

personified by Jewish thought, especially in connexion with the prophets to whom " the Word of the Lord " came. " In the beginning," then, St John tells us, the Word was — was with God — yea, was God. He was the medium of creation, the source of its light and its life — especially of that higher life which finds its manifestation in men. So He was in the world, and the world was made by Hirn, and yet the world knew Him not. At length He came, came to the home which had been prepared for Him, but His own people rejected Him. But such as did receive Him found a new birth, beyond their birth of flesh and blood: they became children of God, were born of God. In order thus to manifest Himself He had under- gone a human birth : " the Word was made flesh, and dwelt among us, and we 'beheld His glory " — the glory, as the evangelist has learned to see, of the Father's only-begotten Son, who has come into the world to reveal to men that God whom " no man hath ever seen." In these opening words we are invited to study the life of Christ from a new point of view, to observe His self- manifestation and its issue. The evangelist looks back across a period of half a century, and writes of Christ not merely as he saw Him in those far-off days, but as he has come by long experi- ence to think and speak of Him. The past is now filled with a glory which could not be so fully perceived at the time, but which, as St John tells, it was the function of the Holy Spirit to reveal to Christ's disciples.

The first name which occurs in this Gospel is that of John the Baptist. He is even introduced into the prologue which sketches in general terms the manifestation of the Divine Word: "There was a man sent from God, whose name was John: he came for witness, to witness to the Light, that through him all might believe." This witness of John holds a position of high impor- tance in this Gospel. His mission is described as running on for a while concurrently with that of our Lord, whereas in the other Gospels we have no record of our Lord's work until John is cast into prison. It is among the disciples of the Baptist on the banks of the Jordan that Jesus finds His first disciples. The Baptist has pointed Him out to them in striking language, which recalls at once the symbolic ritual of the law and the spiritual lessons of the prophets : " Behold, the Lamb of God, which taketh away the sin of the world."

Soon afterwards at Cana of Galilee Jesus gives His first " sign," as the evangelist calls it, in the change of water into wine to supply the deficiency at a marriage feast. This scene has all the happy brightness of the early Galilean ministry which St Mark records. It stands in sharp contrast with the subsequent appear- ance of Jesus in Jerusalem at the Passover, when

His first act is to drive the traders from the Temple courts. In this He seems to be carrying the Baptist's stern mission of purification from the desert into the heart of the sacred city, and so fulfilling, perhaps consciously, the solemn prophecy of Malachi which opens with the words: " Behold, I will send My Messenger, and He shall prepare the way before Me; and the Lord whom ye seek shall suddenly come to His Temple " (Mai. iii. 1-5). This significant action provokes a challenge of His authority, which is answered by a mysterious saving, not understood at the time, but interpreted afterwards as referring to the Resurrection. After this our Lord was visited secretly by a Pharisee named Nicodemus, whose advances were severely met by the words, " Except a man be born again, he cannot see the kingdom of God." When Nico- demus objected that this was to demand a physical impossibility, he was answered that the new birth was " of water and spirit " — words which doubtless contained a reference to the mission of the Baptist and to his prophecy of One who should baptize with the Holy Spirit. Towards the end of this conversation the evangelist passes imperceptibly from reporting the words of the Lord into an interpretation or amplification of them, and in language which recalls the prologue he unfolds the meaning of Christ's mission and indicates the crisis of self-judgment which necessarily ac- companies the manifestation of the Light to each individual. When he resumes his narrative the Lord has left Jerusalem, and is found baptizing disciples, in even greater numbers than the Baptist himself. Though Jesus did not personally perform the rite, it is plain once again that in this early period He closely linked His own mission with that of John the Baptist. When men hinted at a rivalry between them, John plainly declared " He must increase, and I must decrease": and the reply of Jesus was to leave Judaea for Galilee.

Away from the atmosphere of contention we find Him mani- festing the same broad sympathy and freedom from convention which we have noted in the other Gospels, especially in that of St Luke. He converses with a woman, with a woman moreover who is a Samaritan, and who is of unchaste life. He offers her the " living water " which shall supply all her needs: she readily accepts Him as the expected Messiah, and He receives a welcome from the Samaritans. He passes on to Galilee, where also He is welcomed, and where He performs His second " sign," healing the son of one of Herod's courtiers.

But St John's interest does not lie in Galilee, and he soon brings our Lord back to Jerusalem on the occasion of a feast. The The Mini- Baptist's work is now ended; and, though Jesus still atryat appeals to the testimony of John, the new conflict Jerusalem. w ; t jj ^ j ew j s }j authorities shows that He is moving now on His own independent and characteristic lines. In cleansing the Temple He had given offence by what might seem an excess of rigour: now, by healing a sick man and bidding him carry his bed on the

Sabbath, He offended by His laxity. He answered His accusers by the brief but pregnant sentence: " My Father worketh even until now, and I work." They at once understood that He thus claimed a unique relation to God, and their antagonism became the more intense: " the Jews therefore sought the more to kill Him, because He had not only broken the Sabbath, but had also said that God was His own Father, making Himself equal to God." His first reply is then expanded to cover the whole region of life. The Son beholds the Father at work, and works concurrently, doing nothing of Himself. He does the Father's will. The very principle of life is entrusted to Him. He quickens, and He judges. As Son of Man He judges man.

The next incident is the feeding of the five thousand, which belongs to the Galilean ministry and is recorded by the three other evangelists. St John's purpose in introducing it is not his- torical but didactic. It is made the occasion of instruction as to

the heavenly food, the flesh and blood of Him who came down from heaven. This teaching leads to a conflict with certain Judaeans who seem to have come from Jerusalem, and it proves a severe test even to the faith of disciples.

The feast of tabernacles brings fresh disputes in Jerusalem, and an attempt is made to arrest Jesus. A climax of indignation is reached when a blind man is healed at the pool of Siloam on the sabbath day. At the feast of the dedication a fresh effort at arrest was made, and Jesus then withdrew beyond the Jordan. Here He learned of the sickness of Lazarus, and presently He returned and came to Bethany to raise him from the dead. The excitement produced by this miracle led to yet another attack, destined this time to be successful, on the life of Jesus. The Passover was at hand, and the last supper of our Lord with His disciples on the evening before the Passover lamb was killed is made the occasion of the most inspiring consolations. Our Lord interprets His relation to the disciples by the figure of a tree and its branches — He is the whole of which they are the parts; He promises the mission of the Holy Spirit to continue His work in the world; and He solemnly commends to His Father the dis- ciples whom He is about to leave.

The account of the trial and the crucifixion differs considerably from the accounts given in the other Gospels. St John's narra- tives are in large part personal memories, and in more than one incident he himself figures as the unnamed disciple " whom Jesus loved." In the Resurrection scenes he also gives incidents in which he has played a part; and the appearances of the risen Lord are not confined either to Jerusalem or to. Galilee, but occur in both localities.

If we ask what is the special contribution to history, apart from theology, which St John's Gospel makes, the answer would seem to be this — that beside the Galilean ministry reported by St Mark there was a ministry to " Jews " (Judaeans) in Jeru-. salem, not continuous, but occasional, taken up from time to time as the great feasts came round; that its teaching was widely different from that which was given to Galileans, and that the situation created was wholly unlike that which arose out of the Galilean ministry. The Galilean ministry opens with enthu- siasm, ripening into a popularity which even endangers a satis- factory result. Where opposition manifests itself, it is not native opposition, but comes from religious teachers who are parts of a system which centres in Jerusalem, and who are some- times expressly noted as having come from Jerusalem. The Jerusalem ministry on the contrary is never welcomed with enthusiasm. It has to do with those who challenge it from the first. There is no atmosphere of simplicity and teachableness which rejoices in the manifestation of power and sympathy and liberty. It is a- witness delivered to a hostile audience, whether they will hear or no. Ultimate issues are quickly raised: keen critics see at once the claims which underlie deeds and words, and the claims in consequence become explicit: the relation of the teacher to God Himself is the vital interest. The conflict which thus arose explains what St Mark's succinct narrative had left unexplained — the fatal hostility of Jerusalem. It may have been a part of St John's purpose to give this explanation, and to make other supplements or corrections where earlier narratives appeared to him incomplete or misleading. But he says nothing to indicate this, while on the other hand he distinctly proclaims that his purpose is to produce and confirm conviction of the divine claims of Jesus Christ.

ForbibliographyseeBlBLE;CHRiSTlANlTY;CHURCHHiSTORY;and the articles on the separate Gospels. (J. A. R.)

JET (Fr. jais, Ger. Gagat), a substance which seems to be a peculiar kind of lignite or anthracite; often cut and polished for ornaments. The word " jet " probably comes, through O. Fr. jaiet, from the classical gagales, a word which was derived, according to Pliny, from Gagas, in Lycia, where jet, or a similar substance, was originally found. Jet was used in Britain in prehistoric times; many round barrows of the Bronze age have yielded jet beads, buttons, rings, armlets and other ornaments. The abundance of jet in Britain is alluded to by Caius Julius

Solinus (fl. 3rd century) and jet ornaments are found with Roman relics in

Britain. Probably the supply was obtained from the coast of Yorkshire, especially near Whitby, where nodules of jet were formerly picked up on the shore. Caedmon refers to this jet, and at a later date it was used for rosary beads by the monks of Whitby Abbey.

The Whitby jet occurs in irregular masses, often of lenticular shape, embedded in hard shales known as jet-rock. The jet-rock series belongs to that division of the Upper Lias which is termed the zone of Ammonites serpentinus. Microscopic examination of jet occasionally reveals the structure of coniferous wood, which A. C. Seward has shown to be araucarian. Probably masses of wood were brought down by a river, and drifted out to sea, where becoming water-logged they sank, and became gradually buried in a deposit of fine mud, which eventually hardened into shale. Under pressure, perhaps assisted by heat, and with exclusion of air, the wood suffered a peculiar kind of decomposition, probably modified by the presence of salt water, as suggested by Percy E. Spielmann. Scales of fish and other fossils of the let-rock are frequently impreg- nated with bituminous products, which may replace the original tissues. Drops of liquid bitumen occur in the cavities of some fossils, whilst inflammable gas is not uncommon in the jet-workings, and petroleum may be detected by its smell. Iron pyrites is often associated with the jet.

Formerly sufficient jet was found in loose pieces on the shore, set free by the disintegration of the cliffs, or washed up from a submarine source. When this supply became insufficient, the rock was attacked by the jet-workers; ultimately the workings took the form ol true mines, levels being driven into the shales not only at their outcrop in the cliffs but in some of the inland dales of the Yorkshire moor- lands, such as Eskdale. The best jet has a uniform black colour, and is hard, compact and homogeneous in texture, breaking with a conchoidal fracture. It must be tough enough to be readily carved or turned on the lathe, and sufficiently compact in texture to receive a high polish. The final polish was formerly given by means of rouge, which produces a beautiful velvety surface, but rotten-stone and lampblack are often employed instead. The softer kinds, not capable of being freely worked, are known as bastard jet. A soft jet is obtained from the estuarine series of the Lower Oolites of Yorkshire.

Much jet is imported from Spain, but it is generally less hard and lustrous than true Whitby jet. In Spain the chief locality is Villaviciosa, in the province of Asturias. France furnishes jet, especially in the department of the Aude. Much jet, too, occurs in the Lias of Wiürttemberg, and works have been established for its utilization. In the United States jet is known at many localities but is not systematically worked. Pennsylvanian anthracite, however, has been occasionally employed as a substitute. In like manner Scotch cannel coal has been sometimes used at Whitby. Imitations of jet, or

substitutes for it, are furnished by vulcanite, glass, black obsidian and black onyx, or stained chalcedony. Jet is sometimes improperly termed black amber, because like amber, though in less degree, it becomes electric by friction.

See P. E. Spielmann, " On the Origin of Jet," Chemical News (Dec. 14, 1906) ; C. Fox-Strangways, " The Jurassic Rocks of Britain, Vol. I. Yorkshire," Mem. Geol. Suro. (1892); J. A. Bower, " Whitby Jet and its Manufacture," Journ. Soc. Arts (1874, vol. xxii. p. 80).

JETHRO (or Jether, Exod. iv. 18), the priest of Midian, in the Bible, whose daughter Zipporah became the wife of Moses. He is known as Hobab the son of Reuel the Kenite (Num. x. 29; Judg. iv. 11), and once as Reuel (Exod. ii. 18); and if Zipporah is the wife of Moses referred to in Num. xii. 1, the family could be regarded as Cushite (see Cush). Jethro was the priest of Yahweh, and resided at the sacred mountain where the deity commissioned Moses to deliver the Israelites from Egypt. Subsequently Jethro came to Moses (probably at Kadesh), a great sacrificial feast was held, and the priest instructed Moses in legislative procedure; Exod. xviii. 27 (see Exodus) and Num. x. 30 imply that the scene was not Sinai. Jethro was invited to accompany the people into the promised land, and later, we find his clan settling in the south of Judah (Judg. i. 16); see Kenites. The traditions agree in representing the kin of Moses as related to the mixed tribes of the south of Palestine (see Edom) and in ascribing to the family an important share in the early develop- ment of the worship of Yahweh. Cheyne suggests that the names of Hobab and of Jonadab the father of the Rechabites (q.v.) were originally identical (Ency. Bib. ii. col. 2101).

JETTY. The term jetty, derived from Fr. jetee, and therefore signifying something " thrown out," is applied to a variety of structures employed in river, dock and maritime works, which

are generally carried out in pairs from river banks, or in continua- tion of river channels at their outlets into deep water; or out into docks, and outside their entrances; or for forming basins along the sea-coast for ports in tideless seas. The forms and construc- tion of these jetties are as varied as their uses; for though they invariably extend out into water, and serve either for directing a current or for accommodating vessels, they are sometimes formed of high open timber-work, sometimes of low solid pro- jections, and occasionally only differ from breakwaters in their object.

Jetties for regulating Rivers. — Formerly jetties of timber- work were very commonly extended out, opposite one another, from each bank of a river, at intervals, to contract a wide channel, and by concentra- tion of the current to produce a deepening of the central channel ; or sometimes

mounds of rubble stone, stretching down the foreshore from each bank, served the same purpose. As, however, this system occasioned a greater scour between the ends of the jetties than in the intervening channels, and consequently produced an irregular depth, it has to a great extent been superseded by longitudinal training works, or by dipping cross dikes pointing somewhat up- stream (see River Engineering).

Jetties at Docks. — Where docks are given sloping sides, openwork timber jetties are generally carried across the slope, at the ends of which vessels can lie in deep water (fig. 1); or more solid structures

Fig. 1. — Timber Jetty across Dock Slope.

are erected over the slope for supporting coal-tips. Pilework jetties are also constructed in the water outside the entrances to docks on each side, so as to form an enlarging trumpet-shaped channel between the entrance, lock or tidal basin and the approach channel, in order to guide vessels in entering or leaving the docks. Solid jetties, moreover, lined with quay walls, are sometimes carried out into a wide dock, at right angles to the line of quays at the side, 'to enlarge the accommodation ; and they also serve, when extended on a large scale from the coast of a tideless sea under shelter of an out- lying breakwater, to form the basins in which vessels lie when discharging and taking in cargoes in such a port as Marseilles (see Dock).

Jetties at Entrances to Jetty Harbours. — The approach channel to some ports situated on sandy coasts is guided and protected across the beach by parallel jetties, made solid up to a little above low water of neap tides, on which open timber-work is erected, provided with a planked platform at the top raised above the highest tides. The channel between the jetties was originally maintained by tidal scour from low-lying areas close to the coast, and subsequently by the current from sluicing basins; but it is now often considerably deepened by sand-pump dredging. It is protected to some extent by the solid portion of the jetties from the inroad of sand from the adjacent beach, and from the levelling action of the waves; whilst the upper open portion serves to indicate the channel, and to guide the vessels if necessary (see Harbour). The bottom part of the older jetties, in such long-established jetty ports as Calais, Dunkirk and Ostend, was composed of clay or rubble stone, covered on the top by fascine- work or pitching; but the deepening of the jetty channel by dredging, and the need which arose for its enlargement, led to the reconstruction of the jetties at these ports. The new jetties at Dunkirk were founded in the sandy beach, by the aid of compressed air, at a depth of 22f ft. below low water of spring tides; and their solid masonry portion, on a concrete foundation, was raised 58 ft. above low water of neap tides (fig. 2).

Jetties at Lagoon Outlets. — A small tidal rise spreading tidal water over a large expanse of lagoon or inland back-water causes the influx and efflux of the tide to maintain a deep channel through a narrow outlet; but the issuing current on emerging from the outlet, being

no longer confined by a bank on each side, becomes dispersed, and owing to the reduction of its scouring force, is no longer able at a

moderate distance from the shore effectually to resist the action of the waves and littoral currents tending to form a continuous beach in front of the outlet. Hence a bar is produced which diminishes the available depth in the ap- proach channel. By carrying out a solid jetty over the bar, however, on each side of the outlet, the tidal currents are concentrated in the channel across the bar, and lower it by scour. Thus the available depth of the approach channels to Venice through the Malamocco and Lido outlets from the Venetian lagoon have been deepened several feet over their bars by jetties of rubble stone surmounted by a small super- structure (fig. 3), carried out across the foreshore into deep water on both sides of the channel. Other examples are provided by the long jetties extended into the sea in front of the entrance to Charleston harbour, formerly constructed of fascines, weighted with stone and

Sea.

Fig. 2. — Dunkirk East Jetty.

Riven.

Fig. 3. — Lido Outlet Jetty, Venice.

logs, but subsequently of rubble stone, and by the two converging rubble jetties carried out from each shore of Dublin bay for deepening the approach to Dublin harbour. Jetties at the Outlet of Titleless Rivers. — Jetties have been con- structed on each side of the outlet of some of the rivers flowing into the Baltic, with the objects of prolonging the scour of the river and protecting the channel from being shoaled by the littoral drift along the shore. The most inter- esting application of parallel jetties is in lowering the bar in , front of one of the mouths of a : deltaic river flowing into a tide- less sea, by extending the scour ; of the river out to the bar by ” a virtual prolongation of its banks. Jetties prolonging the Sulina branch of the Danube into the Black Sea, and the south pass of the Mississippi into the Gulf of Mexico (fig.

shifting outlet of the river Yare to the south of Yarmouth, and has also been successfully employed for fixing the wandering mouth of the Adur near Shoreham, and of the Adour flowing into the Bay of Biscay below Bayonne. When a new channel was cut across the Hook of Holland to provide a straighter and deeper outlet channel for the river Maas, forming the approach channel to Rotterdam, low, broad, parallel jetties, composed of fascine mattresses weighted with stone (fig. 5), were carried across the foreshore into the sea on either side of the new mouth of the river, to protect the jetty channel from littoral drift, and cause the discharge of the river to maintain it out to deep water (see River Engineering). The channel, also, beyond the outlet of the river Nervion into the Bay of Biscay has

Sea.

Fig. 5. — River Maas Outlet, North Jetty.

been regulated by jetties; and by extending the south-west jetty out for nearly half a mile with a curve concave towards the channel the outlet has not only been protected to some extent from the easterly drift, but the bar in front has been lowered by the scour produced by the discharge of the river following the concave bend of the south-west jetty. As the outer portion of this jetty was exposed to westerly storms from the Bay of Biscay before the outer harbour was constructed, it has been given the form and strength of a breakwater situated in shallow water (fig. 6). (L. F. V.-H.)

Fig. ,6. — River Nervion" Outlet, Western Jetty.

4), formed of and concrete

Riven.

Sea.

rubble stone blocks, and

Fig. 4. — Mississippi South Pass Outlet Jetty.

fascine mattresses weighted with stone and surmounted with large concrete blocks respectively, have enabled the discharge of these rivers to scour away the bars ob- structing the access to them ; and they have also carried the sediment-bearing waters sufficiently far out to come under the influence of littoral currents, which, by conveying away some of the sediment, post- pone the eventual formation of a fresh bar farther out (see River Engineering).

Jetties at the Mouth of Tidal Rivers. — Where a river is narrow near its

mouth, and its discharge is generally feeble, the sea is liable on an exposed coast, when the tidal range is small, to block up its outlet during severe storms. The river is thus forced to seek another exit at a weak spot of the beach, which along a low coast may be at some distance off; and this new outlet in its turn may be blocked up, so that the river from time to time shifts the position of its mouth. This inconvenient cycle of changes may be stopped by fixing the outlet of the river at a suitable site, by carrying a jetty on each side of this outlet across the beach, thereby concentrating its discharge in a definite channel and protecting the mouth from being blocked up by littoral drift. This system was long ago applied to the

JEVER, a town of Germany, in the grand-duchy of Oldenburg, 13 m. by rail N.W. of Wilhelmshaven, and connected with the North Sea by a navigable canal. Pop. (1901), 5486. The chief industries are weaving, spinning, dyeing, brewing and milling; there is also a trade in horses and cattle. The fathers {Die Gelreuen) of the town used to send an annual birthday present of 101 plovers' eggs to Bismarck, with a dedication in verse.

The castle of Jever was built by Prince Edo Wiemken (d. 1410), the ruler of Jeverland, a populous district which in 1575 came under the rule of the dukes of Oldenburg. In 1603 it passed to the house of Anhalt and was later the property of the empress Catherine II. of Russia, a member of this family. In 1814 it came again into the possession of Oldenburg.

See D. Hohnholz, Aus J ever s Vorgangenheit (Jever, 1886) ; Hagena, Jeverland bis zum Jakr 1500 (Oldenburg, 1902) ; and F. W. Riemann, Geschichte des Jeverlandes (Jever, 1896).

JEVEROS (Jeberos, Jibaros, Jivaros or Givaros), a tribe of South American Indians on the upper Maranon, Peru, where they wander in the forests. The tribe has many branches and there are frequent tribal wars, but they have always united against a common enemy. Juan de Velasco declares them to be faithful, noble and amiable. They are brave and warlike, and

though upon the conquest of Peru they temporarily submitted, a general insurrection in 1599 won them back their liberty. Curious dried human heads, supposed to have been objects of worship, have been found among the Jeveros (see Ethnol. Soc. Trans. 1862, W. Bollaert).

JEVONS, WILLIAM STANLEY (1835-1882), English econo- mist and logician, was born at Liverpool on the 1st of September 1835. His father,

Thomas Jevons, a man of strong scientific tastes and a writer on legal and economic subjects, was an iron merchant. His mother was the daughter of William Roscoe. At the age of fifteen he was sent to London to attend University College school. He appears at this time to have already formed the belief that important achievements as a thinker were possible to him, and at more than one critical period in his career this belief was the decisive factor in determining his conduct. To- wards the end of 1853, after having spent two years at University College, where his favourite subjects were chemistry and botany, he unexpectedly received the offer of the assayership to the new mint in Australia. The idea of leaving England was distasteful, but pecuniary considerations had, in consequence of the failure of his father's firm in 1847, become of vital importance, and he accepted the post. He left England for Sydney in June 1854, and remained there for five years. At the end of that period he resigned his appointment, and in the autumn of 1859 entered again as a student at University College, London, proceeding in due course to the B.A. and M.A. degrees of the university of London. He now gave his principal attention to the moral sciences, but his interest in natural science was by no means exhausted: throughout his life he continued to write occasional papers on scientific subjects, and his intimate knowledge of the physical sciences greatly contributed to the success of his chief logical work, The Principles of Science. Not long after taking his M.A. degree Jevons obtained a post as tutor at Owens College, Manchester. In 1 866 he was elected professor of logic and mental and moral philosophy and Cobden professor of political economy in Owens college. Next year he married Harriet Ann Taylor, whose father had been the founder and proprietor of the Man- chester Guardian. Jevons suffered a good deal from ill health and sleeplessness, and found the delivery of lectures covering so wide a range of subjects very burdensome. In 1876 he was glad to exchange the Owens professorship for the professorship of political economy in University College, London. Travelling and music were the principal recreations of his life; but his health continued bad, and he suffered from depression. He found his professorial duties increasingly irksome, and feeling that the pressure of literary work left him no spare energy, he decided in 1880 to resign the post. On the 13th of August 1882 he was drowned whilst bathing near Hastings. Throughout his life he had pursued with devotion and industry the ideals with which he had set out, and his journal and letters display a noble sim- plicity of disposition and an unswerving honesty of purpose. He was a prolific writer, and at the time of his death he occupied the foremost position in England both as a logician and as an economist. Professor Marshall has said of his work in economics that it " will probably be found to have more constructive force than any, save that of Ricardo, that has been done during the last hundred years." At the time of his death he was engaged upon an economic work that promised to be at least as important

as any that he had previously undertaken. It would be difficult to exaggerate the loss which logic and political economy sustained through the accident by which his life was prematurely cutshort. Jevons arrived quite early in his career at the doctrines that constituted his most characteristic and original contributions to economics and logic. The theory of utility, which became the keynote of his general theory of political economy, was practi- cally formulated in a letter written in i860; and the germ of his logical principles of the substitution of similars may be found in the view which he propounded in another letter written in 1861, that " philosophy would be found to consist solely in pointing out the likeness of things." The theory of utility above referred to, namely, that the degree of utility of a commodity is some continuous mathematical function of the quantity of the com-

modity available, together with the implied doctrine that economics is essentially a mathematical science, took more definite form in a paper on " A General Mathematical Theory of Political Economy," written for the British Association in 1862. This paper does not appear to have attracted much attention either in 1862 or on its publication four years later in the Journal of the Statistical Society; and it was not till 1871, when the Theory of Political Economy appeared, that Jevons set forth his doctrines in a fully developed form. It was not till after the publication of this work that Jevons became acquainted with the applications of mathematics to political economy made by earlier writers, notably Antoine Augustin Cournot and H. H. Gossen. The theory of utility was about 1870 being independently developed on somewhat similar lines by Carl Menger in Austria and M.E.L. Walras in Switzerland. As regards the discovery of the con- nexion between value in exchange and final (or marginal) utility, the priority belongs to Gossen, but this in no way detracts from the great importance of the service which Jevons rendered to English economics by his fresh discovery of the principle, and by the way in which he ultimately forced it into notice. In his reaction from the prevailing view he sometimes expressed himself without due qualification: the declaration, for instance, made at the commencement of the Theory of Political Economy, that " value depends entirely upon utility," lent itself to misinter- pretation. But a certain exaggeration of emphasis may be pardoned in a writer seeking to attract the attention of an in- different public. It was not, however, as a theorist dealing with the fundamental data of economic science, but as a brilliant writer on practical economic questions, that Jevons first received general recognition. A Serious Fall in the Value of Gold (1863) and The Coal Question (1865) placed him in the front rank as a writer on applied economics and statistics; and he would be remembered as one of the leading economists of the 19th century even had his Theory of Political Economy never been written. Amongst his economic works may be mentioned Money and the

Mechanism of Exchange (1875), written in a popular style, and descriptive rather than theoretical, but wonderfully fresh and original in treatment and full of suggestiveness, a Primer on Political Economy (1878), The State in Relation to Labour (1882), and two works published after his death, namely, Methods of Social Reform and Investigations inCurrency and Finance, containing papers that had appeared separately during his lifetime. The last-named volume contains Jevons's interesting speculations on the con- nexion between commercial crises and sun-spots. He was engaged at the time of his death upon the preparation of a large treatise on economics and had drawn up a table of contents and completed some chapters and parts of chapters. This fragment was published in 1905 under the title of The Principles of Eco- nomics: a Fragment of a Treatise on the Industrial Mechanism of Society, and other Papers.

Jevons's work in logic went on pari passu with his work in political economy. In 1864 he published a small volume, entitled Pure Logic; or, the Logic of Quality apart from Quantity, which was based on Boole's system of logic, but freed from what he considered the false mathematical dress of that system. In the years immediately following he devoted considerable atten- tion to the construction of a logical machine, exhibited before the Royal Society in 1870, by means of which the conclusion deriv- able from any given set of premisses could be mechanically obtained. In 1866 what he regarded as the great and universal principle of all reasoning dawned upon him; and in 1869 he published a sketch of this fundamental doctrine under the title of The Substitution of Similars. He expressed the principle in its simplest form as follows: " Whatever is true of a thing is true of its like," and he worked- out in detail its various applications. In the following year appeared the Elementary Lessons on Logic, which soon became the most widely read elementary textbook on logic in the English language. In the meantime he was engaged upon a much more important logical treatise, which appeared in 1874 under the title of The Principles of Science. In this work Jevons embodied the substance of his earlier works on pure logic and the substitution of similars; he also enunciated

and developed the view that induction is simply an inverse employment of deduction; he treated in a luminous manner the general theory of probability, and the relation between proba- bility and induction; and his knowledge of the various natural sciences enabled him throughout to relieve the abstract character of logical doctrine by concrete scientific illustrations, often worked out in great detail. Jevons's general theory of induction was a revival of the theory laid down by Whewell and criticized

by Mill; but it was put in a new form, and was free from some of the non-essential adjuncts which rendered Whewell's exposi- tion open to attack. The work as a whole was one of the most notable contributions to logical doctrine that appeared in Great Britain in the 19th century. His Studies in Deductive Logic, consisting mainly of exercises and problems for the use of students, was published in 1880. In 1877 and the following years Jevons contributed to the Contemporary Review some articles on J. S. Mill, which he had intended to supplement by further articles, and eventually publish in a volume as a criticism of Mill's philosophy. These articles and one other were republished after Jevons's death, together with his earlier logical treatises, in a volume, entitled Pure Logic, and other Minor Works. The criti- cisms on Mill contain much that is ingenious and much that is forcible, but on the whole they cannot be regarded as taking rank with Jevons's other work. His strength lay in his power as an original thinker rather than as a critic; and he will be remembered by his constructive work as logician, economist and statistician. See Letters and Journal of W. Stanley Jevons, edited by his wife (1886). This work contains a bibliography of Jevons's writings. See also Logic: History. (J. N. K.)

JEW, THE WANDERING, a legendary Jew (see Jews) doomed to wander till the second coming of Christ because he had taunted Jesus as he passed bearing the cross, saying, " Go on quicker." Jesus is said to have replied, " I go, but thou shalt wait till I return." The legend in this form first appeared in a pamphlet of four leaves alleged to have been printed at Leiden in 1602. This pamphlet relates that Paulus von Eizen (d. 1308), bishop of Schleswig, had met at Hamburg in 1542 a Jew named Ahas- uerus (Ahasverus), who declared he was " eternal " and was the same who had been punished in the above-mentioned manner by Jesus at the time of the crucifixion. The pamphlet is supposed to have been written by Chrysostomus Dudulaeus of Westphalia and printed by one Christoff Crutzer, but as no such author or printer is known at this time — the latter name indeed refers directly to the legend — it has been conjectured that the whole story is a myth invented to support the Protestant contention of a continuous witness to the truth of Holy Writ in the person of this " eternal " Jew; he was to form, in his way, a counterpart to the apostolic tradition of the Catholic Church.

The story met with ready acceptance and popularity. Eight editions of the pamphlet appeared in 1602, and the fortieth edition before the end of the following century. It was translated into Dutch and Flemish with almost equal success. The first French edition appeared in 1609, and the story was known in England before 1625, when a parody was produced. Denmark and Sweden followed suit with translations, and the expression " eternal Jew " passed as a current term into Czech. In other words, the story in its usual form spread wherever there was a tincture of Protestantism. In

southern Europe little is heard of it in this version, though Rudolph Botoreus, parliamentary advocate of Paris (Comtn. histor., 1604), writing in Paris two years after its first appearance, speaks contemptuously of the popular belief in the Wandering Jew in Germany, Spain and Italy.

The popularity of the pamphlet and its translations soon led to reports of the appearance of this mysterious being in almost all parts of the civilized world. Besides the original meeting of the bishop and Ahasuerus in 1542 and others referred back to 1575 in Spain and 1599 at Vienna, the Wandering Jew was stated to have appeared at Prague (1602), at Liibeck (1603), in Bavaria 1604), at Ypres (1623), Brussels (1640), Leipzig (1642), Paris (1644, by the " Turkish Spy "), Stamford (1658), Astrakhan (1672), and Frankenstein (1678). In the next century the

Wandering Jew was seen at Munich (1721), Altbach (1766), Brussels (1774), Newcastle (1790, see Brand, Pop. Antiquities, s.v.), and on the streets of London between 1818 and 1830 (see Athenaeum, 1866, ii. 561). So far as can be ascertained, the latest report of his appearance was in the neighbourhood of Salt Lake City in 1868, when he is said to have made himself known to a Mormon named O'Grady. It is difficult to tell in any one of these cases how far the story is an entire fiction and how far some ingenious impostor took advantage of the existence of the myth.

The reiterated reports of the actual existence of a wandering being, who retained in his memory the details of the crucifixion, show how the idea had fixed itself in popular imagination and found its way into the 19th-century collections of German legends. The two ideas combined in the story of the restless fugitive akin to Cain and wandering for ever are separately represented in the current names given to this figure in different countries. In most Teutonic languages the stress is laid on the perpetual character of his punishment and he is known as the " everlast- ing, " or " eternal " Jew (Ger. " Ewige Jude "). In the lands speaking a Romance tongue, the usual form has reference to the wanderings (Fr. " le Juif errant "). The English form follows the Romance analogy, possibly because derived directly from France. The actual name given to the mysterious Jew varies in the different versions : the original pamphlet calls him Ahasver, and this has been followed in most of the literary versions, though it is difficult to imagine any Jew being called by the name of the typical anti-Semitic king of the Book of Esther. In one of his appearances at Brussels his name is given as Isaac Laque- dem, implying an imperfect knowledge of Hebrew in an attempt to represent Isaac " from of old." Alexandre Dumas also made use of this title. In the Turkish Spy the Wandering Jew is called Paid Marrane and is supposed to have suffered persecution at the hands of the Inquisition, which was mainly occupied in dealing with the Marranos, i.e. the secret Jews of the Iberian peninsula. In the few references to the legend

in Spanish writings the Wandering Jew is called Juan Espera en Dios, which gives a more hopeful turn to the legend.

Under other names, a story very similar to that given in the pamphlet of 1602 occurs nearly 400 years earlier on English soil. According to Roger of Wendover in his Flores hisloriarum under the year 1228, an Armenian archbishop, then visiting England, was asked by the monks of St Albans about the well-known Joseph of Arimathaea, who had spoken to Jesus and was said to be still alive. The archbishop claimed to have seen him in Armenia under the name of Carthaphilus or Cartaphilus, who had confessed that he had taunted Jesus in the manner above related. This Carthaphilus had afterwards been baptized by the name of Joseph. Matthew Paris, in repeating the passage from Roger of Wendover, reported that other Armenians had confirmed the story on visiting St Albans in 1252, and regarded it as a great proof of the Christian religion. A similar account is given in the chronicles of Philippe Mouskes (d. 1243). A variant of the same story was known to Guido Bonati, an astronomer quoted by Dante, who calls his hero or villain Butta Deus because he struck Jesus. Under this name he is said to have appeared at Mugello in 141 3 and at Bologna in 141 5 (in the garb of a Franciscan of the third order).

The source of all these reports of an ever-living witness of the crucifixion is probably Matthew xvi. 28: " There be some of them that stand here which shall in no wise taste of death till they see the Son of Man coming in his kingdom." As the kingdom had not come, it was assumed that there must be persons living who had been present at the crucifixion; the same reasoning is at the root of the Anglo-Israel belief. These words are indeed quoted in the pamphlet of 1602. Again, a legend was based on John xxi. 20 that the beloved disciple would not die before the second coming; while another legend (current in the 16th century) condemned Malchus, whose ear Peter cut off in the garden of Gethsemane (John xvii. 10), to wander perpetually till the second coming. The legend alleges that he had been so condemned for having scoffed at Jesus. These legends and the

utterance of Matt. xvi. 28 became "contaminated" by the legend of St Joseph of Arimathaea and the Holy Grail, and took the form given in Roger of Wendover and Matthew Paris. But there is nothing to show the spread of this story among the people before the pamphlet of 1602, and it is difficult to see how this Carthaphilus could have given rise to the legend of the Wander- ing Jew, since he is not a Jew nor does he wander. The author of 1602 was probably acquainted either directly or indirectly with

the story as given by Matthew Paris, since he gives almost the same account. But he gives a new name to his hero and directly connects his fate with Matt. xvi. 28.

Moncure D. Conway (Ency. Brit., oth ed., xiii. 673) attempted to connect the legend of the Wandering Jew with a whole series of myths relating to never-dying heroes like King Arthur, Frederick Barbarossa, the Seven Sleepers, and Thomas the Rhymer, not to speak of Rip Van Winkle. He goes even farther and connects our legend with mortals visiting earth, as the Yima in Parsism, and the " Ancient of Days " in the Books of Daniel and Enoch, and further connects the legend with the whole medieval tendency ,to regard the Jew as something uncanny and mysterious. But all these mythological explanations are super- erogatory, since the actual legend in question can be definitely traced to the pamphlet of 1602. The same remark applies to the identification with the Mahommedan legend of the "eternal" Chadhir proposed by M. Lidzbarski {Zeit.f. Assyr. vii. 116) and I. Friedlander (Arch. f. Religionswiss. xiii. no).

This combination of eternal punishment with restless wandering has attracted the imagination of innumerable writers in almost all European tongues. The Wandering Jew has been regarded as a symbolic figure representing the wanderings and sufferings of his race. The Germans have been especially attracted by the legend, which has been made the subject of poems by Schubart, Schreiber, W. Miiller, Lenau, Chamisso, Schlegel, Mosen and Koehler, from which enumeration it will be seen that it was a particularly favourite subject with the Romantic school. They were perhaps influenced by the example of Goethe, who in his Autobiography describes, at considerable length, the plan of a poem he had designed on the Wandering Jew. More recently poems have been composed on the subject in German by Adolf Wilbrandt, Fritz Lienhard and others; in English by Robert Buchanan, and in Dutch by H. Heijermans. German novels also exist on the subject, by Franz Horn, Oeklers, Laun and Schuck- ing, tragedies by Klinemann, Haushofer and Zedlitz. Sigismund Heller wrote three cantos on the wanderings of Ahasuerus, while Hans Andersen made of him an " Angel of Doubt." Robert Hamerling even identifies Nero with the Wandering Jew. In France, E. Quinet published a prose epic on the subject in 1833, and Eugene Sue, in his best-known work, Le Juif errant (1844), introduces the Wandering Jew in the prologues of its different sections and associates him with the legend of Herodias. In modern times the subject has been made still more popular by Gustave Dore's elaborate designs (1856), containing some of his most striking and imaginative work. Thus, probably, he sug- gested Grenier's poem on the subject (1857).

In England, besides the ballads in Percy's Reliques, William Godwin introduced the idea of an eternal witness of the course of civilization in his

St Leon (1799), and his son-in-law Shelley introduces Ahasuerus in his Queen Mob. It is doubtful how far Swift derived his idea of the immortal Struldbrugs from the notion of the Wandering Jew. George Croly's Salathiel, which appeared anonymously in 1828, gave a highly elaborate turn to the legend; this has been re-published under the title Tarry Thou Till I Come. Bibliography. — J. G. Th. Graesse, Die Sage vom ewigen Juden (1844); F. Helhig, Die Sage vom ewigen Juden (1874); G. Paris, Le Juif errant (1881); M. D. Conway, The Wandering Jew (1881); S. Morpugo, L' libreo errante in Italia (1891); L. Neubaur, Die Sage vom ewigen Juden (2nd ed., 1893). The recent literary handling of the subject has been dealt with by J. Prost, Die Sage vom ewigen Juden in der neueren deutschen Literatur (1905); T. Kappstein, Ahasver in der Weltpoesie (1905). (J. J a.)

JEWEL, JOHN (1522-1571), bishop of Salisbury, son of John Jewel of Buden, Devonshire, was born on the 24th of May 1522, and educated under his uncle John Bellamy, rector of Hampton,

and other private tutors until his matriculation at Merton college, Oxford, in July 1535. There he was taught by John Parkhurst, afterwards bishop of Norwich; but on the 19th of August 1539 he was elected scholar of Corpus Christi college. He graduated B.A. in 1540, and M.A. in 1545, having been elected fellow of his college in 1542. He made some mark as a teacher at Oxford, and became after 1547 one of the chief disciples of Peter Martyr. He graduated B.D. in 1552, and was made vicar of Sunningwell, and public orator of the university, in which capacity he had to compose a congratulatory epistle to Mary on her accession. In April 1554 he acted as notary to Cranmer and Ridley at their disputation, but in the autumn he signed a series of Catholic articles. He was, nevertheless, sus- pected, fled to London, and thence to Frankfort, which he reached in March 1555. There he sided with Coxe against Knox, but soon joined Martyr at Strassburg, accompanied him to Zurich, and then paid a visit to Padua.

Under Elizabeth's succession he returned to England, and made earnest efforts to secure what would now be called a low-church settlement of religion. Indeed, his attitude was hardly dis- tinguishable from that of the Elizabethan Puritans, but he gradually modified it under the stress of office and responsibility. He was one of the disputants selected to confute the Romanists at the conference of Westminster after Easter 1559; he was select preacher at St Paul's cross on the 15th of June; and in the autumn was engaged as one of the royal visitors of the western counties. His conge d'elire as bishop of Salisbury had been made out on the 27th of July, but he was not consecrated until the 2 1 st of January 1560. He now constituted himself the literary apologist of the Elizabethan settlement. He had on the 26th of November 1559, in a sermon at St Paul's Cross,

challenged all comers to prove the Roman case out of the Scriptures, or the councils or Fathers for the first six hundred years after Christ. He repeated his challenge in 1 560, and Dr Henry Cole took it up. The chief result was Jewel's Apologia ecclesiae Anglicanae, published in 1562, which in Bishop Creighton's words is "the first methodical statement of the position of the Church of England against the Church of Rome, and forms the ground-work of all subsequent controversy." A more formidable antagonist than Cole now entered the lists in the person of Thomas Harding, an Oxford contemporary whom Jewel had deprived of his prebend in Salisbury Cathedral for recusancy. He published an elaborate and bitter Answer in 1564, to which Jewel issued a Reply in 1565. Harding followed with a Confutation, and Jewel with a Defence, of the Apology in 1566 and 1567; the combatants ranged over the whole field of the Anglo-Roman controversy, and Jewel's theology was officially enjoined upon the Church by Archbishop Bancroft in the reign of James I. Latterly Jewel had been confronted with criticism from a different quarter. The arguments that had weaned him from his Zwinglian sim- plicity did not satisfy his unpromoted brethren, and Jewel had to refuse admission to a benefice to his friend Laurence Humphrey (q.v.), who would not wear a surplice. He was consulted a good deal by the government on such questions as England's attitude towards the council of Trent, and political considerations made him more and more hostile to Puritan demands with which he had previously sympathized. He wrote an attack on Cart- wright; which was published after his death by Whitgift. He died on the 23rd of September 1571, and was buried in Salisbury Cathedral, where he had built a library. Hooker, who speaks of Jewel as " the worthiest divine that Christendom hath bred for some hundreds of years," was one of the boys whom Jewel prepared in his house for the university; and his Ecclesiastical Polity owes much to Jewel's training.

Jewel's works were published in a folio in 1609 under the direction of Bancroft, who ordered the Apology to be placed in churches, in some of which it may still be seen chained to the lectern; other editions appeared at Oxford (1848, 8 vols.) and Cambridge (Parker Soc, 4 vols.). See also Gough's Index to Parker Soc. Publ. ; Strype's Works (General Index); Acts of the Privy Council; Calendars of Domestic and Spanish State Papers; Dixon's and Frere's Church Histories; and Dictionary of National Biography (art. bv Bishop Creighton). (A". F. P.)

JEWELRY (0. Fr. jouel, Fr. joyau, perhaps from joie, joy; Lat. gaudium; retranslated into Low Lat. jocale, a toy, from jocus, by misapprehension of

the origin of the word), a collective term for jewels, or the art connected with them — jewels being personal ornaments, usually made of gems, precious stones, &c, with a setting of precious metal; in a restricted sense it is also common to speak of a gem-stone itself as a jewel, when utilized in this way. Personal ornaments appear to have been among the very first objects on which the invention and ingenuity of man were exercised; and there is no record of any people so rude as not to employ some kind of personal decoration. Natural objects, such as small shells, dried berries, small perforated stones, feathers of variegated colours, were combined by stringing or tying together to ornament the head, neck, arms and legs, the fingers, and even the toes, whilst the cartilages of the nose and ears were frequently perforated for the more ready suspension of suitable ornaments.

Amongst modern Oriental nations we find almost every kind of personal decoration, from the simple caste mark on the fore- head of the Hindu to the gorgeous examples of beaten gold and silver work of the various cities and provinces of India. Nor are such decorations mere ornaments without use or meaning. The hook with its corresponding perforation or eye, the clasp, the buckle, the button, grew step by step into a special ornament, according to the rank, means, taste and wants of the wearer, or became an evidence of the dignity of office. Nor was the jewel deemed to have served its purpose with the death of its owner, for it is to the tombs of ancient peoples that we must look for evidence of the early existence of the jeweller's art.

The jewelry of the ancient Egyptians has been preserved for us in their tombs, sometimes in, and sometimes near the sarco- phagi which contained the embalmed bodies of the wearers. An amazing series of finds of the intact jewels of five princesses of the Xllth Dynasty (c. 2400 B.C.) was the result of the excava- tions of J. de Morgan at Dahshur in 1894-1895. The treasure of Princess Hathor-Set contained jewels with the names of Senwosri (Usertesen) II. and III., one of whom was probably her father. The treasure of Princess Merit contained the names of the same two monarchs, and also that of Amenemhe III., to whose family Princess Nebhotp may have belonged. The two remaining princesses were Ita and Khnumit.

represented — including chiselling, soldering, inlaying with coloured stones, moulding and working with twisted wires and filigree. Here also occurs the earliest instance of granulated work, with small grains of gold, soldered on a flat surface (fig. 1). The principal items in this dazzling group are the following: Three gold pectorals (fig. 2 and Plate I. figs. 35, 36) worked a jour (with the interstices left open) ; on the front side they are inlaid with coloured stones, the fine cloisons being the only portion of the gold that is visible ; on the back, the gold surfaces are most delicately carved, in low

relief. Two gold crowns (Plate I. figs. 32, 34), found together, are curiously contrasted in character. The one (fig. 32) is of a formal design, of gold, inlaid (the plume, Plate I. fig 33, was attached to it) ; the other (fig. 34) has a multitude of star-like flowers, embodied in a filigree of daintily twisted wires. A dagger with inlaid patterns on the handle shows extraordinary perfection of finish.

Fig. 2

Nearly a thousand years later we have another remarkable collection of Egyptian art in the jewelry taken from the coffin of Queen Aah-hotp, discovered in 1859 by Mariette in the entrance to 'the valley of the tombs of the kings and now preserved in the Cairo museum. Compared with the Dahshur treasure the jewelry of Aah-hotp is in parts rough and coarse, but none the less it is marked by the ingenuity and mastery of the materials that characterize all the work of the Egyptians. Hammered work, incised and chased work, the evidence of soldering, the combinations of layers of gold plates, together with coloured stones, are all present, and the handicraft is complete in every respect.

A diadem of gold and enamel, found at the back of the head of the mummy of the queen (fig. 3), was fixed in the back hair, show- ing the cartouche in front. The box holding this car- touche has on the upper surface the titles of the king, " the son of the sun, Aahmes, living for ever and ever," in gold on a ground of lapis lazuli, with a chequered ornament in blue

and red pastes, and a sphinx p IG , j.

couchant on each side. A

necklace with three pendant flies (fig. 4) is entirely of gold, having a hook and loop to fasten it round the neck. Fig. 5 is a gold drop, inlaid with turquoise or blue paste, in the shape of a fig. A gold

The art of the nameless Memphite jewellers of the Xllth Dynasty is marked by perfect accuracy of execution, by sureness of intention, by decorative instinct and sobriety in design, and by the service- able nature of the jewels for actual wear. All forms of work are

Fig. 5.

chain (fig. 6) is formed of wires closely plaited and very flexible, the ends terminating in the heads of water fowl, and having small rings to secure the collar behind. To the centre is suspended by a

Fig. 6.

small ring a scarabaeus of solid gold inlaid with lapis lazuli. We have an example of a bracelet, similar to those in modern use (fig. 7),

Fig. 7.

Fig. 8.

and stars formed of combined crosses, with crosses in the centre forming spikes — all elaborately ornamented in detail. The spiral forms an incessant decoration from its facile production and repeti- tion by means of twisted gold wire. Grasshoppers or tree crickets in gold repousse suspended by chains and probably used for the

and worn by all persons of rank. It is formed of two pieces joined by a hinge, and is decorated with figures in repousse on a ground inlaid with lapis lazuli.

That the Assyrians used personal decorations of a very dis- tinct character, and no doubt made of precious materials, is

proved by the bas-re- liefs from which a con- siderable collection of jewels could be gather- ed, such as bracelets, ear-rings and necklaces. Thus, for example, in the British Museum we have representa- tions of Assur-nazir-pal, king of Assyria (c. 885-860 B.C.), wear- ing a cross (fig. 8) very similar to the Maltese cross of modern times. It happens, however, that the excavations have not hitherto been fertile in actual re- mains of gold work from Assyria. Chance also has so far ordained that the excavations in Crete should not be particularly rich in ornaments of gold. A few isolated objects have been found, such as a duck and other pendants, and also several necklaces with beads of the Argonaut shell-fish pattern. More striking than these is a short bronze sword. The handle has an agate pommel, and is covered with gold plates, engraved with spirited scenes of lions and wild goats (fig. o, A. J. Evans in Archaeologia, 59, 447). In general, however, the gold jewelry of the later Minoan periods is more brilliantly represented by the finds made on the main- land of Greece and at Enkomi in Cyprus. Among the former the gold ornaments found by Heinrich Schliemann in the graves of Mycenae are pre-eminent.

The objects found ranged over most of the personal ornaments still in use; necklaces with gold beads and pendants, butterflies (fig. 10), cuttlefish (fig.

11), single and concentric circles, rosettes and leafage, with perforations for attachment to clothing, crosses

Fig. 9. — From Archaeologia, vol. 59, p. 447, by permission of the Society of Antiquaries of London.

Fig. 10.

Fig. 11.

decoration of the hair, and a griffin (fig. 12), having the upper part of the body of an eagle and the lower parts of a lion, with wings decorated with spirals, are among the more remarkable examples of perforated ornaments for attachment to the clothing. There are also perforated ornaments belonging to neck- laces, with intaglio engravings . of such subjects as a contest' of a man and lion, and a duel

of two warriors, one of whom p IG I2

stabs his antagonist in the

throat. There are also pinheads and brooches formed of two stags lying down (fig. 13), the bodies and necks crossing each other, and the horns meeting symmetrically above the heads, forming a finial. The heads of these ornaments were of gold, with silver blades or pointed pins inserted for use. The bodies of the two stags rest on fronds of the date-palm growing out of the stem which receives the pin. Another remarkable series is composed of figures of women with doves. Some have one dove resting on the head; others have three doves, one on the head and the others resting on arms. The arms in both instances are extended to the elbow, the hands being placed on the breasts. These ornaments are also perforated, and were evidently sewed on the dresses, although there is some evidence that an example with three doves has been fastened with a pin.

An extraordinary diadem was found upon the head of one of the bodies discovered in the same tomb with many objects similar to those noticed above. It is 25 in. in length, covered with shield-like or rosette ornaments in repousse, the relief being very low but per- fectly distinct, and further ornamented by thirty-six large leaves of repouss6 gold attached to it. As an example of design and perfec- tion of detail, another smaller diadem found in another tomb may be noted (fig. 14). It is of gold plate, so thick as to require no " piping "

Fig. 13.

Fig. 14.

at the back to sustain it ; but in general the repousseˆ examples have a piping of copper wire.

The admirable inlaid daggers of the IVth grave at Mycenae are unique in their kind, with their subjects of a lion hunt, of a lion chasing a herd of antelopes, of running lions, of cats hunting wild duck, .of inlaid lilies, and of geometric patterns. The subjects are inlaid in. gold of various tints, and silver, in bronze plates which are inserted in the flat surfaces of the dagger-blades. In part also the subjects are rendered in relief and gilded. The whole is executed with marvellous precision and vivid representation of motion. To a certain limited extent these daggers are paralleled by a dagger and hatchet found in the treasure of Queen Aah-hotp mentioned above, but in their most characteristic features there is little resemblance. The gold ornaments found by Schliemann at Hissarlik, the supposed site of Troy, divide themselves, generally speaking, into two groups, one being the " great treasure " of diadems, ear-rings, beads, brace- lets, &c, which seem the product of a local and uncultured art. The other group, which were found in smaller " treasures," have spirals and rosettes similar to those of Mycenae. The discovery, however, of the gold treasures of the Artemision at Ephesus has brought out points of affinity between the Hissarlik treasures and those of Ephesus, and has made any reasoning difficult, in view of the uncertainties surrounding the Hissarlik finds. The group with

3 66

Mycenaean affinities (fig. 15) includes necklaces, brooches, bracelets (g), hair-pins (a) ear-rings (c, d, e, f), with and without pendants beads and twisted wire drop The majority of these are ornamented with spirals of twisted wire, or small rosettes, with fragments of stones m the centres. The twisted wire ornaments were evidently portions of necklaces. A circular plaque decorated with a rosette*

JEWELRY

51 52 53

37:

39

38

Fig. 15.

illE Tk7- S T lar to t – ho – se f ? und at Mycenae, and a conventionalized atwJ I ' S ? ha , r – acte r-, stlc ˆ f l . much of the deta; l found at that

place ZZL f Hissarhk.- They were all of pure gold, and the wire must have been drawn through a plate of harder metal-probably bronze. Ihe principal ornaments differing from those found at Mycenae are diadems or head fillets of pure hammered gold (!) f a

*eTch sˆe°of fhe faceˆ * ”’ the “° ng ««*””■ falIi < * °" The jewelry of the close of the Mycenaean period is best represented by the rich finds of the cemetery of Enkomi near Salamis, m Cyprus. This field was excavated by the British Museum in 1896, and a considerable portion of the finds is now at Bloomsbury. It was rich in all forms of jewelry, but especially m pins, rings and diadems with patterns in relief In its geometric patterns the art of Enkomi is entirely Mycenaean but special stress is laid on the mythical forms that were in- herited by Greek art, such as the sphinx and the gryphon Figs. 37-48 (Plate I.) are examples of the late Mycenaean treasures from Enkomi. Ear-rings.*

Diadem, to be tied on the forehead. The impressed figure of a sphinx is repeated twelve times. Ear-rings, originally in bull’s head form (fig. 40). Later, the same general form is retained, but decorative patterns (figs 41 , 46) take the place of the bull’s head, fin probably connected by a chain with a

lellow, to be used as a cloak fastening. Pomegranate pendant, with fine granulated work. %

Pins as No. 42. The heads are of vitreous

paste. (See above.) Pendant ornament, in lotus-form, of a

pectoral, inlaid with coloured pastes, bmall slate cylinder, set in filigree. • Another find of importance was that of a collection of gold ornaments from one of the Greek islands (said to be Aegina) which also found its way to the British Museum. Here we find the themes of archaic Greek art, such as a figure holding up two water-birds, in immediate connexion with Mycenaean gold patterns. 6

Figs. 49-53 (Plate I.) are specimens from this treasure. ” 49 ” PIat e with repousse” ornament for sewing on

3. dress. ” 5 ° ” Pendant. Figure with two water-birds, on

a lotus base, and having serpents issuing from near his middle, modified from Egyptian forms.

40, 41, 46

42 43 44,45

46

47

48

Fig. 51 (Plate I.) Ring, with cut blue glass-pastes in the

grooves. Pendant ornament, repousse, and originally

inlaid with pieces of cut glass-paste. Pendant ornament, with dogs and apes

modified from Egyptian forms.

For the beginnings of Greek art proper, the most striking series of personal jewels is the great deposit of orna- ments which was found in 1 905 by D. G. Hogarth in the soil beneath the central basis of the ar- chaic temple of Artemis of Ephesus. The gold ornaments in question (amounting in all to about 1000 pieces) were mingled with the closely packed earth, and must neces- sarily, it would seem, have .- ff – , been in the nature of vo-

tive offerings, made at the end of the 7 th or the beginning of the

*stamnedT V & f ^ ^ ”” ^ * P inS > brO0cheS > b – d * – d stamped disks of gold. The greater part of the find is at Con- stantinople, but a portion was assigned to the British Museum, which had undertaken the excavations*

Figs. 54-58 (Plate II.) Examples of the Ephesus hoard. ” f ” plectrum pin, with pomegranate head.*

“03 >i Hawk ornament.

” 56 „ Electrum pin.

tLˆI’ 5 ! • “r F lectru , m ornaments for sewing on drapery.

ieJelv Tr l Cy ? rUS have y ielded a rich harvest of

jewelry of Graeco-Phoenic.an style of the yth and following

*enr Hnff B – C ‘ r ˆ l6 *** ˆ “* typkal exam P les of a ri ng and ear-ring from Cyprus.*

Fig. 16. FlG _ I7

Greek Etruscan and Roman ornaments partake of very similar characteristics. Of course there is variety in design and sometimes m treatment, but it does not rise to any special individuality Fretwork is a distinguishing feature of all together with the wave ornament, the guilloche, and the occasional use of the human figure. The workmanship is often of a character which modern gold-workers can only rival with their best skill, and can never surpass.

Fig. 18.

JEWELRY

Plate I,

(From Enkomi.)

LATE MYCENAEAN. (Frou the Greek Islands.)

Plate II.

JEWELRY

m

54

55 B 56

57

58

^^62 ^^63

GREEK.

ETRUSCAN.

The Greek jewelry of the best period is of extraordinary delicacy and beauty. Fine examples are shown in the British Museum from Melos and elsewhere. Undoubtedly, however, the most brilliant collection of such ornaments is that of the Hermi- tage, which was derived from the tombs of Kerch and the Crimea. It contains examples of the purest Greek work, together with objects which must have been of local origin, as is shown by the themes which the artist has chosen for his reliefs. Fig. 18 illustrates the jewelry of the Hermitage (see also Ear-Ring).

As further examples of Greek jewelry see the pendant oblong ornament for containing a scroll (fig. 19).

Fig. 21.

Fig. 19. Fig. 20.

The ear-rings (figs. 20, 21) are also characteristic.

Figs. 59-70 (Plate II.) Examples of fine Greek jewelry, in the

„ 59-6o

British Museum Pair of ear-rings, from a grave at Cyme in

Aeolis, with filigree work and pendant

Erotes. 61 ,, Small bracelet.

62-63 .. Small gold reel with repouss6 figures of

Nereid with helmet of Achilles, and Eros.

From Cameiros (Rhodes).

64 ,, Filigree ornament (ear-ring?) with Eros in centre. From Syria.

65 ,, Medallion ornament with repoussd head of Dionysos and filigree work. (Blacas coll.)

66 „ Stud, with filigree work. 67-68 ,, Pair of ear-rings, of gold, with filigree and

enamel, from Eretria.

69 ,, Diadem, with filigree, and enamel scales, from Tarquinii.

70 ,, Necklace pendants.

Etruscan jewlery at its best is not easily distinguished from the Greek, but it tends in its later forms to become florid and diffuse, without precision of design. The granulation of surfaces piactised with the highest degree of refinement by the Etruscans was long a puzzle and a problem to the modern jeweller, until Castellani of Rome discovered gold-workers in the Abruzzi to whom the method had descended through many generations. He induced some of these men to go to Naples, and so revived the art, of which he contributed examples to the London Exhibition of 1872 (see Filigree).

Figs. 71-77 (Plate II.) are well-marked examples of Etruscan work, in the British Museum. ,,71 ,, Pair of sirens, repousseˆ forming a hook

and eye fastening. From Chiusi (?). ,, 72 ,, Early fibula. Horse and chimaera. (Blacas

coll.) _ ,, 74 ,, Medallion-shaped fibula, of fine granulated

work, with figures of sirens in relief, and set with dark blue pastes. (Bale coll.) 73. 75 ■• P a ‘ r of late Etruscan ear-rings.

.. 761 77 .. Pair of late Etruscan ear-rings, in the

florid style. The jewels of the Roman empire are marked by a greater use of large cut stones in combination with the gold, and by larger surfaces of plain and undecorated metal. The adaptation of imperial gold coins to the purposes of the jeweller is also not uncommon.

Figs. 78-82 (Plate II.) Late Roman imperial jewelry, in the

British Museum.

„ 78 ,, Large pendant ear-ring, set with stones

and pearls. From Tunis, 4th century. ,, 79 ,, Pierced-work pendant, set with a coin of

the emperor Philip. ” 80 ” Ear-rinj, roughly set with garnets.

,, 81 ,, Bracelet, with a winged cornucopia a3

central ornament, set with plasmas, and with filigree and leaf work. ,, 82 ,,

Bracelet, roughly set with pearls and

stones. From Tunis, 4th century.

With the decay of the Roman empire, and the approach of the barbarian tribes, a new Teutonic style was developed. An important example of this style is the remarkable gold treasure, discovered at Petrossa in Transylvanian Alps in 1837, an d now preserved, as far as it survives, in the museum of Bucharest. A runic inscription shows that it belonged to the Goths. Its style is in part the classical tradition, debased and modified; in part it is a singularly rude and vigorous form of barbaric art. Its chief characteristics are a free use of strongly conventional- ized animal forms, such as great bird-shaped fibulae, and an ornamentation consisting of pierced gold work, combined with a free use of stones cut to special shapes, and inlaid either cloisonne-fashion or in a perforated gold plate. This part of the hoard has its affinities in objects found over a wide field from Siberia to Spain. Its rudest and most naturalistic forms occur in the East in uncouth objects from Siberian tombs, whose lineage however has been traced to Persepolis, Assyria and Egypt. In its later and more refined forms the style is known by the name, now somewhat out of favour (except as applied to a limited number of finds), of Merovingian.

The so-called Merovingian jewelry of the 5th century, and the Anglo-Saxon of a later date, have as their distinctive feature thin plates of gold, decorated with thin slabs of garnet, set in walls of gold soldered vertically like the lines of cloisonne enamel, with the addition of very decorative details of filigree work, beading and twisted gold. The typical group are the contents of the tomb of King Childeric (a.d. 481) now in the Bibliotheque Nationale at Paris. In Figs. 22 and 23 we have examples of Anglo-Saxon fibulae, the first being decorated with a species

Fig. 22. Fig. 23. Fig. 24.

of cloisonne, in which garnets are inserted, while the other is in hammered work in relief. A pendant (fig. 24) is also set with garnets. The buckles (figs. 25, 26, 27) are remarkably charac

Fig. 25. Fig. 26. Fig. 27.

teristic examples, and very elegant in design. A girdle ornament in gold, set with garnets (fig. 28), is an example of Carolingian design of a high class. Another remarkable group of barbaric jewelry, dated by coins as of the beginning of the 7th century, was excavated at Castel Trosino near the Picenian Ascoli, and is attributed to the Lombards. See Monumenti antichi {Accademia dei Lincei), xii. 145.

We turn now to the Celtic group of jewelled ornaments, which has an equally long and inde- pendent line of descent. The characteristic Celtic ornaments are of hammered work with details in repousse, having fillings-in of vitreous paste, coloured enamels, amber, and in the later examples rock crystal with a smooth rounded surface cut en cabochon. The

Fig. 28.

whole group is a special development within the British Isles of the art of the mid-European Early Iron age, which in its turn had been considerably influenced by early Mediterranean culture. In its early stages its special marks are combinations of curves, with peculiar central thickenings which give a quasi- naturalistic effect; a skilful use of inlaid enamels, and the chased line. After the introduction of Christianity, a con- tinuous tradition combined the old system with the interlaced winding scrolls and other new forms of decoration, and so led up to the extreme complexity of early Irish illumination and metal work.

A remarkable group of gold ornaments of the pre-Christian time (probably of the ist century) was discovered about 1896, in the north-west of Ireland, and acquired by the British Museum. It was subsequently claimed by the Crown as treasure trove, and after litigation was transferred to Dublin (see Archaeologia, lv., pi. 22).

Figs. 29 and 30 are illustrations of two brooches of the latest

Fig. 29.

period in this class of work. The first is 13th century; the latter is probably 12th century, and is set with paste, amber and blue.

Rings are the chief specimens now seen of medieval jewelry from the 10th to the 13th century. They are generally massive and simple. Through the 16th century a variety of changes arose; in the traditions and designs of the cinquecento we have plenty of evidence that the workmen used their own designs, and the results culminated in the triumphs of Albert Diirer, Benvenuto Cellini and Hans Holbein. The goldsmiths of the

Fig. 30.

Italian republics must have produced works of surpassing excellence in workmanship, and reaching the highest point in design as applied to

handicrafts of any kind. The use of enamels, precious stones, niello work and engraving, in combina- tion with skilful execution of the human figure and animal life, produced effects which modern art in this direction is not likely to approach, still less to rival.

In fig. 31 illustrations are given of various characteristic specimens of the Renaissance and later forms of jewelry. A crystal cross set in enamelled gold (a) is German work of the 16th century. The pendant reliquary (6), enamelled and jewelled, is of 16th century Italian work, and so probably is the jewel © of gold set with dia- monds and rubies. The Darnley or Lennox jewel (d), now in the possession of the king, was made about 1576-1577 for Lady Margaret

Douglas, countess of Lennox, the mother of Henry Darnley. It is a pendant golden heart set with a heart-shaped sapphire, richly jewelled and enamelled with emblematic figures and devices. It also has Scottish mottoes around and within it. The ear-ring (e) of gold, enamelled, hung with small pearls, is an example of 17th cen- tury Russian work, and another (/) is Italian of the same period, being of gold and filigree with enamel, also with pendant pearls. A Spanish ear-ring, of 18th century work (g), is a combination of ribbon, cord and filigree in gold; and another (h) is Flemish, of probably the same period; it is of gold open work set with diamonds in projecting collets. The old French-Normandy pendant cross and locket (/) presents a characteristic example of peasant jewelry ; it is of branched open work set with bosses and ridged ornaments of crystal. The ear-ring (j) is French of 17th century, also of gold open work set with crystals. A small pendant locket (k) is of rock crystal, with the cross of Santiago in gold and translucent crimson enamel; it is 16th or 17th century Spanish work. A pretty ear-ring of gold open scroll work (m), set with minute diamonds and three pendant pearls, is Portuguese of 17th century, and another ear-ring («) of gold circular open work, set also with minute diamonds, is Portuguese work of 1 8th century. These examples fairly illustrate the general features of the most characteristic jewelry of the dates quoted.

During the 17th and 18th centuries we see only a mechanical kind of excellence, the results of the mere tradition of the work- shop — the lingering of the power which when wisely directed had done so much and so well, but now simply living on tra- ditional forms, often combined in a most incongruous fashion. Gorgeous effects were aimed at by massing the gold, and intro- ducing stones elaborately cut in themselves or clustered in groups. Thus diamonds were clustered in rosettes and bou- quets; rubies, pearls, emeralds and other coloured special stones were brought together for little other purpose than to get them into a given space in conjunction with a certain quantity of gold. The question was not of design in its

relation to use as personal decoration, but of the value which could be got into a given space to produce the most striking effect.

The traditions of Oriental design as they had come down through the various periods quoted, were comparatively lost in the wretched results of the rococo of Louis XIV. and the inanities of what modern revivalists of the Anglo-Dutch call " Queen Anne." In the London exhibition of 1851, the ex-travagances of modern jewelry had to stand comparison with the Oriental examples contributed from India. Since then we have learnt more about these works, and have been compelled to acknowledge, in spite of what is sometimes called inferiority of workmanship, how completely the Oriental jeweller under- stood his work, and with what singular simplicity of method he carried it out. The combinations are always harmonious, the result aimed at is always achieved; and if in attempting to work to European ideas the jeweller failed, this was rather the fault of the forms he had to follow, than due to any want of skill in making the most of a subject in which half the thought and the intended use were foreign to his experience.

A collection of peasant jewelry got together by Castellani for the Paris exhibition of 1867, and now in the Victoria and Albert Museum, illustrates in an admirable manner the traditional jewelry and personal ornaments of a wide range of peoples in Europe. This collection, and the additions made to it since its acquisition by the nation, show the forms in which these objects existed over several generations among the peasantry of France (chiefly Normandy), Spain, Portugal, Holland, Den- Mark, Germany and Switzerland, and also show how the forms popular in one country are followed and adopted in another, almost invariably because of their perfect adaptation to the purpose for which they were designed.

Apart from these humbler branches of the subject, in the middle of the 19th century the production of jewelry, regarded as a personal art, and not as a commercial and anonymous industry, was almost extinct. Its revival must be associated with the artistic movement which marked the close of that century, and which found emphatic expression in the Paris international exhibition of 1900. For many years before 1895 this industry, though prosperous from the commercial point of view, and always remarkable from that of technical finish, I remained stationary as an art. French jewelry rested on its

reputation. The traditions were maintained of either the 17th and 1 8th centuries or the style affected at the close of the second empire — light

pierced work and design borrowed from natural flowers. The last type, introduced by Massin, had exercised, indeed, a revolutionary influence on the treatment of jewelry. This clever artist, not less skilful as a craftsman, produced a new genre by copying the grace and lightness of living blossoms, thus introducing a perfectly fresh element into the limited variety of traditional style, and by the use of filigree gold work altering its character and giving it greater elegance. Massin still held the first rank in the exhibition of 1878; he had a marked influence on his contemporaries, and his name will be remem- bered in the history of the goldsmith's art to designate a style

further confirmed in his remarkable position by the exhibition of 1900. What specially stamps the works of Lalique is their striking originality. His work may be considered from the point of view of design and from that of execution. As an artist he has completely reconstructed from the foundation the scheme of design which had fed the poverty-stricken imagination of the last generation of goldsmiths. He had recourse to the art of the past, but to the spirit rather than the letter, and to nature for many new elements of design — free double curves, suave or soft; opalescent harmonies of colouring; reminiscences, with quite a new feeling, of Egypt, Chaldea, Greece and the East, or of the art of the Renaissance; and infinite variety of floral forms even of the humblest. He introduces also the female nude in the

Fig. 31.

and a period. Throughout'these years the craft was exclusively devoted to perfection of workmanship. The utmost finish was aimed at in the mounting and setting of gems; jewelry was, in fact, not so much an art as a high-class industry; individual effort and purpose were absent.

Up to that time precious stones had been of such intrinsic value that the jeweller's chief skill lay in displaying these costly stones to the best advantage; the mounting was a secondary consideration. The settings were seldom long preserved in their original condition, but in the case of family jewels were renewed with each generation and each change of fashion, a state of things which could not be favourable to any truly artistic development of taste, since the work was doomed, sooner or later, to destruction. However, the evil led to its own remedy. As soon as diamonds fell in value they lost at the same time their overwhelming prestige, and refined taste could give a preference to trinkets which derived their value and character from artistic design. This revolutionized the jeweller's craft, and revived the simple ornament of gold or silver, which came forward but timidly at first, till, in the Salon of 1895, it bursl, upon the world in the exhibits of Rene Lalique, an artist who was

form "of sirens and sphinxes. As a craftsman he has effected a radical change, breaking through old routine, combining all the processes of the goldsmith, the chaser, the enameller and the gem-setter, and freeing himself from the narrow lines in which the art had been confined. He ignores the hierarchy of gems, caring no more on occasion for a diamond than for a flint, since, in his view, no stone, whatever its original estimation, has any value beyond the characteristic expression he lends it as a means to his end. Thus, while he sometimes uses diamonds, rubies, sapphires or emeralds as a background, he will, on the other hand, give a conspicuous position to common stones — carnelian, agate, malachite, jasper, coral, and even materials of no intrinsic value, such as horn. One of his favourite stones is the opal, which lends itself to his arrangements of colour, and which has in consequence become a fashionable stone in French jewelry.

In criticism of the art of Lalique and his school it should be observed that the works of the school are apt to be unsuited to the wear and tear of actual use, and inconveniently eccentric in their details. Moreover, the preciousness of the material is an almost inevitable consideration in the jeweller's craft, and cannot be set at naught by the artist without violating the canons of his art.

The movement which took its rise in France spread in due course to other countries. In England the movement con- veniently described as the " arts and crafts movement " affected the design of jewelry. A group of designers has aimed at purg- ing the jeweller's craft of its character of mere gem-mounting in conventional forms (of which the more unimaginative, represent- ing stars, bows, flowers and the like, are varied by such absurdi- ties as insects, birds, animals, figures of men and objects made up simply of stones clustered together). Their work is often excellently and fancifully designed, but it lacks that exquisite perfection of execution achieved by the incomparable craftsmen of France. At the same time English sculptor-decorators — such as Alfred Gilbert, R.A., and George J. Frampton, A.R.A. — have produced objects of a still higher class, but it is usually the work of the goldsmith rather than of the jeweller. Examples may be seen in the badge executed by Gilbert for the president of the Institute of Painters in Water Colours and in the mayoral chain for Preston. Symbolism here enters into the design, which has not only an ornamental but a didactic purpose.

The movement was represented in other countries also. In the United States it was led by L. C. Tiffany, in Belgium by Philippe Wolfers, who occupies in

Belgium the position which in France is held by Rene Lalique. If his design is a little heavier, it is not less beautiful in imagination or less masterly in execu- tion. Graceful, ingenious, fanciful, elegant, fantastic by turns, his objects of jewelry and goldsmithery have a solid claim to be considered creations d'art. It has also been felt in Germany, Austria, Russia and Switzerland. It must be admitted that many of the best artists who have devoted themselves to jewelry have been more successful in design than in securing the lightness and strength which are required by the wearer, and which were a characteristic in the works of the Italian craftsmen of the Renais- sance. For this reason many of their masterpieces are more beautiful in the case than upon the person.

Modern Jewelry. — So far we have gone over the progress and results of the jeweller's art. We have now to speak of the pro- duction of jewelry as a modern art industry, in which large numbers of men and women are employed in the larger cities of Europe. Paris, Vienna, London and Birmingham are the most important centres. An illustration of the manufacture as carried on in London and Birmingham will be sufficient to give an insight into the technique and artistic manipulation of this branch of art industry; but, by way of contrast, it may be inter- esting to give in the first place a description of the native working jeweller of Hindustan.

He travels very much after the fashion of a tinker in England; his budget contains tools, materials, fire pots, and all the requisites of his handicraft. The gold to be used is generally supplied by the patron or employer, and is frequently in gold coin, which the travelling jeweller undertakes to convert into the ornaments required. He squats down in the corner of a courtyard, or under cover of a veranda, lights his fire, cuts up the gold pieces entrusted to him, hammers, cuts, shapes, drills, solders with the blow-pipe, files, scrapes and burnishes until he has produced the desired effect. If he has stones to set or coloured enamels to introduce, he never seems to make a mistake; his instinct for harmony of colour, like that of his brother craftsman the weaver, is as unerring as that of the bird in the construction of its nest. Whether the materials are common or rich and rare, he invariably does the very best possible with them, according to native ideas of beauty in design and com- bination. It is only when he is interfered with by European dictation that he ever vulgarizes his art or makes a mistake. The result may appear rude in its finish, but the design and the thought are invariably right. We thus see how a trade in the working of which the " plant " is so simple and wants are so readily met could spread itself, as in years past it did at Clerkenwell and at Birmingham before gigantic factories were invented for producing everything under the sun.

It is impossible to find any date at which the systematic pro- duction of jewelry was introduced into England. Probably the Clerkenwell trade dates

its origin from the revocation of the edict of Nantes, as the skilled artisans in the jewelry, clock and watch, and trinket trades appear to have been descendants of the emigrant Huguenots. The Birmingham trade would appear to have had its origin in the skill to which the workers in fine steel had attained towards the middle and end of the 18th

century, a branch of industry which collapsed after the French Revolution.

Modern jewelry may be classified under three heads: (i) objects in which gems and stones form the principal portions, and in which the work in silver, platinum or gold is really only a means for carrying out the design by fixing the gems or stones in the position arranged by the designer, the metal employed being visible only as a setting; (2) when gold work plays an important part in the development of the design, being itself ornamented by en- graving (now rarely used) or enamelling or both, the stones and gems being arranged in subordination to the gold work in such positions as to give a decorative effect to the whole ; (3) when gold or other metal is alone used, the design being wrought out by ham- mering in repousse, casting, engraving, chasing or by the addition of filigree work (see Filigree), or when the surfaces are left abso- lutely plain but polished and highly finished.

Of course the most ancient and primitive methods are those wholly dependent upon the craft of the workman; but gradually various ingenious processes were invented, by which greater accuracy in the portions to be repeated in a design could be produced with certainty and economy: hence the various methods of stamping used in the production of hand-made jewelry, which are in themselves as much mechanical in relation to the end in view as if the whole object were stamped out at a blow, twisted into its proper position as regards the detail, or the various stamped portions fitted into each other for the mechanical completion of the work. It is there- fore rather difficult to draw an absolute line between hand-made and machine-made jewelry, except in extreme cases of hand-made, when everything is worked, so to speak, from the solid, or of machine- made, when the hand has only to give the ornament a few touches of a tool, or fit the parts together if of more than one piece.

The best and most costly hand-made jewelry produced in England, whether as regards gold work, gems, enamelling or engraving, is made in London, and chiefly at Clerkenwell. A design is first made with pencil, sepia or water colour, and when needful with separate enlargement of details, everything in short to make the drawing thoroughly intelligible to the working jeweller. According to the nature and purpose of the design, he cuts out, hammers, files and brings into shape the constructive portions of the work as a basis. Upon this, as each detail is wrought out, he solders, or

(more rarely) fixes by rivets, &c, the' ornamentation necessary to the effect. The human figure, representations of animal life, leaves, fruit, &c, are modelled in wax, moulded and cast in gold, to be chased up and finished. As the hammering goes on the metal becomes brittle and hard, and then it is passed though the fire to anneal or soften it. In the case of elaborate examples of repouss6, after the general forms are beaten up, the interior is filled with a resinous compound, pitch mixed with fire-brick dust ; and this, forming a solid but

E liable body underneath the metal, allows of the finished details eing wrought out on the front of the design, and being finally completed by chasing. When stones are to be set, or when they form the principal portions of the design, the gold or other metal has to be wrought by hand so as to receive them in little cup-like orifices, these walls of gold enclosing the stone and allowing the edges to be bent over to secure it. Setting is never effected by cement in well-made jewelry. Machine-made settings have in recent years been made, but these are simply cheap imitations of the true hand-made setting. Even strips of gold have been used, serrated at the edges to allow of being easily bent over, for the retention of the stones, true or false.

Great skill and experience are necessary in the proper setting of stones and gems of high value, in order to bring out the greatest amount of brilliancy and colour, and the angle at which a diamond (say) shall be set, in order that the light shall penetrate at the proper point to bring out the " spark " or " flash," is a. subject of grave consideration to the setter. Stones set in a haphazard, slovenly manner, however brilliant in themselves, will look commonplace by the side of skilfully set gems of much less fine quality and water. Enamelling (see Enamel) has of late years largely taken the place of " paste " or false stones.

Engraving is a simple process in itself, and diversity of effect can be produced by skilful manipulation. An interesting variety in the effect of a single ornament may be produced by the combina- tion of coloured gold of various tints. This colouring is a process requiring skill and experience in the manipulation of the materials according to the quality of the gold and the amount of silver alloy in it. The objects to be coloured are dipped in a boiling mixture of salt, alum and saltpetre. Of general colouring it may be said that the object aimed at is to enhance the appearance of the gold by removing the particles of alloy on the surface, and thus allowing the pure gold only to remain visible to the eye. The process has, however, gone much out of fashion. It is apt to rot the solder, and repairs to gold work can be better finished by electro-gilding. The application of machinery to the economical production of certain classes of jewelry, not necessarily imitations, but as much " real gold " work, to use a trade phrase, 'as the

best hand-made, has been on the increase for many years. Nearly every kind of gold chain now made is manufactured by machinery, and nothing like

the beauty of design or perfection of workmanship could be obtained by hand at, probably, any cost. The question therefore in relation to chains is not the mode of manufacture, but the quality of the metal. Eighteen carat gold is of course preferred by those who wear chains, but this is only gold in the proportion of 18 to 24, pure gold being represented by 24. The gold coin of the realm is 22 carat ; that is, it contains one-twelfth of alloy to harden it to stand wear and tear. Thus 18 carat gold has one-fourth of alloy, and so on with lower qualities down to 12, which is in reality only gold by courtesy. It must be remembered that the alloys are made by weight, and as gold is nearly twice as heavy as the metal it is mixed with, it only forms a third of the bulk of a 12 carat mixture.

The application of machinery to the production of personal ornaments in gold and silver can only be economically and success- fully carried on when there is a large demand for similar objects, that is to say, objects of precisely the same design and decoration throughout. In machine-made jewelry everything is stereotyped, so to speak, and the only work required for the hand is to fit the parts together — in some instances scarcely that. A design is made, and from it steel dies are sunk for stamping out as rapidly as possible from a plate of rolled metal the portion represented by each die. It is in these steel dies that the skill of the artist die-sinker is mani- fested. Brooches, ear-rings, pinheads, bracelets, lockets, pendants, &c, are struck out by the gross. This is more especially the case in silver and in plated work — that is, imitation jewelry — the base of which is an alloy, afterwards gilt by electro-plating. With these ornaments imitation stones in paste and glass, pearls, &c, are used, and it is remarkable that of late years some of the best designs, the most simple, appropriate and artistic, have appeared in imitation jewelry. It is only just to those engaged in this manufacture to state distinctly that their work is never sold wholesale for anything else than what it is. The worker in gold only makes gold or real jewelry, and he only makes of a quality well known to his customers. The producer of silver work only manufactures silver ornaments, and so on throughout the whole class of plated goods.

It is the retailer who, if he is unprincipled, takes advantage of the ignorance of the buyer and sells for gold that which is in reality an imitation, and which he bought as such. The imitations of old styles of jewelry which are largely sold in curiosity shops at foreign places of fashionable resort are said to be made in Germany, especially at Munich.

Bibliography. — For the Dahshur jewels, see J. de Morgan and others; Fouilles d. Dahchour, Mars-Juin 18Q4 (Vienna, 1895) and Fouilles a Dahchour en 1804-1895 (Vienna, 1903). For the Aah-hotp jewels, see Mariette, Album de Musee de Boulaq, pis. 29-31; Birch, Facsimiles of the Egyptian Relics discovered in the Tomb of Queen Aah- hotep (1863). For Cretan excavations, see A. J Evans, in Annual of the British School at Athens, Nos. 7 to II ; Archaeologia, vol. lix. For excavations at Enkorni, see Excavations in Cyprus, by A. S. Murray and others (1900). For Schliemann's excavations, see Schliemann's works; also Schuchhardt, Schliemann's Excavations; Perrot & Chipiez, Histoire de I' Art, vi. For the Greek Island treasure, see A. J. Evans, Journal of Hellenic Studies, xiii. For Ephesus gold treasure, see D. G. Hogarth, British Museum Excavations at Ephesus; The Archaic Artemisia. For the Hermitage Collection from South Russia, see Gille, Antiquiles du Bosphore Cimmerien (reissued by S. Reinach), and the Coinptes rendus of the Russian Archaeological Commission (St Petersburg). For later jewelry, Pollak, Gold-schmiedearbeit. For Treasure of Petrossa, A. Odobesco, Le Tresor de Petrossa. For the European and west Asiatic barbaric jewelry, see O. M. Dalton, in Archaeologia, Iviii. 237, and the Treasure of the Oxus (British Museum, 1905). For the whole history, G. Fontenay, Les Bijoux anciens et modernes (Paris [Quantin], 1887). For the recent movement, Leonce Benddite, " La Bijouterie et la joaillerie, a l'exposition universelle; Rene Lalique, ' in the Revue des arts decoratifs, 1900 (July, August). (A. H. Sm.)

JEWETT, SARAH ORNE (1849-1909), American novelist, was born in South Berwick, Maine, on the 3rd of September 1849. She was a daughter of the physician Theodore H. Jewett (1815- 1878), by whom she was greatly influenced, and whom she has drawn in A Country Doctor (1884). She studied at the Berwick Academy, and began her literary career in 1869, when she con- tributed her first story to the Atlantic Monthly. Her best work consists of short stories and sketches, such as those in. The Country of the Pointed Firs (1896). The People of Maine, with their characteristic speech, manners and traditions, she describes with peculiar charm and realism, often recalling the work of Hawthorne. She died at South Berwick, Maine, on the 24th of June 1909.

Among her publications are: Deephaven (1877), a series of sketches; Old Friends and New (1879); Country By-ways (1881); A Country Doctor (1884), a novel; A Marsh Island (1885), a novel; A White Heron and other Stories (1886) ; The King of Folly Island and, other People (1888); Strangers and Wayfarers (1890); A Native of Winby and other Tales (1893); The Queen's Twin and other Stories (1899), and The Tory Lover (1901), an historical novel.

JEWS (Heb. Yghudl, man of Judah; Gr. ‘IovScuol; Lat.

Judaei), the general name for the Semitic people which inhabited Palestine from early times, and is known in various connexions as ” the Hebrews,” ” the Jews,” and ” Israel ” (see §5 below). Their history may be divided into three great periods: (1) That covered by the Old Testament to the foundation of Judaism in the Persian age, (2) that of the Greek and Roman domination to the destruction of Jerusalem, and (3) that of the Diaspora or Dispersion to the present day.

I. — Old Testament History

1. The Land and the People. — For the first two periods the history of the Jews is mainly that of Palestine. It begins among those peoples which occupied the area lying between the Nile on the one side and the Tigris and the Euphrates on the other. Surrounded by ancient seats of culture in Egypt and Baby- lonia, by the mysterious deserts of Arabia, and by the highlands of Asia Minor, Palestine, with Syria on the north, was the high road of civilization, trade and warlike enterprise, and the meeting-place of religions. Its small principalities were entirely dominated by the great Powers, whose weakness or acquiescence alone enabled them to rise above dependence or vassalage. The land was traversed by old-established trade routes and possessed important harbours on the Gulf of ‘Akaba and on the Mediterranean coast, the latter exposing it to the influence of the Levantine culture. It was ” the physical centre of those movements of history from which, the world has grown.” The portion of this district abutting upon the Mediter- ranean may be divided into two main parts: — Syria (from the Taurus to Hermon) and Palestine (southward to the desert bordering upon Egypt). The latter is about 150 m. from north to south (the proverbial ” Dan to Beersheba “), with a breadth varying from 25 to 80 m., i.e. about 6040 sq. m. This excludes the land east of the Jordan, on which see Palestine.

From time to time streams of migration swept into Palestine and Syria. Semitic tribes wandered northwards from their home in Arabia to seek sustenance in its more fertile fields, to plunder, or to escape the pressure of tribes in the rear. The course leads naturally into either Palestine or Babylonia, and, following the Euphrates, northern Syria is eventually reached. Tribes also moved down from the north: nomads, or offshoots from the powerful states which stretch into Asia Minor. Such frequently recurring movements introduced new blood. Tribes, chiefly of pastoral habits, settled down among others who were so nearly of their own type that a complete amalgamation could be effected, and this without any

marked modification of the general characteristics of the earlier inhabitants. It is from such a fusion as this that the ancestors of the Jews were descended, and both the history and the genius of this people can be properly understood only by taking into account the physical features of their land and the characteristics of the Semitic races in general (see Palestine, Semitic Languages).

2. Society and Religion. — The similarity uniting the peoples of the East in respect of racial and social characteristics is accompanied by a striking similarity of mental outlook which has survived to modern times. Palestine, in spite of the numer- ous vicissitudes to which it has been subjected, has not lost its fundamental characteristics. The political changes involved in the Babylonian, Assyrian, Egyptian or Persian conquests surely affected it as little as the subsequent waves of Greek, Roman and other European invasions. Even during the tem- porary Hellenization in the second great period the character of the people as a whole was untouched by the various external influences which produced so great an effect on the upper classes. When the foreign civilization perished, the old culture once more came to the surface. Hence it is possible, by a comprehensive comparative study of Eastern peoples, in both ancient and modern times, to supplement and illustrate within certain limits our direct knowledge of the early Jewish people, and thus to understand more clearly those characteristics which were

peculiar to them, in relation to those which they shared with other Oriental peoples.

Even before authentic history begins, the elements of religion and society had already crystallized into a solid coherent struc- ture which was to persist without essential modification. Reli- gion was inseparable from ordinary life, and, like that of all peoples who are dependent on the fruits of the earth, was a nature-worship. The tie between deities and worshippers was regarded as physical and entailed mutual obligations. The study of the clan-group as an organization is as instructive here as in other fields. The members of each group lived on terms of equality, the families forming a society of worship the rites of which were conducted by the head. Such groups (each with its local deity) would combine for definite purposes under the impulse of external needs, but owing to inevitable internal jealousies and the incessant feuds among a people averse from discipline

and authority, the unions were not necessarily lasting. The elders of these groups possessed some influence, and tended to form an aristocracy, which took the lead in social life, although their authority generally depended merely upon custom. Individual leaders in times of stress acquired a recognized supremacy, and, once a tribe outstripped the rest, the opportunities for continued advance gave further scope to their authority. " The interminable feuds of tribes, conducted on the theory of blood-revenge, . . . can seldom be durably healed without the intervention of a third party who is called in as arbiter, and in this way an impartial and wise power acquires of necessity a great and beneficent influence over all around it " (W. R. Smith). In time, notwithstanding a certain inherent individualism and impatience of control, veri- table despotisms arose in the Semitic world, although such organizations were invariably liable to sudden collapse as the old forms of life broke down with changing conditions. 1

3. Early History. 2 — Already in the 15th century B.C. Palestine was inhabited by a settled people whose language, thought and religion were not radically different several hundred years later. Small native princes ruled as vassals of Egypt which, after expelling the Hyksos from its borders, had entered upon a series of conquests as far as the Euphrates. Some centuries pre- viously, however, Babylonia had laid claim to the western states, and the Babylonian (i.e. Assyrian) script and language were now used, not merely in the diplomatic correspondence between Egypt and Asia, but also for matters of private and everyday life among the Palestinian princes themselves. To what extent specific Babylonian influence showed itself in other directions is not completely known. Canaan (Palestine and the south Phoenician coast land) and Amor (Lebanon district and beyond) were under the constant supervision of Egypt, and Egyptian officials journeyed round to collect tribute, to attend to com- plaints, and to assure themselves of the allegiance of the vassals. The Amarna tablets and those more recently found at Taannek (bibl. Taanach), together with the contemporary archaeological evidence (from Lachish, Gezer, Megiddo, Jericho, &c), represent advanced conditions of life and culture, the precise chronological limits of which cannot be determined with certainty. This age, with its regular maritime intercourse between the Aegean settlements, Phoenicia and the Delta, and with lines of caravans connecting Babylonia, North Syria, Arabia and Egypt, presents a remarkable picture of life and activity, in the centre of which lies Palestine, with here and there Egyptian colonies and some traces of Egyptian cults. The history of this, the " Amarna " age, reveals a state of anarchy in Palestine for which the weak- ness of Egypt and the downward pressure of north Syrian

1 On the homogeneity of the population, see further, W. R. Smith, Religion of the Semites (2nd ed., chaps, i.-iii.) ; T. Noldeke, Sketches from Eastern History, pp. 1-20 (on " Some Characteristics of the Semitic Race “) ; and

especially E. Meyer, Gesch. d. Altertums (2nd ed., i- §§330, sqq.). For the relation between the geographical character- istics and the political history, see G. A. Smith, Historical Geography of the Holy Land.

2 For fuller information on this section see Palestine : History, and the related portions of Babylonia and Assyria, Egypt, Hittites, Syria.

peoples were responsible. Subdivided into a number of little local principalities, Palestine was suffering both from internal intrigues and from the designs of this northern power. It is now that we find the restless Habiru, a name which is commonly identified with that of the " Hebrews " ('ibrim). They offer themselves where necessary to either party, and some at least perhaps belonged to the settled population. The growing prominence of the new northern group of " Hittite " states con- tinued to occupy the energies of Egypt, and when again we have more external light upon Palestinian history, the Hittites (5.11.) are found strongly entrenched in the land. But by the end of the first quarter of the 13th century B.C. Egypt had recovered its province (precise boundary uncertain), leaving its rivals in pos- session of Syria. Towards the close of the 13 th century the Egyptian king Merneptah (Mineptah) records a successful cam- paign in Palestine, and alludes to the defeat of Canaan, Ascalon, Gezer, Yenuam (in Lebanon) and (the people or tribe) Israel. 3 Bodies of aliens from the Levantine coast had previously threatened Egypt and Syria, and at the beginning of the 12th century they formed a coalition on land and sea which taxed all the resources of Rameses III. In the Purasati, apparently the most influential of these peoples, may be recognized the origin of the name " Philistine." The Hittite power became weaker, and the invaders, in spite of defeat, appear to have succeeded in maintaining themselves on the sea coast. External history, however, is very fragmentary just at the age when its evidence would be most welcome. For a time the fate of Syria and Pales- tine seems to have been no longer controlled by the great powers. When the curtain rises again we enter upon the historical traditions of the Old Testament.

4. Biblical History. — For the rest of the first period the Old Testament forms the main source. It contains in fact the history itself in two forms: (a) from the creation of man to the fall of Judah (Genesis-2 Kings), which is supplemented and continued further — (b) to the foundation of Judaism in the 5th century B.C. (Chronicles — Ezra-Nehemiah). In the light of contemporary monuments, archaeological evidence, the progress of scientific knowledge and the recognized methods of modern historical criticism, the representation of the origin of mankind and of the history of the Jews in the Old Testament can no longer be implicitly accepted. Written by an Oriental people and clothed in an Oriental dress, the Old Testament does not contain objective records, but subjective history written and

incorporated for specific purposes. Like many Oriental works it is a compila- tion, as may be illustrated from a comparison of Chronicles with Samuel-Kings, and the representation of the past in the light of the present (as exemplified in Chronicles) is a frequently recur- ring phenomenon. The critical examination of the nature and growth of this compilation has removed much that had formerly caused insuperable difficulties and had quite unnecessarily been made an integral or a relevant part of practical religion. On the other hand, criticism has given a deeper meaning to the Old Testament history, and has brought into relief the central truths which really are vital; it may be said to have replaced a divine account of man by man's account of the divine. Scholars are now almost unanimously agreed that the internal features are best explained by the Graf-Wellhausen hypothesis. This involves the view that the historical traditions are mainly due to two characteristic though very complicated recensions, one under the influence of the teaching of Deuteronomy (Joshua to Kings, see § 20), the other, of a more priestly character (akin to Leviticus), of somewhat later date (Genesis to Joshua, with traces in Judges to Kings, see § 23). There are, of course, numerous problems relating to the nature, limits and dates of the two recensions, of the incorporated sources, and of other sources (whether early or late) of independent origin; and here there is naturally room for much divergence of opinion. Older material (often of composite origin) has been used, not so much for the purpose of providing historical information, as with the object of showing the religious significance of past history;

3 Or land Israel, W. Spiegelberg, Orient. Lit. Zeit. xi. (1908), cols.

403-405.

and the series Joshua- Kings is actually included among the " prophets " in Jewish reckoning (see Midrash). In general, one may often observe that freedom which is characteristic of early and unscientific historians. Thus one may note the reshaping of older material to agree with later thought, the building up of past periods from the records of other periods, and a frequent loss of perspective. The historical traditions are to be supplemented by the great body of prophetic, legal and poetic literature which reveal contemporary conditions in various internal literary, theological or sociological features. The investigation of their true historical background and of the trustworthiness of their external setting (e.g. titles of psalms, dates and headings of prophecies) involves a criticism of the historical traditions themselves, and thus the two major classes of material must be constantly examined both separately and in their bearing on one another. In a word, the study of biblical history, which is dependent in the

first instance upon the written sources, demands constant attention to the text (which has had an interesting history) and to the literary features; and it requires a sympathetic acquaintance with Oriental life and thought, both ancient and modern, an appreciation of the neces- sity of employing the methods of scientific research, and (from the theological side) a reasoned estimate of the dependence of individual religious convictions upon the letter of the Old Testament. 1

In view of the numerous articles in this work dealing with biblical subjects, 2 the present sketch is limited to the outlines of the tra- ditional history; the religious aspect in its bearing upon biblical theology (which is closely bound up with the traditions) is handled separately under Hebrew Religion. The related litera- ture is enormous (see the bibliographies to the special articles) ; it is indexed annually in Orientalische Bibliographie (Berlin), and is usefully summarized in the Theologische Jahresbericht (Berlin). On the development of the study of biblical history see C. A. Briggs, Study of Holy Scripture (1899), especially ch. xx. The first scientific historical work was by H. Ewald, Gesch. d. Volkes Israel (1843; 3rd ed., 1864-1868; Eng. trans., 1869-1883), popularized by Arthur Penrhyn Stanley in his Hist, of the Jewish Church (1863-1879). The works of J. Wellhausen (especially Prolegomena to the Hist, of Israel, Eng. trans., 1885, also the brilliant article " Israel " in the 9th ed. of the Ency. Brit., 1879) were epoch-making; his position was inter- preted to English readers by W. Robertson Smith (Old Test, in Jewish Church, 1881, 2nd ed., 1892; Prophets of Israel, 1882, 2nd ed. bv T. K. Chevne, 1902). The historical (and related) works of T. K. Cheyne, H. Graetz, H. Guthe, F. C. Kent, A. Kittel, W. H. Kosters, A. Kuenen, C. Piepenbring, and especially B. Stade, al- though varying greatly in standpoint, are among the most valuable by recent scholars; H. P. Smith's Old Test. Htst. (" International Theological Library," Edinburgh, 1903) is in many respects the most serviceable and complete study; a modern and more critical " Ewald " is a desideratum. For the works of numerous other scholars who have furthered Old Testament research in the past it must suffice to refer to the annotated list by J. M. P. Smith, Books for O.T. Study (Chicago, 1908).

For the external history, E. Schrader, Cuneiform Inscr. and the Old Testament (Eng. trans, by O. C. Whitehouse, 1885-1888) is still helpful ; among the less technical works are J. F. McCurdy, History, Prophecy and the Monuments; B. Paton, Syria and Palestine (1902); G. Maspero, Hist, ancienne (6th ed., 1904) ; A. Jeremias, Alte Test, im Lichte d. Alien Orients (2nd ed., 1906) ; and especially Altoriental. Texte u. Bilder zum Alten Test., ed. by H. Gressman, with A. Ungnad and H. Ranke (1909). The most complete is that of Ed. Meyer, Gesch. d. Alterthums (2nd ed., 1907 sqq.). That of Jeremias follows upon the lines of H. Winckler, whose works depart from the some- what narrow limits of purely " Israelite "

histories, emphasize the necessity of observing the characteristics of Oriental thought and policy, and are invaluable for discriminating students. Winckler's own views are condensed in the 3rd edition — a re-writing — of Schrader's work (Keilinschr. u. d. Alte Testament, 1903), and, with an instructive account of the history of " ancient nearer Asia," in H. F. Helmolt's World's History, iii. 1-252 (1903). All modern

1 It is useful to compare the critical study of the Koran (q.v.), where, however, the investigation of its various " revelations " is simpler than that of the biblical " prophecies " on account of the greater wealth of independent historical tradition. See also G. B. Gray, Contemporary Review (July 1907) ; A. A. Bevan, Cambridge Biblical Essays (ed. Swete, 1909), pp. 1-19.

2 See primarily Bible: Old Testament; the articles on the con- tents and literary structure of the several books; the various bio- graphical, topographical and ethnical articles, and the separate treatment of the more important subjects (e.g. Levites, Prophet, Sacrifice).

histories of any value are necessarily compromises between the biblical traditions and the results of recent investigation, and those studies which appear to depart most widely from the biblical or canonical representation often do greater justice to the evidence as a whole than the slighter or more conservative and apologetic reconstructions. 3 Scientific biblical historical study, nevertheless, is still in a relatively backward condition ; and although the labours of scholars since Ewald constitute a distinct epoch, the trend of research points to the recognition of the fact that the purely subjec- tive literary material requires a more historical treatment in the light of our increasing knowledge of external and internal conditions in the old Oriental world. But an inductive and deductive treatment, both, comprehensive and in due proportion, does not as yet (1910) exist, and awaits fuller external evidence. 4

5. Traditions of Origin. — The Old Testament preserves the remains of an extensive literature, representing different stand- points, which passed through several hands before it reached its present form. Surrounded by ancient civilizations where writing had long been known, and enjoying, as excavation has proved, a considerable amount of material culture, Palestine could look back upon a lengthy and stirring history which, however, has rarely left its mark upon our records. Whatever ancient sources may have been accessible, whatever trustworthy traditions were in circulation, and whatever a knowledge of the ancient Oriental world might lead one to expect, one is naturally restricted in the first instance to those

undated records which have survived in the form which the last editors gave to them. The critical investigation of these records is the indispensable prelude to all serious biblical study, and hasty or sweeping deductions from monumental or archaeological evidence, or versions com- piled promiscuously from materials of distinct origin, are alike hazardous. A glimpse at Palestine in the latter half of the second millennium B.C. (§ 3) prepares us for busy scenes and active intercourse, but it is not a history of this kind which the biblical historians themselves transmit. At an age when — on literary-critical grounds — the Old Testament writings were assuming their present form, it was possible to divide the im- mediately preceding centuries into three distinct periods, (a) The first, that of the two rival kingdoms: Israel (Ephraim or Samaria) in the northern half of Palestine, and Judah in the south. Then (b) the former lost its independence towards the close of the 8th century B.C., when a number of its inhabitants were carried away, and the latter shared the fate of exile at the beginning of the 6th, but succeeded in making a fresh reconstruction some fifty or sixty years later. Finally ©, in the so-called " post-exilic " period, religion and life were reorganized under the influence of a new spirit ; relations with Samaria were broken off, and Judaism took its definite character, perhaps about the middle or close of the 5th century. Throughout these vicissitudes there were important political and religious changes which render the study of the composite sources a work of unique difficulty. In addition to this it should be noticed that the term " Jew " (originally Yehudi), in spite of its wider application, means properly " man of Judah," i.e. of that small district which, with Jerusalem as its capital, became the centre of Judaism. The favourite name " Israel " with all its religious and national associations is some- what ambiguous in an historical sketch, since, although it is used as opposed to Judah (a), it ultimately came to designate the true nucleus of the worshippers of the national god Yahweh as op- posed to the Samaritans, the later inhabitants of Israelite territory (c). A more general term is " Hebrew " (see Hebrew Language), which, whether originally identical with the Habiru or not (§ 3), is used in contrast to foreigners, and this non-committal ethnic

3 On the bearing of external evidence upon the internal biblical records, see especially S. R. Driver's essay in Hogarth's Authority and Archaeology; cf. also A. A. Bevan, Critical Review (1897), p. 406 sqq., 1898, pp. 131 sqq.); G. B. Gray, Expositor, May 1898; W. G. Jordan, Bib. Crit. and Modern Thought (1909), pp. 42 sqq.

4 For the sections which follow the present writer may be per- mitted to refer to his introductory contributions in the Expositor (June, 1906; " The Criticism of the O.T."); the Jewish Quarterly Review (July 1905-January 1907 = Critical Notes on O.T. History, especially sections vii.-ix.); July and October 1907, April 1908; Amer. Journ. Theol. (July 1909, " Simeon

and Levi: the Problem of the Old Testament “) ; and Swete’s Cambridge Bib. Essays, pp. 54-89 (” The Present Stage of O.T. Research “).

deserves preference where precise distinction is unnecessary or impossible.

The traditions which prevailed among the Hebrews concerning their origin belong to a time when Judah and Israel were regarded as a unit. Twelve divisions or tribes, of which Judah was one, held together by a traditional sentiment, were traced back to the sons of Jacob (otherwise known as Israel), the son of Isaac and grandson of Abraham. Their names vary in origin and probably also in point of age, and where they represent fixed territorial limits, the districts so described were in some cases certainly peopled by groups of non-Israelite ancestry. But as tribal names they invited explanation, and of the many character- istic traditions which were doubtless current a number have been preserved, though not in any very early dress. Close relationship was recognized with the Aramaeans, with Edom, Moab and Ammon. This is characteristically expressed when Esau, the ancestor of Edom, is represented as the brother of Jacob, or when Moab and Ammon are the children of Lot, Abra- ham’s nephew (see Genealogy: Biblical). Abraham, it was believed, came from Harran (Carrhae) , primarily from Babylonia, and Jacob re-enters from Gilead in the north-east with his Aramaean wives and concubines and their families (Benjamin excepted). It is on this occasion that Jacob’s name is changed to Israel. These traditions of migration and kinship are in them- selves entirely credible, but the detailed accounts of the ancestors Abraham, Isaac and Jacob, as given in Genesis, are inherently doubtful as regards both the internal conditions, which the (late) chronological scheme ascribes to the first half of the second millennium B.C., and the general circumstances of the life of these strangers in a foreign land. From a variety of independent reasons one is forced to conclude that, whatever historical elements they may contain, the stories of this remote past represent the form which tradition had taken in a very much later age.

Opinion is at variance regarding the patriarchal narratives as a whole. To deny their historical character is to reject them as trustworthy accounts of the age to which they are ascribed, and even those scholars who claim that they are essentially historical already go so far as to concede idealization and the possibility or probability of later revision. The failure to apprehend historical method has often led to the fallacious argument that the trust-

worthiness of individual features justifies our accepting the whole, or that the elimination of unhistorical elements will leave an historical residuum. Here and frequently elsewhere in biblical history it is necessary to allow that a genuine historical tradition may be clothed in an unhistorical dress, but since many diverse motives are often concentrated upon one narrative (e.g. Gen. xxxii. 22-32, xxxiv., xxxviii.), the work of internal historical criticism (in view of the scantiness of the evidence) can rarely claim finality. The patriarchal narratives themselves belong to the popular stock of tradition of which only a portion has been preserved. Many of the elements lie outside questions of time and place and are almost immemorial. Some appear written for the first time in the book of Jubilees, in "the Testament of the Twelve Patriarchs "• (both perhaps 2nd century B.C.) and in later sources; and although in Genesis the stories are now in a post-exilic setting (a stage earlier than Jubilees), the older portions may well belong to the 7th or 6th cent. This question, however, will rest upon those criteria alone which are of true chronological validity (see further Genesis).

The story of the settlement of the national and tribal ancestors in Palestine is interrupted by an account of the southward move- ment of Jacob (or Israel) and his sons into a district under the immediate influence of the kings of Egypt. After an interval of uncertain duration we find in Exodus a numerous people subjected to rigorous oppression. No longer individual sons of Jacob or Israel, united tribes were led out by Moses and Aaron; and, after a series of incidents extending over forty years, the " children of Israel " invaded the land in which their ancestors had lived. The traditions embodied in the books Exodus- Joshua are considerably later than the apparent date of the events themselves, and amid the diverse and often conflicting data it is possible to recognize distinct groups due to some extent to distinct historical conditions. The story of the " exodus " is that of the religious birth of " Israel," joined by covenant with the national god Yahweh 1 whose aid in times of peril and need 1 On the name see Jehovah, Tetragrammaton.

proved his supremacy. In Moses {q.v.) was seen the founder of Israel's religion and laws; in Aaron (q.v.) the prototype of the Israelite priesthood. Although it is difficult to determine the true historical kernel, two features are most prominent in the narratives which the post-exilic compiler has incorporated: the revelation of Yahweh, and the movement into Palestine. Yahweh had admittedly been the God of Israel's ancestors, but his name was only now made known (Exod. iii. 13 sqq., vi. 2 seq.), and this conception of a new era in Yahweh's relations with the people is associated with the family of Moses and with small groups from the south of Palestine which reappear in religious move- ments in later history (see Kenites) . Amid a great variety of motives the prominence of Kadesh in south

Palestine is to be recognized, but it is uncertain what clans or tribes were at Kadesh, and it is possible that traditions, originally confined to those with whom the new conception of Yahweh is connected, were subsequently adopted by others who came to regard them- selves as the worshippers of the only true Yahweh. At all events, two quite distinct views seem to underlie the opening books of the Old Testament. The one associates itself with the ancestors of the Hebrews and has an ethnic character. The other, part of the religious history of " Israel," is essentially bound up with the religious genius of the people, and is partly connected with clans from the south of Palestine whose influence appears in later times. Other factors in the literary growth of the present narratives are not excluded (see further § 8, and Exodus, The). 2

6. The Monarchy of Israel. — The book of Joshua continues the fortunes of the " children of Israel " and describes a successful occupation of Palestine by the united tribes. This stands in striking contrast to other records of the partial successes of individual groups (Judg. i.). The former, however, is based upon the account of victories by the Ephraimite Joshua over confederations of petty kings to the south and north of central Palestine, apparently the specific traditions of the people of Ephraim describing from their standpoint the entire conquest of Palestine. 3 The book of Judges represents a period of unrest after the settlement of the people. External oppression and internal rivalries rent the Israelites, and in the religious philo- sophy of a later (Deuteronomic) age the period is represented as one of alternate apostasy from and of penitent return to the Yahweh of the " exodus." Some vague recollection of known historical events (§ 3 end) might be claimed among the traditions ascribed to the closing centuries of the second millennium, but the view that the prelude to the monarchy was an era when individual leaders " judged " all Israel finds no support in the older narratives, where the heroes of the age (whose correct sequence is uncertain) enjoy only a local fame. The best historical narratives belong to Israel and Gilead ; Judah scarcely appears, and in a relatively old poetical account of a great fight of the united tribes against a northern adversary lies outside the writer's horizon or interest (Judg. v., see Deborah). Stories of successful warfare and of temporary leaders (see Abimelech; Ehud; Gideon; Jephthah) form an introduction to the institu- tion of the Israelite monarchy, an epoch of supreme importance in biblical history. The heroic figure who stands at the head is Saul (" asked "), and two accounts of his rise are recorded. (1) The Philistines, a foreign people whose presence in Palestine

2 The story of Joseph has distinctive internal features of its own, and appears to be from an independent cycle, which has been used to form a connecting link between the Settlement and the Exodus ; see also Ed. Meyer, Die Israelites, u. ihre Nachbarstamme (1906), pp. 228, 433; B.

Luther, ibid. pp. 108 seq., 142 sqq. Neither of the poems in Deut. xxxii. seq. alludes to an escape from Egypt; Israel is merely a desert tribe inspired to settle in Palestine. Apparently even the older accounts of the exodus are not of very great anti- quity; according to Jeremiah ii. 2, 7 (cf. Hos. ii. 15) some traditions of the wilderness must have represented Israel in a very favourable light; for the " canonical " view, see Ezekiel xvi., xx., xxiii.

3 The capture of central Palestine itself is not recorded ; ac- cording to its own traditions the district had been seized by Jacob (Gen. xlviii. 22; cf. the late form of the tradition in Jubilees xxxiv.). This conception of a conquering hero is entirely distinct from the narratives of the descent of Jacob into Egypt, &c. (see Meyer and Luther, op. cit. pp. no, 227 seq., 415, 433).

has already been noticed, had oppressed Israel (cf. Samson) until a brilliant victory was gained by the prophet Samuel, some account of whose early history is recorded. He himself held supreme sway over all Israel as the last of the " judges " until compelled to accede to the popular demand for a king. The young Saul was chosen by lot and gained unanimous recognition by delivering Jabesh in Gilead from the Ammonites. (2) But other traditions represent the people scattered and in hiding; Israel is groaning under the Philistine yoke, and the unknown Saul is raised up by Yahweh to save his people. This he accom- plishes with the help of his son Jonathan. The first account, although now essential to the canonical history, clearly gives a less authentic account of the change from the " judges " to the monarchy, while the second is fragmentary and can hardly be fitted into the present historical thread (see Saul). At all events the first of a series of annalistic notices of the kings of Israel ascribes to Saul conquests over the surrounding peoples to an extent which implies that the district of Judah formed part of his kingdom (1 Sam. xiv. 47 seq). His might is attested also by the fine elegy (2 Sam. i. 19 sqq.) over the death of two great Israelite heroes, Saul and Jonathan, knit together by mutual love, inseparable in life and death, whose unhappy end after a career of success was a national misfortune. Disaster had come upon the north, and the plain of Jezreel saw the total defeat of the king and the rout of his army. The court was hastily removed across the Jordan to Mahanaim, where Saul's son Ishbaal (Ish-bosheth), thanks to his general Abner, recovered some of the lost prestige. In circumstances which are not detailed, the kingdom seems to have regained its strength, and Ishbaal is credited with a

reign of two years over Israel and Gilead (2 Sam. ii. 8-10; contrast v. 11). But at this point the scantyannals are suspended and the history of the age is given in more popular sources. Both Israel and Judah had their own annals, brief excerpts from which appear in the books of Samuel, Kings and Chronicles, and they are supplemented by fuller narratives of dis- tinct and more popular origin. The writings are the result of a continued literary process, and the Israelite national history has come down to us through Judaean hands, with the result that much of it has been coloured by late Judaean feeling. It is precisely in Saul's time that the account of the Judaean monarchy, or perhaps of the monarchy from the Judaean standpoint, now begins.

7. The Monarchy of Judah. — Certain traditions of Judah and Jerusalem appear to have looked back upon a movement from the south, traces of which underlie the present account of the " exodus." The land was full of " sons of Anak," giants who had terrified the scouts sent from Kadesh. Caleb (q.v.) alone had distinguished himself by his fearlessness, and the clan Caleb drove them out from Hebron in south Judah (Josh. xv. 14 sqq. ; cf. also xi. 21 seq.). David and his followers are found in the south of Hebron, and as they advanced northwards they en- countered wondrous heroes between Gath and Jerusalem (2 Sam. xxi. 15 sqq.; xxiii. 8 sqq.). After strenuous fighting the district was cleared, and Jerusalem, taken by the sword, became the capital. History saw in David the head of a lengthy line of kings, the founder of the Judaean monarchy, the psalmist and the priest-king who inaugurated religious institutions now recognized to be of a distinctly later character. As a result of this backward projection of later conceptions, the recovery of the true historical nucleus is difficult. The prominence of Jeru- salem, the centre of post-exilic Judaism, necessarily invited reflection. Israelite tradition had ascribed the conquest of Jerusalem, Hebron and other cities of Judah to the Ephraimite Joshua; Judaean tradition, on the other hand, relates the capture of the sacred city from a strange and hostile people (2 Sam. v.). The famous city, within easy reach of the southern desert and central Palestine (to Hebron and to Samaria the distances are about 1 8 and 3 5 miles respectively) , had already entered into Pales- tinian history in the " Amarna "age (§3). Anathoth, a few miles to the north-east, points to the cult of the goddess Anath, the near-lying Nob has suggested the name of the Babylonian Nebo, and the neighbouring, though unidentified, Beth-Ninib of the

Amarna tablets may indicate the worship of a Babylonian war and astral god (cf. the solar name Beth-Shemesh). Such was the religious environment of the ancient city which was destined to become the centre of Judaism. Judaean tradition dated the sanctity of Jerusalem from the installation of the ark, a sacred movable object which symbolized the presence of Yahweh. It is associated with the half-nomad clans in the south of

Palestine, or with the wanderings of David and his own priest Abiathar; it is ultimately placed within the newly captured city. Quite another body of tradition associates it with the invasion of all the tribes of Israel from beyond the Jordan (see Ark). To combine the heterogeneous narratives and isolated statements into a consecutive account is impossible; to ignore those which conflict with the now predominating views would be unmetho- dical. When the narratives describe the life of the young David at the court of the first king of the northern kingdom, when the scenes cover the district which he took with the sword, and when the brave Saul is represented in an unfavourable light, one must allow for the popular tendency to idealize great figures, and for the Judaean origin of the compilation. To David is ascribed the sovereignty over a united people. But the stages in his progress are not clear. After being the popular favourite of Israel in the little district of Benjamin, he was driven away by the jealousy and animosity of Saul. Gradually strengthening his position by alliance with Judaean clans, he became king at Hebron at -the time when Israel suffered defeat in the north. His subsequent advance to the kingship over Judah and Israel at Jerusalem is represented as due to the weak condition of Israel, facilitated by the compliance of Abner; partly, also, to the long-expressed wish of the Israelites that their old hero should reign over them. Yet again, Saul had been chosen by Yahweh to free his people from the Philistines; he had been rejected for his sins, and had suffered continuously from this enemy; Israel at his death was left in the unhappy state in which he had found it; it was the Judaean David, the faithful servant of Yahweh, who was now chosen to deliver Israel, and to the last the people gratefully remembered their debt. David accomplished the conquests of Saul but on a grander scale; " Saul hath slain his thousands and David his tens of thousands " is the popular couplet comparing the relative merits of the rival dynasts. A series of campaigns against Edom, Moab, Ammon and the Aramaean states, friendly relations with Hiram of Tyre, and the recognition of his sovereignty by the king of Hamath on the'Orontes, combine to portray a monarchy which was the ideal.

But in passing from the books of Samuel, with their many rich and vivid narratives, to the books of Kings, we enter upon another phase of literature; it is a different atmosphere, due to the character of the material and the aims of other compilers (see § 9 beginning). David, the conqueror, was followed by his son Solomon, famous for his wealth, wisdom and piety, above all for the magnificent Temple which he built at Jerusalem. Phoe- nician artificers were enlisted for thepurpose, and with Phoenician sailors successful trading-journeys were regularly undertaken. Commercial intercourse with Asia Minor, Arabia, Tarshish (probably in Spain) and Ophir (q.v.) filled his coffers, and his realm extended from the Euphrates to the border of Egypt. Tradition depicts him as a worthy successor to his

father, and represents a state of luxury and riches impressive to all who were familiar with the great Oriental courts. The commercial activity of the king and the picture of intercourse and wealth are quite in accordance with what is known of the ancient monarchies, and could already be illustrated from the Amarna age. Judah and Israel dwelt at ease, or held the superior position of military officials, while the earlier inhabitants of the land were put to forced labour. But another side of the picture shows the domestic intrigues which darkened the last days of David. The accession of Solomon had not been without bloodshed, and Judah, together with David's old general Joab and his faithful priest Abiathar, were opposed to the son of a woman who had been the wife of a Hittite warrior. The era of the Temple of Jerusalem starts with a new regime, another captain of the army

and another priest. Nevertheless, the enmity of Judah is passed over, and when the kingdom is divided for administrative pur- poses into twelve districts, which ignore the tribal divisions, the centre of David's early power is exempt from the duty of providing supplies (i Kings iv.). Yet again, the approach of the divided monarchy is foreshadowed. The employment of Judaeans and Israelites for Solomon's palatial buildings, and the heavy taxation for the upkeep of a court which was the wonder of the world, caused grave internal discontent. External rela- tions, too, were unsatisfactory. The Edomites, who had been almost extirpated by David in the valley of Salt, south of the Dead Sea, were now strong enough to seek revenge; and the powerful kingdom of Damascus, whose foundation is ascribed to this period, began to threaten Israel on the north and north-east. These troubles, we learn, had affected all Solomon's reign, and even Hiram appears to have acquired a portion of Galilee. In the approaching disruption writers saw the punishment for the king's apostasy, and they condemn the sanctuaries in Jerusalem which he erected to the gods of his heathen wives. Nevertheless, these places of cult remained some 300 years until almost the close of the monarchy, when their destruction is attributed to Josiah (§ 16). When at length Solomon died the opportunity was at once seized to request from his son Rehoboam a more generous treatment. The reply is memorable: " My little finger is thicker than my father's loins; my father chastised you with whips, but I will chastise you with scorpions." These words were calculated to inflame a people whom history proves to have been haughty and high-spirited, and the great Israel renounced its union with the small district of Judah. Jeroboam (g.v.), once one of Solomon's officers, became king over the north, and thus the history of the

divided monarchy begins (about 930 B.C.) with the Israelite power on both sides of the Jordan and with Judah extending southwards from a point a few miles north of Jerusalem.

8. Problems of the Earliest History. — Biblical history previous to the separation of Judah and Israel holds a prominent place in current ideas, since over two-fifths of the entire Old Testament deals with these early ages. The historical sources for the crucial period, from the separation to the fall of Jerusalem (586 B.C.), occupy only about one-twelfth, and even of this about one-third is spread over some fifteen years (see below, §11). From the flourishing days of the later monarchy and onwards, different writers handled the early history of their land from different standpoints. The feeling of national unity between north and south would require historical treatment, the existence of rival monarchies would demand an explanation. But the surviving material is extremely uneven; vital events in these centuries are treated with a slightness in striking contrast to the relatively detailed evidence for the preceding period — evidence, however, which is far from being contemporary. Where the material is fuller, serious discrepancies are found ; and where external evidence is fortunately available, the independent character of the biblical history is vividly illustrated. The varied traditions up to this stage cannot be regarded as objective history. It is naturally impossible to treat them from any modern standpoint as fiction; they are honest even where they are most untrustworthy. But the recovery of successive historical nuclei does not furnish a continuous thread, and if one is to be guided by the historical context of events the true background to each nucleus must be sought. The northern kingdom cherished the institution of a monarchy, and in this, as in all great political events, the prophets took part. The precise part these figures play is often idealized and expresses the later views of their prominence. It was only after a bitter experience that the kingship was no longer regarded as a divine gift, and traditionsihave been revised in order to illustrate the opposition to secular authority. In this and in many other respects the records of the first monarchy have been elaborated and now reveal traces of differing conceptions of the events (see Dan; David; Eli; Samuel; Saul; Solomon). The oldest narratives are not in their original contexts, and they contain features which render it questionable whether a very trust- worthy recollection of the period was retained. Although the rise of the Hebrew state, at an age when the great powers were quiescent and when such a people as the Philistines is known to have appeared upon the scene, is entirely intelligible, it is not improbable that legends of Saul and David, the heroic founders of the two kingdoms, have been put in a historical setting with the help of later historical tradition. It is at least necessary to distinguish provisionally between a possibly historical framework and narratives which may be of later growth — between the

general outlines which only external evidence can test and details which cannot be tested and appear isolated without any cause or devoid of any effect.

Many attempts have been made to present a satisfactory sketch of the early history and to do justice to (a) the patriarchal narratives,

(b) the exodus from Egypt and the Israelite invasion, and © the rise of the monarchy. As regards (b), external evidence has already suggested to scholars that there were Israelites in Palestine before the invasion ; internal historical criticism is against the view that all the tribes entered under Joshua; and in (a) there are traces of an actual settlement in the land, entirely distinct from the cycle of narratives which prepare the way for (b). The various reconstruc- tions and compromises by modern apologetic and critical writers alike involve without exception an extremely free treatment of the biblical sources and the rejection of many important and circum- stantial data. 1 On the one hand, a sweeping invasion of all the tribes of Israel moved by a common zeal may, like the conquests of Islam, have produced permanent results. According to this view the enervating luxury of Palestinian culture almost destroyed the lofty ideal monotheism inculcated in the desert, and after the fall of the northern tribes (latter part of the 8th cent.) Judah is naturally regarded as the sole heir. But such a conquest, and all that it signifies, conflict both with external evidence (e.g. the results of excavation), and with any careful inspection of the narratives themselves. On the other hand, the reconstructions which allow a gradual settlement (perhaps of distinct groups), and an intermingling with the earlier inhabitants, certainly find support in biblical evidence, and they have been ingeniously built up with the help of tribal and other data (e.g. Gen. xxxiv., xxxviii. ; Judg. i. ix.). But they imply political, sociological and religious developments which do not do justice either to the biblical evidence as a whole or to a comprehensive survey of contemporary conditions. 2 Thus, one of the important questions is the relation between those who had taken part in the exodus and the invasion and those who had not. This inquiry is further complicated by ©, where the history of Israel and Judah, as related in Judges and I Samuel, has caused endless perplexity. The traditions of the Ephraimite Joshua and of Saul the first king of (north) Israel virtually treat Judah as part of Israel and are related to the underlying representations in (a). But the specific independent Judaean standpoint treats the unification of the two divisions as the work of David who leaves the heritage to Solomon. The varied narratives, now due to Judaean editors, preserve distinct points of view, and it is extremely difficult to unravel the threads and to determine their relative position in the history. Finally, the consciousness that the people as a religious body owed everything to the desert clans (b) (see § 5) subsequently leaves its mark upon (north) Israelite history (§ 14), but has not the profound

significance which it has in the records of Judah and Jerusalem. Without sufficient external and independent evidence wherewith to interpret in the light of history the internal features of the intricate narratives, any reconstruction would naturally be hazardous, and all attempts must invariably be considered in the light of the biblical evidence itself, the date of the Israelite exodus, and the external conditions. Biblical criticism is concerned with a composite (Judaean) history based upon other histories (partly of non-Judaean origin), and the relation between native written sources and external contemporary evidence (monumental and archaeological) distinctly forbids any haphazard selection from accessible sources. The true nature of this relation can be readily observed in other fields (ancient Britain, Greece, Egypt, &c), where, however, the native documents and sources have not that complexity which characterizes the composite biblical history. (For the period under review, as it appears in the light of existing external evidence, see Palestine: History.)

9. The Rival Kingdoms. — The Palestine of the Hebrews was but part of a great area breathing the same atmosphere, and there was little to distinguish Judah from Israel except when they were distinct political entities. The history of the two kingdoms is contained in Kings and the later and relatively less trustworthy Chronicles, which deals with Judah alone. In the former a separate history of the northern kingdom has been combined with Judaean history by means of synchronisms in accordance with a definite scheme. The 480 years from the foundation of the temple of Jerusalem back to the date of the exodus (1 Kings vi. 1) corresponds to the period forward to the return from the exile (§ 20). This falls into three equal divisions, of which the first ends with Jehoash's temple-reforms and the second with Heze- kiah's death. The kingdom of Israel lasts exactly half the time.

1 This is especially true of the various ingenious attempts to com- bine the invasion of the Israelites with the movements of the Habiru in the Amarna period (§ 3).

2 cf. Winckler, Keil. u. das Alte Test. p. 212 seq. ; also his " Der alte Orient und die Geschichtsforschung " in Mitteilungen der Vorderasiat. Gesellschaft (Berlin, 1906) and Religionsgeschichtlkher u. gesch. Orient (Leipzig, 1906); A. Jeremias, Alte Test. (p. 464 seq.); B. Baentsch, Altoricnt. u. israel. Monotheismus (pp. 53, 79, 105, &c.) ; also Theolog. Lit. Blatt (1907) No. 19. On the reconstructions of the tribal history, see especially T. K. Cheyne, Ency. Bib. art. " Tribes." The most suggestive study of the pre-monarchical narratives is that of E. Meyer and B. Luther (above; see the former's criticisms on the reconstructions, pp. 50, 251 sqq., 422, n. 1 and passim).

Of the 240 years from Jeroboam I., 80 elapse before the Syrian wars in Ahab's reign, these cover another 80; the famous king Jeroboam II. reigns 40 years, and 40 years of decline bring the kingdom to an end. These figures speak for themselves, and the present chronology can be accepted only where it is indepen- dently proved to be trustworthy (see further W. R. Smith, Prophets of Israel, pp. 144-149). Next, the Judaean compiler regularly finds in Israel's troubles the punishment for its schis- matic idolatry; nor does he spare Judah, but judges its kings by a standard which agrees with the standpoint of Deuteronomy and is scarcely earlier than the end of the 7th century B.C. (§§ 16, 20). But the history of (north) Israel had naturally its own independent political backgrounds and the literary sources contain the same internal features as the annals and prophetic narratives which are already met with in 1 Samuel. Similarly the thread of the Judaean annals in Kings is also found in 2 Samuel, although the supplementary narratives in Kings are not so rich or varied as the more popular records in the preceding books. The striking differences between Samuel and Kings are due to differences in the writing of the history ; independent Israelite records having been incorporated with those of Judah and supplemented (with revision) from the Judaean standpoint (see Chronicles; Kings; Samuel).

The Judaean compiler, with his history of the two kingdoms, looks back upon the time when each laid the foundation of its subsequent fortunes. His small kingdom of Judah enjoyed an unbroken dynasty which survived the most serious crises, a temple which grew in splendour and wealth under royal patron- age, and a legitimate priesthood which owed its origin to Zadok, the successful rival of David's priest Abiathar. Israel, on the other hand, had signed its death-warrant by the institu- tion of calf-cult, a cult which, however, was scarcely recognized as contrary to the worship of Yahweh before the denunciations of Hosea. The scantiness of political information and the dis- tinctive arrangement of material preclude the attempt to trace the relative position of the two rivals. Judah had natural connexions with Edom and southern Palestine; Israel was more closely associated with Gilead and the Aramaeans of the north. That Israel was the stronger may be suggested by the acquies- cence of Judah in the new situation. A diversion was caused by Shishak's invasion, but of this reappearance of Egypt after nearly three centuries of inactivity little is preserved in biblical history. Only the Temple records recall the spoliation of the sanctuary of Jerusalem, and traditions of Jeroboam I. show that

Shishak's prominence was well known. 1 Although both kingdoms suffered, common misfortune did not throw them together. On the contrary, the statement that there was con- tinual warfare is supplemented in Chronicles by the story of a victory over Israel by Abijah the son of Rehoboam. Jeroboam's son Nadab perished in a conspiracy whilst besieging the Philistine city of Gibbethon, and Baasha of (north) Israel seized the throne. His reign is noteworthy for the entrance of Damascus into Palestinian politics. Its natural fertility and its commanding position at the meeting-place of trade-routes from every quarter made it a dominant factor until its overthrow. In the absence of its native records its relations with Palestine are not always clear, but it may be supposed that amid varying political changes it was able to play a double game. According to the annals, incessant war prevailed between Baasha and Abijah's successor, Asa. It is understood that the former was in league with Damascus, which had once been hostile to Solomon (1 Kings xi. 24 seq.) — it is not stated upon whom Asa could rely. How- ever, Baasha at length seized Ramah about five miles north of Jerusalem, and the very existence of Judah was threatened. Asa utilized the treasure of the Temple and palace to induce the Syrians to break off their relations with Baasha. These sent troops to harry north Israel, and Baasha was compelled to retire. Asa, it is evident, was too weak to achieve the remarkable victory ascribed to him in 2 Chron. xiv. (see Asa). As for Baasha, his

1 2 Chron. xii. 8, which is independent of the chronicler's artificial treatment of his material, apparently points to some tradition of Egyptian suzerainty.

short-lived dynasty resembles that of his predecessors. His son Elah had reigned only two years (like Ishbaal and Nadab) when he was slain in the midst of a drunken carousal by his captain Zimri. Meanwhile the Israelite army was again besieging the Philistines at Gibbethon, and the recurrence of these conflicts points to a critical situation in a Danite locality in which Judah itself (although ignored by the writers), must have been vitally concerned. The army preferred their general Omri, and march- ing upon Zimri at Tirzah burnt the palace over his head. A fresh rival immediately appeared, the otherwise unknown Tibni, son of Ginath. Israel was divided into two camps, until, on the death of Tibni and his brother Joram, Omri became sole king (c. 887 B.C.). The scanty details of these important events must naturally be contrasted with the comparatively full accounts of earlier Philistine wars and internal conflicts in narratives which date from this or even a later age.

10. The Dynasty of Omri. — Omri (q.v.), the founder of one of the greatest dynasties of Israel, was contemporary with the revival of Tyre under Ithobaal, and the relationship between the states is seen in the

marriage of Omri's son Ahab to Jezebel, the priest-king's daughter. His most notable recorded achieve- ment was the subjugation of Moab and the seizure of part of its territory. The discovery of the inscription of a later king of Moab (q.v.) has proved that the east-Jordanic tribes were no uncivilized or barbaric folk; material wealth, a considerable religious and political organization, and the cultivation of letters (as exemplified in the style of the inscription) portray conditions which allow us to form some conception of life in Israel itself. Moreover, Judah (now under Jehoshaphat) enjoyed intimate relations with Israel during Omri's dynasty, and the traditions of intermarriage, and of co-operation in commerce and war, imply what was practically a united Palestine. Alliance with Phoenicia gave the impulse to extended intercourse; trading expeditions were undertaken from the Gulf of Akaba, and Ahab built himself a palace decorated with ivory. The cult of the Baal of Tyre followed Jezebel to the royal city Samaria and even found its way into Jerusalem. This, the natural result of matrimonial and political alliance, already met with under Solomon, receives the usual denunciation. The conflict between Yahweh and Baal and the defeat of the latter are the characteristic notes of the religious history of the period, and they leave their impression upon the records, which are now more abundant. Although little is preserved of Omri's history, the fact that the northern kingdom long continued to be called by the Assyrians after his name is a significant indication of his great reputation. Assyria 2 was now making itself felt in the west for the first time since the days of Tiglath-Pileser I. (c. 1100 B.C.), and external sources come to our aid. Assur-nazir-pal III. had exacted tribute from north Syria (c. 870 B.C.), and his successor Shalmaneser II., in the course of a series of expeditions, succeeded in gaining the greater part of that land. A defensive coalition was formed in which the kings of Cilicia, Hamath, the Phoenician coast, Damascus and Ammon, the Arabs of the Syrian desert, and " Ahabbu Sirlai " were concerned. In the last, we must recognize the Israelite Ahab. His own contribution of 10,000 men and 12,000 chariots perhaps included levies from Judah and Moab (cf. for the number 1 Kings x. 26). In 854 the allies at least maintained themselves at the battle of Karkar (perhaps Apamea to the north of Hamath) . In 849 and 846 other indecisive battles were fought, but the precise constitution of the coalition is not recorded. In 842 Shalmaneser records a campaign against Hazael of Damascus; no coalition is mentioned, although a battle was fought at Sanir (Hermon, Deut. iii. 9), and the cities of Hauran to the south of Damascus were spoiled. Tribute was received from Tyre and Sidon; and Jehu, who was now king of Israel, sent his gifts of gold, silver, &c, to the conqueror. The Assyrian inscription (the so-called " Black Obelisk " now in the British Museum), which records the submission of the petty kings, gives an inter- esting representation of the humble Israelite emissaries with their long fringed robes and strongly marked physiognomy (see I Costume, fig. 9). Yet

*another expedition in 839 would seem to I * See for chronology, Babylonia and Assyria, §§ v. and viii.*

show that Damascus was neither crushed nor helpless, but thence- forth for a number of years Assyria was fully occupied elsewhere and the west was left to itself. The value of this external evi- dence for the history of Israel is enhanced by the fact that biblical tradition associates the changes in the thrones of Israel and Damascus with the work of the prophets Elijah and Elisha, but handles the period without a single reference to the Assyrian Empire. Ahab, it seems, had aroused popular resentment by encroaching upon the rights of the people to their landed posses- sions; had it not been for Jezebel (q.v.) the tragedy of Naboth would not have occurred. The worship of Baal of Tyre roused a small circle of zealots, and again the Phoenician marriage was the cause of the evil. We read the history from the point of view of prophets. Elijah of Gilead led the revolt. To one who favoured simplicity of cult the new worship was a desecration of Yahweh, and, braving the anger of the king and queen, he fore- shadowed their fate. Hostility towards the dynasty culminated a few years later in a conspiracy which placed on the throne the general Jehu, the son of one Jehoshaphat (or, otherwise, of Nimshi). The work which Elijah began was completed by Elisha, who supported Jehu and the new dynasty. A massacre ensued in which the royal families of Israel and Judah perished. While the extirpation of the cult of Baal was furthered in Israel by Jonadab the Rechabite, it was the " people of the land " who undertook a similar reform in Judah. Jehu (q.v.) became king as the champion of the purer worship of Yahweh. The descen- dants of the detested Phoenician marriage were rooted out, and unless the close intercourse between Israel and Judah had been suddenly broken, it would be supposed that the new king at least laid claim to the south. The events form one of the fundamental problems of biblical history.

ii. Damascus, Israel and Judah. — The appearance of Assyria in the Mediterranean coast-lands had produced the results which inevitably follow when a great empire comes into contact with minor states. It awakened fresh possibilities — successful combination against a common foe, the sinking of petty rivalries, the chance of gaining favour by a neutrality which was scarcely benevolent. The alliances, counter-alliances and far-reaching political combinations which spring up at every advance of the greater powers are often perplexing in the absence of records of the states

concerned. Even the biblical traditions alone do not always represent the same attitude, and our present sources pre- serve the work of several hands. Hazael of Damascus, Jehu of Israel and Elisha the prophet are the three men of the new age linked together in the words of one writer as though commissioned for like ends (i Kings xix. 15-17). Hostility to Phoenicia {i.e. the Baal of Tyre) is as intelligible as a tendency to look to Ara- maean neighbours. Though Elisha sent to anoint Jehu as king, he was none the less on most intimate terms with Bar-hadad (Old. Test. Ben-hadad) of Damascus and recognized Hazael as its future ruler. It is a natural assumption that Damascus could still count upon Israel as an ally in 842; not until the with- drawal of Assyria and the accession of Jehu did the situation change. " In those days Yahweh began to cut short " (or, altering the text, " to be angry with ") " Israel." This brief notice heralds the commencement of Hazael's attack upon Israelite territory east of the Jordan (2 Kings x. 32). The origin of the outbreak is uncertain. It has been assumed that Israel had withdrawn from the great coalition, that Jehu sent tribute to Shalmaneser to obtain that monarch's recognition, and that Hazael consequently seized the first opportunity to retaliate. Certain traditions, it is true, indicate that Israel had been at war with the Aramaeans from before 854 to 842, and that Hazael was attacking Gilead at the time when Jehu revolted; but in the midst of these are other traditions of the close and friendly relations between Israel and Damascus ! With these perplexing data the position of Judah is inextricably involved.

The special points which have to be noticed in the records for this brief period (1 Kings xvii.-2 Kings xi.) concern both literary and historical criticism. 1 A number of narratives illustrate the

1 See Jew. Quart. Rev. (1908), pp. 597-630. The independent Israelite traditions which here become more numerous have points

work of the prophets, and sometimes purely political records appear to have been used for the purpose (see Elijah; Elisha). If Elijah is the prophet of the fall of Omri's dynasty, Elisha is no less the prophet of Jehu and his successors; and it is extremely probable that his lifework was confined to the dynasty which he inaugurated. 2 In the present narratives, however, the stories in which he possesses influence with king and court are placed before the rise of Jehu, and some of them point to a state of hostility with Damascus before he foresees the atrocities which Hazael will perpetrate. But Ahab's wars with Syria can with difficulty be reconciled with the Assyrian evidence (see Ahab), and the narratives, largely anonymous, agree in a singular manner with what is known of the serious conflicts which, it is said, began in Jehu's time. Moreover, the account of the joint undertaking by Judah (under Jehoshaphat) and Israel against Syria at Ramoth-Gilead at the time of Ahab's death, and again (under Ahaziah)

when Jehoram was wounded, shortly before the accession of Jehu, are historical doublets, and they can hardly be harmonized either with the known events of 854 and 842 or with the course of the intervening years. Further, all the traditions point clearly to the very close union of Israel and Judah at this period, a union which is apt to be obscured by the fact that the annalistic summaries of each kingdom are mainly independent. Thus we may contrast the favourable Judaean view of Jehoshaphat with the condemnation passed upon Ahab and Jezebel, whose daughter Athaliah married Jehoram, son of Jehoshaphat. It is noteworthy, also, that an Ahaziah and a Jehoram appear as kings of Israel, and (in the reverse order) of Judah, and somewhat similar incidents recur in the now separate histories of the two kingdoms. The most striking is a great revolt in south Palestine. The alliance between Jehoshaphat and Ahab doubtless continued when the latter was succeeded by his son Ahaziah, and some disaster befell their trading fleet in the Gulf of Akaba (1 Kings xxii. 48 seq. ; 2 Chron. xx. 35 _ 37)- Next came the revolt of Moab (2 Kings i. 1), and Ahaziah, after the briefest of reigns, was followed by Jehoram, whose Judaean contemporary was Jehoshaphat (ch. iii.), or perhaps rather his own namesake (i. 17). The popular story of Jehoram's campaign against Moab, with which Edom was probably allied (see Moab), hints at a disastrous ending, and the Judaean annals, in their turn, record the revolt of Edom and the Philistine Libnah (see Philistines), andallude obscurely to a defeat of the Judaean Jehoram (2 Kings viii. 20-22). Further details in 2 Chron. xxi.xxii. 1 even record an invasion of Philistines and Arabians (? Edomites), an attack upon Jerusalem, the removal of the palace treasures and of all the royal sons with the sole exception of Jehoahaz, i.e. Ahaziah (see Jehoram; Jehosha phat). Had the two kingdoms been under a single head, these features might find an explanation, but it must be allowed that it is extremely difficult to fit the general situation into our present history, and to determine where the line is to be drawn between trustworthy and untrustworthy details. Moreover, of the various accounts of the massacre of the princes of Judah, the Judaean ascribes it not to Jehu and the reforming party (2 Kings x. 13 seq.) but to Athaliah (q.v.). Only the babe Jehoash was saved, and he remained hidden in the Temple adjoining the palace itself. The queen, Athaliah, despite the weak state of Judah after the revolt in Philistia and Edom, actually appears to have maintained herself for six years, until the priests slew her in a conspiracy, overthrew the cult of Baal, and crowned the young child. It is a new source which is here suddenly introduced, belonging apparently to a history of the Temple; it throws no light upon the relations between Judah with its priests and Israel with its prophets, the circumstances of the regency under the priest Jehoiada are ignored, and the Temple re- forms occupy the first place in the compiler's interest. The Judaean annals then relate Hazael's advance to Gath; the city was captured and Jerusalem was saved only by using the Temple and

palace treasure as a bribe. On the other hand, Chronicles has a different story with a novel prelude. Jehoash, it is said, turned away from Yahweh after the death of Jehoiada and gave heed to the Judaean nobles, " wrath came upon Judah and Jerusalem for their guilt," prophets were sent to bring them back but they turned a deaf ear. The climax of iniquity was the murder of Jehoiada's son Zechariah. Soon after, a small band of Syrians entered Judah, destroyed its princes, and. sent the spoil to the king of Damascus; the disaster is regarded as a prompt retribution (2 Chron. xxiv.). The inferiority of Chronicles as a historical source and its varied examples of " ten- dency-writing " must be set against its possible access to traditions

of contact with those of Saul in I Samuel, and the relation is highly suggestive for the study of their growth, as also for the perspective of the various writers.

2 See W. R. Smith (after Kuenen), Ency. Bib., col. 2670; also W. E. Addis, ib., 1276, the commentaries of Benzinger (p. 130) and Kittel (pp. 153 seq.) on Kings; J. S. Strachan, Hastings's Diet. Bible, i. 694 ; G. A. Smith, Hist. Geog. of Holy Land, p. 582 ; Konig and Hirsch, Jew. Ency. v. 137 seq. (" legend … as indifferent to accuracy in dates as it is to definiteness of places and names ") ; W. R. Harper, Amos and Hosea, p. xli. seq. (" the lack of chronological order …. the result is to create a wrong impression of Elisha's career "). The bearing of this displacement upon the literary and historical criticism of the narratives has never been worked out.

as trustworthy as those in Kings. 1 In the present instance the novel details cannot be lightly brushed aside. The position of Judah at this period must be estimated (a) from the preceding years of intimate relationship with Israel to the accession of Jehu, and ~(b) from the calamity about half a century later when Jerusalem was sacked by Israel. The Judaean narratives do not allow us to fill the gap or to determine whether Judaean policy under the regent Jehoiada would be friendly or hostile to Israel, or whether Judaean nobles may have severed the earlier bond of union. If the latter actually occurred, the hostility of the Israelite prophets is only to be expected. But it is to be presumed that the punishment came from Israel — the use of Syrian mercenaries not excluded — and if, instead of using his treasure to ward off the invasion of Syria, Jehoash bribed Damascus to break off relations with Israel, an alternative explana- tion of the origin of

the Aramaean wars may be found. 2

1 2. The Aramaean Wars. — If the records leave it uncertain (a) whether Jehu (like Tyre and Sidon) sent tribute to Shalmaneser as a sign of submission or, while severing relations with Hazael, sought the favour of Assyria, and (b) whether Judah only es- caped Hazael's vengeance by a timely bribe or, in freeing itself from Israel, had bribed Hazael to create a diversion, it appears that the southern kingdom suffered little in the disastrous wars between Damascus and Israel. There were, indeed, internal troubles, and Jehoash perished in a conspiracy. His son Amaziah had some difficulty in gaining the kingdom and showed unwonted leniency in sparing the children of his father's mur- derers. This was a departure from the customs of the age, and was perhaps influenced less by generosity than by expediency. Israel, on the other hand, was almost annihilated. The Syrians seized Gilead, crossed over into Palestine, and occupied the land. Jehu's son Jehoahaz saw his army made " like the dust in thresh- ing," and the desperate condition of the country recalls the straits in the time of Saul (i Sam. xiii. 6, 7, 19-22), and the days before the great overthrow of the northern power as described in Judges v. 6-8. The impression left by the horrors of the age is clear from the allusions to the barbarities committed by Damascus and its Ammonite allies upon Gilead (Amos i. 3, 13), and in the account of the interview between Elisha and Hazael (2 Kings viii. 12). Several of the situations can be more vividly realized from the narratives of Syrian wars ascribed to the time of Omri's dynasty, even if these did not originally refer to the later period. Under Joash, son of Jehoahaz, the tide turned. Elisha was apparently the champion, and posterity told of his exploits when Samaria was visited with the sword. Thrice Joash smote the Syrians — in accordance with the last words of the dying prophet — and Aphek in the Sharon plain, famous in history for Israel's disasters, now witnessed three victories. The enemy under Hazael's son Ben-hadad (properly Bar-hadad) was driven out and Joash regained the territory which his father had lost (2 Kings xiii. 25); it may reasonably be supposed that a treaty was concluded (cf. 1 Kings xx. 34). But the peace does not seem to have been popular. The story of the last scene in Elisha 's life implies in Joash an easily contented disposition which hindered him from completing his successes. Syria had not been crushed, and the failure to utilize the opportunity was an act of impolitic leniency for which Israel was bound to suffer (2 Kings xiii. 19). Elisha's indignation can be illustrated by the denunciation passed upon an anonymous king by the prophetic party on a similar occasion (1 Kings xx. 35-43).

At this stage it is necessary to notice the fresh invasion of Syria by Hadad (Adad)-nirari, who besieged Mari, king of Damascus, and exacted a heavy tribute (c. 800 B.C.). A diversion of this kind may explain the Israelite victories; the subsequent with- drawal of Assyria may have afforded the

occasion for retaliation. Those in Israel who remembered the previous war between

1 Careful examination shows that no a priori distinction can be drawn between "trustworthy" books of Kings and "untrust- worthy books " of Chronicles. Although the latter have special late and unreliable features, they agree with the former in presenting the same general trend of past history. The " canonical " history in Kings is further embellished in Chronicles, but the gulf between them is not so profound as that between the former and the under- lying and half-suppressed historical traditions which can still be recognized. (See also Palestine: History.)

2 For the former (2 Kings xii. 17 seq.) cf. Hezekiah and Sen- nacherib (xviii. 13-15), and for the latter, cf. Asa and Baasha (1 Kings xv. 18-20; above).

Assyria and Damascus would realize the recuperative power of the latter, and would perceive the danger of the short-sighted policy of Joash. It is interesting to find that Hadad-nirari claims tribute from Tyre, Sidon and Beth-Omri (Israel), also from Edom and Palastu (Philistia). There are no signs of an extensive coalition as in the days of Shalmaneser; Ammon is probably included under Damascus; the position of Moab — which had freed itself from Jehoram of Israel — can hardly be calculated. But the absence of Judah is surprising. Both Jehoash (of Judah) and his son Amaziah left behind them a great name; and the latter was comparable only to David (2 Kings xiv. 3). He defeated Edom in the Valley of Salt, and hence it is conceivable that Amaziah's kingdom extended over both Edom and Philistia. A vaunting challenge to Joash (of Israel) gave rise to one of the two fables that are preserved in the Old Testa- ment (Judg. ix. 8 sqq.; see Abimelech). It was followed by a battle at Beth-shemesh; the scene would suggest that Philistia also was involved. The result was the route of Judah, the capture of Amaziah, the destruction of the northern wall of Jerusalem, the sacking of the temple and palace, and the removal of hostages to Samaria (2 Kings xiv. 12 sqq.). Only a few words are preserved, but the details, when carefully weighed, are extremely significant. This momentous event for the southern kingdom was scarcely the outcome of a challenge to a trial of strength; it was rather the sequel to a period of smouldering jealousy and hostility.

The Judaean records have obscured the history since the days of Omri's dynasty, when Israel and Judah were as one, when they were moved by common aims and by a single reforming zeal, and only_ Israel's vengeance gives the measure of the injuries she had received. That the Judaean compiler has not given fuller informa- tion is not surprising; the wonder is that he should have given so much. It is one of those epoch-making facts in

the light of which the course of the history of the preceding and following years must be estimated. It is taken, strangely enough, from an Israelite source, but the tone of the whole is quite dispassionate and objective. It needs little reflection to perceive that the position of Jerusalem and Judah was now hardly one of independence, and the conflicting chronological notices betray the attempt to maintain intact the thread of Judaean history. So, on the one hand, the year of the disaster sees the death of the Israelite king, and Amaziah survives for fifteen years, while, on the other, twenty-seven years elapse between the battle and the accession of Uzziah, the next king of Judah. 3

The importance of the historical questions regarding relations between Damascus, Israel and Judah is clear. The defeat of Syria by Joash (of Israel) was not final. The decisive victories were gained by Jeroboam II. He saved Israel from being blotted out, and through his successes " the children of Israel dwelt in their tents as of old " (2 Kings xiii. 5, xiv. 26 seq.). Syria must have resumed warfare with redoubled energy, and a state of affairs is presup- posed which can be pictured with the help of narratives that deal with similar historical situations. In particular, the overthrow of Israel as foreshadowed in I Kings xxii. implies an Aramaean invasion (cf. w. 17, 25), after a treaty (xx. 35 sqq.), although this can scarcely be justified by the events which followed the death of Ahab, in whose time they are now placed.

For the understanding of these great wars between Syria and Israel (which the traditional chronology spreads over eighty years), for the significance of the crushing defeats and inspiring victories, and for the alternations of despair and hope, a careful study of all the records of relations between IsraeJ and the north is at least instructive, and it is important to remember that, although the present historical outlines are scanty and incomplete, some — if not all — of the analogous descriptions in their present form are certainly later than the second half of the 9th century B.C., the period in which these great events fall. 4

13. Political Development. — Under Jeroboam II. the borders of Israel were restored, and in this political revival the prophets again took part. 5 The defeat of Ben-hadad by the king of

s It is possible that Hadad-nirari's inscription refers to conditions in the latter part of his reign (812-783 B.C.), when Judah apparently was no longer independent and when Jeroboam II. was king of Israel. The accession of the latter has been placed between 785 and 782. It is now known, also, that Ben-hadad and a small coalition were defeated by the king of Hamath ; but the bearing of this upon Israelite history is uncertain.

4 Cf. generally, 1 Sam. iv., xxxi. ; 2 Sam. ii. 8; 1 Kings xx., xxii.; 2 Kings vi. 8-vii. 20; also Judges v. (see Deborah).

6 Special mention is made of Jonah, a prophet of Zebulun in (north) Israel (2 Kings xiv. 25). Nothing is known of him, unless the very late prophetical writing with the account of his visit to Nineveh rests upon some old tradition, which, however, can scarcely be recovered (see Jonah).

Hamath and the quiescence of Assyria may have encouraged Israelite ambitions, but until more is known of the campaigns of Hadad-nirari and of Shalmaneser III. (against Damascus, 773 B.C.) the situation cannot be safely gauged. Moab was probably tributary; the position of Judah and Edom is involved with the chronological problems. According to the Judaean annals, the " people of Judah " set Azariah (Uzziah) upon his father's throne; and to his long reign of fifty-two years are ■ ascribed conquests over Philistia and Edom, the fortification of Jerusalem and the reorganization of the army. As the relations with Israel are not specified, the sequel to Amaziah's defeat is a matter for conjecture; although, when at the death of Jeroboam Israel hastened to its end amid anarchy and dissension, it is hardly likely that the southern kingdom was unmoved. All that can be recognized from the biblical records, however, is the period of internal prosperity which Israel and Judah enjoyed under Jeroboam and Uzziah (qq.v.) respectively.

It is difficult to trace the biblical history century by century as it reaches these last years of bitter conflict and of renewed prosperity. The northern kingdom at the height of its power included Judah, it extended its territory east of the Jordan towards the north and the south, and maintained close relations with Phoenicia and the Aramaean states. It had a national history which left its impress upon the popular imagination, and sundry fragments of tradition reveal the pride which the patriot felt in the past. An original close connexion is felt with the east of the Jordan and with Gilead; stories of invasion and conquest express themselves in varied forms. In so far as in- ternal wealth and luxury presuppose the control of the trade- routes, periodical alliances are implied in which Judah, willingly or unwillingly, was included. But the Judaean records do not allow us to trace its independent history with confidence, and our estimate can scarcely base itself solely upon the accidental fulness or scantiness of political details. In the subsequent disasters of Israel (§ 15) we may perceive the growing

supremacy of Judah, and the Assyrian inscriptions clearly indicate the dependence of Judaean politics upon its relations with Edom and Arab tribes on the south-east and with Philistia on the west. Whatever had been the effect of the movement of the Purasati some centuries previously, the Philistines (i.e. the people of Philistia) are now found in possession of a mature organization, and the Assyrian evidence is of considerable value for an estimate of the stories of conflict and covenant, of hostility and friendship, which were current in south Palestine. The extension of the term " Judah " (cf. that of " Israel " and " Samaria ") is in- volved with the incorporation of non- Judaean elements. The country for ten miles north of Jerusalem was the exposed and highly debatable district ascribed to the young tribe of Benjamin (the favourite " brother " of both Judah and Joseph; Gen. xxxvii., xxxix. sqq.); the border-line between the rival kingdoms oscillated, and consequently the political position of the smaller and half-desert Judaean state depended upon the attitude of its neighbours. It is possible that tradition is right in supposing that "Judah went down from his brethren" (Gen. xxxviii. 1; cf. Judg. i. 3). Its monarchy traced its origin to Hebron in the south, and its growth is contemporary with a decline in Israel (§ 7). It is at least probable that when Israel was supreme an independent Judah would centre around a more southerly site than Jerusalem. It is naturally uncertain how far the traditions of David can be utilized; but they illustrate Judaean situations when they depict intrigues with Israelite officials, vassalage under Philistia, and friendly relations with Moab, or when they suggest how enmity between Israel and Ammon could be turned to useful account. Tradition, in fact, is concentrated upon the rise of the Judaean dynasty under David, but there are significant periods before the rise of both Jehoash and Uzziah upon which the historical records maintain a perplexing silence.

The Hebrews of Israel and Judah were, political history apart, men of the same general stamp, with the same cult and custom; for the study of religion and social usages, therefore, they can be treated as a single people. The institution of the monarchy

was opposed to the simpler local forms of government, and a military r6gime had distinct disadvantages (cf. 1 Sam. viii. 11-18). The king stood at the head, as the court of final appeal, and upon him and his officers depended the people's welfare. A more in- tricate social organization caused internal weakness, and Eastern history shows with what rapidity peoples who have become strong by discipline and moderation pass from the height of their glory into extreme corruption and disintegration. 1 This was Israel's fate. Opposition to social abuses and enmity towards religious innovations are regarded as the factors which led to the overthrow of Omri's dynasty by Jehu, and when Israel seemed to be at the height of its glory under Jeroboam II. warning voices again made themselves heard. The

two factors are inseparable, for in ancient times no sharp dividing-line was drawn between religious and civic duties: righteousness and equity, religious duty and national custom were one.

Elaborate legal enactments codified in Babylonia by the 20th century B.C. find striking parallels in Hebrew, late Jewish (Talmudic), Syrian and Mahommedan law, or in the unwritten usages of all ages; for even where there were neither written laws nor duly instituted lawgivers, there was no lawlessness, since custom and belief were, and still are, almost inflexible. Various collections are preserved in the Old Testament; they are attributed to the time of Moses the lawgiver, who stands at the beginning of Israelite national and religious history. But many of the laws were quite unsuitable for the circumstances of his age, and the belief that a body of intricate and even contradictory legislation was imposed suddenly upon a people newly emerged from bondage in Egypt raises insurmountable objections, and underestimates the fact that legal usage existed in the earliest stages of society, and therefore in pre-Mosaic times. The more important question is the date of the laws in their present form and content. Collections of laws are found in Deuteronomy and in exilic and post-exilic writings; groups of a relatively earlier type are preserved in Exod. xxxiv. 14-26, xx. 23-xxiii., and (of an- other stamp) inLev.xvii.-xxvi. (now in post-exilic form). Forauseful conspectus of details, see J. E.Carpenter and G. Harford-Battersby. The Hexateuch (vol. i., appendix) ; C. F. Kent, Israel's Laws and Legal Enactments (1907); and in general I. Benzinger, articles "Government," "Family" and "Law and Justice," Ency. Bib., and G. B. Gray, " Law Literature," ib. (the literary growth of legislation). Reference may also be made, for illustrative material, to W. R. Smith, Kinship and Marriage, Religion of the Semites; to E. Day, Social Life of the Hebrews ; and, for some comparison of customary usage in the Semitic field, to S. A. Cook, Laws of Moses and Code of Hammurabi.

14. Religion and the Prophets. — The elements of the thought and religion of the Hebrews do not sever them from their neighbours; similar features of cult are met with elsewhere under different names. Hebrew religious institutions can be understood from the biblical evidence studied in the light of comparative religion; and without going afield to Babylonia, Assyria or Egypt, valuable data are furnished by the cults of Phoenicia, Syria and Arabia, and these in turn can be illustrated from excavation and from modern custom. Every religion has its customary cult and ritual, its recognized times, places and persons for the observance. Worship is simpler at the smaller shrines than at the more famous temples; and, as the rulers are the patrons of the religion and are brought into contact with the religious personnel, the character of the social organization leaves its mark upon those who hold religious and judicial func- tions alike. The Hebrews shared the paradoxes of Orientals, and religious enthusiasm and ecstasy

were prominent features. Seers and prophets of all kinds ranged from those who were consulted for daily mundane affairs to those who revealed the oracles in times of stress, from those who haunted local holy sites to those high in royal favour, from the quiet domestic communities to the austere mountain, recluse. Among these were to be found the most sordid opportunism and the most heroic self-effacement, the crassest supernaturalism and — the loftiest conceptions of practical morality. A development of ideals and a growth of spirituality can be traced which render the biblical writings with their series of prophecies a unique

1 This is philosophically handled by the Arabian historian Ibn Khaldun, whose Prolegomena is well worthy of attention ; see De Slane, Not. et extraits, vols, xix.-xxi., with Von Kremer's criticisms in the Sitz. d. Kais. Akad. of Vienna (vol. xciii., 1879); cf. also R. Flint, History of the Philosophy of History, i. 157 sqq.

phenomenon. 1 The prophets taught that the national exis- tence of the people was bound up with religious and social con- ditions; they were in a sense the politicians of the age, and to regard them simply as foretellers of the future is to limit their sphere unduly. They took a keen interest in all the political vicissitudes of the Oriental world. Men of all standards of integrity, they were exposed to external influences, but whether divided among themselves in their adherence to conflicting parties, or isolated in their fierce denunciation of contemporary abuses, they shared alike in the worship of Yahweh whose inspira- tion they claimed. A recollection of the manifold forms which religious life and thought have taken in Christendom or in Islam, and the passions which are so easily engendered among opposing sects, will prevent a one-sided estimate of the religious stand-points which the writings betray; and to the recognition that they represent lofty ideals it must be added that the great prophets, like all great thinkers, were in advance of their age.

The prophets are thoroughly Oriental figures, and the inter- pretation of their profound religious experiences requires a particular sympathy which is not inherent in Western minds. Their writings are to be understood in the light of their age and of the conditions which gave birth to them. With few exceptions they are preserved in fragmentary form, with additions and ad-justments which were necessary in order to make them applicable to later conditions. When, as often, the great figures have been made the

spokesmen of the thought of subsequent generations, the historical criticism of the prophecies becomes one of peculiar difficulty. 2 According to the historical traditions it is precisely in the age of Jeroboam II. and Uzziah that the first of the extant prophecies begin (see Amos and Hosea). Here it is enough to observe that the highly advanced doctrines of the dis- tinctive character of Yahweh, as ascribed to the 8th century B.C., presuppose a foundation and development. But the evidence does' not allow us to trace the earlier progress of the ideas. Yahwism presents itself under a variety of aspects, and the history of Israel's relations to the God Yahweh (whose name is not necessarily of Israelite origin) can hardly be disentangled amid the complicated threads of the earlier history. The view that the seeds of Yahwism were planted in the young Israelite nation in the days of the " exodus " conflicts with the belief that the worship of Yahweh began in the pre-Mosaic age. Neverthe- less, it implies that religion passed into a new stage through the influence of Moses, and to this we find a relatively less com- plete analogy in the specific north Israelite traditions of the age of Jehu. The change from the dynasty of Omri to that of Jehu has been treated by several hands, and the writers, in their recognition of the introduction of a new tendency, have obscured the fact that the cult of Yahweh had flourished even under such a king as Ahab. While the influence of the great prophets Elijah and Elisha is clearly visible, it is instructive to find that the south, too, has its share in the inauguration of the new era. At Horeb, the mount of God, was located the dramatic theophany which heralded to Elijah the advent of the sword, and Jehu's supporter in his sanguinary measures belongs to the Rechabites, a sect which felt itself to be the true worshipping community of Yahweh and is closely associated with the Kenites, the kin of Moses. It was at the holy well of Kadesh, in the sacred mounts of Sinai and Horeb, and in the field of Edom that the

1 Cf. J. G. Frazer, Adonis, Attis, Osiris (1907), p. 67: " Prophecy of the Hebrew type has not been limited to Israel; it is indeed a phenomenon of almost world-wide occurrence; in many lands and in many ages the wild, whirling words of frenzied men and women have been accepted as the utterances of an in-dwelling deity. What does distinguish Hebrew prophecy from all others is that the genius of a few members of the profession wrested this vulgar but powerful instrument from baser uses, and by wielding it in the interest of a high morality rendered a service of incalculable value to humanity. That is indeed the glory of Israel. ..."

2 The use which was made in Apocalyptic literature of the tradi- tions of Moses, fsaiah and others finds its analogy within the Old Testament itself; cf. the relation between the present late prophecies of Jonah and the unknown prophet of the time of Jeroboam II. (see § 13, note 5). To condemn re-shaping or adaptation of this nature from a modern Western

standpoint is to misunderstand entirely the Oriental mind and Oriental usage.

Yahweh of Moses was found, and scattered traces survive of a definite belief in the entrance into Palestine of a movement uncompromisingly devoted to the purer worship of Yahweh. The course of the dynasty of Jehu — the reforms, the disastrous Aramaean wars, and, at length, Yahweh's " arrow of victory " — constituted an epoch in the Israelite history, and it is regarded as such. 3

The problem of the history of Yahwism depends essentially upon the view adopted as to the date and origin of the biblical details and their validity for the various historical and religious conditions they presuppose. Yahwism is a religion which appears upon a soil saturated with ideas and usages which find their parallel in extra- biblical sources and in neighbouring lands. The problem cannot be approached from modern preconceptions because there was much associated with the worship of Yahweh which only gradually came to be recognized as repugnant, and there was much in earlier ages and in other lands which reflects an elevated and even complex religious philosophy. In the south of the Sinaitic peninsula, remains have been found of an elaborate half-Egyptian, half-Semitic cultus (Petrie, Researches in Sinai, xiii.), and not only does Edom possess some reputation for "wisdom," but, where this district is concerned, the old_ Arabian religion (whose historical connexion with Palestine is still imperfectly known) claims some attention. The character- istic denunciations of corruption and lifeless ritual in the writings of the prophets and the emphasis which is laid upon purity and simplicity of _ religious life are suggestive of the influence of the nomadic spirit rather than of an internal evolution on Palestinian soil. _ Desert pastoral life does not necessarily imply any intellectual inferiority, and its religious conceptions, though susceptible of modi- fication, are not artificially moulded through the influence of other civilizations. " Nomadic life is recognized by Arabian writers them- selves as possessing a relative superiority, and its characteristic purity of manner and its reaction against corruption and luxury are not incompatible with a warlike spirit. If nomadism may be recognized as one of the factors in the growth of Yahwism, there is something to be said for the hypothesis which associates it with the clans connected with the Levites (see E. Meyer, Israeliten, pp. 82 sqq. ; B. Luther, ib. 138). It is, however, obvious that the influ- ence due to immigrants could be, and doubtless was, exerted at more than one period (see §§18,20; also Hebrew Religion; Priest).

15. The Fall of the Israelite Monarchy. — The prosperity of Israel was its undoing. The disorders that hastened its end find an analogy in the events of the more obscure period after the death of the earlier Jeroboam. Only

the briefest details are given. Zechariah was slain after six months by Shallum ben Jabesh in Ibleam; but the usurper fell a month later to Menahem (g.v.), who only after much bloodshed established his posi- tion. Assyria again appeared upon the scene under Tiglath- pileser IV. (745-728 B.C.). 4 His approach was the signal for the formation of a coalition, which was overthrown in 738. Among those who paid tribute were Rasun (the biblical Rezin) of Damascus, Menahem of Samaria, the kings of Tyre, Byblos and Hamath and the queen of Aribi (Arabia, the Syrian desert). Israel was once more in league with Damascus and Phoenicia, and the biblical records must be read in the light of political history. Judah was probably holding aloof. Its king, Uzziah, was a leper in his latter days, and his son and regent, Jotham, claims notice for the circumstantial reference (2 Chron. xxvii. ; cf . xxvi. 8) to his subjugation of Ammon — the natural allies of Damas- cus — for three years. Scarcely had Assyria withdrawn before Menahem lost his life in a conspiracy, and Pekah with the help of Gilead made himself king. The new movement was evidently anti-Assyrian, and strenuous endeavours were made to present a united front. It is suggestive to find Judah the centre of attack. 5 Rasun and Pekah directed their blows from the north, Philistia threatened the west flank, and the Edomites who drove out the Judaeans from Elath (on the Gulf of 'Akaba) were no doubt only taking their part in the concerted action. A more critical situation could scarcely be imagined. The throne of David was then occupied by the young Ahaz, Jotham's son.

3 The condemnation passed upon the impetuous and fiery zeal of the adherents of the new movement (cf. Hos. i. 4), like the remark- able vicissitudes in the traditions of Moses, Aaron and the Levites (qq.v.), represents changing situations of real significance, whose true place in the history can with difficulty be recovered.

4 Formerly thought to be the third of the name.

_ 5 Perhaps Judah had come to an understanding with Tiglath- pileser (H. M. Haydn, Journ. Bib. Lit., xxviii. 1909, pp. 182-199); see Uzziah.

In this crisis we meet with Isaiah (q.v.), one of the finest of Hebrew prophets. The disorganized state of Egypt and the un- certain allegiance of the desert tribes left Judah without direct aid; on the other hand, opposition to Assyria among the con- flicting interests of Palestine and Syria was

rarely unanimous. Either in the natural course of events — to preserve the unity of his empire — or influenced by the rich presents of gold and silver with which Ahaz accompanied his appeal foe help, Tiglath- pileser intervened with campaigns against Philistia (734 B.C.) and Damascus (733-732). Israel was punished by the ravaging of the northern districts, and the king claims to have carried away the people of " the house of Omri." Pekah was slain and one Hoshea (q.v.) was recognized as his successor. Assyrian officers were placed in the land and Judah thus gained its deliverance at the expense of Israel. But the proud Israelites did not remain submissive for long; Damascus had indeed fallen, but neither Philistia nor Edom had yet been crushed.

At this stage a new problem becomes urgent. A number of petty peoples, of whom little definite is known, fringed Palestine from the south of Judah and the Delta to the Syrian desert. They belong to an area which merges itself in the west into Egypt, and Egypt in fact had a hereditary claim upon it. Continued intercourse between Egypt, Gaza and north Arabia is natural in view of the trade-routes which connected them, and on several occasions joint action on the part of Edomites (with allied tribes) and the Philistines is recorded, or may be inferred. The part played by Egypt proper in the ensuing anti-Assyrian combinations is not clearly known; with a number of petty dynasts fomenting discontent and revolt, there was an absence of cohesion in that ancient empire previous to the rise of the Ethiopian dynasty. Consequently the references to " Egypt " (Heb. Misrayim, Ass. Musri) sometimes suggest that the geo- graphical term was really extended beyond the bounds of Egypt proper towards those districts where Egyptian influence or domi- nation was or had been recognized (see further Mizraim).

When Israel began to recover its prosperity and regained confidence, its policy halted between obedience to Assyria and reliance upon this ambiguous " Egypt." The situation is illus- trated in the writings of Hosea (q.v.). When at length Tiglath- pileser died, in 727, the slumbering revolt became general; Israel refused the usual tribute to its overlord, and definitely threw in its lot with " Egypt." In due course Samaria was besieged for three years by Shalmaneser IV. The alliance with So (Seveh, Sibi) of " Egypt," upon whom hopes had been placed, proved futile, and the forebodings of keen-sighted prophets were justified. Although no evidence is at hand, it is probable that Ahaz of Judah rendered service to Assyria by keeping the allies in check; possible, also, that the former enemies of Jerusalem had now been induced to turn against Samaria. The actual capture of the Israelite capital is claimed by Sargon (722), who removed 27,290 of its inhabitants and fifty chariots. Other peoples were introduced, officers were placed in charge, and the usual tribute re-imposed. Another revolt was planned in 720 in which the province of Samaria joined with

Hamath and Damas- cus, with the Phoenician Arpad and Simura, and with Gaza and " Egypt." Two battles, one at Karkar in the north, another at Rapih (Raphia) on the border of Egypt, sufficed to quell the disturbance. The desert peoples who paid tribute on this occasion still continued restless, and in 7 1 5 Sargon removed men of Tamud, Ibadid, Marsiman, Hayapa, " the remote Arabs of the desert," and placed them in the land of Beth-Omri. Sar- gon's statement is significant for the internal history; but unfortunately the biblical historians take no further interest in the fortunes of the northern kingdom after the fall of Samaria, and see in Judah the sole survivor of the Israelite tribes (see 2 Kings xvii. 7-23). Yet the situation in this neglected district must continue to provoke inquiry.

16. Judah and Assyria. — Amid these changes Judah was inti- mately connected with the south Palestinian peoples (see further Philistines). Ahaz had recognized the sovereignty of Assyria and visited Tiglath-pileser at Damascus. The Temple records describe the innovations he introduced on his return. Under his

son Hezekiah there were fresh disturbances in the southern states, and anti-Assyrian intrigues began to take a more definite shape among the Philistine cities. Ashdod openly revolted and found support in Moab, Edom, Judah, and the still ambiguous " Egypt." This step may possibly be connected with the attempt of Marduk (Merodach)-baladan in south Babylonia to form a league against Assyria (cf. 2 Kings xx. 12) ; at all events Ashdod fell after a three years' siege (711) and for a time there was peace. But with the death of Sargon in 705 there was another great outburst; practically the whole of Palestine and Syria was in arms, and the integrity of Sennacherib's empire was threatened. In both Judah and Philistia the anti-Assyrian party was not without opposition, and those who adhered or favoured adherence to the great power were justified by the result. The inevitable lack of cohesion among the petty states weakened the national cause. At Sennacherib's approach, Ashdod, Ammon, Moab and Edom submitted; Ekron, Ascalon, Lachish and Jerusalem held out strenuously. The southern allies (with " Egypt ") were defeated at Eltekeh (Josh. xix. 44). Hezekiah was besieged and compelled to submit (701). The small kings who had remained faithful were rewarded by an extension of their terri- tories, and Ashdod, Ekron and Gaza were enriched at Judah's expense. These events are related in Sennacherib's inscription; the biblical records preserve their own traditions (see Hezekiah). If the impression left upon current thought can be estimated from certain of the utterances of the court-prophet Isaiah and the Judaeari countryman Micah (q.v.), the light which these throw upon internal conditions must also be used to gauge the real extent of the religious changes ascribed to Hezekiah. A brazen serpent, whose institution was attributed to Moses, had not hitherto been considered out of place in the cult; its destruc- tion was perhaps the king's most

notable reform.

In the long reign of his son Manasseh later writers saw the deathblow to the Judaean kingdom. Much is related of his wickedness and enmity to the followers of Yahweh, but few political details have come down. It is uncertain whether Sennacherib invaded Judah again shortly before his death, never- theless the land was practically under the control of Assyria. Both Esar-haddon (681-668) and Assur-bani-pal (668-c. 626) number among their tributaries Tyre, Ammon, Moab, Edom, Ascalon, Gaza and Manasseh himself, 1 and cuneiform dockets unearthed at Gezer suggest the presence of Assyrian garrisons there (and no doubt also elsewhere) to ensure allegiance. The situation was conducive to the spread of foreign customs, and the condemnation passed upon Manasseh thus perhaps becomes more significant. Precisely what form his worship took is a matter of conjecture; but it is possible that the religion must not be judged too strictly from the standpoint of the late com- piler, and that Manasseh merely assimilated the older Yahweh- worship to new Assyrian forms. 2 Politics and religion, how- ever, were inseparable, and the supremacy of Assyria meant the supremacy of the Assyrian pantheon.

If Judah was compelled to take part in the Assyrian campaigns against Egypt, Arabia (the Syrian desert) and Tyre, this would only be in accordance with a vassal's duty. But when tradition preserves some recollection of an offence for which Manasseh was taken to Babylon to explain his conduct (2 Chron. xxxiii.), also of the settling of foreign colonists in Samaria by Esar-haddon (Ezra iv. 2), there is just a possibility that Judah made some attempt to gain independence. According to Assur-bani-pal all the western lands were inflamed by the revolt of his brother Samas-sum-ukin. What part Judah took in the Transjordanic disturbances, in which Moab fought invading Arabian tribes on behalf of Assyria, is unknown (see Moab) . Manasseh's son Amon fell in a court intrigue and " the people of the land," after avenging the murder, set up in his place the infant Josiah (637). The circumstances imply a regency, but the records are silent upon

1 The fact that these lists are of the kings of the " land Hatti " would suggest that the term " Hittite " had been extended to Palestine.

2 So K. Budde, Rel. of Israel to Exile, pp. 165-167. For an attempt to recover the character of the cults, see W. Erbt, Hebraer (Leipzig, 1906), pp. 150 sqq.

the outlook. The assumption that the decay of Assyria awoke the national feeling of independence is perhaps justified by those events which made the greatest impression upon the compiler, and an account is given of Josiah's religious reforms, based upon a source apparently identical with that which described the work of Jehoash. In an age when the oppression and corruption of the ruling classes had been such that those who cherished the old worship of Yahweh dared not confide in their most intimate companions (Mic. vii. 5, 6), no social reform was possible; but now the young Josiah, the popular choice, was upon the throne. A roll, it is said, was found in the Temple, its contents struck terror into the hearts of the priests and king, and it led to a solemn covenant before Yahweh to observe the provisions of the law-book which had been so opportunely recovered.

That the writer (2 Kings xxii. seq.) meant to describe the discovery of Deuteronomy is evident from the events which followed; and this identification of the roll, already made by Jerome, Chrysostom and others, has been substantiated by modern literary criticism since De Wette (1805). (See Deuteronomy; Josiah.) Some very interesting parallels have been cited from Egyptian and Assyrian records where religious texts, said to have been found in temples, or oracles from the distant past, have come to light at the very time when " the days were full." 1 There is, however, no real proof for the traditional antiquity of Deuteronomy. The book forms a very distinctive landmark in the religious history by reason of its attitude to cult and ritual (see Hebrew Religion, § 7). In particular it is aimed against the worship at the numerous minor sanctuaries and inculcates the sole pre-eminence of the one great sanctuary — the Temple of Jerusalem. This centralization involved the removal of the local priests and a modification of ritual and legal observance. The fall of Samaria, Sennacherib's devastation of Judah, and the growth of Jerusalem as the capital, had tended to raise the position of the Temple, although Israel itself, as also Judah, had famous sanctuaries of its own. From the standpoint of the popular religion, the removal of the local altars, like Hezekiah's destruction of the brazen serpent, would be an act of desecration, an iconoclasm which can be partly appreciated from the sentiments of 2 Kings xviii. 22, and partly also from the modern

Wahhabite reformation (of the 19th century). But the details and success of the reforms, when viewed in the light of the testimony of contemporary prophets, are uncer- tain. The book of Deuteronomy crystallizes a doctrine; it is the codification of teaching which presupposes a carefully prepared soil. The account of Josiah's work, like that of Hezekiah, is written by one of the Deuteronomic school: that is to say, the writer describes the promulgation of the teaching under which he lives. It is part of the scheme which runs through the book of Kings, and its apparent object is to show that the Temple planned by David and founded by Solomon ultimately gained its true position as the only sanctuary of Yahweh to which his worshippers should repair. Accordingly, in handling Josiah's successors the writer no longer refers to the high places. But if Josiah carried out the reforms ascribed to him they were of no lasting effect. This is conclusively shown by the writings of Jeremiah (xxv. 3-7, xxxvi. 2 seq.) and Ezekiel. Josiah himself is praised for his justice, but faithless Judah is insincere (Jer. iii. 10), and those who claim to possess Yahweh's law are denounced (viii. 8). If Israel could appear to be better than Judah (iii. 1 1 ; Ezek. xvi., xxiii.), the religious revival was a practical failure, and it was not until a century later that the opportunity again came to put any new teaching into effect (§ 20). On the other hand, the book of Deuteronomy has a characteristic social-religious side; its humanity, philanthropy and charity are the distinctive features of its laws, and Josiah's reputation (Jer. xxii. 15 seq.) and the circumstances in which he was chosen king may suggest that he, like Jehoash (2 Kings xi. 17; cf. xxiii. 3), had entered into a reciprocal covenant with a people who, as Micah's writings would indicate, had suffered grievous oppression and misery. 2

17. The Fall of the Judaean Monarchy. — In Josiah's reign a new era was beginning in the history of the. world. Assyria was rapidly decaying and Egypt had recovered from the blows of Assur-bani-pal (to which the Hebrew prophet Nahum alludes, iii. 8-10). Psammetichus (Psamtek) I., one of the ablest of Egyptian rulers for many centuries, threw off the Assyrian yoke

■*See G. Maspero, Gesch. d. morgenland. Volker (1877), p. 446; E. Naville, Proc. Soc. Bibl. Archaeol. (1907), pp. 232 sqq., and T. K. Cheyne, Decline and Fall of Judah (1908), p. 13, with references. [The genuineness of such discoveries is naturally a matter for his- torical criticism to decide. Thus the discovery of Numa's laws in Rome (Liyy xl. 29), upon which undue weight has sometimes been laid (see Klostermann, Der Pentateuch (1906), pp. 155 sqq., was not accepted as genuine by the senate (who had the laws destroyed), and probably not by Pliny himself. Only the later antiquaries clung to the belief in their trustworthiness. — (Communicated.)}*

2 Both kings came to the throne after a conspiracy aimed at existing abuses, and other parallels can be found (see Kings).

with the help of troops from Asia Minor and employed these to guard his eastern frontiers at Defneh. He also revived the old trading-connexions between Egypt and Phoenicia. A Chaldean prince, Nabopolassar, set himself up in Babylonia, and Assyria was compelled to invoke the aid of the Askuza. It was perhaps after this that an inroad of Scythians (q.v.) occurred (c. 626 B.C.); if it did not actually touch Judah, the advent of the people of the north appears to have caused great alarm (Jer. iv.vi.: Zephaniah). Bethshean in Samaria has perhaps preserved in its later (though temporary) name Scythopolis an echo of the inva sion. 3 Later, Necho, son of Psammetichus, proposed to add to Egypt some of the Assyrian provinces, and marched through Palestine. Josiah at once interposed; it is uncertain whether, in spite of the power of Egypt, he had hopes of extending his king- dom, or whether the famous reformer was, like Manasseh, a vassal of Assyria. The book of Kings gives the standpoint of a later Judaean writer, but Josiah's authority over a much larger area than Judah alone is suggested by xxiii. 19 (part of an addition), and by the references to the border at Riblah in Ezek. vi. 14, xi. 10 seq. He was slain at Megiddo in 608, and Egypt, as in the long-distant past, again held Palestine and Syria. The Judaeans made Jehoahaz (or Shallum) their king, but the Pharaoh banished him to Egypt three months later and appointed his brother Jehoiakim. Shortly afterwards Nineveh fell, and with it the empire which had dominated the fortunes of Palestine for over two centuries (see § 10). Nabonidus (Nabunaid) king of Baby- lonia (556 B.C.) saw in the disaster the vengeance of the gods for the sacrilege of Sennacherib; the Hebrew prophets, for their part, exulted over Yahweh's far-reaching judgment. The newly formed Chaldean power at once recognized in Necho a dangerous rival and Nabopolassar sent his son Nebuchadrezzar, who over- threw the Egyptian forces at Carchemish (605). The battle was the turning-point of the age, and with it the succession of the new Chaldean or Babylonian kingdom was assured. But the relations between Egypt and Judah were not broken off. The course of events is not clear, but Jehoiakim (q.v.) at all events was in- clined to rely upon Egypt. He died just as Nebuchadrezzar, seeing his warnings disregarded, was preparing to lay siege to Jerusalem. His young son Jehoiachin surrendered after a three months' reign, with his mother and the court; they were taken away to Babylonia, together with a number of the artisan class (596). Jehoiakim's brother, Mattaniah or Zedekiah, was set in his place under an oath of allegiance, which he broke, pre- ferring Hophra the new king of Egypt. A few years later the second siege took place. It began on the tenth day of the tenth month, January 587. The looked-for intervention of Egypt was unavailing, although a temporary

raising of the siege inspired wild hopes. Desertion, pestilence and famine added to the usual horrors of a siege, and at length on the ninth day of the fourth month 586, a breach was made in the walls. Zedekiah fled towards the Jordan valley but was seized and taken to Nebuchad- rezzar at Riblah (45 m. south of Hamath). His sons were slain before his eyes, and he himself was blinded and carried off to Babylon after a reign of eleven years. The Babylonian Nebuzar- adan was sent to take vengeance upon the rebellious city, and on the seventh day of the fifth month 586 B.C. Jerusalem was destroyed. The Temple, palace and city buildings were burned, the walls broken down, the chief priest Seraiah, the second priest Zephaniah, and other leaders were put to death, and a large body of people was again carried away. The disaster became the great epoch-making event for Jewish history and literature.

*Throughout these stormy years the prophet Jeremiah (q.v.) had realized that Judah's only hope lay in submission to Babylonia. Stigmatized as a traitor, scorned and even imprisoned, he had not ceased to utter his warnings to deaf ears, although Zedekiah himself was perhaps open to persuasion. Now the penalty had been paid, and the Babylonians, whose policy was less destructive than that of Assyria, contented themselves with appointing as governor a certain Gedaliak The new centre was Mizpah, a commanding eminence and sanctuary, about 5 m. N.W. of Jerusalem; and here Gedaliah issued an appeal to the people to * Bat see N. Schmidt, Ency. Bib., " Scythians," § 1.*

be loyal to Babylonia and to resume their former peaceful occu- pations. The land had not been devastated, and many gladly returned from their hiding-places in Moab, Edom and Ammon. But discontented survivors of the royal family under Ishmael intrigued with Baalis, king of Ammon. The plot resulted in the murder of Gedaliah and an unsuccessful attempt to carry off various princesses and officials who had been left in the governor's care. This new confusion and a natural fear of Babylonia's vengeance led many to feel that their only safety lay in flight to Egypt, and, although warned by Jeremiah that even there the sword would find them, they fled south and took refuge in Tahpanhes (Daphnae, q.v.), afterwards forming small settle- ments in other parts of Egypt. But the thread of the history is broken, and apart from an allusion to the favour shown to the captive Jehoiachin (with which the books of Jeremiah and Kings conclude), there is a gap in the records, and subsequent events are viewed from a new

standpoint (§ 20).

The last few years of the Judaean kingdom present several difficult problems.

(a) That there was some fluctuation of tradition is evident in the case of Jehoiakim, with whose quiet end (2 Kings xxiv. 6 [see also Lucian]; 2 Chron. xxxvi. 8 [Septuagint]) contrast the fate fore- shadowed in Jer. xxii. 18 seq., xxxvi. 30 (cf. Jos. Ant. x. 6, 2 seq.). The tradition of his captivity (2 Chron. xxxvi. 6; Dan. i. 2) has apparently confused him with Jehoiachin, and the latter's reign is so brief that some overlapping is conceivable. Moreover, the prophecy in Jer. xxxiv. 5 that Zedekiah would die in peace is not borne out by the history, nor does Josiah's fate agree with the promise in 2 Kings xxii. 20. There is also an evident relation between the pairs: Jehoahaz and Jehoiakim, lehoiachin and Zedekiah {e.g. length of reigns), and the difficulty felt in regard to the second and third is obvious in the attempts of the Jewish historian Josephus to provide a compromise. The contemporary prophecies ascribed to Jeremiah and Ezekiel require careful examination in this con- nexion, partly as regards their traditional background (especially the headings and setting), and partly for their contents, the details of which sometimes do not admit of a literal interpretation in accor- dance with our present historical material (cf. Ezek. xix. 3-9, where the two brothers carried off to Egypt and Babylon respectively would seem to be Jehoahaz and his nephew Jehoiachin).

(b) Some fluctuation is obvious in the number, dates and extent of the deportations. Jer. lii. 28-30 gives a total of 4600 persons, in contrast to 2 Kings xxiv. 14, 16 (the numbers are not inclusive), and reckons three deportations in the 7th (? 17th), 18th and 23rd years of Nebuchadrezzar. Only the second is specifically said to be from Jerusalem (the remaining are of Judaeans), and the last has been plausibly connected with the murder of Gedaliah, an interval of five years being assumed. For this twenty-third year Josephus (A nt. x. 9, 7) gives an invasion of Egypt and an attack upon Ammon, Moab and Palestine (see Nebuchadrezzar).

(c) That the exile lasted seventy years (? from 586 B.C. to the com- pletion of the second. temple) is the view of the canonical history (2 Chron. xxxvi. 21; Jer. xxv. II, xxix. 10; Zech. i. 12; cf. Tyre, Isa. xxiii. 15), but it is usually reckoned from the first deportation, which was looked upon as of greater significance than the second (Jer. xxiv. xxix.), and it may be a round number. Another difficulty is the interpretation of the 40 years in Ezek. iv. 6 (cf . Egypt, xxix. 11), and the 390 in v. 5 (Septuagint 150 or 190; 130 in Jos. x. 9, 7 end). A period of fifty years is allowed by the chronological scheme (1 Kings vi. 1 ;cf. Jos. c. Ap. i. 21), and the late

book of Baruch (vi. 3) even speaks of seven generations. Varying chronological schemes may have been current and some weight must be laid upon the remarkable vagueness of the historical information in later writings (see Daniel).

(d) The attitude of the neighbouring peoples constitutesanother seri- ous problem (cf. 2 Kings xxiv. 2 and 2 Chron. xxxvi. 5, where Lucian's recension and the Septuagint respectively add the Samaritans!), in view of the circumstances of Gedaliah's appointment (Jer. xl. 11, see above) as contrasted with the frequent prophecies against Ammon, Moab and Edom which seem to be contemporary (see Edom ; Moab).

(e) Finally, the recurrence of similar historicalsituationsinjudaean history must be considered. The period under review, with its rela- tions between Judah and Egypt, can be illustrated by prophecies ascribed to a similar situation in the time of Hezekiah. But the destruction of Jerusalem is not quite unique, and somewhat later we meet with indirect evidence for at least one similar disaster upon which the records are silent. There are a number of apparently related passages which, however, on internal grounds, are unsuitable to the present period, and when they show independent signs of a later date (in their present form), there is a very strong probability that they refer to such subsequent disasters. The scantiness of historical tradition makes a final solution impossible, but the study of these years has an important bearing on the history of the later Judaean state, which has been characteristically treated from the standpoint of exiles who returned from Babylonia and regard them-

selves as the kernel of " Israel." From this point of view, the desire to intensify the denudation of Palestine and the fate of its remnant, and to look to the Babylonian exiles for the future, can probably be recognized in the writings attributed to contemporary prophets. 1

18. Internal Conditions and the Exile. — Many of the exiles accepted their lot and settled down in Babylonia (cf. Jer. xxix. 4 _ 7); Jewish colonies, too, were being founded in Egypt. The agriculturists and herdsmen who had been left in Palestine formed, as always, the staple population, and it is impossible to imagine either Judah or Israel as denuded of its inhabitants. The down-trodden peasants were left in peace to divide the land among them, and new conditions arose as they took over the ownerless estates. But the old continuity . was not entirely broken; there was a return to earlier conditions, and life moved more freely in its wonted channels. The fall of the monarchy involved a reversion to a pre-monarchical state. It had scarcely been otherwise in Israel. The Israelites who had been carried off by the Assyrians were also removed from the cult of the land (cf. 1 Sam. xxvi. 19; Ruth i. 15 seq.). It is possible that some had escaped by taking

timely refuge among their brethren in Judah; indeed, if national tradition availed, there were doubtless times when Judah cast its eye upon the land with which it had been so intimately connected. It would certainly be unwise to draw a sharp boundary line between the two districts; kings of Judah could be tempted to restore the kingdom of their traditional founder, or Assyria might be complaisant towards a faithful Judaean vassal. The character of the Assyrian domination over Israel must not be misunderstood; the regular payment of tribute and the provision of troops were the main requirements, and the position of the masses underwent little change if an Assyrian governor took the place of an unpopular native ruler. The two sections of the Hebrews who had had so much in common were scarcely severed by a border-line only a few miles to the north of Jerusalem. But Israel after the fall of Samaria is artificially excluded from the Judaean horizon, and lies as a foreign land, although Judah itself had suffered from the intru- sion of foreigners in the preceding centuries of war and turmoil, and strangers had settled in her midst, had formed part of the royal guard, or had even served as janissaries (§ 15, end).

Samaria had experienced several changes in its original population, 2 and an instructive story tells how the colonists, in their ignorance of the religion of their new home, incurred the divine wrath. Cujus regio ejus religio — settlement upon a new soil involved dependence upon its god, and accordingly priests were sent to instruct the Samaritans in the fear of Yahweh. Thenceforth they continued the worship of the Israelite Yahweh along with their own native cults (2 Kings xvii. 24-28, $3). Their descendants claimed participation in the privileges of the Judaeans (cf. Jer. xli. 5), and must have identified themselves with the old stock (Ezra iv. 2). Whatever recollection they preserved of their origin and of the circumstances of their entry would be retold from a new standpoint; the ethnological tradi- tions would gain a new meaning; the assimilation would in time become complete. In view of subsequent events it would be difficult to find a more interesting subject of inquiry than the internal religious and sociological conditions in Samaria at this age.

To the prophets the religious position was lower in Judah than in Samaria, whose iniquities were less grievous (Jer. iii. 11 seq., xxiii. 11 sqq.; Ezek. xvi. 51). The greater prevalence of heathen elements in Jerusalem, as detailed in the reforms of Josiah or in the writings of the prophets (cf. Ezek. viii.), would

1 So also one can now compare the estimate taken of the Jews in Egypt in Jer. xliv. with the actual religious conditions which are known to have prevailed later at Elephantine, where a small Jewish colony worshipped Yahu (Yahweh) at their own temple (see E. Sachau, " Drei aram. Papyrusurkunde," in the Abhandlungen of the Prussian Academy, Berlin,

1907).

2 Sargon had removed Babylonians into the land of Hatti (Syria and Palestine), and in 715 B.C. among the colonists were tribes appar- ently of desert origin (Tamud, Hayapa, &c.) ; other settlements are ascribed to Esar-haddon and perhaps Assur-bani-pal (Ezra iv. 2, 10). See for the evidence, A. E. Cowley, Ency. Bib., col. 4257; J. A. Montgomery, The Samaritans, pp. 46-57 (Philadelphia, 1907).

at least suggest that the destruction of the state was not entirely a disaster. To this catastrophe may be due the fragmentary character of old Judaean historical traditions. Moreover, the land was purified when it became divorced from the practices of a luxurious court and lost many of its worst inhabitants. In Israel as in Judah the political disasters not only meant a shifting of population, they also brought into prominence the old popular and non-official religion, the character of which is not to be condemned because of the attitude of lofty prophets in advance of their age. When there were sects like the Rechabites (Jer. xxxv.), when the Judaean fields could produce a Micah or a Zephaniah, and when Israel no doubt had men who inherited the spirit of a Hosea, the nature of the underlying conditions can be more justly appreciated. The writings of the prophets were cherished, not only in the un- favourable atmosphere of courts (see Jer. xxxvi., 21 sqq.), but also in the circles of their followers (Isa. viii. 16). In the quiet smaller sanctuaries the old-time beliefs were maintained, and the priests, often perhaps of the older native stock (cf. 2 Kings xvii. 28 and above), were the recognized guardians of the reli- gious cults. The old stories of earlier days encircle places which, though denounced for their corruption, were not regarded as illegitimate, and in the form in which the dim traditions of the past are now preserved they reveal an attempt to purify popular belief and thought. In the domestic circles of prophetic communities the part played by their great heads in history did not suffer in the telling, and it is probable that some part at least of the extant history of the Israelite kingdom passed through the hands of men whose interest lay in the pre-eminence of their seers and their beneficent deeds on behalf of these small communities. This interest and 'the popular tone of the history may be combined with the fact that the literature does not take us into the midst of that world of activity in which the events unfolded themselves.

Although the records preserve complete silence upon the period now under

review, it is necessary to free oneself from the narrow out- look of the later Judaean compilers. It is a gratuitous assumption that the history of (north) Israel ceased with the fall of Samaria or that Judah then took over Israelite literature and inherited the old Israelite spirit: the question of the preservation of earlier writings is of historical importance. It is true that the situation in Israel or Samaria continues obscure, but a careful study of literary pro- ductions, evidently not earlier than the 7th century B.C., reveals a particular loftiness of conception and a tendency which finds its parallels in Hosea and approximates the peculiar characteristics of the Deuteronomic school of thought. But the history which the Judaean writers have handed down is influenced by the later hostility between Judah and Samaria. The traditional bond between the north and south which nothing could efface (cf. Jos. Ant., xi. 8, 6) has been carried back to the earliest ages; yet the present period, after the age of rival kingdoms, Judah and Israel, and before the founda- tion of Judaism, is that in which the historical background for the inclusion of Judah among the " sons " of Israel is equally suit- able (§§ 5, 20, end). The circumstances favoured a closer alliance between the people of Palestine, and a greater prominence of the old holy places (Hebron, Bethel, Shechem, &c), of which the ruined Jerusalem would not be one, and the existing condition of Judah and Israel from internal and non-political points of view — not their condition in the pre-monarchical ages — is the more crucial problem in biblical history. 1

19. Persian Period.' 1 — The course of events from the middle of the 6th century B.C. to the close of the Persian period is lamentably obscure, although much indirect evidence indicates that this age holds the key to the growth of written biblical history. It was an age of literary activity which manifested itself, not in contemporary historical records — only a few of which have survived — but rather in the special treatment of previously existing sources. The problems are of unusual

1 The growing recognition that the land was not depopulated after 586 is of fundamental significance for the criticism of " exilic " and " post-exilic " history. G. A. Smith thus sums up a dis- cussion of the extent of the deportations: "... A large majority of the Jewish people remained on the land. This conclusion may startle us with our generally received notions of the whole nation as exiled. But there are facts which support it " (Jerusalem, ii. 268).

2 On the place of Palestine in Persian history see Persia: History, ancient, especially § 5 ii. ; also Artaxerxes; Cambyses; Cyrus; Darius, &c.

intricacy and additional light is needed from external evidence. It will be

convenient to turn to this first. Scarcely 40 years after the destruction of Jerusalem, a new power appeared in the east in the person of Cyrus the Great. Babylon speedily fell (530 B.C.) and a fresh era opened. To the petty states this meant only a change of masters; they now became part of one of the largest empires of antiquity. The prophets who had marked in the past the advent of Assyrians and Chaldeans now fixed their eyes upon the advance of Cyrus, confident that the fall of Babylon would bring the restoration of their fortunes. Cyrus was hailed as the divinely appointed saviour, the anointed one of Yahweh. The poetic imagery in which the prophets clothed the doom of Babylon, like the romantic account of Herodotus (i. 191), falls short of the simple contemporary account of Cyrus himself. He did not fulfil the detailed predictions, and the events did not reach the ideals of Hebrew writers; but these anticipations may have influenced the form which the Jewish traditions subsequently took. Nevertheless, if Cyrus was not originally a Persian and was not a worshipper of Yahweh (Isa. xli. 25), he was at least tolerant towards subject races and their religions, and the persistent traditions unmistakably point to the honour in which his memory was held. Throughout the Persian supremacy Palestine was necessarily influenced by the course of events in Phoenicia and Egypt (with which intercourse was continual), and some light may thus be in- directly thrown on its otherwise obscure political history. Thus, when Cambyses, the con of Cyrus, made his great expedition against Egypt, with the fleets of Phoenicia and Cyprus and with the camels of the Arabians, it is highly probable that Palestine itself was concerned. Also, the revolt which broke out in the Persian provinces at this juncture may have extended to Palestine; although the usurper Darius encountered his most serious opposition in the north and north-east of his empire. An outburst of Jewish religious feeling is dated in the second year of Darius (520), but whether Judah was making a bold bid for independence or had received special favour for abstaining from the above revolts, external evidence alone can decide. Towards the close of the reign of Darius there was a fresh revolt in Egypt; it was quelled by Xerxes (485-465), who did not imitate the religious tolerance of his predecessors. Artaxerxes I. Longimanus (465-425), attracts attention because the famous Jewish reformers Ezra and Nehemiah flourished under a king of this name. Other revolts occurred in Egypt, and for these and also for the rebellion of the Persian satrap Megabyzos (c. 448-447), independent evidence for the position of Judah is needed, since a catastrophe apparently befell the unfortunate state before Nehemiah appears upon the scene. Little is known of the mild and indolent Artaxerxes II. Mnemon (404-359). With the growing weakness of the Persian empire Egypt reas- serted its independence for a time. In the reign of Artaxerxes III. Ochus (359-338), Egypt, Phoenicia and Cyprus were in revolt; the rising was quelled without mercy, and the details of the vengeance are valuable for the possible fate of

Palestine itself. The Jewish historian Josephus {Ant. xi. 7) records the enslavement of the Jews, the pollution of the Temple by a certain Bagoses (see Bagoas), and a seven years' punishment. Other late sources narrate the destruction of Jericho and a deportation of the Jews to Babylonia and to Hyrcania (on the Caspian Sea). The evidence for the catastrophes under 1 Artaxerxes I. and III. (see Artaxerxes), exclusively contained in biblical and in external tradition respectively, is of particular importance, since several biblical passages refer to disasters similar to those of 586 but presuppose different conditions and are apparently of later origin. 3 The murder of Artaxerxes III. by

3 The evidence for Artaxerxes III., accepted by Ewald and others (see W. R. Smith, Old Testament in Jewish Church, p. 438 seq. ; W. Judeich, Kleinasiat. Stud., p. 170; T. K. Cheyne, Ency. Bib., col. 2202 ; F. C. Kent, Hist. [1899], pp. 230 sqq.) has however been ques- tioned by Willrich, Judaica, 35-39 (see Cheyne, Ency. Bib., col. 3941). The account of Josephus (above) raises several difficulties, especially the identity of Bagoses. It has been supposed that he has placed the record too late, and that this Bagoses is the Judaean governor who flourished about 408 B.C. (See p. 286, n. 3.)

Bagoses gave a set-back to the revival of the Persian Empire. Under Darius Codomannus (336-330) the advancing Greek power brought matters to a head, and at the battle of Issus in 333 Alexander settled its fate. The overthrow of Tyre and Gaza secured the possession of the coast and the Jewish state entered upon the Greek period. (See § 25.)

During these two centuries the Jews in Palestine had been only one of an aggregate of subject peoples enjoying internal freedom provided in return for a regular tribute. They lived in comparative quietude; although Herodotus knows the Palestinian coast he does not mention the Jews. The earlier Persian kings acknowledged the various religions of the petty peoples; they were also patrons of their temples and would take care to preserve an ancient right of asylum or the privileges of long-established cults. 1 Cyrus on enter- ing Babylon had even restored the gods to the cities to which they belonged. 2 Consequently much interest attaches to the evidence which illustrates the environment of the Jews during this period.

Those who had been scattered from Palestine lived in small colonies, sometimes mingling and intermarrying with the natives, sometimes strictly preserving their own individuality. Some took root in the strange lands, and, as later popular stories indicate, evidently reached high positions; others, retaining a more vivid tradition of the land of their fathers, cherished the ideal of a restored Jerusalem. Excava- tion at Nippur (q.v.) in Babylonia has brought to light numerous contract tablets of the 5th century B.C. with Hebrew proper names (Haggai, Hanani, Gedaliah, &c). Papyri from Elephantine in Upper Egypt, of the same age, proceed from Jewish families who carry on a flourishing business, live among Egyptians and Persians, and take their oaths in courts of law in the name of the god " Yahu," the " God of Heaven," whose temple dated from the last Egyptian kings. Indeed, it was claimed that Cambyses had left the sanctuary unharmed but had destroyed the temples of the Egyptians. In Elephantine, as in Nippur, the legal usages show that similar elements of Babylonio-Assyrian culture prevailed, and the evidence from two such widely separated fields is instructive for conditions in Palestine itself.?

20. The Restoration of Judah. — The biblical history for the Persian period is contained in a new source — the books of Ezra and Nehemiah, whose standpoint and period are that of Chronicles, with which they are closely joined. After a brief description of the fall of Jerusalem the " seventy years " of the exile are passed over, and we are plunged into a history of the return (2 Chron. xxxvi. ; Ezra i.). Although Palestine had not been depopulated, and many of the exiled Jews remained in Persia, the standpoint is that of those who returned from Babylon'. Settled in and around Jerusalem, they look upon themselves as the sole community, the true Israel, even as it was believed that once before Israel entered and developed inde- pendently in the land of its ancestors. They look back from the age when half-suppressed hostility with Samaria had broken out, and when an exclusive Judaism had been formed. The interest of the writers is as usual in the religious history; they were indifferent to, or perhaps rather ignorant of, the strict order of events. Their narratives can be partially supplemented from other sources (Haggai; Zechariah i.-viii.; Isa. xl.-lxvi.; Malachi), but a consecutive sketch is impossible. 4

1 Thus a decree of Darius I. takes the part of his subjects against the excessive zeal of the official Gadatas, and grants freedom of taxation and exemption from forced labour to those connected with a temple of Apollo in Asia Minor (Bulletin de correspondance hellenique, xiii. 529; E. Meyer, Entstehung des Judenthums, p. 19 seq.; cf. id. Forschungen, ii. 497).

2 In addition to this, the Egyptian story of the priest Uza-hor at the court of Cambyses and Darius reflects a policy of religious tolerance which illustrates the biblical account of Ezra and Nehemiah (Brugsch, Gesch.

Aeg. pp. 784 sqq. ; see Cheyne, Jew. Relig. Life after the Exile, pp. 40-43).

3 From Tema in north Arabia, also, there is monumental evidence of the 5th century B.C. for Babylonian and Assyrian influence upon the language, cult and art. For Nippur, see Bab. Exped. of Univ. of Pennsylvania, series A., vol. ix. (1898), by H. V. Hilprecht; for Elephantine, the Mond papyri, A. H. Sayce and A. E. Cowley, Aramaic Papyri Discovered at Assuan (1906), and those.cited above (p. 282, n. i)._ For the Jewish colonies in general, see H. Guthe, Ency. Bib., art. " Dispersion " (with references) ; also below, § 25 sqq.

4 See Ezra and Nehemiah with bibliographical references, also T. K. Cheyne, Introd. to Isaiah (1895); Jew. Religious Life after the Exile (1898); E. Sellin, Stud. z. Entstehungsgesch. d. jud. Gemeinde (1901); R. H. Kennett in Swete's Cambridge Biblical Essays (pp. 92 sqq.); G. Jahn, Die Biicher Esra u. Nehemja (1909); and C. C. Torrey, Ezra Studies (1910).

In 561 B.C. the captive Judaean king, Jehoiachin, had received special marks of favour from Nebuchadrezzar's son Amil- marduk. So little is known of this act of recognition that its significance can only be conjectured. A little later Tyre received as its king Merbaal (555-552) who had been fetched from Babylonia. Babylonia was politically unsettled, the repre- sentative of the Davidic dynasty had descendants; if Babylon was assured of the allegiance of Judah further acts of clemency may well have followed. But the later recension of Judaean history — our sole source — entirely ignores the elevation of Jehoiachin (2 Kings xxv. 27 sqq.; Jer. Hi. 31-34), and proceeds at once to the first year of Cyrus, who proclaims as his divine mission the rebuilding of the Temple (538). The Judaean Sheshbazzar (a corruption of some Babylonian name) brought back the Temple vessels which Nebuchadrezzar had carried away and prepared to undertake the work at the expense of the royal purse. An immense body of exiles is said to have returned at this time to Jerusalem under Zerubbabel, who was of Davidic descent, and the priest Jeshua or Joshua, the grandson of the murdered Seraiah (Ezra i.-iii.; v. 13-vi. 5). When these refused the proffered help of the people of Samaria, men of the same faith as themselves (iv. 2), their troubles began, and the Samaritans retaliated by preventing the rebuilding. The next historical notice is dated in the second year of Darius (520) when two prophets, Haggai and Zechariah, came forward to kindle the Judaeans to new efforts, and in spite of opposition the work went steadily onwards, thanks to the favour of Darius, until the Temple was completed four years later (Ezra v. 2, vi. 13 sqq.). On the other hand, from the independent writings ascribed to these prophets, it appears that no considerable body of exiles could have returned — it is still an event of the future (Zech. ii. 7, vi. 15); little, if anything, had been done

to the Temple (Hag. ii. 15); and Zerubbabel is the one to take in hand and complete the great undertaking (Zech. iv. 9). The prophets address themselves to men living in comfortable abodes with olive-fields and vineyards, suffering from bad seasons and agricultural depression, and though the country is un- settled there is no reference to any active opposition on the part of Samaritans. So far from drawing any lesson from the brilliant event in the reign of Cyrus, the prophets imply that Yahweh's wrath is still upon the unfortunate city and that Persia is still the oppressor. Consequently, although small bodies of individuals no doubt came back to Judah from time to time, and some special mark of favour may have been shown by Cyrus, the opinion has gained ground since the early arguments of E. Schrader (Stud. u. Krit., 1867, pp. 460-504), that the com- piler's representation of the history is untrustworthy. His main object is to make the new Israel, the post-exilic community at Jerusalem, continuous, as a society, with the old Israel. 5 Greater weight must be laid upon the independent evidence of the prophetical writings, and the objection that Palestine could not have produced the religious fervency of Haggai or Zechariah without an initial impulse from Babylonia begs the question. Unfortunately the internal conditions in the 6th century B.C. can be only indirectly estimated (§ 18), and the political position must remain for the present quite uncertain. In Zerubbabel the people beheld once more a ruler of the Davidic race. The; new temple heralded a new future; the mournful fasts com- memorative of Jerusalem's disasters would become feasts;', Yahweh had left the Temple at the fall of Jerusalem, but had now returned to sanctify it with his presence; the city had purged its iniquity and was fit once more to become the central sanc- tuary. So Haggai sees in Zerubbabel the representative of the

6 There is an obvious effort to preserve the continuity of tradition (a) in Ezra ii. which gives a list of families who returned from exile each to its own city, and (b) in the return of the holy vessels in the time of Cyrus (contrast I Esdras iv. 43 seq.), a view which, in spite of Dan. i. 2, v. 2 seq., conflicts with 2 Kings xxiv. 13 and xxv. 13 (see, however, v. 14). That attempts have been made to adjust contradictory representations is suggested by the prophecy ascribed to Jeremiah (xxvii, 16 sqq.) where the restoration of the holy vessels finds no place in the shorter text of the Septuagint (see W. R. Smith, Old Test, and Jew. Church, pp. 104 sqq.).

ideal kingdom, the trusted and highly favoured minister who was the

signet-ring upon Yahweh's hand (contrast Hag. ii. 24 with Jer. xxii. 23). Zechariah, in his turn, proclaims the overthrow of all difficulties in the path of the new king, who shall rule in glory supported by the priest (Zech. vi.). What political aspirations were revived, what other writers were inspired by these momentous events are questions of inference.

A work which inculcates the dependence of the state upon the purity of its ruler is the unfinished book of Kings with its history of the Davidic dynasty and the Temple. Its ideals culminate in Josiah (§ 16, end), and there is a strong presumption that it is intended to impress upon the new era the lessons drawn from the past. Its treatment of the monarchy is only part of a great and now highly complicated literary undertaking (traceable in the books Joshua to Kings), inspired with the thought and coloured by language characteristic of Deuteronomy (especially the secondary portions), which forms the necessary introduction. Whatever reforms Josiah actually accomplished, the restoration afforded the opportunity of bringing the Deuteronomic teaching into action; though it is more probable that Deuteronomy itself in the main is not much earlier than the second half of the 6th century B.C. 1 It shows a strong nationalist feeling which is not restricted to Judah alone, but comprises a greater Israel from Kadesh in Naphtali in the north to Hebron in the south, and even extends beyond the Jordan. Distinctive non-Judaean features are included, as in the Samaritan liturgical office (Deut. xxvii. 14-26), and the evidence for the conclusion that traditions originally of (north) Israelite interest were taken over and adapted-to the later standpoint of Judah and Jerusalem (viz. in the Deuteronomic book of Kings) independently confirms the inferences drawn from Deuteronomy itself. The ab- sence of direct testimony can be partially supplied by later events which presuppose the break-up of no inconsiderable state, and imply relations with Samaria which had been by no means so unfriendly as the historians represent. A common ground for Judaism and Samaritanism is obvious, and it is in this obscure age that it is to be sought. But the curtain is raised for too brief an interval to allow of more than a passing glimpse at the restoration of Judaean for- tunes; not until the time of Nehemiah, about 140 years after the fall of Jerusalem, does the historical material become less imperfect. Upon this blank period before the foundation of Judaism (§§ 21, 23) much light is also thrown by another body of evidence. It has long been recognized that I Chron. ii. and iv. represent a Judah composed mainly of groups which had moved up from the south (Hebron) to the vicinity of Jerusalem. It includes Caleb and Jerah- meel, Kenite or Rechabite families, scribes, &c, and these, as " sons " of Hezron, claim some relationship with Gilead. The names point generally to an affinity with south Palestine and north Arabia (Edom, Midian, &c. ; see especially the lists in Gen. xxxvi.), and suggest that certain members of a closely related collection of groups had separated

from the main body and were ultimately enrolled as Israelites. It is also recognized by many scholars that in the present account of the exodus there are indications of the original prominence of traditions of Kadesh, and also of a journey northwards in which Caleb, Kenites and others took part (§ 5). On these and on other grounds besides, it has long been felt that south Palestine, with its north Arabian connexions, is of real importance in biblical research, and for many years efforts have been made to determine the true significance of the evidence. The usual tendency has been to regard it in the light of the criticism of early Israelite history, which demands some reconstruction (§8), and to discern distinct tribal movements previous to the union of Judah and Israel under David. On the other hand, the elaborate theory of T. K. Cheyne involves the view th»t a history dealing with the south actually underlies our sources and can be recovered by emendation of the text. Against the former is the fact that although certain groups are ultimately found in Judah (Judg. i.), the evidence for the movement — a conquest north of Kadesh, almost at the gate of the promised land — explicitly mentions Israel; and against the latter the evidence again shows that this representation has been deliber- ately subordinated to the entrance of Israel from beyond the Jordan. 5

1 The view that Deuteronomy is later than the 7th century has been suggested by M. Vernes, Nouvelle hypothese sur la comp. et Vorigine du Deut. (1887); Havet, Christian, et ses origines (1878); Horst, in Rev. de I'hist. des relig., 1888; and more recently by E. Day, Journ. Bib. Lit. (1902), pp. 202 sqq. ; and R. H. Kennett, Journ. Theol. Stud. (1906), pp. 486 sqq. The strongest counter-arguments (see W. E. Addis, Doc. of Hexat. ii. 2-9) rely upon the historical trustworthiness of 2 Kings xxii. seq. Weighty reasons are brought also by conservative writers against the theory that Deuteronomy dates from or about the age of Josiah, and their objections to the " discovery " of a new law-roll apply equally to the " re-discovery " and promulgation of an old and authentic code.

2 See, for Cheyne's view, his Decline and Fall of Judakˆ Introduction (1908). The former tendency has many supporters; see, among recent writers, N. Schmidt, Hibbert Journal (1908), pp. 322 sqq. ; C.F. Burney, Journ. Theol. Stud. (1908), pp. 321 sqq.; O. A. Totfteen,

In either case the history of separate sections of people may have been extended to Israel as a whole, but there is no evidence for any adequate reconstruction. Yet the presence of distinct representa- tions of the history may be recognized, and since the Judaean compilers of the Old Testament have incorporated non-Judaean sources (e.g. the history of the northern monarchy), it is obvious that, apart from indigenous. Judaean tradition, the southern groups which were ultimately enrolled in Judah would possess their own stock of oral and written lo a. Hence it is noteworthy that the

late editor of Judges has given the first place to Othniel, a Kenizzite, and therefore of Edomite affinity, though subsequently reckoned as a Judaean (Judg i. 13, i i. 9; cf. Gen. xxxvi. II ; I Chron. iv. 13). Of Kenite interest is the position of Cain, ancestor of heroes of culture and of the worship of Yahweh (Gen. iv. 17 sqq.). One fragmentary source alludes to a journey to the Midianite or Kenite father-in-law of Moses with the Ark (q.v.); another knows of its movements with David and the priest Abiathar (a name closely related to Jether or Jethro; cf. also I Chron. iv. 17). Distinctively Calebite are the stories of the eponym who, fearless of the " giants " of Palestine, gained striking divine promises (Num. xiv. 1 1-24) ; Caleb's overthrow of the Hebronite giants finds a parallel in David's conflicts before the capture of Jerusalem, and may be associated with the belief that these primitive giants once filled the land (Josh. xi. 21 seq. ; see § 7, and David; Samuel, Books of). Calebite, too, are Hebron and its patron Abraham, and both increase in prominence in the patriarchal narratives, where, moreover, an important body of tradition can have emanated only from outside Israel and Judah (see Genesis). Although Judah was always closely connected with the south, these " southern " features (once clearly more extensive and complete) are found in the Deuteronomic and priestly compilations, and their presence in the historical records can hardly be severed from the prominence of " southern " families in the vicinity of Jerusalem, some time after the fall of Jerusalem. The background in 1 Chron. ii. presupposes the desolation after that disaster, and some traces of these families are found in Nehemiah 's time ; and while the traditions know of a separation from Edom (viz. stories of Jacob and his " brother " Esau), elsewhere Edom is frequently denounced for unbrotherly conduct in connexion with some disaster which befell Jerusalem, apparently long after 586 B.C. (see § 22). 3 The true inwardness of this movement, its extent and its history, can hardly be recovered at present, but it is noteworthy that the evidence generally involves the Levites, an ecclesiastical body which under- went an extremely intricate development. To a certain extent it would seem that even as Chronicles (q.v.) has passed through the hands of one who was keenly interested in the Temple service, so the other historical books have been shaped not only by the late priestly writers (symbolized in literary criticism by P), but also by rather earlier writers, also of priestly sympathies, but of " southern " or half-Edomite affinity. This is independently suggested by the contents and vicissitudes of the purely ecclesiastical traditions. 4

Recent criticism goes to show that there is a very considerable body of biblical material, more important for its attitude to the history than for its historical accuracy, the true meaning of which cannot as yet be clearly perceived. It raises many serious problems which concentrate upon that age which is of the greatest importance for the biblical and theological student.

The perplexing relation between the admittedly late compilations and the actual course of the. early history becomes still more intricate when one observes such a feature as the late interest in the Israelite tribes. No doubt there is much that is purely artificial and untrustworthy in the late (post-exilic) representations of these divisions, but it is almost incredible that the historical foundation for their early career is severed from the written sources by centuries of warfare, immigration and other disturbing factors. On the one hand, conservative scholars insist upon the close material relation between the constituent sources; critical scholars, on the other hand, while recognizing much that is relatively untrustworthy, refrain from departing from the general outlines of the canonical history more than is absolutely necessary. Hence the various reconstructions of the earlier history, with all their inherent weak nesses. But

The Historic Exodus (1909), pp. 120 sqq.; especially Meyer and Luther, Die Israeliten, pp. 442-440, &c. For the early recognition of the evidence in question, see J. Wellhausen, De gentibus et familiis Judaeis (Gottingen, 1870); Prolegomena (Eng. trans.), pp. 216 sqq., 342 sqq., and 441-443 (from art. " Israel," § 2, Ency. Brit. 9th ed); also A. Kuenen, Relig. of Israel (i. 135 seq., 176-182); W. R. Smith, Prophets of Israel, pp. 28 seq., 379.

_ 3 For the prominence of the " southern " element in Judah see E. Meyer, Entstehung d. Judenthums (1896), pp. 119, 147, 167, 177, 183 n. I ; Israeliten, pp. 352 n. 5, 402, 429 seq.

4 See § 23 end, and Levites. When Edom is renowned for wis- dom and a small Judaean family boasts of sages whose names have south Palestinian affinity (1 Chron. ii. 6), and when such names as Korah, Heman, Ethan and Obed-edom, are associated with psalmody, there is no inherent improbability in the conjecture that the " south- ern " families settled around Jerusalem may have left their mark in other parts of the Old Testament. It is another question whether such literature can be identified (for Cheyne's views, see Ency. Bib. " Prophetic Literature," " Psalms," and his recent studies).

historical criticism is faced with the established literary conclusions which, it should be noticed, place the Deuteronomic and priestly compilations posterior to the great changes at and after the fall of the northern

monarchy, and, to some extent, contemporary with the equally serious changes in Judah. There were catastrophes detrimental to the preservation of older literary records, and vicis- situdes which, if they have not left their mark on contemporary history — which is singularly blank— may be traced on the represen- tations of the past. There are external historical circumstances and internal literary features which unite to show that the application of the literary hypotheses of the Old Testament to the course of Israelite history is still incomplete, and they warn us that the intrinsic value of religious and didactic writings should not depend upon the accuracy of their history. 1 Future research may not be able to solve the problems which arise in the study of the period now under discussion; it is the more necessary, therefore, that all efforts should be tested in the light of purely external evidence (see further § 24; and Palestine: History).

21. Nehemiah and Ezra. — There is another remarkable gap in the historical traditions between the time of Zerubbabel and the reign of Artaxerxes I. In obscure circumstances the enthusiastic hopes have melted away, the Davidic scion has dis- appeared, and Jerusalem has been the victim of another disaster. The country is under Persian officials, the nobles and priests form the local government, and the ground is being prepared for the erection of a hierocracy. It is the work of rebuilding and re-organization, of social and of religious reforms, which we en- counter in the last pages of biblical history, and in the records of Ezra and Nehemiah we stand in Jerusalem in the very centre of epoch-making events. Nehemiah, the cup-bearer of Artaxerxes at Susa, plunged in grief at the news of the desolation of Jerusalem, obtained permission from the king to rebuild the ruins. Provided with an escort and with the right to obtain supplies of wood for the buildings, he returned to the city of his fathers' sepulchres (the allusion may suggest his royal ancestry). His zeal is repre- sented in a twofold aspect. Having satisfied himself of the extent of the ruins, he aroused the people to the necessity of fortifying and repopulating the city, and a vivid account is given in his name of the many dangers which beset the rebuilding of the walls. Sanballat of Horon, Tobiah the Ammonite, and Gashmu the Arabian (? Edomite) unceasingly opposed him. Tobiah and his son Jobanan were related by marriage to Judaean secular and priestly families, and active intrigues resulted, in which nobles and prophets took their part. It was insinuated that Nehemiah had his prophets to proclaim that Judah had again its own king; it was even suggested that he was intending to rebel against Persia! Nehemiah naturally gives us only his version, and the attitude of Haggai and Zechariah to Zerubbabel may illustrate the feeling of his partisans. But Tobiah and Johanan themselves were worshippers of Yahweh (as their names also show), and consequently, with prophets taking different sides and with the Samaritan claims summarily repudiated (Neh. ii. 20; cf. Ezra iv. 3), all the

facts cannot be gathered from the narratives. Nevertheless the undaunted Judaean pressed on unmoved by the threatening letters which were sent around, and succeeded in completing the walls within fifty-two days. 2

In the next place, Nehemiah appears as governor of the small district of Judah and Benjamin. Famine, the avarice of the rich, and the necessity of providing tribute had brought the humbler classes to the lowest straits. Some had mortgaged their houses, fields and vineyards to buy corn; others had borrowed to pay the taxes, and had sold their children to their richer brethren to repay the debt. Nehemiah was faced with old abuses, and vehemently contrasted the harshness of the nobles with the generosity of the exiles who would redeem their poor countrymen from slavery. He himself had always refrained from exacting the usual provision which other governors had claimed; indeed, he had readily entertained over 150 officials and dependants at his table, apart from casual refugees (Neh. v.). We hear some-

1 One may recall, in this connexion, Caxton's very interesting prologue to Malory's Morte a" Arthur and his remarks on the per- manent value of the " histories " of this British hero. [Cf. also Horace, Ep. 1. ii. and R. Browning, " Development."]

2 It is noteworthy that Josephus, who has his own representation of the post-exilic age, allows two years and four months for the work (Ant. xi. 5, 8).

thing of a twelve-years' governorship and of a second visit, but the evidence does not enable us to determine the sequence (xiii. 6). Neh. v. is placed in the middle of the building of the walls in fifty-two days; the other reforms during the second visit are closely connected with the dedication of the walls and with the events which immediately follow his first arrival when he had come to rebuild the city. Nehemiah also turns his attention to religious abuses. The sabbath, once a festival, had become more strictly observed, and when he found the busy agriculturists and traders (some of them from Tyre) pursuing their usual labours on that day, he pointed to the disasters which had resulted in the past from such profanation, and immediately took measures to put down the evil (Neh. xiii. 18; cf. Jer. xvii. 20 sqq.; Ezek. xx. 13-24; Isa. Ivi. 2, 6; lviii. 13). Moreover, the mainten- ance of the Temple servants called for supervision; the customary allowances had not been paid to the Levites who had come to Jerusalem after the smaller shrines had been put down, and they had now forsaken the city. His last acts were the most conspicu- ous of all. Some of the Jews had married women of Ashdod, Ammon and Moab, and the impetuous governor indignantly adjured them to desist from a practice which was the historic cause of national sin. Even members of the priestly families had

intermarried with Tobiah and Sanballat; the former had his own chamber in the precincts of the Temple, the daughter of the latter was the wife of a son of Joiada the son of the high priest Eliashib. Again Nehemiah's wrath was kindled. Tobiah was cast out, the offending priest expelled, and a general purging followed, in which all the foreign element was removed. With this Nehemiah brings the account of his reforms to a conclusion, and the words " Remember me, O my God, for good " (xiii. 31) are not meaning- less. The incidents can be supplemented from Josephus. According to this writer (Ant. xi. 7, 2), a certain Manasseh, the brother of Jaddua and grandson of Joiada, refused to divorce his wife, the daughter of Sanballat. For this he was driven out, and, taking refuge with the Samaritans, founded a rival temple and priesthood upon Mt Gerizim, to which repaired other priests and Levites who had been guilty of mixed marriages. There is little doubt that Josephus refers to the same events; but there is considerable confusion in his history of the Persian age, and when he places the schism and the founda- tion of the new Temple in the time of Alexander the Great (after the obscure disasters of the reign of Artaxerxes III.), it is usually supposed that he is a century too late. 3 At all events, there is now a complete rupture with Samaria, and thus, in the concluding chapter of the last of the historical books of the Old Testament, Judah maintains its claim to the heritage of Israel and rejects the right of the Samaritans to the title 4 (see § 5).

In this separation of the Judaeans from religious and social intercourse with their neighbours, the work of Ezra (q.v.) re- quires notice. The story of this scribe (now combined with the memoirs of Nehemiah) crystallizes the new movement inaugu- rated after a return of exiles from Babylonia. The age can also be illustrated from Isa. lvi.-lxvi. and Malachi (q.v.). There was a poor and weak Jerusalem, its Temple stood in need of renovation, its temple-service was mean, its priests unworthy of their office. On the one side was the grinding poverty of the poor; on the other the abuses of the governors. There were two leading religious parties: one of oppressive formalists, exclusive, strict

3 The papyri from Elephantine (p. 282, n. 1, above) mention as contemporaries the Jerusalem priest Johanan (cf. the son of Joiada and father of Jaddua, Neh. xii. 22), Bagohi (Bagoas), governor of Judah, and Delaiah and Shelemiah sons of Sanballat (408-407 B.C.) They ignore any strained relations between Samaria and judah, and Delaiah and Bagohi unite in granting permission to the Jewish colony to rebuild their place of worship. If this fixes the date of Sanballat and Nehemiah in the time of the first Artaxerxes, the probability of confusion in the later written sources is enhanced by the recurrence of identical names of kings, priests, &c, in the history.

4 The Samaritans, for their part, claimed the traditions of their land and called themselves the posterity of Joseph, Ephraim and Manasseh. But they were ready to deny their kinship with the Jews when the latter were in adversity, and could have replied to the tradition that they were foreigners with a tu quoque (Josephus, Ani. ix. 14, 3; xi. 8, 6; xii. 5, 5) (see Samaritans).

and ritualistic; the other, more cosmopolitan, extended a freer welcome to strangers, and tolerated the popular elements and the superstitious cults which are vividly depicted (Isa. lxv. seq.). But the former gained the day, and, realizing that the only hope of maintaining a pure worship of Yahweh lay in a forcible isolation from foreign influence, its adherents were prepared to take measures to ensure the religious independence of their assembly. It is related that Ezra, the scribe and priest, returned to Jerusalem with priests and Levites, lay exiles, and a store of vessels for the Temple. He was commissioned to inquire into the religious con- dition of the land and to disseminate the teaching of the Law to which he had devoted himself (Ezra vii.). On his arrival the people were gathered together, and in due course he read the " book of the Law of Moses " daily for seven days (Neh. viii.). They entered into an agreement to obey its teaching, undertaking in particular to avoid marriages with foreigners (x. 28 sqq.). A special account is given of this reform (Ezra ix. seq.) and the description of Ezra's horror at theprevalence of intermarriage, which threatened to destroy the distinctive character of the community, sufficiently indicates the attitude of the stricter party. The true seed of Israel separated themselves from all foreigners (not, however, without some opposition) and formed an exclusively religious body or " congregation." Dreams of political freedom gave place to hopes of religious independence, and " Israel " became a church, the foundation of which it sought in the desert of Sinai a thousand years before.

22. Post-exilic History. — The biblical history for the period in the books of Ezra and Nehemiah is exceptionally obscure, and it is doubtful how far the traditions can be trustee! before we reach the reign of Artaxerxes (Ezra vii. sqq., Neh.). The records belonging to this reign represent four different stages: (a) The Samaritans re- ported that the Jews who had returned from the king to Jerusalem were rebuilding the city and completing its walls, an act calculated to endanger the integrity of the province. Artaxerxes accordingly instructed them to stop the work until he should give the

necessary decree, and this was done by force (Ezra iv. 7-23, undated; I Esdras ii. 16 sqq. mentions a building of the Temple!), (b) It was in the 7th year (i.e. 458 B.C.) that Ezra returned with a small body of exiles to promulgate the new laws he had brought and to set the Temple service in order. 1 Fortified with remarkable powers, some of which far exceed the known tolerance of Persian kings, he began wide-sweeping marriage reforms; but the record ceases abruptly (vii.-x.). (c) In the 20th year (445 B.C.) Nehemiah returned with permission to rebuild the walls, the citadel and the governor's house (Xeh. ii. 5, 8; see § 21 above). But (d), whilst as governor he accomplishes various needed reforms, there is much confusion in the present narratives, due partly to the resumption of Ezra's labours after an interval of twelve years, and partly to the closely related events of Nehemiah 's activity in which room must be found for his twelve-years' governorship and a second visit. The internal literary and historical questions are extremely intricate, and the necessity for some reconstruction is very generally felt (for prelimi- nary details, see Ezra and Nehemiah). The disaster which aroused Nehemiah's grief was scarcely the fall of Jerusalem in 586 B.C., but a more recent one, and it has been conjectured that it followed the work of Ezra (in b above). On the other hand, a place can hardly be found for the history of Ezra before the appearance of Nehemiah ; he moves in a settled and peaceful community such as Nehemiah had helped to form, his reforms appear to be more mature and schematic than those of Nehemiah ; and, whilst Josephus handles the two separately, giving Ezra the priority, many recent scholars incline to place Nehemiah's first visit before the arrival of Ezra. 2 That later tradition should give the pre-eminence to the priestly reforms of Ezra is in every way natural, but it has been found extremely difficult to combine the two in any. reconstruction of the period. Next, since there are three distinct sources, for (a) above, and for the work of Nehemiah and of Ezra, implicit reliance cannot be placed upon the present sequence of narratives. Thus (a), with its allusion to a further decree, forms a plausible prelude to the return of either Ezra (vii. 13) or Nehemiah (i. 3, ii. 3) ; and if it is surprising that the Samaritans and other opponents, who had previously waited to address Artaxerxes (Ezra iv. 14ˆ sqq., v. 5, 17), should now interfere when Nehemiah was armed with a royal mandate (Neh. ii. 7-9), it is very difficult not to conclude that the royal permits, as now detailed, have been coloured by Jewish patriotism and the history by enmity to Samaria. Finally, the situation in the

1 The statement that the king desired to avoid the divine wrath may possibly have some deeper meaning (e.g. some recent revolt, Ezra vii. 23).

2 It must suffice to refer to the opinions of Bertholet, Buhl, Cheyne, Guthe, Van Hoonacker, Jahn, Kennett, Kent, Kosters, Marquart, Torrey, and Wildeboer.

independent and undated record (a) points to a return, a rebuilding (apparently after some previous destruction) , and some interference. This agrees substantially with the independent records of Nehemiah, and unless we assume two disasters not widely separated in date — viz. those presupposed in (a) and © — the record in (a), may refer to that stage in the history where the other source describes the intrigues of the Samaritans and the letters sent by Tobiah (cf. Tabeel in Ezra iv. 7) to frighten Nehemiah (Neh. vi. 19). 3 Their insinuations that Nehemiah was seeking to be ruler and their repre- sentations to Artaxerxes would be enough to alarm the king (cf. Neh. vi. 5-9, 19, and Ezra iv. 15 seq., 20 seq.), and it may possibly be gathered that Nehemiah at once departed to justify himself (Neh. vii. 2, xiii. 4, 6). Nevertheless, since the narratives are no longer in their original form or sequence, it is impossible to trace the successive steps of the sequel; although if the royal favour was endorsed (cf. the account ascribed to the time of Darius, Ezra v. seq.), Nehe- miah's position as a reformer would be more secure.

Although there was a stock of tradition for the post-exilic age (cf. Daniel, Esther, I Esdras, Josephus), the historical narratives are of the scantiest and vaguest until the time of Artaxerxes, when the account of a return (Ezra iv. 12), which otherwise is quite ignored, appears to have been used for the times of Darius (1 Esdras iv. seq.) and subsequently of Cyrus (Ezra i.-iii.). Moreover, although general opinion identifies our Artaxerxes with the first of that name, certain features suggest that there has been some confusion with the traditions of the time of Artaxerxes II. and III. (§ 19). But the problems are admittedly complicated, and since one is necessarily dependent upon scanty narratives arranged and rearranged by later hands in accordance with their own historical theories, it is difficult to lay stress upon internal evidence which appears to be conclusive for this or that reconstruction. 4 The main facts, however, are clear. Jerusalem had suffered some serious catastrophe before Nehemiah's return; a body of exiles returned, and in spite of interference the work of rebuilding was completed; through their influence the Judaean community underwent reorganization, and separated itself from its so-called heathen neighbours. How many years elapsed from beginning to end can hardly be said. Tradition concentrated upon Ezra and his age many events and changes of fundamental importance. The canonical history has allowed only one great destruction of Jerusalem, and the disaster of 586 B.C. became the type for similar disasters, but how many there were criticism can scarcely decide. 6 Allusions to Judah's sufferings at the hands of Edom, Moab and Ammon often imply conditions which are not applicable to 586. A definite series knows of an invasion and occu- pation by Edom (q.v. end), a people with whom Judah, as the genea- logies show, had once been intimately connected. The unfriendli- ness of the " brother " people, which added so

much to the bitterness of Judah, although associated with the events of 586 (so especially I Esdras iv. 45), probably belongs to a much later date. 6 The tradition that Edomites burned the Temple and occupied part of Judah (ib. ro – 45 > 5°) is partially confirmed by Ezek. xxxv. 5, 10, xxxvi. 5; Ps. exxxvii. 7; but the assumption that Darius, as in 1 Esdras, helped the Jews against them can with difficulty be maintained. The in- teresting conjecture that the second Temple suffered another disaster in the obscure gap which follows the time of Zerubbabel has been urged, after Isa. lxiii. 7-lxiv. 12, by Kuenen (afterwards withdrawn) and by Sellin, and can be independently confirmed. In the records of Nehemiah the ruins of the city are extensive (ii. 8, 17, iii.; cf. Ecclus. xlix. 13), and the tradition that Nehemiah rebuilt this Temple (Jos. Ant. xi. 5, 6; 2 Mace. i. 18) is supported (a) by the explicit

3 C. F. Kent, Israel's Hist, and Biog. Narratives (1905), p. 358 seq. The objections against this very probable view undervalue Ezra iv. 7-23 and overlook the serious intricacies in the book of Nehemiah.

1 There are three inquiries: (a) the critical value of I Esdras, (&) the character of the different representations of post-exilic inter- nal and external history, and © the recovery of the historical facts. To start with the last before considering (a) and (b) would be futile.

6 For example, to the sufferings under Artaxerxes III. (§ 19) have been ascribed such passages as Isa. lxiii. 7-lxiv. 12 ; Ps. xliv., lxxiv., lxxix., lxxx., lxxxiii. (see also Lamentations). In their present form they are not of the beginning of the 6th century and, if the evidence for Artaxerxes III. proves too doubtful, they may belong to the history preceding Nehemiah's return, provided the internal features do not stand in the way (e.g. prior or posterior to the forma- tion of the exclusive Judaean community, &c). Since the book of Baruch (named after Jeremiah's scribe) is now recognized to be con- siderably later (probably after the destruction of Jerusalem a.d. 70), it will be seen that the recurrence of similar causes leads to a similar- ity in the contemporary literary productions (with a reshaping of earlier tradition), the precise date of which depends upon delicate points of detail and not upon the apparently obvious historical elements.

6 See H. Winckler, Keil. u. Alte Test., 295, and Kennett, Journ. Theol. Stud. (1906), p. 487; Camb. Bib. Essays, p. 117. The Chaldeans alone destroyed Jerusalem (2 Kings xxv.) ; Edom was friendly or at least neutral (Jer. xxvii. 3, xl. II seq.). The proposal to read " Edomites " for " Syrians " in the list of bands which troubled Jehoiakim (2 Kings xxiv. 2) is not supported by the contemporary reference, Jer. xxxv. 11.

references to the rebuilding of the Temple in the reign of Artaxerxes (i Esdras ii. 18, not in Ezra iv. 12 ; but both in a context relating to the history of the Temple), and (b) by the otherwise inaccurate state- ment that the Temple was finished according to the decree of " Cyrus, Darius and Artaxerxes king of Persia " (Ezra vi. 14).

The untrustworthy account of the return in the time of Cyrus (Ezra i. sqq.) or Darius (1 Esdras iv. seq. ; probably the older form) is curiously indebted to material which seems to have belonged to the history of the work of Nehemiah (cf. Ezra ii. with Neh. vii.), and the important return in the reign of Artaxerxes (Ezra iv. 12) seems to be connected with other references to some new settlement (Neh. xi. 20, 23, 25. especially xii. 29). The independent testimony of the names in Neh. iii. is against any previous large return from Babylon, and clearly illustrates the strength of the groups of " southern " origin whose presence is only to be expected (p. 285). Moreover, the late compiler of I Chronicles distinguishes a Judah composed almost wholly of " southern " groups (1 Chron. ii. and iv.) from a subsequent stage when the first inhabitants of Jerusalem correspond in the main to the new population after Nehemiah had repaired the ruins (1 Chron. ix. and Neh. xi.). Consequently, underlying the canonical form of post -exilic history, one may perhaps recognize some fresh disaster, after the completion of Zerubbabel's temple, when Judah suffered grievously at the hands of its Edomite brethren (in Malachi, date uncertain, vengeance has at last been taken); Nehemiah restored the city, and the traditions of the exiles who returned at this period have been thrown back and focussed upon the work of Zerubbabel. The criticism of the history of Nehemiah, which leads to this conjecture, suggests also that if Nehemiah repulsed the Samaritan claims (ii. 20 ; cf. Ezra iv. 3, where the building of the Temple is concerned) and refused a compromise (vi.2), it is extremely unlikely that Samaria had hitherto been seriously hostile; see also C. C. Torrey, Ezra Studies, pp. 321-333.

Bibilical history ends with the triumph of the Judaean community, the true " Israel," the right to which title is found in the distant past. The Judaean view pervades the present sources, and whilst its David and Solomon ruled over a united land, the separation under Jeroboam is viewed as one of calf-worshipping northern tribes from Jerusalem with its one central temple and the legitimate priesthood of the Zadokites. It is from this narrower standpoint of an exclusive and confined Judah (and Benjamin) that the traditions as incorporated in the late recensions gain fresh force, and in Israel's renunciation of the Judaean yoke the later hostility between the two may be read between the lines. The history in Kings was not finally settled until a very late date, as is evident from the important variations in the

Septuagint, and it is especially in the description of the time of Solomon and the disruption that there continued to be considerable fluctuations. 1 The book has no finale and the sudden break may not be accidental. It is replaced by Chronicles, which, confining itself to Judaean history from a later standpoint (after the Persian age), includes new characteristic traditions wherein some recollection of more recent events may be recognized. Thus, the south Judaean or south Palestinian element shows itself in Judaean genealogies and lists; there are circumstantial stories of the rehabili- tation of the Temple and the reorganization of cultus; there are fuller traditions of inroads upon Judah by southern peoples and their allies. There is also a more definite subordination of the royal authority to the priesthood (so too in the writings of Ezekiel, q.v.) ; and the stories of punishment inflicted upon kings who dared to contend against the priests (Jehoash, Uzziah) point to a conflict of authority, a hint of which is already found in the reconciliation of Zerubbabel and the priest Joshua in a passage ascribed to Zechariah (ch. vi.).

23. Post-exilic Judaism.— With Nehemiah and Ezra we enter upon the era in which a new impulse gave to Jewish life and thought that form which became the characteristic orthodox Judaism. It was not a new religion that took root; older ten dencies were diverted into new paths, the existing material was shaped to new ends. Judah was now a religious community whose representative was the high priest of Jerusalem. Instead of sacerdotal kings, there were royal priests, anointed with oil, arrayed with kingly insignia, claiming the usual royal dues in addition to the customary rights of the priests. With his priests and Levites, and with the chiefs and nobles of the Jewish families, the high priest directs this small state, and his death marks an epoch as truly as did that of the monarchs in the past. This hierarchical government, which can find no founda- tion in the Hebrew monarchy, is the forerunner of the Sanhe- drin {q.v.); it is an institution which, however inaugurated, set its stamp upon the narratives which have survived. Laws were

‘ Tt , ! s , at 1(; a st a coincidence that the prophet who took the part of 1 obiah and Sanballat against Nehemiah (vi. 10 seq.) bears the same name as the one who advised Rehoboam to acquiesce in the disrup- tion (1 Kings xn. 21-24), or announced the divine selection of Tero- boam (lb. v. 24, Septuagint only).

recast in accordance with the requirements of the time, with the result that, by the side of usages evidently of very great anti- quity, details now appear which were previously unknown or wholly unsuitable. The age, which the scanty historical tra- ditions themselves represent as one of supreme

importance for the history of the Jews, once seemed devoid of interest, and it is entirely through the laborious scholarship of the 19th century that it now begins to reveal its profound significance. The Graf-Wellhausen hypothesis, that the hierarchical law in its complete form in the Pentateuch stands at the close and not at the beginning of biblical history, that this mature Judaism was the fruit of the 5th century B.C. and not a divinely appointed institution at the exodus (nearly ten centuries previously), has won the recognition of almost all Old Testament scholars. It has been substantiated by numerous subsidiary investigations in diverse departments, from different standpoints, and under various aspects, and can be replaced only by one which shall more adequately explain the literary and historical evidence (see further, p. 289).

The post-exilic priestly spirit represents a tendency which is absent from the Judaean Deuteronomic book of Kings but is fully mature in the later, and to some extent parallel, book of Chronicles (q.v.). The " priestly " traditions of the creation and of the patriarchs mark a very distinct advance upon the earlier narratives, and appear in a further developed form in the still later book of Jubilees, or " Little Genesis," where they are used to demonstrate the pre-Mosaic antiquity of the priestly or Levitical institutions. There is also an unmistakable de- velopment in the laws; and the priestly legislation, though ahead of both Ezekiel and Deuteronomy, not to mention still earlier usage, not only continues to undergo continual internal modi- fication, but finds a further distinct development, in the way of definition and interpretation, outside the Old Testament — in the Talmud (q.v.). Upon the characteristics of the post-exilic priestly writings we need not dwell. 2 Though one may often be repelled by their lifelessness, their lack of spontaneity and the externalization of the ritual, it must be recognized that they placed a strict monotheism upon a legal basis. " It was a necessity that Judaism should incrust itself in this manner; without those hard and ossified forms the preservation of its essential elements would have proved impossible. At a time when all nationalities, and at the same time all bonds of religion and national customs, were beginning to be broken up in the seeming cosmos and real chaos of the Graeco-Roman Empire, the Jews stood out like a rock in the midst of the ocean. When the natural conditions of independent nationality all failed them, they nevertheless artificially maintained it with an energy truly marvellous, and thereby preserved for themselves, and at the same time for the whole world, an eternal good." 3

If one is apt to acquire too narrow a view of Jewish legalism, the whole experience of subsequent history, through the heroic age of the Maccabees (q.v.) and onwards, only proves that the minuteness of ritual procedure could not cramp the heart. Besides, this was only one of the aspects of Jewish literary activity. The work represented in Nehemiah and Ezra, and

put into action by the supporters of an exclusive Judaism, certainly won the day, and their hands have left their impress upon the historical traditions. But Yahwism, like Islam, had its sects and tendencies, and the opponents to the stricter ritualism always had followers. Whatever the predominant party might think of foreign marriages, the tradition of the half-Moabite origin of David serves, in the beautiful idyll of Ruth (q.v.), to suggest the debt which Judah and Jerusalem owed to one at least of its neighbours. Again, although some may have desired a self-contained community opposed to the heathen neigh- bours of Jerusalem, the story of Jonah implicitly contends against the attempt of Judaism to close its doors. The conflict- ing tendencies were incompatible, but Judaism retained the

2 See Hebrew Religion, § 8 seq., and the relevant portions of the histories of Israel.

3 J. Wellhausen, art. " Israel," Ency. Brit. 9th ed., vol. xiii. p. 419; or his Prolegomena, pp. 497 seq.

incompatibilities within its limits, and the two tendencies, prophetical and priestly, continue, the former finding its further development in Christianity. 1

The Graf-Wellhausen hypothesis (§4) does not pretend to be com- plete in all its details and it is independent of its application to the historical criticism of the Old Testament. No alternative hypo- thesis prevails, mere desultory criticism of the internal intricacies being quite inadequate. Maintaining that the position of the Pentateuch alone explains the books which follow, conservative writers concede that it is composite, has had some literary history, and has suffered some revision in the post-exilic age. Their con- cessions continue to become ever more significant, and all that follows from them should be carefully noticed by those who are impressed by their arguments. They identify with Deuteronomy the law-roll which explains the noteworthy reforms of Josiah (§ 16); but since it is naturally admitted that religious conditions had become quite inconsistent with Mosaism, the conservative view implies that the " long-lost " Deuteronomy must have differed profoundly from any known Mosaic writings to which earlier pious kings and prophets had presumably adhered. Similarly, the " book of the Law of Moses," brought from Babylon by Ezra (Ezra vii.; Neh. viii.), clearly contained much of which the people were ignorant, and

conservative writers, who oppose the theory that a new Law was then introduced, emphasize (a) the previous existence of legislation (to prove that Ezra's book was not entirely a novelty), and (b) the gross wickedness in Judah (as illustrated by the prophets) from the time of Josiah to the strenuous efforts of the reformers on behalf of the most fundamental principles of the national religion. This again simply means that the Mosaism of Ezra or Nehemiah must have differed essentially from the priestly teaching prior to their arrival. The arguments of conservative writers involve concessions which, though often overlooked by their readers, are very detri- mental to the position they endeavour to support, and the objections they bring against the theory of the introduction of new law-books (under a Josiah or an Ezra) apply with equal force to the promulga- tion of Mosaic teaching which had been admittedly ignored or forgotten. Their arguments have most weight, however, when they show the hazardous character of reconstructions which rely upon the trustworthiness of the historical narratives. What book Ezra really brought from Babylon is uncertain; the writer, it seems, is merely narrating the introduction of the Law ascribed to Moses, even as a predecessor has recounted the discovery of the Book of the Law, the Deuteronomic code subsequently included in the Pentateuch.

The importance which the biblical writers attach to the return from Babylon in the reign of Artaxerxes forms a starting-point for several interesting inquiries. Thus, in any estimate of the influence of Babylonia upon the Old Testament, it is obviously necessary to ask whether certain features (a) are of true Babylonian origin, or (b) merely find parallels or analogies in its stores of literature ; whether the indebtedness goes back to very early times or to the age of the Assyrian domination or to the exiles who now returned. Again, there were priestly and other families — some originally of " southern " origin — already settled around Jerusalem, and questions inevitably arise concerning their relation to the new-comers and the literary vicissitudes which gave us the Old Testament in its present form. To this age we may ascribe the literature of the Priestly writers (symbolized by P), which differs markedly from the other sources. Yet it is clear from the book of Genesis alone that in the age of Priestly writers and compilers there were other phases of thought. Popular stories with many features of popular religion were current. They could be, and indeed had been made more edifying; but the very noteworthy conservatism of even the last compiler or editor, in contrast to the re-shaping and re-writing of the material in the book of Jubilees, indicates that the Priestly spirit was not that of the whole community. But through the Priestly hands the Old Testament history passed, and their standpoint colours its records. This is especially true of the history of the exilic and post-exilic periods, where the effort is made to preserve the continuity of Israel and the Israelite

community (Chronicles-Ezra-Nehemiah). The bitterness aroused by the ardent and to some extent unjust zeal of the reforming element can only be conjectured. The traditions reveal a tendency to legitimate new circumstances. Priesthoods, whose traditions connect them with the south, are subordinated ; the ecclesiastical records are re-shaped or re-adjusted; and a picture is presented of hierarchical jealousies and rivalries which (it was thought) were settled once and for all in the days of the exodus from Egypt. Many features gain in significance as the account of the Exodus, the foundation of Israel, is read in the light of the age when, after the advent of a new element from Babylonia, the Pentateuch assumed its present shape; it must suffice to mention the supremacy of the Aaronite priests and the glorification of uncompromising

1 An instructive account of Judaism in the early post-exilic age on critical lines (from the Jewish standpoint) is given by C. G. Montefiore, Hibbert Lectures (1892), pp. 355 sqq.; cf. also the sketch by I. Abrahams, Judaism (1907).

hostility to foreign marriages. 2 The most " unhistorical " tradition has some significance for the development of thought or of history- writing, and thus its internal features are ultimately of historical value. Only from an exhaustive comparison of controlling data can the scattered hints be collected and classified. There is much that is suggestive, for example, in the relation between the " post- exilic " additions to the prophecies and their immediately earlier form; or in the singular prominence of the Judaean family of Perez (its elevation over Zerah, a half-Edomite family, Gen. xxxviii. ; its connexion with the Davidic dynasty, Ruth iv. ; its position as head of all the Judaean sub-divisions, 1 Chron. ii. 5 sqq.) ; or in the late insertion of local tradition encircling Jerusalem ; or in the perplexing attitude of the histories towards the district of Benjamin and its famous sanctuary of Bethel (only about 10 m. north of Jerusalem). Although these and other phenomena cannot yet be safely placed in a historical frame, the methodical labours of past scholars have shed much light upon the obscurities of the exilic and post-exilic ages, and one must await the more comprehensive study of the two or three centuries which are of the first importance for biblical history and theology.

24. Old Testament History and External Evidence. — Thus the Old Testament, the history of the Jews during the first great period, describes the relation of the Hebrews to surrounding peoples, the superiority of Judah over the faithless (north) Israelite tribes, and the reorganization of the Jewish community in and around Jerusalem at the arrival of Ezra with the Book of the Law. The whole gives an impression of unity, which is designed, and is to be expected in a compilation. But closer examination reveals remarkable gaps and irreconcilable historical standpoints. For all

serious biblical study, the stages in the growth of the written traditions and the historical circumstances which they imply, must inevitably be carefully considered,, and upon the result depends, directly or indirectly, almost every subject of Old Testament investigation. Yet it is impossible to recover with confidence or completeness the develop- ment of Hebrew history from the pages of the Old Testament alone. The keen interest taken by the great prophets in the world around them is not prominent in the national records; political history has been subordinated, and the Palestine which modern discovery is revealing is not conspicuous in the didactic narratives. To external evidence one must look, therefore, for that which did not fall within the scope or the horizon of the religious historians. They do not give us the records of the age of the Babylonian monarch Khammurabi (perhaps Amraphel, Gen. xiv.), of the Egyptian conquests in the XVIIIth and following dynasties, or of the period illustrated by the Amarna tablets (§3). They treat with almost unique fullness a few years in the middle of the 9th century B.C., but ignore Assyria ; yet only the Assyrian inscriptions explain the politi- cal situation (§ 10 seq.), and were it not for them the true significance of the 8th~7th centuries could scarcely be realized (§ 15 seq.). It would be erroneous to confuse the extant sources with the historical material which might or must have been accessible, or to assume that the antiquity of the elements of history proves or presupposes the antiquity of the records themselves, or even to deny the presence of some historical kernel merely on account of unhistorical elements or the late dress in which the events are now clothed. External research constantly justifies the cautious attitude which has its logical basis in the internal conflicting character of the written traditions or in their divergence from ascertained facts ; at the same time it has clearly shown that the internal study of the Old Testa- ment has its limits. Hence, in the absence of more complete external evidence one is obliged to recognize the limitations of Old Testament historical criticism, even though this recognition means that positive reconstructions are more precarious than negative conclusions.

The naive impression that each period of history was handled by some more or less contemporary authority is not confirmed by a criticism which confines itself strictly to the literary evidence. An interest in the past is not necessarily confined to any one age, and the critical view that the biblical history has been compiled from relatively late standpoints finds support in the still later treatment of the events — in Chronicles as contrasted with Samuel-Kings or in Jubilees as contrasted with Genesis. 3 It is instructive to observe in Egypt the form which old traditions have taken in Manetho (Maspero, Rec. de travaux, xxvii., 1905, 1. 22 seq.); cf. also the late story of Rameses II. and the Hittites (J. H. Breasted, Anc. Rec. of Egypt, iii. 189 seq.); while in Babylonia one may note the didactic treatment, after the age of Cyrus, of the events of the time of Kham- murabi (A. H. Sayce, Proc.

Soc. Biblical Archaeol., 1907, pp. 13 sqq.). The links which unite the traditional heroes with Babylonia (e.g. Abraham, Ezra), Mesopotamia (e.g. Jacob), Egypt (e.g. Joseph,

2 Cf. the story of Phinehas, Num. xxv. 6 sqq. ; on Gen. xxxiv., see Simeon. Apropos of hostility towards Samaria, it is singular that the term of reproach, " Cutheans," applied to the Samaritans is derived from Cutha, the famous seat of the god Nergal, only some 25 m. N.E. of Babylon itself (see above, p. 286, n. 4).

3 The various tendencies which can be observed in the later pseudepigraphical and apocalyptical writings are of considerable value in any consideration of the development of thought illustrated in the Old Testament itself.

Jeroboam), Midian (e.g. Moses, Jethro), &c, like the intimate relationship between Israel and surrounding lands, ha vea significance in the light of recent research. Israel can no longer be isolated from the politics, culture, folk-lore, thought and religion of western Asia and Egypt. Biblical, or rather Palestinian, thought has been brought into the world of ancient Oriental life, and this life, in spite of the various forms in which it has from time to time been shaped, still rules in the East. This has far-reaching consequences for the traditional attitude to Israelite history and religion. Research is seriously complicated by the growing stores of material, which unfortunately are often utilized without attention to the principles of the various departments of knowledge or aspects of study. The complexity of modern knowledge and the interrelation of its different branches are often insufficiently realized, and that by writers who differ widely in the application of such material as they use to their particular views of the manifold problems of the Old Testament. It has been easy to confuse the study of the Old Testament in its relation to modern religious needs with the technical scientific study of the much edited remains of the literature of a small part of the ancient East. If there was once a tendency to isolate the Old Testament and ignore comparative research, it is now sometimes found possible to exaggerate its general agreement with Oriental history, life and thought. Difficulties have been found in the super- natural or marvellous stories which would be taken as a matter of course bv contemporary readers, and efforts are often made to recover historical facts or to adapt the records to modern theology without sufficient attention to the historical data as a whole or to their religious environment. The preliminary preparation for research of any value becomes yearly more exacting.

Many traces of myth, legend and primitive " thought survive in the Old Testament, and on the most cautious estimate they pre- suppose a vitality which is not a little astonishing. But they are now softened and often bereft of their earlier significance, and it is this and their divergence from common Oriental thought which make Old Testament thought so profound and unique. The process finds its normal development in later and non-bibhcal literature; but one can recognize earlier, cruder and less distinctive stages, and, as surely as writings reflect the mentality of an author or of his age, the peculiar characteristics of the extant sources, viewed in the light of a comprehensive survey of Palestinian and surrounding culture, demand a reasonable explanation. The differences between the form of the written history and the conditions which prevailed have impressed themselves variously upon modern writers, and efforts have been made to recover from the Old Testament earlier forms more in accordance with the external evidence. It may be doubted, however, whether the material is sufficient for such restoration or reconstruction. 1 In the Old Testament we have the outcome of specific developments, and the stage at which we see each element of tradition or belief is not always isolated or final (cf. Kings and Chronicles). The early myths, legends and traditions which can be traced differ profoundly from the canonical history, and the gap is wider than that between the latter and the subsequent apocalyptical and pseudepigraphical literature.

Where it is possible to make legitimate and unambiguous com- parisons, the ethical and spiritual superiority of Old Testament thought has been convincingly demonstrated, and to the re-shaping and re- writing of the older history and the older traditions the Old Testament owes its permanent value. While the history of the great area between the Nile and the Tigris irresistibly emphasizes the insignificance of Palestine, this land's achievements for humanity grow the more remarkable as research tells more of its environ- ment. Although the light thrown upon ancient conditions of life and thought has destroyed much that sometimes seems vital for the Old Testament, it has brought into relief a more permanent and indisputable appreciation of its significance, and it is gradually dispelling that pseudo-scientific literalism which would fetter the greatest of ancient Oriental writings with an insistence upon the verity of historical facts. Not internal criticism, but the incontest- able results of objective observation have shown once and for all that the relationship between the biblical account of the earliest history (Gen. i.-xi.) and its value either as an authentic record (which requires unprejudiced examination) or as a religious document (which remains untouched) is typical. If, as seems probable, the continued methodical investigation, which is demanded by the advance of modern knowledge, becomes more drastic in its results, it will recognize ever more clearly that there were certain unique influences in the

history of Palestine which cannot be explained by purely historical research. The change from Palestinian polytheism to the pre-eminence of Yahweh and the gradual development of ethical monotheism are facts which external evidence continues to emphasize, which biblical criticism must investigate as completely as possible. And if the work of criticism has brought a fuller appreciation of the value of these facts, the debt which is owed to the Jews is enhanced when one proceeds to realize the immense difficulties against which those who transmitted the Old Testament had to contend in the period of Greek domination. The growth of

1 Reference may be made to H. Winckler, Gesch. Israels, ii. (1900) ; W. Erbt, Die Hebraer (1906); and T. K. Cheyne, Traditions and Beliefs of Ancient Israel (1907).

the Old Testament into its present form, and its preservation despite hostile forces, are the two remarkable phenomena which most arrest the attention of the historian; it is for the theologian to interpret their bearing upon the history of religious thought. (S. A. C.)

II. — Greek Domination

25. Alexander the Great. — The second great period of the history of the Jews begins with the conquest of Asia by Alexander the Great, disciple of Aristotle, king of Macedon and captain- general of the Greeks. It ends with the destruction of Jeru- salem by the armies of the Roman Empire, which was, like Alexander, at once the masterful pupil and the docile patron of Hellenism. The destruction of Jerusalem might be regarded as an event of merely domestic importance; for the Roman cosmopolitan it was only the removal of the titular metropolis of a national and an Oriental religion. But, since a derivative of that religion has come to be a power in the world at large, this event has to be regarded in a different light. The destruction of Jerusalem in a.d. 70 concludes the period of four centuries, during which the Jews as a nation were in contact with the Greeks and exposed to the influence of Hellenism, not wholly of their own will nor yet against it. Whether the master of the provinces, in which there were Jews, be an Alexander, a Ptolemy, a Seleucid or a Roman, the force by which he rules is the force of Greek culture. These four centuries are the Greek period of Jewish history.

The ancient historians, who together cover this period, are strangely indifferent to the importance of the Jews, upon which Josephus is at pains to insist. When Alexander invaded the interior of the Eastern world, which had hitherto remained inviolable, he came as the champion of Hellenism.

His death prevented the achievement of his designs; but he had broken down the barrier, he had planted the seed of the Greek's influ- ence in the four quarters of the Persian Empire. His successors, the Diadochi, carried on his work, but Antiochus Epiphanes was the first who deliberately took in hand to deal with the Jews. Daniel (viii. 8) describes the interval between Alexander and Antiochus thus: " The he-goat (the king of Greece) did very greatly: and when he was strong the great horn (Alexander) was broken; and instead of it came- up four other ones — four king- doms shall stand up out of his nation but not with his power. And out of one of them came forth a little horn (Antiochus Epiphanes) which waxed exceeding great towards the south (Egypt) and towards the East (Babylon) and towards the beauteous land (the land of Israel)." The insignificance of the Jewish community in Palestine was their salvation. The re- forms of Nehemiah were directed towards the establishment of a religious community at Jerusalem, in which the rigour of the law should be observed. As a part of the Persian Empire the community was obscure and unimportant. But the race whose chief sanctuary it guarded and maintained was the heir of great traditions and ideals. In Egypt, moreover, in Babylon and in Persia individual Jews had responded to the influences of theii environment and won the respect of the aliens whom they despised. The law which they cherished as their standard and guide kept them united and conscious of their unity. And the individuals, who acquired power or wisdom among those outside Palestine shed a reflected glory upon the nation and its Temple.

In connexion with Alexander's march through Palestine Josephus gives a tradition of his visit to Jerusalem. In Arrian's narrative of Alexander's exploits, whose fame had already faded before the greater glory of Rome, there is no mention of the visit or the city or the Jews. Only Tyre and Gaza barred the way to Egypt. He took, presumably, the coast-road in order to establish and retain his command of the sea. The rest of Palestine, which is called Coele-Syria, made its submission and furnished supplies. Seven days after the capture of Gaza Alexander was at Pelusium. According to the tradition which Josephus has preserved the high priest refused to transfer his allegiance, and Alexander marched against Jerusalem after the capture of Gaza. The high priest dressed in his robes went out to meet him, and at the sight Alexander remembered a dream, in which such a man had appeared to him as the appointed leader of his expedition. So the danger was averted : Alexander offered sacrifice and was shown the prophecy of Daniel, which spoke of him. It is alleged, further, that at this time certain Jews who could not refrain from intermarriage with

the heathen set up a temple on Mt Gerizim and became the Samari- tan

schism (§21 above). The combination is certainly artificial and not historical. But it has a value of its own inasmuch as it illus- trates the permanent tendencies which mould the history of the Jews. It is true that Alexander was subject to dreams and visited shrines in order to assure himself or his followers of victory. But it is not clear that he had such need of the Jews or such regard for the Temple of Jerusalem that he should turn aside on his way to Egypt for such a purpose.

However this may be, Alexander's tutor had been in Asia and had met a Jew there, if his disciple Clearchus of Soli is to be trusted. " The man," Aristotle says, " was by race a Jew out of Coele-Syria. His people are descendants of the Indian philosophers. It is re- ported that philosophers are called Calani among the Indians and Jews among the Syrians. The Jews take their name from their place of abode, which is called Judaea. The name of their city is very difficult; they call it Hierusaleme. This man, then, having been a guest in many homes and having come down gradually from the highlands to the sea-coast, was Hellenic not only in speech but also in soul. And as we were staying in Asia at the time, the man cast up at the same place and interviewed us and other scholars, making trial of their wisdom. But inasmuch as he had come to be at home with many cultured persons he imparted more than he got." The date of this interview is probably determined by the fact that Aristotle visited his friend Hermias, tyrant of Atarneus, in 347-345 B.C. There is no reason to doubt the probability or even the accuracy of the narrative. Megasthenes also describes the Jews as the philosophers of Syria and couples them with the Brahmins of India. This hellenized Jew who descended from the hills to the coast is a figure typical of the period.

26. The Ptolemies. — After the death of Alexander Palestine fell in the end to Ptolemy (301 B.C.) and remained an Egyptian province until 198 B.C. For a century the Jews in Palestine and in Alexandria had no history — or none that Josephus knew. But two individuals exemplify the different attitudes which the nation adopted towards its new environment and its wider opportunities, Joseph the tax-farmer and Jesus the sage.

The wisdom of Jesus ben Sira (Sirach) is contained in the book commonly called Ecclesiasticus (q.v.). At a time when men were attracted by the wisdom and science of the Greeks, he taught that all wisdom came from Yahweh who had chosen Israel to receive it in trust. He discouraged inquiries into the nature and purpose of things: it was enough for him that Yahweh had created and ruled the universe. If a man had leisure to be wise — and this is not for many — he should study the Scriptures which had come down, and so become a scribe. For the scribe, as for the man at the plough-tail, the Law was the rule of life. All, however much or little preoccupied with worldly business, must fear God, from whom come good

things and evil, life, death, poverty and riches. It was not for men to meddle with secrets which are beyond human intelligence. Enough that the individual did his duty in the state of life in which he was set and left behind him a good name at his death. The race survives — " the days of Israel are unnumbered." Every member of the congregation of Israel must labour, as God has appointed, at some handicraft or profession to provide for his home. It is his sacred duty and his private interest to beget children and to train them to take his place. The scholar is apt to pity the smith, the potter, the carpenter and the farmer: with better reason he is apt to condemn the trader who becomes absorbed in greed of gain and so deserts the way of righteousness and fair dealing. As a teacher Jesus gave his own services freely. For the soldier he had no commendation. There were physicians who understood the use of herbs, and must be rewarded when their help was invited. But, whatever means each head of a family adopted to get a liveli- hood, he must pay the priest's dues. The centre of the life of Israel was the Temple, over which the high priest presided and which was inhabited by Yahweh, the God of Israel. The scribe could train the individual in morals and in manners; but the high priest was the ruler of the nation.

As ruler of the nation the high priest paid its tribute to Egypt, its overlord. But Josephus reports of one Onias that for avarice he withheld it. The sequel shows how a Jew might rise to power in the civil service of the Egyptian Empire and yet remain a hero to some of the Jews — provided that he did not intermarry with a Gentile. For Joseph, the son of Tobiah and nephew of Onias, went to court and secured the taxes of Palestine, when they were put up to auction. As tax-farmer he oppressed the non-Jewish cities and so won the admiration of Josephus.

But while such men went out into the world and brought back wealth of one kind or another to Palestine, other Jews were content to make their homes in foreign parts. At Alexandria in particular Alexander provided for a Jewish colony which soon became Hellenic enough in speech to require a translation of the Law. It is probable that, as in Palestine an Aramaic para-phrase of the Hebrew text was found to be necessary, so in

Alexandria the Septuagint grew up gradually, as need arose. The legendary tradition which even Philo accepts gives it a formal nativity, a royal patron and inspired authors. From the text which Philo uses, it is probable that the translation had been transmitted in writing; and his legend probably fixes the date of the commencement of the undertaking for the reign of Ptolemy Lagus.

The apology for the necessary defects of a translation put forward by the translator of Ecclesiasticus in his Prologue shows that the work was carried on beyond the limits of the Law. Apparently it was in progress at the time of his coming to Egypt in the reign of Ptolemy Euergetes I. or II. He seems to regard this body of literature as the answer to the charge that the Jews had contributed nothing useful for human life. Once translated into Greek, the Scriptures became a bond of union for the Jews of the dispersion and were at least capable of being used as an instrument for the conversion of the world to Judaism. So far as the latter function is concerned Philo confesses that the Law in his day shared the ob- scurity of the people, and seems to imply that the proselytes adopted little more than the monotheistic principle and the observance of the Sabbath. According to Juvenal the sons of such proselytes were apt to go farther and to substitute the Jewish Law for the Roman — Romanas autem soliti contemnere leges ; Judaicum ediscunt et servant ac metuunt ius Tradidit arcano quodcunque volumine Moyses. 27. The Seleucids. — Toward the end of the 3rd century the Palestinian Jews became involved in the struggle between Egypt and Syria. In Jerusalem there were partisans of both the .combatants. The more orthodox or conservative Jews preferred the tolerant rule of the Ptolemies: the rest, who chafed at the isolation of the nation, looked to the Seleucids, who inherited Alexander's ideal of a united empire based on a universal adoption of Hellenism. At this point Josephus cites the testimony of Polybius: — " Scopas, the general of Ptolemy, advanced into the highlands and subdued the nation of the Jews in the winter. After the defeat of Scopas, Antiochus gained Batanaea and Samaria and Abila and Gadara, and a little later those of the Jews who live round the Temple called Jerusalem adhered to him." From this it appears that the pro-Syrian faction of the Jews had been strong and active enough to bring an Egyptian army upon them (109-198 B.C.). Josephus adds that an Egyptian garrison was left in Jerusalem. This act of oppression presumably strengthened the Syrian faction of the Jews and led to the transference of the nation's allegiance. The language of Polybius suggests that he was acquainted with other Jewish communities and with the fame of the Temple: in his view they are not an organized state. They were not even a pawn in the game which Antiochus proposed to play with Rome for the possession of Greece and Asia Minor. His defeat left the resources of his kingdom exhausted and its extent diminished; and so the Jews became important to his successors for the sake of their wealth and their position on the frontier. To pay his debt to Rome he was compelled to resort to extraordinary methods of raising money; he actually met his death (187 B.C.) in an attempt to loot the temple of Elymais.

The pro-Syrian faction of the Palestinian Jews found their opportunity in this emergency and informed the governor of Coele-Syria that the treasury

in Jerusalem contained untold sums of money. Heliodorus, prime minister of Seleucus Philopator, who succeeded Antiochus, arrived at Jerusalem in his progress through Coele-Syria and Phoenicia and declared the treasure confiscate to the royal exchequer. According to the Jewish legend Heliodorus was attacked when he entered the Temple by a horse with a terrible rider and by two young men. He was scourged and only escaped with his life at the inter- cession of Onias the high priest, who had pleaded with him vainly that the treasure included the deposits of widows and orphans and also some belonging to Hyrcanus, " a man in very high position." Onias was accused by his enemies of having given the information which led to this outrage and when, rely- ing upon the support of the provincial governor, they proceeded to attempt assassination, he fled to Antioch and appealed to the king.

When Seleucus was assassinated by Heliodorus, Antiochus IV., his brother, who had been chief magistrate at Athens, came

back secretly " to seize the kingdom by guile " (Dan. xi. 21 seq.). On his accession he appointed Jesus, the brother of Onias, to the high-priesthood, and sanctioned his proposals for the conversion of Jerusalem into a Greek city. The high priest changed his name to Jason and made a gymnasium near the citadel. The principle of separation was abandoned. The priests deserted the Temple for the palaestra and the young nobles wore the Greek cap. The Jews of Jerusalem were enrolled as citizens of Antioch. Jason sent money for a sacrifice to Heracles at Tyre; and the only recorded opposition to his policy came from his envoys, who pleaded that the money might be applied to naval expen- diture. Thus Jason stripped the high-priesthood of its sacred character and did what he could to stamp out Judaism.

Menelaus supplanted Jason, obtaining his appointment from the king by the promise of a larger contribution. In order to secure his position, he contrived the murder of Onias, who had taken sanctuary at Daphne. This outrage, coupled with his appropriation of temple vessels, which he used as bribes, raised against Menelaus the senate and the people of Jerusalem. His brother and deputy was killed in a serious riot, and an accusation was laid against Menelaus before Antiochus. At the inquiry he bought his acquittal from a courtier and his accusers were executed. Antiochus required peace in Jerusalem and probably regarded Onias as the representative of the pro-Egyptian faction, the allies of his enemy.

During his second Egyptian campaign a rumour came .that Antiochus was dead, and Jason made a raid upon Jerusalem. Menelaus held the citadel and Jason was unable to establish himself in the city. The people were

presumably out of sym- pathy with hellenizers, whether they belonged to the house of Onias or that of Tobiah. When Antiochus finally evacuated Egypt in obedience to the decree of Rome, he thought that Judaea was in revolt. Though Jason had fled, it was necessary to storm the city; the drastic measures which Menelaus advised seem to indicate that the poorer classes had been roused to defend the Temple from further sacrilege. A massacre took place, and Antiochus braved the anger of Yahweh by entering and pillaging the Temple with impunity. The author of 2 Maccabees infers from his success that the nation had forfeited all right to divine protection for the time (2 Mace. v. 18-20).

The policy which Antiochus thus inaugurated he carried on rigorously and systematically. His whole kingdom was to be unified; Judaism was an eccentricity and as such doomed to extinction. The Temple of Jerusalem was made over to Zeus Olympius: the temple of Gerizim to Zeus Xenius. All the religious rites of Judaism were proscribed and the neighbouring Greek cities were requested to enforce the prohibition upon their Jewish citizens. Jerusalem was occupied by an army which took advantage of the Sabbath and proceeded to suppress its observance. An Athenian came to be the missionary of Hellen- ism and to direct its ceremonies, which were established by force up and down the country.

28. The Maccabees. — Jerusalem and Gerizim were purged and converted to the state religion with some ease. Elsewhere, as there, some conformed and some became martyrs for the faith. And the passive resistance of those who refused to conform at length gave rise to active opposition. " The king's officers who were enforcing the apostasy came into the city of Modein to sacrifice, and many of Israel went over to them, but Matta- thias . . . slew a Jew who came to sacrifice and the king's officer and pulled down the altar " (1 Macc.ii. issqq.). Whether led by this Mattathias or not, certain Jews fled into the wilder- ness and found a leader in Judas Maccabaeus his reputed son, the first of the five Asmonean (Hasmonean) brethren. The warfare which followed was like that which Saul and David waged against the Philistines. Antiochus was occupied with his Parthian campaign and trusted that the Hellenized Jews would maintain their ascendancy with the aid of the provincial troops. In his last illness he wrote to express his confidence in their loyalty. But the rebels collected adherents from the villages; and, when they resolved to violate the sabbath to the extent of resisting attack, they were joined by the company of

the Assideans (Hasidim). Such a breach of the sabbath was necessary if the whole Law was to survive at all in Palestine. But the transgression is enough to explain the disfavour into which the Maccabees seem to fall in

the judgment of later Judaism, as, in that judgment, it is enough to account for the instability of their dynasty. Unstable as it was, their dynasty was soon established. In the country-side of Judaea, Judaism — and no longer Hellenism — was propagated by force. Apollo- nius, the commander of the Syrian garrison in Jerusalem, and Seron the commander of the army in Syria, came in turn against Judas and his bands and were defeated. The revolt thus became important enough to engage the attention of the governor of Coele-Syria and Phoenicia, if not of Lysias the regent himself. Nicanor was despatched with a large army to put down the rebels and to pay the tribute due to Rome by selling them as slaves. Judas was at Emmaus; " the men of the citadel " guided a detachment of the Syrian troops to his encampment by night. The rebels escaped in time, but not into the hills, as their enemies surmised. At dawn they made an unexpected attack upon the main body and routed it. Next year (165 B.C.) Lysias himself entered the Idumaean country and laid siege to the fortress of Bethsura. Judas gathered what men he could and joined battle. The siege was raised, more probably in consequence of the death of Antiochus Epiphanes than because Judas had gained any real victory. The proscription of the Jewish religion was withdrawn and the Temple restored to them. But it was Menelaus who was sent by the king " to encourage " (2 Mace. xi. 32) the Jews, and in the official letters no reference is made to Judas. Such hints as these indicate the impossibility of recovering a complete picture of the Jews during the sove- reignty of the Greeks, which the Talmudists regard as the dark age, best left in oblivion.

Judas entered Jerusalem, the citadel of which was still occupied by a Syrian garrison, and the Temple was re-dedicated on the 25th of Kislev (164 B.C.). So " the Pious " achieved the object for which presumably they took up arms. The re-establishment of Judaism, which alone of current religions was intolerant of a rival, seems to have excited the jealousy of their neighbours who had embraced the Greek way of life. The hellenizers had not lost all hope of converting the nation and were indisposed to acquiesce in the concordat. Judas and his zealots were thus able to maintain their prominence and gradually to increase their power. At Joppa, for example, the Jewish settlers — two hundred in all — " were invited to go into boats provided in ac- cordance with the common decree of the city." They accepted the invitation and were drowned. Judas avenged them by burning the harbour and the shipping, and set to work to bring into Judaea all such communities of Jews who had kept them- selves separate from their heathen neighbours. In this way he became strong enough to deal with the apostates of Judaea.

In 163 Lysias led another expedition against these disturbers of the king's peace and defeated Judas at Bethzachariah. But while the forces were besieging Bethzur and the fortress on Mount Zion, a pretender arose in

Antioch, and Lysias was com- pelled to come to terms — and now with Judas. The Jewish refugees had turned the balance, and so Judas became strategus of Judaea, whilst Menelaus was put to death.

In 162′ Demetrius escaped from Rome and got possession of the kingdom of Syria. Jakim, whose name outside religion was Alcimus, waited upon the new king on behalf of the loyal Jews who had hellenized. He himself was qualified to be the legiti- mate head of a united state, for he was of the tribe of Aaron. Judas and the Asmoneans were usurpers, who owed their title to Lysias. So Alcimus- Jakim was made high priest and Bacchides brought an army to instal him in his office. The Assideans made their submission ‘ at once. Judas had won for them religious freedom: but the Temple required a descendant of Aaron for priest and he was come. But his first act was to seize and slay sixty of them: so it was clear to Judas at any rate, if not also to the Assideans who survived, that political inde- pendence was necessary if the religion was to be secure. In face of his active opposition Alcimus could not maintain himself

without the support of Bacchides and was forced to retire to Antioch. In response to his complaints Nicanor was appointed governor of Judaea with power to treat with Judas. It appears that the two became friends at first, but fresh orders from Antioch made Nicanor guilty of treachery in the eyes of Judas’s partisans. Warned by the change of his friend’s manner Judas fled. Nicanor threatened to destroy the Temple if the priests would not deliver Judas into his hands. Soon it came to his knowledge that Judas was in Samaria, whither he followed him on a sabbath with Jews pressed into his service. The day was known afterwards as Nicanor’s day, for he was found dead on the field (Capharsalama) by the victorious followers of Judas (13th of Adar, March 161 B.C.). After this victory Judas made an alliance with the people of Rome, who had no love for Demetrius his enemy, nor any intention of putting their professions of friendship into practice. Bacchides and Alcimus returned meanwhile into the land of Judah; at Elasa ” Judas fell and the rest fled ” (1 Mace. ix. 18). Bacchides occupied Judaea and made a chain of forts. Jonathan, who succeeded his brother Judas, was captain of a band of fugitive outlaws. But on the death of Alcimus Bacchides retired and Jonathan with his followers settled down beyond the range of the Syrian garrisons. The Hellenizers still enjoyed the royal favour and Jonathan made no attempt to dispossess them. After an inter- val of two years they tried to capture him and failed. This failure

seems to have convinced Bacchides that it would be well to recognize Jonathan and to secure a balance of parties. In 158 Jonathan began to rule as a judge in Michmash and he destroyed the godless out of Israel — so far, that is, as his power extended. In 153 Alexander Balas withdrew Jonathan from his allegiance to Demetrius by the offer of the high-priesthood. He had already made Jerusalem his capital and fortified the Temple mount: the Syrian garrisons had already been withdrawn with the exception of those of the Akra and Bethzur. In 147 Jonathan repaid his benefactor by destroying the army of the governor of Coele-Syria, who had espoused the cause of Deme- trius. The fugitives took sanctuary in the temple of Dagon at Azotus. " But Jonathan burned the temple of Dagon and those who fled into it. " After the death of Balas he laid siege to the Akra; and " the apostates, who hated their own nation," ap- pealed to Demetrius. Jonathan was summoned to Antioch, made his peace and apparently relinquished his attempt in return for the addition of three Samaritan districts to his terri- tory. Later, when the people of Antioch rose against the king, Jonathan despatched a force of 3000 men who played a notable part in the merciless suppression of the insurrection. 1 Macca- bees credits them with 100,000 victims. Trypho, the regent of Antiochus VI., put even greater political power into the hands of Jonathan and his brother Simon, but finally seized Jonathan on the pretext of a conference. Simon was thus left to consolidate what had been won in Palestine for the Jews and the family whose head he had become. The weakness of the king enabled him to demand and to secure immunity from taxation. The Jewish aristocracy became peers of the Seleucid kingdom. Simon was declared high priest: Rome and Sparta rejoiced in the elevation of their friend and ally. In the hundred and seventieth year (142 b.c.) the yoke of the heathen was taken away from Israel and the people began to date their legal documents " in the first year of Simon the great high priest and commander and leader of the Jews." The popular verdict received official and formal sanction. Simon was declared by the Jews and the priests their governor and high priest for ever, until there should arise a faithful prophet. The garrison of the Akra had been starved by a close blockade into submission, and beyond the boundaries of Judaea " he took Joppa for a haven and made himself master of Gazara and Bethsura."

29. John Hyrcanus and the Sadducees. — But in 138 B.C. Antiochus Sidetes entered Seleucia and required the submission of all the petty states, which had taken advantage of the weak- ness of preceding kings. From Simon he demanded an indem- nity of 1000 talents for his oppression and invasion of non- Jewish territory : Simon offered 100 talents. At length Antiochus

appeared to enforce his demand in 134. Simon was dead (135 B.C.) and John Hyrcanus had succeeded his father. The Jewish forces were driven

back upon Jerusalem and the city was closely invested. At the feast of tabernacles of 132 Plyrcanus requested and Antiochus granted a week's truce. The only hope of the Jews lay in the clemency of their victorious suzerain, and it did not fail them. Some of his advisers urged the demolition of the nation on the ground of their exclusiveness, but he sent a sacrifice and won thereby the name of " Pious." In subsequent negotiations he accepted the disarmament of the besieged and a tribute as conditions of peace, and in response to their entreaty left Jerusalem without a garrison. When he went on his last disastrous campaign, Hyrcanus led a Jewish contingent to join his army, partly perhaps a troop of mercenaries (for Hyrcanus was the first of the Jewish kings to hire mercen- aries, with the treasure found in David's tomb). After his death Hyrcanus took advantage of the general confusion to extend Jewish territory with the countenance of Rome. He destroyed the temple of Gerizim and compelled the Idumaeans to submit to circumcision and embrace the laws of the Jews on pain of deportation.

*In Jerusalem and in the country, in Alexandria, Egypt and Cyprus, the Jews were prosperous (Jos. Ant. xiii. 284). This prosperity and the apparent security of Judaism led to a breach between Hyrcanus and his spiritual directors, the Pharisees. His lineage was (in the opinion of one of them at least) of doubtful purity; and so it was his duty to lay down the high-priesthood and be content to rule the nation. That one man should hold both offices was indeed against the example of Moses, and could only be admitted as a temporary concession to necessity. Hyrcanus could not entertain the proposal that he should resign the sacred office to which he owed much of his authority. The allegation about his mother was false: the Pharisee who retailed it was guilty of no small offence. A Sadducean friend advised Hyrcanus to ask the whole body of the Pharisees to prescribe the penalty. Their leniency, which was notorious, alienated the king or probably furnished him with a pretext for breaking with them. The Pharisees were troublesome counsellors and doubtful allies for an ambitious prince. They were all-powerful with the people, but Hyrcanus with his mercenaries was inde- pendent of the people, and the wealthy belonged to the sect of the Sadducees. The suppression of the Pharisaic ordinances and the punishment of those who observed them led to some disturbance. But Hyrcanus " was judged worthy of the three great privileges, the rule of the nation, the high-priestly dignity, and prophecy." This verdict suggests that the Sadducees, with whom he allied himself, had learned to affect some show of Judaism in Judaea. If the poor were ardent nationalists who would not intermingle with the Greeks, the *ich had long out- grown and now could humour such prejudices; and the title of their party was capable of recalling at any rate the sound of the national ideal of righteousness, i.e. Sadaqah.*

The successor of Hyrcanus (d. 105) was Judas Aristobulus, " the friend of the Greeks," who first assumed the title of king. According to Strabo he was a courteous man and in many ways useful to the Jews. His great achievement was the conquest of a part of Ituraea, which he added to Judaea and whoseinhabi- tants he compelled to accept Judaism/

The Sadducean nobility continued in power under his brother and successor Alexander Jannaeus (103-78); and the breach between the king and the mass of the people widened. But Salome Alexandra, his brother's widow, who released him from prison on the death of her husband and married him, was con- nected with the Pharisees through her brother Simon ben Shetach. If his influence or theirs dictated her policy, there is no evidence of any objection to the union of the secular power with the high-priesthood. The party may have thought that Jannaeus was likely to bring the dynasty to an end. His first action was to besiege Ptolemais. Its citizens appealed to Ptolemy Lathyrus, who had been driven from the throne of Egypt by his mother Cleopatra and was reigning in Cyprus. Alexander raised the siege, made peace with Ptolemy and secretly sent to Cleopatra

for help against her son. The result of this double-dealing was that his army was destroyed by Ptolemy, who advanced into Egypt leaving Palestine at the mercy of Cleopatra. But Cleo- patra's generals were Jews and by their protests prevented her from annexing it. Being thus freed from fear on the side of Ptolemy, Alexander continued his desultory campaigns across the Jordan and on the coast without any apparent policy and with indifferent success. Finally, when he officiated as high priest at the feast of tabernacles he roused the fury of the people by a derisive breach of the Pharisaic ritual. They cried out that he was unworthy of his office, and pelted him with the citrons which they were carrying as the Law prescribed. Alex- ander summoned his mercenaries, and 6000 Jews were killed before he set out on his disastrous campaign against an Arabian king. He returned a fugitive to find the nation in armed re- bellion. After six years of civil war he appealed to them to .state the conditions under which they would lay aside their hostility. They replied by demanding his death and called in the Syrians. But when the Syrians chased him into the moun- tains, 6000 Jews went over to him and, with their aid, he put down the rebellion. Eight hundred Jews who had held a fortress against him were crucified; 8000 Pharisees fled to Egypt and remained there. Offering an ineffectual resistance to the passage of the Syrian troops, Alexander was driven back

by Aretas, king of Arabia, against whom they had marched. His later years brought him small victories over isolated cities.

On his deathbed it is said that Alexander advised his wife to reverse this policy and rely upon the Pharisees. According to the Talmud, he warned her " to fear neither the Pharisees nor their opponents but the hypocrites who do the deed of Zimri and claim the reward of Phinehas: " the warning indicates his justification of his policy in the matter of the crucifixions. In any case the Pharisees were predominant under Alexandra, who became queen (78-69) under her husband's will. Hyrcanus her elder son was only high priest, as the stricter Pharisees required. All the Pharisaic ordinances which Hyrcanus had abolished were reaffirmed as binding. Simon ben Shatach stood beside the queen: the exiles were restored and among them his great colleague Jehudah ben Tabai. The great saying of each of these rabbis is concerned with the duties of a judge; the selection does justice to the importance of the Sanhedrin, which was filled with Pharisees. The legal reforms which they introduced tended for the most part to mercy, but the Talmud refers to one case which is an exception: false witnesses were condemned to suffer the penalty due to their victim, even if he escaped. This ruling may be interpreted as part of a campaign directed against the counsellors of Alexander or as an instance of their general principle that intention is equivalent to commis- sion in the eye of -the Law. The queen interposed to prevent the execution of those who had counselled the crucifixion of the rebels and permitted them to withdraw with her younger son Aristobulus to the fortresses outside Jerusalem. Against their natural desire for revenge may be set the fact that the Pharisees did much to improve the status of women among the Jews.

On the death of Alexandra (69 B.C.) Aristobulus disputed the succession of Hyrcanus. When their forces met at Jericho, Hyrcanus, finding that the bulk of his following deserted to Aristobulus, fled with those who remained to the tower Antonia and seized Aristobulus's wife and children as hostages for his own safety. Having this advantage, he was able to abdicate in favour of Aristobulus and to retire into private life. But he was not able to save his friends, who were also the enemies of the reigning king. In fear of reprisals Antipas (or Antipater), the Idumaean, his counsellor, played on the fears of Hyrcanus and persuaded him to buy the aid of the Nabataean Arabs with promises. Aristobulus could not withstand the army of Aretas: he was driven back' upon Jerusalem and there besieged. The Jews deserted to the victorious Hyrcanus: only the priests remained loyal to their accepted king; many fled to Egypt.

30. The Romans and the Idumaeans. — At this point the power of Rome appeared upon the scene in the person of M. Aemilius Scaurus (stepson of Sulla) who had been sent into Syria by

Pompey (65 B.C.). Both brothers appealed to this new tribunal and Aristobulus bought a verdict in his favour. The siege was raised. Aretas retired from Judaea; and Aristobulus pursued the retreating army. But, when Pompey himself arrived at Damascus, Antipater, who pulled the strings and exploited the claims of Hyrcanus, realized that Rome and not the Arabs, who were cowed by the threats of Scaurus, was the ruler of the East. To Rome, therefore, he must pay his court. Others shared this conviction: Strabo speaks of embassies from Egypt and Judaea bearing presents — one deposited in the temple of Jupiter Capitolinus bore the inscription of Alexander, the king of the Jews. From Judaea there were three embassies pleading, for Aristobulus, for Hyrcanus, and for the nation, who would have no king at all but their God.

Pompey deferred his decision until he should have inquired into the state of the Nabataeans, who had shown themselves to be capable of dominating the Jews in the absence of the Roman army. In the interval Aristobulus provoked him by his display of a certain impatience. The people had no responsible head, of whom Rome could take cognisance: so Pompey decided in favour of Hyrcanus and humoured the people by recognizing him, not as king, but as high priest. Antipater remained secure, in power if not in place. The Roman supremacy was established : the Jews were once more one of the subject states of Syria, now a Roman province. Their national aspirations had received a contemptuous acknowledgment, when their Temple had been desecrated by the entry of a foreign conqueror.

Aristobulus himself had less resolution than his partisans. When he repented of his attempted resistance and treated with Pompey for peace, his followers threw themselves into Jeru- salem, and, when the faction of Hyrcanus resolved to open the gates, into the Temple. There they held out for three months, succumbing finally because in obedience to the Law (as inter- preted since the time of Antiochus Epiphanes) they would only defend themselves from actual assault upon the sabbath day. The Romans profited by this inaction to push on the siege- works, without provoking resistance by actual assaults until the very end. Pompey finally took the stronghold by choosing the day of the fast, when the Jews abstain from all work, that is the sabbath (Strabo). Dio Cassius calls it the day of Cronos. On this bloody sabbath the priests showed a devotion to their worship which matched the inaction of the fighting men. Though they saw the enemy advancing upon them sword in hand they remained at worship untroubled and were slaughtered as they poured libation and burned incense, for they put their own safety second to the service of God. And there were Jews among the murderers of the 12,000 Jews who fell.

The Jews of Palestine thus became once more a subject state, stripped of their conquests and confined to their own borders. Aristobulus and his

children were conveyed to Rome to grace their conqueror's triumphal procession. But his son Alexander escaped during the journey, gathered some force, and overran Judaea. The Pharisees decided that they could not take action on either side, since the elder son of Alexandra was directed by the Idumaean Antipater; and the people had an affection for such Asmonean princes as dared to challenge the Roman domina- tion of their ancestral kingdom. The civil war was renewed; but Aulus Gabinius, the proconsul, soon crushed the pretender and set up an aristocracy in Judaea with Hyrcanus as guardian of the Temple. The country was divided into five districts with five synods; and Josephus asserts that the people welcomed the change from the monarchy. In spite of this, Aristobulus (56 B.C.) and Alexander (55 B.C.) found loyalists to follow them in their successive raids. But Antipater found supplies for the army of Gabinius, who, despite Egyptian and Parthian distrac- tions, restored order according to the will of Antipater. M. Crassus, who succeeded him, plundered the Temple of its gold and the treasure (54 B.C.) which the Jews of the dispersion had contributed for its maintenance. It is said that Eleazqr, the priest who guarded the treasure, offered Crassus the golden beam as ransom for the whole, knowing, what no one else knew, that it was mainly composed of wood. So Crassus departed to,

GREEK DOMINATION]

Parthia and died. When the Parthians, elated by their victory over Crassus (53 B.C.) advanced upon Syria, Cassius opposed them. Some of the Jews, presumably the partisans of Aristo- bulus, were ready to co-operate with the Parthians. At any rate Antipater was ready to aid Cassius with advice; Taricheae was taken and 30,000 Jews were sold into slavery (51 B.C.). In spite of this vigorous coercion Cassius came to terms with Alexander, before he returned to the Euphrates to hold it against the Parthians.

Two years later Julius Caesar made himself master of Rome and despatched the captive Aristobulus with two legions to win Judaea (49 B.C.). But Pompey's partisans were beforehand with him : he was taken off by poison and got not so much as a burial in his fatherland. At the same time his son Alexander was beheaded at Antioch by Pompey's order as an enemy of Rome. After the defeat and death of Pompey (48 B.C.) Antipater transferred his allegiance to Caesar and demonstrated its value during Caesar's Egyptian campaign. He carried with him the Arabs and the princes of Syria, and through Hyrcanus he was able to transform the hostility of the Egyptian Jews into active friendliness. These services, which incidentally illustrate the solidarity and unity of the Jewish nation and the respect of the communities of the dispersion for the metropolis, were recog- nized and rewarded. Before his assassination in 44 B.C. Julius Caesar had confirmed Hyrcanus in the high-priesthood and added the title of ethnarch.

Antipater had been made a Roman citizen and procurator of the reunited Judaea. Further, as confederates of the senate and people of Rome, the Jews had received accession of territory, including the port of Joppa and, with other material privileges, the right of observing their religious customs not only in Palestine but also in Alexandria and elsewhere. Idumaean or Philistine of Ascalon, Antipater had displayed the capacity of his adoptive or adopted nation for his own profit and theirs. And when Caesar died Suetonius notes that he was mourned by foreign nations, especially by the Jews (Caes. 84).

In the midst of all this civil strife the Pharisees and all who were preoccupied with religion found it almost impossible to discern what they should do to please God. The people whom they directed were called out to fight, at the bidding of an alien, for this and that foreigner who seemed most powerful and most likely to succeed. In Palestine few could command leisure for meditation; as for opportunities of effective intervention in affairs, they had none, it would seem, once Alexander was dead.

There is a story of a priest named Onias preserved both by Josephus and in the Talmud, which throws some light upon the in- decision of the religious in the period just reviewed. When Aretas intervened in the interest of Hyrcanus and defeated Aristobulus, the usurper of his brother's inheritance, the people accepted the verdict of battle, sided with the victor's client, and joined in the siege of Jerusalem. The most reputable of the Jews fled to Egypt; but Onias, a righteous man and dear to God, who had hidden himself, was discovered by the besiegers. He had a name for power in prayer ; for once in a drought he prayed for rain and God had heard his prayer. His captors now required of him that he should put a curse upon Aristobulus and his faction. On compulsion he stood in their midst and said : " O God, king of the universe, since these who stand with me are thy people and the besieged are thy priests, I pray thee that thou hearken not to those against these, nor accomplish what these entreat against those." So he prayed — and the wicked Jews stoned him.

Unrighteous Jews were in the ascendant. There were only Asmonean princes, degenerate and barely titular sons of Levi, to serve as judges of Israel — and they were at feud and both relied upon foreign aid. The righteous could only flee or hide, and so wait dreaming of the mercy of God past and to come. As yet our authori- ties do not permit us to follow them to Egypt with any certainty, but the Psalms of Solomon express the mind of one who survived to see Pompey the Great brought low. Although Pompey had spared the temple treasure, he was the embodiment of the power of Rome, which was not always so considerately exercised. And so the psalmist exults in his death and dishonour (Ps. ii.) : he prayed that the pride of the dragon might be humbled and God shewed him the dead body

lying upon the waves — and there was none to bury it. As one of those who fear the Lord in truth and in patience, he looks forward to the punishment of all sinners who oppress the righteous and profane the sanctuary. For the sins of the <- u l e r S God had

rejected his people ; but the remnant could not but inherit the promises, which belong to the chosen people. For the Lord is faithful unto those who walk in the righteousness of his commandments (xiv. 1) : in the exercise of their freewill and with God's help they will attain salvation. As God's servant, Pompey destroyed theirrulersand every wise councillor: soon the righteous and sinless king of David's house shall reign over them and over all the nations (xvii.).

31. Herod the Great. — After the departure of Caesar, Antipater warned the adherents of Hyrcanus against taking part in any revolutionary attempts, and his son Herod, who, in spite of his youth, had been appointed governor of Galilee, dealt summarily with Hezekiah, the robber captain who was overrunning the adjacent part of Syria. The gratitude of the Syrians brought him to the knowledge of Sextus Caesar the governor of Syria; but his action inspired the chief men of the Jews with appre- hension. Complaint was made to Hyrcanus that Herod had violated the law which prohibited the execution of even an evil man, unless he had been first condemned to death by the San- hedrin. At the same time the mothers of the murdered men came to the Temple to demand vengeance. So Herod was summoned to stand his trial. He came in answer to the summons — but attended by a bodyguard and protected by the word of Sextus. Of all the Sanhedrin only Sameas " a righteous man and therefore superior to fear " dared to speak. Being a Pharisee he faced the facts of Herod's power and warned the tribunal of the event, just as later he counselled the people to receive him, saying that for their sins they could not escape him. Herod put his own profit above the Law, acting after his kind, and he also was God's instrument. The effect of the speech was to goad the Sanhedrin into condemning Herod: Hyrcanus post- poned their decision and persuaded him to flee. Sextus Caesar made him lieutenant-governor of Coele Syria, and only his father restrained him from returning to wreak his revenge upon Hyrcanus.

It is to be remembered that, in this and all narratives of the life of Herod, Josephus was dependent upon the history of Herod's client, Nicolaus of Damascus, and was himself a supporter of law and order. The action of the Sanhedrin and the presence of the women suppliants in the Temple suggest, if they do not prove, that this Hezekiah who harassed the Syrians was a Jewish patriot, who could not acquiesce and wait with Sameas.

Malichus also, the murderer or reputed murderer of Anti- pater, appears to have been a partisan of Hyrcanus, who had a zeal for Judaism. When Cassius demanded a tribute of 700 talents from Palestine, Antipater set Herod, Phasael and this Malichus, his enemy, to collect it. Herod thought it im- prudent to secure the favour of Rome by the sufferings of others. But some cities defaulted, and they were apparently among those assigned to Malichus. If he had been lenient for their sakes or in the hope of damaging Antipater, he was disappointed; for Cassius sold four cities into slavery and Hyrcanus made up the deficit. Soon after this (43 B.C.) Malichus succeeded, it is said, in poisoning Antipater as he dined with Hyrcanus, and was assas- sinated by Herod's bravoes.

After the departure of Cassius, Antipater being dead, there was confusion in Judaea. Antigonus, the son of Aristobulus, made a raid and was with difficulty repulsed by Herod. The prince of Tyre occupied part of Galilee. When Antony assumed the dominion of the East after the defeat of Cassius at Philippi, an embassy of the Jews, amongst other embassies, approached him in Bithynia and accused the sons of Antipater as usurpers of the power which rightly belonged to Hyrcanus. Another approached him at Antioch. But Hyrcanus was well content to forgo the title to political power, which he could not exercise in practice, and Antony had been a friend of Antipater. So Herod and Phasael continued to be virtually kings of the Jews: Antony's court required large remittances and Palestine was not exempt.

In 40 B.C. Antony was absent in Egypt or Italy; and the Parthians swept down upon Syria with Antigonus in their train. Hyrcanus and Phasael were trapped: Herod fled by way of Egypt to Rome. Hyrcanus, who was Antigonus' only rival, was mutilated and carried to Parthia. So he could no more be

high priest, and his life was spared only at the intercession of the Parthian Jews, who had a regard for the Asmonean prince. Thus Antigonus succeeded his uncle as " King Antigonus " in the Greek and " Mattathiah the high priest " in the Hebrew by grace of the Parthians.

The senate of Rome under the influence of Antony and Octavian ratified the claims of Herod, and after some delay lent him the armed force necessary to make them good. In the hope of healing the breach, which his

success could only aggravate, and for love, he took to wife Mariamne, grandniece of Hyrcanus. Galilee was pacified, Jerusalem taken and Antigonus beheaded by the Romans. From this point to the end of the period the Jews were dependents of Rome, free to attend to their own affairs, so long as they paid taxes to the subordinate rulers, Herodian or Roman, whom they detested equally. If some from time to time dared to hope for political independence their futility was demonstrated. One by one the descendants of the Asmoneans were removed. The national hope was relegated to an indefinite future and to another sphere. At any rate the Jews were free to worship their God and to study his law: their religion was recognized by the state and indeed established.

This development of Judaism was eminently to the mind of the rulers; and Herod did much to encourage it. More and more it became identified with the synagogue, in which the Law was expounded: more and more it became a matter for the individual and his private life. This was so even in Palestine — the land which the Jews hoped to possess — and in Jerusalem itself, the holy city, in which the Temple stood. Herod had put down Jewish rebels and Herod appointed the high priests. In his appointments he was careful to avoid or to suppress any person who, being popular, might legitimize a rebellion by heading it. The Pharisees, who regarded his rule as an inevitable penalty for the sins of the people, he encouraged. Pollio the Pharisee and Sameas his disciple were in special honour with him, Josephus says, when he re-entered Jerusalem and put to death the leaders of the faction of Antigonus. How well their teaching served his purpose is shown by the sayings of two rabbis who, if not identical with these Pharisees, belong to their period and their party. Shemaiah said, " Love work and hate lordship and make not thyself known to the government." Abtalion said, " Ye wise, be guarded in your words: perchance ye may incur the debt of exile." Precepts such as these could hardly fail to effect some modification of the reckless zeal of the Galileans in the pupils of the synagogue. Many if not all of the professed rabbis had travelled outside Palestine: some were even members of the dispersion, like Hillel the Babylonian, who with Shammai forms the second of the pairs. Through them the experience of the dispersion was brought to bear upon the Palestinian Jews. Herod's nominees were not the men to extend the prestige of the high-priesthood at the expense of these rabbis: even in Jerusalem the synagogue became of more importance than the Temple. Hillel also inculcated the duty of making converts to Judaism. He said, " Be of the disciples of Aaron, loving peace, and pursuing peace, loving mankind and bringing them nigh to the Law." But even he reckoned the books of Daniel and Esther as canonical, and these were dangerous food for men who did not realize the full power of Rome.

So long as Herod lived there was no insurrection. Formally he was an

orthodox Jew and set his face against intermarriage with the uncircumcised. He was also ready and able to protect the Jews of the dispersion. But that ability was largely due to his whole-hearted Hellenism, which was shown by the Greek cities which he founded in Palestine and the buildings he erected in Jerusalem. In its material embodiments Greek civilization became as much a part of Jewish life in Palestine as it was in Alexandria or Antioch; and herein the rabbis could not follow him.

When all the Jewish people swore to be loyal to Caesar and the king's policy, the Pharisees — above 6000 — refused to swear. The king imposed a fine upon them, and the wife of Pheroras — Herod's brother— paid it on their behalf. In return for her

kindness, being entrusted with foreknowledge by the visitation of God, they prophesied that God had decreed an end of rule for Herod and his line and that the sovereignty devolved upon her and Pheroras and their children.

From the sequel it appears that the prophecy was uttered by one Pharisee only, and that it was in no way endorsed by the party. When it came to the ears of the king he slew the most responsible of the Pharisees and every member of his household who accepted what the Pharisee said. An explanation of this unwarrantable generalization may be found in the fact that the incident is derived from a source which was unfavourable to the Pharisees: they are described as a Jewish section of men who pretend to set great store by the exactitude of the ancestral tradition and the laws in which the deity delights — as dominant over women-folk — and as sudden and quick in quarrel.

Towards the end of Herod's life two rabbis attempted to up- hold by physical force the cardinal dogma of Judaism, which prohibited the use of images. Their action is intelligible enough. Herod was stricken with an incurable disease. He had sinned against the Law; and at last God had punished him. At last the law-abiding Jews might and must assert the majesty of the outraged Law. The most conspicuous of the many symbols and signs of his transgression was the golden eagle which he had placed over the great gate of the Temple; its destruction was the obvious means to adopt for the quickening and assertion of Jewish principles.

By their labours in the education of the youth of the nation, these rabbis, Judas and Matthias, had endeared themselves to the populace and had gained influence over their disciples. A report that Herod was dead co-operated with their exhortations to send the iconoclasts to their appointed work. And so they went to earn the rewards of their practical piety from the Law. If they died, death was inevitable, the rabbis said, and no better death would they ever find. Moreover, their children and kindred would

benefit by the good name and fame belonging to those who died for the Law. Such is the account which Josephus gives in the Antiquities; in the Jewish War he represents the rabbis and their disciples as looking forward to greater happiness for themselves after such a death. But Herod was not dead yet, and the instigators and the agents of this sacrilege were burned alive.

32. The Settlement of Augustus. — On the death of Herod in 4 B.C. Archelaus kept open house for mourners as the Jewish custom, which reduced many Jews to beggary, prescribed. The people petitioned for the punishment of those who were responsible for the execution of Matthias and his associates and for the removal of the high priest. Archelaus temporized; the loyalty of the people no longer constituted a valid title to the throne; his succession must first be sanctioned by Augustus. Before he departed to Rome on this errand, which was itself an insult to the nation, there were riots in Jerusalem at the Passover which he needed all his soldiery to put down. When he presented himself before the emperor — apart from rival claimants of his own family — there was an embassy from the Jewish people who prayed to be rid of a monarchy and rulers such as Herod. As part of the Roman province of Syria and under its governors they would prove that they were not really disaffected and rebellious. During the absence of Archelaus, who would — the Jews feared — prove his legitimacy by emulating his father's ferocity, and to whom their ambassadors preferred Antipas, the Jews of Palestine gave the lie to their protestations of loyalty and peaceableness. At the Passover the pilgrims attacked the Roman troops. After hard fighting the procurator, whose cruelty provoked the attack, captured the Temple and robbed the treasury. On this the insurgents were joined by some of Herod's army and besieged the Romans in Herod's palace. Elsewhere the occasion tempted many to play at being king — Judas, son of Hezekiah, in Galilee; Simon, one of the king's slaves, in Peraea. Most notable of all perhaps was the shepherd Athronges, who assumed the pomp of royalty and employed his four brothers as captains and satraps in the war which he waged upon Romans and king's men alike — not even Jews escaped him unless they brought him contributions.

Order was restored by Varus the governor of Syria in a campaign which Josephus describes as the most important war between that of Pompey and that of Vespasian.

At length Augustus summoned the representatives of the nation and Nicholaus of Damascus, who spoke for Archelaus, to plead before him in the temple of Apollo. Augustus apportioned Herod's dominions among his sons in accordance with the pro- visions of his latest will. Archelaus received the lion's share: for ten years he was ethnarch of Idumaea, Judaea and Samaria, with a yearly revenue of 600 talents. Antipas became tetrarch of Galilee and Peraea, with a revenue of 200 talents. Philip, who had been left in charge of Palestine pending the decision and had won the respect of Varus, became tetrarch of Batanaea, Trachonitis and Auranitis, with 100 talents. His subjects included only a sprinkling of Jews. Up to his death (a.d. 34) he did nothing to forfeit the favour of Rome. His coins bore the heads of Augustus and Tiberius, and his government was worthy of the best Roman traditions — he succeeded where proconsuls had failed. His capital was Caesarea Philippi, where Pan had been worshipped from ancient times, and where Augustus had a temple built by Herod the Great.

33. Archelaus. — Augustus had counselled Archelaus to deal gently with his subjects. But there was an outstanding feud between him and them; and his first act as ethnarch was to remove the high priest on the ground of his sympathy with the rebels. In violation of the Law he married a brother's widow, who had already borne children, and in general he showed himself so fierce and tyrannical that the Jews joined with the Samaritans to accuse him before the emperor. Archelaus was summoned to Rome and banished to Gaul; his territory was entrusted to a series of procurators (a.d. 6-41), among whom was an apostate Jew, but none with any pretension even to a semi-legitimate authority. Each procurator represented not David but Caesar. The Sanhedrin had its police and powers to safeguard the Jewish religion; but the procurator had the appointment of the high priests, and no capital sentence could be executed without his sanction.

3.1. The Procurators. — So the Jews of Judaea obtained the settlement for which they had pleaded at the death of Herod; and some of them beg?n to regret it at once. The first pro- curator Coponius was accompanied by P. Sulpicius Quirinius, legate of Syria, who came to organi2e the new Roman province. As a necessary preliminary a. census (a.d. 6-7) was taken after the Roman method, which did not conform to the Jewish Law. The people were affronted, but for the most part acquiesced, under the influence of Joazar the high priest. But Judas the Galilean, with a Pharisee named Sadduc (Sadduk), endeavoured to incite them to rebellion in the name of religion. The result of this alliance between a revolutionary and a Pharisee was the formation of the party of Zealots, whose influence — according to Josephus — brought about the great revolt and so led to the destruction of Jerusalem in 70. So far as this influence ex- tended, the Jewish community was threatened with the danger of suicide, and the distinction drawn by Josephus between the Pharisees and the Zealots is a valid one. Not all

Pharisees were prepared to take such action, in order that Israel might " tread on the neck of the eagle " (as is said in The Assumption of Moses). So long as the Law was not deliberately outraged and so long as the worship was established, most of the religious leaders of the Jews were content to wait.

It seems that the Zealots made more headway in Galilee than in Judaea — so much so that the terms Galilean and Zealot are practically interchangeable. In Galilee the Jews predominated over the heathen and their ruler Herod Antipas had some sort of claim upon their allegiance. His marriage with the daughter of the Arabian king Aretas (which was at any rate in accordance with the general policy of Augustus) seems to have preserved his territory from the incursions of her people, so long as he remained faithful to her. He conciliated his subjects by his deference to the observances of Judaism, and — the case is probably typical of his policy — he joined in protesting, when Pilate set up a votive shield in the palace of Herod within the sacred city.

He seems to have served Tiberius as an official scrutineer of the imperial officials and he commemorated his devotion by the foundation of the city of Tiberias. But he repudiated the daughter of Aretas in order to marry Herodias and so set the Arabians against him. Disaster overtook his forces (a.d. 36) and Tiberius, his patron, died before the Roman power was brought in full strength to his aid. Caligula was not predisposed to favour the favourites of Tiberius; and Antipas, having petitioned him for the title of king at the instigation of Hero- dias, was banished from his tetrarchy and (apparently) was put to death in 39.

Antipas is chiefly known to history in connexion with John the Baptist, who reproached him publicly for his marriage with Herodias. According to the earliest authority, he seems to have imprisoned John to save him from the vengeance of Herodias. But — whatever his motive — Antipas certainly con- sented to John's death. If the Fourth Gospel is to be trusted, John had already recognized and acclaimed Jesus of Nazareth as the Messiah for whom the Jews were looking. By common consent of Christendom, John was the forerunner of the founder of the Christian Church. It was, therefore, during the reign of Antipas, and partly if not wholly within his territory, that the Gospel was first preached by the rabbi or prophet whom Christendom came to regard as the one true Christ, the Messiah of the Jews. Josephus' history of the Jews contains accounts of John the Baptist and Jesus, the authenticity of which has been called in question for plausible but not entirely convincing reasons. However this may be, the Jews who believed Jesus to be the Christ play no great part in the history of the Jews before 70, as we know it. Many religious teachers and many revolu- tionaries were crucified within this period; and the early Christians

were outwardly distinguished from other Jews only by their scrupulous observance of religious duties.

The crucifixion of Jesus was sanctioned by Pontius Pilate, who was procurator of Judaea a.d. 26-36. Of the Jews under his predecessors little enough is known. Speaking generally, they seem to have avoided giving offence to their subjects. But Pilate so conducted affairs as to attract the attention not only of Josephus but also of Philo, who represents for us the Jewish community of Alexandria. Pilate inaugurated his term of office by ordering his troops to enter Jerusalem at night and to take their standards with them. There were standards and standards in the Roman armies: those which bore the image of the emperor, and therefore constituted a breach of the Jewish Law, had hitherto been kept aloof from the holy city. On learning of this, the Jews repaired to Caesarea and besought Pilate to remove these offensive images. Pilate refused; and, when they persisted in their petition for six days, he surrounded them with soldiers and threatened them with instant death. They protested that they would rather die than dare to transgress the wisdom of the laws; and Pilate yielded. But he proceeded to expend the temple treasure upon an aqueduct for Jerusalem; and some of the Jews regarded the devotion of sacred money to the service of man as a desecration. Pilate came up to Jerusalem and dispersed the petitioners by means of disguised soldiers armed with clubs. So the revolt was put down, but the exces- sive zeal of the soldiers and Pilate's obstinate adherence to his policy widened the breach between Rome and the stricter Jews. But the death of Sejanus in 31 set Tiberius free from prejudice against the Jews; and, when Pilate put up the votive shields in Herod's palace at Jerusalem, the four sons of Herod came forward in defence of Jewish principles and he was ordered to remove them. In 35 he dispersed a number of Samaritans, who had assembled near Mt Gerizim at the bidding of an impostor, in order to see the temple vessels buried there by Moses. Complaint was made to Vitellius, then legate of Syria, and Pilate was sent to Rome to answer for his shedding of innocent blood. At the passover of 36 Vitellius came to Jerusalem and pacified the Jews by two concessions: he remitted the taxes on fruit sold in the city, and he restored to their custody the high priest's vestments, which Herod Archelaus and the Romans had kept in the tower Antonia. The vestments had been stored there since the time

of the first high priest named Hyrcanus, and Herod had taken them over

along with the tower, thinking that his possession of them would deter the Jews from rebellion against his rule. At the same time Vitellius vindicated the Roman supremacy by degrading Caiaphas from the high-priesthood, and appointing a son of Annas in his place. The motive for this change does not appear, and we are equally ignorant of the cause which prompted his transference of the priesthood from his nominee to another son of Annas in 37. But it is quite clear that Vitellius was con- cerned to reconcile the Jews to the authority of Rome. When he marched against Aretas, his army with their standards did not enter Judaea at all; but he himself went up to Jerusalem for the feast and, on receipt of the news that Tiberius was dead, administered to the Jews the oath of allegiance to Caligula.

35. Caligula and Agrippa I. — The accession of Caligula (a.d. 37-41) was hailed by his subjects generally as the beginning of the Golden Age. The Jews in particular had a friend at court. Agrippa, the grandson of Herod the Great, was an avowed partisan of the new emperor and had paid penalty for a prema- ture avowal of his preference. But Caligula's favour, though lavished upon Agrippa, was not available for pious Jews. His foible was omnipotence, and he aped the gods of Greece in turn. In the provinces and even in Italy his subjects were ready to acknowledge his divinity — with the sole exception of the Jews. So we learn something of the Palestinian Jews and more of the Jewish community in Alexandria. The great world (as we know it) took small note of Judaism even when Jews converted its women to their faith; but now the Jews as a nation refused to bow before the present god of the civilized world. The new Catholicism was promulgated by authority and accepted with deference. Only the Jews protested: they had a notion of the deity which Caligula at all events did not fulfil.

The people of Alexandria seized the opportunity for an attack upon the Jews. Images of Caligula were set up in the syna- gogues, an edict deprived the Jews of their rights as citizens, and finally the governor authorized the mob to sack the Jewish quarter, as if it had been a conquered city (38). Jewesses were forced to eat pork and the elders were scourged in the theatre. But Agrippa had influence with the emperor and secured 1jjie degradation of the governor. The people and the Jews re- mained in a state of civil war, until each side sent an embassy (40) to wait upon the emperor. The Jewish embassy was headed by Philo, who has described its fortunes in a tract dealing with the divine punishment of the persecutors. Their opponents also had secured a friend at court and seem to have prevented any effective measure of redress. While the matter was still pending, news arrived that the emperor had commanded Publius Petronius, the governor of Syria, to set up his statue in the temple of Jeru- salem. On the intervention of Agrippa the order was counter- manded, and the assassination of the emperor (41) effectually stopped the desecration.

36. Claudius and the Procurators. — Claudius, the new emperor, restored the civic rights of the Alexandrian Jews and made Agrippa I. king over all the territories of Herod the Great. So there was once more a king of Judaea, and a king who observed the tradition of the Pharisees and protected the Jewish religion. There is a tradition in the Talmud which illustrates his popularity. As he was reading the Law at the feast of tabernacles he burst into tears at the words " Thou mayest not set a stranger over thee which is not thy brother "; and the people cried out, " Fear not, Agrippa; thou art our brother." The fact that he began to build a wall round Jerusalem may be taken as further proof of his patriotism. But the fact that he summoned five vassal-kings of the empire to a conference at Tiberias suggests rather a policy of self-aggrandisement. Both projects were prohibited by the emperor on the intervention of the legate. In 44 he died. The Christian records treat his death as an act of divine vengeance upon the persecutor of the Christian Church. The Jews prayed for his recovery and lamented him. The Gentile soldiers exulted in the downfall of his dynasty, which they signalized after their own fashion. Claudius intended that Agrippa's young son should succeed to the kingdom; but he was

overruled by his advisers, and Judaea was taken over once more by Roman procurators. The success of Agrippa's brief reign had revived the hopes of the Jewish nationalists, and concessions only retarded the inevitable insurrection.

Cuspius Fadus, the first of these procurators, purged the land of bandits. He also attempted to regain for the Romans the custody of the high priest's vestments; but the Jews appealed to the emperor against the revival of this advertisement of their servitude. The emperor granted the petition, which indeed the procurator had permitted them to make, and further transferred the nomination of the high priest and the supervision of the temple from the procurator to Agrippa's brother, Herod of Chalcis. But these concessions did not satisfy the hopes of the people. During the government of Fadus, Theudas, who claimed to be a prophet and whom Josephus describes as a wizard, per- suaded a large number to take up their possessions and follow him to the Jordan, saying that he would cleave the river asunder with a word of command and so provide them with an easy crossing. A squadron of cavalry despatched by Fadus took them alive, cut off the head of Theudas and brought it to Jerusalem.

Under the second procurator Tiberius Alexander, an apostate Jew of Alexandria, nephew of Philo, the Jews suffered from a great famine and were relieved by the queen of Adiabene, a proselyte to Judaism, who purchased corn from Egypt. The famine was perhaps interpreted by the Zealots as a punishment for their acquiescence in the rule of an apostate.

At any rate Alexander crucified two sons of Simon the Galilean, who had headed a revolt in the time of the census. They had presumably followed the example of their father.

Under Ventidius Cumanus (48-52) the mutual hatred of Jews and Romans, Samaritans and Jews, found vent in insults and bloodshed. At the passover, on the fourth day of the feast, a soldier mounting guard at the porches of the Temple provoked an uproar, which ended in a massacre, by indecent exposure of his person. Some of the rebels intercepted a slave of the emperor on the high-road near the city and robbed him of his possessions. Troops were sent to pacify the country, and in one village a soldier found a copy of Moses' laws and tore it up in public with jeers and blasphemies. At this the Jews flocked to Caesarea, and were only restrained from a second outbreak by the execution of the soldier. Finally, the Samaritans attacked certain Gali- leans who were (as the custom was) travelling through Samaria to Jerusalem for the passover. Cumanus was bribed and refused to avenge the death of the Jews who were killed. So the Gali- leans with some of the lower classes of " the Jews " allied them- selves with a " robber " and burned some of the Samaritan villages. Cumanus armed the Samaritans, and, with them and his own troops, defeated these Jewish marauders. The leading men of Jerusalem prevailed upon the rebels who survived the defeat to disperse. But the quarrel was referred first to the legate of Syria and then to the emperor. The emperor was still disposed to conciliate the Jews; and, at the instance of Agrippa, son of Agrippa I., Cumanus was banished.

37. Felix and the Revolutionaries. — Under Antonius Felix (52-60) the revolutionary movement grew and spread. The country, Josephus says, was full of " robbers " and " wizards." The high priest was murdered in the Temple by pilgrims who carried' daggers under their cloaks. Wizards and impostors per- suaded the multitude to follow them into the desert, and an Egyptian, claiming to be a prophet, led his followers to the Mount of Olives to see the walls of Jerusalem fall at his command. Such deceivers, according to Josephus, did no less than the murderers to destroy the happiness of the city. Their hands were cleaner but their thoughts were more impious, for they pretended to divine inspiration.

Felix the procurator — a king, as Tacitus says, in power and in mind a slave — tried in vain to put down the revolutionaries. The " chief-robber " Eleazar, who had plundered the country for twenty years, was caught and sent to Rome; countless robbers of less note were crucified. But this severity cemented the alliance of religious fanatics with the physical-force party and induced the ordinary citizens to join them, in spite of the punishments

which they received when captured. Agrippa II. received a kingdom — first Chalcis, and then the tetrarchies of Philip and Lysanias — but, though he had the oversight of the Temple and the nomination of the high priest, and enjoyed a reputation for knowledge of Jewish customs and questions, he was unable to check the growing power of the Zealots. His sister Drusilla had broken the Law by her marriage with Felix; and his own notorious relations with his sister Berenice, and his coins which bore the images of the emperors, were an open affront to the conscience of Judaism. When Felix was recalled by Nero in 60 the nation was divided against itself, the Gentiles within its gates were watching for their opportunity, and the chief priests robbed the lower priests with a high hand.

In Caesarea there had been for some time trouble between the Jewish and the Syrian inhabitants. The Jews claimed that the city was theirs, because King Herod had founded it. The Syrians admitted the fact, but insisted that it was a city for Greeks, as its temples and statues proved. Their rivalry led to street- fighting: the Jews had the advantage in respect of wealth and bodily strength, but the Greek party had the assistance of the soldiers who were stationed there. On one occasion Felix sent troops against the victorious Jews; but neither this nor the scourge and the prison, to which the leaders of both factions had been consigned, deterred them. The quarrel was therefore referred to the emperor Nero, who finally gave his decision in favour of the Syrians or Greeks. The result of this decision was that the synagogue at Caesarea was insulted on a Sabbath and the Jews left the city taking their books of the Law with them. So — Josephus says — the war began in the twelfth year of the reign of Nero (a.d. 66).

38. Festus, Albinus and Florus. — Meanwhile the procurators who succeeded Felix — Porcius Festus (60-62), Albinus (62-64) and Gessius Florus (64-66) — had in their several ways brought the bulk of the nation into line with the more violent of the Jews of Caesarea. Festus found Judaea infested with robbers and the sicarii, who ♦ningled with the crowds at the feasts and stabbed their enemies with the daggers (sicae) from which their name was derived. He also, had to deal with a wizard, who de- ceived many by promising them salvation and release from evils, if they would follow him into the desert. His attempts to crush all such disturbers of the peace were cut short by his death in his second year of office.

In the interval which elapsed before the arrival of Albinus, Ananus son of Annas was made high priest by Agrippa. With the apparent intention of restoring order in Jerusalem, he assembled the Sanhedrin, and being, as a

Sadducee, cruel in the matter of penalties, secured the condemnation of certain law- breakers to death by stoning. For this he was deposed by Agrippa. Albinus fostered and turned to his profit the struggles of priests with priests and of Zealots with their enemies. The general release of prisoners, with which he celebrated his impend- ing recall, is typical of his policy. Meanwhile Agrippa gave the Levites the right to wear the linen robe of the priests and sanc- tioned the use of the temple treasure to provide work — the paving of the city with white stones — for the workmen who had finished the Temple (64) and now stood idle. But everything pointed to the destruction of the city, which one Jesus had prophesied at the feast of tabernacles in 62. The Zealots' zeal for the Law and the Temple was flouted by their pro-Roman king.

By comparison with Florus, Albinus was, in the opinion of Josephus, a benefactor. When the news of the troubles at Caesarea reached Jerusalem, it became known also that Florus had seized seventeen talents of the temple treasure (66). At this the patience of the Jews was exhausted. The sacrilege, as they considered it, may have been an attempt to recover arrears of tribute; but they were convinced that Florus was providing for himself and not for Caesar. The revolutionaries went about among the excited people with baskets, begging coppers for their destitute and miserable governor. Stung by this insult, he neglected the fire of war which had been lighted at Caesarea, and hastened to Jerusalem. His soldiers sacked the upper city and killed 630 persons — men, women and children. Berenice, who

was fulfilling a Nazarite vow, interposed in vain. Florus actually dared to scourge and crucify Jews who belonged to the Roman order of knights. For the moment the Jews were cowed, and next day they went submissively to greet the troops coming from Caesarea. Their greetings were unanswered, and they cried out against Florus. On this the soldiers drew their swords and drove the people into the city; but, once inside the city, the people stood at bay and succeeded in establishing themselves upon the temple-hill. Florus withdrew with all his troops, except one cohort, to Caesarea. The Jews laid complaint against him, and he complained against the Jews before the governor of Syria, Cestius Gallus, who sent an officer to inquire into the matter. Agrippa, who had hurried from Alexandria, entered Jerusalem with the governor's emissary. So long as he counselled submission to the overwhelming power of Rome the people complied, but when he spoke of obedience to Florus he was com- pelled to fly. The rulers, who desired peace, and upon whom Florus had laid the duty of restoring peace, asked him for troops; but the civil war ended in their complete discomfiture. The rebels abode by their decision to stop the daily sacrifice for the emperor; Agrippa's troops capitulated and marched out unhurt; and the Romans, who surrendered on the same condition and laid down their

arms, were massacred. As if to emphasize the spirit and purpose of the rebellion, one and only one of the Roman soldiers was spared, because he promised to become a Jew even to the extent of circumcision.

39. Josephus and the Zealots. — Simultaneously with this massacre the citizens of Caesarea slaughtered the Jews who still remained there; and throughout Syria Jews effected — and suffered — reprisals. At length the governor of Syria approached the centre of the disturbance in Jerusalem, but retreated after burning down a suburb. In the course of his retreat he was attacked by the Jews and -fled to Antioch, leaving them his engines of war. Some prominent Jews fled from Jerusalem — as from a sinking ship — to join him and carried the news to the emperor. The rest of the pro-Roman party were forced or persuaded to join the rebels and prepared for war on a grander scale. Generals were selected by the Sanhedrin from the aristo- cracy, who had tried to keep the peace and still hoped to make terms with Rome. Ananus the high priest, their leader, re- mained in command at Jerusalem; Galilee, where the first attack was to be expected, was entrusted to Josephus, the historian of the war. The revolutionary leaders, who had already taken the field, were superseded.

Josephus set himself to make an army of the inhabitants of Galilee, many of whom had no wish to fight, and to strengthen the strongholds. His organization of local government and his efforts to maintain law and order brought him into collision with the Zealots and especially with John of Giscala, one of their leaders. The people, whom he had tried to conciliate, were roused against him; John sent assassins and finally procured an order from Jerusalem for his recall. In spite of all this Josephus held his ground and by force or craft put down those who resisted his authority.

In the spring of 67 Vespasian, who had been appointed by Nero to crush the rebellion, advanced from his winter quarters at Antioch. The inhabitants of Sepphoris — whom Josephi'j, had judged to be so eager for the war that he left them to build their wall for themselves — received a Roman garrison at their own request. Joined by Titus, Vespasian advanced into Galilee with three legions and the auxiliary troops supplied by Agrippa and other petty kings. Before his advance the army of Josephus fled. Josephus with a few stalwarts took refuge in Tiberias, and sent a letter to Jerusalem asking that he should be relieved of his command or supplied with an adequate force to continue the war. Hearing that Vespasian was preparing to besiege Jotapata, a strong fortress in the hills, which was held by other fugitives, Josephus entered it just before the road approaching it was made passable for the Roman horse and foot. A deserter announced his arrival to Vespasian, who rejoiced (Josephus says) that the cleverest of his enemies had thus voluntarily imprisoned him- self. After some six weeks' siege the place was stormed, and its

exhausted garrison were killed or enslaved. Josephus, whose pretences had postponed the final assault, hid in a cave with forty men. His companions refused to permit him to surrender and were resolved to die. At his suggestion they cast lots, and the first man was killed by the second and so on, until all were dead except Josephus and (perhaps) one other. So Josephus saved them from the sin of suicide and gave himself up to the Romans. He had prophesied that the place would be taken — as it was — on the forty-seventh day, and now he prophesied that both Vespasian and his son Titus would reign over all mankind. The prophecy saved his life, though many desired his death, and the rumour of it produced general mourning in Jerusalem. By the end of the year (67) Galilee was in the hands of Vespasian, and John of Giscala had fled. Agrippa celebrated the conquest at Caesarea Philippi with festivities which lasted twenty days.

In accordance with ancient custom Jerusalem welcomed the fugitive Zealots. The result was civil war and famine. Ananus incited the people against these robbers, who arrested, imprisoned and murdered prominent friends of Rome, and arrogated to them- selves the right of selecting the high priest by lot. The Zealots took refuge in the Temple and summoned the Idumaeans to their aid. Under cover of a storm, they opened the city-gates to their allies and proceeded to murder Ananus the high priest, and, against the verdict of a formal tribunal, Zacharias the son of Baruch in the midst of the Temple. The Idumaeans left, but John of Giscala remained master of Jerusalem.

40. The Fall of Jerusalem. — Vespasian left the rivals to consume one another and occupied his army with the subjugation of the country. When he had isolated the capital and was preparing to besiege it, the news of Nero's death reached him at Caesarea. For a year (June 68-June 69) he held his hand and watched events, until the robber-bands of Simon Bar-Giora (son of the proselyte) required his attention. »But, before Vespasian took action to stop his raids, Simon had been invited to Jerusalem in the hope that he would act as a counterpoise to the tyrant John. And so, when Vespasian was proclaimed emperor in fulfilment of Josephus' prophecy, and deputed the command to Titus, there were three rivals at war in Jerusalem — Eleazar, Simon and John. The temple sacrifices were still offered and worshippers were admitted; but John's catapults were busy, and priest and worshippers at the altar were killed, because Eleazar's party occupied the inner courts of the Temple. A few days before the passover of

70 Titus advanced upon Jerusalem, but the civil war went on. When Eleazar opened the temple-gates to admit those who wished to worship God, John of Giscala introduced some of his own men, fully armed under their garments, and so got possession of the Temple. Titus pressed the attack, and the two factions joined hands at last to repel it. In spite of their desperate sallies, Jerusalem was surrounded by a wall, and its people, whose numbers were increased by those who had come up for the passover, were hemmed in to starve. The famine affected all alike — the populace, who desired peace, and the Zealots, who were determined to fight to the end. At last John of Giscala por- tioned out the sacred wine and oil, saying that they who fought for the Temple might fearlessly use its stores for their sustenance. Steadily the Romans forced their way through wall after wall, until the Jews were driven back to the Temple and the daily sacrifices came to an end on the 17th of July for lack of men. Once more Josephus appealed in vain to John and his followers to cease from desecrating and endangering the Temple. The siege proceeded and the temple-gates were burned. According to Josephus, Titus decided to spare the Temple, but — whether this was so or not — on the 10th of August it was fired by a soldier after a sortie of the Jews had been repelled. The legions set up their standards in the temple-court and hailed Titus as imperator.

Some of the Zealots escaped with John and Simon to the upper city and held it for another month. But Titus had already earned the triumph which he celebrated at Rome in 71. The Jews, wherever they might be, continued to pay the temple-tax; but now it was devoted to Jupiter Capitolinus. The Romans had taken their holy place, and the Law was all that was left to them.

41. From a.d. 70 to a.d. 135. — The destruction of the Temple carried with it the destruction of the priesthood and all its power. The priests existed to offer sacrifices, and by the Law no sacrifice could be offered except at the Temple of Jerusalem. Thenceforward the remnant of the Jews who survived the fiery ordeal formed A. church rather than a nation or a state, and the Pharisees exercised an unchallenged supremacy. With the Temple and its Sadducean high priests perished the Sanhedrin in which the Sadducees had competed with the Pharisees for predominance. The Sicarii or Zealots who had appealed to the arm of flesh were exterminated. Only the teachers of the Law survived to direct the nation and to teach those who remained loyal Jews, how they should render to Caesar what belonged to Caesar, and to God what belonged to God. Here and there hot-headed Zealots rose up to repeat the errors and the disasters of their predecessors. But their fate only served to deepen the impression already stamped upon the general mind of the nation. The Temple was gone, but they had the Law. Already the Jews of the Dispersion had learned to supplement the Temple by the synagogue, and even the Jews of Jerusalem had not been

free to spend their lives in the worship of the Temple. There were still, as always, rites which were independent of the place and of the priest; there had been a 'time when the Temple did not exist. So Judaism survived once more the destruction of its central sanctuary. When Jerusalem was taken, the Sicarii still continued to hold three strongholds: one — Masada — for three years. But the com- mander of Masada realized at length that there was no hope of escaping captivity except by death, and urged his comrades to anticipate their fate. Each man slew his wife and children; ten men were selected by lot to slay the rest; one man slew the nine executioners, fired the palace and fell upon his sword. When the place was stormed the garrison consisted of two old women and five children who had concealed themselves in caves. So Vespasian obtained possession of Palestine — the country which Nero had given him — and for a time it was purged of revolutionaries. Early Christian writers assert that he proceeded to search out and to execute all descendants of David who might conceivably come forward as claimants of the vacant throne.

In Egypt and in Cyrene fugitive Zealots endeavoured to continue their rebellion against the emperor, but there also with disastrous results. The doors of the Temple in Egypt were closed, and its sacri- fices which had been offered for 243 years were prohibited. Soon afterwards this temple also was destroyed. Apart from these local outbreaks, the Jews throughout the empire remained loyal citizens and were not molested. The general hope of the nation was not necessarily bound up with the house of David, and its realization was not incompatible with the yoke of Rome. They still looked for a true prophet, and meanwhile they had their rabbis.

Under Johanan ben Zaccai (q.v.) the Pharisees established them- selves at Jamnia. A new Sanhedrin was formed there under the presidency of a ruler, who received yearly dues from all Jewish communities. The scribes through the synagogues preserved the national spirit and directed it towards the religious life which was prescribed by Scripture. The traditions of the elders were tested and gradually harmonized in their essentials. The canon of Scrip- ture was decided in accordance with the touchstone of the Penta- teuch. Israel had retired to their tents to study their Bible.

Under Vespasian and Titus the Jews enjoyed freedom of con- science and equal political rights with non- Jewish subjects of Rome. But Domitian, according to pagan historians, bore hardly on them. The temple-tax was strictly exacted ; Jews who lived the Jewish life without openly confessing their religion and Jews who concealed their nationality were brought before the magistrates. Proselytes to Judaism were condemned either to death or to forfeiture of their property. Indeed it would seem that Domitian instituted a persecution of the Jews, to which Nerva his successor put an end. Towards the end of Trajan's reign (114-117) the Jews of Egypt and

Cyrene rose against their Greek neighbours and set up a king. The rebellion spread to Cyprus; and when Trajan advanced from Mesopotamia into Parthia the Jews of Mesopotamia revolted. The massacres they perpetrated were avenged in kind and all the insurrections were quelled when Hadrian succeeded Trajan.

In 132 the Jews of Palestine rebelled again. Hadrian had for- bidden circumcision as illegal mutilation: he had also replaced Jerusalem by a city of his own, Aelia Capitolina, and the temple of Yahweh by a temple of Jupiter. Apart from these bitter provoca- tions—the prohibition of the sign of the covenant and the desecration of the sacred place — the Jews had a leader who was recognized as Messiah by the rabbi Aqiba. Though the majority of the rabbis looked for no such deliverer and refused to admit his claims, Barcoche- bas (q.v.) drew the people after him to struggle for their national independence. For three years and a half he held his own and issued coins in the name of Simon, which commemorate the liberation of Jerusalem. Some attempt was apparently made to rebuild the Temple; and the Jews of the Dispersion, who had perhaps been won over by Aqiba, supported the rebellion. Indeed even Gentiles helped them, so that the whole world (Dio Cassius says) was stirred. Hadrian sent his best generals against the rebels, and at length they were driven from Jerusalem to Bethar (135). The Jews-were for- bidden to enter the new city of Jerusalem on pain of death.

DISPERSION TO MODERN TIMES]

Bibliography. — The most comprehensive of modern booksdealing with the period is Emil Schurer, Geschichte des Jiidischen Volkes im Zeilalter Jesu Christi (3 vols., Leipzig, 1901 foil.). Exception has been taken to a certain lack of sympathy with the Jews, espe- cially the rabbis, which has been detected in the author. But at least the book remains an indispensable storehouse of references to ancient and modern authorities. An earlier edition was translated into English under the title History of the Jewish People (Edinburgh, 1890, 189 1). Of shorter histories, D. A. Schlatter's Geschichte Israel's von Alexander dem Grossen bis Hadrian (2nd ed., 1906) is perhaps the least dependent upon Schurer and attempts more than others to interpret the fragmentary evidence available. Dr R. H. Charles has done much by his editions to restore to their proper prominence in connexion with Jewish history the Testaments of the Twelve Patriarchs, The Book of Jubilees, Enoch, &c. But Schurer gives a complete bibliography to which it must suffice to refer. For the Sanhedrin see Synedrium. (J. H.

A. H.)

III. — From the Dispersion to Modern Times 42. The Later Empire. — With the failure in 135 of the attempt led by Barcochebas to free Judaea from Roman domination a new era begins in the history of the Jews. The direct consequence of the failure was the annihilation of political nationality. Large numbers fell in the actual fighting. Dio Cassius puts the total at the incredible figure of 580,000, besides the incalculable number who succumbed to famine, disease and fire (Dio-Xiphilin lxix. 11-15). Jerusalem was rebuilt by Hadrian, orders to this effect being given during the emperor's first journey through Syria in < 130, the date of his foundations at Gaza, Tiberias and Petra (Reinach, Texles relatifs au Judaisme, p. 198). The new city was named Aelia Capitolina, and on the site of the temple of Jehovah there arose another temple dedicated to Jupiter. To Eusebius the erection of a temple of Venus over the sepulchre of Christ was an act of mockery against the Christian religion. Rome had been roused to unwonted fury, and the truculence of the rebels was matched by the cruelty of their masters. The holy city was barred against the Jews; they were excluded, under pain of death, from approaching within view of the walls. Hadrian's policy in this respect was matched later on by the edict of the caliph Omar (c. 638), who, like -his Roman prototype, prevented the Jews from settling in the capital of their ancient country. The death of Hadrian and the accession of Antoninus Pius (138), however, gave the dispersed people of Palestine a breathing-space. Roman law was by no means intolerant to the Jews. Under the constitution of Caracalla (198-217) all inhabitants of the Roman empire enjoyed the civil rights of the Cives Romani (Scherer, Die Rechtsverhdltnisse der Juden, p. 10).

Moreover, a spiritual revival mitigated the crushing effects of material ruin. The synagdgue had become a firmly established institution, and the personal and social life of the masses had come under the control of communal law. The dialectic of the school proved stronger to preserve than the edge of the sword to destroy. Pharisaic Judaism, put to the severest test to which a religious system has ever been subject, showed itself able to control and idealize life in all its phases. Whatever question may be possible as to the force or character of Phari- saism in the time of Christ, there can be no doubt that it became both all-pervading and ennobling among the successors of Aqiba (q.v.), himself one of the martyrs to Hadrian's severity. Little more than half a century after the overthrow of the Jewish nationality, the Mishnah was practically completed, and by this code of rabbinic law — and law is here a term which includes the social, moral and religious as well as the ritual and legal phases of human activity — the Jewish people were organized into a community, living more or less autonomously under the Sanhedrin or Synedrium (q.v.) and its officials.

Judah the prince, the patriarch or nasi who edited the Mishnah, died early in the 3rd century. With him the importance of the Palestinian patriarchate attained its zenith. Gamaliel II. of Jamnia (Jabne Yebneh) had been raised to this dignity a century before, and, as members of the house of Hillel and thus descendants of David, the patriarchs enjoyed almost royal authority. Their functions were political rather than reli- gious, though their influence was by no means purely secular.

They were often on terms of intimate friendship with the emperors, who scarcely interfered with their jurisdiction. As late as Theodosius I. (379-3951 x.be internal affairs of the Jews were formally committed to the patriarchs, and Honorius (404) authorized the collection of the patriarch's tax (aurum coronarium) , by which a revenue was raised from the Jews of the diaspora. Under Theodosius II. (408-450) the patriarchate was finally abolished after a regime of three centuries and a half (Graetz, History of the Jews, Eng. trans, vol. ii. ch. xxii.), though ironically enough the last holder of the office had been for a time elevated by the emperor to the rank of prefect. The real turning-point had been reached earlier, when Christianity became the state religion under Constantine I. in 312.

Religion under the Christian emperors became a significant source of discrimination in legal status, and non-conformity might reach so far as to produce complete loss of rights. The laws concerning the Jews had a repressive and preventive object: the repression of Judaism and the prevention of inroads of Jewish influences into the state religion. The Jews were thrust into a position of isolation, and the Code of Theodosius and other authorities characterize the Jews as a lower order of depraved beings (inferiores and perversi), their community as a godless, dangerous sect (secta nefaria, feralis), their religion a superstition, their assemblies for religious worship a blasphemy (sacrilegi coetus) and a contagion (Scherer, op. cit. pp. 11-12). Yet Judaism under Roman Christian law was a lawful religion (religio licita), Valentinian I. (364-375) forbade the quarter- ing of soldiers in the synagogues, Theodosius I. prohibited inter- ference with the synagogue worship ("Judaeorum sectam nulla lege prohibitam satis constat "), and in 412 a special edict of protection was issued. But the admission of Christians into the Jewish fold was punished by confiscation of goods (357), the erection of new synagogues was arrested by Theodosius II. (439) under penalty of a heavy fine, Jews were forbidden to hold Christian slaves under pain of death (423). A similar penalty attached to intermarriage between Jews and Christians, and an attempt was made to nullify all Jewish marriages which were not celebrated in accordance with Roman law. But Justinian (527-565) was the first to interfere directly in the religious institutions of the Jewish people. In 553 he interdicted the use of the Talmud (which had then not long been completed), and the Byzantine emperors of the 8th and 9th centuries passed, even more

intolerant regulations. As regards civil law, Jews were at first allowed to settle disputes between Jew and Jew before their own courts, but Justinian denied to them and to heretics the right to appear as witnesses in the public courts against orthodox Chris- tians. To Constantine V. (911-959) goes back the Jewish form of oath which in its later development required the Jew to gird him- self with thorns; stand in water; and, holding the scroll of the Torah in his hand, invoke upon his person the leprosy of Naaman, the curse of Eli and the fate of Korah's sons should he perjure himself. This was the original of all the medieval forms of oath more judaico, which still prevailed in many European lands till the 19th century, and are even now maintained by some of the Rumanian courts. Jews were by the law of Honorius excluded from the army, from public offices and dignities (418), from acting as advocates (425); only the curial offices were open to them. Justinian gave the finishing touch by proclaiming in 537 the Jews absolutely ineligible for any honour whatsoever (" honore fruantur nullo ").

43 . Judaism in Babylonia. — The Jews themselves were during this period engaged in building up a system of isolation on their own side, but they treated Roman law with greater hospitality than it meted out to them. The Talmud shows the influence of that law in many points, and may justly be compared to it as a monument of codification based on great principles. The Pales- tinian Talmud was completed in the 4th century, but the better known and more influential version was compiled in Baby- lonia about 500. The land which, a millennium before, had been a prison for the Jewish exiles was now their asylum of refuge. For a long time it formed their second fatherland. Here, far more than on Palestinian soil, was built the enduring edifice of rabbinism. The population of the southern part of Mesopotamia — the strip of land enclosed between the Tigris and the Euphrates — was, according to Graetz, mainly Jewish; while the district extending for about 70 m. on the east of the Euphrates, from Nehardea in the north to Sura in the south, became a new Palestine with Nehardea for its Jerusalem. The Babylonian Jews were practically independent, and the exilarch (resh- galutha) or prince of the captivity was an official who ruled the community as a vassal of the Persian throne. The exilarch claimed, like the Palestinian patriarch, descent from the royal house of David, and exercised most of the functions of

government. Babylonia had risen into supreme importance for Jewish life

at about the time when the Mishnah was com- pleted. The great rabbinic academies at Sura and Nehardea, the former of which retained something of its dominant role till the nth century, had been founded, Sura by Abba Arika (q.v.) (c. 210), but Nehardea, the more ancient seat of the two, famous in the 3rd century for its association with Abba Arika's renowned contemporary Samuel, lost its Jewish import- ance in the age of Mahomet.

To Samuel of Nehardea (q.v.) belongs the honour of formu- lating the principle which made it possible for Jews to live under alien laws. Jeremiah had admonished his exiled brothers: " Seek ye the peace of the city whither I have caused you to be carried away captives, and pray unto the Lord for it: for in the peace thereof shall ye have peace " (Jer. xxix. 7). It was now necessary to go farther, and the rabbis proclaimed a principle which was as influential with the synagogue as "Give unto Caesar that which is Caesar's " became with the Church. " The law of the government is law " (Baba Qama 113 b.), said Samuel, and ever since it has been a religious duty for the Jews to obey and accommodate themselves as far as possible to the laws of the country in which they are settled or reside. In 259 Odenathus, the Palmyrene adventurer whose memory has been eclipsed by that of his wife Zenobia, laid Nehardea waste for the time being, and in its neighbourhood arose the academy of Pumbedita (Pombeditha) which became a new focus for the intellectual life of Israel in Babylonia. These academies were organized on both scholastic and popular lines; their consti- tution was democratic. An outstanding feature was the Kallah assemblage twice a year (in Elul at the close of the summer, and in Adar at the end of the winter), when there were gathered together vast numbers of outside students of the most heterogeneous character as regards both age and attainments. Questions received from various quarters were discussed and the final decision of the Kallah was signed by the Resh-K.allah or president of the general assembly, who was only second in rank to the Resh-Metibta, or president of the scholastic sessions. Thus the Babylonian academies combined the func- tions of specialist law-schools, universities and popular parlia- ments. They were a unique product of rabbinism; and the authors of the system were also the compilers of its literary expression, the Talmud.

44. Judaism in Islam. — Another force now appears on the scene. The new religion inaugurated by Mahomet differed in its theory from the Roman Catholic Church. The Church, it is true, in council after council, passed decisions unfriendly to the Jews. From the synod at Elvira in the 4th century this process began, and it was continued in the West-Gothic Church legislation, in the Lateran councils (especially the fourth in 1215), and in the council of Trent (1563). The anti-social tendency of these councils expressed itself in the infliction of the badge, in the compulsory domicile of Jews within ghettos, and in the erection of formidable barriers against all

intercourse between church and synagogue. The protective instinct was responsible for much of this interference with the natural impulse of men of various creeds towards mutual esteem and forbearance. The church, it was conceived, needed defence against the synagogue at all hazards, and the fear that the latter would influence and dominate the former was never absent from the minds of medieval ecclesiastics. But though this defensive zeal led to active persecution, still in theory Judaism was a tolerated religion wherever the Church had sway, and many papal bulls of a friendly character were issued throughout the middle ages (Scherer, p. 32 seq.).

Islam, on the other hand, had no theoretic place in its scheme for tolerated religions, its principle was fundamentally in- tolerant. Where the mosque was erected, there was no room for church or synagogue. The caliph Omar initiated in the 7th century a code which required Christians and Jews to wear peculiar dress, denied them the right to hold state offices or to possess land, inflicted a poll-tax on them, and while forbidding them to enter mosques, refused them the permission to build

new places of worship for themselves. Again and again these ordinances were repeated in subsequent ages, and intolerance for infidels is still a distinct feature of Mahommedan law. But Islam has often shown itself milder in fact than in theory, for its laws were made to be broken. The medieval Jews on the whole lived, under the crescent, a fuller and freer life than was possible to them under the cross. Mahommedan Baby- lonia (Persia) was the home of the gaonate (see Gaon), the central authority of religious Judaism, whose power transcended that of the secular exilarchate, for it influenced the synagogue far and wide, while the exilarchate was local. The gaonate enjoyed a practical tolerance remarkable when contrasted with the letter of Islamic law. And as the Bagdad caliphate tended to become more and more supreme in Islam, so the gaonate too shared in this increased influence. Not even the Qaraite schism was able to break the power of the geonim. But the dispersion of the Jews was proceeding in directions which carried masses from the Asiatic inland to the Mediterranean coasts and to Europe.

45. In Medieval Europe: Spain. — This dispersion of the Jews had begun in the Hellenistic period, but it was after the Bar- cochebas war that it assumed great dimensions in Europe. There were Jews in the Byzantine empire, in Rome, in France and Spain at very early periods, but it is with the Arab conquest of Spain that the Jews of Europe began to rival in culture and im- portance their brethren of the Persian gaonate. Before this date the Jews had been learning the role they afterwards filled, that of the chief promoters of international commerce. Already under Charlemagne this development is noticeable; in his generous treatment of the Jews this Christian emperor stood in marked contrast to his contemporary the caliph Harun al-Rashid, who persecuted Jews and Christians with equal vigour. But by the 10th century Judaism had received from Islam something more than persecution. It caught the contagion of poetry, philosophy and science. 1 The schismatic Qaraites initiated or rather necessitated a new Hebrew philology, which later on produced Qimhi, the gaon Saadiah founded a Jewish philosophy, the statesman Hasdai introduced a new Jewish culture — and all this under Mahommedan rule. It is in Spain that above all the new spirit manifested itself. The distinctive feature of the Spanish-Jewish culture was its comprehensiveness. Litera- ture and affairs, science and

statecraft, poetry and medicine, these various expressions of human nature and activity were so harmoniously balanced that they might be found in the posses- sion of one and the same individual. The Jews of Spain attained to high places in the service of the state from the time of the Moorish conquest in 711. From Hasdai ibn Shaprut in the 10th century and Samuel the nagid in the nth the line of Jewish scholar-statesmen continued till we reach Isaac Abrabanel in 1492, the date of the expulsion of the Jews from Spain. This last-named event synchronized with the discovery of America; Columbus being accompanied by at least one Jewish navigator. While the Spanish period of Jewish history was thus brilliant from the point of view of public service, it was equally notable on the literary side. Hebrew religious poetry was revived for synagogue hymnology, and, partly in imitation of Arabian models, a secular Hebrew poetry was developed in metre and rhyme. The new Hebrew Piyut found its first important exponent in Kalir, who was not a Spaniard. But it is to Spain that we must look for the best of the medieval poets of the synagogue, greatest among them being Ibn Gabirol and Halevi. So, too, the greatest Jew of the middle ages, Maimonides, was a Spaniard. In him culminates the Jewish expression of the Spanish- Moorish culture; his writings had an influence on European scholas- ticism and contributed significant elements to the philosophy of Spinoza. But the reconquest of Andalusia by the Christians associated towards the end of the 15th century with the establishment of the Inquisition, introduced a spirit of intoler- ance which led to the expulsion of the Jews and Moors. The consequences of this blow were momentous; it may be said to inaugurate the ghetto period. In Spain Jewish life had parti- cipated in the general life, but the expulsion — while it dispersed 1 On the writers mentioned below see articles s.v.

the Spanish Jews in Poland, Turkey, Italy and France, and thus in the end contributed to the Jewish emancipation at the French Revolution — for the time drove the Jews within their own confines and barred them from the outside world. 1

46. In France, Germany, England, Italy. — In the meantime Jewish life had been elsewhere subjected to other influences which produced a result at once narrower and deeper. Under Charlemagne, the Jews, who had begun to settle in Gaul in the time of Caesar, were more than tolerated. They were allowed to hold land and were encouraged to become — what their ubiquity qualified them to be — the merchant princes of Europe. The reign of Louis the Pious (814-840) was, as Graetz puts it, " a golden era for the

Jews of his kingdom, such as they had never enjoyed, and were destined never again to enjoy in Europe " — prior, that is, to the age of Mendelssohn. In Germany at the same period the feudal system debarred the Jews from holding land, and though there was as yet no material persecu- tion they suffered moral injury by being driven exclusively into finance and trade. Nor was there any widening of the general horizon such as was witnessed in Spain. The Jewries of France and Germany were, thus thrown upon their own cultural re- sources. They rose to the occasion. In Mainz there settled in the 10th century Gershom, the " light of the exile," who, about 1000, published his ordinance forbidding polygamy in Jewish law as it had long been forbidden in Jewish practice. This ordinance may be regarded as the beginning of the Synodal government of Judaism, which was a marked feature of medieval life in the synagogues of northern and central Europe from the 1 2th century. Soon after Gershom's death, Rashi (1040- 1106) founded at Troyes a new school of learning. If Maimon- ides represented Judaism on its rational side, Rashi was the expression of its traditions.

French Judaism was thus in a sense more human if less humane than the Spanish variety; the latter produced thinkers, statesmen, poets and scientists; the former, men with whom the Talmud was a passion, men of robuster because of more na'ive and concentrated piety. In Spain and North Africa persecution created that strange and significant phenomenon Maranism or crypto-Judaism, a public acceptance of Islam or Christianity combined with a private fidelity to the rites of Judaism. But in England, France and Germany persecution altogether failed to shake the courage of the Jews, and martyr- dom was borne in preference to ostensible apostasy. The crusades subjected the Jews to this ordeal. The evil was wrought, not by the regular armies of the cross who were in- spired by noble ideals, but by the undisciplined mobs which, for the sake of plunder, associated themselves with the genuine enthusiasts. In 1096 massacres of Jews occurred in many cities of the Rhineland. During the second crusade (1145-1147) Bernard of Clairvaux heroically protested against similar inhumanities. The third crusade, famous for the participation of Richard I., was the occasion for bloody riots in England, especially in York, where 150 Jews immolated themselves to escape baptism. Economically and socially the crusades had disastrous effects upon the Jews (see J. Jacobs, Jewish Encyclopedia, iv. 379). Socially they suffered by the outburst of religious animosity. One of the worst forms taken by this ill-will was the oft-revived myth of ritual murder (q.v.), and later on when the Black Death devastated Europe (1348-1349) the Jews were the victims of an odious charge of well-poisoning. Economically the results were also injurious. " Before the crusades the Jews had prac- tically a monopoly of trade in Eastern products, but the closer connexion between Europe and the East

brought about by the crusades raised up a class of merchant traders among the Christians, and from this time onwards restrictions on the sale of goods by Jews became frequent " (op. cit.). After the second crusade the German Jews fell into the class of servi ca-merae, which at first only implied that they enjoyed the immunity of imperial servants, but afterwards made of them slaves and pariahs. At the personal whim of rulers, whether royal or of

1 For the importance of the Portuguese Jews, see PORTUGAL : History.

lower rank, the Jews were expelled from states and principalities and were reduced to a condition of precarious uncertainty as to what the morrow might bring forth. Pope Innocent III. gave strong impetus to the repression of the Jews, especially by ordaining the wearing of a badge. Popular animosity was kindled by the enforced participation of the Jews in public disputations. In 1306 Philip IV. expelled the Jews from France, nine years later Louis X. recalled them for a period of twelve years. Such vicissitudes were the ordinary lot of the Jews for several centuries, and it was their own inner life — the pure life of the home, the idealism of the synagogue, and the belief in ultimate Messianic redemption — that saved them from utter demoralization and despair. Curiously enough in Italy — ■ and particularly in Rome — the external conditions were better. The popes themselves, within their own immediate jurisdiction, were often far more tolerant than their bulls issued for foreign communities, and Torquemada was less an expression than a distortion of the papal policy. In the early 14th century, the age of Dante, the new spirit of the Renaissance made Italian rulers the patrons of art and literature, and the Jews to some extent shared in this gracious change. Robert of Aragon — vicar-general of the papal states — in particular encouraged the Jews and supported them in their literary and scientific ambi- tions. Small coteries of Jewish minor poets and philosophers were formed, and men like Kalonymos and Immanuel — Dante's friend — shared the versatility and culture of Italy. But in Germany there was no echo of this brighter note. Persecution was elevated into a system, a poll-tax was exacted, and the rabble was allowed (notably in 1336-1337) to give full vent to its fury. Following on this came the Black Death with its terrible consequences in Germany; even in Poland, where the Jews had previously enjoyed considerable rights, extensive massacres took place.

In effect the Jews became outlaws, but their presence being often financially necessary, certain officials were permitted to " hold Jews," who were liable to all forms of arbitrary treatment, on the side of their " owners." The Jews had been among the first to appreciate the commercial advantages of permitting the loan of money on interest, but it was the policy of the Church that drove the Jews into money-lending as a

characteristic trade. Restrictions on their occupations were everywhere common, and as the Church forbade Christians to engage in usury, this was the only trade open to the Jews. The excessive demands made upon the Jews forbade a fair rate of interest. " The Jews were unwilling sponges by means of which a large part of the subjects' wealth found its way into the royal ex- chequer " (Abrahams, Jewish Life in the Middle Ages, ch. xii.). Hence, though this procedure made the Jews intensely obnoxious to the peoples, they became all the more necessary to the rulers. A favourite form of tolerance was to grant a permit to the Jews to remain in the state for a limited term of years; their con- tinuance beyond the specified time was illegal and they were therefore subject to sudden banishment. Thus a second expul- sion of the Jews of France occurred in 1394. Early in the 15th century John Hus — under the inspiration of Wycliffe — initiated at Prague the revolt against the Roman Catholic Church. The Jews suffered in the persecution that followed, and in 1420 all the Austrian Jews were thrown into prison. Martin V. published a favourable bull, but it was ineffectual. The darkest days were nigh. Pope Eugenius (1442) issued a fiercely intolerant missive; the Franciscan John of Capistrano moved the masses to activity by his eloquent denunciations; even Casimir IV. revoked the privileges of the Jews in Poland, when the Turkish capture of Constantinople (1453) offered a new asylum for the hunted Jews of Europe. But in Europe itself the catastrophe was not arrested. The Inquisition in Spain led to the expulsion of the Jews (1492), and this event involved not only the latter but the whole of the Jewish people. " The Jews everywhere felt as if the temple had again been destroyed " (Graetz). Nevertheless, the result was not all evil. If fugitives are for the next half-century to be met with in all parts of Europe, yet, especially in the Levant, there grew up thriving Jewish

communities often founded by Spanish refugees. Such incidents as the rise of Joseph Nasi {q.v.) to high position under the Turkish government as duke of Naxos mark the coming change. The reformation as such had no favourable influence on Jewish fortunes in Christian Europe, though the championship of the cause of toleration by Reuchlin had considerable value. But the age of the ghetto {q.v.) had set in too firmly for immediate amelioration to be possible. It is to Holland and to the 17th century that we must turn for the first real steps towards Jewish emancipation.

47. Period of Emancipation. — The ghetto, which had prevailed more or

less rigorously for a long period, was not formally pre- scribed by the papacy until the beginning of the 16th century. The same century was not ended before the prospect of liberty dawned on the Jews. Holland from the moment that it joined the union of Utrecht (1579) deliberately set its face against religious persecution {Jewish Encyclopedia, i. 537). Maranos, fleeing to the Netherlands, were welcomed; the immigrants were wealthy, enterprising and cultured. Many Jews, who had been compelled to conceal their faith, now came into the open. By the middle of the 17 th century the Jews of Holland had become of such importance that Charles II. of England (then in exile) entered into negotiations with the Amsterdam Jews (1656). In that same year the Amsterdam community was faced by a serious problem in connexion with Spinoza. They brought themselves into notoriety by excommunicating the philosopher — an act of weak self-defence on the part of men who had themselves but recently been admitted to the country, and were timorous of the suspicion that they shared Spinoza's then execrated views. It is more than a mere coincidence that this step was taken during the absence in England of one of the ablest and most notable of the Amsterdam rabbis. At the time, Menasseh ben Israel {q.v.) was in London, on a mission to Cromwell. The Jews had been expelled from England by Edward I., after a sojourn in the country of rather more than two centuries, during which they had been the licensed and oppressed money-lenders of the realm, and had — through the special exchequer of the Jews — been used by the sovereign as a means of extorting a revenue from his subjects. In the 17th century a considerable number of Jews had made a home in the English colonies, where from the first they enjoyed practically equal tights with the Christian settlers. Cromwell, upon the inconclusive termination of the conference summoned in 1655 at Whitehall to consider the Jewish question, tacitly assented to the return of the Jews to this country, and at the restoration his action was confirmed. The English Jews " gradually substituted for the personal protection of the crown, the sympathy and confidence of the nation " (L. Wolf, Menasseh ben Israel's Mission to Cromwell, p. lxxv.). The city of London was the first to be converted to the new attitude. " The wealth they brought into the country, and their fruitful commercial activity, especially in the colonial trade, soon revealed them as an indispensable element of the prosperity of the city. As early as 1668, Sir Josiah Child, the millionaire governor of the East India company, pleaded for their naturalization on the score of their commercial utility. For the same reason the city found itself compelled at first to connive at their illegal representation on 'Change, and then, to violate its own rules by permitting them to act as brokers without previously taking up the freedom. At this period they con- trolled more of the foreign and colonial trade than all the other alien merchants in London put together. The momentum of their commercial enterprise and stalwart patriotism proved irresistible. From the exchange to the city council chamber, thence

to the aldermanic court, and eventually to the mayoralty itself, were inevitable stages of an emancipation to which their large interests in the city and their high character entitled them. Finally the city of London — not only as the converted champion of religious liberty but as the convinced apologist of the Jews — sent Baron Lionel de Rothschild to knock at the door of the unconverted House of Commons as parliamentary representative of the first city in the world " (Wolf, loc. cit.).

The pioneers of this emancipation in Holland and England

were Sephardic (or Spanish) Jews — descendants of the Spanish exiles. In the meantime the Ashkenazic (or German) Jews had been working out their own salvation. The chief effects of the change were not felt till the 18th century. In England emanci- pation was of democratic origin and concerned itself with practical questions. On the Continent, the movement was more aristocratic and theoretical; it was part of the intellectual renaissance which found its most striking expression in the principles of the French Revolution. Throughout Europe the 1 8th century was less an era of stagnation than of transition. The condition of the European Jews seems, on a superficial examination, abject enough. But, excluded though they were from most trades and occupations, confined to special quarters of the city, disabled from sharing most of the amenities of life, the Jews nevertheless were gradually making their escape from the ghetto and from the moral degeneration which it had caused. Some ghettos (as in Moravia) were actually not founded till the 1 8th century, but the careful observer can perceive clearly that at that period the ghetto was a doomed institution. In the " dark ages " Jews enjoyed neither rights nor privileges; in the 1 8th century they were still without rights but they had privileges. A grotesque feature of the time in Germany and Austria was the class of court Jews, such as the Oppenheims, the personal favourites of rulers and mostly their victims when their usefulness had ended. These men often rendered great services to their fellow-Jews, and one of the results was the growth in Jewish society of an aristocracy of wealth, where previously there had been an aristocracy of learning. Even more important was another privileged class — that of the Schutz-Jude (protected Jew). Where there were no rights, privileges had to be bought. While the court Jews were the favourites of kings, the protected Jews were the proteges of town councils. Corruption is the frequent concomitant of privilege, and thus the town councils often connived for a price at the presence in their midst of Jews whose admission was illegal. Many Jews found it possible to evade laws of domicile by residing in one place and trading in another. Nor could they be effectually excluded from the fairs, the great markets of the 1 8th century. The Sephardic Jews in all these respects occupied a superior position, and they merited the partiality shown to them. Their personal dignity and the vast range of their colonial enterprises were in striking contrast to the retail

traffic of the Ashkenazim and their degenerate bearing and speech. Peddling had been forced on the latter by the action of the gilds which were still powerful in the 18th century on the Continent. Another cause may be sought in the Cossack assaults on the Jews at an earlier period. Crowds of wanderers were to be met on every road; Germany, Holland and Italy were full of Jews who, pack on shoulder, were seeking a precarious live- lihood at a time when peddling was neither lucrative nor safe.

But underneath all this were signs of a great change. The 1 8th century has a goodly tale of Jewish artists in metal- work, makers of pottery, and (wherever the gilds permitted it) artisans and wholesale manufacturers of many important commodities. The last attempts at exclusion were irritating enough; but they differed from the earlier persecution. Such strange enactments as the Familianten-Gesetz, which prohibited more than one member of a family from marrying, broke up families by forcing the men to emigrate. In 1781 Dohm pointed to the fact that a Jewish father could seldom hope to enjoy the happiness of living with his children. In that very year, however, Joseph II. initiated in Austria a new era for the Jews. This Austrian reformation was so typical of other changes elsewhere, and so expressive of the previous disabilities of the Jews, that, even in this rapid summary, space must be spared for some of the details supplied by Graetz. " By this new departure (19th of October 1781) the Jews were permitted to learn handicrafts, arts and sciences, and with certain restrictions to devote them- selves to agriculture. The doors of the universities and acade- mies, hitherto closed to them, were thrown open. . . . An ordinance of November 2 enjoined that the Jews were every- where considered fellow-men, and all excesses against them were

to be avoided. The Leibzoll (body-tax) was also abolished, in addition to the special law-taxes, the passport duty, the night- duty and all similiar imposts which had stamped the Jews as outcast, for they were now (Dec. 19) to have equal rights with the Christian inhabitants." The Jews were not, indeed, granted complete citizenship, and their residence and public worship in Vienna and other Austrian cities were circum- scribed and even penalized. " But Joseph II. annulled a number of vexatious, restrictive regulations, such as the compulsory wearing of beards, the prohibition against going out in the forenoon on Sundays or holidays, or frequenting public pleasure resorts. The emperor even permitted Jewish wholesale mer- chants, notables and their sons, to wear swords (January 2, 1782), and

especially insisted that Christians should behave ina friendly manner towards Jews."

48. The Mendelssohn Movement. — This notable beginning to the removal of " the ignominy of a thousand years " was causally connected with the career of Moses Mendelssohn (1729- 1786; q.v.). He found on both sides an unreadiness for approxi- mation: the Jews had sunk into apathy and degeneration, the Christians were still moved by hereditary antipathy. The failure of the hopes entertained of Sabbatai Zebi (q.v.) had plunged the Jewries of the world into despair. This Smyrnan pretender not only proclaimed himself Messiah (c. 1650) but he was accepted in that r61e by vast numbers of his brethren. At the moment when Spinoza was publishing a system which is still a dominating note of modern philosophy, this other son of Israel was capturing the very heart of Jewry. His miracles were reported and eagerly believed everywhere; " from Poland, Hamburg and Amsterdam treasures poured into his court; in the Levant young men and maidens prophesied before him; the Persian Jews refused to till the fields. 'We shall pay no more taxes,' they said, ' our Messiah is come.' " The expectation that he would lead Israel in triumph to the Holy Land was doomed to end in disappointment. Sabbatai lacked one quality without which enthusiasm is ineffective; he failed to believe in himself. At the critical moment he embraced Islam to escape death, and though he was still believed in by many — it was not Sabbatai himself but a phantom resemblance that had assumed the turban! — his meteoric career did but colour the sky of the Jews with deeper blackness. Despite all this, one must not fall into the easy error of exaggerating the degeneration into which the Jewries of the world fell from the middle of the 17th till the middle of the 18th century. For Judaism had organized itself; the Shulhan aruch of Joseph Qaro (q.v.), printed in 1564 within a decade of its completion, though not accepted without demur, was nevertheless widely admitted as the code of Jewish life. If in more recent times progress in Judaism has implied more or less of revolt against the rigors and fetters of Qaro's code, yet for 250 years it was a powerful safeguard against demoralization and stagnation. No community living in full accordance with that code could fail to reach a high moral and intellectual level. It is truer to say that on the whole the Jews began at this period to abandon as hopeless the attempt to find a place for themselves in the general life of their country. Perhaps they even ceased to desire it. Their children were taught without any regard to outside conditions, they spoke and wrote a jargon, and their whole training, both by what it included and by what it excluded, tended to produce isolation from their neighbours. Moses Mendelssohn, both by his career and by his propaganda, for ever put an end to these conditions; he more than any other man. Born in the ghetto of Dessau, he was not of the ghetto. At the age of fourteen he found his way to Berlin, where Frederick

the Great, inspired by the spirit of Voltaire, held the maxim that " to oppress the Jews never brought prosperity to any govern- ment." Mendelssohn became a warm friend of Lessing, the hero of whose drama Nathan the Wise was drawn from the Dessau Jew. Mendelssohn's Phaedo, on the immortality of the soul, brought the author into immediate fame, and the simple home of the " Jewish Plato " was sought by many of the leaders of Gentile society in Berlin. Mendelssohn's translation of the Pentateuch into German with a new commentary by himself

and others introduced the Jews to more modern ways of thinking. Two results emanated from Mendelssohn's work. A new school of scientific study of Judaism emerged, to be dignified by the names of Leopold Zunz (q.v.), H. Graetz (q.v.) and many others. On the other hand Mendelssohn by his pragmatic conception of religion (specially in his Jerusalem) weakened the belief of certain minds in the absolute truth of Judaism, and thus his own grandchildren (including the famous musician Felix Mendelssohn-Bartholdy) as well as later Heine, Borne, Gans and Neander, embraced Christianity. Within Judaism itself two parties were formed, the Liberals and the Conservatives, and as time went on these tendencies definitely organized themselves. Holdheim (q.v.) and Geiger (q.v.) led the reform movement in Germany and at the present day the effects of the movement are widely felt in America on the Liberal side and on the opposite side in the work of the neo-orthodox school founded by S. R. Hirsch (q.v.). Modern seminaries were established first in Breslau by Zacharias Frankel (q.v.) and later in other cities. Brilliant results accrued from all this participation in the general life of Germany. Jews, engaged in all the professions and pur- suits of the age, came to the front in many branches of public life, claiming such names as Riesser (d. 1863) and Lasker in politics, Auerbach in literature, Rubinstein and Joachim in music, Traube in medicine, and Lazarus in psychology. Especi- ally famous have been the Jewish linguists, pre-eminent among them Theodor Benfey (1809-1881), the pioneer of modern comparative philology; and the Greek scholar and critic Jakob Bernays (1824-1881).

49. Effect of the French Revolution. — In close relation to the German progress in Mendelssohn's age, events had been pro- gressing in France, where the Revolution did much to improve the Jewish condition, thanks largely to the influence of Mirabeau. In 1807 Napoleon convoked a Jewish assembly in Paris. Though the decisions of this body had no binding force on the Jews generally, yet in some important particulars its decrees represent principles widely adopted by the Jewish community. They proclaim the acceptance of the spirit of Mendelssohn's recon- ciliation of the Jews to modern life. They assert the citizen- ship and patriotism of Jews, their determination to accommodate themselves to the present as far as they could while retaining loyalty to the past. They declare their

readiness to adapt the law of the synagogue to the law of the land, as for instance in the question of marriage and divorce. No Jew, they decided, may perform the ceremony of marriage unless civil formalities have been fulfilled; and divorce is allowed to the Jews only if and so far as it is confirmatory of a legal divorce pronounced by the civil law of the land. The French assembly did not succeed in obtaining formal assent to these decisions (except from Frankfort and Holland), but they gained the practical adhesion of the majority of Western and American Jews. Napoleon, after the report of the assembly, established the consistorial system which remained in force, with its central consistory in the capital, until the recent separation of church and state. Many French Jews acquired fame, among them the ministers Cremieux (1796- 1879), Fould, Gondchaux and Raynal; the archaeologists and philologians Oppert, Halevy, Munk, the Derenbourgs, Darme- steters and Reinachs; the musicians Halevy, Waldteufel and Meyerbeer; the authors and dramatists Catulle Mendes and A. d'Ennery, and many others, among them several distinguished occupants of civil and military offices.

50. Modern Italy. — Similar developments occurred in other countries, though it becomes impossible to treat the history of the Jews, from this time onwards, in general outline. We must direct our attention to the most important countries in such detail as space permits. And first as to Italy, where the Jews in a special degree have identified themselves with the national life. The revolutions of 1848, which greatly affected the posi- tion of the Jews in several parts of Europe, brought considerable gain to the Jews of Italy. During the war against Austria in the year named, Isaac Pesaro Marogonato was finance minister in Venice. Previously to this date the Jews were still confined to the ghetto, but in 1859, in the Italy united under Victor

Emanuel II., the Jews obtained complete rights, a privilege which was extended also to Rome itself in 1870. The Italian Jews devoted themselves with ardour to the service of the state. Isaac Artom was Cavour's secretary, L' Olper a counsellor of Mazzini. " The names of the Jewish soldiers who died in the cause of Italian liberty were placed along with those of their Christian fellow soldiers on the monuments erected in their honour" (Jewish Encyclopedia, vii. 10). More recently men like Wollemberg, Ottolenghi and Luzzatti rose to high positions as ministers of state. Most noted of recent Jewish scholars in Italy was S. D. Luzzatto (q.v.).

51. Austria. — From Italy we may turn to the country which so much influenced Italian politics, Austria, which had founded the system of " Court Jews" in 1518, had expelled the Jews from Vienna as late as 1670, when the synagogue of that city was converted into a church. But economic laws are often too strong for civil vagaries or sectarian fanaticism, and as the commerce of Austria suffered by the absence of the Jews, it was impossible to exclude the latter from the fairs in the provinces of from the markets of the capital. As has been pointed out above, certain protected Jews were permitted to reside in places where the expulsion of the Jews had been decreed. But Maria Theresa (1740-1780) was distinguished for her enmity to the Jews, and in 1744 made a futile attempt to secure their expulsion from Bohemia. " In 1760 she issued an order that all unbearded Jews should wear a yellow badge on their left arm " (Jewish Encyclopedia, ii. 330). The most petty limitations of Jewish commercial activity continued; thus at about this period the community of Prague, in a petition, " complain that they are not permitted to buy victuals in the market before a certain hour, vegetables not before 9 and cattle not before n o'clock; to buy fish is sometimes altogether prohibited; Jewish drug- gists are not permitted to buy victuals at the same time with Christians" (op. cit.). So, too, with taxation. It was exorbi- tant and vexatious. To pay for rendering inoperative the banishment edict of 1744, the Jews were taxed 3,000,000 florins annually for ten years. In the same year it was decreed that the Jews should pay" a special tax of 40,000 florins for the right to import their citrons for the feast of booths." Nevertheless, Joseph II. (1780-1790) inaugurated a new era for the Jews of his empire. Soon after his accession he abolished the distinctive Jewish dress, abrogated the poll-tax, admitted the Jews to military service and their children to the public schools, and in general opened the era of emancipation by the Toleranzpatent of 1782. This enlightened policy was not continued by the successors of Joseph II. Under Francis II. (1792-1835) eco- nomic and social restrictions were numerous. Agriculture was again barred; indeed the Vienna congress of 181 5 practically restored the old discriminations against the Jews. As time went on, a more progressive policy intervened, the special form of Jewish oath was abolished in 1846, and in 1848, as a result of the revolutionary movement in which Jews played an active part, legislation took a more liberal turn. Francis Joseph I. ascended the throne in that year, and though the constitution of 1849 recognized the principle of religious liberty, an era of reaction supervened, especially when " the concordat of 1855 delivered Austria altogether into the hands of. the clericals." But the day of medieval intolerance had passed, and in 1867 the new constitution " abolished all disabilities on the ground of religious differences," though anti-Semitic manipulation of the law by administrative authority has led to many instances of intolerance. Many Jews have been members of the Reichsrath, some have risen to the rank of general in the army, and Austrian Jews

have contributed their quota to learning, the arts and literature. Low, Jellinek, Kaufmann, as scholars in the Jewish field; as poets and novelists, Kompert, Franzos, L. A. Frankl; the pianist Moscheles, the dramatist Mosenthal, and the actor Sonnenthal, the mathematician Spitzer and the chess-player Steinitz are some of the most prominent names. The law of 1890 makes it " compulsory for every Jew to be a member of the congregation of the district in which he resides, and so gives to every congregation the right to tax the individual members "

(op. cit.). A similar obligation prevails in parts of Germany. A Jew can avoid the communal tax only by formally declaring himself as outside the Jewish community. The Jews of Hungary shared with their brethren in Austria the same alternations of expulsion and recall. By the law " De Judaeis " passed by the Diet in 1 79 1 the Jews were accorded protection, but half a century passed before their tolerated condition was regularized. The " toleration-tax " was abolished in 1846. During the revolu- tionary outbreak of 1848, the Jews suffered severely in Hungary, but as many as 20,000 Jews are said to have joined the army. Kossuth succeeded in granting them temporary emancipation, but the suppression of the War of Independence led to an era of royal autocracy which, while it advanced Jewish culture by enforcing the establishment of modern schools, retarded the obtaining of civic and political rights. As in Austria, so in Hungary, these rights were granted by the constitution of 1867. But one step remained. The Hungarian Jews did not consider themselves fully emancipated until the Synagogue was " duly recognized as one of the legally acknowledged religions of the country." This recognition was granted by the law of 1895-1896. In the words of Biichler (Jewish Encyclopedia,vi. 503) : " Since their emancipation the Jews have taken an active part in the political, industrial, scientific and artistic life of Hungary. In all these fields they have achieved prominence. They have also founded great religious institutions. Their progress has not been arrested even by anti-Semitism, which first developed in 1883 at the time of the Tisza-Eslar accusation of ritual murder."

52. Other European Countries. — According to M. Caimi the present Jewish communities of Greece are divisible into five groups : (1) Arta (Epirus) ; (2) Chalcis (Euboea) ; (3) Athens (Attica) ; (4) Volo, Larissa and Trikala (Thessaly) ; and (5) Corfu and Zante (Ionian Islands). The Greek constitution admits no religious disabilities, but anti-Semitic riots in Corfu and Zante in 1891 caused much distress and emigration. In Spain there has been of late a more liberal attitude towards the Jews, and there is a small congregation (without a public synagogue) in Madrid. In 1858 the edict of expulsion was repealed. Portugal, on the other hand, having abolished the Inquisition in 1821, has since 1826 allowed Jews freedom of religion, and there are synagogues in Lisbon and Faro. In Holland the Jews

were admitted to political liberty in 1796. At present more than half of the Dutch Jews are concentrated in Amsterdam, being largely engaged in the diamond and tobacco trades. Among famous names of recent times foremost stands that of the artist Josef Israels. In 1675 was consecrated in Amsterdam the synagogue which is still the most noted Jewish edifice in Europe. Belgium granted full freedom to the Jews in 1815, and the community has since 1808 been organized on the state consistorial system, which till recently also prevailed in France. It was not till 1874 that full religious equality was granted to the Jews of Switzerland. But there has been considerable interference (ostensibly on humani- tarian grounds) with the Jewish method of slaughtering animals for food (Shehitah) and the method was prohibited by a refer- endum in 1893. In the same year a similar enactment was passed in Saxony, and the subject is a favourite one with anti- Semites, who have enlisted on their side some scientific authori- ties, though the bulk of expert opinion is in favor of Shehitah (see Dembo, Das Schlachten,i&g4) . In Sweden the Jews have all the rights which are open to non-Lutherans; they cannot become members of the council of state. In Norway there is a small Jewish settlement (especially in Christiania) who are engaged in industrial pursuits and enjoy complete ‘ liberty. Denmark has for long been distinguished for its liberal policy towards the Jews. Since 1814 the latter have been eligible as magistrates, and in 1849 full equality was formally ratified. Many Copen- hagen Jews achieved distinction as manufacturers, merchants and bankers, and among famous Jewish men of letters may be specially named Georg Brandes.

The story of the Jews in Russia and Rumania remains a black spot on the European record. In Russia the Jews are more numerous and more harshly treated than in any other part of the world. In the remotest past Jews were settled in much of

the territory now included in Russia, but they are still treated as aliens. They are restricted to the pale of settlement which was first established in 1791. The pale now includes fifteen governments, and under the May laws of 1802 the congestion of the Jewish population, the denial of free movement, and the exclusion from the general rights of citizens were rendered more oppressive than ever before. The right to leave the pale is indeed granted to merchants of the first gild, to those possessed of certain educational diplomas, to veteran soldiers and to certain classes of skilled artisans. But these concessions are unfavour- ably interpreted and much

extortion results. Despite a huge emigration of Jews from Russia, the congestion within the pale is the cause of terrible destitution and misery. Fierce massacres occurred in Nizhniy-Novgorod in 1882, andin Kishinev in 1903. Many other pogroms have occurred, and the condition of the Jews has been reduced to one of abject poverty and despair. Much was hoped from the duma, but this body has proved bitterly opposed to the Jewish claim for liberty. Yet in spite of these disabilities there are amongst the Russian Jews many enterprising contractors, skilful doctors, and successful lawyers and scientists. In Rumania, despite the Berlin Treaty, the Jews are treated as aliens, and but a small number have been natural- ized. They are excluded from most of the professions and are hampered in every direction.

53. Oriental Countries. — In the Orient the condition of the Jews has been much improved by the activity of Western organizations, of which something is said in a later paragraph. Modern schools have been set up in many places, and Palestine has been the scene of a notable educational and agricultural revival, while technical schools — such as the agricultural college near Jaffa and the schools of the alliance and the more recent Bezalel in Jerusalem — have been established. Turkey has always on the whole tolerated the Jews, and much is hoped from the new regime. In Morocco the Jews, who until late in the 19th century were often persecuted, are still confined to a mellah (separate quarter), but at the coast-towns there are prosperous Jewish communities mostly engaged in commerce. In other parts of the same continent, in Egypt and in South Africa, many Jews have settled, participating in all industrial and financial pursuits. Recently a mission has been sent to the Falashas of Abyssinia, and much interest has been felt in such outlying branches of the Jewish people as the Black Jews of Cochin and the Bene Israel community of Bombay. In Persia Jews are often the victims of popular outbursts as well as of official extor- tion, but there are fairly prosperous communities at Bushire, Isfahan, Teheran andKashan (in Shiraz they are in low estate). The recent advent of constitutional government may improve the condition of the Jews.

54. The United Kingdom. — The general course of Jewish history in England has been indicated above. The Jews came to England at least as early as the Norman Conquest; they were expelled from Bury St Edmunds in n 90, after the massacres at the coronation of Richard I. ; they were required to wear badges in 1 2 18. At the end of the 12th century was established the " exchequer of the Jews," which chiefly dealt with suits concern- ing money-lending, and arranged a " continual flow of morny from the Jews to the royal treasury," and a so-called " parlia- ment of the Jews " was summoned in 1 241; in 1275 was enacted the statute de Judaismo which, among other things, permitted the Jews to hold land. But this concession was illusory, and as the statute prevented Jews from

engaging in finance — the only occupation which had been'open to them — it was a prelude to their expulsion in 1290. There were few Jews in England from that date till the Commonwealth, but Jews settled in the American colonies earlier in the 17th century, and rendered considerable services in the advancement of English commerce. The White- hall conference of 1655 marks a change in the status of the Jews in England itself, for though no definite results emerged it was clearly defined by the judges that there was no legal obstacle to the return of the Jews. Charles II. in 1664 continued Cromwell's tolerant policy. No serious attempt towards the emancipation of the Jews was made till the Naturalization Act of 1753, which

was, however, immediately repealed. Jews no longer attached to the Synagogue, such as the Herschels and Disraelis, attained to fame. In 1830 the first Jewish emancipation bill was brought in by Robert Grant, but it was not till the legislation of 1858- 1860 that Jews obtained full parliamentary rights. In other directions progress was more rapid. The office of sheriff was thrown open to Jews in 1835 (Moses Montefiore, sheriff of London was knighted in 1837); Sir I. L. Goldsmid was made a baronet in 1 84 1, Baron Lionel de Rothschild was elected to Parliament in 1847 (though he was unable to take his seat), Alderman (Sir David) Salomons became lord mayor of London in 1855 and Francis Goldsmid was made a Q.C. in 1858. In 1873 Sir George Jessel was made a judge, and Lord Rothschild took his seat in the House of Lords as the first Jewish peer in 1886. A fair propor- tion of Jews have been elected to the House of Commons, and Mr Herbert Samuel rose to cabinet rank in 1909. Sir Matthew Nathan has been governor of Hong-Kong and Natal, and among Jewish statesmen in the colonies Sir Julius Vogel and V. L. Solomon have been prime ministers (Hyamson: A History of the Jews in England, p. 342). It is unnecessary to remark that in the British colonies the Jews everywhere enjoy full citizenship. In fact, the colonies emancipated the Jews earlier than did the mother country. Jews were settled in Canada from the time of Wolfe, and a congregation was founded at Montreal in 1768, and since 1832 Jews have been entitled to sit in the Canadian parliament . There are some thriving Jewish agricultural colonies in the same dominion. In Australia the Jews from the first were welcomed on perfectly equal terms. The oldest congregation is that of Sydney (181 7); the Melbourne community dates from 1844. Reverting to incidents in England itself, in 1870 the abolition of university tests removed all restrictions on Jews at Oxford and Cambridge, and both universities have since elected Jews to professorships and other posts of honour. The communal organization of English Jewry is somewhat inchoate. In 1841 an independent reform congregation was founded, and the Spanish and Portuguese Jews have always maintained their separate existence with a Haham as the

ecclesiastical head. In 1870 was founded the United Synagogue, which is a metropolitan organization, and the same remark applies to the more recent Federation of Synagogues. The chief rabbi, who is the ecclesi- astical head of the United Synagogue, has also a certain amount of authority over the provincial and colonial Jewries, but this is nominal rather than real. The provincial Jewries, however, participate in the election of the chief rabbi. At the end of 1909 was held the first conference of Jewish ministers in London, and from this is expected some more systematic organization of scattered communities. Anglo- Jewry is rich, however, in chari- table, educational and literary institutions; chief among these respectively may be named the Jewish board of guardians (1859), the Jews' college (1855), and the Jewish historical society (1893'). Besides the distinctions already noted, English Jews have risen to note in theology (C. G. Montefiore), in literature (Israel Zangwill and Alfred Sutro), in art (S. Hart, R.A., and S. J. Solomon, R.A.) in music (Julius Benedict and Frederick Hymen Co wen). More than 1000 English and colonial Jews participated as active combatants in the South African War. The immigration of Jews from Russia was mainly responsible for the ineffective yet oppressive Aliens Act of 1905. (Full accounts of Anglo-Jewish institutions are given in the Jewish Year-Book published annually since 1895.)

55. The American Continent. — Closely parallel with the progress of the Jews in England has been their steady advancement in America. Jews made their way to America early in the 16th century, settling in Brazil prior to the Dutch occupation. Under Dutch rule they enjoyed full civil rights. In Mexico and Peru they fell under the ban of the Inquisition. In Surinam the Jews were treated as British subjects; in Barbadoes, Jamaica and New York they are found as early as the first half of the 17th century. During the War of Independence the Jews of America took a prominent part on both sides, for under the British rule many had risen to wealth and high social position . After the Declaration of Independence, Jews are found all over America, where they

have long enjoyed complete emancipation, and have enormously increased in numbers, owing particularly to immigration from Russia. The American Jews bore their share in the Civil War (7038 Jews were in the two armies), and have always identified themselves closely with national movements such as the eman- cipation of Cuba. They have attained to high rank in all branches of the public service, and have shown most splendid instances of far-sighted and generous philanthropy. Within the Synagogue the reform movement began in 1825, and soon won many successes, the central

conference of American rabbis and Union College (1875) at Cincinnati being the instruments of this progress. At the present time orthodox Judaism is also again acquiring its due position and the Jewish theological seminary of America was founded for this purpose. In 1908 an organiza- tion, inclusive of various religious sections, was founded under the description " the Jewish community of New York." There have been four Jewish members of the United States senate, and about 30 of the national House of Representatives. Besides filling many diplomatic offices, a Jew (O. S. Straus) has been a member of the cabinet. Many Jews have filled professorial chairs at the universities, others have been judges, and in art, literature (there is a notable Jewish publication society), industry and commerce have rendered considerable services to national culture and prosperity. American universities have owed much to Jewish generosity, a foremost benefactor of these (as of many other American institutions) being Jacob Schiff. Such institu- tions as the Gratz and Dropsie colleges are further indications of the splendid activity of American Jews in the educational field. The Jews of America have also taken a foremost plac6 in the succour of their oppressed brethren in Russia and other parts of the world. (Full accounts of American Jewish institu- tions are given in the American Jewish Y ear-Book, published annually since 1899.)

56. Anti-Semitism. — It is saddening to be compelled to close this record with the statement that the progress of the European Jews received a serious check by the rise of modern anti-Semi- tism in the last quarter of the 19th century. While in Russia this took the form of actual massacre, in Germany and Austria it assumed the shape of social and civic ostracism. In Germany Jews are still rarely admitted to the rank of officers in the army, university posts are very difficult of access, Judaism and its doctrines are denounced in medieval language, and a tone of hostility prevails in many public utterances. In Austria, as in Germany, anti-Semitism is a factor in the parliamentary elections. The legend' of ritual murder (q.v.) has been revived, and every obstacle is placed in the way of the free intercourse of Jews with their Christian fellow-citizens. In France Edouard Adolphe Drumont led the way to a similar animosity, and the popular fury was fanned by the Dreyfus case. It is generally felt, how- ever, that this recrudescence of anti-Semitism is a passing phase in the history of culture (see Anti-Semitism).

57. The Zionist Movement. — The Zionist movement (see Zionism), founded in 1895 by Theodor Herzl (q.v.) was in a sense the outcome of anti-Semitism. Its object was the foundation of a Jewish state in Palestine, but though it aroused much interest it failed to attract the majority of the emancipated Jews, and the movement has of late been transforming itself into a mere effort at colonization. Most Jews not only confidently be- lieve that their own future lies in progressive development within the various

nationalities of the world, but they also hope that a similar consummation is in store for the as yet unemancipated branches of Israel. Hence the Jews are in no sense internation- ally organized. The influence of the happier communities has been exercised on behalf of those in a worse position by indivi- duals such as Sir Moses Montefiore (q.v.) rather than by societies or leagues. From time to time incidents arise which appeal to the Jewish sympathies everywhere and joint action ensues. Such incidents were the Damascus charge of ritual murder (1840) , the forcible baptism of the Italian child Mortara (1858), and the Russian pogroms at various dates. But all attempts at an international union of Jews, even in view of such emergencies as these, have failed. Each countrv has its own local organiza-

tion for dealing with Jewish questions. In France the Alliance Israelite (founded in i860), in England the Anglo-Jewish Associa- tion (founded in 187 1), in Germany the Hilfsverein der deutschen Juden, and in Austria the Israelitische Allianz zu Wien (founded 1 8 7 2) , in America the American Jewish Committee (founded 1906) , and similar organizations in other countries deal only incidentally with political affairs. They are concerned mainly with the education of Jews in the Orient, and the establishment of colonies and technical institutions. Baron Hirsch (q.v.) founded the Jewish colonial association, which has undertaken vast colonizing and educational enterprises, especially in Argentina, and more recently the Jewish territorial organization has been started to found a home for the oppressed Jews of Russia. All these institutions are performing a great regenerative work, and the tribulations and disappointments of the last decades of the 19th century were not all loss. The gain consisted in the rousing of the Jewish consciousness to more virile efforts towards a double end, to succour the persecuted and ennoble the ideals of the emancipated.

58. Statistics. — Owing to the absence of a religious census in several important countries, the Jewish population of the world can only be given by inferential estimate. The following approximate figures are taken from the American Jewish Year-Book for 1909-1910 and are based on similar estimates in the English Jewish Year-Book, the Jewish Encyclopedia, Nossig's Jiidische Statistik and the Reports of the Alliance Israelite Universelle According to these estimates the total Jewish population of the world in the year named was approximately 11,500,000. Of this total there were in the British Empire about 380,000 Jews (British Isles 240,000, London accounts for 150,000 of these; Canada and British Columbia 60,000; India 18,000; South Africa 40,000). The largest Jewish populations were those of Russia (5,215,000), Austria-Hungary (2,084,000), United States of America (1,777,000), Germany (607,000, of whom 409,000 were in Prussia), Turkey (463,000, of whom some 78,000 resided in Palestine), Rumania (250,000), Morocco (109,000) and Holland (106,000). Others of the more important totals are: France

95,000 (besides Algeria 63,000 and Tunis 62,000); Italy 52,000; Persia 49,000; Egypt 39,000; Bulgaria 36,000; Argentine Republic 30,000; Tripoli 19,000; Turkestan and Afghanistan 14,000; Switzerland and Belgium each 12,000; Mexico 9000; Greece 8000; Servia 6000; Sweden and Cuba each 4000; Denmark 3500; Brazil and Abyssinia (Falashas) each 3000; Spain and Portugal 2500; China and Japan 2000. There are also Jews in Curacpa, Surinam, Luxemburg, Norway, Peru, Crete and Venezuela; but in none of these does the Jewish population much exceed 1000.

Bibliography. — H. Graetz, Geschichte der Juden (11 vols., 1853- 1875; several subsequent editions of separate volumes; Eng. trans. 5 vols., 1891-1892); the works of L. Zunz; Jewish ˆEncyclopedia passim; publications of Jewish societies, such as Etudes Juives, Jewish historical societies of England and America, German histori- cal commission, Julius Barasch society (Rumania), Societas Litteraria Hungarico-Judaica, the Viennese communal publications, and many others to which may be added the 20 vols, of the Jewish Quarterly Review; Scherer, Rechtsverhdltnisse der Juden (1901); M. Giidemann Geschichte des Erziehungswesens und der Cultur der Juden (1880, &c.) ; A. Leroy-Beaulieu, Israel among the Nations (1895); I. Abrahams, Jewish Life in the. Middle Ages (1896); G. F. Abbott, Israel in Europe (1905) ;G.Caro, Wirtschafts geschichte der Juden (1908) ; M. Philippson, Neueste Geschichte des judischen Volkes (1907, &c.) ; Nossig, Jiidische Statistik (1903); and such special works as H. Gross, Gallia Judaica (1897), &c. (I. A.)

JEWSBURY, GERALDINE ENDSOR (1812-1880), English writer, daughter of Thomas Jewsbury, a Manchester merchant, was born in 1812 at Measham, Derbyshire. Her first novel, Zoe: the History of Two Lives, was published in 1845, and was followed by The Half Sisters (1848), Marian Withers (1851), Constance Herbert (1855), The Sorrows of Gentility (1856), Right or Wrong (1859). In 1850 she was invited by Charles. Dickens to write for Household Words; for many years she was a frequent con- tributor to the Athenaeum and other journals and magazines. It is, however, mainly on account of her friendship with Thomas Carlyle and his wife that her name is remembered. Carlyle described her, after their first meeting in 184 1, as " one of the most interesting young women I have seen for years; clear delicate sense and courage looking out of her small sylph-like figure." From this time till Mrs Carlyle's death in 1866, Geraldine Jews- bury was the most intimate of her friends. The selections from Geraldine Jewsbury 's letters to Jane Welsh Carlyle (1892, ed. Mrs I Alexander Ireland) prove how confidential were the relations

between the two women for a quarter of a century. In 1854 Miss Jewsbury removed from Manchester to London to be near her friend. To her Carlyle turned for sympathy when his wife died; and at his request she wrote down some " biographical anecdotes " of Mrs Carlyle's childhood and early married life. Carlyle's comment was that " few or none of these narratives are correct in details, but there is a certain mythical truth in all or most of them;" and he added, " the Geraldine accounts of her (Mrs Carlyle's) childhood are substantially correct." He ac- cepted them as the groundwork for his own essay on " Jane Welsh Carlyle," with which they were tharefore incorporated by Froude when editing Carlyle's Reminiscences. Miss Jewsbury was consulted by Froude when he was preparing Carlyle's biography, and her recollection of her friend's confidences con- firmed the suspicion that Carlyle had on one occasion used physical violence towards his wife. Miss Jewsbury further informed Froude that the secret of the domestic troubles of the Carlyles lay in the fact that Carlyle had been " one of those persons who ought never to have married," and that Mrs Carlyle had at one time contemplated having her marriage legally an- nulled (see My Relations with Carlyle. by James Anthony Froude, 1903). The endeavour has been made to discredit Miss Jews- bury in relation to this matter, but there seems to be no sufficient ground for doubting that she accurately repeated what she had learnt from Mrs Carlyle's own lips. Miss Jewsbury died in London on the 23rd of September 1880.

JEW'S EARS, the popular name of a fungus, known botani- cally as Hirneola auricula-judae, so called from its shape, which somewhat resembles a human ear. It is very thin, flexible, flesh- coloured to dark brown, and one to three inches broad. It is common on branches of elder, which it often kills, and is also found on elm, willow, oak and other trees. It was formerly prescribed as a remedy for dropsy.

JEW'S HARP, or Jew's Trump (Fr. guimbarde, O. Fr. trompe, gronde; Ger. Mundharmonica, Maultrommel, Brummeisen ; Ital. scaccia-pensieri or spassa-pensiero) , a small musical instrument of percussion, known for centuries all over Europe. " Jew's trump " is the older name, and " trump " is still used in parts of Great Britain. Attempts have been made to derive " Jew's " from " jaws " or Fr.jeu, but, though there is no apparent reason for associating the instrument with the Jews, it is certain that " Jew's " is the original form (see the New English Dictionary and C. B. Mount in Notes and Queries (Oct. 23, 1897, p. 322). The instrument consists of a slender tongue of steel riveted at one end to the base of a pear-shaped steel loop; the other end of the tongue, left free and passing out between the two branches of the frame, terminates in a sharp bend at right angles, to enable the player to depress it by an elastic blow and thus set it vibrating while

firmly pressing the branches of the frame against his teeth. The vibrations of the steel tongue produce a compound sound composed of a fundamental and its harmonics. By using the cavity of the mouth as a resonator, each harmonic in succession can be isolated and reinforced, giving the instrument the compass shown. The lower harmonics of the series cannot be

6

.-=!=

9 10 11 12

*=5 ■zJ,zzM= *?-.*

8 9

10 11

12

obtained, owing to the limited capacity of the resonating cavity. The black notes on the stave show the scale which may be produced by using two harps, one tuned a fourth above the other. The player on the Jew's harp, in order to isolate the harmonics, frames his mouth as though intending to pronounce the various vowels. At the beginning of the 19th century, when much energy and ingenuity were being expended in all countries upon the invention of new musical instruments, the Maultrommel, re-christened Mundharmonica (the most rational of all its names), attracted attention in Germany. Heinrich Scheibler devised an ingenious holder with a handle, to contain

five Jew's harps, all tuned to different notes; by holding one in each hand, a large compass, with duplicate notes, became avail- able; he called this complex Jew's harp Aura 1 and with it played themes with variations, marches, Scotch reels, &c. Other virtuosi, such as Eulenstein, a native of Wurtemberg, achieved the same result by placing the variously tuned Jew's harps upon the table in front of him, taking them up and setting them down as required. Eulenstein created a sensation in London in 1827 by playing on no fewer than sixteen Jew's harps. In 1828 Sir Charles Wheatstone published an essay on the technique of the instrument in the Quarterly Journal of Science. (K. S.)

JEZEBEL (Heb. t-zebel, perhaps an artificial form to suggest " un-exalted," a divine name or its equivalent would naturally be expected instead of the first syllable), wife of Ahab, king of Israel (1 Kings xvi. 31), and mother of

Athaliah, in the Bible. Her father Eth-baal (Ithobal, Jos., contra Ap. i. 18) was king of Tyre and priest of the goddess Astarte. He had usurped the throne and was the first important Phoenician king after Hiram (see Phoenicia). Jezebel, a true daughter of a priest of Astarte, showed herself hostile to the worship of Yahweh, and to his prophets, whom she relentlessly pursued (1 Kings xviii. 4-13; see Elijah). She is represented as a woman of virile character, and became notorious for the part she took in the matter of Naboth's vineyard. When the Jezreelite 2 sheikh refused to sell the family inheritance to the king, Jezebel treacherously caused him to be arrested on a charge of treason, and with the help of false witnesses he was found guilty and condemned to death. For this the prophet Elijah pronounced a solemn curse upon Ahab and Jezebel, which was fulfilled when Jehu, who was anointed king at Elisha's instigation, killed the son Jehoram, massacred all the family, and had Jezebel destroyed (1 Kings xxi.; 2 Kings ix. 11-28). What is told of her comes from sources written under the influence of strong religious bias; among the exagger- ations must be reckoned 1 Kings xviii. 13, which is inconsistent with xix. 18 and xxii. 6. A literal interpretation of the reference to Jezebel's idolatry (2 Kings ix. 22) has made her name a by- word for a false prophetess in Rev. ii. 20. Her name is often used in modern English as a synonym for an abandoned woman or one who paints her face. (S. A. C.)

JEZREEL (Heb. " God sows "), the capital of the Israelite monarchy under Ahab, and the scene of stirring Biblical events (1 Sam. xxix. 1; 1 Kings xxi.; 2 Kings ix. 21-37). The name was also applied to the great plain (Esdraelon) dominated by the city (" valley of Jezreel," Josh. xvii. 16, &c). The site has never been lost, and the present village Zercin retains the name radically unchanged. In Greek {e.g. Judith) the name appears under the form 'JZoSparjXa; it is Stradela in the Bordeaux Pilgrim, and to the Crusaders the place was known as Parvum Gerinum. The modern stone village stands on a bare rocky knoll, 500ft. above the broad northern valley, at the north extremity of a long ledge, terminating in steep cliffs, forming part of the chain of Mt Gilboa. The buildings are modern, but some scanty remains of rock-hewn wine presses and a few scattered sarcophagi mark the antiquity of the site. The view over the plains is fine and extensive. It is vain now to look for Ahab's palace or Naboth's vineyard. The fountain mentioned in 1 Sam. xxix. 1 is perhaps the fine spring ' Ain el Meiyyita, north of the village, a shallow pool of good water full of small fish, rising between black basalt boulders: or more probably the copious 'Ain Jalud. A second city named Jezreel lay in the hill country of Judah, somewhere near Hebron (Josh. xv. 56). This was the native place of David's wife Abinoam (1 Sam. xxv. .43).

See, for an excellent description of the scenery and history of the Israelite Jezreel, G. A. Smith, Hist. Geog. xix.

JHABUA, a native state of Central India, in the Bhopawar agency. Area, with the dependency of Rutanmal, 1336 sq. m.

ˆee Allg. musik. Ztg. (Leipzig, 1816), p. 506, and Beilage g, where the construction of the instruments is described and illus- trated and the system of notation shown in various pieces of music.

2 According to another tradition Naboth lived at Samaria (xxi. I [LXX.], 18 seq. ; cf. xxii. 38). A similar confusion regarding the king's home appears in 2 Kings x. 11 compared with w. 1, 17.

Pop. (1901), 80,889. More than half the inhabitants belong to the aboriginal Bhils. Estimated revenue, £7000; tribute, £1000. Manganese and opium are exported. The chief, whose title is raja, is a Rajput of the Rathor clan, descended from a branch of the Jodhpur family. Raja Udai Singh was invested in 1898 with the powers of administration.

The town of Jhabua (pop. 3354) stands on the bank of a lake, and is surrounded by a mud wall. A dispensary and a guest- house were constructed to commemorate Queen Victoria's Diamond Jubilee in 1897.

JHALAWAR, a native state of India, in the Rajputana agency, pop. (1901), 90,175; estimated revenue, £26,000; tribute, £2000. Area, 810 sq. m. The ruling family of Jhalawar belongs to the Jhala clan of Rajputs, and their ancestors were petty chiefs of Halwad in the district of Jhalawar, in Kathiawar. About 1709 one of the younger sons of the head of the clan left his country with his son to try his fortunes at Delhi. At Kotah he left his son Madhu Singh, who soon became a favourite with the maharaja, and received from him an important post, which became hereditary. On the death of one of the Kotah rajas (1771), the country was left to the charge of Zalim Singh, a descendant of Madhu Singh. From that time Zalim Singh was the real ruler of Kotah. He brought it to a wonderful state of prosperity, and under his administration, which lasted over forty-five years, the Kotah territory was respected by all parties. In 1838 it was resolved, with the consent of the chief of Kotah, to dismember the state, and to create the new principality of Jhalawar as a separate provision for the descendants of Zalim Singh. The districts then severed from Kotah were considered to represent one-third (£120,000) of the income of Kotah; by treaty they acknowledged the supremacy of the British, and agreed to pay an annual tribute of £8000. Madan Singh received the title of maharaja rana, and was placed on the same footing as the other chiefs in Rajputana.

He died in 1845. An adopted son of his successor took the name of Zalim Singh in 1875 on becom- ing chief of Jhalawar. He was a minor and was not invested with governing powers till 1884. Owing to his maladminis- tration, his relations with the British government became strained, and he was finally deposed in 1896, " on account of persistent misgovernment and proved unfitness for the powers of a ruling chief." He went to live at Benares, on a pension of £2000; and the administration was placed in the hands of the British resident. After much consideration, the government resolved in 1897 to break up the state, restoring the greater part to Kotah, but forming the two districts of Shahabad and the Chaumahla into a new state, which came into existence in 1899, and of which Kunwar Bhawani Singh, a descendant of the original Zalim Singh, was appointed chief.

The chief town is Patan, or Jhalrapatan (pop.7955), founded close to an old site by Zalim Singh in 1796, by the side of an artificial lake. It is the centre of trade, the chief exports of the state being opium, oil-seeds and cotton. The palace is at the cantonment or chhaoni, 4 m. north. The ancient site near the town was occupied by the city of Chandrawati, said to have been destroyed in the time of Aurangzeb. The finest feature of its remains is the temple of Sitaleswar Mahadeva (c. 600).

JHAN6, a town and district of British India, in the Multan division of the Punjab. The town, which forms one municipality with the newer and now more important quarter of Maghiana, is about 3 m. from the right bank of the river Chenab. Founded by Mai Khan, a Sial chieftain, in 1462, it long formed the capital of a Mahommedan state. Pop. (1901), 24,382. Maghiana has manufactures of leather, soap and metal ware.

The District of Jhang extends along both sides of the Chenab, including its confluences with the Jhelum and the Ravi. Area, 3726 sq. m. Pop. (1901), 378,695, showing an apparent decrease of 13 % in the decade, due to the creation of the district of Lyallpur in 1904. But actually the population increased by 132 % on the old area, owing to the opening of the Chenab canal and the colonization of the tract irrigated by it. Within Jhang many thousands of acres of government waste

have been allotted to colonists, who are reported to be flourishing. A branch of the North-Western railway enters the district in this quarter, extending throughout its entire length. The Southern Jech Doab railway serves the south. The principal industries are the ginning, pressing and weaving of cotton.

Jhang contains the ruins of Shorkot, identified with one of the towns taken by Alexander. In modern times the history of Jhang centres in the famous clan of Sials, who exercised an extensive sway over a large tract between

Shahpur and Multan, with little dependence on the imperial court at Delhi, until they finally fell before the %11-absorbing power of Ranjit Singh. The Sials of Jhang are Mahommedans of Rajput descent, whose ancestor, Rai Shankar of Daranagar, emigrated early in the 13th century from the Gangetic Doab. In the beginning of the 19th century Maharaja Ranjit Singh invaded Jhang, and cap- tured the Sial chieftain's territory. The latter recovered a small portion afterwards, which he was allowed to retain on payment of a yearly tribute. In 1847, after the establishment of the British agency at Lahore, the district came under the charge of the British government; and in 1848 Ismail Khan, the Sial leader, rendered important services against the rebel chiefs, for which he received a pension. During the Mutiny of 1857 the Sial leader again proved his loyalty by serving in person on the British side. His pension was afterwards increased, and he obtained the title of khan bahadur, with a small jagir for life.

JHANSI, a city and district of British India, in the Allahabad division of, the United Provinces. The city is the centre of the Indian Midland railway system, whence four lines diverge, to Agra, Cawnpore, Allahabad and Bhopal. Pop. (1901), 55,724. A stone fort crowns a neighbouring rock. Formerly the capital of a Mahratta principality, which lapsed to the British in 1853, it was during the Mutiny the scene of disaffection and massacre. It was then made over to Gwalior, but has been taken back in exchange for other territory. Even when the city was within Gwalior, the civil headquarters and the cantonment were at Jhansi Naoabad, under its walls. Jhansi is the principal centre for the agricultural trade of the district, but its manufactures are small.

The District of Jhansi was enlarged in 1891 by the incor- poration of the former district of Lalitpur, which extends farther into the hill country, almost entirely surrounded by native states. Combined area, 3628 sq. m. Pop. (1901), 616,759 showing a decrease of 10 % in the decade, due to the results of famine. The main line and branches of the Indian Midland rail- way serve the district, which forms a portion of the hill country of Bundelkhand, sloping down from the outliers of the Vindhyan range on the south to the tributaries of the Jumna on the north. The extreme south is composed of parallel rows of long and narrow-ridged hills. Through the intervening valleys the rivers flow down impetuously over ledges of granite or quartz. North of the hilly region, the rocky granite chains gradually lose them- selves in clusters of smaller hills. The northern portion consists of the level plain of Bundelkhand, distinguished for its deep black soil, known as mar, and admirably adapted for the cultivation of cotton. The district is intersected or bounded by three principal rivers — the Pahuj, Betwa and Dhasan. The district is much cut up, and portions of it are insulated by the surrounding native states. The principal crops are millets, cotton, oil-seeds, pulses, wheat, gram and barley. The destructive kans grass has proved as

great a pest here as elsewhere in Bundelkhand. Jhansi is especially exposed to blights, droughts, floods, hailstorms, epi- demics, and their natural consequence — famine.

Nothing is known with certainty as to the history of this district before the period of Chandel rule, about the nth century of our era. To this epoch must be referred the artificial reser- voirs and architectural remains of the hilly region. The Chandels were succeeded by their servants the Khangars, who built the fort of Karar, lying just outside the British border. About the 14th century the Bundelas poured down upon the plains, and gradually spread themselves over the whole region which now bears their name. The Mahommedan governors were constantly making irruptions into the Bundela country; and in

1732 Chhatar Sal, the Bundela chieftain, called in the aid of the Mahrattas. They came to his assistance with their accustomed promptitude, and were rewarded on the raja's death in 1734, by the bequest of one-third of his dominions. Their general founded the city of Jhansi, and peopled it with inhabitants from Orchha state. In 1806 British protection was promised to the Mahratta chief, and in 1817 the peshwa ceded to the East India Company all his rights over Bundelkhand. In 1853 the raja died childless, and his territories lapsed to the British. The Jhansi state and the Jalaun and Chanderi districts were then formed into a superintendency. The widow of the raja considered herself aggrieved because she was not allowed to adopt an heir, and because the slaughter of cattle was permitted in the Jhansi territory. Reports were spread which excited the religious prejudices of the Hindus. The events of 1857 accordingly found Jhansi ripe for mutiny. In June a few men of the 1 2th native infantry seized the fort containing the treasure and magazine, and massacred the European officers of the garrison. Everywhere the usual anarchic quarrels rose among the rebels, and the country was plundered mercilessly. The rani put herself at the head of the rebels, and died bravely in battle. It was not till November 1858, after a series of sharp contests with various guerilla leaders, that the work of reorgan- ization was fairly set on foot.

JHELUM, or Jehlam {Hydaspes of the Greeks), a river of northern India. It is the most westerly of the " five rivers " of the Punjab. It rises in the north-east of the Kashmir state, flows through the city of Srinagar and the Wular lake, issues through the Pir Panjal range by the narrow pass of Baramula, and enters British territory in the Jhelum district. Thence it flows through the plains of the Punjab, forming the boundary between the Jech Doab and

the Sind Sagar Doab, and finally joins the Chenab at Timmu after a course of 450 miles. The Jhelum colony, in the Shahpur district of the Punjab, formed on the example of the Chenab colony in 1901, is designed to contain a total irrigable area of 1,130,000 acres. The Jhelum canal is a smaller work than the Chenab canal, but its silt is noted for its fertilizing qualities. Both projects have brought great prosperity to the cultivators.

JHELUM, or Jehlam, a town and district of British India, in the Rawalpindi division of the Punjab. The town is situated on the right bank of the river Jhelum, here crossed by a bridge of the North-Western railway, 103 m. N. of Lahore. Pop. (1901), 14,951. It is a modern town with river and railway trade (principally in timber from Kashmir), boat-building and canton- ments for a cavalry and four infantry regiments.

The District of Jhelum stretches from the river Jhelum almost to the Indus. Area, 2813 sq. m. Pop. (1901), 501,424, showing a decrease of 2 % in the decade. Salt is quarried at the Mayo mine in the Salt Range. There are two coal-mines, the only ones worked in the province, from which the North-Western railway obtains part of its supply of coal. The chief centre of the salt trade is Pind Dadan Khan (pop. 13,770). The district is crossed by the main line of the North-Western railway, and also traversed along the south by a branch line. The river Jhelum is navigable throughout the district, which forms the south-eastern portion of a rugged Himalayan spur, extending between the Indus and Jhelum to the borders of the Sind Sagar Doab. Its scenery is very picturesque, although not of so wild a character as the mountain region of Rawalpindi to the north, and is lighted up in places by smiling patches of cultivated valley. The backbone of the district is formed by the Salt Range, a treble line of parallel hills running in three long forks from east to west throughout its whole breadth. The range rises in bold precipices, broken by gorges, clothed with brushwood and tra- versed by streams which are at first pure, but soon become impregnated with the saline matter over which they pass. Between the line of hills lies a picturesque table-land, in which the beautiful little lake of Kallar Kahar nestles amongst the minor ridges. North of the Salt Range, the country extends upwards in an elevated plateau, diversified by countless ravines and fissures, until it loses itself in tangled masses of Rawalpindi

mountains. In this rugged tract cultivation is rare and difficult, the soil being choked with saline matter. At the foot of the Salt Range, however, a small strip of level soil lies along the banks of the Jhelum, and is thickly dotted with prosperous villages. The drainage of the district is determined by a low central watershed running north and south at right angles to the Salt Range. The waters of the western portion find their way into the Sohan, and finally into the Indus; those of the opposite slope collect themselves into small torrents, and empty themselves into the Jhelum.

The history of the district dates back to the semi-mythical period of the Mahdbhdrata. Hindu tradition represents the Salt Range as the refuge of the five Pandava brethren during the period of their exile, and every salient point in its scenery is connected with some legend of the national heroes. Modern research has fixed the site of the conflict between Alexander and Porus as within Jhelum district, although the exact point at which Alexander effected the passage of the Jhelum (or Hydaspes) is disputed. After this event, we have little infor- mation with regard to the condition of the district until the Mahommedan conquest brought back literature and history to Upper India. The Janjuahs and Jats, who now hold the Salt Range and its northern plateau respectively, appear to have been the earliest inhabitants. The Ghakkars seem to represent an early wave of conquest from the east, and they still inhabit the whole eastern slope of the district; while the Awans, who now cluster in the western plain, are apparently later invaders from the opposite quarter. The Ghakkars were the dominant race at the period of the first Mahommedan incursions, and long continued to retain their independence. During the flourishing period of the Mogul dynasty, the Ghakkar chieftains were prosperous and loyal vassals of the house of Baber; but after the collapse of the Delhi Empire Jhelum fell, like its neighbours, under the sway of the Sikhs. In 1765 Gujar Singh defeated the last independent Ghakkar prince, and reduced the wild mountaineers to subjection. His son succeeded to his dominions, until 1 8 10, when he fell before the irresistible power of Ranjit Singh. In 1849 the district passed, with the rest of the Sikh territories, into the hands of the British.

JHERING, RUDOLF VON (1818-1892), German jurist, was born on the 22nd of August 1818 at Aurich in East Friesland, where his father practised as a lawyer. Young Jhering entered the university of Heidelberg in 1836 and, after the fashion of German students, visited successively Gottingen and Berlin. G. F. Puchta, the author of Geschichte des Rechts bei dem romischen Volke, alone of all his teachers appears to have gained his admir- ation and influenced the bent of his mind. After graduating doctor juris, Jhering established himself in 1844 at Berlin as privatdocent for Roman law, and delivered public lectures on the Geist des romischen Rechts, the theme which may be said to have constituted his life's work. In 1845 he became an ordinary professor at Basel, in 1846 at Rostock, in 1849 at Kiel, and in 1 85 1 at Giessen. Upon all these seats of learning he left his mark; beyond any other of his contemporaries he animated the dry bones of Roman law. The German juristic world was still under the dominating influence of the Savigny cult, and the older school looked askance at the daring of the young professor, who essayed to adapt the old to new exigencies and to build up a system of natural jurisprudence. This is the keynote of his famous work, Geist des romischen Rechts auf den

verschiedenen Stufen seiner Entwickelung (1852-1865), which for originality of conception and lucidity of scientific reasoning placed its author in the forefront of modern Roman jurists. It is no exaggeration to say that in the second half of the 19th century the reputation of Jhering was as high as that of Savigny in the first. Their methods were almost diametrically opposed. Savigny and his school represented the conservative, historical tendency. In Jhering the philosophical conception of jurisprudence, as a science to be utilized for the further advancement of the moral and social interests of mankind, was predominant. In 1868 Jhering accepted the chair of Roman Law at Vienna, where his lecture-room was crowded, not only with regular students but

with men of all professions and even of the highest ranks in the official world. He became one of the lions of society, the Austrian emperor conferring upon him in 1872 a title of hereditary nobility. But to a mind constituted like his, the social functions of the Austrian metropolis became wearisome, and he gladly exchanged its brilliant circles for the repose of Gottingen, where he became professor in 1872. In this year he had read at Vienna before an admiring audience a lecture, published under the title of Der Kampf urn's Recht (1872; Eng. trans., Battle for Right, 1884). Its success was extraordinary. Within two years it attained twelve editions, and it has been translated into twenty- six languages. This was followed a few years later by Der Zweck im Recht (2 vols., 1877-1883). In these two works is clearly seen Jhering's individuality. The Kampf urn's Recht shows the firmness of his character, the strength of his sense of justice, and his juristic method and logic: " to assert his rights is the duty that every responsible person owes to himself." In the Zweck im Recht is perceived the bent of the author's intellect. But perhaps the happiest combination of all his distinctive charac- teristics is to be found in his Jurisprudenz des taglichen Lebens (1870; Eng. trans., 1904). A great feature of his lectures was his so-called Praklika, problems in Roman law, and a collection of these with hints for solution was published as early as 1847 under the title Civilrechtsfalle ohne Entscheidungen. In Gottingen he continued to work until his death on the 17th of September 1892. A short time previously he had been the centre of a devoted crowd of friends and former pupils, assembled at Wilhelmshohe near Cassel to celebrate the jubilee of his doc- torate. Almost all countries were worthily represented, and this pilgrimage affords an excellent illustration of the extra- ordinary fascination and enduring influence that Jhering commanded. In appearance he was of middle stature, his face clean-shaven and of classical mould, lit up with vivacity and beaming with good nature. He was perhaps seen at his best

when dispensing hospitality in his own house. With him died the best beloved and the most talented of Roman-law professors of modern times. It was said of him by Professor Adolf Merkel in a memorial address, R. v. Jhering (1893), that he belonged to the happy class of persons to whom Goethe's lines are applicable: "Was ich in der Jugend gewiinscht, das habe ich im Alter die Fiille," and this may justly be said of him, though he did not live to complete his Geist des romischen Rechts and his Rechts-geschichte. For this work the span of a single life would have been insufficient, but what he has left to the world is a monument of vigorous intellectual power and stamps Jhering as an original thinker and unrivalled exponent (in his peculiar interpretation) of the spirit of Roman law.

Among others of his works, all of them characteristic of the author and sparkling with wit, may be mentioned the following: Beitrdge zur Lehre von Besitz, first published in the Jahrbiicher fur die Dogmatik des heutigen romischen und deutschen Privat-rechts, and then separ- ately; Der Besitzwille, and an article entitled "Besitz" in the Handworterbuch der Staatswissenschaften (1891), which aroused at the time much controversy, particularly on account of the opposition manifested to Savigny's conception of the subject. See also Scherz und Ernst in der Jurisprudenz (1 885) ; Das Schuldmoment im romischen Privat-recht (1867); Das Trinkgeld (1882); and among the papers he left behind him his Vorgeschichte der Indoeuropder , a fragment, has been published by v. Ehrenberg (1894). See for an account of his life also M. de Jonge, Rudolf v. Jhering (1888); and A. Merkel, Rudolf von Jhering (1893). (P. A. A.)

JIBITOS, a tribe of South American Indians, first met with by the Franciscans in 1676 in the forest near the Huallaga river, in the Peruvian province of Loreto. After their con- version they settled in villages on the western bank of the river.

JIBUTI (Djibouti), the chief port and capital of French Somaliland, in n° 35′ N., 43 10′ E. Jibuti is situated at the entrance to and on the southern shore of the Gulf of Tajura abvnit 150 m. S.W. of Aden. The town is built on a horseshoe- shaped peninsula partly consisting of mud flats, which are spanned by causeways. The chief buildings are the governor's palace, customs-house, post office, and the terminal station of the railway to Abyssinia. The houses in the European

quarter are built of stone, are fiat-roofed and provided with verandas. There is a good water supply, drawn from a reser- voir about 2§ m. distant. The harbour is land-locked and capacious. Ocean steamers are able to enter it at all states of wind and tide. Adjoining the mainland is the native town, consisting mostly of roughly made wooden houses with well thatched roofs. In it is held a large market, chiefly for the disposal of live

stock, camels, cattle, &c. The port is a regular calling-place and also a coaling station for the steamers of the Messageries Maritimes, and there is a local service to Aden. Trade is confined to coaling passing ships and to importing goods for and exporting goods from southern Abyssinia via Harrar, there being no local industries. (For statistics see Somaliland, French.) The inhabitants are of many races — Somali, Danakil, Gallas, Armenians, Jews, Arabs, Indians, besides Greeks, Italians, French and other Europeans. The population, which in 1900 when the railway was building was about 15,000, had fallen in 1907 to some 5000 or 6000, including 300 Europeans.

Jibuti was founded by the French in 1888 in consequence of its superiority to Obok both in respect to harbour accommodation and in nearness to Harrar. It has been the seat of the governor of the colony since May 1896. Order is maintained by a purely native police force. The port is not fortified. ,%

JICARILLA, a tribe of North American Indians of Athapascan stock. Their former range was in New Mexico, about the head- waters of the Rio Grande and the Pecos, and they are now settled in a reservation on the northern border of New Mexico. Origin- ally a scourge of the district, they are now subdued, but remain uncivilized. They number some 800 and are steadily decreasing. The name is said to be from the Spanish jicara, a basket tray, in reference to their excellent basket-work.

JIDDA (also written Jeddah, Djiddah, Djeddeh), a town in Arabia on the Red Sea coast in 21° 28′ N. and 39° 10′ E. It is of importance mainly as the principal landing place of pilgrims to Mecca, from which it is about 46 m. distant. It is situated in a low sandy plain backed by a range of hills 10 m. to the east, with higher mountains behind. The town extends along the beach for about a mile, and is enclosed by a wall with towers at intervals, the seaward angles being commanded by two forts, in the northern of which are the prison and other public buildings. There are three gates, the Medina gate on the north, the Mecca gate on the east, and the Yemen gate (rarely opened) on the south; there are also three small posterns on the west side, the centre one leading to the quay. In front of the Mecca gate is a rambling suburb with shops, coffee houses, and an open market place; before the Medina gate are the Turkish barracks, and beyond them the holy place of Jidda, the tomb of " our mother Eve," surrounded by the principal cemetery.

The tomb is a walled enclosure said to represent the dimensions of the body, about 200 paces long and 15 ft. broad. At the head is a small erection where gifts are deposited, and rather more than half-way down a whitewashed dome encloses a small dark chapel within which is the black

stone known as El Surrah, the navel. The grave of Eve is mentioned by Edrisi, but except the black stone nothing bears any aspect of antiquity (see Burton's Pilgrimage, vol. ii.).

The sea face is the best part of the town; the houses there are lofty and well built of the rough coral that crops out all along the shore. The streets are narrow and winding. There are two mosques of considerable size and a number of smaller ones. The outer suburbs are merely collections of brushwood huts. The bazaars are well supplied with food-stuffs imported by sea, and fruit and vegetables from Taif and Wadi Fatima. The water supply is limited and brackish; there are, however, two sweet wells and a spring 7J m. from the town, and most, of the houses have cisterns for storing rain-water. The climate is hot and damp, but fever is not so prevalent as at Mecca. The harbour though inconvenient of access is well protected by coral reefs; there are, however, no wharves or other dock facilities and cargo is landed in small Arab boats, sambuks.

The governor is a Turkish kaimakam under the vali of Hejaz, and there is a large Turkish garrison; the sharif of Mecca, however, through his agent at Jidda exercises an authority

practically superior to tnat of the sultan's officials. Consulates are maintained by Great Britain, France, Austria, Russia, Holland, Belgium and Persia. The permanent population is estimated at 20,000, of which less than half are Arabs, and of these a large number are foreigners from Yemen and Hadramut, the remainder are negroes and Somali with a few Indian and Greek traders.

Jidda is said to have been founded by Persian merchants in the caliphate of Othman, but its great commercial prosperity dates from the beginning of the 15th century when it became the centre of trade between Egypt and India. Down to the time of Burckhardt (181 5) the Suez ships went no farther than Jidda, where they were met by Indian vessels. The introduction of steamers deprived Jidda of its place as an emporium, not only for Indian goods but for the products of the Red Sea, which formerly were collected here, but are now largely exported direct by steamer from Hodeda, Suakin, Jibuti and Aden. At the same time it gave a great impulse to the pilgrim traffic which is now regarded as the annual harvest of Jidda. The average number of pilgrims arriving^by sea exceeds 50,000, and in 1903-1904 the total came to 74,600. The changed status of the port if, shown in its trade returns, for while its exports decreased from £250,000

in 1880 to £25,000 in 1904, its imports in the latter year amounted to over £1,400,000. The adverse balance of trade is paid by a very large export of specie, collected from the pilgrims during their stay in the country.

JIG, a brisk lively dance, the quick and irregular steps of which have varied at different times and in the various countries in which it has been danced (see Dance). The music of the " jig," or such as is written in its rhythm, is in various times and has been used frequently to finish a suite, e.g. by Bach and Handel. The word has usually been derived from or con- nected with Fr. gigue, Ital. giga, Ger. Geige, a fiddle. The French and Italian words are now chiefly used of the dance or dance rhythm, and in this sense have been taken by etymologists as adapted from the English " jig," which may have been originally an onomatopoeic word. The idea of jumping, jerking move- ment has given rise to many applications of " jig " and its derivative " jigger " to mechanical and other devices, such as the machine used for separating the heavier metal-bearing por- tions from the lighter parts in ore-dressing, or a tackle consisting of a double and single block and fall, &c. The word " jigger," a corruption of the West Indian chigoe, is also used as the name of a species of flea, the Sarcopsylla penetrans, which burrows and lays its eggs in the human foot, generally under the toe nails, and causes great swelling and irritation (see Flea).

JIHAD (also written Jehad, Jahad, Djehad), an Arabic word of which the literal meaning is an effort or a contest. It is used to designate the religious duty inculcated in the Koran on the followers of Mahomet to wage war upon those who do not accept the doctrines of Islam. This duty is laid down in five suras — all of these suras belonging to the period after Mahomet had established his power. Conquered peoples who will neither embrace Islam nor pay a poll-tax ijizya) are to be put to the sword. (See further Mahommedan Institutions.) By Mahommedan commentators the commands in the Koran are not interpreted as a general injunction on all Moslems constantly to make war on the infidels. It is generally supposed that the order for a general war can only be given by the caliph (an office now claimed by the sultans of Turkey). Mahommedans who do not acknowledge the spiritual authority of the Ottoman sultan, such as the Persians and Moors, look to their own rulers for the proclamation of a jihad; there has been in fact no universal warfare by Moslems on unbelievers since the early days of Mahommedanism. Jihads are generally proclaimed by all persons who claim to be mahdis, e.g. Mahommed Ahmad (the Sudanese mahdi) proclaimed a jihad in 1882. In the belief of Moslems every one of their number slain in a jihad is taken straight to paradise.

JIMENES (or Ximenes) DE CISNEROS, FRANCISCO (1436- 1517) , Spanish cardinal and statesman, was born in 1436 at Torrelaguna in

Castile, of good but poor family. He studied at

Alcala. de Henares and afterwards at Salamanca; and in 1459, having entered holy orders, he went to Rome. Returning to Spain in 1465, he brought with him an " expective " letter from the pope, in virtue of which he took possession of the archpriest- ship of Uzeda in the diocese of Toledo in 1473. Carillo, arch- bishop of Toledo, opposed him, and on his obstinate refusal to give way threw him into prison. For six years Jimenes held out, and at length in 1480 Carillo restored him to his benefice. This Jimenes exchanged almost at once for a chaplaincy at Siguenza, under Cardinal Mendoza, bishop of Siguenza, who shortly appointed him vicar-general of his diocese. In that posi- tion Jimenes won golden opinions from ecclesiastic and layman; and he seemed to be on the sure road to distinction among the secular clergy, when he abruptly resolved to become a monk. Throwing up all his benefices, and changing his baptismal name Gonzales for that of Francisco, he entered the Franciscan monastery of San Juan de los Reyes, recently founded by Fer dinand and Isabella at Toledo. Not content with the ordinary severities of the noviciate, he added voluntary austerities. He slept on the bare ground, wore a hair-shirt, doubled his fasts, and scourged himself with much fervour; indeed throughout his whole life, even when at the acme of his greatness, his private life was most rigorously ascetic. The report of his sanctity brought crowds to confess to him; but from them he retired to the lonely monastery of Our Lady of Castanar; and he even built with his own hands a rude hut in the neighbouring woods, in which he lived at times as an anchorite. He was afterwards guardian of a monastery at Salzeda. Meanwhile Mendoza (now archbishop of Toledo) had not forgotten him; and in 1492 he recommended him to Isabella as her confessor. The queen sent for Jimenes, was pleased with him, and to his great reluctance forced the office upon him. The post was politically important, for Isabella submitted to the judgment of her father-confessor not only her private affairs but also matters of state. Jimenes's severe sanctity soon won him considerable influence over Isabella; and thus it was that he first emerged into political life. In 1494 the queen's confessor was appointed provincial of the order of St Francis, and at once set about reducing the laxity of the conventual to the strictness of the observantine Franciscans. Intense opposition was continued even after Jimenes became archbishop of Toledo. The general of the order himself came from Rome to interfere with the archbishop's measures of reform, but the stern inflexibility of Jimenes, backed by the influence of the queen, subdued every obstacle. Cardinal Mendoza had died in 1495, and Isabella had secretly procured a papal bull nomina- ting her confessor to his diocese of Toledo, the richest and most powerful in Spain, second perhaps to no other dignity of the Roman Church save the papacy. Long and sincerely Jimenes strove to evade the honour; but his nolo episcopari was after six months

overcome by a second bull ordering him to accept consecration. With the primacy of Spain was associated the lofty dignity of high chancellor of Castile; but Jimenes still maintained his lowly life; and, although a message from Rome required him to live in a style befitting his rank, the outward pomp only concealed his private asceticism. In 1499 Jimenes accompanied the court to Granada, and there eagerly joined the mild and pious Archbishop Talavera in his efforts to convert the Moors. Talayera had begun with gentle measures, but Jimenes preferred to proceed by haranguing the fakihs, or doctors of religion, and loading them with gifts. Outwardly the latter method was successful; in two months the converts were so numerous that they had to be baptized by aspersion. The indignation of the unconverted Moors swelled into open revolt. Jimenes was besieged in his house, and the utmost difficulty was found in quieting the city. Baptism or exile was offered to the Moors as a punishment for rebellion. The majority accepted baptism; and Isabella, who had been momentarily annoyed at her arch- bishop's imprudence, was satisfied that he had done good service to Christianity.

On the 24th of November 1504 Isabella died. Ferdinand at once resigned the title of king of Castile in favour of his daughter Joan and her husband the archduke Philip, assuming instead

that of regent. Philip was keenly jealous of Ferdinand's pre- tensions to the regency; and it required all the tact of Jimenes to bring about a friendly interview between the princes. Ferdinand finally retired from Castile; and, though Jimenes re- mained, his political weight was less than before. The sudden death of Philip in September 1506 quite overset the already tottering intellect of his wife; his son and heir Charles was still a child; and Ferdinand was at Naples. The nobles of Castile, mutually jealous, agreed to entrust affairs to the archbishop of Toledo, who, moved more by patriotic regard for his country's welfare than by special friendship for Ferdinand, strove to es- tablish the final influence of that king in Castile. Ferdinand did not return till August 1507; and he brought, a cardinal's hat for Jimenes. Shortly afterwards the new cardinal of Spain was appointed grand inquisitor-general for Castile and Leon.

The next great event in the cardinal's life was the expedition against the Moorish city of Oran in the north of Africa, in which his religious zeal was supported by the prospect of the political and material gain that would accrue to Spain from the possession of such a station. A preliminary expedition, equipped, like that which followed, at the expense of Jimenes,

captured the port of Mers-el-Kebir in 1505; and in 1509 a strong force, accompanied by the cardinal in person, set sail for Africa, and in one day the wealthy city was taken by storm. Though the army remained to make fresh conquests, Jimenes returned to Spain, and occupied himself with the administration of his diocese, and in endeavour- ing to recover from the regent the expenses of his Oran expedi- tion. On the 28th of January 1516 Ferdinand died, leaving Jimenes as regent of Castile for Charles (afterwards Charles V.), then a youth of sixteen in the Netherlands. Though Jimenes at once took firm hold of the reins of government, and ruled in a determined and even autocratic manner, the haughty and turbulent Castilian nobility and the jealous intriguing Flemish councillors of Charles combined to render his position peculiarly difficult; while the evils consequent upon the unlimited de- mands of Charles for money threw much undeserved odium upon the regent. In violation of the laws, Jimenes acceded to Charles's desire to be proclaimed king; he secured the person of Charles's younger brother Ferdinand; he fixed the seat of the cortes at Madrid; and he established a standing army by drilling the citizens of the great towns. Immediately on Ferdinand's death, Adrian, dean of Louvain, afterwards pope, produced a commission from Charles appointing him regent. Jimenes admitted him to a nominal equality, but took care that neither he nor the subsequent commissioners of Charles ever had any real share of power. In September 151 7 Charles landed in the province of Asturias, and Jimenes hastened to meet him. On the way, however, he fell ill, not without a suspicion of poison. While thus feeble, he received a letter from Charles coldly thanking him for his services, and giving him leave to retire to his diocese. A few hours after this virtual dismissal, which some, however, say the cardinal never saw, Francisco Jimenes died at Roa, on the 8th of November 1517.

Jimenes was a bold and determined statesman. Sternly and inflexibly, with a confidence that became at times over- bearing, he carried through what he had decided to be right, with as little regard for the convenience of others as for his own. In the midst of a corrupt clergy his morals were irreproachable. He was liberal to all, and founded and maintained very many benevolent institutions in his diocese. His whole time was devoted either to the state or to religion; his only recreation was in theological or scholastic discussion. Perhaps one of the most noteworthy points about the cardinal is the advanced period of life at which he entered upon the stage where he was to play such leading parts. Whether his abrupt change from the secular to the regular clergy was the fervid outcome of religious enthusiasm or the far-seeing move of a wily schemer has been disputed; but the constant austerity of his life, his unvarying superiority to small personal aims, are arguments for the former alternative that are not to be met by merely pointing to the actual honours and power he at last attained.

In 1500 was founded, and. in 1508 was opened, the university of Alcala de Henares, which, fostered by Cardinal Jimenes, at whose sole expense it was raised, attained a great pitch of outward magni- ficence and internal worth. At one time 7000 students met within its walls. In 1836 the university was removed to Madrid, and the costly buildings were left vacant. In the hopes of supplanting the romances generally found in the hands of the young, Jimenes caused to be published religious treatises by himself and others. He revived also the Mozarabic liturgy, and endowed a chapel at Toledo, in which it was to be used. But his most famous literary service was the printing at Alcala (in Latin Complutum) of theComplutensian Polyglott, the first edition of the Christian Scriptures in the original text. In this work, on which he is said to have expended half a million of ducats, the cardinal was aided by the celebrated Stunica (D. Lopez de Zuniga), the Greek scholar Nunez de Guzman (Pin- cianus), the Hebraist Vergara, and the humanist Nebrija, by a Cretan Greek Demetrius Ducas, and by three Jewish converts, of whom Zamora edited the Targum to the Pentateuch. The other Targums are not included. In the Old Testament Jerome's version stands between the Greek and Hebrew. The synagogue and the Eastern church, as the preface expresses it, are set like the thieves on this side and on that, with Jesus (that is, the Roman Church) in the midst. The text occupies five volumes, and a sixth contains a Hebrew lexicon, &c. The work commenced in 1502. The New Testament was finished in January 15 14, and the whole in April 1517. It was dedicated to Leo X., and was reprinted in 1572 by the Antwerp firm of Plantin, after revision by Benito Arias Montano at the expense of Philip II. The second edition is known as the Biblia Regia or Filipina.

The work by Alvaro Gomez de Castro, De Rebus Gestis Francisci Ximenii (folio, 1659, Alcala), is the quarry whence have come the materials for biographies of Jimenes — in Spanish by Robles (1604) and Quintanilla (1633); in French by Baudier (1635), Marsollier (1684), Flechier (1694) and Richard (1704); in German by Hefele (1844, translated into English by Canon Dalton, i860) and Have- mann (1848); and in English by Barrett (1813). See also Prescott's Ferdinand and Isabella; Revue des Deux Mondes (May 1841) and Mem. de I'Acad. d'hist. de Madrid, vol. iv.

JIND, a native state of India, within the Punjab. It ranks as one of the Cis-Sutlej states, which came under British influence in 1809. The territory consists of three isolated tracts, amid British districts. Total area, 1332 sq. m. Pop. (1901), 282,003, showing a decrease of 1% in the decade. Estimated gross revenue £109,000; there is no tribute. Grain and cotton are ex- ported, and there are manufactures of gold and silver ornaments, leather and wooden wares and cloth. The chief, whose title is raja, is a Sikh of the Sidhu Jat clan and of the Phulkian family. The principality was founded in 1763, and the chief was recog- nized by the Mogul emperor in

1768. The dynasty has always been famous for its loyalty to the British, especially during the Mutiny, which has been rewarded with accessions of territory. In 1857 the raja of Jind was actually the first man, European or native, who took the field against the mutineers; and his con- tingent collected supplies in advance for the British troops marching upon Delhi, besides rendering excellent service during the siege. Raja Ranbir Singh succeeded as a minor in 1887, and was granted full powers in 1899. During the Tirah expedition of 1897-98 the Jind imperial service infantry specially distin- guished themselves. The town of Jind, the former capital, has a station on the Southern Punjab railway, 80 m. N.W. of Delhi. Pop. (1901), 8047. The present capital and residence of the raja since 1827 is Sangrur; pop. (1901), 11,852.

JINGO, a legendary empress of Japan, wife of Chuai, the 14th mikado (191-200). On her husband's death she assumed the government, and fitted out an army for the invasion of Korea (see Japan, § 9). She returned to Japan completely victorious after three years' absence. Subsequently her son Ojen Tenno, afterwards 15th mikado, was born, and later was canonized as Hachiman, god of war. The empress Jingo ruled over Japan till 270. She is still worshipped.

As regards the English oath, usually " By Jingo," or " By the living Jingo," the derivation is doubtful. The identification with the name of Gingulph or Gengulphus, a Burgundian saint who was martyred on the 1 ith of May 760, was a joke on the part of R. H. Barham, author of the Ingoldsby Legends. Some explain the word as a corruption of Jainko, the Basque name for God. It has also been derived from the "Persia.11 jang (war), St Jingo being the equivalent of the Latin god of war, Mars; and is even explained as a corruption of " Jesus, Son of God," Je-n-go. In

support of the Basque derivation it is alleged that the oath was first common in Wales, to aid in the conquest of which Edward I. imported a number of Basque mercenaries. The phrase does not, however, appear in literature before the 17th century, first as conjurer's jargon. Motteux, in his " Rabelais," is the first to use " by jingo," translating par dieu. The political use of the word as indicating an aggressive patriotism (Jingoes and Jingoism) originated in 1877 during the weeks of national excitement pre- luding the despatch of the British Mediterranean squadron to Gallipoli, thus frustrating Russian designs on Constantinople. While the public were on the tiptoe of expectation as to what policy the government would pursue, a bellicose music-hall song with the refrain " We don't want to

fight, but by Jingo if we do," &c, was produced in London by a singer known as " the great MacDermott," and instantly became very popular. Thus the war-party came to be called Jingoes, and Jingoism has ever since been the term applied to those who advocate a national policy of arrogance and pugnacity.

For a discussion of the etymology of Jingo see Notes and Queries, (August 25, 1894), 8th series, p. 149.

JINN (Djinn), the name of a class of spirits {genii) in Arabian mythology. They are the offspring of fire, but in their form and the propagation of their kind they resemble human beings. They are ruled by a race of kings named " Suleyman," one of whom is considered to have built the pyramids. Their central home is the mountain Kaf , and they manifest themselves to men under both animal and mortal form and become invisible at will. There are good and evil jinn, and these in, each case reach the extremes of beauty and ugliness.

JIRECEK, JOSEF (1825-1888), Czech scholar, was born at Vysoke My to in Bohemia on the 9th of October 1825. He entered the Prague bureau of education in 1850, and became minister of the department in the Hohenwart cabinet in 187 1. His efforts to secure equal educational privileges for the Slav nationalities in the Austrian dominions brought him into disfavour with the German element. He became a member of the Bohemian Land- tag in 1878, and of the Austrian Reichsrat in 1879. His merits as a scholar were recognized in 1875 by his election as president of the royal Bohemian academy of sciences. He died in Prague on the 25th of November 1888.

With Hermenegild Jirecek he defended in 1862 the genuineness of the Koniginhof MS. discovered by Wenceslaus Hanka. He published in the Czech language an anthology of Czech literature (3 vols., 1858-1861), a biographical dictionary of Czech writers (2 vols., 1875-1876), a Czech hymnology, editions of Blahoslaw's Czech grammar and of some Czech classics, and of the works of his father-in-law Pavel Josef Safarik (1795-1861).

His brother Hermenegild JireCek, Ritter von Samakow (1827-), Bohemian jurisconsult, who was born at Vysoke Myto on the 13th of April 1827, was also an official in the education department.

Among his important works on Slavonic law were Codex juris bohemici (11 parts, 1 867-1 892), and a Collection of Slav Folk-Law (Czech, 1880), Slav Law in Bohemia and Moravia down to the 14th Century (Czech, 3 vols. 1863-1873).

Jirecek, Konstantin Josef (1854-), son of Josef, taught history at Prague. He entered the Bulgarian service in 1879, and in 1881 became minister of education at Sofia. In 1884 he became professor of universal history in Czech at Prague, and in 1893 professor of Slavonic antiquities at Vienna.

The bulk of Konstantin's writings deal with the history of the southern Slavs and their literature. They include a History of the Bulgars (Czech and German, 1876), The Principality of Bulgaria (1891), Travels in Bulgaria (Czech, 1 888), &c.

JIZAKH, a town of Russian Central Asia, in the province of Samarkand, on the Transcaspian railway, 71m. N.E. of the city of Samarkand. Pop. (1897), 16,041. As a fortified post of Bokhara it was captured by the Russians in 1866.

JOAB (Heb. " Yah[weh] is a father "), in the Bible, the son of Zeruiah, David's sister (1 Chron. ii. 16). His brothers were Asahel and Abishai. All three were renowned warriors and played a prominent part in David's history. Abishai on one occasion saved the king's life from a Philistine giant (2 Sam. xxi. 17), and Joab as warrior and statesman was directly respon-

sible for much of David's success. Joab won his spurs, according to one account, by capturing Jerusalem (1 Chron. xi. 4-9) ; with Abishai and Ittai of Gath he led a small army against the Israel- ites who had rebelled under Absalom (2 Sam. xviii. 2); and he superintended the campaign against Ammon and Edom (2 Sam. xi. 1, xii. 26; 1 Kings xi. 15). He showed his sturdy character by urging the king after the death of Absalom to place his duty to his people before his grief for the loss of his favourite son (2 Sam. xix. 1-8), and by protesting against David's proposal to number the people, an innovation which may have been regarded as an infringement of their liberties (2 Sam. xxiv.; 1 Chron. xxi. 6).

The hostility of the " sons of Zeruiah " towards the tribe of Benjamin is characteristically contrasted with David's own gener- osity towards Saul's fallen house. Abishai proposed to kill Saul when David surprised him asleep (1 Sam. xxvi. 8), and was anxious to slay Shimei when he cursed the ting (2 Sam. xvi. 9). But David was resigned to the will of Yahweh and refused to entertain the suggestions. After Asahel met his death at the hands of Abner, Joab expostulated with David for not taking revenge upon the guilty one, and indeed the king might be considered bound in honour to take up his nephew's cause. But when Joab himself killed Abner, David's imprecation against him and his brother Abishai showed that he dissociated himself from the act of vengeance, although it brought him nearer to the

throne of all Israel (2 Sam. iii.). Fear of a possible rival may have influenced Joab, and this at all events led him to slay Amasa of Judah (2 Sam. xx. 4-13). The two deeds are similar, and the impression left by them is expressed in David's last charges to Solomon (1 Kings ii.). But here Joab had taken the side of Adonfjah against Solomon, and was put to death by Benaiah at Solomon's command, and it is possible that the charges are the fruit of a later tradition to remove all possible blame from Solomon (g.tf.). It is singular that Joab is not blamed for killing Absalom, but it would indeed be strange if the man who helped to reconcile father and son (2 Sam. xiv.) should have perpetrated so cruel an act in direct opposition to the king's wishes (xviii. 5, 10-16). A certain animus against Joab's family thus seems to underlie some of the popular narratives of the life of David {q.v.). (S. A. C.)

JOACHIM OF FLORIS (c. 1145-1202), so named from the monastery of San Giovanni in Fiore, of which he was abbot, Italian mystic theologian, was born at Celico, near Cosenza, in Calabria. He was of noble birth and was brought up at the court of Duke Roger of Apulia. At an early age he went to visit the holy places. After seeing his comrades decimated by the plague at Constantinople he resolved to change his mode of life, and, on his return to Italy, after a rigorous pilgrimage and a period of ascetic retreat, became a monk in the Cistercian abbey of Casamari. In August 1 1 77 we know that he was abbot of the monastery of Corazzo, near Martirano. In 1183 he went to the court of Pope Lucius III. at Veroli, and in 1185 visited Urban III. at Verona. There is extant a letter of Pope Clement III., dated the 8th of June 1188, in which Clement alludes to two of Joachim's works, the Concordia and the Expositio in Apocalypsin, and urges him to continue them. Joachim, however, was unable to continue his abbatial functions in the midst of his labours in prophetic exegesis, and, moreover, his asceticism accommodated itself but ill with the somewhat lax discipline of Corazzo. He accordingly retired into the solitudes of Pietralata, and subsequently founded with some companions under a rule of his own creation the abbey of San Giovanni in Fiore, on Monte Nero, in the massif of La Sila. The pope and the emperor befriended this foundation; Frederick. II. and his wife Constance made important donations to it, and promoted the spread of offshoots of the parent house; while Innocent III., on the 21st of January 1204, approved the " ordo Florensis " and the " institutio " which its founder had bestowed upon it. Joachim died in 1202, probably on the 20th of March.

Of the many prophetic and polemical works that were attributed to Joachim in the 13th and following centuries, only those enu- merated in his will can be regarded as absolutely authentic. These are the Concordia novi et veteris Testamenti (first printed at Venice in 1519), the Expositio in Apocalypsin (Venice, 1527), the Psallerium decern chordarum (Venice,

1527), together with some " libelli " against the Jews or the adversaries of the Christian faith. It is very probable that these " libelli " are the writings entitled Concordia Evangeliorum, Contra Judaeos, De articulis fidei, Confessio fidei and De unitate Trinitatis. The last is perhaps the work which was condemned by the Lateran council in 1 2 1 5 as containing an erroneous

criticism of the Trinitarian theory of Peter Lombard. This council, though condemning the book, refrained from condemning the author, and approved the order of Floris. Nevertheless, the monks continued to be subjected to insults as followers of a heretic, until they obtained from Honorius III. in 1220 a bull formally recognizing Joachim as orthodox and forbidding anyone to injure his disciples.

It is impossible to enumerate here all the works attributed to Joachim. Some served their avowed object with great success, being powerful instruments in the anti-papal polemic and sustaining the revolted Franciscans in their hope of an approaching triumph. Among the most widely circulated were the commentaries on Jeremiah, Isaiah and Ezekiel, the Vaticinia pontificum and the De oneribus ecclesiae. Of his authentic works the doctrinal essential is very simple. Joachim divides the history of humanity, past, present and future, into three periods, which, in his Expcsitio in Apocalypsin (bk. i. ch. 5), he defines as the age of the Law, or of the Father ; the age of the Gospel, or of the Son ; and the age of the Spirit, which will bring the ages to an end. Before each of these ages there is a period of incubation, or initiation: the first age begins with Abraham, but the period of initiation with the first man Adam. The initiation period of the third age begins with St Benedict, while the actual age of the Spirit is not to begin until 1260, the Church — ■ mulier amicta sole (Rev. xii. 1) — remaining hidden in the wilderness 1260 days. We cannot here enter into the infinite details of the other subdivisions imagined by Joachim, or into his system of perpetual concordances between the New and the Old Testaments, which, according to him, furnish the prefiguration of the third age. Far more interesting as explaining the diffusion and the religious and social importance of his doctrine is his conception of the second and third ages. The first age was the age of the Letter, the second was intermediary between the Letter and the Spirit, and the third was to be the age of the Spirit. The age of the Son is the period of study and wisdom, the period of striving towards mystic know- ledge. I n the age of the Father all that was

necessary was obedience ; in the age of the Son reading is enjoined ; but the age of the Spirit was to be devoted to prayer and song. The third is the age of the plena spiritus libertas, the age of contemplation, the monastic age par excellence, the age of a monachism wholly directed towards ecstasy, more Oriental than Benedictine. Joachim does not conceal his sympathies with the ideal of Basilian monachism. In his opinion — which is, in form at least, perfectly orthodox — the church of Peter will be, not abolished, but purified; actually, the hierarchy effaces itself in the third age before the order of the monks, the viri spirituales. The entire world will become a vast monastery in that day, which will be the resting-season, the sabbath of humanity. In various passages in Joachim's writings the clerical hierarchy is represented by Rachel and the contemplative order by her son Joseph, and Rachel is destined to efface herself before her son. Similarly, the teaching of Christ and the Apostles on the sacraments is considered, implicitly and explicitly, as transi- tory, as representing that passage from the significantia to the significata which Joachim signalizes at every stage of his demonstra- tion. Joachim was not disturbed during his lifetime. In 1200 he submitted all his writings to the judgment of the Holy See, and unreservedly affirmed his orthodoxy; the Lateran council, which condemned his criticism of Peter Lombard, made no allusion to his eschatological temerities; and the bull of 1220 was a formal certificate of his orthodoxy.

The Joachimite ideas soon spread into Italy and France, and especially after a division had been produced in the Franciscan order. The rigorists, who soon became known as " Spirituals," represented St Francis as the initiator of Joachim's third age. Certain convents became centres of Joachimism. Around the hermit of Hyeres, Hugh of Digne, was formed a group of Franciscans who expected from the advent of the third age the triumph of their ascetic ideas. The Joachimites even obtained a majority in the general chapter of 1247, and elected John of Parma, one of their number, general of the order. Pope Alexander IV., however, compelled John of Parma to renounce his dignity, and the Joachimite opposition became more and more vehement. Pseudo-Joachimite treatises sprang up on every hand, and, finally, in 1254, there appeared in Paris the Liber introductorius ad Evangelium aeternum, the work of a Spiritual Franciscan, Gherardo da Borgo San Donnino. This book was published with, and as an introduction to, the three principal works of Joachim, in which the Spirituals had made some interpolations. 1 Gherardo, however, did not say, as has been supposed, that Joachim's books were the new gospel, but merely that the Calabrian abbot had supplied the key to Holy Writ, and that with the help of that intelligentia mystica it would be possible to extract from the Old and New Testaments the eternal meaning, the gospel according to the Spirit, a gospel which would never be written; as for this

eternal sense, it had been entrusted to an order set apart, to the Franciscan order announced by Joachim, and in this order the ideal of the third age was realized. These affirmations provoked very keen protests in the ecclesiastical world. The secular masters of the university of Paris denounced the work to Pope Innocent IV., and the bishop of Paris sent it to the pope. It

1 Preger is the only writer who has maintained that the three books in their primitive form date from 1254.

was Innocent's successor, Alexander IV., who appointed a commis- sion to examine it; and as a result of this commission, which sat at Anagni, the destruction of the Liber introductorius was ordered by a papal breve dated the 23rd of October 1255. In 1260 a council held at Aries condemned Joachim's writings and his supporters, who were very numerous in that region. The Joachimite ideas were equally persistent among the Spirituals, and acquired new strength with the publication of the commentary on the Apocalypse. This book, probably published after the death of its author and probably interpolated by his disciples, contains, besides Joachimite principles, an affirmation even clearer than that of Gherardo da Borgo of the elect character of the Franciscan order, as well as extremely violent attacks on the papacy. The Joachimite literature is extremely vast. From the 14th century to the middle of the 16th, Ubertin of Casale (in his Arbor Vitae crucifixae) , Bartholomew of Pisa (author of the Liber Conformitatum) , the Calabrian hermit Telesphorus, John of La Rochetaillade, Seraphin of Fermo, Johannes Anmus of Viterbo, Coelius Pannonius, and a host of other writers, repeated or complicated ad infinitum the exegesis of Abbot Joachim. A treatise entitled De ultima aetate ecclesiae, which appeared in 1356, has been attributed to Wycliffe, but is undoubtedly from the pen of an anonymous Joachimite Franciscan. The heterodox movements in Italy in the 13th and 14th centuries, such as those of the Segarellists, Dolcinists, and Fraticelli of every description, were penetrated with Joachimism; while such independent spirits as Roger Bacon, Arnaldus de Villa Nova and Bernard Delicieux often comforted themselves with the thought of the era of justice and peace promised by Joachim. Dante held Joachim in great reverence, and has placed him in Paradise (Par., xii. 140-141).

See Acta Sanctorum, Boll. (May), vii. 94-112; W. Preger in Abhandl. der kgl. Akad. der Wissenschaften, hist, sect., vol. xii., pt. 3 (Munich, 1874); idem, Gesch. d. deutschen Mystik im Miltel- alter, vol. i. (Leipzig, 1874); E. Renan, "Joachim de Flore et l'Evangile eternel " in Nouvelles etudes d'histoire religieuse (Paris, 1884); F Tocco, L'Eresia nel medio evo (Florence, 1884); H. Denifle, " Das Evangelium aeternum und die Commission zu Anagni " in Archiv fur Literatur- und Kirchengesch. des

Mittelalters, vol. i. ; Paul Fournier, " Joachim de Flore, ses doctrines, son influence " in Revue des questions historiques, t. i. (1900); H. C. Lea, History of the Inquisition of the Middle Ages, vol. iii. ch. i. (London, 1888); F. Ehrle's article " Joachim " in Wetzer and Welte's Kirchenlexikon. On Joachimism see E. Gebhardt, " Recherches nouvelles sur l'histoire du Joachimisme " in Revue historique, vol. xxxi. (1886); H. Haupt, " Zur Gesch. des Joachimismus " in Briegers Zeitschrift fur Kirchengesch., vol. vii. (1885). (P. A.)

JOACHIM I. (1484-1 535) , surnamed Nestor, elector of Branden- burg, elder son of John Cicero, elector of Brandenburg, was born on the 21st of February 1484. He received an excellent educa- tion, became elector of Brandenburg on his father's death in January 1499, an d soon afterwards married Elizabeth, daughter of John, king of Denmark. He took some part in the political complications of the Scandinavian kingdoms, but the early years of his reign were mainly spent in the administration of his elector- ate, where by stern and cruel measures he succeeded in restoring some degree of order (see Brandenburg). He also improved the administration of justice, aided the development of commerce, and was a friend to the towns. On the approach of the imperial election of 15 19, Joachim's vote was eagerly solicited by the partisans of Francis I., king of France, and by those of Charles, afterwards the emperor Charles V. Having treated with, and received lavish promises from, both parties, he appears to have hoped for the dignity for himself; but when the election came he turned to the winning side and voted for Charles. In spite of this step, however, the relations between the emperor and the elector were not friendly, and during the next few years Joachim was frequently in communication with the enemies of Charles. Joachim is best known as a pugnacious adherent of Catholic orthodoxy. He was one of the princes who urged upon the emperor the necessity of enforcing the Edict of Worms, and at several diets was prominent among the enemies of the Reformers. He was among those who met at Dessau in July 1525, and was a member of the league established at Halle in November 1533. But his wife adopted the reformed faith, and in 1528 fled for safety to Saxony; and he had the mortification of seeing these doctrines also favoured by other members of his family. Joachim, who was a patron of learning, established the uni- versity of Frankfort-on-the-Oder in 1506. He died at Stendal on the nth of July 1535.

See T. von Buttlar, Der Kampf Joachims I. von Brandenburg gegen den Adel (1889); J. G. Droysen, Geschichte der Preussischen Polilik

(1855-1886).

JOACHIM II.— JOACHIM, JOSEPH

JOACHIM II. (1505-1571), surnamed Hector, elector of Bran- denburg, the elder son of Joachim I., elector of Brandenburg, was born on the 13th of January 1505. Having passed some time at the court of the emperor Maximilian I., he married in 1524 a daughter of George, duke of Saxony. In 1532 he led a contingent of the imperial army on a campaign against the Turks; and soon afterwards, having lost his first wife, married Hedwig, daughter of Sigismund I., king of Poland. He became elector of Brandenburg on his father's death in July 1535, and undertook the government of the old and middle marks, while the new mark passed to his brother – John. Joachim took a prominent part in imperial politics as an advocate of peace, though with a due regard for the interests of the house of Habs- burg. He attempted to make peace between the Protestants and the emperor Charles V. at Frankfort in 1539, and subse- quently at other places; but in 1542 he led the German forces on an unsuccessful campaign against the Turks. When the war broke out between Charles and the league of Schmalkalden in 1546 the elector at first remained neutral; but he afterwards sent some troops to serve under the emperor. With Maurice, elector of Saxony, he persuaded Philip, landgrave of Hesse, to surrender to Charles after the imperial victory at Miihlberg in April 1547, and pledged his word that the landgrave would be pardoned. But, although he felt aggrieved when the emperor declined to be bound by this promise, he refused to join Maurice in his attack on Charles. He supported the Interim, which was issued from Augsburg in May 1548, and took part in the negotiations that resulted in the treaty of Passau (1552), and the religious peace of Augsburg (1555). In domestic politics he sought to consoli- date and strengthen the power of his house by treaties with neighbouring princes, and succeeded in secularizing the bishoprics of Brandenburg, Havelberg and Lebus. Although brought up as a strict adherent of the older religion, he showed signs of wavering soon after his accession, and in 1539 allowed free entrance to the reformed teaching in the electorate. He took the communion himself in both kinds, and established a new ecclesiastical organization in Brandenburg, but retained much of the ceremonial of the Church of Rome. His position was not unlike that of Henry VIII. in England, and may be partly ex- plained by a desire to replenish his impoverished exchequer with the wealth of the Church (see Brandenburg). After the peace of Augsburg the elector mainly confined his attention to Bran- denburg, where he showed a keener desire to further the principles of the Reformation. By his luxurious habits and his lavish expenditure on public buildings he piled up a great accumulation of debt, which was partly discharged by the estates of the land in return for important concessions. He cast covetous eyes upon the archbishopric of Magdeburg and the bishopric of Halberstadt, both of which he secured for his son Frederick in 1551. When Frederick died in the following year, the elector's son Sigismund obtained the two sees; and on Sigismund's death in 1 566

Magdeburg was secured by his nephew, Joachim Frederick, afterwards elector of Brandenburg. Joachim, who was a prince of generous and cultured tastes, died at Kopenick on the 3rd of January 1571, and was succeeded by his son, John George. In 1880 a statue was erected to his memory at Spandau.

See Steinmuller, Einfiihrung der Reformation in die Kurmark Brandenburg durch Joachim II. (1903) ; S. Isaacsohn, " Die Finanzen Joachims II." in the Zeilschrift fur Preussische Geschichte und Landes- kuvde (1864-1883); J. G. Droysen, Geschichte der Preussischen Politik (1855-1886).

JOACHIM, JOSEPH (1831-1907), German violinist and com- poser, was born at Kittsee, near Pressburg, on the 28th of June 1831, the son of Jewish parents. His family moved to Budapest when he was two years old, and he studied there under Serwac- zynski, who brought him out at a concert when he was only eight years old. Afterwards he learnt from the elder Hellmesberger and Joseph Bohm in Vienna, the latter instructing him in the management of the bow. In 1843 he went to Leipzig to enter the newly founded conservatorium. Mendelssohn, after testing his musical powers, pronounced that the regular training of a music school was not needed, but recommended that he should

receive a thorough general education in music from Ferdinand David and Moritz Hauptmann. In 1844 he visited England, and made his first appearance at Drury Lane Theatre, where his playing of Ernst's fantasia on Olello made a great sensation; he also played Beethoven's concerto at a Philharmonic concert conducted by Mendelssohn. In 1847-1849 and 1852 he revisited England, and after the foundation of the popular concerts in 1859, up to 1899, he played there regularly in the latter part of the season. On Liszt's invitation he accepted the post of Konzertmeisler at Weimar, and was there from 1850 to 1853. This brought Joachim into close contact with the advanced school of German musicians, headed by Liszt; and he was strongly tempted to give his allegiance to what was beginning to be called the " music of the future "; but his artistic convic- tions forced him to separate himself from the movement, and the tact and good taste he displayed in the difficult moment of ex- plaining his position to Liszt afford one of the finest illustrations of his character.

His acceptance of a similar post at Hanover brought him into a different atmosphere, and his playing at the Diisseldorf festival of 1853 procured him the intimate friendship of Robert Schu- mann. His introduction of the young Brahms to Schumann is a famous incident of this time. Schumann and Brahms col- laborated with Albert Dietrich in a joint sonata for violin

and piano, as a welcome on his arrival in Diisseldorf. At Hanover he was koniglicher Konzertdirektor from 1853 to 1868, when he made Berlin his home. He married in 1863 the mezzo soprano singer, Amalie Weiss, who died in 1899. In 1869 Joachim was appointed head of the newly founded konigliche Hochschule fur Musik in Berlin. The famous " Joachim quartet " was started in the Sing-Akademie in the following year. Of his later life, continually occupied with public performances, there is little to say except that he remained, even in a period which saw the rise of numerous violinists of the finest technique, the acknowledged master of all. He died on the 15th of August 1907.

Besides the consummate manual skill which helped to make him famous in his youth, Joachim was gifted with the power of interpreting the greatest music in absolute perfection: while Bach, Mozart, Beethoven and Brahms were masters, whose works he played with a degree of insight that has never been approached, he was no less supreme in the music of Mendelssohn and Schumann; in short, the whole of the classical repertory has become identified with his playing. No survey of Joachim's artistic career would be complete which omitted mention of his absolute freedom from tricks or mannerism, his dignified bearing, and his unselfish character. His devotion to the highest ideals, combined with a certain austerity and massivity of style, brought against him an accusation of coldness from admirers of a more effusive temperament. But the answer to this is given by the depth and variety of expression which his mastery of the re- sources of his instrument put at his command. His biographer (1898), Andreas Moser, expressed his essential characteristic in the words, " He plays the violin, not for its own sake, but in the service of an ideal."

As a composer Joachim did but little in his later years, and the works of his earlier life never attained the public success which, in the opinion of many, they deserve (see Music). They un- doubtedly have a certain austerity of character which does not appeal to every hearer, but they are full of beauty of a grave and dignified kind; and in such things as his " Hungarian con- certo " for his own instrument the utmost degree of difficulty is combined with great charm of melodic treatment. The " romance " in B flat for violin and the variations for violin and orchestra are among his finest things, and the noble overture in memory of Kleist, as well as thi scena for mezzo soprano from Schiller's Demetrius, show a wonderful degree of skill in orchestra- tion as well as originality of thought. Joachim's place in musical history as a composer can only be properly appreciated in the light of his intimate relations with Brahms, with whom he studiously refrained from putting himself into independent rivalry, and to whose work as a composer he gave the co-opera- tion of one who might himself have ranked as a master.

There are admirable portraits of Joachim by G. F. Watts (1866) and by J. S. Sargent (1904), the latter presented to him on the 16th of May 1904, at the celebration of the sixtieth anniversary of his first appearance in England.

JOAN, a mythical female pope, who is usually placed between Leo IV. (847-855) and Benedict III. (855-858). One account has it that she was born in England, another in Germany of English parents. After an education at Cologne, she fell in love with a Benedictine monk and fled with him to Athens disguised as a man. On his death she went to Rome under the alias of Joannes Anglicus (John of England), and entered the priesthood, eventually receiving a cardinal's hat. She was elected pope under the title of John VIII., and died in child- birth during a papal procession.

A French Dominican, Steven of Bourbon (d. c. 1261) gives the legend in his Seven Gifts of the Holy Spirit. He is believed to have derived it from an earlier writer. More than a hundred authors between the 13th and 17th centuries gave circulation to the myth. Its explosion was first seriously undertaken by David Blondel, a French Calvinist, in his £claircissement de la question si une femme a ete assise au siege papal de Rome (1647); and De Joanna Papissa (1657). The refutation was completed by Johann Dollinger in his Papstfabeln des Mittelalters (1863; Eng. trans. 1872).

JOAN OF ARC, more properly Jeanneton Darc, afterwards known in France as Jeanne d'Arc 1 (1411-1431), the " Maid of Orleans," was born between 1410 and 1412, the daughter of Jacques Darc, peasant proprietor, of Domremy, a small village in the Vosges, partly in Champagne and partly in Lorraine, and of his wife Isabeau, of the village of Vouthon, who from having made a pilgrimage to Rome had received the usual surname of Romee. Although her parents were in easy circumstances, Joan never learned to read or write, and received her sole religious instruction from her mother, who taught her to recite the Pater Noster, Ave Maria, and Credo. She sometimes guarded her father's flocks, but at her trial in 143 1 she strongly resented being referred to as a shepherd girl. In all household work she was specially proficient, her skill in the use of the needle not being excelled (she said) by that of any matron even of Rouen. In her childhood she was noted for her abounding physical energy; but her vivacity, so far from being tainted by any coarse or un- feminine trait, was the direct outcome of an abnormally sensitive nervous temperament. Towards her parents her conduct was uniformly exemplary, and the charm

of her unselfish kindness made her a favourite in the village. As she grew to womanhood she became inclined to silence, and spent much of her time in solitude and prayer. She repelled all attempts of the young men of her acquaintance to win her favour; and while active in the performance of her duties, and apparently finding her life quite congenial, inwardly she was engrossed with thoughts reaching far beyond the circle of her daily concerns.

At this time, through the alliance and support of Philip of Burgundy, the English had extended their conquest over the whole of France north of the Loire in addition to their possession of Guienne; and while the infant Henry VI. of England had in 1422 been proclaimed king of France at his father's grave at St Denis, Charles the dauphin (still uncrowned) was forced to watch the slow dismemberment of his kingdom. Isabella, the dauphin's mother, had favoured Henry V. of England, the husband of her daughter Catherine; and under Charles VI. a visionary named Marie d'Avignon declared that France was being ruined by a woman and would be restored by an armed virgin from the marches of Lorraine. To what extent this idea worked in Joan's mind is doubtful. In Geoffrey of Monmouth's tract, De pro- phetiis Merlini, there is a reference to an ancient prophecy of the enchanter Merlin concerning a virgin ex netnore canulo, and it appears that this nemus canutum had been identified in folk-lore with the oak wood of Domremy. Joan's knowledge of the prophecy does not, however, appear till 1429; and already before that, from 1424, according to her account at her trial, she

1 In the act of ennoblement the name is spelt Day, due probably to the peculiar pronunciation. It has been disputed whether the name was written originally d'Arc or Darc. It is beyond doubt that the father of Joan was not of noble origin, but Bouteiller suggests that at that period the apostrophe did not indicate nobility. Her mother, it may be noted, is called " de Vouthon."

had become imbued with a sense of having a mission to free France from the English. She heard the voices of St Michael, St Catherine and St Margaret urging her on. In May 1428 she tried to obtain from Robert de Baudricourt, governor of Vaucou- leurs, an introduction to the dauphin, saying that God would send him aid, but she was rebuffed. When, however, in September the English (under the earl of Salisbury) invested Orleans, the key to the south of France, she renewed her efforts with Baudricourt, her mission being to relieve Orleans and crown the dauphin at Reims. By persistent importunity, the effect of which was in- creased by the simplicity of her demeanour and her calm assur- ance of success, she at last prevailed on the governor to grant her request; and in February 1429, accompanied by six men-at-arms, she set out on her perilous journey to the court of the

dauphin at Chinon. At first Charles refused to see her, but popular feel- ing in her favour induced his advisers to persuade him after three days to grant her an interview. She is said to have persuaded him of the divine character of her commission by discovering him though disguised in the crowd of his courtiers, and by reassuring him regarding his secret doubts as to his legitimacy. And Charles was impressed by her knowledge of a secret prayer, which (he told Dunois) could only be known to God and himself. Accordingly, after a commission of doctors had reported that they had found in her nothing of evil or contrary to the Catholic faith, and a council of matrons had reported on her chastity, she was permitted to set forth with an army of 4000 or 5000 men designed for the relief of Orleans. At the head of the army she rode clothed in a coat of mail, armed with an ancient sword, said to be that with which Charles Martel had vanquished the Sara- cens, the hiding-place of which, under the altar of the parish church of the village of Ste Catherine de Fierbois, the " voices " had revealed to her; she carried a white standard of her own design embroidered with lilies, and having on the one side the image of God seated on the clouds and holding the world in His hand, and on the other a representation of the Annunciation. Joan succeeded in entering Orleans on the 29th of April 1429, and through the vigorous and unremitting sallies of the French the English gradually became so discouraged that on the 8th of May they raised the siege. It is admitted that her extraordinary pluck and sense of leadership were responsible for this result. In a single week (June 12 to 19), by the capture of Jargeau and Beaugency, followed by the great victory of Patay, where Talbot was taken prisoner, the English were driven beyond the Loire. With some difficulty the dauphin was then persuaded to set out towards Reims, which he entered with an army of 12,000 men on the 16th of July, Troyes having yielded on the. way. On the following day, holding the sacred banner, Joan stood beside Charles at his coronation in the cathedral.

The king then entered into negotiations with a view to detach- ing Burgundy from the English cause. Joan, at his importunity, remained with the army, but the king played her false when she attempted the capture of Paris; and after a failure on the 8th of September, when Joan was wounded, 2 his troops were disbanded. Joan went into Normandy to assist the duke of Alencon, but in December returned to the court, and on the 29th she and her family were ennobled with the surname of du Lis. Unconsoled by such honours, she rode away from the court in March, to assist in the defence of Compiegne against the duke of Burgundy; and on the 24th of May she led an unsuccessful sortie against the besiegers, when she was surrounded and taken prisoner. Charles, partly perhaps on account of his natural indolence, partly on account of the intrigues at the court, made no effort to effect her ransom, and never showed any sign of interest

in her fate. By means of negotiations instigated and prosecuted with great perseverance by the university of Paris and the Inquisition, and through the persistent scheming of Pierre Cauchon, the bishop of Beauvais — a Burgundian partisan, who, chased from his own see, hoped to obtain the archbishopric of Rouen — she was sold in November by John of Luxemburg and Burgundy to the English, who on the 3rd of January 1431, at the instance of the

2 The Porte St Honore where Joan was wounded stood where the Comeclie Francaise now stands.

university of Paris, delivered her over to the Inquisition for trial. After a public examination, begun on the 9th of January and lasting six days, and another conducted in the prison, she was, on the 20th of March, publicly accused as a heretic and witch, and, being in the end found guilty, she made her submission at the scaffold on the 24th of May, and received pardon. She was still, however, the prisoner of the English, and, having been in- duced by those who had her in charge to resume her male clothes, she was on this account judged to have relapsed, was sentenced to death, and burned at the stake on the streets of Rouen on the 30th of May 1431. In 1436 an impostor appeared, professing to be Joan of Arc escaped from the flames, who succeeded in inducing many people to believe in her statement, but afterwards confessed her imposture. The sentence passed on Joan of Arc was revoked by the pope on the 7th of July 1456, and since then it has been the custom of Catholic writers to uphold the reality of her divine inspiration.

During the latter part of the 19th century a popular cult of the Maid of Orleans sprang up in France, being greatly stimulated by the clerical party, which desired to advertise, in the person of this national heroine, the intimate union between patriotism and the Catholic faith, and for this purpose ardently desired her enrolment among the Saints. On the 27th of January 1894 solemn approval was given by Pope Leo XIII., and in February 1903 a formal proposal was entered for her canonization. The Feast of the Epiphany (Jan. 6), 1904 was made the occasion for a public declaration by Pope Pius X. that she was entitled to the designation Venerable. On the 13th of December 1908 the decree of beatification was published in the Consistory Hall of the Vatican.

As an historical figure, it is impossible to dogmatize concerning the personality of Joan of Arc. The modern clerical view has to some extent provoked what appears, in Anatole France's learned account, ably presented as it is, to be a retaliation, in regarding her as a clerical tool in

her own day. But her character was in any case exceptional. She undoubtedly nerved the French at a critical time, and inspired an army of laggards and pillagers with a fanatical enthusiasm, comparable with that of Cromwell's Puritans. Moreover, as regards her genuine military qualities we have the testimony of Dunois and d'Alencon; and Captain Marin, in his Jeanne d' Arc, taclicien et strategiste (1891), takes a high view of her achievements. The nobility of her purpose and the genuineness of her belief in her mission, combined with her purity of character and simple patriotism, stand clear. As to her " supranormal " faculties, a matter concerning which belief largely depends on the point of view, it is to be remarked that Quicherat, a freethinker wholly devoid of clerical influences, admits them (AperQus nouveaux, 1850), saying that the evidence is as good as for any facts in her history. See also A. Lang on " the voices " in Proc. Soc. Psychical Research, vol. xi.

Authorities. — For bibliography see Le Livre d'or de Jeanne a" Arc (1894), and A. Molinier, Sources de I'histoire de France (1904). Until the 19th century the history of Joan of Arc was almost entirely neglected; Voltaire's scurrilous satire La Pucelle, while indicative of the attitude of his time, may be compared with the very fair praises in the Encyclopedic The first attempt at a study of the sources was that of L'Averdy in 1790, published in the third volume of Memoires of the Academy of Inscriptions, which served as the base for all lives until J. Quicherat 's great work, Le Proces de Jeanne d'Arc (1841-1849), a collection of the texts so full and so vivid that they reveal the character and life of the heroine with great dis- tinctness. Michelct's sketch of her work in his Histoire de France, one of the best sections of the history, is hardly more vivid than these sources, upon which all the later biographies (notably that of H. A. Walton, i860) are based. See also A. Marty, L' Histoire de Jeanne a" Arc d'aprhs des documents originaux, with introduction by M. Sepet (1907) ; P. H. Dunand, Jeanne d'Arc et I'eglise (1908) ; and especially Andrew Lang, The Maid of France (1908). The Vie de Jeanne d'Arc, by Anatole France (2 vols., 1908), is brilliant and erudite, but in some respects open to charges of inaccuracy and prejudice in its handling of the sources (see the criticism by Andrew Lang in The Times, Lit. Suppl., May 28, 1908). The attempt to establish the reality of the " revelations " and consequently to obtain the canoni- zation of Joan of Arc led the Catholic party in France to publish lives (such as Sepet's, 1869) in support of their claims. Excellent works worth special mention are: Simeon Luce, Jeanne d'Arc a Domremy; L. Jarry, L'Armee anglaise au siege d'Orleans (1892);

J. J. Bourasse 1 , Miracles de Madame Sainte Katherine de Fierbois (1838, trans, by A. Lang); Boucher de Molandon and A. de Beau- corps, L'Armee

anglaise vaincue par Jeanne d'Arc (1892); R. P. Agroles. S.J., La Vraie Jeanne d'Arc. For the " false Pucelle " see A. Lang's article in his Valet's Tragedy (1903). Of the numerous dramas and poems of which Joan of Arc has been the subject, mention can only be made of Die Jungfrau von Orleans of Schiller, and of the Joan of Arc of Southey. A drama in verse by Jules Barbier was set to music by C. Gounod (1873). (J.T. S.; H. Ch.)*

JOANES (or Jtjanes), VICENTE (1506-1579), head of the Valencian school of painters, and often called " the Spanish Raphael," was born at Fuente de la Higuera in the province of Valencia in 1506. He is said to have studied his art for some time in Rome, with which school his affinities are closest, but the greater part of his professional life was spent in the city of Valencia, where most of the extant examples of his work are now to be found. All relate to religious subjects, and are characterized by dignity of conception, accuracy of drawing, truth and beauty of colour, and minuteness of finish. He died at Bocairente (near Jativa) while engaged upon an altarpiece in the church there, on the 21st of December 1579.

JOANNA (1479-1555), called the Mad (la Loca), queen of Castile and mother of the emperor Charles V., was the second daughter of Ferdinand and Isabella, king and queen of Spain, and was born at Toledo on the 6th of November 1479. Her youngest sister was Catherine of Aragon, the first wife of Henry VIII. In 1496 at Lille she was married to the archduke Philip the Hand- some, son of the German King Maximilian I., and at Ghent, in February 1500, she gave birth to the future emperor. The death of her only brother John, of her eldest sister Isabella, queen of Portugal, and then of the latter's infant son Miguel, made Joanna heiress of the Spanish kingdoms, and in 1502 the cortes of Castile and of Aragon recognized her and her husband as their future sovereigns. Soon after this Joanna's reason began to give way. She mourned in an extravagant fashion for her absent husband, whom at length she joined in Flanders; in this country her passionate jealousy, although justified by Philip's conduct, led to deplorable scenes. In November 1504 her mother's death left Joanna queen of Castile, but as she was obviously incapable of ruling, the duties of government were undertaken by her father, and then for a short time by her husband. The queen was with Philip when he was wrecked on the English coast and became the guest of Henry VII. at Windsor; soon after this event, in September 1506, he died and Joanna's mind became completely deranged, it being almost impossible to get her away from the dead body of her husband. The remaining years of her miserable existence were spent at Tordesillas, where she died on the nth of April 1555. In spite of her afflictions the queen was sought in marriage by Henry VII. just before his death. Nominally Joanna remained queen of Castile until her death, her name being joined with that of Charles in all public documents, but of necessity she took no part in the business of state. In addition to Charles

she had a son Ferdinand, afterwards the emperor Ferdinand I., and four daughters, among them being Maria (1505-1558), wife of Louis II., king of Hungary, afterwards governor-general of the Netherlands.

See R. Villa, La Reina dona Juana la Loca (Madrid, 1892) ; Rosier, Johannadie Wahnsinnige (Vienna, 1890) ;W. H. Vrescott, Hist, of Ferdinand and Isabella (1854) ; and H. Tighe, A Queen of Unrest (1907).

JOANNA I. (c. 1327-1382), queen of Naples, was the daughter of Charles duke of Calabria (d. 1328), and became sovereign of Naples in succession to her grandfather King Robert in 1343. Her first husband was Andrew, son of Charles Robert, king of Hungary, who like the queen herself was a member of the house of Anjou. In 1345 Andrew was assassinated at Aversa, possibly with his wife's connivance, and at once Joanna married Louis, son of Philip prince of Taranto. King Louis of Hungary then came to Naples to avenge his brother's death, and the queen took refuge in Provence — which came under her rule at the same time as Naples — purchasing pardon from Pope Clement VI. by selling to him the town of Avignon, theh part of her dominions. Having returned to Naples in 1352 after the departure of Louis, Joanna lost her second husband in 1362, and married James, king of

Majorca (d. 1375), and later Otto of Brunswick, prince of Taranto. The queen had no sons, and as both her daughters were dead she made Louis I. duke of Anjou, brother of Charles V. of France, her heir. This proceeding so angered Charles, duke of Durazzo, who regarded himself as the future king of Naples, that he seized the city. Joanna was captured and was put to death at Aversa on the 22nd of May 1382. The queen was a woman of intel- lectual tastes, and was acquainted with some of the poets and scholars of her time, including Petrarch and Boccaccio.

See Crivelli, Delia prima e delta seconda Giovanna, regine di Napoli (1832); G. Battaglia, Giovanna I., regina di Napoli (1835); W. St C. Baddeley, Queen Joanna I. of Naples (1893); Scarpetta, Giovanna I. di Napoli (1903) ; and Francesca M. Steele, The Beautiful Queen Joanna I. of Naples (1910).

JOANNA II. (1371-1435), queen of Naples, was descended from Charles II. of Anjou through his son John of Durazzo. She had been married to William, son of Leopold III. of Austria, and at the death of her brother King Ladislaus in 14 14 she succeeded to the Neapolitan crown. Her life

had always been very dissolute, and although now a widow of forty-five, she chose as her lover Pandolfo Alopo, a youth of twenty-six, whom she made seneschal of the kingdom. He and the constable Muzio Attendolo Sforza completely dominated her, and the turbulent barons wished to provide her with a husband who would be strong enough to break her favourites yet not make himself king. The choice fell on James of Bourbon, a relative of the king of France, and the marriage took place in 1415. But James at once declared himself king, had Alopo killed and Sforza imprisoned, and kept his wife in a state of semi-confinement; this led to a counter- agitation on the part of the barons, who forced James to liberate Sforza, renounce his kingship, and eventually to quit the country. The queen now sent Sforza to re-establish her authority in Rome, whence the Neapolitans had been expelled after the death of Ladislaus; Sforza entered the city and obliged the condoltiere Braccio da Montone, who was defending it in the pope's name, to depart (1416). But when Oddo Colonna was elected pope as Martin V., he allied himself with Joanna, who promised to give up Rome, while Sforza returned to Naples. The latter found, however, that he had lost all influence with the queen, who was completely dominated by her new lover Giovanni (Sergianni) Caracciolo. Hoping to re-establish his position and crush Caracciolo, Sforza favoured the pretensions of Louis III. of Anjou, who wished to obtain the succession of Naples at Joanna's death, a course which met with the approval of the pope. Joanna refused to adopt Louis owing to the influence of Caracciolo, who hated Sforza; she appealed for help instead to Alphonso of Aragon, promising to make him her heir. War broke out be- tween Joanna and the Aragonese on one side and Louis and Sforza, supported by the pope, on the other. After much fight- ing by land and sea, Alphonso entered Naples, and in 1422 peace was made. But dissensions broke out between the Aragonese and Catalans and the Neapolitans, and Alphonso had Caracciolo arrested; whereupon Joanna, fearing for her own safety, invoked the aid of Sforza, who with difficulty carried her off to Aversa. There she was joined by Louis whom she adopted as her successor instead of the ungrateful Alphonso. Sforza was accidentally drowned, but when Alphonso returned to Spain, leaving only a small force in Naples, the Angevins with the help of a Genoese fleet recaptured the city. For a few years there was peace in the kingdom, but in 1432 Caracciolo, having quarrelled with the queen, was seized and murdered by his enemies. Internal disorders broke out, and Gian Antonio Orsini, prince of Taranto, led a revolt against Joanna in Apulia; Louis of Anjou died while conducting a campaign against the rebels (1434), and Joanna herself died on the nth of February 1435, after having appointed his son Rene her successor. Weak, foolish and dissolute, she made her reign one long scandal, which reduced the kingdom to the lowest depths of degradation. Her perpetual intrigues and her political incapacity made Naples a prey to anarchy and foreign invasions, destroying all sense

of patriotism and loyalty both in the barons and the people. Authorities. — A. von Platen, Storia del reame di Napoli dal 1414

al 1423 (1864). C. Cipolla, Storia, della signoria Italiana (1 881), where the original authorities are quoted. (See also Naples; Sforza.)

JOASH, or Jehoash (Heb. " Yahweh is strong, or hath given "), the name of two kings of Palestine in the Bible.

1. Son of Ahaziah (see Jehoeam, 2) and king of Judah. He obtained the throne by means of a revolt in which Athaliah (q.v.) perished, and his accession was marked by a solemn covenant, and by the overthrow of the temple of Baal and of its priest Mattan(-Baal). In this the priest Jehoiada (who must have continued to act as regent) took the leading part. The account of Joash's reign is not from a contemporary source (2 Kings xi. 4 xii. 16), and 2 Chronicles adds several new details, including a tradition of a conflict between the king and priests after the death of Jehoiada (xxii. n; xxiv. 3, 15 sqq.). 1 At an unstated period, the Aramaeans under Hazael captured Gath, and Jeru salem only escaped by buying off the enemy (2 Kings xii. 17 sqq.). This may perhaps be associated with the Aramaean attacks upon Israel (2 below) , but the tradition recorded in 2 Chron. xxiv. 23 seq. differs widely and cannot be wholly rejected. The king perished in a conspiracy, the origin of which is not clear; it may have been for his attack upon the priests, it was scarcely for the course he took to save Jerusalem. He was succeeded by his son Amaziah, whose moderation in avenging his father's death receives special mention. After defeating the Edomites, Amaziah turned his attention to Israel.

2. Son of Jehoahaz and king of Israel. Like his grandfather Jehu, he enjoyed the favour of the prophet Elisha, who promised him a triple defeat of the Aramaeans at Aphek (2 Kings xiii. 14 sqq. 22-25). The cities which had been taken from his father by Hazael the father of Ben-hadad were recovered (cf. 1 Kings xx. 34, time of Ahab) and the relief gained by Israel from the previous blows of Syria prepared the way for its speedy extension of power. When challenged by Amaziah of Judah, Joash uttered the famous fable of the thistle and cedar (for another example see Judg. ix. 8-15; see also Abimelech), and a battle was fought at Beth-shemesh, in which Israel was completely success- ful. An obscure statement in 2 Chron. xxv. 13 would show that this was not the only conflict; at all events, Amaziah was captured, the fortifications of Jerusalem were partially destroyed, the treasures of the Temple and palace were looted, and hostages were carried away to Samaria. According to one statement, Amaziah survived the disaster fifteen years, and lost his life in a conspiracy; but there is a gap in the history of Judah which the narratives do not enable us to fill (1 Kings xv. 1; see xiv. 17, 23). See further Uzziah;

Jeroboam (2); and Jews.

(S. A. C.) JOB. The book of Job (Heb. aV 'Iyyob, Gr. TcL/3), in the Bible, the most splendid creation of Hebrew poetry, is so called from the name of the man whose history and afflictions and sayings form the theme of it.*

Contents. — As it now lies before us it consists of five parts. 1 . The prologue, in prose, chr. i.ii., describes in rapid and dramatic steps the history of this man, his prosperity and greatness corresponding to his godliness ; then how his life is drawn in under the operation of the sifting providence of God, through the suspicion suggested by the Satan, the minister of this aspect of God's providence, that his godliness is selfish and only the natural return for unexampled prosperity, and the insinuation that if stripped of his prosperity he will curse God to His face. These suspicions bring down two severe calamities on Job, one depriving him of children and possessions alike, and the other throwing the man himself under a painful malady. In spite of these afflictions Job retains his integrity and ascribes no wrong to God. Then is described the advent of Job's three friends — Eliphaz the Temanite, Bildad the Shuhite, and Zophar the Naamathite — who, having heard of Job's calamities, come to condole with him. 2. The body of the book, in poetry, ch. iii.xxxi., contains a series of speeches in which the problem of Job's afflictions and the relation of external evil to the righteousness of God and the conduct of men are brilliantly dis cussed. This part, after Job's passionate outburst in ch. lii., is divided into three cycles, each containing six speeches, one by each of the friends, and three by Job, one in reply to each of theirs (ch. iv.-xiv. ; xv.-xxi.; xxii.-xxxi.). although in the last cycle the

1 That the murder of Zechariah the son of Jehoiada (2 Chron. I.e.) is referred to in Matt, xxiii. 35, Luke xi. 51 is cc'ttimonly held; but see Cheyne, Ency. Bib. col. 5373.

third speaker Zophar fails to answer (unless his answer is to be found in ch. xxvii.). Job, having driven his opponents from the field, carries his reply through a series of discourses in which he dwells in pathetic words upon his early prosperity, contrasting with it his present humiliation, and ends with a solemn repudiation of all the offences that might be suggested against him, and a challenge to God to appear and put His hand to the charge which He had against him and for which He afflicted him. 3. Elihu, the representative of a younger generation, who has been a silent observer

of the debate, intervenes to express his dissatisfaction with the manner in which both Job and his friends conducted the cause, and offers what is in some respects a new solution of the question (xxxii.-xxxvii.). 4. In answer to Job's repeated demands that God would appear and solve the riddle of his life, the Lord answers Job out of the whirlwind. The divine speaker does not condescend to refer to Job's individual problem, but in a series of ironical interrogations asks him, as he thinks himself capable of fathoming all things, to expound the mysteries of the origin and subsistence of the world, the phenomena of the atmosphere, the instincts of the creatures that inhabit the desert, and, as he judges God's conduct of the world amiss, invites him to seize the reins, gird himself with the thunder and quell the rebellious forces of evil in the universe (xxxviii.-xlii. 6). Job is humbled and abashed, lays his hand upon his mouth, and repents his hasty words in dust and ashes. No solution of his problem is vouchsafed ; but God Himself effects that which neither the man's own thoughts of God nor the representations of the friends could accomplish : he had heard of him with the hearing of the ear without effect, but now his eye sees Him. This is the profoundest religious deep in the book. 5. The epilogue, in prose, xlii. 7-17, describes Job's restoration to a prosperity double that of his former estate, his family felicity and long life.

Design. — With the exception of the episode of Elihu, the con- nexion of which with the original form of the poem may be doubt- ful, all five parts of the book are essential elements of the work as it came from the hand of the first author, although some parts of the second and fourth divisions may have been expanded by later writers. The idea of the composition is to be derived not from any single element of the book, but from the teaching and movement of the whole piece. Job is unquestionably the hero of the work, and in his ideas and his history combined we may assume that we find the author himself speaking and teaching. The discussion between Job and his friends of the problem of suffering occupies two-thirds of the book, or, if the space occupied by Elihu be not considered, nearly three-fourths, and in the direc- tion which the author causes this discussion to take we may see revealed the main didactic purpose of the book. When the three friends, the representatives of former theories of providence, are reduced to silence, we may be certain that it was the author's purpose to discredit the ideas which they represent. Job himself offers no positive contribution to the doctrine of evil; his position is negative, merely antagonistic to that of the friends. But this negative position victoriously maintained by him has the effect of clearing the ground, and the author himself supplies in the prologue the positive truth, when he communicates the real explanation of his hero's calamities, and teaches that they were a trial of his righteousness. It was therefore the author's main purpose in his work to widen men's views of the providence of God and set before them a new

view of suffering. This purpose, however, was in all probability subordinate to some wider practical design. . No Hebrew writer is merely a poet or a thinker. He is always a teacher. He has men before him in their relations to God, 1 and usually not men in their individual relations, but members of the family of Israel, the people of God. It is consequently scarcely to be doubted that the book has a national scope. The author considered his new truth regarding the meaning of affliction as of national interest, and as the truth then needful for the heart of his people. But the teaching of the book is only half its contents. It contains also a history — deep and inexplicable affliction, a great moral struggle, and a victory. The author meant his new truth to inspire new conduct, new faith, and new hopes. In Job's suffer- ings, undeserved and inexplicable to him, yet capable of an explanation most consistent with the goodness and faithfulness of God, and casting honour upon his faithful servants; in his despair bordering on unbelief, at last overcome; and in the happy

1 Exceptions raurt be made in the cases of Esther and the Song of Songs, which do not mention God, and the original writer in Ecclesi- sstes who is a philosopher.

issue of his afflictions — in all this Israel may see itself, and from the sight take courage, and forecast its own history. Job, how- ever, is not to be considered Israel, the righteous servant of the Lord, under a feigned name; he is no mere parable (though such a view is found as early as the Talmud) ; he and his history have both elements of reality in them. It is these elements of reality common to him with Israel in affliction, common even to him with humanity as a whole, confined within the straitened limits set by its own ignorance, wounded to death by the mysterious sorrows of life, tortured by the uncertainty whether its cry finds an entrance into God's ear, alarmed and paralysed by the irrecon- cilable discrepancies which it seems to discover between its necessary thoughts of Him and its experience of Him in His provi- dence, and faint with longing that it might come into His place, and behold him, not girt with His majesty, but in human form, as one looketh upon his fellow — it is these elements of truth that make the history of Job instructive to Israel in the times of affliction when it was set before them, and to men of all races in all ages. It would probably be a mistake, however, to imagine that the author consciously stepped outside the limits of his nation and assumed a human position antagonistic to it. The chords he touches vibrate through all humanity — but this is because Israel is the religious kernel of humanity, and because from Israel's heart the deepest religious music of mankind is heard, whether of pathos or of joy.

Two threads requiring to be followed, therefore, run through the book — one the discussion of the problem of evil between Job and his friends, and

the other the varying attitude of Job's mind towards God, the first being subordinate to the second. Both Job and his friends advance to the discussion of his sufferings and of the problem of evil, ignorant of the true cause of his calamities — Job strong in his sense of innocence, and the friends armed with their theory of the righteousness of God, who giveth to every man according to his works. With fine psychological instinct the poet lets Job altogether lose his self-control first when his three friends came to visit him. His bereavements and his malady he bore with a steady courage, and his wife's direct instigations to godlessness he repelled with severity and resignation. But when his equals and the old associates of his happiness came to see him, and when he read in their looks and in their seven days' silence the depth of his own misery, his self-command deserted him, and he broke out into a cry of despair, cursing his day and crying for death (hi.). Job had somewhat misinterpreted the demeanour of his friends. It was not all pity that it expressed. Along with their pity they had also brought their theology, and they trusted to heal Job's malady with this. Till a few days before, Job would have agreed with them on the sovereign virtues of this remedy. But he had learned through a higher teaching, the events of God's providence, that it was no longer a specific in his case. His violent impatience, however, under his afflictions and his covert attacks upon the divine rectitude only served to confirm the view of his sufferings which their theory of evil had already suggested to his friends. And thus commences the high debate which continues through twenty-nine chapters.

The three friends of Job came to the consideration of his history with the principle that calamity is the result of evil-doing, as prosper- ity is the reward of righteousness. Suffering is not an accident or a spontaneous growth of the soil ; man is born unto trouble as the sparks fly upwards ; there is in human life a tendency to do evil which draws down upon men the chastisement of God (v. 6). The principle is thus enunciated by Eliphaz, from whom the other speakers take their cue : where there is suffering there has been sin in the sufferer. Not suffering in itself, but the effect of it on the sufferer is what gives insight into his true character. Suffering is not always punitive; it is sometimes disciplinary, designed to wean the good'man from his sin. If he sees in his suffering the monition of God and turns from his evil, his future shall be rich in peace and happiness, and his latter estate more prosperous than his first. If he murmurs or resists, he can only perish under the multiplying chastisements which his impenitence will provoke. Now this principle is far from being a peculiar crotchet of the friends; its truth is undeniable, though they erred in supposing that it would cover the wide providence of God. The principle is the fundamental idea of moral government, the ex- pression of the natural conscience, a principle common more or less to all peoples, though perhaps more prominent in the Semitic mind, because all religious ideas are more prominent and simple there —

not suggested to Israel first by the law, but found and adopted by the law, though it may be sharpened by it. It is the fundamental principle of prophecy no less than of the law, and, if possible, of the wisdom of philosophy of the Hebrews more than of either. Specula- tion among the Hebrews had a simpler task before it than it had in the West or in the farther East. The Greek philosopher began his operations upon the sum of things; he threw the universe into his crucible at once. His object was to effect some analysis of it, so

that he could call one element cause and another effect. Or, to vary the figure, his endeavour was to pursue the streams of tendency which he could observe till he reached at last the central spring which sent them all forth. God, a single cause and explanation, was the object of his search. But to the Hebrew of the later time this was already found. The analysis resulting in the distinction of God and the world had been effected for him so long ago that the history and circumstances of the process had been forgotten, and only the unchallengeable result remained. His philosophy was not a quest of God whom he did not know, but a recognition on all hands of God whom he knew. The great primary idea to his mind was that of God, a Being wholly just, doing all. And the world was little more than the phenomena that revealed the mind and the presence and the operations of God. Consequently the nature of God as known to him and the course of events formed a perfect equation. The idea of what God was in Himself was in complete harmony with His manifestation of Himself in providence, in the events of individual human lives, and in the history of nations. The philosophy of the wise did not go behind the origin of sin, or referred it to the freedom of man; but, sin existing, and God being in immediate personal contact with the world, every event was a direct expression of His moral will and energy ; calamity fell on wickedness, and Fuccess attended right-doing. This view of the moral harmony between the nature of God and the events of providence in the fortunes of men and nations is the view of the Hebrew wisdom in its oldest form, during what might be called the period of principles, to whirh belong Prov. x. seq. ; and this is the position maintained by Job's three friends. And the significance of the book of Job in the history of Hebrew thought arises in that it marks the point when such a view was definitely overcome, closing the long period when this principle was merely subjected to questionings, and makes a new positive addition to the doctrine of evil.

Job agreed that afflictions came directly from the hand of God, and also that God afflicted those whom He held guilty of sins. But his conscience denied the imputation of guilt, whether insinu- ated by his friends or implied in God's chastisement of him. Hence he was driven to conclude that

God was unjust. The position of Job appeared to his friends nothing else but impiety; while theirs was to him mere falsehood and the special pleading of sycophants on behalf of God because He was the stronger. Within these two iron walls the debate moves, making little progress, but with much brilliancy, if not of argument, of illustration. A certain advance indeed is perceptible. In the first series of speeches (iv.-xiv.), the key-note of which is struck by Eliphaz, the oldest and most considerate of the three, the position is that affliction is caused by sin, and is chastisement designed for the sinner's good ; and the moral is that Job should recognize it and use it for the purpose for which it was sent. In the second (xv.xxi.) the terrible fate of the sinner is emphasized, and those brilliant pictures of a restored future, thrown in by all the speakers in the first series, are absent. Job's demeanour under the consolations offered him afforded little hope of his repentance. In the third series (xxii. seq.) the friends cast off all disguise, and openly charge Job with a course of evil life. That their armoury was now exhausted is shown by the brevity of the second speaker, and the failure of the third (at least in the present text) to answer in any form. In reply Job disdains for a time to touch what he well knew lay under all their exhortations ; he laments with touching pathos the defection of his friends, who were like the winter torrents looked for in vain by the perishing caravan in the summer heat; he meets with bitter scorn their constant cry that God will not cast off the righteous man, by asking: How can one be righteous with God? what can human weakness, however innocent, do against infinite might and subtlety? they are righteous whom an omnipotent and perverse will thinks fit to consider so; he falls into a hopeless wail over the universal misery of man, who has a weary campaign of life appointed him; then, rising up in the strength of his conscience, he upbraids the Almighty with His mis use of His power and His indiscriminate tyranny — righteous and innocent He destroys alike — and challenges Him to lay aside His majesty and meet His creature as a man, and then he would not fear Him. Even in the second series Job can hardly bring himself to face the personal issue raised by the friends. His relations to God absorb him almost wholly — his pitiable isolation, the indignities showered on his once honoured head, the loathsome spectacle of his body ; abandoned by all, he turns for pity from God to men and from men to God. Only in the third series of debates does he put out his hand and grasp firmly the theory of his friends, and their " defences of mud ' fall to dust in his hands. Instead of that roseate moral order on which they are never weary of insisting, he finds only disorder and moral confusion. When he thinks of it, trembling takes hold of him. It is not the righteous but the wicked that live, grow old, yea, wax mighty in strength, that send forth their children like a flock and establish them in their sight. Before the logic of facts the theory of the friends goes down; and with this negative result, which the author skilfully reaches through the debate, has to be combined his own positive doctrine of

the uses of adversity advanced in the prologue.

To a modern reader it appears strange that both parties were so entangled in the meshes of their preconceptions regarding God as to be unable to break through the broader views. The friends, while

maintaining that injustice on the part of God is inconceivable, might have given due weight to the persistent testimony of Job's conscience as that behind which it is impossible to go, and found refuge in the reflection that there might be something inexplicable in the ways of God, and that affliction might have some other mean- ing than to punish the sinner or even to wean him from his sin. And Job, while maintaining his innocence from overt sins, might have confessed that there was such sinfulness in every human life as was sufficient to account for the severest chastisement from heaven, or at least he might have stopped short of charging God foolishly. Such a position would certainly be taken up by an afflicted saint now, and such an explanation of his sufferings would suggest itself to the sufferer, even though it might be in truth a false explanation. Perhaps here, where an artistic fault might seem to be committed, the art of the writer, or his truth to nature, and the extraordinary freedom with which he moves among his materials, as well as the power and individuality of his dramatic creations, are most remark- able. The r61e which the author reserved for himself was to teach the truth on the question in dispute, and he accomplishes this by allowing his performers to push their false principles to their proper extreme. There is nothing about which men are usually so sure as the character of God. They are ever ready to take Him in their own hand, to interpret His providence in their own sense, to say what things are consistent or not with His character and word, and beat down the opposing consciences of other men by His so-called authority, which is nothing but their own. The friends of Job were religious Orientals, men to whom God was a being in immediate contact with the world and life, to whom the idea of second causes was unknown, on whom science had not yet begun to dawn, nor the conception of a divine scheme pursuing a distant end by complicated means, in which the individual's interest may suffer for the larger good. The broad sympathies of the author and his sense of the truth lying in the theory of the friends are seen in the scope which he allows them, in the richness of the thought and the splendid luxuriance of the imagery — drawn from the immemorial moral consent of mankind, the testimony of the living conscience, and the observation of life — with which he makes them clothe their views. He remembered the elements of truth in the theory from which he was departing, that it was a national heritage, which he himself perhaps had been constrained not without a struggle to abandon; and, while showing its insufficiency, he sets it forth in its most brilliant form.

The extravagance of Job's assertions was occasioned greatly by the extreme position of his friends, which left no room for his conscious innocence along with the rectitude of God. Again, the poet's purpose, as the prologue shows, was to teach that afflictions may fall on a man out of all connexion with any offence of his own, and merely as the trial of his righteousness; and hence he allows Job, as by a true instinct of the nature of his sufferings, to repudiate all connexion between them and sin in himself. And further, the terrible conflict into which the suspicions of the Satan brought lob could not be exhibited without pushing him to the verge of ungodliness. These are all elements of the poet's art; but art and nature are one. In ancient Hebrew life the sense of sin was less deep than it is now. In the desert, too, men speak boldly of God. Nothing is more false than to judge the poet's creation from our later point of view, and construct a theory of the book according to a more developed sense of sin and a deeper reverence for God than belonged to antiquity. In complete contradiction to the testimony of the book itself, some critics, as Hengstenberg and Budde, have assumed that Job's spiritual pride was the cause of his afflic- tions, that this was the root of bitterness in him which must be killed down ere he could become a true saint. The fundamental position of the book is that Job was already a true saint; this is testified by God Himself, is the radical idea of the author in the prologue, and the very hypothesis of the drama. We might be ready to think that Job's afflictions did not befall him out of all connexion with his own condition of mind, and we might be disposed to find a vindica- tion of God's ways in this. There is no evidence that such an idea was shared by the author of the book. It is remarkable that the attitude which we imagine it would have been so easy for Job to assume, namely, while holding fast his integrity, to fall back upon the inexplicableness of providence, of which there are such imposing descriptions in his speeches, is just the attitude which is taken up in ch. xxviii. It is far from certain, however, that this chapter is an integral part of the original book.

The other line running through the book, the varying attitude of Job's mind towards God, exhibits dramatic action and tragic interest of the highest kind, though the movement is internal. That the exhibition of this struggle in Job's mind was a main point in the author's purpose is seen from the fact that at the end of each of his great trials he notes that Job sinned not, nor ascribed wrong to God (i. 22; ii. 10), and from the effect which the divine voice from the whirlwind is made to produce upon him (xl. 3). In the first cycle of debate (iv.-xiv.) Job's mind reaches the deepest limit of estrangement. There he not merely charges God with injustice, but, unable to reconcile His former goodness with His present enmity, he regards the latter as the true expression of God's attitude towards His creatures, and the former, comprising all his infinite creative skill in weaving the delicate

human nature and the rich endowments of His providence, only as the means of exercising His mad and immoral cruelty in the time to come. When the Semitic skin of Job is scratched, we find a modern pessimist beneath. Others in later days have brought the keen sensibility of the human frame and the torture which it endures together, and asked with Job to whom at last all this has to be referred. Towards the end of the cycle a star of heavenly light seems to rise on the horizon ; the thought seizes the sufferer's mind that man might have another life, that God's anger pursuing him to the grave might be sated, and that He might call him out of it to Himself again (xiv. 13). This idea of a resurrection, unfamiliar to Job at first, is one which he is allowed to reach out of the necessities of the moral complications around him, but from the author's manner of using the idea we may judge that it was familiar to himself. In the second cycle the thought of a future reconciliation with God is more firmly grasped. That satisfaction or at least composure which, when we observe calamities that we cannot morally account for, we reach by considering that providence is a great scheme moving according to general laws, and that it does, not always truly reflect the relation of God to the individual, Job reached in the only way possible to a Semitic mind. He drew a distinction between an outer God whom events obey, pursuing him in His anger, and an inner God whose heart was with him, who was aware of his innocence ; and he appeals from God to God, and beseeches God to pledge Himself that he shall receive justice from God (xvi. 19; xvii. 3). And so high at last does this consciousness that God is at one with him rise that he avows his assurance that He will yet appear to do him justice before men, and that he shall see Him with his own eyes, no more estranged but on his side, and for this moment he faints with longing (xix. 25 seq.). 1

After this expression of faith Job's mind remains calm, though he ends by firmly charging God with perverting his right, and demand- ing to know the cause of his afflictions (xxvii. 2 seq.; xxxi. 35, where render: " Oh, that I had the indictment which mine adversary has written ! "). In answer to this demand the Divine voice answers Job out of the tempest: " Who is this that darkeneth counsel by words without knowledge?" The word "counsel" intimates to Job that God does not act without a design, large and beyond the comprehension of man; and to impress this is the purpose of the Divine speeches. The speaker does not enter into Job's particular cause; there is not a word tending to unravel his riddle; his mind is drawn away to the wisdom and majesty of God Himself. His own words and those of his friends are but re-echoed, but it is God Himself who now utters them. Job is in immediate nearness to the majesty of heaven, wise, unfathomable,

ironical over the littleness of man, and he is abased ; God Himself effects what neither the man's

'This remarkable passage reads thus: "But I know that my redeemer liveth, and afterwards he shall arise upon the dust, and after my skin, even this body, is destroyed, without my flesh shall I see God; whom I shall see for myself, and mine eyes shall behold, and not as a stranger; my reins within me are consumed with longing." The redeemer who liveth and shall arise or stand upon the earth is God whom he shall see with his own eyes, on his side. The course of exegesis was greatly influenced by the translation of Jerome, who, departing from the Itala, rendered: "In novissimo die de terra surrecturus sum . . . et rursum circumdabor pelle mea et in carne mea videbo deum meum." The only point now in question is whether : (a) Job looks for this manifestation of God to him while he is still alive, or (&) after death, and therefore in the sense of a spiritual vision and union with God in another life; that is, whether the words " destroyed " and " without my flesh " are to be taken relatively only, of the extremest effects of his disease upon him, or literally, of the separation of the body in death. A third view which assumes that the words rendered " without my flesh," which run literally, " out of my flesh," mean looking out from my flesh, that is, clothed with a new body, and finds the idea of resurrection repeated, perhaps imports more into the language than it will fairly bear. In favour of (b) may be adduced the persistent refusal of Job throughout to entertain the idea of a restoration in this life : the word " afterwards " ; and perhaps the analogy of other passages where the same situation appears, as Ps. xlix. and lxxiii., although the actual denouement of the tragedy supports (a). The difference between the two senses is not important, when the Old Testament view of immortality is considered. To the Hebrew the life beyond was not what it is to us, a freedom from sin and sorrow and admission to an immediate divine fellowship not attainable here. To him the life beyond was at best a prolongation of the life here ; all he desired was that his fellowship with God here should not be interrupted in death, and that Sheol, the place into which deceased persons descended and where they remained, cut off from all life with God, might be overleapt. On this account the theory of Ewald, which throws the centre of gravity of the book into this passage in ch. xix., considering its purpose to be to teach that the riddles of this life shall be solved and its inequalities corrected in a future life, appears one-sided. The point of the passage does not lie in any distinction which it draws between this life and a future life ; it lies in the assur- ance which Job expresses that God, who even now knows his inno- cence, will vindicate it in the future, and that, though estranged now, He will at last take him to His heart.

own thoughts of God nor the representations of his friends could accomplish, though by the same means. The religious insight of the writer sounds here the profoundest deeps of truth.

Integrity. — Doubts whether particular portions of the present book belonged to the original form of it have been raised by many. M. L. De Wette expressed himself as follows: " It appears to us that the present book of Job has not all flowed from one pen. As many books of the Old Testament have been several times written over, so has this also " (Ersch and Gruber, Ency., sect, ii. vol. viii.). The judgment formed by De Wette has been adhered to more or less by most of those who have studied the book. Questions regarding the unity of such books as this are difficult to settle; there is not unanimity among scholars re- garding the idea of the book, and consequently they differ as to what parts are in harmony or conflict with unity; and it is dangerous to apply modern ideas of literary composition and artistic unity to the works of antiquity and of the East. The problem raised in the book of Job has certainly received frequent treatment in the Old Testament ; and there is no likelihood that all efforts in this direction have been preserved to us. It is probable that the book of Job was but a great effort amidst or after many smaller. It is scarcely to be supposed that one with such poetic and literary power as the author of chap, iii- xxxi., xxxviii.xli. would embody the work of any other writer in his own. If there be elements in the book which must be pronounced foreign, they have been inserted in the work of the author by a later hand. It is not unlikely that our present book may, in addition to the great work of the original author, contain some fragments of the thoughts of other religious minds upon the same question, and that these, instead of being loosely appended, have been fitted into the mechanism of the first work. Some of these fragments may have originated at first quite in dependently of our book, while others may be expansions and insertions that never existed separately. At the same time it is scarcely safe to throw out any portion of the book merely because it seems to us out of harmony with the unity of the main part of the poem, or unless several distinct lines of consideration conspire to point it out as an extraneous element.

The arguments against the originality of the prologue — as, that it is written in prose, that the name Yahweh appears in it, that sacrifice is referred to, and that there are inconsistencies between it and the body of the book — are of little weight. There must have been some introduction to the poem explaining the circumstances of Job, otherwise the poetical dispute would have been unintelligible, for it is improbable that the story of Job was so familiar that a poem in which he and his friends figured as they do here would have been understood. And there is no trace of any other prologue or intro- duction having ever existed. The prologue, too, is an essential element of the work, containing the author's positive contribution

to the doctrine of suffering, for which the discussion in the poem prepares the way. The intermixture of prose and poetry is common in Oriental works containing similar discussions; the reference to sacrifice is to primitive not to Mosaic sacrifice; and the author, while using the name Yahweh freely himself, puts the patriarchal Divine names into the mouth of Job and his friends because he regards them as belonging to the patriarchal age and to a country outside of Israel. That the observance of this rule had a certain awkwardness for the writer appears perhaps from his allowing the name Yahweh to slip in once or twice (xii. 9, cf. xxviii. 28) in familiar phrases in the body of the poem. The discrepancies, such as Job's references to his children as still alive (xix. 17, the interpretation is doubtful), and to his servants, are trivial, and even if real imply nothing in a book admittedly poetical and not historical. The objections to the epilogue are equally unimportant — as that the Satan is not mentioned in it, and that Job's restoration is in conflict with the main idea of the poem — that earthly felicity does not follow righteousness. The epilogue confirms the teaching of the poem when it gives the divine sanction to Job's doctrine regarding God in opposition to that of the friends (xlii. 7). A n d it is certainly not the intention of the poem to teach that earthly felicity does not follow righteousness; its purpose is to correct the exclusiveness with which the friends of Job maintained that principle. The Satan is introduced in the prologue, exercising his function as minis- ter of God in heaven; but it is to misinterpret wholly the doctrine of evil in the Old Testament to assign to the Satan any such personal importance or independence of power as that he should be called before the curtain to receive the hisses that accompany his own discomfiture. The Satan, though he here appears with the begin- nings of a malevolent will of his own, is but the instrument of the sifting providence of God. His work was to try; that done he

disappears, his personality being too slight to have any place in the result.

Much graver are the suspicions that attach to the speeches of Elihu. Most of those who have studied the book carefully hold that this part does not belong to the original cast, but has been introduced at a considerably later time. The piece is one of the most interesting parts of the book ; both the person and the thoughts of Elihu are marked by a strong individuality. This individuality has indeed been very diversely estimated. The ancients for the most part passed a very severe judgment on Elihu : he is a buffoon, a boastful youth whose shallow intermeddling is only to be explained by the fewness of his years, the incarnation of folly, or even the Satan himself gone a-mumming. Some moderns on the other hand have regarded him as

the incarnation of the voice of God or even of God himself. The main objections to the connexion of the episode of Elihu with the original book are: that the prologue and epilogue know nothing of him; that on the cause of Job's afflictions he occupies virtually the same position as the friends; that his speeches destroy the dramatic effect of the divine manifestation by introducing a lengthened break between Job's challenge and the answer of God ; that the language and style of the piece are marked by an excessive mannerism, too great to have been created by the author of the rest of the poem ; that the allusions to the rest of the book are so minute as to betray a reader rather than a hearer; and that the views regarding sin, and especially the scandal given to the author by the irreverence of Job, indicate a religious advance which marks a later age. The position taken by Elihu is almost that of a critic of the book. Regarding the origin of afflictions he is at one with the friends, although he dwells more on the general sinfulness of man than on actual sins, and his reprobation of Job's position is even greater than theirs. His anger was kindled against Job because he made himself righteous before God, and against his friends because they found no answer to Job. His whole object is to refute Job's charge of injustice against God. What is novel in Elihu, therefore, is not his position but his arguments. These do not lack cogency, but betray a kind of thought different from that of the friends. Injustice in God, he argues, can only arise from sel- fishness in Him ; but tHe very existence of creation implies unselfish love on God's part, for if He thought only of Himself, He would cease actively to uphold creation, and it would fall into death. Again, without justice mere earthly rule is impossible; how then is injustice conceivable in Him who rules over all ? It is probable that the original author found his three interlocutors a sufficient medium for expression, and that this new speaker is the creation of another. To a devout and thoughtful reader of the original book, belonging perhaps to a more reverential age, it appeared that the language and bearing of Job had scarcely been sufficiently reprobated by the original speakers, and that the religious reason, apart from any theophany, could suggest arguments sufficient to condemn such demeanour on the part of any .man. (For an able though hardly convincing argument for the originality of the discourses of Elihu see Budde's Commentary.)

It is more difficult to come to a decision in regard to some other portions of the book, particularly ch. xxvii. 7-xxviii. In the latter part of ch. xxvii. Job seems to go over to the camp of his opponents, and expresses sentiments in complete contradiction to his former views. Hence some have thought the passage to be the missing speech of Zophar. Others, as Hitzig, believe that Job is parodying the ideas of the friends; while others, like Ewald, consider that he is recanting his former excesses, and making such a modification as to express correctly his views on evil. None of these opinions is quite

satisfactory, though the last probably expresses the view with which the passage was introduced, whether it be original or not. The meaning of ch. xxviii. can only be that " Wisdom," that is, a theoretical comprehension of providence, is unattainable by man, whose only wisdom is the fear of the Lord or practical piety. But to bring Job to the feeling of this truth was just the purpose of the theophany and the divine speeches; and, if Job had reached it already through his own reflection, the theophany becomes an irrelevancy. It is difficult, therefore, to find a place for these two chapters in the original work. The hymn on Wisdom is a most exquisite poem, which probably originated separately, and was brought into our book with a purpose similar to that which suggested the speeches of Elihu. Objections have also been raised to the descriptions of leviathan and behemoth (ch. xl. 15-xli.). Regarding these it may be enough to say that in meaning these passages are in perfect harmony with other parts of the Divine words, although there is a breadth and detail in the style unlike the sharp, short, ironical touches otherwise characteristic of this part of the poem. (Other longer passages, the originality of which has been called into question, are: xvii. 8 seq.; xxi. 16-18; xxii. 17 seq. ; xxiii. 8 seq. ; xxiv. 9, 18-24; xxvi. 5-14. On these see the commentaries.)

Date.- — The age of such a book as Job, dealing only with prin- ciples and having no direct references to historical events can be fixed only approximately. Any conclusion can be reached only by an induction founded on matters which do not afford perfect certainty, such as the comparative development of certain moral ideas in different ages, the pressing claims of certain problems for

solution at particular epochs of the history of Israel, and points of contact with other writings of which the age may with some certainty be determined. The Jewish tradition that the book is Mosaic, and the idea that it is a production of the desert, written in another tongue and translated into Hebrew, want even a shadow of probability. The book is a genuine outcome of the religious life and thought of Israel, the product of a religious knowledge and experience that were possible among no other people. That the author lays the scene of the poem outside his own nation and in the patriarchal age is a proceeding common to him with other dramatic writers, who find freer play for their principles in a region removed from the present, where they are not hampered by the obtrusive forms of actual life, but are free to mould occurrences into the moral form that their ideas require.

It is the opinion of some scholars, e.g. Delitzsch, that the book belongs to the age of Solomon. It cannot be earlier than this age, for Job (vii. 17) travesties the ideas of Ps. viii. in a manner which shows that this hymn was well known. To infer the date from a comparison of literary coincidences

and allusions is however a very delicate operation. For, first, owing to the unity of thought and language which prevades the Old Testa- ment, in which, regarded merely as a national literature, it differs from all other national literatures, we are apt to be deceived, and to take mere similarities for literary allusions and quotations; and, secondly, even when we are sure that there is dependence, it is often uncommonly difficult to decide which is the original source. The reference to Job in Ezek. xiv. 14 is not to our book, but to the man (a legendary figure) who was afterwards made the hero of it. The affinities on the other hand between Job and Isa. xl.-lv. are very close. The date, however, of this part of Isaiah is uncertain, though it cannot have received its final form, if it be composite, long before the return. Between Job iii. and Jer. xx. 14 seq. there is, again, certainly literary connexion. But. the judgment of different minds differs on the question which passage is dependent on the other. The language of Jeremiah, however, has a natural pathos and genuineness of feeling in it, somewhat in contrast with the elaborate poetical finish of Job's words, which might suggest the originality of the former.

The tendency among recent scholars is to put the book of Job not earlier than the 5th century B.C. There are good reasons for putting it in the 4th century. It stands at the beginning of the era of Jewish philosophical inquiry — its affinities are with Proverbs, Ecclesiasticus, Ecclesiastes, and the Wisdom of Solomon, a body of writings that belongs to the latest period of pre-Christian Jewish literary development (see Wisdom Literature). Its points of connexion with Isa. xl.-lv. relate only to the problem of the suffering of the righteous, and that it is later than the Isaiah passage appears from the fact that this latter is national and ritual in scope, while Job is universal and ethical.

The book of Job is not literal history, though it reposes on historical tradition. To this tradition belong probably the name of Job and his country, and the names of his three friends, and perhaps also many other details impossible to specify particularly. The view that the book is entirely a literary creation with no basis in historical tradition is as old as the Talmud (Baba Bathra, xv. 1), in which a rabbi is cited who says; Job was not, and was not created, but is an allegory. This view is supported by Hengstenberg and others. But pure poetical creations on so extensive a scale are not probable in the East and at so early an age.

Author. — The author of the book is wholly unknown. The religious life of Israel was at certain periods very intense, and at those times the spiritual energy of the nation expressed itself almost impersonally, through men who forgot themselves and were speedily forgotten in name by others. Hitzig conjectures that the author was a native of the north on account of the free criticism of providence which he allows himself. Others, on account of

some affinities with the prophet Amos, infer that he belonged to the south of Judah, and this is supposed to account

for his intimate acquaintance with the desert. Ewald considers that he belonged to the exile in Egypt, on account of his minute acquaintance with that country. But all these conjectures localize an author whose knowledge was not confined to any locality, who was a true child of the East and familiar with life and nature in every country there, who was at the same time a true Israelite and felt that the earth was the Lord's and the fullness thereof, and whose sympathies and thought took in all God's works.

Literature. — Commentaries by Ewald (1854); Renan (1859); Delitzsch (1864); Zockler in Lange's Bibelwerk (1872); F. C. Cook in Speaker's Comm. (1880); A. B. Davidson in Cambridge Bible (1884); Dillmann (1891); K. Budde (1896); Duhm (1897). See also Hoekstra, " Job de Knecht van Jehovah " in Theol. Tijdschr. (1871), and, in reply, A. Kuenen, " Job en de leidende Knecht van jahveh," ibid. (1873) ; C. H. H. Wright in Bib. Essays (1886) ; G. G. Bradley, Lecls. on job (2nd ed., 1888); Cheyne, Job and Solomon (1887) ; Dawson, Wisd. Lit. (1893) ; D-B. Macdonald, " The Original Form of the Legend of Job " in Journ. Bib. Lit. (1895); E. Hatch, Essays in Bib. Gk. (1889); A. Dillmann, in Trans, of Roy. Pruss. Acad. (1890). (A. B. D., C. H. T.)*

JOBST, or Jodocus (c. 1350-1411), margrave of Moravia, was a son of John Henry of Luxemburg, margrave of Moravia, and grandson of John, the blind king of Bohemia. He became margrave of Moravia on his father's death in 1375, and his clever and unscrupulous character enabled him to amass a considerable amount of wealth,- while his ambition led him into constant quarrels with his brother Procop, his cousins, ,the German king Wenceslaus and Sigismund, margrave of Brandenburg, and others. By taking advantage of their difficulties he won consider- able power, and the record of his life is one of warfare and treachery, followed by broken promises and transitory recon- ciliations. In 1385 and 1388 he purchased Brandenburg from Sigismund, and the duchy of Luxemburg from Wenceslaus; and in 1397 he also became possessed of upper and lower Lusatia. For some time he had entertained hopes of the German throne and had negotiated with Wenceslaus and others to this end. When, however, King Rupert died in 1410 he maintained at first that there was no vacancy, as Wenceslaus, who had been deposed in 1400, was still king; but changing his attitude, he was chosen German king at Frankfort on the 1st of October 1410 in opposition to Sigismund, who had been elected a few days

previously. Jobst however was never crowned, and his death on the 17th of January 1411 prevented hostilities between the rival kings.

See F. M. Pelzel, Lebensgeschichte des rbmischen und bbhmischen Kbnigs Wenceslaus (1788-1790); J. Heidemann, Die Mark Branden- burg unter Jobst von Mahren (1881); J. Aschbach, Geschichte Kaiser Sigmunds (1838-1845); F. Palacky, Geschichte von Bbhmen, iii. (1 864-1 874); and T. Lindner, Geschichte des Deutschen Reiches vom Ende des 14 Jahrhunderts bis zur Reformation, i. (1875-1880).

JOB'S TEARS, in botany, the popular name for Coix Lachryma- Jobi, a species of grass, of the tribe maydeae, which also includes the maize (see Grasses). The seeds, or properly fruits, are con- tained singly in a stony involucre or bract, which does not open until the enclosed seed germinates. The young involucre sur- rounds the female flower and the stalk supporting the spike of male flowers, and when ripe has the appearance of bluish-white porcelain. Being shaped somewhat like a large drop of fluid, the form has suggested the name. The fruits are esculent, but the involucres are the part chiefly used, for making necklaces and other ornaments. The plant is a native of India, but is now widely spread throughout the tropical zone. It grows in marshy places; and is cultivated in China, the fruit having a supposed value as a diuretic and anti-phthisic. It was cultivated by John Gerard, author of the famous Herball, at the end of the 16th century as a tender annual.

JOCASTA, or Iocasta ('Iokoottj; in Homer, 'Exi/cdor?)), in Greek legend, wife of La'ius, mother (afterwards wife) of Oedipus (q.v.) , daughter of Menoeceus, sister (or daughter) of Creon. According to Homer (Od. xi. 271) and Sophocles (Oed. Tyr. 1241), on learning that Oedipus was her son she immediately hanged herself; but in Euripides {Phoenissae, 1455) she stabs herself over the bodies of her sons Eteocles and Polynices, who had slain each other in single combat before the walls of Thebes.

JOCKEY, a professional rider of race-horses, now the current usage (see Horse-racing). The word is by origin a diminutive of " Jock," the Northern or Scots colloquial equivalent of the name " John " (cf. Jack). A familiar instance of the use of the word as a name is in " Jockey of Norfolk " in Shakespeare's Richard III. v. 3, 304. In the 16th and 17th centuries the word was applied to horse-dealers, postilions, itinerant minstrels and vagabonds, and thus frequently bore the meaning of a cunning trickster, a " sharp," whence " to jockey," to outwit, or " do " a person out of something. The current usage is found in John Evelyn's Diary, 1670, when it was clearly well known. George Borrow's attempt to derive the word from the gipsy chukni, a heavy whip used by horse-dealing gipsies, has no foundation.

JODELLE, ETIENNE, seigneur de Limodin (1532-1573), French dramatist and poet, was born in Paris of a noble family. He attached himself to the poetic circle of the Pleiade (see Daurat) and proceeded to apply the principles of the reformers to dramatic composition. Jodelle aimed at creating a classical drama that should be in every respect different from the moralities and soties that then occupied the French stage. His first play, Cliopdtre captive, was represented before the court at Reims in 1552. Jodelle himself took the title role, and the cast included his friends Remy Belleau and Jean de la Peruse. In honour of the play's success the friends organized a little fete at Arcueil when a goat garlanded with flowers was led in procession and presented to the author — a ceremony exaggerated by the enemies of the Ronsardists into a renewal of the pagan rites of the worship of Bacchus. Jodelle wrote two other plays. Eugene, a comedy satirizing the superior clergy, had less success than it deserved. Its preface poured scorn on Jodelle's pre- decessors in comedy, but in reality his own methods are not so very different from theirs. Didon se sacrifiant, a tragedy which follows Virgil's narrative, appears never to have been represented. Jodelle died in poverty in July 1573. His works were collected the year after his death by Charles de la Mothe. They include a quantity of miscellaneous verse dating chiefly from Jodelle's youth. The intrinsic value of his tragedies is small. Cliopdtre is lyric rather than dramatic. Throughout the five acts of the piece nothing actually happens. The death of Antony is an- nounced by his ghost in the first act; the story of Cleopatra's suicide is related, but not represented, in the fifth. Each act is terminated by a chorus which moralizes on such subjects as the inconstancy of fortune and the judgments of heaven on human pride. But the play was the starting-point of French classical tragedy, and was soon followed by the MidSe (1553) of Jean de la Peruse and the A man (1561) of Andr6 de Rivaudeau. Jodelle was a rapid worker, but idle and fond of dissipation. His friend Ronsard said that his published poems gave no adequate idea of his powers.

Jodelle's works are collected (1868) in the PUiade francaise of Charles Marty-Laveaux. The prefatory notice gives full informa- tion of the sources of Jodelle's biography, and La Mothe's criticism is reprinted in its entirety.

JODHPUR, or Marwar, a native state of India, in the Rajputana agency. Area, 34,963 sq. m. Pop. (1901), 1,935,565, showing a decrease of 23% in the decade, due to the results of famine. Estimated revenue, £373,600; tribute, £14,000. The general aspect of the country is that of a sandy plain, divided into two unequal parts by the river Luni, and dotted with pic- turesque conical hiils, attaining in places an elevation of 3000 ft. The river Luni is the principal feature in the physical aspects of Jodhpur. One of its head-streams rises in the sacred lake of Pushkar in Ajmere, and the main river flows through Jodhpur in a south-westerly direction till it is finally

lost in the marshy ground at the head of the Runn of Cutch. It is fed by numerous tributaries and occasionally overflows its banks, fine crops of wheat and barley being grown on the saturated soil. Its water is, as a rule, saline or brackish, but comparatively sweet water is obtained from wells sunk at a distance of 20 or 30 yds. from the river bank. The famous salt-lake of Sambhar is situ- ated on the borders of Jodhpur and Jaipur, and two smaller lakes of the same description lie within the limits of the state,

from which large quantities of salt are extracted. Marble is mined in the north of the state and along the south-east border.

The population consists of Rathor Rajputs (who form the ruling class), Brahmans, Charans, Bhats, Mahajans or traders, and Jats. The Charans, a sacred race, hold large religious grants of land, and enjoy peculiar immunities as traders in local produce. The Bhats are by profession genealogists, but also engage in trade. Marwari traders are an enterprising class to be found throughout the length and breadth of India.

The principal crops are millets and pulses, but wheat and barley are largely produced in the fertile tract watered by the Luni river. The manufactures comprise leather boxes and brass utensils; and turbans and scarfs and a description of em- broidered silk knotted thread are specialities of the country.

The Maharaja belongs to the Rathor clan of Rajputs. The family chronicles relate that after the downfall of the Rathor dynasty of Kanauj in 1194, Sivaji, the grandson of Jai Chand, the last king of Kanauj, entered Marwar on a pilgrimage to Dwarka, and on halting at the town of Pali he and his followers settled there to protect the Brahman community from the con- stant raids of marauding bands. The Rathor chief thus laid the foundation of the state, but it was not till the time of Rao Chanda, the tenth in succession from Sivaji, that Marwar was actually conquered. His grandson Jodha founded the city of Jodhpur, which he made his capital. In 1561 the country was invaded by Akbar, and the chief was forced to submit, and to send his son as a mark of homage to take service under the Mogul emperor. When this son Udai Singh succeeded to the chiefship, he gave his sister Jodhbai in marriage to Akbar, and was rewarded by the restoration of most of his former possessions. Udai Singh's son, Gaj Singh, held high service under Akbar, and conducted success- ful expeditions in Gujarat and the Deccan. The bigoted and intolerant Aurangzeb invaded Marwar in 1679, plundered Jodh- pur, sacked all the large towns, and commanded

the conversion of the Rathors to Mahommedanism. This cemented all the Rajput clans into a bond of union, and a triple alliance was formed by the three states of Jodhpur, Udaipur and Jaipur, to throw off the Mahommedan yoke. One of the conditions of this alliance was that the chiefs of Jodhpur and Jaipur should regain the privilege of marriage with the Udaipur family, which they had forfeited by contracting alliances with the Mogul em- perors, on the understanding that the offspring of Udaipur princesses should succeed to the state in preference to all other children. The quarrels arising from this stipulation lasted through many generations, and led to the invitation of Mahratta help from the rival aspirants to power, and finally to the sub- jection of all the Rajput states to the Mahrattas. Jodhpur was conquered by Sindhia, who levied a tribute of £60,000, and took from it the fort and town of Ajmere. Internecine disputes and succession wars disturbed the peace of the early years of the century, until in January 1818 Jodhpur was taken under British protection. In 1839 the misgovernment of the raja led to an insurrection which compelled the interference of the British. In 1843, the chief having died without a son, and without having adopted an heir, the nobles and state officials were left to select a successor from the nearest of kin. Their choice fell upon Raja Takht Sinh, chief of Ahmednagar. This chief, who did good service during the Mutiny, died in 1873. Maharaja Jaswant Singh, who died in 1896, was a very enlightened ruler. His brother, Sir Pertab Singh (q.v.), conducted the administration until his nephew, Sardar Singh, came of age in 1898. The imperial service cavalry formed part of the reserve brigade during the Tirah campaign.

The state maintains a railway running to Bikanir, and there is also a branch railway into Sind. Gold, silver and copper money is coined. The state emblems are ajhar or sprig of seven branches and a khanda or sword. Jodhpur practically escaped the plague, but it suffered more severely than any other part of Rajputana from the famine of 1899-1900. In February 1900 more than 11 0,000 persons were in receipt of famine relief. The city of Jodhpur is 64 m. by rail N.W. of Marwar junction,

on the Rajputana railway. Pop. (1901), 60,437. It was built by Rao Jodha in 1459, and from that time has been the seat of government. It is surrounded by a strong wall nearly 6 m. in extent, with seventy gates. The fort, which stands on an iso- lated rock, contains the maharaja's palace, a large and handsome building, completely covering the crest of the hill on which it stands, and overlooking the city, which lies several hundred feet below. The city contains palaces of the maharaja, and town residences of the thdkurs or nobles, besides numerous fine temples and tanks. Building stone is plentiful and close at hand, and the architecture is solid and handsome. Three miles north of Jodhpur are the ruins of Mandor, the site of the ancient capital of the Parihar princes of Marwar, before its conquest

by the Rathors. Mills for grinding flour and crushing grain have been constructed for the imperial service troops. The Jaswant college is affiliated to the B.A. standard of the Allahabad univer- sity. To the Hewson hospital a wing for eye diseases was added in 1898, and the Jaswant hospital for women is under an English lady doctor.

JOEL. The second book among the minor prophets in the Bible is entitled The word of Yahweh that came to Joel the son of Pethuel, or, as the Septuagint, Latin, Syriac and other versions read, Belhuel. Nothing is recorded as to the date or occasion of the prophecy. Most Hebrew prophecies contain pointed references to the foreign politics and social relations of the nation at the time. In the book of Joel there are only scanty allusions to Phoenicians, Philistines, Egypt and Edom, couched in terms applicable to very different ages, while the prophet's own people are exhorted to repentance without specific reference to any of those national sins of which other prophets speak. The occasion of the prophecy, described with great force of rhetoric, is no known historical event, but a plague of locusts, perhaps repeated in successive seasons; and even here there are features in the description which have led many expositors to seek an allegorical interpretation. The most remarkable part of the book is the eschatological picture with which it closes; and the way in which the plague of locusts appears to be taken as foreshadowing the final judgment — the great day or assize of Yahweh, in which Israel's enemies are destroyed — is so unique as greatly to com- plicate the exegetical problem. It is not therefore surprising that the most various views are still held as to the date and mean- ing of the book. Allegorists and literalists still contend over the first and still more over the second chapter, and, while the largest number of recent interpreters accept Credner's view that the prophecy was written in the reign of Joash of Judah (835- 796 B.C.?), a powerful school of critics (including A. B. Davidson) follow the view suggested by Vatke {Bib. Theol. p. 462 seq.), and reckon Joel among the post-exile prophets. Other scholars give yet other dates: see the particulars in the elaborate work of Merx. The followers of Credner are literalists; the opposite school of moderns includes some literalists (as Duhm), while others (like Hilgenfeld, and in a modified sense Merx) adopt the old allegorical interpretation which treats the locusts as a figure for the enemies of Jerusalem.

There are cogent reasons for placing Joel either earlier or later than the great series of prophets extending from the time when Amos first proclaimed the approach of the Assyrian down to the Babylonian exile. In Joel the enemies of Israel are the nations collectively, and among those specified by name neither Assyria nor Chaldaea finds a place. This circumstance might, if it stood alone, be explained by placing Joel with Zephaniah in the brief interval between the decline of the empire of Nineveh and the advance of the Babylonians. But it is further obvious that

Joel has no part in the internal struggle between spiritual Yahweh-worship and idola- try which occupied all the prophets from Amos to the captivity. He presupposes a nation of Yahweh-worshippers, whose religion has its centre in the temple and priesthood of Zion, which is indeed conscious of sin, and needs forgiveness and an outpouring of the Spirit, but is not visibly divided, as the kingdom of Judah was. between the adherents of spiritual prophecy and a party whose national worship of Yahweh involved for them no fundamental separation from the surrounding nations. The book, therefore, must have been written before the ethico-spiritual and the popular conceptions of Yahweh came into conscious antagonism, or else after the fall of the state and the restoration of the community of Jerusalem to religious rather than political existence had decided

the contest in favour of the prophets, and of the Law in which their

teaching was ultimately crystallized.

The considerations which have given currency to an early date for Joel are of various kinds. The absence of all mention of one great oppressing world-power seems most natural before the westward march of Assyria involved Israel in the general politics of Asia. The purity of the style is also urged, and a comparison of Amos i. 2, Joel iii. 16 (Heb. iv. 16), and Amos ix. 13, Joel iii. 18 (iv. 18), has been taken as proving that Amos knew our book. The last argument might be inverted with much greater probability, and numerous points of contact between Joel and other parts of the Old Testament {e.g. Joel ii. 2, Exod. x. 14; Joel ii. 3, Ezek. xxxvi. 35; Joel iii. 10, Mie. iv. 3) make it not incredible that the purity of his style— which is rather elegant than original and strongly marked — is in large measure the fruit of literary culture. The absence of allusion to a hostile or oppressing empire may be fairly taken in connexion with the fact that t"he prophecy gives no indication of political life at Jerusalem. When the whole people is mustered in ch. i., the elders or sheikhs of the municipality and the priests of the temple are the most prominent figures. The king is not mentioned — which on Credner's view is explained by assuming that the plague fell in the minority of Joash, when the priest Jchoiada held the reins of power — ■ and the princes, councillors and warriors necessary to an independent state, and so often referred to by the prophets before the exile, are altogether lacking. The nation has only a municipal organiza- tion with a priestly aristocracy, precisely the state of things that prevailed under the Persian empire. That the Persians do not appear as enemies of Yahweh and his people is perfectly natural. They were hard masters but not invaders, and under them the enemies of the Jews were their neighbours, just as appears in Joel. 1 Those, however, who place our prophet in the minority of King Joash draw a special argument from the mention of Phoenicians, Philistines and Edomites (iii. 4 seq., 19), pointing to the revolt of Edom under Joram (2 Kings viii. 20) and the incursion of the Philistines in the same reign (2 Chron. xxi. 16, xxii. 1). These were recent events in the time of Joash, and in like manner the Phoenician slave trade in Jewish children is carried back to an early date by the reference in Amos i. 9. This argument is rather specious than sound. Edom's hostility to Judah was incessant, but the feud reached its full intensity only after the time of Deuteronomy (xxiii. 7), when the Edomites joined the Chaldaeans, drew profit from the overthrow of the Jews, whose land they partly occupied,

and exercised barbarous cruelty towards the fugitives of Jerusalem (Obad. passim; Mai. i. 2 seq.; Isa. lxiii.). The offence of shedding innocent blood charged on them by Joel is natural after these events, but hardly so in connexion with the revolt against Joram.

As regards the Philistines, it is impossible to lay much weight on the statement of Chronicles, unsupported as it is by the older history, and in Joel the Philistines plainly stand in one category with the Phoenicians, as slave dealers, not as armed foes. Gaza in fact was a slave emporium as early as the time of Amos (i. 6), and continued so till Roman times.

Thus, if any inference as to date can be drawn from ch. iii., it must rest on special features of the trade in slaves, which was always an important part of the commerce of the Levant. In the time of Amos the slaves collected by Philistines and Tyr'ans were sold en masse to Edom, and presumably went to Egypt or Arabia. Joel complains that they were sold to the Grecians (Javan, Ionians). 2 It is probable that some Hebrew and Syrian Siaves were exported to the Mediterranean coasts from a very early date, and Isa. xi. 11 already speaks of Israelites captive in these districts as well as in Egypt, Ethiopia and the East. But the traffic in this direction hardly became extensive till a later date. In Deut. xxviii. 68, Egypt is still the chief goal of the maritime slave trade, and in Ezek. xxvii. 13 Javan exports slaves to Tyre, not conversely. Thus the allusion to Javan in Joel better suits a later date, when Syrian slaves were in special request in Greece. 3 And the name of Javan is not found in any part of the Old Testament certainly older than Ezekiel. In Joel it seems to stand as a general representative of the distant countries reached by the Mediterranean (in contrast with the southern Arabians, Sabaeans, ch. iii. 8), the farthest nation reached by the fleets of the Red Sea. This is precisely the geographi- cal standpoint of the post-exile author of Gen. x. 4, where (assuming that Elishah = Carthage and Tarshish = Tartessus) Javan includes Carthage and Tartessus.

Finally, the allusion to Egypt in Joel iii. 19 must on Credner's theory be explained of the invasion of Shishak a century before

1 In the A.V. of ii. 17 it appears that subjection to a foreign power is not a present fact but a thing feared. But the parallelism and v. 19 justify the rendering in margin of R.V. " use a byword against them."

2 The hypothesis of an Arabian Javan, applied to Joel iii. 6 by Credner, Hitzig, and others, may be viewed as exploded (see Stade, " DasVolk Javan," 1880, reprinted in his Akad.Reden u.Ablwndlungen, 1899, pp. 123-142). The question, however, has to be re-examined; later interpreters, e.g. the LXX translators, may have misunder- stood. The text of the passages has to be critically treated anew. See Cheyne, Traditions and

Beliefs of Ancient Israel (on Gen. x. 2).

3 Compare Movers, Phonizisches Alterthum, iii. i. 70 seq.

Joash. From this time down to the last period of the Hebrew monarchy Egypt was not the enemy of Judah.

If the arguments chiefly relied on for an early date are so pre- carious or can even be turned against their inventors, there are others of an unambiguous kind which make for a date in the Persian period. It appears from ch. iii. 1,2, that Joel wrote after the exile. The phrase " to bring again the captivity " would not alone suffice to prove this, for it is used in a wide sense, and perhaps means rather to " reverse the calamity," 4 but the dispersion of Israel among the nations, and the allotment of the Holy Land to new occu- pants, cannot fairly be referred to any calamity less than that of the captivity. With this the whole standpoint of the prophecy agrees. To Joel Judah and the people of Yahweh are synonyms; northern Israel has disappeared. Now it is true that those who take their view of the history from Chronicles, where the kingdom of Ephraim is always treated as a sect outside the true religion, can reconcile this fact with an early date. But in ancient times it was not so; and under Joash, the contemporary of Elisha, such a limitation of the people of Yahweh is wholly inconceivable. The earliest prophetic books have a quite different standpoint ; otherwise indeed the books of northern prophets and historians could never have been admitted into the Jewish canon. Again, the significant fact that there is no mention of a king and princes, but only of sheikhs and priests, has a force not to be invalidated by the ingenious reference of the book to the time of Joash's minority and the supposed regency of Jehoiada. And the assumption that there was a period before the prophetic conflicts of the 8th century B.C. when spiritual prophecy had unchallenged sway, when there was no gross idolatry or superstition, when the priests of Jerusalem, acting in accord with prophets like Joel, held the same place as heads of a pure worship which they occupie'd after the exile (cf. Ewald, Propheten, i. 89), is not consistent with history. It rests on the old theory of the antiquity of the Levitical legislation, so that in fact all who place that legislation later than Ezekiel are agreed that the book of Joel is also late. In this connexion one point deserves special notice. The religious significance of the plague of drought and locusts is expressed in ch. 1. 9 in the observation that the daily meat and drink offering are cut off, and the token of new blessing is the restoration of this service, ch. ii. 14. In other words, the daily offering is the continual symbol of gracious intercourse between Yahweh and his people and the main office of religion. This conception, which finds its parallel in Dan. viii. II, xi. 31, xii. II, is quite in accordance with the later law. But under the monarchy the daily oblation was the king's private offering, and not till Ezra's reformation did it become the affair of the*

community and the central act of national worship (Neh. x. 33 seq.). 6 That Joel wrote not only after the exile but after the work of Ezra and Nehemiah may be viewed as confirmed by the allusions to the walls of Jerusalem in ch. ii. 7, 9. Such is the historical basis which we seem to be able to lay for the study of the exegetical problems of the book.

The style of Joel is clear (which hardly favours an early date), and his language presents peculiarities which are evidences of a late origin. But the structure of the book, the symbolism and the connexion of the prophet's thoughts have given rise to much controversy. It seems safest to start from the fact that the prophecy is divided into two well-marked sections by ch. ii. 18, 19a. According to the Massoretic vocalization, which is in harmony with the most ancient exegetical tradition as contained in the LXX, these words are historical: " Then the Lord was jealous, . . . and answered and said unto his people, Behold," &c. Such is the natural meaning of the words as pointed.

Thus the book falls into two parts. In the first the prophet speaks in his own name, addressing himself to the people in a lively description of a present calamity caused by a terrible plague of locusts which threatens the entire destruction of the country, and appears to be the vehicle of a final consuming judgment (the day of Yahweh). There is no hope save in repentance and prayer'; and in ch. ii. 12 the prophet, speaking now for the first time in Yahweh's name, calls the people to a solemn fast at the sanctuary, and invites the intercession of the priests. The calamity is described in the strongest colours of Hebrew hyper- bole, and it seems arbitrary to seek too literal an interpretation of details, e.g. to lay weight on the four names of locusts, or to take ch. i. 20 of a conflagration produced by drought, when it appears from ii. 3 that the ravages of the locusts themselves are compared to those of fire. But when due allowance is made for

4 See Ewald on Jer. xlviii. 47, Kuenen, Theol. Tijdschrift (1873), p. 519; Schwally, Z.A.T.W., viii. 200, and Briggs on Ps. xiv. 7.

6 Stade not unreasonably questions whether 2 Kings xii. 1-3 implies the paramount political influence of Jehoiada.

6 See Wellhausen, Geschichte Israels, p. 78 seq.; Prolegomena zur Gesch. Israels (1883), p. 82 seq.

Eastern rhetoric, there is no occasion to seek in this section anything else

than literal locusts. Nay, the allegorical interpre- tation, which takes the locusts to be hostile invaders, breaks through the laws of all reasonable writing; for the poetical hyper- bole which compares the invading swarms to an army (ii. 4 seq.) would be inconceivably lame if a literal army was already con- cealed under the figure of the locusts. Nor could the prophet so far forget himself in his allegory as to speak of a victorious host as entering the conquered city like a thief (ii. 9). The second part of the book is Yahweh's answer to the people's prayer. The answer begins with a promise of deliverance from famine, and of fruitful seasons compensating for the ravages of the locusts. In the new prosperity of the land the union of Yahweh and his people shall be sealed anew, and so the Lord will proceed to pour down further and higher blessings. The aspiration of Moses (Num. xi. 29) and the hope of earlier prophets (Isa. xxxii. 15, lix. 21; Jer. xxxi. 33) shall be fully realized in the outpouring of the Spirit on all the Jews and even upon their servants (Isa. lxi. 5 with lvi. 6, 7); and then the great day of judgment, which had seemed to overshadow Jerusalem in the now averted plague, shall draw near with awful tokens of blood and fire and darkness. But the terrors of that day are not for the Jews but for their enemies. The worshippers of Yahweh on Zion shall be delivered (cf. Obad. v. 17, whose words Joel expressly quotes in ch. ii. 32), and it is their heathen enemies, assembled before Jerusalem to war against Yahweh, who shall be mowed down in the valley of Jehoshaphat (" Yahweh judgeth ") by no human arm, but by heavenly warriors. Thus definitively freed from the profane foot of the stranger (Isa. lii. 1), Jerusalem shall abide a holy city for ever. The fertility of the land shall be such as was long ago predicted in Amos ix. 13, and streams issuing from the Temple, as Ezekiel had described in his picture of the restored Jerusalem (Ezek. xlvii.), shall fertilize the barren Wadi of Acacias. Egypt and Edom, on the other hand, shall be desolate, because, they have shed the blood of Yahweh's innocents. Compare the similar predictions against Edom, Isa. xxxiv. 9 seq. (Mai. i. 3), and against Egypt, Isa. xix. 5 seq., Ezek. xxix. Joel's eschato- logical picture appears indeed to be largely a combination of elements from older unfulfilled prophecies. Its central feature, the assembling of the nations to judgment, is already found in Zeph. iii. 8, and in Ezekiel's prophecy concerning Gog and Magog, where the wonders of fire and blood named in Joel ii. 30 are also mentioned (Ezek. xxxviii. 22). The other physical features of the great day, the darkening of the lights of heaven, are a standing figure of the prophets from Amos v. 6, viii. 9, downwards. It is characteristic of the prophetic eschatology that images suggested by one prophet are adopted by his successors, and gradually become part of the permanent scenery of the last times; and it is a proof of the late date of Joel that almost his whole picture is made up of such features. In this respect there is a close paral- lelism, extending to minor details, between Joel and the last chapters of Zechariah.

That Joel's delineation of the final deliverance and glory attaches itself directly to the deliverance of the nation from a present calamity is quite in the manner of the so-called prophetic perspective. But the fact that the calamity which bulks so largely is natural and not political is characteristic of the post- exile period. Other prophets of the same age speak much of dearth and failure of crops, which in Palestine then as now were aggravated by bad government, and were far more serious to a small and isolated community than they could ever have been to the old kingdom. It was indeed by no means impossible that Jerusalem might have been altogether undone by the famine caused by the locusts; and so the conception of these visitants as the destroying army, executing Yahweh's final judgment, is really much more natural than appears to us at first sight, and does not need to be explained away by allegory. The chief argument relied upon by those who still find allegory at least in ch. ii. is the expression hassephoni, " the northerner " l [if this rendering is correct], in ii. 20. In view of the other points of

1 It has been suggested that Saphon, which is often rather trouble- some if rendered " the north," may be a weakened form of sib'on, a

affinity between Joel and Ezekiel, this word inevitably suggests Gog and Magog, and it is difficult to see how a swarm of locusts could receive such a name, or if they came from the north could perish, as the verse puts it, in the desert between the Mediter- ranean and the Dead Sea. The verse remains a crux inter prelum, and no exegesis hitherto given can be deemed thoroughly satis- factory; but the interpretation of the whole book must not be made to hinge on a single word in a verse which might be alto- gether removed without affecting the general course of the prophet's argument.

The whole verse is perhaps the addition of an allegorizing glossator. The prediction in v. 19, that the seasons shall hence- forth be fruitful, is given after Yahweh has shoMin his zeal and pity for Israel, not of course by mere words, but by acts, as appears in verses 20, 21, where the verbs are properly perfects recording that Yahweh hath already done great things, and that vegetation has already revived. In other words, the mercy already experienced in the removal of the plague is taken as a pledge of future grace not to stop short till all God's old promises are fulfilled. In this context v. 20 is out of place. Observe also that in v. 25 the locusts are spoken of in the plain language of chap. i.

See the separate commentaries on Joel by Credner (1 83 1) , Wunsche (1872), Merx (1879). The last-named gives an elaborate history of interpretation from the Septuagint down to Calvin, and appends the Ethiopic text edited by Dillmann. Nowack and Marti should also be consulted (see their respective series of commentaries) ; also G. A. Smith,

in The Booh of the Twelve Prophets, vol. i. (1896), and S. R. Driver, Joel and Amos (1897). On the language of Joel, see Holzinger, Z. A. T. W. (1889), pp. 89-131. Of older commentaries the most valuable is Pococks (Oxford, 1691). Bochart's Hierozo'icon may also be consulted. (W. R. S. ; T. K. C.)

JOEL, MANUEL (1826-1890), Jewish philosopher and preacher. After teaching for several years at the Breslau rabbinical semi- nary, founded by Z. Frankel, he became the successor of Abraham Geiger in the rabbinate of Breslau. He made important con- tributions to the history of the school of Aqiba (q.v.) as well as to the history of Jewish philosophy, his essays on Ibn Gabirol and Maimonides being of permanent worth. But his most influential work was connected with the relations between Jewish philosophy and the medieval scholasticism. He showed how Albertus Magnus derived some of his ideas from Maimonides and how Spinoza was indebted to the same writer, as well as to Hasdai Crescas. These essays were collected in two volumes of Beilrdge zur Geschichte der Philosophic (1876), while another two volumes of Blicke in die Religionsgeschichte (1 880-1 883) threw much light on the development of religious thought in the early centuries of the Christian era. Equally renowned were Joel's pulpit addresses. Though he was no orator, his appeal to the reason was effective, and in their published form his three volumes of Predigten (issued posthumously) have found many readers. (I. A.)

JOFFRIN, JULES FRANCOIS ALEXANDRE (1846-1890), French politician, was born at Troyes on the 16th of March 1846. He served in the Franco- German War, was involved in the Commune, and spent eleven years in England as a political exile. He attached himself to the " possibilist " group of the socialist party, the section opposed to the root-and-branch measures of Jules Guesde. He became a member of the municipal council of Paris in 1882", and vice-president in 1888-1889. Violently attacked by the Boulangist organs, L'Intransigeant and La France, he won a suit against them for libel, and in 1889 he con- tested the 18th arrondissement of Paris with General Boulanger, who obtained a majority of over 2000 votes, but was declared ineligible. Joffrin was only admitted to the Chamber after a heated discussion, and continued to be attacked by the nation- alists. He died in Paris on the 17th of September 1890.

current popular corruption of shimo'n = \shmae. In Ezek. xxxviii. 15 it is distinctly said that Gog is to come from the recesses of Saphon. " Meshech " and " Tubal " are no hindrance to this view, if the names of the so-called " sons of Japheth " are critically exam- ined. For they, too, as well as Saphon, can be plausibly shown t« represent regions of North Arabia. See Cheyne, Traditions and Beliefs of Anc. Israel, on Gen. x. 2-4.

J06UES, ISAAC (1 607-1 646), French missionary in North America, was born at Orleans on the 10th of January 1607. He entered the Society of Jesus at Rouen in 1624, and in 1636 was ordained and sent, by his own wish, to the Huron mission. In 1639 he went among the Tobacco Nation, and in 1641 jour- neyed to Sault Sainte Marie, where he preached to the Algon- quins. Returning from an expedition to Three Rivers he was captured by Mohawks, who tortured him and kept him as a slave until the summer of 1643, when, aided by some Dutchmen, he escaped to the manor of Rensselaerwyck and thence to New Amsterdam. After a brief visit to France, where he was treated with high honour, he returned to the Mohawk country in May 1646 and ratified a treaty between that tribe and the Canadian government. Working among them as the founder of the Mission of the Martyrs, he incurred their enmity, was tortured as a sorcerer, and finally killed at Ossernenon, near Auriesville, N.Y.

See Parkman, The Jesuits in North America (1

JOHANAN BEN ZACCAI, Palestinian rabbi, contemporary of the Apostles. He was a disciple of Hillel (g.v.), and after thedestruction of the Temple of Jerusalem by Titus was the main instrument in the preservation of the Jewish religion. During the last decades of the Temple Johanan was a member of the Sanhedrin and a skilled controversialist against the Sadducees. He is also reported to have been head of a great school in the capital. In the war with Rome he belonged to the peace party, and finding that the Zealots were resolved on carrying their revolt to its inevitable sequel, Johanan had himself conveyed out of Jerusalem in a coffin. In the Roman camp the rabbi was courteously received, and Vespasian (whose future elevation to the imperial dignity Johanan, like Josephus, is said to have foretold) agreed to grant him any boon he desired. Johanan obtained permission to found a college at Jamnia (Jabneh), which became the centre of Jewish culture. It practically exercised the judicial functions of the Sanhedrin (see Jews, § 40 ad fin.). That chief literary expression of Pharisaism, the Mishnah, was the outcome of the work begun at Jamnia. Johanan solaced his disciples on the fall of the Temple by the double thought that charity could replace sacrifice, and that a life devoted to the religious law could form a fitting continuation of the old theocratic state. “Johanan felt the fall of his people more deeply than anyone else, but — and in this lies his historical importance — he did more than any one else to prepare the way for Israel to rise again ” (Bacher).

See Graetz, History of the Jews (Eng. trans.), vol. ii. ch. xiii. ; Weiss, Dor

dor ve-doreshav, ii. 36; Bacher, Die Agada der Tannaiten, vol. i. ch. iii. (I. A.)

JOHANNESBURG, a city of the Transvaal and the centre of the Rand gold-mining industry. It is the most populous city and the commercial capital of South Africa. It is built on the southern slopes of the Witwatersrand in 26 n' S. 28° 2′ E., at an elevation of 5764 ft. above the sea. The distances by rail from Johannesburg to the following seaports are: Lourenco Marques, 364 m.; Durban, 483 m.; East London, 659 m.; Port Elizabeth, 714 m.; Cape Town, 957 m. Pretoria is, by rail, 46 m. N. by E.

The town lies immediately north of the central part of the main gold reef. The streets run in straight lines east and west or north and south. The chief open spaces are Market Square in the west and Government Square in the south of the town. Park railway station lies north of the business quarter, and farther north are the Wanderers' athletic sports ground and Joubert's Park. The chief business streets, such as Commis- sioner Street, Market Street, President Street and Pritchard Street, run east and west. In these thoroughfares and in several of the streets which intersect them are the offices of the mining companies, the banks, clubs, newspaper offices, hotels and shops, the majority being handsome stone or brick buildings, while the survival of some wooden shanties and corrugated iron buildings recalls the early character of the town.

Chief Buildings, &c. — In the centre of Market Square are the market buildings, and at its east end the post and telegraph

offices, a handsome block of buildings with a facade 200 ft. long and a tower 106 ft. high. The square itself, a quarter of a mile long, is the la gest in South Africa. The offices of the Witwaters- rand chamber of mines face the market buildings. The stock exchange is in Marshall Square. The telephone exchange is in the centre of the city, in Von Brandis Square. The law courts are in the centre of Government Square. The Transvaal university college is in Plein Square, a little south of Park station. In the vicinity is St Mary's (Anglican) parish hall (1905-1907), the first portion of a large building planned to take the place of " Old " St Mary's Church, the " mother " church of the Rand, built in 1887. The chief Jewish synagogue is in the same neigh- bourhood. In Kerk Street, on the outskirts of central Johannes- burg, is the Roman Catholic Church of the Immaculate Con- ception, the headquarters of the vicar apostolic of the Transvaal. North of Joubert's Park is the general hospital, and beyond, near the crest of the hills, commanding the town and the road to Pretoria, is a fort built by the Boer government and now used as a gaol. On the hills, some 3 m. E.N.E. of the town, is the observatory, built in 1903. Johannesburg has several theatres and buildings adapted for public

meetings. There is a race-course 2 m. south of the town under the control of the Johannesburg Turf Club.

The Suburbs. — North, east and west of the city proper are suburbs, laid out on the same rectangular plan. The most fashionable are to the east and north — Jeppestown, Belgravia, Doornfontein, the Berea, Hillbrow, Parktown, Yeoville and Belle- vue. Braamfontein (with a large cemetery) lies north-west and Fordsburg due west of the city. At Fordsburg are the gas and electric light and power works, and north of Doornfontein there is a large reservoir. There are also on the Rand, and dependent on the gold-mining, three towns possessing separate municipali- ties — Germiston and Boksburg (g.v.), respectively 9 m. and 15 m. E. of Johannesburg, and Krugersdorp (g.v.), 21 m. W.

The Mines and other Industries. — South, east and west of the city are the gold mines, indicated by tall chimneys, battery houses and the compounds of the labourers. The bare veld is dotted with these unsightly buildings for a distance of over fifty miles. The mines are worked on the most scientific lines. Characteristic of the Rand is the fine white dust arising from the crushing of the ore, and, close to the batteries, the incessant din caused by the stamps employed in that operation. The com- pounds in general,, especially those originally made for Chinese labourers, are well built, comfortable, and fulfil every hygienic requirement. Besides the buildings, the compounds include wide stretches of veld. To enter and remain in the district, Kaffirs require a monthly pass for which the employer pays 2S. (For details of gold-mining, see Gold.) A railway traverses the Rand, going westward past Krugersdorp to Klerksdorp and thence to Kimberley, and eastward past Springs to Delagoa Bay. From Springs, 25 m. E. of Johannesburg, is obtained much of the coal used in the Rand mines.

The mines within the municipal area produce nearly half the total gold output of the Transvaal. The other industries of Johannesburg include brewing; printing and bookbinding, timber sawing, flour milling, iron and brass founding, brick making and the manufacture of tobacco.

Health, Education and Social Conditions. — The elevation of Johannesburg makes it, despite its nearness to the tropics, a healthy place for European habitation. Built on open undu- lating ground, the town is, however, subject to frequent dust storms and to considerable variations in the temperature. The nights in winter are frosty and snow falls occasionally. The average day temperature in winter is 53 F., in summer 75°; the average annual rainfall is 28 in. The death-rate among white inhabitants averages about 17 per thousand. The principal causes of death, both among the white and coloured inhabitants, are diseases of the lungs — including miners' phthisis and pneu- monia — diarrhoea, dysentery and

enteric. The death-rate among young children is very high.

Education is provided in primary and secondary schools maintained by the state. In the primary schools education is

free but not compulsory. The Transvaal university college, founded in 1904 as the technical institute (the change of title being made in 1906), provides full courses in science, mining, engineering and law. In 1906 Alfred Beit (q.v.) bequeathed £200,000 towards the cost of erecting and equipping university buildings.

In its social life Johannesburg differs widely from Cape Town and Durban. The white population is not only far larger but more cosmopolitan, less stationary and more dependent on a single industry; it has few links with the past, and both city and citizens bear the marks of youth. The cost of living is much higher than in London or New York. House rent, provisions, clothing, are all very dear, and more than counterbalance the lowness of rates. The customary unit of expenditure is the threepenny-bit or " tickey."

Sanitary and other Services. — There is an ample supply of water to the town and mines, under a water board representing all the Rand municipalities and the mining companies. A water- borne sewerage system began to be introduced in 1906. The general illuminant is electricity, and both electrical and gas services are owned by the municipality. The tramway service, opened in 1891, was taken over by the municipality in 1904. Up to 1906 the trams were horse-drawn; in that year electric cars began running. Rickshaws are also a favourite means of conveyance. The police force is controlled by the government.

Area, Government and Rateable Value. — The city proper covers about 6 sq. m. The municipal boundary extends in every direction some 5 m. from Market Square, encloses about 82 sq. m. and includes several of the largest mines. The local government is carried on by an elected municipal council, the franchise being restricted to white British subjects (men and women) who rent or own property of a certain value. In 1908 the rateable value of the municipality was £36,466,644, the rate 2jd. in the £, and the town debt £5,500,000.

Population. — In 1887 the population was about 3000. By the beginning of 1890 it had increased to over 25,000. A census taken in July 1896 showed a population within a radius of 3 m. from Market Square of 102,078, of whom 50,907 were whites. At the census of April 1904 the

inhabitants of the city proper numbered 99,022, the population within the municipal area being 155,642, of whom 83,363 were whites. Of the white inhabitants, 35% were of British origin, 51,629 were males, and 3 1,734 females. Of persons aged sixteen or over, the number of males was almost double the number of females. The coloured population included about 7000 British Indians — chiefly small traders. A municipal census taken in August 1908 gave the following result: whites 95,162; natives and coloured 78,781; Asiatics 6780 — total 180,687.

History. — Johannesburg owes its existence to the discovery of gold in the Witwatersrand reefs. The town, named after Johannes Rissik, then surveyor-general of the Transvaal, was founded in September 1886, the first buildings being erected on the part of the reef where are now the Ferreira and Wemmer mines. These buildings were found to cover valuable ore, and in December following the Boer government marked out the site of the city proper, and possession of the plots was given to pur- chasers on the 1st of January 1887. The exploitation of the mines led to a rapid development of the town during the next three years. The year 1890 was one of great depression following the exhaustion of the surface ore, but the provision of better machinery and cheaper coal led to a revival in 1891. By 1892 the leading mines had proved their dividend-earning capa- city, and in 1895 there was a great " boom " in the shares of the mining companies. The linking of the town to the seaports by railways during 1892-1895 gave considerable impetus to the gold- mining industry. Material prosperity was accompanied, how- ever, by political, educational and other disadvantages, and the desire of the Johannesburgers — most of whom were foreigners or " Uitlanders " — to remedy the grievances under which they suffered led, in January 1896, to an abortive rising against the Boer government (see Transvaal: History). One result of this movement was a slight advance in municipal self-government.

Since 1887 the management of the town had been entrusted to a nominated sanitary board, under the chairmanship of the mining commissioner appointed by the South African Republic. In 1890 elected members had been admitted to this board, but at the end of 1897 an elective stadsraad (town council) was constituted, though its functions were strictly limited, ˆhere was a great development in the mining industry during 1897- 1898 and 1899, the value of the gold extracted in 1898 exceeding £15,000,000, but the political situation grew worse, and in September 1899, owing to the imminence of war between the Transvaal and Great Britain, the majority of the Uitlanders fled from the city. Between October 1899, when war broke out, and the 31st of May 1900, when the city was taken by the British, the Boer government worked certain mines for their own benefit. After a period of military administration and of government by a nominated town council, an

ordinance was passed in June 1903 providing for elective municipal councils, and in December following the first election to the new council took place. In 1905 the town was divided into wards. In that year the number of municipal voters was 23,338. In 1909 the proportional representation system was adopted in the election of town councillors. During 1901-1903, while the war was still in progress or but recently concluded, the gold output was comparatively slight. The difficulty in obtaining sufficient labour for the mines led to a successful agitation for the importation of coolies from China (see Transvaal: History). During 1904-1906 over 50,000 coolies were 'brought to the mines, a greatly increased output being the result, the value of the gold extracted in 1905 exceeding £20,000,000. Notwithstanding the increased production of gold, Johannesburg during 1905-1907 passed through a period of severe commercial depression, the result in part of the un- settled political situation. In June 1907 the repatriation of the Chinese coolies began; it was completed in February 1910.

An excellent compilation, entitled Johannesburg Statistics, dealing with almost every phase of the city's life, is issued monthly (since January 1905) by the town council. See also the Post Office Direc- tory, Transvaal (Johannesburg, annually), which contains specially prepared maps, and the annual reports of the Johannesburg chamber of commerce. For the political history of Johannesburg, see the bibliography under Transvaal.

JOHANNISBERG, a village of Germany, in the Prussian province of Hesse-Nassau, in the Rheingau, on the right bank of the Rhine, 6 m. S. of Rudesheim by railway. The place is mainly celebrated for the beautiful Schloss which crowns a hill overlooking the Rhine valley, and is surrounded by vineyards yielding the famous Johannisberger wine. The Schloss, built in 1 757-1 759 by the abbots of Fulda on the site of a Benedictine monastery founded in 1090, was bestowed, in 1807, by Napoleon upon Marshal Kellermann. In 1814 it was given by Francis, emperor of Austria, to Prince Metternich, in whose family it still remains.

JOHN (Heb. ⌊jnV), Yohanan, " Yahweh has been gracious," Gr. 'Iu&vvtis, Lat. Joannes, Ital. Giovanni, Span. Juan, Port. Joao, Fr. Jean, Ger. Johannes, Johann [abbr. Hans), Gael. Ian, Pol. and Czech Jan, Hung. Jdnos), a masculine proper name common in all Christian countries, its popularity being due to its having been borne by the " Beloved Disciple " of Christ, St John the Evangelist, and by the forerunner of Christ, St John the Baptist. It has been the name of twenty-two popes — the style of Popes John XXII. and XXIII. being due to an error in the number assumed by John XXI. (q.v.) — and of many sovereigns, princes, &c. The order followed in the biographical notices below is as follows: (1) the Apostle, (2) the Baptist, (3) popes, (4) Roman emperors, (5) kings; John of

England first, the rest in the alphabetical order of their countries, (6) other sovereign princes, (7) non-sovereign princes, (8) saints, (9) theologians, chroniclers, &c. These princes who are known by a name in addition to John (John Albert, &c.) will be found after the article John, Gospel of.

JOHN, the Apostle, in the Bible, was the son of Zebedee, a Galilean fisherman, and Salome. It is probable that he was born at Bethsaida, where along with his brother James he followed

JOHN THE BAPTIST

his father's occupation. The family appears to have been in easy circumstances; at least we find that Zebedee employed hired servants, and that Salome was among those women who contributed to the maintenance of Jesus (Mark i. 20, xv. 40, 41, xvi. 1). John's " call " to follow our Lord occurred simulta- neously with that addressed to his brother, and shortly after that addressed to the brothers Andrew and Simon Peter (Mark i. 19,20). John speedily took his place among the twelve apostles, sharing with James the title of Boanerges (" sons of thunder," perhaps strictly " sons of anger," i.e. men readily angered), and became a member of that inner circle to which, in addition to his brother, Peter alone belonged (Mark v. 37, ix. 2, xiv. 33). John appears throughout the synoptic record as a zealous, fiery Jew-Christian. It is he who indignantly complains to Jesus, " We saw one casting out devils in Thy name, and he followeth not us," and tells Him, " We forbade him " for that reason (Mark ix. 38); and who with his brother, when a Samaritan village will not receive Jesus, asks Him, " Wilt thou that we command fire to come down from heaven and consume them?" (Luke ix. 54). The book of Acts confirms this tradition. After the departure of Jesus, John appears as present in Jerusalem with Peter and the other apostles (i. 13); is next to Peter the most prominent among those who bear testimony to the fact of the resurrection (iii. 12-26, iv. 13, 19-22); and is sent with Peter to Samaria, to confirm the newly converted Christians there (viii. 14, 25). St Paul tells us similarly that when, on his second visit to Jerusalem, " James," the Lord's brother, " and Cephas and John, who were considered pillars, perceived the grace that was given unto me, they gave to me and Barnabas the right hand of fellowship, that we should go unto the heathen, and they unto the circumcision " (Gal. ii. 9). John thus belonged in 46-47 to the Jewish-Christian school; but we do not know whether to' the stricter group of James or to the milder group of Peter (ibid. ii. 11-14).

The subsequent history of the apostle is obscure. Polycrates, bishop of Ephesus (in Euseb., H. E. iii. 31; v. 24), attests in 196 that John " who lay on the bosom of the Lord rests at Ephesus "; but previously in this very sentence he has declared that " Philip one of the twelve apostles rests in

Hierapolis," although Eusebius (doubtless rightly) identifies this Philip not with the apostle but with the deacon-evangelist of Acts xxi. 8. Polycrates also declares that John was a priest wearing the ireraXov (gold plate) that distinguished the high-priestly mitre. Irenaeus in various passages of his works, 181-191, holds a similar tradition. He says that John lived up to the time of Trajan and published his gospel in Ephesus, and identifies the apostle with John the disciple of the Lord, who wrote the Apocalypse under Domitian, whom Irenaeus's teacher Polycarp had known personally and of whom Polycarp had much to tell. These traditions are accepted and enlarged by later authors, Tertullian adding that John was banished to Patmos after he had miraculously survived the punishment of immersion in burning oil. As it is evident that legend was busy with John as early as the time of Polycrates, the real worth of these traditions requires to be tested by exami- nation of their ultimate source. This inquiry has been pressed upon scholars since the apostolic authorship of the Apocalypse or of the Fourth Gospel, or of both these works, has been disputed. (See John, Gospel of, and Revelation, Book of.) The question has not been strictly one between advanced and conservative criticism, for the Tubingen school recognized the Apocalypse as apostolic, and found in it a confirmation of John's residence in Ephesus. On the other hand, Liitzelberger (1840), Th. Keim (Jesus v. Naz., vol. i., 1867), J. H. Scholten (1872), H. J. Holtzmann (esp. in Einl. in d. N. T., 3rd ed., 1902), and other recent writers, wholly reject the tradition. It has had able defenders in Steitz {Stud. u. Krit., 1868), Hilgenfeld (Einl., 1875) and Lightfoot (Essays on Supernatural Religion, collected 1889). W. Sanday (Criticism of Fourth Gospel, 1905) makes passing admissions eloquent as to the strength of the negative position; whilst amongst Roman Catholic scholars, A. Loisy (Le 4me. Ev., 1903) stands with Holtzmann, and Th. Calmes (Ev. selon S. Jean, 1904, 1906) and L. Duchesne (Hist. anc. de

I'Egl., 1906) exhibit, with papal approbation, the inconclusive- ness of the conservative arguments.

The opponents of the tradition lay weight on the absence of positive evidence before the latter part of the 2nd century, especially in Papias and in the epistles of Ignatius and of Irenaeus's authority, Polycarp. They find it necessary to assume that Irenaeus mistook Polycarp; but this is not a difficult task, since already Eusebius (c. 310-313) is compelled to point out that Papias testifies to two Johns, the Apostle and a presbyter, and that Irenaeus is mistaken in identifying those two Johns, and in holding that Papias had seen John the Apostle (H.E. iii. 39, 5, 2). Irenaeus tells us, doubtless correctly, that Papias was " the, companion of Polycarp": this fact alone would suffice, given his two mistakes concerning Papias, to make

Irenaeus decide that Polycarp had seen John the Apostle. The chronicler George the Monk (Hamartolus) in the 9th century, and an epitome dating from the 7th or 8th century but probably based on the Chronicle of Philip of Side (c. 430), declare, on the authority of the second book of Papias, that John the Zebedean was killed by Jews (presumably in 60-70). Adolf Harnack, Chron. d. altchr. Litt. (1897), pp. 656- 680), rejects the assertion; but the number of scholars who accept it as correct is distinctly on the increase. (F. v. H.)

JOHN THE BAPTIST, in the Bible, the " forerunner " of Jesus Christ in the Gospel story. By his preaching and teaching he evidently made a great impression upon his contemporaries (cf. Josephus, Ant. xviii., § 5). According to the birth-narrative embodied in Luke i. and ii., he was born in " a city of Judah " in " the hill country " (possibly Hebron J) of priestly parentage. His father Zacharias was a priest " of the course of Abijah," and his mother Elizabeth, who was also of priestly descent, was related to Mary, the mother of Jesus, whose senior John was by six months. This narrative of the Baptist's birth seems to embody some very primitive features, Hebraic and Palestinian in character, and possibly at one time independent of the Christian tradition. In the apocryphal gospels John is some- times made the subject of special miraculous experiences (e.g. in the Protevangelium Jacobi, ch. xxii., where Elizabeth fleeing from Herod's assassins cried: " Mount of God, receive a mother with her child," and suddenly the mountain was divided and received her).

In his 30th year (15th year of the emperor Tiberius, ? a.d. 25-26) John began his public life in the " wilderness of Judaea," the wild district that lies between the Kedron and the Dead Sea, and particularly in the neighbourhood of the Jordan, where multitudes were attracted by his eloquence. The central theme of his preaching was, according to the Synoptic Gospels, the nearness of the coming of the Messianic kingdom, and the consequent urgency for preparation by repentance. John was evidently convinced that he himself had received the divine commission to bring to a close and complete the prophetic period, by inaugurating the Messianic age. He identified him- self with the " voice " of Isa. xl. 3. Noteworthy features of his preaching were its original and prophetic character, and its high ethical tone, as shown e.g. in its anti-Pharisaic denunciation of trust in mere racial privilege (Matt. iii. 9). Herein also lay, probably, the true import of the baptism which he administered to those who accepted his message and confessed their sins. It was an act symbolizing moral purification (cf. Ezek. xxxvi. 25; Zech. xiii. 1) by way of preparation for the coming " kingdom of heaven," and implied that the Jew so baptized no longer rested in his privileged position as a child of Abraham. John's appearance, costume and habits of life, together with the tone of his preaching, all suggest the prophetic character. He was popularly

regarded as a prophet, more especially as a second Elijah. His preaching awoke a great popular response, particu- larly among the masses of the people, " the people of the land." He had disciples who fasted (Mark ii. 18, &c), who visited him

1 There is no reason to suppose that Jutta is intended by the tAXis 'IoG5a of Luke i. 39: the tradition which makes 'Ain Karim, near Jerusalem, the birthplace of the Baptist only dates from the crusad- ing period.

regularly in prison (Matt. xi. 2, xiv. 12), and to whom he taught special forms of prayer (Luke v. 33, xi. 1). Some of these afterwards became followers of Christ (John i. 37). John's activity indeed had far-reaching effects. It profoundly influenced the Messianic movement depicted in the Gospels. The preaching of Jesus shows traces of this, and the Fourth Gospel (as well as the Synoptists) displays a marked interest in connecting the Johannine movement with the beginnings of Christianity. The fact that after the lapse of a quarter of a century there were Christians in Ephesus who accepted John's baptism (Acts xviii. 25, xix. 3) is highly significant. This influence also persisted in later times. Christ's estimate of John (Matt. xi. 7 seq.) was a very high one. He also pointedly alludes to John's work and the people's relation to it, in many sayings and parables (some- times in a tone of irony). The duration of John's ministry cannot be determined with certainty: it terminated in his imprisonment in the fortress of Machaerus, to which he had been committed by Herod Antipas, whose incestuous marriage with Herodias, the Baptist had sternly rebuked. His execution cannot with safety be placed later than a.d. 28.

In the church calendar this event is commemorated on the 29th of August. According to tradition he was buried at Samaria (Theodoret, H.E. iii. 3). (G. H. Bo.)

JOHN I., pope from 523 to 526, was a Tuscan by birth, and was consecrated pope on the death of Hormisdas. In 525 he was sent by Theodoric at the head of an embassy to Constanti- nople to obtain from the emperor Justin toleration for the Arians; but he succeeded so imperfectly in his mission that Theodoric on his return, suspecting that he had acted only half- heartedly, threw him into prison, where he shortly afterwards died, Felix IV. succeeding him. He was enrolled among the martyrs, his day being May 27.

JOHN II., pope from 533 to 535, also named Mercurius, was elevated to

the papal chair on the death of Boniface II. During his pontificate a decree against simony was engraven on marble and placed before the altar of St Peter's. At the instance of the emperor Justinian he adopted the proposition unus de Trinitate passus est in came as a test of the orthodoxy of certain Scythian monks accused of Nestorian tendencies. He was succeeded by Agapetus I.

JOHN III., pope from 561 to 574, successor to Pelagius, was descended from a noble Roman family. He is said to have been successful in preventing an invasion of Italy by the recall of the deposed exarch Narses, but the Lombards still continued theii incursions, and, especially during the pontificate of his successoi Benedict I., inflicted great miseries on the province.

JOHN IV., pope from 640 to 642, was a Dalmatian by birth, and succeeded Severinus after the papal chair had been vacant four months. While he adhered to the repudiation of the Monothelitic doctrine by Severinus, he endeavoured to explain away the connexion of Honorius I. with the heresy. His successor was Theodorus I.

JOHN V., pope from 685 to 686, was a Syrian by birth, and on account of his knowledge of Greek had in 680 been named papal legate to the sixth ecumenical council at Constantinople. He was the successor of Benedict II., and after a pontificate of little more than a year, passed chiefly in bed, was followed by Conon.

' JOHN VI., pope from 701 to 705, was a native of Greece, and succeeded to the papal chair two months after the death of Sergius I. He assisted the exarch Theophylact, who had been sent into Italy by the emperor Justinian II., and prevented him from using violence against the Romans. Partly by persuasion and partly by means of a bribe, John succeeded in inducing Gisulf, duke of Benevento, to withdraw from the territories of the empire.

JOHN VII., pope from 705 to 707, successor of John VI., was also of Greek nationality. He seems to have acceded to the request of the emperor Justinian II. that he should give his sanction to the decrees of the Quinisext or Trullan council of 692. There are several monuments of John in the church of St Maria Antiqua at the foot of the Palatine hill; others were

formerly in the chapel of the Virgin, built by him in the basilica of St Peter. He was succeeded by Sisinnius.

JOHN VIII., pope from 872 to 882, successor of Adrian II., was a Roman by birth. His chief aim during his pontificate was to defend the Roman state and the authority of the Holy See at Rome from the Saracens, and

from the nascent feudalism which was represented outside by the dukes of Spoleto and the marquises of Tuscany and within by a party of Roman nobles. Events, however, were so fatally opposed to his designs that no sooner did one of his schemes begin to realize itself in fact than it was shattered by an unlooked-for chance. To obtain an influential alliance against his enemies, he agreed in 875, after death had deprived him of his natural protector, the emperor Louis II., to bestow the imperial crown on Charles the Bald; but that monarch was too much occupied in France to grant him much effectual aid, and about the time of the death of Charles he found it necessary to come to terms with the Saracens, who were only prevented from entering Rome by the promise of an annual tribute. Carloman, the opponent of Charles's son Louis, soon after invaded northern Italy, and, securing the support of the bishops and counts, demanded from the pope the imperial crown. John attempted to temporize, but Lambert, duke of Spoleto, a partisan of Carloman, whom sickness had recalled to Germany, entered Rome in 878 with an overwhelming force, and for thirty days virtually held John a prisoner in St Peter's. Lambert was, however, unsuccessful in winning any concession from the pope, who after his withdrawal carried out a previous purpose of going to France. There he presided at the council of Troyes, which promulgated a ban of excommunication against the supporters of Carloman — amongst others Adalbert of Tuscany, Lambert of Spoleto, and Formosus, bishop of Porto, who was afterwards elevated to the papal chair. In 879 John returned to Italy accompanied by Boso, duke of- Provence, whom he adopted as his son, and made an unsuccessful attempt to get recognized as king of Italy. In the same year he was compelled to give a promise of his sanction to the claims of Charles the Fat, who received from him the imperial crown in 881. Before this, in order to secure the aid of the Greek emperor against the Saracens, he had agreed to sanction the restoration of Photius to the see of Constantinople, and had withdrawn his consent on finding that he reaped from the concession no substantial benefit. Charles the Fat, partly from unwillingness, partly from natural inability, gave him also no effectual aid, and the last years of John VIII. were spent chiefly in hurling vain anathemas against his various political enemies. According to the annalist of Fulda, he was murdered by members of his household. His successor was Marinus.

JOHN IX., pope from 898 to 900, not only confirmed the judgment of his predecessor Theodore II. in granting Christian burial to Formosus, but at a council held at Ravenna decreed that the records of the synod which had condemned him should be burned. Finding, however, that it was advisable to cement the ties between the empire and the papacy, John gave unhesi- tating support to Lambert in preference to Arnulf, and also induced the council to determine that henceforth the consecra- tion of the popes should

take place only in the presence of the imperial legates. The sudden death of Lambert shattered the hopes which this alliance seemed to promise. John was succeeded by Benedict IV.

JOHN X., pope from 914 to 928, was deacon at Bologna when he attracted the attention of Theodora, the wife of Theophylact, the most powerful noble in Rome, through whose influence he was elevated first to the see of Bologna and then to the archbishopric of Ravenna. In direct opposition to a decree of council, he was also at the instigation of Theodora promoted to the papal chair as the successor of Lando. Like John IX. he endeavoured to secure himself against his temporal enemies through a close alliance with Theophylact and Alberic, marquis of Camerino, then governor of the duchy of Spoleto. In December 915 he granted the imperial crown to Berengar, and with the assistance of the forces of all the princes of the Italian peninsula he took I the field in person against the Saracens, over whom he gained a

great victory on the banks of the Garigliano. The defeat and 'death of Berengar through the combination of the Italian princes, again frustrated the hopes of a united Italy, and after witnessing several years of anarchy and confusion John perished through the intrigues of Marozia, daughter of Theodora. His successor was Leo VI.

JOHN XI., pope from 031 to 935, was the son of Marozia and the reputed son of Sergius III. Through the influence of his mother he was chosen to succeed Stephen VII. at the early age of twenty-one. He was the mere exponent of the purposes of his mother, until her son Alberic succeeded in 933 in over- throwing their authority. The pope was kept a virtual prisoner in the Lateran, where he is said to have died in 935, in which year Leo VII. was consecrated his successor.

JOHN XII., pope from 95s to 964, was the son of Alberic, whom he succeeded as patrician of Rome in 954, being then only sixteen years of age. His original name was Octavian, but when he assumed the papal tiara as successor to Agapetus II., he adopted the apostolic name of John, the first example, it is said, of the custom of altering the surname in connexion with elevation to the papal chair. As a temporal ruler John was devoid of the vigour and firmness of his father, and his union of the papal office — which through his scandalous private life he made a by- word of reproach — with his civil dignities proved a source of weakness rather than of strength. In order to protect himself against the intrigues in Rome and the

power of Berengar II. of Italy, he called to his aid Otto the Great of Germany, to whom he granted the imperial crown in 962. Even before Otto left Rome the pope had, however, repented of his recognition of a power which threatened altogether to overshadow his authority, and had begun to conspire against the new emperor. His intrigues were discovered by Otto, who, after he had defeated and taken prisoner Berengar, returned to Rome and summoned a council which deposed John, who was in hiding in the moun- tains of Campania, and elected Leo VIII. in his stead. An attempt at an insurrection was made by the inhabitants of Rome even before Otto left the city, and on his departure John returned at the head of a formidable company of friends and retainers, and caused Leo to seek safety in immediate flight. Otto determined to make an effort in support of Leo, but before he reached the city John had died, in what manner is uncertain, and Benedict V. had mounted the papal chair.

JOHN XIII., pope from 965 to 972, was descended from a noble Roman family, and at the time of his election as successor to Leo VIII. was bishop of Narni. He had been somewhat inconsistent in his relations with his predecessor Leo, but his election was confirmed by the emperor Otto, and his submissive attitude towards the imperial power was so distasteful to the Romans that they expelled him from the city. On account of the threatening procedure of Otto, they permitted him shortly afterwards to return, upon which, with the sanction of Otto, he took savage vengeance on those who had formerly opposed him. Shortly after holding a council along with the emperor at Ravenna in 967, he gave the imperial crown to Otto II. at Rome in assurance of his succession to his father; and in 972 he also crowned Theophano as empress immediately before her marriage. On his death in the same year he was followed by Benedict VI.

JOHN XIV., pope from 983 to 984, successor to Benedict VII., was born at Pavia, and before his elevation to the papal chair was imperial chancellor of Otto II. Otto died shortly after his election, when Boniface VII., on the strength of the popular feeling against the new pope, returned from Constantinople and placed John in prison, where he died either by starvation or poison.

JOHN XV., pope from 985 to 996, generally recognized as the successor of Boniface VII., the pope John who was said to have ruled for four months after John XIV., being now omitted by the best authorities. John XV. was the son of Leo, a Roman presbyter. At the time he mounted the papal chair Crescentius was patrician of Rome, but, although his influence was on this account very much hampered, the presence of the empress

Theophano in Rome from 989 to 991 restrained also the ambition of Crescentius. On her departure the pope, whose venality and nepotism had

made him very unpopular with the citizens, died of fever before the arrival of Otto III., who elevated his own kinsman Bruno to the papal dignity under the name of Gregory V.

JOHN XVI., pope or antipope from 997 to 998, was a Calabrian Greek by birth, and a favourite of the empress Theophano, from whom he had received the bishopric of Placentia. His original name was Philagathus. In 995 he was sent by Otto III. on an embassy to Constantinople to negotiate a marriage with a Greek princess. On his way back he either accidentally or at the special request of Crescentius visited Rome. A little before this Gregory V., at the end of 996, had been compelled to flee from the city; and the wily and ambitious Greek had now no scruple in accepting the papal tiara from the hands of Crescentius. The arrival of Otto at Rome in the spring of 998 put a sudden end to the teacherous compact. John sought safety in flight, but was discovered in his place of hiding and brought back to Rome, where after enduring cruel and ignominious tortures he was immured in a dungeon.

JOHN XVII., whose original name was Sicco, succeeded Silvester II. as pope in June 1003, but died less than five months afterwards.

JOHN XVIII., pope from 1003 to 1009, was, during his whole pontificate, the mere creature of the patrician John Crescentius, and ultimately he abdicated and retired to a monastery, where he died shortly afterwards. His successor was Sergius IV.

JOHN XIX., pope from 1024 to 1033, succeeded his brother Benedict VIII., both being members of the powerful house of Tusculum. He merely took orders to enable him to ascend the papal chair, having previously been a consul and senator. He displayed his freedom from ecclesiastical prejudices, if also his utter ignorance of ecclesiastical history, by agreeing, on the pay- ment of a large bribe, to grant to the patriarch of Constantinople the title of an ecumenical bishop, but the general indignation which the proposal excited throughout the church compelled him almost immediately to withdraw from his agreement. On the death of the emperor Henry II. in 1024 he gave his support to Conrad II., who along with his consort was crowned with great pomp at St Peter's in Easter of 1027. John died in 1033, in the full possession of his dignities. A successor was found for him in his nephew Benedict IX., a boy of only twelve years of age.

(L. D.) JOHN XXI. (Pedro Giuliano-Rebulo), pope from the 8th of September 1276 to the 20th of May 1277 (should be named John XX., but there is an error in the reckoning through the insertion of an antipope), a native of Portugal, educated for the church, became archdeacon and then*

archbishop of Braga, and so ingratiated himself with Gregory X. at the council of Lyons (1274) that he was taken to Rome as cardinal-bishop of Frascati, and succeeded Gregory after an interregnum of twenty days. As pope he excommunicated Alphonso III. of Portugal for interfering with episcopal elections and sent legates to the Great Khan. He was devoted to secular science, and his small affection for the monks awakened the distrust of a large portion of the clergy. His life was brought to a premature close through the fall. of the roof in the palace he had built at Viterbo. His successor was Nicholas III.

John XXI. has been identified since the 14th century, most probably correctly, with Petrus Hispanus, a celebrated Portu- guese physician and philosopher, author of several medical works — notably the curious Liber de oculo, trans, into German and well edited by A. M. Berger (Munich, 1899), an d of a popular textbook in logic, the Summulae logicales. John XXI. is constantly referred to as a magician by ignorant chroniclers.

See Les Registres de Grigoire X. et Jean XXI., published by J. Guiraud and E .Cadier in Biblioth'eque des ecoles francaises d'Athenes et de Rome (Paris, 1898) ; A. Petthast, Regesta pontif. Roman., vol. 2 (Berlin, 1875); F. Gregorovius, Rome in the Middle Ages, vol. v., trans.by M rs G.W. Hamilton (London, 1 900-1 902) ; R.Stapper, Papst Johann XXI. (Miinster, 1898); J. T. Kohler, Vollstandige Nachricht von Papst Johann XXI. (Gottingen, 1760). (C. H. Ha.)

43ˆ

JOHN (POPES)

JOHN XXII., pope from 13 16 to 1334, was born at Cahors, France, in 1249. His original name was Jacques Duese, and he came either of a family of petty nobility or else of well-to-do middle-class parents, and was not, as has been popularly supposed, the son of a shoemaker. He began his education with the Dominicans at Cahors, subsequently studied law at Montpellier, and law and medicine in Paris, and finally taught at Cahors and Toulouse. At Toulouse he became intimate with the bishop Louis, son of Charles II., king of Naples. In 1300 he was elevated to the episcopal see of Frejus by Pope Boniface VIII. at the instance of the king of Naples, and in 1308 was made chancellor of Naples by Charles, retaining this office under Charles's successor, Robert of Anjou. In 1310 Pope Clement V. summoned Jacques to Avignon and instructed him to advise upon the affair of the Templars and also upon the question of condemning the memory of Boniface VIII. Jacques decided on the legality of suppressing the order of the Templars, holding that the pope would be serving the best interests of the church by pronouncing its suppression; but he rejected the

condemnation of Boniface as a sacrilegious affront to the church and a mon- strous abuse of the lay power. On the 23rd of December 131 2 Clement appointed him cardinal-bishop of Porto, and it was while cardinal of Porto that he was elected pope, on the 7th of August 1316. Clement had died in April 1314, but the cardinals assembled at Carpentras were unable to agree as to his successor. As the two-thirds majority requisite for an election could not be obtained, the cardinals separated, and it was not until the 28th of June 13 16 that they reassembled in the cloister of the Dominicans at Lyons, and then only in deference to the pressure exerted upon them by Philip V. of France. After deliberating for more than a month they elected Robert of Anjou's candidate, Jacques Duese, who was crowned on the 5th of September, and on the 2nd of October arrived at Avignon, where he remained for the rest of his life.

More jurist than theologian, John defended the rights of the papacy with rigorous zeal and as rigorous logic. For the restoration of the papacy to its old independence, which had been so gravely compromised under his immediate predecessors, and for the execution of the vast enterprises which the papacy deemed useful for its prestige and for Christendom, considerable sums were required; and to raise the necessary money John burdened Christian Europe with new taxes and a complicated fiscal system, which was fraught with serious consequences. For his personal use, however, he retained but a very small fraction of the sums thus acquired, and at his death his private fortune amounted to scarce a million florins. The essentially practical character of his administration has led many historians to tax him with avarice, but later research on the fiscal system of the papacy of the period, particularly the joint work of Samaran and Mollat, enables us very sensibly to modify the severe judg- ment passed on John by Gregorovius and others.

John's pontificate was continually disturbed by his conflict with Louis of Bavaria and by the theological revolt of the Spiritual Franciscans. In October 13 14 Louis of Bavaria and Frederick of Austria had each been elected German king by the divided electors. Louis was gradually recognized by the whole of Germany, especially after his victory at Miihldorf (1322), and gained numerous adherents in Italy, where he supported the Visconti, who had been condemned as heretics by the pope. John affected to ignore the successes of Louis, and on the 8th of October 1323 forbade his recognition as king of the Romans. After demanding a respite, Louis abruptly appealed at Nurem berg from the future sentence of the pope to a general council (December 8, 1323). The conflict then assumed a grave doctrinal character. The doctrine of the rights of the lay monarchy sustained by Occam and John of Paris, by Marsilius of Padua, John of Jandun and Leopold of Bamberg, was affirmed by the jurists and theologians, penetrated into the parlements and the universities, and was

combated by the upholders of papal absolutism, such as Alvaro Pelayo and Alonzo Trionfo. Excommunicated on the 21st of March 1324, Louis retorted by appealing for a second time to a general council, which was held

on the 22nd of. May 1324, and accused John of being an enemy to the peace and the law, stigmatizing him as a heretic on the ground that he opposed the principle of evangelical poverty as professed by the strict Franciscans. From this moment Louis appeared in the character of the natural ally and even the protector of the Spirituals against the persecution of the pope. On the nth of July 1324 the pope laid under an interdict the places where Louis or his adherents resided, but this bull had no effect in Germany. Equally futile was John's declaration (April 3, 1327) that Louis had forfeited his crown and abetted heresy by granting protection to Marsilius of Padua. Having reconciled himself with Frederick of Austria, Louis penetrated into Italy and seized Rome on the 7th of January 1328, with the help of the Roman Ghibellines led by Sciarra Colonna. After installing himself in the Vatican, Louis got himself crowned by the deputies of the Roman people; instituted proceedings for the deposition of John, whom the Roman people, displeased by the spectacle of the papacy abandoning Rome, declared to have forfeited the pontificate (April 18, 1328); and finally caused a Minorite friar, Pietro Rainalucci da Corvara, to be elected pope under the name of Nicholas V. John preached a platonic crusade against Louis, who burned the pope's effigy at Pisa and in Amelia. Soon, however, Louis felt his power waning, and quitted Rome and Italy (1329). Incapable of independent action, the antipope was abandoned by the Romans and handed over to John, who forced him to make a solemn submission with a halter round his neck (August 15, 1330). Nicholas was condemned to perpetual imprisonment, and died in obscurity at Avignon; while the Roman people submitted to King Robert, who governed the church through his vicars. In 13 17, in execu- tion of a bull of Clement V., the royal vicariate in Italy had been conferred by John on Robert of Anjou, and this appointment was renewed in 1322 and 1324, with threats of excommunication against any one who should seize the vicariate of Italy without the authorization of the pope. One of John's last acts was his decision to separate Italy from the Empire, but this bull was of no avail and fell into oblivion. After his death, however, the interdict was not removed from Germany, and the resistance of Louis and his theologians continued.

A violent manifestation of this resistance took place in connexion with the accusation of heresy brought against the pope. On the third Sunday in Advent 1329, and afterwards in public consistory, John had preached that the souls of those who have died in a state of grace go into Abraham's bosom, sub altari Dei, and do not enjoy the beatific vision (visio facie ad faciem) of the Lord until after the Last Judgment and the Resurrection; and

he had even instructed a Minorite friar, Gauthier of Dijon, to collect the passages in the Fathers which were in favour of this doctrine. On the 27th of December 1331 a Dominican, Thomas of England, preached against this doctrine at Avignon itself and was thrown into prison. When news of this affair had reached Paris, the pope sent the general of the Minorites, Gerard Odonis, accompanied by a Dominican, to sustain his doctrine in that city, but King Philip VI., perhaps at the instigation of the refugee Spirituals in Paris, referred the question to the faculty of theology, which, on the 2nd of January 1333, declared that the souls of the blessed were elevated to the beatific vision immediately after death; the faculty, nevertheless, were of opinion that the pope should have propounded his erroneous doctrine only " recitando," and not " determinando , asserendo, seu etiam opinando." The king notified this decision to the pope, who assembled his consistory in November 1333, and gave a haughty reply. The theologians in Louis's following who were opposed to papal absolutism already spoke of " the new heretic, Jacques de Cahors," and reiterated with increasing insistency their demands for the convocation of a general council to try the pope. John appears to have retracted shortly before his death, which occurred on the 4th of December 1334. 1

1 On the 29th of January 1336 Pope Benedict XII. pronounced a long judgment on this point of doctrine, a judgment which he de- clared had been included by John in a bull which death had prevented him from sealing.

John had kindled very keen animosity, not only among the upholders of the independence of the lay power, but also among the upholders of absolute religious poverty, the exalted Francis- cans. Clement V., at the council of Vienne, had attempted to bring back the Spirituals to the common rule by concessions; John, on the other hand, in the bull Quorundam exigil (April I 3> J3I7)) adopted an uncompromising and absolute attitude, and by the bull Gloriosam ecclesiam (January 23, 1318) con- demned the protests which had been raised against the bull Quorundam by a group of seventy-four Spirituals and conveyed to Avignon by the monk Bernard Delicieux. Shortly afterwards four Spirituals were burned at Marseilles. These were imme- diately hailed as martyrs, and in the eyes of the exalted Franciscans at Naples and in Sicily and the south of France the pope was regarded as antichrist. In the bull Sancla Romana et universa ecclesia (December 28, 1318) John definitively excommunicated them and condemned their principal book, the Postil (commentary) on the Apocalypse (February 8, 1326). The bull Quia nonnunquam (March 26, 1322) defined the

derogations from the rule punished by the pope, and the bull Cum inter nonnullos (November 12, 1323) condemned the proposition which had been admitted at the general chapter of the Franciscans held at Perugia in 1322, according to which Christ and the Apostles were represented as possessing no property, either personal or common. The minister general, Michael of Cesena, though opposed to the exaggerations of the Spirituals, joined with them in protesting against the condemna- tion of the fundamental principle of evangelical poverty, and the agitation gradually gained ground. The pope, by the bull Quia quorundam (November 10, 1324), cited Michael to appear at Avignon at the same time as Occam and Bonagratia. All three fled to the court of Louis of Bavaria (May 26, 1328), while the majority of the Franciscans made submission and elected a general entirely devoted to the pope. But the resist- ance, aided by Louis and merged as it now was in the cause sustained by Marsilius of Padua and John of Jandun, became daily bolder. Treatises on poverty appeared on every side; the party of Occam clamoured with increasing imperiousness for the condemnation of John by a general council; and the Spirituals, confounded in the persecution with the Beghards and with Fraticelli of every description, maintained themselves in the south of France in spite of the reign of terror instituted in that region by the Inquisition.

See M. Souchon, Die Papstwahlen von Bonifaz VIII. bis Urban VI. (Brunswick, 1888) ; AbM Albe, Autour ie lean XXII. (Rome, 1904) ; K. Miiller, Der Kampf Ludwigs des Bayern mit der Curie (Tubingen, 1879 seq.) ; W. Preger, " M6moires sur la lutte entre Jean XXII. et Louis de BaviSre " in Abhandl. der bayr. Akad., hist, sec, xv., xvi., xvii. ; S. Riezler, Die litterar. Widersacher der Papste zur Zeit Ludwigs des Baiers (Leipzig, 1874); F. Ehrle, " Die Spiritualen " in Archiv fur Litteratur – und Kirchengeschichte des Mittelalters (vols. i. and ii.) ; C. Samaran and G. Mollat, La Fiscalite pontificate en France au xiv" si'ecle (Paris, 1905) ; A. Coulon and G. Mollat, Lettres secretes et curiales de Jean XXII. se rapportant d. la France (Paris, 1899, seq.). (P. A.)

JOHN XXIII. (Baldassare Cossa), pope, or rather anti-pope from 1410 to 1415, was born of a good Neapolitan family, and began by leading the life of a corsair before entering the service of the Church under the pontificate of Boniface IX. His abilities, which were mainly of an administrative and military order, were soon rewarded by the cardinal's hat and the legation of Bologna. On the 29th of June 1408 he and seven of his colleagues broke away from Gregory XII., and together with six cardinals of the obedience of Avignon, who had in like manner separated from Benedict XIII., they agreed to aim at the assem- bling of a general council, setting aside the two rival pontiffs, an expedient which they considered would put an end to the great schism of the Western Church, but which resulted in the election of yet a third pope. This act was none the less decisive for Baldassare Cossa's

future. Alexander V., the first pope elected at Pisa, was not perhaps, as has been maintained, merely a man of straw put forward by the ambitious cardinal of Bologna; but he reigned only ten months, and on his death, which happened rather suddenly on the 4th of May 1410,

Baldassare Cossa succeeded him. Whether the latter had bought his electors by money and promises, or owed his success to his dominant position in Bologna, and to the support of Florence and of Louis II. of Anjou, he seems to have received the unani- mous vote of all the seventeen cardinals gathered together at Bologna (May 17). He took the name of John XXIII. , and France, England, and part of Italy and Germany recognized him as head of the Catholic church.

The struggle in which he and Louis II. of Anjou engaged with Ladislaus of Durazzo, king of Sicily, and Gregory XII. 's chief protector in Italy, at first went in John's favour. After the brilliant victory of Roccasecca (May 19, 141 1) he had the satisfaction of dragging the standards of Pope Gregory and King Ladislaus through the streets of Rome. But the dispersion of Louis of Anjou's troops and his carelessness, together with the lack of success which attended the preaching of a crusade in Germany, France and England, finally decided John XXIII. to abandon the French claimant to the throne of Sicily; he recognized Ladislaus, his former enemy, as king of Naples, and Ladislaus did not fail to salute John XXIII. as pope, abandoning Gregory XII. (June 15, 1412). This was a fatal step: John XXIII. was trusting in a dishonest and insatiable prince; he would have acted more wisely in remaining the ally of the weak but loyal Louis of Anjou. However, it seemed desirable that the reforms announced by the council of Pisa, which the popes set up by this synod seemed in no hurry to carry into effect, should be further discussed in the new council which it had been agreed should be summoned about the spring of 141 2. But John was anxious that this council should be held in Rome, a city where he alone was master; the few prelates and ambassa- dors who very slowly gathered there held only a small number of sessions, in which John again condemned the writings of Wycliffe. John was attacked by the representatives of the various nations and reprimanded even for his private conduct, but endeavoured to extricate himself from this uncomfortable position by gratifying their desires, if not by reforming abuses. It is, however, only fair to add that he took various half- measures and gave many promises which, if they had been put into execution, would have confirmed or completed the reforms inaugurated at Pisa. But on the 3rd of Mrach 1413 John ad- journed the council of Rome till December, without even fixing the place where the next session should be held. It was held at Constance in Germany, and John could only have resigned himself to accepting such an uncertain meeting-place because he was forced by distress, isolation and fear to turn towards the head of the empire. Less

than a year after the treaty con- cluded with Ladislaus of Durazzo, the latter forced his way into Rome (June 8, 1413), which he sacked, expelling John, to whom even the Florentines did not dare to throw open their gates for fear of the king of Sicily. Sigismund, king of the Romans, not only extorted, it is said, a sum of 50,000 florins from the pontiff in his extremity, but insisted upon his summoning the council at Constance (December 9). It was in vain that, on the death of Ladislaus, which took place unexpectedly (August 6, 1414), John was inspired with the idea of breaking his compact with Sigismund and returning to Rome, at the same time appealing to Louis of Anjou. It was too late. The cardinals forced him towards Germany by the most direct road, without allowing him to go by way of Avignon as he had projected, in order to make plans with the princes of France.

On the 5th of November 1414 John opened the council of Constance, where, on Christmas Day, he received the homage of the head of the empire, but where his lack of prestige, the defec- tion of his allies, the fury of his adversaries, and the general sense of the necessity for union soon showed only too clearly how small was the chance of his retaining the tiara. He had to take a solemn oath to abdicate if his two rivals would do the same, and this concession, which was not very sincere, gained him for the last time the honour of seeing Sigismund prostrate at his feet (March 2, 1415). But on the night of the 2oth-2ist of March, having donned the garments of a layman, with a cross-bow slung at his side, he succeeded in making his escape

from Constance, accompanied only by a single servant, and took refuge first in the castle of Schaffhausen, then in that of Laufen- burg, then at Freiburg-im-Breisgau, and finally at Brisach, whence he hoped to reach Alsace, and doubtless ultimately Avignon, under the protection of an escort sent by the duke of Burgundy. The news of the pope's escape was received at Constance with an extraordinary outburst of rage, and led to the subversive decrees of the 4th and 5th sessions, which proclaimed the superiority of the council over the pope. Duke Frederick of Austria had hitherto sheltered John's flight; but, laid under the ban of the empire, attacked by powerful armies, and feeling that he was courting ruin, he preferred to give up the pontiff who had trusted to him. John was brought back to Freiburg (April 27), and there in vain attempted to appease the wrath which he had aroused by more or less vague promises of resignation. His trial, however, was already beginning. The three cardinals whom he charged with his defence hastily declined this compromising task. Seventy-

four charges were drawn up, only twenty of which were set aside after the wit- nesses had been heard. The accusation of having poisoned Alexander V. and his doctor at Bologna was not maintained. But enough deeds of immorality, tyranny, ambition and simony were found proved to justify the severest judgment. He was suspended from his functions as pope on the 14th of May 1415, and deposed on the following 29th of May.

However irregular this sentence may have been from the canonical point of view (for the accusers do not seem to have actually proved the crime of heresy, which was necessary, according to most scholars of the period, to justify the deposi- tion of a sovereign pontiff), the condemned pope was not long in confirming it. Baldassare Cossa, now as humble and re- signed as he had before been energetic and tenacious, on his transference to the castle of Rudolf zell admitted the wrong which he had done by his flight, refused to bring forward anything in his defence, acquiesced entirely in the judgment of the council which he declared to be infallible, and finally, as an extreme precaution, ratified molu proprio the sentence of deposition, declaring that he freely and willingly renounced any rights which he might still have in the papacy. This fact has subse- quently been often quoted against those who have appealed to the events of 1415 to maintain that a council can depose a pope who is scandalizator ecclesiae.

Cossa kept his word never to appeal against the sentence which stripped him of the pontificate. He was held prisoner for three years in Germany, but in the end bought his liberty from the count palatine. He used this liberty only to go to Florence, in 1419, and throw himself on the mercy of the legitimate pope. Martin V. appointed him cardinal-bishop of Tusculum, a dignity which Cossa only enjoyed for a few months. He died on the 22nd of December 1419, and all visitors to the Baptistery at Florence may admire, under its high baldacchino, the sombre figure sculptured by Donatello of the dethroned pontiff, who had at least the merit of bowing his head under his chastisement, and of contributing by his passive resignation to the extinction of the series of popes which sprang from the council of Pisa. (N.V.)

JOHN I. (925-976), surnamed Tzimisces, East Roman emperor, was born of a distinguished Cappadocian family. After helping his uncle Nicephorus Phocas (q.v.) to obtain the throne and to restore the empire's eastern provinces he was deprived of his command by an intrigue, upon which he retaliated by conspiring with Nicephorus' wife Theophania to assassinate him. Elected ruler in his stead, John proceeded to justify his usurpation by the energy with which he repelled the foreign invaders of the empire. In a series of campaigns against the newly established Russian power (970-973) he drove the enemy out of Thrace, crossed Mt Haemus and besieged the fortress of Dorystolon on the Danube. In several hard-fought battles he

broke the strength of the Russians so completely that they left him master of eastern Bulgaria. He further secured his northern frontier by transplanting to Thrace some colonies of Paulicians whom he suspected of sympathising with their Saracen neighbours in the east. In 974 he turned against the Abassid empire and easily

recovered the inland parts of Syria and the middle reaches of the Euphrates. He died suddenly in 976 on his return from his second campaign against the Saracens. John's surname was apparently derived from the Armenian tshemshkik (red boot) .

See E. Gibbon, The Decline and Fall of the Roman Empire, vol. vi. (ed. Bury, 1896) ; G. Finlay, History of Greece, ii. 334-360 (ed. 1877) ; G. Schlumberger, L' Epopee Byzantine, i. 1-326 (1896).

JOHN II. (1088-1143), surnamed Comnenus and also Kalo- joannes (John the Good), East Roman emperor, was the eldest son of the East Roman emperor Alexius, whom he succeeded in 11 18. On account of his mild and just reign he has been called the Byzan- tine Marcus Aurelius. By the personal purity of his character he effected a notable improvement in the manners of his age, but he displayed little vigour in internal administration or in extirpating the long-standing corruptions of the government. Nor did his various successes against the Hungarians, Servians and Seljuk Turks, whom he pressed hard in Asia Minor and pro- posed to expel from Jerusalem, add much to the stability of his empire. He was accidentally killed during a wild-boar hunt on Mt Taurus, on the 8th of April 1143.

See E. Gibbon, The Decline and Fall of the Roman Empire,v. 228 seq. (ed. Bury, 1896).

JOHN III. (1193-1254), surnamed Vatatzes and also Ducas, East Roman emperor, earned for himself such distinction as a soldier that in 1222 he was chosen to succeed his father- in-law Theodore I. Lascaris. He reorganized the remnant of the East Roman empire, and by his administrative skill made it the strongest and richest principality in the Levant. Having secured his eastern frontier by an agreement with the Turks, he set himself to recover the European posses- sions of his predecessors. While his fleet harassed the Latins in the Aegean Sea and extended his realm to Rhodes, his army, reinforced by Frankish mercenaries, defeated the Latin emperor's forces in the open field. Though unsuccessful in a siege of Constantinople, which he undertook in concert with the Bulgarians (1235), he obtained supremacy over the despotats of Thessalonica and Epirus. The ultimate recovery of Constanti- nople by the Rhomaic emperors is chiefly due to his exertions.

See E. Gibbon, The Decline and Fall of the Roman Empire, vi. 431-462 (ed. Bury, 1896); G. Finlay, History of Greece, iii. 196-320 (ed. 1877)1 A. Meliarakes, 'Ioropta rod BaatXetou rijs NiKaias Kat tou AeaTOTarov Trjs 'TlireLpov, pp. I55~4 21 C 1 ˆ

JOHN IV. (c. 1250-c. 1300), surnamed Lascaris, East Roman emperor, son of Theodore II. His father dying in 1258, Michael Palaeologus conspired shortly after to make himself regent, and in 1 261 dethroned and blinded the boy monarch, and imprisoned him in a remote castle, where he died a long time after.

See E. Gibbon, The Decline and Fall of the Roman Empire, vi. 459- 466 (ed. Bury, 1896) ; A. Meliarakes, 'laropia rod BaaiXeiov rijs Nt/coios (Athens, 1898), pp. 491-528.

JOHN V. or VI. (1332-1391), surnamed Palaeologus, East Roman emperor, was the son of Andronicus III., whom he succeeded in 134 1. At first he shared his sovereignty with his father's friend John Cantacuzene, and after a quarrel with the latter was practically superseded by him for a number of years (1347-1355). His reign was marked by the gradual dissolution of the imperial power through the rebellion of his son Andronicus and by the encroachments of the Ottomans, to whom in 138 1 John acknowledged himself tributary, after a vain attempt to secure the help of the popes by submitting to the supremacy of the Roman Church.

See E. Gibbon, The Decline and Fall of the Roman Empire, vi. 495 seq., vii. 38 seq. (ed. Bury, 1896); E. Pears, The Destruction of the Greek Empire, pp. 70-96 (1903).

JOHN VI. or V. (c. 1 292-1383), surnamed Cantacuzene, East Roman emperor, was born at Constantinople. Connected with the house of Palaeologus on his mother's side, on the accession of Andronicus III. (1328) he was entrusted with the supreme administration of affairs. On the death of the emperor in 1341, Cantacuzene was left regent, and guardian of his son John I Palaeologus, who was but nine years of age. Being suspected

by the empress and opposed by a powerful party at court, he rebelled, and got himself crowned emperor at Didymoteichos in Thrace, while John Palaeologus and his supporters maintained themselves at Constantinople. The civil war which ensued lasted six years, during which the rival parties called in the aid of the Servians and Turks, and engaged mercenaries of

every description. It was only by the aid of the Turks, with whom he made a disgraceful bargain, that Cantacuzene brought the war to a termination favourable to himself. In 1347 he entered Constantinople in triumph, and forced his opponents to an arrangement by which he became joint emperor with John Palaeologus and sole administrator during the minority of his colleague. During this period, the empire, already broken up and reduced to the narrowest limits, was assailed on every side. There were v/ars with the Genoese, who had a colony at Galata and had money transactions with the court; and with the Servians, who were at that time establishing an extensive empire on the north-western frontiers; and there was a hazardous alliance with the Turks, who made their first permanent settle- ment in Europe, at Callipolis in Thrace, towards the end of the reign (1354). Cantacuzene was far too ready to invoke the aid of foreigners in his European quarrels; and as he had no money to pay them, this gave them a ready pretext for seizing upon a European town. The financial burdens imposed by him had long been displeasing to his subjects, and a strong party had always favoured John Palaeologus. Hence, when the latter entered Constantinople at the end of 1354, his success was easy. Cantacuzene retired to a monastery (where he assumed the name of Joasaph Christodulus)and occupied himself in literary labours. He died in the Peloponnese and was buried by his sons at Mysithra in Laconia. His History in four books deals with the years 1320-1356. Really an apologia for his own actions, it needs to be read with caution; fortunately it can be supplemented and corrected by the work of a contemporary, Nicephorus Gregoras. It possesses the merit of being well arranged and homogeneous, the incidents being grouped round the chief actor in the person of the author, but the information is defective on matters with which he is not directly concerned.

Cantacuzene was also the author of a commentary on the first five books of Aristotle's Ethics, and of several controversial theologi- cal treatises, one of which (Against Mohammedanism) is printed in Migne (Patrologia Graeca, cliv.). History, ed. pr. by J. Pontanus (1603) ; in Bonn, Corpus scriptorum hist. Byz., by J. Schopen (1828- 1832) and Migne, cliii., cliv. See also Val Parisot, Cantacuzene, homme d'etat et hislorien (1845); E. Gibbon, Decline and Fall, ch. lxiii.; and C. Krumbacher, Geschichte der byzantinischen Litteratur

(1897).

JOHN VI. or VII. (1390-1448), surnamed Palaeologus, East Roman emperor, son of Manuel II., succeeded to the throne in 1425. To secure protection against the Turks he visited the pope and consented to the union of the Greek and Roman churches, which was ratified at Florence in 1439. The union failed of its purpose, but by his prudent conduct towards the

Ottomans he succeeded in holding possession of Constantinople, and in 1432 withstood a siege by Sultan Murad I.

See Turkey : History ; and also E. Gibbon, The Decline and Fall of the Roman Empire, vi. 97-107 (ed. Bury, 1896); E. Pears, The Destruction of the Greek Empire, pp. 1 15-130 (1903).

JOHN (1167-1216), king of England, the youngest son of Henry II. by Eleanor of Aquitaine, was born at Oxford on the 24th of December 1167. He was given at an early age the nick- name of Lackland because, unlike his elder brothers, he received no apanage in the continental provinces. But his future was a subject of anxious thought to Henry II. When only five years old John was betrothed (1173) to the heiress of Maurienne and Savoy, a principality which, as dominating the chief routes from France and Burgundy to Italy, enjoyed a consequence out of all proportion to its area. Later, when this plan had fallen through, he was endowed with castles, revenues and lands on both sides of the channel; the vacant earldom of Cornwall was reserved for him (1175); he was betrothed to Isabella the heiress of the earl- dom of Gloucester (11 76); and he was granted the lordship of Ireland with the homage of the Anglo-Irish baronage (n 77).

Henry II. even provoked a civil war by attempting to transfer the duchy of Aquitaine from the hands of Richard Cceur de Lion to those of John (n 83). In spite of the incapacity which he dis- played in this war, John was sent a little later to govern Ireland (1185); but he returned in a few months covered with disgrace, having alienated the loyal chiefs by his childish insolence and entirely failed to defend the settlers from the hostile septs. Remaining henceforth at his father's side he was treated with the utmost indulgence. But he joined with his brother Richard and the French king Philip Augustus in the great conspiracy of 1 189, and the discovery of his treason broke the heart of the old king (see Henry II.).

Richard on his accession confirmed John's existing possessions; married him to Isabella of Gloucester; and gave him, besides other grants, the entire revenues of six English shires; but ex- cluded him from any share in the regency which was appointed to govern England during the third crusade; and only allowed him to live in the kingdom because urged to this concession by their mother. Soon after the king's departure for the Holy Land it became known that he had designated his nephew, the young Arthur of Brittany, as his successor. John at once began to intrigue against the regents with the aim of securing England for himself. He picked a quarrel with the un- popular chancellor William Longchamp (q.v.), and succeeded, by the help of the barons and the Londoners, in expelling this minister, whose chief fault was that of fidelity to the absent Richard. Not

being permitted to succeed Longchamp as the head of the administration, John next turned to Philip Augustus for help. A bargain was struck; and when Richard was captured by Leopold, duke of Austria (December 1192), the allies en- deavoured to prevent his release, and planned a partition of his dominions. They were, however, unable to win either English or Norman support and their schemes collapsed with Richard's return (March 1194). He magnanimously pardoned his brother, and they lived on not unfriendly terms for the next five years. On his deathbed Richard, reversing his former arrangements, caused his barons to swear fealty to John (1199), although the hereditary claim of Arthur was by the law of primogeniture undoubtedly superior.

England and Normandy, after some hesitation, recognized John's title; the attempt of Anjou and Brittany to assert the rights of Arthur ended disastrously by the capture of the young prince at Mirebeau in Poitou (1 202). But there was no part of his dominions in which John inspired personal devotion. Originally accepted as a political necessity, he soon came to be detested by the peopl e as a tyrant and despised by the nobles for his cowardice and sloth. He inherited great difficulties — the feud with France, the dissensions of the continental provinces, the growing indifference of England to foreign conquests, the discontent of all his subjects with a strict executive and severe taxation. But he cannot be acquitted of personal responsibility for his misfortunes. Astute in small matters, he had no breadth of view or foresight; his policy was continually warped by his passions or caprices ; he flaunted vices of the most sordid kind with a cynical indifference to public opinion, and shocked an age which was far from tender- hearted by his ferocity to vanquished enemies. He treated his most respectable supporters with base ingratitude, reserved his favour for unscrupulous adventurers, and gave a free rein to the licence of his mercenaries. While possessing considerable gifts of mind and a latent fund of energy, he seldom acted or reflected until the favourable moment had passed. Each of his great humiliations followed as the natural result of crimes or blunders. By his divorce from Isabella of Gloucester he offended the English baronage (1200); by his marriage with Isabella of Angoulfime, the betrothed of Hugh of Lusignan, he gave an opportunity to the discontented Poitevins for invoking French assistance and to Philip Augustus for pronouncing against him a sentence of forfeiture. The murder of Arthur (1203) ruined his cause in Normandy and Anjou; the story that the court of the peers of France condemned him for the murder is a fable, but no legal process was needed to convince men of his guilt. In the later quarrel with Innocent III. (1207-12 13; see Langton,

Stephen) he prejudiced his case by proposing a worthless favourite for the primacy and by plundering those of the clergy who bowed to the pope's sentences. Threatened with the desertion of his barons he drove all whom he suspected to despera- tion by his terrible severity towards the Braose family (1210); and by his continued misgovernment irrevocably estranged the lower classes. When submission to Rome had somewhat im- proved his position he squandered his last resources in a new and unsuccessful war with France (1214), and enraged the feudal classes by new claims for military service and scutages. The barons were consequently able to exact, in Magna Carta (June 12 1 5), much more than the redress of legitimate grievances; and the people allowed the crown to be placed under the control of an oligarchical committee. When once the sovereign power had been thus divided, the natural consequence was civil war and the intervention of the French king, who had long watched for some such opportunity. John's struggle against the barons and Prince Louis (1216), afterwards King Louis VIII., was the most credit- able episode of his career. But the calamitous situation of England at the moment of his death, on the 19th of October 1 2 1 6, was in the main his work; and while he lived a national reaction in favour of the dynasty was out of the question.

John's second wife, Isabella of Angouleme (d. 1246), who married her former lover, Hugh of Lusignan, after the English king's death, bore the king two sons, Henry III. and Richard, earl of Cornwall; and three daughters, Joan (1 210-1238), wife of Alexander II., king of Scotland, Isabella (d. 1241), wife of the emperor Frederick II., and Eleanor (d. 1274), wife of William Marshal, earl of Pembroke, and then of Simon de Montfort, earl of Leicester. John had also two illegitimate sons, Richard and Oliver, and a daughter, Joan or Joanna, who married Llewelyn I. ab Iorwerth, prince of North Wales, and who died in 1236 or 1237.

Authorities. — The chief chronicles for the reign are Gervase of Canterbury's Gesta regum, Ralf of Coggeshall's Chronicon, Walter of Coventry's Memoriale, Roger of Wendover's Flores historiarum, the Annals of Burton, Dunstaple and Margan — all these in the Rolls Series. The French chronicle of the so-called " Anonyme de B6- thune " (Bouquet, Recueil des historiens des Gaules et de la France, vol. xxiv.), the Histoire des dues de Normandie et des rois d'Angleterre (ed. F. Michel, Paris, 1840) and the metrical biography of William the Marshal (Histoire de Guillaume le Marechal, ed. Paul Meyer, 3 vols., Paris, 1891, &c.) throw valuable light on certain episodes. H. S. Sweetman's Calendar of Documents relating to Ireland, vol. i. (Rolls Series) ; W.H. Bliss's Calendar of Entries in the Papal Registers, vol. i. (Rolls Series) ; Potthast's Regesta pontificum, vol. i. (Berlin, 1874) ; Sir T. D. Hardy's Rotuli litlerarum clausarum (Rec. Commis- sion, 1835) and Rotuli litlerarum patentium (Rec. Commission, 1835) and L. Delisle's Catalogue desactes de Philippe

Auguste (Paris, 1856) are the most important guides to the documents. Of modern works W. Stubbs's Constitutional history, vol. i. (Oxford, 1897); the same writer's preface to Walter of Coventry, vol. ii. (Rolls Series); Miss K. Norgate's John Lackland (London, 1902) ; C. Petit-Dutaillis' Htude sur la vie et le regne de Louis VIII. (Paris, 1894) and W. S. McKechnie's Magna Carta (Glasgow, 1905) are among the most useful. (H. W. C. D.)

JOHN I. (1350-1395), king of Aragon, was the son of Peter IV. and his third wife Eleanor of Sicily. He was born on the 27th of December 1350, and died by a fall from his horse, like his namesake, cousin and contemporary of Castile. He was a man of insignificant character, with a taste for artificial verse.

JOHN II. (1397-1479), king of Aragon, son of Ferdinand I. and of his wife Eleanor of Albuquerque, born on the 29th of June 1397, was one of the most stirring and most unscrupulous kings of the 15th century. In his youth he was one of the infantes (princes) of Aragon who took part in the dissensions of Castile during the minority and reign of John II. Till middle life he was also lieutenant-general in Aragon for his brother and predecessor Alphonso V., whose reign was mainly spent in Italy. In his old age he was engaged in incessant conflicts with his Aragonese and Catalan subjects, with Louis XL of France, and in preparing the way for the marriage of his son Ferdinand with Isabella of Castile, which brought about the union of the crowns. His troubles with his subjects were closely connected with the tragic dissensions in his own family. John was first married to Blanche of Navarre, of the house of Evreux. By right of Blanche he became king

of Navarre, and on her death in 1441 he was left in possession of the kingdom for his life. But a son Charles, called, as heir of Navarre, prince of Viana, had been born of the marriage. John from the first regarded his son with jealousy, which after his second marriage with Joan Henriquez, and under her influence, grew into absolute hatred. He endeavoured to deprive his son of his constitutional right to act as lieutenant-general of Aragon during his father's absence. The cause of the son was taken up by the Aragonese, and the king's attempt to join his second wife in the lieutenant-generalship was set aside. There followed a long conflict, with alternations of success and defeat, which was not terminated till the death of the prince of Viana, perhaps by poison given him by his stepmother, in 1461. The Catalans, who had adopted the cause of Charles and who had grievances of their own, called in a succession of foreign pretenders. In conflict with these the last years of King John were spent. He was forced to pawn Rousillon, his possession on the north-east of the Pyrenees, to Louis XL, who refused to part with it. In his old age he was blinded by cataract, but recovered his eyesight by the operation of couching. The Catalan revolt was

pacified in 1472, but John had war, in which he was generally unfortunate, with his neighbour the French king till his death on the 20th of January 1479. He was succeeded by Ferdinand, his son by his second marriage, who was already associated with his wife Isabella as joint sovereign of Castile.

For the history, see Rivadeneyra, " Cronicas de los reyes de Castilla," Biblioteca de autores espanoles, vols, lxvi, lxviii (Madrid, 1845, &c); G. Zurita, Anales de Aragon (Saragossa, 1610). The reign of John II. of Aragon is largely dealt with in W. H. Prescott's History of the Reign of Ferdinand and Isabella (1854).

JOHN (1 296-1346), king of Bohemia, was a son of the emperor Henry VII. by his wife Margaret, daughter of John L, duke of Brabant, and was a member of the family of Luxemburg. Born on the 10th of August 1296, he became count of Luxemburg in 1309, and about the same time was offered the crown of Bohemia, which, after the death of Wenceslas III., the last king of the Premyslides dynasty in 1306, had passed to Henry, duke of Carinthia, under whose weak rule the country was in a very disturbed condition. The emperor accepted this offer on behalf of his son, who married Elizabeth (d. 1330), a sister of Wenceslas, and after Henry's departure for Italy, John was crowned king of Bohemia at Prague in February 1311. Henry of Carinthia was driven from the land, where a certain measure of order was restored, and Moravia was again united with Bohemia. As imperial vicar John represented his father at the diet of Nurem- berg in January 1313, and was leading an army to his assistance in Italy when he heard of the emperor's death, which took place in August 13 13. John was now a candidate for the imperial throne; but, on account of his youth, his claim was not regarded seriously, and he was persuaded to give his support to Louis, duke of Upper Bavaria, afterwards the emperor Louis the Bavarian. At Esslingen and elsewhere he aided Louis in his struggle with Frederick the Fair, duke of Austria, who also claimed the Empire; but his time was mainly passed in quelling disturbances in Bohemia, where his German followers were greatly disliked and where he himself soon became unpopular, especially among the nobles; or in Luxemburg, the borders of which county he was constantly and successfully striving to extend. Restless, adventurous and warlike, John had soon tired of governing his kingdom, and even discussed exchanging it with the emperor Louis for the Palatinate; and while Bohemia was again relapsing into a state of anarchy, her king was winning fame as a warrior in almost every part of Europe. He fought against the citizens of Metz and against his kinsman, John III., duke of Brabant ; he led the knights of the Teutonic Order against the heathen in Lithuania and Pomerania and promised Pope John XXII. to head a crusade; and claiming to be king of Poland he attacked the Poles and brought Silesia under his rule. He obtained Tirol by

marrying his son, John Henry, to Margaret Maultasch, the heiress of the county, assisted the emperor to defeat and capture Frederick the Fair at the battle of Miihldorf in 1322, and was alternately at peace and at war with the dukes

of Austria and with his former foe, Henry of Carinthia. He was a frequent and welcome visitor to France, in which country he had a personal and hereditary interest; and on several occasions his prowess was serviceable to his brother-in-law King Charles IV., and to Charles's successor Philip VI., whose son John, afterwards King John II., married a daughter of the Bohemian king. Soon after the battle of Muhldorf, the relations between John and the emperor became somewhat strained, partly owing to the king's growing friendship with the Papacy and with France, and partly owing to territorial disputes. An agreement, however, was con- cluded, and John undertook his invasion of Italy, which was perhaps the most dazzling of his exploits. Invited by the citizens of Brescia, he crossed the Alps with a meagre following in 1 33 1, quickly received the homage of many of the cities of northern Italy, and soon found himself the ruler of a great part of the peninsula. But his soldiers were few and his enemies were many, and a second invasion of Italy in 1333 was followed by the dissipation of his dreams of making himself king of Lombardy and Tuscany, and even of supplanting Louis on the imperial throne. The fresh trouble between king and emperor, caused by this enterprise, was intensified by a quarrel over the lands left by Henry of Carinthia, and still later by the interference of Louis in Tirol ; and with bewildering rapidity John was allying himself with the kings of Hungary and Poland, fighting against the emperor and his Austrian allies, defending Bohemia, governing Luxemburg, visiting France and negotiating with the pope. About 1340 the king was overtaken by blindness, but he con- tinued to lead an active life, successfully resisting the attacks of Louis and his allies, and campaigning in Lithuania. In 1346 he made a decisive move against the emperor. Acting in union with Pope Clement VI. he secured the formal deposition of Louis and the election of his own son Charles, margrave of Moravia, as German king, or king of the Romans, in July 1346. Then journeying to help Philip of France against the English, he fought at the battle of Crecy, where his heroic death on the 26th of August 1346 was a fitting conclusion to his adventurous life.

John was a chivalrous and romantic personage, who enjoyed a great reputation for valour both before and after his death; but as a ruler he was careless and extravagant, interested only in his kingdom when seeking relief from his constant pecuniary embarrassments. After the death of his

first wife, who bore him two sons, Charles, afterwards the emperor Charles IV., and John Henry (d. 1375), and who had been separated from her husband for some years, the king married Beatrice (d. 1383), daughter of Louis I., duke of Bourbon, by whom he had a son, Wenceslas (d. 1383). According to Camden the crest or badge of three ostrich feathers, with the motto Ich dien, borne by the prince of Wales was originally that of John of Bohemia and was first assumed by Edward the Black Prince after the battle of Crecy. There is no proof, however, that this badge was ever worn by John — it certainly was not his crest— and its origin must be sought elsewhere.

See J. Schotter, Johann, Graf von Luxemburg and Konig von Bbhmen (Luxemburg, 1865); F. von Weech, Kaiser Ludwig der Bayer und Konig Johann von Bbhmen (Munich, i860), and U. Chevalier, Repertoire des sources historiques, tome v. (Paris, 1905).

JOHN I. (1358-1300), king of Castile, was the son of Henry II., and of his wife Joan, daughter of John Manuel of Villena, head of a younger branch of the royal house of Castile. In the be- ginning of his reign he had to contend with the hostility of John of Gaunt, who claimed the crown by right of his wife Constance, daughter of Peter the Cruel. The king of Castile finally bought off the claim of his English competitor by arranging a marriage between his son Henry and Catherine, daughter of John of Gaunt, in 1387. Before this date he had been engaged in hostilities with Portugal which was in alliance with John of Gaunt. His first quarrel with Portugal was settled by his marriage, in 1382, with Beatrix, daughter of the Portuguese king Ferdinand. On the death of his father-in-law in 1383, John endeavoured to enforce the claims of his wife, Ferdinand's only child, to the crown of Portugal. He was resisted by the national sentiment of the

people, and was utterly defeated at the battle of Aljubarrota, on the 14th of August 1385. King John was killed at Aicala on the 9th of October 1390 by the fall of his horse, while he was riding in a. fantasia with some of the light horsemen known as the farfanes, who were mounted and equipped in the Arab style.

JOHN II. (1405-1454), king of Castile, was born on the 6th of March 1405, the son of Henry III. of Castile and of his wife Catherine, daughter of John of Gaunt. He succeeded his father on the 25th of December 1406 at the age of a year and ten months. It was one of the many misfortunes of Castile that the long reign of John II. — forty-nine years — should have been granted to one of the most incapable of her kings. John was amiable, weak and dependent on those about him. He had no taste except for ornament, and no serious interest except in amusements, verse- making, hunting and tournaments. He wa§ entirely under the influence of his

favourite, Alvaro de Luna, till his second wife, Isabella of Portugal, obtained control of his feeble will. At her instigation he threw over his faithful and able favourite, a mean- ness which is said to have caused him well-deserved remorse. He died on the 20th of July 1454 at Valladolid. By his second marriage he was the father of Isabella " the Catholic."

JOHN I. (b. and d. 13 16), king of France, son of Louis X. and Clemence, daughter of Charles Martel, who claimed to be king of Hungary, was born, after his father's death, on the 15th of November 13 16, and only lived seven days. His uncle, after- wards Philip V. has been accused of having caused his death, or of having substituted a dead child in his place; but nothing was ever proved. An impostor calling himself John I., appeared in Provence, in the reign of John II., but he was captured and died in prison.

JOHN II. (1319-1364), surnamed the Good, king of France, son of Philip VI. and Jeanne of Burgundy, succeeded his father in 13 50. At the age of 13 he married Bona of Luxemburg, daughter of John, king of Bohemia. His early exploits against the English were failures and revealed in the young prince both avarice and stubborn persistence in projects obviously ill-advised. It was especially the latter quality which brought about his ruin. His first act upon becoming king was to order the execution of the constable, Raoul de Brienne. The reasons for this are unknown, but from the secrecy with which it was carried out and the readi- ness with which the honour was transferred to the king's close friend Charles of La Cesda, it has been attributed to the influence and ambition of the latter. John surrounded himself with evil counsellors, Simon de Buci, Robert de Lorris, Nicolas Braque, men of low origin who robbed the treasury and oppressed the people, while the king gave himself up to tournaments and festivities. In imitation of the English order of the Garter, he established the knightly order of the Star, and celebrated its festivals with great display. Raids of the Black Prince in Langue- doc led to the states-general of 1355, which readily voted money, but sanctioned the right of resistance against all kinds of pillage — a distinct commentary on the incompetence of the king. In September 1356 John gathered the flower of his chivalry and attacked the Black Prince at Poitiers. The utter defeat of the French was made the more humiliating by the capture of their king, who had bravely led the third line of battle. Taken to England to await ransom, John was at first installed in the Savoy Palace,- then at Windsor, Hertford, Somerton, and at last in the Tower. He was granted royal state with his captive com- panions, made a guest at tournaments, and supplied with luxuries imported by him from France. The treaty of Bretigny (1360), which fixed his ransom at 3,000,000 crowns, enabled him to return to France, but although he married his daughter Isabella to Gian Galeazzo Visconti of Milan, for a gift of 600,000 golden crowns, imposed a heavy feudal " aid " on merchandise, and various other taxes, John was unable to pay more than

400,000 crowns to Edward III. His son Louis of Anjou, who had been left as hostage, escaped from Calais in the summer of 1363, and John, far in arrears in the payments of the ransom, sur- rendered himself again " to maintain his royal honour which his son had sullied." He landed in England in January 1364 and was received with great honour, lodged again in the Savoy, and was a

frequent guest of Edward at Westminster. He died on the 8th of April, and the body was sent back to France with royal honours. See Froissart's Chronicles; Due d'Aumale, Notes et documents relatifs a Jean, roi de France, et d- sa captivite (1856); A. Coville, in Lavisse's Histoire dc France, vol. iv., and authorities cited there.

JOHN (Zapolya) (1487-1540), king of Hungary, was the son of the palatine Stephen Zapolya and the princess Hedwig of Teschen, and was born at the castle of Szepesvar. He began his public career at the famous Rakos diet of 1505, when, on his motion, the assembly decided that after the death of the reigning king, Wladislaus II., no foreign prince should be elected king of Hungary. Henceforth he became the national candidate for the throne, which his family had long coveted. As far back as 1 49 1 his mother had proposed to the sick king that his daughter Anne should be committed to her care in order, subsequently, to be married to her son; but Wladislaus frustrated this project by contracting a matrimonial alliance with the Habsburgs. In 1 5 10 Zapolya sued in person for the hand of the Princess Anne in vain, and his appointment to the voivody of Tran- sylvania (15 11) was with the evident intention of removing him far from court. In 1513, after a successful raid in Turkish territory, he hastened to Buda at the head of 1000 horsemen and renewed his suit, which was again rejected. In 15 14 he stamped out the dangerous peasant rising under Dozsa (q.v.) and the infernal torments by means of which the rebel leader was slowly done to death were the invention of Zapolya. With the gentry, whose hideous oppression had moved the peasantry to revolt, ne was now more than ever popular, and, on the death of Wladislaus II., the second diet of Rakos (1516) appointed him the governor of the infant king Louis II. He now aimed at the dignity of palatine also, but the council of state and the court party combined against him and appointed Istvan Bathory instead (1519). The strife of factions now burnt more fiercely than ever at the very time when the pressure of the Turk de- manded the combination of all the national forces against a common danger. It was entirely due to the dilatoriness and dissensions of Zapolya and Bathory that the great fortress of Belgrade was captured in 1521, a loss which really sealed the fate of

Hungary. In 1522 the diet would have appointed both Zapolya and Bathory captains-general of the realm, but the court set Zapolya aside and chose Bathory only. At the diets of Hatvan and Rakos in 1522, Zapolya placed himself at the head of a confederation to depose the palatine and the other great officers of state, but the attempt failed. In the following year, however, the revolutionary Hatvan diet drove out all the members of the council of state and made Istvan Verboczy, the great jurist, and a friend of Zapolya, palatine. In the midst of this hopeless anarchy, Suleiman I., the Magnificent, invaded Hungary with a countless army, and the young king perished on the field of Mohacs in a vain attempt to stay his progress, the contradictory orders of Louis II. preventing Zapolya from arriving in time to turn the fortunes of the day. The court party accused him of deliberate treachery on this occasion; but the charge must be pronounced groundless. His younger brother George was killed at Mohacs, where he was second commander-in-chief. Zapolya was elected king of Hungary at the subsequent diet of Tokaj (Oct. 14), the election was confirmed by the diet of Szekes- fehervar (10th of November), and he was crowned on the follow- ing day with the holy crown.

A struggle with the rival candidate, the German king Ferdi- nand I., at once ensued (see Hungary: History) and it was only with the aid of the Turks that king John was able to exhaust his opponent and compel him to come to terms. Finally, in 1538, by the compact of Nagyvarad, Ferdinand recognized John as king of Hungary, but secured the right of succession on his death. Nevertheless John broke the compact by bequeathing the king- dom to his infant son John Sigismund under Turkish protection. John was the last national king of Hungary. His merit, as a statesman, lies in his stout vindication of the national indepen- dence, though without the assistance of his great minister Gyorgy Utiesenovich, better known as " Frater George " (Cardinal Martinuzzi q.v.), this would have been impossible. Indirectly

he contributed to the subsequent conquest of Hungary by admitting the Turk as a friend.

See Vilmos Fraknoi, XJngarn vor der Schlacht bet Mohdcs (Buda- pest, 1886) ; L. Kupelwieser, Die Kdmpfe Ungarns mit den Osmanen bis zur Schlacht bei Mohdcs (Vienna, 1895); Ignacz Acsady, History of the Hungarian Realm, vol. i. (Hung.) (Budapest, 1902-1904).

JOHN OF BRIENNE (c. 1148-1237), king of Jerusalem and Latin emperor of Constantinople, was a man of sixty years of age before he began to play any considerable part in history. Destined originally for the Church, he had preferred to become a knight, and in forty years of tournaments and fights he had won himself a considerable reputation, when in 1208 envoys came

from the Holy Land to ask Philip Augustus, king of France, to select one of his barons as husband to the heiress, and ruler of the kingdom, of Jerusalem. Philip selected John of Brienne, and promised to support him in his new dignity. In 1 210 John married the heiress Mary (daughter of Isabella and Conrad of Montferrat), assuming the title of king in right of his wife. In 121 1, after some desultory operations, Tie concluded a six years' truce with Malik-el- Adil; in 121 2 he lost his wife, who left him a daughter, Isabella; soon afterwards he married an Armenian princess. In the fifth crusade (1218-1221) he was a prominent figure. The legate Pelagius, however, claimed the command; and insisting on the advance from Damietta, in spite of the warnings of King John, he refused to accept the favourable terms of the sultan, as the king advised, until it was too late. After the failure of the crusade, King John came to the West to obtain help for his kingdom. In 1223 he met Honorius III. and the emperor Frederick II. at Ferentino, where, in order that he might be connected more closely with the Holy Land, Frederick was betrothed to John's daughter Isabella, now heiress of the kingdom. After the meeting at Ferentino, John went to France and England, finding little consolation; and thence he travelled to Compostella, where he married a new wife, Berengaria of Castile. After a visit to Germany he returned to Rome (1225). Here he received a demand from Frederick II. (who had now married Isabella) that he should abandon his title and dignity of king, which — so Frederick claimed — had passed to himself along with the heiress of the kingdom. John was now a septuagenarian " king in exile," but he was still vigorous enough to revenge himself on Frederick, by commanding the papal troops which attacked southern Italy during the emperor's absence on the sixth crusade (1228-1229). In 1229 John, now eighty years of age, was invited by the barons of the Latin empire of Constantinople to become emperor, on condition that Baldwin of Courtenay should marry his second daughter and succeed him. For nine years he ruled in Constanti- nople, and in 1235, with a few troops, he repelled a great siege of the city by Vataces of Nicaea and Azen of Bulgaria. After this last feat of arms, which has perhaps been exaggerated by the Latin chroniclers, who compare him to Hector and the Maccabees, John died in the habit of a Franciscan friar. An aged paladin, somewhat uxorious and always penniless, he was a typical knight errant, whose wanderings led him all over Europe, and planted him successively on the thrones of Jerusalem and Constantinople.

The story of John's career must be sought partly in histories of the kingdom of Jerusalem and of the Latin Empire of the East, partly in monographs. Among these, of which R. Rohricht gives a list {Geschichte des Kbnigreichs Jerusalem, p. 699, n. 3), see especially that of E. de Montcarmet, Vn chevalier du temps passe (Limoges, 1876 and 1881).

JOHN III. (Sobieski) (1624-1696), king of Poland, was the eldest son of

James Sobieski, castellan of Cracow, and Theofila Danillowiczowna, grand-daughter of the great Hetman Zol- kiewski. After being educated at Cracow, he made the grand tour with his brother Mark and returned to Poland in 1648. He served against Chmielnicki and the Cossacks and was present at the battles of Beresteczko (1651) and Batoka (1652), but was one of the first to desert his unhappy country when invaded by the Swedes in 1654, and actually assisted them to conquer the I Prussian provinces in 1655. He returned to his lawful allegiance

in the following year and assisted Czarniecki in his difficult task of expelling Charles X. of Sweden from the central Polish provinces. For his subsequent services to King John Casimir, especially in the Ukraine against the Tatars and Cossacks, he received the grand baton of the crown, or commandership- in-chief (1668). He had already (1665) succeeded Czarniecki as acting commander-in-chief. Sobieski had well earned these distinctions by his extraordinary military capacity, but he was now to exhibit a less pleasing side of his character. He was in fact a typical representative of the unscrupulous self- seeking Polish magnates of the 17th century who were always ready to sacrifice everything, their country included, to their own private ambition. At the election diet of 1669 he accepted large bribes from Louis XIV. to support one of the French candi- dates; after the election of Michael Wisniowiecki (June 19, 1669) he openly conspired, again in the French interest, against his lawful sovereign, and that too at the very time when the Turk was ravaging the southern frontier of the republic. Michael was the feeblest monarch the Poles could have placed upon the throne, and Sobieski deliberately attempted to make government of any kind impossible. He formed a league with the primate Prazmowski and other traitors to dethrone the king; when (1670) the plot was discovered and participation in it repudiated by Louis XIV., the traitors sought the help of the elector of Brandenburg against their own justly indignant countrymen. Two years later the same traitors again conspired against the king, at the very time when the Turks had defeated Sobieski's unsupported lieutenant, Luzecki, at Czertwerty- worska and captured the fortress of Kamieniec (Kamenetz- Podolskiy), the key of south-eastern Poland, while Lemberg was only saved by the valour of Elias Lancki. The unhappy king did the only thing possible in the circumstances. He summoned the tuszenia pospolite, or national armed assembly; but it failed to assemble in time, whereupon Michael was constrained to sign the disgraceful peace of Buczacz (Oct. 17, 1672) whereby Poland ceded to the Porte the whole of the Ukraine with Podolia and Kamieniec. Aroused to duty by a series of disasters for which he himself was primarily responsible,

Sobieski now hastened to the frontier, and won four yictories in ten days. But he could not recover Kamieniec, and when the tuszenia pos- polite met at Golenba and ordered an inquiry into the conduct of Sobieski and his accomplices he frustrated all their efforts by summoning a counter confederation to meet at Szczebrzeszyn. Powerless to oppose a rebel who was at the same time com- mander-in-chief, both the king and the diet had to give way, and a compromise was come to whereby the peace of Buczacz was repudiated and Sobieski was given a chance of rehabilitating himself, which he did by his brilliant victory over an immense Turkish host at Khotin (Nov. 10, 1673). The same day King Michael died and Sobieski, determined to secure the throne for himself, hastened to the capital, though Tatar bands were swarming over the frontier and the whole situation was acutely perilous. Appearing at the elective diet of 1674 at the head of 6000 veterans he overawed every other competitor, and despite the persistent opposition of the Lithuanians was elected king on the 21st of May. By this time, however, the state of things in the Ukraine was so alarming that the new king had to hasten to the front. Assisted by French diplomacy at the Porte (Louis XIV. desiring to employ Poland against Austria), and his own skilful negotiations with the Tatar khan, John III. now tried to follow the example of Wladislaus IV. by leaving the guardianship of the Ukraine entirely in the hands of the Cossacks, while he assembled as many regulars and militiamen as possible at Lemberg, whence he might hasten with adequate forces to defend whichever of the provinces of the Republic might be in most danger. But the appeal of the king was like the voice of one crying in the wilderness, and not one gentleman in a hundred hastened to the assistance of the fatherland. Even at the end of August Sobieski had but 3000 men at his disposal to oppose to 60,000 Turks. Only his superb strategy and the heroic devo- tion of his lieutenants — notably the converted Jew, Jan Samuel Chrzanowski, who held the Ottoman army at bay for eleven days

behind the walls of Trembowla — enabled the king to remove " the pagan yoke from our shoulders "; and he returned to be crowned at Cracow on the 14th of February 1676. In October 1676, in his entrenched camp at Zaravno, he with 13,000 men withstood 80,000 Turks for three weeks, and recovered by special treaty two-thirds of the Ukraine, but without Kamieniec (treaty of Zaravno, Oct. 16, 1676).

Having now secured peace abroad Sobieski was desirous of strengthening Poland at home by establishing absolute mon- archy; but Louis XIV. looked coldly on the project, and from this time forth the old familiar relations between the republic and the French monarchy were strained to breaking point, though the final rupture did not come till 1682 on the arrival of the Austrian minister, Zerowski, at Warsaw. After resisting every attempt of the French court to draw him into the anti- Habsburg league, Sobieski

signed the famous treaty of alliance with the emperor Leopold against the Turks (March 31, 1683), which was the prelude to the most glorious episode of his life, the relief of Vienna and the liberation of Hungary from the Ottoman yoke. The epoch-making victory of the 12th of Sep- tember 1683 was ultimately decided by the charge of the Polish cavalry led by Sobieski in person. Unfortunately Poland profited little or nothing by this great triumph, and now that she had broken the back of the enemy she was left to fight the common enemy in the Ukraine with whatever assistance she could obtain from the unwilling and unready Muscovites. The last twelve years of the reign of John III. were a period of unmitigated humiliation and disaster. He now reaped to the full the harvest of treason and rebellion which he himself had sown so abundantly during the first forty years of his life. A treasonable senate secretly plotting his dethronement, a mutinous diet rejecting the most necessary reforms for fear of " absolu- tism," ungrateful allies who profited exclusively by his victories ■ — these were his inseparable companions during the remainder of his life. Nay, at last his evil destiny pursued him to the battle- field and his own home. His last campaign (in 1690) was an utter failure, and the last years of his life were embittered by the violence and the intrigues of his dotingly beloved wife, Marya Kazimiera d'Arquien, by whom he had three sons, James, Alexander and Constantine. He died on the 17th of June 1696, a disillusioned and broken-hearted old man.

See Tadeusz Korzon, Fortunes and Misfortunes of John Sobieski (Pol.) (Cracow, 1898) ; E. H. R. Tatham, John Sobieski (Oxford, 1881); Kazimierz Waliszewski, Archives of French Foreign Affairs, 1674-1696, v. (Cracow, 1881); Ludwik Piotr Leliwa, John Sobieski and His Times (Pol.) (Cracow, 1882-1885); Kazimierz Waliszewski, Marysienka Queen of Poland (London, 1898); Georg Rieder, Johann Sobieski in Wien (Vienna, 1882). (R. N. B.)

JOHN I. (1357-1433), king of Portugal, the natural son of Pedro I. {el Justicieiro), was born at Lisbon on the 22nd of April 1357, and in 1364 was created grand-master of Aviz. On the death of his lawful brother Ferdinand L, without male issue, in October 1383, strenuous efforts were made to secure the succession for Beatrice, the only child of Ferdinand I., who as heiress-apparent had been married to John I. of Castile (Spain), but the popular voice declared against an arrangement by which I Portugal would virtually have become a Spanish province, and John was after violent tumults proclaimed protector and regent in the. following December. In April 1385 he was unanimously chosen king by the estates of the realm at Coimbra. The king of Castile invaded Portugal, but his army was compelled by pestilence to withdraw, and subsequently by the decisive battle of Aljubarrota (Aug. 14, 1385) the stability of John's throne was permanently secured. Hostilities continued inter- mittently until John of

Castile died, without leaving issue by Beatrice, in 1390. Meanwhile the king of Portugal went on consolidating the power of the crown at home and the influence of the nation abroad. In 141 5 Ceuta was taken from the Moors by his sons who had been born to him by his wife Philippa, daughter of John, duke of Lancaster; specially distinguished in the siege was Prince Henry (q.v.) afterwards generally known as " the Navigator." John I., sometimes surnamed " the Great," and sometimes " father of his country," died on the

nth of August 1433, in the forty-eighth year of a reign which had been characterized by great prudence, ability and success; he was succeeded by his son Edward or Duarte, so named out of compliment to Edward III. of England.

See J. P. Oliveira Martins, Os filhos de D. Joao I. and A vida de Nun' Alvares (Lisbon, 2nd ed. 1894).

JOHN II. (1455-1495), the Perfect, king of Portugal, succeeded his father, Alphonso V., in August 1481. His first business was to curtail the overgrown power of his aristocracy; note- worthy incidents in the contest were the execution (1483) of the duke of Braganza for correspondence with Castile, and the murder, by the king's own hand, of the youthful duke of Viseu for conspiracy. This reign was signalized by Bartholomeu Diaz's discovery of the Cape of Good Hope in 1488. Maritime rivalry led to disputes between Portugal and Castile until their claims were adjusted by the famous treaty of Tordesillas (June 7, 1494). John II. died, without leaving male issue, in October 1405, and was succeeded by his brother-in-law Emmanuel (Manoel) I.

See J. P. Oliveira Martins, O principe perfeito (Lisbon, 1895).

JOHN III. (1502-1557), king of Portugal, was born at Lisbon, on the 6th of June 1502, and ascended the throne as successor of his father Emmanuel I. in December 1521. In 1524 he married Catherine, sister to the Emperor Charles V., who shortly after- wards married the infanta Isabella, John's sister. Succeeding to the crown at a time when Portugal was at the height of its political power, and Lisbon in a position of commercial impor- tance previously unknown, John III., unfortunately for his dominions, became subservient to the clerical party among his subjects, with disastrous consequences to the commercial and social prosperity of his kingdom. He died of apoplexy on the 6th of June 1557, and was succeeded

*by his grandson Sebastian, then a child of only three years. *■*

JOHN IV. (1603-1656), the Fortunate, king of Portugal, was born at Villaviciosa in March 1603, succeeded to the dukedom of Braganza in 1630, and married Luisa de Guzman, eldest daughter of the duke of Medina Sidonia, in 1633. By the unanimous voice of the people he was raised to the throne of Portugal (of which he was held to be the legitimate heir) at the revolution effected in December 1640 against the Spanish king, Philip IV. His accession led to a protracted war with Spain, which only ended with the recognition of Portuguese 'inde- pendence in a subsequent reign (1668). He died on the 6th of November 1656, and was succeeded by his son Alphonso VI.

JOHN V. (1680-17 50), king of Portugal, was born at Lisbon on the 22nd of October 1689, and succeeded his father Pedro II. in December 1706, being proclaimed on the 1st of January 1707. One of his first acts was to intimate his adherence to the Grand Alliance, which his father had joined in 1703. Accordingly his general Das Minas, along with Lord Galway, advanced into Castile, but sustained the defeat of Almanza (April 14). In October 1708 he married Maria Anna, daughter of Leopold I., thus strengthening the alliance with Austria; the series of un- successful campaigns which ensued ultimately terminated in a favourable peace with France in 17 13 and with Spain in 171 5. The rest of his long reign was characterized by royal subservience to the clergy, the kingdom being administered by ecclesiastical persons and for ecclesiastical objects to an extent that gave him the best of rights to the title " Most Faithful King," bestowed upon him and his successors by a bull of Pope Bene- dict XIV. in 1748. John V. died on the 31st of July 1750, and was succeeded by his son Joseph.

JOHN VI. (1769-1826), king of Portugal, was born at Lisbon on the 13th of May 1769, and received the title of prince of Brazil in 1788. In 1792 he assumed the reins of government in name of his mother Queen Mary I., who had become insane. He had been brought up in an ecclesiastical atmosphere, and, being naturally of a somewhat weak and helpless character, was but ill adapted for the responsibilities he was thus called on to undertake. In 1799 he assumed the title of regent, which he retained until his mother's death in 1816. (For the political history of his regency, see Portugal.) In 1816 he was

recognized as king of Portugal but he continued to reside in Brazil; the consequent spread of dissatisfaction resulted in the peaceful revolution of 1820, and the proclamation of a constitutional government, to which he swore fidelity on his return to Portugal in 1822. In the same year, and again in 1823, he had to suppress a rebellion led by his son Dom Miguel,

whom he ultimately was compelled to banish in 1824. He died at Lisbon on the 26th of March 1826, and was succeeded by Pedro IV.

JOHN (1801-1873), king of Saxony, son of Prince Maxi- milian of Saxony and his wife Caroline of Parma (d. 1804), was borri at Dresden on the 12th of December 1801. As a boy he took a keen interest in literature and art (also in history, law, and political science), and studied with the greatest ardour classical and German literature (Herder, Schiller, Goethe). He soon began to compose poetry himself, and drew great inspiration from a journey in Italy (1821-1822), the pleasure of which was however darkened by the death of his brother Clemens. In Pavia the prince met with Biagioli's edition of Dante, and this gave rise to his lifelong and fruitful studies of Dante. The first part of his German translation of Dante was published in 1828, and in 1833 appeared the complete work, with a valuable commentary, which met with a great success. Several new editions appeared under his constant supervision, and he collected a complete library of works on Dante.

On his return from Italy he was betrothed to Princess Amalia of Bavaria, daughter of King Maximilian Joseph. He thus became the brother-in-law of Frederick William IV., king of Prussia, with whom he had a deep and lasting friendship. His wife Amalia died on the 8th of November 1877, having borne him nine children, two of whom, Albert and George, later became kings of Saxony.

On his return to Dresden, John was called in 1822 to the privy board of finance (Geheimes Finanzkollegium) and in 1825 became it's vice-president. Under the leadership of the president, Freiherr von Manteuffel, he acquired a thorough knowledge of administration and of political economy, and laid the founda- tions of that conservatism which he retained throughout life. These new activities did not, however, interrupt his literary and artistic studies. He came into still closer relations with politics and government after his entry into the privy council in 1830. During the revolution in Saxony he helped in the pacification of the country, became commandant of the new national guard, the political tendencies of which he tried to check, and took an exceptionally active part in the organization of the con- stitution of the 4th of September 1831 and especially in the deliberations of the upper chamber, where he worked with un- flagging energy and great ability. Following the example of his father, he taught his children in person, and had a great influence on their education. On the 12th of August 1845, during a stay at Leipzig, the prince was the object of hostile public demon- strations, the people holding him to be the head of an alleged ultramontane party at court, and the revolution of 1848 com- pelled him to interrupt his activities in the upper chamber. Immediately after the suppression of the revolution he resumed his place and took part

chiefly in the discussion of legal questions. He was also interested in the amalgamation of the German his- torical and archaeological societies. On the death of his brother Frederick Augustus II., John became, on the 9th of August 1854, king of Saxony. As king he soon won great popularity owing to his simplicity, graciousness and increasingly evident know- ledge of affairs. In his policy as regards the German confedera- tion he was entirely on the side of Austria. Though not opposed to a reform of the federal constitution, he held that its main- tenance under the presidency of Austria was essential. This view he supported at the assembly of princes at Frankfort in August and September 1863. He was unable to uphold his views against Prussia, and in the war of 1866 fought on the side of Austria. It was with difficulty that, on the conclusion of peace, Austrian diplomacy succeeded in enabling the king to retain his crown. After 1866 King John gradually became recon- ciled to the new state of affairs. He entered the North German

confederation, and in the war of 1870-71 with France his troops fought with conspicuous courage. He died at Dresden on the 29th of October 1873.

See J. Petzholdt, " Zur Litteratur des Konigs Johann," Neuer Anzeigerfür Bibliographie (1858,1859,1871,1873, 1874) ; "Aphorismen iiber unsern Konig J., " Bote von Geising (1866-1869) ; Das Biichlein vom Konig Johann (Leipzig, 1867); H. v. Treitschke, Preussische Jahrbiicher 23 (1869); A. Reumont, " Elogio di Giovanni, Re di Sassonia," Dagli Atti delta Accademia delta Crusca (Florence, 1874) ; J. P. von Winterstein, Johann, Konig von Sachsen (Dresden, 1878), and in Allgemeine Deutsche Biographie (1881) ; H. Ermisch, Die Wet- liner und die Landesgeschichte (Leipzig, 1902) ; O. Kaemmel, Sachsische Geschichte (Leipzig, 1899, Sammlung Goschen). (J. Hn.)

JOHN I. (d. 1294), duke of Brabant and Lorraine, surnamed the Victorious, one of the most gifted and chivalrous princes of his time, was the second son of Duke Henry III. and Aleidis of Burgundy. In 1267 his elder brother Henry, being infirm of mind and body, was deposed in his favour. In 12 71 John mar- ried Margaret, daughter of Louis IX. of France, and on her death in childbirth he took as his second wife (1273) Margaret of Flan- ders, daughter of Guy de Dampierre. His sister Marie was es- poused in 1275 to Philip III. (the Bold) of France, and during the reign of Philip and his son Philip IV. there were close rela- tions of friendship and alliance between Brabant and France. In 1285 John accompanied Philip III. in his expedition against Peter III., king of Aragon, but the duchy of Limburg was the scene of his chief activity and greatest successes. After the

death of Waleran IV. in 1279 the succession to this duchy was disputed. His heiress, Ermengarde, had married Reinald I. count of Gelderland. She died childless, but her husband con- tinued to rule in Limburg, although his rights were disputed by Count Adolph of Berg, nephew to Waleran IV. (see Limburg). Not being strong enough to eject his rival, Adolph sold his rights to John of Brabant, and hostilities broke out in 1283. Harassed by desultory warfare and endless negotiations, and seeing no prospect of holding his own against the powerful duke of Brabant, Reinald made over his rights to Henry III. count of Luxemburg, who was a descendant of Waleran III. of Limburg. Henry III. was sustained by the archbishop of Cologne and other allies, as well as by Reinald of Gelderland. The duke of Brabant at once invaded the Rhineland and laid siege to the castle of Woeringen near Bonn. Here he was attacked by the forces of the confederacy on the 5th of June 1288. After a bloody struggle John of Brabant, though at the head of far inferior numbers, was completely victorious. Limburg was henceforth attached to the duchy of Brabant. John consolidated his conquest by giving his daughter in marriage to Henry of Luxem- burg (1291). John the Victorious was a perfect model of a feudal prince in the days of chivalry, brave, adventurous, ex- celling in every form of active exercise, fond of display, generous in temper. He delighted in tournaments, and was always eager personally to take part in jousts. On the 3rd of May 1294, on the occasion of some marriage festivities at Bar, he was wounded in the arm in an encounter by Pierre de Bausner, and died from the effects of the hurt.

Bibliography. — H. Barlandus, Rerum gestarum a Brabantiae ducibus historia usque in annum 1526 (Louvain, 1566) ; G. C. van der Berghe, Jean le Victorieux, due de Brabant (1259-1294), (Louvain,

1857); K. F. Stallaert, Gesch. v. Jan I. van Braband en zijne tijdvak (Brussels, 1861); A. Wauters, Le Due Jean V et le Brabant sous le regne de ce prince (Brussels, 1859).

JOHN, or Hans (1513-1571), margrave of Brandenburg- Ciistrin, was the younger son of Joachim I., elector of Branden- burg, and was born at Tangermiinde on the 3rd of August 1513. In spite of the dispositio Achillea which decreed the indivisi- bility of the electorate, John inherited the new mark of Branden- burg on his father's death in July 1535. He had been brought up as a strict Catholic, but soon wavered in his allegiance, and in 1538 ranged himself definitely on the side of the Reformers. About the same time he joined the league of Schmalkalden; but before the war broke out between the league and the em- peror Charles V. the promises of the emperor had won him over to the imperial side. After the conclusion of the war, the rela- tions between John and Charles became somewhat strained.

The margrave opposed the Interim, issued from Augsburg in May 1548; and he was the leader of the princes who formed a league for the defence of the Lutheran doctrines in February 1550. The alliance of these princes, however, with Henry II., king of France, does not appear to have commended itself to him and after some differences of opinion with Maurice, elector of Saxony, he returned to the emperor's side. His remaining years were mainly spent in the new mark, which he ruled carefully and economically. He added to its extent by the purchase of Beeskow and Storkow, and fortified the towns of Ciistrin and Peitz. He died at Ciistrin on the 13th of January 1571. His wife Catherine was a daughter of Henry II., duke of Brunswick, and as he left no sons the new mark passed on his death to his nephew John George, elector of Brandenburg.

See Berg, Beitrdge zur Geschichte des Markgrafen Johann von Kilstrin (Landsberg, 1903).

JOHN (1371-1419), called the Fearless (Sans Peur), duke of Burgundy, son of Philip the Bold, duke of Burgundy, and Mar- garet of Flanders, was born at Dijon on the 28th of May 1371. On the death of his maternal grandfather in 1384 he received the title of count of Nevers, which he bore until his father's death. Though originally destined to be the husband of Catherine, sister of Charles VI. of France, he married in 1385 Margaret, daughter of Duke Albert of Bavaria, an alliance which con- solidated his position in the Netherlands. In the spring of 1396 he took arms for Hungary against the Turks and on the 28th of September was taken prisoner by the Sultan Bayezid I. at the bloody battle of Nicopolis, where he earned his surname of " the Fearless." He did not recover his liberty until 1397, and then only by paying an enormous ransom. He succeeded his father in 1404, and immediately found himself in conflict with Louis of Orleans, the young brother of Charles VI. The history of the following years is filled with the struggles between these two princes and with their attempts to seize the authority " in the name of the demented king. John endeavoured to strengthen his position by marrying his daughter Margaret to the dauphin Louis, and by betrothing his son Philip to a daugh- ter of Charles VI. Like his father, he looked for support to the popular party, to the tradesmen, particularly the powerful gild of the butchers, and also to the university of Paris. In 1405 he opposed in the royal council a scheme of taxation proposed by the duke of Orleans, which was nevertheless adopted. Louis retaliated by refusing to sanction the duke of Burgundy's projected expedition against Calais, whereupon John quitted the court in chagrin on the pretext of taking up his mother's heritage. He was, however, called back to the council to find that the duke of Orleans and the queen had carried off the dauphin. John succeeded in bringing back the dauphin to Paris, and open war seemed imminent between the two princes. But an arrangement was effected in October 1405, and in 1406 John was made

by royal decree guardian of the dauphin and the king's children.

The struggle, however, soon revived with increased force. Hostilities had been resumed with England; the duke of Orleans had squandered the money raised for John's expedition against Calais; and the two rivals broke out into open threats. On the 20th of November 1407 their uncle, the duke of Berry, brought about a solemn reconciliation, but three days later Louis was assassinated by John's orders in the Rue Barbette, Paris. John at first sought to conceal his share in the murder, but ultimately decided to confess to his uncles, and abruptly left Paris. His vassals, however, showed themselves determined to support him in his struggle against the avengers of the duke of Orleans. The court decided to negotiate, and called upon the duke to return. John entered Paris in triumph, and instructed the Franciscan theologian Jean Petit (d. 141 1) to pronounce an apology for the murder. But he was soon called back to his estates by a rising of the people of Liege against his brother-in-law, the bishop of that town. The queen and the Orleans party took every advantage of his absence and had Petit's discourse solemnly refuted. John's victory over the Liegeois at Hasbain on the 23rd of September 1408, enabled him to return to Paris, where he

was reinstated in his ancient privileges. By the peace of Chartres (March 9, 1409) the king absolved him from the crime, and Valentina Visconti, the widow of the murdered duke, and her children pledged themselves to a reconciliation; while an edict of the 27th of December 1409 gave John the guardianship of the dauphin. Nevertheless, a new league was formed against the duke of Burgundy in the following year, principally at the instance of Bernard, count of Armagnac, from whom the party opposed to the Burgundians took its name. The peace of Bicetre (Nov. 2, 1410) prevented the outbreak of hostilities, inasmuch as the parties were enjoined by its terms to return to their estates; but in 141 1, in consequence of ravages com- mitted by the Armagnacs in the environs of Paris, the duke of Burgundy was called back to Paris. He relied more than ever on the support of the popular party, which then obtained the reforming Ordonnance Cabochienne (so called from Simon Caboche, a prominent member of the gild of the butchers). But the bloodthirsty excesses of the populace brought a change. John was forced to withdraw to Burgundy (August 1413), and the university of Paris and John Gerson once more cen- sured Petit's propositions, which, but for the lavish bribes of money and wines offered by John to the prelates, would have been solemnly condemned at the council of Constance. John's attitude was undecided; he

negotiated with the court and also with the English,, who had just renewed hostilities with France. Although he talked of helping his sovereign, his troops took no part in the battle of Agincourt (1415), where, however, two of his brothers, Anthony, duke of Brabant, and Philip, count of Nevers, fell fighting for France.

In 141 7 John made an attack on Paris, which failed through his loitering at Lagny; x but on the 30th of May 1418 a traitor, one Perrinet Leclerc, opened the gates of Paris to the Burgundian captain, Villiers de ITsle Adam. The dauphin, afterwards King Charles VI. , fled from the town, and John betook himself to the king, who promised to forget the past. John, however, did nothing to prevent the surrender of Rouen, which had been besieged by the English, and on which the fate of the kingdom seemed to depend; and the town was taken in 1419. The dauphin then decided on a reconciliation, and on the nth of July the two princes swore peace on the bridge of Pouilly, near Melun. On the ground that peace was not sufficiently assured by the Pouilly meeting, a fresh interview was proposed by the dauphin and took place on the 10th of September 1419 on the bridge of Montereau, when the duke of Burgundy was felled with an axe by Tanneguy du Chastel, one of the dauphin's companions, and done to death by the other members of the dauphin's escort. His body was first buried at Montereau and afterwards removed to the Chartreuse of Dijon and placed in a magnificent tomb sculptured by Juan de la Huerta; the tomb was afterwards transferred to the museum in the hdtel de ville.

By his wife, Margaret of Bavaria, he had one son, Philip the Good, who succeeded him; and seven daughters — Margaret, who married in 1404 Louis, son of Charles VI., and in 1423 Arthur, earl of Richmond and afterwards duke of Brittany; Mary, wife of Adolph of Cleves; Catherine, promised in 1410 to a son of Louis of Anjou; Isabella, wife of Olivier de Chatillon, count of Penthievre; Joanna, who died young; Anne, who married John, duke of Bedford, in 1423; and Agnes, who married Charles I., duke of Bourbon, in 1425.

See A. G. P. Baron de Barante, Histoire des dues de Bourgogne, (Brussels, 1835-1836); B. Zeller, Louis de France el Jean sans Peur (Paris, 1886) ; and E. Petit, Itineraire de Philippe le Hardi et de Jean sans Peur (Paris, 1888). (R. Po.)

JOHN (1468-1532), called the Steadfast, elector of Saxony, fourth son of the elector Ernest, was born on the 30th of June 1468. In i486, when his eldest brother became elector as Frederick III., John received a part of the paternal inheritance and afterwards assisted his kinsman, the German king Maxi- milian I., in several campaigns. He was an early adherent of Luther, and, becoming elector of Saxony by his brother's death

1 This incident earned for him among the Parisians the con- temptuous nickname of " John of Lagny, who does not hurry."

in May 1525,'was soon prominent among the Reformers. Having assisted to suppress the rising led by Thomas Munzer in 1525, he helped Philip, landgrave of Hesse, to found the league of Gotha, formed in 1526 for the protection of the Reformers. He was active at the diet of Spires in 1526, and the " recess " of this diet gave him an opportunity to reform the church in Saxony, where a plan for divine service was drawn up by Luther. The assertions of Otto von Pack that a league had been formed against the elector and his friends induced John to ally himself again with Philip of Hesse in March 1528, but he restrained Philip from making an immediate attack upon their opponents. He signed the protest against the " recess " of the diet of Spires in 1529, being thus one of the original Protestants, and was actively hostile to Charles V. at the diet of Augsburg in 1530. Having signed the confession of Augsburg, he was alone among the electors in objecting to the election of Ferdinand, afterwards the emperor Ferdinand I., as king of the Romans. He was among the first members of the league of Schmalkalden, assented to the religious peace of Nuremberg in 1532, and died at Schweid- nitz on the 16th of August 1532. John was twice married and left two sons and two daughters. His elder son, John Frederick, succeeded him as elector, and his younger son was John Ernest (d. 1553). He rendered great services to the Protestant cause in its infancy, but as a Lutheran resolutely refused to come to any understanding with other opponents of the older faith.

See J. Becker, Kurfurst Johann von Sachsen und seine Beziehungen zu Luther (Leipzig, 1890) ; J. Janssen, History of the German People (English translation), vol. v. (London, 1903) ; L. von Ranke, Deutsche Geschichte im Zeitalter der Reformation (Leipzig, 1882).

JOHN, DON (1545-1578), of Austria, was the natural son of the emperor Charles V. by Barbara Blomberg, the daughter of an opulent citizen of Regensburg. He was born in that free imperial city on the 24th of February 1545, the anniversary of his father's birth and coronation and of the battle of Pavia, and was at first confided under the name of Geronimo to foster parents of humble birth, living at a village near Madrid; but in 1554 he was transferred to the charge of Madalena da Ulloa, the wife of Don Luis de Quijada, and was brought up in ignorance of his parentage at Quijada's castle of Villagarcia not far from Valladolid. Charles V. in a codicil of his will recognized Gero- nimo as his son, and recommended him to the care of his successor. In September 1559 Philip II. of Spain publicly recognized the boy as a member of the royal family, and he was known at court as Don Juan de Austria. For three years he was educated at Alcalfi., and had as school companions his nephews, the infante Don Carlos and Alexander

Farnese, prince of Parma. With Don Carlos his relations were especially friendly. It had been Philip's intention that Don John should become a monk, but he showed a strong inclination for a soldier's career and the king yielded. In 1568 Don John was appointed to the command of a squadron of 33 galleys, and his first operations were against the Algerian pirates. His next services were (1569-70) against the rebel Moriscos in Granada. In 1571 a nobler field of action was opened to him. The conquest of Cyprus by the Turks had led the Christian powers of the Mediterranean to fear for the safety of the Adriatic. A league between Spain and Venice was effected by the efforts of Pope Pius V. to resist the Turkish advance to the west, and Don John was named admiral in chief of the combined fleets. At the head of 208 galleys, 6 galleasses and a number of smaller craft, Don John encountered the Turkish fleet at Lepanto on the 7th of October 1571, and gained a complete victory. Only forty Turkish vessels effected their escape, and it was computed that 35,000 of their men were slain or captured while 15,000 Christian galley slaves were released. Unfortunately, through divisions and jealousies between the allies, the fruits of one of the most decisive naval victories in history were to a great extent lost.

This great triumph aroused Don John's ambition and filled his imagination with schemes of personal aggrandizement. He thought of erecting first a principality in Albania and the Morea, and then a kingdom in Tunis. But the conclusion by Venice of a separate peace with the sultan put an end to the

league, and though Don John captured Tunis in 1573, it was again speedily lost. The schemes of Don John found no support in Philip II., who refused to entertain them, and even withheld from his half-brother the title of infante of Spain. At last, however, he was appointed (1576) governor-general of the Nether- lands, in succession to Luis de Requesens. The administration of the latter had not been successful, the revolt headed by the prince of Orange had spread, and at the time of Don John's nomination the Pacification of Ghent appeared to have united the whole of the seventeen provinces of the Netherlands in deter- mined opposition to Spanish rule and the policy of Philip II. The magic of Don John's name, and the great qualities of which he had given proof, were to recover what had been lost. He was, however, now brought into contact with an adversary of a very different calibre from himself. This was William of Orange, whose influence was now supreme throughout the Nether- lands. The Pacification of Ghent, which was really a treaty between Holland and Zeeland and the other provinces for the defence of their common interests

against Spanish oppression, had been followed by an agreement between the southern pro- vinces, known as the Union of Brussels, which, though maintain- ing the Catholic religion and the king's authority, aimed at the expulsion of the Spanish soldiery and officials from the Nether- lands. Confronted by the refusal of the states general to accept him as governor unless he assented to the conditions of the Paci- fication of Ghent, swore to maintain the rights and privileges of the provinces, and to employ only Netherlanders in his service, Don John, after some months of fruitless negotiations, saw himself compelled to give way. At Huey on the 12th of February 1577 he signed a treaty, known as the " Perpetual Edict," in which he complied with these terms. On the 1st of May he made his entry into Brussels, but he found himself governor-general only in name, and the prince of Orange master of the situation. In July he suddenly betook himself to Namur and withdrew his concessions. William of Orange forthwith took up his residence at Brussels, and gave his support to the archduke Matthias, afterwards emperor, whom the states- general accepted as their sovereign. Meanwhile Philip had sent large reinforcements to Don John under the leadership of his cousin Alexander Farnese. At the head of a powerful force Don John now suddenly attacked the patriot army at Gem- blours, where, chiefly by the skill and daring of Farnese, a com- plete victory was gained on the 31st of January 1578. He could not, however, follow up his success for lack of funds, and was compelled to remain inactive all the summer, chafing with impatience "at the cold indifference with which his appeals for the sinews of war were treated by Philip. His health gave way, he was attacked with fever, and on the 1st of October 1578, at the early age of 7,3, Don John died, heartbroken at the failure of all his soaring ambitions, and at the repeated proofs that he had received of the king his brother's jealousy and neglect.

See Sir W. Stirling Maxwell, Don John of Austria 1547-1575 (1883) and the bibliography under Philip II. of Spain.

JOHN, DON (1629-1679), of Austria, the younger, recognized as the natural son of Philip IV., king of Spain, his mother, Maria Calderon, or Calderona, being an actress. Scandal accused her of a prodigality of favours which must have rendered the paternity of Don John very dubious. He was, however, recognized by the king, received a princely education at Ocana, and was amply endowed with commanderies in the military orders, and other forms of income. Don John was sent in 1647 to Naples — then in the throes of the popular rising first led by Masaniello — with a squadron and a military force, to support the viceroy. The restoration of royal authority was due rather to the exhaustion of the insurgents and the follies of their French leader, the duke of Guise, than to the forces of Don John. He was next sent as viceroy to Sicily, whence he was recalled in 1651 to complete the pacification of Catalonia, which had been in revolt

since 1640. The excesses of the French, whom the Catalans had called in, had produced a reaction, and Don John had not much more to do than to preside over the final siege of Barcelona and the convention which terminated the revolt in October 1652.

On both occasions he had played the peacemaker, and this

sympathetic part, combined with his own pleasant manners and handsome person with bright eyes and abundant raven- black hair — a complete contrast to the fair complexions of the Habsburgs — made him a popular favourite. In 1656 he was sent to command in Flanders, in combination with the prince of Conde, then in revolt against his own sovereign. At the storming of the French camp at Valenciennes in 1656, Don John displayed brilliant personal courage at the head ' of a cavalry charge. When, however, he took a part in the leadership of the army at the Dunes in the battle fought against Turenne and the British forces sent over by Cromwell in 1658, he was completely beaten, in spite of the efforts of Conde, whose advice he neglected, and of the hard fighting of English Royalist exiles. During 1661 and 1662 he commanded against the Portuguese in Estremadura. The Spanish troops were ill-appointed, irregularly paid and un- trustworthy, but they were superior in numbers and some successes were gained. If Don John had not suffered from the indolence which Clarendon, who knew him, considered his chief defect, the Portuguese would have been hard pressed. The greater part of the south of Portugal was overrun, but in 1663 the Portuguese were reinforced by a body of English troops, and were put under the command of the Huguenot Schomberg. By him Don John was completely beaten at Estremos. Even now he might not have lost the confidence of his father, if Queen Mariana, mother of the sickly infante Carlos, the only surviving legitimate son of the king, had not regarded the bastard with distrust and dislike. Don John was removed from command and sent to his commandery at Consuegra. After the death of Philip IV. in 1665 Don John became the recognized leader of the opposition to the government of Philip's widow, the queen regent. She and her favourite, the German Jesuit Nithard, seized and put to death one of his most trusted servants, Don Jose Malladas. Don John, in return, put himself at the head of a rising of Aragon and Catalonia, which led to the expulsion of Nithard on the 25th of February 1669. Don John was, however, forced to content himself with the viceroyalty of Aragon. In 1677, the queen mother having aroused universal opposition by her shameless favour for Fernando de Valenzuela, Don John was able to drive her from court, and establish himself as prime minister. Great hopes were entertained of his administration, but it proved disappointing and short. Don John died on the 17th of September 1679.

The career of Don John can be followed in J. C. Dunlop's Memoirs of

Spain 1 621-1700 (Edin. 1834).

JOHN OF BEVERLEY, ST (d. 721), English bishop, is said to have been born of noble parents at Harpham, in the east riding of Yorkshire. He received his education at Canterbury under Archbishop Theodore, the statement that he was educated at Oxford being of course untrue. He was for a time a member of the Whitby community, under St Hilda, and in 687 he was conse- crated bishop of Hexham and in 705 was promoted to the bishop- ric of York. He resigned the latter see in 718, and retired to a monastery which he had founded at Beverley, where he died on the 7th of May 721. He was canonized in 1037, and his feast is celebrated annually in the Roman Church on the 7th of May. Many miracles of healing are ascribed to John, whose pupils were numerous and devoted to him. He was celebrated for his scholarship as well as for his virtues.

The following works are ascribed to John by J. Bale: Pro Luca exponendo (an exposition of Luke) ; Homiliae in Evangelia; Epistolae ad' Herebaldum, Audenam, et Bertinum; and Epistolae ad Hyldam abbatissam. See life by Folcard, based on Bede, in Acta SS. Bolland. ; and J. Raine's Fasti eboracenses (1863).

JOHN OF THE CROSS, ST (1542-1591), Spanish mystic, was born at Ontiveros (Old Castile) on the 24th of June 1542. He became a professed" Carmelite in 1564, and was ordained priest at Salamanca in 1567. He met with much opposition in his efforts to introduce the reforms proposed by St Theresa, and was more than once imprisoned. His real name was Juan de Yepez y Alvarez; in religion he was known as Juan de San Matias till 1 568, when he adopted the name of Juan de la Cruz.

Broken by persecution, he was sent to the monastery of Ubeda, where he died in 1591; his Obras espirituales were published posthumously in 1618. He was beatified in 1674 and canonized on the 27th of December 1726. The lofty symbolism of his prose is frequently obscure, but his lyrical verses are distinguished for their rapturous ecstasy and beauty of expression.

Some of his poems have been translated with great success by Arthur Symons in Images of Good and Evil; the most convenient edition of his works, which have been frequently reprinted, is that contained in vol. xvi. of the Biblioteca de autores espanoles.

JOHN OF ASIA (or of Ephesus), a leader of the Monophysite Syriac-speaking Church in the 6th century, and one of the earliest and most

important of Syriac historians. Born at Amid (Diarbekr) about 505, he was there ordained as a deacon in 529 but in 534 we find him in Palestine, and in 535 he passed to Constantinople. The cause of his leaving Amid was probably either the great pestilence which broke out there in 534 or the furious persecution directed against the Monophysites by Ephraim (patriarch of Antioch 529-544) and Abraham (bishop of Amid c. 520-541). In Constantinople he seems to have early won the notice of Justinian, one of the main objects of whose policy was the con- solidation of Eastern Christianity as a bulwark against the heathen power of Persia. John is said by Barhebraeus {Chron. eccl. i. 195) to have succeeded Anthimus as Monophysite bishop of Constantinople, but this is probably a mistake. 1 Anyhow he enjoyed the emperor's favour until the death of the latter in 565 and (as he himself tells us) was entrusted with the administration of the entire revenues of the Monophysite Church. He was also sent, with the rank of bishop, on a mission for the conversion of such heathen as remained in Asia Minor, and informs us that the number of those whom he baptized amounted to 70,000. He also built a large monastery at Tralles on the hills skirting the valley of the Meander, and more than 90 other monasteries. Of the mission to the Nubians which he promoted, though he did not himself visit their country, an interesting account is given in the 4th book of the 3rd cart of his History? In 546 the emperor entrusted him with the task of rooting out the secret practice of idolatry in Constantinople and its neighbourhood. But his fortunes changed soon after the accession of Justin II. About 571 Paul of Asia, the orthodox or Chalcedonian patriarch, began (with the sanction of the emperor) a rigorous persecution of the Monophysite Church leaders, and John was among those who suffered most. He gives us a detailed account of his sufferings in prison, his loss of civil rights, &c, in the third part of his History. The latest events recorded are of the date 585, and the author cannot have lived much longer; but of the circumstances of his death nothing is known.*

John's main work was his Ecclesiastical History, which covered more than six centuries, from the time of Julius Caesar to 585. It was composed in three parts, each containing six books. The first part seems to have wholly perished. The second, which extended from Theodosius II. to the 6th or 7th year of Justin II., was (as F. Nau has recently proved) 3 reproduced in full or almost in full, in John's own words, in the third part of the Chronicle which was till lately attributed to the patriarch Dionysius Telmaharensis, but is really the work of an unknown compiler. Of this second division of John's History, in which he had probably incorporated the so- called Chronicle of Joshua the Styhte, considerable portions are found in the British Museum MSS. Add. 14647 and 14650, and these have been published in the second volume of Land's Anecdota Syriaca. But the whole

is more completely presented in the Vatican MS. (clxii.), which contains the third part of the Chronicle of pseudo-Dionysius. The third part of John's history, which is a detailed account of the ecclesiastical events which happened in 571—585, as well as of some earlier occurrences, survives in a fairly complete state in Add. 14640, a British Museum MS. of the 7th century. It forms a contemporary record of great value to the historian. Its somewhat disordered state, the want of chronological

1 See Land, Joannes Bisckof von Ephesos, pp. 57 seq.

2 Cf. Land's Appendix (op. cit. 172-193).

3 See Bulletin critique, 15th June and 25th Aug. 1896, and 25th Jan. 1897; Journal asiatique, 9th series, vol. viii. (1896) pp. 346 sqq. and vol. ix. (1897) p. 529; also Revue de V Orient chretien, Suppl. trimestriel (1897), pp. 41-54, 455-493; and compare Noldeke in Vienna Oriental Journal (1896), pp. 160 sqq. The facts are briefly stated in Duval's Literature syriaque, p. 192. A full analysis of this second part of John's history has been given by M. Nau.

arrangement, and the occasional repetition of accounts of the same events are due, as the author himself informs us (ii. 50), to the work being almost entirely composed during the times of persecution. The same cause may account for the somewhat slovenly Syriac style. The writer claims to have treated his subject impartially, and though written from the narrow point of view of one to whom Monophysite " orthodoxy " was all-important, it is evidently a faithful reproduc- tion of events as they occurred. This third part was edited by Cureton (Oxford, 1853), and was translated into English by R. Payne- Smith (Oxford, i860) and into German by J. M. Schonfelder (Munich,

1862).

John's other known work was a series of Biographies of Eastern Saints, compiled about 569. These have been edited by Land in Anecdota Syriaca, ii. 1-288, and translated into Latin by Douwen and Land (Amsterdam, 1889). An interesting estimate of John as an ecclesiastic and author was given by the Abbe' Duchesne in a memoir read before the five French Academies on the 25th of October 1892.

JOHN OF DAMASCUS (Johannes Damascentjs) (d. before 754), an eminent theologian of the Eastern Church, derives his surname from Damascus, where he was born about the close of the 7th century. His Arabic name was Mansur (the victor) , and he received the epithet Chrysorrhoas (gold-pouring) on account of his eloquence. The principal

account of his life is contained in a narrative of the 10th century, much of which is obviously legendary. His father Sergius was a Christian, but notwithstand- ing held a high office under the Saracen caliph, in which he was succeeded by his son. John is said to have owed his education in philosophy, mathematics and theology to an Italian monk named Cosmas, whom Sergius had redeemed from a band of captive slaves. About the year 730 he wrote several treatises in defence of image-worship, which the emperor, Leo the Isaurian, was making strenuous efforts to suppress.

Various pieces of evidence go to show that it was shortly after this date that he resolved to forsake the world, divided his fortune among his friends and the poor, and betook himself to the monas- tery of St Sabas, near Jerusalem, where he spent the rest of his life. After the customary probation he was ordained priest by the patriarch of Jerusalem. In his last years he travelled through Syria contending against the iconoclasts, and in the same cause he visited Constantinople at the imminent risk of his life during the reign of Constantine Copronymus. With him the "mysteries," the entire ritual, are an integral part of the Orthodox system, and all dogma culminates in image-worship. The date of his death is uncertain; it is probably about 752. John Damas- cenus is a saint both in the Greek and in the Latin Churches, his festival being observed in the former on the 29th of November and on the 4th of December, and in the latter on the 6th of May.

The works of Damascenus give him a foremost place among the theologians of the early Eastern Church, and, according to Dorner, he " remains in later times the highest authority in the theological literature of the Greeks." This is not because he is an original thinker but because he compiled into systematic form the scattered teaching of his theological predecessors. Several treatises attributed to him are probably spurious, but his undoubted works are numerous and embrace a wide range. Themost important contains three parts under the general title Utty^ yvixreas ("The Fountain of Knowledge "). The first part, entitled Kej&dAtua 0iXo1 alpiatwv ("Of Heresies") , is a reproduction of the earlier work of Epiph- anius, with a continuation giving an account of the heresies that arose after the time of that writer. The third part, entitled "EkSoctis &npit)j)s rijs 6p6oS6%ovirioTews ("An Accurate Exposition of the Orthodox Faith ") , is much the most important, containing as it does a complete system of theology founded on the teaching of the fathers and church councils, from the 4th to the 7th century. It thus embodies the finished result of the theological thought of the early Greek Church. Through a Latin translation made by Burgundio of Pisa in the 12th century, it was well known to Peter Lombard and Aquinas, and in this way it influenced the scholastic theology of the West. Another well-known work is the Sacra parallela, a collection of biblical passages followed by illustrations drawn from other scriptural

sources and from the fathers. There is much merit in his hymns and " canons " one of the latter is very familiar as the hymn " The Day of Resurrec- tion, Earth tell it out abroad." John of Damascus has sometimes been called the " Father of Scholasticism," and the " Lombard of the Greeks," but these epithets are appropriate only in a limited sense. The Christological position of John may be summed up in the following description: 4 " He tries to secure the unity of the two

' G.'P. Fisher, Hist, of Chr. Doctrine, 159 seq. More fully in R. L. Ottley, The Doctrine of the Incarnation, ii. 138-146.

natures by relegating to the divine Logos the formative and control- ling agency. It is not a human individual that the Logos assumes, nor is it humanity, or human nature in general. It is rather a potential human individual, a nature not yet developed into a person or hypostasis. The hypostasis through which this takes place is the personal Logos through whose union with this potential man, in the womb of Mary, the potential man acquires a concrete reality, an individual existence. He has, therefore, no hypostasis of himself but only in and through the Logos. It is denied that he is non-hypo- static (&vvTr6o-To.Tos) ; it is affirmed that he is en-hypostatic {kwirboT arcs). Two natures may form a unity, as the body and soul in man. So man, both soul and body, is brought into unity with the Logos ; there being then one hypostasis for both natures." There is an interchange of the divine and human attributes, a communication of the former which deifies the receptive and passive human nature. In Christ the human will has become the organ of the divine will. Thus while John is an adherent of Chalcedon and a dyothelite, the drift of his teaching is in the monophysite direction. " The Chalcedonian Definition is victorious, but Apollinaris is not overcome"; what John gives with the one hand he takes away with the other. On the question of the Atonement he regards the death of Christ as a sacrifice offered to God and not a ransom paid to the devil.

Literature. — The Life of John of Damascus was written by John, patriarch of Jerusalem in the ioth century (Migne, Patrol. Graec, xciv. 429-489). The works were edited by Le Quien (2 vols., fol., Paris, 1712) and form vols. 94 to 96 in Migne's Greek series. A monograph by J. Langen was published in 1879. A. Harnack's History of Dogma is very full (see especially vols. iii. and iv. ; on the image-worship controversy, iv. 322 seq.), and so are the similar works of F. Loofs-Seeberg and A. Dorner. See also O. Bardenhewer's Patrologie, and other literature cited in F. Kattenbusch's excellent article in Hauck-Herzog, Realencyklopddie, vol. ix.

JOHN OF HEXHAM (c. 1 160-1209), English chronicler, is known to us merely as the author of a work called the Historia XX V, annorum, which continues the Historia regum of Simeon of Durham and contains an account of English events 1 130-1 1 53. From the title, as given in the only manuscript, we learn John's name and the fact that he was prior of Hexham. It must have been between 1160 and 1209 that he held this position; but the date at which he lived and wrote cannot be more accurately determined. Up to the year 1139 he follows closely the history written by his predecessor, Prior Richard; thenceforward he is an independent though not a very valuable authority. He is best informed as to the events of the north country; his want of care, when he ventures farther afield, may be illustrated by the fact that he places in 1145 King Stephen's siege of Oxford, which really occurred in 1 142. Even for northern affairs his chronology is faulty; from 1 140 onwards his dates are uniformly one year too late. Prior Richard is not the only author to whom John is indebted; he incorporates in the annal of 1138 two other narra- tives of the battle of the Standard, one in verse by the monk Serlo, another in prose by Abbot Ailred of Rievaux; and also a poem, by a Glasgow clerk, on the death of Sumerled of the Isles.

The one manuscript of John's chronicle is a 13th century copy; MS. C. C. C. Cambridge, cxxxix. 8. The best edition is that of T. Arnold in Symeonis monachi opera, vol. ii. (Rolls Series, 1885). There is an English translation in J. Stevenson's Church Historians of England, vol. iv. (London, 1856). (H. W. C. D.)

JOHN OF IRELAND (Johannis de Irlandia), (fl. 1480), Scottish writer, perhaps of Lowland origin, was resident for thirty years in Paris and later a professor of theology. He was confessor to James IV. and also to Louis XI. of France and was rector of Yarrow (de Foresta) when he completed, at Edinburgh, the work on which rests his sole claim as a vernacular writer. This book, preserved in MS. in the Advocates' Library, Edinburgh (MS. 18, 2, 8), and labelled " Johannis de Irlandia opera theologica," is a treatise in Scots on the wisdom and discipline necessary to a prince, especially intended for the use of the young James IV. The book is the earliest extant example of original Scots prose. It was still in MS. in 1910, but an edition was promised by the Scottish Text Society. In this book John refers to two other vernacular writings, one " of the commandementis and uthir thingis pretenand to the salvacioune of man," the other, " of the tabill of confessioune." No traces of these have been discovered. The author's name appears on the registers of the university of Paris and on the rolls of the Scottish parliaments, and xv. 15*

he is referred to by the Scottish historians, Leslie and Dempster.

See the notices in John Lyden's Introduction to his edition of the Complaynt of Scotlande (1801), pp. 85 seq.; The Scottish Antiquary, xiii. 111-115 and xv. 1-14. Annotated extracts are given in Gregory Smith's Specimens of Middle Scots (1902). _

JOHN OF RAVENNA. Two distinct persons of this name, formerly confused and identified with a third (anonymous) Ravennese in Petrarch's letters, lived at the end of the 14th and the beginning of the 15th century.

1. A young Ravennese born about 1347, who in 1364 went to live with Petrarch as secretary. In 1367 he set out to see the world and make a name for himself, returned in a state of destitution, but, growing restless again, left his employer for, good in 1368. He is not mentioned again in Petrarch's corre- spondence, unless a letter " to a certain wanderer " {vago cuidam) , congratulating him on his arrival at Rome in 1373, is addressed to him.

2. Son of Conversanus (Conversinus, Convertinus) . He is first heard of (Nov. 17, 1368) as appointed to the professor- ship of rhetoric at Florence, where he had for some time held the post of notary at the courts of justice. This differentiates him from (1). He entered (c. 1370) the service of the ducal house of Padua, the Carraras, in which he continued at least until 1404, although the whole of that period was not spent in Padua. From 1375 to 1379 he was a schoolmaster at Belluno, and was dismissed as too good for his post and not adapted for teaching boys. On the 22nd of March 1382, he was appointed professor of rhetoric at Padua. During the struggle between the Carraras and Viscontis, he spent five years at Udine (1387-1392). From 1395-1404 he was chancellor of Francis of Carrara, and is heard of for the last time in 1406 as living at Venice. His history of the Carraras, a tasteless production in barbarous Latin, says little for his literary capacity; but as a teacher he enjoyed a great reputation, amongst his pupils being Vittorino da Feltre and Guarino of Verona.

3. Malpaghini (De Malpaghinis), the most important. Born about 1356, he was a pupil of Petrarch from a very early age to 1374. On the 19th of September 1397 he was appointed pro- fessor of rhetoric and eloquence at Florence. On the 9th of June 1412, on the re-opening of the studio, which had been shut from 1405 to 141 1 owing to the plague, his appointment was renewed for five years, before the expiration of which period he died (May 1417). Although Malpaghini left nothing behind him, he did much to encourage the study of Latin; among his pupils was Poggio Bracciolini.

The local documents and other authorities on the subject will be found in E.

T. Klette, Beitrage zur Geschichte und Litteratur der italienischen Gelehrtenrenaissance, vol. i. (1888); see also G. Voiet, Die Wiederbelebungdes klassischen Altertums, who, however, identifies (1) and (2).

JOHN OF SALISBURY (c. 1115-1180), English author, diplomatist and bishop, was born at Salisbury between the years 1 115 and 1 1 20. Beyond the fact that he was of Saxon, not of Norman race, and applies to himself the cognomen of Parvus, " short," or " small," few details are known regarding his early life; but from his own statements it is gathered that he crossed to France about 1136, and began regular studies in Paris under Abelard, who had there for a brief period re-opened his famous school on Mont St Genevieve. After Abelard's retirement, John carried on his studies under Alberich of Reims and Robert of Melun. From 1138 to 1140 he studied grammar and the classics under William of Conches and Richard l'Eveque, the disciples of Bernard of Chartres, though it is still a matter of controversy whether it was in Chartres or not (cf. A. Clerval, Les £coles de Chartres au moyen dge, 1895). Bernard's teaching was distinguished partly by its pronounced Platonic tendency, partly by the stress laid upon literary study of the greater Latin writers; and the influence of the latter feature is noticeable in all John of Salisbury's works. About 1140 he was at Paris studying theology under Gilbert de la Porree, then under Robert Pullus and Simon of Poissy. In 1148 he resided at

Moutiers la Celle in the diocese of Troyes, with his friend Peter of Celle. He was present at the council of Reims, presided over by Pope Eugenius III., and was probably presented by Bernard of Clairvaux to Theobald, archbishop of Canterbury, at whose court he settled, probably about 1150. Appointed secretary to Theobald, he was frequently sent on missions to the papal see. During this time he composed his greatest works, published almost certainly in 1159, the Policraticus, sive de nugis curialium et de vestigiis philosophorum and the Metalogicus, writings invaluable as storehouses of information regarding the matter and form of scholastic education, and remarkable for their cultivated style and humanist tendency. After the death of Theobald in 1161, John continued as secretary to Thomas Becket, and took an active part in the long disputes between that primate and his sovereign, Henry II. His letters throw light on the constitutional struggle then agitating the English world. With Becket he withdrew to France during the king's displeasure; he returned with him in n 70, and was present at his assassination. In the following years, during which he continued in an influential situation in Canterbury, but at what precise date is unknown, he drew up the Life of Thomas Beckel. In 1 1 76 he was made bishop of Chartres, where he passed the remainder of his life. In n 79 he took an active part in the council of the Lateran. He died at or near Chartres on the 25th of October 1180.

John's writings enable us to understand with much completeness the literary and scientific position of the 12th century. His views imply a cultivated intelligence well versed in practical affairs, opposing to the extremes of both nominalism and realism a practical common sense. His doctrine is a kind of utilitarianism, with a strong leaning on the speculative side to the modified literary scepticism of Cicero, for whom he had unbounded admiration. He was a humanist, before the Renaissance, surpassing all other representatives of the school of Chartres in his knowledge of the Latin classics, as in the purity of his style, which was evidently moulded on that of Cicero. Of Greek writers he appears to have known nothing at first hand, and very little in translations. The Timaeus of Plato in the Latin version of Chalcidius was known to him as to his contemporaries and predecessors, and probably he had access to translations of the Phaedo and Meno. Of Aristotle he possessed the whole of the Organon in Latin; he is, indeed, the first of the medieval writers of note to whom the whole was known. Of other Aristotelian writings he

appears to have known nothing.

The collected editions of the works are by J. A. Giles (5 vols., Oxford, 1848), and by Migne, in the Patrologiae cursus, vol. 199: neither accurate. The Policraticus was edited with notes and introductions by C. C. I. Webb, Toannis Saresberiensis episcopi Carnotensis Policratici (Oxford, 1909), 2 vols. The most complete study of John of Salisbury is the monograph by C. Schaarschmidt, Johannes Sarisberiensis nach Leben und Studien, Schriften und Philosophic 1862, which is a model of accurate and complete work-manship. See also the article in the Diet. Nat. Biog.

JOHN (1290-e. 1320), surnamed the Parricide, and called also John of Swabia, was a son of Rudolph II. count of Habsburg and Agnes daughter of Ottakar II. king of Bohemia, and consequently a grandson of the German king Rudolph I. Having passed his early days at the Bohemian court, when he came of age he demanded a portion of the family estates from his uncle, the German king Albert I. His wishes were not gratified, and with three companions he formed a plan to murder the king. On the 1st of May 1308 Albert in crossing the river Reuss at Windisch became separated from his attendants, and was at once attacked and killed by the four conspirators. John escaped the vengeance of Albert's sons, and was afterwards found in a monastery at Pisa, where in 1313 he is said to have been visited by the emperor Henry VII., who had placed him under the ban. From this time he vanishes from history. The character of John is used by Schiller in his play Wilhelm Tell.

JOHN, THE EPISTLES OF. The so-called epistles of John, in the Bible, are not epistles in the strict sense of the term, for the first is a homily, and encyclical or pastoral (as has been recog- nized since the days of Bretschneider and Michaelis), while the other two are brief notes or letters. Nor are they John's, ii John means the son of Zebedee. The latter conclusion depends upon the particular hypothesis adopted with regard to the

general Johannine problem, yet even when it is held that John the apostle (q.v.) survived to old age in Ephesus, the second and third epistles may be fairly ascribed (with Erasmus, Grotius, Credner, Bretschneider, Reuss, &c.) to John the presbyter 1 , as several circles in the early church held (" Opinio a plerisque tradita," Jerome: De vir. ill. 18). An apostle indeed might call himself a presbyter (cf. 1 Pet. v. 1). But these notes imply no apostolic claim on the part of the author, and, although their author is anonymous, the likelihood is that their composition by the great Asiatic presbyter John led afterwards to their incorporation in the " instrumentum " of John the apostle's writings, when the prestige of the latter had obscured the former. All hypotheses as to their pseudonymity or

composition . by different hands may be dismissed. They would never have floated down the stream of tradition except on the support of some primitive authority. If this was not connected with John the apostle the only feasible alternative is to think of John the presbyter, for Papias refers to the latter in precisely this fashion (Euseb. H.E. iii. 39, 15; nal tovto 6 ir. i \eye).

The period of all three lies somewhere within the last decade of the 1st century and the first decade of the 2nd. No evidence is available to determine in what precise order they were written, but it will be convenient to take the two smaller notes before the larger. The so-called Second Epistle of John is one of the excommunicating notes occasionally despatched by early Christian leaders to a community (cf . 2 Cor. v. 9). The presbyter or elder warns a Christian community, figuratively addressed as " the elect lady " (cf. 13 with 1 Pet. i. 1; v, 13; also the plural of 6, 8, 10 and 13), against some itinerant (cf. Didache xi. 1-27 teachers who were promulgating advanced Docetic views (7) upon the person of Christ. The note is merely designed to serve (12) until the writer arrives in person. He sends greetings to his correspondents from some community in which he is residing at present (13), and with which they had evidently some connexion.

The noit. vvas familiar to Irenaeus 2 who twice (i. 16, 3, iii. 16, 8) cites io-n, once quoting it from the first epistle by mistake, but no tradition, has preserved the name of the community in question, and all opinions on the matter are guess-work. The reference to " all who know the truth " (ver. 1) is, of course, to be taken relatively (cf . Rev. ii. 23) ; it does not necessarily imply a centre like Antioch or Rome (Chapman). Whiston thought of Philadelphia, and probably it must have been one of the Asiatic churches.

The so-called Third Epistle of John belongs to the eTriaroXcu crwraTiKcu (2 Cor. iii. 1) of the early church, like Rom. xvi. It is a private note addressed by the presbyter to a certain Gaius, a member of the same community or house-church (9) as that to which 2 John is written. A local errorist, Diotrephes (9-10) had repudiated the authority of the writer and his party, threatening even to excommunicate Gaius and others from the church (cf. Abbott's Dialessarica, § 2258). With this opponent the writer promises (10) to deal sharply in person before very long. Meantime (14) he despatches the present note, in hearty appreciation of his correspondent's attitude and character.

The allusion in 9 (eypaipa.) refers in all likelihood to the " second " epistle (so Ewald, Wolf, Salmon, &c). In order to avoid the suggestion that it implied a lost epistle, ixv was inserted at an early stage in the textual history of the note. If eKKMjo-ias could be read in 12, Demetrius would be

a presbyter; in any case, he is not to be identified with Demas (Chapman), nor is

1 So Selwyn, Christian Prophets (pp. 133-145), Harnack, Heinrici (Das Urchristenthum, 1902, pp. 129 seq.), and von Soden (History of Early Christian Literature, pp. 445-446), after Renan (L'Eglise chritienne, pp. 78 seq.). Von Dobschiit? (Christian Life in the Primitive Church, pp. 218 seq.) and R. Knopf (Das nachapost. Zeitalter, 1905, pp. 32 seq., &c.) are among the most recent critics who ascribe all three epistles to the presbyter.

2 On the early allusions to these brief notes, cf. Gregory: The Canon and Text of the New Testament (1907), pp. 131, 190 seq., West- cott's Canon of the New Testament, pp. 218 seq., 355, 357, 366, &c, and Leipoldt's Geschichte d. neut. Kanons (1907), i. pp. 66 seq., 78 seq., 99 seq., 151 seq., 192 seq., 232 seq.

there any reason to suppose (with Harnack) 1 that the note of 9 was written to, and suppressed by, him. What the presbyter is afraid of is not so much that his note would not be read (Ewald, Harnack), as that it would not be acted upon.

These notes, written originally on small sheets of papyrus, reveal the anonymous presbyter travelling (so Clem. Alex. Quis dives salv. xlii.) in his circuit or diocese of churches, and writing occasional pastoral letters, in which he speaks not only in his own name but in that of a coterie of like-minded Christians. 2 It is otherwise with the brochure or manifesto known as the " first epistle." This was written neither at the request of its readers nor to meet any definite local emergency, but on the initiative of its author (i. 4) who was evidently concerned about the effect produced upon the Church in general by certain contemporary phases of semi-gnostic teaching. The polemic is directed against a dualism which developed theoretically into docetic views of Christ's person (ii. 22, iv. 2, &c), and practically into libertinism (ii. 4, &c.). 3 It is natural to think, primarily, of the churches in Asia Minor as the circle addressed, but all indications of date or place are absent, except those which may be inferred from its inner connexion with the Fourth Gospel.

The plan of the brochure is unstudied and unpremeditated, resembling a series of variations upon one or two favourite themes rather than a carefully constructed melody. Fellowship (tcoivaivia.) with God and man is its dominant note. After defining the essence of Christian noivwvia. (i.

1-3), 4 the writer passes on to its conditions (i. 5 — ii. 17), under the antithesis of light and darkness. These conditions are twofold: (a) a sense of sin, which leads Christians to a sense of forgiveness 6 through Jesus Christ, (6) and obedience to the supreme law of brotherly love (cf. Ignat. Ad Smyrn. 6). If these conditions are unfulfilled, moral darkness is the issue, a darkness which spells ruin to the soul. This prompts the writer to explain the dangers of kolvwvIo. (ii. 18-29), under the antithesis of truth and falsehood, the immediate peril being a novel heretical view of the person of

1 In his ingenious study (Texte und Unlet suchungen, xv. 3), whose main contention is adopted by von Dobschiitz and Knopf. On this view (for criticism see Belser in the Tubing. Quartalschrift, 1897, pp. 150 seq., Kriiger in Zeitschrift fur die wiss. Theologie, 1898, pp. 307-311, and Hilgenfeld: ibid. 316-320), Diotrephes was voicing a successful protest of the local monarchical bishops against the older itinerant authorities (cf. Schmiedel, Ency. Bib., 3146-3147). As Wilamowitz-Moellendorf {Hermes, 1898, pp. 529 seq.) points out, there is a close connexion between ver. 1 1 and ver. 10. The same writer argues that, as the substitution of ayairr)Tos for L\raTos (ver. 1) " ist Schonrednerei und nicht vom besten Geschmacke," the writer adds op iyo> ayaira iv aXrfida.

2 This is the force of the ij/j«is in 3 John 9-10 (cf. 1 John iv. 6, 14) " The truth " (3 John 3-5) seems to mean a life answering to the apostolic standard thus enforced and exemplified.

3 Several of these traits were reproduced in the teaching of Cerin- thus, others may have been directly Jewish or Jewish Christian. The opposition to the Messianic r61e of Jesus had varied adherents. The denial of the Virgin-birth, which also formed part of the system of Cerinthus, was met by anticipation in the stories of Matthew and Luke, which pushed back the reception of the spirit from the baptism to the birth, but the Johannine school evidently preferred to answer this heresy by developing the theory of the Logos, with its implicate of pre-existence.

4 On the vexed question whether the language of this paragraph is purely spiritual or includes a realistic reference, cf. G. E. Findlay (Expositor, 1893, pp. 97 seq.), and Dr E. A. Abbott's recent study in Diatessarica, §§ 1615-1620. The writer is controverting the Docetic heresy, and at the same time keeping up the line of communications with the apostolic base.

5 The universal range (ii. 2) ascribed to the redeeming work of Christ is directed against Gnostic dualism and the Ebionitic narrow- ing of salvation to Israel; only ij^iets here denotes Christians in general, not Jewish Christians. On the answer to the Gnostic pride of perfectionism (i. 8), cf.

Epict. iv. 12, 19. The emphasis on " you all " (ii. 20) hints at the Gnostic aristocratic system of degrees among believers, which naturally tended to break up brotherly love (cf. I Cor. viii. I seq.). The Gnostics also held that a spiritual seed cf. iii. 9) was implanted in man, as the germ of his higher develop- ment into the divine life; for the Valentinian idea cf. Iren. Adv. Haer. i. 64, and Tertull. De anima, 11 [haeretici] " nescio quod spiritale semen infulciunt animae "). Cf. the general discussions by Haring in Theologische Abhandlungen C. von Weizsacker gewidmel (1892), pp. 188 seq., and Zahn in Wanderungen durch Schrift u. Geschichte (1892), pp. 3-74.

Christ. The characteristics of the fellowship are then developed (iii. 1-12), as sinlessness and brotherly love, under the antithesis of children of God (cf. ii. 29, " born of Him ") and children of the devil. This brotherly love bulks so largely in the writer's mind that he proceeds to enlarge upon its main elements of confidence towards God (iii. 13-24), moral discernment (iv. 1-6), and assurance of union with God (iv. 7-21), all these being bound up with a true faith in Jesus as the Christ (v. 1-12). 6 A brief epilogue gives what is for the most part a summary (v. 13-21) of the leading ideas of the homily. 7

Disjointed as the cause of the argument may seem, a close scrutiny of the context often reveals a subtle connexion between paragraphs which at first sight appear unlinked. Thus the idea of the Koanos passing away (ii. 17) suggests the following sen- tences upon the nearness of the Tapovcia (ii. 18 seq.), whose signs are carefully noted in order to reassure believers, and whose moral demands are underlined (ii. 28, iii. 3). Within this paragraph 8 even the abrupt mention of the xP'ovm has its genetical place (ii. 20). The heretical avrixpurTOi, it is implied, have no xptc/ia from God; Christians have (note the emphasis on i>neis), owing to their union with the true Xpiaros. Again, the genetic relation of iii. 4 seq. to what precedes becomes evident when we consider that the norm of Christian purity (iii. 3) is the keeping of the divine commandments, or conduct resembling Christ's on earth (iii. 3— ii. 4-6), so that the Gnostic 9 breach of this law not only puts a man out of touch with Christ (iii. 6 seq.), but defeats the very end of Christ's work, i.e. the abolition of sin (iii. 8). Thus iii. 7-10 resumes and completes the idea of ii. 29; the Gnostic is shown to be out of touch with the righteous God, partly because he will not share the brotherly love which is the expression of the righteousness, and partly because his claims to sinlessness render God's righteous forgiveness (i. 9) superfluous. Similarly the mention of the Spirit (iii. 24) opens naturally into a discussion of the decisive test for the false claims of the heretics or gnostic illuminati to spiritual powers and gifts (iv. 1 seq.) ; and, as this test of the genuine Spirit of God is the confession of Jesus Christ as really human and incarnate, the writer, on returning (in iv. 17 seq.) to his cardinal idea of brotherly love,

expresses it in view of the incarnate Son (iv. 9),

6 Cf. Denney, TheDeathof Chrisl(ig02), pp. 269-281. The polemi- cal reference to Cerinthus is specially clear at this point. The death of Jesus was not that of a phantom, nor was his ministry from the baptism to the crucifixion that of a heavenly aeon which suffered nothing: such is the writer's contention. " In every case the his- torical is asserted, but care is taken that it shall not be material- ized : a primacy is given to the spiritual. . . . Except through the historical, there is no Christianity at all, but neither is there any Christianity till the historical has been spiritually comprehended. The well-known interpolation of the three heavenly witnesses (v. 7) has now been proved by Karl Kiinstle (Das Comma Johanneum, 1905) to have originally come from the pen of the 4th century Span- iard, Priscillian, who himself denied all distinctions of person in the Godhead.

7 On the " sin to death "(v. 16) cf. Jubilees xxi. 22, xxvi. 34 with Karl's Johann. Studien (1898), i. 97 seq. and M. Goguel's La Notion johannique de l' esprit (1902), pp. 147-153, for the general theology of the epistle. The conceptions of light and life are best handled by Grill in his TJnter suchungen iiber die Entstehung des vierten Evgliums (1902), pp. 301 seq., 312 seq.

8 In Preuschen s Zeitschrift filr die neutest. Wissenschaft (1907), pp. 1-8, von Dobschiitz tries to show that the present text of ii. 28- iii. 12- indicates a revision or rearrangement of an earlier text. Cludius (Uransichten des Christentums, Altona, 1808) had already conjectured that a Gnostic editor must have worked over a Jewish Christian document.

Dr Alois Wurm's attempt (Die Irrlehrer im ersten Johannesbriefe, 1903) to read the references to errorists solely in the light of Jewish Christianity ignores or underrates several of the data. He is sup- ported on the whole by Clemen, in Preuschen's Zeitschrift (1905), pp._ 271-281. There is certainly an anti-Jewish touch, e.g. in the claim of iii. I (note the emphatic Vf-iv), when one recollects the saying of Aqiba (Aboth iii. 12) and Philo's remark, ical yap ei jiˆru iKavoi. deov Traldes vo/Aifevdai yeybvaixev, dWd tol rijs A«t5oDseiK6»'os clOtov, \6yov rod UpoiT drov' Oeov yap el/caiv Xayos 6 irpeafiOraTos (De conf. ling. 28). But the antithesis of John and Cerinthus, unlike that of Paul and Cerinthus (Epiph. Haer. xxviii.), is too well based in the tradition of the early Church to be dismissed as a later dogmatic reflection, and the internal evidence of this manifesto corroborates it clearly.

whose mission furnishes the proof of God's love as well as the example and the energy of man's (iv. 10 seq.) . The same concep- tion of the real humanity of Jesus Christ as essential to faith's being and well-being is worked out in the following paragraph (v. 1-12), while the allusion to eternal life (v. 11-12) leads to the closing recapitulation (v. 13-21) of the homily's leading ideas under this special category.

The curious idea, mentioned by Augustine (Quaest. evang. ii. 39), that the writing was addressed ad Parthos, has been literally taken by several Latin fathers and later writers {e.g. Grotius, Paulus, Hammond) , but this title probably was a corruption of ad sparsos (Wetstein, Wegschneider) or of irpds irapdkvovs (Whiston: the Christians addressed as virgin, i.e. free from heresy), if not of irapdevos, as applied in early tradition to John the apostle. The circle for which the homily was meant was probably, in the first instance, that of the Fourth Gospel, but it is impossible to determine whether the epistle preceded or followed the larger treatise. The division of opinion on this point (cf. J. Moffat, Historical New Testament, 1901, p. 534) is serious, but the evidence for either position is purely subjective. There are sufficient peculiarities of style and conception 1 to justify provisionally some hesitation on the matter of the authorship. The epistle may have been written by a different author, or, from a more popular standpoint, by the author of the gospel, possibly (as some critics hold) by the author of John xxi. But res lubrica, opinio incerta.

It is unsafe to lay much stress upon the apparent reminiscence of iv. 2-3 (or of 2 John 7) in Polycarp, ad Phil. 7 reading eXijXufloTa, instead of SkqKvd'evai) , though, if a literary filiation is assumed, the probability is that Polycarp is quoting from the epistle, not vice versa (as Volkmar contends, in his Ur sprung d. unseren Evglien 47 seq.) . But Papias is said by Eusebius (H . E. iii. 39) to have used 17 'luavvov Trporepa (= 17 'Icokwovirpurr], v. 8?), i.e. the anonymous tract, which, by the time of Eusebius, had come to be known as 1 John, and we have no reason to suspect or reject this statement, particularly as Justin Martyr, another Asiatic writer, furnishes clear echoes of the epistle (Dial. 123). The tract must have been in circulation throughout Asia Minor at any rate before the end of the first quarter of the 2nd century. 2 The terminus a quo is approximately the period of the Fourth Gospel's composition, but there is no valid evidence to indicate the priority of either, even upon the hypothesis that both came from the same pen. The aim of each is too special to warrant the conclusion that the epistle was intended to accompany or to introduce the gospel.

Literature. — The most adequate modern editions of the three epistles are

by Westcott (3rd ed., 1892), H. J. Holtzmann (Hand- Commentar zum N '. 7\,3rded., 1908), B.Weiss (inMeyer,6thed., 1900), Baljon (1904) and J. E. Belser (Freiburg im Breisgau, 1906). Briefer English notes are furnished by W. Alexander (Speaker's Commentary, 1 881), W. H. Bennett (Century Bible, 1 901) and H. P. Forbes (Internat. Handbooks to New Testament, vol. iv. 1907), while Plummer has a concise edition of the Greek text (in The Cambridge Greek Testament, 1886). Huther's edition (in Meyer, 1880) has been translated into English (Edinburgh, 1882), like Rothe's (1878) invaluable commen- tary on the first epistle (cf. Expository Times, vols. iii. v.). Otto Baumgarten's popular edition in Die Schriften des N.T. (1907) is, like that of Forbes, written from practically the same standpoint as Holtzmann's. The earlier commentaries of Alford (2nd ed.,

1 " The style is not flowing and articulated ; the sentences come like minute-guns, as they would drop from a natural Hebrew. The writer moves, indeed, amidst that order of religious ideas which meets us in the Fourth Gospel, and which was that of the Greek world wherein he found himself. He moves amongst these new ideas, however, not with the practised felicity of the evangelist, but with something of helplessness, although the depth and serene beauty of his spirit give to all he says an infinite impressiveness and charm " (M. Arnold; God and the Bible, ch. vi.).

2 By the end of the 2nd century it appears to have been fairly well-known, to judge from Origen, Irenaeus (iii. 16, 8), and Clement of Alexandria (Stran. ii. 15, 66). In the Muratorian canon, which mentions two epistles of John, it seems to be reckoned (cf. Kuhn, Das Murat. Fragment, pp. 58 f.) as an appendix or sequel to the Fourth Gospel. The apparent traces of its use in Ignatius (cf. Smyrn. vi. 2 =1 John iii. 17; Smyrn. vii =1 John iii. 14, and Eph. xviii. = 1 John v. 6) seem too insecure, of themselves, to warrant any hypothesis of filiation.

1862), C. A. Wolf (2nd ed., 1885), Ewald (Die J oh. Brief eilbersetzt und erklaert, Gottingen, 1861-1862), and Liicke (3rd ed., revised by Bertheau, 1856) still repay the reader, and among previous editions those of W. Whiston (Comm. on St John's Three Catholic Epistles, 1719) and de Wette (1837, &c.) contain material of real exegetical interest. Special editions of the first epistle have been published by John Cotton (London, 1655), Neander (1851 ; Eng. trans. New York, 1853), E. Haupt (1869; Eng. trans. 1879), Lias (1887) and C. Watson (1891, expository) among others. Special studies by F. H. Kern (De epistolae Joh. consilio, Tubingen, 1830), Erdmann (Primae Joh. epistolae argumentum, nexus et consilium, Berlin, 1855), C. E. Lu- thardt (De primae Joannis epistolae composilione, i860), J. Stock- meyer (Die Structur des ersten Joh. Briefes, Basel, 1873) and, most elaborately, by H. J. Holtzmann (Jahrb.für protest. Theologie, 1881, pp.690seq.;l882,pp. i28seq.,3i6seq.,46oseq.). To the monographs

already noted in the course of this article may be added the essays by Wiesinger (Studien und Kritiken, 1899, pp. 575 seq.) and Wohlenberg (" Glossen zum ersten Johannisbrief," Neue Kirchliche Zeitschrift, 1902, pp. 233 seq., 632 seq.). On 2 John there are special comment- aries and studies by Ritmeier (De electa domina, I 706) , C. A. Kriegele (De Kvpia. Johannis, 1758), Carpzov (Theolog. exegetica, pp. 105-208), H. G. B. Miiller (Comment, in secundum epistolam Joannis, 1783), C. Klug (De authentia, &c, 1823), J. Rendel Harris (Expositor, 6th series, 1901, pp. 194 seq.), W. M. Ramsay (ibid., pp. 354 seq.) and Gibbins (ibid., 1902, pp. 228-236), while, in addition to Hermann's Comment, in Joan. ep. III. (1778), P. L. Gachon (Authenticity de la deuxieme et troisieme epitres de Jean, 1851), Poggel (Der zweite und dritle Brief e d. Apostel Johannis, 1896), and Chapman (Journal of Theological Studies, 1904, " The Historical Setting of the Second and the Third Epistles of St John "), have discussed both of the minor epistles together. General studies of all three are furnished by H. J. Holtzmann in Schenkel's Bibel-Lexicon, iii. 342-352, Sabatier (Ency- clop. des sciences religieuses, vii. 177 seq.), S. Cox (The Private Letters of St Paul and St John, 1867), Farrar (Early Days of Christianity, chs. xxxi., xxxiv. seq.), Gloag (Introduction to Catholic Epistles, 1887, pp. . 256-350), S. D. F. Salmond in Hasting's Diet. Bible (vol. ii), G. H. Gilbert (The First Interpreters of Jesus, 1901, pp. 301-332), and V. Bartlet (The Apostolic Age, 1900, pp. 418 seq. ; from a more advanced critical position by Cone (The Gospel and its Earliest Interpretations, l8 93. PP- 320-327), P. W. Schmiedel (Ency. Bib., 2556-2562, also in a pamphlet, Evangelium, Brief e, und Offenbarung des Johannes, 1906; Eng. trans. 1908), J. ReVille (Le Quatrieme Evangile, 1901, pp. 49 seq.) and Pfleiderer (Das Urchristentum, 2nd ed., 1902, pp. 390 seq.). The problem of the epistles is discussed incidentally by many writers on the Fourth Gospel, as well as by writers on New Testament introduction like Zahn, Jacquier, Barth and Belser, on the Conserva- tive side, and Hilgenfeld, Julicher and von Soden on the Liberal. On the older Syriac version of 2 and 3 John, see Gwynn's article in Hermathena (1890), pp. 281 seq. On the general reception of the three epistles in the early Church, Zahn's paragraphs (in his Geschichte d. N. T. Kanons, i. 209 seq., 374 seq., 905 seq.; ii. 48 seq., 88 seq.) are the most adequate. (J. Mt.)

JOHN, GOSPEL OF ST, the fourth and latest of the Gospels, in the Bible, and, next to that of St Mark, the shortest. The present article will first describe its general structure and more obvious contents; compare it with the Synoptic Gospels; and draw out its leading characteristics and final object. It will then apply the tests thus gained to the narratives special to this Gospel; and point out the book's special difficulties and limits, and its abiding appeal and greatness. And it will finally con- sider the questions of

its origin and authorship.

Analysis of Contents. — The book's chief break is at xiii. I, the solemn introduction to the feet-washing : all up to here reports Jesus' signs and apologetic or polemical discourses to the outer world ; hence onwards it pictures the manifestation of His glory to the inner circle of His disciples. These two parts contain three sections each.

I. (i.) Introduces the whole work (i. i-ii. 11). (a) The prologue, i. 1-18. The Logos existed before creation and time; was with the very God and was God; and all things were made through Him. For in this Logos is Life, and this Life is a Light which, though shining in darkness, cannot be suppressed by it. This 1 true Light became flesh and tabernacled amongst us; and we beheld His glory, as of an Only-Begotten from the Father, full of grace and truth. John the Baptist testified concerning Him, the Logos-Light and Logos-Life incarnate ; but this Logos alone, who is in the bosom of the Father, hath declared the very God. (b) The four days' work (i. 19-51). On the first three days John declares that he is not the Christ, proclaims Jesus to be the Christ, and sends his own disciples away to Jesus. On the fourth day, Jesus Himself calls Philip and Nathanael. (c) The seventh day's first manifestation of the Incarnate Light's glory (ii. 1-11); Jesus at Cana turns water into wine.

(ii.) Records the manifestations of the Light's and Life's glory and power to friend and foe (ii. 22-vi. 71). (d) Solemn inauguration of the Messianic ministry (ii. 12— iii. 21) : cleansing of the Temple and prophecy of His resurrection; discourse to Nicodemus on baptismal regeneration, (e) Three scenes in Judea, Samaria, Galilee respec- tively (iii.32— iv. 54) : the Baptist's second testimony ; Jesus' discourse

with the woman at the well concerning the spiritual, universal character of the new religion; and cure of the ruler's son, the reward of faith in the simple word of Jesus. (/) Manifestation of Jesus as the vivifying Life-Logos and its contradiction in Judea, v. : the paralytic's cure, (g) Manifestation of Jesus as the heaven-descended living Bread and its contradiction in Galilee, vi.-: multiplication of the loaves; walking on the waters; and His discourse on the holy Eucharist.

(iii.) Acute conflict between the New Light and the old darkness (vii.-xii). (h) Self-manifestation of the Logos-Light in the Temple (vii. i-x. 39). Journey to the feast of tabernacles; invitation to the soul athirst to come to

Him (the fountain of Life) and drink, and proclamation of Himself as the Light of the world; cure of the man born blind; allegory of the good shepherd. The allegory continued at the feast of the dedication. They strive to stone or to take Him. (i) The Logos-Life brings Lazarus to life ; effects of the act (x. 40-xii. 50). Jesus withdraws beyond Jordan, and then comes to Bethany, His friend Lazarus being buried three days; proclaims Himself the Resurrection and the Life; and calls Lazarus back to life. Some who saw it report the act to the Pharisees ; the Sanhedrim meets, Caiaphas declares that one man must die for the people, and henceforward they ceaselessly plan His death. Jesus withdraws to the Judaean desert, but soon returns, six days before Passover, to Bethany; Mary anoints Him, a crowd comes to see Him and Lazarus, and the hier- archs then plan the killing of Lazarus also. Next morning He rides into Jerusalem on an ass's colt. Certain Greeks desire to see Him: He declares the hour of His glorification to have come: " Now My soul is troubled. . . . Father, save Me from this hour. But for this have I come unto this hour: Father, glorify Thy Name." A voice answers, " I have glorified it and will glorify it again ": some think that an angel spoke; but Jesus explains that this voice was not for His sake but for theirs. When lifted up from earth, He will draw all men to Himself; they are to believe in Him, the Light. The writer's concluding reflection : the small success of Jesus' activity among the Jews. Once again He cries: " I am come a Light into the world, that whoso believeth in Me should not abide in darkness." 2. The Logos-Christ's manifestation of His life and love to His' disciples, during the last supper, the passion, the risen life (xiii.-xx). (iv.) The Last Supper (xiii.xvii.) (_/') Solemn washing of the dis ciples' feet; the beloved disciple ; designates the traitor; Judas goes forth, it is night (xiii. 1-30). (k) Last discourses, first series (xiii. 31-xiv. 31): the new commandment, the other helper; " Arise, let us go hence." Second series (xv. i-xvi. 33): allegory of the true vine; " Greater love than this hath no man, that he lay down his life for his friend " ; the world's hatred ; the spirit of truth shall lead them into all truth; " I came forth from the Father and am come into the world, again I leave the world and go to the Father"; " Be of good cheer, I have overcome the world." (/) The high- priestly prayer (xvii). " Father, glorify Thy Son . . . with the glory which I had with Thee before the world was . . . that to as many as Thou hast given Him, He should give eternal life." " I pray for them, I pray not for the world. I pray also for them that shall believe in Me through their word, that they may be all one, as Thou Father art in Me, and I in Thee."

(v.) The Passion (xviii. xix.). (m) In thegarden: the Roman soldiers come to apprehend Him, fall back upon the ground at His declara- tion " I am He." Peter and Malchus. (n) Before Annas at night and Caiaphas at dawn; Peter's denials (xviii. 12-27). (0) Before Pilate (xviii. 28-40). Jesus declares, " My kingdom is not of this world. I have come into the world

that I may bear witness to the truth : everyone that is of the truth, heareth My voice " ; Pilate asks sceptically "What is truth?" and the crowd prefers Barabbas. (p) The true king presented to the people as a mock-king; His rejection by the Jews and abandonment to them (xix. 1-16). (q) Jesus carries His cross to Golgotha, and is crucified there between two others; the cross's title and Pilate's refusal to alter it (xix. 17-22). (r) The soldiers cast lots upon His garments and seamless tunic; His mother with two faithful women and the beloved disciple at the cross's foot; His commendation of His mother and the disciple to each other; His last two sayings in deliberate accomplishment of scripture " I thirst," " It is accomplished." He gives up the spirit ; His bones remain unbroken ; and from His spear-lanced side blood and water issue (xix. 23-37). (s) The two nobles, Joseph of Arimathaea and Nicodemus, bind the dead body in a winding sheet with one hundred pounds of precious spices, and place it in a new monument in a near garden, since the sabbath is at hand.

(vi.) The risen Jesus, Lord and God (xx.). (t) At early dawn on the first day of the week, Mary Magdalen, finding the stone rolled away from the monument, runs to tell Peter and the beloved disciple that the Lord's body has been removed. Peter and the other disciple run to the grave; the latter, arriving first, enters only after Peter has gone in and noted the empty grave-clothes — enters and believes. After their departure, Mary sees two angels where His body had lain and turning away beholds Jesus standing, yet recognizes Him only when He addresses her. He bids her " Do not touch Me, for I have not yet ascended " ; but to tell His brethren " I ascend to My Father and to your Father, to My God and to your God." And she does so. («) Second apparition (xx. 19-23). Later on the same day, the doors being shut, Jesus appears amongst His disciples, shows them His (pierced) hands and side, and solemnly commissions and endows

them for the apostolate by the words, " As the Father hath sent Me, so I send you," and by breathing upon them saying "Receive the Holy Spirit : whose sins ye remit, they are remitted to them ; whose sins ye retain, they are retained." (») Third apparition and culmina- ting saying ; conclusion of entire book (xx. 24-31). Thomas, who had been absent, doubts the resurrection; Jesus comes and submits to the doubter's tests. Thomas exclaims, "My Lord and my God"; but Jesus declares " Blessed are they that have not seen and yet have believed." " Now Jesus," concludes the writer, " did many other signs, . . . but these are written, that ye may believe that Jesus is the Christ, the Son of God, and that believing ye may have life in His name."

The above analysis is rough, since even distantly placed sections, indeed the two parts themselves, are interrelated by delicate com- plex references on and back. And it omits the account of the adulteress (vii. 53-viii. 11): (a

valuable report of anactual occurrence which probably belonged to some primitive document otherwise incorporated by the Synoptists), because it is quite un-Johannine in vocabulary, style and character, intercepts the Gospel's thread wherever placed, and is absent from its best MSS. It also omits xxi. This chapter's first two stages contain an important early historical document of Synoptic type: Jesus' apparition to seven disciples by the Lake of Galilee and the miraculous draught of fishes; and Peter's threefold confession and Jesus' threefold commission to him. And its third stage, Jesus' prophecies to Peter and to the beloved disciple concerning their future, and the declaration " This is the disciple who testifies to these things and who has written them, and we know that his testimony is true," is doubtless written by the redactor of the previous two stages. This writer imitates, but is different from, the great author of the first twenty chapters.

Comparison with the Synoptists. — The following are the most obvious differences between the original book and the Synoptists. John has a metaphysical prologue ; Matthew and Luke have historical prologues; and Mark is without any prologue. The earthly scene is here Judea, indeed Jerusalem, with but five breaks (vi. i-vii. 10) is the only long one ; whilst over two-thirds of each Synoptist deal with Galilee or Samaria. The ministry here lasts about three and a half years (it begins some months before the first Passover, ii. 13; the feast of v. I is probably a second; the third occurs vi. 4; and on the fourth, xi. 55, He dies) : whilst the Synoptists have but the one Passover of His death, after barely a year of ministry. Here Jesus' teaching contains no parables and but three allegories, the Synop- tists present it as parabolic through and through. Here not one exorcism occurs; in the Synoptists the exorcisms are as prominent as the cures and the preaching, John has, besides the passion, seven accounts in common with the Synoptists: the Baptist and Jesus, (i. 19-34) ; cleansing of the Temple (ii. 13-16) ; cure of the centurion's (ruler's) servant (son) (iv. 46-54) ; multiplication of the loaves (vi. 1-13); walking upon the water (vi. 16-21); anointing at Bethany, (xii. 1-8) ; entry into Jerusalem (xii. 12-16): all unique occurrences. In the first, John describes how the Baptist, on Jesus' approach, cries " Behold the Lamb of God, which taketh away the sins ofthe world " ; and how he says " I saw the spirit descending upon Him, and I bore witness that this is the Son of God." But the Synoptists, especially Mark, give the slow steps in even the apostles' realization of Jesus' Messianic character; only at Caesarea Philippi Simon alone, for the first time, clearly discerns it, Jesus declaring that His Father has revealed it to Him, and yet Simon is still scandalized at the thought of a suffering Messiah (Mark viii. 28-34). Only some two weeks before the end is He proclaimed Messiah at Jericho (x. 46-48) ; then in Jerusalem, five days before dying for this upon the cross (xi. 1-10, xv. 37). As to the Baptist, in all three Synoptists, he baptizes Jesus, and in Mark i. 10, II it is

Jesus who sees the Spirit descending upon Himself on His emerging from beneath the water, and it is to Himself that God's voice is addressed ; in John, Jesus' baptism is ignored, only the Spirit remains hovering above Him, as a sign for the Baptist's instruction. And in Matt. xi. 2-6, the Baptist, several months after the Jordan scene, sends from his prison to ascertain if Jesus is indeed the Messiah ; in John, the Baptist remains at large so as again (iii. 22-36) to proclaim Jesus' heavenly provenance. The cleansing of the Temple occurs in the Synoptists four days before His death, and instantly determines the hierarchs to seek His destruction (Mark xi. 15-18); John puts it three years back, as an appropriate frontispiece to His complete claims and work.

The passion-narratives reveal the following main differences. John omits, at the last supper, its central point, the great historic act of the holy eucharist, carefully given by the Synoptists and St Paul, having provided a highly doctrinal equivalent in the discourse on the living bread, here spoken by Jesus in Capernaum over a year before the passion (vi. 4), the day after the multiplication of the loaves. This transference is doubtless connected with the change in the relations between the time of the Passover meal and that of His death: in the Synoptists, the Thursday evening's supper is a true Passover meal, the lamb had been slain that afternoon and Jesus dies some twenty-four hours later; in John, the supper is not a Passover- meal, the Passover is celebrated on Friday, and Jesus, proclaimed here from the first, the Lamb of God, dies whilst the paschal lambs, His prototypes, are being slain. The scene in the garden is without the agony of Gethsemane ; a faint echo of this historic anguish appears in the scene with the Greeks four days earlier, and even that peaceful

appeal to, and answer of, the Father occurs only for His followers' sakes. In the garden Jesus here Himself goes forth to meet His captors, and these fall back upon the ground, on His revealing Him- self as Jesus of Nazareth. The long scenes with Pilate culminate in the great sayings concerning His kingdom not being of this world and the object of this His coming being to bear witness to the truth, thus explaining how, though affirming kingship (Mark xv. 2) He could be innocent. In John He does not declare Himself Messiah before the Jewish Sanhedrin (Mark xiv. 61) but declares Himself supermundane regal witness to the truth before the Roman governor. The scene on Calvary differs as follows: In the Synoptists the soldiers divide His garments among them, casting lots (Mark xv. 24) ; in John they make four parts of them and cast lots concerning His seamless tunic, thus fulfilling the text, " They divided My gar- ments among them and upon My vesture they

cast lots": the parallelism of Hebrew poetry, which twice describes one fact, being taken as witnessing to two, and the tunic doubtless symbol- izing the unity of the Church, as in Philo the high priest's seamless robe symbolizes the indivisible unity of the universe, expressive of the Logos (De ebrietate, xxi.). In the Synoptists, of His followers only women — the careful, seemingly exhaustive lists do not include His mother — remain, looking on " from afar " (Mark xv. 40) ; in John, His mother stands with the two other Marys and the beloved disciple beneath the cross, and " from that hour the disciple took her unto his own (house)," while in the older literature His mother does not appear in Jerusalem till just before Pentecost, and with " His brethren " (Acts i. 14). And John alone tells how the bones of the dead body remained unbroken, fulfilling the ordinance as to the paschal lamb (Exod. xii. 46) and how blood and water flow from His spear-pierced side: thus the Lamb " taketh away the sins of the world " by shedding His blood which " cleanseth us from every sin " ; and " He cometh by water and blood," historically at His baptism and crucifixion, and mystically to each faithful soul in baptism and the eucharist. The story of the risen Christ (xx.) shows dependence on and contrast to the Synoptic accounts. Its two halves have each a negative and a positive scene. The empty grave (1-10) and the apparition to the Magdalen (11-18) together correspond to the mes- sage brought by the women (Matt, xxviii. 1-10) ; and the apparition to the ten joyously believing apostles (19-23) and then to the sadly doubting Thomas (24-29) together correspond to Luke xxiv. 36-43, where the eleven apostles jointly receive one visit from the risen One, and both doubt and believe, mourn and rejoice.

The Johannine discourses reveal differences from the Synoptists so profound as to be admitted by all. Here Jesus, the Baptist and the writer speak so much alike that it is sometimes impossible to say where each speaker begins and ends: e.g. in iii. 27-30, 31-36. The speeches dwell upon Jesus' person and work, as we shall find, with a didactic directness, philosophical terminology and denuncia- tory exclusiveness unmatched in the Synoptist sayings. " This is eternal life, that they may know Thee the only true God and Jesus Christ whom Thou hast sent " (xvii. 3), is part of the high-priestly prayer; yet Pere Calmes, with the papal censor's approbation, says, " It seems to us impossible not to admit that we have here dogmatic developments explicable rather by the evangelist's habits of mind than by the actual words of Jesus." " I have told you of earthly things and you believe not; how shall ye believe if I tell you of heavenly things ? " (iii. 12), and " Ye are from beneath, I am from above " (viii. 23), give us a Plato-(Philo-) like upper, " true " world, and a lower, delusive world. " Ye shall die in your sins " (viii. 21) ; " ye are from your father the devil " (viii. 44) ; " I am the door of the sheep, all they that came before Me are thieves and robbers," (x. 7, 8); " they have no excuse for their sin " (xv.

22) — contrast strongly with the yearning over Jerusalem: " The blood of Abel the just " and " the blood of Zacharias son of Barachias " (Matt, xxiii. 35-37 ; an d " Father, forgive them ; for they know not what they do" Luke xxiii. 34). And whilst the Synoptist speeches and actions stand in loose and natural relation to each other, the Johannine deeds so closely illustrate the sayings that each set everywhere supplements the other: the history itself here tends to become one long allegory. So with the woman at the well and "the living water" ; the multipli- cation of the loaves and " the living Bread " ; " I am the Light of the world " and the blind man's cure; " I am the Resurrection and the Life "and the raising of Lazarus; indeed even with the Temple- cleansing and the prophecy as to His resurrection, Nicodemus's night visit and " men loved the darkness rather than the light," the cure o(the inoperative paralytic and " My Father and I work hitherto," the walking phantom-like upon the waters (John vi. 15-21; Mark vi. 49), and the declaration concerning the eucharist, " the spirit it is that quickeneth " (John vi. 63). Only some six- teen Synoptic sayings reappear here; but we are given some great new sayings full of the Synoptic spirit.

Characteristics and Object. — The book's character results from the continuous operation of four great tendencies. There is everywhere a readiness to handle traditional, largely historical, materials with a sovereign freedom, controlled and limited by doctrinal convictions and devotional experiences alone. There is everywhere the mystic's deep love for double, even treble

meanings: e.g. the "again" in iii. 2, means, literally, "from the beginning," to be physically born again; morally, to become as a little child; mystically, " from heaven, God," to be spiritu- ally renewed. " Judgment " (np'xns), in the popular sense, condemnation, a future act; in the mystical sense, discrimination, a present fact. There is everywhere the influence of certain central ideas, partly identical with, but largely developments of, those less reflectively operative in the Synoptists. Thus six great terms are characteristic of, or even special to, this Gospel. " The Only-Begotten " is most nearly reached by St Paul's term " His own Son." The " Word," or " Logos," is a term derived from Heracleitus of Ephesus and the Stoics, through the Alexandrian Jew Philo, but conceived here throughout as definitely personal. " The Light of the World " the Jesus- Logos here proclaims Himself to be; in the Synoptists He only declares His disciples to be such. " The Paraclete," as in Philo, is a "helper," "intercessor"; but in Philo he is the intelligible universe, whilst here He is a self-conscious Spirit. " Truth," " the truth," " to know," have here a prominence and significance far beyond their Synoptic or even their Pauline use. And above all stand the uses of " Life," " Eternal Life." The living ever-working Father (vi. 57; v. 17) has a Logos in whom is Life (i. 4), an ever- working Son (v. 17), who declares Himself " the living Bread," " the Resurrection and the Life,"

” the Way, the Truth and the Life ” (vi. 51; xi. 25; xiv. 16): so that Father and Son quicken whom they will (v. 21) ; the Father’s commandment is life everlasting, and Jesus’ words are spirit and life (xii. 50; vi. 63, 68). The term, already Synoptic, takes over here most of the connotations of the ” Kingdom of God,” the standing Synoptic expression, which appears here only in iii. 3-5; xviii. 36. Note that the term ” the Logos ” is peculiar to the Apocalypse (xix. 13), and the prologue here; but that, as Light and Life, the Logos-conception is present throughout the book. And thus there is everywhere a striving to contemplate history sub specie aeternitatis and to englobe the successiveness of man in the simultaneity of God.

Narratives Peculiar to John. — Of his seven great symbolical, doctrinally interpreted ” signs,” John shares three, the cure of the ruler’s son, the multiplication of the loaves, the walking on the waters, with the Synoptists: yet here the first is transformed almost beyond recognition; and the two others only typify and prepare the eucharistic discourse. Of the four purely Johannine signs, two — the cures of the paralytic (v. 1-16), and of the man born blind (ix. 1-34) — are, admittedly, profoundly symbolical. In the first case, the man’s physical and spiritual lethargy are closely interconnected and strongly contrasted with the ever- active God and His Logos. In the second case there is also the closest parallel between physical blindness cured, and spiritual darkness dispelled, by the Logos-Light as described in the accompanying discourse. Both narratives are doubtless based upon actual occurrences — the cures narrated in Mark ii., iii., viii., x. and scenes witnessed by the writer in later times; yet here they do but picture our Lord’s spiritual work in the human soul achieved throughout Christian history. We cannot well claim more than these three kinds of reality for the first and the last signs, the miracle at Cana and the resurrection of Lazarus.

For the marriage-feast sign yields throughout an allegorical meaning. Water stands in this Gospel for what is still but symbol; thus the water-pots serve here the external Jewish ablutions — old bottles which the ” new wine ” of the Gospel is to burst (Mark ii. 22). Wine is the blood of the new covenant, and He will drink the fruit of the vine new in the Kingdom of God (Mark xiv. 23-25); the vineyard where He Himself is the true Vine (Mark xii. 1; John xv. 1). And “the kingdom of heaven is like to a marriage-feast ” (Matt, xxii.2); Jesus is the Bridegroom (Mark ii. 19); “the marriage of the Lamb has come ” (Rev. xix. 7). “They have no wine”: the hopelessness of the old conditions is announced here by the true Israel, the Messiah’s spiritual mother, the same ” woman ” who in Rev. xii. 2, 5 ” brought forth a man-child who was to rule all nations.” Cardinal Newman admits that the latter woman “represents the church, this is the real or direct sense”; yet as her man-child

is certainly the Messiah, this church must be the faithful Jewish church. Thus also the " woman " at the wedding and beneath the cross stands primarily for the faithful Old Testament community, corresponding to the beloved disciple, the typical New Testament follower of her Son, the Messiah: in each case the devotional accommodation to His earthly mother is equally ancient and legitimate. He answers her " My hour is not yet come," i.e. in the symbolic story, the moment for working the miracle; in the symbolized reality, the hour of His death, con- dition for the spirit's advent; and " what is there between Me and thee?" i.e. " My motives spring no more from the old religion," words devoid of difficulty, if spoken thus by the Eternal Logos to the passing Jewish church. The transformation is soon afterwards accomplished, but in symbol only; the "hour" of the full sense is still over three years off. Already Philo says " the Logos is the master of the spiritual drinking-feast," and " let Melchisedeck " — the Logos — " in lieu of water offer wine to souls and inebriate them " (De somn. ii. 37; Legg. all. iii. 26). But in John this symbolism figures a great historic fact, the joyous freshness of Jesus' ministerial beginnings, as indicated in the sayings of the Bridegroom and of the new wine, a fresh- ness typical of Jesus' ceaseless renovation of souls.

The raising of Lazarus, in appearance a massive, definitely localized historical fact, requires a similar interpretation, unless we would, in favour of the direct historicity of a story peculiar to a profoundly allegorical treatise, ruin the historical trust- worthiness of the largely historical Synoptists in precisely their most complete and verisimilar part. For especially in Mark, the passing through Jericho, the entry into Jerusalem, the Temple-cleansing and its immediate effect upon the hierarchs, their next day's interrogatory, " By what authority doest thou these things? " i.e. the cleansing (x. 46-xi. 33), are all closely interdependent and lead at once to His discussions with His Jerusalem opponents (xii. xiii.), and to the anointing, last supper, and passion (xiv. xv). John's last and greatest symbolic sign replaces those historic motives, since here it is the raising of Lazarus which determines the hierarchs to kill Jesus (xi. 46- 52), and occasions the crowds which accompany and meet Him on His entry (xii. 9-19). The intrinsic improbabilities of the narrative, if taken as direct history, are also great: Jesus' deliberate delay of two days to secure His friend's dying, and His rejoicing at the death, since thus He can revivify His friend and bring His disciples to believe in Himself as the Life; His deliberate weeping over the death which He has thus let happen, yet His anger at the similar tears of Lazarus's other friends; and His praying, as He tells the Father in the prayer itself, simply to edify the bystanders: all point

to a doctrinal allegory. Indeed the climax of the whole account is already reached in Jesus' great saying: " I am the Resurrection and the Life; he that believeth in Me . . . shall not die for ever," and in Martha's answer: " I believe that Thou art the Christ, the Son of God, who hast come into the world" (xi. 26, 27); the sign which follows is but the pictorial representation of this abiding truth. The materials for the allegory will have been certain Old Testa- ment narratives, but especially the Synoptic accounts of Jesus' raisings of Jairus's daughter and of the widow's son (Mark v.; (Luke vii.). Mary and Martha are admittedly identical with the sisters in Luke x. 38-42; and already some Greek fathers connect the Lazarus of this allegory with the Lazarus of the parable (Luke xvi. 19-31). In the parable Lazarus returns not to earth, since Abraham foresees that the rich man's brethren would disbelieve even if one rose from the dead; in the corresponding allegory, Lazarus does actually return to life, and the Jews believe so little as to determine upon killing the very Life Himself.

Special Difficulties and Special Greatness. — The difficulties, limitations and temporary means special to the book are closely connected with its ready appeal and abiding power; let us take both sets of things together, in three couples of inter- related price and gift.

The book's method and form are pervadingly allegorical; its instinct and aim are profoundly mystical. Now from Philo to

Origen we have a long Hellenistic, Jewish and Christian applica- tion of that all-embracing allegorism, where one thing stands for another and where no factual details resist resolution into a symbol of religious ideas and forces. Thus Philo had, in his life of Moses, allegorized the Pentateuchal narratives so as to represent him as mediator, saviour, intercessor of his people, the one great organ of revelation, and the soul's guide from the false lower world into the upper true one. The Fourth Gospel is the noblest instance of this kind of literature, of which the truth depends not on the factual accuracy of the symbolizing appearances but on the truth of the ideas and experiences thus symbolized. And Origen is still full of spontaneous sympathy with its pervading allegorism. But this method has lost its attraction; the Synoptists, with their rarer and slighter pragmatic rearrangements and their greater closeness to our Lord's actual words, deeds, experiences, environment, now come home to us as indefinitely richer in content and stimulative appeal. Yet mysticism persists, as the intuitive and emotional apprehension of the most specifically religious of all truths, viz. the already full, operative existence of eternal beauty, truth and goodness, of infinite Personality and Spirit independently of our action, and not, as in ethics, the simple possibility and obligation for ourselves to produce such-like things. And of this elemental mode of apprehension and root-truth, the Johannine Gospel is the greatest literary

document and incentive extant: its ulti- mate aim and deepest content retain all their potency.

The book contains an intellectualist, static, determinist, abstractive trend. In Luke x. 25-28, eternal life depends upon loving God and man; here it consists in knowing the one true God and Christ whom He has sent. In the Synoptists, Jesus " grows in favour with God and man," passes through true human experiences and trials, prays alone on the mountain-side, and dies with a cry of desolation; here the Logos' watchword is " I am," He has deliberately to stir up emotion in Himself, never prays for Himself, and in the garden and on the cross shows but power and self-possession. Here we find " ye cannot hear, cannot believe, because ye are not from God, not of My sheep" (viii. 47, x. 26); "the world cannot receive the spirit of truth " (xiv. 17). Yet the ethical current appears here also strongly: " he who doeth the truth, cometh to the light " (iii. 21), " if you love Me, keep My commandments " (xiv. 15). Libertarianism is here: " the light came, but men loved the darkness better than the light," " ye will not come to Me " (iii. 19, v. 40) ; hence the appeal " abide in Me " — the branch can cease to be in Him the Vine (xv. 4, 2). Indeed even those first currents stand here for the deepest religious truths, the prevenience of God and man's affinity to Him. " Not we loved God (first), but He (first) loved us "; " let us love Him, because He first loved us " (1 John iv. 10, 19); " no man can come to Me, unless the Father draw him " (vi. 44), a drawing which effects a hunger and thirst for Christ and God (iv. 14, vi. 35). Thus man's spirit, ever largely but potential, can respond actively to the historic Jesus, because already touched and made hungry by the all-actual Spirit-God who made that soul akin unto Himself.

The book has an outer protective shell of acutely polemical and exclusive moods and insistences, whilst certain splendid Synoptic breadths and reconciliations are nowhere reached; but this is primarily because it is fighting, more consciously than they, for that inalienable ideal of all deepest religion, unity, even external and corporate, amongst all believers. The " Pneu- matic " Gospel comes thus specially to emphasize certain central historical facts; and, the most explicitly institutional and sacramental of the four, to proclaim the most universalistic and developmental of all Biblical sayings. Here indeed Jesus will not pray for the world (xvii. 9) ; " ye shall die in your sins," He insists to His opponents (viii. 44, 24) ; it is the Jews generally who appear throughout as such; nowhere is there a word as to forgiving our enemies; and the commandment of love is desig- nated by Jesus as His, as new, and as binding the disciples to " love one another " within the community to which He gives His "example" (xv. 12, xiii. 34, 15). In the Synoptists, the

disciples' intolerance is rebuked (Mark ix. 38-41); Jesus' opposition is everywhere restricted to the Pharisees and the worldly Sadducees; He ever longs for the conversion of Jerusalem; the great double commandment of love is proclaimed as already formulated in the Mosaic law (Mark xii. 28-34); the neighbour to be thus loved and served is simply any and every suffering fellow-man; and the pattern for such perfect love is found in a schismatical Samaritan (Luke x. 25-37). Yet the deepest strain here is more serenely universalist even than St Paul, for here Jesus says: " God so loved the world, that He gave His only begotten Son, that whosoever believeth in Him should . . . have everlasting life " (iii. 16). True, the great prologue passage (i. 9) probably reads " He was the true Light coming into the world, that enlighteneth every man," so that the writer would everywhere concentrate his mind upon the grace attendant upon explicit knowledge of the incarnate, historic Christ. Yet Christian orthodoxy, which itself has, all but uniformly, understood this passage of the spiritual radiation throughout the world of the Word before His incarnation, has been aided towards such breadth as to the past by the Johannine outlook into the future. For, in contrast to the earliest Synoptic tradition, where the full Christian truth and its first form remain undistinguished, and where its earthly future appears restricted to that generation, in John the Eternal Life conception largely absorbs the attention away from all successiveness; Jesus' earthly life does not limit the religion's assimilation of further truth and experience: " I have many things to tell you, but you cannot bear them now," " the Father will give you another Helper, the spirit of truth, who will abide with you for ever " (xvi. 12, xiv. 15). This universalism is not simply spiritual; the external element, presupposed in the Synoptists as that of the Jewish church within which Jesus' earthly life was spent, is here that of the now separate Christian community: He has other sheep not of this fold — them also He must bring, there will be one fold, one shepherd; and His seamless tunic, and Peter's net which, holding every kind of fish, is not rent, are symbols of this visible unity. Ministerial gradations exist in this church; Jesus begins the feet-washing with Peter, who alone speaks and is spoken to; the beloved disciple outruns Peter to Jesus' monument, yet waits to go in till Peter has done so first; and in the appendix the treble pastoral commission is to Peter alone: a Petrine pre-eminence which but echoes the Synoptists. And sacramentalism informs the great discourses concerning rebirth by water and the spirit, and feeding on the Living Bread, Jesus' flesh and blood, and the narrative of the issue of blood and water from the dead Jesus' side. Indeed so severe a stress is laid upon the explicitly Christian life and its specific means, that orthodoxy itself interprets the rebirth by water and spirit, and the eating the flesh and drinking the blood to which entrance into the Kingdom and possession of interior life are here

exclusively attached, as often represented by a simple sincere desire and will for spiritual purification and a keen hunger and thirst for God's aid, together with such cultual acts as such souls can know or find, even without any knowledge of the Christian rites. Thus there is many " a pedagogue to Christ," and the Christian visible means and expressions are the culmination and measure of what, in various degrees and forms, accompanies every sincerely striving soul throughout all human history.

Origin and Authorship. — The question as to the book's origin has lost its poignancy through the ever-increasing recognition of the book's intrinsic character. Thus the recent defenders of the apostolic authorship, the Unitarian James Drummond (1903), the Anglican William Sanday (1905), the Roman Catholic Theodore Calmes (1904), can tell us, the first, that " the evangelist did not aim at an illustrative picture of what was most charac- teristic of Jesus"; the second, that "the author sank into his own consciousness and at last brought to light what he found there "; the third, that " the Gospel contains an entire theological system," " history is seen through the intervening dogmatic development," " the Samaritan woman is … a personifica- tion," " the behaviour of the Greeks is entirely natural in such

a book." We thus get at cross-purposes with this powerful, profound work. Only some such position as Abbe Loisy's critical summing up (1903) brings out its specific greatness. " What the author was, his book, in spite of himself, tells us to some extent: a Christian of Judeo- Alexandrine formation; a believer without, apparently, any personal reminiscence of what had actually been the life, preaching and death of Jesus; a theologian far removed from every historical preoccupation, though he retains certain principal facts of tradition without which Christianity would evaporate into pure ideas; and a seer who has lived the Gospel which he propounds." " To find his book beautiful and true, we need but take it as it is and under- stand it." " The church, which has never discussed the literary problem of this Gospel, in nowise erred as to its worth."

Several traditional positions have indeed been approximately maintained or reconquered against the critics. As to the Gospel's date, critics have returned from 160-170 (Baur), 150 (Zeller), 130 (Keim), to 110-115 (Renan) and 80-110 (Harnack): since Irenaeus says its author lived into the times of Trajan (90-117), a date somewhere about 105 would satisfy tradition. As to the place, the critics accept proconsular Asia with practical unanimity, thus endorsing Irenaeus's declaration that the Gospel was published in Ephesus. As to the author's ante- cedents, critics have ceased to hold that he could not have been a Jew-Christian (so Bretschneider, 1820), and admit (so Schmiedel, (1901) that he must have been by birth a Jew of the Dispersion, or the son of Christian parents who had been such

Jews. And as to the vivid accuracy of many of his topographical and social details, the predominant critical verdict now is that he betrays an eye-witness's knowledge of the country between Sichem and Jordan and as to Jerusalem; he will have visited these places, say in 90, or may have lived in Jerusalem shortly before its fall. But the reasons against the author being John the Zebedean or any other eyewitness of Jesus' earthly life have accumulated to a practical demonstration.

As to the external evidence for the book's early date, we must remember that the Epistle to the Hebrews and the Book of Revelation, though admittedly earlier, are of the same school, and, with the great Pauline Epistles, show many preformations of Johannine phrases and ideas. Other slighter prolusions will have circulated in that Philonian centre Ephesus, before the great Gospel englobed and superseded them. _ Hence the pre-cariousness of the proofs derived from more or less close parallels to Johannine passages in the apostolic fathers. Justin Martyr (163-167) certainly uses the Gospel; but his conception of Jesus' life is so strictly Synoptic that he can hardly have accepted it as from an apostolic eyewitness. Papias of Hierapolis, in his Exposition of the Lord's Sayings (145-160) appears nowhere to have mentioned it, and clearly distinguishes between " what Andrew, Peter, . . . John or Matthew or any other of the Lord's disciples spoke," and " what Aristion and the presbyter John, the Lord's disciples, say." Thus Papias, as Eusebius about 314 insists, knew two Johns, and the apostle was to him a far-away figure; indeed early medieval chroniclers recount that Papias " in the second book of the Lord's sayings " asserted that both the sons of Zebedee were "slain by Jews," so that the apostle John would have died before 70. Irenaeus's testi- mony is the earliest and admittedly the strongest we possess for the Zebedean authorship; yet, as Calmes admits, " it cannot be considered decisive." In his work against the Heresies and in his letter to Florinus, about 185-191, he tells how he had himself known Bishop Polycarp of Smyrna, and how Polycarp " used to recount his familiar intercourse with John and the others who had seen the Lord "; and explicitly identifies this John with the Zebedean and the evangelist. But Irenaeus was at most fifteen when thus frequenting Polycarp; writes thirty-five to fifty years later in Lyons, admitting that he noted down nothing at the time; and, since his mistaken description of Papias as " a hearer of John " the Zebedean was certainly reached by mistaking the presbyter for the apostle, his additional words " and a companion of Polycarp " point to this same mistaken identification having also operated in his mind with regard to Polycarp. In any case,

the very real and important presbyter is completely unknown to Irenaeus, and his conclusion as to the book's authorship resulted apparently from a comparison of its contents with Polycarp's teaching. If the presbyter wrote Revelation and was Polycarp's master, such a mistake could easily arise. Certainly Polycrates, bishop of Ephesus, made a precisely similar mistake when about 190 he described the Philip " who rests in Hierapolis " as " one of the twelve apostles," since Eusebius rightly identifies this Philip with the deacon of Acts xxi. A positive testimony for the critical conclusion is derived from the existence of a group of Asia Minor Christians who about 165 rejected the Gospel as not by John but by Cerinthus. The attribution is doubtless mistaken. But could Christians sufficiently numerous to deserve a long discussion by St Epiphanius in 374-377, who upheld the Synoptists, stoutly opposed the Gnostics and Mon- tanists, and had escaped every special designation till the bishop nicknamed them the " Alogoi " (irrational rejectors of the Logos-Gospel), dare, in such a time and country, to hold such views, had the apostolic origin been incontestable ? Surely not. The Alexandrian Clement, Tertullian, Origen, Eusebius, Jerome and Augustine only tell of the Zebedean what is trace- able to stories told by Papias of others, to passages of Revelation and the Gospel, or to the assured fact of the long-lived Asian presbyter.

As to the internal evidence, if the Gospel typifies various im- perfect or sinful attitudes in Nicodemus, the Samaritan woman and Thomas; if even the mother appears to symbolize faithful Israel: then, profoundly spiritual and forward-looking as it is, a type of the perfect disciple, not all unlike Clement's perfect " Gnostic," could hardly be omitted by it; and the precise details of this figure may well be only ideally, mystically true. The original work nowhere identifies this disciple with any particular historic figure. " He who saw " the lance-thrust " hath borne witness, and his witness is true," is asserted (xix. 35) of the disciple. Yet " to see " is said also of intuitive faith, " whoso hath seen Me, hath seen the Father" (xiv. 9); and "true" appears also in " the true Light," " the true Bread from heaven," as characterizing the realities of the upper, alone fully true world, and equals "heavenly" (iii. 12); thus a "true wit- ness" testifies to some heavenly reality, and appeals to the reader's " pneumatic," i.e. allegorical, understanding.

Only in the appendix do we find any deliberate identification with a particular historic person: " this is the disciple who witnessed to and who wrote these things " (24) refers doubtless to the whole previous work and to " the disciple whom Jesus loved," identified here with an unnamed historic personage whose recent death had created a shock, evidently because he was the last of that apostolic generation which had so keenly expected the second coming (18-23). This man was so great that the writer strives to win his authority for this Gospel; and yet this man was not John

the Zebedean, else why, now he is dead and gone, not proclaim the fact? If the dead man was John the presbyter — if this John had in youth just seen Jesus and the Zebedean, and in extreme old age had still seen and approved the Gospel — to attribute this Gospel to him, as is done here, would not violate the literary ethics of those times. Thus the heathen philosopher Iamblichus (d. c. 330) declares: " this was admirable " amongst the Neo-Pythagoreans " that they ascribed everything to Pythagoras; but few of them acknowledge their own works as their own " ide Pythag. vita, 198). And as to Christians, Tertullian about 210 tells how the presbyter who, in proconsular Asia, had " composed the Acts of Paul and Thecla " was convicted and deposed, for how could it be credible that Paul should confer upon women the power to " teach and baptize " as these Acts averred? The attribution as such, then, was not condemned.

The facts of the problem would all appear covered by the hypothesis that John the presbyter, the eleven being all dead, wrote the book of Revelation (its more ancient Christian por- tions) say in 69, and died at Ephesus say in 100; that the author of the Gospel wrote the first draft, here, say in 97; that this book, expanded by him, first circulated within a select Ephesian

Christian circle; and that the Ephesian church officials added to it the appendix and published it in 1 10-120. But however different or more complicated may have been the actual origins, three points remain certain. The real situation that confronts us is not an unbroken tradition of apostolic eye-witnesses, in- capable of re-statement with any hope of ecclesiastical accep- tance, except by another apostolic eye-witness. On one side indeed there was the record, underlying the Synoptists, of at least two eye-witnesses, and the necessity of its preservation and transmission; but on the other side a profound double change had come over the Christian outlook and requirements. St Paul's heroic labours (30-64) had gradually gained full recognition and separate organization for the universalist strain in our Lord's teaching; and he who had never seen the earthly Jesus, but only the heavenly Christ, could even declare that Christ " though from the Jewish fathers according to the flesh " had died, " so that henceforth, even if we have known Christ according to the flesh, now we no further know Him thus," " the Lord is the Spirit," and " where the Spirit of the Lord is, there is liberty." And the Jewish church, within which Christianity had first lived and moved, ceased to have a visible centre. Thus a super-spatial and super-temporal interpretation of that first markedly Jewish setting and apprehension of the Christian truth became as necessary as the attachment to the original contingencies. The Fourth Gospel, inexplicable without St Paul and the fall of Jerusalem, is fully understandable with them. The attribution of the book to an eye-witness nowhere resolves, it everywhere increases, the real difficulties; and by insisting upon having history in the same degree and way in John as in the Synoptists, we cease to get it

sufficiently anywhere at all. And the Fourth Gospel's true greatness lies well within the range of this its special character. In character it is pro- foundly " pneumatic "; Paul's super-earthly Spirit-Christ here breathes and speaks, and invites a corresponding spiritual comprehension. And its greatness appears in its inexhaustibly deep teachings concerning Christ's sheep and fold; the Father's drawing of souls to Christ; the dependence of knowledge as to Christ's doctrine upon the doing of God's will; the fulfilling of the commandment of love, as the test of true discipleship; eternal life, begun even here and now; and God a Spirit, to be served in spirit and in truth.

Bibliography. — See also the independent discussion, under Revelation, Book of, of the authorship of that work. Among the immense literature of the subject, the following books will be found especially instructive by the classically trained reader: Origen's commentary, finished (only to John xiii. 33) in 235-237 (best ed. by Preuschen, 1903). St Augustine's Tractatus in Joannis Ev. et Ep., about 416. The Spanish Jesuit Juan Maldonatus' Latin com- mentary, published 1596 (critical reprint, edited by Raich, 1874), a pathfinder on many obscure points, is still a model for tenacious penetration of Johannine ideas. Bretschneider's short Probabilia de Evangelii . . . Joannis Apostoli indole et origine (1820), the first systematic assault on the traditional attribution, remains unrefuted in its main contention. The best summing up and ripest fruit of the critical labour since then are Professor H. J. Holtzmann's Handr kommentar (2nd ed., 1893) and the respective sections in his Einlei- tung in d. N. T. (3rd ed., 1892) and his Lehrbuch der N. T. Theologie (1897), vol. 2. Professor C. E. Luthardt's St John, Author of 'the Fourth Gospel (Eng. trans., with admirable bibliography by C. R. Gregory, 1875), still remains the best conservative statement. Among the few critically satisfactory French books, Abb6 Loisy's Le Quatrihme evangtie (1903) stands pre-eminent for delicate psychological analysis and continuous sense of the book's closely knit unity; whilst PSre Th. Calmes' E~vangile selon S. Jean (1904) indicates how numerous are the admissions as to the book's character and the evidences for its authorship, made by intelligent Roman Catholic apologists with Rome's explicit approbation. In England a considerably less docile conservatism has been predominant. Bp Lightfoot's Essays on . . . Supernatural Religion (1874-1877; collected 1889) are often masterly conservative interpretations of the external evidence ; but they leave this evidence still inconclusive, and the formidable contrary internal evidence remains practically untouched. Much the same applies to Bp Westcott's Gospel according to St John (1882), devotionally so attractive, and in textual criticism excellent. Dr James Drummond's Inquiry into the Character and Authorship of the Fourth Gospel (1903) does not, by its valuable survey of the external evidence, succeed in giving credibility to the eyewitness origin of such a book as this is admitted to be. Professor W.

Sanday's slighter Criticism of the Fourth Gospel (1905) is in a similar position. Professor P. W. Schmiedel's

article " John s. of Zebedee " in the Ency. Bib. (1901) is the work of a German of the advanced left. Dr E. A. Abbott's laborious From Letter to Spirit (1903), Joannine Vocabulary (1904) and Grammar (1906) overflow with statistical details and ever acute, often fanciful, conjecture. Professor F. C. Burkitt's The Gospel History (1906) vigor- ously sketches the book's dominant characteristics and true function. E. F. Scott's The Fourth Gospel (1906) gives a lucid, critical and religiously tempered account of the Gospel's ideas, aims, affinities, difficulties and abiding significance. ' (F. v. H.)

JOHN ALBERT (1459-1501), king of Poland, third son of Casimir IV. king of Poland and Elizabeth of Austria. As crown prince he distinguished himself by his brilliant victory over the Tatars at Kopersztyn in 1487. He succeeded his father in 1492. The loss of revenue consequent upon the secession of Lithuania placed John Albert at the mercy of the Polish Sejmiki or local diets, where the szlachta, or country gentry, made their subsidies dependent upon the' king's subservience. Primarily a warrior with a strong taste for heroic adventure, John Albert desired to pose as the champion of Christendom against the Turks. Circumstances seemed, moreover, to favour him. In his brother Wladislaus, who as king of Hungary and Bohemia possessed a dominant influence in Central Europe, he found a counterpoise to the machinations of the emperor Maximilian, who in 1492 had concluded an alliance against him with Ivan III. of Muscovy, while, as suzerain of Moldavia, John Albert was favourably situated for attacking the Turks. At the conference of Leutschau in 1494 the details of the expedition were arranged between the kings of Poland and Hungary and the elector Frederick of Brandenburg, with the co-operation of Stephen, hospodar of Moldavia, who had appealed to John Albert for assistance. In the course of 1496 John Albert with great difficulty collected an army of 80,000 men in Poland, but the crusade was deflected from its proper course by the sudden invasion of Galicia by the hospodar, who apparently — for the whole subject is still very obscure — had been misled by reports from Hungary that John Albert was bent upon placing his younger brother Sigismund on the throne of Moldavia. Be that as it may, the Poles entered Moldavia not as friends, but as foes, and, after the abortive siege of Suczawa, were compelled to retreat through the Bukowina to Sniatyn, harassed all the way by the forces of the hospodar. The insubordination of the szlachta seems to have been one cause of this

disgraceful collapse, for John Albert confiscated hundreds of their estates after his return; in spite of which, to the end of his life he retained his extraordinary popularity. When the new grand master of the Teutonic order, Frederic of Saxony, refused to render homage to the Polish crown, John Albert compelled him to do so. His intention of still further humiliating the Teutonic order was frustrated by his sudden death in 1501. A valiant soldier and a man of much enlightenment, John Albert was a poor politician, recklessly sacrificing the future to the present.

See V. Czerny, The Reigns of John Albert and Alexander Jagiello (Pol.) (Cracow, 1882).

JOHN ANGELUS (d. 1244), emperor of Thessalonica. In 1232 he received the throne from his father Theodore, who, after a period of exile, had re-established his authority, but owing to his loss of eyesight resolved to make John the nominal sovereign. His reign is chiefly marked by the aggressions of the rival emperor of Nicaea, John Vatatzes, who laid siege to Thessalonica in 1 243 and only withdrew upon John Angelus con- senting to exchange the title " emperor " for the subordinate one of "despot."

See G. Finlay, History of Greece, vol. iii. (1877).

JOHN FREDERICK I. (1 503-1 554), called the Magnanimous, elector of Saxony, was the elder son of the elector, John the Steadfast, and belonged to the Ernestine branch of the Wettin family. Born at Torgau on the 30th of June 1503 and educated as a Lutheran, he took some part in imperial politics and in the business of the league of Schmalkalden before he became elector by his father's death in August 1532. His lands com- prised the western part of Saxony, and included Thuringia, but

in 1542 Coburg was surrendered to form an apanage for his brother, John Ernest (d. 1553). John Frederick, who was an ardent Lutheran and had a high regard for Luther, continued the religious policy of his father. In 1534 he assisted to make peace between the German king Ferdinand I. and Ulrich, duke of Wiirttemberg, but his general attitude was one of vacillation between the emperor and his own impetuous col- league in the league of Schmalkalden, Philip, landgrave of Hesse. He was often at variance with Philip, whose bigamy he disliked, and his belief in the pacific intentions of Charles V. and his loyalty to the Empire prevented him from pursuing any definite policy for the defence of Protestantism. In 1541 his kinsman Maurice became duke of Saxony, and cast covetous eyes upon the electoral dignity. A cause of quarrel soon arose. In 1 541 John Frederick forced Nicholas Amsdorf into the see of Naumburg in spite of the chapter, who had elected a Roman Catholic, Julius von Pflug; and about the same time he seized Wurzen, the property of the bishop of Meissen, whose see was

under the joint protection of electoral and ducal Saxony. Maurice took up arms, and war was only averted by the efforts of Philip of Hesse and Luther. In 1542 the elector assisted to drive Henry, duke of Brunswick-Wolfenbtittel, from his duchy, but in spite of this his relations with Charles V. at the diet of Spires in 1 544 were very amicable. This was, however, only a lull in the storm, and the emperor soon began to make preparations for attacking the league of Schmalkalden, and especially John Frederick and Philip of Hesse. The support, or at least the neutrality, of Maurice was won by the hope of the electoral dignity, and in July 1546 war broke out between Charles and the league. In September John Frederick was placed under the imperial ban, and in November Maurice invaded the electorate. Hastening from southern Germany the elector drove Maurice from the land, took his ally, Albert Alcibiades, prince of Bayreuth, prisoner at Rochlitz, and overran ducal Saxony. His progress, however, was checked by the advance of Charles V. Notwith- standing his valour he was wounded and taken prisoner at Miihlberg on the 24th of April 1 547, and was condemned to 'death in order to induce Wittenberg to surrender. The sentence was not carried out, but by the capitulation of Wittenberg (May 1547) he renounced the electoral dignity and a part of his lands in favour of Maurice, steadfastly refusing however to make any concessions on religious matters, and remained in captivity until May 1552, when he returned to the Thuringian lands which his sons had been allowed to retain, his return being hailed with wild enthusiasm. During his imprisonment he had refused to accept the Interim, issued from Augsburg in May 1548, and had urged his sons to make no peace with Maurice. After his release the emperor had restored his dignities to him, and his assumption of the electoral arms and title prevented any arrangement with Maurice. However, after the death of this prince in July 1553, a treaty was made at Naumburg in February 1554 with his successor Augustus. John Frederick consented to the transfer of the electoral dignity, but retained for himself the title of " born elector," and received some lands and a sum of money. He was thus the last Ernestine elector of Saxony. He died at Weimar on the 3rd of March 1554, having had three sons by his wife, Sibylla (d. 1554), daughter of John III., duke of Cleves, whom he had married in 1527, and was succeeded by his eldest son, John Frederick. The elector was a great hunter and a hard drinker, whose brave and dignified bearing in a time of misfortune won for him his surname of Magnanimous, and drew eulogies from Roger Ascham and Melanchthon. He founded the university of Jena and was a benefactor to that of Leipzig.

See Mentz, Johann Friedrich der GrossmiXtige (Jena, 1903); Rogge, Johann Friedrich der Grossmiitige (Halle, 1902) and L. von Ranke, Deutsche Geschichte im Zeitalter der Reformation (Leipzig, 1882).

JOHN FREDERICK (1529-1595), called der Mittlere, duke of Saxony, was

the eldest son of John Frederick, who had been deprived of the Saxon electorate by the emperor Charles V. in 1547. Born at Torgau on the 8th of January 1529, he received a good education, and when his father was imprisoned in 1547

JOHN GEORGE

undertook the government of the remnant of electoral Saxony which the emperor allowed the Ernestine branch of the Wettin family to keep. Released in 1552 John Frederick the elder died two years later, and his three sons ruled Ernestine Saxony together until 1557, when John Frederick was made sole ruler. This arrangement lasted until 1565, when John Frederick shared his lands with his surviving brother, John William (1 530-1 573), retaining for himself Gotha and Weimar. The duke was a strong, even a fanatical, Lutheran, but his religious views were gradually subordinated to the one idea of regaining the electoral dignity then held by Augustus I. To attain this end he lent a willing ear to the schemes of Wilhelm von Grumbach, who came to his court about 1557 and offered to regain the electoral dignity and even to acquire the Empire for his patron. In spite of repeated warnings from the emperor Ferdinand I., John Frederick con- tinued to protect Grumbach, and in 1566 his obstinacy caused him to be placed under the imperial ban. Its execution was entrusted to Augustus who, aided by the duke's brother, John William, marched against Gotha with a strong force. In conse- quence of a mutiny the town surrendered in April 1567, and John Frederick was delivered to the emperor Maximilian II. He was imprisoned in Vienna, his lands were given to his brother, and he remained in captivity until his death at Steyer on the 6th of May 1595. These years were mainly occupied with studying theology and in correspondence. John Frederick married firstly Agnes (d. 1555) daughter of Philip, landgrave of Hesse, and widow of Maurice, elector of Saxony, and secondly Elizabeth (d. 1594) daughter of Frederick III., elector palatine of the Rhine, by whom he left tw T o sons, John Casimir (1564- 1633) and John Ernest (1 566-1638). Elizabeth shared her husband's imprisonment for twenty-two years.

See A. Beck, Johann Friedrich der Mittlere, Herzog zu Sachsen (Vienna, 1858); and F. Ortloff, Geschichte der Grumbachischen Handel (Jena, 1 868-1 870).

JOHN GEORGE I. (1585-1656), elector of Saxony, second son of the elector Christian I., was born on the 5th of March 1585, succeeding to the electorate in June 161 1 on the death of his elder brother, Christian II. The geographical position of electoral Saxony hardly less than her high standing among the German Protestants gave her ruler much importance during the Thirty Years' War. At the beginning of his reign, however, the new elector

took up a somewhat detached position. His personal allegiance to Lutheranism was sound, but he liked neither the growing strength of Brandenburg nor the increasing prestige of the Palatinate; the adherence of the other branches of the Saxon ruling house to Protestantism seemed to him to suggest that the head of electoral Saxony should throw his weight into the other scale, and he was prepared to favour the advances of the Habsburgs and the Roman Catholic party. Thus he was easily induced to vote for the election of Ferdinand, archduke of Styria, as emperor in August 1619, an action which nullified the anticipated opposition of the Protestant electors. The new emperor secured the help of John George for the impending campaign in Bohemia by promising that he should be undisturbed in his possession of certain ecclesiastical lands. Carrying out his share of the bargain by occupying Silesia and Lusatia, where he displayed much clemency, the Saxon elector had thus some part in driving Frederick V., elector palatine of the Rhine, from Bohemia and in crushing Protestantism in that country, the crown of which he himself had previously refused. Gradually, however, he was made uneasy by the obvious trend of the im- perial policy towards the annihilation of Protestantism, and by a dread lest the ecclesiastical lands should be taken from him; and the issue of the edict of restitution in March 1629 put the coping-stone to his fears. Still, although clamouring vainly for the exemption of the electorate from the area covered by the edict, John George took no decided measures to break his alliance with the emperor. He did, indeed, in February 1631 call a meeting of Protestant princes at Leipzig, but in spite of the appeals of the preacher Matthias Hoe von Hohenegg (1 580-1645) he contented himself with a formal protest. Meanwhile Gustavus Adolphus had landed in Germany, and the elector

had refused to allow him to cross the Elbe at Wittenberg, thus hindering his attempt to relieve Magdeburg. But John George's reluctance to join the Protestants disappeared when the imperial troops under Tilly began to ravage Saxony, and in September 1631 he concluded an alliance with the Swedish king. The Saxon troops were present at the battle of Breitenfeld, but were routed by the imperialists, the elector himself seeking safety in flight. Nevertheless he soon took the offensive. Marching into Bohemia the Saxons occupied Prague, but John George soon began to negotiate for peace and consequently his soldiers offered little resistance to Wallenstein, who drove them back into Saxony. However, for the present the efforts of Gustavus Adolphus prevented the elector from deserting him, but the position was changed by the death of the king at Lützen in 1632, and the refusal of Saxony to join the Protestant league under Swedish leadership. Still letting his troops fight in a desultory fashion against the imperialists, John George again negotiated for peace, and in May 1635 he concluded

the important treaty of Prague with Ferdinand II. His reward was Lusatia and certain other additions of territory; the retention by his son Augustus of the archbishopric of Magdeburg; and some conces- sions with regard to the edict of restitution. Almost at once he declared war upon the Swedes, but in October 1636 he was beaten at Wittstock; and Saxony, ravaged impartially by both sides, was soon in a deplorable condition. At length in September 1645 the elector was compelled to agree to a truce with the Swedes, who, however, retained Leipzig; and as far as Saxony was concerned this ended the Thirty Years' War. After the peace of Westphalia, which with regard to Saxony did little more than confirm the treaty of Prague, John George died on the 8th of October 1656. Although not without political acumen, he was not a great ruler; his character appears to have been harsh and unlovely, and he was addicted to drink. He was twice married, and in addition to his successor John George II. he left three sons, Augustus (1614-1680), Christian (d. 1691) and Maurice (d. 1681) who were all endowed with lands in Saxony, and who founded cadet branches of the Saxon house.

John George II. (1613-1680), elector of Saxony, was born on the 31st of May 1613. In 1657, just after his accession, he made an arrangement with his three brothers with the object of preventing disputes over their separate territories, and in 1664 he entered into friendly relations with Louis XIV. He received money from the French king, but the existence of a strong anti-French party in Saxony induced him occasionally to respond to the overtures of the emperor Leopold I. The elector's primary interests were not in politics, but in music and art. He adorned Dresden, which under him became the musical centre of Germany; welcoming foreign musicians and others he gathered around him a large and splendid court, and his capital was the constant scene of musical and other festivals. His enormous expenditure compelled him in 1661 to grant greater control over monetary matters to the estates, a step which laid the foundation of the later system of finance in Saxony. John George died at Freiberg on the 22nd of August 1680.

John George III. (1647-1691), elector of Saxony, the only son of John George II., was born on the 20th of June 1647. He forsook the vacillating foreign policy of his father and in June 1683 joined an alliance against France. Having raised the first standing army in the electorate he helped to drive the Turks from Vienna in September 1680, leading his men with great gallantry; but disgusted with the attitude of the emperor Leopold I. after the victory, he returned at once to Saxony. However, he sent aid to Leopold in 1685. When Louis XIV. 's armies invaded Germany in September 1688 John George was one of the first to take up arms against the French, and after sharing in the capture of Mainz he was appointed commander-in-chief of the imperial forces. He had not, however, met with any notable success

when he died at Tubingen on the 12th of Septem- ber 1 69 1. Like his father, he was very fond of music, but he appears to have been less extravagant than John George II. I His wife was Anna Sophia, daughter of Frederick III. king of

Denmark, and both his sons, John George and Frederick Augustus, became electors of Saxony, the latter also becoming king of Poland as Augustus II.

John George IV. (1668-1694), elector of Saxony, was born on the 18th of October 1668. At the beginning of his reign his chief adviser was Hans Adam von Schoning (1641-1696), who counselled a union between Saxony and Brandenburg and a more independent attitude towards the emperor. In accordance with this advice certain proposals were put before Leopold I. to which he refused to agree; and consequently the Saxon troops withdrew from the imperial army, a proceeding which led the chagrined emperor to seize and imprison Schoning in July 1692. Although John George was unable to procure his minister's release, Leopold managed to allay the elector's anger, and early in 1693 the Saxon soldiers rejoined the imperialists. This elector is chiefly celebrated for his passion for Magdalene Sibylle von Neidschutz (d. 1694), created in 1693 countess of Rochlitz, whom on his accession he publicly established as his mistress. John George left no legitimate issue when he died on the 27th of April 1694.

JOHN 1 MAURICE OF NASSAU (1604-1679), surnamed the Brazilian, was the son of John the Younger, count of Nassau- Siegen-Dillenburg, and the grandson of John, the elder brother of William the Silent and the chief author of the Union of Utrecht. He distinguished himself in the campaigns of his cousin, the stadtholder Frederick Henry of Orange, and was by him recommended to the directors of the Dutch West India company in 1636 to be governor-general of the new dominion in Brazil recently conquered by the company. He landed at the Recife, the port of Pernambuco, and the chief stronghold of the Dutch, in January 1637. By a series of successful expeditions he gradually extended the Dutch possessions from Sergipe on the south to S. Luis de Maranham in the north. He likewise conquered the Portuguese possessions of St George del Mina and St Thomas on the west coast of Africa. With the assistance of the famous architect, Pieter Post of Haarlem, he transformed the Recife by building a new town adorned with splendid public edifices and gardens, which was called after his name Mauritstad. By his statesmanlike policy he brought the colony into a most flourishing condition and succeeded even in reconciling the Portuguese settlers to submit quietly to Dutch rule. His large schemes and lavish expenditure alarmed however the parsi- monious directors of the West India company, but John Maurice refused to retain his post unless he was

given a free hand, and he returned to Europe in July 1644. He was shortly afterwards appointed by Frederick Henry to the command of the cavalry in the States army, and he took part in the campaigns of 1645 an d 1646. When the war was ended by the peace of Munster in January 1648, he accepted from the elector of Brandenburg the post of governor of Cleves, Mark and Ravensberg, and later also of Minden. His success in the Rhineland was as great as it had been in Brazil, and he proved himself a most able and wise ruler. At the end of 1652 he was appointed head of the order of St John and made a prince of the Empire. In 1664 he came back to Holland; when the war broke out with England supported by an invasion from the bishop of Munster, he was appointed com- mander-in-chief of the Dutch forces on land. Though hampered in his command by the restrictions of the states-general, he repelled the invasion, and the bishop, Christoph von Galen, was forced to conclude peace. His campaigning was not yet at an end, for in 1673 he was appointed by the stadtholder William III. to command the forces in Friesland and Groningen, and to defend the eastern frontier of the Provinces. In 1675 his health com- pelled him to give up active military service, and he spent his last years in his beloved Cleves, where he died on the 20th of December 1679. The house which he built at the Hague, named after him the Maurits-huis, now contains the splendid collections of pictures so well known to all admirers of Dutch art.

1 This name is usually written Joan, the form used by the man himself in his signature — see the facsimile in Netscher's Les Hollandais en Bresil.

Bibliography. — Caspar Barlaeus,Rerum per octennium in Brasilia et alibi nuper gestarum historia, sub praefectura illustrissimi comitis J. Mauritii Nassoviae (Amsterdam, 1647); L. Driessen, Leben des Fursten Johann Moritz von Nassau (Berlin, 1849); D. Veegens, Leven van Jaan Maurits, Craaf van Nassau-Siegen (Haarlem,

1840).

JOHN 0′ GROAT'S HOUSE, a spot on the north coast of Caith- ness, Scotland, 14 m. N. of Wick and if m. W. of Duncansby Head. It is the mythical site of an octagonal house said to have been erected early in the 16th century by one John Groot, a Dutchman who had migrated to the north of Scotland by per- mission of James IV. According to the legend, other members of the Groot family followed John, and acquired lands around Duncansby. When there were eight Groot families, disputes began to arise as to precedence at annual feasts. These squabbles John Groot is said to have settled by building an octagonal house which had eight entrances and eight tables, so that the head of each family could enter by his own door and sit at the head of his own table. Being but a few miles south of Dunnet Head, John o' Groat's is a colloquial term for the most

northerly point of Scotland. The site of the traditional building is marked by an outline traced in turf. Descendants of the Groot family, now Groat, still live in the neighbourhood. The cowry-shell, Cypraea europaea, is locally known as " John o' Groat's bucky."

JOHNS HOPKINS UNIVERSITY, an American educational institution at Baltimore, Maryland, U.S. A. Its trustees, chosen by Johns Hopkins (1794-1873), a successful Baltimore merchant, were incorporated on the 24th of August 1867 under a general act " for the promotion of education in the state of Mary- land." But nothing was actually done until after the death of Johns Hopkins (Dec. 24, 1873), when his fortune of $7,000,000 was equally divided between the projected university and a hospital, also to bear his name, and intended to be an auxiliary to the medical school of the university. The trustees of the university consulted with many prominent educationists, notably Charles W. Eliot of Harvard, Andrew D. White of Cornell, and James B. Angell of the university of Michigan; on the 30th of December 1874 they elected Daniel Coit Gilman (q.v.) president. The university was formally opened on the 3rd of October 1876, when an address was delivered by T. H. Huxley. The first year was largely given up to consultation among the newly chosen professors, among whom were — in Greek, B. L. Gildersleeve; in mathematics, J. J. Sylvester; in chemistry, Ira Remsen; in biology, Henry Newell Martin (1848-1896); in zoology, William Keith Brooks (1848-1908); and in physics, Henry Augustus Rowland (1848-1901). Prominent among later teachers were Arthur Cayley in mathematics, the Semitic scholar Paul Haupt (b. 1858), Granville Stanley Hall in psychology, Maurice Bloomfield in Sanskrit and comparative philology, James Rendel Harris in Biblical philology, James Wilson Bright in English philology, Herbert B. Adams in history, and Richard T. Ely (b. 1854) in economics. The university at once became a pioneer in the United States in teaching by means of seminary courses and laboratories, and it has been eminently successful in encouraging research, in scientific production, and in preparing its students to become instructors in other colleges and univer- sities. It includes a college in which each of five parallel courses leads to the degree of Bachelor of Arts, but its reputation has been established chiefly by its other two departments, the graduate school and the medical school. The graduate school offers courses in philosophy and psychology, physics, chemistry and biology, historical and economic science, language and literature, and confers the degree of Doctor of Philosophy after at least three years' residence. From its foundation the university had novel features and a liberal administration. Twenty annual fellow- ships of $500 each were opened to the graduates of any college. Petrography and laboratory psychology were among the new sciences fostered by the new university. Such eminent out- siders were secured for brief residence and lecture courses as J. R. Lowell, F. J. Child,

Simon Newcomb, H. E. von Hoist, F. A. Walker, William James, Sidney Lanier, James Bryce, E. A. Freeman, W. W. Goodwin, and Alfred Russel Wallace. President Gilman gave up his presidential duties on the 1st of

September 1901, Ira Remsen 1 succeeding him in the office. The medical department, inaugurated in 1893, is closely affiliated with the excellently equipped Johns Hopkins Hospital (opened in 1889), and is actually a graduate school, as it admits only students holding the bachelor's degree or its equivalent. The degree of Doctor of Medicine is conferred after four years of successful study, and advanced courses are offered. The department's greatest teachers have been William Osier (b. 1849) and William Henry Welch (b. 1850).

The buildings of the university were in 1901 an unpretentious group on crowded ground near the business centre of the city. In 1902 a new site was secured, containing about 125 acres amid pleasant surroundings in the northern suburbs, and new build- ings were designed in accordance with a plan formed with a view to secure harmony and symmetry. In 1907 the library contained more than 133,000 bound volumes. Among the numerous publications issued by the university press are: American Journal of Mathematics, Studies in Historical and Political Science, Reprint of Economic Tracts, American Journal of Philo- logy, Contributions to Assyriology and Semitic Philology, Modern Language Notes, American Chemical Journal, American Journal of Insanity, Terrestrial Magnetism and Atmospheric Electricity, Reports of the Maryland Geological Survey, and Reports of the Maryland Weather Service. The institution is maintained chiefly with the proceeds of the endowment fund. It also receives aid from the state, and charges tuition fees. Its government is entrusted to a board of trustees, while the direction of affairs of a strictly academic nature is delegated to an academic council and to department boards. In 1907-1908 the regular faculty numbered 175, and there was an enrolment of 683 students, of whom 518 were in post-graduate courses.

On'the history of the university see Daniel C. Gilman, The Launch- ing of a University (New York, 1906), and the annual reports of the president.

JOHNSON, ANDREW (1808-1875), seventeenth president of the United States, was born at Raleigh, North Carolina, on the 29th of December 1808. His parents were poor, and his- father died when Andrew was four years old. At the age of ten he was apprenticed to a tailor, his spare hours being spent in acquiring the rudiments of an education. He learned to read

from a book which contained selected orations of great British and American statesmen. The young tailor went to Laurens Court House, South Carolina, in 1824, to work at his trade, but returned to Raleigh in 1826 and soon afterward removed to Greeneville in the eastern part of Tennessee. He married during the same year Eliza McCardle (1810-1876), much his superior by birth and education, who taught him the common school branches of learning and was of great assistance in his later career. In East Tennessee most of the people were small farmers, while West Tennessee was a land of great slave plantations. Johnson began in politics to oppose the aristocratic element and became the spokesman and champion of the poorer and labouring classes. In 1828 he was elected an alderman of Greeneville and in 1830- 1834 was mayor. In 1834, in the Tennessee constitutional con- vention he endeavoured to limit the influence of the slaveholders by basing representation in the state legislature on the white population alone. In 1835-1837 and 1839-1841 Johnson was a Democratic member of the state House of Representatives, and in 1841-1843 of the state Senate; in both houses he uniformly upheld the cause of the " common people," and, in addition, opposed legislation for " internal improvements." He soon was recognized as the political champion of East Tennessee. Though his favourite leaders became Whigs, Johnson remained a Democrat, and in 1840 canvassed the state for Van Buren for president.

1 Ira Remsen was born in New York City on the 10th of February 1846, graduated at the college of the City of New York in 1865, studied at the New York college of physicians and surgeons and at the university of Gottingen, was professor of chemistry at Williams College in 1872-1876, and in 1876 became professor cf chemistry at Johns Hopkins University. He published many textbooks of chemistry, organic and inorganic, which were republished in England and were translated abroad. In 1879 he founded the American Chemical Journal.

In 1843 he was elected to the national House of Representatives and there remained for ten years until his district was gerry- mandered by the Whigs and he lost his seat. But he at once offered himself as a candidate for governor and was elected and re-elected, and was then sent to the United States Senate, serving from 1857 to 1862. As governor (1853-1857) he proved to be able and non-partisan. He championed popular education and recom- mended the homestead policy to the national government, and from his sympathy with the working classes and his oft-avowed pride in his former calling he became known as the " mechanic governor." In Congress he proved to be a tireless advocate of the claims of the poorer whites and an opponent of the aristo- cracy. He favoured the annexation of Texas, supported the Polk administration on the issues of the Mexican War and the Oregon boundary controversy, and though voting for the admis- sion of

free California demanded national protection for slavery. He also advocated the homestead law and low tariffs, opposed the policy of " internal improvements," and was a zealous worker for budget economies. Though opposed to a monopoly of politi- cal power in the South by the great slaveholders, he deprecated anti-slavery agitation (even favouring denial of the right of petition on that subject) as threatening abolition or the dissolu- tion of the Union, and went with his sectional leaders so far as to demand freedom of choice for the Territories, and protection for slavery where it existed — this even so late as i860. He supported in i860 the ultra-Democratic ticket of Breckinridge and Lane, but he did not identify the election of Lincoln with the ruin of the South, though he thought the North should give renewed guarantees to slavery. But he followed Jackson rather than Calhoun, and above everything else set his love of the Union, though believing the South to be grievously wronged. He was the only Southern member of Congress who opposed secession and refused to " go with his state " when it withdrew from the Union in 186 1. In the judgment of a leading opponent (O. P. Morton) " perhaps no man in Congress exerted the same influence on the public sentiment of the North at the beginning of the war " as Johnson. During the war he suffered much for his loyalty to the Union. In March 1862 Lincoln made him military governor of the part of Tennessee captured from the Confederates, and after two years of autocratic rule (with much danger to himself) he succeeded in organizing a Union govern- ment for the state. In 1864, to secure the votes of the war Democrats and to please the border states that had remained in the Union, Johnson was nominated for vice-president on the ticket with Lincoln.

A month after the inauguration the murder of Lincoln left him president, with the great problem to solve of reconstruction of the Union. All his past career and utterances seemed to indicate that he would favour the harshest measures toward ex- Confederates, hence his acceptability to the most radical republi- cans. But, whether because he drew a distinction between the treason of individuals and of states, or was influenced by Seward, or simply, once in responsible position, separated Republican party politics from the question of constitutional interpretation, at least he speedily showed that he would be influenced by no acrimony, and adopted the lenient reconstruction policy of Lincoln. In this he had for some time the cordial support of his cabinet. During the summer of 1865 he set up provisional civil governments in all the seceded states except Texas, and within a few months all those states were reorganized and applying for readmission to the Union. The radical congress (Republican by a large majority) sharply opposed this plan of restoration, as they had opposed Lincoln's plan: first, because the members of Congress from the Southern States (when readmitted) would almost certainly vote with the Demo-

crats'; secondly, because relatively few of the Confederates were punished; and thirdly, because the newly organized Southern States did not give political rights to the negroes. The question of the status of the negro proved the crux of the issue. Johnson was opposed to general or immediate negro suffrage. A bitter contest began in Feb. 1866, between the presi- dent and the Congress, which refused to admit representatives

from the South and during 1866 passed over his veto a number of important measures, such as the Freedmen's Bureau Act and the Civil Rights Act, and submitted to the States the Fourteenth Amendment to the Constitution. Johnson took a prominent and undignified part in the congressional campaign of 1866, in which his policies were voted down by the North. In 1867 Congress threw aside his work of restoration and pro- ceeded with its own plan, the main features of which were the disfranchisement of ex- Confederates and the enfranchisement of negroes. On the 2nd of March 1867 Congress passed over the president's veto the Tenure of Office Act, prohibiting the presi- dent from dismissing from office without the consent of the Senate any officer appointed by and with the advice and consent of that body, and in addition a section was inserted in the army appropriation bill of this session designed to subordinate the president to the Senate and the general-in-chief of the army in military matters. The president was thus deprived of practi- cally all power. Stanton and other members of his cabinet and General Grant became hostile to him, the president attempted to remove Stanton without regard to the Tenure of Office Act, and, finally, to get rid of the president, Congress in 1868 (Feb- ruary-May) made an attempt to impeach and remove him, his disregard of the Tenure of Office Act being the principal charge against him. The charges 1 were in part quite trivial, and the evidence was ridiculously inadequate for the graver charges. A two-thirds majority was necessary for conviction; and the votes being 35 to 10 (7 Republicans and 12 Democrats voting in his favour on the crucial clauses) he was acquitted. The misguided animus of the impeachment as a piece of partisan politics was soon very generally admitted; and the importance of its failure, in securing the continued power and independence of the presi- dential element in the constitutional system, can hardly be over-estimated. The rest of his term as president was compara- tively quiet and uneventful. In 1869 he retired into private life in Tennessee, and after several unsuccessful efforts was elected to the United States Senate, free of party trammels, in 1875, but died at Carter's Station, Tenn., on the 31st of July 1875. The only speech he made was a skilful and temperate arraignment of President Grant's policy towards the South.

1 The charges centred in the president's removal of Secretary Stanton, his ad interim appointment of Lorenzo Thomas, his cam- paign speeches in 1866, and the relation of these three things to the Tenure of Office Act. Of the eleven charges of impeachment the first was that Stanton's removal was contrary to the Tenure of Office Act; the second, that the appointment of Thomas was a violation of the same law; the third, that the appointment violated the Constitution; the fourth, that Johnson conspired with Thomas "to hinder and prevent Edwin M. Stanton . . . from holding . . . office of secretary for the department of war " ; the fifth, that Johnson had conspired with Thomas to " prevent and hinder the execution " of the Tenure of Office Act; the sixth, that he had conspired with Thomas " to seize, take and possess the property of the United States in the department of war," in violation of the Tenure of Office Act; the seventh, that this action was " a high misdemeanour "; the eighth, that the appointment of Thomas was " with intent unlawfully to control the disbursements of the moneys appropriated for the military service and for the department of war " ; the ninth, that he had instructed Major-General Emory, in command of the department of Washington, that an act of 1867 appropriating money for the army was unconstitutional; the tenth, that his speeches in 1866 constituted " a high misdemeanour in office " ; and the eleventh, the " omnibus " article, that he had committed high misdemeanours in saying that the 39th Congress was not an authorized Congress, that its legislation was not binding upon him, and that it was incapable of proposing amendments. The actual trial began on the 30th of March (from the 5th of March it was adjourned to the 23rd, and on the 24th of March to the 30th). On the 16th of May, after sessions in which the Senate repeatedly reversed the rulings of the chief justice as to the admission of evidence, in which the president's counsel showed that their case was excellently prepared and the prosecuting counsel appealed in general to political passions rather than to judicial impartiality, the eleventh article was voted on and impeachment failed by a single vote (35 to 19; 7 republicans and 12 democrats voting " Not guilty ") of the necessary two-thirds. After ten days' interval, during which B. F. Butler of the prosecuting counsel attempted to prove that corruption had been practised on some of those voting " Not guilty," on the 26th of May a vote was taken on the second and third articles with the same result as on the eleventh article. There was no vote on the other articles.

President Johnson's leading political principles were a rever- ence of Andrew Jackson' unlimited confidence in the people, and an intense veneration for the constitution. Throughout his life he remained in some respects a " backwoodsman." He lacked the finish of systematic education. But his whole career suffi- ciently proves him to have been a man of extraordinary qualities. He did not rise above untoward circumstances by

favour, nor — until after his election as senator — by fortunate and fortuitous connexion with great events, but by strength of native talents, persistent purpose, and an iron will. He had strong, rugged powers, was a close reasoner and a forcible speaker. Unfor- tunately his extemporaneous speeches were commonplace, in very bad taste, fervently intemperate and denunciatory; and though this was probably due largely to temperament and habits of stump-speaking formed in early life, it was attributed by his enemies to drink. Resorting to stimulants after illness, his marked excess in this respect on the occasion of his inauguration as vice-president undoubtedly did him harm with the public. Faults of personality were his great handicap. Though approach- able and not without kindliness of manner, he seemed hard and inflexible; and while president, physical pain and domestic anxieties, added to the struggles of public life, combined to accen- tuate a naturally somewhat severe temperament. A lifelong Southern Democrat, he was forced to lead (nominally at least) a party of Northern Republicans, with whom he had no bond of sympathy save a common opposition to secession; and his ardent, aggressive convictions and character, above all his complete lack of tact, unfitted him to deal successfully with the passionate partisanship of Congress. The absolute integrity and unflinching courage that marked his career were always ungrudgingly admitted by his greatest enemies.

See L. Foster, The Life and Speeches of Andrew Johnson (1866); D. M. DeWitt, The Impeachment and Trial of Andrew Johnson (1903) ; C. E. Chadsey, The Struggle between President Johnson and Congress over Reconstruction (1896); and W. A. Dunning, Essays on the Civil – War and Reconstruction (1898). Also see W. A. Dunning's paper " MoreLight on Andrew Johnson" (in the American Historical Review, April 1906), in which apparently conclusive evidence is presented to prove that Johnson's first inaugural, a notable state paper, was written by the historian George Bancroft.

JOHNSON, BENJAMIN (c. 1665-1742), English actor, was first a scene painter, then acted in the provinces, and appeared in London in 1695 at Drury Lane after Betterton's defection. He was the original Captain Driver in Oronooko (1696), Captain Fireball in Farquhar's Sir Harry Wildair (1701), Sable in Steele's Funeral (1702), &c; as the First Gravedigger in Hamlet and in several characters in the plays of Ben Jonson he was particu- larly good. He succeeded, also, to Thomas Doggett's roles.

JOHNSON, EASTMAN (1824-1906), American artist, was born at Lovell, Maine, on the 29th of July 1824. He studied at Diisseldorf, Paris, Rome and The Hague, the last city being his home for four years. In i860 he was elected to the National Academy of Design, New York. A distinguished portrait and genre painter, he made distinctively American themes his own,

depicting the negro, fisherfolk and farm life with unusual interest. Such pictures as " Old Kentucky Home " (1867), " Husking Bee " (1876), " Cranberry Harvest, Nantucket " (1880), and his portrait group " The Funding Bill " (1881) achieved a national reputation. Among his sitters were many prominent men, including Daniel Webster; Presidents Hayes, Arthur, Cleveland and Harrison; William M. Evarts, Charles J. Folger; Emerson, Longfellow, Hawthorne, James McCosh, Noah Porter and Sir Edward Archbald. He died in New York City on the 5th of April 1906.

JOHNSON, REVERDY (1796-1876), American political leader and jurist, was born at Annapolis, Maryland, on the 21st of May 1796. His father, John Johnson (1 770-1824), was a distinguished lawyer, who served in both houses of the Maryland General Assembly, as attorney-general of the state (1806-1811), as a judge of the court of appeals (1811-1821), and as a chancellor of his state (1821-1824). Reverdy graduated from St John's college in 181 2. He then studied law in his father's office, was admitted to the bar in 1815 and began to practise in Upper Marlborough,

Prince George's county. In 1817 he removed to Baltimore, where he became the professional associate of Luther Martin, William Pinkney and Roger B. Taney; with Thomas Harris he reported the decisions of the court of appeals in Harris and Johnson's Reports (18ˆ0-1827); and in 181 8 he was appointed chief commissioner of insolvent debtors. From 1821 to 1825 he was a state senator; from 1825 to 1845 he devoted himself to his practice; from 1845 to 1849, as a Whig, he was a member of the United States Senate; and from March 1849 to July 1850 he was attorney-general of the United States. In 1856 he became identified with the conservative wing of the Democratic party, and four years later supported Stephen A. Douglas for the presidency. In 1861 he was a delegate from Maryland to the peace convention at Washington; in 1861-1862 he was a member of the Maryland House of Delegates. After the capture of New Orleans he was commissioned by Lincoln to revise the decisions of the military commandant, General B. F. Butler, in regard to foreign governments, and reversed all those decisions to the entire satisfaction of the administration. In 1863 he again took his seat in the United States Senate. In 1868 he was appointed minister to Great Britain and soon after his arrival in England negotiated the Johnson-Clarendon treaty for the settlement of disputes arising out of the Civil War; this, however, the Senate refused to ratify, and he returned home on the acces- sion of General U. S. Grant to the presidency. Again resuming his practice he was engaged by the government in the prosecu- tion of Ku-Klux cases. He died on the 10th of February

1876 at Annapolis. He repudiated the doctrine of secession, and pleaded for compromise and conciliation. Opposed to the Reconstruction measures, he voted for them on the ground that it was better to accept than reject them, since they were probably the best that could be obtained. As a lawyer he was engaged during his later years in most of the especially important cases in the Supreme Court of the United States and in the courts of Maryland.

JOHNSON, RICHARD (1573-1659?), English romance writer, was baptized in London on the 24th of May 1573. His most famous romance is The Famous Historie of the Seaven Champions of Christendom (1596?). The success of this book was so great that the author added a second and a third part in 1608 and 1616. His other stories include: The Nine Worthies of London (1592); The Pleasant Walks of Moorefields (1607); The Pleasant Conceiles of Old Hobson (1607), the hero being a well-known haberdasher in the Poultry; The Most Pleasant History of Tom a Lincolne (1607); A Remembrance of . . . Robert Earle of Salisbury (1612); Looke on Me, London (1613) ; The History of Tom Thumbe (1621). The Crown Garland of Golden Roses . . . set forth in Many Pleasant new Songs and Sonnets (1612) was reprinted for the Percy Society (1842 and 1845).

JOHNSON, RICHARD MENTOR (1781-1850), ninth vice- president of the United States, was born at Bryant's Station, Kentucky, on the 17th of October 1781. He was admitted to the bar in 1 800, and became prominent as a lawyer and Democratic politician, serving in the Federal House of Representatives and in the Senate for many years. From 1837 to 1841 he was vice- president of the United States, to which position he was elected over Francis Granger, by the Senate, none of the four candidates for the vice-presidency having received a majority of the elec- toral votes. The opposition to Johnson within the party greatly increased during his term, and the Democratic national conven- tion of 1840 adopted the unprecedented course of refusing to nominate anyone for the vice-presidency. In the ensuing elec- tion Johnson received most of the Democratic electoral votes, but was defeated by the Whig candidate, John Tyler. He died in Frankfort, Kentucky, on the 19th of November 1850.

JOHNSON, SAMUEL (1709-1784), English writer and lexico- grapher, was the son of Michael Johnson (1656-1731), bookseller and magistrate of Lichfield, who married in 1706 Sarah Ford (1669-17 59). Michael's abilities and attainments seem to have been considerable. He was so well acquainted with the con- tents of the volumes which he exposed for sale that the country rectors of Staffordshire and Worcestershire thought him an

oracle on points of learning. Between him and the clergy, indeed, there was a strong religious and political sympathy. He was a zealous churchman,

and, though he had qualified himself for municipal office by taking the oaths to the sovereigns in possession, was to the last a Jacobite in heart. The social position of Samuel's paternal grandfather, William Johnson, remains obscure; his mother was the daughter of Cornelius Ford, " a little Warwickshire Gent."

At a house (now the Johnson Museum) in the Market Square, Lichfield, Samuel Johnson was born on the 18th of September 1 709 and baptized on the same day at St Mary's, Lichfield. In the child the physical, intellectual and moral peculiarities which afterwards distinguished the man were plainly discernible: great muscular strength accompanied by much awkwardness and, many infirmities; great quickness of parts, with a morbid pro-! pensity to sloth and procrastination; a kind and generous heart, with a gloomy and irritable temper. He had inherited from his ancestors a scrofulous taint, and his parents were weak enough to believe that the royal touch would cure him. In his third year he was taken up to London, inspected by the court surgeon, prayed over by the court chaplains and stroked and presented with a piece of gold by Queen Anne. Her hand was applied in vain. The boy's features, which were originally noble and not irregular, were distorted by his malady. His cheeks were deeply scarred. He lost for a time the sight of one eye; and he saw but very imperfectly with the other. But the force of his mind overcame every impediment. Indolent as he was, he acquired knowledge with such ease and rapidity that at every school (such as those at Lichfield and Stourbridge) to which he was sent he was soon the best scholar. From sixteen to eighteen he resided at home, and was left to his own devices. He learned much at this time, though his studies were without guidance and without plan. He ransacked his father's shelves, dipped into a multitude of books, read what was interesting, and passed over what was dull An ordinary lad would have acquired little or no useful knowledge in such a way; but much that was dull to ordinary lads was interesting to Samuel. He read little Greek; for his proficiency in that language was not such that he could take much pleasure in the masters of Attic poetry and eloquence. But he had left school a good Latinist, and he soon acquired an extensive knowledge of Latin literature. He was peculiarly^ attracted by the works of the great restorers of learning. Once, while searching for some apples, he found a huge folio volume of Petrarch's works. The name excited his curiosity, and he eagerly 1 devoured hundreds of pages. Indeed, the diction and versification of his own Latin compositions show that he had paid at least as much attention to modern copies from the antique as to the original models.

While he was thus irregularly educating himself, his family was sinking into hopeless poverty. Old Michael Johnson was much better qualified to pore over books, and to talk about them, than to trade in them. His business

declined; his debts increased; it was with difficulty that the daily expenses of his household were defrayed. It was out of his power to support his son at either university; but a wealthy neighbour offered assistance; and, in reliance on promises which proved to be of very little value, Samuel was entered at Pembroke College, Oxford. When the young scholar presented himself to the rulers of that society, they were amazed not more by his ungainly figure and eccentric manners than by the quantity of extensive and curious inform- ation which he had picked up during many months of desultory but not unprofitable study. On the first day of his residence he surprised his teachers by quoting Macrobius; and one of the most learned among them declared that he had never known a fresh- man of equal attainments.

At Oxford Johnson resided barely over two years, possibly less. He was poor, even to raggedness; and his appearance excited a mirth and a pity which were equally intolerable to his haughty spirit. He was driven from the quadrangle of Christ Church by the sneering looks which the members of that aristo- cratical society cast at the holes in his shoes. Some charitable person placed a new pair at his door; but he spurned them away

in a fury. Distress made him, not servile, but reckless and un- governable. No opulent gentleman commoner, panting for one- and-twenty, could have treated the academical authorities with more gross disrespect. The needy scholar was generally to be seen under the gate of Pembroke, a gate now adorned with his effigy, haranguing a circle of lads, over whom, in spite of his tattered gown and dirty linen, his wit and audacity gave him an undisputed ascendancy. In every mutiny against the discipline of the college he was the ringleader. Much was pardoned, how- ever, to a youth so highly distinguished by abilities and acquire- ments. He had early made himself known by turning Pope's " Messiah " into Latin verse. The style and rhythm, indeed, were not exactly Virgilian; but the translation found many admirers, and was read with pleasure by Pope himself.

The time drew near at which Johnson would, in the ordinary course of things, have become a Bachelor of Arts; but he was at the end of his resources. Those promises of support on which he had relied had not been kept. His family could do nothing for him. His debts to Oxford tradesmen were small indeed, yet larger than he could pay. In the autumn of 1731 he was under the necessity of quitting the university without a degree. In the following winter his father died. The old man left but a pittance; and of that pittance almost the whole was appro- priated to the support of his

widow. The property to which Samuel succeeded amounted to no more than twenty pounds.

His life, during the thirty years which followed, was one hard struggle with poverty. The misery of that struggle needed no aggravation, but was aggravated by the sufferings of an unsound body and an unsound mind. Before the young man left the university, his hereditary malady had broken forth in a singu- larly cruel form. He had become an incurable hypochondriac. He said long after that he had been mad all his life, or at least not perfectly sane; and, in truth, eccentricities less strange than his have often been thought ground sufficient for absolving felons and for setting aside wills. His grimaces, his gestures, his mutterings, sometimes diverted and sometimes terrified people who did not know him. At a dinner table he would, in a fit of absence, stoop down and twitch off a lady's shoe. He would amaze a drawing-room by suddenly ejaculating a clause of the Lord's Prayer. He would conceive an unintelligible aversion to a particular alley, and perform a great circuit rather than see the hateful place. He would set his heart on touching every post in the streets through which he walked. If by any chance he missed a post, he would go back a hundred yards and repair the omission. Under the influence of his disease, his senses became morbidly torpid, and his imagination morbidly active. At one time he would stand poring on the town clock without being able to tell the hour. At another he would distinctly hear his mother, who was many miles off, calling him by his name. But this was not the worst. A deep melancholy took possession of him, and gave a dark tinge to all his views of human nature and of human des- tiny. Such wretchedness as he endured has driven many men to shoot themselves or drown themselves. But he was under no temptation to commit suicide. He was sick of life; but he was afraid of death ; and he shuddered at every sight or sound which reminded him of the inevitable hour. In religion he found but little comfort during his long and frequent fits of dejection; for his religion partook of his own character. The light from heaven shone on him indeed, but not in a direct line, or with its own pure splendour. The rays had to struggle through a disturbing medium; they reached him refracted, dulled and discoloured by the thick gloom which had settled on his soul, and, though they might be sufficiently clear to guide him, were too dim to cheer him.

With such infirmities of body and of mind, he was left, at two- and-twenty, to fight his way through the world. He remained during about five years in the midland counties. At Lichfield, his birthplace and his early home, he had inherited some friends and acquired others. He was kindly noticed by Henry Hervey, a gay officer of noble family, who happened to be quartered there. Gilbert Walmesley, registrar of the ecclesiastical court of the diocese, a man of distinguished parts, learning and know-

ledge of the world, did himself honour by patronizing the young adventurer, whose repulsive person, unpolished manners and squalid garb moved many of the petty aristocracy of the neighbourhood to laughter or disgust. At Lichfield, however, Johnson could find no way of earning a livelihood. He became usher of a grammar school in Leicestershire; he resided as a humble companion in the house of a country gentleman; but a life of dependence was insupportable to his haughty spirit. He repaired to Birmingham, and there earned a few guineas by literary drudgery. In that town he printed a translation, little noticed at the time, and long forgotten, of a Latin book about Abyssinia. He then put forth proposals for publishing by sub- scription the poems of Politian, with notes containing a history of modern Latin verse; but subscriptions did not come in, and the volume never appeared.

While leading this vagrant and miserable life, Johnson fell in love. The object of his passion was Mrs Elizabeth Porter (1688- 1752), widow of Harry Porter (d. 1734), whose daughter Lucy was born only six years after Johnson himself. To ordinary spectators the lady appeared to be a short, fat, coarse woman, painted half an inch thick, dressed in gaudy colours, and fond of exhibiting provincial airs and graces which were not exactly those of the Queensberrys and Lepels. To Johnson, however, whose passions were strong, whose eyesight was too weak to distinguish rouge from natural bloom, and who had seldom or never been in the same room with a woman of real fashion, his Tetty, as he called her, was the most beautiful, graceful and ac complished of her sex. That his admiration was unfeigned cannot be doubted; she had, however, a jointure of £600 and perhaps a little more; she came of a good family, and her son Jervis (d. 1763) commanded H.M.S. " Hercules." The marriage, in spite of occasional wranglings, proved happier than might have been expected. The lover continued to be under the illusions of the wedding-day (July 9, 1 73 5) till the lady died in her sixty-fourth year. On her monument at Bromley he placed an inscription extolling the charms of her person and of her manners; and when, long after her decease, he had occasion to mention her, he exclaimed with a tenderness half ludicrous, half pathetic, " Pretty creature!"

His marriage made it necessary for him to exert himself more strenuously than he had hitherto done. He took a house at Edial near Lichfield and advertised for pupils. But eighteen months passedaway, and only three pupils came to his academy. The " faces " that Johnson habitually made (probably nervous contortions due to his disorder) may well have alarmed parents. Good scholar though he was, these twitchings had lost him usher- ships in 1735 and 1736. David Garrick, who was one of the pupils, used, many years later, to throw the best company of London into convulsions of laughter by mimicking the master and his lady.

At length Johnson, in the twenty-eighth year of his age, determined to seek his fortune in London as a literary adventurer. He set out with a few guineas, three acts of his tragedy of Irene in manuscript, and two or three letters of introduction from his friend Walmesley. Never since literature became a calling in England had it been a less gainful calling than at the time when Johnson took up his residence in London. In the preceding generation a writer of eminent merit was sure to be munificently rewarded by the Government. The least that he could expect was a pension or a sinecure place; and, if he showed any apti- tude for politics, he might hope to be a member of parliament, a lord of the treasury, an ambassador, a secretary of state. But literature had ceased to flourish under the patronage of the great, and had not yet begun to flourish under the patronage of the public. One man of letters, indeed, Pope, had acquired by his pen what was then considered as a handsome fortune, and bved on a footing of equality with nobles and ministers of state. But this was a solitary exception. Even an author whose reputation was established, and whose works were popular — such an author as Thomson, whose Seasons was in every library, such an author as Fielding, whose Pasquin had had a greater run than any drama since The Beggar's Opera — was sometimes glad to obtain, by

pawning his best coat, the means of dining on tripe at a cookshop underground, where he could wipe his hands, after his greasy meal, on the back of a Newfoundland dog. It is easy, therefore, to imagine what humiliations and privations must have awaited the novice who had still to earn a name. One of the publishers to whom Johnson applied for employment measured with a scornful eye that athletic though uncouth frame, and exclaimed, " You had better get a porter's knot and carry trunks." Nor was the advice bad, for a porter was likely to be as plentifully fed, and as comfortably lodged, as a poet.

Some time appears to have elapsed before Johnson was able to form any literary connexion from which he could expect more than bread for the day which was passing over him. He never forgot the generosity with which Hervey, who was now residing in London, relieved his wants during this time of trial. " Harry Hervey," said Johnson many years later, " was a vicious man; but he was very kind to me. If you call a dog Hervey, I shall love him." At Hervey's table Johnson sometimes enjoyed feasts which were made more agreeable by contrast. But in general he dined, and thought that he dined well, on sixpenny- worth of meat and a pennyworth of bread at an alehouse near Drury Lane.

The effect of the privations and sufferings which he endured at this time was discernible to the last in his temper and his deportment. His manners had never been courtly. They now became almost savage. Being frequently under the necessity of wearing shabby coats and dirty shirts, he became a confirmed sloven. Being often very hungry when he sat down to his meals, he contracted a habit of eating with ravenous greediness. Even to the end of his life, and even at the tables of the great, the sight of food affected him as it affects wild beasts and birds of prey. His taste in cookery, formed in subterranean ordinaries and a la mode beef shops, was far from delicate. Whenever he was so fortunate as to have near him a hare that had been kept too long, or a meat pie made with rancid butter, he gorged himself with such violence that his veins swelled and the moisture broke out on his forehead. The affronts which his poverty emboldened stupid and low-minded men to offer to him would have broken a mean spirit into sycophancy, but made him rude even to ferocity. Unhappily the insolence which, while it was defensive, was par- donable, and in some sense respectable, accompanied him into societies where he was treated with courtesy and kindness. He was repeatedly provoked into striking those who had taken liberties with him. All the sufferers, however, were wise enough to abstain from talking about their beatings, except Osborne, the most rapacious and brutal of booksellers, who proclaimed everywhere that he had been knocked down by the huge fellow whom he had hired to puff the Harleian Library.

About a year after Johnson had begun to reside in London he was fortunate enough to obtain regular employment from Edward Cave {q. v.) on the Gentleman' s Magazine. That periodical, just entering on the ninth year of its long existence, was the only one in the kingdom which then had what would now be called a large circulation. Johnson was engaged to write the speeches in the " Reports of the Debates of the Senate of Lilliput " (see Report- ing), under which thin disguise the proceedings of parliament were published. He was generally furnished with notes, meagre indeed and inaccurate, of what had been said; but sometimes he had to find arguments and eloquence both for the ministry and for the opposition. He was himself a Tory, not from rational conviction — for his serious opinion was that one form of govern- ment was just as good or as bad as another — but from mere passion, such as inflamed the Capulets against the Montagues, or the Blues of the Roman circus against the Greens. In his infancy he had heard so much talk about the villainies of the Whigs, and the dangers of the Church, that he had become a furious partisan when he could scarcely speak. Before he was three he had in- sisted on being taken to hear Sacheverel preach at Lichfield Cathedral, and had listened to the sermon with as much respect and probably with as much intelligence, as any Staffordshire squire in the congregation. The work which had been begun

in the nursery had been completed by the university. Oxford,

when Johnson resided there, was the most Jacobitical place in England; and Pembroke was one of the most Jacobitical colleges in Oxford. The prejudices which he brought up to London were scarcely less absurd than those of his own Tom Tempest. Charles II. and James II. were two of the best kings that ever reigned. Laud was a prodigy of parts and learning over whose tomb Art and Genius still continued to weep. Hampden deserved no more honourable name than that of the " zealot of rebellion." Even the ship-money Johnson would not pronounce to have been an unconstitutional impost. Under a government which allowed to the people an unprecedented liberty of speech and action, he fancied that he was a slave. He hated Dissenters and stock-jobbers, the excise and the army, septennial parliaments, and Continental connexions. He long had an aversion to the Scots, an aversion of which he could not remember the commencement, but which, he owned, had probably originated in his abhorrence of the conduct of the nation during the Great Rebellion. It is easy to guess in what manner debates on great party questions were likely to be reported by a man whose judgment was so much disordered by party spirit. A show of fairness was indeed necessary to the prosperity of the Magazine. But Johnson long afterwards owned that, though he had saved appearances, he had taken care that the Whig dogs should not have the best of it; and, in fact, every passage which has lived, every passage which bears the marks of his higher faculties, is put into the mouth of some member of the opposition.

A few weeks after Johnson had entered on these obscure labours, he published a work which at once placed him high among the writers of his age. It is probable that what he had suffered during his first year in London had often reminded him of some parts of the satire in which Juvenal had described the misery and degradation of a needy man of letters, lodged among the pigeons' nests in the tottering garrets which overhung the streets of Rome. Pope's admirable imitations of Horace's Satires and Epistles had recently appeared, were in every hand, and were by many readers thought superior to the originals. What Pope had done for Horace, Johnson aspired to do for Juvenal.

Johnson's London appeared without his name in May 1738. He received only ten guineas for this stately and vigorous poem ; but the sale was rapid and the success complete. A second edition was required within a week. Those small critics who are always desirous to lower established reputations ran about proclaiming that the anonymous satirist was superior to Pope in Pope's own peculiar department of literature. It ought to be remembered, to the honour of Pope, that he joined heartily in the applause with which the appearance of a rival genius was welcomed. He made inquiries about the author of London. Such a man, he said, could not long

be concealed. The name was soon discovered; and Pope, with great kindness, exerted himself to obtain an academical degree and the mastership of a grammar school for the poor young poet. The attempt failed, and Johnson remained a bookseller's hack.

It does not appear that these two men, the most eminent writer of the generation which was going out, and the most eminent writer of the generation which was coming in, ever saw each other. They lived in very different circles, one surrounded by dukes and earls, the other by starving pamphleteers and index- makers. Among Johnson's associates at this time may be men- tioned Boyse, who, when his shirts were pledged, scrawled Latin verses sitting up in bed with his arms through two holes in his blanket, who composed very respectable sacred poetry when he was sober, and who was at last run over by a hackney coach when he was drunk; Hoole, surnamed the metaphysical tailor, who, instead of attending to his measures, used to trace geometrical diagrams on the board where he sat cross-legged; and the penitent impostor, George Psalmanazar, who, after poring all day, in a humble lodging, on the folios of Jewish rabbis and Christian fathers, indulged himself at night with literary and theological conversation at an alehouse in the City. But the most remark- able of the persons with whom at this time Johnson consorted was Richard Savage, an earl's son, a shoemaker's apprentice,

who had seen life in all its forms, who had feasted among blue ribands in St James's Square, and had lain with fifty pounds weight of irons on his legs in the condemned ward of Newgate. This man had, after many vicissitudes of fortune, sunk at last into abject and hopeless poverty. His pen had failed him. His patrons had been taken away by death, or estranged by the riotous profusion with which he squandered their bounty, and the ungrateful insolence with which he rejected their advice. He now lived by begging. He dined on venison and champagne whenever he had been so fortunate as to borrow a guinea. If his questing had been unsuccessful, he appeased the rage of hunger with some scraps of broken meat, and lay down to rest under the piazza of Covent Garden in warm weather, and, in cold weather, as near as he could get to the furnace of a glass house. Yet in his misery he was still an agreeable companion. He had an inexhaustible store of anecdotes about that gay and brilliant world from which he was now an outcast. He had observed the great men of both parties in hours of careless relaxation, had seen the leaders of opposition without the mask of patriotism, and had heard the prime minister roar with laughter and tell stories not over-decent. During some months Savage lived

in the closest familiarity with Johnson; and then the friends parted, not without tears. Johnson remained in London to drudge for Cave. Savage went to the west of Eng- land, lived there as he had lived everywhere, and in 1743 died, penniless and heartbroken, in Bristol Gaol.

Soon after his death, while the public curiosity was strongly excited about his extraordinary character and his not less extra- ordinary adventures, a life of him appeared widely different from the catchpenny lives of eminent men which were then a staple article of manufacture in Grub Street. The style was indeed deficient in ease and variety; and the writer was evidently too partial to the Latin element of our language. But the little work, with all its faults, was a masterpiece. No finer specimen of literary biography existed in any language, living or dead; and a discerning critic might have confidently predicted that the author was destined to be the founder of a new school of English eloquence.

The Life of Savage was anonymous; but it was well known in literary circles that Johnson was the writer. During the three years which followed, he produced no important work; but he was not, and indeed could not be, idle. The fame of his abilities and learning continued to grow. Warburton pronounced him a man of parts and genius; and the praise of Warburton was then no light thing. Such was Johnson's reputation that, in 1747, several eminent booksellers combined to employ him in the arduous work of preparing a Dictionary of the English Language, in two folio volumes. The sum which they agreed to pay him was only fifteen hundred guineas; and out of this sum he had to pay several poor men of letters who assisted him in the humbler parts of his task.

The prospectus of the Dictionary he addressed to the earl of Chesterfield. Chesterfield had long been celebrated for the politeness of his manners, the brilliancy of his wit, and the delicacy of his taste. He was acknowledged to be the finest speaker in the House of Lords. He had recently governed Ireland, at a momen- tous conjuncture, with eminent firmness, wisdom and humanity; and he had since become secretary of state. He received John- son's homage with the most winning affability, and requited it with a few guineas, bestowed doubtless in a very graceful manner, but was by no means desirous to see all his carpets blackened with the London mud, and his soups and wines thrown to right and left over the gowns of fine ladies and the waistcoats of fine gentle- men, by an absent, awkward scholar, who gave strange starts and uttered strange growls, who dressed like a scarecrow and ate like a cormorant. During some time Johnson continued to call on his patron, but, after being repeatedly told by the porter that his lordship was not at home, took the hint, and ceased to present himself at the inhospitable door.

Johnson had flattered himself that he should have completed his Dictionary by the end of 1750; but it was not till 1755 that he at length gave his huge volumes to the world. During the seven

years which he passed in the drudgery of penning definitions and marking quotations for transcription, he sought for relaxa- tion in literary labour of a more agreeable kind. In January 1 749 he published The Vanity of Human Wishes, an excellent imitation of the tenth satire of Juvenal, for which he received fifteen guineas.

A few days after the publication of this poem, his tragedy of Irene, begun many years before, was brought on the stage by his old pupil, David Garrick, now manager of Drury Lane Theatre. The relation between him and his old preceptor was of a very singular kind. They repelled each other strongly, and yet attracted each other strongly. Nature had made them of very different clay; and circumstances had fully brought out the natural peculiarities of both. Sudden prosperity had turned Garrick's head. Continued adversity had soured Johnson's temper. Johnson saw with more envy than became so great a man the villa, the plate, the china, the Brussels carpet, which the little mimic had got by repeating, with grimaces and gesticulations, what wiser men had written; and the exquisitely sensitive vanity of Garrick was galled by the thought that, while all the rest of the world was applauding him, he could obtain from one morose cynic, whose opinion it was impossible to despise, scarcely any compliment not acidulated with scorn. Yet the two Lichfield men had so many early recollections in common, and sympathized with each other on so many points on which they sympathized with nobody, else in the vast population of the capital, that, though the master was often provoked by the monkey-like impertinence of the pupil, and the pupil by the bearish rudeness of the master, they remained friends till they were parted by death. Garrick now brought Irene out, with alterations sufficient to displease the author, yet not sufficient to make the piece pleasing to the audience. After nine representations the play was withdrawn. The poet however cleared by his benefit nights, and by the sale of the copyright of his tragedy, about three hundred pounds, then a great sum in his estimation.

About a year after the representation of Irene, he began to publish a series of short essays on morals, manners and literature. This species of composition had been brought into fashion by the success of the Tatler, and by the still more brilliant success of the Spectator. A crowd of small writers had vainly attempted to rival Addison. The Lay Monastery, the Censor, the Freethinker, the Plain Dealer, the Champion, and other works of the same kind had had their short day. At length Johnson undertook the adventure in which so many aspirants had failed. In the thirty- sixth year after the appearance of the last number of the Spectator appeared the first number

of the Rambler. From March 1750 to March 1752 this paper continued to come out every Tuesday and Saturday.

From the first the Rambler was enthusiastically admired by a few eminent men. Richardson, when only five numbers had appeared, pronounced it equal if not superior to the Spectator. Young and Hartley expressed their approbation not less warmly. In consequence probably of the good offices of Bubb Dodington, who was then the confidential adviser of Prince Frederick, two of his royal highness's gentlemen carried a gracious message to the printing office, and ordered seven copies for Leicester House. But Johnson had had enough of the patronage of the great to last him all his life, and was not disposed to haunt any other door as he had haunted the door of Chesterfield.

By the public the Rambler was at first very coldly received. Though the price of a number was only twopence, the sale did not amount to five hundred. The profits were therefore very small. But as soon as the flying leaves were collected and re- printed they became popular. The author lived to see thirteen thousand copies spread over England alone. Separate editions were published for the Scotch and Irish markets. A large party pronounced the style perfect, so absolutely perfect that in some essays it would be impossible for the writer himself to alter a single word for the better. Another party, not less numerous, vehemently accused him of having corrupted the purity of the English tongue. The best critics admitted that his diction was too monotonous, too obviously artificial, and now and then turgid

even to absurdity. But they did justice to the acuteness of his observations on morals and manners, to the constant precision and frequent brilliancy of his language, to the weighty and magnificent eloquence of many serious passages, and to the solemn yet pleasing humour of some of the lighter papers.

The last Rambler was written in a sad and gloomy hour. Mrs Johnson had been given over by the physicians. Three days later she died. She left her husband almost broken-hearted. Many people had been surprised to see a man of his genius and learning stooping to every drudgery, and denying himself almost every comfort, for the purpose of supplying a silly, affected old woman with superfluities, which she accepted with but little gratitude. But all his affection had been concentrated on her. He had neither brother nor sister, neither son nor daughter. Her opinion of his writings was more

important to him than the voice of the pit of Drury Lane Theatre, or the judgment of the Monthly Review. The chief support which had sustained him through the most arduous labour of his life was the hope that she would enjoy the fame and the profit which he anticipated from his Dictionary. She was gone; and in that vast labyrinth of streets, peopled by eight hundred thousand human beings, he was alone. Yet it was necessary for him to set himself, as he expressed it, doggedly to work. After three more laborious years, the Dictionary was at length complete.

It had been generally supposed that this great work would be dedicated to the eloquent and accomplished nobleman to whom the prospectus had been addressed. Lord Chesterfield well knew the value of such a compliment; and therefore, when the day of publication drew near, he exerted himself to soothe, by a show of zealous and at the same time of delicate and judicious kindness, the pride which he had so cruelly wounded. Since the Rambler had ceased to appear, the town had been entertained by a journal called the World, to which many men of high rank and fashion contributed. In two successive numbers of the World, the Dictionary was, to use the modern phrase, puffed with wonderful skill. The writings of Johnson were warmly praised. It was pro- posed that he should be invested with the authority of a dictator, nay, of a pope, over our language, and that his decisions about the meaning and the spelling of words should be received as final. His two folios, it was said, would of course be bought by everybody who could afford to buy them. It was soon known that these papers were written by Chesterfield. But the just resentment of Johnson was not to be so appeased. In a letter written with singular energy and dignity of thought and language, he repelled the tardy advances of his patron. The Dictionary came forth without a dedication. In the Preface the author truly declared that he owed nothing to the great, and described the difficulties with which he had been left to struggle so forcibly and pathetically that the ablest and most malevolent of all the enemies of his fame, Home Tooke, never could read that passage without tears.

Johnson's Dictionary was hailed with an enthusiasm such as no similar work has ever excited. It was indeed the first dictionary which could be read with pleasure. The definitions show so much acuteness of thought and command of language, and the passages quoted from poets, divines and philosophers are so skilfully selected, that a leisure hour may always be very agree- ably spent in turning over the pages. The faults of the book resolve themselves, for the most part, into one great fault. John- son was a wretched etymologist. He knew little or nothing of any Teutonic language except English, which indeed, as he wrote it, was scarcely a Teutonic language; and thus he was absolutely at the mercy of Junius and Skinner.

The Dictionary, though it raised Johnson's fame, added no- thing to his

pecuniary means. The fifteen hundred guineas which the booksellers had agreed to pay him had been advanced and spent before the last sheets issued from the press. It is painful to relate that twice in the course of the year which followed the publication of this great work he was arrested and carried to sponging-houses, and that he was twice indebted for his liberty to his excellent friend Richardson. It was still necessary for the roan who had been formerly saluted by the highest authority

as dictator of the English language to supply his wants by con- stant toil. He abridged his Dictionary. He proposed to bring out an edition of Shakespeare by subscription, and many subscribers sent in their names and laid down their money; but he soon found the task so little to his taste that he turned to more attrac- tive employments. He contributed many papers to a new monthly journal, which was called the Literary Magazine. Few of these papers have much interest; but among them was one of the best things that he ever wrote, a masterpiece both of reason- ing and of satirical pleasantry, the review of Jenyns' Inquiry into the Nature and Origin of Evil.

In the spring of 1758 Johnson put forth the first of a series of essays, entitled the Idler. During two years these essays con- tinued to appear weekly. They were eagerly read, widely circulated, and indeed impudently pirated, while they were still in the original form, and had a large sale when collected into volumes. The Idler may be described as a second part of the Rambler, somewhat livelier and somewhat weaker than the first part.

While Johnson was busied with his Idlers, his mother, who had accomplished her ninetieth year, died at Lichfield. It was long since he had seen her, but he had not failed to contribute largely out of his small means to her comfort. In order to defray the charges of her funeral, and to pay some debts which she had left, he wrote a little book in a single week, and sent off the sheets to the press without reading them over. A hundred pounds were paid him for the copyright, and the purchasers had great cause to be pleased with their bargain, for the book was Rasselas, and it had a great success.

The plan of Rasselas might, however, have seemed to invite severe criticism. Johnson has frequently blamed Shakespeare for neglecting the proprieties of time and place, and for ascribing to one age or nation the manners and opinions of another. Yet Shakespeare has not sinned in this way more grievously than Johnson. Rasselas and Imlac, Nekayah and Pekuah, are evidently meant to be Abyssinians of the 18th century; for the Europe which Imlac describes is the Europe of the 18th century, and the inmates of the Happy Valley talk familiarly of that law of gravitation which Newton discovered and which was not fully received even at Cambridge till the

18th century. Johnson, not content with turning filthy savages, ignorant of their letters, and gorged with raw steaks cut from living cows, into philosophers as eloquent and enlightened as himself or his friend Burke, and into ladies as highly accomplished as Mrs Lennox or Mrs Sheridan, transferred the whole domestic system of England to Egypt. Into a land of harems, a land of polygamy, a land where women are married without ever being seen, he introduced the flirtations and jealousies of our ball-rooms. In a land where there is bound- less liberty of divorce, wedlock is described as the indissoluble compact. " A youth and maiden meeting by chance, or brought together by artifice, exchange glances, reciprocate civilities, go home, and dream of each other. Such," says Rasselas, " is the common process of marriage." A writer who was guilty of such improprieties had little right to blame the poet who made Hector quote Aristotle, and represented Julio Romano as flourishing in the days of the Oracle of Delphi.

By such exertions as have been described Johnson supported himself till the year 1762. In that year a great change in his circumstances took place. He had from a child been an enemy of the reigning dynasty. His Jacobite prejudices had been exhibited with little disguise both in his works and in his con- versation. Even in his massy and elaborate Dictionary he had, with a strange want of taste and judgment, inserted bitter and contumelious reflexions on the Whig party. The excise, which was a favourite resource of Whig financiers, he had designated as a hateful tax. He had railed against the commissioners of excise in language so coarse that they had seriously thought of prosecuting him. He had with difficulty been prevented from holding up the lord privy seal by name as an example of the meaning of the word " renegade." A pension he had defined as pay given to a state hireling to betray his country; a pensioner as a slave of state hired by a stipend to obey a master. It

seemed unlikely that the author of these definitions would him- self be pensioned. But that was a time of wonders. George III. had ascended the throne, and had, in the course of a few months, disgusted many of the old friends, and conciliated many of the old enemies of his house. The city was becoming mutinous; Oxford was becoming loyal. Cavendishes and Bentincks were murmur- ing; Somersets and Wyndhams were hastening to kiss hands. The head of the treasury was now Lord Bute, who was a Tory, and could have no objection to Johnson's Toryism. Bute wished to be thought a patron of men of letters; and Johnson was one of the most eminent and one of the most needy men of letters in Europe. A pension of

three hundred a year was graciously offered, and with very little hesitation accepted.

This event produced a change in Johnson's whole way of life. For the first time since his boyhood he no longer felt the daily goad urging him to the daily toil. He was at liberty, after thirty years of anxiety and drudgery, to indulge his constitutional indolence, to lie in bed till two in the afternoon, and to sit up talking till four in the morning, without fearing either the printer's devil or the sheriff's officer.

One laborious task indeed he had bound himself to perform. He had received large subscriptions for his promised edition of Shakespeare; he had lived on those subscriptions during some years; and he could not without disgrace omit to perform his part of the contract. His friends repeatedly exhorted him to make an effort, and he repeatedly resolved to do so. But, not- withstanding their exhortations and his resolutions, month followed month, year followed year, and nothing was done. He prayed fervently against his idleness; he determined, as often as he received the sacrament, that he would no longer doze away and trifle away his time; but the spell under which he lay resisted prayer and sacrament. Happily for his honour, the charm which held him captive was at length broken by no gentle or friendly hand. He had been weak enough to pay serious attention to a story about a ghost which haunted a house in Cock Lane, and had actually gone himself, with some of his friends, at one in the morning, to St John's Church, Clerkenwell, in the hope of receiving a communication from the perturbed spirit. But the spirit, though adjured with all solemnity, remained obstinately silent; and it soon appeared that a naughty girl of eleven had been amus- ing herself by making fools of so many philosophers. Churchill, who, confident in his powers, drunk with popularity, and burning with party spirit, was looking for some man of established fame and Tory politics to insult, celebrated the Cock Lane ghost in three cantos, nicknamed Johnson Pomposo, asked where the book was which had been so long promised and so liberally paid for, and directly accused the great moralist of cheating. This terrible word proved effectual, and in October 1765 appeared, after a delay of nine years, the new edition of Shakespeare.

This publication saved Johnson's character for honesty, but added nothing to the fame of his abilities and learning. The Preface, though it contains some good passages, is not in his best manner. The most valuable notes are those in which he had an opportunity of showing how attentively he had during many years observed human life and human nature. The best speci- men is the note on the character of Polonius. Nothing so good is to be found even in Wilhelm Meister's admirable examination of Hamlet. But here praise must end. It would be difficult to name a more slovenly, a more

worthless edition of any great classic. 1 Johnson had, in his prospectus, told the world that he was peculiarly fitted for the task which he had undertaken, be- cause he had, as a lexicographer, been under the necessity of taking a wider view of the English language than any of his pre- decessors. But, unfortunately, he had altogether neglected that very part of our literature with which it is especially desirable that an editor of Shakespeare should be conversant. In the two folio volumes of the English Dictionary there is not a single

1 This famous dictum of Macaulay, though endorsed by Lord Rosebery, has been energetically rebutted by Professor W. Raleigh and others, who recognize both sagacity and scholarship in Johnson's Preface and Notes. Johnson's wide grasp of the discourse and knowledge of human nature enable him in a hundred entangled passages to go straight to the dramatist's meaning. — (T. Se.)

passage quoted from any dramatist of the Elizabethan age except Shakespeare and Ben Jonson. Even from Ben the quotations are few. Johnson might easily in a few months have made him- self well acquainted with every old play that was extant. But it never seems to have occurred to him that this was a necessary preparation for the work which he had undertaken. He would doubtless have admitted that it would be the height of absurdity in a man who was not familiar with the works of Aeschylus and Euripides to publish an edition of Sophocles. Yet he ventured to publish an edition of Shakespeare, without having ever in his life, as far as can be discovered, read a single scene of Massinger, Ford, Dekker, Webster, Marlow, Beaumont or Fletcher. His detractors were noisy and scurrilous. He had, however, acquitted himself of a debt which had long lain heavy on his conscience and he sank back into the repose from which the sting of satire had roused him. He long continued to live upon the fame which he had already won. He was honoured by the university of Oxford with a doctor's degree, by the Royal Academy with a professor- ship, and by the king with an interview, in which his majesty most graciously expressed a hope that so excellent a writer would not cease to write. In the interval between 1765 and 1775 John- son published only two or three political tracts.

But, though his pen was now idle, his tongue was active. The influence exercised by his conversation, directly upon those with whom he lived, and indirectly on the whole literary world, was altogether without a parallel. His colloquial talents were indeed of the highest order. He had strong sense, quick discernment, wit, humour, immense knowledge of literature and of life, and an infinite store of curious anecdotes. As respected style, he spoke far better than he wrote. Every sentence which dropped from his lips was as correct in structure as the most nicely balanced period of the Rambler. But

in his talk there were no pompous triads, and little more than a fair proportion of words in -osiiy and ation. All was simplicity, ease and vigour. He uttered his short, weighty, and pointed sentences with a power of voice, and a justness and energy of emphasis, of which the effect was rather increased than diminished by the rollings of his huge form, and by the asthmatic gaspings and puffings in which the peals of his eloquence generally ended. Nor did the laziness which made him unwilling to sit down to his desk prevent him from giving in struction or entertainment orally. To discuss questions of taste, of learning, of casuistry, in language so exact and so forcible that it might have been printed without the alteration of a word, was to him no exertion, but a pleasure. He loved, as he said, to fold his legs and have his talk out. He was ready to bestow the over- flowings of his full mind on anybody who would start a subject: on a fellow-passenger in a stage coach, or on the person who sat ! at the same table with him in an eating-house. But his conversa- tion was nowhere so brilliant and striking as when he was sur- rounded by a few friends, whose abilities and knowledge enabled them, as heˆnce expressed it, to send him back every ball that he threw.fjSome of these, in 1764, formed themselves into a club, which gradually became a formidable power in the common- wealth of letters. The verdicts pronounced by this conclave on new books were speedily known over all London, and were suffi- cient to sell off a whole edition in a day, or to condemn the sheets to the service of the trunkmaker and the pastrycook. Gold- smith was the representative of poetry and light literature, Reynolds of the arts, Burke of political eloquence and political philosophy. There, too, were Gibbon the greatest historian and Sir William Jones the greatest linguist of the age. Garrick brought to the meetings his inexhaustible pleasantry, his incom- parable mimicry, and his consummate knowledge of stage effect. Among the most constant attendants were two high-born and high-bred gentlemen, closely bound together by friendship, but of widely different characters and habits — Bennet Langton, distinguished by his skill in Greek literature, by the orthodoxy of his opinions, and by the sanctity of his life, and Topham Beauclerk, renowned for his amours, his knowledge of the gay world, his fastidious taste and his sarcastic wit.

Among the members of this celebrated body was one to whom it has owed the greater part of its celebrity, yet who was

regarded with little respect by his brethren, and had not without difficulty obtained a seat among them. This was James Boswell (q,v.), a young Scots lawyer, heir to an honourable name and a fair estate. That he was a

coxcomb and a bore, weak, vain, pushing, curioujs, garrulous, was obvious to all who were acquainted with him. J

To a man of Johnson's strong understanding and irritable temper, the silly egotism and adulation of Boswell must have been as teasing as the constant buzz of a fly. Johnson hated to be questioned; and Boswell was eternally catechizing him on all kinds of subjects, and sometimes propounded such questions as, " What would you do, sir, if you were locked up in a tower with a baby ? " Johnson was a water-drinker and Boswell was a wine-bibber, and indeed little better than an habitual sot. It was im- possible that there should be perfect harmony between two such companions. Indeed, the great man was sometimes provoked into fits of passion, in which he said things which the small man, during a few hours, seriously resented. Every quarrel, how- ever, was soon made up. During twenty years the disciple con- tinued to worship the master; the master continued to scold the disciple, to sneer at him, and to love him. The two friends ordinarily resided at a great distance from each other. Boswell practised in the Parliament House of Edinburgh, and could pay only occasional visits to London. During those visits his chief business was to watch Johnson, to discover all Johnson's habits, to turn the conversation to subjects about which Johnson was likely to say something remarkable, and to fill quarto notebooks with minutes of what Johnson had said. In this way were gathered the materials out of which was afterwards constructed the most interesting biographical work in the world.

Soon after the club began to exist, Johnson formed a connexion less important indeed to his fame, but much more important to his happiness, than his connexion with Boswell. Henry Thrale, one of the most opulent brewers in the kingdom, a man of sound and cultivated understanding, rigid principles, and liberal spirit, was married to one of those clever, kind-hearted, engaging, vain, pert young women who are perpetually doing or saying what is not exactly right, but who, do or say what they may, are always agreeable. In 1765 the Thrales became ac- quainted with Johnson, and the acquaintance ripened fast into friendship. They were astonished and delighted by the brilliancy of his conversation. They were flattered by finding that a man so widely celebrated preferred their house to any other in London. Johnson soon had an apartment at the brewery in Southwark, and a still more pleasant apartment at the villa of his friends on Streatham Common. A large part of every year he passed in those abodes, which must have seemed magnificent and luxurious indeed, when compared with the dens in which he had generally been lodged. But his chief pleasures were derived from what the astronomer of his Abyssinian tale called " the endearing elegance of female friendship." Mrs Thrale rallied him, soothed him, coaxed him, and if she sometimes provoked him by her flippancy, made ample amends by listening to his reproofs with angelic sweetness of

temper. When he was diseased in body and in mind, she was the most tender of nurses. No comfort that wealth could purchase, no contrivance that womanly in- genuity, set to work by womanly compassion, could devise, was wanting to his sick room. It would seem that a full half of Johnson's life during about sixteen years was passed under the roof of the Thrales. He accompanied the family sometimes to Bath, and sometimes to Brighton, once to Wales and once to Paris. But he had at the same time a house in one of the narrow and gloomy courts on the north of Fleet Street. In the garrets was his library, a large and miscellaneous collection of books, falling to pieces and begrimed with dust. On a lower floor he sometimes, but very rarely, regaled a friend with a plain dinner — a veal pie, or a leg of lamb and spinach, and a rice pud- ding. Nor was the dwelling uninhabited during his long absences. It was the home of the most extraordinary assemblage of inmates that ever was brought together. • At the head of the establish- ment Johnson had placed an old lady named Williams, whose chief recommendations were her blindness and her poverty. But,

in spite of her murmurs and reproaches, he gave an asylum to another lady who was as poor as herself, Mrs Desmoulins, whose family he had known many years before in Staffordshire. Room was found for the daughter of Mrs Desmoulins, and for another destitute damsel, who was generally addressed as Miss Car- michael, but whom her generous host called Polly. An old quack doctor named Levett, who had a wide practice, but among the very poorest class, poured out Johnson's tea in the morning and completed this strange menagerie. All these poor creatures were at constant war with each other, and with Johnson's negro servant Frank. Sometimes, indeed, they transferred their hostilities from the servant to the master, complained that a better table was not kept for them, and railed or maundered till their benefactor was glad to make his escape to Streatham or to the Mitre Tavern. And yet he, who was generally the haughtiest and most irritable of mankind, who was but too prompt to resent anything which looked like a slight on the part of a purse-proud bookseller, or of a noble and powerful patron, bore patiently from mendicants, who, but for his bounty, must have gone to the workhouse, insults more provoking than those for which he had knocked down Osborne and bidden defiance to Chesterfield. Year after year Mrs Williams and Mrs Desmoulins, Polly and Levett, continued to torment him and to live upon him. The course of life which has been described was interrupted in Johnson's sixty-fourth year by an important event. He had early, read an account of the Hebrides, and had been much interested by learning that there was so near him a land peopled by a race which was still as rude and simple as in the Middle Ages. A wish to become intimately acquainted with a state of society so utterly unlike all that he had ever seen frequently crossed his mind. But it is not

probable that his curiosity would have over- come his habitual sluggishness, and his love of the smoke, the mud, and the cries of London, had not Boswell importuned him to attempt the adventure, and offered to be his squire. At length, in August 1773, Johnson crossed the Highland line, and plunged courageously into what was then considered, by most Englishmen, as a dreary and perilous wilderness. After wandering about two months through the Celtic, region, sometimes in rude boats which did not protect him from the rain, and sometimes on small shaggy ponies which could hardly bear his weight, he returned to his old haunts with a mind full of new images and new theories. During the following year he employed himself in recording his adven- tures. About the beginning of 1775 his Journey to the Hebrides was published, and was, during some weeks, the chief subject of conversation in all circles in which any attention was paid to literature. His prejudice against the Scots had at length become little more than matter of jest; and whatever remained of the old feeling had been effectually removed by the kind and respectful hospitality with which he had been received in every part of Scotland. It was, of course, not to be expected that an Oxonian Tory should praise the Presbyterian polity and ritual, or that an eye accustomed to the hedgerows and parks of England should not be struck by the bareness of Berwickshire and East Lothian. But even in censure Johnson's tone is not unfriendly. The most enlightened Scotsmen, with Lord Mansfield at their head, were well pleased. But some foolish and ignorant Scots- men were moved to anger by a little unpalatable truth which was mingled with much eulogy, and assailed him whom they chose to consider as the enemy of their country with libels much more dishonourable to their country than anything that he had ever said or written. They published paragraphs in the newspapers, articles in the magazines, sixpenny pamphlets, five-shilling books. One scribbler abused Johnson for being blear-eyed, another for being a pensioner; a third informed the world that one of the doc- tor's uncles had been convicted of felony in Scotland, and had found that there was in that country one tree capable of support- ing the weight of an Englishman. Macpherson, whose Fingal had been treated in the Journey as an impudent forgery, threatened to take vengeance with a cane. The only effect of this threat was that Johnson reiterated the charge of forgery in the most con- temptuous terms, and walked about, during some time, with a cudgel.

Of other assailants Johnson took no notice whatever. He had early resolved never to be drawn into controversy; and he adhered to his resolution with a steadfastness which is the more extraordinary because he was, both intellectually and morally, of the stuff of which controversialists are made.

In conversation he was a singularly eager, acute and pertinacious disputant. When at a loss for good reasons, he had recourse to sophistry; and when heated by altercation, he made unsparing use of sar- casm and invective. But when he took his pen in his hand, his whole character seemed to be changed. A hundred bad writers misrepresented him and reviled him; but not one of the hundred could boast of having been thought by him worthy of a refuta- tion, or even of a retort. One Scotsman, bent on vindicating the fame of Scots learning, defied him to the combat in a detest- able Latin hexameter: —

" Maxime, si tu vis, cupio contendere tecum."

But Johnson took no notice of the challenge. He always main- tained that fame was a shuttlecock which could be kept up only by being beaten back as well as beaten forward, and which would soon fall if there were only one battledore. No saying was oftener in his mouth than that fine apophthegm of Bentley, that no man was ever written down but by himself.

Unhappily, a few months after the appearance of the Journey to the Hebrides, Johnson did what none of his envious assailants could have done, and to a certain extent succeeded in writing himself down. The disputes between England and her American colonies had reached a point at which no amicable adjustment was possible. War was evidently impending; and the ministers seem to have thought that the eloquence of Johnson might with advantage be employed to inflame the nation against the opposi- tion at home, and against the rebels beyond the Atlantic. He had already written two or three tracts in defence of the foreign and domestic policy of the government; and those tracts, though hardly worthy of him, were much superior to the crowd of pamphlets which lay on the counters of Almon and Stockdale. But his Taxation no Tyranny was a pitiable failure. Even Boswell was forced to own that in this unfortunate piece he could detect no trace of his master's powers. The general opinion was that the strong faculties which had produced the Dictionary and the Rambler were beginning to feel the effect of time and of disease, and that the old man would best consult his credit by writing no more. But this was a great mistake. Johnson had failed, not because his mind was less vigorous than when he wrote Rasselas in the evenings of a week, but because he had foolishly chosen, or suffered others to choose for him, a subject such as he would at no time have been competent to treat. He was in no sense a statesman. He never willingly read or thought or talked about affairs of state. He loved biography, literary history, the history of manners; but political history was posi- tively distasteful to him. The question at issue between the colonies and the mother country was a question about which he had really nothing to say. Happily, Johnson soon had an opportunity of proving most signally that his failure was not to be

ascribed to intellectual decay.

On Easter Eve 1777 some persons, deputed by a meeting which consisted of forty of the first booksellers in London, called upon him. Though he had some scruples about doing business at that season, he received his visitors with much civility. They came to inform him that a new edition of the English poets, from Cowley downwards, was in contemplation, and to ask him to furnish short biographical prefaces. He readily undertook the task for which he was pre-eminently qualified. His knowledge of the literary history of England since the Restoration was unrivalled. That knowledge he had derived partly from books, and partly from sources which had long been closed: from old Grub Street traditions; from the talk of forgotten poetasters and pamphleteers, who had long been lying in parish vaults; from the recollections of such men as Gilbert Walmesley, who had conversed with the wits of Button, Cibber, who had mutilated the plays of two generations of dramatists, Orrery, who had been admitted to the society of Swift and Savage, who

had rendered services of no very honourable kind to Pope. The biographer therefore sat down to his task with a mind full of matter. He had at first intended to give only a paragraph to every minor poet, and only four or five pages to the greatest name. But the flood of anecdote and criticism overflowed the narrow channel. The work, which was originally meant to consist only of a few sheets, swelled into'ten volumes — small volumes, it is true, and not closely printed. The first four appeared in 1779, the remaining six in 1781.

The Lives of the Poets are, on the whole, the best of Johnson's works. The narratives are as entertaining as any novel. The remarks on life and on human nature are eminently shrewd and profound. The criticisms are often excellent, and, even when grossly and provokingly unjust, well deserve to be studied. Savage's Life Johnson reprinted nearly as it had appeared in 1 744. Whoever, after reading that life, will turn to the other lives will be struck by the difference of style. Since Johnson had been at ease in his circumstances he had wr'tten little and had talked much. When therefore he, after the lapse of years, resumed his pen, the mannerism which he had contracted while he was in the constant habit of elaborate composition was less perceptible than formerly, and his diction frequently had a colloquial ease which it had formerly wanted. The improvement may be discerned by a skilful critic in the Journey to the Hebrides, and in the Lives of the Poets is so obvious that it cannot escape the notice of the most careless reader. Among the Lives the best are perhaps those of Cowley, Dryden and Pope. The very worst is, beyond all doubt, that of Gray; the most controverted that of Milton.

This great work at once became popular. There was, indeed, much just and much unjust censure; but even those who were loudest in blame were attracted by the book in spite of them- selves. Malone computed the gains of the publishers at five or six thousand pounds. But the writer was very poorly remuner- ated. Intending at first to write very short prefaces, he had stipulated for only two hundred guineas. The booksellers, when they saw how far his performance had surpassed his promise, added only another hundred. Indeed Johnson, though he did not despise or affect to despise money, and though his strong sense and long experience ought to have qualified him to protect his own interests, seems to have been singularly unskilful and unlucky in his literary bargains. He was generally reputed the first English writer of his time. Yet several writers of his time sold their copyrights for sums such as he never ventured to ask. To give a single instance, Robertson received £4500 for the History of Charles V.

Johnson was now in his seventy-second year. The infirmities of age were coming fast upon him. That inevitable event of which he never thought without horror was brought near to him; and his whole life was darkened by the shadow of death. The strange dependants to whom he had given shelter, and to whom, in spite of their faults, he was strongly attached by habit, dropped off one by one; and, in the silence of his home, he re- gretted even the noise of their scolding matches. The kind and generous Thrale was no more; and it was soon plain that the old Streatham intimacy could not be maintained upon the same foot- ing. Mrs Thrale herself confessed that without her husband's assistance she did not feel able to entertain Johnson as a constant inmate of her house. Free from the yoke of the brewer, she fell in love with a music master, high in his profession, from Brescia, named Gabriel Piozzi, in whom nobody but herself could discover anything to admire. The secret of this attachment was soon discovered by Fanny Burney, but Johnson at most only sus- pected it.

In September 1782 the place at Streatham was from motives of economy let to Lord Shelburne, and Mrs Thrale took a house at Brighton, whither Johnson accompanied her; they remained for six weeks on the old familiar footing. In March 1783 Boswell was glad to discover Johnson well looked after and staying with Mrs Thrale in Argyll Street, but in a bad state of health. Im- patience of Johnson's criticisms and infirmities had been steadily growing with Mrs Thrale since 1774. She now went to Bath with her daughters, partly to escape his supervision. Johnson

was very ill in his lodgings during the summer, but he still corre- sponded

affectionately with his " mistress " and received many favours from her. He retained the full use of his senses during the paralytic attack, and in July he was sufficiently recovered to renew his old club life and to meditate further journeys. In June 1784 he went with Boswell to Oxford for the last time. In September he was in Lichfield. On his return his health was rather worse; but he would submit to no dietary regime. His asthma tormented him day and night, and dropsical symptoms made their appearance. His wrath was excited in no measured terms against the re-marriage of his old friend Mrs Thrale, the news of which he heard this summer. The whole dispute seems, to-day, entirely uncalled-for, but the marriage aroused some of Johnson's strongest prejudices. He wrote inconsiderately on the subject, but we must remember that he was at the time afflicted in body and mentally haunted by dread of impending change. Throughout all his troubles he had clung vehemently to life. The feeling described in that fine but gloomy paper which closes the series of his Idlers seemed to grow stronger in him as his last hour drew near. He fancied that he should be able to draw his breath more easily in a southern climate, and would probably have set out for Rome and Naples but for his fear of the expense of the journey. That expense, indeed, he had the means of defraying; for he had laid up about two thou- sand pounds, the fruit of labours which had made the fortune of several publishers. But he was unwilling to break in upon this hoard, and he seems to have wished even to keep its existence a secret. Some of his friends hoped that the Government might be induced to increase his pension to six hundred pounds a year, but this hope was disappointed, and he resolved to stand one English winter more.

That winter was his last. His legs grew weaker; his breath grew shorter; the fatal water gathered fast, in spite of incisions which he, courageous against pain but timid against death, urged his surgeons to make deeper and deeper. Though the tender care which had mitigated his sufferings during months of sickness at Streatham was withdrawn, and though Boswell was absent, he was not left desolate. The ablest physicians and surgeons attended him, and refused to accept fees from him. Burke parted from him with deep emotion. Windham sat much in the sick-room. Frances Burney, whom the old man had cherished with fatherly kindness, stood weeping at the door ; while Langton, whose piety eminently qualified him to be an adviser and com- forter at such a time, received the last pressure of his friend's hand within. When at length the moment, dreaded through so many years, came close, the dark cloud passed away from Johnson's mind. Windham's servant, who sat up with him during his last night, declared that " no man could appear more collected, more devout or less terrified at the thoughts of the approaching minute." At hour intervals, often of much pain, he was moved in bed and addressed himself vehemently to prayer. In the morning he was still able to give his blessing, but in the afternoon he

became drowsy, and at a quarter past' seven in the evening on the 13th of December 1784, in his seventy- sixth year, he passed away. He was laid, a week later, in West- minster Abbey, among the eminent men of whom he had been the historian — Cowley and Denham, Dryden and Congreve, Gay, Prior and Addison. (M.)

Bibliography. — The splendid example of his style which Macaulay contributed in the article on Johnson to the 8th edition of this ency- clopaedia has become classic, and has therefore been retained above with a few trifling modifications in those places in which his invincible love of the picturesque has drawn him demonstrably aside from the dull line of veracity. Macaulay, it must be noted, exaggerated persistently the poverty of Johnson's pedigree, the squalor of his early married life, the grotesqueness of his entourage in Fleet Street, the decline and fall from complete virtue of Mrs Thrale, the novelty and success of the Dictionary, the complete failure of the Shakespeare and the political tracts. Yet this contribution is far more mellow than the article contributed on Johnson twenty-five years before to the Edinburgh Review in correction of Croker. Matthew Arnold, who edited six selected Lives of the poets, regarded it as one of Macaulay's happiest and ripest efforts. It was written out of friend- ship for Adam Black, and " payment was not so much as mentioned." The big reviews, especially the quarterlies, have always been the

natural home of Johnsonian study. Sir Walter Scott, Croker, Hay- ward, Macaulay, Thomas Carlyle (whose famous Fraser article was reprinted in 1853) and Whitwell Elwin have done as much as any- body perhaps to sustain the zest for Johnsonian studies. Macaulay's prediction that the interest in the man would supersede that in his " Works " seemed and seems likely enough to justify itself; but his theory that the man alone mattered and that a portrait painted by the hand of an inspired idiot was a true measure of the man has not worn better than the common run of literary propositions. Johnson's prose is not extensively read. But the same is true of nearly all the great prose masters of the 18th century. As in the case of all great men, Johnson has suffered a good deal at the hands of his imitators and admirers. His prose, though not nearly so uniformly monotonous or polysyllabic as the parodists would have us believe, was at one time greatly overpraised. From the " Life of Savage " to the " Life of Pope " it developed a great deal, and in the main improved. To the last he sacrificed expression rather too much to style, and he was perhaps over conscious of the balanced epithet. But he contributed both dignity and dialectical force to the prose movement of his period.

The best edition of his works is still the Oxford edition of 1825 in 9 vols. At the present day, however, his periodical writings are neglected, and all that can be said to excite interest are, first the Lives of the Poets (best

edition by Birkbeck Hill and H.S. Scott, 3 vols., 1905), and then the Letters,'the Prayers and Meditations, and the Poems, to which may doubtfully be added the once idolized Rasselas. The Poems and Rasselas have been reprinted times without number. The others have been re-edited with scrupulous care for the Oxford University Press by the pious diligence of that most enthusiastic of all Johnsonians, Dr Birkbeck Hill. But the tendency at the present day is undoubtedly to prize Johnson's personality and sayings more than any of his works. These are preserved to us in a body of biographical writing, the efficiency of which is unequalled in the whole range of literature. The chief constituents are Johnson's own Letters and Account of his Life from his Birth to his Eleventh Year (1805), a fragment saved from papers burned in 1784 and not seen by Boswell ; the life by his old but not very sympathetic friend and club-fellow, Sir John Hawkins (1787); Mrs Thrale-Piozzi's Anecdotes (1785) and Letters; the Diary and Letters of Fanny Burney (D'Arblay) (1841); the shorter Lives of Arthur Murphy, T. Tyers, &c. ; far above all, of course, the unique Life by James Boswell, first published in 1791, and subsequently encrusted with vast masses 01 Johnsoniana in the successive editions of Malone, Croker, Napier, Fitzgerald, Mowbray Morris (Globe), Birrell, Ingpen (copiously illustrated) and Dr Birkbeck Hill (the most exhaustive). The sayings and Johnsoniana have been reprinted in very many and various forms. Valuable work has been done in Johnsonian genealogy and topography by Aleyn Lyell Reade in his Johnsonian Gleanings, &c, and in the Memorials of Old Staffordshire (ed. W. Beresford). The most excellent short Lives are those by F. Grant (Eng. Writers) and Sir Leslie Stephen (Eng. Men of Letters). Pro- fessor W. Raleigh's essay (Stephen Lecture), Lord Rosebery's estimate (1909), and Sir Leslie Stephen's article in the Dictionary of National Biography, with bibliography and list of portraits, should be consulted. Johnson's " Club " (" The Club ") still exists, and has contained ever since his time a large proportion of the public celebrities of its day. A " Johnson Club," which has included many Johnson scholars and has published papers, was founded in 1885. Lichfield has taken an active part in the commemoration of Johnson since 1887, when Johnson's birthplace was secured as a municipal museum, and Lichfield was the chief scene of the Bicentenary Celebrations of September 1909 (fully described in A. M. Broadley's Dr Johnson and Mrs Thrale, 1909), containing, together with new materials and portraits, an essay dealing with Macaulay's treatment of the Johnson-Thrale episodes by T. Seccombe). Statues both of Johnson and Boswell are in the market-place at Lichfield. A statue was erected in St Paul's in 1825, and there are commemorative tablets in Lichfield Cathedral, St Nicholas (Brighton), Uttoxeter, St Clement Danes (London) , Gwaynynog and elsewhere. (T. Se.)

JOHNSON, SIR THOMAS (1664-1729), English merchant, was born in

Liverpool in November 1664. He succeeded his father in 1689 as bailiff and in 1695 as mayor. From 1701 to 1723 he represented Liverpool in parliament, and he was knighted by Queen Anne in 1708. He effected the separation of Liverpool from the parish of Walton-on-the-Hill; from the Crown he ob- tained the grant to the corporation of the site of the old castle where he planned the town market; while the construction of the first floating dock (1708) and the building of St Peter's and St George's churches were due in great measure to his efforts. He was interested in the tobacco trade; in 1715 he conveyed 130 Jacobite prisoners to the American plantations. In 1723, having lost in speculation the fortune which he had inherited from his father, he went himself to Virginia as collector of customs on the Rappahannock river. He died in Jamaica in 1729. A Liverpool street is named Sir Thomas Buildings after him.

4-72

JOHNSON, T.— JOHNSTON, A. S.

JOHNSON, THOMAS, English 18th-century wood-carver and furniture designer. Of excellent repute as a craftsman and an artist in wood, his original conceptions and his adaptations of other men's ideas were remarkable for their extreme flam- boyance, and for the merciless manner in which he overloaded them with thin and meretricious ornament. Perhaps his most inept design is that for a table in which a duck or goose is dis- placing water that falls upon a mandarin, seated, with his head on one side, upon the rail below. No local school of Italian rococo ever produced more extravagant absurdities. His clocks bore scythes and hour-glasses and flashing sunbeams, together with whirls and convolutions and floriated adornments without end. On the other hand, he occasionally produced a mirror frame or a mantelpiece which was simple and dignified. The art of artistic plagiarism has never been so well understood or so dexterously practised as by the 18th-century designers of English furniture, and Johnson appears to have so far exceeded his contemporaries that he must be called a barefaced thief. The three leading " motives " of the time — Chinese, Gothic and Louis Quatorze — were mixed up in his work in the most amazing manner; and he was exceedingly fond of introducing human figures, animals, birds and fishes in highly incongruous places. He appears to have defended his enormities on the ground that " all men vary in opinion, and a fault in the eye of one may be a beauty in that of another; 'tis a duty incumbent on an author to endeavour at pleasing every taste." Johnson, who was in business at the " Golden Boy " in Grafton Street, Westminster, published a folio volume of Designs for Picture Frames, Candelabra, Ceilings, &°c. (1758); and One Hundred and Fifty New Designs

(1761).

JOHNSON, SIR WILLIAM (1715-1774), British soldier and American pioneer, was born in Smithtown, County Meath, Ire- land, in 1 71 5, the son of Christopher Johnson, a country gentle- man. As a boy he was educated for a commercial career, but in 1738 he removed to America for the purpose of managing a tract of land in the Mohawk Valley, New York, belonging to his uncle, Admiral Sir Peter Warren (1703-1752). He established himself on the south bank of the Mohawk river, about 25 m. W. of Schenectady. Before 1743 he removed to the north side of the river. The new settlement prospered from the start, and a valuable trade was built up with the Indians, over whom Johnson exercised an immense influence. The Mohawks adopted him and elected him a sachem. In 1744 he was ap- pointed by Governor George Clinton (d. 1761) superintendent of the affairs of the Six Nations (Iroquois). In 1746 he was made commissary of the province for Indian affairs, and was influential in enlisting and equipping the Six Nations for participation in the warfare with French Canada, two years later (1748) being placed in command of a line of outposts on the New York frontier. The peace of Aix-la-Chapelle put a stop to offensive operations, which he had begun. In May 1 7 50 by royal appoint- ment he became a member for life of the governor's council, and in the same year he resigned the post of superintendent of Indian affairs. In 1754 he was one of the New York delegates to the inter-colonial convention at Albany, N.Y. In 1755 General Edward Braddock, the commander of the British forces in America, commissioned him major-general, in which capacity he directed the expedition against Crown Point, and in September defeated the French and Indians under Baron Ludwig A. Dieskau (1 701-1767) at the battle of Lake George, where he himself was wounded. For this success he received the thanks of parliament, and was created a baronet (November 1755). From July 1756 until his death he was " sole superintendent of the Six Nations and other Northern Indians." He took part in General James Abercrombie's disastrous campaign against Ticon- deroga (1758), and in 1759 he was second in command in General John Prideaux's expedition against Fort Niagara, succeeding to the chief command on that officer's death, and capturing the fort. In 1760 he was with General Jeffrey Amherst (1717-1707) at the capture of Montreal. As a reward for his services the king granted him a tract of 100,000 acres of land north of the Mohawk river. It was due to his influence that the Iroquois refused to join

Pontiac in his conspiracy, and he was instrumental in arranging the treaty of Fort Stanwix in 1768. After the war Sir William retired to his estates, where, on the site of the present Johnstown, he built his residence, Johnson Hall, and lived in all the style of an English baron. He devoted himself to colonizing his exten- sive lands, and is said to have been the first to introduce sheep and blood horses into the province. He died at Johnstown,

N.Y., on the nth of July 1774. In 1739 Johnson had married Catherine Wisenberg, by whom he had three children. After her death he had various mistresses, including a niece of the Indian chief Hendrick, and Molly Brant, a sister of the famous chief Joseph Brant.

His son, Sir John Johnson (1 742-1 830), who was knighted in 1765 and succeeded to the baronetcy on his father's death, took part in the French and Indian War and in the border warfare during the War of Independence, organizing a loyalist regiment known as the " Queen's Royal Greens," which he led at the battle of Oriskany and in the raids (1778 and 1780) on Cherry Valley and in the Mohawk Valley. He was also one of the officers of the force defeated by General John Sullivan in the engagement at Newtown (Elmira), N.Y., on the 29th of August 1779. He was made brigadier-general of provincial troops in 1782. His estates had been confiscated, and after the war he lived in Canada, where he held from 1791 until his death the office of superintendent- general of Indian affairs for British North America. He received £45,000 from the British government for his losses.

Sir William's nephew, Guy Johnson (1740-1788), succeeded his uncle as superintendent of Indian affairs in 1774, and served in the French and Indian War and, on the British side, in the War of Independence.

See W. L. Stone, Life of Sir William Johnson (2 vols., 1865); W. E. Griffis, Sir William Johnson and the Six Nations (1891) in " Makers of America " series; Augustus C. Buell, Sir William Johnson (1903) in " Historic Lives Series " ; and J. Watts De Peyster, " The Life of Sir John Johnson, Bart.," in The Orderly Book of Sir John Johnson during the Oriskany Campaign, 1776-1777, annotated by William L. Stone (1882).

JOHNSTON, ALBERT SIDNEY (1803-1862), American Con- federate general in the Civil War, was born at Washington, Mason county, Kentucky, on the 3rd of February 1803. He graduated from West Point in 1826, and served for eight years in the U.S. infantry as a company officer, adjutant, and staff officer. In 1834 he resigned his commission, emigrated in 1836 to Texas, then a republic, and joined its army as a private. His rise was very rapid, and before long he was serving as commander- in-chief in preference to General Felix Huston, with whom he foughtaduel. From 1838 to 1840 he was Texan secretary for war, and in 1839 he led a successful expedition against the Cherokee Indians. From 1840 to the outbreak of the Mexican War he lived in retirement on his farm, but in 1846 he led a regiment of Texan volunteers in the field, and at Monterey, as a staff officer, he had three horses shot under him. In 1849 he returned to the United States army as major and paymaster, and in 1855 became colonel of the 2nd U.S. Cavalry (afterwards 5th), in which his lieut.- colonel was

Robert E. Lee, and his majors were Hardee and Thomas. In 1857 he commanded the expedition sent against the Mormons, and performed his difficult and dangerous mission so successfully that the objects of the expedition were attained without blood- shed. He was rewarded with the brevet of brigadier-general. At the outbreak of the Civil War in 1861 Johnston, then in command of the Pacific department, resigned his commission and made his way to Richmond, where Pres. Jefferson Davis, whom he had known at West Point, at once made him a full general in the Confederate army and assigned him to command the depart- ment of Kentucky. Here he had to guard a long and weak line from the Mississippi to the Alleghany Mountains, which was dangerously advanced on account of the political necessity of covering friendly country. The first serious advance of the Federals forced him back at once, and he was freely criticized and denounced for what, in ignorance of the facts, the Southern press and people regarded as a weak and irresolute defence. Johnston himself, who had entered upon the Civil War with the reputation of being the foremost soldier on either side, bore with

fortitude the reproaches of his countrymen, and Davis loyally supported his old friend. Johnston then inarched to join Beauregard at Corinth, Miss., and with the united forces took the offensive against Grant's army at Pittsburg Landing. The battle of Shiloh (q.v.) took place on the 6th and 7th of April, 1862. The Federals were completely surprised, and Johnston was in the full tide of success when he fell mortally wounded. He died a few minutes afterwards. President Davis said, in his message to the Confederate Congress, " Without doing injustice to the living, it may safely be said that our loss is irreparable," and the subse- quent history of the war in the west went far to prove the truth of his eulogy.

His son, William Preston Johnston (1831-1890), who served on the staff of General Johnston and subsequently on that of President Davis, was a distinguished professor and president of Tulane University. His chief work is the Life of General Albert Sidney Johnston (1878), a most valuable and exhaustive biography.

JOHNSTON, ALEXANDER (1840-1880), American historian, was born in Brooklyn, New York, on the 29th of April 1849. He studied at the Polytechnic institute of Brooklyn, graduated at Rutgers College in 1870, and was admitted to the bar in 1875 in New Brunswick, New Jersey, where he taught in the Rutgers College grammar school from 1876 to 1879. He was principal of the Latin school of Norwalk, Connecticut, in

1879-1883, and was professor of jurisprudence and political economy in the College of New Jersey (Princeton University) from 1884 until his death in Princeton, N.J., on the 21st of July 1889. He wrote A History of American Politics (1881); The Genesis of a New England State — Connecticut (1883), in " Johns Hopkins University Studies "; A History of the United States for Schools (1886); Connecticut (1887) in the " American Commonwealths Series "; the article on the history of the United States for the 9th edition of the Encyclopaedia Britannica, reprinted as The United States: Its History and Constitution (1887); a chapter on the history of American political parties in the seventh volume of Winsor's Narrative and Critical History of America, and many articles on the history of American politics in Lalor's Cyclopaedia of Political Science, Political Economy, and Political History of the United States (1881-1884). These last articles, which like his other writings represent much original research and are excellent examples of Johnston's rare talent for terse narrative and keen analysis and interpretation of facts, were republished in two volumes entitled American Political History 1763-1876 (1905-1906), edited by Professor J. A. Woodburn. JOHNSTON, ALEXANDER KEITH (1804-1871), Scottish geographer, was born at Kirkhill near Edinburgh on the 28th of December 1 804. After an education at the high school and the university of Edinburgh he was apprenticed to an engraver; and in 1826 joined his brother (afterwards Sir William Johnston, lord provost of Edinburgh) in a printing and engraving business, the well-known cartographical firm of W. and A. K. Johnston. His interest in geography had early developed, and his first important work was the National Atlas of general geography, which gained for him in 1843 the appointment of Geographer- Royal for Scotland. Johnston was the first to bring the study of physical geography into competent notice in England. His attention had been called to the subject by Humboldt; and after years of labour he published his magnificent Physical Atlas in 1848, followed by a second and enlarged edition in 1856. This, by means of maps with descriptive letterpress, illustrates the geology, hydrography, meteorology, botany, zoology, and ethnology of the globe. The rest of Johnston's life was devoted to geography, his later years to its educational aspects especially. His services were recognized by the leading scientific societies of Europe and America. He died at Ben Rhydding, Yorkshire, on the 9th of July 1871. Johnston published a Dictionary of Geography in 1850, with many later editions; The Royal Atlas of Modem Geography, begun in 1855; an atlas of military geography to accompany Alison's History of Europe in 1848 seq.; and a variety of other atlases and maps for educational or scientific purposes. His son of the same name (1844-1879) was also the

author of various geographical works and papers; in 1873-1875 he was geographer to a commission for the survey of Paraguay; and he died in

Africa while leading the Royal Geographical Society's expedition to Lake Nyasa.

JOHNSTON, ARTHUR (1587-1641), Scottish physician and writer of Latin verse, was the son of an Aberdeenshire laird Johnston of Johnston and Caskieben, and on his mother's side a grandson of the seventh Lord Forbes. It is probable that he began his university studies at one, or both, of the colleges at Aberdeen, but in 1608 he proceeded to Italy and graduated M.D. at Padua in 1610. Thereafter he resided at Sedan, in the company of the exiled Andrew Melville (q.v.), and in 1619 was in practice in Paris. He appears to have returned to England about the time of James I.'s death and to have been in Aberdeen about 1628. He met Laud in Edinburgh at the time of Charles I.'s Scottish coronation (1633) and was en- couraged by him in his literary efforts, partly, it is said, for the undoing of Buchanan's reputation as a Latin poet. He was appointed rector of King's College, Aberdeen, in June 1637. Four years later he died at Oxford, on his way to London, whither Laud had invited him.

Johnston left more than ten works, all in Latin. On two of these, published in the same year, his reputation entirely rests: (a) his version of the Psalms (Psalmorum Davidis paraphrasis poetica et canticorum evangelicorum, Aberdeen, 1637), and (b) his anthology of contemporary Latin verse by Scottish poets (Deliciae poetarum scotorumhujusaeviillustrium, Amsterdam, 1637). He had published in 1633 a volume entitled Cantici Salomonis paraphrasis poetica, which, dedicated to Charles I., had brought him to the notice of Laud. The full version of the Psalms was the result of Laud's encourage- ment. The book was for some time a strong rival of Buchanan's work, though its good Latinity was not superior to that of the latter. The Deliciae, in two small thick volumes of 699 and 575 pages, was a patriotic effort in imitation of the various volumes (under a similar title) which had been popular on the Continent during the second decade of the century. The volumes are dedicated by Johnston to John Scot of Scotstarvet, at whose expense the collected works werepublishedafterjohnston'sdeath.at Middelburg (1642). Selec- tions from his own poems occupy pages 439-647 of the first volume, divided into three sections, Parerga, Epigrammata and Musae . Aulicae. He published a volume of epigrams at Aberdeen in 1632. In these pieces he shows himself at his best. His sacred poems, which had appeared in the Opera (1642), were reprinted by Lauder in his Poetarum Scotorum musae sacrae (1739). The earliest lives are by Lauder (u.s.) and Benson (in Psalmi Davidici, 1741). Ruddi- man's Vindication of Mr George Buchanan 's Paraphrase (1745) began a pamphlet controversy regarding the merits of the rival poets.

JOHNSTON, SIR HENRY HAMILTON (1858-), British administrator and explorer, was born on the 12th of June 1858 at Kennington, London, and

educated at Stockwell grammar school and King's College, London. He was a student for four years in the painting schools of the Royal Academy. At the age of eighteen he began a series of travels in Europe and North Africa, chiefly as a student of painting, architecture and languages. In 1879-1880 he visited the then little known interior of Tunisia. He had also a strong bent towards zoology and comparative anatomy, and carried on work of this description at the Royal College of Surgeons, of whose Hunterian Collection he afterwards became one of the trustees. In 1882 he joined the earl of Mayo in an expedition to the southern part of Angola, a district then much traversed by Transvaal Boers. In 1883 Johnston visited H. M. Stanley on the Congo, and was enabled by that explorer to visit the river above Stanley Pool at a time when it was scarcely known to other Europeans than Stanley and De Brazza. These journeys attracted the attention of the Royal Geographical Society and the British Association, and the last-named in con- cert with the Royal Society conferred on Johnston the leadership of the scientific expedition to Mount Kilimanjaro which started from Zanzibar in April 1884. Johnston's work in this region was also under the direction of Sir John Kirk, British consul at Zanzibar. While in the Kilimanjaro district Johnston con- cluded treaties with the chiefs of Moshi and Taveta (Taveita). These treaties or concessions were transferred to the merchants who founded the British East Africa Company, and in the final agreement with Germany Taveta fell to Great Britain. In October 1885 Johnston was appointed British vice-consul in

Cameroon and in the Niger delta, and he became in 1887 acting consul for that region. A British protectorate over the Niger delta had been notified in June 1885, and between the date of his appointment and 1888, together with the consul E. H. Hewett, Johnston laid the foundations of the British administra- tion in that part of the delta not reserved for the Royal Niger Company. His action in removing the turbulent chief Ja-ja (an ex-slave who had risen to considerable power in the palm-oil trade) occasioned considerable criticism but was approved by the Foreign Office. It led to the complete pacification of a region long disturbed by trade disputes. During these three years of resi- dence in the Gulf of Guinea Johnston ascended the Cameroon Mountain, and made large collections of the flora and fauna of Cameroon for the British Museum.

In the spring of 1889 he was sent to Lisbon to negotiate an arrangement for the delimitation of the British and Portuguese spheres of influence in South-East Africa, but the scheme drawn up, though very like the later arrangement of those regions, was not given effect to at the time. On his

return from Lisbon he was despatched to Mozambique as consul for Portuguese East Africa, and was further charged with a mission to Lake Nyasa to pacify that region, then in a disturbed state owing to the attacks of slave-trading Arabs on the stations of the African Lakes Trading Company — an unofficial war, in which Captain (after- wards Colonel Sir Frederick) Lugard and Mr (afterwards Sir Alfred) Sharpe distinguished themselves. Owing to the unexpected arrival on the scene of Major Serpa Pinto, Johnston was compelled to declare a British protectorate over the Nyasa region, being assisted in this work by John Buchanan (vice-consul), Sir Alfred Sharpe, Alfred Swann and others. A truce was arranged with the Arabs on Lake Nyasa, and within twelve months the British flag, by agreement with the natives, had been hoisted over a very large region which extended north of Lake Tanganyika to the vicinity of Uganda, to Katanga in the Congo Free State, the Shire Highlands and the central Zambezi. Johnston's scheme, in fact, was that known as the " Cape-to-Cairo," a phrase which he had brought into use in an article in The Timts in August 1888. According to his arrangement there would have been an all-British route from Alexandria to Cape Town. But by the Anglo-German agreement of the 1st of July 1890 the British sphere north of Tanganyika was abandoned to Germany, and the Cape-to-Cairo route broken by a wedge of German territory. Johnston returned to British Central Africa as commissioner and consul- general in 1891, and retained that post til) 1896, in which year he was made a K.C.B. His health having suffered much from African fever, he was transferred to Tunis as consul-general (1897). In the autumn of 1899 Sir Harry Johnston was despatched to Uganda as special commissioner to reorganize the administration of that protectorate after the suppression of the mutiny of the Sudanese soldiers and the long war with Unyoro. His two years' work in Uganda and a portion of what is now British East Africa were rewarded at the close of 1901 by a G.C.M.G. In the spring of the following year he retired from the consular service. After 1904 he interested himself greatly in the affairs of the Liberian republic, and negotiated various arrangements with that negro state by which order was brought into its finances, the frontier with France was delimited, and the development of the interior by means of roads was commenced. In 1903 he was defeated as Liberal candidate for parliament at a by-election at Rochester. He met with no better success at West Marylebone at the general election of 1906.

For his services to zoology he was awarded the gold medal of the Zoological Society in 1902, and in the same year was made an honorary doctor of science at Cambridge. He received the gold medal of the Royal Geographical and the Royal Scottish Geographical societies, and other medals for his artistic work from South Kensington and the Society of Arts. His pictures, chiefly dealing with African subjects, were frequently

exhibited at the Royal Academy. He was the author of numerous books on Africa, including British Central Africa (1897) ; The Colonization of Africa (1899); The Uganda Protectorate (1902); Liberia (1906);

George Grenfell and the Congo (1908). During his travels in the north-eastern part of the Congo Free State in 1900 he was instrumental in discovering and naming the okapi, a mammal nearly allied to the giraffe. His name has been connected with many other discoveries in the African fauna and flora.

JOHNSTON, JOSEPH EGGLESTON (1807-1891), American Confederate general in the Civil War, was born near Farmville, Prince Edward county, Virginia, on the 3rd of February 1807. His father, Peter Johnston (1763-1841), a Virginian of Scottish descent, served in the War of Independence, and afterwards became a distinguished jurist; his mother was a niece of Patrick Henry. He graduated at West Point, in the same class with Robert E. Lee, and was made brevet second lieutenant, 4th Artillery, in 1829. He served in the Black Hawk and Seminole wars, and left the army in 1837 to become a civil engineer, but a year afterwards he was reappointed to the army as first lieutenant, Topographical Engineers, and breveted captain for his conduct in the Seminole war. During the Mexican war he was twice severely wounded in a reconnaissance at Cerro Gordo, 1847, was engaged in the siege of Vera Cruz, the battles of Contreras, Churubusco, and Molino del Rey, the storming of Chapultepec, and the assault on the city of Mexico, and received three brevets for gallant and meritorious service. From 1853 to 1855 he was employed on Western river improvements, and in 1855 he became lieut. -colonel of the 1st U.S. Cavalry. In i860 he was made quartermaster-general, with the rank of brigadier- general. In April 1861 he resigned from the United States army and entered the Confederate service. He was commis- sioned major-general of volunteers in the Army of Virginia, and assisted in organizing the volunteers. He was later appointed a general officer of the Confederacy, and assigned to the command of the Army of the Shenandoah, being opposed by the Federal army under Patterson. When McDowell advanced upon the Confederate forces under Beauregard at Manassas, Johnston moved from the Shenandoah Valley with great rapidity to Beauregard's assistance. As senior officer he took command on the field, and at Bull Run (Manassas) (q.v.) won the first impor- tant Confederate victory. In August 1861 he was made one of the five full generals of the Confederacy, remaining in command of the main army in Virginia. He commanded in the battle . of Fair Oaks (May 31, 1862), and was so severely wounded as to be incapacitated for several months. In March 1863, still troubled by his wound, he was assigned to the command of the south-west, and in May was ordered to take immediate command of all the Confederate forces in Mississippi, then threatened by Grant's movement on Vicksburg. When

Pember- ton's army was besieged in Vicksburg by Grant, Johnston used every effort to relieve it, but his force was inadequate. Later in 1863, when the battle of Chattanooga brought the Federals to the borders of Georgia, Johnston was assigned to command the Army of Tennessee at Dalton, and in the early days of May 1864 the combined armies of the North under Sherman advanced against his lines. For the main outlines of the famous campaign between Sherman and Johnston see American Civil War (§ 29). From the 9th of May to the 17th of July there were skirmishes, actions and combats almost daily. The great numerical superi- ority of the Federals enabled Sherman to press back the Con- federates without a pitched battle, but the severity of the skirmishing may be judged from the casualties of the two armies (Sherman's about 26,000 men, Johnston's over 10,000), and the obstinate steadiness of Johnston by the fact that his opponent hardly progressed more than one mile a day. But a Fabian policy is never acceptable to an eager people, and when Johnston had been driven back to Atlanta he was superseded by Hood with orders to fight a battle. The wisdom of John- ston's plan was soon abundantly clear, and the Confederate cause was already lost when Lee reinstated him on the 23rd of February 1865. With a handful of men he opposed Sherman's march through the Carolinas, and at Bentonville, N.C., fought and almost won a most gallant and skilful battle against heavy odds. But the Union troops steadily advanced, growing in strength as they went, and a few days after Lee's surrender at

Appomattox Johnston advised President Davis that it was in his opinion wrong and useless to continue the conflict, and he was authorized to make terms with Sherman. The terms entered into between these generals, on the 18th of April, having been rejected by the United States government, another agreement was signed on the 26th of April, the new terms being similar to those of the surrender of Lee. After the close of the war Johnston engaged in civil pursuits. In 1874 he published a Narrative of Military Operations during the Civil War. In 1877 he was elected to represent the Richmond district ol Virginia in Congress. In 1887 he was appointed by President Cleveland U.S. commissioner of railroads. Johnston was married in early life to Louisa (d. 1886), daughter of Louis M'Lane. He died at Washington, D.C., on the 21st of March 1891, leaving no children.

It was not the good fortune of Johnston to acquire the prestige which so much assisted Lee and Jackson, nor indeed did he pos- sess the power of enforcing his will on others in the same degree, but his methods were exact, his strategy calm and balanced, and, if he showed himself less daring than

his comrades, he was un- surpassed in steadiness. The duel of Sherman and Johnston is almost as personal a contest between two great captains as were the campaigns of Turenne and Montecucculi. To Monte- cucculi, indeed, both in his military character and in the incidents of his career, Joseph Johnston bears a striking resemblance.

See Hughes, General Johnston, in " Great Commanders Series "

(1893)-

JOHNSTONE, a police burgh of Renfrewshire, Scotland, on the Black Cart, n m. W. of Glasgow by the Glasgow & South- western railway. Pop. (1901), 10,503. The leading industries include flax-spinning, cotton manufactures (with the introduction of which in 1781 the prosperity of the town began), paper-making, shoe-lace making, iron and brass foundries and engineering works. There are also coal mines and oil works in the vicinity. Elderslie, 1 m. E., is the reputed birthplace of Sir William Wallace, but it is doubtful if " Wallace's Yew," though of great age, and " Wallace's Oak," a fine old tree that perished in a storm in 1856, and the small castellated building (tradi- tionally his house) which preceded the present mansion in the west end of the village, existed in his day.

JOHNSTOWN, a city and the county-seat of Fulton county, New York, U.S.A., on Cayadutta Creek, about 4 m. N. of the Mohawk river and about 48 m. N.W. of Albany. Pop. (1890), 7768; (1900), 10,130 (1653 foreign-born); (1905, state census), 9765; (1910) 10.447. It is served by the Fonda, Johnstown & Gloversville railroad, and by an electric line to Schenectady. The city has a Federal building, a Y.M.C.A. building, a city hall, and a Carnegie library (1902). The most interesting building is Johnson Hall, a fine old baronial mansion, built by Sir William Johnson in 1762 and his home until his death; his grave is just outside the present St John's episcopal church. Originally the hall was flanked by two stone forts, one of which is still standing. In 1907 the hall was bought by the state and was placed in the custody of the Johnstown Historical Society, which maintains a museum here. In the hall Johnson estab- lished in 1766 a Masonic lodge, one of the oldest in the United States. Other buildings of historical interest are the Drumm House and the Fulton county court house, built by Sir William Johnson in 1763 and 1772 respectively, and the gaol (1772), at first used for all New York west of Schenectady county, and during the War of Independence as a civil and a military prison. The court house is said to be the oldest in the United States. Three miles south of the city is the Butler House, built in 1742 by Colonel John Butler (d. 1 794) , a prominent Tory leader during the War of Independence. A free school, said to have been the first in New York state, was established at Johnstown by Sir William Johnson in 1764. The city is (after Gloversville, 3 m.

distant) the principal glove-making centre in the United States, the product being valued at $2,581,274 in 1905 and being 14-6% of the total value of this industry in the United States. The manufacture of gloves in commercial quantities was introduced into the United States and Johnstown in 1809 by Talmadge

Edwards, who was buried there in the colonial cemetery. The value of the total factory product in 1905 was $4,543,272 (a decrease of 11-3% since 1900). Johnstown was settled about 1760 by a colony of Scots brought to America by Sir William Johnson, within whose extensive grant it was situated, and in whose honour, in 1771, it was named. A number of important conferences between the colonial authorities and the Iroquois Indians were held here, and on the 28th of October 1781, during the War of Independence, Colonel Marinus Willett (1 740-1830) defeated here a force of British and Indians, whose leader, Walter Butler, a son of Colonel John Butler, and, with him, a participant in the Wyoming massacres, was mortally wounded near West Canada creek during the pursuit. Johnstown was incorporated as a village in 1808, and was chartered as a city in 1895.

JOHNSTOWN, a city of Cambria county, Pennsylvania, U.S.A., at the confluence of the Conemaugh river and Stony creek, about 75 m. E. by S. of Pittsburg. Pop. (1890), 21,805; (1900), 35,936, of whom 7318 were foreign-born, 2017 being Hungarians, 1663 Germans, and 923 Austrians; (1910 census) 55,482. It is served by the Pennsylvania and the Baltimore & Ohio railways. The city lies about n 70 ft. above the sea, on level ground extending for some distance along the river, and nearly enclosed by high and precipitous hills. Among the public buildings and institutions are the Cambria free library (containing about 14,000 volumes in 1908), the city hall, a fine high school, and the Conemaugh Valley memorial hospital. Roxbury Park, about 3 m. from the city, is reached by electric lines. Coal, iron ore, fire clay and limestone abound in the vicinity, and the city has large plants for the manufacture of iron and steel. The total value of the factory product in 1905 was $28,891,806, an increase of 35-2% since 1900. A settlement was established here in 1791 by Joseph Jahns, in whose honour it was named, and the place was soon laid out as a town, but it was not incor- porated as a city until 1889, the year of the disastrous Johnstown flood. In 1852 a dam (700 ft. long and 100 ft. high), intended to provide a storage reservoir for the Pennsylvania canal, had been built across the South Fork, a branch of the Conemaugh river, 12 m. above the city, but the Pennsylvania canal was subsequently abandoned, and in 1888 the dam was bought and repaired by the South Fork hunting and fishing club, and Cone- maugh lake was formed. On the 31st of May 1889, during a heavy rainfall, the dam gave way and a mass of water 20 ft. or more in height at its head swept over Johnstown at a speed of about 20 m. an hour, almost completely destroying the city. The Pennsylvania railroad bridge withstood the strain, and against it the flood piled up a mass of wreckage many feet in height and several acres in area. On or in this confused mass many of the inhabitants were saved from drowning, only to be burned alive when it caught fire. Seven other towns and villages in the valley were also

swept away, and the total loss of lives was 2000 or more. A relief fund of nearly $3,000,000 was raised, and the city was quickly rebuilt.

JOHOR (Johore is the local official, but incorrect spelling), an independent Malayan state at the southern end of the peninsula, stretching from 2° 40′ S. to Cape Romania (Ramunya), the most southerly point on the mainland of Asia, and including all the small islands adjacent to the coast which lie to the south of parallel 2° 40′ S. It is bounded N. by the protected native state of Pahang, N.W. by the Negri Sembilan and the territory of Malacca, S. by the strait which divides Singapore island from the mainland, E. by the China Sea, and W. by the Straits of Malacca. The province of Muar was placed under the admin- istration of Johor by the British government as a temporary measure in 1877, and was still a portion of the sultan's dominions in 1910. The coast-line measures about 250 m. The greatest length from N.W. to S.E. is 165 m., the greatest breadth from E. to W. 100 m. The area is estimated at about 9000 sq. m. The principal rivers are the Muar, the most important waterway in the south of the peninsula; the Johor, up which river the old capital of the state was situated; the Endau, which marks the boundary with Pahang; and the Batu Pahat and Sfidfili, of

comparative unimportance. Johor is less mountainous than any other state in the peninsula. The highest peak is Gunong Ledang, called Mt Ophir by Europeans, which measures some 4000 ft. in height. Like the rest of the peninsula, Johor is covered from end to end by one vast spread of forest, only broken here and there by clearings and settlements of insig- nificant area. The capital is Johor Bharu (pop. about 20,000), situated at the nearest point on the mainland to the island of Singapore. The fine palace built by the sultan Abubakar is the principal feature of the town. It is a kind of Oriental Monte Carlo, and is much resorted to from Singapore. The capital of the province of Muar is Bandar Maharani, named after the wife of the sultan before he had assumed his final title. The climate of Johor is healthy and equable for a country situ- ated so near to the equator; it is cooler than that of Singapore. The shade temperature varies from 98-5° F. to 68-2° F. The rainfall averages 97-28 in. per annum. No exact figures can be obtained as to the population of Johor, but the best estimates place it at about 200,000, of whom 150,000 are Chinese, 35,000 Malays, 15,000 Javanese. We are thus presented with the curious spectacle of a country under Malay rule in which the Chinese outnumber the people of the land by more than four to one. It is not possible to obtain any exact data on the subject of the revenue and expenditure of the state. The

revenue, however, is probably about 750,000 dollars, and the expenditure under public service is comparatively small. The revenue is chiefly derived from the revenue farms for opium, spirits, gambling, &c, and from duty on pepper and gambier exported by the Chinese. The cultivation of these products forms the principal industry. Areca-nuts and copra are also exported in some quantities, more especially from Muar. There is little mineral wealth of proved value.

History. — It is claimed that the Mahommedan empire of Johor was founded by the sultan of Malacca after his expulsion from his kingdom by the Portuguese in 151 1. It is certain that Johor took an active part, only second to that of Achin, in the protracted war between the Portuguese and the Dutch for the possession of Malacca. Later we find Johor ruled by an officer of the sultan of Riouw (Rlau), bearing the title of Tumenggong, and owing feudal allegiance to his master in common with the Bendahara of Pahang. In 181 2, however, this officer seems to have thrown off the control of Riouw, and to have assumed the title of sultan, for one of his descendants, Sultan Husain, ceded the island of Singapore to the East India Company in 1819. In 1855 the then sultan, Ali, was deposed, and his principal chief, the Tumenggong, was given the supreme rule by the British. His son Tumenggong Abubakar proved to be a man of excep- tional intelligence. He made numerous visits to Europe, took considerable interest in the government and development of his country, and was given by Queen Victoria the title of maharaja in 1879. On one of his visits to England he was made the defendant in a suit for breach of promise of marriage, but the plaintiff was non-suited, since it was decided that no action lay against a foreign sovereign in the English law courts. In 1885 he entered into a new agreement with the British government, and was allowed to assume the title of sultan of the state and territory of Johor. He was succeeded in 1895 by his son Sultan Ibrahim. The government of Johor has been compara- tively so free from abuses under its native rulers that it has never been found necessary to place it under the residential system in force in the other native states of the peninsula which are under British control, and on several occasions Abubakar used his influence with good effect on the side of law and order. The close proximity of Johor to Singapore has constantly subjected the rulers of the former state to the influence of European public opinion. None the less, the Malay is by nature but ill fitted for the drudgery which is necessary if proper attention is to be paid to the dull details whereby government is rendered good and efficient. Abubakar's principal adviser, the Dato 'Mentri, was a worthy servant of his able master. Subsequently, however, the reins of government came chiefly into the hands of a set of young men who lacked either experience

or the serious devotion to dull duties which is the distinguishing mark of the English civil service. Muar, in imitation of the British system, is ruled by a

raja of the house of Johor, who bears the title of resident. (H. Cl.)

JOIGNY, a town of central France, capital of an arrondisse- ment in the department of Yonne, 18 m. N.N.W. of Auxerre by the Paris-Lyon-Mediterranee railway. Pop. (1906), 4888. It is situated on the flank of the hill known as the Cote St Jacques on the right bank of the Yonne. Its streets are steep and narrow, and old houses with carved wooden facades are numerous. The church of St Jean (16th century), which once stood within the enceinte of the old castle, contains a represen- tation (15th century) of the Holy Sepulchre in white marble. Other interesting buildings are the church of St Andre (12th, 1 6th and 17th centuries), of which the best feature is the Renaissance portal with its fine bas-reliefs; and the church of St Thibault (16th century), in which the stone crown suspended from the choir vaulting is chiefly noticeable. The Porte du Bois, a gateway with two massive flanking towers, is a relic of the 10th century castle; there is also a castle of the 16th and 17th centuries, in part demolished. The h6tel de ville (18th century) shelters the library; the law-court contains the sepul- chral chapel of the Ferrands (16th century). The town is the seat of a sub-prefect and has tribunals of first instance and of commerce, and a communal college for boys. It is industrially unimportant, but the wine of the Cote St Jacques is much esteemed. –

Joigny (J oviniacum) was probably of Roman origin. In the 10th century it became the seat of a countship dependent on that of Champagne, which after passing through several hands came in the 18th century into the possession of the family of Villeroi. A fragment of a ladder preserved in the church of St Andr6 commemorates the successful resistance offered by the town to the English in 1429.

JOINDER, in English law, a term used in several connexions.

Joinder of causes of action is the uniting in the same action several causes of action. Save in actions for the recovery of land and in actions by a trustee in bankruptcy a plaintiff may without leave join in one action, not several actions, but several " causes of action." Claims by or against husband and wife may be joined with claims by or against either of them separately. Claims by or against an executor or administrator as such may be joined with claims by or against him personally, provided such claims are alleged to arise with reference to the estate of which the plaintiff or defendant sues or is sued as executor or administrator. Claims by plaintiffs jointly may be joined with claims by them or any of them separately against the same defendant.

Joinder in pleading is the joining by the parties on the point of matter issuing out of the allegations and pleas of the plaintiff and the defendant in

a cause and the putting the cause upon trial.

Joinder of parties. — Where parties may jointly, severally or in the alternative bring separate actions in respect of or arising out of the same transaction or series of transactions they may, by Order XVI. of the rules of the supreme court, be joined in one action as plaintiffs.

JOINERY, one of the useful arts which contribute to the comfort and convenience of man. As the arts of joinery and carpentry are often followed by the same individual, it appears natural to conclude that the same principles are common to both, but a closer examination leads to a different conclusion. The art of carpentry is directed almost wholly to the support of weight or pressure, and therefore its principles must be sought in the mechanical sciences. In a building it includes all the rough timber work necessary for support, division or connexion, and its proper object is to give firmness and stability. The art of joinery has for its object the addition in a building of all the fixed woodwork necessary for convenience or ornament. The joiner's works are in many cases of a complicated nature, and often require to be executed in an expensive material, therefore joinery requires much skill in that part of geometrical science which

treats of the projection and description of lines, surfaces and solids, as well as an intimate knowledge of the structure and nature of wood. A man may be a good carpenter without being a joiner at all, but he cannot be a joiner without being competent, at least, to supervise all the operations required in carpentry. The rough labour of the carpenter renders him in some degree unfit to produce that accurate and neat workmanship which is expected from a modern joiner, but it is no less true that the habit of neatness and the great precision of the joiner make him a much slower workman than the man practised in works of carpentry. In carpentry framing owes its strength mainly to the form and position of its parts, but in joinery the strength of a frame depends to a larger extent upon the strength of the joinings. The importance of fitting the joints together as accurately as possible is therefore obvious. It is very desirable that a joiner shall be a quick workman, but it is still more so that he shall be a good one, and that he should join his materials with firmness and accuracy. It is also of the greatest importance that the work when thus put together shall be constructed of such sound and dry materials, and on such principles, that the whole shall bear the various changes of temperature and of moisture and dryness, so that the least possible shrinkage or swelling shall take place; but provision must be made so that, if swelling or shrinking does

occur, no damage shall be done to the work.

In early times every part was rude, and jointed in the most artless manner. The first dawnings of the art of modern joinery appear in the thrones, stalls, pulpits and screens of early Gothic cathedrals and churches, but even in these it is indebted to the carver for everything that is worthy of regard. With the revival of classic art, however, great changes took place in every sort of construction. Forms began to be introduced in architec- ture which could not be executed at a moderate expense without the aid of new principles, and these principles were discovered and published by practical joiners. These authors, with their scanty geometrical knowledge, had but confused notions of these principles, and accordingly their descriptions are often obscure, and sometimes erroneous. The framed wainscot of small panels gave way to the large bolection moulded panelling. Doors which were formerly heavily framed and hung on massive posts or in jambs of cut stone, were now framed in light panels and hung in moulded dressings of wood. The scarcity of oak timber, and the expense of working it, subsequently led to the importation of fir timber from northern Europe, and this gradually superseded all other material save for special work.

Tools and Materials. — The joiner operates with saws, planes, chisels, gouges, hatchet, adze, gimlets and other boring instru- ments (aided and directed by chalked lines), gauges, squares, hammers, wallets, floor cramps and a great many other tools. His operations consist principally of sawing and planing in all their varieties, and of setting out and making joints of all kinds. There is likewise a great range of other operations — such as paring, gluing up, wedging, pinning, fixing, fitting and hanging — and many which depend on nailing and screwing, such as laying floors, boarding ceilings, wainscoting walls, bracketing, cradling, firring, and the like. In addition to the wood on which the joiner works, he requires also glue, white lead, nails, brads, screws and hinges, and accessorily he applies bolts, locks, bars and other fastenings, together with pulleys, lines, weights, holdfasts, wall hooks, &c. The joiner's work for a house is for the most part prepared at the shop, where there should be convenience for doing everything in the best and readiest manner, so that little remains when the carcase is ready and the floors laid but to fit, fix and hang. The sashes, frames, doors, shutters, linings and soffits are all framed and put together, i.e. wedged up and cleaned off at the shop; the flooring is planed and prepared with rebated or grooved edges ready for laying, and the moulded work — the picture and dado rails, architraves, skirtings and panelling — is all got out at the shop. On a new building the joiner fits up a temporary workshop with benches, sawing stools and a stove for his glue pot. Here he adjusts the

work for fitting up and makes any small portions that may still be required.

The preparation of joinery entirely by hand is now the excep- tion — a fact due to the ever-increasing use of machines, which have remarkably shortened the time required to execute the ordinary operations. Various machines rapidly and perfectly execute planing and surfacing, mortising and moulding, leaving the craftsman merely to fit and glue up. Large quantities of machine-made flooring, window-frames and doors are now imported into England from Canada and the continent of Europe. The timber is grown near the place of manufacture, and this, coupled with the fact that labour at a low rate of wages is easily obtainable on the Continent, enables the cost of production to be kept very low.

The structure and properties of wood should be thoroughly understood by every joiner. The man who has made the nature of timber his study has always a decided advantage over those who have neglected this. Timber shrinks considerably in the width, but not appreciably in the length. Owing to this shrink- age certain joints and details, hereinafter described and illus- trated, are in common use for the purpose of counteracting the bad effect this movement would otherwise have upon all joinery work.

The kinds of wood commonly employed in joinery are the different species of North European and North American pine, oak, teak and mahogany (see Timber). The greater part of English joiners' work is executed in the northern pine exported from the Baltic countries. Hence the joiner obtains the planks, deals, battens and strips from which he shapes his work. The timber reaches the workman from the sawmills in a size convenient for the use he intends, considerable time and labour being saved in this way.

A log of timber sawn to a square section is termed a balk. In section it may range from I to I J ft. square. Planks are formed by sawing the balk into sections from II to 1 8 in. wide and 3 to 6 in. thick, and the term deal is applied to sawn stuff 9 in. wide and 2 to 4J in. thick. Battens are boards running not more than 3 in. thick and 4 to 7 in. wide. A strip is .lot thicker than I J in., the width being about 4 in.

Joints. — Side joints (fig. 1) are used for joining boards together edge to edge, and are widely employed in flooring. In the square joint the edges of the boards are carefully shot, the two edges to be joined brought together with glue applied hot, and the boards tightly clamped and left to dry, when the surface is cleaned off with the smoothing plane. A joint in general use for joining up boards for fascias, panels, linings, window- boards, and other work of a like nature is formed in a similar manner to the above, but with a cross- grained tongue inserted, thereby greatly strengthening the work at an otherwise naturally weak point. This is termed a cross-tongued and glued joint. The dowelled joint is a square glued joint strengthened with hard wood or iron dowels inserted in the edge of each board to a

depth of about f in. and placed about 18 in. apart. The matched joint is shown in two forms, beaded and jointed. Matched boarding is frequently used as a less expensive substitute for panelled framing. Although of course in appearance it cannot compare with the latter, it has a somewhat ornamental appearance, and the moulded joints allow shrinkage to take place without detri- ment to the appearance of the work. The rebated joint is used in the meeting styles of casements and folding doors, and it is useful in excluding draughts and preventing observation through the joint.

Of the angle joints (fig. 2) in common use by tiie joiner the following are the most important. The mitre is shown in the drawing, and is so well known as to need little description. Although simple, it needs a practised and accurate hand for its proper execution. The common mitre is essentially weak unless reinforced with blocks glued into the angle at the back of it, and is therefore often strengthened with a feather of wood or iron. Other variations of the mitre are the mitre and butt, used where the pieces connected are of unequal thick- ness; the mitre and rebate, with a square section which facilitates nailing or screwing ; the mitre rebate and feather, similar to the latter, with a feather giving additional strength to the joint ; and the mitre groove and tongue, having a tongue worked on the material itself in place of the feather of the last-named joint. The last two methods

Matched & V-jointed FlG. I.

are used in the best work, and, carefully worked and glued, with the assistance of angle blocks glued at the back, obviate the neces- sity of face screws or nails. The keyed mitre consists of a simple mitre joint, which after being glued up has a number of pairs of

saw cuts made across the angle, into which are fitted and glued thin triangular slips of hard wood, or as an alternative, pieces of brass or other metal. Other forms of angle joints are based on the rebate with a bead worked on in such a position as to hide any bad effects caused by the joint opening by shrinkage. They may be secured either by nailing or screwing, or by glued angle blocks. The dovetail is a most important joint; its most usual forms are illustrated in fig. 3. The mitre dovetail is used in . the best work. It will be seen that the dovetail is a tenon, shaped as a wedge, and it is this distinguishing feature which gives it great strength irrespec- tive of glue or screws. It is invalu- able in framing together joiners' fittings; its use in drawers espe- cially provides a good example of its purpose and

structure.

Warping in Wide Boards. — It is necessary to prevent the tendency to warp, twist and split, which boards of great width, or several boards glued together edge to edge, naturally possess. On the other hand, swelling and shrinking due to changes in the humidity of the atmosphere must not be checked, or the result will be disastrous. To effect this end various simple devices are available. The direction

Keyed mitre

Fig. 2.

Common dovetail. Lapped dovetail.

Fig. 3. — Dovetails.

Mitre or „?. Secret dovetail.

Tapering Hardwood battep ,

key. »1mU)t>unons.

of the annular rings in alternate boards may be reversed, and when the boards have been carefully jointed with tongues or dowels and glued up, a hard-wood tapering key, dovetail in section, may be let into a wide dovetail at the back (fig. 4). It must be accurately fitted

and driven tightly home, but, of course, not glued. Battens of hard wood may be used for the same purpose, fixed either with hard-wood buttons or by means of brass slots and screws, the slots allowing for any slight movement that may take place. With boards of a substantial thickness light iron rods may be used, holes being bored through the thick- ness of the boards and rods passed through; the edges are then glued up. This method is very effective and neat in . appearance, and is specially

suitable when a smooth surface is desired on both sides of the work. Mouldings are used in joinery to relieve plain surfaces by the contrasts of light and shade formed by their members, and to orna- ment or accentuate those particular portions which the designer may wish to bring into prominence. Great skill and discrimination are required in designing and applying mouldings, but that matter falls to the qualified designer and is perhaps outside the province of the practical workman, whose work is to carry out; in an accurate and finished manner the ideas of the draughtsman. The character of a moulding is greatly affected by the nature and appearance of the wood in which it is worked. A section suitable for a

hard regularly grained wood, such as mahogany, would probably look insignificant if worked in a softer wood with pronounced markings. Mouldings worked on woods of the former type may consist of small and delicate members; woods of the latter class require bold treatment.

The mouldings of joinery, as well as of all other moulded work used in connexion with a building, are usually worked in accordance

Fig. 4. — Prevention of Warping.

quirk

Torus

and

Bead

with full-sized detail drawings prepared by the architect, and are designed by him to conform with the style and class of building. There are, however, a number of moulded forms in common use which have particular names; sections are shown of many of these ’”} %• 5- Most of them occur in the classic architecture of both Greeks and Romans. A striking distinction, how- ever, existed in the mould- ings of these two peoples ; the curves of the Greek mouldings were either de- rived from conic sections or drawn in freehand, while in typical Roman work the curved compo- nents were segments of a circle. Numerous exam- ples of the use of these forms occur in ordinary joinery work, and may be recognized on refer- ence to the illustrations, which will be easily un- derstood without further description.
Fig. 5. — Mouldings.

_ Mouldings may be either stuck or planted on. A stuck moulding is worked directly on to the framing it is used to ornament ; a planted moulding is separately worked and fixed in position with nails or screws. Beads and other small mouldings should always be stuck; larger ones are usually planted on. In the case of mouldings planted on panelled work, the nails should be driven through the moulding into the style or rail of the framing, and on no account into the panel. By adopting the former method the panel is free to shrink — as it undoubtedly’ will do — without altering the good appearance of the work; but should the moulding be fixed to the panel it will, when the latter shrinks, be pulled out of place, leaving an unsightly gap between it and the framing.

Flooring. — When the bricklayer, mason and carpenter have prepared the carcase of a building for the joiner, one of the first operations is that of laying the floor boards. They should have been stacked under cover on the

site for some considerable time, in order to be thoroughly well seasoned when the time to use them arrives. The work of laying should take place in warm dry weather. The joints of flooring laid in winter time or during wet weather are sure to open in the following summer, however tightly they may be cramped up during the process of laying. An additional expense will then be incurred by the necessity of filling in the opened joints with wood slips glued and driven into place. Boards of narrow width are better and more expensive than wide ones. They may be of various woods, the kinds generally preferred, on account of their low comparative cost and ease of working, being yellow deal and white deal. White deal or spruce is an inferior wood, but is fre- quently used with good results for the floors of less important apart- ments. A better floor is obtained with yellow deal, which, when of good quality and well seasoned, is lasting and wears well. For floors where a fine appearance is desired, or which will be subjected to heavy wear, some harder and tougher material, such as pitch pine, oak, ash, maple or teak, should be laid. These woods are capable of taking a fine polish and, finished in this way, form a beautiful as well as a durable floor.

Many of the side joints illustrated in fig. 1 are applied to flooring boards, which, however, are not usually glued up. The heart side of the board should be placed downwards so that in drying the ten- dency will be for the edges to press more tightly to the joists instead of curling upwards. The square joint should be used only on ground floors; if it is used for the upper rooms, dust and water will drop through the crevices and damage the ceiling beneath. Dowelled joints are open to the same objection. One of the best and most econo- mical methods is the ploughed and tongued joint. The tongue may be of hard wood or iron, preferably the latter, which is stronger and occupies very narrow grooves. The tongue should be placed as near the bottom of the board as is practicable, leaving as much wearing material as possible. Two varieties of secret joints are shown in flg. 1. — the splayed, rebated, grooved and tongued, and the rebated, grooved and tongued. Owing to the waste of material in forming these joints and the extra labour involved in laying the boards, they are costly and are only used when it is required that no heads of nails or screws should appear on the surface. The heading joints of flooring are often specified to be splayed or bevelled, but it is far better to rebate them.

Wood block floors are much used, and are exceedingly solid. The blocks are laid directly on a smoothed concrete bed or floor in a damp-proof mastic having bitumen as its base; this fulfils the double purpose of preventing the wood from rotting, and securing the blocks in their places. To check any inclination to warp and rise, however, the edges of the blocks in the better class of floors are connected by dowels of wood or metal, or by a tongued joint. The blocks may be from I to 3 in. thick, and are usually

9 or 12 in. long by 3 in. wide.

Parquet floors are made of hard woods of various kinds, laid in patterns on a deal sub-floor, and may be of any thickness from J to

i\ in. Great care should be taken in laying the sub-floor, especially for the thinner parquet. The boards should be in narrow widths of well-seasoned stun and well nailed, for any movement in'the sub- floor due to warping or shrinking may have disastrous results on the parquet which is laid upon it. Plated parquet consists of selected hare! woods firmly fixed on a framed deal backing. It is made in sections for easy transport, and these are fitted together in the apartment for which they are intended. When secured to the joists these form a perfect floor.

Skirtings. — In joinery, the skirting is a board fixed around the base of internal walls to form an ornamental base for the wall (see fig. 7). It also covers the joint between the flooring and the wall, and protects the base of the wall from injury. Skirtings may be placed in two classes — those formed from a plain board with its upper edge either left square or moulded, and those formed of two or more separate members and termed a built-up skirting (fig. 6). Small angle fillets or mouldings are often used as skirtings. The skirt- ing should be worked so as to allow it to be fixed with the heart side of the wood outwards ; any ten- dency to warp will then only serve to press the top edge more closely to the wall. In good work a groove should be formed in the floor and the skirt- ing tongued into it so that an open joint is avoided should shrinkage occur. The skirting should be nailed only near the top to wood grounds fixed to wood plugs in the joints of the brickwork. These grounds are about J to I in. thick, i.e. the same thickness as the plaster, and are generally splayed or grooved on the edge to form a key for the plaster. A rough coat of plaster should always be laid on the wall behind the skirting in order to prevent the space becoming a harbourage for vermin.

Dados. — A dado, like a skirting, is useful both in a decorative

Fig. 6.— Built- up Skirting tongued to floor.

and a protective sense. It is filled in to ornament and protect that portion of the wall between the chair or dado rail and the skirting. It may be of horizontal boards battened at the back and with cross tongued and glued joints, presenting a perfectly smooth surface, or of matched boarding fixed vertically, or of panelled framing. The last method is of course the most

ornate and admits of great variety of design. The work is fixed to rough framed wood grounds which are nailed to plugs driven into the joints of the brickwork. Fig. 7 shows an example of a panelled dado with capping moulding and skirting. A picture rail also is shown ; it is a small moulding with the top edge grooved to take the metal hooks from which pictures are hung.

Walls are sometimes entirely sheathed with panelling, and very fine effects are obtained in this way. The fixing is effected to rough grounds in a manner similar to that adopted in the case of dados. In England the architects of the Tudor period made great use of oak framing, panelled and richly carved, as a wall covering and decora- tion, and many beautiful examples may be seen in the remaining buildings of that period.

Windows. — The parts of a window sash are distinguished by the same terms as are applied to similar portions of ordinary framing, being formed of rails and styles, with sash bars rebated for glazing. The upright sides are styles ; the horizontal ones, which are tenoned into the styles, are rails (fig. 7).

Sashes hung by one of their vertical edges are called casements (fig. 8). They are really a kind of glazed door and sometimes indeed are used as such, as for example French casements (fig. 9). They may be made to open either outwards or inwards. It is very difficult with the latter to form perfectly water-tight joints ; with those opening outwards the trouble does not exist to so great an extent. This form of window, though almost superseded in England by the case frame with hung sashes, is in almost universal use on the Continent. Yorkshire sliding sashes move in a horizontal direction upon grooved runners with the meeting styles vertical. They are

Section.

Internal Elevation of cased double-hung window. Elevation of internal door

Outsit/e Outside

'Stone'cilf />,,ii e y s Zj e 1 1

H^B

Section.

■*a*

•*a v*

m

IL

P- JPpiˆjRˆlltjTjjrfˆ : li

Window board

%k ‘ • ™-J$J

Enlargement of B.

Plan Of Window. back lining

Plan of door.

Fig. 7.

little used, and are apt to admit draughts and wet unless efficient checks are worked upon the sashes and frames.

Lights in a position difficult of access are often hung on centre pivots. An example of this method is shown in fig. 8 ; metal pivots are fixed to the frame and the sockets in which these pivots work are screwed to the sash. Movement is effected by means of a cord

Casement window fitted with Shutters.

Hiitgei ‘

Half plan through casement.

Half plan through centre hung sash.

Fig. 8. — Casement window fitted with shutters, fixed so that a slight pull opens or closes the window to the desired extent, and the cord is then held by being tied to, or twisted round, a small metal button or clip, or a geared fanlight opener may be used. For the side sashes of lantern lights and for stables and factories this form of window is in general use.

In the British Isles and in America the most usual form of window is the cased frame with double hung sliding sashes. This style has many advantages. It is efficient in excluding wet and draughts, ventilation may be

easily regulated and the sashes can be lowered and raised with ease without interference with any blinds, curtains or other fittings, that may be applied to the windows. In the ordinary window of this style, however, difficulty is experienced in cleaning the external glass without assuming a dangerous position on the sill, but there are many excellent inventions now on the market which obviate this difficulty by allowing — usually on the removal of a small thumb-screw — the reversal of the sash on a pivot or hinge.

Plan

Section.

Details of A. Details of B.

Fig. 9. — Details of French Casement to open inwards.

For a small extra cost these arrangements may be provided; they will be greatly appreciated by those who clean the windows. The cased frames are in the form of boxes to enclose the iron or lead weights which balance the sashes (fig. 7), and consist of a pulley style — which takes the wear of the sashes and is often of hard wood on this account — an inside lining, and an outside lining; these three members are continued to form the head of the frame. The sashes are connected with the weights by flax lines working over metal pulleys fixed in the pulley styles. For heavy sashes with plate glass, chains are sometimes used instead of lines. Access to the weights for the purpose of fitting new cords is obtained by removing the pocket piece. A thin back lining is provided to the sides only and is not required in the head. The sill is of oak weathered to throw off the water. A parting bead separates the sashes, and the inside bead keeps them in position. A parting slip hung from the head side the cased frame separates the balancing weights and ensures

” smooth working. The inside lining is usually grooved to take

iw and soffit linings, and the window board is fitted into a

“med in the sill. The example shown in fig. 7 has an extra

• rail and bead; this enables the lower sash to be raised

: t of ventilation between the meeting rails without

n ” at the bottom of the sash. This is a considerable

. the ordinary form, and the cost of constructing

use , manner is scarcely greater.

Bay windows with cased frames and double hung sashes often require the exercise of considerable ingenuity in their construction in order that the. mullions shall be so small as not to intercept more light than necessary; at the same time the sashes must work easily and the whole framing be stable and strong. The sills should be mitred and tongued at the angles and secured by a hand-rail bolt. Frequently it is not desired to hang all the sashes of a bay window, the side lights being fixed. To enable smaller angle mullions to be obtained, the cords of the front windows may be taken by means of pulleys over the heads of the side lights and attached to counter-balance weights working in casings at the junction of the window with the wall. This enables solid angle mullions to be employed. If all the lights are required to be hung the difficulty may be surmounted by hanging two sashes to one weight. Lead weights take up less space than iron, and are used for heavy sashes.

In framing and fixing skylights and lantern lights also great care is necessary to ensure the result being capable of resisting rough weather and standing firm in high winds. Glue should not be used in any of the joints, as it would attract moisture from the atmosphere and set up decay. Provision must be made for the escape of the water which condenses on and runs down the under side of the glass, by means of a lead-lined channelled moulding, provided with zinc or copper pipe outlets. The skylight stands on a curb raised at least 6 in. to allow of the exclusion of rain by proper flashing. The sashes of the lantern usually take the form of fixed or hung casements fitted to solid mullions and angle posts which are framed into and support a solid head. The glazed framing of the roof is made up of moulded sash bars framed to hips and ridges of stronger section, these rest on the head, projecting well beyond it in order to throw off the water.

Shutters for domestic windows have practically fallen into disuse, but a

reference to the different forms they may take is perhaps neces- sary. They, may be divided into two classes — those fixed to the outside of the window and those fixed inside. They may be battened, panelled or formed with louvres, the latter form admitting air and a little light. External shutters are generally hung by means of hinges to the frame of the window: when the window is set in a reveal these hinges are necessarily of special shape, being of large projection to enable the shutters to fold back against the face of the wall. Internally fixed shutters may be hinged or may slide either vertically or horizontally. Hinged folding boxed shutters are shown in the illustration of a casement window (fig. 8), where the method of working is clearly indicated ; they are usually held in position by means of a hinged iron bar secured with a special catch. Lifting shutters are usually fitted in a casing formed in the window back, and the window board is hinged to lift up, to allow the shutters to be raised by means of rings fixed in their upper edges. The shutters are balanced by weights enclosed with casings in the manner de- scribed for double hung sashes. The panels are of course filled in with wood and not glazed. The shutters are fixed by means of a thumb-screw through the meeting rails, the lower sash being sup- ported on the window board which is closed down when the sashes have been lifted out. Shutters sliding horizontally are also used in some cases, but they are not so convenient as the forms described above.

Shop-fronts. — The forming of shop-fronts may almost be considered a separate branch of joiner's work. The design and construction are attended by many minor difficulties, and, the requirements greatly varying with almost every trade, careful study and close attention to detail are necessary. In the erection of shop-fronts, in order to allow the maximum width of glass with the minimum amount of obstruction, many special sections of sash bars and stanchions are used, the former often being reinforced by cast iron or steel of suitable form. For these reasons the construction of shop-fronts and fittings has been specialized by makers having a knowledge of the requirements of different trades and with facilities for making the special wood and metal fittings and casings necessary. Fig. I® shows an example of a simple shop-front in Spanish mahogany with rolling shutters and spring roller blind ; it indicates the typical construction of a front, and reference to it will inform the reader on many points which need no further description. The London Build- ing Act. 1894 requires the following regulations to be complied with in shop-fronts: — (1) In streets of a width not greater than 30 ft. a shop-front may project 5 in. beyond the external wall of the build- ing to which it belongs, and the cornice may project 13 in. (2) In streets of a width greater than 30 ft., the projections of the shop- front may be 10 in. and of the cornice 18 in. beyond the building line. No woodwork of any shop-front shall be fixed higher than 25 ft. above the level of the public pavement. No woodwork

shall be fixed nearer than 4 in. to the centre of the party wall. The pier of brick or stone must project at least an inch in front of the woodwork. These by-laws will be made clear on reference to fig. 10, which is of a shop-front designed to face on to a road more than 30 ft. wide.

Rolling shutters for shop-fronts are made by a number of firms, and are usually the subject of a separate estimate, being fixed by the makers themselves. The shutter consists of a number of narrow strips of wood, connected with each other by steel bands hinged at every joint, or it may be formed in iron or steel. This construction allows it to be coiled upon a cylinder containing a strong spring and usually fixed on strong brackets behind the fascia. The shutter

is guided into position by the edges working in metal grooves a little under an inch wide. When the width of the opening to be closed renders it necessary to divide the shutters into more than one portion, grooved movable pilasters are used, and when the shutters have to be lowered these are fixed in position with bolts, the shutter working on the grooved edges of the pilasters. Spring roller canvas blinds work on a similar principle. The wrought-iron blind arms are capable, when the blind is extended, of being pushed up by means of a sliding arrangement, and fixed with a pin at a level high enough to allow foot passengers to pass along the pavement under them.

The latter would need to be worked and framed in the shop and fixed entire. Polished hard wood architraves may be secretly fixed, i.e. without the heads of nails or screws showing on the face, by putting screws into the grounds with their heads slightly projecting, and hang- ing the moulding on them by means of keyhole slots formed in the back. Doors may be made in a variety of ways. The simplest form, the common ledged door, consists of vertical boards with plain or matched joints nailed to horizontal battens which correspond to the rails in framed doors. For openings over 2 ft. 3 in. wide, the doors should be furnished with braces. Ledged and braced doors are

Sailer W/nrf

Section on A A.

-iochea 1260

J t

5 Feet

Detail of Shop-front.

r „„_ _, ,_

Plan above Stallboard.

Fig. 10. — Shop-front.

Doors. — External doors are usually hung to solid frames placed in the reveals of the brick or stone wall. The frames are rebated for the door and ornamented by mouldings either stuck or planted on. The jambs or posts are tenoned, wedged and glued to the head, and the feet secured to the sill by stub tenons or dowels of iron. Solid window frames are of similar construction and are used chiefly for casements and sashes hung on centres as already described. Internal doors are hung to jamb linings (fig. 7). They are usually about I \ in. thick and rebated for the door. When the width of jamb allows it, panelling may be introduced as in the example shown. The linings are nailed or screwed to rough framed grounds I in. in thickness plugged or nailed to the wall or partition. Architraves are the borders or finishing mouldings fixed around a window or door opening, and screwed or nailed to wood grounds. They are variously moulded according to the fancy of the designer. The ordinary form of architrave is shown in the illustration of a cased window frame (fig. 8), and a variation appears in the combined architrave and over door frieze and capping fitted around the six-panelled door (fig. 7). XV. 16

similar, but have, in addition to the ledges at the back, oblique braces which prevent any tendency of the door to drop. The upper end of the brace is birdsmouthed into the under side of the rail near the lock edge of the door and crosses the door in an oblique direction to be birdsmouthed into the upper edge of the rail below, near the hanging edge of the door. This is done between each pair of rails. Framed ledged and braced doors are a further development of this form of door. The framing consists of lock and hanging styles, top, middle and bottom rails, with oblique braces between the rails. _ These mem- bers are tenoned together and the door sheathed with boarding. The top rail and styles are the full thickness of the door,, the braces and middle and bottom rails being less by the thickness of the sheathing boards, which are tongued into the top rail and styles and carried down over the other members to the bottom of the door. The three forms of door described above are used mainly for tem- porary purposes, and stables, farm buildings and outhouses of all descriptions. They are usually hung by wrought-iron cross garnet or strap hinges fixed with screws or through bolts and nuts.

Sqvar* A flat .

Joints of rails & style.

The doors in dwelling-houses and other buildings of a like character are commonly framed and panelled in one of the many ways possible. The framing consists of styles, rails and muntins or mountings, and these members are grooved to receive and hold the panels, which are inserted previously to the door being glued and wedged up. The common forms are doors in four or six rectangular panels, and although they may be made with any form and number of panels, the principles of construction remain the same. The example shown in fig. 7 is of a six-panel door, with bolection moulded raised panels on one side, and moulded and flat panels on the other (fig. 11).

A clear idea of the method of jointing the various members may be obtained from fig. 12. The tongues of raised panels should be of parallel thickness, the bevels being stopped at the moulding. The projecting ends or horns of the styles are cut off after the door has been

p IG It _ Forms glued and wedged, as they prevent the ends

of Panelling. ˚f tne styles being damaged by the wedging process. Where there is a great deal of traffic in both directions swing doors, either single or double, are used. To open them it is necessary simply to push, the inconvenience of turning a handle and shutting the door after passing through being avoided, as a spring causes the door to return to its original position without noise. They are usually glazed and should be of substantial con- struction. The door is hinged at the top on a steel pivot ; the bottom part fits into a metal shoe connected with the spring, which is placed in a box fixed below the floor.

For large entrances, notably for hotels and banks, a form of door working on the turnstile principle is frequently adopted. It is formed of four leaves fixed in the shape of a cross and working on top and bottom central ball-bearing steel pivots, in a circular framing which forms a kind of vestibule. The leaves of the door are fitted with slips of india-rubber at their edges which, fitting close to the circular framing, prevent draughts.

When an elegant appearance is desired, and it is at the same time

necessary to keep the cost of production as low as possible, doors of pine or other soft wood are sometimes covered with a veneer or thin layer of hard wood, such as oak, mahogany or teak, giving the appear- ance of a solid door of the better material. Made in the ordinary way, however, the shrinkage or warping of the soft wood is very liable to cause the veneer to buckle and peel off. Veneered doors made on an improved method obviating this difficulty have been placed on the market by a Canadian company. The core is made up of strips of pine with the grain reversed, dried at a temperature of 200° F., and glued up under pressure. Both the core and the hard wood veneer are grooved over their surfaces, and a special damp-resist- ing glue is applied ; the two portions are then welded together under hydraulic pressure. By reason of their construction these doors possess the advantages of freedom from shrinking, warping and splitting, defects which are all too common in the ordinary veneered and solid hard wood doors.

The best glue for internal woodwork is that made in Scotland. Ordinary animal glue should not be used in work exposed to the weather as it absorbs damp and thus hastens decay; in its place a compound termed beaumontique, composed of white lead, linseed oil and litharge, should be employed.

Church Work. — Joinery work in connexion with the fitting up of church interiors must be regarded as a separate branch of the joiner's art. Pitchpine is often used, but the best work is executed in English oak; and when the screens, stalls and seating are well designed and made in this material, a distinction and dignity of effect are added to the interior of the church which cannot be obtained in any other medium. The work is often of the richest character, and frequently enriched with elaborate carving (fig. 13). Many beautiful specimens of early work are to be seen in the English Gothic cathedrals and churches; good work of a later date will be found in many churches and public buildings erected in more recent years. Fine examples of Old English joinery exist at Hampton Court Palace, the Temple Church in London, the Chapel of Henry VII. in Westminster Abbey, and Haddon Hall. Specimens of modern work are to be seen in Beverley Minster in Yorkshire, the Church of St Etheldreda in Ely Place, London, and the Wycliffe Hall Chapel at Oxford. Other examples both ancient and modern abound in the country.

Carving is a trade apart from ordinary joinery, and requires a

Joint of muntin & rail

Fig. 12. — Joints.

special ability and some artistic feeling for its successful execution. But even in this work machinery has found a place, and carved ornaments of all descriptions are rapidly wrought with its aid. Small carved mouldings especially are evolved in this manner, and, being incomparably cheaper than those worked by manual labour, are used freely where a rich effect is desired. Elaborately carved panels also are made by machines and a result almost equal to work done entirely by hand is obtained if, after machinery has done all in its power, the hand worker with his chisels and gouges puts the finishing touches to the work.

Ironmongery. — In regard to the finishing of a building, no detail calls for greater consideration than the selection and accurate fixing of suitable ironmongery, which includes the hinges, bolts, locks, door and window fittings, and the many varieties of metal finishings required for the completion of a building. The task of the selection belongs to the employer or the architect; the fixing is performed by the joiner.

Method of constructing Corinthian Order tˆy in wood. ˆ

Section of cap looking upwards,

Fig. 13.

Of hinges, the variety termed butts are in general use for hanging doors, and are so called from being fitted to the butt edge of the door. They should be of wrought iron, cast-iron butts being liable to snap should they sustain a shock. Lifting butts are made with a removable pin to enable the door to be removed and replaced without unscrew- ing. Rising butts have oblique joints which cause the door to rise and clear a thick carpet and yet make a close joint with the floor when shut. Hinges of brass or gun-metal are used in special cir- cumstances. Common forms of hinges used on ledged doors are the cross garnet and the strap. There are many varieties of spring hinges designed to bring the door automatically to a desired position. With such hinges a rubber stop should be fixed on the floor or other convenient place to prevent undue strain through the door being forced back.

Among locks and fastenings the ordinary barrel or tower bolt needs no description. The flush barrel is a bolt let in flush with the face of a door. The espagnolette is a development of the tower bolt and extends the whole height of the door; a handle at a convenient height, when turned, shooting bolts at the top and bottom simul- taneously. Their chief use is for French casements. The padlock is used to secure doors by means of a staple and eye. The stock lock is a large rim lock with hard wood casing and is used for stables, church doors, &c. ; it is in the form of a dead lock opened only

by a key, and is often used in conjunction with a Norfolk latch. The metal cased rim lock is a cheap form for domestic and general use. The use of a rim lock obviates the necessity of forming a mortice in the thickness of the door which is required when a mortice lock is used. Finger plates add greatly to the good appearance of a door,

and protect the painted work. Sash fasteners are fixed at the meet- ing rails of double hung sashes to prevent the window being opened from the outside and serve also to clip the two sashes tightly to- gether. They should be of a pattern to resist the attack of a knife inserted between the rails. Sash lifts and pulls of brass or bronze are fitted to large sashes. Ornamental casement stays and fasteners in many different metals are made in numerous designs and styles. Fanlight openers for single lights, or geared for a number of sashes, may be designed to suit positions difficult of access.

The following are the principal books of reference on this subject : J. Gwilt, Encyclopaedia of Architecture; Sutcliffe, Modern House Con- struction ; Rivington, Notes on Building Construction (3 vols.) ; H. Adaps, Building Construction; C. F. Mitchell, Building Construction; Robinson, Carpentry and Joinery; J. P. Allen, Practical Building Construction; J. Newlands, Carpenter and Joiner's Assistant; Bury, Ecclesiastical Woodwork; T. Tredgold and Young, Joinery; Peter Nicholson, Carpenter and Joiner's Assistant. (J. Bt.)

JOINT (through Fr. from Lat. junctum, jungere, to join), that which joins two parts together or the place where two parts are joined. (See Joinery; Joints.) In law, the word is used adjectivally as a term applied to obligations, estates, &c, implying that the rights in question relate to the aggregate of the parties joined. Obligations to which several are parties may be several, i.e enforceable against each independently of the others, or joint, i.e. enforceable only against all of them taken together, or joint and several, i.e. enforceable against each or all at the option of the claimant (see Guarantee). So an interest or estate given to two or more persons for their joint lives continues only so long as all the lives are in existence. Joint-tenants are co-owners who take together at the same time, by the same title, and without any difference in the quality or extent of their respective interests; and when one of the joint- tenants dies his share, instead of going to his own heirs, lapses to his co-tenants by survivorship. This estate is therefore to be carefully distinguished from tenancy in common, when the co-tenants have each a separate interest which on death passes to the heirs and not to the surviving tenants. When several take an

estate together any words or facts implying severance will prevent the tenancy from being construed as joint.

JOINTS, in anatomy. The study of joints, or articulations, is known as Arthrology (Gr. apdpov), and naturally begins with the definition of a joint. Anatomically the term is used for any connexion between two or more adjacent parts of the skeleton, whether they be bone or cartilage. Joints may be immovable, like those of the skull, or movable, like the knee.

Immovable joints, or synarthroses, are usually adaptations to growth rather than mobility, and are always between bones. When growth ceases the bones often unite, and the joint is then obliterated by a process known as synostosis, though whether the union of the bones is the cause or the effect of the stoppage of growth is obscure. Immovable joints never have a cavity between the two bones; there is simply a layer of the substance in which the bone has been laid down, and this remains unaltered. If the bone is being deposited in cartilage a layer of cartilage intervenes, and the joint is called synchondrosis (fig. 1), but if in membrane a thin layer of fibrous tissue persists, and the joint is then known as a suture (fig. 2). Good

Fig.'i. — Vertical section through a synchondrosis, b, b, the two bones ; Sc, the interposed car- tilage ; /, the fibrous membrane which plays the part of a ligament.

Fig. 2. — Vertical section through a cranial suture, b, b, the two bones ; s, opposite the suture; /, the fibrous mem- brane, or periosteum, passing between the two bones, which plays the part of a ligament, and which is continuous with the interposed fibrous mem- brane.

and vomer. The other is a peg and socket joint, or gomphosis, found where the fangs of the teeth fit into the alveoli or tooth sockets in the jaws.

Movable joints, or diarthroses, are divided into those in which there is much and little movement. When there is little movement the term half-joint or amphiarthrosis is used. The simplest kind of amphiarthrosis is that in which two bones are connected by bundles of fibrous tissue which pass at right angles from the one to the other; such a joint only differs from a suture in the fact that the intervening fibrous tissue is more plentiful, and is organized into definite bundles, to which the name of interosseous ligaments is given, and also that it does not synostose when growth stops. A joint of this kind is called a syndesmosis, though probably the distinction is a very arbitrary one, and depends upon the amount of movement which is brought about by the muscles on the two bones. As an instance of this the inferior tibiofibular joint of mammals may be cited. In man this is an excellent example of a syndesmosis, and there is only a slight play between

the two bones. In the mouse there is no move- ment, and the two bones form a syn- chondrosis between them which speed- ily becomes a synostosis, while in many Marsupials there is free mobility be- tween the tibia and fibula, and a definite synovial cavity is established. The other variety of amphiarthrosis or half- joint is the symphysis, which differs from the syndesmosis in having both bony surfaces lined with cartilage and between the two cartilages a layer of fibro-cartilage, the centre of which often softens and forms a small synovial cavity. Examples of this are the sym- physis pubis, the mesosternal joint, and the joints between the bodies of the vertebrae (fig. 3).

The true diarthroses are joints in which there is either fairly free or very free movement. The opposing

examples of synchondroses are the epiphysial lines which separate the epiphyses from the shafts of developing long bones, ortheoccipito- sphenoid synchondrosis in the base of the skull. Examples of sutures are plentiful in the vault of the skull, and are given special names, such as sutura dentata, s. serrata, s. squamosa, according to the plan of their outline. There are two kinds of fibrous syn- arthroses, which differ from sutures in that they do not synostose. One of these is a schindylesis, in which a thin plate of one bone is received into a slot in another, as in the joint between the sphenoid

Fig. 3. — Vertical section through an amphiarthrodial joint, b, b, the two bones; c, c, the plate of cartilage on the articular surface of each bone; Fc, the inter- mediate fibro-cartilage; I, I, the external ligaments.

surfaces of the bones are lined with articular cartilage, which is~the unossified remnant of the cartilaginous model in which they are formed and is called the cartilage of encrustment (fig. 4, c). Between the two cartilages is the joint cavity, while surrounding the joint is the capsule (fig. 4, I), which is formed chiefly by the superficial layers of the original peri- osteum or perichondrium, but it may be strengthened externally by surrounding fibrous structures, such as the tendons of muscles, which become modified and acquire fresh attachments for the purpose. It may be said generally that the greater the intermittent strain on any part of the capsule the more it responds by increasing in thickness. Lining the interior of the capsule, and all other parts

Fig. 4. — Vertical section through a diarthrodial joint, b, b, the two bones ; c, c, the plate of cartilage on the articular surface of each bone ; /, /, the invest- ing ligament, the dotted line within which repre- sents the synovial mem- brane. The letter s is placed in the cavity of the joint.

Fig. 5. — Vertical sec- tion through a diarthro- dial joint, in which Jthe cavity is subdivided into two by an interposed fibro-cartilage or men- iscus, Fc. The other letters as in fig. 4.

of the joint cavity except where the articular cartilage is present, is the synovial membrane (fig. 4, dotted line) ; this is a layer of endo- thelial cells which secrete the synovial fluid to lubricate the interior of the joint by means of a small percentage of mucin, albumin and fatty matter which it contains.

_ A compound diarthrodial joint is one in which the joint cavity is divided partly or wholly into two by a meniscus or inter- articular fibro-cartilage (fig. 5, Fc).

The shape of the joint cavity varies greatly, and the different divisions of movable joints depend upon it. It is often assumed that the structure of a joint determines its movement, but there is some- thing to be said for the view that the movements to which a joint is

subject determine its shape. As an example of this it has been found that the mobility of the metacarpophalangeal joint of the thumb in a large number of working men is less than it is in a large number of women who use needles and thread, or in a large number of medical students who use pens and scalpels, and that the slightly movable thumb has quite a differently shaped articular surface from the freely movable one (see /. Anat. and Phys. xxix. 446). R. Fick, too, has demonstrated that the concavity or convexity of the joint surface depends on the position of the chief muscles which move the joint, and has enunciated the law that when the chief muscle or muscles are attached close to the articular end of the skeletal element that end becomes concave, while, when they are attached far off or are not attached at all, as in the case of the phalanges, the articular end is convex. His mechanical explanation is ingenious and to the present writer convincing (see Handbuch der Gelenke, by R. Fick, Jena, 1904). Bernays, however, pointed out that the articular ends were moulded before the muscular tissue was differen- tiated (Morph. Jahrb. iv. 403), but to this Fick replies by pointing out that muscular movements begin before the muscle fibres are formed, and may be seen in the chick as early as the second day of incubation.

The freely movable joints (true diarthrosis) are classified as follows : —

(1) Gliding joints (Arthrodia), in which the articular surfaces are flat, as

in the carpal and tarsal bones.

(2) Hinge joints (Ginglymus) , such as the elbow and interphalangeal joints.

(3) Condyloid joints {Condylarthrosis), allowing flexion and exten- sion as well as lateral movement, but no rotation. The metacarpo- phalangeal and wrist joints are examples of this.

(4) Saddle-shaped joints (Articulus sellaris), allowing the same movements as the last with greater strength. The carpo-metacarpal joint of the thumb is an example.

(5) Ball and socket joints (Enarthrosis), allowing free movement in any direction, as in the shoulder and hip,

(6) Pivot-joint (Trochoides), allowing only rotation round a longitu- dinal axis, as in the radio-ulnar joints.

Embryology. Joints are developed in the mesenchyme, or that part of the mesoderm which is not concerned in the formation of the serous cavities. The synarthroses may be looked upon merely as a delay in development, because, as the embryonic tissue of the mesenchyme passes from a fibrous to a bony state, the fibrous tissue may remain along a certain line and so form a suture, or, when chondrification has preceded ossification, the cartilage may remain at a certain place and so form a synchondrosis. The diarthroses represent an arrest of development at an earlier stage, for a part of the original embryonic tissue remains as a plate of round cells, while the neighbouring two rods chondrify and ossify. This plate may become converted into fibro-cartilage, in which case an amphiarthrodial joint results, or it may become absorbed in the centre to form a joint cavity, or, if this absorption occurs in two places, two joint cavities with an intervening meniscus may result. Although, ontogenetically, there is little doubt that menisci arise in the way just mentioned, the teaching of com- parative anatomy suggests that, phylogenetically, they originate as an ingrowth from the capsule pushing the synovial membrane in front of them. The subject will be returned to when the comparative anatomy of the individual joints is reviewed. In the human foetus the joint cavities are all formed by the tenth week of intra-uterine life.

Anatomy

Joints of the Axial Skeleton.

The bodies of the vertebrae except those of' the sacrum and coccyx are separated, and at the same time connected, by the intervertebral disks.

These are formed of alternating concentric rings of fibrous tissue and fibro-cartilage, with an elastic mass in the centre known as the nucleus pulposus. The bodies are also bound together by anterior and posterior common ligaments. The odontoid process of the axis fits into a pivot joint formed by the enterior arch of the atlas in front and the transverse ligament behind; it is attached to the basioccipital bone by two strong lateral check ligaments, and, in the mid line, by a feebler middle check ligament which is regarded morphologically as containing the remains of the notochord. This atlanto-axial joint is the one which allows the head to be shaken from side to side. Nod- ding the head occurs at the occipito-atlantal joint, which consists

of the two occipital condyles received into the cup-shaped articular facets on the atlas and surrounded by capsular liga- ments. The neural arches of the vertebrae articulate one with another by the articular facets, each of which has a capsular ligament. In addition to these the laminae are connected by the very elastic ligamenta subfiava. The spinous processes are joined by interspinous ligaments, and their tips by a supraspinous ligament, which in the neck is continued from the spine of the seventh cervical vertebra to the external occipital crest and protuberance as the ttgamentum nuchae, a thin, fibrous, median septum between the muscles of the back of the neck.

The combined effect of all these joints and ligaments is to allow the spinal column to be bent in any direction or to be rotated, though only a small amount of movement occurs between any two vertebrae.

The heads of the ribs articulate with the bodies of two con- tiguous thoracic vertebrae and the disk between. The liga- ments which connect them are called costo-central, and' are two in number. The anterior of these is the stellate ligament, which has three bands radiating from the head of the rib to the two vertebrae and the intervening disk. The other one is the inter-articular ligament, which connects the ridge, dividing the two articular cavities on the head of the rib, to the disk; it is absent in the first and three lowest ribs.

The costo-transverse ligaments bind the ribs to the transverse processes of the thoracic vertebrae. The superior costo-trans- verse ligament binds the neck of the rib to the transverse process of the vertebra above; the middle or interosseous connects the back of the neck to the front of its own transverse process ; while the posterior runs from the tip of the transverse process to the outer part of the tubercle of the rib. The inner and lower part of each tubercle forms a diarthrodial joint with the upper and fore part of its own transverse process, except in the eleventh and twelfth ribs. At the junction of the ribs with their cartilages no diarthrodial joint is formed; the periosteum simply becomes perichondrium and binds the two structures

together. Where the cartilages, however, join the sternum, or where they join one another, diarthrodial joints with synovial cavities are estab- lished. In the case of the second rib this is double, and in that of the first usually wanting. The mesosternal joint, between the pre- and mesosternum, has already been given as an example of a symphysis.

Comparative Anatomy. — For the convexity or concavity of the vertebral centra in different classes of vertebrates, see Skeleton: axial. The intervertebral disks first appear in the Crocodilia, the highest existing order of reptilia. In many Mammals the middle fasciculus of the stellate ligament is continued right across the ventral surface of the disk into the ligament of the opposite side, and is probably serially homologous with the ventral arch of the atlas. A similar ligament joins the heads of the ribs dorsal to the disk. To these bands the names of anterior (ventral) and posterior (dorsal) conjugal ligaments have been given, and they may be demon- strated in a seven months' human foetus (see B. Sutton, Ligaments, London, 1902). The ligamentum nuchae is a strong elastic band in the Ungufata which supports the weight of the head. In the Carnivora it only reaches as far forward as the spine of the axis.

The Jaw Joint, or temporo-mandibular articulation, occurs between the sigmoid cavity of the temporal bone and the condyle of the jaw. Between the two there is an interarticular fibro-cartilage or meniscus, and the joint is surrounded by a capsule of which the outer part is the thickest. On first opening the mouth, the joint acts as a hinge, but very soon the condyle begins to glide forward on to the eminentia articularis (see Skull) and takes the meniscus with it. This gliding movement between the meniscus and temporal bone may be separately brought about by protruding the lower teeth in front of the upper, or, on one side only, by moving the jaw across to the opposite side.

Comparative Anatomy. — The joint between the temporal and mandi- bular bones is only found in Mammals ; in the lower vertebrates the jaw opens between the quadrate and articular bones. In the Carnivora it is a perfect hinge; in many Rodents only the antero- posterior gliding movement is present ; while in the Ruminants the lateralizing movement is the chief one. Sometimes, as in the Omithorhynchus, the meniscus is absent.

Joints of the Upper Extremity.

The sterno-clavicular articulation, between the presternufn and clavicle, is

a gliding joint, and allows slight upward and down- ward and forward and backward movements. The two bony surfaces are separated by a meniscus, the vertical movements taking place outside and the antero-posterior inside this. There is a well-marked capsule, of which the anterior part is strongest. The two clavicles are joined across the top of the presternum by an interclavicular ligament.

The acromioclavicular articulation is also a gliding joint, but allows a swinging or pendulum movement of the scapula on the clavicle. The upper part of the capsule is strongest, and from it hangs down a partial meniscus into the cavity.

Comparative Anatomy. — Bland Sutton regards the inter-clavicular ligament as a vestige of the intcrclavicle of Reptiles and Monotremes. The menisci are only found in the Primates, but it must be borne in mind that many Mammals have no clavicle, or a very rudimentary one. By some the meniscus of the sterno-clavicular joint is regarded as the homologue of the lateral part of the interclavicle, but the fact that it only occurs in the Primates where movements in different planes are fairly free is suggestive of a physiological rather than a morphological origin for it.

The shoulder joint is a good example of the ball and socket or enarthrodial variety. Its most striking characteristic is mobility at the expense of strength. The small size of the glenoid cavity in comparison with the head of the humerus, and the great laxity of the capsule, favour this, although the glenoid cavity is slightly deepened by a fibrous lip, called the glenoid ligament, round its margin. The presence of the coracoid and acromial processes of the scapula, with the cor aco acromial liga ment between them, serves as an overhanging protection to the joint, while the biceps tendon runs over the head of the humerus, inside the capsule, though surrounded by a sheath of synovial membrane. Were it not for these two extra safeguards the shoulder would be even more liable to dislocation than it is. The upper part of the capsule, which is attached to the base of the coracoid process, is thickened, and known as the coraco- humeral ligament, while inside the front of the capsule are three folds of synovial membrane, called gleno-humeral folds.

Comparative Anatomy. — In the lower Vertebrates the shoulder is adapted to support rather than prehension and is not so freely movable as in the Primates. The tendon of the biceps has evidently sunk through the capsule into the joint, and even when it is intra- capsular there is usually a double fold connecting its sheath of synovial membrane with that lining the capsule. In Man this has been broken through, but remains of it persist in the superior gleno- humeral fold. The middle gleno-humeral fold is the vestige of a strong ligament which steadies and limits the range of

movement of the joint in many lower Mammals.

The elbow joint is an excellent example of the ginglymus or hinge, though its transverse axis of movement is not quite at right angles to the central axis of the limb, but is lower internally than externally. This tends to bring the forearm towards the body when the elbow is bent. The elbow is a great contrast to the shoulder, as the trochlea and capitellum of the humerus are closely adapted to the sigmoid cavity of the ulna and head of the radius (see Skeleton: appendicular); consequently movement in one plane only is allowed, and the joint is a strong one. The capsule is divided into anterior, posterior, and two lateral liga- ments, though these are all really continuous. The joint cavity communicates freely with that of the superior radio-ulnar articulation.

The radio-ulnar joints are three: the upper one is an example of a pivot joint, and in it the disk-shaped head of the radius rotates in a circle formed by the lesser sigmoid cavity of the ulna internally and the orbicular ligament in the other three quarters.

The middle radio-ulnar articulation is simply an interosseous membrane, the fibres of which run downward and inward from the radius to the ulna.

The inferior radio-ulnar joint is formed by the disk-shaped lower end of the ulna fitting into the slightly concave sigmoid cavity of the radius. Below, the cavity of this joint is shut off from that of the wrist by a triangular fibro-cartilage. The move- ments allowed at these three articulations are called pronation

and supination of the radius. The head of that bone twists, in the orbicular ligament, round its central vertical axis for about half a circle. Below, however, the whole lower end of the radius circles round the lower end of the ulna, the centre of rotation being close to the styloid process of the ulna. The radius, there- fore, in its pronation, describes half a cone, the base of which is below, and the hand follows the radius.

Comparative Anatomy. — In pronograde Mammals the forearm is usually permanently pronated, and the head of the radius, instead of being circular and at the side of the upper end of the ulna, is transversely oval and in front of that bone, occupying the same place that the coronoid process of the ulna does in Man. This type of elbow, which is adapted simply to support and progression, is best seen in the Ungulata; in them both lateral ligaments are attached to the head of the radius, and there is no orbicular ligament, since the shape of the head of the radius does not allow of any supination. The olecranon process of the ulna forms merely a posterior guide or guard to the joint, but transmits no weight. No better example of

the maximum changes which the uses of support and prehension bring about can be found than in contrasting the elbow of the Sheep or other Ungulate with that of Man. Towards one or other of these types the elbows of all Mammals tend. It may be roughly stated that, when pronation and supination to the extent of a quarter of a circle are possible, an orbicular ligament appears.

The wrist joint, or radio-carpal articulation, lies between the radius and triangular fibro-cartilage above, and the scaphoid, semilunar, and cuneiform bones below. It is a condyloid joint allowing flexion and extension round one axis, and slight lateral movement (abduction and adduction) round the other. There is a well-marked capsule, divided into anterior, posterior, and lateral ligaments. The joint cavity is shut off from the inferior radio-ulnar joint above, and the intercarpal joints below.

The intercarpal joints are gliding articulations, the various bones being connected by palmar, dorsal, and a few interosseous ligaments, but only those connecting the first row of bones are complete, and so isolate one joint cavity from another. That part of the intercarpal joints which lies between the first and second rows of carpal bones is called the transverse carpal joint, and at this a good deal of the movement which seems to take place at the wrist really occurs.

The carpo-metacarpal articulations are, with the exception of that of the thumb, gliding joints, and continuous with the great intercarpal joint cavity. The carpo-metacarpal joint of the thumb is the best example of a saddle-shaped joint in Man. It allows forward and backward and lateral movement, and is very strong.

The metacarpo-phalangeal joints are condyloid joints like the wrist, and are remarkable for the great thickness of the palmar ligaments of their capsules. In the four inner fingers these glenoid ligaments, as they are called, are joined together by the transverse metacarpal ligament.

The inter phalangeal articulations are simple hinges surrounded by a capsule, of which the dorsal part is very thin.

Comparative Anatomy. — The wrist joint of the lower Mammals allows less lateral movement than does that of Man, while the lower end of the ulna is better developed and is received into a cup-shaped socket formed by the cuneiform and pisiform bones. At the same time, unless there is pretty free pronation and supination, the triangu- lar fibro-cartilage is only represented by an interosseous ligament, which may be continuous above with the interosseous membrane between the radius and ulna, and suggests the possibility that the fibro-cartilage is largely a derivative of this

membrane. In most Mammals the wrist is divided into two lateral parts, as it is in the human foetus, but free pronation and supination seem to cause the disappearance of the septum.

Joints of the Lower Extremity.

The sacro-innominate articulation consists of the sacro-iliac joint and the sacro-sciatic ligaments. The former is one of the amphiarthroses or half - joints by which the sacrum is bound to the ilium. The mechanism of the human sacrum is that of a • suspension bridge slung between the two pillars or ilia by the very strong posterior sacro-iliac ligaments which represent the chains. The axis of the joint passes through the second sacral vertebra, but the sacrum is so nearly horizontal that the weight of the body, which is transmitted to the first sacral vertebra, tends to tilt that part down. This tendency is corrected by the

great and small sacro-sciatic ligaments, which fasten the lower part of the sacrum to the tuberosity and spine of the ischium respectively, so that, although the sacrum is a suspension bridge when looked at from behind, it is a lever of the first kind when seen from the side or in sagittal section.

The pubic symphysis is the union between the two pubic bones. It has all the characteristics of a symphysis, already described, and may have a small median cavity.

The hip joint, like the shoulder, is a ball and socket, but does not allow such free movement; this is due to the fact that the socket or acetabulum is deeper than the glenoid cavity and that the capsule is not so lax. At the same time the loss of mobility is made up for by increased strength. The capsule has three

Anterior inferior Km ‘ pine Y)Y

(From David Hepburn, Cunningham’s Textbook of Anatomy.)

Fig. 6. — Dissection of the Hip Joint from the front.

thickened bands, of which the most important is the iliofemoral or Y-shaped ligament of Bigelow. The stalk of the Y is attached to the anterior inferior spine of the il : um, while the two limbs are fastened to the upper and lower p? rts of the spiral line of the femur. The ligament is so strong that it hardly ever ruptures in a dislocation of the hip. As a plumb-line,

dropped from the centre of gravity of the body, passes behind the centre of the hip joint, this ligament, lying as it does in front of the joint, takes the strain in Man's erect position. The other two thickened parts of the capsule are known as pubo-femoral and ischio-femoral, from their attachments. Inside the capsule, and deepening the margin of the acetabulum, is a fibrous rim known as the cotyloid ligament, which grips the spherical head of the femur and is continued across the cotyloid notch as the transverse ligament. The floor of the acetabulum has a horseshoe-shaped surface of articular cartilage, concave downward, and, occupying the " frog " of the horse's hoof, is a mass of fat called the Haversian pad. Attached to the inner margin of the horseshoe, and to the transverse liga- ment where that is deficient, is a reflexion of synovial membrane which forms a covering for the pad and is continued as a tube to the depression on the head of the femur called the fossa capitis. This reflexion carries blood-vessels and nerves to the femur, and also contains fibrous tissue from outside the joint. It is known as the ligamentum teres.

Comparative Anatomy. — Bland Sutton regards the ilio-femoral ligament as an altered muscle, the scansorius, though against this is the fact that, in those cases in which a scansorius is present in Man, the ligament is as strong as usual, and indeed, if it were not

there in these cases, the erect position would be difficult to maintain. He also looks upon the ligamentum teres as the divorced tendon of the pectineus muscle. The subject requires much more investiga- tion, but there is every reason to believe that it is a tendon which has sunk into the joint, though whether that of the pectineus is doubtful, since the intra-capsular tendon comes from the ischium in Reptiles. In many Mammals, and among them the Orang, there is no ligamen- tum teres. In others, such as the Armadillo, the structure has not sunk right into the joint, but is connected with the pubo-femoral part of the capsule.

The knee joint is a hinge formed by the condyles and trochlea of the femur, the patella, and the head of the tibia. The capsule is formed in front by the ligamentum patellae, and on each side special bands form the lateral ligaments. On the outer side there are two of these: the anterior or long external lateral ligament is a round cord running from the external condyle to the head of the fibula, while the posterior is slighter and passes from the same place to the styloid process of the fibula. The internal lateral ligament is a flat band which runs from the inner condyle of the femur to the internal surface of the tibia some two inches below the level of the knee joint. The posterior part of the capsule is strengthened by an oblique bundle of fibres running upward and outward from the semimembranosus tendon, and called the posterior ligament of Winslow.

The intra-articular structures are numerous and interesting. Passing from the head of the tibia, in front and behind the spine, are the anterior and posterior crucial ligaments; the former is attached to the outer side of the intercondylar notch above, and the latter to the inner side. These two ligaments cross like an X. The semilunar fibro-cartilages — external and internal — are partial menisci, each of which has an anterior and a posterior cornu by which they are attached to the head of the tibia in front and behind the spine. They are also attached round the margin of the tibial head by a coronary ligament, but the external one is more movable than the internal, and this perhaps accounts for its coronary ligament being less often ruptured and the cartilage displaced than the inner one is. In addition to these the external cartilage has a fibrous band, called the ligament of Wrisberg, which runs up to the femur just behind the posterior crucial ligament. The external cartilage is broader, and forms more of a circle than the internal. The synovial cavity of the knee runs up, deep to the extensor muscles of the thigh, for about two inches above the top of the patella, forming the bursa suprapalellaris. At the lower part of the patella it covers a pad of fat, which lies between the ligamentum patellae and the front of the head of the tibia, and is carried up as a narrow tube to the lower margin of the trochlear surface of the femur. This prolongation is known as the ligamentum mucosum, and from the sides of its base spring two lateral folds called the ligamenta alaria. The tendon of the popliteus muscle is an intracapsular structure, and is therefore covered with a synovial sheath. There are a large number of bursae near the knee joint, one of which, common to the inner head of the gastrocnemius and the semimembranosus, often communicates with the joint. The hinge movement of the knee is accompanied by a small amount of external rotation at the end of extension, and a compensatory internal rotation during flexion. This slight twist is enough to tighten up almost all the ligaments so that they may take a share in resisting over-extension, because, in the erect position, a vertical line from the centre of gravity of the body passes in front of the knee.

Comparative Anatomy. — In some Mammals, e.g. Bradypus and Ornithorhynchus, the knee is divided into three parts, two condylo- tibial and one trochleo-patellar, by synovial folds which in Man are represented by the ligamentum mucosum. In a typical Mammal the external semilunar cartilage is attached by its posterior horn to the internal condyle of the femur only, and this explains the ligament of Wrisberg already mentioned. In the Monkeys and anthropoid Apes this cartilage is circular. The semilunar cartilages first appear in the Amphibia, and, according to B. Sutton, are derived from muscles which are drawn into the joint. When only one kind of movement (hinge) is allowed, as in the fruit bat, the cartilages are not found. In most Mammals the superior tibio-fibular joint communicates with the knee.

The tibio-fibular articulations resemble the 'radio-ulnar in position

but are much less movable. The superior in Man is usually cut off

l from the knee and is a gliding joint; the middle is the interosseous

membrane, while the lower has been already used as an example of a syndesmosis or fibrous half joint.

The ankle joint is a hinge, the astragalus being received into a lateral arch formed by thejower ends of the tibia and fibula. Backward dislocation is prevented by the articular surface of the astragalus being broader in front than behind. The anterior and posterior parts of the capsule are feeble, but the lateral liga- ments are very strong, the external consisting of three separate fasciculi which bind the fibula to the astragalus and calcaneum. To avoid confusion it is best to speak of the movements of the ankle as dorsal and plantar flexion.

The tarsal joints resemble the carpal in being gliding articula- tions. There are two between the astragalus and calcaneum, and at these inversion and eversion of the foot largely occur. The inner arch of the foot is maintained by a very important ligament called the calcaneo-navicular or spring ligament; it connects the sustentaculum tali of the calcaneum with the navicular, and upon it the head of the astragalus rests. When it becomes stretched, flat-foot results. The tarsal bones are connected by dorsal, plantar and interosseous liga- ments. The long and short calcaneo- cuboid are plantar ligaments of special importance, and maintain the outer arch of the foot.

The tarso-meta- tarsal, metatarso- phalangeal and in- terphalangeal joints closely resemble those of the hand, except that the

tarSO- metatarsal Anterior superior tibio-fibular

joint of the great toe is not saddle- shaped.

Impression of external semi r lunar cartilage

External tibial surface of femur

External lateral ligament.

Cut tendon of biceps flexor cruris muscle

ligament External lateral ligament

Comparative Ana- tomy. — The anterior _ . . . facr-lrnlnc nf the. ov Opening in interosseous fasciculus ot tne ex- mem brane for anterior tibial ternal lateral hga- vessels ment of the ankle is only found in Man, and is probably an adaptation to the erect position. In animals with a long

foot, such as the (From D. Hepburn, Cunningham's Texl-boo k oj Anatomy) Ungulates and the _ . .

Kangaroo, the lateral blG – 7-— dissection of the Knee-joint

ligaments of the

ankle are in the form of an X, to give greater protection against lateral movement. In certain marsupials a fibro-cartilage is developed between the external malleolus and the astragalus, and its origin from the deeper fibres of the external lateral ligament of the ankle can be traced. These animals have a rotatory movement of the fibula on its long axis, in addition to the hinge movement' of the ankle. For further details of joints see R. Fick, Handbuch der Gelenke (Jena, 1904); H. Morris, Anatomy of the Joints (London, 1879); Quain's, Gray's and Cunningham's Text-books of Anatomy; J. Bland Sutton, Ligaments, their Nature and Morphology (London, 1902) ; F. G. Parsons, " Hunterian Lectures on the Joints of Mammals," Journ. Anat. & Phys., xxxiv. 41 and 301. (F. G. P.)

Diseases and Injuries of Joints

The affection of the joints of the human body by specific diseases is dealt with under various headings (Rheumatism, &c.) ; in the present article the more direct forms of ailment are dis- cussed. In most joint-diseases the trouble starts either in the synovial lining or in the bone — rarely in the articular cartilage or ligaments. As a rule, the disease begins after an injury. There are three principal types of injury: (1) sprain or strain, in which the ligamentous and tendinous structures are stretched or lacerated; (2) contusion, in which the opposing bones are

driven forcibly together; (3) dislocation, in which the articular surfaces are separated from one another.

A sprain or strain of a joint means that as the result of violence the ligaments holding the bones together have been suddenly stretched or even torn. On the inner aspect the ligaments are lined by a synovial membrane, so when the ligaments are stretched the syno- vial membrane is necessarily damaged. Small blood-vessels are also torn, and bleeding occurs into the joint, which may become full and distended. If, however, bleeding does not take place, the swell- ing is not immediate, but synovitis having been set up, serous effu- sion comes on sooner or later. There is often a good«deal of heat of the surrounding skin and of pain accompanying the synovitis. In the case of a healthy individual the effects of a sprain may quickly pass off, but in a rheumatic or gouty person chronic synovitis may obstinately remain. In a person with a tuberculous history, or of tuberculous descent, a

sprain is apt to be the beginning of serious disease of the joint, and it should, therefore, be treated with continu- ous rest and prolonged supervision. In a person of health and vigour, a sprained joint should be at once bandaged. This may be the only treatment needed. It gives support and comfort, and the even pressure around the joint checks effusion into it. Wide pieces of adhesive strapping, layer on layer, form a still more useful support, and with the joint so treated the person may be able at once to use

the limb. If strap- Patellar surface of femur Ping is not employed,

the bandage may be taken off from time to time in order that the limb and the joint may be mas- saged. If the sprain is followed by much synovitis a plaster of Paris or leather splint may be applied, com- plete rest being se- cured for the limb. Later on, blistering or even " firing " may be found advis- able.

Synovitis. — When a joint has been in- jured, inflammation occurs in the damaged tissue; that is inevit- able. But sometimes the attack of inflam- mation is so slight and transitory as to be scarcely notice- able. This is specially likely to occur if the joint-tissues were in a state of perfect nutrition at the time of the hurt. But if the individual or the joint were at that time in a state of imperfect nutrition, the effects are likely to be more serious. As a rule, it is the synovial membrane lining the fibrous capsule of the joint which first and chiefly suffers; the condition is termed synovitis. Syno- vitis may, however, be due to other causes than mechanical injury, as when the interior of the joint is attacked by the micro-organisms of pyaemia (blood-poisoning), typhoid fever, pneumonia, rheuma- tism, gonorrhoea or syphilis. Under judicious treatment the synovitis generally clears up, but it may linger on and cause the formation of adhesions which may temporarily stiffen the joint; or it may, especially in tuberculous, septic or pyaemic infections, involve the cartilages, ligaments and bones in such serious changes as to destroy the joint, and possibly call for resection or amputation. The symptoms of synovitis include stiffness and tenderness in the joint. The patient notices that movements cause pain. Effu- sion of fluid takes place, and there is marked fullness in the neigh- bourhood. If the inflammation is advancing, the skin over the joint may be flushed, and if the hand is placed on the skin it feels hot. Especially is this the case if the joint is near the surface, as at the knee, wrist or ankle.

The treatment of an inflamed joint demands rest. This may be conveniently obtained by the use of a light wooden splint, padding and bandages. Slight compression of the joint by a bandage is useful in promoting absorption of the fluid. If the inflamed joint is in the lower extremity, the patient had best remain in bed, or on the sofa; if in the upper extremity, he should wear his arm in a sling. The muscles acting on the joint must be kept in complete

control. If the inflammation is extremely acute.

ˆSemilunar facet for patella

Internal tibial surface of femur

Posterior crucial ligament

Anterior crucial ligament

■*Transverse ligament Internal semilunar fibro- cartilage*

Internal lateral ligament

Ligamentum patellar

Inner perpendicular facet on patella

from the front : Patella thrown down.

a few leeches, followed by a fomentation, will give relief; or an ice- bag or an evaporating lotion may, by causing constriction of the blood-vessels, lessen the congestion of the part and the associated pain. As the inflammation is passing off, massage of the limb and of the joint will prove useful. If the inflammation is long continued, the limb must still be kept at rest. By this time it may be found that some other material for the retentive apparatus is more convenient and comfortable, as, for instance, undressed leather which has been moulded on wet and allowed to dry and harden; poro-plastic felt, which has been softened by heat and applied limp, or house-flannel which has been dipped in a creamy mixture of plaster-of-Paris and water, and secured by a bandage.

Chronic Disease of a Joint may be the tailing off of an acute affection, and under the influence of alternate douchings of hot and cold water, of counter-irritation by blistering or " firing," and of massage, it may eventually clear up, especially if the general health of the individual is looked after. But if chronic disease lingers in the joint of a child or young person, the probability of its being under the influence of tuberculous infection must be considered. In such a case prolonged and absolute rest is the one thing necessary. If the disease be in the hip, knee, ankle or foot, the patient may be fitted with an appropriate Thomas's splint and allowed to walk about, for it is highly important to have these patients out in the fresh

air. If the disease be in the shoulder, elbow, wrist or hand, a leather or poro-plastic splint should be moulded on, and the arm worn in a sling. There must be no hurry ; convalescence will needs be slow. And if the child can be sent to a bracing sea-side place it will be much in his favour.

As the disease clears up, the surface heat, the pains and the tender- ness having disappeared, and the joint having so diminished in size as to be scarcely larger than its fellow — though the wasting of the muscles of the limb may cause it still to appear considerably en- larged — the splint may be gradually left off. This remission may be for an hour or two every other day; then every other night; then every other day, and so on, the freedom being gained little by little, and the surgeon watching the case carefully. On the slightest indication of return of trouble, the former restrictive measures must be again resorted to. Massage and gentle exercises may be given day by day, but there must be no thought of "breaking down the stiffness." Many a joint has in such circumstances been wrecked by the manipulations of a " bone-setter."

Permanent Stiffness. — During the treatment of a case of chronic disease of a joint, the question naturally arises as to whether the joint will be left permanently stiff. People have the idea that if an in- flamed joint is kept long on a splint, it may eventually be found permanently stiff. And this is quite correct. But it should be clearly understood that it is not the rest of the inflamed joint which causes the stiffness. The matter should be put thus: in tuber- culous and other forms of chronic disease stiffness may ensue in spite of long-continued rest. It is the destructive disease, not the enforced rest which causes it; for inflammation of a joint rest is absolutely necessary.

The Causes of permanent Stiffness are the destructive changes wrought by the inflammation. In one case it may be that the synovial membrane is so far destroyed by the tuberculous or septic invasion that its future usefulness is lost, and the joint ever after- wards creaks at its work and easily becomes tired and painful. Thus the joint is crippled but not destroyed. In another case the liga- ments and the cartilages are implicated as well as the synovial membrane, and when the disease clears up, the bones are more or less locked, only a small range of motion being left, which forcible flexion and other methods of vigorous treatment are unable materi- ally to improve. In another set of cases the inflammatory germs quickly destroy the soft tissues of the joint, and then invade the bones, and, the disease having at last come to an end, the softened ends of the bones solidly join together like the broken fragments in simple fracture. As a result, osseous solidification of the joint (synostosis) ensues without, of course, the possibility of any move- ment. And, inasmuch as the surgeon cannot tell in any case whether the disease may not advance in this direction, he is

careful to place the limb in that position in which it will be most useful if the bony union should occur. Thus, the leg is kept straight, and the elbow bent.

In the course of a tuberculous or other chronic disease of a joint, the germs of septic disease may find access to the inflamed area, through a wound or ulceration into the joint, or by the germs being carried thither by the blood-stream. A joint-abscess results, which has to be treated by incision and fomentations. If chronic suppura- tion continues, it may become necessary to scrape out or to excise the joint, or even to amputate the limb. And if tuberculous disease of the joint is steadily progressing in spite of treatment, vigorous measures may be needed to prevent the fluid from quietly ulcerating its way out and thus inviting the entrance of septic germs. The fluid may need to be drawn off by aspiration, and direct treatment of the diseased synovial membrane may be undertaken by injections of chloride of zinc or some other reagent. Or the joint may need scraping out with a sharp spoon with the view of getting rid of the tuberculous material. Later, excision may be deemed necessary, or in extreme cases, amputation. But before these measures are considered, A. C. G. Bier's method of treatment by passive conges-

tion, and the treatment by serum injection, will probably have been tried. If a joint is left permanently stiff in an awkward and useless position, the limb may be greatly improved by excision of the joint. Thus, if the knee is left bent and the joint is excised a useful, straight limb may be obtained, somewhat shortened, and, of course, per- manently stiff. If after disease of the hip-joint the thigh remains fixed in a faulty position, it may be brought down straight by divid- ing the bone near the upper end. A stiff shoulder or elbow may be converted into a useful, movable joint by excision of the articular ends of the bones.

A stiff joint may remain as the result of long continued inflamma- tion; the unused muscles are wasted and the joint in consequence looks large. Careful measurement, however, may show that it is not materially larger than its fellow. And though all tenderness may have passed away, and though the neighbouring skin is no longer hot, still the joint remains stiff and useless. No progress being made under the influence of massage, or of gentle exercises, the surgeon may advise that the lingering adhesion be broken down under an anaesthetic, after which the function of the joint m? y quickly return.

There are the cases over which the "bone-setter" secures his greatest triumphs. A qualified practitioner may have been for months judiciously treating an inflamed joint by rest, and then feels a hesitation with regard to suddenly flexing the stiffened limb. The " bone-setter," however, has no

such qualms, and when the case passes out of the hands of the perhaps over-careful surgeon, the unqualified practitioner (because he, from a scientific point of view, knows nothing) fears nothing, and, breaking down inflammatory adhesions, sets the joint free. And his manipulations prove triumph- antly successful. But, knowing nothing and fearing nothing, he is apt to do grievous harm in carrying out his rough treatment in other cases. Malignant disease at the end of a bone (sarcoma), tuber- culosis of a Joint, and a joint stiffened by old inflammation are to him the same thing. " A small bone is out of place," or, " The bone is out of its socket; it has never been put in," and a breaking down of everything that resists his force is the result of the case being taken to him. For the " bone-setter " has only one line of treatment. Of the improvement which he often effects as if by magic the public are told much. Of the cases over which the doctor has been too long devoting skill and- care, and which are set free by the " bone-setter," everybody hears — and sometimes to the discomfiture of the medical man. But of the cases in which irreparable damage follows his vigorous manipulation nothing is said — of his rough usage of a tuberculous hip, or of a sarcomatous shoulder-joint, and of the inevitable disaster and disappointment, those most con- cerned are least inclined to talk ! A practical surgeon with common- sense has nothing to learn from the " bone-setter."

Rheumatoid Arthritis, or chronic Osteo-arthritis, is generally found in persons beyond middle age; but it is not rare in young people, though with them it need not be the progressive disease which it too often is in their elders. It is an obscure affection of the cartilage covering the joint surfaces of the bones, and it eventually involves the bones and the ligaments. A favourite joint for it is the knee or hip, and when one large joint is thus affected the other joints may escape. But when the hands or feet are implicated pretty nearly all the small joints are apt to suffer. Whether the joint is large or small, the cartilages wear away and new bone is developed about the ends of the bones, so that the joint is large and mis-shapen, the fingers being knotted and the hands deformed. When the spine is affected it becomes bowed and stiff. This is the disease which has crippled the old people in the workhouses and almshouses, and with them it is steadily progressive. Its early signs are stiffness and creaking or cracking in the joints, with discomfort and pain after exercise, and with a little effusion into the capsule of the joint. As regards treatment, medicines are of no great value. Wet, cold and damp being bad for the patient, he should be, if possible, got into a dry, bright, sunny place, and he should dress warmly. Perhaps there is no better place for him in the winter than Assuan. Cairo is not so suitable as it used to be before the dam was made, when its climate was drier. For the spring and summer certain British and Continental watering-places serve well. But if this luxury cannot be afforded, the

patient must make himself as happy as he can with such hot douchings and massage as he can obtain, keeping himself warm, and his joints covered by flannel bandages and rubbed with stimulating liniments. In people advanced or advancing in years, the disease, as a rule, gets slowly worse, sometimes very slowly, but sometimes rapidly, especially when its makes its appearance in the hip, shoulder or knee as the result of an injury. In young people, however, its course may be cut short by attention being given to the principles stated above.

Charcot's Disease resembles osteo-arthritis in that it causes destruc- tion of a joint and greatly deforms it. The deformity, however, comes on rapidly and without pain or tenderness. It is usually associated with the symptoms of locomotor ataxy, and depends upon disease of the nerves which preside over the nutrition of the joints. It is incurable.

A Loose Cartilage, or a Displaced Cartilage in the Knee Joint is apt to become caught in the hinge between the thigh bone and the leg bone, and by causing a sudden stretching of the ligaments of the joint to give rise to intense pain. When this happens the individual is

apt to be thrown down as he walks, for it comes on with great sudden- ness. And thus he feels himself to be in a condition of perpetual insecurity. After the joint has thus gone wrong, bleeding and serous effusion take place into it, and it becomes greatly swollen. And if the cartilage still remains in the grip of the-bones he is unable to straighten or bend his knee. But the surgeon by suddenly flexing and twisting the leg may manage to unhitch the cartilage and restore comfort and usefulness to the limb. As a rule, the slipping of a cartilage first occurs as the result of a serious fall or of a sudden and violent action — often it happens when the man is " dodging " at football, the foot being firmly fixed on the ground and the body being violently twisted at the knee. After the slipping has occurred many times, the amount of swelling, distress and lame- ness may diminish with each subsequent slipping, and the individual may become somewhat reconciled to his condition. As regards treatment, a tightly fitting steel cage-like splint, which, gripping the thigh and leg, limits the movements of the knee to flexion and exten- sion, may prove useful. But for a muscular, athletic individual the wearing of this apparatus may prove vexatious and disappointing. The only alternative is to open the joint and remove the loose car- tilage. The cartilage may be found on operation to be split, torn or crumpled, and lying right across between the joint-surfaces of the bones, from which nothing but an operation could possibly have removed it. The

operation is almost sure to give complete and permanent relief to the condition, the individual being able to resume his old exercises and amusements without fear of the knee playing him false. It is, however, one that should not be undertaken without due consideration and circumspection, and the details of the operation should be carried out with the utmost care and cleanliness.

An accidental wound of a joint, as from the blade of a knife, or a spike, entering the knee is a very serious affair, because of the risk of septic germs entering the synovial cavity either at the time of the injury or later. If the joint becomes thus infected there is great swelling of the part, with redness of the skin, and with the escape of blood-stained or purulent synovia. Absorption takes place of the poisonous substances produced by the action of the germs, and, as a result, great constitutional disturbance arises. Blood- poisoning may thus threaten life, and in many cases life is saved only by amputation. The best treatment is freely to open the joint, to wash it out with a strong antiseptic fluid, and to make arrange- ment for thorough drainage, the limb being fixed on a splint. Help may also be obtained by increasing the patient's power of resistance to the effect of the poisoning by injections of a serum prepared by cultivation of the septic germs in question. If the limb is saved, there is a great chance of the knee being permanently stiff.

Dislocation. — The ease with which the joint-end of a bone is dislocated varies with its form and structure, and with the position in which it happens to be placed when the violence is applied. The relative frequency of fracture of the bone and dislocation of the joint depends on the strength of the bones above and below the joint relatively to the strength of the joint itself. The strength of the various joints in the body is dependent upon either ligament or muscle, or upon the shape of the bones. In the hip, for instance, all three sources of strength are present; therefore, considering the great leverage of the long thigh bone, the hip is rarely dislocated. The shoulder, in order to allow of extensive movement, has no osseus or ligamentous strength ; it is, therefore, frequently dislocated. The wrist and ankle are rarely dislocated ; as the result of violence at the wrist the radius gives way, at the ankle the fibula, these bones being relatively weaker than the respective joints. The wrist owes its strength to ligaments, the elbow and the ankle to the shape of the bones. The symptoms of a dislocation are distortion and limited movement, with absence of the grating sensation felt in fracture when the broken ends of the bone are rubbed together. The treatment consists in reducing the dislocation, and the sooner this replacement is effected the better — the longer the delay the more difficult it becomes to put things right. After a variable period, depending on the nature of the joint and the age of the person, it may be impossible to replace the bones. The result will be a more or less useless joint. The

administration of an anaesthetic, by relaxing the muscles, greatly assists the operation of reduction. The length of time that a joint has to be kept quiet after it has been restored to its normal shape depends on its form, but, as a rule, early movement is advis- able. But when by the formation of the bones a joint is weak, as at the outer end of the collar-bone, and at the elbow-end of the radius, prolonged rest for the joint is necessary or dislocation may recur.

Congenital Dislocation at the Hip. — Possibly as a result of faulty position of the subject during intrauterine life, the head of the thigh- bone leaves, or fails throughout to occupy, its normal situation on the haunch-bone The defect, which is a very serious one, is prob- ably not discovered until the child begins to walk, when its peculiar rolling gait attracts attention. The want of fixation at the joint permits of the surgeon thrusting up the thigh-bone, or drawing it down in a painless, characteristic manner.

The first thing to be done is to find out by means of the X-rays whether a socket exists into which, under an anaesthetic, the surgeon may fortunately be enabled to lodge the end of the thigh- bone. If this offers no prospect of success, there are three courses

open : First, to try under an anaesthetic to manipulate the limb until the head of the thigh-bone rests as nearly as possible in its normal position, and then to endeavour to fix it there by splints, weights and bandaging until a new joint is formed; second, to cut down upon the site of the joint, to scoop out a new socket in the haunch-bone, and thrust the end of the thigh-bone into it, keeping it fixed there as just described; and third, to allow the child to run about as it pleases, merely raising the sole of the foot of the short leg by a thick boot, so as to keep the lower part of the trunk fairly level, lest secondary curvature of the spine ensue. The first and second methods demand many months of careful treatment in bed. The ultimate result of the second is so often disappointing that the surgeon now rarely advises its adoption. But, if under an anaes- thetic, as the result of skilful manipulation the head of the thigh-bone can be made to enter a more or less rudimentary socket, the case is worth all the time, care and attention bestowed upon it. Some- times the results of prolonged treatment are so good that the child eventually is able to walk with scarce a limp. But a vigorous attempt at placing the head of the bone in its proper position should be made in every case. (E. O.)*

JOINTS, in engineering, may be classed either (a) according to their material, as in stone or brick, wood or metal; or (b) accord- ing to their object, to prevent leakage of air, steam or water, or to transmit force, which may be thrust, pull or shear; or © ac- cording as they are stationary or moving (" working " in technical language). Many joints, like those of

ship-plates and boiler- plates, have simultaneously to fulfil both objects mentioned under (b).

All stone joints of any consequence are stationary. It being uneconomical to dress the surfaces of the stones resting on each other smoothly and so as to be accurately flat, a layer of mortar or other cementing material is laid between them. This hardens and serves to transmit the pressure from stone to stone without its being concentrated at the " high places." If the ingredients of the cement are chosen so that when hard the cement has about the same coefficient of compressibility as the stone or brick, the pressure will be nearly uniformly distributed. The cement also adheres to the surfaces of the stone or brick, and allows a certain amount of tension to be borne by the joint. It likewise prevents the stones from slipping one on the other, i.e. it gives the joint very considerable shearing strength. The composition of the cement is chosen according as it has to " set " in air or water. The joints are made impervious to air or water by " pointing " their outer edges with a superior quality of cement.

Wood joints are also nearly all stationary. They are made partially fluid-tight by " grooving and tenoning," and by " caulk- ing " with oakum or similar material. If the wood is saturated with water, it swells, the edges of the joints press closer together, and the joints become tighter the greater the water-pressure is which tends to produce leakage. Relatively to its weaker general strength,wood is a better material than iron so far as regards the transmission of a thrust past a joint. So soon as a heavy pressure comes on the joint all the small irregularities of the surfaces in contact are crushed up, and there results an approximately uni- form distribution of the pressure over the whole area (i.e. if there be no bending forces), so that no part of the material is unduly stressed. To attain this result the abutting surfaces should be well fitted together, and the bolts binding the pieces together should be arranged so as to ensure that they will not interfere with the timber surfaces coming into this close contact. Owing to its weak shearing strength on sections parallel to the fibre, timber is peculiarly unfitted for tension joints. If the pieces exerting the pull are simply bolted together with wooden or iron bolts, the joint cannot be trusted to transmit any considerable force with safety. The stresses become intensely localized in the immediate neighborhood of the bolts. A tolerably strong timber tension-joint can, however, be made by making the two pieces abut, and connecting them by means of iron plates cover- ing the joint and bolted to the sides of the timbers by bolts pass- ing through the wood. These plates should have their surfaces which lie against the wood ribbed in a direction transverse to the pull. The bolts should fit their holes slackly, and should be well tightened up so as to make the ribs sink into the surface of the timber. There will then be very little localized shearing stress brought upon the interior portions of the wood.

Iron and the other commonly used metals possess in variously

high degrees the qualities desirable in substances out of which joints are to be made. The joint ends of metal pieces can easily be fashioned to any advantageous form and size without waste of material. Also these metals offer peculiar facilities for the cutting of their surfaces at a comparatively small cost so smoothly and evenly as to ensure the close contact over their whole areas of surfaces placed against each other. This is of the highest importance, especially in joints designed to transmit force. Wrought iron and mild steel are above all other metals suitable for tension joints where there is not continuous rapid motion. Where such motion occurs, a layer, or, as it is technically termed, a " bush," of brass is inserted underneath the iron. The joint then possesses the high strength of a wrought-iron one and at the same time the good frictional qualities of a brass surface. Leak- age past moving metal joints can be prevented by cutting the surfaces very accurately to fit each other. Steam-engine slide- valves and their seats, and piston " packing-rings " and the cylinders they work to and fro in, may be cited as examples. A subsidiary compressible " packing " is in other situations em- ployed, an instance of which may be seen in the " stuffing boxes" which prevent the escape of steam from steam-engine cylinders through the piston-rod hole in the cylinder cover. Fixed metal joints are made fluid tight — (a) by caulking a riveted joint, i.e. by hammering in the edge of the metal with a square-edged chisel (the tighter the joint requires to be against leakage the closer must be the spacing of the rivets — compare the rivet-spacing in bridge, ship and boiler-plate joints) ;(b) by the insertion between the surfaces of a layer of one or other of various kinds of cement, the layer being thick or thin according to circumstances; (c) by the insertion of a layer of soft solid substance called " packing " or " insertion."

Apart from cemented and glued joints, most joints are formed by cutting one or more holes in the ends of the pieces to be joined, and inserting in these holes a corresponding number of pins. The word " pin " is technically restricted to mean a cylindrical pin in a movable joint. The word " bolt " is used when the cylindrical pin is screwed up tight with a nut so as to be im- movable. When the pin is not screwed, but is fastened by being beaten down on either end, it is called a " rivet." The pin is sometimes rectangular in section, and tapered or parallel length- wise. " Gibs " and " cottars " are examples of the latter. It is very rarely the case that fixed joints have their pins subject to simple compression in the direction of their length, though they are frequently subject to simple tension in that direction. A good

example is the joint between a steam cylinder and its cover, where the bolts have to resist the whole thrust of the steam, and at the same time to keep the joint steam-tight.

JOINTS, in geology. All rocks are traversed more or less completely by vertical or highly inclined divisional planes termed joints. Soft rocks, indeed, such as loose sand and uncompacted clay, do not show these planes; but even a soft loam after stand- ing for some time, consolidated by its own weight, will usually be found to have acquired them. Joints vary in sharpness of definition, in the regularity of their perpendicular or horizontal course, in their lateral persistence, in number and in the direc- tions of their intersections. As a rule, they are most sharply defined in proportion to the fineness of grain of the rock. They are often quite invisible, being merely planes of potential weak- ness, until revealed by the slow disintegrating effects of the weather, which induces fracture along their planes in preference to other directions in the rock; it is along the same planes that a rock breaks most readily under the blow of a hammer. In coarse-textured rocks, on the other hand, joints are apt to show themselves as irregular rents along which the rock has been shattered, so that they present an uneven sinuous course, branch- ing off in different directions. In many rocks they descend vertically at not very unequal distances, so that the spaces between them are marked off into so many wall-like masses. But this symmetry often gives place to a more or less tortuous course with lateral joints in various apparently random direc- tions, more especially where in stratified rocks the beds have diverse lithological characters. A single joint may be traced

sometimes for many yards or even for several miles, more particu- larly when the rock is fine-grained and fairly rigid, as in lime- stone. Where the texture is coarse and unequal, the joints, though abundant, run into each other in such a way that no one in particular can be identified for so great a distance. The number of joints in a mass of rock varies within wide limits. Among rocks which have undergone little disturbance the joints may be separated from each other by intervals of several yards. In other cases where the terrestrial movement appears to have been considerable, the rocks are so jointed as to have acquired therefrom a fissile character that has almost obliterated their tendency to split along the lines of bedding.

The Cause of Jointing in Rocks. — The continual state of movement in the crust of the earth is the primary cause of the majority of joints. It is to the outermost layers of the lithosphere that joints are confined; in what van Hise has described as the " zone of frac- ture," which he estimates may extend to a depth of 12,000 metres in the case of rigid rocks. Below the zone of fracture, joints cannot be formed, for there the rocks tend to flow rather than break. The rocky crust, as it slowly accommodates itself to the

shrinking interior of the earth, is subjected unceasingly to stresses which induce jointing by tension, compression and torsion. Thus joints are produced during the slow cyclical movements of elevation and de- pression as well as by the more vigorous movements of earthquakes. Tension-joints are the most widely spread ; they are naturally most numerous over areas of upheaval. Compression-joints are generally associated with the more intense movements which have involved shearing, minor-faulting and slaty cleavage. A minor cause of tension-jointing is shrinkage, due either to cooling or to desiccation. The most striking type of jointing is that produced by the cooling of igneous rocks, whereby a regularly columnar structure is developed, often called basaltic structure, such as is found at the Giant's Cause- way. This structure is described in connexion with modern volcanic rocks, but it is met with in igneous rocks of all ages. It is as well displayed among the felsites of the Lower Old Red Sandstone, and the basalts of Carboniferous Limestone age as among the Tertiary lavas of Auvergne and Vivarais. This type of jointing may cause the rock to split up into roughly hexagonal prisms no thicker than a lead pencil; on the other hand, in many dolerites and diorites the prisms are much coarser, having a diameter of 3 ft. or more, and they are more irregular in form ; they may be so long as to extend up the face of a cliff for 300 or 400 ft. A columnar jointing has often been superinduced upon stratified rocks by contact with intrusive igneous masses. Sandstones, shales and coal may be observed in this condi- tion. The columns diverge perpendicularly from the surface of the injected altering substance, so that when the latter is vertical, the columns are horizontal ; or when it undulates the columns follow its curvatures. Beautiful examples of this character occur among the coal-seams of Ayrshire. Occasionally a prismatic form of jointing may be observed in unaltered strata ; in this case it is usually among those which have been chemically formed, as in gypsum, where, as noticed by Jukes in the Paris Basin, some beds are divided from top to bottom by vertical hexagonal prisms. Desiccation, as shown by the cracks formed in mud when it dries, has probably been instrumental in causing jointing in a limited number of cases among stratified rocks.

Movement along Joint Planes. — In some conglomerates the joints may be seen traversing the enclosed pebbles as well as the surround- ing matrix; large blocks of hard quartz are cut through by them as sharply as if they had been sliced by a lapidary's machine. A similar phenomenon may be observed in flints as they lie embedded in the chalk, and the same joints may be traced continuously through many yards of rock. Such facts show that the agency to which the jointing of rocks was due must have operated with consider- able force. Further indication of movement is supplied by the rubbed and striated surfaces of some joints. These surfaces, termed slickensides , have evidently been ground against each other.

Influence of Joints on Water-flow and Scenery. — Joints form natural paths for the passage downward and upward of subterranean water and have an important bearing upon water supply. Water obtained directly from highly jointed rock is more liable to become contami- nated by surface impurities than that from a more compact rock through which it has had to soak its way ; for this reason many lime- stones are objected to as sources of potable water. On exposed surfaces joints have great influence in determining the rate and type of weathering. They furnish an effective lodgment for surface water, which, frozen by lowering of temperature, expands into ice and wedges off blocks of the rock; and the more numerous the joints the more rapidly does the action proceed. As they serve, in conjunction with bedding, to divide stratified rocks into large quadrangular blocks, their effect on cliffs and other exposed places is seen in the splintered and dislocated aspect so familiar in mountain scenery. Not infrequently, by directing the initial activity of weathering agents, joints have been responsible for the course taken by large streams as well as for the type of scenery on their banks. In lime- stones, which succumb readily to the solvent action of water, the

joints are liable to be gradually enlarged along the course of the under-ground waterflow until caves are formed of great size and intricacy.

Infilled Joints. — Joints which have been so enlarged by solution are sometimes filled again completely or partially by minerals brought thither in solution by the water traversing the rock; calcite, barytes and ores of lead and copper may be so deposited. In this way many valuable mineral veins have been formed. Widened joints may also be filled in by detritus from the surface, or, in deep-seated portions of the crust, by heated igneous rock, forced from below along the planes of least resistance. Occasionally even sedimentary rocks may be forced up joints from below, as in the case of the so-called " sandstone dykes."

Practical Utility of Joints, — An important feature in the joints of stratified rocks is the direction in which they intersect each other. As the result of observations we learn that they possess two dominant trends, one coincident in a general way with the direction in which the strata are inclined to the horizon, the other running transversely approximately at right angles. The former set is known as dip- joints, because they run with the dip or inclination of the rocks, the latter is termed strike- joints , inasmuch as they conform to the general strike or mean outcrop. It is owing to the existence of this double series of joints that ordinary quarrying

operations can be carried on. Large quadrangular blocks can be wedged off that would be shattered if exposed to the risk of blasting. A quarry is usually worked on the dip of the rock, hence strike-joints form clean-cut

Joints in Limestone Quarry near Mallow, CO. Cork. (G. V. Du Noyer.)

faces in front of the workmen as they advance. These are known as backs, and the dip-joints which traverse them as cutters. The way in which this double set of joints occurs in a quarry may be seen in the figure, where the parallel lines which traverse the shaded and unshaded faces mark the successive strata. The broad white spaces running along the length of the quarry behind the seated figure are strike-joints or backs, traversed by some highly inclined lines which mark the position of the dip-joints or cutters. The shaded ends looking towards the spectator are cutters from which the rock has been quarried away on one side. In crystalline (igneous) rocks, bedding is absent and very often there is no horizontal jointing to take its place; the joint planes break up the mass more irregularly than in stratified rocks. Granite, for example, is usually traversed by two sets of chief or master-joints cutting each other somewhat obliquely. Their effect is to divide the rock into long quadrangular, rhomboidal, or even polygonal columns. But a third set may often be noticed cutting across the columns, though less continuous and dominant than the others. When these transverse joints are few in number, columns many feet in length can be quarried out entire. Such monoliths have been from early times employed in the construction cf obelisks and pillars. (J. A. H.)

JOINTURE, in law, a provision for a wife after the death of her husband. As defined by Sir E. Coke, it is ” a competent liveli- hood of freehold for the wife, of lands or tenements, to take effect presently in possession or profit after the death of her husband, for the life of the wife at least, if she herself be not the cause of determination or forfeiture of it ” (Co. Litt. 36b). A jointure is of two kinds, legal and equitable. A legal jointure was first authorized by the Statute of Uses. Before this statute a husband had no legal seisin in such lands as were vested in another to his ” use,” but merely an equitable estate. Consequently it was usual to make settlements on marriage, the most general form being the settlement by deed of an estate to the use of the husband and wife for their lives in joint tenancy (or ” jointure “), so that the whole would go to the survivor. Although, strictly speaking, a jointure is a joint estate limited to both husband and wife, in common acceptation the word extends also to a sole estate limited to the wife only. The requisites of a legal jointure are: (1) the jointure must take effect immediately after the husband’s death; (2) it must be for the wife’s life or for a greater

estate, or be determinable by her own act; (3) it must be made before

marriage — if after, it is voidable at the wife's election, on the death of the husband; (4) it must be expressed to be in satis- faction of dower and not of part of it. In equity, any provision made for a wife before marriage and accepted by her (not being an infant) in lieu of dower was a bar to such. If the provision was made after marriage, the wife was not barred by such pro- vision, though expressly stated to be in lieu of dower; she was put to her election between jointure and dower (see Dower).

JOINVILLE, the name of a French noble family of Champagne, which traced its descent from Etienne de Vaux, who lived at the beginning of the nth century. Geoff roi III. (d. 1184), sire de Joinville, who accompanied Henry the Liberal, count of Champagne, to the Holy Land in 1147, received from him the office of seneschal, and this office became hereditary in the house of Joinville. In 1 203 Geoff roi V., sire de Joinville, died while on a crusade, leaving no children. He was succeeded by his brother Simon, who married Beatrice of Burgundy, daughter of the count of Auxonne, and had as his son Jean (q.v.), the historian and friend of St Louis. Henri (d. 1374), sire de Joinville, the grand- son of Jean, became count of Vaudemont, through his mother, Marguerite de Vaudemont. His daughter, Marguerite de Join- ville, married in 1393 Ferry of Lorraine (d. 1415), to whom she brought the lands of Joinville. In 1532, Joinville was made into a principality for the house of Lorraine. Mile de Mont- pensier, the heiress of Mile de Guise, bequeathed the principality of Joinville to Philip, duke of Orleans (1693). The castle, which overhung the Marne, was sold in 1791 to be demolished. The title of prince de Joinville (q.v.) was given later to the third son of King Louis Philippe. Two branches of the house of Joinville have settled in other countries: one in England, descended from Geoffroi de Joinville, sire de Vaucouleurs, and brother of the historian, who served under Henry III. and Edward I. ; the other, descended from Geoffroi de Joinville, sire de Briquenay, and son of Jean, settled in the kingdom of Naples.

See J. Simonnet, Essai sur Vhistoire el la genialogie des seigneurs de Joinville (1875) ; H. F. Delaborde, Jean de Joinville et les seigneurs de Joinville (1894). (M. P.)*

JOINVILLE, FRANCOIS FERDINAND PHILIPPE LOUIS MARIE, Prince de (1818-1900), third son of Louis Philippe, due d'Orleans, afterwards king of the French, was born at Neuilly on the 14th of August 1818. He was educated for the navy, and became lieutenant in 1836. His first conspicuous service was at the bombardment of San Juan de Ulloa, in November 1838, when he headed a landing party and took the Mexican general Arista prisoner with his own hand at Vera Cruz. He was pro- moted captain, and in 1840 was entrusted with the charge of bringing the remains of Napoleon from St Helena to France. In 1844 he conducted

naval operations on the coast of Morocco, bombarding Tangier and occupying Mogador, and was recom- pensed with the grade of vice-admiral. In the following year he published in the Revue des deux mondes an article on the defici- encies of the French navy which attracted considerable attention, and by his hostility to the Guizot ministry, as well as by an affectation of ill-will towards Great Britain, he gained consider- able popularity. The revolution of 1848 nevertheless swept him away with the other Orleans princes. He hastened to quit Algeria, where he was then serving, and took refuge at Claremont, in Surrey, with the rest of his family. In 1861, upon the break- ing out of the American Civil War, he proceeded to Washington, and placed the services of his son and two of his nephews at the disposal of the United States government. Otherwise, he was little heard of until the overthrow of the Empire in 1870, when he re-entered France, only to be promptly expelled by the government of national defence. Returning incognito, he joined the army of General d'Aurelle de Paladines, under the assumed name of Colonel Lutherod, fought bravely before Orleans, and afterwards, divulging his identity, formally sought permission to serve. Gambretta, however, arrested him and sent him back to England. In the National Assembly, elected in February 1871, the prince was returned by two departments and elected to sit for the Haute Marne, but, by an arrangement with Thiers, did

not take his seat until the latter had been chosen president of the provincial republic. His deafness prevented him from making any figure in the assembly, and he resigned his seat in 1876. In 1886 the provisions of the law against pretenders to the throne deprived him of his rank as vice-admiral, but he continued to live in France, and died in Paris on the 16th of June 1900. He had married in 1843 the princess Francisca, sister of Pedro II., emperor of Brazil, and had a son. the due de Penthievre (born in 1845), also brought up to the navy, and a daughter Francoise (1844-) who married the due de Chartres in 1863.

The prince de Joinville was the author of several essays and pamphlets on naval affairs and other matters of public interest, which were originally published for the most part either unsigned or pseudonymously, and subsequently republished under his own name after the fall of the Empire. They include Essais sur la marine francaise (1853); Etudes sur la marine (1859 and 1870); La Guerre d'Amerique, campagne du Potomac (1862 and 1872); Encore un mot sur Sadowa (Brussels, 1868) ; and Vieux souvenirs (1894).

JOINVILLE, JEAN, Sire de (1224-1319), was the second great writer of history in Old French, and in a manner occupies the interval between Villehardouin and Froissart. Numerous minor chroniclers fill up the gaps, but no one of them has the idiosyncrasy which distinguishes these three writers, who illus- trate the three periods of the middle ages — adolescence, complete manhood, and decadence. Joinville was the head of a noble family of the province of Champagne (see Joinville, above). The provincial court of the counts of Champagne had long been a distinguished one, and the action of Thibaut the poet, together with the proximity of the district to Paris, made the province less rebellious than most of the great feudal divisions of France to the royal authority. Joinville's first appearance at the king's court was in 1241, on the occasion of the knighting of Louis IX. 's younger brother Alphonse. Seven years afterwards he took the cross, thereby giving St Louis a valuable follower, and supplying himself with the occasion of an eternal memory. The crusade, in which he distinguished himself equally by wisdom and prowess, taught his practical spirit several lessons. He returned with the king in 1254. But, though his reverence for the personal character of his prince seems to have known no bounds, he had probably gauged the strategic faculties of the saintly king, and he certainly had imbibed the spirit of the dictum that a man's first duties are those to his own house. He was in the intervals of residence on his own fief a constant attendant on the court, but he declined to accompany the king on his last and fatal expedition. In 1282 he was one of the witnesses whose testimony was formally given at St Denis in trie matter of the canonization of Louis, and in 1298 he was present at the exhumation of the saint's body. It was not till even later that he began his literary work, the occasion being a request from Jeanne of Navarre, the wife of Philippe le Bel and the mother of Louis le Hutin. The great interval between his experiences and the period of the composition of his history is important for the due comprehen- sion of the latter. Some years passed before the task was com- pleted, on its own showing, in October 1309. Jeanne was by this time dead, and Joinville presented his book to her son Louis the Quarreller. This original manuscript is now lost, whereby hangs a tale. Great as was his age, Joinville had not ceased to be actively loyal, and in 13 15 he complied with the royal sum- mons to bear arms against the Flemings. He was at Joinville again in 13 17, and on the nth of July 13 19 he died at the age of ninety-five, leaving his possessions and his position as seneschal of Champagne to his second son Anselm. He was buried in the neighbouring church of St Laurent, where during the Revolution his bones underwent profanation. Besides his Histoire de Saint Louis and his Credo or " Confession of Faith " written much earlier, a considerable number, relatively speaking, of letters and business documents concerning the fief of Joinville and so forth are extant. These have an importance which we shall consider further on; but Joinville owes his place in general estimation only

to his history of his crusading experiences and of the subse- quent fate of St Louis.

Of the famous French history books of the middle ages Joinville's bears the most vivid impress of the personal character-

istics of its composer. It does not, like Villehardouin, give us a picture of the temper and habits of a whole order or cast oi men during a heroic period of human history; it falls far short of Froissart in vivid portraying of the picturesque and external aspects of social life; but it is a more personal book than either. The age and circumstances of the writer must not be forgotten in reading it. He is a very old man telling of circumstances which occurred in his youth. He evidently thinks that the times have not changed for the better — what with the frequency with which the devil is invoked in modern France, and the sinful expenditure common in the matter of embroidered silk coats. But this laudation of times past concentrates itself almost wholly on the person of the sainted king whom, while with feudal inde- pendence he had declined to swear fealty to him, " because I was not his man," he evidently regarded with an unlimited reverence. His age, too, while garrulous to a degree, seems to have been free from the slightest taint of boasting. No one perhaps ever took less trouble to make himself out a hero than Joinville. He is constantly admitting that on such and such an occasion he was terribly afraid; he confesses without the least shame that, when one of his followers suggested defiance of the Saracens and voluntary death, he (Joinville) paid not the least attention to him; nor does he attempt to gloss in any way his refusal to ac- company St Louis on his unlucky second crusade, or his invin- cible conviction that it was better to be in mortal sin than to have the leprosy, or his decided preference for wine as little watered as might be, or any other weakness. Yet he was a sincerely religious man, as the curious Credo, written at Acre and forming a kind of anticipatory appendix to the history, sufficiently shows. He presents himself as an altogether human person, brave enough in the field, and, at least when young, capable of extravagant devotion to an ideal, provided the ideal was fashionable, but having at bottom a sufficient respect for his own skin and a full consciousness of the side on which his bread is buttered. Nor can he be said to be in all respects an intelligent traveller. There were in him what may be called glimmerings of deliberate litera- ture, but they were hardly more than glimmerings. His famous description of Greek fire has a most provoking mixture of circum- stantial detail with absence of verifying particulars. It is as matter-of-fact and comparative as Dante, without a touch of Dante's genius. " The fashion of Greek fire was such that it came to us as great as a tun of verjuice, and the fiery tail of it was as big as a mighty lance; it made such noise in the coming that it seemed like the thunder from heaven, and looked like a dragon flying through the air; so great a light did it throw that through- out the host men saw as

though it were day for the light it threw." Certainly the excellent seneschal has not stinted himself of com- parisons here, yet they can hardly be said to be luminous. That the thing made a great flame, a great noise, and struck terror into the beholder is about the sum of it all. Every now and then indeed a striking circumstance, strikingly told, occurs in Joinville, such as the famous incident of the woman who carried in one hand a chafing dish of fire, in the other a phial of water, that she might burn heaven and quench hell, lest in future any man should serve God merely for hope of the one or fear of the other. But in these cases the author only repeats what he has heard from others. On his own account he is much more interested in small personal details than in greater things. How the Saracens, when they took him prisoner, he being half dead with a complication of diseases, kindly left him " un mien couverture d'ecarlate " which his mother had given him, and which he put over him, having made a hole therein and bound it round him with a cord; how when he came to Acre in a pitiable condition an old servant of his house presented himself, and " brought me clean white hoods and combed my hair most comfortably ", how he bought a hundred tuns of wine and served it — the best first, according to high authority — well-watered to his private soldiers, somewhat less watered to the squires, and to the knights neat, but with a suggestive phial of the weaker liquid to mix " si comme ils vouloient " — these are the details in which he seems to take greatest pleasure, and for readers six hundred years after date perhaps they are not the least interesting details.

JOIST

493

It would, however, be a mistake to imagine that Joinville's book is exclusively or even mainly a chronicle of small beer. If he is not a Villehardouin or a Carlyle, his battlepieces are vivid and truthful, and he has occasional passages of no small episodic importance, such as that dealing with the Old Man of the Moun- tain. But, above all, the central figure of his book redeems it from the possibility of the charge of being commonplace or ignoble. To St Louis Joinville is a nobler Boswell; and hero- worshipper, hero, and heroic ideal all have something of the sublime about them. The very pettiness of the details in which the good seneschal indulges as to his own weakness only serves to enhance the sublime unworldliness of the king. Joinville is a better warrior than Louis, but, while the former frankly prays for his own safety, the latter only thinks of his army's when they have escaped from the hands of the aliens. One of the king's knights boasts that ten thousand pieces have been " forcontes " (counted short) to the Saracens; and it is with the utmost trouble that Joinville and the rest can persuade the king that this is a joke, and that the Saracens are much more likely to have got the advantage. He warns

Joinville against wine-bibbing, against bad language, against all manner of foibles small and great; and the pupil acknowledges that this physician at any rate had healed himself in these respects. It is true that he is severe towards infidels; and his approval of the knight who, finding a Jew likely to get the better of a theological argument, resorted to the baculine variety of logic, does not meet the views of the 20th century. But Louis was not of the 20th century but of the 13th, and after his kind he certainly deserved Joinville's admiration. Side by side with his indignation at the idea of cheating his Saracen enemies may be mentioned his answer to those who after Taillebourg complained that he had let off Henry III. too easily. " He is my man now, and he was not before," said the king, a most unpractical person certainly, and in some ways a sore saint for France. But it is easy to understand the half-despairing adoration with which a shrewd and somewhat prosaic person like Joinville must have regarded this flower of chivalry born out of due time. He has had his reward, for assuredly the portrait of St Louis, from the early collection of anecdotes to the last hearsay sketch of the woeful end at Tunis, with the famous enseignement which is still the best summary of the theoretical duties of a Christian king in medieval times, is such as to take away all charge of vulgarity or mere commirage from Joinville, a charge to which otherwise he might perhaps have been exposed.

The arrangement of the book is, considering its circumstances and the date of its composition, sufficiently methodical. Accord- ing to its own account it is divided into three parts — the first dealing generally with the character and conduct of the hero; the second with his acts and deeds in Egypt, Palestine, &c, as Joinville knew them; the third with his subsequent life and death. Of these the last is very brief, the first not long; the middle con- stitutes the bulk of the work. The contents of the first part are, as might be expected, miscellaneous enough, and consist chiefly of stories chosen to show the valour of Louis, his piety, his justice, his personal temperance, and so forth. The second part enters upon the history of the crusade itself, and tells how Joinville pledged all his land save so much as would bring in a thousand livres a year, and started with a brave retinue of nine knights (two of whom besides himself wore bannerets), and shared a ship with the sire d'Aspremont, leaving Joinville without raising his eyes," pour ce que le cuer ne me attendrisist du biau chastel que je lessoie et de mes deux enfans "; how they could not get out of sight of a high mountainous island (Lampedusa or Pantellaria) till they had made a procession round the masts in honour of the Virgin ; how they reached first Cyprus and then Egypt ; how they took Damietta, and then entangled themselves in the Delta. Bad generalship, which is sufficiently obvious, unwholesome food — it was Lent, and they ate the Nile fish which had been feasting on the carcases of the slain — and Greek fire did the rest, and personal valour

was of little avail,not merely against superior numbers and better generals, but against dysentery and a certain " mal de l'ost " which attacked the mouth and the legs, a curious human version of a well-known bestial malady. After ransom

Acre was the chief scene of Louis's stay in the East, and here Joinville lived in some state, and saw not a few interesting things, hearing besides much gossip as to the inferior affairs of Asia from ambassadors, merchants and others. At last they journeyed back again to France, not without considerable experiences of the perils of the deep, which Joinville tells with a good deal of spirit. The remainder of the book is very brief. Some anecdotes of the king's " justice," his favourite and distinguishing attribute during the sixteen years which intervened between the two crusades, are given; then comes the story of Joinville's own refusal to join the second expedition, a refusal which bluntly alleged the harm done by the king's men who stayed at home to the vassals of those who went abroad as the reason of Joinville's resolution to remain behind. The death of the king at Tunis, his enseignement to his son, and the story of his canonization complete the work.

The book in which this interesting story is told has had a literary history which less affects its matter than the vicissitudes to which Froissart has been subjected, but which is hardly less curious in its way. There is no reason for supposing that Joinville indulged in various editions, such as those which have given Kervyn de Letten- hove and Simeon Luce so much trouble, and which make so vast a difference between the first and the last redaction of the chronicler of the Hundred Years' War. Indeed the great' age of the seneschal of Champagne, and his intimate first-hand acquaintance with his subject, made such variations extremely improbable. But, whereas there is no great difficulty (though much labour) in ascertaining the original and all subsequent texts of Froissart, the original text of Joinville was until recently unknown, and even now may be said to be in the state of a conjectural restoration. It has been said that the book was presented to Louis le Hutin. Now we have a catalogue of Louis le Hutin's library, and, strange to say, Joinville does not figure in it. His book seems to have undergone very much the same fate as that which befell the originals of the first two volumes of the Paston Letters which Sir John Fenn presented to George the Third. Several royal library catalogues of the 14th century are known, but in none of these does the Histoire de St Louis appear. It does appear in that of Charles V. (1411), but apparently no copy even of this survives. As everybody knows, however, books could be and were multiplied by the process of copying tolerably freely, and a copy at first or second hand which belonged to the fiddler king Ren6 of Provence in the 15th century was used for the first printed edition in 1547. Other editions were printed from other versions, all evidently posterior to the

original. But in 1741 the well-known medievalist La Curne de St Palaye found at Lucca a manuscript of the 16th century, evidently representing an older text than any yet printed. Three years later a 14th-century copy was found at Brussels, and this is the standard manuscript authority for the text of Joinville. Those who prefer to rest on MS. authority will probably hold to this text, which appears in the well-known collection of Michaud and Poujoulat as well as that of Buchon, and in a careful and useful separate edition by Francisque Michel. The modern science of critical editing, however, which applies to medieval texts the principles long recognized in editing the classics, has discovered in the 16th-century manuscript, and still more in the original miscellaneous works of Joinville, the letters, deeds, &c, already alluded to, the materials for what we have already called a conjectural restoration, which is not without its interest, though perhaps it is possible for that interest to be exaggerated.

For merely general readers Buchon's or Michaud's editions of Joinville will amply suffice. Both include translations into modern French, which, however, are hardly necessary, for the language is very easy. Natalis de Wailly's editions of 1868 and particularly 1874 are critical editions, embodying the modern research connected with the text, the value of which is considerable, but contestable. They are accompanied by ample annotations and appendices, with illustrations of great merit and value. Much valuable information appeared for the first time in the edition of F. Michel (1859). To these may be added A. F. Didot's Etudes sur Joinville (1870) and H. F. Delaborde's Jean de Joinville (1894). A good sketch of the whole subject will be found in Aubertin's Histoire de la langue el de la literature francaises au moyen Age, ii. 196-21 1 ; see also Gaston Paris, Litt. francaise au moyen Age (1893), and A. Debidour, Les Chroniqueurs (1888). There are English translations by T. Johnes (1807), J. Hutton (1868), Ethel Wedgwood (1906), and (more liter- ally) Sir F. T. Marzials (" Everyman's Library," 1908). (G. Sa.)

JOIST, in building, one of a row or tier of beams set edgewise from one wall or partition to another and carrying the flooring boards on the upper edge and the laths of the ceiling on the lower. In double flooring there are three series of joists, binding, bridging, and ceiling joists. The binding joists are the real support of the floor, running from wall to wall, and carrying the bridging joists above and the ceiling joists below (see Carpentry),

The Mid. Eng. form of the word was giste or gyste, and was adapted from O. Fr. giste, modern gtte, a beam supporting the platform of a gun. By

origin the word meant that on which anything lies or rests (gesir, to lie; Lat. jacere).

The English word " gist," in such phrases as " the gist of the matter," the main or central point in an argument, is a doublet of joist. According to Skeat, the origin of this meaning is an O. Fr. proverbial expression, Je sqay bien oil gist le lievre, I know well where the hare lies, i.e. I know the real point of the matter.

JOKAI, MAURUS (1825-1904), Hungarian novelist, was born at Rev-Komarom on the 19th of February 1825. His father, Joseph, was a member of the Asva branch of the ancient Jokay family; his mother was a scion of the noble Pulays. The lad was timid and delicate, and therefore educated at home till his tenth year, when he was sent to Pressburg, subsequently com- pleting his education at the Calvinist college at Papa, where he first met Petofi, Alexander Kozma, and several other brilliant young men who subsequently became famous. His family had meant him to follow the law, his father's profession, and accord- ingly the youth, always singularly assiduous, plodded conscien- tiously through the usual curriculum at Kecskemet and Pest, and as a full-blown advocate actually succeeded in winning his first case. But the drudgery of a lawyer's office was uncon- genial to the ardently poetical youth, and, encouraged by the encomiums pronounced by the Hungarian Academy upon his first play, Zsido fiu (" The Jew Boy "), he flitted, when barely twenty, to Pest in 1845 with a MS. romance in his pocket; he was introduced by Petofi to the literary notabilities of the Hun- garian capital, and the same year his first notable romance HUkoznapok (" Working Days "), appeared, first in the columns of the Pesti Dievallap, and subsequently, in 1846, in book form. HUkoznapok, despite its manifest crudities and extravagances, was instantly recognized by all the leading critics as a work of original genius, and in the following year Jokai was appointed the editor of Eletkepek, the leading Hungarian literary journal, and gathered round him all the rising talent of the country. On the outbreak of the revolution of 1848 the young editor enthusi- astically adopted the national cause, and served it with both pen and sword. Now, as ever, he was a moderate Liberal, setting his face steadily against all excesses; but, carried away by the Hungarian triumphs of April and May 1849, he supported Kossuth's fatal blunder of deposing the Hapsburg dynasty, and though, after the war was over, his life was saved by an ingenious stratagem of his wife, the great tragic actress, Roza Benke Laborfalvi, whom he had married on the 29th of August 1848, he lived for the next fourteen years the life of a political suspect. Yet this was perhaps the most glorious period of his existence, for during it he devoted himself to the rehabilitation of the pro- scribed and humiliated Magyar language, composing in it no fewer than thirty great romances, besides innumerable volumes of tales, essays, criticisms and facetiae. This was the

period of such masterpieces as Erdely Arany Kord (" The Golden Age of Tran- sylvania "), with its sequel Torokvildg Magyar or szdgon (" The Turks in Hungary"), EgyMagyar Ndbob("A Hungarian Nabob"), Karpdthy Zoltdn, Janicsdrok vegnapjai (" The Last Days of the Janissaries"), Szomorti, napok (" Sad Days "). On the re-estab- lishment of the Hungarian constitution by the Composition of 1867, Jokai took an active part in politics. As a constant sup- porter of the Tisza administration, not only in parliament, where he sat continuously for more than twenty years, but also as the editor of the government organ, Hon, founded by him in 1863, he became a power in the state, and, though he never took office himself, frequently extricated the government from difficult places. In 1897 the emperor appointed him a member of the upper house. As a suave, practical and witty debater he was particularly successful. Yet it was to literature that he con- tinued to devote most of his time, and his productiveness after 1870 was stupendous, amounting to some hundreds of volumes. Stranger still, none of this work is slipshod, and the best of it deserves to endure. Amongst the finest of his later works may be mentioned the unique and incomparable Az arany ember (" A Man of Gold ") — translated into English under the title of

Timar's Two Worlds — and A tengerzemu holgy (" Eyes like the Sea "), the latter of which won the Academy's prize in 1890. He died at Budapest on the 5th of May 1904; his wife having predeceased him in 1886. Jokai was an arch-romantic, with a perfervid Oriental imagination, and humour of the purest, rarest description. If one can imagine a combination, in almost equal parts, of Walter Scott, William Beckford, Dumas pere, and Charles Dickens, together with the native originality of an ardent Magyar, one may perhaps form a fair idea of the great Hungarian romancer's indisputable genius.

See N6vy Laszlo, Jokai M6r; Hegediisis Sandor, Jokai Morrol; H. W. Temperley, " Maurus Jokai and the Historical Novel," Con- temporary Review (July 1904).

JOKJAKARTA, or Jokjokarta (more correctly Jokyakarta; Du. Djokjakarta), a residency of the island of Java, Dutch East Indies, bounded N. by Kedu and Surakarta, E. by Surakarta, S. by the Indian Ocean, W. by Bagelen. Pop. (1897), 858,392. The country is mountainous with the exception of a wedge-like strip in the middle between the rivers Progo and Upak. In the north-west are the southern slopes of the volcano Merapi, and in the east the Kidul hills and the plateau of Sewu. The last- named is an arid and scantily populated chalk range,with numer- ous small summits, whence it is also known as the Thousand Hills. The remainder of the residency is well-watered and fer- tile, important irrigation works having been carried out. Sugar, rice and indigo are cultivated; salt-making is

practised on the coast. The minerals include coal-beds in the Kidul hills and near Nangulan, marble and gold in the neighbourhood of Kalasan. The natives are poor, owing chiefly to maladministration, the use of opium and the usury practised by foreigners (Chinese, Arabs, &c). The principality is divided between the sultan (vassal of the Dutch government) and the so-called independent prince Paku Alam; Ngawen and Imogiri are enclaves of Sura- karta. There are good roads, and railways connect the chief town with Batavia, Samarang, Surakarta, &c. The town of Jokjakarta (see Java) is the seat of the resident, the sultan and the Paku Alam princes; its most remarkable section is the kraton or citadel of the sultan. Imogiri, S.W. of the capital, the burial- place of the princes of Surakarta and Jokjakarta, is guarded by priests and officials. Sentolo, Nangulan, Brosot, Kalasan, Tempel, -Wonosari are considerable villages. There are numerous remains of Hindu temples, particularly in the neighbourhood of Kalasan near the border of Surakarta and Prambanan, which is just across it. Remarkable sacred grottoes are found on the coast, namely, the so-called Nyabi Kidul and Rongkob, and at Selarong, south-east of Jokjakarta.

JOLIET, a city and the county-seat of Will county, Illinois, U.S.A., in the township of Joliet, in the N.E. part of the state, on the Des Plaines river, 40 m. S.W. of Chicago. Pop. (1890), 23,264; (1900), 29,353, °f whom 8536 were foreign-born, 1889 being German, 1579 Austrian, 1206 Irish and 951 Swedish; (1910 census) 34,670. In addition there is a large population in the immediate suburbs: that of the township including the city was 27,438 in 1890, and 50,640 in 1910. Joliet is served by the Atchison, Topeka & Santa Fe, the Chicago & Alton, the Chicago, Rock Island & Pacific, the Michigan Central, the Illinois, Iowa & Minnesota, and the Elgin, Joliet & Eastern railways, by interurban electric lines, and is on the Illinois & Michigan canal and the Chicago Sanitary (ship) canal. The city is situated in a narrow valley, on both sides of the river. It is the seat of the northern Illinois penitentiary, and has a public library (in front of which is a statue, by S. Asbjornsen, of Louis Joliet), the township high school, two hospitals, two Catholic academies and a club-house, erected by the Illinois Steel Company for the use of its employees. There are two municipal parks, West Park and Highland Park; Dell wood Park is an amusement resort, owned by the Chicago & Joliet Electric Railway Company. In the vicinity are large deposits of calcareous building stone, cement and fireclay, and there are coal mines 20 m. distant. Mineral resources and water-power have facilitated the develop- ment of manufactures. The factory product in 1905 was valued at $33,788,700 (29-3% more than in 1900), a large part of which

was represented by iron and steel goods. There are large industrial establishments just outside the city limits. The first settlement on the site of Joliet (1833) was called Juliet, in honour of the daughter of James B. Campbell, one of the settlers. The present name was adopted in 1845, in memory of Louis Joliet (1645-1700), the French Canadian explorer of the Missis- sippi, and in 1852 a city charter was secured.

JOLLY (from O. Fr. jolif; Fr. joli, the French word is obscure in origin; it may be from late Lat. gaudivus, from gaudere, to rejoice, the change of d to I being paralleled by cigada and cigale, or from O. Norse jol, Eng. " yule," the northern festival of midwinter) , and adjective meaning gay, cheerful, jovial, high-spirited. The colloquial use of the term as an intensive adverb, meaning extremely, very, was in early usage quite literary; thus John Trapp (1601-1669), Commentaries on the New Testament, Matthew (1647), writes, " All was jolly quiet at Ephesus before St Paul came hither." In the royal navy " jolly " used as a substantive, is the slang name for a marine. To " jolly " is a slang synonym for " chaff." The word " jolly-boat," the name of a ship's small broad boat, usually clinker- built, is of doubtful etymology. It occurs in English in the 18th century, and is usually connected with Dan. or Swed. jolle, Dutch jol, a small ship's boat; these words are properly represented in English by " yawl " originally a ship's small boat, now chiefly used of a rig of sailing vessels, with a cutter-rigged foremast and a small mizzen stepped far aft, with a spanker sail (see Rigging). A connexion has been suggested with a word of much earlier appearance in English, jolywat, or gellywatte. This occurs at the end of the 1 5th century and is used of a smaller type of ship's boat. This is supposed to be a corruption of the French galiote or Dutch galjoot, galliot (see Galley). The galliot was, however, a large vessel.

JOLY DE LOTBINIERE, SIR HENRI GUSTAVE (1829-1908), Canadian politician, was born at Epernay in France on the 5th of December 1829. His father, Gaspard Pierre Gustave Joly, the owner of famous vineyards at Epernay, was of Huguenot descent, and married Julie Christine, grand-daughter of Eustache Gaspard Michel Chartier de Lotbiniere, marquis de Lotbiniere (one of Montcalm's engineers at Quebec); he thus became seigneur de Lotbiniere. Henri Gustave adopted the name of de Lotbiniere in 1888, under a statute of the province of Quebec. He was educated in Paris, and called to the bar of lower Canada in 1858. Onthe 6th of May i856he married Margarettajosepha (d. 1904), daughter of Hammond Gowen, of Quebec. At the general election of 1861 he was elected to the house of assembly of the province of Canada as Liberal member for the county of Lotbiniere, and from 1867 to 1874 he represented the same county in the House of Commons, Ottawa, and in the legislative assembly, Quebec. Joly was opposed to confederation and supported Dorion in the stand which he took on this question. In 1878 he was called by Luc Letellier de St Just,

lieutenant- governor of Quebec, to form an administration, which was de- feated in 1879, and until 1883 he was leader of the opposition. During his brief administration he adopted a policy of retrench- ment, and endeavoured to abolish the legislative council. In 1885, as a protest against the attitude of his party towards Louis Riel, who was tried and executed for high treason, he retired from public life. Early in the year 1895 he was induced again to take an active part in the campaign of his party, and at the general election of 1896 he was returned as member for the county of Portneuf. He had already in 1895 been created K.C.M.G. On the formation of Sir Wilfrid Laurier's adminis- tration he accepted the office of controller of inland revenue, and a year later he became a privy councillor, as minister of inland revenue. From 1900 to 1906 he was lieutenant-governor of the province of British Columbia. He twice declined a seat in the senate, but rendered eminent service to Canada by promoting the interest of agriculture, horticulture and of forestry. He died on the 17th of November 1908. (A. G. D.)

JOMINI, ANTOINE HENRI, Baron (1779-1869), general in the French and afterwards in the Russian service, and one of the most celebrated writers on the art of war, was born on the

6th of Marchi779 at Payerne in the canton of Vaud, Switzerland, where his father was syndic. His youthful preference for a military life was disappointed by the dissolution of the Swiss regiments of France at the Revolution. For some time he was a clerk in a Paris banking-house, until the outbreak of the Swiss revolution. At the age of nineteen he was appointed to a post on the Swiss headquarters staff, and when scarcely twenty-one to the command of a battalion. At the peace of Luneville in 1801 he returned to business life in Paris, but devoted himself chiefly to preparing the celebrated Traite des grandes operations mili- taires, which was published in 1804-1805. Introduced to Marshal Ney, he served in the campaign of Austerlitz as a volunteer aide-de-camp on Ney's personal staff. In December 1805 Napoleon, being much impressed by a chapter in Jomini's treatise, made him a colonel in the French service. Ney thereupon made him his principal aide-de-camp. In 1806 Jomini published his views as to the conduct of the impending war with Prussia, and this, along with his knowledge of Frederick the Great's campaigns, which he had described in the Traite, led Napoleon to attach him to his own headquarters. He was present with Napoleon at the battle of Jena, and at Eylau won the cross of the Legion of Honour. After the peace of Tilsit he was made chief of the staff to Ney, and created a baron. In the Spanish campaign of 1808 his advice was often of the highest value to the marshal, but Jomini quarrelled with his chief, and was left almost at the mercy of his numerous enemies, especially Berthier, the emperor's chief of staff. Overtures had been made to him, as early as 1807, to enter the Russian service, but Napoleon,

hearing of his intention to leave the French army, compelled him to remain in the service with the rank of general of brigade. For some years thereafter Jomini held both a French and a Russian commission, with the consent of both sovereigns. But when war between France and Russia broke out, he was. in a difficult position, which he ended by taking a command on the line of communica- tion. He was thus engaged when the retreat from Moscow and the uprising of Prussia transferred the seat of war to central Germany. He promptly rejoined Ney, took part in the battle of Liitzen and, as chief of the staff of Ney's group of corps, rendered distinguished services before and at the battle of Baut- zen, and was recommended for the rank of general of division. Berthier, however, not only erased Jomini's name from the list, but put him under arrest and censured him in army orders for failing to supply certain returns that had been called for. How far Jomini was held responsible for certain misunderstandings which prevented the attainment of all the results hoped for from Ney's attack (see Bautzen) there is no means of knowing. But the pretext for censure was trivial and baseless, and during the armistice Jomini did as he had intended to do in 1809-10, and went into the Russian service. As things then were, this was tantamount to deserting to the enemy, and so it was regarded by Napoleon and by the French army, and by not a few of his new comrades. It must be observed, in Jomini's defence, that he had for years held a dormant commission in the Russian army, that he had declined to take part in the invasion of Russia in i8r2, and that he was a Swiss and not a Frenchman. His patriotism was indeed un- questioned, and he withdrew from the Allied Army in 1814 when he found that he could not prevent the violation of Swiss neu- trality. Apart from love of his own country, the desire to study, to teach and to practise the art of war was his ruling motive. At the critical moment of the battle of Eylau he exclaimed, " If I were the Russian commander for two hours ! " On joining the allies he received the rank of lieutenant-general and the appointment of aide-de-camp from the tsar, and rendered important assistance during the German campaign, though the charge that he betrayed the numbers, positions and intentions of the French to the enemy was later acknowledged by Napoleon to be without foundation. He declined as a Swiss patriot and as a French officer to take part in the passage of the Rhine at Basel and the subsequent invasion of France.

In 181 5 he was with the emperor Alexander in Paris, and attempted in vain to save the life of his old commander Ney.

This almost cost him his position in the Russian service, but be succeeded in

making head against his enemies, and took part in the congress of Vienna. Resuming, after a period of several years of retirement and literary work, his post in the Russian army, he was about 1823 made a full general, and thenceforward until his retirement in 1829 he was principally employed in the military education of the tsarevich Nicholas (afterwards emperor) and in the organization of the Russian staff college, which was opened in 1832 and still bears its original name of the Nicholas academy. In 1828 he was employed in the field in the Russo- Turkish War, and at the siege of Varna he was given the grand cordon of the Alexander order. This was his last active service. In 1829 he settled at Brussels where he chiefly lived for the next thirty years. In 1853, after trying without success to bring about a political understanding between France and Russia, Jomini was called to St Petersburg to act as a military adviser to the tsar during the Crimean War. He returned to Brussels on the conclusion of peace in 1856 and some years afterwards settled at Passy near Paris. He was busily employed up to the end of his life in writing treatises, pamphlets and open letters on subjects of military art and history, and in 1839 he was asked by Napoleon III. to furnish a plan of campaign in the Italian War. One of his last essays dealt with the war of 1866 and the influence of the breech-loading rifle, and he died at Passy on the 24th of March 1869 only a year before the Franco-German War. Thus one of the earliest of the great military theorists lived to speculate on the tactics of the present day.

Amongst his numerous works the principal, besides the Traite, are: Histoire critique et militaire des campagnes de la Revolution (1806; new ed. 1819-1824); Vie politique et militaire de Napoleon racontee par lui-mime (1827) and, perhaps the best known of all his publications, the theoretical Precis de Vart de la guerre (1836).

See Ferdinand Lecomte, Le General Jomini, sa vie et ses ecrits (1861 ; new ed. 1888) ; C. A. Saint-Beuve, Le General Jomini (1869) ; A. Pascal, Observations historiques sur la vie, &c, du general Jomini

(1842).

JOMMELLI, NICCOLA (1714-1774), Italian composer, was born at Aversa near Naples on the 10th of September 1714. He received his musical education at two of the famous music schools of that capital, being a pupil of the Conservatorio de' poveri di Gesu Cristo under Feo, and also of the Conservatorio della pieta dei Turchini under Prota, Mancini and Leo. His first opera, L' Err ore amoroso, was successfully produced at Naples (under a pseudonym) when Jommelli was only twenty- three. Three years afterwards he went to Rome to bring out two new operas, and thence to Bologna, where he profited by the advice of Padre Martini, the greatest contrapuntist of his age. In the meantime Jommelli's fame began to spread

beyond the limits of his country, and in 1748 he went for the first time to Vienna, where one of his finest operas, Didone, was produced. Three years later he returned to Italy, and in 1753 he obtained the post of chapel-master to the duke of Wurttemberg at Stutt- gart, which city he made his home for a number of years. In the same year he had ten commissions to write operas for princely courts. In Stuttgart he permitted no operas but his own to be produced, and he modified his style in accordance with German taste, so much that, when after an absence of fifteen years he returned to Naples, his countrymen hissed two of his operas off the stage. He retired in consequence to his native village, and only occasionally emerged from his solitude to take part in the musical life of the capital. His death took place on the 25th of August 1774, his last composition being the celebrated Miserere, a setting for two female voices of Saverio Mattei's Italian para-phrase of Psalm li. Jommelli is the most representative com- poser of the generation following Leo and Durante. He ap- proaches very closely to Mozart in his style, and is important as one of the composers who, by welding together German and Italian characteristics, helped to form the musical language of the great composers of the classical period of Vienna.

JONAH, in the Bible, a prophet born at Gath-hepher in Zebulun, perhaps under Jeroboam (2) (781-741 B.C.?), who fore- told the deliverance of Israel from the Aramaeans (2 Kings xiv. 25). This prophet may also be the hero of the much later book of

Jonah, but how different a man is he ! It is, however, the later Jonah who chiefly interests us. New problems have arisen out of the book which relates to him, but here we can only attempt to consider what, in a certain sense, may be called the surface meaning of the text.

This, then is what we appear to be told. The prophet Jonah is summoned to go to Nineveh, a great and wicked city (cf. 4 Esdras ii. 8, 9), and prophesy against it. Jonah, however, is afraid (iv. 2) that the Ninevites may repent, so, instead of going to Nineveh, he proceeds to Joppa, and takes his passage in a ship bound for Tarshish. But soon a storm arises, and, suppli-cation to the gods failing, the sailors cast lots to discover the guilty man who has brought this great trouble. The lot falls on Jonah, who has been roughly awakened by the captain, and when questioned frankly owns that he is a Hebrew and a wor- shipper of the divine creator Yahweh, from whom he has sought to flee (as if He were only the god of Canaan). Jonah advises the sailors to throw him into the sea. This, after praying to Yahweh, they actually do; at once the sea becomes calm and they sacrifice to Yahweh. Meantime God has " appointed a great fish " which swallows up Jonah. Three days and three nights he is in the fish's belly, till, at a word from Yahweh, it vomits Jonah on to the dry ground. Again Jonah receives the divine call. This time he obeys. After delivering his message to

Nineveh he makes himself a booth outside the walls and waits in vain for the destruction of the city (probably iv. 5 is misplaced and should stand after iii. 4). Thereupon Jonah beseeches Yahweh to take away his worthless life. As an answer Yahweh " appoints " a small quickly-growing tree with large leaves (the castor-oil plant) to come up over the angry prophet and shelter him from the sun. But the next day the beneficent tree perishes by God's " appointment" from a worm- bite. Once more God " appoints " something; it is the east wind, which, together with the fierce heat, brings Jonah again to desperation. The close is fine, and reminds us of Job. God himself gives short-sighted man a lesson. Jonah has pitied the tree, and should not God have pity on so great a city? Two results of criticism are widely accepted. One relates to the psalm in ch. ii., which has been transferred from some other place; it is in fact an anticipatory thanksgiving for the deliverance of Israel, mostly composed of phrases from other psalms. The other is that the narrative before us is not historical but an imaginative story (such as was called a Midrash) based upon Biblical data and tending to edification. It is, however, a story of high type. The narrator considered that Israel had to be a prophet to the " nations" at large, that Israel had, like Jonah, neglected its duty and for its punishment was " swallowed up " in foreign lands. God had watched over His people and prepared its choicer members to fulfil His purpose. This company of faithful but not always sufficiently charitable men represented their people, so that it might be said that Israel itself (the second Isaiah's " Servant of Yahweh " — see Isaiah) had taken up its duty, but in an ungenial spirit which grieved the All-merciful One. The book, which is post-exilic, may therefore be grouped with another Midrash, the Book of Ruth, which also appears to represent a current of thought opposed to the exclusive spirit of Jewish legalism.

Some critics, however, think that the key of symbolism needs to be supplemented by that of mythology. The " great fish " especially has a very mythological appearance. The Babylonian dragon myth (see Cosmogony) is often alluded to in the Old Testament, e.g. in Jer. li. 44, which, as the present writer long since pointed out, may supply the missing link between Jonah i. 17 and the original myth. For the " great fish " is ultimately Tiamat, the dragon of chaos, represented historically by Nebu- chadrezzar, by whom for a time God permitted or " appointed " Israel to be swallowed up.

For further details see T. K. Cheyne, Ency. Bib., " Jonah "; and his article " Jonah, a Study in Jewish Folklore and Religion," Theological Review (1877), pp. 211-219. Konig, Hastings's Diet. Bible, " Jonah," is full but not lucid; C H. H. Wright, Biblical Studies (1886) argues ably for the symbolic theory. Against Cheyne, see Marti's work on the Minor Prophets (1894); the " great fish "

and the " three days and three nights " remain unexplained by this writer. On these points see Zimmern, K.A.T. (3), pp. 366, 389, 508. The difficulties of the mission of a Hebrew prophet to Asshur are diminished by Cheyne's later theory, Critica Biblica (1904), pp. 150-152. (T. K. C.)

JONAH, RABBI (Abulwalid Merwan Ibn Janah, also R. Marixus) (c. 996-c. 1050), the greatest' Hebrew grammarian and lexicographer of the middle ages. He was born before the year 990, in Cordova, studied in Lucena, left his native city in 1012, and, aftei somewhat protracted wanderings, settled in Saragossa, where he died before 1050. He was a physician, and Ibn Abi Usaibia, m his treatise on Arabian doctors, mentions him- as the author of a medical work. But Rabbi Jonah saw the true vocation of his life in the scientific investigation of the Hebrew language and in a rational biblical exegesis based upon sound linguistic knowledge. It is true, he wrote no actual commentary on the Bible, but his philological works exercised the greatest influence on Judaic exegesis. His first work — composed, like all the rest, in Arabic — bears the title Almustalha, and forms, as is indicated by the word, a criticism and at the same time a supplement to the two works of Yehuda 'Hayyuj on the verbs with weak-sounding and double-sounding roots. These two trac- tates, with which "Hayyuj had laid the foundations of scientific Hebrew grammar, were recognized by Abulwalid as the basis of his own grammatical investigations, and Abraham Ibn Daud, when enumerating the great Spanish Jews in his history, sums up the significance of R. Jonah in the words: " He completed what 'Hayyuj had begun." The principal work of R. Jonah is the Kitab al Tankih ("Book of Exact Investigation"), which con- sists of two parts, regarded as two distinct books — the Kitab al- Luma (" Book of Many-coloured Flower-beds ") and the Kitab al- usul (" Book of Roots "). The former (ed. J. Derenbourg, Paris, 1 886) contains the grammar, the latter (ed. Ad. Neubauer, Oxford, 1875) the lexicon of the Hebrew language. Both works are also published in the Hebrew translation of Yehuda Ibn Tibbon (Sefer Ha-Rikmah, ed. B. Goldberg, Frankfurt am Main, 1855; Scfer Ha-Schoraschim, ed. W. Bacher, Berlin, 1897). The other writings of Rabbi Jonah, so far as extant, have appeared in an edition of the Arabic original accompanied by a French transla- tion (Opuscules et trailes d'Abou'l Walid, ed. Joseph and Hartwig Derenbourg, Paris 1880). A few fragments and numerous quotations in his principal book form our only knowledge of the Kitab al-Tashwir (" Book of Refutation ") a controversial work in four parts, in which Rabbi Jonah successfully repelled the attacks of the opponents of his first treatise. At the head of this opposition stood the famous Samuel Ibn Nagdela (S. Ha-

Nagid) a disciple of 'Hayyuj. The grammatical work of Rabbi Jonah extended, moreover, to the domain of rhetoric and biblical hermeneutics, and his lexicon contains many exeget- ical excursuses. This lexicon is of especial importance by reason of its ample contribution to the comparative philology of the Semitic languages — Hebrew and Arabic, in particular. Abulwalid's works mark the culminating point of Hebrew scholarship during the middle ages, and he attained a level which was not surpassed till the modern development of philo- logical science in the 19th century.

See S. Munk, Notice sur Abou'l Walid (Paris, 1851); W. Bacher, Leben und Werke des Abulwalid und die Quellen seiner Schrifterklarung (Leipzig, 1885); id., Aus der Schrifterklarung des Abulwalid (Leip- zig, 1889); id., Die hebr.-arabische Sprachvergleichung des Abulwalid (Vienna, 1884) ; id., Die hebraisch-neuhebrdische und hebr.-aramaische Sprachvergleichung des Abulwalid (Vienna, 1885). (W. Ba.)

JONAS, JUSTUS (1493-1555), German Protestant reformer, was born at Nordhausen in Thuringia, on the 5th of June 1493. His real name was Jodokus (Jobst) Koch, which he changed according to the common custom of German scholars in the 1 6th century, when at the university of Erfurt. He entered that university in 1506, studied law and the humanities, and became Master of Arts in 1 510. In 1 51 1 he went to Wittenberg, where he took his bachelor's degree in law. He returned to Erfurt in 15T4 or 1515, was ordained priest, and in 1518 was promoted doctor in both faculties and appointed to a well- endowed canonry in the church of St Severus, to which a profes-

sorship of law was attached. His great admiration for Erasmus first led him to Greek and biblical studies, and his election in May 1 5 19 as rector of the university was regarded as a triumph for the partisans of the New Learning. It was not, however, until after the Leipzig disputation with Eck that Luther won his allegiance. He accompanied Luther to Worms in 1521, and there was appointed by the elector of Saxony professor of canon law at Wittenberg. During Luther's stay in the Wartburg Jonas was one of the most active of the Wittenberg reformers. Giving himself up to preaching and polemics, he aided the Reformation by his gift as a translator, turning Luther's and Melanchthon's works into German or Latin as the case might be, thus becoming a sort of double of both. He was busied in conferences and visitations during the next twenty years, and in diplomatic work with the princes. In 1541 he began a successful preaching crusade in Halle; he became superintendent of its churches in 1542. In 1546 he was present at Luther's deathbed at Eisleben, and preached the funeral sermon; but in the same year was banished from the duchy by Maurice, duke (later elector) of Saxony. From that time until his death, Jonas was unable to secure a satisfactory living. He wandered from place to place preaching, and finally

went to Eisfeld (1553), where he died. He had been married three times.

See Brief swechsel des Justus Jonas, gesammell und bearbeitet von G. Kawerau (2 vols., Halle, 1884-1885) ; Kawerau's article in Herzog-Hauck, Realencyklopddie, ed. 3, with bibliography.

JONATHAN (Heb. "Yah [weh] gives"). Of the many Jewish bearers of this name, three are well known: (1) the grandson of Moses, who was priest at Dan (Judg. xviii. 30). The reading Manasseh (see R.V. mg.; obtained by inserting n above the consonantal text in the Hebrew) is apparently intended to suggest that he was the son of that idolatrous king. (2) The eldest son of Saul, who, together with his father, freed Israel from the crushing oppression of the Philistines (1 Sam. xiii. seq.). Both are lauded in an elegy quoted from the Book of Jashar (2 Sam. i.) for their warm mutual love, their heroism, and their labours on behalf of the people. Jonathan's name is most familiar for the firm friendship which subsisted between him and David (1 Sam. xviii. 1-4; xix. 1-7; xx., xxii. 8; xxiii. 16-18), and when he fell at the battle of Gilboa and left behind him a young child (1 Sam. xxxi.; 2 Sam. iv. 4), David took charge of the youth and gave him a place at his court (2 Sam. ix.). See further David, Saul. (3) The Maccabee (see Jews; Maccabees).

JONCIERES, VICTORIN (1839-1903), French composer, was born in Paris on the 12th of April 1839. He first devoted his attention to painting, but afterwards took up the serious study of music. He entered the Paris Conservatoire, but did not remain there long, because he had espoused too warmly the cause of Wagner against his professor. He composed the following operas: Sardanapale (1867), Le Dernier jour de Pompei (1869), Dimitri (1876), La Reine Berthe (1878), Le Chevalier Jean (1885), Lancelot (1900). He also wrote incidental music to Hamlet, a symphony, and other works. Joncieres' admiration for Wagner asserted itself rather in a musical than a dramatic sense. The influence of the German master's earlier style can be traced in his operas. Joncieres, however, adhered to the recognized forms of the French opera and did not model his works according to the later developments of the Wagnerian " music drama." He may indeed be said to have been at least as much influenced by Gounod as by Wagner. From 187 1 he was musical critic for La Liberty. He died on the 26th of October 1903.

JONES, ALFRED GILPIN (1824-1906), Canadian politician, was born at Weymouth, Nova Scotia, in September 1824, the son of Guy C. Jones of Yarmouth, and grandson of a United Empire Loyalist. In 1865 he opposed the federation of the British American provinces, and, in his anger at the refusal of the British government to repeal such portions of the British North America Act as referred to Nova Scotia, made a speech which won

for him the name of Haul-down-the-flag Jones. He was for many years a member of the Federal Parliament, and

for a few months in 1878 was minister of militia under the Liberal government. Largely owing to his influence the Liberal party refused in 1878 to abandon its Free Trade policy, an obstinacy which led to its defeat in that year. In 1900 he was appointed lieutenant-governor of his native province, and held this position till his death on the 15th of March 1906.

JONES, SIR ALFRED LEWIS (1845-1909), British shipowner, was born in Carmarthenshire, in 1845. At the age of twelve he was apprenticed to the managers of the African Steamship Company at Liverpool, making several voyages to the west coast of Africa. By the time he was twenty-six he had risen to be manager of the business. Not finding sufficient scope in this post, he borrowed money to purchase two or three small sailing vessels, and started in the shipping business on his own account. The venture succeeded, and he made additions to his fleet, but after a few years' successful trading, realizing that sailing ships were about to be superseded by steamers, he sold his vessels. About this time (1891) Messrs. Elder, Dempster & Co., who purchased the business of the old African Steamship Company, offered him a managerial post. This offer he accepted, subject to Messrs. Elder, Dempster selling him a number of their shares, and he thus acquired an interest in the business, and subsequently, by further share purchases, its control. See further Steamship Lines. In 1901 he was knighted. Sir Alfred Jones took a keen interest in imperial affairs, and was instrumental in founding the Liverpool school of tropical medicine. He acquired considerable territorial interests in West Africa, and financial interests in many of the companies engaged in opening up and developing that part of the world. He also took the leading part in opening up a new line of communication with the West Indies, and stimulating the Jamaica fruit trade and tourist traffic. He died on the 13th of December 1909, leaving large charitable bequests.

JONES, EBENEZER (1820-1860), British poet, was born in Islington, London, on the 20th of January 1820. His father, who was of Welsh extraction, was a strict Calvinist, and Ebenezer was educated at a dull, middle-class school. The death of his father obliged him to become a clerk in the office of a tea merchant. Shelley and Carlyle were his spiritual masters, and he spent all his spare time in reading and writing; but he developed an exaggerated style of thought and expression, due partly to a defective education. The unkind reception of his Studies of Sensation and

Event (1843) seemed to be the last drop in his bitter cup of life. Baffled and disheartened, he destroyed his manuscripts. He earned his living as an accountant and by literary hack work, and it was not until he was rapidly dying of consumption that he wrote his three remarkable poems, " Winter Hymn to the Snow," " When the World is Burning " and "To Death." The fame that these and some of the pieces in the early volume brought to their author came too late. He died on the 14th of September i860.

It was not till 1870 that Dante Gabriel Rossetti praised his work in Notes and Queries. Rossetti's example was followed by W. B. Scott, Theodore Watts-Dunton, who contributed some papers on the subject to the Athenaeum (September and October 1878), and R. H. Sheppard, who edited Studies of Sensation and Event in 1879. i

JONES, ERNEST CHARLES (1819-1869), English Chartist, was born at Berlin on the 25th of January 1819, and educated in Germany. His father, an officer in the British army, was then equerry to the duke of Cumberland — afterwards king of Hanover. In 1838 Jones came to England, and in 1841 published anony- mously The Wood Spirit, a romantic novel. This was followed by some songs and poems. In 1844 he was called to the bar at the Middle Temple. In 1845 he joined the Chartist agitation, quickly becoming its most prominent figure, and vigorously carrying on the party's campaign on the platform and in the press. His speeches, in which he openly advocated physical force, led to his prosecution, and he was sentenced in 1848 to two years' imprisonment for sedition. While in prison he wrote, it is said in his own blood on leaves torn from a prayer-book, The Revolt of Hindostan, an epic poem. On his release he again

became the leader of what remained of the Chartist party and editor of its organ. But he was almost its only public speaker; he was out of sympathy with the other leading Chartists, and soon joined the advanced Radical party. Thenceforward he devoted himself to law and literature, writing novels, tales and political songs. He made several unsuccessful attempts to enter parliament, and was about to contest Manchester, with the certainty of being returned, when he died there on the 26th of January 1869. He is believed to have sacrificed a consider- able fortune rather than abandon his Chartist principles. His wife was Jane Atherley; and his son, Llewellyn Atherley- Jones, K.C. (b. 1851), became a well-known barrister and Liberal member of parliament.

JONES, HENRY (1831-1899), English author, well known as a writer on whist under his nom de guerre " Cavendish," was born in London on the 2nd of November 1831, being the eldest son of Henry D. Jones, a medical practitioner. He adopted his father's profession, established himself in 1852 and continued for sixteen years in practice in London. The father was a

keen devotee of whist, and under his eye the son became early in life a good player. He was a member of several whist clubs, among them the " Caven- dish," and in 1862 appeared his Principles of Whist, stated and explained by " Cavendish," which was destined to become the leading authority as to the practice of the game. This work was followed by treatises on the laws of piquet and ecarte. " Cavendish " also wrote on billiards, lawn tennis and croquet, and contributed articles on whist and other games to the ninth edition of the Encyclopaedia Britannica. " 'Cavendish ' was not a law-maker, but he codified and commented upon the laws which had been made during many generations of card-playing." One of the most noteworthy points in his character was the manner in which he kept himself abreast of improvements in his favourite game. He died on the 10th of February 1899.

JONES, HENRY ARTHUR (1851-), English dramatist, was born at Grandborough, Buckinghamshire, on the 28th of September 1851 the son of Silvanus Jones, a farmer. He began to earn his living early, his spare time being given to literary pursuits. He was twenty-seven before his first piece, Only Round the Corner, was produced at the Exeter Theatre, but within four years of his debut as a dramatist he scored a great success by The Silver King (November 1882), written with Henry Herman, a melodrama produced by Wilson Barrett at the Princess's Theatre. Its financial success enabled the author to write a play " to please himself." Saints and Sinners (1884), which ran for two hundred nights, placed on the stage a picture of middle-class life and religion in a country town, and the introduction of the religious element raised considerable outcry. The author de- fended himself in an article published in the Nineteenth Century (January 1885), taking for his starting-point a quotation from the preface to Moliere's Tartuffe. His next serious piece was The Middleman (1889), followed by Judah (1890), both power- ful plays, which established his reputation. Later plays were The Dancing Girl (1891), The Crusaders (1891), The Bauble Shop (\&<)?,)}The Tempter (1893), The Masqueraders (1894), The Case of Rebellious Susan (1894), The Triumph of the Philistines (1895), Michael and his Lost A ngel (1896), The Rogue's Comedy (1 896) , The Physician (1897), The Liars (1897), Carnac Sahib (1899), The Manoeuvres of Jane (1899), The Lackeys' Carnival (1900), Mrs Dane's Defence (1900), The Princess's Nose (1902) , Chance the Idol (1902), Whitewashing Julia (1903), Joseph Entangled (1904), The Chevalier (1904), &c. A uniform edition of his plays began to be issued in 1891; and his own views of dramatic art have been expressed from time to time in lectures and essays, collected in 1895 as The Renascence of the English Drama.

JONES, INIGO (1573-1651), ,English architect, sometimes called the " English Palladio," the son of a cloth-worker, was born in London on the

15th of July 1573. It is stated that he was apprenticed to a joiner, but at any rate his talent for drawing attracted the attention of Thomas Howard, earl of Arundel (some say William, 3rd earl of Pembroke), through whose help he went to study landscape-painting in Italy. His preference soon transferred itself to architecture, and, following chiefly the style

of Palladio, he acquired at Venice such a reputation that in 1604 he was invited by Christian IV. to Denmark, where he is said to have designed the two great royal palaces of Rosenborg and Frederiksborg. In the following year he accompanied Anne of Denmark to the court of James I. of England, where, besides being appointed architect to the queen and Prince Henry, he was employed in supplying the designs and decorations of the court masques. After a second visit to Italy in 1612, Jones was. ap- pointed surveyor-general of royal buildings by James I., and was engaged to prepare designs for a new palace at Whitehall. In 1620 he was employed by the king to investigate the origin of Stone- henge, when he came to the absurd conclusion that it had been a Roman temple. Shortly afterwards he was appointed one of the commissioners for the repair of St Paul's, but the work was not begun till 1633. Under Charles I. he enjoyed the same offices as under his predecessor, and in the capacity of designer of the masques he came into collison with Ben Jonson, who frequently made him the butt of his satire. After the Civil War Jones was forced to pay heavy fines as a courtier and malignant. He died in poverty on the 5th of July 1651.

A list of the principal buildings designed by Jones is given in Dallaway's edition of Walpole's Anecdotes of Painting, and for an estimate of him as an architect see Fergusson's History of Modern Architecture. The Architecture of Palladio, in 4 books, by Inigo Jones, appeared in 17 15 ; The Most Notable Antiquity of Great Britain, called Stonehenge, restored by Inigo Jones, in 1655 (ed. with memoir, 1725); the Designs of Inigo Jones, by W. Kent, in 1727; and The Designs of Inigo Jones, by J. Ware, in 1757. See also G. H. Birch, London Churches of the XVIIth and XVIIIth Centuries (1896); W. J. Loftie, Inigo Jones and Wren, or the Rise and Decline of Modern Architecture in England (1893).

JONES, JOHN (c. 1800-1882), English art collector, was born about 1800 in or near London. He was apprenticed to a tailor, and about 1825 opened a shop of his own in the west-end of London. In 1850 he was able to retire from active management with a large fortune. When quite a young man he had begun to collect articles of vertu. The rooms over his shop in which he at first lived were soon crowded, and even the bedrooms of his new house

in Piccadilly were filled with art treasures. His collection was valued at approximately £250,000. Jones died in London on the 7th of January 1882, leaving his pictures, furniture and objects of art to the South Kensington Museum.

A Catalogue of the Jones Bequest was published by the Museum in 1882, and a Handbook, with memoir, in 1883.

JONES. JOHN PAUL (1747-1792), American naval officer, was born on the 6th of July 1747, on the estate of Arbigland, in the parish of Kirkbean and the stewartry of Kirkcudbright, Scotland. His father, John Paul, was gardener to Robert Craik, a member of parliament; and his mother, Jean Macduff, was the daughter of a Highlander. Young John Paul, at the age of twelve, became shipmaster's apprentice to a merchant of White- haven, named Younger. At seventeen he shipped as second mate and in the next year as first mate in one of his master's vessels; on being released from his indentures, he acquired an interest in a ship, and as first mate made two voyages between Jamaica and the Guinea coast, trading in slaves. Becoming dis- satisfied with this kind of employment, he sold his share in the ship and embarked for England. During the voyage both the captain and the mate died of fever, and John Paul took command and brought the ship safely to port. The owners gave him and the crew 10% of the cargo; after 1768, as captain of one of their merchantmen, John Paul made several voyages to America; but for unknown reasons he suddenly gave up his command to live in America in poverty and obscurity until 1775. During this period he assumed the name of Jones, apparently out of regard for Willie Jones, a wealthy planter and prominent political leader of North Carolina, who had befriended John Paul in his days of poverty.

When war broke out between England and her American colonies, John Paul Jones was commissioned as a first lieutenant by the Continental Congress, on the 22nd of December 1775. In 1776 he participated in the unsuccessful attack on the island of New Providence, and as commander first of the " Providence "

and then of the " Alfred " he cruised between Bermuda and Nova Scotia, inflicting much damage on British shipping and fisheries. On the 10th of October 1776 he was promoted captain. On the 1st of November 1777 he sailed in the sloop-of-war " Ranger " for France with despatches for the American com- missioners, announcing the surrender of Burgoyne and asking that Jones should be supplied with a swift frigate for harassing the coasts of England. Failing to secure a frigate, Jones sailed from Brest in the " Ranger " on the 10th of April 1778. A few days later he surprised the garrisons of the two forts commanding the harbour of Whitehaven, a port with which he was familiar from boyhood, spiked the guns and made an

unsuccessful attempt to fire the shipping. Four days thereafter he encountered the British sloop-of-war " Drake," a vessel slightly superior to his in fighting capacity, and after an hour's engagement the British ship struck her colours and was taken to Brest. By this exploit Jones became a great hero in the eyes of the French, just begin- ning a war with Great Britain. With the rank of commodore he was now put at the head of a squadron of five ships. His flagship, the " Duras," a re-fitted East Indiaman, was re-named by him the " Bonhomme Richard," as a compliment to Benjamin Frank- lin, whose Poor Richard's Almanac was then popular in France. On the 14th of August the five ships sailed from L'Orient, accom- panied by two French privateers. Several of the French com- manders under Jones proved insubordinate, and the privateers and three of the men-of-war soon deserted him. With the others, however, he continued to take prizes, and even planned to attack the port of Leith, but was prevented by unfavourable winds. On the evening of the 23rd of September the three men-of-war sighted two British men-of-war, the " Serapis " and the " Countess of Scarbrough," off Flamborough Head. The " Alliance," commanded by Captain Landais, made off, leaving the " Bon- homme Richard " and the " Pallas " to engage the Englishmen. Jones engaged the greatly superior " Serapis," and after a des- perate battle of three and a half hours compelled the English ship to surrender. The " Countess of Scarbrough " had meanwhile struck to the more formidable " Pallas." Jones transferred his men and supplies to the " Serapis," and the next day the " Bon- homme Richard " sank.

During the following year Jones spent much of his time in Paris. Louis XVI. gave him a gold-hilted sword and the royal order of military merit, and made him chevalier of France. Early in 1781 Jones returned to America to secure a new command. Congress offered him the command of the " America," a frigate then building, but the vessel was shortly afterwards given to France. In November 1783 he was sent to Paris as agent for the prizes captured in European waters under his own command, and although he gave much attention to social affairs and engaged in several private business enter- prises, he was very successful in collecting the prize money. Early in 1787 he returned to America and received a gold medal from Congress in recognition of his services.

In 1788 Jones entered the service of the empress Catherine of Russia, avowing his intention, however, " to preserve the con- dition of an American citizen and officer." As a rear-admiral he took part in the naval campaign in the Liman (an arm of the Black Sea, into which flow the Bug and Dnieper rivers) against the Turks, but the jealous intrigues of Russian officers caused him to be recalled to St Petersburg for the pretended purpose of being transferred to a command in the North Sea. Here he was compelled to remain in idleness, while rival officers plotted against him and

even maliciously assailed his private character. In August 1789 he left St Petersburg a bitterly disappointed man. In May 1790 he arrived in Paris, where he remained in retirement during the rest of his life, although he made several efforts to re-enter the Russian service.

Undue exertion and exposure had wasted his strength before he reached the prime of life, and after an illness, in which he was attended by the queen's physician, he died on the 18th of July 1792. His body was interred in the St Louis cemetery for foreign Protestants, the funeral expenses being paid from the private purse of Pierrot Francois Simmoneau, the king's

commissary. In the confusion during the following years the burial place of Paul Jones was forgotten; but in June 1899 General Horace Porter, American ambassador to France, began a systematic search for the body, and after excavations on the site of the old Protestant cemetery, now covered with houses, a leaden coffin was discovered, which contained the body in a remarkable state of preservation. In July 1905 a fleet of American war-ships carried the body to Annapolis, where it now rests in one of the buildings of the naval academy.

Jones was a seaman of great bravery and technical ability, but over-jealous of his reputation and inclined to be querulous and boastful. The charges by the English that he was a pirate were particularly galling to him. Although of unprepossessing appearance, 5 ft. 7 in. in height and slightly round-shouldered, he was noted for his pleasant manners and was welcomed into the most brilliant courts of Europe.

Romance has played with the memory of Paul Jones to such an extent that few accounts of his life are correct. Of the early bio- graphies the best are Sherburne's (London, 1825), chiefly a collection of Jones's correspondence; the Janette- Taylor Collection (New York, 1830), containing numerous extracts from his letters and journals; and the life by A. S. MacKenzie (2 vols., New York, 1846). In recent years a number of new biographies have appeared, including A. C. Buell's (2 vols., 1900), the trustworthiness of which has been discredited, and Hutchins Hapgood's in the Riverside Biographical Series (1901). The life by Cyrus Townsend Brady in the " Great Commanders Series " (1900) is perhaps the best.

JONES, MICHAEL (d. 1649), British soldier. His father was bishop of Killaloe in Ireland. At the outbreak of the English Civil War he was studying law, but he soon took service in the army of the king in Ireland.

He was present with Ormonde's army in many of the expeditions and combats of the devastating Irish War, but upon the conclusion of the " Irish Cessation " (see Ormonde, James Butler, Duke of) he resolved to leave the king's service for that of the parliament, in which he soon distinguished himself by his activity and skill. In the Welsh War, and especially at the last great victory at Rowton Heath, Jones's cavalry was always far superior to that of the Royalists, and in reward for his services he was made governor of Chester when that city fell into the hands of the parliament. Soon afterwards Jones was sent again to the Irish War, in the capacity of commander-in-chief. He began his work by reorganizing the army in the neighbourhood of Dublin, and for some time he carried on a desultory war of posts, necessarily more concerned for his supplies than for a victory. But at Dungan Hill he obtained a complete success over the army of General Preston, and though the war was by no means ended, Jones was able to hold a large tract of country for the parliament. But on the execution of Charles I., the war entered upon a new phase, and garrison after garrison fell to Ormonde's Royalists. Soon Jones was shut up in Dublin, and then followed a siege which was regarded both in England and Ireland with the most intense interest. On the 2nd of August 1649 the Dublin garrison relieved itself by the brilliant action of Rathmines, in which the royal army was practically destroyed. A fortnight later Cromwell landed with heavy reinforcements from England. Jones, his lieutenant-general, took the field; but on the 19th of December 1649 he died, worn out by the fatigues of the campaign.

JONES, OWEN (1741-1814), Welsh antiquary, was born on the 3rd of September 1741 at Llanvihangel Glyn y Myvyr in Denbighshire. In 1760 he entered the service of a London firm of furriers, to whose business he ultimately succeeded. He had from boyhood studied Welsh literature, and later devoted time and money to its collection. Assisted by Edward William of Glamorgan (Iolo Morganwg) and Dr. Owen Pughe, he published, at a cost of more than £1000, the well-known Myvyrian Archaiology of Wales (1801-1807), a collection of pieces dating from the 6th to the 14th century. The manuscripts which he had brought together are deposited in the British Museum; the material not utilized in the Myvyrian Archaiology amounts to 100 volumes, containing 16,000 pages of verse and 15,300 pages of prose. Jones was the founder of the Gwyneddigion

Society (1772) in London for the encouragement of Welsh studies and literature; and he began in 1805 a miscellany — the Greal — of which only one volume appeared. An edition of the poems of Davydd ab Gwilyin was also issued at his expense. . He died on the 26th of December 1814 at his business premises in Upper Thames Street, London.

JONES, OWEN (1809-1874), British architect and art decora- tor, .son of

Owen Jones, a Welsh antiquary, was born in London. After an apprenticeship of six years in an architect's office, he travelled for four years in Italy, Greece, Turkey, Egypt and Spain, making a special study of the Alhambra. On his return to England in 1836 he busied himself in his professional work. His forte was interior decoration, for which his formula was: " Form without colour is like a body without a soul." He was one of the superintendents of works for the Exhibi- tion of 185 1 and was responsible for the general decoration of the Crystal Palace at Sydenham. Along with Digby Wyatt, Jones collected the casts of works of art with which the palace was filled. He died in London on the 19th of April 1874.

Owen Jones was described in the Builder for 1874 as " the most potent apostle of colour that architectural England has had in these days." His range of activity is to be traced in his works: Plans, Elevations and Details of the Alhambra (1 835-1 845), in which he was assisted by MM. Goury and Gayangos; Designs for Mosaic and Tesselated Pavements (1842) ; Polychromatic Ornament of Italy (1845) ; An Attempt to Define the Principles which regulate the Employment of Colour in Decorative Arts (1852); Handbook to the Alhambra Court (1854) ; Grammar of Ornament (1856), a very important work; One Thousand and One Initial Letters (1 864) ; Seven Hundred and Two Monograms (1864) ; and Examples of Chinese Ornament (1867).

JONES, RICHARD (1790-1855), English economist, was born at Tunbridge Wells. The son of a solicitor, he was intended for the legal profession, and was educated at Caius College, Cambridge. Owing to ill-health, he abandoned the idea of the law and took orders soon after leaving Cambridge. For several years he held curacies in Sussex and Kent. In 1833 he was appointed professor of political economy at King's College, London, resigning this post in 1835 to succeed T. R. Malthus in the chair of political economy and history at the East India College at Haileybury. He took an active part in the commuta- tion of tithes in 1836 and showed great ability as a tithe commissioner, an office which he filled till 1851. He was for some time, also, a charity commissioner. He died at Haileybury, shortly after he had resigned his professorship, on the 26th of January 1855. In 1831 Jones published his Essay on the Distri- bution of Wealth and on the Sources of Taxation, his most important work. In it he showed himself a thorough-going critic of the Ricardian system.

Jones's method is inductive; his conclusions are founded on a wide observation of contemporary facts, aided by the study of history. The world he professed to study was not an imaginary world, in- habited by abstract "economic men," but the real world with the different forms which the ownership and cultivation of land, and, in general, the conditions of production and distribution, assume at different times and places. His

recognition of such different systems of life in communities occupying different stages in the progress of civilization led to his proposal of what he called a " political economy of nations." This was a protest against the practice of taking the exceptional state of facts which exists, and is indeed only partially realized, in a small corner of our planet as representing the uniform type of human societies, and ignoring the effects of the early history and special development of each community as influencing its economic phenomena. Jones is re- markable for his freedom from exaggeration and one-sided statement ; thus, whilst holding Malthus in, perhaps, undue esteem, he declines to accept the proposition that an increase of the means of subsistence is necessarily followed by an increase of population; and he main- tains what is undoubtedly true, that with the growth of population, in all well-governed and prosperous states, the command over food, instead of diminishing, increases.

A collected edition of Jones's works, with a preface by W.Whewell, was published in 1859.

JONES, THOMAS RUPERT (1819-), English geologist and palaeontologist, was born in London on the 1st of October 181 9. While at a private school at Ilminster, his attention was attracted to geology by the fossils that are so abundant in the Lias quarries. In 1835 he was apprenticed to a surgeon at Taunton, and he completed h ; s apprenticeship in 1842 at

Newbury in Berkshire. He was then engaged in practice mainly in London, till in 1849 he was appointed assistant secretary to the Geological Society of London. In 1862 he was made professor of geology at the Royal Military College, Sandhurst. Having devoted his especial attention to fossil microzoa, he now became the highest authority in England on the Foraminifera and Entomostraca. He edited the 2nd edition of Mantell's Medals of Creation (1854), the 3rd edition of Mantell's Geological Excursions round the Isle of Wight (1854), and the 7th edition of Mantell's Wonders of Geology (1857); he also edited the 2nd edition of Dixon's Geology of Sussex (1878). He was elected F.R.S. in 1872 and was awarded the Lyell medal by the Geologi- cal Society in 1890. For many years he was specially interested in the geology of South Africa.

His publications include A Monograph of the Entomostraca of the Cretaceous Formation of England (Palaeontograph. Soc, 1849); A Monograph of the Tertiary Entomostraca of England (ibid. 1857); A

Monograph of the Fossil Estheriae (ibid. 1862); A Monograph of the Foraminifera of the Crag (ibid. 1866, &c, with H. B. Brady); and numerous articles in the Annals and Magazine of Natural History, the Geological Magazine, the Proceedings of the Geologists' Association, and other journals.

JONES, WILLIAM (1726-1800), English divine, was born at Lowick, in Northamptonshire on the 30th of July 1726. He was descended from an old Welsh family and one of his progenitors was Colonel John Jones, brother-in-law of Cromwell. He was educated at Charterhouse School, and at University College, Oxford. There a kindred taste for music, as well as a similarity in regard to other points of character, led to his close intimacy with George Home {q.v.), afterwards bishop of Norwich, whom he induced to study Hutchinsonian doctrines. After obtaining his bachelor's degree in 1749, Jones held various preferments. In 1777 he obtained the perpetual curacy of Nayland, Suffolk, and on Home's appointment to Norwich became his chaplain, afterwards writing his life. His vicarage became the centre of a High Church coterie, and Jones himself was a link between the non-jurors and the Oxford movement. He could write intelligibly on abstruse topics. He died on the 6th of January 1800.

In 1 756 Jones published his tractate On the Catholic Doctrine of the Trinity, a statement of the doctrine from the Hutchinsonian point of view, with a succinct and able summary of biblical proofs. This was followed in 1762 by an Essay on the First Principles of Natural Philosophy, in which he maintained the theories of Hutchinson in opposition to those of Sir Isaac Newton, and in 1781 he dealt with the same subject in Physiological Disquisitions. Jones was also the originator of the British Critic (May 1793). His collected works,' with a life by William Stevens, appeared in 1801, in 12 vols., and were condensed into 6 vols, in 1810. A life of Jones, forming pt. 5 of the Biography of English Divines, was published in 1849.

JONES, SIR WILLIAM (1746-1794), British Orientalist and jurist, was born in London on the 28th of September 1746. He distinguished himself at Harrow, and during his last three years there applied himself to the study of Oriental languages, teaching himself the rudiments of Arabic, and reading Hebrew with tolerable ease. In his vacations he improved his acquain- tance with French and Italian. In 1764 Jones entered Uni- versity College, Oxford, where he continued to study Oriental literature, and perfected himself in Persian and Arabic by the aid of a Syrian Mirza, whom he had discovered and brought from London. He added to his knowledge of Hebrew and made considerable progress in Italian, Spanish and Portuguese. He began the study of Chinese, and made himself master of the radical characters of that language. During five years he partly

supported himself by acting as tutor to Lord Althorpe, afterwards the second Earl Spencer, and in 1766 he obtained a fellowship. Though but twenty-two years of age, he was already becoming famous as an Orientalist, and when Christian VII. of Denmark visited England in 1768, bringing with him a life of Nadir Shah in Persian, Jones was requested to translate the MS. into French. The translation appeared in 1770, with an introduction containing a description of Asia and a short history of Persia. This was followed in the same year by a Traite sur la poesie orientate, and by a French metrical translation of

the odes of Hafiz. In 1771 he published a Dissertation sur la literature orientate, defending Oxford scholars against the criticisms made by Anquetil Du Perron in the introduction to his translation of the Zend-Avesta. In the same year appeared his Grammar of the Persian Language. In 1772 Jones published a volume of Poems, Chiefly Translations from Asiatick Languages, together with Two Essays on the Poetry of Eastern Nations and on the Arts commonly called Imitative, and in 1774 a treatise entitled Poeseos Asiatica commentatorium libri sex, which defi- nitely confirmed his authority as an Oriental scholar.

Finding that some more financially profitable occupation was necessary, Jones devoted himself with his customary energy to the study of the law, and was called to the bar at the Middle Temple in 1774. He studied not merely the technicalities, but the philosophy, of law, and within two years had acquired so considerable a reputation that he was in 1776 appointed commis- sioner in bankruptcy. Besides writing an Essay on the Law of Bailments, which enjoyed a high reputation both in England and America, Jones translated, in 1778, the speeches of Isaeus on the Athenian right of inheritance. In 1780 he was a parliamentary candidate for the university of Oxford, but withdrew from the contest before the day of election, as he found he had no chance of success owing to his Liberal opinions, especially on the questions of the American War and of the slave trade.

In 1783 was published his translation of the seven ancient Arabic poems called Moallakdt. In the same year he was ap- pointed judge of the supreme court of judicature at Calcutta, then " Fort William," and was knighted. Shortly after his arrival in India he founded, in January 1784, the Bengal Asiatic Society, of which he remained president till his death. Convinced as he was of the great importance of consulting the. Hindu legal authorities in the original, he at once began the study of Sanskrit, and undertook, in 1788, the colossal task of compiling a digest of Hindu and Mahommedan law. This he did not live to com- plete, but he published the admirable beginnings of it in his Institutes of Hindu Law, or the Ordinances of Manu (1794); his Mohammedan Law of Succession to Property of Intestates; and his Mohammedan Law of Inheritance (1792). In 1789

Jones had completed his translation of Kalidasa's most famous drama, Sakuntald. He also translated the collection of fables entitled the Hitopadesa, the Gitagovinda, and considerable portions of the Vedas, besides editing the text of Kalidasa's poem Ritusamhara. He was a large contributor also to his society's volumes of Asiatic Researches.

His unremitting literary labours, together with his heavy judicial work, told on his health after a ten years' residence in Bengal; and he died at Calcutta on the 27th of April 1794. An extraordinary linguist, knowing thirteen languages well, and having a moderate acquaintance with twenty-eight others, his range of knowledge was enormous. As a pioneer in Sanskrit learning and as founder of the Asiatic Society he rendered the language and literature of the ancient Hindus accessible to European scholars, and thus became the indirect cause of later achievements in the field of Sanskrit and comparative philology. A monument to his memory was erected by the East India Company in St Paul's, London, and a statue in Calcutta.

See the Memoir (1804) by Lord Teignmouth, published in the collected edition of Sir W. Jones's works.

JONKOPING, a town of Sweden, capital of the district {Ian) of Jonkoping, 230 m. S.W. of Stockholm by rail. Pop. (1900), 23,143. It occupies a beautiful but somewhat unhealthy position between the southern end of Lake Vetter and two small lakes, Roksjo and Munksjo. Two quarters of the town, Syenska Mad and Tyska Mad, recall the time when the site was a marsh {mad) , and buildings were constructed on piles. The residential suburbs among the hills, especially Dunkehallar, are attractive and healthier than the town. The church of St Kristine {c. 1650), the court-houses, town-hall, government buildings, and high school, are noteworthy. 1'he town is one of the leading in- dustrial centres in Sweden. The match manufacture, for which it is principally famous, was founded by Johan Edvard Lund- strom in 1844. The well-known brand of sdkerhets-tdndstickor

(safety-matches) was introduced later. There are also textile manufactures, paper-factories (on Munksjo), and mechanical works. There is a large fire-arms factory at Huskvarna, s.m E. Water-power is supplied here by a fine series of falls. The hill Taberg, 8 m. S., is a mass of magnetic iron ore, rising 410 ft. above the surrounding country, 2950 ft. long and 1475 ft. broad, but the percentage of iron is low as compared with the rich ores of other parts, and the deposit is little worked. Jonkoping is the seat of one of

the three courts of appeal in Sweden.

Jonkoping received the earliest extant Swedish charter in 1 284 from Magnus I. The castle is mentioned in 1 263, when Waldemar Birgersson married the Danish princess Sophia. Jonkoping was afterwards the scene of many events of moment in Scandinavian history — of parliaments in 1357, 1439, and 1599; of the meeting of the Danish and Swedish plenipotentiaries in 1448; and of the death of Sten Sture, the elder, in 1503. In- 1612 Gustavus Adolphus caused the inhabitants to destroy their town lest it should fall into the hands of the Danes; but it was rebuilt soon after, and in 1620 received special privileges from the king. At this period a textile industry was started here, the first of any importance in Sweden. It was from the Dutch and German workmen, introduced at this time, that the quarter Tyska Mad received its name. On the 10th of December 1809 the plenipo- tentiaries of Sweden and Denmark concluded peace in the town.

JONSON, BEN 1 (1573-1637), English dramatist, was born, probably in Westminster, in the beginning of the year 1573 (or possibly, if he reckoned by the unadopted modern calendar, 1572; see Castelain, p. 4, note 1). By the poet's account his grandfather had been a gentleman who "came from" Carlisle, and originally, the grandson thought, from Annandale. His arms, " three spindles or rhombi," are the family device of the Johnstones of Annandale, ajact which confirms his assertion of Border descent. Ben Jonson further related that he was born a month after the death of his father, who, after suffering in estate and person under Queen Mary, had in the end " turned minister." Two years after the birth of her son the widow married again; she may be supposed to have loved him in a passionate way peculiar to herself, since on one occasion we find her revealing an almost ferocious determination to save his honour at the cost of both his life and her own. Jonson's stepfather was a master bricklayer, living in Hartshorn Lane, near Charing Cross, who provided his stepson with the founda- tions of a good education. After attending a private school in St Martin's Lane, the boy was sent to Westminster School at the expense, it is said, of William Camden. Jonson's gratitude for an education to which in truth he owed an almost inestimable debt concentrated itself upon the " most reverend head " of his benefactor, then second and afterwards head master of the famous school, and the firm friend of his pupil in later life.

After reaching the highest form at Westminster, Jonson is stated, but on unsatisfactory evidence, to have proceeded to Cambridge — according to Fuller, to St John's College. (For reasons in support of the tradition that he was a member of St John's College, see J. B. Mullinger, the Eagle, No. xxv.) He says, however, himself that he studied at neither university, but was put to a trade immediately on leaving school. He soon had enough of

the trade, which was no doubt his father's bricklaying, for Henslowe in writing to Edward Alleyne of his affair with Gabriel Spenser calls him " bergemen [sic] Jonson, bricklayer." Either before or after his marriage — more probably before, as Sir Francis Vere's three English regiments were not removed from the Low Countries till 1592 — he spent some time in that country soldiering, much to his own subsequent satisfaction when the days of self-conscious retrospect arrived, but to no further purpose beyond that of seeing something of the world.

Ben Jonson married not later than 1592. The registers of St Martin's Church state that his eldest daughter Maria died in November 1593 when she was, Jonson tells us (epigram 22), only six months old. His eldest son Benjamin died of the plague

1 His Christian name of Benjamin was usually abbreviated by himself and his contemporaries; and thus, in accordance with his famous epitaph, it will always continue to be abbreviated.

ten years later (epigram 45). (A younger Benjamin died in 1635.) His wife Jonson characterized to Drummond as "a shrew, but honest "; and for a period (undated) of five years he preferred to live without her, enjoying the hospitality of Lord Aubigny (afterwards duke of Lennox). Long burnings of oil among his books, and long spells of recreation at the tavern, such as Jonson loved, are not the most favoured accompaniments of family life. But Jonson was no stranger to the tenderest of affections: two at least of the several children whom his wife bore to him he commemorated in touching little tributes of verse; nor in speaking of his lost eldest daughter did he forget " her mother's tears." By the middle of 1597 we come across further documentary evidence of him at home in London in the shape of an entry in Philip Henslowe's diary (July 28) of 3s. 6d. " re- ceived of Bengemenes Johnsones share." He was therefore by this time — when Shakespeare, his senior by nearly nine years, was already in prosperous circumstances and good esteem — at least a regular member of the acting profession, with a fixed engage- ment in the lord admiral's company, then performing under Henslowe's management at the Rose. Perhaps he had previously acted at the Curtain (a former house of the lord admiral's men), and " taken mad Jeronimo's part " on a play-wagon in the high- way. This latter appearance, if it ever took place, would, as was pointed out by Gifford, probably have been in Thomas Kyd's Spanish Tragedy, since in The First Part of Jeronimo Jonson would have had,, most inappropriately, to dwell on the " smallness " of his " bulk." He was at a subsequent date (1601) employed by Henslowe to write up The Spanish Tragedy, and this fact may have given rise to Wood's story of his performance as a stroller (see, however, Fleay, The English Drama, ii. 29, 30). Jonson's additions, which were not the first changes made in the, play, are usually supposed to

be those printed with The Spanish Tragedy in the edition of 1602; Charles Lamb's doubts on the subject, which were shared by Coleridge, seem an instance of that subjective kind of criticism which it is unsafe to follow when the external evidence to the contrary is so strong.

According to Aubrey, whose statement must be taken for what it is worth, " Jonson was never a good actor, but an ex- cellent instructor." His physique was certainly not well adapted to the histrionic conditions of his — perhaps of any — day; but, in any case, it was not long before he found his place in the organism of his company. In 1597, as we know from Henslowe, Jonson undertook to write a play for the lord admiral's men; and in the following year he was mentioned by Meres in his Palladis Tamia as one of " the best for tragedy," without any reference to a connexion on his part with the other branch of the drama. Whether this was a criticism based on material evidence or an unconscious slip, Ben Jonson in the same year 1598 pro- duced one of the most famous of English comedies, Every Man in his Humour, which was first acted — probably in the earlier part of September — by the lord chamberlain's company at the Curtain. Shakespeare was one of the actors in Jonson's comedy, and it is in the character of Old Knowell in this very play that, according to a bold but ingenious guess, he is represented in the half-length portrait of him in the folio of 1623, beneath which were printed Jonson's lines concerning the picture. Every Man in his Humour was published in 1601; the critical prologue first appears in the folio of 16 16, and there are other divergences (see Castelain, appendix A). After the Restoration the play was revived in 1751 by Garrick (who acted Kitely) with alterations, and long continued to be known on the stage. It was followed in the same year by The Case is Altered, acted by the children of the queen's revels, which contains a satirical attack upon the pageant poet, Anthony Munday. This comedy, which was not included in the folio editions, is one of intrigue rather than of character; it contains obvious reminiscences of Shylock and his daughter. The earlier of these two comedies was indisputably successful.

Before the year 1598 was out, however, Jonson found himself in prison and in danger of the gallows. In a duel, fought on the 22nd of September in Hogsden Fields, he had killed an actor of Henslowe's company named Gabriel Spenser. The quarrel with

Henslowe consequent on this event may account for the produc- tion of Every Man in his Humour by the rival company. In prison Jonson was visited by a Roman Catholic priest, and the result (certainly strange, if

Jonson's parentage is considered) was his conversion to the Church of Rome, to which he adhered for twelve years. Jonson was afterwards a diligent student of divinity; but, though his mind was religious, it is not probable that its natural bias much inclined it to dwell upon creeds and their controversies. He pleaded guilty to the charge brought against him, as the rolls of Middlesex sessions show; but, after a short imprisonment, he was released by benefit of clergy, forfeiting his " goods and chattels," and being branded on his left thumb. The affair does not seem to have affected his reputation ; in 1 599 he is found back again at work for Henslowe, receiving to- gether with Dekker, Chettle and " another gentleman," earnest- money for a tragedy (undiscovered) called Robert II., King of Scots. In the same year he brought out through the lord chamberlain's company (possibly already at the Globe, then newly built or building) the elaborate comedy of Every Man out of his Humour (quarto 1600; fol. 1616) — a play subsequently pre- sented before Queen Elizabeth. The sunshine of court favour, rarely diffused during her reign in rays otherwise than figuratively golden, was not to bring any material comfort to the most learned of her dramatists, before there was laid upon her the inevitable hand of which his courtly epilogue had besought death to forget the use. Indeed, of his Cynthia's Revels, performed by the chapel children in 1600 and printed with the first title of The Fountain of Self Love in 1601, though it was no doubt primarily designed as a compliment to the queen, the most marked result had been to offend two playwrights of note — Dekker, with whom he had formerly worked in company, and who had a healthy it rough grip of his own; and Marston, who was perhaps less dangerous by his strength than by his versatility. Accord ing to Jonson, his quarrel with Marston had begun by the latter attacking his morals, and in the course of it they came to blows, and might have come to worse. In Cynthia's Revels, Dekker is generally held to be satirized as Hedon, and Marston as Anaides (Fleay, however, thinks Anaides is Dekker, and Hedon Daniel), while the character of Crites most assuredly has some features of Jonson himself. Learning the intention of the two writers whom he had satirized, or at all events of Dekker, to wreak literary vengeance upon him, he anticipated them in The Poetaster (1601), again played by the children of the queen's chapel at the Blackfriars and printed in 1602; Marston and Dekker are here ridiculed respectively as the aristocratic Crispinus and the vulgar Demetrius. The play was completed fifteen weeks after its plot was first conceived. It is not certain to what the proceedings against author and play before the lord chief justice, referred to in the dedication of the edition of 1616, had reference, or when they were instituted. Fleay's supposition that the " purge," said in the Returne from Parnassus (Pt. II. act iv. sc. iii.) to have been administered by Shakespeare to Jonson in return for Horace's " pill to the poets" in this piece, consisted of Troilus and Cressida is supremely ingenious, but cannot be examined here. As for Dekker, he

retaliated on The Poetaster by the Satiromastix, or The Untrussing of the Humorous Poet (1602). Some more last words were indeed attempted on Jonson's part, but in the Apologetic Dialogue added to The Poetaster in the edition of 1616, though excluded from that of 1602, he says he intends to turn his attention to tragedy. This intention he apparently carried out immediately, for in 1602 he received £10 from Henslowe for a play, entitled Richard Crookbacke, now lost — unfortunately so, for purposes of comparison in particular, even if it was only, as Fleay conjectures, " an alteration of Marlowe's play." According to a statement by Overbury, early in 1603, " Ben Johnson, the poet, now lives upon one Townesend," supposed to have been the poet and masque-writer Aurelian Townshend. at one time steward to the 1st earl of Salisbury, " and scornes the world. " To his other early patron, Lord Aubigny, Jonson dedicated the first of his two extant tragedies, Sejanus, produced by the king's servants at the Globe late in 1603, Shakespeare once more taking a part in the performance.

Either on its performance or on its appearing in print in 1605, Jonson was called before the privy council by the Earl of North- ampton. But it is open to question whether this was the occa- sion on which, according to Jonson's statement to Drummond, Northampton " accused him both of popery and treason " (see Castelain, Appendix C). Though, for one reason or another, unsuccessful at first, the endurance of its reputation is attested by its performance, in a German version by an Englishman, John Michael Girish, at the court of the grandson of James I. at Heidelberg.

When the reign of James I. opened in England and an adula- tory loyalty seemed intent on showing that it had not exhausted itself at the feet of Gloriana, Jonson's well-stored brain and ready pen had their share in devising and executing ingenious variations on the theme " Welcome — since we cannot do without thee!" With extraordinary promptitude his genius, which, far from being " ponderous " in its operations, was singularly swift and flexible in adapting itself to the demands made upon it, met the new taste for masques and entertainments — new of course in degree rather than in kind — introduced with the new reign and fostered by both the king and his consort. The pageant which on the 7th of May 1603 bade the king welcome to a capital dissolved in joy was partly of Jonson's, partly of Dekker's, devising; and he was able to deepen and diversify the impression by the com- position of masques presented to James I. when entertained at houses of the nobility. The Satyr (1603) was produced on one of these occasions, Queen Anne's sojourn at Althorpe, the seat of Sir Robert Spencer, afterwards Lord Althorpe, who seems to have previously bestowed some patronage upon him. The Penates followed on May-day 1604 at the house of Sir William Cornwallis at Highgate, and the queen herself with her ladies played his Masque of Blackness at Whitehall in 1605. He was soon occasionally employed by the court itself — already

in 1606 in conjunction with Inigo Jones, as responsible for the " painting and carpentry " — and thus speedily showed himself master in a species of composition for which, more than any other English poet before Milton, he secured an enduring place in the national poetic literature. Personally, no doubt, he derived considerable material benefit from the new fashion — more especially if his statement to Drummond was anything like correct, that out of his plays (which may be presumed to mean his original plays) he had never gained a couple of hundred pounds.

Good humour seems to have come back with good fortune. Joint employment in The King's Entertainment (1604) had recon- ciled him with Dekker; and with Marston also, who in 1604 dedicated to him his Malcontent, he was again on pleasant terms. When, therefore, in 1604 Marston and Chapman (who, Jonson told Drummond, was loved of him, and whom he had probably honoured as " Virgil " in The Poetaster, and who has, though on doubtful grounds, been supposed to have collaborated in the original Sejanus) produced the excellent comedy of Eastward Ho, it appears to have contained some contributions by Jonson. At all events, when the authors were arrested on account of one or more passages in the play which were deemed insulting to the Scots, he " voluntarily imprisoned himself " with them. They were soon released, and a banquet at his expense, attended by Camden and Selden, terminated the incident. If Jonson is to be believed, there had been a report that the prisoners were to have their ears and noses cut, and, with reference apparently to this peril, " at the midst of the feast his old mother drank to him, and showed him a paper which she had intended (if the sentence had taken execution) to have mixed in the prison among his drink, which was full of lusty strong poison ; and that she was no churl, she told him, she minded first to have drunk of it her- self." Strange to say, in 1605 Jonson and Chapman, though the former, as he averred, had so "attempered " his style as to have " given no cause to any good man of grief," were again in prison on account of " a play "; but they appear to have been once more speedily set free, in consequence of a very manly and dignified letter addressed by Jonson to the Earl of Salisbury. As to the relations between Chapman and Jonson, illustrated by newly discovered letters, see Bertram Dobell in the Athenaeum

No. 3831 (March 30, 1901), and the comments of Castelain. He thinks that the play in question, in which both Chapman and Jonson took part, was Sir Gyles Goosecappe, and that the last imprisonment of the two poets was shortly after the discovery of the Gunpowder Plot. In the mysterious

history of the Gun- powder Plot Jonson certainly had some obscure part. On the 7 th of November, very soon after the discovery of the conspiracy, the council appears to have sent for him and to have asked him, as a loyal Roman Catholic, to use his good offices in inducing the priests to do something required by the council — one hardly likes to conjecture it to have been some tampering with the secrets of confession. In any case, the negotiations fell through, because the priests declined to come forth out of their hiding- places to be negotiated with — greatly to the wrath of Ben Jonson, who declares in a letter to Lord Salisbury that " they are all so enweaved in it that it will make 500 gentlemen less of the reli- gion within this week, if they carry their understanding about them." Jonson himself, however, did not declare his separation from the Church of Rome for five years longer, however much it might have been to his advantage to do so.

His powers as a dramatist were at their height during the earlier half of the reign of James I.; and by the year 1616 he had produced nearly all the plays which are worthy of his genius. They include the tragedy of Catiline (acted and printed 161 1), which achieved only a doubtful success, and the comedies of Volpone, or the Fox (acted 1605 and printed in 1607 with a dedi- cation " from my house in the Blackfriars ") , Epicoene, or the Silent Woman (1609; entered in the Stationers' Register 1610), the Alchemist(i6io; printed in 1610), Bartholomew Fair and The Devil is an Ass (acted respectively in 16 14 and 161 6). During the same period he produced several masques, usually in con- nexion with Inigo Jones, with whom, however, he seems to have quarrelled already in this reign, though it is very doubtful whether the architect is really intended to be ridiculed in Bartholomew Fair under the character of Lanthorn Leatherhead. Littlewit, according to Fleay, is Daniel. Among the most attractive of his masques may be mentioned the Masque of Black- ness (1606), the Masque of Beauty (1608), and the Masque of Queens (1609), described by Swinburne as "the most splendid of all masques " and as " one of the typically splendid monu- ments or trophies of English literature." In 1616 a modest pension of 100 marks a year was conferred upon him; and possi- bly this sign of royal favour may have encouraged him to the publication of the first volume of the folio collected edition of his works (1616), though there are indications that he had con- templated its production, an exceptional task for a playwright of his times to take in hand, as early as 161 2.

He had other patrons more bountiful than the Crown, and for a brief space of time (in 1613) had travelled to France as governor (without apparently much moral authority) to the eldest son of Sir Walter Raleigh, then a state prisoner in the Tower, for whose society Jonson may have gained a liking at the Mermaid Tavern in Cheapside, but for whose personal character he, like so many of his contemporaries, seems to have had but small esteem. By

the year 1616 Jonson seems to have made up his mind to cease writing for the stage, where neither his success nor his profits had equalled his merits and expectations. He continued to produce masques and entertainments when called upon; but he was attracted by many other literary pursuits, and had already accomplished enough to furnish plentiful materials for retro- spective discourse over pipe or cup. He was already entitled to lord it at the Mermaid, where his quick antagonist in earlier wit-combats (if Fuller's famous description be authentic) no longer appeared even on a visit from his comfortable retreat at Stratford. That on the other hand Ben carried his wicked town habits into Warwickshire, and there, together with Drayton, made Shakespeare drink so hard with them as to bring upon him- self the fatal fever which ended his days, is a scandal with which we may fairly refuse to load Jonson's memory. That he had a share in the preparing for the press of the first folio of Shake- speare, or in the composition of its preface, is of course a mere conjecture.

It was in the year 1618 that, like Dr Samuel Johnson a century and a half afterwards, Ben resolved to have a real holiday for once, and about midsummer started for his ancestral country, Scotland. He had (very heroically for a man of his habits) determined to make the journey on foot; and he was speedily followed by John Taylor, the water-poet, who still further handi- capped himself by the condition that he would accomplish the pilgrimage without a penny in his pocket. Jonson, who put money in his good friend's purse when he came up with him at Leith, spent more than a year and a half in the hospitable Low- lands, being solemnly elected a burgess of Edinburgh, and on another occasion entertained at a public banquet there. But the best-remembered hospitality which he enjoyed was that of the learned Scottish poet, William Drummond of Hawthornden, to which we owe the so-called Conversations. In these famous jottings, the work of no extenuating hand, Jonson lives for us to this day, delivering his censures, terse as they are, in an expansive mood whether of praise or of blame; nor is he at all generously described in the postscript added by his fatigued and at times irritated host as " a great lover and praiser of himself, a contemner and scorner of others." A poetical account of this journey, " with all the adventures," was burnt with Jonson's library.

After his return to England Jonson appears to have resumed his former course of life. Among his noble patrons and patron- esses were the countess of Rutland (Sidney's daughter) and her cousin Lady Wroth; and in 1619 his visits to the country seats of the nobility were varied by a sojourn at Oxford with Richard Corbet, the poet, at Christ Church, on which occasion he took up the master's degree granted to him by the university; whether he actually proceeded to the same degree granted to him at Cambridge seems unknown. He confessed about this time that he was or seemed growing " restive," i.e. lazy, though it was not long before he returned to the

occasional composition of masques. The extremely spirited Gipsies Metamorphosed (1621) was thrice presented before the king, who was so pleased with it as to grant to the poet the reversion of the office of master of the revels, besides proposing to confer upon him the honour of knight-hood. This honour Jonson (hardly in deference to the memory of Sir Petronel Flash) declined; but there was- no reason why he should not gratefully accept the increase of his pension in the same year (1621) to £200 — a temporary increase only, inasmuch as it still stood at 100 marks when afterwards augmented by Charles I. –

The close of King James I. 's reign found the foremost of its poets in anything but a prosperous condition. It would be unjust to hold the Sun, the Dog, the Triple Tun, or the Old Devil with its Apollo club-room, where Ben's supremacy must by this time have become established, responsible for this result; taverns were the clubs of that day, and a man of letters is not considered lost in our own because he haunts a smoking-room in Pall Mall. Disease had weakened the poet's strength, and the burning of his library, as his Execration upon Vulcan sufficiently shows, must have been no mere transitory trouble to a poor poet and scholar. Moreover he cannot but have felt, from the time of the accession of Charles I. early in 1625 onwards, that the royal patronage would no longer be due in part to anything like intellectual sympathy. He thus thought it best to recur to the surer way of writing for the stage, and in 1625 produced, with no faint heart, but with a very clear anticipation of the comments which would be made upon the reappearance of the " huge, overgrown play-maker," The Staple of News, a comedy excellent in some respects, but little calculated to become popular. It was not printed till 1631. Jonson, whose habit of body was not more conducive than were his ways of life to a healthy old age, had a paralytic stroke in 1626, and a second in 1628. In the latter year, on the death of Middleton, the appointment of city chronologer, with a salary of 100 nobles a year, was bestowed upon him. He appears to have considered the duties of this office as purely ornamental; but in 1 63 1 his salary was suspended until he should have pre- sented some fruits of his labours in his place, or — as he more succinctly phrased it — "yesterday the barbarous court of

aldermen have withdrawn their chandlerly pension for verjuice and mustard, £33, 6s. 8d." After being in 1628 arrested by mistake on the utterly false charge of having written certain verses in approval of the assassination of Buckingham, he was soon allowed to return to Westminster, where it would appear from a letter of his " son and

contiguous neighbour," James Howell, he was living in 1629, and about this time narrowly escaped another conflagra- tion. In the same year (1629) he once more essayed the stage with the comedy of The New Inn, which was actually, and on its own merits not unjustly, damned on the first performance. It was printed in 1631, " as it was never acted but most negligently played "; and Jonson defended himself against his critics in his spirited Ode to Himself. The epilogue to The New Inn having dwelt not without dignity upon the neglect which the poet had experienced at the hands of " king and queen," King Charles immediately sent the unlucky author a gift of £100, and in response to a further appeal increased his standing salary to the same sum, with the addition of an annual tierce of canary — the poet-laureate's customary royal gift, though this designa- tion of an office, of which Jonson discharged some of what became the ordinary functions, is not mentioned in the warrant dated the 26th of March 1630. In 1634, by the king's desire, Jonson's salary as chronologer to the city was again paid. To his later years belong the comedies, The Magnetic Lady (1632) and The Tale of a Tub (1633), both printed in 1640, and some masques, none of which met with great success. The patronage of liberal-minded men, such as the earl, afterwards duke, of Newcastle — by whom he must have been commissioned to write his last two masques Love's Welcome at Welbeck (1633) and Love's Welcome at Bolsover (1634) — and Viscount Falkland, was not wanting, and his was hardly an instance in which the fickleness of time and taste could have allowed a literary veteran to end his career in neglect. He was the acknowledged chief of the English world of letters, both at the festive meetings where he ruled the roast among the younger authors whose pride it was to be " sealed of the tribe of Ben, " and by the avowal of grave writers, old or young, not one of whom would have ventured to dispute his titular pre-eminence. Nor was he to the last unconscious of the claims upon him which his position brought with it. When, nearly two years after he had lost his surviving son, death came upon the sick old man on the 6th of August 1637, he left behind him an unfinished work of great beauty, the pastoral drama of The Sad Shepherd (printed in 1 641). For forty years, he said in the prologue, he had feasted the public; at first he could scarce hit its taste, but patience had at last enabled it to identify itself with the working of his pen.

We are so accustomed to think of Ben Jonson presiding, attentive to his own applause, over a circle of younger followers and admirers that we are apt to forget the hard struggle which he had passed through before gaining the crown now universally acknowledged to be his. Howell records, in the year before Ben's death, that a solemn supper at the poet's own house, where the host had almost spoiled the relish of the feast by vilifying others and magnifying himself, " T. Ca. "(Thomas Carew) buzzed in the writer's

ear " that, though Ben had barrelled up a great deal of knowledge, yet it seemed he had not read the Ethics, which, among other precepts of morality, forbid self-commendation." Self- reliance is but too frequently coupled with self-consciousness, and for good and for evil self-confidence was no doubt the most pro- minent feature in the character of Ben Jonson. Hence the com- bativeness which involved him in so many quarrels in his earlier days, and which jarred so harshly upon the less militant and in some respects more pedantic nature of Drummond. But his quarrels do not appear to have entered deeply into his soul, or indeed usually to have lasted long. 1 He was too exuberant in his vituperations to be bitter, and too outspoken to be malicious. He loved of all things to be called " honest," and there is every reason to suppose that he deserved the epithet. The old super- 1 With Inigo Jones, however, in quarrelling with whom, as Howell reminds Jonson, the poet was virtually quarrelling with his bread and butter, he seems to have found it impossible to live permanently at peace; his satirical Expostulation against the architect was pub- lished as late as 1635. Chapman's satire against his old associate, perhaps due to this quarrel, was left unfinished and unpublished.

stition that Jonson was filled with malignant envy of the greatest of his fellow-dramatists, and lost no opportunity of giving ex- pression to it, hardly needs notice. Those who consider that Shakespeare was beyond criticism may find blasphemy in the saying of Jonson that Shakespeare " wanted art." Occasional jesting allusions to particular plays of Shakespeare may be found in Jonson, among which should hardly be included the sneer at " mouldy " Pericles in his Ode to Himself. But these amount to nothing collectively, and to very little individually; and against them have to be set, not only the many pleasant traditions con- cerning the long intimacy between the pair, but also the lines, prefixed to the first Shakespeare folio, as noble as they are judicious, dedicated by the survivor to " the star of poets," and the adaptation, clearly sympathetic notwithstanding all its buts, de Shakespeare nostrat. in the Discoveries. But if Gifford had rendered no other service to Jonson's fame he must be allowed to have once for all vindicated it from the cruellest aspersion which has ever been cast upon it. That in general Ben Jonson was a man of strong likes and dislikes, and was wont to manifest the latter as vehemently as the former, it would be idle to deny. He was at least impartial in his censures, dealing them out freely to Puritan poets like Wither and (supposing him not to have exaggerated his free-spokenness) to princes of his church like Cardinal du Perron. And, if sensitive to attack, he seems to have been impervious to flattery — to judge from the candour with which he condemned the foibles even of so enthusiastic an admirer as Beaumont. The personage that he disliked the most, and openly abused in the roundest terms, was unfortunately one with many beads and a tongue to hiss in each — no

other than that " general public " which it was the fundamental mistake of his life to fancy he could " rail into approbation " before he had effectively secured its goodwill. And upon the whole it may be said that the admiration of the few, rather than the favour of the many, has kept green the fame of the most independent among all the masters of an art which, in more senses than one, must please to live.

Jonson's learning and industry, which were alike exceptional, by no means exhausted themselves in furnishing and elaborating the materials of his dramatic works. His enemies sneered at him as a translator — a title which the preceding generation was inclined to esteem the most honourable in literature. But his classical scholarship shows itself in other directions besides his translations from the Latin poets (the A rs poetica in particular) , in addition to which he appears to have written a version of Barclay's Argenis; it was likewise the basis of his English Grammar, of which nothing but the rough draft remains (the MS. itself having perished in the fire in his library), and in connexion with the sub- ject of which he appears to have pursued other linguistic studies (Howell in 1629 was trying to procure him a Welsh grammar). And its effects are very visible in some of the most pleasing of his non-dramatic poems, which often display that combination of polish and simplicity hardly to be reached — or even to be appreciated — without some measure of classical training.

Exclusively of the few lyrics in Jonson's dramas (which, with the exception of the stately choruses in Catiline, charm, and perhaps may surprise, by their lightness of touch), his non- dramatic works are comprised in the following collections. The book oi-Epigrams (published in the first folio of 1616) contained, in the poet's own words, the "ripest of his studies." His notion of an epigram was the ancient, not the restricted modern one — still less that of the critic (R. C, the author of The Times' Whistle) in whose language, according to Jonson, "witty " was " obscene." On the whole, these epigrams excel more in encomiastic than in satiric touches, while the pathos of one or two epitaphs in the collection is of the truest kind. In the lyrics and epistles con- tained in the Forest (also in the first folio), Jonson shows greater variety in the poetic styles adopted by him; but the subject of love, which Dryden considered conspicuous by its absence in the author's dramas, is similarly eschewed here. The Underwoods (not published collectively till the second and surreptitious folio) are a miscellaneous series, comprising, together with a few religious and a few amatory poems, a large number of epigrams,

epitaphs, elegies and " odes," including both the tributes to Shakespeare and several to royal and other patrons and friends, besides the Execration upon Vulcan, and the characteristic ode addressed by the poet to himself. To these pieces in verse should be added the Discoveries — Timber, or Discoveries made upon Men and Matters, avowedly a commonplace book of aphorisms noted by the poet in his daily readings — thoughts adopted and adapted in more tranquil and perhaps more sober moods than those which gave rise to the outpourings of the Conversations at Hawthornden. As to the critical value of these Conversations it is far from being only negative; he knew how to admire as well as how to disdain. For these thoughts, though abounding with biographical as well as general interest, Jonson was almost entirely indebted to ancient writers, or (as has been shown by Professor Spingarn and by Percy Simpson) indebted to the humanists of the Renaissance (see Modern Language Review, ii. 3, April 1907).

The extant dramatic works of Ben Jonson fall into three or, if his fragmentary pastoral drama be considered to stand by itself, into four distinct divisions. The tragedies are only two in number — Sejanus his Fall and Catiline his Conspiracy. 1 Of these the earlier, as is worth noting, was produced at Shakespeare's theatre, in all probability before the first of Shakespeare's Roman dramas, and still contains a considerable admixture of rhyme in the dialogue. Though perhaps less carefully elaborated in diction than its successor, Sejanus is at least equally impressive as a highly wrought dramatic treatment of a complex historic theme. The character of Tiberius adds an element of curious psychological interest on which speculation has never quite exhausted itself and which, in Jonson's day at least, was wanting to the figures of Catiline and his associates. But in both plays the action is powerfully conducted, and the care bestowed by the dramatist upon the great variety of characters introduced cannot, as in some of his comedies, be said to distract the interest of the reader. Both these tragedies are noble works, though the relative popu- larity of the subject (for conspiracies are in the long run more interesting than camarillas) has perhaps secured the preference to Catiline. Yet this play and its predecessor were alike too manifestly intended by their author to court the goodwill of what he calls the " extraordinary " reader. It is difficult to imagine that (with the aid of judicious shortenings) either could altogether miss its effect on the stage; but, while Shakespeare causes us to forget, Jonson seems to wish us to remember, his authorities. The half is often greater than the whole; and Jonson, like all dramatists and, it might be added, all novelists in similar cases, has had to pay the penalty incurred by too obvious a desire to underline the learning of the author.

Perversity — or would-be originality — alone could declare Jonson's tragedy preferable to his comedy. Even if the revolution which he created in

the comic branch of the drama had been mis- taken in its principles or unsatisfactory in its results, it would be clear that the strength of his dramatic genius lay in the power of depicting a great variety of characters, and that in comedy alone he succeeded in finding a wide field for the exercise of this power. There may have been no very original or very profound discovery in the idea which he illustrated in Every Man in his Humour, and, as it were, technically elaborated in Every Man out of his Humour — that in many men one quality is observable which so possesses them as to draw the whole of their individualities one way, and that this phenomenon "may be truly said to be a humour." The idea of the master quality or tendency was, as has been well observed, a very considerable one for dramatist or novelist. Nor did Jonson (happily) attempt to work out this idea with any excessive scientific consistency as a comic dramatist. But, by refusing to apply the term " humour " (q.v.) to a mere peculiarity or affectation of manners, and restricting its use to actual or implied differences or distinctions of character, he broadened the whole basis of English comedy after his fashion, as Moliere at a 1 Of The Fall of Mortimer Jonson left only a few lines behind him ; but, as he also left the argument of the play, factious ingenuity contrived to furbish up the relic into a libel against Queen Caroline and Sir Robert Walpole in 1 731, and to revive the contrivance by way of an insult to the princess dowager of Wales and Lord Bute in

1762.

later date, keeping in closer touch with the common experience of human life, with a lighter hand broadened the basis of French and of modern Western comedy at large. It does not of course follow that Jonson's disciples, the Bromes and the Cartwrights, always adequately reproduced the master's conception of " humorous " comedy. Jonson's wide and various reading helped him to diversify the application of his theory, while perhaps at times it led him into too remote illustrations of it. Still, Captain Bobadil and Captain Tucca, Macilente and Fungoso, Volpone and Mosca, and a goodly number of other characters im- press themselves permanently upon the memory of those whose attention they have as a matter of course commanded. It is a very futile criticism to condemn Jonson's characters as a mere series of types of general ideas; on the other hand, it is a very sound criticism to object, with Barry Cornwall, to the "multi- tude of characters who throw no light upon the story, and lend no interest to it, occupying space that had better have been bestowed upon the principal agents of the plot."

In the construction of plots, as in most other respects, Jonson's at once conscientious and vigorous mind led him in the direction of originality; he depended to a far less degree than the greater part of his contemporaries

(Shakespeare with the rest) upon borrowed plots. But either his inventive character was occasionally at fault in this respect, or his devotion to his characters often diverted his attention from a brisk conduct of his plot. Barry Cornwall has directed attention to the essential likeness in the plot of two of Jonson's best comedies, Volpone and The Alchemist; and another critic, W. Bodham Donne, has dwelt on the difficulty which, in The Poetaster and elsewhere, Ben Jonson seems to experience in sustaining the promise of his actions. The Poetaster is, however, a play sui generis, in which the real business can hardly be said to begin till the last act.

Dryden, when criticizing Ben Jonson's comedies, thought fit, while allowing the old master humour and incontestable " plea- santness," to deny him wit and those ornaments thereof which Quintilian reckons up under the terms urbana, salsa, faceta and so forth. Such wit as Dryden has in view is the mere outward fashion or style of the day, the euphuism or " sheerwit " or chic which is the creed of Fastidious Brisks and of their astute purveyors at any given moment. In this Ben Jonson was no doubt defective; but it would be an error to suppose him, as a comic dramatist, to have maintained towards the world around him the attitude of a philosopher, careless of mere transient externalisms. It is said that the scene of his Every Man in his Humour was originally laid near Florence ; and his Volpone, which is perhaps the darkest social picture ever drawn by him, plays at Venice. Neither locality was ill-chosen, but the real atmosphere of his comedies is that of the native surroundings amidst which they were produced; and Ben Jonson's times live for us in his men and women, his country gulls and town gulls, his alchemists and exorcists, his " skeldring " captains and whining Puritans, and the whole ragamuffin rout of his Bartholomew Fair, the comedy par excellence of Elizabethan low life. After he had described the pastimes, fashionable and unfashionable, of his age, its feeble superstitions and its flaunting naughtinesses, its vapouring affectations and its lying effronteries, with an odour as of " divine tabacco " pervading the whole, little might seem to be left to describe for his " sons " and successors. Enough, however, remained; only that his followers speedily again threw manners and " humours " into an undistinguishable medley.

The gift which both in his art and in his life Jonson lacked was that of exercising the influence or creating the effects which he wished to exercise or create without the appearance of consciousness. Concealment never crept over his efforts, and he scorned insinuation. Instead of this, influenced no doubt by the example of the free relations between author and public permitted by Attic comedy, he resorted again and again, from Every Man out of his Humour to The Magnetic Lady, to inductions and commentatory intermezzos and appendices, which, though occasionally effective by the excellence of their execution, are

to be regretted as introducing into his dramas an exotic and often vexatious element. A man of letters to the very core, he never quite understood that there is and ought to be a wide difference of methods between the world of letters and the world of the theatre.

The richness and versatility of Jonson's genius will never be fully appreciated by those who fail to acquaint themselves with what is preserved to us of his " masques " and cognate enter- tainments. He was conscious enough of his success in this direction — " next himself," he said, " only Fletcher and Chap- man could write a masque." He introduced, or at least estab- lished, the ingenious innovation of the anti-masque, which Schlegel has described, as a species of " parody added by the poet to his device, and usually prefixed to the serious entry," and which accordingly supplies a grotesque antidote to the often extravagantly imaginative main conception. Jonson's learning, creative power and humorous ingenuity — combined, it should not be forgotten, with a genuine lyrical gift — all found abundant opportunities for displaying themselves in these productions. Though a growth of foreign origin, the masque was by him thoroughly domesticated in the high places of English literature. He lived long enough to see the species produce its poetic masterpiece in Comus.

The Sad Shepherd, of which Jonson left behind him three acts and a prologue, is distinguished among English pastoral dramas by its freshness of tone; it breathes something of the spirit of the greenwood, and is not unnatural even in its supernatural element. While this piece, with its charming love-scenes between Robin Hood and Maid Marion, remains a fragment, another pastoral by Jonson, the May Lord (which F. G. Fleay and J. A. Symonds sought to identify with The Sad Shepherd; see, however, W. W. Greg in introduction to the Louvain reprint), has been lost, and a third, of which Loch Lomond was intended to be the scene, probably remained unwritten.

Though Ben Jonson never altogether recognized the truth of the maxim that the dramatic art has properly speaking no didactic purpose, his long and laborious life was not wasted upon a barren endeavour. In tragedy he added two works of uncommon merit to our dramatic literature. In comedy his aim was higher, his effort more sustained, and his success more solid than were those of any of his fellows. In the subsidiary and hybrid species of the masque, he helped to open a new and attractive though undoubtedly devious path in the field of dramatic literature. His intellectual endowments surpassed those of most of the great English dramatists in richness and breadth; and in energy of application he probably left them all behind. Inferior to more than one of his fellow-dramatists in the power of imaginative sympathy, he was first among the Elizabethans in the power of observation; and there is point in Barrett Wendell's paradox, that as a

dramatist he was not really a poet but a painter. Yet it is less by these gifts, or even by his unexcelled capacity for hard work, than by the true ring of manliness that he will always remain distinguished among his peers.

Jonson was buried on the north side of the nave in West- minster Abbey, and the inscription, " O Rare Ben Jonson," was cut in the slab over his grave. In the beginning of the 18th century a portrait bust was put up to his memory in the Poets' Corner by Harley, earl of Oxford. Of Honthorst's portrait of Jonson at Knole Park there is a copy in the National Portrait Gallery; another was engraved by W. Marshall for the 1640 edition of his Poems.

Bibliography.— The date of the first folio volume of Jonson's Works (of which title his novel but characteristic use in applying it to plays was at the time much ridiculed) has already been men- tioned as 1616; the second, professedly published in 1640, is de- scribed by GifTord as" a wretched continuation of the first, printed from MSS. surreptitiously obtained during his life, or ignorantly hurried through the press after his death, and bearing a variety of dates from 1631 to 1641 inclusive." The works were reprinted in a single folio volume in 1692, in which The New Inn and The Case is Altered were included for the first time, and again in 6 vols 8vo in 17 15. Peter Whalley' sedition in 7 vols., with a life, appeared in 1756, but was superseded in 1816 by William Gifford's, in 9 vols, (of which

the first includes a biographical memoir, and the famous essay on the " Proofs of Ben Jonson's Malignity, from the Commentators on Shakespeare "). A new edition of Gifford's was published in 9 vols, in 1875 by Colonel F. Cunningham, as. well as a cheap reprint in 3 vols, in 1870. Both contain the Conversations with Drummond, which were first printed in full by David Laing in the Shakespeare Society's Publications (1842) and the Jonsonus Virbius, a collection (unparalleled in number and variety of authors) of poetical tributes, published about six months after Jonson's death by his friends and admirers. There is also a single-volume edition, with a very readable memoir, by Barry Cornwall (1838). An edition of Ben Jonson's works from the original texts was recently undertaken by C. H. Herf ord and Percy Simpson. A selection from his plays, edited for the " Mermaid " series in 1893-1895 by B. Nicholson, with an introduction by C. H. Herford, was reissued in 1904. W. W. Bang in his Mater- ialien zur Kunde des alien englischen Dramas has reprinted from the folio of 1616 those of Ben Jonson's plays which are contained in it (Louvain, 1905-1906) . Every Man in his Humour and Every Man out of his Humour have been edited for the same series (16 and 17, 1905 and 1907) by W. W. Bang and W. W. Greg. Every Man in his Humour has also been

edited, with a brief biographical as well as special introduction, to which the present sketch owes some details, by H. B. Wheatley (1877). Some valuable editions of plays by Ben Jonson have been recently published by American scholars in the Yale Studies in English, edited by A. S. Cook — The Poetaster, ed. H. S. Mallory (1905) ; The Alchemist, ed. C. M. Hathaway (1903) ; The Devil is an Ass, ed. W. S. Johnson (1905); The Staple of News, ed. De Winter (1905) ; The New Inn, ed. by G. Bremner (1908) ; The Sad Shepherd (with Waldron's continuation) has been edited by W. W. Greg for Bang's Materialien zur Kunde des alien englischen Dramas (Louvain, 1905).

The criticisms of Ben Jonson are too numerous for cataloguing here; among those by eminent Englishmen should be specially men- tioned John Dryden's, particularly those in his Essay on Dramatic Poesy (1667-1668; revised 1684), and in the preface to An Evening's Love, or the Mock Astrologer (1668), and A. C. Swinburne's Study of Ben Jonson (1889), in which, however, the significance of the Discoveries is misapprehended. See also F. G. Fleay, Biographical Chronicle of the English Drama (1891), i. 311-387, ii. 1-18; C. H. Herford, " Ben Jonson" (art. in Diet. Nat. Biog., vol. xxx., 1802); A. W. Ward, History of English Dramatic Literature, 2nd ed. (1899), ii. 296- 407 ; and for a list of early impressions, W. W. Greg, List of English Plays written before 1643 and printed before iyoo (Bibliographical Society, 1900), pp. 55-58 and supplement 11-15. An important French work on Ben Jonson, both biographical and critical, and containing, besides many translations of scenes and passages, some valuable appendices, to more than one of which reference has been made above, is Maurice Castelain's Ben Jonson, Vhomme et Vceuvre (1907). Among treatises or essays on particular aspects of his literary work may be mentioned Emil Koeppel's Quellenstudien zu den Dramen Ben Jonson's, &c. (1895) ; the same writer's " Ben Jonson's Wirkung auf zeitgenossische Dramatiker," &c, in Angli- cistische Forschungen, 20 (1906) ; F. E. Schelling's Ben Jonson and the Classical School (1898); and as to his masques, A. Soergel, Die englischen Maskenspiele (1882) and J. Schmidt, " Uber Ben Jonson's Maskenspiele," in Herrig's Archiv, &c, xxvii. 51-91. See also H. Reinsch, " Ben Jonson's Poetik und seine Beziehungen zu Horaz," in Munchener Beitrage, 16 (1899). (A. W. W.)

JOPLIN, a city of Jasper county, Missouri, U.S.A., on Joplin creek, about 140 m. S. of Kansas City. Pop. (1890), 9943; (1900), 26,023, of whom 893 were foreign-born and 773 were negroes; (1910 census) 32,073. It is served by the Missouri Pacific, the St Louis & San Francisco, the Missouri, Kansas & Texas, and the Kansas City Southern railways, and by interurban electric lines. The city has a fine court-house, a United States government building, a Carnegie library and a large auditorium. Joplin is the trade centre of a rich agricul- tural and fruit-growing district, but its

growth has been chiefly due to its situation in one of the must productive zinc and lead regions in the country, for which it is the commercial centre. In 1906 the value of zinc-ore shipments from this Missouri- Kansas (or Joplin) district was $12,074,105, and of shipments of lead ore, $3,048,558. The value of joplin's factory product in 1905 was $3,006,203, an increase of 29-3% since 1900. Natural gas, piped from the Kansas fields, is used for light and power, and electricity for commercial lighting and power is derived from plants on Spring River, near Vark, Kansas, and on Shoal creek. The municipality owns its electric-lighting plant; the water-works are under private ownership. The first settle- ment in the neighbourhood was made in 1838. In 1871 Joplin was laid out and incorporated as a town; in 1872 it and a rival town on the other side of Joplin creek were united under the name Union City; in 1873 Union City was chartered as a city

under the name Joplin; and in 1888 Joplin was chartered as a city of the third class. The city derives its name from the creek, which was named in honour of the Rev. Harris G. Joplin (c. 1810-1847), a native of Tennessee.

JOPPA, less correctly Jaffa (Arab. Yafa), a seaport on the coast of Palestine. It is of great antiquity, being mentioned in the tribute lists of Tethmosis (Thothmes) III. ; but as it never was in the territory of the pre-exilic Israelites it was to them a place of no importance. Its ascription to the tribe of Dan (Josh. xix. 46) is purely theoretical. According to the authors of Chronicles (2 Chron. ii. 16), Ezra (iii. 7) and Jonah (i. 3) it was a seaport for importation of the Lebanon timber floated down the coasts or for ships plying even to distant Tarshish. About 148 B.C. it was captured from the Syrians by Jonathan Maccabaeus (1 Mace. x. 75) and later it was retaken and garri- soned by Simon his brother (xii. 33, xiii. 1 1). It was restored to the Syrians by Pompey (Jos., Ant. xiv. 4, 4) but again given back to the Jews (ib. xiv. 10, 6) with an exemption from tax. St Peter for a while lodged at Joppa, where he restored the benevolent widow Tabitha to life, and had the vision which taught him the universality of the plan of Christianity.

According to Strabo (xvi. ii.), who makes the strange mistake of saying that Jerusalem is visible from Joppa, the place was a resort of pirates. It was destroyed by Vespasian in the Jewish War (68). Tradition connects the story of Andromeda and the sea-monster with the sea-coast of Joppa, and in early times her chains were shown as well as the skeleton of the monster itself (Jos. Wars, iii. 9, 3). The site seems to have been shown

even to some medieval pilgrims, and curious traces of it have been detected in modern Moslem legends.

In the 5th and nth centuries we hear from time to time of bishops of Joppa, under the metropolitan of Jerusalem. In 1 1 26 the district was captured by the knights of St John, but lost to Saladin in 1187. Richard Cceur de Lion retook it in 1191, but it was finally retaken by Malek el 'Adil in 1196. It languished for a time; in the 16th century it was an almost uninhabited ruin; but towards the end of the 17th century it began anew to develop as a seaport. In 1799 it was stormed by Napoleon; the fortifications were repaired and strengthened by the British.

The modern town of Joppa derives its importance, first, as a seaport for Jerusalem and the whole of southern Palestine, and secondly as a centre of the fruit-growing industry. During the latter part of the 19th century it greatly increased in size. The old city walls have been entirely removed. Its population is about 35,000 (Moslems 23,000, Christians 5000, Jews 7000; with the Christians are included the " Templars," a semi-religious, semi-agricultural German colony of about 3 20 souls) . The town, which rises over a rounded hillock on the coast, about 100 ft. high, has a very picturesque appearance from the sea. The harbour (so-called) is one of the worst existing, being simply a natural breakwater formed by a ledge of reefs, safe enough for small Oriental craft, but very dangerous for large vessels, which can only make use of the seaport in calm weather; these never come nearer than about a mile from the shore. A railway and a bad carriage-road connect Joppa with Jerusalem. The water of the town is derived from wells, many of which have a brackish taste. The export trade of the town consists of soap of olive oil, sesame, barley, water melons, wine and especially oranges (commonly known as Jaffa oranges), grown in the famous and ever-increasing gardens that lie north and east of the town. The chief imports are timber, cotton and other textile goods, tiles, iron, rice, coffee, sugar and petroleum. The value of the exports in 1900 was estimated at £264,950, the imports £382,405. Over 10,000 pilgrims, chiefly Russians, and some three or four thousand tourists land annually at Joppa. The town is the seat of a kaimakam or lieutenant-governor, subordinate to the governor of Jerusalem, and contains vice- consulates of Great Britain, France, Germany, America and other powers. There are Latin, Greek, Armenian and Coptic monasteries; and hospitals and schools under British, French and German auspices. (R. A. S. M.)

JORDAENS, JACOB (1593-1678), Flemish painter, was born and died at Antwerp. He studied, like Rubens, under Adam van Noort, and his marriage with his master's daughter in 1616, the year after his admission to the gild of painters, prevented him from visiting Rome. He was forced to content himself with studying such examples of the Italian masters as he

found at home; but a far more potent influence was exerted upon his style by Rubens, who employed him sometimes to reproduce small sketches in large. Jordaens is second to Rubens alone in their special department of the Flemish school. In both there is the same warmth of colour, truth to nature, mastery of chiaroscuro and energy of expression; but Jordaens is wanting in dignity of conception, and is inferior in choice of forms, in the character of his heads, and in correctness of drawing. Not seldom he sins against good taste, and in some of his humorous pieces the coarseness is only atoned for by the animation. Of these last he seems in some cases to have painted several replicas. He employed his pencil also in biblical, mythological, historical and allegorical subjects, and is well-known as a portrait painter. He also etched some plates.

See the elaborate work on the painter, by Max Rooses (1908). JORDAN, CAMILLE (1771-1821), French politician, was born in Lyons on the nth of January 1771 of a well-to-do mercantile family. He was educated in Lyons, and from an early age was imbued with royalist principles. He actively supported by voice, pen and musket his native town in its resistance to the Convention; and when Lyons fell, in October 1793, Jordan fled. From Switzerland he passed in six months to England, where he formed acquaintances with other French exiles and with pro- minent British statesmen, and imbibed a lasting admiration for the English Constitution. In 1706 he returned to France, and next year he was sent by Lyons as a deputy to the Council of Five Hundred. There his eloquence won him consideration. He earnestly supported what he felt to be true freedom, especially in matters of religious worship, though the energetic appeal on behalf of church bells in his Rapport sur la liberie des cultes procured him the sobriquet of Jordan-Cloche. Proscribed at the coup d'etat of the 18th Fructidor (4th of September 1797) he escaped to Basel. Thence he went to Germany, where he met Goethe. Back again in France by 1800, he boldly published in 1802 his Vrai sens du vote national pour le consulat & vie, in which he exposed the ambitious schemes of Bonaparte. He was unmo- lested, however, and during the First Empire lived in literary retirement at Lyons with his wife and family, producing for the Lyons academy occasional papers on the Influence reciproque de V eloquence sur la Revolution et de la Revolution sur I 'eloquence; Etudes sur Klopstock, &c. At the restoration in 1814 he again emerged into public life. By Louis XVIII. he was ennobled and named a councillor of state; and from 1816 he sat in the chamber of deputies as representative of Ain. At first he sup- ported the ministry, but when they began to show signs of re- action he separated from them, and gradually came to be at the head of the constitutional opposition. His speeches in the chamber were always eloquent and powerfuL Though warned by failing health to resign, Camille Jordan remained at his post till his death at Paris, on the 19th of May

1-821;

To his pen we owe Lettre & M. Lamourette (1791); Histoire de la conversion d'une dame Parisienne (1792) ; La Loi et la religion vengies (1792); Adresse a ses commettants sur la revolution du 4 Septembre 1797 (i797); Sur les troubles de Lyon (1818); La Session de 1817 (1818). His Discours were collected in 1818. The "Fragments choisis," and translations from the German, were published in L'Abeille fran$aise. Besides the various histories of the time, see further details vol. x. of the Revue encyclopidique ; a paper on Jordan and Madame de Stael, by C. A. Sainteˆ BeUve, in the Revue des deux mondes for March 1868 and R. Boubee, " Camille Jordan a Weimar," in the Correspondant (1901), ccv. 718-738 and 948-970.

JORDAN, DOROTHEA (1762-1816), Irish actress, was born near Waterford, Ireland, in 1762. Her mother, Grace Phillips, at one time known as Mrs Frances, was a Dublin actress. Her father, whose name was Bland, was according to one account an army captain, but more probably a stage hand. Dorothy Jordan made her first appearance on the stage in 1777 in Dublin

as Phoebe in As You Like It. After acting elsewhere in Ireland she appeared in 1782 at Leeds, and subsequently at other Yorkshire towns, in a variety of parts, including Lady Teazle. It was at this time that she began calling herself Mrs Jordan. In 1785 she made her first London appearance at Drury Lane as Peggy in A Country Girl. Before the end of her first season she had become an established public favourite, her acting in comedy being declared second only to that of Kitty Clive. Her engage- ment at Drury Lane lasted till 1809, and she playec a large variety of parts. But gradually it came to be recognized that her special talent lay in comedy, her Lady Teazle, Rosalind and Imogen being specially liked, and such " breeches " parts as William in Rosina. During the rebuilding of Drury Lane she played at the Haymarket; she transferred her services in 181 1 to Covent Garden. Here, in 1814, she made her last appearance on the London stage, and the following year, at Margate, retired altogether. Mrs Jordan's private life was one of the scandals of the period. She had a daughter by her first manager, in Ire- land, and four children by Sir Richard Ford, whose name she bore for some years. In 1790 she became the mistress of the duke of Clarence (afterwards William IV.), and bore him ten children, who were ennobled under the name of Fitz Clarence, the eldest being created earl of Munster. In 181 1 they separated by mutual consent, Mrs Jordan being granted a liberal allowance. In 1 81 5 she went abroad. According to one story she was in danger of imprisonment for debt. If so, the debt must have been

incurred on behalf of others — probably her relations, who appear to have been continually borrowing from her — for her own per- sonal debts were very much more than covered by her savings. She is generally understood to have died at St Cloud, near Paris, on the 3rd of July 1816, but the story that under an assumed name she lived for seven years after that date in England finds some credence.

See James Boaden, Life of Mrs Jordan (1831); The Great Illegiti- mates (1830); John Genest, Account of the Stage; Tate Wilkinson, The Wandering Patentee; Memoirs and Amorous Adventures by Sea and Land of King William IV. (1830) ; The Georgian Era (1838"!.

JORDAN, THOMAS (1612 ?i68s), English poet and pam phleteer, was born in London and started life as an ˆctor at the Red Bull theatre in Clerkenwell. He published in 1637 his first volume of poems, entitled Poeticall Varieties, and in the same year appeared A Pill to Purge Melancholy. In 1639 he recited one of his poems before King Charles I., and from this time forward Jordan's output in verse and prose was continuous and prolific. He freely borrowed from other authors, and frequently re-issued his own writings under new names. During the troubles between the king and the parliament he wrote a number of Royalist pamphlets, the first of which, A Medicine for the Times, or an Antidote against Faction, appeared in 1641. Dedications, occa- sional verses, prologues and epilogues to plays poured from his pen. Many volumes of his poems bear no date, and they were probably written during the Commonwealth. At the Restoration he eulogized Monk, produced a masque at the entertainment of the general in the city of London and wrote pamphlets in his support. He then for some years devoted his chief attention to writing plays, in at least oneol which, Money is an Ass, he himself played a part when it was produced in 1668. In 1671 he was appointed laureate to the city of London; from this date till his death in 1685 he annually composed a panegyric on the lord mayor, and arranged the pageantry of the lord mayor's shows, which he celebrated in verse under such titles as London Triumphant, or the City in Jollity and Splendour (1672), or London in Luster, Projecting many Bright Beams of Triumph (1679). Many volumes of these curious productions are pre- served in the British Museum.

In addition to his numerous printed works, of which perhaps A Royal Arbour of Loyall Poesie (1664) and A Nursery of Novelties in Variety of Poetry are most deserving of mention, several volumes of his poems exist in manuscript. W. C. Hazlitt and other 19th-century critics found more merit in Jordan's, writings than was allowed by his contemporaries, who for the most part scornfully referred to his voluminous productions as commonplace and dull.

See Gerard Langbaine, Account of the English Dramatic Poets (1691); David Erskine Baker, Biographia Dramalica (4 vols., 1812);

W. C. Hazlitt, Handbook to the Popular, Poetical and Dramatic Litera- ture of Great Britain (1867) ; F. W. Fairholt, Lord Mayors' Pageants (Percy Society, 1843), containing a memoir of Thomas Jordan' John Gough Nichols, London Pageants (1831).

JORDAN, WILHELM (1819-1904), German poet and novelist, was born at Insterburg in East Prussia on the 8th of February 1819. He studied, first theology and then philosophy and natural science, at the universities of Konigsberg and Berlin. He settled in Leipzig as a journalist; but the democratic views expressed in some essays and the volumes of poems Giocke und Kanone (1 48 1) and Irdische Phanlasien (1 84 2) led to his expulsion from Saxony in 1846. He next engaged in literary and tutorial work in Bremen, and on the outbreak of the revolution, in Feb- ruary 1848, was sent to Paris, as correspondent of the Bremer Zeitung. He almost immediately, however, returned to Ger- many and, throwing himself into the political fray in Berlin, was elected member for Freienwalde, in the first German parlia- ment at Frankfort-on-Main. For a short while he sided mth. the Left, but soon joined the party of von Gagern. On a vote having been passed for the establishment of a German navy, he was appointed secretary of the committee to deal with the whole question, and was subsequently made ministerial councillor (Ministerialrat) in the naval department of the government. The naval project was abandoned, Jordan was pensioned ana afterwards resided at Frankfort-on-Main until his death on the 25 th of June 1904, devoting himself to literary work, acting as his own. publisher, and producing numerous poems, novels, dramas and translations.

Among his best known works are: Demiurgos (3 vols., 1852-1854), a " Mysterium," in which he attempted to dea with the problems of human existence, but the work found little favour; Nibelunge, an epic poem in alliterative verse, in two parts, (1) Sigfriedsage (1867- 1868; 13th ed. 1889) and (2) Hildebrants Heimkehr (1874; 10th ed. 1892) — in the first part he is regarded as having been remarkably successful; a tragedy, Die Wittwe des Agis (1858); the comedies, Die Liebesleugner (1855) and Durchs Ohr (1870; 6th ed. 1885); and the novels Die Sebalds (1885) and Zwei Wiegen (1887). Jordan also published numerous translations, notably Homers Odyssee (1876; 2nd ed. 1889) and Homers Mas (1881; 2nd ed. 1894); Die Edda (1889). He was also distinguished as a reciter, and on a visit to the United States in 187 1 read extracts from his works before large audiences.

JORDAN (the down-comer; Arab. esk-Sheri'a, the watering- place), the only river of Palestine and one of the most remark- able in the world. It flows from north to south in a deep trough-like valley, the Aulon of the Greeks and Ghor of the Arabs, which is usually believed to follow the line of a fault or fracture of the earth's crust. Most geologists hold that the valley is part of an old sea-bed, traces of which remain in numerous shingle-banks and beach-levels. This, they say, once extended to the Red Sea and even over N.E. Africa. Shrinkage caused the pelagic limestone bottom to be upheaved in two ridges, between which occurred a long fracture, which can now be traced from Coelesyria down the W r adi Araba to the Gulf of Akaba. The Jordan valley in its lower part keeps about the old level of the sea-bottom and is therefore a remnant of the Miocene world. This theory, however, is not universally accepted, some authorities preferring to assume a succession of more strictly local elevations and depressions, connected with the recent volcanic activity of the Jaulan and Lija districts on the east bank; which brought the contours finally to their actual form. In any case the number of distinct sea-beaches seems to imply a succession of convulsive changes, more recent than the great Miocene upheaval, which are responsible for the shrinkage of the water into the three isolated pans now found. For more than two-thirds of its course the Jordan lies below the level of the sea. It has never been navigable, no important town has ever been built on its banks, and it runs into an inland sea which has no port and is destitute of aquatic life. Throughout history it has exerted a separatist influence, roughly dividing the settled from the nomadic populations; and the crossing of Jordan, one way or the other, was always an event in the history of Israel. In Hebrew times its valley was regarded as a " wilderness " and, except in the Roman era, seems always to have been as sparsely inhabited as now. From its sources to the Dead Sea it rushes

down a continuous inclined plane, broken here and there by rapids and small falls; between the Sea of Galilee and the Dead Sea its sinuosity is so great that in a direct distance of 65 m. it traverses at least 200 m. The mean fall is about 9 ft. in the mile. The Jordan has two great sources, one in Tell el-Kadi (Dan) whence springs the Nahr Leddan, a stream 12 ft. broad at its birth; the other at Banias (anc. Paneas, Caesarea-Philippi), some 4 m. N., where the Nahr Banias issues from a cave, about 30 ft. broad. But two longer streams with less water contest their claim, the Nahr Barrighit from Coelesyria, which rises near the springs of the Litany, and the Nahr Hasbany from Hermon. The four streams unite below the fortress of Banias, which once held the gate of the valley, and flow into a marshy

tract now called Huleh (Semechonitis, and perhaps Merom of Joshua. There the Jordan begins to fall below sea-level, rushing down 680 ft. in 9 m. to a delta, which opens into the Sea of Galilee. Thereafter it follows a valley which is usually not above 4 m. broad, but opens out twice into the small plains of Bethshan and Jericho. The river actually flows in a depression, the Zor, from a quarter to 2 m. wide, which it has hollowed out for itself in the bed of the Ghor. During the rainy season (January and February), when the Jordan overflows its banks, the Zor is flooded, but when the water falls it produces rich crops. The floor of the Ghor falls gently to the Zor, and is intersected by deep channels, which have been cut by the small streams and winter torrents that traverse it on their way to the Jordan. As far south as Kurn Surtabeh most of the valley is fertile, and even between that point and the Dead Sea there are several well- watered oases. In summer the heat in the Ghor is intense, 110 F. in the shade, but in winter the temperature falls tor 40°, and sometimes to 32° at night. During the seasons of rain and melting snow the river is very full, and liable to freshets. After twelve hours' rain it has been known to rise from 4 to 5 ft., and to fall as rapidly. In 1257 the Jordan was dammed up for several hours by a landslip, probably due to heavy rain. On leaving the Sea of Galilee the water is quite clear, but it soon assumes a tawny colour from the soft marl which it washes away from its banks and deposits in the Dead Sea. On the whole it is an unpleasant foul stream running between poisonous banks, and as such it seems to have been regarded by the Jews and other Syrians. The Hebrew poets did not sing its praises, and others compared it unfavourably with the clear rivers of Damascus. The clay of the valley was used for brickmaking, and Solomon established brassfoundries there. From crusading times to this day it has grown sugar-cane. In Roman times it had extensive palm-groves and some small towns (e.g. Livias or Julias opposite Jericho) and villages. The Jordan is crossed by two stone bridges — one north of Lake Huleh, the other between that lake and the Sea of Galilee — and by a wooden bridge on the road from Jerusalem to Gilead and Moab. During the Roman period, and almost to the end of the Arab supremacy, there were bridges on all the great lines of communication between eastern and western Palestine, and ferries at other places. The depth of water varies greatly with the season. When not in flood the river is often fordable, and between the Sea of Galilee and the Dead Sea there are then more than fifty fords — some of them of historic interest. The only difficulty is occasioned by the erratic zigzag current. The natural products of the Jordan valley — a tropical oasis sunk in the temperate zone, and overhung by Alpine Hermon — are unique. Papyrus grows in Lake Huleh, and rice and cereals thrive on its shores, whilst below the Sea of Galilee the vegetation is almost tropical. The flora and fauna present a large infusion of Ethiopian types; and the fish, with which the river is abundantly stocked, have a great affinity with those of the rivers

and lakes of east Africa. Ere the Jordan enters the Dead Sea, its valley has become very barren and for- bidding. It reaches the lake at a minus level of 1290 ft., the depression continuing downwards to twice that depth in the bed of the Dead Sea. It receives two affluents, with perennial waters, on the left, the Yarmuk (Hieromax) which flows in from the volcanic Jaulan a little south of the Sea of Galilee, and the Zerka (Jabbok) which comes from the Belka district to a point

more than half-way down the lower course. On the right the Jalud descends from 'the plain of Esdraelon to near Beisan, and the Far'a from near Nablus. Various salt springs rise in the lower valley. The rest of the tributaries are wadis, dry except after rains.

Such human life as may be found in the valley now is mainly migratory. The Samaritan villagers use it in winter as pasture- ground, and, with the Circassians and Arabs of the east bank, cultivate plots here and there. They retire on the approach of summer. Jericho is the only considerable settlement in the lower valley, and it lies some distance west of the stream on the lower slopes of the Judaean heights.

See W. F. Lynch, Narrative of the U.S. Expedition, &c. (1849); H. B. Tristram, Land of Israel (1865) ; J. Macgregor, Rob Roy on the Jordan (1870); A. Neubauer, La Geographie du Talmud (1868); E. Robinson, Physical Geography of the Holy Land (1865); E. Hull, Mount Seir, &c. (1885), and Memoir on the Geology of Arabia Petraea, &c. (1886); G. A. Smith, Hist. Geography of the Holy Land (1894); W. Libbey and F. E. Hoskins, The Jordan Valley, &c. (1905). See also Palestine. (C. W. W. ; D. G. H.)

JORDANES, 1 the historian of the Gothic nation, flourished about the middle of the 6th century. All that we certainly know about his life is contained in three sentences of his history of the Goths (cap. 50), from which, among other particulars as to the history of his family, we learn that his grandfather Paria was notary to Candac, the chief of a confederation of Alans and other tribes settled during the latter half of the 5th century on the south of the Danube in the provinces which are now Bulgaria and the Dobrudscha. Jordanes himself was the notary of Candac's nephew, the Gothic chief Gunthigis, until he took the vows of a monk. This, according to the manner of speaking of that day, is the meaning of his words ante conversionem meant, though it is quite possible that he may at the same time have renounced the Arian creed of his forefathers, which it is clear that he no longer held when he wrote his Gothic history. The Getica of Jordanes shows Gothic sympathies; but these are probably due to an imitation of the tone of Cassiodorus, from whom he draws practically all his material. He was not himself a Goth, belong- ing to a confederation of

Germanic tribes, embracing Alans and Scyrians, which had come under the influence of the Ostrogoths settled on the lower Danube; and his own sympathies are those of a member of this confederation. He is accordingly friendly to the Goths, even apart from the influence of Cassiodorus; but he is also prepossessed in favour of the eastern emperors in whose terri- tories this confederation lived and whose subject he himself was. This makes him an impartial authority on the last days of the Ostrogoths. At the same time, living in Moesia, he is restricted in his outlook to Danubian affairs. He has little to say of the inner history and policy of the kingdom of Theodoric: his inter- ests lie, as Mommsen says, within a triangle of which the three points are Sirmium, Larissa and Constantinople. Finally, con- nected as he was with the Alans, he shows himself friendly to them, whenever they enter into his narrative.

We pass from the extremely shadowy personality of Jordanes to the more interesting question of his works.

1. The Romana, or, as he himself calls it, De summa temporum vel origine actibusque gentis Romanorum, was composed in 551. It was begun before, but published after, the Getica. It is a sketch of the history of the world from the creation, based on Jerome, the epitome of Florus, Orosius and the ecclesiastical history of Socrates. There is a curious reference to Iamblichus, apparently the neo-platonist philosopher, whose name Jordanes, being, as he says himself, agrammatus, inserts by way of a flourish. The work is only of any value for the century 450- 550, when Jordanes is dealing with recent history. It is merely a hasty compilation intended to stand side by side with the Getica. 2

2. The other work of Jordanes commonly called De rebus Geticis or Getica, was styled by himself De origine actibusque

1 The evidence of MSS. is overwhelming against the form Jor- nandes. The MSS. exhibit Jordanis or Jordannis ; but these are only Vulgar-Latin spellings of Jordanes.

2 The terms of the dedication of this book to a certain Vigilius make it impossible that the pope (538-555) of that name is meant.

Getarum, and was also written in 551. He informs us that while he was engaged upon the Romana a friend named Castalius invited him to compress into one small treatise the twelve books — now lost — of the senator Cassiodorus, on TheOrigin and Actions of the Goths. Jordanes professes to have had the work of Cassio- dorus in his hands for but three days, and to reproduce the sense not the words; but his book, short as it is, evidently contains long verbatim extracts from the earlier author, and it may be suspected that the story of the triduana lectio and the apology quamvis verba non recolo, possibly even the friendly invitation of Castalius, are mere blinds to cover his own entire want of originality. This suspicion is strengthened by the fact (dis- covered by von Sybel) that even the very preface to his book is taken almost word for word from Rufinus's translation of Origen's commentary on the epistle to the Romans. There is no doubt, even on Jordanes' own statements, that his work is based upon that of Cassiodorus, and that any historical worth which it possesses is due to that fact. Cassiodorus was one of the very few men who, Roman by birth and sympathies, could yet appreciate the greatness of the barbarians by whom the empire was overthrown. The chief adviser of Theodoric, the East Gothic king in Italy, he accepted with ardour that monarch's great scheme, if indeed, he did not himself originally suggest it, of welding Roman and Goth together into one harmonious state which should preserve the social refinement and the intellectual culture of the Latin-speaking races without losing the hardy virtues of their Teutonic conquerors. To this aim everything in the political life of Cassiodorus was subservient, and this aim he evidently kept before him in his Gothic history. But in writing that history Cassiodorus was himself indebted to the work of a certain Ablabius. It was Ablabius, apparently, who had first used the Gothic sagas (prisca carmina); it was he who had constructed the stem of the Amals. Whether he was a Greek, a Roman or a Goth we do not know; nor can we say when he wrote, though his work may be dated conjecturally in the early part of the reign of Theodoric the Great. We can only say that he wrote on the origin and history of the Goths, using both Gothic saga and Greek sources; and that if Jordanes used Cassiodorus, Cassiodorus used, if to a less extent,

the work of Ablabius.

Cassiodorus began his work, at the request of Theodoric, and therefore before 526: it was finished by 533. At the root of the work lies a theory, whencesoever derived, which identified the Goths with the Scythians, whose country Darius Hystaspes invaded, and with the Getae of Dacia, whom Trajan conquered. This double identification enabled Cassiodorus to bring the favoured race into line with the peoples of classical antiquity, to interweave with their history stories about Hercules and the Amazons, to make them invade Egypt, to claim for them a share in the wisdom of the semi-mythical Scythian philosopher Zamolxis. He was thus able with some show of plausibility to represent the Goths as " wiser than all the other barbarians and almost like the Greeks " (Jord., De reb. Get., cap. v.), and to send a son of the Gothic king Telephus to fight at the siege of Troy, with the ancestors of the Romans. All this we can now perceive to have no relation to history, but at the time it may have made the subjugation of the Roman less bitter to feel that he was not after all bowing down before a race of barbarian up- starts, but that his Amal sovereign was as firmly rooted in classi- cal antiquity as any Julius or Claudius who ever wore the purple. In the eighteen years which elapsed between 533 and the com- position of the Getica of Jordanes, great events, most disastrous for the Romano-Gothic monarchy of Theodoric, had taken place. It was no longer possible to write as if the whole civilization of the Western world would sit down contentedly under the shadow of East Gothic dominion and Amal sovereignty. And, moreover, the instincts of Jordanes, as a subject of the Eastern Empire, pre- disposed him to flatter the sacred majesty of Justinian, by whose victorious arms the overthrow of the barbarian kingdom in Italy had been effected. Hence we perceive two currents of tendency in the Getica. On the one hand, as a transcriber of the philo-Goth Cassiodorus, he magnifies the race of Alarie and

Theodoric, and claims for them their full share, perhaps more than their full share, of glory in the past. On the other hand he speaks of the great anti-Teuton emperor Justinian, and of his reversal of the German conquests of the 5th century, in language which would certainly have grated on the ears of Totila and his heroes. When Ravenna is taken, and Vitigis carried into cap- tivity, Jordanes almost exults in the fact that " the nobility of the Amals and the illustrious offspring of so many mighty men have surrendered to a yet more illustrious prince and a yet mightier general, whose fame shall not grow dim through all the centuries." (Getica, Ix. § 315).

This laudation, both of the Goths and of their Byzantine conquerors, may perhaps help us to understand the motive with which the Getica was written. In the year 551 Germanus, nephew of Justinian, accompanied by

his bride, Matasuntha, grand-daughter of Theodoric, set forth to reconquer Italy for the empire. His early death prevented any schemes for a re- vived Romano-Gothic kingdom which may have been based on his personality. His widow, however, bore a posthumous child, also named Germanus, of whom Jordanes speaks (cap. 60) as " blending the blood of the Anicii and the Amals, and furnishing a hope under the divine blessing of one day uniting their glories." This younger "Germanus did nothing in after life to realize these anticipations; but the somewhat pointed way in which his name and his mother's name are mentioned by Jordanes lends some probability to the view that he hoped for the child's succession to the Eastern Empire, and the final reconciliation of the Goths and Romans in the person of a Gotho-Roman emperor.

The De rebus Geticis falls naturally into four parts. The first (chs. i.-xiii.) commences with a geographical description of the three quarters of the world, and in more detail of Britain and Scanzia (Sweden), from which the Goths under their king Berig migrated to the southern coast of the Baltic. Their migration across what has since been called Lithuania to the shores of the Euxine, and their differentiation into Visigoths and Ostrogoths, are nest described. Chs. v.-xiii. contain an account of the intrusive Geto-Scythian ele- ment before alluded to.

The second section (chs. xiv.-xxiv.) returns to the true history of the Gothic nation, sets forth the genealogy of the Amal kings, and describes the inroads of the Goths into the Roman Empire in the 3rd century, with the foundation and the overthrow of the great but somewhat shadowy kingdom of Hermanric.

The third section (chs. xxv.-xlvii.) traces the history of the West Goths from the Hunnish invasion to the downfall of the Gothic kingdom in Gaul under Alarie II. (376-507). The best part of this section, and indeed of the whole book, is the seven chapters devoted to Attila's invasion of Gaul and the battle of the Mauriac plains. Here we have in all probability a verbatim extract from Cassiodorus, who (possibly resting on Ablabius) interwove with his narrative large portions of the Gothic sagas. The celebrated expression certammis gaudia assuredly came at first neither from the suave minister Cassiodorus nor from the small-souled notary Jordanes, but is the translation of some thought which first found utterance through the lips of a Gothic minstrel.

The fourth section (chs. xlviii.-lx.) traces the history of the East Goths from the same Hunnish invasion to the first overthrow of the Gothic monarchy in Italy (376-539). In this fourth section are inserted, somewhat out of their proper place, some valuable details as to the Gothi Minores, " an immense people dwelling in the region of Nicopolis, with their high priest and

primate Vulfilas, who is said also to have taught them letters." The book closes with the allusion to Germanus and the panegyric on Justinian as the con- queror of the Goths referred to above.

Jordanes refers in the Getica to a number of authors besides Cassiodorus; but he owes his knowledge of them to Cassiodorus. It is perhaps only when he is using Orosius that we can hold Jordanes to have borrowed directly. Otherwise, as Mommsen says, the Getica is a mera epitome, laxata ea et perversa, historiae Gothicae Cassiodorianae.

As to the style and literary character of Jordanes, every author who has used him speaks in terms of severe censure. When he is left to himself and not merely transcribing, he is sometimes scarcely grammatical. There are awkward gaps in his narrative and state- ments inconsistent with each other. He quotes, as if he were familiarly acquainted with their writings, a number of Greek and Roman writers, of whom it is almost certain that he had not read more than one or two. At the same time he does not quote the chronicler Marcellinus, from whom he has copied verbatim the history of the deposition of Augustulus. All these faults make him a peculiarly unsatisfactory authority where we cannot check his statements by those of other authors. It may, however, be pleaded in extenuation that he is professedly a transcriber, and, if

his story be correct, a transcriber in peculiarly unfavourable circumstances. He has also himself suffered much from the in- accuracy of copyists. But nothing has really been more unfortunate for the reputation of Jordanes as a writer than the extreme precious- ness of the information which he has preserved to us. The Teutonic tribes whose dim origins he records have in the course of centuries attained to world-wide dominion. The battle in the Mauriac plains of which he is really the sole historian, is now seen to have had important bearings on the destinies of the world. And thus the hasty pamphlet of a half-educated Gothic monk has been forced into prominence, almost into rivalry with the finished productions of the great writers of classical antiquity. No wonder that it stands the comparison badly; but with all its faults the Getica of Jordanes will probably ever retain its place side by side with the De moribus Germanorum of Tacitus as a chief source of information respecting the history, institutions and modes of thought of our Teutonic forefathers.

Editions. — The classical edition is that of Mommsen (in Mon. Germ. hist. and. antiq., v., ii.), which supersedes the older editions, such as that in the

first volume of Muratori's Scriptt. rer. Ital. The best MS. is the Heidelberg MS., written in Germany, probably in the 8th century; but this perished in the fire at Mommsen's house. The next of the MSS. in value are the Vaticanus Palatinus of the loth century, and the Valenciennes MS. of the 9th.

Authorities. — Von Sybel's essay, De fontibus Jordanis (1838); Schirren's De ratione quae inter Jordanem et Cassiodorum intercedat Commentatio (Dorpat, 1858); Kopke's Die Anfdnge des Konigthums bei den Gothen (Berlin, 1859) ; Dahn's Die Konige der Germanen, vol. ii. (Munich, 1.861) ; Ebert's Geschickte der Christlich-Lateinischen Litera- tur (Leipsic, 1874); VVattenbach's Deutschlands Geschichtsquellen im Mittelalter (Berlin, 1877); and the introduction of Mommsen to his edition. (T.H.; E.Br.)

JORDANUS (Jordan Catalani) (fl. 1321-1330), French Dominican missionary and explorer in Asia, was perhaps born at Severac in Aveyron, north-east of Toulouse. In 1302 he may have accompanied the famous Thomas of Tolentino, via Negropont, to the East; but it is only in 13 21 that we definitely discover him in western India, in the company of the same Thomas and certain other Franciscan missionaries on their way to China. Ill-luck detained them at Tana in Salsette island, near Bombay; and here Jordanus' companions (" the four martyrs of Tana ") fell victims to Moslem fanaticism (April 7, 13 21). Jordanus, escaping, worked some time at Baruch in Gujarat, near the Nerbudda estuary, and at Suali (?) near Surat; to his fellow-Dominicans in north Persia he wrote two letters — the first from Gogo in Gujarat (October 12, 13 21), the second from Tana (January 24, 1323/4) — describing the progress of this new mission. From these letters we learn that Roman attention had already been directed, not only to the Bombay region, but also to the extreme south of the Indian peninsula, especially to "Columbum," Quilon, or Kulam in Travancore; Jordanus' words may imply that he had already started a mission there before October 13 21. From Catholic traders he had learnt that Ethiopia (i.e. Abyssinia and Nubia) was accessible to Western Europeans; at this very time, as we know from other sources, the earliest Latin missionaries pene- trated thither. Finally, the Epistles of Jordanus, like the con- temporary Secreta of Marino Sanuto (1306-1321), urge the pope to establish a Christian fleet upon the Indian seas. Jordanus, between 1324 and 1328 (if not earlier), probably visited Kulam and selected it as the best centre for his future work; it would also appear that he revisited Europe about 1328, passing through Persia, and perhaps touching at the great Crimean port of Soidaia or Sudak. He was appointed a bishop in 1328 and nominated by Pope John XXII. to the see of .Columbum in 1330. Together with the new bishop of Samar- kand, Thomas of Mancasola, Jordanus was commissioned to take the pall to John de Cora, archbishop of Sultaniyah in Persia, within whose province Kulam was reckoned; he was also

commended to the Christians of south India, both east and west of Cape Comorin, by Pope John. Either before going out to Malabar as bishop, or during a later visit to the west, Jordanus probably wrote his Mirabilia, which from internal evidence can only be fixed within the period 1329-1338; in this work he furnished the best account of Indian regions, products, climate, manners, customs, fauna and flora given by any European in the Middle Ages — superior even to Marco Polo's. In his triple division of the Indies, India Major

comprises the shorelands from Malabar to Cochin China; while India Minor stretches from Sind (or perhaps from Baluchistan) to Malabar; and India Tertia (evidently dominated by African conceptions in his mind) includes a vast undefined coast-region west of Baluchistan, reaching into the neighbourhood of, but not including, Ethiopia and Prester John's domain. Jordanus' Mirabilia contains the earliest clear African identification of Prester John, and what is perhaps the first notice of the Black Sea under that name; it refers to the author's residence in India Major and especially at Kulam, as well as to his travels in Armenia, north-west Persia, the Lake Van region, and Chaldaea; and it supplies excellent descriptions of Parsee doctrines and burial customs, of Hindu ox-worship, idol-ritual, and suttee, and of Indian fruits, birds, animals and insects. After the 8th of April 1330 we have no more knowledge of Bishop Jordanus.

Of Jordanus' Epistles there is only one MS., viz. Paris, National Library, 5006 Lat., fol. 182, r. and v. ; of the Mirabilia also one MS. only, viz. London, British Museum, Additional MSS., 19,513, fols. 3, r.l2 r. The text of the Epistles is in Quetif and Echard, Scrip tores ordinis praedicatorum, i. 549-550 (Epistle I.) ; and in Wadding, Annates minorum, vi. 359-361 (Epistle II.) ; the text of the Mirabilia in the Paris Geog. Soc.'s Recueil de voyages, iv. 1-68 (1839). The Papal letters referring to Jordanus are in Raynaldus, Annales ecclesiastici, 1330, §§ lv. and lvii (April 8 ; Feb. 14). See also Sir H. Yule's Jordanus, a version of the Mirabilia with a commentary (Hakluyt Soc, 1863) and the same editor's Cathay, giving a version of the Epistles, with a commentary, &c. (Hak.Soc, 1866) pp. 184-185, 192-196, 225-230; F. Kunstmann, " Die Mission in Meliapor und Tana " and " Die Mission in Columbo " in the Historisch-politische Blatter of Phillips and Gorres, xxxvii. 25-38, 135-152 (Munich, 1856), &c; C. R. Beazley, Dawn of Modern Geography, iii. 215-235.

(C.R.B.) JORIS, DAVID, the common name of Jan Jorisz or Joriszoon (e. 1 501-1 5 56) , Anabaptist heresiarch who called himself later Jan van Brugge; was born in 1501 or 1502, probably in Flanders, at Ghent or Bruges. His father, Georgius Joris de Koman, other- wise Joris van Amersfoordt, probably a native of Bruges, was a shopkeeper and amateur

actor at Delft; from the circumstance that he played the part of King David, his son received the name of David, but probably not in baptism. His mother was Marytje, daughter of Jan de Gorter, of a good family in Delft. As a child he was clever and delicate. He seems then or later to have acquired some tincture of learning. His first known occupation was that of a glass-painter; in 1522 he painted windows for the church at Enkhuizen, North Holland (the birthplace of Paul Potter). In pursuit of his art he travelled, and is said to have reached England; ill-health drove him homewards in 1524, in which year he married Dirckgen Willems at Delft. In the same year the Lutheran reformation took hold of him, and he began to issue appeals in prose and verse against the Mass and against the pope as antichrist. On Ascension Day 1528 he committed an outrage on the sacrament carried in procession; he was placed in the pillory, had his tongue bored, and was banished from Delft for three years. He turned to the Ana- baptists, was rebaptized in 1533, and for some years led a wandering life. He came into relations with John a. Lasco, and with Menno Simons. Much influenced by Melchior Hofman, he had no sympathy with the fanatic violence of the Miinster faction. At the Buckholdt conference in August 1536 he played a mediating part. His mother, in 1537, suffered martyrdom as an Anabaptist. Soon after he took up a role of his own, having visions and a gift of prophecy. He adapted in his own interest the theory (constantly recurrent among mystics and innovators, from the time of Abbot Joachim to the present day) of three dis- pensations, the old, with its revelation of the Father, the newer with its revelation of the Son, and the final or era of the Spirit. Of this newest revelation Christus David was the mouthpiece, supervening on Christus Jesus. From the 1st of April 1544, bringing with him some of his followers, he took up his abode in Basel, which was to be the New Jerusalem. Here he styled himself Jan van Brugge. His identity was unknown to the authorities of Basel, who had no suspicion of his heresies. By his writings he maintained his hold on his numerous followers in Holland and Friesland. These monotonous writings, all in Dutch, flowed in a continual stream from 1524 (though none is

extant before 1529) and amounted to over 200 in number. His magnum opus was 'T Wonder Boeck (n.d. 1542, divided into two parts; 1551, handsomely reprinted, divided into four parts; both editions anonymous). Its chief claim to recognition is its use, in the latter part, of the phrase Restitutio Christi, which apparently suggested to Servetus his title Christianismi Restitutio (1553). In the 1st edition is a figure of the " new man," signed with the author's monogram, and probably drawn as a likeness of himself; it fairly corresponds with the alleged portrait, engraved

in 1607, reproduced in the appendix to A. Ross's Pansebeia (1655), and idealized by P. Burckhardt in 1900. Another work, Ver- klaringe der Scheppenissen (1553) treats mystically the book of Genesis, a favourite theme with Boehme, Swedenborg and others. His remaining writings exhibit all that easy dribble of triumph- ant muddiness which disciples take as depth. His wife died on the 22nd of August, and his own death followed on the 25th of August 1556. He was buried, with all religious honours, in the church of St Leonard, Basel. Three years later, Nicolas Blesdijk, who had married his eldest daughter Jannecke (Susanna), but had lost confidence in Jorisz some time before his death, denounced the dead man to the authorities of Basel. An inves- tigation was begun in March 1559, and as the result of a convic- tion for heresy the exhumed body of Jorisz was burned, together with his portrait, on the 13th of May 1559. Blesdijk's Hisloria (not printed till 1642) accuses Jorisz of having plures uxores. Of this there is no confirmation. Theoretically Jorisz regarded polygamy as lawful; there is.no proof that his theory affected his own practice.

The first attempt at a true account of Jorisz was by Gottfried Arnold, in his anonymous Historia (1713), pursued with much fuller material in his Kirchen und Ketzer Historie (best ed. 1740-1742). See also F. Nippold, in Zeitschrift fiir die historische Theologie (1863, 1864, 1868); A. van der Linde, in Allgemeine Deutsche Biographic (1881) ; P. Burckhardt, Basler Biographien (1900) ; Hegler, in Hauck's Realencyklopddie (1901), and the bibliography by A. van der Linde, 1867, supplemented by E. Weller, 1869. (A. Go.)*

JORTIN, JOHN (1698-1770), English theologian, the son of a Protestant refugee from Brittany, was born in London on the 23rd of October 1698. He went to Charterhouse School, and in 1 7 1 5 became a pensioner of Jesus College, Cambridge, where his reputation as a Greek scholar led to his being selected to translate certain passages from Eustathius for the notes to Pope's Homer. In 1 7 22 he published a small volume of Latin verse entitled Lusus poetici. Having taken orders in 1724, he was in 1726 presented by his college to the vicarage of Swavesey in Cambridgeshire, which he resigned in 1730 to become preacher at a chapel-of-ease in New Street, London. In 1731, along with some friends, he began a publication entitled Miscellaneous Observations on Authors Ancient and Modern, which appeared at intervals during two years. He was Boyle lecturer in 1 749. Shortly after becoming chaplain to the bishop of London in 1762 he was appointed to a prebendal stall of St Paul's and to the vicarage of Kensing- ton, and in 1764 he was made archdeacon of London. He died at Kensington on the 5th of September 1770.

The principal works of Jortin are : Discussions Concerning the Truth of the Christian Religion (1746); Remarks on Ecclesiastical History (3 vols.

1751-2-4); Life of Erasmus (2 vols. 1750, 1760) founded on the Life by Jean Le Clerc; and Tracts Philological Critical and Miscellaneous (1790). A collection of his Various Works appeared in 1805-1810. All his writings display wide learning and acuteness. He writes on theological subjects with the detachment of a thought- ful layman, and is witty without being flippant. See John Disney's Life of Jortin (1792).

JOSEPH, in the Old Testament, the son of the patriarch Jacob by Rachel; the name of a tribe of Israel. Two explanations of the name are given by the Biblical narrator (Gen. xxx. 23 [E], 24 lj]) ; a third, " He (God) increases," seems preferable. Un- like the other " sons " of Jacob, Joseph is usually reckoned as two tribes (viz. his " sons " Ephraim and Manasseh), and closely asso- ciated with it is the small tribe of Benjamin (q.v.), which lay immediately to the south. These three constituted the " sons " of Rachel (the ewe), and with the " sons " of Leah (the antelope ?) are thus on a higher level than the " sons " of Jacob's concubines. The " house of Joseph " and its offshoots xv. 17

occupied the centre of Palestine from the plain of Esdraelon to the mountain country of Benjamin, with dependencies in Bashan and northern Gilead (see Manasseh). Practically it comprised the northern kingdom, and the name is used in this sense in 2 Sam. xix. 20; Amos v. 6; vi. 6 (note the prominence of Joseph in the blessings of Jacob and Moses, Gen. xlix., Deut. xxxiii.). Originally, however, " Joseph " was more restricted, possibly to the immediate neighbourhood of Shechem, its later extension being parallel to the development of the name Jacob. The dramatic story of the tribal ancestor is recounted in Gen. xxxvii.-l. (see Genesis). Joseph, the younger and envied son, is seized by his brothers at Dothan north of Shechem, and is sold to a party of Ishmaelites or Midianites, who carry him down to Egypt. After various vicissitudes he gains the favour of the king of Egypt by the interpretation of a dream, and obtains a high place in the kingdom. 1 Forced by a famine his brothers come to buy food, and in the incidents that follow Joseph shows his preference for his young brother Benjamin (cf. the tribal data above). His father Jacob is invited to come to Goshen, where a settlement is provided for the family and their flocks. This is followed many years later by the exodus, the conquest of Palestine, and the burial of Joseph's body in the grave at Shechem which his father had bought.

The history of Joseph in Egypt displays some familiarity with the circumstances and usages of that country; see Driver (Hastings's D.B.) and Cheyne (Ency. Bib., col. 2589 sea..); although Abrech (xli. 43), possibly the Egyptian ib rk (Crum, in Hastings's D.B., i. 665), has been otherwise connected with the Assyrian abarakku (a high officer). An interesting parallel to the story of Joseph in Gen. xxxix. is found in the Egyptian tale of The Two Brothers (Petrie, Eg. Tales, 2nd series, p.36seq., 1895), which

dates from about 1500 B.C., but the differences are not inconsiderable compared with the points of resemblance, and the tale has features which are almost universal (Frazer, Golden Bough, 2nd ed., vol. iii. 351 seq.). On the theory that the historical elements of Joseph's history refer to an official (Yan- hamu) of ths time of Amenophis III. and IV., see Cheyne, op. cit., and Hibbert Journal, October 1903. That the present form of the narrative has been influenced by current mythological lore is not improbable; on this question see (with caution) Winckler, Cesch. Israels, ii. 67-77 (1900) ; A. Jeremias, Alte Test., pp. 383 sqq. (1906). It may be added that the Egyptian names in the story of Joseph are characteristic of the XXII. and subsequent dynasties. See, also Meyer and Luther, Die Israeliten (1906), Index, s.v. (S. A. C.)

JOSEPH, in the New Testament, the husband of Mary, the mother of Jesus. He is represented as a descendant of the house of David, and his genealogy appears in two divergent forms in Matt. i. 1-17 and Luke iii. 23-38. The latter is pro- bably much more complete and accurate in details. The former, obviously artificial in structure (notice 3X14 generations), traces the Davidic descent through kings, and is governed by an apolo- getic purpose. Of Joseph's personal history practically nothing is recorded in the Bible. The facts concerning him common to the two birth-narratives (Matt, i.-ii.; Luke i.ii.) are: (a) that he was a descendant of David, (b) that Mary was already betrothed to him when she was found with child of the Holy Ghost, and © that he lived at Nazareth after the birth of Christ; but these facts are handled differently in each case. It is noticeable that, in Matthew, Joseph is prominent (e.g. he receives an annunciation from an angel), while in Luke's narra tive he is completely subordinated. Bp Gore (The Incarnation, Bampton lecture for 1891, p. 78) points out that Matthew narrates everything from Joseph's side, Luke from Mary's, and infers that the narrative of the former may ultimately be based on Joseph's account, that of the latter, on Mary's. The narratives seem to have been current (in a poetical form) among the early Jewish- Christian community of Palestine. At Nazareth Joseph followed the trade of a carpenter (Matt. xiii. 55). It is probable that he had died before the public ministry of Christ; for no mention is made of him in passages relating to this period where the mother and brethren of Jesus are

1 Joseph's marriage with the daughter of the priest of On might show that the tribes of Ephraim and Manasseh were believed to be half-Egyptian by descent, but it is notoriously difficult to determine how much is of ethnological value and how much belongs to romance (viz. that of the individual Joseph).

II

introduced; and from John xix. 26 it is clear that he was not alive at the time of the Crucifixion.

Joseph was the father of several children (Matt. xiii. 55), but according to ecclesiastical tradition by a former marriage. The reading of Matt. i. 16, in the Sinaitic Palimpsest {Joseph . . . . begat Jesus, who is called the Christ) also makes him the natural father of Jesus, and this was the view of certain early heretical sects, but it seems never to have been held in orthodox Christian circles. According to various apocryphal gospels (conveniently collected in B. H. Cowper's The Apocryphal Gospels, 1881), when married to Mary he was a widower already 80 years of age, and the father of four sons and two daughters; his first wife's name was Salome and she was a connexion of the family of John the Baptist.

In the Roman Catholic Church the 19th of March has since 1642 been a feast in Joseph's honour. Two other festivals in his honour have also been established (the Patronage of St Joseph, 3rd Sunday after Easter, and the Betrothal of Mary and Joseph, 23rd of January). In December 1870 St Joseph was proclaimed Patron of the whole Church. (G. H. Bo.i

JOSEPH OF ARIMATHAEA, 1 in the New Testament, a wealthy Jew who had been converted by Jesus Christ. He is men- tioned by the Four Evangelists, who are in substantial agreement concerning him: after the Crucifixion he went to Pilate and asked for the body of Jesus, subsequently prepared it for burial and laid it in a tomb. There are, however, minor differences in the accounts, which have given rise to controversy. Matthew (xxvii. 60) says that the tomb was Joseph's own; Mark (xv. 43 seq.), Luke (xxiii. 50 seq.) say nothing of this, while John (xix. 41) simply says that the body was laid in a sepulchre " nigh at hand." Both Mark and Luke say that Joseph was a " council- lor " (eboxwuv fiovhtvrip, Mark xv. 43), and the Gospel of Peter describes him as a " friend of Pilate and of the Lord." This last statement is probably a late invention, and there is considerable difficulty as to " councillor." That Joseph was a member of the Sanhedrin is improbable. Luke indeed, regarding him as such, says that he " had not consented to their counsel and deed," but Mark (xiv. 64) says that all the Sanhedrin " condemned him to be worthy of death." Perhaps the phrase " noble councillor " is intended to imply merely a man of wealth and position. Again Matthew says that Joseph was a disciple, while Mark implies that he was not yet among the definite adherents of Christ, and John describes him as an adherent " secretly for fear of the Jews." Most likely he was a disciple, but belonged only to the wider circle of adherents. The account given in the Fourth Gospel suggests that the writer, faced with these various difficulties, assumed a double tradition: (1) that Joseph of

Arimathaea, a wealthy disciple, buried the body of Christ; (2) that the person in question was Joseph of Arimathaea a " councillor," and solved the problem by substituting Nicode- mus as the councillor; hence he describes both Joseph and Nicodemus (xix. 30) as co-operating in the burial. Some critics (e.g. Strauss, New Life of Jesus, ch. 96) have thrown doubt upon the story, regarding some of the details as invented to suit the prophecy in Isa. liii. 9, " they made his grave with the wicked, and with the rich in his death " (for various translations, see Hastings's Diet. Bible, ii. 778). But in the absence of any reference to this prophecy in the Gospels, this view is uncon- vincing, though the correspondence is remarkable.

The striking character of this single appearance of Joseph of Arimathaea led to the rise of numerous legends. Thus William of Malmesbury says that he was sent to Britain by St Philip, and, having received a small island in Somersetshire, there constructed " with twisted twigs " the first Christian church in Britain — afterwards to become the Abbey of Glastonbury. The legend says that his staff, planted in the ground, became a thorn flowering twice a year (see Glastonbury). This tradition — ■ which is given only as such by Malmesbury himself — is not confirmed, and there is no mention of it in either Gildas or Bede.

1 Generally identified with Ramathaim-Zophim, the city of Elkanah in the hilly district of Ephraim (1 Sam. i. 1), near Diospolis (Lydda). See Euseb., Onomasticon, 225. 12.

Joseph also plays a large part in the various versions of the Legend of the Holy Grail (see Grail, The Holy).

JOSEPH I. (1678-1711), Roman emperor, was the elder son of the emperor Leopold I. and his third wife, Eleanora, countess palatine, daughter of Philip William of Neuburg. Born in Vienna on the 26th of July 1678, he was educated strictly by P?ince Dietrich Otto von Salm, and became a good linguist. In 1687 he received the crown of Hungary, and he was elected king of the Romans in 1690. In 1699 he married Wilhelmina Amalia, daughter of Duke Frederick of Brunswick-Liineburg, by whom he had two daughters. In 1702, on the outbreak of the War of the Spanish Succession, he saw his only military service. He joined the imperial general Louis of Baden in the siege of Landau. It is said that when he was advised not to go into a place of danger he replied that those who were afraid might retire. He succeeded his father as emperor in 1705, and it was his good fortune to govern the Austrian dominions, and to be head of the Empire during the years in which his trusted general Prince Eugene, either acting alone in Italy or with the duke of Marlborough in Germany and Flanders, was beating the armies of Louis XIV. During the whole of his reign Hungary was disturbed by the conflict with Francis Rackoczy II., who eventually

took refuge in France. The emperor did not himself take the field against the rebels, but he is entitled to a large share of the credit for the restoration of his authority. He reversed many of the pedantically authoritative measures of his father, thus, placating all opponents who could be pacified, and he fought stoutly for what he believed to be his rights. Joseph showed himself very independent towards the pope, and hostile to the Jesuits, by whom his father had been much influenced. He had the tastes for art and music which were almost hereditary in his family, and was an active hunter. He began the attempts to settle the question of the Austrian inheritance by a pragmatic sanction, which were continued by his brother Charles VI. Joseph died in Vienna on the'i7th of April 1711, of small-pox.

See F. Krones von Marchland, Grundriss der Oesterreichischen Geschichte (1882); F. Wagner, Historia Josephi Caesaris (1746); J. C. Herchenhahn, Geschichte der Regierung Kaiser Josephs I. (1786-1789) ; C. van Noorden, Europdische Geschichteim l8.Jahrhun- dert (1870-1882).

JOSEPH II. (1741-1790), Roman emperor, eldest son of the empress Maria Theresa and her husband Francis I., was born on the 13th of March 1741, in the first stress of the War of the Austrian Succession. Maria Theresa gave orders that he was only to be taught as if he were amusing himself; the result was that he acquired a habit of crude and superficial study. His real education was given him by the writings of Voltaire and the encyclopaedists, and by the example of Frederick the Great. His useful training was conferred by government officials, who were directed to instruct him in the mechanical details of the administration of the numerous states composing the Austrian dominions and the Empire. In 17 61 he was made a member of the newly constituted council of state (Slaalsrath) and began to draw up minutes, to which he gave the name of " reveries," for his mother to read. These papers contain the germs of his later policy, and of all the disasters which finally overtook him. He was a friend to religious toleration, anxious to reduce the power of the church, to relieve the peasantry of feudal burdens, and to remove restrictions on trade and on knowledge. So far he did not differ from Frederick, Catherine of Russia or his own brother and successor Leopold II., all enlightened rulers of the 18th-century stamp. Where Joseph differed from great con- temporary rulers, and where he was very close akin to the Jacobins, was in the fanatical intensity of his belief in the power of the state when directed by reason, of his right to speak for the state uncontrolled by laws, and of the reasonableness of his own reasons. Also he had inherited from his mother all the belief of the house of Austria in its " august " quality, and its claim to acquire whatever it found desirable for its power or its profit. He was unable to understand that his philosophical plans for the moulding of mankind could meet with pardonable opposition. The overweening character of the man was obvious

to Frederick, who, after their first interview in 1769, described him as ambitious, and as capable of setting the world on fire. The French minister Vergennes, who met Joseph when he was travelling incognito in 1777, judged him to be " ambitious and despotic."

Until the death of his mother in 1 780 Joseph was never quite free to follow his own instincts. After the death of his father in 1765 he became emperor and was made co-regent by his mother in the Austrian dominions. As emperor he had no real power, and his mother was resolved that neither husband nor son should ever deprive her of sovereign control in her hereditary dominions. Joseph, by threatening to resign his place as co-regent, could induce his mother to abate her dislike to religious toleration. He could, and he did, place a great strain on her patience and temper, as in the case of the first partition of Poland and the Bavarian War of 1778, but in the last resort the empress spoke the final word. During these wars Joseph travelled much. He met Frederick the Great privately at Neisse in 1769, and again at Mahrisch-Neustadt in 1770. On the second occasion he was accompanied by Prince Kaunitz, whose conversation with Frederick may be said to mark the starting-point of the first partition of Poland. To this and to every other measure which promised to extend the dominions of his house Joseph gave hearty approval. Thus he was eager to enforce its claim on Bavaria upon the death of the elector Maximilian Joseph in 1777. In April of that year he paid a visit to his sister the queen of France (see Marie Antoinette) , travelling under the name of Count Falkenstein. He was well received, and much flattered by the encyclopaedists, but his observations led him to predict the approaching downfall of the French monarchy, and he was not impressed favourably by the army or navy. In 1778 he commanded the troops collected to oppose Frederick, who supported the rival claimant to Bavaria. Real fighting was averted by the unwillingness of Frederick to embark on a new war and by Maria Theresa's determination to maintain peace. In April 1780 he paid a visit to Catherine of Russia, against the wish of his mother.

The death of Maria Theresa on the 27th of November 1780 left Joseph free. He immediately directed his government on a new course, full speed ahead. He proceeded to attempt to realize his ideal of a wise despotism acting on a definite system for the good of all. The measures of emancipation of the peasantry which his mother had begun were carried on by him with feverish activity. The spread of education, the seculariza- tion of church lands, the reduction of the religious orders and the clergy in general to complete submission to the lay state, the promotion of unity by

the compulsory use of the German language, everything which from the point of view of 18th- century philosophy appeared " reasonable " was undertaken at once. He strove for administrative unity with characteristic haste to reach results without preparation. His anti-clerical innovations induced Pope Pius VI. to pay him a visit in July 1782. Joseph received the pope politely, and showed himself a good Catholic, but refused to be influenced. So many inter- ferences with old customs began to produce unrest in all parts of his dominions. Meanwhile he threw himself into a succession of foreign policies all aimed at aggrandisement, and all equally calculated to offend his neighbours — all taken up with zeal, and dropped in discouragement. He endeavoured to get rid of the Barrier Treaty, which debarred his Flemish subjects from the navigation of the Scheldt; when he was opposed by France he turned to other schemes of alliance with Russia for the partition of Turkey and Venice. They also had to be given up in the face of the opposition of neighbours, and in particular of France. Then he resumed his attempts to obtain Bavaria — this time by exchanging it for Belgium — and only provoked the formation of the Fiirstenbund organized by the king of Prussia. Finally he joined Russia in an attempt to pillage Turkey. It began on his part by an unsuccessful and discreditable attempt to surprise Belgrade in time of peace, and was followed by the ill-managed campaign of 1788. He accompanied his army, but showed no capacity for war. In November he returned to

Vienna with ruined health, and during 1789 was a dying man. The concentration of his troops in the east gave the malcontents of Belgium an opportunity to revolt. In Hungary the nobles were all but in open rebellion, and in his other states there were peasant risings, and a revival of particularist sentiments. Joseph was left entirely alone. His minister Kaunitz refused to visit his sick-room, and did not see him for two years. His brother Leopold remained at Florence. At last Joseph, worn out and broken-hearted, recognized that his servants could not, or would not, carry out his plans. On the 30th of January 1790 he formally withdrew all his reforms, and he died on the 20th of February.

Joseph II. was twice married, first to Isabella, daughter of Philip, duke of Parma, to whom he was attached. After her death on the 27th of November 1763, a political marriage was arranged with Josepha (d. 1767), daughter of Charles Albert, elector of Bavaria (the emperor Charles VII.). It proved extremely unhappy. Joseph left no children, and was succeeded by his brother Leopold II.

Many volumes of the emperor's correspondence have been pub- lished. Among them are Maria Theresia und Joseph II. Ihre Korrespondenz samt Briefen Josephs an seinen Bruder Leopold (1867-1868); Joseph II. und Leopold von Toskana. Ihr Briefwechsel 1781-1790 (1872); Joseph II. und

Katharina von Russland. Ihr Briefwechsel (1869) ; and Maria Antoinette, Joseph II. und Leopold II. Ihr Briefwechsel (1866); all edited by A. Ritter von Arneth. Other collections are: Joseph II., Leopold II. und Kaunitz. Ihr Briefwechsel, edited by A. Beer (1873) '< Correspondances intimes de I'empereuf Joseph II. avec son ami, le comte de Cobenzl et son premier ministre, le prince de Kaunitz, edited by S. Brunner (1871) ; Joseph II. und Graf Ludwig Cobenzl. Ihr Briefwechsel, edited by A. Beer and J. von Fiedler (1901); and the Geheime Korrespondenz Josephs II. mit seinem Minister in den Oesterreichischen Niederlanden, Ferdinand Graf Trauttmannsdorff 1787-1789, edited by H. Schlatter (1902). Among the lives of Joseph may be mentioned: A. J. Gross-Hoffinger, Geschichte Josephs II. (1847) ; C. Paganel, Histoire de Joseph II. (1843; German translation by F. Kohler, 1844); H. Meynert, Kaiser Joseph II. (1862); A. Beer, Joseph II. (1882); A. Jager, Kaiser Joseph II. und Leopold II. (1867); A. Fournier, Joseph II. (1885); and J. Wendrinski, Kaiser Joseph II. (1880). There is a useful small volume on the emperor by J. Franck Bright (1897). Other books which may be consulted are : G. Wolf, Das Unterrichtswesen in Oesterreich unter Joseph II. (1880), and Oesterreich und Preussen 1780-1790 (1880), A. Wolf andH. vonZwiedeneck-Sildenhorst, Oester- reich unter Maria Theresia, Joseph II. und Leopold II. (1882-1884) ; H. Schlitter, Die Regierung Josephs II. in den Oesterreichischen Niederlanden (1900) ; and Pius VI. und Joseph II. 1782-1784 (1894) ; O. Lorenz, Joseph II. und die Belgische Revolution (1862); and L. Delplace, Joseph II. et la revolution brabanconne (1890).

JOSEPH, FATHER (Francois Leclerc du Tremblay) (1577-1638), French Capuchin monk, the confidant of Richelieu, was the eldest son of Jean Leclerc du Tremblay, president of the chamber of requests of the parlement of Paris, and of Marie Motier de Lafayette, As a boy he received a careful classical training, and in 1595 made an extended journey through Italy, returning to take up the career of arms. He served at the siege of Amiens in 1597, and then accompanied a special embassy to London. In 1599 Baron de Mafflier, by which name he was known at court, renounced the world and entered the Capuchin monastery of Orleans. He embraced the religious life with great ardour, and became a notable preacher and reformer. In 1606 he aided Antoinette d'Orleans, a nun of Fontevrault, to found the reformed order of the Filles du Calvaire, and wrote a manual of devotion for the nuns. His proselytizing zeal led him to send missionaries throughout the Huguenot centres — he. had become provincial of Touraine in 1613. He entered politics at the conferences of Loudun, when, as the confidant of the queen and the papal envoy, he opposed the Gallican claims advanced by the parlement, which the princes were upholding, and suc- ceeded in convincing them of the schismatic tendency of Galli- canism. In 161 2 he began those personal relations with Richelieu which have indissolubly

joined in history and legend the cardinal and the " Eminence grise," relations which research has not altogether made clear. In 1627 the monk assisted at the siege of La Rochelle. A purely religious reason also made him Richelieu's ally against the Habsburgs. He had a dream of arousing Europe to another crusade against the Turks, and

believed that the house of Austria was the obstacle to that universal European peace which would make this possible. As Richelieu's agent, therefore, this modern Peter the Hermit manceuvred at the diet of Regensburg (1630) to thwart the aggres- sion of the emperor, and then advised the intervention of Gustavus Adolphus, reconciling himself to the use of Protestant armies by the theory that one poison would counteract another. Thus the monk became a war minister, and, though maintaining a personal austerity of life, gave himself up to diplomacy and politics. He died in 1638, just as the cardinalate was to be conferred upon him. The story that Richelieu visited him when on his deathbed and roused the dying man by the words, " Courage, Father Joseph, we have won Breisach," is apocryphal.

See Fagniez, Le Plre Joseph et Richelieu (1894), a work based largely on original and unpublished sources. Father Joseph, according to this biography, would seem not to have lectured Richelieu in the fashion of the legends, whatever his moral influence may have been in strengthening Richelieu's hands.

JOSEPHINE (Marie Rose Josephine Tascher de la Pagerie) (1763-1814), empress of the French, was born in the island of Martinique on the 23rd of June 1763, being the eldest of three daughters of Joseph Tascher de la Pagerie, lieutenant of artillery. Her beauty and grace, though of a languid Creole style, won the affections of the young officer the vicomte de Beauharnais, and, after some family complications, she was married to him. Their married life was not wholly happy, the frivolity of Josephine occasioning her husband anxiety and jealousy. Two children, Eugene and Hortense, were the fruit of the union. During Josephine's second residence in Martinique, whither she proceeded to tend her mother, occurred the first troubles with the slaves, which resulted from the precipitate action of the constituent assembly in emancipat- ing them. She returned to her husband, who at that time entered into political life at Paris. Her beauty and vivacity won her many admirers in the salons of the capital. As the Revolution ran its course her husband, as an ex-noble, incurred the suspicion and hostility of the Jacobins; and his ill-success at the head of a French army on the

Rhine led to his arrest and execution. Thereafter Josephine was in a position of much perplexity and some hardship, but the friendship of Barras and of Madame Tallien, to both of whom she was then much attached, brought her into notice, and she was one of the queens of Parisian society in the year 1795, when Napoleon Bonaparte's services to the French convention in scattering the malcontents of the capital (13 Vendemiaire, or October 5, 1795) brought him to the front. There is a story that she became known to Napoleon through a visit paid to him by .her son Eugene in order to beg his help in procuring the restoration of his father's sword, but it rests on slender foundations. In any case, it is certain that Bonaparte, however he came to know her, was speedily captivated by her charms. She, on her side, felt very little affection for the thin, impecunious and irrepressible suitor; but by degrees she came to acquiesce in the thought of marriage, her hesitations, it is said, being removed by the influence of Barras and by the nomination of Bonaparte to the command of the army of Italy. The civil marriage took place on the 9th of March 1796, two days before the bridegroom set out for his command. He failed to induce her to go with him to Nice and Italy.

Bonaparte's letters to Josephine during the campaign reveal the ardour of his love, while she rarely answered them. As he came to realize her shallowness and frivolity his passion cooled; but at the time when he resided at Montebello (near Milan) in 1797 he still showed great regard for her. During his absence in Egypt in 1 798-1 799, her relations to an officer, M. Charles, were most compromising; and Bonaparte on his return thought of divorcing her. Her tears and the entreaties of Eugene and Hortense availed to bring about a reconciliation; and during the period of the consulate (1 799-1 804) their relations were on the whole happy, though Napoleon's conduct now gave his consort grave cause for concern. His brothers and sisters more than once begged him to divorce Josephine, and it is known that,

from the time when he became first consul for life (August 1802) with large powers over the choice of a successor, he kept open the alternative of a divorce. Josephine's anxieties increased on the proclamation of the Empire (May 18, 1804); and on the 1st of December 1804, the eve of the coronation at Notre Dame, she gained her wish that she should be married anew to Napoleon with religious rites. Despite her care, the emperor procured the omission of one formality, the presence of the parish priest; but at the coronation scene Josephine appeared radiant with triumph over her envious relatives. The august marriages contracted by her children Eugene and Hortense seemed to establish her position; but her ceaseless extravagance and, above all, the impossibility that she should bear a son strained the relations between Napoleon and Josephine. She complained of his infidelities and growing callousness. The end came in sight after the

campaign of 1809, when Napoleon caused the announcement to be made to her that reasons of state compelled him to divorce her. Despite all her pleadings he held to his resolve. The most was made of the slight technical irregularity at the marriage ceremony of the 1st of December 1804; and the marriage was declared null and void.

At her private retreat, La Malmaison, near Paris, which she had beautified with curios and rare plants and flowers, Josephine closed her life in dignified retirement. Napoleon more than once came to consult her upon matters in which he valued her tact and good sense. Her health declined early in 1814, and after his first abdication (April n, 1814) it was clear that her end was not far off. The emperor Alexander of Russia and Frederick William III. of Prussia, then in Paris, requested an interview with her. She died on the 24th of May 1814. Her friends, Mme de Remusat and others, pointed out that Napoleon's good fortune deserted him after the divorce; and it is certain that the Austrian marriage clogged him in several ways. Josephine's influence was used on behalf of peace and moderation both in internal and in foreign affairs. Thus she begged Napoleon not to execute the due d'Enghien and not to embroil himself in Spanish affairs in 1868.

See M. A. Le Normand, Mimoires historigues et secrets de Josephine (2 vols., 1820) ; Lettres de Napoleon d. Josephine (1833); J. A. Aubenas, Hist, de Vimperatrice Josephine (2 vols., 1858-1859); J. Turquan, L' Imperatrice Josephine (2 vols., 1895-1896) ; F. Masson, Josephine (3 vols., 1899-1902); Napoleon's Letters to Josephine (1796-1812), translated and edited by H. F. Hall (1903). Also the Memoirs of Mme. de Remusat and of Bausset, and P. W. Sergeant, The Empress Josephine (1908). (J. Hl. R.)

JOSEPHUS, FLAVIUS (c. 37-c. 95?), Jewish historian and military commander, was born in the first year of Caligula (37-38). His father belonged to one of the noblest priestly families, and through his mother he claimed descent from the Asmonaean high priest Jonathan. A precocious student of the Law, he made trial of the three sects of Judaism — Pharisees, Sadducees and Essenes — before he reached the age of nineteen. Then, having spent three years in the desert with the hermit Banus, who was presumably an Essene, he became a Pharisee. In 64 he went to Rome to intercede on behalf of some priests, his friends, whom the procurator Felix had sent to render account to Caesar for some insignificant offence. Making friends with Alityrus, a Jewish actor, who was a favourite of Nero, Josephus obtained an introduction to the empress Poppaea and effected his purpose by her help. His visit to Rome enabled him to speak from personal experience of the power of the Empire, when he expostulated with the revolutionary Jews on his return to Palestine. But they refused to listen;

and he, with all the Jews who did not fly the country, was dragged into the great rebellion of 66. In company with two other priests, Josephus was sent to Galilee under orders (he says) to persuade the ill- affected to lay down their arms and return to the Roman allegiance, which the Jewish aristocracy had not yet renounced. Having sent his two companions back to Jerusalem, he organized the forces at his disposal, and made arrangements for the government of his province. His obvious desire to preserve law and order excited the hostility of John of Giscala, who endeavoured vainly to remove him as a traitor to the national

cause by inciting the Galileans to kill him "and by persuading the Sanhedrin at Jerusalem to recall him.

In the spring of 67 the Jewish troops,' whom Josephus had drilled so sedulously, fled before the Roman forces of Vespasian and Titus. He sent to Jerusalem for reinforcements, but none came. With the stragglers who remained, he held a stronghold against the Romans by dint of his native cunning, and finally, when the place was taken, persuaded forty men, who shared his hiding-place, to kill one another in turn rather than commit suicide. They agreed to cast lots, on the understanding that the second should kill the first and so on. Josephus providentially drew the last lot and prevailed upon his destined victim to live. Their companions were all dead in accordance with the compact; but Josephus at any rate survived and surrendered. Being led before Vespasian, he was inspired to prophesy that Vespasian would become emperor. In consequence of the prophecy his life was spared, but he was kept close prisoner for two years. When his prophecy was fulfilled he was liberated, assumed the name of Flavius, the family name of Vespasian, and accom- panied his patron to Alexandria. There he took another wife, as the Jewess allotted him by Vespasian after the fall of Caesarea had forsaken him, and returned to attend Titus and to act as intermediary between him and the Jews who still held Jerusalem. His efforts in this capacity failed; but when the city was stormed (70) Titus granted him whatever boon he might ask. So he secured the lives of some free men who had been taken and (by the gift of Titus) certain sacred books. After this he repaired to Rome and received one of the pensions, which Vespasian (according to Suetonius) was the first to bestow upon Latin and Greek writers. He was also made a Roman citizen and received an estate in Judaea. Thenceforward he devoted himself to literary work under the patronage of Vespasian, Titus and Domitian. As he mentions the death of Agrippa II. it is, probable that he lived into the 2nd century; but the date of Agrippa's death has been challenged and, if his patron Epaphro- ditus may be identified with Nero's freedman, it is possible that Josephus may have been involved in his fall and perished under Domitian in 95.

Works. — 1. The Jewish War (TLepiTov'lov&aUov irokiitov), the oldest of Josephus' extant writings, was written towards the end of Vespa- sian's reign (69-79) The Aramaic original has not been preserved; but the Greek version was prepared by Josephus himself in conjunc- tion with competent Greek scholars. Its purpose in all probability was, in the first instance, to exhibit to the Babylonian Jews the overwhelming power of Rome and so to deter them from repeating the futile revolt of the Jews of Palestine. Of its seven books, the first two survey the history of the Jews from the capture of Jeru- salem by Antiochus Epiphanes to the outbreak of war in 67, and here Josephus relies upon some such general history as that of \icolaus of Damascus. The rest deals with the events of the war (67-73) which fell more or less within his own knowledge. Vespasian, Titus and Agrippa II. testified (he tells us) to his accuracy. Repre- sentatives of the Zealots would probably have protested against his pro- Roman prejudices.

2. The Jewish Antiquities ('lovbainii ' Apxa-iohoyla) covers in twenty books the history of the Jews from the creation of the world to the outbreak of the war with Rome. It was finished in the thirteenth year of Domitian (93). Its purpose was to glorify the Jewish nation in the eyes of the Roman world. In the part covered by the books of the Bible Josephus follows them, and that mainly, if not entirely as they are translated into Greek by the Seventy (the Septuagint version). Being a Pharisee, he sometimes introduces traditions of the Elders, which are either inferences from, or embroideries of, the biblical narrative. Sometimes, also, he gives proof of some knowledge of Hebrew and supplements his scriptural authorities, which include 1 Esdras, from general Greek histories. For the later period he uses the Greek Esther, with its additions, 1 Maccabees, Polybius, Strabo and Nicolaus of Damascus. But towards the end he confesses that he has grown weary of his task, and his history becomes meagre. The work contains accounts of John the Baptist and Jesus, which may account for the fact that Josephus' writings were rescued from oblivion by the Christians. But the description of Jesus as " a wise man, if indeed one should call him a man," can hardly be genuine, and the assertion " this was the Christ " is equally doubtful, unless it be assumed that the Greek word Christos had be- come technical in the sense of false-Christ or false-prophet among non-Christian Jews.

3. Josephus wrote a narrative of his own Life in order to defend himself against the accusation brought by his enemy Justus of Tiberias to the effect that he had really been the cause of the Jewish

rebellion. In his defence Josephus departs from the facts as narrated in the Jewish War and represents himself as a partisan of Rome and, therefore, as

a traitor to his own people from the beginning.

4. The two books Against Apion are a defence or apology directed against current misrepresentations of the Jews. Earlier titles are Concerning the A ntiquity of the Jews or A gainst the Creeks. Apion was the leader of the Alexandrine embassy which opposed Philo and his companions when they appeared in behalf of the Alexandrine Jews before Caligula. The defence which Josephus puts forward has a permanent value and shows him at his best.

The Greek text of Josephus' works has been edited with full collec- tion of different readings by B. Niese (Berlin, 1887-1895). The Teubner text by Naber is based on this. The translation into English of W. Whiston has been (superficially) revised by A. R. Shilleto (1889-1890). Schurer (History of the Jewish People) gives a full bibliography. (J- H. A. H.)

JOSHEKAN, a small province of Persia covering about 1000 sq. m. Pop. about 5000. It has a yearly revenue of about £1200, and is held in fief by the family of Bahram Mirza, Muizz ed Dowleh (d. 1882). Its chief town and the residence of the governor used to be Joshekan-Kali, a large village with fine gardens, formerly famous for its carpets {kali) , but now the chief place is Maimeh, a little city with a population of 2500, situated at an elevation of 6670 ft., about 63 m. from Isfahan in a north- westerly direction and 13 m. south-west of Joshekan-Kali.

JOSHUA, BOOK OF, the sixth book of the Old Testament, and the first of the group known as the " Former Prophets." It takes its name from Joshua 1 the son of Nun, an Ephraimite who, on the death of Moses, assumed the leadership to which he had previously been designated by his chief (Deut. xxxi. 14 seq., 23), and proceeded to the conquest of the land of Canaan. The book differs from the Pentateuch or Torah in the absence of legal matter, and in its intimate connexion with the narrative in the books which follow. It is, however, the proper sequel to the origins of the people as related in Genesis, to the exodus of the Israelite tribes from Egypt, and their journeyings in the wilderness. On these and also on literary grounds it is often convenient to class the first six books of the Bible as a unit under the term " Hexateuch." For an exhaustive detailed study has revealed many signs of diversity of authorship which combine to show that the book is due to the incorporation of older material in two main redactions; one deeply imbued with the language and thought of Deuteronomy itself (D), the other of the post-exilic priestly circle (P) which gave the Pentateuch its present form. That the older sources (which often prove to be composite) are actually identical with the Yahwist or Judaean (J) and the Elohist or Ephraimite (E) narratives (on which see Genesis) is not improbable, though, especially as regards the former, still very uncertain. In general the

literary problems are exceedingly intricate, and no attempt can be made here to deal with them as fully as they deserve.

The Invasion. — The book falls naturally into two main parts, of which the first, the crossing of the Jordan and the conquest of Palestine (i.-xii.) is mainly due to Deuteronomic compilers. It opens with the preparations for the crossing of the Jordan and the capture of the powerful city Jericho. Ai, near Bethel, is taken after a temporary repulse, and Joshua proceeds to erect an altar upon Mt Ebal (north of Shechem). For the fullness with which the events are recorded the writers were probably indebted to local stories.

The Israelites are at Abel-Shittim (already reached in Num. xxv. 1). Moses is dead, and Joshua enters upon his task with the help of the Transjordanic tribes who have already received their territory (i). The narrative is of the later prophetic stamp (D; cf. Deut. iii. 18-22, xi. 24, where Moses is the speaker; xxxi. 1-8), but may be based upon an earlier and shorter record (E; vv. I seq., 10, 11a).

1 Heb. Jehoshua; later Jeshua; Gr. 'Itjo-oDs, whence "Jesus" in the A.V. of Heb. iv. 8; another form of the name is Hoshea (Num. xiii. 8, 16). The name may mean " Yah(weh) is wealth, or is (our) war-cry, or saves." The only extra-biblical notice of Joshua is the inscription of more than doubtful genuineness given by Procopius (Vand. ii. 20), and mentioned also by Moses of Chorene (Hist. Arm. i. 18). It is said to have stood at Tingis in Mauretania, and to have borne that those who erected it had fled before 'I^aoOs 6 \i\arijs. For the medieval Samaritan Book of Joshua, see T. Juynboll, Chronicum Samaritanum (1846); J. A. Montgomery, The Samaritans (1907), pp. 301 sqq.

Of the mission of the spies to Jericho, two versions were current (duplicates ii. 3, 12, 18; v. 15 seq. breaks the connexion between vv. 13 and 18, but is resumed in vv. 22-24) '< D's addition is to be recog- nized in ii. 96-1 1. The incident occupies at least four days, but the main narrative reckons three days between i. 11 and iii. 2. Next follow the passage of the Jordan (commemorated by the erection of twelve stones), the encampment at Gilgal, and the observance of the rite of circumcision and of the passover (iii.— v.)- The complicated narrative in iii.-iv. is of composite origin (contrast iii. 17 with iv. 10 seq., 19; iv. 3, 8 with vv. 9, 20; and cf. iii. 12 with the superfluous iv. 2, &c). As in ii., D has amplified (iii. 46, 7, 106, iv. 9-100, 12, 14; more prominently in iv. 21-v. 1, v. 4-8), and

subsequently P (or a hand akin to P) has worked over the whole (iii. 4, note the number and the prohibition, cf. Num. i. 51 ; iii. 8, 15 seq. ; iv. 13, 19 ; v. 10-12). Circumcision, already familiar from Exod. iv. 26, Deut. x. 16, is here regarded as a new rite (v. 2, 9, supplemented by vv. 1, 4-8), but the conflicting views have been harmonized by the words ' ' the second time " (v. 2). Gilgal is thus named from the " rolling away " of the "reproach of Egypt" (v. 9), but iv. 20 suggests a different origin, viz. the sacred stone-circle (cf. Judges iii. 19, R.V. marg.). An older account of the divine commission to Joshua appears in the archaic passage v. 13-15 (cf. Moses in Exod. iii.). Fusion of sources is obvious in the story of the fall of Jericho (contrast vi. 5 and v. 10, vv. 21 and 24, vv. 22 and 25) ; according to one (E ?) the people march seven times round the city on one day, the ark and the priests occupying a prominent position (vi. 4-6, 76-9, 12 seq., 16a, 20 [part], 22-24) ; but in the other they march every day for seven days. Both here and in the preceding chapters the Septuagint has several variations and omissions, due either to an (unsuccessful) attempt to simplify the present difficulties, or to the use of another recension. The curse pronounced by Joshua upon the- destroyed city of Jericho (vi. 26) should be associated with an incident in the reign of Ahab which is acquainted with the story (1 Kings xvi. 34) ; the city, how- ever, reappears in Joshua xviii. 21 ; 2 Sam. x. 5. Achan's sacrilege, the cause of the repulse at Ai and of the naming of the valley of Achor (vii.), is introduced by vi. 18 seq., 246, and, as its spirit shows, is of relatively later date. It contains some probable traces of D (in vii. 5, 7, 11 seq., 15,25) and P (in vv. I, 18, 24 seq.). The capture of Ai has marks of the same dual origin as the preceding chapters (cf. viii. 3a with 10, and contrast viii. 3-9 with v. 12; vv. 5-7 with 18, 26; v. 19 with 28). The general resemblance between chs. vii.-viii. and the war with Benjamin (Judges xx.) should be noticed.

Conquests in Palestine. — The erection of the altar, not at the scene of battle (cf. 1 Sam. xiv. 35) but on Mt Ebal (viii. 30-35, D), presupposes the conquest of central Palestine and the removal of the ark from Gilgal. These, however, are not narrated, and, unless some account of them has been replaced by the present passage, this portion of the conquest was ignored. Possibly the passage is not in its original position: in the Septuagint it appears after ix. 2, while Josephus (Ant. v. 1, 19) and the Samaritan book of Joshua read it before ch. xiii.; Dillmann, however, would place it after xi. 23. The capture of Jericho and Ai is followed by the successful stratagem of the Gibeonites to make peace with Israel (ix.). This involves them in a war with the southern Canaanites; Joshua intervenes and obtains a crowning victory (x.). The camp is still at Gilgal. A similar conquest of the northern Canaanites follows (xi.), and the first part of the book concludes with a summary of the results of the Israelite invasion (xii.).

No satisfactory explanation of viii. 30-35 has been found, yet ix. I seq.

seems to show that it was the prelude to the Canaanite wars. In contrast to the absence of any reference to the occupation of central Palestine, the conquest of the south was current in several divergent traditions. Two records are blended in ix. ; one narrates the covenant with the Gibeonites, the other that with the Hivites (properly Hivvites) ; and in the latter Joshua has no place (vv. 4 seq., 6b, 7, 11-14, &c). The former has additions by D (vv. 96, 10, 24 seq.) and by P (v. 15 last clause, 17-21); the latter, in accordance with the legislation of its day (posterior to Ezek. xliv. 6 sqq.), does not allow the Gibeonites to minister to the temple or altar, but merely to the " congregation," a characteristic post-exilic term (contrast vv. 21 and 23; and on 27 see Sept. and commentaries). The story of the covenant conflicts with the notice that Gibeon was still an independent Canaanite city in David's time (2 Sam. xxi. 2). The defeat of the southern coalition is based, as the doublets show, upon two sources; the war arises from two causes (vengeance upon the Gibeonites, and the attempt to overthrow Israel), and concludes with a twofold victory: in x. 16-24 the kings are pursued to Makkedah and slain, in v. 11 they are smitten by a great hailstorm in their flight to Azekah (cf. 1 Sam. vii. 10, xiv. 15, in the same district). Redactional links have been added, apparently by D, to whom is possibly due the stanza quoted from the book of Jashar (v. 12 seq.), a poetical address to the sun and moon, of the nature of a prayer or spell for their aid (cf. Judges v. 20, and see Ecclus. xlvi. 4). The

literal interpretation of this picturesque quotation has been influenced by the prosaic comments at the end of v. 13 and beginning of v. 14. Verse 15, which closes the account, anticipates v. 43; the Septuagint omits both. The generalizing narrative (x. 28-43), which is due to D in its present form, is partly based upon old matter (e.g. the capture of Makkedah), but is inconsistent with what precedes (v. 37, see v. 23 sqq.) and follows (capture of Debir, v. 38 seq., see xv. 1 5 ; Judges i. 11). The description of the conquest of the northern Canaanites is very similar to that of the south. The main part is from an older source (xi. 1, 4-9; see Deborah), the amplifications (v. 2 seq.) are due to D, as also are the summary (vv. 10-23, cf. style of x. 28-43), ar, d the enumeration of the total results of the invasion (xii.), which includes names not previously mentioned.

Division of the Land. — The result of the events narrated in the first part of the book is to ascribe the entire subjugation of Canaan to Joshua, whose centre was at Gilgal (x. 15, 43). He is now " old and advanced in years, " and although much outlying land remained to be possessed, he is instructed to divide the con- quered districts among the western tribes (xiii. 1 sqq.). This is detailed at length in the second part of the book. With the completion of the division his mission is accomplished. The main body of this part (xiii. 15-xiv. 5; xv.-xvii.; xviii. 11-xxi. 42; xxii. 7-34) is in its present form almost entirely due to P.

In regard to details, xiii. 2-6 (now D) expresses the view that the conquest was incomplete, and numbers districts chiefly in the south-west and in the Lebanon. Two sources deal with the inherit- ance of the east Jordan tribes in terms which are — (a) general (xiii. 8-12, D), and (b) precise (vv. 15-32, P). The latter stands between the duplicate passages xiii. 14 and 32 seq. (see the Sept.). With the interest taken in these tribes, cf. for (a) i. 12-18; Deut. iii. 12-22, and the sequel in Joshua xxii. 1-6 ; and for (b) xxii. 9 seq. ; Num. xxxii. P's account of the division opens with an introductory notice of the manner in which Eleazar the priest and Joshua (note the order) prepare to complete the work which Moses had begun (xiv. 1-5). It opens with Judah, its borders (xv. 1-12) and cities (vv. 20-62), and continues with the two Joseph tribes, Ephraim (xvi. 4-9, contrast details in vv. 1-3) and Manasseh (xvii. 1-10, cf. Num. xxvi. 30-32, xxvii. i-ii ; P). There is now a break in the narrative (xviii. 2-10, source uncertain) ; seven tribes have not yet received an inheritance, and Joshua (alone) encourages them to send three men from each tribe to walk through the land — excluding the terri- tory of Judah and Joseph — and to bring a description of it to him, after which he divides it among them by lot. P l now resumes with an account of the borders and cities of Benjamin (xviii. 11-28), Simeon, Zebulun, Issachar, Asher, Naphtali and Dan (xix. ; on v. 47, see below); and, after the subscription (xix. 51), concludes with the institution of the cities of refuge (xx., cf. Num. xxxv.), and of the Levitical cities (xxi., contrast the earlier brief notice, xiii. 14, 33). Chapter xx., belonging to the Predaction, has certain points of contact with Deut. xix. which, it is very important to observe, are wanting in the Septuagint; and xxi. 43-45 closes D's account of the division, and in the Septuagint contains matter most of which is now given by P in xix. 49 seq. Two narratives describe the dismissal of the trans- Jordanic tribes after their co-operation in the conquest, viz. xxii. 1-6 (D), and xxii. 9 seq. (P) ; cf. above, on xiii. 8 seq. P, with the descrip- tion of the erection of the altar (11. 34, Gilead ? ; cf. Gen. xxxi. 47 seq.), is apparently a late re- writing of some now obscure incident to emphasize the unity of worship. P's account of the distribution of land among the nine and a half tribes by Eleazar and Joshua (from xiv. 1-5 to xix. 51) appears to have been on the lines laid down in Num. xxxiv. (P). The scene, according to xviii. 1, is Shiloh, and this verse, which does not belong to the context, should apparently precede P's narrative in xiv. 1. But of the occupation of Shiloh, the famous Ephraimite sanctuary and the seat of the ark, we have no information. The older source, however, presupposes that Judah and the two Joseph tribes have acquired their territory; the remaining seven are blamed for their indifference (xviii. 2-10, see above), and receive their lot conjointly at the camp at Shiloh. But if the location is an attempt to harmonize with xviii. I, Gilgal should probably be restored. The section xviii. 2-10 is followed by xxi. 43 seq. (above), and may have been

preceded originally by xiii. I ,_ 7 (where read : inheritance for the seven tribes) ; in its present form it appears to be due to D. Another account of the exploits of Judah and Joseph can be traced here and there; e.g. in xiv. 6-15 (where Caleb receives Hebron as his inheritance and the " land had rest from war"), and xvii. 14-18 (where Joseph receives an additional lot) ; but where these traditions have not been worked into later narratives, they exist only in fragmentary form and are chiefly recognizable by their standpoint. They are characterized by the view that the conquest was only a partial one, and one which was neither the work of a single man nor at his instigation, but due

1 Traces of composite material may be recognized — (a) where, in place of boundaries, P has given lists of cities which appear to be taken from other sources (cf. the instructions in xviii. 9), and (b) in the double headings (see Addis, The Hexateuch, i. 230, note 1 , and the commentaries).

entirely to individual or tribal achievements. This view can be traced in xiii. 13, xv. 63 (cf. the parallel Judges i. 21 in contrast to v. 8), xvi. 10 (Judges i. 29), xvii. 11-13 (Judges i. 27 seq.), and in the references to separate tribal or family exploits: xv. 13-19, xix. 47 (cf. Judges i. 34 seq., xviii.).

Two closing addresses are ascribed to Joshua, one an exhorta- tion similar to the homilies in secondary portions of Deuteronomy (xxiii.; cf. Moses in Deut. xxviii. seq., and Samuel's last address in 1 Sam. xii.), which virtually excludes the other (xxiv.), where Joshua assembles the tribes at Shechem (Shiloh, in the Septua- gint) and passes under review the history of Israel from the days of heathenism (before Abraham was brought into Canaan) down through the oppression in Egypt, the exodus, the conquest in East Jordan and the occupation of Canaan. A few otherwise unknown details are to be found (xxiv. 2, 11 seq. 14). The address (which is extremely important for its representation of the religious conditions) is made the occasion for a solemn covenant whereby the people agree to cleave to Yahweh alone. This is commemorated by the erection of a stone under the oak by the sanctuary of Yahweh (for the tree with its sacred pillar, see Gen. xxxv. 4; Judges ix. 6). The people are then dismissed, and the book closes in ordinary narrative style with the death of Joshua and his burial in his inheritance at Timnath-serah in Mt Ephraim (cf. xix. 49 seq.); the burial of Joseph in Shechem; and the death and burial of Eleazar the son of Aaron in the " hill of Phinehas."

Chapter xxiv. presupposes the complete subjection of the Canaan- ites and is of a late prophetic stamp. Some signs of amplification (e.g. vv. lib, 13,

31) suggest that it was inserted by a Deuteronomic hand, evidently distinct from the author of xxiii. But elsewhere there are traces of secondary Deuteronomic expansion and of internal incongruities in Deuteronomic narratives; contrast xiv. 6-15 with Joshua's extermination of the " Anakim " in xi. 21 seq.; the use of this name with the " Philistines " of xiii. 2 (see Philistines), or the conquests in xi. 16-22 with the names in x. 36-43. All these passages are now due to D ; but not only is Deuteronomy itself composite, a twofold redaction can be traced in Judges, Samuel and Kings, thus involving the deeper literary problems of Joshua with the historical books generally. 1 Both Joshua xxiii. and xxiv. are closely connected with the very complicated introduction to the era of the " judges " in Judges ii. 6 sqq., and ii. 6-9 actually resume Joshua xxiv. 28 sqq., while the Septuagint appends to the close of Joshua the beginning of the story of Ehud (Judges iii. 12 seq.). Both Judges i.-ii-5 and chap, xvii.-xxi. areof post-Deuteronomic insertion, and they represent conditions analogous to the older notices imbedded in the later work of P (Judges i. 21, xix. 10-12, cf. Joshua xv. 63; see Judges ad fin.). Moreover, P in its turn shows elsewhere definite indications of different periods and standpoints, and the fluid state of the book at a late age is shown by the presence of Deutero- nomic elements in Joshua xx., not found in the Septuagint, and by the numerous and often striking readings which the latter recension presents.

Value of the Book. — The value of the book of Joshua is primarily religious; its fervency, its conviction of the destiny of Israel and its inculcation of the unity and greatness of the God of Israel give expression to the philosophy of Israelite historians. As an historical record its value must depend upon a careful criticism of its contents in the light of biblical history and external information. Its description of the conquest of Canaan comes from an age when the event was a shadow of the past. It is an ideal view of the manner in which a divinely appointed leader guided a united people into the promised land of their ancestors, and, after a few brief wars of extermination (x.xii.), died leaving the people in quiet possession of their new inherit ance (xi. 23; xxi. 44 seq.; xxiii. i). 2 On the other hand, the earlier inhabitants were not finally subjugated until Solomon's reign (1 Kings ix. 20); Jerusalem was taken by David from the Jebusites (2 Sam. v.); and several sites in its neighbourhood, together with important fortresses like Gezer, Megiddo and Taanach, were not held by Israel at the first. There are traces

1 The close relation between what may be called the Deuteronomic history (Joshua-Kings) and its introduction (the legal book of Deuteronomy) independently show the difficulty of supporting the traditional date ascribed to the latter.

2 G. F. Moore (Ency. Bib., col. 2608, note 2) draws attention to the

instructive parallel furnished by the Greek legends of the Dorian invasion of the Peloponnesus (the " return " of the Heracleidae, the partition of the land by lot, &c).

519

of other conflicting traditions representing independent tribal efforts which were not successful, and the Israelites are even said to live in the midst of Canaanites, intermarrying with them and adopting their cult (Judges i.iii. 6). From a careful consider ation of all the evidence, both internal and external, biblical scholars are now almost unanimous that the more finished picture of the Israelite invasion and settlement cannot be accepted as a historical record for the age. It accords with this that the elaborate tribal-lists and boundaries prove to be of greater value for the geography than for the history of Palestine, and the attempts to use them as evidence for the early history of Israel have involved numerous additional difficulties and confusion. 3

The book of Joshua has ascribed to one man conquests which are not confirmed by subsequent history. The capture of Bethel, implied rather than described in Joshua viii., is elsewhere the work of the Joseph tribes (Judges i. 22 sqq., cf. features in thj conquest of Jericho, Joshua vi. 25). Joshua's victory in north Palestine has its parallel in Judges iv. at another period (see Deborah), and Adoni-zedek of Jerusalem (Joshua x.) can scarcely be severed from the Adoni-bezek taken by the tribes of Judah and Simeon (Judges i. 5-7) . The prominence of Joshua as military and religious leader, and especially his connexion with Shechem and Shiloh, have suggested that he was a hero of the Joseph tribes of central Palestine (viz. Ephraim and Manasseh). Moreover, the traditions in Joshua viii. 30-ix. 2, and Deut. xxvii. 1-8 seem' to place the arrival at Mt Ebal immediately after the crossing of the Jordan. This implies that Israel (like Jacob in Gen. xxxii.) crossed by the Jabbok, and in fact the Wadi Fari'a provides an easy road to Shechem, to the south-east of which lies Juleijil; and while this is the Gilgal of Deut. xi. 30, the battles at Jericho and Ai (Joshua ii. seq.) occur naturally after the encampment at the southern Gilgal (near Jericho) . The alternative view (see especially Stade, Gesch. Isr. 1. 133 sqq.) connects itself partly with the ancestor of all the tribes (Jacob, i.e. Israel), and partly with the eponym of the Joseph tribes whose early days were spent around Shechem, the removal of whose bones from Egypt must have found a prominent place in the traditions of the tribes concerned (Gen. 1. 25; Exod. xiii. 19; Joshua xxiv. 32). According to one view (Stade, Wellhausen, Guthe, &c.) only the Joseph tribes were in Egypt, and separate tribal movements (see Judah) have been incorporated in the growth of the tradition; the probability that the specific tradi- tions of the Joseph tribes have been excised or subordinated finds support in the manner in which the

Judaean P has abridged and confused the tribal lists of Ephraim and Manasseh.

The serious character of the problems of early Israelite history can be perceived from the renewed endeavours to present an adequate outline of the course of events; for a criticism of the most prominent hypotheses see Cheyne, Ency. Bib. art. " Tribes" (col. 5209 seq.); a new theory has been more recently advanced by E. Meyer (Die Israeliten u. ihre Nachbarstamme, 1906). But Joshua as a tribal hero does not belong to the earliest phase in the surviving traditions. He has no place in the oldest surviving narratives of the exodus (Wellhausen, Steuernagel) ; and only later sources add him to Caleb (Num. xiv. 30; the reference in Deut. i. 38 is part of an insertion), or regard him as the leader of all the tribes (Deut. iii. 21, 28). As an attendant of Moses at the tent of meeting he appears in quite secondary passages (Exod. xxxiii. 7-11; Num. xi. 28). His defeat of the Amalekites is in a narrative (Exod. xvii. 8-16) which belongs more

3 The historical problems are noticed in all biblical histories, and in the commentaries on Joshua and Judges. Against the ordinary critical view, see J. Orr, Problem of the O.T. (1905) pp. 240 seq. This writer (on whom see A. S. Peake, The Interpreter, 1908, pp. 252 seq.) takes the book as a whole, allowance being made for " the generalizing tendency peculiar to all summaries." His argument that " the circumstantiality, local knowledge and evidently full recollection of the narratives (in Joshua) give confidence in the truth of their statements " is one which historical criticism in no field would regard as conclusive, and his contention that a redactor would hardly incorporate conflicting traditions in his narrative " if he believed they contradicted it " begs the question and ignores Oriental literature.

naturally to the wilderness of Shur, and it associates him with traditions of a movement direct into south Palestine which finds its counterpart when the clan Caleb (q.v.) is artificially treated as possessing its seats with Joshua's permission. But points of resemblance between Joshua the invader and Saul the founder of the (north) Israelite monarchy gain in weight when the tradi- tions of both recognize the inclusion or possession of Judah, and thus stand upon quite another plane as compared with those of David the founder of the Judaean dynasty. Instead of rejecting the older stories of Joshua's conquests it may be preferable to infer that there were radical divergences in the historical views of the past. Consequently, the parallels between Joshua and Jacob (see Steuernagel's Commentary, p. 150) are more signifi- cant when the occupation of central Palestine, already implied

in the book of Joshua, is viewed in the light of Gen. xlviii. 22, where Jacob as conqueror (cf. the very late form of the tradition in Jubilees xxxiv.) agrees with features in the patriarchal narratives which, in implying a settlement in Palestine, are entirely distinct from those which belong to the descent into Egypt (see especially, Meyer, op. cit. pp. 227 seq., 414 seq., 433; Luther, ib. 108 seq.). The elaborate account of the exodus gives the prevailing views which supersede other traditions of the origin both of the Israelites and of the worship of Yahweh (Gen. iv. 26). Several motives have influenced its growth, 1 and the kernel — the revelation of Yahweh to Moses — has been developed until all the tribes of Israel are included and their history as a people now begins. The old traditions of conquest in central Palestine have similarly been extended, and have been adapted to the now familiar view of Israelite origins. It is this subordination of earlier tradition to other and more predom- inating representations which probably explains the intricacy of a book whose present text may not have been finally fixed until, as Dillmann held, as late as about 200 B.C.

Bibliography. — See the commentaries of Dillmann, Steuernagel Holzinger (German), or the concise edition by H. W. Robinson in the Century Bible; also articles on " Joshua " by G. A. Smith, Hastings's D. B., and G. F. Moore, Ency. Bib.; Kittel in Hist, of the Hebrews, i. 262 sqq. ; W. H. Bennett, in Haupt's Sacred Books of the Old Testament; Carpenter and Harford-Battersby, Comp. of Hexateuch, ch. xvii; S. R. Driver, Lit. of the O. T. (8th ed., 1909). These give further bibliographical information, for which see also the articles on the books of the Pentateuch. (S. A. C.)

JOSHUA THE STYLITE, the reputed author of a chronicle which narrates the history of the war between the Greeks and Persians in 502-506, and which is one of the earliest and best historical documents preserved to us in Syriac. The work owes Its preservation to having been incorporated in the third part of the history of pseudo-Dionysius of Tell-Mahre, and may probably have had a place in the second part of the Ecclesiastical History of John of Asia, from whom (as Nau has shown) pseudo- Dionysius copied all or most of the matter contained in his third part. The chronicle in question is anonymous, and Nau has shown that the note of a copyist, which was thought to assign it to the monk Joshua of Zuknin near Amid, more probably refers to the compiler of the whole work in which it was incor- porated. Anyhow the author was an eyewitness of many of the events which he describes, and must have been living at Edessa during the years when it suffered so severely from the Persian War. His view of events is everywhere characterized by his belief in overruling Providence; and as he eulogizes Flavian II., the Chalcedonian patriarch of Antioch, in warmer terms than those in which he praises his great Monophysite contemporaries, Jacob of Serugh and Philoxenus of Mabbog, he was probably an orthodox Catholic.

The chronicle was first made known by Assemani's abridged Latin version (B. 0. i. 260-283) and was edited in 1876 by the abbe Martin and (with an English translation) by W. Wright in 1 882. After an elaborate dedication to a friend — the " priest and abbot " Ser- gius — a brief recapitulation of events from the death of Julian in 363 and a fuller account of the reigns of the Persian kings Peroz (457-484) and Baliish (484-488), the writer enters upon his main

1 E.g. the vicissitudes of Levitical families, other migrations into Palestine, &c. The story of Joseph has probably been used as a link (see Luther, op. cit. pp. 142 seq.).

theme — the history of the disturbed relations between the Persian and Greek Empires from the beginning of the reign of Kawad I. (489-531), which culminated in the great war of 502-506. From October 494 to the conclusion of peace near the end of 506, the author gives an annalistic account, with careful specification of dates, of the main events in Mesopotamia, the theatre of conflict — such as the siege and capture of Amid by the Persians (502-503), their unsuc- cessful siege of Edessa (503), and the abortive attempt of the Greeks to recover Amid (504-505). The work was probably written a few years after the conclusion of the war. The style is graphic and straightforward, and the author was evidently a man of good education and of a simple, honest mind. (N. M.)

JOSIAH (Heb. yd ' shiyyahu, perhaps " Yah [weh] supports "), in the Bible, the grandson of Manasseh, and king of Judah. He came to the throne at the age of eight, after the murder of his predecessor Amon. The circumstances of his minority are not recorded, nor is anything related of the Scythian inroads which occurred in the latter half of the 7th century B.C., although some passages in the books of Jeremiah and Zephaniah are supposed to refer to the events. The storm which shook the external states was favourable to the peace of Judah; the Assyrian power was practically broken, and that of the Chaldeans had scarcely developed into an aggressive form. Samaria thus lay within the grasp of Josiah, who may have entertained hopes of forming an independent power of his own. Otherwise, it is not clear why we find him opposing himself to the Egyptian king Necho, since the assumption that he fought as an Assyrian vassal scarcely agrees with the profound reforming policy ascribed to him. At all events, at the battle of Megiddo 2 he lost both his kingdom and his life (608 B.C.), and for a few years Judah was in the hands of Egypt (2 Kings xxiii. 29 seq.). The chronicler gives a rather different account of the battle, and his allusion to the dirge uttered by Jeremiah over his death (2 Chroi. xxxv. 20-25; 1 Esd. i. 32) represents the tradition which makes this prophet the author of the book of Lamentations. The reign of Josiah is important for the biblical account of the great religious reforms which

began in his eighteenth year, when he manifested interest in the repair cf the Temple at Jerusalem. In the course of this work the high priest Hilkiah discovered a " law-book " which gave rise to the liveliest concern. The reasons for believing that this roll was substan- tially identical with the book of Deuteronomy were already appreciated by Jerome, Chrysostom, Theodoret and others, 3 and a careful examination shows that the character of the refor- mation which followed agrees in all its essential features with the prescriptions and exhortations of that book. (See Deutero- nomy.) But the detailed records in 2 Kings xxii. seq. are evidently written under the influence of the reforms themselves, and are not contemporary (see Kings, Book or). They are further expanded, to agree with still later ideals, in 2 Chron. xxxiv. seq. The original roll was short enough to be read at least twice in a day (xxii. 8, 10), and hence only some portions of Deuteronomy (or of an allied production) may be intended. Although the character of the reforms throws remarkable light upon the condition of religion in Judah in the time of Josiah, it is to be observed that the writings of the contemporary prophets (Jeremiah, Ezekiel) make it very questionable whether the narratives are thoroughly trustworthy for the history of the king's measures. (See further Jews, § 16.) (S. A. C.)

J6SIKA, MIKLOS [NICHOLAS], Baron (1794-1865), Hun- garian novelist, was born on the 28th of April 1794 at Torda in Transylvania, of aristocratic and wealthy parents. After finish- ing the usual course of legal studies at Kolozsvar (Klausenburg), he in 181 1 entered the army, joining a cavalry regiment, with which he subsequently took part in the Italian campaign. On the battlefield of Mincio (February 8, 1814) he was promoted to the grade of lieutenant. He served in the campaign against Napoleon, and was present at the entry of the Allied Troops into Paris (March 31, 1814). In 1818 Josika resigned his commission, returned to Hungary, and married his first wife

2 Or " Magdolos " (Herod, ii. 159), i.e. some " Migdal " (tower) of Judaea, not the Migdol of Exod. xiv. 2; Jer. xliv. 1.

3 See Zeit. f. Alttest. Wissenschaft (1902), pp. 170 seq., 312 seq.; Journ Bib. Lit. (1903), p. 50.

Elizabeth Kallai. The union proving an unhappy one, J6sika parted from his wife, settled on his estate at Szurdok in Transyl- vania, and devoted himself to agricultural and literary pursuits. Drawn into the sphere of politics, he took part in the memorable Transylvanian diet of 1834. About

this time Josika first began to attract attention as a writer of fiction. In 1836 his Abafi laid the foundation of his literary reputation. This novel gives a vivid picture of Transylvania in the time of Sigismund Batori. Josika was soon afterwards elected member of the Hungarian Academy of Sciences and of the Kisfaludy Society; of the latter he became, in 1 84 1, director, and in 1842 vice-president. In 1847 he appeared at the Transylvanian diet as second deputy for the county of Szolnok, and zealously supported the movement for the union of Transylvania with Hungary proper. In the same year he was converted to Protestantism, was formally divorced from his wife, and married Baroness Julia Podmaniczky, herself a writer of considerable merit, with whom he lived happily until his death. So great was Josika's literary activity that by the time of the revolution (1848) he had already produced about sixty volumes of romances and novels, besides numerous contributions to perio- dicals. Both as magnate of the upper house of the Hungarian diet and by his writings Josika aided the revolutionary move- ment, with which he was soon personally identified, being chosen one of the members of the committee of national defence. Con- sequently, after the capitulation at Vilagos (Aug. 13, 1849) he found it necessary to flee the country, and settled first at Dresden and then, in 1850, at Brussels, where he resumed his literary pursuits anonymously. In 1864 he removed to Dresden, in which city he died on the 27th of February 1865. The romances of Josika, written somewhat after the style of Sir Walter Scott, are chiefly of an historical and social-political character, his materials being drawn almost entirely from the annals of his own country. Among his more important works may be specially mentioned, besides Abafi — The Poet Zrinyi (1843); The Last of the B&toris (1837) ; The Bohemians in Hungary (1839); Esther (1853); Francis Rdkoczy II. (1861); and A Vegvdr iak, a tale of the time of the Transylvanian prince Bethlen Gabor, 1864. Many of Josika's novels have been translated into German.

See K. Moenich and S. Vutkovich, Magyar Irok Nevtdra (1876); M. Jokai, " Josika Miklos Emlekezete," A Kisfaludy-Tdrsasdg Ev- lapjai, Uj folyam, vol. iii. (1869); G. W. Steinacker, Ungarische Lyriker (1874). Cf. also Josika's autobiography — Emlekirat, vol. iv.

(1 86 5).

JOSIPPON, the name usually given to a popular chronicle of Jewish history from Adam to the age of Titus, attributed to an author Josippon or Joseph ben Gorion. 1 The name, though at one time identified with that of the historian Josephus, is perhaps a corruption of Hegesippus, from whom (according to Trieber) the author derived much of his material. The chronicle was probably compiled in Hebrew early in the 10th century, by a Jewish native of south Italy. The first edition was printed in Mantua in

1476. Josippon subsequently appeared in many forms, one of the most popular being in Yiddish (Judaeo- German), with quaint illustrations. Though the chronicle is more legendary than historical, it is not unlikely that some good and even ancient sources were used by the first com- piler, the Josippon known to us having passed through the hands of many interpolators. The book enjoyed much vogue in England. Peter Morvyn in 1558 translated an abbreviated version into English, and edition after edition was called for. Lucien Wolf has shown that the English translations of the Bible aroused so much interest in the Jews that there was a widespread desire to know more about them. This led to the circulation of many editions of Josippon, which thus formed a link in the chain of events which culminated in the readmission of the Jews to England by Cromwell. (I. A.)

JOSS, in the pidgin-English of the Chinese seaports, the name given to idols and deities. It is used adjectivally in regard to

1 A prefect oi Jerusalem of this name is mentioned by Josephus, $ell. Jud. ii. 20 l

many things connected with religious rites, such as " joss-house," a temple; " joss-stick," a stick which when burned gives forth a fragrant odour and is used as incense; " joss-paper," paper cut to resemble money (and sometimes with prayers written upon it) burned in funeral and other ceremonies. " Joss " is not a Chinese word, and is probably a corruption of Port, deos, god, applied by Portuguese navigators in the 16th century to the idols worshipped in the East Indies. The Dutch form is joosge (diminutive otjoos), whence the Javanese dejos, and the English yos, later joss. The word seems to have been carried to China by English seamen from Batavia.

JOST, ISAAK MARKUS (1 793-1 860), Jewish historical writer, was born on the 22nd of February 1793 at Bernburg, and studied at the universities of Gottingen and Berlin. In Berlin he began to teach, and in 1835 received the appointment of upper master in the Jewish commercial school (called the Philanthropin) at Frankfort-on-the-Main. Here he remained until his death, on the 22nd of November i860. The work by which he is chiefly known is Geschichte der Israeliten seit der Zeit der Maccabder, in 9 vols. (1820-1829), which was afterwards supplemented by Neuere Geschichte der Israeliten von 1815-1845 (1846-1847), and Geschichte des Judenthums und seiner Sekten (1857-1859). Healso published an abridgment under the title Allgemeine Geschichte des israelitischen Volkes (1831-1832), and an edition of the Mishna with a German translation and notes (6 vols., 1832-1834). The 1 sraelitische Annalen were edited by him from 1839 to 1841, and he contributed extensively to periodicals.

See Zirndorf, Isaak Markus lost und seine Freunde (Cincinnati,

1886).

JOTUNHEIM, or Jotun Fjelde, a mountainous region of southern Norway, lying between Gudbrandsdal on the east and Jostedalsbrae and the head of the Sogne fjord on the west. Within an area of about 950 sq. m. it contains the highest moun- tain in the Scandinavian Peninsula — Galdhopiggen (8399 ft.) — and several others but little inferior. Such are Glittertincl or Glitretind (8380), and Memurutind (7966), which face Galdhopiggen across the northward-sloping Visdal; Knutshuls- tind (7812) and several other peaks exceeding 7000 ft., to the south, between lakes Gjende and Bygdin, and Skagastolstind (7723) in the west of the region, above the Utladal, the chief summit of the magnificent Horunger. The upper parts of the main valleys are of characteristic form, not ending in lofty mountain-walls but comparatively low and level, and bearing lakes. The name Jotunheim (giants' home) is a modern memorial of the mountain-dwelling giants of Norse fable; the alternative name Jotun Fjelde was the first bestowed on the region, when it was explored in 1820 by the geologist Balthasar Matthias Keilhau (1797-1858). In modern times ;the region has attracted mountaineers and many visitors accustomed to rough lodging and difficult travelling.

JOUBERT, BARTHELEMY CATHERINE (1769-1799), French general, the son of an advocate, was born at Pont de Vaux (Ain) on the 14th of April 1769. In 1784 he ran away from school to enlist in the artillery, but was brought back and sent to study law at Lyons and Dijon. In 1791 he joined the volunteers of the Ain, and was elected by his comrades successively corporal and sergeant. In January 1792 he became sub-lieutenant, and in November lieutenant, having in the meantime made his first campaign with the army of Italy. In 1793 he distinguished himself by the brilliant defence of a redoubt at the Col di Tenda, with only thirty men against a battalion of the enemy. Wounded and made prisoner in this affair, Joubert was released on parole by the Austrian commander-in-chief, Devins, soon afterwards. In 1794 he was again actively engaged, and in 1795 he rendered such conspicuous service as to be made general of brigade. In the campaign of 1796 the young general commanded a brigade under Augereau, and soon attracted the special attention of Bonaparte, who caused him to be made a general of division in December, and repeatedly selected him for the command of important detachments. Thus he was in charge of the retaining force at the battle of Rivoli, and in the campaign of 1799

(invasion of Austria) he commanded the detached left wing of Bonaparte's army in Tirol, and fought his way through the mountains to rejoin his chief in Styria. He subsequently held various commands in Holland, on the Rhine and in Italy, where up to January 1799 he commanded in chief. Resigning the post in consequence of a dispute with the civil authorities, Joubert returned to France and married (June) Mile de Montholon. But he was almost immediately summoned to the field again. He took over the command in Italy from Moreau about the middle of July, but he persuaded his predecessor to remain at the front and was largely guided by his advice. The odds against the French troops in the disastrous campaign of 1799 (see French Revolutionary Wars) were too heavy. Joubert and Moreau were quickly compelled to give battle by their great antagonist Suvorov. The battle of Novi was disastrous to the French arms, not merely because it was a defeat, but above all because Joubert himself was amongst the first to fall (Aug. 15, 1799). Joubert died before it could be shown whether his genius was of the first rank, but he was at any rate marked out as a future great captain by the greatest captain of all ages, and his countrymen intui- tively associated him with Hoche and Marceau as a great leader whose early death disappointed their highest hopes. After the battle his remains were brought to Toulon and buried in Fort La Malgue, and the revolutionary government paid tribute to his memory by a ceremony of public mourning (Sept. 16). A monument to Joubert at Bourg was razed by order of Louis XVIII. , but another memorial was afterwards erected at Pont de Vaux.

See Guilbert, Notice sur la vie de B. C. Joubert; Chevrier, Le General Joubert d'apres sa correspondance (2nd ed. 1884).

JOUBERT, JOSEPH (1754-1824), French moralist, was born at Montignac (Correze) on the 6th of May 1 7 54. After completing his studies at Toulouse he spent some years there as a teacher. His delicate health proved unequal to the task, and after two years spent at home in study Joubert went to Paris at the be- ginning of 1778. He allied himself with the chiefs of the philo- sophic party, especially with Diderot, of whom he was in some sort a disciple, but his closest friendship was with the abbe de Fontanes. In 1790 he was recalled to his native place to act as juge de paix, and carried out the duties of his office with great fidelity. He had made the acquaintance of Mme de Beaumont in a Burgundian cottage where she had taken refuge from the Terror, and it was under her inspiration that Joubert's genius was at its best. The atmosphere of serenity and affection with which she surrounded him seemed necessary to the development of what Sainte-Beuve calls his " esprit aile, ami du ciel et des hauteurs." Her death in 1803 was a great blow to him, and his literary activity, never great, declined from that time. In 1809, at the solicitation of

Joseph de Bonald, he was made an inspector- general of education, and his professional duties practically absorbed his interests during the rest of his life. He died on the 3rd of May 1824. His manuscripts were entrusted by his widow to Chateaubriand, who published a selection of Pensees from them in 1838 for private circulation. A more complete edition was published by Joubert's nephew, Paul de Raynal, under the title Pensees, essais, maximes et correspondance (2 vols. 1842). A selection of letters addressed to Joubert was published in 1883. Joubert constantly strove after perfection, and the small quantity of his work was partly due to his desire to find adequate and luminous expression for his discriminating criticism of literature and morals.

If Joubert's readers in England are not numerous, he is well known at second hand through the sympathetic essay devoted to him in Matthew Arnold's Essays in Criticism (1st series). See Sainte-Beuve, Causeries du lundi, vol. i. ; Portraits litteraires, vol. ii. ; ind a notice by Paul de Raynal, prefixed to the edition of 1842.

JOUBERT, PETRUS JACOBUS (1834-1900), commandant- general of the South African Republic from 1880 to 1900, was born at Cango, in the district of Oudtshoorn, Cape Colony, cm the 20th of January 1834, a descendant of a French Huguenot who fled to South Africa soon after the revocation of the Edict of

Nantes by Louis XIV. Left an orphan at an early age, Joubert migrated to the Transvaal, where he settled in the Wakker- stroom district near Laing's Nek and the north-east angle of Natal. There he not only farmed with great success, but turned his attention to the study of the law. The esteem in which his shrewdness in both farming and legal affairs was held led to his election to the Volksraad as member for Wakkerstroom early in the sixties, Marthinus Pretorius being then in his second term of office as president. In 1870 Joubert was again elected, and the use to which he put his slender stock of legal knowledge secured him the appointment of attorney-general of the republic, while in 1875 he acted as president during the absence of T. F. Burgers in Europe. During the first British annexation of the Transvaal, Joubert earned for himself the reputation of a consistent irrecon- cilable by refusing to hold office under the government, as Paul Kruger and other prominent Boers were doing. Instead of accepting the lucrative post offered him, he took a leading part in creating and directing the agitation which led to the war of 1880-1881, eventually becoming, as commandant-general of the Boer forces, a member of the triumvirate that administered the provisional Boer government set up in December 1880 at Heidelberg. He was in command of the Boer forces at Laing's Nek, Ingogo, and Majuba Hill, subsequently conducting the earlier peace negotiations that led to the conclusion of the Pretoria Convention. In 1883 he was a

candidate for the pre- sidency of the Transvaal, but received only 1171 votes as against 3431 cast for Kruger. In 1893 he again opposed Kruger in the contest for the presidency, standing as the representative of the comparatively progressive section of the Boers, who wished in some measure to redress the grievances of the Uitlander popula- tion which had grown up on the Rand. The poll (though there is good reason for believing that the voting lists had been mani- pulated by Kruger's agents) was declared to have resulted in 791 1 votes being cast for Kruger and 7246 for Joubert. After a protest Joubert acquiesced in Kruger's continued presidency. He stood again in 1898, but the Jameson raid had occurred mean- time and the voting was 12,858 for Kruger and 2001 for Joubert. Joubert's position had then become much weakened by accusa- tions of treachery and of sympathy with the Uitlander agitation. He took little part in the negotiations that culminated in the ultimatum sent to Great Britain by Kruger in 1899, and though he immediately assumed nominal command of the operations on the outbreak of hostilities, he gave up toothers the chief share in the direction of the war, through his inability or neglect to impose upon them his own will. His cautious nature, which had in early life gained him the sobriquet of " Slim Piet," joined to a lack of determination and assertiveness that characterized his whole career, led him to act mainly on the defensive; and the strategically offensive movements of the Boer forces, such as Elandslaagte and Willow Grange, appear to have been neither planned nor executed by him. As the war went on, physical weakness led to Joubert's virtual retirement, and, though two days earlier he was still reported as being in supreme command, he died at Pretoria from peritonitis on the 28th of March 1900. Sir George White, the defender of Ladysmith, summed up Joubert's character when he called him " a soldier and a gentle- man, and a brave and honourable opponent."

JOUFFROY, JEAN (c. 141 2-1473), French prelate and diplo- matist, was born at Luxeuil (Haute-Saone). After entering the Benedictine order and teaching at the university of Paris from 1435 to 1438, he became almoner to Philip the Good, duke of Burgundy, who entrusted him with diplomatic missions in France, Italy, Portugal and Castile. Jouffroy was appointed abbot of Luxeuil (1451?) bishop of Arras (1453), and papal legate (1459). At the French court his diplomatic duties brought him to the notice of the dauphin (afterwards Louis XL). Jouffroy entered Louis's service, and obtained a cardinal's hat (1461), the bishopric of Albi (1462), and the abbacy of St Denis (1464). On several occasions he was sent to Rome to negotiate the abolition of the Pragmatic Sanction and to defend the interests of the Angevins at Naples. Attached by King Louis to the sieur de Beaujeu in the expedition against John V., count

of Armagnac, Jouffroy was accused of taking the town of Lectoure by treachery, and of being a party to the murder of the count of Armagnac (1473). He died at Reuilly the same year.

See C. Fierrille, Le Cardinal Jean Jouffroy el son temps (1412-1473) (Coutances, Paris, 1874).

JOUFFROY, THEODORE SIMON (1796-1842), French philo- sopher, was born at Pontets, near Mouthe, department of Doubs. In his tenth year, his father, a tax-gatherer, sent him to an uncle at Pontarlier, under whom he commenced his classical studies. At Dijon his compositions attracted the attention of an inspector, who had him placed (1814) in the normal school, Paris. He there came under the influence of Victor Cousin, and in 1817 he was appointed assistant professor of philosophy at the normal and Bourbon schools. Three years later, being thrown upon his own resources, he began a course of lectures in his own house, and formed literary connexions with Le Courrier francais, Le Globe, L' Encyclopedic moderne, and La Revue europeenne. The variety of his pursuits at this time carried him over the whole field of ancient and modern literature. But he was chiefly attracted to the philosophical system represented by Reid and Stewart. The application of " common sense " to the problem of substance supplied a more satisfactory analytic for him than the scepticism of Hume which reached him through a study of Kant. He thus threw in his lot with the Scottish philosophy, and his first dissertations are, in their leading position, adapta- tions from Reid's Inquiry. In 1826 he wrote a preface to a translation of the Moral Philosophy of Stewart, demonstrating the possibility of a scientific statement of the laws of conscious- ness; in 1828 he began a translation of the works of Reid, and in his preface estimated the influence of Scottish criticism upon philosophy, giving a biographical account of the movement from Hutcheson onwards. Next year he was returned to parlement by the arrondissement of Pontarlier; but the work of legislation was ill-suited to him. Yet he attended to his duties conscien- tiously, and ultimately broke his health in their discharge. In 1833 he was appointed professor of Greek and Roman philosophy at the college of France and a member of the Academy of Sciences; he then published the Melanges philosophiques (4th ed. 1866; Eng. trans. G. Ripley, Boston, 1835 and 1838), a collection of fugitive papers in criticism and philosophy and history. In them is foreshadowed all that he afterwards worked out in metaphysics, psychology, ethics and aesthetics. He had already demonstrated in his prefaces the possibility of a psychology apart from physiology, of the science of the phenomena of conscious- ness distinct from the perceptions of sense. He now classified the mental faculties, premising that they must not be confounded with capacities or properties of

mind. They were, according to his analysis, personal will, primitive instincts, voluntary move- ment, natural and artificial signs, sensibility and the faculties of intellect ; on this analytic he founded his scheme of the universe. In 1835 he published a Cours de droit naturel (4th ed. 1866), which, for precision of statement and logical coherence, is the most important of his works. From the conception of a universal order in the universe he reasons to a Supreme Being, who has created it and who has conferred upon every man in harmony with it the aim of his existence, leading to his highest good. Good, he says, is the fulfilment of man's destiny, evil the thwart- ing of it. Every man being organized in a particular way has, of necessity, an aim, the fulfilment of which is good; and he has faculties for accomplishing it, directed by reason. The aim is good, however, only when reason guides it for the benefit of the majority, but that is not absolute good. When reason rises to the conception of universal order, when actions are submitted, by the exercise of a sympathy working necessarily and intuitively to the idea of the universal order, the good has been reached, the true good, good in itself, absolute good. But he does not follow his idea into the details of human duty, though he passes in review fatalism, mysticism, pantheism, scepticism, egotism, sentimentalism and rationalism. In 1835 Jouffroy's health failed and he went to Italy, where he continued to translate the

Scottish philosophers. On his return he became librarian to the university, and took the chair of recent philosophy at the faculty of letters. He died in Paris on the 4th of February 1842. After his death were published Nouveaux mtlanges philosophiques (3rd ed. 1872) and Cours d'esthetique (3rd ed. 1875). The former contributed nothing new to the system except a more emphatic statement of the distinction between psychology and physiology. The latter formulated his theory of beauty.

Jouffroy's claim to distinction rests upon his ability as an expositor of other men's ideas. He founded no system; he con- tributed nothing of importance to philosophical science; he initiated nothing which has survived him. But his enthusiasm for mental science, and his command over the language of popular exposition, made him a great international medium for the transfusion of ideas. He stood between Scotland and France and Germany and France; and, though his expositions are vitiated by loose reading of the philosophers he interpreted, he did serviceable, even memorable work.

See L. Levy Bruhl, History of Modern Philos. in France (1899), pp. 349-357; C. J. Tissot, Th. Jouffroy: sa vie et ses ecrits (1876); J. P. Damiron, Essai sur Vhistoire de la philos. en France au xix" siecle (1846).

JOUGS, Juggs, or Joggs (O. Fr. joug, from Lat. jugum, a yoke), an instrument of punishment formerly in use in Scotland, Holland and possibly

other countries. It was an iron collar fastened by a short chain to a wall, often of the parish church, or to a tree. The collar was placed round the offender's neck and fastened by a padlock. The jougs was practically a pillory. It was used for ecclesiastical as well as civil offences. Examples may still be seen in Scotland.

JOULE, JAMES PRESCOTT (1818-1889), English physicist, was born on the 24th of December 1818, at Salford, near Man- chester. Although he received some instruction from John Dalton in chemistry, most of his scientific knowledge was self- taught, and this was especially the case with regard to electricity and electro-magnetism, the subjects in which his earliest researches were carried out. From the first he appreciated the importance of accurate measurement, and all through his life the attainment of exact quantitative data was one of his chief considerations. At the age of nineteen he invented an electro- magnetic engine, and in the course of examining its performance dissatisfaction with vague and arbitrary methods of specifying electrical quantities caused him to adopt a convenient and scientific unit, which he took to be the amount of electricity required to decompose nine grains of water in one hour. In 1840 he was thus enabled to give a quantitative statement of the law according to which heat is produced in a conductor by the passage of an electric current, and in succeeding years he pub- lished a series of valuable researches on the agency of electricity in transformations of energy. One of these contained the first intimation of the achievement with which his name is most widely associated, for it was in a paper read before the British Association at Cork in 1843, and entitled " The Calorific Effects of Magneto-electricity and the Mechanical Value of Heat," that he expressed the conviction that whenever mechanical force is expended an exact equivalent of heat is always obtained. By rotating a small electro-magnet in water, between the poles of another' magnet, and then measuring the heat developed in the water and other parts of the machine, the current induced in the coils, and the energy required to maintain rotation, he calculated that the quantity of heat capable of warming one pound of water one degree F. was equivalent to the mechanical force which could raise 838 lb. through the distance of one foot. At the same time he brought forward another determination based on the heating effects observable when water is forced through capillary tubes; the number obtained in this way was 770. A third method, depending on the observation of the heat evolved by the mechanical compression of air, was employed a year or two later, and yielded the number 798; and a fourth — the well-known frictional one of stirring water with a sort of paddle- wheel — yielded the result 890 (see Brit. Assoc. Report, 1845), though 781 '5 was obtained by subsequent repetitions of the

experiment. In 1849 he presented to the Royal Society a memoir which, together with a history of the subject, contained details of a long series of determinations, the result of which was 772. A good many years later he was entrusted by the com- mittee of the British Association on standards of electric resist- ance with the task of deducing the mechanical equivalent of heat from the thermal effects of electric currents. This inquiry yielded (in 1867) the result 783, and this Joule himself was in- clined to regard as more accurate than his old determination by the frictional method; the latter, however, was repeated with every precaution, and again indicated 772-55 foot-pounds as the quantity of work that must be expended at sea-level in the latitude of Greenwich in order to raise the temperature of one pound of water, weighed in vacuo, from 60° to 6i° F. Ultimately the discrepancy was traced to an error which, not by Joule's fault, vitiated the determination by the electrical method, for it was found that the standard ohm, as actually denned by the British Association committee and as used by him, was slightly smaller than was intended; when the necessary corrections were made the results of the two methods were almost precisely con- gruent, and thus the figure 772-55 was vindicated. In addition, numerous other researches stand to Joule's credit — the work done in compressing gases and the thermal changes they undergo when forced under pressure through small apertures (with Lord Kelvin) , the change of volume on solution, the change of temperature produced by the longitudinal extension and compression of solids, &c. It was during the experiments involved by the first of these inquiries that Joule was incidentally led to appreciate the value of surface condensation in increasing the efficiency of the steam engine. A new form of condenser was tested on the small engine employed, and the results it yielded formed the starting-point ot a series of investigations which were aided by a special grant from the Royal Society, and were described in an elaborate memoir presented to it on the 13th of December i860. His results, according to Kelvin, led directly and speedily to the present practical method of surface-condensation, one of the most important improvements of the steam engine, especially for marine use, since the days of James Watt. Joule died at Sale on the nth of October 1889.

His scientific papers were collected and published by the Physical Society of London: the first volume, which appeared in 1884, contained the researches for which he was alone responsible, and the second, dated 1887, those which he carried out in association with other workers.

JOURDAN, JEAN BAPTISTE, Count (1762-1833), marshal of France, was born at Limoges on the 29th of April 1762, and in his boyhood was apprenticed to a silk merchant of Lyons. In 1776 he enlisted in a French

regiment to serve in the American War of Independence, and after being invalided in 1784 he married and set up in business at Limoges. At the outbreak of the revolutionary wars he volunteered, and as a subaltern took part in the first campaigns in the north of France. His rise was even more rapid than that of Hoche and Marceau. By 1793 he had become a general of division, and was selected by Carnot to succeed Houchard as commander-in-chief of the Army of the North; and on the i5th-i6th of October 1793 he won thebrilliant and important victory of Wattignies (see French Revolu- tionary Wars). Soon afterwards he became a " suspect," the moderation of his political opinions and his misgivings as to the future conduct of the war being equally distasteful to the trucu- lent and enthusiastic Committee of Public Safety. Warned in time by his friend Carnot and by Barere, he avoided arrest and resumed his business as a silk-mercer in Limoges. He was soon reinstated, and early in 1794 was appointed commander-in-chief of the Army of Sambre-et-Meuse. After repeated attempts to force the passage of the Sambre had failed and several severe general actions had been fought without result, Jourdan and his army were discouraged, but Carnot and the civil commissioners urged the general, even with threats, to a last effort, and this time he was successful not only in crossing the Sambre but in winning a brilliant victory at Fleurus (June 26, 1794), the consequence of which was the extension of the French sphere

of influence to the Rhine, on which river he waged an indecisive campaign in 1795.

In 1796 his army formed the left wing of the advance into Bavaria. The whole of the French forces were ordered to advance on Vienna, Jourdan on the extreme left and Moreau in the centre by the Danube valley, Bonaparte on the right by Italy and Styria. The campaign began brilliantly, the Austrians under the Archduke Charles being driven back by Moreau and Jourdan almost to the Austrian frontier. But the archduke, slipping away from Moreau, threw his whole weight on Jourdan, who was defeated at Amberg and Wiirzburg, and forced over the Rhine after a severe rearguard action, which cost the life of Marceau. Moreau had to fall back in turn, and, apart from Bonaparte's marvellous campaign in Italy, the operations of the year were disastrous. The chief cause of failure was the vicious plan of campaign imposed upon the generals by their government. Jourdan was nevertheless made the scapegoat of the govern- ment's mistakes and was not employed for two years. In those years he became prominent as a politician and above all as the framer of the famous conscription law of 1798. When the war was renewed in 1799 Jourdan was placed at the head of the army on the Rhine, but again underwent defeat at the hands of the archduke Charles at Stockach (March 25), and, disappointed and broken in health, handed over the command to Massena. He at once resumed his

political duties, and was a prominent oppo- nent of the coup d'etat of 18 Brumaire, after which he was expelled from the Council of the Five Hundred. Soon, however, he became formally reconciled to the new regime, and accepted from Napoleon fresh military and civil employment. In 1800 he became inspector-general of cavalry and infantry and repre- sentative of French interests in the Cisalpine Republic, and in 1804 he was made a marshal of France. He remained in the new kingdom of Italy until 1806, when Joseph Bonaparte, whom his brother made king of Naples in that year, selected Jourdan as his military adviser. He followed Joseph into Spain in the same capacity in 1808. But Joseph's throne had to be main- tained by the French army, and throughout the Peninsular War the other marshals, who depended directly upon Napoleon, paid little heed either to Joseph or to Jourdan. After the battle of Vitoria he held no important command up to the fall of the Empire. Jourdan gave in his adhesion to the restoration government of 18 14, and though he rejoined Napoleon in the Hundred Days and commanded a minor army, he submitted to the Bourbons again after Waterloo. He refused, however, to be a member of the court which tried Marshal Ney. He was made a count, a peer of France (1819), and governor of Grenoble (1816). In politics he was a prominent opponent of the royalist reactionaries and supported the revolution of 1830. After this event he held the portfolio of foreign affairs for a few days, and then became governor of the Invalides, where his last years were spent. Marshal Jourdan died on the 23rd of November 1833, and was buried in the Invalides.

He wrote Operations de I'armee du Danube (1799); Memoires pour servir a I'histoire sur la campagne de 17Q6 (1819); and unpublished personal memoirs.

JOURNAL (through Fr. from late Lat. diurnalis, daily), a daily record of events or business. A private journal is usually an elaborated diary. When applied to a newspaper or other periodical the word is strictly used of one published each day; but any publication issued at stated intervals, such as a magazine or the record of the transactions of a learned society, is commonly called a journal. The word " journalist " for one whose business is writing for the public press (see Newspapers) seems to be as old as the end of the 17 th century.

" Journal " is particularly applied to the record, day by day, of the business and proceedings of a public body. The journals of the British houses of parliament contain an official record of the business transacted day by day in either house. The record does not take note of speeches, though some of the earlier volumes contain references to them. The journals are a length- ened account written from the " votes and proceedings " (in the House of Lords called " minutes of the proceedings "),

by day by the assistant clerks, and printed on the responsi- bility of the clerk to the house, after submission to the ” sub- committee on the journals.” In the Commons the journal is passed by the Speaker before publication. The journals of the House of Commons begin in the first year of the reign of Edward VI. (1547), and are complete, except for a short interval under Elizabeth. Those of the House of Lords date from the first year of Henry VIII. (1509). Before that date the proceedings in parliament were entered in the rolls of parliament, which extend from 1278 to 1503. The journals of the Lords are ” records ” in the judicial sense, those of the Commons are not (see Erskine May, Parliamentary Practice, 1906, pp. 201-202).

The term ” journal ” is used, in business, for a book in which an account of transactions is kept previous to a transfer to the ledger (see Book-keeping), and also as an equivalent to a ship’s :og, as a record of the daily run, observations, weather changes, &c. In mining, a journal is a record describing the various strata passed through in sinking a shaft. A particular use of the word is that, in machinery, for the parts of a shaft which are in contact with the bearings; the origin of this meaning, which is firmly established, has not been explained.

JOURNEY (through O. Fi.jornee or journee, mod. Fi.journie, from med. Lat. diurnata, Lat. diurnus, of or belonging to dies, day), properly that which occupies a day in its performance, and so a day’s work, particularly a day’s travel, and the distance covered by such, usually reckoned in the middle ages as twenty miles. The word is now used of travel covering a certain amount of distance or lasting a certain amount of time, frequently defined by qualifying words. ” Journey ” is usually applied to travel by land, as opposed to ” voyage,” travel by sea. The early use of ” journey ” for a day’s work, or the amount produced by a day’s work, is still found in glassmaking, and also at the British Mint, where a ” journey ” is taken as equivalent to the coinage of 15 lb of standard gold, 701 sovereigns, and of 60 lb of silver. The term ” journeyman ” also preserves the original signi- ficance of the word. It distinguishes a qualified workman or mechanic from an ” apprentice ” on the one hand and a ” master ” on the other, and is applied to one who is employed by another person to work at his trade or occupation at a day’s wage.

JOUVENET, JEAN (1647-1717), French painter, born at Rouen, came of

a family of artists, one of whom had taught Poussin. He early showed remarkable aptitude for his profes- sion, and, on arriving in Paris, attracted the attention of Le Brun, by whom he was employed at Versailles, and under whose auspices, in 1675, he became a member of the Academie Royale, of which he was elected professor in 1681, and one of the four perpetual rectors in 1707. The great mass of works that he executed, chiefly in Paris, many of which, including his celebrated Miraculous Draught of Fishes (engraved by Audran; also Landon, Annates, i. 42), are now in the Louvre, show his fertility in invention and execution, and also that he possessed in a high degree that general dignity of arrangement and style which dis- tinguished the school of Le Brun. Jouvenet died on the 5th of April 17 17, having been forced by paralysis during the last four years of his life to work with his left hand.

See Mim. ined. acad. roy. de p. el de sc, 1854, and DArgenville, Vies des peintres.

JOUY, VICTOR JOSEPH ETIENNE DE (1 764-1846), French dramatist, was born at Jouy, near Versailles, on the 12th of September 1764. At the age of eighteen he received a commis- sion in the army, and sailed for South America in the company of the governor of Guiana. He returned almost immediately to France to complete his studies, and re-entered the service two years later. He was sent to India, where he met with many romantic adventures which were afterwards turned to literary account. On the outbreak of the Revolution he returned to France and served with distinction in the early campaigns, attaining the rank of adjutant-general. He drew suspicion on himself, however, by refusing to honour the toast of Marat, and had to fly for his Uie. At the fall of the Terror he resumed his

commission but again fell under suspicion, being accused of treasonable correspondence with the English envoy, James Harris, 1st earl of Malmes'bury who had been sent to France to negotiate terms of peace. He was acquitted of this charge, but, weary of repeated attacks, resigned his position on the pretext of his numerous wounds. Jouy now turned his attention to literature, and produced in 1807 with immense success his opera La vestale (music by Spontini). The piece ran for a hundred nights, and was characterized by the Institute of France as the best lyric drama of the day. Other operas followed, but none obtained so great a success. He published in the Gazette de France a series of satirical sketches of Parisian life, collected under the title of L'Ermite de la Chausste d'Antin, ou observations sur les mosurs et les usages jrancais au commencement du xix' siecle (1812-1814, 5 vols.), which was warmly received. In 1821 his tragedy of Sylla gained a triumph due in part to the genius of Talma, who had studied the title-r61e from Napoleon. Under the Restoration Jouy consistently fought for the cause of freedom, and if his work was overrated

by his contemporaries, they were probably influenced by their respect for the author himself. He died in rooms set apart for his use in the palace of St Germain-en- Laye on the 4th of September 1846.

Out of the long list of his operas, tragedies and miscellaneous writings may be mentioned, Fernand Cortez (1809), opera, in col- laboration with J. E. Esmfinard, music by Spontini; Tippo Saib, tragedy (1813); Belisaire, tragedy (1818); Les Hermites en prison (1823), written in collaboration with Antoine Jay, like himself a political prisoner; Guillaume Tell (1829), with Hippolyte Bis, for the music of Rossini. Jouy was also one of the founders of the Biographie nouvelle des contemporains.

JOVELLANOS (or Jove Llanos), GASPAR MELCHOR DE

(1744-1811), Spanish statesman and author, was born at Gijon in Asturias, Spain, on the 5th of January 1744. Selecting law as his profession, he studied at Oviedo, Avila, and Alcaic, and in 1767 became criminal judge at Seville. His integrity and ability were rewarded in 1778 by a judgeship in Madrid, and in 1780 by appointment to the council of military orders. In the capital Jovellanos took a good place in the literary and scientific societies; for the society of friends of the country he wrote in 1787 his most valuable work, Informe sobre un proyecto de ley agraria. Involved in the disgrace of his friend, Frangois Cabarrus, Jovellanos spent the years 1790 to 1797 in a sort of banishment at Gijon, engaged in literary work and in founding the Asturian institution for agricultural, industrial, social and educational reform throughout his native province. This institution continued his darling project up to the latest hours of his life. Summoned again to public life in 1797, Jovellanos refused the post of ambassador to Russia, but accepted that of minister of grace and justice, under " the prince of the peace," whose attention had been directed to him by Cabarrus, then a favourite of Godoy. Displeased with Godoy's policy and conduct Jovellanos combined with his colleague Saavedra to procure his dismissal. Godoy returned to power in 1798; Jovellanos was again sent to Gijon, but in 1801 was thrown into prison in Majorca. The revolution of 1808, and the advance of the French into Spain, set him once more at liberty. Joseph Bona- parte, on mounting the Spanish throne, made Jovellanos the most brilliant offers; but the latter, sternly refusing them all, joined the patriotic party, became a member of the central junta, and contributed to reorganize the cortes. This accomplished, the junta at once fell under suspicion, and Jovellanos was in- volved in its fall. To expose the conduct of the cortes, and to defend the junta and himself were the last labours of his pen. In 181 1 he was enthusiastically welcomed to Gijon; but the approach of the French drove him forth again. The vessel in which he sailed was compelled by stress of weather to put in at Vega in Asturias, and there he died on'the 27th of November 181 1.

The poetical works of Jovellanos comprise a tragedy'EZ pelayo, the comedy El delincuente honrado, satires, and miscellaneous pieces, including a translation of the first book of Paradise Lost. His prose works, especially those on political and legislative economy, constitute his real title to literary fame. In them depth of thought and clear-sighted sagacity are couched in a certain Ciceronian

elegance and classical purity of style. Besides the Ley agraria he wrote Eiogios; various political and other essays; and Memorias polilicas (1801), suppressed in Spain, and translated into French, 1825. An edition of his complete works was published at Madrid (1831-1832) in 7 vols., and another at Barcelona (1839).

See Noticias historicas de Don G. M. de Jovellanos (1812), and Memorias para la vida del Senor . . . Jovellanos, by J. A. C. Ber- mudez (1814).

JOVELLAR Y SOLER, JOAQUIN (1819-1892), captain- general of Spain, was born at Palma de Mallorca, on the 28th of December 1819. At the close of his studies at the military academy he was appointed sub-lieutenant, went to Cuba as captain in 1842, returned to the War Office in 1851, was promoted major in 1853, and went to Morocco as private secretary to Marshal O'Donnell, who made him colonel in i860 after Jovellar had been wounded at the battle of Wad el Ras. In 1863 Jovellar became a brigadier-general, in 1864 under-secretary for war; he was severely wounded in fighting the insurgents in the streets of Madrid, and rose to the rank of general of division in 1866. Jovellar adhered to the revolution, and King Amadeus made him a lieutenant-general in 1872. He absented himself from Spain when the federal republic was proclaimed, and returned in the autumn of 1873, when Castelar sent him to Cuba as governor-general. In 1874 Jovellar came back to the Peninsula, and was in command of the Army of the Centre against the Carlists when Marshal Campos went to Sagunto to proclaim Alfonso XII. General Jovellar became war minister in the first cabinet of the restoration under Canovas, who sent him to Cuba again as governor-general, where he remained until the 18th of June 1878, when the ten years' insurrection closed with the peace of Zaujon. Alfonso XII. made him a captain-general, presi- dent of the council, life-senator, and governor-general of the Philippines. Jovellar died in Madrid on the 17th of April

1892.

JOVIAN (Flavius Jovtanus) (c. 332-364), Roman emperor from June 363 to February 364, was born at Singidunum in Moesia about 332. As captain of the imperial bodyguard he accom- panied Julian in his Persian expedition; and on the day after that emperor's death, when the aged Sallust, prefect of the East, declined the purple, the choice of the army fell upon Jovian. His election caused considerable surprise, and it is suggested by Ammianus Marcellinus that he was wrongly identified with another Jovian, chief notary, whose name also had been put forward, or that, during the acclamations, the soldiers mistook the name Jovianus for Julianus, and imagined that the latter had recovered from his illness. Jovian at once continued the retreat begun by Julian, and, continually harassed by the Persians, succeeded in reaching the banks of the Tigris, where a humiliating treaty was concluded with the Persian king, Shapur II. (q.v.). Five provinces which had been conquered by Galerius in 298 were surrendered, together with Nisibis and other cities. The Romans also gave up all their interests in the kingdom of Armenia, and abandoned its Christian prince Arsaces to the Persians. During his return to Constantinople Jovian was found dead in his bed at Dadastana, halfway between Ancyra and Nicaea. A surfeit of mushrooms or the fumes of a charcoal fire have been assigned as the cause of death. Under Jovian, Christianity was established as the state religion, and the Labarum of Constantine again became the standard of the army. The statement that he issued an edict of toleration, to the effect that, while the exercise of magical rites would be severely punished, his subjects should enjoy full liberty of conscience, rests on insufficient evidence. Jovian entertained a great regard for Athanasius, whom he reinstated on the archiepiscopal throne, desiring him to draw up a statement of the Catholic faith. In Syriac literature Jovian became the hero of a Christian romance (G. Hoffmann, Julianus der Ablrunnige, 1880).

See Ammianus Marcellinus, xxv. 5-10; J. P. de la Bleterie, His- loire de Jovien (1740); Gibbon, Decline and Fall, chs. xxiv., xxv.; J. Wordsworth in Smith and Wace's Dictionary of Christian Biography; H. Schiller, Geschichte der romischen Kaiserzeit, vol. ii. (1887) ; A. de Broglie, L' Jigliseet I'empire romain au iv°- siecle (4th ed. 1882). For the relations of Rome and Persia see Persia: Ancient History.

JOVINIANUS, or Jovianus, a Roman monk of heterodox views, who flourished during the latter half of the 4th century. All our knowledge of him is derived from a passionately hostile polemic of Jerome (Adv. Jovinianum, Libri II.), written at Bethlehem in 393, and without any personal acquaintance with the man assailed. According to this authority Jovinian in 388 was living at Rome the celibate life of an ascetic monk, possessed a good acquaintance with the Bible, and was the author of several minor works, but, undergoing an heretical change of view, after-

wards became a self-indulgent Epicurean and unrefined sensualist. The views which excited this denunciation were mainly these:

(1) Jovinian held that in point of merit, so far as their domestic state was concerned, virgins, widows and married persons who had been baptized into Christ were on a precisely equal footing;

(2) those who with full faith have been regenerated in baptism cannot be overthrown (or, according to another reading, tempted) of the devil; (3) to abstain from meats is not more praiseworthy than thankfully to enjoy them; (4) all who have preserved their baptismal grace shall receive the same reward in the kingdom of heaven. 1 Jovinian thus indicates a natural and vigorous reaction against the exaggerated asceticism of the 4th century, a protest shared by Helvidius and Vigilantius. He was condemned by a Roman synod under Bishop Siricius in 390, and afterwards excommunicated by another at Milan under the presidency of Ambrose. The year of his death is unknown, but he is referred to as no longer alive in Jerome's Contra Vigilantium (406).

JOVIUS, PAULUS, or Paolo Giovio (1483-1552), Italian historian and biographer, was born of an ancient and noble family at Como on the 19th of April 1483. His father died when he was a child, and Giovio owed his education to his brother Benedetto. After studying the humanities, he applied himself to medicine and philosophy at his brother's request. He was Pomponazzi's pupil at Padua; and afterwards he took a medical degree in the university of Pavia. He exercised the medical profession in Rome, but the attraction of literature proved irresistible for Giovio, and he was bent upon becoming the historian of his age. He presented a portion of his history to Leo X., who read the MS., and pronounced it superior in elegance to anything since Livy. Thus encouraged, Giovio took up his residence in Rome, and attached himself to Cardinal Giulio de' Medici, the pope's nephew. The next pope, Adrian VI., gave him a canonry in Como, on the condition, it is said, that Giovio should mention him with honour in his history. This patronage from a pontiff who was averse from the current tone of Italian humanism proves that Giovio at this period passed for a man of sound learn- ing and sober manners. After Adrian's death, Giulio de' Medici became pope as Clement VII. and assigned him chambers in the Vatican, with maintenance for servants befitting a courtier of rank. In addition to other benefices, he finally, in 1528, bestowed on him the bishopric of Nocera. Giovio had now become in a special sense dependent on the Medici. He was employed by that family on several missions — as when he accompanied Ippolito to Bologna on the occasion of Charles V.'s coronation, and Caterina to Marseilles before her marriage to the duke of Orleans. During the siege of Rome in 1527 he attended Clement in his flight from the Vatican. While crossing the bridge which connected the

palace with the castle of S. Angelo, Giovio threw his mantle over the pope's shoulders in order to disguise his master.

In the sack he suffered a serious pecuniary and literary loss, if we may credit his own statement. The story runs that he deposited the MS. of his history, together with some silver, in a box at S. Maria Sopra Minerva for safety. This box was discovered by two Spaniards, one of whom secured the silver, while the other, named Herrera, knowing who Giovio was, preferred to hold the MSS. for ransom. Herrera was so careless, however, as to throw away the sheets he found in paper, reserving only that portion of the work which was transcribed on parchment. This he subsequently sold to Giovo in exchange for a benifice at Cordova, which Clement VII. conceded to the Spaniard. Six books of the history were lost in this transaction. Giovo contented himself with indicating their substance in a summary. Perhaps he was not unwilling that his work should resemble that of Livy, even in its imperfection. But

1 See, more fully, Harnack, Hist, of Dogma, v. 57.

doubt rests upon the whole of this story. Apostolo Zeno affirms that in the middle of the last century three of the missing books turned up among family papers in the possession of Count Giov. Batt. Giovio, who wrote a panegyric on his ancestor. It is therefore not improbable that Giovio possessed his history intact, but pre- ferred to withhold from publication those portions which might have involved him" in difficulties with living persons of importance. The omissions were afterwards made good by Curtio Marinello in the Italian edition, published at Venice in 1581. But whether Marinello was the author of these additions is not known.

After Clement's death Giovio found himself out of favour with the next pope, Paul III. The failure of his career is usually ascribed to the irregularity of the life he led in the literary society of Rome. We may also remember that Paul had special causes for animosity against the Medici, whose servant Giovio had been. Despairing of a cardinal's hat, Giovio retired to his villa on the lake of Como, where he spent the wealth he had acquired from donations and benefices in adorning his villa with curiosities, antiquities and pictures, including a very important collection of portraits of famous soldiers and men of letters, now almost entirely dispersed. He died upon a visit to Florence in 1552.

Giovio's principal work was the History of His Own Times, from the invasion of Charles VIII. to the year 1547. It was divided into two parts, containing altogether forty-five books. Of these, books v.-xi. of part i. were

said by him to have been lost in the sack of Rome, while books xix.xxiv. of part ii., which should have embraced the period from the death of Leo to the sack, were never written. Giovio supplied the want of the latter six books by his lives of Leo, Adrian, Alphonso I. of Ferrara, and several other personages of importance. But he alleged that the history of that period was too painful to be written in full. His first published work, printed in 1524 at Rome, was a treatise De piscibus romanis. After his retirement to Como he produced a valuable series of biographies, entitled Elogia virorum illustrium. They commemorate men dis tinguished for letters and arms, selected from all periods, and are said to have been written in illustration of portraits collected by him for the museum of his villa at Como. Besides these books, we may mention a biographical history of the Visconti, lords of Milan; an essay on mottoes and badges; a dissertation on the state of Turkey; a large collection of familiar epistles; together with descriptions of Britain, Muscovy, the Lake of Como and Giovio's own villa. The titles of these miscellanies will be found in the bibliographical note appended to this article.

Giovio preferred Latin in the composition of his more im- portant works. Though contemporary with Machiavelli, Guicci- ardini and Varchi, he adhered to humanistic usages, and cared more for the Latinity than for the matter of his histories. His style is fluent and sonorous rather than pointed or grave. Partly owing to the rhetorical defects inherent in this choice of Latin, when Italian had gained the day, but more to his own untrustworthy and shallow character, Giovio takes a lower rank as historian than the bulk and prestige of his writings would seem to warrant. He professed himself a flatterer and a lam- pooner, writing fulsome eulogies on the princes who paid him well, while he ignored or criticized those who proved less gener- ous. The old story that he said he kept a golden and an iron pen, to use according as people paid him, condenses the truth in epigram. His private morals were of a dubious character, and as a writer he had the faults of the elder humanists, in combina- tion with that literary cynicism which reached its height in Aretino; and therefore his histories and biographical essays are not to be used as authorities, without corroboration. Yet Giovio's works, taken in their entirety and with proper reserva- tion, have real value. To the student of Italy they yield a lively picture of the manners and the feeling of the times in which he lived, and in which he played no obscure part. They abound in vivid sketches, telling anecdotes, fugitive comments, which unite a certain charm of autobiographical romance with the worldly wisdom of an experienced courtier. A flavour of person- ality makes them not unpleasant reading. While we learn to despise and mistrust the man in Giovio, we appreciate the author. It would not be too far-fetched tc describe him as a sort of 16th- century Horace Walpole.

Bibliography. — The sources of Giovio's biography are: his own works; Tiraboschi's History of Italian Literature; Litta's Genealogy of Illustrious Italian Families ; and Giov. Batt. Giovio's Vomini illustri della diocesi Comasca, Modena (1784). Cicogna, in his Delle inscrizi- oni Veneziane raccolta (Venice, 1830), gives a list of Giovio's works,

from which the following notices are extracted : 1 . Works in Latin :

(1) Pauli Jovii historiarum sui temporis, ab anno 1494 ad an. IS 47 (Florence 1 550-1 552), the same translated into Italian by L. Domenichi, and first published at Florence (1551), afterwards at Venice;

(2) Leonis X ., Hadriani VI., Pompeii Columnae Card.,vitae (Florence, 1548), translated by Domenichi (Florence, 1549); (3) Vitae XII. vicecomitum Mediolani principum (Paris, 1549), translated by Dome- nichi (Venice, 1549); (4) Vita Sfortiae clariss. duds (Rome, 1549), translated by Domenichi (Florence, 1549); (5) Vita Fr. Ferd. Davali (Florence, 1549), translated by Domenichi (ibid. 1 55 1) ; (6) Vita magni Consalvi (ibid. 1549), translated by Domenichi (ibid. !5$o); (7) Alfonsi Atestensi, &c. (ibid. 1550), Italian translation by Giov. Batt. Gelli (Florence, 1553) ; (8) Elogiavirorum bellicavirtute illustrium (ibid. 1551), translated by Domenichi (ibid. 1554) ; (9) Elogia clarorum virorum, &c. (Venice, 1546) (these are biographies of men of letters), translated by Hippolito Orio of Ferrara (Florence, 1552) ; (10) Libellus de legatione Basilii Magni principis Moscoviae (Rome, 1525); (11) Descriptio Larii Lacus (Venice, 1559) ; (12) Descriptio Britanniae, &c. (Venice, 1548) ; (13) De piscibus romanis (Rome, 1524) ; (14) Descrip- tions quolquol extant regionum atque locorum (Basel, 1 57 1) . 2. Works in Italian: (1) Dialogo delle imprese militari et amorose (Rome, I 555) ". (2) Commentari delle cose dei Turchi (Venice, 1 541) ; (3) Lettere volgari (Venice, 1560). Some minor works and numerous reprints of those cited have been omitted from this list ; and it should also be mentioned that some of the lives with additional matter, are included in the Vitae illustrium virorum (Basel, 1576). (J. A. S.)

The best and most complete edition of Giovio's works is that of Basel (1678). For his life see Giuseppe Sanesi, "Alcuni osservazioni e notizie intorno a tre storici minori del cinquecento — Giovio; Nerli, Segni" (in Archivio Storico Italiano, 5th series, vol.xxiii.) ; Eug. Miintz, Sul museo di ritratti composto da Paolo Giovio (ibid., vol. xix.).

JOWETT, BENJAMIN (181 7-1893), English scholar and theologian, master of Balliol College, Oxford, was born in Cam- berwell on the 15th of

April 181 7. His father was one of a Yorkshire family who, for three generations, had been supporters of the Evangelical movement in the Church of England. His mother was a Langhorne, in some way related to the poet and translator of Plutarch. At twelve the boy was placed on the foundation of St Paul's School (then in St Paul's Churchyard) , and in his nineteenth year he obtained an open scholarship at Balliol. In 1838 he gained a fellowship, and graduated with first-class honours in 1839. Brought up amongst pious Evangelicals, he came to Oxford at the height of the Tractarian movement, and through the friendship of W. G. Ward was drawn for a time in the direction of High Anglicanism; but a stronger and more lasting influence was that of the Arnold school, represented by A. P. Stanley. Jowett was thus led to concentrate his attention on theology, and in the summers of 1845 and 1846, spent in Germany with Stanley, he became an eager student of German criticism and speculation. Amongst the writings of that period he was most impressed by those of F. C. Baur. But he never ■ ceased to exercise an independent judgment, and his work on St Paul, which appeared in 1855, was the result of much original reflection and inquiry. He was appointed to the Greek professor- ship in the autumn of that year. He had been a tutor of Balliol and a clergyman since 1842, and had devoted himself to the work of tuition with unexampled zeal. His pupils became his friends for life. He discerned their capabilities, studied their characters, and sought to remedy their defects by frank and searching criticism. Like another Socrates, he taught them to know them- selves, repressing vanity, encouraging the despondent, and attaching all alike by his unobtrusive sympathy. This work gradually made a strong impression, and those who cared for Oxford began to speak of him as " the great tutor." As early as 1839 Stanley had joined with Tait, the future archbishop, in advocating certain university reforms. From 1846 onwards Jowett threw himself into this movement, which in 1848 became general amongst the younger and more thoughtful fellows, until it took effect in the commission of 1850 and the act of 1854. Another educational reform, the opening of the Indian civil service to competition, took place at the same time, and Jowett was one of the commission. He had two brothers who served and died in India, and he never ceased to take a deep and practical interest in Indian affairs. A great disappointment, his repulse for the mastership of Balliol. also in 1854, appears to have roused him into the completion of his book on The Epistles of St Paul. This work, described by one of his friends as " a miracle of bold- ness," is full of originality and suggestiveness, but its publication

awakened against him a storm of theological prejudice, which followed him

more or less through life. Instead of yielding to this, he joined with Henry Bristowe Wilson and Rowland Williams, who had been similarly attacked, in the production of the volume known as Essays and Reviews. This appeared in i860 and gave rise to a strange outbreak of fanaticism. Jowett's loyalty to those who were prosecuted' on this account was no less characteristic than his persistent silence while the augmentation of his salary as Greek professor was withheld. This petty perse- cution was continued until 1865, when E. A. Freeman and Charles Elton discovered by historical research that a breach of the con- ditions of the professorship had occurred, and Christ Church raised the endowment from £40 a year to £500. Meanwhile Jowett's influence at Oxford had steadily increased. It culmi- nated in 1864, when the country clergy, provoked by the final acquittal of the essayists, had voted in convocation against the endowment of the Greek chair. Jowett's pupils, who were now drawn from the university at large, supported him with the enthusiasm which young men feel for the victim of injustice. In the midst of other labours Jowett had been quietly exerting his influence so as to conciliate all shades of liberal opinion, and bring them to bear upon the abolition of the theological test, which was still required for the M.A. and other degrees, and for university and college offices. He spoke at an important meeting upon this question in London on the 10th of June 1864, which laid the ground for the University Tests Act of 1871. In connexion with the Greek professorship Jowett had undertaken a work on Plato which grew into a complete translation of the Dialogues. with introductory essays. At this he laboured in vacation time for at least ten years. But his interest in theology had not abated, and his thoughts found an outlet in occasional preaching. The university pulpit, indeed, was closed to him, but several congregations in London delighted in his sermons, and from 1866 until the year of his death he preached annually in Westminster Abbey, where Stanley had become dean in 1863. Three volumes of selected sermons have been published since his death. The years 1865-1870 were occupied with assiduous labour. Amongst his pupils at Balliol were men destined to high positions in the state, whose parents had thus shown their confidence in the supposed heretic, and gratitude on this account was added to other motives for his unsparing efforts in tuition. In 1870, by an arrangement which he attributed to his friend Robert Lowe, afterwards Lord Sherbrooke (at that time a member of Glad- stone's ministry), Scott was promoted to the deanery of Rochester and Jowett was elected to the vacant mastership by the fellows of Balliol. From the vantage-ground of this long-coveted position the Plato was published in 1871. It had a great and well-deserved success. While scholars criticized particular renderings (and there were many small errors to be removed in subsequent editions), it was generally agreed that he had suc- ceeded in making Plato an English classic.

If ever there was a beneficent despotism, it was Jowett's rule as master. Since 1866 his authority in Balliol had been really paramount, and various reforms in college had been due to his initiative. The opposing minority were now powerless, and the younger fellows who had been his pupils were more inclined to follow him than others would have been. There was no obstacle to the continued exercise of his firm and reasonable will. He still knew the undergraduates individually, and watched their pro- gress with a vigilant eye. His influence in the university was less assured. The pulpit of St Mary's was no longer closed to him, but the success of Balliol in the schools gave rise to jealousy in other colleges, and old prejudices did not suddenly give way; while a new movement in favour of " the endowment of research " ran counter to his immediate purposes. Meanwhile, the tutor- ships in other colleges, and some of the headships also, were being filled with Balliol men, and Jowett's former pupils were promi- nent in both houses of parliament and at the bar. He continued the practice, which he had commenced in 1848, of taking with him a small party of undergraduates in vacation time, and work- ing with them in one of his favourite haunts, at Askrigg in Wensleydale, or Tummel Bridge,, or later at WestMalvern. The

new hall (1876), the organ there, entirely his gift (zSSs). and the cricket ground (1889), remain as external monuments of the master's activity. Neither business nor the many claims of friendship interrupted literary work. The six or seven weeks of the long vacation, during which he had pupils with him, were mainly employed in writing. The translation of Aristotle's Politics, the revision of Plato, and, above all, the translation of Thucydides many times revised, occupied several years. The edition of the Republic, undertaken in 1856, remained unfinished, but was continued with the help of Professor Lewis Campbell. Other literary schemes of larger scope' and deeper interest were long in contemplation, but were not destined to take effect — an Essay on the Religions of the World, a Commentary on the Gospels, a Life of Christ, a volume on Moral Ideas. Such plans were frustrated, not only by his practical avocations, but by his determination to finish what he had begun, and the fastidious self-criticism which it took so long to satisfy. The book on Morals might, however, have been written but for the heavy burden of the vice-chancellorship, which he was induced to accept in 1882, by the hope, only partially fulfilled, of securing many improvements for the university. The vice-chancellor was ex officio a delegate of the press, where he hoped to effect much; and a plan for draining the Thames Valley, which he had now the power of initiating, was one on which his mind had dwelt for many years. The exhausting labours of the vice-chancellor- ship were followed by an illness (1887); and after this he relin- quished the hope of producing any great original writing. His literary industry was thenceforth confined to his commentary

on the Republic of Plato, and some essays on Aristotle which were to have formed a companion volume to the translation of the Politics. The essays which should have accompanied the trans- lation of Thucydides were never written. Jowett, who never married, died on the 1st of October 1893. The funeral was one of the most impressive ever seen in Oxford. The pall-bearers were seven heads of colleges and the provost of Eton, all old pupils.

Theologian, tutor, university reformer, a great master of a college, Jowett's best claim to the remembrance of succeeding generations was his greatness as a moral teacher. Many of the most prominent Englishmen of the day were his pupils and owed much of what they were to his precept and example, his pene- trative sympathy, his insistent criticism, and his unwearying friendship. Seldom have ideal aims been so steadily pursued with so clear a recognition of practical limitations. Jpwett's theological work was transitional, and yet has an element of permanence. As has been said of another thinker, he was " one of those deeply religious men who, when crude theological notions are being revised and called in question seek to put new life into theology by wider and more humane ideas." In earlier life he had been a zealous student of Kant and Hegel, and to the end he never ceased to cultivate the philosophic spirit; but he had little confidence in metaphysical systems, and sought rather to translate philosophy into the wisdom of life. As a classical scholar, his scorn of littlenesses sometimes led him into the neglect of minutiae, but he had the higher merit of interpreting ideas. His place in literature rests really on the essays in his Plato. When their merits are fully recognized, it will be found that his worth, as a teacher of his countrymen, extends far beyond his own generation.

See The Life and Letters of Benjamin Jowett, by E. A. Abbott and Lewis Campbell (1897); Benjamin Jowett, by. Lionel Tollemache (1895)- (L- C.)

JOYEUSE, a small town in the department of Ardeche, France, situated on the Baume, a tributary of the Ardeche, is historically important as having been the seat of a noble French family which derived its name from it. The lordship of Joyeuse came, in the 13 th century, into the possession of the house of Chateau- neuf-Randon, and .was made into a viscountship in 1432. Guillaume, viscount of Joyeuse, was bishop of Alet, but after- wards left the church, and became a marshal of France; he died in 1592. His eldest son Anne de Joyeuse (1561-1587), was one of the favourites of Henry III. of France, wko created him duke

and peer (1581), admiral of France (1582), and governor of Normandy (1586), and married him to Marguerite de Lorraine- Vaudemont, younger sister of the queen. He gained several successes against the Huguenots, but was recalled by court intrigues at an inopportune moment, and when he marched a second time against Henry of Navarre he was defeated and killed at Coutras. Guillaume had three other sons: Francois fe Joyeuse (d. 161 5), cardinal and archbishop of Narbonne, Toulouse and Rouen, who brought about the reconciliation of Henry IV. with the pope; Henri, count of Bouchage, and later duke of Joyeuse, who first entered the army, then became a Capuchin under the name of Pere Ange, left the church and became a marshal of France, and finally re-entered the church, dying in 1608; Antoine Scipion, grand prior of Toulouse in the order of the knights of Malta, who was one of the leaders in the League, and died in the retreat of Villemur (1592). Henriette Catherine de Joyeuse, daughter of Henri, married in 161 1 Charles of Lorraine, duke of Guise, to whom she brought the duchy of Joyeuse. On the death of her great-grandson, Francois Joseph de Lorraine, duke of Guise, in 1675, without issue, the duchy of Joyeuse was declared extinct, but it was revived in 17 14, in favour of Louis de Melun, prince of Epinoy. (M. P.)*

JOYEUSE ENTREE, a famous charter of liberty granted to Brabant by Duke John III. in 1354. John summoned the re- presentatives of the cities of the duchy to Louvain to announce to them the marriage of his daughter and heiress Jeanne of Brabant to Wenceslaus duke of Luxemburg, and he offered them liberal concessions in order to secure their assent to the change of dynasty. John III. died in 1355, and Wenceslaus and Jeanne on the occasion of their state entry into Brussels solemnly swore to observe all the provisions of the charter, which had been drawn up. From the occasion on which it was first proclaimed this charter has since been known in history as La Joyeuse Entree. By this document the dukes of Brabant undertook to maintain the integrity of the duchy, and not to wage war, make treaties, or impose taxes without the consent of their subjects, as repre- sented by the municipalities. All members of the duke's council were to be native-born Brabanters. This charter became the model for other provinces and the bulwark of the liberties of the Netherlands. Its provisions were modified from time to time, but remained practically unchanged from the reign of Charles V. onwards. The ill-advised attempt of the emperor Joseph II. in his reforming zeal to abrogate the Joyeuse Entree caused a revolt in Brabant, before which he had to yield.

See E.Poullet, La Joyeuse entree, ou constitution Brabanconne (1862).

JUAN FERNANDEZ ISLANDS, a small group in the South Pacific Ocean, between 33 and 34° S., 8o° W., belonging to Chile and included in the province of Valparaiso. The main island is called Mas-a-Tierra (Span,

“more to land”) to dis- tinguish it from a smaller island, Mas-a-Fuera (” more to sea “), 100 m. farther west. Off the S-W. of Mas-a-Tierra lies the islet of Santa Clara. The aspect of Mas-a-Tierra is beautiful; only 13 m. in length by 4 in width, it consists of a series of precipi- tous rocks rudely piled into irregular blocks and pinnacles, and strongly contrasting with a rich vegetation. The highest of these, 3225 ft., is called, from its massive form, El Yunque (the anvil). The rocks are volcanic. Cumberland Bay on the north side is the only fair anchorage, and even there, from the great depth of water, there is some risk. A wide valley collecting streams from several of the ravines on the north side of the island opens into Cumberland Bay, and is partially enclosed and cultivated. The inhabitants number only some twenty.

The flora and fauna of Juan Fernandez are in most respects Chilean. There are few trees on the island, for most of the valuable indigenous trees have been practically exterminated, such as the sandalwood, which the earlier navigators found one of the most valuable products of the island. Ferns are prominent among the flora, about one-third of which consists of endemic species. There are no indigenous land mammals. Pigs and goats, however, with cattle, horses, asses and dogs, have been introduced, have multiplied, and in considerable numbers run wild. Sea-elephante and fur-seals

were formerly plentiful. Of birds, a tyrant and a humming-bird {Eustephanus fernandensis) are peculiar to the group, while another humming bird (E. galerites), a thrush, and some birds of prey also occur in Chile. E. fernandensis has the peculiarity that the male is of a bright cinnamon colour, while the female is green. Both sexes are green in E. galerites.

Juan Fernandez was discovered by a Spanish pilot of that name in 1563. Fernandez obtained from the Spanish govern- ment a grant of the islands, where he resided for some time, stocking them with goats and pigs. He soon, however, appears to have abandoned his possessions, which were afterwards for many years only visited occasionally by fishermen from the coasts of Chile and Peru. In 16 16 Jacob le Maire and Willem Cornelis Schouten called at Juan Fernandez for water and fresh provisions. Pigs and goats were then abundant on. the islands. In February 1700 Dampier called at Juan Fernandez and while there Captain Straddling of the ” Cinque Porte ” galley quarrelled with his men, forty-two of whom deserted but were afterwards taken on board by Dampier; five seamen, however, remained on shore. Other parties had previously colonized the islands but none had remained permanently. In October 1704 the ” Cinque Porte ” returned and found two of these men, the others having been apparently captured by the French. On this occasion Straddling quarrelled with Alexander Selkirk (q.v.), who, at his own request, became the island’s most

famous colonist, for his adventures are commonly believed to have inspired Daniel Defoe's Robinson Crusoe. Among later visits, that of Commodore Anson, in the " Centurion " (June 1741) led, on his return home, to a proposal to form an English settle- ment on Juan Fernandez; but the Spaniards, hearing that the matter had been mooted in England, gave orders to occupy the island, and it was garrisoned accordingly in 1750. Philip Carteret first observed this settlement in May 1767, and on ac- count of the hostility of the Spaniards preferred to put in at Mas- a-Fuera. After the establishment of the independence of Chile at the beginning of the 19th century, Juan Fernandez passed into the possession of that country. On more than one occasion before 1840 Mas-a-Tierra was used as a state prison by the Chilean government.

JUANGS (Patuas, literally " leaf- wearers "), a jungle tribe of Orissa, India. They are found in only two of the tributary states, Dhenkanal and Keonjhar, most of them in the latter. They are estimated to amount in all to about 10,000. Their language belongs to the Munda family. They have no traditions which connect them with any other race, and they repudiate all connexion with the Hos or the Santals, declaring themselves the aborigines. They say the headquarters of the tribe is the Gonasika. In manners they are among the most primitive people of the world, representing the Stone age in our own day. They do not till the land, but live on the game they kill or on snakes and vermin. Their huts measure about 6 ft. by 8 ft., with very low doorways. The interior is divided into two compartments. In the first of these the father and all the females of a family huddle together; the second is used as a store-room. The boys have a separate hut at the entrance to the village, which serves as a guest-house and general assembly place where the musical instruments of the village are kept. Physically they are small and weak-looking, of a reddish-brown colour, with flat faces, broad noses with wide nostrils, large mouths and thick lips, the hair coarse and frizzly. The women until recently wore nothing but girdles of leaves, the men, a diminutive bandage of cloth. The Juangs declare that the river goddess, emerging for the first time from the Gonasika rock, surprised a party of naked Juangs dancing, and ordered them to wear leaves, with the threat that they should die if they ever gave up the custom. The Juangs' weapons are the bow and arrow and a primitive sling made entirely of cord. Their religion is a vague belief in forest spirits. They offer fowls to the sun when in trouble and to the earth for a bountiful harvest. Polygamy is rare. They burn their dead and throw the ashes into any running stream. The most sacred oaths a Juang can take are those on an ant-hill or a tiger-skin. I See E. W. Dalton, Descriptive Ethnology of Bengal (1872).

JUAN MANUEL, DON (i 282-1349), infante of Castile, son of the infante Don Manuel and Beatrix of Savoy, and grandson of St Ferdinand, was born at Escalona on the 5th of May 1282. His father died in 1284, and the young prince was educated at the court of his cousin, Sancho IV., with whom his preco- cious ability made him a favourite. In 1294 he was appointed adelantado of Murcia and in his fourteenth year served against the Moors at Granada. In 1304 he was entrusted by the queen- mother, Dofia Maria de Molina, to conduct political negotiations with James II. of Aragon on behalf of her son, Ferdinand IV., then under age. His diplomacy was successful and his marriage to James II. 's daughter, Constantina, added to his prestige. On the death of Ferdinand IV. and of the regents who governed in the nameof Alphonso XI., Don Juan Manuel acted as guardian of the king who was proclaimed of age in 1325. His ambitious design of continuing to exercise the royal power was defeated by Alphonso XI., who married the ex-regent's daughter Constanza, and removed his father-in-law from the scene by nominating him adelantado mayor de la frontera. Alphonso XL's repudiation of Constanza, whom he imprisoned at Toro, drove Don Juan Manuel into opposition, and a long period of civil war followed. On the death of his wife Constantina in 1327, Don Juan Manuel strengthened his position by marrying Dona Blanca de la Cerda; he secured the support of Juan Nunez, alferez of Castile, by arranging a marriage between him and Maria, daughter of Don Juan el Tuerto; he won over Portugal by promising the hand of his daughter, the ex-queen Constanza, to the infante of that kingdom, and he entered into alliance with Mahomet III. of Granada. This formidable coalition compelled Alphonso XI. to sue for terms, which he accepted in 1328 without any serious intention of complying with them; but he was com- pelled to release Dofia Constanza. War speedily broke out anew, and lasted till 1331 when Alphonso XI. invited Juan Manuel and Juan Nunez to a banquet at Villahumbrales with the intention, it was believed, of assassinating them; the plot failed, and Don Juan Manuel joined forces with Peter IV. of Aragon. He was besieged by Alphonso XI. at Garci-Nuflez, whence he escaped on the 30th of July 1336, fled into exile, and kept the rebellion alive till 1338, when he made his peace with the king. He proved his loyalty by serving in further expeditions against the Moors of Granada and Africa, and died a tranquil death in the first half of 1349.

Distinguished as an astute politician, Don Juan Manuel is an author of the highest eminence, and, considering the cir- cumstances of his stormy life, his voluminousness is remarkable. The Libro de los sabios, a treatise called Engenos de Guerra and the Libro de cantares, a collection of verses, were composed between 1320 and 1327; but they have disappeared together with the Libro de la caballeria (written during the winter of 1326, and the Reglas como se debe trovar, a metrical treatise assigned to 1 3 28-1 334.

Of his surviving writings, Juan Manuel's Cronica abreviada was compiled between 1319 and 1325, while the Libro de la caza must have been written between 1320 and 1329; and during this period of nine years the Cronicc de Espaita, the Cronica complida, and the Tratado sobre las armas were pro- duced. The Libro del caballero el del escudero was finished before the end of 1326; the first book of the Libro de los estados was finished on the 22nd of May 1330, while the second was begun five days later; the first book of El Conde Lucanor was written in 1328, the second in 1330, and the fourth is dated 12th of June !335- We are unable to assign to any precise date the devout Traclado on the Virgin, dedicated to the prior of the monastery at Pehafiel, to which Don Juan Manuel bequeathed his manu- scripts; but it seems probable that the Libro de los frailes predicadores is slightly later than the Libro de los estados; that the Libro de los castigos (left unfinished, and therefore known by the alternative title of Libro infinido) was written not later than 1333, and that the treatise De las maneras de amor was composed between 1334 and 1337.

The historical summaries, pious dissertations and miscel- laneous writings are of secondary interest. The Libro del cabal- lero et del escudero is on another plane; it is no doubt suggested by

Lull's Libre del orde de cavalleria, but the points of resemblance have been exaggerated; the morbid mysticism of Lull is rejected, and the carefully finished style justifies the special pride which the author took in this performance. The influence of Lull's Blanquerna is likewise visible in the Libro de los estados; but there are marked divergences of substance which go to prove Don Juan Manuel's acquaintance with some version (not yet identified) of the Barlaam and Josaphat legend. Nothing is more striking than the curious and varied erudition of the turbu- lent prince who weaves his personal experiences with historical or legendary incidents, with reminiscences of Aesop and Phaedrus, with the Disciplina clericalis, with Kalilah and Dim- nah, with countless Oriental traditions, and with all the material of anecdotic literature which he embodies in the Libro de patronio, best known by the title of El Conde Lucanor (the name Lucanor being taken from the prose Tristan). This work (also entitled the Libro de enxemplos) was first printed by Gonzalo Argote de Molina at Seville in 1575, and it revealed Don Juan Manuel as a master in the art of prose composition, and as the predecessor of Boccaccio in the province of romantic narrative. The Cento novelle antiche are earlier in date, but these anonymous tales, derived from popular stories diffused throughout the world, lack the personal character which Don Juan lends to all he touches. They are simple, unadorned variants of folk-lore items; El Conde Lucanor is essentially the production of a conscious artist, deliberative and selective in his methods. Don Juan ' Manuel has not Boccaccio's festive fancy nor his constructive skill; he is too persistently didactic and concerned to point

a moral; but he excels in knowledge of human nature, in the faculty of ironical presentation, in tolerant wisdom and in luminous conciseness. He naturalizes the Eastern apologue in Spain, and by the laconic picturesqueness of his expression imports a new quality into Spanish prose which attains its full development in the hands of Juan de Valdes and Cervantes. Some of his themes are utilized for dramatic purposes by Lope de Vega in La Pobreza estimada, by Ruiz de Alarcon in La Prueba de las promesas, by Calderon in La Vida es sueno, and by Cafiizares in Don Juan de Espina en Mildn: there is an evident, though remote, relation between the tale of the mancebo que casd con una mujer muy fuerte y muy brava and The Taming of the Shrew; and a more direct connexion exists between some of Don Juan Manuel's enxemplos and some of Anderson's fairy tales.

Bibliography. — Obras, edited by P. de Gayangos in the Biblioleca de autores Espanoles, vol. li. ; El Conde Lucanor (Leipzig, 1900), edited by H. Knust and A. Hirschfeld ; Libro de la caza (Halle, 1880), edited by G. Baist ; El Libro del caballero et del escudero, edited by S. Grafen- berg in Romanische Forschungen, vol. vi. ; La cronica complida, edited by G. Baist in Romanische Forschungen, vol. vi. ; G. Baist, Alter und Textueberlieferung der Schriften Don Juan Manuels (Halle, 1880); F. Hanssen, Notas a la versificacion de D. Juan Manuel (Santiago de Chile, 1902). The Conde Lucanor has been translated by J. Eichendorff into German (1840), by A. Puibusque into French (1854) and by J. York into English (1868). (J. F.-K.)

JUAREZ, BENITO PABLO (1806-1872), president of Mexico, was born near Ixtlan, in the state of Oajaca, Mexico, on the 21st of March 1806, of full Indian blood. Early left in poverty by the death of his father, he received from a charitable friar a good general education, and afterwards the means of studying law. Beginning to practise in 1834, Juarez speedily rose to professional distinction, and in the stormy political life of his time took a prominent part as an exponent of liberal views. In 1832 he sat in the state legislature; in 1846 he was one of a legislative triumvirate for his native state and a deputy to the republican congress, and from 1847 to 1852 he was governor of Oajaca. Banished in 1853 by Santa Anna, he returned to Mexico in 1855, an d joined Alvarez, who, after Santa Anna's defeat, made him minister of justice. Under Comonf ort, who then succeeded Alvarez, Juarez was governor of Oajaca (1855-57), and in 1857 chief justice and secretary of the interior; and, when Comonfort was unconstitutionally replaced by Zuloaga in 1858, the chief justice, in virtue of his office, claimed to be legal president of the republic. It was not, however, till the beginning of 1861 that he succeeded in finally defeating the

unconstitutional party and in being duly elected president by congress. His decree of July 1861, suspending for two years all payments on public debts of every kind, led to the landing in Mexico of English, Spanish and French troops. The first two powers were soon induced to withdraw their forces; but the French remained, declared war in 1862, placed Maximilian upon the throne as emperor, and drove Juarez and his adherents to the northern limits of the republic. Juarez maintained an obstinate resistance, which resulted in final success. In 1867 Maximilian was taken at Queretaro, and shot; and in August Juarez was once more elected president. His term of office was far from tranquil; discontented generals stirred up ceaseless revolts and insurrections; and, though he was re-elected in 187 1, his popularity seemed to be on the wane. He died of apoplexy in the city of Mexico on the 18th of July 1872. He was a statesman of integrity, ability and determination, whose good qualities are too apt to be overlooked in consequence of his connexion with the unhappy fate of Maximilian. JUBA, the name of two kings of Numidia. Juba I. (1st century B.C.), son and successor of Hiempsal, king of Numidia. During the civil wars at Rome he sided with Pompey, partly from gratitude because he had reinstated his father on his throne (Appian, B.C., i. 80), and partly from enmity to Caesar, who had insulted him at Rome by pulling his beard (Suet., Caesar, 71). Further, C. Scribonius Curio, Caesar's general in Africa, had openly proposed, 50 B.C., when tribune of the plebs, that Numidia should be sold to colonists, and the king reduced to a private station. In 49 Juba inflicted on the Caesarean army a crushing defeat, in which Curio was slain (Veil. Pat. ii. 54; Caesar, B.C. ii. 40). Juba's attention was distracted by a counter invasion of his territories by Bocchus the younger and Sittius; but, finding that his lieutenant Sabura was able to defend his interests, he rejoined the Pompeians with a large force, and shared the defeat at Thapsus. Fleeing from the field with the Roman general M. Petreius, he wandered about as a fugi- tive. At length, in despair, Juba killed Petreius, and sought the aid of a slave in despatching himself (46). Juba was a thorough savage; brave, treacherous, insolent and cruel. (See Numidia.)

Juba II., son of the above. On the death of his father in 46 B.C. he was carried to Rome to grace Caesar's triumph. He seems to have received a good education under the care of Augustus who, in 29, after Mark Antony's death, gave him the hand of Cleopatra Selene, daughter of Antony and Cleopatra, and placed him on his father's throne. In ?£ however, he trans- ferred him from Numidia to Mauretania, to which was added a part of Gaetulia (see Numidia). Juba seems to have reigned in considerable prosperity, though in a.d. 6 the Gaetulians rose in a revolt of sufficient importance to afford the surname Gaetulicus to Cornelius Lentulus Cossus, the Roman general who helped to suppress it. The date of

Juba's death is by no means certain; it has been put between a.d. 19 and 24 (Strabo, xvii. 828; Dio Cassius, li. 15; liii. 26; Plutarch, Ant. 87; Caesar, 55). Juba, according to Pliny, who constantly refers to him, is mainly memorable for his' writings. He has been called the African Varro.

He wrote many historical and geographical works, of which some seem to have been voluminous and of considerable value on account of the sources to which their author had access: (l)'Pa>juauc4 ioTopia: (2) 'AcrcrupiaKd: (3) Aiˆtxa: (4) De Arabia sive De expeditione arabica; (5) Physiologa; (6) De Euphorbia herba; (7) Ilepi owov: (8) Ilepi ypa.(j>iKrjs (Ilepi fa>7pd#a;p) : (9) Qearpmij (oropta: (10) 'OjUoi6T7jTes ; (ii) Hepi (fidopas Xefews: (12) 'Eiri-ypapna.

Fragments and life in Mtiller, Frag. Hist. Graec, vol. iii.; see also Sevin, Mem. del' Acad, des Inscriptions, vol. iv. ; Hullemann, De vita et scriptis Jubae (1846). For the denarii of Juba II. found in 1908 at El Ksar on the coast of Morocco see Dieudonn6 in Revue Numism. (1908), pp. 350 seq. They are interesting mainly as throwing light on the chronology of the reign.

JUBA, or Jub, a river of East Africa, exceeding iooo m. in length, rising on the S.E. border of the Abyssinian highlands and flowing S. across the Galla and Somali countries to the sea. It is formed by the junction of three streams, all having their source in the mountain range N.E. of Lake Rudolf which is the

water-parting between the Nile basin and the rivers flowing to the Indian Ocean.

Of the three headstreams, the Web, the Ganale and the Daua, the Ganale (or Ganana) is the central river and the true upper course of the J uba. It has two chief branches, the Black and the Great Ganale. The last-named, the most remote source of the river, rises in 7° 30′ N., 38° E. at an altitude of about 7500 ft., the crest of the mountains reaching another 2500 ft. In its upper course it flows over a rocky bed with a swift current and many rapids. The banks are clothed with dense jungle and the hills beyond with thorn-bush. Lower down the river has formed a narrow valley, 1500 to 2000 ft. below the general level of the country. Leaving the higher mountains in about 5 15′ N., 40° E., the Ganale enters a large slightly undulating grass plain which extends south of the valley of the Daua and occu- pies all the country eastward to the junction of the two rivers. In this plain the Ganale makes a semicircular sweep northward before resuming its general S.-E. course. East of 42 E. in 4 12′ N. it is joined by the Web on the left or eastern bank, and about 10 m. lower down the Daua enters on the right bank.

The Web rises in the mountain chain a little S. and E. of the sources of the Ganale, and some 40 m. from its source passes, first, through a canon 500 ft. deep, and then through a series of remarkable underground caves hollowed out of a quartz mountain and, with their arches and white columns, presenting the appearance of a pillared temple. The Daua (or Dawa) is formed by the mountain torrents which have- their rise S. and W. of the Ganale and is of similar character to that river. It has few feeders and none of any size. The descent to the open country is somewhat abrupt. In its middle course the Daua has cut a deep narrow valley through the plain ; lower down it bends N.E. to its junction with the Ganale. The river is not deep and can be forded in many places ; the banks are fringed with thick bush and dom-palms. At the junction of the Ganale and the Web the river is swift-flowing and 85 yards across; just below the Daua confluence it is 200 yds. wide, the altitude here — 300 m. in a direct line from the source of the Ganale — being only 590 ft.

Below the Daua the river, now known as the Juba, receives no tributary of importance. It first flows in a valley bounded, espe- cially towards the west, by the escarpments of a high plateau, and containing the towns of Lugh (in 3 50′ N., the centre of active trade), Bardera, 387 m. above the mouth, and Saranli — the last two on opposite sides of the stream, in 2 ° 20′ N. , a crossing-place for caravans. Beyond 1° 45′ N. the country becomes more level and the course of the river very tortuous. On the west a series of small lakes and backwaters receives water from the Juba during the rains. Just south of the equator channels from the long, branching Lake Deshekwama or Hardinge, fed by the Lakdera river, enter from the west, and in 0° 15′ S. the Juba enters the sea across a dangerous bar, which has only one fathom of water at high tide.

From its mouth to 20 m. above Bardera, where at 2° 35′ N. rapids occur, the Juba is navigable by shallow-draught steamers, having a general depth of from 4 to 12 ft., though shallower in places. Just above its mouth it is a fine stream 250 yds. wide, with a current of 2§ knots. Below the mountainous region of the headstreams the Juba and its tributaries flow through a country generally arid away from the banks of the streams. The soil is sandy, covered either with thorn-scrub or rank grass, which in the rainy season affords herbage for the herds of cattle, sheep and camels owned by the Boran Gallas and the Somali who inhabit the district. But by the banks of the lower river the character of the country changes. In this district, known as Gosha, are considerable tracts of forest, and the level of flood water is higher than much of the surrounding land. This low- lying fertile belt stretches along the river for about 300 m., but . is not more than a mile or two wide. In the river valley maize, rice, cotton and other crops are cultivated. From Gobwen, a trading settlement about 3 m. above the mouth of the Juba, a road runs S.W. to the seaport of Kismayu, 10 m.

distant.

The lower Juba was ascended in 1865 in a steamer by Baron Karl von der Decken, who was murdered by Somali at Bardera, but the river system remained otherwise almost unknown until after 1890. In 1891 a survey of its lower course was exe- cuted by Captain F. G. Dundas of the British navy, while in 1892-1893 its headstreams were explored by the Italian officers, Captains Vittorio, Bottego and Grixoni, the former of whom dis- proved the supposed connexion of the Omo (see Rudolf, Lake) with the Juba system. It has since been further explored by Prince Eugenio Ruspoli, by Bottego's second expedition (1895), by Donaldson Smith, A. E. Butter, Captain P. Maud of the British army, and others. The river, from its mouth to the con- fluence of the Daua and Ganale, forms the frontier between the

British East Africa protectorate and Italian Somaliland; and from that point to about 4 20′ N. the Daua is the boundary between British and Abyssinian territory.

JUBBULPORE, or Jabalpur, a city, district, and division of British India in the Central Provinces. The city is 616 m. N.E. of Bombay by rail, and 220 m. S.W. of Allahabad. Pop. (1901), 90,316. The numerous gorges in the neighbouring rocks have been taken advantage of to surround the city with a series of lakes, which, shaded by fine trees and bordered by fantastic crags, add much beauty to the suburbs. The city itself is modern, and is laid out in wide and regular streets. A streamlet separ- ates the civil station and cantonment from the native quarter; but, though the climate is mild, a swampy hollow beneath renders the site unhealthy for Europeans. Formerly the capital of the Saugor and Nerbudda territories, Jubbulpore is now the headquarters of a brigade in the 5th division of the southern army. It is also one of the most important railway centres in India, being the junction of the Great Indian Peninsula and the East Indian systems. It has a steam cotton-mill. The govern- ment college educates for the science course of the Allahabad University, and also contains law and engineering classes; there are three aided high schools, a law class, an engineering class and normal schools for male and female teachers. A native associa- tion, established in 1869, supports an orphanage, with help from government. A zenana mission manages 13 schools for girls. Waterworks were constructed in 1882.

The District of Jubbulpore lies on the watershed between the Nerbudda and the Son, but mostly within the valley of the former river, which here runs

through the famous gorge known as the Marble rocks, and falls 30 ft. over a rocky ledge (the Dhuan dhar, or " misty shoot "). Area, 3912 sq. m. It consists of a long narrow plain running north-east and south-west, and shut in on all sides by highlands. This plain, which forms an off- shoot from the great valley of the Nerbudda, is covered in its western and southern portions by a rich alluvial deposit of black cotton-soil. At Jubbulpore city the soil is sandy, and water plentiful near the surface. The north and east belong to the Ganges and Jumna basins, the south and west to the Nerbudda basin. In 1901 the population was 680,585, showing a decrease of 9% since 1891, due to the results of famine. The principal crops are wheat, rice, pulse and oil-seeds. A good deal of iron- smelting with charcoal is carried on in the forests, manganese ore is found, and limestone is extensively quarried. The district is traversed by the main railway from Bombay to Calcutta, and by new branches of two other lines which meet at Katni junc- tion. Jubbulpore suffered severely in the famine of 1896-1897, the distress being aggravated by immigration from the adjoining native states. Fortunately the famine of 1900 was less severely felt.

The early history of Jubbulpore isunknown; but inscriptions record the existence during the nth and 12th centuries of a local line of princes of that Haihai race which is closely connected with the history of Gondwana. In the 16th century the Gond raja of Garha Mandla extended his power over fifty-two districts, including the present Jubbulpore. During the minority of his grandson, Asaf Khan, the viceroy of Kara Manikpur, conquered the Garha principality and held it at first as an independent chief. Eventually he submitted to the emperor Akbar. The Delhi power, however, enjoyed little more than a nominal supremacy ; and the princes of. Garha Mandla main- tained a practical independence until their subjugation by the Mahratta governors of Saugor in 1781. In 1798 the peshwa granted the Nerbudda valley to the Bhonsla princes of Nagpur, who continued to hold the district until the British occupied it in 1818.

The Division of Jubbulpore lies mainly among the Vindhyan and Satpura hill systems. It comprises the five following districts: Jubbulpore, Saugor, Damoh, Seoni and Mandla. Area, 18,950 sq. m.; pop. (1901), 2,081,499.

JUBE\ the French architectural term (taken from the impera- tive of Lat. jubere, to order) for the chancel or choir screen, which in England is known as the rood-screen (see Rood). Above the screen was a gallery or loft, from which the words " Jube Domine benedicere " were spoken by the deacon before the reading of the Gospel, and hence probably the name. One of the finest jubes in France is that of the church of the Madeleine

at Troyes, in rich flamboyant Gothic. A later example, of the Renaissance period, c. 1600, is in the church of St Etienne du Mont, Paris. In the Low

Countries there are many fine exam- ples in marble, of which one of the most perfect from Bois-le- Duc is now in the Victoria and Albert Museum.

JUBILEE (or Jubile), YEAR OF, in the Bible, the name applied in the Holiness section of the Priestly Code of the Hexateuch (Lev. xxv.) to the observance of every 50th year, determined by the lapse of seven seven-year periods as a year of perfect rest, when there was to be no sowing, nor even gathering of the natural products of the field and the vine. At the beginning of the jubilee-year the liberation of all Israelitish slaves and the restoration of ancestral possessions was to be proclaimed. As regards the meaning of the name " jubilee " (Heb. yobel) modern scholars are agreed that it signifies " ram " or " ram's horn." ' Year of jubilee " would then mean the year that is inaugurated by the blowing of the ram's horn (Lev. xxv. 9).

According to Lev. xxv. 8-12, at the completion of seven sabbaths of years {i.e. 7X7 = 49 years) the trumpet of the jubilee is to be sounded " throughout the land " on the 10th day of the seventh month (Tisri 10), the great Day of Atonement. The 50th year thus announced is to be " hallowed," i.e. liberty l is to be proclaimed everywhere to everyone, and the people are to return " every man unto his possession and unto his family." As in the sabbatical year, there is to be no sowing, nor reaping that which grows of itself, nor gathering of grapes.

As regards real property (Lev. xxv. 13-34) the law is that if any Hebrew under pressure of necessity shall alienate his pro- perty he is to get for it a sum of money reckoned according to the number of harvests to be reaped between the date of alienation and the first jubilee-year: should he or any relation desire to redeem the property before the jubilee this can always be done be repaying the value of the harvests between the redemption and the jubilee.

This legal enactment, though it is not found (nor anything like it) in the earlier collections of laws, is evidently based on (or modified from) an ancient custom which conferred on a near kinsman the right of pre-emption as well as of buying back (cf. Jer. xxxii. 6 sqq.). The tendency to impose checks upon the alienation of landed property was exceptionally strong in Israel. The fundamental principle is that the land is a sacred possession belonging to Yahweh. As such it is not to be alienated from Yahweh's people, to whom it was originally assigned. In Eze- kiel's restoration programme " crown lands presented by the ' prince ' to any of his officials revert to the crown in the year of liberty (? jubilee year)"; only to his sons may any portion of his inheritance be alienated in perpetuity (Ezek. xlvi. 16-18; cf. Code of Hammurabi, § 38 seq.).

The same rule applies to dwelling-houses of un walled villages; the case is

different, however, as regards dwelling-houses in walled cities. These may be redeemed within a year after trans- fer, but if not redeemed within that period they continue per- manently in possession of the purchaser, and this may well be an echo of ancient practice. An exception to this last rule is made for the houses of the Levites in the Levitical cities.

As regards property in slaves (Lev. xxv. 35-55) the Hebrew whom necessity has compelled to sell himself into the service of his brother Hebrew is to be treated as a hired servant and sojourner, and to be released absolutely at the jubilee; non- Hebrew bondmen, on the other hand, are to be bondmen for ever. But the Hebrew who has sold himself to a stranger or sojourner is entitled to freedom at the year of jubilee, and further is at any time redeemable by any of his kindred — the redemption price being regulated by the number of years to run between the redemption and the jubilee, according to the ordinary wage of hired servants. Such were the enactments of the Priestly Code — which, of course, represents the latest legislation of the Pentateuch (post-exilic). These enactments, in order to be understood rightly, must be viewed in relation to the earlier

1 Heb. deror. The same word (duraru) is used in the Code of Hammurabi in the similar enactment that wife, son or daughter sold into slavery for debt are to be restored to liberty in the fourth year (§ 117).

similar provisions in connexion with the sabbatical (seventh) year. " The foundations of Lev. xxv. are laid in the ancient provisions of the Book of the Covenant (Exod. xxi. 2 seq.; xxiii. 10 seq.) and in Deuteronomy (xv.). The Book of the Covenant enjoined that the land should lie fallow and Hebrew slaves be liberated in the seventh year; Deuteronomy required in addition the remission of debts " (Benzinger). Deuteronomy, it will be noticed, in accordance with its humanitarian tendency, not only liberates the slave but remits the debt. It is evident that these enactments proved impracticable in real life (cf. Jer. xxxiv. 8 seq.), and so it became necessary in the later legislation of P, represented in the present form of Lev. xxv., to relegate them to the 50th year, the year of jubilee. The latter, however, was a purely theoretic development of the Sabbath idea, which could never have been reduced to practice (its actual observance would have necessitated that for two consecutive years — the 49th and 50th — absolutely nothing could be reaped, while in the 51st only summer fruits could be obtained, sowing being prohibited in the 50th year). That in practice the enactments for the jubilee-year were disregarded is evidenced by the fact that, according to the unanimous testimony of the Talmudists

and Rabbins, although the jubilee-years were " reckoned " they were not observed.

The conjecture of Kuenen, supported by Wellhausen, that originally Lev. xxv. 8 seq. had reference to the seventh year is a highly probable one. This may be the case also with Ezek. xlvi. 16-18 (cf. Jer. xxxiv. 14). A later Rabbinical device for evading l he provisions of the law was the prosbul (ascribed to Hillel) — i.e. a condition made in the presence of the judge securing to the creditor the right of demanding repayment at any time, irrespective of the year of remission. Further enactments regarding the jubilee are found in Lev. xxvii. 17-25 and Num. xxxvi. 4. (W. R. S.; G. H. Bo.)

JUBILEES, BOOK OF, an apocryphal work of the Old Testa- ment. The Book of Jubilees is the most advanced pre-Christian representative of the Midrashic tendency, which had already been at work in the Old Testament Chronicles. As the chronicler had rewritten the history of Israel and Judah from the stand- point of the Priests' Code, so our author re-edited from the Pharisaic standpoint of his time the history of the world from the creation to the publication of the Law on Sinai. His work constitutes the oldest commentary in the world on Genesis and part of Exodus, an enlarged Targum on these books, in which difficulties in the biblical narration are solved, gaps supplied, dogmatically offensive elements removed and the genuine spirit of later Judaism infused into the primitive history of the world. Titles 0} the Book. — The book is variously entitled. First, it is known as to. 'loofirfKala, 01 'Icoj3t/Xcuoi, Heb. d'Sti-h. This name is admirably adapted to our book, as it divides into jubilee periods of forty-nine years each the history of the world from the creation to the legislation on Sinai. Secondly, it is frequently designated " The Little Genesis," 17 Xeirrri Teveas or 17 MiKpoyeveais, Heb. ran rvcx-n. This title may have arisen from its dealing more fully with details and minutiae than the biblical work. For the other names by which it is referred to, such as The Apocalypse of Moses, The Testament of Moses, The Book of Adam's Daughters and the Life of Adam, the reader may consult Charles's The Book of Jubilees, pp. xvii.-xx.

Object. — The object of our author was the defence and expo- sition of Judaism from the Pharisaic standpoint of the 2nd century b.c. against the disintegrating effects of Hellenism. In his elaborate defence of Judaism our author glorifies circumcision and the sabbath, the bulwarks of Judaism, as heavenly ordi- nances, the sphere of which was so far extended as to embrace Israel on earth. The Law, as a whole, was to our author the realization in time of what was in a sense timeless and eternal. Though revealed in time it was superior to time. Before it had been made known in sundry portions to the fathers, it had been kept in heaven by the angels,

and to its observance there was no limit in time or in eternity. Our author next defends Judaism by his glorification of Israel. Whereas the various nations of the Gentiles were subject to angels, Israel was subject to God alone.

Israel was God's son, and not only did the nation stand in this relation to God, but also its individual members. Israel received circumcision as a sign that they were the Lord's, and this privi- lege of circumcision they enjoyed in common with the two highest orders of angels. Hence Israel was to unite with God and these two orders in the observance of the sabbath. Finally the des- tinies of the world were bound up with Israel. The world was renewed in the creation of the true man Jacob, and its final renewal was to synchronize with the setting-up of God's sanc- tuary in Zion and the establishment of the Messianic kingdom. In this kingdom the Gentiles had neither part nor lot.

Versions: Greek, Syriac, Ethiopic and Latin. — Numerous frag- ments of the Greek Version have come down to us in Justin Martyr, Origen, Diodorus of Antioch, Isidore of Alexandria, Epiphanius, John of Malala, Syncellus and others. This version was the parent of the Ethiopic and Latin. The Ethiopic Version is most accurate and trustworthy, and indeed, as a rule, slavishly literal. It has naturally suffered from the corruptions incident to transmission through MSS. Thus dittographies are frequent and lacunae of occasional occurrence, but the version is singularly free from the glosses and corrections of unscrupulous scribes. The Latin Version, of which about one-fourth has been preserved, is where it exists of almost equal value with the Ethiopic. It has, however, suffered more at the hands of correctors. Notwithstanding, it attests a long array of passages in which it preserves the true text over against corruptions or omissions in the Ethiopic Version. Finally, as re- gards the Syriac Version, the evidence for its existence is not con- clusive. It is based on the fact that a British Museum MS. contains a Syriac fragment entitled " Names of the wives of the Patriarchs according to the Hebrew Book of Jubilees."

The Ethiopic and Latin Versions: Translations from the Greek. — The Ethiopic Version is translated from the Greek, for Greek words such as 5p0s, |8aXacos, Xiˆ, &c, are transliterated in the Greek. Secondly, many passages must be retranslated into Greek before we can dis- cover the source of the various corruptions. And finally, proper names are transliterated as they appear in Greek and not in Hebrew. That the Latin is also a translation from the Greek is no less obvious. Thus in xxxix. 12 timoris = 8ti\ias, corrupt for SouXcios; in xxxviii. 13 honorem = Tinr)j>, but riˆ-qv should here have been rendered by tributum, as the Ethiopic and the context require; in xxxii. 26, celavit = l/cpuˆe, corrupt for Zypaipe (so Ethiopic).

The Greek a Translation from the Hebrew. — The early date of our book — the 2nd century B.C. — and its place of composition speak for a Semitic original, and the evidence bearing on this subject is con- clusive. But the question at once arises, was the original Aramaic or Hebrew? Certain proper names in the Latin Version ending in -in seem to bespeak an Aramaic original, as Cettin, Filistin, &c. But since in all these cases the Ethiopic transliterations end in -m and not in n, it is not improbable that the Aramaism in the Latin Version is due to the translator, who, it has been concluded on other grounds, was a Palestinian Jew. 1 The grounds, on the other hand, for a Hebrew original are weighty and numerous. (1) A work which claims to be from the hand of Moses would naturally be in Hebrew, for Hebrew according to our author was the sacred and national language. (2) The revival of the national spirit of a nation is universally, so far as we know, accompanied by a revival of the national language. (3) The text

must be retranslated into Hebrew in order to explain unintelligible expressions and restore the true text. One instance will sufficiently illustrate this statement. In xliii. II a certain Ethiopic expression = kv k/ioi, which is a mis translation of '3; for '3 in this context, as we know from the parallel passage in Gen. xliv. 18, which our text reproduces almost verbally, =bkonai. We might observe here that our text attests the presence of dittographies already existing in the Hebrew text. (4) Hebraisms survive in the Ethiopic and Latin Versions. In the former nuha in iv. 4, is a corrupt transliteration of jh. In the Latin eligere in te in xxii. 10 is a reproduction of 3 Tin and in qua . . . in ipsa in xix. 8 = m . . . ito. This idiom could, of course, be explained on the hypothesis of an Aramaic original. (5) Many paronomasiae discover themselves on retranslation into Hebrew.

Textual Affinities. — A minute study of the text shows that it attests an independent form of the Hebrew text of the Pentateuch. Thus it agrees at times with the Samaritan, or Septuagint, or Syriac, or Vulgate, or even with Onkelos against all the rest. To be more exact, our book represents some form of the Hebrew text of the Pentateuch midway between the forms presupposed by the Septua- gint and the Syriac ; for it agrees more frequently with the Septuagint, or with combinations into which the Septuagint enters, than with

1 In the Ethiopic Version in xxi. 12 it should be observed that in the list of the twelve trees suitable for burning on the altar several are transliterated Aramaic names of trees. But in a late Hebrew work (2nd century B.C.) the popular names of such objects would naturally be used. In certain cases the Hebrew may have been forgotten, I or, where the tree was of late introduction, been non-existent.

any other single authority, or with any combination excluding the Septuagint. Next to the Septuagint it agrees most often with the Syriac or with combinations into which the Syriac enters. On the other hand, its independence of the Septuagint is shown in a large number of passages, where it has the support of the Samaritan and Massoretic, or of these with various combinations of the Syriac Vulgate and Onkelos. From these and other considerations we may conclude that the textual evidence points to the composition of our book at some period between 250 B.C. and a.d. 100, and at a time nearer the earlier date than the later.

Date. — The book was written between 135 B.C. and the year of Hyrcanus's breach with the Pharisees. This conclusion is drawn from the

following facts: — (1) The book was written during the pontificate of the Maccabean family, and not earlier than 135 B.C. For in xxxii. 1 Levi is called a "priest of the Most High God." Now the only high priests who bore this title were the Maccabean, who appear to have assumed it as reviving the order of Melchizedek when they displaced the Zadokite order of Aaron. Jewish tradition ascribes the assumption of this title to John Hyrcanus. It was retained by his successors down to Hyrcanus II. (2) It was written before 96 B.C. or some years earlier in the reign of John Hyrcanus; for since our author is of the strictest sect a Pharisee and at the same time an upholder of the Maccabean pontificate, Jubilees cannot have been written after 96 when the Pharisees and Alexander Jannaeus came to open strife. Nay more, it cannot have been written after the open breach between Hyrcanus and the Pharisees, when the former joined the Sadducean party.

The above conclusions are confirmed by a large mass of other evidence postulating the same date. We may, however, observe that our book points to the period already past — of stress and persecution that preceded the recovery of national independence under the Maccabees, and presupposes as its historical back- ground the most flourishing period of the Maccabean hegemony. Author. — Our author was a Pharisee of the straitest sect. He maintained the everlasting validity of the law, he held the strictest views on circumcision, the sabbath, and the duty of shun- ning all intercourse with the Gentiles; he believed in angels and in a blessed immortality. In the next place he was an upholder of the Maccabean pontificate. He glorifies Levi's successors as high-priests and civil rulers, and applies to them the title assumed by the Maccabean princes, though he does not, like the author of the Testaments of the Twelve Patriarchs, expect the Messiah to come forth from among them. He may have been a priest.

The Views of the Author on the Messianic Kingdom and the Future Life. — According to our author the Messianic kingdom was to be brought about gradually by the progressive spiritual develop- ment of man and a corresponding transformation of nature. Its members were to reach the limit of 1000 years in happiness and peace. During its continuance the powers of evil were to be restrained, and the last judgment was apparently to take place at its close. As regards the doctrine of a future life, our author adopts a position novel for a Palestinian writer. He abandons the hope of a resurrection of the body. The souls of the righteous are to enjoy a blessed immortality after death. This is the earliest attested instance of this expectation in the last two centuries B.C.

Literature. — Ethiopic Text and Translations: This text was first edited by Dillmann from two MSS. in 1859, and in 1895 by R. H. Charles from four (The Ethiopic Version of the Hebrew Book of Jubilees . . . with the Hebrew, Syriac, Greek and Latin fragments). In the latter edition, the Greek and

Latin fragments are printed together with the Ethiopic. The book was translated into German by Dillmann from one MS. in Ewald's Jahrbiicher, vols. ii. and iii.f (1850, 1 851), and by Littmann (in Kautzsch's Apok. und Pseud, ii. 39-119) from Charles's Ethiopic text; into English by Schodde (Bibl. Sacr. 18S5) from Dillmann's text, and by Charles (Jewish Quarterly Review, vols, v., vi., vii. (1893-1895) from the text afterwards published in 1895, and finally in his commentary, The Book of Jubilees (1902). Critical Inquiries: Dillmann, " Das Buch der Jubilaen " (Ewald's Jahrbiicher d. bibl. Wissensch. (1851), Hi. 72-96); " Pseudepig. des Alten Testaments," Herzog's Realencyk? xii. 364-365 ; " Beitrage aus dem Buche der Jubilaen zur Kritik des Pentateuch Textes " (Sitzungs- berichte der Kgl. Preussischen Akad., 1883) ; Beer, Das Buch der Jubi- laen (1856) ; Ronsch, Das Buch der Jubilaen (1874) ; Singer, Das Buch der Jubilaen (1898) ; Bohn, " Die Bedeutungdes Buches der Jubilaen" (Theol. Stud, und Kritiken (1900), pp. 167-184). A full bibliography

will be found in Schurer or in R. H. Charles's commentary, The Book of Jubilees or the Little Genesis (1902), which deals exhaustively with all the questions treated in this article. (R. H. C.)

JUBILEE YEAR, an institution in the Roman Catholic Church, observed every twenty-fifth year, from Christmas to Christmas. During its continuance plenary indulgence is obtainable by all the faithful, on condition of their penitently confessing their sins and visiting certain churches a stated number of times, or doing an equivalent amount of meritorious work. The institution dates from the time of Boniface VIII. , whose bull Antiquorum habetfidem is dated the 22nd of February 1300. The circumstances in which it was promulgated are related by a contemporary authority, Jacobus Cajetanus, according to whose account (" Relatio de centesimo s. jubilaeo anno " in the Bibliotheca Patrum) a rumour spread through Rome at . the close of 1299 that every one visiting St Peter's on the 1st of January 1300 would receive full absolution. The result was an enormous influx of pilgrims to Rome, which stirred the pope's attention. Nothing was found in the archives, but an old peasant 107 years of age avowed that his father had been similarly benefited a century previously. The bull was then issued, and the pilgrims became even more numerous, to the profit of both clergy and citi- zens. Originally the churches of St Peter and St Paul in Rome were the only jubilee churches, but the privilege was afterwards extended to the Lateran Church and that of Sta Maria Maggiore, and it is now shared also for the year immediately following that of the Roman jubilee by a number of specified provincial churches. At the request of the Roman people, which was supported by St Bridget of Sweden and by Petrarch, Clement VI. in 1343 appointed, by the bull Unigenitus Dei filius, that the jubilee should recur every fifty years instead of every hundred years as had been originally contemplated in the

constitution of Boniface; Urban VI., who was badly in need of money, by the bull Sahator noster in 1389 reduced the interval still further to thirty-three years (the supposed duration of the earthly life of Christ) ; and Paul II. by the bull Inefabilis (April 19, 1470) finally fixed it at twenty-five years. Paul II. also permitted foreigners to substi- tute for the pilgrimage to Rome a visit to some specified church in their own country and a contribution towards the expenses of the Holy Wars. According to the special ritual prepared by Alexander VI. in 1500, the pope on the Christmas Eve with which the jubilee begins goes in solemn procession to a particular walled-up door (" Porta aurea ") of St Peter's and knocks three times, using at the same time the words of Ps. cxviii. 19 (Aperite mihi portas justitiae) . The doors are then opened and sprinkled with holy water, and the pope passes through. A similar cere- mony is conducted by cardinals at the other jubilee churches of the city. At the close of the jubilee, the special doorway is again built up with appropriate solemnities.

The last ordinary jubilee was observed in 1900. " Extraordinary" jubilees are sometimes appointed on special occasions, e.g. the acces- sion of a new pope, or that proclaimed by Pope Leo XIII. for the 12th of March 1881, " in order to obtain from the mercy of Almighty God help and succour in the weighty necessities of the Church, and comfort and strength in the battle against her numerous and mighty foes." These are not so much jubilees in the ordinary sense as special grants of plenary indulgences for particular purposes (Indul- gentiae plenariae in forma jubilaei).

JUCAR, a river of eastern Spain. It rises in the north of the province of Cuenca, at the foot of the Cerro de San Felipe (5906 ft.), and flows south past Cuenca to the borders of Albacete; here it bends towards the east, and maintains this direction for the greater part of its remaining course. On the right it is connected with the city of Albacete by the Maria Cristina canal. After entering Valencia, it receives on the left its chief tributary the Cabriel, which also rises near the Cerro de San Felipe, in the Montes Universales. Near Alcira the Jucar turns south-east- ward, and then sharply north, curving again to the south-east before it enters the Mediterranean Sea at Cullera, after a total course of 314 m. Its estuary forms the harbour of Cullera, and its lower waters are freely utilized for purposes of irrigation.

JUD, LEO (1482-1542), known to his contemporaries as Meister Leu, Swiss reformer, was born in Alsace and educated

at Basel, where after a course in medicine he turned to the study of theology. This change was due to the influence of Zwingli whose colleague at Zurich Jud became after serving for four years (1518-1522) as pastor

of Einsiedeln. His chief activity was as a translator; he was the leading spirit in the translation of the Zurich Bible and also made a Latin version of the Old Testament. He died at Zurich on the 19th of June 1542.

See Life by C. Pestalozzi (i860); art. in Herzog-Hauck's Real-encyktopddie, vol. ix. (1901).

JUDAEA, the name given to the southern part of Palestine as occupied by the Jewish community in post-exilic days under Persian, Greek and Roman overlordship. In Luke and Acts the term is sometimes used loosely to denote the whole of western Palestine. The limits of Judaea were never very precisely defined and — especially on the northern frontier — varied from time to time. After the death of Herod, Archelaus became ethnarch of Samaria, Idumea and Judaea, and when he was deposed Judaea was merged in Syria, being governed by a pro- curator whose headquarters were in Caesarea.

For a description of the natural features of the country see Palestine; for its history see Jews and Judah. Cf. T. Mommsen, The Provinces of the Roman Empire, ch. xi.

JUDAH, a district of ancient Palestine, to the south of the kingdom of Israel, between the Dead Sea and the Philistine plain. It falls physically into three parts: the hill-country from Hebron northwards through Jerusalem; the lowland (Heb. Shlphelah) on the west; and the steppes or " dry land " (Heb. Negeb) on the south. The district is one of striking contrasts, with a lofty and stony table-land in the centre (which reaches a height of 3300 ft. just north of Hebron), with a strategically important valley dividing the central mountains from the low- land, and with the most desolate of tracts to the east (by the Dead Sea) and south. Some parts, especially around Hebron, are extremely fertile, but the land as a whole has the character-istics of the southern wilderness — the so-called " desert " is not a sterile Sahara — and was more fitted for pastoral occupa- tions; see further G. A. Smith, Hist. Geog. Holy Land, chs. x.xv. Life in ancient Judah is frequently depicted in the Bible, but much of the Judaean history is obscure. In the days of the old Hebrew monarchy there were periods of conflict and rivalry between Judah and Israel — even times when the latter incor porated, or at least claimed supremacy over, the former. Later, from the 5th century B.C. there was a breach between the Jews (the name is derived from Judah) and the Samaritans {q.v.). The intervening years after the fall of Samaria (722 B.C.), and after the destruction of Jerusalem (586 B.C.), were probably marked by closer intercourse, similar to the period of union in the popular traditions relating to the pre-monarchical age. The course of Judaean history was conditioned, also, by the proximity of the Philistines in the west, Moab in the east, and by Edom and other southern peoples*

extending from North Arabia to the delta of the Nile. Judah's stormy history, con- tinued under Greek and Roman domination, reached its climax in the birth of Christianity, and ended with the fall of Jerusalem in a.d. 70 (see Jews, Palestine).

In conformity with ancient methods of genealogy (q.v.), Judah is traced back to a son of Jacob or Israel by Leah and along with other " tribes " (Dan, Levi, Simeon, &c.) is included under the collective term Israel. Thus it shares the general traditions of the Israelites, although Judah appears as an individual in the story of his " brother " Joseph (on ch. xxxvii. seq., see Genesis). Its boundaries in Joshua xv. are manifestly artificial or imaginary; they include the Philistines and number places which are elsewhere ascribed to Simeon or Dan. The origin of the name (Yehudah) is quite uncertain; the interpretation " praised " is suggested in Gen. xxix. 35 (cf. xlix. 8 seq.), but some connexion with allied names, as Yehiid (Yahudiya, E. of Jaffa), or Ehud (a Benjamite clan) seems more probable. That Judah, whatever its original connotation, underwent development through the incorporation of other clans appears from 1 Chron. ii., iv., where it is found to contain a large element of non-Israelite population whose names find analogies or parallels in Simeonite, Edomite and other southern lists. 1 Indeed,

1 See especially Wellhausen, De gentibus et familiis Judaeorum (Gottingen, 1869), the articles on the relative proper names in the Ency. Bib., and E. Meyer, Die Israelite, u. ihre Nachbarstamme, pp. 299-471 (much valuable matter).*

underlying the account of the Israelite exodus {q.v.) there are traces of a separate movement of certain clans — apart from the Israelite inva- sion of Palestine — who are ultimately found in the south of Judah; and the traditions in Chronicles themselves allow the view that the incorporation of these elements began under David, when Judah first occupies a prominent position in biblical history (cf. Cheyne, Ency. Bib., col. 2618 seq., and see Caleb, Jerahmeel, Kenites). But such movements were not necessarily limited to one single period, and the evidence connecting (a) the non-Israelite clans of Judah with Levites, and (b) both with the south, is found in narratives referring to several different ages and might point to an unceasing relationship withthe south. On the other hand, clans, which in the traditions of David's time were in the south of Judah, about five hundred years later (in the exile) are found near Jerusalem (e.g. Caleb), so that either these survived the strenuous vicissitudes of half a millennium or all perspective of their early history has been lost. In Gen. xxxviii. a curious narrative points to the separation of Judah " from his brethren"

and his marriage with Shua the Canaanite; two sons Er and Onan perish and the third Shelah survives. From Judah and Er's widow Tamar are derived Perez and Zerah, and these with Shelah appear in post-exilic times as the three representative families of Judah (Neh. xi. 4-6 ; 1 Chron. ix. 4-6). This story, amid a number of other motives, appears to reflect the growth of the tribe of Judah and its fluctuations, but that the reference is to any very early period is unlikely, partly because the interest of the story is in post- exilic families, and partly because the scenes (Adullam, Chezib and Timnah) overlap with David's own fights between Hebron and Jerusalem (2 Sam. xxi. xxiii. ; see David, ad fin.). 2 Even David's conquest of Jerusalem (2 Sam. v.) conflicts both with the statement of its capture by Judah many years previously (Judges i. 8), and with the traditions of the Israelite heroes Joshua and Saul. Conse- quently, the few surviving data are too uncertain for any decisive conclusions regarding the origin of the tribe of Judah. Judah as a kingdom may have taken its name from a limited district, in which case its growth finds a parallel in the extension of the name Samaria from the city to the province. The location of Yehud and Ehud in the light of 1 Kings iv. 8-19 (perhaps the subdivisions of the Israelite kingdom, see Solomon), would necessitate the assumption of a violent separation from the north ; this, however, is quite conceivable (see Jews, §§ 11-13). On the bearing of South Judah upon the historical criticism of the Old Testament, see especially N. Schmidt, Hibbert Journal (1908), pp. 322-342, " The Jerahmeel Theory and the Historic Importance of the Negeb, with some account of personal exploration of the country "; also Jews, § 20. (S. A. C.)

JUDAS ISCARIOT ('lovSas TffKaptwrijs or 'lo-napuhd), in the Bible, the son of Simon Iscariot (John vi. 71, xiii. 26), and one of the twelve apostles. He is always enumerated last with the special mention of the fact that he was the betrayer of Jesus. If the generally accepted explanation of his surname (" man of Kerioth "; see Josh. xv. 25) be correct, he was the only original member of the apostolic band who was not a Galilean. The circumstances which led to his admission into the apostolic circle are not stated; while the motives by which he was actuated in enabling the Jewish authorities to arrest Jesus without tumult have been variously analysed by scholars. According to some (as De Quincey in his famous Essay) the sole object of Judas was to place Jesus in a position in which He should be compelled to make what had seemed to His followers the too tardy display of His Messianic power: according to others (and this view seems more in harmony with the Gospel narratives) Judas was an avaricious and dishonest man, who had already abused the con- fidence placed in him (John xii. 6), and who was now concerned only with furthering his own ends.

As regards the effects of his subsequent remorse and the use to which his

ill-gotten gains were put, the strikingly apparent discrepancies between the narratives of Matt, xxvii. 3, 10 and Acts i. 18, 19 have attracted the attention of biblical scholars, ever since Papias, in his fourth book, of which a fragment has been preserved, discussed the subject. The simplest explanation is that they represent different traditions, the Gospel narrative being composed with more special reference to prophetic fulfil- ments, and being probably nearer the truth than the short explanatory note inserted by the author of the Acts (see Bernard, Expositor, June 1904, p. 422 seq.). In ecclesiastical legend and

2 For the principle of the Levirate illustrated in Gen. xxxviii., see Ruth. Lagarde (Orientalia, ii.) ingeniously conjectured that the chapter typified the suppression of Phoenician (viz. Tamar, the date-palm) and the old Canaanite elements (Zerah = indigena) by the younger Israelite invaders (Perez = " branch "). For other discussions, apart from commentaries on Genesis, see B. Luther in Meyer, op. cit., pp. 200 sqq.

in sacred art Judas Iscariot is generally treated as the very in- carnation of treachery, ingratitude and impiety. The Middle Ages, after their fashion, supplied the lacunae in what they deemed his too meagre biography. According to the common form of their story, he belonged to the tribe of Reuben. 1 Before he was born his mother Cyborea had a dream that he was destined to murder his father, commit incest with his mother, and sell his God. The attempts made by her and her husband to avert this curse simply led to its accomplishment. At his birth Judas was enclosed in a chest and flung into the sea; picked up on a foreign shore, he was educated at the court until a murder committed in a moment of passion compelled his flight. Coming to Judaea, he entered the service of Pontius Pilate as page, and during this period committed the first two of the crimes which had been expressly foretold. Learning the secret of his birth, he, full of remorse, sought the prophet who, he had heard, had power on earth to forgive sins. He was accepted as a disciple and pro- moted to a position of trust, where avarice, the only vice in which he had hitherto been unpractised, gradually took possession of his soul, and led to the complete fulfilment of his evil destiny. This Judas legend, as given by Jacobus de Voragine, obtained no small popularity; and it is to be found in various shapes in every important literature of Europe.

For the history of its genesis and its diffusion the reader may consult D'Ancona, La leggenda di Vergogna e la leggenda di Giuda (1869), and papers by W. Creizenach in Paul and Braune's Beitr. zur Gesch. der

deutschen Sprache und Litteratur, vol. ii. (1875), and Victor Diederich in Russiche Revue (1880). Cholevius, in his Gcschichte der deutschen Poesie nach ihren antiken Elementen (1854), pointed out the connexion of the legend with the Oedipus story. According to Daub {Judas Ischariot, oder Betrachtungen uber das Bbse im Verhdltniss zum Guten, 1816, 1818) Judas was " an incarna- tion of the devil," to whom " mercy and blessedness are alike impossible."

The popular hatred of Judas has found strange symbolical expression in various parts of Christendom. In Corfu, for instance, the people at a given signal on Easter Eve throw vast quantities of crockery from their windows and roofs into the streets, and thus execute an imaginary stoning of Judas (see Kirkwall, Ionian Islands, ii. 47). At one time (according to Mustoxidi, Delle cose corciresi) the tradition prevailed that the traitor's house and country villa existed in the island, and that his descendants were to be found among the local Jews.

Details in regard to some Judas legends and superstitions are given in Notes and Queries, 2nd series, v., vi. and vii. ; 3rd series, vii. ; 4th series, i. ; 5th series, vi. See also a paper by Professor Rendel Harris entitled " Did Judas really commit suicide?" in the American Journal of Philology (July 1900). Matthew Arnold's poem " St Brandan " gives fine expression to the old story that, on account of an act of charity done to a leper at Joppa, Judas was allowed an hour's respite from hell once a year. (G.Ml.)

JUDAS-TREE, the Cercis siliquastrum of botanists, belonging to the section Caesalpineae of the natural order Leguminosae. It is a native of the south of France, Spain, Portugal, Italy, Greece and Asia Minor, and forms a handsome low tree with a flat spread- ing head. In Spring it is covered with a profusion of purplish- pink flowers, which appear before the leaves. The flowers have an agreeable acid taste, and are eaten mixed with salad or made into fritters. The tree was frequently figured by the older herbalists. One woodcut by Castor Durante has the figure of Judas Iscariot suspended from one of the branches, illustrating the popular tradition regarding this tree. A second species, C. canadensis, is common in North America from Canada to Alabama and eastern Texas, and differs from the European species in its smaller size and pointed leaves. The flowers are also used in salads and for making pickles, while the branches are used to dye wool a nankeen colour.

JUDD, SYLVESTER (1813-1853) American Unitarian clergy- man and author, was born in Westhampton, Massachusetts, on the 23rd of July 1813. He bore the same name as his father and grandfather; the former (1789-1860) made an especial study of local history of the towns of the Connecticut valley, and wrote a History of Hadley (1863). The son lived in

North- ampton after his tenth year, was converted in a revival there in 1826, graduated from Yale in 1836, and taught in 1836 at

1 Other forms make him a Danite, and consider the passage in Genesis (xlix. 17) a prophecy of the traitor.

Templeton, Mass., where he first met Unitarians and soon found the solution of his theological difficulties in their views. He entered the Harvard divinity school, from which he graduated in 1840. In the same year he was ordained pastor of the Unitarian church of Augusta, Maine, where he died on the 26th of January 1853. His widest reputation was as the author of Margaret, a Tale of the Real and the I deal, including Sketches of a place not before described, called Mons Christi (1845; revised 185 1), written to exhibit the errors of Calvinistic and all trinitarian theology, and the evils of war, intemperance, capital punish- ment, the prison system of the time, and the national treatment of the Indians. This story, published anonymously, attracted much attention by its true descriptions of New England life and scenery as well as by its author's earnest purpose. Richard Edney and the Governor's Family (1850) is in much the same vein as Margaret. A poem entitled Philo, an Evangeliad (1850) is a versified defence of Unitarianism. He published, besides, The Church, in a Series of Discourses (1 8 54) . As a preacher and pastor he urged the desirability of infant baptism. He lectured frequently on international peace and opposed slavery.

See Arethusa Hall, Life and Character of the Rev. Sylvester Judd (Boston, 1857) published anonymously.

JUDE, THE GENERAL EPISTLE OF, a book of the New Testament. As with the epistle of James, the problems of the writing centre upon the superscription, which addresses in Pauline phraseology (1 Thess. i. 4; 2 Thess. ii. 13; Rom. i. 7; 1 Cor. 1. 2) the Christian world in general in the name of "Jude, the brother of James" (Matt. xiii. 55; Mark vi. 3). The historical situation depicted must then fall within the lifetime of this Judas, whose two grandchildren Zoker and James (Hegesippus ap. Phil. Sidetes) by their testimony before the authorities brought to an end the (Palestinian) persecution of Domitian (Hegesippus ap. Eus. H. E. iii. 20, 7). These two grandsons of Judas thereafter " lived until the time of Trajan," ruling the churches " because they had (thus) been witnesses (martyrs) and were also relatives of the Lord." But in that case we must either reject the testimony of the same Hegesippus that up to their death, and that of Symeon son of Clopas, successor in the Jerusalem see of James the Lord's brother, " who suffered martyrdom at the age of one hundred and twenty years while Trajan was emperor and Atticus governor," " the church (universal) had remained a pure and uncorrupted virgin " free from " the folly of heretical teachers "; or else we must reject the superscription,

which presents the grandfather in vehement conflict with the very heresies in question. For the testimony of Hegesippus is explicit that at the time of the arrest of Zoker and James they were all who survived of the kindred of the Lord. True, there is confusion in the narrative of Hegesippus, and even a probability that the martyrdom of Symeon dated under Trajan really took place in the persecution of Domitian,before the arrest of the grandsons of Jude, for apart from the alleged age of Symeon (the traditional Jewish limit of human life, Gen. vi. 3, Deut. xxxiv. 7), the cause of his appre- hension " on the ground that he was a descendant of David and a Christian " (Hegesippus ap. Eus. H. E. iii. 3 2, 3) is inconsistent with both the previous statements regarding the " martyrdom " of Zoker and James, that they were cited as the only surviving Christian Davididae, and that the. persecution on this ground collapsed through the manifest absurdity of the accusation. But even if we date the rise of heresies in the reign of Domitian instead of Trajan, 2 the attributing of this epistle against

2 On this point (date of the outbreak of heresy) there is some inconsistency in the reported fragments of Hegesippus. In that quoted below from Eus. H.E. iii. 32. 7 seq., it is expressly dated after the martyrdom of Symeon and death of the grandsons of Jude under Trajan. In iii. 19 the " ancient tradition " attributing the denun- ciation of these to " some of the heretics " is perhaps not from Hegesippus ; but in iv. 22 the beginning of heresy is traced to a cer- tain Thebuthis, a candidate for the bishopric after the death 0$ James, as rival to Symeon. The same figure of the church as a pure virgin is also used as in iii. 32. But as it is only the envious feeling of Thebuthis which is traced to this early date, Hegesippus doubtless means to place the outbreak later.

corrupting heresy to " Jude the brother of James " will still be incompatible with the statements of Hegesippus, our only- informant regarding ms ~er history.

The Greek of Jude is also such as to exclude the idea of authorship in Palestine by an unschooled Galilean, at an early date in church history. As F. H. Chase has pointed out: (i) the terms kXtjtoi, awrqpLa, maris, have attained their later technical sense; (2) " the writer is steeped in the language of the LXX.," employing its phraseology independently of other N.T. writers, and not that of the canonical books alone, but of the broader non-Palestinian canon; (3) " he has at his command a large stock of stately, sonorous, sometimes poetical words," proving him a " man of some culture, and, as it would seem, not without acquaintance with Greek

writers."

If the superscription be not from the hand of the actual brother of Jesus, the question may well be asked why some apostolic name was not chosen which might convey greater authority ? The answer is to be found in the direction toward which the principal defenders of orthodoxy in 100-150 turned for " the deposit of the faith " (Jude 3) in its purity. The Pastoral Epistles point to " the pattern of sound words, even the sayings of our Lord Jesus Christ." (1 Tim. vi. 3, &c), as the arsenal of orthodoxy against the same foe (with 1 Tim. vi. 3-10; cf. Jude 4, 11, 16, 18 seq.). Ignatius's motto is to " be inseparable from Jesus Christ and from your bishop " (ad Trail, vii.), Polycarp's, to " turn unto the word delivered unto us from the beginning " (cf. Jude 3; 1 John ii. 7, iii. 23, iv. 21), " the oracles of the Lord," which the false teachers " pervert to their own lusts." Papias, his eraipos (Irenaeus), turns in fact from " the vain talk of the many, and from the " alien commandments " to such as were " delivered by the Lord to the faith," offering to the Christian world his Interpretation of the Lord's Oracles based upon personal inquiry from those who " came his way," who could testify as to apostolic tradition. Hegesippus, after a journey to all the principal seats of Christian tradition, testifies that all are holding to the true doctrine as transmitted at the original seat, where it was witnessed first by the apostles and afterwards by the kindred of the Lord and " witnesses " of the first generation. All these writers in one form or other revert to the historic tradition against the licence of innovators. Hegesippus indicates plainly the seat of its authority. For the period before the adoption of a written standard the resort was not so much to " apostles " as to " disciples " and " witnesses." The appeal was to " those who from the beginning had been eye- witnesses and ministers of the word " (Luke i. 2) ; and these were to be found primarily (until the complete destruction of that church during the revolt of Barcochebas and its suppression by Hadrian) in the mother community in Jerusalem (cf. Acts xv.2). Its life is the measure of the period of oral tradition, whose requiem is sung by Papias. Hegesippus (ap. Eus. H.E. iii. 32, 7 seq.) looks back to it as the safe guardian of the deposit " of the faith " against all the depredations of heresy which " when the sacred college of apostles had suffered death in various forms, and the generation of those that had been deemed worthy to hear the inspired wisdom with their own ears had passed away . . . attempted thenceforth with a bold face, to proclaim, in opposition to the preaching of the truth, ' the knowledge which is falsely so-called (\ptv5avvfios yv&cns).' " For an appeal like that of our epistle to the authority of the past against the moral laxity and antinomian teaching of degenerate Pauline churches in the Greek world, the natural resort after Paul himself (Pastoral Epp.) would be the " kindred of the Lord " who were the " leaders and witnesses in every church " in Palestine. Doubtless the framer of Jude 1 would have preferred

the aegis of " James the Lord's brother," if this, like that of Paul, had not been already appropriated. Failing this, the next most imposing was " Judas, the brother of James."

The superscription in the case of Jude, unlike that of James, takes hold of the substance of the book. Verse 3 and the farewell (v. 24 seq.) show that Jude was composed from the start as an " epistle." If this appearance be not fallacious, the obvious relation between the two superscriptions will be best explained

by the supposition that the author of Jude gave currency to the existing homily (James) before composing under the pseudonym of Jude. On the interconnexion of the two see Sieffert, s.v. " Judasbrief " in Hauck, Realencykl. vol. ix.

Judas is conceived as cherishing the intention of discussing for the benefit of the Christian world (for no mere local church is addressed) the subject of " our common salvation " (the much desiderated authoritative definition of the orthodox faith), but diverted from this purpose by the growth of heresy.

Few writings of this compass afford more copious evidence of date in their literary affinities. The references to Enoch (principally ver. 14 seq. = Eth. En. i. 9, but cf . F. H. Chase, s.v. " Jude " in Hastings's Diet. Bible) and the Assumption of Moses (v. 9) have more a geographical than a chronological bearing, the stricter canon of Palestine excluding these apocryphal books of 90 B.C. to a.d. 40; but the Pauline writings are freely employed, especially 1 Cor. x. 1-13, Rom. xvi. 25 seq., and probably Eph. and Col. Moreover, the author explicitly refers to the apostolic age as already past, and to the fulfilment of the Pauline prediction (1 Tim. iv. 1 sqq.) of the advent of heresy (v. 17 seq.). The Pauline doctrine of " grace " has been perverted to lasciviousness, as by the heretics whom Polycarp opposes (Ep. Polyc. vii.), and this doctrine is taught for " hire " (m.ii, 12, 16; cf. 1 Tim. vi. 5). The unworthy " shepherds " (v. 12; cf. Ezek. xxxiv. 8; John x. 12 seq.) live at the expense of their flocks, polluting the " love-feasts," corrupting the true disciples. According- to Clement of Alexandria this was written prophetically to apply to the Carpocratians, an antinomian Gnostic sect of c. 150; but hyper-Paulinists had given occasion to similar complaints already in Rev. ii. 14, 20 (95). Thus Paulinism and its perversion alike are in the past. As regards the undeniable contact of Didache ii. 7 with Jude 22 seq. (cf. Didache, iv. 1, Jude 8) priority cannot be determined; and the use of 1 John iii. 12 in Jude n is doubtful.

On the other hand, practically the whole of Jude is taken up into 2 Pet., the author merely avoiding, so far as he discovers them, the quotations

from apocryphal writings, and prefixing and affixing sections of his own to refute the heretical eschatology. On the priority of Jude see especially against Spitta Zur Gesch.u. Litt. d. Urchristenthums, ii. 400-411, F. H. Chase, loc. cit. p. 803. (On 2 Pet. see Peter Epistles or.) Unfortunately, the date of 2 Pet. cannot be determined as earlier than late in the second century, so that we are thrown back upon internal evidence for the inferior limit.

The treatment of the heresy as the anti-Christ who precedes "the last hour" (v. 18), reminds us of 1 John ii. 18, but it is indicative of conditions somewhat less advanced that the heretics have not yet " gone out from " the church. The treat- ment of the apostolic age as past, and the deposit of the faith as a regula fidei (cf. Ign. ad Trail, ix.), the presence of anti-nomian Gnosticism, denying the doctrine of lordship and " glories " (v. 8), with " discriminations " between " psychic " and " pneumatic " (v. 19), strongly oppose a date earlier than

100.

Sieffert, on account of the superscription, would date as early as 70-80, but acknowledges the hyper-Pauline affinity of the heresy, its propagation as a doctrine, and close relation to the Nicolaitan of Rev. ii. 14. To these phenomena he gives accord- ingly a correspondingly early date. The nature of the heresy, opposed, however, and the resort to the authority of Jude " the brother of James " against it, favour rather the period of Polycarp and Papias (117-150).

The history of the reception of the epistle into church canons is similar to that of James, beginning with a quotation of it as the work of Jude by Clement of Alexandria (Paed. iii. 8), a reference by Tertullian (De cult. fern. i. 3), and a more or less hesitant endorsement by Origen (" if one might adduce the epistle of Jude," In Matt. torn. xvii. 30) and by the Muratorianum (c. 200), which excepts Jude and 2 and 3 John from its condem- nation of apocryphal literature, placing it on a par with the Wisdom of Solomon " which was written by friends of his in his honour." The use of apocryphal literature in Jude itself

may account for much of the critical disposition toward it of many subsequent writers. Eusebius classed it among the " disputed" books, declaring that as with James " not many of the ancients have mentioned it " (H. E. ii. 23, 25).

The Introd. to the New Test, by Holtzmann, Julicher, Weiss, Zahn, Davidson, Salmon, Bacon and the standard Commentaries of Meyer and Holtzmann, the International (Bigg) and other series, contain discussions of authorship and date. The articles s.v. in Hastings's Diet. Bible (Chase) and the Ency. Bib. (Cone) are full and scholarly. In addition the Histories of the Apostolic Age, by Haus- rath, Weizsacker, McGiffert, Bartlet, Ropes and others, and the kindred works of Baur, Schwegler and Pfleiderer should be consulted. Moffat's Historical New Testament, 2nd ed., p. 589, contains a con- venient summary of the evidence with copious bibliography. One of the most thorough of conservative treatments is the Commentary on Jude and Second Peter by J. B. Mayor (1907). (B. W. B.)

JUDGE (Lat. judex, Fr. juge), in the widest legal sense an officer appointed by the sovereign power in a state to administer the law; in English practice, however, justices of the peace and magistrates are not usually regarded as " judges " in the titular sense. The duties of the judge, whether in a civil or a criminal matter, are to hear the statements on both sides in open court, to arrive at a conclusion as to the truth of the facts submitted to him or, when a jury, is engaged, to direct the jury to find such a conclusion, to apply to the facts so found the appropriate rules of law, and to certify by his judgment the relief to which the parties are entitled or the obligations or penalties which they have incurred. With the judgment the office of the judge is at an end, but the judgment sets in motion the executive forces of the state, whose duty it is to carry it into execution.

Such is the type of a judicial officer recognized by mature systems of law, but it is not to be accepted as the universal type, and the following qualifying circumstances should be noticed: (1) in primitive systems of law the judicial is not separated from the legislative and other governing functions; (2) although the judge is assumed to take the law from the legislative authority, yet, as the existing law never at any time contains provision for all cases, the judge may be obliged to invent or create principles applicable to the case — this is called by Bentham and the English jurists judge-made and judiciary law; (3) the separation of the function of judge and jury, and the exclusive charge of questions of law given to the judge, are more particularly characteristic of the English judicial system. During a considerable period in the history of Roman law an entirely different distribution of parts was observed. The adjudication of a case was divided between the magistratus and the judex, neither of whom corresponds to the English judge. The former was a public officer charged with the execution of the law; the latter was an arbitrator whom the magistrates commissioned to hear and report upon a particular case.

The following are points more specially characteristic of the English system and its kindred judicial systems: (1) Judges are absolutely protected from

action for anything that they may do in the discharge of their judicial duties. This is true in the fullest sense of judges of the supreme courts. " It is a principle of English law that no action will lie against a judge of one of the superior courts for a judicial act, though it be alleged to have been done maliciously and corruptly." Other judicial officers are also protected, though not to the same extent, against actions. (2) The highest class of judges are irremovable except by what is in effect a special act of parliament, viz. a resolution passed by both houses and assented to by the sovereign. The inferior judges and magistrates are removable for misconduct by the lord chancellor. (3) The judiciary in England is not a separate profession. The judges are chosen from the class of advocates, and almost entirely according to their eminence at the bar. (4) Judges are in England appointed for the most part by the crown. In a few cases municipal corporations may appoint their own judicial officer.

See also Lord High Chancellor ; Lord Chief Justice ; Master of the Rolls, &c, &c, and the accounts of judicial systems under country headings.

JUDGE-ADVOCATE-GENERAL, an officer appointed in England to assist the -Crown with advice in matters relating

to military law, and more particularly as to courts-martial. In the army the administration of justice as pertaining to discipline is carried out in accordance with the provisions of military law, and it is the function of the judge-advocate-general to ensure that these disciplinary powers are exercised in strict conformity with that law. Down to 1793 the judge-advocate-general acted as secretary and legal adviser to the board of general officers, but on the reconstitution of the office of commander-in-chief in that year he ceased to perform secretarial duties, but remained chief legal adviser. He retained his seat in parliament and in 1806 he was made a member of the government and a privy councillor. The office ceased to be political in 1892, on the recommendation of the select committee of 1888 on army estimates, and was conferred on Sir F. Jeune (afterwards Lord St Helier). There was no salary attached to the office when held by Lord St Helier, and the duties were for the most part performed by deputy. On his death in 1905, Thomas Milvain, K.C., was appointed, and the terms and conditions of the post were rearranged as follows: (1) A salary of £2000 a year;

(2) the holder to devote his whole time to the duties of the post;

(3) the retention of the post until the age of seventy, subject to continued efficiency — but with claim to gratuity or pension on retirement. The holder was to be subordinate to the secretary of state for war, without direct access to the sovereign. The appointment is conferred by letters-

patent, which define the exact functions attaching to the office, which practically are the reviewing of the proceedings of all field-general, general and district courts-martial held in the United Kingdom, and advising the sovereign as to the confirmation of the finding and sentence. The deputy judge-advocate is a salaried official in the department of the judge-advocate-general and acts under his letters-patent. A separate judge-advocate-general's department is maintained in India, where at one time deputy judge-advocates were attached to every important command. All general courts- martial held in the United Kingdom are sent to the judge-advocate-general, to be by him submitted to the sovereign for confirmation; and all district courts-martial, after having been confirmed and promulgated, are sent to his office for examination and custody. The judge-advocate-general and his deputy, being judges in the last resort of the validity of the proceedings of courts-martial, take no part in their conduct; but the deputy judge-advocates frame and revise charges and attend at courts- martial, swear the court, advise both sides on law, look after the interests of the prisoner and record the proceedings. In the English navy there is an official whose functions are somewhat similar to those of the judge-advocate-general. He is called counsel and judge-advocate of the fleet.

In the United States there is also a judge-advocate-general's department. In addition to being a bureau of military justice, and keeping the records of courts-martial, courts of inquiry and military commissions, it has the custody of all papers relating to the title of lands under the control of the war department. The officers of the department, in addition to acting as prose- cutors in all military trials, sometimes represent the government when cases affecting the army come up in civil courts.

See further Military Law, and consult C. M. Clode, Administra- tion of Justice under Military and Martial Law (1872) ; Military Forces of the Crown (2 vols., 1869).

JUDGES, THE BOOK OF, in the Bible. This book of the Old Testament, which, as we now read it, constitutes a sequel to the book of Joshua, covering the period of history between the death of this conqueror and the birth of Samuel, is so called because it contains the history of the Israelites before the establishment of the monarchy, when the government was in the hands of certain leaders who appear to have formed a con- tinuous succession, although the office was not hereditary. The only other biblical source ascribed to this period is Ruth, whose present position as an appendix to Judges is not original (see Bible and Ruth).

Structure. — It is now generally agreed that the present adjust- ment of the older historical books of the Old Testament to form a continuous record of

events from the creation to the Babylonian

exile is due to an editor, or rather to successive redactors, who pieced together and reduced to a certain unity older memoirs of very different dates; and closer examination shows that the continuity of many parts of the narrative is more apparent than real. This is very clearly the case in the book of Judges. It consists of three main portions: (i) an introduction, presenting one view of the occupation of Palestine by the Israelites (i. i- ii. 5) ; (2) the history of the several judges (ii. 6-xvi.) ; and (3) an appendix containing two narratives of the period.

1. The first section relates events which are said to have taken place after the death of Joshua, but in reality it covers the same ground with the book of Joshua, giving a brief account of the occupation of Canaan, which in some particulars repeats the statements of the previous book, while in others it is quite independent (see Joshua). It is impossible to regard the war- like expeditions described in this section as supplementary campaigns undertaken after Joshua's death; they are plainly represented as the first efforts of the Israelites to gain a firm footing in the land (at Hebron, Debir, Bethel), in the very cities which Joshua is related to have subdued (Josh. x. 39). 1 Here then we have an account of the settlement of Israel west of the Jordan which is parallel to the book of Joshua, but makes no mention of Joshua himself, and places the tribe of Judah in the front. The author of the chapter cannot have had Joshua or his history in his eye at all, and the words " and it came to pass after the death of Joshua " in Judg. i. 1 are from the hand of the last editor, who desired to make the whole book of Judges, including ch. i., read continuously with that which now pre- cedes it in the canon of the earlier prophets. 2

2. The second and main section (ii. 6-xvi.) stands on quite another footing. According to Josh. xxiv. 31 the people "served Yah weh" during the lifetime of the great conqueror and his contemporaries. In Judg. ii. 7 this statement is repeated, and the writer proceeds to explain that subsequent generations fell away from the faith, and served the gods of the nations among which they dwelt (ii. 6-iii. 6). The worship of other gods is represented, not as something which went on side by side with Yahweh-worship (cf. x. 6), but as a revolt against Yahweh, periodically repeated and regularly chastised by foreign invasion. The history, therefore, falls into recurring cycles, each of which begins with religious corruption, followed by chastisement, which continues until Yahweh, in answer to the groans of his oppressed people, raises up a " judge " to deliver Israel, and

recall them to the true faith. On the death of the " judge," if not sooner, the corruption spreads anew and the same vicissitudes follow. This religious explanation of the course of the history, formally expounded at the outset and repeated in more or less detail from chapter to chapter (espe- cially vi. 1-10, x. 6-18), determines the form of the whole narrative. It is in general agreement with the spirit as also with the language of Deuteronomy, and on this account this section may be conveniently called " the Deuteronomic Book of Judges." But the main religious ideas are not so late and are rather akin to those of Josh, xxiv; in particular the worship of the high places is not condemned, nor is it excused as in 1 Kings iii. 2. The sources of the narrative are obviously older than the theological exposition of its lessons, and herein lies the value and interest of Judges. The importance of such docu- ments for the scientific historian lies not so much in the events they record as in the unconscious witness they bear to the state of society in which the narrator or poet lived. From this point of view the parts of the book are by no means all of equal value; critical analysis shows that often parallel or distinct narratives have been fused together, and that, whilst the older stories gave more prominence to ordinary human motives and combinations,

1 This is confirmed by the circumstance that in Judg. ii. I the " angel of Yahweh," who, according to Exod. xiv. 24, xxiii. 20, xxxii. 34, xxxiii. 2, 7 seq., must be viewed as having his local mani- festation at the headquarters of the host of Israel, is still found at Gilgal and not at Shiloh.

2 The chapter was written after Israel had become strong enough to make the Canaanite cities tributary (v. 28), that is, after the establishment of the monarchy (see I Kings ix. 20-21).

the later are coloured by religious reflection and show the characteristic tendency of the Old Testament to re-tell the fortunes of Israel in a form that lays ever-inereasing weight on the work of Yahweh for his people. That the pre-Deutero- nomic sources are to be identified with the Judaean (J, or Yahwist) and Ephraimite (E, or Elohist) strands of the Hexa- teuch is, however, not certain.

To the unity of religious pragmatism in the main stock of the book of Judges corresponds a unity of chronological scheme. The " judges," in spite of the fact that most of them had clearly no more than a local influence, are all represented as successive rulers in Israel, and the history is dated by the years of each judgeship and those of the intervening periods of oppression. But it is impossible to reconcile the numbers with the statement elsewhere that the fourth year of Solomon was the 480th from the exodus (1 Kings vi. 1). See Bible: Chronology.

The general introduction (ii. 6-iii. 6) is a blend of Deuteronomic and other sources. The intimate relation between it and the separate narratives (Josh. xxiv. 1-27, a late [Ephraimite] record inserted by a second Deuteronomic hand, and xxiii., D) appears both from their contents and from the fact that Judg. ii. 6-10 is almost identical with the narrative appended to Joshua's address (Joshua xxiv. 28-3 1) . Judg. i.ii. 5, however, is not touched by D, and hence was probably inserted in its present position at a later date. According to the highly intricate introduction the Hebrews were oppressed : (a) to familiarize them with warfare — it is assumed that they had inter married with the Canaanites and worshipped their gods (iii. 2, 6); (b) to test their loyalty to Yahweh (ii. 22 ; iii. 1) ; or © to punish them for their marriage with the heathen and their apostasy (D in ii. 12 ; cf. Josh, xxiii., and ibid. v. 12).

To this succeeds a noteworthy example of the Deuteronomic treatment of tradition in the achievement of Othniel (q.v.) the only Judaean " judge," The bareness of detail, not to speak of the improbability of the situation, renders its genuineness doubtful, and the passage is one of the indications of a secondary Deuteronomic redaction. The case, however, is exceptional ; the stories of the other great " judges " were not rewritten or to any great extent revised by the Deuteronomic redactor, and his hand appears chiefly in the framework. 3 Thus, in the story of Ehud and the defeat of Moab only iii. 12-15, 29-30 are Deuteronomic. But the rest is not homo- geneous, w. 19 and 20 appear to be variants, and the mention of Israel (v. 276) is characteristic of the tendency to treat local troubles as national oppressions, whereas other records represent little national unity at this period (i., v.). See further Ehud. ;

According to the Septuagint addition to Josh. xxiv. 33, Moab was the first of Israel's oppressors. The brief notice of Shamgar, who delivered Israel from the Philistines (iii. 31), is one of the later inser- tions, and in some MSS. of the LXX.it stands after xvi. 31. The story of the defeat of Sisera appears in two distinct forms, an earlier, in poetical form (v.), and a later, in prose (iv.). D's framework is to be recognized in iv. 1-4, 23 seq., v. I (probably), 31 (last clause) ; see further Deborah. The Midianite oppression (vi.-viii,) is contained in the usual frame (vi. 1-6; viii. 27 seq.), but is not homogeneous, since viii. 4, the pursuit of the kings, cannot be the sequel of viii. 3 (where they have been slain), and viii. 33-35 ignores ix. The structure of vi. i-viii. 3 is particularly intricate: vi. 25-32 does not continue vi. 1 1-24 (there are two accounts of Gideon's introduction and diver- gent representations of Yahweh-worship) ; vi. 34 forms the sequel of the latter, and vi. 36-40 (with "God ") is strange after the description of the miracle in w. 21 seq. (with " Yahweh "). Further, there are difficulties in vi. 34, vii. 23 seq., viii. I, when compared with vii. 2-8, and in vii. 16-22 two stratagems are combined. There are two sequels: vii. 23 seq.

and viii. 4; with the former contrast vi. 35; with viii. 1-3 cf. xii. 1-6, and see below. Chapter viii. 22 seq. comes unexpectedly, and the refusal of the offer of the kingship reflects later ideas (cf. I Sam. viii. 7; x. 19; xii. 12, 17). The conclusion, however, shows that Jerubbaal had only a local reputation. Finally, the condemnation of the ephod as part of the worship of Yahweh (viii. 27) agrees with the thought in vi. 25-32 as against that in vi. 11-24. (See Ephod; Gideon.) Chapter ix. (see Abimelech) appears to have been wanting in the Deuteronomic book of Judges, but inserted later perhaps by means of the introduction, viii. 30-32 (post-exilic). It has two accounts of the attack upon Shechem (lx. 26-41 and 42-49).

After a brief notice of two " minor judges " (see below), follows the story of Jephthah. It concludes with the usual Deuteronomic

3 Hence, it is to be inferred that the reviser had older written records before him. Had these been in the oral stage he would scarcely incorporate traditions which did not agree with his views.; at all events they would hardly have been written down by him in the form in which they have survived. The narratives of the monarchy which are preserved only in Chronicles, on the other hand, illustrate the manner in which tradition was reshaped and rewritten under the influence of a later religious standpoint.

formula (xii. 7), but is prefaced by a detailed introduction to the oppression of Israel (x.,6 sqq.). By the inclusion of the Philistines among the oppressors, and of Judah, Benjamin and Ephraim among the oppressed (x. 7, 9), it appears to have in view not merely the story of Samson, a hero of local interest, but the early chapters in 1 Samuel. This introduction is of composite origin (as also ii.6-2 1 ; Josh, xxiii.-xxiv. 25), but a satisfactory analysis seems impossible. As it stands, it has literary connexions with the late narrative in 1 Sam. (vii. seq., xii.), and appears to form the preface to that period of history which ended with Samuel's great victory and the institution of the monarchy. But this belongs to a later scheme (see Samuel), and the introduction in its earlier form must have been the prelude to earlier narratives. 1 The story of Jephthah's fight with Ammon is linked to the preceding introduction by x. 17 seq. ; for the framework see x. 6 (above), xii. 7. Chapter xi. 12-28 (cf. Num. xx. seq.) is applicable only to Moab, w. 29 and 32 are variants, and Jeph- thah's home is placed variously in Tob. (xi. 3) and Mizpeh (v. 34). In xi. 1-10 the outlaw stipulates that he shall be chief of Gilead if successful, but in w. 12-28 a ruler speaks on behalf of Israel. Both Moab and Ammon had good reason to be hostile to Gilead (Num. xxi.), but the scene of the victory points

rather to the former (i>. 33, possibly conflate). There is a general resemblance between the victories of Gideon and Jephthah, which is emphasized by the close relation between viii. 1-3 and xii. 1-6, the explanation of which in its present context is difficult. See further Jephthah.

The old stories of Samson the Danite have been scarcely touched by the redaction (xiii. 1 ; xv. 20; xvi. 316, where he is a " judge ") ; only xiii. appears to be rather later (v. 5 represents him as a fore- runner of Samuel and Saul), and gives a rather different impression of the hero of the folk-tales. The cycle illustrates some interesting customs and is in every way valuable as a specimen of popular narrative. See Samson.

Grouped among these narratives are the five so-called "minor judges " (x. 1-5; xii. 8-15). By the addition of Shamgar (iii. 31) the number is made to agree with the six more important names. They are not represented as having any immediate religious impor- tance ; they really lie outside of the chronological scheme, and their history is plainly not related from such lively and detailed remi- niscence as gives charm to the longer episodes of the book. The notices are drawn up in set phraseology, and some of the names, in harmony with a characteristic feature of early Hebrew history, are those of personified families of communities rather than of families. 2

3. The third and last section of the book embraces chapters xvii.xxi., and consists of two narratives independent of one another and of the main stock of the book, with which they are not brought into any chronological connexion. They appear to owe their position to the latest redactor (akin to the latest stratum in the Hexateuch) who has heavily worked over xix xxi., and put the book into its present form by the addition of i.-ii. 5, ix. and possibly of v. 3

The first narrative, that of Micah and the Danites, is of the highest interest both as a record of the state of religion and for the picture it gives of the way in which one clan passed from the condition of an invading band into settled possession of land and city. Its interest (xvii. seq.) lies in the foundation of the Ephraimite sanctuary by Micah as also in that of Dan. There are some repetitions in the account, but there is not enough evidence to restore two complete stories. The history of the Levite and the Benjamites is of quite another character, and presupposes a degree of unity of feeling and action among the tribes of Israel which it is not easy to reconcile with the rest of the book. In its present form this episode appears to be not very ancient ; it resembles Ruth in giving a good deal of curious archaeological detail (the feast at Shiloh) in a form which suggests that the usages referred to were already obsolete when the narrative was composed. It appears to consist of an old story which has been heavily revised to form an edifying

piece of exposition. The older parts are preserved in xix. : the account of the Levite of Mt Ephraim whose concubine from Bethlehem in Judah was outraged, not by the non- Israelite Jebusites of Jerusalem, but by the Benjamites of Gibeah; there are traces of another source in w. 6-8, 10, 13, 15. The older portions of xx. seq. include : the vengeance taken by Israel {e.g. xx. 3-8, 14, 19, 29, 36-41, 47), and the reconstruction of the tribe by intermarriage with the women of Shiloh (xxi. 1, 15, 17-19, 21-23). The post-exilic expansions (found chiefly in xx., xxi. 2-14,

1 It may be conjectured that the introduction originally formed the prelude to the rise of Saul: the intervening narratives, though not necessarily of late origin themselves, having been subsequently inserted. See S. A. Cook, Crit. Notes 0. T. Hist., p. 127 seq.

2 Tola and Puah (x. 1) are clans of Issachar (Gen. xlvi. 13), for Jair (v. 3), see Num. xxxii. 41, and for Elon (xii. n), see Gen. xlvi. 14. See Genealogy : Biblical.

3 To the same post-exilic hand may also be ascribed the introduc- tion of the " minor judges " (so several critics), and smaller additions here and there (ch. i. 1 opening words, vv. 4, 8 seq. [contrast 21] 18; viii. 30-32: xi. 2, &c).

16, 24 seq.) describe the punishment of Benjamin by the religious assembly and the massacre of Jabesh-Gilead for its refusal to join Israel, four hundred virgins of the Gileadites being saved for Ben- jamin. How much old tradition underlies these stories is question- able. It is very doubtful whether Hosea's allusion to the depravity of Gibeah (ix. 9 ; x. 9) is to be referred hither, but it is noteworthy that whilst Gibeah and Jabesh-Gilead, which appear here in a bad light, are known to be associated with Saul, the sufferer is a Levite of Bethlehem, the traditional home of David. The account of the great fight in xx. is reminiscent of Joshua's battle at Ai (Josh, vii.-viii.).

Historical Value. — The book of Judges consists of a number of narratives collected by Deuteronomic editors; to the same circles are due accounts of the invasions of Palestine and settlement in Joshua, and of the foundation of the monarchy in 1 Samuel. The connexion has been broken by the later insertion of matter (not necessarily of late date itself), and the whole was finally formed into a distinct book by a post-exilic hand. The dates of the older stories preserved in ii. 6-xvi. 6 are quite unknown. If they are trustworthy for the period to which they are rele- gated (approximately 14U1-1 2th cent. B.C.) they are presumably of very great antiquity, but if they belong to the sources J and E of the Hexateuch (at least some four or five centuries later) their value is seriously weakened. On the other hand,

the belief that the monarchy had been preceded by national " judges " may have led to the formation of the collection. It is evident that there was more than one period in Israelite history in which one or other of these stories of local heroes would be equally suitable. They reflect tribal rivalry and jealousy (cf. Isa. ix. 21, and the successors of Jeroboam 2), attacks by nomads and wars with Ammon and Moab; conflicts between newly settled Israelites and indigenous Canaanites have been suspected in the story of Abime- lech, and it is not impossible that the post-Deuteronomic writer who inserted ch. ix. so understood the record. A striking exception to the lack of unity among the tribes is afforded by the account of the defeat of Sisera, and here the old poem represents a combined effort to throw off the yoke of a foreign oppressor, while the later prose version approximates the standpoint of Josh. xi. i-15, with its defeat of the Canaanites. The general stand-point of the stories (esp. Judg. v.) is that of central Pales- tine; the exceptions are Othniel and Samson — the latter inter- rupting the introduction in x., and its sequel, the former now entirely due to the Deuteronomic editor. Of the narratives which precede and follow, ch. i. represents central Palestine separated by Canaanite cities from tribes to the south and north; it is the situation recognized in Judg. xix. 10-12, as well as in passages imbedded in the latest portions of the book of Joshua, though it is in contradiction to the older traditions of Joshua himself. Chapters xvii. seq. (like the preceding story of Samson) deal with Danites, but the migration can hardly be earlier than David's time; and xix.xxi., by describing the extermina tion of Benjamin, form a link between the presence of the tribe in the late narratives of the exodus and its new prominence in the traditions of Saul (q.v.). As an historical source, therefore, the value of Judges will depend largely upon the question whether the Deuteronomic editor (about 600 B.C. at the earliest) would have access to trustworthy documents relating to a period some six or seven centuries previously. See further Jews, §§ 6, 8; and Samuel, Books of.

Literature. — Biblical scholars are in agreement regarding the preliminary literary questions of the book, but there is divergence of opinion on points of detail, and on the precise growth of the book (e.g. the twofold Deuteronomic redaction). See further W. R. Smith, Ency. Brit. 9th ed. (upon which the present article is based) ; G. F. Moore, International Critical Comm. (1895); Ency. Bib., art. "Judges"; K. Budde, Kurzer Handcommentar (1897); Lagrange, Livres des juges (1903); G. W. Thatcher (Century Bible); also S. R. Driver, Lit. of Old Testament (1909) ; Moore, in the Sacred Books of Old Testament (1898); C. F. Kent, The Student's Old Testament, vol. i. (1904). (S. A. C.)

JUDGMENT, in law, a term used to describe (1) the adjudica- tion by a court of justice upon a controversy submitted to it inter partes (post litem contestatam) and determining the rights of the parties and the relief to be

awarded by the court as between them; (2) the formal document issuing from the court

in which that adjudication is expressed; (3) the opinions of the judges expressed in a review of the facts and law applicable to the controversy leading up to the adjudication expressed in the formal document. When the judgment has been passed and entered and recorded it binds the parties: the controversy comes to an end (transit in rem judicatam) , and the person in whose favour the judgment is entered is entitled to enforce it by the appropriate method of " execution." There has been much controversy among lawyers as to the meaning of the expressions " final " and " interlocutory " as applied to judgments, and as to the distinction between a " judgment," a " decree," and an " order." These disputes arise upon the wording of statutes or rules of court and with reference to the appropriate times or modes of appeal or of execution.

The judgments of one country are not as a rule directly enforceable in another country. In Europe, by treaty or arrangement, foreign judgments are in certain cases and on compliance with certain formalities made executory in various states. A similar provision is made as between England, Scotland and Ireland, for the registry and execution in each country of certain classes of judgments given in the others. But as regards the rest of the king's dominions and foreign states, a " foreign " judgment is in England recognized only as consti- tuting a cause of action which may be sued upon in England. If given by a court of competent jurisdiction it is treated as creating a legal obligation to pay the sum adjudged to be due. Summary judgment may be entered in an English action based on a foreign judgment unless the defendant can show that the foreign court had not jurisdiction over the parties or the subject matter of the action, or that there was fraud on the part of the foreign court or the successful party, or that the foreign proceedings were contrary to natural justice, e.g. concluded without due notice to the parties affected. English courts will not enforce foreign judgments as to foreign criminal or penal or revenue laws.

JUDGMENT DEBTOR, in English law, a person against whom a judgment ordering him to pay a sum of money has been obtained and remains unsatisfied. Such a person may be examined as to whether any and what debts are owing to him, and if the judgment debt is of the necessary amount he may be made bankrupt if he fails to comply with a bankruptcy notice served on him by the judgment creditors, or he may be committed to prison or have a receiving order made against him in a judgment summons

under the Debtors Act 1869.

JUDGMENT SUMMONS, in English law, a summons issued under the Debtors Act 1869, on the application of a creditor who has obtained a judgment for the payment of a sum of money by instalments or otherwise, where the order for payment has not been complied with. The judgment summons cites the defendant to appear personally in court, and be examined on oath as to the means he has, or has had, since the date of the order or judgment made against him, to pay the same, and to show cause why he should not be committed to prison for his default. An order of commitment obtained in a judgment summons remains in force for a year only, and the extreme term of imprisonment is six weeks, dating from the time of lodging in prison. When a debtor has once been imprisoned, although for a period of less than six weeks, no second order of commitment can be made against him in respect of the same debt. But if the judgment be for payment by instalments a power of committal arises on default of payment for each instalment. If an order of commitment has never been executed, or becomes inoperative through lapse of time, a fresh commitment may be made. Im- prisonment does not operate as a satisfaction or extinguishment of a debt, or deprive a person of a right of execution against the land or goods of the person imprisoned in the same manner as if there had been no imprisonment.

JUDICATURE ACTS, an important series of English statutes having for their object the simplification of the system of judicature in its higher branches. They are the Supreme Court of Judicature Act 1873 (36 & 37 Vict. c. 66) and the Supreme Court of Judicature Act 1875 (38 & 39 Vict. c. 77), with various amending acts, the twelfth of these being in 1899. By the act of

1873 the court of chancery, the court of queen's (king's) bench, the court of common pleas, the court of exchequer, the high court of admiralty, the court of probate and the court of divorce and matrimonial causes were consolidated into one Supreme 1 Court of Judicature (sec. 3), divided into two permanent divisions, called " the high court," with (speaking broadly) original juris- diction, and " the court of appeal " (sec. 4). The objects of the act were threefold — first, to reduce the historically indepen- dent courts of common law and equity into one supreme court; secondly, to establish for all divisions of the court a uni- form system of pleading and procedure; and thirdly, to provide for the enforcement of the same rule of law in those cases where chancery and common law recognized different rules. It can be seen at once how bold and revolutionary was this new enact- ment. By one section the august king's bench, the common pleas, in which Serjeants only had formerly the right of audience, and the exchequer, which had its origin in the reign of Henry I., and all their

jurisdiction, criminal, legal and equitable, were vested in the new court. It must be understood, however, that law and equity were not fused in the sense in which that phrase has generally been employed. The chancery division still remains distinct from the common law division, having a certain range of legal questions under its exclusive control, and possess- ing to a certain extent a peculiar machinery of its own for carrying its decrees into execution. But all actions may now be brought in the high court of justice, and, subject to such special assignments of business as that alluded to, may be tried in any division thereof.

There were originally three common law divisions of the High Court corresponding with the three former courts of common law. But after the death of Lord Chief Baron Kelly on the 17th of September 1880, and of Lord Chief Justice Cockburn on the 20th of November 1880, the common pleas and exchequer divi- sions were (by order in council, 10th December 1880) consolidated with the king's bench division into one division under the presidency of the lord chief justice of England, to whom, by the 25th section of the Judicature Act 1881, all the statutory jurisdiction of the chief baron and the chief justice of the common pleas was transferred. The high court, therefore, now consists of the chancery division, the common law division, under the name of the king's bench division; and the probate, divorce and admiralty division. To the king's bench division is also attached, by order of the lord chancellor (Jan. 1, 1884), the business of the London court of bankruptcy.

For a more detailed account of the composition of the various courts, see Chancery ; King's Bench ; and Probate, Divorce and Admiralty Court.

The keystone of the structure created by the Judicature Acts was a strong court of appeal. The House of Lords remained the last court of appeal, as before the acts, but its judicial functions were virtually transferred to an appeal committee, consisting of the lord chancellor and other peers who have held high judicial office, and certain lords of appeal in ordinary created by the act of 1873 (see Appeal).

The practice and procedure of the Supreme Court are regulated by rules made by a committee of judges, to which have been added the president of the incorporated law society and a practising barris- ter and one other person nominated by the lord chancellor. The rules now in force are those of 1883, with some subsequent amend- ments. With the appendices they fill ; a moderate-sized volume. Complaints are made that they go into too much detail, and place a burden on the time and temper of the busy practitioner which he can ill afford to bear. It is possible that the authors of the rules attempted too much, and it might have been better to provide a simpler and more elastic code of procedure. Rules have sometimes been

made to meet individual cases of hardship, and rules of pro- cedure have been piled up from time to time, sometimes embodying a new experiment, and not always consistent with former rules.

1 The comte de Franqueville in his interesting work, Le Systeme judiciaire de la Grande Bretagne, criticizes the use of the word " supreme " as a designation of this court, inasmuch as its judgments are subject to appeal to the House of Lords, but in the act of 1873 the appeal to the House of Lords was abolished. He is also severe on the illogical use of the words " division " and " court " in many different senses (i. 180-181).

The most important matter dealt with by the rules is the mode of pleading. The authors of the Judicature Act had before them two systems of pleading, both of which were open to criticism. The common law pleadings (it was said) did not state the facts on which the pleader relied, but only the legal aspect of the facts or the infer- ences from them, while the chancery pleadings were lengthy, tedious and to a large extent irrelevant and useless. There was some exaggeration in both statements. In pursuing the fusion of law and equity which was the dominant legal idea of law reformers of that period, the framers of the first set of rules devised a system which they thought would meet the defects of both systems, and be appro- priate for both the common-law and the chancery divisions. In a normal case, the plaintiff delivered his statement of claim, in which he was to set forth concisely the facts on which he relied, and the relief which he asked. The defendant then delivered his statement of defence, in which he was to say whether he admitted or denied the plaintiff's facts (every averment not traversed being taken to be admitted), and any additional facts and legal defences on which he relied. The plaintiff might then reply, and the defendant rejoin, and so on until the pleaders had exhausted themselves. This system of pleading was not a bad one if accompanied by the right of either party to demur to his opponent's pleading, i.e. to say, " admitting all your averments of fact to be true, you still have no cause of action," or " defence " (as the case may be). It may be, however, that the authors of the new system were too intent on uniformity when they abolished the common-law pleading, which, shorn of its abuses (as it had been by the Common Law Procedure Acts), was an admirable instrument for defining the issue between the parties though unsuited for the more complicated cases which are tried in chancery, and it might possibly have been better to try the new system in the first instance in the chancery division only. It should be added that the rules contain provisions for actions being tried without pleadings if the defendant does not require a statement of claim,

and for the plaintiff in an action of debt obtaining immediate judgment unless the defendant gets leave to defend. In the chancery division there are of course no pleadings in those matters which by the rules can be disposed of by summons in chambers instead of by ordinary suit as formerly.

The judges seem to have been dissatisfied with the effect of their former rules, for in 1883 they issued a fresh set of consolidated rules, which, with subsequent amendments, are those now in force. By these rules a further attempt was made to prune the exuberance of pleading. Concise forms of statement of claim and defence were given in the appendix for adoption by the pleader. It is true that these forms do not display a high standard of excellence in draftsmanship, and it was said that many of them were undoubtedly demurrable, but that was not of much importance. Demurrers were abolished, and instead thereof it was provided that any point of law raised by the pleadings should be disposed of at or after the trial, provided that by consent or order of the court the same might be set down and disposed of before the trial (Order xxv. rules 1, 2). This, in the opinion of Lord Davey in 1902 (Ency. Brit., 10th ed., xxx. 146), was a disastrous change. The right of either party to challenge his opponent in limine, either where the ques- tion between them was purely one of law, or where even the view of the facts taken and alleged by his opponent did not constitute a cause of action or defence, was a most valuable one, and tended to the curtailment of both the delay and the expense of litigation. Any possibility of abuse by frivolous or technical demurrers (as undoubtedly was formerly the case) had been met by powers of amendment and the infliction of costs. Many of the most im- portant questions of law had been decided on demurrer both in common law and chancery. Lord Davey considered that demurrer was a useful and satisfactory mode of trying questions in chan- cery (on bill and demurrer), and it was frequently adopted in preference to a special case, which requires the statement of facts to be agreed to by both parties and was consequently more difficult and expensive. It is obvious that a rule which makes the normal time for decision of questions at law the trial or subsequently, and a preliminary decision the exception, and such exception dependent on the consent of both parties or an order of the court, is a poor substitute for a demurrer as of right, and it has proved so in practice. The editors of the Yearly Practice for 190 1 (Muir Mackenzie, Lushing- ton and Fox) said (p. 272) : " Points of law raised by the pleadings are usually disposed of at the trial or on further considerationafterthe trial of the issues of fact," that is to say, after the delay, worry and expense of a trial of disputed questions of fact which after all may turn out to be unnecessary. The abolition of demurrers has also (it is believed) had a prejudicial effect on the standard of legal accuracy and knowledge required in practitioners. Formerly the pleader had the fear of a demurrer before him. Nowadays he need not stop to think

whether his cause of action or defence will hold water or not, and anything which is not obviously frivolous or vexatious will do by way of pleading for the purpose of the trial and for getting the opposite party into the box.

Another change was made by the rules of 1883, which was regarded by some common law lawyers as revolutionary. Formerly every issue of fact in a common law action, including the amount of damage, had to be decided by the verdict of a jury. " The effect of the rules of 1883," said Lord Lindley, who was a member of the

rule committee, " was to make trial without a jury the normal mode of trial, except where trial with a jury is ordered under rules 6 or 7a, or may be had without an order under rule 2" (Timson v. Wilson, 38 Ch. D. 72, at p. 76). The effect of the rules may be thus summarized: (1) In the chancery division no trial by jury unless ordered by the judge. (2) Generally the judge may order trial without a jury of any cause or issue, which before the Judicature Act might have been so tried without consent of parties, or which involves prolonged investigation of documents or accounts, or scientific or local investigation. (3) Either party has a right to a jury in actions of slander, libel, false imprisonment, malicious prosecution, seduction or breach of promise of marriage, upon notice without order; (4) or in any other action, by order. (5) Subject as above, actions are to be tried without a jury unless the judge, of his own motion, otherwise orders.

Further steps have been taken with a view to simplification of procedure. By Order xxx. rule 1 (as amended in 1897), a summons, called a summons for directions, has to be taken out by a plaintiff immediately after the appearance of the defendant, and upon such summons an order is to be made respecting pleadings, and a number of interlocutory proceedings. To make such an order at that early stage would seem to demand a prescience and intelligent anticipa- tion of future events which can hardly be expected of a master, or even a judge in chambers, except in simple cases, involving a single issue of law or fact which the parties are agreed in presenting to the court. The effect of the rule is that the plaintiff cannot deliver his statement of claim, or take any step in the action without the leave of the judge. In chancery cases the order usually made is that the plaintiff deliver his statement of claim, and the rest of the summons stand over, and the practical effect is merely to add a few pounds to the costs. It may be doubted whether, as applied to the majority of actions, the rule does not proceed on wrong lines, and whether it would not be better to leave the parties, who know the exigencies of their case better even than a judge in chambers, to proceed in their own way, subject to stringent provisions for immediate payment of the costs occasioned by unnecessary, vexatious, or dilatory proceed- ings. The order does not apply to admiralty cases or to

proceedings under the order next mentioned.

The Supreme Court of Judicature Act (Ireland) 1877 follows the same lines as the English acts. The pre-existing courts were consolidated into a supreme court of judicature, consisting of a high court of justice and a court of appeal. The judicature acts did not affect Scottish judicature, but the Appellate Jurisdiction Act included the court of session among the courts from which an appeal lies to the House of Lords.

JUDITH, THE BOOK OF, one of the apocryphal books of the Old Testament. It takes its name from the heroine Judith (‘lovdiB, ‘lovdijO, i.e. ””!””>:, Jewess), to whom the last nine of its sixteen chapters relate. In the Septuagint and Vulgate it immediately precedes Esther, and along with Tobit comes after Nehemiah; in the English Apocrypha it is placed between Tobit and the apocryphal additions to Esther.

Argument. — In the twelfth year of his reign Nebuchadrezzar, who is described as king of Assyria, having his capital in Nineveh, makes war against Arphaxad, king of Media, and overcomes him in his seventeenth year. He then despatches his chief general Holofernes to take vengeance on the nations of the west who had withheld their assistance. This expedition has already succeeded in its main objects when Holofernes proceeds to attack Judaea. The children of Israel, who are described as having newly returned from captivity, are apprehensive of a desecration of their sanctuary, and resolve on resistance to the uttermost. The inhabitants of Bethulia (Betylua) and Beiomes- tham in particular (neither place can be identified), directed by Joachim the high priest, guard the mountain passes near Dothaim, and place themselves under God’s protection. Holo- fernes now inquires of the chiefs who are with him about the Israelites, and is answered by Achior the leader of the Ammonites, who enters upon a long historical narrative showing the Israelites to be invincible except when they have offended God. For this Achior is punished by being handed over to the Israelites, who lead him to the governor of Bethulia. Next day the siege begins, and after forty days the famished inhabitants urge the governor Ozias to surrender, which he consents to do unless relieved in five days. Judith, a beautiful and pious widow of the tribe of Simeon, npw appears on the scene with a plan of deliverance. Wearing her rich attire, and accompanied by her maid, who carries a bag of provisions, she goes over to the hostile camp, where she is at once conducted to the general, whose suspicions are disarmed by the tales she invents. After four days Holofernes, smitten with her charms, at the close of a r

sumptuous entertainment invites her to remain within his tent over night.

No sooner is he overcome with sleep than Judith, seizing his sword, strikes off his head and gives it to her maid; both now leave the camp (as they had previously been accustomed to do, ostensibly for prayer) and return to Bethulia, where the trophy is displayed amid great rejoicings and thanks-givings. Achior now publicly professes Judaism, and at the instance of Judith the Israelites make a sudden victorious onslaught on the enemy. Judith now sings a song of praise, and all go up to Jerusalem to worship with sacrifice and rejoicing. The book concludes with a brief notice of the closing years of the heroine.

Versions. — Judith was written originally in Hebrew. This is shown not only by the numerous Hebraisms, but also by mistransla- tions of the Greek translation, as in ii. 2, iii. 9, and other passages (see Fritzsche and Ball in he), despite the statement of Origen (Ep. ad Afrir.. 13) that the book was not received by the Jews among their apocryphal writings. In his preface to Judith, Jerome says that he based his Latin version on the Chaldee, which the Jews reckoned among their Hagiographa. Ball (Speaker's Apocrypha, i. 243) holds that the Chaldee text used by Jerome was a free transla- tion or adaptation of the Hebrew. The book exists in two forms: the shorter, which is preserved only in Hebrew (see under Hebrew Midrashim below), is, according to Scholz, Lipsius, Ball and Gaster, the older; the longer form is that contained in the versions.

Greek Version. — This is found in three recensions: (1) in A B, k; (2) in codices 19, 108 (Lucian's text) ; (3) in codex 58, the source of the old Latin and Syriac.

Syriac and Latin Versions. — -Two Syriac versions were made from the Greek — the first, that of the Peshito; and the second, that of Paul of Telia, the so-called Hexaplaric. The Old Latin was de- rived from the Greek, as we have remarked above, and Jerome's from the Old Latin, under the control of a Chaldee version.

Later Hebrew Midrashim. — These are printed in Jellinek's Bet ha-Midrasch, i. 130-131; ii. 12-22; and by Gaster in Proceedings of the Society of Biblical Archaeology (1894), pp. 156-163.

Date. — The book in its fuller form was most probably written in the 2nd century B.C. The writer places his romance two centuries earlier, in the time of Ochus, as we may reasonably infer from the attack made by Holofernes and Bagoas on Judaea; for Artaxerxes Ochus made an expedition against Phoenicia and Egypt in 350 B.C., in which his chief generals were Holofernes and Bagoas.

Recent Literature. — Ball, Speaker's Apocrypha (1888), an ex- cellent

piece of work; Scholz, Das Buch Judith (1896); Lohr, Apok. und Pseud. (1900), ii. 147-164; Porter in Hastings's Diet. Bible, ii. 822-824; Gaster, Ency. Bib., ii. 2642-2646. See Ball, pp. 260-261, and Schurer in loc, for a full bibliography. (R. H. C.)

JUDSON, ADONIRAM (1788-1850), American missionary, was born at Maiden, Massachusetts, on the 9th of August 1788, the son of a Congregational minister. He graduated at Brown University in 1807, was successively a school teacher and an actor, completed a course at the Andover Theological Seminary in September 1810, and was at once licensed to preach as a Congre- gational clergyman. In the summer of 1810 he with several of his fellows students at Andover had petitioned the general associa- tion of ministers to be sent to Asiatic missionary fields. This application resulted in the establishment of the American board of commissioners for foreign missions, which sent Judson to England to secure, if possible, the co-operation of the London Missionary Society. His ship fell into the hands of a French privateer and he was for some time a prisoner in France, but finally proceeded to London, where his proposal was considered without anything being decided. He then returned to America, where he found the board ready to act independently. His appointment to Burma followed, and in 1812, accompanied by his wife, Ann Hasseltine Judson (1789-1826), he went to Calcutta. On the voyage both became advocates of baptism by immersion, and being thus cut off from Congregationalism, they began independent work. In 1814 they began to receive support from the American Baptist missionary union, which had been founded with the primary object of keeping them in the field. After a few months at Madras, they settled at Rangoon. There Judson mastered Burmese, into which he translated part of the Gospels with his wife's help. In 1824 he removed to Ava, where during the war between the East India Company and Burma he was imprisoned for almost two years. After peace had

been brought about (largely, it is said, through his exertions) Mrs Judson died. In 1827 Judson removed his headquarters to Maulmain, where school buildings and a church were erected, and where in 1834 he married Sarah Hall Boardman (1803-1845). In 1833 he completed his translation of the Bible; in succeeding years he compiled a Burmese grammar, a Burmese dictionary, and a Pali dictionary. In 1845 his wife's failing health decided Judson to return to America, but she died during the voyage, and was buried at St Helena. In the United States Judson married Emily Chubbuck (1817-1854), well-known as a poet and novelist under the name of " Fanny Forrester," who was one of the earliest advocates in America of the higher education of women. She returned with him in 1846

to Burma, where the rest of his life was devoted largely to the rewriting of his Burmese dictionary. He died at sea on the 12th of April 1850, while on his way to Martinique, in search of health. Judson was perhaps the greatest, as he was practically the first, of the many missionaries sent from the United States into foreign fields; his fervour, his devotion to duty, and his fortitude in the face of danger mark him as the prototype of the American missionary.

The Judson Memorial, an institutional church, was erected on Washington Square South, New York City, largely through the exertions of his son, Rev. Edward Judson (b. 1844), who became its pastor and director, and who prepared a life of Dr Judson (1883; new ed. 1898). Another biography is by Francis Wayland (2 vols., 1854). See also Robert T. Middleditch's Life of Adoniram Judson, Burmah's Great Missionary (New York, 1859). For the three Mrs. Judsons, see Knowles, Life of Ann Hasseltine Judson (1829); Emily C. Judson, Life of Sarah Hall Boardman Judson (1849); Asahel C. Kendrick, Life and Letters of Emily Chubbuck Judson (1861).

JUEL, JENS (1631-1700), Danish statesman, born on the 15th of July 1 63 1, began his diplomatic career in the suite of Count Christian Rantzau, whom he accompanied to Vienna and Regens- burg in 1652. In August 1657 Juel was accredited to the court of Poland, and though he failed to prevent King John Casimir from negotiating separately with Sweden he was made a privy councillor on his return home. But it was the reconciliation of Juel's uncle Hannibal Sehested with King Frederick III. which secured Juel's future. As Sehested's representative, he con- cluded the peace of Copenhagen with Charles X., and after the Danish revolution of 1660 was appointed Danish minister at Stockholm, where he remained for eight years. Subsequently the chancellor Griffenfeldt, who had become warmly attached to him, sent him in 1672, and again in 1674, as ambassador extraordinary to Sweden, ostensibly to bring about a closer union between the two northern kingdoms, but really to give time to consolidate Griffenfeldt's far-reaching system of alliances. Juel completely sympathized with Griffenfeldt's Scandinavian policy, which aimed at weakening Sweden sufficiently to re-establish some- thing like an equilibrium between the two states. Like Griffen- feldt, Juel also feared, above all things, a Swedo-Danish war. After the unlucky Scanian War of 1675-79, Juel was one of the Danish plenipotentiaries who negotiated the peace of Lund. Even then he was for an alliance with Sweden " till we can do better." This policy he consistently followed, and was largely instrumental in bringing about the marriage of Charles XI. with Christian V.'s daughter Ulrica Leonora. But for the death of the like-minded Swedish statesman Johan Gyllenstjerna in June 1680, Juel's " Scandinavian " policy might have succeeded, to the infinite advantage of both kingdoms. He represented Denmark at the coronation of Charles XII, (December 1697), when he concluded a new

treaty of alliance with Sweden. He died in 1700.

Juel, a man of very few words and a sworn enemy of phrase- making, was perhaps the shrewdest and most cynical diplomatist of his day. His motto was: " We should wish for what we can get." Throughout life he regarded the political situation of Denmark with absolute pessimism. She was, he often said, the cat's-paw of the Great Powers. While Griffenfeldt would have obviated this danger by an elastic political system, adaptable to all circumstances, Juel preferred seizing whatever he could get in favourable conjunctures. In domestic affairs Juel was an

adherent of the mercantile system, and laboured vigorously for the industrial development of Denmark and Norway. For an aristocrat of the old school he was liberally inclined, but only favoured petty reforms, especially in agriculture, while he re- garded emancipation of the serfs as quite impracticable. Juel made no secret of his preference for absolutism, and was one of the few patricians who accepted the title of baron. He saw some military service during the Scanian War, distinguishing himself at the siege of Venersborg, and by his swift decision at the critical moment materially contributing to his brother Niels's naval victory in the Bay of Kjoge. To his great honour he re- mained faithful to Griffenfeldt after his fall, enabled his daughter to marry handsomely, and did his utmost, though in vain, to obtain the ex-chancellor's release from his dungeon.

See Carl Frederik Bricka, Dansk biografish lex., art. " Juel " (1887, &c); Adolf Ditlev Jorgensen, P. Schumacher Griffenfeldt (1893- 1894). (R.N.B.)

JUEL, NIELS (1629-1697), Danish admiral, brother of the preceding, was born on the 8th of May 1629, at Christiania. He served his naval apprenticeship under Van Tromp and De Ruyter, taking part in all the chief engagements of the war of 1652-54 between England and Holland. During a long indisposition at Amsterdam in 1655-1656 he acquired a thorough knowledge of ship-building, and returned to Denmark in 1656 a thoroughly equipped seaman. He served with distinction during the Swedo- Danish wars of 1658-60 and took a prominent part in the defence of Copenhagen against Charles X. During fifteen years of peace, Juel, as admiral of the fleet, laboured assiduously to develop and improve the Danish navy, though he bitterly resented the setting over his head in 1663 of Cort Adelaar on his return from the Turkish wars. In 166 1 Juel married Margre the Ulfeldt. On the outbreak of the Scanian War he served at first under Adelaar, but

on the death of the latter in November 1675 he was appointed to the supreme command. He then won a European reputation, and raised Danish sea-power to unprecedented eminence, by the system of naval tactics, afterwards perfected by Nelson, which consists in cutting off a part of the enemy's force and concen- trating the'whole attack on it. He first employed this manoeuvre at the battle of Jasmund off Riigen (May 25, 1676) when he broke through the enemy's line in close column and cut off five of their ships, which, however, nightfall prevented him from pursuing. Juel's operations were considerably hampered at this period by the overbearing conduct of his Dutch auxiliary, Philip Almonde, who falsely accused the Danish admiral of cowardice. A few days after the battle of Jasmund, Cornelius Van Tromp the younger, with 17 fresh Danish and Dutch ships of the line, super- seded Juel in the supreme command. Juel took a leading part in Van Tromp's great victory off Oland (June 1, 1676), which enabled the Danes to invade Scania unopposed. On the 1st of June 1677 Juel defeated the Swedish admiral Sjoblad off Moen; on the 30th of June 1677 he won his greatest victory, in the Bay of Kjoge, where, with 25 ships of the line and 1267 guns, he routed the Swedish admiral Evert Horn with 36 ships of the line and 1800 guns. For this great triumph, the just reward of superior seamanship and strategy — at an early stage of the engagement Juel's experienced eye told him that the wind in the course of the day would shift from S.W. to W. and he took extraordinary risks accordingly— he was made lieutenant admiral general and a privy councillor. This victory, besides permanently crippling the Swedish navy, gave the Danes a self- confidence which enabled them to keep their Dutch allies in their proper place. In the following year Van Tromp, whose high- handedness had become unbearable, was discharged by Chris- tian V., who gave the supreme command to Juel. In the spring of 1678 Juel put to sea with 84 ships carrying 2400 cannon, but as the Swedes were no longer strong enough to encounter such a formidable armament on the open sea, his operations were limited to blockading the Swedish ports and transporting troops to Riigen. After the peace of Lund Juel showed himself an administrator and reformer of the first order, and under his energetic supervision the Danish navy ultimately reached impos- ing dimensions, especially after Juel became chief of the admiralty

in 1683. Personally Juel was the noblest and most amiable of men, equally beloved and respected by his sailors, simple, straight- forward and unpretentious in all his ways. During his latter years he was popularly known in Copenhagen as " the good old knight." He died on the 8th of April 1697.

See Garde, Niels Juel (1842), and Den dansk. norske Somagts His- toric, 1535-1700 (1861). (R. N. B.)

JUG, a vessel for holding liquid, usually with one handle and a lip, made of earthenware, glass or metal. The origin of the • word in this sense is uncertain, but it is probably identical with a shortened form of the feminine name Joan or Joanna; cf. the similar use of Jack and Jill or Gill for a drinking-vessel or a liquor measure. It has also been used as a common expression for a homely woman, a servant-girl, a sweetheart, sometimes in a sense of disparagement. In slang, " jug " or " stone-jug " is used to denote a prison; this may possibly be an adaptation of Fr.joug, yoke, L&t. jugum. The word "jug"is probably onomato- poeic when used to represent a particular note of the nightin- gale's song, or applied locally to various small birds, as the hedge-jug, &c.

The British Museum contains a remarkable bronze jug which was found at Kumasi during the Ashanti Expedition of 1896. It dates from the reign of Richard II., and is decorated in relief with the arms of England and the badge of the king. It has a lid, spout and handle, which ends in a quatrefoil. An inscription, on three raised bands round the body of the vessel, modernized runs : — " He that will not spare when he may shall not spend when he would. Deem the best in every doubt till the truth be tried out." The British Museum Guide to the Medieval Room contains an illustration of this vessel.

A particular form of jug is the " ewer," the precursor of the ordinary bedroom jug (an adaptation of O. Fr. ewaire, med. Lat. aquaria, water-pitcher, from aqua, water). The ewer was a jug with a wide spout, and was principally used at table for pouring water over the hands after eating, a matter of some necessity before the introduction of forks. Early ewers are sometimes mounted on three feet, and bear inscriptions such as Venez laver. A basin of similar material and design accompanied the ewer. In the 13 th and 14th centuries a special type of metaljewer takes the form of animals, men on horseback, &c. ; these are generally known as aquamaniles, from med. Lat. aqua manile or aqua manale {aqua, water, and manare, to trickle, pour, drip). The British Museum contains several examples.

In the 18th and early 19th centuries were made the drinking- vessels of pottery known as "Toby jugs," properly Toby Fillpots or Philpots. These take the form of a stout old man, sometimes seated, with a three-cornered hat, the corners of which act as spouts. Similar drinking-vessels were also made representing characters popular at the time, such as " Nelson jugs," &c.

JUGE, BOFFILLE DE (d. 1502), French-Italian adventurer and statesman, belonged to the family of del Giudice, which came from Amalfi, and followed the fortunes of the Angevin dynasty. When John of Anjou, duke

of Calabria, was conquered in Italy (1461) and fled to Provence, Boffille followed him. He was given by Duke John and his father, King Rene, the charge of upholding by force of arms their claims on Catalonia. Louis XL, who had joined his troops to those of the princes of Anjou, attached Boffille to his own person, made him his chamberlain and conferred on him the vice-royalty of Roussillon and Cerdagne (1471), together with certain important lordships, among others the countship of Castres, confiscated from James of Armagnac, duke of Nemours (1476), and the temporalities of the bishopric of Castres, confiscated from John of Armagnac. He also entrusted him with diplomatic negotiations with Flanders and England. In 1480 Boffille married Marie d' Albret, sister of Alain the Great, thus confirming the feudal position which the king had given him in the south. He was appointed as one of the judges in the trial of Rene of Alencon, and showed such zeal in the discharge of his functions that Louis XL rewarded him by fresh gifts. However, the bishop of Castres recovered his diocese (1483), and the heirs of the duke of Nemours took legal proceedings for

the recovery of the countship of Castres. Boffille, with the object of escaping from his enemies, applied for the command of the armies of the republic of Venice. His application was re- fused, and he further lost the viceroyalty of Roussillon (1491). His daughter Louise married against his will a gentleman of no rank, and this led to terrible family dissensions. In order to disinherit his own family, Boffille de Juge gave up the countship of Castres to his brother-in-law, Alain d'Albret (1494). He died in 1502.

See P. M. Perret, Boffille de Juge, comte de Castres, et la rSpublique de Venise (1891); F. Pasquier, Inventaire des documents concernant Boffille de Juge (1905). (M. P.)*

JUGGERNAUT, a corruption of Sans. Jagannatha, " Lord of the World," the name under which the Hindu god Vishnu is worshipped at Puri in Orissa. The legend runs that the sacred blue-stone image of Jagannatha was worshipped in the solitude of the jungle by an outcast, a Savara mountaineer, called Basu. The king of Malwa, Indradyumna, had despatched Brahmans to all quarters of the peninsula, and at last discovered Basu. Thereafter the image was taken to Puri, and a temple, begun in 1 1 74, was completed fourteen years later at a cost of upwards of half a million sterling. The site had been associated for centuries before and after the Christian era with Buddhism, and the famous Car festival is probably based on the Tooth festival of the Buddhists, of which the Chinese pilgrim Fa-Hien gives an account. The present temple is a pyramidal build-

ing, 192 ft. high, crowned with the mystic wheel and flag of Vishnu. Its inner enclosure, nearly 400 ft. by 300 ft., contains a number of small temples and shrines. The main temple has four main rooms — the hall of offerings, the dancing hall, the audience chamber, and the shrine itself — the two latter being each 80 ft. square. The three principal images are those of Vishnu, his brother and his sister, grotesque wooden figures roughly hewn. Elaborate services are daily celebrated all the year round, the images are dressed and redressed, and four meals a day are served to them. The attendants on the god are divided into 36 orders and 97 classes. Special servants are assigned the tasks of putting the god to bed, of dressing and bathing him. The annual rent-roll of the tempi was put at £68,000 by Sir W. W. Hunter; but the pilgrims' offerings, which form the bulk of the income, are quite unknown and have been said to reach as much as £100,000 in one year. Ranjit Singh bequeathed the Koh-i-nor to Jagannath. There are four chief festivals, of which the famous Car festival is the most important.*

The terrible stories of pilgrims crushed to death in the god's honour have made the phrase " Car of Juggernaut " synonymous with the merciless sacrifice of human lives, but these have been shown to be baseless calumnies. The worship of Vishnu is innocent of all bloody rites, and a drop of blood even accidentally spilt in the god's presence is held to pollute the officiating priests, the people, and the consecrated food. The Car festival takes place in June or July, and the feature of its celebration is the drawing of the god from the temple to his " country-house," a distance of less than a mile. The car is 45 ft. in height and 35 ft. square, and is supported on 16 wheels of 7 ft. in diameter. Vishnu's brother and sister have separate cars, slightly smaller. To these cars ropes are attached, and thousands of eager pilgrims vie with each other to have the honour of dragging the god. Though the distance is so short the journey_ lasts several days, owing to the deep sand in which the wheels sink. During the festival serious accidents have often happened. Sir W. W. Hunter in the Gazetteer of India writes: " In a closely packed, eager throng of a hundred thousand men and women under the blazing tropical sun, deaths must occa- sionally occur. There have doubtless been instances of pilgrims throwing themselves under the wheels in a frenzy of religious excitement, but such instances have always been rare, and are now unknown. The few suicides that did occur were, for the most part, cases of diseased and miserable objects who took this means to put themselves out of pain. The official returns now place this beyond doubt. Nothing could be more opposed to the spirit of Vishnu- worship than self-immolation. Accidental death within the temple renders the whole place unclean. According to Chaitanya, the apostle of Jagannath, the destruction of the least of God's creatures is a sin against the Creator."

See also Sir W. W. Hunter's Orissa (1872); and District Gazetteer of Puri (1908).

JUGGLER (Lat. joculator, jester), in the modern sense a per- former of sleight-of-hand tricks and dexterous feats of skill in tossing balls, plates, knives, &c. The term is practically synony- mous with conjurer (see Conjuring). The joculatores were the mimes of the middle ages (see Drama) ; the French use of the word jongleurs (an erroneous form of jongleur) included the singers known as trouveres; and the humbler English minstrels of the same type gradually passed into the strolling jugglers, from whose exhibitions the term came to cover loosely any acrobatic, pantomimic and sleight-of-hand performances. In ancient Rome various names were given to what we call jugglers, e.g. ventilatores (knife-throwers), and pilarii (ball-players).

JUGURTHA' (Gr. 'loyopdas), king of Numidia, an illegitimate son of Mastanabal, and grandson of Massinissa. After his father's death he was brought up by his uncle Micipsa together with his cousins Adherbal and Hiempsal. Jugurtha grew up strong, handsome and intelligent, a skilful rider, and an adept in warlike exercises. He inherited much of Massinissa's political ability. Micipsa, naturally afraid of him, sent him to Spain (134 B.C.) in command of a Numidian force, to serve under P. Cornelius Scipio Africanus Minor. He became a favourite with Scipio and the Roman nobles, some of whom put into his head the idea of making himself sole king of Numidia, with the help of Roman money.

In 118 B.C. Micipsa died. By his will, Jugurtha was associated with Adherbal and Hiempsal in the government of Numidia. Scipio had' written to Micipsa a strong letter of recommendation in favour of Jugurtha; and to Scipio, accordingly, Micipsa en- trusted the execution of his will. None the less, his testamentary arrangements utterly failed. The princes soon quarrelled, and Jugurtha claimed the entire kingdom. Hiempsal he contrived to have assassinated; Adherbal he quickly drove out of Numidia. He then sent envoys to Rome to defend his usurpation on the ground that he was the injured party. The senate decided that Numidia was to be divided, and gave the western, the richer and more populous half, to Jugurtha, while the sands and deserts of the eastern half were left to Adherbal. Jugurtha's envoys appear to have found several of the Roman nobles and senators accessible to bribery. Having secured the best of the bargain, Jugurtha at once began to provoke Adherbal to a war of self-defence. He completely defeated him near the modern Philippe- ville, and Adherbal sought safety in the fortress of Cirta (Con- stantine). Here he was besieged by Jugurtha, who, notwith- standing the interposition of a Roman embassy, forced the place to capitulate, and treacherously massacred all the inhabitants, among them his cousin Adherbal and a number of Italian

merchants resident in the town. There was great wrath at Rome and throughout Italy; and the senate, a majority of which still clung to Jugurtha, were persuaded in the same year (in) to declare war. An army was despatched to Africa under the consul L. Calpurnius Bestia, several of the Numidian towns voluntarily surrendered, and Bocchus, the king of Mauretania, and Jugurtha's father-in-law, offered the Romans his alliance. Jugurtha was alarmed, but having at his command the accumulated treasures of Massinissa, he was successful in arranging with the Roman general a peace which left him in possession of the whole of Numidia. When the facts were known at Rome, the tribune Memmius insisted that Jugurtha should appear in person and be questioned as to the negotiations. Jugurtha appeared under a safe conduct, but he had partisans, such as the tribune C. Baebius, who took care that his mouth should be closed. Soon afterwards he caused his cousin Massiva, then resident at Rome and a claimant to the throne of Numidia, to be assassinated. The treaty was thereupon set aside, and Jugurtha was ordered to quit Rome. On this occasion he uttered the well-known words, " A city for sale, and doomed to perish as soon as it finds a purchaser!" (Livy, Epit. 64). The war was renewed, and the consul Spurius Albinus entrusted with the command. The Roman army in Africa was thoroughly demoralized. An un- successful attempt was made on a fortified town, Suthul, in which the royal treasures were deposited. The army was surprised by the enemy in a night attack, and the camp was taken and

plundered. Every Roman was driven out of Numidia, and a disgraceful peace was concluded (109).

By this time the feeling at Rome and in Italy against the corruption and incapacity of the nobles had become so strong that a number of senators were prosecuted and Bestia and Albinus sentenced to exile. The war was now entrusted to Quintufi Metellus, an able soldier and stern disciplinarian, and from the year 109 to its close in 106 the contest was carried on with credit to the Roman arms. Jugurtha was defeated on the river Muthul, after an obstinate and skilful resistance. Once again, however, he succeeded in surprising the Roman camp and forcing Metellus into winter quarters. There were fresh nego- tiations, but Metellus insisted on the surrender of the king's person, and this Jugurtha refused. Numidia on the whole seemed disposed to assert its independence, and Rome had before her the prospect of a troublesome guerrilla war. Negotiations, reflecting little credit on the Romans, were set on foot with Bocchus (q.v.) who for a time played fast and loose with both parties. In 106, Marius was called on by the vote of

the Roman people to supersede Metellus, but it was through the perfidy of Bocchus and the diplomacy of L. Cornelius Sulla, Marius's quaestor, that the war was ended. Jugurtha fell into an ambush, and was conveyed a prisoner to Rome. Two years afterwards, in 104, he figured with his two sons in Marius's triumph, and in the subterranean prison beneath the Capitol — " the bath of ice," as he called it — he was either strangled or starved to death.

Though doubtless for a time regarded by his countrymen as their deliverer from the yoke of Rome, Jugurtha mainly owes his historical importance to the full and minute account of him which we have from the hand of Sallust, himself afterwards governor of Numidia.

See A. H. J. Greenidge, Hist, of Rome (1904) ; T. Mommsen, Hist, of Rome, book iv. ch. v. ; the chief ancient authorities (besides Sallust) are Livy, Epit., lxii.-lxvii. ; Plutarch, Marius and Sulla; Velleius Paterculus, ii.; Diod. Sic, Excerpta, xxxiv. ; Florus, iii. I. See also Marius, Sulla, Numidia.

JUJU, a West African word held by some authorities to be a corruption of Mandingo gru-gru, a charm. It is more generally believed to have been adapted by the Mandingos directly from Yr.joujou, a toy or plaything. The word, as used by Europeans on the Guinea coast, was originally applied to the objects which it was supposed the negroes worshipped, and was transferred from the objects themselves to the spirits or gods who dwelt in them, and finally to the whole religious beliefs of the West Africans. It is currently used in each of these senses, and more loosely to indicate all the manners and customs of the negroes of the Guinea coast, particularly the power of interdiction exercised in the name of spirits (see Fetishism and Taboo).

JUJUBE. Under this name the fruits of at least two species of Zizyphus are usually described, namely, Z. vulgaris and Z. Jujuba. 1 The genus is a member of the natural order Ana- cardiaceae. The species are small trees or shrubs, armed with sharp, straight, or hooked spines, having alternate leaves, and fruits which are in most of the species edible, and have an agreeable acid taste; this is especially the case with those of the two species mentioned above.

Z. vulgaris is a tree about 20 feet high, extensively cultivated in many parts of Southern Europe, also in Western Asia, China and Japan. In India it extends from the Punjab to the north- western frontier, ascending in the Punjab Himalaya to a height of 6500 feet, and is found both in the wild and cultivated state. The plant is grown almost exclusively for the sake of its fruit, which both in size and shape resembles a moderate-sized plum ; at first the fruits are green, but as they ripen they become of a reddish-brown

colour on the outside and yellow within. They ripen in September, when they are gathered and preserved by storing in a dry place; after a time the pulp becomes much softer and sweeter than when fresh. Jujube fruits when carefully dried will keep for a long time, and retain their refreshing acid flavour, on account of which they are much valued in the countries of the Mediterranean region as a winter dessert fruit; and,

1 The med. Lat. jujuba is a much altered form of the Gr. ffixxfrov.

besides, they are nutritive and demulcent. At one time a decoction was prepared from them and recommended in pectoral complaints. A kind of thick paste, known as jujube paste, was also made of a composition of gum arabic and sugar dis- solved in a decoction of jujube fruit evaporated to the proper consistency.

Z. Jujuba is a tree averaging from 30 to 50 ft. high, found both wild and cultivated in China, the Malay Archipelago, Ceylon, India, tropical Africa and Australia. Many varieties are cultivated by the Chinese, who distinguish them by the shape and size of their fruits, which are not only much valued as dessert fruit in China, but are also occasionally exported to England.

As seen in commerce jujube fruits are about the size of a small filbert, having a reddish-brown, shining, somewhat wrinkled exterior, and a yellow or gingerbread coloured pulp enclosing a hard elongated stone.

The fruits of Zizyphus do not enter into the composition of the lozenges now known as jujubes which are usually made of gum-arabic, gelatin, &c, and variously flavoured.

JU-JUTSU or JIU-JITSU (a Chino- Japanese term, meaning muscle-science), the Japanese method of offence and defence without weapons in personal encounter, upon which is founded the system of physical culture universal in Japan. Some historians assert that it was founded by a Japanese physician who learned its rudiments while studying in China, but most writers maintain that ju-jutsu was in common use in Japan centuries earlier, and that it was known in the 7th century B.C. Originally it was an art practised solely by the nobility, and particularly by the samurai who, possessing the right, denied to commoners, of carrying swords, were thus enabled to show their superiority over common people even when without weapons. It was a secret art, jealously guarded from those not privileged to use it, until the feudal system was abandoned in Japan, and now ju-jutsu is taught in the schools, as well as in public and private gymnasia. In the army, navy and police it receives particular attention. About the beginning of the 20th century, masters of the art began to attract attention in Europe

and America, and schools were established in Great Britain and the United States, as well as on the continent of Europe.

Ju-jutsu may be briefly defined as " an application of anatomi- cal knowledge to the purpose of offence and defence. It differs from wrestling in that it does not depend upon muscular strength. It differs from the other forms of attack in that it uses no weapon. Its feat consists in clutching or striking such part of an enemy's body as will make him numb and incapable of resistance. Its object is not to kill, but to incapacitate one for action for the time being " (Inazo Nitobe, Bushido: the Soul of Japan).

Many writers translate the term ju-jutsu " to conquer by yielding " (Jap. ju, pliant), and this phrase well expresses a salient characteristic of the art, since the weight and strength of the opponent are employed to his own undoing. When, for example, a big man rushes at a smaller opponent, the smaller man, instead of seeking to oppose strength to strength, falls backwards or sidewise, pulling his heavy adversary after him and taking advantage of his loss of balance to gain some lock or hold known to the science. This element of yielding in order to conquer is thus referred to in Lafcadio Hearn's Out of the East: " In jiu-jitsu there is a sort of counter for every twist, wrench, pull, push or bend: only the jiu-jitsu expert does not oppose such movements. No; he yields to them. But he does much more than that. He aids them with a wicked sleight that causes the assailant to put out his own shoulder, to fracture his own arm, or, in a desperate case, even to break his own neck or back." < (

The knowledge of anatomy mentioned by Nitobe is acquired in order that the combatant may know the weak parts of his adversary's body and attack them. Several of these sensitive places, for instance the partially exposed nerve in the elbow popularly known as the " funny-bone " and the complex of nerves over the stomach called the solar plexus, are familiar to the European, but the ju-jutsu expert is acquainted with many

others which, when compressed, struck, or pinched, cause tem- porary paralysis of a more or less complete nature. Such places are the arm-pit, the ankle and wrist bones, the tendon running downward from the ear, the " Adam's apple," and the nerves of the upper arm. In serious fighting almost any hold or attack is resorted to, and a broken or badly sprained limb is the least that can befall the victim; but in the practice qf the art as a means of physical culture the knowledge of the different grips is assumed on both sides, as well as the danger of resisting too long. For this reason the

combatant, when he feels himself on the point of being disabled, is instructed to signal his acknowledgment of defeat by striking the floor with hand or foot. The bout then ends and both combatants rise and begin afresh. It will be seen that a victory in ju-jutsu does not mean that the opponent shall be placed in some particular position, as in wrestling, but in any position in which his judgment or knowledge tells him that, unless he yields, he will suffer a disabling injury. This difference existed between the wrestling and the pancratium of the Olympic games. In the pancratium the fight went on until one combatant acknowledged defeat, but, although many a man allowed himself to be beaten into insensibility rather than suffer this humiliation, it was nevertheless held to be a disgrace to kill an opponent.

A modern bout at ju-jutsu usually begins by the combatants taking hold with both hands upon the collars of each other's jackets or kimonos, after which, upon the word to start being given, the manceuvring for an advantageous grip begins by pushes, pulls, jerks, falls, grips or other movements. Once the wrist, ankle, neck, arm or leg of an assailant is firmly grasped so that added force will dislocate it, there is nothing for the seized man to do, in case he is still on his feet, but go to the floor, often | being thrown clean over his opponent's head. A fall of this kind does not necessarily mean defeat, for the struggle proceeds upon the floor, where indeed most of the combat takes place, and the ju-jutsu expert receives a long training in the art of falling with- out injury. Blows are delivered, not with the fist, but with the open hand, the exterior edge of which is hardened by exercises.

The physical training necessary to produce expertness is the most valuable feature of ju-jutsu. The system includes a light and nourishing diet, plenty of sleep, deep-breathing exercises, an abundance of fresh air and general moderation in habits, in addition to the actual gymnastic exercises for the purpose of muscle-building and the cultivation of agility of eye and mind as well as of body. It is practised by both sexes in Japan.

Many attempts have been made in England and America to match ju-jutsu experts against wrestlers, mostly of the " catch- as-catch can " school, but these trials have, almost without exception, proved unsatisfactory, since many of the most effi- cacious tricks of ju-jutsu, such as the strangle holds and twists of wrists and ankles, are accounted foul in wrestling. Never- theless the Japanese athletes, even when obliged to forgo these, have usually proved more than a match for European wrestlers of their own weight.

See H. Irving Hancock's Japanese Physical Training (1904); Physical Training for Women by Japanese Methods (1904) ; The Com- plete Kano

Jiu-jitsu (Jiudo) (1905); M. Ohashi, Japanese Physical Culture (1904); K. Saito, Jiu-jitsu Tricks (1905).

JUJUY, a northern province of the Argentine Republic, bounded N. and N.W. by Bolivia, N.E., E., S. and S.W. by Salta, and W. by the Los Andes territory. Pop. (1895), 49,713; (1905, estimate), 55,450, including many mestizos. Area, 18,977 sq. m > the greater part being mountainous. The province is traversed from N. to S. by three distinct ranges be longing to the great central Andean plateau: the Sierra de Santa Catalina, the Sierra de Humahuaca, and the Sierras de Zenta and Santa Victoria. In the S.E. angle of the province are the low, isolated ranges of Alumbre and Santa Barbara. Between the more eastern of these ranges are valleys of surpassing fertility, watered by the Rio Grande de Jujuy, a large tributary of the Bermejo. The western part, however, is a high plateau (parts of which are 11,500 ft. above sea-level), whose general character- istics are those of the puna regions farther west. The surface of this high plateau is broken, semi-arid and desolate, having a

very scanty population and no important industry beyond the breeding of a few goats and the fur-bearing chinchilla. There are two large saline lagoons: Toro, or Pozuelos, in the N., and Casa- bindo, or Guayatayoc, in the S. The climate is cool, dry and healthy, with violent tempests in the summer season. (For a vivid description of this interesting region, see F. O'Driscoll, " A Journey to the North of the Argentine Republic," Geogr. Jour. xxiv. 1904.) The agricultural productions of Jujuy in- clude sugar cane, wheat, Indian corn, alfalfa and grapes. The breeding of cattle and mules for the Bolivian and Chilean markets is an old industry. Coffee has been grown in the department of Ledesma, but only to a limited extent. There are also valuable forest areas and undeveloped mineral deposits. Large borax deposits are worked in the northern part of the province, the out- put in 1901 having been 8000 tons. The province is traversed from S. to N. by the Central Northern railway, a national govern- ment line, which has been extended to the Bolivian frontier. It passes through the capital and up the picturesque Humahuaca valley, and promises, under capable management, to be an im- portant international line, affording an outlet for southern Bolivia. The climate of the lower agricultural districts is tropical, and irrigation is employed in some places in the long dry season. The capital, Jujuy (estimated pop. 1905, 5000), is situated on the Rio Grande at the lower end of the Humahuaca valley, 942 m. from Buenos Aires by rail. It was founded in 1 593 and is 403 5 ft. above sea-level. It has a mild, temperate climate and pictur- esque natural surroundings, and is situated on the old route between Bolivia and Tucuman, but its growth has been slow. JUKES, JOSEPH BEETE (1811-1869), English geologist, was I born at Summer Hill, near Birmingham, on the 10th of October 181 1. He took his degree at Cambridge in 1836. He began the study of geology under

Sedgwick, and in 1839 was appointed geological surveyor of Newfoundland. He returned to England at the end of 1840, and in 1842 sailed as naturalist on board H.M.S. " Fly," despatched to survey Torres Strait, New Guinea, and the east coast of Australia. Jukes landed in England again in June 1846, and in August received an appointment on the geological survey of Great Britain. The district to which he was first sent was North Wales. In 1847 he commenced the survey of the South Staffordshire coal-field and continued this work during successive years after the close of field-work in Wales. The results were published in his Geology of the South Staffordshire Coal-field (1853; 2nd ed. 1859), a work remarkable for its accu- racy and philosophic treatment. In 1850 he accepted the post of local director of the geological survey of Ireland. The ex- hausting nature of this work slowly but surely wore out even his robust constitution and on the 29th of July 1869 he died. For many years he lectured as professor of geology, first at the Royal Dublin Society's Museum of Irish Industry, andafterwards at the Royal College of Science in Dublin. He was an admirable teacher, and his Student's Manual was the favoured textbook of British students for many years. During his residence in Ireland he wrote an article " On the Mode of Formation of some of the River-valleys in the South of Ireland " {Quarterly Journ. Geol. Soc. 1862), and in this now classic essay he first clearly sketched the origin and development of rivers. In later years he devoted much attention to the relations between the Devonian system and the Carboniferous rocks and Old Red Sandstone.

Jukes wrote many papers that were printed in the London and Dublin geological journals and other periodicals. He edited, and in great measure wrote, forty-two memoirs explanatory of the maps of the south, east and west of Ireland, and prepared a geological map of Ireland on a scale of 8 m. to an inch. He was also the author of Excursions in and about Newfoundland (2 vols., 1842); Narrative of the Surveying Voyage ofH. M.S." Fly" (2 vols., 1847) ; A Sketch of tht> Physical Structure of Australia (1850); Popular Physical Geology (1853); Student's Manual of Geology (1857; 2nd ed. 1862; a later edition was revised by A. Geikie, 1872); the article " Geology " in the Ency. Brit. 8th ed. (1858) and School Manual of Geology (1863). See Letters, &c, of J. Beete Jukes, edited, with Connecting Memorial Notes, by his Sister (C. A. Browne) (1871), to which is added a chronological list of Jukes's writings.

JULIAN (Flavitjs Claudius Julianus) (331-363), commonly called Julian the Apostate, Roman emperor, was born in

Constantinople in 33 1, 1 the son of Julius Constantius and his wife Basilina, and nephew of Constantine the Great. He was thus a member of the dynasty under whose auspices Christianity became the established religion of Rome. The name Flavius he inherited from his paternal grandfather Constantius Chlorus ; Julianus came from his maternal grandfather; Claudius had been assumed by Constantine's family in order to assert a connexion with Claudius Gothicus.

Julian lQSt his mother not many months after he was born. He was only six when his imperial uncle died; and one of his earliest memories must have been the fearful massacre of his father and kinsfolk, in the interest and more or less at the insti- gation of the sons of Constantine. Only Julian and his elder half-brother Gallus were spared, Gallus being too ill and Julian too young to excite the fear or justify the cruelty of the murderers. Gallus was banished, but Julian was allowed to remain in Con- stantinople, where he was carefully educated under the super- vision of the family eunuch Mardonius, and of Eusebius, bishop of Nicomedia. About 344 Gallus was recalled, and the two brothers were removed to Macellum, a remote and lonely castle in Cappadocia. Julian was trained to the profession of the Christian religion; but he became early attracted to the old faith, or rather to the idealized amalgam of paganism and philo- sophy which was current among his teachers, the rhetoricians. Cut off from all sympathy with the reigning belief by the terrible fate of his family, and with no prospect of a public career, he turned with all the eagerness of an enthusiastic temperament to the literary and philosophic studies of the time. The old Hellenic world had an irresistible attraction for him. Love for its culture was in Julian's mind intimately associated with loyalty to its religion.

In the meantime the course of events had left as sole autocrat of the Roman Empire his cousin Constantius, who, feeling himself unequal to the enormous task, called Julian's brother Gallus to a share of power, and in March 351 appointed him Caesar. At the same time Julian was permitted to return to Constantinople, where he studied grammar under Nicocles and rhetoric under the Christian sophist Hecebolius. After a short stay in the capi- tal Julian was ordered to remove to Nicomedia, where he made the acquaintance of some of the most eminent rhetoricians of the time, and became confirmed in his secret devotion to the pagan faith. He promised not to attend the lectures of Libanius, but bought and read them. But his definite conversion to paganism was attributed to the neoplatonist Maximus of Ephesus, who may have visited him at Nicomedia. The downfall of Gallus (354), who had been appointed governor of the East, again exposed Julian to the greatest danger. By his rash and headstrong conduct Gallus had incurred the enmity of Constantius and the eunuchs, his confidential ministers, and was put to death. Julian fell under a like suspicion, and

narrowly escaped the same fate. For some months he was confined at Milan (Mediolanum) till at the intercession of the empress Eusebia, who always felt kindly towards him, permission was given him to retire to a small property in Bithynia. While he was on his way, Constantius recalled him, but allowed — or rather ordered — him to take up his residence at Athens. The few months he spent there (July- October 355) were probably the happiest of his life.

The emperor Constantius and Julian were now the sole sur- viving male members of the family of Constantine; and, as the emperor again felt himself oppressed by the cares of government, there was no alternative but to call Julian to his assistance. At the instance of the empress he was summoned to Milan, where Constantius. bestowed upon him the hand of his sister Helena, together with the title of Caesar and the government of Gaul.

A task of extreme difficulty awaited him beyond the Alps. During recent troubles the Alamanni and other German tribes had crossed the Rhine; they had burned many flourishing cities,

1 For the date of Julian's birth see Gibbon's Decline and Fall (ed. Bury), ii. 247, note 11. The choice seems to lie between May 331 and May 332. If the former be adopted, Julian must have died in the thirty-third, not the thirty-second, year of his age (as stated in Ammianus Marcellinus, xxv. 3, 23).

and extended their ravages far into the interior of Gaul. The internal government of the province had also fallen into great confusion. In spite of his inexperience, Julian quickly brought affairs into order. He completely overthrew the Alamanni in the great battle of Strassburg (August 357). The Frankish tribes which had settled on the western bank of the lower Rhine were reduced to submission. In Gaul he rebuilt the cities which had been laid waste, re-established the administration on a just and secure footing, and as far as possible lightened the taxes ; which weighed so heavily on the poor provincials. Paris was the usual residence of Julian during his government of Gaul, and his name has become inseparably associated with the early history of the city.

Julian's reputation was now established. He was general of a victorious army enthusiastically attached to him and governor of a province which he had saved from ruin; but he had also become an object of fear and jealousy at the imperial court. Constantius accordingly resolved to weaken his power. A threatened invasion of the Persians was made an excuse for with- drawing some of the best legions from the Gallic army. Julian recognized the covert purpose of this, yet proceeded to fulfil the commands

of the emperor. A sudden movement of the legions themselves decided otherwise. At Paris, on the night of the parting banquet, they forced their way into Julian's tent, and, proclaiming him emperor, offered him the alternative either of accepting the lofty title or of an instant death. Julian accepted the empire', and sent an embassy with a deferential message to Constantius. The message being contemptuously disregarded, both sides prepared for a decisive struggle. After a march of unexampled rapidity through the Black Forest and down the Danube, Julian reached Sirmium, and was on the way to Con- stantinople, when he received news of the death of Constantius, who had set out from Syria to meet him, at Mopsucrene in Cilicia (Nov. 3, 361). Without further trouble Julian found himself everywhere acknowledged the sole ruler of the Roman Empire; it is even asserted that Constantius himself on his death-bed had designated him his successor. Julian entered Constantinople on the nth of December 361.

Julian had already made a public avowal of paganism, of which he had been a secret adherent from the age of twenty. It was no ordinary profession, but the expression of a strong and even enthusiastic conviction; the restoration of the pagan wor- ship was to be the great aim and controlling principle of his government. His reign was too short to show what precise form the pagan revival might ultimately have taken, how far his feelings might have become embittered by his conflict with the Christian faith, whether persecution, violence and civil war might not have taken the place of the moral suasion which was the method he originally affected. He issued an edict of universal toleration; but in many respects he used his imperial influence unfairly to advance the work of restoration. In order to deprive the Christians of the advantages of culture, and discredit them as an ignorant sect, he forbade them to teach rhetoric. The symbols of paganism and of the imperial dignity were so artfully interwoven on the standards of the legions that they could not pay the usual homage to the emperor without seeming to offer worship to the gods; and, when the soldiers came forward to receive- the customary donative, they were required to throw a handful of incense on the altar. Without directly excluding Christians from the high offices of state, he held that the wor- shippers of the gods ought to have the preference. In short, though there was no direct persecution, he exerted much more than a moral pressure to restore the power and prestige of the old faith.

Having spent the winter of 361-362 at Constantinople, Julian proceeded to Antioch to prepare for his great expedition against Persia. His stay there was a curious episode in his life. It is doubtful whether his pagan convictions or his ascetic life, after the fashion of an antique philosopher, gave most offence to the so-called Christians of the dissolute city. They soon grew heartily tired of each other, and Julian took up his winter quar- ters at Tarsus, from which in early spring he marched against

Persia. At the head of a powerful and well-appointed army he advanced through Mesopotamia and Assyria as far as Ctesiphon, near which he crossed the Tigris, in face of a Persian army which he defeated. Misled by the treacherous advice of a Persian nobleman, he desisted from the siege, and set out to seek the main army of the enemy under Shapur II. (q.v.). After a long, useless march he was forced to retreat, and found himself enveloped by the whole Persian army, in a waterless and desolate country, at the hottest season of the year. The Romans repulsed the enemy in many an obstinate battle, but on the 26th of June 363 Julian, who was ever in the front, was mortally wounded. The same night he died in his tent. In the most authentic historian of his reign, Ammianus Marcellinus, we find a noble speech, which he is said to have addressed to his afflicted officers. Soon after his death the rumour spread that the fatal wound had been inflicted by a Christian in the Roman army. The well-known statement, first found in Theodoret (ft. 5th century), that Julian threw his blood towards heaven, exclaiming, " Thou hast conquered, O Galilean!" is probably a development of the account of his death in the poems of Ephraem Syrus.

From Julian's unique position as the last champion of a dying polytheism, his character has always excited interest. Authors such as Gregory of Nazianzus have heaped the fiercest anathemas upon him; but a just and sympathetic criticism finds many noble qualities in his character. In childhood and youth he had learned to regard Christianity as a persecuting force. The only sympathetic friends he met were among the pagan rhetoricians and philosophers; and he found a suitable outlet for his restless and inquiring mind only in the studies of ancient Greece. In this way he was attracted to the old paganism; but it was a paganism idealized by the philosophy of the time.

In other respects Julian was no unworthy successor of the Antonines. Though brought up in a studious and pedantic solitude, he was no sooner called to the government of Gaul than he displayed all the energy, the hardihood and the practical sagacity of an old Roman. In temperance, self-control and zeal for the public good, as he understood it, he was unsurpassed. To these Roman qualities he added the culture, literary instincts and speculative curiosity of a Greek. One of the most remark- able features of his public life was the perfect ease and mastery with which he associated the cares of war and statesman- ship with the assiduous cultivation of literature and philo- sophy. Yet even his devotion to culture was not free from pedantry and dilettantism. His contemporaries observed in him a want of naturalness. He had not the moral health or the composed and reticent manhood of a Roman, or the spon- taneity of a Greek. He was

never at rest; in the rapid torrent of his conversation he was apt to run himself out of breath; his manner was jerky and spasmodic. He showed quite a deferen- tial regard for the sophists and rhetoricians of the time, and advanced them to high offices of state ; there was real cause for fear that he would introduce the government of pedants' in the Roman empire. Last of all, his love for the old philosophy was sadly disfigured by his devotion to the old superstitions. He was greatly given to divination; he was noted for the number of his sacrificial victims. Wits applied to him the joke that had been passed on Marcus Aurelius: " The white cattle to Marcus Caesar, greeting. If you conquer, there is an end of us."

Bibliography. — The works of Julian, of which there are complete editions by E. Spanheim (Leipzig, 1696) and F. C. Hertlein (Teubner series, 1875-1876), consist of the following: (1) Letters, of which more than eighty have been preserved under his name, although the genuineness of several has been disputed. For his views on religious toleration and his attitude towards Christians and Jews the most important are 25-27, 51, 52, and the fragment in Hertlein, i. 371. The letter of Gallus to Julian, warning him against reverting to heathenism, is probably a Christian forgery. Six new letters were discovered in 1884 by A. Papadopulos Kerameus in a monastery on the island of Chalcis near Constantinople (see Rheinisches Museum, xlii., 1887). Separate edition of the letters by L. H. Heyler (1828) ; see also J. Bidez and F. Cumont, " Recherches sur la tradition MS. des lettres de l'empereur Julian " in Memoires couronnes . . . publies par I 'Acad, royale de Belgique, lvii. (1898) and F. Cumont, Sur V authenticity de quelques lettres de Julien (1889). (2) Orations, eight in number — two panegyrics on Constantius, one on the empress Euse-

bia, two theosophical declamations on King Helios and the Mother of the Gods, two essays on true and false cynicism, and a consolatory address to himself on the departure of his friend Salustius to the East. (3) Caesares or Symposium, a satirical composition after the manner of Seneca's Apocolocyntosis, in which the deified Caesars appear in succession at a banquet given in Olympus, to be censured for their vices and crimes by old Silenus. (4) Misopogon (the beard-hater), written at Antioch, a satire on the licentiousness of its inhabitants; while at the same time his own person and manner of life are treated in a whimsical spirit. It also contains a charming description of Lutetia (Paris). It owes its name to the ridicule heaped upon his beard by the Antiocheans, who were in the habit of shaving. (5) Five epigrams, two of which (Anth. Pal., ix. 365, 368) are of some interest. (6) Kara Xpio-riavuv [Adversus Christianos) in three books, an attack on Christianity written during the Persian campaign, is lost. Theodosius II. ordered all copies of it to be destroyed, and our knowledge

of its contents is derived almost entirely from the Contra Julianum of Cyril, bishop of Alexandria, written sixty years later (see Juliani librorum contra Christianos quae supersunt, ed. C.J. Neumann 1880). English Translations: Select works by J. Dun- combe (1784) containing all except the first seven orations (viii. and the fable from vii. are included) : the theosophical addresses to King Helios and the Mother of the Gods by Thomas Taylor (i793) and C. W. King in Bohn's Classical Library (1888) ; the public letters, by E. J. Chinnock (1901).

Authorities. — 1. Ancient:_ (a) Pagan writers. Of these the most trustworthy and impartial is the historian Ammianus Mar- cellinus (xv. 8-xxv.), a contemporary and in part an eye-witness of the events he describes (other historians are Zosimus and Eutropius) ; the sophist Libanius, who in speaking of his imperial friend shows himself creditably free from exaggeration and servility; Eunapius (in his lives of Maximus, Oribasius, the physician and friend of Julian, and Prohaeresius) and Claudius Mamertinus, the panegyrist, are less trustworthy, (b) Christian writers. Gregory of Nazianzus, the author of two violent invectives against Julian; Rufinus; Socrates; Sozomen; Theodoret; Philostorgius; the poems of Ephraem Syrus written in 363; Zonaras; Cedrenus; and later Byzantine chronographers. The impression which Julian produced on the Christians of the East is reflected in two Syriac romances published by J. G. E. Hoffmann, Julianos der Abtrunnige (1880; see also Th. Noldeke in Zeitschrift der deulschen morgenlandischen Gesellschaft [1874], xxviii. 263).

2. Modern. For works before 1878 see R. Engelmann, Scriptores Graeci (8th ed., by E. Preuss, 1880). Of later works the most important are G. H. Rendall, The Emperor Julian, Paganism and Christianity (1879) ; Alice Gardner, Julian, Philosopher and Emperor (1895) ; G. Negri, Julian the Apostate (Eng. trans., 1905) ; E. Mtiller, Kaiser Flavius Claudius Julianus (1901); P. Allard, Julien I'apostat (1900-1903) ; G. Mau, Die Religionsphilosophie Kaiser Julians in seinen Reden auf Kbnig Helios und die Gottermulter (1907); J. E. Sandys, Hist, of Classical Scholarship (1906), p. 356; W. Christ, Geschichte der griechischen Litter atur (1 898) , § 603 ; J . Geffcken," Kaiser Julianus und die Streitschriften seiner Gegner," in Neue Jahrb. f. das klassische Altertum (1908), pp. 161-195. The sketch by Gibbon (Decline and Fall, chs. xix., xxii.xxiv.) and the articles by J. Words worth in Smith's Dictionary of Christian Biography and A. Harnack in Herzog-Hauck's Realencyklopddie fur protestantische Theologie ix. (1901) are valuable, the last especially for the bibliography.

(T. K.;J. H. F.)

JULICH (Fr. Juliers), a town of Germany, in the Prussian Rhine province,

on the right bank of the Roer, 16 m. N. E. of Aix-la-Chapelle. Pop. (1900), 5459. It contains an Evangelical and two Roman Catholic churches, a gymnasium, a school for non-commissioned officers, which occupies the former ducal palace, and a museum of local antiquities. Its manufactures include sugar, leather and paper. Jiilich (formerly also Gulch, Guliche) the capital of the former duchy of that name, is the Juliacum of the Antonini Itinerarium; some have attributed its origin to Julius Caesar. It became a fortress in the 17th cen- tury, and was captured by the archduke Leopold in 1609, by the Dutch under Maurice of Orange in 1610, and by the Spaniards in 1622. In 1794 it was taken by the French, who held it until the peace of Paris in 1814. Till i860, when its works were demolished, Jiilich ranked as a fortress of the second class.

Juxich, or Juliers, Duchy of. In the 9th century a certain Matfried was count of Jiilich (pagus Juliacensis) , and towards the and of the nth century one Gerhard held this dignity. This Gerhard founded a family of hereditary counts, who held Jiilich as immediate vassals of the emperor, and in 1356 the county was raised to the rank of a duchy. The older and reigning branch of the family died in 1423, when Jiilich passed to Adolph, duke of Berg (d. 1437), who belonged to a younger branch, and who had obtained Berg by virtue of the marriage

of one of his ancestors. Nearly a century later Mary (d. 1543) the heiress of these two duchies, married John, the heir of the duchy of Cleves, and in 1521 the three duchies, Jiilich, Berg and Cleves, together with the counties of Ravensberg and La Marck, :vere united under John's sway. John died in 1539 and was succeeded by his son William who reigned until 1592.

At the beginning of the 1 7th century the duchies became very prominent in European politics. The reigning duke, John William, was childless and insane, and several princes were only waiting for his demise in order to seize his lands. The most prominent of these princes were two Protestant princes, Philip Louis, count palatine of Neuburg, who was married to the duke's sister Anna, and John Sigismund, elector of Brandenburg, whose wife was the daughter of another sister. Two other sisters were married to princes of minor importance. Moreover, by virtue of an imperial promise made in 1485 and renewed in 1495, the elector of Saxony claimed the duchies of Jiilich and Berg, while the proximity of the coveted lands to the Netherlands made their fate a matter of great moment to the Dutch. When it is remembered that at this time there was a great deal of tension between the Roman Catholics and the Protestants, who were fairly evenly matched in the duchies, and that the rivalry between France and the Empire was very keen, it will be seen that the situation lacked no element of discord. In

March 1609 Duke John William died. Having assured themselves of the support of Henry IV. of France and of the Evangelical Union, Brandenburg and Neuburg at once occupied the duchies. To counter this stroke and to support the Saxon claim, the emperor Rudolph II. ordered some imperialist and Spanish troops to seize the disputed lands, and it was probably only the murder of Henry IV. in May 1610 and the death of the head of the Evangelical Union, the elector palatine, Frederick IV., in the following September, which prevented, or rather delayed, a great European war. About this time the emperor adjudged the duchies to Saxony, while the Dutch captured the fortress of Jiilich; but for all practical purposes victory remained with the " possessing princes," as Brandenburg and Neuburg were called, who continued to occupy and to administer the lands. These two princes had made a compact at Dortmund in 1609 to act together in defence of their rights, but proposals for a mar- riage alliance between the two houses broke down and differences soon arose between them. The next important step was the timely conversion of the count palatine's heir, Wolfgang William of Neuburg, to Roman Catholicism, and his marriage with a daughter of the powerful Roman Catholic prince, Duke Maxi- milian of Bavaria. The rupture between the possessing princes was now complete. Each invited foreign aid. Dutch troops marched to assist the elector of Brandenburg and Spanish ones came to aid the count palatine, but through the intervention of England and France peace was made and the treaty of Xanten was signed in November 1614. By this arrangement Branden- burg obtained Jtilich and Berg, the rest of the lands falling to the count palatine. In 1666 the great elector, Frederick William of Brandenburg, made with William, count palatine of Neuburg, a treaty of mutual succession to the duchies, providing that in case the male line of either house became extinct the other should inherit its lands.

The succession to the duchy of Jiilich was again a matter of interest in the earlier part of the 18th century. The family of the counts palatine of Neuburg was threatened with extinction and the emperor Charles VI. promised the succession to Jiilich to the Prussian king, Frederick William I., in return for a guarantee of the pragmatic sanction. A little later, however, he promised the same duchy to the count palatine of Sulzbach, a kinsman of the count palatine of Neuburg. Then Frederick the Great, having secured Silesia, abandoned his claim to Jtilich, which thus passed to Sulzbach when, in 1742, the family of Neuburg became extinct. From Sulzbach the duchy came to the electors palatine of the Rhine, and, when this family died out in

1799, to the elector of Bavaria, the head of the other branch of the house of Wittelsbach. In 1801 Jiilich was seized by France, and by the settlement of r8is it came into the hands of Prussia.

Its area was just over 1600 sq. m. and its population about

400,000.

See Kuhl, Geschichte der Stadt Jtilich; M. Ritter, Sachsen und der Jiilicher Erbfolgestreit (1873), and Der Julicher Erbfolgekrieg, 1610 und 1611 (1877); A. Muller, Der Jiilich-Klevescke Erbfolgestreit im Jahrt 1614 (1900) and H. H. Koch, Die Reformation im Herzogtum Jiilich

1883-1888).

JULIEN, STANISLAS (i797?-i873), French orientalist, was born at Orleans, probably on the 13th of April 1797. Stanislas Julien, a mechanic of Orleans, had two sons, Noel, born on the 13th of April 1797, and Stanislas, born on the 20th of September 1799. It appears that the younger son died in America, and that Noel then adopted his brother's name. He studied classics at the college de France, and in 1821 was appointed assistant professor of Greek. In the same year he published an edition of the 'EXepijs apTrayrj of Coluthus, with versions in French, Latin, English, German, Italian and Spanish. He attended the lectures of Abel Remusat on Chinese, and his progress was as rapid as it had been in other languages. From the first, as if by intuition, he mastered the genius of the language; and in 1824 he published a Latin translation of a part of the works of Mencius (Mang-tse), one of the nine classical books of the Chinese. Soon afterwards he translated the modern Greek odes of Kalvos under the title of La Lyre patriotique de la Grece. But such works were not profitable in a commercial sense, and, being without any patri- mony, Julien was glad to accept the assistance of Sir William Drummond and others, until in 1827 he was appointed sub- librarian to the French institute. In 1 83 2 he succeeded Remusat as professor of Chinese at the college de France. In 1833 he was elected a member of the Acad6mie des Inscriptions in the place of the orientalist, Antoine Jean Saint-Martin. For some years his studies had been directed towards the dramatic and lighter literature of the Chinese, and in rapid succession he now brought out translations of the Hoei-lan-ki(L' Histoire du cercle de crate), a drama in which occurs a scene curiously analogous to the judg- ment of Solomon; the Pih shay tsing ki; and the Tchao-chi kou eul, upon which Voltaire had founded his Orphelin de la Chine (1755). With the versatility which belonged to his genius, he next turned, apparently without difficulty, to the very different style common to Taoist writings, and translated in 1835 Le Livre des recompenses et des peines of Lao-tsze. About this time the cultivation of silkworms was beginning to attract attention in France, and by order of the minister of agriculture Julien com- piled, in 1837, a Resume des principaux traitts chinois sur la culture des tnuriers, et V education des vers-d-soie, which was speedily translated into English, German, Italian and Russian.

Nothing was more characteristic of his method of studying Chinese than his habit of collecting every peculiarity of idiom and expression which he met with in his reading; and, in order that others might reap the benefit of his experiences, he published in 1 84 1 Discussions grammaticales sur certaines regies de position qui, en'chinois,jouent le mtme rdle que les inflexions dans les autres langues, which he followed in 1842 by Exercices pratiques d' analyse, de syntaxe, et de lexigraphie chinoise. Meanwhile in 1839, he had been appointed joint keeper of the Bibliotheque royale, with the especial superintendence of the Chinese books, and shortly afterwards he was made administrator of the college de France.

The facility with which he hacflearnea Chinese, and the success which his proficiency commanded, naturally inclined less gifted scholars to resent the impatience with which he regarded their mistakes, and at different times bitter controversies arose between Julien and his fellow sinologues on the one subject which they had in common. In 1842 appeared from his busy pen a trans- lation of the Tao te King, the celebrated work in which Lao-tsze attempted to explain his idea of the relation existing between the universe and something which he called Tao, and on which the religion of Taoism is based. From Taoism to Buddhism was a natural transition, and about this time Julien turned his attention to the Buddhist literature of China, and more especially to the travels of Buddhist pilgrims to India. In order that he might better understand the references to Indian institutions,

and the transcriptions in Chinese of Sanskrit words and proper names, he began the study of Sanskrit, and in 1853 brought out his Voyages du pelerin Hiouen-tsang, which is regarded by some critics as his most valuable work. Six years later he published Les Avad&nas, contes et apologues Indiens inconnus jusqu'a ce jour, suivis de poesies et de nouvelles chinoises. For the benefit of future students he disclosed his system of deciphering Sanskrit words occurring in Chinese books in his MUhode pour dechijfrer et transcrire les noms sanscrits qui se rencontrent dans les livres chinois (1861). This work, which contains much of interes't and impor-tance, falls short of the value which its author was accustomed to attach to it. It had escaped his observation that, since the translations of Sanskrit works into Chinese were undertaken in different parts of the empire, the same Sanskrit words were of necessity differently represented in Chinese characters in accor- dance with the dialectical variations. No hard and fast rule can therefore possibly be laid down for the decipherment of Chinese transcriptions of Sanskrit words, and the effect of this impossi- bility was felt though not recognized by Julien, who in order to make good his rule

was occasionally obliged to suppose that wrong characters had by mistake been introduced into the texts. His Indian studies led to a controversy with Joseph Toussaint Reinaud, which was certainly not free from the gall of bitterness. Among the many subjects to which he turned his attention were the native industries of China, and his work on the Hisloire et fabrication de la porcelaine chinoise is likely to remain a standard work on the subject. In another volume he also published an account of the Industries anciennes et modernes de I'empire chinois (1869), translated from native authorities. In the inter- vals of more serious undertakings he translated the San tseu King (Le Livre des trois mots) ; Thsien tseu wen (Le Livre de mille mots); Les Deux cousines; Nouvelles chinoises; the Ping chan ling yen {Les Deux jeunes filles leltrees) ; and the Dialoghi Cinesi, Ji- tch'ang k' eou-t' eou-koa. His last work of importance was Syntaxe nouvelle de la langue chinoise (1869), in which he gave the result of his study of the language, and collected a vast array of facts and of idiomatic expressions. A more scientific arrangement and treatment of his subject would have added much to the value of this work, which, however, contains a mine of material which amply repays exploration. One great secret by which Julien acquired his grasp of Chinese, was, as we have said, his methodical collection of phrases and idiomatic expressions. Whenever in the course of his reading he met with a new phrase or expression, he entered it on a card which took its place in regular order in a long series of boxes. At his death, which took place on the 14th of February 1873, he left, it is said, 250,000 of such cards, about the fate of which, however, little seems to be known. In politics Julien was imperialist, and in 1863 he was made a com- mander of the legion of honour in recognition of the services he had rendered to literature during the second empire.

See notice and bibliography by Wallon, Mem. de VAcad. des Inscr. (1884), xxxi. 409-458. (R. K. D.)

JULIUS, the name of three popes.

Julius I., pope from 337 to 352, was chosen as successor of Marcus after the Roman see had been vacant four months. He is chiefly known by the part which he took in the Arian con- troversy. After the Eusebians had, at a synod held in Antioch, renewed their deposition of Athanasius they resolved to send delegates to Constans, emperor of the West, and also to Julius, setting forth the grounds on which they had proceeded. The latter, after expressing' an opinion favourable to Athanasius, adroitly invited both parties to lay the case before a synod to be presided over by himself. This proposal, however, the Eastern bishops declined to accept. On his second banishment from Alexandria, Athanasius came to Rome, and was recognized as a regular bishop by the synod held in 340. It was through the influence of Julius that, at a later date, the council of Sardica in Illyria was

held, which was attended only by seventy-six Eastern bishops, who speedily withdrew to Philippopolis and deposed Julius, along with Athanasius and others. The Western bishops who remained confirmed the previous decisions of the Roman synod; and by its 3rd, 4th and 5th decrees relating to the rights

of revision, the council of Sardica endeavoured to settle the procedure of ecclesiastical appeals. Julius on his death in April 352 was succeeded by Liberius. (L. D.)*

Julius II. (Giuliano della Rovere), pope from the 1st of November 1503 to the 2istof February 1 5 1 3 , was born at Sa vona in 1443. He was at first intended for a commercial career, but later was sent by his uncle, subsequently Sixtus IV., to be edu- cated among the Franciscans, although he does not appear to have joined that order. He was loaded with favours during his uncle's pontificate, being made bishop of Carpentras, bishop of Bologna, bishop of Vercelli, archbishop of Avignon, cardinal- priest of S. Pietro in Vincoli and of Sti Dodici Apostoli, and car- dinal-bishop of Sabina, of Frascati, and finally of Ostia and Velletri. In 1480 he was made legate to France, mainly to settle the question of the Burgundian inheritance, and acquitted him- self with such ability during his two years' stay that he acquired an influence in the college of cardinals which became paramount during the pontificate of Innocent VIII. A rivalry, however, growing up between him and Roderigo Borgia, he took refugi at Ostia after the latter's election as Alexander VI., and in 1494 went to France, where he incited Charles VIII. to undertake the conquest of Naples. He accompanied the young king on his campaign, and sought to convoke a council to inquire into the conduct of the pope with a view to his deposition, but was defeated in this through Alexander's machinations. During the remainder of that pontificate Della Rovere remained in France, nominally in support of the pope, for whom he negotiated the treaty of 1498 with Louis XII., but in reality bitterly hostile to him. On the death of Alexander (1503) he returned to Italy and supported the election of Pius III., who was then suffering from an incurable malady, of which he died shortly afterwards. Delia Rovere then won the support of Cesare Borgia and was unanimously elected pope. Julius II. from the beginning repudiated the system of nepotism which had flourished under Sixtus IV., Innocent VIII. and Alexander VI., and set himself with courage and determination to restore, consolidate and extend the temporal possessions of the Church. By dexterous diplomacy he first succeeded (1504) in rendering it impossible for Cesare Borgia to remain in Italy. He then pacified Rome and the surrounding country by reconciling the powerful houses of Orsini and Colonna and by winning the other nobles to his own cause. In 1504 he arbitrated on the differences between France and Germany, and concluded an alliance with them in order to oust the Venetians from Faenza, Rimini

and other towns which they occupied. The alliance at first resulted only in compelling the surrender of a few unimportant fortresses in the Romagna; but Julius freed Perugia and Bologna in the brilliant campaign of 1506. In 1508 he concluded against Venice the famous league of Cambray with the emperor Maximilian, Louis XII. of France and Ferdinand of Aragon, and in the following year placed the city of Venice under an interdict. By the single battle of Agnadello the Italian dominion of Venice was practi- cally lost; but as the allies were not satisfied with merely effect- ing his purposes, the pope entered into a combination with the Venetians against those who immediately before had been engaged in his behalf. He absolved the Venetians in the beginning of 1 5 10, and shortly afterwards placed the ban on France. At a synod convened by Louis XII. at Tours in September, the French bishops announced their withdrawal from the papal obedience and resolved, with Maximilian's co-operation, to seek the deposition of Julius. In November 1511 a council actually met at Pisa for this object, but its efforts were fruitless. Julius forthwith formed the Holy league with Ferdinand of Aragon and with Venice against France, in which both Henry VIII. and the emperor ultimately joined. The French were driven out of Italy in 1 5 1 2 and papal authority was once more securely established in the states immediately around Rome. Julius had already issued, on the 1 8th of July 1511, the summons for a general council to deal with France, with the reform of the Church, and with a war against the Turks. This council, which is known as the Fifth Lateran, assembled on the 3rd of May 1512, condemned the celebrated pragmatic sanction of the French church, and was

still in session when Julius died. In the midst of his combats, Julius never neglected his ecclesiastical duties. His bull of the 14th of January 1505 against simony in papal elections was re-enacted by the Lateran council (February 16, 1513). He condemned duelling by bull of the 24th of February 1509. He effected some reforms in the monastic orders; urged the conver- sion of the sectaries in Bohemia; and sent missionaries to America, India, Abyssinia and the Congo. His government of the Papal States was excellent. Julius is deserving of particular honour for his patronage of art and literature. He did much to improve and beautify Rome; he laid the foundation-stone of St Peter's (April 18, 1506); he founded the Vatican museum; and he was a friend and patron of Bramante, Raphael and Michelangelo. While moderate in personal expenditure, Julius resorted to objectionable means of replenishing the papal treasury, which had been exhausted by Alexander VI., and of providing funds for his numerous enterprises; simony and traffic in indulgences were increasingly prevalent.

Julius was undoubtedly in energy and genius one of the greatest popes since Innocent III., and it is a misfortune of the Church that his temporal policy eclipsed his spiritual office. Though not despising the Machia- vellian arts of statecraft so universally practised in his day, he was nevertheless by nature plain-spoken and sincere, and in his last years grew violent and crabbed. He died of a fever on the 2 1 st of February 15 13, and was succeeded by Leo X.

See L. Pastor, History of the Popes, vol. vi., trans, by F. I. Antrobus (1898) ; M.Creighton,HistoryoflhePapacy,vo.v. (1901) ; F.Gregoro- vius, Rome in the Middle Ages, vol. viii., trans, by Mrs G. W. Hamilton (1900-1902) ; Hefele-Hergenrother, Conciliengeschichte, vol. viii., 2nd ed. ; J. Klaczko, Rome etlarenaissance . . . Jules II. (1898), trans, into English by J. Dennie (New York, 1903) ; M. Brosch, Papst Julius II. u. die Grründung des Kirchenstaates (1878); A. J. Dumesnil, Histoire de Jules II. (1873) ; J. J. I. von Dollinger, Beitrage zur polit., kirchl., u. Cultur-Geschichte der sechs letzten Jahrhunderte, vol. iii. (1882); A. Schulte, Die Fugger in Rom 1495-15 23, mil Studien zur Gesch. deskirchlichenFinanzwesensjenerZeit{i<)o\). (C. H. Ha.)

Julius III. (Giovanni Maria del Monte), pope from 1550 to 1555, was born on the 10th of September 1487. He was created cardinal by Paul III. in 1536, filled several important legations, and was elected pope on the 7th of February 1550, despite the opposition of Charles V., whose enmity he had incurred as presi- dent of the council of Trent. Love of ease and desire for peace moved him, however, to adopt a conciliatory attitude, and to yield to the emperor's desire for the reassembling of the council (September 1551), suspended since 1549- But deeming Charles's further demands inconvenient, he soon found occasion in the renewal of hostilities to suspend the council once more (April 1552). Asan adherent of the emperor he suffered in consequence of imperial reverses, and was forced to confirm Parma to Ottavio Farnese, the ally of France (1552). Weary of politics, and obeying a natural inclination to pleasure, Julius then virtually abdicated the management of affairs, and gave himself up to enjoyment, amusing himself with the adornment of his villa, near the Porta del Popolo, and often so far forgetting the proprieties of his office as to participate in entertainments of a questionable character. His nepotism was of a less ambitious order than that of Paul III.; but he provided for his family out of the offices and revenues of the Church, and advanced unworthy favourites to the cardinalate. What progress reform made during his pontifi- cate was due to its acquired momentum, rather than to the zeal of the pope. Yet under Julius steps were taken to abolish plurality of benefices and to restore monastic discipline; the Collegium Germanicum, for the conversion of Germans, was established in Rome, 1552; and England was absolved by the cardinal-legate Pole, and received again into the Roman com- munion

(1554). Julius died on the 23rd of March 1555, and was succeeded by Marcellus II.

See Panvinio, continuator of Platina, De Vitis Pontiff. Rom.; Ciaconius, Vitae et res gestae summorum Pontiff. Rom. (Rome, 1601- 1602) (both contemporaries of Julius III.); Ranke, Popes (Eng. trans., Austin), i. 276 seq. ; v. Reumont, Gesch. der Stadl Rom., iii. 2, 503 seq.; Brosch, Gesch. des Kirchenstaates (1880), i. 189 seq.; and extended bibliography in Herzog-Hauck, Realencyklopadie, s.v. "Julius III." (T. F. C.)

JULLIEN, LOUIS ANTOINE (181 2-1860), musical conductor, was born at Sisteron, Basses Alpes, France, on the 23rd of April 18 1 2, and studied at the Paris conservatoire. His fondness for the lightest forms of music cost him his position in the school, and after conducting the band of the Jardin Turc he was com- pelled to leave Paris to escape his creditors, and came to London, where he formed a good orchestra and established promenade concerts. Subsequently he travelled to Scotland, Ireland and America with his orchestra. For many years he was a familiar figure in the' world of popular music in England, and his portly form with its gorgeous waistcoats occurs very often in the early volumes of Punch. He brought out an opera, Pietro il Grande, at Covent Garden (1852) on a scale of magnificence that ruined him, for the piece was a complete failure. He was in America until 1854, when he returned to London for a short time; ulti- mately he went back to Paris, where, in 1859, he was arrested for debt and put into prison. He lost his reason soon afterwards, and died on the 14th of March i860.

JULLUNDUR, or Jalandhar, a city of British India, giving its name to a district and a division in the Punjab. The city is 260 m. by rail N.W. of Delhi. Pop. (1901), 67,735. It is the headquarters of a brigade in the 3rd division of the northern army. There are an American Presbyterian mission, a govern- ment normal school, and high schools supported by Hindu bodies. The District or Jullundur occupies the lower part of the tract known as the Jullundur Doab, between the rivers Sutlej and Beas, except that it is separated from the Beas by the state of Kapurthala. Area, 1431 sq. m. Pop. (1901), 917,58.7, showing an increase of 1% in the decade; the average density is 641 persons per square mile, being the highest in the province. Cotton-weaving and sugar manufacture are the principal industries for export trade, and silk goods and wheat are also exported. The district is crossed by the main line of the North- Western railway from Phillaur towards Amritsar.

The Jullundur Doab in early times formed the Hindu kingdom of Katoch, ruled by a family of Rajputs whose descendants still exist in the petty princes of the Kangra hills. Under Mahom- medan rule the Doab was generally attached to the province of Lahore, in which it is included as a

circar or governorship in the great revenue survey of Akbar. Its governors seem to have held an autonomous position, subject to the payment of a fixed tribute into the imperial treasury. The Sikh revival extended to Jullundur at an early period, and a number of petty chieftains made themselves independent throughout the Doab. In 1766 the town of Jullundur fell into the hands of the Sikh confederacy of Faiz-ulla-puria, then presided over by Khushal Singh. His son and successor built a masonry fort in the town, while several other leaders similarly fortified themselves in the suburbs. Meanwhile, Ranjit Singh was consolidating his power in the south, and in 181 1 he annexed the Faiz-ulla-puria dominions. Thenceforth Jullundur became the capital of the Lahore possessions in the Doab until the British annexation at the close of the first Sikh war (1846).

The Division of Jullundur comprises the five districts of Kangra, Hoshiarpur, Jullundur, Ludhiana and Ferozepore, all lying along the river Sutlej. Area, 19,410 sq. m. Pop. (1901),

4,306,662.

See Jullundur District Gazetteer (Lahore, 1908).

JULY, the seventh month in the Christian calendar, consisting cf thirty-one days. It was originally the fifth month of the year, and as such was called by the Romans Quintilis. The later name of Julius was given in honour of Julius Caesar (who was born in the month); it came into use in the year of his death. The Anglo-Saxons called July Hegmdnath, " hay-month," or Maed-mdnath, " mead-month," the meadows being then in bloom. Another name was aftera lifia, " the latter mild month," in contradistinction to June, which was named " the former mild month." Chief dates of the month: 3rd July, Dog Days begin; 15th July, St Swithin; 25th July, St James.

JUMALA, the supreme god of the ancient Finns and Lappa. Among some tribes he is called Num or Jilibeambaertje, as protector of the flocks. Jumala indicates rather godhead than

a divine being. In the runes Ukko, the grandfather, the sender of the thunder, takes the place of Jumala.

JUMI&GES, a village of north-western France, in the depart- ment of Seine-Inferieure, 17 m. W. of Rouen by road, on a peninsula formed by a

bend of the Seine. Pop. (1906), 244. Jumieges is famous for the imposing ruins of its abbey, one of the great establishments of the Benedictine order. The principal remains are those of the abbey-church, built from 1040 to 1067; these comprise the facade with two towers, the walls of the nave, a wall and sustaining arch of the great central tower and debris of the choir (restored in the 13th century). Among the minor relics, preserved in a small museum in a building of the 14th century, are the stone which once covered the grave of Agnes Sorel, and two recumbent figures of the 13th century, commonly known as the Enervis, and representing, according to one legend, two sons of Clovis II., who, as a punishment for revolt against their father, had the tendons of their arms and legs cut, and were set adrift in a boat on the Seine. Another tradition states that the statues represent Thassilo, duke of Bavaria, and Theodo his son, relegated to Jumieges by Charlemagne. The church of St Pierre, which adjoins the south side of the abbey-church, was built in the 14th century as a continuation of a previous church of the time of Charlemagne, of which a fragment still survives. Among the other ruins, those of the chapter-house (13th century) and refectory (12th and 15th centuries) also survive.

The abbey of Jumieges was founded about the middle of the 7th century by St Philibert, whose name is still to be read on gold and silver coins obtained from the site. The abbey was destroyed by the Normans, but was rebuilt in 928 by William Longsword, duke of Normandy, and continued to exist till 1790. Charles VII. often resided there with Agnes Sorel, who had a manor at Mesnil-sous- Jumieges in the neighbourhood, and died in the monastery in 1450.

JUMILLA, a town of eastern Spain, in the province of Murcia, 40 m. N. by W. of Murcia by road, on the right bank of the Arroyo del Jua, a left-bank tributary of the Segura. Pop. (1900), 16,446. Jumilla occupies part of a narrow valley, enclosed by mountains. An ancient citadel, several churches, a Franciscan convent, and a hospital are the principal buildings. The church of Santiago is noteworthy for its fine paintings and frescoes, some of which have been attributed, though on doubtful authority, to Peter Paul Rubens and other illustrious artists. The local trade is chiefly in coarse cloth, esparto fabrics, wine and farm produce.

JUMNA, or Jamuna, a river of northern India. Rising in the Himalayas in Tehri state, about 5 m. N. of the Jamnotri hot springs, in 31 3′ N. and 78 30′ E., the stream first flows S. for 7 m., then S.W. for 32 m., and afterwards due S. for 26 m., receiving several small tributaries in its course. It afterwards turns sharply to the W. for 14 m., when it is joined by the large river Tons from the north. The Jumna here emerges from the Himalayas into the valley of the Dun, and flows in a S.W. direction for 22m., dividing the Kiarda Dun on the W. from the Dehra Dun on the E. It

then, at the 95th mile of its course, forces its way through the Siwalik hills, and debouches upon the plains of India at Fyzabad in Saharanpur district. By this time a large river, it gives off, near Fyzabad, the eastern and western Jumna canals. From Fyzabad the river flows for 65 m. in a S.S.W. direction, receiving the Maskarra stream from the east. Near Bidhauli, in Muzaffarnagar district, it turns due S. for 80 m. to Delhi city, thence S.E. for 27 m. to near Dankaur, receiving the waters of the Hindan river on the east. From Dankaur it resumes its southerly course for 100 m. to Mahaban near Muttra, where it turns E. for nearly 200 m., passing the towns of Agra, Ferozabad and Etawah, receiving on its left bank the Karwan-nadi, and on its right the Banganga (Utanghan). From Etawah it flows 140 m. S.E. to Hamirpur, being joined by the Sengar on its north bank, and on the south by the great river Chambal from the west, and by the Sind. From Hamirpur, the Jumna flows nearly due E., until it enters Allahabad district and passes Allahabad city, below which it

falls into the Ganges in 25° 25′ N. and 81° 55′ E. In this last part of its course it receives the waters of the Betwa and the Ken. Where the Jumna and the Ganges unite is the prayag, or place of pilgrimage, where devout Hindus resort in thousands to wash and be sanctified.

The Jumna, after issuing from the hills, has a longer course through the United Provinces than the Ganges, but is not so large nor so important a river; and above Agra in the hot season it dwindles to a small stream. This is no doubt partly caused by the eastern and western Jumna canals, of which the former, constructed in 1823-1830, irrigates 300,000 acres in the districts of Saharanpur, Muzaffarnagar and Meerut, in the United Provinces; while the latter, consisting of the reopened channels of two canals dating from about 1350 and 1628 respectively, extends through the districts of Umballa, Karnal, Hissar, Rohtak and Delhi, and the native states of Patiala and Jind in the Punjab, irrigating 600,000 acres. The headworks of the two canals are situated near the point where the river issues from the Siwaliks.

The traffic on the Jumna is not very considerable; in its upper portion timber, and in the lower stone, grain and cotton are the chief articles of commerce, carried in the clumsy barges which navigate its stream. Its waters are clear and blue, while those of the Ganges are yellow and muddy; the difference between the streams can be discerned for some distance below the point at which they unite. Its banks are high and rugged, often attaining the proportions of cliffs, and the ravines which run into it are deeper and larger than those of the Ganges. It traverses the extreme edge of the alluvial plain of Hindustan, and in the latter part of its course it almost touches the Bundel- khand offshoots of the Vindhya. range of mountains. Its passage is therefore more tortuous, and the scenery along its

banks more varied and pleasing, than is the case with the Ganges.

The Jumna at its source near Jamnotri is 10,849 ft- above the sea-level; at Kotnur, 16 m. lower, it is only 5036 ft.; so that, between these two places, it falls at the rate of 314 ft. in a mile. At its junction with the Tons it is 1686 ft. above the sea; at its junction with the Asan, 1470 ft.; and at the point where it issues from the Siwalik hills into the plains, 1276 ft. The catchment area of the river is 118,000 sq. m.; its flood discharge at Allahabad is estimated at 1,333,000 cub. ft. per second. The Jumna is crossed by railway bridges at Delhi, Muttra, Agra and Allahabad, while bridges of boats are stationed at many places.

JUMPING, 1 a branch of athletics which has been cultivated from the earliest times (see Athletic Sports). Leaping competitions formed a part of the pentathlon, or quintuple games, of the Olympian festivals, and Greek chronicles record that the athlete Phayllus jumped a distance of 55 Olympian, or more than 30 English, feet. Such a leap could not have been made without weights carried in the hands and thrown backwards at the moment of springing. These were in fact employed by Greek jumpers and were called halleres. They were masses of stone or metal, nearly semicircular, according to Pausanias, and the fingers grasped them like the handles of a shield. Halteres were also used for general exercise, like modern dumb-bells. The Olympian jumping took place to the music of lutes.

Jumping has always been popular with British athletes, and tradition has handed down the record of certain leaps that border on the incredible. Two forms of jumping are included in modern athletic contests, the running long jump and the running high jump; but the same jumps, made from a standing position, are also common forms of competition, as well as the hop step and jump, two hops and jump, two jumps, three jumps, five jumps and ten jumps, either with a run or from a standing position. These events are again divided into two categories by the use of weights, which are not allowed in championship contests.

1 The verb " to jump " only dates from the beginning of the 16th century. The New English Dictionary takes it to be of onomatopoeic origin and does not consider a connexion with Dan. gumpe, Icel. goppa, &c, possible. The earlier English word is " leap " (O.E. hliapan, to run, jump, cf. Ger. laufen).

In the running long jump anything over 18 ft. was once considered good, while Peter O'Connor's world's record (1901) is 24 ft. iif in. The jump is

made, after a short fast run on a cinder path, from a joist sunk into the ground flush with the path, the jumper landing in a pit filled with loose earth, its level a few inches below that of the path. The joist, called the " take-off," is painted white, and all jumps are measured from its edge to the nearest mark made by any part of the jumper's person in landing.

In the standing long jump, well spiked shoes should be worn, for it is in reality nothing but a push against the ground, and a perfect purchase is of the greatest importance. Weights held in the hands of course greatly aid the jumper. Without weights J. Darby (professional) jumped 12 ft. i§ in. and R. C. Ewry (American amateur) 1 1 ft. 4! in. With weights J. Darby covered 14 ft. 9 in. at Liverpool in 1890, while the amateur record is 12 ft. 95 in., made by J. Chandler and G. L. Hellwig (U.S.A.). The standing two, three, five and ten jumps are merely repetitions of the single jump, care being taken to land with the proper balance to begin the next leap. The record for two jumps without weights is 22 ft. 25 in., made by H. M. Johnson (U.S.A.); for three jumps without weights, R. C. Ewry, 35 ft. 7j in.; with weights J. Darby, 41 ft. 7 in.

The hop step and jump is popular in Ireland and often included in the programmes of minor meetings, and so is the two hops and a jump. The record for the first, made by W. McManus, is 49 ft. 25 in. with a run and without weights; for the latter, also with a run and without weights, 49 ft. 5 in., made by J. B. Conolly.

In the running high jump also the standard has improved. In 1864 a jump of 5 ft. 6 in. was considered excellent. The Scotch professional Donald Dinnie, on hearing that M. J. Brooks of Oxford had jumped 6 ft. 2j in. in 1876, wrote to the news- papers to show that upon a priori grounds such an achievement was impossible. Since then many jumpers who can clear over 6 ft. have appeared. In 1895 M. F. Sweeney of New York accomplished a jump of 6 ft. sf in. Ireland has produced many first- class high jumpers, nearly all tall men, P. Leahy winning the British amateur record in Dublin in 1898 with a jump of 6 ft. 4! in. The American A. Bird Page, however, although only 5 ft. 6f in. in height, jumped 6 ft. 4 in. High jumping is done over a light staff or lath resting upon pins fixed in two uprights upon which a scale is marked. The " take-off," or ground immediately in front of the uprights from which the spring is made, is usually grass in Great Britain and cinders in America. Some jumpers run straight at the bar and clear it with body facing forward, the knees being drawn up almost to the chin as the body clears the bar; others run and spring sideways, the feet being thrown upwards and over the bar first, to act as a kind of lever in getting the body over. There should be a shallow pit of loose earth or a mattress to break the fall.

The standing high jump is rarely seen in regular athletic meetings. The jumper stands sideways to the bar with his arms extended upwards. He then swings his arms down slowly, bending his knees at the same time, and, giving his arms a violent upward swing, springs from the ground. As the body rises the arms are brought down, one leg is thrown over the bar, and the other pulled, almost jerked, after it. The record for the standing high jump without weights is 6 ft., by J. Darby in

1892.

By the use of a spring-board many extraordinary jumps have been made, but this kind of leaping is done only by circus gymnasts and is not recognized by athletic authorities. For pole-jumping see Pole-vaulting.

See Encyclopaedia of Sport; M. W. Ford, "Running High Jump," Outing, vol. xviii. ; "Running Broad Jump," Outing, vol. xix. ; " Standing Jumping," Outing, vol. xix.; "Miscellaneous Jumping," Outing, vol. xx. Also Sporting and Athletic Register (annual).

JUMPING-HARE, the English equivalent of springhaas, the Boer name of a large leaping south and east African rodent mammal, Pedetes caffer, typifying a family by itself, the Pedetjdae. Originally classed with the jerboas, to which

it has no affinity, this remarkable rodent approximates in the structure of its skull to the porcupine-group, near which it is placed by some naturalists, although others consider that its true position is with the African scaly-tailed flying squirrels (Anomaluridae) . The colour of the creature is bright rufous fawn; the eyes are large; and the bristles round the muzzle very long, the former having a fringe of long hairs. The front limbs are short, and the hind ones very long; and although the fore-feet have five toes, those of the hind-feet are reduced to four. The bones of the lower part of the hind leg (tibia and fibula) are united for a great part of their length. There are four pairs of cheek-teeth in each jaw, which do not develop roots. The jump- ing-hare is found in open or mountainous districts, and has habits very like a jerboa. It is nocturnal, and dwells in composite burrows excavated and tenanted by several families. When feeding it progresses on all four legs, but if frightened takes gigantic leaps on the hind-pair alone; the length of such leaps frequently reaches twenty feet, or even more. The young are generally three or four in number, and are born in the summer. A second smaller species has been named. (See Rodentia.)

JUMPING-MOUSE, the name of a North American mouse- like rodent, Zapus hudsonius, belonging to the family Jacu- lidae (Dipodidae), and the other members of the same genus. Although mouse-like in general

appearance, these rodents are distinguished by their elongated hind limbs, and, typically, by the presence of four pairs of cheek-teeth in each jaw. There are five toes to all the feet, but the first in the fore-feet is rudimentary, and furnished with a flat nail. The cheeks are provided with pouches. Jumping-mice were long supposed to be confined to North America, but a species is now known from N.W. China. It is noteworthy that whereas E. Coues in 1877 recognized but a single representative of this genus, ranging over a large area in North America, A. Preble distinguishes no fewer than twenty North American species and sub-species, in addition to the one from Szechuen. Among these, it may be noted that Z. insignis differs from the typical Z. hudsonius by the loss of the premolar, and has accordingly been referred to a sub-genus apart. Moreover, the Szechuen jumping-mouse differs from the typical Zapus by the closer enamel-folds of the molars, the shorter ears, and the white tail-tip, and is therefore made the type of another sub-genus. In America these rodents inhabit forest, pasture, cultivated fields or swamps, but are nowhere numerous. When disturbed, they start off with enormous bounds of eight or ten feet in length, which soon diminish to three or four; and in leaping the feet scarcely seem to touch the ground. The nest is placed in clefts of rocks, among timber or in hollow trees, and there are generally three litters in a season. (See Rodentia.)

JUMPING-SHREW, a popular name for any of the terrestrial insectivora of the African family Macroscelididae, of which there are a number of species ranging over the African continent, representing the tree-shrews of Asia. They are small long- snouted gerbil-like animals, mainly nocturnal, feeding on insects, and characterized by the great length of the metatarsal bones, which have been modified in accordance with their leaping mode of progression. In some (constituting the genus Rhyncocyon) the muzzle is so much prolonged as to resemble a proboscis, whence the name elephant-shrews is sometimes applied to the members of the family.

JUNAGARH, or Junagadh, a native state of India, within the Gujarat division of Bombay, extending inland from the southern coast of the peninsula of Kathiawar. Area, 3284 sq. m.; pop. (1901), 395,428, showing a decrease of 19% in the decade, owing to famine; estimated gross revenue, £174,000; tribute to the British government and the gaekwar of Baroda, £4200; a considerable sum is also received as tribute from minor states in Kathiawar. The state is traversed by a railway from Rajkot, to the seaport of Verawal. It includes the sacred mountain of Girnar and the ruined temple of Somnath, and also the forest of Gir, the only place in India where the lion survives. Junagarh ranks as a first-class state among the many chiefships of Kathia- war, and its ruler first entered into engagements with the British

in 1807. Nawab Sir Rasul Khanji, K.C.S.L, was born in 1858 and succeeded his brother in 1892.

The modern town of Junagarh (34,251), 60 m. by rail S. of Rajkot, is handsomely built and laid out. In November 1897 the foundation-stones of a hospital, library and museum were laid, and an arts college has recently been opened.

JUNCACEAE (rush family), in botany, a natural order of flowering plants belonging to the series Liliiflorae of the class Monocotyledons, containing about two hundred species in seven genera, widely distributed in temperate and cold regions. It is well represented in Britain by the two genera which com- prise nearly the whole order — Juncus, rush, and Luzula, wood-rush. They are generally perennial herbs with a creeping under- ground stem and erect, unbranched, aerial stems, bearing slender

Juncus effusus, common rush. I Plant. 4. Flower, enlarged.

2. Inflorescence. 5. Fruit, enlarged.

3. End of branch of inflorescence, 6. Seed.

slightly enlarged. 7. Seed, much enlarged.

leaves which are grass-like or cylindrical or reduced to mem- branous sheaths. The small inconspicuous flowers are generally more or less crowded in terminal or lateral clusters, the form of the inflorescence varying widely according to the manner of branching and the length of the pedicels. The flowers are hermaphrodite and regular, with the same number and arrange- ment of parts as in the order Liliaceae, from which they differ in the inconspicuous membranous character of the perianth, the absence of honey or smell, and the brushlike stigmas with long papillae-adaptations to wind-pollination as contrasted with the methods of pollination by insect agency, which characterize the Liliaceae. Juncaceae are, in fact, a less elaborated group of the same series as Liliaceae, but adapted to a simpler and more uniform environment than that larger and much more nighly developed family.

JUNCTION CITY, a city and the county-seat of Geary county, Kansas, U.S.A., between Smoky Hill and Republican rivers, about 3 m. above their confluence to form the Kansas, and 72 m. by rail W. of Topeka. Pop. (1900), 4695, of whom 545 were

foreign-born and 292 were negroes; (1905), 5494; (1910), 3598. Junction City is served by the Union Pacific and the Missouri, Kansas & Texas railways. It is the commercial centre of a region in whose fertile valleys great quantities of wheat, Indian corn, oats and hay are grown and live stock is raised, and whose uplands contain extensive beds of limestone, which is quarried for building purposes. Excellent water-power is available and is partly utilized by flour mills. The munici- pality owns and operates the waterworks. At the confluence of Smoky Hill and Republican rivers and connected with the city by an electric railway is Fort Riley, a U.S. military post, which was established in 1853 as Camp Centre but was renamed in the same year in honour of General Bennett Riley (1787-1853); in 1887 the mounted service school of the U.S. army was established here. Northward from the post is a rugged country over which extends a military reservation of about 19,000 acres. Adjoining the reservation and about 5 m. N.E. of Junction City is the site of the short-lived settlement of Pawnee, where from the 2nd to the 6th of July 1855 the first Kansas legislature met, in a build- ing the ruins of which still remain; the establishment of Pawnee (in December 1854) was a speculative pro-slavery enterprise conducted by the commandant of Fort Riley, other army officers and certain territorial officials, and when a government survey showed that the site lay within the Fort Riley reservation, the settlers were ordered (August 1855) to leave, and the com- mandant of Fort Riley was dismissed from the army; one of the charges brought against Governor A. H. Reeder was that he had favoured the enterprise. Junction City was founded in 1857 and was chartered as a city in 1859.

JUNE, the sixth month in the Christian calendar, consisting of thirty days. Ovid (Fasti, vi. 25) makes Juno assert that the name was expressly given in her honour. Elsewhere (Fasti, vi. 87) he gives the derivation a junioribus, as May had been derived from majores, which may be explained as in allusion either to the two months being dedicated respectively to youth and age in general, or to the seniors and juniors of the government of Rome, the senate and the comitia curiata in particular. Others connect the term with the gentile name Junius, or with the consulate of Junius Brutus. Probably, however, it originally denoted the month in which crops grow to ripeness. In the old Latin calendar June was the fourth month, and in the so-called year of Romulus it is said to have had thirty days; but at the time of the Julian reform of the calendar its days were only twenty-nine. To these Caesar added the thirtieth. The Anglo-Saxons called June " the dry month," " midsummer month," and, in contradistinction to July, " the earlier mild month." The summer solstice occurs in June. Principal festival days in this month: nth June, St Barnabas; 24th June, Midsummer Day (Nativity of St John the Baptist) ; 29th June, St Peter.

JUNEAU, formerly Harrisburg, a mining and trading town picturesquely

situated at the mouth of Gold Creek on the continental shore of Gastineau channel, south-east Alaska, and the capital of Alaska. Pop. (1900), 1864 (450 Indians); (1910), 1644. It has a United States custom-house and court-house. The city has fishing, manufacturing and trading interests, but its prosperity is chiefly due to the gold mines in the adjacent Silver Bow basin, the source of Gold Creek, and the site of the great Perseverance mine, and to those on the Treadwell lode on Douglas Island, 2 m. from Juneau. Placer gold was found at the mouth of the creek in 1879, and the city was settled in 1880 by two prospectors named Joseph Juneau and Richard Harris. The district was called Juneau and the camp Harrisburg by the first settlers ; exploring naval officers named the camp Rockwell, in honour of Commander Charles Henry Rockwell, U.S.N, (b. 1840). A town meeting then adopted the name oi Juneau. The town was incorporated in 1900. In October 1906 the seat of government of Alaska was removed from Sitka to Juneau.

JUNG, JOHANN HEINRICH (1 740-181 7), best known by his assumed name of Heinrich Stilling, German author, was born in the village of Grund near Hilchenbach in Westphalia on

the 1 2th of September 1740. His father, Wilhelm Jung, school- master and tailor, was the son of Eberhard Jung, charcoal- burner, and his mother was Dortchen Moritz, daughter of a poor clergyman. Jung became, by his father's desire, schoolmaster and tailor, but found both pursuits equally wearisome. After various teaching appointments he went in 1768 with "half a French dollar " to study medicine at the university of Strassburg. There he met Goethe, who introduced him to Herder. The acquaintance with Goethe ripened into friendship; and it was by his influence that Jung's first and best work, Heinrich Stillings Jugend was written. In 1772 he settled at Elberfeld as physician and oculist, and soon became celebrated for operations in cases of cataract. Surgery, however, was not much more to his taste than tailoring or teaching; and in 1778 he was glad to accept the appointment of lecturer on " agriculture, technology, commerce and the veterinary art" in the newly established Kameralschule at Kaiserslautern, a post which he continued to hold when the school was absorbed in the university of Heidelberg. In 1787 he was appointed professor of economi- cal, financial and statistical science in the university of Marburg. In 1803 he resigned his professorship and returned to Heidelberg, where he remained until 1806,' when he received a pension from the grand-duke Charles Frederick of Baden, and removed to Karlsruhe, where he remained until his death on the 2nd of April 1817. He was married three times, and

left a numerous family. Of his works his autobiography Heinrich Sailings Leben, from which he came to be known as Stilling, is the only one now of any interest, and is the chief authority for his life. His early novels reflect the piety of his early surroundings.

A complete edition of his numerous works, in 14 vols. 8vo, was published at Stuttgart in 1S35-1838. There are English translations by Sam. Jackson of the Leben (1835) and of the Theorie der Geister- kunde (London, 1834, and New York, 1851); and of Theobald, or the Fanatic, a religious romance, by the Rev. Sam. Schaeffer (1846). See biographies by F. W. Bodemann (1868), J. v. Ewald (1817), Peterson (1890). N

JUNG BAHADUR, SIR, Maharaja (1816-1877), prime minister of Nepal, was a grand-nephew of Bhim sena Thapa (Bhim sen Thappa), the famous military minister of Nepal, who from 1804 to 1839 was de facto ruler of the state under the rani Tripuri and her successor. Bhimsena's supremacy was threatened by the Kala Pandry, and many of his relations, including Jung Bahadur, went into exile in 1838, thus escaping the cruel fate which overtook Bhimsena in the following year. The Pandry leaders, who then reverted to power, were in turn assassinated in 1843, and Matabar Singh, uncle of Jung Bahadur, was created prime minister. He appointed his nephew general and chief judge, but shortly afterwards he was himself put to death. Fateh Jung thereon formed a ministry, of which Jung Bahadur was made military member. In the following year, 1846, a quarrel was fomented, in which Fateh Jung and thirty- two other chiefs were assassinated, and the rani appointed Jung Bahadur sole minister. The rani quickly changed her mind, and planned the death of her new minister, who at once appealed to the maharaja. But the plot failed. The raja and the rani wisely sought safety in India, and Jung Bahadur firmly estab- lished his own position by the removal of all dangerous rivals. He succeeded so well that in January 1850 he was able to leave for a visit to England, from, which he did not return to Nepal until the 6th of February 1851. On his return, and frequently on subsequent dates, he frustrated conspiracies for his assassina- tion. The reform of the penal code, and a desultory war with Tibet, occupied his attention until news of the Indian Mutiny reached Nepal. Jung Bahadur resisted all overtures from the rebels, and sent a column to Gorakpur in July 1857. In Decem- ber he furnished a force of 8000 Gurkhas, which reached Lucknow on the nth of March 1858, and took part in the siege. The moral support of the Nepalese was more valuable even than the military services rendered by them. Jung Bahadur was made a G.C.B., and a tract of country annexed in 1815 was restored to Nepal. Various frontier disputes were settled, and in 1875

Sir Jung Bahadur was on his way to England when he had a fall from his horse in Bombay and returned home. He received a visit from the Prince of

Wales in 1876. On the 25th of February 1877 he died, having reached the age of sixty-one. Three of his widows immolated themselves on his funeral pyre. (W. L.-W.)

JUNG-BUNZLAU (Czech, Mladd Boleslav), a town of Bohemia, 44 m. N.N.E. of Prague by rail. Pop. (1900), 13,479, mostly Czech. The town contains several old buildings of historical interest, notably the castle, built towards the end of the 10th century, and now used as barracks. There are several old churches. In that of St Maria the celebrated bishop of the Bohemian brethren, Johann August, was buried in 1595; but his tomb was destroyed in 1621. The church of St Bonaventura with the convent, originally belonging to the friars minor and later to the Bohemian brethren, is now a Piaristic college. The church of St Wenceslaus, once a convent of the brotherhood, is now used for military stores. Jung-Bunzlau was built in 995, under Boleslaus II., as the seat of a gaugraf or royal count. Early in the 13th century it was given the privileges of a town and pledged to the lords of Michalovic. In the Hussite wars Jung-Bunzlau adhered to the Taborites and became later the metropolis of the Bohemian Brethren. In 1595 Bohuslav of Lobkovic sold his rights as over-lord to the town, which was made a royal city by Rudolf II. During the Thirty Years' War it was twice burned, in 1631 by the imperialists, and in 1640 by the Swedes.

JUNGFRAU, a well-known Swiss mountain (13,669 ft.), admirably seen from Interlaken. It rises on the frontier between the cantons of Bern and of the Valais, and is reckoned among the peaks of the Bernese Oberland, two of which (the Finsteraarhorn, 14,026 ft., and the Aletschhorn, 13,721 ft.) surpass it in height. It was first ascended in 1811 by the brothers Meyer, and again in 18 12 by Gottlieb Meyer (son of J. R. Meyer), in both cases by the eastern or Valais side, the foot of which (the final ascent being made by the 1811-1812 route) was reached in 1828 over the Monchjoch by six peasants from Grindelwald. In 1841 Principal J. D. Forbes, with Agassiz, Desor and Du Chatelier, made the fourth ascent by the 181 2 route. It was not till 1865 that Sir George Young and the Rev. H. B. George succeeded in making the first ascent from the west or Interlaken side. This is a far more difficult route than that from the east, the latter being now frequently taken in the course of the summer. (W. A. B. C.)

JUNGLE (Sans, jangala) , an Anglo-Indian term for a forest, a thicket, a tangled wilderness. The Hindustani word means strictly waste, uncultivated ground; then such ground covered with trees or long grass; and thence again the Anglo-Indian application is to forest or other wild growth, rather than to the fact that it is not cultivated.

JUNIN, an interior department of central Peru, bounded N. by Huanuco, E. by Loreto and Cuzco, S. by Huancavelica, and W. by Lima and

Ancachs. Pop. (1906 estimate), 305,700. It lies wholly within the Andean zone and has an area of 23,353 sq. m. It is rich in minerals, including silver, copper, mercury, bismuth, molybdenum, lead and coal. The Huallaga and Man- taro rivers have their sources in this department, the latter in Lake Junin, or Chanchaycocha, 13,230 ft. above sea-level. The capital of Junin is Cerro de Pasco, and its two principal towns are Jauja and Tarma (pop., 1906, about 12,000 and 5000 respectively).

JUNIPER. The junipers, of which there are twenty-five or more species, are evergreen bushy shrubs or low columnar trees, with a more or less aromatic odour, inhabiting the whole of the cold and temperate northern hemisphere, but attaining their maximum development in the Mediterranean region, the North Atlantic islands, and the eastern United States. The leaves are usually articulated at the base, spreading, sharp-pointed and needle-like in form, destitute of oil-glands, and arranged in alternating whorls of three; but in some the leaves are minute and scale-like, closely adhering to the branches, the apex only being free, and furnished with an oil-gland on the back.

JUNIUS

SSI

Sometimes the same plant produces both kinds of leaves on differ- ent branches, or the young plants produce acicular leaves, while those of the older plants are squamiform. The male and female flowers are usually produced on separate plants. The male flowers are developed at the ends of short lateral branches, are rounded or oblong in form, and consist of several antheriferous scales in two or three rows, each scate bearing three or six almost spherical pollen-sacs on its under side. The female flower is a small bud-like cone situated at the apex of a small branch, and consists of two or three whorls of two or three scales. The scales of the upper or middle series each bear one or two erect ovules. The mature cone is fleshy, with the succulent scales fused together and forming the fruit-like structure known to the older botanists as the galbulus, or berry of the juniper. The berries are red or purple in colour, varying in size from that of a pea to a nut. They thus differ considerably from the cones of other members of the order Coniferae, of Gymnosperms (q.v.), to which the junipers belong. The seeds are usually three in number, sometimes fewer (i), rarely more (8), and have the surface near the middle or base marked with large glands containing oil. The genus occurs in a fossil state, four species having been described from rocks of Tertiary age.

The genus is divided into three sections, Sabina, Oxycedrus and Caryocedrns. Juniperus Sabina is the savin, abundant on the mountains of

central Europe, an irregularly spreading much- branched shrub with scale-like glandular leaves, and emitting a disagreeable odour when bruised. The plant is poisonous, acting as a powerful local and general stimulant, diaphoretic, emmenagogue and anthelmintic; it was formerly employed both internally and externally. The oil of savin is now occasionally used criminally as an abortifacient. J. bermudiana, a tree about 40 or 50 ft. in height, yields a fragrant red wood, which was used for the manufacture of " cedar " pencils. The tree is now very scarce in Bermuda, and the " red cedar," /. virginiana, of North America is employed instead for pencils and cigar-boxes. The red cedar is abundant in some parts of the United States and in Virginia is a tree 50 ft. in height. It is very widely distributed from the Great Lakes to Florida and round the Gulf of Mexico, and extends as far west as the Rocky Mountains and beyond to Vancouver Island. The wood is applied to many uses in the United States. The fine red fragrant heart-wood takes a high polish, and is much used in cabinet-work and inlaying, but the small size of the planks prevents its more extended use. The galls produced at the ends of the branches have been used in medicine, and the wood yields cedar-camphor and oil of cedar-wood. /. thurifera is the incense juniper of Spain and Portugal, and /. phoenicea (J. lycia) from the Mediterranean district is stated by Loudon to be burned as incense.

J. communis, the common juniper (see fig.), and several other species, belong to the section Oxycedrus. The common juniper is a very widely distributed plant, occurring in the whole of northern Europe, central and northern Asia to Kamchatka, and east and west North America. It grows at considerable eleva- tions in southern Europe, in the Alps, Apennines, Pyrenees and Sierra Nevada (4000 to 8000 ft.). It also grows in Asia Minor, Persia, and at great elevations on the Himalayas. In Great Britain it is usually a shrub with spreading branches, less frequently a low tree. In former times the juniper seems to have been a very well-known plant, the name occurring almost unaltered in many languages. The Lat. juniperus, probably formed ixomjuni — crude form oijuvenis, fresh, young, and parere, to produce, is" represented by Fr. genievre, Sp. enebro, Ital. gine-pilo, &c. The dialectical names, chiefly in European languages, were collected by Prince L. L. Bonaparte, and published in the Academy (July 17, 1880, No. 428, p. 45). The common juniper is official in the British pharmacopoeia and in that of the United States, yielding the oil of juniper, a powerful diuretic, distilled from the unripe fruits. This oil is closely allied in composition to oil of turpentine and is given in doses of a half to three minims. The Spiritus juniperi of the British pharma-

copoeia is given in doses up to one drachm. Much safer and more powerful diuretics are now in use. The wood is very aromatic and is used for ornamental purposes. In Lapland the bark is made into ropes. The fruits are used for flavouring gin (a name derived from juniper, through Fr.

genievre) ; and in some parts of France a kind of beer called genivrette was made from them by the peasants. J. Oxycedrus, from the Mediter- ranean district and Madeira, yields cedar-oil which is official in most of the European pharmacopoeias, but not in that of Britain. This oil is largely used by microscopists in what is known as the " oil-immersion lens."

The third section, Caryocedrus, consists of a single species, /. drupacea of Asia Minor. The fruits are large and edible: they are known in the East by the name habhel.

(From Bentley and Trimen's Medicinal Plants, by permission of J. & A. Churchill.) Juniper {Juniperus communis).

1. Vertical section of fruit. .

2. Male catkin.

JUNIUS, the pseudonym of a writer who contributed a series of letters to the London Public Advertiser, from the 21st of January 1769 to the 21st of January 1772. The signature had been already used by him in a letter of the 21st of November 1768, which he did not include in his collection of the Letters of Junius published in 1772. The name was chosen in all probability because he had already signed " Lucius " and " Brutus," and wished to exhaust the name of Lucius Junius Brutus the Roman patriot. Whoever the writer was, he wrote under other pseudonyms before, during and after the period between January 1760 and January 1772. He acknowledged that he had written as " Philo- Junius," and there is evidence that he was identical with " Veteran," " Nemesis " and other anonymous correspon- dents of the Public Advertiser. There is a marked distinction between the " letters of Junius " and his so-called miscellaneous letters. The second deal with a variety of subjects, some of a purely personal character, as for instance the alleged injustice of Viscount Barrington the secretary at war to the officials of his department. But the " letters of Junius " had a definite object — to discredit the ministry of the duke of Grafton. This administration had been formed in October 1768, when the earl of Chatham was compelled by ill health to retire from office, and was a reconstruction of his cabinet of July 1766. Junius

fought for the return to power of Chatham, who had recovered and was not on good terms with his successors. He communi- cated with Chatham, with George Grenville, with Wilkes, all enemies of the duke of Grafton, and also with Henry Sampson Woodfall, printer and part owner of the Public

Advertiser. This private correspondeace has been preserved. It is written in the disguised hand used by Junius.

The letters are of interest on three grounds — their political significance, their style, and the mystery which long surrounded their authorship. As political writings they possess no intrinsic value. Junius was wholly destitute of insight, and of the power to disentangle, define and advocate principles. The matter of his letters is always invective. He began by a general attack on the ministry for their personal immorality or meanness. An ill-judged defence of one of the body — the marquess of Granby, commander-in-chief — volunteered by Sir William Draper, gave him an easy victory over a vulnerable opponent. He then went on to pour acrimonious abuse on Grafton, on the duke of Bedford, on King George III. himself in the letter of the 19th of December

1769, and ended with a most malignant and ignorant assault on Lord Chief Justice Mansfield. Several of his accusations were shown to be unfounded. The practical effect of the letters was insignificant. They were noticed and talked about. They provoked anger and retorts. But the letter to the king aroused indignation, and though Grafton's administration fell in January

1770, it was succeeded by the long-lived cabinet of Lord North. Junius confessed himself beaten, in his private letter to Woodfall of the 19th of January 1773. He had materially contributed to his own defeat by his brutal violence. He sinned indeed in a large company. The employment of personal abuse had been habitual in English political controversy for generations, and in the 18th century there was a strong taste for satire. Latin literature, which was not only studied but imitated, supplied the inspiration and the models, in the satires of Juvenal, and the speeches of Cicero against Verres and Catiline.

If, however, Junius was doing what others did, he did it better than anybody else — a fact which sufficiently explains his rapid popularity. His superiority lay in his style. Here also he was by no means original, and he was unequal. There are passages in his writings which can be best described in the words which Burke applied to another writer: " A mere mixture of vinegar and water, at once vapid and sour." But at his best Junius attains to a high degree of artificial elegance and vigour. He shows the influence of Bolingbreke, of Swift, and above all of Tacitus, who appears to have been his favourite author. The imitation is never slavish. Junius adapts, and does not only repeat. The white heat of his malignity animates the whole. No single sentence will show the quality of a style which produces its effect by persistence and repetition, but such a typical passage as follows displays at once the method and the spirit. It is taken from Letter XLIX. to the duke of

Grafton, June 22, 1771: —

" The profound respect i bear to the gracious prince who governs this country with no less honour to himself than satisfaction to his subjects, and who restores you to your rank under his standard, will save you from a multitude of reproaches. The attention I should have paid to your failings is involuntarily attracted to the hand which rewards them ; and though I am not so partial to the royal judgment as to affirm that the favour of a king can remove moun- tains of infamy, it serves to lessen at least, for undoubtedly it divides, the burden. While I remember how much is due to his sacred character, I cannot, with any decent appearance of propriety, call you the meanest and the basest fellow in the kingdom. I protest, my Lord, I do not think you so. You will have a dangerous rival in that kind of fame to which you have hitherto so happily directed your ambition, as long as there is one man living who thinks you worthy of his confidence, and fit to be trusted with any share in his government. . . . With any other prince, the shameful desertion of him in the midst of that distress, which you alone had created, in the very crisis of danger, when he fancied he saw the throne already surrounded by men of virtue and abilities, would have outweighed the memory of your former services. But his majesty is full of justice, and understands the doctrine of compen- sations; he remembers with gratitude how soon you had accommo- dated your morals to the necessities of his service, how cheerfully you had abandoned the engagements of private friendship, and renounced

the most solemn professions to the public. The sacrifice of Lord Chatham was not lost on him. Even the cowardice and perfidy of deserting him may have done you no disservice in his esteem. The instance was painful, but the principle might please."

What is artificial and stilted in this style did not offend the would-be classic taste of the 18th century, and does not now conceal the fact that the laboriously arranged words, and art- fully counterbalanced clauses, convey a venomous hate and scorn. The pre-established harmony between Junius and his readers accounts for the rapidity of his success, and for the importance attributed to him by Burke and Johnson, far better writers than himself. Before 1772 there appeared at least twelve un- authorized republications of his letters, made by speculative printers. In that year he revised the collection named " Junius: Stat nominis umbra," with a dedication to the English people and a preface. Other independent editions followed in quick succession. In 1801 one was published with annotations by Robert Heron. In 1806 another appeared with notes by John Almon. The first new edition of real importance was issued by the Woodfall family in 1812. It contained the correspondence of Junius with H. S, Woodfall, a selection of the miscellaneous letters attributed to Junius, facsimiles of his

handwriting, and notes by Dr Mason Good. Curiosity as to the mystery of the authorship began to replace political and literary interest in the writings. Junius himself had been early aware of the advantage he secured by concealment. " The mystery of Junius increases his importance " is his confession in a letter to Wilkes dated the 18th of September 1771. The calculation was a sound one. For two generations after the appearance of the letter of the 21st of January 1769, speculations as to the authorship of Junius were rife, and discussion had hardly ceased in 1910. Joseph Parkes, author with Herman Merivale of the Memoirs of Sir Philip Francis (1867), gives a list of more than forty persons who had been supposed to be Junius. They are: Edmund Burke, Lord George Sackville, Lord Chatham, Colonel Barre, Hugh Macaulay Boyd, Dr Butler, John Wilkes, Lord Chesterfield, Henry Flood, William Burke, Gibbon, W. E. Hamilton, Charles Lloyd, Charles Lee (general in the American War of Independence), John Roberts, George Grenville, James Grenville, Lord Temple, Duke of Portland, William Greatrakes, Richard Glover, Sir William Jones, James Hollis, Laughlin Maclean, Philip Rosenhagen, Home Tooke, John Kent, Henry Grattan, Daniel Wray, Horace Walpole, Alexander Wedderburn (Lord Loughborough), Dunning (Lord Ashburton), Lieut.-General Sir R. Rich, Dr Philip Francis, a " junto " or committee of writers who used a common name, De Lolme, Mrs Catherine Macaulay (1733-91), Sir Philip Francis, Lord Littleton, Wolfram Cornwall and Gov. Thomas Pownall. In the great majority of cases the attribution is based on nothing more than a vague guess. Edmund Burke denied that he could have written the letters of Junius if he would, or would have written them if he could. Grattan pointed out that he was young when they appeared. More plausible claims, such as those made for Lord Temple and Lord George Sackville, could not stand the test of examination. Indeed after 1816 the question was not so much " Who wrote Junius? " as " Was Junius Sir Philip Francis, or some undiscoverable man? " In that year John Taylor was led by a careful study of Woodfall's edition of 1 81 2 to publish The identity of Junius with a distinguished living character established, in which he claimed the letters for Sir Philip Francis. He had at first been inclined to attribute them to Sir Philip's father, Dr Francis, the author of translations of Horace and Demosthenes. Taylor applied to Sir Philip, who did not die till 1818, for leave to publish, and received from him answers which to an unwary person might appear to constitute denials of the authorship, but were in fact evasions.

The reasons for believing that Sir Philip Francis (q.v.) was Junius are very strong. His evasions were only to be expected. Several of the men he attacked lived nearly as long as himself, the sons of others were conspicuous in society, and King George III. survived him. Sir Philip, who had held office, who had been decorated, and who in his later years was

ambitious to obtain

the governor-generalship of India, dared not confess that he was Junius. The similarity of his handwriting to the disguised hand used by the writer of the letters is very close. If Sir Philip Francis did, as his family maintain, address a copy of verses to a Miss Giles in the handwriting of Junius (and the evidence that he did is weighty) there can be no further question as to the identity of the two. The similarity of Junius and Francis in regard to their opinions, their likes and dislikes, their knowledge and their known movements, amount, apart from the handwriting, almost to proof. It is certain that many felons have been condemned on circumstantial evidence less complete. The opposition to his claim is based on such asser- tions as that his known handwriting was inferior to the feigned hand of Junius, and that no man can make a disguised hand better than his own. But the first assertion is unfounded, and the second is a mere expression of opinion. It is also said that Francis must have been guilty of baseness if he wrote Junius, but if that explains why he did not avow the authorship it can be shown to constitute a moral impossibility only by an examina- tion of his life.

Authorities. — The best edition of the Letters of Junius, properly so called, with the Miscellaneous Letters, is that of J. Ward (1854). The most valuable contributions to the controversy as to the authorship are: The Handwriting of Junius investigated by Charles Chabot, expert, with preface and collateral evidence by the Hon. E. Twisleton (1871); Memoirs of Sir Philip Francis, K.C.B., by Parkes and Merivale (1867) ; Junius Revealed by his Surviving Grandson, by H. R. Francis (1894); The Francis Letters, edited by Beata Francis and Eliza Keary, with a note on the Junius controversy by C. F. Keary (1901); and " Francis, Sir Philip," by Sir Leslie Stephen, in Diet, of Nat. Biog. The case for those who decline to accept the claim of Sir Philip Francis is stated by C. W. Dilke, Papers of a Critic (1875), and Abraham Hayward, More about Junius, Franciscan Theory Unsound (1868). (D. H.)

JUNIUS, FRANZ (in French, Frangois du Jon), the name of two Huguenot scholars.

(1) Franz Junius (1545-1602) was born at Bourges in France on the 1st of May 1545. He had studied law for two years under Hugo Donellus (1527-1591) when he was given a place in the retinue of the French ambassador to Constantinople, but before he reached Lyons the ambassador had departed. Junius found ample consolation in the opportunities for study at the gymnasium at Lyons. A religious tumult warned him back to Bourges, where he was cured of certain rationalistic

principles that he had imbibed at Lyons, and he determined to enter the reformed church. He went in 1562 to study at Geneva, where he was reduced to the direst poverty by the failure of remit- tances from home, owing to civil war in France. He would accept only the barest sustenance from a humble friend who had himself been a protege of Junius's family at Bourges, and his health was permanently injured. The long-expected remittance from home was closely followed by the news of the brutal murder of his father by a Catholic fanatic at Issoudun; and Junius resolved to remain at Geneva, where his reputation enabled him to live by teaching. In 1565, however, he was appointed minister of the Walloon church at Antwerp. His foreign birth excluded him from the privileges of the native reformed pastors, and exposed him to persecution. Several times he barely escaped arrest, and finally, after spending six months in preaching at Limburg, he was forced to retire to Heidelberg in 1567. There he was welcomed by the elector Frederick II., and temporarily settled in charge of the Walloon church at Schonau; but in 1568 his patron sent him as chaplain with Prince William of Orange in his unfortunate expedition to the Netherlands. Junius escaped as soon as he could from that post, and returning to his church remained there till 1573. From 1573 till 1578 he was at Heidelberg, assisting Emmanuel Tremel- lius (1 510-1580), whose daughter he married, in his Latin version of the Old Testament (Frankfort, 1579); in 1 581 he was appointed to the chair of divinity at Heidelberg. Thence he was taken to France by the duke of Bouillon, and after an interview with Henry IV. was sent again to Germany on a mission. As he was returning to France he was named professor of theology at Leiden, where he died on the 13th of October 1602.

559

He was a voluminous writer on theological subjects, and translated and composed many exegetical works. He is best known from his own edition of the Latin Old Testament, slightly altered from the former joint edition, and with a version of the New Testament added (Geneva, 1590; Hanover, 1624). The Opera Theologica Francisci Junii Biturigis were published at Geneva (2 vols., 1613), to which is prefixed his autobiography, written about 1592 (new ed., edited by Abraham Kuypers,i882 seq.). The autobiography had been published at Leiden (1595), and is reprinted in the Miscellanea Groningana, vol. i., along with a list of the author's other writings.

(2) Franz Junius (1589-1677), son of the above, was born at Heidelberg, and brought up at Leiden. His attention was diverted from military to theological studies by the peace of 1609 between Spain and the Netherlands. In 1617 he became pastor at Hillegondsberg, but in 1620 went to England, where he became librarian to Thomas Howard, earl of

Arundel, and tutor to his son. He remained in England thirty years, devoting himself to the study of Anglo-Saxon, and afterwards of the cognate old Teutonic languages. His work, intrinsically valu- able, is important as having aroused interest in a frequently neglected subject. In 1651 he returned to Holland; and for two years lived in Friesland in order to study the old dialect. In 1675 he returned to England, and during the next year resided in Oxford; in 1677 he went to live at Windsor with his nephew, Isaac Vossius, in whose house he died on the 19th of November 1677. He was buried at Windsor in St George's Chapel.

He was pre-eminently a student. He published De piclura veterum (1637) (in English by the author, 1638; enlarged and im- proved edition, edited by J. G. Graevius, who prefixed a life of Junius, with a catalogue of architects, painters, &c, and their works, Rotterdam, 1694); Observationes in Willerami Abbatis francicam paraphrasin cantici canticorum (Amsterdam, 1655); Annotationes in harmoniam latino-francicam quatuor evangelis- tarum, latine a Tatiano confectam (Amsterdam, 1655) ; Caedmonis monachi paraphrasis poetica geneseos (Amsterdam, 1655) (see criticism under Caedmon) ; Quatuor D.N.I.C. evangeliorum versiones perantiquae duae, gothica scilicet et anglo-saxonica (Dort, 2 vols., 1665) (the Gothic version in this book Junius transcribed from the Silver Codex of Ulfilas ; the Anglo-Saxon version is from an edition by Thomas Marshall, whose notes to both versions are given, and a Gothic glossary by Junius) ; Etymologicum anglicanum, edited by Edward Lye, and preceded by a life of Junius and George Hickes's Anglo-Saxon grammar (Oxford, 1743) (its results require careful verification in the light of modern research). His rich collection of ancient MSS., edited and annotated by him, Junius bequeathed to the university of Oxford. Graevius gives a list of them ; the most important are a version of the Ormulum, the version of Caedmon, and 9 volumes containing Glossarium v. linguarum septentrionalium.

JUNK. (1) (Through Port, junco, adapted from Javanese djong, or Malayan adjong, ship), the name of the native sailing vessel, common to the far eastern seas, and especially used by the Chinese and Javanese. It is a flat-bottomed, high-sterned vessel with square bows and masts carrying lug-sails, often made of matting. (2) A nautical term for small pieces of disused rope or cable, cut up to make fenders, oakum, &c, hence applied colloquially by sailors to the salt beef and pork used on board ship. The word is of doubtful origin, but may be connected with " junk " (Lat. juncus), a reed, or rush. This word is now obsolete except as applied to a form of surgical appliance, used as a support in cases of fracture where immediate setting is impossible, and consisting of a shaped pillow or cushion stuffed with straw or horsehair, formerly with rushes or reeds.

JUNKER, WILHELM (1840-1892), German explorer of Africa, was born

at Moscow on the 6th of April 1840. He studied medi- cine at Dorpat, Gottingen, Berlin and Prague, but did not practise for long. After a series of short journeys to Iceland, Tunis and Lower Egypt, he remained almost continuously in eastern Equatorial Africa from 1875 to 1886, making first Khartum and afterwards Lado the base of his expeditions, Junker was a leisurely traveller and a careful observer; his main object was to study the peoples with whom he came into contact, and to collect specimens of plants and animals, and the result of his investigations in these particulars is given in his Reisen in Afrika (3 vols., Vienna, 1889-1891), a work of high merit. An English translation by A. H. Keane was published in 1890-1892. Perhaps the greatest service he rendered to geographical science

was his investigation of the Nile-Congo watershed, when he suc- cessfully combated Georg Schweinfurth's hydrographical theories and established the identity of the Welle and Ubangi. The Mah- dist rising prevented his return to Europe through the Sudan, as he had planned to do, in 1884, and an expedition, fitted out in 1885 by his brother in St Petersburg, failed to reach him. Junker then determined to go south. Leaving Wadelai on the 2nd of January 1886 he travelled by way of Uganda and Tabora and reached Zanzibar in December 1886. In 1887 he received the gold medal of the Royal Geographical Society. As an explorer Junker is entitled to high rank, his ethnographical observations in the Niam-Niam (Azandeh) country being especially valuable. He died at St Petersburg on the 13th of February 1892.

See the biographical notice by E. G. Ravenstein in Proceedings of the Royal Geographical Society (1892), pp. 185-187.

JUNKET, a dish of milk curdled by rennet, served with clotted cream and flavoured with nutmeg, which is particularly associated in England with Devonshire and Cornwall. The word is of somewhat obscure history. It appears to come through O. Fr. jonquette, a rush-basket, from Lat. juncus, rush. In Norman dialect this word is used of a cream cheese. The commonly accepted origin is that it refers to the rush-basket on which such cream cheeses or curds were served. Juncade appears in Rabelais, and is explained by Cotgrave as " spoon- meat, rose-water and sugar." Nicholas Udall (in his translation of Erasmus's Apophthegms, 1542) speaks of " marchepaines or wafers with other like junkerie." The word " junket " is also used for a festivity or picnic.

JUNO, the chief Roman and Latin goddess, and the special object of

worship by women at all the critical moments of life. The etymology of the name is not certain, but it is usually taken as a shortened form of Jovino, answering to Jovis, from a root div, shining. Under Greek influence Juno was early identified with the Greek Hera, with whose cult and characteristics she has much in common; thus the Juno with whom we are familiar in Latin literature is not the true Roman deity. In the Aeneid, for example, her policy is antagonistic to the plans of Jupiter for the conquest of Latium and the future greatness of Rome; though in the fourth Eclogue, as Lucina, she appears in her proper role as assisting at childbirth. It was under Greek influence again that she became the wife of Jupiter, the mother of Mars; the true Roman had no such personal interest in his deities as to invent family relations for them.

That Juno was especially a deity of women, and represents in a sense the female principle of life, is seen in the fact that as every man had his genius, so every woman had her Juno; and the goddess herself may have been a development of this conception. The various forms of her cult all show her in close connexion with women. As Juno Lucina she was invoked in childbirth, and on the 1st of March, the old Roman New Year's day, the matrons met and made offerings at her temple in a grove on the Esquiline; hence the day was known as the Matronalia. As Caprotina she was especially worshipped by female slaves on the 7th of July (Nonae Caprolinae) ; as Sospita she was invoked all over Latium as the saviour of women in their perils, and later as the saviour of the state; and under a number of other titles, Cinxia, Unxia, Pronuba, &c, we find her taking a leading part in the ritual of marriage. Her real or supposed connexion with the moon is explained by the alleged influence of the moon on the lives of women; thus she became the deity of the Kalends, or day of the new moon, when the regina sacrorum offered a lamb to her in the regia, and her husband the rex made known to the people the day on which the Nones would fall. Thus she is brought into close relation with Janus, who also was worshipped on the Kalends by the rex sacrorum, and it may be that in the oldest Roman religion these two were more closely connected than Juno and Jupiter. But in historical times she was asso- ciated with Jupiter in the great temple on the Capitoline hill as Juno Regina, the queen of all Junones or queen of heaven, as Jupiter there was Optimus Maximus (see Jupiter), and under the same title she was enticed from Veii after its capture in 392 b.c, and settled in a temple on the Aventine. Thus exalted

above all other female deities, she was prepared for that identi- fication with Hera which was alluded to above. That she was in some sense a deity of light seems certain; as Lucina, e.g., she introduced new-born infants " in luminis oras."

See Roscher's article " Juno " in his Lexicon of Mythology, and his earlier

treatise on Juno and Hera; Wissowa, Religion und Kultus der Romer, 113 foil.; also a fresh discussion by Walter Otto in Philologus for 1905 (p. 161 foil.). (W. W. F.)*

JUNOT, ANDOCHE, Duke or Abrantes (1771-1813), French general, was born at Bussy-le-Grand (C6te d'Or), on the 23rd of October 1771. He went to school at Chatillon, and was known among his comrades as a blustering but lovable creature, with a pugnacious disposition. He was studying law in Paris at the outbreak of the Revolution and joined a volunteer battalion. He distinguished himself by his valour in the first year of the Revolutionary wars, and came under the special notice of Napoleon Bonaparte during the siege of Toulon, while serving as his secretary. It is related that as he was taking down a despatch, a shell burst hard by and covered the paper with sand, whereupon he exclaimed, " Bien! nous n'avions pas de sable pour secher l'encre ! en voici ! " He remained the faithful companion of his chief during the latter's temporary disgrace, and went with him to Italy as aide-de-camp. He distinguished himself so much at the battle of Millesimo that he was selected to carry back the captured colours to Paris; returning to Italy he went, through the campaign with honour, but was badly wounded in the head at Lonato. Many rash incidents in his career may be traced to this wound, from which he never com- pletely recovered. During the expedition to Egypt he became a general of brigade. His devotion to Bonaparte involved him in a duel with General Lanusse, in which he was again wounded. He had to be left in Egypt to recover, and in crossing to France was captured by English cruisers. On his return to France he was made commandant of Paris, and afterwards promoted general of division. It was at this time that he married Laure Permon (see Junot, Laure). He next served at Arras in com- mand of the grenadiers of the army destined for the invasion of England, and made some alterations in the equipment of the troops which received the praise of the emperor. It was, however, a bitter mortification that he was not appointed a marshal of France when he received the grand cross of the legion of honour. He was made colonel-general of hussars instead and sent as ambassador to Lisbon, his entry into which city resembled a royal progress. But he was so restless and dis- satisfied in the Portuguese capital that he set out, without leave, for the army of Napoleon, with which he took part in the battle of Austerlitz, behaving with his usual courage and zeal. But he soon gave fresh offence. Although his early devotion was never forgotten by the emperor, his uncertain temper and want of self-control made it dangerous to employ him at court or head- quarters, and he was sent to Parma to put down an insurrection and to be out of the way. In 1806 he was recalled and became governor of Paris. His extravagance and prodigality shocked the government, and some rumours of an intrigue with a lady of the imperial family — it is said Pauline Bonaparte — made it

desirable again to send him away. He was therefore appointed to lead an invading force into Portugal. For the first time Juhot had a great task to perform, and only his own resources to fall back upon for its achievement. Early in November 1807 he set out from Salamanca, crossed the mountains of Beira, rallied his wearied forces at Abrantes r and, with 1500 men, dashed upon Lisbon, in order, if possible, to seize the Portuguese fleet, which had, however, just sailed away with the regent and court to Brazil. The whole movement only took a month; it was undoubtedly bold and well-conducted, and Junot was made duke of Abrantes and invested with the governorship of Portugal. But administration was his weak point. He was not a civil governor, but a sabreur, brave, truculent, and also dissipated and rapacious, though in the last respect he was far from being the worst offender amongst the French generals in Spain. His hold on Portugal was never supported by a really adequate force, and his own conduct, which resembled that of

an eastern monarch, did nothing to consolidate his conquest. After Wellesley encountered him at Vimiera (see Peninsular War) he was obliged to conclude the so-called convention of Cintra, and to withdraw from Portugal with all his forces. Napoleon was furious, but, as he said, was spared the necessity of sending his old friend before a court martial by the fact that the English put their own generals on their trial. Junot was sent back to Spain, where, in 1810-1811, acting under Massena, he was once more seriously wounded. His last campaign was made in Russia, and he received more than a just share of discredit for it. Napoleon next appointed him to govern Illyria. But Junot's mind had become deranged under the weight of his misfortunes, and on the 29th of July 1813, at Montbard, he threw himself from a window in a fit of insanity. JUNOT, LAURE, Duchess or Abrantes (1 783-1834), wife of the preceding, was born at Montpellier. She was the daughter of Mme. Permon, to whom during her widowhood the young Bonaparte made an offer of marriage — such at least is the version presented by the daughter in her celebrated Memoirs. The Permon family, after various vicissitudes, settled at Paris, and Bonaparte certainly frequented their house a good deal after the downfall of the Jacobin party in Thermidor 1794. Mile. Permon was married to Junot early in the consulate, and at once entered eagerly into all the gaieties of Paris, and became noted for her beauty, her caustic wit, and her extravagance. The first consul nicknamed her petite peste, but treated her and Junot with the utmost generosity, a fact which did not restrain her sarcasms and slanders in her portrayal of him in her Memoirs. During Junot's diplomatic mission to Lisbon, his wife displayed her prodigality so that on his return to Paris in

1806 he was burdened with debts, which his own intrigues did not lessen. She joined him again at Lisbon after he had entered that city as conqueror at the close of 1807 ; but even the presents and spoils won at Lisbon did not satisfy her demands; she accompanied Junot through part of the Peninsular War. On her return to France she displeased the emperor by her vivacious remarks and by receiving guests whom he disliked. The mental malady of Junot thereafter threatened her with ruin; this perhaps explains why she took some part in the intrigues for bringing back the Bourbons in 1814. She did not side with Napoleon during the Hundred Days. After 1815 she spent most of her time at Rome amidst artistic society, which she enlivened with her sprightly converse. She also compiled her spirited but somewhat spiteful Memoirs, which were published at Paris in 1831-1834 in 18 volumes. Many editions have since appeared.

Of her other books the most noteworthy are Histoires contempo- raries (2 vols., 1835); Scenes de la vie espagnole (2 vols., 1836); Histoire des salons de Paris (6 vols., 1837-1838); Souvenirs d'une ambassade el d'un sejour en Espagne et en Portugal, de 1808

JUNTA (from juntar, to join), a Spanish word meaning (1) any meeting for a common purpose; (2) a committee; (3) an administrative council or board. The original meaning is now rather lost in the two derivative significations. The Spaniards have even begun to make use of the barbarism metin, corrupted from the English " meeting." The word junta has always been and still is used in the other senses. Some of the boards by which the Spanish administration was conducted under the Habsburg and the earlier Bourbon kings were styled juntas. The superior governing body of the Inquisition was the junta suprema. The provincial committees formed to organize resistance to Napoleon's invasion in 1808 were so called, and so was the general committee chosen from among them to represent the nation. In the War of Independence (i8o8-i8i4),andinall subsequent civil wars or revolutionary disturbances in Spain or Spanish America, the local executive bodies, elected, or in some cases self-chosen, to appoint officers, raise money and soldiers, look after the wounded, and discharge the functions of an administration, have been known as juntas.

The form " Junto," a corruption due to other Spanish words ending in -o, came into use in English in the 1 7th century, often in a disparaging sense, of a party united for a political purpose,

a faction or cabal; it was particularly applied to the advisers of Charles I., to the Rump under Cromwell, and to the leading members of the great Whig houses who controlled the govern- ment in the reigns of William III. and Anne.

JUPITER, the chief deity of the Roman state. The great and constantly growing influence exerted from a very early period on Rome by the superior civilization of Greece not only caused a modification of the Roman god on the analogy of Zeus, the supreme deity of the Greeks, but led the Latin writers to identify the one with the other, and to attribute to Jupiter myths and family relations which were purely Greek and never belonged to the real Roman religion. The Jupiter of actual worship was a Roman god; the Jupiter of Latin literature was more than half Greek. This identification was facilitated by the community of character which really belonged to Jupiter and Zeus as the Roman and Greek developments of a common original conception of the god of the light and the heaven.

That this was the original idea of Jupiter, not only in Rome, but among all Italian peoples, admits of no doubt. The earliest form of his name was Diovis paler, or Diespiter, and his special priest was the fiamen dialis; all these words point to a. root div, shining, and the connexion with dies, day, is obvious (cf. Juno). One of his most ancient epithets is Lucetius, the light-bringer; and later literature has preserved the same idea in such phrases as sub Jove, under the open sky. All days of the full moon (idus) were sacred to him; all emanations from the sky were due to him and in the oldest form of religious thought were probably believed to be manifestations of the god himself. As Jupiter Elicius he was propitiated, with a peculiar ritual, to send rain in time of drought; as Jupiter Fulgur he had an altar in the Campus Martius, and all places struck by lightning were made his property and guarded from the profane by a circular wall. The vintage, which needs especially the light and heat of the sun, was under his particular care, and in the festivals connected with it (Vinalia urbana) and Meditrinalia, he was the deity invoked, and his fiamen the priest employed. Throughout Italy we find him worshipped on the summits of hills, where nothing intervened between earth and heaven, and where all the phenomena of the sky could be conveniently observed. Thus on the Alban hill south of Rome was an ancient seat of his worship as Jupiter Latiaris, which was the centre of the league of thirty Latin cities of which Rome was originally an ordinary member. At Rome itself it is on the Capitoline hill that we find his oldest temple, described by Livy (i. 10); here we have a tradition of his sacred tree, the oak, common to the worship both of Zeus and Jupiter, and here too was kept the lapis silex, perhaps a celt, believed to have been a thunderbolt, which was used symbolically by the fetiales when officially declaring war and making treaties on behalf of the Roman state. Hence the curious form of oath, Jovem lapidem jurare, used both in public and private life at Rome.

In this oldest Jupiter of the Latins and Romans, the god of the light and the heaven, and the god invoked in taking the most solemn oaths, we may undoubtedly see not only the great protecting deity of the race, but one,

and perhaps the only one, whose worship embodies a distinct moral conception. He is specially concerned with oaths, treaties and leagues, and it was in the presence of his priest that the most ancient and sacred form of marriage, confarreatio, took place. The lesser deities, Dius Fidius and Fides, were probably originally identical with him, and only gained a separate existence in course of time by a process familiar to students of ancient religion. This connexion" with the conscience, with the sense of obligation and right dealing, was never quite lost throughout Roman history. In Virgil's great poem, though Jupiter is in many ways as much Greek as Roman, he is still the great protecting deity who keeps the hero in the path of duty (pietas) towards gods, state and family.

But this aspect of Jupiter gained a new force and meaning at the close of the monarchy with the building of the famous temple on the Capitol, of which the foundations are still to be seen. It was dedicated to Jupiter Optimus Maximus, i.e. the best and greatest of all the Jupiters, and with him were associated

Juno and Minerva, in a fashion which clearly indicates a Graeco-Etruscan origin; for the combination of three deities in one temple was foreign to the ancient Roman religion, while it is found both in Greece and Etruria. This temple was built on a scale of magnificence quite unknown to primitive Rome, and was beyond doubt the work of Etruscan architects employed, we may presume, by the Tarquinii. Its three celiac contained the statues of the three deities, with Jupiter in the middle holding his thunderbolt. Henceforward it was the centre of the religious life of the state, and symbolized its unity and strength. Its dedication festival fell on the 13th of September, on which day the consuls originally succeeded to office; accompanied by the senate and other magistrates and priests, and in fulfilment of a vow made by their predecessors, they offered to the great god a white heifer, his favourite sacrifice, and after rendering thanks for the preservation of the state during the past year, made the same vow as that by which they them- selves had been bound. Then followed the epulum Jovis or feast of Jupiter, in which the three deities seem to have been visibly present in the form of their statues, Jupiter having a couch and each goddess a sella, and shared the meal with senate and magistrates. In later times this day became the central point of the great Roman games (ludi Romani), originally games vowed in honour of the god if he brought a war to a successful issue. When a victorious army returned home, it was to this temple that the triumphal procession passed, and the triumph of which we hear so often in Roman history may be taken as a religious ceremonial in

honour of Jupiter. The general was dressed and painted to resemble the statue of Jupiter himself, and was drawn on a gilded chariot by four white horses through the Porta Triumphalis to the Capitol, where he offered a solemn sacrifice to the god, and laid on his knees the victor's laurels (see Triumph).

Throughout the period of the Republic the great god of the Capitol in his temple looking down on the Forum continued to overshadow all other worships as the one in which the whole state was concerned, in all its length and breadth, rather than any one gens or family. Under Augustus and the new monarchy it is sometimes said that the Capitoline worship suffered to some extent an eclipse (J. B. Carter, The Religion of Numa, p. 160 seq.); and it is true that as it was the policy of Augustus to identify the state with the interests of his own family, he did what was feasible to direct the attention of the people to the worships in which he and his family were specially concerned; thus his temple of Apollo on the Palatine, and that of Mars Ultor in the Forum Augusti, took over a few of the prerogatives of the cult on the Capitol. But Augustus was far too shrewd to attempt to oust Jupiter Optimus Maximus from his paramount position; and he became the protecting deity of the reigning emperor as representing the state, as he had been the protecting deity of the free republic. His worship spread over the whole empire; it is probable that every city had its temple to the three deities of the Roman Capitol, and the fact that the Romans chose the name of Jupiter in almost every case, by which to indicate the chief deity of the subject peoples, proves that they continued to regard him, so long as his worship existed at all, as the god whom they themselves looked upon as greatest.

See Zeus, Roman Religion. Excellent accounts of Jupiter may be found in Roscher's Mythological Lexicon, and in Wissowa's Religion und Kullus der Rbmer (p. 100 seq.).

(W. M. Ra.; W. W. F.)*

JUPITER, in astronomy, the largest planet of the solar system; his size is so great that it exceeds the collective mass of all the others in the proportion of 5 to 2. He travels in his orbit at a mean distance from the sun exceeding that of the earth 5-2 times, or 483,000,000 miles. The eccentricity of this orbit is consider- able, amounting to 0-048, so that his maximum and minimum distances are 504,000,000 and 462,000,000 miles respectively. When in opposition and at his mean distance, he is situated 390,000,000 miles from the earth. His orbit is inclined about i° 18′ 40″ to the ecliptic. His sidereal revolution is completed in 4332-585 days or 11 years 314-9 days, and his synodical

period, or the mean interval separating his returns to opposition, amounts to 398-87 days. His real polar and equatorial diameters measure 84,570 and 90,190 miles respectively, so that the mean is 87,380 miles. His apparent diameter (equatorial) as seen from the earth varies from about 32", when in conjunction with the sun, to 50″ in opposition to that luminary. The oblateness, or compression, of his globe amounts to about xt; his volume exceeds that of the earth 1390 times, while his mass is about 300 times greater. These values are believed to be as accurate as the best modern determinations allow, but there are some differ- ences amongst various observers and absolute exactness cannot be obtained.

The discovery of telescopic construction early in the 17th century and the practical use of the telescope by Galileo and others greatly enriched our knowledge of Jupiter and his system. Four of the satellites were detected in 1610, but the dark bands or belts on the globe of the planet do not appear to have been noticed until twenty years later. Though Galileo first sighted the satellites and perseveringly studied the Jovian orb, he failed to distinguish the belts, and we have to conclude either that these features were unusually faint at the period of his observations, or that his telescopes were insufficiently powerful to render them visible. The belts were first recognized by Nicolas Zucchi and Daniel Bartoli on the 1 7th of May 1630. They were seen also by Francesco Fontana in the same and immediately succeeding years, and by other observers of about the same period, including Zuppi, Giovanni Battista Riccioli and Francesco Maria Grimaldi. Improvements in telescopes were quickly introduced, and be- tween 1655 and 1666 C. Huygens, R. Hooke and J. D. Cassini made more effective observations. Hooke discovered a large dark spot in the planet's southern hemisphere on the 19th of May 1664, and from this object Cassini determined the rotation period, in 1665 and later years, as 9 hours 56 minutes.

The belts, spots and irregular markings on Jupiter have now been assiduously studied during nearly three centuries. These markings are extremely variable in their tones, tints and relative velocities, and there is little reason to doubt that they are atmo- spheric formations floating above the surface of the planet in a series of different currents. Certain of the markings appear to be fairly durable, though their rates of motion exhibit consider- able anomalies and prove that they must be quite detached from the actual sphere of Jupiter. At various times determinations of the rotation period were made as follows: —

Date.

1672 1692 1708

1773 1788 1788 1835 1835

Observer. Period. Place of Spot.

J. D. Cassini 9 h. 55 m. 50 s. Lat. i6 c S.

„ 9 h. 50 m. Equator.

J. P. Maraldi 9 h. 55 m. 48 s. S. tropical zone

J. Sylvabelle 9 h. 56 m. „ „

J. H. Schroter 9 h. 55 m. 33-6 s. Lat. 12 N.

„ 9 h. 55 m. 17-6 s. Lat. 20 S.

J. H. Madler 9 h. 55 m. 26-5 s. Lat. 5° N.

G. B. Airy 9 h. 55 m. 21-3 s. N. tropical zone.

A great number of Jovian features have been traced in more recent years and their rotation periods ascertained. According to the researches of Stanley Williams the rates of motion for different latitudes of the planet are approximately as under: — Latitude. Rotation Period.

+85° to +28 9 h. 55 m. 37-5 s.

9 h. 545 m. to 9 h. 56! m.

9 h. 48 m. to 9 h. 495 m.

9 h. 55 m. 33-9 s.

9 h. 50 m. 20 s.

9 h. 55 m. 40 s.

9 h. 55 m. 18-1 s.

9 h. 55 m. 5 s.

W. F. Denning gives the following relative periods for the years 1898 to 1905: —

Latitude. Rotation Period.

N.N. temperate 9 h.

N. temperate

+ 28°

to

+24

+24″

to +20

+20°

to +10

+ 10°

to

-12

-12°

to

-18

-18

to

-37

-37°

to

-55

N. tropical Equatorial . S. temperate S.S. temperate

55 m. 41-5 s. 9 h. 55 m. 53-8 s. 9 h. 55 m. 30 s. 9 h. 50 m. 27 s. 9 h. 55 m. 19-5 s. 9 h. 55 m. 7 s.

JUPITER

563

/ S.S.

« 7

i'CIHP. \

f &

ian

T«mp. \

/ s.

» 55 37

Trop. \

Bqu.

9 5* 9°

-torlAl

1 N

» SS »

Trop. /

V N.

(Sit

Temp. I

\ N.N

» 55 4»

Temp. /

Fig. 1. — Inverted disk of Jupiter, showing the different currents and their rates of rotation.

The above are the mean periods derived from a large number of markings. The bay or hollow in the great southern equatorial belt north of the red spot has perhaps been observed for a longer period than any other feature

on Jupiter except the red spot itself. H. Schwabe saw the hollow in the belt on the 5th of September 1831 and on many subse- quent dates. The rotation period of this object during the seventy years to the 5th of September 1901 was 9 h. 55 m. 36 s. from 61,813 rotations. Since 1901 the mean period has been 9 h. 55 m. 40 s., but it has fluctuated between 9 h. 55 m. 38 s. and 9 h. 55 m. 42 s. The motion of the various features is not therefore dependent upon their latitude, though at the equator the rate seems swifter as a rule than in other zones. But exceptions occur, for in 1880 some spots appeared in about 23 N. which rotated in 9 h. 48 m. though in the region immediately N. of this the spot motion is ordinarily the slowest of all and averages 9 h. 55 m. 53-8 s. (from twenty determinations). These differences of speed remind us of the sun-spots and their proper motions. The solar envelope, how- ever, appears to show a pretty regular retardation towards the poles, for according to Gustav Sporer's formula, while the equa- torial period is 25 d. 2 h. 15 m. the latitudes 46 N. and S. give a period of 28 d. 15 h. o m.

The Jovian currents flow in a due east and west direction as though mainly influenced by the swift rotatory movement of the globe, and exhibit little sign of deviation either to N. or S. These currents do not blend and pass gradually into each other, but seem to be definitely bounded and controlled by separate, phenomena well capable of preserving their individuality. Occasionally, it is true, there have been slanting belts on Jupiter (a prominent example occurred in the spring of 1861), as though the materials were evolved with some force in a polar direction, but these oblique formations have usually spread out in longitude and ultimately formed bands parallel with the equator. The longi- tudinal currents do not individually present us with an equable rate of motion. In fact they display some curious irregularities, the spots carried along in them apparently oscillating to and fro without any reference to fixed periods or cyclical variations. Thus the equatorial current in 1880 moved at the rate of 9 h. 50 m. 6 s. whereas in 1905 it was 9 h. 50 m. 33 s. The red spot in the S. tropical zone gave 9 h. 55 m. 34 s. in 1879-1880, whereas during 1900-1908 it has varieda little on either side of 9 h. 55 m. 40-6 s. Clearly therefore no fixed period of rotation can be applied for any spot since it is subject to drifts E. or W. and these drifts sometimes come into operation suddenly, and may be either temporary or durable. Between 1878 and 1900 the red spot in the planet's S. hemisphere showed a continuous retardation of speed.

It must be remembered that in speaking of the rotation of these markings, we are simply alluding to the irregularities in the vaporous envelope of Jupiter. The rotation of the planet itself is another matter and its value is not yet exactly known, though it is probably little different from that of the markings, and especially from those of the most durable character, which

indicate a period of about 9 h. 56 m. We never discern the actual landscape of Jupiter or any of the individual forms really diversifying it.

Possibly the red spot which became so striking an object in 1878, and which still remains faintly visible on the planet, is the same feature as that discovered by R. Hooke in 1664 and watched by Cassini in following years. It was situated in approximately the same latitude of the planet and appears to have been hidden temporarily during several periods up to 1713. But the lack of fairly continuous observations of this particular marking makes its identity with the present spot extremely doubtful. The latter was seen by W. R. Dawes in 1857, by Sir W. Huggins in 1858, by J. Baxendell in 1859, by Lord Rosse and R. Copeland

in 1873, by H. C. Russell in 1876-1877, and in later years it has formed an object of general observation. In fact it may safely be said that no planetary marking has ever aroused such wide- spread interest and attracted such frequent observation as the great red spot on Jupiter.

The slight inclination of the equator of this planet to the plane of his orbit suggests that he experiences few seasonal changes. From the conditions we are, in fact, led to expect a prevailing calm in his atmosphere, the more so from the circumstance that the amount of the sun's heat poured upon each square mile of it is (on the average) less than the 27th part of that received by each square mile of the earth's surface. Moreover, the seasons of Jupiter have nearly twelve times the duration of ours, so that it would be naturally expected that changes in his atmo- sphere produced by solar action take place with extreme slowness. But this is very far from being the case. Telescopes reveal the indications of rapid changes and extensive disturbances in the aspect and material forming the belts. New spots covering large areas frequently appear and as frequently decay and vanish, implying an agitated condition of the Jovian atmosphere, and leading us to admit the operation of causes much more active than the heating influence of the sun.

When we institute a comparison between Jupiter and the earth on the basis that the atmosphere of the former planet bears the

Fig. 2. — Jupiter, 1903, July 10, 2-50 a.m.

Fig. 3. — Jupiter, 1906, April 15, 5-50 p.m.

same relation to his mass as the atmosphere of the earth bears to her mass, we find that a state of things must prevail on Jupiter very dissimilar to that affecting our own globe. The density of the Jovian atmosphere we should expect to be fully six times as great as the density of our air at sea-level,

while it would be comparatively shallow. But the telescopic aspect of Jupiter apparently negatives the latter supposition. The belts and spots grow faint as they approach the limb, and disappear as they near the edge of the disk, thus indicating a dense and deep atmosphere. R. A. Proctor considered that the observed features suggested inherent heat, and adopted this conclusion as best explaining the surface phenomena of the planet. He regarded Jupiter as belonging, on account of his immense size, to a different class of bodies from the earth, and was led to believe that there existed greater analogy between Jupiter and the sun than between Jupiter and the earth. Thus the density of the sun, like that of Jupiter, is small compared with the earth's; in fact, the mean density of the sun is almost identical with that of Jupiter, and the belts of the latter planet may be much more aptly compared with the spot zones of the sun than with the trade zones of the earth.

In support of the theory of inherent heat on Jupiter it has been said that his albedo (or light reflected from his surface) is much greater than the amount would be were his surface similar to that of the moon, Mercury or Mars, and the reasoning has been applied to the large outer planets, Saturn, Uranus and Neptune, as well as to Jupiter. The average reflecting capacity of the moon and five outer planets would seem to be (on the assumption that they possess no inherent light) as follows: —

Moon . Mars .

0-1736 0-2672

Jupiter Saturn

0-6238 Uranus . 0-6400 0-4981 Neptune . 0-4848

These values were considered to support the view that the four larger and more distant orbs shine partly by inherent lustre, and the more so as spectroscopic analysis indicates that they are each involved in a deep vapour-laden atmosphere. But certain observations furnish a contradiction to Proctor's views. The absolute extinction of the satellites, even in the most power- ful telescopes, while in the shadow of Jupiter, shows that they cannot receive sufficient light from their primary to render them visible, and the darkness of the shadows of the satellites when projected on the planet's disk proves that the latter cannot be self-luminous except in an insensible degree. It is also to be remarked that, were it only moderately self-luminous, the colour of the light which it sends to us would be red,

such light being at first emitted from a heated body when its temperature is raised. Possibly, however, the great red spot, when the colouring was intense in 1878 and several following years, may have repre- sented an opening in the Jovian atmosphere, and the ruddy belts may be extensive rifts in the same envelope. If Jupiter's actual globe emitted a good deal of heat and light we should probably distinguish little of it, owing to the obscuring vapours floating above the surface. Venus reflects relatively more light than Jupiter, and there is little doubt that the albedo of a planet is dependent upon atmospheric characteristics, and is in no case a direct indication of inherent light and heat.

The colouring of the belts appears to be due to seasonal variations, for Stanley Williams has shown that their changes have a cycle of twelve years, and correspond as nearly as possible with a sidereal revolution of Jupiter. The variations are of such character that the two great equatorial belts are alter- nately affected; when the S. equatorial belt displays maximum redness the N. equatorial is at a minimum and vice versa.

The most plausible hypothesis with regard to the red spot is that it is of the nature of an island floating upon a liquid surface, though its great duration does not favour this idea. But it is an open question whether the belts of Jupiter indicate a liquid or gaseous condition of the visible surface. The difficulty in the way of the liquid hypothesis is the great difference in the times of rotation between the equatorial portions of the planet and the spots in temperate latitudes. The latter usually rotate in periods between 9 h. 55 m. and 9 h. 56 m., while the equatorial markings make a revolution in about five minutes less, 9 h. 50 m. to 9 h. 51 m. The difference amounts to 7-5° in a terrestrial day and proves that an equatorial spot will circulate right round the enormous sphere of Jupiter (circumference 283,000 m.) in 48 days. The motion is equivalent to about 6000 m. per day and 250 m. per hour. (W. F. D.)

Satellites of Jupiter. Jupiter is attended by eight known satellites, resolvable as re- gards their visibility into two widely different classes. Four satel- lites were discovered by Galileo and were the only ones known until 1892. In September of that year E. E. Barnard, at the Lick Observatory, discovered a fifth extremely faint satellite, per- forming a revolution in somewhat less than twleve hours. In 1 904 two yet fainter satellites, far outside the other five, were photo- graphically discovered by C. D. Perrine at the Lick Observatory. The eighth satellite was discovered by P. J. Melotte of Greenwich on the 28th of February 1908. It is of the 17th magnitude and appears to be very distant from Jupiter; a re-observation on the 1 6th of January 1909 proved it to be retrograde, and to have a very eccentric orbit. These bodies are usually numbered in the order of their discovery, the nearest to the sun being V. In apparent brightness each of the four

Galilean satellites may be roughly classed as of the sixth magnitude;

Under good conditions and sufficient telescopic power the satellites are visible as disks, and not mere points of light. Measures of the apparent diameter of objects so faint are, how- ever, difficult and uncertain. The results for the Galilean satellites range between o”-o and i”5, corresponding to dia meters of between 3000 and 5000 kilometres. The smallest is therefore about the size of our moon. Satellite I. has been found to exhibit marked variations in its brightness and aspect, but the law governing them has not been satisfactorily worked out. It seems probable that one hemisphere of this satellite is brighter than the other, or that there is a large dark region upon if . A revolution on its axis corresponding with that of the orbital revolution around the planet has also been suspected, but is not yet established. Variations of light somewhat similar, but less in amount, have been noticed in the second and third satellites.

The most interesting and easily observed phenomena of these bodies are their eclipses and their transits across the disk of Jupiter. The four inner satellites pass through the shadow of Jupiter at every superior conjunction, and across his disk at every inferior conjunction. The outer Galilean satellite does the same when the conjunctions are not too near the line of nodes of the satellites’ orbit. When most distant from the nodes, the satellites pass above or below the shadow and below or above the disk. These phenomena for the four Galilean satellites are predicted in the nautical almanacs.

When one of the four Galilean satellites is in transit across the disk of Jupiter it can generally be seen projected on the face of the planet. It is commonly brighter than Jupiter when it first enters upon the limb but sometimes darker near the centre of the disk. This is owing to the fact that the planet is much darker at the limb. During these transits the shadow of 1 the satellites can also be seen projected on the planet as a dark point.

The theories of the motion of these bodies form one of the more interesting problems of celestial mechanics. Owing to the great ellipticity of Jupiter, growing out of his rapid rotation, the influence of this ellipticity upon the motions of the five inner satellites is much greater than that of the sun, or of the satellites on each other. The inclination of the orbits to the equator of Jupiter is quite small and almost constant, and the motion of each node is nearlyuniform around the plane of the planet’s equator.

The most marked feature of these bodies is a relation between the mean longitudes of Satellites I., II. and III. The mean longitude of I. plus twice that of III. minus three times that of II. is constantly near to 180 . It follows that the same relations subsist among the mean motions. The cause

of this was pointed out by Laplace. : If we put Li L 2 and L 3 for the mean longitudes, and define an angle U as follows :■; —

U = Li — 3L 2 +2L 3 . it was shown mathematically by Laplace that if the longitudes and mean motions were such that the angle U differed a little from 1 80 °, there was a minute residual force arising from the mutual actions of the several bodies tending to bring this angle towards the value 180 . Consequently, if the mean motions were such that this angle increased only with great slowness, it would after a certain period tend back toward the value 180°, and then beyond it, exactly as a pendulum drawn out of the perpendicular oscillates towards and beyond it. Thus an oscillation would be engendered in virtue of which the angle would oscillate very slowly on each side of the central value. Computation of the mean longitude from observations has indicated that the angle does differ from 180 , but it is not certain whether this deviation is greater than the possible result of the errors of observation. How- ever this may be, the existence of the libration> and its period if it does exist, are still unknown.

The following are the principal elements of the orbits of the five inner satellites, arranged in the order of distance from Jupiter. The mean longitudes are for 1891, 20th of October, G.M.T., and are referred to the equinox of the epoch, 1891, 2nd of Octobers —

Satellite

they would therefore be visible to a keen eye if the brilliancy of the planet did not obscure them. Some observers profess to have seen one or more of these bodies with the naked eye notwithstanding this drawback, but the evidence can scarcely be regarded as con- clusive. It does not however seem unlikely that the third, which is the brightest, might be visible when in conjunction with one of the others.

Mean Long. Synodic Period Mean Distance Mass f Mass of Jup. Stellar Mag.

V.

264°-29

11 h. 58 m.

106,400 m.

(?)

13

I.

3I3-7I93 1 d. 18 h. -48 260,000 m.

•0000283′ 1

6-0

II.

39° -1187 3d. I3h. -30 414,000 m.

•00002324

61

III.

i7I°-2448 7d. 3h. -99 661,000 m.

•00008125

5-6

IV.

62°-2000

i6d. 1 8m. -09

1,162,000 m.

•00002149

6-6

I The following numbers relating to the planet itself have been supplied mostly by Professor Hermann Struve.

Filar Mic. Heliom. Equatorial diameter of Jupiter (Dist. 5-2028) . 38-50 37”-5 < >*

Polar diameter of Jupiter 36”-02 35’-23

Ellipticity i--i5-5 i-*-i6-5*

Theoretical ellipticity from motion of 900″ in the pericentre

of Sat. V I-M5-3

Centrifugal force 5 gravity at equator 0-0900

Mass of Jupiter ; Mass of Sun, now used in tables . I 5 1047-34 Inclination of planet's equator to ecliptic . . 2° 9'-o7+o-oo6i

» orbit . . .3° 4'-8o Long, of Node of equator on ecliptic . . 336 2i'-47+o'-762<

orbit . . . i35°25'-8i+o-729< The longitudes are referred to the mean terrestrial equinox, and t is the time in years from 1900.0.

For the elements of Jupiter's orbit, see Solar System; and for physical constants, see Planet. (S. N.)

JUR (Diur), the Dinka name for a tribe of negroes of the upper Nile valley, whose real name is Luoh, or Lwo. They appear to be immigrants, and tradition places their home in the south; they now occupy a district of the Bahr-el-Ghazal between the Bongo and Dinka tribes. Of a reddish black colour, fairer than the Dinka, they are well proportioned, with the hair short. Tattooing is not common, but when found is similar to that of the Dinka; they pierce the ears and nose, and in addition to the ornaments found among the Dinka (q.v.) wear a series of iron rings on the forearm covering it from wrist to elbow. They are mainly agricultural, but hunt and fish to a considerable extent; they are also skilful smiths, smelting their own iron, of which they supply quantities to the Dinka. They are a prosperous tribe and in consequence spinsters are unknown among them. Their chief currency is spears and hoe-blades, and cowrie shells are used in the purchase of wives. Their chief weapons are spears and bows.

See G. Schweinfurth, The Heart of Africa: Travels 1868-1871, trans. G. E. E. Frewer (2nd ed., 1874) ; W. Junker, Travels in Africa (Eng. ed., 1890-1892).

JURA, a department of France, on the eastern frontier, formed from the southern portion of the old province of Franche- Comte. It is bounded N by the department of Haute-Saone, N.E. by Doubs, E. by Switzerland, S. by Ain, and W. by Sa6ne- et-Loire and Cote d'Or. Pop. (1906), 257,725. Area, 195 1 sq. m. Jura comprises four distinct zones with a general direction from north to south. In the S.E. lie high eastern chains of the central Jura, containing the Cret Pela (4915 ft.), the highest point in the

department. More to the west there is a chain of forest- clad plateaus bordered on the E. by the river Ain. Westward of these runs a range of hills, the slopes of which are covered with vineyards. The north-west region of the department is occupied by a plain which includes the fertile Finage, the north- ern portion of the Bresse, and is traversed by the Doubs and its left affluent the Loue, between! which lies the fine forest of Chaux, 76 sq. m. in area. Jura falls almost wholly within the basin of the Rhone. Besides those mentioned, the chief rivers are the Valouze and the Bienne, which water the south of the department. There are several lakes, the largest of which is that of Chalin, about 12 m. E. of Lons-le-Saunier. The climate is, on the whole, cold; the temperature is subject to sudden and violent changes, and among the mountains winter sometimes lingers for eight months. The rainfall is much above the average of France.

Jura is an agricultural department: wheat, oats, maize and barley are the chief cereals, the culture of potatoes and rape being also of importance. Vines are grown mainly in the cantons of Arbois, Poligny, Salins and Voiteur. Woodlands occupy about a fifth of the area: the oak, hornbeam and beech, and, in the mountains, the spruce and fir, are the principal varieties. Natural pasture is abundant on the mountains. Forests, gorges, torrents and cascades are characteristic features of the scenery. Its minerals include iron and salt and there are stone-quarries. Peat is also worked. Lons-le-Saunier and Salins have mineral .springs. Industries include the manufacture of Gruyere, Sept- moncel and other cheeses (made in co-operative cheese factories or fruitibres), metal founding and forging, saw-milling, flour- milling, the cutting of precious stones (at Septmoncel and else-

where), the manufacture of nails, tools and other iron goods, paper, leather, brier-pipes, toys and fancy wooden-ware and basket-work. The making of clocks, watches, spectacles and measures, which are largely exported, employs much labour in and around Morez. Imports consist of grain, cattle, wine, leaf- copper, horn, ivory, fancy- wood; exports of manufactured articles, wine, cheese, stone, timber and salt. The department is served chiefly by the Paris-Lyon-M6diterran6e railway, the main line from Paris to Neuchatel traversing its northern region. The canal from the Rhone to the Rhine, which utilizes the channel of the Doubs over portions of its course, traverses it for 25 m. Lons-le-Saunier is the chief town of Jura, which embraces four arrondissements named after the towns of Lons-le-Saunier, D61e, Poligny and St Claude, with 32 cantons and 584 communes. The department forms the diocese of St Claude and part of the ecclesiastical province of Besancon; it comes within the region of the Vllth army corps and the educational circumscription (academie) of Besancon, where is its court of appeal. Lons-le- Saunier, Dole, Arbois, Poligny, St Claude and Salins, the more noteworthy towns, receive separate notices. At

Baume-les- Messieurs, 8 m. N.E. of Lons-le-Saunier, there is an ancient abbey with a fine church of the 12th century.

JURA (" deer island "), an island of the inner Hebrides, the fourth largest of the group, on the west coast of Argyllshire, Scotland. Pop. (1901), 560. On the N. it is separated from the island of Scarba by the whirlpool of Corrievreckan, caused by the rush' of the tides, often running over 13 m. an hour, and sometimes accelerated by gales, on the E. from the main-land by the sound of Jura, and on the S. and S.W. from Islay by the sound of Islay. At Kinuachdrach there is a ferry to Aird in Lome, in Argyllshire, and at Faolin there is a ferry to Port Askaig in Islay. Its area is about 160 sq. m., the greatest length is about 27 m., and the breadth varies from 2 m. to 8 m. The surface is mountainous and the island is the most rugged of the Hebrides. A chain of hills culminating in the Paps of Jura — Beinn-an-Oir (2571 ft.) and Beinn Chaolais (2407 ft.) — runs the whole length of the island, interrupted only by Tarbert loch, an arm of the sea, which forms an indentation nearly 6 m. deep and almost cuts the island in two. Jura derived its name from the red deer which once abounded on it. Cattle and sheep are raised; oats, barley and potatoes are cultivated along the eastern shore, and there is some fishing. Granite is quarried and silicious sand, employed in glass-making is found. The parish of Jura comprises the islands of Balnahua, Fladda, Garvelloch, Jura, Lunga, Scarba and Skervuile.

JURA, a range which may be roughly described as the block of mountains rising between the Rhine and the Rhone, and form- ing the frontier between France and Switzerland. The gorges by which these two rivers force their way to the plains cut off the Jura from the Swabian and Franconian ranges to the north and those of Dauphine to the south. But in very early days, before these gorges had been carved out, there were no openings in the Jura at all, and even now its three chief rivers — the Doubs, the Loue and the Ain — flow down the western slope, which is both much longer and but half as steep as the eastern. Some geographers extend the name Jura to the Swabian and Fran- conian ranges between the Danube and the Neckar and the Main ; but, though these are similar in point of composition and direc-tion to the range to the south, it is most convenient to limit the name to the mountain ridges lying between France and Switzer- land, and this narrower sense will be adopted here.

The Jura has been aptly described as a huge plateau about 156 m. long and 38 m. broad, hewn into an oblong shape, and raised by internal forces to an average height of from 1950 to 2600 ft. above the surrounding plains. The shock by which it was raised and the vibration caused by the elevation of the great chain of the Alps, produced many transverse gorges or " cluses," while on the plateaus between these subaerial agencies have

exercised their ordinary influence.

Geologically the Jura Mountains belong to the Alpinfe system; and the same forces which crumpled and tore the strata of the one produced the folds and faults in the other. Both chains

owe their origin to the mass of crystalline and unyielding rock which forms the central plateau of France, the Vosges and the Black Forest, and which, between the Vosges and the central plateau, lies at no great depth beneath the surface. Against this mass the more yielding strata which lay to the south and west were crushed and folded, and the Alps and the Jura were carved from the ridges which were raised. But the folding decreases in intensity towards the north; the folding in the Alps is much more violent than the folding in the Jura, and in the Jura itself the folding is most marked along its southern flanks.

The Jura is composed chiefly of Jurassic rocks — it is from this chain that the Jurassic system derives its name — but Triassic, Cretaceous and Tertiary beds take part in its formation. It may be divided into three zones which run parallel to the length of the chain and differ from one another in their structure. The innermost zone, which rises directly from the plain of Switzer- land, is the folded Jura {Jura plissi, Keltenjura) , formed of narrow parallel undulations which diminish in intensity towards the French border. This is followed by the Jura plateau (Jura tabu- late, Tafeljura), in which the beds are approximately horizontal but are broken up into blocks by fractures or faults. Finally, along its western face there is a zone of numerous dislocations, and the range descends abruptly to the plain of the Sa6ne. This is the Region du vignoble and is well shown at Arbois.

Owing to the convergence of the faults which bound it, the plateau zone decreases in width towards the south, while towards the north it forms a large proportion of the chain. The folded zone is more constant. Along its inner margin the folds are frequently overthrown, leaning towards France, but elsewhere they are simple anticlinals and synclinals, parallel to the length of the chain, and as a rule there is a remarkable freedom from dislocations of any importance, except towards Neuchatel and Bienne.

The countless blocks of gneiss, granite and other crystalline formations which are found in such numbers on the slopes of the Jura, and go by the name of " erratic blocks " (of which the best known instance — the Pierre a. Bot — is 40 ft. in diameter, and rests on the side of a hill 800 ft. above

the Lake of Neuchatel), have been transported thither from the Alps by ancient glaciers, which have left their mark on the Jura range itself in the shape of striations and moraines.

The general direction of the chain is from north-east to south- west, but a careful study reveals the fact that there were in reality two main lines of upheaval, viz. north to south and east to west, the former best seen in the southern part of the range and the latter in the northern; and it was by the union of these two forces that the lines north-east to south-west (seen in the greater part of the chain) , and north-west to south-east (seen in the Villebois range at the south-west extremity of the chain), were produced. This is best realized if we take Besangon as a centre; to the north the ridges run east and west, to the south, north and south, while to the east the direction is north-east to south-west.

Before considering the topography of the interior of the Jura, it may be convenient to take a brief survey of its outer slopes.

1. The northern face dominates on one side the famous " Trouee (or Trench) of Belfort, one of the great geographical centres of Europe, whence routes run north down the Rhine to the North Sea, south-east to the Danube basin and Black Sea, and south-west into France, and so to the Mediterranean basin. It is now so strongly fortified that it becomes a question of great strategical importance to prevent its being turned by means of the great central plateau of the Jura, which, as we shall see, is a network of roads and railways. On the other side it overhangs the " Trouee " of the Black Forest towns on the Rhine (Rheinfelden, Sackingen, Laufenburg and Waldshut), through which the central plain of Switzerland is easily gained. On this north slope two openings offer routes into the interior of the chain — the valley of the Doubs belonging to France, and the valley of the Birse belonging to Switzerland. Belfort is the military, Mulhausen the industrial, and Basel the commercial centre of this slope.

2. The eastern' and western faces offer many striking parallels. The plains through which flow the Aar and the Sa6ne have each been the bed of an ancient lake, traces of which remain in the lakes of Neuchatel, Bienne and Morat. The west face runs mainly north and south like its great river, and for a similar reason the east face runs north-east to south-west. Again, both slopes are pierced by

many transverse gorges or " cluses " (due to fracture and not to erosion), by which access is gained to the great central plateau of Pontarlier, though these are seen more plainly on the east face than on the west ; thus the gorges at the exit from which Lons-le-Saunier, Poligny, Arbois and Salins are built balance those of the Suze, of the Val de Ruz, of the Val de

Travers, and of the Val d'Orbe, though on the east face there is but one city which commands all these important routes — Neuch&tel. This town is thus marked out by nature as a great military and industrial centre, just as is Besangon on the west, which has besides to defend the route from Belfort down the Doubs. These easy means of communicating with the Free County of Burgundy or Franche-Comte account for the fact that the dialect of Neuchatel is Burgundian, and that it was held generally by Burgundian nobles, though most of the country near it was in the hands of the house of Savoy until gradually annexed by Bern. The Chasseron (5286 ft.) is the central point of the eastern face, commanding the two great railways which join Neuchatel and Pontarlier. This ridge is in a certain sense parallel to the valley of the Loue on the west face, which flows into the Doubs a little to the south of D61e, the only important town of the central portion of the Saone basin. The Chasseron is wholly Swiss, as are the lower summits of the Chasseral (5279 ft.), the Mont Suchet (5220 ft.), the Aiguille de Baulmes (5128 ft.), the Dent de Vaulion (4879 ft.), the Weissenstein (4223 ft.), and the Chaumont (3845 ft.), the two last-named points being probably the best-known points in the Jura, as they are accessible by carriage road from Soleure and Neuchatel respectively. South of the Orbe valley the east face becomes a rocky wall which is crowned by all the highest summits (the first and second Swiss, the rest French) of the chain — the Mont Tendre (5512 ft.), the D61e (5505 ft.), the Reculet (5643 ft.), the CrSt de la Neige (5653 ft.) and the Grand Credo (5328 ft.), the uni- formity of level being as striking as on the west edge of the Jura, though there the absolute height is far less. The position of the D61e is similar to that of the Chasseron, as along the sides of it run the great roads of the Col de St Cergues (3973 ft.) and the Col de la Faucille (4341 ft.), the latter leading through the Vallee des Dappes, which was divided in 1862 between France and Switzer- land, after many negotiations. The height of these roads shows that they are passages across the chain, rather than through natural depressions.

3. . The southern face is supported by two great pillars — on the east by the Grand Cr<5do and on the west by the ridge of Revermont (2529 ft.) above Bourg en Bresse; between these a huge bastion (the district of Bugey) stretches away to the south, forcing the Rhone to make a long detour. On the two sides of this bastion the plains in which AmbeVieu and Culoz stand balance one another, and are the meeting points of the routes which cut through the bastion by means of deep gorges. On the eastern side this great wedge is steep and rugged, ending in the Grand Colombier (5033 ft.) above Culoz, and it sinks on the western side to the valley of the Ain, the district of Bresse, and the plateau of Dombes. The junction of the Ain and the Surand at Pont d'Ain on the west balances that of the Valserine and the Rhone at Bellegarde on the east.

The Jura thus dominates on the north one of the great highways of Europe, on the east and west divides the valleys of the Sa&ne and the Aar, and stretches out to the south so as nearly to join hands with the great mass of the Dauphine Alps. It therefore commands the routes from France into Germany, Switzerland and Italy, and hence its enormous historical importance.

Let us now examine the topography of the interior of the range. This naturally falls into three divisions, each traversed by one of the three great rivers of the Jura — the Doubs, the Loue and the Ain.

1. In the northern division it is the east and west line which prevails— the Lomont, the Mont Terrible, the defile of the Doubs from St Ursanne to St Hippcflyte, and the " Trouee " of the Black Forest towns. It thus bars access to the central plateau from the north, and this natural wall does away with the necessity of artificial fortifications. This division falls again into two distinct portions.

(a) The first is the part east of the deep gorge of the Doubs after it turns south at St Hippolyte ; it is thus quite cut off on this side, and is naturally Swiss territory. It includes the basin of the river Birse, and the great plateau between the Doubs and the Aar, on which, at an average height of 2600 ft., are situated a number of towns, one of the most striking features of the Jura. These include Le Locle (q.v.) and La Chaux de Fonds (q.v.), and are mainly occupied with watch-making, an industry which does not require bulky machinery, and is therefore well fitted for a mountain district.

(b) The part west of the " cluse " of the Doubs: of this, the district east of the river Dessoubre, isolated in the interior of the range (unlike the Le Locle plateau), is called the Haute Montagne, and is given up to cheese-making, curing of hams, saw-mills, &c. But little watch-making is carried on there, Besangon being the chief French centre of this industry, and being connected with Geneva by a chain of places similarly occupied, which fringe the west plateau of the Jura. The part west of the Dessoubre, or the. Moyenne Montagne, a huge plateau north of the Loue, is more especially devoted to agriculture, while along its north edge metal- working and manufacture of hardware are carried on, particularly at Besangon and Audincourt.

2. The central division is remarkable for being without the deep gorges which are found so frequently in other parts of the range. It consists of the

basin of which Pontarlier is the centre, through notches in the rim of which routes converge from every direction; this is the great characteristic of the middle region of the Jura. Hence its immense strategical and commercial importance. On the north-east roads run to Morteau and Le Locle, on the north-west to Besancon, on the west to Salins, on the south-west to D61e and Lons-le-Saunier, on the east to the Swiss plain. The Pontarlier plateau is nearly horizontal, the slight indentations in it being due to erosion, e.g. by the river Drugeon. The keys to this important plateau are to the east the Fort de Joux, under the walls of which meet the two lines of railway from Neuchatel, and to the west Salins, the meeting place of the routes from the Col de la Faucille, from Besancon, and from the French plain.

The Ain rises on the south edge of this plateau, and on a lower shelf or step, which it waters, are situated two points of great military importance — Nozeroy and Champagnole. The latter is specially important, since the road leading thence to Geneva traverses one after another, not far from their head, the chief valleys which run down into the South Jura, and thus commands the southern routes as well as those by St Cergues and the Col de la Faucille from the Geneva region, and a branch route along the Orbe river from Jougne. The fort of Les Rousses, near the foot of the Dole, serves as an advanced post to Champagnole, just as the Fort de Joux does to Pontarlier.

The above sketch will serve to show the character of the central Jura as the meeting place of routes from all sides, and the importance to France of its being strongly fortified, lest an enemy approaching from the north-east should try to turn the fortresses of the " Trouee de Belfort." It is in the western part of the central Jura that the north and south lines first appear strongly marked. There are said to be in this district no less than fifteen ridges running parallel to each other, and it is these which force the Loue to the north, and thereby occasion its very eccentric course. The cultivation of wormwood wherewith to make the tonic " absinthe " has its head- quarters at Pontarlier.

3. The southern division is by far the most complicated and entangled part of the Jura. The lofty ridge which bounds it to the east forces all its drainage to the west, and the result is a number of valleys of erosion (of which that of the Ain is the chief instance),

Suite distinct from the natural " cluses " or fissures of those of the •oubs and of the Loue. Another point of interest is the number of roads which intersect it, despite its extreme irregularity. This is due to the great " cluses " of Nantua and Virieu, which traverse it from east to west. The north and south line is very clearly seen in the eastern part of this division; the north-east and south-west is entirely wanting, but in the Villebois range south of

Amberieu we have the principal example of the north-west to south-east line. The plateaus west of the Ain are cut through by the valleys of the Valouse and of the Surand, and like all the lowest terraces on the west slope do not possess any considerable towns. The Ain receives three tributaries from the east : —

(a) The Bienne, which flows from the fort of Les Rousses by St Claude, the industrial centre of the south Jura, famous for the manufacture of wooden toys, owing to the large quantity of box- wood in the neighbourhood. Septmoncel is busied with cutting of gems, and Morez with watch and spectacle making. Cut off to the east by the great chain, the industrial prosperity of this valley is of recent origin.

(ft) The Oignin, which flows from south to north. It receives the drainage of the lake of Nantua, a town noted for combs and silk weaving, and which communicates by the " cluse " of the Lac de Silan with the Valserine valley, and so with the Rhone at Bellegarde, and again with the various routes which meet under the walls of the fort of Les Rousses, while by the Val Romey and the Seran Culoz is easily gained.

(c) The Albarine, connected with Culoz by the " cluse " of Virieu, and by the Furan flowing south with Belley, the capital of the district of Bugey (the old name for the South Jura).

The " cluses " of Nantua and Virieu are now both traversed by important railways; and it is even truer than of old that the keys of the south Jura are Lyons and Geneva. But of course the strategic importance of these gorges is less than appears at first sight, because they can be turned by following the Rhoneˆin its great bend to the south.

The range is mentioned by Caesar (Bell. Gall. i. 2-3, 6 (1), and 8 (1)), Strabo (iv. 3, 4, and 6, 11), Pliny (iii. 31; iv. 105; xvi. 197) and Ptolemy (ii. ix. 5), its name being a word which appears under many forms (e.g. Joux, Jorat, Jorasse, Juriens), and is a synonym for a wood or forest. The German name is Leberberg, Leber being a provincial word for a hill.

Politically the Jura is French (departments of the Doubs, Jura and Ain) and Swiss (parts of the cantons of Geneva, Vaud, Neuchatel, Bern, Soleure and Basel) ; but at its north extremity it takes in a small bit of Alsace (Pfirt or Ferrette). In the middle

ages the southern, western and northern sides were parcelled out into a number of districts, all of which were gradually absorbed by the French crown, viz., Gex, Val Romey, Bresse and Bugey (exchanged in 1601 by Savoy for the marquisate of Saluzzo), Franche-Comte, or the Free County

of Burgundy, an imperial fief till annexed in 1674, the county of Montbeliard (Mompelgard) acquired in 1793, and the county of Ferrette (French 1648-187 1). The northern part of the eastern side was held till 1792 (part till 1797) by the bishop of Basel as a fief of the empire, and then belonged to France till 1814, but was given to Bern in 1815 (as a recompense for its loss of Vaud), and now forms the Bernese Jura, a French-speaking district. The centre of the eastern slope formed the principality of Neuchatel (q.v.) and the county of Valangin, which were generally held by Burgundian nobles, came by succession to the kings of Prussia in 1707, and were formed into a Swiss canton in 181 5, though they did not become free from formal Prussian claims until 1857. The southern part of the eastern slope originally belonged to the house of Savoy, but was conquered bit by bit by Bern, which was forced in 1815 to accept its subject district Vaud as a colleague and equal in the Swiss Confederation. It was Charles the Bold's defeats at Grandson and Morat which led to the annexation by the con- federates of these portions of Savoyard territory.

Authorities.— E.F.Berlioux, LeJura (Paris, 1880) ; F. Machacek, Der Schweizer Jura (Gotha, 1905); A. Magnin, Les lacs du Jura (Paris, 1895) ; J. Zimmerli, " Die Sprachgrenze im Jura " (vol. i. of his Die Deutsch-franzosische Sprachgrenze in der Schweiz (Basel, 1891). For the French slope see Joanne's large Itineraire to the Jura, and the smaller volumes relating to the departments of the Ain, Doubs and Jura, in his Geographies departementales. For the Swiss slope see 3 vols, in the series of the Guides Monod (Geneva) ; A. Monnier, La Chaux de Fonds et le Haut-Jura Neuchdte- lois; J. Monod, Le Jura Bernois; and E. J. P. de la Harpe, Le Jura Vaudois. (W. A. B. C.)

JURASSIC, in geology, the middle period of the Mesozoic era, that is to say, succeeding the Triassic and preceding the Creta- ceous periods. The name Jurassic (French jurassique; German Juraformation or Jura) was first employed by A. Brongniart and A. von Humboldt for the rocks of this age in the western Jura mountains of Switzerland, where they are well developed. It was in England, however, that they were first studied by William Smith, in whose hands they were made to lay the foundations of stratigraphical geology. The names adopted by him for the subdivisions he traced across the country have passed into universal use, and though some of them are uncouth English provincial names, they are as familiar to the geologists of France, Switzerland and Germany as to those of England. During the following three decades Smith's work was elaborated by W. D. Conybeare and W. Phillips. The Jurassic rocks of fossils of the European continent were described by d'Orbigny, 1840-1846; by L. von Buch, 1839; by F. A. Quenstedt, 1843-1888; by A. Oppel, 1856-1858; and since then by many other workers: E. Benecke, E. Hebert, W. Waagen, and others.

The study of Jurassic rocks has continued to attract the attention of geologists, partly because the bedding is so well defined and regular — the strata are little disturbed anywhere outside the Swiss Jura and the Alps — and partly because the fossils are numerous and usually well-preserved. The result has been that no other system of rocks has been so carefully examined throughout its entire thickness; many "zones" have been established by means of the fossils — principally by ammonites — and these zones are not restricted to limited districts, but many of them hold good over wide areas. Oppel distinguished no fewer than thirty-three zonal horizons, and since then many more sub-zonal divisions have been noted locally.

The existence of faunal regions in Jurassic times was first pointed out by J. Marcou; later M. Neumayr greatly extended observations in this direction. According to Neumayr, three distinct geographical regions of deposit can be made out among the Jurassic rocks of Europe: (1) The Mediterranean province, embracing the Pyrenees, Alps and Carpathians, with all the tracts lying to the south. One of the biological characters of this area was the great abundance of ammonites belonging to

the groups of Heterophylli (Phyttoceras) and Fimbriati (Lyloceras) . (2) The central European province, comprising the tracts lying to the north of the Alpine ridge, and marked by the comparative rarity of the ammonites just mentioned, which are replaced by others of the groups Inflati (Aspidoceras) and Oppelia, and by abundant reefs and masses of coral. (3) The boreal or Russian province, comprising the middle and north of Russia, Spitzbergen and Greenland. The life in this area was much less varied than in the others, showing that in Jurassic times there was a perceptible diminution of temperature towards the north. The ammonites of the more southern tracts here disappear, together with the corals.

The cause of these faunal regions Neumayr attributed to climatic belts — such as exist to-day — and in part, at least, he

•'L

TV

•

*^^. BraiiPo – Ethiopian ' jl J Continent *

Map of the g£| .. ^^^ probable distribution of nu,/del> . Land & Sea in the , £

Jurassic Period /

after Ncunuyr.

was probably correct. It should be borne in mind, however, that although Neumayr was able to trace a broad, warm belt, some 60° in width, right round the earth, with a narrower mild belt to the north and an arctic or boreal belt beyond, and certain indications of a repetition of the climatic zones on the southern side of the thermal equator, more recent discoveries of fossils seem to show that other influences must have been at work in determining their distribution; in short, the identity of the Neumayrian climatic boundaries becomes increasingly obscured by the advance of our knowledge.

The Jurassic period was marked by a great extension of the sea, which commenced after the close of the Trias and reached its maximum during the Callovian and Oxfordian stages; conse- quently, the Middle Jurassic rocks are much more widely spread than the Lias. In Europe and elsewhere Triassic beds pass gradually up into the Jurassic, so that there is difficulty some- times in agreement as to the best line for the base of the latter ; similarly at the top of the sytsem there is a passage from the Jurassic to the Cretaceous rocks (Alps).

Towards the close of the period elevation began in certain regions; thus, in America, the Sierras, Cascade Mountains, Klamath Mountains, and Humboldt Range probably began to emerge. In England the estuarine Portlandian resulted partly from elevation, but in the Alps marine conditions steadily per- sisted (in the Tithonian stage). There appears to have been very little crustal disturbance or volcanic activity; tuffs are known in Argentina and California; volcanic rocks of this age occur also in Skye and Mull.

The rocks of the Jurassic system present great petrological diversity. In England the name " Oolites " was given to the middle and higher members of the system on account of the prevalence of oolitic structure in the limestones and ironstones; the same character is a common feature in the rocks of northern Europe and elsewhere, but it must not be overlooked that clays and sandstones together bulk more largely in the aggregate than the oolites. The thickness of Jurassic rocks in England is 4000 to 5000 ft., and in Germany 2000 to 3000 ft. Most of the

rocks represent the deposits of shallow seas, but estuarine con- ditions and

land deposits occur as in the Purbeck beds of Dorset and the coals of Yorkshire. Coal is a very important feature among Jurassic rocks, particularly in the Liassic division; it is found in Hungary, where there are twenty-five workable beds; in Persia, Turkestan, Caucasus, south Siberia, China, Japan, Further India, New Zealand and in many of the Pacific Islands.

Being shallow water formations, petrological changes come in rapidly as many of the beds are traced out; sandstones pass laterally into clays, and the latter into limestones, and so on, but a reliable guide to the classification and correlation is found in the fossil contents of the rocks. In the accompanying table a list is given of some of the zonal fossils which regularly occur in the order indicated; other forms are known that are equally useful. It will be noticed that while there is general agreement as to the order in which the zonal forms occur, the line of division between one formation and another is liable to vary according to factors in the personal equation of the authors.

The Jurassic formations stretch across England in a varying band from the mouth of the Tees to the coast of Dorsetshire. They consist of harder sandstones and limestones interstratified with softer clays and shales. Hence they give rise to a character- istic type of scenery — the more durable beds standing out as long ridges, sometimes even with low cliffs, while the clays under- lie the level spaces between.

Jurassic rocks cover a vast area in Central Europe. They rise from under the Cretaceous formations in the north-east of France, whence they range southwards down the valleys of the Saone and Rhone to the Mediterranean. They appear as a broken border round the old crystalline nucleus of Auvergne. Eastwards they range through the Jura Mountains up to the high grounds of Bo- hemia. They appear in the outer chains of the Alps on both sides, and on the south they rise along the centre of the Apennines, and here and there over the Spanish Peninsula. Covered by more recent formations they underlie the great plain of northern Germany, whence they range eastwards and occupy large tracts in central and eastern Russia.

Lower Jurassic rocks are absent from much of northern Russia, the stages represented being the Callovian, Oxfordian and Volgian (of Professor S. Nikitin) ; the fauna differs considerably from that of western Europe, and the marine equivalents of the Purbeck beds are found in this region. In south Russia, the Crimea and Caucasus, Lias and Lower Jurassic rocks are present. In the Alps, the Lower Jurassic rocks are intimately associated with the underlying Triassic formations, and resemble them in consisting largely of reddish limestones and marbles; the ammonites in this region

differ in certain respects from those of western and central Europe. The Oxfordian, Callovian, Coreilian and Astartian stages are also present. The Upper Jurassic is mainly represented by a uniform series of limestones, with a peculiar and characteristic fauna, to which Oppel gave the name ‘ Tithonian.” This includes most of the horizons from Kimeridgian to Cretaceous ; it is developed on the southern flanks of the Alps, Carpathians, Apennines, as well as in south France and other parts of the Mediterranean basin. A characteristic formation on this horizon is the ” Diphya limestone,” so-called from the fossil Terebratula diphya (Pygope janitor) seen in the well-known escarpments (Hochgebirge Kalk). Above the Diphya limestone comes the Stramberg limestone (Stramberg in Moravia), with ” Aptychus ” beds and coral reefs. The rocks of the Mediterranean basin are on the whole more calcareous than those of corresponding age in north-west Europe; thus the Lias is represented by 1500 ft. of white crystalline limestone in Calabria and a similar rock occurs in Sicily, Bosnia, Epirus, Corfu ; in Spain the Liassic strata are frequently dolomitic; in the Apennines they are variegated limestones and marls. The Higher Jurassic beds of Portugal show traces of the proximity of land in the abundant plant remains that are found in them. In Scania the Lias succeeds the Rhaetic beds in a regular manner, and Jurassic rocks have been traced northward well within the polar circle; they are known in the Lofoten Isles, Spitzbergen, east Greenland, King Charles’s Island, Cape Stewart in Scoresby Sound, Grinnell Land, Prince Patrick Land, Bathurst and Exmouth Island ; in many cases the fossils denote a climate considerably milder than now obtains in these latitudes.

In the American continent Jurassic rocks are not well developed. Marine Lower and Middle Jurassic beds occur on the Pacific coast (California and Oregon), and in Wyoming, the Dakotas, Colorado, east Mexico and Texas. Above the marine beds in the interior are brack- ish and fresh-water deposits, the Morrison and Como beds (Atlanto- saurus and Baptanodon beds of Marsh). Later Jurassic rocks are found in northern British Columbia and perhaps in Alaska, Wyoming, Utah, Montana, Colorado, the Dakotas, &c. In California some of the

gold-bearing , metamorphic slates are of this age. Marine Jurassic rocks have not been clearly identified on the Atlantic side of America. The Patuxent and Arundel formations (non-marine) are doubtfully referred to this period. Lower and Middle Jurassic formations occur in Argentina and Bolivia. Jurassic rocks have been recognized in Asia, including India, Afghanistan, Persia, Kurdistan, Asia Minor, the Caspian region, Japan and

Borneo. The best marine development is in Cutch, where the following groups

series = Bathonian. In the western half of the Salt Range and the Himalayas, Spiti shales are the equivalents of the European Callovian and Kimeridgian. The upper part of the Gondwana series is not improbably Jurassic. On the African continent, Liassic strata are found in Algeria, and Bathonian formations occur in Abyssinia, Somaliland, Cape Colony and western Madagascar. In Australia the Permo-Carboniferous formations are succeeded in Queensland and Western Australia by what may be termed the Jura-Trias,

Stages 1

Ammonite Zones

Substages Von Quenstedt Buch

A. de Lapparent, TraitS, 5th ed.

Alpine

S w

H to

>

O !7>

<

OS

Purbeckian

Portlandian

Kimeridgian

Corallian

Oxfordian

Callovian

Bathonian

Bajocian (InferiorOolite)

Perisphinctes transitorius

Perisphinctes giganteus Olcostephanus gigas

Reineckia eudoxus Oppelia tenuilobata

Peltoceras bimammatum

Peltoceras transversarium Aspidoceras perarmatum

Peltoceras athleta Cosmoceras Jason Macrocephalites macrocephalus

Oppelia aspidoides Parkinsonia ferruginea

Parkinsonia Parkinsoni Coeloceras Humphresianus Sphaeroceras Sauzei Sonninia Sowerbyi Harpoceras Murchisonae

Purbeckien

or Aquilonien

Bononien

Virgulien

Pteroceran

a. a.

S3

Astartien Rauracien

T3 C

0!

O Pl.

13

S'Sa

3 =

Argovien

Neuvizien

{passage beds)

Harpoceras (Lioceras) opalinum

Upper Lias

Middle Lias

Lower Lias

Lytoceras jurense Posidonia Bronni

Amaltheus spinatus Amaltheus margaritatus Dactylioceras Davoei Phylloceras ibex Aegoceras Jamesoni

Arietites raricostatus Oxynoticeras oxynotum Arietites obtusus Arietites Bucklandi Schlotheimia angulata Psiloceras planorbis

5

y

Upper Divesien Lower Divesien

c

o u

m

•o -o

Bathonien

oa

o

Bajocien

Toarcien

Charmouthien

Diphya-Ka\ke

k" a. Acanthictis "8 < Beds

c D

O 3 $

.22g

Sinemourien Hettangien

(part) Hettangien

(part) Rh&ien

.2 8

'C n)

"g T3 M OS

e v

3" Posidonien "^ Beds (S.Alps) Klauss Beds (N. Alps)

Sauzei- Kalke

Oolite of San Vigilio

to

ai.2S

*& N ►in *j*

u rt «

i I 5 1

^ 9- r,

pa

o

Da

are distinguished from above downwards: the Umia series = Port- landian and Tithonian of south Europe, passing upwards into the Neocomian; the Katrol series = Oxfordian (part) and Kimeridgian; the Chari series = Callovian and part of the Oxfordian ; the Patcham

1 Purbeckian from the " Isle " of Purbeck. Aquilonien from Aquilo (Nord). Bononien from Bononia (Boulogne). Virgulien from Exogyra virgula. Pteroceran from Pteroceras oceani. Astartien from Astarte supracorallina. Rauracien from Rauracia (Jura). Argovien from Argovie (Switzerland). Neuvizien from Neuvizy (Ardennes). Divesien from Dives (Calvados). Bathonien from Bath (England). Bajocien from Bayeux (Calvados). Toarcien from Toarcium (Tours). Charmouthien from Charmouth (England). Sinemourien from Sinemurum, Semur (C6te d'Or). Hettangien from Hettange (Lorraine).

which include the coal-bearing " Ipswich " and " Burrum " forma- tions of Queensland. In New Zealand there is a thick series of marine beds with terrestrial plants, the Mataura series in the upper part of Hutton's Hokanui system. Sir J. Hector included also the Putakaka series (as Middle Jurassic) and the Flag series with the Catlin's River and Bastion series below. Jurassic rocks have been recorded from New Guinea and New Caledonia.

Life in the Jurassic Period. — The expansion of the sea during this period, with the formation of broad sheets of shallow and probably warmish water, appears to have been favourable to many forms of marine life. Under these conditions several groups of organisms developed rapidly along new directions, so that the Jurassic period as a whole came to have a fauna differing clearly and distinctly from the preceding Palaeozoic or succeeding Tertiary faunas. In the seas, all the main groups were represented as they are to-day

Corals were abundant, and in later portions of the period covered large areas in Europe ; the modern type of coral became dominant ; besides reef-building forms such as Thamnastrea, Isastrea, Thecos- milia, there were numerous single forms like Montivaltia. Crinoids existed in great numbers in some of the shallow seas; compared with Palaeozoic forms there is a marked reduction in the size of the calyx with a great extension in the number of arms and pinnules; Pentacrinus, Eugeniacrinus, Apiocrinus are all well known; Antedon was a stalkless genus. Echinoids (urchins) were gradually develop- ing the so-called " irregular " type, Echinobrissus,

Holectypus, Collyrites, Clypeus, but the " regular " forms prevailed, Cidaris, Hemicidaris, Acrosalenia. Sponges were important rock-builders in Upper Jurassic times (Spongiten Kalk) ; they include lithistids such as Cnemediaslrum, Hyalotragus, Peronidetta; hexactinellids, Tremadictyon, Craticularia ; and horny sponges have been found in the Lias and Middle Jurassic.

Polyzoa are found abundantly in some of the beds, Stomatopora, Berenicia, &c. Brachiopods were represented principally by terebratulids {Terebratula, Waldheimia, Megerlea), and by rhyn- chonellids; Thecae, Lingula and Crania were also present. The Palaeozoic spirifirids and athyrids still lingered into the Lias. More important than the brachiopods were the pelecypods; Ostrea, Exogyra, Gryˆ&aeawereveryabundant (Gryphite limestone, Gryphite grit) ; the genus Trigonia, now restricted to Australian waters, was present in great variety; Aucella, Lima, Pecten, Pseudomonotis Gervillia, Astarle, Diceras, Isocardia, Pleuromya may be mentioned out of many others. Amongst the gasteropods the Pleurotomariidae and Turbinidae reached their maximum development; the Palaeo- zoic Conularia lived to see the beginning of this period (Pleurotomaria, Nerinea, Pteroceras, Cerithium, Turritella).

Cephalopods flourished everywhere; first in importance were the ammonites ; the Triassic genera Phylloceras and Lytoceras were still found in the Jurassic waters, but all the other numerous genera were new, and their shells are found with every variation of size and ornamentation. Some are characteristic of the older Jurassic rocks, Arietites, Aegoceras, Amaltheus, Harpoceras, "Vxynoticeras, Stepheoceras , and the two genera mentioned above; in the middle stages are found Cosmoceras, Perisphinctes, Cardioceras, Kepplerites Aspidoceras; in the upper stages Olcostephanus, Perisphinctes, Reineckia, Oppelia. So regularly do certain forms characterize definite horizons in the rocks that some thirty zones have been distinguished in Europe, and many of them can be traced even as far as India. Another cephalopod group, the belemnites, that had been dimly outlined in the preceding Trias, now advanced rapidly in numbers and in variety of form, and they, like the ammonites, have proved of great value as zone-indicators. The Sepioids or cuttlefish made their first appearance in this period {Beloteuthis, Geoteuthis,) and their ink-bags can still be traced in examples from the Lias and lithographic limestone. Nautiloids existed but they were somewhat rare.

A great change had come over the crustaceans; in place of the Palaeozoic trilobites we find long-tailed lobster-like forms, Penaeus, Eryon, Magila, and the broad crab-like type first appeared in Pro- sopon. Isopods were represented by Archaeoniscus and others. Insects have left fairly abundant remains in the Lias of England, Schambelen (Switzerland) and Dobbertin

(Mecklenburg), and also in the English Purbeck. Neuropterous forms predominate, but hemiptera occur from the Lias upwards; the earliest known flies % (Diptera) and ants (Hymenoptera) appeared; orthoptera, cock- roaches, crickets, beetles, &c, are found in the Lias, Stonesfield slate and Purbeck beds.

Fishes were approaching the modern forms during this period, heterocercal ganoids becoming scarce (the Coelacanthidae reached their maximum development), while the homocercal forms were abundant (Gyrodus, Microdon, Lepidosteus, Lepidotus, Dapedius). The Chimaeridae, sea-cats, made their appearance (Squaloraja) . The ancestors of the modern sturgeons, garpikes and selachians, Hybodus, Acrodus were numerous. Bony-fish were represented by the small Leptolepis.

So important a place was occupied by reptiles during this period that it has been well described as the " age of reptiles." In the seas the fish-shaped Ichthyosaurs and long-necked Plesiosaurs dwelt in great numbers and reached their maximum development ; the latter ranged in size from 6 to 40 ft. in length. The Pterosaurs, with bat-like wings and pneumatic bones and keeled breast-bone, flew over the land ; Pterodactyl with short tail and Rhamphorhyncus with long tail are the best known. Curiously modified crocodilians appeared late in the period {Mystriosaurus, Geosaurus, Steneosaurus, Teleosaurus). But even more striking than any of the above were the Dinosaurs; these ranged in size from a creature no larger than a rabbit up to the gigantic Atlantosaurus, 100 ft. long, in the Jurassic of Wyoming. Both herbivorous and carnivorous forms were present; Brontosaurus, Megalosaurus, Stegosaurus, Cetiosaurus, Diplodocus, Ceratosaurus and Campsognathus are a few of the genera. By comparison with the Dinosaurs the mammals took a very subordinate position in Jurassic times; only a few jaws have been found, belonging to quite small creatures; they appear to have been marsupials and were probably insectivorous (Plagiaulax Bolodon, Triconodon, Phascolotherium, Stylacodon). Of great interest are the remains of the earliest known bird (Archaeopteryx) from the

Solenhofen slates of Bavaria. Although this was a great advance beyond the Pterodactyls in avian characters, yet many reptilian features were retained.

Comparatively little change took place in the vegetation in the time that elapsed between the close of the Triassic and the middle of the Jurassic periods. Cycads, Zamites, Podozamites, &c, ap- peared to reach their maximum; Equisetumswere still found growing to a great size and Ginkgos occupied a prominent place ; ferns were common ; so too were pines, yews, cypresses and other conifers, which while they outwardly resembled their

modern representatives, were quite distinct in species. No flowering plants had yet appeared, although a primitive form of angiosperm has been reported from the Upper Jurassic of Portugal.

The economic products of the Jurassic system are of considerable importance ; the valuable coals have already been noticed ; the well-known iron ores of the Cleveland district in Yorkshire and those of the Northampton sands occur respectively in the Lias and Inferior Oolites. Oil shales are found in Germany, and several of the Jurassic formations in England contain some petroleum. Building stones of great value are obtained from the Great Oolite, the Portlandian and the Inferior Oolite; large quantities of hydraulic cement and lime have been made from the Lias. The celebrated lithographic stone of Solenhofen in Bavaria belongs to the upper portion of this system.

See D'Orbigny, Paleontologie francaise, Terrain Jurassique (1840, 1846); L. von Buch, " Uber den Jura in Deutschland " (Abhand. d. Berlin Akad., 1839); F. A. Quenstedt, Flbtzgebirge Wurttembergs (1843) and other papers, also Der Jura (1883-1888); A. Oppel, Die Juraformation Englands, Frankreichs und s.w. Deutschlands (1856- 1858). For a good general account of the formations with many references to original papers, see A. de Lapparent, Traite de geologie, vol. ii. 5th ed. (1906). The standard work for Great Britain is the series of Memoirs of the Geological Survey entitled The Jurassic Rocks of Britain, i and ii. " Yorkshire " (1892); hi. " The Lias of England and Wales " (1893) ; iv. " The Lower Oolite Rocks of England (York- shire excepted)" (1894); v. "The Middle and Upper Oolitic Rocks of England (Yorkshire excepted)" (1895). The map is after that of M. Neumayr, " Die geographische Verbreitung der Juraformation," Denkschr. d. k. Akad. d. Wiss., Wien, Math. u. Naturwiss., cl. L., Abth. i., Karte 1. (1885). (J. A. H.)

JURAT (through Fr. from med. Lat. juratus, one sworn, Lat. jurare, to swear), a name given to the sworn holders of certain offices. Under the ancien regime in France, in several towns, of the south-west, such as Rochelle and Bordeaux, the jurats were members of the municipal body. The title was also borne by officials, corresponding to aldermen, in the Cinque Ports, but is now chiefly used as a title of office in the Channel Islands. There are two bodies, consisting each of twelve jurats, for Jersey and the bailiwick of Guernsey respectively. They are elected for life, in Jersey by the ratepayers, in Guernsey by the elective states. They form, with the bailiff as presiding judge, the royal court of justice, and are a constituent part of the legislative bodies. In English law, the word jurat (juratum) is applied to that part of an affidavit which contains the names of the parties swearing the affidavit and the person before whom it was sworn, the date, place and other necessary particulars.

JURIEN DE LA GRAVIERE, JEAN BAPTISTE EDMOND (1812-1892), French admiral, son of Admiral Jurien, who served through the Revolutionary and Napoleonic wars and was a peer of France under Louis Philippe, was born on the 19th of Novem- ber 18 1 2. He entered the navy in 1828, was made a commander in 1841, and captain in 1850. During the Russian War he com- manded a ship in the Black Sea. He was promoted to be rear- admiral on the 1st of December 1855, and appointed to the command of a squadron in the Adriatic in 1859, when he abso- lutely sealed the Austrian ports with a close blockade. In October 1861 he was appointed to command the squadron in the Gulf of Mexico, and two months later the expedition against Mexico. On the 15th of January 1862 he was promoted to be vice-admiral. During the Franco-German War of 1870 he had command of the French Mediterranean fleet, and in 1871 he was appointed " director of charts." As having commanded in chief before the enemy, the age-limit was waived in his favour, and he was continued on the active list. Jurien died on the 4th of March 1892. He was a voluminous author of works on naval history and biography, most of which first appeared in the Revue des deux mondes. Among the most noteworthy of these are Guerres maritimes sous la rcpubiique et I 'empire, which was trans- lated by Lord D unsany under the title of Sketches of the Last Naval War (1848) ; Souvenirs d'un amiral (i860), that is, of his father,

Admiral Jurien; La Marine d'autrefois (1865), largely autobio- graphical; and La Marine d'aujourd'hui (1872). In 1866 he was elected a member of the Academy.

JURIEU, PIERRE (1637-1713), French Protestant divine, was born at Mer, in Orleanais, where his father was a Protestant pastor. He studied at Saumur and Sedan under his grandfather, Pierre Dumoulin, and under Leblanc de Beaulieu. After com- pleting his studies in Holland and England, Jurieu received Anglican ordination; returning to France he was ordained again and succeeded his father as pastor of the church at Mer. Soon after this he published his first work, Examen de livre de la riunion du Christianisme (1671). In 1674 his TraiU de la devo- tion led to his appointment as professor of theology and Hebrew at Sedan, where he soon became also pastor. A year later he published his Apologie pour la morale des Reformis. He obtained a high reputation, but his work was impaired by his controver- sial temper, which frequently developed into an irritated fanati- cism, though he was always entirely sincere. He was called by his adversaries " the Goliath of the Protestants." On the suppression of the academy of Sedan in 1681, Jurieu received an invitation to a church at

Rouen, but, afraid to remain in France on account of his forthcoming work, La Politique du clerge de France, he went to Holland and was pastor of the Walloon church of Rotterdam till his death on the nth of January 1713. He was also professor at the 6cole illustre. Jurieu did much to help those who suffered by the revocation of the Edict of Nantes (1685). He himself turned for consolation to the Apocalypse, and succeeded in persuading himself (Accomplissement des pro- phities, 1686) that the overthrow of Antichrist {i.e. the papal church) would take place in 1689. H. M. Baird says that " this persuasion, however fanciful the grounds on which it was based, exercised no small influence in forwarding the success of the designs of William of Orange in the invasion of England." Jurieu defended the doctrines of Protestantism with great ability against the attacks of Antoine Arnauld, Pierre Nicole and Bossuet, but was equally ready to enter into dispute with his fellow Protestant divines (with Louis Du Moulin and Claude Payon, for instance) when their opinions differed from his own even on minor matters. The bittecness and persistency of his attacks on his colleague Pierre Bayle led to the latter being deprived of his chair in 1693.

One of Jurieu's chief works is Lettres pastorales adressees aux fideles de France (3 vols., Rotterdam, 1686-1687; Eng. trans., 1689), which, notwithstanding the vigilance of the police, found its way into France and produced a deep impression on the Protestant population. His last important work was the Histoire critique des dogmes el des cultes (1704; Eng. trans., 1715). He wrote a great number of controversial works.

See the article in Herzog-Hauck, Realencyklopadie ; also H. M. Baird, The Huguenots and the Revocation of the Edict of Nantes (1895).

JURIS, a tribe of South American Indians, formerly occupying the country between the rivers Iga (lower Putumayo) and Japura, north-western Brazil. In ancient days they were the most powerful tribe of the district, but in 1820 their numbers did not exceed 2000. Owing to inter-marrying, the Juris are believed to have been extinct for half a century. They were closely related to the Passes, and were like them a fair-skinned, finely built people with quite European features.

JURISDICTION, in general, the exercise of lawful authority, especially by a court or a judge; and so the extent or limits within which such authority is exercisable. Thus each court has its appropriate jurisdiction; in the High Court of Justice in England administration actions are brought in the chancery division, salvage actions in the admiralty, &c. The jurisdiction of a particular court is often limited by statute, as that of a county court, which is local and is also limited in amount. In inter- national law jurisdiction has a wider meaning, namely, the rights exercisable by a state

within the bounds of a given space. This is frequently referred to as the territorial theory of jurisdiction. (See International Law; International Law, Private.)

JURISPRUDENCE (Lat. juris prudentia, knowledge of law, from jus, right, and prudentia, from provider e, to foresee), the general term for " the formal science of positive law " (T. E.

Holland); see Law. The essential principles involved are dis- cussed below and in Jurisprudence, Comparative; the details of particular laws or sorts of law (Contract, &c.) and of in- dividual national systems of law (English Law, &c.) being dealt with in separate articles.

The human race may be conceived as parcelled out into a number of distinct groups or societies, differing greatly in size and circumstances, in physical and moral characteristics of all kinds. But they all resemble each other in that they reveal on examination certain rules of conduct in accordance with which the relations of the members inter se are governed. Each society has its own system of laws, and all the systems, so far as they are known-, constitute the appropriate subject matter of juris- prudence. The jurist may deal with it in the following ways. He may first of all examine the leading conceptions common to all the systems, or in other words define the leading terms common to them all. Such are the terms law itself, right, duty, property, crime, and so forth, which, or their equivalents, may, notwithstanding delicate differences of connotation, be regarded as common terms in all systems. That kind of inquiry is known in England as analytical jurisprudence. It regards the concep- tions with which it deals as fixed or stationary, and aims at expressing them distinctly and exhibiting their logical relations with each other. What is really meant by a right and by a duty, and what is the true connexion between a right and a duty, are types of the questions proper to this inquiry. Shifting our point of view, but still regarding systems of law in the mass, we may consider them, not as stationary, but as changeable and chang- ing, we may ask what general features are exhibited by the record of the change. This, somewhat crudely put, may serve to indicate the field of historical or comparative jurisprudence. In its ideal condition it would require an accurate record of the history of all legal systems as its material. But whether the material be abundant or scanty the method is the same. It seeks the explanation of institutions and legal principles in the facts of history. Its aim is to show how a given rule came to be what it is. The legislative source — the emanation of the rule from a sovereign authority — is of no importance here; what is important is the moral source — the connexion of the rule with the ideas prevalent during contemporary periods. This method, it is evident, involves not only a comparison of successive stages in the history of the same system, but a comparison of different systems, of the Roman

with the English, of the Hindu with the Irish, and so on. The historical method as applied to law may be regarded as a special example of the method of comparison. The comparative method is really employed in all generalizations about law; for, although the analysis of legal terms might be conducted with exclusive reference to one system, the advantage of testing the result by reference to other systems is obvious. But, besides the use of comparison for purposes of analysis and in tracing the phenomena of the growth of laws, it is evident that for the purposes of practical legislation the comparison of differ- ent systems may yield important results. Laws are contrivances for bringing about certain definite ends, the larger of which are identical in all systems. The comparison of these contrivances not only serves to bring their real object, often obscured as it is in details, into clearer view, but enables legislators to see where the contrivances are deficient, and how they may be improved.

The " science of law," as the expression is generally used, means the examination of laws in general in one or other of the ways just indicated. It means an investigation of laws which exist or have existed in some given society in fact — in other words, positive laws; and it means an examination not limited to the exposition of particular systems. Analytical jurisprudence is in England associated chiefly with the name of John Austin (q.v.), whose Province of Jurisprudence Determined systematized and completed the work begun in England by Hobbes, and continued at a later date and from a different point of view by Bentham.

Austin's first position is to distinguish between laws properly so called and laws improperly so called. In any of the older writers on law, we find the various senses in which the word is

used grouped together as variations of one common meaning. Thus Blackstone advances to his proper subject, municipal laws, through (i) the laws of inanimate matter, (2) the laws of animal nutrition, digestion, &c, (3) the laws of nature, which are rules imposed by God on men and discoverable by reason alone, and (4) the revealed or divine law which is part of the law of nature directly expounded by God. All of these are connected by this common element that they are " rules of action dictated by some superior being." And some such generalization as this is to be found at the basis of most treatises on jurisprudence which have not been composed under the influence of the analytical school. Austin disposes of it by the distinction that some of those laws are commands, while others are not commands. The so-called laws of nature are not commands; they are

uniformities which resemble commands only in so far as they may be supposed to have been ordered by some intelligent being. But they are not commands in the only proper sense of that word — they are not addressed to reasonable biings, who may or may not will obedience to them. Laws of nature are not addressed to anybody, and there is no possible question of obedience or disobedience to them. Austin accord- ingly pronounces them laws improperly so called, and confines his attention to laws properly so called, which are commands addressed by a human superior to a human inferior.

This distinction seems so simple and obvious that the energy and even bitterness with which Austin insists upon it now seem superfluous. But the indiscriminate identification of everything to which common speech gives the name of a law was, and still is, a fruitful source of confusion. Blackstone's statement that when God " put matter into motion He established certain laws of motion, to which all movable matter must conform," and that in those creatures that have neither the power to think nor to will such laws must be invariably obeyed, so long as the creature itself subsists, for its existence depends on that obedience, im- putes to the law of gravitation in respect of both its origin and its execution the qualities of an act of parliament. On the other hand the qualities of the law of gravitation are imputed to certain legal principles which, under the name of the law of nature, are asserted to be binding all over the globe, so that " no human laws are of any validity if contrary to this." Austin never fails to stigmatize the use of " natural laws " in the sense of scientific facts as improper, or as metaphorical.

Having eliminated metaphorical or figurative laws, we restrict ourselves to those laws which are commands. This word is the key to the analysis of law, and accordingly a large portion of Austin's work is occupied with the determination of its meaning. A command is an order issued by a superior to an inferior. It is a signification of desire distinguished by this peculiarity that " the party to whom it is directed is liable to evil from the other, in case he comply not with the desire." " If you are able and willing to harm me in case I comply not with your wish, the expression of your wish amounts to a command." Being liable to evil in case I comply not with the wish which you signify, I am bound or obliged by it, or I he under a duty to obey it. The evil is called a sanction, and the command or duty is said to be sanctioned by the chance of incurring the evil. The three terms command, duty and sanction are thus inseparably connected. As Austin .expresses it in the language of formal logic, " each of the three terms signifies the same notion, but each denotes a different part of that notion and connotes the residue."

All commands, however, are not laws. That term is reserved for those

commands which oblige generally to the performance of acts of a class. A command to your servant to rise at such an hour on such a morning is a particular command, but not a law or rule; a command to rise always at that hour is a law or rule. Of this distinction it is sufficient to say in the meantime that it involves, when we come to deal with positive laws, the rejection of particular enactments to which by inveterate usage the term law would certainly be applied. On the other hand it is not, according to Austin, necessary that a true law should bind persons as a class. Obligations imposed on the grantee of an office specially created by parliament would imply a law; a

general order to go into mourning addressed to the whole nation for a particular occasion would not be a law.

So far we have arrived at a definition of laws properly so called. Austin holds superiority and inferiority to be necessarily implied in command, and such statements as that " laws emanate from superiors " to be the merest tautology and trifling. Elsewhere he sums up the characteristics of true laws as ascertained by the analysis thus: (1) laws, being commands, emanate from a determinate source; (2) every sanction is an evil annexed to a command; and (3) every duty implies a command, and chiefly means obnoxiousness to the evils annexed to commands.

Of true laws, those only are the subject of jurisprudence which are laws strictly so called, or positive laws. Austin accordingly proceeds to distinguish positive from other true laws, which are either laws set by God to men or laws set by men to men, not, however, as political superiors nor in pursuance of a legal right. The discussion of the first of these true but not positive laws leads Austin to his celebrated discussion of the utilitarian theory. The laws set by God are either revealed or unrevealed, i.e. either ex- pressed in direct command, or made known to men in one or other of the ways denoted by such phrases as the " light of nature," " natural reason," " dictates of nature," and so forth. Austin maintains that the principle of general utility, based ultimately on the assumed benevolence of God, is the true index to such of His commands as He has not chosen to reveal. Austin's exposi- tion of the meaning of the principle is a most valuable contribu- tion to moral science, though he rests its claims ultimately on a basis which many of its supporters would disavow. And the whole discussion is now generally condemned as lying outside the proper scope of the treatise, although the reason for so con- demning it is not always correctly stated. It is found in such assumptions of fact as that there is a God, that He has issued commands to men in what Austin calls the " truths of revela- tion," that He designs the happiness of all His creatures, that there is a predominance of good in the order of the world — which do not now command universal assent. It is impossible to place these

propositions on the same scientific footing as the assump- tions of fact with reference to human society on which juris- prudence rests. If the " divine laws " were facts like acts of parliament, it is conceived that the discussion of their character- istics would not be out of place in a scheme of jurisprudence.

The second set of laws properly so called, which are not positive laws, consists of three classes: (1) those which are set by men living in a state of nature; (2) those which are set by sovereigns but not as political superiors, e.g. when one sovereign commands another to act according to a principle of international law ; and (3) those set by subjects but not in pursuance of legal rights. This group, to which Austin gives the name of positive morality, helps to explain his conception of positive law. Men are living in a state of nature, or a state of anarchy, when they are not living in a state of government or as members of a political society. " Political society " thus becomes the central fact of the theory, and some of the objections that have been urged against it arise from its being applied to conditions of life in which Austin would not have admitted the existence of a political society. Again, the third set in the group is intimately connected with positive laws on the one hand and rules of positive morality which are not even laws properly so called on the other. Thus laws set by subjects in consequence of a legal right are clothed with legal sanctions, and are laws positive. A law set by guardian to ward, in pursuance of a right which the guardian is bound to exercise, is a positive law pure and simple; a law set by master to slave, in pursuance of a legal right, which he is not bound to exercise, is, in Austin's phraseology, to be regarded both as a positive moral rule and as a positive law. 1 On the other hand the rules set by a club or society, and enforced upon its members by exclusion from the society, but not in pursuance of any legal right, are laws, but not positive laws. They are imperative and proceed from

1 This appears to be an unnecessary complication. The sovereign has authorized the master to set the law, although not compelling him to do so, and enforces the law when set. There seems no good reason why the law should be called a rule of positive morality at all.

a determinate source, but they have no legal or political sanction. Closely connected with this positive morality, consisting of true but not positive laws, is the positive morality whose rules are not laws properly so called at all, though they are generally denominated laws. Such are the laws of honour, the laws of fashion, and, most important of all, international law.

Nowhere does Austin's phraseology come more bluntly into conflict with common usage than in pronouncing the law of nations (which in substance is a compact body of well-defined rules resembling nothing so much as the ordinary rules of law) to be not laws at all, even in the wider sense of the term. That the rules of a private club should be law properly so called, while the whole mass of international jurisprudence is mere opinion, shocks our sense of the proprieties of expression. Yet no man was more careful than Austin to observe these properties. He recognizes fully the futility of definitions which involve a painful struggle with the current of ordinary speech. But in the present instance the apparent paralogism cannot be avoided if we accept the limitation of laws properly so called to commands proceeding from a determinate source. And that limitation is so generally present in our conception of law that to ignore it would be a worse anomaly than this. No one finds fault with the statement that the so-called code of honour or the dictates of fashion are not, properly speaking, laws. We repel the same statement applied to the law of nature, because it resembles in so many of its most striking features — in the certainty of a large portion of it, in its terminology, in its substantial principles — the most universal elements of actual systems of law, and because, moreover, the assumption that brought it into existence was nothing else than this, that it consisted of those abiding portions of legal systems which prevail everywhere by their own authority. But, though " positive morality " may not be the best phrase to describe such a code of rules, the distinction insisted on by Austin is unimpeachable.

The elimination of those laws properly and improperly so called which are not positive laws brings us to the definition of positive law, which is the keystone of the system. Every positive law is " set by a sovereign person, or sovereign body of persons, to a member or members of the independent political society wherein that person or body is sovereign or superior." Though pos- sibly sprung directly from another source, it is a positive law, by the institution of that present sovereign in the character of a political superior. The question is not as to the historical origin of the principle, but as to its present authority. " The legislator is he, not by whose authority the law was first made, but by whose authority it continues to be law." This definition in- volves the analysis of the connected expressions sovereignty, subjection and independent political society, and of determinate body — which last analysis Austin performs in connexion with that of commands. These are all excellent examples of the logical method of which he was so great a master. The broad . results alone need be noticed here. In order that a given society may form a society political and independent, the generality or bulk of its members must be in a habit of obedience to a certain and common superior; whilst that certain person or body of persons must not be habitually obedient to a certain person or body. All the

italicized words point to circumstances in which it might be difficult 'to say whether a given society is political and independent or not. Several of these Austin has discussed — e.g. the state of things in which a political society yields obedience which may or may not be called habitual to some external power, and the state of things in which a political society is divided between contending claimants for sovereign power, and it is uncertain which shall prevail, and over how much of the society. So long as that uncertainty remains we have a state of anarchy. Further, an independent society to be political must not fall below a number which can only be called considerable. Neither then in a state of anarchy, nor in inconsiderable communities, nor among men living in a state of nature, have we the proper phenomena of a political society. The last limitation goes some way to meet the most serious criticism to which Austin's system has been exposed, and it ought to be

stated in his own words. He supposes a society which may be styled independent, which is considerable in numbers, and which is in a savage or extremely barbarous condition. In such a society, " the bulk of its members is not in the habit of obedience to one and the same superior. For the purpose of attacking an external enemy, or for the purpose of repelling an attack, the bulk of its members who are capable of bearing arms submits to one leader or one body of leaders. But as soon as that emergency passes the transient submission ceases, and the society reverts to the state which may be deemed its ordinary state. The bulk of each of the families which compose the given society renders habitual obedience to its own peculiar, chief, but those domestic societies are themselves independent societies, or are not united and compacted into one political society by habitual and general obedience to one common superior, and there is no law (simply or strictly so styled) which can be called the law of that society. The so-called laws which are common to the bulk of the com- munity are purely and properly customary laws — that is to say, laws which are set or imposed by the general opinion of the com- munity, but are not enforced by legal or political sanctions." Such, he says, are the savage societies of hunters and fishers in North America, and such were the Germans as described by Tacitus. He takes no account of societies in an intermediate stage between this and the condition which constitutes political society.

We need not follow the analysis in detail. Much ingenuity is displayed in grouping the various kinds of government, in detecting the sovereign authority under the disguises which it • wears in the complicated state system of the United States or under the fictions of English law, in elucidating the precise mean- ing of abstract political terms. Incidentally the source of many celebrated fallacies in political thought is laid bare. That the question who is sovereign in a given state is a question of fact and not of law or morals or religion, that the sovereign is incapable of legal

limitation, that law is such by the sovereign's command, that no real or assumed compact can limit his action — are posi- tions which Austin has been accused of enforcing with needless iteration. He cleared them, however, from the air of paradox with which they had been previously encumbered, and his influ- ence was in no direction more widely felt than in making them the commonplaces of educated opinion in this generation.

Passing from these, we may now consider what has been said against the theory, which may be summed up in the following terms. Laws, no matter in what form they be expressed, are in the last resort reducible to commands set by the person or body of persons who are in fact sovereigns in any independent political society. The sovereign is the person or persons whose commands are habitually obeyed by the great bulk of the community; and by an independent society we mean that such sovereign head is not himself habitually obedient to any other determinate body of persons. The society must be sufficiently numerous to be considerable before we can speak of it as a political society. From command, with its inseparable incident of sanction, come the duties and rights in terms of which laws are for the most part expressed. Duty means that the person of whom it is predicated is liable to the sanction in case he fails to obey the command. Right means that the person of whom it is predicated may set the sanction in operation in case the command be disobeyed.

We may here interpolate a doubt whether the condition of inde- pendence on the part of the head of a community is essential to the legal analysis. It seems to us that we have all the elements of a true law present when we point to a community habitually obedient to the authority of a person or determinate body of persons, no matter what the relations of that superior may be to any external or superior power. Provided that in fact the commands of the lawgiver are those beyond which the community never looks, it seems immaterial to inquire whether this lawgiver in turn takes his orders from some- body else or is habitually obedient to such orders when given. One may imagine a community governed by a dependent legislatorial body or person, while the supreme sovereign whose representative and nominee such body or person may be never directly addresses the community at all. We do not see that in such a case anything is gained in clearness by representing the law of the community as set by the suzerain, rather than the dependent legislator. Nor is the ascertainment of the ultimate seat of power necessary to define

political societies. That we get when we suppose a community to be in the

habit of obedience to a single person or to a determinate combination of persons.

The use of the word " command " is not unlikely to lead to a misconception of Austin's meaning. When we say that a law is a command of the sovereign, we are apt to think of the sovereign as enunciating the rule in question for the first time. Many laws are not traceable to the sovereign at all in this sense. Some are based upon immemorial practices, some can be traced to the influence of private citizens, whether practising lawyers or writers on law, and in most countries a vast body of law owes its existence as such to the fact that it has been observed as law in some other society. The great bulk of modern law owes its existence and its shape ultimately to the labours of the Roman lawyers of the empire. Austin's definition has nothing to do with this, the historical origin of laws. Most books dealing with law in the abstract generalize the modes in which laws may be originated under the name of the " sources " of law, and one of these is legislation, or the direct command of the sovereign body. The connexion of laws with each other as principles is properly the subject matter of historical jurisprudence, the ideal perfection of which would be the establishment of the general laws governing the evolution of law in the technical sense. Austin's definition looks, not to the authorship of the law as a principle, not to its inventor or originator, but to the person or persons who in the last resort cause it to be obeyed. If a given rule is enforced by the sovereign it is a law.

It may be convenient to notice here what is usually said about the sources of law, as the expression sometimes proves a stumbling- block to the appreciation of Austin's system. In the corpus juris of any given country only a portion of the laws is traceable to the direct expression of his commands by the sovereign. Legislation is one, but only one, of the sources of law. Other portions of the law may be traceable to other sources, which may vary in effect in different systems. The list given in the Institutes of Justinian of the ways in which law may be made — lex, plebiscitum, principis placita, edicta magistratuum, and so on — is a list of sources. Among the sources of law other than legislation which are most commonly exemplified are the laws made by judges in the course of judicial decisions, and law originating as custom. The source of the law in the one case is the judicial decision, in the other the custom. In consequence of the decisions and in consequence of the custom the rule has prevailed. English law is largely made up of principles derived in each of those ways, while it is deficient in principles derived from the writings of independent teachers, such as have in other systems exercised a powerful influence on the development of law. The responsa prudentum, the opinions of learned men, published as such, did undoubtedly originate an immense portion of Roman law. No such influence has affected English law to any appreciable extent

— a result owing to the activity of the courts of the legislature. This difference has profoundly affected the form of English law as compared with that of systems which have been developed by the play of free discussion. These are the most definite of the influences to which the beginning of laws may be traced. The law once established, no matter how, is nevertheless law in the sense of Austin's definition. It is enforced by the sovereign authority. It was originated by something very different. But when we speak of it as a command we think only of the way in which it is to-day presented to the subject. The newest order of an act of parliament is not more positively presented to the people as a command to be obeyed than are the elementary rules of the common law for which no legislative origin can be traced. It is not even necessary to resort to the figure of speech by which alone, according to Sir Henry Maine (Early History of Institutions, p. 314), the common law can be regarded as the commands of the govern- ment. " The common law," he says, " consists of their commands because they can repeal or alter or restate it at pleasure." " They command because, being by the assumption possessed of uncontrol- lable force, they could innovate without limit at any moment." On the contrary, it may be said that they command because they do as a matter of fact enforce the rules laid down in the common law. It is not because they could innovate if they pleased in the common law that they are said to command it, but because it is known that they will enforce it as it stands.

The criticism of Austin's analysis resolved itself into two different sets of objections. One relates to the theory of sove- reignty which underlies it; the other to its alleged failure to include rules which in common parlance are laws, and which it is felt ought to be included in any satisfactory definition of law. As the latter is to some extent anticipated and admitted by Austin himself, we may deal with it first.

Frederic Harrison (Fortnightly Review, vols, xxx., xxxi.) was at great pains to collect a number of laws or rules of law which do not square with the Austinian definition of law as a command creating rights and duties. Take the rule that " every will must be in writing." It is a very circuitous way of looking at things, according to Harrison, to say that such a rule creates a specific

right in any determinate person of a definite description. So, again, the rule that " a legacy to the witness of a will is void." Such a rule is not " designed to give any one any rights, but simply to protect the public against wills made under undue influence." Again, the technical rule in Shelley's case that a gift to A for life, followed by a gift to the heirs of A, is a gift to A in fee simple, is pronounced to be inconsistent with the definition. It is an idle waste of ingenuity to force any of these rules into a form in which they might be said to create rights.

This would be a perfectly correct description of any attempt to take any of these rules separately and analyse it into a com- plete command creating specific rights and duties. But there is no occasion for doing anything of the kind. It is not contended that every grammatically complete sentence in a textbook or a statute is per se a command creating rights and duties. A law, like any other command, must be expressed in words, and will require the use of the usual aids to expression. The gist of it may be expressed in a sentence which, standing by itself, is not intelligible; other sentences locally separate from the principal one may contain the exceptions and the modifications and the interpretations to which that is subject. In no one of these taken by itself, but in the substance of them all taken together, is the true law, in Austin's sense, to be found. Thus the rule that every will must be in writing is a mere fragment— only the limb of a law. It belongs to the rule which fixes the rights of devisees or legatees under a will. That rule in whatever form it may be expressed is, without any straining of language, a command of the legislator. That " every person named by a testator in his last will and testament shall be entitled to the property thereby given him " is surely a command creating rights and duties. After testament add " expressed in writing "; it is still a com- mand. Add further, " provided he be not one of the witnesses to the will," and the command, with its product of rights and duties, is still there. Each of the additions limits the operation of the command stated imperatively in the first sentence. So with the rule in Shelley's case. It is resolvable into the rule that every person to whom an estate is given by a conveyance ex- pressed in such and such a way shall take such and such rights. To take another example from later legislation. An English statute passed in 1881 enacts nothing more than this, that an act of a previous session shall be construed as if " that " meant " this." It would be futile indeed to force this into conformity with Austin's definition by treating it as a command addressed to the judges, and as indirectly creating rights to have such a construc- tion respected. As it happens, the section of the previous act referred to (the Burials Act 1880) was an undeniable command addressed to the clergy, and imposed upon them a specific duty. The true command — the law — is to be found in the two sections taken together.

All this confusion arises from the fact that laws are not habitu- ally expressed in imperative terms. Even in a mature system like that of England the great bulk of legal rules is hidden under forms which disguise their imperative quality. They appear as principles, maxims, propositions of fact, generalizations, points of pleading and procedure, and so forth. Even in the statutes the imperative form is not uniformly observed. It might be said that the more mature a legal system is the less do its individual rules take the form of commands. The greater portion of Roman law is expressed in terms which would not misbecome scientific or speculative treatises. The

institutional works abound in propositions which have no legal significance at all, but which are not distinguished from t he true law in which they are embedded by any difference in the forms of expression. Assertions about matters of history, dubious speculations in philology, and reflections on human conduct are mixed up in the same narrative with genuine rules of law. Words of description are used, not words of command, and rules of law assimilate themselves in form to the extraneous matter with which they are mixed up.

It has been said that Austin himself admitted to some extent the force of these objections. He includes among laws which are not imperative " declaratory laws, or laws explaining the

import of existing positive law, and laws abrogating or repealing existing positive law." He thus associates them with rules of positive morality and with laws which are only metaphorically so called. This collocation is unfortunate and out of keeping with Austin's method. Declaratory and repealing laws are as completely unlike positive morality and metaphorical laws as are the laws which he describes as properly so called. And if we avoid the error of treating each separate proposition enunciated by the lawgiver as a law, the cases in question need give us no trouble. Read the declaratory and the repealing statutes along with the principal laws which they affect, and the result is per- fectly consistent with the proposition that all law is to be resolved into a species of command. In the one case we have in the principal taken together with the interpretative statute a law, and whether it differs or not from the law as it existed before the interpretative statute was passed makes no difference to the true character of the latter. It contributes along with the former to the expression of a command which is a true law. In the same way repealing statutes are to be taken together with the laws which they repeal — the result being that there is no law, no command, at all. It is wholly unnecessary to class them as laws which are not truly imperative, or as exceptions to the rule that laws are a species of commands. The combination of the two sentences in which the lawgiver has expressed himself, yields the result of silence — absence of law — which is in no way incompat- ible with the assertion that a law, when it exists, is a kind of command. Austin's theory does not logically require us to treat every act of parliament as being a complete lav/ in itself, and therefore to set aside a certain number of acts of parliament as being exceptions to the great generalization which is the basis of the whole system.

Rules of procedure again have been alleged to constitute another exception. They cannot, it is said, be regarded as commands involving punishment if

they be disobeyed. Nor is anything gained by considering them as commands addressed to the judge and other ministers of the law. There may be no doubt in the law of procedure a great deal that is resolvable into law in this sense, but the great bulk of it is to be regarded like the rules of interpretation as entering into the substantive com- mands which are laws. They are descriptions of the sanction and its mode of working. The bare prohibition of murder with- out any penalty to enforce it would not be a law. To prohibit it under penalty of death implies a reference to the whole machinery of criminal justice by which the penalty is enforced. Taken by themselves the rules of procedure are not, any more than canons of interpretation, complete laws in Austin's sense of the term. But they form part of the complete expression of true laws. They imply a command, and they describe the sanction and the mode in which it operates.

A more formidable criticism of Austin's position is that which attacks the definition of sovereignty. There are countries, it is said, where the sovereign authority cannot by any stretch of language be said to command the laws, and yet where law mani- festly exists. The ablest and the most moderate statement of this view is given by Sir Henry Maine in Early History of Institutions, p. 380: —

" It is from no special love of Indian examples that I take one from India, but because it happens to be the most modern precedent in point. My instance is the Indian province called the Punjaub, the country of the Five Rivers, in the state in which it was for about a quarter of a century before its annexation to the British Indian Empire. After passing through every conceivable phase of anarchy and dormant anarchy, it fell urider the tolerably consolidated dominion of a half-military half-religious oligarchy known as the Sikhs. The Sikhs themselves were afterwards reduced to subjection by a single chieftain belonging to their order, Runjeet Singh. At first sight there could be no more perfect embodiment than Runjeet Singh of sovereignty as conceived by Austin. He was absolutely despotic. Except occasionally on his wild frontier he kept the most perfect order. He could have commanded anything; the smallest disobedience to his commands would have been followed by death or mutilation ; and this was perfectly well known to the enormous majority of his subjects. Yet I doubt whether once in all his life he issued a command which Austin would call a law. He took as his revenue a prodigious share of the produce of the soil. He harried

villages which recalcitrated at his exactions, and he executed great numbers of men. He levied great armies; he had all material of power, and he exercised it in various ways. But he never made a law. The rules which

regulated the lives of his subjects were derived from their immemorial usages, and those rules were admin- istered by domestic tribunals in families or village communities — that is, in groups no larger or little larger than those to which the application of Austin's principles cannot be effected on his own admission without absurdity."

So far as the mere size of the community is concerned, there is no difficulty in applying the Austinian theory. In postulating a considerably numerous community Austin was thinking evidently of small isolated groups which could not without pro- voking a sense of the ridiculous be termed nations. Two or three families, let us suppose, occupying a small island, totally disconnected with any great power, would not claim to be and would not be treated as an independent political community. But it does not follow that Austin would have regarded the village communities spoken of by Maine in the same light. Here we have a great community, consisting of a vast number of small communities, each independent of the other, and disconnected with all the others, so far as the administration of anything like law is concerned. Suppose in each case that the headman or council takes his orders from Runjeet Singh, and enforces them, each in his own sphere, relying as the last resort on the force at the disposal of the suzerain. The mere size of the separate communities would make no sort of difference to Austin's theory. He would probably regard the empire of Runjeet Singh as divided into small districts — an assumption which inverts no doubt the true historical order, the smaller group being generally more ancient than the larger. But provided that the other conditions prevail, the mere fact that the law is administered by local tribunals for minute areas should make no difference to the theory. The case described by Maine is that of the undoubted possession of supreme power by a sovereign, coupled with the total absence of any attempt on his part to originate a law. That no doubt is, as we are told by the same authority, " the type of all Oriental communities in their native state during their rare intervals of peace and order." The empire was in the main in each case a tax-gathering empire. The unalterable law of the Medes and Persians was not a law at all but an occasional com- mand. So again Maine puts his position clearly in the following sentences: " The Athenian assembly made true laws for resi- dents on Attic territory, but the dominion of Athens over her subject cities and islands was clearly a tax-taking as distinguished from a legislating empire." Maine, it will be observed, does, not say that the sovereign assembly did not command the laws in the subject islands — only that it did not legislate.

In the same category may be placed without much substantial difference all the societies that have ever existed on the face of the earth previous to the point at which legislation becomes active. Maine is undoubtedly right in connecting the theories of Bentham and Austin with the overwhelming

activity of legislatures in modern times. And formal legislation, as he elsewhere shows, comes late in the history of most legal systems. Law is generated in other ways, which seem irreconcilable with anything like legislation. Not only the tax-gathering emperors of the East, indifferent to the condition of their subjects, but even actively benevolent governments have up to a certain point left the law to grow by other means than formal enactments. What is ex facie more opposed to the idea of a sovereign's com- mands than the conception of schools of law ? Does it not " sting us with a sense of the ridiculous "to hear principles which are the outcome of long debates between Proculians and Sabi- nians described as commands of the emperor ? How is sectarian- ism in law possible if the sovereign's command is really all that is meant by a law ? No mental attitude is more common than that which regards law as a natural product — discoverable by a diligent investigator, much in the same way as the facts of science or the principles of mathematics. The introductory portions of Justinian's Institutes are certainly written from this point of view, which may also be described without much unfairness as the point of view of German jurisprudence. And yet the English

jurist who accepts Austin's postulate as true for the English system of our own day would have no difficulty in applying it to German or Roman law generated under the influence of such ideas as these.

Again, referring to the instance of Runjeet Singh, Sir H. Maine says no doubt rightly that " he never did or could have dreamed of changing the civil rules under which his subjects lived. Pro- bably he was as strong a believer in the independent obligatory force of such rules as the elders themselves who applied them." That too might be said- with truth of states to which the applica- tion of Austin's system would be far from difficult. The sovereign body or person enforcing the rules by all the ordinary methods of justice might conceivably believe that the rules which he enforced had an obligatory authority of their own, just as most lawyers at one time, and possibly some lawyers now, believe in the natural obligatoriness, independently of courts or parlia- ments, of portions of the law of England. But nevertheless, whatever ideas the sovereign or his delegates might entertain as to " the independent obligatory force " of the rules which they enforce, the fact that they do enforce them distinguishes them from all other rules. Austin seizes upon this peculiarity and fixes it as the determining characteristic of positive law. When the rule is enforced by a sovereign authority as he defines it, it is his command, even if he should never so regard it himself, or should suppose himself to be unable to alter it

in a single particular.

It may be instructive to add to these examples of dubious cases one taken from what is called ecclesiastical law. In so far as this has not been adopted and enforced by the state, it would, on Austin's theory, be, not positive law, but either positive morality or possibly a portion of the Divine law. No jurist would deny that there is an essential difference between so much of ecclesiastical law as is adopted by the state and all the rest of it, and that for scientific purposes this distinction ought to be recognized. How near this kind of law approaches to the positive or political law may be seen from the sanctions on which it depended. " The theory of peniten- tial discipline was this: that the church was an organized body with an outward and visible form of government; that all who were outside her boundaries were outside the means of divine grace; that she had a command laid upon her, and authority given to her, to gather men into her fellowship by the ceremony of baptism, but, as some of those who were admitted proved unworthy of their calling, she also had the right by the power of the keys to deprive them temporarily or absolutely of the privilege of communion with her, and on their amendment to restore them once more to church membership. On this power of exclusion and restoration was founded the system of ecclesiastical discipline. It was a purely spiritual jurisdiction. It obtained its hold over the minds of men from the belief, universal in the Catholic church of the early ages, that he who was expelled from her pale was expelled also from the way of salvation, and that the sentence which was pronounced by God's church on earth was ratified by Him in heaven." (Smith's Dictionary of Christian Antiquities, art. " Penitence," p. 1587.)

These laws are not the laws of the jurists, though they resemble them closely in many points — indeed in all points except that of the sanction by which they are enforced. It is a spiritual not a political sanction. The force which lies behind them is not that of the sovereign or the state. When physical force is used to compel obedience to the laws of the church they become positive laws. But so long as the belief in future punishments or the fear of the purely spiritual punishments of the church is sufficient to procure obedience to them, they are to be regarded as commands, not by the state, but by the church. That difference Austin makes essen- tial. In rejecting spiritual laws from the field of positive law his example would be followed by jurists who would nevertheless include other laws, not ecclesiastical in purpose, but enforced by very similar methods.

Austin's theory in the end comes to this, that true laws are in all cases obeyed in consequence of the application of regulated physical force by some portion of the community. That? is a fair paraphrase of the position that laws are the commands of the sovereign, and is perhaps less objectionable inasmuch as it does not imply or suggest anything about the

forms in which laws are enunciated. All rules, customs, practices and laws — or by whatever name these uniformities of human conduct may be called — have either this kind of force at their back or they have not. Is it worth while to make this difference the basis of a scientific system or not? Apparently it is. If it were a question of distinguishing between the law of the law courts and the laws

of fashion no one would hesitate. Why should laws or rules having no support from any political authority be termed laws positive merely because there are no other rules in the society having such support?

The question may perhaps be summed up as follows. Austin's definitions are in strict accordance with the facts of government in civilized states; and, as it is put by Maine, certain assumptions or postulates having been made, the great majority of Austin's positions follow as of course or by ordinary logical process. But at the other extreme end of the scale of civilization are societies to which Austin himself refuses to apply his system, and where, it would be conceded on all sides, there is neither political commu- nity nor sovereign nor law — none of the facts which jurisprudence assumes to exist. There is an intermediate stage of society in which, while the rules of conduct might and generally would be spoken of as laws, it is difficult to trace the connexion between them and the sovereign authority whose existence is necessary to Austin's system. Are such societies to be thrown out of account in analytical jurisprudence, or is Austin's system to be regarded as only a partial explanation of the field of true law, and his definitions good only for the laws of a portion of the world ? The true answer to this question appears to be that when the rules in any given case are habitually enforced by physical penalties, administered by a determinate person or portion of the com- munity, they should be regarded as positive laws and the ap- propriate subject matter of jurisprudence. Rules which are not so enforced, but are enforced in any other way, whether by what is called public opinion, or spiritual apprehensions, or natural instinct, are rightly excluded from that subject matter. In all stages of society, savage or civilized, a large body of rules of conduct, habitually obeyed, are nevertheless not enforced by any state sanction of any kind. Austin's method assimilates such rules in primitive society, where they subserve the same purpose as positive laws in an advanced society, not to the positive laws which they resemble in purpose but to the moral or other rules which they resemble in operation. If we refuse to accept this position we must abandon the attempt to frame a general definition of law and its dependent terms, or we must content ourselves with saying that law is one thing in one state of society and another thing in another. On the ground of clearness and convenience Austin's method is, we be- lieve, substantially right, but none the less should the student of jurisprudence be on his guard against such assumptions as

that legislation is a universal phenomenon, or that the relation of sovereign a ad subject is discernible in all states of human society. And a careful examination of Maine's criticism will show that it is devoted not so much to a rectification of Austin's position as to correction of the misconceptions into which some of his disciples may have fallen. It is a misconception of the analysis to suppose that it involves a difference in juridical character between custom not yet recognized by any judicial decision and custom after such recognition. There is no such difference except in the case of what is properly called " judicial legislation " — wherein an absoˆ lutely new rule is added for the first time to the law. The recognition of a custom or law is not necessarily the beginning of the custom or law. Where a custom possesses the marks by which its legality is determined according to well understood principles, the courts pronounce it to have been law at the time of the happening of the facts as to which their jurisdiction is invoked. The fact that no previous instance of its recognition by a court of justice can be produced is not material. A lawyer before any such decision was given would nevertheless pronounce the custom to be law — with more or less hesitation according as the marks of a legal custom were obvious or not. The char- acter of the custom is not changed when it is for the first time enforced by a court of justice, and hence the language used by Maine must be understood in a very limited sense. " Until customs are enforced by courts of justice " — so he puts the posi- tion of Austin — they are merely " positive morality," rules en- forced by opinion ; but as soon as courts of justice enforce them they become commands of the sovereign, conveyed through the judges who are his delegates or deputies. This proposition, on

Austin's theory, would only be true of customs as to which these marks were absent. It is of course true that when a rule enforced only by opinion becomes for the first time enforceable by a court of justice — which is the same thing as the first time of its being actually enforced — its juridical character is changed. It was positive morality; it is now law. So it is when that which was before the opinion of the judge only becomes by his decision a Tule enforceable by courts of justice. It was not even positive morality but the opinion of an individual; it is now law.

The most difficult of the common terms of law to define is right; and, as right rather than duty is the basis of classification, it is a point of some importance. Assuming the truth of the analysis above discussed, we may go on to say that in the notion of law is involved an obligation on the part of some one, or on the part of every one, to do or forbear from doing. That obligation is duty; what is right? Dropping the negative of forbearance, and

taking duty to mean an obligation to do something, with the alternative of punishment in default, we find that duties are of two kinds. The thing to be done may have exclusive reference to a determinate person or class of persons, on whose motion or complaint the sovereign power will execute the punishment or sanction on delinquents; or it may have no such reference, the thing being commanded, and the punishment following on dis- obedience, without reference to the wish or complaint of indi- viduals. The last are absolute duties, and the omission to do, or forbear from doing, the thing specified in the command is in general what is meant by a crime. The others are relative duties, each of them implying and relating to a right in some one else. A person has a right who may in this way set in operation the sanction provided by the state. In common thought and speech, however, right appears as something a good deal more positive and definite than this — as a power or faculty residing in individuals, and suggesting not so much the relative obligation as the advantage or enjoyment secured thereby to the person having the right. J. S. Mill, in a valuable criticism of Austin, suggests that the definition should be so modified as to introduce the element of " advantage to the person exercising the right." But it is exceedingly difficult to frame a positive definition of right which shall not introduce some term at least as ambiguous as the word to be defined. T. E. Holland defines right in general as a man's " capacity of influencing the acts of another by means, not of his own strength, but of the opinion or the force of society." Direct influence exercised by virtue of one's own strength, physical or otherwise, over another's acts, is " might " as distinguished from right. When the indirect influence is the opinion of society, we have a " moral right." When it is the force exercised by the sovereign, we have a legal right. It would be more easy, no doubt, to pick holes in this definition than to frame a better one. 1

The distinction between rights available against determinate persons and rights available against all the world, jura in per- sonam and jura in rem, is of fundamental importance. The phrases are borrowed from the classical jurists, who used them originally to distinguish actions according as they were brought to enforce a personal obligation or to vindicate rights of property. The owner of property has a right to the exclusive enjoyment thereof, which avails against all and sundry, but not against one person more than another. The parties to a contract have rights available against each other, and against no other persons. The jus in rem is the badge of property ; the jus in personam is a mere personal claim.

1 In English speech another ambiguity is happily wanting which in many languages besets the phrase expressing " a right." The Latin " jus." the German " Recht," the Italian " diritto," and the French " droit " express, not only a right, but also law in the abstract. To indicate the distinction between " law " and " a right " the Germans are therefore obliged to resort

to such phrases as " objectives " and " subjectives Recht," meaning by the former law in the abstract, and by the latter a concrete right. And Blackstone, paraphrasing the distinction drawn by Roman law between the " jus quod ad res " and the " jus quod ad personas attinet," devotes the first two volumes of his Commentaries to the " Rights of Persons and the Rights of Things." See Holland's Elements of Jurisprudence, ioth ed., 78 seq. xv. 19

That distinction in rights which appears in the division of law into the law of persons and the law of things is thus stated by Austin. There are certain rights and duties, with certain capa- cities and incapacities, by which persons are determined to various classes. The rights, duties, &c, are the condition or status of the person; and one person may be invested with many status or conditions. The law of persons consists of the rights, duties, &c, constituting conditions or status; the rest of the law is the law of things. The separation is a mere matter of convenience, but of convenience so great that the distinction is universal. Thus any given right may be exercised by persons belonging to innumerable classes. The person who has the right may be under twenty-one years of age, may have been born in a foreign state, may have been convicted of crime, may be a native of a particular county, or a member of a particular profession or trade, &c; and it might very well happen, with reference to any given right, that, while persons in general, under the circumstances of the case, would enjoy it in the same way, a person belonging to any one of these classes would not. If belonging to any one of those classes makes a difference not to one right merely but to many, the class may conveniently be abstracted, and the variations in rights and duties dependent thereon may be separately treated under the law of persons. The personality recognized in the law of persons is such as modifies indefinitely the legal relations into which the individual clothed with the personality may enter.

T. E. Holland disapproves of the prominence given by Austin to this distinction, instead of that between public and private law. This, according to Holland, is based on the public or private character of the persons with whom the right is connected, public persons being the state or its delegates. Austin, holding that the state cannot be said to have legal rights or duties, recog- nizes no such distinction. The term " public law " he confines strictly to that portion of the law which is concerned with political conditions, and which ought not to be opposed to the rest of the law, but " ought to be inserted in the law of persons as one of the limbs or members of that supplemental department."

Lastly, following Austin, the main division of the law of things is into (1) primary rights with primary relative duties, (2) sanc- tioning rights with sanctioning duties (relative or absolute). The former exist, as it has been

put, for their own sake, the latter for the sake of the former. Rights and duties arise from facts and events; and facts or events which are violations of rights and duties are delicts or injuries. Rights and duties which arise from delicts are remedial or sanctioning, their object being to prevent the violation of rights which do not arise from delicts.

There is much to be said for Frederic Harrison's view (first expressed in the Fortnightly Review, vol. xxxi.), that the re- arrangement of English law on the basis of a scientific classifi- cation, whether Austin's or any other, would not result in advantages at all compensating for its difficulties. If anything like a real code were to be attempted, the scientific classification would be the best; but in the absence of that, and indeed in the absence of any habit on the part of English lawyers of studying the system as a whole, the arrangement of facts does not very much matter. It is essential, however, to the abstract study of the principles of law. Scientific arrangement might also be observed with advantage in treatises affecting to give a view of the whole law, especially those which are meant for educational rather than professional uses. As an example of the practical application of a scientific system of classification to a complete body of law, we may point to W. A. Hunter's elaborate Exposition of Roman Law (1876).

It is impossible to present the conclusions of historical juris- prudence in anything like the same shape as those which we have been discussing. Under the heading Jurisprudence, Compara- tive, an account will be found of the method and results of what is practically a new science. The inquiry is in that stage which is indicated in one way by describing it as a philosophy. It resembles, and is indeed only part of, the study which is described as the philosophy of history. Its chief interest has been in the light which it has thrown upon rules of law and legal institutions which had been and are generally contemplated as positive facts

merely, without reference to their history, or have been associated historically with principles and institutions not really connected with them.

The historical treatment of law displaces some very remarkable misconceptions. Peculiarities and anomalies abound in every legal system ; and, as soon as laws become the special study of a professional class, some mode of explaining or reconciling them will be resorted to. One of the

prehistorical ways of philoso- phizing about law was to account for what wanted explanation by some theory about the origin of technical words. This implied some previous study of words and their history, and is an instance of the deep-seated and persistent tendency of the human mind to identify names with the things they represent. The Institutes of Justinian abound in explanations, founded on a supposed derivation of some leading term. Testamentum, we are told, ex eo appellator quod testatio mentis est. A testament was no doubt, in effect, a declaration of intention on the part of the testator when this was written. But the mentum is a mere termination, and has nothing to do with mens at all. The history of testaments, which, it may be noted incidentally, has been developed with conspicuous success, gives a totally different meaning to the institution from that which was expressed by this fanciful deriva tion. So the perplexing subject of possessio was supposed in some way to be explained by the derivation from pono and sedeo — quasi sedibus positio. Posthumi was supposed to be a com- pound of post and humus. These examples belong to the class of rationalizing derivations with which students of philosophy are familiar. Their characteristic is that they are suggested by some prominent feature of the thing as it then appeared to observers — which feature thereupon becomes identified with the essence of the thing at all times and places.

Another prehistorical mode of explaining law may be described as metaphysical. It conceives of a rule or principle of law as existing by virtue of some more general rule or principle in the nature of things. Thus, in the English law of inheritance, until the passing of the Inheritance Act 1833, an estate belonging to a deceased intestate would pass to his uncle or aunt, to the ex clusion of his father or other lineal ancestor. This anomaly from an early time excited the curiosity of lawyers, and the explanation accepted in the time of Bracton was that it was an example of the general law of nature: " Descendit itaque jus quasi ponderosum quid cadens deorsum recta linea vel trans- versal!, et nunquam reascendit ea via qua descendit." It has been suggested that the " rule really results from the associations involved in the word descent." It seems more likely, however, that these associations explained rather than that they suggested the rule — that the omission of the lineal ancestor existed in custom before it was discovered to be in harmony with the law of nature. It would imply more influence than the reasoning of lawyers is likely to have exercised over the development of law at that time to believe that a purely artificial inference of this kind should have established so very remarkable a rule. However that may be, the explanation is typical of a way of looking at law which was common enough before the dawn of the historical method. Minds capable of reasoning in this way were, if possible, farther removed from the conceptions implied in the reasoning of the analytical jurists than they were

from the historical method itself. In this connexion it may be noticed that the great work of Blackstone marks an era in the develop- ment of legal ideas in England. It was not merely the first, as it still remains the only, adequate attempt to expound the leading principles of the whole body of law, but it was distinctly inspired by a rationalizing method. Blackstone tried not merely to express but to illustrate legal rules, and he had a keen sense of the value of historical illustrations. He worked of course with the materials at his command. His manner and his work are obnoxious alike to the modern jurist and to the modern historian. He is accused by the one of perverting history, and by the other 6f confusing the law. But his scheme is a great advance on anything that had been attempted before; and, if his work has been prolific in popular fallacies, at all events it enriched English literature by a conspectus of the law, in which the logical

connexion of its principles inter se, and its relations to historical facts, were distinctly if erroneously recognized.

While the historical method has superseded the verbal and metaphysical explanation of legal principles, it had apparently, in some cases, come into conflict with the conclusions of the analytical school. The difference between the two systems comes out most conspicuously in relation to customs. There is an unavoidable break in the analytical method between societies in which rules are backed by regulated physical force and those in which no such force exists." At what point in its develop- ment a given society passes into the condition of " an independent political society " it may not be easy to determine, for the evidence is obscure and conflicting. To the historical jurist there is no such breach. The rule which in one stage of society is a law, in another merely a rule of " positive morality," is the same thing to him throughout. By the Irish Land Act 1881 the Ulster custom of tenant-right and other analogous customs were legalized. For the purposes of analytical jurisprudence there is no need to go beyond the act of parliament. The laws known as the Ulster custom are laws solely in virtue of the sovereign government. Between the law as it now is and the custom as it existed before the act there is all the difference in the world. To the historical jurist no such separation is possible. His account of the law would not only be imcomplete without embrac- ing the precedent custom, but the act which made the custom law is only one of the facts, and by no means the most significant or important, in the history of its development. An exactly parallel case is the legalization in England of that customary tenant-right known as copyhold. It is to the historical jurist exactly the same thing as the legalization of the Ulster tenant right. In the one case a practice was made law by formal legis- lation, and in the other without formal legislation. And there can be very little doubt that in an earlier stage of society, when formal legislation had not become the rule, the custom would have been legalized relatively much sooner than it

actually was. Customs then are the same thing as laws to the historical jurist, and his business is to trace the influences under which they have grown up, flourished and decayed, their dependence on the intellectual and moral conditions of society at different times, and their reaction upon them. The recognized science ■ — and such it may now be considered to be — with which historical, or more properly comparative, jurisprudence has most analogy is the science of language. Laws and customs are to the one what words are to the other, and each separate municipal system has its analogue in a language. Legal systems are related together like languages and dialects, and the investigation in both cases brings us back at last to the meagre and obscure records of savage custom and speech. A great master of the science of language (Max Muller) has indeed distinguished it from juris- prudence, as belonging to a totally different class of sciences. " It is perfectly true," he says, " that if language be the work of man in the same sense in which a statue, or a temple, or a poem, or a law are properly called the works of man, the science of language would have to be classed as an historical science. We should have a history of language as we have a history of art, of poetry and of jurisprudence; but we could not claim for it a place side by side with the various branches of natural history." Whatever be the proper position of either philology or juris- prudence in relation to the natural sciences, it would not be difficult to show that laws and customs on the whole are equally independent of the efforts of individual human wills — which appears to be what is meant by language not being the work of man. The most complete acceptance of Austin's theory that law everywhere and always is the command of the sovereign does not involve any withdrawal of laws from the domain of natural science, does not in the least interfere with the scientific study of their affinities and relationships. Max Muller elsewhere illustrates his conception of the different relations of words and laws to the individual will by the story of the emperor Tiberius, who was reproved for a grammatical mistake by Marcellus, whereupon Capito, another grammarian, observed that, if what the emperor said was not good Latin, it would soon be so.

" Capito," said Marcellus, " is a liar; for, Caesar, thou canst give the Roman citizenship to men, but not to words." The mere impulse of a single mind, even that of a Roman emperor, how- ever, probably counts for little more in law than it does in lan- guage. Even in language one powerful intellect or one influ- ential academy may, by its own decree, give a bent to modes of speech which they would not otherwise have taken. But whether law or language be conventional or natural is really an obsolete question,

and the difference between historical and natural sciences in the last result is one of names.

The application of the historical method to law has not resulted in anything like the discoveries which have made comparative philology a science. There is no Grimm's law for jurisprudence; but something has been done in that direction by the discovery of the analogous processes and principles which underlie legal systems having no external resemblance to each other. But the historical method has been applied with special success to a single system — the Roman law. The Roman law presents itself to the historical student in two different aspects. It is, regarded as the law of the Roman Republic and Empire, a system whose history can be traced throughout a great part of its duration with certainty, and in parts with great detail. It is, moreover, a body of rationalized legal principles which may be considered apart from the state system in which they were developed, and which have, in fact, entered into the jurisprudence of the whole of modern Europe on the strength of their own abstract authority — so much so that the continued existence of the civil law, after the fall of the Empire, is entitled to be considered one of the first discoveries of the historical method. Alike, therefore, in its original history, as the law of the Roman state, and as the source from which the fundamental principles of modern laws have been taken, the Roman law presented the most obvious and attractive subject of historical study. An immense impulse was given to the history of Roman law by the discovery of the Institutes of Gaius in 1816. A complete view of Roman law, as it existed three centuries and a half before Justinian, was then obtained, and as the later Institutes were, in point of form, a recension of those of Gaius, the comparison of the two stages in legal history was at once easy and fruitful. Moreover, Gaius dealt with antiquities of the law which had become obsolete in the time of Justinian, and were passed over by him without notice. Nowhere did Roman law in its modern aspect give a stronger impulse to the study of legal history than in Germany. The historical school of German jurists led the reaction of national sentiment against the proposals for a general code made by Thibaut. They were accused by their opponents of setting up the law of past times as intrinsically entitled to be observed, and they were no doubt strongly inspired by reverence for customs and traditions. Through the examination of their own custom- ary laws, and through the elimination and separate study of the Roman element therein, they were led to form general views of the history of legal principles. In the hands of Savigny, the greatest master of the school, the historical theory was developed into a universal philosophy of law, covering the ground which we should assign separately to jurisprudence, analytical and his- torical, and to theories of legislation. There is not in Savigny's system the faintest approach to the Austinian analysis. The range of it is not the analysis of law as a command, but that

of a Rechtsverhaltniss or legal relation. Far from regarding law as the creation of the will of individuals, he maintains it to be the natural outcome of the consciousness of the people, like their social habits or their language. And he assimilates changes in law to changes in language. " As in the life of individual men no moment of complete stillness is experienced, but a constant organic development, such also is the case in the life of nations, and in every individual element in which this collective life consists; so we find in language a constant formation and develop- ment, and in the same way in law." German jurisprudence is darkened by metaphysical thought, and weakened, as we believe, by defective analysis of positive law. But its conception of laws is exceedingly favourable to the growth of a historical philosophy, the results of which have a value of their own, apart

altogether from the character of the first principles. Such, for instance, is Savigny's famous examination of the law of possession.

There is only one other system of law which is worthy of being placed by the side of Roman law, and that is the law of England. No other European system can be compared with that which is the origin and substratum of them all; but England, as it happens, is isolated in jurisprudence. She has solved her legal problems for herself. Whatever element of Roman law may exist in the English system has come in, whether by conscious adaptation or otherwise, ab extra; it is not of the essence of the system, nor does it form a large portion of the system. And, while English law is thus historically independent of Roman law, it is in all respects worthy of being associated with it on its own merits. Its originality, or, if the phrase be preferred, its peculiarity, is not more remarkable than the intellectual qualities which have gone to its formation — the ingenuity, the rigid logic, the reason- ableness, of the generations of lawyers and judges who have built it up. This may seem extravagant praise for a legal system, the faults of which are and always have been matter of daily complaint, but it would be endorsed by all unprejudiced students. What men complain of is the practical hardship and inconve- nience of some rule or process of law. They know, for example, that the law of real property is exceedingly complicated, and that, among other things, it makes the conveyance of land ex- pensive. But the technical law of real property, which rests to this day on ideas that have been buried for centuries, has never- theless the qualities we have named. So too with the law of procedure as it existed under the " science " of special pleading. The greatest practical law reformer, and the severest critic of existing systems that has ever appeared in any age or country, Jeremy Bentham, has admitted this: " Confused, indetermi- nate, inadequate, ill-adapted, and inconsistent as to a vast extent the provision or no provision would be found to be that has been made by it for the various cases that have happened to present themselves

for decision, yet in the character of a repository of such cases it affords, for the manufactory of real law, a stock of materials which is beyond all price. Traverse the whole continent of Europe, ransack all the libraries belonging to all the jurisprudential systems of the several political states, add the contents together, you would not be able to compose a collection of cases equal in variety, in amplitude, in clearness of statement — in a word, all points taken together, in constructive- ness — to that which may be seen to be afforded by the collection of English reports of adjudged cases " (Bentham's Works, iv. 460) . On the other hand, the fortunes of English jurisprudence are not unworthy of comparison even with the catholic position of Roman law. In the United States of America, in India, and in the vast Colonial Empire, the common law of England constitutes most of the legal system in actual use, or is gradually being super- imposed upon it. It would hardly be too much to say that English law of indigenous growth, and Roman law, between them govern the legal relations of the whole civilized world. Nor has the influence of the former on the intellectual habits and the ideas of men been much if at all inferior. Those who set any store by the analytical jurisprudence of the school of Austin will be glad to acknowledge that it is pure outcome of English law. Sir Henry Maine associated its rise with the activity of modern legislatures, which is of course a characteristic of the societies in which English laws prevail. And it would not be difficult to show that the germs of Austin's principles are to be found in legal writers who never dreamed of analysing a law. It is certainly remarkable, at all events, that the accep- tance of Austin's system is as yet confined strictly to the domain of English law. Maine found no trace of its being even known to the jurists of the Continent, and it would appear that it has been equally without influence in Scotland, which, like the con- tinent of Europe, is essentially Roman in the fundamental elements of its jurisprudence.

The substance of the above article is repeated from Professor E. Robertson's (Lord Lochee's) article " Law," in the 9th ed. of this work.

5 8o

JURISPRUDENCE, COMPARATIVE

Among numerous English textbooks, those specially worth men- tion are: T. E. Holland, The Elements of Jurisprudence (1880; 10th ed., 1906) ; J. Austin, Lectures on Jurisprudence (4th ed., 1873) ; VV. Jethro Brown, The Austinian Theory of Law (1906) ; Sir F. Pollock, A First Book on Jurisprudence (1896; 2nd ed., 1904).

JURISPRUDENCE, COMPARATIVE. The object of this article is to give a general survey of the study of the evolution of law. It is not concerned with analytical jurisprudence as a theory of legal thought, or an encyclopaedic introduction to legal teaching. Jurisprudence in such a philosophic or pedagogical sense has certainly to reckon with the methods and results of a comparative study of law, but its aims are distinct from those of the latter: it deals with more general problems. On the other hand, the comparative study of law may itself be treated in two different ways: it may be directed to a comparison of existing systems of legislation and law, with a view to tracing analogies and contrasts in the treatment of practical problems and taking note of expedients and of possible solutions. Or else it may aim at discovering the principles regulating the develop- ment of legal systems, with a view to explain the origin of insti- tutions and to study the conditions of their life. In the first sense, comparative jurisprudence resolves itself into a study of home and foreign law (cf. Hofmann in the Zeitschrift fur das private und ojfenlliche Recht der Gegenwart, 1878). In the second sense, comparative jurisprudence is one of the aspects of so-called sociology, being the study of social evolution in the special domain of law. From this point of view it is, in substance, immaterial whether the legal phenomena subjected to investi- gation are ancient or modern, are drawn from civilized or from primitive communities. The fact that they are being observed and explained as features of social evolution characterizes the inquiry and forms the distinctive attribute separating these studies from kindred subjects. It is only natural, however, that early periods and primitive conditions have attracted investigators in this field more than recent developments. The interest of students seems to have stood in inverse ratio to- the chronological vicinity of the facts under consideration — the farther from the observer, the more suggestive and worthy of attention the facts were found to be. This peculiarity is easily explained if we take into account the tendency of all evolution- ary investigations to obtain a view of origins in order to follow up the threads of development from their initial starting-point. Besides, it has been urged over and over again that the simpler phenomena of ancient and primitive society afford more convenient material for generalizations as to legal evolution than the extremely complex legal institutions of civilized nations. But there is no determined line of division between ancient and modern comparative jurisprudence in so far as both are aiming at the study of legal development. The law of Islam or, for that matter, the German civil code, may be taken up as a subject of study quite as much as the code of Hammurabi or the marriage customs of Australian tribes.

The fact that the comparative study of legal evolution is chiefly represented by investigations of early institutions is therefore a characteristic, but not a necessary feature in the treatment of the subject. But it is essential to this

treatment that it should be historical and comparative. Historical, because it is only as history, i.e. a sequence of stages and events, that development can be thought of. Comparative, because it is not the casual notices about one or the other chain of historical facts that can supply the basis for any scientific induction. Comparisons of kindred processes have to be made in order to arrive at any conception of their general meaning and scientific regularity. As linguistic science differs from philology in so far as it treats of the general evolution of language and not of particular languages, even so comparative jurisprudence differs from the history of law as a study of general legal evolution distinct from the development of one or the other national branch of legal enactment. Needless to say that there are intermediate shades between these groups, but it is not to these shades we have to attend, but to the main distinctions and divisions.

1. The idea that the legal enactments and customs of different

countries should be compared for the purpose of deducing general principles from them is as old as political science itself. It was realized with especial vividness in epochs when a con- siderable material of observations was gathered from different sources and in various forms. The wealth of varieties and the recurrence of certain leading views in them led to comparison and to generalizations based on comparison. Aristotle, who lived at the close of a period marked by the growth of free Greek cities, summarized, as it were, their political experience in his Constitutions and Politics; students of these know that the Greek philosopher had to deal with not only public law and political institutions, but also to some extent private, criminal law, equity, the relations between law and morals, &c.

Another great attempt at comparative observation was made at the close of the pre-revolutionary period of modern Europe. Montesquieu took stock of the analogies and contrasts of law in the commonwealths of his time and tried to show to what extent particular enactments and rules were dependent on certain general currents in the life of societies — on forms of government, on moral conditions corresponding to these, and ultimately on the geographical facts with which various nationalities and states have to reckon in their development.

These were, however, only slight beginnings, general forecasts of a coming line of thought, and Montesquieu's remarks on laws and legal customs read now almost as if they were meant to serve as materials for social Utopias, although they were by no means conceived in this sense. At this distance of time we cannot help perceiving how fragmentary, incomplete and uncritical his notions of the facts of legal history were, and how strongly his thought was biased by didactic considerations, by the wish to teach his contemporaries what politics and law should be.

It was reserved for the 19th century to come forward with connected and far-reaching investigations in this field as in many others. We are not deceived by proximity and self- consciousness when we affirm that comparative jurisprudence, as understood in these introductory remarks, dates from the 19th century and especially from its second half.

There were many reasons for such a new departure: two of these reasons have been especially manifest and decisive. The 19th century was an eminently historical and an eminently scientific age. In the domain of history it may be said that it opened an entirely new vista. While, speaking roughly, before that time history was conceived as a narrative of memorable events, more or less skilful, more or less sensational, but appealing primarily to the literary sense of the reader, it became in the course of the 19th century an encyclopaedia of reasoned know- ledge, a means of understanding social life by observing its phenomena in the past. The immense growth of historical scholarship in that sense, and the transformation of its aims, can hardly be denied.

Apart from the personal efforts of eminent writers, a great and general movement has to be taken into account in order to explain this remarkable stage of human thought. The historic bent of mind of 19th-century thinkers was to a great extent the result of heightened political and cultural self-consciousness. It was the reflection in the world of letters of the tremendous upheaval in the states of Europe and America which took place from the close of the 18th century onwards. As one of the greatest leaders of the movement, Niebuhr, pointed out, the fact of being a witness of such struggles and catastrophes as the American Revolution, the French Revolution, the Napoleonic Empire and the national reaction against it, taught every one to think historically, to appreciate the impor- tance of historical factors, to measure the force not only of logical argument and moral impulse, but also of instinctive habits and traditional customs. It is not a matter of chance that the historical school of jurisprudence, Savigny's doctrine of the organic growth of law, was formed and matured while Europe collected its forces after the most violent revolutionary crisis it had ever experienced, and in most intimate con- nexion with the romantic movement, a movement animated by

enthusiastic belief in the historical, traditional life of social groups as opposed to the intellectual conceptions of indi- vidualistic radicalism.

On the other hand, the 19th century was a scientific age and especially an

age of biological science. Former periods — the 1 6th and 17th centuries especially — had bequeathed to it high standards of scientific investigation, an ever-increasing weight of authority in the direction of an exact study of natural phe- nomena and a conception of the world as ruled by laws and not by capricious interference. But these scientific views had been chiefly applied in the domain of mathematics, astronomy and physics; although great discoveries had already been made in physiology and other branches of biology, yet the achievements of 19th-century students in this respect far surpassed those of the preceding period. And the doctrine of transformation which came to occupy the central place in scientific thought was eminently fitted to co-ordinate and suggest investigations of social facts. As F. York Powell put it, Darwin is the greatest historian of modern times, and certainly an historian not in the sense of a reader of annals, but in that of a guide in the under- standing of organic evolution. Though much is expressed in the one name of Darwin, it is perhaps even more momentous as a symbol of the tendency of a great age than as a mark of personal work. To this tendency we are indebted for the rise of anthro- pology and of sociology, of the scientific study of man and of the scientific study of society. Of course it ought not to be disre- garded that the application of scientific principles and methods to human and social facts was made possible by the growth of knowledge in regard to savage and half-civilized nations called forth by the increased activity of European and American business men, administrators and explorers. Ethnography and ethnology have brought some order into'the wealth of materials accumulated by generations of workers in this direction, and it is with their help that the far-reaching generalizations of modern inquirers as to man and society have been achieved.

2. It is not difficult to see that the comparative study of legal evolution finds its definite place in a scientific scheme elaborated from such points of view. Let us see how, as a matter of fact, the study in question arose and what its progress has been. The immediate incitement for the formation of com- parative jurisprudence was given by the great discoveries of comparative philology. When the labours of Franz Bopp, August Schleicher, Max Muller, W. D. Whitney and others revealed the profound connexion between the different branches of the Indo-European race in regard to their languages, and showed that the development of these languages proceeded on lines which might be studied in a strictly scientific manner, on the basis of comparative observation and with the object of tracing the uniformities of the process, it was natural that students of religion, of folk-lore and of legal institutions took up the same method and tried to win similar results (Sir H. Maine, Rede lecture in Village Communities, 3rd ed.).

It is interesting to note that one of the leading scholars of the Germanistic revival in the beginning of the 19th century, Jacob Grimm, a compeer of

Savigny in his own line, took up with fervent zeal and remarkable results not only the scientific study of the German language, but also that of Germanic mythology and popular law. His Rechtsalterthumer are still unrivalled as a collection of data as to the legal lore of Teutonic tribes. Their basis is undoubtedly a narrow one: they treat of the varieties of legal custom among the continental Germans, the Scandinavians and the Germanic tribes of Great Britain, but the method of treatment is already a comparative one. Grimm takes up the different subjects — property, contract, procedure, succession, crime, &c— and examines them in the light of national, provin- cial and local customs, sometimes noticing expressly affinities with Roman and Greek law (e.g. the subject of imprisonment for debt, Rechtsalterthumer, 4th ed., vol. ii., p. 165).

A broader basis was taken up by a linguist who tried to trace the primitive institutions and customs of the early Aryans before their separation into divers branches. Adolphe Pictet (Les Origines indo-europiennes, i. 1859; ii. 1863) had to touch con-

stantly on questions of family law, marriage, property, public authority, in his attempt to reconstruct the common civilization of the Aryan race, and he did so on the strength of a comparative study of terms used in the different Indo-European languages. He showed, for instance, how the idea of protection was the predominant element in the position of the father in the Aryan household. The names pitar, ‘ pater, Trarr/p, father, which recur in most branches of the Aryan race, go back to a root pa-, pointing to guardianship or protection. Thus we are led to consider the patria pctestas, so stringently formulated in Roman law, as an expression of a common Aryan notion, which was already in existence before the Aryan tribes parted company and went their different ways. Descriptions of Aryan early culture have been given several times since in connexion with linguistic observations. An example is W. E. Hearn’s Aryan Household (1879). Fustel de Coulanges’ famous volume on the ancient city and Rudolf von Jhering’s studies of primitive Indo-European institutions {Vorgeschichte der Indoeuropaer) start from similar observations, although the first of these scholars is chiefly interested in tracing the influence of religion on the material arrangements of life, while the latter draws largely on principles of public and private law, studied more especially in Roman antiquity.

3. The chief work in that direction has been achieved in one sense by a German scholar, B. W. Leist. His Graeco-Roman legal history, his Jus Gentium of Primitive Aryans, and his Jus Civile of Primitive Aryans, form the most complete and learned attempt not only to reconstitute the fundamental rules of common Aryan law before the separation of tongues and nations, but also to trace the influence of this original stock of juridical ideas in the later development of different branches of the Aryan race.

These three books present three stages of comparison 1 , marked by a successive widening of the horizon. He began his legal history by putting together the data as to Roman and Greek legal origins; in the Alt-arisches Jus Gentium the material of Hindu law is not only drawn into the range of observation, but becomes its very centre; in the Alt-arisches Jus Civile the legal customs of the Zend branch, of Celts, Germans and Slavs, are taken into account, although the most important part of the inquiry is still directed to the combination of Hindu, Greek and Roman law. In this way Leist builds up his theories by the comparative method, but he restricts its use consciously and con- sistently to a definite range. He does not want to plunge into haphazard analogies, but seeks common ground before all things in order to be able to watch for the appearance of ramifications and to explain them. According to his view comparison is of use only between " coherent " lines of facts. Common origin, not similarity of features, appears to him as the fundamental basis for fruitful comparison. It may be said that Leist's work is characterized by the attempt to draw up a continuous history of a supposed archaic common law of the Aryan race rather than to put different solutions of kindred legal problems by the side of each other. For him Aryan tribal organization with its double-sided relationship — cognatic and agnatic — through men and through women — is one, and although he does not draw its picture as Fustel de Coulanges does by the help of traits taken in- discriminately from Hindu, Roman and Greek material, although he notices divisions, degrees and variations, at bottom he writes the history of one set of principles exemplified and modulated, as it were, in the six or seven main varieties of the race. Even so the nine rules of conduct prescribed by Hindu sacral law are, according to his view, the directing rules of Roman, Greek, Germanic, Celtic, Slavonic legal custom — the duties in regard to gods, parents and fatherland, guests, personal purity, the pro- hibitions against homicide, adultery and theft— are variations of one and the same religious, moral and legal system, and their original unity is reflected and proved by the unity of legal terminology itself.

The same leading idea is embodied in the books of Otto Schrader — Urgeschichte und Sprachvergleickung (1st ed., 1883; 2nd ed., 1890) and Reallexikon der indogermanischen Alter- tumskunde (1901). In this case we have to do not with a jurist

but with a linguist and a student of cultural history. His training made him especially fit to trace the national affinities in the data of language, and the sense of the intimate connexion between the growth of institutions on one

side, of words and linguistic forms on the other, underlies all his investigations. But Schrader testifies also to another powerful influence — to that of Victor Hehn, the author of a remarkable book on early civilization, KulturpflanzenundHausthiere in ihrem Ubergang ausAsien in Europa (ist ed., 1870; 7th ed., 1902), dealing with the migra- tions of tribes and their modes of acquiring material civilization. Although the linguistic and archaeological sides naturally pre- dominate in Schrader's works, he has constantly to consider legal subjects, and he strives conscientiously to obtain a clear and common-sense view of the early legal notions of the Aryans. Speaking of the " ordeals," the " waging of God's law," for example, he traces the customs of purification by fire, water, iron, &c, to the practice of oaths (Sans, am; Gr. 6/jw/ii; O. Ital. otnr = first group; O. Ger. aips, It. deth = second group; O. Norse rota, Arm. erdnum = I swear = third group). The central idea of the ordeal is thus shown to be the imprecation — " Let him be cursed whose assertion is false."

The comparative study of the Aryan group assumed another aspect in the works of Sir Henry Maine. He did not rely on linguistic affinities, but made great use of another element of investigation which plays hardly any part in the books of the writers mentioned hitherto. His best personal preparation for the task was that he had not only taught law in England, but had come into contact with living legal customs in India. For him the comparison between the legal lore of Rome and that of India did not depend on linguistic roots or on the philological study of the laws of Manu, but was the result of recognizing again and again, in actual modern custom, the views, rules and institutions of which he had read in Gaius or in the fragments of the Twelve Tables. The sense of historical analogy and evolu- tion which had shown itself already in the lectures oh Ancient Law, which, after all, were mainly a presentment of Roman legal history mapped out by a man of the world, averse from pedantic disquisitions. But what appears as the expression of Maine's personal aptitude and intelligent reading in Ancient Law gets to be the interpretation of popular legal principles by modern as well as by ancient instances of their application in Village Com- munities, The Early History of Institutions, Early Law and.Custom. The evolution of property in land out of archaic collectivism, ancient forms of contract and compulsion, rudimentary forms of feudalism and the like, were treated in a new light in conse- quence of systematic comparisons with the conditions not only of India but of southern Slavonic nations, medieval celts and Teutons. This breadth of view seemed startling when the lectures appeared, and the original treatment of the subject was hailed on all sides as a most welcome new departure in the study of legal customs and institutions. And yet Maine set very definite boundaries to his comparative surveys. He re- nounced the chronological limitation confining

such inquiries to the domain of antiquaries, but he upheld the ethnographical limitation confining them to laws of the same race. In his case it was the Aryan race, and in his Law and Custom he opposed in a determined manner the attempts of more daring students to extend to the Aryans generalizations drawn from the life of savage tribes unconnected with the Aryans by blood.

Thus, notwithstanding all diversities in the treatment of particular problems, one leading methodical principle runs through the works of all the above-mentioned exponents of comparative study. It was to proceed on the basis of common origin and on the assumption of a certain common stock of language, religion, material culture, and law to start with. What Pictet, Leist, Schrader, and Maine were doing for the Aryans, F. Hommel, Robertson Smith and others did in a lesser degree for the Semitic race.

4. The literary group which started from the discoveries of comparative philology and history was met on the way by what may be called the ethnological school of inquirers. The original impetus was given, in this case, by jurists and historians who

took up the study in the field of ancient history, but treated it from the beginning in such a way as to break up the subdivisions of historic races and to direct the inquiry to a state of culture best illustrated by savage customs. The first impulse may be said to have come from J. J. Bachofen (Mutterrecht, 1861; Anti- quarische Brief e, 1880; Die Sage von Tanaquil). All the repre- sentatives of Aryan antiquities are at one in laying stress on the patriarchal and agnatic system of the kindreds in the different Aryan nations; even Leist, although dwelling on the importance of cognatic ties, looks to agnatic relationship for the explana- tion of military organization and political authority. And un- doubtedly, if we argue from the predominant facts and from the linguistic evidence of parallel terms, we are led to assume that already before their separation the Aryans lived in a patriarchal state of society. Now, Bachofen discovered in the very tradition of classical antiquity traces of a fundamentally different state of things, the central conception of which was not patriarchal power, but maternity, relationship being traced through mothers, the wife presenting the constant and directing element of the household, while the husband (and perhaps several husbands) joined her from time to time in more or less inconstant unions. Such a state of society is definitely described by Herodotus in the case of the Lycians, it is clearly noticeable even in later his- torical times in Sparta; the passage from this matriarchal conception to the recognition of the claims of the father is reflected in poetical fiction in the famous Orestes myth, based on the struggle between the moral incitement which prompted the son to avenge his father and the absolute reverence for the mother required by ancient law. Although chiefly drawing his materials from

classical literature, Bachofen included in his Antiquarian Letters an interesting study of the marriage custom and systems of relationship of the Malabar Coast in India; they attracted his attention by the contrasts between different layers of legal tradition — the Brahmans living in patriarchal order, while the class next to them, the Nayirs (Nairs), follow rules of matriarchy.

Similar ideas were put forward in a more comprehensive form by J. F. McLennan. His early volume (Studies in Ancient History, 1876) contains several essays published some time before that date. He starts from the wide occurrence of marriage by capture in primitive societies, and groups the tribes of which we have definite knowledge into endogamous and exogamous societies according as they take their wives from among the kindred or outside it. Marriage by capture and by purchase are signs of exogamy, connected with the custom in many tribes of killing female offspring. The development of marriage by capture and purchase is a powerful agent in bringing about patriarchal rule, agnatic relationship, and the formation of clans or gentes, but the more primitive forms of relationship appear as variations of systems based on mother-right. These views are supported by ethnological observations and used as a clue to the history of relationship and family law in ancient Greece. In further contributions published after McLennan's death these researches are supplemented 'and developed in many ways. The peculiarities of exogamous societies, for instance, are traced back to the even more primitive practice of Totemism, the grouping of men according to their conceptions of animal worship and to their symbols. McLennan's line of inquiry was taken up in a very effective manner not only by anthropologists like E. B. Tylor or A. Lang, but also in a more special manner by students of primitive family law. One of. the most brilliant monographs in this direction is Robertson Smith's study of Kinship and Marriage in Arabia.

But perhaps the most decisive influence was exercised on the development of the ethnological study of law by the dis- coveries of an American, Lewis H. Morgan. In his epoch- making works on. Systems of Consanguinity (1869) and on Ancient Society {1877) he drew attention to the remarkable fact that in the case of a number of tribes — the Red Indians of America, the Australian black tribes, some of the polar races, and several Asiatic tribes, mostly of Turanian race — degrees of relationship are reckoned and distinguished by names, not as ties between

individuals, but as ties between entire groups, classes or genera- tions. Instead of a mother and a father a man speaks of fathers and mothers; all the individuals of a certain group are deemed husbands or wives of corresponding individuals of another group; sisters and brothers have to be sought in entire generations, and not among the descendants of a definite and common parent, and so forth. There are variations and types in these forms of organization, and intermediate links may be traced between unions of consanguine people — brothers and sisters of the same blood— - on the one hand, and the monogamic marriage prevailing nowadays, on the other; but the central and most striking fact seems to be that in early civilizations, in conditions which we should attribute to savage and barbarian life, marriage appears as a tie, not between single pairs, but between classes, all the men of a class being regarded as potential or actual husbands of the women of a corresponding class. Facts of this kind produce very peculiar and elaborate systems of relationship, which have been copiously illustrated by Morgan in his tables. In his Ancient Society he attempted to reduce all the known forms and facts of marriage and kinship arrangements to a comprehensive view of evolution leading up to the Aryan, Semitic and Uralian family, as exhibiting the most modern type of relationship.

These observations, in conjunction with Bachofen's and McLennan's teaching on mother-right, brought about a complete change of perspective in the comparative study of man and society. The rights of ethnologists to have their say in regard to legal, political and social development was forcibly illustrated from both ends, as it were. On the one hand, classical antiquity itself proved to be a rather thin layer of human civilization hardly sufficient to conceal the long periods of barbarism and primitive evolution which had gone to its making. On the other hand, unexpected combinations in regard to family, property, social order, were discovered in every corner of the inhabited world, and our trite notions as to the character of laws and institutions were reduced to the rank of variations on themes which recur over and over again, but may be and have been treated in very different ways.

There is no need to speak of the use made of ethnological material in the wider range of anthropological and sociological studies — the works of Tylor, Lubbock, Lippert, Spencer are in everybody's hands — but attention must be called to the further influence of the ethnological point of view in comparative jurisprudence. An interesting example of the passage from one line of investigation to another, from the historical to the anthro- pological line, if the expression may be used for the sake of brevity, is presented in the works of one of the founders of the Zeitschrift fiir vgl. Rechtswissenschaft — Franz Bernhoft. He appears in his earlier books as an exponent of the comparative study of Greek and Roman antiquities,

more or less in the style of Leist. Like the latter he was gradually incited to draw India into the range of his observations, but unlike Leist, he ended by fully recognizing the importance of ethnological evidence, and although he did not do much original research in that direction himself, the influence of Bachofen and of the ethnologists made itself felt in Bernhoft's treatment of classical antiquity itself: in his State and Law in Rome at the Time of the Kings he starts from the view that patricians and plebeians represent two ethnological layers of society — a patriarchal Aryan and a matriarchal pre-Aryan one.

But, of course, the utmost use was made of ethnological evidence by writers who cut themselves entirely free from the special study of classical or European antiquities. The enthu- siasm of the explorers of new territory led them naturally to disregard the peculiar claims of European development in the history of higher civilization. They wanted material for a study of the genus homo in all its varieties, and they had no time to look after the minute questions of philological and antiquarian research which had so long constituted the daily bread of inquirers into the history of laws. The most characteristic representative of the new methods of extensive comparison was undoubtedly A. H. Post (1839-1895) — the author of many works,

in which he ranges over the whole domain of mankind — Hovas, Zulus, Maoris, Tunguses, alternating in a kaleidoscopic fashion with Hindus, Teutons, Jews, Egyptians. The order of his com- positions is systematic, not chronological or even ethnographical in the sense of grouping kindred races together. He takes up the different subdivisions of law and traces them through all the various tribes which present any data in regard to them. His method is not only not bound by history, it is opposed to it. He writes: —

" The method of comparative ethnology is different from the historical method, inasmuch as it collects the given material from an entirely distinct point of view. Historical investigation tries to get at the causes of the facts of rational life by observing the develop- ment of these facts from such as preceded them within the range of separate kindreds, tribes and peoples. The investigation of com- parative ethnology inquires after the causes of facts in national life by collecting identical or similar ethnological data wherever they may be found in the world, and by drawing inferences from these materials to identical or similar causes. This method is therefore quite unhistorical. It severs things that have been hitherto regarded as closely joined and arranges these shreds into new combinations " (Grundriss, i. 14).

This is not a mere paradox, but the necessary outcome of the situation in respect of the material used. What is being sought is not common origin or

a common stock of ideas, but recourse to similar expedients in similar situations, and it is one of the most striking results of ethnology that it can show how peoples entirely cut- off from each other and even placed in very different planes of development can resort to analogous solutions in analogous emergencies. Is not the custom of the so-called Couvade — the pretended confinement of the husband when a child is born to his wife — a most quaint and seemingly recondite ceremony? Yet we find it practised in the same way by Basques, Californian Indians, and some Siberian tribes. They have surely not borrowed from each other, nor have they kept the ceremony as a remnant of the time when they formed one race: in each case, evidently the passage from a matriarchal state to a patri- archal has suggested it, and a very appropriate method it seems to establish the fact of fatherhood in a solemn and graphic though artificial manner. Again, an inscription from the Cretan town of Gortyn, published in the American Journal of Archaeology (2nd series, vol. i., 1897) by Halbherr, tells us that the weapons of a warrior, the wool of a woman, the plough of a peasant, could not be taken from them as pledges. We find a similar idea in the prohibition to take from a knight his weapons, from a villein his plough, in payment of fines, which obtained in medieval England and was actually inserted in Magna Carta. Here also the similarity extends to details, and is certainly not derived from direct borrowing or common origin but from analogies of situations translating themselves into analogies of legal thought. It may be said in a sense that for the ethnological school the less relationship there is between the compared groups the more instructive the comparison turns out to be.

The collection of ethnological parallels for the use of sociology and comparative jurisprudence has proceeded in a most fruitful manner. By the side of special monographs about single tribes or geographical groups of tribes, such as Kamilaroi and Kurnai, by L. Fison & A. W. Howitt (1880), and The Native Tribes of Australia, by Baldwin Spencer & F. G. Gillen (1899), the whole range of ethnological jurisprudence was gone through by Wilken in regard to the inhabitants of the Dutch possessions in Asia, by M. M. Kovalevsky in regard to Caucasians, &c. As a rule the special monographs turned out to be more successful than the general surveys, but the interest of the special monographs themselves depended partly on the fact that people's eyes had been opened to the recurrence of certain widespread phenomena and types of development.

5. Ethnologists of Post's school have not had it entirely their own way, however. Not only did their natural opponents, the philologists, historians and jurists, reproach them with lack of critical discrimination, with a tendency to disregard funda- mental distinctions, to wipe out characteristic features, to throw the most disparate elements into the same pot. In their own ranks a number of conscientious and scientifically trained

investigators protested against the haphazard manner in which the most intricate problems were treated, and sought to evolve more definite methodical rules. P. and F. Sarrasin in their description of the Ceylon Veddahs showed a most primitive race scattered in small clusters, monogamous and patriarchal in their marriage customs and systems of relationship. E. A. Westermarck challenged the sweeping generalizations indulged in by many ethnologists about primitive promiscuity in sexual relations and the necessary passage of all human tribes through the stages of matriarchy and group marriage.

A very interesting departure was attempted by Dargun in his studies on the origin and development of property and his treatise on mother-right and marriage by capture. His lead was followed by R. Hildebrand in the monograph on law and custom. The principal idea of these inquirers may be stated as follows. We must utilize ethnological as well as historical materials from the whole world, but it is no use doing this indiscriminately. Fruit- ful comparisons may be instituted mainly in the case of tribes on the same level in their general culture and especially their economic pursuits. Hunting tribes must be primarily compared with other hunters, fishers with fishers, pastoral nations with pastoral nations, agriculturists with agriculturists; nations in transitional stages from one type of culture to the other have to be grouped and examined by themselves. The result would be to establish certain parallel lines in the development of institu- tions and customs. From this point of view both Dargun and Hildebrand attacked the prevailing theory of primitive commun- ism and insisted on the atomistic individualism of the rudimen- tary civilization of hunting tribes. Collectivism in the treatment of ownership, common field husbandry, practices of joint holdings, eo-aration, common stores, &c, make their appearance according to Dargun in consequence of the drawing together of scattered groups and smaller independent settlements. An evolution of the same kind leading from loose unions around mothers through marriage by capture to patriarchal kindreds was traced in the history of relationship. Grosse (Die Formen der Familie und der Wirtschaft, 1896) followed in a similar strain. Another line of criticism was opened up from the side of exact sociological study. Its best exponent is Steinmetz, who represents with Wilken the Dutch group of investigators of social pheno- mena. He takes up a standpoint which severs him entirely from the linguistic and historic school. In a discourse on the Meaning of Sociology (p. 10) he expresses himself in the following words: " One who judges of the social state of the Hindus by the book of Manu takes the ideal notions of one portion of the people for the actual conditions of all its parts." In regard to jurisprudence

he distinguishes carefully between art and science. " Juris- prudence in the wider sense is an art, the art of framing rules for social intercourse in so far as these rules can be put into exe- cution by the state and its organs, as well as the art of inter- preting and applying these rules. In another sense it is pure science, the investigation of all consciously formulated and actually practised rules, and of their conditions and founda- tions, in fact of the entire social life of existing and bygone nations, without a knowledge and understanding of which a knowledge and understanding of law as its outcome is, of course, impossible." In this sense jurisprudence is a part of ethnology and of the comparative history of culture. But in order to grapple with such a tremendous task comparative jurisprudence has not only to call to help the study of scattered ethnological facts. This is not sufficient to widen the frame of observation and to realize the relative character of the principles with which practical lawyers operate, without ever putting in question their general acceptance or logical derivations. Ethnological studies themselves have to look for guidance to psychology, especially to the psychology of emotional life and of character. Although these branches of psychological science have been much less investigated than the study of intellectual processes, they still afford material help to the ethnologist and the comparative jurist; and Steinmetz himself made a remarkable attempt to utilize a psychological analysis of the feelings of revenge in his Origins of Punishment.

6. The necessity of employing more stringent standards of criticisms and more exact methods is now recognized, and it is characteristic that the foremost contemporary representative of comparative jurisprudence, Joseph Kohler of Berlin, principal editor of the Zeitschrift fur vgl. Rechtswissenschaft, often gives expression to this view. Beginning with studies of procedure and private law in the provinces of Germany where the French law of the Code Napoleon was still applied, he has thrown his whole energy into monographic surveys and investi- gations in all the departments of historical and ethnological jurisprudence. The code of Khammurabi and the Babylonian contracts, the ancient Hindu codes and juridical commentaries on them, the legal customs of the different tribes and provinces of India, the collection and sifting of the legal customs of abori- gines in the German colonies in Africa, the materials supplied by investigators of Australian and American tribes, the history of legal customs of the Mahommedans, and numberless other points of ethnological research, have been treated by him in articles in his Zeitschrift and in other publications. Comprehen- sive attempts have also been made by him at a synthetic treat- ment of certain sides of the law — like the law of debt in his Shake- speare vor dem Forum der Jurisprudenz (1883) or his Primitive History of Marriage. Undoubtedly we have not to deal in this case with mere accumulation of material or with remarks on casual analogies. And

yet the importance of these works consists mainly in their extensive range of observation. The critical side is still on the second plane, although not conspicuously absent as in the case of Post and some of his followers. We may sympathize cordially with Kohler's exhortation to work for a universal history of law without yet perceiving clearly what the stages of this universal history are going to be. We may acknow- ledge the enormous importance of Morgan's and Bachofen's discoveries without feeling bound to recognize that all tribes and nations of the earth have gone substantially through the same forms of development in respect of marriage custom, and without admitting that the evidence for a universal spread of group-marriage has been produced. Altogether the reproach seems not entirely unfounded that investigations of this kind are carried on too much under the sway of a preconceived notion that some highly peculiar arrangement entirely different from what we are practising nowadays — say sexual promiscuity or communism in the treatment of property — must be made out as a universal clue to earlier stages of development. Kohler's occasional remarks on matters of method (e.g. Zeitschift fiir vgl. Rechtswissenschaft, xii. 193 seq.) seem hardly adequate to dispel this impression. But in his own work and in that of some of his compeers and followers, J. E. Hitzig, Hellwig, Max Huber, R. Dareste, more exact forms and means of inquiry are gradually put into practice, and the results testify to a distinct heightening of the scientific standard in this group of studies on comparative jurisprudence. Especially conspicuous in this respect are three tendencies: (a) the growing disinclination to accept super- ficial analysis between phenomena belonging to widely different spheres of culture as necessarily produced by identical causes (e.g. Darinsky's review of Kovalevsky's assumptions as to group marriage among the Caucasian tribes, Z. fiir vgl. Rw., xiv. 151 seq.); (b) the selection of definite historical or ethnological terri- tories for monographic inquiries, in the course of which arrange- ments observed elsewhere are treated as suggestive material for supplying gaps and starting possible explanations: Kohler's own contributions have been mainly of this kind; (c) the treat- ment of selected subjects by an intensive legal analysis, bringing out the principles underlying one or the other rule, its possible differentiation, the means of its application in practice, &c. : Hellwig's monograph on the right of sanctuary in savage com- munities (Das Asylrechl der Naturvolker) may be named in illus- tration of this analytical tendency. Altogether, there can be no doubt that the stage has been reached by comparative juris- prudence when, after a hasty, one might almost say a voracious consumption of materials, investigators begin to strive towards careful sifting of evidence and a conscious examination of methods and critical rules which have to be followed in order

to make the investigations undertaken in this line worthy of their scientific aims. Until the latter has been done many students, whose trend of thought would seem to lead them naturally into this domain, may be repelled by the uncritical indistinctness with which mere analogies are treated as elusive proofs by some of the representatives of the comparative school. F. W. Mait- land, for instance, was always kept back by such considerations. 7. It is desirable, in conclusion, to review the entire domain of comparative jurisprudence, and to formulate the chief prin- ciples of method which have to be taken into consideration in the course of this study. It is evident, to begin with, that a scientific comparison of facts must be directed towards two aims — towards establishing and explaining similarity, and towards enumerating and explaining differences. As a matter of fact the same material may be studied from both points of view, though logically these are two distinct processes.

*(a) Now at this initial stage we have already to meet a diffi- culty and to guard against a misconception: we have namely to reckon with the plurality of causes, and are therefore debarred from assuming that wherever similar phenomena are forth- coming they are always produced by identical causes. Death may be produced by various agents — by sickness, by poison, by a blow. The habit of wearing mourning upon the death of a relation is a widespread habit, and yet it is not always to be ascribed to real or supposed grief and the wish to express it in one's outward get-up. Savage people are known to go into mourning in order to conceal themselves from the terrible spirit of the dead which would recognize them in their everyday cos- tume (Jhering, Der Zweckim Recht, 2nded., 1884-1886). This is certainly a momentous difficulty at the start, but it can be greatly reduced and guarded against in actual investigation. In the example taken we are led to suppose different origin because we are informed as to the motives of the external ceremony, and thus we are taught to look not only to bare facts, but to the psychological environment in which they appear.. And it is evident that the greater the complexity of observed phenomena, the more they are made up of different elements welded into one sum, the less probability there is that we have to do with conse- quences derived from different causes. The recurrence of group-marriage in Australia and among the Red Indians of North America can in no way be explained by the working of entirely different agencies. And it may be added that in most cases of an analysis of social institutions the limits of human probability and reasonable assumption do not coincide with mathematical possibility in any sense. When we register our facts and causes in algebraic forms, marking the first with a, b, c, and the latter with *, y, z, we are apt to demand a degree of precision which is hardly ever to be met with in dealing with social facts and causes. Let us rest content with*

reasonable inferences and probable explanations.

(b) The easiest way of explaining a given similarity is by attributing it to a direct loan. The process of reception, of the borrowing of one people from the other, plays a most notable part in the history of institutions and ideas. The Japanese have in our days engrafted many European institutions on their perfectly distinct civilization; the Germans have used for cen- turies what was termed euphemistically the Roman law of the present time (heutiges rbmisches Recht) ; the Romans absorbed an enormous amount of Greek and Oriental law in their famous jurisprudence. A check upon explanation by direct loan will, of course, lie in the fact that two societies are entirely discon- nected, so that it comes to be very improbable that one drew its laws from the other. Although migrations of words, legends, beliefs, charms, have been shown by Theodor Benfey and his school to range over much wider areas than might be supposed on the face of it, still, in the case of law, in so far as it has to regulate material conditions, the limits have perhaps to be drawn rather narrowly. In any case we shall not look to India in order to explain the burning of widows among the negroes of Africa; the suttee may be the example of this custom which happens to be most familiar to us, but it is certainly not the only root of it on the surface of the earth.

It is much more difficult to make out the share of direct borrowing in the case of peoples who might conceivably have in- fluenced one another. A hard and fast rule cannot be laid down in such cases, and everything depends on the weighing of evidence and sometimes on almost instinctive estimates. The use of a wager for the benefit of the tribunal in the early procedure of the Romans and Greeks, the sacr amentum and the wpvTavtia, with a similar growth of the sum laid down by the parties in proportion to the interests at stake, has been explained by a direct borrow- ing by the Romans from the Greeks at the time of the Twelve Tables legislation (Hofmann, Beitrage zur Geschichte des griechischen und romischen Rechts). No direct proof is available for this hypothesis, and the question in dispute might have lain for ever between this explanation and that based on the analogous development in the two closely related branches of law. The further study of the legal antiquities of other branches of the Aryan race leads one to suppose, however, that we have actually to do with the latter and not with the former eventuality. Why should the popular custom of the Vzddni in Bohemia (Kapras, "Das Pfandrecht in altbohmischen Land- recht," Z. fur vgl. R.wissenschaft, xvii. 424 seq.), regulating the wager of litigation in the case of two parties submitting their dispute to the decision of a public tribunal, turn out to be so similar to the Greek and the Roman process? And the Teutonic Wedde would further countenance the view that we have to do in this case with analogous expediency or, possibly, common origin, not loans. But while dwelling on

considerations which may disprove the assumption of direct loans, we must not omit to mention circumstances that may render such an assumption the best available explanation for certain points of similarity. We mean especially the recurrence of special secondary traits not deducible from the nature of the relations compared. Termino logical parallels are especially convincing dn such cases. An example of most careful linguistic investigation attended by important results is presented by W. Thomsen's treatment of the affinities between the languages and cultures of the peoples of northern and eastern Europe. Taking the indications in regard to the influence of Germanic tribes on Finns and Lapps, we find, for instance, that the Finnish race has stood for some 1500 or 2000 years under "the influence of several Germanic languages — partly of a more ancient form of Gothic than that represented by Ulfilas, partly of a northern (Scandinavian) tongue and even possibly of a common Gothic-northern one." The importance of these linguistic investigations for our subject becomes apparent when we find that a series of most important legal and political terms has been imported from Teutonic into Finnish. For example, the Finnish Kuningas, " king," comes from a Germanic root illustrated by O. Norse konung, O. H. Ger. chuning, A.-S. cyning, Goth, thiudans. The Finnish valta," power," "authority," is of Germanic origin, as shown by O. N. void, Goth, valdan. The Finnish kihla, a compact secured by solemn promise, is akin with O. N. gisl, A.-S. gisel, O. H. Ger. glsal, "hostage." The explanation for Finnish vuokra, "interest," "usury," is to be found in Gothic vokrs, O. N. okr, Ger. Wucher, &c. (W. Thomsen, IJber den Einfluss der germanischen Sprachen auf die Finnisch-lappischen, trans. E. Sievers, 1870, p. 166 seq.; cf. W. Thomsen, The Relations between Ancient Russia and Scan- dinavia and the Origin of the Russian State, p. 127'seq.; Miklosich, " Die Fremdworter in den slavischen Sprachen," Denkschriften der Wiener Akademie, Ph, hist. Klasse, XV.).

(c) The next group of analogies is formed by cases which may be reduced to common origin. In addition to what has already been said on the subject in connexion with the literature of the historical school, we must point out that in the case of kindred peoples this form of derivation has, of course, to be primarily considered. This is especially the case when we have to deal with the original stock of cultural notions of a race, and when analogies in the framing and working of institutions and legal rules are supported by linguistic affinities. The testi- mony of the Aryan languages in regard to terms denoting family organization and relationship can in no way be dis- regarded, whatever our view may be about the most primitive

stages of development in this respect. The fact that the common stock of Aryan languages and of Aryan legal customs points to a patriarchal organization of the family may be regarded as established, and it is certainly an important fact drawn from a very ancient stage of human history, although there are indications that still more primitive formations may be discovered.

Inferences in the direction ot common origin become more doubtful when we argue, not that certain facts proceed from a common stock of notions embodied in the early culture of a race before it was broken up into several branches, but that they have to be accounted for as instances of a similar treatment of legal problems by different peoples of the same ethnic family. The only thing that can be said in such a case is that, methodi- cally, the customs of kindred nations have the first claim to comparison. It is evident that in dealing with blood feud, composition for homicide, and the like, among the Germans or Slavs, the evidence of other Aryan tribes has to be primarily studied. But it is by no means useless for the investigator of these problems to inform himself about the aspect of such customs in the life of nations of other descent, and especially of savage tribes. The motives underlying legal rules in this respect are to a large extent suggested by feelings and considerations which are not in any way peculiarly Aryan, and may be fully illustrated from other sources, as has been done e.g. in Steinmetz's Origins of Punishment.

(d) This leads to the consideration of what maybe called discon- nected analogies. They are instructive in so far as they go back, not to any continuous development, but to the fundamental, psychological and logical unity of human nature. In similar circumstances human beings are likely to solve the same problems in the same way. Take a rather late and special case. In the Anglo-Saxon laws of Ine, a king who lived in the 7th century, it is enacted that no landowner should be allowed to claim per- sonal labour service from his tenants unless he provides them not merely with land, but with their homesteads. Now an exactly similar rule is found in the statement of rural by-laws to be enforced on great domains in Africa, which had been taken over by the imperial fiscus — the Lex Manciana (cf. Schulten, Lex manciana). There is absolutely no reason for assuming a direct transference of the rule from one place to the other: it reflects considerations of natural equity which in both cases were directed against similar encroachments of powerful land- owners on a dependent peasant population. In both instances government interfered to draw the line between the payment of rent and the performance of labour, and fastened on the same feature to fix the limit, namely, on the difference between peasants living in their own homes and those who had been settled by the landowner on his farms. Of such analogies, the study of savage life presents a great number, e.g. the widely spread practices of purification by ordeal

(H. C. Lea, Superstition and Force).

(e) Organizing thought always seeks to substitute order for chaotic variety. Observations as to disconnected analogies lead to attempts to systematize them from some comprehensive point of view. These attempts may take the shape of a theory of consecutive stages of development. Similar facts appear over and over again in ethnological and antiquarian evidence, because all peoples and tribes, no matter what their race and geographical position, go through the same series of social arrangements. This is the fundamental idea which directed the researches of Maine, McLennan, Morgan, Post, Kohler, although each of these scholars formulated his sequence of stages in a peculiar way. McLennan, for instance, puts the idea referred to in the following words: —

"In short, it is suggested to us, that the history of human society is that of a development following very slowly one general law, and that the variety of forms of life — of domestic and civil institution — is ascribable mainly to the unequal development of the different sections of mankind. . . . The first thing to be done is to inform ourselves of the facts relating to the least developed races. To begin with them is to begin with history at the farthest-back point of time to which, except by argument and inference, we can reach.

Their condition, as it niay to-day be observed, is truly the most ancient condition of man " (Studies in Ancient History, 2nd series,

9. 15)-

On this basis we might draw up tables of consecutive stages, of which the simplest may be taken from Post : —

"Four types of organization: the tribal, the territorial, the seignorial, and the social. The first has as its basis marriage and relationship by blood; the second, neighbouring occupation of a district ; the third, patronage relations between lord and dependants ; the fourth, social intercourse and contractual relations between individual personalities " (Post, Grundriss, i. 14).

This may be supplemented from Friedrichs in regard to initial stages of family organization. He reckons four stages of this kind: promiscuity, loose relations, matriarchal family, patriarchal family, modern, bilateral family (Z. f. vgl. R. wissenschajt) . This mode of grouping similar phenomena as a sequence of stages leads to a conception of universal history of a peculiar kind. And as such it has been realized and advocated by Kohler (see e.g. his article in Helmolt's World's History, Eng. trans, i.). Prompted by this

conception several represen- tatives of comparative jurisprudence have found no difficulty to insert such a peculiar institution as group-marriage into the general and obligatory course of legal evolution. It is to be noticed, however, that Kohler himself has entered a distinct protest against McLennan 's and Post's view that the more rudimentary a people's culture is, the more archaic it is, and the earlier it has to be placed in the natural sequence of evolution.' This would create difficulties in the case of tribes of exceedingly low culture, like the Ceylon Veddahs, who live in monogamous and patriarchal groups. According to Kohler's view, neither the mere fact of a low standard of culture, nor the fact that a certain legal custom precedes another in some cases in point of time, settles the natural sequence of development. The process of development must be studied in cases when it is sufficiently clear, gaps in other cases have to be supplied accordingly, and the working together of distinct institutions, especially in cases when there is no ethnic connexion has to be especially noticed. These are counsels of perfection, but Kohler's own example shows sufficiently that it is not easy to follow them to the letter. One thing is, however, clearly indicated by these and similar criticisms; it is, at the least, premature to sketch anything like a course of universal develop- ment for legal history. We have grave doubts whether the time will ever come for laying down any single course of that kind. The attempts made hitherto have generally led to over- stating the value of certain parts of the evidence and to squeezing special traits into a supposed general course of evolution.

(/) Another group of thinkers is therefore content to systema- tize and explain the material from the point of view, not of universal history, but of correspondence to economic stages and types. This is, as we have seen, the leading idea in Dargun's or Hildebrand's investigations. It is needless to go into the ques- tion of the right or wrong of particular suggestions made by thest; writers. The place assigned to individualism and collectivism may be adequate or not; how far can be settled only by special inquiries. But the general trend of study initiated in this direc- tion is certainly a promising one, if only one consideration of method is well kept in view. Investigators ought to be very chary of laying down certain combinations as the necessary outcome of certain economic situations. Such combinations or consequences certainly exist; pastoral husbandry, the life of scattered hunting groups, the conditions of agriculturists under feudal rule, certainly contain elements which will recur in divers ethnical surroundings. But we must not forget a feature which is constantly before our eyes in real life: namely, that different minds and characters will draw different and perhaps opposite conclusions in exactly similar outward conditions. This may happen in identical or similar geographical environment; let us only think of ancient Greeks and Turks on the Balkan peninsula, or of ancient Greeks and modern Greeks for that matter. But even the same historical

medium leaves, as a rule, scope for treatment of legal problems on divers lines. Take systems of succession. They exercise the most potent influence on the

structure and life of society. Undivided succession, whether in the form of primogeniture or in that of junior right, sacrifices equity and natural affection to the economic efficiency of estates. Equal-partition rules, like gavelkind or parage, lead in an exactly opposite direction. And yet both sets of rules co-existed among the agriculturists of feudal England; communities placed in nearly identical historical positions followed one or the other of these rules. The same may be said of type's of dwelling and forms of settlement. In other words, it is not enough to start from a given economic condition as if it were bound to regulate with fatalistic precision all the incidents of legal custom and social intercourse. We have to start from actual facts as complex results of many causes, and to try to reduce as much as we can of this material to the action of economic forces in a particular stage or type of development.

(g) The psychological diversities of mankind in dealing with the same or similar problems of food and property, of procreation and marriage, of common defence and relationship, of intercourse and contrast, &c, open another possibility for the grouping of facts and the explanation of their evolution. It may be difficult or impossible to trace the reasons and causes of synthetic combinations in the history of society. That is, we can hardly go beyond noting that certain disconnected features of social life appear together and react on each other. But it is easier and more promising to approach the mass of our material from the analytical side, taking hold of certain principles, or rules, or institutions, and tracing them to their natural consequences either through a direct systematization of re- corded facts or, when these fail, through logical inferences. Some of the most brilliant and useful work in the historical study of law has been effected on these lines. Mommsen's theory of Roman magistracy, Jhering's theory of the struggle for right, Kohler's view of the evolution of contract, &c, have been evolved by such a process of legal analysis; and, even when such generalizations have to be curtailed or complicated later on, they serve their turn as a powerful means of organizing evidence and suggesting reasonable explanations. The attribute of " reasonableness " has to be reckoned with largely in such cases. Analytical explanations are attractive to students because they substitute logical clearness for irrational accumula- tion of traits and facts. They do so to a large extent through appeals to the logic and to the reason common to us and to the people we are studying. This

deductive element has to be closely watched and tested from the side of a concrete study of the evidence, but it seems destined to play a very prominent part in the comparative history of law, because legal analysis and construction have at all times striven to embody logic and equity in the domain of actual interests and forces. And, as we have seen in our survey of the literature of the subject, recent comparative studies tend to make the share of juridical analysis in given relative surroundings larger and larger. What is so difficult of attainment to single workers — a harmonious appreciation of the combined influences of common origin, re- ception of foreign custom, recurring psychological combinations, the driving forces of economic culture and of the dialectical process of legal thought, will be achieved, it may be hoped, by the enthusiastic and brotherly exertions of all the workers in the field.

Bibliography. — Of the principal works of reference may be mentioned : Zeitschrift fur vergleichende Rechtswissenschaft, edited by Bernhoft, Cohn and Kohler (1878-) ; Nouvelle revue historique de droit francais el elranger, edited by Dareste.Esmein, Appert, Fournier, Tardiff and Prou (1877-); A. Pictet, Les Origines indo-euro- peennes (i. 1859, ii. 1863) ; Fustel de Coulanges, La Citiantique (1890) ; W. E. Hearn, The Aryan Household (1879); R. v. Jhering, Vor- geschichte der Indoeuropaer (1894) ; B. W. Leist, Graekoitalische Rechts- geschichte (1884) , Alt-arisches Jus Gentium (1889) ,Alt-arischesJusCivile (1892-1896) ; Hruza, Geschichte des griechischen und romischen Fami- lienrechtes (1893); O. Schrader, Ur geschichte und Sprachvergleichung (1890), Reallexikon des indo-germanischen Alter tumskunde (1901); B. Delbriick, Die indo-germanischen Verwandtschajtsnamen (1889), Das Mutterrecht bei den Indogermanen; SirH. S. Maine, Ancient Law, with notes by Sir F. Pollock (1906), Village Communities (1871), Early History of Institutions (1875), Early Law and Custom (1883) ; M. H. d'Arbois de Jubainville, Etudes de droit celtique (1895), La

Famille celtique (1905); J. J. Bachofen, Das Mutterrecht (1861), Antiquarische Briefe (1880); J. F. McLennan, Studies in Ancient History (1876), Patriarchal Theory (1885), Studies in Ancient History (2nd series, 1896) ; Giraud Teulon, Origines de la famille et du mariage (1884) ; L. H. Morgan, " Systems of Consanguinity " in the publica- tions of the Smithsonian Institution, vol. xvii. (1869) ; Ancient Society (1877); E. B. Tylor, Primitive Culture (1871); Lord Avebury (Sir J. Lubbock), Origin of Civilization (1870); J. Lippert, Kullurgeschichte der Menschheit (1887); W. Robertson Smith, Kinship and Marriage in Arabia (1885) ;F. Bernhoft, Staat und Recht der romischen Kbnigszeit im Verhdltniss zu verwandten Rechten (1882); A. H. Post, Aufgaben einer allgemeinen Rechtswissenschaft (1891), Die Anfange des Staats- und Rechtslebens (1878), Bausteine einer allgemeinen Rechts geschichte auf vergleichend-

ethnologischer Basis (1881), Einleitung in das Studium der ethnologischen Jurisprudent (1886), Grundlagen des Rechts und Grundzilge seiner Entwickelungs geschichte (1882), Studien zur Ent- wickelungs geschichte des Familienrechts (1889), Afrikanische Juris- prudenz (1887), Grundriss der ethnologischen Jurisprudenz (1894); Wilken, Das Matriarchat im alten A rabien (1 884) ; M . M . Kovalevsky , Coutume contemporaine et loi ancienne (1893), Gesetz und Gewohnheit im Kaukasus (1890), Tableau du developpement de la famille et de la propriete (1889); Dargun, "Mutterrecht und Raubehe," in Otto Gierke's Untersuchungen zur deutschen Staats- und Rechtsgeschichte (1883) ; R. Hildebrand, Das Problem einer allgemeinen Entwickelungs- geschichte des Rechts und der Sitte (1894), Recht und Sitte auf den verschiedenen wirtschaftlichen Kulturstufen (1896) ; E. Grosse, Die Formen der Familie und der Wirtschaft (1896) ; E. A. Westermarck, History of Human Marriage (1894), The Origin and Development of the Moral Ideas (1906); C. N. Starcke, Die primitive Familie (1888); G. Tarde, Les Transformations du droit (2nd ed., 1894); Steinmetz, Ethnologische Studien zur ersten Entwickelung der Strafe (1894); J. Kohler, Das Recht als Kulturerscheinung: Einleitung in die ver- gleichende Rechtswissenschaft (1885), Shakespeare vor dem Forum der Jurisprudenz (1884), " Das chinesische Strafrecht," Beitrag zur Uni- versalgeschichte des Straf rechts (1886), Rechtsvergleichende Studien ilber islamitisches Recht, Recht der Berbern, chinesisch.es Recht und Recht auf Ceylon (1889), Altindisches Prozessrecht (1892), Zur Vrgeschichte der Ehe (1897), Kulturrechte des Alten Amerikas, das Recht der Azteken (1892), Das Negerrecht (1895) ; Kohler arid Peisker, Aus dem babylon- ischen Rechtsleben (1890), Hammurubi's Gesetz (1904); A. Lang, The Secret of the Totem (1905) ; P. J. H. Grierson, The Silent Trade (1903) ; J. G. Frazer, Lectures on the Early History of the Kingship (1905) ; R. Dareste, Etudes d'histoire de droit (1889), Nouvelles etudes d histoire de droit (1896); Lambert, La Fonction du droit civil compart (1903); Fritz Hommel, Semitische Alterthumskunde (Eng. trans., The Ancient Hebrew Tradition as illustrated by the Monuments, 1897); H. C. Lea, Superstition and Force (1866); A. Hellwig, Das Asylrecht der Naturvolker (Berliner juristische Beitrage, 1893); F. Seebohm, Tribal Custom in Anglo-Saxon Law (1902). .- (P. Vl.)

JURJANI, the name of two Arabic scholars.

1. Abu Bakr 'Abdu-l-Qahir ibn 'Abdur-Rahman ul- Jurjani (d. 1078,) Arabian grammarian, belonged to the Persian school and wrote a famous grammar, the Kitdb ul- 'Awdmil ul-Mi'a or Kitdb Mi'at 'Amil, which was edited by Erpenius (Leiden, 1617), by Baillie (Calcutta, 1803), and by A. Lockett (Calcutta, 1814). Ten Arabic commentaries on this work exist in MS., also two Turkish. It has been versified five times and translated into Persian. Another of his grammatical works on which several commentaries

have been written is the Kitdb Jumal fin-Nahw.

For other works see C. Brockelmann's Gesch. der Arabischen Litteratur (1898), i. 288.

2. 'AlI ibn Mahommed ul-Jurjani (1339-1414), Arabian encyclopaedic writer, was born near Astarabad and became professor in Shlraz. When this city was plundered by Tfmur (1387) he removed to Samarkand, but returned to Shlraz in 1405, and remained there until his death. Of his thirty-one extant works, many being commentaries on other works, one of the best known is the Tarifdt {Definitions), which was edited by G. Flugel (Leipzig, 1845), published also in Constantinople (1837), Cairo (1866, &c), and St Petersburg (1897). (G. W. T.)

JURY, in English law, a body of laymen summoned and sworn (jurati) to ascertain, under the guidance of a judge, the truth as to questions of fact raised in legal proceedings whether civil or criminal. The development of the system of trial by jury has been regarded as one of the greatest achievements of English jurisprudence; it has even been said that the ultimate aim of the English constitution is " to get twelve good men into a box." l In modern times the English system of trial by jury

1 I.e. the jury-box, or enclosed space in which the jurors sit in court.

has been adopted in many countries in which jury trial was not native or had been strangled or imperfectly developed under local conditions.

The origin of the system in England has been much investi- gated by lawyers and historians. The result of these investiga- tions is a fairly general agreement that the germ of jury trial is to be found in the Frankish inquest (recognitio or inquisitio) transplanted into England by the Norman kings. The essence of this inquest was the summoning of a body of neighbours by a public officer to give answer upon oath (recognoscere veritatem) on some question of fact or law (Jus), or of mixed fact and law. At the outset the object of the inquiry was usually to obtain information for the king, e.g. to ascertain facts needed for assessing taxation. Indeed Domesday Book appears to be made up by recording the answers of inquests.

The origin of juries is very fully discussed in W. Forsyth's History of Trialby Jury (1852), and the various theories advanced are more concisely stated in W. Stubbs's Constitutional History (vol. i.) and in E. A. Freeman's

Norman Conquest (vol. v.). Until the modern examination of historical documents proved the contrary, the jury system, like all other institutions, was popularly regarded as the work of a single legislator, and in England it has been usually assigned to Alfred the Great. This supposition is without historical foundation, nor is it correct to regard the jury as " copied from this or that kindred institution to be found in this or that German of Scandinavian land," or brought over ready made by Hengist or by William. 1 " Many writers of authority," says Stubbs, " have maintained that the entire jury system is indigenous in England, some deriving it from Celtic tradition based on the principles of Roman law, and adopted by the Anglo-Saxons and Normans from the people they had conquered. Others have regarded it as a product of that legal genius of the Anglo-Saxons of which Alfred is the mythical impersonation, or as derived by that nation from the customs of primitive Germany or from their intercourse with the Danes. Nor even when it is admitted that the system of ' recognition ' was introduced from Normandy have legal writers agreed as to the source from which the Normans them- selves derived it. One scholar maintains that it was brought by the Norsemen from Scandinavia; another that it was derived from the processes of the canon law; another that it was developed on Gallic soil from Roman principles; another that it came from Asia through the crusades," or was borrowed by the Angles and Saxons from their Slavonic neighbours in northern Europe. The true answer is that forms of trial resembling the jury system in various particulars are to be found in the primitive institutions of all nations. That which comes nearest in time and character to trial by jury is the system of recognition by sworn inquest, introduced into England by the Normans. " That inquest," says Stubbs, " is directly derived from the Frank capitularies, into which it may have been adopted from the fiscal regulations of the Theodosian code, and thus own some distant relationship with the Roman jurisprudence." However that may be, the system of " recognition " consisted in questions of fact, relating to fiscal or judicial business, being submitted by the officers of the crown to sworn witnesses in the local courts. Freeman points out that the Norman rulers of England were obliged, more than native rulers would have been, to rely on this system for accurate information. They needed to have a clear and truthful account of disputed points set before them, and such an account was sought for in the oaths of the recog- nitors. 2 The Norman conquest, therefore, fostered the growth of those native germs common to England with other countries out of which the institution of juries grew. Recognition, as introduced by the Normans, is only, in this point of view, another form of the same principle which shows itself in the compurgators, in the frith-borh (frank-pledge), in every detail of the action of the popular courts before the conquest. Admitting

1 Freeman, Norman Conquest, v, 451.

2 This fact would account for the remarkable development of the system on English ground, as contrasted with its decay and extinction in France.

with Stubbs that the Norman recognition was the instrument which the lawyers in England ultimately shaped into trial by jury, Freeman maintains none the less that the latter is dis- tinctively English. Forsyth comes to substantially the same conclusion. Noting the jury germs of the Anglo-Saxon period, he shows how out of those elements, which continued in full force under the Anglo-Normans, was produced at last the institution of the jury. " As yet it was only implied in the requirement that disputed questions should be determined by the voice of sworn witnesses taken from the neighbourhood, and deposing to the truth of what they had seen or heard." The conclusions of Sir F. Pollock and F.W. Maitland, expressed in their History of English Law, and based on a closer study, are to the same effect.

This inquest then was a royal institution and not a survival from Anglo-Saxon law or popular custom, under which com- purgation and the ordeal were the accepted modes of trying issues of fact.

The inquest by recognition, formerly an inquest of office, i.e. to ascertain facts in the interests of the crown or the exchequer, was gradually allowed between subjects as a mode of settling disputes of fact. This extension began with the assize' of novel disseisin, whereby the king protected by royal writ and inquest of neighbours every seisin of a freehold. This was followed by the grand assize, applicable to questions affecting freehold or status. A defendant in such an action was enabled by an enactment of Henry II. to decline trial by combat and choose trial by assize, which was conducted as follows. The sheriff summoned four knights of the neighbourhood, who being sworn chose the twelve lawful knights most cognisant of the facts, to determine on their oaths which had the better right to the land. If they all knew the facts and were agreed as to their verdict, well and good; if some or all were ignorant, the fact was certified in court, and new knights were named, until twelve were found to be agreed. The same course was followed when the twelve were not unanimous. New knights were added until the twelve were agreed. This was called afforcing the assize. At this time the knowledge on which the jurors acted was their own personal knowledge, acquired independently of the trial. " So entirely," says Forsyth, "did they proceed upon their own previously formed view of the facts in dispute that they seem to have considered themselves at liberty to pay no attention to evidence offered in court, however clearly it might disprove the case which they were prepared to support." The use of recogni- tion is prescribed by the constitutions of Clarendon (1166) for cases of dispute as to lay or clerical tenure. See Forsyth, p. 131 ; Stubbs, i. 617.

This procedure by the assize was confined to real actions, and while it preceded, it is not identical with the modern jury trial in civil cases, which was gradually introduced by consent of the parties and on pressure from the judges. Jury trial proper differs from the grand and petty assizes in that the assizes were summoned at the same time as the defendant to answer a question formulated in the writ; whereas in the ordinary jury trial no order for a jury could be made till the parties by their pleadings had come to an issue of fact and had put themselves on the country, posuerunt se super palriam (Pollock and Mait- land, i. 119-128; ii. 601, 615, 621).

The Grand Jury. — In Anglo-Saxon times there was an institu- tion analogous to the grand jury in criminal cases, viz. the twelve I senior thegns, who, according to an ordinance of ˆEthelred II., were sworn in the county court that they would accuse no innocent man and acquit no guilty one. The twelve thegns were a jury of presentment or accusation, like the grand jury of later times, and the absolute guilt or innocence of those accused by them had to be determined by subsequent proceedings — by compurgation or ordeal. Whether this is the actual origin of the grand jury or not, the assizes of Clarendon (1166) and Northampton (n 76) establish the criminal jury on a definite basis. '

In the laws of Edward the Confessor and the earlier Anglo- Saxon kings are found many traces of a public duty to bring

offenders to justice, by hue and cry, or by action of the frith- borh, township, tithing or hundred. By the assize of Clarendon it is directed that inquiry be made in each county and in each hundred by twelve lawful {legations) men of the hundred, and by four lawful men from each of the four vills nearest to the scene of the alleged crime, on oath to tell the truth if in the hundred or vill there is any man accused (rettatus aut publicatus) as a robber or murderer or thief, or receiver of such. The assize of Northampton added forgery of coin or charters (Jalsonaria) and arson. The inquiry is to be held by the justices in eyre, and by the sheriffs in their county courts. On a finding on the oath aforesaid, the accused was to be taken and to go to the ordeal. By the articles of visitation of 1194, four knights are to be chosen from the county who by their oath shall choose two lawful knights of each hundred or wapentake, or, if knights be wanting, free and legal men, so that the twelve may answer for all matters within the hundred, including, says Stubbs, " all the pleas of the crown, the trial of malefactors and their receivers,- as well as a vast amount of civil business." The process thus described is now regarded as an employment of

the Frankish inquest for the collection of jama publica. It was alternative to the rights of a private accuser by appeal, and the inquest were not exactly either accusers or witnesses, but gave voice to public repute as to the criminality of the persons whom they presented. From this form of inquest has developed the grand jury of pre- sentment or accusation, and the coroner's inquest, which works partly as a grand jury as to homicide cases, and partly as an inquest of office as to treasure trove, &c.

The number of the grand jury is fixed by usage at not less than twelve nor more than twenty-three jurors. Unanimity is not required, but twelve must concur in the presentment or indict- ment. l This jury retains so much of its ancient character that it may present of its own knowledge or information, and is not tied down by rules of evidence. After a general charge by the judge as to the bills of indictment on the file of the court, the grand jury considers the bills in private and hears upon oath in the grand jury chamber some or all the witnesses called in support of an indictment whose names are endorsed upon the bill. It does not as a rule hear counsel or solicitors for the prosecution, nor does it see or hear the accused or his witnesses, and it is not concerned with the nature of the defence, its functions being to ascertain whether there is a prima facie case against the accused justifying his trial. If it thinks that there is such a case, the indictment is returned into court as a true bill; if it thinks that there is not, the bill is ignored and returned into court torn up or marked " no bill," or " ignoramus." Inasmuch as no man can be put on trial for treason or felony, and few are tried for mis- demeanour, without the intervention of the grand jury, the latter has a kind of veto with respect to criminal prosecutions. The grand jurors are described in the indictment as " the jurors for our lord the king." As such prosecutions in respect of indictable offences are now in almost all cases begun by a full preliminary inquiry before justices, and inasmuch as cases rarely come before a grand jury until after committal of the accused for trial, the present utility of the grand jury depends very much on the character of the justices' courts. As a review of the discretion of stipendiary magistrates in committing cases for trial, the intervention of the grand jury is in most cases superfluous; and even when the committing justices are not lawyers, it is now a common opinion that their views as to the existence of a case to be submitted to a jury for trial should not be over-ridden by a lay tribunal sitting in private, and in this opinion many grand jurors concur. But the abolition of the grand jury would involve great changes in criminal procedure for which parliament seems to have no appetite. Forsyth thinks that the grand jury will often baffle " the attempts of malevolence " by ignoring a malicious and unfounded prosecution; but it may also defeat the ends of justice by shielding a criminal with whom it has

1 Blackstone puts the principle as being that no man shall be convicted

except by the unanimous voice of twenty-four of his equals or neighbours — twelve on the grand, and twelve on the petty jury.

strong political or social sympathies. The qualification of the grand jurymen is that they should be freeholders of the county — to what amount appears to be uncertain — and they are sum- moned by the sheriff, or failing him by the coroner.

The coroner's jury must by statute (1887) consist of not more than twenty-three nor less than twelve jurors. It is summoned by the coroner to hold an inquest super visum corporis in cases of sudden or violent death, and of death in prisons or lunatic asylums, and to deal with treasure trove. The qualification of the coroner's jurors does not depend on the Juries Acts 1825 and 1870, and in practice they are drawn from householders in the immediate vicinity of the place where the inquest is held. Unanimity is not required of a coroner's jury; but twelve must concur in the verdict. If it charges anyone with murder or manslaughter, it is duly recorded and transmitted to a court of assize, and has the same effect as an indictment by a grand jury, i.e. it is accusatory only and is not conclusive, and is traversable, and the issue of guilt or innocence is tried by a petty jury.

The Petty Jury. — The ordeal by water or fire was used as the final test of guilt or innocence until its abolition by decree of the Lateran council (1219). On its abolition it became necessary to devise a new mode of determining guilt as distinguished from ill fame as charged by the grand jury. So early as 1221 accused persons had begun to put themselves on the country, or to pay to have a verdict for " good or ill "; and the trial seems to have been by calling for the opinions of the twelve men and the four townships, who may have been regarded as a second body of witnesses who could traverse the opinion of the hundred jury. (See Pollock and Maitland, ii. 646.) The reference to judicium parium in Magna Carta is usually taken to refer to the jury, but it is clear that what is now known as the petty jury was not then developed in its present form. " The history of that institution is still in manuscript," says Maitland.

It is not at all clear that at the outset the trial by the country {in pais; in patria) was before another and different jury. The earliest instances look as if the twelve men and the four vills were the patria and had to agree. But by the time of Edward I. the accused seems to have been allowed to call in a second jury. A person accused by the inquest of the hundred was allowed to have the truth of the charge tried by another and different jury. 2 "There is," says Forsyth, " no possibility of assigning a date to this alteration." " In the time of Bract on (middle of the 13th century) the usual mode of determining innocence or guilt was by combat or appeal. But in most cases the appellant had the option of either fighting with his adversary or putting

himself on his country for trial " — the exceptions being murder by secret poisoning, and certain circumstances presumed by the law to be conclusive of guilt.' But the separation must have been complete by 1352, in which year it was enacted " that no indictor shall be put in inquests upon deliverance of the indictees of felonies or trespass if he be challenged for that same cause by the indictee."

The jurors, whatever their origin, differed from the Saxon doomsmen and the jurats of the Channel Islands in that they adjudged nothing; and from compurgators or oath-helpers in

2 The distinction between the functions of the grand jury, which

E resents or accuses criminals, and the petty jury, which tries them, as suggested the theory that the system of compurgation is the origin of the jury system — the first jury representing the compur- gators of the accuser, the second the compurgators of the accused.

3 Forsyth, 206. The number of the jury (twelve) is responsible for some unfounded theories of the origin of the system. This use of twelve is not confined to England, nor in England or elsewhere to judicial institutions. " Its general prevalence," says Hallam {Middle Ages, ch. viii.), " shows that in searching for the origin of trial by jury we cannot rely for a moment upon any analogy which the mere number affords." In a Guide to English Juries (1682), by a person of quality (attributed to Lord Somers), the following passage occurs: " In analogy of late the jury is reduced to the number of twelve, like as the prophets were twelve to foretell the truth; the apostles twelve to preach the truth; the discoverers twelve, sent into Canaan to seek and report the truth; and the stones twelve that the heavenly Hierusalem is built on." Lord Coke indulged in similar speculations.

that they were not witnesses called by a litigant to support his case (Pollock and Maitland, i. 118). Once established, the jury of trial whether of actions or indictments developed on the same lines. But at the outset this jury differed in one material respect from the modern trial jury. The ancient trial jury certify to the truth from their knowledge of the facts, however acquired. In other words, they resemble witnesses or collectors of local evidence or gossip rather than jurors. The complete withdrawal of the witness character from the jury is connected by Forsyth with the ancient rules of law as to proof of written instruments, and a peculiar mode of trial per sectam. When a deed is attested by witnesses, you have a difference

between the testimony of the witness, who deposes to the execution of the deed, and the verdict of the jury as to the fact of execution. It has been contended with much plausibility that in such cases the attesting witnesses formed part of the jury. Forsyth doubts that conclusion, although he admits that, as the jurors themselves were originally mere witnesses, there was no distinction in principle between them and the attesting witnesses, and that the attesting witnesses might be associated with the jury in the discharge of the function of giving a verdict. However that may be, in the reign of Edward III., although the witnesses are spoken of " as joined to the assize," they are distinguished from the jurors. The trial per sectam was used as an alternative to the assize or jury, and resembled in principle the system of compurgation. The claimant proved his case by vouching a certain number of witnesses (secta), who had seen the transaction in question, and the defendant rebutted the presumption thus created by vouching a larger number of witnesses on his own side. In cases in which this was allowed, the jury did not interpose at all, but in course of time the practice arose of the witnesses of the secta telling their story to the jury. In these two instances we have the jury as judges of the facts sharply contrasted with the witnesses who testify 'to the facts; and, with the increasing use of juries and the development of rules of evidence, this was gradually established as the true principle of the system. In the reign of Henry IV. we find the judges declaring that the jury after they have been sworn should not see or take with them any other evidence than that which has been offered in open court. But the personal knowledge of the jurors was not as yet regarded as outside the evidence on which they might found a verdict, and the stress laid upon the selection of jurymen from the neighbourhood of the cause of the action shows that this element was counted on, and, in fact, deemed essential to a just consideration of the case. Other examples of the same theory of the duties of the jury may be found in the language used by legal writers. Thus it has been said that the jury may return a verdict although no evidence at all be offered, and again, that the evidence given in court is not binding on the jury, because they are assumed from their local connexion to be sufficiently informed of the facts to give a verdict without or in opposition to the oral evidence. A recorder of London, temp. Edward VI., says that, " if the witnesses at a trial do not agree with the jurors, the verdict of the twelve shall be taken and the witnesses shall be rejected." Forsyth suggests as a reason for the continuance of this theory that it allowed the jury an escape from the attaint, by which penalties might be imposed on them for delivering a false verdict in a civil case. They could suggest that the verdict was according to the fact, though not according to the evidence.

In England the trial jury (also called petty jury or traverse jury) consists of twelve jurors, except in the county court, where the number is eight. In civil

but not in criminal cases the trial may by consent be by fewer than twelve jurors, and the verdict may by consent be that of the majority. The rule requiring, a unanimous verdict has been variously explained. Forsyth regards the rule as intimately connected with the original character of the jury as a body of witnesses, and with the conception common in primitive society that safety is to be found in the number of witnesses, rather than the character of their testimony. The old notion seems to have been that to justify an accusation, or to find a fact, twelve sworn men must

be agreed. The afforcing of the jury, already described, marks an intermediate stage in the development. Where the juries were not unanimous new jurors were added until twelve were found to be of the same opinion. From the unanimous twelve selected out of a large number to the unanimous twelve consti- tuting the whole jury was a natural step, which, however, was not taken without hesitation. In some old cases the verdict of eleven jurors out of twelve was accepted, but it was decided in the reign of Edward III. that the verdict must be the unani- mous opinion of the whole jury. Diversity of opinion was taken to imply perversity of judgment, and the law sanctioned the application of the harshest methods to produce unanimity. The jurors while considering their verdict were not allowed a fire nor any refreshment, and it is said in some of the old books that, if they failed to agree, they could be put in a cart and drawn after the justices to the border of the county, and then upset into a ditch. These rude modes of enforcing unanimity has been softened in later practice, but in criminal cases the rule of unanimity is still absolutely fixed.

In civil cases and in trials for misdemeanour, the jurors are allowed to separate during adjournments and to return to their homes; in trials for treason, treason-felony and murder, the jurors, once sworn, must not separate until discharged. But by an act of 1897 jurors on trials for other felonies may be allowed by the court to separate in the same way as on trials for misdemeanour.

These rules do not apply to a jury which has retired to consider its verdict. During the period of retirement it is under the keeping of an officer of the court.

At common law aliens were entitled to be tried by a jury de medietate linguae — half Englishmen, half foreigners, not neces- sarily compatriots of the accused. This privilege was abolished by the Naturalization Act 1870; but by the Juries Act 1870 aliens who have been domiciled in England or Wales for ten years or upwards, if in other respects duly qualified, are liable to jury service as if they were natural-born subjects (s. 8).

A jury of matrons is occasionally summoned, viz. on a writ de ventre

inspiciendo, or where a female condemned to death pleads pregnancy in stay of execution.

The jurors are selected from the inhabitants of the county, borough or other area for which the court to which they are summoned is commissioned to act. In criminal cases, owing to the rules as to venue and that crime is to be tried in the neigh- bourhood where it is committed, the mode of selection involves a certain amount of independent local knowledge on the part of the jurors. Where local prejudice has been aroused for or against the accused, which is likely to affect the chance of a fair trial, the proceedings may be removed to another jurisdiction, and there are a good many offences in which by legislation the accused may be tried where he is caught, irrespective of the place where he is alleged to have broken the law. As regards civil cases, a distinction was at an early date drawn between local actions which must be tried in the district in which they originated, and transitory actions which could be tried in any county. These distinctions are now of no importance, as the place of trial of a civil action is decided as a matter of procedure and convenience, and regard is not necessarily paid to the place at which a wrong was done or a contract broken.

The qualifications for, and exemptions from, service as a petty juror are in the main contained in the Juries Acts 1825 and 1870, though a number of further exemptions are added by scattered enactments. The exemptions include members of the legislature and judges, ministers of various denominations, and practising barristers and solicitors, registered medical practitioners and dentists, and officers and soldiers of the regular army. Persons over sixty are exempt but not disqualified. Lists of the jurors are prepared by the overseers in rural parishes and by the town clerks in boroughs, and are submitted to justices for revision. When jurors are required for a civil or criminal trial they are summoned by the sheriff or, if he cannot act, by the coroner. I Special and Common Juries. — For the purpose of civil trials in I the superior courts there are two lists of jurors, special and

common. The practice of selecting special jurors to try impor- tant civil cases appears to have sprung up, without legislative enactment, in the procedure of the courts. Forsyth says that the first statutory recognition of it is so late as 3 Geo. II. c. 25, and that in the oldest book of practice in existence (Powell's Attourney's Academy, 1623) there is no allusion to two classes of jurymen. The acts, however, which regulate the practice allude to

it as well established. The Juries Act 1870 (a & 34 Vict. c 77) defines the class of persons entitled and liable to serve on special juries thus: Every man whose name shall be on the jurors' book for any county, &c, and who shall be legally entitled to be called an esquire, or shall be a person of higher degree, or a banker or merchant, or who shall occupy a house of a certain rateable value (e.g. £100 in a town of 20,000 inhabitants, £50 elsewhere), or a farm of £300 or other premises at £100. A special juryman receives a fee of a guinea for each cause. Either party may obtain an order for a special jury, but must pay the additional expenses created thereby unless the judge certifies that it was a proper case to be so tried. For the common jury any man is qualified and liable to serve who has £10 by the year in land or tenements of freehold, copyhold or customary tenure; or £20 on lands or tenement held by lease for twenty-one years or longer, or who being a householder is rated at £30 in the counties of London and Middlesex, or £20 in any other county. A special jury cannot be ordered in cases of treason or felony, and may be ordered in cases of misdemeanour only when the trial is in the king's bench division of the High Court, or the civil side at assizes.

Challenge. — It has always been permissible for the parties to challenge the jurors summoned to consider indictments or to try cases. Both in civil and criminal cases a challenge " for cause " is allowed; in criminal cases a peremptory challenge is also allowed. Challenge "for cause" may be either to the array, i.e. to the whole number of jurors returned, or to the polls, i. e. to the jurors individually. A challenge to the array is either a principal challenge (on the ground that the sheriff is a party to the cause, or related to one of the parties), or a challenge for favour (on the ground of circumstances implying " at least a probability of bias or favour in the sheriff "). A challenge to the polls is an exception to one or more jurymen on either of the following grounds: (1) propter honoris respectutn, as when a lord of parliament is summoned; (2) propter defectum, for want of qualification; (3) propter affectum, on suspicion of bias or partiality; and (4) propter delictum, when the juror has been convicted of an infamous offence. The challenge propter affectum is, like the challenge to the array, either principal challenge or " to the favour. " In England as a general rule the juror may be interrogated to show want of qualification; but in other cases the person making the challenge must prove it without questioning the juror, and the courts do not allow the protracted examination on the voir dire which precedes every cause celebre in the United States. On indictments for treason the accused has a right peremptorily to challenge thirty-five of the jurors on the panel; in cases of felony the number is limited to twenty, and in cases of misdemeanour there is no right of peremptory challenge. The Crown has not now the right of peremptory challenge and may challenge only for cause certain (Juries Act 1825, s.

29). In the case of felony, on the first call of the list jurors objected to by the Crown are asked to stand by, and the cause of challenge need not be assigned by the Crown until the whole list has been perused or gone through, or unless there remain no longer twelve jurors left to try the case, exclusive of those challenged. This arrangement practically amounts to giving the Crown the benefit of a peremptory challenge.

Function of Jury. — The jurors were originally the mouthpiece of local opinion on the questions submitted to them, or witnesses to fact as to such questions. They have now become the judges of fact upon the evidence laid before them. Their province is strictly limited to questions of fact, and within that province they are still further restricted to matters proved by evidence in the course of the trial and in theory must not act upon their own personal knowledge and observation except so

far as it proceeds from what is called a " view " of the subject matter of the litigation. Indeed it is now well established that if a juror is acquainted with facts material to the case, he should inform the court so that he may be dismissed from the jury and called as a witness; and Lord Ellenborough ruled that a judge would misdirect the jury if he told them that they might reject the evidence and go by their own knowledge. The old decantatum assigns to judge and jury their own independent functions: Ad quaestionem legis respondent judices: ad quaes- tionem facli juratores (Plowden, 114). But the independence of the jurors as to matters of fact was from an early time not absolute. In certain civil cases a litigant dissatisfied by the verdict could adopt the procedure by attaint, and if the attaint jury of twenty-four found that the first jury had given a false verdict, they were fined and suffered the villainous judg- ment. Attaints fell into disuse on the introduction about 1665 of the practice of granting new trials when the jury found against the weight of the evidence, or upon a wrong direction as to the law of the case.

In criminal cases the courts attempted to control the verdicts by fining the jurors for returning a verdict contra plenam et manifestam evidentiam. But this practice was declared illegal in Bushell's case (1670) ; and so far as criminal cases are concerned the independence of the jury as sole judges of fact is almost absolute. If they acquit, their action cannot be reviewed nor punished, except on proof of wilful and corrupt consent to " embracery " (Juries Act 1825, s. 61). If they convict no new trial can be ordered except in the rare instances of misdemeanours tried as civil cases in the High Court. In trials for various forms of libel during the 18th century, the judges restricted the powers of juries by ruling that their function was limited to finding whether the libel had in fact been published, and that it was for the court to decide whether the words published constituted an offence. 1 By Fox's Libel Act 1792 the jurors in such cases were expressly

empowered to bring in a general verdict of libel or no libel, i.e. to deal with the whole question of the meaning and extent of the incriminated publication. In other words, they were given the same independence in cases of libel as in other criminal cases. This independence has in times of public excitement operated as a kind of local option against the existing law and as an aid to procuring its amendment. Juries in Ireland in agrarian cases often acquit in the teeth of the evidence. In England the independence of the jury in criminal trials is to some extent menaced by the provisions of the Criminal Appeal Act 1907.

While the jury is in legal theory absolute as to matters of fact, it is in practice largely controlled by the judges. Not only does the judge at the trial decide as to the relevancy of the evidence tendered to the issues to be proved, and as to the admissibility of questions put to a witness, but he also advises the jury as to the logical bearing of the evidence admitted upon the matters to be found by the jury. The rules as to admissibility of evidence, largely based upon scholastic logic, sometimes difficult to apply, and almost unknown in continental jurisprudence, coupled with the right of an English judge to sum up the evidence (denied to French judges) and to express his own opinion as to its value (denied to American judges), fetter to some extent the indepen-. dence or limit the chances of error of the jury.

" The whole theory of the jurisdiction of the courts to interfere with the verdict of the constitutional tribunal is that the' court is satisfied that the jury have not acted reasonably upon the evidence but have been misled by prejudice or passion " {Watt v. Watt (1905), App. Cas. 118, per Lord Halsbury). In civil cases the verdict may be challenged on the ground that it is against the evidence or against the weight of the evidence, or unsupported by any evidence. It is said to be against the evidence when the jury have completely misapprehended the facts proved and have drawn an inference so wrong as to be in substance perverse. The dissatisfaction of the trial judge with the verdict is a potent but not conclusive element in determining as to the perversity of a verdict, because of his special opportunity of appreciating the 1 See R. v. Dean of St. Asaph (1789), 3 T.R. 418.

evidence and the demeanour of the witnesses. But his opinion is less regarded now that new trials are granted by the court of appeal than under the old system when the new trial was sought in the court of which he was a member.

The appellate court will not upset a verdict when there is substantial and conflicting evidence before the jury. In such cases it is for the jury to say which side is to be believed, and the court will not interfere with the verdict. To upset a verdict on the ground that there is no evidence to go to the jury implies that the judge at the trial ought to have withdrawn the case from the jury. Under modern procedure, in order to avoid the risk of a new trial, it is not uncommon to take the verdict of a jury on the hypothesis that there was evidence for their considera- tion, and to leave the unsuccessful party to apply for judgment notwithstanding the verdict. The question whether there was any evidence proper to be submitted to the jury arises oftenest in cases involving an imputation of negligence — e.g. in an action of damages against a railway company for injuries sustained in a collision. Juries are somewhat ready to infer negligence, and the court has to say whether, on the facts proved, there was any evidence of negligence by the defendant. This is by no means the same thing as saying whether, in the opinion of the court, there was negligence. The court may be of opinion that on the facts there was none, yet the facts themselves may be of such a nature as to be evidence of negligence to go before a jury. When the facts proved are such that a reasonable man might have come to the conclusion that there was negligence, then, although the court would not have come to the same conclusion, it must admit that there is evidence to go before the jury. This statement indicates existing practice but scarcely determines what relation between the facts proved and the conclusion to be established is necessary to make tire facts evidence from which a jury may infer the conclusion. The true explanation is to be found in the prin- ciple of relevancy. Any fact which is relevant to the issue con- stitutes evidence to go before the jury, and any fact, roughly speaking, is relevant between which and the fact to be proved there may be a connexion as cause and effect (see Evidence). As regards damages the court has always had wide powers, as damages are often a question of law. But when the amount of the damages awarded by a jury is challenged as excessive or inadequate, the appellate court, if it considers the amount un- reasonably large or unreasonably small, must order a new trial unless both parties consent to a reduction or increase of the damages to a figure fixed by the court; see Watt v. Watt (1905), App. Cas. 115.

Value of Jury System. — The value of the jury in past history as a bulwark against aggression by the Crown or executive cannot be over-rated, but the working of the institution has not escaped criticism. Its use protracts civil trials. The jurors are usually unwilling and are insufficiently remunerated; and jury trials in civil cases often drag out much longer and at greater expense than trials by a judge alone, and the proceedings are occasionally rendered ineffective by the failure of the jurors to agree.

There is much force in the arguments of Bentham and others against the

need of unanimity — the application of pressure to force conviction on the minds of jurors, the indifference to veracity which the concurrence of unconvinced minds must produce in the public mind, the probability that jurors will disagree and trials be rendered abortive, and the absence of any reasonable security in the unanimous verdict that would not exist in the verdict of a majority. All this is undeniably true, but disagree- ments are happily not frequent, and whatever may happen in the jury room no compulsion is now used by the court to induce agreement.

But, apart from any incidental defects, it may be doubted whether, as an instrument for the investigation of truth, the jury system deserves all the encomiums which have been passed upon it. In criminal cases, especially of the graver kind, it is perhaps the best tribunal that could be devised. There the element of moral doubt enters largely into the consideration of the case, and that can best be measured by a popular tribunal. Opinion in England has hitherto been against subjecting a man

to serious punishment as a result of conviction before a judge sitting without a jury, and the judges themselves would be the first to deprecate so great a responsibility, and the Criminal Appeal Act 1907, which constituted the court of criminal appeal, recognized the responsibility by requiring a quorum of three judges in order to constitute a court. The same act, by permit- ting an appeal to persons convicted on indictment both on questions of fact and of law, removed to a great extent any possibility of error by a jury. But in civil causes, where the issue must be determined one way or the other on the balance of probabilities, a single judge would probably be a better tribunal than the present combination of judge and jury. Even if it be assumed that he would on the whole come to the same conclusion as a jury deliberating under his directions, he would come to it more quickly. Time would be saved in taking evidence, summing up would be unnecessary, and the addresses of counsel would inevitably be shortened and concentrated on the real points at issue. Modern legislation and practice in England have very much reduced the use of the jury both in civil and criminal cases. •

In the county courts trial by jury is the exception and not the rule. In the court of chancery and the admiralty court it was never used. Under the Judicature Acts many cases which in the courts of common law would have been tried with a jury are now tried before a judge alone, or (rarely) with assessors, or before an official referee. Indeed cynics say that a jury is in- sisted on chiefly in cases when a jury, from prejudice or other causes, is likely to be more favourable than a judge alone.

In criminal cases, by reason of the enormous number of offences punishable on summary conviction and of the provi- sions made for trying certain indictable offences summarily if the offender is young or elects for

summary trial, juries are less called on in proportion to the number of offences committed than was the practice in former years.

Scotland. — According to the Regiam Majestatem, which is identical with the treatise of Glanvill on the law of England (but whether the original or only a copy of that work is disputed), trial by jury existed in Scotland for civil and criminal cases from as early a date as in England, and there is reason to believe that at all events the system became established at a very early date. Its history was very different from that of the English jury system. There was no grand jury under Scots law, but it was introduced in 1708 for the purpose of high treason (7 Anne c. 21). For the trial of criminal cases the petty jury is represented by the criminal " assize." This jury has always consisted of fifteen persons and the jurors are chosen by ballot by the clerk of the court from the list containing the names of the special and common jurors, five from the special, ten from the common. Prosecutor and accused each have five peremptory challenges, of which two only may be directed against the special jurors; but there is no limit to challenges for cause. The jury is not secluded during the trial except in capital cases or on special order of the court made proprio motu or on the application of prosecutor or accused. The verdict need not be unanimous, nor is enclosure a necessary preliminary to a majority verdict. It is returned viva voce by the chancellor or foreman, and entered on the record by the clerk of the court, and the entry read to the jury. Besides the verdicts of " guilty " and " not guilty," a Scots jury may return a verdict of " not proven," which has legally the same effect as not guilty in releasing the accused from further proceedings on the particular charge, but inflicts on him the stigma of moral guilt.

Jury trial in civil cases was at one time in general if not prevailing use, but was gradually superseded for most purposes on the institu- tion of the Court of Session (1 Mackay, Ct. Sess. Pr. 33). In this, as in many other matters, Scots law and procedure tend to follow continental rather than insular models. The civil jury was reintro- duced in 1815 (55 Geo. III. c. 42), mainly on account of the difficulties experienced by the House of Lords in dealing with questions of fact raised on Scottish appeals. At the outset a special court was insti- tuted in the nature of a judicial commission to ascertain by means of a jury facts deemed relevant to the issues in a cause and sent for such determination at the discretion of the court in which the cause was pending. The process was analogous to the sending of an issue out of chancery for trial in a superior court of common law, or in a court of assize. In 1830 the jury court ceased to exist as a separate tribunal and was merged in the Court of Session. By legislation of 1819 and 1825 certain classes of cases were indicated as appropriate to be tried by a jury; but in 1850 the cases so to be tried were limited to actions for defamation and nuisance, or properly and in substance actions for damages, and under

an act of 1866 even in these cases the jury may be dispensed with by consent of parties.

JUS PRIMAE NOCTIS— JUSSIEU

The civil jury consists as in England of twelve jurors chosen by ballot from the names on the list of those summoned. There is a right of peremptory challenge limited to four, and also a right to challenge for cause. Unanimity was at first but is not now required. The jury if unanimous may return a verdict immediately on the close of the case. If they are not unanimous they are enclosed and may at any time not less than three hours after being enclosed return a verdict by a bare majority. If after six hours they do not agree by the requisite majority, i.e. are equally divided, they must be discharged. It was stated by Commissioner Adam, under whom the Scots civil jury was originated, that in twenty years he knew of only one case in which the jury disagreed. Jury trial in civil cases in Scotland has not flourished or given general satisfac- tion, and is resorted to only in a small proportion of cases. This is partly due to its being transplanted from England.

Ireland. — The jury laws of Ireland do not differ in substance from those of England. The qualifications of jurors are regulated by O'Hagan's Acts 1871 and 1872, and the Juries Acts 1878 and 1894. In criminal cases much freer use is made than in England of the rights of the accused to challenge, and of the Crown to order jurors to stand by, and what is called " jury-packing " seems to be the object of both sides when some political or agrarian issue is involved in the trial. Until the passing of the Irish Local Government Act 1898, the grand jury, besides its functions as a jury of accusation, had large duties with respect to local government which are now transferred to the county councils and other elective bodies.

British Empire.— In most parts of the British Empire the jury system is in force as part of the original law of the colonists or under the colonial charters of justice or by local legislation. The grand jury is not in use in India; was introduced but later abolished in the Cape Colony ; and in Australia has been for most purposes superseded by the public prosecutor. The ordinary trial jury for criminal cases is twelve, but in India may be nine, seven, five or three, according to certain provisions of the Criminal Procedure Code 1898. In countries where the British Crown has foreign jurisdiction the jury for criminal trials has in some cases been fixed at a less number than twelve and the right of the Crown to fix the number is established ; see ex p. Carew, 1897, A.C. 719. In civil cases the number of the jury is reduced in some colonies, e.g. to seven in Tasmania andTrinidad.

European Countries. — In France there is no civil jury. In criminal cases the place of the grand jury is taken by the chambre des mises en accusation, and the more serious crimes are tried before a jury of twelve which finds its verdict by a majority, the exact number of which may not be disclosed. In Belgium, Spain, Italy and Germany, certain classes of crime are tried with the aid of a jury.

United States. — The English jury system was part of the law of the American colonies before the declaration of independence ; and grand jury, coroner's jury and petty jury continue in full use in the Lnited States. Under the Federal Constitution (Article iii.) there is a right to trial by jury in all criminal cases (except on impeachment) and in all civil actions at common law in which the subject matter exceeds $20 in value (amendments vi. and vii.). The trial jury must be of twelve and its verdict must be unanimous; see Cooley, Constitutional Limitations (6th ed.), 389. The respective provinces of judge and jury have been much discussed and there has been a disposition to declare the jury supreme as to law as well as fact. The whole subject is fully treated by reference to English and American authorities, and the conflicting views are stated in Sparf v. United States, 1895, 156 U.S. 61. The view of the majority of the court in that case was that it is the duty of the jury in a criminal case to receive the law from the court and to apply it as laid down by the court, subject to the condition that in giving a general verdict the jury may incidentally determine both law and fact as compounded in the issues submitted to them in the particular case. The power to give a general verdict renders the duty one of imperfect obligation and enables the jury to take its own view of the terms and merits of the law involved.

The extent to which the jury system is in force in the states of the union depends on the constitution and legislation of each state. In some the use of juries in civil and even in criminal cases is reduced or made subject to the election of the accused. In others unanimous verdicts are not required, while the constitutions of others require the unanimous verdict of the common law dozen. (W. F. C.)

JUS PRIMAE NOCTIS, or Droit du Seigneur, a custom alleged to have existed in medieval Europe, giving the overlord a right to the virginity of his vassals' daughters on their wedding- night. For the existence of the custom in a legalized form there is no trustworthy evidence. That some such abuse of power may have been occasionally exercised by brutal nobles in the lawless days of the early middle ages is only too likely, but the jus, it seems, is a myth, invented no earlier than the 16th or 17th century. There appears to have been an entirely religious custom established by the council of Carthage in 398, whereby the Church required from the faithful continence on the wedding- night, and this may have "been, and there is

evidence that it was, known as Droit du Seigneur, or " God's right." Later the

clerical admonition was extended to the first three days of marriage. This religious abstention, added to the undoubted fact that the feudal lord extorted fines on the marriages of his vassals and their children, doubtless gave rise to the belief that the jus was once an established custom.

The whole subject has been exhaustively treated by Louis Veuillot in Le Droit du seigneur au moyen age (1854).

JUS RELICTAE, in Scots law, the widow's right in the movable property of her deceased husband. The deceased must have been domiciled in Scotland, but the right accrues from movable property, wherever situated. The widow's provision amounts to one-third where there are children surviving, and to one-half where there are no surviving children. The widow's right vests by survivance, and is independent of the husband's testamentary provisions; it may however be renounced by contract, or be dis- charged by satisfaction. It is subject to alienation of the husband's movable estate during his lifetime or by its conversion into heritage. See also Will.

JUSSERAND, JEAN ADRIEN ANTOINE JULES (1855-), French author and diplomatist, was born at Lyons on the 18th of February 1855. Entering the diplomatic service in 1876, he became in 1878 consul in London. After an interval spent in Tunis he returned to London in 1887 as a member of the French Embassy. In 1890 he became French minister at Copenhagen, and in 1902 was transferred to Washington. A close student of English literature, he produced some very lucid and vivacious monographs on comparatively little-known subjects: Le Thedtre en Angleterredepuislaconquitejusqu' aux predecesseurs immediats de Shakespeare (1878); Le Roman au temps de Shakespeare (1887; Eng. trans, by Miss E. Lee, 1890); Les Anglais au moyen dge: la vie nomade et les routes d'Angleterre au XIV siecle (1884; Eng. trans., English Wayfaring Life in the Middle Ages, by L. T. Smith,. 1889) ; and L' Epopee de Langland (1893 ; Eng. trans., Piers Plow- man, by M. C. R., 1894). His Histoire litteraire du peuple anglais, the first volume of which was published in 1895, was completed in three volumes in 1909. In English he wrote A French Ambassador at the Court of Charles II. (1892), from the un- published papers of the count de Cominges.

JUSSIEU, DE, the name of a French family which came into prominent notice towards the close of the 16th century, and for a century and a half was distinguished for the botanists it pro- duced. The following are its more

eminent members: —

1. Antoine de Jussieu (1686-1758), born at Lyons on the 6th of July 1686, was the son of Christophe de Jussieu (or Dejussieu), an apothecary of some repute, who published a Nouveau traite de la theriaque (1708). Antoine studied at the university of Montpellier, and travelled with his brother Bernard through Spain, Portugal and southern France. He went to Paris in 1708, J. P. de Tournefort, whom he succeeded at the Jardin des Plantes, dying in that year. His own original publica- tions are not of marked importance, but he edited an edition of Tournefort's Institutions rei herbariae (3 vols., 1 719), and also a posthumous work of Jacques Barrelier, Plantae per Galliam, Hispaniam, e.t Italiam observatae, &c. (1714). He practised medicine, chiefly devoting himself to the very poor. He died at Paris on the 22nd of April 1758. •

2. Bernard de Jussieu (1699-1777), a younger brother of the above, was born at Lyons on the 17th of August 1699. He took a medical degree at Montpellier and began practice in 1720, but finding the work uncongenial he gladly accepted his brother's invitation to Paris in 1722, when he succeeded Sebastien Vaillant as sub-demonstrator of plants in the Jardin du Roi. In 1725 he brought out a new edition of Tournefort's Histoire des flantes qui naissent aux environs de Paris, 2 vols., which was afterwards translated into English by John Martyn, the original work being incomplete. In the same year he was admitted into the acade- mie des sciences, and communicated several papers to that body. Long before Abraham Trembley (1700-1784) published his Histoire des polypes d'eau douce, Jussieu maintained the doctrine that these organisms were animals, and not the flowers of marine plants, then the current notion; and to confirm his views he made

three journeys to the coast of Normandy. Singularly modest and retiring, he published very little, but in 1759 he arranged the plants in the royal garden of the Trianon at Versailles, according to his own scheme of classification. This arrangement is printed in his nephew's Genera, pp. lxiii.-lxx., and formed the basis of that work. He cared little for the credit of enunciating new discoveries, so long as the facts were made public. On the death of his brother Antoine, he could not be induced to succeed him in his office, but prevailed upon L. G. Lemonnier to assume the higher position. He died at Paris on the 6th of November

1777.

3. Joseph de Jussieu (1704-1779), brother of Antoine and Bernard, was born at Lyons on the 3rd of September 1704. Educated like the rest of the family for the medical profession, he accompanied C. M. de la Condamine to Peru, in the expedition for measuring an arc of meridian, and remained in South America for thirty-six years, returning to France in 1771. Amongst the seeds he sent to his brother Bernard were those of Heliotropium peruvianum, Linn., then first introduced into Europe. He died at Paris on the nth of April 1779.

4. Antoine Laurent de Jussieu (1 748-1836), nephew of the three preceding, was born at Lyons on the 12th of April 1748. Called to Paris by his uncle Bernard, and carefully trained by him for the pursuits of medicine and botany, he largely profited by the opportunities afforded him. Gifted with a tenacious memory, and the power of quickly grasping the salient points of subjects under observation, he steadily worked at the improvement of that system of plant arrangement which had been sketched out by his uncle. In 1789 was issued his Genera plantarum secundum ordines nalurales disposita, juxta methodum in horto regio Parisi- ensi exaratam, anno mdcclxxiv. This volume formed the basis of modern classification; more than this, it is certain that Cuvier derived much help in his zoological classification from its perusal. Hardly had the last sheet passed through the press, when the French Revolution broke out, and the author was installed in charge of the hospitals of Paris. The museum d'histoire naturelle was organized on its present footing mainly by him in 1793, and he selected for its library everything relating to natural history from the vast materials obtained from the convents then broken up. He continued as professor of botany there from 1770 to 1826, when his son Adrien succeeded him. Besides the Genera, he produced nearly sixty memoirs on botanical topics. He died at Paris on the 17th of September 1836.

5. Adrien Laurent Henri de Jussieu (1797-1853), son of Antoine Laurent, was born at Paris on the 23rd of Decem- ber 1797. He displayed the qualities of his family in his thesis for the degree of M.D., De Euphorbiacearum generibus medicisque earundem viribus tentamen, Paris, 1824. He was also the author of valuable contributions to botanical literature on the Rutaceae, Meliaceae and Malpighiaceae respectively, of " Taxonomie " in the Dictionnaire universelle d'histoire naturelle, and of an intro- ductory work styled simply Botanique, which reached nine editions, and was translated into the principal languages of Europe. He also edited his father's Introductio in historiam plantarum, issued at Paris, without imprint or date, it being a fragment of the intended second edition of the Genera, which Antoine Laurent did not live to complete. He died at Paris on the 29th of June 1853, leaving two daughters, but no son, so that with him closed the brilliant botanical dynasty.

6. Laurent Pierre de Jussieu (1792-1866), miscellaneous writer, nephew of Antoine Laurent, was born at Villeurbanne on the 7th of February 1792. His Simon de Nantua, ou le mar- chand forain (1818), reached fifteen editions, and was translated into seven languages. He also wrote Simples notions de physique el d'histoire naturelle (1857), and a few geological papers. He died at Passy on the 23rd of February 1866.

JUSTICE (La.t.justitia), a term used both in the abstract, for the quality of being or doing what is just, i.e. right in law and equity, and in the concrete for an officer deputed by the sove- reign to administer justice, and do right by way of judgment. It has long been the official title of the judges of two of the English superior courts of common law, and it is now extended to

all the judges in the supreme court of judicature — a judge in the High Court of Justice being styled Mr Justice, and in the court of appeal Lord Justice. The president of the king's bench division of the High Court is styled Lord Chief Justice (q.v.). The word is also applied, and perhaps more usually, to certain subordinate magistrates who administer justice in minor matters, and who are usually called justices of the peace (q.v.).

JUSTICE OF THE PEACE, an inferior magistrate appointed in England by special commission under the great seal to keep the peace within the jurisdiction for which he is appointed. The title is commonly abbreviated to J.P. and is used after the name. " The whole Christian world," said Coke, " hath not the like office as justice of the peace if duly executed." Lord Cowper, on the other hand, described them as " men sometimes illiterate and frequently bigoted and prejudiced." The truth is that the justices of the peace perform without any other reward than the consequence they acquire from their office a large amount of work indispensable to the administration of the law, and (though usually not professional lawyers, and therefore apt to be ill-informed in some of their decisions) for the most part they discharge their duties with becoming good sense and impartiality. For centuries they have necessarily been chosen mainly from the landed class of country gentlemen, usually Conservative in politics; and in recent years the attempt has been made by the Liberal party to reduce the balance by appointing others than those belonging to the landed gentry, such as tradesmen, Nonconformist ministers, and working-men. But it has been recognized that the appointment of justices according to their political views is undesirable, and in 1909 a royal commission was appointed to consider and report whether any and what steps should be taken to facilitate the selection of the most suitable persons to be justices of the peace irrespective of creed and political opinion. In great centres of population, when the judicial business of justices is heavy, it has been found necessary to appoint paid justices or stipendiary magistrates 1 to do the work, and an extension of the system to the country districts has been

often advocated.

The commission of the peace assigns to justices the duty of keeping and causing to be kept all ordinances and statutes for the good of the peace and for preservation of the same, and for the quiet rule and government of the people, and further assigns' " to you and every two or more of you (of whom any one of the aforesaid A, B, C, D, &c, we will, shall be one) to inquire the truth more fully by the oath of good and lawful men of the county of all and all manner of felonies, poisonings, enchantments, sorceries, arts, magic, trespasses, forestallings, regratings, en- grossings, and extortions whatever." This part of the commission is the authority for the jurisdiction of the justices in sessions. Justices named specially in the parenthetical clause are said to be on the quorum. Justices for counties are appointed by the Crown on the advice of the lord chancellor, and usually with the recommendation of the lord lieutenant of the county. Justices for boroughs having municipal corporations and separate com- missions of the peace are appointed by the crown, the lord chancellor either adopting the recommendation of the town coun- cil or acting independently. Justices cannot act as such until they have taken the oath of allegiance and the judicial oath. A justice for a borough while acting as such must reside in or within seven miles of the borough or occupy a house, warehouse or other property in the borough, but he need not be a burgess. The mayor of a borough is ex officio a justice during his year of office and the succeeding year. He takes precedence over all borough justices, but not over justices acting in and for the county in which the borough or any part thereof is situated, unless when acting in relation to the business of the borough.

1 Where a borough council desire the appointment of a stipendiary magistrate they may present a petition for the same to the secretary of state and it is thereupon lawful for the king to appoint to that office a barrister of seven years" standing. He is by virtue of his office a justice for the borough, and receives a yearly salary, payable in four equal quarterly instalments. Cm a vacancy, application must again be made as for a first appointment. There may be more than one stipendiary magistrate for a borough _

The chairman of a county council is ex officio a justice of the peace for the county, and the chairman of an urban or rural district council for the county in which the district is situ- ated. Justices cannot act beyond the limits of the jurisdic- tion for which they are appointed, and the warrant of a justice cannot be executed out of his jurisdiction unless it be backed, that

is, endorsed by a justice of the jurisdiction in which it is to be carried into execution. A justice improperly refusing to act on his office, or acting partially and corruptly, may be proceeded against by a criminal information, and a justice refusing to act may be compelled to do so by the High Court of Justice. An action will lie against a justice for any act done by him in excess of his jurisdiction, and for any act within his jurisdiction which has been done wrongfully and with malice, and without reason- able or probable cause. But no action can be brought against a justice for a wrongful conviction until it has been quashed. By the Justices' Qualification Act 1744, every justice for a county was required to have an estate of freehold, copyhold, or custo- mary tenure in fee, for life or a given term, of the yearly value of £100. By an act of 1875 the occupation of a house rated at £100 was made a qualification. No such qualifications were ever required for a borough justice, and it was not until 1906 that county justices were put on the same footing in this respect. The Justices of the Peace Act 1906 did away with all qualifica- tion by estate. It also removed the necessity for residence within the county, permitting the same residential qualification as for borough justices, " within seven miles thereof." The same act removed the disqualification of solicitors to be county justices and assimilated to the existing power to remove other justices from the commission of the peace the power to exclude ex officio justices.

The justices for every petty sessional division of a county or for a borough having a separate commission of the peace must appoint a fit person to be their salaried clerk. He must be either a barrister of not less than fourteen years' standing, or a solicitor of the supreme court, or have served for not less than seven years as a clerk to a police or stipendiary magistrate or to a metropolitan police court. An alderman or councillor of a borough must not be appointed as clerk, nor can a clerk of the peace for the borough or for the county in which the borough is situated be appointed. A borough clerk is not allowed to prosecute. The salary of a justice's clerk comes, in London, out of the police fund; in counties out of the county fund; in county boroughs out of the borough fund, and in other boroughs out of the county fund.

The vast and multifarious duties of the justices cover some portion of every important head of the criminal law, and extend to a considerable number of matters relating to the civil law.

In the United States these officers are sometimes appointed by the executive, sometimes elected. In some states, justices of the peace have jurisdiction in civil cases given to them by local regulations.

JUSTICIAR (med. Lat. justiciarius or justitiarius, a judge), in English

history, the title of the chief minister of the Norman and earlier Angevin kings. The history of the title in this connota- tion is somewhat obscure. Justiciarius meant simply " judge," and was originally applied, as Stubbs points out (Const. Hist. i. 389, note), to any officer of the king's court, to the chief justice, or in a very general way to all and sundry who possessed courts of their own or were qualified to act asjudices in the shire-courts, even the style capitalis justiciarius being used of judges of the royal court other than the chief. It was not till the reign of Henry II. that the title summus or capitalis justiciarius, or justiciarius totius Angliae was exclusively applied to the king's chief minister. The office, however, existed before the style of its holder was fixed; and, whatever their contemporary title (e.g. Custos Angliae), later writers refer to them as justiciarii, with or without the prefix summus or capitalis (ibid. p. 346). Thus Ranulf Flambard, the minister of William II., who was probably the first to exercise the powers of a justiciar, is called justiciarius by Ordericus Vitalis.

The origin of the justiciarship is thus given by Stubbs (ibid.

276). The sheriff " was the king's representative in all matters judicial, military and financial in the shire. From him, or from the courts of which he was the presiding officer, appeal lay to the king alone; but the king was often absent from England and did not understand the language of his subjects. In his absence the administration was entrusted to a justiciar, a regent or lieutenant of the kingdom; and the convenience being once ascertained of having a minister who could in the whole kingdom represent the king, as the sheriff did in the shire, the justiciar became a permanent functionary."

The fact that the kings were often absent from England, and that the justiciarship was held by great nobles or churchmen, made this office of an importance which at times threatened to overshadow that of the Crown. It was this latter circumstance which ultimately led to its abolition. Hubert de Burgh (q.v.) was the last of the great justiciars; after his fall (1231) the jus- ticiarship was not again committed to a great baron, and the chancellor soon took the position formerly occupied by the justiciar as second to the king in dignity, as well as in power and influence. Finally, under Edward I. and his successor, in place of the justiciar — who had presided over all causes vice regis — separate heads were established in the three branches into which the curia regis as a judicial body had been divided: justices of common pleas, justices of the king's bench and barons of the exchequer.

Outside England the title justiciar was given under Henry II. to the seneschal of Normandy. In Scotland the title of justiciar was borne, under the earlier kings, by two high officials, one having his jurisdiction to the

north, the other to the south of the Forth. They were the king's lieutenants for judicial and ad- ministrative purposes and were established in the 12th century, either by Alexander I. or by his successor David I. In the 1 2th century a magister justitiarius also appears in the Norman kingdom of Sicily, title and office being probably borrowed from England; he presided over the royal court (Magna curia) and was, with his assistants, empowered to decide, inter alia, all cases reserved to the Crown (see Du Cange, s.v. Magister Justitiarius) .

See W. Stubbs, Const. Hist, of England; Du Cange, Glossarium (Niort, 1885) s.v. " Justitiarius."

JUSTICIARY, HIGH COURT OF, in Scotland, the supreme criminal court, consisting of five of the lords of session together with the lord justice-general and the lord justice-clerk as president and vice-president respectively. The constitution of the court is settled by the Act 1672 c. 16. The lords of justiciary hold circuits regularly twice a year according to the ancient practice, which, however, had been allowed to fall into disuse until revived in 1748. For circuit purposes Scotland is divided into northern, southern and western districts (see Circuit). Two judges generally go on a circuit, and in Glasgow they are by special statute authorized to sit in separate courts. By the Criminal Procedure (Scotland) Act 1887 all the senators of the college of justice are lords commissioners of justiciary. The high court, sitting in Edinburgh, has, in addition to its general juris- diction, an exclusive jurisdiction for districts not within the jurisdiction of the circuits — the three Lothians, and Orkney and Shetland. The high court also takes up points of difficulty arising before the special courts, like the court for crown cases reserved in England. The court of justiciary has authority to try all crimes, unless when its jurisdiction has been excluded by special enactment of the legislature. It is also stated to have an inherent jurisdiction to punish all criminal acts, even if they have never before been treated as crimes. Its judgments are believed to be not subject to any appeal or review, but it may be doubted whether an appeal on a point of law would not lie to the house of lords. The following crimes must be prosecuted in the court of justiciary: treason, murder, robbery, rape, fire-raising, deforcement of messengers, breach of duty by magistrates, and all offences for which a statutory punishment higher than imprisonment is imposed.

JUSTIFICATION, in law, the showing by a defendant in a suit of sufficient reason why he did what he was called upon to answer,

For example, in an action for assault and battery, the defendant may prove in justification that the prosecutor assaulted or beat him first, and that he acted merely in self-defence. The word is employed particularly in actions for defamation, and has in this connexion a somewhat special meaning. When a libel consists of a specific charge a plea of justification is a plea that the words are true in substance and in fact (see Libel and Slander).
JUSTIN I. (450-527), East Roman emperor (518-527), was born in 450 as a peasant in Asia, but enlisting under Leo I. he rose to be commander of the imperial guards of Anastasius. On the latter's death in 518 Justin used for his own election to the throne money that he had received for the support of another candidate. Being ignorant even of the rudiments of letters, Justin entrusted the administration of state to his wise and faithful quaestor Proclus and to his nephew Justinian, though his own experience dictated several improvements in military affairs. An orthodox churchman himself, he effected in 519 a reconciliation of the Eastern and Western Churches, after a schism of thirty-five years (see Hormisdas). In 522 he entered upon a desultory war with Persia, in which he co-operated with the Arabs. In 522 also Justin ceded to Theodoric, the Gothic king of Italy, the right of naming the consuls. On the 1st of April 527 Justin, enfeebled by an incurable wound, yielded to the request of the senate and assumed Justinian at his colleague; on the 1st of August he died. Justin bestowed much care on the repairing of public buildings throughout his empire, and contributed large sums to repair the damage caused by a destructive earthquake at Antioch.

See E. Gibbon, Decline and Fall of the Roman Empire (ed. Bury, 1896), iv. 206-209.

JUSTIN II. (d. 578), East Roman emperor (565-578), was the nephew and successor of Justinian I. He availed himself of his influence as master of the palace, and as husband of Sophia, the niece of the late empress Theodora, to secure a peaceful election. The first few days of his reign — when he paid his uncle's debts, administered justice in person, and proclaimed universal religious toleration — gave bright promise, but in the face of the lawless aristocracy and defiant governors of provinces he effected few subsequent reforms. The most important event of his reign was the invasion of Italy by the Lombards (q.v.), who, entering in 568, under Alboin, in a few years made themselves masters of nearly the entire country. Justin's attention was distracted from Italy towards the N. and E. frontiers. After refusing to pay the Avars tribute, he fought several unsuccessful campaigns against them. In 572 his overtures to the Turks led to a war with Persia. • After two disastrous campaigns, in which his enemies overran Syria, Justin bought a precarious peace by pay- ment of a yearly tribute. The temporary fits of insanity into which he fell warned him to name a colleague. Passing over his own relatives, he raised, on the

advice of Sophia, the general Tiberius (q.v.) to be Caesar in December 574 and withdrew for his remaining years into retirement.

See E. Gibbon, Decline and Fall of the Roman Empire (ed. Bury, 1896), v. 2-17; G. Finlay, History of Greece (ed. 1877), i. 291-297; J. Bury, The Later Roman Empire (1889), ii. 67-79. (M. O. B. C.)

JUSTIN (Junianus Justinus), Roman historian, probably lived during the age of the Antonines. Of his personal history nothing is known. He is the author of Historiarum Philippi- carum libri XLIV., a work described by himself in his preface as a collection of the most important and interesting passages from the voluminous Historiae philippicae et toiius mundi origines et terrae situs, written in the time of Augustus by Pompeius Trogus (q.v.). The work of Trogus is lost; but the prologi or arguments of the text are preserved by Pliny and other writers. Although the main theme of Trogus was the rise and history of the Macedonian monarchy, Justin yet permitted himself con- siderable freedom of digression, and thus produced a capricious anthology instead of a regular epitome of the work. As it stands, however, the history contains much valuable information. The style, though far from perfect, is clear and occasionally elegant. The book was much used in the middle ages, when the author was sometimes confounded with Justin Martyr.

Ed. princeps (1470) ; J. G. Graevius (1668) ; J. F. Gronovius (1719) ; C. H. Frotscher (1 827-1 830) ; J. Jeep (1 859) ; F. Riihl (1886, with pro- logues) ; see also J. F. Fischer, De elocutione Justini (1868) ; F. Riihl, Die Verbreitung des J. im Mittelalter (1871); O. Eichert, Worterbuch zu J. (1881); Kohler and Riihl in Neue Jahrbucher fur Philologie, xci., ci., cxxxiii. There are translations in the chief European languages; in English by A. Goldyng (1564); R. Codrington (1682); Brown-Dykes (1712); G. Turnbull (1746); J. Clarke (1790); J. S. Watson (1853).

JUSTINIAN I. (483-565). Flavius Anicius Justinianus, sur- named the Great, the most famous of all the emperors of the Eastern Roman Empire, was by birth a barbarian, native of a place called Tauresium in the district of Dardania, a region of Illyricum, 1 and was born, most probably, on the 1 1 th of May 483. His family has been variously conjectured, on the strength of the proper names which its members are stated to have borne, to have been Teutonic or Slavonic. The latter seems the more probable view. His own name was originally Uprauda. 2 Justini- anus was a Roman name which he took from his uncle Justin I., who adopted him, and to whom his advancement in life was due. Of his early life we know nothing except that he went to Con- stantinople while still a young man, and received there an excellent education. Doubtless he knew Latin before Greek; it is alleged that he always spoke Greek with a barbarian accent.

When Justin ascended the throne in 518, Justinian became at once a person of the first consequence, guiding, especially in church matters, the policy of his aged, childless and ignorant uncle, receiving high rank and office at his hands, and soon coming to be regarded as his destined successor. On Justin's death in 527, having been a few months earlier associated with him as co- emperor, Justinian succeeded without opposition to the throne. About 523 he had married the famous Theodora (q.v.), who, as empress regnant, was closely associated in all his actions till her death in 547.

Justinian's reign was filled with great events, both at home and abroad, both in peace and in war. They may be classed under four heads: (1) his legal reforms; (2) his administration of the empire; (3) his ecclesiastical policy; and (4) his wars and foreign policy generally.

1. It is as a legislator and codifier of the law that Justinian's name is most familiar to the modern world; and it is therefore this department of his action that requires to be most fully dealt with here. He found the law of the Roman empire in a state of great confusion. It consisted of two masses, which were usually distinguished as old law (jus vetus) and new law (jus novum). The first of these comprised: (i.) all such of the statutes (leges) passed under the republic g.nd early empire as had not become obsolete; (ii.) the decrees of the senate (senalus consulta) passed at the end of the republic and during the first two centuries of the empire; (iii.) the writings of the jurists of the later republic and of the empire, and more particularly of those jurists to whom the right of declaring the law with authority (jus respondendi) had been committed by the emperors. As these jurists had in their commentaries upon the leges, senatus consulta and edicts of the magistrates practically incorporated all that was of importance in those documents, the books of the jurists may substantially be taken as including (i.) and (ii.). These writings were of course very numerous, and formed a vast mass of literature. . Many of them had become exceedingly scarce — many had been altogether lost. Some were of doubtful authenticity. They were so costly that no person of moderate means could hope to possess any large number; even the public libraries had nothing approaching to a complete collection. Moreover, as they proceeded from a large number of independent authors, who wrote expressing their own opinions, they contained many discrepancies and contradictions, the dicta of one writer being controverted by another, while yet both writers might enjoy the same formal authority. A remedy had been attempted to be applied to this evil by a law of the

1 It is commonly identified with the modern Kiistendil, but Uskiib (the ancient Skupi) has also been suggested. See Tozer, Highlands of European Turkey, ii. 370.

2 The name Uprauda is said to be derived from the word prauda, which in Old Slavic means jus, justitia, the prefix being simply a breathing frequently attached to Slavonic names.

emperors Theodosius II. and Valentinian III., which gave special weight to the writings of five eminent jurists (Papinian, Paulus, Ulpian, Modestinus, Gaius); but it was very far from removing it. As regards the jus vetus, therefore, the judges and practi- tioners of Justinian's time had two terrible difficulties to contend with — first, the bulk of the law, which made it impossible for any one to be sure that he possessed anything like the whole of the authorities bearing on the point in question, so that he was always liable to find his opponent quoting against him some authority for which he could not be prepared; and, secondly, the uncer- tainty of the law, there being a great many important points on which differing opinions of equal legal validity might be cited, so that the practising counsel could not advise, nor the judge decide, with any confidence that he was right, or that a superior court would uphold his view.

The new law (Jus novum), which consisted of the ordinances of the emperors promulgated during the middle and later empires (edicta, rescripta, mandata, decreta, usually called by the general name of constitutiones) , was in a condition not much better. These ordinances or constitutions were extremely numerous. No complete collection of them existed, for although two collec- tions (Codex gregorianus and Codex hermogenianus) had been made by two jurists in the 4th century, and a large supple- mentary collection published by the emperor Theodosius II. in 438 (Codex theodosianus) , these collections did not include all the constitutions; there were others which it was necessary to ob- tain separately, but many whereof it must have been impossible for a private person to procure. In this branch too of the law there existed some, though a less formidable, uncertainty; for there were constitutions which practically, if not formally, repealed or superseded others without expressly mentioning them, so that a man who relied on one constitution might find that it had been varied or abrogated by another he had never heard of or on whose sense he had not put such a construction. It was therefore clearly necessary with regard to both the older and the newer law to take some steps to collect into one or more bodies or masses so much of the law as was to be regarded as binding, reducing it within a reasonable compass, and purging away the contradictions or inconsistencies which it contained. The evil had been long felt, and reforms apparently often proposed, but nothing (except by the compilation of the Codex theodosianus) had been

done till Justinian's time. Immediately after his accession, in 528, he appointed a commission to deal with the imperial constitutions (jus novum), this being the easier part of the problem. The commissioners, ten in number, were directed to go through all the constitutions of which copies existed, to select such as were of practical value, to cut these down by retrenching all unnecessary matter, and gather them, arranged in'order of date, into one volume, getting rid of any contradictions by omitting one or other of the conflicting passages. 1 These statute law commissioners, as one may call them, set to work forthwith, and completed their task in fourteen months, dis- tributing the constitutions which they placed in the new collec- tion into ten books, in general conformity with the order of the Perpetual Edict as settled by Salvius Julianus and enacted by Hadrian. By this means the bulk of the statute law was immensely reduced, its obscurities and internal discrepancies in great measure removed, its provisions adapted, by the abrogation of what was obsolete, to the circumstances of Justinian's own time. This Codex constitutionum was formally promulgated and enacted as one great consolidating statute in 529, all imperial ordinances not included in it being repealed at one stroke.

The success of this first experiment encouraged the emperor to attempt the more difficult enterprise of simplifying and digesting the older law contained in the treatises of the jurists. Before entering on this, however, he wisely took the preliminary step of settling the more important of the legal questions as to which the older jurists had been divided in opinion, and which had therefore remained sources of difficulty, a difficulty aggra-

1 See, for an account of the instructions given to the commission, the constitution Haec quae, prefixed to the revised Codex in the Corpus juris civilii.

vated by the general decline, during the last two centuries, of the level of forensic and judicial learning. This was accomplished by a series of constitutions known as the "Fifty Decisions" (Quinquaginta decisiones), along with which there were published other ordinances amending the law in a variety of points, in which old and now inconvenient rules had been suffered to subsist. Then in December 530 a new commission was appointed, con- sisting of sixteen eminent lawyers, of whom the president, the famous Tribonian (who had already served on the previous com- mission), was an exalted official (quaestor), four were professors of law, and the remaining eleven practising advocates. The instructions given to them by the emperor were as follows: — they were to procure and peruse all the writings of all the author- ized jurists (those who had enjoyed tht jus respondendi) ; were to extract from these writings whatever was of most permanent and substantial value, with power to change the expressions of the author wherever conciseness or clearness would be thereby promoted,

or wherever such a change was needed in order to adapt his language to the condition of the law as it stood in Justinian's time; were to avoid repetitions and contradictions by giving only one statement of the law upon each point; were to insert nothing at variance with any provision contained in the Codex constitutionum; and were to distribute the results of their labours into fifty books, subdividing each book into titles, and following generally the order of the Perpetual Edict. 2

These directions were carried out with a speed which is surpris- ing when we remember not only that the work was interrupted by the terrible insurrection which broke out in Constantinople in January 532, and which led to the temporary retirement from office of Tribonian, but also that the mass of literature which had to be read through consisted of no less than two thousand treat- ises, comprising three millions of sentences. The commissioners, who had for greater despatch divided themselves into several com- mittees, presented their selection of extracts to the emperor in 533, and he published it as an imperial statute on December 16th of that year, with two prefatory constitutions (those known as Omnem reipublicae and Dedit nobis). It is the Latin volume which we now call the Digest (Digesta) or Pandects (liavSeKrai) and which is by far the most precious monument of the legal genius of the Romans, and indeed, whether one regards the intrin- sic merits of its substance or the prodigious influence it has exerted and still exerts, the most remarkable law-book that the world has seen. The extracts comprised in it are 9123 in number, taken from thirty-nine authors, and are of greatly varying length, mostly only a few lines long. About one-third (in quantity) come from Ulpian, a very copious writer; Paulus stands next. To each extract there is prefixed the name of the author, and of the treatise whence it is taken. 3 The worst thing about the Digest is its highly unscientific arrangement. The order of the Perpetual Edict, which appears to have been taken as a sort of model for the general scheme of books and titles, was doubtless convenient to the Roman lawyers from their familiarity with it, but was in itself rather accidental and historical than logical. The dis- position of the extracts inside each title was still less rational; it has been shown by a modern jurist to have been the result of the way in which the committees of the commissioners worked through the books they had to peruse. 4 In enacting the Digest as a law book, Justinian repealed all the other law contained in the treatises of the jurists (that jus vetus which has been already mentioned), and directed that those treatises should never be cited in future even by way of illustration; and he of course at the same time abrogated all the older statutes, from the Twelve Tables downwards, which had formed a part of the jus vetus. This was a necessary incident of his scheme of reform. But he went

2 See the constitution Deo auclore (Cod. i. 17, 1).

3 In the middle ages people used to cite passages by the initial words; and the Germans do so still, giving, however, the number of the paragraph in the extract (if there are more paragraphs than one), and appending the number of the book and title. We in Britain and America usually cite by the numbers of the book, the title and the paragraph, without referring to the initial words.

4 See Bluhme, " Die Ordnung der Fragmente in den Pandekten- titeln," in Savigny's Zeitschr. f. gesch. Reehtswissenschaft, vol. iv.

too far, and indeed attempted what was impossible, when he forbade all commentaries upon the Digest. He was obliged to allow a Greek translation to be made of it, but directed this translation to be exactly literal.

These two great enterprises had substantially despatched Justinian's work; however, he, or rather Tribonian, who seems to have acted both as his adviser and as his chief executive officer in all legal affairs, conceived that a third book was needed, viz. an elementary manual for beginners which should present an outline of the law in a clear and simple form. The little work of Gaius, most of which we now possess under the title of Com- mentarii institutionum, had served this purpose for nearly four centuries; but much of it had, owing to changes in the law, be- come inapplicable, so that a new manual seemed to be required. Justinian accordingly directed Tribonian, with two coadjutors, Theophilus, professor of law in the university of Constantinople, and Dorotheus, professor in the great law school at Beyrout, to prepare an elementary textbook on the lines of Gaius. This they did while the Digest was in progress, and produced the useful little treatise which has ever since been the book with which students commonly begin their studies of Roman law, the Insti- tutes of Justinian. It was published as a statute with full legal validity shortly before the Digest. Such merits as it possesses — simplicity of arrangement, clearness and conciseness of expres- sion — belong less to Tribonian than to Gaius, who was closely followed wherever the alterations in the law had not made him obsolete. However, the spirit of that great legal classic seems to have in a measure dwelt with and inspired the inferior men who were recasting his work ; the Institutes is better both in Latinity and in substance than we should have expected from the con- dition of Latin letters at that epoch, better than the other laws which emanate from Justinian.

In the four years and a half which elapsed between the publica- tion of the Codex and that of the Digest, many important changes had been made in

the law, notably by the publication of the " Fifty Decisions," which settled many questions that had exer- cised the legal mind and given occasion to intricate statutory provisions. It was therefore natural that the idea should present itself of revising the Codex, so as to introduce these changes into it, for by so doing, not only would it be simplified, but the one volume would again be made to contain the whole statute law, whereas now it was necessary to read along with it the ordinances issued since its publication. Accordingly another commission was appointed, consisting of Tribonian with four other coadjutors, full power being given them not only to incorporate the new constitutions with the Codex and make in it the requisite changes, but also to revise the Codex generally, cutting down or filling in wherever they thought it necessary to do so. This work was completed in a few months; and in November 534 the revised Codex (Codex repetitae praelectionis) was promulgated with the force of law, prefaced by a con- stitution (Cordi nobis) which sets forth its history, and declares it to be alone authoritative, the former Codex being abrogated. It is this revised Codex which has come down to the modern world, all copies of the earlier edition having disappeared.

The constitutions contained in it number 4652, the earliest dating from Hadrian, the latest being of course Justinian's own. A few thus belong to the period to which the greater part of the Digest belongs, i.e. the so-called classical period of Roman law down to the time of Alexander Severus (244) ; but the great majority are later, and belong to one or other of the four great eras of imperial legislation, the eras of Diocletian, of Constantine, of Theodosius II., and of Justinian himself. Although this Codex is said to have the same general order as that of the Digest, viz. the order of the Per- petual Edict, there are considerable differences of arrangement between the two. It is divided into twelve books. Its contents, although of course of the utmost practical importance to the lawyers of that time, and of much value still, historical as well as legal, are far less interesting and scientifically admirable than the extracts preserved in the Digest. The difference is even greater than that between the English reports of cases decided since the days of Lord Holt and the English acts of parliament for the same two centuries.

The emperor's scheme was now complete. All the Roman law had been gathered into two volumes of not excessive size, and a satisfactory manual for beginners added. But Justinian and Tribo- nian had grown so fond of legislating that they found it hard to leave

off. Moreover, the very simplifications that had been so far effected brought into view with more clearness such anomalies or pieces of injustice as still continued to deform the law. Thus no sooner had the work been rounded off than fresh excrescences beganto be created by the publication of new

laws. Between 534 and 565 Justinian issued a great number of ordinances, dealing with all sorts of sub- jects and seriously altering the law on many points — the majority appearing before the death of Tribonian, which happened in 545. These ordinances are called, by way of distinction, new constitu- tions, Novellae constitutiones post codicem (veapal Siara^), Novels. Although the emperor had stated in publishing the Codex that all further statutes (if any) would be officially collected, this promise does not seem to have been redeemed. The three collections of the Novels which we possess are apparently private collections, nor do we even know how many such constitutions were promulgated. One of the three contains 168 (together with 13 Edicts), but some of these are by the emperors Justin II. and Tiberius II. Another, the so-called Epitome of Julian, contains 125 Novels in Latin; and the third, the Liber authenticarum or vulgata versio, has 134, also in Latin. This last was the collection first known and chiefly used in the West during the middle ages; and of its 134 only 97 have been written on by the glossatores or medieval commentators ; these there- fore alone have been received as binding in those countries which recognize and obey the Roman law, — according to the maxim Quicpiid non agnoscit glossa, nee agnoscit curia. And, whereas Justinian's constitutions contained in the Codex were all issued in Latin, the rest of the book being in that tongue, these Novels were nearly all published in Greek, Latin translations being of course made for the use of the western provinces. They are very bulky, and with the exception of a few, particularly the 1 1 6th and 11 8th, which introduce the most sweeping and laudable reforms into the law of intestate succession, are much more interesting, as supplying materials for the history of the time, social, economical and eccle- siastical, than in respect of any purely legal merits. They may be found printed in any edition of the Corpus juris civilis.

This Corpus juris, which bears and immortalizes Justinian's name, consists of the four books described above: (1) The authorized collection of imperial ordinances (Codex constitutionum) ; (2) the authorized collection of extracts from the great jurists (Digesta or Pandectae) ; (3) the elementary handbook (Institutiones) ; (4) the unauthorized collection of constitutions subsequent to the Codex (Novellae).

From what has been already stated, the reader wHl perceive that Justinian did not, according to a strict use of terms, codify the Roman law. By a codification we understand the reduction of the whole pre-existing body of law to a new form, the re-stating it in a series of propositions, scientifically ordered, which may or may not contain some new substance, but are at any rate new in form. If he had, so to speak, thrown into one furnace all the law contained in the treatises of the jurists and in the imperial ordinances, fused them down, the gold of the one and the silver of the other, and run them out into new moulds, this would have been

codification. What he did do was something quite different. It was not codification but consolidation, not remoulding but abridging. He made extracts from the existing law, preserving the old words, and merely cutting out repetitions, removing con- tradictions, retrenching superfluities, so as immensely to reduce the bulk of the whole. And he made not one set of such extracts but two, one for the jurist law, the other for the statute law. He gave to posterity not one code but two digests or collections of extracts, which are new only to this extent that they are arranged in a new order, having been previously altogether unconnected with one another, and that here and there their words have been modified in order to bring one extract into harmony with some other. Except for this, the matter is old in expression as well as in substance.

Thus regarded, even without remarking that the Novels, never having been officially collected, much less incorporated with the Codex, mar the symmetry of the structure, Justinian's work may appear to entitle him and Tribonian to much less credit than they have usually received for it. But let it be observed, first, that to reduce the huge and confused mass of pre-existing law into the compass of these two collections was an immense practical benefit to the empire; secondly, that, whereas the work which he under- took was accomplished in seven years, the infinitely more difficult task of codification might probably have been left unfinished at Tribonian's death, or even at Justinian's own, and been aban- doned by his successor; thirdly, that in the extracts preserved in the Digest we have the opinions of the greatest legal luminaries given in their own admirably lucid, philosophical and concise

language, while in the extracts of which the Codex is composed we find valuable historical evidence bearing on the administra- tion and social condition of the later Pagan and earlier Christian empire; fourthly, that Justinian's age, that is to say, the intellect of the men whose services he commanded, was quite unequal to so vast an undertaking as the fusing upon scientific principles into one new organic whole of the entire law of the empire. With sufficient time and labour the work might no doubt have been done; but what we possess of Justinian's own legislation, and still more what we know of the general condition of literary and legal capacity in his time, makes it certain that it would not have been well done, and that the result would have been not more valuable to the Romans of that age, and much less valuable to the modern world, than are the results, preserved in the Digest and the Codex, of what he and Tribonian actually did.

To the merits of the work as actually performed some reference has already been made. The chief defect of the Digest is in point of scientific arrangement, a matter about which the Roman lawyers, perhaps one may say the ancients generally, cared very little. There are some repetitions and some inconsistencies, but not more than may fairly be allowed for in a compilation of such magnitude executed so rapidly. Tribonian has been blamed for the insertions the compilers made in the sentences of the old jurists (the so-called Emblemata Triboniani) ; but it was a part of Justinian's plan that such insertions should be made, so as to adapt those sentences to the law as settled in the emperor's time. On Justinian's own laws, contained in the Codex and in his Novels, a somewhat less favourable judgment must be pro- nounced. They, and especially the latter, are diffuse and often lax in expression, needlessly prolix, and pompously rhetorical. The policy of many, particularly of those which deal with ecclesi- astical matters, may also be condemned; yet some gratitude is due to the legislator who put the law of intestate succession on that plain and rational footing whereon it has ever since con- tinued to stand. It is somewhat remarkable that, although Justinian is so much more familiar to us by his legislation than by anything else, this sphere of his imperial labour is hardly referred to by any of the contemporary historians, and then only with censure. Procopius complains that he and Tribonian were always repealing old laws and enacting new ones, and accuses them of venal motives for doing so.

The Corpus Juris of Justinian continued to be, with naturally a few additions in the ordinances of succeeding emperors, the chief law-book of the Roman world till the time of the Macedonian dynasty when, towards the end of the 9th century, a new system was prepared and issued by those sovereigns, which we know as the Basilica. It is of course written in Greek, and consists of parts of the substance of the Codex and the Digest, thrown together and often altered in expression, together with some matter from the Novels and imperial ordinances posterior to Justinian. In the western provinces, which had been wholly severed from the empire before the publication of the Basilica, the law as settled by Justinian held its ground; but copies of the Corpus Juris were extremely rare, nor did the study of it revive until the end of the nth century.

The best edition of the Digest is that of Mommsen (Berlin 1868-1870), and of the Codex that of Kriiger (Berlin 1875-1877).

2. In his financial administration of the empire, Justinian is represented to us as being at once rapacious and extravagant. His unwearied activity and inordinate vanity led him to under- take a great many costly public works, many of them, such as the erection of palaces and churches, unremunerative. The money needed for these, for his wars, and for buying

off the barbarians who threatened the frontiers, had to be obtained by increasing the burdens of the people. They suffered, not only from the regular taxes, which were seldom remitted even after bad seasons, but also from monopolies; and Procopius goes so far as to allege that the emperor made a practice of further recruiting his treasury by confiscating on slight or fictitious pretexts the property of persons who had displeased Theodora or himself. Fiscal severities were no doubt one cause of the insurrections which now and then broke out, and in the gravest of which, (532) thirty thousand persons are said to have perished in the capital. It is not always easy to discover, putting together the trustworthy evidence of Justinian's own laws and the angry

complaints of Procopius, what was the nature and justification of the changes made in the civil administration. But the general conclusion seems to be that these changes were always in the direction of further centralization, increasing the power of the chief ministers and their offices, bringing all more directly under the control of the Crown, and in some cases limiting the powers and appropriating the funds of local municipalities. Financial necessities compelled retrenchment, so that a certain number of offices were suppressed altogether, much to the dis- gust of the office-holding class, which was numerous and wealthy, and had almost come to look on the civil service as its hereditary possession. The most remarkable instance of this policy was the discontinuance of the consulship. This great office had re- mained a dignity centuries after it had ceased to be a power; but it was a very costly dignity, the holder being expected to spend large sums in public displays. As these sums were provided by the state, Justinian saved something considerable by stopping the payment. He named no consul after Basilius, who was the name-giving consul of 541.

In a bureaucratic despotism the greatest merit of a sovereign is to choose capable and honest ministers. Justinian's selections were usually capable, but not so often honest; probably it was hard to find thoroughly upright officials; possibly they would not have been most serviceable in carrying out the imperial will, and especially in replenishing the imperial treasury. Even the great Tribonian labours under the reproach of corruption, while the fact that Justinian maintained John of Cappadocia in power long after his greed, his unscrupulousness, and the excesses of his private life had excited the anger of the whole empire, reflects little credit on his own principles of government and sense of duty to his subjects. The department of administration in which he seems to have felt most personal interest was that of public works. He spent immense sums on buildings of all sorts, on quays and harbours, on fortifications, repairing the walls of cities and erecting castles in Thrace to check the inroads of the barbarians, on aqueducts, on monasteries, above all, upon churches. Of these works only

two remain perfect, St Sophia in Constantinople, now a mosque, and one of the architectural wonders of the world, and the church of SS Sergius and Bacchus, now commonly called Little St Sophia, which stands about half a mile from the great church, and is in its way a very delicate and beautiful piece of work. The church of S. Vitale at Ravenna, though built in Justinian's reign, and containing mosaic pictures of him and Theodora, does not appear to have owed anything to his mind or purse.

3. Justinian's ecclesiastical policy was so complex and varying that it is impossible within the limits of this article to do more than indicate its bare outlines. For many years before the accession of his uncle Justin, the Eastern world had been vexed by the struggles of the Monophysite party, who recognized only one nature in Christ, against the view which then and ever since has maintained itself as orthodox, that the divine and human natures coexisted in Him. The latter doctrine had triumphed at the council of Chalcedon, and was held by the whole Western Church, but Egypt, great part of Syria and Asia Minor, and a considerable minority even in Constantinople clung to Monophy- sitism. The emperors Zeno and Anastasius had been strongly suspected of it, and the Roman bishops had refused to communi- cate with the patriarchs of Constantinople since 484, when they had condemned Acacius for accepting the formula of conciliation issued by Zeno. One of Justinian's first public acts was to put an end to this schism by inducing Justin to .make the then patri- arch renounce this formula and declare his full adhesion to the creed of Chalcedon. When he himself came to the throne he endeavoured to persuade the Monophysites to come in by sum- moning some of their leaders to a conference. This failing, he ejected suspected prelates, and occasionally persecuted them, though with far less severity than that applied to the heretics of a deeper dye, such as Montanists or even Arians. Not long after- wards, his attention having been called to the spread of Origen- istic opinions in Syria, he issued an edict condemning fourteen propositions drawn from the writings of the great Alexandrian,

and caused a synod to be held under the presidency of Mennas (whom he had named patriarch of Constantinople) , which renewed the condemnation of the impugned doctrines and anathematized Origen himself. Still later, he was induced by the machinations of some of the prelates who haunted his court, and by the influence of Theodora, herself much interested in theological questions, and more than suspected of Monophysitism, to raise a needless, mischievous, and protracted controversy. The Monophysites sometimes alleged that they could not

accept the decrees of the council of Chalcedon because that council had not condemned, but (as they argued) virtually approved, three writers tainted with Nestorian principles, Theodore of Mopsuestia, Theodoret, and Ibas, bishop of Edessa. It was represented to the emperor, who was still pursued by the desire to bring back the schismatics, that a great step would have been taken towards reconciliation if a condemnation of these teachers, or rather of such of their books as were complained of, could be brought about, since then the Chalcedonian party would be purged from any appearance of sympathy with the errors of Nestorius. Not stopping to reflect that in the angry and suspicious state of men's minds he was sure to lose as much in one direction as he would gain in the other, Justinian entered into the idea, and put forth an edict exposing and denouncing the errors contained in the writings of Theodore generally, in the treatise of Theodoret against Cyril of Alexandria, and in a letter of Bishop Ibas (a letter whose authenticity was doubted, but which passed under his name) to the Persian bishop Maris. This edict was circulated through the Christian world to be subscribed by the bishops. The four Eastern patriarchs, and the great majority of the Eastern prelates generally, subscribed, though reluctantly, for it was felt that a dangerous precedent was being ,set when dead authors were anathematized, and that this new movement could hardly fail to weaken the authority of the council of Chalcedon. Among the Western bishops, who were less disposed both to Monophysitism and to subservience, and especially by those of Africa, the edict was earnestly resisted. When it was found that Pope Vigilius did not forthwith comply, he was summoned to Constantinople. Even there he resisted, not so much, it would seem, from any scruples of his own, for he was not a high-minded man, as because he knew that he dared not return to Italy if he gave way. Long disputes and negotia- tions followed, the end of which was that Justinian summoned a general council of the church, that which we reckon the Fifth, which condemned the impugned writings, and anathematized several other heretical authors. Its decrees were received in the East but long contested in the Western Church, where a schism arose that lasted for seventy years. This is the controversy known as that of theThree Chapters (Tria capitula,rpla Kea\aia) , apparently from the three propositions or condemnations con- tained in Justinian's original edict, one relating to Theodore's writings and person, the second to the incriminated treatise of Theodoret (whose person was not attacked), the third to the letter (if genuine) of Ibas (see Hefele, Conciliengeschichte, ii. 777). At the very end of his long career of theological discussion, Justinian himself lapsed into heresy, by accepting the d6ctrine that the earthly body of Christ was incorruptible, insensible to the weaknesses of the' flesh, a doctrine which had been advanced by Julian, bishop of Halicarnassus, and went by the name of Aphthartodocetism. According to his usual practice, he issued an edict enforcing this view, and requiring all patriarchs, metro- politans, and

bishops to subscribe to it. Some, who not un- naturally held that it was rank Monophysitism, refused at once, and were deprived of their sees, among them Eutychius the eminent patriarch of Constantinople. Others submitted or temporized; but before there had been time enough for the matter to be carried through, the emperor died, having tarnished if not utterly forfeited by this last error the reputation won by a life devoted to the service of Orthodoxy.

As no preceding sovereign had been so much interested in church affairs, so none seems to have shown so much activity as a persecutor both of pagans and of heretics. He renewed with additional stringency the laws against both these classes. The former embraced a large part of the rural population in certain

secluded districts, such as parts of Asia Minor and Pelopon- nesus; and we are told that the efforts directed against them resulted in the forcible baptism of 70,000 persons in Asia Minor alone. Paganism, however, survived; we find it in Laconia in the end of the 9th century, and in northern Syria it has lasted till our own times. There were also a good many crypto-pagans among the educated population of the capital. Procopius, for instance, if he was not actually a Pagan, was certainly very little of a Christian. Inquiries made in the third year of Justinian's reign drove nearly all of these persons into an outward conformity, and their offspring seem to have become ordinary Christians. At Athens, the philosophers who taught in the schools hallowed by memories of Plato still openly professed what passed for Paganism, though it was really a body of moral doctrine, strongly tinged with mysticism, in which there was far more of Christianity and of the speculative metaphysics of the East than of the old Olympian religion. Justinian, partly from religious motives, partly because he discountenanced all rivals to the imperial university of Constantinople, closed these Athenian schools (529). The professors sought refuge at the court of Chosroes, king of Persia, but were soon so much disgusted by the ideas and practices of the fire- worshippers that they re- turned to the empire, Chosroes having magnanimously obtained from Justinian a promise that they should be suffered to pass the rest of their days unmolested. Heresyprovedmoreobstinate. The severities directed against the Montanists of Phrygia led to a furious war, in which most of the sectaries perished, while the doctrine was not extinguished. Harsh laws provoked the Samaritans to a revolt, from whose effects Palestine had not recovered when conquered by the Arabs in the following century. The Nestorians and the Eutychian Monophysites were not threa- tened with such severe civil penalties, although their worship was interdicted, and their bishops were sometimes banished; but this vexatious treatment was quite enough to keep them dis- affected, and the rapidity of the Mahommedan conquests may be partly traced to that alienation of the bulk of the

Egyptian and a large part of the Syrian population which dates from Justinian's persecutions.

4. Justinian was engaged in three great foreign wars, two of them of his own seeking, the third a legacy which nearly every emperor had come into for three centuries, the secular strife of Rome and Persia. The Sassanid kings of Persia ruled a dominion which extended from the confines of Syria to those of India, and from the straits of Oman to the Caucasus. The martial char- acter of their population made them formidable enemies to the Romans, whose troops were at this epoch mainly barbarians, the settled and civilized subjects of the empire being as a rule averse from war. When Justinian came to the throne, his troops were maintaining an unequal struggle on the Euphrates against the armies of Kavadh I. (q.v.). After some campaigns, in which the skill of Belisarius obtained considerable successes, a peace was concluded in 533 with Chosroes I. (q.v.). This lasted till S39, when Chosroes declared war, alleging that Justinian had been secretly intriguing against him with the Hephthalite Huns, and doubtless moved by alarm and envy at the victories which the Romans had been gaining in Italy. The emperor was too much occupied in the West to be able adequately to defend his eastern frontier. Chosroes advanced into Syria with little resistance, and in 540 captured Antioch, then the greatest city in Asia, carrying off its inhabitants into captivity. The war continued with varying fortunes for four years more in this quarter ; while in the meantime an even fiercer struggle had begun in the mountainous region inhabited by the Lazi at the south- eastern corner of the Black Sea (see Colchis). When after two-and-twenty years of fighting no substantial advantage had been gained by either party, Chosroes agreed in 562 to a peace which left Lazica to the Romans, but under the dishonourable condition of their paying 30,000 pieces of gold annually to the Persian king. Thus no result of permanent importance flowed from these Persian wars, except that they greatly weakened the Roman Empire, increased Justinian's financial embarrassments, and prevented him from prosecuting with sufficient vigour his

enterprises in the West. (See further Persia: Ancient History, " The Sassanid Dynasty.")

These enterprises had begun in 533 with an attack on the Vandals, who were then reigning in Africa. Belisarius, des- patched from Constantinople with a large fleet and army, landed without opposition, and destroyed the barbarian power in two engagements. North Africa from beyond the straits

of Gibraltar to the Syrtes became again a Roman province, although the Moorish tribes of the interior maintained a species of indepen- dence; and part of southern Spain was also recovered for the empire. The ease with which so important a conquest had been effected encouraged Justinian to attack the Ostrogoths of Italy, whose kingdom, though vast in extent, for it included part of south-eastern Gaul, Raetia, Dalmatia and part of Pannonia, as (veil as Italy, Sicily, Sardinia and Corsica, had been grievously weakened by the death first of the great Theodoric, and some years later of his grandson Athalaric, so that the Gothic nation was practically without a head. Justinian began the war in 535, taking as his pretext the murder of Queen Amalasuntha, daughter of Theodoric, who had placed herself under his pro- tection, and alleging that the Ostrogothic kingdom had always owned a species of allegiance to the emperor at Constantinople. There was some foundation for this claim, although of course it could not have been made effective against Theodoric, who was more powerful than his supposed suzerain. Belisarius, who had been made commander of the Italian expedition, overran Sicily, reduced southern Italy, and in 536 occupied Rome. Here he was attacked in the following year by Vitiges, who had been chosen king by the Goths, with a greatly superior force. After a siege of over a year, the energy, skill, and courage of Belisarius, and the sickness which was preying on the Gothic troops, obliged Vitiges to retire. Belisarius pursued his diminished army northwards, shut him up in Ravenna, and ultimately received the surrender of that impregnable city. Vitiges was sent prisoner to Constanti- nople, where Justinian treated him, as he had previously treated the captive Vandal king, with clemency. The imperial adminis- tration was established through Italy, but its rapacity soon began to excite discontent, and the kernel of the Gothic nation had not submitted. After two short and unfortunate reigns, the crown had been bestowed on Totila or Baduila, a warrior of distinguished abilities, who by degrees drove the imperial generals and governors out of Italy. Belisarius was sent against him, but with forces too small for the gravity of the situation. He moved from place to place during several years, but saw city after city captured by or open its gates to Totila, till only Ravenna, Otranto and Ancona remained. Justinian was occupied by the ecclesiastical controversy of the Three Chapters, and had not the money to fit out a proper army and fleet; indeed, it may be doubted whether he would ever have roused himself to the necessary exertions but for the presence at Constantinople of a knot of Roman exiles, who kept urging him to reconquer Italy, representing that with their help and the sympathy of the people it would not be a difficult enterprise. The emperor at last complied, and in 552 a powerful army was despatched under Narses, an Armenian eunuch now advanced in life, but reputed the most skilful general of the age, as Belisarius was the hottest soldier. He marched along the coast of the Gulf of Venice, and encountered the army

of Totila at Taginae not far from Cesena. Totila was slain, and the Gothic cause irretrievably lost. The valiant remains of the nation made another stand under Teias on the Lactarian Hill in Campania; after that they disappear from history. Italy was recovered for the empire, but it was an Italy terribly impoverished and depopulated, whose possession carried little strength with it . Justinian's policy both in the Vandalic and in the Gothic War stands condemned by the result. The resources of the state, which might better have been spent in defending the northern frontier against Slavs and Huns and the eastern frontier against Persians, were consumed in the conquest of two countries which had suffered too much to be of any substantial value, and which, separated by language as well as by intervening seas, could not be permanently retained. However, Justinian must have been almost preternaturally wise to have foreseen this: his

conduct was in the circumstances only what might have been expected from an ambitious prince who perceived an opportunity of recovering territories that had formerly belonged to the empire, and over which its rights were conceived to be only suspended.

Besides these three great foreign wars, Justinian's reign was troubled by a constant succession of border inroads, especially on the northern frontier, where the various Slavonic and Hunnish tribes who were established along the lower Danube and on the north coast of the Black Sea made frequent marauding expedi- tions into Thrace and Macedonia, sometimes penetrating as far as the walls of Constantinople in one direction and the Isthmus of Corinth in another. Immense damage was inflicted by these marauders on the subjects of the empire, who seem to have been mostly too peaceable to defend themselves, and whom the emperor could not spare troops enough to protect. Fields were laid waste, villages burnt, large numbers of people carried into captivity; and on one occasion the capital was itself in danger.

5. It only remains to say something regarding Justinian's personal character and capacities, with regard to which a great diversity of opinion has existed among historians. The civilians, looking on him as a patriarch of their science, have as a rule extolled his wisdom and virtues; while ecclesiastics of the Roman Church, from Cardinal Baronius downwards, have been offended by his arbitrary conduct towards the popes, and by his last lapse into heresy, and have therefore been disposed to accept the stories which ascribe to him perfidy, cruelty, rapacity and extravagance. The difficulty of arriving at a fair conclusion is increased by the fact that Procopius, who is our chief authority for the events of his reign, speaks with a very different voice in his secret memoirs (the Anecdota) from that which he has used in his published history, and that some of the accusations con- tained in the former work are so rancorous and

improbable that a certain measure of discredit attaches to everything which it con- tains. The truth seems to be that Justinian was not a great ruler in the higher sense of the word, that is to say, a man of large views, deep insight, a capacity for forming just such plans as the circumstances needed, and carrying them out by a skilful adaptation of means to ends. But he was a man of considerable abilities, wonderful activity of mind, and admirable industry. He was interested in many things, and threw himself with ardour into whatever he took up; he contrived schemes quickly, and pushed them on with an energy which usually made them succeed when no long time was needed, for, if a project was delayed, there was a risk of his tiring of it and dropping it. Although vain and full of self-confidence, he was easily led by those who knew how to get at him, and particularly by his wife. She exercised over him that influence which a stronger character always exercises over a weaker, whatever their respective positions; and unfortunately it was seldom a good influence, for Theodora (q.v.) seems to have been a woman who, with all her brilliant gifts of intelli- gence and manner, had no principles and no pity. Justinian was rather quick than strong or profound; his policy does not strike one as the result of deliberate and well-considered views, but dictated by the hopes and fancies of the moment. His activity was in so far a misfortune as it led him to attempt too many things at once, and engage in undertakings so costly that oppression became necessary to provide the funds for them. Even his devotion to work, which excites our admiration, in the centre of a luxurious court, was to a great extent unprofitable, for it was mainly given to theological controversies which, neither he nor any one else could settle. Still, after making all deductions, it is plain that the man who accomplished so much, and kept the whole world so occupied, as Justinian did during the thirty-eight years of his reign, must have possessed no common abilities. He was affable and easy of approach to all his subjects, with a pleasant address; nor does he seem to have been, like his wife, either cruel or revengeful. We hear several times of his sparing those who had conspired against him. But he was not scrupulous in the means he employed, and he was willing to maintain in power detestable ministers if only they served him efficiently and filled his coffers. His chief passion, after that for his own fame and

glory, seems to have been for theology and religion; it was in this field that his literary powers exerted themselves (for he wrote controversial treatises and hymns), and his taste also, for among his numerous buildings the churches are those on which he spent most thought and money. Considering that his legal reforms are those by which his name is mainly known to posterity, it is curious that we should have hardly any information as to his

legal knowledge, or the share which he took in those reforms. In person he was somewhat above the middle height, well-shaped, with plenty of fresh colour in his cheeks, and an extraordinary power of doing without food and sleep. He spent most of the night in reading or writing, and would sometimes go for a day with no food but a few green herbs. Two mosaic figures of him exist at Ravenna, one in the apse of the church of S. Vitale, the other in the church of S. Apollinare in Urbe; but of course one cannot be sure how far in such a material the portrait fairly repre- sents the original. He had no children by his marriage with Theodora, and did not marry after her decease. On his death, which took place on the 14th of November 565, the crown passed to his nephew Justin II.

Authorities. — For the life of Justinian the chief authorities are Procopius (Historiae, De aedificiis, Anecdota) and (from 552 A.D.) the History of Agathias; the Chronicle of Johannes Malalas is also of value. Occasional reference must be made to the writings of Jordanes and Marcellinus, and even to the late compilations of Cedrenus and Zonaras. The Vita Justiniani of Ludewig or Ludwig (Halle, 1731), a work of patient research, is frequently referred to by Gibbon in his important chapters relating to the reign of Justinian, in the Decline and Fall (see Bury's edition, 1900). There is a Vie de Justinien by Isambert (2 vols., Paris, 1856). See also Hutton's Church of the Sixth Century (1897) ; J. B. Bury's Later Roman Empire (1889) ; Hodgkin's Italy and her Invaders (1880). (J. Br.)

JUSTINIAN II., Rhinotmetus (669-711), East Roman emperor 685-695 and 704-711, succeeded his father Constantine IV., at the age of sixteen. His reign was unhappy both at home and abroad. After a successful invasion he made a truce with the Arabs, which admitted them to the joint possession of Armenia, Iberia and Cyprus, while by removing 1 2,000 Christian Maronites from their native Lebanon, he gave the Arabs a command over Asia Minor of which they took advantage in 692 by conquering all Armenia. In 688 Justinian decisively defeated the Bulgarians. Meanwhile the bitter dissensions caused in the Church by the emperor, his bloody persecution of the Manichaeans, and the rapacity with which, through his creatures Stephanus and Theodatus, he extorted the means of gratifying his sumptuous tastes and his mania for erecting costly buildings, drove his subjects into rebellion. In 695 they rose under Leontius, and, after cutting off the emperor's nose (whence his surname), banished him to Cherson in the Crimea. Leontius, after a reign of three years, was in turn dethroned and imprisoned by Tiberius Absimarus, who next assumed the purple. Jus- tinian meanwhile had escaped from Cherson and married Theo- dora, sister of Busirus, khan of the Khazars. Compelled, however, by the intrigues of Tiberius, to quit his new home, he fled to Terbelis, king of the Bulgarians. With an army of 1 5,000 horsemen Justinian suddenly pounced upon Constantinople, slew his rivals Leontius and Tiberius, with

thousands of their partisans, and once more ascended the throne in 704. His second reign was marked by an unsuccessful war against Ter- belis, by Arab victories in Asia Minor, by devastating expedi- tions sent against his own cities of Ravenna and Cherson, where he inflicted horrible punishment upon the disaffected nobles and refugees, and by the same cruel rapacity towards his subjects. Conspiracies again broke out: Bardanes, sur- named Philippicus, assumed the purple, and Justinian, the last of the house of Heraclius, was assassinated in Asia Minor, December 711.

See E. Gibbon, Decline and Fall of the Roman Empire (ed. Bury, 1896), v. I79-i 8 3; J- B. Bury, The Later Roman Empire (1889), ii.

320-330, 358-367-

JUSTIN MARTYR, one of the earliest and ablest Christian apologists, was born about 100 at Flavia Neapolis (anc. Sichem), now Nablus, in Palestinian Syria (Samaria). His parents,

according to his own account, were Pagans {Dial. c. Tryph. 28). He describes the course of his religious development in the introduction to the dialogue with the Jew Trypho, in which he relates how chance intercourse with an aged stranger brought him to know the truth. Though this narrative is a mixture of truth and fiction, it may be said with certainty that a thorough study of the philosophy of Peripatetics and Pythagoreans, Stoics and Platonists, brought home to Justin the conviction that true knowledge was not to be found in them. On the other hand, he came to look upon the Old Testament prophets as approved by their antiquity, sanctity, mystery and prophecies to be interpreters of the truth. To this, as he tells us in another place {Apol. ii. 12), must be added the deep impression pro- duced upon him by the life and death of Christ. His conversion apparently took place at Ephesus; there, at any rate, he places his decisive interview with the old man, and there he had those discussions with Jews and converts to Judaism, the re- sults of which he in later years set down in his Dialogue. After his conversion he retained his philosopher's cloak (Euseb., Hist. Eccl. iv. 11. 8), the distinctive badge of the wandering pro- fessional teacher of philosophy, and went about from place to place discussing the truths of Christianity in the hope of bringing educated Pagans, as he himself had been brought, through philosophy to Christ. In Rome he made a fairly long stay, giving lectures in a class-room of his own, though not without opposition from his fellow-teachers. Among his opponents was the Cynic Crescentius {Apol. ii. 13). Eusebius {Hist. Eccl. iv. 16. 7-8) concludes somewhat hastily, from the statement of Justin and his disciple Tatian {Orat. ad Graec. 19), that the accusation of Justin before the authorities, which led to his death, was due to Crescentius. But we know, from the un- doubtedly genuine Acta SS Justini et sociorum, that Justin suffered the

death of a martyr under the prefect Rusticus between 163 and 167.

To form an opinion of Justin as a Christian and theologian, we must turn to his Apology and to the Dialogue with the Jew Trypho, for the authenticity of all other extant works attri- buted to him is disputed with good reason. The Apology — it is more correct to speak of one Apology than of two, for the second is only a continuation of the first, and dependent upon it — was written in Rome about 1 50. In the first part Justin defends his fellow-believers against the charge of atheism and hostility to the state. He then draws a positive demonstration of the truth of his religion from the effects of the new faith, and especially from the excellence of its moral teaching, and concludes with a comparison of Christian and Pagan doctrines, in which the latter are set down with naive confidence as the work of demons. As the main support of his proof of the truth of Christianity appears his detailed demonstration that the prophecies of the old dispensation, which are older than the Pagan poets and philo- sophers, have found their fulfilment in Christianity. A third part shows, from the practices of their religious worship, that the Christians had in truth dedicated themselves to God. The whole closes with an appeal to the princes, with a reference to the edict issued by Hadrian in favour of the Christians. In the so-called Second Apology, Justin takes occasion from the trial of a Christian recently held in Rome to argue that the inno- cence of the Christians was proved by the very persecutions.

Even as a Christian Justin always remained a philosopher. By his conscious recognition of the Greek philosophy as a pre- paration for the truths of the Christian religion, he appears as the first and most distinguished in the long list of those who have endeavoured to reconcile Christian with non-Christian culture. Christianity consists for him in the doctrines, guaran- teed by the manifestation of the Logos in the person of Christ, of God, righteousness and immortality, truths which have been to a certain extent foreshadowed in the monotheistic religious philosophies. In this process the conviction of the recon- ciliation of the sinner with God, of the salvation of the world and the individual through Christ, fell into the background before the vindication of supernatural truths intellectually conceived. Thus Justin may give the impression of having

rationalized Christianity, and of not having given it its full value as a religion of salvation. It must not, however, be forgotten that Justin is here speaking as the apologist of Christi- anity to an educated Pagan public, on whose philosophical view of life he had to base his arguments, and from

whom he could not expect an intimate comprehension of the religious position of Christians. That he himself had a thorough comprehension of it he showed in the Dialogue with the Jew Trypho. Here, where he had to deal with the Judaism that believed in a Messiah, he was far better able to do justice to Christianity as a revelation; and so we find that the arguments of this work are much more completely in harmony with primitive Christian theology than those of the Apology. He also displays in this work a consider- able knowledge of the Rabbinical writings and a skilful polemical method which was surpassed by none of the later anti- Jewish writers.

Justin is a most valuable authority for the life of the Christian Church in the middle of the 2nd century. While we have else- where no connected account of this, Justin's Apology contains a few paragraphs (61 seq.), which give a vivid description of the public worship of the Church and its method of celebrating the sacraments (Baptism and the Eucharist). And from this it is clear that though, as a theologian, Justin wished to go his own way, as a believing Christian he was ready to make his standpoint that of the Church and its baptismal confession of faith. His works are also of great value for the history of the New Testament writings. He knows of no canon of the New Testament, i.e. no fixed and inclusive collection of the apostolic writings. His sources for the teachings of Jesus are the " Memoirs of the Apostles," by which are probably to be under- stood the Synoptic Gospels (without the Gospel according to St John), which, according to his account, were read along with the prophetic writings at the public services. From his writings we derive the impression of an amiable personality, who is honestly at pains to arrive at an understanding with his opponents. As a theologian, he is of wide sympathies; as a writer, he is often diffuse and somewhat dull. There are not many traces of any particular literary influence of his writings upon the Christian Church, and this need not surprise us. The Church as a whole took but little interest in apolo- getics and polemics, nay, had at times even an instinctive feeling that in these controversies that which she held holy might easily suffer loss. Thus Justin's writings were not much read, and at the present time both the Apology and the Dialogue are preserved in but a single MS. (cod. Paris, 450, a.d. 1364).

Bibliography. — The editions of Robert litienne (Stephanus) (1551); H. Sylburg (1593); F. Morel (1615); Prudentius Maranuis (1742) are superseded by J. C. T. Otto, Justini philosophi et martyris opera quae feruntur omnia (3rd ed. 5 vols., Jena, 1876-1881). This edition contains besides the Apologies (vol. i.) and the Dialogue (vol. ii.) the following writings : Speech to the Greeks (Oratio) ; Address to the Greeks (Cohortatio) : On the Monarchy of God; Epistle to Diognetus; Fragments on the Resurrection and other Fragments; Exposition of the True Faith ; Epistle to Zenas and Serenus ; Refutation of certain Doctrines of A ristotle ;

Questions and A nswers to the Orthodox ; Questions of Christians to Pagans ; Questions of Pagans to Christians. None of these writings, not even the Cohortatio, which former critics ascribed to Justin, can be attributed to him. The authenticity of the Dialogue has occasionally been disputed, but without reason. For a handy edition of the Apology see G. Kriiger, Die Apologien Justins des Martyrers (3rd ed. Tubingen, 1904). There is a good German translation with a comprehensive commentary by H. Veil (1894). For English translations consult the " Oxford Library of the Fathers" and the " Ante-Nicene Library." Full information about Justin's history and views may be had from the following monographs: C. Semisch, Justin der Martyrer (2 vols., 1840-1842); J. Donaldson, A Critical History of Christian Literature and Doctrine, vol. 2 (1866); C. E. Freppel, St Justin (3rd ed., 1886); Moritz von Engelhardt, Das Christentum Justins des Martyrers (1878); T. M. Wehofer, Die Apologie Justins des Philosophen und Martyrers in litterarhistorischer Beziehung zum ersten Male untersucht (1897); Alfred Leonhard Feder, Justins des Martyrers Lehre von Jesus Christus (1906). On the critical questions raised by the spurious writings consult W. Gaul, Die Abfassungsverhallnisse der pseudo- justinischen Cohortatio ad Graecos (1902) ; Adolf Harnack, Diodor von Tarsus. Vier pseudo-justinische Schriften als Eigenlum Diodors nachgewiesen (1901). 'G. K.)

JUTE, a vegetable fibre now occupying a position in the manu- facturing scale inferior only to cotton and flax. The term jute appears to have been first used in 1 746, when the captain of the "Wake" noted in his log that he had sent on shore " 60 bales of gunney with all the jute rope" (New Eng. Diet. s.v.). In 1795 W. Roxburgh sent to the directors of the East India Company a bale of the fibre which he described as " the jute of the natives." Importations of the substance had been made at earlier times under the name of pat, an East Indian native term by which the fibre continued to be spoken of in England till the early years of the 19th century, when it was supplanted by the name it now bears. This modern name appears to be derived from jhot or jhout (Sansk. jhat), the vernacular name by which the substance is known in the Cuttack district, where the East India Company had extensive roperies when Roxburgh first used the term.

Fig. 1. — Capsules of Jute Plants, a, Corchorus capsularis;

b, C. olitorius.

The fibre is obtained from two species of Corchorus (nat. ord. Tiliaceae), C. capsularis and C. olitorius, the products of both being so essentially alike that neither in commerce nor agricul- ture is any distinction made between them. These and various other species of Corchorus are natives of Bengal,

where they have been cultivated from very remote times for economic purposes, although there is reason to believe that the cultivation did not originate in the northern parts of India. The two species cultivated for jute fibre are in all respects very similar to each other, except in their fructification and the relatively greater size attained by C. capsularis. They are annual plants from 5 to 10 ft. high, with a cylindrical stalk as thick as a man's finger, and hardly branching except near the top. The light- green leaves are from 4 to 5 in. long by i| in. broad above the base, and taper upward into a fine point ; the edges are serrated; the two lower teeth are drawn out into bristle-like points. The small whitish-yellow flowers are produced in clusters of two or three opposite the leaves.

The capsules or seed-pods in the case of C. capsularis are globular, rough and wrinkled, while in C. olitorius they are slender, quill-like cylinders (about 2 in. long), a very marked distinction, as may be noted from fig. 1, in which a and b show the capsules of C. capsularis and C. olitorius respectively. Fig. 2 represents a flowering top of C. olitorius.

Both species are cultivated in India, not only on account

of their fibre, but also fcr the sake of their leaves, which are there extensively used as a pot-herb. The use of C. olitorius for the latter purpose dates from very ancient times, it if may be identi- fied, as some suppose, with the mallows (J'^5) mentioned in Job xxx. 4; hence the name Jew's mallow. It is certain that the Greeks used this plant as a pot-herb; and by many other nations around the shores of the Mediterranean this use of it was, and is still, common. Throughout Bengal the name by which the plants when used as edible vegetables are recog- nized is nalila; when on the other hand they are spoken of as fibre-producers it is generally under the name pat. The culti- vation of C. capsidaris is most prevalent in central and eastern Bengal, while in the neighbourhood of Calcutta, where, however, the area under cultivation is limited, C. olitorius is principally grown. The fibre known as China jute or Tien-tsin jute is the product of another plant, Abutilon Avicennae, a member of the Mallow family.

Cultivation and Cropping. — Attempts have been made to grow the jute plant in America, Egypt, Africa and other places, but up to the present the fibre has proved much inferior to that obtained from plants grown in India. Here the cultivation of the plant extends from the Hugh through eastern and northern Bengal. The successful cultivation of the plant demands a hot, moist climate, with a fair amount of rain. Too much rain at the beginning

of the season is detrimental to the growth, while a very dry season is disastrous. The climate of eastern and northern Bengal appears to be ideal for the growth of the plant.

The quality of the fibre and the produce per acre depend in a measure on the preparation of the soil. The ground should be ploughed about four times and all weeds removed. The seed is then sown broadcast as in the case of flax. It is only within quite recent years that any attention has been paid to the selection of the seed. The following extract from Capital (Jan. 17, 1907) indicates the new interest taken in it.

" Jute seed experiments are being continued and the report for 1006 has been issued. The object of these experiments is, of course, to obtain a better class of jute seed by growing plants, especially for no other purpose than to obtain their seed. The agricultural department has about 300 maunds (25,000 ft) of selected seed for distribution this year. The selling price is to be Rs. 10 per maund. The agricultural department of the government of Bengal are now fully alive to the importance of fostering the jute industry by showing conclusively that attention to scientific agriculture will make two maunds of jute grow where only one maund grew before. Let them go on (as they will) till all the ryots are thoroughly indoctrinated into the new system."

The time of sowing extends from the middle of March to the middle of June, while the reaping, which depends upon the time of sowing and upon the weather, is performed from the end of June to the middle of October. The crop is said to be ready

for gathering when the flowers appear; if gathered before, the fibre is weak, while if left until the seed is ripe, the fibre is stronger, but is coarser and lacks the characteristic lustre.

The fibre is separated from the stalks by a process of retting similar to that for flax and hemp. In certain districts of Bengal it is the practice to stack the crop for a few days previous to retting in order to allow the leaves to dry and to drop off the stalks. It is stated that the colour of the fibre is darkened if the leaves are allowed to remain on during the process of retting. It is also thought that the drying of the plants before retting facilitates the separation of the fibre. Any simple operation which improves the colour of the fibre or shortens the operation of retting is worthy of consideration. The benefits to be derived from the above process, however, cannot be great, for the bundles are usually taken direct to the pools and streams. The period necessary for the completion of the retting process varies according to the temperature and to the properties of the water, and may occupy from two days to a month. After the first few days of

immersion the stalks are examined daily to test the progress of the retting. When the fibres are easily separated from the stalk, the operation is complete and the bundles should be withdrawn. The following description of the retting of jute is taken from Royle's Fibrous Plants of India: —

" The proper point being attained, the native operator, standing up to his middle in water, takes as many of the sticks in his hands as he can grasp, and removing a small portion of the bark from the ends next the roots, and grasping them together, he strips off the whole with a little management from end to end, without breaking either stem or fibre. Having prepared a certain quantity into this half state, he next proceeds to wash off: this is done by taking a large handful; swinging it round his head he dashes it repeatedly against the surface of the water, drawing it through towards him, so as to wash off the impurities; then, with a dexterous throw he fans it out on the surface of the water and carefully picks off all remaining black spots. It is now wrung out so as to remove as much water as possible, and then hung up on lines prepared on the spot, to dry in the sun."

The separated fibre is then made up into bundles ready for sending to one of the jute presses. The jute is carefully sorted into different qualities, and then each lot is subjected to an enor- mous hydraulic pressure from which it emerges in the shape of the well-known bales, each weighing 400 lb.

The crop naturally depends upon the quality of the soil, and upon the attention which the fibre has received in its various stages; the yield per acre varies in different districts. Three bales per acre, or 1200 lb is termed a 100% crop, but the usual quantity obtained is about 2-6 bales per acre. Sometimes the crop is stated in lakhs of 100,000 bales each. The crop in 1906 reached nearly 9,000,000 bales,, and in 1907 nearly 10,000,000 was reached. The following particulars were issued on the 19th of September 1906 by Messrs. W. F. Souter & Co., Dundee: —

Artiial

Estimated yield

(100%

equal 3 bales

Estimated total

Shipment to Europe.

Shipment to America.

Supplies to

Indian mills

and local

Out-turn

Year.

HL L LI til

acreage.

crop.

Jute.

Cuttings.

Jute.

Cuttings.

total crop.

per acre).

Bales.

Bales.

Bales.

Bales.

Bales.

consumption.

Bales.

1901 — 1st

2,216,500

94% =

6,250,000

Final

2,249,000

96% =

6,500,000

3.528,691

54.427

295,921

426,331

3,100,000 =

7.405,37o

1902 — 1st

2,200,000

80% =

5,280,000

Final

2,200,000

80% =

5,280,000

2,773,621

39.oi9

230,415

207,999

2,600,000 =

5,851,054

1903 — 1st

2,100,000

85% =

5,400,000

Final

2,250,000

93i% =

6,500,000

3.161,791

59.562

329.048

236,959

3,650,000 =

7,437.36o

1904 — 1st

2,700,000

87* % =

7,100,000

Final

2,850,000

85% =

7,400,000

2.939,940

44,002

253.882

290,854

3,475,782 =

7,004,460

1905 — 1st

3,163,500

87% =

8,250,000

Final

3,145,000

87% =

Outlying

8,200,000)

200,000 f Madras

3.483.315 75.384

63,118

347,974

245,044

4,Ol8,523| =

8,233,358

1906 — 1st

3,271,400?

67,000$

87% =

8,713,000

Outlying

j Madras

100,000

Final (Outlying

I 3.336,400

districts ant ad

1 Madras, say 250, ditional)

1 8,736,220

000 bales

1

JUTE

605

Estimated consumption of jute 1906-1907. In Europe Bales per annum.

Scotland 1,250,000

England 20,000

Ireland 25,000

France 475,000

Belgium Germany

Austria and Bohemia Norway and Sweden Russia …. Holland …. Spain …. Italy

In America

120,000

750,000

262,000

62,500

180,000

25,000

90,000

160,000

600,000

In India —

Mills 3,900,000

Local 500,000

3,419,500 bales 600,000 „

4,400,000 ,,

8,419,500 bales Statistics of consumption of jute, rejections and cuttings.

Consumption.

1894.

Bales.

1904.

Bales.

1906.

Bales.

United Kingdom

Indian mills …. Local Indian consumption .

Total jute crop consumption

1,200,000 1,100,000

500,000 1,500,000

500,000

1 ,200,000 1 ,800,000

500,000 2,900,000

500,000

1,295,000 2,124,500

600,000 3, ‘900,000

500,000

4,800,000

6,900,000

8,419.500

A number of experiments in jute cultivation were made during 1906, and the report showed that very encouraging results were obtained from land manured with cow-dung. If more scientific attention be given to the cultivation it is quite possible that what is now considered as 100% yield may be exceeded.

Characteristics. — The characters by which qualities of jute are judged are colour, lustre, softness, strength, length, firmness, uniformity and absence of roots. The best qualities are of a clear whitish-yellow colour, with a fine silky lustre, soft and smooth to the touch, and fine, long and uniform in fibre. When the fibre is intended for goods in the natural colour it is essential that it should be of a light shade and uniform, but if intended for yarns which are to be dyed a dark shade, the colour is not so important. The cultivated plant yields a fibre with a length of from 6 to 10 ft., but in exceptional cases it has been known to reach 14 or 15 ft. in length. The fibre is decidedly inferior to flax and hemp in strength and tenacity; and, owing to a peculiarity in its microscopic structure, by which the walls of the separate cells composing the fibre vary much in thickness at different points, the single strands of fibre are of unequal strength. Recently prepared fibre is always stronger, more lustrous, softer and whiter than such as has been stored for some time — age and exposure rendering it brown in colour and harsh and brittle in quality. Jute, indeed, is much more woody in texture than either flax or hemp, a circumstance which may be easily demonstrated by its .behaviour under appropriate re- agents; and

to that fact is due the change in colour and character it undergoes on exposure to the air. The fibre bleaches with facility, up to a certain point, sufficient to enable it to take brilliant and delicate shades of dye colour, but it is with great difficulty brought to a pure white by bleaching. A very striking and remarkable fact, which has much practical interest, is its highly hygroscopic nature. While in a dry position and atmo- sphere it may not possess more than 6% of moisture, under damp conditions it will absorb as much as 23 %.

Sir G. Watt, in his Dictionary of the Economic Products of India, mentions the following eleven varieties of jute fibre: Serajganji, Narainganji, Desi, Deora, Uttariya, Deswal, Bakrabadi, Bhatial, Karimginji, Mirganji and Jungipuri. There are several other varieties of minor importance. The first four form the four classes into which the commercial fibre is divided, and they are commonly known as Serajgunge, Naraingunge, Daisee and Dowrah. Seraj- gunge is a soft fibre, but it is superior in colour, which ranges from

white to grey. Naraingunge is a strong fibre, possesses good spinning qualities, and is very suitable for good warp yarns. Its colour, which is not so high as Serajgunge, begins with a cream shade and approaches red at the roots. All the better class yarns are spun from these two kinds. Daisee is similar to Serajgunge in softness, is of good quality and of great length; its drawback is the low colour, and hence it is not so suitable for using in natural colour. It is, however, a valuable fibre for carpet yarns, especially for dark yarns. _ Dowrah is a strong, harsh and low quality fibre, and is used principally for heavy wefts. Each class is subdivided according to the quality and colour of the material, and each class receives a distinctive mark called a baler's mark. Thus, the finest fibres may be divided as follows: —

Superfine first marks.

Extra fine first marks 1st, 2nd and 3rd numbers.

Superior first marks

Standard „

Good „

Ordinary ,,

Good second

Ordinary „

The lower qualities are, naturally, divided into fewer varieties.

Each baler has his own marks, the fibres of which are guaranteed equal in equality to some standard mark. It would be impossible to give a list of the different marks, for there are h un- dreds, and new marks are con- stantly being added. A list of all the principal marks is issued in book form by the Calcutta Jute Baler's association.

The relative prices of the dif- ferent classes de- ■ pend upon the crop, upon the de- mand and upon the quality of the fibre; in 1905 the prices of Daisee jute and First Marks were prac- tically the same, although the for- mer is always con- sidered inferior to the latter. It does not follow that a large crop of jute will result in low prices, for the year 1906-1907 was not only a record one for crops, but also

for prices. R. F. C. grade has been as high as £40 per ton, while its lowest recorded price is £12. Similarly the price for First Marks reached £29, 15s. in 1906 as compared with £9, 5s. per ton in 1897. The following table shows a few well-known grades with the average prices during December for the years 1903, 1904, 1905 and 1906.

Fig. 2. — Corchorus olitorius.

Class.

Dec. 1903.

Dec. 1904.

Dec. 1905.

Dec. 1906.

£ s. d.

£ s. d.

£

s. d.

£ s. d.

First marks . . ■ .

12 15

16

19

15

27 15 °

BlackS CC . . .

11 2

6

14 5

17

IS

20 15

RedSCC . . .

12

14 17

6

18

i.S

23 15

Native rejections.

8 2

6

—

14

10

15 17 6

S 4 group . . .

—

—

25

10

38

R F block D group

—

—

—

36

R F circle D group

14 10

16 15

21

10

—

R F D group

11 15

14 2

6

17

12

6

22 00

N B green D .

14 5

—

21

O

32

Heart T 4 …

14 12

6

17 10

22

10

34

Heart T 5. . . .

14 12

6

17 10

21

31

Daisee 2 . . . .

12 17

6

—

18

15

25 10

Daisee assortment

12 10

14 17

6

18

5

—

Mixed cuttings .

4 5

O

—

10

10

Jute Manufacture. — Long before jute came to occupy a prominent place amongst the textile fibres of Europe, it formed

the raw material of a large and important industry throughout the regions of Eastern Bengal. The Hindu population made the material up into cordage, paper and cloth, the chief use of the latter being in the manufacture of gunny bags. Indeed, up to 1830-1840 there was little or no competition with hand labour for this class of material. The process of weaving gunnies for bags and other coarse articles by these hand-loom weavers has been

described as follows: — ■

" Seven sticks or chattee weaving-posts, called tana para or warp, are fixed upon the ground, occupying the length equal to the measure of the piece to be woven, and a sufficient number of twine or thread is wound on them as warp called tana. The warp is taken up and removed to the weaving machine. Two pieces of wood are placed at two ends, which are tied to the ohari and okher or roller; they are made fast to the kholi. The belut or

treadle is put into the warp; next to that is the sarsul; a thin piece of wood is laid upon the warp, called chupari or regulator. There is no sley used in this, nor is a shuttle necessary ; in the room of the latter a stick covered with thread called singa is thrown into the warp as woof, which is beaten in by a piece of plank called beyno, and as the cloth is woven it is wound up to the roller. Next to this is a piece of wood called kketone, which is used for smoothing and regulating the woof; a stick is fastened to the warp to keep the wocf straight." Gunny cloth is woven of numerous qualities, according to the purpose to which it is devoted. Some kinds are made close and dense in texture, for carrying such seed as poppy or rape and sugar; others less close are used for rice, pulses, and seeds of like size, and coarser and opener kinds again are woven for the outer cover of packages and for the sails of country boats. There is a thin close-woven cloth made and used as garments among the females of the aboriginal tribes near the foot of the Himalayas, and in various localities a cloth of pure jute or of jute mixed with cotton is used as a sheet to sleep on, as well as for wearing pur- poses. To indicate the variety of uses to which jute is applied, the following quotation may be cited from the official report of Hem Chunder Kerr as applying to Midnapur.

" The articles manufactured from jute are principally (1) gunny bags; (2) string, rope and cord; (3) kampa, a net-like bag for carrying wood or hay on bullocks; (4) chat, a strip of stuff for tying bales of cotton or cloth; (5) dola, a swing on which infants are rocked to sleep ; (6) shika, a kind of hanging shelf for little earthen pots, &c. ; (7) dulina, a floor-cloth ; (8) beera, a small circular stand for wooden plates used particularly in poojahs; (9) painter's brush and brush for white- washing; (10) ghunsi, a waist-band worn next to the.skin; (11) gochh-dari, a hair- band worn by women; (12) mukbar, a net bag used as muzzle for cattle; (13) parchula, false hair worn by players; (14) rakhi-bandhan, a slender arm-band worn at the Rakhi-poornima festival; and (15) dhup, small incense sticks burned at poojahs."

The fibre began to receive attention in Great Britain towards the close of the 18th century, and early in the igth century it was spun into yarn and woven into cloth in the town of Abingdon. It is claimed that this was the first British town to manufacture the material. For years small quantities of jute were imported into Great Britain and other European countries and into America, but it was not until the year 1832 that the fibre may be said to have made any great impression in Great Britain. The first really practical experiments with the fibre were made in this year in Chapelshade Works, Dundee, and these experi- ments proved to be the foundation of an enormous industry. It is interesting to note that the site of Chapelshade Works was in 1907 cleared for the erection of a large new technical college.

In common with practically all new industries progress was slow for a time, but once the value of the fibre and the cloth produced from it had become known the development was more rapid. The pioneers of the work were confronted with many difficulties; most people condemned the fibre and the cloth, many warps were discarded as unfit for weaving, and any attempt to mix the fibre with flax, tow or hemp was considered a form of deception. The real cause of most of these objections was the fact that suitable machinery and methods of treatment had not been developed for preparing yarns from this useful fibre. Warden in his Linen Trade says: —

" For years after its introduction the principal spinners refused to have anything to do with jute, and cloth made of it long retained a tainted reputation. Indeed, it was not until Mr. Rowan got the Dutch government, about 1838, to substitute jute yarns for those made from flax in the manufacture of the coffee bagging for their East Indian possessions, that the jute trade in Dundee got a

proper start. That fortunate circumstance gave an impulse to the spinning of the fibre which it never lost, and since that period its progress has been truly astonishing."

The demand for this class of bagging, which is made from fine hessian yarns, is still great. These fine Rio hessian yarns form an important branch of the Dundee trade, and in some weeks during 1906 as many as 1000 bales were despatched to Brazil, besides numerous quantities to other parts of the world.

For many years Great Britain was the only European country engaged in the manufacture of jute, the great seat being Dundee. Gradually, however, the trade began to extend, and now almost every European country is partly engaged in the trade.

The success of the mechanical method of spinning and weaving of jute in Dundee and district led to the introduction of textile machinery into and around Calcutta. The first mill to be run there by power was started in 1854, while by 1872 three others had been established. In the next ten years no fewer than sixteen new mills were erected and equipped with modern machinery from Great Britain, while in 1907 there were thirty-nine mills engaged in the industry. The expansion of the Indian power trade may be gathered from the following particulars of the number of looms and spindles from 1892 to 1906. In one or two cases the number of spindles is obtained approximately by reckoning twenty spindles per loom, which is about the average for the Indian mills.

' Year.

Looms.

Spindles.

1892-3

8,479

177,732

1893-4

9,082

189,144

1894-5

9.504

197.673

1895-6

10,071

212,595

1896-7

12,276

254,610

1897-8

12,737

271.363

1898-9

13,323

277,398

1 899- 1 900

14,021

293,218

1900-01

15.242

315.264

1901-02

16,059

329,300

1902-03

17,091

350,120

1904 1

19,901

398, 020 2

1905 1

21,318

426,36o 2

1906 1

26,799

520,98o 2

The Calcutta looms are engaged for the most part with a few varieties of the commoner classes of jute fabrics, but the success in this direction has been really remarkable. Dundee, on the other hand, turns out not only the commoner classes of fabrics, but a very large variety of other fabrics. Amongst these may be mentioned the following: Hessian, bagging, tarpaulin, sacking, scrims, Brussels carpets, Wilton carpets, imitation Brussels, and several other types of carpets, rugs and matting, in addition to a large variety of fabrics of which jute forms a part. Calcutta has

certainly taken a large part of the trade which Dundee held in its former days, but the continually increasing demands for jute fabrics for new purposes have enabled Dundee to enter new markets and so to take part in the prosperity of the trade.

The development of the trade with countries outside India from 1828 to 1906 may be seen by the following figures of exports: —

1828 to 1832-33

1833-34 ., 1837-38 1838-39 , ” 1843-44 , 1848-49 , 1853-54 , 1858-59 , 1863-64 , 1868-69 , 1873-74 , 1878-79 , 1883-84 1888-89 1893-94 1898-99 1903-04

Average per year from

1842-43 1847-48

1852-53 1857-58 1862-63 1867-68 1872-73 1877-78 1882-83 1887-88 1892-93 1897-98 1902-03 1905-06

1 1 ,800 cwt.

67,483 „

117,047 »

234,055 M

439,850 „

710,826 ,,

969,724 „

2,628,110 ,,

4,858,162 „

5,362,267 „

7,274,000 „

8,223,859 „

10,372,991 „

12,084,292 ,,

11,959,189 „

13,693,090 „

1 End of calendar year, the remainder being taken to the 31st of March, the end of financial year.

2 Approximate number of spindles.

JUTE

607

The subjoined table shows the extent of the trade from an agricultural, as well as from a manufacturing, point of view. The difference between the production and the exports represents the native consumption, for very little jute is sent overland. The figures are taken to the 31st of March, the end of the Indian financial year.

Year.

Acres under

Production

Exports by

cultivation.

in cwt.

sea in cwt.

1893

2,181,334

20,419,000

10,537,512

1894

2,230,570

17,863,000

8,690,133

1895

2,275,335

21,944,400

12,976,791

1896

2,248,593

19,825,000

12,266,781

1897

2,215,105

20,418,000

11,464,356

1898

2,159,908

24,425,000

15,023,325

1899

1,690,739

19,050,000

9,864,545

1900

2,070,668

19,329,000

9,725,245

1901

2,102,236

23,307,000

12,414,552

1902

2,278,205

26,564,000

I4,755,U5

1903

2,142,700

23,489,000

13,036,486

1904

2,275,050

25,861,000

13,721,447

1905

2,899,700

26,429,000

12,875,312

1906

3,181,600

29,945,000

14,581,307

thickness of material passing through the machine. The fibre is delivered by what is called the delivery cloth, and the batcher usually selects small streaks of about 1 J lb to 2 lb weight each and passes them on to the attendant or feeder of the softening machine. These small streaks are now laid as regularly as possible upon the feed-cloth of the softening machine, a general view of which is shown in fig. 4. The fibre passes between a series of fluted rollers, each pair of which is kept in contact by spiral springs as shown in the figure. The standard number of pairs is sixty-three, but different lengths obtain. There is also a difference in the structure of the

Manufacture. — In their general features the spinning and weaving of jute fabrics do not differ essentially as to machinery and processes from those employed in the manufacture of hemp and heavy flax goods. Owing, however, to the woody and brittle nature of the fibre, it has to undergo a preliminary treatment peculiar to itself. The pioneers of the jute industry, who did not understand this necessity, or rather who did not know how the woody and brittle character of the fibre could be remedied, were greatly perplexed by the difficulties they had to encounter, the fibre spinning badly into a hard, rough and hairy yarn owing to the splitting and breaking of the fibre. This peculiarity of jute, coupled also with the fact that the machinery on which it was first spun, although quite suitable for the stronger and more elastic fibres for which it was designed, required certain modifications to suit it to the weaker jute, was the cause of many annoyances and failures in the early days of the trade.

The first process in the manufacture of jute is termed batching. Batch setting is the first part of this operation ; it consists of select- ing the different kinds or qualities of jute for any predetermined kind of yarn. The number of bales for a batch seldom exceeds twelve, in- deed it is generally about six, and of these there may be three, four or even more varieties or marks. The " streaks " 1 or " heads " of jute as they come from the bale are in a hard condition in consequence of having been subjected to a high hydraulic pressure during baling; it is therefore necessary to soften them before any further process is entered. The streaks are sometimes partly softened or crushed by means of a steam hammer during the process of opening the bale, then taken to the " strikers-up " where the different varie- ties are selected and hung on pins, and then taken to the jute softening machine. The more general practice, however, is to employ what is termed a " bale opener," or " jute crusher." The essential parts of one type of bale opener are three specially shaped rollers, the peri- pheries of which contain a number of small knobs. Two of these rollers are supported in the same horizontal plane of the framework, while the third or top roller is kept in close contact by means of weights and springs acting on each end of the arbor. Another type of machine termed the three pair roller jute

opener is illustrated in fig. 3. The layers from the different bales are laid upon the feed cloth which carries them up to the rollers, between which the layers are crushed and partly separated. The proximity of the weighted roller or rollers to the fixed ones depends upon the

1 Also in the forms " streek," " strick " or " strike," as in Chaucer, Cant. Tales, Prologue 676, where the Pardoner's hair is compared with a " strike of flax." The term is also used of a handful of hemp or other fibre, and is one of the many technical applications of " strike " or " streak," which etymologically are cognate words.

Fig. 3. — Jute Opener. (The three machines shown in this article are made by Urquhart, Lindsay & Co., Ltd., Dundee.)

flutes, some being straight, and others spiral, and each pair may or may not contain the same number of flutes. The springs allow the top rollers of each pair to rise as the material passes through the machine. Advantage is taken of this slight upward and downward movement of the top rollers to automatically regulate the flow of water and oil upon the material. The apparatus for this function is placed immediately over the nth and 12th rollers of the softening machine and an idea of its construction may be gathered from fig. 5. In many cases the water and oil are applied by less automatic, but equally effective, means. The main object is to see that the liquids are distributed evenly while the fibre is passing through, and to stop the supply when the machine stops or when no fibre is passing. The uniform moistening of the fibre in this machine facilitates the subsequent operations, indeed the introduction of this preliminary process (originally by hand) constituted the first important step in the practical solution of the difficulties of jute spinning. The rela- tive quantities of oil and water depend upon the quality of the batch. Sometimes both whale and mineral oils are used, but in most cases the whale oil is omitted. About 1 to if gallons of oil is the usual amount given per bale of 400 lb of jute, while the quantity of water per bale varies from 3 to 7 gallons. The delivery attendants remove the streaks, give them a twist to facilitate future handling, and place

Fl3. 4. — Jute Softening Machine, them on what are termed jute barrows. The streaks are now handed over to the cutters who cut off the roots, and finally the material is allowed to remain for twelve to twenty-four hours to allow the mix- ture of oil and water to thoroughly spread over the fibre.

When the moisture has spread sufficiently, the material is taken to the " breaker card," the first machine in the preparing department. A certain weight of jute, termed a " dollop," is laid upon the feed cloth for each revolution of the latter. The fibre, which should be arranged on the sheet as

evenly as possible, is carried up by the feed cloth and passes between the feed roller and the shell on to the

large cylinder. This cylinder, which has a high surface speed, carries part of the fibre towards the workers and strippers; the surface speed of the workers being much slower than that of the cylinder. The pins in the two rollers oppose each other, those of the workers being " back-set," and this arrangement, combined with the relative angle of the pins, and the difference in the surface speeds of the two rollers, results in part of the fibre being broken and carried round by the worker towards the stripper. This, as its

Fig. 5. — Improved Batching Gear.

name implies, strips the fibre off the worker, and carries it round to the cylinder. The pins of the stripper and cylinder point in the same direction, but since the surface speed of the cylinder is much

freater than the surface speed of the stripper, it follows that the bre is combed between the two, and that part is carried forward by the cylinder to be reworked. The strippers and workers are in pairs, of which there may be two or more. After passing the last pair of workers and strippers the fibre is carried forward towards the doffing roller, the pins of which are back-set, and the fibre is removed from the cylinder by the doffer, from which it passes between the drawing and pressing rollers into the conductor, and finally between the delivery and pressing rollers into the sliver can. It may be mentioned that more or less breaking takes place between each pair of rollers, the pins of which are opposed, and that combing and drawing out obtains between those rollers with pins pointing in the same direction. The ratio of the surface speeds of the drawing roller and the feed roller is termed the draft : —

surface speed of drawing roller . , surface speed of feed roller In this machine the draft is usually about thirteen.

The sliver from the can of the breaker card may be wound into balls, or it may be taken direct to the finisher card. In the latter method from eight to fifteen cans are placed behind the feed rollers, and all the slivers from these cans are united before they emerge from the machine. The main difference between a breaker card and a finisher card is that the latter is fitted with finer pins, that it contains two doffing rollers, and that it usually possesses a greater number of pairs of workers and strippers — a full circular

finisher card having four sets.

After the fibre has been thoroughly carded by the above machines, the cans containing the sliver from the finisher card are taken to the first drawing frame. A very common method is to let four slivers run into one sliver at the first drawing, then two slivers from the first drawing are run into one sliver at the second drawing frame. There are several types of drawing frames, e.g. push-bar or slide, rotary, spiral, ring, open-link or chain, the spiral being generally used for the second drawing. All, however, perform the same function, viz., combing out the fibres and thus laying them parallel, and in addition drawing out the sliver. The designation of the machine indicates the particular method in which the gill pins are moved. These pins are much finer than those of the breaker and finisher cards, consequently the fibres are more thoroughly separated. The draft in the first drawing varies from three to five, while that in the second drawing is usually five to seven. It is easy to see that a certain amount of draft, or drawing out of the sliver, is necessary, otherwise the various doublings would cause the sliver to emerge thicker and thicker from each machine. The doublings play a very important part in the appearance of the ultimate rove and yarn, for the chief reason for doubling threads or slivers is to minimize irregularities of thickness and of colour in the material. In an ordinary case, the total doublings in jute from the breaker card to the end of the second drawing is ninety-six: 12 X 4 X 2 = 96; and if the slivers were made thinner and more of them used the ultimate result would naturally be improved.

The final preparing process is that of roving. In thrt operation there is no doubling of the slivers, but each sliver passes separately through the machine, from the can to the spindle, is drilwn out to about eight times its length, and receives a small amount of twist to strengthen it, in order that it may be successfully wound upon the roving bobbin by the flyer. The chief piece of mechanism in the roving frame is the gearing known as the " differential motion." It works in conjunction with the disk and scroll, the cones, or the expanding pulley, to impart an intermittingly variable speed to the bobbin (each layer of the bobbin has its own particular speed which is constant for the full traverse, but each change of direction of the builder is accompanied by a quick change of speed to the bobbin). It is essential that the bobbin should have such a motion, because the delivery of the sliver and the speed of the flyer are constant for a given size of rove, whereas the layers of rove on the bobbin increase in length as the bobbin fills. In the jute roving frame the bobbin is termed the " follower," because its revolutions per minute are fewer than those of the flyer. Each layer of rove increases the diameter of the material on the bobbin shank; hence, at the beginning of each layer, the speed of the bobbin must be increased, and kept at this increased speed for the whole traverse from top to bottom or

vice versa.

Let R — the revolutions per second of the flyer;

r = the revolutions per second of the bobbin ;

d = the diameter of bobbin shaft plus the material ;

L = the length of sliver delivered per second ; then (R — r) d . ir = L.

In the above expression R, v and L are constant, therefore as d increases the term (R — r) must decrease; this can happen only when r is increased, that is, when the bobbin revolves quicker. It is easy to see from the above expression that if the bobbin were the " leader "- its speed would have to decrease as it filled.

The builder, which receives its motion from the disk and scroll, from the cones, or from the expanding pulley, has also an inter- mittingly variable speed. It begins at a maximum speed when the bobbin is empty, is constant for each layer, but decreases as the bobbin fills.

The rove yarn is now ready for the spinning frame, where a further draft of about eight is given. The principles of jute spinning are similar to those of dry spinning for flax. For very heavy jute yarns the spinning frame is not used — the desired amount of twist being given at the roving frame.

The count of jute yarn is based upon the weight in pounds of 14,400 yds., such length receiving the name of spyndle." The finest yarns weigh 2 1 lb to 3 lb per spyndle, but the commonest kinds are 7 lb, 8 lb, 9 lb and 10 lb per spyndle. The sizes rise in pounds up to about 20 lb, then by 2 lb up to about 50 lb per spyndle, with much larger jumps above this weight. It is not uncommon to find 200 H> to 300 lb rove yarn, while the weight occasionally reaches 450 lb per spyndle. The different sizes of yarn are extensively used in a large variety of fabrics, sometimes alone, sometimes in conjunction with other fibres, e.g. with worsted in the various kinds of carpets, with cotton in tapestries and household cloths, with line and tow yarns for the same fabrics and for paddings, &c, and with wool for horse clothing. The yarns are capable of being dyed brilliant colours, but, unfortunately, the colours are not very fast to light. The fibre can also be prepared to imitate human hair with remarkable close- ness, and advantage of this is largely taken in making stage wigs.

For detailed information regarding jute, the cloths made from it and the machinery used, see the following works : Watts's Dictionary of the Economic Products of India ; Royle's Fibrous Plants of India ; Sharp's Flax, Tow and Jute Spinning; Leggatt's Jute Spinning; Woodhouse and Milne's

Jute and Linen Weaving; and Woodhouse and Milne's Textile Design: Pure and Applied. (T. Wo.)

jtJTERBOG, or Guterbog, a town of Germany in the Prussian province of Brandenburg, on the Nuthe, 39 m. S.W. of Berlin, at the junction of the main lines of railway from Berlin to Dresden and Leipzig. Pop. (1900), 7407. The town is surrounded by a medieval wall, with three gateways, and contains two Protes- tant churches, of which that of St Nicholas (14th century) is remarkable for its three fine aisles. There are also a Roman Catholic church, an old town-hall and a modern school. Jiiter- bog carries on weaving and spinning both of flax and wool, and trades in the produce of those manufactures and in cattle. Vines are cultivated in the neighbourhood. Jiiterbog belonged in the later middle ages to the archbishopric of Magdeburg, passing to electoral Saxony in 1648, and to Prussia in 1815. It was here that a treaty over the succession to the duchy of Jiilich was made in March 161 1 between Saxony and Brandenburg, and here in November 1644 the Swedes defeated the Imperialists. Two miles S.W. of the town is the battlefield of Dennewitz where the Prussians defeated the French on the 6th of Septem- ber 1813.

JUTES, the third of the Teutonic nations which invaded Britain in the 5th century, called by Bede Jutae or Iuti (see Britain, Anglo-Saxon). They settled in Kent and the Isle of Wight together with the adjacent parts of Hampshire. In the latter case the national name is said to have survived until Bede's own time, in the New Forest indeed apparently very much later. In Kent, however, it seems to have soon passed out of use, though there is good reason for believing that the inhabitants of that kingdom were of a different nationality from their neighbours (see Kent, Kingdom of). With regard to the origin of the Jutes, Bede only says that Angulus (Angel) lay between the territories of the Saxons and the Iutae — a statement which points to their identity with the Iuti or Jyder of later times, i.e. the inhabitants of Jutland. Some recent writers have preferred to identify the Jutes with a tribe called Eucii mentioned in a letter from Theodberht to Justinian {Man. Germ. Hist., Epist. Hi., p. 132 seq.) and settled apparently in the neighbourhood of the Franks. But these people may themselves have come from Jutland.

See Bede, Hist. Eccles. i. 15, iv. 16. (H. M. C.)

JUTIGALPA, or Juticalpa, the capital of the department of Jutigalpa in eastern Honduras, on one of the main roads from the Bay of Fonseca to

the Atlantic coast, and on a small left- band tributary of the river Patuca. Pop. (1905), about 18,000. Jutigalpa is the second city of Honduras, being surpassed only by Tegucigalpa. It is the administrative centre of a mountainous region rich in minerals, though mining is rendered difficult by the lack of communications and the unsettled con- dition of the country. The majority of the inhabitants are Indians or half-castes, engaged in the cultivation of coffee, bananas, tobacco, sugar or cotton.

JUTLAND (Danish Jylland), though embracing several islands as well as a peninsula, may be said to belong to the continental portion of the kingdom of Denmark. The peninsula (Chersonese or Cimbric peninsula of ancient geography) extends northward, from a line between Liibeck and the mouth of the Elbe, for 270 m. to the promontory of the Skaw (Skagen), thus preventing a natural communication directly east and west between the Baltic and North Seas. The northern portion only is Danish, and bears the name Jutland. The southern is Ger- man, belonging to Schleswig-Holstein. The peninsula is almost at its narrowest (36 m.) at the frontier, but Jutland has an extreme breadth of no m. and the extent from the south-western point (near Ribe) to the Skaw is 180 m. Jutland embraces nine amter (counties), namely, Hjorring, Thisted, Aalborg, Ringkjob- ing, Viborg, Randers, Aarhus, Vejle and Ribe. The main water- shed of the peninsula lies towards the east coast; therefore such elevated ground as exists is found on the east, while the western slope is gentle and consists of a low sandy plain of slight undulation. The North Sea coast (western) and Skager- rack coast (north-western) consist mainly of a sweeping line of dunes with wide lagoons behind them. In the south the northernmost of the North Frisian Islands (Fano) is Danish. Towards the north a narrow mouth gives entry to the Limf jord, or Liimf jord, which, wide and ramifying among islands to the west, narrows to the east and pierces through to the Cattegat, thus isolating the counties of Hjorring and Thisted (known together as Vendsyssel). It is, however, bridged at Aalborg, and its depth rarely exceeds 1 2 ft. The seaward banks of the lagoons are fre- quently broken in storms, and the narrow channels through them are constantly shifting. The east coast is slightly bolder than the west, and indented with true estuaries and bays. From the south-east the chain of islands forming insular Denmark ex- tends towards Sweden, the strait between Jutland and Fiinen having the name of the Little Belt. The low and dangerous coasts, off which the seas are generally very shallow, are effi- ciently served by a series of lifeboat stations. The western coast region is well compared with the Landes of Gascony. The interior is low. The Varde, Omme, Skjerne, Stor and Karup, sluggish and tortuous streams draining into the western lagoons, rise in and flow through marshes, while the eastern Limfjord is flanked by the swamps known as Vildmose. The only

considerable river is the Gudenaa, flowing from S.W- into the Randersfjo'rd (Cattegat), and rising among the picturesque lakes of the county of Aarhus, where the principal elevated ground in the peninsula is found in the Himmelbjerg and adjacent hills (exceeding 500 ft.). The German portion of the peninsula is generally similar to that of western Jutland, the main difference lying in the occurrence of islands (the North Frisian) off the west coast in place of sand-bars and lagoons. Erratic blocks are of frequent occurrence in south Jutland. (For geology, and the general consideration of Jutland in connexion with the whole kingdom, see Denmark.)

Although in ancient times well wooded, the greater portion of the interior of Jutland consisted for centuries of barren drift- sand, which grew nothing but heather; but since t866, chiefly through the instrumentality of the patriotic Heath association, assisted by annual contributions from the state, a very large proportion of this region has been more or less reclaimed for cultivation. The means adopted are: (i.) the plantation of trees; (ii.) the making of irrigation canals and irrigating meadows; (iii.) exploring for, extracting and transporting loam, a process aided by the construction of short light railways; and (iv.), since 1889, the experimental cultivation of fenny districts. The activity of the association takes the form partly of giving gratuitous advice, partly of experimental attempts, and partly of model works for imitation. The state also makes annual grants directly to owners who are willing to place their planta- tions under state supervision, for the sale of plants at half price to the poorer peasantry, for making protective or sheltering plantations, and for free transport of marl or loam. The species of timber almost exclusively planted are the red fir {Picea excelsa) and the mountain pine (Pinus montana) . This admirable work quickly caused the population to increase at a more rapid rate in the districts where it was practised than in any other part of the Danish kingdom. The counties of Viborg, Ringkjobing and Ribe cover the principal heath district.

Jutland is well served by railways. Two lines cross the fron- tier from Germany on the east and west respectively and run northward near the coasts. The eastern touches the ports of Kolding, Fredericia, Vejle, Horsens, Aarhus, Randers, Aalborg on Limfjord, Frederikshavn and Skagen. On the west the only port of first importance is Esbjerg. The line runs past Skjerne, Ringkjobing, Vemb and Holstebro to Thisted. Both throw off many branches and are connected by lines east and west between Kolding and Esbjerg, Skanderborg and Skjerne, Langaa and Struer on Limfjord via Viborg. Of purely inland towns only Viborg in the midland and Hjorring in the extreme north are of importance.

JUTURNA (alder form Diuturna, the lasting), an old Latin divinity, a

personification of the never-failing springs. Her ori- ginal home was on the river Numicius near Lavinium, where there was a spring called after her, supposed to possess heal- ing qualities (whence the old Roman derivation from juvare, to help). Her worship was early transferred to Rome, localized by the Lacus Juturnae near the temple of Vesta, at which Castor and Pollux, after announcing the victory of lake Regillus, were said to have washed the sweat from their horses. At the end of the First Punic War Lutatius Catulus erected a temple in her honour on the Campus Martius, subsequently re- stored by Augustus. Juturna was associated with two festivals: the Juturnalia on the nth of January, probably a dedication festival of a temple built by Augustus, and celebrated by the college of the foniani, workmen employed in the construction and maintenance of aqueducts and fountains; and the Volcan- alia on the 23rd of August, at which sacrifice was offered to Volcanus, the Nymphs and Juturna, as protectors against outbreaks of fire. In Virgil, Juturna appears as the sister of Turnus (probably owing to the partial similarity of the names), on whom Jupiter, to console her for the loss of her chastity, bestowed immortality and the control of all the lakes and rivers of Latium. For the statement that she was the wife of Janus and mother of Fontus (or Fons), the god of fountains, Arnobius (Adv. gentes iii. 29) is alone responsible.

See Virgil, Aeneid, xii. 139 and Servius ad loc; Ovid, Fasti, ii. 583-616; Valerius Maximus, i. 8. 1 ; L. Deubner, " Juturna und die Ausgrabungen auf dem romischen Forum," in Neue Jahrb. f. das klassische Altertum (1902), p. 370.

JUVENAL (Decimus Junius Juvenalis) (c. 60-140), Roman poet and satirist, was born at Aquinum. Brief accounts of his life, varying considerably in details, are prefixed to different MSS. of the works. But their common original cannot be traced to any competent authority, and some of their statements are intrinsically improbable. According to the version which appears to be the earliest: —

" Juvenal was the son or ward of a wealthy freedman ; he practised declamation till middle age, not as a professional teacher, but as an amateur, and made his first essay in satire by writing the lines on Paris, the actor and favourite of Domitian, now found in the seventh satire (lines 90 seq.). Encouraged by their success, he devoted him- self diligently to this kind of composition, but refrained for a long time from either publicly

reciting or publishing his verses. When at last he did come before the public, his recitations were attended by great crowds and received with the utmost favour. But the lines originally written on Paris, having been inserted in one of his new satires, excited the jealous anger of an actor of the time, who was a favourite of the emperor, and procured the poet's banishment under the form of a military appointment to the extremity of Egypt. Being then eighty years of age, he died shortly afterwards of grief and vexation."

Some of these statements are so much in consonance with the indirect evidence afforded by the satires that they may be a series of conjectures based upon them. The rare passages in which the poet speaks of his own position, as in satires xi. and xiii., indicate that he was in comfortable but moderate circum- stances. We should infer also that he was not dependent on any professional occupation, and that he was separated in social station, and probably too by tastes and manners, from the higher class to which Tacitus and Pliny belonged, as he was by character from the new men who rose to wealth by servility under the empire. Juvenal is no organ of the pride and dignity, still less of the urbanity, of the cultivated representatives of the great families of the republic. He is the champion of the more sober virtues and ideas, and perhaps the organ of the rancours and detraction, of an educated but depressed and embittered middle class. He lets us know that he has no leanings to philosophy (xiii. 121) and pours contempt on the serious epic writing of the day (i. 162). The statement that he was a trained and practised declaimer is confirmed both by his own words (i. 16) and by the rhetorical mould in which his thoughts and illustra- tions are cast. The allusions which fix the dates when his satires first appeared, and the large experience of life which they imply, agree with the statement that he did not come before the world as a professed satirist till after middle age.

The statement that he continued to write satires long before he gave them to the world accords well with the nature of their contents and the elaborate character of their composition, and might almost be inferred from the emphatic but yet guarded statement of Quintilian in his short summary of Roman litera- ture. After speaking of the merits of Lucilius, Horace and Per- sius as satirists, he adds, " There are, too, in our own day, dis- tinguished writers of satire whose names will be heard of here- after " (Inst. Or. x. 1, 94). There is no Roman writer of satire who could be mentioned along with those others by so judicious a critic, except Juvenal. The motive which a writer of satire must have had for secrecy under Domitian is sufficiently obvious; and the necessity of concealment and self-suppression thus im- posed upon the writer may have permanently affected his whole manner of composition.

So far the original of these lives follows a not improbable tradition. But when we come to the story of the poet's exile the case is otherwise. The undoubted reference to Juvenal in Sidonius Apollinaris as the victim of the rage of an actor only proves that the original story from which all the varying versions of the lives are derived was generally believed before the middle of the 5th century of our era. If Juvenal was banished at the age of eighty, the author of his banishment could not have been the " enraged actor " in reference to whom the original lines

were written, as Paris was put to death in 83, and Juvenal was certainly writing satires long after 100. The satire in which the lines now appear was probably first published soon after the accession of Hadrian, when Juvenal was not an octogenarian but in the maturity of his powers. The cause of the poet's banishment at that advanced age could not therefore have been either the original composition or the first publication of the lines.

An expression in xv. 45 is quoted as a proof that Juvenal had visited Egypt. He may have done so as an exile or in a military command; but it seems hardly consistent with the importance which the emperors attached to the security of Egypt, or with the concern which they took in the interests of the army, that these conditions were combined at an age so unfit for military employment. If any conjecture is warrantable on so obscure a subject, it is more likely that this temporary disgrace should have been inflicted on the poet by Domitian. Among the many vic- tims of Juvenal's satire it is only against him and against one of the vilest instruments of his court, the Egyptian Crispinus, that the poet seems to be animated by personal hatred. A sense of wrong suffered at their hands may perhaps have mingled with the detestation which he felt towards them on public grounds. But if he was banished under Domitian, it must have been either before or after 93, at which time, as we learn from an epigram of Martial, Juvenal was in Rome.

More ancient evidence is supplied by an inscription found at Aquinum, recording, so far as it has been deciphered, the dedi- cation of an altar to Ceres by a Iunius Iuvenalis, tribune of the first cohort of Dalmatians, duumvir quinquennalis, and flamen Divi Vespasiani, a provincial magistrate whose functions corresponded to those of the censor at Rome. This Juvenalis may have been the poet, but he may equally well have been a relation. The evidence of the satires does not point to a prolonged absence from the metropolis. They are the product of immediate and intimate familiarity with the life of the great city. An epigram of Martial, written at the time when Juvenal was most vigorously employed in their composition, speaks of him as settled in Rome. He himself hints (iii. 318) that he maintained his connexion with Aquinum, and that he had some special interest in the worship of the " Helvinian Ceres." Nor is the tribute

to the national religion implied by the dedication of the altar to Ceres incon- sistent with the beliefs and feelings expressed in the satires. While the fables of mythology are often treated contemptuously or humorously by him, other passages in the satires clearly imply a conformity to, and even a respect for, the observances of the national religion. The evidence as to the military post filled by Juvenal is curious, when taken in connexion with the con- fused tradition of his exile in a position of military importance. But it cannot be said that the satires bear traces of military experience; the life described in them is rather such as would present itself to the eyes of a civilian.

The only other contemporary evidence which affords a glimpse of Juvenal's actual life is contained in three epigrams of Martial. Two of these (vii. 24 and 91) were written in the time of Domitian, the third (xii. 18) early in the reign of Trajan, after Martial had retired to his native Bilbilis. The first attests the strong regard which Martial felt for him; but the subject of the epigram seems to hint that Juvenal was not an easy person to get on with. In the second, addressed to Juvenal himself, the epithet facundus is applied to him, equally applicable to his " eloquence " as satirist or rhetorician. In the last Martial imagines his friend wandering about discontentedly through the crowded streets of Rome, and undergoing all the discomforts incident to attendance on the levees of the great. Two lines in the poem suggest that the satirist, who inveighed with just severity against the worst corruptions of Roman morals, was not too rigid a censor of the morals of his friend. Indeed, his intimacy with Martial is a ground for not attributing to him exceptional strictness of life. The additional information as to the poet's life and circum- stances derivable from the satires themselves is not important. He had enjoyed the training which all educated men received in his day (i. 15); he speaks of his farm in the territory of Tibur

(xi. 65), which furnished a young kid and mountain asparagus for a homely dinner to which he invites a friend during the festival of the Megalesia. From the satire in which this invitation is contained we are able to form an idea of the style in which he habitually lived, and to think of him as enjoying a hale and vigorous age (203), and also as a kindly master of a household (159 seq.). The negative evidence afforded in the account of his establishment suggests the inference that, like Lucilius and Horace, Juvenal had no personal experience of either the cares or the softening influence of family life. A comparison of this poem with the invitation of Horace toTorquatus (Ep. i. 5) brings out strongly the differences not in urbanity only but in kindly feeling between the two*

satirists. Gaston Boissier has drawn from the indications afforded of the career and character of the persons to whom the satires are addressed most unfavourable conclusions as to the social circumstances and associations of Juvenal. If we believe that these were all real people, with whom Juvenal lived in intimacy, we should conclude that he was most unfortunate in his associates, and that his own relations to them were marked rather by outspoken frankness than civility. But they seem to be more " nominis umbrae " than real men; they serve the purpose of enabling the satirist to aim his blows at one particular object instead of declaiming at large. They have none of the individuality and traits of personal character dis- cernible in the persons addressed by Horace in his Satires and Epistles. It is noticeable that, while Juvenal writes of the poets and men of letters of a somewhat earlier time as if they were still living, he makes no reference to his friend Martial or the younger Pliny and Tacitus, who wrote their works during the years of his own literary activity. It is equally noticeable that Juvenal's name does not appear in Pliny's letters.

The times at which the satires were given to the world do not in all cases coincide with those at which they were written and to which they immediately refer. Thus the manners and per- sonages of the age of Domitian often supply the material of satiric representation, and are spoken of as if they belonged to the actual life of the present, 1 while allusions even in the earliest show that, as a finished literary composition, it belongs to the age of Trajan. The most probable explanation of these discrepancies is that in their present form the satires are the work of the last thirty years of the poet's life, while the first nine at least may have pre- served with little change passages written during his earlier manhood. The combination of the impressions, and, perhaps of the actual compositions, of different periods also explains a certain want of unity and continuity found in some of them.

There is no reason to doubt that the sixteen satires which we possess were given to the world in the order in which we find them, and that they were divided, as they are referred to in the ancient grammarians, into five books. Book I,, embracing the first five satires, was written in the freshest vigour of the author's powers, and is animated with the strongest hatred of Domitian. The publication of this book belongs to the early years of Trajan. The mention of the exile of Marius (49) shows that it was not published before 100. In the second satire, the lines 29 seq.,

" Qualis erat nuper tragico pollutus adulter Concubitu,"

show that the memory of one of the foulest scandals of the reign of Domitian was still fresh in the minds of men. The third satire, imitated by Samuel Johnson in his London, presents such a picture as Rome may have

offered to the satirist at any time in the 1st century of our era; but it was under the worst emperors, Nero and Domitian, that the arts of flatterers and foreign adventurers were most successful, and that such scenes of violence as that described at 2 7 7 seq. were most likely to occur ; 2 while the mention of Veiento (185) as still enjoying influence is a distinct reference to the court of Domitian. The fourth, which alone has any political significance, and reflects on the emperor as a frivolous

1 This is especially noticeable in the seventh satire, but it applies also to the mention of Crispinus, Latinus, the class of delatores, &c, in the first, to the notice of Veiento in the third, of Rubellius Blandus in the eighth, of Gallicus in the thirteenth, &c.

1 Cf. Tacitus, Annals, xiii. 25.

trifler rather than as a monster of lust and cruelty, is the reproduc- tion of a real or imaginary scene from the reign of Domitian, and is animated by the profoundest scorn and loathing both of the tyrant himself and of the worst instruments of his tyranny. The fifth is a social picture of the degradation to which poor guests were exposed at the banquets of the rich, but many of the epigrams of Martial and the more sober evidence of one of Pliny's letters show that the picture painted by Juvenal, though perhaps exaggerated in colouring, was drawn from a state of society prevalent during and immediately subsequent to the times of Domitian. 3 Book II. consists of the most elaborate of the satires, by many critics regarded as the poet's masterpiece, the famous sixth satire, directed against the whole female sex, which shares with Domitian and his creatures the most cherished place in the poet's antipathies. It shows certainly no diminu- tion of vigour either in its representation or its invective. The time at which this satire was composed cannot be fixed with certainty, but some allusions render it highly probable that it was given to the world in the later years of Trajan, and before the accession of Hadrian. The date of the publication of Book III., containing the seventh, eighth and ninth satires, seems to be fixed by its opening line to the first years after the accession of Hadrian. In the eighth satire another reference is made (120) to the misgovernment of Marius in Africa as a recent event, and at line 51 there may be an allusion to the Eastern wars that occupied the last years of Trajan's reign. The ninth has no allusion to determine its date, but it is written with the same outspoken freedom as the second and the sixth, and belongs to the period when the poet's power was most vigorous, and his exposure of vice most uncompromising. In Book IV., comprising the famous tenth, the eleventh and the twelfth satires, the author appears more as a moralist than as a pure satirist. In the tenth, the theme of the " vanity of human wishes " is illustrated by great historic instances, rather than by pictures of the men and manners of the age; and, though the declamatory vigour and power of

expression in it are occasionally as great as in the earlier satires, and although touches of Juvenal's saturnine humour, and especially of his misogyny, appear in all the satires of this book, yet their general tone shows that the white heat of his indignation is abated; and the lines of the eleventh, already referred to (201 seq.),

" Spectent juvenes quos clamor et audax Sponsio, quos cultae decet assedisse puellae : Nostra bibat vernum contracta cuticula solem,"

leave no doubt that he was well advanced in years when they were written.

Two important dates are found in Book V., comprising satires xiii.xvi. At xiii. 16 Juvenal speaks of his friend Calvinus as now past sixty years of age, having been born in the consulship of Fonteius. Now L. Fonteius Capito was consul in 67. Again at xv. 27 an event is said to have happened in Egypt " nuper consule Iunco." There was a L. Aemilius Iuncus consul stiff ectus in 127. The fifth book must therefore have been pub lished some time after this date. More than the fourth, this book bears the marks of age, both in the milder tone of the senti- ments expressed, and in the feebler power of composition exhi- bited. The last satire is now imperfect, and the authenticity both of this and of the fifteenth has been questioned, though on insufficient grounds.

Thus the satires were published at different intervals, and for the most part composed between 100 and 130, but the most powerful in feeling and vivid in conception among them deal with the experience and impressions of the reign of Domitian, occasionally recall the memories or traditions of the times of Nero and Claudius, and reproduce at least one startling page from the annals of Tiberius. 4 The same overmastering feeling which constrained Tacitus (Agric. 2, 3), when the time of long endurance and silence was over, to recall the " memory of the

3 Pliny's remarks on the vulgarity as well as the ostentation of his host imply that he regarded such behaviour as exceptional, at least in the circle in which he himself lived {Ep. ii. 6).

4 x. 56-107.

former oppression," acted upon Juvenal. There is no evidence that these two great writers, who lived and wrote at the same time, who were animated by the same hatred of the tyrant under whom the best years of their manhood were spent, and who both felt most deeply the degradation

of their times, were even known to one another. Tacitus belonged to the highest official and senatorial class, Juvenal apparently to the middle class and to that of the struggling men of letters; and this difference in posi- tion had much influence in determining the different bent of their genius, and in forming one to be a great national historian, the other to be a great social satirist. If the view of the satirist is owing to this circumstance more limited in some directions, and his taste and temper less conformable to the best ancient stan- dards of propriety, he is also saved by it from prejudices to which the traditions of his class exposed the historian. But both writers are thoroughly national in sentiment, thoroughly mascu- line in tone. No ancient authors express so strong a hatred of evil. The peculiar greatness and value of both Juvenal and Tacitus is that they did not shut their eyes to the evil through which they had lived, but deeply resented it — the one with a vehement and burning passion, like the " saeva indignatio " of Swift, the other with perhaps even deeper but more restrained emotions of mingled scorn and sorrow, like the scorn and sorrow of Milton when " fallen on evil days and evil tongues." In one respect there is a difference. For Tacitus the prospect is not wholly cheerless, the detested tyranny was at an end, and its effects might disappear with a more beneficent rule. But the gloom of Juvenal's pessimism is unlighted by hope.

A. C. Swinburne has suggested that the secret of Juvenal's concentrated power consisted in this, that he knew what he hated, and that what he did hate was despotism and democracy. But it would be hardly true to say that the animating motive of his satire was political. It is true that he finds the most typical examples of lust, cruelty, levity and weakness in the emperors and their wives — in Domitian, Otho, Nero, Claudius and Messa- lina. It is true also that he shares in the traditional idolatry of Brutus, that he strikes at Augustus in his mention of the " three disciples of Sulla," and that he has no word of recognition for what even Tacitus acknowledges as the beneficent rule of Trajan. So too his scorn for the Roman populace of his time, who cared only for their dole of bread and the public games, is unqualified. But. it is only in connexion with its indirect effects that he seems to think of despotism; and he has no thought of democracy at all. It is not for the loss of liberty and of the senatorian rule that he chafes, but for the loss of the old national manliness and self-respect. This feeling explains his detestation of foreign manners and superstitions, his loathing not only of inhuman crimes and cruelties but even of the lesser derelictions from self- respect, his scorn of luxury and of art as ministering to luxury, his mockery of the poetry and of the stale and dilettante culture of his time, and perhaps, too, his indifference to the schools of philosophy and his readiness to identify all the professors of stoicism with the reserved and close-cropped puritans, who concealed the worst vices under an outward appearance of austerity. The great fault of his character, as it appears in

his writings, is that he too exclusively indulged this mood. It is much more difficult to find what he loved and admired than what he hated. But it is characteristic of his strong nature that, where he does betray any sign of human sympathy or tenderness, it is for those who by their weakness and position are dependent on others for their protection — as for " the peasant boy with the little dog, his playfellow," 1 or for "the home-sick lad from the Sabine highlands, who sighs for his mother whom he has not seen for a long time, and for the little hut and the familiar kids." 2

If Juvenal is to be ranked as a great moralist, it is riot for his greatness and consistency as a thinker on moral questions. In the rhetorical exaggeration of the famous tenth satire, for in- stance, the highest energies of patriotism — the gallant and des- perate defence of great causes, by sword or speech — are quoted

- *. . . . "Meliusne hie rusticus infans*

Cum matre et casulis et conlusore catello," &c.ˆix. 60. 2 xi. 152, 153.

as mere examples of disappointed ambition; and, in the indis- criminate condemnation of the arts by which men sought to gain a livelihood, he leaves no room for the legitimate pursuits of industry. His services to morals do not consist in any positive contributions to the notions of active duty, but in the strength with which he has realized and expressed the restraining influ- ence of the old Roman and Italian ideal of character, and also of that religious conscience which was becoming a new power in the world. Though he disclaims any debt to philosophy (xiii. 121), yet he really owes more to the " Stoica dogmata," then prevalent, than he is aware of. But his highest and rarest literary quality is his power of painting characters, scenes, incidents and actions, whether from past history or from con- temporary life. In this power, which is also the great power of Tacitus, he has few equals and perhaps no superior among ancient writers. The difference between Tacitus and Juvenal in power of representation is that the prose historian is more of an imagi- native poet, the satirist more of a realist and a grotesque humor- ist. Juvenal can paint great historical pictures in all their detail— as in the famous representation of the fall of Sejanus; he can describe a character elaborately or hit it off with a single stroke. The picture drawn may be a caricature, or a misrepre- sentation of the fact — as that of the father of Demosthenes, " blear-eyed with the soot of the glowing mass," &c. — but it is, with rare exceptions, realistically conceived, and it is brought before us with the vivid touches of a Defoe or a Swift, or of the great pictorial satirist of the 18th century, Hogarth. Yet even in this, his most characteristic talent, his proneness to exaggera- tion, the attraction which coarse and repulsive images have for his mindj and the tendency to sacrifice general effect to minute- ness of detail not

infrequently mar his best effects.

The difficulty is often felt of distinguishing between a powerful rhetorician and a genuine poet, and it is felt particularly in the case of Juvenal. He himself knew and has well described (vii. S3 seq.) the conditions under which a great poet could flourish; and he felt that his own age was incapable of producing one. He has little sense of beauty either in human life or nature. Whenever such sense is evoked it is only as a momentary relief to his prevailing sense of the hideousness of contemporary life, or in protest against what he regarded as the enervating influences of art. Even his references to the great poets of the past indicate rather a blase sense of indifference and weariness than a fresh enjoyment of them. Yet his power of touching the springs of tragic awe and horror is a genuine poetical gift, of the same kind as that which is displayed by some of the early English dramatists. But he is, on the whole, more essentially a great rhetorician than a great poet. His training, the practical bent of his understand- ing, his strong but morose character, the circumstances of his time, and the materials available for his art, all fitted him to rebuke his own age and all after-times in the tones of a powerful preacher, rather than charm them with the art of an accom- plished poet. The composition of his various satires shows no negligence, but rather excess of elaboration; but it produces the impression of mechanical contrivance rather than of organic growth. His movement is sustained and powerful, but there is no rise and fall in it. The verse is most carefully constructed, and is also most effective, but it is so with the rhetorical effec- tiveness of Lucan, not with the musical charm of Virgil. The diction is full, even to excess, of meaning, point and emphasis. Few writers have added so much to the currency of quotation. But his style altogether wants the charm of ease and simplicity. It wearies by the constant strain after effect, its mock-heroics and allusive periphrasis, and excites distrust by its want of moderation.

On the whole no one of the ten or twelve really great writers of ancient Rome leaves on the mind so mixed an impression, both as a writer and as a man, as Juvenal. He has little, if anything at all, of the high imaginative mood — the mood of reverence and noble admiration — which made Ennius, Lucretius and Virgil the truest poetical representatives of the genius of Rome. He has nothing of the wide humanity of Cicero, of the urbanity of Horace, of the ease and grace of Catullus. Yet he

represents another mood of ancient Rome, the mood natural to her before she was humanized by the lessons of Greek art and thought. If we could

imagine the elder Cato living under Domitian, cut off from all share in public life, and finding no out- let for his combative energy except in literature, we should per- haps understand the motives of Juvenal's satire and the place which is his due as a representative of the genius of his country. As a man he shows many of the strong qualities of the old Roman plebeian— the aggressive boldness, the intolerance of superiority and privilege, which animated the tribunes in their opposition to the senatorian rule. Even where we least like him we find nothing small or mean to alienate our respect from him. Though he loses no opportunity of being coarse, he is not licentious; though he is often truculent, he cannot be called malignant. It is, indeed, impossible to say what motives of personal chagrin, of love of detraction, of the mere literary passion for effective writing, may have contributed to the indignation which inspired his verse. But the prevailing impression we carry away after reading him is that in all his early satires he was animated by a sincere and manly detestation of the tyranny and cruelty, the debauchery and luxury, the levity and effeminacy, the crimes and frauds, which we know from other sources were then rife in Rome, and that a more serene wisdom and a happier frame of mind were attained by him when old age had somewhat allayed the fierce rage which vexed his manhood.

Authorities. — The remarkable statements in a " life " found in a late Italian MS. (Barberini, viii. 18), " Iunius Iuvenalis Aquinas Iunio Iuvenale patre matre vero Septumuleia ex Aquinati municipio Claudio Nerone et L. Antistio consulibus (55) natus est, sororem habuit Septumuleiam quae Fuscino (Sat. xiv. 1) nupsit," though not necessarily false, cannot be accepted without confirmation.

The earliest evidence for the banishment of Juvenal is that of Sidonius Apollinaris (c. 480), Carm. ix. 269, " Non qui tempore Caesaris seeundi | Aeterno coluit Totnos reatu | Nee qui consimili deinde casu | Ad vulgi tenuem strepentis auram j Irati fuit his- trionis exul," lines which by the exact parallel drawn between Ovid's fate and Juvenal's imply the belief that Juvenal died in exile. The banishment is also mentioned by J. Malalas, a Greek historian subsequent to Justinian, who gives the place as Pentapolis in Africa, Chron. x. 262, Dindorf. The inscription (on a stone now lost) is as follows, the words and letters in brackets being the conjectural restorations of scholars: — " [Cere] ri sacrumj [D. Iu] nius Iuvenalis (trib.coh. [I] Delmatarum (Ilvirquinq.flamen | divi Vespasiani | vo- vit dedicav[it] que | sua pec, " Corp. inscr. lat. X. 5382, xiii. 201 sqq. The best of the known manuscripts of Juvenal (P) is at Montpellier (125); but there are several others which cannot be neglected. Amongst these may be specially mentioned the Bodleian MS. (Canon. Lat. 41), which contains a portion of Satire vi., the existence of which was unknown until E. O. Winstedt published it in the Classical Review (1899), pp. 201 seq. Another

fragment in the Bibliotheque Nationale was described by C. E. Stuart in the Classical Quarterly (Jan. 1909). Numerous scholia and glossaries attest the interest taken in Juvenal in post-classical times and the middle ages. There are two classes of scholia — the older or " Pithoeana," first published by P. Pithoeus, and the " Cornutus scholia " of less value, specimens of which have been published by various scholars. The earliest edition which need now be mentioned is that of P. Pithoeus, 1585, in which P was first used for the text. Amongst later ones we may mention the commentaries of Ruperti (1819) and C. F. Heinrich (1839, with the old scholia), O. Jahn (185 1, critical with the old scholia), A. Weidner (1889), L. Friedlander (1895, with a full verbal index). The most useful English commentaries are those of J. E. B. Mayor (a voluminous and learned commentary on thirteen of the Satires, ii.,vi. and ix. being omitted), J. D. Lewis (1882, with a prose translation) and J. D. Duff (1898, expurgated, and ii. and ix. being omitted). There are recent critical texts: conservative and chiefly based on P, by F. Buecheler (1893, with selections from the scholia) and S. G. Owen (in the Oxford Series of Texts) ; on the other side, by A. E. Housman(l905)andby the same, but with fewer innova- tions, in the new Corpus poelarum latinorum, fasc. v. The two last- named editors alone give the newly discovered lines of Satire vi. There are no recent translations of Juvenal into English verse. Dryden translated i., iii., vi., x. and xvi., the others being committed to inferior hands. Other versions are Gifford's (1802), of some merit, and C Badham's (1814). Johnson's imitations of Satires iii. and x. are w:ll known. For the numerous articles and contributions to the criticism and elucidation of the Satires, reference should be made to Teuffel's Geschichte der romischen Litteratur (Eng. trans, by Warre), § 331, and Schanz, ditto (1901, ii. § 2, § 420a). (W. Y.S. ;J. P. P.)

JUVENCUS, OAIUS VETTIUS AQUILINUS, Christian poet, flourished during the reign of Constantine the Great. Nothing

is known of him except that he was a Spanish presbyter of dis- tinguished family. About 330 he published his Libri evangeli- orum IV., each book containing about 800 hexameters. The division into books is possibly a reminiscence of the number of the Gospels. The work itself, written with the idea of ousting the absurdities of Pagan mythology and replacing them by the truths of Christianity, may be called the first Christian epic. In the Praefatio the author expresses the hope that the sacred- ness of his subject may procure him safety at the final con- flagration of the world and admission into heaven. The whole is, in the main, a poetical version of the Gospel of Matthew, the other evangelists only being used for supplementary details. It is founded upon a pre-vulgate Latin translation, although there is evidence that Juvencus also consulted the Greek. In spite of metrical irregularities, the language and style are simple and show good taste, being

free from the artificiality of other Christian poets and prose writers, and the author has made excellent use of Virgil (his chief model) and other classical writers. Juvencus set the fashion of verse translations of the Bible, and the large number of MSS. of his poem mentioned in lists and'Still extant are sufficient evidence of its great popularity. According to Jerome, he was also the author of some poems on the sacraments, but no trace of these has survived. The Latin Heptateuch, a hexameter version of the first seven books of the Old Testament, has been attributed to- Juvencus amongst others; but it is now generally supposed to be the work of a certain Cyprianus, a Gaul who lived in the 6th century, possibly a bishop of Toulon, author of the Life of Caesarius, bishop of Arelate (Aries).

See M. Manitius, Geschichte der christlich-lateinischen Poesie (1891) ; A. Ebert, Allgemeine Geschichte der Literatur des Mittelalters, vol. i. (1889); editions of Juvencus by C. Marold (1886); J. Hiimer in Corpus scriptorum ecclesiasticorum latinorum, vol. .xxiv. (Vienna, l89i);J.T. Hatfield, A Study of Juvencus (1890), dealing with syntax, metre and language; editions of the Heptateuch by J. E. B. Mayor (1889; reviewed by W. Sanday in Classical Review, October 1889, and by J. T. Hatfield in American Journal of Philology, vol. xi.,.1890), and R. Peiper, vol. xxiii. of the Vienna series above. •

JUVENILE OFFENDERS. In modern social science the question of the proper penal treatment of juvenile (i.e. non- adult) offenders has been increasingly discussed; and the reformatory principle, first applied in the case of children, has even been extended to reclaimable adult offenders (juveniles in crime, if not in age) in a way which brings them sufficiently within the same category to be noticed in this article. In the old days the main idea in England was to use the same penal methods for all criminals, young and old; when the child broke the law he was sent to prison like his elders. It was only in com- paratively recent times that it was realized that child criminals were too often the victims to circumstances beyond their own control. They were cursed with inherited taint; they were brought up among evil surroundings; they suffered from the culpable neglect of vicious parents, and still more from bad example and pernicious promptings. They were rather poten- tial than actual criminals, calling for rescue and regeneration rather than vindictive reprisals. Under the old system a painstaking English gaol chaplain calculated that 58% of all criminals had made their first lapse at fifteen. Boys and girls- laughed at imprisonment. Striplings of thirteen and fourteen had been committed ten, twelve, sixteen or seventeen times. Religion and moral improvement were little regarded in prisons, industrial and technical training were. impossible. The chief lesson learnt was an intimate and contemptuous acquain- tance with the demoralizing interior of a gaol. There were at one fime in London 200 " flash houses " frequented by 6000 boys trained and proficient in thieving*

and depredation. .■ The substantial movement for reform dates from the protests of Charles Dickens, who roused public opinion to such an extent that the first Reformatory School Act was passed in 1854. Sporadic efforts to meet the evil had indeed been made earlier. In 1756 the Marine Society established a school for the reception and reform of younger criminals; in 1788 the City of London formed a similar institution, which grew much later into

the farm school at Redhill. In 1838 an act of parliament created an establishment at Parkhurst for the detention and correction of juvenile offenders, to whom pardon was given conditional on their entrance into some charitable institution. Parkhurst was technically a prison, and the system combined industrial training with religious and educational instruction. These earlier efforts had, however, been quite insufficient to meet the evils, for in the years immediately preceding 1854 crime was being so constantly reinforced in its beginnings, under the existing penal system, that it threatened to swamp the country. Unofficial, but more or less accurate, figures showed that between 11,000 and 12,000 juveniles passed annually through the prisons of England and Wales, a third of the whole number being contributed by London alone. In 1854 the total reached 14,000. The ages of offenders ranged from less than twelve to seventeen; 60% of the whole were between fourteen and seventeen; 46% had been committed more than once; 18% four times and more.

The Reformatory School Act 1854, which was thrashed out at conferences held in Birmingham in 1851 and 1853, substituted the school for the gaol, and all judicial benches were empowered to send delinquents to schools when they had been guilty of acts punishable by short imprisonment, the limit of which was at first fourteen and became afterwards ten days. A serious flaw in this act long survived; this was the provision that a short period of imprisonment in gaol must precede reception into the reformatory; it was upheld by well-meaning but mis- taken people as essential for deterrence. But more enlightened opinion condemned the rule as inflicting an indelible prison taint and breeding contamination, even with ample and effective safeguards. Wiser legislation has followed, and an act of 1899 abolished preliminary imprisonment.

Existing reformatories, or " senior home office schools " as they are officially styled, in England numbered 44 in 1907. They receive all juvenile offenders, up to the age of sixteen, who have been convicted of an offence punishable with penal servi- tude or imprisonment. The number of these

during the years between 1894 and 1906 constantly varied, but the figure of the earliest date, 6604, was never exceeded, and in some years it was considerably less, while in 1906 it was no more than 5586,- though the general population had increased by several millions in the period. These figures, in comparison with those of 1854, must be deemed highly satisfactory, even when we take into account that the latter went up to the age of seventeen. Older offenders, between sixteen and twenty-one, come within the category of juvenile adults and are dealt with differently (see Borstal Scheme below).

Other schools must be classed with the reformatory, although they have no connexion with prisons and deal with youths who are only potential criminals. The first in importance are the industrial schools. When the newly devised reformatories were doing excellent service it was realized that many of the rising generation might some day lapse into evil ways but were still on the right side and might with proper precautions be kept there. They wanted preventive, not punitive treatment, and for them industrial schools were instituted. The germ of these establishments existed in the Ragged Schools, " intended to educate destitute children and save them from vagrancy and crime." They had been invented by John Pounds (1766-1839), a Portsmouth shoemaker, who, early in the 19th century, was moved with sympathy for these little outcasts and devoted himself to this good work. The ragged school movement found powerful support in active philanthropists when public atten- tion was aroused to the prevalence of juvenile delinquency. The first Industrial School Act was passed in 1856 and applied only to Scotland. Next year its provisions were extended to England, and their growth was rapid. There were 45 schools in the beginning; in 1878 the number had more than been doubled; in 1907 there were 102 in England and Wales and 31 in Scotland.

The provisions of the Education Acts 1871 and 1876 led to a large increase in the number of children committed for breaches

of the law and to the establishment of two kinds of subsidiary industrial schools, short detention of truant schools and day industrial schools in which children do not reside but receive their meals, their elementary education and a certain amount of industrial training. The total admissions to truant schools in 1907 were 1368 boys, and the numbers actually in the schools on the last day of that year were 1125 with 2568 on licence. The average length of detention was fourteen weeks and three days on first admission, seventeen weeks and five days on first re-admission, and twenty-three weeks six days on second re- admission. The total number of admissions into truant schools from 1878 to the end of 1907 was 44,315, of whom just half had been licensed and not returned, 11,239 had been licensed and once re-admitted, 8900 had been re-admitted twice or oftener.

The day industrial schools owed their origin to another reason than the enforcement of the Education Acts. It was found that some special treatment was required for large masses of youths in large cities, who were in such a neglected or degraded con- dition that there was little hope of their growing into healthy men and women or becoming good citizens. They were left un- clean, were ill-fed and insufficiently clothed, and were not use- fully taught. The total number who attended these day schools in 1907 was 1951 boys and 1232 girls.

The disciplinary system of the English schools is planned upon the establishment or institution system, as opposed to that of the " family " or " boarding out " systems adopted in some countries, and some controversy has been aroused as to the comparative value of the methods. The British practice has always favoured the well-governed school, with the proviso that it is kept small so that the head may know all of his charges. But a compromise has been effected in large establishments by dividing the boys into " houses," each containing a small manageable total as a family under an official father or head. Under this system the idea of the home is maintained, while uniformity of treatment and discipline is secured by grouping several houses together under one general authority. The plan of " boarding out " is not generally approved of in England; the value of the domestic training is questionable and of uncertain quality, depending entirely upon the character and fitness of the foster-parents secured. Education must be less systematic in the private home, industrial training is less easily carried out, and there can be none of that esprit de corps that stimulates effort in physical training as applied to athletics and the playing of games. No very definite decision has been arrived at as to the comparative merits of institution life and boarding out. Among the Latin races — France, Italy, Portugal and Spain — the former is as a rule preferred; also in Belgium; in Germany, Holland and the United States placing out in private families is very much the rule; in Austria-Hungary and Russia both methods are in use.

The total admissions to English reformatory schools from their creation to the 31st of December 1907 amounted to 76,455, or 64,031 boys and 12,424 girls. The total discharges for the same period were 70,890, or 59,081 boys and 11,809 girls. The results may be tested by the figures for those discharged in 1904, 1905 and 1906: —

Boys.— 3573 were placed out, of whom 66 had died, leaving 3507 ; of these it was found that 2735 (or about 78%) were in regular employment; 158 (or about 4) were in casual employment; 439 (or about 13) had been convicted; and 175 (or about 5%) were unknown.

Girls. — 480, of whom 11 had died, leaving 469; of these it was found

that 384 (or about 82) were in regular employment ; 28 (or about 6) were in casual "employment ; 17 (or about 4%) had been convicted, and 40 (or about 8 %) were unknown.

For industrial schools, including truant and day schools, the total admissions, up to the 31st of December 1907, were 153,893, or 120,955 boys and 32,938 girls. The total discharges to the same date (excluding transfers) were 136,961, or 108,398 boys and 28,563 girls. The results as tested by those discharged in 1904, 1905 and 1906 were as follow : —

Boys. — 8909 were placed out, of whom 118 had since died, leaving 8791 to be reported on; of these it was found that 7547 (or about 86%) were in regular employment; 415 (or about 4- 7%) were in casual employment ; 419 (or about 4-7) convicted or re- committed; and 410 (or about 4-6) unknown.

Girls. — 2505 placed out, of whom 50 had died, leaving 2455; of

these 2180 (or abQUt 89 %) were in regular employment; 112 (or about 4 %) were in casual employment ; 2 1 (or about 1 %) convicted or re-committed; and 142 (or about 6 %) unknown.

These results are of course wholly independent of those achieved by the juvenile-adult prison reformatory at Borstal instituted in October 1902. The record of the first year's work of this excellent system showed that 50 % of cases placed out had done well, thanks to the system and philanthropic labours of the Borstal Association.

An interesting point in regard to the reclamation of these crimin- ally inclined juveniles is the nature of the employments to which they have been recommended, and in which, as shown, they have done so well. In 1904, 1905 and 1906, the total number of boys discharged and placed was 12,482. By far the largest number of these, nearly a sixth, joined the army, 679 of them entering the bands; 292 joined the navy; 961 the mercantile marine; 1567 went to farm service; 414 worked in factories or mills as skilled hands; but others joined as labourers, a general class the total of which was 1096. Other jobs found included miners (629), carters (352), iron or steel workers (214), mechanics (301), shoemakers (181), tailors (161), shop assistants (228), carpenters (178), bakers (131), messen- gers and porters, including 112 errand boys (315). The balance Found employment in smaller numbers at other trades. The fate of 585 was unknown, 858 had been re-convicted, and the balance were in unrecorded

or casual employment.

The outlets found by the girls from these various schools naturally follow lines appropriate to their sex and the instruction received. Out of a total of 2985 discharged in the three years mentioned, 1235 became general servants, 268 housemaids, 203 laundry-maids, 52 cooks, 98 nursemaids, 65 dressmakers, 221 were engaged in factories and mills, and the balance was made up by marriage, death or casual employment.

In Ireland the reformatory and industrial school system conforms to that of Great Britain. There were in 1905 six reformatory and 70 industrial schools in Ireland, mostly under Roman Catholic management.

A short account of the reformatory methods of dealing with juvenile offenders in certain other countries will fitly find a place here.

Austria-Hungary. — The law leaves children of less than ten years of age to domestic discipline, as also children above that age if not exactly criminal, although the latter may be sent to correctional schools. There they are detained for varying periods, but never after twenty years of age, and they may be sent out on licence to situations or employment found for them. These schools also receive children between ten and fourteen guilty of crimes which are, however, by law deemed " contra- ventions " only; also the destitute between the same ages and the incorrigible whose parents cannot manage them.

In Hungary the penal code prescribes that children of less than twelve cannot be charged with offences; those between twelve and sixteen may be deemed to have acted without dis- cretion, and thus escape sentence, but are sent to a correctional school where they may be detained till they are twenty years of age. An excellent system prevails in Hungary by which the supervision of those liberated is entrusted to a " protector," a philanthropic person in the district who visits and reports upon the conduct of the boys, much like the " probation officer " in the United States. .—..... .. ..

Belgium. — The law of November 1801 places the whole mass of juveniles — those who are likely to give trouble and those who have already done so — at the disposal of the state. The system is very elastic, realizing the infinite variety of child- ish natures. The purely paternal regime would be wasted upon the really vicious; a severe discipline would press too heavily on the well-disposed. Accordingly, all juveniles, male and female, are divided into six principal classes with a corre- sponding treatment, it being strictly ruled that there is no intermingling of the classes; the very youngest, rescued early, are never to be associated with the older, who may be already vicious and degraded and who could not fail to exercise a per-

nicious influence. One of the great merits of the Belgian system is that the regulations may be relaxed, and children of whose amendment good hopes are entertained may be released provi- sionally, either to the care of parents and guardians or to em- ployers, artisans or agriculturists who will teach them a trade. Denmark. — There were 61 establishments of all classes for juveniles in Denmark in 1906, holding some 2000 inmates. In

1874, by the will of Countess Danner, a large female refuge

was founded at Castle Jagerspris, which holds some 360 girls. Another of the same class is the Royal Vodrofsvei Bonnehjem at Copenhagen, founded in the same year by Mile Schneider. The regime preferred in Denmark is that of the family or the very small school. The Jagerspris system is to divide the whole number of 360 into small parties of 20 each under a nurse or official mother. Employment in Danish schools is mainly agricultural, field labour and gardening, with a certain amount of industrial training; and on discharge the inmates go to farms or to apprenticeship, while a few emigrate.

France. — There are five methods of disposing of juvenile offenders in France: —

1. The preliminary or preventative prison (maisons d'arrit and de justice) for those arrested and accused.

2. The ordinary prison for all sentenced to less than six months, whose time of detention is too short to admit of their transfer to a provincial colony. It also receives children whom parents have found unmanageable.

3. The public or private penitentiary colony for the irresponsible children, acquitted as " without discretion," as well as for the guilty sentenced to more than six months' and less than two years' detention.

4. The correctional colony, where the system is more severe, receiving all sentenced for more than two years and all who have misconducted themselves in the milder establishments.

5. Various penitentiary houses for young females, whatever their particular sentence.

Foremost among French penal reformers stands the name of F. A. Demetz (1796-1873), the founder of the famous colony of Mettray. M. Demetz was a judge who, aghast at the evils inflicted upon children whom he was compelled by law to im- prison, left the bench and undertook to find some other outlet for them. At that time the French law, while it acquitted minors shown to have acted without discretion, still consigned them for safe

keeping and inevitable contamination to the common gaols. M. Demetz conceived the idea of an agricul- tural colony, and in 1840 organized a small " sociiH palernelle," as it was called, of which he became vice-president. Another philanthropist, the Vicomte de Bretignieres de Courteilles, a landed proprietor in Touraine, associated himself in the enter- prise and endowed the institution with land at Mettray near Tours. The earliest labours at Mettray were in the development of the institution, but as this approached completion they were applied to farmwork, agricultural employment being the chief feature of the place. The motto and device of Mettray was " the moralization of youth by the cultivation of the soil "; a healthy life in the open air was to replace the enervating and demoralizing influences of the confined prisons; and this was effected in the usual farming operations, to which were added gardening, vine-dressing, the raising of stock and the breeding of silkworms. The labour was not light; on the contrary, the directors of the colony sought by constant employment to send their charges to bed tired, ready to sleep soundly and not romp and chatter in their dormitories. The excellence of its aims, and the manifestly good results that were growing out of the system, soon made Mettray a model for imitation in France and beyond it. Many establishments were planned upon it, started by the state or private enterprise; penitentiary colonies were created for boys in connexion with some of the great central prisons. The colony of Val de Yevre has a good record. It was started by a private philanthropist, Charles J. M. Lucas, (1803-1889) but after five-and-twenty years was handed over to the state. Other cognate establishments are those of Petit Quevilly near Rouen, Petit Bourg near Paris, St Hiliar and Eysses. There are several female colonies, especially that of Darnetal at Rouen.

It is for the magistrate or juge oV instruction to select the class of establishment to which the juvenile delinquents brought before him shall be committed. The very young, those of twelve years of age and under, are placed out in the country with fami- lies, unless they can be again entrusted to their parents or com- mitted to maisons paternels, containing very limited numbers, twenty or thirty, in charge of a large staff. After twelve, and

from that age to fourteen or fifteen, the " ungrateful age " as

the French call it, boys are sent to a reformatory or "preservative school," where they will be under stronger discipline. For the third class, from fifteen to sixteen or eighteen, stricter measures are necessary, so as to

dispose of them in specially selected penal colonies, as has already been done at Eysses, where the discipline is severe, while embodying technical and industrial instruction.

Germany. — In most parts of the German Empire juvenile delinquents and neglected youths are treated in the same estab- lishments. No child of less than twelve years of age can be proceeded against in a court of law, although in some German states destitute or abandoned children have been taken at the ages of six, five and even three years. Youths between twelve and eighteen may be convicted, but their offences are passed over if they are proved to have acted without discretion. There are many kinds of correctional institutions and a number of schools not of a correctional character. These last are generally very small, the largest taking barely a hundred, but are very numerous. Many private persons have devoted themselves to the work. Count A. von der Recke-Volmerstein (1791-1878) about 1821 founded a refuge for neglected children in Dtisselthal, between Diisseldorf and Elberstadt. Pastor T. F. Fliedner (1 800-1 864) built up a fine establishment at Kaisers werth from 1833, in which was an infant school, a penitentiary and an orphan asylum. Another famous name is that of W. von Turk (1 774-1846), who studied under Pestalozzi in Switzerland.*

A school which has largely influenced public opinion in Great Britain, as in Germany, is the Rauhe Haus, near Hamburg, founded by Dr Wickern in 1833. This began with a single cottage but had grown in twenty years to a hamlet of twenty houses, with from twelve to sixteen inmates in each. The establishment is a Lutheran < ne; both boys and girls are ad- mitted, in separate houses, and a marked feature of the place is the number of " brothers," young men of good character qualifying for rescue work as superintendents of homes, prison officers and schoolmasters. They take part in the work and are in constant touch with the boys whom they closely supervise, being bound to " keep them in sight day and night, eat with them, sleep in their dormitories, direct their labour, accompany them to chapel, join in their recreations and sports." These " brothers " are honourably known throughout the world and have per- formed a large work in distant lands as missionaries, prison officers and schoolmasters. The Rauhe Haus receives three classes of juveniles: first, the boys, mostly street arabs; second, girls of the same category; third, children taken as boarders from private families, who confess their inability to manage them. The instruction given is in trades, in farming operations, gardening and fruit-raising. The pupils are largely assisted on release, through the good offices of the citizens of Hamburg.

Holland. — In the Low Countries, refuges, called ” Gods- huis,” were founded as early as the 14th century, intended for the care and shelter of

neglected youth and indigent old age. In the 17 th century people came from all parts of Europe to learn from the Dutch how orphans and unfortunate children could best be cared for. The Godshuis of Amsterdam was a vast establishment, into which as many as 4000 juveniles were sometimes crowded, with such disastrous effects that its name was changed to that of " pesthuis," and the government in the begin- ning of the present century ordered it to be emptied and closed. Other reformatory institutions in Holland are the Netherlands Mettray, the reform school of Zetten, near the Arnheim railway station, for Protestant girls; and that of Alkmaar for boys; the reformatory school of St Vincent de Paul at Amsterdam for both sexes; the Amsterdam reformatory for young vagabonds, male and female; the reform school of Smallepod at Amsterdam. The Netherlands Mettray, which is about five hours' journey from Amsterdam on a farm called Rissjelt, near Zutphen, is planned on the model of the French Mettray and was founded about 1855 by M. Suringar, a veteran Dutch philanthropist, long vice-president of the directors of prisons in Amsterdam.

Italy. — In Italy there is no distinction between the treatment of the offending and the neglected or deserted in youth. There are seventeen or more correctional establishments, eight of

which are state institutions and the rest founded by private benevolence or by charitable associations or local communities. None of these is exclusively agricultural; ten are industrial, seven industrial and agricultural combined. In Italy the age of responsibility is nine, below which no child can be charged with an offence. The Italian schools are mostly planned on a large scale. That of Marchiondi Spagliardi accommodates 550, divided among three houses under one supreme head. The Turazza institution at Treviso holds 380, and there are eight others with from 200 to 300 inmates. The regime is very various; the larger number of schools are on the congregate system, with daily labour in association and isolation by night. The " family " method is also practised with small groups, divi- sions or companies, into which the children are formed according to age or conduct.

Sweden. — All children below the age of sixteen may be sent to a correctional establishment or boarded out in respectable families: —

1. If they have committed acts punishable by law which indicate moral perversity and it is deemed advisable to correct them.

2. If they are neglected, ill-used, or if their moral deterioration is feared from the vicious life and character of parents or friends.

3. If their conduct at school or at home is such that a more severe

correctional treatment is necessary for their rescue.

Under this law the state is also to provide special schools to take all above ten who have shown peculiar depravity; all who have reached eighteen and who are not yet thought fit for freedom; all who have relapsed after provisional release. Sweden is rich in institutions devoted to the care of destitute and deserted children, all due to the efforts of the charitable. The largest correctional establishment is that founded at Hall, near the town of Sodertelge on the shores of the Baltic. This admirable agricultural colony, modelled on that of Mettray, owes its existence to the " Oscar- Josephine society," founded by Queen Josephine, widow of Oscar I.

United States. — In the words of a report made in 1878 by F. B. Sanborn, secretary of the American Social Science Society, " America can justly plume herself upon the work accom- plished by her juvenile reformatories since their inauguration down to the present time." The first in point of date and still the most considerable of the reformatories in the United States is that founded in 1825, thanks to the unwearied efforts of the great American publicist and philanthropist Edward Livingston, which now has its home on Randall's Island in New York City. In the following year a reformatory of the same class was founded in Boston, and another in the year after in Philadelphia. All were intended to receive criminal youth. There are state reformatories now in almost all the states of the Union, and those for juvenile adults in New York and Massachusetts have attracted world-wide attention, aiming so high and with such an elaboration of means that they deserve particular description.

The great state reformatory establishment of Elmira, New York, called into existence in 1889 with the avowed aim of compassing the reformation of the criminal by new processes, partakes of the system involved in the treatment of juvenile offenders. It was based upon the principle that crime ought to be attacked in its beginnings by other than ordinary punitive and prison methods. Under this view, the right of society to defend itself by punishment was denied, and it was held that a youthful offender was more sinned against than sinning. It was urged that his crime, due largely to inherited defects, mental or physical and vicious surroundings, was not his own fault, and he had a paramount claim to be treated differently by the state when in custody. The state was not justified in using powers of repression to imprison him in the usual mechanical hard and fast fashion and then return him to society, no better, possibly worse, than before; it was bound to regenerate him, to change his nature, improve his physique, and give him a new mental equip- ment, so that when again at large he might be fitted to take his place amongst honest citizens, to earn his living by reputable means and escape all temptation to drift back into crime. This

is the plausible explanation given for the state reformatory movement, which led to the creation on such costly and extensive lines of Elmira, and of Concord in Massachusetts, a cognate establishment. There is very little penal about the treatment, which is that of a boarding school; the education, thorough and carried far, includes languages, music, science and industrial art; diet is plentiful, even luxurious; amusements and varied recreation are permitted; well stocked libraries are provided with entertaining books; a prison newspaper is issued (edited by an inmate). Physical development is sedulously cultivated both by gymnastics and military exercises, and the whole course is well adapted to change entirely the character of the individual subjected to it. The trouble taken in the hope of transforming erring youth into useful members of society goes still further. The original sentence has been indefinite, and release on parole will be granted to inmates who pass through the various courses with credit and are supposed to have satisfied the authorities of their desire to amend. The limit of detention need not exceed twelve months, after which parole is possible, although the average period passed before it is granted is twenty-two months. The hope of permanent amendment is further sought by the fact that a situation, generally with good wages and congenial work, provided by the authorities, awaits every inmate at the time of his discharge. The inmates, selected from a very large class, are first offenders, but guilty generally of criminal offences, which include manslaughter, burglary, forgery, fraud, robbery and receiving. The exact measure of reformation achieved can never be exactly known, from the absence of authentic statistics and the- difficulty of following, up the surveillance of individuals when released on parole. Reports issued by the manager of Elmira claim that 81 % of those paroled have done well, but these results are not definitely authenticated. They are based upon the ascertained good conduct during the term of surveillance, six or twelve months only, during which time these subjects have not yet spent the gratuities earned and have pro- bably still kept the situations found for them on discharge. No doubt the material treated at Elmira and Concord is of a kind to encourage hope of reformation, as they are first offenders and presumably not of the criminal classes. Although the processes are open to criticism, the discipline enforced in these state reformatories does not err in excessive leniency. They a,re not " hotels," as has been sometimes said in ridicule, where prisoners go to enjoy themselves, have a good time, study Plato and conic sections, and pass out to an assured future. There is plenty of hard work, mental and physical, and the " inmates " rather envy their fellows in state prisons. A point to which great attention is paid is that physical degeneracy lies at the bottom of the criminal character, and great attention is paid to

the development of nervous energy and strengthening by every means the normal and healthful functions of the body. A leading feature in the treatment is the frequency and perfection with which bathing is carried out. A series of Turkish baths forms a part of the course of instruction; the baths being fitted elaborately with all the adjuncts of shower bath, cold douche, ending with gymnastic exercises.

A remarkable and unique institution is the state reformatory for women at Sherborn, Massachusetts, for women with sentences of more than a year, who in the opinion of the court are fit subjects for reformatory treatment. The majority of the inmates were convicted of drunkenness, an offence which the law of Massachusetts visits with severity — a sentence of two years being very common. This at once differentiates the class of women from that in ordinary penal establishments. At the same time we find that other women guilty of serious crime are sent by the courts to this prison with a view to their reform. Thus of 352 inmates, while no fewer than 200 were convicted of drunkenness, there were also 63 cases of offences against chastity and 30 of larceny. The average age was thirty-one and the average duration of sentence just over a year. In appearance and in character it more resembles a hospital or home for inebriates than a state convict prison. A system of grades or divisions is relied upon as a stimulus to

reform. The difference in grades is denoted by small and scarcely perceptible variations of the little details of everyday life, such as are supposed in a peculiar degree to affect the appre- ciation of women, e.g. in the lowest division the women have their meals off old and chipped china; in the next the china is less chipped; in the highest there is no chipped china; in the next prettily set out with tumblers, cruet-stands and a pepper pot to each prisoner. The superintendent relies greatly also on the moralizing influence of animals and birds. Well-behaved convicts are allowed to tend sheep, calves, pigs, chickens, canaries and parrots. This privilege is highly esteemed and productive, it is said, of the most softening influences.

The " George Junior Republic " (q.v.) is a remarkable institu- tion established in 1895 at Freeville, near the centre of New York State, by Mr. William Reuben George. The original features of the institution are that the motto " Nothing without labour " is rigidly enforced, and that self-government is carried to a point that, with mere children, would appear whimsical were it not a proved success. The place is, as the name implies, a miniature "republic" with laws, legislature, courts and administration of its own, all made and carried on by the " citizens " themselves. The tone and spirit of the place appeared to be excellent and there is much evidence that in many cases strong and independent character is developed in children whose antecedents have been almost hopeless.

Borstal Scheme in England. — The American system of state reformatories as above described has been sharply criticized, but the principle that underlies it is recognized as, in a measure, sound, and it has been adopted by the English authorities. Some time back the experiment of establishing a penal reformatory for offenders above the age hitherto committed to reformatory schools was resolved upon. This led to the foundation of the Borstal scheme, which was first formally started in October 1902. The arguments which had led to it may be briefly stated here. It had been conclusively shown that quite half the whole number of professional criminals had been first convicted when under twenty-one years of age, when still at a malleable period of development, when in short the criminal habit had not yet been definitely formed. Moreover these adolescents escaped special reformatory treatment, for sixteen is in Great Britain the age of criminal majority, after which no youthful offenders can be committed to the state reformatory schools. But there was always a formidable contingent of juvenile adults between sixteen and twenty-one, sent to penal servitude, and their numbers although diminishing rose to an average total of 15,000. It was accordingly decided to create a penal establishment under state control, which should be a half-way house between the prison and the reformatory school. A selection was made of juvenile adults, sentenced to not less than six months and sent to Borstal in 1902 to be treated under rules approved by the home secretary. They were to be divided on arrival into three separate classes, penal, ordinary and special, with promotion by industry and good conduct from the lowest to the highest, in which they enjoyed distinctive privileges. The general system, educational and disciplinary, was intelligent and governed by common sense. Instruction, both manual and educational, . was well suited to the recipients; the first embraced field work, market gardening, and a knowledge of useful handicrafts; the second was elemen- tary but sound, aided by well-chosen libraries and brightened by the privilege of evening association to play harmless but interesting games. Physical development was also guaran- teed by gymnastics and regular exercises. The results were distinctly encouraging. They arrived at Borstal " rough, untrained cubs," but rapidly improved in demeanour and inward character, gaining self-reliance and self-respect, and; left the prison on the high road to regeneration. It was wisely remem- bered that to secure lasting amendment it is not enough to chasten the erring subject, to train his hands, to strengthen his moral sense while still in durance; it is essential to assist him on discharge by helping him to find work, and encourage him by timely advice to keep him in the straight path. Too much praise cannot be accorded to the agencies and associations

which labour strenuously and unceasingly to this excellent end. Especial good work has been done by the Borstal association, founded under the patronage of the best known and most distinguished persons in English public life — archbishops, judges, cabinet ministers and privy councillors — which receives the juvenile adults on their release and helps them to employ- ment. Their labours, backed by generous voluntary contribu- tions, have produced very gratifying results. Although the offenders originally selected to undergo the Borstal treatment were those committed for a period of six months, it was recog- nized that this limit was experimental, and that thoroughly satisfactory results could only be obtained with sentences of at least a year's duration, so as to give the reforming agencies ample time to operate. In the second year's working of the system it was formally applied to young convicts sentenced to penal servitude between the ages of sixteen and twenty-one. In the next year it was adopted for all offenders between the ages of sixteen and twenty-one committed to prison, as far as the length of sentence would permit. The commissioners of prisons, in their Report for the year 1908 (Cd. 4300) thus expressed themselves on the working of the experiment: —

" Experience soon began to point to the probable success of this general application of the principle, in spite of the fact that the prevailing shortness of sentences operated against full benefit being derived from reformatory effort. The success was most marked in those localities where magistrates, or other benevolent persons, personally co-operated in making the scheme a success. Local Borstal committees were established at all prisons, and it was arranged that those members of the local committees should become ex officio honorary members of the Central Borstal Association, which it was intended should become, what it now is, the parent society directing the general aid on discharge of this category of young prisoners."

In spite of the general adoption of the Borstal system, there was a large class of young criminals who were outside its effects, those who were sentenced to terms of ten days and under for trifling offences. These juvenile adults, once having had the fear of prison taken away by actual experience, were found to come back again and again. To remedy this state of affairs, a bill was introduced in 1907 to give effect to the principle of a long period of detention for all those showing a tendency to embark on a criminal career. The bill was, however, dropped, but a somewhat similar bill was introduced the next year and became law under the title of The Prevention of Crime Act 1908. This measure introduces a new departure in the treatment of professional crime by initiating a system of detention for habitual criminals (see Recidivism). The act attempts the reformation of young offenders by giving the court power to pass sentence of detention in a Borstal institution for a term of not less than one year nor more than three on those between the ages of sixteen and twenty-one who by reason of

criminal habits or tendencies or association with persons of bad character require such instruction and discipline as appear most conducive to their reformation. The power of detention applies also to reformatory school offences, while such persons as are already undergoing penal servitude or imprisonment may be transferred to a Borstal institution if detention would conduce to their advantage. The establish- ment of other Borstal institutions is authorized by the act, while a very useful provision is the power to release on licence if there is a reasonable probability that the offender will abstain from crime and lead a useful and industrious life. The licence is issued on condition that he is placed under the supervision or authority of some society or person willing to take charge of him. Supervision is introduced after the expiration of the term of sentence, and power is given to transfer to prison incorrigibles or those exercising a bad influence on the other inmates of a Borstal institution. The act marks a noteworthy advance in the endeavour to arrest the growing habit of crime.

(A. G. ; T. A. I.)

JUVENTAS (Latin for " youth " : later Inventus), in Roman mythology, the tutelar goddess of young men. She was wor- shipped at Rome from very early times. In the front court of the temple of Minerva on the Capitol there was a chapel of Juventas, in which a coin had to be deposited by each youth on his assumption of the toga virilis, and sacrifices were offered on behalf of the rising manhood of the state. In connexion with this chapel it is related that, when the temple was in course of erection, Terminus, the god of boundaries, and Juventas refused to quit the sites they had already appropriated as sacred to themselves, which accordingly became part of the new sanctuary. This was interpreted as a sign of the immovable boundaries and eternal youth of the Roman state. It should be observed that in the oldest accounts there is no mention of Juventas, whose name (with that of Mars) was added in support of the augural predic- tion. After the Second Punic War Greek elements were intro- duced into her cult. In 218 B.C., by order of the Sibylline books, a lectisternium was prepared for Juventas and a public thanks- giving to Hercules, an association which shows the influence of the Greek Hebe, the wife of Heracles. In 207 Marcus Livius Salinator, after the defeat of Hasdrubal at the battle of Sena, vowed another temple to Juventas in the Circus Maximus, which was dedicated in 191 by C. (or M.) LiciniusLucullus; it was destroyed by fire in 16 B.C. and rebuilt by Augustus. In imperial times, Juventas personified, not the youth of the Roman state, but of the future emperor.

See Dion. Halic, iii. 69, iv. 15; Livy v. 54, xxi. 62, xxxvi. 36. JUXON, WILLIAM (1 582-1663), English prelate, was the son of Robert Juxon and was born probably at Chichester, being educated at Merchant Taylors' School, London, and at St John's College, Oxford, where he was elected to

a scholarship in 1598. He studied law at Oxford, but afterwards he took holy orders, and in 1609 became vicar of St Giles, Oxford, a living which he retained until he became rector of Somerton, Oxfordshire, in 1615. In December 1621 he succeeded his friend, William Laud, as president of St John's College, and in 1626 and 1627 he was vice-chancellor of the university. Juxon soon obtained other important positions, including that of chaplain-in-ordinary to Charles I. In 1627 he was made dean of Worcester and in 1632 he was nominated to the bishopric of Hereford, an event which led him to resign the presidency of St John's in January 1633. However, he never took up his episcopal duties at Here- ford, as in October 1633 he was consecrated bishop of London in succession to Laud. He appears to have been an excellent bishop, and in March 1636 Charles I. entrusted him with impor- tant secular duties by making him lord high treasurer of England; thus for the next five years he was dealing with the many financial and other difficulties which beset the king and his advisers. He resigned the treasurership in May 1641. During the Civil War the bishop, against whom no charges were brought in parliament, lived undisturbed at Fulham Palace, and his advice was often sought by the king, who had a very high opinion of him, and who at his execution selected him to be with him on the scaffold and to administer to him the last consola- tions of religion. Juxon was deprived of his bishopric in 1649 and retired to Little Compton in Gloucestershire, where he had bought an estate, and here he became famous as the owner of a pack of hounds. At the restoration of Charles II. he became archbishop of Canterbury and in his official capacity he took part in the coronation of this king, but his health soon began to fail and he died at Lambeth on the 4th of June 1663. By his will the archbishop was a benefactor to St John's College, where he was buried; he also aided the work of restoring St Paul's Cathedral and rebuilt the great hall at Lambeth Palace.

See W. H. Marah, Memoirs of Archbishop Juxon and his Times (1869); the best authority for the archbishop's life is the article by W. H. Hutton in the Diet. Nat. Biog. (1892).

KThe eleventh letter in the Phoenician alphabet and in its descendant Greek, the tenth in Latin owing to the omis- sion of Teth (see I), and once more the eleventh in the alphabets of Western Europe owing to the insertion of J. In its long history the shape of K has changed very little. It is on the inscription of the Moabite Stone (early 9th cent. B.C.) in the form (written from right to left) of H and ˆ . Similar forms are also found in early Aramaic, but another form H or H , which is found in the Phoenician of

*Cyprus in the 9th or 10th century B.C. has had more effect upon the later development of the Semitic forms. The length of the two back strokes and the manner in which they join the upright are the only variations in Greek. In various places the back strokes, treated as an angle < , become more rounded (, so that the letter appears as K , a form which in Latin probably affected the development of C (q.v.). In Crete it is elaborated into K and P . In Latin K, which is found in the earliest inscriptions, was*soon replaced by C, and survived only in the abbreviations for Kalendae and the proper name Kaeso. The original name Kaph became in Greek Kappa. The sound of K throughout has been that of the un- voiced guttural, varying to some extent in its pronunciation according to the nature of the vowel sound which followed it. In Anglo-Saxon C replaced K through Latin influence, writing being almost entirely in the hands of ecclesiastics. As the sound-changes have been discussed under C it is necessary here only to refer to the palatalization of K followed earlier by a final e as in watch (Middle English wacche, Anglo-Saxon wcecce) by the side of wake (M.E. waken, A.-S. wacan) ; batch, bake, &c. Sometimes an older form of the substantive survives, as in the Elizabethan and Northern make = mate alongside match. (P. Gi.)*

Ka, or Mi Godwin-Austen, the second highest mountain in the world, ranking after Mt Everest. It is a peak of the Karakoram extension of the Muztagh range dividing Kashmir from Chinese Turkestan. The height of K 2 as at present deter- mined by triangulation is 28,250 ft., but it is possible that an ultimate revision of the values of refraction at high altitudes may have the effect of lowering the height of K 2 , while it would elevate those of Everest and Kinchinjunga. The latter moun- tain would then rank second, and K 2 third, in the scale of altitude, Everest always maintaining its ascendancy. K 2 was ascended for the first time by the duke of the Abruzzi in June 1909, being the highest elevation on the earth's surface ever reached by man. KA'BA, KAABA, or Kaabeh, the sacred shrine of Mahom- medanism, containing the " black stone," in the middle of the great mosque at Mecca (q.v.).

KABARDIA, a territory of S. Russia, now part of the province of Terek. It is divided into Great and Little Kabardia by the upper river Terek, and covers 3780 sq. m. on the northern slopes of the Caucasus range (from Mount Elbruz to Pasis-mta, or Edena) , including the Black Mountains (Kara-dagh) and the high plains on their northern slope. Before the Russian conquest it extended as far as the Sea of Azov. Its population is now about 70,000. One-fourth of the territory is owned by the aristocracy and the remainder is divided among the auls or villages. A great portion is under permanent pasture, part under forests, and some under perpetual snow. Excellent breeds of horses are reared, and the peasants own many cattle. The land is well cultivated in the lower parts, the chief crops being

millet, maize, wheat and oats. Bee-keeping is extensively practised, and Kabardian honey is in repute. Wood-cutting and the manufacture of wooden wares, the making of btirkas (felt and fur cloaks), and saddlery are very general. Nalchik is the chief town.

The Kabardians are a branch of the Adyghe (Circassians). The policy of Russia was always to be friendly with the Kabardian aristocracy, who were possessed of feudal rights over the Ossetes, the Ingushes, the Abkhasians and the mountain Tatars, and had command of the roads leading into Transcaucasia. Ivan the Terrible took Kabardia under his protection in the 16th century.

Later, Russian influence was counterbalanced by that of the Crimean khans, but the Kabardian nobles nevertheless supported Peter the Great during his Caucasian campaign in 1722-23. In 1739 Kabardia was recognized as being under the double pro- tectorate of Russia and Turkey, but thirty-five years later it was definitively annexed to Russia, and risings of the population in 1804 and 1822 were cruelly suppressed. Kabardia is considered as a school of good manners in Caucasia; the Kabardian dress sets the fashion to all the mountaineers. Kabardians constitute the best detachment of the personal Imperial Guards at St Petersburg.

A short grammar of the Kabardian language and a Russian- Kabardian dictionary, by Lopatinsky, were published in Sbornik Materialov dla Opisaniya Kavkaza (vol. xii., Tiflis, 1891). Frag- ments of the poem " Sosyruko," some Persian tales, and the tenets of the Mussulman religion were printed in Kabardian in 1864, by Kazi Atazhukin and Shardanov. The common law of the Kabar- dians has been studied by Maxim Kovalevsky and Vsevolod Miller.

KABBA, a province of the British protectorate of Northern Nigeria, situated chiefly on the right bank of the Niger, between 7° 5′ and 8° 45′ N. and 5 30′ and 7 E. It has an area of 7800 sq. m. and an estimated population of about 70,000. The province consists of relatively healthy uplands interspersed with fertile valleys. It formed part at one time of the Nupe emirate, and under Fula rule the armies of Bida regularly raided for slaves and laid waste the country. Amongst the native inhabitants the Igbira are very industrious, and crops of tobacco, indigo, all the African grains, and a good quantity of cotton are already grown. The sylvan products are valuable and include palm oil, kolas, shea and rubber. Lokoja, a town which up to 1902 was the principal British station in the protectorate, is situated in this province. The site of Lokoja, with a surrounding tract of country at the junction of the Benue and the Niger, was ceded to the British government in 1841 by the attah of Idah, whose dominions at that time extended to the right bank of the river. The first British settlement was a

failure. In 1854 MacGregor Laird, who had taken an active part in promoting the explora- tion of the river, sent thither Dr W. B. Baikie, who was success- ful in dealing with the natives and in 1857 became the first British consul in the interior. The town of Lokoja was founded by him in i860. In 1868 the consulate was abolished and the settlement was left wholly to commercial interests. In 1879 Sir George Goldie formed the Royal Niger Company, which bought out its foreign rivals and acquired a charter from the British government. In 1886 the company made Lokoja its military centre, and on the transfer of the company's territories to the Crown it remained for a time the capital of Northern Nigeria. In 1902 the political capital of the protectorate was shifted to Zungeru in the province of Zaria, but Lokoja remains the commercial centre. The distance of Lokoja from the sea at the Niger mouth is about 250 m.

In the absence of any central native authority the province is entirely dependent for administration upon British initiative. It has been divided into four administrative divisions. British and native courts of justice have been established. A British station has been established at Kabba town, which is an admir- able site some 50 m. W. by N. of Lokoja, about 1300 ft. above the sea, and a good road has been made from Kabba to Lokoja. Roads have been opened through the province. (See Nigeria.) KABBABISH (" goatherds": James Bruce derives the name from Hebsh, sheep), a tribe of African nomads of Semitic origin. It is perhaps the largest " Arab " tribe in the Anglo-Egyptian Sudan, and its many clans are scattered over the country extend- ing S.W. from the province of Dongola to the confines of Darfur. The Kabbabish speak Arabic, but their pronunciation differs much from that of the true Arabs. The Kabbabish have a tradition that they came from Tunisia and are of Mogrebin or western descent; but while the chiefs look like Arabs, the tribes- men resemble the Beja family. They themselves declare that

one of their clans, Kawahla, is not of Kabbabish blood, but was affiliated to them long ago. Kawahla is a name of Arab forma- tion, and J. L. Burckhardt spoke of the clan as a distinct one living about Abu Haraz and on the Atbara. The Kabbabish probably received Arab rulers, as did the Ababda. They are chiefly employed in cattle, camel and sheep breeding, and before the Sudan wars of 1883-99 they had a monopoly of all trans- port from the Nile, north of Abu Gussi, to Kordofan. They also cultivate the lowlands which border the Nile, where they have permanent villages. They are of fine physique, dark with black wiry hair, carefully arranged in tightly rolled curls which cling to the head, with regular features and rather

thick aquiline noses. Some of the tribes wear large hats like those of the Kabyles of Algeria and Tunisia.

See James Bruce, Travels to Discover the Source of the Nile (1796) ; A. H. Keane, Ethnology of Egyptian Sudan (1884); Anglo-Egyptian Sudan (edited by Count Gleichen, 1905).

KABBALAH (late Hebrew kabbalah, qabbalah), the technical name for the system of Jewish theosophy which played an im- portant part in the Christian Church in the middle ages. The term primarily denotes " reception " and then " doctrines received by tradition." In the older Jewish literature the name is applied to the whole body of received religious doctrine with the exception of the Pentateuch, thus including the Prophets and Hagiographa as well as the oral traditions ultimately embodied in the Mishnah. 1 It is only since the nth or 12th century that Kabbalah has become the exclusive appellation for the renowned system of theosophy which claims to have been transmitted uninterruptedly by the mouths of the patriarchs and prophets ever since the creation of the first man.

The cardinal doctrines of the Kabbalah embrace the nature of the Deity, the Divine emanations or SSphiroth, the cosmogony, Doctrine the creation of angels and man, their destiny, and of the the import of the revealed law. According to this Sephiroth. esoteric doctrine, God, who is boundless, and above everything, even above being and thinking, is called En Soph (amipos); He is the space of the universe containing rd Trap, but the universe is not his space. In this boundlessness He could not be comprehended by the intellect or described in words, and as such the En Soph was in a certain sense Ayin, non- existent (Zohar, iii. 283). 2 To make his existence known and comprehensible, the En SOph had to become active and creative. As creation involves intention, desire, thought and work, and as these are properties which imply limit and belong to a finite being, and moreover as the imperfect and circumscribed nature of this creation precludes the idea of its being the direct work of the infinite and perfect, the En Soph had to become creative, through the medium of ten Sephiroth or intelligences, which emanated from him like rays proceeding from a luminary.

Now the wish to become manifest and known, and hence the idea of creation, is co-eternal with the inscrutable Deity, and the first manifestation of this primordial will is called the first Sephirah or emanation. This first Sephirah, this spiritual sub- stance which existed in the En Soph from all eternity, contained nine other intelligences or Sephiroth. These again emanated one from the other, the second from the first, the third from the second, and so on up to ten.

_ The ten Sephiroth, which form among themselves and with the En Soph a strict unity, and which simply represent different aspects of one and the same being, are respectively denominated (1) the Crown, (2) Wisdom, (3) Intelligence, (4) Love, (5) Justice, (6) Beauty, (7) Firmness, (8) Splendour, (9) Foundation, and (10) Kingdom. Their evolution was as follows: " When the Holy Aged, the con- cealed of all concealed, assumed a form, he produced everything in the form of male and female, as things could not continue in any other form. Hence Wisdom, the second Sephirah, and the beginning of development, when it proceeded from the Holy Aged (another name of the first Sephirah) emanated in male and female, for Wisdom expanded, and Intelligence, the third Sephirah, proceeded from it, and thus were obtained male and female, viz. Wisdom the father and Intelligence the mother, from whose union the other

1 C. Taylor, Sayings of the Jewish Fathers (1897), pp. 106 sqq., 175 seq.; W. Bacher, Jew. Quart. Rev. xx. 572 sqq. (1908).

2 On the Zohar, " the Bible of the Kabbalists," see below.

pairs of Sephiroth successively emanated" {Zohar, iii. 290). These two opposite potencies, viz. the masculine Wisdom or Sephirah No. 2 and the feminine Intelligence or Sephirah No. 3 are joined together by the first potency, the Crown or Sephirah No. 1 ; they yield the first triad of the Sephiric decade, and constitute the divine head of the archetypal man.

From the junction of Sephiroth Nos. 2 and 3 emanated the mascu- line potency Love or Mercy (4) and the feminine potency Justice (5), and from the junction of the latter two emanated again the uniting potency Beauty (6). Beauty, the sixth Sephirah, consti- tutes the chest in the archetypal man, and unites Love (4) and Justice (5), which constitute the divine arms, thus yielding the second triad of the Sephiric decade. From this second conjunction emanated again the masculine potency Firmness (7) and the feminine potency Splendour (8), which constitute the divine legs of the archetypal man; and these sent forth Foundation (9), which is the genital organ and medium of union between them, thus yielding the third triad in the Sephiric decade. Kingdom (10), which emanated from the ninth Sephirah, encircles all the other nine, inasmuch as it is the Shechinah, the divine halo, which encompasses the whole by its all-glorious presence.

In their totality and unity the ten Sephiroth are not only denominated the World of Sephiroth, or the World of Emana- tions, but, owing to the above representation, are called the primordial or archetypal man (ˆirpwrbyovos) and the heavenly man. It is this form which, as we are assured, the prophet Ezekiel saw in the mysterious chariot (Ezek. i. 1-28), and of which the

earthly man is a faint copy.

As the three triads respectively represent intellectual, moral and physical qualities, the first is called the Intellectual, the second the Moral or Sensuous, and the third the Material World. According to this theory of the archetypal man the three Sephiroth on the right-hand side are masculine and represent the principle of rigour, the three on the left are feminine and represent the principle of mercy, and the four central or uniting Sephiroth represent the principle of mildness. Hence the right is called " the Pillar of Judgment," the left " the Pillar of Mercy," and the centre " the Middle Pillar." The middle Sephiroth are synecdochically used to represent the worlds or triads of which they are the uniting potencies. Hence the Crown, the first Sephirah, which unites Wisdom and Intelligence to constitute the. first triad, is by itself denominated the Intellectual World. So Beauty is by itself described as the Sensuous World, and in this capacity is called the Sacred King or simply the King, whilst Kingdom, the tenth Sephirah, which unites all the nine Sephiroth, is used to denote the Material World, and as such is denominated the Queen or the Matron. Thus a trinity of units, viz. the Crown, Beauty and Kingdom, is obtained within the trinity of triads. But farther, each Sephirah is as it were a trinity in itself. It (1) has its own absolute character, (2) receives from above, and (3) communicates to what is below. " Just as the Sacred Aged is represented by the number three, so are all the other lights (Sephiroth) of a threefold nature " (Zohar, iii. 288). In this all-important doctrine of the Sephiroth, the Kabbalah insists upon the fact that these potencies are not creations of the En Soph, which would be a diminution of strength; that they form among themselves and with the En Soph a strict unity, and simply represent different aspects of the same being, just as the different rays which proceed from the light, and which appear different things to the eye, are only different manifestations of one and the same light; that for this reason they all alike partake of the .perfections of the En Soph ; and that as emanations from the Infinite, the Sephiroth are infinite and perfect like the En Soph, and yet constitute the first finite things. They are infinite and perfect when the En Soph imparts his fullness to them, and finite and imperfect when that fullness is withdrawn from them. The conjunction of the Sephiroth, or, according to the language of the Kabbalah, the union of the crowned King and Queen, pro- duced the universe in their own image. Worlds came into existence before the En Soph manifested himself in the human form of emanations, but they could not continue, and necessarily perished because the con- ditions of development which obtained with the sexual opposites of the Sephiroth did not exist. These worlds which perished are compared to sparks which fly out from a red-hot iron beaten by a hammer, and which are extinguished according to the distance

The Universe.

they are removed from the burning mass. Creation is not ex nihilo; it is simply a further expansion or evolution of the Sephiroth. 1 The world reveals and makes visible the Boundless, and the concealed of the concealed. And, though it exhibits the Deity in less splendour than its Sephiric parents exhibit the En Soph, because it is farther removed from the primordial source of light than the Sephiroth, still, as it is God manifested, all the multifarious forms in the world point out the unity which they represent. Hence nothing in the whole universe can be annihilated. Everything, spirit as well as body, must return to the source whence it emanated (Zohqr, ii. 218). The universe consists of four different worlds, each of which forms a separate Sephiric system of a decade of emanations.

They were evolved in the following order. (1) The World of Emanations, also called the Image and the Heavenly or Archetypal Man, is, as we have seen, a direct emanation from the En Soph. Hence it is most intimately allied to the Deity, and is perfect and immutable. From the conjunction of the King and Queen (i.e. these ten Sephiroth) is produced (2) the World of Creation, or the Briatic world, also called " the Throne." Its ten Sephiroth, being farther removed from the En Soph, are of a more limited and circumscribed potency, though the substances they comprise are of the purest nature and without any admixture of matter. The angel Metatron inhabits this world. He alone constitutes the world of pure spirit, and is the garment of Shaddai, i.e. the visible manifestation of the Deity. His name is numerically equivalent to that of the Lord (Zohar, iii. 231). He governs the visible world, preserves the harmony and guides the revolutions of all the spheres, and is the captain of all the myriads of angelic beings. This Briatic world again gave rise to (3) the World of Formation, or Yetziratic World. Its ten Sephiroth, being still farther removed from the Primordial Source, are of a less refined substance. Still they are yet without matter. It is the abode of the angels, who are wrapped in luminous garments, and who assume a sensuous form when they appear to men. The myriads of the angelic hosts who people this world are divided into ten ranks, answering to the ten Sephiroth, and each one of these numerous angels is set over a different part of the universe, and derives his name from the heavenly body or element which he guards (Zohar, i. 42). From this world finally emanated (4) the World of Action, also called the World of Matter. Its ten Sephiroth are made up of the grosser elements of the former three worlds; they consist of material substance limited by space and perceptible to the senses in a multiplicity of forms. This world is subject to constant changes and corruption, and is the dwelling of the evil spirits. These, the grossest and most deficient of all forms, are also divided into ten degrees, each

lower than the other. The first two are nothing more than the absence of all visible form and organization; the third degree is the abode of darkness; whilst the remaining seven are " the seven infernal halls," occupied by the demons, who are the incarnation of all human vices. These seven hells are subdivided into innumerable compartments corresponding to every species of sin, where the demons torture the poor deluded human beings who have suffered themselves to be led astray whilst on earth. The prince of this region of darkness is Samael, the evil spirit, the serpent who seduced Eve. His wife is the Harlot or the Woman of Whoredom. The two are treated as one person, and are called " the Beast " {Zohar, ii. 255-259, with i. 35).

The whole universe, however, was incomplete, and did not receive its finishing stroke till man was formed, who is the Doctrine acme of the creation and the microcosm. " The of Man. heavenly Adam (i.e. the ten Sephiroth) who eman- ated from the highest primordial obscurity (i.e. the En Soph) created the earthly Adam " (Zohar, ii. 70). " Man is both the import and the highest degree of creation, for which reason he was formed on the sixth day. As soon as man was created everything was complete, including the upper and nether worlds, for everything is comprised in man. He unites in himself all forms " (Zohar, iii. 48). Each member of his body corresponds to a part of the visible universe. " Just as we see in the firma- ment above, covering all things, different signs which are formed of the stars and the planets, and which contain secret things and profound mysteries studied by those who are wise and expert in these things; so there are in the skin, which is the cover of the body of the son of man, and which is like the sky that covers all things above, signs and features which are the stars and planets of the skin, indicating secret things and profound mysteries whereby the wise are attracted who understand the reading of

1 The view of a mediate creation, in the place of immediate creation out of nothing, and that the mediate beings were emana- tions, was much influenced by Solomon ibn Gabirol (1021-1070).

the mysteries in the human face" (Zohar, ii. 76). Thehuman form is shaped after the four letters which constitute the Jewish Tetragrammaton (q.v.; see also Jehovah). The head is in the shape of ', the arms and the shoulders are like ", the breast like \ and the two legs with the back again resemble 1,1 (Zohar, ii. 72). The souls of the whole human race pre-exist in the World of Emanations, and are all destined to inhabit human bodies. Like the Sephiroth from which it emanates, every soul has ten potencies, consisting of a trinity of triads. (1) The Spirit (nesh'amah), which is the highest degree of being, corresponds to and is operated upon by the Crown, which is the highest triad in the Sephiroth, and is called the Intellectual World; (2) the Soul (ru&h), > which is the seat of the moral qualities, corresponds to and is operated upon by Beauty, [which is the second triad

in the Sephiroth, and is called the Moral World; and (3) the Cruder Soul (nephesh), which is imme- diately connected with the body, and is the cause of its lower instincts and the animal life, corresponds to and is operatedi upon by Foundation, the third triad in the Sephiroth, called the Material World. Each soul prior to its entering into this world consists of male and female united into one being. When it descends on this earth the two parts are separated and animate two different bodies. " At the time of marriage the Holy One, blessed be he, who knows all souls and spirits, unites them again as they were before; and they again constitute one body and one soul, forming as it were the right and the left of the individual. . . . This union, however, is influenced by the deeds of the man and by the ways in which he walks. If the man is pure and his conduct is pleasing in the sight of God, he is united with that female part of the soul which was his component part prior to his birth " (Zohar, i. 91). The soul's destiny upon earth is to develop those perfections the germs of which are eter- nally implanted in it, and it ultimately must return to the infinite source from which it emanated. Hence, if, after assuming a body and sojourning upon earth, it becomes polluted by sin and fails to acquire the experience for which it descends from heaven, it must three times reinhabit a body, till it is able to ascend in. a purified state through repeated trials. If, after its third resi- dence in a human body, it is still too weak to withstand the con- tamination of sin, it is united with another soul, in order that by their combined efforts it may resist the pollution which by itself it was unable to conquer. When the whole pleroma of pre- existent souls in the world of the Sephiroth shall have descended and occupied human bodies and have passed their period of probation and have returned purified to the bosom of the infinite Source, then the soul of Messiah will descend from the region of souls; then the great Jubilee will commence. There shall be no more sin, no more temptation, no more suffering. Universal restoration will take place. Satan himself, " the venomous Beast," will be restored to his angelic nature. Life will be an everlasting feast, a Sabbath without end. All souls will be united with the Highest Soul, and will supplement each other in the Holy of Holies of the Seven Halls (Zohar, i. 45, 168; ii. 97).

*According to the Kabbalah all these esoteric doctrines are contained in the Hebrew Scriptures. The uninitiated cannot perceive them; but they are plainly revealed to the Ant i gulty spiritually minded, who discern the profound import a ad In flu- of this theosophy beneath the surface of the letters «»« of and words of Holy Writ. " If the law simply con- Ka ** a ' a &- sists of ordinary expressions and narratives, such as the words of Esau, Hagar, Laban, the ass of Balaam or Balaam himself, why should it be called the law of truth, the perfect law, the true witness of God ? Each word contains a sublime source, each narrative points not only to the single instance in question, but also to generals " (Zohar, iii. 149, cf. 152).*

To obtain these heavenly mysteries, which alone make the Torah superior to profane codes, definite hermeneutical rules are employed, of which the following are the most important. (1) The words of several verses in the Hebrew Scriptures which are regarded as containing a recondite sense are placed over each other, and the letters are formed into new words by reading them vertically. (2) The words of the text are ranged in squares in such a manner as to be read either vertically or boustrophedon. (3) The words are

joined together and redivided. (4) The initials and final letters of several words are formed into separate words. (5) Every letter of a word is reduced to its numerical value, and the word is explained by another of the same quantity. (6) Every letter of a word is taken to be the initial or abbreviation of a word. (7) The twenty- two letters of the alphabet are divided into two halves ; one half is placed above the other; and the two letters which thus become associated are interchanged. By this permutation, Aleph, the first letter of the alphabet, becomes Lamed, the twelfth letter; Beth becomes Mem, and so on. This cipher alphabet is called Albam, from the first interchangeable pairs. (8) The commutation of the twenty-two letters is effected by the last letter of the alphabet taking the place of the first, the last but one the place of the second, and so forth. This cipher is called Atbash These hermeneutical canons are much older than the Kabbalah. They obtained in the synagogue from time immemorial, and were used by the Christian fathers in the interpretation of Scripture. 1 Thus Canon V., accord- ing to which a word is reduced to its numerical value and interpreted by another word of the same value, is recognized in the New Testa- ment (cf. Rev. xiii. 18). Canon VI. is adopted by Irenaeus, who tells us that, according to the learned among the Hebrews, the name Jesus contains two letters and a half, and signifies that Lord who contains heaven and earth [is» = pm d'de- w.t] (Against Heresies, ii. xxiv., i. 205, ed. Clark). The cipher Atbash (Canon VIII.) is used in Jeremiah xxv. 26, li. 41, where Sheshach is written for Babel. In Jer. li. 1, 'Dp 3 1 ?, Leb-Kamai (" the heart of them that rise up against me"), is written for a'-wz, Chaldea, by the same rule.

Exegesis of this sort is not the characteristic of any single circle, people or century; unscientific methods of biblical interpreta- tion have prevailed from Philo's treatment of the Pentateuch to modern apologetic interpretations of Genesis, ch. i. 2 The Kabbalah itself is but an extreme and remarkable develop- ment of certain forms of thought which had never been absent from Judaism; it is bound up with earlier tendencies to mysti-

cism, with man's inherent striving to enter into communion with the Deity. To seek its sources would be futile. The Pytha- gorean theory of numbers, Neoplatonic ideas of emanation, the Logos, the personified Wisdom, Gnosticism — these and many other features combine to show the antiquity of tendencies which, clad in other shapes, are already found in the old pre-Christian Oriental religions. 3 In its more mature form the Kabbalah belongs to the period when medieval Christian mysticism was beginning to manifest itself (viz. in Eckhart, towards end of 13th century) ; it is an age which also produced the rationalism of Maimonides (q.v.). Although some of its foremost exponents were famous Talmudists, it was a protest against excessive inteilectualism and Aristotelian scholasticism. It laid stress, not on external authority, as did the Jewish law, but on in- dividual experience and inward meditation. " The mystics accorded the first place to prayer, which was considered as a mystical progress towards God, demanding a state of ecstasy." 4 As a result, some of the finest specimens of Jewish devotional literature and some of the best types of Jewish individual character have been Kabbalist. 6 On the other hand, the Kabbalah has been condemned, arid nowhere more strongly than among the Jews themselves. Jewish orthodoxy found itself attacked by the more revolutionary aspects of mysticism and its tendencies to alter established customs. While the medieval scholasticism denied the possibility of knowing anything unattainable by reason, the spirit of the Kabbalah held that the Deity could be realized, and it sought to bridge the gulf. Thus it encouraged an unrestrained emotionalism, rank super- stition, an unhealthy asceticism, and the employment of artificial means to induce the ecstatic state. That this brought moral laxity was a stronger reason for condemning the Kabbalah,

1 See F. Weber, Judische Theologie (1897), PP- II8 S Q < 1-

» See C. A. Briggs, Study of Holy Scripture (1899), pp. 427 sqq., 570.

3 Even the " over-Soul " of the mystic Isaac Luria (1534-1572) is a conception known in the 3rd century A.D. (Rabbi Resh Lakish). For the early stages of Kabbalistic theories, see K. Kohler, Jew. Ency. iii. 457 seq., and L. Ginzberg, ibid. 459 seq. ; and for examples of the relationship between old Oriental (especially Babylonian) and Jewish Kabbalistic teaching (early and late), see especially A. Jeremias, Babylonisches in N. Test. (Leipzig, 1 905) ; E. Bischoff , Bab. Astrales im Weltbilde des Thalmud u. Midrasch (1907).

*4 L. Ginzberg, Jew. Ency. iii. 465. * See, especially, on the mystics of Safed in Upper Galilee, S.*

Schechter, Studies (1908), pp. 202-285.

and the evil effects of nervous degeneration find a more recent illustration in the mysticism of the Chasidim {H&sldim, " saints "), a Jewish sect in eastern Europe which started from a movement in the 18th century against the exaggerated casuistry of con- temporary rabbis, and combined much that was spiritual and beautiful with extreme emotionalism and degradation. 6 The appearance of the Kabbalah and of other forms of mysticism in Judaism may seem contrary to ordinary and narrow conceptions of orthodox Jewish legalism. Its interest lies, not in its doctrines, which have often been absurdly over-estimated (particularly among Christians), but in its contribution to the study of human thought. It supplied a want which has always been felt by certain types, and it became a movement which had mischievous effects upon ill-balanced minds. As usual, the excessive self-introspection was not checked by a rational criticism; the individual was guided by his own reason, the limitations of which he did not realize; and in becoming a law unto himself he ignored the accumulated experiences of civilized humanity. 7

A feature of greater interest is the extraordinary part which this theosophy played in the Christian Church, especially at the time of the Renaissance. We have already seen that the Sephiric decade or the archetypal man, like Christ, is considered to be of a double nature, both infinite and finite, perfect and imperfect. More distinct, however, is the doctrine of the Trinity. In Deut. vi. 43, where Yahweh occurs first, then Elohenu, and then again Yahweh, we are told " The voice though one, consists of three elements, fire {i.e. warmth), air {i.e. breath), and water {i.e. humidity), yet all three are one in the mystery of the voice and can only be one. Thus also Yahweh, Elohenu, Yahweh, con- stitute one — three forms which are one " (Zohar, ii. 43 ; compare iii. 65). Discussing the thrice holy in Isaiah vi. 3, one codex of the Zohar had the following remark: " The first holy denotes the Holy Father, the second the Holy Son, and the third the Holy Ghost" (cf. Galatinus, De arcanis cathol. lib. ii. c. 3, p. 31; Wolf, Bibliotheca hebraica, i. 1136). Still more distinct is the doctrine of the atonement. " The Messiah invokes all the sufferings, pain, and afflictions of Israel to come upon Him. Now if He did not remove them thus and take them upon Himself, no man could endure the sufferings of Israel, due as their punishment for transgressing the law; as it is written (Isa. liii. 4), Surely He hath borne our griefs and carried our sorrows " {Zohar, ii. 12). These and similar statements favouring the doctrines of the New Testament made many Kabbalists of the highest position in the synagogue embrace the Christian faith and write elaborate books to win their Jewish brethren over to Christ. As early as 1450 a company of Jewish converts in Spain, at the head of which were Paul de Heredia, Vidal de Saragossa de Aragon, and Davila, published compilations of Kabbalistic treatises to prove from them the doctrines of Christianity. They were followed by Paul Rici, professor at

Pavia, and physi- cian to the emperor Maximilian I. Among the best-known non-Jewish exponents of the Kabbalah were the Italian count Pico di Mirandola (1463-1494), the renowned Johann Reuchlin (1455-1522), Heinrich Cornelius Agrippa of Nettesheim (1487- IS3S) > Theophrastus Paracelsus (1493-1541), and, later, the Englishman Robert Fludd (1 574-1637). Prominent among the " nine hundred theses " which Mirandola had placarded in Rome, and which he undertook to defend in the presence of all European scholars, whom he invited to the Eternal City, promising to defray their travelling expenses, was the following: " No science yields greater proof of the divinity of Christ than magic and the Kabbalah." Mirandola so convinced Pope Sixtus of the paramount importance of the Kabbalah as an auxiliary to Christianity that his holiness exerted himself to have Kabbalistic writings translated into Latin for the use of divinity students. With equal zeal did Reuchlin act as the

6 See the instructive article by S. Schechter, Studies in Judaism (London, 1896), pp. 1-55.

7 See the discriminating estimates by S. A. Hirsch, Jew. Quart. Rev. xx. 50-73; I. Abrahams, Jew. Lit. (1906), ch. xvii.: Judaism (1907), ch. vi.

apostle of the Kabbalah. His treatises exercised an almost magic influence upon the greatest thinkers of the time. Pope Leo X. and the early Reformers were alike captivated by the charms of the Kabbalah as propounded by Reuchlin, and not only divines, but statesmen and warriors, began to study the Oriental languages in order to be able to fathom the mysteries of Jewish theosophy. The Zohar, that farrago of absurdity and spiritual devotion, was the weapon with which these Christians defended Jewish literature against hostile ecclesiastic bodies (Abrahams, Jew. Lit. p. 106). Thus the Kabbalah linked the old scholasticism with the new and independent inquiries in learning and philosophy after the Renaissance, and although it had evolved a remarkably bizarre conception of the universe, it partly anticipated, in its own way, the scientific study of natural philosophy. 1 Jewish theosophy, then, with its good and evil tendencies, and with its varied results, may thus claim to have played no unimportant part in the history of European scholarship and thought.

The main sources to be noticed are : —

1. The Sepher Yeslrah, or "book of creation," not the old Hilkoth Y. (" rules of creation "), which belongs to the Talmudic

period (on which see Kohler, Jew. Ency. xii. 602 seq.), ,? but a later treatise, a combination of medieval natural

Sources. philosophy and mysticism. It has been variously ascribed to the patriarch Abraham and to the illustrious rabbi 'Aqiba; its essential elements, however, maybe of the 3rd or 4th century A.D., and it is apparently earlier than the 9th (see L. Ginz- berg, op. cit. 603 sqq.). It has " had a greater influence on the development of the Jewish mind than almost any other book after the completion of the Talmud " (ibid.).

2. The Batiir (" brilliant," Job. xxxvii. 21), though ascribed to Nehunyah b. Haqqanah (1st century a.d.), is first quoted by Nahmanides, and is now attributed to his teacher Ezra or Azriel (1 160-1238). It shows the influence of the Sepher Yeslrah, is marked by the teaching of a celestial Trinity, is a rough outline of what the Zohar was destined to be, and gave the first opening to a thorough study of metaphysics among the Jews. (See further I. Broyde, Jew. Ency. ii. 442 seq.).

3. The Zohar (" shining," Dan. xii. 3) is a commentary on the Pentateuch, according to its division intQ fifty-two hebdomadal lessons. It begins with the exposition of Gen. i. 4 (" let there be light ") and includes eleven dissertations: (1) " Additions and Supplements"; (2) "The Mansions and Abodes," describing the structure of paradise and hell ; (3) " The Mysteries of the Pentateuch," describing the evolution of the Sephiroth, &c. ; (4) "The Hidden Interpretation," deducing esoteric doctrine from the narratives in the Pentateuch; (5) " The Faithful Shepherd," recording discussions between Moses the faithful shepherd, the prophet Elijah and R. Simon b. Yoljai, the reputed compiler of the Zohar; (6) " The Secret of Secrets," a treatise on physiognomy and psychology; (7) " The Aged," i.e. the prophet Elijah, discoursing with R. Simon on the doctrine of transmigration as evolved from Exod. xxi. l-xxiv. 18; (8) " The Book of Secrets," discourses on cosmogony and demon- ology; (9) "The Great Assembly," discourses of R. Simon to his numerous assembly of disciples on the form of the Deity and on pneumatology ; (10) " The Young Man," discourses by young men of superhuman origin on the mysteries of ablutions; and (11) " The Small Assembly," containing the discourses on the Sephiroth which R. Simon delivered to the small congregation of six surviving disciples. The Zohar pretends to be a compilation made by Simon b. Yohai (the second century a.d.) of doctrines which God com- municated to Adam in Paradise, and which have been received uninterruptedly from the mouths of the patriarchs and prophets. It was discovered, so the story went, in a cavern in Galilee where it had been hidden for a thousand years. Amongst the many facts, however, established by modern criticism which prove the Zohar to be a compilation of the 13th century, are the following: (1) the Zohar itself praises most fulsomely R. Simon, its reputed author, and exalts

him above Moses; (2) it mystically explains the Hebrew vowel points, which did not obtain till 570; (3) the compiler borrows two verses from the celebrated hymn called " The Royal Diadem," written by Ibn Gabirol, who was born about 102 1 ; (4) it mentions the capture of Jerusalem by the crusaders and the re-taking of the Holy City by the Saracens ; (5) it speaks of the comet which appeared at Rome, 15th July 1264, under the pontificate of Urban IV.; (6) by a slip the Zohar assigns a reason why its contents were not revealed before 5060-5066 a.m., i.e. 1300-1306 A.D., (7) the doctrine of the En Soph and the Sephiroth was not known before the 13th century; and (8) the very existence of the Zohar itself was not known prior

1 See, e.g., G. Margoliouth, " The Doctrine of Ether in the Kabbalah," Jew. Quart. Rev. xx. 828 sqq. On the influence of the Kabbalah on the Reformation, see Stockl, Gesch. d. Philosophic des Mittelalters, ii. 232-251.

to the 13th century. Hence it is now believed that Moses de Leon (d. 1305}, who first circulated and sold the Zohar as the production of R. Simon, was himself the author or compiler. That eminent scholars both in the synagogue and in the church should have been induced to believe in its antiquity is owing to the fact that the Zohar embodies many older opinions and doctrines, and the un- doubted antiquity of some of them has served as a lever in the minds of these scholars to raise the late speculations about the En Soph, the Sephiroth, &c, to the same age.

Literature. — The study of the whole subject being wrapped up with Gnosticism and Oriental theosophy, the related literature is immense. Ameng the more important works may be mentioned, Baron von Rosenroth's Kabbala Denudata (Sulzbach, 1677-1678; Frankfort, 1684); A. Franck, La Kabbale (Paris, 2nd ed., 1889; German by Jellinek, Leipzig, 1844); C. D. Ginsburg, The Kabbalah, its Doctrines, Development and Literature (London, 1865); I. Meyer, Qabbalah (Philadelphia, 1888); Rubin, Kabbala und Agada (Vienna, 1895), Heidentum und Kabbalah (1893) ; Karppe, £.t. sur les origines du Zohar (Paris, 1891); A. E. Waite, Doctrine and Literature of the Kabbalah (London, 1902) ; Flugel, Philosophy, Kabbala, &c. (Balti- more, 1902); D. Neumark, Gesch. d. Jiid. Philosophie d. Mittelalters (Berlin, 1907) ; also S. A. Binion, in C. D. Warner's World's Best Literature, 8425 sqq. See further the very full articles in the Jewish Ency. by K. Kohler and L. Ginzberg (" Cabbala "), I. Broyd6 (" Bahir," " Zohar "), with the references. (C. D. G. ; S. A. C.)

KABINDA, a Portuguese possession on the west coast of Africa north of the mouth of the Congo. Westwards it borders the Atlantic, N. and N.E. French Congo, S. and S.E. Belgian Congo. It has a coast-line of 93 m., extends inland, at its greatest breadth, 70 m., and has an area of about 3000 sq.

m. In its physical features, flora, fauna and inhabitants, it resembles the coast region of French Congo (q.v.). The only considerable river is the Chiloango, which in part forms the boundary between Portuguese and Belgian territory, and in its lower course divides Kabinda into two fairly even portions. The mouth of the river is in 5 12′ S., 12 5′ E. The chief town, named Kabinda, is a seaport on the right bank of the small river Bele, in 5 33′ S., i2°io'E.; pop. about 10,000. From the beauty of its situation, and the fertility of the adjacent country, it has been called the paradise of the coast. The harbour is sheltered and commo- dious, with anchorage in four fathoms. Kabinda was formerly a noted slave mart. Farther north are the ports of Landana and Massabi. Between Kabinda and Landana is Molembo at the head of a small bay of the same name. There is a considerable trade in palm oil, ground nuts and other jungle produce, largely in the hands of British and German firms.

The possession of the enclave of Kabinda by Portugal is a result of the efforts made by that nation during the last quarter of the 19th century to obtain sovereignty over both banks of the lower Congo. Whilst Portugal succeeded in obtaining the southern bank of the river to the limit of navigability from the sea, the northern bank became part of the Congo Free State (see Africa, § 5). Portuguese claims to the north of the river were, however, to some extent met by the recognition of her right to Kabinda. The southernmost part of Kabinda is 25 m. (following the coast-line) north of the mouth of the Congo. This district as far north as the Chiloango river (and including the adjacent territory of Belgian Congo) is sometimes spoken of as Kacongo. The name Loango (q.v.) was also applied to this region as well as to the coast-lands immediately to the north. Administratively Kabinda forms a division of the Congo dis- trict of the province of Angola (q.v.). The inhabitants are Bantu negroes who are called Kabindas. They are an intelligent, energetic and enterprising people, daring sailors and active traders.

KABlR, the most notable of the Vaishnava reformers of religion in northern India, who flourished during the first half of the 15th century. He is counted as one of the twelve disciples of Ramanand, the great preacher in the north (about a.d. 1400) of the doctrine of bhakti addressed to Rama, which originated with Ramanuja (12th century) in southern India. He himself also mentions among his spiritual forerunners Jaideo and Namdeo (or Nama) the earliest MarathI poet (both about 1250). Legend relates that Kabir was the son of a Brahman widow, by whom he was exposed, and was found on a lotus in Lahar Talao, a pond near Benares, by a Musalman weaver named 'All (or

Nuri), who with his wife Nlma adopted him and brought him up in their craft as a Musalman. He lived most of his life at Benares, and afterwards removed to Maghar (or Magahar), in the present district of BastI, where he is said to have died in 1449. There appears to be no reason to doubt that he was originally a Musalman and a weaver; his own name and that of his son Kamal are Mahommedan, not Hindu. His adhesion to the doctrine of Ramanand is not a solitary instance of the religious syncretism which prevailed at this time in northern India. The religion of the earlier Sikh Gurus, which was largely based upon his teaching, also aimed at the fusion of Hinduism and Islam; and the example of Malik Muhammad, 1 the author of the Padmawat, who lived a century later than Kabir, shows that the relations between the two creeds were in some cases extremely intimate. It is related that at Kablr's death the Hindus and Musalmans each claimed him as an adherent of their faith, and that when his funeral issued forth from his house at Maghar the contention was only assuaged by the appearance of Kablr himself, who bade them look under the cloth which covered the corpse, and immediately vanished. On raising the cloth they found nothing but a heap of flowers. This was divided between the rival faiths, half being buried by the Musalmans and the other half burned by the Hindus. 2

Kablr's fame as a preacher of bhakti, or enthusiastic devotion to a personal God, whom he preferred to call by the Hindu names of Rama and Hari, is greater than that of any other of the Vaishnava spiritual leaders. His fervent conviction of the truth and power of his doctrine, and the homely and searching expres- sion given to it in his utterances, in the tongue of the people and not in a learned language remote from their understanding, won for him multitudes of adherents; and his sect, the Kablrpanthis, is still one of the most numerous in northern India, its numbers exceeding a million. Its headquarters are the Kablr Chaura at Benares, where are preserved the works attributed to Kablr (called the Granth), the greater part of which, however, were written by his immediate disciples and their followers in his name. ;

Those works which seem to have the best claim to be considered his own compositions are the Sdkhis, or stanzas, some 5000 in number, which have a very wide currency even among those who do not formally belong to the sect, and the Shabdawall , consisting of a thousand " words " (shabd), or short doctrinal expositions. Perhaps some of the Rekhtas, or odes (100 in number), and of the Ramainis — brief mystical poems in very obscure language — may also be from his hand. Of these different forms specimens will be found translated in Professor H. H. Wilson's Sketch of the Religious Sects of the Hindus, i. 79-90. Besides the followers who call them- selves by

Kablr's name, there may be reckoned to him many other religious sects which bear that of some intermediate guru or master, but substantially concur with Kabir in doctrine and practice. Such, for instance, are the Nanakshahis in the United Provinces, the Central Provinces, and Bombay, and the Dddu-panthls, numerous in Rajputana (Wilson, loc. cit. pp. 103 sqq.) ; theSikhs, numbering two and a half millions in the Panjab, are also his spiritual descendants, and their Granth or Scripture is largely stocked with texts drawn from his works. –

Kabir taught the life of bhakti (faith, or personal love and devotion), the object of which is a personal God, and not a philo- sophical abstraction or an impersonal quality-less, all-pervading spiritual substance (as in the Vedanta of Sankaracharya). His utterances do not, like those of Tulsl Das, dwell upon the inci- dents of the human life of Rama, whom he takes as his type of the Supreme; nevertheless, it is the essence of his creed that God became incarnate to bring salvation to His children, mankind, and that the human mind of this incarnation still subsists in the Divine Person. He proclaims the unity of the Godhead, the vanity of idols, the powerlessness of brdhmans or mullds to guide or help, and the divine origin of the human soul, divinae particula aurae. All evil in the world is ascribed to Maya, illusion or false- hood, and truth in thought, word and deed is enjoined as the chief duty of man: " No act of devotion can equal truth; no crime is so heinous as falsehood; in the heart where truth abides

1 See article Hindostani Literature.

J An exactly similar tale is told of Nanak, the first Guru of the Sikhs, who died in 1538.

there is My abode." 3 The distinctions of creeds are declared to be of no importance in the presence of God: " The city of Hara 1 is to the east, that of 'Ali. & is to the west; but explore your own heart, for there are both Rama and Karim; " 6 " Behold but One in all things: it is the second that leads you astray. Every man and woman that has ever been born is of the same nature as yourself. He, whose is the world, and whose are the children of 'All and Rama, He is my Guru, He is my Pir." He proclaims the universal brotherhood of man, and the duty of kindness to all living creatures. Life is the gift of God, and must not be violated; the shedding of blood, whether of man or animals, is a heinous crime. The followers of Kablr do not observe celibacy, and live quiet unostentatious lives; Wilson (p. 97) compares them to Quakers for their hatred of violence and unobtrusive piety.

The resemblance of many of Kabir's utterances to those of Christ, and especially to the ideas set forth in St John's gospel, is very striking; still

more so is the existence in the ritual of the sect of a sacramental meal, involving the eating of a consecrated wafer and the drinking of water administered by the Mahant or spiritual superior, which bears a remarkable likeness to the Eucharist. Yet, though the deities of Hinduism and the prophet of Islam are frequently mentioned in his sayings, the name of Jesus has nowhere been found in them. It is conjectured that the doctrine of Ramanand, which came from southern India, has been influenced by the Christian settlements in that region, which go back to very early times. It is also possible that Suflism, the pietistic (as distinguished from the theosophic) form of which seems to owe much to eastern Christianity, has contri- buted some echo of the Gospel to Kablr's teaching. A third (but scarcely probable) hypothesis is that the sect has borrowed both maxims and ritual, long after Kabir's own time, from the teaching of the Roman Catholic missionaries, who were estab- lished at Agra from the reign of Akbar (1556-1605) onwards.

No critical edition of the writings current under the name of Kabir has yet been published, though collections of his sayings (chiefly the Sdkhis) are constantly appearing from Indian presses. The reader is referred, for a summary account of his life and doctrine, to H. H. Wilson's Sketch of the Religious Sects of the Hindus (Works, i. 68 sqq.). Dr E. Trumpp's edition of the A di Granth (Introduction, pp. xcvii. sqq.) may also be consulted. Recent publications dealing with the subject are the Rev. G. H. Westcott's Kablr and the Kablr Panth (Cawnpore, l9o8),andMr.M.A.MacaulirFe's77itf Si&ft Religion (Oxford, 1909), vi. 122-316. (C. J. L.)

KABUL, the capital of Afghanistan, standing at an elevation of 6900 ft. above the sea in 34 32′ N. and 69 14′ E. Estimated pop. (1901), 140,000. Lying at the foot of the bare and rocky mountains forming the western boundary of the Kabul valley, just below the gorge made by the Kabul River, the city extends a mile and a half east to west and one mile north to south. Hemmed in by the mountains, there is no way of extending it, except in a northerly direction towards the Sherpur cantonment. As the key of northern India, Kabul has been a city of vast importance for countless ages. It commands all the passes which here debouch from the north through the Hindu Kush, and from the west through Kandahar; and through it passed successive invasions of India by Alexander the Great, Mahmud of Ghazni, Jenghiz Khan, Baber, Nadir Shah and Ahmad Shah. Indeed from the time of Baber to that of Nadir Shah (1526-1738) Kabul was part of the empire of Delhi. It is now some 160 m. from the British frontier post of Jamrud near Peshawar.

Kabul was formerly walled; the old wall had seven gates, of which two alone remain, the Lahori and the Sirdar. The city itself is a huddle of

narrow and dirty streets, with the Bala Hissar or fort forming the south-east angle, and rising about 150 ft. above the plain. The Amir's palace is situated outside the town about midway between it and the Sherpur cantonment which lies about a mile to the north-east. Formerly the greatest

*3 This and the following passages in quotation marks are from Professor Wilson's translation of 100 Sdkhis, pp. 83-90. * Benares ; Hara, a name of Siva. 6 I.e. Mecca. 8 " The Bountiful," one of the Koranic names of God (Allah).*

ornament of the city was the arcaded and roofed bazaar called Chihdr Chdtd, ascribed to Ali Mardan Khan, a noble of the 17th century, who has left behind him many monuments of his munifi- cent public spirit both in Kabul and in Hindustan. Its four arms had an aggregate length of about 600 ft., with a breadth of 30. The display of goods was remarkable, and in the evening it was illuminated. This edifice was destroyed by Sir G. Pollock on evacuating Kabul in 1842 as a record of the treachery of the city.

The tomb of the Sultan Baber stands on a slope about a mile to the west of the city in a charming spot. The grave is marked by two erect slabs of white marble. Near him lie several of his wives and children; the garden was formerly enclosed by a marble wall; a clear stream waters the flower-beds. From the hill that rises behind the tomb there is a noble prospect of his beloved city, and of the all-fruitful plain stretching to the north of it.

After the accession of Abdur Rahman in 1880 the city under- went great changes. The Bala Hissar was destroyed and has never since been entirely rebuilt, and a fortified cantonment at Sherpur (one side of which was represented by the historic Bemaru ridge) had taken the place of the old earthworks of the British occupation of 1842 which were constructed on nearly the same site. The city streets were as narrow and evil-smelling, the surrounding gardens as picturesque and attractive, and the wealth of fruit was as great, as they had been fifty years previously. The amir, however, effected many improvements. Kabul is now connected by well-planned and metalled roads with Afghan Turk- estan on the west, with the Oxus and Bokhara on the north, and with India on the east. The road to India was first made by British and is now maintained by Afghan engineers. The road southwards to Ghazni and Kandahar was always naturally ex- cellent and has probably needed little engineering, but the general principle of road-making in support of a military advance has always been consistently maintained, and the expeditions of Kabul troops to Kafiristan have been

supported by a very well graded and substantially constructed road up the Kunar valley from Jalalabad to Asmar, and onwards to the Bashgol valley of Kafiristan. The city ways have been improved until it has be- come possible for wheeled vehicles to pass, and the various roads connecting the suburbs and the city are efficiently maintained. A purely local railway has also been introduced, to assist in transporting building material. The buildings erected by Abdur Rahman were pretentious, but unmarked by any originality in design and hardly worthy representation of the beauty and dignity of Mahommedan architecture. They included a new palace and a durbar hall, a bridge across the river and embank- ment, a pavilion and garden laid out around the site of Baber's tomb overlooking the Chardeh valley; and many other buildings of public utility connected with stud arrangements, the manu- facture of small arms and ammunition, and the requirements of what may be termed a wholesale shop under European direc- tion, besides hospitals, dispensaries, bazaars, &c. The new palace is within an entrenchment just outside the city. It is enclosed in a fine garden, well planted with trees, where the harem serai (or ladies' apartments) occupies a considerable space. The public portion of the buildings comprise an ornamental and lofty pavilion with entrances on each side, and a high-domed octagonal room in the centre, beautifully fitted and appointed, where public receptions take place. The durbar hall, which is a separate build- ing, is 60 yards long by 20 broad, with a painted roof supported by two rows of pillars. But the arrangement of terraced gardens and the lightly constructed pavilion which graces the western slopes of the hills overlooking Chardeh are the most attractive of these innovations. Here, on a summer's day, with the scent of roses pervading the heated air, the cool refreshment of the passing breezes and of splashing fountains may be enjoyed by the officials of the Kabul court, whilst they look across the beauty of the thickly planted plains of Chardeh to the rugged outlines of Paghman and the snows of the Hindu Kush. The artistic taste of the landscape gardening is excellent, and the mountain scenery is not unworthy of Kashmir. It is pleasant to record

that the graveyard of those officers who fell in the Kabul campaign of 1879-1880, which lies at the northern end of the Bemaru ridge, is not uncared for.

Kabul is believed to be the Ortospanum or Ortospana of the geographies of Alexander's march, a name conjectured to be a corruption of Urddhasthdna, " high place." This is the meaning of the name Bala Hissar. But the actual name is perhaps also found as that of a people in this position (Ptolemy's Kabolitae), if not in the name of a city apparently identical with Ortospana, Carura, in some copies read Cabura. It was invaded by the Arabs as early as the thirty-fifth year of the Hegira, but it was long before the Mahommedans effected any lasting settlement. In the

early Mahommedan histories and geographies we find (according to a favourite Arabic love of jingle) Kabul and Zdbul constantly asso- ciated. Zabul appears to have been the country about Ghazni. Kabul first became a capital when Baber made himself master of it in 1504, and here he reigned for fifteen years before his invasion of Hindustan. In modern times it became a capital again, under Timur Shah (see Afghanistan), and so has continued both to the end of the Durani dynasty, and under the Barakzais, who now reign. It was occupied by Sir John Keane in 1839, General Pollock in 1842, and again by Sir Frederick, afterwards Lord Roberts, in 1879.

Kabul is also the name of the province including the city so called. It may be considered to embrace the whole of the plains called Koh Daman and Beghram, &c, to the Hindu Kush northward, with the Kohistan or hill country adjoining. Eastward it extends to the border of Jalalabad at Jagdalak; southward it includes the Logar district, and extends to the border of Ghazni; north-westward it includes the Paghman hills, and the valley of the upper Kabul river, and so to the Koh-i-Baba. Roughly it embraces a territory of about 100 m. square, chiefly mountainous. Wheat and barley are the staple products of the arable tracts. Artificial grasses are also much cultivated, and fruits largely, especially in the Koh Daman. A considerable part of the population spends the summer in tents. The villages are not enclosed by fortifications, but contain small private castles or fortalices.

See C. Yate, Northern Afghanistan (1888) ; J. A. Gray, At the Court of the Amir (1895); Sir T. H. H. Holdich, The Indian Borderland (1901). (T. H. H.)*

KABUL RIVER, a river of Afghanistan, 300 m.'in length. The Kabul (ancient Kophes), which is the most important (although not the largest) river in Afghanistan, rises at the foot of the Unai pass leading over the Sanglakh range, an offshoot of the Hindu Kush towards Bamian and Afghan Turkestan. Its basin forms the province of Kabul, which includes all northern Afghanistan between the Hindu Kush and the Safed Koh ranges. From its source to the city of Kabul the course of the river is only 45 m., and this part of it is often exhausted in summer for purposes of irrigation. Half a mile east of Kabul it is joined by the Logar, a much larger river, which rises beyond Ghazni among the slopes of the Gul Koh (14,200 ft.), and drains the rich and picturesque valleys of Logar and Wardak. Below the confluence the Kabul becomes a rapid stream with a great volume of water and gradu- ally absorbs the whole drainage of the Hindu Kush. About 40 m. below Kabul the Panjshir river joins it; 15 m. farther the Tagao; 20 m. from the Tagao junction the united streams of Alingar and Alishang (rivers of Kafiristan) ; and 20 m. below that, at Balabagh, the

Surkhab from the Safed Koh . Two or three miles below Jala- labad it is joined by the Kunar, the river of Chitral. Thence- forward it passes by deep gorges through the Mohmand hills, curving northward until it emerges into the Peshawar plain at Michni. Soon afterwards it receives the Swat river from the north and the Bara river from the south, and after a further course of 40 m. falls into the Indus at Attock. From Jalalabad downwards the river is navigable by boats or rafts of inflated skins, and is considerably used for purposes of commerce.

KABYLES, or Kabail, a confederation of tribes in Algeria, Tunisia, and a few oases of the Sahara, who farm a branch of the great Berber race. Their name is the Arabic gabilat (pi.: gabdil), and was at first indiscriminately applied by the Arabs to all Berber peoples. The part of Algeria which they inhabit is usually regarded as consisting of two divisions — Great Kabylia and Lesser Kabylia, the former being also known as the Kabylia of the Jurjura (also called Adrar Budfel, " Mountain of Snow "). Physically many Kabyles do not present much contrast to the Arabs of Algeria. Both Kabyle and Arab are white at birth, but rapidly grow brown through exposure to air and sunshine. Both have in general brown eyes and wavy hair

of coarse quality, varying from dark brown to jet black. In stature there is perhaps a little difference in favour of the Kabyle, and he appears also to be of heavier build and more muscular. Both are clearly long-headed. Some, however, of the purer type of Kabyles in Kabylia proper have fair skins, ruddy com- plexions and blue or grey eyes. In fact there are two distinct types of Kabyles: those which by much admixture have approximated to Arab and negroid types, and those which pre- serve Libyan features. Active, energetic and enterprising, the Kabyle is to be found far from home — as a soldier in the French army, as a workman in the towns, as a field labourer, or as a pedlar or trader earning the means of purchasing his bit of ground in his native village. The Kabyles are Mahommedans of the Sunnite branch and the Malikite rite, looking to Morocco as the nearer centre of their religion. Some of the Kabyles retain their vernacular speech, while others have more or less completely adopted Arabic. The best known of the Kabyle dialects is the Zouave 1 or Igaouaouen, those speaking it having been settled on the northern side of the Jurjura at least from the time of Ibn Khaldun; it is the principal basis of Hanoteau's Essai de grammaire kabyle (Paris, 1858). Unlike their southern brethren, the Kabyles have no alphabet, and their literature is still in the stage of oral transmission, for the most part by pro- fessional

reciters. Hanoteau's Poesies populaires de la Kabylie du Jurjura (Paris, 1867) gives the text and translation of a considerable number of historical pieces, proverbial couplets and quatrains, dancing songs, &c.

Consult General L. L. C. Faidherbe and Dr Paul Topinard, Instruc- tions sur V anthropologic de I'Algerie (Paris, 1874); Melchior Joseph Eugene Daumas, Le Sahara algerien (Paris, 1845) and Moeurs et coutumes de I'Algerie (1857) ; De Slane's translation of Ibn Khaldun's Hist, des Berberes (Algiers, 1852) ; Aucapitaine, Les Kabyles et la colonie de I'Algerie (Paris, 1864) and Les Beni M'zab (1868) ; L.J.A.C. Hanoteau and A. Letourneux, La Kabylie et les coutumes kabyles (Paris, 1893) ; Charmetant, in Jahrbiicher derVerbreitung des Glaubens (1874) ; Masqueray, Formation descMs . . de I'Algerie (1886) ; Dugas, La Kabylie et le peuple kabyle (Paris, 1878) ; Recoux, La Demographie de V Alg&rie (Paris, 1880); J. Liorel, Races berberes: les Kabyles (Paris, 1893); Maclver and Wilkin, Libyan Notes (1901).

KACH GANDAVA, or Kachhi (Kach, Kej, Kiz), a low-lying flat region in Baluchistan separating the Bugti hills from those of Kalat. It is driven, like a wedge, into the frontier mountain system and extends for 150 m. from Jacobabad to Sibi, with nearly as great a breadth at its base on the Sind frontier. Area, 5310 sq. m.; pop. (1901), 82,909. The Mula pass, which con- nects it with the Kalat highlands, was once (when the ancient city of Kandabel was the capital of Gandava) a much trodden trade highway, and is still a practicable route though no longer a popular one. The soil is fertile wherever it can be irrigated by the floods brought down from the surrounding hills; but much of the central portion is sandy waste. It is traversed by the North- Western railway. The climate is unhealthy in summer, when pestilential hot winds are sometimes destructive to life. The annual rainfall averages only 3 in. Kachhi, though subject to the khan of Kalat, is administered under the tribal system. There are no schools, dispensaries or gaols.

See Baluchistan District Gazetteer, vol. vi. (Bombay, 1907).

KACHIN HILLS, a mountainous tract in Upper Burma, in- habited by the Kachin or Chingpaw, who are known on the Assam frontier as Singphos. Owing to the great number of tribes, sub-tribes and clans of the Kachins, the part of the Kachin hills which has been taken under administration in the Myitkyina and Bhamo districts was divided into 40 Kachin hill tracts (recently reduced to five). Beyond these tracts there are many Kachins in Katha, Mong Mit and the northern Shan States. The country within the Kachin hill tracts is roughly estimated at 19,177 sq. m., and consists of a series of ranges, for the most part running north and south, and intersected by valleys, all leading towards the Irrawaddy, which drains the country.

There were 64,405 Kachins enumerated at the census of 1901. Philological investigations show that it is probable that the progenitors

1 From the enlistment of Kabyles speaking the Zouave dialect the Zouave regiments of the French army came to be so called.

of the Kachins or Chingpaw were the Indo-Chinese race who, before the beginnings of history, but after the Mon-Annam wave had covered Indo-China, forsook their home in western China to pour over the region where Tibet, Assam, Burma and China converge, and that the Chingpaw are the residue left round the headquarters of the Irrawaddy and the Chindwin after those branches, destined to become the Tibetans, the Nagas, the Burmans and the Kuki Chins, had gone westwards and southwards. In the middle of the 19th, century the southern limit of the Kachins was 200 m. farther north than it is now. Since then the race has been drifting steadily southward and eastward, a vast aggregate of small independent clans united by no common government, but all obeying a common impulse to move outwards from their original seats along the line of least resistance. Now the Kachins are on both sides of the border of Upper Burma, and are a force to be reckoned with by frontier administrators. According to the Kachin Hill Tribes Regula- tion of 1895, administrative responsibility is accepted by the British government on the left bank of the Irrawaddy for the country south of the Nmaikha, and on the right bank for the country south of a line drawn from the confluence of the Malikha and Nmaikha through the northern limit of the Laban district and including the jade mines. The tribes north of this line were told that if they abstained from raiding to the south of it they would not be interfered with. South of that line peace was to be enforced and a small tribute exacted, with a minimum of inter- ference in their private affairs. On the British side of the border the chief objects have been the disarmament of the tribes and the construction of frontier and internal roads. A light tribute is exacted.

The Kachins have been the object of many police operations and two regular expeditions: (1) Expedition of 1892-93. Bhamo was occupied by the British on the 28th of December 1885, and almost immediately trouble began. Constant punitive measures were carried on by the military police; but in December 1892 a police column proceeding to establish a post at Sima was heavily attacked, and simultaneously the town of Myitkyina was raided by Kachins. A force of 1200 troops was sent to put down the rising. The enemy received their final blow at Palap, but not before three officers were killed, three wounded, and 102 sepoys and followers killed and wounded. (2) Expedition of 1895-96. The continued misconduct of the Sana Kachins from beyond the administrative border ren- dered punitive measures necessary. They had remained unpunished since the attack on Myitkyina in December 1892. Two columns were sent up, one of 250 rifles

from Myitkyina, the other of 200 rifles from Mogaung, marching in December 1895. The resistance was insignificant, and the operations were completely successful. A strong force of military police is stationed at Myitkyina, with several outposts in the Kachin hills, and the country is never wholly free from crimes of violence committed by the Kachins.

KADUR, a district of Mysore state, in southern India, with an area of 2813 sq. m. Pop. (1901), 362,752, showing an increase of 9 % in the decade. The larger portion of the district consists of the Malnad or hill country, which contains some of the wildest mountain scenery in southern India. The western frontier is formed by the chain of the Ghats, of which the highest peaks are the Kudremukh (6215 ft.) and the Meruti Gudda (5451 ft.). The centre is occupied by the horse-shoe range of the Baba Budans, containing the loftiest mountain in Mysore, Mulaingiri (6317 ft.). The Maidan or plain country lying beneath the amphitheatre formed by the Baba Budan hills is a most fertile region, well watered, and with the famous " black cotton soil." The principal rivers are the Tunga and Bhadra, which rise near each other in the Ghats, and unite to form. the Tungabhadra, a tributary of the Kistna. The eastern region is watered by the Vedavati. At the point where this river leaves the Baba Budan hills it is embanked to form two extensive tanks which irrigate the lower valley. From all the rivers water is drawn off into irrigation channels by means of anicuts or weirs. The chief natural wealth of Kadur is in its forests, which contain inex- haustible supplies of the finest timber, especially teak, and also furnish shelter for the coffee plantations. Iron is found and smelted at the foot of the hills, and corundum exists in certain localities. Wild beasts and game are numerous, and fish are I abundant.

The largest town is Tarikere (pop. 10,164); the headquarters are at Chikmagalur (9515)'. The staple crop is rice, chiefly grown on the hill slopes, where the natural rainfall is sufficient, or in the river valley, where the fields can be irrigated. Coffee cultivation is said to have been introduced by a Mahommedan saint, Baba Budan, more than two centuries ago; but it first attracted European capital in 1840. The district is served by the Southern Mahratta railway.

KAEMPFER, ENGELBRECHT (1651-1716), German traveller and physician, was born on the 16th of November 1651 at Lemgo in Lippe-Detmold, Westphalia, where his father was a pastor. He studied at Hameln, Luneburg, Hamburg, Lubeck and Danzig, and after graduating Ph.D. at Cracow, spent four years at Konigsberg in Prussia, studying medicine and

natural science. In 1681 he visited Upsala in Sweden, where he was offered inducements to settle; but his desire for foreign travel led him to become secretary to the embassy which Charles XL sent through Russia to Persia in 1683. He reached Persia by way of Moscow, Kazan and Astrakhan, landing at Nizabad in Daghestan after a voyage in the Caspian; from Shemakha in Shirvan he made an expedition to the Baku peninsula, being perhaps the first modern scientist to visit these fields of " eternal fire." In 1684 he arrived in Isfahan, then the Persian capital. When after a stay of more than a year the Swedish embassy prepared to return, Kaempfer joined the fleet of the Dutch East India Company in the Persian Gulf as chief surgeon, and in spite of fever caught at Bander Abbasi he found opportunity to see something of Arabia and of many of the western coast-lands of India. In September 1689 he reached Batavia; spent the following winter in studying Javanese natural history; and in May 1690 set out for Japan as physician to the embassy sent yearly to that country by the Dutch. The ship in which he sailed touched at Siam, whose capital he visited; and in September 1690 he arrived at Nagasaki, the only Japanese port then open to foreigners. Kaempfer stayed two years in Japan, during which he twice visited Tokyo. His adroitness, insinuating manners and medical skill overcame the habitual jealousy and reticence of the natives, and enabled him to elicit much valuable information. In November 1692 he left Japan for Java and Europe, and in October 1693 he landed at Amsterdam. Receiving the degree of M.D. at Leiden, he settled down in his native city, becom- ing also physician to the count of Lippe. He died at Lemgo on the 2nd of November 1716.

The only work Kaempfer lived to publish was Amoenitatum exoticarum politico-physico-medicarum fasciculi V. (Lemgo, 1712), a selection from his papers giving results of his invaluable observa- tions in Georgia, Persia and Japan. At his death the unpublished manuscripts were purchased by Sir Hans Sloane, and conveyed to England. Among them was a History of Japan, translated from the manuscript into English by J. G. Scheuchzer and published at London, in 2 vols., in 1727. The original German has never been published, the extant German version being taken from the English. Besides Japanese history, this book contains a description of the political, social and physical state of the country in the 17th century. For upwards of a hundred years it remained the chief source of informa- tion for the general reader, and is still not wholly obsolete. A life of the author is prefixed to the History.

KAFFA, a country of N.E. Africa, part of the Abyssinian empire. Kaffa proper (formerly known also as Gomara) has an area of little more than 5000 sq. m., but the name is used in a general sense to include the neighbouring territories of Gimirra, Jimma, Ennarea, &c. In this larger acceptation Kaffa extends roughly from 6° to 9° N. and from 35° to 37I E.

It forms the S.W. part of the great Abyssinian plateau and consists of broken table-land deeply scored by mountain torrents and densely wooded. The general elevation is about 8000 ft., while several peaks are over 10,000 ft. From the western slopes of the plateau descend headstreams of the Sobat. The principal river however is the Omo, the chief feeder of Lake Rudolf. Kaffa proper is believed to be the native home of the coffee plant (whence the name), which grows in profusion on the mountain sides. The principal town was Bonga, 75 N., 36 12′ E., a great trading centre, but the Abyssinian headquarters are at Anderacha, about 12 m. S.S.W. of Bonga. Jiren, the capital

of Jimma, 60 m. N.E. of Bonga, is a still more important town, its weekly market being attended by some 20,000 persons.

A great variety of races inhabit these countries of southern Ethiopia. The Kaficho (people of Kaffa proper) are said to be of the same stock as the northern Abyssinians and to have been separated from the rest of the country by the Mahommedan invasion of the 16th century. Thus Jimma, immediately north of Kaffa proper, is peopled by Mahommedan Gallas. The Kaficho, though much mixed with Galla blood, retained their Christianity and a knowledge of Geez, the ecclesiastical tongue of Abyssinia. The ordinary language of the Kaficho has no outward resemblance to modern Abyssinian. Their speech was, however, stated by Dr C. T. Beke (c. 1850) to be cognate with the Gonga tongue, spoken in a portion of Damot, on the northern side of the Abai. Kaffa, after having been ruled by independent sovereigns, who were also suzerains of the neighbouring states, was about 1895 conquered by the Abyssinians. The first European explorer of Kaffa was Antoine de'Abbadie, who visited it in 1843. Not until the early years of the 20th century was the country accurately mapped.

KAFFIR BREAD, in botany, the popular name for a species of Encephalartos (E. caffra), one of the cycads, a native of South Africa, so called from the farinaceous food-stuff which is found at the apex of the stem (Gr. kv, in, Ke4>a\ri, head, and apros, bread). It is a tree reaching nearly 20 ft. in height, with very stiff, spreading pinnate leaves 3 to 4 ft. long and recurving at the tip. The species of Encephalartos, which are natives of tropical and South Africa, form handsome greenhouse and conservatory plants; some species are effectively used in subtropical gardening in the summer months.

KAFFIRS (Arabic Kafir, an unbeliever), a name given by the Arabs to the native races of the east coast of Africa. The term was current along the east coast at the arrival of the Portuguese, and passed from them to the Dutch and English, and to the natives themselves under the form of Kafula. There

are no general or collective national names for these peoples, and the various tribal divisions are mostly designated by historical or legendary chiefs, founders of dynasties or hereditary chief- taincies. The term has no real ethnological value, for the Kaffirs have no national unity. To-day it is used to describe that large family of Bantu negroes inhabiting the greater part of the Cape, the whole of Natal and Zululand, and the Portuguese dominions on the east coast south of the Zambezi. The name is also loosely applied to any negro inhabitant of South Africa. For example, the Bechuana of the Transvaal and Orange Free State are usually called Kaffirs.

The Kaffirs are divisible into two great branches: the Ama- Zulu with the Ama-Swazi and Ama-Tonga and the Kaffirs proper, represented by the Ama-Xosa, the Tembu (q.v.) and the Pondo (g.v.). Hence the compound term Zulu-Kaffir applied in a collective sense to all the Kaffir peoples. Intermediate between these two branches were several broken tribes now collectively known as Ama-Fengu, i.e. " wanderers " or " needy " people, irom fenguza, to seek service 1 (see Fingo).

The ramifications of the Kaffirs proper cannot be understood without reference to the national genealogies, most of the tribal names, as already stated, being those of real or reputed founders of dynasties. Thus the term Ama-Xosa means simply the " people of Xosa," a somewhat mythical chief supposed to have flourished about the year 1530. Ninth in descent from his son Toguh was Palo, who died about 1780, leaving two sons, Gcaleka and Rarabe (pronounced Kha-Kha-be), from whom came the Ama-Gcaleka, Ama-Dhlambe (T'slambies) and the Ama-Ngquika (Gaika or Sandili's people). The Pondo do not descend from Xosa, but probably from an elder brother, while the Tembu, though apparently representing a younger branch, are regarded by all the Kaffir tribes as the royal race. Hence the Gcaleka chief, who is the head of all

1 The Ama-Fengu are regarded both by the Zulu and Ama-Xosa as slaves or out-castes, without any right to the privileges of true- born Kaffirs. Any tribes which become broken and mixed would probably be regarded as Ama-Fengu by the other Kaffirs. Hence the multiplicity of clans, such as the Ama-Bele, Aba-Sembotweni Ama-Zizi, Ama-Kuze, Aba-Sekunene, Ama-Ntokaze, Ama-Tetyeni Aba-Shwawa, &c, all of whom are collectively grouped as Ama- Fengu.

the Ama-Xosa tribes, always takes his first or " great wife " from the

Tembu royal family, and her issue alone have any claim to the succession. The subjoined genealogical tree will place Kaffir relations in a clearer light :—

Zuide (1500?), reputed founder of the nation.

1

Tembu.

1

Xosa (153° ?)■

1

Toguh.

1

Mpondo.

Ama-Tembu

1

1

(Tambookies),

Ama-Mponda,

Ama-Mpondu-

Tembuland

Palo (ob. 1780?),

between river

misi

and Emigrant

10th in descent

Umtata and

1

Tembuland.

from Xosa.

1

Natal..

Abelungu (dispersed?)

1

Gcaleka.

1

1

Rarabe (Khakhabe).

Klanta.

1

.1

Hinza.

1

Omlao.

1

Mbalu.

1

Ndhlambe

1

Kreli.

1

Ngqika.

Ama-Mbalus.

Ama-Ndhlambes

1

Ama-Gwali.

or T'slambies,

Ama-Gcaleka

Macomo

Ama-Ntinde.

between the

(Galeka),

1

Ama-Gqunuk-

Keiskamma and

between the

Tyali.

webi.

Great Kei rivers.

Bashee and

1 ..

Ama-Velelo.

Umtata rivers

Sandili.

Ama-Baxa.

Imi-Dange.

Ama-Ngqika

Imi-Dushane.

(Gaika) ,

Amatola highlands.

j

Ama- Khakhabe

1

Ama-Xosa.

It will be seen that, as representing the elder branch, the Gcaleka stand apart from the rest of Xosa's descendants, whom they group collectively asAma-Rarabe (Ama-Khakhabe), and whose genealogies, except in the

case of the Gaikas and T'slambies, are very confused. The Ama-Xosa country lies mainly between the Keiskama and Umtata rivers.

The Zulu call themselves Abantu ba-Kwa-Zulu, i.e. " people of Zulu's land," or briefly Bakwa-Zulu, from a legendary chief Zulu, founder of the royal dynasty. They were originally an obscure tribe occupying the basin of the Umfolosi river, but rose suddenly to power under Chaka, 1 who had been brought up among the neigh- bouring and powerful Umtetwas, and who succeeded the chiefs of that tribe and of his own in the beginning of the 19th century. But the true mother tribe seems to have been the extinct Ama- Ntombela, whence the Ama-Tefulu, the U'ndwande, U'mlelas, U'mtetwas and many others, all absorbed or claiming to be true Zulus. But they are only so by political subjection, and the gradual adoption of the Zulu dress, usages and speech. Hence in most cases the term Zulu implies political rather than blood relationship. This remark applies also to the followers of Mosilikatze (properly Umsilikazi), who, after a fierce struggle with the Bechuana, founded about 1820 a second Zulu state about the head waters of the Orange river. In 1837 most of them were driven northwards by the Boers and are now known as Matabele.

The origin of the Zulu-Kaffir race has given rise to much controversy. It is obvious that they are not the aborigines of their present domain, whence in comparatively recent times — since the beginning of the 16th century — they have displaced the Hottentots and Bushmen of fundamentally distinct stock. They themselves are conscious of their foreign origin. Yet they are closely allied in speech (see Bantu Languages) and physique to the surrounding Basuto, Bechuana and other mem- bers of the great South African Negroid family. Hence their appearance in the south-east corner of the continent is sufficiently explained by the gradual onward movement of the populations pressing southward on the Hottentot and Bushman domain. The specific differences in speech and appearance by which they are distinguished from the other branches of the family must in the same way be explained by the altered conditions of their new habitat. Hence it is that the farther they have penetrated southwards the farther have they become differentiated from the pure Negro type. Thus the light and clear brown complexion

1 Seventh in descent from Zulu, through Kumede, Makeba, Punga, Ndaba, Yama and Tezengakona or Senzangakona (Bleek, Zulu Legends).

prevalent amongst the southern Tembu becomes gradually darker as we proceed northwards, passing at last to the blue black and sepia of the Ama-Swazi and Tekeza. Even many of the mixed Fingo tribes are of a polished ebony colour, like that of the Jolofs and other Senegambian negroes. The Kaffir hair is uniformly of a woolly texture. The head is dolichocephalic,

but it is also high or long vertically, 2 and it is in this feature of hypsistenocephaly (height and length combined) that the Kaffir presents the most striking contrast with the pure Negro. But, the nose being generally rather broad 3 and the lips thick, the Kaffir face, though somewhat oval, is never regular in the European sense, the deviations being normally in the direction of the Negro, with which race the peculiar odour of the skin again connects the Kaffirs. In stature they rank next to the Patagonians, Polynesians and West Africans, averaging from 5 ft. 9 in. to 5 ft. 11 in., and even 6 ft. 4 They are slim, well- proportioned and muscular. Owing to the hard life they lead, the women are generally inferior in appearance to the men, except amongst the Zulu, and especially the Tembu. Hence in the matrimonial market, while the Ama-Xosa girl realizes no more than ten or twelve head of cattle, the Tembu belle fetches as many as forty, and if especially fine even eighty.

The more warlike tribes were usually arrayed in leopard or ox skins, of late years generally replaced by European blankets, with feather head-dresses, coral and metal ornaments, bead armlets and necklaces. The Makua and a few others practise tattooing, and the Ama-Xosa are fond of painting or smearing their bodies with red ochre. Their arms consist chiefly of ox-hide shields 4 to 6 ft. long, the kerrie or club, and the assegai, of which there are two kinds, one long, with 9-in. narrow blade, for throwing, the other short, with broad blade 12 to 18 in. long, for stabbing. The dwellings are simple conical huts grouped in kraals or villages. Although cattle form their chief wealth, and hunting and stock-breeding their main pursuits, many have turned to husbandry. The Zulu raise regular crops of " mealies " (maize), and the Pondo cultivate a species of millet, tobacco, water melons, yams and other vegetables. Milk (never taken fresh), millet and maize form the staples of food, and meat is seldom eaten except in time of war.

A young Kaffir attains man's estate socially, not at puberty, but upon his marriage. Polygyny is the rule and each wife is regarded as adding dignity to the household. Marriage is by purchase, the price being paid in cattle. Upon the husband's death family life is continued under the headship of the eldest son of the house, the widows by virtue of levirate becoming the property of the uncle or nearest males, not sons. A son inherits and honourably liquidates, if he can, his father's debts.

Mentally the Kaffirs are superior to the Negro. In their social and political relations they display great tact and intelligence; they are remarkably brave, warlike and hospitable, and were honest and truthful until through contact with the whites they became suspicious, revengeful and thievish, besides acquiring most European vices. Of religion as ordinarily understood they have very little, and have certainly never developed any mythologies

or dogmatic systems. It is more than doubtful whether they had originally formed any notion of a Supreme Being. Some conception, however, of a future state is implied by a strongly developed worship of ancestry, and by a belief in spirits and ghosts to whom sacrifices are made. There are no idols or priests, but belief in witchcraft formerly gave the " witch-doctor " or medicine-man overwhelming power. 6 Circumcision and polygyny are universal; the former is sometimes attributed to Mahommedan influences, but has really prevailed almost everywhere in East Africa from the remotest time.

Dearer than anything else to the Kaffir are his cattle; and many ceremonial observances in connexion with them were once the rule. Formerly ox-racing was a common sport, the oxen running, riderless, over a ten-mile course. The owner of a champion racing ox was a popular hero, and these racers were valued at hundreds of head of cattle. Cattle are the currency of the Kaffirs in their wild state. Ten to twenty head are the price of a wife. When a girl marries,

2 P. Topinard, Anthropology (1878), p. 274.

3 This feature varies considerably, " in the T'slambie tribes being broader and more of the Negro shape than in the Gaika or Gcaleka, while among the Ama-Tembu and Ama-Mpondo it assumes more of the European character. In many of them the perfect Grecian and Roman noses are discernible " (Fleming's Kaffraria, p. 92).

4 Gustav Fritsch gives the mean of the Ama-Xosa as 1-718 metres, less than that of the Guinea Negro (1-724), but more than the English (1-708) and Scotch (1-710).

6 Since the early years of the 19th century Protestant and Roman Catholic missions have gained hundreds of thousands of converts among the Kaffirs. Purely native Christian churches have also been organized.

her father (if well off) presents her with a cow from his herd. This animal is called ubulungu or " doer of good " and is regarded as sacred. It must never be killed nor may its descendants, as long as it lives. A hair of its tail is tied round the neck of each child immediately after birth. In large kraals there is the "dancing-ox," usually of red colour. Its horns are trained to peculiar shapes by early mutilations. It figures in many ceremonies when it is paid a kind of knee-worship.

The Kaffirs have three, not four, seasons: "Green Heads," " Kindness " and " Cutting "; the first and last referring to the crops, the second to the " warm weather." Women and children only eat after the men are satisfied. A light beer made from sorghum is the national drink.

Of the few industries the chief are copper and iron smelting, practised by the Tembu, Zulu and Swazi, who manufacture weapons, spoons and agricultural implements both for their own use and for trade. The Swazi display some taste in wood-carving, and others prepare a peculiar water-tight vessel of grass. Characteristic of this race is their neglect of the art of navigation. Not the smallest boats are ever made for crossing the rivers, much less for venturing on the sea, except by the Makazana of Delagoa Bay and by the Zambezi people, who have canoes and flat-bottomed boats made of planks.

The Kaffir race had a distinct and apparently very old political system, which may be described as a patriarchal monarchy limited by a powerful aristocracy. Under British rule the tribal indepen- dence of the Kaffirs has disappeared. Varying degrees of autonomy have been granted, but the supreme powers of the chiefs have gone, the Swazi being in 1904 the last to be brought to order. In the Transkeian Territories tribal organization exists, but it is modified by special legislation and the natives are under the control of special magistrates. To a considerable extent in Natal and through- out Zululand the Kaffirs are placed in reserves, where tribal organization is kept up under European supervision. In Basuto- land the tribal organization is very strong, and the power of chiefs is upheld by the imperial government, which exercises general supervision.

See Gustav Fritsch, Die Eingeborenen Sudafrikas, with atlas, 30 plates and 120 typical heads (Breslau, 1872); W. H. I. Bleek, Comparative Grammar of the South African Languages (London and Cape Town, pt. i., 1862; pt. ii., 1869); Theo. flahn, Grundziige einer Grammatik des Herero (Berlin, 1857); Dr Colenso, Grammar of the Zulu-Kafir Language (1855); Girard de Rialle, Les Peuples de I'Afrique el de I'Amerique (Paris, 1880); G. W. Stow, The Native Races of South Africa (London, 1905); G. McC. Theal, History and Ethnography of South Africa, 1505 to 179$ (3 vols., London, 1907- 1910) and History of South Africa since 1795 (5 vols., London, 1908), specially valuable for the political history of the Kaffirs ; Caesar C. Henkel, The Native or Transkeian Territories (Hamburg, 1903); The Natives of South Africa (1901), and its sequel, The South African Natives (1908); Dudley Kidd, The Essential Kafir (1904) and Kafir Socialism. The last four books deal with the many social and economic questions raised by the contact of the Kaffir races with Europeans.

KAFFRARIA, the descriptive name given to the S.E. part of the Cape

province, South Africa. Kafiraria, i.e. the land of the Kaffirs (q.v.), is no longer an official designation. It used to com- prise the districts now known as King William's Town and East London, which formed British Kaffraria, annexed to Cape Colony in 1865, and the territory beyond the Kei River south of the Drakensberg Mountains as far as the Natal frontier, known as Kaffraria proper. As a geographical term it is still used to indicate the Transkeian territories of the Cape provinces com- prising the four administrative divisions of Transkei, Pondoland, Tembuland and Griqualand East, incorporated into Cape Colony at various periods between 1879 and 1894. They have a total area of 18,310 sq. m., and a population (1904) of 834,644, of whom 16,777 were whites. Excluding Pondoland — not counted previously to 1904 — the population had increased from 487,364 in 1891 to 631,887 in 1904.

Physical Features. — The physical characteristics of Kaffraria bear a general resemblance to those of the Cape province proper. The country rises from sea-level in a series of terraces to the rugged range of the Drakensberg. Between that range and the coast-lands are many subsidiary ranges with fertile valleys through which a large number of rivers make their way to the Indian Ocean. These rivers have very rapid falls in comparison to their length and when less than 40 m. from the coast are still 2000 ft. above sea-level. The chief, beginning at the south, are the Kei, the Bashee, the Umtata, the St John's or Umzimvubu, and the Umtamvuna, which separates Kaffraria from Natal. The St John's River rises in the Drakensberg near the Basuto-Natal frontier. The river valley has a length of 140 m., the river with its many twists being double that length. It receives numerous tributaries, one, the

Tsitza, possessing a magnificent waterfall, the river leaping over an almost vertical precipice of 375 ft. The St John's reaches the sea between precipitous cliffs some 1200 ft. high and covered with verdure. The mouth is obstructed by a sand bar over which there is 14 ft. of water. None of the rivers of Kaffraria except the St John's is navigable.

Kaffraria is one of the most fertile regions in South Africa. The mountain gorges abound in fine trees, thick forest and bush cover the river banks, grass grows luxuriantly in the lower regions, and the lowlands and valleys are favourable to almost any kind of fruit, field and garden cultivation. The coast districts are very hot in summer, the temperature from October to April on an average varying from 70 to 90 F., while in winter the day temperature is seldom below 50°, though the nights are very cold. But the varia- tion in altitude places climates of all grades within easy reach, from the burning coast to the often snow-clad mountain. Thunder- storms are frequent in summer; the winters are generally dry. On the whole the climate is extremely healthy. At St John's are sulphur springs.

A considerable area is devoted to the raising of wheat and other cereals, especially in the northern district (Griqualand East), where in the higher valleys are many farms owned by Europeans. Large quantities of stock are raised. Most of the land is held by the natives under tribal tenure, and the ease with which their wants are supplied is detrimental to the full cultivation of the land. Kaffraria is, however, one of the chief recruiting grounds for labour throughout South Africa. Most of the white inhabitants are engaged in trade.

Towns and Communication. — The chief town is Kokstad (q.v.), pop. (1904), 2903, the capital of Griqualand East. Umtata (2100 ft. above the sea, pop. 2342) on the river of the same name, capital of Tembuland, is the residence of an assistant chief magistrate, head- quarters of a division of the Cape Mounted Rifles, and seat of the Anglican bishopric of Kaffraria. The principal buildings are the cathedral, a Gothic structure, built 1901-1906, and the town-hall, a fine building in Renaissance style, erected 1907-1908. Port St John is the chief town in Pondoland, and the only harbour of the country. Butterworth is the chief town in Transkei. Cala (pop. about 1000), in the N.W. part of Tembuland, is the educational centre of Kaffraria. A railway, 107 m. long, the first link in the direct Cape-Natal line, runs from Indwe, 65 m. from Sterkstroom Junction on the main line from East London to the Transvaal, to Maclear, an agricultural centre in Griqualand East. Another railway parallel but south of that described also traverses Kaffraria. Starting from Amabele, a station on the main line from East London to the north, it goes via Butterworth (132 m. from East London) to Umtata (234 m.J.

Administration and Justice. — The Cape administrative and judicial system is in force, save as modified by special enactments of the Cape parliament. A " Native Territories Penal Code " which came into operation on the 1st of January 1887 governs the relations of the natives, who are under the jurisdiction of a chief magistrate (resident at Cape Town) with subordinate magistrates in the Terri- tories. In civil affairs the tribal organization and native laws are maintained. No chief, however, exercises criminal jurisdiction. Since 1898 certain provisions of the Glen Grey Act have been applied to Kaffraria (see Glen Grey). The revenue is included in the ordi- nary budget of the Cape province. The expenditure on Kaffraria considerably exceeds the revenue derived from it. The franchise laws are the same as in the Cape proper. Though the Kaffirs out- number the whites by fifty to one, white men form the bulk of the electorate, which in 1904 numbered 4778.

Religion. — Numbers of Protestant missionary societies have churches and educational establishments in Kaffraria, but, except in Fingoland, the bulk of the Kaffirs are heathen. The Griquas profess Christianity and have their

own churches and ministers. The Anglican diocese of St John's, Kaffraria, was founded in 1873.

Annexation to the Cape. — The story of the conflicts between the Kaffir tribes and the Cape colonists is told under Cape Colony. As early as 1819 Kaffirland, or Kaffraria, was held not to extend west beyond the Keiskamma River. The region east of that river as far as the Kei River became in 1847 the Crown colony of British Kaffraria, and was annexed to Cape Colony in 1865. The Transkeian territories remained in nominal independence until 1875, when the Tembu sought British pro- tection. An inter-tribal war in 1877 between Fingo and Gcaleka resulted in the territory of the Gcaleka chief Kreli being occupied by the British. It was not, however, till 1879 that Fingoland and the Idutywa Reserve, together with the district then commonly called Noman's-land, were proclaimed an integral part of the Cape. About this time most of the rest of Kaffraria came under British control, but it was 1885 before Gcalekaland, the coast region of Transkei, and the various dis- tricts comprising Tembuland — Bomvanaland on the coast, Tem- buland Proper and Emigrant Tembuland — were annexed to the colony. By the annexation, the frontier of the colony was

carried to the Umtata River, so that by 1885 only Pondoland, fronting on the Indian Ocean, separated the Cape from Natal. In Pondoland, Port St John, proclaimed British territory in 1881, was, along with the lower reaches of the St John's River, incor- porated with Cape Colony in 1884; in 1886 the Xesibe country (Mount Ayliff) was annexed to the Cape and added to Griqua- land East; and in the following year Rhode Valley was included within the boundary line. The rest of Pondoland, chiefly in virtue of a British protectorate established over all the coast region in 1885, was already more or less under British control, and in 1894 it was annexed to the Cape in its entirety. Thus the whole of Kaffraria was incorporated in Cape Colony, with the exception of some 1550 sq. m., then part of Noman's-land, annexed by Natal in 1866 and named Alfred county. To the wise adminis- tration of Major Sir Henry G. Elliot, who served in Kaffraria in various official capacities from 1877 to 1903, the country owes much of its prosperity.

Particulars concerning each of the four divisions of Kaffraria follow.

Griqualand East (area, 7594 sq. m.), so called to distinguish it from Griqualand West, a district north of the Orange River, lies between

Basutoland (N.W.), Natal (N.E.), Tembuland (S.W.) and Pondoland (S.E.). It occupies the southern slopes of the Drakensberg or the fertile valleys at their feet. It includes most of the region formerly called Noman's-land, and afterwards named Adam Kok's Land from the Griqua chief who occupied it in 1862 with the consent of the British authorities, and governed the country till his death in 1876, establishing a volksraad on the Dutch model. The Griquas are still ruled by an officially appointed head-man. The majority of the inhabitants are Basutos and Kaffirs (Pondomisi, Ama-Baka and other tribes). The Griquas number about 6000. Since its annexation to Cape Colony Griqualand East has made fairly rapid progress. The population rose from 121,000 in 1881 to 222,685 in 1904, of whom 5901 were whites. Stock-breed- ing on the uplands, tillage on the lower slopes of the Drakensberg, are the chief industries. On these slopes and uplands the climate is delightful and well suited to Europeans. There is considerable trade with Basutoland in grain and stock, and through Kokstad with Port St John and Port Shepstone, Natal. Much of the best agricultural land is owned by Europeans.

Tembuland (area, 4122 sq. m.), which lies S.W. of Griqualand East and comprises the districts of Tembuland Proper, Emigrant Tembu- land and Bomvanaland, takes its name from, the Tembu nation, called sometimes Tambookies, one of the most powerful of the Kaffir groups. In the national genealogies the Tembu hold an honourable position, being traditionally descended from Tembu, elder brother of Xosa, from whom most of the other Kaffirs claim descent. The inhabitants increased from about 160,000 in 1881 to 231,472 in 1904, of whom 8056 were whites. The chief town is Umtata.

Transkei (area, 2552 sq. m.) comprises the districts of Fingoland, the Idutywa Reserve and Gcalekaland, this last being named from the Gcaleka nation, who claim to be the senior branch of the Xosa family, the principal royal line of the Kaffir tribes. They still form the chief element of the population, which rose from 136,000 in 1881 to 177,730 in 1904 (1707 whites). Here are some prosperous missionary stations, where the natives are taught agriculture, mechanical industries and a knowledge of letters. The heroic deeds of Hinza, Kreli and other chiefs famous in the wars are still remembered ; but witchcraft, rain-making and other pagan practices seem to have died out. Even more advanced in all social respects are the Fingo, who give their name to the district of Fingoland, and also form the bulk of the population in the Idutywa Reserve. They wear European clothes, support their schools by voluntary contri- butions, edit newspapers, translate English poetry, set their national songs to correct music, and the majority profess Christianity. The industrial institution of Blythswood, about 20 m. N.W. of Butterworth, is a branch of Lovedale (q.v.), and is largely supported by the Fingo.

Pondoland (area, 4040 sq. m.; pop. (1904), 202,757 (including 1 1 13 whites), an estimated increase of 36,000 since 1 891) is bounded E. by the sea, N. by Natal, W. by Griqualand East, by S. and Tembuland. In Pondoland the primitive organization of the natives has been little altered and the influence of the chiefs is very great. Land is held almost wholly in tribal tenure, though a number of whites possess farms acquired before the annexation of the country. The Pondo have shown some appreciation of the benefits of educa- tion.

See G. McCall Theal's History of South Africa and other works cited under Cape Colony; also The Native or Transkeian Territories, by C. C. Henkel (Hamburg, 1903), a useful handbook by an ex-official in the Transkeian Territories.

KAFIRISTAN, a province of Afghanistan. Very little of this country was known with accuracy and nothing at first hand until

General Sir W. (then Colonel) Lockhart headed a mission tc examine the passes of the Hindu Kush range in 1885-1886. He penetrated into the upper part of the Bashgal valley, but after a few days he found himself compelled to return to Chitral. Previously Major Tanner, R.A., had sought to enter Kafiristan from Jalalabad, but sudden severe illness cut short his enterprise. M'Nair, the famous explorer of the Indian Survey department, believed that he had actually visited this little-known land during an adventurous journey which he made from India and through Chitral in disguise; but the internal evidence of his reports shows that he mistook the Kalash district of Chitral, with its debased and idolatrous population, for the true Kafir- istan of his hopes. In 1889 Mr G. S. Robertson (afterwards Sir George Robertson, K.C.S.I.) was sent on a mission to Kafiristan. He only remained a few days, but a year later he revisited the country, staying amongst the Kafirs for nearly a year. Although his movements were hampered, his presence in the country being regarded with suspicion, he was able to study the people, and, in spite of intertribal jealousy, to meet members of many of the tribes. The facts observed and the information collected by him during his sojourn in eastern Kafiristan, and during short expeditions to the inner valleys, are the most trust- worthy foundations of our knowledge of this interesting country. Kafiristan, which literally means " the land of the infidel," is the name given to a tract of country enclosed between Chitral and Afghan territory. It was formerly peopled by pagan mountaineers, who maintained a wild independence until 1895, when they were finally subdued by Abdur Rahman, the amir of Kabul, who also compelled them to accept the religion of Islam. The territory thus ill named is included between 34 30′ and 36 N., and from about 70° to 71 30′ E. As the western and northern boundaries are imperfectly known, its size cannot he estimated with any certainty; Its greatest extent is from east to west at

35 10′ N.; its greatest breadth is probably about 71 E. The total area approximates to 5000 sq. m. Along the N. the boundary is the province of Badakshan, on the N.E. the Lutkho valley of Chitral. Chitral and lower Chitral enclose it to the E., and the Kunar valley on the S.E. Afghanistan proper supplies the S. limit. The ranges above the Nijrao and Pansher valleys of Afghanistan wall it in upon the W. The northern frontier is split by the narrow Minjan valley of Badakshan, which seems to rise in the very heart of Kafiristan.

Speaking generally, the country consists of an irregular series of main valleys, for the most part deep, narrow and tortuous, into which a varying number of still deeper, narrower and more twisted valleys, ravines and glens pour their torrent water. The mountain ranges of Metamorphic rock, which separate the main drainage valleys, are all of considerable altitude, rugged and difficult, with the outline of a choppy sea petrified. During the winter months, when the snow lies deep, Kafiristan becomes a number of isolated communities, with few if any means of intercommunication, in the whole land there is probably nothing in the shape of a plain. M uch of the silent, gigantic country warms the heart as well as captivates the eye with its grandeur and varied beauty; much of it is the bare skeleton of the world wasted by countless centuries of storms and frost, and profoundly melancholy in its sempiternal ruin. Every variety of mountain scenery can be found : silent peaks and hard, naked ridges, snowfields and glaciers; mighty pine forests, wooded slopes and grazing grounds; or wild vine and pomegranate thickets bordering sparkling streams. At low elevations the hill-sides are covered with the wild olive and evergreen oaks. Many kinds of fruit trees — walnuts, mulberries, apricots and apples — grow near the villages or by the wayside, as well as splendid horse-chestnuts and other shade trees. Higher in elevation, and from 4000 to 8000 ft., are the dense pine and cedar forests. Above this altitude the slopes become dreary, the juniper, cedar and wild rhubarb gradually giving place to scanty willow patches, tamarisk and stunted birches. Over 13,000 ft. there are merely mosses and rough grass. Familiar wildflowers blossom at different heights. The rivers teem with fish. Immense numbers of red-legged partridges live in the lower valleys, as well as pigeons and doves. Gorgeously plumaged pheasants are plentiful. Of wild animals the chief are the markhor (a goat) and the oorial (a sheep). In the winter the former are recklessly slaughtered by hunters, being either brought to bay by trained hounds, or trapped in pits, or caught floundering in the snow-drifts ; but in the summer immense herds move on the higher slopes. The ibex is very rare. Bears and leopards are fairly common, as well as the smaller hill creatures.

AH the northern passes leading into Badakshan or into the Minjan valley of Badakshan seem to be over 15,000 ft. in altitude. Of Pass saud t ‘ lese t ˆ le c ‘ 1 ‘ e ˆ are tne Mandal, the Kamah (these two Roads alone have been explored by a European traveller), the

Kti, the Kulam and the Ramgal passes. Those to the east, the Chitral passes, are somewhat lower, ranging from 12,000 to 14,000 ft., e.g. the Zidig, the Shui, the Shawal and the Parpit, while the Patkun, which crosses one of the dwindled spurs near the Kunar river, is only 8400 ft. high. Between neighbouring valleys the very numerous communicating footways must rarely be lower than 10,000, while they sometimes exceed 14,000 ft. The western passes are unknown. All these toilsome paths are so faintly indicated, even when free from snow, that to adventure them without a local guide is usually unsafe. Yet the light-framed cattle of these jagged mountains can be forced over many of the worst passes. Ordinarily the herding tracks, near the crest of the ridges and high above the white torrents, are scarcely discoverable to untutored eyes. They wind and waver, rise, drop and twist about the irregular semi- precipitous slopes with baffling eccentricity and abruptness. Never- theless the cattle nose their way along blunderingly, but without hurt. Of no less importance in the open months, and the sole trade routes during winter, are the lower paths by the river. An unguided traveller is continually at fault upon these main lines of intercourse and traffic.

All the rivers find their tumultuous way into the Kabul, either directly, as the Alingar at Laghman, or after commingling with the Rivers Kunar at Arundu and at Chigar-Serai. The Bashgal,

” draining the eastern portion of the country, empties itself into the Kunar at Arundu. It draws its highest waters from three main sources at the head of the Bashgal valley. It glides gently through a lake close to this origin, and then through a smaller tarn. The first affluent of importance is the Skorigal, which joins it above the village of Pshui. Next comes the noisier Manangal water, from the Shawal pass, which enters the main stream at Lutdeh or Bragamatal, the chief settlement of the Bashgal branch of the Katir tribe. By-and-by the main stream becomes, at the hamlet of Sunra, a raging, shrieking torrent in a dark narrow valley, its run obstructed by giant boulders and great tree-trunks. Racing past Bagalgrom, the chief village of the Madugal Kafirs, the river clamours round the great spur which, 1800 ft. higher up, gives space for the terraces and houses of Kamdesh, the headquarters of the Kam people. The next important affluent is the river which drains the Pittigal valley, its passes and branches. Also on the left bank, and still lower down, is the joining-place of the Gourdesh valley waters. Finally it ends in the Kunar just above Arundu and Birkot. The middle part of Kafiristan, including the valleys occupied by the Presun,

Kti, Ashkun and Wai tribes, is drained by a river variously called the Pech, the Kamah, and the Presun or Viron River. It has been only partially explored. Fed by the fountains and snows of the upper Presun valley, it is joined at the village of Shtevgrom by the torrent from the Kamah pass. Thence it moves quietly past meadowland, formerly set apart as holy ground, watering on its way all the Presun villages. Below the last of them, with an abrupt bend, it hurries into the unexplored and rockbound Tsaru country, where it absorbs on the right hand the Kti and the Ashkun and on the left the Wai rivers, finally losing itself in the Kunar, close to Chigar-Serai. Concerning the Alingar or Kao, which carries the drainage of western Kafiristan into the Kabul at Laghman, there are no trustworthy details. It is formed from the waters of all the valleys inhabited by the Ramgal Kafirs, and by that small branch of the Katirs known as the Kalam tribe.

The climate varies with the altitude, but in the summer-time it is hot at all elevations. In the higher valleys the winter is rigorous. Climate. Snow falls heavily everywhere over 4000 ft. above the sea-level. During the winter of 1890-1891 at Kamdesh (elevation 6100 ft.) the thermometer never fell below 17° F. In many of the valleys the absence of wind is remarkable. Conse- quently a great deal of cold can be borne without discomfort. The Kunar valley, which is wet and windy in winter, but where snow, if it falls, melts quickly, gives a much greater sensation of cold than the still Kafiristan valleys of much lower actual temperature. A deficiency of rain necessitates the employment of a somewhat elaborate system of irrigation, which in its turn is dependent upon the snowfall.

The present inhabitants are probably mainly descended from the broken tribes of eastern Afghanistan, who, refusing to accept The Kafirs. ˆ a – m (m the i°th century), were driven away by the fervid swordsmen of Mahomet. Descending upon the feeble inhabitants of the trackless slopes and perilous valleys of modern Kafiristan, themselves, most likely, refugees of an earlier date, they subjugated and enslaved them and partially amalgamated with them. These ancient peoples seem to be represented by the Presun tribe, by the slaves and by fragments of lost peoples, now known as the Jazhis and the Aroms. The old division of the tribes into the Siah-Posh, or the black-robed Kafirs, and the Safed-Posh, or the white-robed, was neither

scientific nor convenient, for while the Siah-Posh have much in common in dress, language, customs and appearance, the Safed- Posh divisions were not more dissimilar from the Siah-Posh than they were from one another. Perhaps the best division at present possible is into (1) Siah-Posh, (2) Waigulis, and (3) Presungalis or Viron folk.

The black-robed Kafirs consist of one very large, widely spread tribe, the Katirs, and four much smaller communities, the Kam, the Madugalis, the Kashtan or Kashtoz, and the Gourdesh. Numerically, it is probable that the Katirs J° e / are more important than all the remaining tribes put s ‘ together. They inhabit several valleys, each community being independent of the others, but all acknowledging the same origin and a general relationship. The Katirs fall readily into the following groups: (a) Those of the Bashgal valley, also called Kamoz and Lutdehchis, who occupy eleven villages between Badawan and Sunra, the border hamlet of the Madugal country, namely, Ptsigrom, Pshui or Pshowar, Apsai, Shidgal, Bragamatal (Lutdeh), Bajindra, Badamuk, Oulagal, Chabu, Baprok and Purstam; (b) the Kti or Katwar Kafirs, who live in two settlements in the Kti valley; (c) the Kulam people, who have four villages in the valley of the same name ; (d) the Ramgalis, or Gabariks, who are the most numerous, and possess the western part on the Afghan border. Of the remaining tribes of the Siah-Posh, the chief is the Kam or Kamtoz, who inhabit the Bashgal valley, from the Madugal boundary to the Kunar valley, and its lateral branches in seven chief settlements, namely, Urmir, Kambrom or Kamdesh, Mergrom, Kamu, Sarat, Pittigal and Bazgal. The next Siah-Posh tribe in importance is the Muman or Madugal Kafirs, who have three villages in the short tract between the Katirs and the Kam in the Bashgal valley. The last Siah-Posh’ tribe is the Kashtan or Kashtoz, who in 1891 were all located in one greatly overcrowded village, their outlying settle- ment having been plundered by the Afghan tribes of the Kunar valley. One colony of Siah-Posh Kafirs lives in the Gourdesh valley ; but they differ from all the other tribes, and are believed to be descended, in great part, from the ancient people called the Aroms.

Our exact knowledge of the Waigulis is scanty. They seem to be related in language and origin with a people fierce, shy and isolated, called the Ashkun, who are quite unknown. The Wai _,. speak a tongue altogether different from that spoken by ivatei/te the Siah-Posh and by the Presungalis. The names of their ten chief villages are Runchi, Nishi, Jamma, Amzhi, Chimion, Kegili, Akun or Akum, Mildesh, Bargal and Prainta. Of these Amzhi and Nishi are the best known.

The Presungalis, also called Viron, live in a high valley. In all respects they differ from other Kafirs, in none more than in their unwarlike disposition. Simple, timid, stolid-featured j. fie and rather clumsy, they are remarkable for their in-pˆ es „ / ,„ afe# dustry and powers of endurance. They probably repre- sent some of the earliest immigrants. Six large well-built villages are occupied by them — Shtevgrom, Pontzgrom, Diogrom, Kstigi-grom, Satsumgrom and Paskigrom.

The slaves are fairly numerous. Their origin is probably partly from the

very ancient inhabitants and partly from war prisoners. Coarse in feature and dark in tint, they cannot be 7,. Slaves distinguished from the lowest class of freemen, while their dress is indistinctive. They are of two classes — household slaves, who are treated not unkindly; and artisan slaves, who are the skilled handicraftsmen — carvers, blacksmiths, bootmakers and so forth; many of the musicians are also slaves. They live in a particular portion of a village, and were considered to a certain extent unclean, and might not approach closely to certain sacred spots. All slaves seem to wear the Siah-Posh dress, even when they own as masters the feeble Presungal folk.

Little respect is shown to women, except in particular cases to a few of advanced years. Usually they are mistresses and slaves, saleable chattels and field-workers. Degraded, immoral, Women overworked and carelessly fed, they are also, as a rule, unpleasant to the sight. Little girls are sometimes quite beautiful, but rough usage and exposure to all weathers soon make their complexions coarse and dark. They are invariably dirty and uncombed. In comparison with the men they are somewhat short. Physically they are capable of enormous labour, and are very enduring. All the field-work falls to them, as well as all kinds of inferior occupations, such as load-carrying. They have no rights as against their husbands or, failing them, their male relations. They cannot inherit or possess property.

There are certainly three tongues spoken, besides many dialects, that used by the Siah-Posh being of course the most common ; and although it has many dialects, the employers of one seem Language. to understand all the others. It is a Prakritic language. Of the remaining two, the Wai and the Presun have no similarity ; they are also unlike the Siah-Posh. Kafirs themselves maintain that very young children from any valley can acquire the Wai speech, but that only those born in the Presungal can ever converse in that language, even roughly. To European ears it is disconcert- ingly difficult, and it is perhaps impossible to learn.

Before their conquest by Abdur Rahman all the Kafirs were idolaters of a rather low type. There were lingering traces of Relleioa ancestor-worship, and perhaps of fire-worship also. The ” ” gods were numerous; tribal, family, household deities had to be propitiated, and mischievous spirits and fairies haunted forests, rivers, vales and great stones. Imra was the Creator, and all the other supernatural powers were subordinate to him. Of the inferior gods, Moni seemed to be the most ancient; but Gish, the war-god, was by far the most popular. It was his worship, doubt- less, which kept the

Kafirs so long independent. In life as a hero, and after death as a god, he symbolized hatred to the religion of Mahomet. Every village revered his shrine ; some possessed two. Imra, Gish and Moni were honoured with separate little temples, as was usually Dizani goddess ; but three or four of the others would share one between them, each looking out of a small separate square window. The worshipped object was either a large fragment df stone or an image of wood conventionally carved, with round white stones for eyes. Different animals were sacrificed at different shrines: cows to Imra, male goats and bulls to Gish, sheep to the god of wealth; but goats were generally acceptable, and were also slain ceremonially to discover a complaisant god, to solemnize a vow, to end a quarrel, to ratify brotherhood. The ministers of religion were a hereditary priest, a well-born chanter of praise, and a buffoon of low station, who wassupposed to become inspired at each sacrifice, and to have the power of seeing fairies and other spirits whenever they were near, also of understanding their wishes. The blood of the offering, together with flour, wine and butter, was cast on the shrine after the animal and the other gifts had been sanctified with water sprinkled by the officiating priests, while he cried " Such, such!" ("Be pure!"). Dense clouds of smoke from burning juniper-cedar, which crackled and gave forth pungent incense, added to the spectacle, which was dignified by the bearing of the officials and solemnized by the devout responses of the congregation. There was no human sacrifice except when a prisoner of war, after a solemn service at a shrine, was taken away and stabbed before the wooden tomb of some unavenged headman. Kafirs believed in a kind of Hell where wicked people burned ; but the Hereafter was an underground region entered by a guarded aperture, and inhabited by the shapes which men see in dreams. Suicide was as unknown as fear of dying. Melancholy afflicted only the sick and the be- reaved. Religious traditions, miracles and anecdotes were puerile, and pointed no social lesson or any religious law. Music, dancing and songs of praise were acceptable to the gods, and every village (grom) had its dancing platform and dancing house (grom ma), furnished with a simple altar. No prayers were offered, only invocations, exhortative or remonstrant.

The great majority of the tribes were made up of clans. A person's importance was derived chiefly from the wealth of his Trlh I family and the number of male adults which it contained.

_ a . The power of a family, as shown by the number and

*t , rg * a Z ' quality of its fighting men as well as by the strength of its followers, was the index of that family's influence. Weak clans and detached families, or poor but free households, carried their independence modestly. The lowest clan above the slaves sought service with their wealthier tribesmen as henchmen and armed shepherds. By intricate*

ceremonial, associated with complicated duties, social and religious, which extended over two years, punctuated at intervals by prodigious compulsory banquets, rich men could become elders or jast. Still further outlay and ostentation enabled the few who could sustain the cost to rank still higher as chief or Mir. Theoretically, all the important and outside affairs of the tribe were managed by the jast in council ; actually they were controlled by two or three of the most respected of that class. Very serious questions which inflamed the minds of the people would be debated in informal parliaments of the whole tribe. Kafirs have a remarkable fondness for discussing in conclave. Orators, consequently, are influential. The internal business of a tribe was managed by an elected magistrate with twelve assistants. It was their duty to see that the customs of the people were respected; that the proper seasons for gathering fruit were rigidly observed. They regulated the irrigation of the fields, moderating the incessant quarrels which originated in the competition for the water; and they kept the channels in good repair. Their chief, helped by contribu- tions in kind from all householders, entertained tribal guests. He also saw that the weekly Kafir Sabbath, from the sowing to the carrying of the crops, was carefully observed, the fires kept burning, and the dancers collected and encouraged. Opposition to these annual magistrates or infraction of tribal laws was punished by fines, which were the perquisites and the payment of those officials. Serious offences against the whole people were judged by the com- munity itself; the sentences ranged as high as expulsion from the settlement, accompanied with the burning of the culprit's house and the spoliation of his goods. In such cases, the family and the clan refusing to intervene, the offender at once became cowed into submission.

Habitations are generally strong, and built largely of wood. They are frequently two or more storeys high, often with an open gallery at the top. Wealthy owners were fond of elaborate carving in simple designs and devices. A room is square, with a smoke- hole when possible; small windows, with shutters and bolts, and

heavy doors fastened by a sliding wooden pin, are common. The nature of the ground, its defensible character, the necessity of not encroaching upon the scanty arable land, and such fj oasesan j considerations, determine the design of the villages. Speci- y]/i ares mens of many varieties may be discovered. There is the '

shockingly overcrowded oblong kind, fort-shaped, three storeys high, and on a river's bank, which is pierced by an underground way leading to the water. Here all rooms look on to the large central courtyard ; outwards are few or no windows. There is also the tiny hamlet of a few piled-up hovels perched on the flattish top of some huge rock, inaccessible when the ladder connecting it with the neighbouring hill-side or leading to the ground is

withdrawn. Some villages on mounds are defended at the base by a circular wall strengthened with an entanglement of branches. Others cling to the knife-edged back of some difficult spur. Many are hidden away up side ravines. A few boldly rely upon the numbers of their fighting men, and are unprotected save by watch-towers. While frequently very picturesque at a distance, all are dirty and grimed with smoke; bones and horns of slaughtered animals litter the ground. The ground floor of a house is usually a winter stable for cows and the latrine, as well as the manure store for the household ; the middle part contains the family treasures; on the top is the living-place. In cold valleys, such as the Presungal, the houses are often clustered upon a hillock, and penetrate into the soil to the depth of two or more apartments. Notched poles are the universal ladders and stairways.

In height Kafirs average about 5 ft. 6 in. They are lean; always in hard condition; active jumpers, untiring walkers, expert moun- taineers; exceptionally they are tall and heavy. With character- chests fairly deep, and muscular, springy legs, there is i stics some lightness and want of power about the shoulder muscles, the arms and the hand-grasp. In complexion they are purely Eastern. Some tribes, notably the Wai, are fairer than others, but the average colour is that of the natives of the Punjab. Albinos, or red-haired people, number less than \ % of the popula- tion. As a rule, the features are well-shaped, especially the nose. The glance is wild and bold, with the wide-lidded, restless gaze of the hawk; or the exact converse — a shifty, furtive peer under lowered brows. This look is rather common amongst the wealthier families and the most famous tribesmen. The shape of a man's head not uncommonly indicates his social rank. Several have the brows of thinkers and men of affairs. The degraded forms are the bird-of-prey type — low, hairy foreheads, hooked noses with receding chin, or the thickened, coarse features of the darker slave class. Intellectually they are of good average power. Their moral charac- teristics are passionate covetousness, and jealousy so intense that it smothers prudence. Before finally destroying, it constantly endangered their wildly cherished independence. Revenge, espe- cially on neighbouring Kafirs, is obtained at any price. Kafirs are subtle, crafty, quick in danger and resolute, as might be expected of people who have been plunderers and assassins for centuries, whose lives were the forfeit of a fault in unflinchingness or of a moment's vacillation. Stealthy daring, bor» of wary and healthy nerves and the training of generations, almost transformed into an instinct, is the national characteristic. Ghastly shadows, they flitted in the precincts of hostile villages far distant from their own valleys, living upon the poorest food carried in a fetid goatskin bag; ever ready to stab in the darkness or to wriggle through aper- tures, to slay as they slept men, women and babies. Then, with clothing for prize, and human ears as a

trophy, they sped, watchful as hares, for their far-away hills, avenger Pathans racing furiously in their track. Kafirs, most faithful to one another, never aban- doned a comrade. If he were killed, they sought to carry away his head for funeral observances. As traders, though cunning enough, they are no match for the Afghan. They were more successful as brigands and blackmailers than as skilled thieves. In night robbery and in pilfering they showed little ingenuity. Truth was considered innately dangerous; but a Kafir is far more trustworthy than his Mahommedan neighbours. Although hospitality is generally viewed as a hopeful investment, it can be calculated on, and is unstinted. Kafirs are capable of strong friendship. They are not cruel, being kind to children and to animals, and protective to the weak and the old. Family ties and the claim of blood even triumph over jealousy and covetousness.

The national attire of the men is a badly-cured goatskin, confined at the waist by a leather belt studded with nails, supporting the I-hilted dagger, strong but clumsy, of slave manufacture, Dress

sheathed in wood covered with iron or brass, and often

Weapons,

prettily ornamented. Women are dressed in a long, ut eas iis &c very dark tunic of wool, ample below the shoulders, and edged with red. This is fastened at the bosom by an iron pin, a thorn, or a fibula; it is gathered round the body by a woven band, an inch wide, knotted in front to dangle down in tassels. On this girdle is carried a fantastically handled knife in a leather covering. The woman's tunic is sometimes worn by men. As worn by women its shape is something between a long frock-coat and an Inverness cape. Its hue and the blackness of the hairy goatskin give the name of Siah-Posh, " black-robed," to the majority of the clans. The other tribes wear such articles of cotton attire as they can obtain by barter, by theft, or by killing beyond the border, for

only woollen cloth is made in the country. Of late years long robes from Chitral and Badakshan have been imported by the wealthy, as well as the material for loose cotton trousers and wide shirts. Clothing, always hard to obtain, is precious property. Formerly little girls, the children of slaves, or else poor relations, used to be sold in exchange for clothes and ammunition. Mahommedans eagerly bought the children, which enabled them in one transaction to acquire a female slave and to convert an infidel.

Men go bare- headed, which wrinkles them prematurely, or they wear Chitral caps. Certain priests, and others of like degree, wind a strip of cotton cloth round their brows. Siah-Posh women wear curious horned caps or a small square white head-dress upon informal occasions. Females of other tribes bind their heads with turbans ornamented with shells and other finery. Excellent snow gaiters are made of goat's hair for both sexes, and of woollen material for women. Boots, strongly sewn, of soft red leather cannot be used in the snow or when it is wet, because they are imperfectly tanned. For the ceremonial dances all manner of gay-coloured articles of attire, made of cheap silk, cotton velvet, and sham cloth-of-gold, are displayed, and false jewelry and tawdry ornaments; but they are not manufactured in the country, but brought from Peshawar by pedlars. Woollen blankets and goat's-hair mats cover the bed- steads — four-legged wooden frames laced across with string or leather thongs. Low square stools, 18 in. broad, made upon the same principle as the bedsteads, are peculiar to the Kafirs and their half-breed neighbours of the border. Iron tripod tables, singularly Greek in design, are fashioned in Waigul. A warrior's weapons are a matchlock (rarely a flintlock), a bow and arrows, a spear and the dagger which he never puts aside day or night. The axes, often carried, are light and weak, and chiefly indicate rank. Clubs, care- fully ornamented by carving, are of little use in a quarrel; their purpose is that of a walking-stick. As they are somewhat long, these walking-clubs have been often supposed to be leaping-poles. Swords are rarely seen, and shields, carried purely for ostentation, seldom. Soft stone is quarried to make large utensils, and great grim chests of wood become grain boxes or coffins indifferently. Prettily carved bpwls with handles, or with dummy spouts, hold milk, butter, water or small quantities of flour. Wine, grain, everything else, is stored or carried in goatskin bags. Musical instruments are represented by reed flageolets, small drums, primi- tive fiddles, and a kind of harp.

Isolated and it the outskirts of every village is a house used by women when menstruating and for lying-in. Children are named pˆ—ll-.. as soon as born. The infant is given to the mother to Customs suc k' e > while a wise woman rapidly recites the family ancestral names; the name pronounced at the instant the baby begins to feed is that by which it is thereafter known. Everybody has a double name, the father's being prefixed to that given at birth. Very often the two are the same. There is a special day for the first head-shaving. No hair is allowed on a male's scalp, except from a 4-in. circle at the back of the head, whence long locks hang down straight. Puberty is attained ceremoniously by boys. Girls simply change a fillet for a cotton cap when nature proclaims womanhood. Marriage is merely the purchase of a wife through intermediaries, accompanied by feasting. Divorce is often merely a sale or the sending away of a wife to slave for her

parents in shame. Sexual morality is low. Public opinion applauds gallantry, and looks upon adultery as hospitality, provided it is not discovered by the husband. If found out, in flagrante delicto, there is a fiscal fine in cows. There is much collusion to get this penalty paid in poor households. Funeral rites are most elaborate, according to the rank and warrior fame of the deceased, if a male, and to the wealth and standing of the family, if a woman. Children are simply carried to the cemetery in a blanket, followed by a string of women lamenting. A really great man is mourned over for days with orations, dancing, wine-drinking and food distribution. Gun-firing gives notice of the procession. After two or three days the corpse is placed in the coffin at a secluded spot, and the observances are continued with a straw figure lashed upon a bed, to be danced about, lamented over, and harangued as before. During regular intervals for business and refreshment old women wail genealogies. A year later, with some- what similar ritual, a wooden statue is inaugurated preliminary to erection on the roadside or in the village Valhalla. The dead are not buried, but deposited in great boxes collected in an assigned place. Finery is placed with the body, as well as vessels holding water and food. Several corpses may be heaped in one receptacle, which is, rarely, ornamented with flags; its lid is kept from warping by heavy stones. Thˆ wooden statues or effigies are at times sacrificed to when there is sickness, and at one ofthe many annual festivals food is set before them. Among the Presungal there are none of these images. Blood-feuds within a tribe do not exist. The slayer of his fellow, even by accident, has to pay a heavy compensation or else become an outcast. Several hamlets and at least one village are peopled by families who had thus been driven forth from the community. The stigma attaches itself to children and their marriage connexions. Its outward symbol is an inability to look in the face any of the dead person's family. This avoidance is ceremonial. In private and after dark all may be good friends after a decorous interval. The compensation is seldom paid, although payment carries with it much enhancement of family

dignity. All the laws to punish theft, assault, adultery and other injury are based on a systeJJ of compensation whenever possible, and of enlisting the wholewbithe community in all acts of punish- ment. Kafirs have true conceptions of justice. There is no death penalty; a fighting male is too valuable a property of the whole tribe to be so wasted. War begins honourably with proper notice, as a rule, but the murder of an unsuspecting traveller may be the first intimation. Bullets or arrow-heads sent to a tribe or village is the correct announcement of hostilities. The slaying of a tribes- man need not in all cases cause a war. Sometimes it may be avoided by the sinning tribe handing over a male to be killed by the inj ured relations. Ambush, early morning attacks by large numbers, and stealthy killing parties of two or three are the favourite tactics. Peace is

made by the sacrifice of cows handed over by the weaker tribe to be offered up to a special god of the stronger. When both sides have shown equal force and address, the same number of animals are exchanged. Field-work falls exclusively to the women. It is poor. The ploughs are light and very shallow. A woman, who only looks as if she were yoked with the ox, keeps the beast in the furrows, while a second holds the handle. All the operations of agriculture are done primitively. Grazing and dairy-farming are the real trade of the Kafirs, the surplus produce being exchanged on the frontier or sold for Kabul rupees. Herders watch their charges fully armed against marauders.

History. — The history of Kafiristan has always been of the floating legendary sort. At the present day there are men living in Chitral and on other parts of the Kafiristan frontier who are prepared to testify as eye-witnesses to marvels observed, and also heard, by them, not only in the more remote valleys but even in the Afghan borderland itself. It is not surprising therefore that the earlier records are to a great extent fairy tales of a more or less imaginative kind and chiefly of value to those interested in folk-lore. Sir Henry Yule, a scientific soldier, a profound geographer and a careful student, as the result of his researches thought that the present Kafiristan was part of that pagan country stretching between Kashmir and Kabul which medieval Asiatics referred to vaguely as Bilaur, a name to be found in Marco Polo as Bolor. The first distinct mention of the Kafirs as a separate people appears in the history of Timur. On his march to the invasion of India the people at Andarab appealed to Timur for help against the Kator and the Siah-Posh Kafirs. He responded and entered the country of those tribes through the upper part of the Panjhir valley. It was in deep winter weather and Timur had to be let down the snows by glissade in a basket guided by ropes. A detachment of 10,000 horse which he speaks of as having been sent against the Siah- Posh to his left, presumably therefore to the north, met with disaster; but he himself claims to have been victorious. Never- theless he seems quickly to have evacuated the impracticable mountain land, quitting the country at Khawak. He caused an inscription to be carved in the defiles of Kator to commemorate his invasion and to explain its route. Inside the Kafir country on the Najil or Alishang River there is a fort still called Timur's Castle, and in the Kalam fort there is said to be a stone engraved to record that as the farthest point of his advance. In the Memoirs of Baber there is mention of the Kafirs raiding into Panjhir and of their taste for drinking, every man having a leathern wine-bottle slung round his neck. The Ain-i-Akbari makes occasional mention of the Kafirs, probably on the autho- rity of the famous Memoirs; it also contains a passage which may possibly have originated the widespread story that the Kafirs were descendants of the Greeks. Yule however be- lieved that this passage did not refer to the Kafirs at all, but to

the claims to descent from Alexander of the rulers in Swat before the time of the Yusufzai. Many of the princelings of the little Hindu-Kush states at the present day pride them- selves on a similar origin, maintaining the founders of their race to be Alexander, " the two-horned," and a princess sent down miraculously from heaven to wed him.

Benedict Goes, travelling from Peshawar to Kabul in 1603, heard of a place called Capperstam, where no Mahommedan might enter on pain of death. Hindu traders were allowed to visit the country, but not the temples. Benedict Goes tasted the Kafir wine, and from all that he heard suspected that the Kafirs might be Christians. Nothing more is heard of the Kafirs until 1788, when Rennell's Memoir of a Map ef

Hindostan was published. Twenty-six years later Elphinstone's Caubal was published. During the British occupation of Kabul in 1839-1840 a deputation of Kafirs journeyed there to invite a visit to their country from the Christians whom they assumed to be their kindred. But the Afghans grew furiously jealous, and the deputation was sent coldly away.

After Sir George Robertson's sojourn in the country and the visit of several Kafirs to India with him in 1892 an increasing intimacy continued, especially with the people of the eastern valleys, until 1895, when by the terms of an agreement entered into between the government of India and the ruler of Afghani- stan the whole of the Kafir territory came nominally under the sway of Kabul. The amir Abdur Rahman at once set about enforcing his authority, and the curtain, partially lifted, fell again heavily and in darkness. Nothing but rumours reached the outside world, rumours of successful invasions, of the wholesale deportation of boys to Kabul for instruction in the religion of Islam, of rebellions, of terrible repressions. Finally even rumour ceased. A powerful Asiatic ruler has the means of ensuring a silence which is absolute, and nothing is ever known from Kabul except what the amir wishes to be known. Probably larger numbers of the growing boys and young men of Kafiristan are fanatical Mahommedans, fanatical with the zeal of the recent convert, while the older people and the majority of the population cherish their ancient customs in secret and their degraded religion in fear and trembling — waiting dumbly for a sign.

See Sir G. S. Robertson, Kafirs of the Hindu-Kush (London, 1896). (G.S.R.)

KAGERA, a river of east equatorial Africa, the most remote headstream of

the Nile. The sources of its principal upper branch, the Nyavarongo, rise in the hill country immediately east of Lake Kivu. After a course of over 400 m. the Kagera enters Victoria Nyanza on its western shore in o° 58′ S. It is navigable by steamers for 70 m. from its mouth, being obstructed by rapids above that point. The river was first heard of by J. H. Speke in 1858, and was first seen (by white men) by the same traveller (Jan. 16, 1862) on his journey to discover the Nile source. Speke was well aware that the Kagera was the chief river emptying into the Victoria Nyanza and in that sense the headstream of the Nile. By him the stream was called " Kitangule," kagera being given as .equivalent to " river." The exploration of the Kagera has been largely the work of German travellers.

See Nile ; also Speke's Discovery of the Source of the Nile (Edin- burgh, 1863); R. Kandt's Caput Nili (Berlin, 1904); and map by P. Sprigade and M. Moisel in Grosser deutscher Kolonialallas, No. 16 (Berlin, 1906). ,

KAHLUR, or Bilaspur, a native state of India, within the Punjab. It is one of the hill states that came under British protection after the first Sikh war in 1846. The Gurkhas had overrun the country in the early part of the 19th century, and expelled the raja, who was, however, reinstated by the British in 1815. The state occupies part of the basin of the Sutlej amid the lower slopes of the Himalaya. Area, 448 sq. m. Pop. (1901), 90,873; estimated gross revenue, £10,000; tribute, £530. The chief, whose title is raja, is a Chandel Rajput. The town of Bilaspur is situated on the left bank of the Sutlej, 1465 ft. above sea-level; pop. (1901), 3192.

KAHN, GUSTAVE (1859-), French poet, was born at Metz on the 21st of December 1859. He was educated in Paris at the Ecole des Chartes and the Ecole des langues orientales, and began to contribute to obscure Parisian reviews. After four years spent in Africa he returned to Paris in 1885, and founded in 1886 a weekly review, La Vogue, in which many of his early poems appeared. In the autumn of the same year he founded, with Jean Moreas and Paul Adam, a short-lived periodi- cal, Le Symboliste, in which they preached the nebulous poetic doctrine of St6phane Mallarme; and in 1888 he became one of the editors of the Revue indipendante. He contributed poetry and criticism to the French and Belgian reviews favour- able to the extreme symbolists, and, with Catulle Mendes,

he founded at the Odeon, the Theatre Antbine and the Theatre Sarah Bernhardt, matinees for the production of the plays of the younger poets. He claimed to be the earliest writer of the vers libre, and explained his methods and the history of the move- ment in a preface to his Premiers poemes (1897). Later books are Le Livre d'images (1897); Les Fleurs de la passion (1900); some novels; and a valuable contribution to the history of modern French verse in Symbolistes et decadents (1902).

KAHNIS, KARL FRIEDRICH AUGUST (1814-1888), German Lutheran theologian, was born at Greiz on the 22nd of December 1814. He studied at Halle, and in 1850 was appointed professor ordinarius at Leipzig. Ten years later he was made canon of Meissen. He retired in 1886, and died on the 20th of June 1888 at Leipzig. Kahnis was at first a neo-Lutheran, blessed by E. W. Hengstenberg and his pietistic friends. He then attached himself to the Old Lutheran party, interpreting Luther- anism in a broad and liberal spirit and showing some appre- ciation of rationalism. His Lutherische Dogmatik, historisch- genetisch dargeslellt (3 vols., 1861-1868; 2nd ed. in 2 vols., 1874-1875), by making concessions to modern criticism, by spiritualizing and adapting the old dogmas, by attacking the idea of an infallible canon of Scripture and the conventional theory of inspiration, by laying stress on the human side of Scripture and insisting on the progressive character of revelation, brought him into conflict with his former friends. A. W. Diekhoff, Franz Delitzsch (Fur und wider Kahnis, 1863) and Hengstenberg (Evangelische Kirchenzeitung, 1862) protested loudly against the heresy, and Kahnis replied to Hengstenberg in a vigorous pamphlet, Zeugniss fiir die Grundwahrheiten des Protestantismus gegen Dr Hengstenberg (1862). »

Other works by Kahnis are Lehre vom Abendmahl (1851), Der innere Gang des deutschen Protestantismus seit Mitte des vorigen Jahrhunderts (1854; 3rd ed. in 2 vols., 1874; Eng. trans., 1856); Christentum und Luthertum (1871) ; Geschichte der deutschen Reforma- tion, vol. i. (1872) ; Der Gang der Kirche in Lebensbildern (1881, &c.) ; and l)ber das Verhaltnis der alten Philosophic zum Christentum (1884).

K'AI-FENG FU, the capital of the province of Honan, China. It is situated in 34 52′ N., 114° 33′ E., on a branch line of the Peking-Hankow railway, and forms also the district city of Siang-fu. A city on the present site was first built by Duke Chwang (774-700 B.C.) to mark off (k'ai) the boundary of'his fief {fling); hence its name. It has, however, passed under several aliases in Chinese history. During the Chow, Suy arid T'ang dynasties (557-007) it was known as P'ien-chow. During the Wu-tai, or five dynasties (907-960), it was the Tung-king, or eastern capital. Under the Sung and Kin dynasties (960-1260) it was called P'ien-king. By the Yuan or Mongol dynasty (1260-1368) its name was again changed to P'ien-liang, and on the return of the Chinese to power with the establishment of the Ming dynasty (1368-1644), its original name was restored. The city is situated at the point where the last spur of the Kuen-lun mountain system merges in the eastern plain, and a few miles south of the Hwang-ho. Its' position, therefore, lays it Open to the destructive influences of this river. In 1642 it was totally destroyed by a flood caused by the dikes bursting, and on several prior and subsequent occasions it has suffered injury from the same dause. The city is large and imposing, with

broad – streets and handsome buildings, the most notable of which are a twelve-storeyed pagoda 600 ft. high, and a watch tower from which, at a height of 200 ft., the inhabitants are able to observe the approach of the yellow waters of the river in times of flood. The city wall forms a substantial protection and is pierced by five gates. The whole neighbour-hood, which is the site of one of the earliest settlements of the Chinese in China, is full of historical associations, and it was in this city that the Jews who entered China in A;D. 1163 first established a colony. For many centuries these people held themselves aloof from the natives, and practised the rites of their religion in a temple built and supported by themselves. At last, however, they fell upon evil times, and in 1851, out of the seventy families which constituted the original colony, only seven remained. For fifty years no rabbi

had ministered to the wants of this remnant. In 1853 the city was attacked by the T'ai-p'ing rebels, and, though at the first assault its defenders successfully resisted the enemy, it was subsequently taken. The captors looted and partially destroyed the town. It has now little commerce, but contains several schools on Western lines — including a government college opened in 1902, and a military school near the railway station. A mint was established in 1905, and there is a district branch of the imperial post. The population — largely Mahommedan — was estimated (1908) at 200,000. Jews numbered about 400.

KAILAS, a mountain in Tibet. It is the highest peak of the range of mountains lying to the north of Lake Manasora- war, with an altitude of over 22,000 ft. It is famous in Sanskrit literature as Siva's paradise, and is a favourite place of pil- grimage with Hindus, who regard it as the most sacred spot on earth. A track encircles the base of the mountain, and it takes the pilgrim three weeks to complete the round, pros- trating himself all the way.

KAIN, the name of a sub-province and of a town of Khorasan, Persia. The sub-province extends about 300 m. N. to S., from Khaf to Seistan, and about 150 m. W. to E., from the hills of Tun to the Afghan frontier, comprising the whole of south- western Khorasan. It is very hilly, but contains many wide plains and fertile villages at a mean elevation of 4000 ft. It has a population of about 150,000, rears great numbers of camels and produces much grain, saffron, wool, silk and opium. The chief manufactures are felts and other woollen fabrics, princi- pally carpets, which have a world-wide reputation. The best Kami carpets are made

at.Darakhsh, a village in the Zirkuh district and 50 m. N.E. of Birjend. It is divided into eleven administrative divisions: — Shahabad (with the capital Birjend), Naharjan, Alghur, Tabas sunnl Khaneh, Zirkuh Shakhan, Kain, Nlmbuluk, Nehbandan, Khusf, Arab Khaneh or Momenabad.

The town of Kain, the capital of the sub-province until 1740, when it was supplanted by Birjend, is situated 65 m. N. of Birjend on the eastern side of a broad valley, stretching from N. to S., at the base of the mountain Abuzar, in 33° 42′ N. and 59° 8′ E., and at an elevation of 4500 ft. Its population is barely 5000. It is surrounded by a mud wall and bastions, and near it, on a hill rising 500 ft. above the plain, are the ruins of an ancient castle which, together with the old town, was destroyed either by Shah Rukh (1404-1447), a son, or by Baysunkur (d. 1433), a grandson of Timur (Tamerlane), who afterwards built a new town. After a time the Uzbegs took possession and held the town until Shah Abbas I. (1587-16 29) expelled them. In the 18th century it fell under the sway of the Afghans and remained a dependency of Herat until 185 1. A large number of windmills are at work outside the town. The great mosque, now in a ruinous state, was built a.h. 796 (a.d. 1394) by Karen b. Jamshid and repaired by Yusof Dowlatyar.

KAIRA, or Kheda, a town and district of British India, in the northern division of Bombay. The town is 20 m. S.W. of Ahmedabad and 7 m. from Mehmadabad railway station. Pop. (1901), 10,392. Its antiquity is proved by the evidence of copperplate grants to have been known as early as the 5th century. Early in the 18th century it passed to the Babi family, with whom it remained till 1763, when it was taken by the Mahrattas; it was finally handed over to the British in 1803. It was a large military station till 1830, when the cantonment was removed to Deesa.

The District of Kaira has an area of 1595 sq. m.; pop. (1901), 716,332, showing a decrease of 18% in the decade, due to the results of famine. Except a small corner of hilly ground near its northern boundary and in the south-east and south, where the land along the Mahi is furrowed into deep ravines, the district forms one unbroken plain, sloping gently towards the south-west. The north and north-east portions are dotted with patches of rich rice-land, broken by untilled tracts of low brush- wood. The centre of the district is very fertile and highly cultivated; the luxuriant fields are surrounded by high hedges, and the whole country is clothed with clusters of shapely trees. To the west this belt of rich vegetation passes into a bare

though well-cultivated tract of rice-land, growing more barren and open till it reaches the maritime belt, whitened by a salt-like crust, along the Gulf of Cambay. The chief rivers are the Mahi on the south-east and south, and the Sabarmati on the western boundary. The Mahi, owing to its deeply cut

bed and sandbanks, is impracticable for either navigation or irrigation; but the waters of the Sabarmati are largely utilized for the latter purpose. A smaller stream, the Khari, also waters a consider- able area by means of canals and sluices. The principal crops are cotton, millets, rice and pulse; the industries are calico- printing, dyeing, and the manufacture of soap and glass. The chief centre of trade is Nadiad, on the railway, with a cotton-mill. A special article of export is ghi, or clarified butter. The Bombay & Baroda railway runs through the district. The famine of 1899-1900 was felt more severely here than in any other part of the province, the loss of cattle being specially heavy.

KAIRAWAN (Kerotjan), the " sacred " city of Tunisia, 36 m. S. by W. by rail from Susa, and about 80 m. due S. from the capital. Kairawan is built in an open plain a little west of a stream which flows south to the Sidi-el-Hani lake. Of the luxuriant gardens and olive groves mentioned in the early Arabic accounts of the place hardly a remnant is left. Kairawan, in shape an irregular oblong, is surrounded by a crenellated brick wall with towers and bastions and five gates. The city, however, spreads beyond the walls, chiefly to the south and west. Some of the finest treasures of Saracenic art in Tunisia are in Kairawan; but the city suffered greatly from the vulgarization which followed the Turkish conquest, and also from the blundering attempts of the French to restore buildings falling into ruin. The streets have been paved and planted with trees, but the town retains much of its Oriental aspect. The houses are built round a central courtyard, and present nothing but bare walls to the street. The chief buildings are the mosques, which are open to Christians, Kairawan being the only town in Tunisia where this privilege is granted.

In the northern quarter stands the great mosque founded by Sidi Okba ibn Nafi, and containing his shrine and the tombs of many rulers of Tunisia. To the outside it presents a heavy buttressed wall, with little of either grandeur or grace. It consists of three parts: a cloistered court, from which rises the massive and stately minaret, the maksura or mosque proper, and the vestibule. The maksura is a rectangular domed chamber divided by 296 marble and porphyry columns into 17 aisles, each aisle having 8 arches. The central aisle is wider than the others, the columns being arranged by threes. All the columns are Roman or Byzantine, and are the spoil of many ancient cities. Access to the central aisle is gained through a door of sculptured wood known as the Beautiful Gate. It has an in- scription with the record of its construction. The walls are of painted plaster- work; the mimbar or pulpit is of carved wood, each panel bearing a different design. The court is surrounded by a double arcade with coupled columns. In all the mosque contains 439 columns, including two of alabaster given by one of the Byzantine emperors. To the Mahommedan mind the crowning distinction of the building is that through divine inspiration the founder was

enabled to set it absolutely true to Mecca. The mosque of Sidi Okba is the prototype of many other notable mosques (see Mosque). Of greater external beauty than that of Sidi Okba is the mosque of the Three Gates. Cunc inscriptions on the facade record its erection in the 9th and its restoration in the 15th century a.d. Internally the mosque is a single chamber supported by sixteen Roman columns. One of the finest specimens of Moorish architecture in Kairawan is the zawia of Sidi Abid-el-Ghariani (d. c. a.d. 1400), one of the Almoravides, in whose family is the hereditary governorship of the city. The entrance, a door in a false arcade of black and white marble, leads into a court whose arches support an upper colonnade. The town contains many other notable buildings, but none of such importance as the mosque of the Companion (i.e. of the Prophet), outside the walls to the N.W. This mosque is specially sacred as possessing what are said to be three hairs of the Prophet's beard, buried with the saint, who

was one of the companions of Mahomet. (This legend gave rise to the report that the tomb contained the remains of Mahomet's barber.) The mosque consists of several courts and chambers, and contains some beautiful stained glass. The court which forms the entrance to the shrine of the saint is richly adorned with tiles and plaster-work, and is surrounded by an arcade of white marble columns, supporting a painted wooden roof. The minaret is faced with tiles and is surmounted by a gilded crescent. The 19th-century mosque of Sidi Amar Abada, also outside the wall, is in the form of a cross and is crowned with seven cupolas. In the suburbs are huge cisterns, attributed to the 9th century, which still supply the city with water. The cemetery covers a large area and has thousands of Cufic and Arabic inscriptions.

Formerly famous for its carpets and its oil of roses, Kairawan is now known in northern Africa rather for copper vessels, articles in morocco leather, potash and saltpetre. The town has a population of about 20,000, including a few hundred Europeans.

Arab historians relate the foundation of Kairawan by Okba with miraculous circumstances (Tabari ii. 63; Yaqut iv. 213). The date is variously given (see Weil, Gesch. d. Chalifen, i. 283 seq.) ; accord- ing to Tabari it must have been before 670. The legend says that Okba determined to found a city which should be a rallying-point for the followers of Mahomet in Africa. He led his companions into the desert, and having exhorted the serpents and wild beasts, in the name of the Prophet,

to retire, he struck his spear into the ground exclaiming " Here is your Kairawan " (resting-place), so naming the city. 1 In the 8th century Kairawan was the capital of the province of Ifrikia governed by amirs appointed by the caliphs. Later it became the capital of the Aghlabite princes, thereafter following the fortunes of the successive rulers of the country (see Tunisia : History). After Mecca and Medina Kairawan is the most sacred city in the eyes of the Mahommedans of Africa, and constant pilgrimages are made to its shrines. Until the time of the French occupation no Christian was allowed to pass through the gates without a special permit from the bey, whilst Jews were altogether forbidden to approach the holy city. Contrary to expectation no opposition was offered by the citizens to the occupation of the place by the French troops in 1881. On that occasion the native troops hastened to the mosques to perform their devotions; they were followed by European soldiers, and the mosques having thus been " violated " have remained open ever since to non-Mahommedans.

See Murray's Handbook to Algeria and Tunis, by Sir R. L. Playfair (1895); A. M. Broadley, The Last Punic War: Tunis Past and Present (1882) and H. Saladin, Tunis el Kairouan (1908).

KAISERSLAUTERN, a town in the Bavarian palatinate, on the Waldlauter, in the hilly district of Westrich, 41 m. by rail W. of Mannheim. Pop. (1905), 52,306. Among its educational institutions are a gymnasium, a Protestant normal school, a commercial school and an industrial museum. The house of correction occupies the site of Frederick Barbarossa's castle, which was demolished by the French in 17 13. Kaiserslautern is one of the most important industrial towns in the palatinate. Its industries include cotton and wool spinning and weaving, iron-founding, and the manufacture of beer, tobacco, gloves, boots, furniture, &c. There is some trade in fruit and in timber.

Kaiserslautern takes its name from the emperor (Kaiser) Frederick I., who built a castle here about 1152, although it appears to have been a royal residence in Carolingian times. It became an imperial city, a dignity which it retained until 1357, when it passed to the palatinate. In 162 1 it was taken by the Spanish, in 1631 by the Swedish, in 1635 by the imperial and in 1 7 13 by the French troops. During 1793 and 1794 it was the scene of fighting; and in the Franco-Prussian War of 1870 it was the base of operations of the second German army, under Prince Frederick Charles. It was one of the early stations of the Reformation, and in 1849 was the centre of the revolutionary spirit in the palatinate.

See Lehmann, Urkundliche Geschichte von Kaiserslautern (Kaiserslautern, 1853), and E. Jost, Geschichte der Stadt Kaiserslautern (Kaiserslautern, 1886).

. KAISERSWERTH, a town in the Prussian Rhine province, on the right bank of the Rhine, 6 m. below Dusseldorf . Pop. (1905), 2462. It possesses a Protestant and a large old Romanesque

1 Though Okba founded his city in a desert place, excavations undertaken in 1908 revealed the existence of Roman ruins, including a temple of Saturn, in the neighbourhood.

Roman Catholic church of the 12th or 13th century, with a valuable shrine, said to contain the bones of St Suitbert, and has several benevplent institutions, of which the chief is the Diakon- issen Anstalt, or training-school for Protestant sisters of charity. This institution, founded by Pastor Theodor Fliedner (1800- 1864) in 1836, has more than 100 branches, some being in Asia and America; the head establishment at Kaiserswerth includes an orphanage, a lunatic asylum and a Magdalen institution. The Roman Catholic hospital occupies the former Franciscan convent. The population is engaged in silk-weaving and other small industries.

In 710 Pippin of Heristal presented the site of the town to Bishop Suitbert, who built the Benedictine monastery round which the town gradually formed. Until 1214 Kaiserswerth lay on an island, but in that year Count Adolph V. of Berg, who was besieging it, dammed up effectually one arm of the Rhine. About the beginning of the 14th century Kaiserswerth, then an imperial city, came to the archbishopric of Cologne, and afterwards to the duchy of Juliers, whence, after some vicissitudes, it finally passed into the possession of the princes of the palatinate, whose rights, long disputed by the elector of Cologne, were legally settled in 1772. In 1702 the fortress was captured by the Austrians and Prussians, and the Kaiserpfalz, whence the young emperor Henry IV. was abducted by Archbishop Anno of Cologne in 1062, was blown up.

See J. Disselhoff, Das Diaconissenmutterhaus zu Kaiserswerth (new ed., 1903; Eng. trans., 1883).

KAITHAL, or Kythal, an ancient town of British India in Karnal district, Punjab. Pop. (1901), 14,408. It is said to have been founded by the mythical hero Yudisthira, and is con- nected by tradition with the monkey-god Hanuman. In 1767 it fell into the hands of the Sikh chieftain, Bhai Desu Singh, whose descendants, the bhais of Kaithal, ranked among the most powerful Cis-Sutlej chiefs. Their territories lapsed to the British in 1843. There remain the fort of the bhais, and several Mahommedan tombs of the 13th century and later. There is some trade in grain, sal-ammoniac, live stock and blankets; and cotton, saltpetre, lac ornaments and toys are manufactured.

KAKAPO, the Maori name, signifying " night parrot," and frequently adopted by English writers, of a bird, commonly called by the British in New Zealand the "ground-parrot" or " owl-parrot." The existence of this singular form was first made known in 1843 by Ernst Dieffenbach (Travels in N. Zealand, ii. 194), from some of its tail-feathers obtained by him, and he suggested that it was one of the Cuculidae, possibly belonging to the genus Centropus, but he added that it was becoming scarce, and that no example had been seen for many years. G. R. Gray, noticing it in June 1845 {Zool. Voy. " Erebus " and " Terror," pt. ix. p. 9), was able to say little more of it, but very soon after- wards a skin was received at the British Museum, of which, in the following September, he published a figure (Gen. Birds, pt. xvii.), naming it Strigops 2 habroptilus, and rightly placing it among the parrots, but he did not describe it technically for another eighteen months (Proc. Zool. Society, 1847, P- 61). Many specimens have now been received in Europe, so that it is repre- sented in most museums, and several examples have reached England alive.

In habits the kakapo is almost wholly nocturnal, 3 hiding in holes (which in some instances it seems to make for itself) under the roots of trees or rocks during the day time, and only issuing forth about sunset to seek its food, which is solely vegetable in kind, and consists of the twigs, leaves, seeds and fruits of trees, grass and fern roots — some observers say mosses also. It some- times climbs trees, but generally remains on the ground, only using its comparatively short wings to balance itself in running or to break its fall when it drops from a tree—though not always then — being apparently incapable of real flight. It thus becomes an easy prey to the marauding creatures — cats, rats and so forth — which European colonists have, by accident or design, let loose in New Zealand. Sir G. Grey says it had been, within the memory of old people, abundant in every part of that country,

2 This generic term was subsequently altered by Van der Hoeven, rather pedantically, to Stringops, a spelling now generally adopted.

3 It has, however, been occasionally observed abroad by day; and, in captivity, one example at least is said to have been as active by day as by night.

but (writing in 1854) was then found only in the unsettled districts.

The kakapo is about the size of a raven, of a green or brownish- green

colour, thickly freckled and irregularly barred with dark brown, and dashed here and there with longitudinal stripes of light yellow. Examples are subject to much variation in colour and shade, and in some the lower parts are deeply tinged with yellow. Externally the most striking feature of the bird is its head, armed with a powerful beak that it well knows how to use, and its face clothed with hairs and elongated feathers that sufficiently resemble the physiognomy of an owl to justify the generic name bestowed upon it. Of its internal structure little has been described, and that not always correctly. Its furcula has been said (Proc. Zool. Society, 1874, p. 594) to be " lost," whereas the clavicles, which in most birds unite to form that bone, are present, though they do not meet, while in like manner the bird has been declared {op. cit., 1867, p. 624, note) to furnish among the Carinatae " the only apparent exception to the pres- ence of a keel " to the sternum. The keel, however, is undoubt- edly there, as remarked by Blanchard (Ann. Nat. Sc, Zoologie, 4th series, vol. xi. p. 83) and A. Milne Edwards (Ois. Foss. de la France, ii. 516), and, though much reduced in size, is nearly as much developed as in the Dodo and the Ocydrome. The aborted condition of this process can hardly be regarded but in connexion with the incapacity of the bird for flight, and may very likely be the result of disuse. There can be scarcely any doubt as to the propriety of considering this genus the type of a separate family of Psittaci; but whether it stands alone or some other forms (Pezoporus or Geopsittacus, for example, which in coloration and habits present some curious analogies) should be placed with it, must await future determination. In captivity the kakapo is said to show much intelligence, as well as an affectionate and playful disposition. Unfortunately it does not seem to share the longevity characteristic of most parrots, and none that has been held in confinement appears to have long survived, while many succumb speedily.

For further details see Gould's Birds of Australia (ii. 247), and Handbook (ii. 539) ; DrFinsch's Die Papageien (i. 241), and Sir Walter Buller's Birds of New Zealand especially. (A.. N.)

KAKAR, a Pathan tribe on the Zhob valley frontier of Balu- chistan. The Kakars inhabit the back of the Suliman mountains between Quetta and the Gomal river; they are a very ancient race, and it is probable that they were in possession of these slopes long before the advent of Afghan or Arab. They are divided into many distinct tribes who have no connexion beyond the common name of Kakar. Not only is there no chief of the Kakars, or general jirgah (or council) of the whole tribe, but in most cases there are no recognized heads of the different clans. In 1901 they numbered 105,444. During the second Afghan War the Kakars caused some annoyance on the British line of communications; and the Kakars inhabiting the Zhob valley were punished by the Zhob valley expedition of 1884.

KALA-AZAR, or Dum-Dum fever, a tropical disease, character- ized by remittent fever, anaemia and enlargement of the spleen (splenomegaly) and often of the liver. It is due to a protozoon parasite (see Parasitic Diseases), discovered in 1900 by Leish- man in the spleen, and is of a malarial type. The treatment is similar to that for malaria. In Assam good results have been obtained by segregation.

KALABAGH, a town of British India in the Mianwali district of the Punjab. Pop. (1901), 5824. It is picturesquely situated at the foot of the Salt range, on the right bank of the Indus, opposite the railway station of Mari. The houses nestle against the side of a precipitous hill of solid rock-salt, piled in successive tiers, the roof of each tier forming the street which passes in front of the row immediately above, and a cliff, also of pure rock-salt, towers above the town. The supply of salt, which is worked from open quarries, is practically inexhaustible. Alum also occurs in the neighbouring hills, and forms a considerable item of local trade. Iron implements are manufactured.

KALACH, also known as Donskaya, a village of S.E. Russia, in the territory of the Don Cossacks, and a river port on

the Don, 31m. N.E. of Nizhne-Chirskaya, in 43 30′ E. and 48 43′ N. Its permanent population, only about 1200, increases greatly in summer. It is the terminus of the railway (45 m.j which connects the Don with Tsaritsyn on the Volga, and all the goods (especially fish, petroleum, cereals and timber) brought from the Caspian Sea up the Volga and destined for middle Russia, or for export through the Sea of Azov, are unloaded at Tsaritsyn and sent over to Kalach on the Don.

KALAHANDI (formerly Karond), a feudatory state of India, which was transferred from the Central Provinces to the Orissa division of Bengal in 1905. A range of the Eastern Ghats runs from N.E. to S.W. through the state, with open undulating country to the north. Area 3745 sq. m.; pop. (1901), 350,529; estimated revenue, £8000; tribute, £800. The inhabitants mostly belong to the aboriginal race of Khonds. A murderous outbreak against Hindu settlers called for armed intervention in 1882. The chief, Raghu Kishor Deo, was murdered by a servant in 1897, and during the minority of his son, Brij Mohan Deo, the state was placed in charge of a British political agent. The capital is Bhawani Patna.

KALAHARI DESERT, a region of South Africa, lying mainly between 20 and 28 S. and 19 and 24 E., and covering fully 120,000 sq. m. The greater part of this territory forms the western portion of the (British) Bechuanaland protectorate, but it extends south into that part of Bechuanaland annexed to the Cape and west into German South- West

Africa. The Orange river marks it's southern limit ; westward it reaches to the foot of the Nama and Damara hills, eastward to the cultivable parts of Bechuanaland, northward and north-westward to the valley of the Okavango and the bed of Lake Ngami. The Kalahari, part of the immense inner table-land of South Africa, has an average elevation of over 3000 ft. with a general slope from east to west and a dip northward to Ngami. Described by Robert Moffat as " the southern Sahara," the Kalahari resembles the great desert of North Africa in being generally arid and in being scored by the beds of dried-up rivers. It presents however many points of difference from the Sahara. The surface soil is mainly red sand, but in places limestone overlies shale and conglomerates. The ground is undulating and its appearance is comparable with that of the ocean at times of heavy swell. The crests of the waves are represented by sand dunes, rising from 30 to 100 ft. ; the troughs between the dunes vary greatly in breadth. On the eastern border long tongues of sand project into the veld, while the veld in places penetrates far into the desert. There are also, and especially along the river beds, extensive mud flats. After heavy rain these become pans or lakes, and water is then also found in mud-bottomed pools along the beds of the rivers. The water in the pans is often brackish, and in some cases thickly encrusted with salt. Pans also occur in crater-like depressions where rock rises above the desert sands. A tough, sun-bleached grass, growing knee-high in tufts at intervals of about 15 in., covers the dunes and gives the general colour of the landscape. Considerable parts of the Kalahari, chiefly in the west and north, are however covered with dense scrub and there are occasional patches of forest. Next to the lack of water the chief characteristics of the desert are the tuberous and herbaceous plants and the large numbers of big game found in it. Of the plants the most remarkable is the water-melon, of which both the bitter and sweet variety are found, and which supplies both man and beast with water. The game includes the lion, leopard, hippopotamus, rhinoceros, buffalo, zebra, quagga, many kinds of antelope (among them the kudu and gnu), baboon and ostrich. The elephant, giraffe and eland are also found. The hunting of these three last-named animals is prohibited, and for all game there is a close time from the beginning of September to the end of February.

The climate is hot, dry and healthy, save in the neighbourhood of the large marshes in the north, where malarial fever is preva- lent. In this region the drainage is N.E. to the great Makarikari marsh and the Botletle, the river connecting the marsh with the Ngami system. In the south the drainage is towards the Orange. The Molopo and the Kuruman, which in their upper course in

eastern Bechuanaland are perennial streams, lose their water by evaporation and percolation on their way westward through the Kalahari. The Molopo, a very imposing river on the map, is dry in its lower stretches. The annual rainfall does not exceed 10 in. It occurs in the summer months, September to March, and chiefly in thunderstorms. The country is suffering from progressive desiccation, but there is good evidence of an abundant supply of water not far beneath the surface. In the water-melon season a few white farmers living on the edge of the desert send their herds thither to graze. Such few spots as have been under cultivation by artificial irrigation yield excellent returns to the farmer; but the chief commercial products of the desert are the skins of animals.

The Kalahari is the home of wandering Bushmen (£.fl.), who live entirely by the chase, killing their prey with poisoned arrows, of Ba-Kalahari, and along the western border of Hottentots, who are both hunters and cattle-rearers. The Ba-Kalahari (men of the Kalahari), who constitute the majority of the inhabitants, appear to belong to the Batau tribe of the Bechuanas, now no longer having separate tribal existence, and traditionally reported to be the oldest of the Bechuana tribes. Their features are markedly negroid, though their skin is less. black than that of many negro peoples. They have thin legs and arms. The Ba-Kalahari are said to have possessed enormous herds of large horned cattle until deprived of them and driven into the desert by a fresh migration of more powerful Bechuana tribes. Unlike the Bushmen, and in spite of desert life, the Ba-Kalahari have a true passion for agriculture and cattle-breeding. They carefully cultivate their gardens, though in many cases all they can grow is a scanty supply of melons and pumpkins, and they rear small herds of goats. They are also clever hunters, and from the neighbouring Bechuana chiefs obtain spears, knives, tobacco and dogs in exchange for the skins of the animals they kill. In disposition they are peaceful to timidity, grave and almost morose. Livingstone states that he never saw Ba-Kalahari children at play. An ingenious method is employed to obtain water where there is no open well or running stream. To one end of a reed about 2 ft. long a bunch of grass is tied, and this end of the reed is inserted in a hole dug at a spot where water is known to exist under- ground, the wet sand being rammed jdown firmly round it. An ostrich egg-shell, the usual water vessel, is placed on the ground alongside the reed. The water-drawer, generally a p woman, then sucks up the water through the reed, dexterously squirting it into the adjacent egg-shell. To aid her aim she places between her lips a straw, the other end of which is inserted in the shell. The shells, when filled, are buried, the object of the Ba-Kalahari being to preserve their supplies from any sudden raid by Bushmen or other foe. Early travellers stated that no amount of bullying or hunting in a Ba- Kalahari village would result in a

find of water; but that on friendly relations being established the natives would bring a supply, however arid the district. The British government has since sunk wells in one or two districts. Though the Ba Kalahari have no religion in the strict sense of the word, they show traces of totemism, and as Batau, i.e. " men of the lion," revere rather than fear that beast.

The Kalahari was first crossed to Lake Ngami by David Living- stone, accompanied by William C. Oswell, in 1849. In 1878-1879 a party of Boers, with about three hundred wagons, trekked from the Transvaal across the Kalahari to Ngami and thence to the hinterland of Angola. Many of the party, men, women and children, perished of thirst during the journey. Survivors stated that in all some 250 people and 9000 cattle died.

See Bechuanaland. Die Kalahari, by Dr Siegfried Passarge (Berlin, 1904), is a valuable treatise on the geology, topography, hydrography, climate and flora of the desert, with maps and biblio- graphy. The author spent two years (1896-1898) in the Kalahari. See also Missionary Travels and Researches in South Africa, &c, by David Livingstone (London, 1857).

KALAMATA (officially KaXa/wu, from an ancient town near the site) , chief town of the modern Greek nomarchy of Messenia in the Morea, situated on the left bank of the Nedon, about 1 m. from the sea. Pop. (1907), 13,123. There is a suburb on the right bank of the stream. On a hill behind the town are the ruins of a medieval castle, but no ancient Greek remains have been discovered, although some travellers have identified the site with that of the classical Pharae or Pherae. It is the seat of a court of justice and of an archbishop. During the middle ages it was for a time a fief of the Villehardouins. In 1685 Kalamata was captured by the Venetians; in 1770, and again in 182 1, it was the revolutionary headquarters in the Morea. In 1825 it was sacked by Ibrahim Pasha. Kalamata is situated in a very fruitful district, of which it is the emporium. The harbour, though recently improved, offers little shelter to shipping.

Vessels load and discharge by means of lighters, the outer harbour having a depth at entrance of 24 ft. and inside of 14 ft. The inner harbour has a depth of 15 ft. and is sheltered by a breakwater 1640 ft. in length; in the winter months the fishing craft take shelter in the haven of Armyro. The silk industry, formerly important, still employs about 300 women and girls in four spinning establishments. Olive oil and silk are the chief exports.

KALAMAZOO, a city and the county-seat of Kalamazoo county, Michigan, U.S.A., on the W. bank of the Kalamazoo River, about 49 m. S. of Grand Rapids and 144 m. W. of Detroit. Pop. (1900) 24,404, of whom 4710 were foreign-born; (1910 census) 39,437. It is served by the Michigan Central, the Lake Shore & Michigan Southern, the Grand Rapids &

Indiana, the Kalamazoo, Lake Shore & Chicago, and the Chicago, Kalamazoo & Saginaw railways, and by interurban electric lines. The city has a public library, and is the seat of Kalamazoo college (Baptist), which grew out of the Kalamazoo literary institute (1833) and was chartered under its present name in 1855; the Michigan female seminary (Presbyterian), established in 1866; the Western State normal school (1904); Nazareth Academy (1897), for girls; Barbour Hall (1899), a school for boys; two private schools for the feeble-minded; and the Michigan asylum for the insane, opened in 1859. The surrounding country is famous for its celery, and the city is an important manufacturing centre, ranking third among the cities of the state in the value of its factory products in 1904. The value of the factory pro- duct in 1904 was $13,141,767, an increase of 82-9% since 1900. The waterworks and electric-lighting plant are owned and operated by the municipality. Kalamazoo was settled in 1829, was known as Bronson (in honour of Titus Bronson, an early settler) until 1836, was incorporated as the village of Kalamazoo in 1838, and in 1884 became a city under a charter granted in the preceding year.

KALAPUYA, or Caixapooya, a tribe and stock of North- American Indians, whose former range was the valley of the Willamette River, Oregon. They now number little more than a hundred, on a reservation on Grande Ronde reservation, Oregon.

KALAT, the capital of Baluchistan, situated in 29 2′ N. and 66° .35′ E., about 6780 ft. above sea-level, 88 m. from Quetta. The town gives its name also to a native state with an area, in- cluding Makran and Kharan, of 71,593 m. and a population (1901) of 470,336. The word Kalat is derived from kala — a fortress; and Kalat is the most picturesque fortress in the Baluch high- lands. It crowns a low hill, round the base of which clusters the closely built mass of flat-roofed mud houses which form the insignificant town. A miri or citadel, having an imposing ap- pearance, dominates the town, and contains within its walls the palace of the khan. It was in an upper room of this residence that Mehrab Klian, ruler of Baluchistan, was killed during the storming of the town and citadel by the British troops at the close of the first Afghan War in 1839. In 1901 it had a popu- lation of only 2000. The valleys immediately surrounding the fortress are well cultivated and thickly inhabited, in spite of their elevation and the extremes of temperature to which they are exposed. Recent surveys of Baluchistan have determined the position of Hozdar or Khozdar (27 48′ N., 66° 38′ E.) to be about 50 m. S. of Kalat. Khozdar was the former capital of Baluchistan, and is as directly connected with the southern branches of the Mulla Pass as Kalat is with the northern, the Mulla being the ancient trade route to Gandava (Kandabe) and Sind. In spite of the rugged and barren nature of the mountain districts of the Kalat highlands,

the main routes through them (concentrating on Khozdar rather than on Kalat) are compara- tively easy. The old " Pathan vat," the trade highway between Kalat and Karachi by the Hab valley, passes through Khozdar. From Khozdar another route strikes a little west of south to Wad, and then passes easily into Las Bela. This is the " Kohan vat." A third route runs to Nal, and leads to the head of the Kolwa valley (meeting with no great physical obstruction), and then strikes into the open high road to Persia. Some of the

valleys about Kalat (Mastang, for instance) are wide and fertile, full of thriving villages and strikingly picturesque; and in spite of the great preponderance of mountain wilderness (a wilderness which is, however, in many parts well adapted for the pasturage of sheep) existing in the Sarawan lowlands almost equally with the Jala wan highlands, it is not difficult to understand the import- ance which the province of Kalat, anciently called Turan (or Tubaran) , maintained in the eyes of medieval Arab geographers (see Baluchistan) . New light has been thrown on the history of Kalat by the translation of an unpublished manuscript obtained at Tatta by Mr Tate, of the Indian Survey Department, who has added thereto notes from the Tufhat-ul-Kiram, for the use of which he was indebted to Khan Sahib Rasul Baksh, mukhtiardar of Tatta. According to these authorities, the family of the khans of Kalat is of Arabic origin, and not, as is usually stated, of Brahuic extraction. They belong to the Ahmadzai branch of the Mirwari clan, which originally emigrated from Oman to the Kolwa valley of Mekran. The khan of Kalat, Mir Mahmud Khan, who succeeded his father in 1893, is the leading chieftain in the Baluch Confederacy. The revenue of the khan is estimated at nearly £60,000, including subsidies from the British government; and an accrued surplus of £240,000 has been invested in Indian securities.

See G. P. Tate, Kalat (Calcutta, 1896); Baluchistan District Gazetteer, vol. vi. (Bombay, 1907). (T. H. H.)*

KALAT-I-GHILZAI, a fort in Afghanistan. It is situated on an isolated rocky eminence 5543 ft. above sea-level and 200 ft. above the plain, on the right bank of the river Tarnak, on the road between Kabul and Kandahar, 87 m. from Kandahar and 229 m. from Kabul. It is celebrated for its gallant defence by Captain Craigie and a sepoy garrison against the Afghans in the first Afghan War of 1842. In memory of this feat of arms, the 1 2th Pioneers still bear the name of "The Kalat-i-Ghilzai Regiment," and carry a special colour with the motto "Invicta."

KALB, JOHANN (" Baron de Kalb ") (1721-1780), German soldier in the American War of Independence, was born in Hiittendorf , near Bayreuth, on the 29th of June 1 7 2 1 . He was of peasant parentage, and left home when he was sixteen to become a butler; in 1743 he was a lieutenant in a German regiment in the French service, calling himself at this time Jean de Kalb. He served with the French in the War of the Austrian Succes- sion, becoming captain in 1747 and major in 1756; in the Seven Years' War he was in the corps of the comte de Broglie, render- ing great assistance to the French after Rossbach (November 1757) and showing great bravery at Bergen (April 1759); and in 1 763 he resigned his commission. As secret agent, appointed by Choiseul, he visited America in 1 768-1 769 to inquire into the feel- ing of the colonists toward Great Britain. From his retirement at Milon la Chapelle, Kalb went to Metz for garrison duty under de Broglie in 1775. Soon afterwards he received permission to volunteer in the army of the American colonies, in which the rank of major-general was promised to him by Silas Deane. After many delays he sailed with eleven other officers on the ship fitted out by Lafayette and arrived at Philadelphia in July 1777. His commission from Deane was disallowed, but the Continental Congress granted him the rank of major-general (dating from the 15th of September 1777), and in October he joined the army, where his growing admiration for Washington soon led him to view with disfavour de Broglie's scheme for putting a European officer in chief command. Early in 1778, as second in command to Lafayette for the proposed expedition against Canada, he accompanied Lafayette to Albany; but no adequate preparations had been made, and the expedition was abandoned. In April 1 780, he was sent from Morristown, New Jersey, with his division of Maryland men, his Delaware regiment and the 1st artillery, to relieve Charleston, but on arriving at Petersburg, Virginia, he learned that Charleston had already fallen. In his camp at Buffalo Ford and Deep River, General Horatio Gates joined him on the 2 5th of July ; and next day Gates led the army by the short and desolate road directly towards Camden. On the nth-i3th of August, when Kalb advised an immediate attack on Rawdon, Gates hesitated and then marched to a position on the Salisbury-

Charlotte road which he had previously refused to take. On the 14th Cornwallis had occupied Camden, and a battle took place there on the 16th when, the other American troops having broken and fled, Kalb, unhorsed and fighting fiercely at the head of his right wing, was wounded eleven times. He was taken prisoner and died on the 19th of August 1780 in Camden. Here in 1825 Lafayette laid the corner-stone of a monument to him. In 1887 a statue of him by Ephraim Keyser was dedicated in Annapolis, Maryland.

See Friedrich Kapp, Leben des amerikanischen Generals Johann Kalb

(Stuttgart, 1862; English version, privately printed, New York, 1870), which is summarized in George W. Greene's The German Element in the War of American Independence (New York,

1876).

KALCKREUTH (or Kalkretjth), FRIEDRICH ADOLF,

Count von (1 737-1818), Prussian soldier, entered the regiment of Gardes du Corps in 1752, and in 1758 was adjutant or aide de camp to Frederick the Great's brother, Prince Henry, with whom he served throughout the later stages of the Seven Years' War. He won special distinction at the battle of Freiberg (Sept. 29, 1762), for which Frederick promoted him major. Personal differences with Prince Henry severed their connexion in 1766, and for many years Kalckreuth lived in comparative retirement. But he made the campaign of the War of the Bavarian Succession as a colonel, and on the accession of Frederick William II. was restored to favour. He greatly distinguished himself as a major- general in the invasion of Holland in 1787, and by 1792 had be- come count and lieutenant-general. Under Brunswick he took a conspicuous part in the campaign of Valmy in 1792, the siege and capture of Mainz in 1793, and the battle of Kaiserslautern in 1794. In the campaigns against Napoleon in 1806 he played a marked part for good or evil, both at Auerstadt and in the miser- able retreat of the beaten Prussians. In 1 807 he defended Danzig for 78 days against the French under Marshal Lefebvre, with far greater skill and energy than he had shown in the previous year. He was promoted field marshal soon afterwards, and conducted many of the negotiations at Tilsit. He died as governor of Berlin in i8r8.

The Dictees du Feldmarichal Kalckreuth were published by his son (Paris, 1844).

KALCKREUTH, LEOPOLD, Count von (1855-), German painter, a direct descendant of the famous field-marshal (see above), was born at Diisseldorf, received his first training at Weimar from his father, the landscape painter Count Stanislaus von Kalckreuth (1820-1894), and subsequently studied at the academies of Weimar and Munich. Although he painted some portraits remarkable for their power of expression, he devoted himself principally to depicting with relentless realism the monotonous life of the fishing folk on the sea-coast, and of the peasants in the fields. His palette is joyless, and almost melan- choly, and in his technique he is strongly influenced by the im- pressionists. He was one of the founders of the secessionist movement. From 1885 to 1890 Count von Kalckreuth was professor at the Weimar art school. In 1890 he resigned his pro- fessorship and retired to his estate of Hbckricht in Silesia, where he

occupied himself in painting subjects drawn" from the life of the country-folk. In 1895 he became a professor at the art school at Karlsruhe. The Munich Pinakothek has his " Rain- bow " and the Dresden Gallery his " Old Age." Among his chief works are the " Funeral at Dachau," " Homewards," " Wedding Procession in the Carpathian Mountains." " The Gleaners," "Old Age," "Before the Fish Auction," "Summer," and " Going to School."

See A. Ph. W. v. Kalckreuth, Gesch. der Herren, Freiherren und Grafen von Kalckreuth (Potsdam, 1904).

KALEIDOSCOPE (from Gr. KaXos, beautiful, eiSos, form, and aKovtiv, to view). The article Reflection explains the sym- metrical arrangement of images formed by two mirrors inclined at an angle which is a sub-multiple of four right angles. This is the principle of the kaleidoscope, an optical toy which received its present form at the hands of Sir David Brewster about the

year 181 5, and which at once became exceedingly popular owing to the beauty and variety of the images and the sudden and unexpected changes from one graceful form to another. A hundred years earlier R. Bradley had employed a similar arrange- ment which seems to have passed into oblivion (New Improvements of Planting and Gardening, 17 10). The instrument has been extensively used by designers. In its simplest form it consists of a tube about twelve inches long containing two glass plates, extending along its whole length and inclined at an angle of 6o°. The eye-end of the tube is closed by a metal plate having a small hole at its centre near the intersection of the glass plates. The other end is closed by a plate of muffed glass at the distance of distinct vision, and parallel to this is fixed a plate of clear glass. In the intervening space (the object-box) are contained a number of fragments of brilliantly coloured glass, and as the tube is turned round its axis these fragments alter their positions and give rise to the various patterns. A third reflecting plate is sometimes employed, the cross-section of the three forming an equilateral triangle. Sir David Brewster modified his apparatus by moving the object-box and closing the end of the tube by a lens of short focus which forms images of distant objects at the distance of distinct vision. These images take the place of the coloured fragments of glass, and they are symmetrically multi- plied by the mirrors. In the polyangular kaleidoscope the angle between the mirrors can be altered at pleasure. Such instruments are occasionally found in old collections of philosophical appara- tus and they have been used in order to

explain to students the formation of multiple images. (C. J. J.)

KALERGIS, DIMITRI (Demetrios) (1803-1867), Greek statesman, was a Cretan by birth, studied medicine at Paris and on the outbreak of the War of Greek Independence went to the Morea and joined the insurgents. He fought under Karaiskakis, was taken prisoner by the Turks before Athens and mulcted of an ear; later he acted as aide de camp to the French philhellene Colonel Fabvier and to Count Capo d'Istria, president of Greece. In 1832 he was promoted lieutenant-colonel. In 1843, as com- mander of a cavalry division, he was the prime mover in the insurrection which forced King Otto to dismiss his Bavarian ministers. He was appointed military commandant of Athens and aide de camp to the king, but after the fall of the Mavro- cordato ministry in 1845 was forced to go into exile, and spent several years in London, where he became an intimate of Prince Louis Napoleon. In 1848 he made an abortive descent on the Greek coast, in the hope of revolutionizing the kingdom. He was captured, but soon released and, after a stay in the island of Zante, went to Paris (1853). At the instance of the Western Powers he was recalled on the outbreak of the Crimean War and appointed minister of war in the reconstituted Mavrocordato cabinet (1854). He was, however, disliked by King Otto and his consort, and in October 1855 was forced to resign. In 1861 he was appointed minister plenipotentiary in Paris, in which capacity he took an important part in the negotiations which followed the fall of the Bavarian dynasty and led to the accession of Prince George of Denmark to the Greek throne.

KALEWALA, or Kalevala, the name of the Finnish national epos. It takes, its name from the three sons of Kalewa (or Finland), viz. the ancient Wainamoinen, the inventor of the sacred harp Kantele; the cunning art-smith, Ilmarinen; and the gallant Lemminkainen, who is a sort of Arctic Don Juan. The adventures of these three heroes are wound about a plot for securing in marriage the hand of the daughter of Louhi, a hero from Pohjola, a land of the cold north. Ilmarinen is set to construct a magic mill, the Sanpo, which grinds out meal, salt and gold, and as this has fallen into the hands of the folk of Pohjola, it is needful to recover it. The poem actually opens, however, with a very poetical theory of the origin of the world. The virgin daughter of the atmosphere, Luonnotar, wanders for seven hundred years in space, until she bethinks her to invoke Ukko, the northern Zeus, who sends his eagle to her; this bird makes its nest on the knees of Luonnotar and lays in it seven eggs. Oat of the substance of these eggs the visible world is made. But it is empty and sterile until Wainamoinen descends

upon it and woos the exquisite Aino. She disappears into space, and it is to recover from his loss and to find another bride that Wainamoinen makes

his series of epical adventures in the dismal country of Pohjola. Various episodes of great strangeness and beauty accompany the lengthy recital of the struggle to acquire the magical Sanpo, which gives prosperity to whoever possesses it. In the midst of a battle the Sanpo is broken and falls into the sea, but one fragment floats on the waves, and, being stranded on the shores of Finland, secures eternal felicity for that country. At the very close of the poem a virgin, Mariatta, brings forth a king who drives Wainamoinen out of the country, and this is understood to refer to the ultimate conquest of Paganism by Christianity.

The Kalewala was probably composed at various times and by various bards, but always in sympathy with the latent traditions of the Finnish race, and with a mixture of symbolism and realism exactly accordant with the instincts of that race. While in the other antique epics of the world bloodshed takes a predominant place, the Kalewala is characteristically gentle, lyrical and even domestic, dwelling at great length on situations of moral beauty and romantic pathos. It is entirely concerned with the folk-lore and the traditions of the primeval Finnish race. The poem is written in eight-syllabled trochaic verse, and an idea of its style may be obtained from Longfellow's Hiawatha, which is a pretty true imitation of the Finnish epic.

Until the 19th century the Kalewala existed only in fragments in the memories and on the lips of the peasants. A collection of a few of these scattered songs was published in 1822 by Dr Zacharius Topelius, but it was not until 1835 that anything like a complete and systematically arranged collection was given to the world by Dr Elias Lonnrot. For years Dr Lonnrot wandered from place to place in the most remote districts, living with the peasantry, and taking down from their lips all that they knew of their popular songs. Some of the most valuable were discovered in the governments of Archangel and Olonetz. After unwearied diligence Lonnrot was successful in collecting 12,000 lines. These he arranged as methodically as he could into thirty-two runes or cantos, which he published exactly as he heard them sung or chanted. Continuing his re- searches, Dr LSnnrot published in 1849 a new edition of 22,793 verses in fifty runes. A still more complete text was published by A. V. Forsman in 1887. The importance of this indigenous epic was at once recognized in Europe, and translations were made into Swedish, German and French. Several translations into English exist, the fullest being that by J. M. Crawford in 1888. The best foreign editions are those of Castren in Swedish (1844), Leouzon le Due in French (1845 and 1868), Schiefner in German (1852). (E. G.)

KALGAN (Chang-Chia K'ow), a city of China, in the pro- vince of Chih-li, with a population estimated at from 70,000 to 100,000. It lies in the line of the Great Wall, 122 m. by rail N.W. of Peking, commanding an

important pass between China and Mongolia. Its position is stated as in 40 50′ N. and 1 14° 54′ E., and its height above the sea as 2810 ft. The valley amid the mountains in which it is situated is under excellent cultivation, and thickly studded with villages. Kalgan consists of a walled town or fortress and suburbs 3 m. long. The streets are wide, and excellent shops are abundant; but the ordinary houses have an unusual appearance, from the fact that they are mostly roofed with earth and become covered with green-sward. Large quantities of soda are manufactured; and the town is the seat of a very extensive transit trade. In October 1909 it was connected by railway with Peking. In early autumn long lines of camels come in from all quarters for the conveyance of the tea- chests from Kalgan to Kiakhta; and each caravan usually makes three journeys in the winter. Some Russian merchants have permanent residences and warehouses just outside the gate. On the way to Peking the road passes over a beautiful bridge of seven arches, ornamented with marble figures of animals. The name Kalgan is Mongolian, and means a barrier or " gate-beam."

KALGOORLIE, a mining town of Western Australia, 24 m. byrailE.N.E. of Coolgardie. Pop. (1901), 6652. It is a thriving town with an electric tramway service, and is the junction of four lines of railway. The gold-field, discovered in 1893, is very rich, supporting about 15,000 miners. The town is supplied with water, like Coolgardie, from a source near Perth 360 m, distant.

KALI (black), or Kali Ma (the Black Mother), in Hindu mythology, the goddess of destruction and death, the wife of Siva. According to one theory, Calcutta owes its name to her, being originally Kalighat, " Kali's landing-place." Siva's consort has many names {e.g. Durga, Bhawani, Parvati, &c). Her idol is black, with four arms, and red palms to the hands. Her eyes are red, and her face and breasts are besmeared with blood. Her hair is matted, and she has projecting fang-like teeth, between which protrudes a tongue dripping with blood. She wears a necklace of skulls, her earrings are dead bodies, and she is girded with serpents. She stands on the body of Siva, to account for which attitude there is an elaborate legend. She is more worshipped in Gondwana and the forest tracts to the east and south of it than in any other part of India. Formerly human sacrifice was the essential of her ritual. The victim, always a male, was taken to her temple after sunset and im- prisoned there. When morning came he was dead: the priests told the people that Kali had sucked his blood in the night. At Dante wara in Bastar there is a famous shrine of Kali under the name of Danteswari. Here many a human head has been

presented on her altar. About 1830 it is said that upwards of twenty-five full-grown men were immolated at once by the raja. Cutting their flesh and burning portions of their body were among the acts of devotion of her worshippers. Kali is goddess of small-pox and cholera. The Thugs murdered their victims in her honour, and to her the sacred pickaxe, wherewith their graves were dug, was consecrated.

The Hook-swinging Festival (Churruk or Churuck Puja), one of the most notable celebrations in honour of the goddess Kali, has now been prohibited in British territory. Those who had vowed themselves to self-torture submitted to be swung in the air supported only by hooks passed through the muscles over the blade-bones. These hooks were hung from a long crossbeam, which see-sawed upon a huge upright pole. Hoisted into the air by men pulling down the other end of the see-saw beam, the victim was then whirled round in a circle. The torture usually lasted fifteen or twenty minutes. See A. A. Macdonell, Vedic Mythology (Strassburg, 1897).

KALIDASA, the most illustrious name among the writers of the second epoch of Sanskrit literature, which, as contrasted with the age of the Vedic hymns, may be characterized as the period of artificial poetry. Owing to the absence of the historical sense in the Hindu race, it is impossible to fix with chronological exactness the lifetime of either Kalidasa or any other Sanskrit author. Native tradition places him in the 1st century B.C.; but the evidence on which this belief rests is worthless. The works of the poet contain no allusions by which their date can be directly determined; yet the extremely corrupt form of the Prakrit or popular dialects spoken by the women and the sub- ordinate characters in his plays, as compared with the Prakrit in inscriptions of ascertained age, led such authorities as Weber and Lassen to agree in fixing on the 3rd century a.d. as the approximate period to which the writings of Kalidasa should be referred.

He was one of the ” nine gems ” at the court of King Vikra- maditya or Vikrama, at Ujjain, and the tendency is now to regard the latter as having flourished about ad. 375; others, however, place him as late as the 6th century. The richness of his creative fancy, his delicacy of sentiment, and his keen appre- ciation of the beauties of nature, combined with remarkable powers of description, place Kalidasa in the first rank of Oriental poets. The effect, however, of his productions as a whole is greatly marred by extreme artificiajity of diction, which, though to a less extent than in other Hindu poets, not unfrequently takes the form of puerile conceits and plays on words. In this respect his writings contrast very unfavourably with the more genuine poetry of the Vedas. Though a true poet, he is wanting in that artistic sense of proportion so characteristic of the Greek mind, which exactly adjusts the parts to the whole, and combines form and matter into an inseparable poetic unity. Kalidasa’s fame rests chiefly on his dramas,

but he is also distinguished as an epic and a lyric poet.

He wrote three plays, the plots of which all bear a general resem- blance, inasmuch as they consist of love intrigues, which, after numerous and seemingly insurmountable impediments of a similar nature, are ultimately brought to a successful conclusion.

Of these, Sakuntala is that which has always justly enjoyed the greatest fame and popularity. The unqualified praise bestowed upon it by Goethe sufficiently guarantees its poetic merit. There are two recensions of the text in India, the Bengali and the Devana- garl, the latter being generally considered older and purer. Sakun- tala was first translated into English by Sir William Jones (Calcutta, 1789), who used the Bengali recension. It was soon after translated into German by G. Forster (1791 ; new ed. Leipzig, 1879). An edition of the Sanskrit original, with French translation, was pub- lished by A. L. Chezy at Paris in 1830. This formed the basis of a translation by B. Hirzel (Zurich, 1830) ; later trans, by L. Fritze (Chemnitz, 187&). Other editions of the Bengali recension were published by Prema Chandra (Calcutta, i860) for the use of European students and by R. Pischel (2nd ed., Kiel, 1886). The Devanagarl recension was first edited by O. Bohtlingk (Bonn, 1842), with a German translation. On this were based the successive German translations of E. Meier (Tubingen, 1851) and E. Lobedanz (8th ed., Leipzig, 1892). The same recension has been edited by Dr C. Burkhard with a Sanskrit-Latin vocabulary and short Prakrit gram- mar (Breslau, 1872), and by Professor Monier Williams (Oxford, 2nd ed. 1876), who also translated the drama (5th ed., 1887). There is another translation by P. N. Patankar (Poona, 1888-). There are also a South Indian and a Cashmir recension.

The Vikramorvasi, or Urvasi won by Valour, abounds with fine lyrical passages, and is of all Indian dramas second only to Sakuntala in poetic beauty. It was edited by R. Lenz (Berlin, 1833) and trans- lated into German by C. G. A. Hofer (Berlin, 1837), by B. Hirzel (1838), by E. Lobedanz (Leipzig, 1861) andF.Bollensen (Petersburg, 1845). There is also an English edition by Monier Williams, a metrical and prose version by Professor H. H. Wilson, and a literal prose translation by Professor E. B. Cowell (1851). The latest editions are by S. P. Pandit (Bombay, 1879) and K. B. Paranjpe (ibid. 1898).

The third play, entitled Malavikagnimitra, has considerable poetical and dramatic merit, but is confessedly inferior to the other two. It possesses the advantage, however, that its hero Agnimitra and its heroine Malavika are more ordinary and human characters than those of the other plays. It is edited by O. F. Tullberg (Bonn, 1840), by Shankar P. Pandit, with English notes (1869), and S. S. Ayyar (Poona, 1896); translated into German by

A. Weber (1856), and into English by C. H. Tawney (2nd ed., Calcutta, 1898). Two epic poems are also attributed to Kalidasa. The longer of these is entitled Raghuvamsa, the subject of which is the same as that of the Ramayana, viz. the history of Rama, but beginning with a long account of his ancestors, the ancient rulers of Ayodhya (ed. by A. F. Stenzler, London. 1832; and with Eng. trans, and notes by Gopal Raghunath Nandargikar, Poona, 1897; verse trans, by P. de Lacy Johnstone, 1902). The other epic is the Kumarasam- bhava, the theme of which is the birth of Kumara, otherwise called Karttikeya or Skanda, god of war (ed. by Stenzler, London, 1838; K. M. Banerjea, 3rd ed. Calcutta, 1872 ; Parvanikara and Parab, Bombay, 1893; and M. R. Kale and S. R. Dharadhara, ibid. 1907; Eng. trans, by R. T. Griffith, 1879). Though containing many fine passages, it is tame as a whole.

His lyrical poems are the Meghaduta and the Ritusamkara. The Meghaduta, or the Cloud-Messenger, describes the complaint of an exiled lover, and the message he sends to his wife by a cloud. It is full of deep feeling, and abounds with fine descriptions of the beauties of nature. It was edited with free English translation by H. H. Wilson (Calcutta, 1813), and by J. Gildemeister (Bonn, 1841) ; a German adaptation by M. Müller appeared at Konigsberg (1847), and one by C. Schiitz at Bielefeld (1859). It was edited by F. Johnson, with vocabulary and Wilson's metrical translation (London, 1867); later editions by K. P. Parab (Bombay, 1891) and K. B. Pathak (Poona, 1894). The Ritusamkara, or Collection of the Seasons, is a short poem, of less importance, on the six seasons of the year. There is an edition by P. von Bohlen, with prose Latin and metrical German translation (Leipzig, 1840) ; Eng. trans, by C. S. Sitaram Ayyar (Bombay, 1897).

Another poem, entitled the Nalodaya, or Rise of Nala, edited by F. Benary (Berlin, 1830), W. Yates (Calcutta, 1844) and Vidyasagara (Calcutta, 1873), is a treatment of the story of Nala and Damayanti, but describes especially the restoration of Nala to prosperity and power. It has been ascribed to the celebrated Kalidasa, but was probably written by another poet of the same name. It is full of most absurd verbal conceits and metrical extravagances.

So many poems, partly of a very different stamp, are attributed to KalidSsa that it is scarcely possible to avoid the necessity of assuming the existence of more authors than one of that name. It is by no means improbable that there were three poets thus named ; indeed modern native astronomers are so convinced of the existence of a triad of authors of this name that they apply the term Kalidasa to designate the number three.

On Kalidasa generally, see A. A. Macdonell's History of Sanskrit Literature

(1900), and on his date G. Huth, Die Zeit des K. (Berlin, 1890). (A. A. M)

KALIMPONG, a village of British India, in the Darjeeling district of Bengal, 4000 ft." above sea-level; pop. (1001), 1069. It is a frontier market for the purchase of wool and mules from Tibet, and an important agricultural fair is held in November. In 1900 Kalimpong was chosen by the Church of Scotland as the site of cottage homes, known as St Andrew's Colonial Homes, for the education and training of poor European and Eurasian children.

KALINGA, or Calinga, one of the nine kingdoms of southern India in ancient times. Its exact limits varied, but included the eastern Madras coast from Pulicat to Chicacole, running inland from the Bay of Bengal to the Eastern Ghats. The name at one time had a wider and vaguer meaning, comprehending Orissa, and possibly extending to the Ganges valley. The Kalinga of Pliny certainly included Orissa, but latterly it seems to have been confined to the Telugu-speaking country; and in the time of Hsiian Tsang (630 a.d.) it was distinguished on the south and west from Andhra, and on the north from Odra or Orissa. Taranatha, the Tibetan historian, speaks of Kalinga as one division of the country of Telinga. Hsiian Tsang speaks of Kalinga (" Kie-ling-kia ") having its capital at what has been identified with the site either of Rajahmundry or Coringa. Both these towns, as well as Singapur, Calingapatam and Chica- cole, share the honour of having been the chief cities of Kalinga at different periods; but inscriptions recently deciphered seem to prove that the capital of the Ganga dynasty of Kalinga was at Mukhalingam in the Ganjam district.

KALINJAR, a town and hill fort of British India in the Banda district of the United Provinces. Pop. (1901), 3015. The fort stands on an isolated rock, the termination of the Vindhya range, at an elevation of 1203 ft., overlooking the plains of Bundelkhand. Kalinjar is the most characteristic specimen of the hill-fortresses, originally hill-shrines, of central India. Its antiquity is proved by its mention in the Mahabhdrata. It was besieged by Mahmud of Ghazni in 1023, and here the Afghan emperor Sher Shah met his death in 1545, and Kalinjar played a prominent part in history down to the time of the Mutiny in 1857, when it was held by a small British garrison. Both the fort and the town, which stands at the foot of the hill, are of interest to the antiquary on account of their remains of temples, sculptures, inscriptions and caves.

KALIR [QALIR], ELEAZER, Hebrew liturgical poet, whose hymns (piyyutim) are found in profusion in the festival prayers of the German synagogal rite. The age in which he lived is unknown. Some (basing the view on Saadiah's Sefer ha-galuy) place him as early as the 6tb century, others regard him as belonging to the 10th century. Kalir's style is powerful but involved; he may be described as a Hebrew Browning.

Some beautiful renderings of Kalir's poems may be found in the volumes of Davis & Adler's edition of the German Festival Prayers entitled Service of the Synagogue.

KALISCH, ISIDOR (1816-1886), Jewish divine, was born at Krotoschin in Prussia on the 15th of November 1816, and was educated at Berlin, Breslau and Prague. In 1848 he came to London, but passed on in 1849 to America, where he ministered as rabbi inCleveland, Cincinnati, Milwaukee, Detroit and Newark, New Jersey. At Newark from 1875 he gave himself entirely to literary work, and exercised a strong . influence as leader of the radical and reforming Jewish party.

Among his works are Wegweisen fur rationelle Forschungen in den biblischen Schriften (1853); and translations of Nathan der Weise (1869); Sepher Jezirah (1877); and Munz's History of Philosophy among the Jews (1881). He also wrote a good deal of German and Hebrew verse.

KALISCH, MARCUS (or Matjrice)(i828-i885), Jewish scholar, was born in Pomerania in 1828, and died in England 1885. He was one of the pioneers of the critical study of the Old Testament in England. At one time he was secretary to the Chief Rabbi; in 1853 he became tutor in the Rothschild family and enjoyed leisure to produce his commentaries and other works. The first instalment of his commentary on the Penta- twuch was Exodus (1855) ; this was followed by Genesis (1858) and

Leviticus in two parts (1867-1872). Kalisch wrote before the publication of Wellhausen's works, and anticipated him in some important points. Besides these works, Kalisch published in 1877-1878 two volumes of Bible studies (on Balaam and Jonah). He was also author of a once popular Hebrew grammar in two volumes (1862-1863). In 1880 he published Path and Goal, a brilliant discussion of human destiny. His commentaries are of permanent value, not only because of the author's originality, but also because of his erudition. No other works in English contain such full citations of earlier literature. (I. A.)

KALISPEL, or Pend d'Oreille, a tribe of North-American Indians of Salishan stock. They formerly ranged the country around Pend d'Oreille Lake, Washington. They number some 600, and are settled on a

reservation in Montana.

KALISZ, a government of Russian Poland, having Prussia on the W., and the governments of Warsaw and Piotrkow on the E. Its area is 4390 sq. m. Its surface is a lowland, sloping towards the west, and is drained by the Prosna and the Warta and their tributaries, and also by the Bzura. It was formerly covered with countless small lakes and thick forests; the latter are now mostly destroyed, but many lakes and marshes exist still. Pop. (1897), 844,358 of whom 427,978 were women, and 113,609 lived in towns; estimated pop. (1906), 983,200. They are chiefly Poles. Roman Catholics number 83%; Jews and Protestants each amount to 7%. Agriculture is carried to perfection on a number of estates, as also livestock breeding. The crops principally raised are rye, wheat, oats, barley and potatoes. Various domestic trades, including the weaving of linen and wool, are carried on in the villages. There are some factories, pro- ducing chiefly cloth and cottons. The government is divided into eight districts, the chief towns of which, with their popula- tions in 1897, are: Kalisz (21,680), Kolo (9400), Konin (8530), Leczyca (8863), Slupec (3758), Sieradz (7019), Turek (8141) and Wielun (7442).

KALISZ, the chief town of the above government, situated in 51° 46′ N. and 18 E., 147 m. by rail W.S.W. of Warsaw, on the banks of the Prosna, which there forms the boundary of Prussia. Pop. (1871), 18,088; (1897), 21,680, of whom 37% were Jews. It is one of the oldest and finest cities of Poland, is the seat of a Roman Catholic bishop, and possesses a castle, a teachers' insti- tute and a large public park. The industrial establishments comprise a brewery, and factories for ribbons, cloth and sugar, and tanneries.

Kalisz is identified with the Calisia of Ptolemy, and its antiquity is indicated by the abundance of coins and other objects of ancient art which have been discovered on the site, as well as by the numerous burial mounds existing in the vicinity. It was the scene of the decisive victory of Augustus the Strong of Poland over the Swedes on the 29th of October 1706, of several minor conflicts in 1813, and of the friendly meeting of the Russian and Prussian troops in 1835, in memory of which an iron obelisk was erected in the town by Nicholas I. in 1841. The treaty of 1813 between Russia and Prussia was signed here.

KALK, a town in the Prussian Rhine province, on the right bank of the Rhine, 2 m. E. of Cologne. Pop. (1905), 25,478. Kalk is an important junction of railway lines connecting Cologne with places on the right bank of the river. It has various iron and chemical industries, brickworks and breweries, and an electric tramway joins it with Cologne.

KALKAS, or Khalkas, a Mongoloid people mainly concen- trated in the northern steppes of Mongolia near their kinsmen, the Buriats. According to Sir H. Howorth they derive their name from the river Kalka, which runs into the Buir lake. Of all Mongolians they physically differ most from the true Mongol type (see Mongols). Their' colour is a brown rather than a yellow, and their eyes are open and not oblique. They have, however, the broad flat face, high cheekbones and lank black hair of their race. They number some 250,000, and their terri- tory is divided into the four khanates of Tushetu (Tushiyetu), Tsetien (Setzen), Sai'noi'm ("Sain Noyan) and Jesaktu (Jassaktu).

KALKBRENNER, FRIEDRICH WILHELM (1784-1849), German pianist and composer, son of Christian Kalkbrenner (1 755-1806), a Jewish musician of Cassel, was educated at the

Paris Conservatoire, and soon began to play in public. From 1814 to 1823 he was well known as a brilliant performer and a successful teacher in London, and then settled in Paris, dying at Enghien, near there, in 1849. He became a member of the Paris piano-manufacturing firm of Pleyel & Co., and made a fortune by his business and his art combined. His numerous compo- sitions are less remembered now than his instruction-book, with " studies," which have had considerable vogue among pianists.
KALLAY, BENJAMIN VON (1839-1903), Austro-Hungarian statesman, was born at Budapest on the 22nd of December 1839. His family derived their name from their estates at Nagy Kallo, in Szabolcs, and claimed descent from the Balogh Semjen tribe, which colonized the counties of Borsod, Szabolcs, and Szatmar, at the cldse of the 9th century, when the Magyars conquered Hungary. They played a prominent part in Hun- garian history as early as the reign of Koloman (1095-1114); and from King Matthias Corvinus (1458-1490) they received their estates at Mezo Tur, near Kecskemet, granted to Michael Kallay for his heroic defence of Jajce in Bosnia, and still held by his descendants. The father of Benjamin von Kallay, a superior official of the Hungarian Government, died in 1845, and his widow, who survived until 1903, devoted herself to the education of her son. At an early age Kallay manifested a deep interest in politics, and especially in the Eastern Question. He travelled in Russia, European Turkey and Asia Minor, gaining a thorough knowledge of Greek, Turkish and several Slavonic languages. He became as proficient in Servian as in his native tongue. In 1867 he entered the Hungarian Diet as Conservative deputy for Miihlbach (Szasy-Szebes) ; in 1869 he was appointed consul-general at Belgrade; and in 1872 he visited Bosnia for the first time. His

views on Balkan questions strongly influenced Count Andrassy, the Austro-Hungarian minister for foreign affairs. Leaving Belgrade in 1875, he resumed his seat in the Diet, and shortly afterwards founded the journal Kelet Nepe, or Eastern Folk, in which he defended the vigorous policy of Andrassy. After the Russo-Turkish War of 1878 he went to Philippopolis as Austro-Hungarian envoy extraordinary on the International Eastern Rumelian Commission. In 1879 he became second, and soon afterwards first, departmental chief at the foreign office in Vienna. On the 4th of June 1882 he was appointed Imperial minister of finance and administrator of Bosnia and Herzegovina, and the distinction with which he filled this office, for a period of 21 years, is his chief title of fame (see Bosnia and Herzegovina). Kallay was an honorary member of the Budapest and Vienna academies of science, and attained some eminence as a writer. He translated J. S. Mill's Liberty into Hungarian, adding an introductory critique; while his version of Galatea, a play by the Greek dramatist S. N. Basiliades (1843-1874), proved successful on the Hungarian stage. His monographs on Servian history (Geschichte der Serben) and on the Oriental ambition of Russia (Die Orientpolitik Russlands) were translated into German by J. H. Schwicker, and published at Leipzig in 1878. But, in his own opinion, his masterpiece was an academic oration on the political and geo- graphical position of Hungary as a link between East and West. In 1873 Kallay married the countess Vilma Bethlen, who bore him two daughters and a son. His popularity in Bosnia was partly due to the tact and personal charm of hjs wife. He died on the 13th of July 1903.

KALMAR (Calmar), a seaport of Sweden on the Baltic coast, chief town of the district (Ian) of Kalmar, 250 m. S. S. W. of Stockholm by rail. Pop. (1900), 12,715. It lies opposite the island of Oland, mainly on two small islands, but partly on the mainland, where there is a pleasant park. The streets are regular, and most of the houses are of wood. The principal public edifices, however, are constructed of limestone from Oland, including the cathedral, built by Nicodemus Tessin and his son Nicodemus in the second half of the 17th century. Kalmar, a town of great antiquity, was formerly strongly forti- fied, and there remains the island-fortress of Kalmarnahus, dating partly from the 12th century, but mainly from the 16th and 17th. It contains the beautiful chamber of King Eric XIV.

(d. 1 5 7 7) , an historical museum, and in the courtyard a fine ornate well-cover. This stronghold stood several sieges in the 14th, 15th and 1 6th centuries, and the town gives name to the treaty (Kalmar Union) by which Sweden, Norway and Denmark were united into one kingdom in 1397. Kalmar has an artificial harbour admitting vessels drawing 19 ft. There are a school of navigation, and tobacco and match factories, the produce of which, together with timber and oats, is exported. Ship- building is carried on.

KALMUCK, or Kalmyk Steppe, a territory or reservation belonging to the Kalmuck or Kalmyk Tatars, in the Russian government of Astrakhan, bounded by the Volga on the N.E., the Manych on the S.W., the Caspian Sea on the E., and the territory of the Don Cossacks on the N.W. Its area is 36,900 sq. m., to which has to be added a second reservation of 3045 sq. m. on the left bank of the lower Volga. According to I. V. Mushketov, the Kalmuck Steppe must be divided into two parts, western and eastern. The former, occupied by the Ergeni hills, is deeply trenched by ravines and rises 300 and occasionally 630 ft. above the sea. It is built up of Tertiary deposits, belonging to the Sarmatian division of the Miocene period and covered with loess and black earth, and its escarpments repre- sent the old shore-line of the Caspian. No Caspian deposits are found on or within the Ergeni hills. These hills exhibit the usual black earth flora, and they have a settled population. The eastern part of the steppe is a plain, lying for the most part 30 to 40 ft. below the level of the sea, and sloping gently towards the Volga. Post-Pliocene " Aral-Caspian deposits," containing the usual fossils (Hydrobia, Neritina, eight species of Cardium, two of Dreissena, three of Adacna and Lithoglyphus caspius), attain thicknesses varying from 105 ft. to 7 or 10 ft., and dis- appear in places. Lacustrine and fluviatile deposits occur intermingled with the above. Large areas of moving sands exist near Enotayevsk, where high dunes or barkhans have been formed. A narrow tract of land along the coast of the Caspian, known as cthe " hillocks of Baer," is covered with hillocks elongated from west to east, perpendicularly to the coast-line, the spaces between them being filled with water or overgrown with thickets of reed, Salix, Ultnus campestris, almond trees, &c. An archipelago of little islands is thus formed close to the shore by these mounds, which are backed on the N. and N.W. by strings of salt lakes, partly desiccated. Small streams originate in the Ergenis, but are lost as soon as they reach the lowlands, where water can only be obtained from wells. The scanty vegetation is a mixture of the flora of south-east Russia and that of the deserts of central Asia. The steppe has an estimated population of 130,000 persons, living in over 27,700 kibitkas, or felt tents. There are over 60 Buddhist monasteries. Part of the Kalmucks are settled (chiefly in the hilly parts), the remainder being nomads. They breed horses, cattle and sheep, but suffer heavy losses from murrain. Some attempts at agriculture and tree-planting are being made. The breeding of livestock, fishing, and some domestic trades, chiefly carried on by the women, are the principal sources of maintenance.

See 1. V. Mushketov, Geol. Researches in the Kalmyk Steppe in 1884-1885 (St Petersburg, 1894, ' n Russian); Kostenkov's works (1868-1870); and other works quoted in Semenov's Geogr. Diet. and Russ. Encycl. Diet. (P. A. K. ; J. T. Be.)

KALN6KY, GUSTAV SIEGMUND, Count (1832-1898), Austro-

Hungarian statesman, was born at Lettowitz, in Moravia, on the 29th of December 1832, of an old Transylvanian family which had held countly rank in Hungary from the 17th century. After spending some years in a hussar regiment, in 1854 he entered the diplomatic service without giving up his connexion with the army, in which he reached the rank of general in 1879. He was for the ten years i860 to 1870 secretary of embassy at London, and then, after serving at Rome and Copenhagen, was in 1880 appointed ambassador at St Petersburg. His success in Russia procured for him, on the death of Baron v. Haymerle in 1881, the appointment of minister of foreign affairs for Austria-Hungary, a post which he held for fourteen years. Essentially a diplomatist,

he took little or no part in the vexed internal affairs of the Dual Monarchy, and he came little before the public except at the annual statement on foreign affairs before the Delegations. His management of the affairs of his department was, however, very successful; he confirmed and maintained the alliance with Germany, which had been formed by his predecessors, and co- operated with Bismarck in the arrangements by which Italy joined the alliance. Kalnoky's special influence was seen in the improvement of Austrian relations with Russia, following on the meeting of the three emperors in September 1884 at Skier- nevice, at which he was present. His Russophile policy caused some adverse criticism in Hungary. His friendliness for Russia did not, however, prevent him from strengthening the position of Austria as against Russia in the Balkan Peninsula by the establishment of a closer political and commercial understanding with Servia and Rumania. In 1885 he interfered after the battle of Slivnitza to arrest the advance of the Bulgarians on Belgrade, but he lost influence in Servia after the abdication of King Milan. Though he kept aloof from the Clerical party, Kalnoky was a strong Catholic; and his sympathy for the difficulties of the Church caused adverse comment in Italy, when, in 1801, he stated in a speech before the Delegations that the question of the position of the pope was still unsettled. He subsequently explained that by this he did not refer to the Roman question, which was permanently settled, but to the possibility of the pope leaving Rome. The jealousy felt in Hungary against the Ultramontanes led to his fall. In 1895 a case of clerical interference in the internal affairs of Hungary by the nuncio Agliardi aroused a strong protest in the Hungarian parliament, and consequent differences between Banffy, the Hungarian minister, and the minister for foreign affairs led to Kaln6ky's resignation. He died on the 13th of February 1898 at Prodlitz in Moravia.

KALOCSA, a town of Hungary, in the county of Pest-Pilis- Solt-Kis-Kun, 88 m. S. of Budapest by rail. Pop. (1900), 11,372. It is situated in a marshy but highly productive dis- trict, near the left bank of the Danube, and was once of far greater importance than at present. Kalocsa is the see of one of the four Roman Catholic archbishops in Hungary. Amongst its buildings are a fine cathedral, the archiepiscopal palace, an astronomical observatory, a seminary for priests, and colleges for training of male and female teachers. The inhabitants of Kalocsa and its wide-spreading communal lands are chiefly employed in the cultivation of the vine, fruit, flax, hemp and cereals, in the capture of water-fowl and in fishing. Kalocsa is one of the oldest towns in Hungary. The present arch- bishopric, founded about 1135, i s a development of a bishopric said to have been founded in the year 1000 by King Stephen the Saint. It suffered much during the 16th century from the hordes of Ottomans who then ravaged the country. A large part of the town was destroyed by a fire in 1875.

KALPI, or Calpee, a town of British India, in the Jalaun district of the United Provinces, on the right bank of the Jumna, 45 m. S.W. of Cawnpore. Pop. (1901), 10,139. It was founded, according to tradition, by Vasudeva, at the end of the 4th century a.d. In 1 196 it fell to Kutab-ud-din, the viceroy of Mahommed Ghori, and during the subsequent Mahommedan period it played a large part in the annals of this part of India. About the middle of the 18th century it passed into the hands of the Mah- rattas. It was captured by the British in 1803, and since 1806 has remained in British possession. In May 1858 Sir Hugh Rose (Lord Strathnairn) defeated here a force of about 10,000 rebels under the rani of Jhansi. Kalpi had a mint for copper coinage in the reign of Akbar; and the East India Company made it one of their principal stations for providing the " commercial investment." The old town, which is beside the river, has ruins of a fort, and several temples of interest, while in the neighbour- hood are many ancient tombs. There is a lofty modern tower ornamented with representations of the battles of the Ramayana. The new town lies away from the river to the south-east. Kalpi isstill a centre of local trade (principally in grain, ghi and cotton), with a station on the Indian Midland railway from Jhansi to

Cawnpore, which here crosses the Jumna. There are manufac- tures of sugar and paper.

KALUGA, a government of middle Russia, surrounded by those of Moscow, Smolensk, Orel and Tula, with an area of 11,942 sq. m. Its surface is an undulating, plain, reaching 800 to 900 ft. in its highest parts, which lie in the S.W., and deeply trenched by watercourses, especially in the N.E. The Oka, a main tributary of the Volga, and its confluents (the Zhizdra and Ugra) drain all but a strip of country in the west, which is traversed by the

Bolva, an affluent of the Dnieper. The govern- ment is built up mainly of carboniferous deposits (coal-bearing) , with patches of the soft Jurassic clays and limestones which formerly covered them. Cretaceous deposits occur in the S.W., and Devonian limestones and shales crop out in the S.E. The government is covered with a thick layer of boulder clay in the north, with vast ridges and fields of boulders brought during the Glacial Period from Finland and the government of Olonets; large areas in the middle are strewn with flint boulders and patches of loess are seen farther south. The mean annual temperature is 41 F. Iron ores are the chief mineral wealth, nearly 40,000 persons being engaged in mining. Beds of coal occur in several places, and some of them are worked. Fireclay, china-clay, chalk, grindstone, pure quartz sand, phosphorite and copper are also extracted. Forests cover 20% of the surface, and occur chiefly in the south. The soil is not very suitable for agriculture, and owing to a rather dense population, considerable numbers of the inhabitants find occupation in industry, or as carriers and carpenters for one-half of the year at the Black Sea ports.

The population (1,025,705 in i860) was 1,176,353 in 1897, nearly all Great Russians. There were 116 women to 100 men, and out of the total population 94,853 lived in towns. The estimated population in 1906 was 1,287,300. Of the total area over 4,000,000 acres are owned by the peasant communities, nearly 3,000,000 acres by private owners and some 250,000 by the Crown. The principal crops are rye, oats, barley, buckwheat, and potatoes. Hemp is grown for local use and export. Bees are kept. The chief non-agricultural industries are distilleries, iron-works, factories for cloth, cottons, paper, matches, leather and china, flour-mills and oil works. Large quantities of wooden wares are fabricated in the villages of the south. A considerable trade is carried on in hemp, hempseed and hempseed oil, corn and hides; and iron, machinery, leather, glass, chemicals and linen are exported. The government is divided into n districts, the chief towns of which, with their populations in 1897, are: Kaluga (49,728), Borovsk (8407), Kozelsk (5908), Likhvin (1776), Maloyaroslavets (2500), Medyfi (4392), Meshchovsk (3667), Mosalsk (2652), Peremyshl (3956), Tarusa (1989) and Zhizdra (5996). (P. A. K.; J. T. Be.)

KALUGA, the chief town of the above government, situated on the left bank of the Oka, 117 m. S.W. of Moscow by rail, in 54 31′ N. and 36 6′ E. Pop. (1870), 36,880; (1897) 49,728. It is the see of a Greek Orthodox bishop. The public buildings include the cathedral of the Trinity (rebuilt in the 19th century in place of an older edifice dating from 1687), two monastic establishments, an ecclesiastical seminary, and a lunatic asylum. The principal articles of industrial production are leather, oil, bast mats, wax candles, starch and Kaluga cakes. The first historical mention of Kaluga occurs in 1389; its incorporation with the principality of Moscow

took place in 1518. In 1607 it was held by the second false Demetrius and vainly besieged for four months by the forces of Sbuisky, who had ascended the Russian throne as Basil IV. on the death of the first false Demetrius. In 1619 Kaluga fell into the hands of the hetman or chief of the Zaporozhian Cossacks. Later two-thirds of its inhabitants were carried off by a plague; and in 1622 the whole place was laid waste by a conflagration. It recovered, however, in spite of several other conflagrations (especially in 1742 and 1754). On several occasions Kaluga was the residence of political prisoners; among others Shamyl, the Lesghian chief, spent his exile there (1859-1870).

KALYAN, a town of British India, in the Thana district of Bombay, situated 33 m. N.E. of Bombay city, where the two

main lines of the Great Indian Peninsula railway diverge. Pop. (1901), 10,749. There is a considerable industry of rice-husking. Kalyan is known to have been the capital of a kingdom and a centre of sea-borne commerce in the early centuries of the Christian era. The oldest remains now existing are of Mahom- medan times.

KAMA, or Kamadeva, in Hindu mythology, the god of love. He is variously stated to have been the child of Brahma or Dharma (virtue). In the Rig Veda, Kama (desire) is described as the first movement that arose in the One after it had come into life through the power of fervour or abstraction. In the Atharva-Veda Kama does not mean sexual desire, but rather the yearning after the good of all created things. Later Kama is simply the Hindu Cupid. While attempting to lure Siva to sin, he was destroyed by a fiery glance of the goddess' third eye. Thus in Hindu poetry Kama is known as Ananga, the " bodiless god." Kama's wife Rati (voluptuousness) mourned him so greatly that Siva relented, and he was reborn as the child of Krishna and Rukmini. The babe was called Pradyumna (Cupid). He is represented armed with a bow of sugar-cane; it is strung with bees, and its five arrows are tipped with flowers which overcome the five senses. A fish adorns his flag, and he rides a parrot or sparrow, emblematic of lubricity.

KAMALA, a red powder formerly used in medicine as an anthelmintic and employed in India as a yellow dye. It is obtained from Mallotus philippinensis, Miill., a small euphor- biaceous tree from 20 to 45 ft. in height, distributed from southern Arabia in the west to north Australia and the Philippines in the east. In India kamala has several ancient Sanskrit names, one of which, kapila, signifies dusky or tawny red. Under the name

of wars, kanbil, or qinbil, kamala appears to have been known to the Arabian physicians as a remedy for tapeworm and skin diseases as early as the 10th century, and indeed is mentioned by Paulus ˆEgineta still earlier. The drug was formerly in the British Pharmacopoeia, but is inferior to many other anthel- mintics and is not now employed.

KAMCHATKA, a peninsula of N.-E. Siberia, stretching from the land of the Chukchis S.S.W. for 750 m., with a width of from 80 to 300 m. (51° to 62 N., and 156° to 163° E.), between the Sea of Okhotsk and Bering Sea. It forms part of the Russian Maritime Province. Area, 104,260 sq. m.

The isthmus which connects the peninsula with the mainland is a flat tundra, sloping gently both ways. The mountain chain", which Ditmar calls central, seems to be interrupted under 57° N. by a deep indentation corresponding to the valley of the Tighil. There too the hydrographical network, as well as the south-west to north-east strike of the clay-slates and metamor- phic schists on Ditmar's map, seem to indicate the existence of two chains running south-west to north-east, parallel to the volcanic chain of S.E. Kamchatka. Glaciers were not known till the year 1899, when they were discovered on the Byelaya and Ushkinskaya (15,400 ft.) mountains. Thick Tertiary deposits, probably Miocene, overlie the middle portions of the west coast. The southern parts of the central range are com posed of granites, syenites, porphyries and crystalline slates, while in the north of Ichinskaya volcano, which is the highest summit of the peninsula (16,920 ft.), the mountains consist chiefly of Tertiary sandstones and old volcanic rocks. Coal- bearing clays containing fresh-water molluscs and dicotyledo- nous plants, as also conglomerates, alternate with the sandstones in these Tertiary deposits. Amber is found in them. Very extensive layers of melaphyre and andesite, as also of con- glomerates and volcanic tuffs, cover the middle portions of the peninsula. The south-eastern portion is occupied by a chain of volcanoes, running along the indented coast, from Cape Lopatka to Cape Kronotskiy (54 25′ N.), and separated from the rest of the peninsula by the valleys of the Bystraya (an affluent of the Bolstraya, on the west coast) and Kamchatka rivers. Another chain of volcanoes runs from Ichinskaya (which burst into activity several times in the 18th and 19th centuries) to Shiveluch, seemingly parallel to the above but farther north. The two chains contain twelve active and twenty-

six extinct volcanoes, from 7000 to more than 15,000 ft. high. The highest volcanoes are grouped under 56 N., and the highest of them, Kluchevskaya (16,990 ft.), is in a state of almost in- cessant activity(notable outbreaks in 1729, 1737, 1841, 1853-1854, and 1896-1897), a flow of its lava having reached to Kamchatka river in 1853. The active Shiveluch (9900 ft.) is the last volcano of this chain. Several lakes and probably Avacha Bay are old craters. Copper, mercury, and iron ores, as also pure copper,

ochre and sulphur, are found in the peninsula. The principal river is the Kamchatka (325 m. long), which flows first north- eastwards in a fertile longitudinal valley, and then, bending suddenly to the east, pierces the above-mentioned volcanic chain. The other rivers are the Tighil (135 m.) and the Bolstraya (120 m.), both flowing into the Sea of Okhotsk; and the Avacha, flowing into the Pacific.

The floating ice which accumulates in the northern parts of the Sea of Okhotsk and the cold current which flows along the east coast of the peninsula render its summers chilly, but the winter is relatively warm, and temperatures below 40 F. are experienced only in the highlands of the interior and on the Okhotsk littoral. The average temperatures at Petropavlovsk (53° N.) are: year 37° F., January 17 , July 58 ; while in the valley of the Kamchatka the average temperature of the winter is 1 6°, and of the summer as high as 5 8° and 64 . Rain and snow are copious, and dense fogs enshroud the coast in summer; conse quently the mountains are well clothed with timber and the meadows with grass, except in the tundras of the north. The natives eat extensively the bulbs of the Martagon lily, and weave cloth out of the fibres of the Kamchatka nettle. Delphinopterus leucus, the sea-lion (Otaria Stelleri), and walrus abound off the coasts. The sea-otter {Enhydris marina) has been destroyed.

The population (5846 in 1870) was 7270 in 1900. The southern part of the peninsula is occupied by Kamchadales, who exhibit many attributes of the Mongolian race, but are more similar to the aborigines of N.E. Asia and N.W. America. Fishing (quantities of salmon enter the rivers) and hunting are their chief occupations. Dog-sledges are principally used as means of communication. The efforts of the government to introduce cattle-breeding have failed. The Kamchadale lan- guage cannot be assigned to any known group; its vocabulary is extremely poor. The purity of the tongue is best preserved by the people of the Penzhinsk district on the W. coast. North of 57 N. the peninsula is peopled with Koryaks, settled and nomad, and Lamuts (Tunguses) , who came from the W. coast of the Sea of Okhotsk. The principal Russian settlements are: Petropavlovsk, on the E. coast, on Avacha Bay, with an ex- cellent roadstead; Verkhne-Kamchatsk and Nizhne-Kamchatsk in the valley of the Kamchatka river; Bolsheryetsk, on the Bolshaya; and Tighil, on the W. coast.

The Russians made their first settlements in Kamchatka in the end of the 17th century; in 1696 Atlasov founded Verkhne-Kamchatsk, and in 1704 Robelev founded Bolsheryetsk. In 1720 a survey of the peninsula was undertaken; in 1 725-1730 it was visited by Bering's expedition; and in 1733-1745 it was the scene of the labours of the Krasheninnikov and Steller expedition.

See G. A. Erman, Reise um die Erde iii., (Berlin, 1848); C. von Ditmar, Reisen und Aufenthalt in Kamchatka in den Jahren 1851- 1855 (1890-1900) ; G. Kennan, Tent Life in Siberia (1870), and paper in Jour, of American Geog. Soc. (1876); K. Diener, in Petermann's Mitteilungen (1891, vol. xxxvii.); V. A. Obruchev, in Izvestia of the East Siberian Geographical Society (xxiii. 4, 5; 1892); F. H. H. Guillemard, Cruise of the " Marchesa " (2nd ed., London, 1889) ; and G. E. H. Barrett-Hamilton in Scott. Geog. Mag. (May, 1899), with bibliography. (P. A. K. ; J. T. Be.)

KAME (a form of Scandinavian comb, hill), in physical geography, a short ridge or bunched mound of gravel or sand, " tumultuously stratified," occurring in connexion with glacial deposits, having been formed at the mouths of tunnels under the ice. When the ice-sheet melts, these features, formerly con- cealed by the glacier, are revealed. They are common in the glaciated portions of the lower Scottish valleys. By some authorities the term " kame," or specifically " serpentine

kame," is taken as synonymous with " esker," which however is preferably to be applied to the long mound deposited within the ice-tunnel, not to the bunched mound at its mouth.

KAMENETS PODOLSKIY, or' Podolian Kamenets (Polish Kamieniec) , a town of S.W. Russia, chief town of the govern ment of Podolia. It stands in 48° 40′ N. and 26 30′ E., on a high, rocky bluff of the river Smotrich, a left-hand tributary of the Dniester, and near the Austrian frontier. Pop. (1863), 20,699; (1900) 39,113, of whom 50% were Jews and 30% Poles. Round the town lies a cluster of suburban villages, Polish Folwark, Russian Folwark, Zinkovtsui, Karvasarui, &c; and on the opposite side of the river, accessible by a wooden bridge, stands the castle which long frowned defiance across the Dniester to Khotin in Bessarabia. Kamenets is the see of a Roman Catholic and a Greek Orthodox bishop. The Roman Catholic cathedral of St Peter and St Paul, built in 1361, is dis- tinguished by a minaret, recalling the time when it was used as a mosque by the Turks (1672-1699). The Greek cathedral of John the Baptist dates from the 16th century, but up to 1798 belonged to the Basilian monastery. Other buildings are the Orthodox Greek monastery of the Trinity, and the Catholic Armenian church (founded in 1398), possessing a 14th-century missal and an image of the Virgin Mary that saw the Mongol invasion of 1239- 1242. The town contains Orthodox Greek and Roman Catholic seminaries, Jewish colleges, and an archaeological museum for church antiquities, founded in 1890. Kamenets was laid waste by the Mongol leader Batu in 1240. In 1434 it was made the chief town of the province of Podolia. In the 15th and 16th centuries it suffered frequently from the invasions of Tatars, Moldavians and Turks; and in 1672 the hetma,n of the Cossacks, Doroshenko, assisted by Sultan Mahommed IV. of Turkey, made himself master of the place. Restored to Poland by the peace of Karlowitz (1699), it passed with Podolia to Russiain 1795. Here the Turks were defeated by the Poles in 1633, and here twenty years later peace was concluded between the same antagonists. The fortifications were demolished in 1813.

KAMENZ, a town in the kingdom of Saxony, on the Black Elster, 21 m. N.E. of Dresden, on a branch line of railway from Bischofswerda. Pop. (1900), 9726. It has four Evangeli- cal churches, among them a Wendish one, and a handsome new town-hall with a library. The hospital is dedicated to the memory of Lessing, who was born here. A colossal bust of the poet was placed opposite the Wendish church in 1863, and a monument was raised to him on a neighbouring hill in 1864. The industries of Kamenz include wool-spinning, and the manu- facture of cloth, glass, crockery and stoneware. Built about 1 200, Kamenz, was known by the name Dreikretcham until the 16th century. In 1318 it passed to the mark of Brandenburg; in 1319 to Bohemia; and in 1635, after suffering much in the Hussite and Thirty Years' wars, it came into the possession of Saxony. In 1706 and 1842 it was almost entirely consumed by fire.

Kamenz is also the name of a village in Prussia, not far from Breslau; pop. 900. This is famous on account of its Cistercian monastery, founded in 1094. Of the house, which was closed in 1 810, only a few buildings remain.

KAMES, HENRY HOME, Lord (1696-1782), Scottish lawyer and philosopher, son of George Home of Karnes, in Berwickshire, where he was born in 1696. After receiving a somewhat imperfect education from a private tutor, he was in 1712 inden- tured to a writer to the signet in Edinburgh, but an accidental introduction to Sir Hew Dalrymple, then president of the court of session, determined him to aspire to the position of advocate. He accordingly set himself to studying various branches of literature, specially metaphysics and moral philosophy. He was called to the bar in January 1724, and, as he lacked those brilliant qualities which sometimes command immediate success, he employed his leisure in the compilation of Remarkable Deci- sions in the Court of Session from 1716 to 1728 (1728). This work having attracted attention, his power of ingenious reasoning and mastery of law gradually gained him a leading position at the bar. In 1752 he was appointed a judge in the

court of session under the title of Lord Karnes, and in 1763 he was made one of the lords of justiciary. In 1741 he married Agatha Drummond, through whom in 1761 he succeeded to the estate of Blair Drummond, Perthshire. He continued to discharge his judicial duties till within a few days of his death at Edinburgh on the 27th of December 1782.

Lord Kames took a special interest in agricultural and commercial affairs. In 1755 he was appointed a member of the board of trustees for encouragement of the fisheries, arts and manufactures of Scotland , and about the same time he was named one of the commissioners for the management of the forfeited estates annexed to the Crown. On the subject of agriculture he wrote The Gentleman Farmer (1776). In 1765 he published a small pamphlet On the Flax Husbandry of Scotland; and, besides availing himself of his extensive acquaintance with the proprietors of Scotland to recommend the introduction of manufactures, he took a prominent part in furthering the project of the Forth and Clyde Canal. He was also one of the founders of the Physical and Literary Society, afterwards the Royal Society of Edinburgh. It is, however, as a writer on philosophy that Lord Kames is best known. In 1751 he published his Essays on the Principles of Morality and Natural Religion (Ger. trans., Leipzig, 1772), in which he endeavoured to maintain the doctrine of innate ideas, but conceded to man an apparent but only apparent freedom of the will. His statement of the latter doctrine so aroused the alarm of certain clergymen of the Church of Scotland that he found it necessary to withdraw what was regarded as a serious error, and to attribute man's

delusive sense of freedom, not to an innate conviction implanted by God, but to the influence of the passions. His other philosophical works are An Introduction to the Art of Thinking (1761), Elements of Criticism (1762), Sketches of the History of Man (1774).

See Life of Lord Kames, by A. F. Tytler, Lord Woodhouselee (2 vols., 1807).

KAMMIN, or Cammin, a town in the Prussian province of Pomerania, 25 m. from the Baltic, on the Kamminsche Bodden, a lake connected with the sea by the Dievenow. Pop. (1905), 5923. Among its four Evangelical churches, the cathedral and the church of St Mary are noteworthy. Iron-founding and brewing are carried on in the town, which has also some fishing and shipping. There is steamer communication with Stettin, about 40 m. S.S.W. Kammin is of Wendish origin, and obtained municipal privileges in 1274. From about 1200 till 1628 it was the seat of a bishopric, which at the latter date became a secular principality, being in 1648 incorporated with Brandenburg.

See Kuchen, Geschichte der Stadt Kammin (Kammin, 1885).

KAMPEN, a town in the province of Overysel, Holland, on the left bank of the Ysel, 35 m. above its mouth, and a terminal railway station 8 m. N.W. of Zwolle. It has regular steamboat communication with Zwolle, Deventer, Amsterdam, and Enk- huizen. Pop. (1900), 19,664. Kampen is surrounded by beauti- ful gardens and promenades in the place of the old city walls, and has a fine river front. The four turreted gateways furnish excellent examples of 16th and 17 th century architecture. Of the churches the Bovenkerk (" upper church "), or church of St Nicholas, ranks with the cathedral of Utrecht and the Janskerk at 's Hertogenbosch as one of the three great medieval churches in Holland. It was begun in 1369, and has double aisles, ambula- tory and radiating chapels, and contains some finely carved woodwork. The Roman Catholic Buitenkerk (" outer church ") is also a fine building of the 14th century, with good modern panelling. There are many other, though slighter, remains of the ancient churches and monasteries of Kampen; but the most remarkable building is the old town-hall, which is unsurpassed in Holland. It dates from the 14th century, but was partly restored after a fire in 1543. The exterior is adorned with niched statues and beautiful iron trellis work round the windows. The old council-chamber is wainscoted in black oak, and contains a remarkable sculptured chimney-piece (1545) and fine wood carving. The town-hall contains the municipal library, collec- tions of tapestry, portraits and antiquities, and valuable archives relating to the town and province. Kampen is the seat of a Christian Reformed theological school, a gymnasium, a higher burgher school, a municipal school of design, and a

large orphan- age. There are few or no local taxes, the municipal chest being filled by the revenues derived from the fertile delta-land, the Kampeneiland, which is always being built up at the mouth of

the Ysel. There is a considerable, trade in dairy produce ; and there are shipyards, rope-walks, a tool factory, cigar factories, paper mills, &c.

KAMPTEE, or Kamthi, a town of British India, in the Nagpur district of the Central Provinces, just below the confluence of the Kanhan with the rivers Pench and Kolar; 10 m. N.E. of Nagpur by rail. Pop. (1901), 38,888, showing a continuous decrease since 1 88 1. Kamptee was founded in 182 1, as a military cantonment in the neighbourhood of the native capital of Nagpur, and became an important centre of trade. Since the opening of the railway, trade has largely been diverted to Nagpur, and the garrison has recently been reduced. The town is well laid out with wide roads, gardens and tanks.

KAMRUP, a district of British India, in the Brahmaputra valley division of Eastern Bengal and Assam. The headquarters are at Gauhati. Area, 3858 sq. m.; pop. (1001), 589,187, showing a decrease of 7% in the decade. In the immediate neighbourhood of the Brahmaputra the land is low, and exposed to annual inundation. In this marshy tract reeds and canes flourish luxuriantly, and the only cultivation is that of rice. At a comparatively short distance from the river banks the ground begins to rise in undulating knolls towards the mountains of Bhutan on the north, and towards the Khasi hills on the south. The hills south of the Brahmaputra in some parts reach the height of 800 ft. The Brahmaputra, which divides the district into two nearly equal portions, is navigable by river steamers throughout the year, and receives several tributaries navigable by large native boats in the rainy season. The chief of these are the Manas, Chaul Khoya and Barnadi on the north, and the Kulsi and Dibru on the south bank. There is a government forest preserve in the district and also a plantation where seedlings of teak, sal, sissu, sum, and nahor are reared, and experiments are being made with the caoutchouc tree. The population is entirely rural, the only town with upwards of 5000 inhabitants being Gauhati (11,661). The temples of Hajo and Kamakhya attract many pilgrims from all quarters. The staple crop of the district is rice, of which there are three crops. The indigenous manufactures are confined to the weaving of silk and cotton cloths for home use, and to the making of brass cups and plates. The cultivation and manufacture of tea by European capital is not very prosperous. The chief exports are rice, oil- seeds, timber and cotton; the

imports are fine rice, salt, piece goods, sugar, betel-nuts, coco-nuts and hardware. A section of the Assam-Bengal railway starts from Gauhati, and a branch of the Eastern Bengal railway has recently been opened to the opposite bank of the river. A metalled road runs due south from Gauhati to Shillong.

KAMYSHIN, a town of Russia, in the government of Saratov, 145 m. by river S.S.W. of the city of Saratov, on the right bank of the Volga. Pop. (1861), 8644; (1897), 15,934. Being the terminus of the railway to Tambov, Moscow and the Baltic ports, it is an important port for the export of cereals and salt from the Volga, and it imports timber and wooden wares. It is famous for its water-melons. Peter the Great built here a fort, which was known at first as Dmitrievsk, but acquired its present name in 1780.

KANAKA, a Polynesian word meaning " man," used by Poly- nesians to describe themselves. Its ethnical value, never great, has been entirely destroyed by. its indiscriminate use by the French to describe all South Sea islanders, whether black or brown. The corrupt French form canaque has been used by some English writers. The term came into prominence in 1884- 1885 in connexion with the scandals arising over the kidnap- ping of South Sea islanders for enforced labour on the sugar plantations of north Queensland.

KANARA, or Canara, the name of two adjoining districts of British India: North Kanara in the presidency of Bombay, South Kanara in that of Madras. Both are on the western coast.

North Kanara District forms part of the southern division of Bombay. The administrative headquarters are at Karwar, which is also the chief seaport. Area, 3945 sq. m.; pop .(1901),

454,490, showing an increase of 2 % in the decade. The trade of the interior, which used to pass down to the seaports, has been largely diverted by the opening of the Southern Mahratta rail- way. Along the coast rice is the chief crop, and coco-nut palms are also important. In the upland there are valuable gardens of areca palms, cardamoms and pepper. Rice and timber are exported, and sandalwood-carving and salt manufacture are carried on. The main feature in the physical geography of the district is the range of the Western Ghats, which, running from north to south, divides it into two parts, a lowland or coast strip (Payanghat), and an upland plateau (Balaghat). The coast-line is only broken by the Karwar headland in the north, and by the estuaries of four rivers and the mouths of many smaller streams, through which the salt water finds an entrance into numerous lagoons winding several miles inland. The breadth of the low-

lands varies from 5 to 15 miles. From this narrow belt rise a few smooth, flat-topped hills, from 200 to 300 ft. high; and at places it is crossed by lofty, rugged, densely wooded spurs, which, start- ing from the main range, maintain almost to the coast a height of not less than 1000 ft. Among these hills lie well-tilled valleys of garden and rice land. The plateau of the Balaghat is irregular, varying from 1500 to 2000 ft. in height. In some parts the country rises into well-wooded knolls, in others it is studded by small, isolated, steep hills. Except on the banks of streams and in the more open glades, the whole is one broad waste of wood- land and forest. The open spaces are dotted with hamlets or parcelled out into rice clearings. Of the rivers flowing eastward from the watershed of the Sahyadri hills the only one of impor- tance is the Wardha or Varada, a tributary of the Tungabhadra. Of those that flow westwards, the four principal ones, proceeding from north to south, are the Kali, Gungawali, Tadri and Shara- vati. The last of these forms the famous Gersoppa Falls. Exten- sive forests clothe the hills,, and are conserved under the rules of the forest department.

South Kanara District has its headquarters at Mangalore. Area, 4021 sq. m. Pop. (1901), 1,134,713, showing an increase of 7 % in the decade. The district is intersected by rivers, none of which exceeds 100 miles in length. They all take their rise in the Western Ghats, and many are navigable during the fair weather for from 15 to 25 miles from the coast. The chief of these streams are the Netravati, Gurpur and Chendragiri. Numerous groves of coco-nut palms extend along the coast, and green rice-fields are seen in every valley. The Western Ghats, rising to a height of 3000 to 6000 ft., fringe the eastern boundary. Forest land of great extent and value exists, but most of it is private property. Jungle products (besides timber) consist of bamboo, cardamoms, wild arrowroot, gall-nuts, gamboge, catechu, fibrous bark, cinnamon, gums, resin, dyes, honey and beeswax. The forests formerly abounded in game, which, however, is rapidly decreasing under incessant shooting. The staple crop is rice. The chief articles of import are piece goods, cotton yarn, oils and salt. Tiles are manufactured in several places out of a fine potter's clay. The Azhikal-Mangalore line of the Madras railway serves the district.

See South Canara District Manual (2 vols., Madras, 1894-1895).

KANARESE, a language of the Dravidian family, spoken by about ten millions of people in southern India, chiefly in Mysore, Hyderabad, and the adjoining districts of Madras and Bombay. It has an ancient literature, written in an alphabet closely resembling that employed for Telugu. Since the 12th century the Kanarese-speaking people have largely adopted the Lingayat form of faith, which may be described as an anti-Brahmanical sect of Siva worshippers (see Hinduism). Most of them are agriculturists, but they also engage actively in trade.

KANARIS (or Canaris), CONSTANTINE (1790-1877), Greek patriot, belonged to the class of coasting sailors who produced if not the most honest, at least the bravest, and the most success- ful of the combatants in the cause of Greek independence. He belonged by birth to the little island of Psara, to the north-west of Chio. He first became prominent as the effective leader of the signal vengeance taken by the Greeks for the massacre at

Chio in April 1822 by the Turkish Capitan Pasha. The com- mander of the force of fifty small vessels and eight fireships sent to assail the Turkish fleet was the navarch Miaoulis, but it was Kanaris who executed the attack with the fireships on the flag- ship of the Capitan Pasha on the night of the 18th of June 1822. The Turks were celebrating the feast of Bahram at the end of the Ramadan fast. Kanaris had two small brigs fitted as fireships, and thirty-six men. He was allowed to come close to the Turkish flagship, and succeeded in attaching his fireships to her, setting .them on fire, and escaping with his party. The fire reached the powder and the flagship blew up, sending the Capitan Pasha and 2000 Turks into the air. Kanaris was undoubtedly aided by the almost incredible sloth and folly of his opponents, but he chose his time well, and the service of the fireships was always considered peculiarly dangerous. That Kanaris could carry out the venture with a volunteer party not belonging to a regularly disciplined service, not only proved him to be a clever partisan fighter, but showed that he was a leader of men. He repeated the feat at Tenedos in November of 1822, and was then considered to have disposed of nearly 4000 Turks in the two ventures. When his native island, Psara, was occu- pied by the Turks he continued to serve under the command of Miaoulis. He was no less distinguished in other attacks with fireships at Samos and Mytilene in 1824, which finally established an utter panic in the Turkish navy. His efforts to destroy the ships of Mehemet Ali at Alexandria in 1825 were defeated by contrary winds. When the Greeks tried to organize a regular navy he was appointed captain of the frigate " Hellas " in 1826. In politics he was a follower of Capo d'Istria. He helped to upset the government of King Otho and to establish his successor, was prime minister in 1864-1865, came back from retirement to preside over the ministry formed during the crisis of the Russo- Turkish war, and died in office on the 15th of September 1877. Kanaris is described as of small stature, simple in appearance, somewhat shy and melancholy. He is justly remembered as the most blameless of the popular heroes of the War of Independence. He was almost the only one among them whom Dundonald, with whom he served in a successful attack on an Egyptian war-ship near Alexandria, exempts from the sweeping charges of cowardice he brings against the Greeks. (D.

H.)

KANAUJ, an ancient city of British India, in Farukhabad district, United Provinces, near the left bank of the Ganges. Pop. (iqoi), 18,552. Kanauj in early times formed the capital of a great Hindu kingdom. Its prosperity dates from a prehistoric period, and seems to have culminated about the 6th century under Harsha. In 1010 it fell before Mahmud of Ghazni, and again in n 94 before Mahommed Ghori. The existing ruins extend over the lands of five villages, occupying a semicircle fully 4 m. in diameter. No Hindu buildings remain intact; but the great mosque, constructed by Ibrahim Shah of Jaunpur in 1406 out of Hindu temples, is still called by Hindus " Sita's Kitchen." Kanauj, which is traditionally said to be derived from Kanyakubja (= the crooked maiden), has given its name to an important division of Brahmans in northern India. Hindu- ism in Lower Bengal also dates its origin from a Brahman migra- tion southwards from this city, about 800 or 900. Kanauj is now noted for the distilling of scents.

KANDAHAR, the largest city in Afghanistan, situated in 31 37′ N. lat. and 65 43′ E. long., 3400 ft. above the sea. It is 370 m. distant from Herat on the N.W., by Girishk and Farah — Girishk being 75 m., and Farah 225 m. from Kandahar. From Kabul, on the N.E., it is distant 315 m., by Kalat-i-Ghilzai and Ghazni — Kalat-i-Ghilzai being 85 m., and Ghazni 225 m. from Kandahar. To the Peshin valley the distance is about no m., and from Peshin to India the three principal routes measure approximately as follows: by the Zhob valley to Dera Ismail Khan, 300 m.; by the Bori valley to Dera Ghazi Khan, 275 m.; by Quetta and the Bolan to Dadar, 125 m.; and by Chappar and Nari to Sibi, 120 m. The Indian railway system extends to New Chaman, within some 80 m. of Kandahar. Im- mediately round the city is a plain, highly cultivated and well populated to the south and west; but on the north-west barren,

and bounded by a double line of hills, rising to about 1000 ft. above its general level, and breaking its dull monotony with irregular lines of scarped precipices, crowned with fantastic pinnacles and peaks. To the north-west these hills form the watershed between the valleys of the Arghandab and the Tarnak, until they are lost in the mountain masses of the Hazarajat — a wild region inhabited by tribes of Tatar origin, which effectually shuts off Kandahar from communication with the north. On the south-west they lose themselves in the sandy desert of Registan, which wraps itself round the plain of Kandahar, and forms another impassable barrier. But there is a break in these hills — a gate, as it were, to the great high road between Herat and India; and it is this gate which the fortress of Kandahar so effectually guards, and to which it owes its strategic importance. Other routes there are, open to trade, between Herat and northern India, either following the banks of the Hari Rud, or, more circuitously, through the

valley of the Helmund to Kabul; or the line of hills between the Arghandab and the Tarnak may be crossed close to Kalat-i-Ghilzai; but of the two former it may be said that they are not ways open to the passage of Afghan armies owing to the hereditary hostility existing between the Aeimak and Hazara tribes and the Afghans generally, while the latter is not beyond striking distance from Kandahar. The one great high road from Herat and the Persian frontier to India is that which passes by Farah and crosses the Helmund at Girishk. Between Kandahar and India the road is comparatively open, and would be available for railway communication but for the jealous exclusiveness of the Afghans.

To the north-west, and parallel to the long ridges of the Tarnak watershed, stretches the great road to Kabul, traversed by Nott in 1842, and by Stewart and subsequently by Roberts in 1880. Between this and the direct route to Peshin is a road which leads through Maruf to the Kundar river and the Guleri pass into the plains of Hindustan at Dera Ismail Khan. This is the most direct route to northern India, but it involves the passage of some rough country, across the great watershed between the basins of the Helmund and the Indus. But the best known road from Kandahar to India is that which stretches across the series of open stony plains interspersed with rocky hills of irregular formation leading to the foot of the Kwaja Amran (Khojak) range, on the far side of which from Kandahar lies the valley of Peshin. The passage of the Kwaja Amran involves a rise and fall of some 2300 ft., but the range has been tunnelled and a railway now connects the frontier post of New Chaman with Quetta. Two lines of railway now connect Quetta with Sind, the one known as the Harnai loop, the other as the Bolan or Mashkaf line. They meet at Sibi (see Baluchistan). Several roads to India have been developed through Baluchistan, but they are all dominated from Kandahar. Thus Kandahar be- comes a sort of focus of all the direct routes converging from the wide-stretching western frontier of India towards Herat and Persia, and the fortress of Kandahar gives protection on the one hand to trade between Hindustan and Herat, and on the other it lends to Kabul security from invasion by way of Herat.

Kandahar is approximately a square-built city, surrounded by a wall of about 3! m. circuit, and from 25 to 30 ft. high, with an average breadth of 15 ft. Outside the wall is a ditch 10 ft, deep. The city and its defences are entirely mud-built. There are four main streets crossing each other nearly at right angles, the central " chouk " being covered with a dome. These streets are wide and bordered with trees, and are flanked by shops with open fronts and verandas. There are no buildings of any great pretension in Kandahar, a few of the more wealthy Hindus occupying the best houses. The tomb of Ahmad Shah is the only attempt at monumental architecture. This, with its rather handsome cupola, and the twelve minor tombs of

Ahmad Shah's children grouped around, contains a few good specimens of fretwork and of inlaid inscriptions. The four streets of the city divide it into convenient quarters for the accommodation of its mixed population of Duranis, Ghilzais, Parsiwans and Kakars, numbering in all some 30,000 souls. Of these the greater proportion are the Parsiwans (chiefly Kizilbashes) .

It is reckoned that there are 1600 shops and 182 mosques in the city. The mullahs of these mosques are generally men of considerable power. The walls of the city are pierced by the four principal gates of " Kabul," " Shikarpur," " Herat " and the " Idgah," opposite the four main streets, with two minor gates, called the Top Khana and the Bardurani respectively, in the western half of the city. The Idgah gate passes through the citadel, which is a square-built enclosure with sides of about 260 yas. in length. The flank defences of the main wall are insufficient; indeed there is no pretence at scientific structure about any part of the defences; but the site of the city is well chosen for defence, and the water supply (drawn by canals from the Arghandab or derived from wells) is good.

About 4 m. west of the present city, stretched along the slopes of a rocky ridge, and extending into the plains at its foot, are the ruins of the old city of Kandahar sacked and plundered by Nadir Shah in 1738. From the top of the ridge a small citadel overlooks the half-buried ruins. On the north-east face of the hill forty steps, cut out of solid limestone, lead upward to a small, dome-roofed recess, which contains some interesting Persian inscriptions cut in relief on the rock, recording particulars of the history of Kandahar, and defining the vast extent of the kingdom of the emperor Baber. Popular belief ascribes the foundation of the old city to Alexander the Great.

Although Kandahar has long ceased to be the seat of govern- ment, it is nevertheless by far the most important trade centre in Afghanistan, and the revenues of the Kandahar province assist largely in supporting the chief power at Kabul. There are no manufactures or industries of any importance peculiar to Kandahar, but the long lines of bazaars display goods from England, Russia, Hindustan, Persia and Turkestan, embracing a trade area as large probably as that of any city in Asia. The customs and town dues together amount to a sum equal to the land revenue of the Kandahar province, which is of considerable extent, stretching to Pul-i-Sangin, 10 m. south of Kalat-i-Ghilzai on the Kabul side, to the Helmund on the west, and to the Hazara country on the north. Although Farah has

been governed from Kandahar since 1863, its revenues are not reckoned as a part of those of the province. The land revenue proper is assessed in grain, the salaries of government officials, pay of soldiers, &c, being disbursed by " barats " or orders for grain at rates fixed by government, usually about 20 % above the city market prices. The greater part of the English goods sold at Herat are imported by Karachi and Kandahar — a fact which testifies to the great insecurity of trade between Meshed and Herat. Some of the items included as town dues are curious. For instance, the tariff on animals exposed for sale includes a charge of 5 % ad valorem on slave girls, besides a charge of I rupee per head. The kidney fat of all sheep and the skins of all goats slaughtered in the public yard are perquisites of government, the former being used for the manufacture of soap, which, with snuff, is a government mono- poly. The imports consist chiefly of English goods, indigo, cloth, boots, leather, sugar, salt, iron and copper, from Hindustan, and of shawls, carpets, " barak " (native woollen cloth), postins (coats made of skins), shoes, silks, opium and carpets from Meshed, Herat and Turkestan. The exports are wool, cotton, madder, cummin seed, asafoetida, fruit, silk and horses. The system of coinage is also curious: 105 English rupees are melted down, and the alloy extracted, leaving 100 rupees' worth of sih'er; 295 more English rupees are then melted, and the molten metal mixed with the 100 rupees silver; and out of this 808 Kandahari rupees are coined. As the Kandahari rupee is worth about 8 annas (half an English rupee) the government thus realizes a profit of 1 %. Government accounts are kept in " Kham " rupees, the " Kham " being worth about five-sixths of a Kandahari rupee; in other words, it about equals the franc, or the Persian " kran."

Immediately to the south and west of Kandahar is a stretch of well-irrigated and highly cultivated country, but the valley of the Arghandab is the most fertile in the district, and, from the luxuriant abundance of its orchards and vineyards, offers the most striking scenes of landscape beauty. The pomegranate fields form a striking feature in the valley — the pomegranates of Kandahar, with its " sirdar " melons and grapes, being unequalled in quality by any in the East. The vines are grown on artificial banks, probably for want of the necessary wood to trellis them — the grapes being largely exported in a semi-dried state. Fruit, indeed, besides being largely exported, fcrms the chief staple of the food supply of the inhabitants throughout Afghanistan. The art of irrigation is so well understood that the water supply is at times exhausted, no river water being allowed to run to waste. The plains about Kandahar are chiefly watered by canals drawn from the Arghandab near Baba-wali, and conducted through the same gap in the hills which admits the Herat road. The amount of irrigation and the number of water channels form a considerable impediment to the movements of troops, not only immediately

about Kandahar, but in all districts where the main rivers and streams are bordered by green bands of cultivation. Irrigation by " karez " is also largely resorted to. The karez is a

system of underground channelling which usually taps a sub-surface water supply at the foot of some of the many rugged and apparently waterless hills which cover the face of the country. The water is not brought to the surface, but is carried over long distances by an underground channel or drain, which is constructed by sinking shafts at intervals along the required course and connecting the shafts by tunnelling. The general agricultural products of the country are wheat, barley, pulse, fruit, madder, asafoetida, lucerne, clover and tobacco.

Of the mineral resources of the Kandahar district not much is known, but an abandoned gold mine exists about 2 m. north of the town. Some general idea of the resources of the Kandahar district may be gathered from the fact that it supplied the British troops with everything except luxuries during the entire period of occupa- tion in 1879-81; and that, in spite of the great strain thrown on those resources by the presence of the two armies of Ayub Khan and of General Roberts, and after the total failure of the autumn crops and only a partial harvest the previous spring, the army was fed without great difficulty until the final evacuation, at one-third of the prices paid in Quetta for supplies drawn from india.

History. — Kandahar has a stormy history. Sultan Mahmud of Ghazni took it in the nth century from the Afghans who then held it. In the beginning of the 13th century it was taken by Jenghiz Khan, and in the 14th by Timur. In 1507 it was captured by the emperor Baber, but shortly afterwards it fell again into Afghan hands, to be retaken by Baber in 1521. Baber's son, Humayun, agreed to cede Kandahar to Persia, but failed to keep his word, and the Persians besieged the place unsuccessfully. Thus it remained in the possession of the Moguls till 1625, when it was taken by Shah Abbas. Aurangzeb tried to take it in 1649 with 5000 men, but failed. Another attempt in 1652 was equally unsuccessful. It remained in Persian possession till 1709, when it was taken by the Afghans, but was retaken after a two years' siege by Nadir Shah. Nadir Shah was assassinated in 1749, and immediately on hearing the news of his death Ahmad Shah (Abdali) seized Nadir Shah's treasure at Kandahar, and proclaimed himself king, with the consent, not only of the Afghans, but, strange to say, of the Hazaras and Baluchis as well. He at once changed the site of the city to its present position, and thus founded the Afghan kingdom, with modern Kandahar as its capital. Ahmad Shah died in 1773, and was succeeded by his son Timur, who died in 1793, and left the throne to his son Zaman Shah, This prince was deposed by his half-brother Mahmud, who was in his turn deposed by Shah Shuja, the full brother of Zaman Shah. After a short

reign Shah Shuja was compelled to abdicate from his inability to repress the rising power of Fateh Khan, a Barakzai chief, and he took refuge first with Ranjit Singh, who then ruled the Punjab, and finally secured the protection of British power. Afghanistan was now practically dismembered. Mahmud was reinstated by Fateh Khan, whom he appointed his vizier, and whose nephews, Dost Mahommed Khan and Kohn dil Khan, he placed respectively in the governments of Kabul and Kandahar. Fateh Khan was barbarously murdered by Kamran (Mahmud's son) near Ghazni in 1818; and in retaliation Mahmud himself was driven from power, and the Barakzai clan secured the sovereignty of Afghanistan. While Dost Mahommed held Kabul, Kandahar became temporarily a sort of independent chiefship under two or three of his brothers. In 1839 the cause of Shah Shuja was actively supported by the British. Kandahar was occupied, and Shah Shuja reinstated on the throne of his ancestors. Dost Mahommed was defeated near Kabul, and after surrender to the British force, was deported into Hindustan. The British army of occupation in southern Afghanistan continued to occupy Kandahar from 1839 till the autumn of 1842, when General Nott marched on Kabul to meet Pollock's advance from Jalalabad. The cantonments near the city, built by Nott's division, were repaired and again occupied by the British army in 1879, when Shere Ali was driven from power by the invasion of Afghanistan, nor were they finally evacuated till the spring of 1 881. Trade statistics of late years show a gradual increase of exports to India from Kandahar and the countries adjacent thereto, but a curious falling-off in imports. The short-sighted policy of the amir Abdur Rahman in discouraging imports doubtless affected the balance, nor did his affectation of ignoring the railway between New Chaman and Kila Abdulla (on the Peshin side of the Khojak) conduce to the improvement of trade.

(T. H. H.)*

KANDI, a town of British India, in Murshidabad district, Bengal. Pop. (1901), 12,037. It is the residence of the rajas of Paikpara, a wealthy and devout Hindu family. The founder of this family was Ganga Govind Singh, the banyan or agent of Warren Hastings, who was born at Kandi, and retired hither in his old age with an immense fortune. His name has acquired celebrity for the most magnificent sraddha, or funeral obsequies, ever performed in Bengal, celebrated in honour of his mother, at a cost, it is said, of £200,000.

KANDY, a town near the centre of Ceylon, 75 m. from Colombo by rail, formerly the capital of a kingdom of the same name,

situated towards the heart of the island, 1718 ft. above the sea. It lies round the margin of an artificial lake constructed by the last king of Kandy in 1806, and is beautifully surrounded by hills. The most striking objects are the temples (of which twelve are Buddhist and four Brahman), the tombs of the Kandian kings, and the various buildings of the royal residence, partly allowed to fall into disrepair, partly utilized by the government. Of the temples the Dalada Malagawa is worthy of particular mention; it claims, as the name indicates, to be in possession of a Buddha tooth.

Kandy was occupied by the Portuguese in the 16th century and by the Dutch in 1763; but in both instances the native kings succeeded in shaking off the foreign yoke. The British got possession of the place in 1803, but the garrison afterwards capitulated and were massacred, and it was not till 1814-15 that the king was defeated and dethroned. The British autho- rity was formally established by the convention of March 2, 1815. In 1848, owing to an attempt at rebellion, the town was for a time under martial law. It has been greatly improved of recent years. Sir William Gregory when governor did much to restore the ancient Kandy decorations, while the Victoria Jubilee Commemoration Building, including " Ferguson Memorial Hall," and two fine hotels, add to the improvements. The Royal Botanic Gardens are situated at Peradeniya, 3 m. distant. Kandy is a uniquely beautiful, highland, tropical town, full of interesting historical and Buddhistic associations. A water supply and electric lighting have been introduced. Roman Catholic missions are active in the work of education, for which a large block of buildings has been erected. Church of England, Wesleyan and Baptist missions are also at work. The population of the town in 1900 was 26,386; of the district, 377,591. Average annual rainfall, 815 in.; average temperature, 75-3. There is a branch railway from Kandy, north to Matale, 17 m.

KANE, ELISHA KENT (1820-1857), American scientist and explorer, was born in Philadelphia on the 20th of February 1820, the son of the jurist John Kintzing Kane (1795-1858), a friend and supporter of Andrew Jackson, attorney-general of Pennsyl- vania in 1845-1846,11.8. judge of the Eastern District of Pennsyl- vania after 1846, and president of the American Philosophical Society in 1856-1858. Young Kane entered the university of Virginia and obtained the degree of M.D. in 1842, and in the following year entered the U.S. navy as surgeon. He had already acquired a considerable reputation in physiological research. The ship to which he was appointed was ordered to China, and he found opportunities during the voyage for indulg- ing his passion for exploration, making a journey from Rio de Janeiro to the base of the Andes, and another from Bombay through

India to Ceylon. On the arrival of the ship at its des- tination he provided a substitute for his post and crossed over to the island of Luzon, which he explored. In 1844 he left China, and, returning by India, Persia, Syria, Egypt, Greece, Austria, Germany and Switzerland, reached America in 1846. In that year he was ordered to the west coast of Africa, where he visited Dahomey, and contracted fever, which told severely on his constitution. On his return in 1847, he exchanged the naval for the military service, and was sent to join the U.S. army in Mexico, where he had some extraordinary adventures, and where he was again stricken with fever.

On the fitting out of the first Grinnell expedition, in 1850, to search for Sir John Franklin, Kane was appointed surgeon and naturalist under Lieut, de Haven, who commanded the ships " Advance " and " Rescue." The expedition, after an absence of sixteen months, during nine of which the ships were ice-bound, returned without having found any trace of the miss- ing vessels. Kane was in feeble health, but worked on at his narrative of the expedition, which was published in 1854, under the title of The U.S. Grinnell Expedition in Search of Sir John Franklin. He was determined not to give up the search for Franklin, and in spite of ill-health travelled through the States lecturing to obtain funds, and gave up his pay for twenty months. At length Henry Grinnell fitted out an expedition, in the little brig " Advance," of which Kane was given the

command. She sailed in June 1853, and passing up Smith Sound at the head of Baffin Bay advanced into the enclosed sea which now bears the name of Kane Basin, thus establishing the Polar route of many future Arctic expeditions. Here, off the coast of Greenland, the expedition passed two winters, accomplishing much useful geographical, as well as scientific, work, including the attainment of what was to remain for sixteen years the highest northern latitude, 8o° 35′ N. (June 1854). From this point a large area of open water was seen which was believed to be an " open Polar Sea," a chimera which played an important and delusive r61e in subsequent explorations. After enduring the greatest hardships it was resolved to abandon the ship, Upernivik being reached on the 5th of August 1855, whence a relief expedition brought the explorers home. Medals were authorized by Congress, and in the following year Dr Kane received the founder's medal of the Royal Geographical Society, and, two years later, a gold medal from the Paris Geographical Society. He published The Second Grinnell Expedition in 1856. Dr Kane died at Havana on the 16th of February 1857, at the age of thirty-seven. Between his first and second arctic voyages he made the acquaintance of the Fox family, the spiritualists. With one of the daughters, Margaret, he carried on a long corre- spondence, which was afterwards published by the lady, who declared that they were privately married.

See Biography of E. K. Kane, by William Elder (1858); Life of E. K. Kane and other American Explorers, by S. M. Smucker (1858) ; The Love-Life of Dr Kane, containing the Correspondence and a History of the Engagement and Secret Marriage between E. K. Kane and Margaret Fox (New York, 1866);." Discoveries of Dr Kane," in Jour, of the Roy. Geog Soc, vol. xxviii. (reprinted in R. G. S. Arctic Papers of 1875).

KANE, a borough of McKean county, Pennsylvania, U.S.A., about 90 m. E.S.E. of Erie. Pop. (1890), 2944; (1900), 5296, (971 foreign-born); (1910) 6626. It is served by the Pennsyl- vania, the Baltimore & Ohio, the Kane & Elk, and the Big Level & Kinzua railways. It is situated about 2015 ft. above the sea in a region producing natural gas, oil, lumber and silica, and has some reputation as a summer resort. The borough has manufactories of window glass, plate glass and bottles, and repair shops of the Pennsylvania railroad. Kane was settled in 1859, and was incorporated as a borough in 1887. It was named in honour of its founder Gen. Thomas L. Kane (1822- ' 1883), brother of Elisha Kent Kane.

KANGAROO, the universally accepted, though not apparently the native, designation of the more typical representatives of the marsupial family Macropodidae (see Marsupialia). Although intimately connected with the cuscuses and phalangers by means of the musk-kangaroo, the kangaroos and wallabies, together with the rat-kangaroos, are easily distinguishable from other diprotodont marsupials by their general conformation, and by peculiarities in the structure of their limbs, teeth and other organs. They vary in size from that of a sheep to a small rabbit. The head, especially in the larger species, is small, compared with the rest of the body, and tapers forward to the muzzle. The shoulders and fore-limbs are feebly developed, and the hind-limbs of disproportionate strength and magnitude, which give the animals a peculiarly awkward appearance when moving about on all-fours,- as they occasionally do when feeding. Rapid progres- sion is, however, performed only by the powerful hind-limbs, the animals covering the ground by a series of immense bounds, during which the fore part of the body is inclined forwards, and balanced by the long, strong and tapering tail, which is carried horizontally backwards. When not moving, they often assume a perfectly upright position, the tail aiding the two hind-legs to form a tripod, and the front-limbs dangling by the side of the chest. This position gives full scope for the senses of sight, hearing and smell to warn of the approach of enemies. The fore-paws have five digits, each armed with a strong, ' curved claw. The hind-foot is extremely long, narrow and (except in the musk-kangaroo) without the first toe. It consists mainly of one very large and strong toe, corresponding to the fourth of the human foot, ending in a strong curved and pointed claw

KANGAROO

(fig. 2). Close to the outer side of this lies a smaller fifth digit, and to the inner side two excessively slender toes (the second and third), bound together almost to the extremity in a common

Fig. I. — The Great Grey Kangaroo (Macropus giganteus).

integument. The two little claws of these toes, projecting to- gether from the skin, may be of use in scratching and cleaning the fur of the animal, but the toes must have quite lost all con- nexion with the functions of support or progression. This type of foot-structure is termed syndactylous.

The dental formula, when completely de- veloped, is incisors \, canines J, premolars f , molars f on each side, giving a total of 34 teeth. The three incisors of the upper jaw are arranged in a continuous arched series, and have crowns with broad cutting edges; the first or middle incisor is often larger than the others. Corresponding to these in the lower jaw is but one tooth on each side, which is of great size, directed horizontally forwards, narrow, lanceolate and pointed with sharp edges. Owing to the slight union of the two halves of the lower jaw in front in many species the two lower incisors work together like the blades of a pair of scissors. The canines are absent or rudimentary in the lower, and often deciduous at an early age in the upper jaw. The first two premolars are compressed, with cutting longitudinal edges, the anterior one is deciduous, being lost about the time the second one replaces the milk-molar, so that three premolars are never found in place and use in the same indi- vidual. The last premolar and the molars have quadrate crowns, provided with two strong transverse ridges, or with four obtuse cusps. In Macropus giganteus and its imme- diate allies, the premolars and sometimes the first molar are shed, so that in old examples only the two posterior molars and the incisors FlG f 2 ‘vK ke v t d n are found in P lace – The milk-dentition, as foot of* Kan- in otlier marsupials, is confined to a single garoo. tooth on each side of each jaw, the other

molars and incisors being never changed. The dentition of the kangaroos, functionally considered, thus consists of sharp-edged incisors, most developed near the median line of the mouth, for the purpose of cropping herbage, and ridged or tuberculated molars for crushing.

The number of vertebrae is — in the cervical region 7, dorsal 13, lumbar 6, sacral 2, caudal varying according to the length of the tail, but generally from 21 to 25. In the fore-limb the clavicle

and the radius and ulna are well developed, allowing of con- siderable

freedom of motion of the fore-paw. The pelvis has large epipubic or " marsupial " bones. The femur is short, and the tibia and fibula of great length, as is the foot, the whole of which is applied to the ground when the animal is at rest in the upright position.

The stomach is large and very complex, its walls being puc- kered by longitudinal muscular bands into a number of folds. The alimentary canal is long, and the caecum well developed. The young (which, as in other marsupials, leave the uterus in an extremely small and imperfect condition) are placed in the pouch as soon as they are born; and to this they resort temporarily for shelter for some time after they are able to run, jump and feed upon the herbage which forms the nourishment of the parent. During the early period of their sojourn in the pouch, the blind, naked, helpless young creatures (which in the great kangaroo scarcely exceed an inch in length) are attached by their mouths to the nipple of the mother, and are fed by milk injected into their stomach by the contraction of the muscle covering the mammary gland. In this stage of existence the elongated upper part of the larynx projects into the posterior nares, and so main- tains a free communication between the lungs and the external surface, independently of the mouth and gullet, thus averting danger of suffocation while the milk is passing down the gullet.

Kangaroos are vegetable-feeders, browsing on grass and various kinds of herbage, but the smaller species also eat

Fig. 3. — Skull and teeth of Bennett's Wallaby (Macropus ruficollis bennettii): i 1 , i 2 , i 3 , first, second and third upper incisors; pm, second premolar (the first having been already shed) ; m l , m % , m z , m, last premolar and three molars. The last, not fully developed, is nearly concealed by the ascending part of the lower jaw.*

roots. They are naturally timid and inoffensive, but the larger kinds when hard pressed will turn and defend themselves, sometimes killing a dog by grasping it in their fore-paws, and inflicting terrible wounds with the sharp claws of their powerful hind-legs, supporting themselves meanwhile upon the tail. The majority are inhabitants of Australia and Tasmania, forming one of the most prominent and characteristic features of the fauna of these lands, and performing the part of the deer and antelopes of other parts of the world. They were important sources of food-supply to the natives, and are hunted by the colonists, both for sport and on account of the damage they do in consuming grass required for cattle and sheep. A few species are found in New Guinea, and the adjacent islands, which belong, in the zoological sense, to the Australian province, beyond the bounds of which none occurs.

The more typical representatives of the group constitute the sub- family Macropodinae, in which the cutting-edges of the upper incisors are nearly level, or the first pair but slightly longer than the others (fig. 3). The canines are rudimentary and often wanting. The molars are usually not longer (from before backwards) than the anterior premolars, and less compressed than in the next section. The crowns of the molars have two prominent transverse ridges. The fore-limbs are small with subequal toes, armed with strong, moderately long, curved claws. Hind-limbs very long and strongly made. Head small, with more or less elongated muzzle. Ears generally rather long and ovate.

The typical genus Macropus, in which the muzzle is generally naked, the ears large, the fur on the nape of the neck usually directed backwards, the claw of the fourth hind-toe very large, and the tail stout and tapering, includes a large number of species. Among these, the great grey kangaroo (M. giganteus, fig. 1) deserves special mention on account of having been discovered during Captain Cook's first voyage in 1770. The great red kangaroo (M. rufus) is about the same size, while other large species are M. antilopinus and M. robuslus. The larger wallabies, or brush-kangaroos, such as the red-necked wallaby (M. ruficollis) constitute a group of smaller- sized species; while the smaller wallabies, such as the filander {q.v.) (M. muelleri) and M. thetidis, constitute yet another section. The genus ranges from the eastern Austro-Malay islands to New Guinea.

Nearly allied are the rock-wallabies of Australia and Tasmania, constituting the genus Petrogale, chiefly distinguished by the thinner tail being more densely haired and terminating in a tuff. Well- known species are P. penicillata, P. xanthopus and P. lateralis. The few species of nail-tailed wallabies, Onychogale, which are confined to the Australian mainland, take their name from the presence of a horny spur at the end of the tail, and are further distinguished by the hairy muzzle. 0. unguifer, O. fraenatus and 0. lunatus repre- sent the group. The hare-wallabies, such as Lagorchestes leporoides, L. hirsutus and L. consepicillatus, constitute a genus with the same distribution as the last, and likewise with a hairy muzzle, but with a rather short, evenly furred tail, devoid of a spur. They are great leapers and swift runners, mostly frequenting open stony plains.

More distinct is the Papuan genus Dorcopsis, as typified by D. muelleri, although it is to some extent connected with Macropus by D. macleyi. The muzzle is naked, the fur on the nape of the neck directed more or less completely forward, and the hind-limbs are less disproportionately

elongated. Perhaps, however, the most

Fig. 4.-Skull and teeth of Lesueuir's Rat-Kangaroo (Bettongia lesueuiri). c, upper canine. Other letters as in fig. 3. The anterior premolar has been shed.

distinctive feature of the genus is the great fore-and-aft length of the penultimate premolar in both jaws. Other species are D. rufolateralis and D. aurantiacus. In the tree-kangaroos, which include the Papuan Dendrolagus inustus, D. ursinus, D. dorianus, D. benetianus and D. maximus, and the North Queensland D. lum- holtzi, the reduction in the length of the hind-limbs is carried to a still further degree, so that the proportions of the fore and hind limbs are almost normal. The genus agrees with Dorcopsis in the direction of the hair on the neck, but the muzzle is only partially hairy, and the elongation of the penultimate premolar is less. These kangaroos are largely arboreal in their habits, but they descend to the ground to feed. Lastly, we have the banded wallaby, Lago- strophus fasciatus, of Western Australia, a small species character- ized by its naked muzzle, the presence of long bristles on the hind- feet which conceal the claws, and also of dark transverse bands on the lower part of the back. The skull has a remarkably narrow and pointed muzzle and much inflated auditory bullae; v/hile the two halves of the lower jaw are firmly welded together at their junction, thus effectually preventing the scissor-like action of the lower incisors distinctive of Macropus and its immediate allies. As regards the teeth, canines are wanting, and the penultimate upper premolar is short, from before backwards, with a distinct ledge on the inner side.

In the rat-kangaroos, or kangaroo-rats, as they are called in Australia, constituting the sub-family Potoroinae, the first upper incisor is narrow, curved, and much exceeds the others in length; the upper canines are persistent, flattened, blunt and slightly curved, and the first two premolars of both jaws have large, simple, com- pressed crowns, with a nearly straight or slightly concave free cut- ting-edge, and both outer and inner surfaces usually marked by a series of parallel, vertical groovesand ridges. Molars with quadrate crowns and a blunt conical cusp at each corner, the last notably smaller than the rest, sometimes rudimentary or absent. Fore- feet narrow ; the three middle toes considerably exceeding the first and fifth in length and their claws long, compressed and but slightlv curved. Hind-feet as in Macropus. Tail long, and some- times partially prehensile when it is used for carrying bundles of

grass with which these animals build their nests. The group is confined to Australia and Tasmania, and all the species are rela- tively small.

In the members of the typical genus Potorous (formerly known as

Hypsiprymnus) the head is long and slender, with the auditory bullae somewhat swollen ; while the ridges on the first two premolars are few and perpendicular, and there are large vacuities on the palate. The tarsus is short and the muzzle naked. The genus includes P. tridactylus, P. gilberti and P. platyops. In Bettongia, on the other hand, the head is shorter and wider, with smaller and more rounded ears, and more swollen auditory bullae. The ridges on the first two premolars are also more numerous and somewhat oblique (fig. 4) ; the tarsus is long and the tail is prehensile. The species include B. lesueuiri, B. gaimardi and B. cuniculus. The South Australian Caloprymnus campestris represents a genus near akin to the last, but with the edge of the hairy border of the bare muzzle less emarginate in the middle line, still more swollen auditory bullae, very large and posterially expanded nasals and longer vacuities on the palate. The list is completed by Aepyprymnus rufescens, which differs from all the others by the hairy muzzle, and the absence of inflation in the auditory bullae and of vacuities in the palate.

Perhaps, however, the most interesting member of the whole group is the tiny musk-kangaroo (Hypsiprymnodon moschatus) of north-east Australia, which alone represents the sub-family Hypsiprymnodontinae, characterized by the presence of an opposable first toe on the hind-foot and the outward inclination of the penulti- mate upper premolar, as well by the small and feeble claws. In all these features the musk-kangaroo connects the Macropodidae with the Phalangeridae. The other teeth are like those of the rat- kangaroos. (W. H. F. ; R. L.)*

KANGAROO-RAT, a name applied in different parts of the world to two widely different groups of mammals. In Australia it is used to denote the small kangaroo-like marsupials techni- cally known as Potoroinae, which zoologists prefer to call rat- kangaroos (see Marsupialia and Kangaroo). In North America it is employed for certain small jumping rat-like rodents nearly allied to the pocket-gophers and belonging to the family Geomyidae. Kangaroo-rats in this latter series are represented by three North American genera, of which Dipodomys phillipsi, Cricetodipus agilis and Microdipodops megacephalus may respec- tively be taken as examples. Resembling pocket-gophers in the possession of cheek-pouches, kangaroo-rats, together with pocket-mice, are distinguished by their elongated hind-limbs and tails, large eyes, well-developed ears and general jerboa-like appearance and habits. The upper incisor teeth are also rela- tively narrower, and there are important differences in the skull. The cheek-teeth are rootless in kangaroo-rats, but they develop roots in the pocket-mice. The former inhabit open, sandy districts, where they burrow beneath rocks or stones, and hop about like jerboas; their food consisting of grasses and other plants.

KANGAVAR, a small district of Persia, situated between Hamadan and Kermanshah, and, being held in fief by the family of a deceased court official, forming a separate government. The district is very fertile and contains 30 villages. Its revenues amount to about £500 per annum, and its chief place is the large village of Kangavar, which has a population of about 2500 and is 47 m. from Hamadan on the high road to Kermanshah.

KANGRA, a town and district of British India, in the Tullundur division of the Punjab. The town, sometimes called Nagarkot, is situated 2409 ft. above the sea. Pop. (1901), 4746. The Katoch rajas had a stronghold here, with a fort and rich temples. Mahmud of Ghazni took the fort in 1009 and from one of the temples carried off a vast treasure. In 1360 Kangra was again plundered, by Feroz Shah. The temple of Devi Bajreshri was one of the oldest and wealthiest in northern India. It was de- stroyed, together with the fort and the town, by an earthquake on the 4th of April 1905, when 1339 lives were lost in this place alone, and about 20,000 elsewhere. In 1855 the headquarters of the district were removed to the sanitarium of Dharmsala.

The district of Kangra extends from the Jullundur Doab far into the southern ranges of the Himalaya. Besides some Rajput states, annexed after the Sikh wars, it includes Lahul, Spiti and Kulu, which are essentially Tibetan. The Beas is the only important river. Area, 9978 sq. m., of which Kangra proper has only 2725. Pop. (1901), 768,124; average density 77 persons per sq. m., but with only one person per sq. m. in Spiti.. Tea

cultivation was introduced into Kangra about 1830. The Palampur fair, established by government with a view to foster- ing commerce with central Asia, attracts a small concourse of Yarkandi merchants. The Lahulis carry on an enterprising trade with Ladakh and countries beyond the frontier, by means of pack sheep and goats. Rice, tea, potatoes, opium, spices, wool and honey are the chief exports.

See Kangra District Gazetteer (Lahore, 1906).

KANISHKA, king of Kabul, Kashmir, and north-western India in the 2nd century a.d., was a Tatar of the Kushan tribe, one of the five into which the Yue-chi Tatars were divided. His dominions extended as far down into India as Madura, and probably as far to the north-west as Bokhara. Private inscrip- tions found in the Punjab and Sind, in the Yusufzai district and at Madura, and referred by European scholars to his reign, are dated

in the years five to twenty-eight of an unknown era. It is the references by Chinese historians to the Yue-chi tribes before their incursion into India, together with conclusions drawn from the history of art and literature in his reign, that render the date given the most probable. Kanishka's predecessors on the throne were Pagans; but shortly after his accession he professed himself, probably from political reasons, a Buddhist. He spent vast sums in the construction of Buddhist monuments; and under his auspices the fourth Buddhist council, the council of Jalandhara (Jullunder) was convened under the presidency cf Vasumitra. At this council three treatises, commentaries on the Canon, one on each of the three baskets into which it is divided, were composed. King Kanishka had these treatises, when completed and revised by Asvaghosha, written out on copper plates, and enclosed the latter in stone boxes, which he placed in a memorial mound. For some centuries afterwards these works survived in India; but they exist now only in Chinese translations or adaptations. We are not told in what language they were written. It was probably Sanskrit (not Pali, the language of the Canon) — just as in Europe we have works of exegetical commentary composed, in Latin, on the basis of the Testament and Septuagint in Greek. This change of the language used as a medium of literary inter- course was partly the cause, partly the effect, of a complete re- vulsion in the intellectual life of India. The reign of Kanishka was certainly the turning-point in this remarkable change. It has been suggested with great plausibility, that the wide extent of his domains facilitated the incursion into India of Western modes of thought ; and thus led in the first place to the corruption and gradual decline of Buddhism, and secondly to the gradual rise of Hinduism. Only the publication of the books written at the time will enable us to say whether this hypothesis — for at present, it is nothing more — is really a sufficient explanation of the very important results of his reign. In any case it was a migration of nomad hordes in Central Asia that led, in Europe, to the downfall of the Roman civilization; and then, through the conversion of the invaders, to medieval conditions of life and thought. It was the very same migration of nomad hordes that led, in India, to the downfall of the Buddhist civilization; and subsequently, after the conversion of the Saka and Tatar invaders, to medieval Hinduism. As India was nearer to the starting-point of the migration, its results were felt there some- what sooner.

Authorities. — Vincent A. Smith, The Early History of India (Oxford, 1908) ;" The Kushan Period of Indian History," in J.R. A. S. (1903); M. Boyer, " L'fipoque de Kaniska," in Journal Asiatique (1900) ; T. Watters, On Yuan Chwang (London, 1904, 1905) ; J. Taka- kusu, " The Sarvastivadin Abhidharma Books," in Jour, of the Pali Text Soc. (1905), esp. pp. 118-130; Rhys Davids, Buddhist India (London, 1903), ch. xvi., " Kanishka." (T. W. R. D.)

KANKAKEE, a city and the county-seat of Kankakee county, Illinois, U.S.A., in the N.E. part of the state, on the Kankakee river, 56 m S. of Chicago. Pop. (1900), 13,595, of whom 3346 were foreign-born; (iqio census), 13,986. Kankakee is served by the Cleveland, Cincinnati, Chicago & St Louis, the Illinois Central, and the Chicago, Indiana & Southern (controlled by the New York Central) railways. It is the seat of the Eastern Hospital for the Insane (1879) a state institution;

St Joseph's Seminary (Roman Catholic) and a Conservatory of Music. At Bourbonnais Grove, 3 m. N. of Kankakee is St Viateur's College (founded 1868), a well-known Roman Catholic divinity school, and Notre Dame Academy, another Catholic institution. The city has a public library and four large parks; in Court House Square there is a monument erected by popular subscription in honour of the soldiers from Kankakee county who died in the Civil War. There are rock quarries here, and the city manufactures sewing machines, musical instruments, especially pianos, foundry and machine shop products, agri- cultural implements and furniture. The total value of the factory product in 1905 was $2,089,143, an increase of 222 % since 1900. Kankakee is also a shipping point for agricultural products. It was first settled in 1832; was platted as the town of Bourbonnais in 1853, when Kankakee county was first organized; was chartered as the city of Kankakee in 1855, and was re-chartered in 1892.

KANKER, a feudatory state of India, within the Central Provinces; area, 1429 sq. m.; pop. (1901), 103,536; estimated revenue, £10,000. It is a hilly tract, containing the headwaters of the Mahanadi. The extensive forests have recently been made profitable by the opening of a branch railway. The residence of the raja, who is of an old Rajput family though ruling over (Gonds, is at Ranker (pop. 3906).

KANO, one of the most important provinces of the British protectorate of Northern Nigeria. It includes the ancient emirates of Kano, Katsena, Daura and Kazaure, and covers an area of about 31,000 sq. m. The sub-province of Katagum was incorporated with Kano in 1905, and is included within this area. The population of the double province is estimated at about

2,250,000.

Kano was one of the original seven Hausa states. Written annals carry the record of its kings back to about a.d. 900. Legendary history goes back much further. It was conquered by the Songhoi (Songhay) in the early part of the 16th century, and more than once appears to have made at least partial sub- mission to Bornu. Mahommedanism was introduced at a period which, according to the system adopted for the dating of the annals, must be placed either in the i2thor the 14th century. The Hausa system of

government and taxation was adopted by the Fulawheninthe early part of the 19th century that Mahommedan people overran the Hausa states. It has been erroneously stated that the Fula imposed Mahommedanism on the Hausa states. The fact that they adopted the existing system of government and taxation, which are based upon Koranic law, would in itself be sufficient proof that this was not the case. But the annals of Kano distinctly record the introduction and describe the develop- ment of Mahommedanism at an early period of local history.

The capital is the city of Kano, situated in 1 2° N. and 8° 20′ E., 220 m. S.S.E. of Sokoto and 500 N.E. of Lagos. It is built on an open plain, and is encompassed by a wall n m. in perimeter and pierced by thirteen gates. The wall is from 30 to 50 ft. high and about 40 ft. thick at the base. Round the wall is a deep double ditch, a dwarf wall running along its centre. The gates are simply cow-hide, but are set in massive entrance towers. Only about a third of the area (71 sq. m.) enclosed by the walls is inhabited nor was the whole space ever occupied by buildings, the intention of the founders of the city being to wall in ground sufficient to grow food for the inhabitants during a siege. The arable land within the city is mainly on the west and north; only to the south-east do the houses come right to the walls. Within the walls are two steep hills, one, Dala, about 120 ft. high being the most ancient quarter of the town. Dala lies north-west. To its east is a great pond, the Jakara, 15 m. long, and by its north- east shore is the market of the Arab merchants. Here also was the slave market. The palace of the emir, in front of which is a large open space, is in the Fula quarter in the south-east of the city. The palace consists of a number of buildings covering 33 acres and surrounded by a wall 20 to 30 ft. high. The architecture of the city is not without merit. The houses are built of clay with (generally) flat roofs impervious to fire. Traces of Moorish influence are evident and the horseshoe arch is common. The

audience hall of the emir's palace — 25 ft. sq. and 18 ft. high — -is decorated with designs in black, white, green and yellow, the yellow designs (formed of micaceous sand) glistening like gold. The dome-shaped roof is supported by twenty arches.

The city is divided into fourteen quarters, each presided over by a headman, and inhabited by separate sections of the com- munity. It is probably the greatest commercial city in the central Sudan. Other towns, like Zaria, may do as much trade, but Kano is pre-eminent as a manufacturing centre. The chief industry is the weaving of cloth from

native grown cotton. Leather goods of all kinds are also manufactured, and from Kano come most of the " morocco leather " goods on the European markets. Dyeing is another large trade, as is the preparation of indigo. Of traders there are four distinct classes. They are:

(1) Arabs from Tripoli, who export ostrich feathers, skins and ivory, and bring in burnouses, scents, sweets, tea, sugar, &c;

(2) Salaga merchants who import kola nuts from the hinterland of the Guinea Coast, taking in exchange cloth and live stock and leather and other goods; (3) the Asbenawa traders, who come from the oases of Asben or Air with camels laden with salt and " potash " (i.e. sodium carbonates), and with herds of cattle and sheep, receiving in return cotton and hardware and kolas; (4) the Hausa merchants. This last class trades with the other three and despatches caravans to Illorin and other places, where the Kano goods, the " potash " and other merchandise are ex- changed for kolas and European goods. The " potash " finds a ready sale among the Yorubas, being largely used for cooking purposes. In Kano itself is a great market for livestock: camels, horses, oxen, asses and goats being on sale.

Besides Hausa, who represent the indigenous population, there are large colonies of Kanuri (from Bornu) and Nupians in Kano. The Fula form the aristocratic class. The population is said to amount to 100,000. About a mile and a half east of Kano is Nassarawa, formerly the emir's suburban residence, but since 1902 the British Residency and barracks.

The city of Kano appears on the map of the Arab geographer, Idrisi, a.d. 1145, and the hill of Dala is mentioned in the earliest records as the original site of Kano. Barth, however, concluded that the present town does not date earlier than the second half of the 16th century, and that before the rise of the Fula power (c. 1800) scarcely any great Arab merchant ever visited Kano. The present town may be the successor of an older town occupying a position of similar pre-eminence. Kano submitted to the Fula without much resistance, and under them in the first half of the 19th century flourished greatly. It was visited by Hugh Clapperton, an English officer, in 1824, and in it Barth lived some time in 185 1 and again in 1854. Barth 's descriptions of the wealth and importance of the city attracted great attention in Europe, and Kano was subsequently visited by several travellers, missionaries, and students of Hausa, but none was permitted to live permanently in the city. In the closing years of the century, Kano became the centre of resistance to British influence, and the emir, Alieu, was the most inveterate of Fula slave raiders. In February 1903 the city was captured by a British force under Colonel T. L. N. Morland, and a new emir, Abbas, a brother of Alieu, installed.

After the occupation by the British in 1903 the province was organized for administration on the same system as that adopted throughout northern Nigeria. The emir on his installation takes an oath of allegiance to the British Crown, and accepts the position of a chief of the first class under British rule. A resident is placed at his court, and assistant residents have their headquarters in the administrative districts of the province. British courts of justice are established side by side with the native courts throughout the province. Taxation is assessed under British supervision and paid into the native treasury. A fixed portion is paid by the emir to the British government. The emir is not allowed to maintain a standing army, and the city of Kano is the headquarters of the British garrison. The conditions of appointment of the emirs are fully laid down in the terms accepted at Sokoto on the close of the Sokoto-Kano campaign of 1903. Since the introduction of British rule there has been no serious trouble in the province. The emir Abbas worked loyally with the British and proved himself a ruler of remarkable ability and intelligence. He was indefatigable in dispensing justice, and himself presided over a native court in which he disposed of from fifty to a hundred cases a month. He also took an active in- terest in the reform and reorganization of the system of taxation, and in the opening of the country to trade. He further showed him- self helpful in arranging difficulties which at times arose in connexion with the lesser chiefs of his province.

The province of Kano is generally fertile. For a radius of 30 m. round the capital the country is closely cultivated and densely

populated, with some 40 walled towns and with villages and hamlets hardly half a mile apart. Kano district proper contains 170 walled towns and about 450 villages. There are many streams, but water is chiefly obtained from wells 15 to 40 ft. deep. The principal crops are African grains, wheat, onions, cotton, tobacco, indigo, with sugar-cane, cassava, &c. The population is chiefly agricultural, but also commercial and industrial. The chief industries are weaving, leather-making, dyeing and working in iron and pottery. Cattle are abundant. (See Nigeria: History; and Sokoto.)

Consult the Travels of Heinrich Barth (new ed., London, 1890); Hausaland, by C. H. Robinson (London, 1896); Northern Nigeria, by Sir F. D. Lugard, in vol. xxii. Geographical Journal (London, 1904) ; A Tropical Dependency, by Lady Lugard (London, 1905) ; the Colonial Office Reports on Northern Nigeria from 1902 onward, and other works cited under Nigeria. (F. L. L.)

KANSAS (known as the "Sunflower State"), the central commonwealth of the United States of America, lying between 37° and 40 N. lat. and

between 94 38′ and 102 1′ 34″ W. long. (i.e. 25 W. long, from Washington). It is bounded on the N. by Nebraska, on the E. by Missouri, on the S. t>y Oklahoma, and on the W. by Colorado. The state is nearly rectangular in shape, with a breadth of about 210 m. from N. to S. and a length of about 410 m. from E. to W. It contains an area of 82,158 sq. m. (including 384 sq. m. of water surface).

Physiography. — Three physiographic regions may be distin- guished within the state — the first, a small portion of the Ozark uplift in the extreme south-east corner; the second, the Prairie Plains, covering approximately the east third of the state; the third, the Great Plains, covering the remaining area. Between the lattertwo there is only the most gradual transition. The entire state is indeed practically an undulating plain, gently sloping from west to east at an average of about 7 ft. per mile. There is also an inclination in the eastern half from north to south, as indicated by the course of the rivers, most of which flow south-easterly (the Kansas, with its general easterly course, is the principal exception), the north-west corner being the highest portion of the state. The lowest point in the state in its south-east part, in Montgomery county, is 725 ft. above sea level. The average elevation of the east boundary is about 850 ft., while contour lines of 3500-3900 ft. run near the west border. Some- what more than half the total area is below 2000 ft. The gently rolling prairie surface is diversified by an endless suc- cession of broad plains, isolated hills and ridges, and moderate valleys. In places there are terraced uplands, and in others the undulating plain is cut by erosion into low escarpments. The bluffs on the Missouri are in places 200 ft. high, and the valley of the Cimarron, in the south-west, has deep cuts, almost gorges. The west central portion has considerable irregularities of contour, and the north-west is distinctively hilly. In the south- west, below the Arkansas river, is an area of sandhills, and the Ozark Plateau region, as above stated, extends into the south- east corner, though not there much elevated. The great central valley is traversed by the Kansas (or Kaw) river, which, inclusive of the Smoky Hill Branch, extends the entire length of the state, with lateral valleys on the north. Another broad valley is formed in the south half of the state by the Arkansas river, with lateral valleys on the north and south. The south-east portion contains the important Neosho and smaller valleys. In the extreme south- west is the valley of the Cimarron, and along the south boundary is a network of the south tributaries of the Arkansas. Numerous small affluents of the Missouri enrich and diversify the north-east quarter. The streams of Kansas are usually fed by perennial springs, and, as a rule, the east and middle portions of the state are well watered. Most of the streams maintain a good flow of water in the driest seasons, and in case of heavy rains many of them ” underflow ” the adjacent bottom lands, saturating the permeable substratum of the country with the surplus water, which in time

drains out and feeds the subsiding streams. This feature is particularly true of the Saline, Solomon and Smoky Hill rivers. The west part is more elevated and water is less abundant.

Climate. — The climate of Kajisas is exceptionally salubrious. Extremes of heat and cold occur, but as a rule the winters are dry and mild, while the summer heats are tempered by the perpetual prairie breezes, and the summer nights are usually cool and refresh- ing. The average annual temperature of the state for seventeen years preceding 1903 was 54-3° F. > the warmest mean being 56-0°, the

coldest 52-6°. The extreme variation of yearly means throughout the east, west and middle sections during the same period was very slight, 51 '6° to 566°, and the greatest variation for any one section was 37°. The absolute extremes were 1 16 and —34°. The dryness of the air tempers exceedingly to the senses the cold of winter and the heat of summer. The temperature over the state is much more uniform than is the precipitation, which diminishes somewhat regularly westward. In the above period of seventeen years the yearly' means in the west section varied from 1 1 '93 to 20/21 in. (av. 19/21), in the middle from i8'58 to 34/30 (av. 26'68), in the east from 26-00 to 45-71 (av. 34-78); the mean for the state ranging from 20'I2 to 3550 (av. 27"I2). J The precipitation in the west is not sufficient for confident agriculture in any series of years, since agriculture is practically dependent upon the mean fall ; a fact that has been and is of profound importance in the history of the state. The line of 20 in. fall (about the limit of certain agriculture) approximately bisects the state in dry years. The precipitation is very largely in the growing season — at Dodge the fall between April and October is 78 % of that for the year. Freshets and droughts at times work havoc. The former made notable 1844 and 1858; and the latter i860, 1874 and 1894. Tornadoes are also a not infrequent infliction, least common in the west. The years 1871, 1879, 1881 and 1892 were made memorable by particularly severe storms. There are 150 to 175 " growing days " for crops between the frosts of spring and autumn, and eight in ten days are bright with sunshine — half of them without a cloud. Winds are prevailingly from the south (in the winter often from the north-west).

Fauna and Flora. — The fauna and flora of the state are those which are characteristic of the plain region generally of which Kansas is a part. The state lies partly in the humid, or Carolinian, and partly in the arid, or Upper Sonoran, area of the Upper Austral life-zone; ioo° W. long, is

approximately the dividing line between these areas. The bison and elk have disappeared. A very great variety of birds is found within the state, either as residents or as visitants from the adjoining avifaunal regions — mountain, plain, northern and southern. In 1886 Colonel N. S. Goss compiled a list of 335 species, of which 175 were known to breed in the state. The wild turkey, once abundant, was near extermination in 1886, and prairie chickens (pinnated grouse) have also greatly diminished in number. The jack-rabbit is characteristic of the prairie. Locusts (" grasshoppers " in local usage) have worked incalculable damage, notably in 1854, 1866, and above all in 1 874-1 875. In the last two cases their ravages extended over a great portion of the state.

Kansas has no forests. Along the streams there is commonly a fringe of timber, which in the east is fairly heavy. There is an in- creasing scarcity westward.. With the advancing settlement of the state thin wind-break rows become a feature of the prairies. The lessened ravages of prairie fires have facilitated artificial afforesting, and many cities, in particular, are abundantly and beautifully shaded. Oaks, elms, hickory, honey-locusts, white ash, sycamore and willows, the rapid growing but miserable box-elder and cotton- wood, are the most common trees. Black walnut was common in the river valleys in Territorial days. The planting of tree reserves by the United States government in the arid counties of this state promises great success. A National Forest of 302,387 acres in Finney, Kearney, Hamilton and Grant counties was set aside in May 1908. Buffalo and bunch, and other short native prairie grasses, very nutritious ranging food but unavailable as hay, once covered the plains and pastured immense herds of buffalo and other animals, but with increasing settlement they have given way gener- ally to exotic bladed species, valuable alike for pasture and for hay, except in the western regions. The hardy and ubiquitous sunflower has been chosen as the state flower or floral emblem. Cactus and yucca occur in the west.

The soil of the upland prairies is generally a deep rich clay loam of a dark colour. The bottom lands near the streams are a black sandy loam; and the intermediate lands,, or "second bottoms," show a rich and deep black loam, containing very little sand. These soils are all easily cultivated, free from stones, and exceedingly productive. There are exceptional spots on the upland prairies composed of stiff clay, not as easily cultivated, but very productive when properly managed and enriched. The south-west section is distinctively sandy.

A griculture. — The United States Census of 1900 shows that of the farming area of the state in 1900 (41,662,970 acres, 79'6 % of the total area), 6o'i % was " improved." The value of all farm property was §864,100,286 — of which land and improvements (including buildings),

livestock and implements and machinery represented respectively 745, 22-1 and 3‘4 %. Almost nine-tenths of all farms derived their principal income from livestock or hay and grain, these two sources being about equally important. Of the total value of farm products in 1899 ($209,895,542), crops represented 537, animal products 45‘9 and forest products only o – 4 %. In 1899 the wheat crop was 38,778,450 bushels, being less than that of Minnesota, North Dakota, Ohio or South Dakota. According to

‘For the thirty years 1877-1906 the mean rainfall for ten-year periods was: at Dodge, 22‘8 in., i8‘4 in. and 227 in.; and at Law- rence, 351 in., 30‘2 in. and 367 in. for the first, second and third periods respectively.

the Year Book of the United States Department of Agriculture, the crop in 1906 was 81,830,611 bushels, almost one-ninth of the crop of the entire country for that year, and much more than the crop of any other state. In 1909 it was 87,203,ooobushels (lessthanthe crops of either Minnesota or North Dakota). Winter wheat constitutes almost the entire output. The hard varieties rank in the flour market with the finest Minnesota wheat. The wheat belt crosses the state from north to south in its central third. Greater even than wheat in absolute output, though not relatively to the output of other states, is Indian corn. In 1906 the crop was 195,075,000 bushels, and in 1909 it was 154,225,000. The crop is very variable, according to seasons and prospective markets; ranging e.g. in the decade 1892- 1901 from 426 (1901) to225’l (1899) million bushels. The Indian corn belt is mainly in the eastern third of the state. In the five years 1 896-1900 the combined value of the crops of Indian corn and wheat exceeded the value of the same crops in any other state of the Union (Illinois being a close second). In the western third irrigation has been tried, in the earlier years unsuccessfully; in all Kansas, in 1899, there were 23,620 acres irrigated, of which 8939 were in Finney and 7071 in Kearney county. In this western third the rainfall is insufficient for Indian corn ; but Kafir corn, an exceptional drought-resisting cereal, has made extraordinary progress in this region, and indeed generally over the state, since 1893, its acreage increasing 4l6”i % in the decade 1895-1904. With the saccharine variety of sorghum, which increased greatly in the same period, this grain is replacing Indian corn. Oats are the third great cereal crop, the yield being 24,780,000 bushels in 1906 and 27,185,000 in 1909. Alfalfa showed an increased acreage in 1895-1904 of 3I0‘8 %; it is valuable in the west for the same qualities as the Kafir corn. The hay crop in 1909 was 2,652,000 tons. Alfalfa, the Japanese soy bean and the wheat fields — which furnish the finest of pasture in the early spring and ordinarily well into the winter season — are the props of a prosperous dairy industry. In the early ‘eighties the organization of creameries and cheese factories began in the county-seats; they depended upon gathered cream. About 1889 separators and the whole-milk system were introduced,

and about the same time began the service of refrigerator cars on the railways ; the hand separator became common about 1901. Western Kansas is the dairy country. Its great ranges, whose insufficient rainfall makes impossible the certain, and therefore the profitable, cultivation of cereals, or other settled agriculture, lend themselves with profit to stock and dairy farming. Dairy products increased 606 % in value from 1895 to 1904, amounting in the latter year to $16,420,095. This value was almost equalled by that of eggs and poultry ($14,050,727), which increased 79-7 % in the same decade. The livestock interest is stimulated by the enormous demand for beef-cattle at Kansas City.

Sugar-beet culture was tried in the years following 1 890 with indifferent success until the introduction of bounties in 1901. It has extended along the Arkansas valley from the Colorado beet district and into the north-western counties. There is a large beet- sugar factory at Garden City, Finney county. Experiments have been made unsuccessfully in sugar cane (1885) and silk culture (1885 seq.). The bright climate and pure atmosphere are admirably adapted to the growth of the apple, pear, peach, plum, grape and cherry. The smaller fruits also, with scarce an exception, flourish finely. The fruit product of Kansas ($2,431,773 in 1899) is not, however, as yet particularly notable when compared with that of various other states.

According to the estimates of the state department of agriculture, of the total value of all agricultural products in the twenty years 1885-1904 ($3,078,999,855), Indian corn and wheat together represented more than two-fifths (821 '3 and 518T million dollars respectively), and livestock products nearly one-third (1024-9 millions). The aggregate value of all agricultural products in 1903- 1904 was $754,954,208.

Minerals. — In the east portion of the state are immense beds of bituminous coal, often at shallow depths or cropping out on the surface. In 1907 more than 95 % of the coal came from Crawford, Cherokee, Leavenworth and Osage counties, and about 91 "5 % from the first two. The total value of the production of coal in 1905 (6,423,979 tons) was $9,350,542, and in 1908 (6,245,508 tons) $9,292,222. In the central portion, which belongs to the Triassic formation, magnesian limestone, ferruginous sandstone and gypsum are representative rocks. Gypsum (in beautiful crystalline form) is found in an almost continuous bed across the state running north- east and south-west with three principal areas, the northern in Marshall county, the central in Dickinson and Saline counties, and the southern (the heaviest, being 3 to 40 ft. thick) in Barber and Comanche counties. The product in 1908 was valued at $281,339. Magnesian limestone, or dolomite, is especially plentiful along the Blue, Republican and Neosho rivers and their tributaries. This beautiful stone,

resembling white, grey and cream-coloured marble, is exceedingly useful for building purposes. It crops out in the bluffs in endless quantities, and is easily worked. The stone resources of the state are largely, but by no means exclusively, confined to the central part. There are marbles in Osage and other counties, shell marble in Montgomery county, white limestone in Chase county, a valuable bandera flagstone and hydraulic cement rock near Fort Scott, &c. The limestones produced in 1908 were I valued at $403,176 and the sandstones at $67,950. In the central

region salt is produced in immense quantities, within a great north to south belt about Hutchinson. The beds, which are exploited by the brine method at Hutchinson, at Ellsworth (Ellsworth county), at Anthony (Harper county) and at Sterling (Rice county), lie from 400 to 1200 ft. underground, and are in places as much as 350 ft. thick and 99 % pure. At- Kanopolis in Ellsworth county, at Lyons in Rice county and at Kingman, Kingman county, the salt is mined and sold as rock-salt. In the south-west salt is found in beds and dry incrustations, varying in thickness from a few inches to 2 ft. The total product from 1880-1899 was valued at $5,538,855; the product of 1908 (when Kansas ranked fourth among the states producing salt) was valued at $882,984. The development has been mainly since 1887 at Hutchinson and since about 1890 in the rock-salt mines. In the west portion of the state, which belongs to the Cretaceous formation, chalks and a species of native quicklime are very prominent in the river bluffs. The white and cream-coloured chalks are much used for building purposes, but the blue is usually too soft for exposure to the weather. The quicklime as quarried from the bluffs slakes perfectly, and with sand makes a fairly good mortar, without calcination or other previous preparation. The lignite found near the Colorado line makes a valuable domestic fuel.

Natural gas, oil, zinc and lead have been discovered in south-east Kansas and have given that section an extraordinary growth and prosperity. Indications of gas were found about the time of the Civil War, but only in the early 'seventies were they recognized as unmistakable, and they were not successfully developed until the 'eighties. Iola, in Allen county, is the centre of the field, and the gas yields heat, light, and a cheap fuel for smelters, cement-works and other manufacturing plants throughout a large region. The pools lie from 400 to 950 ft. below the surface; some wells have been drilled 1500 ft. deep. The value of the natural gas produced in the state was $15,873 in 1889, $2,261,836 in 1905 and $7,691,587 in 1908, when there were 1917 producing wells, and Kansas ranked fourth of

the states of the United States in the value of the natural gas product, being surpassed by Pennsylvania, West Virginia and Ohio. Petroleum was discovered about 1865 in Miami and Bourbon counties, and about 1892 at Neodesha, Wilson county. There was only slight commercial exploitation before 1900. The production increased from 74,714 barrels in that year to 4,250,779 in 1904; in 1908 it was 1,801,781 barrels. Chanute has been the most active centre of production. The field was prospected here in the 'nineties, but developed only after 1900. In 1877 an immense deposit of lead was discovered on land now within the limits of Galena. Rich zinc blendes were at first thrown away among the by-products of the lead mines. After the discovery of their true nature there was a slow development, and at the end cf the century a notable boom in the fields. From 1876 to 1897 the total value of the output of the Galena field was between $25,000,000 and $26,000,000; but at present Kansas is far more important as a smelter than as a miner of zinc and lead, and in 1906 58% of all spelter produced in the United States came from smelters in Kansas. In 1908 the mines' output was 2293 tons of lead valued at $192,612 and 8628 tons of zinc valued at $811,032. Pottery, fire, ochre and brick clays are abundant, the first two mainly in the eastern part of the state. Coffeyville has large vitrified brick interests. In 1908 the total value of all the mineral products (incompletely reported) of Kansas was $26,162,213.

Industry and Trade. — Manufactures are not characteristic of the state. The rank of the state in manufactures in 1900 was sixteenth and in farm products Seventh in the Union. The value of the manufactured product in 1900, according to the Twelfth United States Census, was $172,129,398, an increase of 56-2% over the output of 1890; of this total value, the part representing establish- ments under the " factory system " was $154,008,544,' and in 1905 the value of the factory product was $198,244,992, an increase of 28-7%. Kansas City, Topeka, Wichita, Leavenworth and Atchison were the only cities which had manufactures whose gross product was valued in 1905 at more than $3,000,000 each; their joint pro- duct was valued at $126,515,804, and that of Kansas City alone was $96,473,050, almost half the output of the state. The most impor- tant manufacturing industry, both in 1900 and in 1905, was slaugh- tering and meat-packing — for which Kansas City is the second centre of the country — with a product for the state valued at $77,411,883 in 1900, and $96,375,639 in 1905; in both these years the value of the product of Kansas was exceeded only by that of Illinois. The flour and grist mill industry ranked next, with a product valued at $21,328,747 in 1900 and nearly twice that amount, $42,034,019, in 1905. In 1900 a quarter of the wheat crop was handled by the mills of the state. Lesser manufacturing interests are railway shop construction (value in 1905, $11,521,144); zinc smelting and refining (value in 1905,

$10,999,468) ; the manufacture of cheese, butter and condensed milk (value in 1905, $3,946,349); and of foundry and machine shop products (value in 1905, $3,756,825).

1 All subsequent figures in this paragraph for manufactures in 1900 are given for establishments under the " factory system " only, so as to be comparable with statistics for 1905, which do not include minor establishments.

Communications. — Kansas is excellently provided with railways, with an aggregate length in January 1909 of 8914-77 m. (in 1870, 1880, 1890 respectively, 1,501, 3,244 and 8,710 m.). The most important systems are the Atchison, Topeka & Santa Fe, the Missouri Pacific, the Chicago, Rock Island & Pacific, the Union Pacific, the Missouri, Kansas & Texas, the Chicago, Burlington & Quincy, and the St Louis & San Francisco systems. The first train entered Kansas on the Union Pacific in i860. During the following decade the lines of the Missouri Pacific, the Missouri, Kansas & Texas and the Santa Fe were well under construction. These roads give excellent connexions with Chicago, the Gulf and the Pacific. Kansas has an eastern river front of 150 m. on the Missouri, which is navigable for steamboats of good size. The internal rivers of the state are not utilized for commercial purposes.

Population. — In population Kansas ranked in 1900 and 1910 (1,690,949) twenty-second in the Union. The decennial in- creases of population from i860 to 1900 were 239-9, I 73"4i 43"3 and 3-0%, the population in 1900 being 1,470,495, or 18 to the sq. m. 2 Of this number 22-5% lived in cities of 2500 or more inhabitants. Nine cities numbered more than 10,000 inhabi- tants: Kansas City (51,418), Topeka — the state capital (33,608), Wichita (24,671), Leavenworth (20,735), Atchison (15,722), Lawrence — the seat of the state university (10,862), Fort Scott (10,322), Galena (10,155) an d Pittsburg (10,112). The life of all of these save the last two goes back to Territorial days; but the importance of Fort Scott, like that of Galena and Pittsburg, is due to the development of the mineral counties in the south- east. Other cities of above 5000 inhabitants were Hutchinson (9379), Emporia (8223), Parsons (7682), Ottawa (6934), Newton (6208), Arkansas City (6140), Salina (6074), Argentine (5878) and Iola (5791). The number of negroes (3-5%) is somewhat large for a northern and western state. This is largely owing to an exodus of coloured people from the South in 1878-1880, at a time when their condition was an unusually hard one: an exodus turned mainly toward Kansas. The population is very largely American-born (91-4% in 1900; 47-1 % being natives of Kansas). Germans, British, Scandinavians and Russians constitute the bulk of the foreign-born. The west third of the state is compara- tively scantily populated, owing to its

aridity. In the 'seventies, after a succession of wet seasons, and again in the 'eighties, settlement was pushed far westward, beyond the limits of safe agriculture, but hundreds of settlers — and indeed many entire • communities — were literally starved out by the recurrence of droughts. Irrigation has made a surer future for limited areas, however, and the introduction of drought-resisting crops and the substitution of dairy and livestock interests in the place of agriculture have brightened the outlook in the western counties, whose population increased rapidly after 1900. The early 'eighties were made notable by a tremendous " boom " in real estate, rural and urban, throughout the commonwealth. As regards the distribution of religious sects, in 1906 there were 458,190 communicants of all denominations, and of this number 121,208 were Methodists (108,097 being Methodist Episcopalians of the Northern Church), 93ˆ195 were Roman Catholics, 46,299 were Baptists (34,975 being members of the Northern Baptist Convention and 10,011 of the National (Colored) Baptist Con- vention), 40,765 were Presbyterians (33,465 being members of the Northern Church) and 40,356 were Disciples of Christ. The German-Russian Mennonites, whose immigration became notable about 1874, furnished at first many examples of communal economy, but these were later abandoned. In 1906 the total number of Mennonites was 7445, of whom 3581 were members of the General Conference of Mennonites of North America, 1825 belonged to the Schellenberger Bruder-gemeinde, and the others were distributed among seven other sects.

2 According to the state census Kansas had in rgcj a total population of 1,544,968; nearly 28% lived in cities of 2500 or more inhabitants; 13 cities had more than 10,000 inhabitants: Kansas City (67,614). Topeka (37,641), Wichita (31,110), Leavenworth (20,934), Atchison (18,159), Pittsburg (15,012), Coffeyville (13,196), Fort Scott (12,248), Parsons (11,720), Lawrence (11,708), Hutchinson (11,215), Independence (11,206), and Iola (10,287). Other cities of above 5000 inhabitants each were: Chanute (9704), Emporia (8974), Winfield (7845), Salina (7829), Ottawa (7727), Arkansas City (7634), Newton (6601), Galena (6449), Argentine (6053), J unction City (5264) and Cherry vale (5089).

Government. — The constitution is that adopted at Wyandotte on the 29th of July 1859 and ratified by the people on the 4th of October 1859; it came into operation on the 29th of January 1861, and was amended in 1861, 1864, 1867, 1873, 1875, 1876, 1880, 1888, 1900, 1902, 1904 and 1906. An amendment may be proposed by either branch of the legislature, and, if approved by two-thirds of the members elected to each

house as well as by a majority of the electors voting on it at a general election, it is adopted. A constitutional convention to revise or amend the constitution may be called in the same manner. Universal manhood suffrage is the rule, but women may vote in school and municipal elections, Kansas being the first state to grant women municipal suffrage as well as the right to hold municipal offices (1887). General elections to state, county and township offices are biennial, in even-numbered years, and take place on the first Tuesday after the first Monday in November. The state executive officers are a governor, lieutenant-governor, secretary of state, auditor, treasurer, attorney-general' and super- intendent of public instruction, all elected for a term of two years. The governor appoints, with the approval of the Senate, a board of public works and some other administrative boards, and he may veto any bill from the legislature, which cannot thereafter become a law unless again approved by two-thirds of the members elected to each house.

The legislature, consisting of a Senate and a House of Repre- sentatives, meets in regular session at Topeka, the capital, on the second Tuesday of January in odd-numbered years. The membership of the senate is limited to 40, and that of the house of representatives to 125. Senators are elected for four years and representatives for two years. In regular sessions not ex- ceeding fifty days and in special sessions not exceeding thirty days the members of both houses are paid three dollars a day besides an allowance for travelling expenses, but they receive no compensation for the extra time of longer sessions. In 1908 a direct primary law was passed applicable to all nominations except for presidential electors, school district officers and officers in cities of less than 5000 inhabitants; like public elections the primaries are made a public charge; nomination is by petition signed by a certain percentage (for state office, at least 1%; for district office, at least 2%; for sub-district or county office, at least 3%) of the party vote; the direct nominating system applies to the candidates for the United States Senate, the nominee chosen by the direct primaries of each party being the nominee of the party.

The judicial power is vested in one supreme court, thirty-eight district courts, one probate court for each county, and two or more justices of the peace for each township. All justices are elected: those of the supreme court, seven in number, for six years, two or three every two years; those of the district courts for four years; and those of the probate courts and the justices of the peace for two years. The more important affairs of each county are managed by a board of commissioners, who are elected by districts for four years, but each county elects also a clerk, a treasurer, a probate judge, a register of deeds, a sheriff, a coroner, an attorney, a clerk of the district court, and a surveyor, and the district court for the county appoints a county auditor. The township officers, all elected for two years,

are a trustee, a clerk, a treasurer, two or more justices of the peace, two constables and one road overseer for each road district. Cities are governed under a general law, but by this law they are divided into three classes according to size, and the govern- ment is different for each class. Those having a population of more than 15,000 constitute the first class, those having a population of more than 2000 but not more than 15,000 constitute the second clas,s, and those having a population not exceeding 2000 constitute the third class. Municipal elections are far removed from those of the state, being held in odd-numbered years in April. In cities of the first class the state law requires the election of a mayor, city clerk, city treasurer, police judge and councilmen; in those of the second class it requires the election of a mayor, police judge, city treasurer, councilmen, board of education, justices of the peace and constables; and in those of the third class it requires the election of a mayor, police judge and councilmen. Several other offices provided for in each class are filled by the appointment of the mayor.

The principal grounds for a divorce in Kansas are adultery, extreme cruelty, habitual drunkenness, abandonment for one year, gross neglect of duty, and imprisonment in the penitentiary as a Felon subsequent to marriage, but the applicant for a divorce must have resided in the state the entire year preceding the presentment

of the petition. A married woman has the same rights to her property after marriage as before marriage, except that she is not permitted to bequeath away from her husband more than one- half of it without his written consent, and no will made by the husband can affect the right of the wife, if she survive him, to one-half of the property of which he died seized. Whenever a husband dies intestate, leaving a farm or a house and lot in a town or city which was the residence of the family at his death, his widow, widow and children, or children alone if there be no widow, may hold the same as a homestead to the extent of 160 acres if it be a farm, or one acre if it be a town or city lot. A homestead of this size is exempt from levy for the debts of the intestate except in case of an incumbrance given by consent of both husband and wife, or of obligations for purchase money, or of liens for making improvements, and the homestead of a family cannot be alienated without the joint consent of husband and wife. The homestead status ceases, however, whenever the widow marries again or when all the children arrive at the age of majority. An eight-hour labour law was passed in 1891 and was upheld by the state supreme court. In 1909 a law was passed for state regulation of fire insurance rates (except in the case of farmers' mutuals insuring farm property only) and forbidding local discrimination of rates within the state. In the same year a law was passed requiring that any corporation acting as a common carrier in the state. must receive the permission of the state board of railway commissioners for

the issue of stocks, bonds or other evidences of indebtedness.

The manufacture and sale of intoxicating liquors except for medical, scientific and mechanical purposes were prohibited by a constitutional amendment adopted in 1880. The Murray liquor law of 1881, providing for the enforcement of the amendment, was declared constitutional by the state supreme court in 1883. At many sessions of the legislature its enemies vainly attempted its repeal. It was more seriously threatened in 1890 by the " Original Package Decision," of the United States Supreme Court, the decision, namely, that the state law could not apply to liquor introduced into Kansas from another state and sold from the original package, such inter-state commerce being within the exclu- sive jurisdiction of Congress. That body thereupon gave Kansas the power needed, and its action was upheld by the Federal Supreme Court. The enforcement of the law has varied , however, enormously according to the locality. In 1906-1907 a fresh crusade to enforce the law was begun by the attorney-general, who brought ouster suits against the mayors of Wichita, Junction City, Pittsburg and Leavenworth for not enforcing the law and for replacing it with the " fine " system, which was merely an irregular licence. In 1907 the attorney-general's office turned its attention to outside brewing companies doing business in the state and secured injunctions against such breweries doing business in the state and the appointment of receivers of their property. The provision of the law permitting the sale of whisky for medicinal, scientific or mechanical purposes was repealed by a law of 1909 prohibiting the sale, manufacture or barter of spirituous, malt, vinous or any other intoxicating liquors within the state. The severity of this law was ascribed to efforts of the liquor interests to render it objectionable.

The constitution forbids the contraction of a state debt exceeding $1,000,000. The actual debt on the 30th of June 1908 was $605,000, which was a permanent school fund. Taxation is on the general- property system. The entire system has been — as in other states where it prevails — extremely irregular and arbitrary as regards local assessments, and very imperfect ; and the figures of total valuation (in 1880 $160,570,761, in 1890 $347,717,218, in 1906 $408,329,749, and in 1908, when it was supposed to be the actual valuation of all taxable property, $2,453,691,859), though significant of taxation methods, are not significant of the general condition or progress of the state.

Education. — Of higher educational institutions, the state supports the university of Kansas at Lawrence (1866), an agricultural college at Manhattan (1863; aided by the United States government); a normal school at Emporia (1865), a western branch of the same at Hays (1902); a manual training normal school (1903) at Pittsburg, western university (Quindaro) for negroes and the Topeka indus- trial and educational

institute (1896, reorganized on the plan of Tuskegee institute in 1900) also for negroes. The university of Kansas was organized in 1864 and opened in 1866. Its engineering department was established in 1870, its normal department in 1876 (abolished 1885), its department of music in 1877, its department of law in 1878, and the department of pharmacy ir 1885; in 1 891 the preparatory department was abolished and the university was re-organized with " schools " in place of the former " departments." In 1899 a school of medicine was established, in connexion with which the Eleanor Taylor Bell memorial hospital was erected in 1905. In 1907-1908 the university had a faculty of 211, an enrol- ment of 2063 (1361 men and 702 women) ; the university library contained 60,000 volumes and 37,000 pamphlets. An efficient com- pulsory education law was passed in 1903. Kansas ranks very high among the states in its small percentage of illiteracy (inability to write) — in 1900 only 2-9% of persons at least ten years of age; the figures for native whites, foreign whites and negroes being respectively I- 3> 8'5, 22-3. In addition to the state schools, various flourishing private or denominational institutions are maintained Tbp largest

of these are the Kansas Wesleyan University (Methodist Episcopal, 1886) at Salina and Baker University (Methodist Episcopal, 1858) at Baldwin. Among the many smaller colleges are Washburn College (Congregational, 1869) at Topeka, the Southwest Kansas College (Methodist Episcopal, opened 1886) at Winfield, the College of Em- poria (Presbyterian, 1883) at Emporia, Bethany College (Lutheran, 1 88 1) at Lindsborg, Fairmount College (non-sectarian, 1 895) at Wich- ita, St Mary 's College (Roman Catholic, i8&9)at St Mary's, and Ottawa University (Baptist, 1865) at Ottawa. At Topeka is the College of the Sisters of Bethany (Protestant Episcopal, 1861) for women. There are also various small professional schools and private normal schools. An industrial school for Indian children is maintained by the United States near Lawrence (Haskell Institute, 1 884). Among the state charitable and reformatory institutions are state hospitals for the insane at Topeka and Osawatomie and a hospital for epileptics at Parsons; industrial reform schools for girls at Beloit, for boys at Topeka, and for criminals under twenty-five at Hutchinson; a penitentiary at Lansing; a soldiers' orphans' home at Atchison and a soldiers' home at Dodge City ; and schools for feeble-minded youth at Winfield, for the deaf at Olathe, and for the blind at Kansas City. These institutions are under the supervision of a state board of control. The state contributes also to many institutions on a private basis. Most of the counties maintain poor farms and administer outdoor relief, and some care

for insane patients at the cost of the state.

History. — The territory now included in Kansas was first visited by Europeans in 1 541, when Francisco de Coronado led his Spaniards from New Mexico across the buffalo plains in search of the wealth of " Quivira," a region located by Bandelier and other authorities in Kansas north-east of the Great Bend of the Arkansas. Thereafter, save for a brief French occupation, 1719- 1725, and possibly slight explorations equally inconsequential, Kansas remained in undisturbed possession of the Indians until in 1803 it passed to the United States (all save the part west of ioo° long, and south of the Arkansas river) as part of the Louisiana Purchase. The explorations for the United States of Z. M. Pike (i8o7)andS.H. Long (1819) tended to confirm old ideas ofsandy wastes west of the Mississippi. But with the establishment of prairie commerce to Santa Fe (New Mexico), the waves of emigration to the Mormon land and to California, the growth of traffic to Salt Lake, and the explorations for a transcontinental railway, Kansas became well known, and was taken out of that mythical " Great American Desert," in which, thanks especially to Pike and to Washington Irving, it had been supposed to lie. The trade with Santa Fe began about 1804, although regular caravans were begun only about 1825. This trade is one of the most picturesque chapters in border history, and picturesque in retrospect, too, is the army of emigrants crossing the continent in " prairie schooners " to California or Utah, of whom almost all went through Kansas.

But this movement of hunters, trappers, traders, Mormons, miners and homeseekers left nothing to show of settlement in Kansas, for which, therefore, the succession of Territorial govern- ments organized for the northern portion of the Louisiana Purchase had no real significance. Before 1854 Kansas was an Indian land, although on its Indian reservations (created in its east part for eastern tribes removed thither after 1830) some few whites resided: missionaries, blacksmiths, agents, farmers supposed to teach the Indians agriculture, and land " squatters," — possibly 800 in all. Fort Leavenworth was established in 1827, Fort Scott in 1842, Fort Riley in 1853. There were Methodist (1829), Baptist, Quaker, Catholic and Presbyterian missions active by 1837. Importunities to Congress to institute a Territorial government began in 1852. This was realized by the Kansas-Nebraska Bill of 1854.

By that Act Kansas (which from 1854 to 1861 included a large part of Colorado) became, for almost a decade, the storm centre of national political passion, and her history of prime significance in the unfolding prologue of the Civil War. Despite the Mis- souri Compromise, which had prohibited slavery in the Louisiana Purchase N. of 36 30′ N. lat. (except in Missouri), slaves were living at the missions and elsewhere, among Indians

and whites, in 1854. The " popular sovereignty " principle of the Kansas-Nebraska Bill involved a sectional struggle for the new Territory. Time showed that the winning of Kansas was a question of the lightest-footed immigrant. Slaveholders were not footloose;

they had all to lose if they should carry their blacks into Kansas and should nevertheless fail to make it a slave-state. Thus the South had to establish slavery by other than actual slaveholders, unless Missouri should act for her to establish it. But Missouri did not move her slaves; while her vicinity encouraged border partisans to seek such establishment even without residence — by intimidation, election frauds and outrage. This determined at once the nature of the Kansas struggle and its outcome; and after the South had played and lost in Kansas, " the war for the Union caught up and nationalized the verdict of the Territorial broil."

In the summer of 1854 Missouri " squatters " began to post claims to border lands and warn away intending anti-slavery settlers. The immigration of these from the North was fostered in every way, notably through the New England Emigrant Aid Company (see Lawrence, A. A.), whose example was widely imi- tated. Little organized effort was made in the South to settle the Territory; Lawrence (Wakarusa) and Topeka, free-state centres, and Leavenworth, Lecompton and Atchison, pro-slavery towns, were among those settled in 1854.

At the first election (Nov. 1854), held for a delegate to Con- gress, some 1 700 armed Missourians invaded Kansas and stuffed the ballot boxes; and this intimidation and fraud was practised on a much larger scale in the election of a Territorial legislature in March 1855- The resultant legislature (at Pawnee, later, at Shawnee Mission) adopted the laws of Missouri almost en bloc, made it a felony to utter a word against slavery, made extreme pro-slavery views a qualification for office, declared death the penalty for aiding a slave to escape, and in general repudiated liberty for its opponents. The radical free-state men thereupon began the importation of rifles. All criticism of this is incon- sequent;" fighting gear " was notoriously the only effective asset of Missourians in Kansas, every Southern band in Kansas was militarily organized and armed, and the free-state men armed only under necessity. Furthermore, a free-state " government " was set up, the " bogus " legislature at Shawnee being " repu- diated." Perfecting their organization in a series of popular conventions, they adopted (Dec. 1855) the Topeka Constitution — which declared the exclusion of negroes from Kansas — elected state officials, and sent a contestant delegate to Congress. The Topeka " government " was simply a craftily impressive organization, a standing protest. It met now and then, and directed sentiment, being twice dispersed by United States troops; but it passed no laws, and did nothing that conflicted with the Territorial

government countenanced by Congress. On the other hand, the laws of the " bogus " legislature were generally ignored by the free-state partisans, except in cases (e.g. the service of a writ) where that was impossible without apparent actual rebellion against the authority of the legisla- ture, and therefore of Congress.

Meanwhile the " border war " began. During the (almost bloodless) " Wakarusa War " Lawrence was threatened by an armed force from Missouri, but was saved by the intervention of Governor Shannon. Up to this time the initiative and the bulk of outrages lay assuredly heavily on the pro-slavery side; hereafter they became increasingly common and more evenly divided. In May 1856 another Missouri force entered Lawrence without resistance, destroyed its printing offices, wrecked build- ings and pillaged generally. This was the day before the assault on Charles Sumner (

put an end to them late in 1856. (In the isolated south-eastern counties they continued through 1856-1858, mainly to the advantage of the " jay-hawkers " of free-state Kansas and to the terror of Missouri.)

The struggle now passed into another phase, in which questions of state predominate. But something may be remarked in passing of the leaders in the period of turbulence. John Brown wished to deal a blow against slavery, but did nothing to aid any conservative political organization to that end. James H. Lane was another radical, and always favoured force. He was a political adventurer, an enthusiastic, energetic, ambitious, ill-balanced man, shrewd and magnetic. He assuredly did much for the free-state cause; meek politics were not alone sufficient in those years in Kansas. The leader of the conservative free- soilers was Charles Robinson (1818-1894). He was born in Massachusetts, studied medicine at the Berkshire Medical School, and had had political experience in California, whither he had gone in 1849, and where in 1850-1852 he was a member of the legislature and a successful anti-slavery leader. In 1854 he had come to Kansas as an agent of the Emigrant Aid Company. He was the author of the Topeka government idea, or at least was its moving spirit, serving throughout as the " governor " under it; though averse to force, he would use it if necessary, and was first in command in the " Wakarusa War." His par- tisans say that he saved Kansas, and regard Lane as a fomenter of trouble who accomplished nothing. Andrew H. Reeder (1807-1864), who showed himself a. pro-slavery sympathizer as first Territorial governor, was removed from office for favour- ing the free-state party; he became a leader in the free-state cause. Every governor who followed him was forced by the

logic of events and truth tacitly to acknowledge that right lay with the free-state party. Reeder and Shannon fled the Terri- tory in fear of assassination by the pro-slavery party, with which at first they had had most sympathy. Among the pro-slavery leaders David Rice Atchison (1 807-1 886), United States Senator in 1843-1855, accompanied both expeditions against Lawrence; but he urged moderation, as always, at the end of what was a legitimate result of his radical agitation.

In June 1857 delegates were elected to a constitutional con- vention. The election Act did not provide for any popular vote upon the constitution they should form, and was passed over Governor John W. Geary's veto. A census, miserably deficient (largely owing to free-state abstention and obstruction), was the basis of apportionment of delegates. The free-state party demanded a popular vote on the constitution. On the justice of this Governor Robert J. Walker and President Buchanan were at first unequivocally agreed, and the governor promised f airplay. Nevertheless only pro-slavery men voted, and the convention was thus pro-slavery. The document it framed is known as the Lecompton Constitution. Before the convention met, the free- state party, abandoning its policy of political inaction, captured the Territorial legislature. On the constitutional convention rested, then, all hope of saving Kansas for slavery; and that would be impossible if they should submit their handiwork to the people. The convention declared slave property to be " before and higher than any constitutional sanction " and for- bade amendments affecting it; but it provided for a popular vote on the alternatives) the " constitution with slavery " or the " constitution with no slavery." If the latter should be adopted, slavery should cease " except " that the right to pro- perty in slaves in the Territory should not be interfered with. The free-state men regarded this as including the right to property in offspring of slaves, and therefore as pure fraud. Governor Walker stood firmly against this iniquitous scheme; he saw that slavery was, otherwise, doomed, but he thought Kansas could be saved to the Democratic party though lost to slavery. But President Buchanan, under Southern influence, repudiated his former assurances. There is reason to believe that the whole scheme was originated at Washington, and though Buchanan was not privy to it before the event, yet he adopted it. He abandoned Walker, who left Kansas; and he dismissed Acting-Governor Frederick P. Stanton for convoking the (now

free-state) legislature. This body promptly ordered a vote on the third alternative, " Against the Constitution."

The free-state men ignored the alternatives set by the Lecomp- ton Convention; but they participated nevertheless in the pro- visional election tor officers under the Lecompton government, capturing all offices, and then, the same day, voted overwhelm- ingly against the constitution (Jan.

4, 1858).

Nevertheless, Buchanan, against the urgent counsel of Gover- nor Denver, urged on Congress (Feb. 2) the admission of Kansas under the Lecompton Constitution. He was opposed by Senator Stephen A. Douglas, the leader of the Northern Demo- cracy. The Senate upheld the President; the House of Repre- sentatives voted down his policy ; and finally both houses accepted the English Bill, by which Kansas was virtually offered some millions of acres of public lands if she should accept the Lecomp- ton Constitution. 1 On the 21st of August 1858, by a vote of 1 1 ,300 to 1 788, Kansas resisted this temptation. The plan of the Administration thus effectually miscarried, and its final result was a profound split in the Democratic party.

The free-state men framed an excellent anti-slavery consti- tution at Leavenworth in March-April 1858, but the origins of the convention were illegal and their work was still-born. On the 29th of July 1859 still another constitution was therefore framed at Wyandotte, and on the 4th of October it was ratified by the people. Meanwhile the Topeka ” government ” dis- appeared> and also, with its single purpose equally served, the free-state party, most of it (once largely Democratic) passing into the Republican party, now first organized in the Territory. On the 29th of January 1861 Kansas was admitted to the Union under the Wyandotte Constitution. The United States Census of i860 gave her a population of 107,204 inhabitants. The struggle in Kansas, the first physical national struggle over slavery, was of paramount importance in the breaking up of the Whig party, the firm establishment of an uncompromisingly anti-slavery party, the sectionalization of the Democracy, and the general preparation of the country for the Civil War.

Drought and famine came in i860, and then upon the impover- ished state came the strain of the Civil War. Nevertheless Kansas furnished proportionally a very large quota of men to the Union armies. Military operations within her own borders were largely confined to a guerrilla warfare, carrying on the bitter neighbour- hood strife between Kansas and Missouri. The Confederate officers began by repressing predatory plundering from Missouri; but after James H. Lane, with an undisciplined brigade, had crossed the border, sacking, burning and killing in his progress, Missouri ” bushrangers ” retaliated in kind. Freebooters trained in Territorial licence had a free hand on both sides. Kansas bands were long the more successful. But William C. Quantrell, after sacking various small Kansas towns along the Missouri river (1862-63), in August 1863 took Lawrence (q.v.) and put it mercilessly to fire and sword — the most ghastly episode in border history. In the autumn of 1864 the Confederate general, Sterling Price, aiming to enter Kansas from Missouri but de- feated

by General Pleasanton's cavalry, retreated southward, zig- zagging on both sides of the Missouri-Kansas line. This ended for Kansas the border raids and the war. Lane was probably the first United States officer to enlist negroes as soldiers. Many of them (and Indians too) fought bravely for the state. Indian raids and wars troubled the state from 1864 to 1878. The tribes domiciled in Kansas were rapidly moved to Indian Territory after 1868.

1 The English Bill was not a bribe to the degree that it has usually been considered to be, inasmuch as it " reduced the grant of land demanded by the Lecompton Ordinance from 23,500,000 acres to 3,500,000 acres, and offered only the normal cession to new states." But this grant of 3,500,000 acres was conditioned on the acceptance of the Lecompton Constitution, and Congress made no promise of any grant if that Constitution were not adopted. The bill was introduced by William Hayden English (1822-1896), a Democratic representative in Congress in 1853-1861 (see Frank H. Hodder, " Some Aspects of the English Bill for the Admission of Kansas," in Annual Report of the American Historical Association for the Year 1906, i. 201-210).

After the Civil War the Republicans held uninterrupted supremacy in national elections, and almost as complete control in the state government, until 1892. From about 1870 onward, however, elements of reform and of discontent were embodied in a succession of radical parties of protest. Prohibition arose thus, was accepted by the Republicans, and passed into the con- stitution. Woman suffrage became a vital political issue. Much legislation has been passed to control the railways. General control of the media of commerce, economic co-operation, tax reform, banking reforms, legislation against monopolies, disposal of state lands, legislation in aid of the farmer and labourer, have been issues of one party or another. The movement of the Patrons of Industry (1874), growing into the Grange, Farmers' Alliance, and finally into the People's (Populist) party (see Farmers' Movement), was perhaps of greatest importance. In conjunction with the Democrats the Populists controlled the State government in 1892-1894 and 1896-1898. These two parties decidedly outnumbered the Republicans at the polls from 1890-1898, but they could win only by fusion. In 1892-1893, when the Populists elected the governor and the Senate, and the Republicans (as the courts eventually determined) the House of Representatives, political passion was so high as to threaten armed conflicts in the capital. The Australian ballot was introduced in 1893. In the decade following 1880, struggles in the western counties for

the location of county seats (the bitter- est local political fights known in western states) repeatedly led to bloodshed and the interference of state militia.

Territorial Governors x

Andrew H. Reeder Wilson Shannon John W. Geary Robert J. Walker James W. Denver Samuel Medary

Daniel Woodson 5

Frederick P. Stanton 2 James W. Denver 1 Hugh S. Walsh 4(5 George M. Beebe 2

July 7, 1854-Aug. 16,

Sept. 7, 1855-Aug. 18,

Sept. 9, 1856-Mar. 12,

May 27, 1857-Nov. 16.,

May 12, 1858-Oct. 10,

Dec. 18, 1858-Dec. 17,

Acting Governors 2

Aggregate

times (164 days) Apr. 17, 1855-Apr.

„ (78 .. „) Apr. 16, 1857-Dec.

(23 „) Dec. 21, 1857-May

?).. (177 ..) July 3. 1858-june

,, (131 ,,) Sept. 11, 1860-Feh State Governors

55 ‘56 57 57 58 ‘60

16, ‘57 21, ‘57 12, ‘58 16, ‘60

9> ‘6i

Charles Robinson Republican

Thomas Carney „

Samuel J. Crawford ,,

N. Green (to fill vacancy) ,,

James M. Harvey ,,

Thomas A. Osborn „

George T. Anthony „

John P. St John

George W. Glick

John A. Martin

Lyman U. Humphrey

Lorenzo D. Lewelling

Edmund N. Morrill

John W. Leedy

W. E. Stanley

Willis J. Bailey

Edward W. Hoch

Walter R. Stubbs

Authorities. — Consult for

Democrat Republican

11

Populist

Repubjican

Democrat-Populist

Republican

1 861-1863

1863-1865

1865-1869

1869 (3 months)

1869-1873

1873-1877

1877-1879 1879-1883

I 883-1 885

1 885-1 889,

I 889-1 893

1893-1895

I 895-1 897

1 897-1 899

I 899-1903

1903-1905 1905-1909 1909-

physiographic descriptions general works oh the United States, exploration, surveys, &c, also paper by George I. Adams in American Geographical Society, Bulletin 34 (1902), pp. 89-104. Onclimate see U.S. Department of Agriculture, Kansas Climate and Crop Service (monthly, since 1887). On soil and agriculture, see Biennial Reports (Topeka, 1877 seq.) of the State Board of Agriculture; Experiment Station Bulletin of the Kansas Agricultural College (Manhattan) ; and statistics in the United States Statistical Abstract (annual, Washington), and Federal Census reports. On manufactures see Federal Census reports; Kansas Bureau of Labor and Industry, Annual Report (1885 seq.) ; Kansas Inspector of Coal Mines, Annual Report (1887 seq.). On administra- tion consult the State of Kansas Blue Book (Topeka, periodical), and

1 Terms of actual service in Kansas, not period of commissions. The appointment was for four years. Reeder was removed, all the others resigned.

5 Secretaries of the Territory who served as governors in the interims of gubernatorial terms or when the governor was absent from the Territory. In the case of H. S. Walsh several dates cannot be fixed with exactness.

reports of the various state officers (Treasurer, annuai, then biennial since 1 877-1 878 ; Board of Trusteesof State Charities and Corrections, biennial, 1877-1878 seq.; State Board of Health, founded 1885, annual, then biennial reports since 1901-1902 ; Bureau of Labor Statistics, founded 1885, annual reports; Irrigation Commission, organized 1895, annual reports, &c). On taxation see Report and Bill of the State Tax Commission, created 1901 (Topeka, 1901). On the history of the state, see A. T. Andreas, History of Kansas (Chicago, 1883; compiled mainly by J. C. Hebbard) ; D. W. Wilder's Annals of Kansas (Topeka, 1875 and later), indispensable for reference; L. W. Spring's Kansas (Boston, 1885, in the American Common- wealth Series) ; Charles Robinson, The Kansas Conflict (New York, 1892); Eli Thayer, The Kansas Crusade (New York, 1889); the Proceedings of the Kansas State Historical Society (Topeka, 1891 seq.), full of the most valuable material; W. E. Connelley, Kansas Territorial Governors (Topeka, 1900); W. E. Miller, The Peopling of Kansas (Columbus, 0., 1906), a doctoral dissertation of Columbia University; and for the controversy touching John Brown, G. W. Brown's The Truth at Last, Reminiscences of Old John Brown (Rock- ford, 111., 1880), and W. E. Connelley, An Appeal to the Record . . . Refuting . . . Things Written for . . . Charles Robinson and G. W. Brown (Topeka, 1903). W. C. Webb's Republican Election Methods in Kansas, General Election of i8q2, and Legislative Investigations (Topeka, 1893) may also be mentioned.

KANSAS CITY, a city and the county-seat of Wyandotte county, Kansas, U.S.A., on the W. bank of the Missouri River, at the mouth of the Kansas, altitude about 800 ft. It is separated from its greater neighbour, Kansas City, Missouri, only by the state line, and is the largest city in the state. Pop. (1890), 38,315; (1900), 51,418, of whom 6,377 were foreign-born and 6509 were negroes; (1910 census) 82,331. It is served by the Union Pacific, the Missouri Pacific, the Chicago, Rock Island & Pacific, and the Chicago Great Western railways, and by electric lines connecting with Leavenworth and with Kansas City, Missouri. There are several bridges across the Kansas river. The city covers the low, level bottom-land at the junction of the two rivers, and spreads over the surrounding highlands to the W., the principal residential district. Its plan is regular. The first effective steps toward a city park and boulevard system were taken in 1907, when a board of park commissioners, consist- ing of three members, was appointed by the mayor. The city has been divided into the South Park District and the North Park District, and at the close of 1908 there were 10 m. of boulevards and parks aggregating 1 60 acres. A massive steel and

concrete toll viaduct, about if m. in length, extends from the bluffs of Kansas City, Kan., across the Kansas valley to tne bluffs of Kansas City, Mo., and is used by pedestrians, vehicles and street cars. There is a fine public library building given by Andrew Carnegie. The charities of the city are co-ordinated through the associated charities. Among charitable state-aided institutions are the St Margaret's hospital (Roman Catholic), Bethany hospital (Methodist), a children's home (1893), and, for negroes, the Douglass hospital training school for nurses (1898) — the last the largest private charity of the state. The medical department of the Kansas state university, the other departments of which are in Lawrence, is in Kansas City; and among the other educational institutions of the city are the Western university and industrial school (a co-educational school for negroes), the Kansas City Baptist theological seminary (1902), and the Kansas City university (Methodist Protestant, 1896), which had 454students in 1908-1909 and comprises Mather college (for liberal arts), Wilson high school (preparatory), a school of elocution and oratory (in Kansas City, Mo.), a Normal School, Kansas City Hahnemann Medical College (in Kansas City, Mo.) , and a school of theology. The City is the seat of the Kansas (State) school for the blind. Kansas City is one of the largest cities in the country without a drinking saloon. Indus- trially the city is important for its stockyards and its meat-packing interests. With the exception of Chicago, it is the largest live- stock market in the United States. The product-value of the city's factories in 1905 was $96,473,050; 93-5% consisting of the product of the wholesale slaughtering and meat-packing houses. Especially in the South-west markets Kansas City has an advantage over Chicago, St Louis, and other large pack- ing centres (except St Joseph), not only in freights, but in its situation among the "corn and beef " states; it shares also the

extraordinary railway facilities of Kansas City, Missouri. There are various important manufactures, such as soap and candles, subsidiary to the packing industry; and the city has large flour mills, railway and machine shops, and foundries. A large cotton-mill, producing coarse fabrics, was opened in 1907. Natural gas derived from the Kansas fields became available for lighting and heating, and crude oil for fuel, in 1906.

Kansas City was founded in 1886 by the consolidation of " old " Kansas City, Armourdale and Wyandotte (in which Armstrong and Riverview were then included). Of these municipalities Wyandotte, the oldest, was originally settled by the Wyandotte Indians in 1843; it was platted and settled by whites in 1857; and was incorporated as a town in 1858, and as

a city in 1859. At Wyandotte were made the first moves for the Territorial organi- zation of Kansas and Nebraska. During the Kansas struggle Wyandotte was a pro-slavery town, while Quindaro (1856), a few miles up the Missouri, was a free-state settlement and Wyandotte's commercial rival until after the Civil War. The convention that framed the constitution, the Wyandotte Con- stitution, under which Kansas was admitted to the Union, met here in July 1859. " Old " Kansas City was surveyed in 1869 and was incorporated as a city in 1872. Armourdale was laid out in 1880 and incorporated in 1882. The packing interest was first established in 1867; the first large packing plant was that of Armour & Co., which was removed to what is now Kansas City in 187 1. Kansas City adopted government by commission in 1909.

KANSAS CITY, a city and port of entry of Jackson county, Missouri, U.S.A., the second in size and importance in the state, situated at the confluence of the Missouri and Kansas rivers, adjoining Kansas City, Kansas, and 235 m. W. by N. of St Louis. Pop. (1890), 132,716; (1900), 163,752, of whom 18,410 were foreign born (German, 4816; Irish, 3507; Swedish, 1869; English, 1863; English-Canadian, 1369; Italian, 1034), and 17,567 were negroes; (1910 census) 248,381. Kansas City, the gateway to the South-west, is one of the leading railway centres of the United States. It is served by the Union Pacific, the Missouri Pacific, the 'Frisco System, the Chicago, Burlington & Quincy, the Atchison, Topeka & Santa Fe, the Chicago Great Western, the Chicago, Milwaukee & St Paul, the Chicago & Alton, the Wabash, the Kansas City Southern, the Chicago, Rock Island & Pacific, the Missouri, Kansas & Texas, the Leaven- worth, Kansas & Western, the Kansas City, Mexico & Orient, the St Louis, Kansas City & Colorado, the Quincy, Omaha & Kansas City, and the St Joseph & Grand Island railways, and by steamboat lines to numerous river ports.

The present retail, office, and wholesale sections were once high bluffs and deep ravines, but through and across these well graded streets were constructed. South and west of this highland, along the Kansas river, is a low, level tract occupied chiefly by railway yards, stock yards, wholesale houses and manufacturing establishments; north and east of the highland is a flat section, the Missouri River bottoms, occupied largely by manufactories, railway yards, grain elevators and homes of employes. Much high and dry " made " land has been reclaimed from the river flood-plain. Two great railway bridges across the Missouri, many smaller bridges across the Kansas, and a great inter- state toll viaduct extending from bluff to bluff across the valley of the latter river, he within the metropolitan area of the two cities. The streets of the Missouri city are generally wide and excellently paved. The city-hall (1890-1893), the court- house (1888-1892), and the Federal Building (1892-1900) are the most imposing of the public buildings. A convention hall, 314 ft. long and 198

ft. wide, with a seating capacity of about 15,000, is covered by a steel-frame roof without a column for its support; the exterior of the walls is cut stone and brick. The building was erected within three months, to replace one destroyed by fire, for the National Democratic Convention which met here on the 4th of July 1900. The Public Library with walls of white limestone and Texas granite, contained (1908) 95,000 volumes. The Congregational, the Calvary Baptist, the Second Presbyterian, the Independence Avenue Christian, the

Independence Avenue Methodist, and the Second Christian Science churches are the finest church buildings. The board of trade building, the building of the Star newspaper, and several large office buildings (including the Scarritt, Long, and New York Life Insurance buildings) are worthy of mention.

Kansas City has over 2000 acres in public parks; but Swope Park, containing 1354 acres, lies south of the city limits. The others are distributed with a design to give each section a recrea- tion ground within easy walking distance, and all (including Swope) are connected by parkways, boulevards and street-car lines. The Paseo Parkway, 250 ft. wide, extends from N. to S. through the centre of the city for a distance of 2| m., and adjoin- ing it near its middle is the Parade, or principal playground. The city has eight cemeteries, the largest of which are Union, Elmwood, Mt Washington, St Mary's and Forest Hill. The charitable institutions and professional schools included in 1908 about thirty hospitals, several children's homes and homes for the aged, an industrial home, the Kansas City school of law, the University medical college, and the Scarritt training school. The city has an excellent public school system. A Methodist Episcopal institutional church, admirably equipped, was opened in 1906. The city has a juvenile court, and maintains a free employment bureau.

Kansas City is primarily a commercial centre, and its trade in livestock, grain and agricultural implements is especially large. The annual pure-bred livestock show is of national importance. The city's factory product increased from $23,588,653 in 1900 to $35,573,049 in 1905, or 50-8 %. Natural gas and crude petroleum from Kansas fields became of industrial importance about 1906. Natural gas is used to light the residence streets and to heat many of the residences.

Kansas City is one of the few cities in the United States em- powered to frame its own charter. The first was adopted in 1875 and the second in 1889. In 1905 a new charter, drawn on the lines of the model " municipal program " advocated by th< National Municipal League, was submitted to popular vote, but was defeated by the influence of the saloons and other

special interests. The charter of 1908 is a revision of this proposed charter of 1905 with the objectionable features eliminated; it was adopted by a large majority vote. Under the provisions of the charter of 1908 the people elect a mayor, city treasurer, city comptroller, and judges of the municipal court, each for a term of two years. The legislative body is the common council composed of two houses, each having as many members as there are wards in the city — 14 in 1908. The members of the lower house are elected, one by each ward, in the spring of each even numbered year. The upper house members are elected by the city at large and serve four years. A board of public works, board of park commissioners, board of fire and water commissioners, a board of civil service, a city counsellor, a city auditor, a city assessor, a purchasing agent, and subordinate officers, are ap- pointed by the mayor, without confirmation by the common council. A non-partisan board composed of citizens who must not be physicians has general control of the city's hospitals and health department. A new hospital at a cost of half a million dollars was completed in 1908. The charter provides for a referendum vote on franchises, which may be ordered by the council or by petition of the people, the signatures of 20 % of the registered voters being sufficient to force such election. Public work may be prevented by remonstrance of interested property owners except in certain instances, when the city, by vote of the people, may overrule all remonstrances. A civic league attempts to give a non-partisan estimate of all municipal candidates. The juvenile court, the arts and tenement commissions, the municipal employment bureau, and a park board are provided for by the charter. All the members of the city board of election commissioners and a majority of the police board are appointed by the governor of the state; and the police control the grant of liquor licences. The city is supplied with water drawn from the Missouri river above the mouth of the Kansas or Kaw (which is used as a sewer by Kansas City, Kan.); the main pumping station and settling, basins being ax

Quindaro, several miles up the river in Kansas; whence the water is carried beneath the Kansas, through a tunnel, to a high-pres- sure distributing station in the west bottoms. The waterworks (direct pressure system) were acquired by the city in 1895. All other public services are in private hands. The street-railway service is based on a universal 5-cent transfer throughout the metropolitan area. Some of the first overhead electric trolleys used in the United States were used here in 1885.

The first permanent settlement within the present limits of Kansas City, which took its name from Kansas river, 1 was established by French fur

traders about 1821. Westport, a little inland town — platted 1833, a city 1857, merged in Kansas City in 1899 — now a fashionable residence district of Kansas City— was a rival of Independence in the Santa Fe trade which she gained almost in tolo in 1844 when the great Missouri flood (the greatest the river has known) destroyed the river landing utilized by Independence. Meanwhile, what is now Kansas City, and was then Westport Landing, being on the river where a swift current wore a rocky shore, steadily increased in importance and overshadowed Westport. But in 1838 lots were surveyed and the name changed to the Town of Kansas. It was officially organized in part in 1847, formally incorporated as atown in 1850, chartered under its present name in 1853, rechartered in 1875, in 1889 and in 1908. Before 1850 it was practically the exclusive eastern terminus on the river for the Santa Fe trade, 2 and a great outfitting point for Californian emigrants. The history of this border trade is full of picturesque colour. During the Civil War both Independence and Westport were the scene of battles; Kansas City escaped, but her trade went to Leavenworth, where it had the protection of an army post and a quiet frontier. After the war the railways came, taking away the traffic to Santa Fe, and other cities farther up the Missouri river took over the trade to its upper valley. In

1866 Kansas City was entered by the first railway from St Louis;

1867 saw the beginning of the packing industry; in i869arailway bridge across the Missouri assured it predominance over Leaven- worth and St Joseph; and since that time — save for a depression shortly after 1890, following a real-estate boom — the material progress of the city has been remarkable; the population in- creased from 4418 in i860 to 32,260 in 1870, 55,785 in 1880, and 132,716 in 1890.

See T. S. Case (ed.), History of Kansas City, Missouri (Syracuse, 1888) ; William Griffith, History of Kansas City (Kansas City, 1 900) ; for industrial history, the Greater Kansas City Yearbook (1907 seq.) ; for all features of municipal interest, the Kansas City Annual ˆKansas City, 1907 seq.), prepared for the Business Men's League.

KANSK, a town of eastern Siberia, in the government of Veniseisk, 151 m. by rail E. of Krasnoyarsk, on the Kan River, a tributary of the Yenisei, and on the Siberian highway. Pop. (1897), 7504. It is the chief town of a district in which gold is found, but lies on low ground subject to inundation by the river.

KAN-SUH, a north-western province of China, bounded N. by Mongolia, E. by Shen-si, S. by Szech'uen, W. by Tibet and N.W. by Turkestan. The boundary on the N. remains undefined, but the province may be said to

occupy the territory lying between 3 2 30′ and 40° N., and 108 and 98 20′ E., and to contain about 260,000sq.m. The population is estimated at 9,800,000. Western Kan-suh is mountainous, and largely a wilderness of sand and snow, but east of the Hwang-ho the country is cultivated. The principal river is the Hwang-ho, and in the mountains to the south of Lan-chow Fu rises the Wei-ho, which traverses Shen-si and flows into the Hwang-ho at Tung-kwan. The chief products

1 ” Kansas ” — in archaic variants of spelling and pronunciation, ” Kansaw,” and still called, locally and colloquially, the ” Kaw.”

2 Before Kansas City, first Old Franklin (opposite Boonville), then Ft. Osage, Liberty, Sibley, Lexington, Independence and Westport had successively been abandoned as terminals, as the transfer- point from boat to prairie caravan was moved steadily up the Missouri. Whisky, groceries, prints and notions were staples sent to Santa Fe; wool, buffalo robes and dried buffalo meat, Mexican silver coin, gold and silver dust and ore came in return. In i860 the trade employed 3000 wagons and 7000 men, and amounted to millions of dollars in value.

of Kan-suh are cloth, horse hides, a kind of curd like butter which is known by the Mongols under the name of wula, musk, plums, onions, dates, sweet melons and medicines. (See China.)

KANT, IMMANUEL (17 24-1 804), German philosopher, was born at Konigsberg on the 22nd of April 1724. His grandfather was an emigrant from Scotland, and the name Cant is not un- common in the north of Scotland, whence the family is said to have come. His father was a saddler in Konigsberg, then a stronghold of Pietism, to the strong influence of which Kant was subjected in his early years. In his tenth year he was entered at the Collegium Fredericianum with the definite view of studying theology. His inclination at this time was towards classics, and he was recognized, with his school-fellow, David Ruhnken, as among the most promising classical scholars of the college. His taste for the greater Latin authors, particularly Lucretius, was never lost, and he acquired at school an unusual facility in Latin composition. With Greek authors he does not appear to have been equally familiar. During his university course, which began in 1740, Kant was principally attracted towards mathe- matics and physics. The lectures on classics do not seem to have satisfied him, and, though he attended courses on theology, and even preached on one or two occasions, he appears finally to have given up the intention of entering the Church. The last years of his university studies were much disturbed by poverty. His father died in 1746, and for nine years he was compelled to earn his own living as a private tutor. Although he disliked the life and was not specially qualified for it — -as he used to say regarding the excellent

precepts of his Pddagogik, he was never able to apply them — yet he added to his other accomplishments a grace and polish which he displayed ever afterwards to a degree somewhat unusual in a philosopher by profession.

In 1755 Kant became tutor in the family of Count Kayserling. By the kindness of a friend named Richter, he was enabled to resume his university career, and in the autumn of that year he graduated as doctor and qualified as privatdocent. For fifteen years he continued to labour in this position, his fame as writer and lecturer steadily increasing. Though twice he failed to obtain a professorship at Konigsberg, he steadily refused ap- pointments elsewhere. The only academic preferment received by him during the lengthy probation was the post of under- librarian (1766). His lectures, at first mainly upon physics, gradually expanded until nearly all descriptions of philosophy were included under them.

In 1770 he obtained the chair of logic and metaphysics at Konigsberg, and delivered as his inaugural address the disserta- tion De mundi sensibilis el intelligibilis forma el principiis. Eleven years later appeared the Kritik of Pure Reason, the work towards which he had been steadily advancing, and of which all his later writings are developments. In 1783 he published the Prolegomena, intended as an introduction to the Kritik, which had been found to stand in need of some explanatory comment. A second edition of the Kritik, with some modifications, appeared in 1787, after which it remained unaltered.

In spite of its frequent obscurity, its novel terminology, and its declared opposition to prevailing systems, the Kantian philo- sophy made rapid progress in Germany. In the course of ten or twelve years from the publication of the Kritik of Pure Reason, it was expounded in all the leading universities, and it even penetrated into the schools of the Church of Rome. Such men as J. Schulz in Konigsberg, J. G. Kiesewetter in Berlin, Jakob in Halle, Born and A. L. Heydenreich in Leipzig, K. L. Reinhold and E. Schmid in Jena, Buhle in Gottingen, Tennemann in Marburg, and Snell in Giessen, with many others, made it the basis of their philosophical teaching, while theologians like Tieftrunk, Staudlin, and Ammon eagerly applied it to Christian doctrine and morality. Young men flocked to Konigsberg as to a shrine of philosophy. The Prussian Government even under- took the expense of their support. Kant was hailed by some as a second Messiah. He was consulted as an oracle on all questions of casuistry — as, for example, on the lawfulness of inoculation for the small-pox. This universal homage for a long time left Kant unaffected; it was only in his later years that he

spoke of his system as the limit of philosophy, and resented all further progress. He still pursued his quiet round of lecturing and authorship, and contributed from time to time papers to the literary journals. Of these, among the most remarkable was his review of Herder's Philosophy of History, which greatly exasperated that author, and led to a violent act of retaliation some years after in his Metakritik of Pure Reason. Schiller at this period in vain sought to engage Kant upon his Horen. He remained true to the Berlin Journal, in which most of his criticisms appeared.

In 1792 Kant, in the full height of his reputation, was involved in a collision with the Government on the question of his religious doctrines. Naturally his philosophy had excited the declared opposition of all adherents of historical Christianity, since its plain tendency was towards a moral rationalism, and it could not be reconciled to the literal doctrines of the Lutheran Church. It would have been much better to permit his exposition of the philosophy of religion to enjoy the same literary rights as his earlier works, since Kant could not be interdicted without first silencing a multitude of theologians who were at least equally separated from positive Christianity. The Government, how- ever, judged otherwise; and after the first part of his book, On Religion within the Limits of Reason alone, had appeared in the Berlin Journal, the publication of the remainder, which treats in a more rationalizing style of the peculiarities of

Christianity, was forbidden. Kant, thus shut out from Berlin, availed himself of his local privilege, and, with the sanction of the theological faculty of his own university, published the full work in Kbnigs- berg. The Government, probably influenced as much by hatred and fear of the French Revolution, of which Kant was supposed to be a partisan, as by love of orthodoxy, resented the act; and a secret cabinet order was received by him intimating the dis- pleasure of the king, Frederick William II., and exacting a pledge not to lecture or write at all on religious subjects in future. With this mandate Kant, after a struggle, complied, and kept his engagement till 1797, when the death of the king, according to his construction of his promise, set him free. This incident, how- ever, produced a very unfavourable effect on his spirits. He withdrew in 1 794 from society; next year he gave up all his classes but one public lecture en logic or metaphysics; and in 1797, before the removal of the interdict on his theological teaching, he ceased altogether his public labours, after an academic course of forty- two years. He previously, in the same year, finished his treatises on the Metaphysics of Ethics, which, with his Anthropology, com- pleted in 1798, were the last considerable works that he revised with his own hand. His Lectures on Logic, on Physical Geography, on Paedagogics, were edited during his lifetime by his friends and pupils. By way of asserting his right to resume theological disquisition, he also issued in 1798 his Strife of the Faculties, in which all the strongest points of his work on religion were urged afresh, and the correspondence that had passed between himself and his censors was given to the world.

From the date of his retirement from the chair Kant declined in strength, and gave tokens of intellectual decay. His memory began to fail, and a large work at which he wrought night and day, on the connexion between physics and metaphysics, was found to be only a repetition of his already published doctrines. After 1802, finding himself attacked with a weakness in the limbs attended with frequent fits of falling, he mitigated the Spartan severity of his life, and consented to receive medical advice. A constant restlessness oppressed him; his sight gave way; his conversation became an extraordinary mixture of metaphors; and it was only at intervals that gleams of his former power broke out, especially when some old chord of association was struck in natural science or physical geography. A few days before his decease, with a great effort he thanked his medical attendant for his visits in the words, " I have not yet lost my feeling for humanity." On the 12th of February 1804 he died, having almost completed his eightieth year. His stature was small, and his appearance feeble. He was little more than five feet high; his breast was almost concave, and, like Schleier- macher, he was deformed in the right shoulder. His senses were

quick and delicate; and, though of weak constitution, he escaped by strict

regimen all serious illness.

His life was arranged with mechanical regularity; and, as he never married, he kept the habits of his studious youth to old age. His man-servant, who awoke him summer and winter at five o'clock, testified that he had not once failed in thirty years to respond to the call. After rising he studied for two hours, then lectured other two, and spent the rest of the forenoon, till one, at his desk. He then dined at a restaurant, which he fre- quently changed, to avoid the influx of strangers, who crowded to see and hear him. This was his only regular meal; and he often prolonged the conversation till late in the afternoon. He then walked out for at least an hour in all weathers, and spent the evening in lighter reading, except an hour or two devoted to the preparation of his next day's lectures, after which he retired between nine and ten to rest. In his earlier years he often spent his evenings in general society, where his knowledge and conversational talents made him the life of every party. He was especially intimate with the families of two English merchants of the name of Green and Motherby, where he found many opportunities of meeting ship-captains, and other travelled persons, and thus gratifying his passion for physical geography. This social circle included also the celebrated J. G. Hamann, the friend of Herder and Jacobi, who was thus a mediator between Kant and these philosophical adversaries.

Kant's reading was of the most extensive and miscellaneous kind. He cared comparatively little for the history of specula- tion, but his acquaintance with books of science, general history, travels and belles lettres was boundless. He was well versed in English literature, chiefly of the age of Queen Anne, and had read English philosophy from Locke to Hume, and the Scottish school. He was at home in Voltaire and Rousseau, but had little or no acquaintance with the French sensational philosophy. He was familiar with all German literature up to the date of his Kritik, but ceased to follow it in its great development by Goethe and Schiller. It was his habit to obtain books in sheets from his publishers Kanter and Nicolovius; and he read over for many years all the new works in their catalogue, in order to keep abreast of universal knowledge. He was fond of newspapers and works on politics; and this was the only kind of reading that could interrupt his studies in philosophy.

As a lecturer, Kant avoided altogether that rigid style in which his books were written. He sat behind a low desk, with a few jottings on slips of paper, or textbooks marked on the margin, before him, and delivered an extemporaneous address, opening up the subject by partial glimpses, and with many anecdotes or familiar illustrations, till a complete idea of it was presented. His voice was extremely weak, but sometimes rose into eloquence, and always commanded perfect silence. Though kind to his

students, he refused to remit their fees, as this, he thought, would discourage independence. It was another principle that his chief exertions should be bestowed on the intermediate class of talent, as the geniuses would help themselves, and the dunces were beyond remedy.

Simple, honourable, truthful, kind-hearted and high-minded as Kant was in all moral respects, he was somewhat deficient in the region of sentiment. Hehadlittle enthusiasm for the beauties of nature, and indeed never sailed out into the Baltic, or travelled more than 40 miles from Konigsberg. Music he disregarded, and all poetry that was more than sententious prose. His ethics have been reproached with some justice as setting up too low an ideal for the female sex. Though faithful in a high degree to the duties of friendship, he could not bear to visit his friends in sickness, and after their death he repressed all allusion to their mernory. His engrossing intellectual labours no doubt tended somewhat to harden his character; and in his zeal for rectitude of purpose he forgot the part which affection and sentiment must ever play in the human constitution.

On the 1 2th of February 1904, the hundredth anniversary of Kant's death, a Kantian society (Kantgesellschaft) was formed at Halle under the leadership of Professor H. Vaihinger to promote Kantian studies. In 1909 it had an annual membership

of 191; it supports the periodical Kantstudien (founded 1896; see Bibliography, ad init.).

The Writings of Kant

No other thinker of modern times has been throughout his work so penetrated with the fundamental conceptions of physical science; no other has been able to hold with such firmness the balance between empirical and speculative ideas. Beyond all question much of the influence which the critical philosophy has exercised and continues to exercise must be ascribed to this characteristic feature in the training of its great author.

The early writings of Kant are almost without exception on questions of physical science. It was only by degrees that philo- sophical problems began to engage his attention, and that the main portion of his literary activity was turned towards them. The following are the most important of the works which bear directly on physical science.

1. Gedanken von der wahren Schdtzung der lebendigen Krdfte (1747) ; an

essay dealing with the famous dispute between the Cartesians and Leibnitzians regarding the expression for the amount of a force. According to the Cartesians, this quantity was directly proportional to velocity ; according to their opponents, it varied with the square of the velocity. The dispute has now lost its interest, for physicists have learned to distinguish accurately the two quantities which are vaguely included under the expression amount of force, and conse- quently have been able to show in what each party was correct and in what it was in error. Kant's essay, with some fallacious explana- tions and divisions, criticizes acutely the arguments of the Leib- nitzians, and concludes with an attempt to show that both modes of expression are correct when correctly limited and interpreted.

2. Whether the Earth in its Revolution has experienced some Change since the Earliest Times (1754; ed. and trans., W. Hastie, 1900, Kant's Cosmogony; cf. Lord Kelvin in The Age of the Earth, 1897, p. 7). In this brief essay Kant throws out a notion which has since been carried out, in ignorance of Kant's priority, by Delaunay(i865) and Adams. He points out that the action of the moon in raising the waters of the earth must have a secondary effect in the slight retardation of the earth's motion, and refers to a similar cause the fact that the moon turns always the same face to the earth.

3. Allgemeine Naturgeschichte und Theorie des Himmels, published anonymously in 1755 (4th ed. 1808; republished H. Ebert, 1890). In this remarkable work Kant, proceeding from the Newtonian conception of the solar system, extends his consideration to the entire sidereal system, points out how the whole may be mechanically regarded, and throws out the important speculation which has since received the title of the nebular hypothesis. In some details, such e.g. as the regarding of the motion of the entire solar system as portion of the general cosmical mechanism, he had predecessors, among others Thomas Wright of Durham, but the work as a whole contains a wonderfully acute anticipation of much that was after- wards carried out by Herschel and Laplace. The hypothesis of the original nebular condition of the system, with the consequent explanation of the great phenomena of planetary formations and movements of the satellites and rings, is unquestionably to be assigned to Kant. (On this question see discussion in W. Hastie's Kant's Cosmogony, as above.)

4. Meditalionum quarundam de igne succincta delineatio (1755 J: an inaugural dissertation, containing little beyond the notion that bodies operate on one another through the medium of a uniformly d;ffused, elastic and subtle matter (ether) which is the underlying substance of heat and light. Both heat and light are regarded as vibrations of this diffused ether.

5. On the Causes of Earthquakes (1755); Description of the Earth- quake of 1755 (1756); Consideration of some Recently Experienced Earthquakes (1756).

6. Explanatory Remarks on the Theory of the Winds (1756). In this brief tract, Kant, apparently in entire ignorance of the explana- tion given in 1735 by Hadley, points out how the varying velocity of rotation of the successive zones of the earth's surface furnishes a key to the phenomena of periodic winds. His theory is in almost entire agreement with that now received. See the parallel statements from Kant's tract and Dove's essay on the influence of the rotation of the earth on the flow of its atmosphere (1835), given in Zollner's work, Ueber die Natur der Cometen, pp. 477-482.

7. On the Different Races of Men (1775); Determination of the Notion of a Human Race (1785); Conjectural Beginning of Human History (1786): three tracts containing some points of interest as regards the empirical grounds for Kant's doctrine of teleology. Reference will be made to them in the notice of the Kritik of Judgment.

8. On theVolcanoes in the Moon (1785) ; On the Influence of the Moon on the "Weather (1794). The second of these contains a remarkable discussion of the relation between the centre of the moon's figure and its centre of gravity. From the difference between these Kant is led to conjecture that the climatic conditions of the side of the moon turned from us must be altogether unlike those of the face presented to us. His views have been restated by Hansen.

9. Lectures on Physical Geography (1822) : published from notes of Kant's lectures, with the approval of the author.

Consideration of these works is sufficient to show that Kant's mastery of the science of his time was complete and thorough, and that his philosophy is to be dealt with as having throughout a reference to general scientific conceptions. For more detailed treatment of his importance in science, reference may be made to Zollner's essay on " Kant and his Merits on Natural Science " con- tained in the work on the Nature of Comets (pp. 426-484) ; to Dietrich, Kant and Newton; Schultze, Kant and Darwin; Reuschle's careful analysis of the scientific works in the Deutsche Vierteljahrs-Schrift (1868); W. Hastie's introduction to Kant's Cosmogony (1900), which summarizes criticism to that date; and articles in Kant-Studien (1896 foil.).

The notice of the philosophical writings of Kant need not be more than bibliographical, as in the account of his philosophy it will be necessary to

consider at some length the successive stages in the development of his thought. Arranged chronologically these works are as follows: —

1755. Principiorum primorum cognitionis metaphysicae novae dilucidatio.

1756. Metaphysicae cum geometria junctae usus in philosophia naturali, cujus specimen I. continet monadologiam physicam.

\~j(>2.. Die falsche Spitzfindigkeii der vier syllogistischen Figuren, " The False Subtlety of the Four Syllogistic Figures " (trans. T. K. Abbott, Kant's Introduction to Logic and his Essay on the Mistaken Subtilty of the Figures, 1885).

1763. Versuch den Begriff der negativen Grbssen in die Weltweisheit einzufuhren, " Attempt to introduce the Notion of Negative Quan- tities into Philosophy."

1763. Der einzig mogliche Beweisgrund zu einer Demonstration des Daseins Gottes, " The only possible Foundation for a Demonstration of the Existence of God."

1764. Beobachlungen iiber das Gefiihl des Schbnen und Erhabenen (Riga, 177.1; Konigsberg, 1776).

1 764. Untersuchung uber die Deutlichkeit der Grundsdtze der natur- lichen Theologie und Moral, " Essay on the Evidence (Clearness) of the Fundamental Propositions of Natural Theology and Ethics."

1766. Traume eines Geistersehers, erldutert durch Trdume der Metaphysik, " Dreams of a Ghost-seer (or Clairvoyant), explained by the Dreams of Metaphysic " (Eng. trans. E. F. Goerwitz, with introd. by F. Sewall, 1900).

1768. Von dem ersten Grunde des Unterschiedes der Gegenden int Raum, " Foundation for the Distinction of Positions in Space."

The above may all be regarded as belonging to the precritical period of Kant's development. The following introduce the notions and principles characteristic of the critical philosophy.

1770. De mundi sensibilis et intelligibilis forma et principiis.

1 78 1. Kritik der reinen Vernunfl, " Kritik of Pure Reason " (revised ed. 1787; ed. Vaihinger, 1881 foil, and B. Erdmann, 1900; Eng. trans., F. Max Miiller, 1896, 2nd ed. 1907, and J. M. D. Meiklejohn, 1854).

1783. Prolegomena zu einer jeden kiinftigen Metaphysik die ah

Wissenschaft wird auftreten kbnnen, " Prolegomena to all Future Metaphysic which may present itself as Science " (ed. B. Erdmann, 1878; Eng. trans. J. P. Mahaffy and J. H. Bernard, 2nd ed. 1889; Belfort Bax, 1883 and Paul Carus, 1902 ; and cf. M. Apel, Kommentar zu Kants Prolegomena, 1908).

1784. Idee zu einer allgemeinen Geschichte im weltburgerlicher Absicht, " Notion of a Universal History in a Cosmopolitan Sense." With this may be coupled the review of Herder in 1785.

1785. Grundlegung zur Metaphysik der Sitten, " Foundations of the Metaphysic of Ethics " (see T. K. Abbott, Fundamental Principles of the Metaphysic of Ethics, 3rd ed. 1907).

1786. Metaphysische Anfangsgriinde der Naturwissenschaft, " Meta-physical Elements of Natural Science " (ed. A. Hofler, 1900; trans. Belfort Bax, Prolegomena and Metaphysical Foundations, 1883).

1788. Ueber den Gebrauch teleologischer Prinzipien in der Philosophic, "On the Employment of Teleological Principles in Philosophy."

1788. Kritik der praktischen Vernunft, " Kritik of Practical Reason " (trans. T. K. Abbott, ed. 1898).

1790. Kritik der Urtheilskraft, " Kritik of Judgment " (trans, with notes J. H. Bernard, 1892).

1790. Ueber eine Entdeckung, nach der alle neue Kritik der reinen Vernunft durch eine alter e entbehrlich gemacht werden soil, " On a Discovery by which all the recent Critique of Pure Reason is super- seded by a more ancient " {i.e by Leibnitz's philosophy).

1 79 1. Ueber die wirklichen Fortschrilte der Metaphysik seit Leibnitz und Wolff, " On the Real Advances of Metaphysics since Leibnitz and Wolff " ; and Ueber das Misslingen alter philosophischen Versuche in der Theodicee.

1793. Die Religion innerhalb der Grenzen der bios sen Vernunft, " Religion within the Bounds of Reason only " (Eng. trans. J. W. Semple, 1838).

1794. Ueber Philosophic uberhaupt, " On Philosophy generally," and Das Ende alter Dinge.

1795. Zumewigen Frieden (Eng. trans., M. Campbell Smith, 1903).

1797. Metaphysische Anfangsgriinde der Rechtslehre (trans. W Hastie), and Metaphysische Anfangsgriinde der Tugendlehre.

1798. Der Streit der Facultdten, " Contest of the Faculties." 1798. Anthropologic in pragmatischer Hinsicht.

KANT

665

The Kantian Philosophy. 1

Historians are accustomed to divide the general current of speculation into epochs or periods marked by the dominance of some single philosophic conception with its systematic evolution. Perhaps in no case is the character of an epoch more clearly apparent than in that of the critical philosophy. The great work of Kant absolutely closed the lines of speculation along which the philosophical literature of the 1 8th century had proceeded, and substituted for them a new and more comprehensive method of regarding the essential problems of thought, a method which has prescribed the course of philosophic speculation in the present age. The critical system has thus a two- fold aspect. It takes up into itself what had characterized the previous efforts of modern thought, shows the imperfect nature of the fundamental notions therein employed, and offers a new solution of the problems to which these notions had been applied. It opens up a new series of questions upon which subsequent philosophic reflection has been directed, and gives to them the form, under which it is possible that they should be fruitfully regarded. A work of this kind is essentially epoch-making.

In any complete account of the Kantian system it is therefore necessary that there should be constant reference, on the one hand, to the peculiar character of the preceding 18th-century philosophy, and, on the other hand, to the problems left for renewed treatment to more modern thought. Fortunately the development of the Kantian system itself furnishes such treatment as is necessary of the former reference. For the critical philosophy was a work of slow growth. In the early writings of Kant we are able to trace with great definiteness the successive stages through which he passed from the notions of the preceding philosophy to the new and comprehensive method which gives its special character to the critical work. Scarcely any great mind, it has been said with justice, ever matured so slowly. In the early essays we find the principles of the current philosophies, those of Leibnitz and English empiricism, applied in various directions to those problems which serve as tests of their truth and completeness; we note the appearance of the difficulties or contradictions which manifest the one-sidedness or imperfection of the principle applied ; and we can trace the gradual growth of the new conceptions which were destined, in the completed system, to take the place of the earlier method.

To understand the Kantian work it is indispensable to trace the history of its growth in the mind of its author.

Of the two preceding stages of modern philosophy, only the second, that of Locke and Leibnitz , seems to have influenced practically the course of Kant's speculation. With the Cartesian movement as a whole he shows little acquaintance and no sympathy, and his own philosophic conception is never brought into relation with the systematic treatment of metaphysical problems charac- teristic of the Cartesian method. The fundamental question for philosophic reflection presented itself to him in the form which it had assumed in the hands of Locke and his successors in England, of Leibnitz and the Leibnitzian school in Germany. The transition from the Cartesian movement to this second stage of modern thought had doubtless been natural and indeed necessary. Nevertheless the full bearings of the philosophic question were somewhat obscured by the comparatively limited fashion in which it was then regarded. The tendency towards what may be technically called subjectivism, a tendency which differentiates the modern from the ancient method of speculation, is expressed in Locke and Leibnitz in a definite and peculiar fashion. However widely the two systems differ in details, they are at one in a certain fundamental conception which dominates the whole course of their philosophic construction. They are through- out individualist, i.e. they accept as given fact the existence of the concrete, thinking subject, and endeavour to show how this subject, as an individual conscious being, is related to the wider universe of which he forms part. In dealing with such a problem, there are evidently two lines along which investigation may proceed. It may be asked how the individual mind comes to know himself and the system of things with which he is connected, how the varied contents of his experience are to be accounted for, and what certainty attaches to his subjective consciousness of things. Regarded from the individualist point of view, this line of inquiry becomes purely psychological, and the answer may be presented,' as it was presented by Locke, in the fashion of a natural history of the growth of con- scious experience in the mind of the subject. Or, it may be further asked, how is the individual really connected with the system of things apparently disclosed to him in conscious experience? what is the precise significance of the existence which he ascribes both to himself and to the objects of experience ? what is the nature of the relation between himself as one part of the system, and the system as a whole ? This second inquiry is specifically metaphysical in bearing, and the kind of answer furnished to it by Leibnitz on the one hand, by Berkeley on the other, is in fact prescribed or deter- mined beforehand by the fundamental conception of the indivi- dualist method with which both begin their investigations. So soon as we make clear to ourselves the essential nature of this method, we are able to discern the specific difficulties or perplexities arising

'See further Idealism; Metaphysics; Logic, &c, where Kant's relation to subsequent thought is discussed.

in the attempt to carry it out systematically, and thus to note with precision the special problems presented to Kant at the outset of his philosophic reflections.

Consider, first, the application of the method on its psychological side, as it appears in Locke. Starting with the assumption of conscious experience as the content or filling-in of the individual mind, Locke proceeds to explain its genesis and nature by reference to the real universe of things and its mechanical operation upon the mind. The result of the interaction of mind, i.e. the individual mind, and the system of things, is conscious experience, consisting of ideas, which may be variously compounded, divided, compared, or dealt with by the subjective faculties or powers with which the entity, Mind, is supposed to be endowed. Matter of fact and matter of knowledge are thus at a stroke dissevered. The very notion of relation between mind and things leads at once to the counter notion of the absolute restriction of mind to its own subjective nature. That Locke was unable to reconcile these opposed notions is not surprising; that the difficulties and obscurities of the Essay arise from the impossibility of reconciling them is evident on the slightest consideration of the main positions of that work. Of these difficulties the philosophies of Berkeley and Hume are systematic treatments. In Berkeley we find the resolute determination to accept only the one notion, that of mind as restricted to its own conscious experience, and to attempt by this means to explain the nature of the external reality to which obscure reference is made. Any success in the attempt is due only to the fact that Berkeley introduces alongside of his individualist notion a totally new conception, that of mind itself as not in the same way one of the matters of conscious experi- ence, but as capable of reflection upon the whole of experience and of reference to the supreme mind as the ground of all reality. It is only in Hume that we have definitely and completely the evolution of the individualist notion as groundwork of a theory of knowledge ; and it is in his writings, therefore, that we may expect to find the fundamental difficulty of that notion clearly apparent. It is not a little remarkable that we should find in Hume, not only the sceptical dissolution of all fixity of cognition, which is the inevitable result of the individualist method, but also the clearest consciousness of the very root of the difficulty. The systematic application of the doctrine that conscious experience consists only of isolated objects of knowledge, impressions or ideas, leads Hume to distinguish between truths reached by analysis and truths which involve real connexion of the objects of knowledge. The first he is willing to accept without further inquiry, though it is an error to suppose, as Kant seems to have supposed, that he regarded mathematical propositions as coming under this head (see Hume) ; with respect to the

second, he finds himself, and confesses that he finds himself, hopelessly at fault. No real connexions between isolated objects of experience are perceived by us. No single matter of fact neces sarily implies the existence of any other. In short, if the difficulty be put in its ultimate form, no existence thought as a distinct individual can transcend itself, or imply relation to any other existence. If the parts of conscious experience are regarded as so many distinct things, there is no possibility of connecting them other than contingently, if at all. If the individual mind be really thought as individual, it is impossible to explain how it should have knowledge or consciousness at all. " In short," says Hume, " there are two principles which I cannot render consistent, nor is it in my power to renounce either of them, viz. that all our distinct perceptions are distinct existences, and that the mind never perceives any real connexion among distinct existences. Did our perceptions either inhere in something simple or individual, or did the mind perceive some real connexion among them, there would be no difficulty in the case " (App. to Treatise of Human Nature).

Thus, on the one hand, the individualist conception, when carried out to its full extent, leads to the total negation of all real cognition. If the real system of things, to which conscious experience has reference, be regarded as standing in casual relation to this experience there is no conceivable ground for the extension to reality of the notions which somehow are involved in thought. The same result is apparent, on the other hand, when we consider the theory of knowledge implied in the Leibnitzian individualism. The meta- physical conception of the monads, each of which is the universe in nuce, presents insuperable difficulties when the connexion or interdependence of the monads is in question, and these difficulties obtrude themselves when the attempt is made to work out a con- sistent doctrine of cognition. For the whole mass of cognisable fact, the mundus intelligibilis, is contained impliciter in each monad, and the several modes of apprehension can only be regarded as so many stages in the developing consciousness of the monad. Sense and understanding, real connexion of facts and analysis of notions, are not, therefore, distinct in kind, but differ only in degree. The same fundamental axioms, the logical principles of identity and sufficient reason, are applicable in explanation of all given proposi- tions. It is true that Leibnitz himself did not work out any com- plete doctrine of knowledge, but in the hands of his successors the theory took definite shape in the principle that the whole work of cognition is in essence analytical. The process of analysis might be complete or incomplete. For finite intelligences there was an I inevitable incompleteness so far as knowledge of matters of fact was

concerned. In respect to them, the final result was found in a series of irreducible notions or categories, the prima possibilia, the analysis and elucidation of which was specifically the business of philosophy or metaphysics.

It will be observed that, in the Leibnitzian as in the empirical individualism, the fundamental notion is still that of the abstract separation of the thinking subject from the materials of conscious experience. From this separation arise all the difficulties in the effort to develop the notion systematically, and in tracing the his- tory of Kant's philosophical progress we are able to discern the gradual perception on his part that here was to be found the ultimate cause of the perplexities which became apparent in considering the subordinate doctrines of the system. The successive essays which have already been enumerated as composing Kant's precritical work are not to be regarded as so many imperfect sketches of the doctrines of the Kritik, nor are we to look in them for anticipations of the critical view. They are essentially tentative, and exhibit with unusual clearness the manner in which the difficulties of a received theory force on a wider and more comprehensive view. There can be no doubt that some of the special features of the Kritik are to be found in these precritical essays, e.g. the doctrine of the Aesthetik is certainly foreshadowed in the Dissertation of 1770; the Kritik, however, is no patchwork, and what appears in the Dissertation takes an altogether new form when it is wrought into the more comprehensive conception of the later treatise.

The particular problem which gave the occasion to the first of the precritical writings is, in an imperfect or particular fashion, the fundamental question to which the Kritik is an answer. What is the nature of the distinction between knowledge gained by analysis of notions and knowledge of matters of fact ? Kant seems never to have been satisfied with the Wolffian identification of logical axioms and of the principle of sufficient reason. The tract on the False Subtlety of the Four Syllogistic Figures, in which the view of thought or reason as analytic is clearly expressed, closes with the significant division of judgments into those which rest upon the logical axioms of identity and contradiction and those for which no logical ground can be shown. Such immediate or indemonstrable judgments, it is said, abound in our experience. They are, in fact, as Kant presently perceived, the foundations for all judgments regarding real existence. It was impossible that the question regarding their nature and legitimacy and their distinction from analytic judgments should not present itself to him. The three tracts belonging to the years 1763- 1764 bring forward in the sharpest fashion the essential opposition between the two classes of judgments. In the Essay on Negative Quantities, the fundamental

thought is the total distinction in kind between logical opposition (the contradictoriness of notions, which Kant always viewed as formed, definite products of thought) and real opposition. For the one adequate explanation is found in the logical axiom of analytical thinking; for the other no such explanation is to be had. Logical ground and real ground are totally distinct. " I can understand perfectly well," says Kant, " how a consequence follows from its reason according to the law of identity, since it is discoverable by mere analysis of the notion contained in it. . . . But how something follows from another thing and not according to the law of identity, this I should gladly have made clear to me. . . . How shall I comprehend that, since something is, something else should be?" Real things, in short, are distinct existences, and, as distinct, not necessarily or logically connected in thought. " I have," he proceeds, " reflected on the nature of our knowledge in relation to our judgment of reason and consequent, and I intend to expound fully the result of my reflections. It follows from them that the relation of a real ground to that which is thereby posited or denied cannot be expressed by a judgment but only by means of a notion, which by analysis may certainly be reduced to yet simpler notions of real grounds, but yet in such a way that the final resort of all our cognition in this regard must be found in simple and irreducible notions of real grounds, the relation of which to their consequents cannot be made clear."

The striking similarity between Kant's expressions in this Essay and the remarks with which Hume introduces his analysis of the notion of cause has led to the supposition that at this period of his philosophical career Kant was definitely under the influence of the earlier empirical thinker. Consideration of the whole passage is quite sufficient to show the groundlessness of this supposition. The difficulty with which Kant is presented was one arising inevi- tably from reflection upon the Leibnitzian theory of knowledge, and the solution does not in any way go beyond that theory. It is a solution, in fact, which must have been impossible had the purport of Hume's empirical doctrine been present to Kant's mind. He is here at the point at which he remained for many years, accepting without any criticism certain fundamental notions as required for real cognition. His ideal of metaphysic is still that of complete analysis of given notions. No glimmering of the further question, Whence come these notions and with what right do we apply them in cognition? is yet apparent. Any direct influence from Hume must be referred to a later period in his career.

The prize essay On the Principles of Natural Theology and Morals brings forward the same fundamental oppdsition — though in a special form. Here, for the first time, appears definitely the dis- tinction between synthesis and analysis, and in the distinction is

found the reason for the superior certainty and clearness of mathe- matics as opposed to philosophy. Mathematics, Kant thinks, proceeds synthetically, for in it the notions are constructed. Meta- physics, on the other hand, is analytical in method ; in it the notions are given, and by analysis they are cleared up. It is to be observed that the description of mathematics as synthetic is not an anticipa- tion of the critical doctrine on the same subject. Kant does not, in this place, raise the question as to the reason for assuming that the arbitrary syntheses of mathematical construction have any reference to reality. The deeper significance of synthesis has not yet become apparent.

In the Only Possible Ground of Proof for the Existence of God, the argument, though largely Leibnitzian, advances one step farther towards the ultimate inquiry. For there Kant states as precisely as in the critique of speculative theology his fundamental doctrine that real existence is not a predicate to be added in thought to the conception of a possible subject. So far as subjective thought is con- cerned, possibility, not real existence, is contained in any judgment. The year 1765 was marked by the publication of Leibnitz's post- humous Nouveaux Essais, in which his theory of knowledge is more fully stated than in any of his previous tracts. In all probability Kant gave some attention to this work, though no special reference to it occurs in his writings, and it may have assisted to give addi- tional precision to his doctrine. In the curious essay, Dreams of a Clairvoyant, published 1766, he emphasizes his previously reached conclusion that connexions of real fact are mediated in our thought by ultimate notions, but adds that the significance and warrant for such notions can be furnished only by experience. He is inclined, therefore, to regard as the function of metaphysics the complete statement of these ultimate, indemonstrable notions, and therefore the determination of the limits to knowledge by their means. Even at this point, where he approximates more closely to Hume than to any other .thinker, the difficulty raised by Hume does not seem to occur to him. He still appears to think that experience does warrant the employment of such notions, and when there is taken into account his correspondence with Lambert during the next few years, one would be inclined to say that the Architektonik of the latter represents most completely Kant's idea of philosophy.

On another side Kant had been shaking himself free from the principles of the Leibnitzian philosophy. According to Leibnitz, space, the order of coexisting things, resulted from the relations of monads to one another. But Kant began to see that such a con- ception did not accord with the manner in which we determine directions or positions in space. In the curious little essay, On the Ground of distinguishing Particular Divisions in Space, he pointed out that the idea of space as a whole is not deducible from the experience of particular spaces, or particular relations of objects in space,

that we only cognize relations in space by reference to space as a whole, and finally that definite positions involve reference to space as a given whole.

The whole development of Kant's thought up to this point is intelligible when regarded from the Leibnitzian point of view, with which he started. There appears no reason to conclude that Hume at this time exercised any direct influence. One may go still further, and add that even in the Dissertation of 1770, generally regarded as more than foreshadowing the Kritik, the really critical question is not involved. A brief notice of the contents of this tract will suffice to show how far removed Kant yet was from the methods and principles of the critical or transcendental philosophy. Sense and understanding, according to the Dissertation, are the two sources of knowledge. The objects of the one are things of sense or phenomena; the objects of the other are noumena. These are absolutely distinct, and are not to be regarded as differing only in degree. In phenomena we distinguish matter, which is given by sense, and form, which is the law of the order of sensations. Such form is twofold — the order of space and time. Sensations formed by space and time compose the world of appearance, and this when treated by the understanding, according to logical rules, is experi- ence. But the logical use of the understanding is not its only use. Much more important is the real use, by which are produced the pure notions whereby we think things as they are. These pure notions are the laws of the operation of the intellect; they are leges intellectus.

Apart, then, from the expanded treatment of space and time as subjective forms, we find in the Dissertation little more than the very precise and definite formulation of the slowly growing opposi- tion to the Leibnitzian doctrines. That the pure intellectual notions should be defended as springing from the nature of intellect is not out of harmony with the statement of the Traume eines Geistersehers, for there the pure notions were allowed to exist, but were not held to have validity for actual things except on grounds of experience. Here they are supposed to exist, dissevered from experience, and are allowed validity as determinations of things in themselves.

The stage which Kant had now reached in his philosophical development was one of great significance. The doctrine of know- ledge expressed in the Dissertation was the final form which the Wolffian rationalism could assume for him, and, though many of the elements of the Kritik are contained therein, it was not really in advance of the Wolffian theory. The doctrine of space and time

as forms of sense-perception, the reference of both space and time and the pure intellectual notions to the laws of the activity of mind itself, the distinction between sense and understanding as one of kind, not of degree, with the correlative distinction between pheno- mena and noumena, — all of these reappear, though changed and modified, in the Kritik, But, despite this resemblance, it seems clear that, so far as the Dissertation is concerned, the way had only been prepared for the true critical inquiry, and that the real import of Hume's sceptical problem had not yet dawned upon Kant. From the manner, however, in which the doctrine of knowledge had been stated in the Dissertation, the further inquiry had been rendered inevitable. It had become quite impossible for Kant to remain longer satisfied with the ambiguous position assigned to a funda- mental element of his doctrine of knowledge, the so-called pure intellectual notions. Those notions, according to the Dissertation, had no function save in relation to things-in-themselves, i.e. to objects which are not directly or immediately brought into relation to our faculty of cognition. They did not serve as the connecting links of formed experience; on the contrary, they were supposed to be absolutely dissevered from all experience which was possible for intelligence like ours. In his previous essays, Kant, while like- wise maintaining that such pure, irreducible notions existed, had asserted in general terms that they applied to experience, and that their applicability or justification rested on experience itself, but had not raised the question as to the ground of such justification. Now, from another side, the supreme difficulty was presented — how could such notions have application to any objects whatsoever? For some time the correlative difficulty, how objects of sense- perception were possible, does not seem to have suggested itself to Kant. In the Dissertation sense-perception had been taken as receptivity of representations of objects, and experience as the product of the treatment of such representations by the logical or analytical processes of understanding. Some traces of this confused fashion of regarding sense-perceptions are left even in the Kritik, specially perhaps in the Aesthetik, and they give rise to much of the ambiguity which unfortunately attaches to the more developed theory of cognition. So soon, however, as the critical question was put, On what rests the reference of representations in us to the object or thing? in other words, How do we come to have knowledge of objects at all? it became apparent that the problem was one of perfect generality, and applied, not only to cognition through the pure notions, but to sense-perceptions likewise. It is in the state- ment of this general problem that we find the new and characteristic feature of Kant's work.

There is thus no reason to doubt the substantial accuracy of Kant's reference to the particular occasion or cause of the critical inquiry. Up to the stage indicated by the Dissertation he had been attempting, in various

ways, to unite two radically divergent modes of explaining cognition — that which would account for the content of experience by reference to affection from things without us, and that which viewed the intellect itself as somehow furnished with the means of pure, rational cognition. He now discovered that Hume's sceptical analysis of the notion of cause was really the treatment of one typical or crucial instance of the much more general problem. If experience, says Hume, consists solely of states of mind somehow given to us, each of which exists as an effect, and therefore as dis- tinct from others, with what right do we make the common assump- tion that parts of experience are necessarily connected ? The only possible answer, drawn from the premises laid down, must be that there is no warrant for such an assumption. Necessity for thought, as Kant had been willing to admit and as Hume also held, involves or implies something more than is given in experience — for that which is given is contingent — and rests upon an a priori or pure notion. But a priori notions, did they exist, could have no claim to regulate experience. Hume, therefore, for his part, rejected entirely the notion of cause as being fictitious and delusive, and professed to account for the habit of regarding experience as neces- sarily connected by reference to arbitrarily formed custom of thinking. Experience, as given, contingent material, had a certain uniformity, and recurring uniformities generated in us the habit of regarding things as necessarily connected. That such a resort to experience for explanation could lead to no valid conclusion has been already noted as evident to Hume himself.

The dogmatic or individualist conception of experience had thus proved itself inadequate to the solution of Hume's difficulty regarding the notion of cause, — a difficulty which Kant, erroneously, had thought to be the only case contemplated by his predecessor. The perception of its inadequacy in this respect, and the consequent generalization of Hume's problem, are the essential features of the new critical method. For Kant was now prepared to formulate his general inquiry in a definite fashion. His long-continued reflection on the Wolffian doctrine of knowledge had made clear to. him that synthetic connexion, the essence of real cognition, was not contained in the products of thinking as a formal activity of mind operating on material otherwise supplied. On the other hand, Hume's analysis enabled him to see that synthetic connexion was not contained in experience regarded as given material. Thus neither the formal nor the material aspect of conscious experience, when regarded from the individualist point of view, supplied any

absolutely new conception of experience was necessary, if the fact of cognition was to be explained at all, and the various modes in which Kant expresses the business of his critical philosophy were merely different fashions of stating the one ultimate problem, differ- ing according to the

particular aspect of knowledge which he happened to have in view. To inquire how synthetic a priori judgments are possible, or how far cognition extends, or what worth attaches to metaphysical propositions, is simply to ask, in a specific form, what elements are necessarily involved in experience of which the subject is conscious. How is it possible for the indivi- dual thinking subject to connect together the parts of his experience in the mode we call cognition?

The problem of the critical philosophy is, therefore, the complete analysis of experience from the point of view of the conditions under which such experience is possible for the conscious subject. The central ideas are thus self-consciousness, as the supreme condition under which experience is subjectively possible, and the manifold details of experience as a varied and complex whole. The solution of the problem demanded the utmost care in keeping the due balance between these ideas; and it can hardly be said that Kant was perfectly successful. He is frequently untrue to the more comprehensive conception which dominates his work as a whole. The influence of his previous philosophical training, nay, even the unconscious influence of terminology, frequently induces in his statements a certain laxity and want of clearness. He selects definitely for his starting point neither the idea of self-consciousness nor the details of experience, but in his actual procedure passes from one to the other, rarely, if ever, taking into full consideration the weighty question of their relation to one another. Above all, he is continuously under the influence of the individualist notion which he had done so much to explode. The conception of conscious experience, which is the net result of the Kritik, is indefinitely pro- founder and richer than that which had ruled the 18th century philosophizing, but for Kant such experience still appears as some- how the arbitrary product of the relation between the individual conscious subject and the realm of real facts. When he is actually analysing the conditions of knowledge, the influence of the indivi- dualist conception is not prominent; the conditions are stated as quite general, as conditions of knowledge. But so soon as the deeper, metaphysical problems present themselves, the shadow of the old doctrine reappears. Knowledge is regarded as a mechanical product, part furnished by the subject, part given to the subject, and is thus viewed as mechanically divisible into a priori and a posteriori, into pure and empirical, necessary and contingent. The individual as an agent, conscious of universal moral law, is yet regarded as in a measure opposed to experience, and the Kantian ethical code remains purely formal. The ultimate relation between intelligence and natural fact, expressed in the notion of end, is thought as problem- atic or contingent. The difficulties or obscurities of the Kantian system, of which the above are merely the more prominent, may all be traced to the one source, the false or at least inadequate idea of the individual. The more thorough explanation of the

relation between experience as critically conceived and the individual subject was the problem left by Kant for his successors.

In any detailed exposition of the critical system it would be requisite in the first place to state with some fullness the precise nature of the problems immediately before Kant, and in the second place to follow with some closeness the successive stages of the system as presented in the three main works, the Kritik of Pure Reason, the Kritik of Practical Reason and the Kritik of Judgment, with the more important of the minor works, the Metaphysic of Nature and the Metaphysic of Ethics. It would be necessary, also, in any such expanded treatment, to bring out clearly the Kantian classification of the philosophical sciences, and to indicate the relation between the critical or transcendental investigation of the several faculties and the more developed sciences to which that investigation serves as introduction. As any detailed statement of the critical system, however compressed, would be beyond the limits of the present article, it is proposed here to select only the more salient doctrines, and to point out in connexion with them what advance had been effected by Kant, and what remained for sub- sequent efforts at complete solution of the problems raised by him. Much that is of interest and value must necessarily be omitted in any sketch of so elaborate a system, and for all points of special interpretation reference must needs be made to the many elaborate dissertations on or about the Kantian philosophy.

The doctrine from which Kant starts in his critical or transcen- dental investigation of knowledge is that to which the slow develop- ment of his thought had led him. The essence of cognition or knowledge was a synthetic act, an act of combining in thought the detached elements of experience. Now synthesis was explicable neither by reference to pure thought, the logical or elaborative faculty, which in Kant's view remained analytic in function, nor by reference to the effects of external real things upon our faculties of cognition. For, on the one hand, analysis or logical treatment applied only to objects of knowledge as already given in synthetic forms, and, on the other hand, real things could yield only isolated effects and not the combination of these effects in the forms of cognitive experience. If experience is to be matter of knowledge

foundation for real knowledge, whether a priori or empirical. An ' for the conscious subject, it must be regarded as the conjoint product

of given material and synthetic combination. Form and matter may indeed

be regarded separably and dealt with in isolation for purposes of critical inquiry, but in experience they are necessarily and inseparably united. The problem of the Kritik thus becomes for Kant the complete statement of the elements necessarily involved in synthesis, and of the subjective processes by which these elements are realized in our individual consciousness. He is not asking, with Locke, whence the details of experience arise ; he is not attempting a natural history of the growth of experience in the individual mind ; but he is endeavouring to state exhaustively what conditions are necessarily involved in any fact of knowledge, i.e. in any synthetic combination of parts of experience by the conscious subject.

So far as the elements necessarily involved in conscious experience are concerned, these may be enumerated briefly thus: — given data of sense, inner or outer; the forms of perception, i.e. space and time; the forms of thought, i.e. the categories; the ultimate condition of knowledge, the identity of the pure ego or self. The ego or self is the central unity in reference to which alone is any part of experience cognizable. But the consciousness of self is the foundation of knowledge only when related to given material. The ego has not in itself the element of difference, and the essence of knowledge is the consciousness of unity in difference. For knowledge, therefore, it is necessary that difference should be given to the ego. The modes under which it is possible for such given difference to become portion of the conscious experience of the ego, the modes under which the isolated data can be synthetically combined so as to form a cogni- zable whole, make up the form of cognition, and upon this form rests the possibility of any a priori or rational knowledge.

The notion of the ego as a purely logical unity, containing in itself no element of difference, and having only analytical identity, is fundamental in the critical system, and lies at the root of all its difficulties and perplexities. To say that the ego as an individual does not produce the world of experience is by no means the same as to say that the ego is pure unity without element of difference. In the one case we are treating the ego as one of the objects of experience and denying of it productive efficacy; in the second case we are dealing with the unity of the ego as a condition of knowledge, of any experience whatsoever. In this second sense, it is wholly wrong to assert that the ego is pure identity, pure unity. The unity and identity of the ego, so regarded, are taken in abstraction, i.e. as dissevered from the more complex whole of which they are necessary elements. When the ego is taken as a condition of knowledge, its unity is not more important than the difference necessarily correlated with it. That the ego as a thing should not produce difference is quite beside the mark. The consequences of the abstract separation which Kant so draws between the ego and the world of experience are apparent throughout his whole system. Assuming at the outset an opposition between the two, self and matter of

knowledge, he is driven by the exigencies of the problem of reconciliation to insert term after term as means of bringing them together, but never succeeds in attaining a junction which is more than mechanical. To the end, the ego remains, partly the pure logical ego, partly the concrete individual spirit, and no explanation is afforded of the relation between them. It is for this reason that the system of forms of perception and categories appears so contingent and hap- hazard. No attempt is made to show how or why the difference supplied for the pure logical ego should present itself necessarily under these forms. They are regarded rather as portions of the subjective mechanism of the individual consciousness. The mind or self appears as though it were endowed with a complex machinery by which alone it could act upon the material supplied to it. Such a crude conception is far, indeed, from doing justice to Kant's view, but it undoubtedly represents the underlying assumption of many of his cardinal doctrines. The philosophy of Fichte is historically interesting as that in which the deficiencies of Kant's fundamental position were first discerned and the attempt made to remedy them.

Unfortunately for the consistency of the Kritik, Kant does not attempt to work out systematically the elements involved in knowledge before considering the subjective processes by which knowledge is realized in consciousness. He mixes up the two inquiries, and in the general division of his work depends rather upon the results of previous psychology than upon the lines pre- scribed by his own new conception of experience. He treats the elements of cognition separately in connexion with the several sub- jective processes involved in knowledge, viz. sense and under- standing. Great ambiguity is the natural result of this procedure. For it was not possible for Kant to avoid the misleading connotation of the terms employed by him. In strictness, sense, understanding, imagination and reason ought to have had their functions defined in close relation to the elements of knowledge with which they are severally connected, and as these elements have no existence as separate facts, but only as factors in the complex organic whole, it might have been possible to avoid the error of supposing that each subjective process furnished a distinct, separately cognizable portion of a mechanical whole. But the use of separate terms, such as sense and understanding, almost unavoidably led to phraseology only interpretable as signifying that each furnished a specific kind of knowledge, and all Kant's previous training contributed to strengthen this erroneous view. Especially noteworthy is this in the case of the categories. Kant insists upon treating these as

Begriffe, notions, and assigns to them certain characteristics of notions. But it is readily seen, and in the Logik Kant shows him- self fully aware of the fact, that these pure connective links of experience, general aspects of objects of intelligible experience, do not resemble concepts formed by the

so-called logical or elaborative processes from representations of completed objects. Nothing but harm can follow from any attempt to identify two products which differ so entirely. So, again, the Aesthetik is rendered extremely obscure and difficult by the prevalence of the view, already noted as obtaining in the Dissertation, that sense is a faculty receiving representations of objects. Kant was anxious to avoid the error of Leibnitz, who had taken sense and understanding to differ in degree only, not in kind ; but in avoiding the one error he fell into another of no less importance.

*The consideration of the several elements which in combination make up the fact of cognition, or perception, as it may be called, contains little or nothing bearing on the origin and nature of the given data of sense, inner or outer. The manifold of sense, which plays so important a part in the critical theory of knowledge, is left in an obscure and perplexed position. So much is clear, however, that according to Kant sense is not to be regarded as receptive of representations of objects. The data of sense are mere stimuli, not partial or confused representations. The sense-manifold is not to be conceived as having, per se, any of the qualities of objects as actually cognized; its parts are not cognizable per se, nor can it with propriety be said to be received successively or simultaneously. When we apply predicates to the sense-manifold regarded in isola- tion, we make that which is only a factor in the experience of objects into a separate, independent object, and use our predicates trans- cendently. Kant is not always in his language faithful to his view of the sense-manifold, but the theory as a whole, together with his own express definitions, is unmistakable. On the origin of the data of sense, Kant's remarks are few and little satisfactory. He very commonly * employs the term affection of the faculty of sense as expressing the mode of origin, but offers no further explanation of a term which has significance only when interpreted after a somewhat mechanical fashion. Unquestionably certain of his remarks indicate the view that the origin is to be sought in things-in-themselves, but against hasty misinterpretations of such remarks there are certain cautions to be borne in mind. The relation between phenomena and noumena in the Kantian system does not in the least resemble that which plays so important a part in modern psychology — between the subjective results of sense affection and the character of the objective conditions of such affection. Kant has pointedly declared that it would be a gross absurdity to suppose that in his view separate, distinct things-in-themselves existed corresponding to the several objects of perception. And, finally, it is not at au difficult to understand why Kant should say that the affection of sense originated in the action of things-in-themselves, when we consider what was the thing-in-itself to which he was referring. The thing-in-itself to which the empirical order and relations of sense-experience are referred is the divine*

order, which is not matter of knowledge, but involved in our practical or moral beliefs. Critics who limit their view to the Kritik of Pure Reason, and there, in all probability, to the first or constructive portion of the work, must necessarily fail to interpret the doctrines of the Kantian system, which do not become clear or definite till the system has been developed. Reason was, for Kant, an organic whole ; the speculative and moral aspects are never severed ; and the solution of problems which appear at first sight to belong solely to the region of speculative thought may be found ultimately to depend upon certain charac- teristics of our nature as practical.

Data of sense-affection do not contain in themselves synthetic combination. The first conditions of such combination are found by Kant in the universal forms under which alone sense-phenomena manifest themselves in experience. These universal forms of per- ception, space and time, are necessary, a priori, and in character- istic features resembling intuitions, not notions. They occupy, therefore, a peculiar position, and one section of the Kritik, the Aesthetik, is entirely devoted to the consideration of them. It is important to observe that it is only through the a priori character of these perceptive forms that rational science of nature is at all possible. Kant is here able to resume, with fresh insight, his pre- vious discussions regarding the synthetic character of mathematical propositions. In his early essays he had rightly drawn the distinc- tion between mathematical demonstration and philosophic proof, referring the certainty of the first to the fact that the constructions were synthetic in character and entirely determined by the action of constructive imagination. It had not then occurred to him to ask, With what right do we assume that the conclusions arrived at from arbitrary constructions in mathematical matter have applica- bility to objects of experience? Might not mathematics be a purely imaginary science? To this question he is now enabled to return an answer. Space and time, the two essential conditions of sense- perception, are not data given by things, but universal forms of intellect into which all data of sense must be received. Hence, whatever is true of space and time regarded by imagination as objects, i.e. quantitative constructions, must be true of the objects making up our sense-experience. The same forms and the same constructive activity of imagination are involved in mathematical

synthesis and in the constitution of objects of sense-experience. The foundation for pure or rational mathematics, there being included under this the pure science of movement, is thus laid in the critical doctrine of space and time.

The Aesthetik isolates sense-perception, and considers its forms as though it were an independent, complete faculty. A certain con- fusion, arising from this, is noticeable in the Analytik when the necessity for justifying the position of the categories is under dis- cussion, but the real difficulty in which Kant was involved by his doctrine of space and time has its roots even deeper than the erroneous isolation of sensibility. He has not in any way " de- duced " space and time, but, proceeding" from the ordinary current view of sense-experience, has found these remaining as residuum after analysis. The relation in which they stand to the categories or pure notions is ambiguous; and, when Kant has to consider the fashion in which category and data of sense are to be brought together, he merely places side by side as a priori elements the pure connective notions and the pure forms of perception, and finds it, apparently, only a matter of contingent convenience that they should harmonize with one another and so render cognition possible. To this point also Fichte was the first to call attention.

Affection of sense, even when received into the pure forms of perception, is not matter of knowledge. For cognition there is requisite synthetic combination, and the intellectual function through which such combination takes place. The forms of in- tellectual function Kant proceeds to enumerate with the aid of the commonly received logical doctrines. For this reference to logic he has been severely blamed, but the precise nature of the debt due to the commonly accepted logical classification is very generally misconceived. Synthetic combination, Kant points out, is formally expressed in a judgment, which is the act of uniting representations. At the foundation of the judgments which express the types of synthetic combination, through which knowledge is possible, lie the pure general notions, the abstract aspect of the conditions under which objects are cognizable in experience. General logic has also to deal with the union of representations, though its unity is analytic merely, not synthetic. But the same intellectual function which serves to give unity in the analytic judgments of formal logic serves to give unity to the synthetic combinations of real perception. It appeared evident, then, to Kant that in the forms of judgment, as they are stated in the common logic, there must be found the analogues of the types of judgment which are involved in transcen- dental logic, or in the theory of real cognition. His view of the ordinary logic was wide and comprehensive, though in his restriction of the science to pure form one can trace the influence of his earlier training, and it is no small part of the value of the critical philosophy that it has revived the study of logic and prepared the way for a more thorough consideration of logical doctrines. The position assigned to logic by Kant is not, in all probability, one which can be defended; indeed, it is hard to see how Kant himself, in consis- tency with the critical doctrine of knowledge, could have retained many of the older logical theorems, but the precision with which the

position was stated, and the sharpness with which logic was marked off from cognate philosophic disciplines, prepared the way for the more thoughtful treatment of the whole question.

Formal logic thus yields to Kant the list of the general notions, pure intellectual predicates, or categories, through which alone experience is possible for a conscious subject. It has already been noted how serious was the error involved in the description of these as notions, without further attempt to clear up their precise significance. Kant, indeed, was mainly influenced by his strong opposition to the Leibnitzian rationalism, and therefore assigns the categories to understanding, the logical faculty, without considera- tion of the question, — which might have been suggested by the previous statements of the Dissertation, — what relation these cate- gories held to the empirical notions formed by comparison, abstrac- tion and generalization when directed upon representations of objects. But when the categories are described as notions, i.e. formed products of thought, there rises of necessity the problem which had presented itself to Kant at every stage of his pre-critical thinking, — with what right can we assume that these notions apply to objects of experience? The answer which he proceeds to give altogether explodes the definition of the categories as formed pro- ducts of thought, and enables us to see more clearly the nature of the new conception of experience which lies in the background of all the critical work.

The unity of the ego, which has been already noted as an element entering into the synthesis of cognition, is a unity of a quite distinct and peculiar kind. That the ego to which different parts of experi- ence are presented must be the same ego, if there is to be cognition at all, is analytically evident; but the peculiarity is that the ego must be conscious of its own unity and identity, and this unity of self-consciousness is only possible in relation to difference not contained in the ego but given to it. The unity of apperception, then, as Kant calls it, is only possible in relation to synthetic unity of experience itself, and the forms of this synthetic unity, the cate- gories, are, therefore, on the one hand, necessary as forms in which self-consciousness is realized, and, on the other hand, restricted in their application and validity to- the data of given sense, or the particular element of experience. Thus experience presents itself

as the organic combination of the particular of sense with the individual unity of the ego through the universal forms of the categories. Reference of representations to the unity of the object, synthetic unity of apperception, and subsumption of data of sense under the categories, are thus three sides or aspects of the one fundamental fact.

In this deduction of the categories, as Kant calls it, there appears for the

first time an endeavour to connect together into one organic whole the several elements entering into experience. It is evident, however, that much was wanting before this essential task could be regarded as complete. Kant has certainly brought together self- consciousness, the system of the categories and data of sense. He has shown that the conditions of self - consciousness are the conditions of possible experience. But he has not shown, nor did he attempt to show, how it was that the conditions of self-consciousness are the very categories arrived at by consideration of the system of logical judgments. He does endeavour to show, but with small success, how the junction of category and data of sense is brought about, for according to his scheme these stood, to a certain extent at least, apart from and independent of one another. The failure to effect an organic combination of the several elements was the natural consequence of the false start which had been made.

The mode in which Kant endeavours to show how the several portions of cognition are subjectively realized brings into the clearest light the inconsistencies and imperfections of his doctrine. Sense had been assumed as furnishing the particular of knowledge, under- standing as furnishing the universal; and it had been expressly declared that the particular was cognizable only in and through the universal. Still, each was conceived as somehow in itself complete and finished. Sense and understanding had distinct functions, and there was wanting some common term, some intermediary which should bring them into conjunction. Data of sense as purely particular could have nothing in common with the categories as purely Universal. But data of sense had at least one universal aspect, — their aspect as the particular of the general forms, space and time. Categories were in themselves abstract and valueless, serviceable only when restricted to possible objects of experience. There was thus a common ground on which category and intuition were united in one, and an intermediate process whereby the univer- sal of the category might be so far individualized as to comprehend the particular of sense. This intermediate process — which is really the junction of understanding and sense — Kant calls productive imagination, and it is only through productive imagination that knowledge or experience is actually realized in our subjective consciousness. The specific forms of productive imagination are called schemata, and upon the nature of the schema Kant gives much that has proved of extreme value for subsequent thought.

Productive imagination is thus the concrete element of knowledge, and its general modes are the abstract expression of the a priori laws of all possible experience. The categories are restricted in their applicability to the schema, i.e. to the pure forms of conjunction of the manifold in time, and in the modes of combination of schemata and categories we have the foundation for the rational sciences of mathematics and physics. Perception

or real cognition is thus conceived as a complex fact, involving data of sense and pure perceptive forms, determined by the category and realized through productive imagination in the schema. The system of principles which may be deduced from the consideration of the mode in which understanding and sense are united by productive imagination is the positive result of the critical theory of knowledge, and some of its features are remarkable enough to deserve attention. According to his usual plan, Kant arranges these principles in conformity with the table of the categories, dividing the four classes, however, into two main groups, the mathematical and the dynamical. The mathematical principles are the abstract expression of the necessary mode in which data of sense are determined by the category in the form of intuitions or representations of objects; the dynamical are the abstract expression of the modes in which the existence of objects of intuition is determined. The mathematical principles are constitutive, i.e. express determinations of the objects themselves; the dynamical are regulative, i.e. express the conditions under which objects can form parts of real experience. Under the mathematical principles come the general rules which furnish the ground for the application of quantitative reasoning to real facts of experience. For as data of sense are only possible objects when received in the forms of space and time, and as space and time are Only cognized when determined in definite fashion by the understanding through the schema of number (quantity) or degree (quality), all intuitions are extensive quantities and contain a real element, that of sense, which has degree. Under the dynamical principles, the general modes in which the existence of objects are determined, fall the analogies of experience, or general rules according to which the existence of objects in relation to one another can be determined, and the postulates of experience, the general rules according to which the existence of objects for us or our own subjective existence can be determined. The analogies of experience rest upon the order of perceptions in time, i.e. their permanence, succession or coexistence, and the principles are respectively those of substance, causality and reciprocity. It is to be observed that Kant in the expression of these analogies reaches the final solution of the difficulty which had

so long'pressed upon him, the difficulty as to the relation of the pure connective notions to experience. These notions are not directly applicable to experience, nor do we find in experience anything corresponding to the pure intellectual notions of substance, cause and reciprocity. But experience is for us the combination of data of sense in the forms of productive imagination, forms determined by the pure intellectual notions, and

accordingly experience is possible for us only as in modes corresponding to the notions. The permanent in time is substance in any possible experience, and no experience is possible save through the determination of all changes as in relation to a permanent in time. Determined sequence is the causal relation in any possible experience, and no experience i3 possible save through the determination of perceived changes as in relation to a determined order in time. So with coexistence and reciprocity.

The postulates of experience are general expressions of the signifi- cance of existence in the experience of a conscious subject. The element of reality in such experience must always be given by intuition, and, so far as determination of existence is assumed, external intuition is a necessary condition of inner intuition. The existence of external things is as certain as the existence of the con- crete subject, and the subject cannot cognise himself as existing save in relation to the world of facts of external perception. Inner and outer reality are strictly correlative elements in the experience of the conscious subject.

Throughout the positive portion of his theory of cognition, Kant has been beset by the doctrine that the categories, as finished, com- plete notions, have an import or significance transcending the bounds of possible experience. Morever, the manner in which space and time had been treated made it possible for him to regard these as contingent forms, necessary for intelligences like ours, but not to be viewed as absolutely necessary. The real meaning of these pecu- liarities is hardly ever expressed by him, though it is clear that the solution of the matter is to be found in the inadequacy of the positive theory to meet the demands of reason for completed explanation. But the conclusion to which he was led was one of the greatest importance for the after development of his system. Cognition is necessarily limited. The categories are restricted in their applica- tion to elements of possible experience to that which is presented in intuition, and all intuition is for the ego contingent. But to assert that cognition is limited and its matter contingent is to form the idea of an intelligence for whom cognition would not be limited and for whom the data of intuition would not be given, contingent facts, but necessarily produced along with the pure categories. This idea of an intuitive understanding is the definite expression for the complete explanation which reason demands, and it involves the conception of a realm of objects for such an understanding, a realm of objects which, in opposition to the phenomena of our relative and limited experience, may be called noumena or things-in-themselves. The noumenon, therefore, is in one way the object of a non-sensuous intuition, but more correctly is the expression of the limited and partial character of our knowledge. The idea of a noumenon is thus a limiting notion.

Assuredly, the difficult section of the Kritik, on the ground of the

distinction between phenomena and noumena, would not have led to so much misconception as it has done, had Kant then brought forward what lies at the root of the distinction, his doctrine of reason and its functions. Understanding, as has been seen, is the faculty of cognition strictly so called; and within its realm, that of space, time and matter, positive knowledge is attainable. But the ultimate conception of understanding, that of the world of objects, quantita- tively determined, and standing in relation of mutual reciprocity to one another, is not a final ground of explanation. We are still able and necessitated to reflect upon the whole world of phenomena as thus cognized, and driven to inquire after its significance. In our reflection we necessarily treat the objects, not as phenomena, as matters of positive, scientific knowledge, but as things-in-themselves, as noumena. The distinction between phenomena and noumena is, therefore, nothing but the expression of the distinction between understanding and reason, a distinction which, according to Kant, is merely subjective.

The specific function of reason is the effort after completed ex- planation of the experience presented in cognition. But in such effort there are no notions to be employed other than the categories, and these, as has already been seen, have validity only in reference to objects of possible experience. We may expect, then, to find the transcendent employment of the categories leading into various difficulties and inconsistencies. The criticism of reason in its specific aspect throws fresh light on the limits to human knowledge and the significance of experience.

Experience has presented itself as the complex result of relation between the ego or subject and the world of phenomena. Reason may therefore attempt a completed explanation either of the ego or of the world of phenomena or of the total relation between them. The three inquiries correspond to the subjects of the three ancient metaphysical sciences, rational psychology, rational cosmology, rational theology. It is readily seen, in regard to the first of them, that all attempts to determine the nature of the ego as a simple, perdurable, immaterial substance rest upon a confusion between the ego as pute logical unity and the ego as object of intuition, and

involve a transcendent use of the categories of experience. It profits not to apply such categories to the soul, for no intuition corresponding to them is or can be given. The idea of the soul must be regarded as transcendent. So too when we endeavour, with the help of the categories of quantity, quality, relation and modality, to determine the nature and relation of parts of the world, we find that reason is landed in a peculiar difficulty. Any solution that can be given is too narrow for the demands of reason and too wide for the restrictions of understanding. The transcendent employment of the categories leads to antinomy, or equally balanced statements of apparently

contradictory results. Due attention to the relation between understanding and reason enables us to solve the antinomies and to discover their precise origin and significance. Finally, the endeavour to find in the conception of God, as the supreme reality, the explanation of experience, is seen to lead to no valid conclusion. There is not any intuition given whereby we might show the reality of our idea of a Supreme Being. So far as knowledge is concerned, God remains a transcendental ideal.

The criticism of the transcendental ideas, which is also the examination of the claims of metaphysic to rank as a science, yields a definite and intelligible result. These ideas, the expression of the various modes in which unity of reason may be sought, have no objects corresponding to them in the sphere of cognition. They have not, therefore, like the categories, any constitutive value, and all attempts at metaphysical construction with the notions or categories of science must be resigned as of necessity hopeless. But the ideas are not, on that account, destitute of all value. They are supremely significant, as indicating the very essence of the function of reason. The limits of scientific cognition become intelligible, only when the sphere of understanding is subjected to critical reflexion and com- pared with the possible sphere of reason, that is, the sphere of rationally complete cognition. The ideas, therefore, in relation to knowledge strictly so called, have regulative value, for they furnish the general precepts for extension and completion of knowledge, and, at the same time, since they spring from reason itself, they have a real value in relation to reason as the very inmost nature of intelligence. Self-consciousness cannot be regarded as merely a mechanically determined result. Free reflection upon the whole system of knowledge is sufficient to indicate that the sphere of intuition, with i\& rational principles, does not exhaust conscious experience. There still remains, over and above the realm of nature, the realm of free, self-conscious spirit; and, within this sphere, it may be anticipated that the ideas will acquire a significance richer and deeper than the merely regulative import which they possess in reference to cognition.

Where, then, are we to look for this realm of free self-conscious- ness? Not in the sphere of cognition, where objects are mechani- cally determined, but in that of will or of reason as practical. That reason is practical or prescribes ends for itself is sufficiently manifest from the mere fact of the existence of the conception of morality or duty, a conception which can have no corresponding object within the sphere of intuition, and which is theoretically, or in accordance with the categories of understanding, incognizable. The presence of this conception is the datum upon which may be founded a special investigation of the conditions of reason as practical, a Kritik of pure practical reason, and the analysis of it yields the statement of the formal prescripts of morality.

The realization of duty is impossible for any being which is not thought as free, i.e. capable of self-determination. Freedom, it is true, is theoretically not an object of cognition, but its impossibility is not thereby demonstrated. The theoretical proof rather serves as useful aid towards the more exact determination of the nature and province of self-determination, and of its relation to the whole concrete nature of humanity. For in man self-determination and mechanical determination by empirical motives coexist, and only in so far as he belongs and is conscious of belonging both to the sphere of sense and to the sphere of reason does moral obligation become possible for him. The supreme end prescribed by reason in its practical aspect, namely, the complete subordination of the empirical side of nature to the prescripts of morality, demands, as conditions of its possible realization, the permanence of ethical progress in the moral agent, the certainty of freedom in self-determination, and the necessary harmonizing of the spheres of sense and reason through the intelligent author or ground of both. These conditions, the postulates of practical reason, are the concrete expressions of the three transcendental ideas, and in them we have the full significance of the ideas for reason. Immortality of the soul, positive freedom of will, and the existence of an intelligent ground of things are speculative ideas practically warranted, though theoretically neither demonstrable nor comprehensible.

Thus reason as self -determining supplies notions of freedom; reason as determined supplies categories of understanding. Union between the two spheres, which seem at first sight disparate, is found in the necessary postulate that reason shall be realized, for its realization is only possible in the sphere of sense. But such a union, when regarded in abstracto, rests upon, or involves, a notion of quite a new order, that of the adaptation of nature to reason, or, as it may be expressed, that of end in nature. Understanding and reason thus coalesce in the faculty of judgment, which mediates between, or brings together, the universal and particular elements

in conscious experience. Judgment is here merely reflective; that is to say, the particular element is given, so determined as to be possible material of knowledge, while the universal, not necessary for cognition, is supplied by reason itself. The empirical details of nature, which are not determined by the categories of understanding, are judged as being arranged or ordered by intelligence, for in no other fashion could nature, in its particular, contingent aspect, be thought as forming a complete, consistent, intelligible whole.

The investigation of the conditions under which adaptation of nature to intelligence is conceivable and possible makes up the subject of the third great Kritik, the Kritik of Judgment, a work presenting unusual difficulties to the interpreter of the Kantian system. The general principle of the adaptation of nature to our faculties of cognition has two specific applications, with the second of which it is more closely connected than with the first. In the first place, the adaptation may be merely subjective, when the empirical condition for the exercise of judgment is furnished by the feeling of pleasure or pain; such adaptation is aesthetic. In the second place, the adaptation may be objective or logical, when empirical facts are given of such a kind that their possibility can be conceived only through the notion of the end realized in them ; such adaptation is teleological, and the empirical facts in question are organisms.

Aesthetics, or the scientific consideration of the judgments resting on the feelings of pleasure and pain arising from the harmony or want of harmony between the particular of experience and the laws of understanding, is the special subject of the Kritik of Judgment, but the doctrine of teleology there unfolded is the more important for the complete view of the critical system. For the analysis of the teleological judgment and of the consequences flowing from it leads to the final statement of the nature of experience as conceived by Kant. The phenomena of organic production furnish data for a special kind of judgment, which, however, involves or rests upon a quite general principle, that of the contingency of the particular element in nature and its subjectively necessary adaptation to our faculty of cognition. The notion of contingency arises, according to Kant, from the fact that understanding and sense are distinct, that understanding does not determine the particular of sense, and, consequently, that the principle of the adaptation of the particular to our understanding is merely supplied by reason on account of the peculiarity or limited character of understanding. End in nature, therefore, is a subjective or problematic conception, implying the limits of understanding, and consequently resting upon the idea of an understanding constituted unlike ours — of an intuitive under- standing in which particular and universal should be given together. The idea of such an understanding is, for cognition, transcendent, for no corresponding fact of intuition is furnished, but it is realized with practical certainty in relation to reason as practical. For we are, from practical grounds, compelled with at least practical necessity to ascribe a certain aim or end to this supreme understand- ing. The moral law, or reason as practical, prescribes the realiza- tion of the highest good, and such realization implies a higher order than that of nature. We must, therefore, regard the supreme cause as a moral cause, and nature as so ordered that realization of the moral end is in it possible. The final conception of the Kantian philosophy is, therefore, that of ethical teleology. As Kant expresses it in a remarkable

passage of the'Kritik, " The systematic unity .of ends in this world of intelligences, which, although as mere nature it is to be called only the world of sense, can yet as a system of freedom be called an intelligible, i.e. moral world (regnum gratiae), leads inevitably to the teleological unity of all things which consti- tute this great whole according to universal natural laws, just as the unity of the former is according to universal and necessary moral laws, and unites the practical with the speculative reason. The world must be represented as having originated from an idea, if it is to harmonize with that use of reason without which we should hold ourselves unworthy of reason — viz. the moral use, which rests entirely on the idea of the supreme good. Hence all natural research tends towards the form of a system of ends, and in its highest development would be a physico-theology. But this, since it arises from the moral order as a unity grounded in the very essence of freedom and not accidentally instituted by external commands, establishes the teleology of nature on grounds which a priori must be inseparably connected with the inner possibility of things. The teleology of nature is thus made to rest on a transcen- dental theology, which takes the ideal of supreme ontological per- fection as a principle of systematic unity, a principle which connects all things according to universal and necessary natural laws, since they all have their origin in the absolute necessity of a single primal being " (p. 538).

Bibliography. — Editions and works of reference are exceedingly numerous. Since 1896 an indispensable guide is the periodical review Kantstudien (Hamburg and Berlin, thrice yearly), edited by Hans Vaihinger and Bruno Bauch, which contains admirable original articles and notices of all important books on Kant and Kantianism. It has reproduced a number of striking portraits of Kant. For books up to 1 887 see Erich Adickes in Philosophical Review (Boston, 1892 foil.); for 1890-1894 R. Reicke's Kant Bibliographie (1895). See also in general the latest edition of Ueberweg's Grundriss der Geschichte der Philosophie.

Editions. — Complete editions of Kant's works are as follows: (1) G. Hartenstein (Leipzig, 1838-1839, 10 vols.) ; (2) K. Rosenkranz and F. W. Schubert (Leipzig, 1838-1840, 12 vols., the 12th con- taining a history of the Kantian school); (3) G. Hartenstein, " in chronological order " (Leipzig, 1867-1869, 8 vols.); (4) Kirchmann (in the " Philosophische Bibliothek," Berlin, 1868-1873, 8 vols, and supplement) ; (5) under the auspices of the Koniglich Preussische Akademie der Wissenschaften a new collected edition was begun in 1900 (vol. ii., 1906) in charge of a number of editors. It was planned in four sections: Works, Letters, MSS. Remains and Vorlesungen. There are also useful editions of the three Kritiks by Kehrbach, and critical editions of the Prolegomena and Kritik der reinen Vernunft by B. Erdmann (see also his Beitrdge zur Geschichte und Revision des Textes von Kants Kritik der reinen Vernunft (1900). A useful selection

(in English) is that of John Watson, The Philosophy of Kant (Glasgow, 1888).

Translations. — There are translations in all the principal languages. The chief English translators are J. P. Mahaffy, W. Hastie, T. K. Abbott, J. H. Bernard and Belfort Bax. Their versions have been mentioned in the section on " Works " above.

Biographical. — Schubert in the nth vol. of P.osenkranz's edition; Borowski, Darstellung des Lebens und Charakters Kants (Konigsberg, 1804); Wasianski, Kant in seinen letzten Lebensjahren (Konigsberg, 1804) ; Stuckenberg, The Life of Immanuel Kant (1882) ; Rudolf Reicke, Kants Briefwechsel (1900). See also several of the critical works below. On Kant's portraits see D. Minden, Ueber Portraits und Abbildungen Imm. Kants (1868) and cf. frontispieces of Kantstudien (as above).

Critical (in alphabetical order of authors). — R. Adamson, Philosophy of Kant (1879; Germ, trans., 1880); Felix Adler, A Critique of Kant's Ethics (1908) ; S. Aicher, Kants Begriff der Erkennt- nis verglichen mit dem des Aristoteles (1907) ; M. Apel, Immanuel Kant: Ein Bild seines Lebens und Denkens (1904) ; Arnoldt, Kritische Exkurse im Gebiete der Kantforschung (1894); C. Bache, "Kants Prinzip der Autonomic im Verhaltnis zur Idee des Reichs der Zwecke " (Kantstudien, 1909) ; B. Bauch, Luther und Kant (1904) ; Paul Boehm, Die vorkritischen Schriften Kants (1906) ; E. Caird, Critical Philosophy of Kant (2 vols., 1889); Chalybaus, Historische Entwickelung der spekulativen Philosophie von Kant bis Hegel (5th ed., i860); H. S. Chamberlain, Immanuel Kant (1909); Cousin, Legons sur la philosophie de Kant (4th ed., 1864) ; B. Erdmann, Immanuel Kant, Kants Kritizismus in der 1 und 2 Auflage der " Kritik der reinen Vernunft "(1877) ; O. ˆLwa\&, Kants kritischer Idealismus als Grundlage von Erkenntnistheorie und Ethik (1908) and Kants Methodo- logie in ihren Grundziigen (1906); Kuno Fischer, Immanuel Kant (4th ed., 1898-1899), Die beiden Kantischen Schulen in Jena (1862), and Commentary on Kant's Kritik of Pure Reason (1878) ; F. Forster, Der Enlwicklungsgangder Kantischen Ethik bis zur Kritik der reinen Vernunft (1893) ; A. Fouillee, Le Moralisme de Kant et Vamoralisme contemporaine (1905) ; C. R. E. von Hartmann, Kants Erkenntnis- theorie und Metaphysik in den vier Perioden ihrer Entwickelung (1894) ; A. Hegler, Die Psychologie in Kants Ethik (1891); G. D. Hicks, Die Begriff e Phdnomenon und Noumenon in ihrem Verhdltniss zu einander bei Kant (1897); G. Jacoby, Herders und Kants Aesthetik (1907); W. Kabitz, Studien zur Entwickelungsgeschichte der Fichteschen Wissenschaftslehre aus der Kantischen Philosophic (1902) ; M. Kelly, Kant's Philosophy as rectified by Schopenhauer (1909) ; W. Koppel- mann, /. Kant und die Grundlagen der christlichen Religion (1890) ; M. Kronenberg, Kant: Sein Leben und seine Lehre (1897; 3rd ed., 1905) ; E.

Kuhnemann, Kants und Schillers Begrundung der Aesthetik (1895) and Die Kantischen Studien Schillers und die Komposition des Wallenstein (1889); H. Levy, Kants Lehre vom Schematismus der reinen Verstandesbe griff e (1901) ; Arthur O. Lovejoy, Kant and the English Platonists (1908) ; J. P. Mahaffy, Kant's Critical Philosophy for English Readers (1872-1874) ; W. Mengel, Kants Begrundung der Religion (1900); A. Messer, Kants Ethik (1904); H. Meyer-Benfey, Herder und Kant (1904) ; Morris, Kant's Critique of Pure Reason (Chicago, 1882) ; C. Oesterreich, Kant und die Metaphysik (1906) ;

F. Paulsen, Kant: Sein Leben und seine Lehre (1898; 4th ed., 1904; Eng. 1902) ; Harold H. Prichard, Kant's Theory of Knowledge (1909); A. Seth Pringle-Pattison, The Development from Kant to Hegel (1882) ; and, on Kant's philosophy of religion, in The Philosophic Radicals (1907) ; F. Rademaker, Kants Lehren vom innerri Sinn in der Kritik der reinen Vernunft (1908) ; R. Reininger, Kants Lehre vom inneren Sinn und seine Theorie der Erfahrung (1900); C. B. Renouvier, Critique de la doctrine de Kant (1906) ; H. Romundt, Kants philosophische Religionslehre eine Fruchtder gesammten Vernunft- kritik (1902) ; T. Ruyssen, Kant (1900) ; E. Saenger, Kants Lehre vom Glauben (1903) ; O. Schapp, Kants Lehre vom Genieund die Entstehung der "Kritik der Urteilskraft " (1901); Carl Schmidt, Beitrdge zur Entwickelung der Kant'schen Ethik (1900); A. Schweitzer, Die Religionsphilosophie Kants (1899); H. Sidgwick, Lectures on the Philosophy of Kant (1905) ; J. H. Stirling, Text Book to Kant (1881) ;

G. Simmel, Kant und Goethe (1906) ; L. Staehlin, Kant, Lotze und Ritschl (1889) ; O. Thon, Die Grundprinzipien der Kantischen Moral- philosophie (1895); T. Valentiner, Kant und die platonische Philoso- phie (1904); C. Vorlander, ' Kant, Schiller, Goethe (1907); G. C. Uphues, Kant und sein Vorganger (1906); W. Wallace, Kant (1905); M. Wartenberg, Kants Theorie der Kausalitat (1899) ; John Watson, Philosophy of Kant Explained (1908), Kant and his English Critics

(1881); A. Weir, A Student's Introduction to Critical Philosophy (1906) ;G.A. Wyneken, Hegel's KritikKants (1898); W. Windelband, Kuno Fischer und sein Kant (1897).

On Kant's theory of education, see E. F. Biichner, The Educational Theory of Immanuel Kant (trans., ed., intro., 1904); trans, of Ueber Pddagogik by Annette Churton (1899) ; J. Geluk, Kant (1883).

(R. Ad.; X.)

KANURI, or Beriberi, an African tribe of mixed .origin, the dominant race of Bornu. They are large-boned and coarse- featured, but contain nevertheless a distinct strain of Fula blood. Beriberi (or Berberi) is the name given them by the Hausa (see Bornu).

KAOLIN, a pure white clay, know also as china-clay, since it is an essential ingredient in the manufacture of china, or porce- lain. The word kaolin, formerly written by some authors caulin, is said to be a corruption of the Chinese Kau-ling, meaning " High Ridge," the name of a hill east of King-te-chen, whence the earliest samples of the clay sent to Europe were obtained by the Pere d'Entrecolles, a French Jesuit missionary in China in the early part of the 18th century. His specimens, examined in Paris by R. A. Reaumur, showed that true porcelain, the composition of which had not previously been known in Europe, contained two essential ingredients, which came to be known — though it now appears incorrectly — as kaolin and petuntse, corresponding respectively to our china-clay and china-stone. The kaolin confers plasticity on the paste and secures retention of form for the ware when exposed to the heat of the kiln, whilst the petuntse gives the translucency so characteristic of porcelain. Some of the earliest discoveries of kaolin in Europe were at Aue, near Schneeberg in Saxony, and at St Yrieix, near Limoges in France. In England it was discovered in Cornwall about the year 1750 by William Cookworthy, of Plymouth; and in 1768 he took out his patent for making porcelain from moorstone or growan (china-stone) and growan clay (kaolin), the latter imparting " whiteness and infusibility " to the china. These raw materials were found first at Tregonning Hill, near Breage, and afterwards at St Stephen's in Brannel, near St Austell; and their discovery led to the manufacture of hard paste, or true porcelain, at Plymouth and subsequently at Bristol.

Kaolin is a hydrous aluminium silicate, having the formula H 4 Al 2 Si 2 09, or Al 2 Si 2 07.2H 2 0, but in common clay this silicate is largely mixed with impurities. Certain clays contain pearly white hexagonal scales, usually microscopic, referable to the monoclinic system, and having the chemical composition of kaolin. This crystalline substance was termed kaolinite by S. W. Johnson and J. M. Blake in 1867, and it is now regarded as the basis of pure clay. The kaolinite of Amlwch in Anglesey has been studied by Allan Dick. The origin of kaolin may be traced to the alteration of certain aluminous silicates like feldspar, scapolite, beryl and topaz; but all large deposits of china-clay are due to the decomposition of feldspar, generally in granite, but sometimes in gneiss, pitchstone, &c. The turbidity of many feldspars is the result of partial " kaolinization," or alteration to kaolin. The china-clay rocks of Cornwall and Devon are granites in which the orthoclase has become kaolinized. These rocks are

sometimes known as carclazite, a name proposed by J. H. Collins from a typical locality, the Carclaze mine, near St Austell. It has often been supposed that the alteration of the granite has been effected mainly ‘ by meteoric agencies, the carbonic acid having decomposed the alkaline silicate of the feldspar, whilst the aluminous silicate assumes a hydrated con- dition and forms kaolin. In many cases, however, it seems likely that the change has been effected by subterranean agencies, probably by heated vapours carrying fluorine aj»d boron, since minerals containing these elements, like tourmaline, often occur in association with the china-clay. According to F. H. Butler the kaolinization of the west of England granite may have been effected by a solution of carbonic acid at a high temperature, acting from below.

The china-stone, or petuntse, is a granitic rock which still retains much of the unaltered feldspar, on which its fusibility depends. In order to prepare kaolin for the market, the china- clay rock is broken up, and the clay washed out by means of

water. The liquid containing the clay in mechanical suspension is run into channels called ” drags ” where the coarser im- purities subside, and whence it passes to another set of channels known as ” micas,” where the finer materials settle down. Thus purified, the clay- water is led into a series of pits or tanks, in which the finely divided clay is slowly deposited; and, after acquiring sufficient consistency, it is transferred to the drying-house, or ” dry,” heated by flues, where thf moisture is expelled, and the kaolin obtained as a soft white earthy substance. The clay has extensive application in the arts, being used not only in ceramic manufacture but in paper-making, bleaching and various chemical industries.

Under the species ” kaolinite ” may be included several minerals which have received distinctive names, such as the Saxon mineral called from its pearly lustre nacrite, a name originally given by A. Brongniart to a nacreous mica; pholerite found chiefly in cracks of ironstone and named by J. Guillemin from the Greek o\ls, a scale ; and lithomarge, the old •German Steinmark, a compact clay-like body of white, yellow or red colour. Dr C. Hintze has pointed out that the word pholerite should properly be written pholidite (<£o\ts, <£o\('5os). Closely related to kaolinite is the mineral called halloysite, a name given to it by P. Berthier after his uncle Omalius d'Halloy, the Belgian geologist. (F. W. R.)*

KAPUNDA, a municipal town of Light county, South Aus- tralia, 48 m. by rail N.N.E. of Adelaide. Pop. (1901), 1805. It is the centre of a large wheat-growing district. The celebrated copper mines discovered in 1843 were closed in 1879. There are quarries near the town, in which is found fine marble of every colour from dark blue to white. This marble was

largely used in the Houses of Parliament at Adelaide.

KAPURTHALA, a native state of India, within the Punjab. Area, 652 sq. m.; pop. (1901), 314,341, showing an increase of 5% in the decade; estimated gross revenue, £178,000; tribute, £8700. The Kapurthala family is descended from Jassa Singh, a contemporary of Nadir Shah and Ahmad Shah, who by his intelligence and bravery made himself the leading Sikh of his day. At one time it held possessions on both sides of the Sutlej, and also in the Bari Doab. The cis-Sutlej estates and scattered tracts in the Bari Doab were forfeited owing to the hostility of the chief in the first Sikh war; but the latter were afterwards restored in recognition of the loyalty of Raja Randhir Singh during the mutiny of 1857, when he led a contingent to Oudh which did good service. He also received a grant of land in Oudh, 700 sq. m. in extent, yielding a gross rental of £89,000. In Oudh, however, he exercises no sovereign powers, occupying only the status of a large landholder, with the title of Raja-i- Rajagan. Raja Sir Jagatjit Singh, K.C.S.I., was born in 1872, succeeded his father in 1877, and attained his majority in 1890. During the Tirah expedition of 1897-98 the Kapurthala imperial service infantry took a prominent part. The territory is crossed by the railway from Jullundur to Amritsar. The state has a large export trade in wheat, sugar, tobacco and cotton. The hand-painted cloths and metal-work of Phagwara are well known. The town of Kapurthala is n miles from Jullundur; pop. (1901), 18,519.

KARACHI, or Kurrachee, a seaport and district of British India, in the Sind province of Bombay. The city is situated at the extreme western end of the Indus delta, 500 m. by sea from Bombay and 820 m. by rail from Lahore, being the maritime terminus of the North- Western railway, and the main gateway for the trade of the Punjab and part of central Asia. It is also the capital of the province of Sind. Pop. (1881), 73,500; (1891), 105,199; (1901), 115,407. Before 1725 no town appears to have existed here; but about that time some little trade began to centre upon the convenient harbour, and the silting up of Shahbandar, the ancient port of Sind, shortly afterwards drove much of its former trade and population to the rising village. Under the Kalhora princes, the khan of Kalat obtained a grant of the town, but in 1795 it was captured by the Talpur Mirs, who built the fort at Manora, at the entrance to the harbour. They also made considerable efforts to increase the trade of the port

and at the time of the British acquisition of the province the town and suburbs contained a population of 14,000. This was in 1843, from which

time the importance of the place practically dates. The harbour of Karachi has an extreme length and breadth of about 5 m. It is protected by the promontory of Manora Head; and the entrance is partially closed by rocks and by the peninsula (formerly an island) of Kiamari. On Manora Head, which is fortified, are the buildings of the port establishment, a cantonment, &c. Kiamari is the landing-place for passengers and goods, and has three piers and railway connexions. The harbour improvements were begun in 1854 with the building of the Napier Mole or causeway connecting Kiamari with the main- land. The entrance has a minimum depth of 25 ft.; and a large number of improvements and extensions have been carried out by the harbour board, which was created in 1880, and transformed in 1886 into the port trust.

The great extension of the canal colonies in the Punjab, entirely devoted to the cultivation of wheat, has immensely increased the export trade of Karachi. It now ranks as the third port of India, being surpassed only by Calcutta and Bombay. The principal articles ef export, besides wheat, are oilseeds, cotton, wool, hides and bones. The annual value of exports, including specie, amounts to about nine millions sterling. There are iron works and manufactures of cotton cloth, silk scarves and carpets. The fisheries and oyster beds are important.

Among the principal public buildings are government house, the Frere municipal hall, and the Napier barracks. The military cantonments, stretching north-east of the city, form the head- quarters of a brigade in the 4th division of the southern army. An excellent water supply is provided by an underground aqueduct 18 m. in length. The chief educational institutions are the Dayaram Jethmal Arts College, with a law class; five high schools, of which two are for Europeans and one for Mahommedans; a convent school for girls; and an engineer- ing class. The average rainfall for the year is about 5 in. The rainy months are July and August, but one or two heavy showers usually fall about Christmas. The end of May, begin- ning of June, and first fortnight in October are hot. November, December, January, February and March are delightfully cool and dry; the remaining months are damp with a constant cool sea breeze.

The District of Karachi has an area of 11,970 sq. m. Pop. (1001), 607,439, showing an increase of 6% in the decade. It consists of an immense tract of land stretching from the mouth of the Indus to the Baluch boundary. It differs in general appearance from the rest of Sind, having a rugged, mountainous region along its western border. The country gradually slopes away to the south-east, till in the extreme south the Indus delta presents a broad expanse of low, flat and unpicturesque alluvium. Besides the Indus and its mouths, the only river in the district is the Hab, forming the boundary between Sind and Baluchistan. The Manchhar lake

in Sehwan sub-division forms the only con- siderable sheet of water in Sind. The hot springs at Pir Mangho are 6 m. N. of Karachi town. The principal crops are rice, millets, oil-seeds and wheat. In addition to Karachi, there are seaports at Sirgonda and Keti Bandar, which conduct a con- siderable coasting trade. Tatta was the old capital of Sind. Kotri is an important railway station on the Indus. The main line of the North-Western railway runs through the district. From Kotri downwards the line has been doubled to Karachi, and at Kotri a bridge has been constructed across the Indus opposite Hyderabad, to connect with the Rajputana railway system.

See A. F. Baillie, Kurrachee: Past, Present and Future (1890).

KARAGEORGE (in Servian, Karadyordye) (c. 1766-18 17), the leader of the Servians during their first revolution against the Turks (1804-13), and founder of the Servian dynasty Kara- georgevich. His Christian name was George (Dyordye), but being not only of dark complexion but of gloomy, taciturn and easily excitable temper, he was nicknamed by the Servians

xv. z?

" Tsrni Dyordye " and by the Turks " Karageorge," both mean- ing " Black George," the Turkish name becoming soon the generally adopted one. He was born in 1766 (according to some' in 1768), the son of an extremely poor Servian peasant, Petroniye Petrovich. When quite a young man, he entered the service of a renowned Turkish brigand, Fazli-Bey by name, and accompanied his master on his adventurous expeditions. When twenty he married and started a small farm. But having killed a Turk, he left Servia for Syrmia, in Croatia-Slavonia, where the monks of the monastery Krushedol engaged him as one of their forest guards. He remained in the service of the monks nearly two years, then enlisted into an Austrian regiment, and as sergeant took part in the Austrian war against Turkey (1788-91). He deserted his regiment, returned to Servia, and settled in the village of Topola, living sometimes as a peaceful farmer and sometimes again as the leader of a small band of " hayduks " — men who attacked, robbed and in most cases killed the travelling Turks in revenge for the oppression of their country.

The circumstances in which the Servians rose against the janissaries of the pashalik of Belgrade are related in the article on Servia. The leaders of the insurgents' bands and other men of influence met about the middle of February 1804 at the village of Orashatz, and there elected Karageorge as the supreme leader (Vrhovni Vozd) of the nation. Under his command the Servians speedily cleared their country not only of the janissaries disloyal to the Sultan, but of all other Turks, who withdrew from the open country to the fortified places. Karageorge and his armed Servians demanded from

the Sultan the privileges of self-government. The Porte, confronted by the chances of a war with Russia, decided in the autumn of 1806 to grant to the Servians a fairly large measure of autonomy. Unfortunately Karageorge was comparatively poor in political gifts and diplomatic tact. While the hatlisherif granting the rights demanded by the Servians was on the way to Servia, Karageorge attacked the Turks in Belgrade and Shabats, captured the towns first and then also the citadels, and allowed the Turkish population of Belgrade to be massacred. At the same time the Russian headquarters in Bucharest informed Karageorge that Russia was at war with Turkey and that the Tsar counted on the co-operation of the Servians. Karageorge and his Servians then definitely rejected all the concessions which the Porte had granted them, and joined Russia, hoping thereby to secure the complete independence of Servia. The co-operation of the Servians with the Russians was of no great importance, and probably disappointing to both parties. But as the principal theatre of war was far away from Servia on the lower Danube, Karageorge was able to give more attention to the internal organization of Servia. The national assembly proclaimed Karageorge the hereditary chief and gospodar of the Servians (Dec. 26, 1808), he on his part promising under oath to govern the country " through and by the national council " (senate).

Karageorge's hasty and uncompromising temper and imperious habits, as well as his want of political tact, soon made him many enemies amongst the more prominent Servians (voyvodes and senators). His difficulties were considerably increased by the intrigues of the Russian political agent to Servia, Rodophinikin. A crisis came during the summer months of the year 1813. The treaty of peace, concluded by the Russians somewhat hurriedly in Bucharest in 1812, did not secure efficiently the safety of the Servians. The Turks demanded from Karageorge, as a pre- liminary condition for peace, that the Servians should lay down their arms, and Karageorge refused to comply. Thereupon the entire Turkish army which fought against the Russians on the Danube, being disengaged, invaded Servia. After a few inefficient attempts to stem the invasion, Karageorge gave up the struggle, and with most of the voyvodes and chiefs of the nation left the country, and crossed to Hungary as a refugee (Sept. 20, 1813). From Hungary he went to Russia and settled in Khotin (Bessarabia), enjoying a pension from the Tiar's government. But in the summer of 181 j- he suddenly and

secretly left Russia and reappeared quite alone in Servia in the neighbourhood of Semendria (Smederevo) on the Danube. The motives and the object of his return are not clear. Some believe that he was sent by the

Hetaerists to raise up Servia to a new war with Turkey and thereby facilitate the rising of the Greek people. It is generally assumed, however, that, having heard that Servia, under the guidance of Milosh Obrenovich, had obtained a certain measure of self-government, he desired to put himself again at the head of the nation. This impression seems to have been that of Milosh himself, who at once reported to the Pasha of Belgrade the arrival of Karageorge. The pasha demanded that Karageorge, alive or dead, should be delivered to him immediately, and made Milosh personally responsible for the execution of that order. Karageorge's removal could not unfortunately be separated from the personal interest of Milosh; already acknowledged as chief of the nation, Milosh did not like to be displaced by his old chief, who in a critical moment had left the country. Karageorge was killed (July 27, O.S., 1817) while he was asleep, and his head was sent to the pasha for trans- mission to Constantinople. It is impossible to exonerate Milosh Obrenovich from responsibility for the murder, which became the starting-point for a series of tragedies in the modern history of Servia.

Karageorge was one of the most remarkable Servians of the 19th century. No other man could have led the bands of undisciplined and badly-armed Servian peasants to such decisive victories against the Turks. Although he never assumed the title of prince, he practically was the first chief and master {gospodar) of the people of Servia. He succeeded, however, not because he was liked but because he was feared. His gloomy silence, his easily aroused anger, his habit of punishing without hesitation the slightest transgressions by death, spread terror among the people. He is believed to have killed his own father in a fit of anger when the old man refused to follow him in his flight to Hungary at the beginning of his career. In another fit of rage at the report that his brother Marinko had assaulted a girl, he ordered his men to seize his brother and to hang him there and then in his presence, and he forbade his mother to go into mourning for him. Even by his admirers he is admitted to have killed by his own hand no fewer than 125 men who pro- voked bis anger. But in battles he is acknowledged to have been always admirable, displaying marvellous energy and valour, and giving proofs of a real military genius. The Servians con- sider him one of their greatest men. In grateful remembrance of his services to the national cause they elected his younger son, Alexander, in 1842, to be the reigning prince of Servia, and again in 1903 they chose his grandson, Peter Karageorgevich (son of Alexander) to be the king of Servia.

See Servia; also Ranke, Die serbische Revolution; Stoyan Nova- kovich, Vaskzhs srpske drzhave (Belgrade, 1904); M. G. Milityevich, Karadyordye (Belgrade, 1904). (C. Mi.)

KARA-HISSAR ("Black Castle"). (1) Afium Kara- Hissar (q.v.). (2) Ichje, or Ischa Kara-Hissar (anc. Doci- mium), a small village about 14 m. N.E. of No. 1. Docimium was a Macedonian colony established on an older site. It was a self-governing municipality, striking its own coins, and stood on the Apamea-Synnada-Pessinus road,, by which the cele- brated marble called Synnadic, Docimian and Phrygian was conveyed to the coast. The quarries are 23 m. from the village, and the marble was carried thence direct to Synnada (Chifut Kassaba). Some of the marble has the rich purple veins in which poets saw the blood of Atys.

See W. M. Ramsay, Hist. Geog. of Asia Minor (London, 1890); Murray, Hbk. to Asia Minor (1893).

KARA-HISSAR SHARKI [i.e. "eastern Kara-Hissar"], also called Shabin Kara-Hissar from the alum mines in its vicin- ity, the chief town of a sanjak of the same name in the Sivas vilayet of Asia Minor. Pop. about 12,000, two-thirds Mussul- man. It is the Roman Colonia, which gradually superseded Pompey's foundation, Nicopolis, whose ruins lie at Purkh, about 12 m. W. (hence Kara-Hissar is called Nikopoli by the

Armenians). In later Byzantine times it was an important frontier station, and did not pass into Ottoman hands till twelve years after the capture of Constantinople. The town, altitude 4860 ft., is built round the foot of a lofty rock, upon which stand the ruins of the Byzantine castle, Maurocastron, the Kara Hissar Daula of early Moslem chroniclers. It is connected with its port, Kerasund, and with Sivas, Erzingan and Erzerum, by carriage roads.

KARAISKAKIS, GEORGES (1782-1827), leader in the War of Greek Independence, was born at Agrapha in 1782. During the earlier stages of the war he served in the Morea, and had a somewhat discreditable share in the intrigues which divided the Greek leaders. But he showed a sense of the necessity for providing the country with a government, and was a steady supporter of Capo d'Istria. His most honourable services were performed in the middle and later stages of the war. He helped to raise the first siege of Missolonghi in 1823, and did his best to save the town in the second siege in 1826. In that year he commanded the patriot forces in Rumelia, and though he failed to co-operate effectually with other chiefs, or with the foreign sympathizers fighting for the Greeks, he gained some successes against the Turks which were very welcome amid the disasters of the time. He took a share in the unsuccessful attempts to raise the siege of Athens in 1827, and made an effort to prevent the disastrous massacre of the Turkish garrison of fort S Spiridion. He was shot in action on the 4th of May 1827. Finlay speaks of him as a capable partisan leader who had great , influence over his men, and describes him as of " middle size, thin, dark-

complexioned, with a bright expressive animal eye which indicated gipsy blood."

See G. Finlay, History of the Greek Revolution (London, 1861).

KARAJICH, VUK STEFANOVICH (1787-1864), the father of modern Servian literature, was born on the 6th of November 1787 in the Servian village of Trshich, on the border between Bosnia and Servia. Having learnt to read and write in the old monastery Tronosha (near his native village), he was engaged as writer and reader of letters to the commander of the insurgents of his district at the beginning of the first Servian rising against the Turks in 1804. Mostly in the position of a scribe to different voyvodes, sometimes as school-teacher, he served his country during the first revolution (1804-1813), at the collapse of whidh he left Servia, but instead of following Karageorge and other voyvodes to Russia he went to Vienna. There he was introduced to the great Slavonic scholar Yerney Kopitar, who, having heard him recite some Servian national ballads, encouraged him to collect the poems and popular songs, write a grammar of the Servian language, and, if possible, a dictionary. This programme of literary work was adhered to by Karajich, who all his life acknowledged gratefully what he owed to his learned teacher.

In the second half of the 18th and in the beginning of the 19th century all Servian literary efforts were written in a language which was not the Servian vernacular, but an artificial language, of which the foundation was the Old Slavonic in use in the churches, but somewhat Russianized, and mixed with Servian words forced into Russian forms. That language, called by its writers " the Slavonic-Servian," was neither Slavonic nor Servian. It was written in Old Cyrillic letters, many of which had no meaning in the Servian language, while there were several sounds in that language which had no corresponding signs or letters in the Old Slavonic alphabet. The Servian philosopher Dositey Obradovich (who at the end of the 18th century spent some time in London teaching Greek) was the first Servian author to proclaim the principle that the books for the Servian people ought to be written in the language of the people. But the great majority of his contemporaries were of opinion that the language of Servian literature ought to be evolved out of the dead Old Slavonic of the church books. The church natur- ally decidedly supported this view. Karajich was the great reformer who changed all this. Encouraged by Kopitar, he published in 1814 (2nd ed., 1815) in Vienna his first book, Mala Prostonarodna Slaveno-Serbska Pyesmaritsa (" A small collection of Slavonic-Servian songs of the common people "), containing a

hundred lyric songs, sung by the peasant women of Servia, and six poems about heroes, or as the Servians call them Yunachke pesme, which are generally recited by the blind bards or by peasants. From that time Karajich's literary activity moved on two parallel lines: to give scientific justification and founda- tion to the adoption of the vernacular Servian as the literary language; and, by collecting and publishing national songs, folk-lore, proverbs, &c, to show the richness of the Servian people's poetical and intellectual gifts, and the wealth and beauty of the Servian language. By his reform of the Servian alphabet and orthography, his Servian grammar and his Servian dictionary, he established the fact that the Servian language contains thirty distinct sounds, for six of which the Old Slavonic alphabet had no special letters. He introduced new letters for those special sounds, at the same time throwing out of the Old Slavonic alphabet eighteen letters for which the Servian language had no use. This reform was stren- uously opposed by the church and many conservative authors, who went so far as to induce the Servian government to prohibit the printing of books in new letters, a prohibition removed in 1859. Karajich's alphabet facilitated his reform of orthography, his principle being: write as you speak, and read as ■U is written! Hardly any other language in the civilized world has such a simple, logical, scientific spelling system and ortho- graphy as the Servian has in Karajich's system. His first gram- matical essay was published in Vienna in 1814, Pismenitsa Serbskoga yezika po govoru prostoga naroda (" The grammar of the Servian language as spoken by the common people"). An improved edition appeared in Vienna in 1818, together with his great work Srpski Ryechnik (Lexicon Serbico-Germanico- Latinum). This dictionary— containing 26,270 words— was .mil of important contributions to folk-lore, as Karajich never missed an opportunity to add to the meaning of the word the description of the national customs or popular beliefs connected with it. A new edition of his dictionary, containing 46,270 words was published at Vienna in 1852. Meanwhile he gave himself earnestly to the work of collecting the "creations of the mind of the Servian common people." He travelled through Servian countries (Servia, Bosnia, Herzegovina, Montenegro, Daimatia, Syrmia, Croatia), and the result was shown in a largely augmented edition of his Srpske Narodne Pyesme, of which the first three volumes appeared at Leipzig in 1823 and 1824, the fourth volume appearing at Vienna in 1833. Popular Stones and Enigmas was published in 1821, and Servian National Proverbs m 1836. From 1826 to 1834 he was the editor of an annual, called Danitsa (The Morning Star), which he filled with important contributions concerning the ethnography and modern history of the Servian people. In 1828 he published a historical monograph, MUosh Obrenovich, Prince of Servia; in 1837, in German, Montenegro and Montenegrins; in 1867, The Servian Governing Council of State. He supplied Leopold Ranke with the materials for his History of the Servian

Revolution. He also translated the New Testament into Servian, for the British and Foreign Bible Society (Vienna, 1847). Karajich died in Vienna on the 6th of February 1864; and his remains were transferred to Belgrade in 1897 with great solemnity and at the expense of the government of Servia. (C Mi)

KARA-KALPAKS (" Black Caps "), a Mongolo-Tatar people, originally dominant along the east coast of the Aral Sea, where they still number some thousands. They thus form geographi- cally the transition between the northern Kirghiz and the southern Turkomans. Once a powerful nation, they are scattered for the most part in Astrakhan, Perm, Orenburg in the Caucasian province of Kuban, and in Tobolsk, Siberia numbering in all about 50,000. These emigrants have crossed much with the alien populations among whom they have settled- but the pure type on the Aral Sea are a tall powerful people with broad flat faces, large eyes, short noses and heavy chins Their women are the most beautiful in Turkestan. The name of " Black Caps" is given them in allusion to their high sheep- skin hats. They are a peaceful agricultural folk, who have suffered much from their fierce nomad neighbours.

KARAKORUM (Turkish, " black stone debris "), the name of two cities in Mongolia. One of these, according to G. Potanin was the capital of the Uighur kingdom in the 8th century, and the' other was in the 13th century a capital of the steppe monarchy of Mongolia. The same name seems also to have been applied to the Khangai range at the headwaters of the Orkhon. (1) The Uighur Karakorum, also named Mubalik (" bad town ") was situated on the left bank of the Orkhon, in the Talal-khain'-dala steppe to the south-east of Ughei-nor. It was deserted after the fall of the Uighur kingdom, and in the 10th century Abaki the founder of the Khitan kingdom, planted on its ruins a stone bearing a description of his victories. (2) The Mongolian Karakorum was founded at the birth of the Mongolian monarchy established by Jenghiz Khan. A palace for the khan was built in it by Chinese architects in 1234, and its walls were erected in 1235. Piano Carpini visited it in 1246, Rubruquis in 1253, and Marco Polo in 1275. Later, the fourth Mongolian king, Kublai, left Karakorum, in order to reside at Kai-pin-fu, near Peking When the khan Arik-bog declared himself and Karakorum inde- pendent of Kublai-Khan, the latter besieged Karakorum, took it by famine, and probably laid it waste so thoroughly that the town was afterwards forgotten.

The exact sites of the two Mongolian capitals were only estab- hshedin 1889-1891. SirH. Yule {The Book of Marco Polo, 1871) was the first to distinguish two cities of this name. The Russian traveller Paderin in 187 1

visited the Uighur capital (see Turks) named now' by the Mongols Kara Balghasun (" black city ") or Khara-kherem (" black wall "), of which only the wall and a tower are m existence, while the streets and ruins outside the wall are seen at a distance of if m. Paderin's belief that this was the old Mongol capital has been shown to be incorrect. As to the Mongolian Karakorum, it is identified by several authorities with a site on which towards the close of the 16th century the Buddhist monastery of Erdeni Tsu was built. This monastery lies about 25 m. south by east of the Uighur capital. North and north-east of the monastery are ruins of ancient buildings. Professor D. Pozdneev, who visited Erdeni Tsu for a second time m 1892, stated that the earthen wall surrounding the monastery might well be part of the wall of the old city. The proper posi- tion of the two Karakorums was determined by the expedition of N. Yadrintsev in 1889, and the two expeditions of the Helsing- fors Ugro-Finnish society (1890) and the Russian academy of science, under Dr W. Radlov (1891), which were sent out to study Yadrintsev's discovery.

See Works {Trudy) of the Orkhon Expedition (St Petersburg, 1802V Yule s Marco Polo, ed,tion revised by Henri Cordier (of Paris , vol. i! 1 \l m (Lon . don '. I 903)- Cordier confines the use of Karakorum to the Mongol capital; Pozdneev, Mongolia and the Mongols, vol. i. (St Petersburg, 1896); C. W Campbell, "Journeys in Mongolia," Gepg. Journ. vol. xx. (1903), with map. Campbell's report was printed as a parliamentary paper {China No. 1, 1904).

KARA-KUL, the name of two lakes (" Great " and " Little ") of Russian Turkestan, in the province of Ferghana, and on the Pamir plateau. Great 1 Kara-kul, 12 m. long and 10 m wide (formerly much larger), is under 39° N, to the south of the Trans- Alai range, and lies at an altitude of 13,200 ft.; it is sur- rounded by high mountains, and is reached from the north over the Kyzyl-art pass (14,015 ft.). A peninsula projecting from the south shore and an island off the north shore divide it into two basins, a smaller eastern one which is shallow, 42 to 63 ft and a larger western one, which has depths of 726 to 756 ft' It has no drainage outlet. Little Kara-kul lies in the north- east Pamir, or Sarikol, north-west of the Mustagh-ata peak (25,850 ft.), at an altitude of 12,700 ft. It varies in depth from 79 ft. in the south to 50 to 70 ft. in the middle, and 1000 ft or more in the north. It is a moraine lake; and a stream of the same name flows through it, but is named Ghez in its farther course towards Kashgar in East Turkestan.

KARA-KUM ("Black Sands"), a flat desert in Russian Central Asia. It extends to nearly 110,000 sq. m., and is bounded on the N.W. by the Ust- urt plateau, between the Sea of Aral and the Caspian Sea, on the N.E. by the Amu-darya, on the S by the Turkoman oases, and on the W. it nearly reaches the Caspian

Sea. Only part of this surface is covered with sand. There are broad expanses (takyrs) of clay soil upon which water accu- mulates in the spring; in the summer these are muddy, but later quite dry, and merely a few Solanaceae and bushes grow on them. There is also shor, similar to the above but encrusted with salt and gypsum, and relieved only by Solanaceae along their borders. The remainder is occupied with sand, which, accord- ing to V. Mainov, assumes five different forms. (1) Barkhans, chiefly in the east, which are mounds of loose sand, 15 to 35 ft. high, hoof-shaped, having their gently sloping convex sides turned towards the prevailing winds, and a concave side, 30 to 40 steep, on the opposite slope. They are disposed in groups or chains, and the winds drive them at an average rate of 20 ft. annually towards the south and south-east. Some grass (Stipa pennata) and bushes of saksaul (Haloxylon ammodendron) and other steppe bushes {e.g. Calligonium, Halimodendron and Atra- phaxis) grow on them. (2) Mounds of sand, of about the same size, but irregular in shape and of a slightly firmer consistence, mostly bearing the same bushes, and also Artemisia and Tamarix; they are chiefly met with in the east and south. (3) A sandy desert, slightly undulating, and covered in spring'with grass and flowers (e.g. tulips, Rheum, various Umbelliferae), which are soon burned by the sun; they cover very large spaces in the south- east. (4) Sands disposed in waves from 50 to 70 ft., and occa- sionally up to 100 ft. high, at a distance of from 200 to 400 ft. from each other; they cover the central portion, and their vege- tation is practically the same as in the preceding division. (5) Dunes on the shores of the Caspian, composed of moving sands, 3 s to 80 ft. high and devoid of vegetation.

A typical feature of the Kara-kum is the number of " old river beds," which may have been either channels of tributaries of the Amu and other rivers or depressions which contained elongated salt lakes. Water is only found in wells, 10 to 20 m. apart — sometimes as much as 100 m. — which are dug in the takyrs and give saline water, occasionally unfit to drink, and in pools of rain-water retained in the lower parts of the takyrs. The population of the Kara-kum, consisting of nomad Kirghiz and Turkomans, is very small. The region in the north of the province of Syr-darya, between Lake Aral and Lake Chalkar- teniz, is also called Kara-kum. (P. A. K. ; J. T. Be.)

KARAMAN (anc. Laranda, a name still used by the Christian inhabitants) , a town in the Konia vilayet of Asia Minor, situated in the plain north of Mount Taurus. Pop. 8000. It has few industries and little trade, but the medieval walls, well preserved castle and mosques are interesting, and the

old Seljuk medresse, or college, is a beautiful building. Karaman is connected with Konia by railway, having a station on the first section of the Bagdad railway. Little is known of its ancient history except that it was destroyed by Perdiccas about 322 B.C., and after- wards became a seat of Isaurian pirates. It was occupied by Frederick Barbarossa in 1100; in 1466 it was captured by Mahommed II., and in i486 by Bayezid II.

KARAMANIA, formerly an independent inland province in the south of Asia Minor, named after Karaman, the son of an Armenian convert to Islam, who married a daughter of Ala ed-Din Kaikobad, the Seljuk sultan of Rum, and was granted Laranda in fief, and made governor of Selefke, 12 23-1 245. The name Karaman is, however, Turkoman and that of a powerful tribe, settled apparently near Laranda. The Armenian convert must have been adopted into this. On the collapse of the Seljuk empire, Karaman's grandson, Mahmud, 1279-1319, founded a state, which included Pamphylia, Lycaonia and large parts of Cilicia, Cappadocia and Phrygia. Its capital, Laranda, super- seded Konia. This state was frequently at war with the kings of Lesser Armenia, the Lusignan princes of Cyprus and the knights of Rhodes. It was also engaged in a long struggle for supremacy with the Osmanli Turks, which only ended in 1472, when it was definitely annexed by Mahommed II. The Os- manlis divided Karamania into Kharij north, and Ichili south, of the Taurus, and restored Konia to its metropolitan position. The name Karamania is now often given by geographers to Ichili only; but so far as it has had any exact significance in modern

times, it has stood for the whole province of Konia. Before the present provincial division was made (1864), Karamania was the eyalet of which Konia was the capital, and it did not extend to the sea, the whole littoral from Adalia eastward being under the pasha of Adana. Nevertheless, in Levantine popular usage at the present day, " Karamania " signifies the coast from Adalia to Messina. (D. G. H.)

KARAMNASA, a river of northern India, tributary to the Ganges on its right bank, forming the boundary between Bengal and the United Provinces. The name means " destroyer of religious merit," which is explained by more than one legend. To this day all high-caste Hindus have to be carried over without being defiled by the touch of its waters.

KARA MUSTAFA (d. 1683), Turkish vizier, surnamed " Mer- zifunli," was a son of Uruj Bey, a notable Sipahi of Merzifun (Marsovan), and brother-in-law to Ahmed Kuprili, whom he succeeded as grand vizier in 1676, after having for some years held the office of Kaimmakam or locum tenens. His greed and ostentation were equalled by his incapacity, and he behaved with characteristic insolence to the foreign ambassadors, from whom he extorted

large bribes. After conducting a campaign in Poland which terminated unfortunately, he gave a ready response to the appeal for aid made by the Hungarians under Imre Thokoly (q.v.) when they rose against Austria, his hope being to form out of the Habsburg dominions a Mussulman em- pire of the West, of which he should be the sultan. The plan was foiled -in part by his own lack of military skill, but chiefly through the heroic resistance of Vienna and its timely relief by John Sobieski, king of Poland. Kara Mustafa paid for his defeat with his life; he was beheaded at Belgrade in 1683 and his head was brought to the sultan on a silver dish.

Another Kara Mustafa Pasha (d. 1643), who figures in Turkish history, was by birth a Hungarian, who was enrolled in the Janissaries, rose to be Kapudan Pasha under Murad IV., and after the capture of Bagdad was made grand vizier. He was severe, but just and impartial, and strove to effect necessary reforms by reducing the numbers of the Janissaries, improving the coinage, and checking the state expenditure. But the dis- content of the Janissaries led to his dismissal and death in 1643.
KARAMZIN, NIKOLAI MIKHAILOVICH (1765-1826), Rus- sian historian, critic, novelist and poet, was born at the village of Mikhailovka, in the government of Orenburg, and not at Sim- birsk as many of his English and German biographers incorrectly state, on the 1st of December (old style) 1765. His father was an officer in the Russian army, of Tatar extraction. He was sent to Moscow to study under Professor Schaden, whence he after- wards removed to St Petersburg, where he made the acquaint- ance of Dmitriev, a Russian poet of some merit, and occupied himself with translating essays by foreign writers into his native language. After residing some time at St Petersburg, he went to Simbirsk, where he lived in retirement till induced to revisit Moscow. There, finding himself in the midst of the society of learned men, he again betook himself to literary work. In 1789 he resolved to travel, and visited Germany, France, Switzerland and England. On his return he published his Letters of a Russian Traveller, which met with great success. These letters were first printed in the Moscow Journal, which he edited, but were after- wards collected and issued in six volumes (1 797-1 801). In the same periodical Karamzin also published translations of some of the tales of Marmontel, and some original stories, among which may be mentioned Poor Liza and Natalia the Boyar's Daughter. In 1794 and 1795 Karamzin abandoned his literary journal, and published a miscellany in,two volumes, entitled Aglaia, in which appeared, among other things, " The Island of Bornholm " and " Ilia Mourometz," a story based upon the adventures of the well- known hero of many a Russian legend. In 1 797-1 799 he issued another miscellany or poetical almanac, The Aonides, in con- junction with Derzhavin and Dmitriev. In 1798 he compiled The Pantheon, a collection of pieces from the works of the mosi celebrated authors ancient and

modern, translated into Russian. Many of his lighter productions were subsequently printed by him in a volume entitled My Trifles. In 1802 and 1803 Karamzin

edited the journal the European Messenger. It was not until after the publication of this work that he realized where his strength lay, and commenced his History of the Russian Empire. In order to accomplish the task, he secluded himself for two years; and, on the cause of his retirement becoming known to the emperor Alexander, Karamzin was invited to Tver, where he read to the emperor the first eight volumes of his history. In 1816 he removed to St Petersburg, where he spent the happiest days of his life, enjoying the favour of Alexander, and submitting to him the sheets of his great work, which the emperor read over with him in the gardens of the palace of Tzarskoe Selo. He did not, however, live to carry his work further than the eleventh volume, terminating it at the accession of Michael Romanov in 1613. He died on the 22nd of May (old style) 1826, in the Taurida palace. A monument was erected to his memory at Simbirsk in 1843.

As an historian Karamzin has deservedly a very high reputation. Till the appearance of his work little had been done in this direction in Russia. The preceding attempt of Tatistchev was merely a rough sketch, inelegant in style, and without the true spirit of criticism. Karamzin was most industrious in accumulating materials, and the notes to his volumes are mines of curious information. The style of his history is elegant and flowing, modelled rather upon the easy sentences of the French prose writers than the long periodical paragraphs of the old Slavonic school. Perhaps Karamzin may justly be censured for the false gloss and romantic air thrown over the early Russian annals, concealing the coarseness and cruelty of the native manners; in this respect he reminds us of Sir Walter Scott, whose writings were at this time creating a great sensation throughout Europe, and probably had their influence upon him. Karamzin appears openly as the panegyrist of the autocracy ; indeed, his work has been styled the " Epic of Despotism." He does not hesitate to avow his admiration of Ivan the Terrible, and considers him and his grandfather Ivan III. as the builders up of Russian greatness, a glory which in his earlier writings, perhaps at that time more under the influence of Western ideas, he had assigned to Peter the Great In the battle-pieces (e.g. the description of the field of Koulikovo, the taking of Kazan, &c.) we find considerable powers of description; and the characters of many of the chief personages in the Russian annals are drawn in firm and bold lines. As a critic

Karamzin was of great service to his country; in fact he may be regarded as the founder of the review and essay (in the Western style) among the Russians.

KARA SEA, a portion of the Arctic Ocean demarcated, and except on the north-west completely enclosed, by NovayaZemlya, Vaygach Island and the Siberian coast. It is approached from the west by three straits — Matochkin, between the two islands of Novaya Zemlya, and Kara and Yugor to the north and south of Vaygach Island respectively. On the south-east Kara Bay penetrates deeply into the mainland, and to the west of this the short Kara river enters the sea. The sea is all shallow, the deepest parts lying off Vaygach Island and the northern part of Novaya Zemlya. It had long the reputation of being almost constantly ice-bound, but after the Norwegian captain Johannesen had demonstrated its accessibility in 1869, and Nordenskiold had crossed it to the mouth of the Yenisei in 1875, it was considered by many to offer a possible trade route between European Russia and the north of Siberia. But the open season is in any case very short, and the western straits are sometimes icebound during the entire year.

KARASU-BAZAR, a town of Russia, in the Crimea and govern- ment of Taurida, in 45° 3′ N. and 34° 26′ E., 25 m. E.N.E. of Simferopol. Pop. (1897), 12,961, consisting of Tatars, Arme- nians, Greeks, Qaraite Jews, and about 200 so-called Krym- chaki, i.e. Jews who have adopted the Tatar language and dress, and who live chiefly by making morocco leather goods, knives, embroidery and so forth. The site is low, but the town is surrounded by hills, which afford protection from the north wind. The dirty streets full of petty traders, the gloomy bazaar with its multitude of tiny shops, the market squares, the blind alleys, the little gates in the dead courtyard walls, all give the place the stamp of a Tatar or Turkish town. Placed on the high road between Simferopol and Kerch, and in the midst of a country rich in corn land, vineyards and gardens, Karasu-Bazar used to be a chjef seat of commercial activity in the Crimea; but it is gradually declining in importance, though still a considerable centre for the export of fruit.

The caves of Akkaya close by give evidence of early occupation of the spot. When in 1736 Khan Feta Ghirai was driven by the Russians from Bakhchi-sarai he settled at Karasu-Bazar, but next year the town was captured, plundered and burned by the Russians.

KARATE6HIN, a country of Central Asia, subject to Bokhara, and consisting of a highland district bounded on the N. by Samarkand and Ferghana (Khokand), on the E. by Ferghana, on the S. by Darvaz, and on the W. by Hissar and other Bokharian provinces. The plateau is traversed

by the Surkhab or Vakhsh, a right-hand tributary of the Amu-darya (Oxus) . On the N. border run the Hissar and Zarafshan mountains, and on the S. border the Peter I. (Periokhtan) range (24,900 ft.). The area is 8000 sq. m. and the population about 60,000-five-sixths Tajiks, the rest Kara-kirghiz. With the neighbouring lands Karateghin has no communication except during summer, that is, from May to September. The winter climate is extremely severe; snow begins to fall in October and it is May before it disappears. During the warmer months, however, the mountain sides are richly clothed with the foliage of maple, mountain ash, apple, pear and walnut trees; the orchards furnish, not only apples and pears, but peaches, cherries, mulberries and apricots; and the farmers grow sufficient corn to export. Both cattle and horses are of a small and hardy breed. Rough woollen cloth and mohair are woven by the natives, who also make excellent fire-arms and other weapons. Gold is found in various places and there are salt-pits in the moun- tains. The chief town, Harm or Garm, is a place of some 2000 inhabitants, situated on a hill on the right bank of the Surkhab. The native princes, who claimed to be descended from Alex- ander the Great, were till 1868 practically independent, though their allegiance was claimed in an ineffective way by Khokand, but eventually Bokhara took advantage of their intestine feuds to secure their real submission in 1877.

KARAULI, or Kerowlee, a native state of India, in the Rajputana agency. Area, 1242 sq. m.; pop. (1901), 156,786; estimated revenue about £330,000. Almost the entire territory is composed of hills and broken ground, but there are no lofty peaks, the highest having an elevation of less than 1400 ft. above sea-level. The Chambal river flows along the south-east boundary of the state. Iron ore and building stone comprise the mineral resources. The prevailing agricultural products are millets, which form the staple food of the people. The only manufactures consist of a little weaving, dyeing, wood-turning and stone- cutting. The principal imports are piece goods, salt, sugar, cotton, buffaloes and bullocks; the exports rice and goats. The feudal aristocracy of the state consists of Jadu Rajputs connected with the ruling house. They pay a tribute in lieu of constant military service, but in case of emergency or on occasions of state display they are bound to attend on the chief with their retainers. The maharaja is the head of the clan, which claims descent from Krishna. Maharaja Bhanwar Pal Deo, who was born in 1862 and succeeded in 1866, was appointed G.C.I.E. in i897,onthe occasion of Queen Victoria's diamond jubilee.

The town of Karauli had a population in 1901 of 23,482. It dates from 1348, and is well situated in a position naturally defended by ravines on the north and east, while it is further protected by a great wall. The palace of the maharaja is a handsome block of buildings dating mainly from the

middle of the 1 8th century.

KAREN, one of the chief hill races of Burma. The Karens inhabit the central Pegu Yoma range, forming the watershed between the Sittang and Irrawaddy rivers, the Paunglaung range between the Sittang and the Salween, and the eastern slopes of the Arakan Yoma mountains to the west of the Irra- waddy delta. They are supposed to be the descendants of Chinese tribes driven southwards by the pressure of the Shan races, before they were again made to retire into the hills by the expansion of the M6n power. Their own traditions ascribe their original home to the west of the sandy desert of Gobi stretching between China and Tibet. According to the census of 1901 they numbered in all 727,235 persons within British India, divided into the Sgaw, 86,434, the Pwo, i74>°7°, and the Bghai, 4036.

while 457,355 are returned as " unspecified." The Sgaw and Pwo are collectively known as the " White Karens," and chiefly inhabit British territory. They take their name from the colour of their clothes. The Bghai, or " Red Karens," who are supposed by some to be an entirely distinct race, chiefly inhabit the independent hill state of Karen-ni (q.v.). The Karen is of a squarer build than the Burman, his skin is fairer, and he has more of the Mongolian obliquity of the eyes. In character also the people differ from the Burmese. They are singularly devoid of humour, they are stolid and cautious, and lack altogether the light gaiety and fascination of the Burmese. They are noted for truthfulness and chastity, but are dirty and addicted to drink. The White Karens furnish perhaps the most notable instance of conversion to Christianity of any native race in the British empire. Prepared by prophecies current among them, and by curious traditions of a biblical flavour, in addition to their an- tagonism to the dominant Burmese, they embraced with fervour the new creed brought to them by the missionaries, so that out of the 147,525 Christians in Burma according to the census of 1 90 1 upwards of a hundred thousand were Karens. The Red Karens differ considerably from the White Karens. They are the wildest and most lawlessoftheso-calledKaren tribes. Every male belonging to the clan used to have the rising sun tattooed in bright vermilion on his back. The men are small and wizened, but athletic, and have broad reddish-brown faces. Their dress consists of a short pair of breeches, usually of a reddish colour, with black and white stripes interwoven perpendicularly or like a tartan, and a handkerchief is tied round the head. The Karen language is tonal, and belongs to the Siamese-Chinese branch of the Indo-Chinese family.

See D. M. Smeaton, The Loyal Karens of Burma (1887) ; J. Nisbet, Burma under British Rule (1901) ; M. and B. Ferrars, Burma (1900) ; and O'Connor Scott, The Silken East (1904). (J. G. Sc.)

KAREN-NI, the country of the Red Karens, a collection of small states, formerly independent, but now feudatory to Burma. It is situated approximately between 18 50′ and 19 55′ .N. and between 97 10′ and 97 50′ E. The tract is bounded on the N. by the Shan states of Mong Pai, Hsatung and Mawkmai; on the E. by Siam; on the S. by the Papun district of Lower Burma; and on the W. a stretch of mountainous country, inhabited by the Bre and various other small tribes, formerly in a state of independence, divides it from the districts of Toungoo and Yamethin. It is divided in a general way into eastern and western Karen-ni; the former consisting of one state, Gantara- wadi, with an approximate area of 2500 sq. m.; the latter of the four small states of Kyebogyi, area about 350 sq. m.; Baw- lake, 200 sq. m.; Nammekon, 50 sq. m.; and Naungpale, about 30 sq. m. The small states of western Karen-ni were formerly all subject to Bawlake, but the subordination has now ceased. Karen-ni consists of two widely differing tracts of country, which roughly mark now, and formerly actually did mark, the division into east and west. Gantarawadi has, however, encroached westwards beyond the boundaries which nature would assign to it. The first of these two divisions is the southern portion of the valley of the Hpilu, or Balu stream, an open, fairly level plain, well watered and in some parts swampy. The second division is a series of chains of hills, intersected by deep valleys, through which run the two main rivers, the Salween and the Pawn, and their feeder streams. Many of the latter are dried up in the hot season and only flow freely during the rains. The whole country being hilly, the most conspicuous ridge is that lying between the Pawn and the Salween, which has an average altitude of 5000 ft. It is crossed by several tracks, passable for pack-animals, the most in use being the road between Sawlon, the capital of Gantara- wadi and Man Matt. The principal peak east of the Salween is on the Loi Lan ridge, 7100 ft. above mean sea-level. Parts of this ridge form the boundary between eastern Karen-ni and Mawkmai on the west and Siam on the east. It falls away rapidly to the south, and at Pang Salang is crossed at a height of 2200 ft. by the road from Hsataw to Mehawnghsawn. West of the Balu valley the continuation of the eastern rim of the Myelat plateau rises in Loi Nangpa to about 5000 ft. The Nam Pawn

is a large river, with an average breadth of 100 yds., but is unnavigable owing tp its rocky bed. Even timber cannot be floated down it without the assistance of elephants. The Salween throughout Karen-ni is navigated by large native craft. Its tributary, the Me Pai, on the eastern bank, is navigable as far as Mehawnghsawn in Siamese territory. The Balu stream flows out of the Inle lake, and is navigable from that point to close on

Lawpita, where it sinks into the ground in a marsh or succession of funnel holes. Its breadth averages 50 yds., and its depth is 1 5 ft. in some places.

The chief tribes are the Red Karens (24,043), Bres (3500), and Padaungs (1867). Total revenue, Rs. 37,000. An agent of the British government, with a guard of military police, is posted at the village of Loikaw. Little of the history of the Red Karens is known; but it appears to be generally admitted that Bawlake was originally the chief state of the whole country, east and west, but eastern Karen-ni under Papaw-gyi early became the most powerful. Slaving raids far into the Shan states brought on invasions from Burma, which, however, were not very successful. Eastern Karen-ni was never reduced until Sawlapaw, having defied the British government, was overcome and deposed by General Collett in the beginning of 1889. Sawlawi was then appointed myoza, and received a sanad, or patent of appoint- ment, on the same terms as the chiefs of the Shan states. The independence of the Western Karen-ni states had been guaranteed by the British government in a treaty with King Mindon in 1875. They were, however, formally recognized as feudatories in 1892 and were presented with sanads on the 23rd of January of that year. Gantarawadi pays a regular tribute of Rs. 5000 yearly, whereas these chieflets pay an annual kadaw, or nuzzur, of about Rs. 100. They are forbidden to carry out a sentence of death passed on a criminal without the sanction of the superintendent of the southern Shan states, but otherwise retain nearly all their customary law.

Tin, or what is called tin, is worked in Bawlake. It appears, ■ however, to be very impure. It is worked intermittently by White Karens on the upper waters of the Hkemapyu stream. Rubies, spinels and other stones are found in the upper Tu valley and in the west of Nammekon state, but they are of inferior quality. The trade in teak is the chief or only source of wealth in Karen-ni. The largest and most important forests are those on the left bank of the Salween. Others lie on both banks of the Nam Pawn, and in western Karen-ni on the Nam Tu. The yearly out-turn is estimated at over 20,000 logs, and forest officers have estimated that an annual out-turn of 9000 logs might be kept up without injury to the forests. Some quantity of cutch is exported, as also stick-lac, which the Red Karens graft so as to foster the production. Other valuable forest produce exists, but is not exported. Rice, areca-nuts, and betel-vine leaf are the chief agricultural products. The Red Karen women weave their own and their husbands' clothing. A characteristic manufacture is the pa-si or Karen metal drum, which is made at Ngwedaung. These drums are from 2§ to 3 ft. across the boss, with sides of about the same depth. The sound is out of proportion to the metal used, and is inferior to that of the Shan and Burmese gongs. It is thought that the population of Karen-ni is steadily decreasing. The birth-rate of the people is considered to exceed the death-rate by very little, and the Red Karen habit

of life is most unwholesome. Numbers have enlisted in the Burma police, but there are various opinions as to their value. (J. G. Sc.)

KARIKAL, a French settlement in India, situated on the south-east coast, within the limits of Tanjore district, with an area of 53 sq. m., and a population (1901) of 56,595. The site was promised to the French by the Tanjore raja in 1738, in return for services rendered, but was only obtained by them by force in 1739. It was captured by the British in 1760, restored in 1765, again taken in 1768, and finally restored.in 1817. The town is neatly built on one of the mouths of the Cauvery, and carries on a brisk trade with Ceylon, exporting rice and importing chiefly European articles and timber. A chef de V administration, subordinate to the government at Pondicherry, is in charge of the settlement, and there is a tribunal of first instance.

KARLI, a village of British India, in the Poona district of the Bombay presidency, famous for its rock caves. Pop. (1901), 903. The great cave of Karli is said by Fergusson to be without exception the largest and finest chaitya cave in India; it was

excavated at a time when the style was in its greatest purity, and is splendidly preserved. The great chaitya hall is 126 ft. long, 45 ft. 7 in. wide, and about 46 ft. high. A row of ornamental columns rises on either side to the ribbed teak roof, and at the far end of the nave is a massive dagoba. Dating from the begin- ning of the Christian era or earlier, this cave has a wooden roof, which repeats the pattern of the walls, and which Fergusson considers to be part of the original design. Since wood rapidly deteriorates in India owing to the climate and the ravages of white ants, the state of preservation of this roof is remarkable.

KARLOWITZ, or Carlowitz (Hungarian, Karloeza; Croatian, Karlovci), a city of Croatia-Slavonia, in the county of Syrmia; on the right bank of the Danube, and on the railway from Peter- wardein, 6 m. N.W. to Belgrade. Pop. (1900), 5643. Kar- lowitz is the seat of an Orthodox metropolitan, and has several churches and schools, and a hospital. The fruit-farms and vineyards of the Fruska Gora, a range of hills to the south, yield excellent plum brandy and red wine. An obelisk at Slankamen, 13 m. E. by S., commemorates the defeat of the Turks by Louis of Baden, in i6or. The treaty of Karlowitz, between Austria, Turkey, Poland and Venice, was concluded in 1699; in 1848- 1849 the city was the headquarters of Servian opposition to Hungary. It was included, until 1881, in the Military

Frontier.

KARLSKRONA [Carlscrona,] a seaport of Sweden, on the Baltic coast, chief town of the district (Ian) of Blekinge, and head- quarters of the Swedish navy. Pop. (1900), 23,955. It is pleasantly situated upon islands and the mainland, 290 m. S.S.W. of Stockholm by rail. The harbour is capacious and secure, with a sufficient depth of water for the largest vessels. It has three entrances; the principal, and the only one practicable for large vessels, is to the south of the town, and is defended by two strong forts, at Drottningskar on the island of Aspo, and on the islet of Kungsholm. The dry docks, of great extent, are cut out of the solid granite. There is slip-accommodation for large vessels. Karlskrona is the seat of the Royal Naval Society, and has a navy-arsenal and hospital, and naval and other schools. Charles XL, the founder of the town as naval headquarters (1680), is commemorated by a bronze statue (1897). There are factories for naval equipments, galvanized metal goods, felt hats, canvas, leather and rice, and breweries and granite quarries. Exports are granite and timber; imports, coal, flour, provisions, hides and machinery.

KARLSRUHE, or Carlsrtjhe, a city of Germany, capital of the grand-duchy of Baden, 33 m. S.W. of Heidelberg, on the railway Frankfort-on-Main-Basel, and 39 m. N. W. of Stuttgart. Pop. (1895), 84,030; (1905), iri,2oo. It stands on an elevated plain, 5 m. E. of the Rhine and on the fringe of the Hardtwald forest. Karlsruhe takes its name from Karl Wilhelm, margrave of Baden, who, owing to disputes with the citizens of Durlach, erected here in 171 5 a hunting seat, around which the town has been built. The city is surrounded by beautiful parks and gardens. The palace (Schloss), built in r75i-r776 on the site of the previous erection of 171 5, is a plain building in the old French style, composed of a centre and two wings, presenting nothing remarkable except the octagon tower (Bleiturm), from the summit of which a splendid view of the city and surrounding country is obtained, and the marble saloon, in which the meridian of Cassini was fixed or drawn. In front of the palace is the Great Circle, a semicircular line of buildings, containing the government offices. From the palace the principal streets, fourteen in number, radiate in the form of an expanded fan, in a S.E., S. and S.W. direction, and are again intersected by parallel streets. This fan-like plan of the older city has, however, been abandoned in the more modern extensions. Karlsruhe has several fine public squares, the principal of which are the Schlossplatz, with Schwanthaler's statue of the grand duke Karl Friedrich in the centre, and market square (Markt- platz), with a fountain and a statue of Louis, grand duke of Baden. In the centre of the Rondelplatz is an obelisk in honour of the grand duke Karl Wilhelm. The finest street is the Kaiser- strasse, running from east to west and having a length of a mile and a half and a uniform breadth of 72 ft. In it are several of

the chief public buildings, notably the technical high school, the arsenal and the post office. Among other notable buildings are the town hall; the theatre; the hall of representatives; the mint; the joint museum of the grand-ducal and national collec- tions (natural history, archaeology, ethnology, art and a library of over 1 50,000 volumes) ; the palace of the heir-apparent, a late Renaissance building of 1891-1896; the imperial bank (1893); the national industrial hall, with an exhibition of machinery; the new law courts; and the hall of fine arts, which shelters a good picture gallery. The city has six Evangelical and four Roman Catholic Churches. The most noteworthy of these are the Evangelical town church, the burial-place of the margraves of Baden; the Christuskirche, and the Bernharduskirche. Karlsruhe possesses further the Zahringen museum of curiosities, which is in the left wing of the Schloss; an architectural school (i89r) ; industrial art school and museum; cadet school (1892); botanical and electro- technical institutes; and horticultural and agricultural schools. Of its recent public monuments may be mentioned one to Joseph Victor von Scheffel (1826-1886); a bronze equestrian statue of the emperor William I. (1896); and a memorial of the 1870-71 war. Karlsruhe is the headquarters of the XIV. German army corps. Since 1870 the industry of the city has grown rapidly, as well as the city itself. There are large railway workshops; and the principal branches of industry are the making of loco- motives, carriages, tools and machinery, jewelry, furniture, gloves, cement, carpets, perfumery, tobacco and beer. There is an important arms factory. Maxau, on the Rhine, serves as the river port of Karlsruhe and is connected with it by a canal finished in 1901.

See Fecht, Geschichte der Haupt- und Residenzstadt Karlsruhe (Karlsruhe, 1887); F. von Weech, Karlsruhe, Geschichte der Stadt und ihrer Verwaltung (Karlsruhe, 1893-1902) ; Naeher, Die Umgebung der Residenz Karlsruhe (Karlsruhe, 1888) ; and the annual Chronik der Haupt- und Residenzstadt Karlsruhe.

KARLSTAD [Carlstad], a town of Sweden, the capital of the district (Ian) of Vermland, on the island of Tingvalla under the northern shore of Lake Vener, 205 m. W. of Stockholm by the Christiania railway. Pop. (1000), 11,869. The fine Klar River here enters the lake, descending from the mountains of the fron- tier. To the north-west lies the Fryksdal or valley of the Nors River, containing three beautiful lakes and fancifully named the " Swedish Switzerland." In this and other parts of the district are numerous iron- works. Karlstad was founded in 1584. It is the seat of a bishop and has a cathedral. Trade is carried on by way of the lake and the Gota canal. There are mechanical works, match factories and stockinet factories, and a mineral spring rich in iron, the water of which is bottled for export. Under the constitution of united Sweden and Norway, in the event of the necessity of electing a Regent and the disagreement, of the parliaments of

the two countries, Karlstad was indicated as the meeting-place of a delegacy for the purpose. Here, on the 31st of August 1905 the conference met to decide upon the severance of the union between Sweden and Norway, the delegates concluding their work on the 23rd of September. ■

KARLSTADT or Carlstadt (Hungarian, Kdrolyvdros; Croa- tian, Karlovac), a royal free city, municipality and garrison town in the county of Agram, Croatia-Slavonia; standing on hilly ground beside the river Kulpa, which here receives the Korana and the Dobra. Pop. (1900), 7396. Karlstadt is on the railway from Agram to Fiume. It consists of the fortress, now obsolete, the inner town a,nd the suburbs. Besides the Roman Catholic and Orthodox churches, its chief buildings are the Franciscan monastery, law-courts and several large schools, including one for military cadets.- Karlstadt has a considerable transit trade in grain, wine, spirits and honey, and manufactures the liqueur called rosoglio.

KARMA, sometimes written Karman, a Sanskrit noun (from the root kri, to do), meaning deed or action. In addition to this simple meaning it has also, both in the philosophical and the colloquial speech of India a technical meaning, denoting " a person's deeds as determining his future lot." This is not merely in the vague sense that on the whole good will be rewarded

and evil punished, but that every single act must work out to the uttermost its inevitable consequences, and receive its retribu- tion, however many ages the process may require. Every part of the material universe — man, woman, insect, tree, stone, or whatever it be — is the dwelling of an eternal spirit that is working out its destiny, and while receiving reward and punishment for the past is laying up reward and punishment for the future. This view of existence as an endless and concomitant sowing and reaping is accepted by learned and unlearned alike as accounting for those inequalities in human life which might otherwise lead men to doubt the justice of God. Every act of every person has not only a moral value producing merit or demerit , but also an inherent power which works out its fitting reward or punishment. To the Hindu this does not make heaven and hell unnecessary. These two exist in many forms more or less grotesque, and after death the soul passes to one of them and there receives its due; but that existence too is marked by desire and action, and is therefore productive of merit or demerit, and as the soul is thus still entangled in the meshes of karma it must again assume an earthly garb and continue the strife. Salvation is to the Hindu simply deliverance from the power of karma, and each of the philosophic systems has its own method of

obtaining it. The last book of the Laws of Manu deals with karmaphalam, " the fruit of karma," and gives many curious details of the way in which sin is punished and merit rewarded. The origin of the doctrine cannot be traced with certainty, but there is little doubt that it is post-vedic, and that it was readily accepted by Buddha in the 6th century B.C. As he did not believe in the existence of soul he had to modify the doctrine (see Buddhism).

KARMAN, J6ZSEF (i 760-1 795), Hungarian author, was born at Losoncz on the 14th of March 1769, the son of a Cal- vinist pastor. He was educated at Losoncz and Pest, whence he migrated to Vienna. There he made the acquaintance of the beautiful and eccentric Countess Markovics, who was for a time his mistress, but she was not, as has often been supposed, the heroine of his famous novel Fanni Hagyomdnai (Fanny's testa- ment). Subsequently he settled in Pest as a lawyer. His sensi- bility, social charm, liberal ideas (he was one of the earliest of the Magyar freemasons) and personal beauty, opened the doors of the best houses to him. He was generally known as the Pest Alcibiades, and was especially at home in the salons of the Protestant magnates. In 1792, together with Count Raday, he founded the first theatrical society at Buda. He maintained that Pest, not Pressburg, should be the literary centre of Hungary, and in 1794 founded the first Hungarian quarterly, Urania, but it met with little support and ceased to exist in 1795, after three volumes had appeared. Karman, who had long been suffering from an incurable disease, died in the same year. , The most important contribution to Urania was his sentimental novel, Fanni Hagyomdnai, much in the style of La nouvelle Heloise and Werther, the most exquisite product of Hungarian prose in the 18th century and one of the finest psychological romances in the literature. Karman also wrote two satires and fragments of an historical novel, while his literary programme is set forth in his dissertation Anemzet csinosoddsa.

Karman's collected works were published in Abafi's Nemzeti Konyvtdr (Pest, 1878), &c, preceded by a life of Karman. See F. Barath, Joseph Karman (Hung., Vas. Ujs, 1874); Zsolt Beothy, article on Karman in Kepes Irodalomtortenet (Budapest, 1894).

(R. N. B.)

KARNAK, a village in Upper Egypt (pop. 1907, 12,585), which has given its name to the northern half of the ruins of Thebes on the east bank of the Nile, the southern being known as Luxor (q.v.). The Karnak ruins comprise three great enclo- sures built of crude brick. The northernmost and smallest of these contained a temple of the god Mont, built by Amenophis III., and restored by Rameses II. and the Ptolemies. Except a well-preserved gateway dating from the reign of Ptolemy Euer- getes I., little more than the plan of

the foundations is traceable. Its axis, the line of which is continued beyond the enclosure wall by an avenue of sphinxes, pointed down-stream (N.E.). The southern enclosure contained a temple of the goddess Mut, also

built by Amenophis III., and almost as ruinous as the last, but on a much larger scale. At the back is the sacred lake in the shape of a horse-shoe. The axis of the temple runs approxi- mately northward, and is continued by a great avenue of rams to the southern pylons of the central enclosure. This last is of vast dimensions, forming approximately a square of 1500 ft., and it contains the greatest of all known temples, the Karnak temple of Ammon (see Architecture, sect. " Egyptian," with plan).

Inside and outside each of these enclosures there were a number of subsidiary temples and shrines, mostly erected by individual kings to special deities. The triad of Thebes was formed by Ammon, his wife Mut and their son Khons. The large temple of Khons is in the enclosure of the Ammon temple, and the temple of Mut, as already stated, is connected with the latter by the avenue of rams. The Mont temple, on the other hand, is isolated from the others and turned away from them; it is smaller than that of Khons. Mont, however, may perhaps be considered a special god of Thebes; he certainly was a great god from very ancient times in the immediate neighbourhood, his seats being about 4 m. N.E. at Medamot, the ancient Madu, and about 10 m. S.W. on the west bank at Hermonthis.

It is probable that a temple of Ammon existed at Karnak under the Old Kingdom, if not in the prehistoric age; but it was unimportant, and no trace of it has been discovered. Slight remains of a considerable temple of the Middle Kingdom survive behind the shrine of the great temple, and numbers of fine statues of the twelfth and later dynasties have been found ; two of these were placed against the later seventh pylon, while a large number were buried in a great pit, in the area behind that pylon, which has yielded an enormous number of valuable and interesting monuments reaching to the age of the Ptolemies. The axis of the early temple lay from E. to W., and was followed by the main line of the later growth; but at the beginning of the eighteenth dynasty, Amenophis I. built a temple south of the west front of the eld one, and at right angles to it, and thus started a new axis which was later developed in the series of pylons VII.X., and the avenue to the temple of Mut. The VIHth pylon in particular was built by Hatshepsut, probably as an approach to this temple of Amenophis, but eventually Tethmosis III. cleared the latter away entirely. Thebes was then the royal residence, and Ammon of Karnak was the great god of the state. Tethmosis I. built a court round the temple of the Middle Kingdom, entered through a pylon (No. V.), and later added the pylon No. IV. with obelisks in front of it. Hat shepsut placed two splendid obelisks between the Pylons IV. and V., and built a shrine in the court of Tethmosis I., in front of the old temple.

Tethmosis III., greatest of the Pharaohs, remodelled the buildings about the obelisks of his unloved sister with the deliberate intention of hiding them from view, and largely reconstructed the surroundings of the court. At a later date, after his wars were over, he altered Hatshepsut's sanctuary, engraving on the walls about it a record of his campaigns; to this time also is to be attributed the erection of a great festival hall at the back of the temple. The small innermost pylon (No. VI.) is likewise the work of Tethmosis III. Amenophis III., though so great a builder at Thebes, seems to have contented himself with erecting a great pylon (No. III.) at the west end. The cloaely crowded succession of broad pylons here suggests a want of space for westward expansion, and this is perhaps explained by a trace of a quay found byLegrain in 1905 near the southern line of pylons; a branch of the Nile or a large canal may have limited the growth. As has been stated, Tethmosis III. continued on the southern axis; he destroyed the temple of Amenophis I. and erected a larger pylon (No. VII.) to the north of Hatshepsut's No. VIII. To these Haremheb added two great pylons and the long avenue of ram-figures, changing the axis slightly so as to lead direct to the temple of Mut built by Amenophis III. All of these southern pylons are well spaced. In the angle between these pylons and the main temple was the great rectangular sacred lake. By this time the temple of Karnak had attained to little more than half of its ultimate length from east to west.

With the XlXth Dynasty there is a notable change perhaps due to the filling of the hypothetical canal. No more was added on the southern line of building, but westward Rameses I. erected pylon No. II. at an ample distance from that of Amenophis III., and Seti I. and Rameses II. utilized the space between for their immense Hall of Columns, one of the most celebrated achievements of Egyptian architecture. The mate- rials of which the pylon is composed bear witness to a temple having stood near by of the heretic and unacknowledged kings of the XVIIIth Dynasty. Haremheb's pylon No. IX. was like- wise constructed out of the ruins of a temple dedicated by Amenophis IV. (Akhenaten) to the sun-god Harmakhis. Rameses III. built a fine temple, still well preserved, to Ammon at right angles to the axis westward of pylon No. II. ; Sheshonk I. (Dynasty XXII.) commenced a great colonnaded court in front of the pylon, enclosing part of this temple and a smaller triple shrine built by Seti II. In the centre of the court Tirhaka (Tirhaka, Dynasty XXV.) set up huge columns 64 ft. high, rivalling those of the central aisle in the Hall of Columns, for some building now destroyed. A vast unfinished pylon at the west end (No. I.), 370 ft. wide and 142I ft. high, is of later date than the court, and is usually

attributed to the Ptolemaic age. It will be observed that the successive pylons diminish in size from the outside inwards. Portions of the solid crude-brick scaffolding are still seen banked against this pylon. About 100 metres west of it is a stone quay, on the platform of which stood a pair of obelisks of Seti II.; numerous graffiti recording the height of the Nile from the XXIst to the XXVIth Dynasties are engraved on the quay.

Besides the kings named above, numbers of others contributed in greater or less measure to the building or decoration of the colossal temple. Alexander the Great restored a chamber in the festival hall of Tethmosis III. , and Ptolemy Soter built the central shrine of granite in the name of Philip Arrhidaeus. The walls throughout, as usually in Egyptian temples, are covered with scenes and inscriptions, many of these, such as those which record the annals of Tethmosis III., the campaign of Seti I. in Syria, the exploit of Rameses II. at the battle of Kadesh and his treaty with the Hittites, and the dedication of Sheshonk's victories to Ammon, are of great historical importance. Several large stelae with interesting inscriptions have been found in the ruins, and statues of many ages of workmanship. In December 1903 M. Legrain, who has been engaged for several years in clearing the temple area systematically, first tapped an immense deposit of colossal statues, stelae and other votive objects large and small in the space between pylon No. VII. and the great hypostyle hall. After three seasons' work, much of it in deep water, 750 large monuments have been extracted, while the small figures, &c. in bronze and other materials amount to nearly 20,000. The value of the find, both from the artistic and historical stand-points, is immense. The purpose of the deposit is still in doubt; many of the objects are of the finest materials and finest workmanship, and in perfect preservation: even precious metals are not absent. Multitudes of objects in wood, ivory, &c, have decayed beyond recovery. That all were waste pieces seems incredible. They are found lying in the utmost confusion ; in date they range from the XHth Dynasty to the Ptolemaic period.

The inundation annually reaches the floor of the temple, and the saltpetre produced from the organic matter about the ruins, annually melting and crystallizing, has disintegrated the soft sandstone in the lower courses of the walls and the lower drums and bases of the columns. There is moreover no solid foundation in any part of the temple. Slight falls of masonry have taken place from time to time, and the accumulation of rubbish was the only thing that prevented a great disaster. Repairs, often on a large scale, have therefore gone on side by side with the clearance, especially since the fall of many columns in the great hall in 1899. All the columns which fell in that year were re- erected by 1908.

The temple of Khons, in the S.W. corner of the great enclosure, is approached by an avenue of rams, and entered through a fine

pylon erected by Euergetes I. It was built by Rameses III. and his successors of the XXth Dynasty, with Hrihor of Dynasty XXI. Excavations in the opposite S.E. corner have revealed flint weapons and other sepulchral remains of the earliest periods, proving that the history of Thebes goes back to a remote antiquity.

See Baedeker's Handbook for Egypt; also Description de V £gy pte.. Atlas, Antiquites(tome iii.) ; A. Mariette, Karnak, Alude topographique et archiologique; L. Borchardt, Zur Baugeschichte des Ammontempels von Karnak ; G. Legrain in Recueil des travaux relatifs a Varch. £,gypt. t vol. xxvii. &c. ; and reports in Annates du service des antiquites de I'Bgypte. (F. Ll. G.)

KARNAL, a town and district of British India, in the Delhi division of the Punjab. The town is 7 m. from the right bank of the Jumna, with a railway station 76 m. N. of Delhi. Pop. (1901), 23,559. There are manufactures of cotton cloth and boots, besides considerable local trade and an annual horse fair.

The District of Karnal stretches along the right bank of the Jumna, north of Delhi. It is entirely an alluvial plain, but is crossed by the low uplift of the watershed between the Indian Ocean and the Bay of Bengal. Area, 3153 sq. m.; pop. (1901), 883,225, showing an increase of nearly 3 % in the decade. The principal crops are millets, wheat, pulse, rice, cotton and sugar-cane. There are several factories for ginning and pressing cotton. The district is traversed by the Delhi-Umballa-Kalka railway, and also by the Western Jumna canal. It suffered from famine in 1896-1897, and again to some extent in 1899-1900.

No district of India can boast of a more ancient history than Karnal, as almost every town or stream is connected with the legends of the Mahabharata. The town of Karnal itself is said to owe its foundation to Raja Kama, the mythical champion of the Kauravas in the great war which forms the theme of the national epic. Panipat, in the south of the district, is said to have been one of the pledges demanded from Duryodhana by Yudisthira as the price of peace in that famous conflict. In historical times the plains of Panipat have three times proved the theatre of battles which decided the fate of Upper India. It was here that Ibrahim Lodi and his vast host were defeated in 1526 by the veteran army of Baber; in 1556 Akbar reasserted the claims of his family on the same battlefield against the Hindu general of the house of Adil Shah, which had driven the heirs of Baber from the throne for a brief interval; and at Panipat too, on the 7th of January 1761, the Mahratta confederation was defeated by Ahmad Shah Durani. During the troublous period which then ensued the Sikhs managed to introduce them- selves, and in 1767 one of their chieftains,

Desu Singh, appro- priated the fort of Kaithal, which had been built during the reign of Akbar. His descendants, the bhais of Kaithal, were reckoned amongst the most important Cis-Sutlej princes. Different portions of this district have lapsed from time to time into the hands of the British.

KAROLYI, ALOYS, Count (1825-1889), Austro-Hungarian diplomatist, was born in Vienna on the 8th of August 1825. The greatness of the Hungarian family of Karolyi dates from the time of Alexander Karolyi (1668-1743), one of the generals of Francis Rakoczy II., who in 1711 negotiated the peace of Szatmar between the insurgent Hungarians and the new king, the emperor Charles VI., was made a count of the Empire in 1 712, and subsequently became a field marshal in the imperial army. Aloys Karolyi entered the Austrian diplomatic service, and was attached successively to embassies at various European capitals. In 1858 he was sent to St Petersburg on a special mission to seek the support of Russia against Napoleon III. He was ambassador at Berlin in 1866 at the time of the rupture between Prussia and Austria, and after the Seven Weeks' War was charged with the negotiation of the preliminaries of peace at Nikolsburg. He was again sent to Berlin in 1871, acted ,as second plenipotentiary at the Berlin congress of 1878, and ' was sent in the same year to London, where he represented Austria for ten years. He died on the 2nd of December 1889 at Totmegyer.

KAROSS, a cloak made of sheepskin, or the hide of other animals, with the hair left on. It is properly confined to the coat of skin without sleeves worn by the Hottentots and Bush- men of South Africa. These karosses are now often replaced by a blanket. Their, chiefs wore karosses of the skin cf the wild cat, leopard or caracal. The word is also loosely applied to the cloaks of leopard-skin worn by the chiefs and principal men of the Kaffir tribes. Kross is probably either a genuine Hottentot word, or else an adaptation of the Dutch kuras (Portuguese couraqa), a cuirass. In a vocabulary dated 1673 karos is described as a " corrupt Dutch word."

KARR, JEAN BAPTISTE ALPHONSE (1 808-1 890), French critic and novelist, was born in Paris, on the 24th of November 1808, and after being educated at the College Bourbon, became a teacher there. In 1832 he published a novel, Sous les tilleuls, characterized by an attractive originality and a delightful freshness of personal sentiment. A second novel, Une heure trop tard, followed next year, and was succeeded by many other popular works. His Vendredi soir (1835) and Le Chemin le plus court (1836) continued the vein of autobiographical romance with which he had

made his first success. Genevieve (1838) is one of his best stories, and his Voyage autour de mon jardin (1845) was deservedly popular. Others were Feu Bressier (1848), and Fort en thtme (1853), which had some influence in stimulating educational reform. In 1839 Alphonse Karr, who was essentially a brilliant journalist, became editor of Le Figaro, to which he had been a constant contributor; and he also started a monthly journal, Les GuSpes, of a keenly satirical tone, a publication which brought him the reputation of a somewhat bitter wit. His epigrams were frequently quoted; e.g. " plus ca change, plus c'est la mfime chose," and, on the proposal to abolish capital punishment, " je veux bien que messieurs les assassins commencent." In 1848 he founded Le Journal. In 1855 he went to live at Nice, where he indulged his predilections for floriculture, and gave his name to more than one new variety. Indeed he practically founded the trade in cut flowers on the Riviera. He was also devoted to fishing, and in Les Soirees de Sainte-Adresse (1853) and Au bord de la tner (i860) he made use of his experiences. His reminiscences, Livre de bord, were published in 1879-1880. He died at St Raphael (Var), on' the 29th of September 1890.

KARRER, FELIX (1825-1903), Austrian geologist, was born in Venice on the nth of March 1825. He was educated in Vienna, and served for a time in the war department, but he retired from the public service at the age of thirty-two, and devoted himself to science. He made especial studies of the Tertiary formations and fossils of the Vienna Basin, and investi- gated the geological relations of the thermal and other springs in that region. He became an authority on the foraminifera, on which subject he published numerous papers. He wrote also a little book entitled Der Eoden der Hauptstadte Europas (1881). He died in Vienna on the 19th of April 1903.

KARROO, two extensive plateaus in the Cape province, South Africa, known respectively as the Great and Little Karroo. Karroo is a corruption of Kdrusa, a Hottentot word meaning dry, barren, and its use as a place-name indicates the character of the plateaus so designated. They form the two intermediate " steps " between the coast-lands and the inner plateau which constitutes the largest part of South Africa. The Little (also called Southern) Karroo is the table-land nearest the southern coast -line of the Cape, and is bounded north by the Zwaarteberg, which separates it from the Great Karroo. From west to east the Little Karroo has a length of some 200 m., whilst its average width is 30 m. West of the Zwaarteberg the Little Karroo merges into the Great Karroo. Eastward it is limited by the hills which almost reach the sea in the direction of St Francis and Algoa Bays. The Great Karroo is of much larger extent. Bounded south, as stated, by the Zwaarteberg, further east by the Zuurberg (of the coast chain), its northern limit is the mountain range which, under various names, such as

Nieuwveld and Sneeuwberg, forms the wall of the inner plateau. To the south-west and west it is bounded by the Hex River Moun-

tains and the Cold Bokkeveld, eastward by the Great Fish River. West to east it extends fully 350 m. in a straight line,, varying in breadth from more than 80 to less than 40 m. Whilst the Little Karroo is divided by a chain of hills which run across it from east to west, and varies in altitude from 1000 to 2000 ft., the Great Karroo has more the aspect of a vast plain and has a level of from 2000 to 3000 ft. The total area of the Karroo plateaus is stated to be over 100,000 sq. m. The plains are dotted with low ranges of kopjes. The chief characteristics of the Karroo are the absence of running water during a great part of the year and the consequent parched aspect of the country. There is little vegetation save stunted shrubs, such as the mimosa (which generally marks the river beds), wild pome- granate, and wax heaths, known collectively as Karroo bush. After the early rains the bush bursts into gorgeous purple and yellow blossoms and vivid greens, affording striking evidence of the fertility of the soil. Such parts of the Karroo as are under perennial irrigation are among the most productive lands in South Africa. Even the parched bush provides sufficient nourishment for millions of sheep and goats. There are also numerous ostrich farms, in particular in the districts of Oudtshoorn and Ladismith in the Little Karroo, where lucerne grows with extraordinary luxuriance. The Karroo is admirably adapted to sufferers from pulmonary complaints. The dryness of the air tempers the heat of summer, which reaches in January a mean maximum of 87° F., whilst July, the coldest month, has a mean minimum of 36 F. A marked feature of the climate is the great daily range (nearly 30) in temperature; the Karroo towns are also subject to violent dust storms. Game, formerly plentiful, has been, with the exception of buck, almost exter- minated. In a looser sense the term Karroo is also used of the vast northern plains of the Cape which are part of the inner table-land of the continent. (See Cape Colony.)

KARS, a province of Russian Transcaucasia, having the governments of Kutais and Tiflis on the N., those of Tifiis and Erivan on the E., and Asiatic Turkey on the S. and W. Its area amounts to 7410 sq. m. It is a mountainous, or rather a highland, country, being in reality a plateau, with ranges of mountains running across it. The northern border is formed by the Arzyan range, a branch of the Ajari Mts., which attains altitudes of over 9000 ft. In the south the Kara-dagh reach 10,270 ft. in Mount Ala-dagh, and the Agry-dagh 10,720 ft. in Mount Ashakh; and in the middle Allah-akhbar rises to 10,215 ft- The passes which connect valley with valley often lie at considerable altitudes, the average of those in the S.E. being 9000 ft. Chaldir-gol (altitude 6520 ft.) and one or two other smaller lakes lie towards the N.E.; the Chaldir-gol is overhung on the S.W. by the Kysyr-dagh (10,470 ft.). The east side of the province is throughout

demarcated by the Arpa-chai, which receives from the right the Kars river, and as it leaves the province at its S.E. corner joins the Aras. The Kura rises within the province not far from the Kysyr-dagh and flows across it westwards, then eastwards and north-eastwards, quitting it in the north-east. The winters are very severe. The towns of Kaghyshman (4620 ft.) and Sarykamish (7800 ft.) have , a winter temperature like that of Finland, and at the latter place, with an annual mean (35 F.) equal to that of Hammerfest in the extreme north of Norway, the thermometer goes down in winter to 40 below zero and rises in summer to 99 . The annual mean temperature at Kars is 40-5° and at Ardahan, farther north, 37 . The Alpine meadows (yailas) reach up to 1000 ft. and afford excellent pasturage in spring and summer. The province is almost everywhere heavily forested. Firs and birches flourish as high as 7000 ft., and the vine up to above 3000 ft. Cereals ripen well, and barley and maize grow up to considerable altitudes. Large numbers of cattle and sheep are bred. Extensive deposits of salt occur at Kaghyshman and Olty. The population was 167,610 in 1883 and 292,863 in 1897. The estimated population in 1906 was 349,100. It is mixed. In remote antiquity the province was inhabited by Armenians, the ruins of whose capital, Ani, attest the ancient prosperity of I the country. To the Armenians succeeded the Turks, whil«

Kurds invaded the Alpine pasturages above the valley of the Aras; and after them Kabardians, Circassians, Ossetes and Kara-papaks successively found a refuge in this highland region. After the Russo-Turkish War of 1877-78, when this region was transferred to Russia by the treaty of Berlin, some 82,750 Turks emigrated to Asia Minor, their places being taken by nearly 22,000 Armenians, Greeks and Russians. At the census of 1897 the population consisted principally of Armenians (73,400), Kurds (43,000), Greeks (32,600), Kara-papaks (30,000), Russians, Turks and Persians. The capital is Kars. The province is divided into four districts, the chief towns of which are Kars (g.v.), Ardahan (pop. 800 in 1897), Kaghyshman (3435) and Olty. (J. T. Be.)

KARS, a fortified town of Russian Transcaucasia, in the province of Kars, formerly at the head of a sanjak in the Turkish vilayet of Erzerum. It is situated in 40 37′ N. and 43 6′ E., 185 m. by rail S.W. of Tiflis, on a dark basalt spur of the Soghanli- dagh, above the deep ravine of the Kars-chai, a sub-tributary of the Aras. Pop. (1878), 8672; (1897), 20,891. There are three considerable suburbs — Orta-kapi to the S., Bairam Pasha to the E., and Timur Pasha on the western side of the river. At the N.W. corner of the town, overhanging the river, is the ancient citadel, in earlier times a

strong military post, but completely commanded by the surrounding eminences. The place is, however, still defended by a fort and batteries. There is a 10th century cathedral, Kars being the see of a bishop of the Orthodox Greek Church. Coarse woollens, carpets arid felt are manufactured.

During the 9th and 10th centuries the seat of an independent Armenian principality, Kars was captured and destroyed by the Seljuk Turks in the nth century, by the Mongols in the 13th, and by Timur (Tamerlane) in 1387. The citadel, it would appear, was built by Sultan Murad III. during the war with Persia, at the close of the 16th century. It was strong enough to with- stand a siege by Nadir Shah of Persia, in 1731, and in 1807 it successfully resisted the Russians. After a brave defence it sur- rendered on the 23rd of June 1828 to the Russian general Count I. F. Paskevich, 11,000 men becoming prisoners of war. During the Crimean War the Turkish garrison, guided by General Williams (Sir W. Fenwick Williams of Kars) and other foreign officers, kept the Russians at bay during a protracted siege; but, after the garrison had been devastated by cholera^ and food had utterly failed, nothing was left but to capitulate (Nov. 1855). The fortress was again stormed by the Russians in the war of 1877-78, and on its conclusion was transferred to Russia.

See Kmety, The Defence of Kars (1856), translated from the German; H. A. Lake, Kars and our Captivity in Russia (London, 1856); and Narrative of the Defence of Kars (London, 1857); Dr Sandwith, Narrative of the Siege of Kars (London, 1856); C. B. Norman, Armenia and the Campaign of 1877 (London, 1878) ; Greene, Russian Army and its Campaigns in Turkey (1879).

KARSHI, a town of Bokhara, in Central Asia, situated 96 m. S.E. of the city of Bokhara, in a plain at the junction of two main confluents of the Kashka-darya. It is a large and strag- gling place, with a citadel, and the population amounts to 25,000. There are three colleges, and the Biki mosque is a fine building inlaid with blue and white tiles. Along the river stretches a fine promenade sheltered by poplars. Poppies and tobacco are largely grown, the tobacco being deemed the best in Central Asia. There is a considerable trade in grain; but the commercial prosperity of Karshi is mainly due to its being a meeting-point for the roads from Samarkand, Bokhara, Hissar, Balkh and Maimana, and serves as the market where the Turkomans and Uzbegs dispose of their carpets, knives and fire- arms. Its coppersmiths turn out excellent work. Karshi was a favourite residence of Timur (Tamerlane) .

KARST, in physical geography, the region east of the northern part of the Adriatic. It is composed of high and dry limestone ridges. The country is excessively faulted by a long series of parallel fractures that border the N.E. Adriatic and continue inland that series of steps which descend beneath the sea and produce the series of long parallel islands off the coast of Triest

and along the Dalmatian shore. It has been shown by E. Suess (Antlitz der Erde, vol. i. pt. 2, ch. Hi.) that the N. Adriatic is a sunken dish that has descended along these fractures and folds, which are not uncommonly the scene of earthquakes, showing that these movements are still in progress. The crust is very much broken in consequence and the water sinks readily through the broken limestone rocks, which owing to their nature are also very absorbent. The result is that the scenery is barren and desolate, and as this structure always, wherever found, gives rise to similar features, a landscape of this character is called a Karst landscape. The water running in underground channels dissolves and denudes away the underlying rock, producing great caves as at Adelsberg, and breaking the surface with sinks, potholes and unroofed chasms. The barren nature of a purely limestone country is seen in the treeless regions of some parts of Derbyshire, while the underground streams and sinks of parts of Yorkshire, and the unroofed gorge formed by the Cheddar cliffs, give some indication of the action that in the high fractured mountains of the Karst produces a depressing landscape which has some of the features of the " bad lands " of America, though due to a different cause.

KARSTEN, KARL JOHANN BERNHARD (1782-1853), German mineralogist, was born at Btitzow in Mecklenburg, on the 26th of November 1782. He was author of several compre- hensive works, including Handbuchder Eisenhiittenkunde (2 vols., 1816; 3rd ed., 1 841) ; SystemderMetallurgiegeschichtlich,statistisch, theoretisch ttnd technisch (5 vols, with atlas, 1831-1832); Lehrbuch der Salinenkunde (2 vols., 1846-1847). He was well known as editor of the Archivfiir Bergbau und Huttenwesen (20 vols., 1818- 183 1); and (with H. von Dechen) of the Archivfur Mineralogie, Geognosie, Bergbau und Hiiltenkunde (26 vols., 1820-1854). He died at Berlin on the 22nd of August 1853. His son, Dr Hermann Karsten (1809-18 7 7), was professor of mathematics and physics in the university of Rostock.

KARTIKEYA, in Hindu mythology, the god of war. Of his birth there are various legends. One relates that he had no mother but was produced by Siva alone, and was suckled by six nymphs of the Ganges, being miraculously endowed with six faces that he might simultaneously obtain nourishment from each. Another story is that six babes, miraculously conceived, were born of the six nymphs, and that Parvati, the wife of Siva, in her great affection for them, embraced the infants so closely that they became one, but preserved six faces, twelve arms, feet, eyes, &c. Kartikeya became the victor of giants and the leader of the armies of the gods. He is represented as riding a peacock. In southern India he is known as Subramanya.

KARUN, an important river of Persia. Its head-waters are in the mountain

cluster known since at least the 14th century as Zardeh Kuh (13,000 ft.) and situated in the Bakhtiari country about 115 m. W. of Isfahan. In its upper course until it reaches Shush ter it is called Ab i Kurang.(also Kurand and Kuran), and in the Bundahish, an old cosmographical work in Pahlavi, it is named Kharae. 1 From the junction of the two principal sources in the Zardeh Kuh at an altitude of about 8000 ft., the Ab i Kurang is a powerful stream, full, deep and flowing with great velocity for most of its upper course between precipices varying in height from 1000 to 3000 ft. The steepness and height of its banks make it in general useless for irrigation purposes. From its principal sources to Shushter the distance as the crow flies is only about 75 m., but the course of the river is so tortuous that it travels 250 m. before it reaches that city. Besides being fed on its journey through the Bakhtiari country by many mountain-side streams, fresh-water and salt, it receives various tributaries, the most important being the Ab i Bazuft from the right and the Ab i Barz from the left. At Shushter it divides into two branches, one the " Gerger," an artificial channel cut in olden times and flowing east of the

1 The real principal source of the river has been correctly located at ten miles above the reputed principal source, but the name Kurang has been erroneously explained as standing for Kuh i rang and has been given to the mountain with the real principal source. Kuh i rang has been wrongly explained as meaning the " variegated mountain."

city, the other the " Shutait " flowing west. These two branches, which are navigable to within a few miles below Shushter, unite after a run of about 50 m. at Band i Kir, 24 m. S. of Shushter, and there also take up the Ab i Diz (river of Dizful). From Band i Kir to a point two miles above Muhamrah the river is called Karun (Rio Carom of the Portuguese writers of the 16th and 17th centuries) and is navigable all the way with the exception of about two miles at Ahvaz, where a series of cliffs and rocky shelves cross the river and cause rapids. Between Ahvaz and Band i Kir (46 m. by river, 24 m. by road) the river has an average depth of about 20 ft., but below Ahvaz down to a few miles above Muhamrah it is in places very shallow, and vessels with a draught exceeding 3 ft. are liable to ground. About 12 m. above Muhamrah and branching off to the left is a choked-up river bed called the " blind Karun," by which the Karun found its way to the sea in former days. Ten miles farther a part of the river branches off to the left and due S. by a channel called Bahmashir (from Bahman-Ardashir, the name of the district in the early middle ages) which is navigable to the sea for vessels of little draught. The principal river, here

about a quarter of a mile broad and 20 to 30 ft. deep, now flows west, and after passing Muhamrah enters into the Shatt el Arab about 20 m. below Basra. This part of the river, from the Bahmashir to the Shatt, is a little over three miles in length and, as its name, Hafar (" dug ") implies, an artificial channel. It ' was dug c. a.d. 980 by Azud ed-Dowleh to facilitate communica- tion by water between Basra and Ahvaz, as related by the Arab geographer Mukaddasi a.d. 986. The total length of the river is 460 to 470 m. while the distance from the sources to its junction with the Shatt el Arab is only 160 m. as the crow flies. The Karun up to Ahvaz was opened to international navigation on the 30th of October 1888, and Messrs Lynch of London established a fortnightly steamer service on it immediately after.

To increase the water supply of Isfahan Shah Tahmasp I. (1524-1576) and some of his successors, notably Shah Abbas I. (1587-1629), undertook some works for diverting the Kurang into a valley which drains into the Zayendeh-rud, the river of Isfahan, by tunnelling, or cutting through a narrow rocky ridge separating the two river systems. The result of many years' work, a cleft 300 yds. long, 15 broad and 18 deep, cut into the rock, probably amounting to no more than one-twentieth of the necessary work, can be seen at the junction of the two principal sources of the Kurang.

On the upper Karun see Mrs Bishop, Journeys in Persia and Kurdistan (London, 1891); Lord Curzon, Persia and the Persian Question (London, 1892); Lieut. -Colonel H. A. Sawyer, "The Bakhtiari Mountains and Upper Elam," Geog. Journal (Dec. 1894).

(A. H.S.) KARWAR, or Carwar, a seaport of British India, adminis trative headquarters of North Kanara district in the Bombay presidency; 295 m. S. of Bombay city. Pop. (1901), 16,847. As early as 1660 the East India Company had a factory here, with a trade in muslin and pepper; but it suffered frequently from Dutch, Portuguese and native attacks, and in 1752 the English agent was withdrawn. Old Karwar fell into ruins, but a new town grew up after the transfer of North Kanara to the Bombay presidency. It is the only safe harbour all the year round between Bombay and Cochin. In the bay is a cluster of islets called the Oyster Rocks, on the largest of which is a lighthouse. Two smaller islands in the bay afford good shelter to native craft during the strong north-west winds that prevail from February to April. The commercial importance of Karwar has declined since the opening of the railway to Marmagao in Portuguese territory.

KARWI, a town of British India, in the Banda district of the United Provinces, on a branch of the Indian Midland railway; pop. (1901), 7743. Before the Mutiny it was the residence of a Mahratta noble, who lived in

great state, and whose accumu- lations constituted the treasure afterwards famous as " the Kirwee and Banda Prize Money."

KARYOGAMY (Gr. Kapvov, nut or kernel, thus " nucleus," and yaiMS, marriage), in biology: (1) the fusion of nuclei to

form a single nucleus in syngamic processes (see Reproduction) ; (2) the process of pairing in Infusoria (?.».) > m which two migra- tory nuclei are interchanged and fuse with two stationary nuclei, while the cytoplasmic bodies, of the two mates are in intimate temporary union.

KASAI, or Cassai, a river of Africa, the chief southern affluent of the Congo. It enters the main stream in 3 10′ S., 16° 16′ E. after a course of over 800 m. from its source in the highlands which form the south-western edge of the Congo basin — separating the Congo and Zambezi systems. The Kasai and its many tributaries cover a very large part of the Congo basin. The Kasai rises in about 12 S., 19 E. and flows first in a north-easterly direction. About io° 35′ S., 22° 15′ E. it makes a rectangular bend northward and then takes a north-westerly direction. Five rivers — the Luembo, Chiumbo, Luijimo or Luashimo, Chikapa and Lovua or Lowo — rise west of the Kasai and run in parallel courses for a considerable distance, falling successively into the parent stream (between 7 and 6° S.) as it bends westward in its northern course. The Luembo and Chiumbo join and enter the Kasai as one river. A number of rapids occur in these streams. A few miles below the confluence of the Lowo, the last of the five rivers named to join the Kasai, the main stream is interrupted by the Wissmann Falls which, though not very high, bar further navigation from the north. Below this point the river receives several right-hand (eastern) tributaries. These also have their source in the Zambezi-Congo watershed, rising just north of 12 S., flowing north in parallel lines, and in their lower course bending west to join the Kasai. The chief of these affluents are the Lulua and the Sankuru, the Lulua running between the Kasai and the Sankuru. The Sankuru makes a bold curve westward on reaching 4 S., following that parallel of latitude a considerable distance. Its waters are of a bright yellow colour. After the junction of the two rivers (in 4° 17′ S., 20 15′ E.), the united stream of the Kasai flows N.W. to the Congo. From the south it is joined by the Loange and the Kwango. The Kwango is a large river rising a little north of 12° S., and west of the source of the Kasai. Without any marked bends it flows north — is joined from the east by the Juma, Wamba and other streams— ˆand has a course of 600 m. before joining the Kasai in 3 S., 18′ E. The lower reaches of the Kwango are navigable; the upper course is interrupted by rapids. On the north (in 3 8′ S., 17 E.) the lower Kasai is joined by the Lukenye or Ikatta. This river, the most northerly affluent of the Kasai, rises between 24 and 25° E., and about 3° S. in swampy land through which the Lomami (another Congo

affluent) flows northward. The Lukenye has an east to west direction flowing across a level country once occupied by a lake, of which Lake Leopold II. (q.v.), connected with the lower course of the Lukenye, is the scanty remnant. Below the lake the Lukenye is known as the Mfini. Near its mouth the Kasai, in its lower course generally a broad stream strewn with islands, is narrowed to about half a mile on passing through a gap in the inner line of the West African highlands, by the cutting of which the old lake of the Kasai basin must have been drained. The Kasai enters the Congo with a minimum depth of 25 feet and a breadth of about 700 yards, at a height of 942 ft. above the sea. The confluence is known as the Kwa mouth, Kwa being an alternative name for the lower Kasai. The volume of water entering the Congo averages 321,000 cub. ft. per second: far the largest amount discharged by any of the Congo affluents. In floodtime the current flows at the rate of 5 or 6 m. an hour. The Kasai and its tributaries are navigable for over 1500 m. by steamer.

The Kwango affluent of the Kasai was the first of the large affluents of the Congo known to Europeans. It was reached by the Portuguese from their settlements on the west coast in the 16th century. Of its lower course they were ignorant. Portuguese travellers in the 1 8th century are believed to have reached the upper Kasai, but the first accurate knowledge of the river basin was obtained by David Livingstone, who reached the upper Kasai from the east and explored in part the upper Kwango (1854-1855). V. L. Cameron and Paul Pogge crossed the upper Kasai in the early " seventies." The Kwa mouth was seen by H. M. Stanley in his journey down the Congo in 1877, and he rightly regarded it as the

outlet of the Kwango, though not surmising it was also the outlet of the Kasai. In 1882 Stanley ascended the river to the Kwango- Kasai confluence and thence proceeding up the Mfini discovered Lake Leopold II. In 1884 George Grenfell journeyed up the river beyond the Kwango confluence. The systematic exploration of the main stream and its chief tributaries was, however, mainly the work of Hermann von Wissmann, Ludwig Wolf, Paul Pogge and other Germans during 1 880-1 887. (See Wissmann's books, especi- ally Im Innern Afrikas, Leipzig, 1888.) On his third journey, 1886, Wissmann was accompanied by Grenfell. Major von Mechow, an Austrian, explored the middle Kwango in 1880, and its lower course was subsequently surveyed by Grenfell and Holman Bentley, a Baptist missionary. In 1 899-1900 a Belgian expedition under Captain C. Lemaire traced the Congo-Zambezi watershed, obtaining valuable information concerning the upper courses of the southern Kasai tributaries. The upper

Kasai basin and its peoples were further investigated by a Hungarian traveller, E. Torday, in 1908- 1909. (See Torday's paper in Geog. Jour., 1910; also Congo and the authorities there cited.)

KASBEK (Georgian, Mkin-vari; Ossetian, Urs-khokh), one of the chief summits of the Caucasus, situated in 42 42′ N. and 44 30′ E., 7 m. as the crow flies from a station of the same name on the high road to Tiflis. Its altitude is 16,545 ft- It rises on the range which runs north of the main range (main water-parting), and which is pierced by the gorges of the Ardon and the Terek. It represents an extinct volcano, built up of trachyte and sheathed with lava, and has the shape of a double cone, whose base lies at an altitude of 5800 ft. Owing to the steepness of its slopes, its eight glaciers cover an aggregate surface of not more than 8 sq. m., though one of them, Maliev, is 36 m. long. The best-known glacier is the Dyevdorak, or Devdorak, which creeps down the north-eastern slope into a gorge of the same name, reaching a level of 7530 ft. At its eastern foot runs the Georgian military road through the pass of Darial (7805 ft.). The summit was first climbed in 1868 by D. W. Freshfield, A. W. Moore, and C. Tucker, with a Swiss guide. Several successful ascents have been made since, the most valuable in scientific results being that of Pastukhov (1889) and that of G. Merzbacher and L. Purtscheller in 1890. Kasbek has a great literature, and has left a deep mark in Russian poetry.

See D. W. Freshfield in Proc. Geog. Soc. (November 1888) and The Exploration of the Caucasus (2nd ed., 2 vols., 1902) ; Hatisian's "Kazbek Glaciers" in Izvestia Russ. Geog. Soc. (xxiv., 1888); Pastukhov in Izvestia of the Caucasus Branch of Russ. Geog. Soc. (x. 1, 1891, with large-scale map).

KASHAN, a small province of Persia, situated between Isfahan and Kum. It is divided into the two districts germsir, the " warm," and sardsir, the " cold," the former with the city of Kashan in the plains, the latter in the hills. It has a population of 75,000 to 80,000, and pays a yearly revenue of about £18,000. Kashan (Cashan) is the provincial capital, in 34 o' N. and 51° 27′ E., at an elevation of 3190 ft., 150 m. from Teheran; P°P-35>°°°> including a few hundred Jews occupied as silk- winders, and a few Zoroastrians engaged in trade. Great quantities of silk stuffs, from raw material imported from Gilan, and copper utensils are manufactured at Kashan and sent to all parts of Persia. Kashan also exports rose-water made in villages in the hilly districts about 20 m. from the city, and is the only place in Persia where cobalt can be obtained, from the mine at Kamsar, 19 m. to the south. At the foot of the hills 4 m. W. of the city are the beautiful gardens of Fin, the scene of the official murder, on the 9th of January 1852, of Mirza Taki Khan, Amir Nizam, the grand vizier, one of the ablest ministers that Persia has had in modern times.

KASHGAR, an important city of Chinese Turkestan, in 39 24′ 26″ N. lat., 76 6′ 47″ E. long., 4043 ft. above sea-level. It consists of two towns, Kuhna Shahr or " old city," and Yangi Shahr or " new city," about five miles apart, and separated from one another by the Kyzyl Su, a tributary of the Tarim river. It is called Su-leh by the Chinese, which perhaps represents an original Solek or Sorak. This name seems to be older than Kashgar, which is said to mean " variegated houses." Situated at the junction of routes from the valley of the Oxus, from Khokand and Samarkand, Almati, Aksu, and Khotan, the last two leading from China and India, Kashgar has been noted from very early times as a political and commercial centre. Like all

other cities of Central Asia, it has changed hands repeatedly, and was from 1864-1887 the seat of government of the Amir Yakub Beg, surnamed the Atalik Ghazi, who established and for a brief period ruled with remarkable success a Mahommedan state comprising the chief cities of the Tarim basin from Turfan round along the skirt of the mountains to Khotan. But the kingdom collapsed with his death and the Chinese retook the country in 1877 and have held it since.

Kuhna Shahr is a small fortified city on high ground over- looking the river Tuman. Its walls are lofty and supported by buttress bastions with loopholed turrets at intervals; the fortifications, however, are but of hard clay and are much out of repair. The city contains about 2500 houses. Beyond the bridge, a little way off, are the ruins of ancient Kashgar, which once covered a large extent of country on both sides of the Tuman, and the walls of which even now are 12 feet wide at the top and twice that in height. This city — Aski Shahr (Old Town) as it is now called — was destroyed in 15 14 by Mirza Ababakar (Abubekr) on the approach of Sultan Said Khan's army. About two miles to the north beyond the river is the shrine of Hazrat Af ak, the saint king of the country, who died and was buried here in 1693. It is a handsome mausoleum faced with blue and white glazed tiles, standing under the shade of some magnificent silver poplars. About it Yakub Beg erected- a commodious college, mosque and monastery, the whole being surrounded by rich orchards, fruit gardens and vineyards. The Yangi Shahr of Kashgar is, as its name implies, modern, having been built in 1838. It is of oblong shape running north and south, and is entered by a single gateway. The walls are lofty and massive and topped by turrets, while on each side is a projecting bastion. The whole is surrounded by a deep and wide ditch, which can be filled from the river, at the risk, however, of bringing down the whole structure, for the walls are of mud, and stand upon a porous sandy soil. In the time of the Chinese, before Yakub Beg's sway, Yangi Shahr held a garrison of six thousand men, and was the residence of the amban or governor. Yakub erected his orda or palace on the site of the amban's residence, and two hundred

ladies of his harem occupied a commodious enclosure hard by. The population of Kashgar has been recently estimated at 60,000 in the Kuhna Shahr and only 2000 in the Yangi Shahr.

With the overthrow of the Chinese rule in 1865 the manu- facturing industries of Kashgar declined. Silk culture and carpet manufacture have flourished for ages at Khotan, and the products always find a ready sale at Kashgar. Other manu- factures consist of a strong coarse cotton cloth called kham (which forms the dress of the common people, and for winter wear is padded with cotton and quilted), boots and shoes, saddlery, felts, furs and sheepskins made up into cloaks, and various articles of domestic use. A curious street sight in Kashgar is presented by the hawkers of meat pies, pastry and sweetmeats, which they trundle about on hand-barrows just as their counterparts do in Europe; while the knife-grinder's cart, and the vegetable seller with his tray or basket on his head, recall exactly similar itinerant traders further west.

The earliest authentic mention of Kashgar is during the second period of ascendancy of the Han dynasty, when the Chinese con- quered the Hiungnu, Yutien (Khotan), Sulei (Kashgar), and a group of states in the Tarim basin almost up to the foot of the Tian Shan mountains. This happened in 76 B.C. Kashgar does not appear to have been known in the West at this time but Ptolemy speaks of Scythia beyond the Imaus, which is in a Kasia Regio, possibly ex- hibiting the name whence Kashgar and Kashgaria (often applied to the district) are formed. Next ensues a long epoch of obscurity. The country was converted to Buddhism and probably ruled by Indo-Scythian or Kushan kings. Hstian Tswang passed through Kashgar (which he calls Ka-sha) on his return journey from India to China. The Buddhist religion, then beginning to decay in India, was working its way to a new growth in China, and contemporane- ously the Nestorian Christians were establishing bishoprics at Herat, Merv and Samarkand, whence they subsequently proceeded to Kashgar, and finally to China itself. In the 8th century came the Arab invasion from the west, and we find Kashgar and Turkestan lending assistance to the reigning queen of Bokhara, to enable her to repel the enemy. But although the Mahommedan religion from the very commencement sustained checks, it nevertheless made its

weight felt upon the independent states of Turkestan to the north and east, and thus acquired a steadily growing influence. It was not, however, till the ioth century that Islam was established at Kashgar, under the Uighur

kingdom (see Turks). The Uighurs appear to have been the descendants of the people called Tolas and to have been one of the many Turkish tribes who migrated westwards from China. Boghra Khan, the most celebrated prince of this line, was converted to Mahommedanism late in the ioth century and the Uighur kingdom lasted until 1 120 but was distracted by complicated dynastic struggles. The Uighurs employed an alphabet based upon the Syriac and borrowed from the Nestorian missionaries. They spoke a dialect of Turkish preserved in the Kudatku Bilik, a moral treatise composed in 1065. Their kingdom was destroyed by an invasion of the Kara-Kitais, another Turkish tribe pressing west- wards from the Chinese frontier, who in their turn were swept away in 1 219 by Jenghiz Khan. His invasion gave a decided check to the progress of the Mahommedan creed, but on his death, and during the rule of the Jagatai Khans, who became converts to that faith, it began to reassert its ascendancy. Marco Polo visited the city, which he calls Cascar, about 1275 and left some notes on it.

In 1 389-1 390 Timur ravaged Kashgar, Andijan and the intervening country. Kashgar passed through a troublous time, and in 1514, on the invasion of the Khan Sultan Said, was destroyed by Mirza Aba- bakar, who with the aid of ten thousand men built the new fort with massive defences higher up on the banks of the Tuman. The dynasty of the Jagatai Khans collapsed in 1572 by the dismemberment of the country between rival representatives; and soon after two power- ful Khoja factions, the White and Black Mountaineers {Ak and Kara Taghluk), arose, whose dissensions and warfares, with the inter- vention of the Kalmucks of Dzungaria, fill up the history till 1759, when a Chinese army from Hi (Kufja) invaded the country, and, after perpetrating wholesale massacres, finally consolidated their authority by settling therein Chinese emigrants, together with a Manchu garrison. The Chinese had thoughts of pushing their con- quests towards western Turkestan and Samarkand, the chiefs of which sent to ask assistance of the Afghan king Ahmed Shah. This monarch despatched an embassy to Peking to demand the restitution of the Mahommedan states of Central Asia, but the embassy was not well received, and Ahmed Shah was too much engaged with the Sikhs to attempt to enforce his demands by arms. The Chinese continued to hold Kashgar, with sundry interruptions from Mahommedan revolts — one of the most serious occurring in 1827, when the territory was invaded and the city taken by Jahanghir Khoja; Chang-lung, however, the Chinese general of Hi, recovered possession of Kashgar and the other revolted cities in 1828. A revolt in 1829 under Mahommed Ali Khan and Yusuf, brother of Jahanghir, was more successful, and resulted in the concession of several important trade privileges to the Mahommedans of the district of Alty Shahr (the six cities "), as it was then named. Until 1846 the country

enjoyed peace under the just and liberal rule of Zahir-ud-din, the Chinese governor, but in that year a fresh Khoja revolt under Kath Tora led to his making himself master of the city, with circumstances of unbridled licence and oppression. His reign was, however, brief, for at the end of seventy-five days, on the approach of the Chinese, he fled back to Khokand amid the jeers of the inhabitants. The last of the Khoja revolts (1857) was of about equal duration with the previous one, and took place under Wali-Khan, a degraded debauchee, and the murderer of the lamented traveller Adolf Schlagintweit.

The great Tungani (Dungani) revolt, or insurrection of the Chinese Mahommedans, which broke out in 1862 in Kansuh, spread rapidly to Dzungaria and through the line of towns in the Tarim basin. The Tungani troops in Yarkand rose, and(loth of August l863)massacred some seven thousand Chinese, while the inhabitants of Kashgar, rising in their turn against their masters, invoked the aid of Sadik Beg, a Kirghiz chief, who was reinforced by Buzurg Khan, the heir of Jahanghir, and Yakub Beg, his general, these being despatched at Sadik's request by the ruler of Khokand to raise what troops they could to aid his Mahommedan friends in Kashgar. Sadik Beg soon repented of having asked for a Khoja, and eventually marched against Kashgar, which by this time had succumbed to Buzurg Khan and Yakub Beg, but was defeated and driven back to Khokand. Buzurg Khan delivered himself up to indolence and debauchery, but Yakub Beg, with singular energy and perseverance, made himself master of Yangi Shahr, Yangi-Hissar, Yarkand and other towns, and eventually became sole master of the country, Buzurg Khan proving himself totally unfitted for the post of ruler. Kashgar and the other cities of the Tarim basin remained under Yakub Beg's rule until 1 877, when the Chinese regained possession of their ancient dominion.

(C. E. D. B.;C. El.)

KASHI, or Kasi, formerly the Persian word for all glazed and enamelled pottery irrespectively; now the accepted term for certain kinds of enamelled tile- work, including brick-work and tile-mosaic work, manufactured in Persia and parts of Mahom- medan India, chiefly during the 16th and 17th centuries. 1

Undoubtedly originating in the Semitic word for glass, kas,

1 Kashi, the Hindu name for the sacred city of Benares, has no ceramic significance.

it is quite possible that the name kashi is immediately derived from Kashan, a town in Persia noted for its faience. This ancient pottery site, in turn,

probably receives its name from the old- time industry; as a " city of the plain " it would obviously have no claim to the farther-eastern suffix shan, meaning a mountain. Sir George Birdwood wisely considers that " the art of glazing eathenware has, in Persia, descended in an almost unbroken tradition from the period of the greatness of Chaldaea and Assyria . . . the name kas, by which it is known in Arabic and Hebrew, carries us back to the manufacture of glass and enamels for which great Sidon was already famous 1500 years before Christ . . . the designs used in the decoration of Sind and Punjab glazed pottery also go to prove how much these Indian wares have been influenced by Persian examples and the Persian tradition of the much earlier art of Nineveh and Baby- lon " {The Industrial Arts of India, 1880). The two native names for glass, kanch and shisha, common to Persia and India, are, seemingly, modifications of kashi. The Indian tradition of Chinese potters settling in bygone days at Lahore and Hala respectively, still lingers in the Punjab and Sihd provinces, and evidently travelled eastward from Persia with the Moguls. Howbeit in Lahore the name Chfni is sometimes wrongly applied to kashi work; and the so-called Chini-ka-Rauza mausoleum at Agra is an instance of this misuse. It now seems an established fact that a colony of Chinese ceramic experts migrated to Isfahan during the 16th century (probably in the reign, and at the invitation, of Shah Abbas I.), and there helped to revive the jaded pottery industry of that district. _ (

Kashi work consisted of two kinds: (a) Enamel-faced tiles and bricks of strongly fired red earthenware, or terra-cotta; (6) Enamel- faced tiles and tesserae of lightly fired " lime-mortar," or sandstone. Tile-mosaic work is described by some authorities as the true kashi. From examination of figured tile-mosaic patterns, it would appear that, in some instances, the shaped tesserae had been cut out of enamelled slabs or tiles after firing ; in other examples to have been cut into shape before receiving their facing of coloured enamel. Mosaic panels in the fort at Lahore are described by J. L. Kipling as " showing a gul dasta, or foliated pattern of a branching tree, each leaf of which is a separate piece of pottery." Conventional repre- sentations of foliage, flowers and fruit, intricate geometrical figures, interlacing arabesques, and decorative calligraphy — inscriptions in Arabic and Persian — constitute the ordinary kashi designs. The colours chiefly used were cobalt blue, copper blue (turquoise colour), lead-antimoniate yellow (mustard colour), manganese purple, iron brown and tin white. A colour-scheme, popular with Mogul and contemporary Persian kashigars, was the design, in cobalt blue and copper blue, reserved on a ground of deep mustard yellow. Before applying the enamel colours, the rough face of the tile, or the tesserae, received a thin coating of slip of variable composition. It is prob- ably owing to some defect in this part of the process, or to imperfect firing, that the enamelled tile surfaces on many old

buildings, particularly on the south side, have weathered and flaked away.

In India the finest examples of kashi work are in the Punjab and Sind provinces. At Lahore, amongst many beautiful structures, the most notable are the mosque of Wazir Khan (a.d. 1634) and the gateways of three famous pleasure gardens, the Shalamar Bagh (a.d. 1637), the Gulabi Bagh (a.d. 1640), and the Charburji (c. a.d. 1665). At Tatta the Jami Masjid, built by Shah Jahan (c. A.D. 1645), is a splendid illustration; whilst in that " vast cemetery of six square miles " on the adjacent Malki plateau, are numerous Mahommedan tombs (a.d. 1570-1640) with extraordinary kashi ornamentation. Delhi, Multan, Jullundur, Shahdara, Lahore cantonment, Agra and Hyderabad (Sind), all possess excellent monuments of the best period viz. those erected during the reigns of Akbar and Jahangir (a.d.

1556-1628).

In Persia, at Isfahan, Kashan, Meshed and Kerman are a few buildings and ruins showing the old kashi work ; the palace of Chehel Situn in Isfahan, built during the reign of Shah Abbas I. (c. a.d. 1600), is a magnificent specimen of this art.

Occasional revivals of the manufacture have taken place both in India and Persia. Mahommed Sharif, a potter of Jullundur in the Punjab, reproduced the Mogul enamelled tile-work in 1885, and there is a manuscript record of a certain Ustad Ali Mahommed, of Isfahan, who revived the Persian processes in 1887. (W. B.; C. S. C.)*

KASHMIR, or Cashmere, a native state of India, including much of the Himalayan mountain system to the north of the Punjab. It has been fabled in song for its beauty {e.g. in Moore's Lalla Rookh), and is the chief health resort for Europeans in India, while politically it is important as guarding one of the approaches to India on the north-west frontier. The proper

name of the state is Jammu and Kashmir, and it comprises in all an estimated area of 80,900 sq. m., with a population (1901) of 2,905,578, showing an increase of 14-21% in the decade. It is bounded on the north by some petty hills chiefships and by the Karakoram mountains; on the east by Tibet; and on the south and west by the Punjab and North-West Frontier provinces. The state is in direct political subordination to the Government of India, which is represented by a resident. Its territories comprise the provinces of Jammu (including the jagir of Punch), Kashmir, Ladakh,

Baltistan and Gilgit; the Shin states of Yaghistan, of which the most important are Chilas, Darel and Tangir, are nominally subordinate to it, and the two former pay a tribute of gold dust. The following are the statistics for the main divisions of the state: —

Area in sq. m. Pop. in 1901.

Jammu 5,223 1,521,307

Kashmir 7,922 1, 157,394

Frontier Districts 443 226,877

The remainder of the state consists of uninhabited mountains, and its only really important possessions are the districts of Jammu and Kashmir.

Physical Conformation. — The greater portion of the country is mountainous, and with the exception of a strip of plain on the south-west, which is continuous with the great level of the Punjab, may be conveniently divided into the following regions:

(1) The outer hills and the central mountains of Jammu district.

(2) The valley of Kashmir.

(3) The far side of the great central range, including Ladakh,

Baltistan and Gilgit. The hills in the outer region of Jammu, adjoining the Punjab plains, begin with a height of 100 to 200 ft., followed by a tract of rugged country, including various ridges running nearly parallel, with long narrow valleys between. The average height of these ridges is from 3000 to 4000 ft. The central mountains are commonly 8000 to 10,000 ft., covered with pasture or else with forest. Then follow the more lofty mountain ranges, including the region of perpetual snow. A great chain of snowy mountains branching off south-east and north-west divides the drainage of the Chenab and the Jhelum rivers from that of the higher branches of the Indus. It is within spurs from this chain that the valley of Kashmir is enclosed amid hills which rise from 14,000 to 15,000 ft., while the valley itself forms a cup-like basin at an elevation of 5000 to 6000 ft. All beyond that great range is a wide tract of mountainous country, bordering the north-western part of Tibet and embracing Ladakh, Baltistan and Gilgit.

The length of the Kashmir valley, including the inner slopes of its surrounding hills, is about 120 m. from north-west to south-east with a maximum width of about 75 m. The low and comparatively level floor of the basin is 84 m. long and 20 to 24 m. broad.

The hills forming the northern half-circuit of the Kashmir valley, and running beyond, include many lofty mountain masses and peaks, the most conspicuous of which, a little outside the confines of Kashmir, is Nanga Parbat, the fourth highest mountain in the world, 26,656 ft. above the sea, with an extensivearea of glacier on its eastern face. The great ridge which is thrown off to the south-west by Nanga Parbat rises, at a distance of 12 m., toanother summit 20,740 ft. in height, from which run south-west, and south-east the ridges which are the northern watershed boundary of Kashmir. The former range, after running 70 m. south-west, between the valleys of the Kishenganga and the Kunhar or Nain-sukh, turns southward, closely pressing the river Jhelum, after it has received the Kishen- ganga, with a break a few miles farther south which admits the Kunhar. This range presents several prominent summits, the highest two 16,487 and 15,544 ft- above the sea. The range which runs south-east from the junction peakabove mentioned divides the valley of the Kishenganga from that of the Astor and other tributaries of the Indus. The highest point on this range, where it skirts Kash- mir, is 17,202 ft. above the sea. For more than 50 m. from Nanga Parbat there are no glaciers on this range; thence eastward they increase; one, near the Zoji-la pass, is only 10,850 ft. above the sea. The mountains at the east end of the valley, running nearly north and south, drain inwards to the Jhelum, and on the other side to the Wardwan, a tributary of the Chenab. The highest part of this eastern boundary is 14,700 ft. There no are glaciers. The highest point on the Panjal range, which forms the south and south-west boundary, is 15,523 ft. above the sea.

The river Jhelum (g.i>.) or Behat (Sanskrit (Vitasta)— the Hydaspes

of Greek historians and geographers— flows north-westward through the middle of the valley. After a slow and winding course it expands about 25 m. below Srinagar,-over a slight depression in the plain, and forms the Wular lake and marsh, which is about I2| m. by 5 m. in extent, and surrounded by the lofty mountains which tower over the north and north-east of the valley. Leaving the lake on the south-west side, near the town of Sopur, the river pursues its sluggish course south-westward, about 18 m. to the gorge at Baramulla. From this point the stream is more rapid through the narrow valley which conducts it westward 75 m. to Muzaffarabad, where it turns sharply south, joined by the Kishenganga. At Islamabad, about 40 m. above Srinagar, the river is 5400 ft. above sea-level, and at Srinagar 5235 ft. It has thus a fall of about 4 ft. per mile in this part of its course. For the next 24 m. to the Wular lake, and thence to Baramulla, its fall is only about 2| ft. in the mile. On the 80 m. of the river in the flat valley between Islamabad and Baramulla, there is much boat traffic; but none below Baramulla, till the river comes out into the plains.

On the north-east side of this low narrow plain of the Jhelum is a broad hilly tract between which and the higher boundary range runs the Kishenganga River. Near the east end of this interior hilly tract, and connected with the higher range, is one summit 17,839 ft. Around this peak and between the ridges which run from it are many small glaciers. These heights look down on one side into the beauti- ful valley of the Sind River, and on another into the valley of the Lidar, which join the Jhelum. Among the hills north of Srinagar rises one conspicuous mountain mass, 16,903 ft. in height, from which on its north side descend tributaries of the Kishenganga, and on the south the Wangat River, which flows into the Sind. By these rivers and their numerous affluents the whole^valley of Kashmir is watered abundantly.

Around the foot of many spurs of the hills which run down on the Kashmir plain are pieces of low table-land, called karewa. These terraces vary in height at different parts of the valley from 100 to 300 ft. above the alluvial plain. Those which are near each other are mostly about the same level, and separated by deep ravines. The level plain in the middle of the Kashmir valley consists of fine clay and sand, with water-worn pebbles. The karewas consist of horizontal beds of clay and sand, the lacustrine nature of which is shown by the shells which they contain.

Two passes lead northward from the Kashmir valley, the Burzil (13,500 ft.) and the Kamri (14,050). The Burzil is the main pass between Srinagar and Gilgit via Astor. It is usually practicable only between the middle of July and the middle of September. The road from Srinagar to Lehin Ladakh follows the Sind valley to the Zoji-la-pass (11,300 ft.) Only a short piece of the road, where snow accumulates, prevents this pass being used all the year. At the south-east end of the valley are three passes, the Margan (11,500 ft.), the Hoksar (13,315) and the Marbal (11,500), leading to the valleys of the Chenab and the Ravi. South of Islamabad, on the direct route to Jammu and Sialkot, is the Banihal pass (9236 ft.). Further west on the Panjal range is the Pir Panjal or Panchal pass (1 1 ,400 ft.), with a second pass, the Rattan Pir (8200 ft.), across a second ridge about 15 m. south-west of it. Between the two passes is the beauti : fully situated fort of Baramgali. This place is in the domain of the raja of Punch, cousin and tributary of the maharaja of Kashmir. At Rajaori, south of these passes, the road divides: one line leads to Bhimber and Gujrat, the other to Jammu and Sialkot by Aknur. South-west of Baramulla is the Haji Pir pass (8500 ft.), which indicates the road to Punch. From Punch one road leads down to the plains at the town of Jhelum, another eastward through the hills to the Rattan Pir pass and Rajaori. Lastly, there is the river pass of the Jhelum, which is the easy route from the valley west- ward, having two ways down to the plains, one by Muzaffarabad and the Hazara valley to Hasan Abdal, the other by the British hill station of

Murree to Rawalpindi.

Geology. — The general strike of the beds, and of the folds which have affected them, is from N.W. to S.E., parallel to the mountain ranges. Along the south-western border lies the zone of Tertiary beds which forms the Sub-Himalayas. Next to this is a great belt of Palaeozoic rocks, through which rise the granite, gneiss and schist of the Zanskar and Dhauladhar ranges and of the Pir Panjal. In the midst of the Palaeozoic area lie the alluvium and Pleistocene deposits of the Srinagar valley, and the Mesozoic and Carboniferous basin of the upper part of the Sind valley. Beyond the great Palaeozoic belt is a zone of Mesozoic and Tertiary beds which commences at Kargil and extends south-eastward past the Kashmir boundary to Spiti and beyond. Finally, in Baltistan and the Ladakh range there is a broad zone composed chiefly of gneiss and schist of ancient date.

The oldest fossils found belong either to the Ordovician or Silurian systems. But it is not until the Carboniferous is reached that fossils become at all abundant (so far as is yet known). The Mesozoic deposits belong chiefly to the Trias and Jura, but Cretaceous beds have been found near the head of the Tsarap valley. _ The Tertiary system includes representatives of all the principal divisions recog- nized in other parts of the Himalayas.

Climate. — The valley of Kashmir, sheltered from the south-west monsoon by the Panjal range, has not the periodical rains of India. Its rainfall is irregular, greatest in the spring months. Occasional

storms in the monsoon pass over the crests of the Panjal and give heavy rain on the elevated plateaus on the Kashmir side. And again clouds pass over the valley and ace arrested by the higher hills on the north-east side. Snow falls on the surrounding hills at inter- vals from October to March. In the valley the first snow generally falls about the end of December, but never to any great amount. The hottest months are July, August and the greater part of Septem- ber, during which the noon shade temperature varies from 85 to 90° and occasionally 95 at Srinagar, probably the hottest place in the valley. The coldest months are January and February, when for several weeks the average minimum temperature is about 15 below freezing. As a health resort the province, excluding Srinagar, which is insanitary and relaxing, has no rival anywhere in the neighbour- hood of India. Its climate is admirably adapted to the European constitution, and in consequence of the varied range of temperature and the facility of moving about the visitor is enabled with ease to select places at elevations most

congenial to him. Formerly only 200 passes a year were issued by the government, but now no restric- tion is placed on visitors, and their number increases annually. European sportsmen and travellers, in addition to residents of India, resort there freely. The railway to Rawalpindi, and a driving road thence to Srinagar make the valley easy of access. When the temperature in Srinagar rises at the beginning of June, there is a general exodus to Gulmarg, which has become a fashionable hill- station. This great influx of visitors has resulted in a corresponding diminution of game. Special game preservation rules have been intro- duced, and nullahs are let out for stated periods with a restriction on the number of head to be shot. The wild animals of the country include ibex, markhor, oorial, the Kashmir stag, and black and brown bears. Many sportsmen now cross into Ladakh and the Pamirs.

People. — The great majority of the inhabitants of Kashmir are professedly Mabommedans, but their conversion to the faith of Islam is comparatively recent and they are still strongly in- fluenced by their ancient superstitions. At the census of 1901 out of a total population in the whole state of 2,905,578, there were 2,154,695 Mahommedans, 689,073 Hindus, 35,047 Buddhists and 25,828 Sikhs. The Hindus are mostly found in Jammu, and the Buddhists are confined to Ladakh. In Kashmir proper the few Hindus (60,682) are almost all Brahmans, known as Pundits. Superstition has made the Kashmiri timid; tyranny has made him a liar; while physical disasters have made him selfish and pessimistic. Up to recent times the cultivator lived under a system of begar, which entitled an official to take either labour or commodities free of payment from the villages. Having no security of property, the people had no incentive to effort, and with no security for life they lost the independence of free men. But the land settlement of 1889 swept all these abuses away. Restrictive monopolies, under which bricks, lime, paper and certain other manufactures were closed to private enterprise, were abolished. The results of the settle- ment are thus enumerated by Sir Walter Lawrence: " Little by little, confidence has sprung up. Land which had no value in 1889 is now eagerly sought after by all classes. Cultivation has extended and improved. Houses have been rebuilt and repaired, fields fenced in, orchards planted, vegetable gardens well stocked and new mills constructed. Women no longer are seen toiling in the fields, for their husbands are now at home to do the work, and the long journeys to Gilgit are a thing of the past. When the harvest is ripe the peasant reaps it at his own good time, and not a soldier ever enters the villages. " In consequence of this improvement in their conditions of life and of the influx of wealth into the country brought by visitors, the Kashmiri grows every year in material prosperity and independence of character. The Kashmir women have a reputation for beauty which is not altogether deserved, but the children are always pretty.

The language spoken in Kashmir is akin to that of the Punjab, though marked by many peculiarities. It possesses an ancient literature, which is written in a special character (see Kashmiri).

Natural Calamities. — The effect of physical calamities partly inci- dental to the climate of Kashmir, upon the character of its in- habitants has been referred to. The list includes fires, floods, earth- quakes, famines and cholera. The ravages of fire are chiefly felt in Srinagar, where the wood houses and their thatched roofs fall an easy prey to the flames. The national habit of carrying a kangar, or small brazier, underneath the clothes for the purpose of warming the body, is a fruitful cause of fires. Srinagar is said to have been burnt down eighteen times. Many disastrous floods are recorded, the greatest being the terrible inundation which followed the slipping of the Khadanyar mountain below Baramula in A.D. 879. The channel of the Jhelum river was blocked and a large part of the

valley submerged. In 1841 a serious flood caused great damage to life and property; there was another in 1893, when six out of the seven bridges in Srinagar were washed away, 25,426 acres under crops were submerged and 2225 houses were wrecked ; another flood occurred in July 1903, when the bund between the Dal Lake and the canal gave way, and the lake rose 10 ft. in half an hour. Between two and three thousand houses in and around Srinagar collapsed, while over 40 miles of the tonga road were submerged. Since the 15th century eleven great earthquakes have occurred, all of long duration and accompanied by great loss of life. During the 19th century there were four severe earthquakes, the last two occurring in 1864 and 1885, when some 3500 people were killed. Native historians record nineteen great famines, the last two occurring in 1 831 and 1877. In 1878 it was reported that only two-fifths of the total population of the valley survived. During the 19th century also there were ten epidemics of cholera, all more or less disastrous, while the worst (in 1892) was probably the last. During that year 5781 persons died in Srinagar and 5931 in the villages. The centre of infection is generally supposed to be the squalid capital of Srinagar, and some efforts to improve its sanitation have been made of recent years.

Crops. — The staple crop of the valley is rice, which forms the chief food of the people. Indian corn comes next; wheat, barley and oats are also grown. Every kind of English vegetable thrives well, especially asparagus, artichoke, seakale, broad beans, scarlet- runners, beetroot, cauliflower and cabbage. Fruit trees are met with all over the valley, wild but bearing fruit, and the cultivated orchards yield pears, apples, peaches, cherries, &c, equal to the best European produce. The chief trees are deodar, firs and pines, chenar or plane, maple, birch and walnut. There are state departments of viticulture, hops, horticulture and sericulture. A complete list of the flora

and fauna of the valley will be found in Sir Walter Lawrence's book on Kashmir.

Industries. — The chief industry of Srinagar was formerly the weaving of the celebrated Kashmir shawl, which dates back to the days of the emperor Baber. These shawls first became fashionable in Europe in the reign of Napoleon, when they fetched from £10 to £100; but the industry received a blow at the time of the Franco- German War, and the famine of 1877 scattered the weavers. The place of the Kashmir shawl has to some extent been taken by the Kashmir carpet, but the most thriving industry now is that of silk- weaving. Srinagar is also celebrated for its silver-work, papier mach6 and wood-carving. The minerals and metals of the Jammu district are promising, and a company has been formed to work them. Coal of fair quality has been found, but the difficulties of transport interfere with its working.

History. — The metrical chronicle of the kings of Kashmir, called Rajatarangint, was pronounced by Professor H. H. Wilson to be the only Sanskrit composition yet discovered to which the title of history can with any propriety be applied. It first became known to the Mahommedans when, on Akbar's invasion of Kashmir in 1588, a copy was presented to the emperor. A translation into Persian was made by his order, and a summary of its contents, from this Persian translation, is given by Abu'l Fazl in the A'ln-i-Akbarl. The Rajataran- gint, the first of a series of four Sanskrit histories, was written about the middle of the 12th century by P. Kalhana. His work, in six books, makes use of earlier writings now lost. Commencing with traditional history of very early times, it comes down to the reign of Sangrama Deva, 1006; the second work, by Jonaraja, takes up the history in continuation of Kalhana's, and, entering the Mahommedan period, gives an account of the reigns down to that of Zain-ul-ab-ad-din, 141 2. P. Srivara carried on the record to the accession of Fah Shah, i486. And the fourth work, called Rdjavalipataka, by Prajnia Bhatta, completes the history to the time of the incorporation of Kashmir in the dominions of the Mogul emperor Akbar, 1 588.

In the Rajdtarangini it is stated that the valley of Kashmir was formerly a lake, and that it was drained by the great rishi or sage, Kasyapa, son of Marichi, son of Brahma, by cutting the gap in the hills at Baramulla (Varaha-mula). When Kashmir had been drained, he brought in the Brahmans to occupy it. This is still the local tradition, and in the existing physical condition of the country we may see some ground for the story which has taken this form. The name of Kasyapa is by history and tradition connected with the draining of the lake, and the chief town or collection of dwellings in the valley was called Kasyapa-pur — a name which has been plausibly identified with the KaoTrcbrupos of Hecataeus

(Steph. Byz., s.v.) and KaoTra-rvpos of Herodotus (iii. 102, iv. 44). Kashmir is the country meant also by Ptolemy's Kounnjpia. The ancient

name Kasyapa-pur was applied to the kingdom of Kashmir when it comprehended great part of the Punjab and extended beyond the Indus. In the 7th century Kashmir is said by the Chinese traveller Hsuan Tsang to have included Kabul and the Punjab, and the hill region of Gandhara, the country of the Gandarae of classical geography.

At an early date the Sanskrit name of the country became Kasmir. The earliest inhabitants, according to the Rajataran- gini, were the people called Naga, a word which signifies " snake." The history shows the prevalence in early times of tree and serpent worship, of which some sculptured stones found in Kashmir still retain the memorials. The town of Islamabad is called also by its ancient name Anant-nag (" eternal snake"). The source of the Jhelum is at Vir-nag (the powerful snake), &c. The other races mentioned as inhabiting this country and the neighbouring hills are Gandhari, Khasa and Daradae. The Khasa people are supposed to have given the name Kasmir. In the Mahabharata the Kasmira and Daradae are named together among the Kshattriya races of northern India. The question whether, in the immigration of the Aryans into India, Kashmir was taken on the way, or entered afterwards by that people after they had reached the Punjab from the north-west, appears to require an answer in favour of the latter view (see vol. ii. of Dr J. Muir's Sanskrit Texts). The Aryan races of Kashmir and surrounding hi'lls, which have at the present time separate geographical distribution, are given by Mr Drew as Kashmiri (mostly Mahommedan), in the Kashmir basin and a few scattered places outside; Dard (mostly Mahommedan) in Gilgit and hills north of Kashmir; Dogra (Hindu) in Jamma; Dogra (Mahom- medan, called Chibiili) in Punch and hill country west of Kash- mir; Pahdri or mountaineers (Hindu) in Kishtwar, east of Kashmir, and hills about the valley of the Chenab.

In the time of Asoka, about 245 B.C., one of the Indian Buddhist missions was sent to Kashmir and Gandhara. After his death Brahmanism revived. Then in the time of the three Kushan princes, Huvishka, Jushka and Kanishka, who ruled over Kashmir about the beginning of the Christian era, Buddhism was to a great extent restored, though for several centuries the two religions existed together in Kashmir, Hinduism pre- dominating. Yet Kashmir, when Buddhism was gradually losing its hold, continued to send Buddhist teachers to other lands. In this Hindu-Buddhist period, and chiefly between the 5th and 10th centuries of the Christian era, were

erected the Hindu temples in Kashmir. In the 6th and 7th centuries Kashmir was visited by some of the Chinese Buddhist pilgrims to India. The country is called Shie-mi in the narrative of To Yeng and Sung Yun (578). One of the Chinese travellers of the next century was for a time an elephant-tamer to the king of Kashmir. Hsuan Tsang spent two years (631-633) in Kash- mir (Kia-chi-mi-lo). He entered by Baramula and left by the Pir Panjal pass. He describes the hill-girt valley, and the abundance of flowers and fruits, and he mentions the tradition about the lake. He found in Kashmir many Buddhists as well as Hindus. In the following century the kings of Kashmir appear to have paid homage and tribute to China, though this is not alluded to in the Kashmir chronicle. Hindu kings continued to reign till about 1294, when Udiana Deva was put to death by his Mahommedan vizier, Amir Shah, who ascended the throne under the name of Shams-ud-din.

Of the Mahommedan rulers mentioned in the Sanskrit chroni- cles, one, who reigned about the close of the 14th century, has made his name prominent by his active opposition to the Hindu religion, and his destruction of temples. This was Sikandar, known as But-shikan, or the " idol-breaker." It was in his time that India was invaded by Timur, to whom Sikandar made sub- mission and paid tribute. The country fell into the hands of the Moguls in 1588. In the time of Alamgir it passed to Ahmad Shah Durani. on his third invasion of India (1756); and from that time it remained in the hands of Afghans till it was wrested from them by Ranjit Singh, the Sikh monarch of the Punjab, in 1810. Eight Hindu and Sikh governors under Ranjit Singh and his successors were followed by two Mahommedans similarly

appointed, the second of whom, Shekh Imam-ud-din, was in charge when the battles of the first Sikh war 1846 brought about new relations between the British Government and the Sikhs.

Gulab Singh, a Dogra Rajput, had from a humble position been raised to high office by Ranjit Singh, who conferred on him the small principality of Jammu. On the final defeat of the Sikhs at Sobraon (February 1846), Gulab Singh was called to take a leading part in arranging conditions of peace. The treaty of Lahore (March 9, 1846) sets forth that, the British Govern- ment having demanded, in addition to a certain assignment of territory, a payment of a crore and a half of rupees (15 millions sterling), and the Sikh government being unable to pay the whole, the maharaja (Driulip Singh) cedes, as equivalent for one crore, the hill country belonging to the Punjab between the Beas and the Indus, including Kashmir and Hazara. The governor- general, Sir Henry Hardinge, considered it expedient to make over Kashmir to the Jammu chief, securing his friendship while the British government was administering the Punjab on

behalf of the young maharaja. Gulab Singh was well prepared to make up the payment in default of which Kashmir was ceded to the British; and so, in consideration of his services in restoring peace, his independent sovereignty of the country made over to him was recognized, and he was admitted to a separate treaty. Gulab Singh had already, after several extensions of territory east and west of Jammu, conquered Ladakh (a Buddhist country, and till then subject to Lhasa), and had then annexed Skardo, which was under independent Mahommedan rulers. He had thus by degrees half encircled Kashmir, and by this last addition bis possessions attained nearly their present form and extent. Gulab Singh died in 1857, and was succeeded by his son, Ranbir Singh, who died in 1885. The next ruler, Maharaja Partab Singh, G. C.S.I, (b. 1850), immediately on his accession inaugurated the settlement reforms already described. His rule was re- markable for the reassertion of the Kashmir sovereignty over Gilgit (q.v.). Kashmir imperial service troops participated in the Black Mountain expedition of 1891, the Hunza Nagar operations of 1891, and the Tirah campaign of 1897-1898. The total revenue of the state is about £666,000.

See Drew, Jammu and Kashmir (1875); M. A. Stein, Kalhana's Rajatarangini (1900) ; W.R. Lawrence, The Valley of Kashmir (1895) ; Colonel A. Durand, The Making of a Frontier (1899) ; R. Lydekker, " The Geology of the Kashmir ana Chamba Territories," Records of the Geological Survey of India, vol. xxii. (1883); J. Duke, Kashmir Handbook (1903). (T.H. H.)*

KASHMIRI (properly Kdsmiri), the name of the vernacular language spoken in the valley of Kashmir (properly Kasmir) and in the hills adjoining. In the Indian census of 1901 the number of speakers was returned at 1,007,957. By origin it is the most southern member of the Dard group of the Pisaca languages (see Indo- Aryan Languages). The other members of the group are Shlna, spoken to its north in the country round Gilgit, and KohistanT, spoken in the hill country on both sides of the river Indus before it debouches on to the plains of India. The Pisaca languages also include Khowar, the vernacular of Chitral, and the Kafir group of speeches, of which the most important is the Bashgali of Kafiristan. Of all these forms of speech Kashmiri is the only one which possesses a literature, or indeed an alphabet. It is also the only one which has been dealt with in the census of India, and it is therefore impossible to give even approximate figures for the numbers of speakers of the others. The whole family occupies the three-sided tract of country between the Hindu-Kush and the north-western frontier of British India.

As explained in Indo-Aryan Languages, the Pisaca lan- guages are Aryan, but are neither Iranian nor Indo-Aryan. They represent the speech of an independent Aryan migration over the Hindu-Kush directly into their

present inhospitable seats, where they have developed a phonetic system of their own, while they have retained unchanged forms of extreme antiquity which have long passed out of current use both in Persia and in India. Their speakers appear to have left the main Aryan body after the great fission which resulted in the Indo-Aryan migration, but before all the typical peculiarities of Iranian speech had fully developed. They are thus representatives of . a stage of

linguistic progress later than that of Sanskrit, and earlier than that which we find recorded in the Iranian Avesta.

The immigrants into Kashmir must have been Shins, speaking a language closely allied to the ancestor of the modern Shlna. They appear to have dispossessed and absorbed an older non- Aryan people, whom local tradition now classes as Nagas, or Snake-gods, and, at an early period, to have come themselves under the influence of Indo-Aryan immigrants from the south, who entered the valley along the course of the river Jhelam. The language has therefore lost most of its original Pisaca character, and is now a mixed one. Sanskrit has been actively studied for many centuries, and the Kashmiri vocabulary, and even its grammar, are now largely Indian. So much is this the case that, for convenience' sake, it is now frequently classed (see Indo- Aryan Languages) as belonging to the north-western group of Indo-Aryan languages, instead of as belonging to the Pisaca family as its origin demands. It cannot be said that either classification is wrong.

Kashmiri has few dialects. In the valley there are slight changes of idiom from place to place, but the only important variety is Kishtwari, spoken in the hills south-west of Kashmir. Smaller dialects, such as Pogul and Rambani of the hills south of the Banihal pass, may also be mentioned. The language itself is an old one. Pure Kashmiri words are preserved in the Sanskrit Rdjatarangini written by Kalhana in the 12th century a. d., and, judging from these specimens, the language does not appear to have changed materially since his time.

General Character of the Language. — Kashmiri is a language of great philological interest. The two principal features which at once strike the student are the numerous epenthetic changes of vowels and consonants and the employment of pronominal suffixes. In both cases the phenomena are perfectly plain, cause and effect being alike presented to the eye in the somewhat com- plicated systems of declension and conjugation. The Indo-

Aryan languages proper have long ago passed through this stage, and many of the phenomena now presented by them are due to its influence, although all record of it has disappeared. In this way a study of Kashmiri explains a number of difficulties found by the student of Indo-Aryan vernaculars. 1

In the following account the reader is presumed to be in possession of the facts recorded in the articles Indo-Aryan Languages and Prakrit, and the following contractions will be employed: Ksh. = Kashmiri ; Skr. = Sanskrit ; P. = Pisaca ; Sh. = Shlna.

A. Vocabulary. The vocabulary of Kashmiri is, as has been explained, mixed. At its basis it has a large number of words which are also found in the neighbouring Shlna, and these are such as con- note the most familiar ideas and such as are in most frequent use. Thus, the personal pronouns, the earlier numerals, the words for " father," " mother," " fire," "the sun," are all closely connected with corresponding Shlna words. There is also a large Indian element, consisting partly of words derived from Sanskrit vocables introduced in ancient times, and partly of words borrowed in later days from the vernaculars of the Punjab. Finally, there is a con- siderable Persian (including Arabic) element due to the long Mus- sulman domination of the Happy Valley. Many of these have been considerably altered in accordance with Kashmiri phonetic rules, so that they sometimes appear in strange forms. Thus the Persian lagam, a bridle, has become lakam, and the Arabic babat, concerning, appears as bapat. The population speaking Kashmiri is mainly Mussulman, there being, roughly speaking, nine Mahommedan Kashmiris to less than one Hindu. This difference of religion has strongly influenced the vocabulary. The Mussulmans use Persian and Arabic words with great freedom, while the Hindus, or " Pandits" as they are called, confine their borrowings almost entirely to words derived from Sanskrit. As the literary class is mostly Hindu, it follows that Kashmiri literature, taken as a whole, while affording most interesting and profitable study, hardly represents the actual language spoken by the mass of the people. There are, however, a few good Kashmiri works written by Mussulmans in their own dialect.

B. Written Characters. Mussulmans and Christian missionaries em- ploy an adaptation of the Persian character for their writings. This alohabet is quite unsuited for representing the very complex Kash- miri vowel system. Hindus employ the Sarada alphabet, of Indian origin and akin to the well-known Nagari. Kashmiri vowel sounds can be recorded very successfully in this character, but there is, unf or-

1 See G. A. Grierson, " On Pronominal Suffixes in the Kacmiri Languages," and " On the Radical and Participial Tenses of the Modern Indo-Aryan Languages," in Journal of the Asiatic Society of Bengal, vol. lxiv. (1895),

pt. 1. pp. 336 and 352.

*tunately, nofixed system of spelling. The Nagari alphabet isalso com- ing into use in printed books, no Sarada types being yet in existence. C. Phonetics. Comparing the Kashmiri with the Sanskrit alpha- bet (see Sanskrit), we must first note a considerable extension of the vowel system. Not only does Ksh. possess the vowels a, a, 1, i, u, u, r, e, ai, 0, au, and the anunasika or nasal symbol ~, but it has also a flat a (like the a in " hat ") a flat e (like the e in " met "), a short b (like the in " hot ") and a broad a (like the a in " all "). It also has a series of what natives call " matra- vowels," which are represented in the Roman character by small letters above the line, viz. ", *, ", ". Of these, ° is simply a very short indeterminate sound something like that of the Hebrew sh a wa mobile, except that it may sometimes be the only vowel in a word, as in ts a h, thou. The ' is a hardly audible i, while " and " are quite inaudible at the end of a syllable. When ' or " is followed by a consonant in the same syllable » generally and " always becomes a full 2 or u respectively and is so pronounced. On the other hand, in similar circumstances, " remains unchanged in writing, but is pronounced like a short German ii. It should be observed that this " always represents an older ?, and is still considered to be a palatal, not, like ", a labial vowel. Although these matra- vowels are so slightly heard, they exercise a great influence on the sound of a preceding syllable. We may compare the sound of a in the English word " mar." If we add e to the end of this word we get " mare," in which the sound of the a is altogether changed, although the e is not itself pronounced in its proper place. The back-action of these matra-vowels is technically known as umlaut or " epenthesis," and is the most striking feature of the Kashmiri language, the structure of which is unintelligible without a thorough knowledge of the system. In the following pages when a vowel is epenthetically affected by a matra- vowel the fact will be denoted by a dot placed under it, thus kg,r". This is not the native system, according to which the change is indicated sometimes by a diacritical mark and sometimes by writing a different letter. The changes of pronunciation effected by each matra-vowel are shown in the following table. If natives employ a different letter to indicate the change the fact is mentioned. In other cases they content themselves with diacritical marks. When no entry is made, it should be understood that the sound of the vowel remains unaltered: — ,*

a.

Pronunciation when followed by

a-matra

a (ad a r, be moist) (some thing like a short Ger- man 6) 6 (kqn a r, pr. kon”r, make one-eyed) (like a long German 6)

i-mdtra

pr.

i (led”r lid”r, be yel- low)

a (kar’, pr. ka’r’, made, plural masc.)*

6′ (German 6 ; mqr’, pr.

mo’r’, killed, masc. plur.)

pr.

u-matra

% (as in Ger- man : kar”, pr. &t£r,made, fern, sing.)

(.mar”, pr. mbr, killed, fem. sing.)

yii (/}’»”, pr.

lyuv,

tered,

sing.

plas- fem.

u (h4kh”r, pr. hukh”r, make

dr vL

gu’r’, horses) (gur’, pr. gu’r’, cow- herds)

1 (pher’, pr and written phir’, turned, masc. plur.)

6′ iwgth’, pr. wo’th’, arisen, masc. plur.) u’ (bu’z’, pr. bu’z’, written buz’, heard. masc. plur.)

u-matrS.

yii (tsel”, pr. tsyul, squeezed, fem. sing.)

i (pher*, pr. phir, written, phir", turned, fem. sing.)

u (woth", pr. wiith, arisen, fem. sing.) u (boz", pr. biiz, written, buz", heard, fem. sing.)

(like first o in " promote "; kar", pr. kor, made, masc. sing.)

& (mar", pr. mar, written, mor", killed, masc. sing.)

yu (liv", pr. lyuv, written lyuv", plas- tered, masc. sing.)

yii (nil", pr. nyul, written nyiil", blue, masc. sing.)

yu (tsel", pr. tsyul, writ- ten tsyul", squeezed, masc. sing.) yu (pher", pr. phyiir, writ- ten phyur", turned, masc. sing.)

(woth", pr. woth, arisen, masc. sing.) u (boz", pr. buz, written buz", heard, masc. sine.)

The letters « and i, even when not M-matra or i-matra, often change a preceding long & to a, which is usually written 6, and a respectively. Thus rawukh, they have lost, is pronounced riwukh, and, in the

native character, is written rowukh. Similarly malis becomes mqlis (molts). The diphthong ai is pronounced when it commences a word ; thus, ai(h, eight, is pronounced b(h. When i and u commence a won! they are pronounced yi and wu respectively. With one important exception, common to all Pisaca languages, Kashmiri employs every consonant found in the Sanskrit alphabet. The exception is the series of aspirated consonants, gh, jh, dh, dh and bh, which are wanting in Ksh., the corresponding unaspirated consonants being substituted for them. Thus, Skr. ghofakas, but Ksh. gur", a horse; Skr. bhavati, Ksh. bow, he will be. There is a tendency to use dental letters where Hindi employs cerebrals, as in Hindi u(h, Ksh. woth, arise. Cerebral letters are, however, owing to Sanskrit influence, on the whole better preserved in Ksh. than in the other Pisaca languages. The cerebral $ has almost disappeared, s being employed instead. The only common word in which it is found is the numeral sah, six, which is merely a learned spelling for sah, due to the influence of the Skr. sat. From the palatals c, ch, j, a new series of consonants has been formed, viz. ts, tsh (aspirate of ts — i.e. ts+h, not t+sh), and 2 (as in English, not dz). Thus, Skr. coras, Ksh. tsur, a thief; Skr. chalayati, Ksh. tshali, he will deceive; Skr. jalam, Ksh. zal, water. The sibilant i, and

*occasionally s, are frequently represented by h. Thus, Skr. dasa, Ksh. dah, ten; Skr. Hras, Ksh. hir, a head. We may compare with this the Persian word Hind, India (compare the Greek 'IvSIk, an Indian), derived from the Skr. Sindhus, the river Indus. When such an h is.followed by a palatal letter the s returns; thus, from the base his-, like this, we have the nominative masculine hjh", but the feminine his", and the abstract noun hisyar, because * and y are palatal letters.*

The palatal letters i, e, u-mdtrd and y often change a preceding consonant. The modifications will be seen from the following examples: rat-, night; nom. plur. rqts"; woth, arise; wotsh", she arose : lad, build ; Iqz", she was built : ran, cook ; ran, she was cooked ; pat*, a tablet; Ag. sing, pad: kath-, a stalk; nom. plur. kdche: bad-, great; nom. plur. fern, baje: batuk", a duck; fem. bal*C": hgkh", dry; fern, hock"; srog", cheap; srojyar, cheapness: wql", a ring; fem. wqj", a small ring ; Ids, be weary ; Iqs" or lots*, she was weary. These changes are each subject to certain rules. Cerebral letters (/, (h, d) change only before i, e or y, and not before u-mdtrd. The others, on the contrary, do not change i, but do change before e, y or u-mdtrd.*

No word can end in an unaspirated surd consonant. If such a conso- nant falls at the end of a word it is aspirated. Thus, ak, one, becomes akh (but ace. akis);ka{, a ram, becomes ia^A ; and hat, a hundred, hath. D. Declension. If the above phonetic rules are borne in mind, declension in Kashmiri is a fairly simple process. If attention is not paid to them, the whole system at once becomes a field of in- extricable confusion. In the following pages it will be assumed that the reader is familiar with them.

*Nouns substantive and adjective have two genders, a masculine and a feminine. Words referring to males are masculine, and to females are feminine. Inanimate things are sometimes masculine and sometimes feminine. Pronouns have three genders, arranged on a different principle. One gender refers to male living beings, another to female living beings, and a third (or neuter) to all inani- mate things whether they are grammatically masculine or feminine. Nouns ending in u are masculine, and most, but not all, of those ending in *, ", e or n are feminine. Of nouns ending in consonants, some are masculine, and some are feminine. No rule can be formu- lated regarding these, except that all abstract nouns ending in ar (a very numerous class) are masculine. There are four declensions. The first consists of masculine nouns ending in a consonant, in a, e or " (very few of these last two). The second consists of the impor- tant class of masculine nouns in "; the third of feminine nouns in ', *, or n (being the feminines corresponding to the masculine nouns of the second declension) ; and the fourth of feminine nouns ending in ', (or a consonant.*

The noun possesses two numbers, a singular and a plural, and in each number there are, besides the nominative, three organic cases, the accusative, the case of the agent (see below, under " verbs "), and the ablative. The accusative, when not definite, may also be the same in form as the nominative. The following are the forms which a noun takes in each declension, the words chosen as examples being : First declension, tsur, a thief; second declension, mql", a father; third declension, maj, a mother; fourth declension, (a) mal, a garland, (b) rat-, night.*

First

Second

Third

Fourth Declension

Declension.

Declension.

Declension.

a. b.

Sing. : Nom.

tsur

maP- (pr.flid/)

mqj"(mbj)

mdl

rath

Ace.

tsuras

malis (molis)

mdje

mdli

rats' 1 (rots)

Ag.

tsuran

mql' (mb'l 1)

maji

mdli

rats' 1 (rots)

Abl.

tsilra

malt

map

mdli

rats' 1 (rots)

Plur. :

Nom

tsur

mal 1 (mb'l)*

mdje

mala

rats" (rots)

Ace.

tsuran

mdlen

majen

mdlan

rqts & n (rotsun)

Ag.

and

Abl.

\ tsurau

mdlyau

majyau

mdlau

rqts”v (rbtsiiv)

The declension 46 is confined to certain nouns in t, th, d, n, h and I, in which the final consonant is liable to change owing to a following u-mdtrd.

Other cases are formed (as in true I ndo- Aryan languages) by the addition of postpositions, some of which are added to the accusative, while others are added to the ablative case. To the former are added manz, in; kjt”, to or for; sytin, with, and others. To the ablative are added s#tin, when it signifies ” by means of “; putshy, for; pefh”, from, and others. For the genitive, masculine nouns in the singular, signifying animate beings, take sand”, and if they signify things without life, take k”. All masculine plural nouns and all feminine nouns whether singular or plural take hand”. Sand” and hand” are added to the accusative, which drops a final s, while k” is added to the ablative. Thus, tsilra sand”, of the thief ; mdl sand”, of the father; sonqk” (usually written sonuk”), of gold (son, abl. sing, sona) ; tsuran nqnd”, of thieves; karen hand”, of bracelets (second declension); mdje hand”, of the mother; majen hand”, of the mothers. Masculine proper names, however, take n” in the singular, as in Rddhdkrsnqn* of Radhakrishna. These genitive terminations, and also the dative termination kit”, are adjectives, and agree with the governing noun in gender, number and case. Thus, tsura sand” neciv”, the son of the thief; tsura sand’ neciv*, by the son of the thief; tsura sang* kdr”, the daughter of the thief; kuljk” lang, a bough of the tree; .kulic” land”, a twig of the tree. Sand” has fem. sing, sqnz”, masc. plur. sand’, fem. plur. sanza. Similarly hand”. K” has fem. sing, c”, masc. plur. k*, fem. plur. ch; n”, fem. sing, n, masc. plur. n*, fem. plur. ne. Similarly for the dative we have the following forms: malis kit” pan”, water (masc.) for the father; malis kits” gdv, a cow for the father; malis kit’ rav, blankets (masc. plur.) for the father; mqlis kitsa pothe, books (fem. plur.) for the father. All these postpositions of the*

genitive and kit" of the dative are declined regularly as substantives, the masculine ones belonging to the second declension and the feminine ones to the third. Note that the feminine plural of sand" is sanza, not sanze, as we might expect ; so also feminine nouns in ts", tsh", z" and s a .

Adjectives ending in » (second declension) form the feminine in d , with the usual changes of the preceding consonant. Thus tat", hot, fem. touts' 2 (pronounced tuts). Other adjectives do not change for gender. All adjectives agree with the qualified noun in gender, number and case, the postposition, if any, being added to the latter word of the two. Take, for example, chat", white, and gur", a horse. From these we have chat" gur", a white horse; ace. sing, chatis guris; nom. plur. chat 1 gur 1 ' ; and chatyau guryau sy.tin, by means of white horses.

The first two personal pronouns are boh. I ; me, me, by me ; as', we; ase, us, by us; and ts"h, thou; tse, thee, by thee; toh',ye; tohii you, by you. Possessive pronouns are employed instead of the genitive. Thus, myqn", my; sqn", our; cyan", thy; tuhand", your. For the third person, we have sing. masc. suh, fem. soh, neut. tih; ace. sing. (masc. or fem.) tamis or tas, neut. tath; agent sing. masc. neut. tqm, fem. tami. The plural is of common gender throughout. Nom. tint ; ace. timan ; ag. timau. The possessive pronoun is tasqnd", of him, of her; tamyuk", of it; tihqnd", of them. The neuter gender is used for all things without life.*

Other pronouns are: — This: yih (com. gen.); ace. masc. fem. yimis, or nomis, neut, yith, nbth; ag. masc. neut., yim', ngm', fem. yimi, nomi; nom. plur. yim, fem. yima, and so on.

That (within sight): masc. neut. huh, fem. hoh; ace. masc. fem. humis or amis, neut. huth, and so on; nom. plur. masc hum.

Who, masc. yus, fem. yossa, neut. yih; ace. masc. fem. yemis, yes, neut. yeth; ag. masc. neut. yem, rem. yemi; nom. plur. masc. yim, and so on.*

Who? masc. kus, fem. kossa, neut. kyah; ace. masc. fem. kamis, kas, neut. kath ; ag. masc. neut. kam, fem. kami ; nom. plur. masc. kam.*

Self, pdna. Anyone, someone, kah, Mh, or katshdh, neut. ketshah.

Kashmiri makes very free use of pronominal suffixes, which are added to verbs to supply the place of personal terminations. These represent almost any case, and are as follows : —

Sing.—

First Person.

Second Person.

Third Person.

Nom.

X

kh, h

none

Ace.

m

th,y

j’

Dat.

m

y

5

Ag.

m

th,y

»

Plur.—

Nom.

none

wa

none

Other

cases

none

wa

kh, h

Before these the verbal terminations are often slightly changed for the sake of euphony, and, when necessary for the pronunciation, the vowel a is inserted as a junction vowel.

In this connexion we may mention another set of suffixes also commonly added to verbs, with an adverbial force. Of these na negatives the verb, as in chuh, he is; chuna, he is not; a asks a

question, as in china, is he? ti adds emphasis, as in chuti, he is indeed ; and tya asks a question with emphasis, as in chutyd, is he indeed ?

Two or three suffixes may be employed together, as in kar", was made, kqru-m, was made by me, kqr"-m-akh, thou wast made by me; kqr"-m-akh-a, wast thou made by me? The two kh suffixes become h when they are followed by a pronominal suffix commencing with a vowel, as in kqr"-h-as (for kqr"-kh-as), I was made by them.

E. Conjugation. As in the case of the modern Indo-Aryan vernaculars, the conjugation of the verb is mainly participial. Three only of the old tenses, the present, the future and the impera- tive have survived, the first having become a future, and the second a past conditional. These three we may call radical tenses. The rest, viz. the Kashmiri present, imperfect, past, aorist, perfect and other past tenses are all participial.

The verb substantive, which is also used as an auxiliary verb, has two tenses, a present and a past. The former is made by adding the pronominal suffixes of the nominative to a base chu{h), and the latter by adding the same to a base as". Thus: —

Singular

Plural

Masculine

Feminine .

Masculine

Feminine

I

2

3

chu-s, I am chu-kh, thou

art chuh, he is

che-s, I am che-kh, thou

art cheh, she is

chih, we are chi-wa, you

are chih, they are

cheh, we are chi-wa, you are

cheh, they are

I

2

3

qsu-s, I was asu-kh, thou

wast qs", he was

qs"-s, I was qs"-kh, thou

wast qs u , she was

qs', we were qs'-wa, you

were qs', they

were

asa, we were asa-wa, you were asa, they were

As for the finite verb, the modern future (old present), and the past conditional (old future) do not change for gender, and do not employ suffixes, but retain relics of the old personal terminations of the tenses from which they are derived, They are thus conjugated, taking the verbal root kar, as the typical verb.

Future, I shall make, &c.

Past Conditional, (if) I had made, &c.

Singular

Plural

Singular

Plural

I

2

3

kara

karakh

kari

karav kariv karan

karahi

karahdkh

karihe

kardhav

kar'hiv

karahdn

For the imperative we have 2nd person singular, kar, plur. kariv ; third person singular and plural karin.

Many of the above forms will be intelligible from a consideration of the closely allied Sanskrit, although they are not derived from that language; but some {e.g. those of the second person singular) can only be explained by the analogy of the Iranian and of the Pisaca languages.

The present participle is formed by adding an to the root; thus, karan, making. It does not change for gender. From this we get a present and an imperfect, formed by adding respectively the present and past tenses of the auxiliary verb. Thus, karan chus, I (mascu- line) am making, I make; karan ches, I (feminine) am making, I make; karan qsus, I (masculine) was making; and so on.

There are several past participles, all of which are liable to change for gender, and are utilized in conjugation. We have:—

Singular

Plural

Masculine

Feminine

Masculine

Feminine

Weak past participle Strong past participle Pluperfect participle Compound past parti- ciple

kar”

karyov

karyav

kar”mat”

kar”

karyeya

karyeya

kar”mqls”

kar’

karyey

kareyey

kar’mSt’

kare

karycya

karyeya

karematsa

In the strong past participle and the pluperfect participle, the final v and y (like the final h of chuh quoted above) are not parts of the original words, but are only added for the sake of euphony. The true words are karyo, karye, karya and karyeye. There are three conjugations. The first includes all transitive verbs. These have both the weak and the strong past participles. The second conjugation consists of sixty-six common intransitive verbs, which also have both of these participles. The third conjugation consists of the remaining intransitive verbs. These have only the strong past participle. The weak past participle in the first two conjugations refers to something which has lately happened, and is used to form an immediate past tense. The strong past participle is more indefinite, and is employed to form a tense corresponding to the Greek aorist. The pluperfect participle refers to something which

happened a long time ago, and is used to form the past tense of narration. As the third conjugation has no weak past participle, the strong past participle is employed to make the immediate past, and the pluperfect participle is employed to make the aorist past, while the new pluperfect participle is formed to make the tense of narration. Thus, from the root wuph, fly (third conjugation) we have wuphydv, he flew just now, while karyov (first conjugation) means "he was made at some indefinite time "; wuphyav, he flew at some indefinite time, but karyav, he was made a long time ago; finally, the new participle of the third conjugation, wuphiyav, he flew a long time ago.

The corresponding tenses are formed by adding pronominal suffixes to the weak, the strong, or the pluperfect participle. In the last two the final v and y, being no longer required by euphony, are dropped. In the case of transitive verbs the participles are passive by derivation and in signification, and hence the suffix indicating the subject must be in the agent case. Thus kar" means " made." For " I made " we must say " made by me," karu-m; for " thou madest," kqru-th, made by thee, and so on. If the thing made is feminine the participle must be feminine, and similarly if it is plural it must be plural. Thus, karu-m, I made him; hqr"-m, I made her; kqri-m, I made them (masculine) ; and kare-m, I made them (femi- nine). • Similarly from the other two participles we have karyo-m, I made him; karyeya-m, I made her; karya-m, I made him (a long time ago). The past participles of intransitive verbs are not passive, and hence the suffix indicating the subject must be in the nominative form. Thus tsql", escaped ("second conjugation) ; tsalu-s, escaped-I, I (masculine) escaped ; tsqj"-s, I (feminine) escaped, and so on. Similarly for the third conjugation, wuphyov, flew; wuphyo-s, I (masculine) flew; wuphyeya-s, I (feminine) flew, &c.

As explained above, these suffixes may be piled one on another. As a further example we may give kar", made; kqru-n, made by him, he made; kqru-n-as, made by him I, he made me, or (as -s also means " for him ") he made for him; kqru-n-as-a, did he make me? or, did he make for him ? and so on.

Tenses corresponding to the English perfect and pluperfect are formed by conjugating the auxiliary verb, adding the appropriate suffixes, with the compound past participle. Thus kqr u mqt" chu- n-as, made am-by-him-I, he has made me; tsql" mat" chu-kh, escaped art thou, thou hast escaped; wuphyomqt" chu-s, flown am-I, I have flown. _ Similarly for the pluperfect, kqrˆmqt" qsu-n-as, made was-by-him-I, he had made me, and so on.

Many verbs have irregular past participles. Thus mar, die, has mud"; di, give, has d\t"; khi, eat, has khyauv for its weak, and kheyov for its strong participle, while ni, take, has nyuv and niyov, respec- tively. _ Others must be learnt from the regular grammars.

The infinitive is formed by adding -un to the root; thus kar-un, to make. It is declined like a somewhat irregular noun of the first declension, its accusative being karanas. There are three forms of the noun of agency, of which typical examples are kar-awun", kar-an-wql", and kar-an-grakh, a maker.

The passive is formed by conjugating the verb yi, come, with the ablative of the infinitive. Thus, karana yvwan chuh, it is coming by making, or into making, i.e. it is being made. A root is made active or causal by adding -anaw, -aw, or -"raw. Thus, kar-anaw, cause to make; kumal, be tender, kumal-aw, make tender; kal, be dumb, kql- a rO,w, make dumb. Some verbs take one form and some another, and there are numerous irregularities, especially in the case of the last. _ F. Indeclinables. Indeclinables (adverbs, prepositions, conjunc- tions and interjections) must be learnt from the dictionary. The number of interjections is very large, and they are distinguished by minute rules depending on the gender of the person addressed and the exact amount of respect due to him.

Literature. — Kashmiri possesses a somewhat extensive litera- ture, which has been very little studied. The missionary William Carey published in 182 1 a version of the New Testament (in the Sarada character), which was the first book published in the language. In 1885 the Rev. J. Hinton Knowles published at Bombay a collection of Kashmiri proverbs and sayings, and K. F. Biirkhard in 1895 published an edition of Mahmud Gaml's poem on Yusuf and Zulaikha. This, with the exception of later trans- lations of the Scriptures in the Persian character and a few minor works, is all the literature that has been printed or about which anything

has been written. Mahmud Gaml's poem is valuable as an example of the Kashmiri used by Mussulmans. For Hindu literature, we may quote a history of Krishna by Dlnanatha. The very popular Lalla-vdkya, a poem on Saiva philosopy by a woman named Lalladevi, is said to be the oldest work in the language which has survived. Another esteemed work is the Siva Pari-naya of Krsna Rajanaka, a living author. These and other books which have been studied by the present writer have little independent value, being imitations of Sanskrit literature. Nothing is known about the dates of most of the authors.

Authorities. — -The scientific study of Kashmiri is of very recent date. The only printed lexicographical work is, a short vocabulary by W. J. Elmslie (London, 1872). K. F. Burkhard brought out a grammar of the Mussulman dialect in the Proceedings of the Royal Bavarian Academy of Science for 1887-1889, of which a translation by G. A. Grierson appeared in the Indian Antiquary of 1895 and the following years (reprinted as a separate publication, Bombay, 1897). T. R. Wade's Grammar (London, 1888) is the merest sketch, and the only attempt at a complete work of the kind in English is G. A. Grierson's Essays on Kdcmirl Grammar (London and Calcutta, 1899). A valuable native grammar in Sanskrit, the Kasmirafabdamrja of Isvara Kaula, has been edited by the same writer (Calcutta, 1888). For an examination of the origin of Kashmiri grammatical forms and the Pisaca question generally, see G. A. Grierson's " On Certain Suffixes in the Modern Indo-Aryan Vernaculars " in the Zeitschrift fitr Vergleichende Sprachforschung auf dent Gebiete der Indogerman- ischen Sprachen for 1903 and The Pisaca Languages of North-Western India (London, 1906).

The only important text which has been published is Burkhard's edition, with a partial translation, cf Mahmud Gami's " Yusuf and Zulaikha " in the Zeitschrift der Deutschen Morgenlandischen Gesell- schaft for 1895 and 1 899. The text of the Siva Parinaya, edited by G. A. Grierson, is in course of publication by the Asiatic Society of Bengal. (G. A. Gr.)

KASHUBES (sing. Kaszub, plur. Kaszebe), a Slavonic people numbering about 200,000, and living on the borders of West Prussia and Pomerania, along the Baltic coast between Danzig and Lake Garden, and inland as far as Konitz. They have no literature and no history, as they consist of peasants and fisher- men, the educated classes being mostly Germans or Poles. Their language has been held to be but a dialect of Polish, but it seems better to separate it, as in some points it is quite independent, in

some it offers a resemblance to the language of the Polabs (q.v.). This is most seen in the western dialect of the so-called Slovinci (of whom there are about 250 left) and Kabatki, whereas the eastern Kashube is more like Polish, which is encroaching upon and assimilating it. Lorentz calls the western dialect a language, and distinguishes 38 vowels. The chief points of Kashube as against Polish are that all its vowels can be nasal instead of a and e only, that it has preserved quantity and a free accent, has developed several special vowels, e. g. o, ce, u, and has preserved the original order, e.g. gard as against grod. The consonants are very like Polish. (See also Slavs.)

Authorities. — F. Lorentz, Slovinzische Grammatik (St Petersburg, 1903) and " Die gegenseitigen Verhaltnisse der sogen. Lechischen Sprachen," in Arch. f. Slav. Phil. xxiv. (1902); J. Baudouin de Courtenay, " Kurzes Resume der Kaschubischen Frage," ibid, xxvi. (1904); G. Bronisch, Kaschubische Dialektstudien (Leipzig, 1896-1898) ; S. Ramult, Stownik jezyka pomorskiego czyli kaszubskiego, i.e. " Dictionary of the Seacoast (Pomeranian) or Kashube Language" (Cracow, 1893). (E. H. M.)

KASIMOV, a town of Russia, in the government of Ryazan, on the Oka river, in 54° 56′ N. and 41 3′ E., 75 m. E.N.E. of Ryazan. Pop. (1897), 13,545,0! whom about 1000 were Tatars. It is famed for its tanneries and leather goods, sheepskins and post-horse bells. Founded in 1152, it was formerly known as Meshcherski Gorodets. In the 1 5th century it became the capital of a Tatar khanate, subject to Moscow, and so remained until 1667. The town possesses a cathedral, and a mosque supposed to have been built by Kasim, founder of the Tatar principality. Near the mosque stands a mausoleum built by Shah-Ali in 1555. Lying on the direct road from Astrakhan to Moscow and Nizhniy- Novgorod, Kasimov is a place of some trade, and has a large annual fair in July. The waiters in the best hotels of St Peters- burg are mostly Kasimov Tatars.

See Veliaminov-Zernov, The Kasimov Tsars (St Petersburg,

1 863- 1 866).

' KASSA (Germ. Kaschau; Lat. Cassovia), the capital of the county of Abauj-Torna, in Hungary, 170 m. N.E. of Budapest by rail. Pop. (1900), 35,856. Kassa is one of the oldest and hand- somest towns of Hungary, and is pleasantly situated on the right bank of the Hernad. It is surrounded on three sides by hills covered with forests and vineyards, and opens to the S.E. to- wards a pretty valley watered by the Hernad and the Tarcza. Kassa consists of the inner town, which was the former old town surrounded with walls, and of three suburbs separated from it by

a broad glacis. The most remarkable building, considered the grandest masterpiece of architecture in Hungary, is the Gothic cathedral of St Elizabeth. Begun about 1270 by Stephen V., it was continued (1342-1382) by Queen Elizabeth, wife of Charles I., and her son Louis I., and finished about 1468, in the reign of Matthias I. (Corvinus). The interior was transformed in the 1 8th century to the Renaissance style, and the whole church thoroughly restored in 1877-1896. The church of St Michael and the Franciscan or garrison church date from the 13th cen- tury. The royal law academy, founded in 1659, and sanctioned by golden bull of King Leopold I. in 1660, has an extensive library; there are also a museum, a Roman Catholic upper gymnasium and seminary for priests, and other schools and benevolent institutions. Kassa is the see of a Roman Catholic bishopric. It is the chief political and commercial town of Upper Hungary, and the principal entrepot for the commerce between Hungary and Galicia. Its most important manufactures are tobacco, machinery, iron, furniture, textiles and milling. About 3 m. N.W. of the town are the baths of Banko, with alkaline and ferruginous springs, and about 12 m. N.E. lies Rank-Herlein, with an intermittent chalybeate spring. About 20 m. W. of Kassa lies the famous Premonstratensian abbey of Jaszo, founded in the 1 2th century. The abbey contains a rich library and valuable archives. In the neighbourhood is a fine stalactite grotto, which often served as a place of refuge to the inhabitants in war time.

Kassa was created a town and granted special privileges by Bela IV. in 1235, and was raised to the rank of a royal free town by Stephen V. in 1270. In 1290 it was surrounded with walls. The subsequent history presents a long record of revolts, sieges and disastrous conflagrations. In 1430 the plague carried off a great number of the inhabitants. In 1458 the right of minting money according to the pattern and value of the Buda coinage was granted to the municipality by King Matthias I. The bishopric was established in 1804. In the revolutionary war of 1848-49 the Hungarians were twice defeated before the walls of Kassa by the Austrians under General Schlick, and the town was held successively by the Austrians, Hungarians and Russians.

KASSALA, a town and mudiria of the Anglo-Egyptian Sudan. The town, a military station of some importance, lies on the river Gash (Mareb) in 15 28′ N., 36° 24′ E., 260 m. E.S.E. of Khartum and 240 m. W. of Massawa, the nearest seaport. Pop. about 20,000. It is built on a plain, 1700 ft. above the sea, at the foot of the Abyssinian highlands 15 m.W. of the frontier of the Italian colony of Eritrea. Two dome-shaped mountains about 2600 ft. high, jebels Mokram and Kassala, rise abruptly from the plain some 3 m. to the east and south-east. These mountains and the numerous gardens Kassala contains give to the place a picturesque appearance. The chief buildings are of brick, but most of the natives dwell in grass tukls. A

short distance from the town is Khatmia, containing a tomb mosque with a high tower, the headquarters of the Morgani family. The sheikhs El Morgani are the chiefs of a religious brotherhood widely spread and of considerable influence in the eastern Sudan. The M organi family are of Afghan descent. Long settled in Jidda, the head of the family removed to the Sudan about 1800 and founded the Morgani sect. Kassala was founded by the Egyptians in 1840 as a fortified post from which to control their newly conquered territory near the Abyssinian frontier. In a few years it grew into a place of some importance. In November 1883 it was be- sieged by the dervishes. The garrison held out till the 30th of July 1885 when owing to lack of food they capitulated. Kassala was captured from the dervishes by an Italian force under Colonel Baratieri on the 17th of July 1894 and by the Italians was handed over on Christmas day 1897 to Egypt. The bulk of the inhabit- ants are Hallenga " Arabs."

Kassala mudiria contains some of the most fertile land in the Anglo-Egyptian Sudan. It corresponds roughly with the dis- trict formerly known as Taka. It is a region of light rainfall, and cultivation depends chiefly on the Gash flood. The river is how- ever absolutely dry from October to June. White durra of excellent quality is raised.

KASSASSIN, a village of Lower Egypt 22 m. by rail W. of Ismailia on the Suez Canal. At this place, on the 28th of August and again on the 9th of September 1882 the British force opera- ting against Arabi Pasha was attacked by the Egyptians — both attacks being repulsed (see Egypt: Military Operations).

KASSITES, an Elamite tribe who played an important part in the history of Babylonia. They still inhabited the north- western mountains of Elam, immediately south of Holwan, when Sennacherib attacked them in 702 B.C. They are the Kossaeans of Ptolemy, who divides Susiana between them and the Ely- maeans; according to Strabo (xi. 13,3,6) they were the neighbours of the Medes. Th. Noldeke (Gott. G. G., 1874, pp. 173 seq.) has shown that they are the Kissians of the older Greek authors who are identified with the Susians by Aeschylus (Choeph. 424, Pers. 17, 120) and Herodotus (v. 49, 52). We already hear of them as attacking Babylonia in the 9th year of Samsu-iluna the son of Khammurabi, and about 1780 B.C. they overran Babylonia and founded a dynasty there which lasted for 576 years and nine months. In the course of centuries, however, they were absorbed into the Babylonian population; the kings adopted Semitic names and married into the royal family of Assyria. Like the other languages of

the non-Semitic tribes of Elam that of the Kassites was agglutinative; a vocabulary of it has been handed down in a cuneiform tablet, as well as a list of Kassite names with their Semitic equivalents. It has no connexion with Indo-European, as has erroneously been supposed. Some of the Kassite deities were introduced into the Babylonian pantheon, and the Kassite tribe of Khabira seems to have settled in the Babylonian plain.

See Fr. Delitzsch, Die Spracheder Kossaer (1884). (A. H. S.)

KASTAMUNI, or Kastambul. (i) A vilayet of Asia Minor which includes Paphlagonia and parts of Pontus and Galatia. It is divided into four sanjaks — Kastamuni, Boli, Changra and Sinope — is rich in mineral wealth, and has many mineral springs and extensive forests, the timber being used for charcoal and building and the bark for tanning. The products are chiefly cereals, fruits, opium, cotton, tobacco, wool, ordinary goat-hair and mohair, in which there is a large trade. There are coal-mines at and near Eregli (anc. Heracleia) which yield steam coal nearly as good in quality as the English, but they are badly worked. Its population comprises about 993,000 Moslems and 27,000 Christians. (2) The capita! of the vilayet, the ancient Castamon, altitude 2500 ft., situated in the narrow valley of the Geuk Irmak (Amnias), and connected by a carriage road, 54 m.,with its port Ineboli on the Black Sea. The town is noted for its copper utensils, but the famous copper mines about 36 m. N., worked from ancient times to the 19th century, are now abandoned. There are over 30 mosques in the town, a dervish monastery, and numerous theological colleges (medresses), and the Moslem inhabi- tants have a reputation for bigotry. The climate though subject to extremes of heat and cold is healthy; in winter the roads are often closed by snow. The population of 16,000 includes about 2500 Christians. Castamon became an important city in later Byzantine times. It lay on the northern trunk-road to the Euphrates and was built round a strong fortress whose ruins crown the rocky hill west of the town. It was taken by the Danishmand Amirs of Sivas early in the 12th century, and passed to the Turks in 1393. (J. G. C. A.)

KASTORIA (Turkish Kesrie), a city of Macedonia, European Turkey, in the vilayet of Monastir, 45 m. S. by W. of Monastir (Bitolia). Pop. (1905), about 10,000, one-third of whom are Greeks, one-third Slavs, and the remainder Albanians or Turks. Kastoria occupies part of a peninsula on the western shore of Lake Kastoria, which here receives from the north its affluent the Zhelova. The lake is formed in a deep hollow surrounded by limestone mountains, and is drained on the south by the Bis- tritza, a large river which flows S.E. nearly to the Greek frontier, then sharply turns N.E., and finally enters the Gulf of Salonica. The lake has an area of 20 sq. m., and is 2850 ft. above sea-level. Kastoria is the seat of an Orthodox archbishop. It is usually identified with the ancient Celetrum, captured by

the Romans under Sulpicius, during the first Macedonian campaign, 200 B.C.,

and better known for the defence maintained by Bryennius against Alexis I. in 1084. A Byzantine wall with round towers runs across the peninsula.

KASUR, a town of British India, in the Lahore district of the Punjab, situated on the north bank of the old bed of the river Beas, 34 m. S.E. of Lahore. Pop. (1901), 22,022. A Rajput colony seems to have occupied the present site before the earliest Mahommedan invasion; but Kasur does not appear in history until late in the Mussulman period, when it was settled by a Pathan colony from beyond the Indus. It has an export trade in grain and cotton, and manufactures of cotton and leather goods.

KATAGUM, the sub-province of the double province of Kano in the British protectorate of Northern Nigeria. It lies approxi- mately between ir° and 13 N. and 8° 20′ and io° 40′ E. It is bounded N. by the French Sudan, E. by Bornu, S. by Bauchi, and W. by Kano. Katagum consists of several small but ancient Mahommedan emirates — Katagum, Messau, Gummel, Hadeija, Machena, with a fringe of Bedde pagans on its eastern frontier towards Bornu, and other pagans on the south towards Bauchi. The Waube flows from Kano through the province via Hadeija and by Damjiri in Bornu to Lake Chad, affording a route for the transport of goods brought by the Zungeru-Zaria-Kano railway to the headquarters of Katagum and western Bornu. Katagum is a fertile province inhabited by an industrious people whose manufactures rival those of Kano.

In ancient times the province of Katagum formed the debate- able country between Bornu and the Hausa states. Though Mahommedan it resisted the Fula invasion. Its northern emirates were for a long time subject to Bornu, and its customs are nearly assimilated to those of B ornu. The province was taken under administrative control by the British in October 1903. In 1904 the capitals of Gummel, Hadeija, Messau and Jemaari, were brought into touch with the administration and native and provincial courts established. At the beginning of 1905 Katagum was incorporated as a sub-province with the province of Kano, and the administrative organization of a double province was extended over the whole. Hadeija, which is a very wealthy town and holds an important position both as a source of supplies and a centre of trade, received a garrison of mounted infantry and became the capital of the sub-province.

Hadeija was an old Habe town and its name, an evident cor- ruption of Khadija, the name of the celebrated wife and first convert of Mahomet, is a strong presumption of the incorrectness of the Fula claim to have introduced Islam to its inhabitants. The ruling dynasty of Hadeija was,

however, overthrown by Fula usurpation towards the end of the 18th century, and the Fula ruler received a flag and a blessing from Dan Fodio at the begin- ning of his sacred war in the opening years of the 19th century. Nevertheless the habit of independence being strong in the town of Hadeija the little emirate held its own against Sokoto, Bornu and all comers. Though included nominally within the province at Katagum it was the boast of Hadeija that it had never been conquered. It had made nominal submission to the British in 1903 on the successful conclusion of the Kano-Sokoto campaign, and in 1905, as has been stated, was chosen as the capital of the sub-province. The emir's attitude became, however, in the spring of 1906 openly antagonistic to the British and a military expedition was sent against him. The emir with his disaffected chiefs made a plucky stand but after five hours' street fighting the town was reduced. The emir and three of his sons were killed, and a new emir, the rightful heir to the throne, who had shown himself in favour of a peaceful policy, was appointed. The offices of the war chiefs in Hadeija were abolished and 150 yards of the town wall were broken down.

Slave dealing is at an end in Katagum. The military station at Hadeija forms a link in the chain of British forts which extends along the northern frontier of the protectorate. (See Nigeria.)

(F. L. L.)

KATANGA, a district of Belgian Congo, forming the south- eastern part of the colony. Area, approximately, 180,000 sq. m. ; estimated population 1,000,000. The natives are members of

the Luba-Lunda group of Bantus. It is a highly mineralized region, being specially rich in copper ore. Gold, iron and tin are also mined. Katanga is bounded S. and S.E. by Northern Rhodesia, and British capital is largely interested in the develop- ment of its resources, the administration of the territory being entrusted to a committee on which British members have seats. Direct railway communication with Cape Town and Beira was established in 1909. There is also a rail and river service via the Congo to the west coast. (See Congo Free State.)

KATER, HENRY (1777-1835), English physicist of German descent, was born at Bristol on the 16th of April 1777. At first he purposed to study law; but this he abandoned on his father's death in 1794, and entered the army, obtaining a commission in the 12th regiment of foot, then stationed

in India, where he rendered valuable assistance in the great trigonometrical survey. Failing health obliged him to return to England; and in 1808, being then a lieutenant, he entered on a distinguished student career in the senior department of the Royal Military College at Sandhurst. Shortly after he was promoted to the rank of captain. In 1814 he retired on half-pay, and devoted the remainder of his life to scientific research. He died at London on the 26th of April 1835.

His first important contribution to scientific knowledge was the comparison of the merits of the Cassegrainian and Gregorian telescopes, from which {Phil. Trans., 1813 and i8i4)he deduced that the illuminating power of the former excee'ded that of the latter in the proportion of 5 : 2. This inferiority of the Gregorian he explained as being probably due to the mutual interference of the rays as they crossed at the principal focus before reflection at the second mirror. His most valuable work was the determination of the length of the second's pendulum, first at London and subsequently at various stations throughout the country {Phil. Trans., 1818, 1819). In these researches he skilfully took advantage of the well-known property of reciprocity between the centres of suspension and oscillation of an oscillating body, so as to determine experimentally the precise position of the centre of oscillation; the distance between these centres was then the length of the ideal simple pendulum having the same time of oscillation. As the inventor of the floating collimator, Kater rendered a great service to practical astronomy {Phil. Trans., 1825, 1828). He also published memoirs {Phil. Trans., 1821, 1831) on British standards of length and mass; and in 1832 he published an account of his labours in verifying the Russian standards of length. For his services to Russia in this respect he received in 1814 the decoration of the order of St. Anne; and the same year he was elected a fellow of the Royal Society.

His attention was also turned to the subject of compass needles, his Bakerian lecture " On the Best Kind of Steel and Form for a Compass Needle" {Phil. Trans., 1821) containing the results of many experiments. The treatise on " Mechanics " in Lardner's Cyclopaedia was partly written by him; and his interest in more purely astro- nomical questions was evidenced by two communications to the Astronomical Society's Memoirs for 1831-1833 — the one on an obser- vation of Saturn's outer ring, the other on a method of determining longitude by means of lunar eclipses.

KATHA, a district in the northern division of Upper Burma, with an area of 6994 sq. m., 3730 of which consists of the former separate state of Wuntho. It is bounded N. by the Upper Chindwin, Bhamo and Myitkyina districts, E. by the Kaukkwe River as far as the Irrawaddy, thence east of the Irrawaddy by the Shan State of Mong Mit(Momeik), and by the Shweli River, S. by the Ruby Mines district and Shwebo, and W. by the Upper

Chindwin district. Three ranges of hills run through the district, known as the Minwun, Gangaw and Mangin ranges. They separate the three main rivers — the Irrawaddy, the Meza and the Mu. The Minwun range runs from north to south, and forms for a considerable part of its length the dividing line between the Katha district proper and what formerly was the Wuntho state. Its average altitude is between 1 500 and 2000 ft. The Gangaw range runs from the north of the district for a considerable portion of its length close to and down the right bank of the Irrawaddy as far as Tigyaing, where the Myatheindan pagoda gives its name to the last point. Its highest point is 4400 ft.,

but the average is between 1500 and 2000 ft. The Katha branch of the railway crosses it at Petsut, a village 12 miles west of Katha town. The Mangin range runs through Wuntho (highest peak, Maingth6n, 5450 ft.).

Gold, copper, iron and lead are found in considerable quantities in the district. The Kyaukpazat gold-mines, worked by an English company, gave good returns, but the quartz reef proved to be a mere pocket and is now worked out. The iron, copper and lead are not now worked. Jade and soapstone also exist, and salt is produced from brine wells. There are three forest reserves in Katha, with a total area of 11 19 sq. m. The popula- tion in 1901 was 176,223, an increase of 32% in the decade. The number of Shans is about half that of Burmese, and of Kadus half that of Shans. The Shans are mostly in the Wuntho sub- division. Rice is the chief crop in the plains, tea, cotton, sesamum and hill rice in the hills. The valley of the Meza, which is very malarious, was used as a convict settlement under Burmese rule. The district was first occupied by British troops in 1886, but it was not finally quieted till 1890, when the Wuntho sawbwa was deposed and his state incorporated in Katha district. Katha is the headquarters of the district. The principal means of communication are the Irrawaddy Flotilla steamers, which run between Mandalay and Bhamo, and the railway which communicates with Sagaing to the south and Myitkyina to the north. A ferry-steamer plies between Katha and Bhamo.

KATHIAWAR, or Kattywar, a peninsula of India, within the Gujarat division of Bombay, giving its name to a political agency. Total area, about 23,400 sq. m.; pop. (1901), 2,645,805. These figures include a portion of the British district of Ahme- dabad, a portion of the state of Baroda, and the small Portuguese settlement of Diu. The peninsula is bounded N. by the Runn of Cutch, E. by Ahmedabad district and the Gulf of Cambay, and S. and W. by the Arabian Sea. The extreme length is 220 m.; the greatest breadth about 165 m. Generally speaking, the surface is undulating, with low ranges running in various direc- tions. With the exception of the Tangha and Mandav hills, in the west of Jhalawar, and some unimportant hills in Hallar, the northern portion of the country is flat; but in the south,

from near Gogo, the Gir range runs nearly parallel with the coast, and at a distance of about 20 m. from it, along the north of Babriawar and Sorath, to the neighbourhood of Girnar. Opposite this latter mountain is the solitary Osam hill, and then still farther west is the Barada group, between Hallar and Barada, running about 20 m. north and south from Gumli to Ranawao. The Girnar group of mountains is an important granitic mass, the highest peak of which rises to 3500 ft. The principal river is the Bhadar, which rises in the Mandav hills, and flowing S.W. falls into the sea at Navi-Bandar; it is everywhere marked by highly culti- vated lands adjoining its course of about 115m. Other rivers are the Aji, Machhu and Satrunji — the last remarkable for romantic scenery. Four of the old races, the Jaitwas, Churasamas, Solunkis and Walas still exist as proprietors of the soil who exercised sovereignty in the country prior to the immigration of the Jhalas, Jadejas, Purmars, Kathis, Gohels, Jats, Mahom- medans and Mahrattas, between whom the country is now chiefly portioned out. Kathiawar has many notable antiquities, com- prising a rock inscription of Asoka, Buddhist caves, and fine Jain temples' on the sacred hill of Girnar and at Palitana.

The political agency of Kathiawar has an area of 20,882 sq. m. In 1901 the population was 2,329,196, showing a decrease of 1 5 % in the decade due to the results of famine. The estimated gross revenue of the several states is £1,278,000; total tribute (payable to the British, the gaekwar of Baroda and the nawab of Junagarh) , £70,000. There are altogether 193 states of varying size and importance, of which 14 exercise independent jurisdic- tion, while the rest are more or less under British administration. The eight states of the first class are Junagaw, Nawanagar,- Bhaunagar, Porbandar, Dhrangadra, Morvi, Gondal and Jafara- bad. The headquarters of the political agent are at Rajkot, in the centre of the peninsula, where also is the Rajkumar college, for the education of the sons of the chiefs. There is a similar school for girasias, or chiefs of lower rank, at Gondal. An

excellent system of metre-gauge railways has been provided at the cost of the leading states. Maritime trade is also very active, the chief ports being Porbandar, Mangrol and Verawal. In 1003-1904 the total sea-borne exports were valued at £1,300,000, and the imports at £1,120,000. The progressive prosperity of Kathiawar received a shock from the famine of 1899-1900, which was felt everywhere with extreme severity.

KATKOV, MICHAEL NIKIFOROVICH (1818-1887), Russian journalist,

was born in Moscow in 1818. On finishing his course at the university he devoted himself to literature and philosophy, and showed so little individuality that during the reign of Nicholas I. he never once came into disagreeable contact with the authorities. With the Liberal reaction and strong reform move- ment which characterized the earlier years of Alexander II. 's reign (1855-1881) he thoroughly sympathized, and for some time he warmly advocated the introduction of liberal institutions of the B ritish type, but when he perceived that the agitation was assum- ing a Socialistic and Nihilist tinge, and that in some quarters of the Liberal camp indulgence was being shown to Polish national aspirations, he gradually modified his attitude until he came to be regarded by the Liberals as a renegade. At the beginning of 1863 he assumed the management and editorship of the Moscow Gazette, and he retained that position till his death in 1887. During these twenty-four years he exercised considerable influ- ence on public opinion and even on the Government, by repre- senting with great ability the moderately Conservative spirit of Moscow in opposition to the occasionally ultra-Liberal and always cosmopolitan spirit of St Petersburg. With the Slavo- phils he agreed in advocating the extension of Russian influence in south-eastern Europe, but he carefully kept aloof from them and condemned their archaeological and ecclesiastical senti- mentality. Though generally temperate in his views, he was extremely incisive and often violent in his modes of expressing them, so that he made many enemies and sometimes incurred the displeasure of the press-censure and the ministers, against which he was more than once protected by Alexander III. in consideration of his able advocacy of national interests. He is remembered chiefly as an energetic opponent of Polish national aspirations, of extreme Liberalism, of the system of public instruction based on natural science, and of German political influence. In this last capacity he helped to prepare the way for the Franco-Russian alliance.

KATMANDU (less correctly Khatmandu), the capital of the state of Nepal, India, situated on the bank of the Vishnumati river at its confluence with the Baghmati, in 27 36′ N., 85° 24′ E. The town, which is said to have been founded about 723, contains a population estimated at 70,000, occupying 5000 houses made of brick, and usually from two to four storeys high. Many of the houses have large projecting wooden windows or balconies, richly carved. The maharaja's palace, a huge, rambling, un- gainly building, stands in the centre of the town, which also contains numerous temples. One of these, a wooden building in the centre of the town, gives it its name (kat = wood). The streets are extremely narrow, and the whole town very dirty. A British resident is stationed about a mile north of the town.

KATO, TAKA-AKIRA (1859-), Japanese statesman, was born at Nagoya,

and commenced life as an employee in the great firm of Mitsu Bishi. In 1887 he became private secretary to Count Okuma,. minister of state for foreign affairs. Subse- quently he served as director of a bureau in the finance depart- ment, and from 1894 to 1899 he represented his country at the court of St James. He received the portfolio of foreign affairs in the fourth Ito cabinet (1900-1901), which remained in office only a few months. Appointed again to the same position in the Saionji cabinet (1906), he resigned after a brief interval, being opposed to the nationalization of the private railways, which measure the cabinet approved. He then remained without office until 1908, when he again accepted the post of ambassador in London. He was decorated with the grand cross of St Michael and St George, and earned the reputation of being one of the strongest men among the junior statesmen.

KATRINE, LOCH, a freshwater lake of Scotland, lying almost entirely in Perthshire. The boundary between the counties of Perth and Stirling runs from Glengyle, at the head of the lake, down the centre to a point opposite Stronachlachar from which it strikes to the south-western shore towards Loch Arklet. The loch, which has a south-easterly trend, is about 8 m. long, and its greatest breadth is 1 m. It lies 364 ft. above the sea- level. It occupies an area of 4! square miles and has a drainage basin of 375 square miles. The average depth is 142 ft., the greatest depth being 495 ft. The average annual rainfall is 78 inches. The mean temperature at the surface is 56-4° F., and at the bottom 41° F. The scenery has been immortalized in Sir Walter Scott's Lady of the Lake. The surrounding hills are of considerable altitude, the most remarkable being the head of Ben A'an (1750 ft.) and the grassy craigs and broken contour of Ben Venue (2393 ft.). It is fed by the Gyle and numerous burns, and drained by the Achray to Loch Achray and thence by the Black Avon to Loch Vennacher. Since 1859 it has formed the chief source of the water-supply of Glasgow, the aqueduct leaving the lake about i§ m. S.E. of Stronachlachar. By powers obtained in 1885 the level of the lake was increased by s ft. by a system of sluices regulating the outflow of the Achray. One result of this damming up has been to submerge the Silver Strand and to curtail the dimensions of Ellen's Isle. The principal points on the shores are Glengyle, formerly a fast- ness of the Macgregors, the Trossachs, the Goblins' Cave on Ben Venue, and Stronachlachar (Gaelic, " the mason's nose "), from which there is a ferry to Coilachra on the opposite side. A road has been constructed from the Trossachs for nearly six miles along the northern shore. During summer steamers ply be- tween the Trossachs and Stronachlachar and there is a daily service of coaches from the Trossachs to Callander (about 10 m.) and to Aberfoyle (9 m.) , and between Stronachlachar, to Inver- snaid on Loch Lomond (about 4! m.). The road to Inversnaid runs through the Macgregors' country referred to in Scott's

Rob Roy.

KATSENA, an ancient state of the western Sudan, now in- cluded in the province of Kano in the British protectorate of Northern Nigeria. Katsena was amongst the oldest of the Hausa states. There exist manuscripts which carry back its history for about 1000 years and tradition ascribes the origin of the Hausa population, which is known also by the name of Habe or Habeche, to the union of Bajibda of Bagdad with a prehistoric queen of Daura. The conquest of the Habe of Katsena by the Fula about the beginning of the 19th century made little differ- ence to the country. The more cultivated Habe were already Mahommedan and the new rulers adopted the existing customs and system of government. These were in many respects highly developed and included elaborate systems of taxation and justice.

The capital of the administrative district is a town of the same name, in i3°N., 7°4i'E., being 160 m. E. by S. of the city of Sokoto, and 84 m. N.W. of Kano. The walls of Katsena have a circuit of between 13 and 14 miles, but only a small part of the enclosed space is inhabited. In the 17th and 18th centuries it appears to have been the largest town in the Hausa countries, and its inhabitants at that time numbered some 100,000. The date of the foundation of the present town must be comparatively modern, for it is believed to have been moved from its ancient site and at the time of Leo Africanus (c. 1513) there was no place of any considerable size in the province of Katsena. Before that period Katsena boasted of being the chief seat of learning throughout the Hausa states and this reputation was main- tained to the time of the Fula conquest. In the beginning of the 19th century the town fell into the hands of the Fula, but only after a protracted and heroic defence. In March 1903 Sir F. Lugard visited Katsena on his way from Sokoto and the emir and chiefs accepted British suzerainty without fighting. The Katsena district has since formed an administrative district in the double province of Kano and Katagum. The emir was unfaithful to his oath of allegiance to the British crown, and was deposed in 1904. His successor was installed and took the oath of allegiance

in December of the same year. Katsena is a rich and populous district.

See the Travels of Heinrich Barth (new ed., London, 1890, chs. xxiii. and xxiv.). Consult also the Annual Reports on Northern Nigeria issued by the Colonial Office, London, particularly the Report for 1902.

Katsena is also the name of a town in the district of Katsena- Allah, in the province of Muri, Northern Nigeria. This district is watered by a river of the same name which takes its rise in the mountains of the German colony of Cameroon, and flows into the Benue at a point above Abinsi."

KATSURA, TARO, Marquess (1847-), Japanese soldier and statesman, was born in 1847 in Choshu. He commenced his career by fighting under the Imperial banner in the civil war of the Restoration, and he displayed such talent that he was twice sent at public expense to Germany (in 1870 and 1884) to study strategy and tactics. In 1886 he was appointed vice-minister of war, and in 1891 the command of division devolved on him. He led the left wing of the Japanese army in the campaign of 1894-95 against China, and made a memorable march in the depth of winter from the north-east shore of the Yellow Sea to Haicheng, finally occupying Niuchwang, and effecting a junction with the second army corps which moved up the Liaotung peninsula. For these services he received the title of viscount. He held the portfolio of war from 1898 to 1901, when he became premier and retained office for four and a half years, a record in Japan. In 1902 his cabinet concluded the first entente with England, which event procured for Katsura the rank of count. He also directed state affairs throughout the war with Russia, and concluded the offensive and defensive treaty of 1905 with Great Britain, receiving from King Edward the grand cross of the order of St Michael and St George, and being raised by the mikado to the rank of marquess. He resigned the premiership in 1905 to Marquess Saionji, but was again invited to form a cabinet in 1908. Marquess Katsura might be con- sidered the chief exponent of conservative views in Japan. Adhering strictly to the doctrine that ministries were respon- sible to the emperor alone and not at all to the diet, he stood wholly aloof from political parties, only his remarkable gift of tact and conciliation enabling him to govern on such principles.

KATTERFELTO (or Katerfelto), GUSTAVUS (d. 1799), quack doctor and conjurer, was born in Prussia. About 1782 he came to London, where his advertisements in the newspapers, headed " Wonders! Wonders! Wonders!" enabled him to trade most profitably upon the credulity of the public during the widespread influenza epidemic of that year. His public enter- tainment, which, besides conjuring, included electrical and chemical experiments and demonstrations with the microscope, extracted a flattering testimonial from the royal family, who witnessed it in 1784. The poet William Cowper refers to Katterfelto in The Task; he became notorious for a long tour he undertook, exciting marvel by his conjuring performances.

KATTOWITZ, a town in the Prussian province of Silesia, on the Rawa, near the Russian frontier, 5 m. S.E. from Beuthen by rail. Pop. (1875), 11,352; (190s), 35,772. There are large iron- works, foundries and

machine shops in the town, and near it zinc and anthracite mines. The growth of Kattowitz, like that of other places in the same district, has been very rapid, owing to the development of the mineral resources of the neighbour- hood. In 1815 it was a mere village, and became a town in 1867. It has monuments to the emperors William I. and Frederick III.

See G. Hoffmann, Geschichte der Stadt Kattowitz (Kattowitz, 1895).

KATWA, or Cutwa, a town of British India, in Burdwan district, Bengal, situated at the confluence of the Bhagirathi and Ajai rivers. Pop. (1901), 7220. It was the residence of many wealthy merchants, but its commercial importance has declined as it is without railway communication and the difficulties of the river navigation have increased. It was formerly regarded as the key to Murshidabad. The old fort, of which scarcely a vestige remains, is noted as the scene of the defeat" of the Mahrattas by Ali Vardi Khan.

KATYDID, the name given to certain North American insects, belonging to the family Locustidae, and related to the green or tree grasshoppers of England. As in other members of the family, the chirrup, alleged to resemble the words " Katydid," is produced by the friction of a file on the underside of the left forewing over a ridge on the upperside of the right. Several species, belonging mostly to the genera Microcentonus and Cyrtophallus, are known.

KAUFBEUREN, a town in the kingdom of Bavaria, on the Wertach, 55 m. S.W. of Munich by rail. Pop. (1905), 8955. Kaufbeuren is still surrounded by its medieval walls and presents a picturesque appearance. It has a handsome town hall with fine paintings, an old tower (the Hexenturm, or witches' tower), a museum and various educational institutions. The most interesting of the ecclesiastical buildings is the chapel of St Blasius, which was restored in 1896. The chief industries are cotton spinning, weaving, bleaching, dyeing, printing, machine building and lithography, and there is an active trade in wine, beer and cheese. Kaufbeuren is said to have been founded in 842, and is first mentioned in chronicles of the year 11 26. It appears to have become a free imperial city about 1288, retain- ing the dignity until 1803, when it passed to Bavaria. It was formerly a resort of pilgrims, and Roman coins have been found in the vicinity.

See F. Stieve, Die Reichsstadt Kaufbeuren und die bayrische Reslaura- tionspolitik '(Munich, 1870); and Schroder, Geschichte der Stadt und Katholischen Pfarrei Kaufbeuren (Augsburg, 1903).

KAUFFMANN, [MARIA ANNA] ANGELICA (1741-1807), the once popular artist and Royal Academician, was born at Coire in the Grisons,

on the 30th of October 1741. Her father, John Josef Kauffmann, was a poor man and mediocre painter, but apparently very successful in teaching his precocious daughter. She rapidly acquired several languages, read incessantly, and showed marked talents as a musician. Her greatest progress, however., was in painting; and in her twelfth year she had become a notability, with bishops and nobles for her sitters. In 1754 her father took her to Milan. Later visits to Italy of long dura- tion appear to have succeeded this excursion; in 1763 she visited Rome, returning to it again in 1764. From Rome she passed to Bologna and Venice, being everywhere feted and caressed, as much for her talents as for her personal charms. Writing from Rome in August 1764 to his friend Franke, Winckelmann refers to her exceptional popularity. She was then painting his picture, a half-length, of which she also made an etching. She spoke Italian as well as German, he says; and she also expressed her- self with facility in French and English — one result of the last- named accomplishment being that she painted all the English visitors to the Eternal City. " She may be styled beautiful," he adds, " and in singing may vie with our best virtuosi." While at Venice, she was induced by Lady Wentworth, the wife of the English ambassador to accompany her to London, where she appeared in 1766. One of her first works was a- portrait of Garrick, exhibited in the year of her arrival at " Mr Moreing's great room in Maiden Lane." The rank of Lady Wentworth opened society to her, and she was everywhere well received, the royal family especially showing her great favour.

Her firmest friend, however, was Sir Joshua Reynolds. In his pocket-book her name as " Miss Angelica " or " Miss Angel " appears frequently, and in 1766 he painted her, a compliment which she returned by her " Portrait of Sir Joshua Reynolds," aetat. 46. Another instance of her intimacy with Reynolds is to be found in the variation of Guercino's " Et in Arcadia ego " produced by her at this date, a subject which Reynolds repeated a few years later in his portrait of Mrs Bouverie and Mrs Crewe. When, about November 1767, she was entrapped into a clandes- tine marriage with an adventurer who passed for a Swedish count (the Count de Horn) Reynolds befriended her, and it was doubt- less owing to his good offices that her name is found among the signatories to the famous petition to the king for the establish- ment of the Royal Academy. In its first catalogue of 1769 she appears with "R.A." after her name (an honour which she shared

with another lady and compatriot, Mary Moser) ; and she con- tributed the " Interview of Hector and Andromache," and three other classical

compositions. From this time until 1782 she was an annual exhibitor, sending sometimes as many as seven pictures, generally classic or allegorical subjects. One of the most notable of her performances was the " Leonardo expiring in the Arms of Francis the First," which belongs to the year 1778. In 1773 she was appointed by the Academy with others to decorate St Paul's, and it was she who, with Biagio Rebecca, painted the Academy's old lecture room at Somerset House. It is probable that her popularity declined a little in consequence of her unfortunate marriage; but in 1781, after her first husband's death (she had been long separated from him), she married Antonio Zucchi (1728-1795), a Venetian artist then resident in England. Shortly afterwards she retired to Rome, where she lived for twenty-five years with much of her old prestige. In 1782 she lost her father; and in 1795 — the year in which she painted the picture of Lady Hamilton — her husband. She continued at intervals to contribute to the Academy, her last exhibit being in 1797. After this she produced little, and in November 1807 she died, being honoured by a splendid funeral under the direction of Canova. The entire Academy of St Luke, with numerous ecclesiastics and virtuosi, followed her to her tomb in S. Andrea delle Fratte, and, as at the burial of Raphael, two of her best pictures were carried in procession.

The works of Angelica Kauffmann have not retained their reputa- tion. She had a certain gift of grace, and considerable skill in composition. But her drawing is weak and faulty; her figures lack variety and expression; and her men are masculine women. Her colouring, however, is fairly enough defined by Waagen's term " cheerful." Rooms decorated by her brush are still to be seen in various quarters. At Hampton Court is a portrait of the duchess of Brunswick; in the National Portrait Gallery, a portrait of herself. There are other pictures by her at Paris, at Dresden, in the Hermitage at St Petersburg, and in the Alte Pinakothek at Munich. The Munich example is another portrait of herself; and there is a third in the Uffizi at Florence. A few of her works in private collections have been exhibited among the " Old Masters " at Burlington House. But she is perhaps best known by the numerous engravings from her designs by Schiavonetti, Bartolozzi and others. Those by Bartolozzi especially still find considerable favour with collectors. Her life was written in 1810 by Giovanni de Rossi. It has also been used as the basis of a romance by Leon de Wailly, 1838; and it prompted the charming novel contributed by Mrs Richmond Ritchie to the Cornhill Magazine in 1875 under the title of " Miss Angel. "

(A. D.)

KAUFMANN, CONSTANTINE PETROVICH (1818-1882), Russian general, was born at Maidani on the 3rd of March 1818. He entered the

engineer branch in 1838, served in the campaigns in the Caucasus, rose to be colonel, and commanded the sappers and miners at the siege of Kars in 1855. O n the capitulation of Kars he was deputed to settle the terms with General Sir W. Fenwick Williams. In 1861 he became director-general of engineers at the War Office, assisting General Milutin in the reorganization of the army. Promoted lieut. -general in 1864, he was nominated aide-de-camp-general and governor of the military conscription of Vilna. In 1867 he became governor of Turkestan, and held the post until his death, making himself a name in the expansion of the empire in central Asia. He accomplished a successful campaign in 1868 against Bokhara, capturing Samarkand and gradually subjugating the whole country. In 1873 he attacked Khiva, took the capital, and forced the khan to become a vassal of Russia. Then followed in 1875 the campaign against Khokand, in which Kaufmann defeated the khan, Nasr-ed-din. Khokand north of the Syr-daria was annexed to Russia, and the independence of the rest of the country became merely nominal. This rapid absorption of the khanates brought Russia into close proximity to Afghani- stan, and the reception of Kaufmann's emissaries by the Amir was a main cause of the British war with Afghanistan in 1878. Although Kaufmann was unable to induce his government to support all his ambitious schemes of further conquest, he sent Skobeleff in 1880 and 1881 against the Akhal Tekkes, and was arranging to add Merv to his annexations when he died suddenly at Tashkend on the 15th of May 1882.

KAUKAUNA. a city of Outagamie county, Wisconsin, U.S.A., on the Fox river 7 m. N.E. of Appleton and about 100 m. N. of Milwaukee. Pop. (1900), 5115, of whom 1044 were foreign- born (1905) 4991; (1910) 4717- Kaukauna is served by the Chicago & North- Western railway (which has car-shops here), by inter-urban electric railway lines connecting with other cities in the Fox river, valley, and by river steamboats. It has a Carnegie library, a hospital and manufactories of pulp, paper, lumber and woodenware. Dams on the Fox River furnish a good water-power. The city owns its water-works. A small settlement of Indian traders was made here as early as 1820; in 1830 a Presbyterian mission was established, but the growth of the place was slow, and the city was not chartered until 1885.

KAULBACH, WILHELM VON (1805-1874), German painter, was born in Westphalia on the 15th of October 1805. His father, who was poor, combined painting with the goldsmith's trade, but means were found to place Wilhelm, a youth of seventeen, in the art academy of Diisseldorf, then becoming renowned under the directorship of Peter von Cornelius. Young Kaulbach con- tended against hardships, even hunger. But his courage never failed; and, uniting genius with industry, he was ere long fore- most among the young national party which sought to revive the arts of Germany. The ambitious work by which Louis I. sought to transform

Munich into a German Athens afforded the young painter an appropriate sphere. Cornelius had been com- missioned to execute the enormous frescoes in the Glyptothek, and his custom was in the winters, with the aid of Kaulbach and others, to complete the cartoons at Diisseldorf, and in the sum- mers, accompanied by his best scholars, to carry out the designs in colour on the museum walls in Munich. But in 1824 Cornelius became director of the Bavarian academy. Kaulbach, not yet twenty, followed, took up his permanent residence in Munich, laboured hard on the public works, executed independent com- missions, and in 1849, when Cornelius left for Berlin, succeeded to the directorship of the academy, an office which he held till his death on the 7th of April 1874. His son Hermann (1846- 1909) also became a distinguished painter.

Kaulbach matured, after the example of the masters of the Middle Ages, the practice of mural or monumental decoration; he once more conjoined painting with architecture, and displayed a creative fertility and readiness of resource scarcely found since the era of Raphael and Michelangelo. Early in the series of his multitudinous works came the famous Narrenhaus, the appalling memories of a certain madhouse near Diisseldorf; the composi- tion all the more deserves mention for points of contact with Hogarth. Somewhat to the same category belong the illustra- tions to Reineke Fuchs. These, together with occasional figures or passages in complex pictorial dramas, show how dominant and irrepressible were the artist's sense of satire and enjoyment of fun; character in its breadth and sharpness is depicted with keenest relish, and at times the sardonic smile bursts into the loudest laugh. Thus occasionally the grotesque degenerates into the vulgar, the grand into the ridiculous, as in the satire on " the Pigtail Age " in a fresco outside the New Pinakothek. Yet these exceptional extravagances came not of weakness but from excess of power. Kaulbach tried hard to become Grecian and Italian; but he never reached Phidias or Raphael; in short the blood of Diirer, Holbein and Martin Schongauer ran strong in his veins. The art products in Munich during the middle of the 19th century were of a quantity to preclude first-rate quality, and Kaulbach contracted a fatal facility in covering wall and canvas by the acre. He painted in the Hofgarten, the Odeon, the Palace and on the external walls of the New Pinakothek. His perspicuous and showy manner also gained him abundant occupation as a book illustrator: in the pages of the poets his fancy revelled; he was glad to take inspiration from Wieland, Goethe, even Klopstock; among his engraved designs are the Shakespeare gallery, the Goethe gallery and a folio edition of the Gospels. With regard to these examples of " the Munich school," it was asserted that Kaulbach had been unfortunate alike in having found Cornelius for a master and King Louis for a patron, that he attempted " subjects far beyond him, believing

that his admiration for them was the same as inspiration"; and supplied the lack of real imagination by " a compound of intellect and fancy."

Nevertheless in such compositions as the Destruction of Jerusalem and the Battle of the Huns Kaulbach shows creative imagination. As a dramatic poet he tells the story, depicts character, seizes on action and situation, and thus as it were takes the spectator by storm. The manner may be occasionally noisy and ranting, but the effect after its kind is tremendous. The cartoon, which, as usual in modern German art, is superior to the ultimate picture, was executed in the artist's prime at the age of thirty. At this period, as here seen, the knowledge was little short of absolute; subtle is the sense of beauty; playful, delicate, firm the touch; the whole treatment artistic.

Ten or more years were devoted to what the Germans term a " cyclus " — a series of pictures depicting the Tower of Babel, the Age of Homer, the Destruction of Jerusalem, the Battle of the Huns, the Crusades and the Reformation. These major tableaux, severally 30 ft. long, and each comprising over one hundred figures above life-size, are surrounded by minor com- positions making more than twenty in all. The idea is to congregate around the world's historic dramas the prime agents of civilization; thus here are assembled allegoric figures of Archi- tecture and other arts, of Science and other kingdoms of know- ledge, together with lawgivers from the time of Moses, not for- getting Frederick the Great. -The chosen situation for this imposing didactic and theatric display is the Treppenhaus or grand staircase in the new museum, Berlin; the surface is a granulated, absorbent wall, specially prepared; the technical method is that known as " water-glass," or " liquid flint," the infusion of silica securing permanence. The same medium was adopted in the later wall-pictures in the Houses of Parliament, Westminster.

The painter's last period brings no new departure; his ultimate works stand conspicuous by exaggerations of early character- istics. The series of designs illustrative of Goethe, which had an immense success, were melodramatic and pandered to popular taste. The vast canvas, more than 30 ft. long, the Sea Fight at Salamis, painted for the Maximilianeum, Munich, evinces wonted imagination and facility in composition; the handling also retains its largeness and vigour; but in this astounding scenic uproar moderation and the simplicity of nature are thrown to the winds, and the whole atmosphere is hot and feverish.

Kaulbach's was a beauty-loving art. He is not supreme as a colourist; he belongs in fact to a school that holds colour in sub- ordination ; but he laid, in common with the great masters, the sure foundation of his art in form and composition. Indeed, the science of composition has seldom if ever been so clearly understood or worked out with equal complexity and exactitude; the constituent lines, the relation of the parts to the whole, are brought into absolute agree- ment ; in modern Germany painting and music have trodden parallel paths, and Kaulbach is musical in the melody and harmony of his compositions. His narrative too is lucid, and moves as a stately march or royal triumph ; the sequence of the figures is unbroken ; the arrangement of the groups accords with even literary form; the picture falls into incident, episode, dialogue, action, plot, as a drama. The style is eclectic ; in the Age of Homer the types and the treat- ment are derived from Greek marbles and vases ; then in the Tower of Babel the severity of the antique gives place to the suavity of the Italian renaissance ; while in the Crusades the composition is let loose into modern romanticism, and so the manner descends into the midst of the 19th century. And yet this scholastically compounded art is so nicely adjusted and smoothly blended that it casts off all incon- gruity and becomes homogeneous as the issue of one mind. But a fickle public craved for change; and so the great master in later years waned in favour, and had to witness, not without inquietude, the rise of an opposing party of naturalism and realism. (J. B. A.)

KAUNITZ-RIETBURG, WENZEL ANTON, Prince von (171 1- 1794), Austrian chancellor and diplomatist, was born at Vienna on the 2nd of February 171 1. His father, Max Ulrich.was the third count of Kaunitz, and married an heiress, Maria Ernestine Franziska von Rietburg. The family was ancient, and was believed to have been of Slavonic origin in Moravia. Wenzel Anton, being a second son, was designed for the church, but on the death of his elder brother he was trained for the law and for diplomacy, at Vienna, Leipzig and Leiden, and by travel. His

family had served the Habsburgs with some distinction, and Kaunitz had no difficulty in obtaining employment. In 1735 he was a Reichshofrath. When the Emperor Charles VI. died in 1740, he is said to have hesitated before deciding to support Maria Theresa. If so, his hesitation did not last long, and left no trace on his loyalty. From 1742 to 1744 he was minister at Turin, and in the latter year was sent as minister with the Arch- duke Charles of Lorraine, the governor of Belgium. He was therefore an eye-witness of the campaigns in which Marshal Saxe overran Belgium. At this time he was extremely discouraged, and sought for his recall. But he had earned the approval of Maria Theresa, who sent him as representative of Austria to the peace congress of Aix-la-Chapelle in 1748. His tenacity and dexterity established his reputation as a diplomatist. He con- firmed his hold on the regard and confidence of the empress by the line he took after

the conclusion of the peace. In 1749 Maria Theresa appealed to all her counsellors for advice as to the policy Austria ought to pursue in view of the changed conditions pro- duced by the rise of Prussia. The great majority of them, including her husband Francis I., were of opinion that the old alliance with the sea Powers, England and Holland, should be maintained. Kaunitz, either because he was really persuaded that the old policy must be given up, or because he saw that the dominating idea in the mind of Maria Theresa was the recovery of Silesia, gave it as his opinion that Frederick was now the "most wicked and dangerous enemy of Austria," that it was hopeless to expect the support of Protestant nations against him, and that the only way of recovering Silesia was by an alliance with Russia and France. The empress eagerly accepted views which were already her own, and entrusted the adviser with the execution of his own plans. An ambassador to France from 1750 to 1752, and after 1753 as " house, court and state chancellor," Kaunitz laboured successfully to bring about the alliance which led to the Seven Years' War. It was considered a great feat of diplomacy, and established Kaunitz as the recog- nized master of the art. His triumph was won in spite of per- sonal defects and absurdities which would have ruined most men. Kaunitz had manias rarely found in company with absolute sanity. He would not hear of death, nor approach a sick man. He refused to visit his dying master Joseph II. for two whole years. He would not breathe fresh air. On the warmest summer day he kept a handkerchief over his mouth when out of doors, and his only exercise was riding under glass, which he did every morning for exactly the same number of minutes. He relaxed from his work in the company of a small dependent society of sycophants and buffoons. He was con- sumed by a solemn, garrulous and pedantic vanity. When in 1770 he met Frederick the Great at Mahrisch-Neustadt, he came with a summary of political principles, which he called a cate- chism, in his pocket, and assured the king that he must be allowed to speak without interruption. When Frederick, whose interest it was to humour him, promised to listen quietly, Kaunitz rolled his mind out for two hours, and went away with the firm con- viction that he had at last enlightened the inferior intellect of the king of Prussia as to what politics really were. Within a very short time Frederick had completely deceived and out- manoeuvred him. With all his pomposity and conceit, Kaunitz was astute, he was laborious and orderly; when his advice was not taken he would carry out the wishes of his masters, while no defeat ever damped his pertinacity.

To tell his history from 1750 till his retirement in 1792 would be to tell part of the internal history of Austria, and all the inter- national politics of eastern and central Europe. His governing principle was to forward the interests of " the august house of Austria," a phrase sometimes repeated at every few lines of his despatches. In internal affairs he in 1758

recommended, and helped to promote, a simplification of the confused and sub- divided Austrian administration. But his main concern was always with diplomacy and foreign policy. Here he strove with untiring energy, and no small measure of success, to extend the Austrian dominions. After the Seven Years' War he endea- voured to avoid great risks, and sought to secure his ends by

alliances, exchanges and claims professing to have a legal basis, and justified at enormous length by arguments both pedantic and hypocritical. The French Revolution had begun to alter all the relations of the Powers before his retirement. He never understood its full meaning. Yet the circular despatch which he addressed to the ambassadors of the emperor on the 17th of July 1794 contains the first outlines of Metternich's policy of " legitimacy," and the first proposal for the combined action of the powers, based on the full recognition of one another's rights, to defend themselves against subversive principles. Kaunitz died at his house, the Garten Palast, near Vienna, on the 27th of June 1794. He married on the 6th of May 1736, Maria Ernestine von Starhemberg, who died on the 6th of September 1754. Four sons were born of the marriage.

See Hormayr, Oesterreichischer Plutarch (Vienna, 1823), for a biographical sketch based on personal knowledge. Also see Brunner, Joseph II.: Correspondance avec Cobcnzl et Kaunitz (Mayence, 1 871) ; A. Beer, Joseph II., Leopold II. und Kaunitz (Vienna, 1873).

KAUP, JOHANN JAKOB (1803-1873), German naturalist, was born at Darmstadt on the 10th of April 1803. After study- ing at Gottingen and Heidelberg he spent two years at Leiden, where his attention was specially devoted to the amphibians and fishes. He then returned to Darmstadt as an assistant in the grand ducal museum, of which in 1840 he became inspector. In 1829 he published Skizze zur Entwickelungsgeschichte der europ&ischen Thierwelt, in which he regarded the animal world as developed from lower to higher forms, from the amphibians through the birds to the beasts of prey; but subsequently he repudiated this work as a youthful indiscretion, and on the publication of Darwin's Origin of Species he declared himself against its doctrines. The extensive fossil deposits in the neigh- bourhood of Darmstadt gave him ample opportunities for palaeontological inquiries, and he gained considerable reputation by his Beitrdge zur ndheren Kenntniss der urweltlichen Sdugethiere (1855-1862). He also wrote Classification der Sdugethiere und Vogel (1844), and, with H. G. Brown (1800-1862) of Heidelberg, Die Gavial-artigen Reste aus dem

Lias (1842-1844). He died at Darmstadt on the 4th of July 1873.

KAURI PINE, in botany, Agathis auslralis, a conifer native of New Zealand where it is abundant in forests in the North Island between the North Cape and 38 south latitude. The forests are rapidly disappearing owing to use as timber and to destruction by fires. It is a tall resirfiferous tree, usually ranging from 80 to 100 ft. in height, with a trunk 4 to 10 ft. in diameter, but reaching 1 50 ft. , with a diameter of 1 5 to 2 2 ft. ; it has a straight columnar trunk and a rounded bushy head. The thick resini- ferous bark falls off in large flat flakes. The leaves, which per- sist for several years, are very thick and leathery; on young trees they are lance-shaped 2 to 4 in. long and 1 to 5 in. broad, becom- ing on mature trees linear-oblong or obovate-oblong and f to 15 in. long. The ripe cones are almost spherical, erect, and 2 to 3 in. in diameter; the broad, flat, rather thin cone-scales fall from the axis when ripe. Each scale bears a single compressed seed with a membranous wing. The timber is remarkable for its strength, durability and the ease with which it is worked. The resin, kauri- gum, is an amber-like deposit dug in large quantities from the sites of previous forests, in lumps generally vary- ing in size from that of a hen's egg to that of a man's head. The colour is of a rich brown or amber yellow, or it may be almost colourless and translucent. It is of value for varnish- making.

KAVA (Cava or Ava), an intoxicating, but non-alcoholic beverage, produced principally in the islands of the South Pacific, from the roots or leaves of a variety of the pepper plant (Piper methysticum). The method of preparation is somewhat peculiar. The roots or leaves are first chewed by young girls or boys, care being taken that only those possessing sound teeth and excellent general health shall take part in this operation. The chewed material is then placed in a bowl, and water or coco-nut milk is poured over it, the whole is well stirred, and subsequently the woody matter is removed by an ingenious but simple mechanical manipulation. The resulting liquid, which

has a muddy or cafe-au-lait appearance, or is of a greenish hue if made from leaves, is now ready for consumption. The taste of the liquid is at first sweet, and then pungent and acrid. The usual dose corresponds to about two mouthfuls of the root. Intoxication (but this apparently only applies to those not inured to the use of the liquor) follows in about twenty minutes. The drunkenness produced by kava is of a melancholy, silent and drowsy character. Excessive drinking is said to lead to skin and other diseases, but per contra many medicinal virtues are ascribed to the preparation. There appears to be little doubt that the active principle in this beverage is a poison of an alka- loidal nature. It seems likely that this substance is not present as such {i.e. as a free alkaloid) in the plant, but that it exists in the form of a glucoside, and that by the process of chewing this glucoside is

split up by one of the ferments in the saliva into the free alkaloid and sugar.

See Pharm. Journ. iii. 474; iv. 85; ix. 219; vii. 149; Comptes Rendus, 1. 436, 598; lii. 206; Journ. de Pharm. (i860) 20; (1862) 218; Seeman, Flora- Vitiensis, 260; Beachy, Voyage of -the "Blossom," ii. 120. j

KAVADH (Kabades, Katjades), a Persian name which occurs first in the mythical history of the old Iranian kingdom as Kai Kobadh (Kaikobad) . It was borne by two kings of the Sassanid dynasty.

(r) Kavadh I., son of Peroz, crowned by the nobles in 488 in place of his uncle Balash, who was deposed and blinded. At this time the empire was utterly disorganized by the invasion of the Ephthalites or White Huns from the east. After one of their victories against Peroz, Kavadh had been a hostage among them during two years, pending the payment ,of a heavy ran- som. In 484 Peroz had been defeated and slain with his whole army. Balash was not able to restore the royal authority. The hopes of the magnates and high priests that Kavadh would suit their purpose were soon disappointed. Kavadh gave his support to the communistic sect founded by Mazdak, son of Bamdad, who demanded that the rich should divide their wives and their wealth with the poor. His intention evidently was, by adopting the doctrine of the Mazdakites, to break the influ- ence of the magnates. But in 496 he was deposed and incar- cerated in the " Castle of Oblivion (Lethe) " in Susiana, and his brother Jamasp (Zamaspes) was raised to the throne. Kavadh, however, escaped and found refuge with the Ephthalites, whose king gave him his daughter in marriage and aided him to return to Persia. In 499 he became king again and punished his oppo- nents. He had to pay a tribute to the Ephthalites and applied for subsidies to Rome, which had before supported the Persians. But now the emperor Anastasius refused subsidies, expecting that the two rival powers of the East would exhaust one another in war. At the same time he intervened in the affairs of the Persian part of Armenia. So Kavadh joined the Ephthalites and began war against the Romans. In 502 he took Theodosio- polis in Armenia, in 503 Amida (Diarbekr) on the Tigris. In 505 an invasion of Armenia by the western Huns from the Caucasus led to an armistice, during which the Romans paid subsidies to the Persians for the maintenance of the fortifications on the Caucasus. When Justin I. (518-527) came to the throne the conflict began anew. The Persian vassal, Mondhir of Hira, laid waste Mesopotamia and slaughtered the monks and nuns. In 531 Belisarius was beaten at Callinicum. Shortly afterwards Kavadh died, at the age of eighty two, in September 531. During his last years his favourite son Chosroes had had great influence over him and had been proclaimed successor. He also induced Kavadh to break with the Mazdakites, whose doctrine had spread widely and caused great social

confusion throughout Persia. In 529 they were refuted in a theological discussion held before the throne of the king by the orthodox Magians, and were slaughtered and persecuted everywhere; Mazdak himself was hanged. Kavadh evidently was, as Pro copius (Pers. i. 6) calls him, an unusually clear-sighted and ener- getic ruler. Although he could not free himself from the yoke of the Ephthalites, he succeeded in restoring order in the interior and fought with success against the Romans, He built some

towns which were named after him, and began to regulate the taxation.

(2) Kavadh II. Sheroe (Siroes), son of Chosroes II., was raised to the throne in opposition to his father in February 628, after the great victories of the emperor Heraclius. He put his father and eighteen brothers to death, began negotiations with Hera- clius, but died after a reign of a few months. (Ed. M.)

KAVALA, orCAVALLA,awalled town and seaport of European Turkey in the vilayet of Salonica, on the Bay of Kavala, an inlet of the Aegean Sea. Pop. (1905), about 5000. Kavala is built on a promontory stretching south into the bay, and opposite the island of Thasos. There is a harbour on each side of the pro- montory. The resident population is increased in summer by an influx of peasantry, of whom during the season 5000 to 6000 are employed in curing tobacco and preparing it for export. The finest Turkish tobacco is grown in the district, and shipped to all parts of Europe and America, to the annual value of about £1,250,000. Mehemet Ali was born here in 1769, and founded a Turkish school which still exists. His birthplace, an unpreten-: tious little house in one of the tortuous older streets, can be dis- tinguished by the tablet which the municipal authorities have affixed to its front wall. Numerous Roman remains have been found in the neighbourhood, of which the chief is the large aqueduct on two tiers of arches which still serves to supply the town and dilapidated citadel with water from Mount Pangeus.

Kavala has been identified with Neapolis, at which St Paul landed on his way from Samothrace to Philippi (Acts xvi. 11). Neapolis was the port of Philippi, as Kavala now is of Seres; in the bay on which it stands the fleet of Brutus and Cassius was stationed during the battle of Philippi. Some authorities identify Neapolis with Datum (Aa-roe), mentioned by Herodotus as famous for its gold mines.

KAVANAGH, ARTHUR MACMORROUGH (1831-1889), Irish politician,

son of Thomas Kavanagh, M.P., who traced his descent to the ancient kings of Leinster, was born in Co. Carlow, Ireland, on the 25th of March 1831. He had only the rudiments of arms and legs, but in spite of these physical defects had a remarkable career. He learnt to ride in the most fearless way, strapped to a special saddle, and managing the horse with the stumps of his arms; and also fished, shot, drew and wrote, various mechanical contrivances being devised to supplement his limited physical capacities. He travelled extensively in Egypt, Asia Minor, Persia and India between 1846 and 1853, and after succeeding to the family estates in the latter year, he married in 1855 his cousin, Miss Frances Mary Leathley. Assisted by his wife, he was a most philanthropic landlord, and was an active county magistrate and chairman of the board of guardians. A Conservative and a Protestant, he sat in Parliament for Co. Wexford from 1866 to 1868, and for Co. Carlow from 1868 to 1880. He was opposed to the disestablishment of the Irish Church, but supported the Land Act of 1870, and sat on the Bessborough Commission. In 1886 he was made a member of the Privy Council in Ireland. He died of pneumonia on the 25th of December 1889, in London. It is supposed that his extraordinary career suggested the idea of " Lucas Malet's " novel, The History of Sir Richard Calmady.

KAVANAGH, JULIA (1824-1877), British novelist, was born at Thurles in Tipperary, Ireland, in 1824. She was the daughter of Morgan Peter Kavanagh (d. 1874), author of various worthless philological works and some poems. Julia spent several years of her early life with her parents in Normandy, laying there the foundation of a mastery of the French language and insight into French modes of thought, which was perfected by her later frequent and long residences in France. Miss Kavanagh's literary career began with her arrival in London about 1844, and her uneventful life affords few incidents to the biographer. Her first book was Three Paths (1847), a story for the young; but her first work to attract notice was Madeleine, a Tale of Auvergne (1848). Other books followed: A Summer and Winter in the Two Sicilies (1858); French Women of Letters (1862); English Women of Letters (1862); Woman in France during the i&lh Century (1850); and Women of Christianity (1852), The scenes

of her storks are almost always laid in France, and she handles her French themes with fidelity and skill. Her style is simple and pleasing rather than striking; and her characters are interesting without being strongly individualized. Her most popular novels were perhaps Adele (1857), Queen Mob (1863), and John Dorrien (1875). On the outbreak of the Franco-German War Julia Kavanagh removed with her mother from Paris to Rouen. She died at Nice on the 28th of October 1877.

KAVASS, or Cavass (adapted from the Turkish qawwas, a bow-maker;

Arabic qaivs, a bow), a Turkish name for an armed police-officer; also for a courier such as it is usual to engage when travelling in Turkey.

KAVIRONDO, a people of British East Africa, who dwell in the valley of the Nzoia River, on the western slopes of Mount Elgon, and along the north-east coast of Victoria Nyanza. Kavirondo is the general name of two distinct groups of tribes, one Bantu and the other Nilotic. Both groups are immigrants, the Bantu from the south, the Nilotic from the north. The Bantu appear to have been the first comers. The Nilotic tribes, probably an offshoot of the Acholi (q.v.), appear to have crossed the lake to reach their present home, the country around Kavirondo Gulf. Of the two groups the Bantu now occupy a more northerly position than their neighbours, and " are practically the most northerly representatives of that race " (Hobley). Their further progress north was stopped by the southward movement of the Nilotic tribes, while the Nilotic Kavirondo in their turn had their wanderings arrested by an irruption of Elgumi people from the east. The Elgumi are themselves probably of Nilotic origin. Both groups of Kavirondo are physically fine, the Nilotic stock appearing more virile than the Bantu. The Bantu Kavirondo are divided into three principal types — the Awa-Rimi, the Awa-Ware and the Awa-Kisii. By the Nilotic Kavirondo their Bantu neighbours are known as Ja-Mwa. The generic name for the Nilotic tribes is Ja-Luo. The Bantu Kavirondo call them Awa-Nyoro. The two groups have many characteristics in common. A charac- teristic feature of the people is their nakedness. Among the Nilotic Kavirondo married men who are fathers wear a small piece of goat-skin, which though practically useless as a covering must be worn according to tribal etiquette. Even among men who have adopted European clothing this goat-skin must still be worn underneath. Contact with whites has led to the adoption of European clothing by numbers of the men, but the women, more conservative, prefer nudity or the scanty covering which they wore before the advent of Europeans. Among the Bantu Kavirondo married women wear a short fringe of black string in front and a tassel of banana fibre suspended from a girdle behind, this tassel having at a distance the appearance of a tail. Hence the report of early travellers as to a tailed race in Africa. The Nilotic Kavirondo women wear the tail, but dispense with the fringe in front. For " dandy " they wear a goat-skin slung over the shoulders. Some of the Bantu tribes practise circumcision, the Nilotic tribes do not. Patterns are tattooed on chest and stomach for ornament. Men, even husbands, are forbidden to touch the women's tails, which must be worn even should any other clothing be wrapped round the body. The Kavirondo are noted for their independent and pugnacious nature, their honesty and their sexual morality, traits particularly marked among the Bantu tribes. There are more women than men, and thus the Kavirondo are naturally inclined towards polygamy. Among the Bantu tribes a man has

the refusal of all the younger sisters of his wife as they attain puberty. Practically no woman lives unmarried all her life, for if no suitor seeks her, she singles out a man and offers herself to him at a " reduced price," an offer usually accepted, as the women are excellent agricultural labourers. The Nilotic Kavirondo incline to exogamy, endeavouring always to marry outside their clan. Girls are betrothed at six or seven, and the husband-elect continually makes small presents to his father- in-law-elect till the bride reaches womanhood. It is regarded as shameful if the girl be not found a virgin on her wedding day. She is sent back to her parents, who have to return the marriage

price, and pay a fine. The wife's adultery was formerly punished with death, and the capital penalty was also inflicted on young men and girls guilty of unchastity. Among the Bantu Kavirondo the usual minimum price for a wife is forty hoes, twenty goats and one cow, paid in instalments. The Nilotic Kavirondo pay twenty sheep and two to six cows; the husband- elect can claim his bride when he has made half payment. If a woman dies without bearing children, the amount of her pur- chase is returnable by her father, unless the widower consents to replace her by another sister. The women are prolific and the birth of twins is common. This is considered a lucky event, and is celebrated by feasting and dances. Among the Bantu Kavirondo the mother of twins must remain in her hut for seven days. Among the Nilotic Kavirondo the parents and the infants must stay in the hut for a whole month. If a Bantu mother has lost two children in succession the next child born is taken out at dawn and placed on the road, where it is left till a neighbour, usually a woman friend who has gone that way on purpose, picks it up. She takes it to its mother who gives a goat in return. A somewhat similar custom prevails among the Nilotic tribes. Names are not male and female, and a daughter often bears her father's name.

The Kavirondo bury their dead. Among one of the Bantu tribes, the Awa-Kisesa, a chief is buried in the floor of his own hut in a sitting position, but at such a depth that the head protrudes. Over the head an earthenware pot is placed, and his principal wives have to remain in the hut till the flesh is eaten by ants or decomposes, when the skull is removed and buried close to the hut. Later the skeleton is unearthed, and reburied with much ceremony in the sacred burial place of the tribe. Married women of the Bantu tribes are buried in their hut lying on their right side with legs doubled up, the hut being then deserted. Among the Nilotic tribes the grave is dug beneath the verandah of the hut. Men of the Bantu tribes are buried in an open space in

the midst of their huts ; in the Nilotic tribes, if the first wife of the deceased be alive he is buried in her hut, if not, beneath the verandah of the hut in which he died. A child is buried near the door of its mother's hut. A sign of mourn- ing is a cord of banana fibre worn round the neck and waist. A chief chooses, sometimes years before his death, one of his sons to succeed him, often giving a brass bracelet as insignia. A man's property is divided equally among his children.

The Kavirondo are essentially an agricultural people: both men and women work in the fields with large iron hoes. In addition to sorghum, Eleusine and maize, tobacco and hemp are both cultivated and smoked. Both sexes smoke, but the use of hemp is restricted to men and unmarried women, as it is thought to injure child-bearing women. Hemp is smoked in a hubble-bubble. The Kavirondo cultivate sesamum and make an oil from its seeds which they burn in little clay lamps. These lamps are of the ancient saucer type, the pattern being, in Hobley's opinion, introduced into the country by the coast people. While some tribes live in isolated huts, those in the north have strongly walled villages. The walls are of mud and formerly, among the Nilotic tribes, occasionally of stone. Since the advent of the British the security of the country has induced the Kavirondo to let the walls fall into disrepair. Their huts are circular with conical thatched roof, and fairly broad verandah all round. A portion of the hut is partitioned off as a sleeping-place for goats, and the fowls sleep indoors in a large basket. Skins form the only bed- steads. In each hut are two fireplaces, about which a rigid etiquette Erevails. Strangers or distant relatives are not allowed to pass eyond the first, which is near the door, and is used for cooking. At the second, which is nearly in the middle of the hut, sit the hut owner, his wives, children, brothers and sisters. Around this fire- place the family sleep. Cooking pots, water pots and earthenware train jars are the only other furniture. The food is served in small askets. Every full grown man has a hut. to himself, and one for each wife. The huts of the Masaba Kavirondo of west Elgon have the apex of the roof surmounted by a carved pole which Sir H. H. Johnston says is obviously a phallus. Among the Bantu Kavirondo a father does not eat with his sons, nor do brothers eat together. Among the Nilotic tribes father and sons eat together, usually in a separate hut with open sides. Women eat apart ind only after the men have finished. The Kavirondo keep cattle, sheep, goats, fowls and a few dogs. Women do not eat sheep, fowls or eggs, and are not allowed to drink milk except when mixed with other things. The flesh of the wild cat and leopard is esteemed by most of the tribes. From Eleusine a beer is made. The Kavirondo are plucky hunters, capturing the hippopotamus with ropes and traps, and attacking with spears the largest elephants. Fish, of which they are very fond, are caught by line and rod or in traps. Bee-keeping is common, and where trees are scarce the hives are placed on the roof of the

hut. Among the Bantu Kavirondo goats and sheep are suffocated, the snout being held until the animal dies. Though a peaceful people the Kavirondo fight well. Their weapons are spears with rather long

flat blades without blood-courses, and broad-bladed swords. Some use slings, and most carry shields. Bows and .arrows are also used; firearms are however displacing other weapons. Kavirondo warfare was mainly defensive and intertribal, this last a form of vendetta. When a man had killed his enemy in battle he shaved his head on his return and he was rubbed with " medicine " (generally goat's dung), to defend him from the spirit of the dead man. This custom the Awa-Wanga abandoned when they obtained firearms. The young warriors were made to stab the bodies of their slain enemies. Kavirondo industries are salt-making, effected by burning reeds and water-plants and passing water through the ashes; the smelting of iron ore (confined to the Bantu tribes) ; pottery and basket-work.

The Kavirondo have many tribes, divided, Sir H. H. Johnston suspects, totemically. Their religion appears to be a vague ancestor- worship, but the northern tribes have two gods, Awafwa and Ishis- hemi, the spirits of good and evil. To the former cattle and goats are sacrificed. The Kavirondo have great faith in divination from the entrails of a sheep. Nearly everybody and everything is to the Kavirondo ominous of good or evil. They have few myths or traditions; the ant-bear is the chief figure in their beast-legends. They believe in witchcraft and practise trial by ordeal. As a race the Kavirondo are on the increase. This is due to their fecundity and morality. Those who live in the low-lying lands suffer from a mild malaria, while abroad they are subject to dysentery and pneu- monia. Epidemics of small-pox have occurred. Native medicine is of the simplest. They dress wounds with butter and leaves, and for inflammation of the lungs or pleurisy pierce a hole in the chest. There are no medicine-men — the women are the doctors. Certain of the incisor teeth are pulled out. If a man retains these he will, it is thought, be killed in warfare. Among certain tribes the women also have incisor teeth extracted, otherwise misfortune would befall their husbands. For the same reason the wife scars the skin of her forehead or stomach. A Kavirondo husband, before starting on a perilous journey, cuts scars on his wife's body to ensure him good luck. Of dances the Kavirondo have four — the birth dance, the death dance, that at initiation and one of a propitiatory kind in seasons of drought. Their music is plaintive and sometimes pretty, produced by a large lyre-shaped instrument. They use also various drums.

The Ja-Luo women use for ear ornaments small beads attached to pieces of brass. Like the aggry beads of West Africa these beads are not of local manufacture nor of recent introduction. They are ancient, in colour

generally blue, occasionally yellow or green, and are picked up in certain districts after heavy rain. By the natives they are supposed to come down with the rain. They are identical in shape and colour with ancient Egyptian beads and other beads obtained from ancient cities in Baluchistan.

See C. W. Hobley, Eastern Uganda, an Ethnological Survey (Anthrop. Inst., Occasional Papers, No. I, London, 1902); Sir H. H. Johnston, Uganda Protectorate (1902); J. F. Cunningham, Uganda and its Peoples (1905); Paul Kollmann, The Victoria Nyanza (1899).

(T. A. J.)

KAW, or Kansa, a tribe of North American Indians of Siouan stock. They were originally an offshoot of the Osages. Their early home was in Missouri, whence they were driven to Kansas by the Dakotas. They were moved from one reservation to another, till in 1873 they were settled in Indian Territory; they have since steadily decreased, and now number some 200.

KAWARDHA, a feudatory state of India, within the Central Provinces; area, 798 sq. m.; pop. (1901), 57,474, showing a decrease of 37 % in the decade, due to famine; estimated revenue, £7000. Half the state consists of hill and forest. The residence of the chief, who is a Raj Gond, is at Kawardha (pop. 4772), which is also the headquarters of the Kabirpanthi sect (see Kabir).

KAY, JOHN (1742-1826), Scottish caricaturist, was born near Dalkeith, where his father was a mason. At thirteen he was apprenticed to a barber, whom he served for six years. He then went to Edinburgh, where in 177 1 he obtained the freedom of the city by joining the corporation of barber-surgeons. In 1785, induced by the favour which greeted certain attempts of his to etch in aquafortis, he took down his barber's pole and opened a small print shop in Parliament Square. There he continued to flourish, painting miniatures, and publishing at short intervals his sketches and caricatures of local celebrities and oddities, who abounded at that period in Edinburgh society. He died on the 21st of February 1826.

Kay's portraits were collected by Hugh Paton and published under the title A series of original portraits and caricature etchings by the late John Kay, with biographical sketches and illustrative anecdotes (Edin., 2 vols. 4to, 1838; 8vo ed., 4 vols., 1842; new 4to ed., with additional plates, 2 vols., 1877), forming a unique record

of the social life and popular habits of Edinburgh at its most interest- ing epoch.

KAY, JOSEPH (1821-1878), English economist, was born at Salford, Lancashire, on the 27th of February 1821. Educated privately and at Trinity College, Cambridge, he was called to the bar at the Inner Temple in 1848. He was appointed judge of the Salford Hundred court of record in 1862 and in 1869 was made a queen's counsel. He is best known for a series of works on the social condition of the poor in France, Switzerland, Holland, Germany and Austria, the materials for which he gathered on a four years' tour as travelling bachelor of his university. They were The Education of the Poor in England and Europe (London, 1846); The Social Condition of the People in England and Europe (London, 1850, 2 vols.); The Condition and Education of Poor Children in English and in German Towns (Manchester, 1853). He was also the author of The Law relating to Shipmasters and Seamen (London, 1875) and Free Trade in Land (1879, with a memoir). He died at Dorking, Surrey, on the 9th of October 1878.

KAYAK, or Cayak, an Eskimo word for a fishing boat, in common use from Greenland to Alaska. It has been erroneously derived from the Arabic caique, supposed to have been applied to the native boats by early explorers. The boat is made by covering a light wooden framework with sealskin. A hole is pierced in the centre of the top of the boat, and the kayaker (also dressed in sealskin) laces himself up securely when seated to prevent the entrance of water. The kayak is propelled like a canoe by a double-bladed paddle. The name kayak is properly only applied to the boat used by an Eskimo man — that used by a woman is called an umiak.

KAYASTH, the writer caste of Northern India, especially numerous and influential in Bengal. In 1901 their total number in all India was more than two millions. Their claim to be Kshattriyas who have taken to clerical work is not admitted by the Brahmans. Under Mahommedan rule they learnt Persian, and filled many important offices. They are now eager students of English, and have supplied not only several judges to the high court but also the first Hindu to be a member of the governor-general's council. In Bombay their place is taken by the Prabhus, and in Assam by the Kalitas (Kolitas) ; in Southern India there is no distinct clerical caste.

KAYE, SIR JOHN WILLIAM (1814-1876), English military historian, was the son of Charles Kaye, a solicitor, and was educated at Eton and the Royal Military College, Addiscombe. From 1832 to 1841 he was an officer in the Bengal Artillery, afterwards spending some years in literary pursuits both in India and in England. In 1856 he entered the civil service of the East India Company, and when the government of India was transferred to the British crown succeeded John Stuart Mill as secretary of the political

and secret department of the India office. In 187 1 he was made a K. C.S.I. He died in London on the 24th of July 1876. Kaye's numerous writings include History of the Sepoy War in India (London, 1864-1876), which was revised and continued by Colonel G. B. Malleson and published in six volumes in 1888- 1889; History of the War in Afghanistan (London, 1851), republished in 1858 and 1874; Administration of the East India Company (London, 1853) ; The Life and Correspondence of Charles, Lord Metcalfe (London, 1854) ; The Life and Correspondence of Henry St George Tucker (London, 1854); Life and Correspondence of Sir John Malcolm (London, 1856); Christianity in India (London, 1859); Lives of Indian Officers (London, 1867); and two novels, Peregrine Pultney and Long engagements. He also edited several works dealing with Indian .affairs; wrote Essays of an Optimist (London, 1870); and was a frequent contributor to periodicals.

KAYSER, FRIEDRICH HEINRICH EMANUEL (1845-). German geologist and palaeontologist, was born at Konigsberg, on the 26th of March 1845. He was educated at Berlin where he took his degree of Ph.D. in 1870. In 1882 he became professor of geology in the university at Marburg. He investigated fossils of various ages and from all parts of the world, but more especially from the Palaeozoic formations, including those of

South Africa, the Polar regions, and notably the Devonian fossils of Germany, Bohemia and other parts of Europe.

Among his separate works are Lehrbuch der Geologie (2 vols., ii.), Geologische Formationskunde 1891 (2nd ed., 1902), and i. Allgemeine Geologie (1893), vol. ii. (the volume first issued) was translated and edited by P. Lake, 1893, under the title Textbook of Comparative Geology. Another work is Beitrdge zur Kenntniss der Fauna der Siegenschen Grauwacke (1892).

KAY-SHUTTLEWORTH, SIR JAMES PHILLIPS, Bart. (1804-1877), English politician and educationalist, was born at Rochdale, Lancashire, on the 20th of July 1804, the son of Robert Kay. At first engaged in a Rochdale bank, in 1824 he became a medical student at Edinburgh University. Settling in Manchester about 1827, he worked for the Ancoats and Ardwick Dispensary, and the experience which he thus gained of the conditions of the poor in the Lancashire factory districts, together with his interest in economic science, led to his appoint- ment in 1835 as poor law commissioner in Norfolk and Suffolk and later in the London districts. In 1839 he was appointed first secretary of the committee formed by the Privy Council to administer the Government grant for the public education in Great Britain. He is remembered as having founded at Battersea, London, in conjunction with E. Carleton Tufnell, the first training college for school

teachers (1839-1840); and the system of national school education of the present day, with its public inspection, trained teachers and its support by state as well as local funds, is largely due to his initiative. In 1842 he married Lady Janet Shuttleworth, assuming by royal licence his bride's name and arms. A breakdown in his health led him to resign his post on the committee in 1849, but subsequent recovery enabled him to take an active part in the working of the central relief committee instituted under Lord Derby, during the Lancashire cotton famine of 1861-1865. He was created a baronet in 1849. Until the end of his life he interested himself in the movements of the Liberal party in Lancashire, and the progress of education. He died in London on the 26th of May 1877. His Physiology, Pathology and Treatment of Asphyxia became a standard textbook, and he also wrote numerous papers on public education.

His son, Sir Ughtred James Kay-Shuttleworth (b. 1844), became a well-known Liberal politician, sitting in parliament for Hastings from 1869 to 1880 and for the Clitheroe division of Lancashire from 1885 till 1902, when he was created Baron Shuttleworth. He was chancellor of the duchy of Lancaster in 1886, and secretary to the Admiralty in 1892-1895.

KAZALA, or Kazalinsk, a fort and town in the Russian province of Syr-darya in West Turkestan, at the point where the Kazala River falls into the Syr-darya, about 50 m. from its mouth in Lake Aral, in 45° 45′ N. and 62 7′ E., " at the junc- tion," to quote Schuyler, " of all the trade routes in Central Asia, as the road from Orenburg meets here with the Khiva, Bokhara and Tashkent roads." Besides carrying on an active trade with the Kirghiz of the surrounding country, it is of growing importance in the general current of commerce. Pop. (1897), 7600. The floods in the river make it an island in spring; in summer it is parched by the sun and hot winds, and hardly a tree can be got to grow. The streets are wide, but the houses, as well as the fairly strong fort, are built of mud bricks.

KAZAR, a government of middle Russia, surrounded by the governments of Vyatka, Ufa, Samara, Simbirsk, Nizhniy- Novgordd and Kostroma. Area 24,601 sq. m. It belongs to the basins of the Volga and its tributary the Kama, and by these streams the government is divided into three regions; the first, to the right of the main river, is traversed by deep ravines sloping to the north-east, towards the Volga, and by two ranges of hills, one of which (300 to 500 ft.) skirts the river; the second region, between the left bank of the Volga and the left bank of the Kama, is an open steppe; and the third, between the left bank of the Volga and the right bank of the Kama, resembles in its eastern part the first region, and in its western part is covered with forest. Marls, limestones and sandstones, of Permian or Triassic age, are the principal rocks; the Jurassic formation

appears in a small part of the Tetylishi district in the south; and Tertiary rocks stretch along the left bank of the Volga. Mineral springs (iron, sulphur and petroleum) exist in several places. The Volga is navigable throughout its course of 200 m. through Kazan, as weil as the Kama (120 m.); and the Vyatka, Kazanka, Rutka, Tsivyl, Greater Kokshaga, Ilet, Vetluga and Mesha, are not without value as- waterways. About four hundred small lakes are enumerated within the government; the upper and lower Kaban supply the city of Kazan with water.

The climate is severe, the annual mean temperature being 37-8° F. The rainfall amounts to 16 in. Agriculture is the chief occupation, and 82 % of the population are peasants. Out of 7,672,600 acres of arable land, 4,516,500 are under crops — chiefly rye and oats, with some wheat, barley, buckwheat, lentils, flax, hemp and potatoes. But there generally results great scarcity, and even famine, in bad years. Live stock are numerous. Forests cover 35% of the total area. Bee-keeping is an important industry. Factories employ about 10,000 persons and include flour-mills, distilleries, factories for soap, candles and tallow, and tanneries. A great variety of petty trades, especially those connected with wood, are carried on in the villages, partly for export. The fairs are well attended. There is considerable shipping on the Volga, Kama, Vyatka and their tributaries. Kazan is divided into twelve districts. The chief town is Kazan (q.v.). The district capitals, with their populations in 1897 are: Cheboksary (4568), Chistopol (20,161), Kozmodemyansk (5212), Laishev (5439), Mamadyzh (4213), Spask (2779), Sviyazhsk (2363), Tetyushi (4754). Tsarevokok-shaisk (1654), Tsivylsk (2337) and Yadrin (2467). Population (1879), 1,872,437; (1897), 2,190,185, of whom 1,113,55s were women, and 176,396 lived in towns. The estimated population in 1906 was 2.504,400. It consists principally of Russians and Tatars, with a variety of Finno-Turkish tribes: Chuvashes, Cheremisses, Mordvinians, Votyaks, Mescheryaks, and some Jews and Poles. The Russians belong to the Orthodox Greek Church or are Nonconformists; the Tatars are Mussulmans; and the Finno-Turkish tribes are either pagans or belong officially to the Orthodox Greek Church, the respective proportions being (in 1897): Orthodox Greek, 69-4% of the whole; Noncon- formists, 1 ; Mussulmans, 28-8. (P. A. K.; J. T. Be.)

KAZAN (called by the Cheremisses Ozon), a town of eastern Russia, capital of the government of the same name, situated in 55° 48′ N. and 49 26″ E., on the river Kazanka, 3 m. from the Volga, which however reaches the city when it overflows its banks every spring. Kazan lies 650 m. E. from

Moscow by rail and 253 E. of Nizhniy-Novgorod by the Volga. Pop. (1883), 140,726; (1900), 143,707, all Russians except for some 20,000 Tatars. The most striking feature of the city is the kreml or citadel, founded in 1437, which crowns a low hill on the N.W. Within its wall, capped with five towers, it contains several churches, amongst them the cathedral of the Annunciation, founded in 1562 by Gury, the first archbishop of Kazan, Kazan being an archiepiscopal see of the Orthodox Greek Church. Other buildings in the kreml are a magnificent monastery, built in 1556; an arsenal; the modern castle in which the governor resides; and the red brick Suyumbeka tower, 246 ft. high, which is an object of great veneration to the Tatars as the reputed burial-place of one of their saints. A little E. of the kreml is the Bogoroditski convent, built in 1579 for the reception of the Black Virgin of Kazan, a miracle-working image transferred to Moscow in 1612, and in St Petersburg since 1710. Kazan is the intellectual capital of eastern Russia, and an important seat of Oriental scholarship. Its university, founded in 1 804, is attended by nearly 1000 students. Attached to it are an excellent library of 220,000 vols., an astronomical observatory, a botanical garden and various museums. The ecclesiastical academy, founded in 1846, contains the old library of the Solovetsk (Solovki) monastery, which is of importance for the history of Russian religious sects. The city is adorned with bronze statues of Tsar Alexander II., set up facing the kreml. in 1895, and of the poet G. R. Derzhavin (1743-1816); also with a monument commemorating the capture of Kazan by Ivan the

Terrible. The central parts of the city consist principally of small one-storeyed houses, surrounded by gardens, and are inhabited chiefly by Russians, while some 20,000 Tatars dwell in the suburbs. Kazan is, further, the intellectual centre of the Russian Mahommedans, who have here their more important schools and their printing-presses. Between the city and the Volga is the Admiralty suburb, where Peter the Great had his Caspian fleet built for his campaigns against Persia. The more important manufactures are leather goods, soap, wax candles, sacred images, cloth, cottons, spirits and bells. A considerable trade is carried on with eastern Russia, and with Turkestan and Persia. Previous to the 13 th century, the present government of Kazan formed part of the territory of the Bulgarians, the ruins of whose ancient capital, Bolgarior Bolgary, lie 60 m. S. of Kazan. The city of Kazan itself stood, down to the 13th century, 30 m. to the N.E., where traces of it can still be seen. In 1438 Ulugh Mahommed (or Ulu Makhmet), khan of the Golden Horde of the Mongols, founded, on the ruins of the Bulgarian state, the kingdom of Kazan, which in its turn was destroyed by Ivan the Terrible of Russia in 1552 and its territory annexed to Russia. In 1774 the city was laid waste by the rebel Pugachev. It has suffered repeatedly from fires, especially in 181 5 and 1825. The Kazan

Tatars, from having lived so long amongst Russians and Finnish tribes, have lost a good many of the characteristic features of their Tatar (Mongol) ancestry, and bear now the stamp of a distinct ethnographic type. They are found also in the neighbouring governments of Vyatka, Ufa, Orenburg, Samara, Saratov, Simbirsk, Tambov and Nizhniy-Novgorod. They are intelligent and enterprising, and are engaged princi- pally in trade.

See Pineghin's KazaH Old and New (in Russian) ; Velyaminov- Zernov's K asimov Tsars (3 vols. , St Petersburg, 1 863-1 866) ; Zarinsky 's Sketches of Old Kazan (Kazan, 1877) ; Trofimov's Siege of Kazan in 1552 (Kazan, 1890); Firsov's books on the history of the native population (Kazan, 1864 and 1869); and Shpilevski, on the antiqui- ties of the town and government, in Izvestia i Zapiski of the Kazan University (1877). A bibliography of the Oriental books published in the city is printed in Bulletins of the St Petersburg Academy (1867). Compare also L. Leger's " Kazan et les tartares," in Bibl. Univ. de Geneve (1874). (P. A. K. ; J. T. Be.)

KAZERUN, a district and town of the province of Fars in Persia. The district is situated between Shiraz and Bushire. In its centre is the Kazerun Valley with a direction N.W. to S.E., a fertile plain 30 m. long and 7 to 8 m. broad, bounded S.E. by the Parishan Lake (8 m. long, 3 m. broad) N.W. by the Boshavir River, with the ruins of the old city of Beh-Shahpur (Beshaver, Boshavir, also, short, Shapur) and Sassanian bas- reliefs on its banks. There also, in a cave, is a statue of Shapur. The remainder of the district is mostly hilly country intersected by numerous streams, plains and hills being covered with zizyphus, wild almond and oak. The district is divided into two divisions: town and villages, the latter being called Kuh i Marreh and again subdivided into (1) Pusht i Kuh; (2) Yarruk; (3) Shakan. It has forty-six villages and a population of about 15,000; it produces rice of excellent quality, cotton, tobacco and opium, but very little corn, and bread made of the flour of acorns is a staple of food in many villages. Wild almonds are exported.

Kazerun, the chief place of the district, is an unwalled town situated in the midst of the central plain, in 29 37′ N., 51 43′ E. at an elevation of 2800 ft., 70 m. from Shiraz, and 96 m. from Bushire. It has a population of about 8000, and is divided into four quarters separated by open spaces. Adjoining it on the W. is the famous Nazar garden, with noble avenues of orange trees planted by a former governor, Hajji Ali Kuli Khan, in 1767. A couple of miles N. of the city behind a low rajige of hills are the imposing ruins of a marble building said to stand over the grave of Sheik Amin ed din Mahommed b. Zia ed din Mas'ud, who died a.h. 740 (a.d. 1339). S.E. of the city on a hugh mound are ruins of buildings with underground

chambers, popularly known as Kal'eh i Gabr, " castle of the fire-worshippers."

KAZINCZY, FERENCZ (1759-1831), Hungarian author, the most indefatigable agent in the regeneration of the Magyar

language and literature at the end of the 18th and beginning of the 19th century, was born on the 27th of October 1759, at Er-Semlyen, in the county of Bihar, Hungary. He studied law at Kassa and Eperies, and in Pest, where he also obtained a thorough knowledge of French and German literature, and made the acquaintance of Gideon Raday, who allowed him the use of his library. In 1784 Kazinczy became subnotary for the county of Abaiij; and in 1786 he was nominated inspector of schools at Kassa. There he began to devote himself to the restoration of the Magyar language and literature by translations from classical foreign works, and by the augmentation of the native vocabulary from ancient Magyar sources. In 1788, with the assistance of Baroti Szabo and John Bacs&nyi, he started at Kassa the first Magyar literary magazine, Magyar Muzeum; the Orpheus, which succeeded it in 1790, was his own creation. Although, upon the accession of Leopold II., Kazinczy, as a non-Catholic, was obliged to resign his post at Kassa, his literary activity in no way decreased. He not only assisted Gideon Raday in the establishment and direction of the first Magyar dramatic society, but enriched the repertoire with several translations from foreign authors. His Hamlet, which first appeared at Kassa in 1790, is a rendering from the German version of Schroder. Implicated in the democratic conspiracy of the abbot Martinovics, Kazinczy was arrested on the 14th of December 1794, and condemned to death; but the sentence was commuted to imprisonment. He was released in 1801, and shortly afterwards married Sophia Torok, daughter of his former patron, and retired to his small estate at Szephalom or " Fairhill," near Sator-Ujhely, in the county of Zemplen. In 1828 he took an active part in the conferences held for the establishment of the Hungarian academy in the historical section of which he became the first correspond- ing member. He died of Asiatic cholera, at Szephalom, on the 22nd of August 1831.

Kazinczy, although possessing great beauty of style, cannot be regarded as a powerful and original thinker; his fame is chiefly due to the felicity of his translations from the masterpieces of Lessing, Goethe, Wieland, Klopstock, Ossian, La Rochefoucauld, Marmontel, Moliere, Metastasio, Shakespeare, Sterne, Cicero, Sallust, Anacreon, and many others. He also edited the works of Baroczy (Pest, 1812, 8 vols.) and of the poet Zrinyi (1817, 2

vols.), and the poems of Dayka (1813, 3 vols.) and of John Kis, (1815, 3 vols.). A collective edition of his works {Szip Literatura), consisting for the most part of translations, was published at Pest, 1814-1816, in 9 vols. His origi- nal productions (Eredeti Mukdi), largely made up of letters, were edited by Joseph Bajza and Francis Toldy at Pest, 1836-1845, in 5 vols. Editions of his poems appeared in 1858 and in 1863.

KAZVIN, a province and town of Persia. The province is situated N.W. of Teheran and S. of Gilan. On the W. it is bounded by Khamseh. It pays a yearly revenue of about £22,000, and contains many rich villages which produce much grain and fruit, great quantities of the latter being dried and exported.

Kazvin, the capital of the province, is situated at an elevation of 4165 ft., in 36 15′ N. and 50 E., and 92 m. by road from Teheran. The city is said to have been founded in the 4th century by the Sassanian king Shapur II (309-379). It has been repeatedly damaged by earthquakes. Many of its streets and most of the magnificent buildings seen there by Chardin in 1674 and other travellers during the 17th century are in ruins. The most remarkable remains are the palace of the Safawid shahs and the mosque with its large blue dome. In the 16th century Shah Tahmasp I. (15 24-1 576) made Kazvin his capital, and it re- mained so till Shah Abbas I. (1587-1629) transferred the seat of government to Isfahan. The town still bears the title Dar es Salteneh, " the seat of government." Kazvin has many baths and cisterns fed by underground canals. The system of irriga- tion formerly carried on by these canals rendered the plain of Kazvin one of the most fertile regions in Persia; now most of the canals are choked up. The city has a population of about 50,000 and a thriving transit trade, particularly since 1899 when the carriage road between Resht and Teheran with Kazvin as a. half-way stage was opened under the auspices of the Russian " Enzeli-Teheran Road Company." Great quantities of rice,

fish and silk are brought to it from Gilan for distribution in Persia and export to Turkey.

KEAN, EDMUND (1787-1833), was born in London on the 17th of March 1 1787. His father was probably Edmund Kean, an architect's clerk; and his mother was an actress, Ann Carey, grand-daughter of Henry Carey. When in his fourth year Kean made his first appearance on the stage as Cupid in Noverre's ballet of Cymon. As a child his vivacity and cleverness, and his ready affection for those who treated him with kindness, made him a universal favourite, but the harsh circumstances of his lot, and the want of proper restraint, while they developed strong self-reliance, fostered

wayward tendencies. About 1794 a few benevolent persons provided the means of sending him to school, where he mastered his tasks with remarkable ease and rapidity; but finding the restraint intolerable, he shipped as a cabin boy at Portsmouth. Discovering that he had only escaped to a more rigorous bondage, he counterfeited both deafness and lameness with a histrionic mastery which deceived even the physicians at Madeira. On his return to England he sought the protection of his uncle Moses Kean, mimic, ventriloquist and general entertainer, who, besides continuing his pantomimic studies, introduced him to the study of Shakespeare. At the same time Miss Tidswell, an actress who had been specially kind to him from infancy, taught him the principles of acting. On the death of his uncle he was taken charge of by Miss Tidswell, and under her direction he began the systematic study of the principal Shakespearian characters, displaying the peculiar originality of his genius by interpretations entirely different from those of Kemble. His talents and interesting countenance induced a Mrs Clarke to adopt him, but the slight of a visitor so wounded his pride that he suddenly left her house and went back to his old surroundings. In his fourteenth year he obtained an engagement to play leading characters for twenty nights in York Theatre, appearing as Hamlet, Hastings and Cato. Shortly afterwards, while he was in the strolling troupe belonging to Richardson's show, the rumour of his abilities reached George III., who commanded him to recite at Windsor. He subse quently joined Saunders's circus, where in the performance of an equestrian feat he fell and broke his legs — the accident leaving traces of swelling in his insteps throughout his life. About this time he picked up music from Charles Incledon, dancing from D'Egville, and fencing from Angelo. In 1807 he played leading parts in the Belfast theatre with Mrs Siddons, who began by calling him " a horrid little man " and on further experience of his ability said that he " played very, very well," but that " there was too little of him to make a great actor." An engage- ment in 1808 to play leading characters in Beverley's provincial troupe was brought to an abrupt close by his marriage (July 17) with Miss Mary Chambers of Waterford, the leading actress. For several years his prospects were very gloomy, but in 1814 the committee of Drury Lane theatre, the fortunes of which were then so low that bankruptcy seemed inevitable, resolved to give him a chance among the " experiments " they were making to win a return of popularity. When the expecta- tion of his first appearance in London was close upon him he was so feverish that he exclaimed " If I succeed I shall go mad." His opening at Drury Lane on the 26th of January 1814 as Shy- lock roused the audience to almost uncontrollable enthusiasm. Successive appearances in Richard III., Hamlet, Othello, Mac- beth and Lear served to demonstrate his complete mastery of the whole range of tragic emotion. His triumph was so great that he himself said on one occasion, " I could not feel the stage under me." On the 29th of November

1820 Kean appeared for the first time in New York as Richard III. The success of his visit to America was unequivocal, although he fell into a vexa- tious dispute with the press. On the 4th of June 1821 he returned to England.

1 This date is apparently settled by a letter from Kean in 1829, to Dr Gibson (see Rothesay Express for the 28th of June 1893, where the letter is printed and vouched for), inviting him to dinner on the 17th of March to celebrate Kean's birthday; various other dates have been given in books of reference, the 4th of November having been formerly accepted by this Encyclopaedia.

Probably his irregular habits were prejudicial to the refinement of his taste, and latterly they tended to exaggerate his special defects and mannerisms. The adverse decision in the divorce case of Cox v. Kean on the 17th of January 1825 caused his wife to leave him, and aroused against him such bitter feeling, shown by the almost riotous conduct of the audiences before which he appeared about this time, as nearly to compel him to retire per- manently into private life. A second visit to America in 1825 was largely a repetition of the persecution which, in the name of morality, he had suffered in England. Some cities showed him a spirit of charity; many audiences submitted him to the grossest insults and endangered his life by the violence of their disapproval. In Quebec he was much impressed with the kindness of some Huron Indians who attended his performances, and he was made chief of the tribe, receiving the name Alanienouidet. Kean's last appearance in New York was on the 5th of December 1826 in Richard III., the role in which he was first seen in America. He returned to England and was ultimately received with all the old favour, but the contest had made him so dependent on the use of stimulants that the gradual deterioration of his gifts was inevit- able. Still, even in their decay his great powers triumphed during the moments of his inspiration over the absolute wreck of his physical faculties, and compelled admiration after his gait had degenerated into a weak hobble, and the lightning brilliancy of his eyes had become dull and bloodshot, and the tones of his match- less voice marred by rough and grating hoarseness. His appear- ance in Paris was a failure owing to a fit of drunkenness. His last appearance on the stage was at Covent Garden, on the 25th of March 1833 when he played Othello to the Iago of his son Charles. At the words " Villain, be sure," in scene 3 of act iii., he suddenly broke down, and crying in a faltering voice " O God, I am dying. Speak to them, Charles," fell insensible into his son's arms. He died at Richmond on the 15th of May

1833-

It was in the impersonation of the great creations of Shake- speare's genius that the varied beauty and grandeur of the acting of Kean were displayed in their highest form, although probably his most powerful character was Sir Giles Overreach in Massinger's A New Way to Pay Old Debts, the effect of his first impersonation of which was such that the pit rose en masse, and even the actors and actresses themselves were overcome by the terrific dramatic illusion. His only personal disadvantage as an actor was his small stature. His countenance was strikingly interesting and unusually mobile; he had a matchless command of facial expres- sion; his fine eyes scintillated with the slightest shades of emo- tion and thought; his voice, though weak and harsh in the upper register, possessed in its lower range tones of penetrating and resistless power, and a thrilling sweetness like the witchery of the finest music; above all, in the grander moments of his passion, his intellect and soul seemed to rise beyond material barriers and to glorify physical defects with their own greatness. Kean specially excelled as the exponent of passion. In Othello, Iago, Shylock and Richard III., characters utterly different from each other, but in which the predominant element is some form of passion, his identification with the personality, as he had con- ceived it, was as nearly as possible perfect, and each isolated phase and aspect of the plot was elaborated with the minutest attention to details, and yet with an absolute subordination of t hese to the distinct individuality he was endeavouring to portray. Coleridge said, " Seeing him act was like reading Shakespeare by flashes of lightning." If the range of character in which Kean attained supreme excellence was narrow, no one except Garrick has been so successful in so many great impersonations. Unlike Garrick, he had no true talent for comedy, but in the ex- pression of biting and saturnine wit, of grim and ghostly gaiety, he was unsurpassed. His eccentricities at the height of his fame were numerous. Sometimes he would ride recklessly on his horse Shylock throughout the night. He was presented with a tame lion with which he might be found playing in his drawing-room. The prizefighters Mendoza and Richmond the Black were among his visitors. Grattan was his devoted friend. In his earlier days Talma said of him, " He is a magnificent uncut gem; polish and

round him off and he will be a perfect tragedian." Macready, who was much impressed by Kean's Richard III. and met the actor at supper, speaks of his " unassuming manner . . . par- taking in some degree of shyness " and of the " touching grace " of his singing. Kean's delivery of the three words " I answer — NO!" in the part of Sir Edward Mortimer in The Iron Chest, cast Macready into an abyss of despair at rivalling him in this role. So full of dramatic interest is the life of Edmund Kean that it formed the subject for a play by the elder Dumas, entitled Kean on desordre et ginie, in which Frederick-Lemaitre achieved one of his greatest triumphs.

See Francis Phippen, Authentic Memoirs of Edmund Kean (1814) ; B. W. Procter (Barry Cornwall), The Life of Edmund Kean (1835); F. W. Hawkins, The Life of Edmund Kean (1869); J. Fitzgerald Molloy, The Life and Adventures of Edmund Kean (1888); Edward Stirling, Old Drury Lane (1887).

His son, Charles John Kean (1811-1868), was born at Water- ford, Ireland, on the 18th of January 181 1. After preparatory education at Worplesdon and at Greenford, near Harrow, he was sent to Eton College, where he remained three years. In 1827 he was offered a cadetship in the East India Company's service, which he was prepared to accept if his father would settle an income of £400 on his mother. The elder Kean refused to do this, and his son determined to become an actor. He made his first appearance at Drury Lane on the 1st of October 1827 as Norval in Home's Douglas, but his continued failure to achieve popularity led him to leave London in the spring of 1828 for the provinces. At Glasgow, on the 1st of October in this year, father and son acted together in Arnold Payne's Brutus, the elder Kean in the title-part and his son as Titus. After a visit to America in 1830, where he was received with much favour, he appeared in 1833 at Covent Garden as Sir Edmund Mortimer in Colman's The Iron Chest, but his success was not. pronounced enough to encourage him to remain in London, especially as he had already won a high position in the provinces. In January 1838, however, he returned to Drury Lane, and played Hamlet with a success which gave him a place among the principal tragedians of his time. He was married to the actress Ellen Tree (1805-1880) on the 29th of January 1842, and paid a second visit to America with her from 1845 to 1847. Returning to England, he entered on a successful engagement at the Haymarket, and in 1850, with Robert Keeley, became lessee of the Princess Theatre. The most noteworthy feature of his management was a series of gorgeous Shakespearian revivals. Charles Kean was not a great tragic actor. He did all that could be done by the persevering cultivation of his powers, and in many ways manifested the possession of high intelligence and refined taste, but his defects of person and voice made it impossible for him to give a representation at all adequate of the varying and subtle emotions of pure tragedy. But in melodramatic parts such as the king in Boucicault's adaptation of Casimir Delavigne's Louis XI., and Louis and Fabian dei Franchi in Boucicault's adaptation of Dumas's The Corsican Brothers, his success was complete. From his " tour round the world " Kean returned in 1866 in broken health, and died in London on the 22nd of January 1868.

See The Life and Theatrical Times of Charles Kean, by John William Cole (1859).

KEANE, JOHN JOSEPH (1830-), American Roman Catholic archbishop,

was born in Ballyshannon, Co. Donegal, Ireland, on the 12th of September 1839. His family settled in America when he was seven years old. He was educated at Saint Charles's College, Ellicott City, Maryland, and at Saint Mary's Seminary, Baltimore, and in 1866 was ordained a priest and made curate of St Patrick's, Washington, D.C. On the 25th of August 1878 he was consecrated Bishop of Richmond, to succeed James Gibbons, and he had established the Con- fraternity of the Holy Ghost in that diocese, and founded schools and churches for negroes before his appointment as rector of the Catholic University, Washington, D.C., in 1886, and his appoint- ' ment in 1888 to the see of Ajasso. He did much to upbuild the Catholic University, but his democratic and liberal policy

made him enemies at Rome, whence there came in 1896 a request for his resignation of the rectorate, and where he spent the years 1897-1900 as canon of St John Lateran, assistant bishop at the pontifical throne, and counsellor to the Propaganda. In 1900 he was consecrated archbishop of Dubuque, Iowa. He took a prominent part in the Catholic Young Men's National Union and in the Total Abstinence Union of North America; and was in general charge of the Catholic delegation to the World's Parliament of Religions held at the Columbian Exposition in 1893. He lectured widely on temperance, education and American institutions, and in 1890 was Dudleian lecturer at Harvard University.

A selection from his writings and addresses was edited by Maurice Francis Egan under the title Onward and Upward: A Year Book (Baltimore, 1902).

KEARNEY, a city and the county-seat of Buffalo county, Nebraska, U.S.A., about 130 m. W. of Lincoln. Pop. (1890), 8074; (I 9°o), 5634 (650 foreign-born); (1910), 6202. It is on the main overland line of the Union Pacific, and on a branch of the Burlington & Missouri River railroad. The city is situated in the broad, flat bottom-lands a short distance N. of the Platte River. Lake Kearney, in the city, has an area of 40 acres. The surrounding region is rich farming land, devoted especially to the growing of alfalfa and Indian corn. At Kearney are a State Industrial School for boys, a State Normal School, the Kearney Military Academy, and a Carnegie library. Good water-power is provided by a canal from the Platte River about 17 m. above Kearney, and the city's manufactures include foundry and machine-shop products, flour and bricks. Kearney Junction, as Kearney was called from 1872 to 1875, was settled a year before the two railways actually formed their junction here or the city was platted.

Kearney became a town in 1873, a city of the second class and the county seat in 1874, and a city of the first class in 1901. It is to be distinguished from an older and once famous prairie city, popularly known as " Dobey Town " {i.e. Adobe), founded in the early 'fifties on the edge of the reservation of old Fort Kearney (removed in 1848 from Nebraska City), in Kearney county, on the S. shore of the Platte about 6 m. S.E. of the present Kearney; here in 1861 the post office of Kearney City was established. In the days of the prairie freight- ing caravans Dobey Town was one of the most important towns between Independence, Missouri, and the Pacific coast, and it had a rough, wild, picturesque history; but it lost its immense freighting interests after the Union Pacific had been extended through it in 1866. The site of Dobey Town, together with the Fort, was abandoned in 1871. Fort Kearney and the city too were named in honour of General Stephen W. Kearny, and the name was at first correctly spelt without a second " e."

KEARNY, PHILIP (1815-1862), American soldier, was born in New York on the 2nd of June 1815, and was originally in- tended for the legal profession. He graduated at Columbia Uni- versity (1833), but his bent was decidedly towards soldiering, and in 1837 he obtained a commission in the cavalry regiment of which his uncle, (General) Stephen Watts Kearny (1794-1848), was colonel and Lieutenant Jefferson Davis adjutant. Two years later he was sent to France to study the methods of cavalry training in vogue there. Before his return to the United States in 1840 he had served, on leave, in Algeria. He had inherited a large fortune, but he remained in the service, and his wide experience of cavalry work caused him to be employed on the headquarters staff of the army. After six more years' service Kearny left the army, but almost immediately afterwards he rejoined, bringing with him a company of cavalry, which he had raised and equipped chiefly at his own expense, to take part in the Mexican war. In December 1846 he was promoted captain. In leading a brilliant cavalry charge at Churubusco he lost his left arm, but he remained at the front, and won the brevet of major for his gallantry at Contreras and Churubusco. In 1851 he again resigned, to travel round the world. He saw further active service with his old comrades of the French cavalry in the Italian war of 1859, and received the cross of the Legion of Honour for his conduct at Solferino. Up to the outbreak of

the American Civil War he lived in Paris, but early in 1861 he hastened home to join the Federal army. At first as a brigade commander and later as a divisional commander of infantry in the Army of the Potomac, he infused into his men his own cavalry spirit of dash and bravery. At Williamsburg, Seven Pines, and Second Bull Run, he displayed his usual romantic courage, but at Chantilly (Sept. 1, 1862), after repulsing an attack of the enemy, he rode out in the dark too far to the front, and mis-

taking the Confederates for his own men was shot dead. His body was sent to the Federal lines with a message from General Lee, and was buried in Trinity Churchyard, New York. His commission as major-general of volunteers was dated July 4, 1862, but he never received it.

See J. W. de Peyster, Personal and Military History of Philip Kearny (New York, 1869).

KEARNY, a town of Hudson county, New Jersey, U.S.A., between the Passaic and Hackensack rivers, adjoining Harrison, and connected with Newark by bridges over the Passaic. Pop. (1900), 10,896, of whom 3597 were foreign-born; (1910 census), 18,659. The New Yo.k & Greenwood Lake division of the Erie railroad has a station at Arlington, the principal village (in the N.W. part), which contains attractive residences of Newark, Jersey City and New York City business men. The town covers an area of about 7 sq. m., including a large tract of marsh-land. In Kearny are railway repair shops of the Pennsylvania system, and a large, abattoir; and there are numerous manufactures. The value of the town's factory products increased from $1,607,002 in 1900 to $4,427,904 in 1905, or 175-5%. Among its institutions are the State Soldiers' Home, removed here from Newark in 1880, a Carnegie library, two Italian homes for orphans, and a Catholic Industrial School for boys.

The neck of land between the Passaic and the Hackensack rivers, for 7 m. N. from where they unite, was purchased from the proprietors of East Jersey and from the Indians by Captain William Sandford in 1668 and through Nathaniel Kingsland, sergeant-major of Barbadoes, received the name " New Bar- badoes." After the town under this name had been extended considerably to the northward, the town of Lodi was formed out of the S. portion in 1825, the town of Harrison was founded out of the S. portion of Lodi in 1840, and in 1867 a portion of Harrison was set apart as a township and named in honour of General Philip Kearny, a former resident. Kearny was incorporated as a town in 1895.

KEARY, ANNIE (1825-1879), English novelist, was born near Wetherby, Yorkshire, on the 3rd of March 1825, the daughter of an Irish clergyman. She was the author of several children's books and novels, of which the best known is Castle Daly, an Irish story. She also wrote an Early Egyptian History (1861) and The Nation Around (1870). She died at Eastbourne on the 3rd of March 1879.

KEATE, JOHN (1773-1852), English schoolmaster, was born at Wells, Somersetshire, in 1773, the son of Prebendary William Keate. He was educated at Eton and King's College, Cam- bridge, where he had a brilliant career as a scholar; taking holy orders, he became, about 1797, an

assistant master at Eton College. In 1809 he was elected headmaster. The discipline of the school was then in a most unsatisfactory condition, and Dr Keate (who took the degree of D.D. in 1810) took stern measures to improve it. His partiality for the birch became a by-word, but he succeeded in restoring order and strengthening the weakened authority of the masters. Beneath an outwardly rough manner the little man concealed a really kind heart, and when he retired in 1834, the boys, who admired his courage, presented him with a handsome testimonial. A couple of years before he had publicly flogged eighty boys on one day. Keate was made a canon of Windsor in 1820. He died on the 5th of March 1852 at Hartley Westpall, Hampshire, of which parish he had been rector since 1824.

See Maxwell Lyte, History of Eton College (3rd ed., 1899) ; Collins, Etoniana; Harwood, Alumni Etonienses; Annual Register (1852); Gentleman's Magazine (1852).

KEATS, JOHN (1795-1821), English poet, was born on the 29th or 31st of October 1795 at the sign of the Swan and Hoop, 24 The Pavement, Moorfields, London. He published his first volume of verse in 181 7, his second in the following year, his third in 1820, and died of consumption at Rome on the 23rd of February 1821 in the fourth month of his twenty-sixth year. (For the biographical facts see the later section of this article.}

In Keats's first book there was little foretaste of anything greatly or even genuinely good; but between the marshy and sandy flats of sterile or futile verse there were undoubtedly some few purple patches of floral promise. The style was fre- quently detestable — a mixture of sham Spenserian and mock Wordsworthian, alternately florid and arid. His second book, Endymion, rises in its best passages to the highest level of Barn- field and of Lodge, the two previous poets with whom, had he published nothing more, he might most properly have been classed; and this, among minor minstrels, is no unenviable place. His third book raised him at once to a foremost rank in the high- est class of English poets. Shelley, up to twenty, had written little or nothing that would have done credit to a boy of ten; and of Keats also it may be said that the merit of his work at twenty- five was hardly by comparison more wonderful than its demerit at twenty-two. His first book fell as flat as it deserved to fall; the reception of his second, though less considerate than on the whole it deserved, was not more contemptuous than that of immeasurably better books published about the same time by Coleridge, Landor and Shelley. A critic of exceptional carefulness and candour might have noted in the first book so singular an

example of a stork among the cranes as the famous and notable sonnet on Chapman's Homer; a just judge would have indicated, a partial advocate might have exaggerated, the value of such golden grain amid a garish harvest of tares as the hymn to Pan and the translation into verse .of Titian's Baccha- nal which glorify the weedy wilderness of Endymion. But the hardest thing said of that poem by the Quarterly reviewer was unconsciously echoed by the future author of Adonais — that it was all but absolutely impossible to read through; and the obscener insolence of the " Blackguard's Magazine," as Landor afterwards very justly labelled it, is explicable though certainly not excusable if we glance back at such a passage as that where Endymion exchanges fulsome and liquorish endearments with the " known unknown from whom his being sips such darling (!) essence." Such nauseous and pitiful phrases as these, and cer- tain passages in his correspondence, make us understand the source of the most offensive imputations or insinuations levelled against the writer's manhood; and, while admitting that neither his love-letters, nor the last piteous outcries of his wailing and shrieking agony, would ever have been made public by merciful or respectful editors, we must also admit that, if they ought never to have been published, it is no less certain that they ought never to have been written; that a manful kind of man or even a manly sort of boy, in his love-making or in his suffering, will not howl and snivel after such a lamentable fashion. One thing hitherto inexplicable a very slight and rapid glance at his amatory correspondence will amply suffice to explain: how it came to pass that the woman so passionately beloved by so great a pcet should have thought it the hopeless attempt of a mistaken kindness to revive the memory of a man for whom the best that could be wished was complete and compassionate oblivion. For the side of the man's nature presented to her inspection, this probably was all that charity or reason could have desired. But that there was a finer side to the man, even if considered apart from the poet, his correspondence with his friends and their general evidence to his character give more sufficient proof than perhaps we might have derived from the general impression left on us by his works; though indeed the preface to Endymion itself, however illogical in its obviously implied suggestion that the poem published was undeniably unworthy of publication, gave proof or hint at least that after all its author was something of a man. And the eighteenth of his letters to Miss Brawne stands out in bright and brave contrast with such as seem in- compatible with the traditions of his character on its manlier

side. But if it must be said that he lived long enough only to give promise of being a man, it must also be said that he lived long enough to give assurance of being a poet who was not born to come short of the first rank. Not even a hint of such a prob- ability could have been gathered from his first or even from his second appearance; after the publication of his third

volume it was no longer a matter of possible debate among judges of tolerable competence that this improbability had become a certainty. Two or three phrases cancelled, two or three lines erased, would have left us in Lamia one of the most faultless as surely as one of the most glorious jewels in the crown of English poetry. Isabella, feeble and awkward in narrative to a degree almost incredible in a student of Dryden and a pupil of Leigh Hunt, is overcharged with episodical effects of splendid and pathetic expression beyond the reach of either. The Eve of St Agnes, aiming at no doubtful success, succeeds in evading all casual difficulty in the line of narrative; with no shadow of pretence to such interest as may be derived from stress of inci- dent or depth of sentiment, it stands out among all other famous poems as a perfect and unsurpassable study in pure colour and clear melody — a study in which the figure of Madeline brings back upon the mind's eye, if only as moonlight recalls a sense of sunshine, the nuptial picture of Marlowe's Hero and the sleeping presence of Shakespeare's Imogen. Beside this poem should always be placed the less famous but not less precious Eve of St Mark, a fragment unexcelled for the simple perfection of its perfect simplicity, exquisite alike in suggestion and in accom- plishment. The triumph of Hyperion is as nearly complete as the failure of Endymion; yet Keats never gave such proof of a manly devotion and rational sense of duty to his art as in his resolution to leave this great poem unfinished; not, as we may gather from his correspondence on the subject, for the pitiful reason assigned by his publishers, that of discouragement at the reception given to his former work, but on the solid and reason- able ground that a Miltonic study had something in its very scheme and nature too artificial, too studious of a foreign influ- ence, to be carried on and carried out at such length as was implied by his original design. Fortified and purified as it had been on a first revision, when much introductory allegory and much tentative effusion of sonorous and superfluous verse had been rigorously clipped down or pruned away, it could not long have retained spirit enough to support or inform the shadowy body of a subject so little charged with tangible significance. The faculty of assimilation as distinguished from imitation, than which there can be no surer or stronger sign of strong and sure original genius, is not more evident in the most Miltonic passages of the revised Hyperion than in the more Shakespearian passages of the unrevised tragedy which no radical correction could have left other than radically incorrigible. It is no conventional exaggeration, no hyperbolical phrase of flattery with more sound than sense in it, to say that in this chaotic and puerile play of Otho the Great there are such verses as Shakespeare might not without pride have signed at the age when he wrote and even at the age when he rewrote the tragedy of Romeo and Juliet. The dramatic frag- ment of King Stephen shows far more power of hand and gives far more promise of success than does that of Shelley's Charles the First. Yet we cannot say with any

confidence that even this far from extravagant promise would certainly or probably have been kept; it is certain only that Keats in these attempts did at least succeed in showing a possibility of future excellence as a tragic or at least a romantic dramatist. In every other line of high and serious poetry his triumph was actual and consummate; here only was it no more than potential or incomplete. As a ballad of the more lyrical order, La Belle dame sans merci is not less absolutely excellent, less triumphantly perfect in force and clearness of impression, that as a narrative poem is Lamia. In his lines on Robin Hood, and in one or two other less noticeable studies of the kind, he has shown thorough and easy mastery of the beautiful metre inherited by Fletcher from Barnfield and by Milton from Fletcher. The simple force of spirit and style which distinguishes the genuine ballad manner from all spurious attempts at an artificial simplicity was once more at least

achieved in his verses on the crowning creation of Scott's humaner and manlier genius — Meg Merrilies. No little injustice has been done to Keats by such devotees as fix their mind's eye only on the more salient and distinctive notes of a genius which in fact was very much more various and tentative, less limited and peculiar, than would be inferred from an exclusive study of his more specially characteristic work. But within the limits of that work must we look of course for the genuine credentials of his fame; and highest among them we must rate his un- equalled and unrivalled odes. Of these perhaps the two nearest to absolute perfection, to the triumphant achievement and accomplishment of the very utmost beauty possible to human words, may be that to Autumn and that on a Grecian Urn; the most radiant, fervent and musical is that to a Nightingale; the most pictorial and perhaps the tenderest in its ardour of passion- ate fancy is that to Psyche; the subtlest in sweetness of thought and feeling is that on Melancholy. Greater lyrical poetry the world may have seen than any that is in these; lovelier it surely has never seen, nor ever can it possibly see. From the divine fragment of an unfinished ode to Maia we can but guess that if completed it would have been worthy of a place beside the highest. His remaining lyrics have many beauties about them, but none perhaps can be called thoroughly beautiful. He has certainly left us one perfect sonnet of the first rank and as certainly he has left us but one.

Keats has been promoted by modern criticism to a place beside Shakespeare. The faultless force and the profound subtlety of his deep and cunning instinct for the absolute expression of absolute natural beauty can hardly be questioned or overlooked; and this is doubtless the one main distinctive gift or power which denotes him as a poet among all his equals, and gives him a right to rank for ever beside Coleridge and Shelley. As a man, the two admirers who did best service to his memory were Lord Houghton and Matthew Arnold. These alone, among all of their day who have written of him without the disadvantage or advantage of a personal acquaintance, have clearly seen and shown us the manhood of the man. That ridiculous and degrad- ing legend which imposed so strangely on the generous tender- ness of Shelley, while evoking the very natural and allowable laughter of Byron, fell to dust at once for ever on the appearance of Lord Houghton's biography, which gave perfect proof to all time that " men have died and worms have eaten them " but not for fear of critics or through suffering inflicted by reviews. Somewhat too sensually sensitive Keats may have been in either capacity, but the nature of the man was as far as was the quality of the poet above the pitiful level of a creature whose soul could " let itself be snuffed out by an article "; and, in fact, owing doubtless to the accident of a death which followed so fast on his early appearance and his dubious reception as a poet, the insolence and injustice of his reviewers in general have been com- paratively and even

considerably exaggerated. Except from the chief fountain-head of professional ribaldry then open in the world of literary journalism, no reek of personal insult arose to offend his nostrils; and the tactics of such unwashed malignants were inevitably suicidal; the references to his brief experiment of apprenticeship to a surgeon which are quoted from Blackwood, in the shorter as well as in the longer memoir by Lord Houghton, could leave no bad odour behind them save what might hang about men's yet briefer recollection of his assailant's unmemor- able existence. The false Keats, therefore, whom Shelley pitied and Byron despised would have been, had he ever existed, a thing beneath compassion or contempt. That such a man could have had such a genius is almost evidently impossible; and yet more evident is the proof which remains on everlasting record that none was ever further from the chance of decline to such degradation than the real and actual man who made that name immortal. (A. C. S.)

Subjoined are the chief particulars of Keats's life. He was the eldest son of Thomas Keats and his wife Frances Jennings, and was baptized at St Botolph's, Bishopsgate, on the iSth of December 1795. The entry of his baptism is supple- mented by a marginal note stating that he was born on the 31st

of October. Thomas Keats was employed in the Swan and Hoop livery stables, Finsbury Pavement, London. He had married his master's daughter, and managed the business on the retirement of his father-in-law. In April 1804 Thomas Keats was killed by a fall from his horse, and within a year of this event Mrs Keats married William Rawlings, a stable- keeper. The marriage proved an unhappy one, and in 1806 Mrs Rawlings, with her children John, George, Thomas and Frances Mary (afterwards Mrs Llanos, d. 1889), went to live at Edmonton with her mother, who had inherited a considerable competence from her husband. There is evidence that Keats's parents were by no means of the commonplace type that might be hastily inferred from these associations. They had desired to send their sons to Harrow, but John Keats and his two brothers were even- tually sent to a school kept by John Clarke at Enfield, where he became intimate with his master's son, Charles Cowden Clarke. His vivacity of temperament showed itself at school in a love of fighting, but in the last year of his school life he developed a great appetite for reading of all sorts. In 1810 he left school to be apprenticed to Mr Thomas Hammond, a surgeon in Edmonton. He was still within easy reach of his old school, where he frequently borrowed books, especially the works of Spenser and the Elizabethans. With Hammond he quarrelled before the termination of his apprenticeship, and in 1814 the connexion was broken by mutual consent. His mother had died in 1810, and in 1814 Mrs Jennings. The children were left in the care of two guardians, one of whom, Richard Abbey, seems to have made himself

solely responsible. John Keats went to London to study at Guy's and St Thomas's hospitals, living at first alone at 8 Dean Street, Borough, and later with two fellow students in St Thomas's Street. It does not appear that he neglected his medical studies, but his chief interest was turned to poetry. In March 1816 he became a dresser at Guy's, but about the same time his poetic gifts were stimulated by an acquaintance formed with Leigh Hunt. His friendship with Benjamin Haydon, the painter, dates from later in the same year. Hunt introduced him to Shelley, who showed the younger poet a constant kindness. In 1816 Keats moved to the Poultry to be with his brothers George and Tom, the former of whom was then employed in his guardian's counting-house, but much of the poet's time was spent at Leigh Hunt's cottage at Hampstead. In the winter of 1816-181 7 he definitely abandoned medicine, and in the spring appeared Poems by John Keats dedicated to Leigh Hunt, and published by Charles and James Oilier. On the 14th of April he left London to find quiet for work. He spent some time at Shanklin, Isle of Wight, then at Margate and Canterbury, where he was joined by his brother Tom. In the summer the three brothers took lodgings in Well Walk, Hampstead, where Keats formed a fast friendship with Charles Wentworth Dilke and Charles Armitage Brown. In September of the same year (1817) he paid a visit to his friend, Benjamin Bailey, at Oxford, and in November he finished Endymion at Burford Bridge, near Dorking. His youngest brother had developed consumption, and in March John went to Teignmouth to nurse him in place of his brother George, who had decided to sail for America with his newly married wife, Georgiana Wylie. In May (181 8) Keats returned to London, and soon after appeared Endymion: A Poetic Romance (1818), bearing on the title-page as motto "The stretched metre of an antique song." Late in June Keats and his friend Armitage Brown started on a walking tour in Scotland, vividly described in the poet's letters. The fatigue and hardship involved proved too great a strain for Keats, who was forbidden by an Inverness doctor to continue his tour. He returned to London by boat, arriving on the 18th of August. The autumn was spent in constant attendance on his brother Tom, who died at the beginning of December. There is no doubt that he resented the attacks on him in Blackwood' s Magazine (August 1818), and the Quarterly Review (April 1818, published only in September), but his chief preoccupations were elsewhere. After his brother's death he went to live with his friend Brown. He had already made the acquaintance of Fanny Brawne, a girl of seventeen, who lived with her mother close by. For her Keats

quickly developed a consuming passion. He was in indifferent health, and,

owing partly to Mr Abbey's mismanagement, in difficulties for money. Nevertheless his best work belongs to this period. In July 1819 he went to Shanklin, living with James Rice. They were soon joined by Brown. The next two months Keats spent with Brown at Winchester, enjoying an interval of calm- ness due to his absence from Fanny Brawne. At Winchester he completed Lamia and Olho the Great, which he had begun in conjunction with Brown, and began his historical tragedy of King Stephen. Before Christmas he had returned to London and his bondage to Fanny. In January 1820 his brother George paid a short visit to London, but received no confidence from him. The fatal nature of Keats's illness showed itself on the 3rd of February, but in March he recovered sufficiently to be present at the private view of Haydon's picture of " Christ's Entry into Jerusalem." In May he removed to a lodging in Wesleyan Place, Kentish Town, to be near Leigh Hunt who eventually took him into his house. In July appeared his third and last book, Lamia, Isabella, The Eve of St Agnes and other Poems (1820). Keats left the Hunts abruptly in August in consequence of a delay in receiving one of Fanny Brawne's letters which had been broken open by a servant. He went to Wentworth Place, where he was taken in by the Brawnes. The suggestion that he should spend the winter in Italy was followed up by an invitation from Shelley to Pisa. This, however, he refused. But on the 18th of September 1820 he set out for Naples in company with Joseph Severn, the artist, who had long been his friend. The travellers settled in the Piazza de Spagna, Rome. Keats was devotedly tended by Dr (afterwards Sir) James Clarke and Severn, and died on the 23rd of February 1821. He was buried on the 27th in the old Protestant cemetery, near the pyramid of Cestius.

Bibliography. — Keats's friends provided the material for the authoritative biography of the poet by Richard Monckton Milnes (afterwards Lord Houghton) entitled Life, Letters and Literary Remains of John Keats (1848; revised ed., 1867). The Poetical Works of John Keats were issued with a memoir by R. M. Milnes in 1854, 1863, 1865, 1866, 1867, and in the Aldine edition, 1876. The standard edition of Keats is The Poetical Works and other Writings of John Keats now first brought together, including Poems and numerous Letters not before published, edited with notes and appendices by Harry Buxton Forman (4 vols., 1883; re-issue with corrections and addi- tions, 1889). Of the many other editions of Keats's poems may be mentioned that in the Muses' Library, The Poems of John Keats (1896), edited by G. Thorn Drury with an introduction by Robert Bridges, and another by E. de Selincourt, 1905. The Letters of John Keats to Fanny Brawne (1889) were edited with introduction and notes by H. Buxton Forman, and the Letters of John Keats to his Family and Friends (1891) by Sidney Colvin, who is also the author of the monograph, Keats (1887), in the English Men of Letters Series. See also The Papers of a

Critic. Selected from the Writings of the late Charles Wentworth Dilke (1875), and for further bibliographical information and particulars of MS. sources the " Editor's Preface," &c. to a reprint edited by H. Buxton Forman (Glasgow, 1900). A facsimile of Keats's autograph MS. of " Hyperion," purchased by the British Museum in 1904, was published by E. de Selincourt (Oxford, 1905). (M. Br.)

KEBLE, JOHN (1792-1866), English poet and divine, the author of the Christian Year, was born on St Mark's Day (April 25), 1792, at Fairford, Gloucestershire. He was the second child of the Rev. John Keble and his wife Sarah Maule. De- scended from a family which had attained some legal eminence in the time of the Commonwealth, John Keble, the father of the poet, was vicar of Coin St Aldwyn, but lived at Fairford, about 3 m. distant from his cure. He was a clergyman of the old High Church school, whose adherents, untouched by the influ- ence of the Wesleys, had moulded their piety on the doctrines on the non-jurors and the old Anglican divines. Himself a good scholar, he did not send his son to any school, but educated him and his brother at home so well that both obtained scholarships at Corpus Christi College, Oxford. John was elected scholar of Corpus in his fifteenth, and fellow of Oriel in his nineteenth year, April 181 1. In Easter term 1810 he had obtained double first class honours, a distinction which had been obtained only once before, by Sir Robert Peel. After his election to the Oriel fellowship Keble gained the University prizes, both for the

English essay and also for the Latin essay. But he was more remarkable for the rare beauty of his character than even for academic distinctions. Sir John Taylor Coleridge, his fellow scholar at Corpus and his life-long friend, says of him, after their friendship of five and fifty years had closed, " It was the singular happiness of his nature, remarkable even in his undergraduate days, that love for him was always sanctified by reverence — reverence that did not make the love less tender, and love that did but add intensity to the reverence." Oriel College was, at the time when Keble became a fellow, the centre of all the finest ability in Oxford. Copleston, Davison, Whately, were among the fellows who elected Keble; Arnold, Pusey, Newman, were soon after added to the society. In 181 5 Keble was ordained deacon, and priest in 1816. His real bent and choice were towards a pastoral cure in a country parish ; but he remained in Oxford, acting first as a public examiner in the schools, then as a tutor in Oriel, till 1823. In summer he sometimes took clerical work, sometimes made tours on foot through various English counties, during which he was composing poems, which after- wards took their place in the Christian Year. He had a rare power of attracting to himself the finest spirits, a power which lay not so much in his ability or his genius as in his character, so simple, so humble, so pure, so unworldly, yet wanting not that severity which can

stand by principle and maintain what he holds to be the truth. In 1823 he returned to Fairford, there to assist his father, and with his brother to serve one or two small and poorly endowed curacies in the neighbourhood of Coin. He had made a quiet but deep impression on all who came within his influence in Oxford, and during his five years of college tutorship had won the affection of his pupils. But it was to pastoral work, and not to academic duty, that he thenceforth devoted himself, associ- ating with it, and scarcely placing on a lower level, the affection- ate discharge of his duties as a son and brother. Filial piety influenced in a quite unusual degree his feelings and his action all life through. It was in 1827, a few years after he settled at Fairford, that he published the Christian Year. The poems which make up that book had been the silent gathering of years. Keble had purposed in his own mind to keep them beside him, correcting and improving them, as long as he lived, and to leave them to be published only " when he was fairly out of the way." This resolution was at length overcome by the importunities of his friends, and above all by the strong desire of his father to see his son's poems in print before he died. Accordingly they were printed in two small volumes in Oxford, and given to the world in June 1827, but with no name on the title-page. The book continued to be published anonymously, but the name of the author soon transpired.

Between 1827 and 1872 one hundred and fifty-eight editions had issued from the press, and it has been largely reprinted since. The author, so far from taking pride in his widespread reputation, seemed all his life long to wish to disconnect his name with the book, and " as if he would rather it had been the work of some one else than himself." This feeling arose from no false modesty. It was because he knew that in these poems he had painted his own heart, the best part of it; and he doubted whether it was right thus to exhibit himself, and by the revelation of only his better self, to win the good opinion of the world.

Towards the close of 1831 Keble was elected to fill the chair of the poetry professorship in Oxford, as successor to his friend and admirer, Dean Milman. This chair he occupied for ten • eventful years. He delivered a series of lectures, clothed in excellent idiomatic Latin (as was the rule), in which He expounded a theory of poetry which was original and suggestive. He looked on poetry as a vent for overcharged feeling, or a full imagina- tion, or some imaginative regret, which had not found their natural outlet in life and action. This suggested to him a dis- tinction between what he called primary and secondary poets — the first employing poetry to relieve their own hearts, the second, poetic artists, composing poetry from some other and less im- pulsive motive. Of the former kind were Homer, Lucretius, Burns, Scott; of the latter were Euripides, Dryden, Milton. This view was set forth in an article contributed to the British

Critic in 1838 on the life of Scott, and was more fully developed in two volumes of Praelectiones Academicae.

His regular visits to Oxford kept him in intercourse with his old friends in Oriel common room, and made him familiar with the currents of feeling which swayed the university. Catholic emancipation and the Reform Bill had deeply stirred, not only the political spirit of Oxford, but also the church feeling which had long been stagnant. Cardinal Newman writes, " On Sunday July 14, 1833, Mr Keble preached the assize sermon in the University pulpit. It was published under the title of National Apostasy. I have ever considered and kept the day as the start of the religious movement of 1833." The occasion of this sermon was the suppression, by Earl Grey's Reform ministry, of ten Irish bishoprics. Against the spirit which would treat the church as the mere creature of the state Keble had long chafed inwardly, and now he made his outward protest, asserting the claim of the church to a heavenly origin and a divine preroga- tive. About the same time, and partly stimulated by Keble's sermon, some leading spirits in Oxford and elsewhere began a concerted and systematic course of action to revive High Church principles and the ancient patristic theology, and by these means both to defend the church against the assaults of its enemies, and also to raise to a higher tone the standard of Christian life in England. This design embodied itself in the Tractarian movement, a name it received from the famous Tracts for the Times, which were the vehicle for promulgating the new doctrines. If Keble is to be reckoned, as Newman would have it, as the primary author of the movement, it was from Pusey that it received one of its best known names, and in Newman that it soon found its genuine leader. To the tracts Keble made only four contributions: — No. 4, containing an argument, in the manner of Bishop Butler, to show that adherence to apostolical succession is the safest course; No. 13, which explains the prin- ciple on which the Sunday lessons in the church service are selected; No. 40, on marriage with one who is unbaptized; No. 89, on the mysticism attributed to the early fathers of the church. Besides these contributions from his own pen, he did much for the series by suggesting subjects, by reviewing tracts written by others, and by lending to their circulation the weight of his personal influence.

In 1835 Keble's father died at the age of ninety, and soon after this his son married Miss Clarke, left Fairford, and settled at Hursley vicarage in Hampshire, a living to which he had been presented by his friend and attached pupil, Sir William Heath- cote, and which continued to be Keble's home and cure for the remainder of his life.

In 1 841 the tracts were brought to an abrupt termination by the publication of Newman's tract No. 90. All the Protestantism of England was in arms against the author of the obnoxious tract. Keble came forward at the time, desirous to share the responsibility and the blame, if there was any; for he had seen the tract before it was published, and approved it. The same year in which burst this ecclesiastical storm saw the close of Keble's tenure of the professorship of poetry, and thenceforward he was seen but rarely in Oxford. No other public event ever affected Keble so deeply as the secession of Newman to the Church of Rome in 1845. It was to him both a public and a private sorrow, which nothing could repair. But he did not lose heart; at once he threw himself into the double duty, which now devolved on himself and Pusey, of counselling the many who had hitherto followed the movement, and who, now in their per- plexity, might be tempted to follow their leader's example, and at the same time of maintaining the rights of the church against what he held to be the encroachments of the state, as seen in such acts as the Gorham judgment, and the decision on Essays and Reviews. In all the ecclesiastical contests of the twenty years which followed 1845, Keble took a part, not loud or obtru- sive, but firm and resolute, in maintaining those High Anglican principles with which his life had been identified. These absorb- ing duties, added to his parochial work, left little time for literature. But in 1846 he published the Lyra Innocentium; and in 1863 he completed a life of Bishop Wilson.

In the late autumn of the latter year, Keble left Hursley for the sake of his wife's health, and sought the milder climate of Bournemouth. There he had an attack of paralysis, from which, he died on the 29th of March 1866. He was buried in his own churchyard at Hursley; and in little more than a month his wife was laid by her husband's side.

Keble also published A Metrical Version of the Psalter (1839), Lyra Innocentium (1846), and a volume of poems was published post- humously. But it is by the Christian Year that he won the ear of the religious world. It was a happy thought that dictated the plan of the book, to furnish a meditative religious lyric for each Sunday of the year, and for each saint's day and festival of the English Church. The subject of each poem is generally suggested by some part of the lessons or the gospel or the epistle for the day. One thing which gives these poems their strangely unique power is the sentiment to which they appeal, and the saintly character of the poet who makes the appeal, illumining more or less every poem.

The intimacy with the Bible which is manifest in the pages of the Christian Year; and the unobtrusive felicity with which Biblical sentiments and language are introduced have done much to endear these poems to all Bible

readers. ” The exactness of the descrip- tions of Palestine, which Keble had never visited, have been noted, and verified on the spot,” by Dean Stanley. He points to features of the lake of Gennesareth, which were first touched in the Chris- tian Year; and he observes that throughout the book ” the Biblical scenery is treated graphically as real scenery, and the Biblical history and poetry as real history and poetry.”

As to its style, the Christian Year is calm and grave in tone, and subdued in colour, as beseems its subjects and sentiments. The contemporary poets whom Keble most admired were Scott, Words- worth and Southey; and of their influence traces are visible in his diction. Yet he has a style of language and a cadence of his own, which steal into the heart with strangely soothing power. Some of the poems are faultless, after their kind, flowing from the first stage to the last, lucid in thought, vivid in diction, harmonious in their pensive melody. In others there are imperfections in rhythm, conventionalities of language, obscurities or over-subtleties of thought, which mar the reader’s enjoyment. Yet even the most defective poems commonly have, at least, a single verse, expressing some profound thought or tender shade of feeling, for which the sympathetic reader willingly pardons artistic imperfections in the rest.

Keble’s life was written by his life-long friend Mr Justice J. T. Coleridge. The following is a complete list of his writings: — 1. Works published in Keble’s lifetime: Christian Year (1827); Psalter (1839); Praelectiones Academicae (1844); Lyra Innocentium (1846); Sermons Academical (1848); Argument against Repeal of Marriage Law., and Sequel (1857); Eucharistical Adoration (1857); Life of Bishop Wilson (1863) ; Sermons Occasional and Parochial (1867). 2. Posthumous publications: Village Sermons on the Baptismal Service (1868); Miscellaneous Poems (1869); Letters of Spiritual Counsel (1870); Sermons for the Christian Year, &c. (n vols., 1875-1880); Occasional Papers and Reviews (1877) ; StudiaSacra (1877); Outlines of Instruction or Meditation (1880).

. KECSKEMET, a town of Hungary, in the county of Pest- Pilis-Solt-Kiskun, 65 m. S.S.E. of Budapest by rail. Pop. (1900), 56,786. Kecskemet is a poorly built and straggling town, situated in the extensive Kecskemet plain. It contains monas- teries belonging to the Piarist and Franciscan orders, a Catholic (founded in 17 14), a’Calvinistic and a Lutheran school. The manufacture of soap and leather are the principal industries. Besides the raising of cereals, fruit is extensively cultivated in the surrounding district; its apples and apricots are largely exported, large quantities of wine are produced, and cattle- rearing constitutes another great source of revenue. Kecskemet was the birthplace of the Hungarian dramatist Jozsef Katona (1792-1830), author of the historical drama, Bdnk-Bdn

(181s).

KEDDAH (from Hindu Khedna, to chase), the term, used in India for the enclosure constructed to entrap elephants. In Ceylon the word employed in the same meaning is corral.

KEDGEREE (Hindostani, kkichri), an Indian dish, composed of boiled rice and various highly-flavoured ingredients. Kedgeree is of two kinds, white and yellow. The white is made with grain, onions, ghee (clarified butter), cloves, pepper and salt. Yellow kedgeree includes eggs, and is coloured by turmeric. Kedgeree is a favourite and universal dish in India; among the poorer classes it is frequently made of rice and pulse only, or rice and beans. In European cookery kedgeree is a similar dish usually made with fish.

KEEL, the bottom timber or combination of plates of a ship or boat, extending longitudinally from bow to stern, and sup- porting the framework (see Ship-building). The origin of the word has been obscured by confusion of two words, the Old Norwegian kjole (cf. Swedish kbl) and a Dutch and German kiel. The first had the meaning of the English " keel," the other of ship, boat. The modern usage in Dutch and German has approximated to the English. The word kid is represented in old English by ceol, a word applied to the long war galleys of the Vikings, in which sense " keel " or " keele " is still used by archaeologists. On the Tyne " keel " is the name given to a flat-bottomed vessel used to carry coals to the colliers. There is another word " keel, " meaning to cool, familiar in Shakespeare (Love's Labour Lost, v. ii. 930), " while greasy Joan doth keel the pot," i.e. prevents a pot from boiling over by pouring in cold water, &c, stirring or skimming. This is from the Old English cdan, to cool, a common Teutonic word, cf. German ktihlen.

KEELEY, MARY ANNE (1806-1800), English actress, was born at Ipswich on the 22nd of November 1805 or 1806. Her maiden name was Goward, her father being a brazier and tinman. After some experience in the provinces, she first appeared on the stage in London on the 2nd of July 1825, in the opera Rosina. It was not long before she gave up " singing parts " in favour of the drama proper, where her powers of character-acting could have scope. In June 1829 she married Robert Keeley (1 793-1 869), an admirable comedian, with whom she had often appeared. Between 1832 and 1842 they acted at Covent Garden, at the Adelphi with Buckstone, at the Olympic with Charles Mathews, and at Drury Lane with

Macready. In 1 836 they visited America. In 1838 she made her first great success as Nydia, the blind girl, in a dramatized version of Bulwer Lytton's The Last Days of Pompeii, and followed this with an equally striking impersona- tion of Smike in Nicholas Nickleby. In 1839 came her decisive triumph with her picturesque and spirited acting as the hero of a play founded upon Harrison Ainsworth's Jack Shcppard. So dangerous was considered the popularity of the play, with its glorification of the prison-breaking felon, that the lord chamber- lain ultimately forbade the performance of any piece upon the subject. It is perhaps mainly as Jack Sheppard that Mrs Keeley lived in the memory of playgoers, despite her long subsequent career in plays more worthy of her remarkable gifts. Under Macready's management she played Nerissa in The Merchant of Venice, and Audrey in As You Like It. She managed the Lyceum with her husband from 1844 to 1847; acted with Webster and Kean at the Haymarket; returned for five years to the Adelphi; and made her last regular public appearance at the Lyceum in 1859. A public reception was given her at this theatre on her 90th birthday. She died on the 12th of March

1899.

See Walter Goodman, The Keeleys on the Stage and off (London,

1895)-

KEELING ISLANDS (often called Cocos and Cocos-Keeling Islands), a group of coral islands in the Indian Ocean, between 12 4′ and >2° 13′ S., and 96 49'~57′ E., but including a smaller island in 1 1° 50′ N. and 96 50′ E. The group furnished Charles Darwin with the typical example of an atoll or lagoon island. There are altogether twenty-three small islands, 95 m. being the greatest width of the whole atoll. The lagoon is very shallow and the passages between many of the islands are fordable on foot. An opening on the northern side of the reef permits the entrance of vessels into the northern part of the lagoon, which forms a good harbour known as Port Refuge or Port Albion. The coco-nut (as the name Cocos Islands indicates) is the character- istic product and is cultivated on all the islands. The flora is scanty in species. One of the commonest living creatures is a monstrous crab which lives on the coco-nuts; and in some places also there are great colonies of the pomegranate crab. The group was visited by Dr H. O. Forbes in 1878, and later, at the expense of Sir John Murray, by Dr Guppy, Mr Ridley and Dr Andrews. The object of their visits was the investigation of the fauna and flora of the atoll, more especially of the formation of the coral

reefs. Dr Guppy was fortunate in reaching North Keeling Island, where a landing is only possible during the calmest weather. The island he found to

be about a mile long, with a shallow enclosed lagoon, less than 3 ft. deep at ordinary low water, with a single opening on its east or weather side. A dense vegetation of iron-wood (Cordia) and other trees and shrubs, together with a forest of coco-nut palms, covers its surface. It is tenanted by myriads of sea-fowl, frigate-birds, boobies, and terns (Gygis Candida), which find here an excellent nesting-place, for the island is uninhabited, and is visited only once or twice a year. The excrement from this large colony has changed the carbonate of lime in the soil and the coral nodules on the surface into phosphates, to the extent in some cases of 60-70%, thus forming a valuable deposit, beneficial to the vegetation of the island itself and promising commercial value. The lagoon is slowly filling up and becoming cultivable land, but the rate of recovery from the sea has been specially marked since the eruption of Krakatoa, the pumice from which was washed on to it in enormous quantity, so that the lagoon advanced its shores from 20 to 30 yards. Forbes's and Guppy's investigations go to show that, contrary to Darwin's belief, there is no evidence of upheaval or of subsidence in either of the Keeling groups.

The atoll has an exceedingly healthy climate, and might well be used as a sanatorium for phthisical patients, the temperature never reaching extremes. The highest annual reading of the thermometer hardly ever exceeds 89° F. or falls beneath 70 . The mean temperature for the year is 78-5° F., and as the rainfall rarely exceeds 40 in. the atmosphere never becomes unpleasantly moist. The south-east trade blows almost ceaselessly for ten months of the year. Terrific storms sometimes break over the island; and it has been more than once visited by earthquakes. A profitable trade is done in coco-nuts, but there are few other exports. The imports are almost entirely foodstuffs and other necessaries for the inhabitants, who form a patriarchal colony under a private proprietor.

The islands were discovered in 1609 by Captain William Keeling on his voyage from Batavia to the Cape. In 1823 Alexander Hare, an English adventurer, settled on the southernmost island with a number of slaves. Some two or three years after, a Scotchman, J. Ross, who had commanded a brig during the English occupation of Java, settled with his family (who continued in the ownership) on Direction Island, and his little colony was soon strengthened by Hare's runaway slaves. The Dutch Government had in an informal way claimed the possession of the islands since 1829; but they refused to allow Ross to hoist the Dutch flag, and accordingly the group was taken under British protection in 1856. In 1878 it was attached to the government of Ceylon, and in 1882 placed under the authority of the governor of the Straits Settlements. The ownership and superintendency continued in the Ross family, of whom George Clunies Ross died in 19 10, and was succeeded by his son Sydney.

See C. Darwin, Journal of the Voyage of the " Beagle," and Geolo- gical Observations on Coral Reefs; also Henry O. Forbes, A Naturalist's Wanderings in the Eastern Archipelago (London, 1884) ; H. B. Guppy, "The Cocos-Keeling I slands, " Scottish Geographical Magazine (vol. v. ,

KEEL-MOULDING, in architecture, a round on which there is a smaH'fillet, somewhat like the keel of a ship. It is common in the Early English and Decorated styles.

KEENE, CHARLES SAMUEL (1823-1891), English black-and- white artist, the son of Samuel Browne Keene, a solicitor, was born at Hornsey on the 10th of August 1823. Educated at the Ipswich Grammar School until his sixteenth year, he early showed artistic leanings. Two years after the death of his father he was articled to a London solicitor, but, the occupation proving uncon- genial, he was removed to the office of an architect, Mr Pilking- ton. His spare time was now spent in drawing historical and nautical subjects in water-colour. For these trifles his mother, to whose energy and common sense he was greatly indebted, soon found a purchaser, through whom he was brought to the notice of the Whympers, the wood-engravers. This led to his being bound to them as apprentice for five years. His earliest known

design is the frontispiece, signed " Chas. Keene," to The Adven- tures of Dick Boldhero in Search of his Uncle, &c. (Darton & Co., 1842). His term of apprenticeship over, he hired as studio an attic in the block of buildings standing, up to 1900, between the Strand and Holywell Street, and was soon hard at work for the Illustrated London News. At this time he was a member of the " Artists' Society " in Clipstone Street, afterwards removed to the Langham studios. In December 1851 he made his first appear- ance in Punch and, after nine years of steady work, was called to a seat at the famous table. It was during this period of pro- bation that he first gave evidence of those transcendent qualities which make his work at once the joy and despair of his brother craftsmen. On the starting of Once a Week, in 1859, Keene's services were requisitioned, his most notable series in this periodical being the illustrations to Charles Reade's A Good Fight (afterwards rechristened The Cloister and the Hearth) and to George Meredith's Evan Harrington. There is a quality of conven- tionality in (the earlier of these which completely disappears in the later. In 1858 Keene, who was endowed with a fine voice and was an enthusiastic admirer of old-fashioned music, joined the " Jermyn Band," afterwards better known as the " Moray Minstrels." He was also for many years a member of Leslie's Choir, the Sacred Harmonic Society, the Catch, Glee and Canon Club, and the Bach Choir. He was also an industrious performer on the

bagpipes, of which instrument he brought together a con- siderable collection of specimens. About 1863 the Arts Club in Hanover Square was started, with Keene as one of the original members. In 1864 John Leech died, and Keene's work in Punch thenceforward found wider opportunities. It was about this time that the greatest of all modern artists of his class,Menzel,discovered Keene's existence, and became a subscriber to Punch solely for the sake of enjoying week by week the work of his brother crafts- man. In 1872 Keene. who, though fully possessed of the humor- ous sense, was not within measurable distance of Leech as a jester, and whose drawings were consequently not sufficiently " funny " to appeal to the laughter-loving public, was fortunate enough to make the acquaintance of Mr Joseph Crawhall, who had been in the habit for many years of jotting down any humorous incidents he might hear of or observe, illustrating them at leisure for his own amusement. These were placed unreservedly at Keene's disposal, and to their inspiration we owe at least 250 of his most successful drawings in the last twenty years of his con- nexion with Punch. A list of more than 200 of these subjects is given at the end of The Life and Letters of Charles Keene of " Punch." In 1879 Keene removed to 239 King's Road, Chelsea, which he occupied until his last illness, walking daily to and from his house, 112 Hammersmith Road. In 1881 a volume of his Punch drawings was published by Messrs Bradbury & Agnew, with the title Our People. In 1 883 Keene, who had hitherto been a strong man, developed symptoms of dyspepsia and rheumatism. By 1889 these had increased to an alarming degree, and the last two years of his life were passed in acute suffering borne with the greatest courage. He died unmarried, after a singularly un- eventful life, on the 4th of January 1891, and his body lies in Hammersmith cemetery.

Keene, who never had any regular art training, was essentially an artists'^ artist. He holds the foremost place amongst English craftsmen in black and white, though his work has never been appre- ciated at its real value by the general public. No doubt the main reason for this lack of public recognition was his unconventionality. He drew his models exactly as he saw them, not as he knew the world wanted to see them. He found enough beauty and romance in all that was around him, and, in his Punch work, enough subtle humour in nature seized at her most humorous moments to satisfy him. He never required his models to grin through a horse collar, as Gillray did, or to put on their company manners, as was du Maurier's wont. But Keene was not only a brilliant worker in pen and ink. As an etcher he has also to be reckoned with, notwithstanding the fact that his plates numbered not more than fifty at the outside. Impres- sions of them are exceedingly rare, and hardlv half a dozen of the plates are now known to be in existence. He himself regarded them only as experiments in a difficult but fascinating medium. But in the opinion of the expert they suffice to place him among

the best etchers of the 19th century. Apart from the etched frontispieces to some of the Punch pocket-books, only three,, and these by no

713

means the best, have been published. Writing in V Artiste for May 1891 of a few which he had seen, Bracquemond says: ” By the freedom, the largeness of their drawing and execution, these plates must be classed amongst modern etchings of the first rank.” A few impressions are in the British Museum, but in the main they were given away to friends and lie hidden in the albums of the collector. <(Authorities.— G. S. Layard, Life and Letters of Charles Keene of " Punch "; The Work of Charles Keene, with an introduction and notes by Joseph Pennell, and a bibliography by W. H. Chesson; M. H. Spielmann, The History of " Punch " ; M. Charpentier, La Vie Moderne,No. 14 (1880); M. H. Spielmann, Magazine of Art (March 1891); M. Bracquemond, L' Artiste (May 1891); G. S. Layard, Scribner's (April 1892) ; Joseph Pennell, Century (Oct. 1897) ; George du Maurier, Harper's (March 1898). (G. S. I.)

KEENE, LAURA (c. 1820-1873), Anglo-American actress and manager, whose real name was Mary Moss, was born in England. In 1851, in London, she was playing Pauline in The Lady of Lyons. She made her first appearance in New York on the 20th of September 1852, on her way to Australia. She returned in 1855 and till 1863 managed Laura Keene’s theatre, in which was produced, in 1858, Our American Cousin. It was her company that was playing at Ford’s theatre, Washington, on the night of Lincoln’s assassination. Miss Keene was a successful melodramatic actress, and an admirable manager. She died at Montclair, New Jersey, on the 4th of November

1873-

See John Creahan’s Life of Laura Keene (1897).

KEENE, a city and the county-seat of Cheshire county, New Hampshire, U.S.A., on the Ashuelot river, about 45 m. S.W. of Concord, N.H., and about 92 m. W.N.W. of Boston. Pop. (1900), 9165, of whom 1255 were foreign-born; (1910 census), 10,068. Area, 36-5 sq. m. It is served by the Boston & Maine railroad and by the Fitchburg railroad (leased by the Boston & Maine). The site is level, but is surrounded by ranges of lofty hills — Monadnock Mountain is about 10 m. S.E. Most of the streets are pleasantly shaded. There are three parks, with a total area of about 219 acres; and in Central Square stands a soldiers’ and sailors’ monument designed by Martin Milmore and erected in 187 1. The principal buildings are the city hall, the county buildings and the city hospital. The Public

Library had in 1908 about 16,300 volumes. There are repair shops of the Boston & Maine railroad here, and manufactures of boots and shoes, woollen goods, furniture (especially chairs), pottery, &c. The value of the factory product in 1905 was $2,690,967. The site of Keene was one of the Massachusetts grants made in 1733, but Canadian Indians made it untenable and it was abandoned from 1746 until 1750. In 1753 it was incorporated and was named Keene, in honour of Sir Benjamin Keene (1697-1757), the English diplomatist, who as agent for the South Sea Company and Minister in Madrid, and as responsible for the commerical treaty between England and Spain in 1750, was in high reputation at the time; it was chartered as a city in 1874.

KEEP, ROBERT PORTER (1844-1904), American scholar, was born in Farmington, Connecticut, on the 26th of April 1844. He graduated at Yale in 1865, was instructor there for two years, was United States consul at the Piraeus in Greece in 1869-1871, taught Greek in Williston Seminary, Easthampton, Massachusetts, in 1876-1885, and was principal of Norwich Free Academy, Norwich, Conn., from 1885 to 1903, the school owing its prosperity to him hardly less than to its founders. In 1903 he took charge of Miss Porter's school for girls at Farming- ton, Conn., founded in 1844 and long controlled by his aunt, Sarah Porter. He died in Farmington on the 3rd of June

1904.

KEEP (corresponding to the French donjon),. in architecture the inmost and strongest part of a medieval castle, answering to the citadel of modern times. The arrangement is said to have originated with Gundulf, bishop of Rochester (d. 1108), architect of the White Tower. The Norman keep is generally a very massive square tower. There is generally a well in a medieval keep, ingeniously concealed in the thickness of a wall or in a pillar. The most celebrated keeps of Norman times in England are the White Tower in London, those at Rochester

Arundel and Newcastle, Castle Hedingham, &c. When the keep was circular, as at Conisborough and Windsor, it was called a " shell-keep " (see Castle). The verb " to keep," from which the noun with its particular meaning here treated was formed, appears in O.E. as cepan, of which the deriva- tion is unknown; no words related to it are found in cognate languages. The earliest meaning (c. iooo) appears to have been to lay hold of, to seize, from which its common uses of to guard, observe, retain

possession of, have developed.

KEEWATIN, a district of Canada, bounded E. by Committee Bay, Fox Channel, and Hudson and James bays, S. and S.W. by the Albany and English rivers, Manitoba, Lake Winnipeg, and Nelson river, W. by the iooth meridian, and N. by Simpson and Rae straits and gulf and peninsula of Boothia; thus including an area of 445,000 sq. m. Its surface is in general barren and rocky, studded with innumerable lakes with intervening elevations, forest-clad below 6o° N., but usually bare or covered with moss or lichens, forming the so-called " barren lands " of the north. With the exception of a strip of Silurian and Devonian rocks, 40 to 80 m. wide, extending from the vicinity of the Severn river to the Churchill, and several isolated areas of Cambrian and Huronian, the district is occupied by Laurentian rocks. The principal river is the Nelson, which, with its great tributary, the Saskatchewan, is 1450 m. long; other tributaries are the Berens, English, Winnipeg, Red and Assiniboine. The Hayes, Severn and Winisk also flow from the south-west into Hudson Bay, and the Ekwan, Attawapiskat and Albany, 500 m. long, into James Bay. The Churchill, 925 m., Thlewliaza, Maguse, and Ferguson rivers discharge into Hudson Bay on the west side; the Kazan, 500 m., and Dubawnt, 660 m., into Chesterfield Inlet; and Back's river, rising near Aylmer Lake, flows north-eastwards 560 m. to the Arctic Ocean. The principal lakes are St Joseph and Seul on the southern boundary; north- ern part of Lake Winnipeg, 710 ft. above the sea; Island; South Indian; Etawney; Nueltin; Yathkyed, at an altitude of 300 ft.; Maguse; Kaminuriak; Baker, 30 ft.; Aberdeen, 130 ft.; and Garry. The principal islands are Southampton, area 17,800 sq. m.; Marble Island, the usual wintering place for whaling vessels; and Bell and Coats Islands, in Hudson Bay; and Akimiski, in James Bay.

A few small communities at the posts of the Hudson Bay Company constitute practically the whole of the white popula- tion. In 1 807 there were 852 Indians in the Churchill and Nelson rivers district, but no figures are available for the district as a whole. The principal posts in Keewatin are Norway House, near the outlet of Lake Winnipeg; Oxford House, on the lake of the same name; York Factory, at the mouth of Hayes river; and Forts Severn and Churchill, at the mouths of the Severn and Churchill rivers respectively. In 1905 the district of Keewatin was included in the North- West Territories and the whole placed under an administrator or acting governor. The derivation of the name is from the Cree — the " north wind."

KEF, more correctly El-Kef (the Rock), a town of Tunisia, 125 m. by rail S.S.W. of the capital, and 75 m. S.E. of Bona in Algeria. It occupies the site of the Roman colony of Sicca Veneria, and is built on the steep slope of a rock in a moun- tainous region through which flows the Mellegue, an

affluent of the Mejerda. Situated at the intersection of main routes from the west and south, Kef occupies a position of strategic import- ance. Though distant some 22 m. from the Algerian frontier it was practically a border post, and its walls and citadel were kept in a state of defence by the Tunisians. The town with its half-dozen mosques and tortuous, dirty streets, is still partly walled. The southern part of the wall has however been destroyed by the French, and the remainder is being left to decay. Beyond the part of the wall destroyed is the French quarter. The kasbah, or citadel, occupies a rocky eminence on the west side of the town. It was built, or rebuilt, by the Turks, the material being Roman. It has been restored by the French, who maintain a garrison, here.

The Roman remains include fragments of a large temple dedicated to Hercules, and of the baths. The ancient cisterns

remain, but are empty, being used as part of the barracks. The town is however supplied by water from the same spring which filled the cisterns. The Christian cemetery is on the site of a basilica. There are ruins of another Christian basilica, excavated by the French, the apse being intact and the narthex serving as a church. Many stones with Roman inscriptions are built into the walls of Arab houses. The modern town is much smaller than the Roman colony. Pop. about 6000, including about 100 Europeans (chiefly Maltese).

The Roman colony of Sicca Veneria appears from the character of its worship of Venus (Val. Max. ii. 6,§ l5)to have been a Phoenician settlement. It was afterwards a Numidian stronghold, and under the Caesars became a fashionable residential city and one of the chief centres of Christianity in North Africa. The Christian apolo- gist Arnobius the Elder lived here.

See H. Barth, Die Kilstenldnder des Mittelmeeres (1849); Corpus Inscript. Lat., vol. viii. ; Sombrun in Bull, de la soc. de geog. de Bordeaux (1878). Also Cardinal Newman's Callista: a Sketch of the Third Century (1856), for a " reconstruction " of the manner of life of the early Christians and their oppressors. ,

KEHL, a town in the grand-duchy of Baden, on the right bank of the Rhine, opposite Strassburg, with which it is connected by a railway bridge and a bridge of boats. Pop. 4000. It has a considerable river trade in timber, tobacco and coal, which has been developed by the formation of a harbour with two basins. The chief importance of Kehl is its connexion with the military defence of Strassburg, to the strategic area of which it belongs. It is encircled- by the strong forts Bose, Blumenthal and Kirchbach of that system. In 1678 Kehl was taken from the imperialists by the French, and in

1683 a new fortress, built by Vauban, was begun. In 1697 it was restored to the Empire and was given to Baden, but in 1703 and again in 1733 it was taken by the French, who did not however retain it for very long. In 1793 the French again took the town, which was retaken by the Austrians and was restored to Baden in 1803. In 1808 the French, again in possession, restored the fortifications, but these were dismantled in 1815, when Kehl was again restored to Baden. In August 1870, during the Franco-German War, the French shelled the defenceless town.

KEIGHLEY (locally Keithley), a municipal borough in the Keighley parliamentary division of the West Riding of Yorkshire, England, 17 m. W.N.W. of Leeds, on .branches of the Great Northern and Midland railways. Pop. (1901), 41,564. It is beautifully situated in a deep valley near the junction of the Worth with the Aire. A canal between Liverpool and Hull affords it water communication with both west and east coasts. The principal buildings are the parish church of St Andrew (dating from the time of Henry I., modernized in 1710, rebuilt with the exception of the tower in 1805, and again rebuilt in 1878), and the handsome Gothic mechanics' institute and technical school (1870). A grammar school was founded in 1 7 13, the operations of which have been extended so as to embrace a trade school (187 1) for boys, and a grammar school for girls. The principal industries are manufactures of woollen goods, spinning, sewing and washing machines, and tools. The town was incorporated in 1882, and the corporation consists of a mayor, 6 aldermen and 18 councillors.

KEI ISLANDS [Ke, Key, Kit, &c; native, Ewab], a group in the Dutch East Indies, in the residency of Amboyna, between 5 and 6° 5′ S. and 131 50′ and 133° 15′ E., and consisting of four parts: Nuhu-Iut or Great Kei, Roa or Little Kei, the Tayanda, and the Kur group. Great Kei differs physically in every respect from the other groups. It is of Tertiary forma- tion (Miocene), and has a chain of volcanic elevations along the axis, reaching a height of 2600 ft. Its area is 290 sq. m., the total land area of the group being 572 sq. m. All the other islands are of post-Tertiary formation and of level surface. The group has submarine connexion, under relatively shallow sea, with the Timorlaut group to the south-west and the chain of islands extending north-west towards Ceram; deep water separates it on the east from the Aru Islands and on the west from the inner islands of the Banda Sea. Among the products are coco-nuts, sago, fish, trepang, timber, copra, maize, yams

and tobacco. The population is about 23,000, of whom 14,900 are pagans, and 8300 Mahommedans.

The inhabitants are of three types. There is the true Kei Islander, a Polynesian by his height and black or brown wavy hair, with a complexion between the Papuan black and the Malay yellow. There is the pure Papuan, who has been largely merged in the Kei type. Thirdly, there are the immigrant Malays. These (distinguished by the use of a special language and by the profession of Mohammedanism) are descendants of natives of the Banda islands who fled eastward before the encroachments of the Dutch. The pagans have rude statues of deities and places of sacrifice indicated by flat-topped cairns. The Kei Islanders are skilful in carving and celebrated boat-builders.

See C. M. Kan, " Onze geographische kennis der Keij-Eilanden," in Tijdschrift Aardrijkskundig Genootschap (1887); Martin, "Die Kei-inseln u. ihr Verhaltniss zur Australisch-Asiatischen Grenzlinie," ibid, part vii. (1890); W. R. van Hoevell, " De Kei-Eilanden," in Tijdschr. Batavian. Gen. (1889) ; " Verslagen van de wetenschappelijke opnemingen en onderzoekingen op de Keij-Eilanden " (1889-1890), by Planten and Wertheim (1893), with map and ethnographical atlas of the south-western and south-eastern islands by Pleyte; Langen, Die Key- oder Kii-Inseln (Vienna, 1902).

KEIM, KARL THEODOR (1825-1878), German Protestant theologian, was born at Stuttgart on the 17th of December 1825. His father, Johann Christian Keim, was headmaster of a gym- nasium. Here Karl Theodor received his early education, and then proceeded to the Stuttgart Obergymnasium. In 1843 he went to the university of Tubingen, where he studied philosophy under J. F. Reiff, a follower of Hegel, and Oriental languages under Heinrich Ewald and Heinrich Meier. F. C. Baur, the leader of the new Tubingen school, was lecturing on the New Testament and on the history of the church and of dogma, and by him in particular Keim was greatly impressed. The special bent of Keim's mind is seen in his prize essay, Verhaltniss der Christen in den ersten drei J ahrhunderten bis Konstantin zum romischen Reiche (1847). His first published work was Die Reformation der Reichstadt Ulm (1851). In 1850 he visited the university of Bonn, where he attended some of the lectures of Friedrich Bleek, Richard Rothe, C. M. Arndt and Isaak Dorner. He taught at Tubingen from June 1851 until 1856, when, having become a pastor, he was made deacon at Esslingen, Wiirttemberg. In 1859 he was appointed archdeacon; but a few months later he was called to the university of Zurich as professor of theology (1859-1873), where he produced his important works. Before this he had written on church history (e.g. Schwabische Refor- mationsgeschichte bis zum Augsburger Reichstag, 1855). His

inaugural address at Zurich on the human development of Jesus, Die menschliche Enlwicklung Jesu Christi (1861), and his Die ‘ geschichtliche Wiirde Jesu (1864) were preparatory to his chief work, Die Geschichte Jesu von Nazara in ihrer Verkcttung mil dem Gesamtleben seines Volkes (3 vols., 1867-1872; Eng. trans., Jesus of Nazareth, and the National Life of Israel, 6 vols.), 1873-1882. In 1873 Keim was appointed professor of theology at Giessen. This post he resigned, through ill-health, shortly before his death on the 17th of November 1878. He belonged to the ” mediation ” school of theology.

Chief works, besides the above: Reformalionsbliilter der’Reichs- stadt Esslingen (i860); Ambrosius Blarer, der Schwabische Reformator (i860); Der Ubertritt Konstantins d. Gr. zum Christenthum (1862); his sermons, Freundesworte zur Gemeinde (2 vols., 1861-1862); and Celsus’ wahres Wort (1873). In 1881 H. Ziegler published one of Keim’s earliest works, Rom und das Christenthum, with a biographical sketch. See also Ziegler’s article in Herzog-Hauck, Realencyklopddie.

KEITH, the name of an old Scottish family which derived its name from the barony of Keith in East Lothian, said to have been granted by Malcolm II., king of Scotland, to a member of the house for services against the Danes. The office of great marishal of Scotland, afterwards hereditary in the Keith family, may have been conferred at the same time; for it was confirmed, together with possession of the lands of Keith, to Sir Robert Keith by a charter of King Robert Bruce, and appears to have been held as annexed to the land by the tenure of grand serjeanty. Sir Robert Keith commanded the Scottish horse at Bannockburn, and was killed at the battle of Neville’s

Cross in 1346. At the close of the 14th century Sir William Keith, by exchange of lands with Lord Lindsay, obtained the crag of Dunnottar in Kincardineshire, where he built the castle of Dunnottar, which became the stronghold of his descendants. He died about 1407. In 1430 a later Sir William Keith was created Lord Keith, and a few years afterwards earl marishal, and these titles remained in the family till 1716. William, fourth earl marishal (d. 1581), was one of the guardians of Mary queen of Scots during her minority, and was a member of her privy council on her return to Scotland. While refraining from extreme partisanship, he was an adherent of the Refor- mation; he retired into private life at Dunnottar Castle about 1567, thereby gaining the sobriquet “William of the Tower.” He was reputed to be the wealthiest man in Scotland. His eldest daughter Anne married the regent Murray. His grand- son George, 5th earl marishal (c. 1 553-1623), was one of the most cultured men of his time. He was educated at King’s College, Aberdeen, where he became a proficient classical scholar, after- wards studying divinity under Theodore Beza at Geneva. He was a firm Protestant, and took an active part in the affairs of

the kirk. His high character and abilities procured him the appointment of special ambassador to Denmark to arrange the marriage of James VI. with the Princess Anne. He was sub- sequently employed on a number of important commissions; but he preferred literature to public affairs, and about 1620 he retired to Dunnottar, where he died in 1623. He is chiefly remembered as the founder in 1 593 of the Marischal College in the university of Aberdeen, which he richly endowed. From an uncle he inherited the title of Lord Altrie about 1590. William, 7th earl marishal (c. 1617-1661), took a prominent part in the Civil War, being at first a leader of the covenanting party in north-east Scotland, and the most powerful opponent of the marquess of Huntly. He co-operated with Montrose in Aber- deenshire and neighbouring counties against the Gordons. With Montrose he signed the Bond of Cumbernauld in August 1640, but took no active steps against the popular party till 1648, when he joined the duke of Hamilton in his invasion of England, escaping from the rout at Preston. In 1650 Charles II. was entertained by the marishal at Dunnottar; and in 1651 the Scottish regalia were left for safe keeping in his castle. Taken prisoner in the same year, he was committed to the Tower and was excluded from Cromwell's Act of Grace. He was made a privy councillor at the Restoration and died in 1661. Sir John Keith (d. 1714), brother of the 7th earl marishal, was, at the Restoration, given the hereditary office of knight marishal of Scotland, and in 1677 was created earl of Kintore, and Lord Keith of Inverurie and Keith-Hall, a reward for his share in preserving the regalia of Scotland, which w T ere secretly conveyed from Dunnottar to another hiding-place, when the castle was besieged by Cromwell's troops, and which Sir John, perilously to himself, swore he had carried abroad and delivered to Charles II., thus preventing further search. From him are descended the earls of Kintore.

George, 10th earl marishal (c. 1693-1778), served under Marl- borough, and like his brother Francis, Marshal Keith (q.v.), was a zealous Jacobite, taking part in the rising of 1715, after which he es« aped to the continent. In the following year he was attainted, his estates and titles being forfeited to the Crown. He lived for many years in Spain, where he concerned himself with Jacobite intrigues, but he took no part in the rebellion of 1745, proceeding about that year to Prussia, where he became, like his brother, intimate with Frederick the Great. Frederick employed him in several diplomatic posts, and he is said to have conveyed valuable information to the earl of Chatham, as a reward for which he received a pardon from George II., and returned to Scotland in 1759. His heir male, on whom, but for the attainder of 17 16, his titles would have devolved, was apparently his cousin Alexander Keith of Ravelston, to whom the attainted earl had sold the castle and lands of Dunnottar in 1766. From Alexander Keith was descended, through the female line, Sir Patrick Keith

Murray of Ochtertyre, who sold the estates of Dunnottar and Ravelston. After the attainder

of 1 716 the right of the Keiths of Ravelston to be recognized as the representatives of the earls marishal was disputed by Robert Keith (1681-1757), bishop of Fife, a member of another collateral branch of the family. The bishop was a writer of some repute, his chief work, The History of the Affairs of the Church and State of Scotland (Edinburgh, 1734), being of considerable value for the reigns of James V., James VI., and Mary Queen of Scots. He also published a Catalogue of the Bishops of Scotland (Edinburgh, 1755), and other less important historical and theological works.

Robert Keith (d. 1774), descended from a younger son of the 2nd earl marishal, was British minister in Vienna in 1748, and subsequently held other important diplomatic appointments, being known to his numerous friends, among whom were the leading men of letters of his time, as " Ambassador Keith." His son, Sir Robert Murray Keith (1730-1795), was on Lord George Sackville's staff at the battle of Minden. He became colonel of a regiment (the 87th foot) known as Keith's High- landers, who won distinction in the continental wars, but were disbanded in 1763; he was then employed in the diplomatic service, in which he achieved considerable success by his honesty, courage, and knowledge of languages. In 1781 he became lieutenant-general; in 1789. he was made a privy councillor.

From the Keith family through the female line was de- scended George Keith Elphinstone, Baron Keith of Stonehaven, Marishal and afterwards Viscount Keith (q.v.), whose titles became extinct at the death of his daughter Margaret, Baroness Keith, in 1867.

See Calendar of Documents relating to Scotland, edited by J.. Bain (4 vols., Edinburgh, 1881-1888) ; Peter Buchan, An Account of the Ancient and Noble Family of Keith (Edinburgh, 1828) ; Memoirs and Correspondence of Sir Robert Murray Keith, edited by Mrs. Gillespie Smyth (London, 1849); John Spalding, Memorialls of the Trubles in Scotland, 1624-1645 (2 vols., Spalding Club Publ. 21, 23, Aberdeen, 1850-1851); Sir Robert Douglas, The Peerage of Scotland (Edinburgh, 1812) ;G.E.C, Complete Peerage, vol. iv. (London, 1892). (R. J. M.)

KEITH, FRANCIS EDWARD JAMES (1696-1758), Scottish soldier and Prussian field marshal, was the second son of William, 9th earl marishal of

Scotland, and was born on the nth of June 1696 at the castle of Inverugie near Peterhead. Through his careful education under Robert Keith, bishop of Fife, and sub- sequently at Edinburgh University in preparation for the legal profession, he acquired that taste for literature which afterwards secured him the esteem of the most distinguished savants of Europe; but at an early period his preference for a soldier's career was decided. The rebellion of 1715, in which he displayed qualities that gave some augury of his future eminence, com- pelled him to seek safety on the Continent. After spending two years in Paris, chiefly at the university, he in 17 19 took part in the ill-starred expedition of the Pretender to the Highlands of Scotland. He then passed some time at Paris and Madrid in obscurity and poverty, but eventually obtained a colonelcy in the Spanish army, and, it is said, took part in the siege of Gibraltar (1726-27). Finding his Protestantism a barrier to promotion, he obtained from the king of Spain a recommendation to Peter II. of Russia, from whom he received (1728) the command of a regiment of the guards. He displayed in numerous campaigns the calm, intelligent and watchful valour which was his chief characteristic, obtaining the rank of general of infantry and the reputation of being one of the ablest officers in the Russian service as well as a capable and liberal civil administrator. Judging, however, that his rewards were not commensurate with his merits, he in 1747 offered his services to Frederick II. of Prussia, who at once gave him the rank of field marshal, in 1 749 made him governor of Berlin, and soon came to cherish towards him, as towards his brother, the 10th earl marishal, a strong personal regard. In 1756 the Seven Years' War broke out. Keith was employed in high command from the first, and added to his Russian reputation on every occasion by resolution and promptitude of action, not less than by care and skill. In 1756 he commanded the troops covering the investment of Pirna, and distinguished himself at Lobositz. In 1757 he commanded

at the siege of Prague; later in this same campaign he defended Leipzig against a greatly superior force, was present at Rossbach, and, while the king was fighting the campaign of Leuthen, con- ducted a foray into Bohemia. In 1758 he took a prominent part in the unsuccessful Moravian campaign, after which he withdrew from the army to recruit his broken health. He returned in time for the autumn campaign in the Lausitz, and was killed on the 14th of October 1758 at the battle of Hoch- kirch. His body was honourably buried on the field by Marshal Daun and General Lacy, the son of his old commander in Russia, and was shortly afterwards transferred by Frederick to the garrison church of Berlin. Many memorials were erected to him by the king, Prince Henry, and others. Keith died un- married, but had several children by his mistress, Eva Mertens, a Swedish prisoner captured by him in the war of 1741-43. In 1889 the 1st Silesian infantry regiment No. 22 of the German army received his name.

See K. A. Varnhagen von Ense, Biographische Denkmale, part 7 (1844) ; Fragment of a Memoir of Field-Marshal James Keith, written by himself (1714-1734; edited by Thomas Constable for the Spalding Club, 1843); T. Carlyle, Frederick the Great, passim; V. Paczynaski- T enczy n,Leben desG. F.M.Jakob Keith (Berlin, 1889); Peter Buchan, Account of the Family of Keith (Edinburgh, 1878); Anon., Memoir of Marshal Keith (Peterhead, 1869); Pauli, Leben grosser Helden, part iv.

KEITH, GEORGE (c. 1639-1716), British divine, was born at Aberdeen about 1639 and was educated for the Presbyterian ministry at Marischal College in his native city. In 1662 he became a Quaker and worked with Robert Barclay (q.v.). After being imprisoned for preaching in 1676 he went to Holland and Germany on an evangelistic tour with George Fox and William Penn. Two further terms of imprisonment in England induced him (1684) to emigrate to America, where he was surveyor-general in East New Jersey and then a schoolmaster at Philadelphia. He travelled in New England defending Quakerism against the attacks of Increase and Cotton Mather, but after a time fell out with his own folk on the subject of the atonement, accused them of deistic views, and started a community of his own called " Christian Quakers " or " Keithians." He endeavoured to advance his views in London, but the Yearly Meeting of 1694 disowned him, and he established a society at Turner's Hall in Philpot Lane, where he so far departed from Quaker usage as to administer the two sacraments. In 1700 he conformed to the Anglican Church, and from 1702 to 1704 was an agent of the Society for the Propagation of the Gospel in America. He died on the 27th of March 1716 at Edburton in Sussex, of which parish he was rector. Among his writings were The Deism of William Penn and his Brethren (1699); The Standard of the Quakers examined; or, an Answer to the Apology of Robert Barclay (1702); ' A Journal of Travels (1 706) . Gilbert Burnet, bishop of Salisbury, a fellow-Aberdonian, speaks of him as " the most learned man that ever was in that sect, and well versed in the Oriental tongues, philosophy and mathematics."

KEITH, GEORGE KEITH ELPHINSTONE, Viscount (1746- 1823), British admiral, fifth son of the 10th Lord Elphinstone, was born in Elphinstone Tower, near Stirling, on the 7th of January 1746. Two of his brothers went to sea, and he followed their example by entering the navy in 1761, in the " Gosport," then commanded by Captain Jervis, afterwards Earl St Vincent. In 1767 he made a voyage to the East Indies in the Company's service, and put £2000 lent him by an uncle to such good purpose in a private trading venture that he laid the foundation of a handsome fortune. He became lieutenant in 1770, commander in 1772, and post captain in 1775. During the war in America he was employed against the privateers, and with a naval brigade at the occupation of Charleston, S.C. In January 1781, when in command of the " Warwick " (50), he captured a Dutch

50- gun ship which had beaten off an English vessel of equal strength a few days before. After peace was signed he remained on shore for ten years, serving in Parliament as member first for Dum- bartonshire, and then for Stirlingshire. When war broke out again in 1793 he was appointed to the " Robust " (74), in which he took part in the occupation of Toulon by lord Hood. He

particularly distinguished himself by beating a body of the French ashore at the head of a naval brigade of English and Spaniards. He was entrusted with the duty of embarking the fugitives when the town was evacuated. In 1794 he was pro- moted rear-admiral, and in 1795 he was sent to occupy the Dutch colonies at the Cape of Good Hope and in India. He had a large share in the capture of the Cape in 1795, and in August 1796 captured a whole Dutch squadron in Saldanha Bay. In the interval he had gone on to India, where his health suffered, and the capture at Saldanha was effected on his way home. When the Mutiny at the Nore broke out in 1797 he was appointed to the command, and was soon able to restore order. He was equally successful at Plymouth, where the squadron was also in a state of effervescence. At the close of 1798 he was sent as second in command to St Vincent. It was for a long time a thankless post, for St Vincent was at once half incapacitated by ill-health and very arbitrary, while Nelson, who considered that Keith's appointment was a personal slight to himself, was peevish and insubordinate. The escape of a French squadron which entered the Mediterranean from Brest in May 1799 was mainly due to jarrings among the British naval commanders. Keith followed the enemy to Brest on their retreat, but was unable to bring them to action. He returned to the Mediter- ranean in November as commander-in-chief. He co-operated with the Austrians in the siege of Genoa, which surrendered on the 4th of June 1800. It was however immediately afterwards lost in consequence of the battle of Marengo, and the French made their re-entry so rapidly that the admiral had considerable difficulty in getting his ships out of the harbour. The close of 1 801 and the be'ginning of the following year were spent in transporting the army sent to recover Egypt from the French. As the naval force of the enemy was completely driven into port, the British admiral had no opportunity of an action at sea, but his management of the convoy carrying the troops, and of the landing at Aboukir, was greatly admired. He was made a baron of the United Kingdom — an Irish barony havllig been conferred on him in 1797. On the renewal of the war in 1803 he was appointed commander-in-chief in the North Sea, which post he held till 1807. In February 181 2 he was appointed commander- in-chief in the Channel, and in 1814 he was raised to a viscounty. During his last two

commands he was engaged first in over- looking the measures taken to meet a threatened invasion, and then in directing the movements of the numerous small squadrons and private ships employed on the coasts of Spain and Portugal, and in protecting trade. He was at Plymouth when Napoleon surrendered and was brought to England in the " Bellerophon " by Captain Maitland (1777-1839). The decisions of the British government were expressed through him to the fallen Emperor. Lord Keith refused to be led into disputes, and confined himself to declaring steadily that he had his orders to obey. He was not much impressed by the appearance of his illustrious charge, and thought that the airs of Napoleon and his suite were ridicu- lous. Lord Keith died on the 10th of March 1823 at Tullyallan, his property in Scotland, and was buried in the parish church. A portrait of him by Owen is in the Painted Hall in Greenwich. He was twice married: in 1787 to Jane Mercer, daughter of Colonel William Mercer of Aldie; and in 1808 to Hester Maria Thrale, who is spoken of as " Queenie " in Boswell's Life of Johnson and Mme. D'Arblay's Diary. He had a daughter by each marriage, but no son. Thus the viscounty became extinct on his death, but the English and Irish baronies descended to his elder daughter Margaret (1788-1867), who married the Comte de Flahault de la Billarderie, only to become extinct on her death.

There is a panegyrical Life of Lord Keith by Alex. Allardyce (Edinburgh, 1882); and biographical notices will be found in John Marshall's Royal Naval Biography, i. 43 (1823-1835), and the Naval Chronicle, x. 1. (D. H.)

KEITH, a police burgh of Banffshire, Scotland, on the Isla, 53j m. N.W. of Aberdeen by the Great North of Scotland rail- way. Pop. (1901), 4753. A branch of the Highland railway also gives access to Elgin, and there is a line to Buckie and Portessie on the Moray Firth. The burgh includes Old Keith and New Keith

on the east bank of the Isla, and Fife-Keith on the west bank. Though Old Keith has a charter dating from William the Lion it fell into gradual decay; New Keith, founded in the 18th century by the second earl of Seafield, being better situated for the growth of a town. Fife-Keith has sprung up since 1816. The principal public buildings include the Turner memorial hospital, the Long- more hall, and the Institute. In the Roman Catholic church there is a painting of the " Incredulity of St Thomas," presented by Charles X. of France. The industries include manufactures of tweeds, blankets, agricultural implements, and boots and shoes; there are also distilleries, breweries, flour mills, and lime and manure works. But the main importance of Keith lies in the fact that it is the centre of the agricultural trade of the shire. The " Summer Eve Fair " held in September is the largest cattle and horse fair in the north of Scotland; the town is also

the head- quarters of the dressed-meat trade in the north.

KEJ, or Kech, the chief place in a district of the province of Makran in Baluchistan, which has given its name to Kej-Makran, as distinguished from Persian Makran. There is no town, but a number of small villages dominated by a fort built upon a rock, on the eastern bank of the Kej River. This fort, like many others similarly placed throughout the country, is supposed to be im- pregnable, but is of no strength except against the matchlocks of the surrounding tribes. Kej (or Kiz) was an important trade centre in the days of Arab supremacy in Sind, and the rulers of Kalat at various times marched armies into the province with a view to maintaining their authority. At the beginning of the 1 9th century it had the reputation of a commercial centre, trading through Panjgur with Kandahar, with Karachi via Bela, and with Muscat and the Persian Gulf by the seaport of Gwadar, distant about 80 m. The present Khan of Kalat exercises but a feeble sway over this portion of his dominion, although he appoints a governor to the province. The principal tribe residing around Kej is that of the Gichki, who claim to be of Rajput origin, and to have settled in Makran during the 17th century, having been driven out of Rajputana. The climate during summer is too hot for Europeans. During winter, however, it is temperate. The principal exports consist of dates, which are considered of the finest quality. A local revolt against Kalat rendered an expedi- tion against Kej necessary in 1898. Colonel Mayne reduced the fortress and restored order in the surrounding districts.

KEKUdS, FRIEDRICH AUGUST (1829-1896), German chemist, was born at Darmstadt on the 7th of September 1829. While studying architecture at Giessen he came under the in- fluence of Liebig and was induced to take up chemistry. From Giessen he went to Paris, and then, after a short sojourn in Switzerland, he visited England. Both in Paris and in England he enjoyed personal intercourse with the leading chemists of the period. On his return to Germany he started a small chemical laboratory at Heidelberg, where, with a very slender equipment, he carried out several important researches. In 1858 he was appointed professor of chemistry at Ghent, and in 1 865 was called to Bonn to fill a similar position, which he held till his death in that town on the 13th of June 1896. Kekule's main importance lies in the far-reaching contributions which he made to chemical theory, especially in regard to the constitution of the carbon com- pounds. The doctrine of atomicity had already been enunciated by E. Frankland, when in 1858 Kekule published a paper in which, after giving reasons for regarding carbon as a tetravalent element, he set forth the essential features of his famous doctrine of the linking of atoms. He explained that in substances containing several carbon atoms it must be assumed that some of the affinities of each carbon atom are bound by the affinities of the atoms of other elements contained in the substance, and some by an equal number

of the affinities of the other carbon atoms. The simplest case is when two carbon atoms are combined so that one affinity of the one is tied to one affinity of the other; two, therefore, of the affinities of the two atoms are occupied in keeping the two atoms together, and only the remaining six are available for atoms of other elements. The next simplest case consists in the mutual interchange of two affinity units, and so on. This conception led Kekul6 to his " closed-chain " or " ring " theory of the constitution

of benzene which has been called the " most brilliant piece of prediction to be found in the whole range of organic chemistry," and this in turn led in particular to the elucidation of the consti- tution of the " aromatic compounds," and in general to new methods of chemical synthesis and decomposition, and to a deeper insight into the composition of numberless organic bodies and their mutual relations. Professor F. R. Japp, in the Kekule memorial lecture he delivered before the London Chemical Society on the 15th of December 1897, declared that three-fourths of modern organic chemistry is directly or indirectly the product of Kekule's benzene theory, and that without its guidance and inspiration the industries of the coal-tar colours and artificial therapeutic agents in their present form and extension would have been inconceivable.

Many of Kekule's papers appeared in the Annalen der Chemie, of which he was editor, and he also published an important work, Lehrbuch der organischen Chemie, of which the first three volumes are dated 1861, 1866 and 1882, while of the fourth only one small section was issued in 1887.

KELLER, ALBERT (1845-), German painter, was born at Gais, in Switzerland; he studied at the Munich Academy under Lenbach and Ramberg, and must be counted among the leading colourists of the modern German school. Travels in Italy, France, England and Holland, and a prolonged sojourn in Paris, helped to develop his style, which is marked by a sense of elegance and refinement all too rare in German art. His scenes of society life, such as the famous " Dinner " (1890), are painted with thoroughly Parisian esprit, and his portraits are marked by the same elegant distinction. He is particularly successful in the rendering of rustling silk and satin dresses and draperies. His historical and imaginative works are as modern in spirit and as unacademical as his portraits. At the Munich Pinakothek is his painting " Jairi Tochterlein " (1886), whilst the Konigsberg Museum contains his " Roman Bath," and the Liebieg collection in Reichenberg the " Audience with Louis XV.," the first picture that drew attention to his talent. Arrtong other important works he painted " Faustina

in the Temple of Juno at Praeneste," " The Witches' Sleep " (1888) " The Judgment of Paris," " The Happy Sister," " Temptation " (1892), " Autumn " (1893), " An Adventure " (1896), and" The Crucifixion."

KELLER, GOTTFRIED (1819-1890), German poet and nove- list, was born at Zurich on the 19th of July 1819. His father, a master joiner, dying while Gottfried was young, his early educa- tion was neglected; he, however, was in 1835 apprenticed to a landscape painter, and subsequently spent two years (1840-1842) in Munich learning to paint. Interest in politics drew him into literature, and his talents were first disclosed in a volume of short poems, Gedichte (1846). This obtained him recognition from the government of his native canton, and he was in 1848 enabled to take a short course of philosophical study at the university of Heidelberg. From i8soto i85Shelived inBerlin, where hewrote his most important novel, Der griine Heinrich (1851-1853; revised edition 1879-1880), remarkable for its delicate autographic por- traiture and the beautiful episodes interwoven with the action. This was followed by Die Leule von Seldwyla (1856), studies of Swiss provincial life, including in Romeo und Julia auf dem Dorfe one of the most powerful short stories in the German language, and in Die drei gerechten Kammmacher, almost as great a master- piece of humorous writing. Returning to his native city with a considerable reputation, he received in 1861 the appointment of secretary to the canton. For a time his creative faculty seemed paralysed by his public duties, but in 1872 appeared Sieben Legenden, and in 1874 a second series of Die Leute von Seldwyla, in both of which books he displayed no abatement of power and originality. He retired from the public service in 1876 and employed his leisure in the production of Zuricher Novellen (1878), Das Sinngedicht, a collection of short stories (1881), and a novel, Martin Salander (Berlin, 1886). He died on the 15th of July 1890 at Hottingen. Keller's place among German novelists is very high. Few have united such fancy and imagination to such uncompromising realism, or such tragic earnestness to such abounding humour. As a lyric poet, his genius is no less original;

he takes rank with the best German poets of this class in the second half of the 19th century.

Keller's Gesammelte Werke were published in 10 vols. (1889-1890), to which was added another volume, Nachgelassene Schriften und Dichtungen, containing the fragment of a tragedy (1893). In English appeared, G. Keller: A Selection of his Tales translated with a Memoir by Kate Freiligrath-Kroeker (1891). For a further estimate of Keller's life and works cf. O. Brahm (1883) ; E. Brenning, G. Keller nach seinem Leben und Dichten (1892); F. Baldensperger, G. Keller; sa vie et ses oenvres (1893) ; A. Frey, Erinnerungen an Gottfried Keller (1893); J. Baechtold, Kellers Leben. Seine Briefe und Tagebiicher (Berlin, 1894-1897); A.

Koster, G. Keller (1900; 2nd ed., 1907); and for his work as a painter, H. E. von Berlepsch, Gottfried Keller als Maler (1895).

KELLER, HELEN ADAMS (1880-), American blind deaf- mute, was born at Tuscumbia, Alabama, in 1880. When barely two years old she was deprived of sight, smell and hearing, by an attack of scarlet fever. At the request of her parents, who were acquainted with the success attained in the case of Laura Bridg- man (q.v.), one of the graduates of the Perkins Institution at Boston, Miss Anne M. Sullivan, who was familiar with the teach- ings of Dr S. G. Howe (q.v.), was sent to instruct her at home. Unfortunately an exact record of the steps in her education was not kept; but from 1888 onwards, at the Perkins Institution, Boston, and under Miss Sarah Fuller at the Horace Mann school in New York, and. at the Wright Humason school, she not only learnt to read, write, and talk, but became proficient, to an ex- ceptional degree, in the ordinary educational curriculum. In 1900 she entered Radcliffe College, and successfully passed the examinations in mathematics, &c. for her degree of A. B. in 1904. Miss Sullivan, whose ability as a teacher must be considered almost as marvellous as the talent of her pupil, was throughout her devoted companion. The case of Helen Keller is the most extraordinary ever known in the education of blind deaf-mutes (see Deaf and Dumb ad fin.), her acquirements including several languages and her general culture being exceptionally wide. She wrote The Story tf My Life (1902), and volumes on Optimism (1903), and The World I Live in (1908), which both in literary style and in outlook on life are a striking revelation of the results of modern methods of educating those who have been so handi- capped by natural disabilities.

KELLERMANN, FRANCOIS CHRISTOPHE DE (1735-1820), duke of Valmy and marshal of France, came of a Saxon family, long settled in Strassburg and ennobled, and was born there on the 28th of May 1735. He entered the French army as a volun- teer, and served in the Seven Years' War and in Louis XV. 's Polish expedition of 177 1, on returning from which he was made a lieutenant-colonel. He became brigadier in 1784, and in the following year marechal-de-camp. In 1789 Kellermann enthusi- astically embraced the cause of the Revolution, and in 1791 became general of the army in Alsace. In April 1792 he was made a lieutenant-general, and in August of the same year there came to him the opportunity of his lifetime. He rose to the occasion, and his victory of Valmy (see French Revolutionary Wars) over the Prussians, in Goethe's words, " opened a new era in the history of the world." Transferred to the army on the Moselle, Kellermann was accused by General Custine of neglect- ing to support his operations on the Rhine; but he was acquitted at the bar of the Convention in Paris, and placed at the head of the army of the Alps and of Italy, in which position he showed himself a careful commander and

excellent administrator. Shortly afterwards he received instructions to reduce Lyons, then in revolt against the Convention, but shortly after the sur- render he was imprisoned in Paris for thirteen months. Once more honourably acquitted, he was reinstated in his command, and did good service in maintaining the south-eastern border against the Austrians until his army was merged into that of General Bonaparte in Italy. He was then sixty-two years of age, still physically equal to his work, but the young generals who had come to the front in these two years represented the new spirit and the new art of war, and Kellermann's active career came to an end. But the hero of Valmy was never for- I gotten. When Napoleon came to power Kellermann was named

successively senator (1800), honorary marshal of France (1803), and duke of Valmy (1808). He was frequently employed in the administration of the army, the control of the line of communi- cations, and the command of reserve troops, and his long and wide experience made him one of Napoleon's most valuable assistants. In 1814 he voted for the deposition of the emperor and became a peer under the royal government. After the " Hundred Days " he sat in the Chamber of Peers and voted with the Liberals. He died at Paris on the 23rd of September

1820.

See J. G. P. de Salve, Fragments historiques sur M. le marechal de Kellermann (Paris, 1807), and De Botidoux, Esquisse de la carriere militaire de F. C. Kellermann, due de Valmy (Paris, 1817).

His son, Francois Etienne de Kellermann, duke of Valmy (1770-1835), French cavalry general, was born at Metz and served for a short time in his father's regiment of Hussars previous to entering the diplomatic service in 1791. In 1793 he again joined the army, serving chiefly under his father's command in the Alps, and rising in 1796 to the rank of chef de brigade. In the latter part of Bonaparte's celebrated Italian campaign of 1796-97 the younger Kellermann attracted the future emperor's notice by his brilliant conduct at the forcing of the Tagliamento. He was made general of brigade at once, and. continued in Italy after the peace of Campo Formio, being employed successively in the armies of Rome and Naples under Macdonald and Championnet. In the campaign of 1800 he commanded a cavalry brigade under the First Consul, and at Marengo (q.v.) he initiated and carried out one of the most famous cavalry charges of history, which, with Desaix's infantry attack, regained the lost battle and decided the issue of

the war. He was promoted general of division at once, but as early as the evening of the battle he resented what he thought to be an attempt to belittle his exploit. A heated con- troversy followed as to the influence of Kellermann's charge on the course of the battle, and in this controversy he displayed neither tact nor forbearance. However, his merits were too great for his career to be ruined either by his conduct in the dispute or by the frequent scandals, and even by the frauds, of his private life. Unlike his father's, his title to fame did not rest on one fortunate opportunity. Though not the most famous, he was perhaps the ablest of all Napoleon's cavalry leaders, and dis- tinguished himself at Austerlitz (q.v.), in Portugal under Junot (on this occasion as a skilful diplomatist), at the brilliant cavalry combat of Tormes (Nov. 28, 1809), -and on many other occasions in the Peninsular War. His rapacity was more than ever notorious in Spain, yet Napoleon met his unconvincing excuses with the words, " General, whenever your name is brought before me, I think of nothing but Marengo." He was on sick leave during the Russian expedition of 181 2, but in 1813 and 18T4 his skill and leading were as conspicuous as ever. He retained his rank under the first Restoration, but joinedNapoleon during the Hundred Days, and commanded a cavalry corps in the Waterloo campaign. At Quatre Bras he personally led his squadrons in the famous cavalry charge, and almost lost his life in the melee, and at Waterloo he was again wounded. He was disgraced at the second Restoration, and, on succeeding to his father's title and seat in the Chamber of Peers in 1820, at once took up and maintained till the fall of Charles X. in 1830 an attitude of determined opposition to the Bourbons. He died on the 2nd of June 1835.

His son Francois Christophe Edmond de Kellermann, duke of Valmy (1 802-1 868), was a distinguished statesman, political historian, and diplomatist under the July Monarchy.

KELLGREN, JOHAN HENRIK (1751-1795), Swedish poet and critic, was born at Floby in West Gothland, on the 1st of Decem- ber 17 51. He studied at the university of Abo, and had already some reputation as a poet when in 1774 he there became a " docent " in aesthetics. Three years later he removed to Stock- holm, where in conjunction with Assessor Carl Lenngren he began in 1778 the publication of the journal Stockholmsposten, of which he was sole editor from 1788 onwards. Kellgren was librarian to Gustavus III. from 1780, and from 1785 his private secretary. On the institution of the Swedish Academy in 1786

he was appointed one of its first members. He died at Stock- holm on the 20th of April 1795. His strong satiric tendency led him into numerous controversies, the chief that with the critic Thomas Thorild, against whom he directed his satire Nytforsok till orimmad vers, where he sneers at the "

raving of Shakespeare " and " the convulsions of Goethe," His lack of humour detracts from the interest of his polemical writings. His poetical works are partly lyrical, partly dramatic; of the plays the versification belongs to him, the plots being due to Gustavus III. The songs interspersed in the four operas which they produced in common, viz., Gustaf Vasa, Gustaf Adolf och Ebba Brake, Aeneas i Kartago, and Drottning Kristina, are wholly the work of Kellgren. From about the year 1788 a higher and graver feeling pervades Kell- gren's verses, partly owing to the influence of the works of Lessing and Goethe, but probably more directly due to his controversy with Thorild. Of his minor poems written before that date the most important are the charming spring-song Vintems vdlde lyktar, and the satrical Mina lojen and Man eger ej snille for det man ar galen. The best productions of what is called his later period are the satire Ljusets fiender, the comic poem Dumboms lefverne, the warmly patriotic Kantatd. 1. fan. 1789, the ode Till Kristina, the fragment Sigwart och Hilma, and the beautiful song Nya skapelsen, both in thought and form the finest of his works. Among his lyrics are the choicest fruits of the Gustavian age of Swedish letters. His earlier efforts, indeed, express the superficial doubt and pert frivolousness characteristic of his time; but in the works of his riper years he is no mere " poet of pleasure," as Thorild contemptuously styled him, but a worthy exponent of earnest moral feeling and wise human sympathies in felicitous and melodius verse.

His Samlade skrifter (3 vols., 1796; a later edition, 1884-1885) were revised by himself. His correspondence with Rosenstein and with Clewberg was edited by H. Schiick (i886-i887and 1894). See Wiesel- gren, Sveriges skona lilteratiir (1833-1849); Atterbom, Svenska siare och skalder (1841-1855) ; C. W. Bottiger in Transactions of the Swedish Academy, xlv. 107 seq. (1870); and Gustaf Ljunggren's Kellgren, Leopold, och Thorild, and his Svenska vitterhetens hdfder (1873-1877).

KELLOGG, CLARA LOUISE (1842-), American singer, was born at Sumterville, South Carolina, in July 1842, and was educated in New York for the musical profession, singing first in opera there in 1861. Her fine soprano voice and artistic gifts soon made her famous. She appeared as prima donna in Italian opera in London, and at concerts, in 1867 and 1868; and from that time till 1887 was one of the leading public singers. She appeared at intervals in London, but was principally engaged in America. In 1874 she organized an opera company which was widely known in the United States, and her enterprise and energy in directing it were remarkable. In 1887 she married Carl Strakosch, and retired from the profession.

KELLS, a market town of county Meath, Ireland, on the Black- water, 9j m. N.W. of Navan on a branch of the Great Northern railway. Pop. of

urban district (1901), 2428. The prosperity of the town depends chiefly upon its antiquarian remains. The most notable is St Columbkille's house, orginally an oratory, but afterwards converted into a church, the chancel of which was in existence in 1752. The present church is modern, with the exception of the bell-tower, rebuilt in 1578. Near the church there is a fine though imperfect specimen of the ancient round tower, 99 ft. in height; and there are several ancient crosses, the finest being that now erected in the market-place. Kells was originally a royal residence, whence its ancient name Ceanannus, meaning the dun or circular northern fort, in which the king resided, and the intermediate name Kenlis, meaning head fort. Here Conn of the Hundred Fights resided in the 2nd century; and here was a palace of Dermot, king of Ireland, in 544-565. The other places in Ireland named Kells are probably derived from Cealla, signifying church. In the 6th century Kells, it is said, was granted to St Columbkille. Of the monastery which he is reported to have founded there are no remains, and the town owes its chief ecclesiastical importance to the bishopric founded about 807, and united to Meath in the 13th century. The ecclesiastical establishment was noted as a seat of learning, and a monument of this remains in the Book of Kells an illuminated

copy of the Gospels in Latin, containing also local records, dating from the 8th century, and preserved in the library of Trinity College, Dublin. The illumination is executed with extraordinary delicacy, and the work is asserted to be the finest extant example of early Christian art of this kind. Neighbouring antiquities are the church of Dulane, with a fine doorway, and the dun or fortification of Dimor, the principal erection of a series of defences on the hills about 6 m. W. of Kells. Among several seats in the vicinity is that of the Marquess of Headfort. Kells returned two members to the Irish parliament before the Union.

KELLY, EDWARD (1854-1880), Australian bushranger, was born at Wallan Wallan, Victoria. His father was a transported Belfast convict, and his mother's family included several thieves. As boys he and his brothers were constantly in trouble for horse- stealing, and " Ned " served three years' imprisonment for this offence. In April 1878, an attempt was made to arrest his brother Daniel on a similar charge. The whole Kelly family resisted this and Ned wounded one of the constables. Mrs Kelly and some of the others were captured, but Ned and Daniel escaped to the hills, where they were joined by two other desperadoes, Byrne and Hart. For two years, despite a reward of £8000 offered jointly by the governments of Victoria and New South Wales for their arrest, the gang under the leadership of

Kelly terrorized the country on the borderland of Victoria and New South Wales, " holding up " towns and plundering banks. Their intimate knowledge of the district, full of convenient hiding-places, and their elaborate system of well-paid spies, ensured the direct pecuniary interest of many persons and contributed to their long immunity from capture. They never ill-treated a woman, nor preyed upon the poor, thus surrounding themselves with an attractive atmosphere of romance. In June t88o, however, they were at last tracked to a wooden shanty at Glenrowan, near Benalla, which the police surrounded, riddled with bullets, and finally set on fire. Kelly himself, who was outside, could, he claimed, easily have escaped had he not refused to desert his companions, all of whom were killed. He was severely wounded, captured and taken to Beechworth, where he was tried, con- victed and hanged in October 1880. The total cost of the capture of the Kelly gang was reckoned at £115,000.

See F. A. Hare, The Last of the Bushrangers (London, 1892).

KELLY, SIR FITZROY (1796-1880), English judge, was born in London in October 1796, the son of a captain in the Royal Navy. In 1824 he was called to the bar, where he gained a reputation as a skilled pleader. In 1834 he was made a king's counsel. A strong Tory, he was returned as member of parlia- ment for Ipswich in 1835, but was unseated on petition. In 1837 however he again became member for that town. In 1843 he sat for Cambridge, and in 1852 was elected member for Harwich, but, a vacancy suddenly occurring in East Suffolk, he preferred to contest that seat and was elected. He was solicitor-general in 1845 (when he was knighted), and again in 1852. In 1858-1859 he was attorney-general in Lord Derby's second administration. In 1866 he was raised to the bench as chief baron of the exchequer and made a member of the Privy Council. He died at Brighton on the 1 8th of September 1880.

See E. Foss, Lives of the Judges (1870).

KELLY, HUGH (1739-1777), Irish dramatist and poet, son of a Dublin publican, was born in 1739 at Killarney. He was apprenticed to a staymaker, and in 1760 went to London. Here he worked at his trade for some time, and then became an attorney's clerk. He contributed to various newspapers, and wrote pamphlets for the booksellers. In 1767 he published Memoirs of a Magdalen, or the History of Louisa Mttdmay (2 vols.) , a novel which obtained considerable success. In 1 766 he published anonymously Thespis; or, A Critical Examination into the Merits of All the Principal Performers belonging to Drury Lane Theatre, a poem in the heroic couplet containing violent attacks on the principal contemporary actors and actresses- The poem opens with a panegyric on David Garrick, however, and bestows foolish praise on friends of the writer. This satire was partly

inspired by Churchill's Rosciad, but its criticism is obviously

dictated chiefly by personal prejudice. In 1767 he produced a second part, less scurrilous in tone, dealing with the Covent Garden actors. His first comedy, False Delicacy, written in prose, was produced by Garrick at Drury Lane on the 23rd of January 1768, with the intention of rivalling Oliver Goldsmith's Good-Natured Man. It is a moral and sentimental comedy, described by Garrick in the prologue as a sermon preached in acts. Although Samuel Johnson described it as " totally void of char- acter," it was very popular and had a great sale. In French and Portuguese versions it drew crowded houses in Paris and Lisbon. Kelly was a journalist in the pay of Lord North, and therefore hated by the party of John Wilkes, especially as being the editor of the Public Ledger. His Thespis had also made him many enemies; and Mrs Clive refused to act in his pieces. The pro- duction of his second comedy, A Word to the Wise (Drury Lane, 3rd of March 1770), occasioned a riot in the theatre; repeated at the second performance, and the piece had to be abandoned. His other plays are: Clementina (Covent Garden, 23rd of February 1 7 7 1) , a blank verse tragedy, given out to be the work of a " young American Clergyman " in order to escape the opposition of the Wilkites; The School for Wives (Drury Lane, nth of December 1 773) , a prose comedy given out as the work of Major (afterwards Sir William) Addington; a two-act piece, The Romance of an Hour (Covent Garden, 2nd of December 1774), borrowed from Mar- montel's tale V Amitii a Vtpreuve; and an unsuccessful comedy, The Man of Reason (Covent Garden, 9th of February 1776). He was called to the bar at the Middle Temple in 1774, and determined to give up literature. He failed in his new profession and died in poverty on the 3rd of February 1777.

See The Works of Hugh Kelly, to which is prefixed the Life of the Author (1778) ; Genest, History of the Stage (v. 163, 263-269, 308, 399, 457. 5 J 7)- Pamphlets in reply to Thespis are: " Anti-Thespis . . ." (1767); " The Kellyad . . ." (1767), by Louis Stamma; and " The Rescue or Thespian Scourge …" (1767), by John Brown-Smith.

KELLY, MICHAEL (1 762-1826), British actor, singer and composer, was the son of a Dublin wine-merchant and dancing- master. He had a musical education at home and in Italy, and for four years from 1 783 was engaged to sing at the Court Theatre at Vienna, where he became a friend of Mozart. In 1 786 he sang in the first performance of the Nozze di Figaro. Appearing in London, at Drury Lane in 1787, he had a great success, and thenceforth was the principal English tenor at that theatre. In 1793 he became acting-manager of the King's Theatre, and he was in great request at concerts. He wrote a number of songs (including " The Woodpecker"), and the music for many dramatic pieces, now fallen into

oblivion. In 1826 he published his enter- taining Reminiscences, in writing which he was helped by Theodore Hook. He combined his professional work with conducting a music-shop and a wine-shop, but with disastrous financial results. He died at Margate on the 9th of October 1826.

KELP (in M.E. culp or culpe, of unknown origin; the Fr. equivalent is varech), the ash produced by the incineration of various kinds of sea-weed {Algae) obtainable in great abundance on the west coasts of Ireland and Scotland, and the coast of Brittany. It is prepared from the deep-sea tangle {Laminaria digitata), sugar wrack {L. saccharind), knobbed wrack {Fucus nodosus), black wrack (F. serratus), and bladder wrack (F. vesica losus). The Laminarias yield what is termed " drift-weed kelp," obtainable only when cast up on the coasts by storms or other causes. The species of Fucus growing within the tidal range are cut from the rocks at low water, and are therefore known as " cut-weeds." The weeds are first dried in the sun and are then collected into shallow pits and burned till they form a fused mass, which while still hot is sprinkled with water to break it up into convenient pieces. A ton of kelp is obtained from 20 to 22 tons of wet sea-weed. The average composition may vary as follows: potassium sulphate, 10 to 12%; potassium chloride, 20 to 25%; sodium carbonate, 5%; other sodium and mag- nesium salts, 15 to 20%; and insoluble ash from 40 to 50%. The relative richness in iodine of different samples varies largely, good drift kelp yielding as much as-10 to 15 lb per ton of 22! cwts., whilst cut-weed kelp will not give more than 3 to

4 tb. The use of kelp in soap and glass manufacture has been rendered obsolete by the modern process of obtaining carbonate of soda cheaply from common salt (see Iodine).

KELSO, a police burgh and market town of Roxburghshire, Scotland, on the left bank of the Tweed, 52 m. (43 m. by road) S.E. of Edinburgh and iof m. N.E. of Jedburgh by the North British railway. Pop. (1901), 4008. The name has been derived from the Old Welsh calch, or Anglo-Saxon cealc, " chalk", and the Scots how, " hollow," a derivation more evident in the earlier forms Calkon and Calchon, and illustrated in Chalkheugh, the name of a locality in the town. The ruined abbey, dedicated to the Virgin and St John the Evangelist, was founded in n 28 by David I. for monks from Tiron in Picardy, whom he trans- ferred hither from Selkirk, where they had been installed fifteen years before. The abbey, the building of which was completed towards the middle of the 13th century, became one of the richest and most powerful establishments in Scotland, claiming

precedence over the other monasteries and disputing for a time the supremacy with St Andrews. It suffered damage in numerous English forays, was pillaged by the 4th earl of Shrewsbury in 1522, and was reduced to ruins in 1545 by the earl of Hertford (afterwards the Protector Somerset). In 1602 the abbey lands passed into the hands of Sir Robert Ker of Cessford, 1st earl of Roxburghe. The ruins were disfigured by an attempt to render part of them available for public worship, and one vault was long utilized as the town gaol. All excrescences, however, were cleared away at the beginning of the 19th century, by the efforts of the Duke of Roxburghe. The late Norman and Early Pointed cruciform church has an unusual ground-plan, the west end of the cross forming the nave and being shorter than the chancel. The nave and transepts extend only 23 ft. from the central tower. The remains include most of the tower, nearly the whole of the walls of the south transept, less than half of the west front with a fragment of the richly moulded and deeply-set doorway, the north and west sides of the north transept, and a remnant of the chancel. The chancel alone had aisles, while its main circular arches were surmounted by two tiers of triforium galleries. The predominant feature is the great central tower, which, as seen from a distance, suggests the keep of a Norman castle. It rested on four Early Pointed arches, each 45 ft. high (of which the south and west yet exist) supported by piers of clustered columns. Over the Norman porch in the north transept is a small chamber with an interlaced arcade surmounted by a network gable.

The Tweed is crossed at Kelso by a bridge of five arches con- structed in 1803 by John Rennie. The public buildings include a court house, the town hall, corn exchange, high school and grammar school (occupying the site of the school which Sir Walter Scott attended in 1783). The public park lies in the east of the town, and the race-course to the north of it. The leading industries are the making of fishing tackle, agricultural machinery and implements, and chemical manures, besides coach-building, cabinet-making and upholstery, corn and saw mills, iron found- ing, &c. James and John Ballantyne, friends of Scott, set up a press about the end of the 18th century, from which there issued, in 1802, the first two volumes of the Minstrelsy of the Scottish Border; but when the brothers transferred their business to Edinburgh printing languished. The Kelso Mail, founded by James Ballantyne in 1797, is now the oldest of the Border news- papers. The town is an important agricultural centre, there being weekly corn and fortnightly cattle markets, and, every September, a great sale of Border rams.

Kelso became a burgh of barony in 1634 and five years later received the Covenanters, under Sir Alexander Leslie, on their way to the encampment on Duns Law. On the 24th of October 1715 the Old Pretender was proclaimed James VIII. in the market square, but in 1745 Prince Charles

Edward found no active adherents in the town.

About 1 m. W. of Kelso is Floors or Fleurs Castle, the principal seat of the duke of Roxburghe. The mansion as originally designed by Sir John Vanbrugh in 1718 was severely plain, but in 1849 William Henrv Playfair converted it into a magnificent structure in the Tudor style.

On the peninsula formed by the junction of the Teviot and the Tweed stood the formidable castle and flourishing town of Roxburgh,

from which the shire took its name. No trace exists of the town, and of the castle all that is left are a few ruins shaded by ancient ash trees. The castle was built by the Northumbrians, who called it Marchidum, or Marchmound, its present name apparently meaning Rawic's burgh, after some forgotten chief. After the consolidation of the kingdom of Scotland it became a favoured royal residence, and a town gradually sprang up beneath its protection, which reached its palmiest days under David I., and formed a member of the Court of Four Burghs with Edinburgh, Stirling and Berwick. It possessed a church, court of justice, mint, mills, and, what was remarkable for the 12th century, grammar school. Alexander II. was married and Alexander III. was born in the castle. During the long period of Border warfare, the town was repeatedly burned and the castle captured. After the defeat of Wallace at Falkirk the castle fell into the hands of the English, from whom it was delivered in 1314 by Sir James Douglas. Ceded to Edward III. in 1333, it was regained in 1342 by Sir Alexander Ramsay of Dalhousie, only to be lost again four years later. The castle was finally retaken and razed to the ground in 1460. It was at the siege that the king, James II., was killed by the explosion of a huge gun called " the Lion." On the fall of the castle the town languished and was finally abandoned in favour of the rising burgh of Kelso. The town, whose patron-saint was St James, is still commemorated by St James's Fair, which is held on the 5th of every August on the vacant site, and is the most popular of Border festivals.

Sandyknowe or Smailholm Tower, 6 m. W. of Kelso, dating from the 15th century, is considered the best example of a Border Peel and the most perfect relic of a feudal structure in the South of Scotland. Two m. N. by E. of Kelso is the pretty village of Ednam (Edenham, " The Village on the Eden "), the birthplace of the poet James Thomson, to whose memory an obelisk, 52 ft. high, was erected on Ferney Hill in 1820.

KELVIN, WILLIAM THOMSON, Baron (1824-1907), British physicist, the second son of James Thomson, LL.D., professor of mathematics in the university of Glasgow, was born at Belfast, Ireland, on the 26th of June 1824, his father being then teacher of mathematics in the Royal

Academical Institution. In 1832 James Thomson accepted the chair of mathematics at Glasgow, and migrated thither with his two sons, James and William, who in 1834 matriculated in that university, William being then little more than ten years of age, and having acquired all his early education through his father's instruction. In 1841 William Thomson entered Peterhouse, Cambridge, and in 1845 took his degree as second wrangler, to which honour he added that of the first Smith's Prize. The senior wrangler in his year was Stephen Parkinson, a man of a very different type of mind, yet one who was a prominent figure in Cambridge for many years. In the same year Thomson was elected fellow of Peterhouse. At that time there were few facilities for the study of experimental science in Great Britain. At the Royal Institution Faraday held a unique position, and was feeling his way almost alone. In Cambridge science had progressed little since the days of Newton. Thomson therefore had recourse to Paris, and for a year worked in the laboratory of Regnault, who was then engaged in his classical researches on the thermal properties of steam. In 1846, when only twenty-two years of age, he accepted the chair of natural philosophy in the university of Glasgow, which he filled for fifty-three years, attaining universal recognition as one of the greatest physicists of his time. The Glasgow chair was a source of inspiration to scientific men for more than half a century, and many of the most advanced researches of other physicists grew out of the suggestions which Thomson scattered as sparks from his anvil. One of his earliest papers dealt with the age of the earth, and brought him into collision with the geologists of the Uniformitarian school, who were claiming thousands of millions of years for the formation of the stratified portions of the earth's crust. Thomson's, calculations on the conduction of heat showed that at some time between twenty millions and four hundred millions, probably about one hundred millions, of years ago, the physical conditions of the earth must have been entirely different from those which now obtain. This led to a long controversy, in which the physical principles held their ground. In 1847 Thomson first met James Prescott Joule at the Oxford meeting of the British Association. A fortnight later they again met in Switzerland, and together measured the rise of the temperature of the water in a mountain torrent due to its fall. Joule's views of the nature of heat strongly influenced Thomson's mind, with the result that in 1848

Thomson proposed his absolute scale of temperature, which is independent of the properties of any particular thermometric substance, and in 1851 he presented to the Royal Society of Edinburgh a paper on the dynamical theory of heat, which reconciled the work of N. L. Sadi Carnot with the

conclusions of Count Rumford, Sir H. Davy, J. R. Mayer and Joule, and placed the dynamical theory of heat and the fundamental principle of the conservation of energy in a position to command universal acceptance. It was in this paper' that the principle of the dissipation of energy, briefly summarized in the second law of thermodynamics, was first stated.

Although his contributions to thermodynamics may properly be regarded as his most important scientific work, it is in the field of electricity, especially in its application to submarine telegraphy, that Lord Kelvin is best known to the world at large. From 1854 he is most prominent among telegraphists. The stranded form of conductor was due to his suggestion; but it was in the letters which he addressed in November and December of that year to Sir G. G. Stokes, and which were published in the Pro- ceedings of the Royal Society for 1855, that he discussed the mathe- matical theory of signalling through submarine cables, and enunciated the conclusion that in long cables the retardation due to capacity must render the speed of signalling inversely propor- tional to the square of the cable's length. Some held that if this were true ocean telegraphy would be impossible, and sought in consequence to disprove Thomson's conclusion. Thomson, on the other hand, set to work to overcome the difficulty by improve- ment in the manufacture of cables, and first of all in the pro- duction of copper of high conductivity and the construction of apparatus which would readily respond to the slightest variation of the current in the cable. The mirror galvanometer and the siphon recorder, which was patented in 1867, were the outcome of these researches; but the scientific value of the mirror galvano- meter is independent of its use in telegraphy, and the siphon recorder is the direct precursor of one form of galvanometer (d'Arsonval's) now commonly used in electrical laboratories. A mind like that of Thomson could not be content to deal with any physical quantity, however successfully from a practical point of view, without subjecting it to measurement. Thomson's work in connexion with telegraphy led to the production in rapid succession of instruments adapted to the requirements of the time for the measurement of every electrical quantity, and when electric lighting came to the front a new set of instruments was produced to meet the needs of the electrical engineer. Some account of Thomson's electrometer is given in the article on that subject, while every modern work of importance on electric lighting describes" the instruments which he has specially de- signed for central station work; and it may be said that there is no quantity which the electrical engineer is ordinarily called upon to measure for which Lord Kelvin did not construct the suitable instrument. Currents from the ten-thousandth of an ampere to ten thousand amperes, electrical pressures from a minute fraction of a volt to 100,000 volts, come within the range of his instru- ments, while the private consumer of electric energy is provided with a meter recording Board of Trade units.

When W. Weber in 185 1 proposed the extension of C. F. Gauss's system of absolute units to electromagnetism, Thomson took up the question, and, applying the principles of energy, calculated the absolute electromotive force of a Daniell cell, and determined the absolute measure of the resistance of a wire from the heat produced in it by a known current. In 1861 it was Thomson who induced the British Association to appoint its first famous com- mittee for the determination of electrical standards, and it was he who suggested much of the work carried out by J. Clerk Maxwell, Balfour Stewart and Fleeming Jenkin as members of that committee. The oscillatory character of the discharge of the Leyden jar, the foundation of the work of H. R. Hertz and of wireless telegraphy were investigated by him in

1853-

It was in 1873 that he undertook to write a series of articles for Good Words on the mariner's compass. He wrote the first, but 90 many questions arose in his mind that it was five years before

the second appeared. In the meanwhile the compass weni through a process of complete reconstruction in his hands a process which enabled both the permanent and the temporary magnetism of the ship to be readily compensated, while th« weight of the 10-in. card was reduced to one-seventeenth of that of the standard card previously in use, although the time of swing was increased. Second only to the compass in its value to the sailor is Thomson's sounding apparatus, whereby soundings can be taken in 100 fathoms by a ship steaming at 16 knots; and by the employment of piano- wire of a breaking strength of 140 tons per square inch and an iron sinker weighing only 34 lb, with a self- registering pressure gauge, soundings can be rapidly taken in deep ocean. Thomson's tide gauge, tidal harmonic analyser and tide predicter are famous, and among his work in the interest of navigation must be mentioned his tables for the simplification of Sumner's method for determining the position of a ship at sea.

It is impossible within brief limits to convey more than a general idea of the work of a philosopher who published more than three hundred original papers bearing upon nearly every branch of physical science; who one day was working out the mathe- matics of a vortex theory of matter on hydrodynamical principles or discovering the limitations of the capabilities of the vortex atom, on another was applying the theory of elasticity to tides in the solid earth, or was calculating the size of water molecules, and later was designing an electricity meter, a dynamo or a domestic water-tap. It is only by reference to his published papers that any approximate conception can be formed of his life's work; but the student who had read all these knew com- paratively little of Lord Kelvin if he had not talked with him

face to face. Extreme modesty, almost amounting to diffidence, was combined with the utmost kindliness in Lord Kelvin's bearing to the most elementary student, and nothing seemed to give him so much pleasure as an opportunity to acknowledge the efforts of the humblest scientific worker. The progress of physical dis- covery during the last half of the 19th century was perhaps as much due to the kindly encouragement which he gave to his students and to others who came in contact with him as to his own researches and inventions; and it would be difficult to speak of his influence as a teacher in stronger terms than this.

One of his former pupils, Professor J. D. Cormack, wrote of him : "It is perhaps at the lecture table that Lord Kelvin displays most of his characteristics. . . . His master mind, soaring high, sees one vast connected whole, and, alive with enthusiasm, with smiling ■ face and sparkling eye, he shows the panorama to his pupils, pointing out the similarities and differences of its parts, the boundaries of our knowledge, and the regions of doubt and speculation. To follow him in his flights is real mental exhilaration."

In 1852 Thomson married Margaret, daughter of Walter Crum of Thornliebank, who died in 1870; and in 1874 he married Frances Anna, daughter of Charles R. Blandy of Madeira. In 1866, perhaps chiefly in acknowledgment of his services to trans- Atlantic telegraphy, Thomson received the honour of knighthood, and in 1892 he was raised to the peerage with the title of Baron Kelvin of Largs. The Grand Cross of the Royal Victorian Order was conferred on him in 1896, the year of the jubilee of his pro- fessoriate.' In 1890 he became president of the Royal Society, and he received the Order of Merit on its institution in 1902. A list of the degrees and other honours which he received during the fifty-three years he held his Glasgow chair would occupy as much space as this article; but any biographical sketch would be conspicuously incomplete if it failed to notice the celebration in 1896 of the jubilee of his professorship. Never before had such a gathering of rank and science assembled as that which filled the halls in the university of Glasgow on the 15th, 16th and 17th of June in that year. The city authorities joined with the university in honouring their most distinguished citizen. About 2500 guests were received in the university buildings, the library of which was devoted to an exhibition of the instruments invented by Lord Kelvin, together with his certificates, diplomas and medals. The Eastern, the Anglo-American and the Commercial

Cable companies united to celebrate the event, and from the university library a message was sent through Newfoundland, New York, Chicago, San Francisco, Los Angeles, New Orleans, Florida and Washington, and was received by Lord Kelvin seven and a half minutes after it had been despatched, having travelled about 20,000 miles and twice crossed the Atlantic during the interval. It was at the banquet in connexion with the jubilee celebration that the Lord Provost of Glasgow thus summarized Lord Kelvin's character: " His industry is unwearied; and he seems to take rest by turning from one difficulty to another — difficulties that would appal most men and be taken as enjoy- ment by no one else. . . . This life of unwearied industry, of universal honour, has left Lord Kelvin with a lovable nature that charms all with whom he comes in contact."

Three years after this celebration Lord Kelvin resigned his chair at Glasgow, though by formally matriculating as a student he maintained his connexion with the university, of which in 1904 he was elected chancellor. But his retirement did not mean cessation of active work or any slackening of interest in the scientific thought of the day. Much of his time was given to writing and revising the lectures on the wave theory of light which he had delivered at Johns Hopkins University, Baltimore, in 1884, but which were not finally published till 1904. He con- tinued to take part in the proceedings of various learned societies; and only a few months before his death, at the Leicester meeting of the British Association, he attested the keenness with which he followed the current developments of scientific speculation by delivering a long and searching address on the electronic theory of matter. He died on the 17th of December rgo7 at his residence, Netherhall, near Largs, Scotland; there was no heir to his title, which became extinct.

In addition to the Baltimore lectures, he published with Professor P. G. Tait a standard but unfinished Treatise on Natural Philosophy (1867). A number of his scientific papers were collected in his Reprint of Papers on Electricity and Magnetism (1872), and in his Mathematical and Physical Papers (1882, 1883 and 1890), and three volumesof his Popular Lectures and Addresses appeared in 1889-1894. He was also the author of the articles on " Heat " and " Elasticity " in the 9th edition of the Encyclopaedia Britannica.

See Andrew Gray, Lord Kelvin (1908) ; S. P. Thompson, Life of Lord Kelvin (1910), which contains a full bibliography of his writings. (W. G. ; H. M. R.)

KEMBLE, the name of a family of English actors, of whom the most famous were Mrs Siddons (q.v.) and her brother John Philip Kemble, the eldest of the twelve children of Roger Kemble (1721-1802), a strolling

player and manager, who in 1753 married an actress, Sarah Wood.

John Philip Kemble (1757-1823), the second child, was born at Prescot, Lancashire, on the 1st of February 1757. His mother was a Roman Catholic, and he was educated at Sedgeley Park Catholic seminary, near Wolverhampton, and the English college at Douai, with the view of becoming a priest. But at the conclusion of the four years' course he discovered that he had no vocation for the priesthood, and returning to England he joined the theatrical company of Crump & Chamberlain, his first appearance being as Theodosius in Lee's tragedy of that name at Wolverhampton on the 8th of January 1776. In 1778 he joined the York company of Tate Wilkinson, appearing at Wakefield as Captain Plume in Farquhar's The Recruiting Officer; in Hull for the first time as Macbeth on the 30th of October, and in York as Orestes in Ambrose Philips's Distressed Mother. In 1781 he obtained a " star " engagement at Dublin, making his first appearance there on the 2nd of November as Hamlet. He also achieved great success as Raymond in The Count of Narbonne, a play taken from Horace Walpole's Castle of Olranlo. Gradually he won for himself a high reputation as a careful and finished actor, and this, combined with the greater fame of his sister, led to an engagement at Drury Lane, where he made his first appearance on the 30th of September 1783 as Hamlet. In this role he awakened interest and discussion among the critics rather than the enthusiastic approval of the public. But as Macbeth on the 31st of March 1785 he shared in the enthusiasm aroused by Mrs Siddons, and established a

reputation among living actors second only to hers. Brother and sister had first appeared together at Drury Lane on the 22nd of November 1783, as Beverley and Mrs Beverley in Moore's The Gamester, and as King John and Constance in Shakespeare's tragedy. In the following year they played Montgomerie and Matilda in Cumberland's The Carmelite, and in 1785 Adorni and Camiola in Kemble's adaptation of Massinger's A Maid of Honour, and Othello and Desdemona. Between 1785 and 1787 Kemble appeared in a variety of roles, his Mentevole in Jephson's Julia producing an overwhelming impression. On the 8th of December 1787 he married Priscilla Hopkins Brereton (1756-1845), the widow of an actor and herself an actress. Kemble's appointment as manager of 'Drury Lane in 1788 gave him full opportunity to dress the characters less according to tradition than in harmony with his own conception of what was suitable. He was also able to experiment with whatever parts might strike his fancy, and of this privilege he took advantage with greater courage than discretion. His activity was prodi- gious, the list of his parts including a large number of Shake- spearian characters and also a great many in plays now forgotten. In his own version of Coriolanus, which was revived during his first season, the character of the " noble Roman " was so exactly suited to his powers

that he not only played it with a perfection that has never been approached, but, it is said, unconsciously allowed its influence to colour his private manner and modes of speech. His tall and imposing person, noble countenance, and solemn arid grave demeanour were uniquely adapted for the Roman characters in Shakespeare's plays; and, when in addition he had to depict the gradual growth and development of one absorbing passion, his representation gathered a momentum and majestic force that were irresistible. His defect was in flexibility, variety, rapidity; the characteristic of his style was method, regularity, precision, elaboration even of the minutest details, founded on a thorough psychological study of the special personality he had to represent. His elocutionary art, his fine sense of rhythm and emphasis, enabled him to excel in declama- tion, but physically he was incapable of giving expression to impetuous vehemence and searching pathos. In Coriolanus and Cato he was beyond praise, and possibly he may have been superior to both Garrick and Kean in Macbeth, although it must be remembered that in it part of his inspiration must have been caught from Mrs Siddons. In all the other great Shakespearian characters he was, according to the best critics, inferior to them, least so in Lear, Hamlet and Wolsey, and most so in Shylock and Richard III. On account of the eccentricities of Sheridan, the proprietor of Drury Lane, Kemble withdrew from the manage- ment, and, although he resumed his duties at the beginning of the season 1800-1801, he at the close of 1802 finally resigned con- nexion with it. In 1803 he became manager of Covent Garden, in which he had acquired a sixth share for £23,000. The theatre was burned down on the 20th of September 1808, and the raising of the prices after the opening of the new theatre, in 1809, led to riots, which practically suspended the performances for three months. Kemble had been nearly ruined by the fire, and was only saved by a generous loan, afterwards converted into a gift, of £10,000 from the duke of Northumberland. Kemble took his final leave of the stage in the part of Coriolanus on the 23rd of June 1817. His retirement was probably hastened by the rising popularity of Edmund Kean. The remaining years of his life were spent chiefly abroad, and he died at Lausanne on the 26th of February 1823.

See Boaden, Life of John Philip Kemble (1825); Fitzgerald, The Kembles (1871).

Stephen Kemble (1758-1822), the second son of Roger, was rather an indifferent actor, ever eclipsed by his wife and fellow player, Elizabeth Satchell Kemble (c. 1763-1841), and a man of such portly proportions that he played Falstaff without padding. He managed theatres in Edinburgh and elsewhere.

Charles Kemble (1775-1854), a younger brother of John Philip and

Stephen, was born at Brecon, South Wales, on the 25th of November 1775. He, too, was educated at Douai.

After returning to England in 1792, he obtained a situation in the post-office, but this he soon resigned for the stage, making his first recorded appearance at Sheffield as Orlando in As You Like It in that year. During the early period of his career as an actor he made his way slowly to public favour. For a con- siderable time he played with his brother and sister, chiefly in secondary parts, and this with a grace and finish which received scant justice from the critics. His first London appearance was on the 21st of April 1794, as Malcolm to his brother's Macbeth. Ultimately he won independent fame, especially in such char- acters as Archer in George Farquhar's Beaux' Stratagem, Dorin- court in Mrs Cowley's Belle's Stratagem, Charles Surface and Ranger in Dr Benjamin Hoadley's Suspicious Husband. His Laertes and Macduff were hardly less interesting than his brother's ■Hamlet and Macbeth. In comedy he was ably supported by his wife, Marie Therese De Camp (1774-1838), whom he married on the 2nd of July 1806. His visit, with his daughter Fanny, to America during 1832 and 1834, aroused much enthusiasm. The later period of his career was clouded by money embarrassments in connexion with his joint proprietorship in Covent Garden theatre. He formally retired from the stage in December 1836, but his final appearance was on the 10th of April 1840. For some time he held the office of examiner of plays. In 1844- 1845 he gave readings from Shakespeare at Willis's Rooms. He died on the 12th of November 1854. Macready regarded his Cassio as incomparable, and summed him up as " a first-rate actor of second-rate parts."

See Gentleman's Magazine, January 1855; Records of a Girlhood, by Frances Anne Kemble.

Elizabeth Whitlock (1761-1836), who was a daughter of Roger Kemble, made her first appearance on the stage in 1783 at Drury Lane as Portia. In 1785 she married Charles E. Whitlock, went with him to America and played with much success there. She had the honour of appearing before President Washington. She seems to have retired about 1807, and she died on the 27th of February 1836. Her reputation as a tragic actress might have been greater had she not been Mrs Siddons's sister.

Frances Anne Kemble (Fanny Kemble) (1800-1893), the actress and author, was Charles Kemble's elder daughter; she was born in London on

the 27th of November 1809, and educated chiefly in France. She first appeared on the stage on the 25th of October 1829 as Juliet at Covent Garden. Her attractive personality at once made her a great favourite, her popularity enabling her father to recoup his losses as a manager. She played all the principal women's parts, notably Portia, Beatrice and Lady Teazle, but Julia in Sheridan Knowles's The Hunchback, especially written for her, was perhaps her greatest success. In 1832 she went with her father to America, and in 1834 she married there a Southern planter, Pierce Butler. They were divorced in 1849. In 1847 she returned to the stage, from which she had retired on her marriage, and later, following her father's example, appeared with much success as a Shakespearian reader. In 1877 she returned to England, where she lived — using her maiden name — till her death in London on the 15th of January 1893. During this period Fanny Kemble was a prominent and popular figure in the social life of London. Besides her plays, Francis the First, unsuccessfully produced in 1832, The Star of Seville (1837), a volume of Poems (1844), and a book of Italian travel, A Year of Consolation (1847), she published a volume of her Journal in 1835, and in 1863 another (dealing with life on the Georgia plantation), and also a volume of Plays, including translations from Dumas and Schiller. These were followed by Records of a Girlhood (1878), Records of Later Life (1882), Notes on some of Shakespeare's Plays (1882), Far Away and Long Ago (1889), and Further Records (1891). Her various volumes, of reminiscences contain much valuable material for the social and dramatic history of the period.

Adelaide Kemble (1814-1879), Charles Kemble's second daughter, was an opera singer of great promise, whose first London appearance was made in Norma on the 2nd of November

841. In 1843 she married Edward John Sartoris, a rich Italian,

and retired after a brief but brilliant career. She wrote A Week in a French Country House (1867), a bright and humorous story, and of a literary quality not shared by other tales that followed. Her son, Algernon Charles Sartoris, married General U. S. Grant's daughter.

Among more recent members of the Kemble family, mention may also be made of Charles Kemble's grandson, Henry Kemble (1 848-1 907), a sterling and popular London actor.

KEMBLE, JOHN MITCHELL (1807-1857), English scholar and historian, eldest son of Charles Kemble the actor, was born in 1807. He received his education partly from Dr Richardson, author of the Dictionary of the English Language, and partly at the grammar school of Bury St Edmunds, where he obtained in 1826 an exhibition to Trinity College, Cambridge. At

the university his historical essays gained him high reputation. The bent of his studies was turned more especially towards the Anglo- Saxon period through the influence of the brothers Grimm, under whom he studied at Gottingen (183 1). His thorough knowledge of the Teutonic languages and his critical faculty were shown in his Beowulf (1833-1837), Uber die Stammtafel der Westsachsen (1836), Codex Diplomalicus Aevi Saxonici (183 9-1 848), and in many contributions to reviews; while his History of the Saxons in England (1849; new ed. 1876), though it must now be read with caution, was the first attempt at a thorough examination of the original sources of the early period of English history. He was editor of the British and Foreign Review from 1835 to 1844; and from 1840 to his death was examiner of plays. In 1857 he published State Papers and Correspondence illustrative of the Social and Political State of Europe from the Revolution to the Accession of the House of Hanover. He died at Dublin on the 26th of March 1857. His HoraeFerales, or Studiesin the Archae-ology of Northern Nations, was completed by Dr R. G. Latham, and published in 1864. He married the daughter of Professor Amadeus Wendt of Gottingen in 1836; and had two daughters and a son ; the elder daughter was the wife of Sir Charles Santley, the singer.

KEMENY, ZSIGMOND, Baron (1816-1875), Hungarian author, came of a noble but reduced family. In 1837 he studied juris- prudence at Marosvasarhely, but soon devoted himself entirely to journalism and literature. His first unfinished work, On the Causes of the Disaster ofMohacs (1840), attracted much attention. In the same year he studied natural history and anatomy at Vienna University. In 184 1, along with Lajos Kovfi.cs, he edited the Transylvanian newspaper Erdelyi Hirado. He also took an active part in provincial politics and warmly supported the principles of Count Stephen Szechenyi. In 1846 he moved to Pest, where his pamphlet, Korteskedes Ss ellenszerei (Partisanship and its Antidote), had already made him famous. Here he consorted with the most eminent of the moderate reformers, and for a time was on the staff of the Pesti Hirlap. The same year he brought out his first great novel, Pdl Gyulay. He was elected a member of the revolutionary diet of 1848 and accompanied it through all its vicissitudes. After a brief exile he accepted the amnesty and returned to Hungary. Careless of his unpopu- larity, he took up his pen to defend the cause of justice and moderation, and in his two pamphlets, Forradalom utdn (After the Revolution) and Mig egysz 6 a forradalom utdn (One word more after the Revolution), he defended the point of view which was realized by Deak in 1867. He subsequently edited the Pesti Napld, which became virtually Deak's political organ. Kemeny also published several political essays {e.g. The Two Wesselenyis, and Stephen Szechenyi) which are among the best of their kind in any literature. His novels published during these years, such as Ferj Ss no (Husband and

Wife), Szivorvenyei (The Heart's Secrets), &c, also won for him a foremost rank among con- temporary novelists. During the 'sixties Kemeny took an active part in the political labours of Deak, whose right hand he con- tinued to be, and popularized the Composition of 1867 which he had done so much to bring about. He was elected to the diet of 1867 for one of the divisions of Pest, but took no part in the debates. The last years of his life were passed in complete seclusion in Transylvania. To the works of Kemeny already

mentioned should be added the fine historical novel Rajongok (The Fanatics) (Pest, 1858-1859), and Collected Speeches (Hung.) (Pest, 1889).

See L. Nogrady, Baron Sigismund Keme'ny's Life and Writings (Hung.) (Budapest, 1902) ; G. Beksics, Sigismund Kemeny , the Revolu- tion and the Composition (Hung.) (Budapest, 1888). (R. N. B.)

KEMP, WILLIAM [fl. 1600), English actor and dancer. He probably began his career as a member of the earl of Leicester's company, but his name first appears after the death of Leicester in a list of players authorized by an order of the privy council in 1593 to play 7 m. out of London. P'erdinand Stanley, Lord Strange, was the patron of the company of which Kemp was the leading member until 1598, and in 1594 was summoned with Burbage and Shakespeare to act before the queen at Green- wich. He was the successor, both in parts and reputation, of Richard Tarlton. But it was as a dancer of jigs that he won his greatest popularity, one or two actors dancing and singing with him, and the words doubtless often being improvised. Examples of the music may be seen in the MS. collection of John Dowland now in the Cambridge University library. At the same time Kemp was given parts like Dogberry, and Peter in Romeo and Juliet; indeed his name appears by accident in place of those of the characters in early copies. Kemp seems to have exhibited his dancing on the Continent, but in 1602 he was a member of the earl of Worcester's players, and Philip Henslowe's diary shows several payments made to him in that year.

KEMPE, JOHN (c. 1380-1454), English cardinal, archbishop of Canterbury, and chancellor, was son of Thomas Kempe, a gentleman of OUantigh, in the parish of Wye near Ashford, Kent. He was born about 1380 and educated at Merton College, Oxford. He practised as an ecclesiastical lawyer, was an assessor at the trial of Oldcastle, and in 141 5 was made dean of the Court of Arches. Then he passed into the royal

service, and being em- ployed in the administration of Normandy was eventually made chancellor of the duchy. Early in 141 9 he was elected bishop of Rochester, and was consecrated at Rouen on the 3rd of December. In February 142 1 he was translated to Chichester, and in November following to London. During the minority of Henry VI. Kempe had a prominent position in the English council as a supporter of Henry Beaufort, whom he succeeded as chancellor in March 1426. In this same year he was promoted to the archbishopric of York. Kempe held office as chancellor for six years; his main task in government was to keep Humphrey of Gloucester in check. His resignation on the 28th of February 1432 was a concession to Gloucester. He still enjoyed Beau- fort's favour, and retaining his place in the council was employed on important missions, especially at the congress of Arras in 1435, and the conference at Calais in 1438. In December 1439 he was created cardinal, and during the next few years took less share in politics. He supported Suffolk over the king's marriage with Margaret of Anjou; but afterwards there arose some differ- ence between them, due in part to a dispute about the nomination of the cardinal's nephew, Thomas Kempe, to the bishopric of London. At the time of Suffolk's fall in January 1450 Kempe once more became chancellor. His appointment may have been due to the fact that he was not committed entirely to either party. In spite of his age and infirmity he showed some vigour in dealing with Cade's rebellion, and by his official experience and skill did what he could for four years to sustain the king's authority. He was rewarded by his translation to Canterbury in July 1452, when Pope Nicholas added as a special honour the title of cardinal-bishop of Santa Rufina. As Richard of York gained influence, Kempe became unpopular; men called him " the cursed cardinal," and his fall seemed imminent when he died suddenly on the 22nd of March 1454. He was buried at Canter- bury, in the choir. Kempe was a politician first, and hardly at all a bishop; and he was accused with some justice of neglecting his dioceses, especially at York. Still he was a capable official, and a faithful servant to Henry VI., who called him " one of the wisest lords of the land " (Paslon Letters, i. 315). He founded a college at his native place at Wye, which was suppressed at the Reformation.

For contemporary authorities see under Henry VI. See also J. Raine's Historians of the Church of York, vol. ii. ; W. Dugdale's Monasticon, iii. 254, vi. 1430-1432; and W. F. Hook's Lives of Arch- bishops of Canterbury, v. 188-267. (C. L. K.)

KEMPEN, a town in the Prussian Rhine Province, 40 m. N. of Cologne by the railway to Zevenaar. Pop. (1900), 6319. It has a monument to Thomas a, Kempis, who was born there. The industries are considerable, and include silk-weaving, glass- making and the manufacture of electrical plant. Kempen belonged in the middle ages to the archbishopric of Cologne

and received civic rights in 1294. It is memorable as the scene of a victory gained, on the 17 th of January 1642, by the French and Hessians over the Imperialists.

See Terwelp, Die Stadt Kempen (Kempen, 1894), and Niessen, Heimatkunde des Kreises Kempen (Crefeld, 1895).

KEMPENFELT, RICHARD (1718-1782), British rear-admiral, was born at Westminster in 1718. His father, a Swede, is said to have been in the service of James II., and subsequently to have entered the British army. Richard Kempenfelt went into the navy, and saw his first service in the West Indies, taking part in the capture of Portobello. In 1746 he returned to England, and from that date to 1780, when he was made rear-admiral, saw active service in the East Indies with Sir George Pocock and in various quarters of the world. In 1781 he gained, with a vastly inferior force, a brilliant victory, fifty leagues south-west of Ushant, over the French fleet under De Guichen, capturing twenty prizes. In 1782 he hoisted his flag on the, " Royal George," which formed part of the fleet under Lord Howe. In August this fleet was ordered to refit at top speed at Portsmouth, and proceed to the relief of Gibraltar. A leak having been located below the waterline of the " Royal George," the vessel was careened to allow of the defect being repaired. According to the version of the disaster favoured by the Admiralty, she was over- turned by a breeze. But the general opinion of the navy was that the shifting of her weights was more than the old and rotten timbers of the " Royal George " could stand. A large piece of her bottom fell out, and she went down at once. It is estimated that not fewer than 800 persons went down with her, for besides the crew there were a large number of tradesmen, women and children on board. Kempenfelt, who was in his cabin, perished with the rest. Cowper's poem, the " Loss of the Royal George," commemorates this disaster. Kempenfelt effected radical altera- tions and improvements in the signalling system then existing in the British navy. A painting of the loss of the " Royal George " is in the Royal United Service Institution, London.

See Charnock's Biog. Nav., vi. 246, and Ralfe's Naval Biographies, i. 215.

KEMPT, SIR JAMES (1764-1854), British soldier, was gazetted to the 101st Foot in India in 1783, but on its disbandment two years later was placed on half-pay. It is said that he took a clerkship in Greenwood's, the army agents (afterwards Cox & Co.) . He attracted the notice of the Duke of York, through whom he obtained a captaincy (very soon followed by a majority) in the newly raised 113th Foot. But it was not long before his regiment experienced the fate of the old 101st; this time how- ever Kempt was retained on full pay in the recruiting service. In 1799 he accompanied Sir Ralph Abercromby to Holland, and later to Egypt as an aide-de-camp.

After Abercromby's death Kempt remained on his successor's staff until the end of the campaign in Egypt. In April 1803 he joined the staff of Sir David Dundas, but next month returned to regimental duty, and a little later received a lieutenant-colonelcy in the 81st Foot. With his new regiment he went, under Craig, to the Mediter- ranean theatre of operations, and at Maida the light brigade led by him bore the heaviest share of the battle. Employed from 1807 to 181 1 on the staff in North America, Brevet-Colonel Kempt at the end of 181 1 joined Wellington's army in Spain with the local rank of major-general, which was, on the 1st of January 1812, made substantive. As one of Picton's brigadiers, Kempt took part in the great assault on Badajoz and was severely wounded. On rejoining for duty, he was posted to the command of a brigade of the Light Division (43rd, 52nd and 95th Rifles),

which he led at Vera, the Nivelle (where he was again wounded), Bayonne, Orthez and Toulouse. Early in 181 5 he was made K.C.B., and in July for his services at Waterloo, G.C.B. At that battle he commanded the 28th, 32nd and 79th as a brigadier under his old chief, Picton, and on Picton's death succeeded to the command of his division. From 1828 to 1830 he was Governor-General of Canada, and at a critical time dis- played firmness and moderation. He was afterwards Master- General of the Ordnance. At the time of his death in 1854 he had been for some years a full General.

KEMPTEN, a town in the kingdom of Bavaria on the Uler, 81 m. S.W. of Munich by rail. Pop. (1905), 20,663. The town is well built, has many spacious squares and attractive public grounds, and contains a castle, a handsome town-hall, a gym- nasium, &c. The old palace of the abbots of Kempten, dating from the end of the 17th century, is now partly used as barracks, and near to it is the fine abbey church. The industries include wool-spinning and weaving and the manufacture of paper, beer, machines, hosiery and matches. As the commercial centre of the Algau, Kempten carries on active trade in timber and dairy produce. Numerous remains have been discovered on the Lindenberg, a hill in the vicinity.

Kempten, identified with the Roman Cambodunum, consisted in early times of two towns, the old and the new. The continual hostility that existed between these was intensified by the wel- come given by the old town, a free imperial city since 1289, to the Reformed doctrines, the new town keeping to the older faith. The Benedictine abbey of Kempten, said to have been founded in 773 by Hildegarde, the wife of Charlemagne, was an

important house. In 1360 its abbot was promoted to the dignity of a prince of the Empire by the emperor Charles IV. ; the town and abbey passed to Bavaria in 1803. Here the Austrians defeated the French on the 17th of September 1796.

See Forderreuther, Die Stadt Kempten und ihre Umgebung (Kempten, 1901); Haggenmuller, Geschichte der Stadt und der gefursteten Grafschaft Kempten, vol. i. (Kempten, 1840) ; and Meirhofer, Geschichtliche Darstellung der dinkwilrdigsten Schicksale der Stadt Kempten (Kempten, 1856).

KEN, THOMAS (1637-1711), the most eminent of the English non-juring bishops, and one of the fathers of modern English hymnology, was born at Little Berkhampstead, Herts, in 1637. He was the son of Thomas Ken of Furnival's Inn, who belonged to an ancient stock, — that of the Kens of Ken Place, in Somerset- shire; his mother was a daughter of the now forgotten poet, John Chalkhill, who is called by Walton an " acquaintant and friend of Edmund Spenser." Ken's step-sister, Anne, was married to Izaak Walton in 1646, a connexion which brought Ken from his boyhood under the refining influence of this gentle and devout man. In 1652 Ken entered Winchester College, and in 1656 became a student of Hart Hall, Oxford. He gained a fellowship at New College in 1657, and proceeded B.A. in 1661 and M.A. in 1664. He was for some time tutor of his college; but the most characteristic reminiscence of his university life is the mention made by Anthony Wood that in the musical gatherings of the time " Thomas Ken of New College, a junior, would be sometimes among them, and sing his part." Ordained in 1662, he succes- sively held the livings of Little Easton in Essex, Brighstone (sometimes called Brixton) in the Isle of Wight, and East Wood- hay in Hampshire; in 1672 he resigned the last of these, and returned to Winchester, being by this time a prebendary of the cathedral, and chaplain to the bishop, as well as a fellow of Winchester College. He remained there for several years, acting as curate in one of the lowest districts, preparing his Manual of Prayers for the use of the Scholars of Winchester College (first published in 1674), and composing hymns. It was at this time that he wrote, primarily for the same body as his prayers, his morning, evening and midnight hymns, the first two of which, beginning " Awake, my soul, and with the sun " and " Glory to Thee, my God, this night," are now household words wherever the English tongue is spoken. The latter is often made to begin with the line " All praise to Thee, my God, this night," but in the earlier editions over which Ken had control, the line is as

first given. 1 In 1674 Ken paid a visit to Rome in company with young Izaak Walton, and this journey seems mainly to have resulted in confirming his regard for the Anglican communion. In 1679 he was

appointed by Charles II. chaplain to the Princess Mary, wife of William of Orange. While with the court at the Hague, he incurred the displeasure of William by insisting that a promise of marriage, made to an English lady of high birth by a relative of the prince, should be kept; and he therefore gladly returned to England in 1680, when he was immediately appointed one of the king's chaplains. He was once more residing at Winchester in 1683 when Charles came to the city with his doubt- fully composed court, and his residence was chosen as the home of Nell Gwynne; but Ken stoutly objected to this arrangement, and succeeded in making the favourite find quarters elsewhere. In August of this same year he accompanied Lord Dartmouth to Tangier as chaplain to the fleet, and Pepys, who was one of the company, has left on record some quaint and kindly remini- scences of him and of his services on board. The fleet returned in April 1684, and a few months after, upon a vacancy occurring in the see of Bath and Wells, Ken, now Dr Ken, was appointed bishop. It is said that, upon the occurrence of the vacancy, Charles, mindful of the spirit he had shown at Winchester, exclaimed, " Where is the good little man that refused his lodging to poor Nell? " and determined that no other should be bishop. The consecration took place at Lambeth on the 25th of January 1685; and one of Ken's first duties was to attend the death-bed of Charles, ' where his wise and faithful ministrations won the admiration of everybody except Bishop Burnet. In this year he published his Exposition on the Church Catechism, perhaps better known by its sub-title, The Practice of Divine Love. In 1688, when James reissued his " Declaration of Indulgence," Ken was one of the " seven bishops " who refused to publish it. He was probably influenced by two considerations: first, by his profound aversion from Roman Catholicism, to which he felt he would be giving some episcopal recognition by compliance; but, second and more especially, by the feeling that James was compromising the spiritual freedom of the church. Along with his six brethren, Ken was committed to the Tower on the 8th of June 1688, on a charge of high misdemeanour; the trial, which took place on the 29th and 30th of the month, and which resulted in a verdict of acquittal, is matter of history. With the revolu- tion which speedily followed this impolitic trial, new troubles encountered Ken; for, having sworn allegiance to James, he thought himself thereby precluded from taking the oath to William of Orange. Accordingly, he took his place among the non-jurors, and, as he stood firm to his refusal, he was, in August 1 69 1, superseded in his bishopric by Dr Kidder, dean of Peter- borough. From this time he lived mostly in retirement, finding a congenial home with Lord Weymouth, his friend from college days, at Longleat in Wiltshire; and though pressed to resume his diocese in 1703, upon the death of Bishop Kidder, he declined, partly on the ground of growing weakness, but partly no doubt from his love for the quiet life of devotion which he was able to lead at Longleat. His death took place there on the 19th of March 1711.

Although Ken wrote much poetry, besides his hymns, he cannot be called a great poet ; but he had that fine combination of spiritual insight and feeling with poetic taste which marks all great hymn- writers. As a hymn- writer he has had few equals in England; it can scarcely be said that even Keble, though possessed of much rarer poetic gifts, surpassed him in his own sphere (see Hymns). In his own day he took high rank as a pulpit orator, and even royalty had to beg for a seat amongst his audiences ; but his sermons are now forgotten. He lives in history, apart from his three hymns, mainly as a man of unstained purity and invincible fidelity to conscience, weak only in a certain narrowness of view which is a frequent at- tribute of the intense character which he possessed. As an ecclesiastic he was a High Churchman of the old school.

Ken's poetical works were published in collected form in four volumes by W. Hawkins, his relative and executor, in 1 721 ; his prose

1 The fact, however, that in 1712 — only a year after Ken's death — his publisher, Brome, published the hymn with the opening words " All praise," has been deemed by such a high authority as the 1st earl of Selborne sufficient evidence that the alteration had Ken's authority.

works were issued in 1838 in one volume, under the editorship of J. T. Round. A brief memoir was prefixed by Hawkins to a selection from Ken's works which he published in 1713; and a life, in two volumes, by the Rev. W. L. Bowles, appeared in 1830. But the standard biographies of Ken are those of J. Lavicount Anderdon (The Life of Thomas Ken, Bishop of Bath and Wells, by a Layman, 1851 ; 2nd ed., 1854) and of Dean Plumptre (2 vols., 1888; revised, 1890). See also the Rev. W. Hunt's article in the Diet. Nat. Biog.

KEN, a river of Northern India, tributary to the Jumna on its right bank, flowing through Bundelkhand. An important reservoir in its upper basin, which impounds about 180 million cubic feet of water, irrigates about 374,000 acres in a region specially liable to drought.

KEN A, or Keneh (sometimes written Qina), a town of Upper Egypt on a canal about a mile E. of the Nile and 380 m. S.S.E. of Cairo by rail. Pop. (1907), 20,069. Kena, the capital of a province of the same name, was called by the Greeks Caene or Caenepolis (probably the N«i? iroKis of Herodotus; see Akhmim) in distinction from Coptos (q.v.), 15 m. S., to whose trade it eventually succeeded. It is a remarkable fact that its modern

name should be derived from a purely Greek word, like Iskenderia from Alexandria, and Nekrash from Naucratis; in the absence of any known Egyptian name it seems to point to Kena having originated in a foreign settlement in connexion with the Red Sea trade. It is a flourishing town, specially noted for the manufac- ture of the porous water jars and bottles used throughout Egypt. The clay for making them is obtained from a valley north of Kena. The pottery is sent down the Nile in specially constructed boats. Kena is also known for the excellence of the dates sold in its bazaars and for the large colony of dancing girls who live there. It carries on a trade in grain and dates with Arabia, via Kosseir on the Red Sea, 100 m. E. in a direct line. This incon- siderable traffic is all that is left of the extensive commerce formerly maintained — chiefly via Berenice and Coptos — between Upper Egypt and India and Arabia. The road to Kosseir is one of great antiquity. It leads through the valley of Hamma- mat, celebrated for its ancient breccia quarries and deserted gold mines. During the British operations in Egypt in 1801 Sir David Baird and his force marched along this road to Kena, taking sixteen days on the journey from Kosseir.

KENDAL, DUKEDOM OF. The English title of duke of Kendal was first bestowed in May 1667 upon Charles (d. 1667), the infant son of the duke of York, afterwards James II. Several persons have been created earl of Kendal, among them being John, duke of Bedford, son of Henry IV.; John Beaufort, duke of Somerset (d. 1444) ; and Queen Anne's husband, George, prince of Denmark.

In 1719 Ehrengarde Melusina (1667-1743), mistress of the English king George I., was created duchess of Kendal. This lady was the daughter of Gustavus Adolphus, count of Schulen- burg (d. 1691), and was born at Emden on the 25th of December 1667. Her father held important positions under the elector of Brandenburg; her brother Matthias John (1661-1747) won great fame as a soldier in Germany and was afterwards com- mander-in-chief of the army of the republic of Venice. Having entered the household of Sophia, electress of Hanover, Melusina attracted the notice of her son, the future king, whose mistress she became about 1690. When George crossed over to England in 1 7 14, the " Schulenburgin," as Sophia called her, followed him and soon supplanted her principal rival, Charlotte Sophia, Baroness von Kilmannsegge (c. 1673-1725), afterwards countess of Darlington, as his first favourite. In 1716 she was created duchess of Munster; then duchess of Kendal; and in 1723 the emperor Charles VI. made her a princess of the Empire. The duchess was very avaricious and obtained large sums of money by selling public offices and titles; she also sold patent rights, one of these being the privilege of supplying Ireland with a new copper coinage. This she sold to a Wolverhampton iron mer- chant named William Wood (167 1-1 730), who flooded the country with coins

known as " Wood's halfpence," thus giving occasion for the publication of Swift's famous Drapier's Letters. In poli- tical matters she had much influence with the king, and she received £10,000 for procuring the recall of Bolingbroke from

exile. After George's death in 1727 she lived at Kendal House, Isleworth, Middlesex, until her death on the 10th of May 1743. The duchess was by no means a beautiful woman, and her thin figure caused the populace to refer to her as the " maypole." By the king she had two daughters: Petronilla Melusina (c. 1693-1778), who was created countess of Walsingham in 1722, and who married the great earl of Chesterfield; and Margaret Gertrude, countess of Lippe (1703-17 73).

KENDAL, WILLIAM HUNTER (1843-), English actor, whose family name was Grimston, was born in London on the 16th of December 1843, the son of a painter. He made his first stage appearance at Glasgow in 1862 as Louis XIV., in A Life's Revenge, billed as " Mr Kendall." After some experience at Birmingham and elsewhere, he joined the Haymarket company in London in 1866, acting everything from burlesque to Romeo. In 1869 he married Margaret (Madge) Shafto Robertson (b. 1849), sister of the dramatist, T. W. Robertson. As " Mr and Mrs Kendal " their professional careers then became inseparable. Mrs Kendal's first stage appearance was as Marie, " a child," in The Orphan of the Frozen Sea in 1854 in London. She soon showed such talent both as actress and singer that she secured numerous engagements, and by 1865 was playing Ophelia and Desdemona. She was Mary Meredith in Our American Cousin with Sothern, and Pauline to his Claud Melnotte. But her real triumphs were at the Haymarket in Shakespearian revivals and the old English comedies. While Mr Kendal played Orlando,' Charles Surface, Jack Absolute and Young Marlowe, his wife made the combination perfect with her Rosalind, Lady Teazle, Lydia Languish and Kate Hardcastle; and she created Galatea in Gilbert's Pygmalion and Galatea (1871). Short seasons followed at the Court theatre and at the Prince of Wales's, at the latter of which they joined the Bancrofts in Diplomacy and other plays. Then in 1879 began a long associa- tion with Mr (afterwards Sir John) Hare as joint-managers of the St James's theatre, some of their notable successes being in The Squire, Impulse, The Ironmaster and A Scrap of Paper. In 1888, however, the Hare and Kendal regime came to an end. From that time Mr and Mrs Kendal chiefly toured in the pro- vinces and in America, with an occasional season at rare intervals in London.

KENDAL, a market town and municipal borough in the Kendal parliamentary division of Westmorland, England, 251m. N.N.W. from London on the Windermere branch of the London & North- Western - railway. Pop. (1901), 14,183. The town, the full name of which is Kirkby-

Kendal or Kirkby-in-Kendal, is the largest in the county. It is picturesquely placed on the river Kent, and is irregularly built. The white-walled houses with their blue-slated roofs, and the numerous trees, give it an attrac- tive appearance. To the S.W. rises an abrupt limestone emi- nence, Scout Scar, which commands an extensive view towards Windermere and the southern mountains of the Lake District. The church of the Holy Trinity, the oldest part of which dates from about 1 200, is a Gothic building with five aisles and a square tower. In it is the helmet of Major Robert Philipson, who rode into the church during service in search of one of Cromwell's officers, Colonel Briggs, to do vengeance on him. This major was notorious as " Robin the Devil," and his story is told in Scott's Rokeby. Among the public buildings are the town hall, classic in style; the market house, and literary and scientific institution, with a museum containing a fossil collection from the limestone of the locality. Educational establishments include a free grammar school, in modern buildings, founded in 1525 and well endowed; a blue-coat school, science and art school, and green-coat Sunday school (1 8 1 3) . On an eminence east of the town are the ruins of Kendal castle, attributed to the first barons of Kendal. It was the birthplace of Catherine Parr, Henry VIII. 's last queen. On the Castlebrow Hill, an artificial mound prob- ably of pre-Norman origin, an obelisk was raised in 1788 in memory of the revolution of 1688. The woollen manufactures of Kendal have been noted since 1331, when Edward III. is said to have granted letters of protection to John Kemp, a Flemish weaver who settled in the town; and, although the coarse cloth

known to Shakespeare as " Kendal green " is no longer made, its place is more than supplied by active manufactures of tweeds, railway rugs, horse clothing, knitted woollen caps and jackets, worsted and woollen yarns, and similar goods. Other manu- factures of Kendal are machine-made boots and shoes, cards for wool and cotton, agricultural and other machinery, paper, and, in the neighbourhood, gunpowder. There is a large weekly market for grain, and annual horse and cattle fairs. The town is governed by a mayor, 6 aldermen and 18 councillors. Area, 2622 acres.

The outline of a Roman fort is traceable at Watercrook near Kendal. The barony and castle of Kendal or Kirkby-in-Kendal, held by Turold before the Conquest, were granted by William I. to Ivo de Taillebois, but the barony was divided into three parts in the reign of Richard II., one part with the castle passing to Sir William Parr, knight, ancestor of Catherine Parr. After the death of her brother William Parr, marquess of Northampton, his share of the barony called Marquis Fee reverted to

Queen Elizabeth. The castle, being evidently deserted, was in ruins in 1586. Kendal was plundered by the Scots in 12 10, and was visited by the rebels in 1715 and again in 1745 when the Pre- tender was proclaimed king there. Burgesses in Kendal are men- tioned in 1345, and the borough with "court housez" and the fee-farm of free tenants is included in a confirmation charter to Sir William Parr in 1472. Richard III. in 1484 granted the inhabitants of the barony freedom from toll, passage and pont- age, and the town was incorporated in 1576 by Queen Elizabeth under the title of an alderman and 12 burgesses, but Charles I. in 1635 appointed a mayor, 12 aldermen and 20 capital burgesses. Under the Municipal Reform Act of 1833 the corporation was again altered. From 1832 to 1885 Kendal sent one member to parliament, but since the last date its representation has been merged in that of the southern division of the county. A weekly market on Saturday granted by Richard I. to Roger Fitz Rein- f red was purchased by the corporation from the earl of Lonsdale and Captain Bagot, lords of the manor, in 1885 and 1886. Of the five fairs which are now held three are ancient, that now held on the 29th of April being granted to Marmaduke de Tweng and William de Ros in 1307, and those on the 8th and 9th of November to Christiana, widow of Ingelram de Gynes, in 1333.

See Victoria County History, Westmorland; Cornelius Nicholson, The Annals of Kendal (1861).

KENDALL, HENRY CLARENCE (1841-1882), Australian poet, son of a missionary, was born in New South Wales on the 18th of April 1841. He received only a slight education, and in i860 he entered a lawyer's office in Sydney. He had always had literary tastes, and sent some of his verses in 1862 to London to be published in the Athenaeum. Next year he obtained a clerkship in the Lands Department at Sydney, being afterwards transferred to the Colonial Secretary's office; and he combined this work with the writing of poetry and with journalism. His principal volumes of verse were Leaves from an Australian Forest (1869) and Songs from the Mountains (1880), his feeling for nature, as embodied in Australian landscape and bush-life, being very true and full of charm. In 1869 he resigned his post in the public service, and for some little while was in business with his brothers. Sir Henry Parkes took an interest in him, and eventually appointed him to an inspectorship of forests. He died on the 1st of August 1882. In 1886 a memorial edition of his poems was published at Melbourne.

KENEALY, EDWARD VAUGHAN HYDE (1810-1880), Irish barrister and author, was born at Cork on the 2nd of July 1819, the son of a local merchant. He'was educated at Trinity College, Dublin; was called to the Irish bar in 1840 and to the English bar in 1847; an d obtained a fair

practice in criminal cases. In 1868 he became a Q.C. and a bencher of Gray's Inn. It was not, however, till 1873, when he became leading counsel for the Tichborne claimant, that he came into any great promi- nence. His violent conduct of the case became a public scandal, and after the verdict against his client he started a paper to plead his cause and to attack the judges. His behaviour was so extreme that in 1874 he was disbenched and disbarred by his Inn.

He then started an agitation throughout the country to ventilate his grievances, and in 1875 was elected to parliament for Stoke; but no member would introduce him when he took his seat. Dr Kenealy, as he was always called, gradually ceased to attract attention, and on the 16th of April 1880 he died in London. He published a great quantity of verse, and also of somewhat mystical theology. His second daughter, Dr Arabella Kenealy, besides practising as a physician, wrote some clever novels.

KING TUNG, the most extensive of the Shan States in the province of Burma. It is in the southern Shan States' charge and lies almost entirely east of the Salween river. The area of the state is rather over 12,000 sq. m. It is bounded N. by the states of Mang Lon, Mong Lem and Keng Hung (Hsip Hsawng Panna), the two latter under Chinese control; E. by the Mekong river, on the farther side of which is French Lao territory; S. by the Siamese Shan States, and W. in a general way by the Salween river, though it overlaps it in some places. The state is known to the Chinese as Meng Kgng, and was frequently called by the Burmese " the 32 cities of the G6n " (Hkon). Keng Tung has expanded very considerably since the establishment of British control, by the inclusion of the districts of Hsen Yawt, Hsen Mawng, Mong Hsat, Mong Pu, and the cis-Mekong portions of Keng Cheng, which in Burmese times were separate charges. The " classical " name of the state is Khemarata or Khemarata Tungkapuri. About 63% of the area lies in the basin of the Mekong river and 37% in the Salween drainage area. The watershed is a high and generally continuous range. Some of its peaks rise to over 7000 ft., and the elevation is nowhere much below 5000 ft. Parallel to this successive hill ranges run north and south. Mountainous country so greatly predominates that the scattered valleys are but as islands in a sea of rugged hills. The chief rivers, tributaries of the Salween, are the Nam Hka, the Hwe Long, Nam Pu, and the Nam Hslm. The first and last are very considerable rivers. The Nam Hka rises in the Wa or Vii states, the Nam Hslm on the watershed range in the centre of the state. Rocks and rapids make both unnavi- gable, but much timber goes down the Nam Hslm. The lower part of both rivers forms the boundary of Keng Tung state. The chief tributaries of the Mekong are the Nam Nga, the Nam Lwe, the Nam Yawng, Nam Lin, Nam Hok and Nam Kok. Of these the chief is the Nam Lwe, which is navigable in the interior of the state, but enters the Mekong by a gorge broken up by rocks. The Nam Lin and the

Nam K6k are also considerable streams. The lower course of the latter passes by Chieng Rai in Siamese territory. The lower Nam H6k or Me Huak forms the boundary with Siam.

The existence of minerals was reported by the sawbwa, or chief, to Francis Gamier in 1867, but none is worked or located. Gold is washed in most of the streams. Teak forests exist in Mong Pu and Mong Hsat, and the sawbwa works them as government con- tracts. One-third of the price realized from the sale of the logs at Moulmein is retained as the government royalty. There are teak forests also in the Mekong drainage area in the south of the state, but there is only a local market for the timber. Rice, as elsewhere in the Shan States, is the chief crop. Next to it is sugar-cane, grown both as a field crop and in gardens. Earth-nuts and tobacco are the only other field crops in the valleys. On the hills, besides rice, cotton, poppy and tea are the chief crops. The tea is carelessly grown, badly prepared, and only consumed locally. A great deal of garden pro- duce is raised in the valleys, especially near the capital. The state is rich in cattle, and exports them to the country west of the Salween. Cotton and opium are exported in large quantities, the former en- tirely to China, a good deal of the latter to northern Siam, which also takes shoes and sandals. Tea is carried through westwards from Keng Hung, and silk from the Siamese Shan States. Cotton and silk weaving are dying out as industries. Large quantities of shoes and sandals are made of buffalo and bullock hide, with Chinese felt uppers and soft iron hobnails. There is a good deal of pottery work. The chief work in iron is the manufacture of guns, which has been carried on for .many years in certain villages of the Sam Tao district. The gun barrels and springs are rude but effective, though not very durable. The revenue of the state is collected as the Burmese thathameda, a rude system of income-tax. From 1890, when the state made its submission, the annual tributary offerings made in Burmese times were continued to the British government, but in 1894 these offerings were converted into tribute. For the quinquennial period

1903-1908 the state paid Rs. 30,000 (£2000) annually.

The population of the state was enumerated for the first time in 1901, giving a total of 190,698. According to an estimate made by Mr G. C. Stirling, the political officer in charge of the state, in 1897- 1898, of the various tribes of Shans, the Hkun and Lu contribute about 36,000 each, the western Shans 32,000, the Lem and Lao Shans about 7000, and the Chinese Shans about 5000. Of the hill tribes, the Kaw or Aka are the most

homogeneous with 22,000, but probably the Wa (or Vii), disguised under various tribal names, are at least equally numerous. Nominal Buddhists make up a total of 133,400, and the remainder are classed as animists. Spirit-worship is, how- ever, very conspicuously prevalent amongst all classes even of the Shans. The present sawbwa or chief received his patent from the British government on the 9th of February 1 897. The early history of Keng Tung is very obscure, but Burmese influence seems to have been maintained since the latter half, at any rate, of the 16th century. The Chinese made several attempts to subdue the state, and appear to have taken the capital in 1765-66, but were driven out by the united Shan and Burmese troops. The same fate seems to have attended the first Siamese invasion of 1804. The second and third Siamese invasions, in 1852 and 1854, resulted in great disaster to the invaders, though the capital was invested for a time.

Keng Tung, the capital, is situated towards the southern end of a valley about 12 m. long and with an average breadth of 7 m. The town is surrounded by a brick wall and moat about 5 m. round. Only the central and northern portions are much built over. Pop. (1901), 5695. It is the most considerable town in the British Shan States. In the dry season crowds attend the market held according to Shan custom every five days, and numerous caravans come from China. The military post formerly was 7 m. west of the town, at the foot of the watershed range. At first the headquarters of a regiment was stationed there; this was reduced to a wing, and recently to military police. The site was badly chosen and proved very unhealthy, and the headquarters both military and civil have been transferred to Loi Ngwe L6ng, a ridge 6500 ft. above sea-level 12 m. south of the capital. The rainfall probably averages between 50 and 60 in. for the year. The temperature seems to rise to nearly 100° F. during the hot weather, falling 30 or more during the night. In the cold weather a temperature of 40 or a few degrees more or less appears to be the lowest experienced. The plain in which the capital stands has an altitude of 3000 ft. (J. G. Sc.)

KENILWORTH, a market town in the Rugby parliamentary division of Warwickshire, England; pleasantly situated on a tributary of the Avon, on a branch of the London & North- western railway, 99 m. N.W. from London. Pop. of urban district (1901), 4544. The town is only of importance from its antiquarian interest and the magnificent ruins of its old castle. The walls originally enclosed an area of 7 acres. The principal portions of the building remaining are the gatehouse, now used as a dwelling-house; Caesar's tower, the only portion built by Geoffrey de Clinton now extant, with massive walls 16 ft. thick; the Merwyn's tower of Scott's Kenilworlh; the great hall built by John of Gaunt with windows of very beautiful design; and the Leicester buildings, which are in a very

ruinous condition. Not far from the castle are the remains of an Augustinian monastery founded in 1122, and afterwards made an abbey. Adjoining the abbey is the parish church of St Nicholas, restored in 1865, a structure of mixed architecture, containing a fine Norman doorway, which is supposed to have been the entrance of the former abbey church.

Kenilworth (Chinewrde, Kenillewurda, Kinelingworthe, Keni- lord, Killingworth) is said to have been a member of Stone- leigh before the Norman Conquest and a possession of the Saxon kings, whose royal residence there was destroyed in the wars between Edward and Canute. The town was granted by Henry I. to Geoffrey de Clinton, a Norman who built the castle round which the whole history of Kenilworth centres. He also founded a monastery here about 11 22. Geoffrey's grandson released his right to King John, and the castle remained with the crown until Henry III. granted it to Simon de Montfort, earl of Leicester. The famous " Dictum de Kenilworth " was proclaimed here in 1266. After the battle of Evesham the rebel forces rallied at the castle, which, after a siege of six months, was surrendered by Henry de Hastings, the governor, on account of the scarceness of food and of the " pestilent disease " which raged there. The king then granted it to his son Edmund. Through John of Gaunt it came to Henry IV. and was granted by Elizabeth in 1562 to Robert Dudley, afterwards earl of .Leicester, but on his death in 1588 again merged in the posses- sions of the Crown. The earl spent large sums on restoring the

castle and grounds, and here in July 1575 he entertained Queen Elizabeth at " excessive cost," as described in Scott's Kenil- worth. On the queen's first entry " a small floating island illuminated by a great variety of torches . . . made its appear- ance upon the lake," upon which, clad in silks, were the Lady of the Lake and two nymphs waiting on her, and for the several days of her stay " rare shews and sports were there exercised." During the civil wars the castle was dismantled by the soldiers of Cromwell and was from that time abandoned to decay. The only mention of Kenilworth as a borough occurs in a charter of Henry I. to Geoffrey de Clinton and in the charters of Henry I. and Henry II. to the church of St Mary of Kenilworth confirming the grant of lands made by Geoffrey to this church, and mention- ing that he kept the land in which his castle was situated and also land for making his borough, park and fishpond. The town possesses large tanneries.

KENITES, in the Bible a tribe or clan of- the south ol Palestine, closely associated with the Amalekites, whose hostility . towards Israel, however, it did not share. On this account Saul spared them when bidden by Yahwch to destroy Amalek; David, too, whilst living in Judah, appears to have been on friendly terms with them (1 Sam. xv. 6; xxx. 29). Moses himself married into a Kenite family (Judges i. 16), and the variant tradition

would seem to show that the Kenites were only a branch of the Midianites (see Jethro, Midian). Jael, the slayer of Sisera (see Deborah), was the wife of Heber the Kenite, who lived near Kadesh in Naphtali; and the appearance of the clan in this locality may be explained from the nomadic habits of the tribe, or else as a result of the northward movement in which at least one other clan or tribe took part (see Dan). There is an obscure allusion to their destruction in an appendage to the oracles of Balaam (Num. xxiv. 21 seq., see G. B. Gray, Intern. Crit. Comm. p. 376); and with this, the only unfavourable reference to them, may perhaps be associated the curse of Cain. Although some connexion with the name of Cain is probable, it is difficult, however, to explain the curse (for one view, see Levites). More important is the prominent part played by the Kenite (or Midianite) father-in-law of Moses, whose help and counsel are related in Exod. xviii.; and if, as seems probable, the Rechabites (q.v.) were likewise of Kenite origin (1 Chron. ii. 55), this obscure tribe had evidently an important part in shaping the religion of Israel.

See on this question, Hebrew Religion, and Budde, Religion of Israel to the Exile, vol. i. ; G. A. Barton, Semitic Origins, pp. 272 sqq. ; L. B. Paton, Biblical World (1906, July and August). On the migration of the Kenites into Palestine (cf. Num. x. 29 with Judges i. 16), see Caleb, Genesis, Jerahmeel, Judah. (S. A. C.)

KENMORE, a village and parish of Perthshire, Scotland, 6 m. W. of Aberfeldy. Pop. of parish (1901), 1271. It is situated at the foot of Loch Tay, near the point where the river Tay leaves the lake. Taymouth Castle, the seat of the Marquess of Breadalbane, stands near the base of Drummond Hill in a princely park through which flows the Tay. It is a stately four- storeyed edifice with corner towers and a central pavilion, and was built in 1801 (the west wing being added in 1842) on the site of the mansion erected in 1580 for Sir Colin Campbell of Glen- orchy. The old house was called Balloch (Gaelic, bealach, " the outlet of a lake "). Two miles S.W. of Kenmore are the Falls of the Acharn, 80 ft. high. When Wordsworth and his sister visited them in 1803 the grotto at the cascade was fitted up to represent a " hermit's mossy cell." At the village of Fortingall, on the north side of Loch Tay, are the shell of a yew conjectured to be 3000 years old and the remains of a Roman camp. Glen- lyon House was the home of Campbell of Glenlyon, chief agent in the massacre of Glencoe. At Garth, z\ m. N.E., are the ruins of an ancient castle, said to have been a stronghold of Alexander Stewart, the Wolf of Badenoch (1343-1405), in close proximity to the modern mansion built for Sir Donald Currie.

KENMURE, WILLIAM GORDON, 6th viscount (d. 17 16), Jacobite leader, son of Alexander, 5th viscount (d. 1698), was descended from the same

family as Sir John Gordon of Loch- invar (d. 1604), whose grandson, Sir John Gordon (d. 1634), was

created Viscount Kenmure in 1633. The family had generally adhered to the Presbyterian cause, but Robert, the 4th viscount, had been excepted from the amnesty granted to the Scottish royalists in 1654, and the 5th viscount, who had succeeded his kinsman Robert in 1663, after some vacillation, had joined the court of the exiled Stuarts. The 6th viscount's adherence to the Pretender in 171 5 is said to have been due to his wife Mary Dalzell (d. 1776), sister of Robert, 6th earl of Carnwath. He raised the royal standard of Scotland at Lochmaben on the 12 th of October 1715, and was joined by about two hundred gentle- men, with Carnwath, William Maxwell, 5th earl of Nithsdale, and George Seton, 5th earl of Wintoun. This small force received some additions before Kenmure reached Hawick, where he learnt the news of the English rising. He effected a junction with Thomas Forster and James Radclyffe, 3rd earl of Derwentwater, at Rothbury. Their united forces of some fourteen hundred men, after a series of rather aimless marches, halted at Kelso, where they were reinforced by a brigade under William Mackintosh. Threatened by an English army under General George Carpenter, they eventually crossed the English border to join the Lancashire Jacobites, and the command was taken over by Forster. Kenmure was taken prisoner at Preston on the 13th of November, and was sent to the Tower. In the following January he was tried with other Jacobite noblemen before the House of Lords, when he pleaded guilty, and appealed to the king's mercy. Immediately before his execution on Tower Hill on the 24th of February he reiterated his belief in the claims of the Pretender. His estates and titles were forfeited, but in 1824 an act of parliament repealed the forfeiture, and his direct descendant, John Gordon (1750-1840), became Viscount Kenmure. On the death of the succeeding peer, Adam, 8th viscount, without issue in 1847, the title became dormant.

KENNEDY, the name of a famous and powerful Scottish family long settled in Ayrshire, derived probably from the name Kenneth. Its chief seat is at Culzean, or Colzean, near Maybole in Ayrshire.

A certain Duncan who became earl of Carrick early in the 13th century is possibly an ancestor of the Kennedys, but a more certain ancestor is John Kennedy of Dunure, who obtained Cassillis and other lands in Ayrshire about 1350. John's descendant, Sir James Kennedy, married Mary, a daughter of King Robert III. and their son, Sir Gilbert Kennedy, was

created Lord Kennedy before 1458. Another son was James Kennedy (c. 1406-1465), bishop of St Andrews from 1441 until his death in July 1465. The bishop founded and endowed St Salvator's college at St Andrews and built a large and famous ship called the " St Salvator." Andrew Lang {History of Scotland, vol. i.) says of him, " The chapel which he built for his college is still thronged by the scarlet gowns of his students; his arms endure on the oaken doors; the beautiful silver mace of his gift, wrought in Paris, and representing all orders of spirits in the universe, is one of the few remaining relics of ancient Scottish plate." Before the bishop had begun to assist in ruling Scotland, a kinsman, Sir Hugh Kennedy, had helped Joan of Arc to drive the English from France.

One of Gilbert Kennedy's sons was the poet, Walter Kennedy (q.v.), and his grandson David, third Lord Kennedy (killed at Flodden, 1513), was created earl of Cassillis before 1510; David's sister Janet Kennedy was one of the mistresses of James IV. The earl was succeeded by his son Gilbert, a prominent figure in the history of Scotland from 1513 until he was killed at Prestwick on the 22nd of December 1527. His son Gilbert, the 3rd earl (c. 1517-1558), was educated by George Buchanan, and was a prisoner in England after the rout of Solway Moss in 1542. He was soon released and was lord high treasurer of Scotland from 1554 to 1558, although he had been intriguing with the English and had offered to kill Cardinal Beaton in the interests of Henry VIII. He died somewhat mysteriously at Dieppe late in 1558 when returning from Paris, where he had attended the marriage of Mary Queen of Scots, and the dauphin of France. He was the father of the " king of Carrick " and the brother of Quintin Kennedy (1520-1564), abbot of Crossraguel. The

abbot wrote several works defending the doctrines of the Roman Catholic Church, and in 1562 had a public discussion on these questions with John Knox, which took place at Maybole and lasted for three days. He died on the 22nd of August 1564.

Gilbert Kennedy, 4th earl of Cassillis (c. 1 541-1576), called the " king of Carrick," became a protestant, but fought for Queen Mary at Langside in 1568. He is better known through his cruel treatment of Allan Stewart, the commendator abbot of Crossraguel, Stewart being badly burned by the earl's orders at Dunure in 1570 in order to compel him to renounce his title to the abbey lands which had been seized by Cassillis. This " ane werry greedy man " died at Edinburgh in December 1576. His son John (c. 1567-1615), who became the 5th earl, was lord high treasurer of Scotland in 1 599 and his lifetime wit- nessed the culmination of a great feud between the senior and a younger branch of the Kennedy family. He was succeeded as 6th earl by his nephew John (c. 1595-1668), called " the grave and solemn earl." A strong presbyterian, John was one of the leaders

of the Scots in their resistance to Charles I. In 1643 he went to the Westminster Assembly of Divines and several times he was sent on missions to Charles I. and to Charles II. ; for a time he was lord justice general and he was a member of Cromwell's House of Lords. His son, John, became the 7th earl, and one of his daughters, Margaret, married Gilbert Burnet, afterwards bishop of Salisbury. His first wife, Jean (1607-1642), daughter of Thomas Hamilton, 1st earl of Haddington, has been regarded as the heroine of the ballad " The Gypsie Laddie," but this identity is now completely disproved. John, the 7th earl, " the heir," says Burnet, " to his father's stiffness, but not to his other virtues," supported the revolution of 1688 and died on the 23rd of July 1 701; his grandson John, the 8th earl, died without sons in August 1759.

The titles and estates of the Kennedys were now claimed by William Douglas, afterwards duke of Queensberry, a great-grand- son in the female line of the 7th earl and also by Sir Thomas Kennedy, Bart., of Culzean, a descendant of the 3rd earl, i.e. by the heir general and the heir male. In January 1762 the House of Lords decided in favour of the heir male, and Sir Thomas became the 9th earl of Cassillis. He died unmarried on the 30th of November 1775, and his brother David, the 10th earl, also died unmarried on the 18th of December 1792, when the baronetcy became extinct. The earldom of Cassillis now passed to a cousin, Archibald Kennedy, a captain in the royal navy, whose father, Archibald Kennedy (d. 1763), had migrated to America in 1722 and had become collector of customs in New York. His son, the nth earl, had estates in New Jersey and married an American heiress; in 1765 he was said to own more houses in New York than any one else. He died in London on the 30th of December 1794, and was succeeded by his son Archibald (1770-1846), who was created Baron Ailsa in 1806 and marquess of Ailsa in 1831. His great-grandson Archibald (b. 1847) became 3rd marquess.

See the article in vol. ii. of Sir R. Douglas's Peerage of Scotland, edited by Sir J. B. Paul (1905). This is written by Lord Ailsa's son and heir, Archibald Kennedy, earl of Cassillis (b. 1872).

KENNEDY, BENJAMIN HALL (1804-1880), English scholar, was born at Summer Hill, near Birmingham, on the 6th of November 1804, the eldest son of Rann Kennedy (1772-1851), who came of a branch of the Ayrshire family which had settled in Staffordshire. Rann Kennedy was a scholar and man of letters, several of whose sons rose to distinction. B. H. Kennedy was educated at Birmingham . and Shrewsbury schools, and St John's College, Cambridge. After a brilliant university career he was elected fellow and classical lecturer of St John's College in 1828. Two years later he became an assis- tant master at Harrow, whence he went to Shrewsbury as head- master in 1836. He retained this post until 1 866, the thirty years of

his rule being marked by a long series of successes won by his pupils, chiefly in classics. When he retired from Shrews- bury a large sum was collected as a testimonial to him, and was devoted partly to the new school buildings and partly to the founding of a Latin professorship at Cambridge. The first two. occupants of the chair were both Kennedy's old pupils, H. A. J.

Munro and J. E. B. Mayor. In 1867 he was elected regius pro- fessor of Greek at Cambridge and canon of Ely. From 1870 to 1880 he was a member of the committee for the revision of the New Testament. He was an enthusiastic advocate for the admission of women to a university education, and took a promi- nent part in the establishment of Newnham and Girton colleges. He was also a keen politician of liberal sympathies. He died near Torquay on the 6th of April 1889. Among a number of classical school-books published by him are two, a Public School Latin Primer and Public School Latin Grammar, which were for long in use in nearly all English schools.

His other chief works are: Sophocles, Oedipus Tyrannus (2nd ed., 1885), Aristophanes, Birds (1874); Aeschylus, Agamemnon (2nd ed., 1882), with introduction, metrical translation and notes; a commentary on Virgil (3rd ed., 1881) ; and a translation of Plato, Theaetetus (1881). He contributed largely to the collec- tion known as Sabrinae Corolla, and published a collection of verse in Greek, Latin and English under the title of Between Whiles (2nd ed., 1882), with many autobiographical details.

His brother, Charles Rann Kennedy (1808-1867), was educated at Shrewsbury school and Trinity College, Cambridge, where he graduated as senior classic (1831). He then became a barrister. From 1840-1856 he was professor of law at Queen's College, Birmingham. As adviser to Mrs Swinfen, the plaintiff in the celebrated will case Swinfen v. Swinfen (1856), he brought an action for remuneration for professional services, but the verdict given in his favour at Warwick assizes was set aside by the court of Common Pleas, on the ground that a barrister could not sue for the recovery of his fees. The excellence of Kennedy's scholarship is abundantly proved by his translation of the orations of Demosthenes (1852-1863, in Bohn's Classical Library), and his blank verse translation of the works of Virgil (1861). He was also the author of New Rules for Pleading (2nd ed., 1841) and A Treatise on Annuities (1846). He died in Birmingham on the 17th of December 1867.

Another brother, Rev. William James Kennedy (1814-1891), was a prominent educationalist, and the father of Lord Justice Sir William Rann Kennedy (b. 1846), himself a distinguished Cambridge scholar.

KENNEDY, THOMAS FRANCIS (1788-1870), Scottish politi- cian, was born near Ayr in 1788. He studied for the bar and became advocate in 181 1. Having been elected M.P. for the Ayr burghs in 1818, he devoted the greater part of his life to the promotion of Liberal reforms. In 1820 he married the only daughter of Sir Samuel Romilly. He was greatly assisted by Lord Cockburn, then Mr Hejiry Cockburn, and a volume of correspondence published by Kennedy in 1874 forms a curious and interesting record of the consultations of the two friends on measures which they regarded as requisite for the political regeneration of their native country. One of the first measures to which he directed his attention was the withdrawal of the power of nominating juries from the judges, and the imparting of a right of peremptory challenge to prisoners. Among other subjects were the improvement of the parish schools, of pauper administration, and of several of the corrupt forms of legal pro- cedure which then prevailed. In the construction of the Scottish Reform Act Kennedy took a prominent part; indeed he and Lord Cockburn may almost be regarded as its authors. After the accession of the Whigs to office in 1832 he held various impor- tant offices in the ministry, and most of the measures of reform for Scotland, such as burgh reform, the improvements in the law of entail, and the reform of the sheriff courts, owed much to his sagacity and energy. In 1837 he went to Ireland as pay- master of civil services, and set himself to the promotion of various measures of reform. Kennedy retired from office in 1854, but continued to take keen interest in political affairs, and up to his death in 1879 took a great part in both county and parish business. He had a stern love of justice, and a determined hatred of everything savouring of jobbery or dishonesty.

KENNEDY, WALTER (c. 1460-c. 1508), Scottish poet, was the third son of Gilbert, 1st Lord Kennedy. He matriculated

at Glasgow University in 1475 and took his M.A. degree in X478. In 148 1 he was one of four examiners in his university, and in 1492 he acted as depute for his nephew, the hereditary bailie of Carrick. He is best known for his share in the Flyting with Dunbar (q.v.). In this coarse combat of wits Dunbar taunts his rival with his Highland speech (the poem is an expression of Gaelic and " Inglis," i.e. English, antagonism); and implies that he had been involved in treason, and had disguised himself as a beggar in Galloway. With the exception of this share in the Flyting Kennedy's poems are chiefly religious in character. They include The Praise of Aige, Ane A git Manis Invective against Mouth Thankless, Ane Ballat in Praise of Our Lady, The Passion of Christ and Pious Counsale. They are printed in

the rare supplement to David Laing's edition of William Dunbar (1834), and they have been re-edited by Dr J. Schipper in the proceedings of the Kais. Akad. der Wissenschaften (Vienna).

See also the prolegomena in the Scottish Text Society's edition of Dunbar; and (for the life) Pitcairn's edition of the Historic of the Kennedies (1830).

KENNEL, a small hut or shelter for a dog, also extended to a group of buildings for a pack of hounds (see Dog). The word is apparently from a Norman-French kenil (this form does not occur, but is seen in the Norman kinet, a little dog), modern French chenil, from popular Latin canile, place for a dog, canis, cf. ovile, sheep-cote. The word " kennel," a gutter, a drain in a street or road, is a corruption of the Middle English canel, cannel, in-modern English " channel," from Latin canalis, canal.

KENNETH, the name of two kings of the Scots.

Kenneth I., MacAlpin (d. c. 860), often described as the first king of Scotland (kingdom of Scone), was the son of the Alpin, called king of the Scots, who had been slain by the Picts in 832 or 834, whilst endeavouring to assert his claim to the Pictish throne. On the death of his father, Kenneth is said to have succeeded him in the kingdom of the Scots. The region of his rule is matter of conjecture, though Galloway seems the most probable suggestion, in which case he probably led a piratic host against the Picts. On the father's side he was descended from the Conall Gabhrain of the old Dalriadic Scottish kingdom, and the claims of father and son to the Pictish throne were probably through female descent. Their chief support seems to have been found in Fife. In the seventh year of his reign (839 or 841) he took advantage of the effects of a Danish invasion of the Pictish kingdom to attack the remaining Picts, whom he finally subdued in 844 or 846. In 846 or 848 he transported the relics of St Columba to a church which he had constructed at Scone. He is said also to have carried out six invasions of Northumbria, in the course of which he burnt Dunbar and took Melrose. According to the Scalacronica of Sir Thomas Gray he drove the Angles and Britons overthe Tweed, reduced the land as far as that river, and first called his kingdom Scotland. In his reign there appears to have been a serious invasion by Danish pirates, in which Cluny and Dunkeld were burnt. He died in 860 or 862, after a reign of twenty-eight years, at Forteviot and was buried at Iona. The double dates are due to a contest of authorities. Twenty-eight years is the accepted length of his reign, and according to the chronicle of Henry of Huntingdon it began in 832. The Pictish Chronicle, however, gives Tuesday, the 13th of February as the day, and this suits 862 only, in which case his reign would begin in 834.

Kenneth II. (d. 995), son of Malcolm I., king of Alban, succeeded Cuilean,

son of Indulph, who had been slain by the Britons of Strathclyde in 971 in Lothian. Kenneth began his reign by ravaging the British kingdom, but he lost a large part of his force on the river Cornag. Soon afterwards he attacked Eadulf, earl of the northern half of Northumbria, and ravaged the whole of his territory. He fortified the fords of the Forth as a defence against the Britons and again invaded Northumbria, carrying off the earl's son. About this time he gave the city of Brechin to the church. In 977 he is said to have slain Amlaiph or Olaf, son of Indulph, king of Alban, perhaps a rival claimant

to the throne. According to the English chroniclers, Kenneth paid homage to King Edgar for the cession of Lothian, but these statements are probably due to the controversy as to the posi- tion of Scotland. The mormaers, or chiefs, of Kenneth were engaged throughout his reign in a contest with Sigurd the Nor- wegian, earl of Orkney, for the possession of Caithness and the northern district of Scotland as far south as the Spey. In this struggle the Scots attained no permanent success. In 995 Kenneth, whose strength like that of the other kings of his branch of the house of Kenneth MacAlpin lay chiefly north of the Tay, was slain treacherously by his own subjects, according to the later chroniclers at Fettercairn in the Mearns through an intrigue of Einvela, daughter of the earl of Angus. He was buried at Iona.

See Chronicles of the Picts and Scots, ed. W. F. Skene (Edinburgh, 1867), and W. F. Skene, Celtic Scotland (Edinburgh, 1876).

KENNETT, WHITE (1660-1728), English bishop and anti- quary, was born at Dover in August 1660. He was educated at Westminster school and at St Edmund's Hall, Oxford, where, while an undergraduate, he published several translations of Latin works, including Erasmus In Praise of Folly. In 1685 he became vicar of Ambrosden, Oxfordshire. A few years after- wards he returned to Oxford as tutor and vice-principal of St Edmund's Hall, where he gave considerable impetus to the study of antiquities. George Hickes gave him lessons in Old English. In 1695 he published Parochial Antiquities. In 1700 he became rector of St Botolph's, Aldgate, London, and in 1701 archdeacon of Huntingdon. For a eulogistic sermon on the first duke of Devonshire he was in 1707 recommended to the deanery of Peterborough. He afterwards joined the Low Church party, strenuously opposed the Sacheverel movement, and in the Bangorian controversy supported with great zeal and consider- able bitterness the side of Bishop Hoadly. His intimacy with Charles Trimnell, bishop of Norwich, who was high in favour with the king, secured for him in 17 18 the bishopric of Peter- borough. He died at Westminster in December 1728.

Kennett published in 1698 an edition of Sir Henry Spelman's History of Sacrilege, and he was the author of fifty-seven printed works, chiefly tracts and sermons. He wrote the third volume (Charles I. -Anne) of the composite Compleat History of England (1706), and a more detailed and valuable Register and Chronicle of the Restoration. He was much interested in the Society for the Propagation of the Gospel.

The Life of Bishop White Kennett, by the Rev. William Newton (anonymous), appeared in 1730. See also Nichols's Literary Anecdotes,

and I. Disraeli's Calamities of Authors.

KENNEY, JAMES (1 780-1 849), English dramatist, was the son of James Kenney, one of the founders of Boodles' Club in London. His first play, a farce called Raising the Wind (1803), was a success owing to the popularity of the character of " Jeremy Diddler." Kenney produced more than forty dramas and operas between 1803 and 1845, and many of his pieces, in which Mrs Siddons, Madame Vestris, Foote, Lewis, Liston and other leading players appeared from time to time, enjoyed a considerable vogue. His most popular play was Sweethearts and Wives, produced at the Haymarket theatre in 1823, and several times afterwards revived; and among the most successful of his other works were : False Alarms (1807), a comic opera with music by Braham; Love, Law and Physic (1812); Spring and Autumn (1827); The Illustrious Stranger, or Married and Buried (1827); Masaniello (1829); The Sicilian Vespers, a tragedy (1840). Kenney, who numbered Charles Lamb and Samuel Rogers among his friends, died in London on the 25th of July 1849. He married the widow of the dramatist Thomas Holcroft, by whom he had two sons and two daughters.

His second son, Charles Lamb Kenney (1823-1881), made a name as a journalist, dramatist and miscellaneous writer. Commencing life as a clerk in the General Post Office in London, he joined the staff of The Times, to which paper he contributed dramatic criticism. In 1856, having been called to the bar, he became secretary to Ferdinand de Lesseps, and in 1857 he pub- lished The Gates of the East in support of the projected construc- tion of the Suez Canal. Kenney wrote the words for a number

of light operas, and was the author of several popular songs, the best known of which were " Soft and Low " (1865) and " The Vagabond " (1871). He also published a Memoir of M. W. Balfe (1875), an d translated the Correspondence of Balzac He included Thackeray and Dickens among his friends in 9 literary coterie in which he enjoyed the reputation of a wit and an accomplished writer of vers de societe. He died in London or the 25th of August 1881.*

See John Genest, Some Account of the English Stage, 1660-1830, vols. vii. and viii. (10 vols., London, 1832); P. W. Clayden, Roger and his Contemporaries (2 vols., London, 1889) ; Diet. National Biog*

KENNGOTT, GUSTAV ADOLPH (1818-1897), German mineralogist, was born at Breslau on the 6th of January 1818. After being employed in the Hofmineralien Cabinet at Vienna, he became professor of mineralogy in the university of Zurich. He was distinguished for his researches on mineralogy, crystallo- graphy and petrology. He died at Lugano, on the 7th of March

1897.

Publications. — Lehrbuch der reinen Krystallographie ..(1846); Lehrbuch der Mineralogie (1852 and 1857; 5th ed., 1880); Vbersicht der Resultate mineralogischer Forschungen in den Jahren 1844-1865 (7 vols., 1852-1868); Die Minerale der Schweiz (1866); Elemente der Petrographie (1868).

KENNICQTT, BENJAMIN (1718-1783), English divine and Hebrew scholar, was born at Totnes, Devonshire, on the 4th of April 1 718. He succeeded his father as master of a charity school, but by the liberality of friends he was enabled to go to Wadham College, Oxford, in 1744, where he distinguished him- self in Hebrew and divinity. While an undergraduate he published two dissertations, On the Tree of Life in Paradise, with some Observations on the Fall of Man, and On the Oblations of Cain and Abel (2nd ed., 1747), which procured him the honour of a bachelor's degree before the statutory time. In 1747 he was elected fellow of Exeter College, and in 1 7 50 he took his degree of M.A. In 1764 he was made a fellow of the Royal Society, and in 1767 keeper of the Radcliffe Library. He was also canon of Christ Church (1770) and rector of Culham (1753), in Oxfordshire, and was subsequently presented to the living of Menheniot, Cornwall, which he was unable to visit and resigned two years before his death. He died at Oxford, on the 18th of September 1783.

His chief work is the Vetus Testamentum hebraicum cum variis lectionibus (2 vols, fol., Oxford, 1776-1780). Before this appeared he had written two dissertations entitled The State of the Printed Hebrew Text of the Old Testament considered, published respectively in 1753 and 1759, which were designed to combat the then current ideas as to the " absolute integrity " of the received Hebrew text. The first contains " a comparison of 1 Chron. xi. with 2 Sam. v. and xxiii. and observations on seventy MSS., with an extract of mistakes and various readings " ; the second defends the claims of the Samari- tan Pentateuch, assails the correctness of the printed copies of the Chaldee paraphrase, gives an account of Hebrew MSS. of the Bible known to be extant, and catalogues one hundred MSS. preserved in the British Museum and in the libraries of Oxford and Cambridge. In 1760 he issued his proposals for collating all Hebrew MSS. of date prior to the invention of printing. Subscriptions to the amount of nearly £10,000 were obtained, and many learned men addressed themselves to the work of collation, Bruns of Helmstadt making himself specially useful as regarded MSS. in Germany, Switzerland and Italy. Between 1760 and 1769 ten " annual accounts " of the progress of the work were given; in its course 615 Hebrew MSS. and 52 printed editions of the Bible were either wholly or partially collated, and use was also made (but often very perfunctorily) of the quotations in the Talmud. The materials thus collected, when properly

arranged and made ready for the press, extended to 30 vols, fol. The text finally followed in printing was that of Van der Hooght — unpointed however, the points having been disregarded in collation — and the various readings were printed at the foot of the page. The Samaritan Pentateuch stands alongside the Hebrew in parallel columns. The Dissertatio generalis, appended to the second volume, contains an account of the MSS. and other authori- ties collated, and also a review of the Hebrew text, divided into periods, and beginning with the formation of the Hebrew canon after the return of the Jews from the exile. Kennicott's great work was in one sense a failure. It yielded no materials of value for ths emendation of the received text, and by disregarding the vowel points overlooked the one thing in which some result (grammatical if not critical) might have been derived from collation of Massoretic MSS. But the negative result of the publication and of the Varies

lectiones of De Rossi, published some years later, was important. It showed that the Hebrew text can be emended only by the use of the versions aided by conjecture.

Kennicott's work was perpetuated by his widow, who founded two university scholarships at Oxford for the study of Hebrew. The fund yields an income of £200 per annum.

KENNINGTON, a district in the south of London, England, within the municipal borough of Lambeth. There was a royal palace here until the reign of Henry VII. Kennington Common, now represented by Kennington Park, was the site of a gallows until the end of the 18th century, and was the meeting-place appointed for the great Chartist demonstration of the 10th of April 1848. Kennington Oval is the ground of the Surrey County Cricket Club. (See Lambeth.)

KENORA (formerly Rat Portage), a town and port of entry in Ontario, Canada, and the chief town of Rainy River district, situated at an altitude of 1087 ft. above the sea. Pop. (1891), 1806; (1001) 5222. It is 133 m. by rail east of Winnipeg, on the Canadian Pacific railway, and at the outlet of the Lake of the Woods. The Winnipeg river has at this point a fall of 16 ft., which, with the lake as a reservoir, furnishes an abundant and unfailing water- power. The industrial establishments comprise reduction works, saw-mills and flour-mills, one of the latter being the largest in Canada. It is the distributing point for the gold mines of the district, and during the summer months steamboat communication is maintained on the lake. There is

important sturgeon fishing.

KENOSHA, a city and the county-seat of Kenosha county, Wisconsin. U.S.A., on the S.W. shore of Lake Michigan, 35 m.S. of Milwaukee and 50 m. N. of Chicago. Pop. (1900), 11,606, of whom 3333 were foreign-born; (1910), 21,371. It is served by the Chicago & North-Western railway, by inter- urban electric lines connecting with Chicago and Milwaukee, and by freight and passenger steamship lines on Lake Michigan. It has a good harbour and a considerable lake commerce. The city is finely situated on high bluffs above the lake, and is widely known for its healthiness. At Kenosha is the Gilbert M. Simmons library, with 19,300 volumes in 1908. Just south of the city is Kemper Hall, a Protestant Episcopal school for girls, under the charge of the Sisters of St Mary, opened in 1870 as a memorial to Jackson Kemper (1789-1870), the first missionary bishop (1835-1859), and the first bishop of Wis- consin (1854-1870) of the Protestant Episcopal Church. Among Kenosha's manufactures are brass and iron beds (the Simmons Manufacturing Co.), mattresses, typewriters, leather and brass goods, wagons, and automobiles — the " Rambler " automobile being made at Kenosha by Thomas B. Jeffery and Co. There is an extensive sole-leather tannery. The total value of the factory product in 1905 was $12,362,600, the city ranking third in product value among the cities of the state. Kenosha, originally known as Southport, was settled about 1832, organized as the village of Southport in 1842, and chartered in 1850 as a city under its present name.

KENSETT, JOHN FREDERICK (1818-1872), American artist, was born in Cheshire, Connecticut, on the 22nd of March 1818. After studying engraving he went abroad, took up painting, and exhibited at the Royal Academy, London, in 1845. In 1849 he was elected to the National Academy of Design, New York, and in 1859 he was appointed a member of the committee to superintend the decoration of the United States Capitol at Washington, D.C. After his death the con- tents of his studio realized at public auction over $150,000. He painted landscapes more or less in the manner of the Hudson River School.

KENSINGTON, a western metropolitan borough of London, England, bounded N.E. by Paddington, and the city of West- minster, S.E. by Chelsea, S.W. by Fulham, N.W. by Hammers- smith, and extending N. to the boundary of the county of London. Pop. (1901), 176,628. It includes the districts of Kensal Green (partly) in the north, Notting Hill in the north-central portion, Earl's Court in the south-west, and Brompton in the south-east. A considerable but indefinite area adjoining Brompton is commonly called South Kensington; but the

area known as West Kensington is within the borough of Fulham.

The name appears in early forms as Chenesilun and Kenesilune. Its origin is obscure, and has been variously connected with a Saxon royal residence (King's town), a family of the name of Chenesi, and the word caen, meaning wood, from the forest which originally covered the district and was still traceable in Tudor times. The most probable derivation, however, finds in the name a connection with the Saxon tribe or family of Kensings. The history of the manor is traceable from the time of Edward the Confessor, and after the Conquest it was held of the Bishop of Coutances by Aubrey de Vere. Soon after this it became the absolute property of the de Veres, who were subsequently created Earls of Oxford. The place of the manorial courts is preserved in the name of the modern district of Earl's Court. With a few short intervals the manor continued in the direct line until Tudor times. There were also three sub- manors, one given by the first Aubrey de Vere early in the 1 2 th century to the Abbot of Abingdon, whence the present parish church is called St Mary Abbots; while in another, Knotting Barnes, the origin of the name Notting Hill is found.

The brilliant period of history for which Kensington is famous may be dated from the settlement of the Court here by William III. The village, as it was then, had a reputation for healthiness through its gravel soil and pure' atmosphere. A mansion stand- ing on the western flank of the present Kensington Gardens had been the seat of Heneage Finch, Lord Chancellor and afterwards Earl of Nottingham. It was known as Nottingham House, but when bought from the second earl by William, who was desirous of avoiding residence in London as he suffered from asthma, it became known as Kensington Palace. The extensive additions and alterations made by Wren according to the taste of the King resulted in a severely plain edifice of brick; the orangery, added in Queen Anne's time, is a better example of the same architect's work. In the palace died Mary, William's consort, William himself, Anne and George II., whose wife Caroline did much to beautify Kensington Gardens, and formed the beautiful lake called the Serpentine (1733) . But a higher interest attaches to the palace as the birthplace of Queen Victoria in 1819; and here her accession was announced to her. By her order, towards the close of her life, the palace became open to the public.

Modern influences, one of the most marked of which is the widespread erection of vast blocks of residential flats, have swept away much that was reminiscent of the historical connexions of the " old court suburb." Kensington Square, however, lying south of High Street in the vicinity of St Mary Abbots church, still preserves some of its picturesque houses, nearly all of which were formerly inhabited by those attached to the court; it numbered among its residents Addison, Talleyrand, John Stuart Mill, and Green the historian. In Young Street, opening from the Square, Thackeray lived for many years. His house here, still standing, is most commonly

associated with his work, though he subsequently moved to Onslow Square and to Palace Green. Another link with the past' is found in Holland House, hidden in its beautiful park north of Kensington Road. It was built by Sir Walter Cope, lord of the manor, in 1607, and obtained its present name on coming into the possession of Henry Rich, earl of Holland, through his marriage with Cope's daughter. He extended and beautified the mansion. General Fairfax and General Lambert are mentioned as occupants after his death, and later the property was let, William Penn of Pennsylvania being among those who leased it. Addison, marrying the widow of the 6th earl, lived here until his death in 17 19. During the tenancy of Henry Fox, third Lord Holland (1773-1840), the house gained a European reputation as a meeting-place of states- men and men of letters. The formal gardens of Holland House are finely laid out, and the rooms of the house are both beautiful in themselves and enriched with collections of pictures, china and tapestries. Famous houses no longer standing were Camp- den House, in the district north-west of the parish church, formerly known as the Gravel Pits; and Gore House, on the site

of the present Albert Hall, the residence of William Wilberforce, and later of the countess of Blessington.

The parish church of St Mary Abbots, High Street, occupies an ancient site, but was built from the designs of Sir Gilbert Scott in 1869. It is in Decorated style, and has one of the loftiest spires in England. In the north the borough includes the cemetery of Kensal Green (with the exception of the Roman Catholic portion, which is in the borough of Hammersmith) ; it was opened in 1838, and great numbers of eminent persons are buried here. The Roman Catholic church of Our Lady of Victories lies close to Kensington Road, and in Brompton Road is the Oratory of St Philip Neri, a fine building with richly decorated interior, noted for the beauty of its musical services, as is the Carmelite Church in Church Street. St Charles's Roman Catholic College (for boys), near the north end of Ladbroke Grove, was founded by Cardinal Manning in 1863 ; the buildings are now used as a training centre for Catholic school mistresses. Of secular institutions the principal are the museums in South Kensington. The Victoria and Albert, commonly called the South Kensington, Museum contains various exhibits divided into sections, and includes the buildings of the Royal College of Science. Close by is the Natural History Museum, in a great building by Alfred Waterhouse, opened as a branch of the British Museum in 1880. Near this stood Cromwell House, erroneously considered to have been the residence of Oliver Cromwell, the name of which survives in the adjacent

Cromwell Road. In Kensington Gardens, near the upper end of Exhibi- tion Road, which separates the two museums, was held the Great Exhibition of 1851, the hall of which is preserved as the Crystal Palace at Sydenham. The greater part of the gardens, however, with the Albert Memorial, erected by Queen Victoria in memory of Albert, prince consort, the Albert Hall, opposite to it, one of the principal concert-halls in London, and the Imperial Institute to the south, are actually within the city of Westminster, though commonly connected with Kensington. The gardens (275 acres) were laid out in the time of Queen Anne, and have always been a popular and fashionable place of recreation. Extensive grounds at Earl's Court are open from time to time for various exhibitions. Further notable buildings in Kensington are the town-hall and free library in High Street, which is also much frequented for its excellent shops, and the Brompton Consump- tion Hospital, Fulham Road. In Holland Park Road is the house of Lord Leigh ton (d. 1896), given to the nation, and open, with its art collection, to the public.

Kensington is a suffragan bishopric in the diocese of London. The parliamentary borough of Kensington has north and south divisions, each returning one member. The borough council consists of a mayor, 10 aldermen and 60 councillors. Area, 2291-1 acres.

KENT, EARLS AND DUKES OF. The first holder of the English earldom of Kent was probably Odo, bishop of Bayeux, and the second a certain William de Ypres (d. 1162),, both of whom were deprived of the dignity. The regent Hubert de Burgh obtained this honour in 1227, and in 1321 it was granted to Edmund Plantagenet, the youngest brother of Edward II. Edmund (1301-1330), who was born at Woodstock on the 5th of August 1 30 1, received many marks of favour from his brother the king, whom he steadily supported until the last act in Edward's life opened in 1326. He fought in Scotland and then in France, and was a member of the council when Edward III. became king in 1327. Soon at variance with Queen Isabella and her lover, Roger Mortimer, Edmund was involved in a conspiracy to restore Edward II., who he was led to believe was still alive; he was arrested, and beheaded on the 19th of March 1330. Although he had been condemned as a traitor his elder son Edmund (c. 1327-1333) was recognized as earl of Kent, the title passing on his death to his brother John (c. 1330-1352).

After John's childless death the earldom appears to have been held by his sister Joan, " the fair maid of Kent," and in 1360 Joan's husband, Sir Thomas de Holand, or Holland, was sum- moned to parliament as earl of Kent. Holand, who was a soldier of some repute, died in Normandy on the 28th of December

1360, and his widow married Edward the Black Prince, by whom she was the mother of Richard II. The next earl was Holand's eldest son Thomas (1350-1397), who was marshal of England from 1380 to 1385, and was in high favour with his half-brother, Richard II. The 3rd earl of Kent of the Holand family was his son Thomas (1374-1400). In September 1397, a few months after becoming earl of Kent, Thomas was made duke of Surrey as a reward for assisting Richard II. against the lords appellant; but he was degraded from his dukedom in 1399, and was beheaded in January of the following year for conspiring against Henry IV. However, his brother Edmund (1384-1408) was allowed to succeed to the earldom, which became extinct on his death in Brittany in September 1408.

In the same century the title was revived in favour of William, a younger son of Ralph Neville, 1st earl of Westmorland, and through his mother Joan Beaufort a grandson of John of Gaunt, duke of Lancaster. William (c. 1405-1463) , who held the barony of Fauconberg in right of his wife, Joan, gained fame during the wars in France and fought for the Yorkists during the Wars of the Roses. His prowess is said to have been chiefly responsible for the victory of Edward IV. at Towton in March 1461, and soon after this event he was created earl of Kent and admiral of England. He died in January 1463, and, as his only legitimate issue were three daughters, the title of earl of Kent again became extinct. Neville's natural son Thomas, " the bastard of Faucon- berg " (d. 147 1), was a follower of Warwick, the " Kingmaker."

The long connexion of the family of Grey with this title began in 1465, when Edmund, Lord Grey of Ruthin, was created earl of Kent. Edmund (c. 1420-1489) was the eldest son of Sir John Grey, while his mother, Constance, was a daughter of John Holand, duke of Exeter. During the earlier part of the Wars of the Roses Grey fought for Henry VI.; but by deserting the Lancastrians during the battle of Northampton in 1460 he gave the victory to the Yorkists. He was treasurer of England and held other high offices under Edward IV. and Richard III. His son and successor, George, 2nd earl of Kent (c. 1455-1503), aiso a soldier, married Anne Woodville, a sister of Edward IV. 's queen, Elizabeth, and was succeeded by his son Richard (1481- 1524). After Richard's death without issue, his half-brother and heir, Henry (c. 1495-1562), did not assume the title of earl of Kent on account of his poverty; but in 1572 Henry's grandson Reginald (d. 1573), who had been member of parliament for Weymouth, was recognized as earl; he was followed by his brother Henry (1541-1615), and then by another brother, Charles (c. 1 545-1623). Charles's son, Henry, the 8th earl (c. 1583- 1639), married Elizabeth (1581-1651), daughter of Gilbert Talbot, 7th earl of Shrewsbury. This lady, who was an authoress, took for her second husband the jurist John Selden. Henry died without children in November 1639, when the earldom

of Kent, separated from the barony of Ruthin, passed to his cousin Anthony (1 557-1643), a clergyman, who was succeeded by his son Henry (1594-1651), Lord Grey of Ruthin. Henry had been a member of parliament from 1640 to 1643, and as a supporter of the popular party was speaker of the House of Lords until its abolition. The nth earl was his son Anthony (1645-1702), whose son Henry became 12th earl in August 1702, lord chamber- lain of the royal household from 1704 to 17 10, and in 1706 was created earl of Harold and marquess of Kent, becoming duke of Kent four years later. All his sons predeceased their father, and when the duke died in June 1740, his titles of earl, marquess and duke of Kent became extinct.

In 1799 Edward Augustus, fourth son of George III., was created duke of Kent and Strathearn by his father. Born on the 2nd of November 1767, Edward served in the British army in North America and elsewhere, becoming a field marshal in 1805. To quote Sir Spencer Walpole, Kent, a stern disciplin- arian, " was unpopular among his troops; and the storm which was created by his well-intentioned effort at Gibraltar to check the licentiousness and drunkenness of the garrison compelled him finally to retire from the governorship of this colony." Owing to pecuniary difficulties his later years were mainly passed on the continent of Europe. He died at Sidmouth on the 23rd

of January 1820. In 1818 the duke married Maria Louisa Victoria (1786-1861), widow of Emich Charles, prince of Lein- ingen (d. 18 14), and sister of Leopold I., king of the Belgians; and his only child was Queen Victoria (q.v.).

KENT, JAMES (1763-1847), American jurist, was born at Philippi in New York State on the 31st of July 1763. He graduated at Yale College in 1781, and began to practise law at Poughkeepsie, in 1785 as an attorney, and in 1787 at the bar. In 1791 and 1792-93 Kent was a representative of Dutchess county in the state Assembly. In 1 793 he removed to New York, where Governor Jay, to whom the young lawyer's Federalist sym- pathies were a strong recommendation, appointed him a master in chancery for the city. He was professor of law in Columbia College in 1 7 93-98 and again served in the Assembly in 1 796-9 7 . In 1797 he became recorder of New York, in 1798 judge of the supreme court of the state, in 1804 chief justice, and in 1814 chancellor of New York. In 1822 he became a member of the convention to revise the state constitution. Next year, Chan- cellor Kent resigned his office and was re-elected to his former chair. Out of the

lectures he now delivered grew the Com- mentaries on American Law (4 vols., 1826-1830), which by their learning, range and lucidity of style won for him a high and permanent place in the estimation of both English and American jurists. Kent rendered most essential service to American jurisprudence while serving as chancellor. Chancery law had been very unpopular during the colonial period, and had received little development, and no decisions had been published. His judgments of this class (see Johnson's Chancery Reports, 7 vols., 1816-1824) cover a wide range of topics, and are so thoroughly considered and developed as unquestionably to form the basis of American equity jurisprudence. Kent was a man of great purity of character and of singular simplicity and guilelessness. He died in New York on the 12th of December 1847.

To Kent we owe several other works (including a Commentary on International Law) of less importance than the Commentaries. See J. Duer's Discourse on the Life, Character and Public Services of James Kent (1 848) ; The National Portrait Gallery of Distinguished A mericans, vol. ii. (1852); W. Kent, Memoirs and Letters of Chancellor Kent (Boston, 1898).

KENT, WILLIAM (1685-1748), English "painter, architect, and the father of modern gardening," as Horace Walpole in his Anecdotes of Painting describes him, was born in Yorkshire in 1685. Apprenticed to a coach-painter, his ambition soon led him to London, where he began life as a portrait and historical painter. He found patrons, who sent him in 1710 to study in Italy; and at Rome he made other friends, among them Lord Burlington, with whom he returned to England in 1719. Under that nobleman's roof Kent chiefly resided till his death on the 1 2th of April 1748 — obtaining abundant commissions in all departments of his art, as well as various court appointments which brought him an income of £600 a year. Walpole says that Kent was below mediocrity in painting. He had some little taste and skill in architecture, of which Holkham palace is

perhaps the most favourable example. The mediocre statue of Shakespeare in Westminster Abbey sufficiently stamps his powers as a sculptor. His merit in landscape gardening is greater. In Walpole's language, Kent " was painter enough to taste the charms of landscape, bold and opinionative enough to dare and to dictate, and born with a genius to strike out a great system from the twilight of imperfect essays." In short, he was the first in English gardening to vindicate the natural against the artificial. Banishing all the clipped monstrosities of the topiary art in yew, box or holly, releasing the streams from the conventional canal and marble basin, and rejecting the mathematical symmetry of ground plan then in vogue for gardens, Kent endeavoured to imitate the variety of nature, with due regard to the principles of light and shade and perspective. Sometimes he carried his imitation too far, as when he planted dead trees in Kensington gardens to give a greater air of truth to the scene, though he himself was one of the first to detect the folly of such an extreme. Kent's plans were designed rather with a view to immediate effect over a comparatively small area than with regard to any broader or subsequent results.

KENT, one of the kingdoms of Anglo-Saxon Britain, the dimensions of which seem to have corresponded with those of the present county (see below). According to tradition it was the first part of the country occupied by the invaders, its founders, Hengest and Horsa, having been employed by the British king Vortigern against the Picts and Scots. Their landing, according to English tradition, took place between 450-455, though in the Welsh accounts the Saxons are said to have arrived in 428 (cf. Hist.Britt.66). AccordmgtoTheAnglo-SaxonChronicle,v?hich probably used

some lost list of Kentish kings, Hengest reigned 455-488, and was succeeded by his son Aesc (Oisc), who reigned till 512; but little value can be attached to these dates. Docu- mentary history begins with Aethelberht, the great-grandson of Aesc, who reigned probably 560-616. He married Berhta, daughter of the Frankish king Haribert, or Charibert, an event which no doubt was partly responsible for the success of the mission of Augustine, who landed in 597. Aethelberht was at this time supreme over all the English kings south of the Humber. On his death in 616 he was succeeded by his son Eadbald, who renounced Christianity and married his stepmother, but was shortly afterwards converted by Laurentius, the successor of Augustine. Eadbald was succeeded in 640 by his son Ercon- berht, who enforced the acceptance of Christianity throughout his kingdom, and was succeeded in 664 by his son Ecgbert, the latter again by his brother Hlothhere in 673. The early part of Hlothhere's reign was disturbed by an invasion of Aethelred of Mercia. He issued a code of laws, which is still extant, together with his nephew Eadric, the son of Ecgbert, but in 685 a quarrel broke out between them in which Eadric called in the South Saxons. Hlothhere died of his wounds, and was succeeded by Eadric, who, however, reigned under two years.

The death of Eadric was followed by a disturbed period, in which Kent was under kings whom Bede calls " dubii vel externi." An unsuccessful attempt at conquest seems to have been made by the West Saxons, one of whose princes, Mul, brother of Cead- walla, is said to have been killed in 687. There is some evidence for a successful invasion by the East Saxon king Sigehere during the sameyear. A king named Oswine, who apparently belonged to the native dynasty, seems to have obtained part of the king- dom in 688. The other part came in 689 into the hands of Swefheard, probably a son of the East Saxon king Sebbe. Wihtred, a son of Ecgbert, succeeded Oswine about 690, and obtained possession of the whole kingdom before 694. From him also we have a code of laws. At Wihtred's death in 725 the kingdom was divided between his sons Aethelberht, Eadberht and Alric, the last of whom appears to have died soon afterwards. Aethelberht reigned till 762 ; Eadberht, according to the Chronicle, died in 748, but some doubtful charters speak of him as alive in 761-762. Eadberht was succeeded by his son Eardwulf, and he again by Eanmund, while Aethelberht was succeeded by a king named Sigered. From 764-779 we find a king named Ecgbert, who in the early part of his reign had a colleague named Hea- berht. At this period Kentish history is very obscure. Another king named Aethelberht appears in 781, and a king Ealhmund in 784, but there is some reason for suspecting that Offa annexed Kent about this time. On his death (796) Eadberht Praen made himself king, but in 798 he was defeated and captured by Coen- wulf , who made his own brother Cuthred king in his place. On Cuthred's death in 807

Coenwulf seems to have kept Kent in his own possession. His successors Ceolwulf and Beornwulf like- wise appear to have held Kent, but in 825 we hear of a king Baldred who was expelled by Ecgbert king of Wessex. Under the West Saxon dynasty Kent, together with Essex, Sussex and Surrey, was sometimes given as a dependent kingdom to one of the royal family. During Ecgbert's reign it was entrusted to his son Aethelwulf, on whose accession to the throne of Wessex, in 839, it was given to Aethelstan, probably his son, who lived at least till 851. From 855 to 860 it was governed by Aethel- berht son of Aethelwulf. During the last years of Alfred's reign it seems to have been entrusted by him to his son Edward. Throughout the 9th century we hear also of two earls, whose spheres of authority may have corresponded to those of the two

kings whom we find in the 8th century. The last earls of whom we have any record were the two brothers Sigehelm and Sigewulf, who fell at the Holm in 905 when the Kentish army was cut off by the Danes, on Edward the Elder's return from his expedition into East Anglia. At a later period Kent appears to have been held, together with Sussex, by a single earl.

The internal organization of the kingdom of Kent seems to have been somewhat peculiar. Besides the division into West Kent and East Kent, which probably corresponds with the kingdoms of the 8th century, we find a number of lathes, apparently administrative districts under reeves, attached to royal villages. In East Kent there were four of these, namely, Canterbury, Eastry, Wye and Lymne, which can be traced back to the 9th century or earlier. In the nth century we hear of two lathes in West Kent, those of Sutton and Aylesford.

The social organization of the Kentish nation was wholly different from that of Mercia and Wessex. Instead of two " noble " classes we find only one, called at first eorlcund, later as in Wessex, gesith- cund. Again below the ordinary freeman we find three varieties of persons called laetas, probably freedmen, to whom we have nothing analogous in the other kingdoms. Moreover the wergeld of the ceorl, or ordinary freeman, was two or three times as great as that of the same class in Wessex and Mercia, and the same difference of treatment is found in all the compensations and fines relating to them. It is not unlikely that the peculiarities of Kentish custom observable in later times, especially with reference to the tenure of land, are connected with these characteristics. An explanation is probably to be obtained from a statement of Bede — that the settlers in Kent belonged to a different nationality from those who founded the other kingdoms, namely

the Jutes (g.v.).

See Bede, Historiae ecclesiaslicae, edited by C. Plummer (Oxford, 1896) ; Two of the Saxon Chronicles, edited by J.Earleand S. Plummer (Oxford, 1892-1899); W. de G. Birch, Cartularium Saxonicutn (London, 1885-1889); B. Seebohm, Tribal Custom in Anglo-Saxon Law (London, 1902); H. M. Chadwick, Studies on Anglo-Saxon Institutions (Cambridge, 1905) ; and T. W. Shore, Origin of the Anglo- Saxon Race (London, 1906). (F- G. M. B.)

KENT, a south-eastern county of England, bounded N. by the Thames estuary, E. and S.E. by the English Channel, S.W. by Sussex, and W. by Surrey. In the north-west the administrative county of London encroaches upon the ancient county of Kent, the area of which is 1554-7 sq. m. The county is roughly tri- angular in form, London lying at the apex of the western angle, the North Foreland at that of the eastern and Dungeness at that of the southern. The county is divided centrally, from west to east, by the well-marked range of hills known as the North Downs, entering Kent from Surrey. In the west above Wester- ham these hills exceed 800 ft.; to the east the height is much less, but even in Kent (for in Surrey they are higher) the North Downs form a more striking physical feature than their height would indicate. They are intersected, especially on the north, by many deep valleys, well wooded. At three points such valleys cut completely through the main line of the hills. In the west the Darent, flowing north to the Thames below Dartford, pierces the hills north of Sevenoaks, but its waters are collected chiefly from a subsidiary ridge of the Downs running parallel to the main line and south of it, and known as the Ragstone Ridge, from 600 to 800 ft. in height. The Medway, however, cuts through the entire hill system, rising in the Forest Ridges of Sussex, flowing N.E. and E. past Tonbridge, collecting feeders from south and east (the Teise, Beult and others) near Yalding, and then flowing N.E. and N. through the hills, past Maidstone, joining the Thames at its mouth through a broad estuary. The rich lowlands, between the Downs and the Forest Ridges to the south (which themselves extend into Kent), watered by the upper Medway and its feeders, are called the Vale of Kent, and fall within the district well known under the name of the Weald. The easternmost penetration of the Downs is that effected by the Stour (Great Stour) which rises on their southern face, flows S.E. to Ashford, where it receives the East Stour, then turns N.E. past Wye and Canterbury, to meander through the lowlands representing the former channel which isolated the Isle of Thanet from the mainland. The channel was called the Wantsume, and its extent may be gathered from the position of the village of Fordwich near Canterbury, which had formerly a tidal harbour, and is a member of the Cinque Port of Sandwich. The Little

Stour joins the Great Stour in these lowlands from a deep vale among the Downs.

About two-thirds of the boundary line of Kent is formed by tidal water. The estuary of the Thames may be said to stretch from London Bridge to Sheerness in the Isle of Sheppey, which is divided from the mainland by the narrow channel (bridged at Queensbridge) of the Swale. Sheerness lies at the mouth of the Medway, a narrow branch of which cuts off a tongue of land termed the Isle of Grain lying opposite Sheerness. Along the banks of the Thames the coast is generally low and marshy, embankments being in several places necessary to prevent inundation. At a few points, however, as at Gravesend, spurs of the North Downs descend directly upon the shore. In the estuary of the Medway there are a number of low marshy islands, but Sheppey presents to the sea a range of slight cliffs from 80 to 90 ft. in height. The marshes extend along the Swale to Whitstable, whence stretches a low line of clay and sandstone cliffs towards the Isle of Thanet, when they become lofty and grand, extending round the Foreland southward to Pegwell Bay The coast from Sheppey round to the South Foreland is skirted by numerous flats and sands, the most extensive of which are the Goodwin Sands off Deal. From Pegwell Bay south to a point near Deal the coast is flat, and the drained marshes or levels of the lower Stour extend to the west; but thence the coast rises again into chalk cliffs, the eastward termination of the North Downs, the famous white cliffs which form the nearest point of England to-continental Europe, overlooking the Strait of Dover. These cliffs continue round the South Foreland to Folkestone, where they fall away, and are succeeded west of Sandgate by a flat shingly shore. To the south of Hythe this shore borders the wide expanse of Romney Marsh, which, immediately west of Hythe, is overlooked by a line of abrupt hills, but for the rest is divided on the north from the drainage system of the Stour only by a slight uplift. The marsh, drained by many channels, seldom rises over a dozen feet above sea-level. At its south- eastern extremity, and at the extreme south of the county, is the shingly promontory of Dungeness. Within historic times much of this marsh was covered by the sea, and the valley of the river Rother, which forms part of the boundary of Kent with Sussex, entering the sea at Rye harbour, was represented by a tidal estuary for a considerable distance inland.

Geology. — The northern part of the county lies on the southern rim of the London basin; here the beds are dipping northwards. The southern part of the county is occupied by a portion of the Wealden anticline. The London Clay occupies the tongue of land between the estuaries of the Thames and Medway, as well as Sheppey and a district about 8 m. wide stretching southwards from Whit- stable to Canterbury, and extending eastwards to the Isle of Thanet. It reappears at Pegwell Bay, and in the neighbourhood of London it rises above the plastic clay into the elevation of Shooter's Hill,

with a height of about 450 ft. and a number of smaller eminences. The thickness of the formation near London is about 400 ft., and at Sheppey it reaches 480 ft. At Sheppey it is rich in various kinds of fossil fish and shells. The plastic clay, which rests chiefly on chalk, occupies the remainder of the estuary of the Thames, but at several places it is broken through by outcrops of chalk, which in some instances run northwards to the banks of the river. The Lower Tertiaries are represented by three different formations known as the Thanet beds, the Woolwich and Reading beds, and the Old- haven and Blackheath beds. The Thanet beds resting on chalk form a narrow outcrop rising into cliffs at Pegwell Bay and Reculver, and consist (1) of a constant base bed of clayey greenish sand, seldom more than 5 ft. in thickness; (2) of a thin and local bed composed of alternations of brown clay and loam; (3) of a bed of fine light buff sand, which in west Kent attains a thickness of more than 60 ft. ; (4) of bluish grey sandy marl containing fossils, and almost entirely confined to east Kent, the thickness of the formation being more than 60 ft. ; and (5) of fine light grey sand of an equal thickness, also fossil- iferous. The middle series of the Lower Tertiaries, knownas the Wool- wich and Reading beds, rests either on the Thanet beds or on chalk, and consists chiefly of irregular alternations of clay and sand of very various colours, the former often containing estuarine and oyster shells and the latter flint pebbles. The thickness of the formation varies from 15 to 80 ft., but most commonly it is from 25 to 40 ft. The highest and most local series of the Lower Tertiaries is the Oldhaven and Blackheath beds lying between the London Clay and the Woolwich beds. They consist chiefly of flint pebbles or of light- coloured quartzose sand, the thickness being from 20 to 30 ft, and. are best seen at Oldhaven and Blackheath. To the south the London

basin is succeeded by the North Downs, an elevated ridge of country consisting of an outcrop of chalk which extends from Westerham to Folkestone with an irregular breadth generally of 3 to 6 miles, but expanding to nearly 12 miles at Dartford and Gravesend and also to the north of Folkestone. After dipping below the London Clay at Canterbury, it sends out an outcrop which forms the greater part of Thanet. Below the chalk is a thin crop of Upper Greensand between Otford and Westerham. To the south of the Downs there is a narrow valley formed by the Gault, a fossiliferous blue clay. This is succeeded by an outcrop of the Lower Greensand — including the Folkestone, Sandgate and Hythe beds with the thin Atherfield Clay at the base — which extends across the country from west to east with a breadth of from 2 to 7 m., and rises into the picturesque elevations of the Ragstone hills. The remains of Jguanodon occur in the

Hythe beds. The valley, which extends from the borders of Sussex to Hythe, is occupied chiefly by the Weald clays, which con- tain a considerable number of marine and freshwater fossils. Along the borders of Sussex there is a narrow strip of country consisting of picturesque sandy hills, formed by the Hastings beds, whose highest elevation is nearly 400 ft. and the south-west corner of the county is occupied by Romney Marsh, which within a comparatively recent period has been recovered from the sea. Valley gravels border the Thames, and Pleistocene mammalia have been found in fissures in the Hythe beds at Ightham, where ancient stone imple- ments are common. Remains of crag deposits lie in pipes in the chalk near Lenham. Coal-measures, as will be seen, have been found near Dover.

The London Clay is much used for bricks, coarse pottery and Roman cement. Lime is obtained from the Chalk and Greensand formations. Ironstone is found in the Wadhurst Clay, a subdivision of the Hastings beds, clays and calcareous ironstone in the Ashdown sand, but the industry has long been discontinued. The last Weal- den furnace was put out in 1828.

Climate and Agriculture. — The unhealthiness of certain portions of the county caused by the marshes is practically removed by drain- ing. In the north-eastern districts the climate is somewhat uncer- tain, and damage is often done to early fruit-blossoms and vegetation by cold easterly winds and late frosts. In the large portion of the county sheltered by the Downs the climate is milder and more equable, and vegetation is somewhat earlier. The average tempera- ture for January is 3ya° F. at Canterbury, and 39‘8° at Dover; for July 63‘3° and 6l‘6° respectively, and the mean annual 50 and 5o – 2° respectively. Rainfall is light, the mean annual being 2772 in. at Dover, and 23”3I at Margate, compared with 23 – i6 at Green- wich. The soil is varied in character, but on the whole rich and under high cultivation. The methods of culture and the kinds of crop produced are perhaps more widely diversified than those of any other county in England. Upon the London Clay the land is generally heavy and stiff, but very fruitful when properly manured and cultivated. The marsh lands along the banks of the Thames, Medway, Stour and Swale consist chiefly of rich chalk alluvium. In the Isle of Thanet a light mould predominates, which has been much enriched by fish manure. The valley of the Medway, espe- cially the district round Maidstone, is the most fertile part of the county, the soil being a deep loam with a subsoil of brick-earth. On the ragstone the soil is occasionally thin and much mixed with small portions of sand and stone; but in some situations the ragstone has a thick covering of clay loam, which is most suitable for the production of hops and fruits. In the district of the Weald marl prevails, with a substratum of clay. The soil of Romney Marsh is a clay alluvium.

No part of England surpasses the more fertile portions of this county in the peculiar richness of its rural scenery. About three- quarters of the total area is under cultivation. Oats and wheat are grown in almost equal quantities, barley being of rather less import- ance. A considerable acreage is under beans, and in Thanet mustard, spinach, canary seed and a variety of other seeds are raised. But the county is specially noted for the cultivation of fruit and hops. Market gardens are very numerous in the neighbourhood of London. The principal orchard districts are the valleys of the Darent and Medway, and the tertiary soilsoverlyingthechalk, between Rochester and Canterbury. The county is specially famed for cherries and fil- berts, but apples, pears, plums, gooseberries, strawberries, raspberries and currants are also largely cultivated. In some cases apples, cherries, filberts and hops are grown in alternate rows. The principal hop districts are the country between Canterbury and Faversham, the valley of the Medway in mid Kent, and the district of the Weald. Much of the Weald, which originally was occupied by a forest, is still densely wooded, and woods are specially extensive in the valley of the Medway. Fine oaks and beeches are numerous, and yew trees of great size and age are seen in some Kentish churchyards, as at Stansted, while the fine oak at Headcorn is also famous. A large extent of woodland consists of ash and chestnut plantations, maintained for the growth of hop poles. Cattle are grazed in con- siderable numbers on the marsh lands, and dairy farms are numerous in the neighbourhood of London. For the rearing of sheep Kent is one of the chief counties in England. A breed peculiar to the dis- trict, known as Kents, is grazed on Romney Marsh, but Southdowns are the principal breed raised on the uplands. Bee-keeping is extensively practised. Dairy schools are maintained by the xv. 24

technical education committee of the county council. The South- eastern Agricultural College at Wy e is under the control of the county councils of Kent and Surrey.

Other Industries. — There were formerly extensive ironworks in the Weald. Another industry now practically extinct was the manufacture of woollen cloth. The neighbourhood of Lamberhurst and Cranbrook was the special seat of these trades. Among the principal modern industries are paper-making, carried on on the banks of the Darent, Medway, Cray and neighbouring streams? engineering, chemical and other works along the Thames; manu- factures of bricks, tiles, pottery and cement, especially by the lower Medway and the Swale. A variety of industries is connected with the Government establishments at Chatham and Sheerness. Ship- building is prosecuted here and at Gravesend, Dover and other ports. Gunpowder is manufactured near Erith and Faversham and else- where.

Deep-sea fishing is largely prosecuted all round the coast. .Shrimps, soles

and flounders are taken in great numbers in the estuaries of the Thames and Medway, along the north coast and off Ramsgate. The history of the Kentish oyster fisheries goes back to the time of the Roman occupation, when the fame of the oyster beds off Rutupiae (Richborough) extended even to Rome. The principal beds are near Whitstable, Faversham, Milton, Queenborough and Rochester, some being worked by ancient companies or gilds of fishermen.

After the cessation in 1 882 of works in connexion with the Channel tunnel, to connect England and France, coal-boring was attempted in the disused shaft, west of the Shakespeare Cliff railway tunnel near Dover. In 1890 coal was struck at a depth of 1190 ft., and further seams were discovered later. The company which took up the mining was unsuccessful, and boring ceased in 190I, but the work was resumed by the Consolidated Kent Collieries Corporation, and an extension of borings revealed in 1905 the probability of a success- ful development of the mining industry in Kent.

Communications. — Railway communications are practically mono- polized by the South Eastern & Chatham Company, a monopoly which has not infrequently been the cause of complaint on the part of farmers, traders and others. This system includes some of, the principal channels of communication with the continent, through the ports of Dover, Folkestone and Queenborough. The county contains four of the Cinque Ports, namely, Dover, Hythe, New Rom- ney and Sandwich. Seaside resorts are numerous and populous— t on the north coast are Minster (Sheppey), Whitstable and Heme Bay; there is a ring of watering-places rounci the Isle of? Thanet— Birchington, Westgate, Margate, Broadstairs, Ramsgate; /while' to the south are Sandwich, Deal, Walmer, St Margaret 's-at-Cliffe, Dover, Folkestone, Sandgate and Hythe. Tunbndge Wells is a favourite inland watering-place. The influence of London in con- verting villages into outer residential suburbs is to be observed at many points, whether seaside, along the Thames or inland. The county is practically without inland water communications, exclud- ing the Thames. The Royal military canal which runs along the inland border of Romney Marsh, and connects the Rother with Hythe, was constructed in 1807 as part of a scheme of defence in connexion with the martello towers or small forts along the coast,

Population and Administration. — The area of the ancient county is 995,014 acres, with a population in 1901 of 1,348,841. In 1801 the population was 308,667. Excluding the portion ; which falls within the administrative county of London the area is 974,950 acres, with a population in 1891 of 807,269 and in 1901 of 935,855. The area of the administrative county is 976,881 acres. The county contains 5 lathes, a partition pecu- liar to the county. The municipal boroughs are Bromley (pop. 27,354), Canterbury, a city and county borough (24,889), Chatham

(37,057), Deal (10,581), Dover (41,794), Faversham (11,290), Folkestone (30,650), Gillingham (42,530), Gravesend (27,196), Hythe (5557), Lydd (2675), Maidstone (33,516). Margate (23,118), New Romney (1328), Queenborough (1544), Ramsgate (27,733), Rochester, a city (30,590), Sandwich (3170), Tenterden (3243), Tunbridge Wells (33,373). The urban dis- tricts are Ashford (12,808), Beckenham (26,331), Bexley (12,918), Broadstairs and St Peter's (6466), Cheriton (7091)ˆ Chislehurst (7429), Dartford (18,644), Erith (25,296), Foots Cray (58ˆ), Heme Bay (6726), Milton (7086), Northfleet (12,906), Penge 1 (22,465), Sandgate (2294), Sevenoaks (8106), Sheerness (18,179), Sittingbourne (8943), Southborough (6977), Tonbridge (12,736), Walmer (5614), Whitstable (7086), Wrotham (3571). Other small towns are Rainham (3693) near Chatham, Aylesford (2678), East Mailing (2391) and West Mailing (2312) in the Maidstone district; Edenbridge (2546) and Westerham (2905) oil the western border of the county; Cranbrook (3949), Goudhursl, (2725) and Hawkhurst (3136) in the south-west. Among villages which have grown into residential towns through their

proximity to London, beyond those included among the boroughs and urban districts, there should be mentioned Orpington (4259). The county is in the south-eastern circuit, and assizes are held at Maidstone. It has two courts of quarter sessions, and is divided into 17 petty sessional divisions. The boroughs having separate commissions of the peace and courts of quarter sessions are Canterbury, Deal, Dover, Faversham, Folkestone, Gravesend, Hythe, Maidstone, Margate, Rochester, Sandwich andTenterden; while those of Lydd, New Romney, Ramsgate and Tunbridge Wells have separate commissions of the peace. The liberty of Romney Marsh has petty and general sessions. The justices of the Cinque Ports exercise certain jurisdiction, the non-corpor- ate members of the Cinque Ports of Dover and Sandwich having separate commissions of the peace and courts of quarter sessions. The central criminal court has jurisdiction over certain parishes adjacent to London. All those civil parishes within the county of Kent of which any part is within twelve miles of, or of which no part is more than fifteen miles from, Charing Cross are within the metropolitan police district. The total number of civil parishes is 427. Kent is mainly in the diocese of Canterbury, but has parts in those of Rochester, Southwark and Chichester. It contains 476 ecclesiastical parishes or districts, wholly or in part. The county (extra-metropolitan) is divided into 8 parlia- mentary divisions, namely, North-western or Dartford, Western or

Sevenoaks, South-western or Tunbridge, Mid or Medway, North-eastern or Faversham, Southern or Ashford, Eastern or St Augustine's and the Isle of Thanet, each returning one member; while the boroughs of Canterbury, Chatham, Dover, Gravesend, Hythe, Maidstone and Rochester each return one member.

History. — For the ancient kingdom of Kent see the preceding article. The shire organization of Kent dates from the time of Aethelstan, the name as well as the boundary being that of the ancient kingdom, though at first probably with the addition of the suffix " shire," the form " Kentshire " occurring in a record of the folkmoot at this date. The inland shire-boundary has varied with the altered course of the Rother. In 1888 the county was diminished by the formation of the county of London.

At the time of the Domesday Survey Kent comprised sixty hundreds, and there was a further division into six lests, probably representing the shires of the ancient kingdom, of which two, Sutton and Aylesford, correspond with the present-day lathes. The remaining four, Borowast Lest, Estre Lest, Limowast Lest and Wiwart Lest, existed at least as early as the 9th century, and were apparently named from their administrative centres, Burgwara (the burg being Canterbury), Eastre,Lymne and Wye, all of which were meeting places of the Kentish Council. The five modern lathes (Aylesford, St Augustine, Scray, Sheppey and Sutton-at-Hone) all existed in the time of Edward I., with the additional lathe of Hedeling, which was absorbed before the next reign in that of St Augustine. The Nomina Villarum of the reign of Edward II. mentions all the sixty-six modern hundreds, more than two-thirds of which were at that date in the hands of the church.

Sheriffs of Kent are mentioned in the time of .lEthelred II. , and in Saxon times the shiremoot met three times a year on Penenden Heath near Maidstone. After the Conquest the great ecclesiastical landholders claimed exemption from the jurisdic- tion of the shire, and in 1279 the abbot of Battle claimed to have his own coroner in the hundred of Wye. In the 13th century twelve liberties in Kent claimed to have separate bailiffs. The assizes for the county were held in the reign of Henry III. at Canterbury and Rochester, and also at the Lowey of Tonbridge under a mandate from the Crown as a distinct liberty; after- wards at different intervals at East Greenwich, Dartford, Maid- stone, Milton-next-Gravesend and Sevenoaks; from the Restora- tion to the present day they have been held at Maidstone. The liberty of Romney Marsh has petty and quarter sessions under its charters.

Kent is remarkable as the only English county which com- prises two entire bishoprics, Canterbury, the see for East Kent, having been founded in 597, and Rochester, the see for West

Kent, in 600. In 1291 the archdeaconry of Canterbury was co- extensive with that diocese and included the deaneries of West- bere, Bridge, Sandwich, Dover, Elham, Lympne, Charing, Sutton, Sittingbourne, Ospringe and Canterbury; the arch- deaconry of Rochester, also co-extensive with its diocese, in- cluded the deaneries of Rochester, Dartford, Mailing and Shore- ham. In 1845 the deaneries of Charing, Sittingbourne and Sutton were comprised in the new archdeaconry of Maidstone, which in 1846 received in addition the deaneries of Dartford, Mailing and Shoreham from the archdeaconry of Rochester. In 1853 the deaneries of Mailing and Charing were subdivided into North and South Mailing and East and West Charing. Lympne was subdivided into North and South Lympne in 1857 and Dart- ford into East and West Dartford in 1864. Gravesend and Cobham deaneries were created in 1862 and Greenwich and Woolwich in 1868, all in the archdeaconry of Rochester. In 1873 East and West Bridge deaneries were created in the arch- deaconry of Canterbury, and Croydon in the archdeaconry of Maidstone. In 1889 Tunbridge deanery was created in the archdeaconry of Maidstone. In 1906 the deaneries of East and West Dartford, North and South Mailing, Greenwich and Wool- wich were abolished, and Shoreham and Tunbridge were trans- ferred from Maidstone to Rochester archdeaconry.

Between the Conquest and the 14th century the earldom of Kent was held successively by Odo, bishop of Bayeux, William of Ypres and Hubert de Burgh (sheriff of the county in the reign of Henry III.), none of whom, however, transmitted the honour, which was bestowed by Edward I. on his youngest son Edmund of Woodstock, and subsequently passed to the families of Holland and Neville (see Kent, Earls and Dukes of). In the Domes- day Survey only five lay tenants-in-chief are mentioned, all the chief estates being held by the church, and the fact that the Kentish gentry are less ancient than in some remoter shires is further explained by the constant iiriplantation of new stocks from London. Greenwich is illustrious as the birthplace of Henry VIII., Mary and Elizabeth. Sir Philip Sidney was born at Penshurst, being descended from William de Sidney, chamber- lain to Henry II. Bocton Malherbe was the seat of the Wottons, from whom descended Nicholas Wotton, privy councillor to Henry VIII., Edward VI., Mary and Elizabeth. The family of Leiborne of Leiborne Castle, of whom Sir Roger Leiborne took an active part in the barons' wars, became extinct in the 14th century. Sir Francis Walsingham was born at Chislehurst, where his family had long flourished; Hever Castle was the seat of the Boleyns and the scene of the courtship of Anne Boleyn by Henry VIII. Allington Castle was the birthplace of Sir Thomas Wyat.

Kent, from its proximity to London, has been intimately concerned in every great historical movement which has agitated the country, while its busy industrial population has steadily resisted any infringement of its rights and

liberties. The chief events connected with the county under the Norman kings were the capture of Rochester by William Rufus during the rebellion of Odo of Bayeux; the capture of Dover and Leeds castles by Stephen; the murder of Thomas a. Becket at Canterbury in 1 1 70; the submission of John to the pope's legate at Dover in 1213, and the capture of Rochester Castle by the king in the same year. . Rochester Castle was in 12 16 captured by the dauphin of France, to whom nearly all Kent submitted, and during the wars of Henry III. with his barons was captured by Gilbert de Clare. In the peasants' rising of 1381 the rebels plundered the arch-bishop's palace at Canterbury, and 100,000 Kentishmen gathered round Wat Tyler of Essex. In 1450 Kent took a leading part in Jack Cade's rebellion; and in 1554 the insurrection of Sir Thomas Wyat began at Maidstone. On the outbreak of the Great Rebellion feeling was much divided, but after capturing Dover Castle the parliament soon subdued the whole county. In 1648, however, a widespread insurrection was organized on behalf of Charles, and was suppressed by Fairfax. The county was among the first to welcome back Charles II. In 1667 the Dutch fleet under De Ruyter advanced up the Medway, levelling the fort at Sheerness and burning the ships at Chatham. In

the Kentish petition of 1701 drawn up at Maidstone the county protested against the peace policy of the Tory party.

Among the earliest industries of Kent were the iron-mining in the Weald, traceable at least to Roman times, and the salt industry, which nourished along the coast in the 10th century. The Domesday Survey, besides testifying to the agricultural activity of the country, mentions over one hundred salt-works and numerous valuable fisheries, vines at Chart Sutton and Leeds, and cheese at Milton. The Hundred Rolls of the reign of Edward I. frequently refer to wool, and Flemish weavers settled in the Weald in the time of Edward III. Tiles were manu- factured at Wye in the 14th century. Valuable timber was afforded by the vast forest of the Weald, but the restrictions imposed on the felling of wood for fuel did serious detriment to the iron-trade, and after the statute of 1558 forbidding the felling of timber for iron-smelting within fourteen miles of the coast the industry steadily declined. The discovery of coal in the northern counties dealt the final blow to its prosperity. Cherries are said to have been imported from Flanders and first planted in Kent by Henry VIII., and from this period the culture of fruits (especially apples and cherries) and of hops spread rapidly over the county. Thread-making at Maidstone and silk-weaving at Canterbury existed in the 16th century, and before 1590 one of the first paper-mills in

England was set up at Dartford. The statute of 1630 forbidding the exportation of wool, followed by the Plague of 1665, led to a serious trade depression, while the former enactment resulted in the vast smuggling trade which spread along the coast, 40,000 packs of wool being smuggled to Calais from Kent and Suss # ex in two years.

In 1290 Kent returned two members to parliament for the county, and in 1295 Canterbury, Rochester and Tunbridge were also represented; Tunbridge however made no returns after this date. In 1552 Maidstone acquired representation, and in 1572 Queenborough. Under the act of 1832 the county returned four members in two divisions, Chatham was represented by one member and Greenwich by two, while Queenborough was dis- franchised. Under the act of 1868 the county returned six members in three divisions and Gravesend returned one member. By the act of 1885 the county returned eight members in eight divisions, and the representation of Canterbury, Maidstone and Rochester was reduced to one member each. By the London Government Act of 1892 the borough of Greenwich was taken out of Kent and made one of the twenty-eight metropolitan boroughs of the county of London.

Antiquities. — As was to be expected from its connexion with the early history of England, and from its beauty and fertility, Kent possessed a larger than average number of monastic founda- tions. The earliest were the priory of Christ's Church and the abbey of St Peter and St Paul, now called St Augustine's, both at Canter- bury, founded by Augustine and the monks who accompanied him to England. Other Saxon foundations were the nunneries at Folkestone (630), Lyminge (633; nunnery and monastery), Reculver (669), Minster-in-Thanet (670), Minster-in-Sheppey (675), and the priory of St Martin at Dover (696), all belonging to the Benedictine order. Some of these were refounded, and the principal monastic remains now existing are those of the Benedictine priories at Roches- ter (1089), Folkestone (1095), Dover (1140); the Benedictine nun- neries at Mailing (time of,William Rufus), Minster-in-Sheppey (1130), Higham (founded by King Stephen), and Davington (1153); the Cistercian Abbey at Boxley (1 146) ; the Cluniac abbey at Faversham (1147) and priory at Monks Horton (time of Henry II.), the precep- tory of Knights Templars at Swingfield (time of Henry II.); the Premonstratensian abbey of St Radigund's, near Dover (1191); the first house of Dominicans in England at Canterburf (122 1); the first Carmelite house in England, at Aylesford (1240); and the priory of Augustinian nuns at Dartford (1355). Other houses of which there are slight remains are Lesnes abbey, near Erith, and Bilsington priory near Ashford, established in 1178 and 1253 respec- tively, and both belonging to the Augustinian canons ; and the house of Franciscans at Canterbury (1225). But no remains exist of the priories of Augustinian canons at Canterbury (St Gregory's; 1084), Leeds,

near Maidstone (11 19), Tunbridge (middle of 12th century), Combwell, near Cranbrook (time of Henry II.); the nunnery of St Sepulchre at Canterbury (about 1 100) and Langdon abbey, near Walmer (1192), both belonging to the Benedictines; the Trinitarian priory of Mottenden near Headcorn, the first house of Crutched Friars in England (1224), where miracle plays were presented in the church by the friars on Trinity Sunday; the Carmelite priories at

Sandwich (1272) and Losenham near Tenterden (1241); and the preceptory of Knights of St John of Jerusalem at West Peckham, near Tunbridge (1408).

Even apart from the cathedral churches of Canterbury and Rochester, the county is unsurpassed in the number of churches it possesses of the highest interest. For remains of a date before the Conquest the church of Lyminge is of first importance. Here, apart from the monastic remains, there may be seen portions of the church founded by /Ethelburga, wife of Edwin, king of Northumber- land, and rebuilt, with considerable use of Roman material, in 965 by St Dunstan. There is similar early work in the church of Paddlesworth, not far distant. Among numerous Norman examples the first in interest is the small church at Barfreston, one of the most perfect specimens of its kind in England, with a profusion of orna- ment, especially round the south doorway and east window. The churches of St Margaret-at-Cliff, Patrixbourne and Darenth are hardly less noteworthy, while the tower of New Romney church should also be mentioned. Among several remarkable Early English examples none is finer than Hythe church, but the churches of SS. Mary and Eanswith, Folkestone, Minster-in-Thanet, Chalk, with its curious porch, Faversham and Westwell, with fine contem- porary glass, are also worthy of notice. Stone church, near Dart- ford, a late example of this style, transitional to Decorated, is very fine; and among Decorated buildings Chartham church exhibits in some of its windows the peculiar tracery known as Kentish Decorated. Perpendicular churches, though numerous, are less remarkable, but the fine glass of this period in Nettlestead church may be noticed. The church of Cobham contains one of the richest collections of ancient brasses in England.

Kent is also rich in examples of ancient architecture other than ecclesiastical. The castles of Rochester and Dover are famous; those of Canterbury and Chilham are notable among others. Ancient mansions are very numerous; among these are the castellated Leeds Castle in the Maidstone district, Penshurst Place, HeverCastle near Edenbridge, Saltwood and Westenhanger near Hythe, the Mote House at Ightham near Wrotham, Knole House near Seven- oaks, and Cobham Hall. Minor examples of early domestic archi- tecture abound throughout the county.

Authorities. — A full bibliography of the many earlier works on the county and its towns is given in J. R. Smith's Bibliotheca Can- liana (London, 1837). There may be mentioned here W. Lambarde, Perambulation of Kent (London, 1576, 1826); R. Kilburne, Topo- graphic or Survey of the County of Kent (London, 1659) ; J. and T. Philipot, Villare Cantianum (London, 1659, 1776); J. Harris, History of Kent (London, 17 19); E. Hasted, History and Topo- graphical Survey of Kent (4 vols, folio, Canterbury, 1 778-1 799; 2nd ed., 12 vols. 8vo, Canterbury, 1797-1801); W. H. Ireland, History of the County of Kent (London, 1828-1830) ; C. Sandys, Consueludines Kantiae (London, 1851); A. Hussey, Notes on the Churches of Kent (London, 1852); L. B. Larking, The Domesday Book of Kent (1869); R. Furley, History of the Weald of Kent (Ashford, 1871-1874) ; W. A. Scott Robertson, Kentish Archaeology (London, 1876-1884) ; Sir S. R. Glynne, Notes on Churches of Kent, ed. W. H. Gladstone (London, 1877); J. Hutchinson, Men of Kent and Kentish Men (London, 1892); Victoria County History," Kent." Seealso Archaeologia Canti- ana (translations of the Kent Archaeological Society, London, from 1858),

KENTIGERN, ST, or Mungo (" dear friend," a name given to him, according to Jocelyn, by St Servanus), a Briton of Strath- clyde, called by the Goidels In Glaschu, " the Grey Hound," was, according to the legends preserved in the lives which remain, of royal descent. His mother when with child was thrown down from a hill called Dunpelder (Traprain Law, Haddingtonshire), but survived the fall and escaped by sea to Culross on the farther side of the Firth of Forth, where Kentigern was born. It is possible that she may have been a nun, as a convent had been founded in earlier times on Traprain Law. The life then describes the training of the boy by Servanus, but the date of the latter renders this impossible. Returning to Strathclyde Kentigern lived for some time at Glasgow, near a cemetery ascribed to St Ninian, and was eventually made bishop of that region by the king and clergy. This story is partially attested by Welsh documents, in which Kentigern appears as the bishop of Garthmwl, apparently the ruler of the region about Glasgow. Subsequently he was opposed by a pagan king called Morken, whose relatives after his death succeeded in forcing the saint to retire from Strathclyde. He thereupon took refuge with St David at Menevia (St David's), and eventually founded a monas- tery at Llanelwy (St Asaph's), for which purpose he received grants from Maelgwn, prince of Gwynedd. After the battle of Ardderyd in 573 in which King Rhydderch, leader of the Chris- tian party in Strathclyde, was victorious, Kentigern was recalled. He fixed his see first at Hoddam in Dumfriesshire, but afterwards

returned to Glasgow. He is credited with missionary work in Galloway and north of the Firth of Forth, but most of the dedications to him which survive are north of the Mounth in the upper valley of the Dee. The meeting of Kentigern and Columba probably took, place soon after 584, when the latter began to preach in the neighbourhood of the Tay.

Authorities. — Lives pf St Kentigern; Fragment used by John of Fordun, and complete " Life " by Jocelyn of Furness in Forbes's Historians of Scotland (Edinburgh, 1874), vol. v. ; Four Ancient Books of Wales (Edinburgh, ed. W. F. Skene, 1868), ii. 457; Myvyrian Archaeology (London, 1801), ii. 34; D. R. Thomas, History of Diocese of St Asaph (London, 1874), p. 5 ; Index of Llyfr Coch Asaph, Archae- ologia Cambrensis, 3rd series, 1868, vol. xiv. p. 151 ; W. F. Skene, Celtic Scotland (Edinburgh, 1877), ii. 179 ff . ; John Rhys, Celtic Britain (London, 1904), pp. 145, 146, 174, 199, 250.

KENTON, a city and the county seat of Hardin county, Ohio, U.S.A., on the Scioto river, 60 m. N.W. of Columbus. Pop. (1900), 6852, including 493 foreign-born and 271 negroes; (roio), 7185. It is served by the Erie, the Cleveland, Cincinnati, Chicago & St Louis, and the Ohio Central railways. It is built on the water-parting between Lake Erie and the Gulf of Mexico, here about 1,000 ft. above sea-level. There are shops of the Ohio Central railway here, and manufactories of hard- ware. The municipality owns and operates its waterworks. Kenton was named in honour of Simon Kenton (1755-1836) a famous scout and Indian fighter, who took pait in the border warfare, particularly in Kentucky and Ohio, during the War of American Independence and afterwards. It was platted and be- came the county seat in 1833, and was chartered as a city in 1885. KENT'S CAVERN, or Kent's Hole, the largest of English bone caves, famous as affording evidence of the existence of Man in Devon (England) contemporaneously with animals now extinct or no longer indigenous. It is about a mile east of Torquay harbour and is of a sinuous nature, running deeply into a hill of Devonian limestone. Although long known locally, it was not until 1825 that it was scientifically examined by Rev. J. McEnery, who found worked flints in intimate association with the bones of extinct mammals. He recognized the fact that they proved the existence of man in Devonshire while those animals were alive, but the idea was too novel to be accepted by his contemporaries. His discoveries were afterwards verified by Godwin Austen, and ultimately by the Committee of the British Association, whose explorations were carried on under the guidance of Win. Pengelly from 1865 to 1880. There are four distinct strata in the cave. (1) The surface is com- posed of dark earth and contains medieval remains, Roman pottery and articles which prove that it was in use during

the Iron, Bronze and Neolithic Ages. (2) Below this is a stalagmite floor, varying in thickness from 1 to 3 ft., and cover- ing (3) the red earth which contained bones of the hyaena, lion, mammoth, rhinoceros and other animals, in association with flint implements and an engraved antler, which proved man to have been an inhabitant of the cavern during its deposition. Above this and below the stalagmite there is in one part of the cave a black band from 2 to 6 in. thick, formed of soil like No. 2, containing charcoal, numerous flint implements, and the bones and teeth of animals, the latter occasionally perforated as if used for ornament. (4) Filling the bottom of the cave was a hard breccia, with the remains of bears and flint implements, the latter in the main ruder than those found above; in some places it was no less than 1 2 ft. thick. The most remarkable animal remains found in Kent's Cavern are those of the Sabre- toothed tiger, Machairodus latidens of Sir Richard Owen. While the value of McEnery's discoveries was in dispute the exploration of the cave of Brixham near Torquay in 1858 proved that man was coeval with the extinct mammalia, and in the following year additional proof was offered by the implements that were found in Wookey Hole, Somerset. Similar remains have been met with in the caves of Wales, and in England as far north as Derbyshire (Cresswell), proving that over the whole of southern and middle England men, in precisely the same stage of rude civilization, hunted the rhinoceros, the mammoth and other extinct animals.

See Sir John Evans, Ancient Stone Implements, of Great Britain (London, 1897); Lord Avebury's Prehistoric Times (1900); W. Pengelly, Address to the British Association (1883) and Life of him by his daughter (1897) ; Godwin Austen, Proc. Geo. Soc. London, 111. 286; Pengelly, " Literature of Kent's Cavern " in Trans. Devonshire Association (1868); William Boyd Dawkins, Cave-hunting and Early Man in Britain.

KENTUCKY, a South Central State of the United States of America, situated between 36 30′ and 39 6′ N., and 82 and 89 38′ W. It is bounded N., N.W., and N.E. by Illinois, Indiana and Ohio; E. by the Big Sandy river and its E. fork, the Tug, which separates it from West Virginia, and by Virginia; S.E. and S. by Virginia and Tennessee; and W. by the Mississippi river, which separates it from Missouri. It has an area of 40,598 sq. m.; of this, 417 sq. m., including the entire breadth of the Ohio river, over which it has jurisdiction, are water surface.

Physiography. -^-From mountain heights along its eastern border the surface of Kentucky is a north-western slope across two much dissected plateaus to a gracefully undulating lowland in the north central part and a longer western slope across the same plateaus to a lower and more level lowland at the western extremity. The narrow mountain belt is part of the western edge of the Appalachian Mountain Province in which parallel

ridges of folded mountains, the Cumberland and the Pine, have crests 2000-3000 ft. high, and the Big Black Mountain rises to 4000 ft. The highest point in the state is The Double on the Virginia state line, in the eastern part of Harlan county with an altitude of over 4100 ft. The entire eastern quarter of the state, coterminous with the Eastern Kentucky coal-field, is commonly known as the region of the " mountains," but with the exception of the narrow area just described it properly belongs to the Alleghany Plateau Province. This plateau belt is exceedingly rugged with sharp ridges alternating with narrow valleys which have steep sides but are. seldom more than 1500 ft. above the sea. The remainder of the state which lies east of the Tennessee river is divided into the Highland Rim Plateau and a lowland basin, eroded in the Highland Rim Plateau and known as the BlueGrass Region ; thisregion is separated from the Highland Rim Plateau by a semicircular escarpment extending from Portsmouth, Ohio, at the mouth of the Scioto river, to the mouth of the Salt river below Louisville; it is bounded north by the Ohio river. The Highland Rim Plateau, lying to the south, east and west of the escarpment, embraces fully one-half of the state, slopes from elevations of 1000-1200 ft. or more in the east to about 500 ft. in the north-west, and is generally much less rugged than the Alle- ghany Plateau ; a peculiar feature of the southern portion of it is the numerous circular depressions (sink holes) in the surface and the cavernous region beneath. Kentucky is noted for its caves, the best-, known of which are Mammoth Cave and Colossal Cavern (qq.v.). The caves are cut in the beds of limestone (lying immediately below the coal-bearing series) by streams that pass beneath the surface in the " sink holes," and according to Professor N. S. Shaler there are altogether " doubtless a hundred thousand miles of ways large enough to permit the easy passage of man." Down the steep slopes of the escarpment the Highland Rim Plateau drops 200 ft. or more to the famous Blue Grass Region, in which erosion has developed on limestone a gracefully undulating surface. This Blue Grass Region is like a beautiful park, without ragged cliffs, precipitous' slopes, or flat marshy bottoms, but marked by rounded hills and dales. Especially within a radius of 20 m. around Lexington, the country is clothed with an unusually luxuriant vegetation. During spring, autumn, and winter in particular, the blue-grass (Poa com-pressa and Poa pratensis) spreads a mat, green, thick, fine and soft, over much of the country, and it is a good winter pasture ; about the middle of June it blooms, and, owing to the hue of its seed vessels, gives the landscape a bluish hue. Another lowland area embraces that small part of the state in the extreme south-east which lies west of the Tennessee river; this belongs to that part of the Coastal Plain Region which extends north along the Mississippi river; it has in Kentucky an average elevation of less than 500 ft. Most of the larger rivers of the state have their sources among the mountains or on the Alleghany Plateau and flow more or less

circuitously in a general north-western direction into the Ohio. Although deep river channels are common, falls or impassable rapids are rare west of the Alleghany Plateau, and the state has an extensive mileage of navigable waters. The Licking, Kentucky, Green and Tradewater are the principal rivers wholly within the state. The Cumberland, after flowing for a considerable distance in the south-east and south central part of the state, passes into Tennessee at a point nearly south of Louisville, and in the extreme south-west the Cumberland and the Tennessee, with only a short distance between them, cross Kentucky and enter the Mississippi at Smithland and Paducah respectively. The drainage of the region under which the caverns lie is mostly underground.

Fauna and Flora. — The first white settlers found great numbers of buffaloes, deer, elks, geese, ducks, turkeys and partridges, also many bears, panthers, lynx, wolves, foxes, beavers, otters, minks,

musk-rats, rabbits, squirrels, raccoons, woodchucks, opossums and

skunks, and the streams were inhabited by trout, perch, buffalo-fish, sun-fish, mullet, eels, and suckers. Of the larger game there remain only a few deer, bears and lynx in the mountain districts, and the numbers of small game and fish have been greatly reduced. In its primeval state Kentucky was generally well timbered, but most of the middle section has been cleared and here the blue grass is now the dominant feature of the flora. Extensive forest areas still remain both in the east and the west, In the east oak, maple, beech, chestnut, elm, tulip-tree (locally ” yellow poplar “), walnut, pine and cedar trees are the most numerous; in the west the forests are composed largely of cypress, ash, oak, hickory, chestnut, walnut, beech, tulip-tree, gum and sycamore trees. Locust, pawpaw, cucumber, buck-eye, black mulberry and wild cherry trees also abound, and the grape, raspberry and strawberry are native fruits.

Climate. — The climate is somewhat more mild and even than that of the neighbouring states. The mean annual temperature, about 50° F. on the mountains in the S. E., and 6o° W. of the Tennessee, is about 55° F. for the entire state ; the thermometer seldom registers as high as 100° or as low as — 10°. The mean annual precipitation ranges from about 38 in. in the north-east to 50 in. in the south, and is about 46 in. for the entire state; it is usually distributed evenly throughout the year and very little is in the

form of snow. The prevailing winds blow from the west or south-west ; rain-bearing winds blow mostly from the south ; and the cold waves come from the north or north-west. Soil, — The best soils are the alluvium in the bottom-lands along some of the larger rivers and that of the Blue Grass Region, which is derived from a limestone rich in organic matter (containing phos- phorus) and rapidly decomposing. The soil within a radius of some 20 m. around Lexington is especially rich; outside of this area the Blue Grass soil is less rich in phosphorus and contains a larger mixture of sand. The soils of the Highland Rim Plateau as well as of the lowland west of the Tennessee river vary greatly, but the most common are a clay, containing more or less carbonate of lime, and a sandy loam. On the escarpment around the Blue Grass Region the soils are for the most part either cherty or stiff with clay and of inferior quality. On the mountains and on the Alleghany Plateau, also, much of the soil is very light and thin.

*Agriculture. — Kentucky is chiefly an agricultural state. Of the 75 2 .53l of its inhabitants who, in 1900, were engaged in some gainful occupation, 408,185 or 54‘2 %, were agriculturists, and of its total land surface 21,979,422 acres, or 85 – 9 , were included in farms. The percentage of improved farm land increased from 35*2 in 1850 to 49‘9 in 1880 and to 62‘5 in 1900. The number of farms increased from 74,777 in 1850 to 166,453 in 1880 and to 234,667 in 1900; and their average size decreased from 226‘7 acres in l850tol29”l acres in 1880 and to 937 acres in 1900, these changes being largely due to the breaking up of slave estates, the introduction of a considerable number of negro farmers, and the increased cultivation of tobacco and market-garden produce. In the best stock-raising country, e.g. in Fayette county, the opposite tendency prevailed during the latter part of this period and old farms of a few hundred acres were combined to form some vast estates of from 2000 to 4000 acres. Of the 234,667 farms in 1900, 155,189 contained less than 100 acres, 76,450 contained between 100 and 500 acres, and 558 contained more than 1000 acres; 152,216 or 64‘86, were operated by owners or part owners, of whom 5320 were negroes; 16,776 by cash tenants, of whom 789 were negroes; and 60,289 by share tenants, of whom 4984 were negroes. In 1900 the value of farm land and improve- ments was $291,117,430; of buildings on farms, $90,887,460; of live- stock, $73,739,106. In the year 1899 the value of all farm products was 8123,266,785 (of which $21,128,530 was the value of products fed to livestock), including the following items: crops, $74,783,365; animal products, $44,303,940; and forest products, $4,179,840. The total acreage of all crops in 1899 was 6,582,696. Indian corn is the largest and most valuable crop. As late as 1849, when it produced 58,672,591 bu., Kentucky was the second largest Indian- corn producing state in the Union. In 1899 the crop had increased to 73,974,220 bu. and the acreage was*

3,319,257 (more than half the acreage of all crops in the state), but the rank had fallen to ninth in product and eleventh in acreage; in 1909 (according to the Yearbook of the United States Department of Agriculture) the crop was 103,472,000 bu. (ninth among the states of the United States), and the acreage was 3,568,000 (twelfth among the states). Among the cereals wheat is the next largest crop; it increased from 2,142,822 bu. in 1849 to 11,356,113 bu. in 1879, and to 14,264,500 bu. in 1899; in 1909 it was only 7,906,000 bu. The crop of each of the other cereals is small and in each case was less in 1899 than in 1849. The culture of tobacco, which is the second most valuable crop in the state, was begun in the north part about 1780 and in the west and south early in the 19th century, but it was late in that century before it was intro- duced to any considerable extent in the Blue Grass Region, where it was then in a measure substituted for the culture of hemp. By 1849 Kentucky ranked second only to Virginia in the production of tobacco, and in 1899 it was far ahead of any other state in both acreage and yield, there being in that year 384,805 acres, which was 34‘9 % of the total acreage in the continental United States, yielding 314,288,050 lb. As compared with the state’s Indian corn crop of that year, the acreage was only a little more than one-ninth, but the value ($18,541,982) was about 63%. In 1909 the tobacco acreage in Kentucky was 420,000, the crop was 350,700,000 lb, valued at

$37,174,200; the average price per pound had increased from 5‘9 cents in 1899 to I0‘6 cents in 1909. The two most important tobacco- growing districts are: the Black Patch, in the extreme south-west corner of the state, which with the adjacent counties in Tennessee grows a black heavy leaf bought almost entirely by the agents of foreign governments (especially Austria, Spain and Italy) and called ” regie ” tobacco; and the Blue Grass Region, as far east as Mays- ville, and the hill country south and east, whose product, the red and white Burley, is a fine-fibred light leaf, peculiarly absorbent of licorice and other adulterants used in the manufacture of sweet chewing tobacco, and hence a peculiarly valuable crop, which formerly averaged 22 cents a pound for all grades. 1 The high price received by the hill growers of the Burley induced farmers in the Blue Grass to plant Burley tobacco there, where the crop proved a great success, more than twice as much (sometimes 2000 lb) being grown to the acre in the Blue Grass as in the hills and twice as large patches being easily managed. In the hill country the share tenant could usually plant and cultivate only four acres of tobacco, had to spend 120 days working the crop, and could use the same land for tobacco only once in six years. So, although a price of 6”5 cents a pound covered expenses of the planter of Burley in the Blue Grass, who could use the same land for tobacco once in four years, this price did not repay the hill planter. The additional

production of the Blue Grass Region sent the price of Burley tobacco down to'this figure and below it. The planters in the Black Patch had met a combination of the buyers by forming a pool, the Planters' Protective Association, into which- 40,000 growers were forced by " night-riding " and other forms of coercion and persuasion, and had thus secured an advance to II cents a pound from the " regie " buyers and had shown the efficacy of pooling methods in securing better prices for the tobacco crop. Following their example, the planters of the Burley formed the Burley Tobacco Society, a Burley pool, with headquarters at Winchester and associated with the American Society of Equity, which promoted in general the pooling of different crops throughout the country. The tobacco planters secured legislation favourable to the formation of crop pools. The Burley Tobacco Society attempted to pool the entire crop and thus force the buyers of the American Tobacco Company of New Jersey (which usually bought more than three-fourths of the crop of Burley) to pay a much higher price for it. In 1906 and in 1907 the crop was very large; the pool sold its lower grades of the 1906 crop at 16 cents a pound to the American Tobacco Company and forced the independent buyers out of business ; and the Burley Society decided in 1907 to grow no more tobacco until the 1906 and 1 907 crops were sold, making the price high enough to pay for this period of idleness. Members of the pool had used force to bring planters into the pool ; and now some tobacco growers, especially in the hills, planted new crops in the hope of immediate return, and a new " night-riding " war was begun on them. Bands of masked men rode about the country both in the Black Patch and in the Burley, burning tobacco houses of the independent planters, scraping their newly-planted tobacco patches, demanding that planters join their organization or leave the country, and whipping or shooting the recalcitrants. Governor Willson, immediately after his inauguration, took measures to suppress disorder. In general the Planters' Protective Association in the Black Patch was more successful in its pool than the Burley Tobacco Society in its, and there was more violence in the "regie " than in the " Burley " district. In November 1908 the lawlessness subsided in the Burley after the agreement of the American Tobacco Company to purchase the remainder of the 1906 crop at a " round " price of 20 J cents a.nd a part of the 1907 crop at an average price of 17 cents, thus making it profitable to raise a full crop in 1909.

Kentucky is the principal hemp-growing state of the Union ; the crop of 1899, which was grown on 14,107 acres and amounted to 10,303,560 lb, valued at $468,454, was 877 % of the hemp crop of the whole country. But the competition of cheaper labour in other countries reduced the profits on this plant and the product of 1899 was a decrease from 78,818,000 lb in 1859. Hay and forage, the fourth in value of the state's crops in 1899, were grown on 683,139 acres and amounted to 776,534 tons, valued at

$6;ioo,647; in 1909 the acreage of hay was 480,000 and the crop of 653,000 tons was valued at $7,771,000. In 1899 the total value of fruit grown in Kentucky was $2,491,457 (making the state rank thirteenth among the states of the Union in the value of this product), of which $1,943,645 was the value of orchard fruits and $435,462 that of small fruits. Among fruits, apples are produced in greatest abundance, 6,053,717 bu. in 1899, an amount exceeded in only nine states; in 1889 the crop had been 10,679,389 bu. and was exceeded only by the crop of Ohio and by that of Michigan. Kentucky also grows con- siderable quantities of cherries, pears, plums and peaches, and, for its size, ranks high in its crops of strawberries, blackberries and rasp- berries. Indian corn is grown in all parts of the state but most largely in the western portion. Wheat is grown both in the Blue Grass Region and farther west ; and the best country for fruit is along the Ohio river between Cincinnati and Louisville and in the hilly land sur- rounding the Blue Grass Region. In the eastern part of the state

1 North of the Black Patch is a district in which is grown a heavy-leaf tobacco, a large part of which is shipped to Great Britain ; and farther north and east a dark tobacco is grown for the American market.

where clops are generally light, Indian corn, oats and potatoes are the principal products, but tobacco, flax and cotton are grown. The thoroughbred Kentucky horse has long had a world-wide reputation for speed ; and the Blue Grass Region, especially Fayette, Bourbon and Woodford counties, is probably the finest horse-breeding region in America and has large breeding farms. In Fayette county, in 1900, the average value of colts between the ages of one'and two years was $377-78. In the Blue Grass Region many thorough- bred shorthorn cattle and fine mules are raised. The numbers of horses, mules, cattle and sheep increased quite steadily from 1850 to 1900, but the number of swine in 1880 and in 1900 was nearly one-third less than in 1850. In I900 the state had 497,245 horses, 198,1 10 mules, 364,025 dairy cows, 755,7 14 other neat cattle, 1,300,832 sheep and 2,008,989 swine; in 1910 there were in Kentucky 407,000 horses, 207,000 mules, 394,000 milch cows, 665,000 other neat cattle, 1,060,000 sheep and 989,000 swine. The principal sheep-raising counties in 1905 were Bourbon, Scott and Harrison, and the prin- cipal hog-raising counties were Graves, Hardin, Ohio, Union and Hickman.

Forests and Timber. — More than one-half of the state (about 22,200 sq. m.) was in 1900 still wooded. In 1900 of the total cut of 777,218 M. ft.,

B.M., 392,804 were white oak and 279,740 M. ft. were tulip-tree. Logging is the principal industry of several localities, especially in the east, and the lumber product of the state increased in value from $1,502,434 in 1850 to $4,064,361 in 1880, and to $13, 774,91 1 in 1900. The factory product in 1900 was valued at $13,338,533 and in 1905 at $14,539,000. In 1905 of a total of 586,371 M. ft., B.M., of sawed lumber, 295,776 M. ft. were oak and 153,057 M. ft. were " poplar."

The planing mill industry is increasing rapidly, as it is found cheaper to erect mills near the forests; between 1900 and 1905 the capital of planing mills in the state increased H7"2 % and the value of products increased I42"8%.

Manufactures. — Kentucky's manufactures are principally those for which the products of her farms and forests furnish the raw material. The most distinctive of these is probably distilled liquors, the state's whisky being famous. A colony of Roman Catholic immigrants from Maryland settled in 1787 along the Salt river a"bout 50 m. S.S.E. of Louisville and with the surplus of their Indian corn crop made whisky, a part of which they sold at settlements on the Ohio and the Mississippi. The industry was rapidly developed by distillers, who immediately after the suppression of the Whisky Insurrection, in 1794, removed from Pennsylvania and settled in what is now Mason county and was then a part of Bourbon county — the product is still known as " Bourbon " whisky. During the first half of the 19th century the industry became of considerable local importance in all parts of the state, but since the Civil War the heavy tax imposed has caused its concentration in large establishments. In 1900 nearly 40% and in 1905 more than one-third of the state's product was distilled in Louisville. Good whisky is made in Mary- land and in parts of Pennsylvania from rye, but all efforts in other states to produce from Indian corn a whisky equal to the Bourbon have failed, and it is probable that the quality of the Bourbon is largely due to the character of the Kentucky lime water and the ' Kentucky yeast germs. The average annual product of the state from 1880 to 1900 was about 20,000,000 gallons; in 1900 the product was valued at $9,786,527; in 1905 at $11,204,649. In 1900 and in 1905 Kentucky ranked fourth among the states in the value of distilled liquors.

The total value of all manufactured products of the state increased from $126,719,857 in 1890 to $154,166,365 in 1900, or 21-7%, and from 1900 to 1905 the value of factory-made products alone increased from $126,508,660 to $159,753,968, or 26-3 %.' Measured by the value of the product, flour and grist mill products rose from third in rank in 1900 to first in rank in 1905, from $13,017,043 to $18,007,786, or 38-3 % ; and chewing and smoking tobacco and snuff fell during the same period from first to third in rank, from $14,948,192 to $13,117,000, or 12-3%; in

1900 Kentucky was second, in 1905 third, among the states in the value of this product. Lumber and timber products held second rank both in 1900 ($13,338, 533) and in 1905 ($14,539,000). Distilled liquors were fourth in rank in 1900 and in 1905. Men's clothing rose from tenth in rank in 1900 to fifth in rank in 1905, from $3,420,365 to $6,279,078, or 83-6%. Other im- portant manufactures, with their product values in 1900 and in 1905, are iron and steel ($5,004,572 in 1900; $6,167,542 in 1905); railway cars ($4,248,029 in 1900; $5,739,071 in 1905); packed meats ($5,177,167 in 1900; $5,693,731 in 1905) ; foundry and machine shop products ($4,434,610 in 1900; $4,699,559 in 1905); planing mill products, including sash, doors and blinds ($1,891,517 in 1900- $4,593,251 in 1905 — an increase already remarked) ; carriages ana wagons ($2,849,713 in 1900; $4,059,438 in 1905) ; tanned and curried leather ($3,757,016 in 1900; $3,952,277 in 1905); and malt liquors ($3,186,627 in 1900; $3,673,678 in 1905). Other important manufactures (each with a product value in 1905 of more than one million dollars) were cotton-seed oil and cake (in 1900 Kentucky was fifth and in 1905 sixth among the states in the value of eotton-seed oil and cake), cooperage, agricultural implements, boots and shoes, cigars

1 In the census of 1905 statistics for other than_ factory-made products, such as tflbse of the hand trades, were not included.

and cigarettes, saddlery and harness, patent medicines and com- pounds, cotton goods, furniture, confectionery, carriage and wagon materials, wooden packing boxes, woollen goods, pottery and terra cotta ware, structural iron-work, and turned and carved wood. Louisville is the great manufacturing centre, the value of its products amounting in 1905 to $83,204,125, 52-1 % of the product of the entire state, and showing an increase of 25-9 % over the value of the city's factory products in 1900. Ashland is the principal centre of the iron industry.

Minerals. — The mineral resources of Kentucky are important and valuable, though very little developed. The value of all manu- factures in 1900 was $154,166,365, and the value of manufactures based upon products of mines or quarries in the same year was $25,204,788; the total value of mineral products was $19,294,341 in 1907. Bituminous coal is the principal mineral, and in 1907 Kentucky ranked eighth among the coal-producing states of the Union; the output in 1907 amounted to 10,753,124 short tons, and in 1902 to 6,766,984 short tons as compared with 2,399,755 tons produced in 1889. In 1902 the amount was about equally divided between the eastern coalfield, which is for the most part in Greenup, Boyd, Carter, Lawrence, Johnson, Lee, Breathitt, Rockcastle, Pulaski, Laurel, Knox, Bell and Whitley counties, and has an area of about 11,180 sq. m., and the western coalfield, which is in Henderson, Union,

Webster, Daviess, Hancock, McLean, Ohio, Hopkins, Butler, Muhlenberg and Christian counties, and has an area of 5800 sq. m. In 1907 the output of the western district was 6,295,397 tons; that of the eastern, 4,457,727. The largest coal-producing counties in 1907 were Hopkins (2,064,154 short tons) and Muhlenberg (1,882,913 short tons) in the western coalfield, and Bell (1,437,886 short tens) and Whitley (762,923 short tons) in the south-western part of the eastern coalfield. All Kentucky coal is either bituminous or semi-bituminous, but of several varieties. Of cannel coal Kentucky is the largest producer in the Union, its output for 1902 being 65,317 short tons, and, according to state reports, for 1903, 72,856 tons (of which 4.6,314 tons were from Morgan county), and for 1904, 68,400 tons (of which 52,492 tons were from Morgan county) ; according to the Mineral Resources of the United States for 1907 (published by the United States Geological Survey) the production of Kentucky in 1907 of cannel coal (including 4650 tons of semi-cannel coal) was 77>733 tons, and exclusive of semi-cannel coal the output of Kentucky was much larger than that of any other state. Some of the coal mined in eastern Kentucky is an excellent steam producer, especially the Jellico coal of Whitley county, Kentucky, and of Campbell county, Tennessee. But with the exception of that mined in Hop- kins and Bell counties, very little is fit for making coke; in 1 880 the product was 4250 tons of coke (value $12,250), in 1890, 12,343 tons ($22,191) ; in 1900, 95,532 tons ($235,505) ; in 1902, 126,879 tons ($317,875), the maximum product up to 1906; and in 1907, 67,068 tons ($157,288). Coal was first mined in Kentucky in Laurel or Pulaski county in 1827; between 1829 and 1835 the annual output was from 2000 to 6000 tons; in 1840 it was 23,527 tons and in i860 it was 285,760 tons.

Petroleum was discovered on Little Rennick's Creek, near Burkes- ville, in Cumberland county, in 1829, when a flowing oil well (the " American well," whose product was sold as " American oil " to heal rheumatism, burns, &c.) was struck by men boring for a "salt well," and after a second discovery in the 'sixties at the mouth of Crocus Creek a small but steady amount of oil was got each year. Great pipe lines from Parkersburg, West Virginia, to Somerset, Pulaski county, and with branches to the Ragland, Barbourville and Prestonburg fields, had in 1902 a mileage of 275 m. The principal fields are in the " southern tier," from Wayne to Allen county, including Barren county; farther east, Knox county, and Floyd and Knott counties ; to the north-east the Ragland field in Bath and Rowan counties on the Licking river. In 1902 the petroleum pro- duced in the state amounted to 248,950 barrels, valued at $172,837, a gain in quantity of 81-4% over 1901. Kentucky is the S.W. extreme of the natural gas region of the west flank of the Appalachian system ; the greatest amount is found in Martincounty in the east, and Breckinridge county in the north-west. The

value of the state's natural gas output increased from $38,993 in 1891 to $99,000 in 1896, $286,243 m 1900, $365,6×1 in 1902, and $380,176 in 1907.

Iron ore has been found in several counties, and an iron furnace was built in Bath county, in the N. E. part of the state, as early as 1791, but since i860 this mineral has received little attention. In 1902 it was mined only in Bath, Lyon and Trigg counties, of which the total product was 71,006 long tons, valued at only $86,169; m 1904 only 35,000 tons were mined, valued at the mines at $35,000.

In 1898 there began an increased activity in the mining of fluor- spar, and Crittenden, Fayette and Livingston counties produced in 1902, 29,030 tons (valued at $143,410) of this mineral, in 1903 30,835 tons (valued at $153,960) and in 1904 19,096 tons (valued at $111,499), amounts (and values) exceeding those produced in any other state for these years; but in 1907 the quantity (21,058 tons) was less than the output of Illinois. Lead and zinc are mined in small quantities near Marion in Crittenden county and elsewhere in connexion with mining for fluorspar; in 1907 the output was 75 tons of lead valued at $7950 and 358 tons of zinc valued at $42,244. Jefferson, Jessamine, Warren, Grayson and Caldwell counties have valuable quarries of an excellent light-coloured

dolitic limestone, resembling the Bedford limestone of Indiana, and best known under the name of the finest variety, the " Bowling Green stone " of Warren county; and sandstones good for structural purposes are found in both coal regions, and especially in Rowan county. In 1907 the total value of limestone quarried in the state was $891,500, and of all stone, $1,002,450. Fire and pottery clay and cement rock also abound within the state. The value of clay products was $2,406,350 in 1905 (when Kentucky was tenth among the states) and was $2,61 1,364 in 1907 (when Kentucky was eleventh among the states). The manufacture of cement was begun in 1829 at Shippingport, a suburb of Louisville, whence the natural cement of Kentucky and Indiana, produced within a radius of 15 m. from Louisville, is called " Louisville cement." In 1905 the value of natural cement manufactured in the state (according to the United States Geological Survey) was only $83,000. The manufacture of Portland cement is of greater importance.

There are mineral springs, especially salt springs, in various parts of the state, particularly in the Blue Grass Region ; these are now of

comparatively little economic importance; no salt was reported among the state's manufactures for 1905, and in 1907 only 736,920 gallons of mineral waters were bottled for sale. Historically and geologi- cally, however, these springs are of considerable interest. According to Professor N. S. Shaler, state geologist in 1873-1880, " When the rocks whence they flow were formed on the Silurian sea-floors, a good deal of the sea-water was imprisoned in the strata, between the grains of sand or mud and in the cavities of the shells that make up a large part of these rocks. This confined sea-water is gradually being displaced by the downward sinking of the rain-water through the rifts of the strata, and thus finds its way to the surface: so that these springs offer to us a share of the ancient seas, in which perhaps a hundred million of years ago the rocks of Kentucky were laid down." To these springs in prehistoric and historic times came annually great numbers of animals for salt, and in the marshes and swamps around some of them, especially Big Bone Lick (in Boone county, about 20 m. S.W. of Cincinnati) have been found many bones of extinct mammals, such as the mastodon and the long- legged bison. 1 The early settlers and the Indians came to the springs to shoot large game for food, and by boiling the waters the settlers obtained valuable supplies of salt. Several of the Kentucky springs have been somewhat frequented as summer resorts; among these are the Blue Lick in Nicholas county (about 48 m. N.E. of Lexington), Harrodsburg, Crab Orchard in Lincoln county (about 115 m. S.E. of Louisville), Rock Castle springs in Pulaski county (about 23 m. E. of Somerset) and Paroquet Springs (near Shepherds- ville, Bullitt county), which was a well-known resort before the Civii War, and near which, at Bullitt Lick, the first salt works in Kentucky are said to have been erected.

Pearls are found in the state, especially in the Cumberland River, and it is supposed that there are diamonds in the kimberlite deposits in Elliott county.

Transportation. — Kentucky in 1909 had 3,503.98 m. of railway. Railway building was begun in the state in 1830, and in 1835 the first train drawn by a steam locomotive ran from Lexington to Franklin, a distance of 27 m. Not until 1851 was the line completed to Louisville. Kentucky's trade during the greater part of the 19th century was very largely with the South, and with the facilities which river navigation afforded for this the development of a railway system was retarded. Up to 1880 the railway mileage had increased to only 1,530; but during the next ten years it increased to 2,942, and railways were in considerable measure substituted for water craft. The principal lines are the Louisville & Nashville, the Chesapeake & Ohio, the Illinois Central, and «the Cincinnati Southern (Queen & Crescent route). Most of the lines run south or south-west from Cincinnati and Louisville, and the east border of the state still has a small railway mileage and practically no wagon roads, most of the

travel being on horseback. The wagon roads of the Blue Grass Region are excellent, because of the plentiful and cheap supply of stone for road building. The assessment of railway property, and in some measure the regulation of railway rates, are entrusted to a state railway commission.

Population. — The population of Kentucky in 1880 2 was 1,648,690; in 1890, 1,858,635, an increase within the decade of I2 '7%; 'n 1900 it was 2,147,174; and in 1910 it had reached 2,289,905. Of the total population of 1900, 284,865 were coloured and 50,249 were foreign-born; of the coloured, 284,706 were negroes, 102 were Indians, and 57 were Chinese; of the foreign-born, 27,555 were natives of Germany, 9874 were natives of Ireland, and 3256 were natives of England. Of the foreign- born, 21,427, or 42-6%, were inhabitants of the city of Louis- ville, leaving a population outside of this city of which 98-4%

1 For a full account of the " licks," see vol. i. pt. ii. of the Memoirs of the Kentucky Geological Survey (1876).

5 The population of the state at the previous censuses was: 73,677 in 1790; 220,955 in 1800; 406,511 in 1810; 564,317 in 1820; 687,917 in 1830; 779,828 in 1840; 982,405 in 1850; 1,155,684 in i860 and 1,321,011 in 1870.

were native born. The rugged east section of the state, a part of Appalachian America, is inhabited by a people of marked characteristics, portrayed in the fiction of Miss Murfree (" Charles Egbert Craddock ") and John Fox, Jr. They are nearly all of British — English and Scotch-Irish — descent, with a trace of Huguenot. They have good native ability, but through lack of communication with the outside world their progress has been retarded. Before the Civil War they were owners of land, but for the most part not owners of slaves, so that a social and political barrier, as well as the barriers of nature, separated them from the other inhabitants of the state. In their speech several hundred words persist which elsewhere have been obsolete for three centuries or occur only in dialects in England. Their life is still in many respects very primitive; their houses are generally built of logs, their clothes are often of homespun, Indian corn and ham form a large part of their diet, and their means of transportation are the saddle-horse and sleds and wheeled carts drawn by oxen or mules. In instincts and in character, also, the typical " mountaineers " are to a marked degree primitive; they are, for the most part, very ignorant; they are primitively hospitable and are warm-hearted to friends and strangers, but are implacable in their enmities and are prone to vendettas and family feuds, which often result in the killing in open fight or from ambush of members of one faction by members of another; and their relative seclusion and isolation has brought them, especially in some districts, to a disregard

for law, or to a belief that they must execute justice with their own hands. This appears particularly in their attitude toward revenue officers sent to discover and close illicit stills for the distilling from Indian corn of so-called "moon-shine" whisky (consisting largely of pure alcohol). The taking of life and " moon-shining," however, have become less and less frequent among them, and Berea College, at Berea, the Lincoln Memorial University, and other schools in Kentucky and adjoining states have done much to educate them and bring them more in harmony with the outside community.

*The population of Kentucky is largely rural. However, in the decade between 1890 and 1900 the percentage of urban population (i.e. population of places of 4000 inhabitants or more) to the total population increased from I7'5 to 19*7 and the percentage of semi- urban (i.e. population of incorporated places with a population of less than 4000) to the total increased from 8'86 to 9"86%; but 48'3 % of the urban population of 1900 was in the city of Louisville. In 1910 the following cities each had a population of more than 5000. Louisville (223,928), Covington (53,270), Lexington (35,099), Newport (30,309), Paducah (22,760), Owensboro (16,011), Hender- son (11,452), Frankfort, the capital (10,465), Hopkinsville (9419), Bowling Green (9173), Ashland (8688), Middlesboro (7305), Win- chester (7156), Dayton (6979), Bellevue (6683), Maysville (6141), Mayfield (5916), Paris (5859), Danville (5420), Richmond (5340). Of historical interest are Harrodsburg (3.11.), the first perma- nent settlement in the state, and Bardstown (pop. in 1900, 171 1), the county-seat of Nelson county. Bardstown was settled about 1775, largely by Roman Catholics from Maryland. It was the see of a Roman Catholic bishop from 1810 to 1841, and the seat of St Joseph's College (Roman Catholic) from 1824 to 1890; and was for some time the home of John Fitch (1743-1798), the inventor, who built his first boat here. The Nazareth Literary and Benevolent Institution, at Nazareth (2 m. N. of Bardstown), was founded in 1829 and is a well-known Roman Catholic school for girls. Boones- borough, founded by Daniel Boone in 1775, in what is now Madison county, long ago ceased to exist, though a railway station named Boone, on the Louisville & Nashville railroad, is near the site of the old settlement.*

In 1906 there were 858,324 communicants of different religious denominations in the state, including 311,583 Baptists, 165,908 Roman Catholics, 156,007 Methodists, 136,110 Disciples of Christ, 47,822 Presbyterians and 8091 Protestant Episcopalians.

Administration. — Kentucky is governed under a constitution adopted in 189 1. 3 A convention to revise the constitution or to draft a new one meets on the call of two successive legislatures, ratified by a majority of the popular vote, provided that majority be at least one-fourth of the total

number of votes cast at the preceding general election. Ordinary amendments are proposed by a three-fifths majority in each house, and are also subject to popular approval. With the usual exceptions of criminals,

8 There were three previous constitutions — those of 1792, 1799 and 1850.

idiots and insane persons, all male citizens of the United States, who are at least 21 years of age, and have lived in the state one year, in the county six months, and in the voting precinct sixty days next preceding the election, are entitled to vote. The legislature provides by law for registration in cities of the first, second, third and fourth classes — the minimum population for a city of the fourth class being 3000. Corpora- tions are forbidden to contribute money for campaign purposes on penalty of forfeiting their charters, or, if not chartered in the state, their right to carry on business in the state. The executive is composed of a governor, a lieutenant-governor, a treasurer, an auditor of public accounts, a register of the land office, a com- missioner of agriculture, labour, and statistics, a secretary of state, an attorney-general and a superintendent of public instruction. All are chosen by popular vote for four years and are ineligible for immediate re-election, and each must be at least 30 years of age and must have been a resident citizen of the state for two years next preceding his election. If a vacancy occurs in the office of governor during the first two years a new election is held; if it occurs during the last two years the lieutenant-governor serves out the term. Lieutenant-governor Beckham, elected in 1900 to fill out the unexpired term of Governor Goebel (assassinated in 1900), was re-elected in 1903, the leading lawyers of the state holding that the constitutional inhibition on successive terms did not apply in such a case.

The governor is commander-in-chief of the militia when it is not called into the service of the United States; he may remit fines and forfeitures, commute sentences, and grant reprieves and pardons, except in cases of impeachment ; and he calls extraordinary sessions of the legislature. His control of patronage, however, is not exten- sive and his veto power is very weak. He may veto any measure, including items in appropriation bills, but the legislature can repass such a measure by a simple majority of the total membership in each house. Among the various state administrative boards are the board of equalization of five members, the board of health of; nine members, a board of control of state institutions with four members (bipartisan), and the railroad commission, the prison commission, the state election commission and the sinking fund commission of three members

each. Legislative power is vested in a General Assembly, which consists of a Senate and a House of Representatives. Senators are elected for four years, one-half retiring every two years; representatives are elected for two years. The minimum age for a representative is 24 years, for a senator 30 years. There are thirty-eight senators and one hundred repre- sentatives. The Senate sits as a court for the trial of impeachment cases. A majority of either house constitutes a quorum, but as regards ordinary bills, on the third reading, not only must they receive a majority of the quorum, but that majority must be at least two-fifths of the total membership of the house. For the enact- ment of appropriation bills and bills creating a debt a majority of the total membership in each house is required. All revenue measures must originate in the House of Representatives, but the Senate may introduce amendments. There are many detailed restrictions on local and special legislation. The constitution provides for local option elections on the liquor question in counties, cities, towns and precincts; in 1907, out of 119 counties 87 had voted for prohibition.

The judiciary consists of a court of appeals, circuit courts, quarterly courts, county courts, justice of the peace courts, police courts and fiscal courts. The court of appeals is composed of from five to seven judges (seven in 1909), elected, one from each appellate district, for a term of eight years. The senior judge presides as chief justice and in case two or more have served the same length of time one of them is chosen by lot. The governor may for any reasonable cause remove judges on the address of two-thirds of each house of the legislature. The counties are grouped into judicial circuits, those containing a population of more than 150,000 consti- tuting separate districts; each district has a judge and a common- wealth's attorney. The county officials are the judge, clerk, attor- ney, sheriff, jailor, coroner, surveyor and assessor, elected for four years. Each county contains from three to eight justice of the peace districts. The financial board of the county is composed of the county judge and the justices of the peace, or of the county judge and three commissioners elected on a general ticket.

The municipalities are divided into six classes according to population, a classification which permits considerable special local legislation in spite of the constitutional inhibition. Marriages between whites and persons of negro descent are prohibited by law, and a marriage of insane persons is legally void. Among causes for absolute divorce are adultery, desertion for one year, habitual drunkenness for one year, cruelty, ungovernable temper, physical incapacity at time of marriage, and the joining by either party of any religious sect which regards marriage as unlawful. A home-

stead law declares exempt from execution an unmortgaged dwelling- house (with appurtenances) not to exceed $1000 in value, and cer- tain property,

such as tools of one's trade, libraries (to the value of $500) of ministers and lawyers, and provisions for one year for each member of a family. Child labour is regulated by an act passed by the General Assembly in 1908; this act prohibits the employment of children less than 14 years of age in any gainful occupation during the session of school or in stores, factories, mines, offices, hotels or messenger service during vacations, and prohibits the employment of children between 14 and 16 unless they have employment certifi- cates issued by a superintendent of schools or some other properly authorized person, showing the child's ability to read and write English, giving information as to the child's age (based upon a birth certificate if possible), and identifying the child by giving height and weight and colour of. eyes and' hair. These certificates must be kept on file and lists of children employed must be posted by employers; labour inspectors receive monthly lists from local school boards of children receiving certificates; and children under 16 are not to work more than 10 hours a day or 60 hours a week, or between 7 p.m. and 7 a.m.

Charitable and Penal Institutions. — The charitable and penal institutions are managed by separate boards of trustees appointed by the governor. There are a deaf and dumb institution at Danville (1823), an institution for the blind at Louisville (1842), and an institution for the education of feeble-minded children at Frankfort (i860). The Eastern Lunatic Asylum at Lexington, established in 1815 as a private institution, came under the control of the state in 1824. The Central Lunatic Asylum at Anchorage, founded in 1869 as a house of refuge for young criminals, became an asylum in 1873. The Western Lunatic Asylum at Hopkinsville was founded in 1848. The main penitentiary at Frankfort was completed in 1799 and a branch was established at Eddyville in 1 89 1. Under an act of 1898 two houses of reform for juvenile offenders, one for boys, the other for girls, were established near Lexington.

Education. — The early history of the schools of Kentucky shows that the rural school conditions have been very unsatisfactory. A system of five trustees, with a sixty-day term of school, was replaced by a three trustee system, first with a one-hundred-day term of school, and subsequently with a one-hundred-and-twenty-day term of school annually. The state fund has not been supplemented locally for the payment of teachers, who have consequently been underpaid. The rural teachers, however, have been paid from the state fund, so that the poorer districts receive aid from the richer districts of the commonwealth. The rural schools are supervised' by a superintendent in each county. Throughout the state white and negro children are taught in separate schools. The state makes provision for revenue for school purposes as follows: (1) the interest on the Bond of the Commonwealth for $1,327,000 00; (2) dividends on 798 shares of the capital stock of the Bank of Kentucky — repre- senting a par value of

$79,800.00; (3) the interest at 6% on the Bond of the Commonwealth for $381,986.08, which is a perpetual obligation in favour of the several counties; (4) the interest at 6% on $606,641.03, which was received from the United States; (5) the annual tax of 26J cents on each $100 of value of all real and personal estate and corporate franchises directed to be assessed for taxation; (6) a certain portion of fines, forfeitures and licences realized by the state ; and (7) a portion of the dog taxes of each county. The present school system of Kentucky may be summarized under three heads: the rural schools, the graded schools, and the high schools (which are further classified as city and county high schools). The 1908 session of the General Assembly passed an act providing: that each county of the state be the unit for taxation; that the county tax be mandatory ; that there be a local subdistrict tax; and that each county be divided into four, six or eight educa- tional divisions, that one trustee be elected for each subdistrict, that the trustees of the subdistricts form division Boards of Educa- tion, and that the chairmen of these various division boards form a County Board of Education together with the county superintendent, who is ex officio chairman. This fystem of taxation and supervision is a great advance in the administration of public schools. Any subdistrict, town or city of the fifth or sixth class may provide for a graded school by voting for an ad valorem and poll tax which is limited as to amount. There were in 1909 135 districts which had complied with this act, and were known as Graded Common School districts. By special charters the General Assembly has also established 25 special graded schools. Statutes provide that all children between the ages of 7 and 14 years living in such districts must attend school annually for at least eight consecutive weeks. In each city of the first, second and third class there must be, and of the fourth class there may be, maintained under control of a city Board of Education a system of public schools, in which all children between the ages of 6 and 20 residing in the city may be taught at public expense. There were in 1909 62 city public high schools whose graduates are admitted to the State University without examination. A truancy act (1908) provides that every child between the ages of 7 and 14 years living in a city of the first, second, third or fourth class must attend school regularly for the full term of said school. It was provided by statute that before June 1910,

there should have been established in each county of the state at least one County High School to which all common school graduates of the county should be admitted without charge. Separate insti- tutes for white and coloured teachers are conducted annually in each county. These institutes are held for a five or ten day session and attendance is required of every

teacher. The state provides for the issuance of three kinds of certificates. A state diploma issued by the State Board of Examiners is good for life. A state certificate issued by the State Board of Examiners is good for eight years with one renewal. County certificates issued by the County Board of Examiners are of three classes, valid for one, two and four years respectively.

According to a school census there was in 1908-1909 a school population of 739,352, of which 587,051 were reported from the rural districts. In the school year 1907-1908 the school population was 734,617, the actual enrolment in public schools was 441,377, the average attendance was 260,843 ; there were approximately 3392 male and 5257 female white teachers and 1274 negro teachers; and the total revenue for school purposes was $3,805,997, of which sum $2,437,942.56 came from the state treasury.

What was formerly the State Agricultural and Mechanical College at Lexington became the State University by legislative enactment (1908); there is no tuition fee except in the School of Law. The State University has a Department of Education. The state main- tains for the whites two State Normal Schools, which were established in 1906 — one, for the eastern district, at Richmond, and the other, for the western district, at Bowling Green. Under the law estab- lishing State Normal Schools, each county is entitled to one or more appointments of scholarships, one annually for every 500 white school children listed in the last school census. A Kentucky Normal and Industrial School (1886) for negroes is maintained at Frankfort. Among the private and denominational colleges in Kentucky are Central University (Presbyterian), at Danville; Tran- sylvania University, at Lexington; Georgetown College (Baptist) at Georgetown; Kentucky Wesleyan College (M.E. South), at Win- chester; and Berea College(non-sectarian) at Berea.

Finance. — Kentucky, in common with other states in this part of the country, suffered from over-speculation in land and railways during 1 830-1 850. The funded debt of the state amounted to four and one-half millions of dollars in 1850, when the hew constitu- tion limited the power of the legislature to contract further obliga- tions or to decrease or misapply the sinking funds. From 1850 to 1880 there was a gradual reduction except during the years of the war. The system of classifying the revenue into separate funds has frequently produced annual deficits, which are, as a rule only nominal, since the total receipts exceed the total expenditures. In 1902 the net bonded debt, exclusive of about two millions of dollars held for educational purposes, was $1,171,394, but this debt was paid in full in the years immediately following. The sinking fund commission is composed of the governor, attorney-general, secretary of state, auditor and

treasurer. The first banking currency in Kentucky was issued in 1802 by a co-operative insurance company established by Mississippi Valley traders. The Bank of Kentucky, established at Frankfort in 1806, had a monopoly for several years. In 1818-1819 the legislature chartered 46 banks, nearly all of which went into liquidation during the panic of 1819. The Bank of the Commonwealth was chartered in 1820 as a state institution and the charter of the Bank of Kentucky was revoked in 1822. A court decision denying the legal tender quality of the notes issued by the Bank of the Commonwealth gave rise to a bitter controversy which had considerable influence upon the political history of the state. This bank failed in 1829. In 1834 the legislature chartered the Bank of Kentucky, the Bank of Louisville and the Northern Bank of Kentucky. These institutions survived the panic of 1837 and soon came to be recognized as among the most prosperous and the most conservative banks west of the Alleghanies. The state banking laws are stringent and most of the business is still controlled by banks operating under state charters.

History. — The settlement and the development of that part of the United States west of the Alleghany Mountains has probably been the most notable feature of American history since the close of the Seven Years' War (1763). Kentucky was the first settle- ment in this movement, the first state west of the Alleghany Mountains admitted into the Union. In 1763 the Kentucky country was claimed by the Cherokees as a part of their hunting grounds, by the Six Nations (Iroquois) as a part of their western conquests, and by Virginia as a part of the territory granted to her by her charter of 1609, although it was actually inhabited only by a few Chickasaws near the Mississippi river, and by a small tribe of Shawnees in the north, opposite what is now Ports- mouth, Ohio. The early settlers were often attacked by Indian raiders from what is now Tennessee or from the country north of the Ohio, but the work of colonization would have been far more difficult if those Indians had lived in the Kentucky region itself. Dr Thomas Walker (1715-1794), as an agent and surveyor of the Loyal Land Company, made an exploration in 1750 into the

present state from the Cumberland Gap, in search of a suitable place for settlement but did not get beyond the mountain region. In the next year Christopher Gist, while on a similar mission for the Ohio Company, explored the country westward from the mouth of the Scioto river. In 1752 John Finley, an Indian trader, descended the Ohio river in a canoe to the site of .Louis- ville. It was Finley's descriptions that attracted Daniel Boone,; and soon after Boone's first visit, in 1767, travellers through the Kentucky region became numerous. The first permanent English settlement was established at Harrodsburg in 1774 by. James Harrod, and in October of the same year the Ohio Indians, having been defeated by Virginia troops in the battle of Point Pleasant (in what is now West Virginia) , signed a

treaty by which they surrendered their claims south of the Ohio river. In March 1775 Richard Henderson and scone North Carolina land speculators met about 1200 Cherokee Indians in council on the Watauga river and concluded a treaty with them for the purchase of all the territory south of the Ohio river and between the Kentucky and Cumberland rivers. The purchase was named Transyl- vania, and within less than a month after the treaty was signed, Boone, under its auspices, founded a settlement at Boones- borough which became the headquarters of the colony. The title was declared void by the Virginia government in 1778, but Henderson and his associates received 200,000 acres in com- pensation, and all sales made to actual settlers were confirmed. During the War of Independence the colonists were almost entirely neglected by Virginia and were compelled to defend them- selves against the Indians who were often under British leader- ship. Boonesborough was attacked in April and in July 1777 and in August 1778. Bryant's (or Bryan's) Station, near Lex- ington, was besieged in August 1782 by about 600 Indians under the notorious Simon Girty, who after raising the siege drew the defenders, numbering fewer than 200, into an ambush and in the . battle of Blue Licks which ensued the Kentuckians lost about 67 killed and 7 prisoners. Kentucky county, practically coter- minous with the present state of Kentucky and embracing: all the territory claimed by Virginia south of the Ohio river and west of Big Sandy Creek and the ridge of the Cumberland Mountains, was one of three counties which was formed out of : Fincastle county in 1776. Four years later, this in turn was divided into three counties, Jefferson, Lincoln and Fayette, hut the name Kentucky was revived in 1782 and was given to the judicial district which was then organized for these three counties. The War of Independence was followed by an extensive immigraˆ tion from Virginia, Maryland and North Carolina 1 of a popu- lation of which fully 95%, excluding negro slaves, were of pure English, Scotch or Scotch-Irish descent. The manners, customs and institutions of Virginia were transplanted beyond the mountains. There was the same political rivalry between the slave-holding farmers of the Blue Grass Region and the "poor whites" of the mountain districts that there was in: Virginia between the tide-water planters and the mountaineers.- Between these extremes were the small farmersof the "Barrens" 2 ' in Kentucky and of the Piedmont Region in Virginia. The aristocratic influences in both states have always been on the Southern and Democratic side, but while they were strong enough in Virginia to lead the state into secession thev were unable to do so in Kentucky.

1 Most of the early settlers of Kentucky made their way thither either by the Ohio river (from Fort Pitt) or — the far larger number — by way of the Cumberland Gap and the " Wilderness Road." This latter route began at Inglis's Ferry, on the New river, in what is now West Virginia, and

proceeded west by south to the Cumberland Gap. The " Wilderness Road," as marked by Daniel Boone in 1775, was a' mere trail, running from the Watauga settlement in east Tennessee to the Cumberland Gap, and thence by way of what are now Crab Orchard, Danville and Baidstown, to the Falls of the Ohio, and was passable only for men and horses until 1795, when the state made it a wagon road. Consult Thomas Speed, The Wilderness Road (Louisville, Ky., 1886), and Archer B. Hulbert, Boone's Wilderness Road (Cleveland, O., 1903).

2 The " Barrens " were in the north part of the state west of the Blue Grass Region, and were so called merely because the Indians had burned most of the forests here in order to provide better pasturage for buffaloes and other game.

At the close of the War of Independence the Kentuckians complained because the mother state did not protect them against their enemies and did not give them an adequate system of local government. Nine conventions were held at Danville from 1784 to 1790 to demand separation from Virginia. The Virginia authorities expressed a willingness to grant the demand provided Congress would admit the new district into the Union as a state. The delay, together with the proposal of John Jay, the Secretary for Foreign Affairs and commissioner to negotiate a commercial treaty with the Spanish envoy, to surrender navigation rights on the lower Mississippi for twenty-five years in order to remove the one obstacle to the negotiations, aroused so much feeling that General James Wilkinson and a few other leaders began to intrigue not only for a separation from Virginia, but also from the United States, and for the formation of a close alliance with the Spanish at New Orleans. Although most of the settlers were too loyal to be led into any such plot they gen- erally agreed that it might have a good effect by bringing pressure to bear upon the Federal government. Congress passed a pre- liminary act in February 1791, and the state was formally admitted into the Union on the 1st of June 1792. In the Act of 1776 for dividing Fincastle county, Virginia, the ridge of the Cumberland Mountains was named as a part of the east boundary of Kentucky; and now that this ridge had become a part of the boundary between the states of Virginia and Kentucky they, in 1799, appointed a joint commission to run the boundary line on this ridge. A dispute with Tennessee over the southern boundary was settled in a similar manner in 1820. 1 The constitution of 1792 provided for manhood suffrage and for the election of the governor and of senators by an electoral college. General Isaac Shelby was the first governor. The people still continued to have troubles with the

Indians and with the Spanish at New Orleans. The Federal government was slow to act, but its action when taken was effective. The power of the Indians was over- thrown by General Anthony Wayne's victory in the battle of Fallen Timbers, fought the 20th of August 1794 near the rapids of the Maumee river a few miles above the site of Toledo, Ohio; and the Mississippi question was settled temporarily by the treaty of 1795 and permanently by the purchase of Louisiana in 1803. In 1798-1799 the legislature passed the famous Kentucky Resolutions in protest against the alien and sedition acts.

For several years the Anti-Federalists or Republicans had contended that the administration at Washington had been exercising powers not warranted by the constitution, and when Congress had passed the alien and sedition laws the leaders of that party seized upon the event as a proper occasion for a spirited public protest which took shape principally in resolutions passed by the legislatures of Kentucky and Virginia. The original draft of the Kentucky Resolutions of 1798 was prepared by Vice-President Thomas Jefferson, although the fact that he was the author of them was kept from the public until he acknow- ledged it in 182 1. They were introduced in the House of Repre- sentatives by John Breckinridge on the 8th of November, were passed by that body with some amendments but with only one dissenting vote on the 10th, were unanimously concurred in by the Senate on the 13th, and were approved by Governor James Garrard on the 16th. The first resolution, was a statement of the ultra states'-rights view of the relation of the states to the Federal government 2 and subsequent resolutions declare the

1 The southern boundary to the Tennessee river was surveyed in 1779-1780 by commissioners representing Virginia and North Carolina, and was supposed to be run along the parallel of latitude 36 30', but by mistake was actually run north of that parallel. By a treaty of 1819 the Indian title to the territory west of the Tennessee was extinguished, and commissioners then ran a line along the parallel of 36 30′ from the Mississippi to the Tennessee. In 1820 commissioners representing Kentucky and Tennessee formally adopted the line of 1 779-1 780 and the line of 1819 as the boundary between the two states.

2 This resolution read as follows: Resolved, that the several states composing the United States of America are not united on the principle of unlimited submission to their general government; but that by compact under the style of a Constitution for the United

alien and sedition laws unconstitutional and therefore " void and of no force," principally on the ground that they provided for an exercise of powers which were reserved to the state. The resolutions further declare

that "this Commonwealth is deter- mined, as it doubts not its co-states are, tamely to submit to undelegated and therefore unlimited powers in no man or body of men on earth," and that "these and successive acts of the same character, unless arrested on the threshold, may tend to drive these states into revolution and blood." Copies of the resolutions were sent to the governors of the various states, to be laid before the different state legislatures, and replies were received from Connecticut, Delaware, Massachusetts, New Hampshire, New York, Rhode Island, Vermont and Virginia, but all except that from Virginia were unfavourable. Neverthe- less the Kentucky legislature on the 22nd of November 1799 reaffirmed in a new resolution the principles it had laid down in the first series, asserting in this new resolution that the state " does now unequivocally declare its attachment to the Union, and to that compact [the Constitution], agreeably to its obvious and real intention, and will be among the last to seek its dissolu- tion," but that " the principle and construction contended for by sundry of the state legislatures, that the General Government is the exclusive judge of the extent of the powers delegated to it, stop nothing [short] of despotism — since the discretion of those who administer the government, and not the Constitution, would be the measure of their powers," " that the several states who formed that instrument, being sovereign and independent, have the unquestionable right to judge of the infraction," and " that a nullification by those sovereignties of all unauthorized acts done under color of that instrument is the rightful remedy." These measures show that the state was Democratic-Republican in its politics and pro-French in its sympathies, and that it was in- clined to follow the leadership of that state from which most of its people had come.

The constitution of 1799 adopted the system of choosing the governor and senators by popular vote and deprived the supreme court of its original jurisdiction in land cases. The Burr con- spiracy (1804-1806) aroused some excitement in the state. Many would have followed Burr in a filibustering attack upon the Spanish in the South-West, but scarcely any would have approved of a separation of Kentucky from the Federal Union. No battles were fought in Kentucky during the War of 181 2, but her troops constituted the greater part of the forces under General William Henry Harrison. They took part in the opera- tions at Fort Wayne, Fort Meigs, the river Raisin and the Thames.

The Democratic-Republicans controlled the politics of the state without any serious opposition until the conflict in 1820-1826, arising from the demands for a more adequate system of currency and other measures for the relief of delinquent debtors divided the state into what were known as the relief and anti-relief parties. After nearly all the forty-six banks chartered by the legislature in 181 8 had been wrecked in the financial panic of 1819, the legislature in 1820 passed a series of laws designed for

the benefit of the debtor class, among them one making state bank notes a legal tender for all debts. A decision of the Clark county district court declaring this measure unconstitutional was affirmed by the court of appeals. The legislature in 1824 repealed all of the laws creating the existing court of appeals and then established a new one. This precipitated a bitter campaign

States and of amendments thereto, they constituted a general government for special purposes, delegated to that government certain definite powers, reserving each state to itself the residuary mass of right to their own self-government; and that whensoever the general government assumes undelegated powers its acts are unauthoritative, void, and of no force: That to this compact each state acceded as a state, and is an integral party, its co-states forming, as to itself, the other party : That the government created by this compact was not made the exclusive or final judge of the extent of the powers delegated to itself, since that would have made its discretion, and not the Constitution, the measure of its powers; but that, as in all other cases of compact among parties having no common judge, each party has an equal right to judge for itself as well of infractions as of the mode and measure of redress.

between the anti-relief or " old court " party and the relief or " new court " party, in which the former was successful. The old court party followed the lead of Henry Clay and John Quincy Adams in national politics, and became National Republicans and later Whigs. The new court party followed Andrew Jackson and Martin Van Buren and became Democrats. The electoral vote of the state was cast for Jackson in 1828 and for Clay in 1832. During the next thirty years Clay's conservative influ- ence dominated the politics of the state. 1 Kentucky voted the Whig ticket in every presidential election from 1832 until the party made its last campaign in 1852. When the Whigs were destroyed by the slavery issue some of them immediately be- came Democrats, but the majority became Americans, or Know- Nothings. They elected the governor in 1855 and almost succeeded in carrying the state for their presidential ticket in 1856. In i860 the people of Kentucky were drawn toward the South by their interest in slavery and by their social relations, and toward the North by business ties and by a national sentiment which was fostered by the Clay traditions. They naturally assumed the leadership in the Constitutional Union movement of i860, casting the vote of the state for Bell and Everett. After the election of President Lincoln they also led in the move- ment to secure the adoption of the Crittenden Compromise or some other peaceful

solution of the difficulties between the North and the South.

A large majority of the state legislature, however, were Demo- crats, and in his message to this body, in January 1861, Governor Magoffin, also a Democrat, proposed that a convention be called to determine " the future of Federal and inter-state relations of Kentucky;" later too, in reply to the president's call for volunteers, he declared, " Kentucky will furnish no troops for the wicked purpose of subduing her sister Southern States." Under these conditions the Unionists asked only for the main- tenance of neutrality, and a resolution to this effect was carried by a bare majority — 48 to 47. Some of the secessionists took this as a defeat and left the state immediately to join the Con- federate ranks. In the next month there was an election of congressmen, and an anti-secession candidate was chosen in nine out of ten districts. An election in August of one-half the Senate and all of the House of Representatives resulted in a Unionist majority in the new legislature of 103 to 35, and in September, after Confederate troops had begun to invade the state, Ken- tucky formally declared its allegiance to the Union. From September 1861 to the fall of Fort Donelson in February 1862 that part of Kentucky which is south and west of the Green River was occupied by the Confederate army under General A. S.John- ston, and at Russellville in that district a so-called " sovereignty convention " assembled on the 18th of November. This body, composed mostly of Kentucky men who had joined the Con- federate army, passed an ordinance of secession, elected state officers, and sent commissioners to the Confederate Congress, which body voted on the 9th of December to admit Kentucky into the Confederacy. Throughout the war Kentucky was repre- sented in the Confederate Congress — representatives and senators being elected by Confederate soldiers from the state. The officers of this " provisional government," headed by G. W. Johnson, who had been elected " governor," left the state when General A. S. Johnston withdrew; Johnson himself was killed at Shiloh, but an attempt was subsequently made by General Bragg to install this government at Frankfort. General Felix K. Zollicorler (1812-1862) had entered the south-east part of the state through Cumberland Gap in September, and later with a Confederate force of about 7000 men attempted the invasion of central Kentucky, but in October 1861 he met with a slight repulse at Wild Cat Mountain, near London, Laurel county, and on the 19th of January 1862, in an engagement near Mill Springs, Wayne county, with about an equal force under General George H. Thomas, he was killed and his force was utterly routed. In 1862 General Braxton Bragg in command of the Confederates in eastern Tennessee, eluded General Don

1 He died in 1852, but the traditions which he represented survived.

Carlos Buell, in command of the Federal Army of the Ohio stationed there,

and entering Kentucky in August 1862 pro- ceeded slowly toward Louisville, hoping to win the state to the Confederate cause and gain recruits for the Confederacy in the state. His main army was preceded by a division of about 1 5 ,000 men under General Edmund Kirby Smith, who on the 30th of August defeated a Federal force under General Wm. Nelson near Richmond and threatened Cincinnati. Bragg met with little opposition on his march, but Buell, also marching from eastern Tennessee, reached Louisville first (Sept. 34), turned on Bragg, and forced him to withdraw. On his retreat, Bragg attempted to set up a Confederate government at Frankfort, and Richard J. Hawes, who had been chosen as G. W. Johnson's successor, was actually " inaugurated," but naturally this state " government " immediately collapsed. On the 8th of October Buell and Bragg fought an engagement at Perryville which, though tactically indecisive, was a strategic victory for Buell; and thereafter Bragg withdrew entirely from the state into Tennessee. This was the last serious attempt on a large scale by the Confederates to win Kentucky; but in February 1863 one of General John H. Morgan's brigades made a raid on Mount Sterling and captured it; in March General Pegram made a raid into Pulaski county; in March 1864 General N. B. Forrest assaulted Fort Anderson at Paducah but failed to capture it; and in June General Morgan made an unsuccessful attempt to take Lexington.

Although the majority of the people sympathized with the Union, the emancipation of the slaves without compensation even to loyal owners, the arming of negro troops, the arbitrary imprisonment of citizens and the interference of Federal military officials in purely civil affairs aroused so much feeling that the state became strongly Democratic, and has remained so almost uniformly since the war. Owing to the panic of 1893, distrust of the free silver movement and the expenditure of large cam- paign funds, the Republicans were successful in the guber- national election of 1895 and the presidential election of 1896. The election of 1899 was disputed. William S. Taylor, Republi- can, was inaugurated governor on the 12th of December, but the legislative committee on contests decided in favour of the Democrats. Governor-elect Goebel was shot by an assassin on the 30th of January 1900, was sworn into office on his death- bed, and died on the 3rd of February. Taylor fled the state to escape trial on the charge of murder. Lieutenant-Governor Beckham filled out the unexpired term and was re-elected in 1903. In 1907 the Republicans again elected their candidate for governor.

Governors of Kentucky Democratic- Republican

Isaac Shelby

James Garrard

Christopher Greenup

Charles Scott

Isaac Shelby

*George Madison**

Gabriel Slaughter (acting)

John Adair

Joseph Desha

Thomas Metcalfe National

*John Breathitt**

James T. Morehead (acting)

*James Clark**

Charles A. Wickliffe (acting)

Robert P. Letcher

William Owsley

John J. Crittendenf

J ohn L. Helmf

Lazarus W. Powell

Charles S. Morehead

Beriah Magoffin

James F. Robinson

Thomas E. Bramlette

*John L. Helm**

John W. StevensonJ

Preston H. Lesliet

James B. McCreary

Luke P. Blackburn

J. Proctor Knott

Simon B. Buckner

John Y. Brown

Democrat Whig

Democrat

», American Democrat

1 792-1 796

1 796- 1 804

1 804-1 808

1808-1812

1812-1816

1816

1816-1820

1820-1824

1 824-1 828

1 828-1 832

1 832-1 834

1 834-1 836

1836

1 836- 1 840

1 840- 1 844

1 844- 1 848

1850-1851

1851-1855

1 855-1 859

1 859-1 862

1862-1863

1 863-1 867

1867

1 867-1 87 1

1871-1875

1 875-1 879 1879-1883 1 883-1 887 1887-1891 1891-1895

74 8

KENYA— KENYON

Governors of Kentucky — continued Republican

i 895-1 899

1899-1900

1900

1900-1907

1907-

William 0. Bradley

William S. Taylor §

William Goebel Democrat*

J. C. W. Beckham

Augustus E. Willson Republican

- *Died in office.*

t Governor Crittenden resigned on the 31st of July to become Attorney-General of the United States and John L. Helm served out the unexpired term.

t Governor Stevenson resigned on the 13th of February 1871 to become U.S. Senator from Kentucky. P. H. Leslie filled out the remainder of the term and was electee! in 1871 for a full term.

§ Taylor's election was contested by Goebel, who received the certificate of election.

Bibliography. — For descriptionsof physicalfeaturcsand accounts of natural resources see Reports of the Kentucky Geological Survey, the Biennial Reports of the Bureau of Agriculture, Labor and Statistics, the Reports of the United States Census and various publications of the U.S. Geological Survey, and other publications listed in Bulletin 301 {Bibliography and Indexof North American Geology for 1901-1905) and other bibliographies of the Survey. For an early description, see Gilbert Imlay, A Topographical Description of the Western Territory of North America (London, 3rd ed., 1797), in which John Filson's " Discovery, Settlement and Present State of Kentucke " (1784) is reprinted. For a brief description of the Blue Grass Region, see James Lane Allen's The Blue Grass Region of Kentucky and other Kentucky Articles (New York, 1900). An account of the social and industrial life of the people in the " mountain " districts is given in William H. Haney's The Mountain People of Kentucky (Cincinnati, 1906). For administration, see the Official Manual for the Use of the Courts, State and County Officials and General Assembly of the State of Kentucky (Lexington), which contains the Constitution of 1 891 ; The Report of the Debates and Proceedings of the Convention . . . of 1849 (Frankfort, 1849) ; The Official Report of the Proceedings and Debates of the Constitutional Convention of 1800 (4 vols:, Frankfort, 1890); B. H. Young, History and Texts of 'Three Constitutions of Kentucky (Louisville, 1 890) ; J . F. Bullitt and John Feland, The General Statutes of Kentucky (Frankfort and Louisville, 1877, revised editions, 1881, 1&87) ; and the Annual Reports ol state officers and boards. For history see R. M. McElroy's Kentucky in the Nation's History (New York, 1909, with bibliography); or (more briefly) N. S. Shaler's Kentucky (Boston, 1885), in the American Commonwealths Series. John M. Brown's The Political Beginnings of Kentucky (Louisville, 1889) is a good monograph dealing with the period before 1 792; it should be compared with Thomas M. Green's The Spanish Conspiracy: A Review of Early Spanish Movements in the Southwest (Cincinnati, 1891), written in reply to it. Among older histories are Humphrey Marshall, The History of Kentucky . . . and the Present State of the Country (2 vols., Frankfort, 1812, 1824), extremely Federalistic in tone; Mann Butler, History of Kentucky from its Exploration' and

Settlement by the Myites to the close of the Southwestern Campaign of 1813 (Louisville, 1834; 2nd ed., Cincinnati, 1836), and Lewis Collins, The History of Kentucky (2 vols., revised edition, Covington, Ky., 1874), a valuable store-house of facts, the basis of Shaler's work. E. D. Warneld's The Kentucky Resolutions of 1798 (New York, 2nd ed., 1887) is an excellent monograph. For the Civil War history see " Campaigns in Kentucky and Tennessee," in the 7th volume of Papers of the Military Historical Society of Massachusetts (Boston, 1908); Thomas Speed, The Union Cause in Kentucky (New York, 1907); Basil W. Duke, History of Morgan's Cavalry (Cincinnati, 1867),' and general works on the history of the war. See also Alvin F.Lewis, History of Higher Education in Kentucky, in Circulars of Informa- tion of the U.S. Bureau of Education (Washington, 1899), and R. G. Thwaites, Daniel Boone (New York, 1902). There is much valuable material in the Register (Frankfort, 1903 seq.) of the Ken- tucky State Historical Society, and especially in the publications of the Filson Club of Louisville. Among the latter are R. T. Durrett's John Filson, the first Historian of Kentucky (1884); ThomasSpeed, The Wilderness Road (1886) ; W. H; Perrin, The Pioneer Press of Kentucky (1888) ; G. W. Ranck, Boonesborough : Its Founding, Pioneer Struggles, Indian Experiences, Transylvania Days and Revolutionary Annals (1901), and The Centenary of Kentucky (1892), containing an address, " TheState of Kentucky : its Discovery, Settlement, Autonomy and Progress in a Hundred Years," by Reuben T. Durrett.

KENYA, a great volcanic mountain in British East Africa, situated just south of the equator in 37 20′ E. It is one of the highest mountains of Africa, its highest peak reaching an altitude of 17,007 ft. (with a possible error of 30 ft. either way). The central core, which consists of several steep pyramids, is that of a very denuded old volcano, which when its crater was complete may have reached 2000 ft. above the present summit. Lavas dip in all directions from the central crystalline core, pointing to the conclusion that the main portion of the mountain repre- sents a single volcanic mass. From the central peaks, of which

the axis runs from W.N.W. to S.S.E., ridges radiate outwards, separated by broad valleys, ending upwards in vast cirques. The most important ridges centre in the peak Lenana (16,300 ft.) at the eastern end of the central group, and through it runs the chief water-parting of the mountain, in a generally north to south direction. Three main valleys, known respectively as Hinde, Gorges and Hobley valleys, run down from this to the east, and four — Mackinder, Hausberg, Teleki and Hohnel — to the west. From the central peaks fifteen glaciers, all lying west of the main divide, descend to the north and south, the two largest being the Lewis and Gregory glaciers, each about 1 m. long, which, with the smaller Kolb glacier, lie immediately west of the main divide. Most of the glaciers terminate at an altitude of

14,800-14,900 ft., but the small Cesar glacier, drained to the Hausberg valley, reachesto 14,450. Glaciation was formerly much more extensive, old moraines being observed down to 12,000 ft. In the upper parts of the valleys a number of lakes occur, occupying hollows and rock basins in the agglomerates and ashes, fed by springs, and feeding many of the streams that drain the mountain slopes. The largest of these are Lake Hohnel, lying at an altitude of 14,000 ft., at the head of the valley of the same name, and measuring 600 by 400 yds.; and Lake Michaelson (12,700 ft.?) in the Gorges Valley. At a distance from the central core the radiat- ing ridges become less abrupt and descend with a gentle gradient, finally passing somewhat abruptly, at a height of some 7000 ft., into the level plateau. These outer slopes are clothed with dense forest and jungle, composed chiefly of junipers and Podocarpus, and between 8000 'and 9800 ft. of huge bamboos. The forest zone extends to about 10,500 ft., above which is the steeper alpine zone, in which pasturages alternate with rocks and crags. This extends to a general height of about 15,000 ft., but in damp, sheltered valleys the pasturages extend some distance higher. The only trees or shrubs in this zone are the giant Senecio (ground- sel) and Lobelia, and tree-heaths, the Senecio forming groves in the upper valleys. Of the fauna of the lower slopes, tracks of elephant, leopard and buffalo have been seen, between 11,500 and 14,500 ft. That of the alpine zone includes two species of dassy (Procavia), a coney (Hyrax) , and a rat (Otomys). The bird fauna is of considerable interest, the finest species of the upper zone being an eagle-owl, met with at 14,000 ft. At 11,000 ft. was found a brown chat, with a good deal of white in the tail. Both the fauna and flora of the higher levels present close affini- ties with those of Mount Elgon, of other mountains of East Africa and of Cameroon Mountain. The true native names of the moun- tain are said to be Kilinyaga, Doenyo Ebor (white mountain) and Doenyo Egeri (spotted mountain) . It was first seen, from a distance, by the missionary Ludwig Krapf in 1849; approached from the west by Joseph Thomson in 1883; partially ascended by Count S. Teleki (1889), J. W. Gregory (1893) and Georg Kolb (1896); and its summit reached by H. J. Mackinder in 1899.

See J. W. Gregory, The Great Rift-Valley (London, 1896); H. J. Mackinder, " Journey to the Summit of Mount Kenya," Geog. Jnl., May 1900. (E. He.)

KENYON, LLOYD KENYON, ist Baeon (1732-1802), lord chief-justice of England, was descended by his father's side from an old Lancashire family; his mother was the daughter of a small proprietor in Wales. He was born at Gredington, Flintshire, on the '5th of October 1732. Educated at Ruthin grammar school, he was in his fifteenth year articled to an attorney at Nantwich, Cheshire. In 1750 he entered at Lincoln's Inn, London, and in 1756 was called to the bar. As for several years he was almost

unemployed, he utilized his leisure in taking notes of the cases argued in the court of King's Bench, which he after- wards published. Through answering the cases of his friend John Dunning, afterwards Lord Ashburton, he gradually became known to the attorneys, after which his success was so rapid that in 1780 he was made king's counsel. He showed conspicuous ability in the cross-examination of the witnesses at the trial of Lord George Gordon, but his speech was so tactless that the verdict of acquittal was really due to the brilliant effort of Erskine, the junior counsel. This want of tact, indeed, often betrayed Kenyon into striking blunders; as an advocate he was,

moreover, deficient in ability of statement; and his position was achieved chiefly by hard work, a good knowledge of law and several lucky friendships. Through the influence of Lord Thurlow, Kenyon in 1780 entered the House of Commons as member for Hindon,and in 1782 he was, through the same friend- ship, appointed attorney-general in Lord Buckingham's adminis- tration, an office which he continued to hold under Pitt. In 1784 he received the mastership of the rolls, and was created a baronet. In 1788 he was appointed lord chief justice as successor to Lord Mansfield, and the same year was raised to the peerage as Baron Kenyon of Gredington. As he had made many enemies, his elevation was by no means popular with the bar; but on the bench, in spite of his capricious and choleric temper, he proved himself not only an able lawyer, but a judge of rare and inflexible impartiality. He died at Bath, on the 4th of April 1802. Kenyon was succeeded as 2nd baron by his son George (1776-1855), whose great-grandson, Lloyd (b. 1864), became the 4th baron in 1869.

See Life by Hon. G. T. Kenyon, 1873.

KEOKUK, a city of Lee county, Iowa, U.S.A., on the Missis- sippi river, at the mouth of the Des Moines, in the S.E. corner of the state, about 200 m. above St Louis. Pop. (1900), 14,641; (1905), 14,604, including 1534 foreign-born; (1910), 14,008. It is served by the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Wabash, and the Toledo, Peoria & Western railways. There is a bridge (about 2200 ft. long) across the Mississippi, and another (about 1200 ft. long) across the Des Moines. The city has a public library and St Joseph and Graham hospitals, and is the seat of the Keokuk Medical College (1849). There is a national cemetery here. Muchofthe city is built on bluffs along the Mississippi. Keokuk is at the foot of the Des Moines Rapids, round which the Federal Govern- ment has constructed a navigable canal (opened 1877) about 9 m.

*long, with a draft at extreme low water of 5 ft.; at the foot a great dam, i-| m. long and 38 ft. high, has been constructed. Keokuk has various manufactures; its factory product in 1905 was valued at $4,225,915, 38-6% more than in 1900. The city was named after Keokuk, a chief of the Sauk and Foxes (1780- 1848), whose name meant " the watchful " or " he who moves alertly." In spite of Black Hawk's war policy in 1832 Keokuk was passive and neutral, and with a portion of his nation remained peaceful while Black Hawk and his warriors fought. His grave, surmounted by a monument, is in Rand Park. The first house on the site of the city was built about 1820, but further settlement did not begin until 1836. Keokuk was laid out as a town in 1*837, was chartered as a city in 1848, and in 1907 was one of five cities of the state governed by a special charter.*

KEONJHAR, a tributary state of India, within the Orissa division of Bengal; area, 3096 sq. m.; pop. (1901), 285,758; estimated revenue, £20,000. The state is an offshoot from Mayurbhanj. Part of it consists of rugged hills, rising to more than 3000 ft. above sea-level. The residence of the raja is at Keonjhar (pop. 453 2).

KEONTHAL, a petty hill state in the Punjab, India, with an area of 116 sq. m.; pop. (1901), 22,499; estimated revenue, £4400. The chief, a Rajput, received the title of raja in 1857. After the Gurkha War in 1815, a portion of Keonthal, which had been occupied by the Gurkhas, was sold to the maharaja of Patiala, the remainder being restored to its hereditary chief. In 1823 the district of Punar was added to the Keonthal state. The raja exercises rights of lordship over the petty states of Kothi, Theog, Madhan and Ratesh.

KEPLER, JOHANN (1571-1630), German astronomer, was born on the 27th of December 1571, at Weil, in the duchy of Wiirttemberg, of which town his grandfather was burgomaster. He was the eldest child of an ill-assorted union. His father, Henry Kepler, was a reckless soldier of fortune; his mother, Catherine Guldenmann, the daughter of the burgomaster of Eltingen, was undisciplined and ill-educated. Her husband found campaigning in Flanders under Alva a welcome relief from domestic life; and, after having lost all he possessed by a forfeited security and tried without success the trade of tavern-keeping in

the village of Elmendingen, he finally, in 1 589, deserted his family. The misfortune and misconduct of his parents were not the only troubles of Kepler's childhood. He recovered from small-pox in his fourth year with crippled hands and eyesight permanently impaired; and a constitution enfeebled by premature birth had to withstand successive shocks of severe illness. His schooling began at Leonberg in 1577 — the year, as he himself

tells us, of a great cormt; but domestic bankruptcy occasioned his transference to field-work, in which he was exclusively employed for several years. Bodily infirmity, combined with mental aptitude, were eventually considered to indicate a theological vocation; he was, in 1584, placed at the seminary of Adelberg, and thence removed, two years later, to that of Maulbronrt A brilliant examination for the degree of bachelor procured him, in 1588, admittance on the foundation to the university of Tubingen, where he laid up a copious store of classical erudition, and imbibed Copernican principles from the private instructions of his teacher and life-long friend, Michael MaesUin. As yet, however, he had little knowledge of, and less inclination for, astronomy; and it was with extreme reluctance that he turned aside from the more promising career of the ministry to accept, early in 1594, the vacant chair of that science at Gratz, placed at the disposal of the Tubingen professors by the Lutheran states of Styria.

The best recognized function of German astronomers in that day was the construction of prophesying almanacs, greedily bought by a credulous public. Kepler thus found that the first duties required of him were of an astrological nature, and set himself with characteristic alacrity to master the rules of the art as laid down by Ptolemy and Cardan. He, moreover, sought in the events of his own life a verification of the theory of planetary influences; and it is to this practice that we owe the summary record of each year's occurrences which, continued almpst to his death, affords for his biography a slight but sure foundation. But his thoughts were already working in a higher sphere. He early attained to the settled conviction that for the actual dis- position of the solar system some abstract intelligible reason must exist, and this, after much meditation, he believed himself to have found in an imaginary relation between the "five regular solids " and the number and distances of the planets. He notes with exultation the 9th of July 1595, as the date of the pseudo- discovery, the publication of which in Prodromus Disserlationum Cosmographicarum sen Mysterium Cosmographicum (Tubingen, 1596) procured him much fame, and a friendly correspondence with the two most eminent astronomers of the time, Tycho 1 Brahe and Galileo.

Soon after his arrival at Gratz, Kepler contracted art engage- ment with Barbara von Miihleck, a wealthy Styrian heiress, who, at the age of twenty-three, had already survived one husband and been divorced from another. Before her relatives could be brought to countenance his pretensions, Kepler was obliged to undertake a journey to Wiirttemberg to obtain documentary evidence of the somewhat obscure nobility of his family, and it was thus not until the 27th of April 1597 that the marriage was celebrated. In the following year the archduke Ferdinand, on assuming the government of his hereditary dominions, issued an edict of banishment against Protestant preachers and professors. Kepler immediately fled to the

Hungarian frontier, but, by the favour Of the Jesuits, was recalled and reinstated in his post. The gyrrmasium, however, was deserted; the nobles of Styria began to murmur at subsidizing a teacher without pupils; and he found it prudent to look elsewhere for employment. His refusal to subscribe unconditionally to the rigid formula of belief adopted by the theologians of Tubingen permanently closed against him the gates of his alma mater. His embarrassment was relieved however by an offer from Tycho Brahe of the position of assistant in his observatory near Prague, which, after a preliminary visit of four months, he accepted. The arrangement was made just in time; for in August 1600 he received definitive notice to leave Gratz, and, having leased his wife's property, he departed with his family for Prague.

By Tycho's unexpected death (Oct. 24, 1601) a brilliant career seemed to be thrown open to Kepler. The emperor Rudolph II.

immediately appointed him to succeed his patron as imperial mathematician, although at a reduced salary of 500 florins; the invaluable treasure of Tycho's observations was placed at his disposal; and the laborious but congenial task was entrusted to him of completing the tables to which the grateful Dane had already affixed the title of Rudolphine. The first works executed by him at Prague were, nevertheless, a homage to the astrological proclivities of the emperor. In De fundamentis astrologiae cerlioribus (Prague, 1602) he declared his purpose of preserving and purifying the grain of truth which he believed the science to contain. Indeed, the doctrine of "aspects" and "influences" fitted excellently with his mystical conception of the universe, and enabled him to discharge with a semblance of sincerity the most lucrative part of his professional duties. Although he strictly limited his prophetic pretensions to the estimate of tendencies and probabilities, his forecasts were none the less in demand. Shrewd sense and considerable knowledge of the world came to the aid of stellar lore in the preparation of " prognostics " which, not unf requently hitting off the event, earned him as much credit with the vulgar as his cosmical speculations with the learned. He drew the horoscopes of the emperor and Wallenstein, as well as of a host of lesser magnates; but, though keenly alive to the unworthy character of such a trade, he made necessity his excuse for a compromise with superstition. " Nature," he wrote, " which has conferred upon every animal the means of subsistence, has given astrology as an adjunct and ally to astro- nomy." He dedicated to the emperor in 1603 a treatise on the " great conjunction" of that year (Judicium de trigono igneo); and he published his observations on a

brilliant star which appeared suddenly (Sept. 30, 1604), and remained visible for seventeen months, in De Stella nova in pede Serpentarii (Prague, 1606). While sharing the opinion of Tycho as to the origin of such bodies by condensation of nebulous matter from the Milky Way, he attached a mystical signification to the coincidence in time and place of the sidereal apparition with a triple conjunction of Mars, Jupiter and Saturn.

The main task of his life was not meanwhile neglected. This was nothing less than the foundation of a new astronomy, in which physical cause should replace arbitrary hypothesis. A preliminary study of optics led to the publication, in 1604, of his Astronomiae pars optica, containing important discoveries in the theory of vision, and a notable approximation towards the true law of refraction. But it was not until 1609 that, the " great Martian labour " being at length completed, he was able, in his own figurative language, to lead the captive planet to the foot of the imperial throne. From the time of his first introduction to Tycho he had devoted himself to the investigation of the orbit of Mars, which, on account of its relatively large eccentricity, had always been especially recalcitrant to theory, and the results appeared in Astronomia nova 0117-10X0717705, seu Physica coeleslis tradita commentariis de motibus stellae Mar lis (Prague, 1600). In this, the most memorable of Kepler's multifarious writings, two of the cardinal principles of modern astronomy — the laws of elliptical orbits and of equal areas — were established (see Astro- nomy: History); important truths relating to gravity were enunciated, and the tides ascribed to the influence of lunar attraction; while an attempt to explain the planetary revolutions in the then backward condition of mechanical knowledge pro- duced a theory of vortices closely resembling that afterwards adopted by Descartes. Having been provided, in August 16 10, by Ernest, archbishop of Cologne, with one of the new Galilean instruments, Kepler began, with unspeakable delight, to observe the wonders revealed by it. He had welcomed with a little essay called Dissertatio cum Nuncio Sidereo Galileo's first announce- ment of celestial novelties; he now, in his Dioplrice (Augsburg, 1 6 1 1) , expounded the theory of refraction by lenses, and suggested the principle of the " astronomical " or inverting telescope. Indeed the work may be said to have founded the branch of science to which it gave its name.

The year 161 1 was marked by Kepler as the most disastrous of his life. The death by small-pox of his favourite child was followed by that of his wife, who, long a prey to melancholy, was on the

3rd of July carried off by typhus. Public calamity was added to private bereavement. On the 23rd of May 161 1 Matthias, brother of the emperor, assumed the Bohemian crown in Prague, compelling Rudolph to take refuge in the citadel, where he died on the 20th of January following. Kepler's

fidelity in remaining with him to the last did not deprive him of the favour of his successor. Payments of arrears, now amounting to upwards of 4000 florins, was not, however, in the desperate condition of the imperial finances, to be hoped for; and he was glad, while retaining his position as court astronomer, to accept (in 161 2) the office of mathematician to the states of Upper Austria. His residence at Linz was troubled by the harsh conduct of the pastor Hitzler, in excluding him from the rites of his church on the ground of supposed Calvinistic leanings — a decision confirmed, with the addition of an insulting reprimand, on his appeal to Wurttemberg. In 1613 he appeared with the emperor Matthias before the diet of Ratisbon as the advocate of the introduction into Germany of the Gregorian calendar; but the attempt was for the time frustrated by anti-papal prejudice. The attention devoted by him to chronological subjects is evidenced by the publication about this period of several essays in which he sought to prove that the birth of Christ took place five years earlier than the commonly accepted date.

Kepler's second courtship forms the subject of a highly char- acteristic letter addressed by him to Baron Stralendorf, in which he reviews the qualifications of eleven candidates for his hand, and explains the reasons which decided his choice in favour of a portionless orphan girl named Susanna Reutlinger. The marriage was celebrated at Linz, on the 30th of October 1613, and seems to have proved a happy and suitable one. The abundant vintage of that year drew his attention to the defective methods in use for estimating the cubical contents of vessels, and his essay on the subject (Nova Stereometria Doliorum, Linz, 1615) entitles him to rank among those who prepared the discovery of the infinitesimal calculus. His observations on the three comets of 1618 were published in De Comelis, contemporaneously with De Harmonice Mundi (Augsburg, 16 19), of which the first linea- ments had been traced twenty years previously at Gratz. This extraordinary production is memorable as having announced the discovery of the " third law " — that of the sesquiplicate ratio between the planetary periods and distances. But the main purport of the treatise was the exposition of an elaborate system of celestial harmonies depending on the various and varying velocities of the several planets, of which the sentient soul animating the sun was the solitary auditor. The work exhibiting this fantastic emulation of extravagance with genius was dedi- cated to James I. of England, and the compliment was acknow- ledged with an invitation to that island, conveyed through Sir Henry Wotton. Notwithstanding the distracted state of his own country, he refused to abandon it, as he had previously, in 161 7, declined the post of successor to G. A. Magini in the mathe- matical chair of Bologna.

The insurmountable difficulties presented by the lunar theory forced Kepler, after an enormous amount of fruitless labour, to abandon his design of

comprehending the whole scheme of the heavens in one great work to be called Hipparchus, and he then threw a portion of his materials into the form of a dialogue intended for the instruction of general readers. The Epitome Astronomiae Copernicanae (Linz and Frankfort, 1618-1621), a lucid and attractive textbook of Copernican science,was remark- able for the prominence given to " physical astronomy," as well as for the extension to the Jovian system of the laws recently discovered to regulate the motions of the planets. The first of a series of ephemerides, calculated on these principles, was published by him at Linz in 1617; and in that for 1620, dedicated to Baron Napier, he for the first time employed logarithms. This important invention was eagerly welcomed by him, and its theory formed the subject of a treatise entitled Chilias Logarithmorum, printed in 1624, but circulated in manuscript three years earlier, which largely contributed to bring the new method into general use in Germany.

His studies were interrupted by family trouble. The restless

disposition and unbridled tongue of Catherine Kepler, his mother, created for her numerous enemies in the little town of Leonberg; while her unguarded conduct exposed her to a species of calumny at that time readily circulated and believed. As early as 1615 suspicions of sorcery began to be spread against her, which she, with more spirit than prudence, met with an action for libel. The suit was purposely protracted, and at length, in 1620, the un- happy woman, then in her seventy-fourth year, was arrested on a formal charge of witchcraft. Kepler immediately hastened to Wtirttemberg, and owing to his indefatigable exertions she was acquitted after having suffered thirteen month's imprisonment, and endured with undaunted courage the formidable ordeal of " territion," or examination under the imminent threat of torture. She survived her release only a few months, dying on the 13th of April 1622.

Kepler's whole attention was now devoted to the production of the new tables. " Germany," he wrote, " does not long for peace more anxiously than I do for their publication." But financial difficulties, combined with civil and religious convul- sions, long delayed the accomplishment of his desires. From the 24th of June to the 29th of August 1626, Linz was besieged, and its inhabitants reduced to the utmost straits by bands of in- surgent peasants. The pursuit of science needed a more tranquil shelter; and on the raising of the blockade, Kepler obtained per- mission to transfer his types to Ulm, where, in September 1627, the Rudolphine Tables were at length given to the world. Although by no means free from errors, their value appears from the fact that they ranked for a century as the best aid to astronomy. Appended were tables of logarithms and of refraction,

together with Tycho's catalogue of 777 stars, enlarged by Kepler to 1005. Kepler's claims upon the insolvent imperial exchequer amounted by this time to 12,000 florins. The emperor Ferdi- nand II., too happy to transfer the burden, countenanced an arrangement by which Kepler entered the service of the duke of Friedland (VVallenstein), who assumed the full responsibility of the debt. In July 1628 Kepler accordingly arrived with his family at Sagan in Silesia, where he applied himself to the printing of his ephemerides up to the year 1636, and whence he issued, in 1629, a Notice to the Curious in Things Celestial, warning astronomers of approaching transits. That of Mercury was actually seen by Gassendi in Paris on the 7th of November 1631 (being the first passage of a planet across the sun ever observed) ; that of Venus, predicted for the 6th of December following, was invisible in western Europe. Wallenstein's promises to Kepler were but imperfectly fulfilled. In lieu of the sums due, he offered him a professorship at Rostock, which Kepler declined. An expedition to Ratisbon, undertaken for the purpose of representing his case to the diet, terminated his life. Shaken by the journey, which he had performed entirely on horseback, he was attacked with fever, and died at Ratisbon, on the 15th of November (N.S.), 1630, in the fifty-ninth year of his age. An inventory of his effects showed him to have been possessed of no inconsiderable property at the time of his death. By his first wife he had five, and by his second seven children, of whom only two, a son and a daughter, reached maturity.

The character of Kepler's genius is especially difficult to estimate. His tendency towards mystical speculation formed a not less funda- mental quality of his mind than its strong grasp of positive scientific truth. Without assigning to each element its due value, no sound comprehension of his modes of thought can be attained. His idea of the universe was essentially Pythagorean and Platonic. He started with the conviction that the arrangement of its parts must correspond with certain abstract conceptions of the beautiful and harmonious. His imagination, thus kindled, animated him to those severe labours of which his great discoveries were the fruit. His demonstration that the planes of all the planetary orbits pass through the centre of the sun, coupled with his clear recognition of the sun as the moving power of the system, entitles him to rank as the founder of physical astronomy. But the fantastic relations imagined by him of planetary movements and distances to musical intervals and geometrical constructions seemed to himself discoveries no less admirable than the achievements which have secured his lasting fame. Outside the boundaries of the solar system, the metaphysical side of his genius, no longer held in check by experience, fully asserted itself. The Keplerian like the Pythagorean cosmos was threefold, consisting of the centre, or sun, the surface, represented by

the sphere of the fixed stars, and the intermediate space, filled with ethereal matter. It is a mistake to suppose that he regarded the stars as so many suns. He quotes indeed the opinion of Giordano Bruno to that effect, but with dissent. Among his happy conjectures may be mentioned that of the sun's axial rotation, postulated by him as the physical cause of the revolutions of the planets, and soon after confirmed by the discovery of sun-spots; the suggestion of a periodical variation in the obliquity of the ecliptic ; and the explana- tion as a solar atmospheric effect of the radiance observed to surround the totally eclipsed sun.

It is impossible to consider without surprise the colossal amount of work accomplished by Kepler under numerous disadvantages. But his iron industry counted no obstacles, and secured for him the highest triumph of genius, that of having given to mankind the best that was in him. In private character he was amiable and affectionate; his generosity in recognizing the merits of others secured him against the worst shafts of envy ; and a life marked by numerous disquietudes was cheered and ennobled by sentiments of sincere piety.

Kepler's extensive literary remains, purchased by the empress Catherine II. in 1724 from some Frankfort merchants, and long inaccessibly deposited in the observatory of Pulkowa, were fully brought to light, under the able editorship of Dr Ch. Frisch, in the first complete edition of his works. This important publication (Joannis Kepleri opera omnia, Frankfort, 1858-1871, 8 vols. 8vo) contains, besides the works already enumerated and several minor treatises, a posthumous scientific satire entitled Joh. Keppleri Somnium (first printed in 1634) and a vast mass of his corre- spondence. A careful biography is appended, founded mainly on his private notes and other authentic documents. His correspondence with Herwart von Hohenburg, unearthed by C. Anschiitz at Munich, was printed at Prague in 1886.

Authorities — C. G. Reuschle, Kepler und die Astronomie (Frank- fort, 1871); Karl Goebel, Vber Keplers astronomische Anschauungen (Halle, 1871) ; E. F. Apelt, Johann Keplers astronomische Weltansicht (Leipzig, 1849); J. L. C. Breitschwert, Johann Keplers Leben und Wirken (Stuttgart, 1831); W. Forster, Johann Kepler und die Har- monie der Sphdren (Berlin, 1862) ; R. Wolf, Geschichte der Astronomie (Munich, 1877); J. von Hasner, Tycho Brahe und J. Kepler in Prag (1872); H. Brocard, Essai sur la Metiorologie de Kepler (Grenoble, 1879, 1881) ; Siegmund Gunther, Johannes Kepler und der tellurisch- kosmische Magnelismus (Wien, 1888); N. Herz, Keplers Astrologie (1895) ; Ludwig Gunther, Keplers Traum vcm Mond (1898 ˆ an anno tated translation of the Somnium) ; A. Miiller, Johann Keppler, der Gesetzgeber der neueren Astronomie (1903) ; Allgemeine Deutsche Biographie, Bd. XV. (1882). (A. M. C.)

KEPPEL, AUGUSTUS KEPPEL, Viscount (1725-1786), British admiral, second son of the second earl of Albemarle, was born on the 25th of April 1725. He went to sea at the age of ten, and had already five years of Service to his credit when he was appointed to the " Centurion," and was sent with Anson round the world in 1740. He had a narrow escape of being killed in the capture of Paita (Nov. 13, 1741), and was named acting lieutenant in 1742. In 1744 he was promoted to be com- mander and post captain. Until the peace of 1748 he was actively employed. In 1747 he ran his ship the " Maidstone " (50) ashore near Belleisle while chasing a French vessel, but was honourably acquitted by a court martial, and reappointed to another command. After peace had been signed he was sent into the Mediterranean to persuade the dey of Algiers to restrain the piratical operations of his subjects. The dey is said to have complained that the king of England should have sent a beard- less boy to treat with him, and to have been told that if the beard was the necessary qualification for an ambassador it would have been easy to send a " Billy goat." After trying the effect of bullying without success, the dey made a treaty, and Keppel returned in 1751. During the Seven Years' War he saw constant service. He was in North America in 1755, on the coast of France in 1756, was detached on a cruise to reduce the French settlements on the west coast of Africa in 1758, and his ship the " Torbay " (74) was the first to get into action in the battle of Quiberon in 1759. In 1757 he had formed part of the court martial which had condemned Admiral Byng, and had been active among those who had endeavoured to secure a pardon for him; but neither he nor those who had acted with him could produce any serious reason why the sentence should not be carried out. When Spain joined France in 1762 he was sent as second in command with Sir George Pocock in the expedition which took Havannah. His health suffered from the fever which carried off an immense proportion of the soldiers and sailors, but the

£25,000 of prize money which he received freed him from the unpleasant position of younger son of a family ruined by the extravagance of his father. He became rear-admiral in October 1762, was one of the Admiralty Board from July 1765 to Novem- ber 1766, and was promoted vice-admiral on the 24th of October 1 7 70. When the Falkland Island dispute occurred in 1 7 70 he was to have commanded the fleet to be sent against Spain, but a settlement was reached, and he had no occasion to hoist his flag. The most important and the most debated period of his life belongs to the opening years of the war of American Indepen- dence. Keppel was by family connexion and personal preference a strong supporter of the Whig connexion, led by the Marquess of Rockingham and the Duke of

Richmond. He shared in all the passions of his party, then excluded from power by the resolute will of George III. As a member of Parliament, in which he had a seat for Windsor from 1761 till 1780, and then for Surrey, he was a steady partisan, and was in constant hostility with the " King's Friends." In common with them he was prepared to believe that the king's ministers, and in particular Lord Sand- wich, then First Lord of the Admiralty, were capable of any villany. When therefore he was appointed to command the Western Squadron, the main fleet prepared against France in 1778, he went to sea predisposed to think that the First Lord would be glad to cause him to be defeated. It was a further misfortune that when Keppel hoisted his flag one of his subordi- nate admirals should have been Sir Hugh Palliser (1723-1796), who was a member of the Admiralty Board, a member of parlia- ment, and in Keppel's opinion, which was generally shared, jointly responsible with his colleagues for the bad state of the navy. When, therefore, the battle which Keppel fought with the French on the 27th of July 1778 ended in a highly unsatis- factory manner, owing mainly to his own unintelligent manage- ment, but partly through the failure of Sir Hugh Palliser to obey orders, he became convinced that he had been deliberately betrayed. Though he praised Sir Hugh in his public despatch he attacked him in private, and the Whig press, with the unquestionable aid of Keppel's friends, began a campaign of calumny to which the ministerial papers answered in the same style, each side accusing the other; of/deliberate treason: The re- sult was a scandalous series of scenes in parliament and of courts martial. Keppel was first tried and acquitted in 1770, and then Palliser was also tried and acquitted. Keppel was ordered to strike his flag in March 1779. Until the fall of Lord North's ministry he acted as an opposition member of parliament. When it fell in 1782 be became First Lord, and was created Viscount 4Leppel and Baron Elden. His career in office was not dis tinguished, and he broke with his old political associates by resigning as a protest against the Peace of Paris. He finally discredited himself by joining the Coalition ministry formed by North and Fox, and with its fall disappeared from public life. He died unmarried on the 2nd of October 1786. Burke, who regarded him with great affection, said that he had " something high " in his nature, and that it" was " a wild stock of pride on which the tenderest of all hearts had grafted the milder virtues." His popularity disappeared entirely in his later years. His portrait was six times painted by Sir Joshua Reynolds. The copy which belonged originally to Burke is now in the National Gallery.

There is a full Life of Keppel (1842), by his grand-nephew, the Rev. Thomas Keppel. (D. H.)

KEPPEL, SIR HENRY (1809-1904), British admiral, son of the 4th earl of Albemarle and of his wife Elizabeth, daughter of Lord de Clifford, was born on the 14th of June 1809, and entered the navy from the old naval

academy of Portsmouth in 1822. His family connexions secured him rapid promotion, at a time when the rise of less fortunate officers was very slow. He became lieutenant in 1829 and commander in 1833. His first command in the " Childers " brig (16) was largely passed on the coast of Spain, which was then in the midst of the convulsions of the Carlist war. Captain Keppel had already made himself known as a good seaman. He was engaged with the squadron stationed on the west coast of Africa to suppress the slave trade.

In 1837 he was promoted post captain, and appointed in 1841 to the " Dido " for service in China and against the Malay pirates, a service which he repeated in 1847, when in command of H.M.S. " Maeander." The story of his two commands was told by himself in two publications, The Expedition to Borneo of H.M.S. " Dido " for the Suppression of Piracy (1846), and in A Visit to the Indian Archipelago in H .M .S . " Maeander " (1853). The substance of these books was afterwards incorporated into his autobiography, wiich was published in 1899 under the title A Sailor's Life under four Sovereigns. In 1853 he was appointed to the command of the " St Jean d'Acre " of 101 guns for service in the Crimean War. But he had no opportunity to distinguish himself at sea in that struggle. As commander of the naval brigade landed to co-operate in the siege of Sevastopol, he was more fortunate, and he had an honourable share in the latter days of the siege and reduction of the fortress. After the Crimean War he was again sent out to China, this time in command of the " Raleigh," as commodore to serve under Sir M. Seymour. The " Raleigh " was lost on an uncharted rock near Hong-Kong, but three small vessels were named to act as her tenders, and Commodore Keppel commanded in them, and with the crew of the " Raleigh," in the action with the Chinese at Fatshan Creek (June 1, 1857). He was honourably acquitted for the loss of the " Raleigh," and was named to the command of the " Alligator," which he held till his promotion to rear-admiral. For his share in the action at Fatshan Creek he was made K.C.B. The prevalence of peace gave Sir Henry Keppel no further chance of active service, but he held successive commands till his retirement from the active list in 1879, two years after he attained the rank of Admiral of the Fleet. He died at the age of 95 on the 17th of January 1904.

KER, JOHN (1673-1726), Scottish spy, was born in Ayrshire on the 8th of August 1673. His true name was Crawfurd, his father being Alexander Crawfurd of Crawfurdland; but having married Anna, younger daughter of Robert Ker, of Kersland, Ayrshire, whose only son Daniel Ker was killed at the battle of Steinkirk in 1692, he assumed the name and arms of Ker in 1697, after buying the family estates from his wife's elder sister. Having become a leader among the extreme Covenanters, he made use of his influence to relieve his pecuniary embarrass- ments, selling his support at

one time to the Jacobites, at another to the government, and whenever possible to both parties at the same time. He held a licence from the government in 1707 permitting him to associate with those whose disloyalty was known or suspected, proving that he was at that date the government's paid spy; and in his Memoirs Ker asserts that he had a number of other spies and agents working under his orders in different parts of the country. He entered into corre- spondence with Catholic priests and Jacobite conspirators, whose schemes, so far as he could make himself cognisant of them, he betrayed to the government. But he was known to be a man of the worst character, and it is improbable that he succeeded in gaining the confidence of people of any importance. The duchess of Gordon was for a time, it is true, one of his correspondents, but in 1707 she had discovered him to be " a knave." He went to London in 1709, where he seems to have extracted considerable sums of money from politicians of both parties by promising or threatening, as the case might be, to expose Godolphin's relations with the Jacobites. In 1 7 13, if his own story is to be believed, business of a semi- ' diplomatic nature took Ker to Vienna, where, although he failed in the principal object of his errand, the emperor made him a present of his portrait set in jewels. Ker also occupied his time in Vienna, he says, by gathering information which he forwarded to the electress Sophia; and in the following year on his way home he stopped at Hanover to give some advice to the future king of England as to the best way to govern the English. Although in his own opinion Ker materially assisted in placing George I. on the English throne, his services were unrewarded, owing, he would have us believe, to the incor- ruptibility of his character. Similar ingratitude was the recompense for his revelations of the Jacobite intentions in 1715;

and as he was no more successful in making money out of the East India Company, nor in certain commercial schemes which engaged his ingenuity during the next few years, he died in a debtors' prison, on the 8th of July 1726. While in the King's Bench he sold to Edmund Curl] the bookseller, a fellow-prisoner, who was serving a sentence of five months for publishing obscene books, the manuscript of (or possibly only the materials on which were based) the Memoirs of John Ker of Kersland, which Curll published in 1726 in three parts, the last of which appeared after Ker's death. For issuing the first part of the Memoirs, which purported to make disclosures damaging to the govern- ment, but which Curll in self-justification described as " vindi- cating the memory of Queen Anne," the publisher was sentenced to the pillory at Charing Cross; and he added to the third part of the Memoirs the indictment on which he had been convicted. See the above-

mentioned Memoirs (London, 1726-1727), and in particular the " preface " to part i.; George Lockhart, The Lockhart Papers (2 vols., London, 1817); Nathaniel Hooke, Correspondence, edited by W. D. Macray (Roxburghe Club, 2 vols., London, 1870), in which Ker is referred to under several pseudonyms, such as " Wicks," " Trustie," " The Cameronian Mealmonger," &c.

KERAK, a town in eastern Palestine, 10 m. E. of the southern angle of the Lisan promontory of the Dead Sea, on the top of a rocky hill about 3000 ft. above sea-level. It stands on a platform forming an irregular triangle with sides about 3000 ft. in length, and separated by deep ravines from the ranges around on all sides but one. The population is estimated at 6000 Moslems and 1800 Orthodox Greek Christians. Kerak is identified with the Moabite town of Kir-Hareseth (destroyed by the Hebrew- Edomite coalition, 2 Kings iii. 25), and denounced by Isaiah under the name Kir of Moab (xv. 1), Kir-Hareseth (xvi. 7) or Kir-Heres (xvi. n): Jeremiah also refers to it by the last name (xxxix. 31, 36). The modern name, in the form Xdpa£, appears in 2 Mace. xii. 17. Later, Kerak was the seat of the archbishop of Petra. The Latin kings of Jerusalem, recognizing its importance as the key of the E. Jordan region, fortified it in 1142: from 1183 it was attacked desperately by Saladin, to whom at last it yielded in 1188. The Arabian Ayyubite princes fortified the town, as did the Egyptian Mameluke sultans. The fortifications were repaired by Bibars in the 13th century. For a long time after the Turkish occupation of Palestine and Egypt it enjoyed a semi- independence, but in 1893 a Turkish governor with a strong garrison was established there, which has greatly contributed to secure the safety of travellers and the general quiet of the district. The town is an irregular congeries of flat mud-roofed houses. In the Christian quarter is the church of St George; the mosque also is a building of Christian origin. The town is surrounded by a wall with five towers; entrance now is obtained through bteaches in the wall, but formerly it was accessible only by means of tunnels cut in the rocky substratum. The castle, now used as the headquarters of the garrison and closed to visitors, is a remarkably fine example of a crusaders' fortress.

(R. A. S. M.)

KERALA, or Chera, the name of one of the three ancient Dravidian kingdoms of the Tamil country of southern India, the other two being the Chola and the Pandya. Its original territory comprised the country now contained in the Malabar district, with Travancore and Cochin, and later the country included in the Coimbatore district and a part of Salem. The boundaries, however, naturally varied much from time to time. The earliest references to this kingdom appear in the edicts of Asoka, where it is called Keralaputra {i.e. son of Kerala) , a name which in a slightly corrupt form

is known to Pliny and the author of the Periplus. There is evidence of a lively trade carried on by sea with the Roman empire in the early centuries of the Christian era, but of the political history of the Kerala kingdom nothing is known beyond a list of rajas compiled from inscriptions, until in the 10th century the struggle began with the Cholas, by whom it was conquered and held till their over- throw by the Mahommedans in 13 10. These in their turn were driven out by a Hindu confederation headed by the chiefs of Vijayanagar, and Kerala was absorbed in the Vijayanagar empire

until its destruction by the Mahommedans in 1565. For about 80 years it seems to have preserved a precarious independence under the naiks of Madura, but in 1640 was conquered by the Adil Shah dynasty of Bijapur and in 1652 seized by the king of Mysore.

See V. A. Smith, Early Hist, of India, chap. xvi. (2nd ed., Oxford,

1908).

KERASUND (anc. Choerades, Pharnacia, Cerasus), a town on the N. coast of Asia Minor, in the Trebizond vilayet, and the port — an exposed roadstead — of Kara-Hissar Sharki, with which it is connected by a carriage road. Pop. just under io,oco, Moslems being in a slight minority. The town is situated on a rocky promontory, crowned by a Byzantine fortress, and has a growing trade. It exports filberts (for which product it is the centre), walnuts, hides and timber. Cerasus was the place from which the wild cherry was introduced into Italy by Lucullus and so to Europe (hence Fr. cerise, " cherry ").

KERATRY, AUGUSTE HILARION, Comte de (1769-1859), French writer and politician, was born at Rennes on the 28th of December 1769. Coming to Paris in 1790, he associated himself with Bernardin de St Pierre. After being twice imprisoned during the Terror he retired to Brittany, where he devoted him- self to literature till 1814. In 1818 he returned to Paris as deputy for Finistere, and sat in the Chamber till 1824, becoming one of the recognized liberal leaders. He was re-elected in 1827, took an active part in the establishment of the July monarchy, was appointed a councillor of state (1830), and in 1837 was made a peer of France. After the coup d'etat of 1851 he retired from public life. Among his publications were Conies et Idylles (1791); Lysus et Cydippe, a poem (1801); Inductions morales et physiologiques (1817); Documents pour servir a I'histoire de France (1820); Du Beau dans les arts d'imitation (1822); Le Dernier des Beaumanoir (1824). His last work, Clarisse (1854), a novel, was written when he was eighty-five. He died at Port-Marly on the 7th of November 1859.

His son, comte Emile de Keratry (1832-), became deputy for Finistere in 1869, and strongly supported the war with Germany in 1870. He was in Paris during part of the siege, but escaped in a balloon, and joined Gambetta. In 187 1 Thiers appointed him to the prefecture, first of the Haute-Garonne, and subsequently of the Bouches-du-Rhone, but he resigned in the following year. He is the author of La Contre- guerilla francaise au Mexique (1868); L' ftlevation et la chute de I'empereur Maximilien (1867); Le Quatre-septembre et le gouvernement de /

KERBELA, or Meshed-Hosain, a town of Asiatic Turkey, the capital of a sanjak of the Bagdad vilayet, situated on the extreme western edge of the alluvial river plain, about 60 m. S.S.W. of Bagdad and 20 m. W. of the Euphrates, from which a canal extends almost to the town. The surrounding territory is fertile and well cultivated, especially in fruit gardens and palm- groves. The newer parts of the city are built with broad streets and sidewalks, presenting an almost European appearance. The inner town, surrounded by a dilapidated brick wall, at the gates of which octroi duties are still levied, is a dirty Oriental city, with the usual narrow streets. Kerbela owes its existence to the fact that Hosain, a son of 'Ali, the fourth caliph, was slain here by the soldiers of Yazid, the rival aspirant to the caliphate, on the 10th of October a.d. 680 (see Caliphate, sec. B, § 2) . The most important feature of the town is the great shrine of Hosain, containing the tomb of the martyr, with its golden dome and triple minarets, two of which are gilded. Kerbela is a place of pilgrimage of the Shi'ite Moslems, and is only less sacred to them than Meshed 'Ah and Mecca. Some 200,000 pilgrims from the Shi'ite portions of Islam are said to journey annually to Kerbela, many of them carrying the bones of their relatives to be buried in its sacred soil, or bringing their sick and aged to die there in the odour of sanctity. The mullahs, who fix the burial fees, derive an enormous revenue from the faithful. Formerly Kerbela was a self-governing hierarchy and constituted an inviolable sanctuary for criminals; but in 1843 the Turkish

government undertook to deprive the city of some of these I liberties and to enforce conscription. The Kerbelese resisted, and Kerbela was bombarded (hence the ruined condition of the old walls) and reduced with great slaughter. Since then it has formed an integral part of the Turkish administration of Irak. The enormous influx of pilgrims naturally creates a brisk trade in Kerbela and the towns along the route from Persia to that place and beyond to Nejef. The population of Kerbela, neces- sarily fluctuating, is estimated at something over 60,000, of whom the principal

part are Shi'ites, chiefly Persians, with a goodly mixture of British Indians. No Jews or Christians are allowed to reside there.

See Chodzko, Thedtre person (Paris, 1878); J. P. Peters, Nippur (1897)- (J. P. Pe.)

KERCH, or Kertch, a seaport of S. Russia, in the govern- ment of Taurida, on the Strait of Kerch or Yenikale, 60 m. E.N.E. of Theodosia, in 45° 21′ N. and 36° 30′ E. Pop. (1897), 31,702. It stands on the site of the ancient Panticapaeum, and, like most towns built by the ancient Greek colonists in this part of the world, occupies a beautiful situation, clustering round the foot and climbing up the sides of the hill (called after Mithradates) on which stood the ancient citadel or acropolis. The church of St John the Baptist, founded in 717, is a good example of the early Byzantine • style. That of Alexander Nevsky was formerly the Kerch museum of antiquities, founded in 1825. The more valuable objects were subsequently removed to the Hermitage at St Petersburg, while those that remained at Kerch were scattered during the English occupation in the Crimean War. The existing museum is a small collection in a private house. Among the products of local industry are leather, tobacco, cement, beer, aerated waters, lime, candles and soap. Fishing is carried on, and there are steam saw-mills and flour-mills. A rich deposit of iron ore was discovered close to Kerch in 1895, and since then mining and blasting have been actively prosecuted. The mineral mud-baths, one of which is in the town itself and the other beside Lake Chokrak (9 m. distant), are much frequented. Notwithstanding the deepen- ing of the strait, so that ships are now able to enter the Sea of Azov, Kerch retains its importance for the export trade in wheat, brought thither by coasting vessels. Grain, fish, linseed, rapeseed, wool and hides are also exported. About 6 m. N.E. are the town and old Turkish fortress of Yenikale, adminis- tratively united with Kerch. Two and a half miles to the south are strong fortified works defending the entrance to the Sea of Azov.

The Greek colony of Panticapaeum was founded about the middle of the 6th century B.C., by the town of Miletus. From about 438 B.C. till the conquest of this region by Mithradates the Great, king of Pontus, about 100 B.C., the town and territory formed the kingdom of the Bosporus, ruled over by an inde- pendent dynasty. Phanaces, the son of Mithradates, became the founder of a new line under the protection of the Romans, which continued to exist till the middle of the 4th century A.D., and extended its power over the maritime parts of Tauris. After that the town — whicn had already begun to be known as Bospora — passed successively into the hands of the Eastern empire, of the Khazars, and of various barbarian tribes. In 1318, the Tatars, who had come into possession in the previous century, ceded the town to the Genoese, who soon raised it into new importance as a commercial centre. They usually

called the place Cerchio, a corruption of the Russian name K'rtchev (whence Kerch), which appears in the nth century inscription of Tmutarakan (a Russian principality at the north foot of the Caucasus). Under the Turks, whose rule dates from the end of the 15th century, Kerch was a military port; and as such it plays a part in the Russo-Turkish wars. Captured by the Russians under Dolgorukov in 1771, it was ceded to them along with Yenikale by the peace of Kuchuk-Kainarji, and it became a centre of Russian naval activity. Its importance was greatly impaired by the rise of Odessa and Taganrog; and in 1820 the fortress was dismantled. Kerch suffered severely during the Crimean War.

Archaeologically Kerch is of particular interest, the kurgans or sepulchral mounds of the town and vicinity having yielded a rich variety of the most beautiful works of art. Since 1825 a large number of tombs have been opened. In the Altun or Zolotai-oba (Golden Mound) was found a great stone vault similar in style to an Egyptian pyramid; and within, among many objects of minor note, were golden dishes adorned with griffins and beautiful arab- esques. IntheKul-oba, or Mound of Cinders (opened in 1830-1831), was a similar tomb, in which were found what would appear to be the remains of one of the kings of Bosporus, of his queen, his horse and his groom. The ornaments and furniture were of the most costly kind ; the king's bow and buckler were of gold ; his very whip intertwined with gold ; the queen had golden diadems, necklace and breast-jewels, and at her feet lay a golden vase. In the Pavlovskoi kurgan (opened in 1858) was the tomb of a Greek lady, containing among other articles of dress and decoration a pair of fine leather boots (a unique discovery) and a beautiful vase on which is painted the return of Persephone from Hades and the setting out of Tri- ptolemus for Attica. In a neighbouring tomb was what is believed to be " the oldest Greek mural painting which has come down to us," dating probably from the 4th century B.C. Among the minor objects discovered in the kurgans perhaps the most noteworthy are the fragments of engraved boxwood, the only examples known of the art taught by the Sicyonian painter Pamphilus.

Very important finds of old Greek art continue to be made in the neighbourhood, as well as at Tamafi, on the east side of the Strait of Kerch. The catacombs on the northern slope of Mithradates Hill, of which nearly 200 have been explored since 1859, possess considerable interest, not only for the relics of old Greek art which some of them contain (although most were plundered in earlier times), but especially as material for the history and ethnography of the Cimmerian Bosporus. In 1890 the first Christian catacomb bearing a distinct date (491) was discovered. Its walls were covered with Greek inscriptions and crosses.

See H. D. Seymour's Russia on the Black Sea and Sea of Azof London,

1855) ; J. B. Telfer, The Crimea (London, 1876) ; P. Bruhn, Tchernomore, 1852-1877 (Odessa, 1878) ; GiWes, Antiquites du Bosphore Cimmerien ˆ1854) > D. Macpherson, Antiquities of Kertch (London, 1857) ; Compte rendu de la Commission Imp. Archeologique (St Petersburg); L. Stephani, Die Alterthiimer vom Kertsch (St Petersburg, 1880) ; C. T. Newton, Essays on Art and Archaeology (London, 1880) ; Reports of the [Russian] Imp. Archaeological Commission; Izvestia (Bulletin) of the Archives Commission for Taurida; Antiquites du Bosphore Cimmerien, conservees au Musee Imperial de I'Ermitage (St Petersburg, 1854); Inscriptiones antiquae orae septentrionalis Ponti Euxini graecae et latinae, with a preface by V. V. Latyshev (St Petersburg, 1890); Materials for the Archaeology of Russia, published by the Imp. Arch. Commission (No. 6, St Petersburg, 1891). _ (P. A. K.;J. T. Be.)

KERCKHOVEN, JAN POLYANDER VAN DEN (1568-1646), Dutch Protestant divine, was born at Metz, in 1568. He became French preacher at Dort in 1591, and afterwards succeeded Franz Gomarus as professor of theology at Leiden. He was invited by the States General of Holland to revise the Dutch translation of the Bible, and it was he who edited the canons of the synod of Dort (1618-1619).

His many published works include Responsio ad sophismata A. Cocheletii doctoris surbonnistae (1610), Dispute contre V adoration des reliques des Saincts trespasses (161 1), Explicatio somae prophetae

(1625).

KERGUELEN ISLAND, Kerguelen's Land, or Desolation Island, an island in the Southern Ocean, to the S.E. of the Cape of Good Hope, and S.W. of Australia, and nearly half-way between them. Kerguelen lies between 48° 39′ and 49° 44′ S. and 68° 42′ and 70° 35′ E. Its extreme length is about 85 m., but the area is only about 1400 sq. m. The island is throughout mountainous, presenting from the sea in some directions the appearance of a series of jagged peaks. The various ridges and mountain masses are separated by steep-sided valleys, which run down to the sea, forming deep fjords, so that no part of the interior is more than 12 m. from the sea. The chief summits are Mounts Ross (6120 ft.), Richards (4000), Crozier (3251), Wyville Thomson (3160), Hooker (2600), Moseley (2400). The coast-line is extremely irregular, and the fjords, at least on the north, east and south, form a series of well-sheltered harbours. As the prevailing winds are westerly, the safest anchorage is on the north-east. Christmas Harbour on the north and Royal Sound on the south are noble harbours, the latter with a labyrinth of islets interspersed over upwards of 20 m. of land-locked waters. The scenery is generally magnificent. A dis- trict of considerable extent in the centre of the island is occupied

by snowfields, whence glaciers descend east and west to the sea. The whole island, exclusive of the snowfields, abounds in fresh- water lakes and pools in the hills and lower ground. Hidden deep mudholes are frequent.

Kerguelen Island is of undoubted volcanic origin, the prevailing rock being basaltic lavas, intersected occasionally by dikes, and an active volcano and hot springs are said to exist in the south-west of the island. Judging from the abundant fossil remains of trees, the island must have been thickly clothed with woods and other vegeta- tion of which it has no doubt been denuded by volcanic action and submergence, and possibly by changes of climate. It presents evidences of having been subjected to powerful glaciation, and to subsequent immersion and immense denudation. The soundings made by the " Challenger " and " Gazelle " and the affinities which in certain respects exist between the islands, seem to point to the existence at one time of an extensive land area in this quarter, of which Kerguelen, Prince Edward's Islands, the Crozets, St Paul and Amsterdam are the remains. The Kerguelen plateau rises in many parts to within 1500 fathoms of the surface of the sea. Beds of coal and of red earth are found in some places. The summits of the flat- topped hills about Betsy Cove, in the south-east of the island, are formed of caps of basalt.

According to Sir J. D. Hooker the vegetation of Kerguelen Island is of great antiquity; and may have originally reached it from the American continent; it has no affinities with Africa. The present climate is not favourable to permanent vegetation; the island lies within the belt of rain at all seasons of the year, and is reached by no drying winds; its temperature is kept down by the surrounding vast expanse of sea, and it lies within the line of the cold Antarctic drift. The temperature, however, is equable. The mean annual temperature is about 39° F., while the summer temperature has been observed to approach 70 . Tempests and squalls are frequent, and the weather is rarely calm. On the lower slopes of the mountains a rank vegetation exists, which, from the conditions mentioned, is con- stantly saturated with moisture. A rank grass, Festuca Cookii, grows thickly in places up to 300 ft., with Azorella, Cotula plumosa, &c. Sir J. D. Hooker enumerated twenty-one species of flowering plants, and seven of ferns, lycopods, and Characeae; at least seventy- four species of mosses, twenty-five of Hepalicae, and sixty-one of lichens are known, and there are probably many more. Several of the marine and many species of freshwater algae are peculiar to the island. The characteristic feature of the vegetation, the Kerguelen's Land cabbage, was formerly abundant, but has been greatly reduced by rabbits introduced on to the island. Fur-seals are still found in

Kerguelen, though their numbers have been reduced by reckless slaughter. The sea-elephant and sea-leopard are characteristic. Penguins of various kinds are abundant; a teal {Querquedula Eatoni) peculiar to Kerguelen and the Crozets is also found in consider- able numbers, and petrels, especially the giant petrel (Ossifraga gigantea), skuas, gulls, sheath-bills (Chionts minor), albatross, terns, cormorants and Cape pigeons frequent the island. There is a con- siderable variety of insects, many of them with remarkable pecu- liarities of structure, and with a predominance of forms incapable of flying.

The island was discovered by the French navigator, Yves Joseph de Kerguelen-Tremarec, a Breton noble (1745-1797), on the 13th of February 1772, and partly surveyed by him in the following year. He was one of those explorers who had been attracted by the belief in a rich southern land, and this island, the South France of his first discovery, was afterwards called by him Desolation Land in his disappointment. Captain Cook visited the island in 1776, and, among other expeditions, the " Challenger " spent some time here, and its staff visited and surveyed various parts of it in January 1874. It was occupied from October 1874 to February 1875 by the expeditions sent from England, Germany and the United States to observe the transit of Venus. The German South Polar expedition in 1901- 1902 established a meteorological and magnetic station at Royal Sound, under Dr Enzensperger, who died there. In January 1893 Kerguelen was annexed by France, and its commercial exploitation was assigned to a private company.

See Y. J. de Kerguelen-Tremarec, Relation de deux voyages dans les mers australes (Paris, 1782) ; Narratives of the Voyages of Captain Cook and the "Challenger" Expedition; Phil. Trans., vol. 168, containing account of the collections made in Kerguelen by the British transit of Venus expedition in 1 874-1 875 ;Lieutard," Mission aux lies Kerguelen," &c, Annales hydro graphiques (Paris, 1893).

KERGUELEN'S LAND CABBAGE, in botany, Pringlea anti- scorbulica (natural order Cruciferae), a plant resembling in habit, and belonging to the same family as, the common cabbage (Brassica oleracea) . The cabbage-like heads of leaves abound in

a pale yellow highly pungent essential oil, which gives the plant a peculiar flavour but renders it extremely wholesome. It was discovered by Captain Cook during his first voyage, but the first account of it was published by (Sir) Joseph Hooker in The Botany of the Antarctic Voyage of the "Erebus" and " Terror " in 1839-1843. During the stay of the latter expedition on the island, daily use was made of this vegetable either cooked by itself or boiled with the ship's beef, pork or pea-soup. Hooker observes of it, " This

is perhaps the most interesting plant pro- cured during the whole of the voyage performed in the Antarctic Sea, growing as it does upon an island the remotest of any from a continent, and yielding, besides this esculent, only seventeen other flowering plants."

KERKUK, or Qerquq, the chief town of a sanjak in the Mosul vilayet of Asiatic Turkey, situated among the foot hills of the Kurdistan Mountains at an elevation of about 1100 ft. on both banks of the Khassa Chai, a tributary of the Tigris, known in its lower course as Adhem. Pop. estimated at 12,000 to 15,000, chiefly Mahommedan Kurds. Owing to its position at the junc- tion of several routes, Kerkuk has a brisk transit trade in hides, Persian silks and cottons, colouring materials, fruit and timber; but it owes its principal importance to its petroleum and naphtha springs. There are also natural warm springs at Kerkuk, used to supply baths and reputed to have valuable medical properties. In the neighbourhood of the city is a burning mountain, locally famous for many centuries. Kerkuk is evidently an ancient site, the citadel standing upon an artificial mound 130 ft. high. It was a metropolitan see of the Chaldean Christians. There is a Jewish quarter beneath the citadel, and the reputed sarcophagi of Daniel and the Hebrew children are shown in one of the mosques. (J. P. Pe.)

KERMADEC, a small group of hilly islands in the Pacific, about 30° S., 178° W., named from D'Entrecasteaux's captain, Huon Kermadec, in 1791. They are British possessions. The largest of the group is Raoul or Sunday Island, 20 m. in circum- ference, 1600 ft. high, and thickly wooded. The flora and fauna belong for the most part to those of New Zealand, on which colony the islands are also politically dependent, having been annexed in 1887.

KERMAN (the ancient Karmania), a province of Persia, bounded E. by Seistan and Baluchistan, S. by Baluchistan and Fars, W. by Fars, and N. by Yezd and Khorasan. It is of very irregular shape, expanding in the north to Khorasan and gradu- ally contracting in the south to a narrow wedge between Fars and Baluchistan; the extreme length between Seistan and Fars (E. and W.) is about 400 m., the greatest breadth (N. and S.) from south of Yezd to the neighbourhood of Bander Abbasi about 300 m., and the area is estimated at about 60,000 sq. m. Kerman is generally described as consisting of two parts, an unin- habitable desert region in the north and a habitable mountainous region in the south, but recent explorations require this view to be considerably modified. There are mountains and desert tracts in all parts, while much of what appears on maps as forming the western portion of the great Kerman desert consists of the fertile uplands of Kuhbanan, Raver and others stretching along the eastern base of the lofty range which runs from Yezd . south-east to Khabis. West of and parallel to this range are two others, one culminating north-west of Bam in the Kuh

Hazar (14,700 ft.), the other continued at about the same elevation under the name of the Jamal Bariz (also Jebel Bariz) south-eastward to Makran. These chains traverse fertile dis- tricts dividing them into several longitudinal valleys of consider- able length, but not averaging more than 12 m. in width. Snow lies on them for a considerable part of the year, feeding the springs and canals by means of which large tracts in this almost rainless region in summer are kept under cultivation. Still farther west the Kuh Dina range is continued from P'ars, also in a south-easterly direction to Bashakird beyond Bander Abbasi. Between the south-western highlands and the Jamal Bariz there is some arid and unproductive land, but the true desert of Kerman lies mainly in the north and north-east, where it merges northwards in the great desert " Lut," which stretches into

Khorasan. 1 These southern deserts differ from the kavir of central Persia mainly in three respects: they are far less saline, are more sandy and drier, and present in some places tracts of 80 to 100 miles almost absolutely destitute of vegetation. Yet they are crossed by well-known tracks running from Kerman eastwards and north-eastwards to Seistan and Khorasan and frequently traversed by caravans. It appears that these sandy wastes are continually encroaching on the fertile districts, and this is the case even in Narmashir, which is being invaded by the sands ˆf the desolate plains extending thence north-westwards to Bam. There are also some kefeh or salt swamps answering to the kavir in the north, but occurring only in isolated depressions and nowhere of any great extent. The desert of Kerman lies about 1000 ft., or less, above the sea, apparently on nearly the same level as the Lut, from which it cannot be geographically separated. The climate, which varies much with the relief of the land, has the reputation of being unhealthy, because the cool air from the hills is usually attended by chills and agues. Still many of the upland valleys enjoy a genial and healthy climate. The chief products are cotton, gums, dates of unrivalled flavour from the southern parts, and wool, noted for its extreme softness, and the soft underhair of goats (kurk), which latter are used in the manufacture of the Kerman shawls, which in delicacy of texture yield only to those of Kashmir, while often surpassing them in design, colour and finish. Besides woollen goods (shawls, carpets, &c.) Kerman exports mainly cotton, grain and dates, receiving in return from India cotton goods, tea, indigo, china, glass, sugar, &c. Wheat and barley are scarce. Bander Abbasi is the natural outport; but, since shipping has shown a preference for Bushire farther west, the trade of Kerman has greatly fallen off.

For administrative purposes the province is divided into nine- teen districts,

one being the capital of the same name with its immediate neighbourhood (humeh); the others are Akta and Urzu; Anar; Bam and Narmashir; Bardsir; Jiruft; Khabis; Khinaman; Kubenan (Kuhbanan); Kuhpayeh; Pariz; Rafsin- jan; Rahbur; Raver; Rayin; Rudbar and Bashakird; Sardu; Sirjan; Zerend. The inhabitants number about 700,000, nearly one-third being nomads. (A. H.-S.)

KERMAN, capital of the above province, situated in 30 17′ N., 56° 59′ E., at an elevation of 6100 ft. Its population is estimated at 60,000, including about 2000 Zoroastrians, 100 Jews, and a few Shikarpuri Indians. Kerman has post and telegraph offices (Indo-European Telegraph Department), British and Russian consulates, and an agency of the Imperial bank of Persia. The neighbouring districts produce little grain and have to get their supplies for four or five months of the year from districts far away. A traveller has stated that it was easier to get a mann (6| lb) of saffron at Kerman than a mann of barley for his horse, and in 1879 Sir A. Houtum-Schindler was ordered by the authorities to curtail his excursions in the province " because his horses and mules ate up all the stock." Kerman manufactures great quantities of carpets and felts, and its carpets are almost unsurpassed for richness of texture and durability. The old name of the city was Guvashir. Adjoining the city on hills rising 400 to 500 ft. above the plain in the east are the ruins of two ancient forts with walls built of sun-dried bricks on stone foundations. Some of the walls are in perfect condition. Among the mosques in the city two deserve special notice, one the Masjid i Jama, a foundation of the Muzaffarid ruler Mubariz ed din Mahommed dating from a.h. 1349, the other the Masjid i Malik built by Malik Kaverd Seljuk (1041-1072).

KERMANSHAH, or Kermanshahan, an important province of Persia, situated W. of Hamadan, N. of Luristan, and S. of Kurdistan, and extending in the west to the Turkish frontier. Its population is about 400,000, and it pays a yearly revenue of over £20,000. Many of its inhabitants are nomadic Kurds and Lurs who pay little taxes. The plains are well watered and very fertile, while the hills are covered with rich pastures which sup-

1 The word lut means bare, void of vegetation, arid, waterless, and has nothing in common with the Lot of Holy Writ, as many have supposed

port large flocks of sheep and goats. The sheep provide a great part of the meat supply of Teheran. The province also produces much wheat and barley, and could supply great quantities for export if the means of transport were better.

Kermanshah (Kermisin of Arab geographers), the capital of the province, is

situated at an elevation of 5100 ft., in 34° 19′ N., and 46 59′ E., about 220 m. from Bagdad, and 250 m. from Teheran. Although surrounded by fortifications with five gates and three miles in circuit, it is now practically an open town, for the walls are in ruins and the moat is choked with rubbish. It has a population of about 40,000. The town is situated on the high road between Teheran and Bagdad, and carries on a transit trade estimated in value at £750,000 per annum.

KERMES (Arab, qirmiz; see Crimson), a crimson dye-stuff, now superseded by cochineal, obtained from Kermes ilicis (= Coccus ilicis, Lat. = C. vermilio, G. Planchon). The genus Kermes belongs to the Coccidae or Scale-insects, and its species are common on oaks wherever they grow. The species from which kermes is obtained is common in Spain, Italy and the South of France and the Mediterranean basin generally, where it feeds on Quercus coccifera, a small shrub. As in the case of other scale-insects, the males are relatively small and are capable of flight, while the females are wingless. The females of the genus Kermes are remarkable for their gall-like form, and it was not until 1714 that their animal nature was discovered.

In the month of May, when full grown, the females are globose, 6 to 7 millim. in diameter, of a reddish-brown colour, and covered with an ash-coloured powder. They are found attached to the twigs or buds by a circular lower surface 2 millim. in diameter, and sur- rounded by a narrow zone of white cottony down. At this time there are concealed under a cavity, formed by the approach of the abdominal wall of the insect to the dorsal one, thousands of eggs of a red colour, and smaller than poppy seed, which are protruded and ranged regularly beneath the insect. At the end of May or the beginning of June the young escape by a small orifice, near the point of attachment of the parent. They are then of a fine red colour, elliptic and convex in shape, but rounded at the two extremities, and bear two threads half as long as their body at their posterior extremity. At this period they are extremely active, and swarm with extraordinary rapidity all over the food plant, and in two or three days attach themselves to fissures in the bark or buds, but rarely to the leaves. In warm and dry summers the insects breed again in the months of August and September, according to EmeVic, and then they are more frequently found attached to the leaves. Usually they remain immovable and apparently unaltered until the end of the succeeding March, when their bodies become gradually distended and lose all trace of abdominal rings. They then appear full of a reddish juice resembling discoloured blood. In this state, or when the eggs are ready to be extruded, the insects are collected. In some cases the insects from which the young are ready to escape are dried in the sun on linen cloths — care being taken to prevent the escape of the young from the cloths until they are dead. The young insects are then sifted from the shells, madeinto a paste with vinegar, and dried on skins exposed to the sun, and

the paste packed in skins is then ready for exportation to the East under the name of " pate d'ecarlate."

In the pharmacopoeia of the ancients kermes triturated with vinegar was used as an outward application, especially in wounds of the nerves. From the 9th to the 16th century this insect formed an ingredient in the " confectio alkermes," a well known medicine, at one time official in the London pharmacopoeia as an astringent in doses of 20 to 60 grains or more. Syrup of kermes was also prepared. Both these preparations have fallen into disuse.

Mineral kermes is trisulphide of antimony, containing a variable portion of trioxide of antimony both free and combined with alkali. It was known as poudre des Chartreux because in 1 7 14 it is said to have saved the life of a Carthusian monk who had been given up by the Paris faculty; but the monk Simon who administered it on that occasion called it Alkermes mineral. Its reputation became so great that in 1720 the French government bought the recipe for its preparation. It still appears in the pharmacopoeias of many European countries and in that of the United States. The product varies somewhat according to the mode of preparation adopted. According to the French direc- tions the official substance is obtained by adding 60 grammes of powdered antimony trisulphide to a boiling solution of 1280 grammes of crystallized sodium carbonate in 12,800 grammes of distilled water and boiling for one hour. The liquid is then filtered hot, and on being allowed to cool slowly deposits the

kermes, which is washed and dried at ioo ° C. ; prepared in this way it is a brown-red velvety powder, insoluble in water.

See G. Planchon, Le Kermes du chine (Montpellier, 1864); Lewis, Materia Medica (1784), pp. 71, 365; Memorias sobre la grana Kermes de Espana (Madrid, 1788); Adams, Paulus Aegineta, iii. 180; Beck- mann, History of Inventions.

KERMESSE (also Kermis and Kirmess), originally the mass said on the anniversary of the foundation of a church and in honour of the patron, the word being equivalent to " Kirkmass." Such celebrations were regularly held in the Low Countries and also in northern France, and were accompanied by feasting, dancing and sports of all kinds. They still survive, but are now practically nothing more than country fairs and the old alle- gorical representations are uncommon. The Brussels Kermesse is, however,

still marked by a procession in which the effigies of the Mannikin and medieval heroes are carried. At Mons the Kermesse occurs annually on Trinity Sunday and is called the procession of Lumecon (Walloon for KmaQon, a snail) : the hero is Gilles de Chin, who slays a terrible monster, captor of a princess, in the Grand Place. This is the story of George and the Dragon. At Hasselt the Kermesse (now only septennial) not only commemorates the Christian story of the foundation of the town, but even preserves traces of a pagan festival. The word Kermesse (generally in the form " Kirmess ") is applied in the United States to any entertainment, especially one organ- ized in the interest of charity.

See Demetrius C. Boulger, Belgian Life in Town and Country

(1904).

KERN, JAN HENDRIK (1833-), Dutch Orientalist, was born in Java of Dutch parents on the 6th of April 1833. He studied at Utrecht, Leiden and Berlin, where he was a pupil of the Sanskrit scholar, Albrecht Weber. After some years spent as professor of Greek at Maestricht, he became professor of Sanskrit at Benares in 1863, and in 1865 at Leiden. His studies included the Malay languages as well as Sanskrit. His chief work is Geschiedenis van het Buddhisme in Indie (Haarlem, 2 vols., 1881-1883); in English he wrote a translation (Oxford, 1884) of the Saddharma Pundarika and a Manual of Indian Buddhism (Strassburg, 1896) for Bühler Kielhorn's Grundriss der indo- arischen Philologie.

KERNEL (O.E. cyrnel, a diminutive of " corn," seed, grain), the soft and frequently edible part contained within the hard outer husk of a nut or the stone of a fruit; also used in botany of the nucleus of a seed, the body within its several integuments or coats, and generally of the nucleus or core of any structure; hence, figuratively, the pith or gist of any matter.

KERNER, JUSTINUS ANDREAS CHRISTIAN (1786-1862), German poet and medical writer, was born on the 18th of Sep- tember 1786 at Ludwigsburg in Wurttemberg. After attending the classical schools of Ludwigsburg and Maulbronn, he was apprenticed in a cloth factory, but, in r8o4, owing to the good services of Professor Karl Philipp Conz (1762-1827) of Tubingen, was enabled to enter the university there; he studied medicine but had also time for literary pursuits in the company of Uhland, Gustav Schwab and others. He took his doctor's degree in 1808, spent some time in travel, and then settled as a practising physician in Wildbad. Here he completed his Reiseschalten von dem Schatlenspieler Luchs (181 1), in which his own experiences are described with caustic humour. He next co-operated with Uhland and Schwab in producing the Poetischer Almanack fur 1812, which was followed by the Deutschcr

Dichterwald (1813), and in these some of Kerner's best poems were published. In 181 5 he obtained the official appointment of district medical officer (Oberamlsarzl) in Gaildorf, and in 1818 was transferred in a like capacity to Weinsberg, where he spent the rest of his life. His house, the site of which at the foot of the historical Schloss Weibertreu was presented by the municipality to their revered physician, became the Mecca of literary pilgrims. Hospitable welcome was extended to all, from the journeyman artisan to crowned heads. Gustavus IV. of Sweden came thither with a knapsack on his back. The poets Count Christian Friedrich Alexander von Wurttemberg (1801-1844) and Lenau (q.v.) were

constant guests, and thither came also in 1826 Friederike Hauffe (1801-1829), the daughter of a forester in Prevorst, a somnambu- list and clairvoyante, who forms the subject of Kerner's famous work Die Seherin von Prevorst, Eroffnungen iiber das innere Leben des Menschen und iiber das Hineinragen einer Geisterwelt in die unsere (1829; 6th ed., 1892). In 1826 he published a collection of Gedichte which were later supplemented by Der lelzte Bliitenstrauss (1852) and Winterblilten (1859). Among others of his well-known poems are the charming ballad Der reichste Fiirst ; a drinking song, Wohlauf, noch getrunken, and the pensive Wanderer in der Sagemuhle.

In addition to his literary productions, Kerner wrote some popular medical books of great merit, dealing with animal magnetism, a treatise on the influence of sebacic acid on animal organisms, Das Fettgift oder die Fettsdure und ihre Wirkungen auf den tierischen Organismus (1822); a description of Wildbad and its healing waters, Das Wildbad im Kbnigreich Wurttemberg (1813) ; while he gave a pretty and vivid account of his youthful years in Bilderbuch aus meiner Knabenzeit (1859); and in Die Bestilrmung der wiirttembergischen Stadt Weinsberg im Jahre 1525 (1820), showed considerable skill in historical narrative. In T851 he was compelled, owing to increasing blindness, to retire from his medical practice, but he lived, carefully tended by his daughters, at Weinsberg until his death on the 21st of February 1862. He was buried beside his wife, who had predeceased him in 1854, in the churchyard of Weinsberg, and the grave is marked by a stone slab with an inscription he himself had chosen: Friederike Kerner und ihr Justinus. Kerner was one of the most inspired poets of the Swabian school. His poems, which largely deal with natural phenomena, are characterized by a deep melancholy and a leaning towards the supernatural, which, however, is balanced by a quaint humour, reminiscent of the Volkslied.

Kerner's Ausgewdklte poetische Werke appeared in 2 vols. (1878); Samlliche poetische Werke, ed. by J. Gaismaier, 4 vols. (1905) ; a selection of his poems will also be found in Reclam's Universal- bibliothek

(1898). His correspondence was edited by his son in 1897. See also D. F. Strauss, Kleine Schriflen (1866); A. Reinhard, J. Kerner und das Kernerhaus zu Weinsberg (1862; 2nd ed., 1886); G. Riimelin, Reden und Aufsatse, vol. iii. (1894); M. Niethammer (Kerner's daughter), /. Kerner s Jugendliebe und mein Vaterhaus (1877); A. Watts, Life and Works of Kerner (London, 1884); T. Kerner, Das Kernerhaus und seine Gaste (1894).

KERRY, a county of Ireland in the province of Munster, bounded W. by the Atlantic Ocean, N. by the estuary of the Shannon, which separates it from Clare, E. by Limerick and Cork, and S.E. by Cork. The area is 1,159,356 acres, or 1811 sq. m., the county being the fifth of the Irish counties in extent. Kerry, with its combination of mountain, sea and plain, possesses some of the finest scenery of the British Islands. The portion of the county south of Dingle Bay consists of mountain masses intersected by narrow valleys. Formerly the mountains were covered by a great forest of fir, birch and yew, which was nearly all cut down to be used in smelting iron, and the constant pas- turage of cattle prevents the growth of young trees. In the north-east towards Killarney the hills rise abruptly into the ragged range of Macgillicuddy's Reeks, the highest summit of which, Carntual (Carrantuohill), has a height of 3414 ft. The next highest summit is Caper (3200 ft.), and several others are over 2 500 ft. Lying between the precipitous sides of the Tomies, the Purple Mountains and the Reeks is the famous Gap of Dunloe. In the Dingle promontory Brandon Mountain attains a height of 3127 ft. The sea-coast, for the most part wild and mountain- ous, is much indented by inlets, the largest of which, Tralee Bay, Dingle Bay and Kenmare River, lie in synclinal troughs, the anticlinal folds of the rocks forming extensive promontories. Between Kenmare River and Dingle Bay the land is separated by mountain ridges into three valleys. The extremity of the peninsula between Dingle Bay and Tralee Bay is very precipi- tous, and Mount Brandon, rising abruptly from the ocean, is skirted at its base (in part) by a road from which magnificent views are obtained. From near the village of Ballybunion to Kilconey Point near the Shannon there is a remarkable succession

of caves, excavated by the sea. One of these caves inspired Tennyson with some lines in " Merlin and Vivien," which he wrote on the spot. The principal islands are the picturesque Skelligs, Valencia Island and the Blasquet Islands.

The principal rivers are the Blackwater, which, rising in the Dunkerran

Mountains, forms for a few miles the boundary line between Kerry and Cork, and then passes into the latter county; the Ruaughty, which with a course resembling the arc of a circle falls into the head of the Kenmare River; the Inny and Ferta, which flow westward, the one into Ballinskellig Bay and the other into Valencia harbour; the Flesk, which flows northward through the lower Lake of Killarney, after which it takes the name of Laune, and flows north-westward to Dingle Bay; the Caragh, which rises in the mountains of Dunkerran, after forming several lakes falls into Castlemaine harbour; the Maine, which flows from Castle Island and south-westward to the sea at Castlemaine harbour, receiving the northern Flesk, which rises in the moun- tains that divide Cork from Kerry; and the Feale, Gale and Brick, the junction of which forms the Cashin, a short tidal river which flows into the estuary of the Shannon. The lakes of Kerry are not numerous, and none is of great size, but those of Killarney (q.v.) form one of the most important features in the striking and picturesque mountain scenery amidst which they are situated. The other principal lakes are Lough Currane (Waterville Lake) near Ballinskellig, and Lough Caragh near Castlemaine harbour. Salmon and trout fishing with the rod is extensively prosecuted in all these waters. Near the summit of Mangerton Mountain •an accumulation of water in a deep hollow forms what is known as the Devil's Punchbowl, the surplus water, after making a succession of cataracts, flowing into Muckross Lake at the foot of the mountain. There are chalybeate mineral springs near Killarney, near Valencia Island, and near the mouth of the Inny; sulphurous chalybeate springs near Dingle, Castlemaine and Tralee; and a saline spring at Magherybeg in Corkaguiney, which bursts out of clear white sand a little below high-water mark. Killarney is an inland centre widely celebrated and much visited on account of its scenic attractions; there are also several well-known coast resorts, among them Derrynane, at the mouth of Kenmare Bay, the residence of Daniel O'Connell the " libera- tor "; Glenbeigh on Dingle Bay, Parknasilla on Kenmare Bay, Waterville (an Atlantic telegraph station) between Ballinskellig Bay and Lough Currane, and Tarbert, a small coast town on the Shannon estuary. Others of the smaller villages have grown into watering-places, such as Ballybunion, Castlegregory and Portmagee.

Geology. — Kerry includes on the north and east a considerable area of Carboniferous shales and sandstones, reaching the coal- measures, with unproductive coals, east of Listowel and on the Glanruddery Mountains. The Carboniferous Limestone forms a fringe to these beds, and is cut off by the sea at Knockaneen Bay, Tralee and Castlemaine. In all the great promontories, Old Red Sandstone, including Jukes's"Glengariff Grits," forms the mountains, while synclinal hollows of Carboniferous Limestone have become submerged to form marine inlets between them. The Upper Lake of Killarney lies in a hollow of the Old Red Sandstqne, which here

rises to its greatest height in Macgillicuddy's Reeks; Lough Leane however, with its low shores, rests on Carboniferous Limestone. In the Dingle promontory the Old Red Sandstone is strikingly unconformable on the Dingle beds and the Upper Silurian series; the latter include volcanic rocks of Wenlock age. The evidences of local glaciation in this county, especially on the wild slopes of the mountains, are as striking as in North Wales. A copper-mine was formerly worked at Muckross, near Killarney, in which cobalt ores also occurred. Slate is quarried in Valencia Island.

Fauna. — Foxes are numerous, and otters and badgers are not un-common. The alpine hare is very abundant. The red deer inhabits the mountains round Killarney. The golden eagle, once frequently seen in the higher mountain regions, is now rarely met. The sea eagle haunts the lofty marine cliffs, the mountains and the rocky islets. The osprey is occasionally seen, and also the peregrine falcon. The merlin is common. The common owl is indigenous, the long- eared owl resident, and the short-eared owl a regular winter visitor. Rock pigeons breed on the sea-cliffs, and the turtle-dove is an occasional visitant. The great grey seal is found in Brandon and Dingle bays.

Climate and Agriculture. — Owing to the vicinity of the sea and the height of the mountains, the climate is very moist and unsuitable for the growth of cereals, but it is so mild even in winter that arbutus

and other trees indigenous to warm climates grow in the open air, and several flowering plants are found which are unknown in England. In the northern parts the land is generally coarse and poor, except in the valleys, where a rich soil has been formed by rocky deposits. , In the Old Red Sandstone valleys there are many very fertile regions, and several extensive districts now covered by bog admit of easy reclamation so as to form very fruitful soil, but other tracts of boggy land scarcely promise a profitable return for labour expended on their reclamation. Over one-third of the total area is quite barren. The numbers of live stock of every kind are generally increased or sustained. Dairy-farming is very largely followed. The Kerry breed of cattle — small finely-shaped animals, black or red in colour, with small upturned horns — are famed for the quality both of their flesh and milk, and are in considerable demand for the parks sur- rounding mansion-houses. The " Dexter," a cross between the Kerry and an unknown breed, is larger but without its fine qualities. Little regard is paid to the breed of sheep, but those in most common use have been crossed with a merino breed from Spain. Goats share with sheep the sweet pasturage of the higher mountain ridges, while cattle occupy the lower slopes.

Other Industries. — In former times there was a considerable linen trade in Kerry, but this is now nearly extinct, the chief manufacture being that of

coarse woollens and linens for home use. At Killarney a variety of articles are made from the wood of the arbutus. A considerable trade in agricultural produce is carried on at Tralee, Dingle and Kenmare, and in slate and stone at Valencia. The deep- sea and coast fisheries are prosperous, and there are many small fishing settlements along the coast, but the centres of the two fishery districts are Valencia and Dingle. Salmon fishing is also an industry, for which the district centres are Kenmare and Killarney.

Communications. — The Great Southern & Western railway almost monopolizes the lines in the county. The principal line traverses the centre of the county, touching Killarney, Tralee and Listowel, and passing ultimately to Limerick. Branches are from Headford to Kenmare; Farranfore to Killorglin, Cahersiveen and Valencia harbour, Tralee to Fenit and to Castlegregory; and the Listowel and Ballybunion railway. All these are lines to the coast. The Tralee and Dingle railway connects these two towns. The only inland branch is from Tralee to Castleisland.

Population and Administration. — The population (179,136 in 1891 ; 165,726 in 1901) decreases to an extent about equal to the average of the Irish counties, but the emigration returns are among the heaviest. The chief towns are Tralee (the county town, pop. 9867); Killarney (5656), Listowel (3605) and Cahersiveen or Cahirciveen (2013), while Dingle, Kenmare, Killorglin and Castle- island are smaller towns. The county comprises 9 baronies, and contains 85 civil parishes. Assizes are held at Tralee, and quarter sessions at Cahersiveen, Dingle, Kenmare, Killarney, Listowel and Tralee. The headquarters of the constabulary force is at Tralee. Previous to the Union the county returned eight members to the Irish parliament, two for the county, and two for each of the boroughs of Tralee, Dingle and Ardfert. At the Union the number was reduced to three, two for the county and one for the borough of Tralee ; but the divisions now number four: north, south, east and west, each returning one member. The county is in the Protestant diocese of Limerick and the Roman Catholic dioceses of Kerry and Limerick.

History. — The county is said to have derived its name from Ciar, who with his tribe, the Ciarraidhe, is stated to have inhabited about the beginning of the Christian era the territory lying between Tralee and the Shannon. That portion lying south of the Maine was at a later period included in the kingdom of Desmond (q.v.). Kerry suffered frequently from invasions of the Danes in the 9th and 10th centuries, until they were finally overthrown at the battle of Clontarf in 1014. In n 72 Dermot MacCarthy, king of Cork and Desmond, made submission to Henry II. on certain conditions, but was nevertheless gradually compelled to retire within the limits of Kerry, which is one of the areas generally considered to have been

made shire ground by King John. An English adventurer, Raymond le Gros, received from this MacCarthy a large portion of the county round Lix- naw. In 1579-1580 attempts were made by the Spaniards to invade Ireland, landing at Limerick harbour, near Dingle, and a fortress was erected here, but was destroyed by the English in 1580. The Irish took advantage of the disturbed state of Eng- land at the time of the Puritan revolution to attempt the over- throw of the English rule in Kerry, and ultimately obtained possession of Tralee, but in 1652 the rebellion was com- pletely subdued, and a large number of estates were afterwards confiscated.

There are remains of a round tower at Aghadoe, near Killarney, and another, one of the finest and most perfect specimens in Ireland, 92 ft. high, at Rattoe, not far from Ballybunion. On

the summit of a hill to the north of Kenmare River is the remark- able stone fortress known as Staigue Fort. There are several stone cells in the principal Skellig island, where penance, involv- ing the scaling of dangerous rocks, was done by pilgrims, and where there were formerly monastic remains which have been swept away by the sea. The principal groups of sepulchral stones are those on the summits of the Tomie Mountains, a remarkable stone fort at Cahersiveen, a circle of stones with cromlech in the parish of Tuosist, and others with inscriptions near Dingle. The remote peninsula west of a line from Dingle to Smerwick harbour is full of remains of various dates. The most notable monastic ruins are those of Innisfallen, founded by St Finian, a disciple of St Columba, and the fine remains of Muckross Abbey, founded by the Franciscans, but there are also monastic remains at Ardfert, Castlemaine, Derrynane, Kilcoleman and O'Dorney. Among ruined churches of interest are those of Aghadoe, Kilcrohane, Lough Currane, Derrynane and Muckross. The cathedral of Ardfert, founded probably in 1253, was partly destroyed during theCromwellian wars, but was restored in 183 1. Some interesting portions remain (see Tralee). There is a large number of feudal castles.

KERSAINT, ARMAND GUY SIMON DE COETNEMPREN, Comte de (1742-1793), French sailor and politician, was born at Paris on the 29th of July 1742. He came of an old family, his father, Guy Francois de Coetnempren, comte de Kersaint, being a distinguished naval officer. He entered the navy in 1755, and in 1757, while serving on his father's ship, was pro- moted to the rank of ensign for his bravery in action. By 1782 he was a captain, and in this year took part in an expedition to Guiana. At

that time the officers of the French navy were divided into two parties — the reds or nobles, and the blues or roturiers. At the outbreak of the Revolution, Kersaint, in spite of his high birth, took the side of the latter. He adopted the new ideas, and in a pamphlet entitled Le Bon Sens attacked feudal privileges; he also submitted to the Constituent Assembly a scheme for the reorganization of the navy, but it was not accepted. On the 4th of January 1791 Kersaint was appointed administrator of the department of the Seine by the electoral assembly of Paris. He was also elected as a deputf suppliant to the Legislative Assembly, and was called upon to sit in it in place of a deputy who had resigned. From this time onward his chief aim was the realization of the navy scheme which he had vainly submitted to the Constituent Assembly. He soon saw that this would be impossible unless there were a general reform of all institutions, and therefore gave his support to the policy of the advanced party in the Assembly, denouncing the conduct of Louis XVI., and on the 10th of August 1792 voting in favour of his deposition. Shortly after, he was sent on a mission to the armee du Centre, visiting in this way Soissons, Reims, Sedan and the Ardennes. While thus occupied he was arrested by the municipality of Sedan; he was set free after a few days' detention. He took an active part in one of the last debates of the Legisla- tive Assembly, in which it was decided to publish a Bulletin officiel, a report continued by the next Assembly, and known by the name of the Bulletin de la Convention Nationale. Kersaint was sent as a deputy to the Convention by the department of Seine-et-Oise in September 1792, and on the 1st of January 1793 was appointed vice-admiral. He continued to devote himself to questions concerning the navy and national defence, prepared a report on the English political system and the navy, and caused a decree to be passed for the formation of a committee of general defence, which after many modifications was to become the famous Committee of Public Safety. He had also had a decree passed concerning the navy on the nth of January 1793. He had, however, entered the ranks of the Girondins, and had voted in the trial of the king against the death penalty and in favour of the appeal to the people. He resigned his seat in the Conven- tion on the 20th of January. After the death of the king his opposition became more marked; he denounced the September massacres, but when called upon to justify his attitude confined himself to attacking Marat, who was at the time all-powerful. His friends tried in vain to obtain his appointment as minister

of the marine; and he failed to obtain even a post as officer. He was arrested on the 23rd of September at Ville d'Avray, near Paris, and taken before the Revolutionary Tribunal, where he was accused of having conspired for the restoration of the monarchy, and of having insulted national representation by resigning his position in the legislature. He was

executed on the 4th of December 1793.

His brother, Guy Pierre (1747-1822), also served in the navy, and took part in the American war of independence. He did not accept the principles of the Revolution, but emigrated. He was restored to his rank in the navy in 1803, and died in 1822, after having been prefet maritime of Antwerp, and prefect of the department of Meurthe.

See Kersaint's own works, Le Bon Sens (1789) ; the Rubicon (1789) ; Considerations sur la force publique et V institution des gardes nationales (1789); Lettre a Mirabeau (1791); Moyens presentes a I'Assemblee nationale pour retablir la paix et I'ordre dans les colonies; also E. Chevalier, Histoire de la Marine jranqaise sous la premiere Republique ; E. Charavay, V Assemblee electorate de Paris en 1790 et 1791 (Paris, 1890) ; and Ag6nor Bardoux, La Duchesse de Duras (Paris, 1898), the beginning of which deals with Kersaint, whose daughter married Amˆdee de Duras. (R. A.)*

KERVYN DE LETTENHOVE, CONSTANTINE BRUNO,

Baron, (1817-1891), Belgian historian, was born at Saint- Michel-les-Bruges in 1817. He was a member of the Catholic Constitutional party and sat in the Chamber as member for Eecloo. In 1870 he was appointed a member of the cabinet of Anethan as minister of the interior. But his official career was short. The cabinet appointed as governor of Lille one Decker, who had been entangled in the financial speculations of Langand-Dumonceau by which the whole clerical party had been discredited, and which provoked riots. The cabinet was forced to resign, and Kervyn de Lettenhove devoted himself entirely to literature and history. He had already become known as the author of a book on Froissart (Brussels, 1855), which was crowned by the French Academy. He edited a series of chron- icles — Chroniques relatives a I'histoire de la Belgique sous la domination des dues de Bourgogne (Brussels, 1870-1873), and Relations politiques des Pays Bas et de V Angleterre sous le regne de Philippe II. (Brussels, 1882-1892). He wrote a history of Les Hugenots et les Gueux (Bruges, 1883-1885) in the spirit of a violent Roman Catholic partisan, but with much industry and learning. He died at Saint-Michel-les-Bruges in 1891.

See Notices biographiques et bibliographiques de I'acadSmie de Belgique for 1887.

KESHUB CHUNDER SEN (Keshava Chandra Sena) (1838- 1884), Indian religious reformer, was born of a high-caste family at Calcutta in 1838. He was educated at one of the Calcutta colleges, where he became proficient in

English literature and history. For a short time he was a clerk in the Bank of Bengal, but resigned his post to devote himself exclusively to literature and philosophy. At that time Sir William Hamilton, Hugh Blair, Victor Cousin, J. H. Newman and R. W. Emerson were among his favourite authors. Their works made the deepest impression on him, for, as he expressed it, " Philosophy first taught me insight and reflection, and turned my eyes inward from the things of the external world, so that I began to reflect on my position, character and destiny." Like many other educated Hindus, Keshub Chunder Sen had gradually dissociated himself from the popular forms of the native religion, without abandoning what he believed to be its spirit. As early as 1857 he joined the Brahma Samaj, a religious association aiming at the reformation of Hinduism. Keshub Chunder Sen threw him., self with enthusiasm into the work of this society and in 1862 himself undertook the ministry of one of its branches. In the same year he helped to found the Albert College and started the Indian Mirror, a weekly journal in which social and moral sub- jects were discussed. In 1863 he wrote The Brahma Samaj Vindicated. He also travelled about the country lecturing and preaching. The steady development of his reforming zeal led to a split in the society, which broke into two sections, Chunder Sen putting himself at the head of the reform movement, which took the name " Brahma Samaj of India," and tried to propagate

its doctrines by missionary enterprise. Its tenets at this time were the following: (1) The wide universe is the temple of God. (2) Wisdom is the pure land of pilgrimage. (3) Truth is the everlasting scripture. (4) Faith is the root of all religions. (5) Love is the true spiritual culture. (6) The destruction of selfishness is the true asceticism. In 1866 he delivered an address on " Jesus Christ, Europe and Asia," which led to the false impression that he was about to embrace Christianity. This helped to call attention to him in Europe, and in 1870 he paid a visit to England. The Hindu preacher was warmly welcomed by almost all denominations, particularly by the Unitarians, with whose creed the new Brahma Samaj had most in common, and it was the committee of the British and Foreign Unitarian Association that organized the welcome soiree at Hanover Square Rooms on the 12th of April. Ministers of ten different denominations were on the platform, and among those who officially bade him welcome were Lord Lawrence and Dean Stanley. He remained for six months in England, visiting most of the chief towns. His eloquence, delivery and command of the language won universal admiration. His own impression of England was somewhat disappointing. Christianity in Eng- land appeared to him too sectarian and narrow, too " muscular and hard,"

and Christian life in England more materialistic and outward than spiritual and inward. " I came here an Indian, I go back a confirmed Indian; I came here a Theist, I go back a confirmed Theist. I have learnt to love my own country more and more." These words spoken at the fare- well soiree may furnish the key to the change in him which so greatly puzzled many of his English friends. He developed a tendency towards mysticism and a greater leaning to the spiritual teaching of the Indian philosophies, as well as a somewhat despotic attitude towards the Samaj. He gave his child daughter in marriage to the raja of Kuch Behar; he revived the performance of mystical plays, and himself took part in one. These changes alienated many followers, who deserted his standard and founded the Sadharana (General) Brahma Samaj (1878). Chunder Sen did what he could to reinvigorate his own section by a new infusion of Christian ideas and phrases, e.g. " the New Dispensation," " the Holy Spirit." He also in- stituted a sacramental meal of rice and water. Two lectures delivered between 1881 and 1883 throw a good deal of light on his latest doctrines. They were " The Marvellous Mystery, the Trinity," and " Asia's Message to Europe." This latter is an eloquent plea against the Europeanizing of Asia, as well as a protest against Western sectarianism. During the intervals of his last illness he wrote The New Samhita, or the Sacred Laws of the Aryans of the New Dispensation. He died in January 1884, leaving many bitter enemies and many warm friends.

See the article Brahma Samaj; also P. Mozoomdar, Life and Teachings of Keshub Chunder Sen (1888).

KESMARK (Ger. Kasmark), a town of Hungary, in the county of Szepes, 240 m. N.E. of Budapest by rail. Pop. (1900), 5560. It is situated on the Poprad, at an altitude of 1950 ft., and is surrounded on all sides by mountains. Among its buildings are the Roman Catholic parish church, a Gothic edifice of the 15th century with fine carved altars; a wooden Protestant church of the 17th century; and an old town-hall. About 12 m. W. of Kesmark lies the famous watering-place Tatrafiired (Ger. Schmecks), at the foot of the Schlagendorfer peak in the Tatra Mountains. Kesmark is one of the oldest and most important Saxon settlements in the north of Hungary, and became a royal free town at the end of the 13th century, In 1440 it became the seat of the counts of Szepes (Ger., Zips), and in 1464 it was granted new privileges by King Matthias Corvinus. During the 1.6th century,- together with the other Saxon towns in the Szepes county, it began to lose both its political and commercial importance. It remained a royal free town until 1876.

KESTREL (Fr. Cresserelle or Creqerelle, O. Fr. Quercerellc and Quercelle, in Burgundy Cristel), the English name 1 for one of the smaller falcons. This bird, though in the form of its bill and

1 Other English names are windhover and standgale (the last often corrupted into stonegale and stannell).

length of its wings one of the true falcons, and by many ornitho- logists placed among them under its Linnaean name of Falco tinnunculus, is by others referred to a distinct genus Tinnunculus as T. alaudarius — the last being an epithet wholly inappropriate. We have here a case in which the propriety of the custom which requires the establishment of a genus on structural characters may seem open to question. The differences of structure which separate Tinnunculus from Falco are of the slightest, and, if insisted upon, must lead to including in the former birds which obviously differ from kestrels in all but a few characters arbi- trarily chosen; and yet, if structural characters be set aside, the kestrels form an assemblage readily distinguishable by several peculiarities from all other Falconidae, and an assemblage separable from the true Falcons of the genus Falco, with its subsidiary groups Aesalon, Ilypotriorchis, and the rest (see Fal- con). Scarcely any one outside the walls of an ornithological museum or library would doubt for a moment whether any bird shown to him was a kestrel or not; and Gurney has stated his belief (Ibis, 1881, p. 277) that the aggregation of species placed by Bowdler Sharpe (Cat. Birds Brit. Mus. i. 423-448) under the generic designation of Cerchneis (which should properly be Tinnunculus) includes " three natural groups sufficiently distinct to be treated as at least separate subgenera, bearing the name of Dissodectes, Tinnunculus and Erythropus." Of these the first and last are not kestrels, but are perhaps rather related to the hobbies (Ilypotriorchis).

The ordinary kestrel of Europe, Falco tinnunculus or Tinnun- culus alaudarius, is by far the commonest bird of prey in the British Islands. It is almost entirely a summer migrant, coming from the south in early spring and departing in autumn, though examples (which are nearly always found to be birds of the year) occasionally occur in winter, some arriving on the eastern coast in autumn. It is most often observed while hang- ing in the air for a minute or two in the same spot, by means of short and rapid beats of its wings, as, with head pointing to windward and expanded tail, it is looking out for prey — which consists chiefly of mice, but it will at times take a small bird, and the remains of frogs, insects and even earthworms have been found in its crop. It generally breeds in the deserted nest of a crow or pie, but frequently in rocks, ruins, or even in hollow trees — laying four or five eggs, mottled all over with dark brownish-red, sometimes tinged with orange and at other times with purple. Though it may occasionally snatch up a young par- tridge or pheasant, the kestrel is the most harmless bird of prey, if it be not, from its destruction of mice and cockchafers, a bene- ficial species. Its range extends over nearly the whole of Europe from 68° N. lat., and the greater part of Asia— though the form which inhabits Japan and is abundant in north-eastern China has been by some writers

deemed distinct and called T.japonicus — it is also found over a great part of Africa, being, however, unknown beyond Guinea on the west and Mombasa on the east coast (Ibis, 1881, p. 457). The southern countries of Europe have also another and smaller species of kestrel, T. tinnunculoides (the T. cenchris and T. naumanni of some writers), which is widely spread in Africa and Asia, though specimens from India and China are distinguished as T. pekinensis.

Three other species are found in Africa — T. rupicola, T. rupi- coloides and T. alopex — the first a common bird in the Cape, while the others occur in the interior. Some of the islands of the Ethiopian region have peculiar species of kestrel, as the T. newtoni of Madagascar, T. punclatus of Mauritius and T. gracilis of the Seychelles; while, on the opposite side, the kestrel of the Cape Verde Islands has been separated as T. neglectus.

The T. sparverius, commonly known in Canada and the United States as the " sparrow-hawk," is a beautiful little bird. Various attempts have been made to recognize several species, more or less in accordance with locality, but the majority of ornithologists seem unable to accept the distinctions which have been elaborated chiefly by Bowdler Sharpe in his Catalogue and R. Ridgway (North American Birds, iii. 159-175), the former of whom recognizes six species, while the latter admits but three —

T. sparverius, T. leucophrys and T. sparverioides — with five geographical races of the first, viz. the typical T. sparverius from the continent of North America except the coast of the Gulf of Mexico; T. australis from the continent of South America except the North Atlantic and Caribbean coasts; T. isabel- linus, inhabiting continental America from Florida to Fr. Guiana; T. dominicensis from the Lesser Antilles as far northwards as St Thomas; and lastly T. cinnamominus from Chile and western Brazil. T. leucophrys is said to be from Haiti and Cuba; and T. sparverioides peculiar to Cuba only. This last has been generally allowed to be a good species, though Dr Gundlach, the best authority on the birds of that island, in his Contribution a la Ornitologia Cubana (1876), will not allow its validity. More recently it was found (Ibis, 1881, pp. 547-564) that T. australis and T. cinnamominus cannot be separated, that Ridgway's T. leucophrys should properly be called T. dominicensis, and his T. dominicensis T. antillarum; while Ridgway has recorded the supposed occurrence of T. sparverioides in Florida. Of other kestrels T. moluccensis is widely spread throughout the islands of the Malay Archipelago, while T. cenchroides seems to inhabit the whole of Australia, and has occurred in Tasmania (Proc. Roy. Soc.

Tasmania, 1875, pp. 7, 8). No kestrel is found in New Zealand, but an approach to the form is made by the very peculiar Hieracidea(or Harpe)novae-zelandiae(oi which a second race or species has been described, H. brunnea or H.ferox), the " sparrow-hawk," " quail-hawk " and " bush-hawk " of the colo- nists — a bird of much higher courage than any kestrel, and per- haps exhibiting the more generalized and ancestral type from which both kestrels and falcons may have descended. (A. N.)

KESWICK, a market town in the Penrith parliamentary division of Cumberland, England, served by the joint line of the Cockermouth Keswick & Penrith, and London & North- Western railways. Pop. of urban district (1001), 4451. It lies in the northern part of the Lake District, in an open valley on the banks of the river Greta, with the mountain of Skiddaw to the north and the lovely lake of Derwentwater to the south. It is much frequented by visitors as a centre for this famous district — for boating on Derwentwater and for the easy ascent of Skiddaw. Many residences are seen in the neighbourhood, and the town as a whole is modern. Fitz Park, opened in 1887, is a pleasant recreation ground. The town-hall contains a museum of local geology, natural history, &c. In the parish church of Crosthwaite, J m. distant, there is a monument to the poet Southey. His residence, Greta Hall, stands at the end of the main street, close by the river. Keswick is noted for its manufacture of lead pencils; and the plumbago (locally wad) used to be supplied from mines in Borrowdale. Char, caught in the neighbouring lakes, are potted at Keswick in large quantities and exported.

KESWICK CONVENTION, an annual summer reunion held at the above town for the main purpose of " promoting practical holiness " by meetings for prayer, discussion and personal intercourse. It has no denominational limits, and is largely supported by the " Evangelical " section of the Church of England. The convention, started in a private manner by Canon Harford-Battersby, then vicar of Keswick, and Mr Robert Wilson in 1874, met first in 1875, and rapidly grew after the first few years, both in numbers and influence, in spite of attacks on the alleged " perfectionism " of some of its leaders and on the novelty of its methods. Its members take a deep interest in foreign missions.

In the History of the C.M.S., vol. iii. (by Eugene Stock), the missionary influence of the " Keswick men " in Cambridge and else- where may be readily traced. See also The Keswick Convention: its Message, its Method and its Men, edited by C. F. Harford (1906).

KET (or Kett), ROBERT (d. 1549), English rebel, is usually called a tanner, but he certainly held the manor of Wymondham in Norfolk. With his brother William he led the men of Wymondham in their quarrel with a

certain Flowerden, and having thus come into prominence, he headed the men of Norfolk when they rose in rebellion in 1 549 owing to the hardships inflicted by the extensive enclosures of common lands and by the general

policy of the protector Somerset. A feast held at Wymondham in July 1549 developed into a riot and gave the signal for the outbreak. Leading his followers to Norwich, Ket formed a camp on Mousehold Heath, where he is said to have commanded i6jOoo men, introduced a regular system of discipline, adminis- tered justice and blockaded the city. He refused the royal offer of an amnesty on the ground that innocent and just men had no need of pardon, and on the 1st of August 1549 attacked and took possession of Norwich. John Dudley, earl of Warwick, marched against the rebels, and after his offer of pardon had been rejected he forced his way into the city, driving its defenders before him. Then, strengthened by the arrival of some foreign mercenaries, he attacked the main body of the rebels at Dussin- dale on the 27th of August. Ket's men were easily routed by the trained soldiery, and Robert and William Ket were seized and taken to London, where they were condemned to death for treason. On the 7th of December 1 549 Robert was executed at Norwich, and his body was hanged on the top of the castle, while that of William was hanged on the church tower at Wymondham.

See F. W. Russell, Rett's Rebellion (1859), and J. A. Froude, History of England, vol. iv. (London, 1898).

KETCH, JOHN (d. 1686), English executioner, who as " Jack Ketch " gave the nickname for nearly two centuries to his successors, is believed to have been appointed public hangman in the year 1663. The first recorded mention of him is in The Plotters Ballad, being Jack Ketch's incomparable Receipt for the Cure of Traytorous Recusants and Wholesome Physick for a Popish Contagion, a broadside published in December 1672. The execution of William, Lord Russell, on the 21st of July 1683 was carried out by him in a clumsy way, and a pamphlet is extant which contains his " Apologie," in which he alleges that the prisoner did not "dispose himself as was most suitable" and that he was interrupted while taking aim. On the scaffold, on the 15th of July 1685, the duke of Monmouth, addressing Ketch, referred to his treatment of Lord Russell, the result being that Ketch was quite unmanned and had to deal at least five strokes with his axe, and finally use a knife, to sever Mon- mouth's head from his shoulders. In 168& Ketch was deposed and imprisoned at Bridewell, but when his successor, Pascha Rose, a butcher, was, after four months in the office, hanged at Tyburn, Ketch was reappointed. He died towards the close of

1686.

KETCHUP, also written catsup and katchup (said to be from the Chinese kde-chiap or kt-tsiap, brine of pickled fish), a sauce or relish prepared principally from the juice of mushrooms and of many other species of edible fungi, salted for preservation and variously spiced. The juices of various fruits, such as cucum- bers,, tomatoes, and especially green walnuts, are used as a basis of ketchup, and shell-fish ketchup, from oysters, mussels and cockles, is also made; but in general the term is restricted to sauces having the juice of edible fungi as their basis.

KETENES, in chemistry, a group of organic compounds which may be considered as internal anhydrides of acetic acid and its substitution derivatives. Two classes may be distinguished: the aldo-ketenes, including ketene itself, together with its mono- alkyl derivatives and carbon suboxide, and the keto-ketenes which • comprise the dialkyl ketenes. The aldo-ketenes are colourless compounds which are not capable of autoxidation, are polymerized by pyridine or quinoline, and are inert towards compounds containing the groupings C:N and C:0. The keto- ketenes are coloured compounds, which undergo autoxidation readily, form ketene bases on the addition of pyridine and quino- line, and yield addition compounds with substances containing the C:N and C:0 groupings. The ketenes are usually obtained by the action of zinc on ethereal or ethyl acetate solutions of halogen substituted acid chlorides or bromides. They are characterized by their additive reactions: combining with water to form acids, with alcohols to form esters, and with primary amines to form amides.

Ketene, CH 2 :CO, was discovered by N. T. M. Wiismore (Jourˆ Chem.Soc, 1907, vol. 91, p. 1938) among the gaseous products formed

when a platinum wire is electrically heated under the surface of acetic anhydride. It is also obtained by the action of zinc on broraacetyl bromide (H. Staudinger, Ber. 1908, 41, p. 594). At ordinary temperatures it is a gas, but it may be condensed to a liquid and finally solidified, the solid melting at -151 ° C. It is characterized by its penetrating smell. On standing for some time a brown-coloured liquid is obtained, from which a colourless liquid boiling at 126-127 C, has been isolated (Wilsmore, ibid., I9°8, 93, P- 946). Although originally described as acetylketen, it has proved to be a cyclic compound (Ber., 1909, 42, p. 4908). It is soluble in water, the solution showing an acid reaction, owing to the formation of aceto-acetic acid, and with alkalis it yields acetates. It differs from the simple ketenes in that it is apparently unacted upon by phenols and alcohols. Dimethyl ketene, (CH 3) 2 C :CO, obtained by the action of zinc on o-brom-

isobutyryl bromide, is a yellowish coloured liquid. At ordinary temperatures it rapidly polymerizes (probably to a tetramethylcylobutanedione). It boils at 34 C. (750 mm.) (Staudinger, Ber. 1905, 38, p. 1735; 1908, 41, p. 2208). Oxygen rapidly converts it into a white explosive solid. Diethyl ketene, (C 2 H 6) 2 C :CO, is formed on heating diethylmalonic an- hydride (Staudinger, ibid.). Diphenyl ketene, (C 8 H 6) 2 C :CO, obtained by the action of zinc on diphenyl-chloracetyl chloride, is an orange- red liquid which boils at 146° C. (12 mm.). It does not polymerize. Magnesium phenyl bromide gives triphenyl vinyl alcohol.

KETI, a sea-port of British India, in Karachi district, Sind, situated on the Hajamro branch of the Indus. Pop. (1901), 2127. It is an important seat of trade, where sea-borne goods are transferred to and from river boats.

KETONES, in chemistry, organic compounds of the type R-CO-R', where R, R' = alkyl or aryl groups. If the groups R and R' are identical, the ketone is called a simple ketone, if unlike, a mixed ketone. They may be prepared by the oxidation of secondary alcohols; by the addition of the elements of water to hydrocarbons of the acetylene type RC CH ; by oxidation of primary alcohols of the type RR'CHCH 2 OH:RR'CHCH 2 OH -» R-CO-R'+H 2 0+H 2 C0 2 ; by distillation of the calcium salts of the fatty acids, C n H2n02; by heating the sodium salts of these acids C n H 2n 2 with the corresponding acid anhydride to 190 C. (W. H. Perkin, Jour. Chem. Soc, 1886, 49, p. 322); by the action of anhydrous ferric chloride on acid chlorides (J. Hamonet, Bull, de la soc. Mm., 1888, 50, p. 357), 2C 2 H 5 C0C1H> C 2 H 5 -CO-CH(CH 3)-COCl

H>C 2 H 5 -CO-CH(CH 3)-C0 2 HˆC 2 H 5 -CO-CH 2 -CH3; and by the action of zinc alkyls on acid chlorides (M . Freund, Ann., 1861, 118, p. 1), 2CH 3 COCl-f-ZnCH 3) 2 = ZnCl 2 +2CH 3 -CO-CH 3 . In the last reaction complex addition products are formed, and must be quickly decomposed by water, otherwise tertiary alcohols are produced (A. M. Butlerow, Jahresb., 1864, p. 496; Ann. 1867, 144, p. 1). They may also be prepared by the decom- position of ketone chlorides with water; by the oxidation of the tertiary hydroxyacids; by the hydrolysis of the ketonic adds or their esters with dilute alkalis or baryta water (see Aceto-acetic Ester); by the hydrolysis of alkyl derivatives of acetone dicarboxylic acid, H0 2 C-CH 2 -CO-CHR-C0 2 H; and by the action of the Grignard reagent on nitriles (E. Blaise, Comptes rendus, 1901, 132, p. 38), R-CN + R'Mgl -> RR'C:NM g I -> R-CO-R' + NH 3 +M g IOH.

The ketones are of neutral reaction, the lower members of the series being colourless, volatile, pleasant-smelling liquids. They do not reduce silver solutions, and are not so readily oxidized as the aldehydes. On oxidation, the molecule is split at the carbonyl group and a mixture of acids is

obtained. Sodium amalgam reduces them to secondary alcohols; phosphorus pentachloride replaces the carbonyl oxygen by chlorine, forming the ketone chlorides. Only those ketones which contain a methyl group are capable of forming crystalline addition com- pounds with the alkaline bisulphites (F. Grimm, Ann., 1871, 157, p. 262). They combine with hydrocyanic acid to form nitriles, which on hydrolysis furnish hydroxyacids,

(CH a) 2 CO -> (CH 3) 2 C-OH-CN -^ (CH 3) 2 -C-OH-C0 2 H; with phenylhydrazine they yield hydrazones; with hydrazine they yield in addition ketazines RR'C:NN:CRR' (T. Curtius), and with hydroxylamine ketoximes. The latter readily under- go the " Beckmann " transformation on treatment with acid chlorides, yielding substituted acid amides.

RR'C:NOH -> RC(NR')OH -^ RCONHR' (see Oxihes, also A. Hantzsch, Ber., 1891,24, p. 13). The ketones react with mercaptan to form mercaptols (E. Baumann, Ber., 1885, 18, p. 883), and with concentrated nitric acid they yield dinitroparaffins (G. Chancel, Bull, de la soc. chim., 1879, 31, p. 503). With nitrous acid (obtained from amyl nitrite and gaseous hydrochloric acid, the ketone being dissolved in acetic acid) they form isonitroso-kctones, R-COCH:NOH (L. Claisen, Ber., 1887, 20, pp. 656, 2194). With ammonia they yield complex condensation products; acetone forming di- and tri- acetonamines (W. Heintz, Ann. 1875, 178, p. 305; 1877, 0:89, p. 214. They also condense with aldehydes, under the influence of alkalis or sodium ethylate (L. Claisen, Ann., 1883, 218, pp. 121,

129, 145; 1884, 223, p. 137; S. Kostanecki and G. Rossbach, Ber., 1896, 29, pp. 1488, 149S, J 893, &c.). On treatment with the Grignard reagent, in absolute ether solution, they yield addition products which are decomposed by water with pro- duction of tertiary alcohols (V. Grignard, Comptes rendus, 1900,

130, P- 1322 et seq.),

RR'CO- RR'-C(OM g I)-R*-} RR'R"-C(OH) + MgI-OH. Ketones do not polymerize in the same way as aldehydes, but under the influence of acids and bases yield condensation products; thus acetone gives mesityl oxide, phorone and mesitylene (see below).*

For dimethyl ketone or acetone, see Acetone. Diethyl ketone, (C 2 H6)2-CO, is a pleasant-smelling liquid boiling at 102-7° C. With concentrated nitric acid it forms dinitroethane, and it is oxidized by chromic acid to acetic and propionic acids. Methylnonylketone, CH 3 -CO-C 9 Hi 9 , is the chief constituent of oil of rue, which also con- tains methylheptylketone,

CH 3 -CO-C 7 Hi 6 , a liquid of boiling-point 85-90 ° C. (7 mm.), which yields normal caprylic acid on oxidation with hypobromites.

Mesityl oxide, (CH 3) 2 C:CH-CO-CH 3 , isan aromatic smelling liquid of boiling point 129-5-130° C. It is insoluble in water, but readily dissolves in alcohol. On heating with dilute sulphuric acid it yields acetone, but with the concentrated acid it gives mesitylene, C 9 Hi 2 . Potassium permanganate oxidizes it to acetic acid and hydroxyiso- butyric acid (A. Pinner, Ber., 1882, 15, p. 591). It forms hydroxy- hydrocollidine when heated with acetamide and anhydrous zinc chloride (F. Canzoneri and G. Spica, Gazz. chim. Ital., 1884, 14, p.349). P/iorone,(CH 3) 2 C:CH-CO-CH:C(CH 3) 2 ,formsyellow crystals which melt at 28° C. and boil at 197-2° C. When heated with phosphorus pentoxide it yields acetone, water and some pseudo- cumene. Dilute nitric acid oxidizes it to aceticand oxalic acids, while potassium permanganate oxidizes it to acetone, carbon dioxide and oxalic acid.

Diketones. — The diketones contain two carbonyl groups, and are distinguished as a or 1-2 diketones, /3 or 1-3 diketones, 7 or 1-4 diketones, &c, according as they contain the groupings -CO-CO-, -CO-CH 2 CO,-CO-CH 2 -CH 2 CO, &c.

The n-diketones may be prepared by boiling the product' of the action of alkaline bisulphites on isonitrosoketones with 15 % sul- phuric acid (H. v. Pechmann, Ber., 1887,20, p. 31 12; 1889, 22, p. 21 15), CH 3 -CO-C:(N-OH)-CH 3 - > CH 3 -CO-C:(NHS0 3)-CH 3 H > CH 3 CO- COCH 3 ; or by the action of isoamyl nitrite on the isonitrosoke- tones (O. Manasse,5er.,i888,2i,p.2i77),C 2 H 6 -CO-C:(NOH)-CHs- -hiCsHONO = C 2 H5-CO-CO-CH 3 -r-C 6 H n OH + N 2 0. They condense with orthodiamines toformquinoxalines (O. Hinsberg, Ann., 1887,237, p. 327),andwithammoniaandaldehydestoformimidazoles. Diacetyl, CH 3 -CO-CO-CH 3 , isa yellowish green liquid, which boilsat 87-88°C., and possesses a pungent smell. It combines with sodium bisulphite and with hydrocyanic acid. Dilute alkalis convert it into para- xyloquinone.

The |S-diketones form characteristic copper salts, and in alcoholic solution they combine with semicarbazide to form products which on boiling with ammoniacal silver nitrate solution give pyrazoles (T. Posner, Ber., 1901, 34, p. 3975); with hydroxylamine they form isoxazoles, and with phenylhydrazine pyrazoles. Acetyl acetone, CH 3 -CO-CH 2 -CO-CH 3 , may be prepared by the action of aluminium chloride on acetyl chloride, or by condensing ethyl acetate with acetone in the presence of sodium (L. Claisen). It is a liquid of boiling point lJ6° C. It condenses readily with aniline to give a-y-dimethyl quinoline.

The 7-diketones are characterized by the readiness with which, they yield furfurane, pyrrol and thiophene derivatives, the fur- furane derivatives being formed by heating the ketones with a de-j hydrating agent, the thiophenes by heating with phosphorus penta- sulphide, and the pyrrols by the action of alcoholic ammonia or amines. ˆ4ceio»yZoc«toMe,CH 3 -CO-CHi!-CH2-CO-CH 3 , a liquid boiling at 194° C, may be obtained by condensing sodium aceto-acetate ■"vitli mono-chloracetone (C. Paal, Ber., 1885, 18, p. 59),

7 6;

CH s COCH 2 Cl + Na-CH-COCH 3 (COOR)

-ˆ> CH 3 CO-CH 2 -CH-COCH 3 (COOR)

-> CH 3 COCH 2 CH 2 COCH 3 ; or by the hydrolysis of diaceto-succinic ester, prepared by the action of iodine on sodium aceto-acetate (L. Knorr, Ber., 1889, 22, pp. 169, 2100).

1-5 diketones have been prepared by L. Claisen by condensing ethoxymethylene aceto-acetic esters and similar compounds with 0-ketonic esters and with 1-3 diketones. The ethoxymethylene aceto-acetic esters are prepared by condensing aceto-acetic ester with ortho-formic ester in the presence of acetic anhydride (German patents 77354, 79087, 79863). The 1-5 diketones of this type, when heated with aqueous ammonia, form pyridine derivatives. Those in which the keto groups are in combination with phenyl residues give pyridine derivatives on treatment with hydroxylamine, thus benzamarone, C6H 6 CH[CH(C6H 6)-COC6H5], gives pentaphenylpyri- dine, NC 6 (C 6 H5)5. On the general reactions of the 1-5 diketones, see E. Knoevenagel (Ann., 1894, 281, p. 25 et seq.) and H. Stobbe (Ber., 1902, 35, p. 1445).

Many cyclic ketones are known, and in most respects they resemble the ordinary aliphatic ketones (see Polymethylenes ; Terpenes).

KETTELER, WILHELM EMMANUEL, Baron von (181 1- 1877), German theologian and politician, was bornatHarkotten, in Bavaria, on the 25th of December 1811. He studied theology at Gottingen, Berlin, Heidelberg and Munich, and was ordained priest in 1844. He resolved to consecrate his life to maintaining the cause of the freedom of the Church from the control of the State. This brought him into collision with the civil power, an attitude which he maintained throughout a stormy and eventful life. Ketteler was rather a man of action than a scholar, and he first distinguished himself as one of the deputies of the Frankfort National Assembly, a position to which

he was elected in 1848, and in which he soon became noted for his decision, foresight, energy and eloquence. In 1850 he was made bishop of Mainz, by order of the Vatican, in preference to the celebrated Professor Leopold Schmidt, of Giessen, whose Liberal sentiments were not agreeable to the Papal party. When elected, Ketteler refused to allow the students of theology in his diocese to attend lectures at Giessen, and ultimately founded an opposition seminary in the diocese of Mainz itself. He also founded orders of School Brothers and School Sisters, to work in the various educational agencies he had called into existence, and he laboured to institute orphanages and rescue homes. In 1858 he threw down the gauntlet against the State in his pamphlet on the rights of the Catholic Church in Germany. In 1863 he adopted Lassalle's Socialistic views, and published his Die Arbeitfrage und das Christenthum. When the question of papal infallibility arose, he opposed the promulgation of the dogma on the ground that such promulgation was inopportune. But he was not resolute in his opposition. The opponents of the dogma complained at the very outset that he was wavering, half converted by his hosts, the members of the German College at Rome, and further influenced by his own misgivings. He soon deserted his anti- Infallibilist colleagues, and submitted to the decrees in August 1870. He was the warmest opponent of the State in the Kultur-kampf provoked by Prince Bismarck after the publication of the Vatican decrees, and was largely instrumental in compelling that statesman to retract the pledge he had rashly given, never to " go to Canossa." To such an extent did Bishop von Ketteler carry his opposition, that in 1874 he forbade his clergy to take part in celebrating the anniversary of the battle of Sedan, and declared the Rhine to be a " Catholic river." He died at Burg- hausen, Upper Bavaria, on the 13th of July 1877.

(J. J- L .)*

KETTERING, a market town in the eastern parliamentary division of Northamptonshire, England, 72 m. N.N.W. from London by the Midland railway. Pop. of urban district (1891), 19,454; (1901), 28,653. The church of SS Peter and Paul, mainly Perpendicular, has a lofty and ornate tower and spire. The chief manufactures are boots, shoes, brushes, stays, clothing and agricultural implements. There are iron-works in the immediate neighbourhood. The privilege of market was granted in 1227 by a charter of Henry III.

KETTLE, SIR RUPERT ALFRED (1817-1894), English county court judge, was born at Birmingham on the 9th of January 181 7. His family had for some time been connected

with the glass-staining business. In 1845 he was called to the bar, and in 1859 he was made judge of the Worcestershire county courts, becoming

also a bencher of the Middle Temple (1882). He acted as arbitrator in several important strikes, and besides being the first president of the Midland iron trade wages board, he was largely responsible for the formation of similar boards in other staple trades. His name thus became identified with the organization of a system of arbitration between employers and employed, and in 1880 he was knighted for his services in this capacity. In 1851 he married; one of his sons subsequently became a London police magistrate. Kettle died on the 6th of October 1894 at Wolverhampton.

KETTLEDRUM 1 (Fr. timbales; Ger. Pauken; Ital. timpani; Sp. timbal), the only kind of drum (q.v.) having a definite musical pitch. The kettledrum consists of a hemispherical pan of copper, brass or silver, over which a piece of vellum is stretched tightly by means of screws working on an iron ring, which fits closely round the head of the drum. In the bottom of the pan is a small vent-hole, which prevents the head being rent by the concussion of air. The vellum head may thus be slackened or tightened at will to produce any one of the notes within its compass of half an octave. Each kettledrum gives but one note at a time, and as it takes some little time to alter all the screws, two or three kettledrums, sometimes more, each tuned to a different note, are used in an orchestra or band. For centuries kettledrums have been made and used in Europe in pairs, one large and one small; the relative proportions of the two instruments being well defined and invariable. Even when eight pairs of drums, all tuned to different notes, are used, as by Berlioz in his " Grand Requiem," there are still but the two sizes of drums to produce all the notes. Various mechanisms have been tried with the object of facilitating the change of pitch, but the simple old-fashioned model is still the most frequently used in England. Two sticks, of which there are several kinds, are employed to play the kettledrum; the best of these are made of whalebone for elasticity, and have a small wooden knob at one end, covered with a thin piece of fine sponge. Others have the button covered with felt or india-rubber. The kettledrum is struck at about a quarter of the diameter from the ring.

The compass of kettledrums collectively is not much more than an octave, between fJH= =3=:u,a= $=zEz ; the larger instruments,

which it is inadvisable to tune below F, take any one of the following notes : —

and the smaller are tuned to one of the notes completing the

chromatic and enharmonic scale from

These

limits comprise all the notes of artistic value that can be obtained from kettledrums. When there are but two drums — the term ” drum ” used by musicians always denotes the kettledrum — they are generally tuned to the tonic and dominant or to the tonic and subdominant, these notes entering into the composition of most of the harmonies of the key. Formerly the kettledrums used to be treated as transposing instruments, the notation, as for the horn, being in C, the key to which the kettledrums were to be tuned being indicated in the score. Now composers write the real notes.

The tone of a good kettledrum is sonorous, rich, and of great power. When noise rather than music is required uncovered sticks are used. The drums may be muffled or covered by placing a piece of cloth or silk over the vellum to damp the sound, a device which produces a lugubrious, mysterious effect and is indicated in the score by the words timpani coperti, timpani con sordini, timbales couvertes, gedampfte Pauken. Besides the beautiful effects obtained by means of delicate gradations of tone, numerous rhythmical figures may be executed on one, two or more notes. German drummers who were

1 From “drum” and ” kettle,” a covered metal vessel for boiling water or other liquid;- the O. E. word is cetel, cf. Du. ketel, Ger. Kessel, borrowed from Lat. catillus, dim. of catinus, bowl.

renowned during the 17th and 18th centuries, borrowing the terms from the trumpets with which the kettledrums were long associated, recognized the following beats: —

Single tonguing (Einfache Zungen)

S

*= * = * = *:*

Double tonguing (Doppel oder gerissene Zungen)

Legato tonguing (Tragende Zungen)

Whole double-tonguing (Ganze Doppel-Zungen)

Double cross-beat l (Doppel Kreuzschldge)

5 =

The roll

(Wirbel)

The double roll (Doppel Wirbel)

3

itS = S = it = ii = jtE

*It is generally stated that Beethoven was the first to treat the kettledrum as a solo instrument, but in Dido, an opera by C. Graupner performed at the Hamburg Opera House in 1707, there is a short solo for the kettledrum.**

The tuning of the kettledrum is an operation requiring time, even when the screw-heads, as is now usual, are T-shaped; to expedite the change, therefore, efforts have been made in all countries to invent some mechanism which would enable the performer to tune the drum to a fixed note by a single movement. The first mechanical kettledrums date from the beginning of the 19th century. In Holland a system was invented by J. C. N. Stumpff 3 ; in France by Labbaye in 1827; in Germany Einbigler patented a system in

1 This rhythmical use of kettledrums was characteristic of the military instrument of percussion, rather than the musical member of the orchestra. During the middle ages and until the end of the 1 8th century, the two different notes obtainable from the pair of kettledrums were probably used more as a means of marking and varying the rhythm than as musical notes entering into the com- position of the harmonies. The kettledrums, in fact, approximated to the side drums in technique. The contrast between the purely rhythmical use of kettledrums, given above, and the more modern musical use is well exemplified by the well-known solo for four kettledrums in Meyerbeer's Robert le Diable, beginning thus —

2 See Wilhelm Kleefeld, Das Orchester der Hamburger Oper (1678- 1738); Internationale Musikgesellschaft, Sammelband i. 2, p. 278 (Leipzig, 1899).

' See J. Georges Kastner, MUhode complete et raisonnee de timbales (Paris), p. 19, where several of the early mechanical kettledrums are described and illustrated.

Frankfort-on-Main in 1836 4 ; in England Cornelius Ward in 1837; in Italy C. A. Boracchi of Monza in 1839. 6

The drawback in most of these systems is the complicated nature of the mechanism, which soon gets out of order, and, being very cumbersome and

heavy, it renders the instrument more or less of a fixture. Potter's kettledrum with instantaneous system of tuning, the best known at the present day in England, and used in some military bands with entire success, is a complete contrast to the above. There is practically no mechanism; the system is simple, ingenious, and neither adds to the weight nor to the bulk of the instrument. There are no screws round the head of Potter's kettle- drum ; an invisible system of cords in the interior, regulated by screws and rods in the form of a Maltese cross, is worked from the outside by a small handle connected to a dial, on the face of which are twenty-eight numbered notches. By means of these the performer is able to tune the drum instantly to any note within the compass by remembering the numbers which correspond to each note and pointing the indicator to it on the face of the dial. Should the cords become slightly stretched, flattening the pitch, causing the represen- tative numbers to change, the performer need only give his indicator an extra turn to bring his instrument back to pitch, each note having several notches at its service. The internal mechanism, being of an elastic nature, has no detrimental effect on the tone but tends to increase its volume and improve its quality.

The origin of the kettledrum is remote and must be sought in the East. Its distinctive characteristic is a hemispherical or convex vessel, closed by means of a single parchment or skin drawn tightly over the aperture, whereas other drums consist of a cylinder, having one end or both covered by the parchment, as in the side-drum and tambourine respectively. The Romans were acquainted with the kettledrum, including it among the tympana; the tympanum leve, like a sieve, was the tambourine used in the rites of Bacchus and Cybele. 6 The comparatively heavy tympanum of bronze mentioned by Catullus was probably the small kettledrum which appears in pairs On monuments of the middle ages. 7 Pliny 8 states that half pearls having one side round and the other flat were called tympania. If the name tympania (Gr. rbimoMov, from rirmnv, to strike) was given to pearls of a certain shape because they resembled the kettledrum, this argues that the instrument was well known among the Romans. It is doubtful, however, if it was adopted by them as a military instrument, since it is not mentioned by Vegetius, 9 who defines very clearly the duties of the service instruments buccina, tuba, cornu and lituus.

The Greeks also knew the kettledrum, but as a warlike instrument of barbarians. Plutarch 10 mentions that the Parthians, in order to frighten their enemies, in offering battle used not the horn or tuba, but hollow vessels covered with a skin, on which they beat, making a terrifying noise with these tympana. Whether the kettledrum penetrated into western Europe before the fall of the Roman Empire and continued to be included during the middle ages among the tympana has not been definitely ascertained. Isidore of Seville gives a some- what vague description of

tympanum, conveying the impression that his information has been obtained second-hand: "Tym- panum est pellis vel corium ligno ex una parte extentum. Est enim pars media symphoniae in similitudinem cribri. Tympanum autem dictum quod medium est. Unde, et mar- garitum medium tympanum dicitur, et ipsum ut symphonia ad virgulam percutitur." u It is clear that in this passage Isidore is referring to Pliny.

The names given during the middle ages to the kettledrum are derived from the East. We have attambal or attabal in Spain,

4 See Gustav Schilling's Encyklopadie der gesammten musikal. Wissenschaften (Stuttgart, 1840), vol. v., art. " Pauke."

6 See Manuale pel Timpanista (Milan, 1842), where Boracchi describes and illustrates his invention.

6 Catullus, lxiii. 8- to; Claud. De cons. Stilich. iii. 365; Lucret. ii. 618; Virg. Aen. ix. 619, &c.

7 John Carter, Specimens of Ancient Sculpture, bas-relief from seats of choir of Worcester cathedral and of collegiate church of St Kath- erine near the Tower of London (plates, vol. i. following p. 53 and vol. ii. following p. 22).

8 Nat. Hist. ix. 35, 23.

9 De re militari, ii. 22 ; iii. 5, &c.

10 Crassus, xxiii. 10. See also Justin xli. 2, and Polydorus, lib. I, cap. xv.

11 See Isidore of Seville, Etymologiarum, lib. iii. cap. 21, 141 ; Migne, Patr. curs, completus, lxxxii. 167.

from the Persian tambal, whence is derived the modern French timbales; nacaire, naquaire or nakeres (English spelling), from the Arabic nakkarah or noqqarich (Bengali, ndgard), and the German Pauke, M.H.G. Bfike or P&ke, which is probably derived from byk, the Assyrian name of the instrument.

A line in the chronicles of Joinville definitely establishes the identity of the nakeres as a kind of drum: " Lor il fist sonner

the instrument before it became inseparably associated with the trumpet, sharing its position as the service instrument of the cavalry. Jost Amman 3 gives a picture of a pair of kettledrums with banners being played by an armed knight on horseback.

(Geo. Potter & Co. of Aldershot.)

Fig. I. — Mechanical Kettledrum, showing the system

of cords inside the head.

This regiment is now the 21st (Empress of India) Lancers.

les tabours que l'on appelle nacaires." The nacaire is among the instruments mentioned by Froissart as having been used on the occasion of Edward III.'s triumphal entry into Calais in 1347: " trompes, tambours, nacaires, chalemies, muses." 1 Chaucer mentions them in the description of the tournament in the Knight's Tale (line 2514): —

" Pipes, trompes, nakeres and clarionnes ,

That in the bataille blowen blody sonnes."

The earliest European illustration showing kettledrums is the scene depicting Pharaoh's banquet in the fine illuminated MS. book of Genesis of the 5th or 6th century, preserved in Vienna. There are two pairs of shallow metal bowls on a table, on which a woman is performing with two sticks, as an accompaniment to the double pipes. 2 As a companion illumination may be cited the picture of an Eastern banquet given in a 14th century MS. at the British Museum (Add. MS. 27,695), illuminated by a skilled Genoese. The potentate is enjoying the music of various instruments, among which are two kettledrums strapped to the back of a Nubian slave. This

was the earlier manner of using

1 Pantheon litteraire (Paris, 1837), J- A. Buchon, vol. i. cap. 322,

P- 2 ?3-

J Reproduced by Franz Wickhoff, " Die Wiener Genesis," supple- ment to the 15th and 16th volumes of the Jahrb. d. kunsthistorischen Sammlungen a. allerhochsten Kaiserhauses (Vienna, 1 895) ; see frontis- piece in colours and plate illustration XXXIV.

(From Hartel u. Wickhoff's "Die Wiener Genesis, " Jahrbuch der kunsthistorischen Sammlungen des allerhochsten Kaiserhauses.)

Fig. 2. — Kettledrums in an early Christian MS.

As in the case of the trumpet, the use of the kettledrum was placed under great restrictions in Germany and France and to some extent in England, but it was used in churches with the trumpet. 4 No French or German regiment was allowed

m?mmmmm§

Fig. 3. — Medieval Kettledrums, 14th century. (Brit. Museum.)

kettledrums unless they had been captured from the enemy, and the timbalier or the Heerpauker on parade, in reviews and marches generally, rode at the head of the squadron; in battle his position was in the wings. In England, before the Restoration, only the Guards were allowed kettledrums, but after the accession of James II. every regiment of horse was provided with them. 5 Before the Royal Regiment of Artillery was established, the master-general of ordnance was responsible for the raising of trains of artillery. Among his retinue in time of war were a trumpeter and kettledrummer. The kettledrums were mounted on a chariot drawn by six white horses. They appeared in the field for the first time in a train of artillery during the Irish rebellion of 1689, and the charges for ordnance

3 Artliche u. kunstreiche Figuren zu der Reutterey (Frankfort-on- Main, 1584).

4 See Michael Praetorius, Syntagma Musicum and Monatshefte f. Musikgeschichte, Jahrgang x. 51.

6 See Georges Kastner, op. cit., pp. 10 and 11 ; Johann Ernst Alten- burg, Versuch einer Anleitung z. heroisch-musikalischen Trompeler u. Paukerkunst (Halle, 1795), p. 128; and H. G. Farmer, Memoirs of the

Royal Artillery Band p. 23, note 1 (London, 1904).

include the item, " large kettledrums mounted on a carriage | with cloaths marked I.R. and cost £158, 9s." 1 A model of the kettledrums with their carriage which accompanied the duke of Marlborough to Holland in 1702 is preserved in the Rotunda Museum at Woolwich. The kettledrums accompanied the Royal Artillery train in the Vigo expedition and during the campaign in Flanders in 1748. Macbean 2 states that they were mounted on a triumphal car ornamented and gilt, bearing the ordnance flag and drawn by six white horses. The position of the car on march was in front of the flag gun, and in camp in front of the quarters of the duke of Cumberland with the artillery guns packed round them. The kettledrummer had by order " to mount the kettledrum carriage every night half an hour before the sun sett and beat till gun fireing." In 1759 the kettledrums ceased to form part of the establishment of the Royal Artillery, and they were deposited, together with their carriage, in the Tower, at the same time as a pair captured at Malplaquet in 1709. These Tower drums were frequently borrowed by Handel for- performances of his oratorios.

The kettledrums still form part of the bands of the Life Guards and other cavalry regiments. (K. S.)

KEUPER, in geology the third or uppermost subdivision of the Triassic system. The name is a local miners' term of German origin; it corresponds to the French marnes irisees. The forma- tion is well exposed in Swabia, Franconia, Alsace and Lorraine and Luxemburg; it extends from Basel on the east side of the Rhine into Hanover, and northwards it spreads into Sweden and through England into Scotland and north-east Ireland; it appears flanking the central plateau of France and in the Pyrenees and Sardinia. In the German region it is usual to divide the Keuper into three groups, the Rhaetic or upper Keuper, the middle, Hauptkeuper or gypskeuper, and the lower, Kohlenkeuper or Lettenkohle. In Germany the lower division consists mainly of grey clays and schieferletten with white, grey and brightly coloured sandstone and dolomitic limestone. The upper part of this division is often a grey dolomite known as the Grenz dolomite; the impure coal beds — Lettenkohle — are aggregated towards the base. The middle division is thicker than either of the others (at Gottingen, 450 metres) ; it consists of a marly series below, grey, red and green marls with gypsum and dolo- mite — this is the gypskeuper in its restricted sense. The higher part of the series is sandy, hence called the Steinmergel; it is comparatively free from gypsum. To this division belong the Myophoria

beds (M. Raibliana) with galena in places; the Estheria beds (E. laxitesta); the Schelfsandstein, used as a buildkig-stone; the Lehrberg and Berg-gyps beds; Semionotus beds (S. Bergeri) with building-stone of Coburg; and the Burg- and Stubensandstein. The salt,which is associated with gypsum, is exploited in south Germany at Dreuze, Pettoncourt, Vie in Lorraine and Wimpfen on the Neckar. A 3-metre coal is found on this horizon in the Erzgebirge, and another, 2 metres thick, has been mined in Upper Silesia. The upper Keuper, Rhaetic or Avicula contorta zone in Germany is mainly sandy with dark grey shales and marls; it is seldom more than 25 metres thick. The sandstones are used for building purposes at Bayreuth, Culmbach and Bamberg. In Swabia and the Wesergebirge are several " bone-beds," thicker than those in the middle Keuper, which contain a rich assemblage of fossil remains of fish, reptiles and the mammalian teeth of Microlestes antiquus and Triglyptus Fraasi. The name Rhaetic is derived from the Rhaetic Alps where the beds are well developed; they occur also in central France, the Pyrenees and England. In S.Tirol and the Judic- arian Mountains the Rhaetic is represented by the Kbssener beds. In the Alpine region the presence of coral beds gives rise to the so-called " Lithodendron Kalk."

In Great Britain the Keuper contains the following sub- divisions: Rhaetic or Penarth beds, grey, red and green marls, black shales and so-called "white lias" (10-150 ft.). Upper Keuper marl, red and grey marls and shales with gypsum and

1 Miller's Artillery Regimental History; see also H. G. Farmer, op. cit., p. 22; illustration 1702, p. 26.

2 Memoirs of the Royal Artillery.

rock salt (800-3000 ft.). Lower Keuper sandstone, marls and thin sandstones at the top, red and white sandstones (including the so-called " waterstones ") below, with breccias and con- glomerates at the base (150-250 ft.). The basal or " dolomitic conglomerate " is a shore or scree breccia derived from local materials; it is well developed in the Mendip district. The rock- salt beds vary from 1 in. to 100 ft. in thickness; they are exten- sively worked (mined and pumped) in Cheshire, Middlesbrough and Antrim. The Keuper covers a large area in the midlands and around the flanks of the Pennine range; it reaches southward to the Devonshire coast, eastward into Yorkshire and north- westward into north Ireland and south Scotland. As in Germany, there are one or more " bone beds " in the English Rhaetic with a similar assemblage of fossils. In the " white lias " the upper hard limestone is known as the " sun bed " or "Jew stone "; at the base is the Cotham or landscape marble.

Representatives of the Rhaetic are found in south Sweden, where the lower portion contains workable coals, in the Hima- layas, Japan, Tibet, Burma, eastern Siberia and in Spitzbergen. The upper portion of the Karroo beds of South Africa and part of the Otapiri series of New Zealand are probably of Rhaetic age.

The Keuper is not rich in fossils ; the principal plants are cypress- like conifers (Walckia, Voltzia) and a few calamites with such forms as Equisetum arenaceum and Pterophyllum Jaegeri, Avicula contorta, Protocardium rhaeticum, Terebratula gregaria, Myophoria costata, M.- Goldfassi and Lingula tenuessima, Anoplophoria leltica may be mentioned among the invertebrates. Fishes include Ceratodus, Hybodus and Lepidotus. Labyrinthodonts represented by the footprints of Cheirotherium and the bones of Labyrinihodon, Mastodonsaurus and Capitosaurus. Among the reptiles are Hy- perodapedon, Palaeosaurus, Zanclodon, Nothosaurus and Belodon. Microlestes, the earliest known mammalian genus, has already been mentioned.

See also the article Triassic System. (J. A. H.)

KEW, a township in the Kingston parliamentary division of Surrey, England, situated on the south bank of the Thames, 6 m. W.S.W. of Hyde Park Corner, London. Pop. (1901), 2699. A stone bridge of seven arches, erected in 1789, connecting Kew with Brentford on the other side of the river, was replaced by a bridge of three arches opened by Edward VII. in 1903 and named after him. Kew has increased greatly as a residential suburb of London; the old village consisted chiefly of a row of houses with gardens attached, situated on the north side of a green, to the south of which is the church and churchyard and at the west the principal entrance to Kew Gardens. From remains found in the bed of the river near Kew bridge it has been conjectured that the village marks the site of an old British settlement. The name first occurs in a document of the reign of Henry VII., where it is spelt Kayhough. The church of St Anne (1714) has a mausoleum containing the tomb of the duke of Cambridge (d. 1850) son of George III., and is also the burial- place of Thomas Gainsborough the artist, Jeremiah Meyer the painter of miniatures (d.1789), John Zoffany the artist (d. 1810), Joshua Kirby the architect (d. 1774), and William Aiton the botanist and director of Kew Gardens (d. 1793).

The free school originally endowed by Lady Capel in 1721 received special benefactions from George IV., and the title of " the king's free school."

The estate of Kew House about the end of the 17th century came into the possession of Lord Capel of Tewkesbury, and in 1 72 1 of Samuel Molyneux, secretary to the prince of Wales, afterwards George II. After his

death it was leased by Frederick prince of Wales, son of George II., and was purchased about 1789 by George III., who devoted his leisure to its improvement. The old house was pulled down in 1802, and a new mansion was begun from the designs of James Wyatt, but the king's death prevented its completion, and in 1827 the portion built was removed. Dutch House, close to Kew House, was sold by Robert Dudley, earl of Leicester, to Sir Hugh Portman, a Dutch merchant, late in the 16th century, and in 1781 was purchased by George III. as a nursery for the royal children. It is a plain brick structure, now known as Kew Palace.

The Royal Botanic Gardens of Kew originated in the exotic garden formed by Lord Capel and greatly extended by the princess dowager, widow of Frederick, prince of Wales, and by George III., aided by the skill of William Aiton and of Sir Joseph Banks. In 1840 the gardens were adopted as a national establishment, and transferred to the department of woods and forests. The gardens proper, which originally contained only about n acres, were subsequently increased to 75 acres, aid the pleasure grounds or arboretum adjoining extend to 270 acres. There are extensive conservatories, botanical museums, including the magnificent herbarium and a library. A lofty Chinese pagoda was erected in 1761. A flagstaff 159 ft. high is made out of the fine single trunk of a Douglas pine. In the neighbouring Richmond Old Park is the important Kew Observatory.

KEWANEE, a city of Henry county, Illinois, U.S.A., in the N. W. part of the state, about 55 m. N. by W. of Peoria. Pop. (1900), 8382, of whom 2006 were foreign-born; (1910 census), 9307. It is served by the Chicago Burlington & Quincy railroad and by the Galesburg & Kewanee Electric railway. Among its manufactures are foundry and machine- shop products, boilers, carriages and wagons, agricultural implements, pipe and fittings, working-men's gloves, &c. In 1905 the total factory product was valued at $6,729,381, or 61-5% more than in 1900. Kewanee was settled in 1836 by people from Wethersfield, Connecticut, and was first chartered as a city in 1897.

KEY, SIR ASTLEY COOPER (1821-1888), English admiral, was born in London in 1821, and entered the navy in 1833. His father was Charles Aston Key (1793-1849), a well-known surgeon, the pupil of Sir Astley Cooper, and his mother was the latter's niece. After distinguishing himself in active service abroad, on the South American station (1844-1846), in the Baltic during the Crimean War (C.B. 1853) and China (1857), Key was appointed in 1858 a member of the royal commission on national

defence, in i860 captain of the steam reserve at Devonport, and in 1863 captain of H.M.S. " Excellent " and superintendent of the Royal Naval College. He had a con siderable share in advising as to the reorganization of adminis- tration, and in 1866, having become rear-admiral, was made director of naval ordnance. Between 1869 and 1872 he held the offices of superintendent of Portsmouth dockyard, super- intendent of Malta dockyard, and second in command in the Mediterranean. In 1872 he was made president of the projected Royal Naval College at Greenwich, which was organized by him, and after its opening in 1873 he was made a K.C.B. and a vice- admiral. In 1876 he was appointed commander-in-chief on the North American and West Indian station. Having become full admiral in 1878, he was appointed in 1879 principal A.D.C., and soon afterwards first naval lord of the admiralty, retaining this post till 1885. In 1882 he was made G.C.B. He died at Maidenhead on the 3rd of March, 1888.

See Memoirs of Sir Astley Cooper Key, by Vice- Admiral Colomb

(1898).

KEY, THOMAS HEWITT (1799-1875), English classical scholar, was born in London on the 20th of March, 1799. He was educated at St John's and Trinity Colleges, Cambridge, and graduated 19th wrangler in 1821. From 1825 to 1827 he was professor of mathematics in the university of Virginia, and after his return to England was appointed (1828) professor of Latin in the newly founded university of London. In 1832 he became joint headmaster of the school founded in connexion with that institution; in 1842 he resigned the professorship of Latin, and took up that of comparative grammar together with the undivided headmastership of the school. These two posts he held till his death on the 29th of November 1875. Key is best known for his introduction of the crude-form (the uninflected form or stem of words) system, in general use among Sanskrit grammarians,intothe teaching of the'classical languages. This system was embodied in his Latin Grammar (1846). In Language, its Origin and Development (1874), he upholds the onomatopoeic theory. Key was prejudiced against the German

" Sanskritists," and the etymological portion of his Latin Dictionary, published in 1888, was severely 'criticized on this account. He was a member of the Royal Society and president of the Philological Society, to the Transactions of which he contributed largely.

See Proceedings of the Royal Society, vol. xxiv. (1876); R. Ellis in the Academy (Dec. 4, 1875); J. P. Hicks, T. Hewitt Key (1893), where a full list of his works and contributions is given.

KEY (in O. Eng. caeg; the ultimate origin of the word is unknown; it appears only in Old Frisian kei of other Teutonic languages; until the end of the 17th century the pronunciation was kay, as in other words in O. Eng. ending in aeg; cf. daeg, day; claig, clay; the New English Dictionary takes the change to kee to be due to northern influence), an instrument of metal used for the opening and closing of a lock (see Lock). Until the 14th century bronze and not iron was most commonly used. The terminals of the stem of the keys were frequently decorated, the " bow " or loop taking the form sometimes of a trefoil, with figures inscribed within it; this decoration increased in the 16th century, the terminals being made in the shape of animals and other figures. Still more elaborate ceremonial keys were used by court officials; a series of chamberlains' keys used during the 18th and 19th centuries in several courts in Europe is in the British Museum. The terminals are decorated with crowns, royal monograms and ciphers. The word " key " is by analogy applied to things regarded as means for the opening or closing of 'anything, for the making clear that which is hidden. Thus it is used of an interpretation as to the arrangement of the letters or words of a cipher, of a solution of mathematical or other problems, or of a translation of exercises or books, &c, from a foreign language. The term is also used figuratively of a place of commanding strategic position. Thus Gibraltar, the " Key of the Mediterranean," was granted in 1462 by Henry IV. of Castile, the arms, gules, a castle proper, with key pendant to the gate, or; these arms form the badge of the 50th regiment of foot (now 2nd Batt. Essex Regiment) in the British army, in memory of the part which it took in the siege of 1782. The word is also frequently applied to many mechanical contrivances for unfastening or loosening a valve, nut, bolt, &c, such as a spanner or wrench,'and to the instruments used in tuning a piano- forte or harp or in winding clocks or watches. A farther extension of the word is to appliances or devices which serve to lock or fasten together distinct parts of a structure, as the " key-stone " of an arch, the wedge or piece of wood, metal, &c, which fixes a joint, or a small metal instrument, shaped like a U, used to secure the bands in the process of sewing in book-binding.

In musical instruments the term " key " is applied in certain wind instruments, particularly of the wood-wind type, to the levers which open and close valves in order to produce various notes, and in keyboard instruments, such as the organ or the pianoforte, to the exterior white or black parts of the levers which either open or shut the valves to admit the wind from the bellows to the pipes or to release the hammers against the strings (see Keyboard). It is from this application of the word to these levers in musical instruments that the term is also used of the parts pressed by the finger in typewriters and in telegraphic instruments.

A key is the insignia of the office of chamberlain in a royal household (see

Chamberlain and Lord Chamberlain). The ” power of the keys ” (clavium potestas) in ecclesiastical usage represents the authority given by Christ to Peter by the words, ” I will give unto thee the keys of the kingdom of heaven ” (Matt. xvi. 19). This is claimed by the Roman Church to have been transmitted to the popes as the successors of St Peter.

“Key” was formerly the common spelling of “quay,” “a wharf, and is still found in America for “cay,” an island reef or sandbank off the coast of Florida (see Quay).

The origin of the name Keys or House of Keys, the lower branch of the legislature, the court of Tynwald, of the Isle of Man, has been much discussed, but it is generally accepted that it is a particular application of the word ” key ” by English- and not Manx-speaking

people. According to A. W. Moore, History of the Isle of Man, i. 160 sqq. (1900), in the Manx statutes and records the name of the house was in 141 7 Claves Manniae el Clones legis, Keys of Man and Keys of the Law ; but the popular and also the documentary name till 1585 seems to have been “the 24,” in Manx Kiare as feed. From 1585 to 1734 the name was in the statutes, &c, “the 24 Keys,” or simply “the Keys.” Moore suggests that the name was possibly originally due to an English “clerk of the rolls,” the members of the house being called in to ” unlock or solve the difficulties of the law.” There is no evidence for the suggestion that Keys is an English cor- ruption of Kiare-as, the first part of Kiare as feed. Another sugges- tion is that it is from a Scandinavian word keise, chosen.

KEYBOARD, or Manual (Fr. clavier; Ger. Klaviatur; Ital. tastatura), a succession of keys for unlocking sound in stringed, wind or percussion musical instruments, together with the case or board on which they are arranged. The two principal types of keyboard instruments are the organ and the piano; their keyboards, although similarly constructed, differ widely in $Cope and capabilities. The keyboard of the organ, a purely piechanical contrivance, is the external means of communicating with the valves or pallets that open and close the entrances to the pipes. As its action is incapable of variation at the will of the performer, the keyboard of the organ remains without influence on the quality and intensity of the sound. The key- board of the piano, on the contrary, besides its purely mechanical function, also forms a sympathetic vehicle of transmission for the performer’s rhythmical and emotional feeling, in consequence of the faithfulness with which it passes on the impulses communi- cated by the

fingers. The keyboard proper does not, in instru- ments of the organ and piano types, contain the complete mechanical apparatus for directly unlocking the sound, but only that external part of it which is accessible to the performer.

The first instrument provided with a keyboard was the organ; we must therefore seek for the prototype of the modern keyboard in connexion with the primitive instrument which marks the transi- tion between the mere syrinx provided with bellows, in which all the pipes sounded at once unless stopped by the fingers, and the first organ in which sound was elicited from a pipe only when unlocked by means of some mechanical contrivance. The earliest contri- vance was the simple slider, unprovided with a key or touchpiece and working in a groove like the lid of a box, which was merely pushed in or drawn out to open or close the hole that formed the communica- tion between the wind chest and the hole in the foot of the pipe. These sliders fulfilled in a simple manner the function of the modern keys, and preceded the groove and pallet system of the modern organ. We have no clear or trustworthy information concerning the primitive organ with sliders. Athanasius Kircher 1 gives a drawing of a small mouth-blown instrument under the name of Magraketha {Mashroqitha' , Dan. iii. 5) , and Ugolini describes a similar one, but with a pair of bellows, as the magrephah of the treatise 'Arakhin. 3 By analogy with the evolution of the organ in central and western Europe from the 8th to the 15th century, of which we are able to study the various stages, we may conclude that in

rinciple both drawings were probably fairly representative, even nothing better than efforts of the imagination to illustrate a text. The invention of the keyboard with balanced keys has been placed by some writers as late as the 13th or 14th century, in spite of its having been described by both Hero of Alexandria and Vitruvius and mentioned by poets and writers. The misconception probably arose from the easy assumption that the organ was the product of Western skill and that the primitive instruments with sliders found in nth century documents 4 represent the sum of the progress made in the evolution ; in reality they were the result of a laborious effort to reconquer a lost arc. The earliest trace of a balanced keyboard we possess is contained in Hero's description of the hydraulic organ said to have been invented by Ctesibius of Alexandria in the 2nd century b.c. After describing the other parts (see Organ), Hero passes on to the sliders with perforations corresponding with the open feet of the speaking pipes which, when drawn forward, traverse and block the pipes. He describes the following contrivances : attached to the slider is a three-limbed, pivoted elbow-key, which, when depressed, pushes the slider inwards; in order to provide for its automatic return when the finger is lifted from the key, a slip of horn is attached by a gut string to each elbow-key. When the key is depressed and the slider pushed home, the gut string pulls the slip of horn and straightens

it. As soon as the key is released, the piece

1 See Musurgia, bk. II., iv. § 3.

2 Thes. Antiq. Sacra. (Venice, 1744-1769), xxxii. 477.

3 II. 3 and fol. 10, 2. 'Arakhin (" Valuations ") is a treatise in the Babylonian Talmud. The word Magrephah occurs in the Mishna, the description of the instrument in the gemO.rO,.

- *See the Cividale Prayer Book of St Elizabeth in Arthur Hase- loff's Eine Sachs. -thuring. Malerschule, pi. 26, No. 57, also Bible of St Etienne Harding at Dijon Csee Organ: History).*

of horn, regaining its natural bent by its own elasticity, pulls the slider out so that the perforation of the slider overlaps and the pipe is silenced. 6 The description of the keyboard by Vitruvius Pollio, a variant of that of Hero, is less accurate and less complete. 8 From evidence discussed in the article Organ, it is clear that the principle of a balanced keyboard was well understood both in the 2nd and in the 5th century a.d. After this all trace of this important develop- ment disappears, sliders of all kinds with and without handles doing duty for keys until the 12th or 13th century, when we find the small portative organs furnished with narrow keys which appear to be balanced; the single bellows were manipulated by one hand while the other fingered the keys. As this little instrument was mainly used to accompany the voice in simple chaunts, it needed few keys, at most nine or twelve. The pipes were flue-pipes. A similar little instrument, having tiny invisible pipes furnished with beating reeds and a pair of bellows (therefore requiring two performers) was known as the regal. There are representations of these medieval balanced keyboards with keys of various shapes, the most common being the rectangular with or without rounded corners and the T-shaped. Until the 14th century all the keys were in one row and of the same level, and although the B flat was used for modulation, it was merely placed between A and B natural in the sequence of notes. During the 14th century small square additional keys made their appearance, one or two to the octave, inserted between the others in the position of our black keys but not raised. An example of this keyboard is reproduced by J. F. Riafio 7 from a fresco in the Cistercian monastery of Nuestra Sefiora de Piedra in Aragon, dated

1390.

So far the history of the keyboard is that of the organ. The only stringed instruments with keys before this date were the organistrum and the hurdy-gurdy, in which little tongues of wood manipulated by handles or keys

performed the function of the fingers in stopping the strings on the neck of the instruments, but they did not influence the development of the keyboard. The advent of the immediate precursors of the pianoforte was at hand. In the Wunderbuch" (1440), preserved in the Grand Ducal Library at Weimar, are repre- sented a number of musical instruments, all named. Among them are a clavichordium and a clavicymbalum with narrow additional keys let in between the wider ones, one to every group of two large keys. The same arrangement prevailed in a clavicymbalum figured in an anonymous MS. attributed to the 14th century, preserved in the public library at Ghent 3 ; from the lettering over the jacks and strings, of which there are but eight, it would seem as though the draughts- man had left the accidentals out of the scheme of notation. Theseare the earliest known representations of instruments with keyboards. The exact date at which our chromatic keyboard came into use has not been discovered, but it existed in the 15th century and may be studied in the picture of St Cecilia playing the organ on the Ghent altarpiece painted by the brothers Hubert and Jan van Eyck. Praetorius distinctly states that the large Halberstadt organ had the keyboard which he figures (plates xxiv. and xxv.) from the outset, and reproduces the inscription asserting that the organ was built in 1361 by the priest Nicolas Fabri and was renovated in 1495 by Gregorius Kleng. The keyboard of this organ has the arrangement of the present day with raised black notes; it is not improbable that Praetorius's statement was correct, for Germany and the Nether- lands led the van in organ-building during the middle ages.

At the beginning of the 16th century, to facilitate the playing of contrapuntal music having a drone bass or point d'orgue, the arrange- ment of the pipes of organs and of the strings of spinets and harp- sichords was altered, with the result that the lowest octave of the keyboard was made in what is known as short measure, or mi, re, ut, i.e. a diatonic with B flat included, but grouped in the space of a sixth instead of appearing as a full octave. In order to carry out this device, the note below F was C, instead of E, the missing D and E and the B flat being substituted for the three sharps of F, G and A, and appearing as black notes, thus: — ■

D E Bb C F G A B C, or if the lowest note appeared to be B, it sounded as G and the arrangement was as follows:—

A B G C D E F G. This was the most common scheme for the short octave during the 16th and 17th centuries, although others are occasionally found. Praetorius also gives examples in which the black notes of the short octave were divided into two halves, or separate keys, the forward

5 See the original Greek with translation by Charles Maclean in " The Principle of the Hydraulic Organ," Intern. Musikges. vi. 2, 219-220

(Leipzig 1905).

6 See Clement Loret's account in Revue archeologique, pp. 76-102 (Paris, 1890).

7 Early Hist, of Spanish Music (London, 1807).

8 Reproduced by Dr Alwin Schulz in Deutsches Leben im XIV. u. XV. Jhdt., figs. 522 seq. (Vienna, 1892).

9 " De diversis monocordis, pentacordis, etc., ex quibus diversa formantur instrumenta musica," reproduced by Edm. van der Straeten in Hist, de la musique aux Pays-Bas, i. 278.

half for the drone note, the back half for the chromatic semitone, thus: —

'" V .

D E B> C F G A B C This arrangement, which accomplishes its object without sacrifice, was to be found early in the 17th century in the organs of the monasteries of Riddageshausen and of Bayreuth in Vogtland.

See A. J. Hipkins, History of the Pianoforte (London, 1896), and the older works of Girolamo Diruta (1597), Praetorius (1618), and Mersenne (1636). (K. S.)

KEYSTONE, the central voussoir of an arch (q.v.). The Etruscans and the Romans emphasized its importance by decorating it with figures and busts, and, in their triumphal arches, projected it forward and utilized it as an additional support to the architrave above. Throughout the Italian period it forms an important element in the design, and serves to connect the arch with the horizontal mouldings running above it. In Gothic architecture there is no keystone, but the junction of pointed ribs at their summit is sometimes decorated with a boss to mask the intersection.

KEY WEST (from the Spanish Cayo Hueso, " Bone Reef "), a city, port of entry, and the county-seat of Monroe county, Florida, U.S.A., situated on a small coral island (4§m. long and about 1 m. wide) of the same name, 60 m. S. W. of Cape Sable, the most southerly point of the mainland. It is connected by lines of steamers with Miami and Port Tampa, with Galveston, Texas, with Mobile, Alabama, with Philadelphia and New York City, and with West Indian ports, and by regular schooner lines with New

York City, the Bahamas, British Honduras, &c. There is now an extension of the Florida East Coast railway from Miami to Key West (155m.). Pop. (1 880) , 9890 ; (1 890) , 1 8,080 ; (1900), 17,114, of whom 7266 were foreign-born and 5562 were negroes; (1910 census), 19,945. The island is notable for its tropical vegetation and climate. The jasmine, almond, banana, cork and coco-nut palm are among the trees. The oleander grows here to be a tree, and there is a banyan tree, said to be the only one growing out of doors in the United States. There are many species of plants in Key West not found elsewhere in North America. The mean annual temperature is 76° F., and the mean of the hottest months is 82-2° F.; that of the coldest months is 69 F.; thus the mean range of temperature is only 13 . The precipitation is 35 in.; most of the rain falls in the " rainy season" from May to November, and is preserved in cisterns by the in- habitants as the only supply of drinking water. The number of cloudy days per annum averages 60. The city occupies the highest portion of the island. The harbour accommodates vessels drawing 27 ft.; vessels of 27-30 ft. draft can enter by either the " Main Ship " channel or the south-west channel; the south-east channel admits vessels of 25 ft. draft or less; and four other channels may be used by vessels of 15-19 ft. draft. The harbour is defended by Fort Taylor, built on the island of Key West in 1846, and greatly improved and modernized after the Spanish- American War of 1898. Among the buildings are t he United States custom house, the city hall, a convent, and a public library.

In 1869 the insignificant population of Key West was greatly increased by Cubans who left their native island after an attempt at revolution; they engaged in the manufacture of tobacco, and Key West cigars were soon widely known. Towards the close of the 19th century this industry suffered from labour troubles, from the competition of Tampa, Florida, and from the commercial improvement of Havana, Cuba; but soon after 1900 the tobacco business of Key West began to recover. Immigrants from the Bahama Islands form another important element in the popu- lation. They are known as " Conchs," and engage in sponge fishing. In 1905 the value of factory products was $4,254,024 (an increase of 37-7% over the value in 1900); the exports in 1907 were valued at $852,457; the imports were valued at $994,472, the excess over the exports being due to the fact that the food supply of the city is derived from other Florida ports and from the West Indies.

According to tradition the native Indian tribes of Key West,

after being almost annihilated by the Caloosas, fled to Cuba. There are relics of early European occupation of the island which suggest that it was

once the resort of pirates. The city was settled about 1822. The Seminole War and the war of the United States with Mexico gave it some military importance. In 1861 Confederate forces attempted to seize Fort Taylor, but they were successfully resisted by General William H. French.

KHABAROVSK (known as Khabarovka until 1895), a town of Asiatic Russia, capital of the Amur region and of the Maritime Province. Pop. (1897), I 4 > 93 2 – It wa s founded in 1858 and is situated on a high cliff on the right bank of the Amur, at its confluence with the Usuri, in 48 28′ N. and 135 6′ E. It is connected by rail with Vladivostok (480 m.), and is an important entrepot for goods coming down the Usuri and its tributary the Sungacha, as well as a centre of trade, especially in sables. The town is built of wood, and has a large cathedral, a monument (1891) to Count Muraviev-Amurskiy, a cadet corps (new building 1904), a branch of the Russian Geographical Society, with museum, and a technical railway school.

KHAIRAGARH, a feudatory state in the Central Provinces, India. Area, 931 sq. m.; pop. (1901), 137,554, showing a decrease of 24% in the decade due to the effects of famine; estimated revenue, £20,000; tribute £4600. The chief, who is descended from the old Gond royal family, received the title of raja as an hereditary distinction in 1898. The state includes a fertile plain, yielding rice and cotton. Its prosperity has been promoted by the Bengal-Nagpur railway, which has a station at Dongargarh, the largest town (pop. 5856), connected by road with Khairagarh town, the residence of the raja.

KHAIREDDIN {Khair-ed-Din = "Joy of Religion") (d. 1890), Turkish statesman, was of Circassian race, but nothing is known about his birth and parentage. In early boyhood he was in the hands of a Tunisian slave-dealer, by whom he was sold to Hamuda Pasha, then bey of Tunis, who gave him his freedom and a French education. When Khaireddin left school the bey made him steward of his estates, and from this position he rose to be minister of finance. When the prime minister, Mahmud ben Ayad, absconded to France with the treasure-chest of the beylic, Hamuda despatched Khaireddin to obtain the extradition of the fugitive. The mission failed; but the six years it occupied enabled Khaireddin to make himself widely known in France, to become acquainted with French political ideas and administrative methods, and, on his return to Tunisia, to render himself more than ever useful to his government. Hamuda died while Khair- eddin was in France, but he was highly appreciated by the three beys— Ahmet (1837), Mohammed (1855), and Sadok (1859) — who in turn followed Hamuda, and to his influence was due the sequence of liberal measures which distinguished their successive reigns. Khaireddin also secured for the reigning family the con- firmation from the sultan of Turkey

of their right of succession to the beylic. But although Khaireddin 's protracted residence in France had imbued him with liberal ideas, it had not made him a French partisan, and he strenuously opposed the French scheme of establishing a protectorate over Tunisia upon which France embarked in the early 'seventies. This rendered him obnoxious to Sadok's prime minister — an apostate Jew named Mustapha ben Ismael — who succeeded in completely undermining the bey's confidence in him. ■ His position thus became untenable in Tunisia, and shortly after the accession of Abdul Hamid he acquainted the sultan with his desire to enter the Turkish service. In 1877 the sultan bade him come to Constantinople, and on his arrival gave him a seat on the Reform Commission then sitting atTophane. Early in 1879 the sultan appointed him grand vizier, and shortly afterwards "he prepared a scheme of constitutional government, but Abdul Hamid refused to have anything to do with it. Thereupon Khaireddin resigned office, on the 28th of July 1879. More than once the sultan offered him anew the grand vizierate, but Khaireddin persistently refused it, and thus incurred disfavour. He died on the 30th of January 1890, practically a prisoner in his own house.

KHAIRPUR, or Khyrpoor, a native state of India; in the Sind province of Bombay. Area, 6050 sq. m.; pop. (1901),

1 99>3 I 3> showing an apparent increase of 55 % in the decade; estimated revenue, £90,000. Like other parts of Sind, Khairpur consists of a great alluvial plain, very rich and fertile in the neighbourhood of the Indus and the irrigation canals, the remain- ing area being a continuous series of sand-hill ridges covered with a stunted brushwood, where cultivation is altogether impossible. A small ridge of limestone hills passes through the northern part of the state, being a continuation of a ridge known as the Ghar, running southwards from Rohri. The state is watered by five canals drawn off from the Indus, besides the Eastern Nara, a canal which follows an old bed of the Indus. In the desert tracts are pits of natron.

Khairpur town is situated on a canal 15 m. E. of the Indus, with a railway station, 20 m. S. of Sukkur, on the Kotri-Rohri branch of the North-Western railway, which here crosses a corner of the state. Pop. (1901), 14,014. There are manu- factures of cloth, carpets, goldsmiths' work and arms, and an export trade in indigo, grain and oilseeds.

The chief, or mir, of Khairpur belongs to a Baluch family, known as the Talpur, which rose on the fall of the Kalhora dynasty of Sind. About 1813, during the troubles in Kabul incidental to the establish- ment of the Barakzai dynasty, the mirs were able to withhold the tribute which up to that date had been somewhat irregularly paid to the rulers of Afghanistan. In 1832 the individuality of the Khair- pur state was recognized by the British government in a treaty under which the use of the river Indus and the roads of Sind were secured. When the first Kabul expedition was decided on, the mir of Khairpur, Ali Murad, cordially supported the British policy; and the result was that, after the battles of Meeanee and Daba had put the whole of Sind at the disposal of the British, Khairpur was the only state allowed to retain its political existence under the pro- tection of the paramount power. The chief mir, Faiz Mahommed Khan, G.C.I.E., who was an enlightened ruler, died in 1909, shortly after returning from a pilgrimage to the Shiite shrine of Kerbela.

KHAJRAHO, a village of Central India, in the state of Chhatarpur, famous for its old temples; pop. (1901), 1242. It is believed to have been the capital of the ancient kingdom of Jijhoti, corresponding with modern Bundelkhand. The temples consist of three groups: Saiva, Vaishnav and Jain, almost all built in the 10th and nth centuries. They are covered outside and inside with elaborate sculptures, and also bear valuable inscriptions.

KHAKI (from Urdu khak, dust), originally a dust-coloured fabric, of the character of canvas, drill or holland, used by the British and native armies in India. It seems to have been first worn by the Guides, a mixed regiment of frontier troops, in 1848, and to have spread to other regiments during the following years. Some at any rate of the British troops had uniforms of khaki during the Indian Mutiny (1857-58), and thereafter drill or holland (generally called "khaki" whatever its colour) became the almost universal dress of British and native troops in Asia and Africa. During the South African War of 1899-1902, drill of a sandy shade of brown was worn by all troops sent out from Great Britain and the Colonies. Khaki drill, however, proved unsuitable material for the cold weather in the uplands of South Africa, and after a time the troops were supplied with dust-coloured sergei uniforms. Since 1900 all drab and green- grey uniforms have been, unofficially at any rate, designated khaki.

KHALIFA, THE. Abduixah et Taaisha (Seyyid Abdullah ibn Seyyid Mahommed) (1846-1899), successor of the mahdi Mahommed Ahmed, born in 1846 in the south-western portion of Darfur, was a member of the Taaisha section of the Baggara or cattle-owning Arabs. His father, Mahommed et Taki, had determined to emigrate to Mecca with his family; but the unsettled state of the country long prevented him, and he died in

Africa after advising his eldest son, Abdullah, to take refuge with some religious sheikh on the Nile, and to proceed to Mecca on a favourable opportunity. Abdullah, who had already had much connexion with slave-hunters, and had fought against the Egyptian conquest of Darfur, departed for the Nile valley with this purpose; hearing on the way of the disputes of Mahommed Ahmed, who had not yet claimed a sacred character, with the Egyptian officials, he went to him in spite of great difficulties,

and, according to his own statement, at once recognized in him the mahdi (" guide ") divinely appointed to regenerate Islam in the latter days. His advice to Mahommed to stir up revolt in Darfur and Kordofan being justified by the result, he became his most trusted counsellor, and was soon declared principal khalifa or vicegerent of the mahdi, all of whose acts were to be regarded as the mahdi's own. The mahdi on his deathbed (1885) solemnly named him his successor; and for thirteen years Abdullah ruled over what had been the Egyptian Sudan. Khartum was deserted by his orders, and Omdurman, at first intended as a temporary camp, was made his capital. At length the progress of Sir Herbert (afterwards Lord) Kitchener's expedition compelled him to give battle to the Anglo-Egyptian forces near Omdurman, where on the 2nd of September 1898 his army, fighting with desperate courage, was almost annihilated. The khalifa, who had not left Omdurman since the death of the mahdi, fled to Kordofan with the remnant of his host. On the 25th of November 1899 he gave battle to a force under Colonel (afterwards General Sir) F. R. Wingate, and was slain at Om Debreikat. He met death with great fortitude, refusing to fly, and his principal amirs voluntarily perished with him.

The khalifa was a man of iron will and great energy, and possessed some military skill. By nature tyrannical, he was impatient of all opposition and appeared to delight in cruelty. It must be remembered, however, that he had to meet the secret or open hostility of all the tribes of the Nile valley and that his authority was dependent on his ability to overawe his opponents. He maintained in public the divine character of the power he inherited from the mahdi and inspired his followers to perform prodigies of valour. Although he treated many of his European captives with terrible severity he never had any of them executed. It is said that their presence in Omdurman ministered to his vanity — one of the most marked features of his character. In private life he showed much affection for his family.

Personal sketches of the khalifa are given in Slatin Pasha's Fire and Sword in the Sudan (London, 1896), and in Father Ohrwalder's Ten Years in the Mahdi's Camp (London, 1892). See also Sir F. R. Wingate's Mahdiism and the Egyptian Sudan (London, 1891).

KHALIL IBN AHMAD [Abu 'Abdurrahman ul-Khalil ibn Ahmad ibn 'Amr

ibn TamIm] (718-791), Arabian philologist, was a' native of Oman. He was distinguished for having written the first Arabic dictionary and for having first classified the Arabic metres and laid down their rules. He was also a poet, and lived the ascetic life of a poor student. His grammatical work was carried on by his pupil SibawaihI. The dictionary known as the Kilab-ul-'Ain is ascribed, at least in its inception, to Khalll. It was probably finished by one of his pupils and was not known in Bagdad until 862. The words were not arranged in alphabetical order but according to physiological principles, beginning with 'Ain and ending with Ya. The work seems to have been in existence as late as the 14th century, but is now only known from extracts in manuscript.

Various grammatical works are ascribed to Khalll, but their authenticity seems doubtful; cf. C. Brockelmann, Gesch. der arabischen Liter atur, i. 100 (Weimar, 1898), (G. W. T.)

KHAM6A0N, a town of India, in the Buldana district of Berar,34o m. N.E. of Bombay. Pop. (1901), 18,341. It is an important centre of the cotton trade. The cotton market, the second in the province, was established about 1820. Khamgaon was connected in 1870 with the Great Indian Peninsula railway by a short branch line.

KHAMSEH, a small but important province of Persia, between Kazvin and Tabriz. It consisted formerly of five districts, whence its name Khamseh, " the five," but is now subdivided into seventeen districts. The language of the inhabitants is Turkish. The province pays a revenue of about £20,000 per annum, and its capital is Zenjan.

KHAMSIN (Arabic for " fifty "), a hot oppressive wind arising in the Sahara. It blows in Egypt at intervals for about fifty days during March, April and May, and fills the air with sand. In Guinea the wind from the Sahara is known as harmattan (?.».).

KHAMTIS, a tribe of the north-east frontier of India, dwelling in the hills bordering the Lakhimpur district of Assam. They are of Shan origin, and appear to have settled in their present abode in the middle of the 18th century. In 1839 they raided the British outpost of Sadiya, but they have since given no trouble. Their headquarters are in a valley 200 m. from Sadiya, which can be reached only over high passes and through dense jungle. In 1901 the number of speakers of Khamti was returned as only 1490, mostly in Burma.

KHAN (from the Turki, hence Persian and Arabic Khan), a title of respect in Mahommedan countries. It is a contracted form of khaqan (khakan), a word equivalent to sovereign or emperor, used among the Mongol and Turkl-nomad hordes. The title khan was assumed by Jenghis when he became supreme ruler of the Mongols; his successors became known in Europe as the Great Khans (sometimes as the Chams, &c.) of Tatary or Cathay. Khan is still applied to semi-independent rulers, such as the khans of Russian Turkestan, or the khan of Kalat in Baluchistan, and is also used immediately after the name of rulers such as the sultan of Turkey; the meaning of the term has also extended downwards, until in Persia and Afghanistan it has become an affix to the name of any Mahommedan gentleman, like Esquire, and in India it has become a part of many Mahom- medan names, especially when Pathan descent is claimed. The title of Khan Bahadur is conferred by the British govern- ment on Mahommedans and also on Parsis.

KHANDESH, EAST and WEST, two districts of British India, in the central division of Bombay. They were formed in 1906 by the division of the old single district of Khandesh. Their areas are respectively 4544 sq. m. and 5497 sq. m., and the population on these areas in 1901 was 957,728 and 469,654. The headquarters of East Khandesh are at Jalgaon, and those of West Khandesh at Dhulia.

The principal natural feature is the Tapti river, which flows through both districts from east to west and divides each into two unequal parts. Of these the larger lie towards the south, and are drained by the rivers Girna, Bori and Panjhra. Northwards beyond the alluvial plain, which contains some of the richest tracts in Khandesh, the land rises towards the Satpura hills. In the centre and east the country is level, save for some low ranges of barren hills, and has in general an arid, unfertile appearance. Towards the north and west, the plain rises into a difficult and rugged country, thickly wooded, and inhabited by wild tribes of Bhils, who chiefly support themselves on the fruits of the forests and by wood-cutting. The drainage of the district centres in the Tapti, which receives thirteen principal tributaries in its course through Khandesh. None of the rivers is navigable, and the Tapti flows in too deep a bed to be useful for irrigation. The district on the whole, however, is fairly well supplied with surface water. Khandesh is not rich in minerals. A large area is under forest; but the jungles have been denuded of most of their valuable timber. Wild beasts are numerous. In 190 1 the population of the old single district was 1,427,382, showing an increase of less than 1% in the decade. Of the aboriginal tribes the Bhils are the most important. They number 167,000, and formerly were a wild and lawless robber tribe. Since the introduction of British rule, the efforts made by kindly treatment, and by the offer of suitable employment, to win the Bhils from their disorderly life have been most successful. Many of

them are now employed in police duties and as village watchmen. The principal crops are millets, cotton, pulse, wheat and oilseeds. There are many factories for ginning and pressing cotton, and a cotton-mill at Jalgaon. The eastern district is traversed by the Great Indian Peninsula railway, which branches at Bhusawal (an important centre of trade) towards Jubbulpore and Nagpur. Both districts are crossed by the Tapti Valley line from Surat. Khandesh suffered somewhat from famine in 1896-1897, and more severely in 1899-1900.

KHANDWA, a town of British India, in the Nimar district of the Central Provinces, of which it is the headquarters, 353 m. N.E. of Bombay by rail. Pop. (1901), 19,401. Khandwa is an ancient town, with Jain and other temples. As a centre of

trade, it has superseded the old capital of Burhanpur. It is an important railway junction, where the Malwa line from Indore meets the main line of the Great Indian Peninsula. There are factories for ginning and pressing cotton, and raw cotton is exported.

KHANSA (Tumadir bint 'Amr, known as al-Khansa) (d. c. 645), Arabian poetess of the tribe Sulaim, a branch of Qais, was born in the later years of the 6th century and brought up in such wealth and luxury as the desert could give. Refusing the offer of Duraid ibn us-Simma, a poet and prince, she married Mirdas and had by him three sons. Afterwards she married again. Before the time of Islam she lost her brothers Sakhr and Moawiya in battle. Her elegies written on these brothers and on her father made her the most famous poetess of her time. At the fair of 'Ukaz Nabigha Dhubyani is said to have placed A'sha first among the poets then present and Khansa second above Hassan ibn Thabit. Khansa with her tribe accepted Islam somewhat late, but persisted in wearing the heathen sign of mourning, against the precepts of Islam. Her four sons fought in the armies of Islam and were slain in the battle of Kadisiya. Omar wrote her a letter congratulating her on their heroic end and assigned her a pension. She died in her tent c. 645. Her daughter 'Amra also wrote poetry. Opinion was divided among later critics as to whether Khansa or Laila (see Arabic Literature: %Poetry) was the greater.

Her diwan has been edited by L. Cheikho (Beirut, 1895) and trans- lated into French by De Coppier (Beirut, 1889). Cf. T. Noldeke's Beitrdge zur Kenntniss der Poesie der alien Araber (Hanover, 1864). Stories of her life are contained in the Kit&b ul-Aghani, xiii. 136-147. (G. W. T.)

KHAR, a small but very fertile province of Persia, known by the ancients as Choara and Choarene; pop. about 10,000. The governor of the province resides at Kishlak Khar, a large village situated 62 m. S.E. of Teheran, or

at Aradan, a village 10 m. farther E. The province has an abundant water-supply from the Hableh-rud, and produces great quantities of wheat, barley and rice. Of the £6000 which it pays to the state, more than £4000 is paid in kind — wheat, barley, straw and rice.

KHARAGHODA, a village of British India, in the Ahmedabad district of Bombay, situated on the Little Runn of Cutch, and the terminus of a branch railway; pop. (1901), 2108. Here is the government factory of salt, known as Baragra salt, producing nearly 2,000,000 cwt. a year, most of which is exported to other provinces in Central and Northern India.

KHARGA (Wah el-Kharga, the outer oasis), the largest of the Egyptian oases, and hence frequently called the Great Oasis. It lies in the Libyan desert between 24 and 26° N. and 30 and 31 E., the chief town, also called Kharga, being 435 m. by rail S. by W. of Cairo. It is reached by a narrow-gauge line (opened in 1908) from Kharga junction, a station on the Nile valley line near Farshut. The oasis consists of a depression in the desert some 1 200 sq. m. in extent, and is about 100 m. long N. to S. and from 1 2 to 50 broad E. to W. Formerly, and into historic times, a lake occupied a considerable part of the depres- sion, and the thick deposits of clay and sand then laid down now form the bulk of the cultivated lands of the oasis. It includes, however, a good deal of desert land. The inhabitants numbered (1907 census) 8348. They are of Berber stock. Administra- tively the oasis forms part of the mudiria of Assiut. It is practically rainless, and there is not now ia single natural flowing spring. There are, however, numerous wells, water being ob- tained freely from the porous sandstone which underlies a great part of the Libyan desert. Some very ancient wells are 400 ft. deep. In water-bearing sandstones near the surface there are underground aqueducts dating from Roman times. The oasis contains many groves of date palms, there being over 60,000 adult trees in 1907. The dom palm, tamarisk, acacia and wild senna are also found. Rice, barley and wheat are the chief cereals cultivated, and lucerne for fodder. Besides agriculture the only industry is basket and mat making — from palm leaves and fibre. Since 1906 extensive boring and land reclamation works have been undertaken in the oasis.

The name of the oasis appears in hieroglyphics as Kenem, and that of its capital as Hebi (the plough). In Pharaonic times it supported a large population, but the numerous ruins are mostly of later date. The principal ruin, a temple of Ammon, built under Darius, is of sandstone, 142 ft. long by 63 ft. broad and 30 ft. in height. South-east is another temple, a square

stone building with the name of Antoninus Pius over one off the entrances. On the eastern escarpment of the oasis on the way to Girga are the remains of a large Roman fort with twelve bastions. On the road to Assiut is a fine Roman columbarium or dove-cote. Next to the great temple the most interesting ruin in the oasis is, however, the necropolis, a burial-place of the early Christians, placed on a hill 3 m. N. of the town of Kharga. There are some two hundred rectangular tomb buildings in unburnt brick with ornamented fronts. In most of the tombs is a chamber in which the mummy was placed, the Egyptian Christians at first con- tinuing this method of preserving the bodies of their dead. In several of the tombs and in the chapel of the cemetery is painted the Egyptian sign of life, which was confounded with the Chris- tian cross. The chapel is basilican; in it and in another building in the necropolis are crude frescoes of biblical subjects.

Kharga town (pop. 1907 census, 5362) is picturesquely situated amid palm groves. The houses are of sun-dried bricks, the streets narrow and winding and for the most part roofed over, the roofs carrying upper storeys. Some of the streets are cut through the solid rock. South of the town are the villages of Genna, Guehda (with a temple dedicated to Ammon, Mut and Khonsu), Bulak (pop. 1012), Dakakih, Beris (pop. 1564), Dush (with remains of a fine temple bearing the names of Domitian and Hadrian) , &c.

Kharga is usually identified with the city of Oasis mentioned by Herodotus as being seven days' journey from Thebes and called in Greek the Island of the Blessed. The oasis was tra- versed by the army of Cambyses when on its way to the oasis of Ammon (Siwa), the army perishing in the desert before reaching its destination. During the Roman period, as it had also been in Pharaonic times, Kharga was used as a place of banishment, the most notable exile being Nestorius, sent thither after his condemnation by the council of Ephesus. Later it became a halting-place for the caravans of slaves brought from Darfur to Egypt.

About 100 m. W. of Kharga is the oasis of Dakhla, the inner or receding oasis, so named in contrast to Kharga as being farther from the Nile. Dakhla has a population (1907) of 18,368. Its chief town, El Kasr, has 3602 inhabitants. The principal ruin, of Roman origin and now called Deir el Hagar (the stone convent) , is of considerable size. The Theban triad were the chief deities worshipped here. Some 120 m. N.W. of Dakhla is the oasis of Farafra, population about 1000, said to be the first of the oases conquered by the Moslems from the Christians. It is noted for the fine quality of its olives. The Baharia, or Little Oasis (pop. about 6000), lies 80 m. N.N.E. of Farafra. Many of its inhabitants, who are of Berber race, are Senussites. Baharia is about 250 m. E.S.E. of the oasis of Siwa (see Egypt: The Oases; and Siwa).

See H. Brugsch, Reise nach dent grossen Oase el-Khargeh in der Libyschen Wiiste (Leipzig, 1878) ; H. J. L. Beadnell, An Egyptian Oasis (London, 1909); Murray's Handbook for Egypt, nth ed. (London, 1907); Geological and Topographical Report on Kharga Oasis (1899), on Farafra Oasis (1899), on Dakhla Oasis (1900), on Baharia Oasis (1903), all issued by the Public Works Department, Cairo. (F. R. C.)

KHARKOV, a government of Little Russia, surrounded by those of Kursk, Poltava, Ekaterinoslav, territory of the Don Cossacks, and Voronezh, and belonging partly to the basin of the Don and partly to that of the Dnieper. The area is 21,035 sq. m. In general the government is a table-land, with an eleva- tion of 300 to 450 ft., traversed by deep-cut river valleys. The soil is for the most part of high fertility, about 57 % of the surface being arable land and 24% natural pasture; and though the winter is rather severe, the summer heat is sufficient for the ripening of grapes and melons in the open air. The bulk of the population is engaged in agricultural pursuits and the

*breeding of sheep, cattle and horses, though various manufactur- ing industries have developed rapidly, more especially since the middle of the 19th century. Horses are bred for the army, and the yield of wool is of special importance. The ordinary cereals, maize, buckwheat, millet, hemp, flax, tobacco, poppies, potatoes and beetroot are all grown, and bee-keeping and silkworm-rearing are of considerable importance. Sixty-three per cent, of the land is owned by the peasants, 25% by the nobility, 6% by owners of other classes, and 6% by the crown and public institutions. Beetroot sugar factories, cotton-mills, distilleries, flour-mills, tobacco factories, brickworks, breweries, woollen factories, iron- works, pottery-kilns and tanneries are the leading industrial establishments. Gardening is actively prosecuted. Salt *is extracted at Slavyansk. The mass of the people are Little Russians, but there are also Great Russians, Kalmucks, Germans, Jews and Gypsies. In 1867 the total population was 1,681,486, and in 1897 2,507,277, of whom 1,242,892 were women and 367,602 lived in towns. The estimated population in 1906 was 2,983,900. The government is divided into eleven districts. The chief town is Kharkov (q.v.). The other district towns, with their populations in 1897, are Akhtyrka (25,965 in 1900), Bogodukhov (11,928), Izyum (12,959), Kupyansk (7256), Lebedin (16,684), Starobyelsk (13,128), Sumy (28,519 in 1900), Valki (8842), Volchansk (11,322), and Zmiyev (4652).*

KHARKOV, a town of southern Russia, capital of the above government, in 56° 37′ N. and 25 5′ E., in the valley of the Donets, 152 m. by rail S.S.E. of Kursk. Oak forests bound it on two sides. Pop. (1867), 59,068; (1900), 197,405. Kharkov is an archiepiscopal see of the Orthodox Greek Church, and the headquarters of the X. army corps. The four annual fairs are

among the busiest in Russia, more especially the Kreshchen- skaya or Epiphany fair, which is opened on the 6th (19th) of January, and the Pokrovsky fair in the autumn. The turnover at the former is estimated at £3,000,000 to £4,000,000. Thou- sands of horses are bought and sold. At the Trinity (Troitsa) fair in June an extensive business (£800,000) is done in wool. A great variety of manufactured goods are produced in the town — linen, felt, beetroot sugar, tobacco, brandy, soap, candles, cast- iron. Kharkov is an educational centre for the higher and middle classes. Besides a flourishing university, instituted in 1805, and attended by from 1600 to 1700 students, it possesses a technological institute (400 students), a railway engineering school, an observatory, a veterinary college, a botanical garden, a theological seminary, and a commercial school. The univer- sity building was formerly a royal palace. The library contains 170,000 volumes; and the zoological collections are especially rich in the birds and fishes of southern Russia. Public gardens occupy the site of the ancient military works; and the govern- ment has a model farm in the neighbourhood. Of the Orthodox churches one has the rank of cathedral (1781). Among the public institutions are a people's palace (1903) and an industrial museum.

The foundation of Kharkov is assigned to 1650, but there is archaeological evidence of a much earlier occupation of the district, if not of the site. The Cossacks of Kharkov remained faithful to the tsar during the rebellions of the latter part of the 17th century; in return they received numerous privileges, and continued to be a strong advance-guard of the Russian power, till the final subjugation of all the southern region. With other military settlements Kharkov was placed on a new footing in 1765 ; and at the same time it became the administrative centre of the Ukraine.

KHARPUT, the most important town in the Kharput (or Mamuret el- Aziz) vilayet of Asia Minor, situated at an altitude of 4350 ft., a few miles south of the Murad Su or Eastern Euphrates, and almost as near the source of the Tigris, on the Samsun- Sivas-Diarbekr road. Pop. about 20,000. The town is built on a hill terrace about 1000 ft. above a well-watered plain of excep- tional fertility which lies to the south and supports a large popu- lation. Kharput probably stands on or near the site of Carcathio- certa in Sophene, reached by Corbulo in a.d. 65. The early Moslem geographers knew it as Hisn Ziyad, but the Armenian name was Khartabirt or Kharbirt, whence Kharput. Cedrenus (nth century) writes Xapirore. There is a story that in 1122

Joscelin (Jocelyn) of Courtenay, and Baldwin II., king of Jeru- salem, both prisoners of the Amir Balak in its castle, were mur- dered by being cast from its cliffs after an attempted rescue. The story is told by William of Tyre, who calls the place Quart Piert or Pierre, but it is a mere romance. Kharput is an impor- tant station of the American missionaries, who have built a college, a theological seminary, and boys' and girls' schools. In November 1895 Kurds looted and burned the Armenian villages on the plain; and in the same month Kharput was at- tacked and the American schools were burned down. A large number of the Gregorian and Protestant Armenian clergy and people were massacred, and churches, monasteries and houses were looted. The vilayet Kharput was founded in 1888, being the result of a provincial rearrangement, designed to ensure better control over the disturbed districts of Kurdistan. It has much mineral wealth, a healthy climate and a fertile soil. The seat of government is Mezere, on the plain 3 m. S. of Kharput.

(D. G. H.) KHARSAWAN, a feudatory state of India, within the Chota Nagpur division of Bengal; area 153 sq. m.; pop. (iqoi), 36,540; estimated revenue £2600. Since the opening of the main line of the Bengal-Nagpur railway through the state trade has been stimulated, and it is believed that both iron and copper can be worked profitably.

KHARTUM, the capital of the Anglo-Egyptian Sudan, on the left bank of the Blue Nile immediately above its junction with the White Nile in 15° 36′ N., 32 32′ E., and 1252 ft. above the sea. It is 432 m. by rail S.W. of Port Sudan, on the Red Sea, and 1345 m. S. of Cairo by rail and steamer. Pop. (1907) with suburbs, but excluding Omdurman, 69,349.

The city, laid out on a plan drawn up by Lord Kitchener in 1898, has a picturesque aspect with its numerous handsome stone and brick buildings surrounded by gardens and its groves of palms and other trees. The river esplanade, 2 m. long, con- tains the chief buildings. Parallel with it is Khedive Avenue, of equal length. The rest of the city is in squares, the streets forming the design of the union jack. In the centre of the esplanade is the governor-general's palace, occupying the site of the palace destroyed by the Mahdists in 1885. It is a three- storeyed building with arcaded verandas and a fine staircase leading to a loggia on the first floor. Here a tablet indicates the spot in the old palace where General Gordon fell. In the gardens, which cover six acres, is a colossal stone " lamb " brought from the ruins of Soba, an ancient Christian city on the Blue Nile. The " lamb " is in reality a ram of Ammon, and has an inscription in Ethiopian hieroglyphs. In front of the southern facade, which looks on to Khedive Avenue, is a bronze statue of General Gordon seated on a camel, a copy of the statue by Onslow Ford at Chatham, England. Government offices and private villas are on either side of the palace, and beyond, on the east, are

the Sudan Club, the military hospital, and the Gordon Memorial College. The college, the chief educational centre in the Sudan, is a large, many-windowed building with accommodation for several hundred scholars and research laboratories and an economic museum. At the western end of the esplanade are the zoological gardens, the chief hotel, the Coptic church and the Mudiria House (residence of the governor of Khartum). Running south from Khedive Avenue at the spot where the Gordon statue stands, is Victoria Avenue, leading to Abbas Square, in the centre of which is the great mosque with two minarets. On the north- east side of the square are the public markets. The Anglican church, dedicated to All Saints, the principal banks and business houses, are in Khedive Avenue. There are Maronite and Greek churches, an Austrian Roman Catholic mission, a large and well-equipped civil hospital and a museum for Sudan archaeo-logy. Outside the city are a number of model villages (each of the principal tribes of the Sudan having its own settlement) in which the dwellings are built after the tribal fashion. Adja- cent are the parade ground and racecourse and the golf-links. A line of fortifications extends south of the city from the Blue to the White Nile. The buildings are used as barracks. Barracks

for British troops occupy the end of the line facing the Blue Nile.

On the right (northern) bank of the Blue Nile is the suburb of Khartum North, formerly called Halfaya, 1 where is the principal railway station. It is joined to the city by a bridge (completed 1 9 10) containing a roadway and the railway, Khartum itself being served by steam trams and rickshaws. The steamers for the White and the Blue Nile start from the quay along the esplanade. West of the zoological gardens is the point of junction of the Blue and White Niles and here is a ferry across to Omdurman (q.v.) on the west bank of the White Nile a mile or two below Khartum. In the river immediately below Khartum is Tuti Island, on which is an old fort and an Arab village.

From its geographical position Khartum is admirably adapted as a commercial and political centre. It is the great entrepot for the trade of the Anglo-Egyptian Sudan. By the Nile water- ways there is easy transport from the southern and western equatorial provinces and from Sennar and other eastern dis- tricts. Through Omdurman come the exports of Kordofan and Darfur, while by the Red Sea railway there is ready access to the markets of the world. The only important manufacture is the making of bricks.

The population is heterogeneous. The official class is com- posed chiefly of British and Egyptians; the traders are mostly Greeks, Syrians and Copts, while nearly all the tribes of the Sudan are represented in the negro and

Arab inhabitants.

At the time of the occupation of the Sudan by the Egyptians a small fishing village existed on the site of the present city. In 1822 the Egyptians established a permanent camp here and out of this grew the city, which in 1830 was chosen as the capital of the Sudanese possessions of Egypt. It got its name from the resemblance of the promontory at the confluence of the two Niles to an elephant's trunk, the meaning of khartum in the dialect of Arabic spoken in the locality. The city rapidly acquired importance as the Sudan was opened up by travellers and traders, becoming, besides the seat of much legitimate commerce, a great slave mart. It was chosen as the headquarters of Protestant and Roman Catholic missions, and had a population of 50,000 or more. Despite its size it contained few buildings of any architectural merit; the most important were the palace of the governor-general and the church of the Austrian mission. The history of the city is intimately bound up with that of the Sudan generally, but it may be recalled here that in 1884, at the time of the Mahdist rising, General Gordon was sent to Khar- tum to arrange for the evacuation by the Egyptians of the Sudan. At Khartum he was besieged by the Mahdists, whose headquarters were at Omdurman. Khartum was captured and Gordon killed on the 26th of January 1885, two days before the arrival off the town of a small British relief force, which withdrew on seeing the city in the hands of the enemy. Nearly every building in Khartum was destroyed by the Mahdists and the city abandoned in favour of Omdurman, which place remained the headquarters of the mahdi's successor, the khalifa Abdullah, till September 1898, when it was taken by the Anglo-Egyptian forces under General (afterwards Lord) Kitchener, and the seat of government again transferred to Khartum. It speedily arose from its ruins, being rebuilt on a much finer scale than the original city. In 1899 the railway from Wadi Haifa was completed to Khartum, and in 1906 through communication by rail was established with the Red Sea.

KHASI AND JAINTIA HILLS, a district of British India, in the Hills division of Eastern Bengal and Assam. It occupies the central plateau between the valleys of the Brahmaputra and the-Surma. Area, 6027 sq. m.; pop. (1901), 202,250, showing an increase of 2 % in the decade.

The district consists of a succession of steep ridges running east and west, with elevated table-lands between. On the southern side, towards Sylhet, the mountains rise precipitously from the valley of the Barak or Surma. The first plateau is about 4000 ft. above sea-level. Farther north is another plateau, on which is situated the station of Shillong, 4900 ft. above the sea; behind lies the Shillong range, of which the highest peak rises to 6450 ft. On the north side, towards Kamrup, are two similar plateaus of lower elevation. The

'The village of Halfaya, a place of some importance before the foundation of Khartum, is 4 m. to the N., on the eastern bank of the Nile. From the 15th century up to 1 821 it was the capital of a small state, tributary to Sennar, regarded as a continuation of the Christian kingdom of Aloa (see Dongola)..

general appearance of all these table-lands is that of undulating downs, covered with grass, but destitute of large timber. At 3000 ft. elevation the indigenous pine predominates over all other vegetation, and forms almost pure pine forests. The highest ridges are clothed with magnificent clumps of timber trees, which superstition has preserved from the axe of the wood - cutter. The characteristic trees in these sacred groves chiefly consist of oaks, chestnuts, magnolias, &c. Beneath the shade grow rare orchids, rhododendrons and wild cinnamon. The streams are merely mountain torrents; many of them pass through narrow gorges of wild beauty. From time immemorial, Lower Bengal has drawn its supply of lime from the Khasi Hills, and the quarries along their southern slope are inexhaustible. Coal of fair quality crops out at several places, and there are a few small coal-mines.

The Khasi Hills were conquered by the British in 1833. They are inhabited by a tribe of the same name, who still live in primitive communities under elective chiefs in political subordi- nation to the British government. There are 25 of these chiefs called Stems, who exercise independent jurisdiction and pay no tribute. According to the census of 1901 the Khasis numbered 107,500. They are a peculiar race, speaking a language that belongs to the Mon-Anam family, following the rule of matri- archal succession, and erecting monolithic monuments over their dead. The Jaintia Hills used to form a petty Hindu principality which was annexed in 1835. The inhabitants, called Syntengs, a cognate tribe to the Khasis, were subjected to a moderate income tax, an innovation against which they rebelled in i860 and 1862. The revolt was stamped out by the Khasi and Jaintia Expedition of 1862-63. The headquarters of the district were transferred in 1864 from Cherrapunji to Shillong, which was afterwards made the capital of the province of Assam. A good cart-road runs north from Cherrapunji through Shillong to Gauhati on the Brahmaputra; total length, 97 m. The district was the focus of the great earthquake of the 1 2th of June 1897, which not only destroyed every permanent building, but broke up the roads and caused many landslips. The loss of life was put at only 916, but hundreds died subse- quently of a malignant fever. In 1901 the district had 17,321 Christians, chiefly converts of the Welsh Calvinistic Mission.

See District Gazetteer (1906) ; Major P. R. T. Gurdon, The Khasis

(1907).

KHASKOY (also Chaskoi, Haskoi, Khaskioi, Ckaskovo, Has- ko-oo, and in Bulgarian Khaskovo), the capital of the department of Khaskoy in the eastern Rumelia, Bulgaria; 45 m. E.S.E. of Philippopolis. Pop. (1900), 14,928. The town has a. station 7 m. N. on the Philippopolis-Adrianople section of the Belgrade- Constantinople railway. Carpets and woollen goods are manu- factured, and in the surrounding country tobacco and silk are produced.

KHATTAK, an important Pathan tribe in the North-West Frontier Province of India, inhabiting the south-eastern portion of the Peshawar district and the south-eastern and eastern portions of Kohat. They number 24,000, and have always been quiet and loyal subjects of the British government. They furnish many recruits to the Indian army, and make most excellent soldiers.

KHAZARS (known also as Chozars, as 'Akotˆ tpoi or Xdf apoi in Byzantine writers, as Khazirs in Armenian and Khwalisses in Russian chronicles, and Ugri Bielii in Nestor), an ancient people who occupied a prominent place amongst the secondary powers of the Byzantine state-system. In the epic of Firdousi Khazar is the representative name for all the northern foes of Persia, and legendary invasions long before the Christian era are vaguely attributed to them. But the Khazars are an historic figure upon the borderland of Europe and Asia for at least 900 years (a.d. 190-1100). The epoch of their greatness is from a.d. 600 to 950. Their home was in the spurs of the Caucasus and along the shores of the Caspian — called by medieval Moslem geographers Bahr-al-Khazar (" sea of the Khazars ") ; their cities, all populous and civilized commercial centres, were Itil, the capital, upon the delta of the Volga, the " river of the Khazars," Semender

(Tarkhu), the older capital, Khamlidje or Khalendsch, Belend- scher, the outpost towards Armenia, and Sarkel on the Don. They were the Venetians of the Caspian and the Euxine, the organizers of the transit between the two basins, the universal carriers between East and West; and Itil was the meeting-place of the commerce of Persia, Byzantium, Armenia, Russia and the Bulgarians of the middle Volga. The tide of their dominion ebbed and flowed repeatedly, but the normal Khazari may be taken as the territory between the Caucasus, the Volga and the Don, with the outlying province of the Crimea, or Little Khazaria! The southern boundary never greatly altered; it did at times reach the Kur and the Aras, but on that side the Khazars were confronted by Byzantium and Persia, and were for the most

part restrained within the passes of the Caucasus by the fortifications of Dariel. Amongst the nomadic Ugrians and agricultural Slavs of the north their frontier fluctuated widely, and in its zenith Khazaria extended from the Dnieper to Bolgari upon the middle Volga, and along the eastern shore of the Caspian to Astarabad.

Ethnology— -The origin of the Khazars has been much disputed, and they have been variously regarded as akin to the Georgians Hnno-Ugnans and Turks. This last view is perhaps the most probable. Their king Joseph, in answer to the inquiry of Hasdai Ibn Shaprut of Cordova (c. 958), stated that his people sprang irom Ihogarmah, grandson of Japhet, and the supposed ancestor ot the other peoples of the Caucasus. The Arab geographers who knew the Khazars best connect them either with the Georgians (lbn Athir) or with the Armenians (Dimishqi, ed. Mehren, p. 263V whilst Ahmad ibn Fadlan, who passed through Khazaria on a mission from the caliph Moqtadir (a.d. 921), positively asserts that the Khazar tongue differed not only from the Turkish, but from that of the bordering nations, which were Ugrian.

Nevertheless there are many points connected with the Khazars which indicate a close connexion with Ugrian or Turkish peoples The official titles recorded by Ibn Fadlan are those in use amongst the Tatar nations of that age, whether Huns, Bulgarians, Turks or Mongols. The names of their cities can be explained only by refer- ence to Turkish or Ugrian dialects (Klaproth, Mem. sur les Khazars- Howorth, Khazars). Some too amongst the medieval authorities (Ibn Hauqal and Istakhri) note a resemblance between the speech in use amongst the Khazars and the Bulgarians ; and the modern Magyar— a Ugrian language— can be traced back to a tribe which in the 9th century formed part of the Khazar kingdom. These characteristics, however, are accounted for by the fact that the Khazars were at one time subject to the Huns (a.d. 448 et seq) at another to the Turks (c. 580), which would sufficiently explain the signs of Tatar influence in their polity, and also by the testimony of all observers, Greeks, Arabs and Russians, that there was a double strain within the Khazar nation. There were Khazars and Kara (black) Khazars. The Khazars were fair-skinned, black-haired and of a remarkable beauty and stature; their women indeed were sought as wives equally at Byzantium and' Bagdad ; while the Kara Khazars were ugly, short, and were reported by the Arabs almost as dark as Indians. The latter were indubitably the Ugrian nomads of the steppe, akin to the Tatar invaders of Europe, who filled the armies and convoyed the caravans of the ruling caste. But the Khazars proper were a civic commercial people, the founders of cities, remarkable for somewhat elaborate political institutions, for persistence and for good faith — all qualities foreign to the Hunnic character.

They have been identified with the 'AKdrfipot (perhaps Ak- Khazari, or White Khazars) who appear upon the lower Volga in the Byzantine annals, and thence they have been deduced, though with less convincing proof, either from the 'kyaOvpooi (Agathyrsi) or the Ktu-iapoi of Herodotus, iv. 104. There was throughout historic times _ a close connexion which eventually amounted to political identity between the Khazars and the Barsileens (the Passils of Moses of Chorene) who occupied the delta of the Volga ; and the Barsileens can be traced through the pages of Ptolemy (Geog. v. 9), of Pliny (iv. 26), of Strabo (vii. 306), and of Pomponius Mela (11. c. 1, p. 119) to the so-called Royal Scyths, SkMcu /3ao- f Xjj«, who were known to the Greek colonies upon the Euxine, and whose political superiority and commercial enterprise led to this rendering of their name. Such points, however, need not here be further pursued than to establish the presence of this white race around the Caspian and the Euxine throughout historic times. They appear in European history as White Huns (Ephthalites), White. Ugrians (Sar-ogours), White Bulgarians. Owing to climatic causes the tract they occupied was slowly drying up. They were the outposts of civilization towards the encroaching desert, and the Tatar nomadism that advanced with it. They held in precarious subjec- tion the hordes whom the conditions of the climate and the soil made it impossible to supplant. They bore the brunt of each of the great waves of Tatar conquests, and were eventually over- whelmed.

History. — Amidst this white race of the steppe the Khazars can be first historically distinguished at the end of the 2nd century A.D. They burst into Armenia with the Barsileens, A.D. 198. They were repulsed and attacked in turn. The pressure of the nomads of the steppe, the quest of plunder or revenge, these seem the only motives of these early expeditions; but in the long struggle between the Roman and Persian empires, of which Armenia was often the battlefield, and eventually the prize, the attitude of the Khazars assumed political importance. Armenia inclined to the civilization and ere long to the Christianity of Rome, whilst her Arsacid princes maintained an inveterate feud with the Sassanids of Persia. It became therefore the policy of the Persian kings to call in the Khazars in every collision with the empire (200-350). During the 4th century however, the growing power of Persia culminated in the annexation of eastern Armenia. The Khazars, endangered by so powerful a neighbour, passed from under Persian influence into that remote alliance with Byzantium which thenceforth charac- terized their policy, and they aided Julian in his invasion of Persia (363). Simultaneously with the approach of Persia to the Caucasus the terrible empire of the Huns sprang up among the Ugrians

of the northern steppes. The Khazars, straitened on every side, remained passive till the danger culminated in the accession of Attila (434). The emperor Theodosius sent envoys to bribe the Khazars ('A/car fipoi) to divert the Huns from the empire by an attack upon their flank. But there was a Hunnic party amongst the Khazar chiefs. The design was betrayed to Attila ; and he extinguished the independence of the nation in a moment. Khazaria became the apanage of his eldest son, and the centre of government amongst the eastern subjects of the Hun (448). Even the iron rule of Attila was prefer- able to the time of anarchy that succeeded it. Upon his death (454) the wild immigration which he had arrested revived. The Khazars and the Sarogours (i.e. White Ogors, possibly the Barsileens of the Volga delta) were swept along in a flood of mixed Tatar peoples which the conquests of the Avars had set in motion. The Khazars and their companions broke through the Persian defences of the Caucasus. They appropriated the territory up to the Kur and the Aras, and roamed at large through Iberia, Georgia and Armenia. The Persian king implored the emperor Leo I. to help him defend Asia Minor at the Caucasus (457), but Rome was herself too hard pressed, nor was it for fifty years that the Khazars were driven back and the pass of Derbent fortified against them (c. 507).

Throughout the 6th century Khazaria was the mere highway for the wild hordes to whom the Huns had opened the passage into Europe, and the Khazars took refuge (like the Venetians from Attila) amongst the seventy mouths of the Volga. The pressure of the Turks in Asia precipitated the Avars upon the West. The conquering Turks followed in their footsteps (560-580). They beat down all opposition, wrested even Bosporus in the Crimea from the empire, and by the annihilation of the Ephthalites completed the ruin of the White Race of the plains from the Oxus to the Don. The empires of Turks and Avars, however, ran swiftly their barbaric course, and the Khazars arose out of the chaos to more than their ancient renown. They issued from the land of Barsilia,and extended their rule over the Bulgarian hordes left masterless by the Turks, compelling the more stubborn to migrate to the Danube (641). The agricultural Slavs of the Dnieper and the Oka were reduced to tribute, and before the end of the 7th century the Khazars had annexed the Crimea, had won complete command of the Sea of Azov, and, serzing upon the narrow neck which separates the Volga from the Don, had organized the portage which has continued since an important link in the traffic between Asia and Europe. The alliance with Byzantium was revived. Simultaneously, and no doubt in concert, with the Byzantine campaign against Persia (589), the' Khazars had reappeared in Armenia, though it was not till 625 that they appear as Khazars in the Byzantine annals. They are then described as " Turks from the East," a powerful nation which held the coasts of the Caspian and the Euxine, and

took tribute of the Viatitsh, the Severians and the Polyane. The khakan, enticed by the promise of an imperial princess, furnished Heraclius with 40,000 men for his Persian war, who shared in the victory over Chosroes at Nineveh.

Meanwhile the Moslem empire had arisen. The Persian empire was struck down (637). and the Moslems poured into Armenia. The khakan, who had defied the summons sent him by the invaders, now aided the Byzantine patrician \n the defence of Armenia. The allies were defeated, and the Moslems undertook the subjugation of Khazaria (651). Eighty years of warfare followed, but in the end the Moslems prevailed. The khakan and his chieftains were captured and compelled to embrace Islam (737), and till the decay of the Mahommedan empire Khazaria with all the other countries of the Caucasus paid an annual tribute of children and of corn (737- 861). Nevertheless, though overpowered in the end, the Khazars had protected the plains of Europe from the Mahommedans, and made the Caucasus the limit of their conquests.

In the interval between the decline of the Mahommedan empire and the rise of Russia the Khazars reached the zenith of their power. The merchants of Byzantium, Armenia and Bagdad met in the markets of Itil (whither since the raids of the Mahommedans the capital had been transferred from Semender), and traded for the wax, furs, leather and honey that came down the Volga. So

important was this traffic held at Constantinople that, when the portage to the Don was endangered by the irruption of a fresh horde of Turks (the Petchenegs), the emperor Theophilus himself despatched the materials and the workmen to build for the Khazars a fortress impregnable to their forays (834). Famous as the one stone structure is in that stoneless region, the post became known far and wide amongst the hordes of the steppe as Sar-kel or the White Abode. Merchants from every nation found protection and good faith in the Khazar cities. The Jews, expelled from Constanti- nople, sought a home amongst them, developed the Khazar trade, and contended with Mahommedans and Christians for the theological allegiance of the Pagan people. The dynasty accepted Judaism {c. 740), but there was equal tolerance for all, and each man was held amenable to the authorized code and to the official judges of his own faith. At the Byzantine court the khakan was held in high honour. The emperor Justinian Rhinotmetus took refuge with him during his exile and married his daughter (702). Justinian's rival Vardanes in turn sought an asylum in Khazaria, and in Leo IV. (775) the grandson of a Khazar sovereign ascended the Byzantine throne. Khazar troops were amongst the bodyguard of the imperial court; they fought for Leo VI. against Simeon of Bulgaria; and the khakan was honoured in diplomatic intercourse with the seal of three solidi, which

marked him as a potentate of the first rank, above even the pope and the Carolingian monarchs. Indeed his dominion became an object of uneasiness to the jealous statecraft of Byzantium, and Constantine Porphyrogenitus, writing for his son's instruction in the government, carefully enumerates the Alans, the Petchenegs, the Uzes and the Bulgarians as the forces he must rely on to restrain it.

It was, however, from a power that Constantine did not consider that the overthrow of the Khazars came. The arrival of the Varangians amidst the scattered Slavs (862) had united them into a nation. The advance of the Petchenegs from the East gave the Russians their opportunity. Before the onset of those fierce invaders the precarious suzerainty of the khakan broke up. By calling in the Uzes, the Khazars did indeed dislodge the Petchenegs from the position they had seized in the heart of the kingdom between the Volga and the Don, but only to drive them inwards to the Dnieper. The Hungarians, severed from their kindred and their rulers, migrated to the Carpathians, whilst Oleg, the Russ prince of Kiev, passed through the Slav tribes of the Dnieper basin with the cry " Pay nothing to the Khazars " (884). The kingdom dwindled rapidly to its ancient limits between the Caucasus, the Volga and the Don, whilst the Russian traders of Novgorod and Kiev supplanted the Khazars as the carriers between Constantinople and the North. When Ibn Fadlan visited Khazaria forty years later, Itil was even yet a great city, with baths and market-places and thirty mosques. But there was no domestic product nor manufacture; the kingdom depended solely upon the now precarious transit dues, and adminis- tration was in the hands pf a major domus also called khakan. At the assault of Swiatoslav of Kiev the rotten fabric crumbled into dust. His troops were equally at home on land and water. Sarkel, Itil and Semender surrendered to him (965-969). He pushed his conquests to the Caucasus, and established Russian colonies upon the Sea of Azov. The principality of Tmutarakan, founded by his grandson Mstislav (988), replaced the kingdom of Khazaria, the last trace of which was extinguished by a joint expedition of Russians and Byzantines (1016). The last of the khakans, George, Tzula, was taken prisoner. A remnant of the nation took refuge in an island of the Caspian (Siahcouye) ; others retired to the Caucasus; part emigrated to the district of Kasakhi in Georgia, and appear for the last time joining with Georgia in her successful effort to throw off the yoke of the Seljuk Turks (1089). But the name is thought to survive in Kadzaria, the Georgian title for Mingrelia, and in Kadzaro, the Turkish word for the Lazis. Till the 13th century the Crimea was known to European travellers as Gazaria; the "ram- parts of the Khazars " are still distinguished in the Ukraine; and the record of their dominion survives in the names of Kazarek, Kazaritshi, Kazarinovod, Kozar-owka, Kozari, and perhaps in Kazan.

Authorities. — Khazar: The letter of King Joseph to R. Hasdai Ibn Shaprut, first published by J. Akrish, Kol Mebasser (Constanti- nople, 1577), and often reprinted in editions of Jehuda hal-Levy's Kuzari. German translations by Zedner (Berlin, 1840) and Cassel, Magyar. Alterth. (Berlin, 1848); French by Carmoly, Rev. Or. (1841). Cf. Harkavy, Russische Revue, iv. 69; Graetz, Geschichte, v. 364, and Carmoly, Itineraires de la Terre Sainle (Brussels, 1847). Arme- nian: Moses of Chorene; cf. Saint-Martin, Memoires historiques et geographiques sur VArmenie (Paris, 1818). Arabic: The account of Ibn Fadlan (921) is preserved by Yakut, ii. 436 seq. See also Isˆakhry (ed. de Geoje, pp. 220 seq.), Mas'udy, ch. xvii. pp. 406 seq. of Sprenger's translation; Ibn Haulial (ed. de Goeje, pp. 279 seq.) and the histories of Ibn el Athir and Tabary. Much of the Arabic material has been collected and translated by Fraehn, " Veteres Memoriae Chasarorum " in Mem. de St Pet. (1822) ; Dorn (from the Persian Tabary), Mem. de St Pet. (1844); Dufremery, Journ. As. (1849). See also D'Ohsson's imaginary Voyage d'Abul Cassim, based on these sources. Byzantine Historians: The relative passages are collected in Stritter's Memoriae populorum (St Petersburg, 1778). Russian : The Chronicle ascribed to Nestor.

Modern: Klaproth, "Mem. sur les Khazars," in Journ. As. 1st series, vol. iii. ; id., Tableaux hist, de I'Asie (Paris, 1823); id., Tabl. hist, de Caucases (1827) ; memoirs on the Khazars by Harkavy and by Howorth (Congres intern, des Orientalistes, vol. ii.) ; Latham, Russian and Turk, pp. 209-217; Vivien St Martin, litudes de geog. ancienne (Paris, 1850); id., Recherches sur les populations du Caucase (1847); id., "Sur les Khazars," in Nouvelles ann. des voyages (1857); D'Ohsson, Peuples du Caucase (Paris, 1828); S. Krauss, " Zur Geschichte der Chazaren," in Revue orientate pour les itudes Ourals-altaiques (1900). (P. L. G. ; C. El.)

KHEDIVE, a Persian word meaning prince or sovereign, granted as a title by the sultan of Turkey in 1867 to his viceroy in Egypt, Ismail, in place of that of " vali."

KHERI, a district of British India, in the Lucknow division of the United Provinces, which takes its name from a small town with a railway station 81 m. N.W. of Lucknow. The area of the district is 2963 sq. m., and its population in 1901 was 905,138. It consists of a series of fairly elevated plateaus, separated by rivers flowing from the north-west, each bordered by alluvial land. North of the river Ul, the country is considered very un-healthy. Through this tract, probably the bed of a lake, flow two rivers, the

Kauriala and Chauka, changing their courses constantly, so that the surface is seamed with deserted river beds much below the level of the surrounding country. The vegeta- tion is very dense, and the stagnant waters are the cause of endemic fevers. The people reside in the neighbourhood of the low ground, as the soil is more fertile and less expensive to culti- vate than the forest-covered uplands. South of the Ul, the scene changes. Between every two rivers or tributaries stretches a plain, considerably less elevated than the tract to the north. There is very little slope in any of these plains for many miles, and marshes are formed, from which emerge the headwaters of many secondary streams, which in the rains become dangerous torrents, and frequently cause devastating floods. The general drainage of the country is from north-west to south-east. Several large lakes exist, some formed by the ancient channels of the northern rivers, being fine sheets of water, from 10 to 20 ft. deep and from 3 to 4 m. long; in places they are fringed with magnificent groves. The whole north of the district is covered with vast forests, of which a considerable portion are govern- ment reserves. Sal occupies about two-thirds of the forest area. The district is traversed by a branch of the Oudh & Rohilkhand railway from Lucknow to Bareilly.

KHERSON, a government of south Russia, on the N. coast of the Black Sea, bounded W. by the governments of Bessarabia and Podolia, N. by Kiev and Poltava, S. by Ekaterinoslav and Taurida. The area is 27,497 sq. m. The aspect of the country, especially in the south, is that of an open steppe, and almost the whole government is destitute of forest. The Dniester marks the western and the Dnieper the south-eastern boundary; the Bug, the Ingul and several minor streams drain the intermediate territory. Along the shore stretch extensive lagoons. Iron, kaolin and salt are the principal minerals. Nearly 45% of the land is owned by the peasants, 31 % by the nobility, 12% by other classes, and 12% by the crown, municipalities and public institutions. The peasants rent 1,730,000 acres more from the landlords. Agriculture is well developed and 9,000,000 acres (51-1 %) are under crops. Agricultural machinery is extensively used. The vine is widely grown, and yields 1,220,000 gallons of wine annually. Some tobacco is grown and manufactured. Besides the ordinary cereals, maize, hemp, flax, tobacco and mustard are commonly grown; the fruit trees in general culti- vation include the cherry, plum, peach, apricot and mulberry; and gardening receives considerable attention. Agriculture has been greatly improved by some seventy German colonies. Cattle-breeding, horse-breeding and sheep-farming are pursued on a large scale. Some sheep farmers own 30,000 or 40,000 merinos each. Fishing is an important occupation. There are manufactures of wool, hemp and leather; also iron-works, machi- nery and especially agricultural machinery works, sugar factories, steam flour-mills and chemical works. The ports of Kherson,

Ochakov, Nikolayev, and especially Odessa, are among the principal outlets of Russian commerce; Berislav, Alexandriya

Elisavetgrad, Voznesenask, Olviopol and Tiraspol play an impor- tant part in the inland traffic. In 1871 the total population was 1,661,892, and in 1897 2,744,040, of whom 1,332,175 were women and 785,094 lived in towns. The estimated pop. in 1906 was 3,257,600. Besides Great and Little Russians, it comprises Rumanians, Greeks, Germans (123,453), Bulgarians, Bohemians, Swedes, and Jews (30% of the total), and some Gypsies. About 84% belong to the Orthodox Greek Church; there are also nu- merous Stundists. The government is divided into six districts, the chief towns of which are: Kherson (q.v.), Alexandriya (14,002 in 1897), Ananiev (16,713), Elisavetgrad (66,182 in 1500), Odessa (449,673 in 1900), and Tiraspol (29,323 in 1900). This region was long subject to the sway of the Tatar khans of the Crimea, and owes its rapid growth to the colonizing activity of Catherine II., who between 1778 and 1792 founded the cities of Kherson, Odessa and Nikolayev. Down to 1803 this government was called Nikolayev.

KHERSON, a town of south Russia, capital of the above government, on a hill above the right bank of the Dnieper, about 19 m. from its mouth. Founded by the courtier Potemkin in 1778 as a naval station and seaport, it had become by 1786 a place of 10,000 inhabitants, and, although its progress was checked by the rise of Odessa and the removal (in 1794) of the naval establishments to Nikolayev, it had in 1900 a population ˚f TSi 1 ˆ. The Dnieper at this point breaks into several arms, forming islands overgrown with reeds and bushes; and vessels of burden must anchor at Stanislavskoe-selo, a good way down the stream. Of the traffic on the river the largest share is due to the timber, wool, cereals, cattle and hides trade; wool-dressing, soap-boiling, tallow-melting, brewing, flour-milling and the manufacture of tobacco are the chief industries. Kherson is a substantially built and regular town. The cathedral is the burial-place of Potemkin, and near Kherson lie the remains of John Howard, the English philanthropist, who died here in 1790. The fortifications have fallen into decay. The name Kherson was given to the town from the supposition that the site was formerly that of Chersonesus Heracleotica, the Greek city founded by the Dorians of Heraclea.

KHEVENHULLER, LUDWIG ANDREAS (1683-1744), Aus- trian field-marshal, Count of Aschelberg-Frankenburg, came of a noble family, which, originally Franconian, settled in Carinthia in the nth century. He first saw active service under Prince Eugene in the War of the Spanish Succession, and by 17 16 had risen to the command of Prince Eugene's own regiment of dragoons. He distinguished himself greatly at the battles of Peterwardein and Belgrade, and became in 1723 major-general of cavalry (General-

Wachtmeister) , in 1726 proprietary colonel of a regiment and in 1733 lieutenant field marshal. In 1734 the War of the Polish Succession brought him into the field again. He was present at the battle of Parma (June 29), where Count Mercy, the Austrian commander, was killed, and after Mercy's death he held the chief command of the army in Italy till Field Marshal Konigsegg's arrival. Under Konigsegg he again dis- tinguished himself at the battle of Guastalla (September 19). He was once more in command during the operations which followed the battle, and his skilful generalship won for him the grade of general of cavalry. He continued in military and diplomatic employment in Italy to the close of the war. In 1737 he was made field marshal, Prince Eugene recommending him to his sovereign as the best general in the service. His chief exploit in the Turkish War, which soon followed his promotion, was at Radojevatz (September 28,1737), where he cut his way through a greatly superior Turkish army. It was in the Austrian Succession War that his most brilliant work was done. As com- mander-in-chief of the army on the Danube he not only drove out the French and Bavarian invaders of Austria in a few days of rapid marching and sharp engagements (January, 1742), but overran southern Bavaria, captured Munich, and forced a large French corps in Linz to surrender. Later in the summer of 1742, owing to the inadequate forces at his disposal, he had to evacuate his conquests, but in the following campaign, though now subordinated to Prince Charles of Lorraine, Khevenhuller

reconquered southern Bavaria, and forced the emperor in June to conclude the unfavourable convention of Nieder-Schonfeld. He disapproved the advance beyond the Rhine which followed these successes, and the event justified his fears, for the Austrians had to fall back from the Rhine through Franconia and the Breisgau, Khevenhiiller himself conducting the retreat with admirable skill. On his return to Vienna, Maria Theresa decorated the field marshal with the order of the Golden Fleece. He died suddenly at Vienna on the 26th. of January

1744.

He was the author of various instructional works for officers and soldiers (Des G. F. M. Grafen v. Khevenhiiller Observationspunkte fur sein Dragoner-regiment (1734 and 1748) and a reglement for the infantry (1737), and of an important work on war in general, Kurzer Begriff aller militdrischen Operationen (Vienna, 1756; French version, Maximes de guerre, Paris, 1 771).

KHEVSURS, a people of the Caucasus, kinsfolk of the Georgians. They live in scattered groups in East Georgia to the north and north-west of Mount Borbalo. Their name is Georgian and means " People of the Valleys." For the most part nomadic, they are still in a semi-barbarous state. They have not the beauty of the Georgian race. They are gaunt and thin to almost a ghastly extent, their generally repulsive aspect being accentu- ated by their large hands and feet and their ferocious expression. In complexion and colour of hair and eyes they vary greatly. They are very muscular and capable of bearing extraordinary fatigue. They are fond of fighting, and still wear armour of the true medieval type. This panoply is worn when the law of vendetta, which is sacred among them as among most Caucasian peoples, compels them to seek or avoid their enemy. They carry a spiked gauntlet, the terrible marks of which are borne by a large proportion of the Khevsur faces.

Many curious customs still prevail among the Khevsurs, as for instance the imprisonment of the woman during childbirth in a lonely hut, round which the husband parades, firing off his musket at intervals. After delivery, food is surreptitiously brought the mother, who is kept in her prison a month, after which the hut is burnt. The boys are usually named after some wild animal, e.g. bear or wolf, while the girls' names are romantic, such as Daughter of the Sun, Sun of my Heart. Marriages are arranged by parents when the bride and bridegroom are still in long clothes. The chief ceremony is a forcible abduction of the girl. Divorce is very com- mon, and some Khevsurs are polygamous. Formerly no Khevsur might die in a house, but was always carried out under the sun or stars. The Khevsurs like to call themselves Christians, but their religion is a mixture of Christianity, Mahommedanism and heathen rites. They keep the Sabbath of the Christian church, the Friday of the Moslems and the Saturday of the Jews. They worship sacred trees and offer sacrifices to the spirits of the earth and air. Their priests are a combination of medicine-men and divines.

See G. F. R. Radde, Die Chevs'uren und ihr Land (Cassel, 1878); Ernest Chantre, Recherches anthropologiques dans le Caucase (Lyons,

1885-1887).

KHILCHIPUR, a mediatized chiefship in Central India, under the Bhopal agency; area, 273 sq. m.; pop. (1001), 31,143; esti- mated revenue, £7000; tribute payable to Sindhia, £700. The residence of the chief, who is a Khichi Rajput of the Chauhan clan, is at Khilchipur (pop. 5121).

KHINGAN, two ranges of mountains in eastern Asia.

(1) Great Khingan is the eastern border ridge of the immense plateau

which may be traced from the Himalaya to Bering Strait and from the Tian-shan Mountains to the Khingan Mountains. It is well known from 50 N. to Kalgan (41 N., 1 1 5° E.) , where it is crossed by the highway from Urga to Peking. As a border ridge of the Mongolian plateau, it possesses very great orographical importance, in that it is an important climatic boundary, and constitutes the western limits of the Manchurian flora. The base of its western slope, which is very gentle, lies at altitudes of 3000 to 3500 ft. Its crest rises to 4800 to 6500 ft., but its eastern slope sinks very precipitately to the plains of Manchuria, which have only 1500 to 2000 ft. of altitude. On this stretch one or two subordinate ridges, parallel to the main range and separated from it by longitudinal valleys, fringe its eastern slope, thus marking two different terraces and giving to the whole system a width of from 80 to 100 m. Basalts, trachytes and other volcanic formations are found in the main

range and on its south-eastern slopes. The range was in volcanic activity in 1720—1721.

South-west of Peking the Great Khingan is continued by the In-shan mountains, which exhibit similar features to those of the Great Khingan, and represent the same terraced escarpment of the Mongolian plateau. Moreover, it appears from the map of the Russian General Staff (surveys of Skassi, V. A. Obruchev, G. N. Potanin, &c.) that similar terrace-shaped escarpments — but consider- ably wider apart than in Manchuria — occur in the Shan-si province of China, along the southern border of the South Mongolian plateau. These escarpments are pierced by the Yellow River or Hwang-ho south of the Great Wall, between 38° and 39° N., and in all prob- ability a border range homologous to the Great Khingan Separates the upper tributaries of the Hwang-ho (namely the Tan-ho) from those of the Yang-tsze-kiang. But according to Obruchev the escarpments of the Wei-tsi-shan and Lu-huang-lin, by which southern Ordos drops towards the Wei-ho (tributary of the Hwang-ho), can hardly be taken as corresponding to the Kalgan escarpment. They fall with gentle slopes only towards the high plains on the south of them, while a steep descent towards the low plain seems to exist further south only, between 32 ° and 34 °. Thus the southern con- tinuations of the Great Khingan, south of 38 ° N., possibly consist of two separate escarpments. At its northern end the place where the Great Khingan is pierced by the Amur has not been ascer- tained by direct observation. Prince P. Kropotkin considers that the upper Amur emerges from the high plateau and its border-ridge, the Khingan, below Albazin and above Kumara. 1 If this view prevail— Petermann has adopted it for his map of Asia, and it has been upheld in all the Gotha publications — it would appear that the Great Khingan joins the Stanovoi ridge or Jukjur, in that portion of it which faces the west coast of the Sea of Okhotsk. At any rate the Khingan, separating the Mongolian plateau

from the much lower plains of the Sungari and the Nonni, is one of the most impor- tant orographical dividing-lines in Asia.

See Semenov's Geographical Dictionary (in Russian) ; D. V. Putiata, Expedition to the Khingan in i8qi (St Petersburg, 1893) ; Potanin, " Journey to the Khingan," in Izvestia Russ. Geog. Soc.

(1901).

(2) The name Little Khingan is applied indiscriminately to two distinct mountain ranges. The proper application of the term would be to reserve it for the typical range which the Amur pierces 40 m. below Ekaterino-Nikolsk (on the Amur), and which is also known as the Bureya mountains, and as Dusse-alin. This range, which may be traced from the Amur to the Sea of Okhotsk, seems to be cleft twice by the Sungari and to be continued under different local names in the same south-westerly direction to the peninsula of Liao-tung in Manchuria. The other range to which the name of Little Khingan is applied is that of the Ilkhuri-alin mountains (51° N., i22°-i26° E.), which run in a north-westerly direction between the upper Nonni and the Amur, west of Blagovyeshchensk. (P. A. K.; J.T. Be.)

KHIVA, formerly an important kingdom of Asia, but now a much reduced khanate, dependent upon Russia, and confined to the delta of the Amu-darya (Oxus). Its frontier runs down the left bank of the Amu, from 40 15′ N., and down its left branch to Lake Aral; then, for about 40 m. along the south coast of Lake Aral, and finally southwards, following the escarpment of the Ust-Urt plateau. From the Transcaspian territory of Russia Khiva is separated by a line running almost W.N.W.-E.S.E. under 40° 30′ N., from the Uzboi depression to the Amu-darya. The length of the khanate from north to south is 200 m., and its greatest width 300 m. The area of the Khiva oasis is 5 2 10 sq. m. while' the area of the steppes is estimated at 17,000 sq. m. The population of the former is estimated at 400,000, and that of the latter also at 400,000 (nomadic). The water of the Amu is brought by a number of irrigation canals to the oasis, the general declivity of the surface westwards facilitating the irrigation. Several old beds of the Amu intersect the territory. The water of the Amu and the very thin layer of ooze which it deposits render the oasis very fertile. Millet, rice, wheat, barley, oats, peas, flax, hemp, madder, and all sorts of vegetables and fruit (especially melons) are grown, as also the vine and cotton. The white-washed houses scattered amidst the elms and poplars, and surrounded by flourishing fields, produce the most agreeable contrast with the arid steppes. Livestock, especially sheep, camels, horses and cattle, is extensively bred by the nomads.

1 See his sketch of the orography of East Siberia (French trans., with

addenda, published by the Institut Geographique of Brussels in I 1902).

The population is composed of four divisions: Uzbegs (150,000 to 200,000), the dominating race among the settled inhabitants of the oasis, from whom the officials are recruited; Sarts and Tajiks, agriculturists and tradespeople of mixed race; Turkomans (c. 170,000), who live in the steppes, south and west of the oasis, and formerly plundered the settled inhabitants by their raids; and the Kara-kalpaks, or Black Bonnets, a Turki tribe some 50,000 in number. They live south of Lake Aral, and in the towns of Kungrad, Khodsheili and Kipchak form the prevailing element. They cultivate the soil, breed cattle, and their women make carpets. There are also about 10,000 Kirghiz, and when the Russians took Khiva in 1873 there were 29,300 Persian slaves, stolen by Turkoman raiders, and over 6500 liberated slaves, mostly Kizil-bashes. The former were set free and the slave trade abolished. Of domestic industries, the embroidering of cloth, silks and leather is worthy of notice. The trade of Khiva is considerable: cotton, wool, rough woollen cloth and silk cocoons are exported to Russia, and various animal products to Bokhara. Cottons, velveteen, hardware and pepper are imported from Russia, and silks, cotton, china and tea from Bokhara. Khivan merchants habitually attend the Orenburg and Nizhniy-Novgorod fairs.

- History. — The present khanate is only a meagre relic of the great kingdom which under the name of Chorasmia, Kharezm (Khwarizm) and Urgenj (Jurjaniya, Gurganj) held the keys of the mightiest river in Central Asia. Its possession has con- sequently been much disputed from early times, but the country has undergone great changes, geographical as well as political, which have lessened its importance. The Oxus (Amu-darya).has changed its outlet, and no longer forms a water-way to the Caspian and thence to Europe, while Khiva is entirely surrounded by territory either directly administered or protected by Russia.

Chorasmia is mentioned by Herodotus, it being then one of the Persian provinces, over which Darius placed satraps, but nothing material of it is known till it was seized by the Arabs in a.d. 680. When the power of the caliphs declined the governor of the pro- vince probably became independent ; but the first king known to history is Mamun-ibn-Mahommed in 995. Khwarizm fell under the power of Mahmud of Ghazni in 1017, and subsequently under that of the Seljuk Turks. In 1097 the governor Kutb-ud- din assumed the title of king, and one of his descendants, 'Ala-ud-din-Mahommed, conquered Persia, and was the greatest prince in

Central Asia when Jenghiz Khan appeared in 12 19. Khiva was conquered again by Timur in 1379; and finally fell under the rule of the Uzbegs in 1512, who are still the dominant race under the protection of the Russians.

Russia established relations with Khiva in the 17th century. The Cossacks of the Yaik during their raids across the Caspian learnt of the existence of this rich territory and made more than one plundering expedition to the chief town Urgenj. In 1 71 7 Peter the Great, having heard of the presence of auriferous sand in the bed of the Oxus, desiring also to " open mercantile relations with India through Turan " and to release from slavery some Russian subjects, sent a military force to Khiva. When within 100 miles of the capital they encountered the troops of the khan. The battle lasted three days, and ended in victory for the Russian arms. The Khivans, however, induced the victors to break up their army into small detachments and treacher- ously annihilated them in detail. It was not until the third decade of the 19th century that the attention of the Muscovite government was again directed to the khanate. In 1839 a force under General Perovsky moved from Orenburg across the Ust-Urt plateau to the Khivan frontiers, to occupy the khanate, liberate the captives and open the way for trade. This expedition like- wise terminated in disaster. In 1847 the Russians founded a fort at the mouth of the Jaxartes or Syr-darya. This advance de- prived the Khivans not only of territory, but of a large number of tax-paying Kirghiz, and also gave the Russians a base for further operations. For the next few years, however, the attention of the Russians was taken up with Khokand, their operations on that side culminating in the capture of Tashkent in 1865. Free in this quarter, they directed their thoughts once

more to Khiva. In 1869 Krasnovodsk on the east shore of the Caspian was founded, and in 1871-1872 the country leading to Khiva from different parts of Russian Turkestan was thoroughly explored and surveyed. In 1873 an expedition to Khiva was carefully organized on a large scale. The army of 10,000 men placed at the disposal of General Kaufmann started from three different bases of operation — Krasnovodsk, Orenburg and Tashkent. Khiva was occupied almost without opposition. All the territory (35,700 sq. m. and 110,000 souls) on the right bank of the Oxus was annexed to Russia, while a heavy war indemnity was imposed upon the khanate. The Russians thereby so crippled the finances of the state that the khan is in complete subjection to his more powerful neighbour.

(J. T. Be.;C El.) KHIVA, capital of the khanate of Khiva, in Western Asia, 25 m. W. of the Amu-darya and 240 m. W.N.W. of Bokhara. Pop. about 10,000. It is surrounded by a low earthen wall, and has a citadel, the residence of the khan and the higher officials. There are a score of mosques, of which the one containing the tomb of Polvan, the patron saint of Khiva, is the best, and four large madrasas (Mahommedan colleges).

Large gardens exist in the western part of the town. A small Russian quarter has grown up. The inhabitants make carpets, silks and cottons.

KHNOPFF, FERNAND EDMOND JEAN MARIE (1858-), Belgian painter and etcher, was born at the chateau de Grem- bergen (Termonde), on the 12th of September 1858, and studied under X. Mellery. He developed a very original talent, his work being characterized by great delicacy of colour, tone and harmony, as subtle in spiritual and intellectual as in its material qualities. " A Crisis " (1881) was followed by " Listening to Schumann," " St Anthony " and " The Queen of Sheba " (1883), and then came one of his best known works, " The Small Sphinx " (1884). His " Memories " (1889) and " White, Black and Gold " . (1901) are in the Brussels Museum; " Portrait of Mile R." (1889) in the Venice Museum; "A Stream at Fosset " (1897) at Budapest Museum; " The Empress "(1899) in the collection of the emperor of Austria, and " A Musician " in that of the king of the Belgians. " I lock my Door upon Myself " (1891), which was exhibited at the New Gallery, London, in 1902 and there attracted much attention, was acquired by the Pinakothek at Munich. Other works are " Silence " (1890), " The Idea of Justice" (1905) and "Isolde" (1906), together with a poly- chrome bust " Sibyl " (1894) and an ivory mask (1897). In quiet intensity of feeling Khnopff was influenced by Rossetti, and in simplicity of line by Burne- Jones, but the poetry and the delicately mystic and enigmatic note of his work are entirely individual. He did good work also as an etcher and dry- pointist.

See L. Dumont-Wilden, Fernand Khnopff (Brussels, 1907). . KHOI, a district and town in the province of Azerbaijan, Persia, towards the extreme north-west frontier, between the Urmia Lake and the river Aras. The district contains many flourishing villages, and consists of an elevated plateau 60 m. by 10 to 15, highly cultivated by a skilful system of drainage and irrigation, producing fertile meadows, gardens and fields yielding rich crops of wheat and barley, cotton, rice and many kinds of fruit. In the northern part and bounding on Maku lies the plain of Chaldaran (Kalderan), where in August 15 14 the Turks under Sultan Selim I. fought the Persians under Shah Ismail and gained a great victory.

The town of Khoi lies in 38 37′ N., 45° 15′ E., 77 m. (90 by road) N.W. of Tabriz, at an elevation of 3300 ft., on the great trade route between Trebizond and Tabriz, and about 2 m. from the left bank of the Kotur Chai (river from Kotur) which is crossed there by a seven-arched bridge and is known lower down as the Kizil Chai, which flows into the Aras. The walled part of the town is a quadrilateral with faces of about 1 200 yds. in length and fortifications consisting of two lines of bastions, ditches, &c, much out of repair. The population numbers about 35,000, a third living inside the walls. The Armenian quarter, with about 500 families and an old church,

is outside the walls. The city within the walls forms one of the best laid out towns in

Persia, cool streams and lines of willows running along the broad and regular streets. There are some good buildings, including the governor's residence, several mosques, a large brick bazaar and a fine caravanserai. There is a large transit trade, and con- siderable local traffic across the Turkish border. The city sur- rendered to the Russians in 1827 without fighting and after the treaty of peace (Turkman Chai, Feb. 1828) was held for some time by a garrison of 3000 Russian troops as a guarantee for the payment of the war indemnity. In September 1881 Khoi suffered much from a violent earthquake. It has post and telegraph offices.

KHOJENT, or Khojend, a town of the province of Syr-darya, in Russian Turkestan, on the left bank of the Syr-darya or Jaxartes, 144 m. by rail S.S.E. from Tashkent, in 40 17′ N. and 69° 30′ E., and on the direct road from Bokhara to Khokand. Pop. (1900), 31,881. The Russian quarter lies between the river and the native town. Near the river is the old citadel, on the top of an artificial square mound, about 100 ft. high. The banks of the river are so high as to make its water useless to the town in the absence of pumping gear. Formerly the entire commerce between the khanates of Bokhara and Khokand passed through this town, but since the Russian occupation (1866) much of it has been diverted. Silkworms are reared, and silk and cotton goods are manufactured. A coarse ware is made in imitation of Chinese porcelain. The district immediately around the town is taken up with cotton plantations, fruit gardens and vineyards. The majority of the inhabitants are Tajiks.

Khojent has always been a bone of contention between Kho- kand and Bokhara. When the amir of Bokhara assisted Khudayar Khan to regain his throne in 1864, he kept posses- sion of Khojent. In 1866 the town was stormed by the Russians; and during their war with Khokand in 1875 it played an important part.

KHOKAND, or Kokan, a town of Asiatic Russia, in the pro- vince of Ferghana, on the railway from Samarkand to Andijan, 85 m. by rail S.W. of the latter, and 20 m. S. of the Syr-darya. Pop. (1900), 86,704. Situated at an altitude of 1375 ft., it has a severe climate, the average temperatures being — year, 56°; January, 22 ; July, 65 . Yearly rainfall, 3-6 in. It is the centre of a fertile irrigated oasis, and consists of a citadel, enclosed by a wall nearly 12 m. in circuit, and of suburbs containing luxuriant gardens.

The town is modernized, has broad streets and large squares, and a particularly handsome bazaar. The former palace of the khans, which recalls by its architecture the mosques of Samarkand, is the best building in the town. Kho-< kand is one of the most important centres of trade in Turkestan. Raw cotton and silk are the principal exports, while manufactured goods are imported from Russia. Coins bearing the inscription " Khokand the Charming," and known as khokands, have or had a wide currency.

The khanate of Khokand was a powerful state which grew up in the 18th century. Its early history is not well known, but the town was founded in 1732 by Abd-ur-Rahim under the name of Iski-kurgan, or Kali-i-Rahimbai. This must relate, however, to the fort only, because Arab travellers of the 10th century mention Hovakend or Hokand, the position of which has been identified with that of Khokand. Many other populous and wealthy towns existed in this region at the time of the Arab con- quest of Ferghana. In 1758-1759 the Chinese conquered Dzun- garia and East Turkestan, and the begs or rulers of Ferghana recognized Chinese suzerainty. In 1807 or 1808 Alim, son of Narbuta, brought all the begs of Ferghana under his authority, and conquered Tashkent and Chimkent. His attacks on the Bokharan fortress of Ura-tyube were however unsuccessful, and the country rose against him. He was killed in 1817 by the adherents of his brother Omar. Omar was a poet and patron of learning, but continued to enlarge his kingdom, taking the sacred town of Azret (Turkestan), and to protect Ferghana from the raids of the nomad Kirghiz built fortresses on the Syr-darya, which became a basis for raids of the Khokand people into Kirghiz land. This was the origin of a conflict with Russia. Several petty wars were undertaken by the Russians after 1847

to destroy the Khokand forts, and to secure possession, first, of the Hi (and so of Dzungaria), and next of the Syr-darya region, the result being that in 1866, after the occupation of Ura-tyube and Jizakh, the khanate of Khokand was separated from Bokhara. During the forty-five years after the death of Omar (he died in 1822) the khanate of Khokand was the seat of continuous wars between the settled Sarts and the nomad Kipchaks, the two parties securing the upper hand in turns, Khokand falling under the dominion or the suzerainty of Bokhara, which supported Khudayar-khan, the representative of the Kipchak party, in 1858-1866; while Alim-kul, the representative of the Sarts, put himself at the head of the gazawat (Holy War) proclaimed in i860, and fought bravely against the Russians until killed at Tashkent in 1865. In 1868 Khudayar-khan, having secured independence from Bokhara, concluded a commercial treaty with the Russians, but was compelled to flee in 1875, when a new Holy War against Russia was proclaimed. It ended in the cap- ture of the strong fort of Makhram, the occupation of Khokand and Marghelan (1875), and the

recognition of Russian superiority by the amir of Bokhara, who conceded to Russia all the territory north of the Naryn river. War, however, was renewed in the following year. It ended, in February 1876, by the capture of Andijan and Khokand and the annexation of the Khokand khanate to Russia. Out of it was made the Russian province of Ferghana.

Authorities. — The following publications are all in Russian: Kuhn, Sketch of the Khanate of Khokand (1876); V. Nalivkin, Short History of Khokand (French trans., Paris, 1889) ; Niazi Mohammed, Tarihi Shahrohi, or History of the Rulers of Ferghana, edited by Pantusov (Kazan, 1885); Maksh6ev, Historical Sketch of Turkestan and the Advance of the Russians (St Petersburg, 1890) ; N. Petrovskiy, Old Arabian Journals of Travel (Tashkent, 1894); Russian Ency- clopaedic Dictionary, vol. xv. (1895). (P. A. K. ; J. T. Be.)«

KHOLM (Polish Chelm), a town of Russian Poland, in the government of Lublin, 45 m. by rail E.S.E. of the town of Lublin. Pop. (1897), 19,236. It is a very old city and the see of a bishop, and has an archaeological museum for church antiquities.

KHONDS, or Kandhs, an aboriginal tribe of India, inhabiting the tributary states of Orissa and the Ganjam district of Madras. At the census of 1901 they numbered 701,198. Their main divisions are into Kutia or hill Khonds and plain-dwelling Khonds; the landowners are known as Raj Khonds. Their religion is animistic, and their pantheon includes eighty-four gods. They have given their name to the Khondmals, a sub- division of Angul district in Orissa: area, 800 sq. m.; pop. (1901), 64,214. The Khond language, Kui, spoken in 1901 by more than half a million persons, is much more closely related to Telugu than is Gondi. The Khonds are a finer type than the Gonds. They are as tall as the average Hindu and not much darker, while in features they are very Aryan. They are undoubtedly a mixed Dravidian race, with much Aryan blood.

The Khonds became notorious, on the British occupation of their district about 1835, from the prevalence and cruelty of the human sacrifices they practised. These " Meriah " sacrifices, as they were called, were intended to further the fertilization of the earth. It was incumbent on the Khonds to purchase their victims. Unless bought with a price they were not deemed acceptable. They seldom sacrificed Khonds, though in hard times Khonds were obliged to sell their children and they could then be purchased as Meriahs. Persons of any race, age or sex, were acceptable if purchased. Numbers were bought and kept and well treated; and Meriah women w T ere encouraged to become mothers. Ten or twelve days before the sacrifice the victim's hair was cut off, and the villagers having bathed, went with the priest to the sacred grove to forewarn the goddess. The festival lasted three

days, and the wildest orgies were indulged in.

See Major Macpherson, Religious Doctrines of the Khonds; his account of their religion in Jour. R. Asiatic Soc. xiii. 220-221 and his Report upon the Khonds of Ganjam and Cuttack (Calcutta, 1842;; also District Gazetteer of Angul (Calcutta, 1908).

KHORASAN, or Khorassan (i.e. " land of the sun "), a geographical term originally applied to the eastern of the four

quarters (named from the cardinal points) into which the ancient monarchy of the Sassanians was divided. After the Arab con- quest the name was retained both as the designation of a definite province and in a looser sense. Under the new Persian empire the expression has gradually become restricted to the north- eastern portion of Persia which forms one of the five great provinces of that country. The province is conterminous E. with Afghanistan, N. with Russian Transcaspian territory, W. with Astarabad and Shahrud-Bostam, and S. with Kerman and Yezd. It lies mainly within 20° 45-38° 15′ N. and 56°-6i° E., extending about 320 m. east and west and 570 m. north and south, with a total area of about 150,000 sq. m. The surface is mountainous. The ranges generally run in parallel ridges, inclosing extensive valleys, with a normal direction from N.W. to S.E. The whole of the north is occupied by an extensive highland system composed of a part of the Elburz and its con- tinuation extending to the Paropamisus. This system, sometimes spoken of collectively as the Kuren Dagh, or Kopet Dagh from its chief sections, forms in the east three ranges, the Hazar Masjed, Binalud Kuh and Jagatai, enclosing the Meshed-Kuchan valley and the Jovain plain. The former is watered by the Kashaf-rud (Tortoise River), or river of Meshed, flowing east to the Hari-rud, their junction forming the Tejen, which sweeps round the Daman-i-Kuh, or northern skirt of the outer range, towards the Caspian but loses itself in the desert long before reaching it. The Jovain plain is watered by the Kali-i-mura, an unimportant river which flows south to the Great Kavir Or central depression. In the west the northern highlands develop two branches: (1) the Kuren Dagh, stretching through the Great and Little Balkans to the Caspian at Krasnovodsk Bay, (2) the Ala Dagh, forming a continuation of the Binalud Kuh and joining |>he mountains between Bujnurd and Astarabad, which form part of the Elburz system. The Kuren Dagh and Ala Dagh enclose the valley of the Atrek River, which flows west and south- west into the Caspian at Hassan Kuli Bay. The western off-shoots of the Ala Dagh in the north and the mountains of Astara- bad in

the south enclose the valley of the Gurgan River, which also flows westwards and parallel to the Atrek to the south- eastern corner of the Caspian. The outer range has probably a mean altitude of 8000 ft., the highest known summits being the Hazar Masjed (10,500) and the Kara Dagh (9800). The central range seems to be higher, culminating with the Shah- Jehan Kuh (11,000) and the Ala Dagh (11,500). The southern ridges, although generally much lower, have the highest point of the whole system in the Shah Kuh (13,000) between Shahrud and Astarabad. South of this northern highland several parallel ridges run diagonally across the province in a N.W.-S.E. direction as far as Seistan.

Beyond the Atrek and other rivers watering the northern valleys a few brackish and intermittent rivers lose themselves in the Great Kavir, which occupies the central and western parts of the province. The true character of the kavir, which forms the distinctive feature of east Persia, has scarcely been determined, some regarding it as the bed of a dried-up sea, others as developed by the saline streams draining to it from the surrounding high-lands. Collecting in the central depressions, which have a mean elevation of scarcely more than 500 ft. above the Caspian, the water of these streams is supposed to form saline deposits with a thin hard crust, beneath which the moisture is retained for a con- siderable time, thus producing those dangerous and slimy quag' mires which in winter are covered with brine, in summer with a treacherous incrustation of salt. Dr Sven Hedin explored the central depressions in 1906.

The surface of Khorasan thus consists mainly of highlands, saline, swampy deserts and upland valleys, some fertile and well- watered. Of the last, occurring mainly in the north, the chief are the longitudinal valley stretching from near the Herat frontier through Meshed, Kuchan and Shirvan to Bujnurd, the Derrehgez district, which lies on the northern skirt of the outer range projecting into the Akhal Tekkeh domain, now Russian territory, and the districts of Nishapur and Sabzevar which lie south of the Binalud and Jagatai ranges. These fertile tracts

produce rice and other cereals, cotton, tobacco, opium and fruits in profusion. Other products are manna, suffron, asafoe- tida and other gums. The chief manufactures are swords, stone- ware, carpets and rugs, woollens, cottons, silks and sheepskin pelisses (puslin, Afghan poshtin).

The administrative divisions of the province are: 1, Nishapur; 2, Sabzevar; 3, Jovain; 4, Asfarain; 5, Bujnurd; 6, Kuchan; 7, Derrehgez; 8, Kelat; 9, Chinaran; 10, Meshed; II, Jam; i2,Bakharz; 13, Radkan; 14, Serrakhs; 15, Sar-i-jam; 16, Bam and Safiabad; 17, Turbet i Haidari; 18, Turshiz; 19, Khaf; 20, Tun and Tabbas; 21, Kain; 22, Seistan.

The population consists of Iranians (Tajiks, Kurds, Baluchis), Mongols, Tatars and Arabs, and is estimated at about a million. The Persians proper have always represented the settled, industrial and trading elements, and to them the Kurds and the Arabs have become largely assimilated. Even many of the original Tatar, Mongol and other nomad tribes (Hat), instead of leading their former roving and unsettled life of the sahara-nishin (dwellers in the desert), are settled and peaceful shahr-nishin (dwellers in towns). In religion all except some Tatars and Mongols and the Baluchis have conformed to the national Shiah faith. The revenues (cash and kind) of the province amount to about £180,000 a year, but very little of this amount reaches the Teheran treasury. The value of the exports and imports from and into the whole province is a little under a million sterling a year. The province produces about 10,000 tons of wool and a third of this quantity, or rather more, valued at £70,000 to £80,000, is exported via Russia to the markets of western Europe, notably to Marseilles, Russia keeping only a small part. Other important articles of export, all to Russia, are cotton, carpets, shawls and turquoises, the last from the mines near Nishapur. (A. H.-S.)

KHORREMABAD, a town of Persia, capital of the province of Luristan, in 33° 32′ N., 48° 15′ E., and at an elevation of 4250 ft. Pop. about 6000. It is situated 138 m. W.N.W. of Isfahan and 117 m. S.E. of Kermanshah, on the right bank of the broad but shallow Khorremabad river, also called Ab-i-istaneh, and, lower down, Kashgan Rud. On an isolated rock between the town and the river stands a ruined castle, the Diz-i-siyah (black castle), the residence of the governor of the district (then called Samha) in the middle ages, and, with some modern additions, one of them consisting of rooms on the summit, called Felek ul aflak (heaven of heavens), the residence of the governors of Luristan in the beginning of the 19th century. At the -foot of the castle stands the modern residence of the governor, built c. 1830, with several spacious courts and gardens. On the left bank of the river opposite the town are the ruins of the old city of Samha. There are a minaret 60 ft. high, parts of a mosque, an aqueduct, a number of walls of other buildings and a four-sided monolith, measuring 95 ft. in height, by 3 ft. long and 2J broad, with an inscription partly illegible, commemorating Mahmud, a grand- son of the Seljuk king Malik Shah, and dated a.h. 517, or 519 (a.d. 1148-1150). There also remain ten arches of a bridge which led over the river from Samha on to the road to Shapur- khast, a city situated some distance west.

KHORSABAD, a Turkish village in the vilayet of Mosul, 12I m. N.E. of that town, and almost 20 m. N. of ancient Nine- veh, on the left bank of the little river Kosar. Here, in 1843, P. E. Botta, then French consul at Mosul, discovered the re- mains of an Assyrian palace and town, at which excavations were conducted by him and Flandin in 1843-1844, and again

by Victor Place in 1851-1855. The ruins proved to be those of the town of Dur-Sharrukin, " Sargon's Castle," built by Sargon, king of Assyria, as a royal residence. The town, in the shape of a rect- angular parallelogram, with the corners pointing approximately toward the cardinal points of the compass, covered 741 acres of ground. On the north-west side, half within and half without the circuit of the walls, protruding into the plain like a great bastion, stood the royal palace, on a terrace, 45 ft. in height, covering about 25 acres. The palace proper was divided into three sections, built around three sides of a large court on the south-east or city side, into which opened the great outer gates, guarded by winged stone bulls, each section containing suites of rooms built around several smaller inner courts. In the centre was the serai, occupied by the king and his retinue, with an extension towards the north, opening on a large inner court, con- taining the public reception rooms, elaborately decorated with

sculptures and historical inscriptions, representing scenes of hunting, worship, feasts, battles, and the like. The harem, with separate provisions for four wives, occupied the south corner, the domestic quarters, including stables, kitchen, bakery, wine cellar, &c, being at the east corner, to the north-east of the great entrance court. In the west corner stood a temple, with a stage- tower (ziggurat) adjoining. The walls of the rooms, which stood only to the height of one storey, were from 9 to 25 ft. in thickness, of clay, faced with brick, in the reception rooms wainscoted with stone slabs or tiles, elsewhere plastered, or, in the harem, adorned with fresco paintings and arabesques. Here and there the floors were formed of tiles or alabaster blocks, but in general they were of stamped clay, on which were spread at the time of occupancy mats and rugs. The exterior of the palace wall exhibited a system of groups of half columns and stepped recesses, an orna- ment familiar in Babylonian architecture. The palace and city were completed in 707 B.C., and in 706 Sargon took up his resi- dence there. He died the following year, and palace and city seem to have been abandoned shortly thereafter. Up to 1909 this was the only Assyrian palace which had ever been explored systematically, in its entirety, and fortunately it was found on the whole in an admirable state of preservation. An immense number of statues and bas-reliefs, excavated by Botta, were transported to Paris, and formed the first Assyrian museum opened to the world. The objects excavated by Place, together with the objects found by Fresnel's expedition in Babylonia and a part of the results of Rawlinson's excavations at Nineveh, were unfortunately lost in the Tigris, on transport from Bagdad to Basra. Flandin had, however, made careful drawings and copies of all objects of importance from Khorsabad. The whole material

was published by the French government in two monumental publications.

See P. E. Botta and E. Flandin, Monument de Ninive (Paris, 1849- 1850; 5 vols. 400 plates); Victor Place, Ninive et V Assyrie, avec des essais de restauration par F. Thomas (Paris, 1866-1869 ; 3 vols.).

Q- P- Pe.)

KHOTAN (locally Ilchi), a town and oasis of East Turkestan, on the Khotan-darya, between the N. foot of the Kuenlun and the edge of the Takla-makan desert, nearly 200 m. by caravan road S.E. from Yarkand. Pop., about 5000. The town con- sists of a labyrinth of narrow, winding, dirty streets, with poor, square, flat-roofed houses, half a dozen madrasas (Mahommedan colleges), a score of mosques, and some masars (tombs of Mahom- medan saints). Dotted about the town are open squares, with tanks or ponds overhung by trees. For centuries Khotan was famous for jade or nephrite, a semi-precious stone greatly esteemed by the Chinese for making small fancy boxes, bottles and cups, mouthpieces for pipes, bracelets, &c. The stone is still exported to China. Other local products are carpets (silk and felt), silk goods, hides, grapes, rice and other cereals, fruits, tobacco, opium and cotton. There is an active trade in these goods and in wool with India, West Turkestan and China. The oasis contains two small towns, Kara-kash and Yurun-kash, and over 300 villages, its total population being about 150,000.

Khotan, known in Sanskrit as Kustana and in Chinese as Yu-than, Yu-tien, Kiu-sa-tan-na, and Khio-tan, is mentioned in Chinese chronicles in the 2nd century B.C. In a.d. 73 it was conquered by the Chinese, and ever since has been generally dependent upon the Chinese empire. During the early centuries of the Christian era, and long before that, it was an important and flourishing place, the capital of a kingdom to which the Chinese sent embassies, and famous for its glass-wares, copper tankards and textiles. About the year a.d. 400 it was a city of some magnificence, and the seat of a flourishing cult of Buddha, with temples rich in paintings and ornaments of the precious metals; but from the 5th century it seems to have declined. In the 8th century it was conquered, after a struggle of 25 years, by the Arab chieftain Kotaiba ibn Moslim, from West Turkestan, who imposed Islam upon the people. In 1220 Khotan was destroyed by the Mongols under Jenghiz Khan. Marco Polo, who passed through the town in 1274, says that " Everything is to be had there [at Cotan, i. e. Khotan] in plenty, including

abundance of cotton, with flax, hemp, wheat, wine, and the like. The people have vineyards and gardens and estates. They live by commerce and manufactures, and are no soldiers." 1 The place suffered severely during

the Dungan revolt against China in 1 864-1 8 7 5, and again a few years later when Yakub Beg of Kashgar made himself master of East Turkestan.

The Khotan-darya rises in the Kuen-lun Mountains in two headstreams, the Kara-kash and the Yurun-kash, which unite towards the middle of the desert, some 90 m. N. of the town of Khotan. The conjoint stream then flows 180 m. northwards across the desert of Takla-makan, though it carries water only in the early summer, and empties itself into the Tarim a few miles below the confluence of the Ak-su with the Yarkand-darya (Tarim). In crossing the desert it falls 1250 ft. in a distance of 270 m. Its total length is about 300 m. and the area it drains probably nearly 40,000 sq. m.

See J. P. A. Rdmusat, Histoire de la ville de Khotan (Paris, 1820) ; and Sven Hedin, Through Asia (Eng. trans., London, 1898), chs. lx. and lxii., and Scientific Results of a Journey in Central Asia, 1899- 1902, vol. ii. (Stockholm, 1906). (J. T.Be.) '< ■■

KHOTIN, or Khoteen (variously written Khochim, Choczim, and Chocim), a fortified town of South Russia, in the government of Bessarabia, in 48 30′ N. and 26 30′ E., on the right bank of the Dniester, near the Austrian (Galician) frontier, and opposite Podolian Kamenets. Pop. (1897), 18,126. It possesses a few manufactures (leather, candles, beer, shoes, bricks), and carries on a considerable trade, but has always been of importance mainly as a military post, defending one of the most frequented passages of the Dniester. In the middle ages it was the seat of a Genoese colony; and it has been in Polish, Turkish and Austrian possession. The chief events in its annals are the defeat of the Turks in 1621 by Ladislaus IV., of Poland, in 1673 by John Sobieski, of Poland, and in 1739 by the Russians under Miinnich; the defeat of the Russians by the Turks in 1768; the capture by the Russians in 1769, and by the Austrians in 1788; and the occupation by the Russians in 1806. It finally passed to Russia with Bessarabia in 181 2 by the peace of Bucharest.

KHULNA, a town and district of British India, in the Presi- dency division of Bengal. The town stands on the river Bhairab, and is the terminus of the Bengal Central railway, 109 m. E. of Calcutta. Pop. (1901), 10,426. It is the most important centre of river-borne trade in the delta.

The District of Khulna lies in the middle of the delta of the Ganges, including a portion of the Sundarbans or seaward fringe of swamps. It was formed out of Jessore in 1882. Area (excluding the Sundarbans), 2077 sq. m. Besides the Sundar- bans, the north-east part of the district is swampy; the north- west is more elevated and drier, while the central part, though low-lying, is cultivated. The whole is alluvial. In 1901 the population was

1,253,043, showing an increase of 6% in the decade. Rice is the principal crop; mustard, jute and tobacco are also grown, and the fisheries are important. Sugar is manufactured from the date palm. The district is entered by the Bengal Central railway, but by far the greater part of the traffic is carried by water.

See District Gazetteer (Calcutta, 1908).

KHUNSAR, a town of Persia, sometimes belonging to the province of Isfahan, at others to Irak, 96 m. N.W. of Isfahan, in 33 9′ N., 50 23′ E., at an elevation of 7600 ft. Pop., about 10,000. It is picturesquely situated on both sides of a narrow valley through which the Khunsar River, a stream about 12 ft. wide, flows in a north-east direction to Kuom. The town and its fine gardens and orchards straggle some 6 m. along the valley with a mean breadth of scarcely half a mile. There is a great profusion of fruit, the apples yielding a kind of cider which, however, does not keep longer than a month. The climate is cool in summer and cold in winter. There are five caravanserais, three mosques and a post office.

KHURJA, a town of British India, in the Bulandshahr district of the United Provinces, 27 m. N.W. of Aligarh, near the main

1 Sir H. Yule, The Book of Ser Marco Polo, bk. i. ch. xxxvi. (3rd ed., London, 1903),

line of the East Indian railway. Pop. (1901), 29,277. It is an important centre of trade in grain, indigo, sugar and ghi, and has cotton gins and presses and a manufacture of pottery. Jain traders form a large and wealthy class; and the principal building in the town is a modern Jain temple, a fine domed structure richly carved and ornamented in gold and colours.

KHYBER PASS, the most important of the passes which lead from Afghanistan into India. It is a narrow defile winding between cliffs of shale and limestone 600 to 1000 ft. high, stretching up to more lofty mountains behind. No other pass in the world has possessed such strategic importance or retains so many historic associations as this gateway to the plains of India. It has probably seen Persian and Greek, Seljuk, Tatar, Mongol and Durani conquerors, with the hosts of Alexander the Great, Mahmud of Ghazni, Jenghiz Khan, Timur, Baber, Nadir Shah, Ahmed Shah, and numerous other warrior chiefs pass and repass through its rocky defiles during a period of 2000 years. The mountain barrier which separates the

Peshawar plains from the Afghan highlands differs in many respects from the mountain barrier which intervenes between the Indus plains and the plateau farther south. To the south this barrier consists of a series of flexures folded parallel to the river, through which the plateau drainage breaks down in transverse lines form- ing gorges and clefts as it cuts through successive ridges. West of Peshawar the strike of the mountain systems is roughly from west to east, and this formation is maintained with more or less regularity as far south as the Tochi River and Waziristan. Almost immediately west of Peshawar, and stretching along the same parallel of latitude from the meridian of Kabul to within ten miles of the Peshawar cantonment, is the great central range of the Safed Koh, which forms throughout its long, straight line of rugged peaks the southern wall, or water- divide, of the Kabul River basin. About the meridian of 71 E. it forks, sending off to the north-east what is locally known as a spur to the Kabul River, but which is geographically only part of that stupendous water-divide which hedges in the Kunar and Chitral valleys, and, under the name of the Shandur Range, unites with the Hindu Kush near the head of the Taghdumbash Pamir. The Kabul River breaks through this northern spur of the Safed Koh; and in breaking through it is forced to the northward in a curved channel or trough, deeply sunk in the mountains between terrific cliffs and precipices, where its narrow waterway affords no foothold to man or beast for many miles. To reach the Kabul River within Afghan territory it is neces- sary to pass over this water-divide; and the Khyber stream, flowing down from the pass at Landi Kotal to a point in the plains opposite Jamrud, 9 m. W. of Peshawar, affords the opportunity.

Pursuing the main road from Peshawar to Kabul, the fort of Jamrud, which commands the British end of the Khyber Pass, lies some n m. W. of Peshawar. The road leads through a barren stony plain, cut up by water-courses and infested by all the worst cut-throats in the Peshawar district. Some three miles beyond Jamrud the road enters the mountains at an opening called Shadi Bagiar, and here the Khyber proper begins. The highway runs for a short distance through the bed of a ravine, and then joins the road made by Colonel Mackeson in 1839-1842, until it ascends on the left-hand side to a plateau called Shagai. From here can be seen the fort of Ali Masjid, which commands the centre of the pass, and which has been the scene of more than one famous siege. Still going westward the road turns to the right, and by an easy zigzag descends to the river of Ali Masjid, and runs along its bank. The new road along this cliff was made by the British during the Second Afghan War (1879-80), and here is the narrowest part of the Khyber, not more than 15 ft. broad, with the Rhotas hill on the right fully 2000 ft. overhead. Some three miles farther on the valley widens, and on either side lie the hamlets and some sixty towers of the Zakka Khel Afridis. Then comes the Loargi Shinwari plateau, some

seven miles in length and three in its widest part, ending at Landi Kotal, where is another British fort, which closes this end of the Khyber and overlooks

the plains of Afghanistan. After leaving Landi Kotal the great Kabul highway passes between low hills, until it debouches on the Kabul River and leads to Dakka. The whole of the Khyber Pass from end to end lies within the country of the Afridis, and is now recognized as under British control. From Shadi Bagiar on the east to Landi Kotal on the west is about 20 m. in a straight line.

The Khyber has been adopted by the British as the main road to Kabul, but its difficulties (before they were overcome by British engineers) were such that it was never so regarded by former rulers of India. The old road to India left the Kabul River near its junction with the Kunar, and crossed the great divide between the Kunar valley and Bajour; then it turned southwards to the plains. During the first Afghan War the Khyber was the scene of many skirmishes with the Afridis and some disasters to the British troops. In July 1839 Colonel Wade captured the fortress of Ali Masjid. In 1842, when Jalalabad was blockaded, Colonel Moseley was sent to occupy the same fort, but was compelled to evacuate it after a few days owing to scarcity of provisions. In April of the same year it was reoccu- pied by General Pollock in his advance to Kabul. It was at Ali Masjid that Sir Neville Chamberlain's friendly mission to the amir Shere Ali was stopped in 1878, thus causing the second Afghan War; and on the outbreak of that war Ali Masjid was captured by Sir Samuel Browne. The treaty which closed the war in May 1879 left the Khyber tribes under British control. From that time the pass was protected by jezailchis drawn from the Afridi tribe, who were paid a subsidy by the British government. For 18 years, from 1879 onward, Colonel R. Warburton controlled the Khyber, and for the greater part of that time secured its safety; but his term of office came to an end synchronously with the wave of fanaticism which swept along the north-west border of India during r897. The Afridis were persuaded by their mullahs to attack the pass, which they themselves had guaranteed. The British government were warned of the intended movement, but only withdrew the British officers belonging to the Khyber Rifles, and left the pass to its fate. The Khyber Rifles, deserted by their officers, made a half-hearted resistance to their fellow-tribesmen, and the pass fell into the hands of the Afridis, and remained in their possession for some months. This was the chief cause of the Tirah Ex- pedition of 1897. The Khyber Rifles were afterwards strength- ened, and divided into two battalions commanded by four British officers.

See Eighteen Years in the Khyber, by Sir Robert Warburton (1900) ; Indian Borderland, by Sir T. Holdich (1901). (T. H. H.)*

KIAKHTA, a town of Siberia, one of the chief centres of trade between Russia and China, on the Kiakhta, an affluent of the Selenga, and on an elevated plain surrounded by moun- tains, in the Russian government of Transbaikalia, 320 m. S.W. of Chita, the capital, and close to the Chinese frontier, in 50 20′ N., 106 40′ E. Besides the lower town or Kiakhta proper, the municipal jurisdiction comprises the fortified upper town of Troitskosavsk, about 2 m. N., and the settlement of Ust- Kiakhta, 10 m. farther distant. The lower town stands directly opposite to the Chinese emporium of Maimachin, is surrounded by walls, and consists principally of one broad street and a large exchange courtyard. From 1689 to 1727 the trade of Kiakhta was a government monopoly, but in the latter year it was thrown open to private merchants, and continued to improve until i860, when the right of commercial intercourse was extended along the whole Russian-Chinese frontier. The annual December fairs for which Kiakhta was formerly famous, and also the regular traffic passing through the town, have con- siderably fallen off since that date. The Russians exchange here leather, sheepskins, furs, horns, woollen cloths, coarse linens and cattle for teas (in value 95% of the entire imports), porcelain, rhubarb, manufactured silks, nankeens and other Chinese produce. The population, including Ust-Kiakhta (5000) and Troitskosavsk (9213 in 1897), is nearly 20,000.

KIANG-SI, an eastern province of China, bounded N. by Hu-peh and Ngan-hui, S. by Kwang-tung, E. by Fu-kien, and

W. by Hu-nan. It has an area of 72,176 sq. m., and a popula- tion returned at 22,000,000. It is divided into fourteen pre- fectures. The provincial capital is Nan-ch'ang Fu, on the Kan Kiang, about 35 m. from the Po-yang Lake. The whole province is traversed in a south-westerly and north-easterly direction by the Nan-shan ranges. The largest river is the Kan Kiang, which rises in the mountains in the south of the province and flows north-east to the Po-yang Lake. It was over the Meiling Pass and down this river that, in old days, embassies landing at Canton proceeded to Peking. During the summer time it has water of sufficient depth for steamers of light draft as far as Nan-ch'ang, and it is navigable by native craft for a considerable distance beyond that city. Another river of note is the Chang Kiang, which has its source in the province of Ngan-hui and flows into the Po-yang Lake, connecting in its course the Wu- yuen district, whence come the celebrated " Moyune " green teas, and the city of King-te-chen, celebrated for its pottery, with Jao-chow Fu on the lake. The black "

Kaisow ” teas are brought from the Ho-kow district, where they are grown, down the river Kin to Juy-hung on the lake, and the Siu-ho connect? by a navigable stream I-ning Chow, in the neighbourhood of which city the best black teas of this part of China are produced, with Wu-ching, the principal mart of trade on the lake. The principal products of the province are tea, China ware, grass- cloth, hemp, paper, tobacco and tallow. Kiu-kiang, the treaty port of the province, opened to foreign trade in 1861, is on the Yangtsze-kiang, a short distance above the junction of the Po-yang Lake with that river.

KIANG-SU, a maritime province of China, bounded N. by Shan-tung, S. by Cheh-kiang, W. by Ngan-hui, and E. by the sea. It has an area of 45,000 sq. m., and a population estimated at 2 1 ,000,000. Kiang-su forms part of the great plain of northern China. There are no mountains within its limits, and few hills. It is watered as no other province in China is watered. The Grand Canal runs through it from south to north ; the Yangtsze- kiang crosses its southern portion from west to east ; it possesses several lakes, of which the T’ai-hu is the most noteworthy, and numberless streams connect the canal with the sea. Its coast is studded with low islands and sandbanks, the results of the deposits brought down by the Hwang-ho. Kiang-su is rich in places of interest. Nanking, ” the Southern Capital,” was the seat of the Chinese court until the beginning of the 1 5th century, and it was the headquarters of the T’ai-p’ing rebels from 1853, when they took the city by assault, to 1864, when its garrison yielded to Colonel Gordon’s army. Hang-chow Fu and Su-chow Fu, situated on the T’ai-hu, are reckoned the most beautiful cities in China. ” Above there is Paradise, below are Su and Hang,” says a Chinese proverb. Shang-hai is the chief port in the province. In 1909 it was connected by railway (270 m. long) via Su-Chow and Chin-kiang with Nanking. Tea and silk are the principal articles of commerce produced in Kiang-su, and next in importance are cotton, sugar and medicines. The silk manufactured in the looms of Su-chow is famous all over the empire. In the mountains near Nanking, coal, plumbago, iron ore and marble are found. Shang-hai, Chin-kiang, Nanking and Su-chow are the treaty ports of the province.

KIAOCHOW BAY, a large inlet on the south side of the promontory of Shantung, in China. It was seized in November 1897 by the German fleet, nominally to secure reparation for the murder of two German missionaries in the province of Shantung. In the negotiations which followed, it was arranged that the bay and the land on both sides of the entrance within certain defined lines should be leased to Germany for 99 years. During the continuance of the lease Germany exercises all the rights of territorial sovereignty, including the right to erect fortifications. The area leased is about 117 sq. m., and over a further area, comprising a zone of some 32 m., measured from any point on the shore of the bay, the Chinese

government may not issue any ordinances without the consent of Germany. The native popu- lation in the ceded area is about 60,000. The German govern- ment in 1899 declared Kiaochow a free port. By arrangement with the Chinese government a branch of the Imperial maritime

customs has been established there for the collection of duties upon goods coming from or going to the interior, in accordance with the general treaty tariff. Trade centres at Ts'ingtao, a town within the bay. The country in the neighbourhood is mountainous and bare, but the lowlands are well cultivated. Ts'ingtao is connected by railway with Chinan Fu, the capital of the province; a continuation of the same line provides for a junction with the main Lu-Han (Peking-Hankow) railway. The value of the trade of the port during 1904 was £2,712,145 (£1,808,113 imports and £904,032 exports).

KICKAPOO (" he moves about "), the name of a tribe of North American Indians of Algonquian stock. When first met by the French they were in central Wisconsin. They sub- sequently removed to the Ohio valley. They fought on the English side in the War of Independence and that of 181 2. In 1852 a large band went to Texas and Mexico and gave much trouble to the settlers; but in 1873 the bulk of the tribe was settled on its present reservation in Oklahoma. They number some 800, of whom about a third are still in Mexico.

KIDD, JOHN (1775-1851), English physician, chemist and geologist, born at Westminster on the 10th of September 1775, was the son of a naval officer, Captain John Kidd. He was educated at Bury St Edmunds and Westminster, and after- wards at Christ Church, Oxford, where he graduated B.A. in 1797 (M.D. in 1804), He also studied at Guy's Hospital, London (1797-1801), wiiere he was a pupil of Sir Astley Cooper. He became reader in chemistry at Oxford in 1801, and in 1803 was elected the first Aldrichian professor of chemistry. He then voluntarily gave courses of lectures on mineralogy and geology: these were delivered in the dark chambers under the Ashmclean Museum, and there J. J. and W. D. Conybeare, W. Buckland, C. G. B. Daubeny and others gained their first lessons in geology. Kidd was a popular and instructive lecturer, and through his efforts the geological chair, first held by Buckland, was established. In 1818 he became a F.R. C.P.; in 1822 regius professor of medi- cine in succession to Sir Christopher Pegge; and in 1834 he was appointed keeper of the Radcliffe Library. He delivered the Harveian oration before the Royal College of Physicians in 1834. He died at Oxford on the 7th of September 1851.

Publications. — Outlines of Mineralogy (2 vols., 1809) ; A Geologi- cal Essay on the Imperfect Evidence in Support of a Theory of the Earth (18

15); On the Adaptation of External Nature to the Physical Condition of M an, 1833 (Bridgewater Treatise). _ ■,.,

KIDD, THOMAS (1770-1850), English classical scholar and schoolmaster, was born in Yorkshire. He was educated at Giggleswick School and Trinity College, Cambridge. He held numerous scholastic and clerical appointments, the last being the rectory of Croxton, near Cambridge, where he died on the 27 th of August 1850. Kidd was an intimate friend of Porson and Charles Burney the younger. He contributed largely to periodicals, chiefly on classical subjects, but his reputation mainly rests upon his editions of the works of other scholars: Opuscula Ruhnkeniana {1807), the minor works of the great Dutch scholar David Ruhnken; Miscellanea Critica of Richard Dawes (2nd ed., 1827); Tracts and Miscellaneous Criticisms of Richard Porson (181 5). He also published an edition of the works of Horace (1817) based upon Bentley's recension.

KIDD, WILLIAM [Captain- Kidd] (c. 1645-1701), privateer and pirate, was born, perhaps, in Greenock, Scotland, but his origin is quite obscure. He told Paul Lorraine, the ordinary of Newgate, that he was " about 56 " at the time of his con- demnation for piracy in 1701. In 1691 an award from the council of New York of £150 was given him for his services during the disturbances in the colony after the revolution of 1688. He was commissioned later to chase a hostile privateer off the coast, is described as an owner of ships, and is known to have served with credit against the French in the West Indies. In 1695 he came to London with a sloop of his own to trade. Colonel R. Livingston (1654-1 724), a well-known New York land- owner, recommended him to the newly appointed colonial governor Lord Bellomont, as a fit man to command a vessel to cruise against the pirates in the Eastern seas (see Pirate).

Accordingly the " Adventure Galley," a vessel of 30 guns and 275 tons, was privately fitted out, and the command given to Captain Kidd, who received the king's commission to arrest and bring to trial all pirates, and a commission of reprisals against the French. Kidd sailed from Plymouth in May 1696 for New York, where he filled up his crew, and in 1697 reached Madagascar, the pirates' principal rendezvous. He made no effort whatever to hunt them down. On the contrary he associated himself with a notorious pirate named Culliford. The fact would seem to be that Kidd meant only to capture French ships. When he found none he captured native trading vessels, under pretence that they were provided with French passes and were fair prize, and he plundered on the coast of Malabar. During

1698-1699 complaints reached the British government as to the character of his proceedings. Lord Bellomont was instructed to apprehend him if he should return to America. Kidd deserted the "Adventure " in Madagascar, and sailed for America in one of his prizes, the "Quedah Mer- chant," which he also left in the West Indies: He reached New England in a small sloop with several of his crew and wrote to Bellomont, professing his ability to justify himself and sending the governor booty. He was arrested in July 1699, was sent to England and tried, first for the murder of one of his crew, and then with others for piracy. He was found guilty on both charges, and hanged at Execution Dock, London, on the 23rd of May 1 701. The evidence against him was that of two members of his crew, the surgeon and a sailor who turned king's evidence, but no other witnesses could be got in such circumstances, as the judge told him when he protested. " Captain Kidd's Treasure " has been sought by various expeditions and about £14,000 was recovered from Kidd's ship and from Gardiner's Island (off the E. end of Long Island); but its magnitude was palpably exaggerated. He left a wife and child at New York. The so-called ballad about him is a poor imitation of the authentic chant of Admiral Benbpw.

Much has been written about Kidd, less because of the intrinsic interest of his career than because the agreement made with him by Bellomont was the subject of violent political controversy. The best popular account is in A n Historical Sketch of Robin Hood and Captain Kidd by W. W. Campbell (New York, 1853), in which the essential documents are quoted. But see Pirate.

KIDDERMINSTER, a market town and municipal and parlia- mentary borough of Worcestershire, England, 135ˆ m. N.W. by W. from London and 15 m. N. of Worcester by the Great Western railway, on the river Stour and the Staffordshire and Worcestershire canal. Pop. (1901), 24,692. The parish church of All Saints, well placed above the river, is a fine Early English and Decorated building, with Perpendicular additions. Of other buildings the principal are the town hall (1876), the corporation buildings, and the school of science and art and free library. There is a free grammar school founded in 1637. A public recreation ground, Brinton Park, was opened in 1887. Richard Baxter, who was elected by the townsfolk as their minister in 1 64 1, was instrumental in saving the town from a reputation of ignorance and depravity caused by the laxity of their clergy. He is commemorated by a statue, as is Sir Rowland Hill, the introducer of penny postage, who was born here in 1795. Kidderminster is chiefly celebrated for its carpets. The per- manency of colour by which they are distinguished is attributed to the properties of the water of the Stour, which is impregnated with iron and fuller's earth. Worsted spinning and dyeing are also carried on, and there are iron foundries, tinplate works,

breweries, malthouses, &c. The parliamentary borough returns one member. The town is governed by a mayor, 6 aldermen and 18 councillors. Area, 12 14 acres.

In 736 lands upon the river Stour, called Stour in Usmere, which have been identified with the site of Kidderminster (Chideminstre), were given to Earl Cyneberght by King .(Ethel- bald to found a monastery. If this monastery was ever built, it was afterwards annexed to the church of Worcester, and the lands on the Stour formed part of the gift of Coenwulf, king of the Mercians, to Deneberht, bishop of Worcester, but were exchanged with the same king in 816 for other property.

At the Domesday Survey, Kidderminster was still in the hands of the king and remained a royal manor until Henry II. granted it to Manser Biset. The poet Edmund Waller was one of the 17th century lords of the manor. The town was possibly a borough in 1187 when the men paid £4 to an aid. As a royal possession it appears to have enjoyed various privileges in the 1 2th century, among them the right of choosing a bailiff to collect the toll and render it to the king, and to elect six burgesses and send them to the view of frankpledge twice a year. The first charter of incorporation, granted in 1636, appointed a bailiff and 12 capital burgesses forming a common council. The town was governed under this charter until the Municipal Reform Act of 1835. Kidderminster sent two members to the parliament of 1295, but was not again represented until the privilege of sending one member was conferred by the Reform Act of 1832. The first mention of the cloth trade for which Kidderminster was formerly noted occurs in 1334, when it was enacted that no one should make woollen cloth in the borough without the bailiff's seal. At the end of the 18th century the trade was still important, but it began to decline after the in- vention of machinery, probably owing to the poverty of the manufacturers. The manufacture of woollen goods was however replaced by that of carpets, introduced in 1735. At first only the " Kidderminster " carpets were made, but in 1749 a Brussels loom was set up in the town and Brussels carpets were soon produced in large quantities.

See Victoria County History: Worcestershire; J. R. Burton, A History of Kidderminster, with Short Accounts of some Neighbouring Parishes (1890).

KIDNAPPING (from kid, a slang term for a child, and nap or nab, to steal), originally the stealing and carrying away of children and others to serve as servants or labourers in the American plantations; it was defined by Blackstone as the forcible abduction or stealing away of a man, woman or child from their own country and sending them into another. The difference between kidnapping, abduction (q.v.) and false im- prisonment is not very great; indeed, kidnapping may be said to be a form of assault and

false imprisonment, aggravated by the carrying of the person to some other place. The term is, however, more commonly applied in England to the offence of taking away children from the possession of their parents. By the Offences against the Person Act 1861, " whosoever shall unlawfully, by force or fraud, lead or take away or decoy or entice away or detain any child under the age of fourteen years with intent to deprive any parent, guardian or other person having the lawful care or charge of such child of the possession of such child, or with intent to steal any article upon or about the person of such child, to whomsoever such article may belong, and whosoever shall with any such intent receive or harbour any such child, &c," shall be guilty of felony, and is liable to penal servitude for not more than seven years, or to imprison- ment for any term not more than two years with or without hard labour. The abduction or unlawfully taking away an unmarried girl under sixteen out of the possession and against the will of her father or mother, or any other person having the lawful care or charge of her, is a misdemeanour under the same act. The term is used in much the same sense in the United States.

The kidnapping or forcible taking away of persons to serve at sea is treated under Impressment.

KIDNEY DISEASES. 1 (For the anatomy of the kidneys, see Urinary System.) The results of morbid processes in the kidney may be grouped under three heads: the actual lesions produced, the effects of these on the composition of the urine, 1 The word " kidney " first appears in the early part of the 14th century in the form kidenei, with plural kideneiren, kideneris, kidneers, &c. It has been assumed that the second part of the word is " neer "or " near " (cf. Ger. Niere), the common dialect word for "kidney " in northern, north midland and eastern counties of England (see J. Wright, English Dialect Dictionary, 1903, s.v. Near), and that the first part represents the O.E. cwiS, belly, womb; this the New English Dictionary considers improbable ; there is only one doubtful instance of singular kidnere and the ordinary form ended in -ei or ey. Possibly this represents M.E. ey, plur. eyren, egg, the name being I given from the resemblance in shape. The first part is uncertain.

and the effects of the kidney-lesion on the body at large. Affec- tions of the kidney are congenital or acquired. When acquired they may be the result of a pathological process limited to the kidney, in which case they are spoken of as primary, or an accompaniment of disease in other parts of the body, when they may be spoken of as secondary.

Congenital Affections. — The principal congenital affections are anomalies in the number or position of the kidneys or of their ducts; atrophy; cystic disease and growths. The most common abnor- mality is the existence of a single kidney; rarely a supernumerary kidney may be present. The presence of a single kidney may be due to failure of development, or to atrophy in foetal life ; it may also be dependent on the fusion of originally separate kidneys in such a way as to lead to the formation of a horse-shoe kidney, the two organs being connected at their lower ends. In some cases of horse-shoe kidney the organs are united merely by fibrous tissue. Occa- sionally the two kidneys are fused end to end, with two ureters. A third variety is that where the fusion is more complete, producing a disk-like mass with two ureters. The kidneys may be situated in abnormal positions; thus they may be in front of the sacro-iliac articulation, in the pelvis, or in the iliac fossa. The importance of such displacements lies in the fact that the organs may be mistaken for tumours. In some cases atrophy is associated with mal-develop- ment, so that only the medullary portion of the kidney is developed ; in others it is associated with arterial obstruction, and sometimes it may be dependent upon obstruction of the ureter. In congenital cystic disease the organ is transformed into a mass of cysts, and the enlargement of the kidneys may be so great as to produce difficulties in birth. The cystic degeneration is caused by obstruction of the uriniferous tubules or by anomalies in development, with persistence of portions of the Wolffian body. In some cases cystic degeneration is accompanied by anomalies in the ureters and in the arterial supply. Growths of the kidney are sometimes found in infants ; they are usually malignant, and may consist of a peculiar form of sarcoma, which has been spoken of as rhabdo-sarcoma, owing to the presence in the mass of involuntary muscular fibres. The existence of these tumours is dependent on anomalies of development ; the tissue which forms the primitive kidney belongs to the same layer as that which gives rise to the muscular system (mesoblast). Anomalies of the excretory ducts: in some cases the ureter is double, in others it is greatly dilated; in others the pelvis of the kidney may be greatly dilated, with or without dilatation of the ureter.

Acquired Affections. Movable Kidney. — One or both of the kidneys in the adult may be preternaturally mobile. This condition is more common in women, and is usually the result of a severe shaking or other form of injury, or of the abdominal walls becoming lax as a sequel to abdominal distension, to emaciation or pregnancy, or to the effects of tight-lacing. The more extreme forms of movable kidney are dependent, generally, on anomalies in the arrangement of the peritoneum, so that the organ has a partial mesentery; and to this condition, where the kidney can be moved freely from one part of the abdomen to another, the term floating kidney is applied. But more usually the organ is loose under the peritoneum, and not

efficiently supported in its fatty bed. Movable kidney produces a variety of symptoms, such as pain in the loin and back, faintness, nausea and vomiting — and the function of the organ may be seriously interfered with, owing to the ureter becoming kinked. In this way hydronephrosis, or distension of the kidney with urine, may be produced. The return of blood through the renal vein may also be hindered, and temporary vascular engorgement of the kidney, with haematuria, may be produced.

In some cases the movable kidney may be satisfactorily kept in its place by a pad and belt, but in other cases an operation has to be undertaken. This consists in exposing the kidney (generally the right) through an incision below the last rib, and fixing it in its proper position by several permanent sutures of silk or silkworm gut. The operation is neither difficult nor dangerous, and its results are excellent.

Embolism. — The arrangement of the blood-vessels of the kidney is peculiarly favourable to the production of wedge-shaped areas of necrosis, the result of a blocking by clots. Sometimes the clot is detached from the interior of the heart, the effect being an arrest of the circulation in the part of the kidney supplied by the blocked artery. In other cases, the plug is infective owing to the presence of septic micro-organisms, and this is likely to lead to the formation of small pyaemic abscesses. It is exceptional for the large branches of the renal artery to be blocked, so that the symptoms produced in the ordinary cases are only the temporary appearance of blood or albumen in the urine. Blocking of the main renal vessels as a result of disease of the walls of the vessels may lead to disorganization of the kidneys. Blocking of the veins, leading to extreme congestion of the kidney, also occurs. It is seen in cases of extreme weakness and wasting, sometimes in septic conditions, as in puerperal pyaemia, where a clot, formed first in one of the pelvic veins, may spread up the vena cava and secondarily block the renal veins. Thrombosis of the renal vein also occurs in malignant disease of the kidney and in certain forms of chronic Bright's disease.

Passive congestion of the kidneys occurs in heart-diseases and lung-diseases, where the return of venous blood is interfered with. It may also be produced by tumours pressing on the vena cava. The engorged kidneys become brownish red, enlarged and fibroid, and they secrete a scanty, high-coloured urine.

Active congestion is produced by the excretion in the urine of such materials as turpentine and cantharides and the toxins of various diseases. These irritants produce engorgement and inflammation of the kidney, much as they would that of any other structures' with which they come in contact. Renal disturbance is often the result of the excretion of microbic poisons. Extreme congestion of the kidneys may be produced by exposure

to cold, owing to some intimate relationship existing between the cutaneous and the renal vessels, the constriction of the one being accompanied by the dilatation of the other. Infective diseases, such as typhoid fever, pneumonia, scarlet fever, in fact, most acute specific diseases, produce during their height a temporary nephritis, not usually followed by permanent alteration in the kidney; but some acute diseases cause a nephritis which may lay the foundation of permanent renal disease. This is most common as a result of scarlet fever.

Bright's disease is the term applied to certain varieties of acute and chronic inflammation of the kidney. Three forms are usually recognized — acute, chronic and the granular or cirrhotic kidney. In the more common form of granular kidney the renal lesion is only part of a widespread affection involving the whole arterial system, and is not actually related to Bright's disease. Chronic Bright's disease is sometimes the sequel to acute Bright's disease, but in a great number of cases the malady is chronic from the beginning. The lesions of the kidney are probably produced by irritation of the kidney-structures owing to the excretion of toxic substances either ingested or formed in the body; it is thought by some that the malady may arise as a result of exposure to cold. The principal causes of Bright's disease are alcoholism, gout, preg- nancy and the action of such poisons as lead ; it may also occur as a sequel to acute diseases, such as scarlet fever. Persons following certain occupations are peculiarly liable to Bright's disease, e.g. engineers who work in hot shops and pass out into the cold air scantily clothed ; and painters, in whom the malady is dependent on the action of lead on the kidney. In the case of alcohol and lead the poison is ingested ; in the case of scarlet fever, pneumonia, and perhaps pregnancy, the toxic agent causing the renal affection is formed in the body. In Bright's disease all the elements of the kidney, the glomeruli, the tubular epithelium, and the interstitial tissue, are affected. When the disease follows scarlet fever, the glomerular structures are mostly affected, the capsules being thickened by fibrous tissue, and the glomerular tuft compressed and atrophied. The epithelium of the convoluted tubules undergoes degeneration; considerable quantities of it are shed, and form the well-known casts in the urine. The tubules become blocked by the epithelium, and distended with the pent-up urine; this is one cause of the increase in size that the kidneys undergo in certain forms of Bright's disease. The lesions in the tubules and in the glomeruli are not generally uniform. The interstitial tissue is always affected, and exudation, proliferation and formation of fibrous tissue occur. In the granular and contracted kidney the lesion in the interstitial tissue reaches a high degree of development, little renal secreting tissue being left. Such tubules as remain are dilated, and the epithelium lining them is altered, the cells becoming hyaline and losing their structure. The vessels are narrowed owing to thickening of the

subendothelial layer, and the muscular coat undergoes hyper- trophic and fibroid changes, so that the vessels are abnormally rigid. When the overgrowth of fibrous tissue is considerable, the surface of the organ becomes uneven, and it is for this reason that the term granular kidney has been applied to the condition. In acute Bright's disease the kidney is increased in size and engorged with blood, the changes described above being in active progress. In the chronic form the kidney may be large or small, and is usually white or mottled. If large, the cortex is thickened, pale and waxy, and the pyramids are congested ; if small, the fibrous change has advanced and the cortex is diminished. Bright's disease, both acute and chronic, is essentially a disease of the cortical secreting portion of the kidney. The true granular kidney, classified by some as a third variety, is usually part of a general arterial degeneration, the over- growth of fibrous tissue in the kidney and the lesions in the arteries being well marked.

The principal degenerations affecting the kidney are the fatty and the albuminoid. Fatty degeneration often reaches a high degree in alcoholics, where fatty degeneration of the heart and liver are also present. Albuminoid disease is frequently associated with some varieties of Bright's disease, and is also seen as a result of chronic bone disease, or of long-continued suppuration involving other parts of the body, or of syphilis. It is due to irritation of the kidneys by toxic products.

Growths of the Kidney. — The principal growths are tubercle, adenoma, sarcoma and carcinoma. In addition, fatty and fibrous growths, the nodules of glanders and the gummata of syphilis, may be mentioned. Tuberculous disease is sometimes primary; more frequently it is secondary to tubercle in other portions of the genito- urinary apparatus. The genito-urinary tract may be infected by

tubercle in two ways; ascending, in which the primary lesion is in the testicle, epididymis, or urinary bladder, the lesion travelling up by the ureter or the lymphatics to the kidney ; descending, where the tubercle bacillus reaches the kidney through the blood-vessels. In the latter case, miliary tubercles, as scattered granules, are seen, especially in the cortex of the kidney; the lesion is likely to be bilateral. In primary tuberculosis, and in ascending tuberculosis, the lesion is at first unilateral. Malignant disease of the kidney takes the form of sarcoma or carcinoma. Sometimes it is dependent on the malignant growths starting in what are spoken of as " adrenal rests " in the cortex of the kidney. Sarcoma is most often seen in the young; carcinoma in the middle-aged and elderly. Carcinoma may be

primary or secondary, but the kidney is not so prone to malignant disease as other organs, such as the stomach, bowel or liver. Cystic Kidneys. — Cysts may be single — sometimes of large size. Scattered small cysts are met with in chronic Bright's disease and in granular contracted kidney, where the dilatation of tubules reaches a high degree. Certain growths, such as adenomata, are liable to cystic degeneration, and cysts are also found in malignant disease. Finally, there is a rare condition of general cystic disease somewhat similar to the congenital affection. In this form the kidneys, greatly enlarged, consist of a congeries of cysts separated by the remains of renal tissue.

Parasitic Affections. — The more common parasites affecting the kidney, or some other portion of the urinary tract, and causing disease, are filaria, bilharzia and the cysticercus form of the taenia echinococcus (hydatids). The presence of filaria in the thoracic duct and other lymph-channels may determine the presence of chyle in the urine, together with the ova and young forms of the filaria, owing to the distension and rupture of a lymphatic vessel into some portion of the urinary tract. This is the common cause of chyluria in hot climates, but chyluria is occasionally seen in the United Kingdom without filaria. Bilharzia, especially in Egypt and South Africa, causes haematuria. The cysticercus form of the taenia echinococcus leads to the production of hydatid cysts in the kidney; this organ, however, is not so often affected as the liver.

Stone in the Kidney. — Calculi are frequently found in the kidney, consisting usually of uric acid, sometimes of oxalates, more rarely of phosphates. Calculous disease of the bladder (q.v.) is generally the sequel to the formation of a stone in the kidney, which, passing down, becomes coated by the salts in the urine. Calculi are usually formed in the pelvis of the kidney, and their formation is dependent either on the excessive amounts of uric acid, oxalic acid, &c, in the urine, or on an alteration in the composition of the urine, such as increased acidity, or on uric acid or oxalate of lime being present in an abnormal amount. The formation of abnormal crystals is oftendueto the presence of some colloid, such as blood, mucus or albumen, in the secretion, modifying the crystalline form. Once a minute calculus has been formed, its subsequent growth is highly probable, owing to the deposition on it of the urinary constituent forming it. Calculi formed in the pelvis of the kidney may be single and may reach a very large size, forming, indeed, an actual cast of the interior of the expanded kidney. At other times they are multiple and of varying size. They may give rise to no symptoms, or on the other hand may cause distressing renal colic, especially when they are small and loose and are passed or are trying to be passed. Serious complications may result from the presence of a stone in the kidney, such as hydronephrosis, from the urinary secretion being pent up behind the obstruction, or complete suppression, which is

apparently produced reflexly through the nervous system. In such cases the surgical removal of the stone is often followed by the restoration of the renal secretion.

The symptoms of renal calculus may be very slight, or they may be entirely absent if the stone is moulding itself into the interior of the kidney; but if the stone is movable, heavy and rough, it may cause great distress, especially during exercise. There will probably be blood in the urine; and there will be pain in the loin and thigh and down into the testicle. The testicle also may be drawn up by its suspensory muscle, and there may be irritability of the bladder. With stone in one kidney the pains may be actually referred to the kidney of the other side. Generally, but not always, there is tender- ness in the loin. If the stone is composed of lime it may throw a shadow on the Rontgen plate, but other stones may give no shadow.

Renal colic is the acute pain felt when a small stone is travelling down the ureter to the bladder. The pain is at times so acute that fomentations, morphia and hot baths fail to ease it, and nothing short of chloroform gives relief.

For the operative treatment of renal calculus an incision is made a little below the last rib, and, the muscles having been traversed, the kidney is reached on the surface which is not covered by peri- toneum. Most likely the stone is then felt, so it is cut down upon and removed. If it is not discoverable on gently pinching the kidney between the finger and thumb, the kidney had better be opened in its convex border and explored by the finger. Often it has happened that when a man has presented most of the symptoms of renal calculus and has been operated on with a negative result as regards finding a stone, all the symptoms have nevertheless disappeared as the direct result of the blank operation. Pyelitis. — Inflammation of the pelvis of the kidney is generally

produced by the extension of gonorrhoeal or other septic inflamma- tion upwards from the bladder and lower urinary tract, or by the presence of stone or of tubercle in the pelvis of the kidney. Pyo- nephrosis, or distension of the kidney with pus, may result as a sequel to pyelitis or as a complication of hydronephrosis; in many cases the inflammation spreads to the capsule of the kidney, and leads to the formation of an abscess outside the kidney — a perinephritic abscess. In some cases a perinephritic abscess results from a septic plug in a blood-vessel of the kidney, or it may occur as the result of an injury to the loose cellular tissue surrounding the kidney, without lesion of the kidney.

Hydronephrosis, or distension of the kidney with pent-up urine, results from

obstruction of the ureter, although all obstructions of the ureter are not followed by it, calculous obstruction, as already noted, often causing complete suppression of urine. Obstruction of the ureter, causing hydronephrosis, is likely to be due to the impac- tion of a stone, or to pressure on the ureter from a tumour in the pelvis — as, for instance, a cancer of the uterus — or to some abnor- mality of the ureter. Sometimes a kink of the ureter of a movable kidney causes hydronephrosis. The hydronephrosis produced by obstruction of the ureter may be intermittent; and when a certain degree of distension is produced, either as a result of the shifting of the calculus or of some other cause, the obstruction is temporarily relieved in a great outflow of urine, and the urinary discharge is re- established. When the hydronephrosis has long existed the kidney is converted into a sac, the remains of the renal tissues being spread out as a thin layer.

Effects on the Urine. — Diseases of the kidney produce alterations in the composition of the urine ; either the proportion of the normal constituents being altered, or substances not normally present being excreted. In most diseases the quantity of urinary water is dimin- ished, especially in those in which the activity of the circulation is impaired. There are diseases, however, more especially the granular kidney and certain forms of chronic Bright's disease, in which the quantity of urinary water is considerably increased, notwithstanding the profound anatomical changes that have occurred in the kidney. There are two forms of suppression of the urine: one is obstructive suppression, seen where the ureter is blocked by stone or other morbid process; the other is non-obstructive suppression, which is apt to occur in advanced diseases of the kidney. In other cases complete suppression may occur as the result of injuries to distant parts of the body, as after severe surgical operations. In some diseases in which the quantity of urinary water excreted is normal, or even greater than normal, the efficiency of the renal activity is really diminished, inasmuch as the urine contains few solids. In estimating the efficiency of the kidneys, it is necessary to take into consideration the so-called " solid urine," that is to say, the quantity of solid matter daily excreted, as shown by the specific gravity of the urine. The nitrogenous constituents — urea, uric acid, creatinin, &c. — vary greatly in amount in different diseases. In most renal diseases the quantities of these substances are diminished because of the physiological impairment of the kidney. The chief abnormal constituents of the urine are serum-albumen, serum-globulin, albu- moses (albuminuria), blood (haematuria), blood pigment (haemo- globinuria), pus (pyuria), chyle (chyluria) and pigments such as melanuria and urobilinuria.

Effects on the Body at large. — These may be divided into the persis- tent and the intermittent or transitory. The most important persistent effects produced by disease of the kidney are, first, nutritional changes leading to

general ill health, wasting and cachexia; and, secondly, certain cardio-vascular phenomena, such as enlargement (hypertrophy) of the heart, and thickening of the inner, and degeneration of the middle, coat of the smaller arteries. Amongst the intermittent or transitory effects are dropsy, secondary inflammations of certain organs and serous cavities, and uraemia. Some of these effects are seen in every form of severe kidney disease, and uraemia may occur in any advanced kidney disease. Renal dropsy is chiefly seen in certain forms of Bright's disease, and the cardiac and arterial changes are commonest in cases of granular or contracted kidney, but maybe absent in other diseases which destroy the kidney tissue, such as hydronephrosis. Uraemia is a toxic condition, and three varieties of it are recognized— the acute, the chronic and the latent. Many of these effects are dependent upon the action of poisons retained in the body owing to the deficient action of the kidneys. It is also probable that abnormal substances having a toxic action are produced as a result of a perverted meta- bolism. Uraemia is of toxic origin, and it is probable that the dropsy of renal disease is due to effects produced in the capillaries by the presence of abnormal substances in the blood. High arterial tension, cardiac hypertrophy and arterial degeneration may also be of toxic origin, or they may be produced by an attempt of the body to maintain an active circulation through the greatly dimin- ished amount of kidney tissue available.

Rupture of the kidney may result from a kick or other direct injury. Vomiting and collapse are likely to ensue, and most likely blood will appear in the urine, or a tumour composed of blood and urine may form in the renal region. An incision made into the swelling from the loin may enable the surgeon to see the torn kidney. . An attempt should be made to save the kidney by suturing and draining; unless

the damage is obviously past repair, the kidney should not be removed without giving nature a chance. (J. R. B. ; E. O.)*

KIDWELLY (Cydweli), a decayed market-town and municipal borough of Carmarthenshire, Wales, situated (as its name implies) near the junction of two streams, the Gwendraeth Fawr and the Gwendraeth Fach, a short distance from the shores of Carmarthen Bay. Pop. (1001), 2285. It has a station on the Great Western railway. The chief attraction of Kidwelly is its magnificent and well-preserved castle, one of the finest in South Wales, dating chiefly from the 13th century and admirably situated on a knoll above the Gwendraeth Fach. The parish church of St Mary, of the 14th

century, possesses a lofty tower with a spire. The quiet little town has had a stirring history. It was a place of some importance when William de Londres, a companion of Fitz Hamon and his conquering knights, first erected a castle here. In 1135 Kidwelly was furiously attacked by Gwenllian, wife of Griffith ap Rhys, prince of South Wales, and a battle, fought close to the town at a place still known as Maes Gwenllian, ended in the total defeat and subsequent exe- cution of the Welsh princess. Later, the extensive lordship of Kidwelly became the property through marriage of Henry, earl of Lancaster, and to this circumstance is due the exclusive juris- diction of the town. Kidwelly received its first charter of incorporation from Henry VI.; its present charter dating from 1618. The decline of Kidwelly is due to the accumula- tion of sand at the mouth of the river, and to the consequent prosperity of the neighbouring Llanelly.

KIEF, Kef or Keif (a colloquial form of the Arabic kaif, pleasure or enjoyment), the state of drowsy contentment pro- duced by the use of narcotics. To " do kef," or to " make kef," is to pass the time in such a state. The word is used in northern Africa, especially in Morocco, for the drug used for the purpose. KIEL, the chief naval port of Germany on the Baltic, a town of the Prussian province of Schleswig-Holstein. Pop. (1900), 107,938; (1905), 163,710, including the incorporated suburbs. It is beautifully situated at the southern end on the Kieler Busen (bay or harbour of Kiel), 70 m. by rail N. from Hamburg. It consists of a somewhat cramped old town, lying between the harbour and a sheet of water called Kleiner Kiel, and a better built and more spacious new town, which has been increased by the incorporation of the garden suburbs of Brunswick and Diisternbrook. In the old town stands the palace, built in the 13th century, enlarged in the 18th and restored after a fire in 1838. It was once the seat of the dukes of Holstein-Gottorp, who resided here from 1721 to 1773, and became the residence of Prince Henry of Prussia. Other buildings are the church of St Nicholas (restored in 1877-1884), dating from 1240, with a lofty steeple; the old town-hall on the market square; the church of the Holy Ghost; three fine modern churches, those of St James, and St Jiirgen and of St Ansgar; and the theatre. Further to the north and facing the bay is the university, founded in 1665 by Christian Albert, duke of Schleswig, and named after him " Christian Albertina." The new buildings were erected in 1876, and connected with them are a library of 240,000 volumes, a zoological museum, a hospital, a botanical garden and a school of forestry. The university, which is celebrated as a medical school, is attended by nearly 1000 students, and has a teaching staff of over 100 professors and docents. Among other scientific and educational institutions are the Schleswig-Holstein museum of national antiquities in the old university buildings, the Thaulow museum (rich in Schleswig-Holstein wood-carving of the 16th and 17th centuries), the naval academy,

the naval school and the school for engineers.

The pride of Kiel is its magnificent harbour, which has a comparatively uniform depth of water, averaging 40 ft., and close to the shores 20 ft. Its length is 1 1 m. and its breadth varies from \ m. at the southern end to 45 m. at the mouth. Its defences, which include two forts on the west and four on the east side, all situated about 5 m. from the head of the harbour at the place (Friedrichsort) where its shores approach one another, make it a place of great strategic stength. The imperial docks (five in all) and ship-building yards are on the east side facing

the town, between Gaarden and Ellerbeck, and comprise basins capable of containing the largest war-ships afloat. The imperial yard employs 7000 hands, and another 7000 are employed in two large private ship-building works, the Germania (Krupp's) and Howalds'. The Kaiser Wilhelm Canal, commonly called the Kiel Canal, connecting the Baltic with the North Sea at Brunsbuttel, has its eastern entrance at Wik, ij m. N. of Kiel (see Germany: Waterways). The town and adjacent villages, e.g. Wik, Heikendorf and Laboe, are resorted to for sea-bathing, and in June of each year a regatta, attended by yachts from all countries, is held. The Kieler Woche is one of the principal social events in Germany, and corresponds to the " Cowes week " in England. Kiel is connected by day and night services with Korsor in Denmark by express passenger boats. The harbour yields sprats which are in great repute. The principal industries are those connected with the imperial navy and ship- building, but embrace also flour-mills, oil-works, iron-foundries, printing-works, saw-mills, breweries, brick-works, soap-making and fish-curing. There is an important trade in coal, timber, cereals, fish, butter and cheese.

The name of Kiel appears as early as the 10th century in the form Kyi (probably from the Anglo-Saxon Kille = a safe place for ships). Kiel is mentioned as a city in the next century; in 1242 it received the Liibeck rights ; in the 14th century it acquired various trading privileges, having in 1284 entered the Hanseatic League. In recent times Kiel has been associated with the peace concluded in January 1814 between Great Britain, Denmark and Sweden, by which Norway was ceded to Sweden. In 1773 Kiel became part of Denmark, and in 1866 it passed with the rest of Schleswig-Holstein to Prussia. Since being made a great naval arsenal, Kiel has rapidly developed in prosperity and population. '

— See Prahl, Chronika der Stadt Kiel (Kiel, 1856) ; Erichsen, Topo-graphic des Landkreises Kiel (Kiel, 1898); H. Eckardt, Alt-Kiel in Wort und Bild (Kiel, 1899); P. Hasse, Das Kieler Stadtbuch, 1264- 1289 (Kiel, 1875); Das dlteste Kieler Rentebuch 1300, 1487, edited by C. Reuter (Kiel, 1893); Das zweite Kieler Rentebuch 1487, 1586, edited by W. Stern

(Kiel, 1904) ; and the Mitteilungen der Gesellschaft fiir Kieler Stadtgeschichte (Kiel, 1877, 1904).

KIELCE, a government in the south-west of Russian Poland, surrounded by the governments of Piotrkow and Radom and by Austrian Galicia. Area, 3896 sq. m. Its surface is an elevated plateau 800 to 1000 ft. in altitude, intersected in the north-east by a range of hills reaching 1350 ft. and deeply trenched in the south. It is drained by the Vistula on its south-east border, and by its tributaries, the Nida and the Pilica, which have a very rapid fall and give rise to inundations. Silurian and Devonian quartzites, dolomite, limestones and sandstones prevail in the north, and contain rich iron ores, lead and copper ores. Carbon- iferous deposits containing rich coal seams occur chiefly in the south, and extend into the government of Piotrkow. Permian limestones and sandstones exist in the south. The Triassic deposits contain very rich zinc ores of considerable thickness and lead. The Jurassic deposits consist of iron-clays and lime- stones, containing large caves. The Cretaceous deposits yield gypsum, chalk and sulphur. White and black marble are also extracted. The soil is of great variety and fertile in parts, but owing to the proximity of the Carpathians, the climate is more severe than might be expected. Rye, wheat, oats, barley and buckwheat are grown; modern intensive culture is spreading, and land fetches high prices, the more so as the peasants' allot- ments were small at the outset and are steadily decreasing. Out of a total of 2,193,300 acres suitable for cultivation 53-4 % are actually cultivated. Grain is exported. Gardening is a thriving industry in the south; beet is grown for sugar in the south-east. Industries are considerably developed: zinc ores are extracted, as well as some iron and a little sulphur. Tiles, metallic goods, leather, timber goods and flour are the chief products of the manufactures. Pop. (1897), 765,212, for the most part Poles, with 11% Jews; (1906, estimated), 910,900. By religion 88 % of the people are Roman Catholics. Kielce is divided into seven districts, the chief towns of which, with

populations in 1897, are Kielce (q.v.), Jedrzejow (Russ. Andreyev, 5010), Miechow (4156), 01kusz(349i), Pinczow (8095), Stopnica (4659) and Wloszczowa (23,065).

KIELCE, a town of Russian Poland, capital of the above government, 1 52 m. by rail S. of Warsaw, situated in a picturesque hilly country. Pop. (1890), 12,775; (1897), 23,189. It has a castle, built in 1638 and for some time inhabited by Charles XII.; it was renowned for its portrait gallery and the library of Zaluski, which was taken to St Petersburg. The squares

and boulevards are lined with handsome modern buildings. The principal factories are hemp-spinning, cotton-printing and cement works. The town was founded in n 73 by a bishop of Cracow. In the 1 6th century it was famous for its copper mines, but they are no longer worked.

KIEPERT, HEINRICH (1818-1899), German geographer, was born at Berlin on the 31st of July 1818. He was educated at the university there, studying especially history, philology and geography. In 1840-1846, in collaboration with Karl Ritter, he issued his first work, Atlas von Hellas und den hellenischen Kolonien, which brought him at once into eminence in the sphere of ancient historical cartography. In 1848 his Historisch-geographischer Alias der alien Welt appeared, and in 1854 the first edition of the Atlas anliquus, which has obtained very wide recognition, being issued in English, French, Russian, Dutch and Italian. In 1894 Kiepert produced the first part of a larger atlas of the ancient world under the title Formae orbis antiqui; his valuable maps in Corpus inscriptionum latinarum must also be mentioned. In 1877-1878 his Lehrbuch der alien Geographie was published, and in 1879 Leitfaden der alien Geographie, which was translated into English (A Manual of Ancient Geography, 1881) and into French. Among Kiepert's general works one of the most important was the excellent Neuer Handatlas tiber alle Teile der Erde (1855 et seq.), and he also compiled a large number of special and educational maps. Asia Minor was an area in which he took particular interest. He visited it four times in 1841-1888; and his first map (1843- 1846), together with his Karte des osmanischen Reiches in Asien (1844 and 1869), formed the highest authority for the geography of the region. Kiepert was professor of geography in the university of Berlin from 1854. He died at Berlin on the 21st of April 1899. He left unpublished considerable material in various departments of his work, and with the assistance of this his son Richard (b. 1846), who followed his father's career, was enabled to issue a map of Asia Minor in 24 sheets, on a scale of 1 : 400,000 (1902 et seq.), and to carry on the issue of Formae orbis antiqui.

KIERKEGAARD, SOREN AABY (1813-1855), Danish philo- sopher, the seventh child of a Jutland hosier, was born in Copen- hagen on the 5th of May 1813. As a boy he was delicate, precocious and morbid in temperament. He studied theology at the university of Copenhagen, where he graduated in 1840 with a treatise On Irony. For two years he travelled in Germany, and in 1842 settled finally in Copenhagen, where he died on the nth of November 1855. He had lived in studious retirement, subject to physical suffering and mental depression. His first volume, Papers of a Still Living Man (1838), a charac- terization of Hans Andersen, was a failure, and he was for some time unnoticed. In 1843 he published Euien — Eller {Either — or) (4th ed., 1878), the work on which his reputation mainly rests; it is a discussion of the ethical and aesthetic ideas of life. In his last

years he carried on a feverish agitation against the theology and practice of the state church, on the ground that religion is for the individual soul, and is to be separated abso- lutely from the state and the world. In general his philosophy was a reaction against the speculative thinkers — Steffens (q.v.), Niels Treschow (17 51-1833) and Frederik Christian Sibbern (1785-1872); it was based on the absolute dualism of Faith and Knowledge. His chief follower was Rasmus Nielsen (1809-1884) and he was opposed by Georg Brandes, who wrote a brilliant account of his life and works. As a dialectician he has been described as little inferior to Plato, and his influence on the literature of Denmark is considerable both in style and in matter.

To him Ibsen owed his character Brand in the drama of that name.

See his posthumous autobiographical sketch, Syns punktetfor min Forfattervirksomhed ("Standpoint of my Literary Work"); Georg Brandes, Sbren Kierkegaard (Copenhagen, 1877); A. Barthold, Noten zu K.'s Lebensgeschichte (Halle, 1876), Die Bedeutung der asthelischen Schriften S. Kierkegaarde (Halle, 1879) and S. K.'s Personlichkeit in ihrer Verwirklichung der Ideale (Gutersloh, 1886); F. Petersen, 5. K.'s Christendomsforkyndelae (Christiania, 1877). For Kierkegaard's relation to recent Danish thought, see Hoffding's Archiv fur Geschichte der Philosophie (1888), vol. ii.

KIEV, Kieff, or Kiyeff, a government of south-western Russia, conterminous with those of Minsk, Poltava, Chernigov, Podolia, Kherson and Volhynia; area 19,686 sq. m. It represents a deeply trenched plateau, 600 to 800 ft. in altitude, reaching 950 to 1050 ft. in the west, assuming a steep character in the middle, and sloping gently northwards to the marshy regions of the Pripet, while on the east it falls abruptly to the valley of the Dnieper, which lies only 250 to 300 ft. above the sea. General A. Tillo has shown that neither geologically nor tectonically can " spurs of the Carpathians " penetrate into Kiev. Many useful minerals are extracted, such as granites, gabbro, labradorites of a rare beauty, syenites and gneiss, marble, grinding stones, pottery clay, phosphorites, iron ore and mineral colours. Towards the southern and central parts the surface is covered by deep rich " black earth." Nearly the whole of the government belongs to the basin of the Dnieper, that river forming part of its eastern boundary. In the south west are a few small tributaries of the Bug. Besides the Dnieper the only navigable stream is its confluent the Pripet. The climate is more moderate than in middle Russia, the average temperatures at the city of Kiev being — year, 44-5°; January, 2i c ; July, 68°; yearly rainfall, 22 inches. The lowlands of the north are covered with woods; they have the flora of the Polyesie, or marshy woodlands of Minsk, and are peopled with animals belonging to higher latitudes. 1 The population, which was

2,017,262 in 1863, reached 3,575,457 in 1897, of whom 1,791,503 were women, and 147,878 lived in towns; and in 1904 it reached 4,042,526, of whom 2,030,744 were women. The estimated population in 1906 was 4,206,100. In 1897 there were 2,738,977 Orthodox Greeks, 14,888 Nonconformists, 91,821 Roman Catholics, 423,875 Jews, and 6820 Protestants.

No less than 41% of the land is in large holdings, and 45% belongs to the peasants. Out of an area of 12,600,000 acres, 11,100,000 acres are available for cultivation, 4,758,000 acres are under crops, 650,000 acres under meadows, and 1,880,000 acres under woods. About 290,000 acres are under beetroot, for sugar. The crops principally grown are wheat, rye, oats, millet, barley and buckwheat, with, in smaller quantities, hemp, flax, vegetables, fruit and tobacco. Camels have been used for agricultural work. Bee-keeping and gardening are general. The chief factories are sugar works and distilleries. The former produce 850,000 to 1,150,000 tons of sugar and over 50,000 tons of molasses annually. The factories include machinery works and iron foundries, tanneries, steam flour- mills, petroleum refineries and tobacco factories. Two main railways, starting from Kiev and Cherkasy respectively, cross the government from N.E. to S.W., and two lines traverse its southern part from N.W. to S.E., parallel to the Dnieper. Steamers ply on the Dnieper and some of its tributaries. Wheat, rye, oats, barley and flour are exported. There are two great fairs, at Kiev and Berdichev respectively, and many of minor importance. Trade is very brisk, the river traffic alone being valued at over one million sterling annually. The government is divided into twelve districts. The chief town is Kiev (q.v ,)and the district towns, with their populations in 1897, Berdichev (53,728), Cherkasy (29,619), Chigirin (9870), Kanev (8892), Lipovets (6068), Radomysl (11,154), Skvira (16,265), Tarashcha (11,452), Uman (28,628), Vasilkov (17,824) and Zvenigorodka (16,972).

The plains on the Dnieper have been inhabited since probably the Palaeolithic period, and the burial-grounds used since the

1 Schmahlhausen's Flora of South-West Russia (Kiev, 1886) contains a good description of the flora of the province,

Stone Age. The burial mounds (kurgans) of both the Scythians and the Slavs, traces of old forts (gorodishche) , stone statues, and more recent caves offer abundant material for anthropological and ethnographical

study.

KIEV, a city of Russia, capital of the above government, on the right or west bank of the Dnieper, in 50 27′ 12″ N. and 30° 30′ 18″ E., 628 m. by rail S.W. of Moscow and 406 m. by rail N.N.E. of Odessa. The site of the greater part of the town consists of hills or bluffs separated by ravines and hollows, the elevation of the central portions being about 300 ft. above the ordinary level of the Dnieper. On the opposite side of the river the country spreads out low and level like a sea. Having received all its important tributaries, the Dnieper is here a broad (400 to 580 yds.) and navigable stream; but as it approaches the town it divides into two arms and forms a low grassy island of considerable extent called Tukhanov. During the spring floods there is a rise of 16 or even 20 ft., and not only the island but the country along the left bank and the 'lower grounds on the right bank are laid under water. The bed of the river is sandy and shifting, and it is only by costly engineering works that the main stream has been kept from returning to the more eastern channel, along which it formerly flowed. Opposite the southern part of the town, where the currents have again united, the river is crossed by a suspension bridge, which at the time of its erection (1848-1853) was the largest enterprise of the kind in Europe. It is about half a mile in length and 525 ft. in breadth, and the four principal spans are each 440 ft. The bridge was designed by Vignoles, and cost about £400,000. Steamers ply in summer to Kremenchug, Ekaterinoslav, Mogilev, Pinsk and Chernigov. Altogether Kiev is one of the most beautiful cities in Russia, and the vicinity too is picturesque.

Until 1837 the town proper consisted of the Old Town, Pechersk and Podoli; but in that year three districts were added, and in 1879 the limits were extended to include Kure- nevka, Lukyanovka, Shulyavka and Solomenka. The admini- strative area of the town is 13,500 acres.

The Old Town, or Old Kiev quarter (Starokievskaya Chast), occupies the highest of the range of hills. Here the houses are most closely built, and stone structures most abundant. In some of the principal streets are buildings of three to five storeys, a comparatively rare thing in Russia, indeed in the main street (Kreshchatik) fine structures have been erected since 1896. In the nth century the area was enclosed by earthen ramparts, with bastions and gateways; but of these the only surviving remnant is the Golden Gate. In the centre of the Old Town stands the cathedral of St Sophia, the oldest cathedral in the Russian empire. Its external walls are of a pale green and white colour, and it has ten cupolas, four spangled with stars and six surmounted each with a cross. The golden cupola of the four-storeyed campanile is visible for many miles across the steppes. The statement frequently made that the church was a copy of St Sophia's in Constantinople has been shown to be a mistake. The building measures in

length 177 ft., while its breadth is 118 ft. But though the plan shows no imitation of the great Byzantine church, the decorations of the interior (mosaics, frescoes, &c.) do indicate direct Byzantine influence. During the occupation of the church by the Uniats or United Greek Church in the 17th century these were covered with whitewash, and were only discovered in 1842, after which the cathedral was internally restored; but the chapel of the Three Pontiffs has been left untouched to show how carefully the old style has been preserved or copied. Among the mosaics is a colossal representation of the Virgin, 1 5 ft. in height, which, like the so-called " indestructible wall " in which it is inlaid, dates from the time (1010-1054) of Prince Yaroslav. This prince founded the church in 1037 in gratitude for his victory over the Petchenegs, a Turkish race then settled in 'the Dnieper valley. His sarcophagus, curiously sculptured with palms, fishes, &c, is preserved. The church of St Andrew the Apostle occupies the spot where, according to Russian tradition, that apostle stood when as yet Kiev was not, and declared that the hill would become the site of a great city. The present building,

in florid rococo style, dates from 1 744-1 767. The church of the Tithes, rebuilt in 1828-1842, was founded in the close of the 10th century by Prince Vladimir in honour of two martyrs whom he had put to death; and the monastery of St Michael (or of the Golden Heads — so called from the fifteen gilded cupolas of the original church) claims to have been built in 1108 by Svyatopolk II., and was restored in 1655 by the Cossack chieftain Bogdan Chmielnicki. On a plateau above the river, the favour- ite promenade of the citizens, stands the Vladimir monument (1853) in bronze. In this quarter, some distance back from the river, is the new and richly decorated Vladimir cathedral (1862- 1896), in the Byzantine style, distinguished for the beauty and richness of its paintings.

Until 1820 the south-eastern district of Pechersk was the industrial and commercial quarter; but it has been greatly altered in carrying out fortifications commenced in that year ' by Tsar Nicholas I. Most of the houses are small and old- fashioned. The monastery — the Kievo-Pecherskaya — is the chief establishment of its kind in Russia; it is visited every year by about 250,000 pilgrims. Of its ten or twelve conventual churches the chief is that of the Assumption. There are four distinct quarters in the monastery, each under a superior, subject to the archimandrite: the Laura proper or New Monas- tery, that of the Infirmary, and those of the Nearer and the Further Caves. These caves or catacombs are the most striking characteristic of the place; the name Pechersk, indeed, is con- nected with the Russian peshchera, " a cave." The first series of caves, dedicated to St Anthony, contains eighty saints' tombs; the second, dedicated to St Theodosius, a saint greatly venerated in Russia, about forty-five. The bodies were formerly exposed to view; but the pilgrims who

now pass through the galleries see nothing but the draperies and the inscriptions. Among the more notable names are those of Nestor the chronicler, and Iliya of Murom, the Old Cossack of the Russian epics. The foundation of the monastery is ascribed to two saints of the nth century — Anthony and Hilarion, the latter metropolitan of Kiev. By the middle of the 12th century it had become wealthy and beautiful. Completely ruined by the Mongol prince Batu in 1240, it remained deserted for more than two centuries. Prince Simeon Oblkovich was the first to begin the restoration. A conflagration laid the buildings waste in 17 16, and their present aspect is largely due to Peter the Great. The cathedral of the Assumption, with seven gilded cupolas, was dedicated in 1089, destroyed by the Mongols in 1240, and restored in 1729; the wall-paintings of the interior are by V. Vereshchagin. The monastery contains a school of picture- makers of ancient origin, whose productions are widely diffused throughout the empire, and a printing press, from which have issued liturgical and religious works, the oldest known examples bearing the date 1616. It possesses a wonder- working ikon or image of the " Death of the Virgin," said to have been brought from Constantinople in 1073, and the second highest bell-tower in Russia.

The Podol quarter lies on the low ground at the foot of the bluffs. It is the industrial and trading quarter of the city, and the seat of the great fair of the " Contracts," the transference of which from Dubno in 1797 largely stimulated the commercial prosperity of Kiev. The present regular arrangement of its streets arose after the great fire of 181 1. Lipki district (from the lipki or lime trees, destroyed in 1833) is of recent origin, and is mainly inhabited by the well-to-do classes. It is some- times called the palace quarter, from the royal palace erected between 1868 and 1870, on the site of the older structure dating from the time of Tsaritsa Elizabeth. Gardens and parks abound ; the palace garden is exceptionally fine, and in the same neighbourhood are the public gardens with the place of amusement known as the Chateau des Fleurs.

In the New Buildings, or the Lybed quarter, are the university

and the botanical gardens. The Ploskaya Chast (Flat quarter)

or Obolon contains the lunatic asylum; the Lukyanovka Chast,

the penitentiary and the camp and barracks; and the Bulvar-

I naya Chast, the military gymnasium of St Vladimir and the

*railway station. The educational and scientific institutions of Kiev rank next to those of the two capitals. Its university, removed from Vilna to Kiev in 1834, has about 2500 students, and is well provided with observatories, laboratories, libraries and museums; five scientific societies and two societies for aid to poor students are attached to it. There are, besides, a theological academy, founded in 1615; a society of church archaeology, which possesses a museum built in 1900, very rich in old ikons, crosses, &c, both Russian and. Oriental; an imperial academy of music; university courses for ladies; a polytechnic, with 1300 students — the building was completed in 1900 and stands on the other side of Old Kiev, away from the river. Of the learned societies the more important are the medical (1840), the naturalists' (1869), the juridical (1876), the historical of Nestor the Chronicler (1872), the horticultural * (!87S), and the dramatic (1879), the archaeological commission (1843), and the society of church archaeology. » Kiev is the principal centre for the sugar industry of Russia, as well as for the general trade of the region. Its Stryetenskaya fair is important. More than twenty caves were discovered on the slope of a hill (Kirilov Street), and one of them, excavated in 1876, proved to have belonged to neolithic troglodytes. Numerous graves, both from the pagan and the Christian periods, the latter containing more than 2000 skeletons, with a great number of small articles, were discovered in the same year in the same neighbourhood. Many colonial Roman coins of the 3rd and 4th centuries, and silver dirhems, stamped at Samarkand, Balkh, Merv, &c, were also found in 1869.*

In 1862 the population of Kiev was returned as 70,341; in 1874 the total was given as 127,251; and in 1902 as 319,000. This includes 20,000 Poles and 12,000 Jews. Kiev is the head- quarters of the IX. Army Corps, and of a metropolitan of the Orthodox Greek Church.

The history of Kiev cannot be satisfactorily separated from that of Russia. According to Nestor's legend it was founded in 864 by three brothers, Kiy, Shchek and Khoriv, and after their deaths the principality was seized by two Varangians (Scandinavians), Askold and Dir, followers of Rurik, also in 864. Rurik's successor Oleg conquered Kiev in 882 and made it the chief town of his principality. It was in the waters of the Dnieper opposite the town that Prince Vladimir, the first saint of the Russian church, caused his people to be baptized (988), and Kiev became the seat of the first Christian church, of the first Christian school, and of the first library in Russia. For three hundred and seventy-six years it was an indepen- dent Russian city; for eighty years (1240-1320) it was subject to the Mongols; for two hundred and forty-nine years (1320-1569) it be- longed to the Lithuanian principality; and for eighty-five years to Poland (1 569-1654). It was finally united to the Russian empire in 1686. The city was devastated by the khan of the Crimea in 1483. The Magdeburg rights, which the city

enjoyed from 1516, were abolished in 1835, and the ordinary form of town government introduced; and in 1840 it was made subject to the common civil law of the empire.

The Russian literature concerning Kiev is voluminous. Its bibliography will be found in the Russian Geographical Dictionary of P. Semenov, and in the Russian Encyclopaedic Dictionary, pub- lished by Brockhaus and Efron (vol. xv., 1895). Among recent publications are: Rambaud's La Russie epique (Paris, 1876); Avenarius, Kniga Kievskikh Bogatuiryakh (St Petersburg, 1876), dealing with the early Kiev heroes; Zakrevski, Opisanie Kieva (1868) ; the materials issued by the commission for the investigation of the ancient records of the city; Taranovskiy, Corod Kiev (Kiev, 1881); De Baye, Kiev, la mere des villes russes (Paris, 1896); Goetz, Das Kiewer Hohlenkloster als Kulturzentrum des Vormongolischen Russ- lands (Passau, 1904). See also Count Bobrinsky, Kurgans of Smiela (1897); and N. Byelyashevsky, The Mints of Kiev.

(P. A. K.; J.T. Be.)

KILBARCHAN, a burgh of barony of Renfrewshire, Scotland, 1 m. from Milliken Park station on the Glasgow & South- western railway, 13 m. W. by S. of Glasgow. Pop. (1901), 2886. The public buildings include a hall, library and masonic lodge (dating from 1784). There is also a park. In a niche in the town steeple (erected in 1755) is the statue of the famous piper, who died about the beginning of the 17th century and is commemorated in the elegy on " The Life and Death of Habbie Simson, Piper of Kilbarchan " by Robert Sempill of Beltrees (1 595-1665). The chief industries are manufactures of linen (introduced in 1739 and dating the rise of the prosperity of the

town), cotton, silks and " Paisley " shawls, and calico-printing, besides quarries, coal and iron mines in the neighbourhood. Two miles south-west is a great rock of greenstone called Clocho- derrick, 12 ft. in height, 22 ft. in length, and 17 ft. in breadth. About 2 m. north-west on Gryfe Water, lies Bridge of Weir (pop. 2242), the industries of which comprise tanning, currying, calico-printing, thread-making and wood-turning. It has a station on the Glasgow & South- Western railway. Immediately to the south-west of Bridge of Weir are the ruins of Ranfurly Castle, the ancient seat of the Knoxes. Sir John de Knocks (fl. 1422) is supposed to have been the great-grandfather of John Knox; and Andrew Knox (1559-1633), one of the most distinguished members of the family, was successively bishop of the Isles, abbot of Icolmkill (Iona), and bishop of Raphoe. About 4 m. N.W. of Bridge of Weir lies the holiday resort of Kilmalcolm (pronounced Kilmacome; pop. 2220), with a station on the Glasgow & South-Western railway. It has a golf-course, public park and hydropathic establishment.

Several charitable institutions have been built in and near the town, amongst them the well-known Quarrier's Orphan Homes of Scotland.

KILBIRNIE, a town in north Ayrshire, Scotland, on the Garnock, 2o| m. S.W. of Glasgow, with stations on the Glasgow & South-Western and the Caledonian railways. Pop. (1901), 4571. The industries include flax-spinning, rope works, engineering works, and manufactures of linen thread, wincey, flannels and fishing-nets, and there are iron and steel works and coal mines in the vicinity. The parish church is of historical interest, most of the building dating from the Reformation. In the churchyard are the recumbent effigies of Captain Thomas Crawford of Jordanhill (d. 1603), who in 1575 effected the surprise of Dumbarton Castle, and his lady. Near Kilbirnie Place, a modern mansion, are the ruins of Kilbirnie Castle, an ancient seat of the earls of Crawford, destroyed by fire, in 1757. About 1 m. E. is Kilbirnie Loch, i|m. long.

KILBRIDE, WEST, a town on the coast of Ayrshire, Scotland, near the mouth of Kilbride Burn, 4 m. N.N.W. of Ardrossan and 35 j m. S.W. of Glasgow by the Glasgow & South-Western railway. Pop. (1901), 2315. It has been growing in repute as a health resort; the only considerable industry is weaving. In the neighbourhood are the ruins of Law Castle, Crosbie Castle and Portincross Castle, the last, dating from the 13th century, said to be a seat of the Stuart kings. Farland Head, with cliffs 300 ft. high, lies 2 m. W. by N. ; and the inland country is hilly, one point, Kaim Hill, being 1270 ft. above sea-level.

KILDARE, a county of Ireland in the province of Leinster, bounded W. by Queen's County and King's County, N. by Meath, E. by Dublin and Wicklow, and S. by Carlow. The area is 418,496 acres or about 654 sq. m. The greater part of Kildare belongs to the great central plain of Ireland. In the east of the county this plain is bounded by the foot-hills of the mountains of Dublin and Wicklow; in the centre it is interrupted by an elevated plateau terminated on the south by the hills of Dun- murry, and on the north by the Hill of Allen (300 ft.) which rises abruptly from the Bog of Allen. The principal rivers are the Boyne, which with its tributary the Blackwater rises in the north part of the county, but soon passes into Meath; the Barrow, which forms the boundary of Kildare with Queen's County, and receives the Greese and the Lane shortly after entering Kildare; the Lesser Barrow, which flows southward from the Bog of Allen to near Rathangan; and the Liffey, which enters the county near Ballymore Eustace, and flowing north-west and then north-east quits it at Leixlip, having received the Morrel between Celbridge and Clane, and the Ryewater at Leixlip. Trout are taken in the upper waters, and there are salmon reaches near Leixlip.

Geology. — The greater part of the county is formed of typical grey Carboniferous' limestone, well seen in the flat land about Clane. The natural steps at the Salmon Falls at Leixlip are formed from similar strata. Along the south-east the broken ground of Silurian shales forms the higher country, rising towards the Leinster chain. The granite core of the latter, with its margin of mica-schist produced by the metamorphism of the Silurian beds, appears in the south round Castledermot. A parallel ridge of Silurian rocks.

including an interesting series of basic lavas, rises from the plain north of Kildare town (Hill of Allen and Chair of Kildare), with some Old Red Sandstone on its flanks. The limestone in this ridge is rich in fossils of Bala age, and has been compared with that at Port- rane in county Dublin. The low ground is diversified by eskers and masses of glacial gravel, notably at the dry sandy plateau of the Curragh; but in part it retains sufficient moisture to give rise to extensive bogs. The Liffey, which comes down as a mountain- stream in the Silurian area, forming a picturesque fall in the gorge of Pollaphuca, wanders through the limestone region between low banks as a true river of the plain.

Climate and Industries. — Owing to a considerable degree to the large extent of bog, the climate of the northern districts is very moist, and fogs are frequent, but the eastern portion is drier, and the climate of the Liffey valley is very mild and healthy. The soil, whether resting on the limestone or on the clay slate, is principally a rich deep loam inclining occasionally to clay, easily cultivated and very fertile if properly drained. About 40,000 acres in the northern part of the county are included in the Bog of Allen, which is, however, intersected in many places by elevated tracts of firm ground. To the east of the town of Kildare is the Curragh, an un- dulating down upwards of 4800 acres in extent. The most fertile and highly cultivated districts of Kildare are the valleys of the Liffey and a tract in the south watered by the Greese. The demesne lands along the valley of the Liffey are finely wooded. More attention is paid to drainage and the use of manures on the larger farms than is done in many other parts of Ireland. The pastures which are not subjected to the plough are generally very rich and fattening. The propor- tion of tillage to pasture is roughly as 1 to 2. Wheat is a scanty crop, but oats, barley, turnips and potatoes are all considerably cultivated. Cattle and sheep are grazed extensively, and the num- bers are well sustained. Of the former, crosses with the shorthorn or the Durham are the commonest breed. Leicesters are the .prin- cipal breed of sheep. Poultry farming is a growing industry.

Though possessing a good supply of water-power the county is almost destitute of manufactures; there are a few small cotton, woollen and paper mills, as well as breweries and distilleries, and several corn mills. Large quantities of turf are exported to Dublin by canal. The main line of the Midland Great Western follows the northern boundary of the county, with a branch to Carbury and Edenderry; and that of the Great Southern & Western crosses the county by way of Newbridge and Kildare, with southward branches to Naas (and Tullow, county Carlow) and to Athy and the south. The northern border is traversed by the Royal Canal, which connects Dublin with the Shannon at Cloondara. Farther south the Grand Canal, which connects Dublin with the Shannon at Shannon Harbour, occupies the valley of the Liffey until at Sallins it enters the Bog of Allen, passing into King's County near the source of the Boyne. Several branch canals afford communica- tion with the southern districts.

Population and Administration. — The decreasing population (70,206 in 1891; 63,566 in 1901) shows an unusual excess of males over females, in spite of an excess of male emigrants. About 86% of the population are Roman Catholics. The county comprises 14 baronies and contains no civil parishes. Assizes are held at Naas, and quarter sessions at Athy, Kildare, Maynooth and Naas. The military stations at Newbridge and the Curragh constitute the Curragh military district, and the barracks at Athy and Naas are included in the Dublin military district. The principal towns are Athy (pop. 3599), Naas (3836) and Newbridge (2903); with Maynooth (which is the seat of a Roman Catholic college), Celbridge, Kildare (the county town), Monasterevan, Kilcullen and Leixlip. Ballitore, one of the larger villages, is a Quaker settlement, and at a school here Edmund Burke was educated. Kildare returned ten members to the Irish parliament, of whom eight represented boroughs; it sends only two (for the north and south divisions of the county) to the parliament of the United Kingdom. The county is in the Protestant diocese of Dublin and the Roman Catholic dioceses of Dublin and of Kildare and Leighlin.

History and Antiquities. — According to a tale in the Book of Leinster the original name of Kildare was Druim Criaidh (Drum- cree), which it retained until the time of St Brigit, after which it was changed to Cilldara, the church of the oak, from an old oak under whose shadow the saint had constructed her cell. For some centuries it was under the government of the Macmur- roughs, kings of Leinster, but with the remainder of Leinster it was granted by Henry II. to Strongbow. On the division of the palatinate of Leinster among the five grand-daughters of Strong- bow, Kildare fell to Sibilla, the fourth daughter, who married William de Ferrars, earl of Derby. Through the marriage of

the only daughter of William de Ferrars it passed to William de Vescy —

who, when challenged to single combat by John Fitz Thomas, baron of Offaly, for accusing him of treason, fled to France. His lands were thereupon in 1297 bestowed on Fitz Thomas, who in 1316 was created earl of Kildare, and in 1317 was appointed sheriff of Kildare, the office remaining in the family until the attainder of Gerald, the ninth earl, in the reign of Henry VIII. Kildare was a liberty of Dublin until 1296, when an act was passed constituting it a separate county.

In the county are several old gigantic pillar-stones, the principal being those at Punchestown, Harristown, Jigginstown and Mullamast. Among remarkable earthworks are the raths at Mullamast, Knockcaellagh near Kilcullen, Ardscull near Naas, and the numerous sepulchral mounds in the Curragh. Of the round towers the finest is that of Kildare; there are remains of others at Taghadoe, Old Kilcullen, Oughterard and Castledermot. Formerly there were an immense number of religious houses in the county. There are remains of a Francis- can abbey at Castledermot. At Graney are ruins of an Augus- tinian nunnery and portions of a building said to have belonged to the Knights Templars. The town of Kildare has ruins of four monastic buildings, including the nunnery founded by St Brigit. The site of a monastery at Old Kilcullen, said to date from the time of St Patrick, is marked by two stone crosses, one of which is curiously sculptured. The fine abbey of Monas- terevan is now the seat of the marquess of Drogheda. On the Liffey are the remains of Great Connel Abbey near Celbridge, of St Wolstan's near Celbridge, and of New Abbey. At Moone, where there was a Franciscan monastery, are the remains of an ancient cross with curious sculpturings. Among castles may be mentioned those of Athy and Castledermot, built about the time of the Anglo-Norman invasion; Maynooth Castle, built by the Fitzgeralds; Kilkea, originally built by the seventh earl of Kildare, and restored within the 19th century; and Timolin, erected in the reign of King John.

KILDARE, a market town and the county town of county Kildare, Ireland, in the south parliamentary division, a junction on the main line of the Great Southern & Western railway, 30. m. S.W. from Dublin, the branch line to Athy, Carlow and Kilkenny diverging southward. Pop. (1901), 1576. The town is of high antiquarian interest. There is a Protestant cathedral church, the diocese of which was united with Dublin in 1846. St Brigit or Bridget founded the religious community in the 5th century, and a fire sacred to the memory of the saint is said to have been kept incessantly burning for several centuries (until the Reformation) in a small ancient chapel called the Fire House, part of which remains. The cathedral suffered with the town from frequent burnings and destructions at thehandsof theDanes and the Irish, and during the Elizabethan wars. The existing church was partially in ruins when an extensive restoration was begun in 1875 under the direction of G.E. Street; while the choir, which dated from

the latter part of the 17th century, was rebuilt in 1896. Close to the church are an ancient cross and a very fine round tower (its summit unhappily restored with a modern battlement) 105J ft. high, with a doorway with unusual ornament of Romanesque character. There are remains of a castle of the 13th century, and of a Carmelite monastery. From the elevated situation of the town, a striking view of the great central plain of Ireland is afforded. Kildare was incorporated by James II., and returned two members to the Irish parliament.

KILHAM, ALEXANDER (1762-1798), English Methodist, was born at Epworth, Lincolnshire, on the 10th of July 1762. He was admitted by John Wesley in 1785 into the regular itin- erant ministry. He became the leader and spokesman of the democratic party in the Connexion which claimed for the laity the free election of class-leaders and stewards, and equal repre- sentation with ministers at Conference. They also contended that the ministry should possess no official authority or pastoral prerogative, but should merely carry into effect the decisions of majorities in the different meetings. Kilham further advo- cated the complete separation of the Methodists from tb/» I Anglican Church. In the violent controversy that ensued he

wrote many pamphlets, often anonymous, and frequently not in the best of taste. For this he was arraigned before the Conference of 1796 and expelled, and he then founded the Methodist New Connexion (1798, merged since 1906 in the United Methodist Church). He died in 1798, and the success of the church he founded is a tribute to his personality and to the principles for which he strove. Kilham's wife (Hannah Spurr, 1774-1832), whom he married only a few months before his death, became a Quaker, and worked as a missionary in the Gambia and at Sierra Leone; she reduced to writing several West African vernaculars.

KILIA, a town of S. Russia, in the government of Bessarabia, 100 m. S.W. of Odessa, on the Kilia branch of the Danube, 20 m. from its mouth. Pop. (1897), 11,703. It has steam flour-mills and a rapidly increasing trade. The town, anciently known as Chilia, Chele, and Lycostomium, was a place of banishment for political dignitaries of Byzantium in the i2th-i3th centuries. After belonging to the Genoese from 1381-1403 it was occupied successively by Walachia and Moldavia, until in 1484 it fell into the hands of the Ottoman Turks. It was taken from them by the Russians in 1790. After being bombarded by the Anglo- French fleet in July 1854, it was given to Rumania on the con- clusion of the war; but in 1878 was

transferred to Russia with Bessarabia.

KILIAN (Chilian, Killian), ST, British missionary bishop and the apostle of eastern Franconia, where he began his labours towards the end of the 7th century. There are several biographies of him, the first of which dates back to the 9th century (Bibliotheca hagiographica latina, Nos. 4660-4663). The oldest texts which refer to him are an 8th century necrology at Wiirzburg and the notice by Hrabanus Maurus in his martyr- ology. According to Maurus Kilian was a native of Ireland, whence with his companions he went to eastern Franconia. After having preached the gospel in Wiirzburg, the whole party were put to death by the orders of an unjust judge named Gozbert. It is difficult to fix the period with precision, as the judge (or duke) Gozbert is not known through other sources. Kilian's comrades, Coloman and Totman, were, according to the Wiirz- burg necrology, respectively priest and deacon. The elevation of the relics of the three martyrs was performed by Burchard, the first bishop of Wiirzburg, and they are venerated in the cathedral of that town. His festival is celebrated on the 8th of July.

See Acta Sanctorum, Julii, ii. 599-619; F. Emmerich, Der heilige Kilian (Wiirzburg, 1896); J. O'Hanlon, Lives of the Irish Saints, vii. 122-143 (Dublin, 1875-1904); A. Hauck, Kirchengeschichte Deutsch- lands, 3rd ed., i. 382 seq. (H. De.)

KILIMANJARO, a great mountain in East Africa, its centre lying in 3° 5′ S. and 37° 23′ E. It is the highest known summit of the continent, rising as a volcanic cone from a plateau of about 3000 ft. to 19,321 ft. Though completely isolated it is but one of several summits which crown the eastern edge of the great plateau of equatorial Africa. About 200 m. almost due north, across the wide expanse of the Kapte and Kikuyu uplands, lies Mount Kenya, somewhat inferior in height and mass to Kiliman- jaro; and some 25 m. due west rises the noble mass of Mount Meru.

The major axis of Kilimanjaro runs almost east and west, and on it rise the two principal summits, Kibo in the west, Mawenzi (Ki-mawenzi) in the east. Kibo, the higher, is a truncated cone with a nearly perfect extinct crater, and marks a comparatively recent period of volcanic activity; while Mawenzi (16,892 ft.) is the very ancient core of a former summit, of which the crater walls have been removed by denudation. The two peaks, about 7 m. apart, are connected by a saddle or plateau, about 14,000 ft. in altitude, below which the vast mass slopes with great regularity in a typical volcanic curve, especially in the south, to the plains below. The sides are furrowed on the south and east by a large number of narrow ravines, down which flow streams which feed the Pangani and Lake Jipe in the south and the Tsavo tributary of the Sabaki in the east. South-west of

Kibo, the Shira ridge seems to be of independent origin, while in the north-west a rugged group of cones, of comparatively recent origin, has poured

forth vast lava-flows. In the south-east the regularity of the outline is likewise broken by a ridge running down from Mawenzi.

The lava slopes of the Kibo peak are covered to a depth of some 200 ft. with an ice-cap, which, where ravines occur, takes the form of genuine glaciers. The crater walls are highest on the south, three small peaks, uncovered by ice, rising from the rim on this side. To the central and highest of these, the culmi- nating point of the mountain, the name Kaiser Wilhelm Spitze has been given. The rim here sinks precipitously some 600 ft. to the interior of the crater, which measures rather over 2000 yds. in diameter, and is in part covered by ice, in part by a bare cone of ashes. On the west the rim is breached, allowing the passage of an important glacier formed from the snow which falls within the crater. Lower down this cleft, which owed its origin to dislocation, is occupied by two glaciers, one of which reaches a lower level (13,800 ft.) than any other on Kilimanjaro. On the north-west three large glaciers reach down to 16,000 ft.

Mawenzi peak has no permanent ice-cap, though at times snow lies in patches. The rock of which it is composed has become very jagged by denudation, forming stupendous walls and preci- pices. On the east the peak falls with great abruptness some 6500 ft. to a vast ravine, due apparently to dislocation and sinking of the ground. Below this the slope is more gradual and more symmetrical. Like the other high mountains of eastern Africa, Kilimanjaro presents well-defined zones of vegetation. The lowest slopes are arid and scantily covered with scrub, but between 4000 and 6000 ft. on the south side the slopes are well watered and cultivated. The forest zone begins, on the south, at about 6500 ft., and extends to 9500, but in the north it is narrower, and in the north-west, the driest quarter of the moun- tain, almost disappears. In the alpine zone, marked especially by tree lobelias and Senecio, flowering plants extend up to 15,700 ft. on the sheltered south-west flank of Mawenzi, but elsewhere vegetation grows only in dwarfed patches beyond 13,000 ft. The special fauna and flora of the upper zone are akin to those of other high African mountains, including Came- roon. The southern slopes, between 4000 and 6000 ft., form the well-peopled country of Chaga, divided into small districts.

As the natives believe that the summit of Kilimanjaro is composed of silver, it is conjectured that Aristotle's reference to " the so-called Silver Mountain " from which the Nile flows was based on reports about this mountain. It is possible, however, that the " Silver Mountain " was Ruwenzori (q.v.), from whose snow-clad heights several headstreams of the Nile do descend. It is

also possible, though improbable, that Ruwenzori and not Kilimanjaro nor Kenya may be the range known to Ptolemy and to the Arab geographers of the middle ages as the Mountains of the Moon. Reports of the existence of mountains covered with snow were brought to Zanzibar about 1845 by Arab traders. Attracted by these reports Johannes Rebmann of the Church Missionary Society journeyed inland from Mombasa in 1848 and discovered Kilimanjaro, which is some 200 m. inland. Rebmann's account, though fully borne out by his colleague Dr Ludwig Krapf, was at first received with great incredulity by professional geographers. The matter was finally set at rest by the visits paid to the mountain by Baron Karl von der Decken (1861 and 1862) and Charles New (1867), the latter of whom reached the lower edge of the snow. Kilimanjaro has since been explored by Joseph Thomson (1883), Sir H. H. Johnston (1884), and others. It has been the special study of Dr Hans Meyer, who made four ex- peditions to it, accomplishing the first ascent to the summit in 1889. In the partition of Africa between the powers of western Europe, Kilimanjaro was secured by Germany (1886) though the first treaties concluded with native chiefs in that region had been made in 1884 by Sir H. H. Johnston on behalf of a British company. On the southern side of the mountain at Moshi is a German government station.

See R. Thornton (the geologist of von der Decken's party) in Proc. of Roy. Geog. Soc. (1861-1862) ; Ludwig Krapf, Travels in East Africa (i860) ; Charles New, Life . . . in East Africa (1873) ; Sir J. D. Hooker in Journal of Linnean Society (1875); Sir H. H. Johnston, The Kilimanjaro Expedition (1886) ; Hans Meyer, Across East African Glaciers (1891); Der Kilimanjaro (Berlin, 1900). Except the last- named all these works were published in London. (E. He.)

KILIN, or Ch'-i-lin, one of the four symbolical creatures which in Chinese mythology are believed to keep watch and ward over the Celestial Empire. It is a unicorn, portrayed in Chinese art as having the body and legs of a deer and an ox's

tail. Its advent on earth heralds an age of enlightened govern- ment and civic prosperity. It is regarded as the noblest of the animal creation and as the incarnation of fire, water, wood, metal and earth. It lives for a thousand years, and is believed to step so softly as to leave no footprints and to crush no living thing.

KILKEE, a seaside resort of county Clare, Ireland, the ter- minus of a

branch of the West Clare railway. Pop. (1901), 1 66 1. It lies on a small and picturesque inlet of the Atlantic named Moore Bay, with a beautiful sweep of sandy beach. The coast, fully exposed to the open ocean, abounds in fine cliff scenery, including numerous caves and natural arches, but is notoriously dangerous to shipping. Moore Bay is safe and attractive for bathers. Bishop's Island, a bold isolated rock in the vicinity, has remains of an oratory and house ascribed to the recluse St Senan.

KILKENNY, a county of Ireland, in the province of Leinster, bounded N. by Queen's County, E. by Carlow and Wexford, S. by Waterford, and W. by Waterford and Tipperary. The area is 511,775 acres, or about 800 sq. m. The greater part of Kil- kenny forms the south-eastern extremity of the great central plain of Ireland, but in the south-east occurs an extension of the mountains of Wicklow and Carlow, and the plain is interrupted in the north by a hilly region forming part of the Castlecomer coal-field, which extends also into Queen's County and Tipperary. The principal rivers, the Suir, the Barrow and the Nore, have their origin in the Slieve Bloom Mountains (county Tipperary and Queen's County), and after widely divergent courses southward discharge their waters into Waterford Harbour. The Suir forms the boundary of the county with Waterford, and is navigable for small vessels to Carrick. The Nore, which is navigable to Innistioge, enters the county at its north-western boundary, and flows by Kilkenny to the Barrow, 9 m. above Ross, having received the King's River at Jerpoint and the Argula near Innis- tioge. The Barrow, which is navigable beyond the limits of Kilkenny into Kildare, forms the eastern boundary of the county from near New Bridge. There are no lakes of any extent, but turloughs or temporary lakes are occasionally formed by the bursting up of underground streams.

The coal of the Castlecomer basin is anthracite, and the most productive portions of the bed are in the centre of the basin at Castlecomer. Hematitic iron of a rich quality is found in the Cambro-Silurian rocks at several places; and tradition asserts that silver shields were made about 850 B.C. at Argetros or Silverwood on the Nore. Manganese is obtained in some of the limestone quarries, and also near the Barrow. Marl is abundant in various districts. Pipeclay and potter's clay are found, and also yellow ochre. Copper occurs near Knocktopher.

The high synclinal coal-field forms the most important feature of the north of the county. A prolongation of the field runs out south- west by Tullaroan. The lower ground is occupied by Carboniferous limestone. The Old Red Sandstone, with a Silurian core, forms the high ridge of Slievenaman in the south ; and its upper laminated beds contain Archanodon, the earliest known freshwater mollusc, and plant-remains, at Kiltorcan near Ballyhale. The Leinster granite appears mainly as inliers in

the Silurian of the south-east. The Carboniferous sandstones furnish the hard pavement-slabs_ sold as ” Carlow flags.” The black limestone with white shells in it at Kilkenny is quarried as an ornamental marble. Good slates are quarried at Kilmoganny, in the Silurian inlier on the Slievenaman range.

On account of the slope of the country, and the nature of the soil, the surface occupied by bog or wet land is very small, and the air is dry and healthy. So temperate is it in winter that the myrtle and arbutus grow in the open air. There is less rain than at Dublin, and vegetation is earlier than in the adjacent counties. Along the banks of the Suir, Nore and Barrow a very rich soil has been formed by alluvial deposits. Above the Coal- measures in the northern part of the county there is a moorland tract devoted chiefly to pasturage. The soil above the limestone is for the most part a deep and rich loam admirably adapted for the growth of wheat. The heath-covered hills afford honey with a flavour of peculiar excellence. Proportionately to its area, Kilkenny has an exceptionally large cultivable area. The

proportion of tillage to pasturage is roughly as 1 to 2j. Oats, barley, turnips and potatoes are all grown; the cultivation of wheat has very largely lapsed. Cattle, sheep, pigs and poultry are extensively reared, the Kerry cattle being in considerable request.

The linen manufacture introduced into the county in the 17 th century by the duke of Ormonde to supersede the woollen manu- facture gradually became extinct, and the woollen manu- facture now carried on is also very small. There are, however, breweries, distilleries, tanneries and flour-mills, as well as marble polishing works. The county is traversed from N. to S. by the Maryborough, Kilkenny and Waterford branch of the Great Southern & Western railway, with a connexion from Kilkenny to Bagenalstown on the Kildare and Carlow line; and the Water- ford and Limerick line of the same company runs for a short distance through the southern part of the county.

The population (87,496 in 1891; 79,159 in 1901) includes about 94% of Roman Catholics. The decrease of population is a little above the average, though emigration is distinctly below it. The chief towns and villages are Kilkenny (g.v.), Callan (1840), Castlecomer, Thomastown and Graigue. The county comprises 10 baronies and contains 134 civil parishes. The county includes the parliamentary borough of Kilkenny, and is divided into north and south parliamentary divisions, each returning one member. Kilkenny returned 16 members to the Irish parliament, two representing the county. Assizes are held at Kilkenny, and quarter sessions at Kilkenny, Pilltown, Urlingford, Castlecomer, Callan, Grace’s Old Castle and Thomas-

town. The county is in the Protestant diocese of Ossory and the Roman Catholic dioceses of Ossory and Kildare and Leighlin.

Kilkenny is one of the counties generally considered to have been created by King John. It had previously formed part of the kingdom of Ossory, and was one of the liberties granted to the heiresses of Strongbow with palatinate rights. Circular groups of stones of very ancient origin are on the summits of Slieve Grian and the hill of Cloghmanta. There are a large number of cromlechs as well as raths (or encampments) in various parts of the county. Besides numerous forts and mounds there are five round towers, one adjoining the Protestant cathedral oi Kilkenny, and others at Tulloherin, Kilree, Fertagh and Agha- viller. All, except that at Aghaviller, are nearly perfect. There are remains of a Cistercian monastery at Jerpoint, said to have been founded by Dunnough, King of Ossory, and of another belonging to the same order at Graigue, founded by the earl of Pembroke in 1212. The Dominicans had an abbey at Rosbercon founded in 1267, and another at Thomastown, of which there are some remains. The Carmelites had a monastery at Knocktopher. There were an Augustinian monastery at Inistioge, and priories at Callan and Kells, of all of which there are remains. There are also ruins of several old castles, such as those of Callan, Legan, Grenan and Clonamery, besides the ancient portions of Kilkenny Castle.*

KILKENNY, a city and municipal and parliamentary borough (returning one member), the capital of county Kilkenny, Ireland, finely situated on the Nore, and on the Great Southern and Western railway, 81 m. S.W. of Dublin. Pop. (1901), 10,609. It consists of Englishtown (or Kilkenny proper) and Irishtown, which are separated by a small rivulet, but although Irishtown retains its name, it is now included in the borough of Kilkenny. The city is irregularjy built, possesses several spacious streets with many good houses, while its beautiful environs and imposing ancient buildings give it an unusual interest and picturesque appearance. The Nore is crossed by two handsome bridges. The cathedral of St Canice, from whom the town takes its name, dates in its present form from about 1255. The see of Ossory, which originated in the monastery of Aghaboe founded by St Canice in the 6th century, and took its name from the early kingdom of Ossory, was moved to Kilkenny (according to conjecture) about the year 1200. In 1835 the diocese of Ferns and Leighlin was united to it. With the excep- tion of St Patrick's, Dublin, the cathedral is the largest

ecclesiastical building in Ireland, having a length from east to west of 226

ft., and a breadth along the transepts from north to south of 123 ft. It occupies an eminence at the western extre- mity of Irishtown. It is a cruciform structure mainly in Early English style, with a low massive tower supported on clustered columns of the black marble peculiar to the district. The building was extensively restored in 1865. It contains many old sepulchral monuments and other ancient memorials. The north transept incorporates the parish church. The adjacent library of St Canice contains numerous ancient books of great value. A short distance from the south transept is a round tower 100 ft. high; the original cap is wanting. The episcopal palace near the east end of the cathedral was erected in the time of Edward III. and enlarged in 1735. Besides the cathedral the principal churches are the Protestant church of St Mary, a plain cruciform structure of earlier foundation than the present cathedral: that of St John, including a portion of the hospital of St John founded about 1220; and the Roman Catholic cathedral, of the diocese of Ossory, dedicated to St Mary (1843-1857), a cruciform structure in the Early Pointed style, with a massive central tower. There are important remains of two monasteries — the Dominican abbey founded in 1225, and now used as a Roman Catholic church; and the Franciscan abbey on the banks of the Nore, founded about 1230. But next in importance to the cathedral is the castle, the seat of the marquess of Ormonde, on the summit of a precipice above the Nore. It was originally built by Strongbow, but rebuilt by William Marshall after the destruction of the first castle in n 75; and many additions and restorations by members of the Ormonde family have maintained it as a princely residence. The Protes- tant college of St John, originally founded by Pierce Butler, 8th earl of Ormonde, in the 16th century, and re-endowed in 1684 by James, 1st duke of Ormonde, stands on the banks of the river opposite the castle. In it Swift, Farquhar, Congreve and Bishop Berkeley received part of their education. On the out- skirts of the city is the Roman Catholic college of St Kyran (Kieran), a Gothic building completed about 1840. The other principal buildings are the modern court-house, the tholsel or city court (1764), the city and county prison, the barracks and the county infirmary. In the neighbourhood are collieries as well as long-established quarries for marble, the manufactures con- nected with which are an important industry of the town. The city also possesses corn-mills, breweries and tanneries. Not far from the city are the remarkable limestone caverns of Dunmore, which have yielded numerous human remains. The corporation of Kilkenny consists of a mayor, 6 aldermen and 18 councillors.

Kilkenny proper owes its origin to an English settlement in the time of Strongbow, and it received a charter from William Marshall, who married Strongbow's daughter. This charter was confirmed by Edward III., and from Edward IV. Irishtown received the privilege of choosing a portreeve

independent of Kilkenny. By Elizabeth the boroughs, while retaining their distinct rights, were constituted one corporation, which in 1609 was made a free borough by James I., and in the following year a free city. From James II. the citizens received a new charter, constituting the city and liberties a distinct county, to be styled the county of the city of Kilkenny, the burgesses of Irishtown continuing, however, to elect a portreeve until the passing of the Muncipal Reform Act. Frequent parliaments were held at Kilkenny from the 14th to the 16th century, and so late as the reign of Henry VIII. it was the occasional residence of the lord- lieutenant. In 1642 it was the meeting-place of the assembly of confederate Catholics. In 1648 Cromwell, in the hope of obtaining possession of the town by means of a plot, advanced towards it, but before his arrival the plot was discovered. In 1650 it was, however, compelled to surrender after a long and resolute defence. At a very early period Kilkenny and Irishtown returned each two members to the Irish parliament, but since the Union one member only has been returned to Westminster for the city of Kilkenny.

The origin of the expression " to fight like Kilkenny cats," which, according to the legend, fought till only their tails were left, has

been the subject of many conjectures. It is said to be an allegory on the disastrous municipal quarrels of Kilkenny and Irish town which lasted from the end of the 14th to the end of the 17th centuries {Notes and Queries, 1st series, vol. ii. p. 71). It is referred also to the brutal sport of some Hessian soldiers, quartered in Kilkenny during the rebellions of 1798 or 1803, who tied two cats together by their tails, hung them over a line and left them to fight. A soldier is said to have freed them by cutting off their tails to escape censure from the officers (ibid. 3rd series, vol. v. p. 433). Lastly, it is attributed to the invention of J. P. Curran. As a sarcastic protest against cock-fighting in England, he declared that he had witnessed in Sligo (?) fights between trained cats, and that once they had fought so fiercely that only their tails were left (ibid. 7th series, vol. ii. P- 394).

KILKENNY, STATUTE OF, the name given to a body of laws promulgated in 1366 with the object of strengthening the English authority in Ireland. In 1361, when Edward III. was on the English throne, he sent one of his younger sons, Lionel, duke of Clarence, who was already married to an Irish heiress, to represent him in Ireland. From the English point of view the country was in a most unsatisfactory condition. Lawless and predatory, the English settlers were hardly distinguishable from the native Irish, and the authority of the English king over both had been reduced to vanishing point. In their efforts to cope with the prevailing disorder Lionel and his advisers sum- moned a parliament to meet at Kilkenny early in 1366 and here the statute of Kilkenny was passed into law. This statute was writ',en in Norman-French, and nineteen of its clauses are merely repetitions of

some ordinances which had been drawn up at Kilkenny fifteen years earlier. It began by relating how the existing state of lawlessness was due to the malign influence exercised by the Irish over the English, and, like Magna Carta, its first positive provision declared that the church should be free. As a prime remedy for the prevailing evils all marriages between the two races were forbidden. Englishmen must not speak the Irish tongue, nor receive Irish minstrels into their dwellings, nor even ride in the Irish fashion; while to give or sell horses or armour to the Irish was made a treasonable offence. Moreover English and not Breton law was to be employed, and no Irishman could legally be receivd into a religious house, nor presented to a benefice. The statute also contained clauses for compelling the English settlers to keep the laws. For each county four wardens of the peace were to be appointed, while the sheriffs were to hold their tourns twice a year and were not to oppress the people by their exactions. An attempt was made to prevent the emigration of labourers, and finally the spiritual arm was invoked to secure obedience to these laws by threats of excommunication. The statute, although marking an interesting stage in the history of Ireland, had very little practical effect.

The full text is published in the Statutes and Ordinances of Ireland. John to Henry V., by H. F. Berry (1907).

KILLALA (pron. Kittalla), a Small town on the north coast of county Mayo, Ireland, in the northern parliamentary division, on the western shore of a fini bay to which it gives name. Pop. (1001), 510. It is a terminus of a branch of the Midland Great Western railway. Its trade is almost wholly diverted to Ballina on the river Moy, which enters the bay, but Killala is of high antiquarian and historical interest. It was for many centuries a bishop's see, the foundation being attributed to St Patrick in the 5th century, but the diocese was joined with Achonry early in the 17th century and with Tuam in 1833. The cathedral church of St Patrick is a plain structure of the 17th century. There is a fine souterrain, evidently connected with a rath, or encampment, in the graveyard. A round tower, 84 ft. in height, stands boldly on an isolated eminence. Close to Killala the French under Humbert landed in 1798, being diverted by con- trary winds from the Donegal coast. Near the Moy river, south of Killala, are the abbeys of Moyne and Roserk or Rosserick, both Decorated in style, and both possessing fine cloisters. At Rathfran, 2 m. N., is a Dominican abbey (1274), and in the neighbourhood are camps, cromlechs, and an inscribed ogham stone, 1 2 ft. in height. Killala gives name to a Roman Catholic diocese, the seat of which, however, is at Ballina.

KILLALOE— KILLIGREW, SIR H.

KILLALOE, a town of county Clare, Ireland, in the east parliamentary division, at the lower extremity of Lough Derg on the river Shannon, at the fpot of the Slieve Bernagh moun- tains. Pop. (iqoi), 885. It is connected, so as to form one town, with Ballina (county Tipperary) by a bridge of 13 arches. Ballina is the terminus of a branch of the Great Southern and Western railway, 15 m. N.E. of Limerick. Slate is quarried in the vicinity, and there were formerly woollen manufactures. The cathedral of St Flannan occupies the site of a church founded by St Dalua in the 6th century. The present building is mainly of the 12th century, a good cruciform example of the period, preserving, however, a magnificent Romanesque doorway. It was probably completed by Donall O'Brien, king of Munster, but part of the fabric dates from a century before his time. In the churchyard is an ancient oratory said to date from the period of St Dalua. Near KilJaloe stood Brian Boru's palace of Kincora, celebrated in verse by Moore; for this was the capital of the kings of Munster. Killaloe is frequented by anglers for the Shannon salmon-fishing and for trout-fishing in Lough Derg. Killaloe gives name to Protestant and Roman Catholic dioceses.

KILLARNEY, a market town of county Kerry, Ireland, in the east parliamentary division, on a branch line of the Great Southern & Western railway, 1851 m. S.W. from Dublin. Pop. of urban district (1901), 5656. On account of the beautiful scenery in the neighbourhood the town is much frequented by tourists. The principal buildings are the Roman Catholic cathedral and bishop's palace of the diocese of Kerry, designed by A. W. Pugin, a large Protestant church and several hotels. Adjoining the town is the mansion of the earl of Kenmare. There is a school of arts and crafts, where carving and inlaying are prosecuted. The only manufacture of importance now carried on at Killarney is that of fancy articles from arbutus wood; but it owed its origin to iron-smelting works, for which abundant fuel was obtained from the neighbouring forests.

The lakes of Killarney, about 15 m. from the town, lie in a basin between several lofty mountain groups, some of which rise abruptly from the water's edge, and all clothed with trees and shrubbery almost to their summits. The lower lake, or Lough Leane (area 5001 acres), is studded with finely wooded islands, on the largest of which, Ross Island, are the ruins of Ross Castle, an old fortress of the O'Donoghues; and on another island, the " sweet Innisfallen " of Moore, are the picturesque ruins of an abbey founded by St Finian the leper at the close of the 6th century. Between the lower lake and the middle or Tore lake (680 acres in extent) stands Muckross Abbey, built by Francis- cans about 1440. With the upper lake (430 acres), thickly studded with islands, and close shut in by mountains, the lower and middle lakes are connected by the Long Range, a winding and finely wooded channel, 25 m. in length, and commanding magnificent

views of the mountains. Midway in its course is a famous echo caused by the Eagle's Nest, a lofty pyramidal rock.

Besides the lakes of Killarney themselves, the immediate neighbourhood includes many features of natural beauty and of historic interest. Among the first are Macgillicuddy's Reeks and the Tore and Purple Mountains, the famous pass known as the Gap of Dunloe, Mount Mangerton, with a curious depression (the Devil's Punchbowl) near its summit, the waterfalls of Tore and Derrycunihy, and Lough Guitane, above Lough Leane. Notable ruins and remains, besides Muckross and Innisfallen, include Aghadoe, with its ruined church of the 12th century (formerly a cathedral) and remains of a round tower; and the Ogham Cave of Dunloe, a souterrain containing inscribed stones. The waters of the neighbourhood provide trout and salmon, and the flora is of high interest to the botanist. Innumerable legends centre round the traditional hero O'Donoghue.

KILLDEER, a common American plover, so called in imitation of its whistling cry, the Charadrius vociferus of Linnaeus, and the Aegialitis vocifera of modern ornithologists. About the size of a snipe, it is mostly sooty-brown above, but showing a bright buff on the tail coverts, and in flight a white bar on the

wings; beneath it is pure white except two pectoral bands of deep black. It is one of the finest as well as the largest of the group commonly known as ringed plovers or ring dotterels, 1 forming the genus Aegialitis of Boie. Mostly wintering in the south or only on the sea-shore of the more northern states, in spring it spreads widely over the interior, breeding on the newly ploughed lands or on open grass-fields. The nest is made in a slight hollow, and is often surrounded with small pebbles and fragments of shells. Here the hen lays her pear- shaped, stone-coloured eggs, four in number, and always arranged with their pointed ends touching each other, as is the custom of most Limicoline birds. The parents exhibit the greatest anxiety for their offspring on the approach of an in- truder. It is the best-known bird of its family in the United States, where it is less abundant in the north-east than farther south or west. In Canada it does not range farther northward than 56° N.; it is not known in Greenland, and hardly in Labrador, though it is a passenger in Newfoundland every spring and autumn. 2 In winter it finds its way to Bermuda and to some of the Antilles, but it is not recorded from any of the islands to the windward of Porto Rico. In the other direction, however, it travels down the Isthmus of Panama and the west coast of South America to Peru. The killdeer has several other congeners in America, among which may be noticed Ae. semipalmata, curiously resembling the ordinary ringed plover of the Old World, Ae. hiaticula, except that it has its toes connected by a web at the base; and Ae. nivosa, a bird inhabiting the western parts of both the

American continents, which in the opinion of some authors is only a local form of the widely spread Ae. alexandrina or canliana, best known as Kentish plover, from its discovery near Sandwich towards the end of the 18th century, though it is far more abundant in many other parts of the Old World. The common ringed plover, Ae. hiaticula, has many of the habits of the killdeer, but is much less often found away from the sea-shore, though a few colonies may be found in dry warrens in certain parts of England many miles from the coast, and in Lapland at a still greater distance. In such localities it paves its nest with small stones (whence it is locally known as " Stone hatch "), a habit almost unaccountable unless regarded as an inherited instinct from shingle-haunting ancestors.

(A. N.) KILLIECRANKIE, a pass of Perthshire, Scotland, 3I m. N.N.W. of Pitlochry by the Highland railway. Beginning close to Killiecrankie station it extends southwards to the bridge of Garry for nearly if m. through the narrow, extremely beautiful, densely wooded glen in the channel of which flows the Garry. A road constructed by General Wade in 1732 runs up the pass, and between this and the river is the railway, built in 1863. The battle of the 27th of July 1689, between some 3000 Jacobites under Viscount Dundee and the royal force, about 4000 strong, led by General Hugh Mackay, though named from the ravine, was not actually fought in the pass. When Mackay emerged from the gorge he found the Highlanders already in battle array on the high ground on the right bank of the Girnaig, a tributary of the Garry, within half a mile of where the railway station now is. Before he had time to form on the more open table-land, the clansmen charged impetuously with their claymores and swept his troops back into the pass and the Garry. Mackay lost nearly half his force, the Jacobites about 900, including their leader. Urrard House adjoins the spot where Viscount Dundee received his death-wound.

KILLIGREW, SIR HENRY (d. 1603), English diplomatist, belonged to an old Cornish family and became member of parliament for Launceston in 1553. Having lived abroad

1 The word dotterel seems properly applicable to a single species only, the Charadrius morinellus of Linnaeus, which, from some of its osteological characters, may be fitly regarded as the type of a dis- tinct genus, Eudromias. Whether any other species agree with it in the peculiarity alluded to is at present uncertain.

2 A single example is said to have been shot near Christchurch, in Hampshire, England, in April 1857 (Ibis, 1862, p. 276).

during the whole or part of Mary's reign, he returned to England when Elizabeth came to the throne and at once began to serve the new queen as a diplomatist. He was employed on a mission to Germany, and in conducting negotiations in Scotland, where he had several interviews with Mary Queen of Scots. He was knighted in 1591, and after other diplomatic missions in various parts of Europe he died early in 1603. Many of Sir Henry's letters on public matters are in the Record Office, London, and in the British Museum. His first wife, Catherine (c. 1530-1583), daughter of Sir Anthony Cooke (1504-1576), tutor to Edward VI., was a lady of talent.

Another celebrated member of this family was Sir Robert Killigrew (c. 1 579-1633), who was knighted by James I. in the same year (1603) as his father, Sir William Killigrew. Sir William was an officer in Queen Elizabeth's household and a member of parliament; he died in November 1622. Sir Robert was a member of all the parliaments between 1603 and his death, but he came more into prominence owing to his alleged connexion with the death of Sir Thomas Overbury. A man of some scientific knowledge, he had been in the habit of supplying powders to Robert Carr, earl of Somerset, but it is not certain that the fatal powder came from the hands of Killigrew. He died early in 1633, leaving five sons, three of whom attained some reputation (see below).

KILLIGREW, THOMAS (1612-1683), English dramatist and wit, son of Sir Robert Killigrew, was born in Lothbury, London, on the 7th of February 161 2. Pepys says that as a boy he satisfied his love of the stage by volunteering at the Red Bull to take the part of a devil, thus seeing the play for nothing. In 1633 he became page to Charles I., and was faithfully attached to the royal house throughout his life. In 1635 he was in France, and has left an account (printed in the European Maga- zine, 1803) of the exorcizing of an evil spirit from some nuns at Loudun. In 1 641 he published two tragi-comedies, The Prisoners and Claracilla, both of which had probably been produced before 1636. In 1647 he followed Prince Charles into exile. His wit, easy morals and accommodating temper recommended him to Charles, who sent him to Venice in 1651 as his repre- sentative. Early in the following year he was recalled at the request of the Venetian ambassador in Paris. At the Restora- tion he became groom of the bedchamber to Charles II., and later chamberlain to the queen. He received in 1660, with Sir William Davenant, a patent to erect a new playhouse, the performances in which were to be independent of the censorship of the master of the revels. This infringement of his prerogative caused a dispute with Sir Henry Herbert, then holder of the office, but Killigrew settled the matter by generous concessions. He acted independently of Davenant, his

company being known as the King's Servants. They played at the Red Bull, until in 1663 he built for them the original Theatre Royal in Drury Lane. Pepys writes in 1664 that Killigrew intended to have four opera seasons of six weeks each during the year, and with this end in view paid several visits to Rome to secure singers and scene decorators. In 1664 his plays were published as Comedies and Tragedies. Written by Thomas Killigrew. They are Claracilla; The Princess, or Love at First Sight; The Parson's Wedding; The Pilgrim; Cicilia and Clorinda, or Love in Arms; Thomaso, or the Wanderer; and Bellamira, her Dream, or Love of Shadows. The Parson's Wedding (acted c. 1640, reprinted in the various editions of Dodsley's Old Plays and in the Ancient British Drama) is an unsavoury play, which displays nevertheless considerable wit, and some of its jokes were appropriated by Congreve. It was revived after the Restoration in 1664 and 1672 or 1673, all the parts being in both cases taken by women. Killigrew succeeded Sir Henry Herbert as master of the revels in 1673. He died at Whitehall on the 19th of March 1683. He was twice married, first to Cecilia Crofts, maid of honour to Queen Henrietta Maria, and secondly to Charlotte de Hesse, by whom he had a son Thomas (1657-1719), who was the author of a successful little piece, Chit-Chat, played at Drury Lane on the 14th of February 17 19, with Mrs Qldfield in the part of Florinda.

Killigrew enjoyed a greater reputation as a wit than as a dramatist. Sir John Denham said of him : —

Had Cowley ne'er spoke, Killigrew ne'er writ, Combined in one, they'd made a matchless wit.

Many stories are related of his bold speeches to Charles I. Pepys (Feb. 12, 1668) records that he was said to hold the title of King's Fool or Jester, with a cap and bells at the expense of the king's wardrobe, and that he might therefore revile or jeer anybody, even the greatest, without offence.

His elder brother, Sir William Killigrew (1606-1695), was a court official under Charles I. and Charles II. He attempted to drain the Lincolnshire fens, and was the author of four plays (printed 1665 and 1666) of some merit.

A younger brother, Dr Henry Killigrew (1613-1700), was chaplain and almoner to the duke of York, and master of the Savoy after the Restoration. A juvenile play of his, The Conspiracy, was printed surreptitiously in 1638, and in an authenticated version in 1653 as Pallantus and Eudora. He had two sons, Henry Killigrew (d. 171 2), an admiral, and James Killigrew, also a naval officer, who was killed in an encounter with the French in January 1695; and a daughter, Anne (1660-1685), poet and painter, who was maid of honour to the duchess of

York, and was the subject of an ode by Dryden, which Samuel Johnson thought the noblest in the language.

A sister, Elizabeth Killigrew, married Francis Boyle, 1st Viscount Shannon, and became a mistress of Charles II.

KILLIN, a village and parish of Perthshire, Scotland, at the south-western extremity of Loch Tay, 4 m. N.E. of Killin Junction on a branch line of the Callander & Oban railway. Pop. of parish (1901), 1423. It is situated near the confluence of the rivers and glens of the Dochart and Lochay, and is a popular tourist centre, having communication by steamer with Kenmore at the other end of the lake, and thence by coach to Aberfeldy, the terminus of a branch of the Highland railway. It has manufactures of tweeds. In a field near the village a stone marks the site of what is known as Fingal's Grove. An island in the Dochart (which is crossed at Killin by a bridge of five arches) is the ancient burial-place of the clan Macnab. Finlarig Castle, a picturesque mass of ivy-clad ruins, was a stronghold of the Campbells of Glenorchy, and several earls of Breadalbane were buried in ground adjoining it, where the modern mausoleum of the family stands. Three miles up the Lochay, which rises in the hills beyond the forest of Mamlorn and has a course of 15 m., the river forms a graceful cascade. The Dochart, issuing from Loch Dochart, flows for 13 m. in a north-easterly direction and falls into Loch Tay. The ruined castle on an islet in the loch once belonged to the Campbells of Lochawe.

KILLIS, a town of N. Syria, in the vilayet of Aleppo, 60 m. N. of Aleppo city. It is situated in an extremely fertile plain, and is completely surrounded with olive groves, the produce of which is reckoned the finest oil of all Syria; and its position on the carriage-road from Aleppo to Aintab and Birejik gives it importance. The population (20,000) consists largely of Circassians, Turkomans and Arabs, the town lying just on the northern rim of the Arab territory. As Killis lies also very near the proposed junction of the Bagdad and the Beirut-Aleppo railways (at Tell Habesh), it is likely to increase in importance. KILLYBEGS, a seaport and market town of county Donegal, Ireland, in the south parliamentary division, on the north coast on Donegal Bay, the terminus of the Donegal railway. Pop. (1901), 607. It derives some importance from its fine land- locked harbour, which, affording accommodation to large vessels, is used as a naval station, and is the centre of an important fishery. There is a large pier for the fishing vessels. The manufacture of carpets occupies a part of the population, employing both male and female labour — the productions being known as Donegal carpets. There are slight remains of a castle and ancient church; and a mineral spring is still used. The town received a charter from James I., and was a parliamentary borough, returning two members, until the Union.

KILLYLEAGH, a small seaport and market town of county Down, Ireland, in the east parliamentary division, on the western shore of Strangford Lough. Pop. (iooi), 1410. Linen manu- facture is the principal industry, and agricultural produce is exported. Killyleagh was an important stronghold in early times, and the modern castle preserves the towers of the old building. Sir John de Courcy erected this among many other fortresses in the neighbourhood; it was besieged by Shane O'Neill (1567), destroyed by Monk (1648), and subsequently rebuilt. The town was incorporated by James I., and returned two members to the Irish parliament.

KILMAINE, CHARLES EDWARD (1751-1799), French general, was born at Dublin on the 19th of October 1751. At the age of eleven he went with his father, whose surname was Jennings, to France, where he changed his name to Kil- maine, after a village in Mayo. He entered the French army as an officer in a dragoon regiment in 1774, and afterwards served as a volunteer in the Navy (1778), during which period he was engaged in the fighting in Senegal. From 1780 to 1783 he took part in the War of American Independence under Rochambeau, rejoining the army on his return to France. In 1 791, as a retired captain, he took the civic oath and was recalled to active service, becoming lieutenant-colonel in 1792, and colonel, brigadier-general, and lieutenant-general in 1793. In this last capacity he distinguished himself in the wars on the northern and eastern frontiers. But he became an object of suspicion on account of his foreign birth and his relations with England. He was suspended on the 4th of August 1793, and was not recalled to active service till 1795. He then took part in the Italian campaigns of 1796 and 1797, and was made commandant of Lombardy. He afterwards received the command of the cavalry in Bonaparte's " army of England," of which, during the absence of Desaix, he was temporarily commander-in-chief (1798). He died on the 15th of December

1799

See J. G. Alger, Englishmen in the French Revolution (1889); Eugene Fieffe, Histoire des troupes etrangeres au service de France (1854) ; Etienne Charavay, Correspondence de Carnot, tome iii.

KILMALLOCK, a market town of county Limerick, Ireland, in the east parliamentary division, 1245 m. S.W. of Dublin by the Great Southern & Western main line. Pop. (1901), 1206. It commands a natural route (now followed by the railway) through the hills to the south and south-west, and

is a site of great historical interest. It received a charter in the reign of Edward III., at which time it was walled and fortified, and entered by four gates, two of which remain. It was a military post of importance in Elizabeth's reign, but its fortifications were for the most part demolished by order of Cromwell. Two castellated mansions are still to be seen. The church of St Peter and St Paul belonged to a former abbey, and has a tower at the north-west corner which is a converted round tower. The Dominican Abbey, of the 13th century, has Early English remains of great beauty and a tomb to Edmund, the last of the White Knights, a branch of the family of Desmond intimately connected with Kilmallock, who received their title from Edward III. at the battle of Halidon Hill. The foundation of Kilmallock, however, is attributed to the Geraldines, who had several towns in this vicinity. Eight miles from the town is Lough Gur, near which are numerous stone circles and other remains. Kilmallock returned two members to the Irish parliament.

KILMARNOCK, a municipal and police burgh of Ayrshire, Scotland, on Kilmarnock Water, a tributary of the Irvine, 24 m. S.W. of Glasgow by the Glasgow & South-Western railway. Pop. (1901), 35,091. Among the chief buildings are the town hall, court-house, corn-exchange (with the Albert Tower, no ft. high), observatory, academy, corporation art gallery, institute (containing a free library and a museum), Kay schools, School of Science and Art, Athenaeum, theatre, infirmary, Agricultural Hall, and Philosophical Institution. The grounds of Kilmarnock House, presented to the town in 1893, were laid out as a public park. In Kay Park (48! acres), purchased from the duke of

Portland for £9000, stands the Burns Memorial, consisting of two storeys and a tower, and containing a museum in which have been placed many important MSS. of the poet and the McKie library of Burns's books. The marble statue of the poet, by W. G. Stevenson, stands on a terrace on the southern face. A Reformers' monument was unveiled in Kay Park in 1885. Kilmarnock rose into importance in the 17th century by its production of striped woollen " Kilmarnock cowls " and broad blue bonnets, and afterwards acquired a great name for its Brussels, Turkey and Scottish carpets. Tweeds, blankets, shawls, tartans, lace curtains, cottons and winceys are also produced. The boot and shoe trade is prosperous, and there are extensive engineering and hydraulic machinery works. But the iron industry is prominent, the town being situated in the midst of a rich mineral region. Here, too, are the workshops of the Glasgow & South-Western railway company. Kilmarnock is famous for its dairy produce, and every October holds the largest cheese-show in Scotland. The neighbourhood abounds in freestone and coal. The burgh, which is governed by a provost and council, unites with Dum- barton, Port Glasgow, Renfrew and Rutherglen in returning one member to parliament. Alexander

Smith, the poet (1830-1867), whose father was a lace-pattern designer, and Sir James Shaw (1764-1843), lord mayor of London in 1806, to whom a statue was erected in the town in 1848, were natives of Kilmarnock. It dates from the 15th century, and in 1591 was made a burgh of barony under the Boyds, the ruling house of the district. The last Boyd who bore the title of Lord Kilmarnock was beheaded on Tower Hill, London, in 1746, for his share in the Jacobite rising. The first edition of Robert Burns's poems was published here in 1786.

KILMAURS, a town in the Cunningham division of Ayrshire, Scotland, on the Carmel, 213 m. S. by W. of Glasgow by the Glasgow & South-Western railway. Pop. (1901), 1803. Once noted for its cutlery, the chief industries now are shoe and bonnet factories, and there are iron and coal mines in the neigh- bourhood. The parish church dates from n 70, and was dedicated either to the Virgin or to a Scottish saint of the 9th century called Maure. It was enlarged in 1403 and in great part rebuilt in 1 888. Adjoining it is the burial-place of the earls of Glencairn, the leading personages in the district during several centuries, some of whom bore the style of Lord Kilmaurs. Their family name was Cunningham, adopted probably from the manor which they acquired in the 1 2th century. The town was made a burgh of barony in 1527 by the earl of that date. Burns's patron, the thirteenth earl, on whose death the poet wrote his touching " Lament," sold the Kilmaurs estate in 1786 to the marchioness of Titchfield.

KILN (O. E. cylene, from the Lat. culina, a kitchen, cooking- stove), a place for burning, baking or drying. Kilns may be divided into two classes — those in which the materials come into actual contact with the flames, and those in which the furnace is beneath or surrounding the oven. Lime-kilns are of the first class, and brick-kilns, pottery-kilns, &c, of the second, which also includes places for merely drying materials, such as hop-kilns, usually called "oasts" or "oast-houses."

KILPATRICK, NEW, or EAST, also called Bearsden, a town of Dumbartonshire, Scotland, 5J m. N.W. of Glasgow byroad, with a station on the North British railway company's branch line from Glasgow to Milngavie. Pop. (1901), 2705. The town is largely inhabited by business men from Glasgow. The public buildings include the Shaw convalescent home, Buchanan, Retreat, house of refuge for girls, library, and St Peter's College, a fine structure, presented to the Roman Catholic Church in 1892 by the archbishop of Glasgow. There is some coal-mining, and lime is manufactured. Remains of the Wall of Antoninus are close to the town. At Garscube and Garscadden, both within i| m. of New Kilpatrick, are extensive iron-works, and at the former place coal is mined and stone quarried.

KILPATRICK, OLD, a town of Dumbartonshire, Scotland, on the right bank of the Clyde, io|m. N.W. of Glasgow by rail, with stations on the North British and Caledonian railways. Pop. (1901), 1533. It is traditionally the birthplace of St Patrick,

whose father is said to have acted there as a Roman magistrate. Roman remains occur in the district, and the Wall of Antoninus ran through the parish. . To the north, occupying an area of about 6 m. from east to west and 5 m. from north to south run the Kilpatrick Hills, of which the highest points are Duncomb and Fynloch Hill (each 1313 ft.).

KILRUSH, a seaport and watering-place of county Clare, Ireland, in the west parliamentary division, on the north shore of the Shannon estuary 45 m. below Limerick. Pop. of urban district (iqoi), 4179. It is the terminus of a branch of the West Clare railway. The only seaport of importance in the county, it has a considerable export trade in peat fuel, extensive fisheries, and flagstone quarries; while general fairs, horse fairs and annual agricultural shows are held. The inner harbour admits only small vessels, but there is a good pier a mile south of the town. Off the harbour lies Scattery Island (Inis Cathaigh), where St Senan (d. 544) founded a monastery. There are the remains of his oratory and house and of seven rude churches or chapels, together with a round tower and a holy well still in repute. The island also received the epithet of Holy, and was a favourite burial-ground until modern times.

KILSYTH, a police burgh of Stirlingshire, Scotland, on the Kelvin, 13 m. N.N.E. of Glasgow by the North British railway, and close to the Forth and Clyde canal. Pop. (1901), 7292. The principal buildings are the town and public halls, and the academy. The chief industries are coal-mining and iron- works; there are also manufactures of paper and cotton, besides quarry- ing of whinstone and sandstone. There are considerable remains of the Wall of Antoninus south of the town, and to the nqrth the ruins of the old castle. Kilsyth dates from the middle of the 17th century and became a burgh of barony in 1826. It was the scene of Montrose's defeat of the Covenanters on the 15th of August 1645. The town was the centre of remarkable religious revivals in 1742-3 and 1839, the latter conducted by William Chalmers Burns (1815-1868), the missionary to China. KILT, properly the short loose skirt or petticoat, reaching to the knees and usually made of tartan, forming part of the dress of a Scottish Highlander (see Costume). The word means that which is " girded or tucked up," and is apparently of Scandinavian origin, cf. Danish kilte, to tuck up. The early

kilt was not a separate garment but was merely the lower part of the plaid, in which the Highlander wrapped himself, hanging down in folds below the belt.

KILWA (Quiloa), a seaport of German East Africa, about 200 m. S. of Zanzibar. There are two Kilwas, one on the main- land — Kilwa Kivinje; the other, the ancient city, on an island — Kilwa Kisiwani. Kilwa Kivinje, on the northern side of Kilwa Bay, is regularly laid out, the houses in the European quarter being large and substantial. The government house and barracks are fortified and are surrounded by fine public gardens. The adjacent country is fertile and thickly populated, and the trade of the port is considerable. Much of it is in the hands of Banyans. Kilwa is a starting-point for caravans to Lake Nyasa. Pop. about 5000. Most of the inhabitants are Swahili.

Kilwa Kisiwani, 18 m. to the south of the modern town, possesses a deep harbour sheltered from all winds by projecting coral reefs. The island on which it is built is separated from the mainland by a shallow and narrow channel. The ruins of the city include massive walls and bastions, remains of a palace and of two large mosques, of which the domed roofs are in fair preservation, besides several Arab forts. The new quarter contains a customs house and a few Arab buildings. Pop. about 600. On the island of Songa Manara, at the southern end of Kilwa Bay, hidden in dense vegetation, are the ruins of another city, unknown to history. Fragments of palaces and mosques in carved limestone exist, and on the beach are the remains of a lighthouse. Chinese coins and pieces of porcelain have been found on the sea-shore, washed up from the reefs.

The sultanate of Kilwa is reputed to have been founded about a.d. 975 by Ali ibn flasan, a Persian prince from Shiraz, upon the site of the ancient Greek colony of Rhapta. The new state, at first confined to the town of Kilwa, extended its influence along the coast

from Zanzibar to Sofala, and the city came to be regarded as the capital of the Zenj "empire" (see Zanzibar: "Sultanate")- An Arab chronicle gives a list of over forty sovereigns who reigned at Kilwa in a period of five hundred years (cf. A. M. H. J. Stokvis, Manuel d'histoire-, Leiden, 1888, i. 558). Pedro Alvares Cabral, the Portu- guese navigator, was the first European to visit it. His fleet, on its way to India, anchored in Kilwa Bay in 1 500. Kilwa was then a large and wealthy city, possessing, it is stated, three hundred mosques. In 1502 Kilwa submitted to Vasco da Gama, but the sultan neglect- ing to pay the tribute imposed upon him, the city in 1505 was occu- pied by the Portuguese. They built a fort there ; the first erected by them on the east coast of Africa. Fighting ensued between the Arabs and the Portuguese, the city was destroyed ; and in 1512 the

Portuguese, whose ranks had been decimated by fever, temporarily abandoned the place. Subsequently Kilwa became one of the chief centres of the slave trade. Towards the end of the 17th century it fell under the dominion of the imams of Muscat, and on the separation in 1856 of their Arabian and African possessions became subject to the sultan of Zanzibar. With the rest of the southern part of the sultan's continental dominions Kilwa was acquired by Germany in 1890 (see Africa, § 5; and German East Africa).

KILWARDBY, ROBERT (d. 1279), archbishop of Canterbury and cardinal, studied at the university of Paris, where he soon became famous as a teacher of grammar and logic. Afterwards joining the order of St Dominic and turning his attention to theology, he was chosen provincial prior of his order in England in 1261, and in October 1272 Pope Gregory X. terminated a dispute over the vacant archbishopric of Canterbury by appointing Kilwardby. Although the new archbishop crowned Edward I. and his queen Eleanor in August 1274, he took little part in business of state, but was energetic in discharging the spiritual duties of his office. He was charitable to the poor, and showed liberality to the Dominicans. In 1278 Pope Nicholas III. made him cardinal-bishop of Porto and Santa Rufina; he resigned his archbishopric and left England, carrying with him the registers and other valuable property belonging to the see of Canterbury. He died in Italy on the nth of September 1279. Kilwardby was the first member of a men- dicant order to attain a high position in the English Church. Among his numerous writings, which became very popular among students, are De ortu scientiarum, De tempore, De Uni- versali, and some commentaries on Aristotle.

See N. Trevet, Annates sex regum Angliae, edited by T. Hog (London, 1845) ; W. F. Hook, Lives of the Archbishops of Canterbury, vol. iii. (London, 1860-1876); J. Querif and J. Echard, Scriplores ordinis Predicatorum (Paris, 1719-1721).

KILWINNING, a municipal and police burgh of Ayrshire, Scotland, on the right bank of the Garnock, 24 m. S.W. of Glasgow by the Caledonian railway, and 26! m. by the Glasgow & South-Western railway. Pop. (1901), 4440. The chief buildings include the public library, the Masonic hall and the district hospital. The centre of interest, however, is the ruined abbey, originally one of the richest in Scotland. Founded about 1 140 by Hugh de Morville, lord of Cunninghame, for Tyronensian monks of the Benedictine order, it was dedicated to St Winnin, who lived on the spot in the 8th century and has given his name to the town. This beautiful specimen of Early English architecture was partly destroyed in 1561, and its lands were granted to the earl of Eglinton and others. Kil- winning is the traditional birthplace of Scottish freemasonry, the lodge, believed to have

been founded by the foreign archi- tects and masons who came to build the abbey, being regarded as the mother lodge in Scotland. The royal company of archer? of Kilwinning — dating, it is said, as far back as 1488 — meet every July to shoot at the popinjay. The industry in weaving shawls and lighter fabrics has died out; and the large iron, coal and fire-clay works at Eglinton, and worsted spinning, employ most of the inhabitants. About a mile from Kilwinning is Eglinton Castle, the seat of the earls of Eglinton, built in 1798 in the English castellated style.

KIMBERLEY, JOHN WODEHOUSE, ist Earl or (1826-1902), English statesman, was born on the 7th of January 1826, being the eldest son of the Hon. Henry Wodehouse and grandson of the 2nd Baron Wodehouse (the barony dating from 1797), whom he succeeded in 1846. He was educated at Eton and Christ Church, Oxford, where he took a first-class degree in

classics in 1847; in the same year married Lady Florence Fitzgibbon (d. 1895), daughter of the last earl of Clare. He was by inheritance a Liberal in politics, and in 1852-1856 and 1859-1861 he was under secretary of state for foreign affairs in Lord Aberdeen's and Lord Palmerston's ministries. In the interval (1856-1858) he had been envoy-extraordinary to Russia; and in 1863 he was sent on a special mission to Copenhagen on the forlorn hope of finding a peaceful solution of the Schleswig- Holsteih question. The mission was a failure, but probably nothing else was possible. In 1864 he became under secretary for India, but towards the end of the year was made Lord- Lieutenant of Ireland. In that capacity he had to grapple with the first manifestations of Fenianism, and in recognition of his vigour and success he was created (1866) earl of Kimberley. In July 1866 he vacated his office with the fall of Lord Russell's ministry, but in 1868 he became Lord Privy Seal in Mr Glad- stone's cabinet, and in July 1870 was transferred from that post to be secretary of state for the colonies. It was the moment of the great diamond discoveries in South Africa, and the new town of Kimberley was named after the colonial secre- tary of the day. After an interval of opposition from 1874 to 1880, Lord Kimberley returned to the Colonial Office in Mr Gladstone's next ministry; but at the end of 1882 he exchanged this office first for that of chancellor of the duchy of Lancaster and then for the secretaryship of state for India, a post he retained during the remainder of Mr Gladstone's tenure of power (1882-1886, 1892-1894), though in 1892-1894 he combined with it that of the lord presidency of the council. In Lord Rosebery's cabinet (1894-1895) he was foreign secretary. Lord Kimberley was an admirable

departmental chief, but it is difficult to asso- ciate his own personality with any ministerial act during his occupation of all these posts. He was at the colonial office when responsible government was granted to Cape Colony, when British Columbia was added to the Dominion of Canada, and during the Boer War of 1880-81, with its conclusion at Majuba; and he was foreign secretary when the misunderstand- ing arose with Germany over the proposed lease of territory from the Congo Free State for the Cape to Cairo route. He was essentially a loyal Gladstonian party man. His moderation, common sense, and patriotism had their influence, nevertheless, on his colleagues. As leader of the Liberal party in the House of Lords he acted with undeviating dignity; and in opposition he was a courteous antagonist and a critic of weight and experience. He took considerable interest in education, and after being for many years a member of the senate of London University, he became its chancellor in 1899. He died in London on the 8th of April 1902, being succeeded in the earldom by his eldest and only surviving son, Lord Wodehouse (b. 1848). KIMBERLEY, a town of the Cape province, South Africa, the centre of the Griqualand West diamond industry, 647 m. N.E. of Cape Town and 310 m. S.W. of Johannesburg by rail. Pop. (1904), 34,331, of whom 13,556 were whites. The town is built on the bare veld midway between the Modder and Vaal Rivers and is 4012 ft. above the sea. Having grown out of camps formed round the diamond mines, its plan is very irregular and in striking contrast with the rectangular outline common to South African towns. Grouped round market square are the law courts, with a fine, clock tower, the post and telegraph offices and the town-hall. The public library and the hospital are in DuToits Pan Road. In the district of Newton, laid out during the siege of 1899-1900, a monument to those who fell during the operations has been erected where four roads meet. Siege Avenue, in.the suburb of Kenilworth, 250 ft. wide, a mile and a quarter long, and planted with 16 rows of trees, was also laid out during the siege. In the public gardens are statues of Queen Victoria and Cecil Rhodes. The diamond mines form, however, the chief attraction of the town (see Diamond). Of these the Kimberley is within a few minutes' walk of market square. The De Beers mine is one mile east of the Kimberley mine. The other principal mines, Bultfontein, Du Toits Pan and Wesselton, are still farther distant from the town. Barbed wire fencing surrounds the mines, which cover about 180 acres.

The Kaffirs who work in the mines are housed in large com- pounds. Wire netting is spread over these enclosures, and every precaution taken to prevent the illicit disposal of diamonds. Ample provision is made for the comfort of the inmates, who in addition to food and lodging earn from 17s. to 24s. a week: Most of the white workmen employed live at Kenilworth, laid out by the De Beers company as a " model village." Beacons- field,

near Du Toits Pan Mine, is also dependent on the diamond industry.

Kimberley was founded in 1870 by diggers who discovered diamonds on the farms of Du Toits Pan and Bultfontein. In 1 87 1 richer diamonds were found on the neighbouring farm of Vooruitzight at places named De Beers and Colesberg Kopje. There were at first three distinct mining camps, one at Du Toits Pan, another at De Beers (called De Beers Rush or Old De Beers) and the third at the Colesberg Kopje (called De Beers New Rush, or New Rush simply). The Colesberg Kopje mine was in July 1873 renamed Kimberley in honour of the then secretary of state for the colonies, the 1st earl of Kimberley, by whose direction the mines were — in 187 1 — taken under the protection of Great Britain. Kimberley was also chosen as the name of the town into which the mining camps developed. Doubt having arisen as to the rights of the crown to the minerals on Vooruitzight farm, litigation ensued, ending in the purchase of the farm by the state for £100,000 in 1875. In 1880 the town was incorporated in Cape Colony (see Griqualand). In 1874 a great part' of the population left for the newly discovered gold diggings in the Lydenburg district of the Transvaal, but others took their place. Among those early attracted to Kimberley were Cecil Rhodes and " Barney " Barnato, who in time came to represent two groups of financiers controlling the mines. The amalgamation of their interests in 1889 — when the De Beers group purchased the Kimberley mine for £5,338,650ˆ— put the whole diamond production of the Kimberley fields in the hands of one company, the De Beers Consolidated Mines, Ltd., so named after the former owners of the farms on which are situated the chief mines. Kimberley in consequence became largely dependent on the good-will of the De Beers corporation, the town having practically no industries other than diamond mining. Horse-breeding is carried on to a limited extent. The value of the annual output of diamonds averages about £4,500,000. The importance of the industry led to the building of a railway from Cape Town, opened in 1885. On the outbreak of war between the British and the Boers in 1899 Kimberley was invested by a Boer force. The siege began on the 12th of October and lasted until the 15th of February 1900, when the town was relieved by General Sir John French. Among the besieged was Cecil Rhodes, who placed the resources of the De Beers company at the disposal of the defenders. In 1906 the town was put in direct railway communication with Johan- nesburg, and in 1908 the completion of the line from Bloem- fontein gave Natal direct access to Kimberley, which thus became an important railway centre.

KIMERIDGIAN, in geology, the basal division of the Upper Oolites in the Jurassic system. The name is derived from the hamlet of Kimeridge or Kimmeridge near the coast of Dorset- shire, England. It appears to have been first suggested by T. Webster in 181 2; in 1818, in the form Kimeridge

Clay, it was used by Buckland. From the Dorsetshire coast, where it is splendidly exposed in the fine cliffs from St Alban's Head to Gad Cliff, it follows the line of Jurassic outcrop through Wilt- shire, where there is a broad expanse between Westbury and Devizes, as far as Yorkshire, there it appears in the vale of Pickering and on the coast in Filey Bay. It generally occupied broad valleys, of which the vale of Aylesbury may be taken as typical. Good exposures occur at Seend, Calne, Swindon, Wootton Bassett, Faringdon, Abingdon, Culham, Shotover Hill, Brill, Ely and Market Rasen. Traces of the formation are found .as far north as the east coast of Cromarty and Sutherland at Eathie and Helmsdale.

In England the Kimeridgian is usually divisible into an Upper Series, 600-650 ft. in the south, dark bituminous shales, paper

shales and clays with layers and nodules of cement-stones and sep- taria. These beds merge gradually into the overlying Portlandian formation. The Lower Series, with a maximum thickness of 400 ft., consists of clays and dark shales with septaria, cement-stones and calcareous " doggers." These lithological characters are very persistent. The Upper Kimeridgian is distinguished as the zone of Perisphincles biplex, with the sub-zone of Discina latissima in the higher portions. Cardioceras alternans is the zonal ammonite charac- teristic of the lower division, with the sub-zone of Ostrea deltoidea in the lower portion. Exogyra virgula is common in the upper part of the lower division, and the lower part of the Upper Kimeridgian. A large number of ammonites are peculiar to this formation, in- cluding Reineckia eudoxus, R. Thurmanni, Aspidoceras longispinus, &c. Large dinosaurian reptiles are abundant, Cetiosaurus, Giganto- saurus, Megalosaurus, also plesiosaurs and ichthyosaurs ; croco- dilian and chelonian remains are also found. Protocardia striatula, Thracia depressa, Belemnites abreviatus, B. Blainvillei, Lingula ovalis, Rhynchonella inconstans and Exogyra nana are characteristic fossils. Alum has been obtained from the Kimeridge Clay, and the cement- stones have been employed in Purbeck; coprolites are found in small quantities. Bricks, tiles, flower-pots, &c, are made from the clay at Swindon, Gillingham, Brill, Ely, Horncastle, and other places. The so-called "Kimeridge coal" is a highly bituminous shale cap- able of being used as fuel, which has been worked on the cliff at Little Kimeridge.

The " Kimeridgien " of continental geologists is usually made to contain the three sub-divisions of A. Oppel and W. Waagen, viz. : —

f Upper (Virgulian) with Exogyra virgula .

Kimeridgien < Middle (Pteroceran) with Pteroceras oceani

[Lower (Astartian) with Astarte supracorallina ; but the upper portion of this continental Kimeridgian is equivalent to some of the British Portlandian ; while most of the Astartian cor- responds to the Corallian. A. de Lapparent now recognizes only the Virgulian and Pteroceran in the Kimeridgien. Clays and marls with occasional limestones and sandstones represent the Kime- ridgien of most of northern Europe, including Russia. In Swabia and some other parts of Germany the curious ruiniform marble Felsenkalk occurs on this horizon, and most of the Kimeridgien of southern Europe, including the Alps, is calcareous. . Representatives of the formation occur in Caucasia, Algeria, Abyssinia, Madagascar; in South America with volcanic rocks, and possibly in California (Maripan beds), Alaska and King Charles's Land.

See " Jurassic Rocks of Britain," vols. v. and i., Memoirs of the Geological Survey (vol. v. contains references to literature up to 1895).

(J.A.H.)

KIMS I, or Qimhi, the family name of three Jewish grammar- ians and biblical scholars who worked at Narbonne in the 12th century and the beginning of the 13th, and exercised great influence on the study of the Hebrew language. The name, as is shown by manuscript testimony, was also pronounced gamhi and further mention is made of the French surname Petit.

Joseph Kimhi was a native of southern Spain, and settled in Provence, where he was one of the first to set forth in the Hebrew language the results of Hebraic philology as expounded by the Spanish Jews in their Arabic treatises. He was acquainted moreover with Latin grammar, under the influence of which he resorted to the innovation of dividing the Hebrew vowels into five long vowels and five short, previous grammarians having simply spoken of seven vowels without distinction of quantity. His grammatical textbook, Sefer Ha-Zikkaron, "Book of Remembrance " (ed. W. Bacher, Berlin, 1888), was marked by methodical comprehensiveness, and introduced into the theory of the verbs a new classification of the stems which has been retained by later scholars. In the far more ample Sefer Ha-Galuy, "Book of Demonstration" (ed. Matthews, Berlin, 1887), Joseph Kimhi attacks the philological work of the greatest French Talmud scholar of that day, R. Jacob Tam, who espoused the antiquated system of Menahem'b.Saruq, and this he supplements by an independent critique of Menahem. This work is a mine of varied exegetical and philological details. He also wrote commentaries — the majority of which are lost — on a great number of the scriptural books. Those on Proverbs and Job have been

published. He composed an apologetic work under the title Sefer Ha-Berith (" Book of the Bond ") , a fragment of which is extant, and translated into Hebrew the ethico-philosophical work of Bahya ibn Paquda (" Duties of the Heart "). In his commentaries he also made contributions to the comparative philology of Hebrew and Arabic.

Moses Kimhi was the author of a Hebrew grammar, known — after the first three words — as Mahalak Shebile Ha-daat, or briefly

as Mahalak. It is an elementary introduction to the study of Hebrew, the first of its kind, in which only the most indispensable definitions and rules have a place, the remainder being almost wholly occupied by paradigms. Moses Kimhi was 'the first who made the verb paqadh a model for conjugation, and the first also who introduced the now usual sequence in the enumeration of stem-forms. His handbook was of great historical importance as in the first half of the 16th century it became the favourite manual for the study of Hebrew among non- Judaic scholars (1st ed., Pesaro, 1508). Elias Levita (q.v.) wrote Hebrew explana- tions, and Sebastian Minister translated it into Latin. Moses Kimhi also composed commentaries to the biblical books; those on Proverbs, Ezra and Nehemiah are in the great rabbinical bibles falsely ascribed to Abraham ibn Ezra.

David Kimhi (c. 1160-1235), also known as Redaq(= R. David Kimhi), eclipsed the fame both of his father and his brother. From the writings of the former he quotes a great number of explanations, some of which are known only from this source. His magnum opus is the Sefer Miklol, "Book of Completeness." This falls into two divisions: the grammar, to which the title of the whole, Miklol, is usually applied (first printed in Constanti- nople, 1532-1534, then, with the notes of Elias Levita, at Venice, 1545), and the lexicon, Sefer Hashorashim, "Book of Roots," which was first printed in Italy before 1480, then at Naples in 1490, and at Venice in 1546 with the annotations of Elias. The model and the principal source for this work of David Kimhi's was the book of R. Jonah (Abulwalid), which was cast in a similar bipartite form; and it was chiefly due to Kimhi's grammar and lexicon that, while the contents of Abulwalid's works were common knowledge, they themselves remained in oblivion for centuries. In spite of this dependence on his predecessors his work shows originality, especially in the arrangement of his material. In the grammar he combined the paradigmatic method of his brother Moses with the procedure of the older scholars who devoted a close attention to details. In his dictionary, again, he recast the lexicological materials inde- pendently, and enriched lexicography itself, especially by his numerous etymological explanations. Under the title Et Sofer, " Pen of the Writer " (Lyk, 1864), David Kimhi composed a sort of grammatical compendium as a guide to the correct punctua- tion of the biblical manuscripts; it consists, for the most part, of

extracts from the Miklol. After the completion of his great work he began to write commentaries on portions of the Scrip- tures. The first was on Chronicles, then followed one on the Psalms, and finally his exegetical masterpiece — the commentary on the prophets. His annotations on the Psalms are especially interesting for the polemical excursuses directed against the Christian interpretation. He was also responsible for a commen- tary on Genesis (ed. A. Giinsburg, Pressburg, 1842), in which he followed Moses Maimonides in explaining biblical narratives as visions. He was an enthusiastic adherent of Maimonides, and, though far advanced in years, took an active part in the battle which raged in southern France and Spain round his philosophico- religious writings. The popularity of his biblical exegesis is demonstrated by the fact that the first printed texts of the Hebrew Bible were accompanied by his commentary : the Psalms 1477, perhaps at Bologna; the early Prophets, 1485, Soncino; the later Prophets, ibid. i486.

His commentaries have been frequently reprinted, many of them in Latin translations. A new edition of that on the Psalms was begun by Schiller-Szinessy,(Firs/ Book of Psalms, Cambridge, 1883). Abr. Geiger wrote of the three Kimhis in the Hebrew periodical Ozar Nefymad (vol. ii., 1857= A. Geiger, Gesammelte Schriften, v. 1-47). See further the Jewish Encyclopedia. • (W. Ba.)

KIN (0. E. cyn, a word represented in nearly all Teutonic languages, cf. Du. kunne, Dan. and Swed. kon, Goth kuni, tribe; the Teutonic base is kunya; the equivalent Aryan root gan- to beget, produce, is seen in Gr. ykvos, Lat. genus, cf. "kind"), a collective word for persons related by blood, as descended from a common ancestor. In law, the term " next of kin " is applied to the person or persons who, as being in the nearest degree of blood relationship to a person dying intestate, share according tc

degree in his personal estate (see Intestacy, and Inheritance). " Kin " is frequently associated with " kith " in the phrase " kith and kin," now used as an emphasized form of " kin " for family relatives. It properly means one's " country and kin," or one's " friends and kin." Kith (O.E. cy®5e and cyS, native land, acquaintances) comes from the stem of cunnan, to know, and thus means the land or people one knows familiarly.

The suffix kin, chiefly surviving in English surnames, seems to have been early used as a diminutive ending to certain Christian names in Flanders and Holland. The termination is represented by the dimi nutive -then in

German, as in Kindchen, Hauschen, &c. Many English words, such as " pumpkin," " firkin," seem to have no diminutive significance, and may have been assimilated from earlier forms, e.g. " pumpkin " from " pumpion."

KINCARDINESHIRE, or The Mearns, an eastern county of Scotland, bounded E. by the North Sea, S. and S.W. by Forfarshire, and N.W. and N. by Aberdeenshire. Area, 243,974 acres, or 381 sq. m. In the west and north-west the Grampians are the predominant feature. The highest of their peaks is Mount Battock (2555 ft.), where the counties of Aberdeen, Forfar and Kincardine meet, but there are a score of hills exceeding 1500 ft. in height. In the extreme north, on the confines of Aberdeenshire, the Hill of Fare, famous for its sheep walks, attains an altitude of 1545 ft. In the north the county slopes from the Grampians to the picturesque and finely-wooded valley of the Dee, and in the south it falls to the Howe (Hollow) of the Mearns, which is a continuation north-eastwards of Strathmore. The principal rivers are Bervie Water (20 m. long) , flowing south-eastwards to the North Sea; the Water of Feugh (20 m.) taking a north-easterly direction and falling into the Dee at Banchory, and forming near its mouth a beautiful cascade; the Dye (15 m.) rising in Mount Battock and ending its course in the Feugh; Luther Water (14 m.) springing not far from the castle of Drumtochty and meandering pleasantly to its junction with the North Esk; the Cowie (13 m.) and the Carron (85 m.) entering the sea at Stonehaven. The Dee and North Esk serve as boundary streams during part of their course, the one of Aberdeenshire, the other of Forfarshire. Loch Loirston, in the parish of Nigg, and Loch Lumgair, in Dunnottar parish, both small, are the only lakes in the shire. Of the glens Glen Dye in the north centre of the county is remarkable for its beauty, and the small Den Fenella, to the south-east of Laurencekirk, contains a picturesque waterfall. Its name perpetuates the memory of Fenella, daughter of a thane of Angus, who was slain here after betraying Kenneth II. to his enemies, who (according to local tradition) made away with him in Kincardine Castle. Excepting in the vicinity of St Cyrus, the coast from below Johnshaven to Girdle Ness presents a bold front of rugged cliffs, with an average height of from 100 to 250 ft., interrupted only by occasional creeks and bays, as at Johnshaven, Gourdon, Bervie, Stonehaven, Port- lethen, Findon, Cove and Nigg.

Geology. — The great fault which traverses Scotland from shore to shore passes through this county from Craigeven Bay, about a mile north of Stonehaven, by Fenella Hill to Edzell. On the northern side of this line are the old crystalline schists of the Dalradian group; on the southern side Old Red Sandstone occupies all the remaining space. Good exposures of the schists are seen, repeatedly folded, in the cliffs between Aberdeen and Stonehaven. They consist of a lower series of greenish slates and a higher,

more micaceous and schistose series with grits; bands of limestone occur in these rocks near Bunchory. Besides the numerous minor flexures the schists are bent into a broad synclinal fold which crosses the county, its axis lying in a south-westerly-north-easterly direction. Rising through the schists are several granite masses, the largest being that forming the high ground around Mt Battock ; south of the Dee are several smaller masses, some of which have been extensively quarried. The lower part of the Old Red Sandstone consists of flags, red sand- stones and purple clays in great thickness; these are followed by coarse conglomerates, well seen in the cliff at Dunnottar Castle, with ashy grits and some thin sheets of diabase. The diabase forms the Bruxie and Leys Hills and some minor elevations. Above the volcanic series more red sandstones, conglomerates and marls appear. The Old Red Sandstone is folded synclinally in a direction con- tinuing the vale of Strathmore ; south of this is an anticline, as may be seen on the coast between St Cyrus and Kinneff. Glacial striae on the higher ground and debris on the lower ground show that the direction taken by the ice flow was south-eastward on the hills but XV. 26

as the shore was approached it gradually took on an easterly and finally a northerly direction.

Climate and Agriculture. — The climate is healthy, but often cold, owing to the exposure to east winds. The average temperature for the year is 45 F., for July 58°, and for January 37°. The average annual rainfall is 34 in. Much of the Grampian territory is occupied by grouse moors, but the land by the Dee, in the Howe and along the coast, is scientifically farmed and yields well. The soil of the Howe is richer and stronger than that in the Dee valley, but the most fer- tile region is along the coast, where the soil is generally deep loam resting on clay, although in some places it is poor and thin, or stiff and cold. Oats are the principal crop, wheat is not largely grown, but the demands of the distillers maintain a very considerable acre- age under barley. Rather more than one-tenth of the total area is under wood. Turnips form the main green crop, but potatoes are extensively raised. A little more than half the holdings consist of 50 acres and under. Great attention is paid to livestock. Short- horns are the most common breed, but the principal home-bred stock is a cross between shorthorned and polled, though there are many valuable herds of pure polled. Cattle- feeding is carried on according to the most advanced methods. Blackfaced sheep are chiefly kept on the hill runs, Cheviots or a cross with Leicesters being usually found on the lowland farms. Most of the horses are employed in connexion with the cultivation of the soil, but several good strains, including Clydesdales, are retained for stock purposes. Pigs are also reared in considerable numbers.

Other Industries. — Apart from agriculture, the principal industry is the

fishing, of which Stonehaven is the centre. The coast being dangerous and the harbours difficult in rough weather, the fishermen often run great risks. The village of Findon (pron. Finnan) has given its name to the well-known smoked haddocks, which were first cured in this way at that hamlet. The salmon fisheries of the sea and the rivers yield a substantial annual return. Manufactures are of little more than local importance. Woollens are made at Stonehaven, and at Bervie, Laurencekirk and a few other places flax-spinning and weaving are carried on. There are also some distilleries, breweries and tanneries. Stonehaven, Gourdon and Johnshaven are the chief ports for seaborne trade.

The Deeside railway runs through the portion of the 'county on the northern bank of the Dee. The Caledonian and North British railways run to Aberdeen via Laurencekirk to Stonehaven, using the same metals, and there is a branch line of the 'N.B.R. from Montrose to Bervie. There are also coaches between Blairs and Aberdeen, Bervie and Stonehaven, Fettercairn and Edzell, Banchory and Birse, and other points.

Population and Government. — The population was 35,492 in 1891, and 40,923 in 1901, when 103 persons spoke Gaelic and English. The chief town is Stonehaven (pop. in 1901, 4577) with Laurencekirk (1512) and Banchory (1475), but part of the city of Aberdeen, with a population of 9386, is within the county. The county returns one member to parliament, and Bervie, the only royal burgh, belongs to the Montrose group of parliamentary burghs. Kincardine is united in one sheriffdom with the shires of Aberdeen and Banff, and one of the Aberdeen sheriffs-substitute sits at Stonehaven. The county is under school-board jurisdiction. The academy at Stonehaven and a few of the public schools earn grants for higher education. The county council hands over the " residue " grant to the county secondary education committee, which expends it in technical education grants. At Blairs, in the north-east of the shire near the Dee, is a Roman Catholic college for the train- ing of young men for the priesthood.

History. — The annals of Kincardineshire as a whole are almost blank. The county belonged of old to the district of Pictavia and apparently was overrun for a brief period by the Romans. In the parish of Fetteresso are the remains of the camp of Raedykes, in which, according to tradition, the Cale- donians under Galgacus were lodged before their battle with Agricola. It is also alleged that in the same district Malcolm I. was killed (954) whilst endeavouring to reduce the unruly tribes of this region. Mearns, the alternative name for the county, is believed to have been derived from Mernia, a Scottish king, to whom the land was granted, and whose brother, Angus, had obtained the adjoining shire of Forfar. The antiquities consist mostly of stone circles, cairns, tumuli, standing stones and a structure in the parish of Dunnottar vaguely known as a " Picts

kiln." By an extraordinary reversion of fortune the town which gave the shire its name has practically vanished. It stood about 2 m. N.E. of Fettercairn, and by the end of the 16th century i had declined to a mere hamlet, being represented now only by

the ruins of the royal castle and an ancient burial-ground. The Bruces, earls of Elgin, also bear the title of earl of Kincardine.

See A. Jervise, History and Traditions of the Lands of the Lindsays (1853), History and Antiquities of the Mearns (1858), Memorials of Angus and the Mearns (1861); J. Anderson, The Black Book of Kin- cardineshire (Stonehaven, 1879); C. A. Mollyson, The Parish of For- doun (Aberdeen, 1893); A. C. Cameron, The History of Fettercairn (Paisley, 1899).

KINCHINJUNGA, or Kanchanjanga, the third (or second; see K2) highest mountain in the world. It is a peak of the eastern Himalayas, situated on the boundary between Sikkim and Nepal, with an elevation of 28,146 ft. Kinchinjunga is best seen from the Indian hill-station of Darjeeling, where the view of this stupendous mountain, dominating all intervening ranges and rising from regions of tropical undergrowth to the altitude of eternal snows, is one of the grandest in the world.

KIND (O. E. ge-cynde, from the same root as is seen in " kin," supra), a word in origin meaning birth, nature, or as an adjective, natural. From the application of the term to the natural disposition or characteristic which marks the class to which an object belongs, the general and most common meaning of " class," genus or species easily develops; that of race, natural order or group, is particularly seen in such expressions as " mankind." The phrase " payment in kind," i.e. in goods or produce as distinguished from money, is used as equivalent to the Latin in specie; in ecclesiastical usage " communion in both kinds " or " in one kind " refers to the elements of bread and wine (Lat. species) in the Eucharist. The present main sense of the adjective " kind," i.e. gentle, friendly, benevolent, has developed from the meaning " born," " natural," through " of good birth, disposition or nature," " naturally well-disposed."

KINDERGARTEN, a German word meaning " garden of children," the name given by Friedrich Froebel to a kind of "play-school" invented by him for furthering the physical, moral and intellectual growth of children between the ages of three and seven. For the theories on which this type of

school was based see Froebel. Towards the end of the 18th century Pestalozzi planned, and Oberlin formed, day-asylums for young children. Schools of this kind took in the Netherlands the name of " play school," and in England, where they have especially thriven, of "infant schools" (q.v.). But Froebel's idea of the " Kindergarten " differed essentially from that of the infant schools. The child required to be prepared for society by being early associated with its equals; and young children thus brought together might have their employments, especially their chief employment, play, so organized as to draw out their capacities of feeling and thinking, and even of inventing and creating.

Froebel therefore invented a course of occupations, most of which are social games. Many of the games are connected with the " gifts," as he called the simple playthings provided for the children. These " gifts " are, in order, six coloured balls, a wooden ball, a cylinder and a cube, a cube cut to form eight smaller cubes, another cube cut to form eight parallelo-grams, square and triangular tablets of coloured wood, and strips of lath, rings and circles for pattern-making. In modern kindergartens much stress has been laid on such occupations as sand-drawing, modelling in clay and paper, pattern-making, plaiting, &c. The artistic faculty was much thought of by Froebel, and, as in the education of the ancients, the sense of rhythm in sound and motion was cultivated by music and poetry introduced in the games. Much care was to be given to the training of the senses, especially those of sight, sound and touch. Intuition or first-hand experience (Anschauung) was to be recognized as the true basis of knowledge, and though stories were to be told, instruction of the imparting and " learning-up " kind was to be excluded. Froebel sought to teach the children not what to think but how to think, in this following in the steps of Pestalozzi, who had done for the child what Bacon nearly two hundred years before had done for the philosopher. Where possible the children were to be much in the open air, and were each to cultivate a little garden.

The first kindergarten was opened at Blankenburg, near Rudolstadt , in 1837, but after a needy existence of eight years was closed for want of funds. In 185 1 the Prussian government declared that " schools founded on Froebel's principles or principles like them could not be allowed." As early as 1854 it was introduced into England, and Henry Barnard reported on it that it was " by far the most original, attractive and philosophical form of infant development the worlc has yet seen " (Report to Governor of Connecticut, 1854). The great propagandist of Froebelism, the Baroness Berta von Marenholtz- Btilow (1811-1893), drew the attention of the French to the kinder- garten from the year 1855, and Michelet declared that Froebel had " solved the problem of human education." In Italy the kinder- garten was introduced by Madame Salis-Schwabe. In Austria it is recognized and regulated by the government, though the Volks-*

Kindergarten are not numerous. But by far the greatest develop- ments of the kindergarten system are in the United States and in Belgium. The movement was begun in the United States by Miss Elizabeth Peabody in 1867, aided by Mrs Horace Mann and Dr Henry Barnard. The first permanent kindergarten was established in St Louis in 1873 by Miss Susan Blow and Dr W. T. Harris. In Belgium the mistresses of the " Fxoles gardiennes " are instructed in the " idea of the kindergarten " and " Froebel's method," and in 1880 the minister of public instruction issued a programme for the " Ecoles Gardiennes Communales," which is both in fact and in profession a kindergarten manual.

For the position of the kindergarten system in the principal countries of the world see Report of a Consultative Committee upon the School Attendance of Children below the Age of Five, English Board of Education Reports (Cd. 4259, 1908); and " The Kindergarten," by Laura Fisher, Report of the United States Commissioner for Educa- tion for 1903, vol. i. eh. xvi. (Washington, 1905).

KINDl [Abu Yusuf Ya'qub ibn Ishaq ul-KindI, sometimes called pre-eminently " The Philosopher of the Arabs "] flourished in the 9th century, the exact dates of his birth and death being unknown. He was born in Kufa, where his father was governor under the Caliphs Mahdi and Harun al-Rashld. His studies were made in Basra and Bagdad, and in the latter place he remained, occupying according to some a government position. In the orthodox reaction under Motawakkil, when all philosophy was suspect, his library was confiscated, but he himself seems to have escaped. His writings— like those of other Arabian philosophers — are encyclopaedic and are concerned with most of the sciences; they are said to have numbered over two hundred, but fewer than twenty are extant. Some of these were known in the middle ages, for Kindl is placed by Roger Bacon in the first rank after Ptolemy as a writer on optics. His work De Somniorum Visione was translated by Gerard of Cremona (q.v.) and another was published as De medicinarum compositarum gradibus investigandis Libellus (Strassburg, 1531). He was one of the earliest translators and commentators of Aristotle, but like Farabi (q.v.) appears to have been superseded by Avicenna.

See G. Flugel, Al Kindt genannt der Philosoph der Araber (Leipzig, 1857), and T. J. de Boer, Geschickte der Philosophie im Islam (Stutt- gart, 1901), pp. 90 sqq. ; also Arabian Philosophy. (G. W. T.)

KINEMATICS (from Gr. nlvrifia, a motion), the branch of mechanics which discusses the phenomena of motion without reference to force or mass (see Mechanics).

KINETICS (from Gr. Kiveiv, to move), the branch of mechanics which discusses the phenomena of motion as affected by force; it is the modern equivalent of dynamics in the restricted sense (see Mechanics).

KING, CHARLES WILLIAM (1818-1888), English writer on ancient gems, was born at Newport (Mon.) on the 5th of September 1818. He entered Trinity College, Cambridge, in 1836; graduated in 1840, and obtained a fellowship in 1842; he was senior fellow at the time of his death in London on the 25th of March 1888. He took holy orders, but never held any cure. He spent much time in Italy, where he laid the founda- tion of his collection of gems, which, increased by subsequent purchases in London, was sold by him in consequence of his failing eyesight and was presented in 1881 to the Metropolitan Museum of Art, New York. King was recognized universally as one of the greatest authorities in this department of art. His chief works on the subject are: Antique Gems, their Origin, Uses and Value (i860), a complete and exhaustive treatise; The Gnostics and their Remains (2nd ed. by J. Jacobs, 1887, which

led to an animated correspondence in the Athenaeum); The Natural History of Precious Stones and Gems and of the Precious Metals (1865); The Handbook of Engraved Gems (2nd ed., 1885); Early Christian Numismatics (1873). King was thoroughly familiar with the works of Greek and Latin authors, especially Pausanias and the elder Pliny, which bore upon the subject in which he was most interested; but he had little taste for the minutiae of verbal criticism. In 1869 he brought out an edition of Horace, illustrated from antique gems; he also translated Plutarch's Moralia (1882) and the theosophical works of the Emperor Julian (1888) for Bonn's Classical Library.

KING, CLARENCE (1842-1901), American geologist, was born at Newport, Rhode Island, U.S.A., on the 6th of January 1842. He graduated at Yale in 1862. His most important work was the geological exploration of the fortieth parallel, of which the main reports (1876 and 1877) comprised the geological and topographical atlas of the Rocky Mountains, the Green River and Utah basins, and the Nevada plateau and basin. When the United States Geological Survey was consolidated in 1879 King was chosen director, and he vigorously conducted investigations in Colorado, and in the Eureka district and on the Comstock lode in Nevada. He held office for a year only; in later years his only noteworthy contribution to geology was an essay on the age of the earth, which appeared in the annual report of the Smithsonian Institution for 1893. He died at Phoenix, Arizona, on the

24th of December 1901.

KING, EDWARD (1612-1637), the subject of Milton's Lycidas, was born in Ireland in 161 2, the son of Sir John King, a member of a Yorkshire family which had migrated to Ireland. Edward King was admitted a pensioner of Christ's College, Cambridge, on the 9th of June 1626, and four years later was elected a fellow. Milton, though two years his senior and himself anxious to secure a fellowship, remained throughout on terms of the closest friendship with his rival, whose amiable character seems to have endeared him to the whole college. King served from 1633 to 1634 as praelector and tutor of his college, and was to have entered the church. His career, however, was cut short by the tragedy which inspired Milton's verse. In 1637 he set out for Ireland to visit his family, but on the roth of August the ship in which he was sailing struck on a rock near the Welsh coast, and King was drowned. Of his own writings many Latin poems contributed to different collections of Cambridge verse survive, but they are not of sufficient merit to explain the esteem in which he was held.

A collection of Latin, Greek and English verse written in his memory by his Cambridge friends was printed at Cambridge in 1638, with the title Justa Edotiardo King naufrago ab amicis moerentibus amoris el nvdas xapiv. The second part of this collection has a separate title-page, Obsequies to the Memorie of Mr Edward King, Anno Dom. 1638, and contains thirteen English poems, of which Lycidas l (signed J. M.) is the last.

KING, EDWARD (1829-1910), English bishop, was the second son of the Rev. Walter King, archdeacon of Rochester and rector of Stone, Kent. Graduating from Oriel College, Oxford, he was ordained in 1854, and four years later became chaplain and lecturer at Cuddesdon Theological College. He was principal at Cuddesdon from 1863 to 1873, when he became regius prof essor of pastoral theology at Oxford and canon of Christ Church. To the world outside he was only known at this time as one of Dr Pusey's most intimate friends and as a leading member of the English Church Union. But in Oxford, and especially among the younger men, he exercised an exceptional influence, due, not to special profundity of intellect, but to his remarkable charm in personal intercourse, and his abounding sincerity and goodness. In 1885 Dr King was made bishop of Lincoln. The most eventful episode of his episcopate was his prosecution (1888-1890)

1 J. W. Hales, in the Athenaeum for the 1st of August 1891, sug- gests that in writing King's elegy Milton had in his mind, besides the idylls of Theocritus, a Latin eclogue of Giovanni Baptista Amalteo entitled Lycidas, in which Lycidas bids farewell to the land he loves and prays for gentle breezes on his voyage. He was familiar with the Italian Latin poets of the

Renaissance, and he may also have been influenced in his choice of the name by the shepherd Lycidas in Sannazaro's eclogue Phillis.

for ritualistic practices before the archbishop of Canterbury, Dr Benson, and, on appeal, before the judicial committee of the Privy Council (see Lincoln Judgment). Dr King, who loyally conformed his practices to the archbishop's judgment, devoted himself unsparingly to the work of his diocese; and, irrespective of his High Church views, he won the affection and reverence of all classes by his real saintliness of character. The bishop, who never married, died at Lincoln on the 8th of March 19 10. See the obituary notice in The Times, March 9, 1910.

KING, HENRY (1591-1669), English bishop and poet, eldest son of John King, afterwards bishop of London, was baptized on the 16th of January 1591- With his younger brother John he proceeded from Westminster School to Christ Church, Oxford, where both matriculated on the 20th of January 1609. Henry King entered the church, and after receiving various ecclesiastical preferments he was made bishop of Chichester in 1642, receiving at the same time the rich living of Petworth, Sussex. On the 29th of December of that year Chichester surrendered to the Parliamentary army, and King was among the prisoners. After his release he found an asylum with his brother-in-law, Sir Richard Hobart of Langley, Buckinghamshire, and afterwards at Richkings near by, with Lady Salter, said to have been a sister of Dr Brian Duppa (1588-1662). King was a close friend of Duppa and personally acquainted with Charles I. In one of his poems dated 1649 he speaks of the Eikon Basilike as the king's own. work; Restored to his benefice at the Restoration, King died at Chichester on the 30th of September 1669. His works include Poems, Elegies, Paradoxes and Sonets (1657), The Psalmes of David from the New Translation of the Bible, turned into Meter (1651), and several sermons. He was one of the executors of John Donne, and prefixed an elegy to the 1663 edition of his friend's poems.

King's Poems and Psalms were edited, with a biographical sketch, by the Rev. J. Hannah (1843).

KING, RUFUS (1755-1827), American political leader, was born on the 24th of March 1755 at Scarborough, Maine, then a part of Massachusetts. He graduated at Harvard in 1777, read law at Newburyport, Mass., with Theophilus Parsons, and was admitted to the bar in 1780. He served in the Massachu- setts General Court in 1 783-1 784 and in the Confederation Con- gress in 1 784-1 787. During these critical years he adopted the " states' rights " attitude. It was largely through his efforts that the General Court in 1784 rejected the amendment to the Articles of Confederation authorizing Congress to levy a 5% impost. He was one of the three Massachusetts delegates in Congress in 1785 who refused to present the resolution of the General Court proposing a convention to amend the articles. He was also out of sympathy with the meeting at Annapolis in 1786. He did good service, however, in opposing the extension of slavery. Early in 1787 King was moved by the Shays Rebellion and by the influence of Alexander Hamilton to take a broader view of the general situation, and it was he who intro- duced the resolution in Congress, on the 21st of February 1787, sanctioning the call for the Philadelphia constitutional con- vention. In the convention he supported the large-state party, favoured a strong executive, advocated the suppression of the slave trade, and opposed the counting of slaves in determining the apportionment of representatives.

In 1788 he was one of the most influential members of the Massachusetts convention which ratified the Federal Constitution. He married Mary Alsop (1769-1819) of New York in 1786 and removed to that city in 1788. He was elected a member of the New York Assembly in the spring of 1789, and at a special session of the legislature held in July of that year was chosen one of the first representatives of New York in the United States Senate. In this body he served in 1 789-1 796, supported Hamilton's financial measures, Washington's neutrality proclamation and the Jay Treaty, and became one of the recognized leaders of the Federal- ist party. He was minister to Great Britain in 1796-1803 and again in 1825-1826, and was the Federalist candidate for vice- president in 1804 and 1808, and for president in 1816, when he

received 34 electoral votes to 183 cast for Monroe. He was again returned to the Senate in 1813, and was re-elected in 181 as the result of a struggle between the Van Buren and Clinton factions of the Democratic-Republican party. In the Missouri Compromise debates he supported the anti-slavery programme in the main, but for constitutional reasons voted against the second clause of the Tallmadge Amendment providing that all slaves born in the state after its admission into the Union should be free at the age of twenty-five years. He died at Jamaica, Long Island, on the 29th of April 1827.

The Life and Correspondence of Rufus King, begun about 1850 by his son, Charles King, was completed by his grandson, Charles R. King, and published in six volumes (New York, 1894-1900).

Rufus King's son, John Alsop King (1788-1867), was edu- cated at Harrow and in Paris, served in the war of 181 2 as a lieutenant of a cavalry company, and was a member of the New York Assembly in 1819-1821 and of the New York Senate in 1823. When his father was sent as minister to Great Britain in 1825 he accompanied him as secretary of the American legation, and when his father returned home on account of ill health he remained as charge d'affaires until August 1826. He was a member of the New York Assembly again in 1832 and in 1840, was a Whig representative in Congress in 1 849-1 851, and in 1857-1859 was governor of New York State. He was a prominent member of the Republican party, and in 1861 was a delegate to the Peace Conference in Washington.

Another son, Charles King (1789-1867), was also educated abroad, was

captain of a volunteer regiment in the early part of the war of 181 2, and served in 1814 in the New York Assembly, and after working for some years as a journalist was president of Columbia College in 1849-1864.

A third son, James Gore King (1791-1853), was an assistant adjutant-general in the war of 181 2, was a banker in Liverpool and afterwards in New York, and was president of the New York & Erie railroad until 1837, when by his visit to London he secured the loan to American bankers of £1,000,000 from the governors of the Bank of England. In 1849-1851 he was a representative in Congress from New Jersey.

Charles King's son, Rufus King (1814-1876), graduated at the U.S. Military Academy in 1833, served for three years in the engineer corps, and, after resigning from the army, became assistant engineer of the New York & Erie railroad. He was adjutant-general of New York state in 1839-1843, and became a brigadier-general of volunteers in the Union army in 1861, commanded a division in Virginia in 1862-1863, and, being com- pelled by ill health to resign from the army, was U.S. minister to the Papal States in 1 863-1 867.

His son, Charles King (b. 1844), served in the artillery until 1870 and in the cavalry until 1879; he was appointed brigadier- general U.S. Volunteers in the Spanish War in 1898, and served in the Philippines. He wrote Famous and Decisive Battles (1884), Campaigning with Crook (1890), and many popular romances of military life.

KING, THOMAS (1730-1805), English actor and dramatist, was born in London on the 20th of August 1730. Garrick saw him when appearing as a strolling player in a booth at Windsor, and engaged him for Drury Lane. He made his first appearance there in 1748 as the Herald in King Lear. He played the part of Allworth in the first presentation of Massinger's New Way to Pay Old Debts (1748), and during the summer he played Romeo and other leading parts in Bristol. For eight years he was the leading comedy actor at the Smock Alley theatre in Dublin, but in 1759 he returned to Drury Lane and took leading parts until 1802. One of his earliest successes was as Lord Ogleby in The Clandestine Marriage (1766), which was compared to Garrick's Hamlet and Kemble's Coriolanus, but he reached the climax of his reputation when he created the part of Sir Peter Teazle at the first representation of The School for Scandal (1777). He was the author of a number of farces, and part- owner and manager of several theatres, but his fondness for gambling brought him to poverty. He died on the nth of December 1805.

KING, WILLIAM (1650-1729), Anglican divine, the son of James King, an Aberdeen man who migrated to Antrim, was born in May 1650. He was

educated at Trinity College, Dublin, and after being presented to the parish of St Werburgh, Dublin, in 1679, became dean of St Patrick's in 1689, bishop of Derry in 1691, and archbishop of Dublin in 1702. In 1718 he founded the divinity lectureship in Trinity College, Dublin, which bears his name. He died in May 1729. King was the author of The Stale of the Protestants in Ireland under King James's Government (1691), but is best known by his De Origins Mali (1702; Eng. trans., 1731), an essay deemed worthy of a reply by Bayle and Leibnitz. King was a strong supporter of the Revolution, and his voluminous correspondence is a valuable help to our know- ledge of the Ireland of his day.

See A Great Archbishop of Dublin, William King, D.D., edited by Sir C. S. King, Bart. (1908).

KING, WILLIAM (1663-1712), English poet and miscellaneous writer, son of Ezekiel King, was born in 1663. From his father he inherited a small estate and he was connected with the Hyde family. He was educated at Westminster School under Dr Busby, and at Christ Church, Oxford (B.A. 1685; D.C.L. 1692). His first literary enterprise was a defence of Wycliffe, written in conjunction with Sir Edward Hannes (d. 17 10) and entitled Reflections upon Mons. Varillas's History of Heresy . . . (1688). He became known as a humorous writer on the Tory and High Church side. He 'took part in the controversy aroused by the conversion of the once stubborn non-juror William Sherlock, one of his contributions being an entertaining ballad, " The Battle Royal," in which the disputants are Sherlock and South. In 1694 he gained the favour of Princess Anne by a defence of her husband's country entitled Animadversions on the Pretended Account of Denmark, in answer to a depreciatory pamphlet by Robert (afterwards Viscount) Molesworth. For this service he was made secretary to the princess. He supported Charles Boyle in his controversy with Richard Bentley over the genuine- ness of the Epistles of Phalaris, by a letter (printed in Dr Bent- ley's Dissertations . . . (1698), more commonly known as Boyle against Bentley), in which he gave an account of the cir- cumstances of Bentley's interview with the bookseller Bennet. Bentley attacked Dr King in his Dissertation in answer (1699) to this book, and King replied with a second letter to his friend Boyle. He further satirized Bentley in ten Dialogues of the Dead relating to . . . the Epistles of Phalaris (1699). In 1700 he pub- lished The Transactioneer , with some of his Philosophical Fancies, in two Dialogues, ridiculing the credulity of Hans Sloane, who was then the secretary of the Royal Society. This was followed up later with some burlesque Useful Transactions in Philosophy (1709). By an able defence of his friend, James Annesley, 5th earl of Anglesey, in a suit brought against him by his wife before the House of Lords in 1701, he gained a legal reputation which he did nothing further to advance. He was sent to Ireland in 1 701 to be judge of the high court of admiralty, and

later became sole commissioner of the prizes, keeper of the records in the Bermingham Tower of Dublin Castle, and vicar-general to the primate. About 1708 he returned to London. He served the Tory cause by writing for The Examiner before it was taken up by Swift. He wrote four pamphlets in support of Sacheverell, in the. most considerable of which, " A Vindication of the Rev. Dr Henry Sacheverell … in a Dialogue between a Tory and a Whig " (1711), he had the assistance of Charles Lambe of Christ Church and of Sacheverell himself. In December 1711 Swift obtained for King the office of gazetteer, worth from £200 to £250. King was now very poor, but he had no taste for work, and he resigned his office on the 1st of July 1712. He died on the 25th of December in the same year.

The other works of William King include: A Journey to London, in theyear 16Q8. After the Ingenious Method of that madeby Dr Martin Lister to Paris, in the same Year . . . (1699), which was considered by the author to be his best work; Adversaria, or Occasional Remarks on Men and Manners, a selection from his critical note-book, which shows wide and varied reading; Rufinus, or An Historical Essay on the Favourite Ministry (1712), a satire on the duke of Marlborough. I His chief poems are: The Art of Cookery: in imitation of Horace's

Art of Poetry. With some Letters to Dr Lister and Others (1708), one of his most amusing works; The Art of Love; in imitation of Ovid . . . (1709) ; Mully of Mountoun," and a burlesque " Orpheus and Eury- e ' ,. A „ volume of Miscellanies in Prose and Verse appeared in 1705; his , Remains were edited by J. Brown in 1732 ; and in

1776 John Nichols produced an excellent edition of his Original Works . . .with Historical Notes and Memoirs of the Author Dr Johnson included him in his Lives of the Poets, and his works appear in subsequent collections.

King is not to be confused with another William King (1685- 1763), author of a mock-heroic poem called The Toast (l736)satirizing the countess of Newburgh, and principal of St Mary Hall, Oxford.

KING [OF OCKHAM], PETER KING, ist Baron (1669-1734), lord chancellor of England, was born at Exeter in 1669. In his youth he was interested in early church history, and published anonymously in 1691 An Enquiry into the Constitution, Discipline, Unity and Worship of the Primitive Church that flourished within the first Three Hundred Years after Christ. This treatise engaged the interest of his cousin, John Locke, the philosopher, by whose advice his father sent him to the university of

Leiden, where he stayed for nearly three years. He entered the Middle Temple in 1694 and was called to the bar in 1698. In 1700 he was returned to parliament for Beer Alston in Devonshire; he was appointed recorder of Glastonbury in 1705 and recorder of London in 1708. He was chief justice of the common pleas from 1714 to 1725, when he was appointed speaker of the House of Lords and was raised to the peerage. In June of the same year he was made lord chancellor, holding office until compelled by a paralytic stroke to resign in 1733. He died at Ockham, Surrey, on the 22nd of July 1734. Lord King as chancellor failed to sustain the reputation which he had acquired at the common law bar. Nevertheless he left his mark on Eng- lish law by establishing the principles that a will of immovable property is governed by the lex loci rei sitae, and that where a husband had a legal right to the personal estate of his wife, which must be asserted by a suit in equity, the court would not help him unless he made a provision out of the property for the wife if she required it. He was also the author of the Act (4 Geo. Il' c. 26) by virtue of which English superseded Latin as the lan- guage of the courts. Lord King published in 1702 a History of the Apostles' Creed (Leipzig, 1706; Basel, 1750) which went through several editions and was also translated into Latin.

His great-great-grandson, William (1805-1893), married in 1835 the only daughter of Lord Byron the poet, and was created earl of Lovelace in 1838. Another descendant, Peter John Locke King (1811-1885), who was member of parliament for East Surrey from 1847 to 1874, won some fame as an advocate of reform, being responsible for the passing of the Real Estate Charges Act of 1854, and for the repeal of a large number of obsolete laws.

KING (O. Eng. cyning, abbreviated into cyng, cing; cf. O. H. G chun- ktining, chun- kunig, M.H.G. kilnic, ktinec, kunc, Mod! Ger. Kbnig, O. Norse konungr, kongr, Swed. konung, kung), a title, in its actual use generally implying sovereignty of the most exalted rank. Any inclusive definition of the word " king " is however, impossible. It always implies sovereignty, but in no special degree or sense; e.g. the sovereigns of the British Empire and of Servia are both kings, and so too, at least in popular parlance, are the chiefs of many barbarous peoples, e.g. the Zulus. The use of the title is, in fact, involved in considerable confusionj largely the result of historic causes. Freeman, indeed, in his Comparative Politics (p. 138) says: " There is a common'idea of kingship which is at once recognized however hard it may be to define it. This is shown among other things by the fact that no difficulty is ever felt as to translating the word king and the words which answer to it in other languages." This, however, is subject to considerable modification. "King," for instance, is used to translate the Homeric &»a£ equally with the Athenian ffaciXtvs or the Roman rex. Yet the Homeric " kings " were but tribal chiefs; while the Athenian and

Roman kings were kings in something more than the modern sense, as supreme priests as well as supreme rulers and lawgivers (see Archon; and Rome- History). In the English Bible, too, the title of king is given indiscriminately to the great king of Persia and to potentates

who were little more than Oriental sheiks. A more practical difficulty, moreover, presented itself in international intercourse, before diplomatic conventions became, in the 19th century, more or less stereotyped. Originally the title of king was superior to that of emperor, and it was to avoid the assumption of the superior title of rex that the chief magistrates of Rome adopted the names of Caesar, imperalor and princeps to signalize their authority. But with the development of the Roman imperial idea the title emperor came to mean more than had been in- volved in that of rex; very early in the history of the Empire there were subject kings; while with the Hellenizing of the East Roman Empire its rulers assumed the style of /WiXew, no longer to be translated " king " but " emperor." From 'this Roman conception of the supremacy of the emperor the medieval Empire of the West inherited its traditions. With the bar- barian invasions the Teutonic idea of kingship had come into touch with the Roman idea of empire and with the theocratic conceptions which this had absorbed from the old Roman and Oriental views of kingship. With these the Teutonic kingship had in its origin but little in common.

Etymologically the Romance and Teutonic words for king have quite distinct origins. The Latin rex corresponds to the Sanskrit rajah, and meant originally steersman. The Teutonic king on the contrary corresponds to the Sanskrit ganaka, and " simply meant father, the father of a family, the king of his own kin, the father of a clan, the father of a people." 1 The Teu- tonic kingship, in short, was national; the king was the supreme representative of the people, " hedged with divinity " in so far as he was the reputed descendant of the national gods, but with none of that absolute theocratic authority associated with the titles of rex or /WtXeto. This, however, was modified by contact with Rome and Christianity. The early Teutonic conquerors had never lost their reverence for the Roman emperor, and were from time to time proud to acknowledge their inferiority by accepting titles, such as " patrician," by which this was implied. But by the coronation of Charles, king of the Franks, as emperor of the West, the German kingship was absorbed into the Roman imperial idea, a process which exercised a profound effect on the evolution of the Teutonic kingship generally. In the symmetri- cal political theory of medieval Europe pope and emperor were sun and moon, kings but lesser satellites; though the theory only partially and occasionally corresponded with the facts. But the elevation of Charlemagne had had a profound effect in modifying the

status of kingship in nations that never came under his sceptre nor under that of his successors. The shadowy claim of the emperors to universal dominion was in theory everywhere acknowledged; but independent kings hastened to assert their own dignity by surrounding themselves with the ceremonial forms of the Empire and occasionally, as in the case of the Saxon bretwaldas in England, by assuming the imperial style. The mere fact of this usurpation showed that the title of king was regarded as inferior to that of emperor; and so it continued, as a matter of sentiment at least, down to the end of the Holy Roman Empire in 1806 and the cheapening of the imperial title by its multiplication in the 19th century. To the

1 Max Mfiller, Led. Sci. Lang., 2nd series, p. 255, " All people, save those who fancy that the name king has something to do with a 1 artar khan or with a ' canning ' . . . man, are agreed that the Eng- lish cyning and the Sanskrit ganaka both come from the same root,

Ji" U r- wide 'y s P read ro °t whence comes our own cyn or kin and the Greek ytvos. The only question is whether there is any connexion between cyning and ganaka closer than that which is implied in their both coming from the same original root. That is to say, are we to suppose that cyning and ganaka are strictly the same word common to Sanskrit and Teutonic, or is it enough to think that cyning is an independent formation made after the Teutons had separated themselves from the common stock ? . . . The differ- ence between the two derivations is not very remote, as the cyn is the ruling idea in any case; but if we make the word immediately cognate with ganaka we bring in a notion about ' the father of his people which has no place if we simply derive cyning from cyn." See also O. Schrader, Reallexikon der Indogermanischen Altertums- kunde (Strassburg, 1901) s.v. " Konig ": the chuning (King) is but the chunni (Kin) personified; cf. A.S. liod masc. = " prince "; Uod femi = " race," i.e. Lat. gens.

last, moreover, the emperor retained the prerogative of creating kings, as in the case of the king of Prussia in 1701, a right bor- rowed and freely used by the emperor Napoleon. Since 1814 the title of king has been assumed or bestowed by a consensus of the Powers; e.g. the elector of Hanover was made king by the con- gress of Vienna (1814), and per contra the title of king was refused to the elector of Hesse by the congress of Aix-la-Chapelle (1818). In general the title of king is now taken to imply a sovereign and independent international position. This was implied in the recognition of the title of king in the rulers of Greece, Rumania, Servia and Bulgaria when these countries were declared abso- lutely independent of Turkey. The

fiction of this independent sovereignty is preserved even in the case of the kings of Bavaria, Saxony and Wiirttemberg, who are technically members of a free confederation of sovereign states, but are not independent, since their relations with foreign Powers are practically con- trolled by the king of Prussia as German emperor.

The theory of the " divine right " of kings, as at present understood, is of comparatively modern growth. The principle DMae that the kingship is " descendible in one sacred Right of family," as George Canning put it, is not only still Kings. tnat f tne British constitution, as that of all mon- archical states, but is practically that of kingship from the be- ginning. This is, however, quite a different thing from asserting with the modern upholders of the doctrine of " divine right " not only that " legitimate " monarchs derive their authority from, and are responsible to, God alone, but that this authority is by divine ordinance hereditary in a certain order of succession. The power of popular election remained, even though popular choice was by custom or by religious sentiment confined within the limits of a single family. The custom of primogeniture grew up owing to the obvious convenience of a simple rule that should avoid ruinous contests; the so-called "Salic Law " went further, and by excluding females, removed another possible source of weakness. Neither did the Teutonic kingship imply absolute power. The idea of kingship as a theocratic function which played so great a part in the political controversies of the 17th century, is due ultimately to Oriental influences brought to bear through Christianity. The crowning and anointing of the emperors, borrowed from Byzantium and traceable to the influence of the Old Testament, was imitated by lesser poten- tates; and this "sacring " by ecclesiastical authority gave to the king a character of special sanctity. The Christian king thus became, in a sense, like the Roman rex, both king and priest. Shakespeare makes Richard II. say, " Not all the water in the rough rude sea can wash the balm off from an anointed king " (act iii. sc. 2); and this conception of the kingship tended to gather strength with the weakening of the prestige of the papacy and of the clergy generally. Before the Reformation the anointed king was, within his realm, the accredited vicar of God for secu- lar purposes; after the Reformation he became this in Protestant states for religious purposes also. In England it is not without significance that the sacerdotal vestments, generally discarded by the clergy — dalmatic, alb and stole — continued to be among the insignia of the sovereign (see Coronation). Moreover, this sacrosanct character he acquired not by virtue of his " sacring," but by hereditary right; the coronation, anointing and vesting were but the outward and visible symbol of a divine grace adherent in the sovereign by virtue of his title. Even Roman Catholic monarchs, like Louis XIV., would never have admitted that their coronation by the archbishop constituted any part of their title to reign; it was no more than the conse- cration of

their title. In England the doctrine of the divine right of kings was developed to its extremest logical conclusions during the political controversies of the 17th century. Of its exponents the most distinguished was Hobbes, the most exagger- ated Sir Robert Filmer. It was the main issue to be decided by the Civil War, the royalists holding that " all Christian kings, princes and governors "derive their authority direct from God, the parliamentarians that this authority is the outcome of a contract, actual or implied, between sovereign and people. In one case the king's power would be unlimited, according to

Louis XIV. 's famous saying: " L' Stat, e'est moi !" or limitable only by his own free act; in the other his actions would be governed by the advice and consent of the people, to whom he would be ultimately responsible. The victory of this latter principle was proclaimed to all the world by the execution of Charles I. The doctrine of divine right, indeed, for a while drew nourishment from the blood of the royal " martyr "; it was the guiding principle of the Anglican Church of the Restora- tion; but it suffered a rude blow when James II. made it impos- sible for the clergy to obey both their conscience and their king; and the revolution of 1688 made an end of it as a great political force. These events had effects far beyond England. They served as precedents for the crusade of republican France against kings, and later for the substitution of the democratic kingship of Louis Philippe, " king of the French by the grace of God and the will of the people," for the "legitimate" kingship of Charles X., " king of France by the grace of God."

The theory of the crown in Britain, as held by descent modified and modifiable by parliamentary action, and yet also " by the grace of God," is in strict accordance with the earliest traditions of the English kingship; but the rival theory of inalienable divine right is not dead. It is strong in Germany and especially in Prussia; it survives as a militant force among the Carlists in Spain and the Royalists in France (see Legitimists) ; and even in England a remnant of enthusiasts still maintain the claims of a remote descendant of Charles I. to the throne (see Jacobites).

See J. Neville Figgis, Theory of the Divine Right of Kings (Cambridge, 1896). (W. A. P.)

KING-BIRD, the Lanius tyrannus of Linnaeus, and the Tyrannus carolinensis or T. pipiri of most later writers, a com- mon and characteristic inhabitant of North America, ranging as high as 57° N. lat. or farther, and westward to the Rocky Mountains, beyond which it is found in Oregon, in Washington (State), and in British Columbia, though apparently not occurring in California. In Canada and the northern states of the Union it is a summer visitor, wintering in the south, but also reaching

Cuba; and, passing through Central America, it has been found in Bolivia and eastern Peru. Both the scientific and common names of this species are taken from the way in which the cock will at times assume despotic authority over other birds, attack- ing them furiously as they fly, and forcing them to divert or altogether desist from their course. Yet it is love of his mate or his young that prompts this bellicose behaviour, for it is only in the breeding season that he indulges in it; but then almost every large bird that approaches his nest, from an eagle down- wards, is assaulted, and those alone that possess greater command of flight can escape from his repeated charges, which are accom- panied by loud and shrill cries. On these occasions it may be that the king-bird displays the emblem of his dignity, which is commonly concealed; for, being otherwise rather plainly coloured — dark-ashy grey above and white beneath — the erectile feathers of the crown of the head, on being parted, form as it were a deep furrow, and reveal their base, which is of a bright golden-orange in front, deepening into scarlet, and then passing into silvery white. This species seems to live entirely on insects, which it captures on the wing ; it is in bad repute with bee-keepers, 1 though, according to Dr E. Coues, it " destroys a thousand noxious insects for every bee it eats." It builds, often in an exposed situation, a rather large nest, coarsely constructed out- side, but neatly lined with fine roots or grasses, and lays five or six eggs of a pale salmon colour, beautifully marked with blotches and spots of purple, brown and orange, generally disposed in a zone near the larger end.

Nearly akin to the king-bird is the petchary or chicheree, so called from its loud and petulant cry, T. dominicensis , or T. griseus, one of the most characteristic and conspicuous birds of the West Indies, and the earliest to give notice of the break of day. In habits, except that it eats a good many berries, it is the very counterpart of its congener, and is possibly even more jealous of any intruder. At all events its pugnacity extends to

1 It is called in some parts the bee-martin. 1

animals from which it could not possibly receive any harm, and is hardly limited to any season of the year.

In several respects both of these birds, with several of their allies, resemble some of the shrikes; but it must be clearly under- stood that the likeness is but of analogy, and that there is no near affinity between the two families Laniidae and Tyrannidae, which belong to wholly distinct sections of the great Passerine

order; and, while the former is a comparatively homogeneous group, much diversity of form and habits is found among the latter. Similarly many of the smaller Tyrannidae bear some analogy to certain Muscicapidae, with which they were at one time confounded (see Flycatcher), but the difference between them is deep seated. 1 Nor is this all, for out of the seventy genera, or thereabouts, into which the Tyrannidae have been divided, comprehending perhaps three hundred and fifty species, all of which are peculiar to the New World, a series of forms can be selected which find a kind of parallel to a series of forms to be found in the other group of Patseres; and the genus Tyrannus, though that from which the family is named, is by no means a fair representative of it; but it would be hard to say which genus should be so accounted. The birds of the genus Muscisaxicola have the habits and almost the appearance of wheat-ears; the genus Alectorurus calls to mind a water- wagtail ; Euscarthmus may suggest a titmouse, Elamea perhaps a willow- wren; but the greatest number of forms have no analogous bird of the Old World with which they can be compared; and, while the combination of delicate beauty and peculiar external form possibly attains its utmost in the long-tailed Milvulus, the glory of the family may be said to culminate in the king of king-birds, Muscivora regia. ‘ (A. N.)

KING-CRAB, the name given to an Arachnid, belonging to the order Xiphosurae, of the grade Delobranchia or Hydropneu- stea. King-crabs, of which four, possibly five, existing species are known, were formerly referred to the genus Limulus, a name still applied to them in all zoological textbooks. It has recently been shown, however, that the structural differences between

1 Two easy modes of discriminating them externally may be mentioned. All the Laniidae and Muscicapidae have but nine primary quills in their wings, and their tarsi are covered with scales in front only; while in the Tyrannidae there are ten primaries, and the tarsal scales extend the whole way round. The more recondite distinction in the structure of the trachea seems to have been first detected by Macgillivray, who wrote the anatomical descriptions published in 1839 by Audubon (Orn. Biography, v. 421, 422); but its value was not appreciated till the publication of Johannes Miiller’s classical treatise on the vocal organs of Passerine birds (Abhandl. k. Akad. Wissensch. Berlin, 1845, pp. 321, 405).

some of the species are sufficiently numerous and important to warrant the recognition of three genera — Xiphosura, of which Limulus is a synonym, Tachypleus and Carcinoscorpius. In Xiphosura the genital operculum structurally resembles the gill-bearing appendages in that the inner

branches consist of three distinct segments, the distal of which is lobate and projects freely beyond the margin of the adjacent distal segment of the outer branch; the entosternite (see Arachnida) has two pairs of antero-lateral processes, and in the male only the ambulatory appendages of the second pair are modified as claspers. In Tachypleus and Carcinoscorpius, on the other hand, the genital operculum differs from the gill-bearing appendages in that the inner branches consist of two segments, the distal of which are apically pointed, partially or completely fused in the middle line, and do not project beyond the distal segments of the outer branches; the entosternite has only one pair of antero-lateral processes, and in the male the second and third pairs of ambulatory limbs are modified as claspers. Tachypleus differs from Carcinoscorpius in possessing a long movable spur upon the fourth segment of the sixth ambulatory limb, in having the postanal spine triangular in section instead of round, and the claspers in the male he:nichelate, owing to the suppression of the immovable finger, which is well developed in Carcinoscorpius. At the present time king-crabs have a wide but discontinuous distribution.' Xiphosura, of which there is but one species, X. polyphemus, ranges along the eastern side of North America from the coast of Maine to Yucatan. Carcinoscorpius, which is also represented by a single species, C. rotundicauda, extends from the Bay of Bengal to the coast of the Moluccas and the Philippines, while of the two better-known species of Tachypleus, T. gigas (= moluccanus) ranges from Singapore to Torres Straits, and T. tridentatus from Borneo to southern Japan. A third species, T. hoeveni, has been recorded from the Moluccas. But although Xiphosura is now so widely sundered geographically from Tachypleus and Carcinoscorpius, the occurrence of the remains of extinct species of king-crabs in Europe, both in Tertiary deposits and in.Triassic, Jurassic and Cretaceous strata, suggests that there was formerly a continuous coast-line, with tropical or temperate conditions, extending from Europe west- ward to America, and eastward to southern Asia. There are, however, no grounds for the assumption that the supposed coast-line between America and Europe synchronized with that between Europe and south Asia. King-crabs do not appear to differ from each other in habits. Except in the breeding season they live in water ranging in depth from about two to six fathoms, and creep about the bottom or bury themselves in the sand. Their food consists for the most part of soft marine worms, which are picked up in the nippers, thrust into the ■ mouth, and masticated by the basal segments of the appendages between which the mouth lies. At the approach of the breeding season, which in the case of Xiphosura polyphemus is in May, June and July, king-crabs advance in pairs into very shallow water at the time of the high tides, the male holding securely to the back of the female by means of his clasping nippers. No actual union between the sexes takes place, the spawn of the female being fertilized by the male at the time of being laid in the sand or soon afterwards. This act

accomplished, the two retreat again into deeper water. Deposited in the mud or sand near high-water mark, the eggs are eventually hatched by the heat of the sun, to which they are exposed every day for a considerable time. The newly hatched young is minute and subcircufar in shape, but bears a close resemblance to its parents except in the absence of the caudal spine and in the presence of a fringe of stiff bristles round the margin of the body. During growth it undergoes a succession of moults, making its exit from the old integument through a wide split running round the edge of the carapace. Moulting is effected in exactly the same way in scorpions, Pedipalpi, and normally in spiders. The caudal spine appears at the second moult and gradually increases in length with successive changes of the skin. This organ is of considerable importance, since it enables the king-crab to right itself when overturned by rough water or other causes. Without it the

animal would remain helpless like an upturned turtle, because it is unable to reach the ground with its legs when lying on its back. Before the tail is sufficiently developed to be used for that purpose, the young king-crab succeeds in regaining the normal position by flapping its flattened abdominal appendages and rising in the water by that means. The king-crab fishery

Fig. i.

1, Limulus polyphemus, adult (dorsal aspect).

2, Limulus polyphemus, young (dorsal aspect).

3, Prestwichia rotundata, Coal M., Shropshire.

4, Prestwichia Birtwelli, Coal M., Lancashire.

5, Neolimulus falcatus, U. Silurian, Lanark.

6, Hemiaspis limuloides, L. Ludlow, Leintwardine, Shropshire.

7, Pseudoniscus aculeatus, U. Silurian, Russia.

is an industry of some importance in the United States, and in the East Indies the natives eat the animal and tip their lances and arrows with the caudal spine. They also use the hollow empty shell as a water-ladle or pan — hence the name " pan-fish " or " saucepan-crab " by which the animal is sometimes known. Fossil king-crabs have been recorded from strata of

the Tertiary and Secondary epochs, and related but less specialized types of the same order are found in rocks of Palaeozoic age. Of these the most important are Belinurus of the Carboniferous, Proto- limulus of the Devonian, and Hemiaspis of the Silurian periods. These ancient forms differ principally from true king-crabs in having the segments of the opisthosoma or hinder half of the body distinctly defined instead of welded into a hexagonal shield. (R. I. P.)

KINGFISHER (Ger. 1 Konigsfischer; Walloon Roi-ptheux = pecheur), the Alcedo ispida of ornithologists, one of the most beautiful and well-known of European birds, being found, though nowhere Very abundantly, in every European country, as well as in North Africa and South-Western Asia as far as Sindh. Its blue-green back and rich chestnut breast render it conspicuous as it frequents the streams and ponds whence it procures its food, by plunging almost perpendicularly into the water, and emerging a moment after with the prey — whether a small fish, crustacean, or an aquatic insect — it has captured. In hard frosts it resorts

1 But more commonly called Eisvogel, which finds its counterpart in the Anglo-Saxon Isern or Isen.

to the sea-shore, hut a severe winter is sure to occasion a great mortality in the species, for many of its individuals seem unable to reach the tidal waters where only in such a season they could obtain sustenance; and to this cause rather than any other is perhaps to be ascribed its general scarcity. Very early in the year it prepares its nest, which is at the end of a tunnel bored by itself in a bank, and therein the six or eight white, glossy, translucent eggs are laid, sometimes on the bare soil, but often on the fishbones which, being indigestible, are thrown up in pellets by the birds; and, in any case, before incubation is completed these rejectamenta accumulate so as to form a pretty cup-shaped structure that increases in bulk after the young are hatched, but, mixed with their fluid excretions and with decaying fishes brought for their support, soon becomes a dripping fetid mass. The kingfisher is the subject of a variety of legends and superstitions, both classical and medieval. Of the latter one of the most curious is that having been originally a plain grey bird it acquired its present bright colours by flying towards the sun on its liberation from Noah's ark, when its upper surface assumed the hue of the sky above it and its lower plumage was scorched by the heat of the setting orb to the tint it now bears. 2 More than this, the kingfisher was supposed to possess many virtues. Its dried body would avert thunderbolts, and if kept in a ward- robe would preserve from moths the woollen stuffs therein laid, or hung by a thread to the ceiling of a chamber would point with its bill to the quarter whence the wind blew. All readers of Ovid (Metam., bk. xi.) know how the faithful but unfortunate Ceyx and Alcyone were changed into kingfishers — birds

which bred at the winter solstice, when through the influence of Aeolus, the wind-god and father of the fond wife, all gales were hushed and the sea calmed so that their floating nest might ride un- injured over the waves during the seven proverbial " Halcyon days"; while a variant or further development of the fable assigned to the halcyon itself the power of quelling storms. 3

The common kingfisher of Europe is the representative of a well-marked family of birds, the Alcedinidae or Haley onidae of ornithologists, which is considered by most authorities 4 to be closely related to the Bucerotidae (see Hornbill) ; but the affinity can scarcely be said as yet to be proved. Be that as it may, the present family forms the subject of an important work by Bowdler Sharpe. 6 Herein are described one hundred and twenty- five species, nearly all of them being beautifully figured by Keulemans, and that number may be taken even now as approximately correct; for, while the validity of a few has been denied by some eminent men, nearly as many have since been made known, and it seems likely that two or three more described by older writers may yet be rediscovered. These one hundred and twenty-five species Sharpe groups in nineteen genera, and divides into two sub-families, Alcedininae and Daceloninae, 6 the one containing five and the other fourteen genera. With existing anatomical materials perhaps no better arrangement could have been made, but the method afterwards published by Sundevall {Tentamen, pp. 95, 96) differs from it not inconsiderably. Here, however, it will be convenient to follow Sharpe. Externally, which is almost all we can at present say, kingfishers present a great uniformity of structure. One of their most remarkable features is the feeble- ness of their feet, and the union (syndactylism) of the third and fourth digits for the greater part of their length; while, as if still

2 Rolland, Faune populaire de la France, ii. 74.

3 In many of the islands of the Pacific Ocean the prevalent king- fisher is the object of much veneration.

4 Cf. Eyton, Contrib. Ornithology (1850), p. 80; Wallace, Ann. Nat. History, series 2, vol. xviii. pp. 201,205; and Huxley, Proc. Zool. Society (1867), p. 467.

6 A Monograph of the Alcedinidae or Family of the Kingfishers, by R. B. Sharpe, 4to (London, 1868-1871). Some important anatomical points were briefly noticed by Professor Cunningham (Proc. Zoel. Soc, 1870, p. 280).

6 The name of this latter sub-family as constituted by Sharpe would seem to be more correctly Ceycinae — the genus Ceyx, founded in 1801 by

Lac6p6de, being the oldest included in it. The word Dacelo, invented by Leach in 1815, is simply an anagram of Alcedo, and, though of course without any etymological meaning, has been very generally adopted.

further to show the comparatively functionless character of these members, in two of the genera, Alcyone and Ceyx, the second digit is aborted, and the birds have but three toes. In most forms the bill does not differ much from that of the common Alcedo ispida, but in Syma its edges are serrated, while in Carcineutes, Dacelo and Melidora the maxilla is prolonged, becoming in the last a very pronounced hook. Generally the wings are short and rounded, and the tail is in many forms incon- spicuous; but in Tanysiptera, one of the most beautiful groups, the middle pair of feathers is greatly elongated and spatulate, while this genus possesses only ten rectrices, all the rest having twelve. Sundevall relies on a character not noticed by Sharpe, and makes his principal divisions depend on the size of the scapulars, which in one form a mantle, and in the other are so small as not to cover the back. The Alcedinidae are a cosmo- politan family, but only one genus, Ceryle, is found in America, and that extends as well over a great part of the Old World, though not into the Australian region, which affords by far the greater number both of genera and species, having no fewer than ten of the former and fifty-nine of the latter peculiar to it. 1

In habits kingfishers display considerable diversity, though all, it would seem, have it in common to sit at times motionless on the watch for their prey, and on its appearance to dart upon it, seize it as they fly or dive, and return to a perch where it may be conveniently swallowed. But some species, and especially that which is the type of the family, are not always content to await at rest their victim's showing itself. They will hover like a hawk over the waters that conceal it, and, in the manner already described, precipitate themselves upon it. This is particularly the way with those that are fishers in fact as well as in name; but no inconsiderable number live almost entirely in forests, feeding on insects, while reptiles furnish the chief susten- ance of others. The last is characteristic of at least one Aus- tralian form, which manages to thrive in the driest districts of that country, where not a drop of water is to be found for miles, and the air is at times heated to a degree that is insupportable by most animals. The belted kingfisher of North America, Ceryle alcyon, is a characteristic bird of that country, though its habits greatly resemble those of the European species; and the so-called " laughing jackass " of New South Wales and South Australia, Dacelo gigas — with its kindred forms, D. leachi,

D. cervina and D. occidentalis, from other parts of the country — deserve special mention. Attention must also be called to the speculations of Dr Bowdler Sharpe (op. cit., pp. xliv.xlvii.) on the genetic affinity of the various forms of Alcedinidae, and it is to be regretted that hitherto no light has been shed by palaeon tologists on this interesting subject, for the only fossil referred to the neighbourhood of the family is the Halcyornis toliapicus of Sir R. Owen (Br. Foss. Mamm. and Birds, p. 554) from the Eocene of Sheppey — the very specimen said to have been pre- viously placed by Konig (Icon. foss. secliles, fig. 153) in the genus Lams. (A. N.)

KINGHORN, a royal and police burgh of Fifeshire, Scotland. Pop. (1901), 1550. It is situated on the Firth of Forth, 2\ m.

E. by N. of Burntisland, on the North British railway. The public buildings include a library and town-hall. It enjoys some repute as a summer resort. The leading industries are ship-building, bleaching and the making of flax and glue. At the time of his visit Daniel Defoe found thread-making in vogue, which employed the women while the men were at sea. Alex- ander III. created Kinghorn a burgh, but his connexion with the town proved fatal to him. As he was riding from Inverkeithing on the 1 2th of March 1286 he was thrown by his horse and fell over the cliffs, since called King's Wud End, a little to the west of the burgh, and killed. A monument was erected in 1887 to mark the supposed scene of the accident. The Witch Hill used to be the place of execution of those poor wretches. King- horn belongs to the Kirkcaldy district group of parliamentary burghs. At Pettycur, i m. to the south, is a good harbour for its size, and at Kinghorn Ness a battery has been established in connexion with the fortifications on Inchkeith. The hill

- Cf. Wallace. Geog. Distr. Animals, ii. 315.

above the battery was purchased by government in 1903 and is used as a point of observation. About 1 m. to the north of Kinghorn is the estate of Grange, which belonged to Sir William Kirkcaldy. Inchkeith, an island in the fairway of the Firth of Forth, i\ m. S. by E. of Kinghorn and 3§ m. N. by E. of Leith, belongs to the parish of Kinghorn. It has a north- westerly and south-easterly trend, and is nearly 1 m. long and \ m. wide. It is a barren rock, on the summit of which stands a lighthouse visible at night for 21m. In 188 r forts connected by a military road were erected on the northern, western and southern headlands.

KINGLAKE, ALEXANDER WILLIAM (1809-1891), English historian and traveller, was born at Taunton on the 5th of August 1809. His father, a successful solicitor, intended his son for a legal career. Kinglake went to Eton and Trinity College, Cambridge, where he matriculated in 1828, being a con- temporary and friend of Tennyson and Thackeray. After leaving

Cambridge he joined Lincoln's Inn, and was called to the bar in 1837. While still a student he travelled, in 1835, throughout the East, and the impression made upon him by his experiences was so powerful that he was seized with a desire to record them in literature. Eotlien, a sensitive and witty record of impres- sions keenly felt and remembered, was published in 1844, and enjoyed considerable reputation. In 1854 he went to the Crimea, and was present at the battle of the Alma. During the campaign he made the acquaintance of Lord Raglan, who was so much attracted by his talents that he suggested to Kinglake the plan for an elaborate History of the Crimean War, and placed his private papers at the writer's disposal. For the rest of his life Kinglake was engaged upon the task of completing this monu- mental history. Thirty-two years elapsed between its commence- ment and the publication of the last volume, and eight volumes in all appeared at intervals between 1863 and 1887. Kinglake lived principally in London, and sat in parliament for Bridg- water from 1857 until the disfranchisement of the borough in 1868. He died on the 2nd of January 1891. Kinglake's life- work, The History of the Crimean War, is in scheme and execution too minute and conscientious to be altogether in proportion, but it is a wonderful example of painstaking and talented industry. It is not without errors of partisanship, but it shows remarkable skill in the moulding of vast masses of despatches and technical details into an absorbingly interesting narrative; it is illumined by natural descriptions and character-sketches of great fidelity and acumen; and, despite its length, it remains one of the most picturesque, most vivid and most actual pieces of historical narrative in the English language.

KINGLET, a name applied in many books to the bird called by Linnaeus Motacilla regulus, and by most modern ornitho- logists Regulus cristatus, the golden-crested or golden-crowned wren of ordinary persons. This species is the type of a small group which has been generally placed among the Sylviidae or true warblers, but by certain systematists it is referred to the titmouse family, Paridae. That the kinglets possess many of the habits and actions of the latter is undeniable, but on the other hand they are not known to differ in any important points of organization or appearance from the former — the chief distinction being that the nostril is covered by a single bristly feather directed forwards. The golden-crested wren is the smallest of British birds, its whole length being about 35 in., and its wing measuring only 2 in. from the carpal joint. Generally of an olive-green colour, the top of its head is bright yellow, deepening into orange, and bounded on either side by a black line, while the wing coverts are dull black, and some of them tipped with white, forming a somewhat conspicuous bar. The cock has a pleasant but weak song. The nest is a beautiful object, thickly felted of the softest moss, wool, and spiders' webs, lined with feathers, and usually built under and near the end of the branch

of a yew, fir or cedar, supported by the inter- weaving of two or three laterally diverging and pendent twigs, and sheltered by the rest. The eggs are from six to ten in number, of a dull white sometimes finely freckled with reddish-brown. The species is particularly social, living for the most part of the

year in family parties, and often joining bands of any species of titmouse in a common search for food. Though to be met with in Britain at all seasons, the bird in autumn visits the east coast in enormous flocks, apparently emigrants from Scandinavia, while hundreds perish in crossing the North Sea, where they are well known to the fishermen as " woodcock's pilots." A second and more local European species is the fire-crested wren, R. igni-capillusf easily recognizable by the black streak on each side of the head, before and behind the eye, as well as by the deeper colour of its crown. A third Species, R. maderensis, inhabits the Madeiras, to which it is peculiar; and examples from the Himalayas and Japan have been differentiated as R. himalay- ensis and R. japonicus. North America has two well-known species, R. satrapa, very like the European R. ignicapillus, and the ruby-crowned wren, R. calendula, which is remarkable for a loud song that has been compared to that of a canary-bird or a skylark, and for having the characteristic nasal feather in a rudimentary or aborted condition. (A. N.)

KINGS, FIRST AND SECOND BOOKS OF, two books of the Bible, the last of the series of Old Testament histories known as the Earlier or Former Prophets. They were originally reckoned as a single book (Josephus; Origen ap. Eus., H.E. vi. 25; Peshitta; Talmud), though modern Bibles follow the biparti- tion which is derived from the Septuagint. In that version they are called the third and fourth books of " kingdoms " {fiaoiktiSiv), the first and second being our books of Samuel. The division into two books is not felicitous, and even the old Hebrew separation between Kings and Samuel must not be taken to mean that the history from the birth of Samuel to the exile was treated by two distinct authors in independent volumes. We cannot speak of the author of Kings or Samuel, but only of an editor or of successive editors whose main work was to arrange in a continuous form extracts or abstracts from earlier sources. The introduction of a chronological scheme and of a series of editorial comments and additions, chiefly designed to enforce the religious meaning of the history, gives a kind of unity to the book of Kings as we now read it; but beneath this we can still distinguish a variety of documents, which, though some- times mutilated in the process of piecing together, retain sufficient individuality of style and colour to prove their original independence.

Of these documents one of the best defined is the vivid picture of David's court at Jerusalem (2 Sam. ix.-xx.) from which the first two chapters of 1 Kings manifestly cannot be separated. As it would be unreasonable to suppose that the editor of the history of David closed his work abruptly before the death of the king, breaking off in the middle of a valuable memoir which lay before him, this observation leads us to conclude that the books of Samuel and Kings are not independent histories. They have at least one source in common, and a single editorial hand was at work on both. From an historical point of view, however, the division which makes the beginning of Solomon's reign the beginning of a new book is very convenient. The conquest of Palestine by the Israelite tribes, recounted in the book of Joshua, leads up to the era of the "judges" (Judg. ii. 6-23; iii. sqq.), and the books of Samuel follow with the institution of the monarchy and the first kings. The books of Kings bring to a close the life of David (c. 975 B.C.), which forms the introduction to the reign of Solomon (1 Kings ii. 12-xi.), the troubles in whose time prepared the way for the separation into the two distinct kingdoms, viz. Judah and the northern tribes of Israel (xii. sqq.). After the fall of Samaria, the history of these Israelites is rounded off with a review (2 Kings xvii.xviii. 12). The history of the surviving kingdom of Judah is then carried down to the destruc tion of Jerusalem and the exile (5 and 6), and, after an account of the Chaldean governorship, concludes with the release of the captive king Jehoiachin (561 B.C.) and with an allusion to his kind treatment during the rest of his lifetime.

The most noticeable feature in the book is the recurring interest in the centralization of worship in the Temple at Jerusalem as prescribed in Deuteronomy and enforced by Josiah. Amidst the great variety in style and manner which marks the several

parts of the history, features which are imbued with the teaching of Deuteronomy recur regularly in similar stereotyped forms. They point in fact to a specific redaction, and thus it would seem that the editor who treated the foundation of the Temple, the central event of Solomon's life, as a religious epoch of the first importance, regarded this as the beginning of a new era — the history of Israel under the one sanctuary.

When we assume that the book of Kings was thrown into its present form by a Deuteronomistic redactor we do not affirm that he was the first who digested the sources of the history into a continuous work, nor must we ascribe Redactions. absolute finality to his work. He gave the book a definite shape and character, but the recognized methods of Hebrew literature left it open to additions and modifications by later hands. Even the redaction in the spirit of Deutero- nomy seems itself to have had more than one stage, as Ewald long ago recognized.

The evidence to be detailed presently shows that there was a cer- tain want of definiteness about the redaction. The mass of dis- jointed materials, not always free from inconsistencies, which lay before the editor in separate documents or in excerpts already par- tially arranged by an earlier hand, could not have been reduced to real unity without critical sifting, and an entire recasting of the narrative in a way foreign to the ideas and literary habits of the Hebrews. The unity which the editor aimed at was limited to (a) chronological continuity in the events recorded and (6) a certain uniformity in the treatment of the religious meaning of the narrative. Even this could not be perfectly attained in the circumstances, and the links of the history were not firmly enough riveted to pre- vent disarrangement or rearrangement of details by later scribes.

(a) The continued efforts of successive redactors can be traced in the chronology ol the book. The chronological method of the narrative appears most clearly in the history after Solomon, where the events of each king's reign are thrown into a kind of stereotyped framework on this type: " In the twentieth year of Jeroboam, king of Israel, Asa began to reign over Judah, and reigned in Jerusalem forty-one years." ..." In the third year of Asa, king of Judah, Baasha began to reign over Israel In Tirzah twenty-four years." The history moves between Judah and Israel according to the date of each accession; as soon as a new king has been introduced, every- thing that happened in his reign is discussed, and wound up by another stereotyped formula as to the death and burial of the sove- reign; and to this mechanical arrangement the natural connexion of events is often sacrificed. In this scheme the elaborate synchron- isms between contemporary monarchs of the north and south give a,n aspect of great precision to the chronology. But in reality _ the data for Judah and Israel do not agree, and remarkable deviations are sometimes found. The key to the chronology is 1 Kings vi. I, which, as Wellhausen has shown, was not found in the original Septuagint, and contains internal evidence of post-Chaldean date. In fact the system as a whole is necessarily later than 535 B.C., the fixed point from which it counts back, and although the numbers for the duration of the reigns may be based upon early sources, the synchronisms appear to have been inserted at a much later stage in the history of the text.

(b) Another aspect in the redaction may be called theological. Its characteristic is the retrospective application to the history of a standard belonging to the later developments of Old Testament religion. Thus the redactor regards the sins of Jeroboam as the real cause of the downfall of Israel (2 Kings xvii. 21 seq.), and passes an unfavourable judgment upon all its rulers, not merely to the effect that they did evil in the sight of Yahweh but that they followed in the way of Jeroboam. But his opinion was manifestly not shared by Elijah or Elisha, nor by the original narrator

of the lives of these prophets. Moreover, the redactor in I Kings iii. 2 seq. regards wor- ship at the high places as sinful after the building of the Temple, although even the best kings before Hezekiah made no attempt to suppress these shrines. This feature in the redaction displays itself not only in occasional comments or homiletical excursuses, but in that part of the narrative in which all ancient historians allowed themselves free scope for the development of their reflec- tions — the speeches placed in the mouths of actors in the history. Here also there is often textual evidence that the theological element is somewhat loosely attached to the earlier narrative and underwent successive additions.

Consequently it is necessary to distinguish between the older sources and the peculiar setting in which the history has been placed; between earlier records and that specific General colouring which, from its affinity to Deuteronomy Structure. and to other portions of the Old Testament which appear to have been similarly treated under the influence cf its teach- ing, may be conveniently termed " Deuteronomistic." For

Solomon.

his sources the compiler refers chiefly to two distinct works, I the "words" or "chronicles" of the kings of Israel and those of the kings of Judah. Precisely how much is copied from these works and how much has been expressed in the compiler's own language is of course uncertain. It is found on inspection that the present history consists usually of an epitome of each reign. It states the king's age at succession (so Judah only), length of reign, death and burial, with allusions to his buildings, wars, and other political events. 1 In the case of Judah, also, the name of the royal or queen-mother is speci- fically mentioned. The references to the respective " chronicles," made as though they were still accessible, are wanting in the case of Jehoram and Hoshea of Israel, and of Solomon, Ahaziah, Athaliah, Jehoahaz, Jehoiachin and Zedekiah of Judah. But for Solomon the authority cited, " book of the acts of Solomon " (i Kings xi. 41), presumably presupposes Judaean chronicles, and the remaining cases preserve details of an annalistic character. Moreover, distinctive annalistic material is found for the Israelite kings Saul and Ishbosheth in 1 Sam. xiii. 1; xiv. 47-51; 2 Sam. ii. 8-ioa (including even their age at accession), and for David in 2 Sam. ii. 11 and parts of v. and viii.

The use which the compiler makes of his sources shows that his aim was not the history of the past but its religious significance. It is rare that even

qualified praise is bestowed upon the kings of Israel (Jehoram, 2 Kings iii. 2; Jehu x. 30; Hoshea xvii. 2). Kings of great historical importance are treated with extreme ■ brevity (Omri, Jeroboam (2), Uzziah), and similar meagrenessof historical information is apparent when the editorial details and the religious judgments are eliminated from the accounts of Nadab, Baasha, and the successors of Jeroboam (2) in Israel or of Abijam and Manasseh in Judah.

To gain a more exact idea of the character of the book we may divide the history into three sections: (1) the life of Solomon, (2) the kingdoms of Ephraim (or Samaria) 2 and Judah, and (3) the separate history of Judah after the fall of Samaria. I. Solomon. — The events which lead up to the death of David and the accession of Solomon(i Kings i., ii.) are closely connected with 2 Sam. ix.-xx. The unity is broken by the appendix 2 Sam. xxi. xxi.-xxiv. which is closely connected, as regards general subject-matter, with ibid, v.-viii. ; the literary questions depend largely upon the structure of the books of Samuel (q.v.). It is evident, at least, that either the compiler drew upon other sources for' the occasion and has been remarkably brief elsewhere, or that his epitomes have been supplemented by the later insertion of material not necessarily itself of late origin. At present 1 Kings i., ii. are both the close of David's life (no source is cited) and the necessary introduction to Solomon. But Lucian's recension of the Septuagint (ed. Lagarde), as also Josephus, begin the book at ii. 12, thus separating the annalistic accounts of the two. Since the contents of 1 Kings iii.xi. do not form a continuous narrative, the compiler's authority (" Acts of S." xi. 41) can hardly have been an ordinary chronicle. The chapters comprise (a) sundry notices of the king's prosperous and peaceful career, severed by (b) a description of the Temple and other buildings; and they con clude with © some account of the external troubles which prove to have unsettled the whole of his reign. After an introduction (iii.), a contains generalizing statements of Solomon's might, wealth and wisdom (iv. 20 seq., 25, 29-34; x. 23-25, 27) and stories of a distinctly late and popular character (iii. 16-28, x. i-10, 13). The present lack of unity can in some cases be remedied by the Septuagint, which offers many deviations from the Hebrew text; this feature together with the present form of

1 Cp. the brief annalistic form of the Babylonian chronicles (for a specimen, see C. F. Kent, Israel's Hist, and Biog. Narratives, p. 502 seq.). For a synchronistic history of Assyria and Babylonia, prepared for diplomatic purposes, see Schrader's Keilinschr. Bibl. i. 194 sqq. ; also L. W. King, Studies in Eastern Hist. i. (Tukulti-Ninib), pp. I, 75 seq. (with interesting variant traditions).

2 The term " Israel " as applied to the northern kingdom is apt to be ambiguous, since as a general national name, with a religious significance,

it can include or suggest the inclusion of Judah.

the parallel texts in Chronicles will exemplify the persistence of fluctuation to a late period (4th-2nd cent. B.C.).

Thus iii. 2 seq. cannot be by the same hand as v. 4, and v. 2 is probably a later Deut. gloss upon v. 3 (earlier Deut.), which repre- sents the compiler's view and (on the analogy of the framework) comes closely after ii. 12. 3 Ch. iii. I can scarcely be severed from ix. 16, and in the Septuagint they appear in iv. in the order: iv. 1-19 (the officers), 27 seq. (their duties), 22-24 (the daily provision), 29-34 (Solomon's reputation), iii. 1; ix. 16-170 (alliance with Egypt); iv. 20 seq. 25 are of a generalizing character and recur in the Septua- gint with much supplementary matter in ii. Ch. iv. 26 is naturally related to x. 26 (cf. 2 Chron. i. 14) and takes its place in Lucian's recension (cf . 2 Chron. ix. 25). There is considerable variation again in ix. 10-x. 29, and the order ix. 10-14, 26-28, x. 1-22 (so partly Septuagint) has the advantage of recording continuously Solomon's dealings with Hiram. The intervening verses belong to a class of floating notices (in a very unnatural order) which seem to have got stranded almost by chance at different points in the two recensions ; contrast also 2 Chron. viii. Solomon's preliminary arrangements with Hiram in ch. v. have been elaborated to emphasize the impor- tance of the Temple (vv. 3-5, cf. 2 Sam. vii.) ; further difficulty is caused by the relation between 13 seq. and 15 seq. (see 2 Chron. ii. 17 seq.) and between both of these and ix. 20 seq. xi. 28. The account of the royal buildings now sandwiched in between the related fragments of a is descriptive rather than narrative, and the accurate details might have been obtained by actual observation of the Temple at a date long subsequent to Solomon. It is not all due to a single hand. Ch. vi. 1 1-14 (with several late phrases) break the connexion and are omitted by the Septuagint; vv. 15-22, now untranslatable, appear in a simple and intelligible form in the Septuagint. The account of the dedication contains many signs of a late date; viii. 14-53, 54"6l are due to a De.uteronomiC writer, and that they are an expansion of the older narrative (vv. 1-13) is suggested by the fact that the ancient fragment, vv. 12, 13 (imperfect in the Hebrew) appears in the Septua- gint after v. 53 in completer form and with a reference to the book of jashar as source (jSijSXIop rijs

The account of the "end of Solomon's reign deals with (a) his religious laxity (xi. 1-13, now in a Deuteronomic form), as the punishment for which the separation of the two kingdoms is announced; and (b) the rise of the adversaries who, according to xi. 25, had troubled the whole of his reign, and therefore cannot have been related originally as the penalty for the sins of his old age. Both, however, form an introduction to subsequent events, and the life of Solomon concludes with a brief annalistic notice of his death, length of reign, successor, and place of burial. (See further

Solomon.) – •

II. Ephraim and Judah.— In the history of the two kingdoms the redactor follows a fixed scheme determined, as has been seen, by the order of succession. The fluctuation of tradition concerning the circumstances of the Kiagdom schism is evident from a comparison with the Septuagint, and all that is related of Ahijah falls under suspicion of being foreign to the oldest history. 4 The story of the man of God from Judah (xiii.) is shown to be late by its general tone (conceptions of prophetism and revelation), 5 and by the term " cities of Samaria " (v. 32, for Samaria as a province, cf. 2 Kings xvii. 24, 26; for the building of the city by Omri see 1 Kings xvi. 24). It is a late Judaean narrative inserted after the Deuteronomic redaction, and

3 Here and elsewhere a careful study (e.g. of the marginal refer- ences in the Revised Version) will prove the close relation between the " Deuteronomic " passages and the book of Deuteronomy itself. The bearing of this upon the traditional date of that book. should not be overlooked.

4 See art. Jeroboam; also W. R. Smith, Old Test, in Jew. Church, pp. 117 sqq.; H. Winckler, Alttest. Untersuchungen, pp. 1 sqq., and the. subsequent criticisms by C. F. Burney {Kings , pp. 163 sqq.) ; J. Skinner (Kings, pp. 443 sqq.); and Ed. Meyer (Israeliten u. Nachbarstamme, pp. 357 sqq.).

6 Notice should everywhere be taken of those prophetical stories which have the linguistic features of the Deuteronomic writers, or which differ in style and expression from the prophecies of Amos, Hosea and others, previous to Jeremiah.

breaks the connexion between xii. 31 and xiii. 33 seq. The latter describe the idolatrous worship instituted by the first king of the schismatic north, and the religious attitude occurs regularly throughout the compiler's epitome, however brief the reigns of the kings. In the account of Nadab, xv. 25 seq., 296, 30 seq. are certainly the compiler's, and the synchronism in v. 28 must also be editorial; xv. 32 (Septuagint omit) and 16 are duplicates leading up to the Israelite and Judaean accounts of Baasha respectively. But xv. , 33-xvi. 7 contains little annalistic information, and the prophecy in xvi. 1-4 is very similar to xiv. 7-1 1, which in turn breaks the connexion between vv. 6 and 12. Ch. xvi. 7 is a duplicate to vv. 1-4 and out of place; the Septuagint inserts it in the middle of v. 8. The brief reign of Elah preserves an important entract in xvi. 9, but the date in v.

10a (LXX. omits) presupposes the late finished chronological scheme. Zimri's seven days receive the inevitable condemnation, but the older material embedded in the framework (xvi. 156-18) is closely connected with v. 9 and is continued in the non- editorial portions of Omri's reign (xvi. 21 seq., length of reign in v. 23, and v. 24). The achievements of Omri to which the editor refers can fortunately be gathered from external sources (see Omri). Under Omri's son Ahab the separate kingdoms converge.

Next, as to Judah: the vivid account of the accession of Rehoboam in xii. 1-16 is reminiscent of the full narratives in 2 Sam. ix.-xx.; 1 Kings i., ii. (cf. especially v. 16 with 2 Sam. xx. 1); xii. 156 refers to the prophecy of Ahijah (see above), and " unto this day," v. 19, cannot be by a contemporary author. ; v. 1 7 (LXX. omits) finds a parallel in 2 Chron. xi. 16 seq., and could represent an Ephraimite standpoint. The Judaean standpoint is prominent in vv. 21-24, where (a) the inclusion of Benjamin and (b) the cessation of war (at the command of Shemaiah) conflict with (a) xi. 3 i, 36, xii. 20 and (b) xiv. 30 respectively. Rehoboam's history, resumed by the redactor in xiv. 21-24, continues with a brief account of the spoiling of the Temple and palace by Sheshonk (Shishak). (The incident appears in 2 Chron. xii. in a rather different context, before the details which now precede v. 21 seq.) The reign of Abijam is entirely due to the editor, whose brief statement of the war in xv. 76 is supplemented by a lengthy story in 2 Chron. xiii. (where the name is Abijah). Ch. xv. 56 (last clause) and v. 6 are omitted by the Septuagint, the former is a unique gloss (see 2 Sam. xi. seq.), the latter is a mere repetition of xiv. 30; with xv. 2 cf. v. 10. The account of Asa's long reign contains a valuable summary of his war with Baasha, xv. 16-22; the isolated v. 15 is quite obscure and is possibly related to v. 18 (but cf. vii. 51). His successor Jehoshaphat is now dealt with completely in xxii. 41-50 after the death of Ahab; but the Septuagint, which follows a different chronological scheme (placing his accession in the reign of Omri), gives the summary (with some variations) after xvi. 28. Another light is thrown upon the incomplete annalistic fragments (xxii. 44, 47-49) by 2 Chron. xx. 35-37: the friendship between Judah and Israel appears to have been displeasing to the redactor of Kings.

The history of the few years between the close of Ahab's life and the accession of Jehu covers about one-third of the Ephraim entire book of Kings. This is due to the inclu- tromAhab sion of a number of narratives which are partly of to Jehu. a political character, and partly are interested in the work of contemporary prophets. The climax is reached in the overthrow of Omri's dynasty by the usurper Jehu, when, after a period of close intercourse between Israel and Judah, its two kings perished. The annals of each kingdom would naturally deal independently with these events, but the present literary structure of 1 Kings xvii.-2 Kings xi. is

extremely complicated by the presence of the narratives referred to. First as regards the framework, the epitome of Ahab is preserved in xvi. 20-34 an d xxii. 39; it contains some unknown references (his ivory house and cities), and a stern religious judgment upon his Phoenician alliance, on which the intervening chapters throw more light. The colourless summary of his son

Ahaziah (xxii. 51-53) 1 finds its conclusion in 2 Kings i. 17 seq. where v. 18 should precede the accession of his brother Jehoram (v. 17b). Jehoram is again introduced in iii. 1-3 (note the variant synchronism), but the usual conclusion is wanting. In Judah, Jehoshaphat was succeeded by his son Jehoram, who had married Athaliah the daughter of Ahab and Jezebel (viii. 16-24) ; to the annalistic details (vv. 20-22) 2 Chron. xxi. n sqq. adds a novel narrative. His son Ahaziah (viii. 25 sqq.) is similarly denounced for his relations with Israel. He is again introduced in the isolated ix. 29, while Lucian's recension adds after x. 36 a variant summary of his reign but without the regular intro- duction. Further confusion appears in the Septuagint, which inserts after i. 18 (Jehoram of Israel) a notice corresponding to iii. 1-3, and concludes " and the anger of the Lord was kindled against the house of Ahab." This would be appropriate in a position nearer ix. seq. where the deaths of Jehoram and Ahaziah are described. These and other examples of serious disorder in the framework may be associated with the literary features of the narratives of Elijah and Elisha.

Of the more detailed narratives those that deal with the northern kingdom are scarcely Judaean (see I Kings xix. 3), and they do not criticize Elijah's work, as the Judaean compiler denounces the whole history of the north. But they are plainly not of one origin. To supplement the articles Elijah and Elisha, it is to be noticed that the account of Naboth's death in the history of Elijah (1 Kings xxi.) differs in details from that in the history of Elisha and Jehu (2 Kings ix.), and the latter more precise narrative presupposes events recorded in the extant accounts of Elijah but not these events themselves. In I Kings xx., xxii. 1-28 (xxi. follows xix. in the LXX.) Ahab is viewed rather more favourably than in the Elijah-narratives (xix., xxi.) or in the compiler's summary. Ch. xxii. 6, moreover, proves that there is some exaggeration in xviii. 4, 13; the great contest between Elijah and the king, between Yahweh and Baal, has been idealized. The denunciation of Ahab in xx. 35-43 has some notable points of contact with xiii. and seems to be a supple- ment to the preceding incidents. Ch. xxii. is important for its ideas of prophetism (especially vv. 19-23 ; cf . Ezek. xiv. 9 ; 2 Sam. xxiv. 1 [in contrast to I Chron. xxi. 1]) ; a gloss at the end of v. 28, omitted by the Septuagint, wrongly identifies Micaiah with the well-known Micah (i. 2). Although the punishment passed upon Ahab in xxi. 20 sqq.(2o6-26 betray the compiler's hand ; cf. xiv. 10 seq.) ismodified in v. 29, this is ignored in the account of his death, xxii. 38, which takes place at Samaria

(see below).

The episode of Elijah and Ahaziah (2 Kings i.) is marked by the revelation through an angel. The prophet's name appears in an unusual form (viz. eliyyah, not -yahu), especially in vv. 2-8. The prediction of Ahaziah's fate finds a parallel in 2 Chron. xxi. 12-15; the more supernatural additions have been compared with the late story in I Sam. xix. 18-24. The ascension of Elijah (2 Kings ii.) is related as the introduction to the work of Elisha, which apparently begins before the death of Jehoshaphat (see iii. I, II sqq.; contrast 2 Chron. loc. cit.). Among the stories of Elisha are some which find him at the head of the prophetic gilds (iv. 1, 38-44, vi. 1-7), whilst in others he has friendly relations with the " king of Israel " and the court. As a personage of almost superhuman dignity he moves in certain narratives where political records appear to have been utilized to describe the activity of the prophets. The Moabite campaign (iii.) concerns a revolt already referred to in the isolated i. 1 ; there are parallels with the story of Jehoshaphat and Ahab (iii. 7, 11 seq. ;cf. I Kings xxii. 4 seq. , 7 sqq.), contrast, however, xxii. 7 (where Elijah is not even named) and iii. 11 seq. But Jehoshaphat's death has been already recorded (1 Kings xxii. 50), and, while Lucian's recension in 2 Kings iii. reads Ahaziah, i. 17 presupposes the acces- sion of the Judaean Jehoram. Other politicalnarrativesmayunder- lie the stories of the Aramaean wars; with vi. 24-vii. 20 (after the complete cessation of hostilities in vi. 23)compare the general style of I Kings xx., xxii. ; with the famine in Samaria,vi. 25 ; cf. ibid. xvii. ; with the victory, cf. ibid. xx. The account of Elisha and Hazael (viii. 7-15) implies friendly relations with Damascus (in v. 12 the terrors of war are in the future), but the description of Jehu's acces- sion (ix.) is in the midst of hostilities. Ch. ix. 7-ioa are a Deuteronomic insertion amplifying the message in vv. 3-6 (cf. I Kings xxi. 20 seq.). The origin of the repetition in ix. 14-150 (cf. viii. 28 seq.) is not clear. The oracle in ix. 25 seq. is not that in I Kings xxi. 19 seq., and mentions the additional detail that Naboth's sons were slain. Here his field or portion is located near Jezreel, but in I Kings xxi. 18 his vineyard is by the royal palace in Samaria (cf. xxii. 38 and contrast xxi. I, where the LXX. omits reference to Jezreel). This fluctuation re- appears in 2 Kings x. 1, II seq., and 17; in ix. 27 compared with 2 Chron. xxii. 9 ; and in the singular duplication of an historical inci- dent, viz. the war against the Aramaeans at Ramoth-Gilead (a) by Jehoshaphat and Ahab, and (b) by Ahaziah and Jehoram, in each

1 The division of the two books at this point is an innovation first made in the LXX. and Vulgate.

case with the death of the Israelite king, at Samaria and Jezreel respectively (see above and observe the contradiction in I Kings xxi. 29 and xxii. 38). These and other critical questions in this section are involved with (a) the probability that Elisha's work belongs rather to the accession of Jehu, with whose dynasty he was on most intimate terms until his death some forty-five years later (2 Kings xiii. 14-21), and (b) the problem of the wars between Israel and Syria which appear to have begun only in the time of Jehu (x. 32). See Jew. Quart. Rev. (1908), pp. 597-630, and Jews: History, § n seq.

In the annals of Jehu's dynasty the editorial introduction to Jehu himself is wanting (x. 32 sqq.), although Lucian's recension in x. 36 concludes in annalistic manner ofjeftuˆ tne l' ves ˚f J enoram 0I Israel and Ahaziah of Judah. The summary mentions the beginning of the Aramaean wars, the continuation of which is found in the redactor's account of his successor Jehoahaz (xiii. 1-9). But xiii. 4-6 modify the disasters, and by pointing to the " saviour " or deliverer (cf. Judg. iii. 9, 15) anticipate xiv. 27. The self-contained account of his son Jehoash (xiii. 10-13) is supplemented (a) by the story of the death of Elisha (vv. 14-21) and (6) by some account of the Aramaean wars (vv. 22-25), where v. 23, like vv. 4-6 (Lucian's recension actually reads it after v. 7), is noteworthy for the sympathy towards the northern kingdom. Further © the defeat of Amaziah of Judah ap- pears in xiv. 8-14 after the annals of Judah, although from an Israelite source (v. 11b Bethshemesh denned as belonging to Judah, see also v. 15, and with the repetition of the concluding statements in v. 15 seq., see xiii. 12 seq.). These features and the transference of xiii. 12 seq. after xiii. 25 in Lucian's recension point to late adjustment. In Judaean history, Jehu's reform and the overthrow of Jezebel in the north (ix., x. 15-28) find their counterpart in the murder of Athaliah and the destruction of the temple of Baal in Judah (xi. 18). But the framework is incomplete. The editorial conclusion of the reign of Ahaziah, the introduction to that of Athaliah, and the sources for both are wanting. A lengthy Judaean document is incorporated detail- ing the accession of Joash and the prominence of the abruptly introduced priest Jehoiada. The interest in the Temple and temple-procedure is obvious; and both xi. and xii. have points of resemblance with xxii. seq. (see below and cf. also xi. 4, 7, n, 19, with 1 Kings xiv. 27 seq.). The usual epitome is found in xi. 21-xii. 3 (the age at accession should follow the synchronism, so Lucian), with fragments of annalistic matter in xii. 17-21 (another version in 2 Chron. xxiv. 23 sqq.). For Joash's son Amaziah see above; xiv. 6 refers to Deut. xxiv. 16, and 2 Chron. xxv. 5-16 replaces v. 7 by a lengthy narrative with some interest- ing details. Azariah or Uzziah is briefly summarized in xv. 1-7, hence the notice in xiv. 22 seems out of place; perhaps the usual statements of Amaziah's death and burial (cf. xiv. 20b, 22b), which were to be expected after v. 18, have been

supple- mented by the account of the rebellion {vv. 19, 20a, 21). 1 The chronological notes for the accession of Azariah imply different views of the history of Judah after the defeat of Amaziah; with xiv. 17, cf. xiii. 10, xiv. 2, 23, but contrast xv. 1, and again v. 8. 2 The important reign of Jeroboam (2) is dismissed as briefly as that of Azariah (xiv. 23-29). The end of the Aramaean war presupposed by v. 25 is supplemented by the sympathetic ad- dition in v. 26 seq. (cf. xiii. 4 seq. 23). Of his successors Zechariah, Shallum and Menahem only the briefest records remain, now imbedded in the editorial framework (xv. 8-25). The summary of Pekah (perhaps the same as Pekahiah, the confusion being due to the compiler) contains excerpts which form the continuation of the older material in v. 25 (cf. also vv. io, 14, 16, 19, 20). For an apparently similar adjustment of an earlier record to the framework see above on 1 Kings xv. 25-31, xvi. 8-25. • The account of Hoshea's conspiracy (xv. 29 seq.) gives the Israelite version with which Tiglath-Pileser's own statement can now be compared. Two accounts of the fall of Samaria are given, one of which is under the reign of the contemporary Judaean

1 Both xiv. 22 and xv. 5 presuppose fuller records of which 2 Chron. xxvi. 6-7, 16-20 may represent merely later and less trustworthy versions.

2 See F. Ruhl, Deutsche Zeit. f. Geschichtwissens. xii. 54 sqq. ; also Jews: History, § 12.

Hezekiah (xvii. 1-6, xviii. 9-12); the chronology is again intricate. Reflections on the disappearance of the northern kingdom appear in xvii. 7-23 and xviii. 12; the latter belongs to the Judaean history. The former is composite; xvii. 21-23 (cf. v. 18) look back to the introduction of calf-worship by Jeroboam (1), and agree with the compiler's usual standpoint; but vv. 19-20 include Judah and presuppose the exile. The remaining verses survey types of idolatry partly of a general kind (vv. 9-12, 16a), and partly characteristic of Judah in the last years of the monarchy (vv. 1 66, 1 7) . The brief account of the subsequent history of Israel in xvii. 24-41 is not from one source, since the piety of the new settlers (v. 32-340, 41) conflicts with the later point of view in 346-40. The last-mentioned supplements the eqilogue in xvii. 7-23, forms a solemn conclusion to the history of the northern kingdom, and is apparently aimed at the Samaritans. III. Later History of Judah. — The summary of Jotham (xv. 32-38) shows interest in the Temple (v. 35) and alludes to the hostility of Pekah (v. 37) upon which the j u dah

Israelite annals are silent. 2. Chron. xxvii. expands the former but replaces the latter by other not unrelated details (see Uzziah). But xv. 37 is resumed afresh in the account of the reign of Ahaz (xvi. 5 sqq.; the text in v. 6 is confused) — another version in 2 Chron. xxviii. 5 sqq. — and is

supplemented by a description, evidently from the Temple records, in which the ritual innovations by " king Ahaz " (in contrast to " Ahaz " alone in vv. 5-9) are described (vv. 10-18). There is further variation of detail in 2 Chron. xxviii. 20-27. The summary of Hezekiah (xviii. 1-8) em- phasizes his important religious reforms (greatly expanded in 2 Chron. xxix. seq. from a later standpoint), and includes two references to his military achievements. Of these v. 8 is ignored in Chron., and v. 7 is supplemented by (a) the annalistic extract in vv. 13-16, and (b) narratives in which the great contemporary prophet Isaiah is the central figure. The latter are later than Isaiah himself (xix. 37 refers to 681 B.C.) and reappear, with some abbreviation and rearrangement, in Isa. xxxvi.-xxxix. (see Isaiah). They are partly duplicate (cf. xix. 7 with vv. 28, 33; vv. 10-13 with xviii. 28-35), an d consist of two portions, xviii. 17-xix. 8 (Isa. xxxvi. 2-xxxvii. 8) and xix. 96-35 (Isa. xxxvii. 96-36) ; to which of these xix. ga and v. 36 seq. belong is dis- puted. 2 Chron. xxxii. (where these accounts are condensed) is in general agreement with 2 Kings xviii. 7, as against vv. 14-16. The poetical fragment, xix. 21-28, is connected with the sign in vv. 29-31; both seem to break the connexion between xix. 20 and 3 2 sqq. Chap. xx. 1-1 9 appears to belong to an earlier period in Hezekiah's reign (see v. 6 and cf . 2 Chron. xxxii. 25 seq.) ; with vv. i-n note carefully the forms in Isa. xxxviii. 1-8, 21 seq., and 2 Chron. xxxii. 24-26; with xx. 12-19 (Isa. xxxix) contrast the brief allusion in 2 Chron. xxxii. 31. In v. 17 seq. the exile is foreshadowed. Use has probably been made of a late cycle of Isaiah-stories; such a work is actually mentioned in 2 Chron. xxxii. 32. The accounts of the reactionary kings Manasseh and Amon, although now by the compiler, give some reference to political events (see xxi. 17, 23 seq.); xxi. 7-15 refer to the exile and find a parallel in xxiii. 26 seq., and xxi. 10 sqq. are replaced in 2 Chron. xxxiii. 10-20 by a novel record of Manasseh's penitence (see also ibid. v. 23 and note omission of 2 Kings xxiii. 26 from Chron).

Josiah's reign forms the climax of the history. The usual framework (xxii. 1; 2, xxiii. 28, 306) is supplemented by narra- tives dealing with the Temple repairs and the reforms of Josiah. These are closely related to xi. seq. (cf. xxii. 3-7 with xii. 4 sqq.), but show many signs of revision; xxii. 16 seq., xxiii. 26 seq., point distinctly to the exile, and xxiii. 16-20 is an insertion (the altar in v. 16 is already destroyed in v. 15) after 1 Kings xiii. But it is difficult elsewhere to distinguish safely between the original records and the later additions. In their present shape the reforms of Josiah are described in terms that point to an acquaintance with the teaching of Deuteronomy which promulgates the reforms themselves. 1

1 See further the special study by E. Day, Journ. Bib. Lit. (1902), pp. 197 sqq.

The annalist c notice in xxiii. 29 seq. (contrast xxii. 20) should precede v. 28; 2 Chron. xxxv. 20-27 gives another version in the correct position and ignores 2 Kings xxiii. 24-27 (see however the Septuagint). For the last four kings of Judah, the references to the worship at the high places (presumably abolished by Josiah) are wanting, and the literary source is only cited for Jehoiakim ; xxiv. 3 seq. (and probably v. 2), which treat the fall of Judah as the punishment for Manasseh's sins, are a Deuteronomistic insertion (2 Chron. xxxvi. 6 sqq. differs widely; see, however, the Septuagint) ; v. 13 seq. and v. 15 seq. are duplicates. With xxiv. 18-xxv. 21 cf. Jer. Hi. 1-27 (the text of the latter, especially vv. 19 sqq. is superior) ; and the fragments ibid, xxxix. 1-10. Ch. xxv. 22-26 appears in much fuller form in Jer. xl. seq. (see xl. 7-9, xli. 1-3, 17 seq.). It is note-worthy that Jeremiah does not enter into the history in Kings (contrast Isaiah above). The book of Chronicles in general has a briefer account of the last years, and ignores both the narratives which also appear in Jeremiah and the concluding hopeful note struck by the restoration of Jehoiachin (xxv. 27-30). This last, with the addition of statistical data, forms the present conclusion also of the book of Jeremiah.

Conclusions. — A survey of these narratives as a whole strengthens our impression of the merely mechanical character of the redaction by which they are united. Though editors have written something of their own in almost every chapter, generally from the standpoint of religious pragmatism, there is not the least attempt to work the materials into a history in our sense of the word; and in particular the northern and southern histories are practically independent, being merely pieced together in a sort of mosaic in consonance with the chronological system, which we have seen to be really later than the main redaction. It is very probable that the order of the pieces was considerably readjusted by the author of the chronology; of this indeed the Septuagint still shows traces. But with all its imperfections as judged from a modern standpoint, the redaction has the great merit of preserving material nearer to the actual history than would have been the case had narratives been rewritten from much later standpoints — as often in the book of Chronicles.

Questions of date and of the growth of the literary process are still unsettled, but it is clear that there was an independent history of (north) Israel with its own chronological scheme. It was based upon annals and fuller political records, and at some period apparently passed through circles where the purely domestic stories of the prophets (Elisha) were current. 1 This was ultimately taken over by a Judaean editor who was

under the influence of the far-reaching reforms ascribed to the 18th year of Josiah (621 B.C.). Certain passages seem to imply that in his time the Temple was still standing and the Davidic dynasty uninterrupted. Also the phrase " unto this day " sometimes apparently presupposes a pre-exilic date. On the other hand, the history is carried down to the end of Jehoiachin's life (xxv. 27 refers to his fifty-fifth year, vv. 29 seq. look back on his death), and a number of allusions point decisively to the post-exilic period. Consequently, most scholars are agreed that an original pre-exilic Deuteronomic compilation made shortly after Josiah 's reforms received subsequent additions from a later Deuteronomic writer.

These questions depend upon several intricate literary and historical problems. At the outset (a) the compiler deals with history from the Deuteronomic standpoint, selecting Certain notices and referring further to separate chronicles of Israel and Judah. The canonical book of Chronicles refers to such a combined work, but is confined to Judah; it follows the religious judgment passed upon the kings, but it introduces new details apparently derived from extant annals, replaces the annalistic excerpts found in Kings by other passages, or uses new narratives which at times are clearly based upon older sources. Next (b) the Septuagint proves that Kings did not reach its present form until a very late date; " each represents a stage and not always the same stage in the long protracted labours of the redactors " (Kuenen). 2 In agreement with this are the unambiguous indications of the post-exilic age (especially

1 Cf. similarly the prophetic narratives in the books of Samuel (q.v.).

2 " The LXX. of Kings is not a corrupt reproduction of the Hebrew receptus, but represents another recension of the text. Neither recension can claim absolute superiority. The defects of the LXX. lie on the surface, and are greatly aggravated by the condition of the Greek text, which has suffered much in transmission, and

in the Judaean history) consisting of complete passages, obvious interpolations, and also sporadic phrases in narratives whose pre-exilic origin is sometimes clear and sometimes only to be presumed. Further ©, the Septuagint supports the independent conclusion that the elaborate synchronisms belong to a late stage in the redaction. Consequently it is necessary to allow that the previous arrangement of the material may have been different; the actual wording of the introductory notices was necessarily also affected. In general, it becomes ever more difficult to distinguish between passages incorporated by an early redactor and those which may have been inserted later, though possibly from old sources. Where the regular framework is disturbed such considerations become more cogent. The relation of annalistic materials in 1 Sam. (xiii. 1; xiv. 47-51,

&c) to the longer detailed narratives will bear upon the question, as also the relation of 2 Sam. ix-xx. to 1 Kings i. seq. (see Samuel, books of). Again (d) the lengths of the reigns of the Judaean kings form an integral part of the framework, and their total, with fifty years of exile, allows four hundred and eighty years from the beginning of the Temple to the return from Babylon. 3 This round number (cf. again 1 Kings vi. 1) points to a date subsequent to 537, and Robertson Smith has observed that almost all events dated by the years of the kings of Jerusalem have reference to the affairs of the Temple. This suggests a connexion between the chronology and the incorporation of those narratives in which the Temple is clearly the centre of interest, (e) But, apart from the question of the origin of the more detailed Judaean records, the arguments for a pre-exilic Judaean Deuteronomic compilation are not quite decisive. The phrase " unto this day " is not necessarily valid (cf. 2 Chron. v. 9, viii.. 8, xxi. 10 with 1 Kings viii. 8, ix. 21, 2 Kings viii. 22), and depends largely upon the compiler's sagacity. Also, the existence of the Temple and of the Davidic dynasty (1 Kings viii. 14-53; ix. 3; xi. 36-38; xv. 4; 2 Kings viii. 19; cf. 2 Chron. xiii. 5) is equally applicable to the time of the second temple when Zerubbabel, the Davidic representative, kindled new hopes and aspirations. Indeed, if the object of the Deu- teronomic compiler is to show from past history that " the sovereign is responsible for the purity of the national religion " (Moore, Ency. Bib. col. 2079), a date somewhere after the death of Jehoiachin (released in 561) in the age of Zerubbabel and the new Temple equally satisfies the conditions. With this is concerned (/) the question whether, on historical grounds, the account of the introduction of Deuteronomic reforms by Josiah is trustworthy. 4 Moreover, although a twofold Deu- teronomic redaction of Kings is generally recognized, the criteria for the presumably pre-exilic form are not so decisive as those which certainly distinguish the post-exilic portions, and it is frequently very difficult to assign Deuteronomic passages to the earlier rather than to the later. Again, apart from the contrast between the Israelite detailed narratives (relatively early) and those of Judaean origin (often secondary), it is noteworthy that the sympathetic treatment of northern history in 2 Kings xiii. 4 seq. 23, xiv. 26 has literary parallels in the Deuteronomic redaction of Judges (where Israelite tradition is again predominant), but is quite distinct from the hostile feeling to the north which is also Deuteronomic. Even the northern prophet Hosea (q.v.) approximates the Deutero- nomic standpoint, and the possibility that the first Deutero- nomic compilation of Kings could originate outside Judah is

particularly has in many places been corrected after the later Greek versions that express the Hebrew receptus of the 2nd century of our era. Yet the LXX. not only preserves many good readings in detail, but throws much light on the long-continued process of redaction at the hand of

successive editors or copyists of which the extant Hebrew of Kings is the outcome. Even the false readings of the Greek are instructive, for both recensions were exposed to corrupting influences of precisely the same kind " (W. R. Smith).

3 See W. R. Smith, Journ. of Philology, x. 209 sqq. ; Prophets of Israel, p. 147. seq. ; and K. Marti, Ency. Bib. art. " Chronology."

4 Against earlier doubts by Havet (1878), Vernes (1887) and Horst (1888), see W. E. Addis, Documents of Hexateuch, ii. 2 sqq. ; but the whole question has been reopened by E. Day (loc. cit. above) and R. H. Kennett (Journ. Theol. Stud., July 1906, 481 sqq).

strengthened by the fact that an Israelite source could be drawn upon for an impartial account of Judaean history (2 Kings xiv. 8-15). Finally, (g) literary and historical problems here converge. Although Judaean writers ultimately rejected as heathen a people who could claim to be followers of Yahweh (Ezra iv. 2; 2 Kings xvii. 28, 33; contrast ibid. 34-40, a secondary insertion), the anti-Samaritan feeling had previously been at most only in an incipient stage, and there is reason to infer that relations between the peoples of north and south had been closer. 1 The book of Kings reveals changing historical condi- tions in its literary features, and it is significant that the very age where the background is to be sought is that which has been (intentionally?) left most obscure: the chronicler's history of the Judaean monarchy (Chron. — Ezra — Nehemiah), as any comparison will show, has its own representation of the course of events, and has virtually superseded both Kings and Jeremiah, which have now an abrupt conclusion. (See further S. A. Cook, Jew. Quart. Rev. (1907), pp. 158 sqq.; and the articles Jews: History, §§ 20, 22; Palestine: History).

Literature. — A. Kuenen, Einleitung; J. Wellhausen, Compos, d. Hcxateuch, pp. 266-302; H. Winckler, Alttest. Untersuchungen (1892) ; and B. Stade, Akademische Reden (1899; on 1 Kings v.-vii. ; 2 Kings x.-xiv. ; xv.xxi.); S. R. Driver, Lit. of O. T. (1909); see also C. Holzhey, Das Buck. d. Konige (1899); the commentaries of Benzinger (1899) and Kittel (1900), and especially F. C. Kent, Israel's Hist, and Biog. Narr. (1905). The article by W. R. Smith, Ency. Brit., 9th ed. (partly retained here), is revised and supplemented by E. Kautzsch in the Ency. Bib. For the Hebrew text see Kloster mann's Sam. u. Konige (1887); C. F. Burney, Notes on the Hebrew Text (1903); and Stade and Schwally's edition in Haupt's Sacred Books of the Old Testament (1904). For English readers, J. Skinner's

commentary in the Century Bible, and W. E. Barnes in the Cam- bridge Bible, are useful introductions. (S. A. C.)

KING'S BENCH, COURT OF, in England, one of the superior courts of common law. This court, the most ancient of English courts — in its correct legal title, " the court of the king before the king himself," coram ipso rege — is far older than parliament itself, for it can be traced back clearly, both in character and the essence of its jurisdiction, to the reign of King Alfred. The king's bench, and the two offshoots of the aula regia, the common pleas and the exchequer, for many years possessed co-ordinate juris- diction, although there were a few cases in which each had exclusive authority, and in point of dignity precedence was given to the court of king's bench, the lord chief justice of which was also styled lord chief justice of England, being the highest per- manent judge of the Crown. The court of exchequer attended to the business of the revenue, the common pleas to private actions between citizens, and the king's bench retained criminal cases and such other jurisdiction as had not been divided between the other two courts. By an act of 1830 the court of exchequer chamber was constituted as a court of appeal for errors in law in all three courts. Like the court of exchequer, the king's bench assumed by means of an ingenious fiction the jurisdiction in civil matters which properly belonged to the common pleas.

Under the Judicature Act 1873 the court of king's bench be- came the king's bench division of the High Court of Justice. It consists of the lord chief justice and fourteen puisne judges. It exercises original jurisdiction and also appellate jurisdiction from the county courts and other inferior courts. By the act of 1873 (sec. 45) this appellate jurisdiction is conferred upon the High Court generally, but in practice it is exercised by a divisional court of the king's bench division only. The determination of such appeals by the High Court is final, unless leave to appeal is given by the court which heard the appeal or by the court of appeal. There was an exception to this rule as regards certain Orders of quarter sessions, the history of which involves some complication. But by sec. 1 (5) of the Court of Session Act 1894 the rule applies to all cases where there is a right of appeal to the High Court from any court or person. It may be here mentioned that if leave is given to appeal to the court of appeal there is a further appeal to the House of Lords, except in bankruptcy

1 See Kennett. Journ. Theol. Stud. 1905, pp. 169 sqq. ; 1906, pp. 488 sqq.; and cf. J. A. Montgomery, The Samaritans (1907), pp. 47, 53 seq., 57, 59, 61 sqq.

(Bankruptcy Appeals (County Courts) Act 1884), when the decision of the court of appeal on appeal from a divisional court sitting in appeal is made

final and conclusive.

There are masters in the king's bench division. Unlike the masters in the chancery division, they have original jurisdiction, and are not attached to any particular judge. They hear appli- cations in chambers, act as taxing masters and occasionally as referees to conduct inquiries, take accounts, and assess damages. There is an appeal from the master to the judge in chambers. Formerly there was an appeal from the judge in chambers to a divisional court in every case and thence to the court of appeal, until the multiplication of appeals in small interlocutory matters became a scandal. Under the Supreme Court of Judicature (Procedure) Act 1894 there is no right of appeal to the court of appeal in any interlocutory matters (except those mentioned in subs, (b)) without the leave of the judge or of the court of appeal, and in matters of " practice and procedure " the appeal lies (with leave) directly to the court of appeal from the judge in chambers.

KINGSBRIDGE, a market town in the Totnes parliamentary division of Devonshire, England, 48 m. S.S.W. of Exeter, on a branch of the Great Western railway. Pop. of urban district (1901), 3025. It lies 6 m. from the English Channel, at the head of an inlet or estuary which receives only small streams, on a sharply sloping site. The church of St Edmund is mainly Perpendicular, but there are Transitional Norman and Early English portions. The town-hall contains a natural history museum. A house called Pindar Lodge stands on the site of the birthplace of John Wolcot (" Peter Pindar," 1738-1819). William Cookworthy (1705-1780), a porcelain manufacturer, the first to exploit the deposits of kaolin in the south-west of England, was also born at Kingsbridge. The township of Dodbrooke, in- cluded within the civil parish, adjoins Kingsbridge on the north- east. Some iron-founding and ship-building, with a coasting trade, are carried on.

Kingsbridge (Kyngysbrygge) was formerly included in the manor of Churchstow, the first trace of its separate existence being found in the Hundred Roll of 1276, which records that in the manor of Churchstow there is a new borough, which has a . Friday market and a separate assize of bread and ale. The name Kingsbridge however does not appear till half a century later. When Kingsbridge became a separate parish is not certainly known, but it was before 1414 when the church was rebuilt and consecrated to St Edmund. In 1461 the abbot of Buckfastleigh obtained a Saturday market at Kingsbridge and a three-days' fair at the feast of St Margaret, both of which are still held. The manor remained in possession of the abbot until the Dissolution, when it was granted to Sir William Petre. Kingsbridge was never represented in parliament or incorporated by charter, the govern- ment being by a portreeve, and down to the present day the steward of the manor holds a court leet and court baron and appoints a portreeve and constables. In 1798 the town mills were converted

into a woollen manufactory, which up to recent times produced large quantities of cloth, and the serge manu- facture was introduced early in the 19th century. The town has been famous from remote times for a beverage called " white ale." Included in Kingsbridge is the little town of Dodbrooke, which at the time of the Domesday Survey had a population of 42, and a flock of 108 sheep and 27 goats; and in 1257 was granted a Wednesday market and a fair at the Feast of St Mary Magdalene.

See " Victoria County History " : Devonshire; Kingsbridge and Sulcombe, with the intermediate Estuary, historically and topographically depicted (Kingsbridge, 18 19) ; S. F. Fox, Kingsbridge Estuary (Kings- bridge, 1864).

KING'S COUNTY, a county of Ireland in the province of Leinster, bounded N. byMeath andWestmeath, W.by Roscommon, Galway and Tipperary (the boundary with the first two counties being the river Shannon); S. by Tipperary and Queen's County, and E. by Kildare. The area is 493,999 acres or about 772 sq. m. The greater part of the county is included in the central plain of Ireland. In the south-east the Slieve Bloom Mountains form the

boundary between King's County and Queen's County, and run into the former county from south-west to north-east for a dis- tance of about 20 m. consisting of a mass of lofty and precipitous crags through which there are two narrow passes, the Black Gap and the Gap of Glandine. In the north-east Croghan Hill, a beautiful green eminence, rises to a height over 700 ft. The remainder of the county is flat, but a range of low hills crosses its north-eastern division to the north of the Barrow. In the centre of the county from east to west a large portion is occupied by the Bog of Allen. The county shares in the advantage of the navigation of the Shannon, which skirts its western side. The Brosna, which issues from Loch Ennell in Westmeath, enters the county near the town of Clara, and flowing south-westwards across its north-west corner, discharges itself into the Shannon after receiving the Clodagh and the Broughill. A small portion of the north-eastern extremity is skirted by the upper Boyne. The Barrow forms the south-eastern boundary with Queen's County. The Little Brosna, which rises in the Slieve Bloom Mountains, forms the boundary of King's County with Tipperary, and falls into the Shannon.

This county lies in the great Carboniferous Limestone plain, with clay-soils and bogs upon its surface, and many drier deposits of esker-gravels rising

as green hills above the general level. The Slieve Bloom Mountains, consisting of Old Red Sandstone with Silurian inliers, form a bold feature in the south. North of Philipstown, the prominent mass of Croghan Hill is formed of basic volcanic rocks contemporaneous with the Carboniferous Limestone, and comparable with those in Co. Limerick.

Notwithstanding the large area occupied by bogs, the climate is generally healthy, and less moist than that of several neigh- bouring districts. The whole of the county would appear {o have been covered formerly by a vast forest, and the district bordering on Tipperary is still richly wooded. The soil naturally is not of great fertility except in special cases, but is capable of being rendered so by the judicious application of bog and lime manures according to its special defects. It is generally either a deep bog or a shallow gravelly loam. On the borders of the Slieve Bloom Mountains there are some very rich and fertile pastures, and there are also extensive grazing districts on the borders of Westmeath, which are chiefly occupied by sheep. Along the banks of the Shannon there are some fine tracts of meadow land. With the exception of the tract occupied by the Bog of Allen, the remainder of the county is nearly all under tillage, the most productive portion being that to the north-west of the Hill of Croghan. The percentage of tillage to pasture is roughly as 1 to 2. Oats, barley and rye, potatoes and turnips, are all considerably grown; wheat is almost neglected, and the acreage of all crops has a decreasing tendency. Cattle, sheep, pigs and poultry are bred increasingly; dairies are numerous in the north of the county, and the sheep are pastured chiefly in the hilly districts.

The county is traversed from S.E. to N.W. by the Portarling- ton, Tullamore, Clara and Athlone line of the Great Southern and Western railway, with a branch from Clara to Banagher; from Roscrea (Co. Tipperary) a branch of this company runs to Parsonstown (Birr); while the Midland Great Western has branches from its main line from Enfield (Co. Kildare) to Edenderry, and from Streamstown (Co. Westmeath) to Clara. The Grand Canal runs through the length of the county from east to west, entering the Shannon at Shannon harbour.

The population (65,563 in 1891; 60,187 m I 9 ox) > decreasing through emigration, includes about 89% of Roman Catholics. The decrease is rather below the average. The chief towns are Tullamore (the county town, pop. 4639) and Birr or Parsons- town (4438), with Edenderry and Clara. Philipstown near Tulla- more was formerly the capital of the county and was the centre of the kingdom of Offaly. The county comprises 12 baronies and 46 civil parishes. It returns two members to parliament, for the Birr and Tullamore divisions respectively. Previous to the Union, King's County returned six members to parliament, two for the county, and two for each of the boroughs of Philips- town and Banagher. Assizes are held at

sessions at Parsonstown, Philipstown and Tullamore. The county is divided into the Protestant dioceses of Killaioe, Meath and Ossory; and the Roman Catholic dioceses of Ardagh, Kildare and Leighlin, Ossory and Clonfert.

King's County, with portions of Tipperary, Queen's County and Kildare, at an early period formed one kingdom under the name of Offaly, a title which it retained after the landing of the English. Subsequently it was known as Glenmallery, Western Glenmallery pretty nearly corresponding to the present King's County, and Eastern Glenmallery to Queen's County. By a statute of 1556 the western district was constituted a shire under the name of King's County in honour of Philip, consort of Queen Mary — the principal town, formerly the seat of the O'Connors, being called Philipstown; and the eastern district at the same time received the name of Queen's County in honour of Mary. Perhaps the oldest antiquarian relic is the large pyramid of white stones in the Slieve Bloom Mountains called the Temple of the Sun or the White Obelisk. There are a considerable number of Danish raths, and a chain of moats commanding the passes of the bogs extended throughout the county. On the borders of Tippe- rary is an ancient causeway leading presumably to a crannog or lake-dwelling. The most important ecclesiastical ruins are those of the seven churches of Clonmacnoise (q.v.) on the Shannon in the north-west of the county, where an abbey was founded by St Kieran in 648, and where the remains include those of churches, two round towers, crosses, inscribed stones and a castle. Among the more famous religious houses in addition to Clonmacnoise were Durrow Abbey, founded by St Columbainsso; Monasteroris founded in the 14th century by John Bermingham, earl of Louth; and Seirkyran Abbey, founded in the beginning of the 5th century. The principal old castles are Rathmore, probably the most ancient in the county; Banagher, commanding an im- portant pass on the Shannon; Leap Castle, in the Slieve Bloom Mountains; and Birr or Parsonstown, now the seat of the earl of Rosse.

KINGSDOWN, THOMAS PEMBERTON LEIGH, Baron (1793- 1867), the eldest son of Thomas Pemberton, a chancery barrister, was born in London on the 1 1 th of February 1793. He was called to the bar at Lincoln's Inn in 1816, and at once acquired a lucrative equity practice. He sat in parliament for Rye (183 1- 1832) and for Ripon (1835-1843) . He was made a king's counsel in 1829. Of a retiring disposition, he seldom took part in parlia- mentary debates, although in 1838 in the case of Stockdale v. Hansard he took a considerable part in upholding the privileges of parliament. In 1841 he accepted the post of attorney-general for the duchy of Cornwall. In 1842 a relative, Sir Robert H. Leigh, left him a life interest in his Wigan estates, amounting to some £15,000 a year; he then assumed

the additional surname of Leigh. Having accepted the chancellorship of the duchy of Cornwall and a privy councillorship, he became a member of the judicial committee of the privy council, and for nearly twenty years devoted his energies and talents to the work of that body; his judgments, more particularly in prize cases, of which he took especial charge, are remarkable not only for legal precision and accuracy, but for their form and expression. In 1858, on the formation of Lord Derby's administration, he was offered the Great Seal, but declined; in the same year, however, he was raised to the peerage as Baron Kingsdown. He died at his seat, Lorry Hill, near Sittingbourne, Kent, on the 7th of October 1867. Lord Kingsdown never married, and his title became extinct.

See Recollections of Life at the Bar and in Parliament, by Lord Kingsdown (privately printed for friends, 1868); The Times (8th of October 1867).

KING'S EVIL, an old, but not yet obsolete, name given to the scrofula, which in the popular estimation was deemed capable of cure by the royal touch. The practice of " touching " for the scrofula, or " King's Evil," was confined amongst the nations of Europe to the two Royal Houses of England and France. As the monarchs of both these countries owned the exclusive right of being anointed with the pure chrism, and not with the ordinary sacred oil, it has been surmised that the common belief in the sanctity of the chrism was in some manner inseparably connected

with faith in the healing powers of the royal touch. The kings both of France and England claimed a sole and special right to this supernatural gift: the house of France deducing its origin from Clovis (5th century) and that of England declaring Edward th e Confessor the first owner of this virtue. That the Saxon origin of the royal power of healing was the popular theory in England is evident from the striking and accurate description of the cere- mony in Macbeth (act vi. scene iii.) . Nevertheless the practice of this rite cannot be traced back to an earlier date than the reign of Edward III. in England, and of St Louis (Louis IX.) in France; consequently, it is believed that the performance of healing by the touch emanated in the first instance from the French Crusader- King, whose miraculous powers were subsequently transmitted to his descendant and representative, Isabella of Valois, wife of Edward II. of England. In any case, Queen Isabella's son and heir, Edward III., claimant to the French throne through his mother, was the first English king to order a public display of an attribute that had hitherto been associated with the Valois kings alone. From his reign dates the use of the " touch-piece," a gold medal given to the sufferer as a kind of

talisman, which was origi- nally the angel coin, stamped with designs of St Michael and of a three-masted ship.

The actual ceremony seems first to have consisted of the sovereign's personal act of washing the diseased flesh with water, but under Henry VII. the use of an ablution was omitted, and a regular office was drawn up for insertion in the Service Book. At the " Ceremonies for the Healing " the king now merely touched his afflicted subject in the presence of the court chaplain who offered up certain prayers and afterwards presented the touch-piece, pierced so that it might be suspended by a ribbon round the patient's neck. Henry VII. 's office was henceforth issued with variations from time to time under successive kings, nor did it disappear from certain editions of the Book of Common Prayer until the middle of the 18th century. The practice of the Royal Healing seems to have reached the height of its popularity during the reign of Charles II., who is stated on good authority to have touched over 100,000 strumous persons. So great a number of applicants becoming a nuisance to the Court, it was afterwards enacted that special certificates should in future be granted to individuals demanding the touch, and such certificates are occasionally to be found amongst old parish registers of the close of the 17th century. After the Revolution, William of Orange refused to touch, and referred all applicants to the exiled James II. at St Germain; but Queen Anne touched frequently, one of her patients being Dr Samuel Johnson in his infancy. The Hanoverian kings declined to touch, and there exists no further record of any ceremony of healing henceforward at the English court. The practice, however, was continued by the exiled Stuarts, and was constantly performed in Italy by James Stuart, " the Old Pretender," and by his two sons, Charles and Henry (Cardinal York). (H.M.V.)

KINGSFORD, WILLIAM (1819-1898), British engineer and Canadian historian, was born in London on the 23rd of December 1 8 19. He first studied architecture, but disliking the confine- ment of an office enlisted in the 1st Dragoon Guards, obtaining his discharge in Canada in 1841. After serving for a time in the office of the city surveyor of Montreal he made a survey for the Lachine canal (1846-1848), and was employed in the United States in the building of the Hudson River railroad in 1849, and in Panama on the railroad being constructed there in 1851. In 1853 he was surveyor and, afterwards district superintendent for the Grand Trunk railroad, remaining in the employment of that company until 1864. The following year he went to England but returned to Canada in 1867 in the hope of taking part in the construction of the Intercolonial Railway. In this he was un- successful, but from 1872 to 1879 he held a government post in charge of the harbours of the Great Lakes and the St Lawrence. He had previously written books on engineering and topo- graphical subjects, and in 1880 he began to study the records of Canadian history at Ottawa.

Among other books he published Canadian Archaeology (1886) and Early Bibliography of Ontario (1892). But the great work of his life was a. History of Canada

in 10 volumes (1887-1897), ending with the union of Upper and Lower Canada in 1841. Kingsford died on the 28th of September 1898.

KINGSLEY, CHARLES (1819-1875), English clergyman, poet and novelist, was born on the 12th of June 1819, at Holne vicarage, Dartmoor, Devon. His early years were spent at Barnack in the Fen country and at Clovelly in North Devon. The scenery of both made a great impression on his mind, and was afterwards described with singular vividness in his writings. He was educated at private schools and at King's College, London, after his father's promotion to the rectory of St Luke's, Chelsea. In 1838 he entered Magdalene College, Cambridge, and in 1842 he was ordained to the curacy of Evers- ley in Hampshire, to the rectory of which he was not long after- wards presented, and this, with short intervals, was his home for the remaining thirty- three years of his life. In 1844 he married Fanny, daughter of Pascoe Grenfell, and in 1848 he published his first volume, The Saint's Tragedy. In 1859 h'e became chaplain to Queen Victoria; in i860 he was appointed to the professorship of modern history at Cambridge, which he resigned in 1869; and soon after he was appointed to a canonry at Chester. In 1873 this was exchanged for a canonry at West- minster. He died at Eversley on the 23rd of January 1875.

With the exception of occasional changes of residence in England, generally for the sake of his wife's health, one or two short holiday trips abroad, a tour in the West Indies, and another in America to visit his eldest son settled there as an engineer, his life was spent in the peaceful, if active, occupations of a clergyman who did his duty earnestly, and of a vigorous and prolific writer. But in spite of this apparently uneventful life, he was for many years one of the most prominent men of his time, and by his personality and his books he exercised con- siderable influence on the thought of his generation. Though not profoundly learned, he was a man of wide and various informa- tion, whose interests and sympathies embraced many branches of human knowledge. He was an enthusiastic student in par- ticular of natural history and geology. Sprung on the father's side from an old English race of country squires, and on his mother's side from a good West Indian family who had been slaveholders for generations, he had a keen love of sport and a genuine sympathy with country-folk, but he had at the same time something of the scorn for lower races to be found in the members of a dominant race.

With the sympathetic organization which made him keenly sensible of the wants of the poor, he threw himself heartily into the movement known as

Christian Socialism, of which Frederick Denison Maurice was the recognized leader, and for many years he was considered as an extreme radical in a profession the traditions of which were conservative. While in this phase he wrote his novels Yeast and Alton Locke, in which, though he pointed out unsparingly the folly of extremes, he certainly sympathized not only with the poor, but with much that was done and said by the leaders in the Chartist movement. Yet even then he considered that the true leaders of the people were a peer and a dean, and there was no real inconsistency in the fact that at a later period he was among the most strenuous defenders of Governor Eyre in the measures adopted by him to put down the Jamaican disturbances. He looked rather to the extension of the co-operative principle and to sanitary reform for the amelioration of the condition of the people than to any radical political change. His politics might therefore have been described as Toryism tempered by sympathy, or as Radicalism tempered by hereditary scorn of subject races. He was bitterly opposed to what he considered to be the medievalism and narrowness of the Oxford Tractarian Movement. In Mac- millan's Magazine for January 1864 he asserted that truth for its own sake was not obligatory with the Roman Catholic clergy, quoting as his authority John Henry Newman (q.v.). In the ensuing controversy Kingsley was completely discomfited. He was a broad churchman, who held what would be called a liberal theology, but the Church, its organization, its creed, its dogma, had ever an increasing hold upon him. Although at one

period he certainly shrank from reciting the Athanasian Creed in church, he was towards the close of his life found ready to join an association for the defence of this formulary. The more orthodox and conservative elements in his character gained the upper hand as time went on, but careful students of him and his writings will find a deep conservatism underlying the most radical utterances of his earlier years, while a passionate sym- pathy for the poor, the afflicted and the weak held possession of him till the last hour of his life.

Both as a writer and in his personal intercourse with men, Kingsley was a thoroughly stimulating teacher. As with his own teacher, Maurice, his influence on other men rather consisted in inducing them to think for themselves than in leading them to adopt his own views, never, perhaps, very definite. But his healthy and stimulating influence was largely due to the fact that he interpreted the thoughts which were stirring in the minds of many of his contemporaries.

As a preacher he was vivid, eager and earnest, equally plain- spoken and uncompromising when preaching to a fashionable congregation or to his own village poor. One of the very best of his writings is a sermon called The Message of the Church to Working Men; and the best of his published discourses are the Twenty-jive Village Sermons which he preached in the early years of his Eversley life.

As a novelist his chief power lay in his descriptive faculties. The descriptions of South American scenery in Westward Ho!, of the Egyptian desert in Hypatia, of the North Devon scenery in Two Years Ago, are among the most brilliant pieces of word- painting in English prose- writing; and the American scenery is even more vividly and more truthfully described when he had seen it only by the eye of his imagination than in his work At Last, which was written after he had visited the tropics. His sympathy for children taught him how to secure their interests. His version of the old Greek stories entitled The Heroes, and Water-babies and Madam How and Lady Why, in which he deals with popular natural history, take high rank among books for children.

As a poet he wrote but little, but there are passages in The Saint's Tragedy and many isolated lyrics, which are worthy of a place in all standard collections of English literature. Andromeda is a very successful attempt at naturalizing the hexameter as a form of English verse, and reproduces with great skill the sonorous roll of the Greek original.

In person Charles Kingsley was tall and spare, sinewy rather than powerful, and of a restless excitable temperament. His complexion was swarthy, his hair dark, and his eye bright and piercing. His temper was hot, kept under rigid control; his disposition tender, gentle and loving, with flashing scorn and indignation against all that was ignoble and impure; he was a good husband, father and friend. One of his daughters, Mary St Leger Kingsley (Mrs Harrison) , has become well known as a novelist under the pseudonym of " Lucas Malet."

Kingsley's life was written by his widow in 1877, entitled Charles Kingsley, his Letters and Memories of his Life, and presents a very- touching and beautiful picture of her husband, but perhaps hardly does justice to his humour, his wit, his overflowing vitality and boyish fun.

The following is a list of Kingsley's writings: — Saint's Tragedy, a drama (1848); Alton Locke, a novel (1849)-; Yeast, a novel (1849) Twenty-five Village Sermons (1849); Phaeton, or Loose Thoughts for Loose Thinkers (1852) ; Sermons onNational Subjects (1st series,i852) ; Hypatia, a novel (1853) ; Glaucus, or the Wonders of the Shore (1855) ; Sermons on National Subjects (2nd series, 1854); Alexandria and her Schools (1854) ;

Westward Ho 1 a novel (1855) ; Sermons for the Times (1855) ; The Heroes, Greek fairy tales (1856) ; Two Years Ago, a novel (1857); Andromeda and other Poems (1858); The Good News of God, sermons (1859) ; Miscellanies (1859) ; Limits of Exact Science applied to History (Inaugural Lectures, i860); Town and Country Sermons (1861); Sermons on the Pentateuch (1863); Water-babies (1863); The Roman and the Teuton (1864); David and other Sermons (1866); Hereward the Wake, a novel (1866); The Ancient Regime (Lectures at the Royal Institution, 1867); Water of Life and other Sermons (1867); The Hermits (1869); Madam How and Lady Why (1869); At last (1871); Town Geology (1872); Discipline and other Sermons 1872); Prose Idylls (1873); Plays and Puritans (1873); Health and Education (1874); Westminster Sermons (1874); Lectures delivered in

America (1875). He was a large contributor to periodical literature-, many of his essays are included in Prose Idylls and other works in the above list. But no collection has been made of some of his more characteristic writings in the Christian Socialist and Politics for the People, many of them signed by the pseudonym he then assumed, " Parson Lot." ■»„ ..

KINGSLEY, HENRY (1830-1876), English novelist, younger brother of Charles Kingsley, was born at Barnack, Northampton- shire, on the 2nd of January 1830. In 1853 he left Oxford, where he was an undergraduate at Worcester College, for the Australian goldfields. This venture, however, was not a success, and after five years he returned to England. He achieved con- siderable popularity with his Recollections of Geoffrey Hamlyn (1859), a novel of Australian life. This was the first of a series of novels of which Ravenshoe (1861) and The Hilly ars and The Burtons (1865) are the best known. These stories are charac- terized by much vigour, abundance of incident, and healthy sentiment. He edited for eighteen months the Edinburgh Daily Review, for which he had acted as war correspondent during the Franco-German War. He died at Cuckfield, Sussex, on the 24th of May 1876.

KINGSLEY, MARY HENRIETTA (1862-1900), English traveller, ethnologist and author, daughter "of George Henry Kingsley (1827-1892), was born in Islington, London, on the 13th of October 1862. Her father, though less widely known than his brothers, Charles and Henry (see above), was a man of versatile abilities, with a passion for travelling which he managed to indulge -in combination with his practice as a doctor. He wrote one popular book of travel, South Sea Bubbles, by the Earl and the Doctor (1872), in collaboration with the 13th earl of Pembroke. Mary Kingsley's reading in history, poetry and philosophy was wide if desultory, but she was most attracted to natural history. Her family moved to Cambridge in 1886, where she studied the science of sociology. The loss of

both parents in 1892 left her free to pursue her own course, and she resolved to study native religion and law in West Africa with a view to completing a book which her father had left unfinished. With her study of " raw fetish " she combined that of a scientific collector of fresh-water fishes. She started for the West Coast in August 1893; and at Kabinda, at Old Calabar, Fernando Po and on the Lower Congo she pursued her investigations, returning to England in June 1894. She gained sufficient knowledge of the native customs to contribute an introduction to Mr R. E. Dennett's Notes on the Folk Lore of the Fjort (1898). Miss Kingsley made careful preparations for a second visit to the same coast; and in December 1894, provided by the British Museum authorities with a collector's equipment, she proceeded via Old Calabar to French Congo, and ascended the Ogowe River. From this point her journey, in part across country hitherto untrodden by Europeans, was a long series of adventures and hairbreadth escapes, at one time from the dangers of land and water, at another from the cannibal Fang. Returning to the coast Miss Kingsley went to Corisco and to the German colony of Cameroon, where she made the ascent of the Great Cameroon (13,760 ft.) from a direction until then unattempted. She returned to England in October 1895. The story of her adventures and her investigations in fetish is vividly told in her Travels in West Africa (1897). The book aroused wide interest, and she lectured to scientific gatherings on the fauna, flora and folk-lore of West Africa, and to com- mercial audiences on the trade of that region and its possible developments, always with a protest against the lack of detailed knowledge characteristic of modern dealings with new fields of trade. In both cases she spoke with authority, for she had brought back a considerable number of new specimens of fishes and plants, and had herself traded in rubber and oil in the districts through which she passed. But her chief concern was for the develop- ment of the negro on African, not European, lines and for the government of the British possessions on the West Coast by methods which left the native " a free unsmashed man — not a whitewashed slave or an enemy." With undaunted energy Miss Kingsley made preparations for a third journey to the West Coast, but the Anglo-Boer War changed her plans, and she

decided to go first to South Africa to nurse fever cases. She died of enteric fever at Simon's Town, where she was engaged in tending Boer prisoners, on the 3rd of June 1900. Miss Kingsley's works, besides her Travels, include West African Studies, The Story of West Africa, a memoir of her father prefixed to his Notes on Sport and Travel (1899), and many contributions to the study of West African law and folk-lore. To continue

the investigation of the subjects Miss Kingsley had made her own " The African Society " was founded in 1901.

Valuable biographical information from the pen of Mr George A. Macmillan is prefixed to a second edition (1901) of the Studies.

KING'S LYNN (Lynn or Lynn Regis), a market town, sea- port and municipal and parliamentary borough of Norfolk, England, on the estuary of the Great Ouse near its outflow into the Wash. Pop. (1901), 20,288. It is 97 m. N. by E. from London by the Great Eastern railway, and is also served by the Midland and Great Northern joint line. On the land side the town was formerly defended by a fosse, and there are still con- siderable remains of the old wall, including the handsome South Gate of the 15th century. Several by-channels of the river, passing through the town, are known as fleets, recalling the similar flethe of Hamburg. The Public Walks forms a pleasant promenade parallel to the wall, and in the centre of it stands a picturesque octagonal Chapel of the Red Mount, exhibiting ornate Perpendicular work, and once frequented by pilgrims. The church of St Margaret, formerly the priory church, is a fine building with two towers at the west end, one of which was formerly surmounted by a spire, blown down in 1741. Norman or transitional work appears in the base of both towers, of which the southern also shows Early English and Decorated work, while the northern is chiefly Perpendicular. There is a fine Perpendicular east window of circular form. The church possesses two of the finest monumental brasses in existence, dated respectively 1349 and 1364. St Nicholas chapel, at the north end of the town, is also of rich Perpendicular workmanship, with a tower of earlier date. All Saints' church in South Lynn is a beautiful Decorated cruciform structure. Of a Franciscan friary there remains the Perpendicular Grey Friars' Steeple, and the doorway remains of a priests' college founded in 1502. At the grammar school, founded in the reign of Henry VIII., but occupying modern buildings, Eugene Aram was usher. Among the other public buildings are the guildhall, with Re- naissance front, the corn exchange, the picturesque custom-house of the 17th century, the athenaeum (including a~ museum, hall and other departments), the Stanley Library and the municipal buildings. The fisheries of the town are important, including extensive mussel-fisheries under the jurisdiction of the corpora- tion, and there are also breweries, corn-mills, iron and brass foundries, agricultural implement manufactories, ship-building yards, rope and sail works. Lynn Harbour has an area of 30 acres and an average depth at low tide of 10 ft. There is also good anchorage in the roads leading from the Wash to the docks. There are two docks of 6| and 10 acres area respectively. A considerable traffic is carried on by barges on the Ouse. The municipal and parliamentary boroughs of Lynn are co-extensive; the parliamentary borough returns one member. The town is governed by a mayor, 6 aldermen and 18 councillors.

Area, 3061 acres.

As Lynn (Lun, Lenne, Bishop's Lynn) owes its origin to the trade which its early settlers carried by the Ouse and its tribu- taries its history dates from the period of'settled occupation by the Saxons. It belonged to the bishops of Thetford before the Conquest and remained with the see when it was translated to Norwich. Herbert de Losinga (c. 1054-1119) granted its juris- diction to the cathedral of Norwich but this right was resumed by a later bishop, John de Gray, who in 1204 had obtained from John a charter establishing Lynn as a free borough. A fuller grant in 1206 gave the burgesses a gild merchant, the husting court to be held once a week only, and general liberties according to the customs of Oxford, saving the rights of the bishop and the earl of Arundel, whose ancestor William D'Albini had received from William II. the moiety of the tolbooth.

Among numerous later charters one of 1268 confirmed the privilege granted to the burgesses by the bishop of choosing a mayor; another of 1416 re-established his election by the aldermen alone. Henry VIII. granted Lynn two charters, the first (1524) incorporating it under mayor and aldermen; the second (1537) changing its name to King's Lynn and transferring to the corporation all the rights hitherto enjoyed by the bishop. Edward VI. added the possessions of the gild of the Trinity, or gild merchant, and St George's gild, while Queen Mary annexed South Lynn. Admiralty rights were granted by James I. Lynn, which had declai ed for the Crown in 1643, surrendered its privileges to Charles II. in 1684, but recovered its charter on the eve of the Revolution. A fair held on the festival of St Margaret (July 20) was included in the grant to the monks of Norwich about 1100. Three charters of John granting the bishop fairs on the feasts of St Nicholas, St Ursula and St Margaret are extant, and another of Edward I., changing the last to the feast of St Peter ad Vincula (Aug. 1). A local act was passed in 1558-1559 for keeping a mart or fair once a year. In the eighteenth century besides the pleasure fair, still held in February, there was another in October, now abolished. A royal charter of 1524 established the cattle, corn and general provisions market, still held every Tuesday and Saturday. Lynn has ranked high among English seaports from early times.

See E. M. Beloe, Our Borough (1899); H. Harrod, Report on Deeds, &c.-, of King's Lynn (1874) ; Victoria County History: Norfolk.

KING'S MOUNTAIN, a mountainous ridge in Gaston county, North Carolina and York county, South Carolina, U.S.A. It is an outlier of the Blue Ridge running parallel with it, i.e. N.E. and S.W., but in contrast with the other mountains of the Blue Ridge, King's Mountain has a crest marked with sharp and irregular notches. Its highest point and great escarpment are

in North Carolina. About if m. S. of the line between the two states, where the ridge is about 60 ft. above the surrounding country and very narrow at the top, the battle of King's Moun- tain was fought on the 7th of October 1 780 between a force of about 100 Provincial Rangers and about 1000 Loyalist militia under Major Patrick Ferguson (1 744-1 780) , and an American force of about 900 backwoodsmen under Colonels William Campbell (1745-1 781) , Benjamin Cleveland (1 738-1806) , Isaac Shelby, John Sevier and James Williams (1 740-1 780), in which the Americans were victorious. The British loss is stated as 119 killed (includ- ing the commander), 123 wounded, and 664 prisoners; the American loss was 28 killed (including Colonel Williams) and 62 wounded. The victory largely contributed to the success of General Nathanael Greene's campaign against Lord Cornwallis. There has been some dispute as to the exact site of the engage- ment, but the weight of evidence is in favour of the position mentioned above, on the South Carolina side of the line. A monument erected in 181 5 was replaced in 1880 by a much larger one, and a monument for which Congress appropriated $30,000 in 1906, was completed in 1909.

See L. C. Draper, King's Mountain and its Heroes (Cincinnati, 188 1); and Edward McCrady, South Carolina in the Revolution I775~i78o (New York, 1901).

KINGSTON, ELIZABETH, Duchess of (1720-1788), sometimes called countess of Bristol, was the daughter of Colonel Thomas Chudleigh (d. 1726), and was appointed maid of honour to Augusta, princess of Wales, in 1743, probably through the good offices of her friend, William Pulteney, earl of Bath. Being a very beautiful woman Miss Chudleigh did not lack admirers, among whom were James, 6th duke of Hamilton, and Augustus John Hervey, afterwards 3rd earl of Bristol. Hamilton, how- ever, left England, and on the 4th of August 1744 she was privately married to Hervey at Lainston, near Winchester. Both husband and wife being poor, their union was kept secret to enable Elizabeth to retain her post at court, while Hervey, who was a naval officer, rejoined his ship, returning to England towards the close of 1746. The marriage was a very unhappy one, and the pair soon ceased to live, together; but when it appeared probable that Hervey would succeed his brother as earl

of Bristol, his wife took steps to obtain proof of her marriage. This did not, however, prevent her from becoming the mistress of Evelyn Pierrepont, 2nd duke of Kingston, and she was not odIv a very prominent figure in London

society, but in 1765 in Berlin she was honoured by the attentions of Frederick the Great. By this time Hervey wished for a divorce from his wife; but Elizabeth, although equally anxious to be free, was un- willing to face the publicity attendant upon this step. However she began a suit of jactitation against Hervey. This case was doubt- less collusive, and after Elizabeth had sworn she was unmarried, '".he court in February 1769 pronounced her a spinster. Within 4 month she married Kingston, who died four years later, leaving her all his property on condition that she remained a widow. Visiting Rome the duchess was received with honour by Clement XIV.; after which she hurried back to England to defend herself from a charge of bigamy, which had been preferred against her by Kingston's nephew, Evelyn Meadows (d. 1826). The house of Lords in 1776 found her guilty, and retaining her fortune she hurriedly left England to avoid further proceedings on the part of the Meadows family, who had a reversionary interest in the Kingston estates. She lived for a time in Calais, and then repaired to St Petersburg, near which city she bought an estate which she named " Chudleigh." Afterwards she resided in Paris, Rome, and elsewhere, and died in Paris on the 26th of August 1788. The duchess was a coarse and licentious woman, and was ridiculed as Kitty Crocodile by the comedian Samuel Foote in a play A Trip to Calais, which, however, he was not allowed to produce. She is said to have been the original of Thackeray's characters, Beatrice and Baroness Bernstein.

There is an account of the duchess in J. H. Jesse's Memoirs of the Court of England 1688-1760, vol. iv. (1901).

KINGSTON, WILLIAM HENRY GILES (1814-1880), English novelist, son of Lucy Henry Kingston, was born in London on the 28th of February 1814. Much of his 'youth was spent at Oporto, where his father was a merchant, but when he entered the business, he made his headquarters in London. He early wrote newspaper articles on. Portuguese subjects. These were translated into Portuguese, and the author received a Portuguese order of knighthood and a pension for his services in the con- clusion of the commercial treaty of 1842. In 1844 his first book, The Circassian Chief, appeared, and in 1845 The Prime Minister, a Story of the Days of the Great Marquis of Pombal. The Lusi- tanian Sketches describe Kingston's travels in Portugal. In 1851 Peter the Whaler, his first book for boys, came out. These books proved so popular that Kingston retired from business, and devoted himself to the production of tales of adventure for boys. Within thirty years he wrote upwards of one hundred and thirty such books. He had a practical knowledge of sea- manship, and his stories of the sea, full of thrilling adventures and hairbreadth escapes, exactly hit the taste of his boy readers. Characteristic specimens of his work are The Three Midshipmen; The Three Lieutenants; The Three Commanders; and The Three Admirals. He also wrote popular accounts of famous travellers by

land and sea, and translated some of the stories of Jules Verne.

In all philanthropic schemes Kingston took deep interest; he was the promoter of the mission to seamen; and he acted as secretary of a society for promoting an improved system of emigration. He was editor of the Colonist for a short time in 1844 and of the Colonial Magazine and East Indian Review from 1849 to 1851. He was a supporter of the volunteer movement in England from the first. He died at Willesden on the 5th of August 1880.

KINGSTON, the chief city of Frontenac county, Ontario, Canada, at the north-eastern extremity of Lake Ontario, and the mouth of the Cataraqui River. Pop. (1901), 17,961. It is an important station on the Grand Trunk railway, the terminus of the Kingston & Pembroke railway, and has steamboat communication with other ports on Lake Ontario and the Bay of Quinte, on the St Lawrence and the Rideau canal. It contains a fine stone graving dock, 280 ft. long, 100 ft. wide, and with a depth of 16 ft. at low water on the sill. The fortifications, which

at one time made it one of the strongest fortresses in Canada, are now out of date. The sterility of the surrounding country, and the growth of railways have lessened its commercial importance, but it still contains a number of small factories, and important locomotive works and ship-building yards. As an educational and residential centre it retains high rank, and is a popular summer resort. It is the seat of an Anglican and of a Roman Catholic bishopric, of the Royal Military College (founded by the Dominion government in 1875), of an artillery school, and of Queen's University, an institution founded in 1839 under the nominal control of the Presbyterian church, now including about 1200 students. In the suburbs are a Dominion penitentiary, and a provincial lunatic asylum. Founded by the French in 1673, under the name of Kateracoui, soon changed to Fort Frontenac, it played an important part in the wars between English and French. Taken and destroyed by the English in 1758, it was refounded in 1782 under its present name, and was from 1 84 1 to 1844 the capital of Canada.

KINGSTON, a city and the county-seat of Ulster county, New York, U.S.A., on the Hudson River, at the mouth of Rondout Creek, about 90 m. N. of New York and about 53 m. S. of Albany. Pop. (1900), 24,535—3551 being foreign-born; (1910 census) 25,908. It is served by the West Shore (which here crosses Rondout Creek on a high bridge), the New York Ontario & Western, the Ulster & Delaware, and the Wallkill Valley rail-ways, by a ferry across the river to Rhinecliff, where connexion is made with the New York Central & Hudson River railroad, and by steamboat lines to New York, Albany and other river points. The principal part of the

city is built on a level plateau about 150 ft. above the river; other parts of the site vary from fiatlands to rough highlands. To the N.W. is the mountain scenery of the Catskills, to the S.W. the Shawangunk Mountains and Lake Mohonk, and in the distance across the river are the Berkshire Hills. The most prominent public buildings are the post office and the city hall; in front of the latter is a Soldiers' and Sailors' Monument. The city has a Carnegie library. The " Senate House " — now the property of the state, with a colonial museum — was erected about 1676; it was the meeting place of the first State Seriate in 1777, and was burned (except the walls) in October of that year. The court house (181 8) stands on the site of the old court house, in which Governor George Clinton was inaugurated in July 1777, and in which Chief Justice John Jay held the first term of the New York Supreme Court in September 1777. The Elmendorf Tavern (1723) was the meeting-place of the New York Council of Safety in October 1777. Kingston Academy was organized in 1773, and in 1864 was transferred to the Kingston Board of Education and became part of the city's public school system; its present building dates from 1806. Kingston's principal manufactures are tobacco, cigars and cigarettes, street railway cars and boats; other manufactures are Rosendale cement, bricks, shirts, lace curtains, brushes, motor wheels, sash and blinds. The city ships large quantities of building and flag stones quarried in the vicinity. The total value of the factory product in 1905 was $5,000,922, an increase of 26-5 % since 1900.

In 1614 a small fort was built by the Dutch at the mouth of Rondout Creek, and in 1652 a settlement was established in the vicinity and named Esopus after the Esopus Indians, who were a subdivision of the Munsee branch of the Delawares, and whose name meant " small river," referring possibly to Rondout Creek. The settlement was deserted in 1655-56 on account of threatened Indian attacks. In 1658 a stockade was built by the order of Governor Peter Stuyvesant, and from this event the actual founding of the city is generally dated. In 1659 the massacre of several drunken Indians by the soldiers caused a general, rising of the Indians, who unsuccessfully attacked the stockade, killing some of the soldiers and inhabitants, and capturing and torturing others. Hostilities continued into the following year. In 1661 the governor named the place Wiltwyck and gave it a municipal charter. In 1663 it suffered from another Indian attack, a number of the inhabitants being slain or taken prisoners. The English took possession

in 1664, and in 1669 Wiltwyck was named Kingston, after Kingston Lisle,

near Wantage, England, the family seat Of Governor Francis Lovelace. In the same year the English garrison was removed. In 1673-1674 Kingston was again tempo- rarily under the control of the Dutch, who called it Swanen- burg. In 1777 the convention which drafted the new state constitution met in Kingston, and during part of the year Kingston was the seat of the new state government. On the 16th of October 1777 the British under General Sir John Vaughan (1748-95) sacked it and burned nearly all its buildings. In 1008 the body of George Clinton was removed from Washington, D.C., and reinterred in Kingston on the 250th anniversary of the building of the stockade. In 1787 Kingston was one of the places contemplated as a site for the national capital. In 1805 it was incorporated as a village, and in 1872 it absorbed the villages of Rondout and Wilbur and was made a city. See M. Schoonmaker, History of Kingston (New York, 1888). KINGSTON, a borough of Luzerne county, Pennsylvania, U.S.A., on the North Branch of the Susquehanna river, opposite Wilkes-Barre. Pop. (1900), 3846 (1039 foreign-born); (1910) 6449. Kingston is served by the Delaware, Lackawanna & Western and the Lehigh Valley railways. It is the seat of Wyoming Seminary (1844; co-educational), a well-known secondary school. Anthracite coal is mined here; there are railway repair and machine-shops; and among the borough's manufactures are hosiery, silk goods, underwear and adding machines. Kingston (at first called " Kingstown," from Kings Towne, Rhode Island) was commonly known in its early days as the " Forty Township," because the first permanent settle- ment was made by forty pioneers from Connecticut, who were sent out by the Susquehanna Company and took possession of the district in its name in 1769. In 1772 the famous "Forty Fort," a stockade fortification, was built here, and in 1777 it was rebuilt, strengthened and enlarged. Here on the 3rd of July 1778 about 400 men and boys met, and under the command of Colonel Zebulon Butler (1731-95) went out to meet a force of about 1 100 British troops and Indians, commanded by Major John Butler and Old King (Sayenqueraghte). The Americans were defeated in the engagement that followed, and many of the prisoners taken were massacred or tortured by the Indians. A monument near the site of the fort commemorates the battle and massacre. Kingston was incorporated as a borough in 1857. (See Wyoming Valley.)

KINGSTON, the capital and chief port of Jamaica, West Indies. Pop. (1901), 46,542, mostly negroes. It is situated in the county of Surrey, in the south-east of the island, standing on the north shore of a land-locked harbour — for its size one of the finest in the world — and with its suburbs occupying an area of 1080 acres. The town contains the principal government offices. It has a good water supply, a telephone service and a supply of both gas and electric light, while electric trams ply between the town and its suburbs. The Institute of Jamaica maintains a public library,

museum and art gallery especially devoted to local interests. The old parish church in King Street, dating probably from 1692 was the burial-place of William Hall (1699) and Admiral Benbow (1702). The suburbs are remarkable for their beauty. The climate is dry and healthy, and the tempera- ture ranges from 93° to 66 °F. Kingston was founded in 1693, after the neighbouring town of Port Royal had been ruined by an earthquake in 1692. In 1703, Port Royal having been again laid waste by fire, Kingston became the commercial, and in 1872 the political, capital of the island. On several occasions King- ston was almost entirely consumed by fire, the conflagrations of 1780, 1843, 1862 and 1882 being particularly severe. On the 14th of January 1907 it was devastated by a terrible earthquake. A long immunity had led to the erection of many buildings not specially designed to withstand such shocks, and these and the fire which followed were so destructive that practically the whole town had to be rebuilt. (See Jamaica.)

KINGSTON-ON-THAMES, a market town and municipal borough in the Kingston parliamentary division of Surrey, England, 11 m. S.W. of Charing Cross, London; on the London

and South-Western railway. Pop. (1901), 34,375. It has a frontage with public walks and gardens upon the right bank of the Thames, and is in close proximity to Richmond and Bushey Parks, its pleasant situation rendering it a favourite residential district. The ancient wooden bridge over the river, which was in existence as early as 1223, was superseded by a structure of stone in 1827. The parish church of All Saints, chiefly Per- pendicular in style, contains several brasses of the 15th century, and monuments by Chantrey and others; the grammar school, rebuilt in 1878, was originally founded as a chantry by Edward Lovekyn in 1305, and converted into a school by Queen Eliza- beth. Near the parish church stood the chapel of St Mary, where it is alleged the Saxon kings were crowned. The ancient stone said to have been used as a throne at these coronations was removed to the market-place in 1850. At Norbiton, within the borough, is the Royal Cambridge Asylum for soldiers' widows (1854). At Kingston Hill is an industrial and training school for girls, opened in 1892. There are large market gardens in the neighbourhood, and the town possesses oil-mills, four- mills, breweries and brick and tile works. The borough is under a mayor, 8 aldermen and 24 councillors. Area, 1133 acres.

The position of Kingston {Cyningestun, Chingestune) on the Thames where there was probably a ford accounts for its origin; its later prosperity was due to the bridge which existed in 1223 and possibly long before. In 836 or 838 it was the meeting-place, of the council under Ecgbert, and in the 10th century some if not all of the West Saxon kings were crowned at Kingston.

In the time of Edward the Confessor it was a royal manor, and in 1086 included a church, five mills and three fisheries. Domesday also mentions bedels in. Kingston. The original charters were granted by John in 1200 and 1209, by which the free men of Kingston were empowered to hold the town in fee-farm for ever, with all the liberties that it had while in the king's hands. Henry III. sanctioned the gild-merchant which had existed previously, and granted other privileges. These charters were confirmed and extended by many succeeding monarchs down to Charles I. Henry VI. incorporated the town under two bailiffs. Except for temporary surrenders of their corporate privileges under Charles II. and James II. the government of the borough continued in its original form until 1835, when it was rein-corporated under the title of mayor, aldermen and burgesses. Kingston returned two members to parliament in 1311, 1313, 1353 and 1373, but never afterwards. The market, still held on Saturdays, was granted by James I., and the Wednesday market by Charles II. To these a cattle-market on Thursdays has been added by the corporation. The only remaining fair, now held on the 13th of November, was granted by Henry III., and was then held on the morrow of All Souls and seven days following.

KINGSTON-UPON-HULL, EARLS AND DUKES OF. These titles were borne by the family of Pierrepont, or Pierrepoint, from 1628 to 1773.

Robert Pierrepont (1 584-1643), second son of Sir Henry Pierrepont of Holme Pierrepont, Nottinghamshire, was member of parliament for Nottingham in 1601, and was created Baron Pierrepont and Viscount Newark in 1627, being made earl of Kingston-upon-Hull in the following year. He remained neutral on the outbreak of the Civil War; but afterwards he joined the king, and was appointed lieutenant-general of the counties of Lincoln, Rutland, Huntingdon, Cambridge and Norfolk. Whilst defending Gainsborough he was taken prisoner, and was accidentally killed on the 25th of July 1643 while being conveyed to Hull. The earl had five sons, one of whom was Francis Pierrepont (d. 1659), a colonel in the parliamentary army and afterwards a member of the Long Parliament; and another was William Pierrepont (q.v.), a leading member of the parliamentary party.

His son Henry Pierrepont (1606-1680), 2nd earl of Kingston and 1st marquess of Dorchester, was member of parliament for Nottinghamshire, and was called to the House of Lords as Baron Pierrepont in 1641. During the earlier part of the Civil War he was at Oxford in attendance upon the king, whom he represented at the negotiations at Uxbridge. In 1645 he was made a privy

councillor and created marquess of Dorchester; but in 1647 he compounded for his estates by paying a large fine to the parlia- mentarians. Afterwards the marquess, who was always fond of books, spent his time mainly in London engaged in the study of medicine and law, his devotion to the former science bringing upon him a certain amount of ridicule and abuse. After the Restoration he was restored to the privy council, and was made recorder of Nottingham and a fellow of the Royal Society. Dorchester had two daughters, but no sons, and when he died in London on the 8th of December 1680 the title of marquess of Dorchester became extinct. He was succeeded as 3rd earl of Kingston by Robert (d. 1682), a son of Robert Pierrepont of Thoresby, Nottinghamshire, and as 4th earl by Robert's brother William (d. 1690).

Evelyn Pierrepont (c. 1655-1726), 5th earl and 1st duke of Kingston, another brother had been member of parliament for East Retford before his accession to the peerage. While serving as one of the commissioners for the union with Scotland he was created marquess of Dorchester in 1706, and took a leading part in the business of the House of Lords. He was made a privy councillor and in 171 5 was created duke of Kingston; afterwards serving as lord privy seal and lord president of the council. The duke, who died on the 5th of March 1726, was a prominent figure in the fashionable society of his day. He was twice married, ■ and had five daughters, among whom was Lady Mary Wortley Montagu (g.v.), and one son, William, earl of Kingston (d. 1713). The latter's son, Evelyn Pierrepont (1711-1773), succeeded his grandfather as second duke of Kingston. When the rebellion of 1745 broke out he raised a regiment called " Kingston's light horse," which distinguished itself at Culloden. The duke, who attained the rank of general in the army, is described by Horace Walpole as " a very weak man, of the greatest beauty and finest person in England." He is chiefly famous for his connexion with Elizabeth Chudleigh, who claimed to be duchess of Kingston (q.v.). The Kingston titles became extinct on the duke's death without children on the 23rd of September 1773, but on the death of the duchess in 1788 the estates came to his nephew Charles Meadows (1737-1816), who took the name of Pierrepont and was created Baron Pierrepont and Viscount Newark in 1796, and Earl Manvers in 1806. His descendant, the present Earl Manvers, is thus the representative of the dukes of Kingston.

KINGSTOWN, a seaport of Co. Dublin, Ireland, in the south parliamentary division, at the south-eastern extremity of Dublin Bay, 6 m. S.E. from Dublin by the Dublin & South- Eastern railway. Pop. of urban district (1901), 17,377. It is a large seaport and favourite watering-place, and possesses several fine streets, with electric trams, and terraces commanding

picturesque sea views. The original name of Kingstown was Dunleary, which was exchanged for the present designation after the embarkation of George IV. at the port on his return from Ireland in 1821, an event which is also commemorated by a granite obelisk erected near the harbour. The town was a mere fishing village until the construction of an extensive harbour, begun in 1817 and finally completed in 1859. The eastern pier has a length of 3500 ft. and the western of 4950 ft., the total area enclosed being about 250 acres, with a varying depth of from 15 to 27 ft. Kingstown is the station of the City of Dublin Steam Packet Company's mail steamers to Holyhead in con- nexion with the London & North-Western railway. It has large export and import trade both with Great Britain and foreign countries. The principal export is cattle, and the principal imports corn and provisions. Kingstown is the centre of an extensive sea-fishery; and there are three yacht clubs: the Royal Irish, Royal St George and Royal Alfred.

KING-TE CHEN, a town near Fu-liang Hien, in the province of Kiang-si, China, and the principal seat of the porcelain manu- facture in that empire. Being situated on the south bank of the river Chang, it was in ancient times known as Chang-nan Chin, or " town on the south of the river Chang." It is unwalled, and straggles along the bank of the river. The streets are narrow, and crowded with a population which is reckoned at a million, the vast majority of whom find employment at the porcelain

factories. Since the Ch'in dynasty (557-589) this has been the great trade of the place, which was then called by its earlier name. In the reign of King-te (Chen-tsung) of the Sung dynasty, early in the nth century a.d., a manufactory was founded there for making vases and objects of art for the use of the emperor. Hence its adoption of its present title. Since the time of the Ming dynasty a magistrate has been specially appointed to superintend the factories and to despatch at regulated intervals the imperial porcelain to Peking. The town is situated on a vast plain surrounded by mountains, and boasts of three thousand porcelain furnaces. These constantly burning fires are the causes of frequent conflagrations, and at night give the city the appear- ance of a place on fire. The people are as a rule orderly, though they have on several occasions shown a hostile bearing towards foreign visitors. This is probably to be accounted for by a desire to keep their art as far as possible a mystery, which appears less unreasonable when it is remembered that the two kinds of earth of which the porcelain is made are not found at King-te Chen, but are brought from K'i-mun in the neighbouring province of Ngan- hui, and that there is therefore no reason why the trade should be necessarily maintained at that place. The two kinds of earth are known as pai-tun-tsze, which is a fine fusible quartz powder, and kao-lin, which is not fusible, and is said to give strength to the ware. Both materials are prepared in the shape of bricks at K'i-mun, and

are brought down the Chang to the seat of the manufacture.

KINGUSSIE, a town of Inverness-shire, Scotland. Pop. (1901), 987. It lies at a height of 750 ft. above sea-level, on the left bank of the Spey, here crossed by a bridge, 465 m. S. by S.E. of Inver- ness by the Highland railway. It was founded towards the end of the 1 8th century by the duke of Gordon, in the hope of its becoming a centre of woollen manufactures. This expectation, however, was not realized, but in time the place grew popular as a health resort, the scenery in every direction being remarkably picturesque. On the right bank of the river is Ruthven, where James Macpherson was born in 1736, and on the left bank, some 25 m. from Kingussie, is the house of Belleville (previously known as Raitts) which he acquired from Mackintosh of Borlum and where he died in 1796. The mansion, renamed Balavil by Macpherson's great-grandson, was burned down in 1903, when the fine library (including some MSS. of Sir David Brewster, who had married the poet's second daughter) was destroyed. Of Ruthven Castle, one of the residences of the Comyns of Badenoch, only the ruins of the walls remain. Here the Jacobites made an ineffectual rally under Lord George Murray after the battle of Culloden.

KING WILLIAM'S TOWN, a town of South Africa, in the Cape province and on the Buffalo River, 42 m. by rail W.N.W. of the port of East London. Pop. ˆ904), 9506, of whom 5987 were whites. It is the headquarters of the Cape Mounted Police. " King," as the town is locally called, stands 1275 ft. above the sea at the foot of the Amatola Mountains, and in the midst of a thickly populated agricultural district. The town is well laid out and most of the public buildings and merchants' stores are built of stone. There are manufactories of sweets and jams, candles, soap, matches and leather, and a large trade in wool, hides and grains is done with East London. " King " is also an important entrepot for trade with the natives throughout Kaffraria, with which there is direct railway communication. Founded by Sir Benjamin D'Urban in May 1835 during the Kaffir War of that year, the town is named after William IV. It was abandoned in December 1836, but was reoccupied in 1846 and was the capital of British Kaffraria from its creation in 1847 to its incorporation in 1865 with Cape Colony. Many of the colonists in the neighbouring districts are descendants of members of the German legion disbanded after the Crimean War and provided with homes in Cape Colony; hence such names as Berlin, Potsdam, Braunschweig, Frankfurt, given to settlements in this part of the country.

KINKAJOU (Cercoleptes caudivolvulus or Potos Jtavus), the single species of an aberrant genus of the raccoon family (Pro- cyonidae). It has been split up into a number of local races. A

native of the forests of the warmer parts of South and Central America, the kinkajou is about the size of a cat, of a uniform pale, yellowish-brown colour, nocturnal and arboreal in its habits, feeding on fruit, honey, eggs and small birds and mammals, and is of a tolerably gentle disposition and easily tamed. (See Carnivoea.)

KINKEL, JOHANN GOTTFRIED (1815-1882), German poet, was born on the nth of August 1815 at Obercassel near Bonn. Having studied theology at Bonn and afterwards in Berlin, he established himself at Bonn in 1836 as privat decent of theology, later became master at the gymnasium there, and was for a short time assistant preacher in Cologne. Changing his religious opinions, he abandoned theology and delivered lectures on the history of art, in which he had become interested on a journey to Italy in 1837. In 1846 he was appointed extraordinary professor of the history of art at Bonn University. For his share in the revolution in the Palatinate in 1849 Kinkel was arrested and, sentenced to penal servitude for life, was interned in the fortress of Spandau. His friend Carl Schurz contrived in November 1850 to effect his escape to England, whence he went to the United States. Returning to London in 1853, he for several years taught German and lectured on German literature, and in 1858 founded the German paper Hermann. In 1866 he accepted the professor- ship of archaeology and the history of art at the Polytechnikum in Zurich, in which city he died on the 13th of November 1882.

The popularity which Kinkel enjoyed in his day was hardly justified by his talent; his poetry is of the sweetly sentimental type which was much in vogue in Germany about the middle of the 19th century. His Gedichte first appeared in 1843, and have gone through several editions. He is to be seen to most advan- tage in the verse romances, Otto der Schiltz, eine rheinische Geschichte in zwolf Abenteuern (1846) which in 1896 had attained its 75th edition, and Der Grobschmied von Antwerpen (1868). Among Kinkel's other works may be mentioned the tragedy Nitnrod (1857), and his history of art, Geschichte der bildenden Ktinste bet den christlichen Vblkern (1845). Kinkel's first wife, Johanna, ne'e Mockel (1810-1858), assisted her husband in his literary work, and was herself an author of considerable merit. Her admirable autobiographical novel Hans Ibeles in London was not published until i860, after her death. She also wrote on musical subjects.

See A. Strodtmann, Gottfried Kinkel (2 vols., Hamburg, 1851); and O. Henne am Rhyn, G. Kinkel, ein Lebensbild (Zurich, 1883).

KINNING PARK, a southern suburb of Glasgow, Scotland. Pop. (1901), 13,852. It is situated on the left bank of the Clyde between Glasgow, with which it is connected by tramway and subway, and Govan. Since 1850 it has grown from a rural village to a busy centre mainly inhabited by artisans and labourers. Its principal industries are engineering, bread and biscuit baking, soap-making and paint-making.

KINNOR (Gr. Kivvpa), the Hebrew name for an ancient stringed instrument, the first mentioned in the Bible (Gen. iv. 21), where it is now always translated " harp." The identification of the instrument has been much discussed, but, from the stand- point of the history of musical instruments, the weight of evidence is in favour of the view that the Semitic kinnor is the Greek cithara (q.v.). This instrument was already in use before 2000 B.C. among the Semitic races and in a higher state of development than it ever attained in Greece during the best classic period. It is unlikely that an instrument (which also appears on Hebrew coins) so widely known and used in various parts of Asia Minor in remote times, and occurring among the Hittite sculptures, should pass unmentioned in the Bible, with the exception of the verses in Dan. iii.

KINO, the West African name of an astringent drug intro- duced into European medicine in 1757 by John Fothergill. When described byjiim it was believed to have been brought from the river Gambia in West Africa, and when first imported it was sold in England as Gummi rubrum astringens gambiense. It was obtained from Ptcrocarpus erinaceus. The drug now recognized as the legitimate kind is East Indian, Malabar or Amboyna kino, which is the evaporated juice obtained from incisions in the trunk

of Pterocarpus Marsupium (Leguminosae), though Botany Bay or eucalyptus kino is used in Australia. When exuding from the tree it resembles red-currant jelly, but hardens in a few hours after exposure to the air and sun. When sufficiently dried it is packed into wooden boxes for exportation. When these are opened it breaks up into angular brittle fragments of a blackish-red colour and shining surface. In cold water it is only partially dissolved, leaving a pale flocculent residue which is soluble in boiling water but deposited again on cooling. It is soluble in alcohol and caustic alkalis, but not in ether.

The chief constituent of the drug is kino-tannic acid, which is present to the extent of about 75%; it is only very slightly soluble in cold water. It is not absorbed at all from the stomach and only very slowly from the intestine. Other constituents are gum, pyrocatechin, and kinoin, a crystalline neutral principle. Kino-red is also present in small quantity, being an oxidation product of kino-tannic acid. The useful preparations of this drug are the

tincture (dose 3—1 drachm), and the pulvis kino compositus (dose 5-20 gr.) which contains one part of opium in twenty. The drug is frequently used in diarrhoea, its value being due to the relative insolubility of kino-tannic acid, which enables it to affect the lower part of the intestine. In this respect it is parallel with catechu. It is not now used as a gargle, antiseptics being recognized as the rational treatment for sore-throat.

KINORHYNCHA, an isolated group of minute animals con- taining the single genus Echinoderes F. Dujardin, with some eighteen species. They occur in mud and on sea-weeds at the bottom of shallow seas below low-water mark and devour organic debris.

The body is enclosed in a stout cuticle, prolonged in places into spines and bristles. These are especially conspicuous in two rings

(Afier Hartog. from Cambridge Natural History, vol. ii., "Worms, &c," by permission of Messrs. Macmillan & Co., Ltd.)

b, bristle ; cs, caudal spine ; ph, pharynx ; s & s', the spines on the two segments of the proboscis ; sg, salivary glands ; st, stomach.

round the proboscis and in the two posterior caudal spines. The body is divided into eleven segments and the protrusible pro- boscis apparently into two, and the cuticle of the central segment is thickened to form three plates, one dorsal and two ventro- lateral. The cuticle is secreted by an epidermis in which no cell boundaries are to be seen; it sends out processes into the bristles. The mouth opens at the tip of the retractile probosds; it leads into a short thin-walled tube which opens into an oval muscular gizzard lined with a thick cuticle; at the posterior end of this are some minute glands and then follows a large stomach slightly sacculated in each segment, this tapers through the rectum to the te/minal anus. A pair of pear-shaped, ciliated gland? inside lie in the eighth segment and open on the ninth. They are regarded as kidneys. The nervous system consists of a ganglion "r brain, which lies dorsally about the level of the junction of the uharynx and the stomach, a nerve ring and a segmented neutral cord. The only sense organs described are eyes, which occur i-n some species, and may number one to four pairs.*

The Kinorhyncha are dioecious. The testes reach forward to the fifth and even to the second segment, and open one each side of the anus. The ovaries open in a similar position but never reach farther forward than the fourth segment. The external openings in the male are armed with a pair of

hollowed spines. The animals are probably oviparous.

Literature. — F. Dujardin, Ann. Sci. Nat., 3rd series, Zool. xv. 1851, p. 158; W. Reinhard, Zeitschr. wiss. Zool. xlv. 1887, pp. 401-467, t. xx.-xxii. ; C. Zelinka, Verh. d. Deutsch. Zool. Ges., 1894.

(A. E. S.)

KINROSS-SHIRE, a county of Scotland, bounded N. and W. by Perthshire, on the extreme S.W. by Clackmannanshire and S. and E. by Fifeshire. Its area is 52,410 acres or 81-9 sq.m. Except- ing Clackmannan it is the smallest county in Scotland both in point of area and of population. On its confines the shire is hilly. To the N. and W. are several peaks of the Ochils, the highest being Innerdouny (1621 ft.) and Mellock (1573); to the E. are the heights of the Lomond group, such as White Craigs (1492 ft.) and Bishop Hill; to the S. are Benarty (1131 ft.) on the Fife border and farther west the Cleish Hills, reaching in Dumglow an altitude of 1241 ft. With the exception of the Leven, which drains Loch Leven and of. which only the first mile of its course belongs to the county, all the streams are short. Green's Burn, | the North and South Queich, and the Gairney are the principal. Loch Leven, the only lake, is remarkable rather for its associations than its natural features. The scenery on the Devon, west of the Crook, the river here forming the boundary with Perth- shire, is of a lovely and romantic character. At one place the stream rushes through the rocky gorge with a loud clacking sound which has given to the spot the name of the Devil's Mill, and later it flows under the Rumbling Bridge. ' In reality there are two bridges, one built over the other, in the same vertical line. The lower one dates from 17 13 and is unused; but the loftier and larger one, erected in 1816, commands a beautiful view. A little farther west is the graceful cascade of the Caldron Linn, the fall of which was lessened, however, by a collapse of the rocks in 1886.*

Geology. — The northern higher portion of the county is occupied by the Lower Old Red Sandstone volcanic lavas and agglomerates of the Ochils. The coarse character of some of the lower agglomer- ate beds is well seen in the gorge at Rumbling Bridge. The beds dip gently towards the S.S.E. ; in a north-easterly direction they con- tain more sandy sediments, and the agglomerates and breccias frequently become conglomerates. The plain of Kinross is occupied by the soft sandstones, marls and conglomerates of the upper Old Red Sandstone, which rest unconforrnably upon the lower division with a strong dip. Southward and eastward these rocks dip conformably beneath the Lower Carboniferous cement stone series of the Calciferous Sandstone group. The overlying Carboniferous lime- stone occupies only a small area in the south and east of the county. Intrusive basalt sheets have been intercalated between some of the Carboniferous

strata, and the superior resisting power of this rock has been the cause of the existence of West Lomond, Benarty, Cleish Hills and Bishop Hill, which are formed of soft marls and sandstones capped by basalt. The Hurlet limestone is worked on the Lomond and Bishop Hills. East- and west-running dikes of basalt are found in the north-east of the county, traversing the Old Red volcanic rocks. Kames of gravel and sand and similar glacial detritus are widely spread over the older rocks.

Climate and Industries. — The lower part of the county is generally well sheltered and adapted to all kinds of crops; and the climate, though wet and cold, offers no hindrance to high farming. The average annual rainfall is 35-5 inches, and the temperature for the year is 48 F., for January 38° F. and for July 59°- 5 F. More than half of the holdings exceed 50 acres each. Much of the land has been reclaimed, the mossy tracts when drained and cultivated being very fertile. Barley is the principal crop, and oats also is grown largely, but the acreage under wheat is small. Turnips and potatoes are the chief green crops, the former the more important. The raising of livestock is pursued with great enterprise, the hilly land being well suited for this industry, although many cattle are pastured on the lowland farms. The cattle are mainly a native breed, which has been much improved by crossing. The number of sheep is high for the area; Although most of the horses are used for agricultural work, a considerable proportion are kept solely for breeding.

Tartans, plaids and other woollens, and linen are manufactured at Kinross and Milnathort, which is besides an important centre for livestock sales. Brewing and milling are also carried on in the county town, but stock-raising and agriculture are the staple interests. The North British railway company's lines, from the south and west run through the county via Kinross, and the Mid-Fife line branches off at Mawcarse Junction.

Population and Government. — The population was 6673 in 1891 and 6981 in 1901, when 55 persons spoke Gaelic and English. The only towns are Kinross (pop. in 1901, 2136) and Milnathort (1052). Kinross is the county town, and of consider- able antiquity. The county unites with Clackmannanshire to return one member to parliament. It forms a sheriffdom with Fifeshire and a sheriff-substitute sits at Kinross. The shire is under school-board jurisdiction.

History. — For several centuries the shire formed part of Fife, and during that period shared its history. Towards the middle of the 13th century, however, the parishes of Kinross and Orwell seem to have been constituted into a shire, which, at the date (1305) of Edward I.'s ordinance for the government of Scotland, had become an hereditary sheriffdom, John of Kinross then being named for the office. James I. dispensed with the

attendance of small barons in 1427 and introduced the principle of represen- tation, when the shire returned one member to the Scots parliament. The inclusion of the Fife parishes of Portmoak, Cleish and Tullibole in 1685, due to the influence of Sir William Bruce, the royal architect and heritable sheriff, converted the older shire into the modern county. Excepting, however, the dramatic and romantic episodes connected with the castle of Loch Leven, the annals of the shire, so far as the national story is concerned, are vacant. As to its antiquities, there are traces of an ancient fort or camp on the top of Dumglow, and on a hill on the northern boundary of the parish of Orwell a remarkable cairn, called Cairn- a-vain, in the centre of which a stone cist was discovered in 1810 containing an urn full of bones and charcoal. Close to the town of Kinross, on the margin of Loch Leven, stands Kinross House, which was built in 1683 by Sir William Bruce as a residence for the Duke of York (James II.) in case the Exclusion Bill should debar him from the throne of England. The mansion, however, was never occupied by royalty.

See^E. J.G. Mackay, History of Fife and Kinross (Edinburgh, 1896) ; W. J. N. Liddall, The Place Names of Fife and Kinross (Edinburgh, 1895); C. Ross, Antiquities of Kinross-shire (Perth, 1886); R. B. Begg, History of Lochleven Castle (Kinross, 1887).

KINSALE, a market town and seaport of Co. Cork, Ireland, in the south-east parliamentary division, on the east shore of Kinsale Harbour (the estuary of the Bandon river) 24 m. south of Cork by the Cork Bandon & South Coast railway, the terminus of a branch line. Pop. of urban district (1901), 4250. The town occupies chiefly the acclivity of Compass Hill, and while of picturesque appearance is built in a very irregular manner, the streets being narrow and precipitous. The Charles Fort was completed by the duke of Ormonde in 1677 and captured by the earl of Marlborough in 1690. The parish church of St Multose is an ancient but inelegant structure, said to have been founded as a conventual church in the 1 2th century by the saint to whom it is dedicated. Kinsale, with the neighbouring villages of Stilly and Cove, is much fre- quented by summer visitors, and is the headquarters of the South of Ireland Fishing Company, with a fishery pier and a commodious harbour with 6 to 8 fathoms of water; but the general trade is of little importance owing to the proximity of Queenstown and Cork. The Old Head of Kinsale, at the west of the harbour entrance, affords fine views of the coast, and is commonly the first British land sighted by ships bound from New York, &c, to Queenstown.

Kinsale is said terderive its name from cean taile, the headland in the sea. At an early period the town belonged to the De Courcys, a representative of whom was created baron of Kinsale or Kingsale in 1181. It received a charter of incorporation from Edward III., having previously been a

borough by pre- scription, and its privileges were confirmed and extended by

KINTORE— KIPLING

various subsequent sovereigns. For several centuries previous to the Union it returned two members to the Irish parliament. It was the scene of an engagement between the French and English fleets in 1380, was forcibly entered by the English in 1488, captured by the Spaniards and retaken by the English in 1601, and entered by the English in 1641, who expelled the Irish inhabitants. Finally, it was the scene of the landing of James II. and of the French army sent to his assistance in 1689, and was taken by the English in the following year.

KINTORE, a royal and police burgh of Aberdeenshire, Scot- land. Pop. (1001), 789. It is situated on the Don, 13J m. N.W. of Aberdeen by the Great North of Scotland railway. It is a place of some antiquity, having been made a royal burgh in the reign of William the Lion (d. 12 14). Kintore forms one of the Elgin group of parliamentary burghs, the others being Banff, Cullen, Elgin, Inverurie and Peterhead. One mile to the south-west are the ruins of Hallforest Castle, of which two storeys still exist, once a hunting-seat of Robert Bruce and afterwards a residence of the Keiths, earls marischal. There are several examples of sculptured stones and circles in the parish, and 2 m. to the north-west is the site of Bruce's camp, which is also ascribed to the period of the Romans. Near it is Thainston House, the residence of Sir Andrew Mitchell (1708-1771), the British envoy to Frederick the Great. Kintore gives the title of earl in the Scottish, and of baron in the British peerage to the head of the Keith-Falconer family.

• KIOTO (Kyoto), the former capital of Japan, in the province of Yamashiro, in 35 01′ N., 135 46′ E. Pop. (1903), 379,404- The Kamo-gawa, upon which it stands, is a mere rivulet in ordi- nary times, trickling through a wide bed of pebbles; but the city is traversed by several aqueducts, and was connected with Lake Biwa in 1890 by a canal 6| m. long, which carries an abundance of water for manufacturing purposes, brings the great lake and the city into navigable "communication, and forms with the Kamo- gawa canal and the Kamo-gawa itself a through route to Osaka, from which Kioto is 25 m. distant by rail. Founded in the year 793, Kioto remained the capital of the empire during nearly eleven centuries. The emperor Kwammu, when he selected this remarkably picturesque spot for the residence of his court, caused the city to be laid out with mathematical accuracy, after the model of the Tang dynasty's capital in China. Its area, 3 m. by 3i> wa s intersected by 18 principal thoroughfares, 9 running due north and south, and 9 due east and west, the two systems being connected at intervals by minor streets. At the middle of the northern face stood the palace, its enclosure covering three- quarters of a square mile, and from it to the centre of the south face ran an avenue

283 ft. wide and 35 m. long. Conflagrations and subsequent reconstructions modified the regularity of this plan, but much of it still remains, and its story is perpetuated in the nomenclature of the streets. In its days of greatest prosperity Kioto contained only half a million inhabitants, thus never even approximating to the size of the Tokugawa metropolis, Yedo, or the Hojo capital Kamakura. The emperor Kwammu called it Heian-jo, or the " city of peace, " when he made it the seat of government ; but the people knew it as Miyako, or Kyoto, terms both of which signify " capital," and in modern times it is often spoken of as Saikyo, or western capital, in opposition to Tokyo, or eastern capital. Having been so long the imperial, intellectual, political and artistic metropolis of the realm, the city abounds with evidences of its unique career. Magnificent temples and shrines, grand monuments of architectural and artistic skill, beautiful gardens, gorgeous festivals, and numerous ateliers where the traditions of Japanese art are obeyed with attractive results, offer to the foreign visitor a fund of interest. Clear water ripples everywhere through the city, and to this water Kioto owes something of its importance, for nowhere else in Japan can fabrics be bleached so white or dyed in such brilliant colours. The people, like their neighbours of Osaka, are full of manu- facturing energy. Not only do they preserve, amid all the progress of the age, their old-time eminence as producers of the

finest porcelain, faience, embroidery, brocades, bronze, cloisonne enamel, fans, toys and metal-work of all kinds, but they have

also adapted themselves to the foreign market, and weave and dye quantities of silk fabrics, for which a large and constantly growing demand is found in Europe and America. Nowhere else can be traced with equal clearness the part played in Japanese civiliza- tion by Buddhism, with its magnificent paraphernalia and impos- ing ceremonial spectacles; nowhere else, side by side with this luxurious factor, can be witnessed in more striking juxtaposition the austere purity and severe simplicity of the Shinto cult; and nowhere else can be more intelligently observed the fine faculty of the Japanese for utilizing, emphasizing and enhancing the beauties of nature. The citizens' dwellings and the shops, on the other hand, are insignificant and even sombre in appearance, their exterior conveying no idea of the pretty chambers within or of the tastefully laid-out grounds upon which they open . behind. Kioto is celebrated equally for its cherry and azalea blossoms in the spring, and for the colours of its autumn foliage.

KIOWAS, a tribe and stock of North American Indians. Their former range was around the Arkansas and Canadian rivers, in Indian Territory (Oklahoma), Colorado and New Mexico. A fierce people, they made raids upon the settlers in western Texas until 1868, when they were placed on a

reservation in Indian Territory. In 1874 they broke out again, but in the following year were finally subdued. In number about 1200, and settled in Oklahoma, they are the sole representatives of the Kiowan linguistic stock.

See J. Mooney, " Calendar History of the Kiowa Indians," 17th Report of Bureau of American Ethnology (Washington, 1898).

KIPLING, RUDYARD (1865-), British author, was born in Bombay on the 30th of December 1865. His father, John Lockwood Kipling (1837-1911), an artist of considerable ability, was from 1875 to 1893 curator of the Lahore museum in India. His mother was Miss Alice Macdonald of Birmingham, two of whose sisters were married respectively to Sir E. Burne-Jones and Sir Edward Poynter. He was educated at the United Services College, Westward Ho, North Devon, of which a some- what lurid account is given in his story Stalky and Co. On his return to India he became at the age of seventeen the sub-editor of the Lahore Civil and Military Gazette. In 1886, in his twenty- first year, he published Departmental Ditties, a volume of light verse chiefly satirical, only in two or three poems giving promise of his authentic poetical note. In 1887 he published Plain Tales from the Hills, a collection mainly of the stories contributed to his own journal. During the next two years he brought out, in six slim paper-covered volumes of Wheeler's Railway Library (Allahabad), Soldiers Three, The Story of the Gadsbys, In Black and White, Under the Deodars, The Phantom 'Rickshaw and Wee Willie Winkee, at a rupee apiece. These were in form and substance a continuation of the Plain Tales. This series of tales, all written before the author was twenty-four, revealed a new master of fiction. A few, but those the best, he afterwards said that his father gave him. The rest were the harvest of his own powers of observation vitalized by imagination. In method they owed something to Bret Harte; in matter and spirit they were absolutely original. They were unequal, as his books continued to be throughout; the sketches of Anglo-Indian social life being generally' inferior to the rest. The style was to some extent disfigured by jerkiness and mannered tricks. But Mr Kipling possessed the supreme spell of the story-teller to entrance and transport. The freshness of the invention, the variety of charac- ter, the vigour of narrative, the raciness of dialogue, the magic of atmosphere, were alike remarkable. The soldier-stories, especially the exuberant vitality of the cycle which contains the immortal "ˆulvaney, established the author's fame throughout the world. The child-stories and tales of the British official were not less masterly, while the tales of native life and of adventure " beyond the pale " disclosed an even finer and deeper vein of romance. India, which had been an old story for generations of English- men, was revealed in these brilliant pictures as if seen for the first time in its variety, colour and passion, vivid as mirage, enchant- ing as the Arabian Nights. The new author's talent was quickly

recognized in India, but it was not till the books reached England that his true rank was appreciated and proclaimed. Between 1887 and 1889 he travelled through India, China, Japan and America, finally arriving in England to find himself already famous. His travel sketches, contributed to The Civil and Military Gazette and The Pioneer, were afterwards collected (the author's hand having been forced by unauthorized publication) in the two volumes From Sea to Sea (1899). A further set of Indian tales, equal to the best, appeared in Macmillan's Maga- zine and were republished with others in Life's Handicap (1891). In The Light that Failed (1891, after appearing with a different ending in Lippincott's Magazine) Mr Kipling essayed his first long story (dramatized 1905), but with comparative unsuccess. In his subsequent work his delight in the display of descriptive and verbal technicalities grew on him. His polemic against " the sheltered life " and " little Englandism " became more didactic. His terseness sometimes degenerated into abruptness and obscurity. But in the meanwhile his genius became prominent in verse. Readers of the Plain Tales had been impressed by the snatches of poetry prefixed to them for motto, certain of them being subscribed " Barrack Room Ballad." Mr Kipling now contributed to the National Observer, then edited by W. E. Henley, a series of Barrack Room Ballads. These vigorous verses in soldier slang, when published in a book in 1892, together with the fine ballad of " East and West " and other poems, won for their author a second fame, wider than he had attained as a story-teller. In this volume the Ballads of the " Bolivar " and of the " Clampherdown," introducing Mr Kipling's poetry of the ocean and the engine-room, and " The Flag of England," finding a voice for the Imperial sentiment, which — largely under the influence of Mr Kipling's own writings — had been rapidly gaining force in England, gave the key-note of much of his later verse. In 1898 Mr Kipling paid the first of several visits to South Africa and became imbued with a type of imperialism that reacted on his literature, not altogether to its advantage. Before finally settling in England Mr Kipling lived some years in America and married in 1892 Miss Caroline Starr Balestier, sister of the Wolcott Balestier to whom he dedicated Barrack Room Ballads, and with whom in collaboration he wrote the Naulahka (1891), one of his less successful books. The next collection of stories, Many Inventions (1893), contained the splendid Mulvaney extravaganza, " My Lord the Elephant "; a vividly realized tale of metempsychosis, " The Finest Story in the World "; and in that fascinating tale " In the Rukh," the prelude to the next new exhibition of the author's genius. This came in 1894 with The Jungle Book, followed in 1895 by The Second Jungle Book. With these inspired beast-stories Kipling conquered a new world and a new audience, and produced what many

critics regard as his most flawless work. His chief subsequent publications were The Seven Seas (poems), 1896; Captains Courageous (a yarn of deep-sea fishery), 1897; The Day's Work (collected stories), 1898; A Fleet in Being (an account of a cruise in a man-of-war), 1898; Stalky and Co. (mentioned above), 1899; From Sea to Sea (mentioned above), 1 899; Kim, 1901; Just So Stories (for children), 1902; The Five Nations (poems, concluding with what proved Mr Kipling's most universally known and popular poem, " Re- cessional," originally published in The Times on the r7th of July 1897 on the occasion of Queen Victoria's second jubilee), 1903; Traffics and Discoveries (collected stories), 1904; Puck of Book's Hill (stories), 1906; Actions and Reactions (stories), 1909. Of these Kim was notable as far the most successful of Mr Kipling's longer narratives, though it is itself rather in the nature of a string of episodes. But everything he wrote, even to a farcical extravaganza inspired by his enthusiasm for the motor-car, breathed the meteoric energy that was the nature of the man. it vigorous and unconventional poet, a pioneer in the modern phase of literary Imperialism, and one of the rare masters in English prose of the art of the short story, Mr Kipling had already by the opening of the 20th century won the most conspicuous place among the creative literary forces of his day. His position in English literature was recognized in 1907 by the award to him of the Nobel prize.

See Rudyard Kipling's chapter in My First Book {Chatto, 1 894); " A Bibliography of Rudyard Kipling," by John Lane, in Rudyard Kipling: a Criticism, by Richard de Gallienne; "Mr Kipling's Short Stories" in Questions at Issue, by Edmund Gosse (1893); " Mr Kipling's Stories " in Essays in Little, by Andrew Lang; " Mr Kipling's Stories," by J. M. Barrie in the Contemporary Review (March 1 891); articles in the Quarterly Review (July 1892) and Edinburgh Review (Jan. 1898); and section on Kipling in Poets of the Younger Generation, by William Archer (1902). See also for bibliography to 1903 English Illustrated Magazine, new series, vol. xxx. pp. 298 and 429-432. (W. P. J.)

KIPPER, properly the name by which the male salmon is known at some period of the breeding season. At the approach of this season the male fish develops a sharp cartilaginous beak, known as the " kip," from which the name " kipper " is said to be derived. The earliest uses of the word (in Old English cypera and Middle English kypre) seem to include salmon of both sexes, and there is no certainty as to the etymology. Skeat derives it from the Old English kippian, " to spawn." The term has been applied by various writers to salmon both during and after milting; early quotations leave the precise meaning of the word obscure, but generally refer to the unwholesomeness of the fish as food during the whole breeding season. It has been usually accepted, without much direct evidence, that from the practice of rendering the breeding (i.e. " kipper ") salmon fit for food by

splitting, salting and smoke-drying them, the term " kipper " is also used of other fish, particularly herrings cured in the same way. The " bloater " as distinct from the " kipper " is a herring cured whole without being split open.

KIPPIS, ANDREW (1725-1795), English nonconformist divine and biographer, son of Robert Kippis, a silk-hosier, was born at Nottingham on the 28th of March 1725. From school at Sleaford in Lincolnshire he passed at the age of sixteen to the nonconformist academy at Northampton, of which Dr Dod- dridge was then president. In 1746 Kippis became minister of a church at Boston; in 1750 he removed to Dorking in Surrey; and in 1753 he became pastor of a Presbyterian con- gregation at Westminster, where he remained till his death on the 8th of October 1795. Kippis took a prominent part in the affairs of his church. From 1763 till 1784 he was classical and philological tutor in Coward's training college at Hoxton; and subsequently for some years at another institution of the same kind at Hackney. In 1778 he was elected a fellow of the Antiquarian Society, and a fellow of the Royal Society in 1779.

Kippis was a very voluminous writer. He contributed largely to The Gentleman's Magazine, The Monthly Review and The Library ; and he had a good deal to do with the establishment and conduct of The Netu Annual Register. He published also a number of sermons and occasional pamphlets; and he prefixed a life of the author to a collected edition of Dr Nathaniel Lardner's Works (1788). He wrote a life of Dr Doddridge, which is prefixed to Doddridge's Exposition of the New Testament (1792). His chief work is his edition of the Biographia Britannica, of which, however, he only lived to publish 5 vols, (folio, 1778-1793). In this work he had the assistance of Dr Towers. See notice by A. Rees, D.D., in The New Annual Register for 1795.

KIRBY, WILLIAM (1759-1850), English entomologist, was born at Witnesham in Suffolk on the 19th of September 1759. From the village school of Witnesham he passed to Ipswich grammar school, and thence to Caius College, Cambridge, where he graduated in 1781. Taking holy orders in 1782, he spent his entire life in the peaceful seclusion of an English country parsonage at Barham in Suffolk. His favourite study was natural history; and eventually entomology engrossed all his leisure. His first work of importance was his Monographia Apum Angliae (2 vols. 8vo, 1802), which as the first scientific treatise on its subject brought him into notice with the leading entomologists of his own and foreign countries. The practical result of a friendship formed in 1805 with William Spence, of Hull, was the jointly written Introduction to Entomology (4 vols., 1815-1826; 7th ed., 1856), one of the most popular books of science that have ever appeared. In 1830 he was chosen to write one of the Bridgewater

Treatises, his subject being The History, Habits, and Instincts of Animals (2 vols., 1835). This undeniably fell short of his earlier works in point of scientific value. He died on the 4th of July 1850.

Besides the books already mentioned he was the author of many papers in the Transactions of the Linnean Society, the Zoological Journal and other periodicals; Strictures on Sir James Smith's Hypothesis respecting the Lilies of the Field of our Saviour and the Acanthus of Virgil (1819); Seven Sermons on our Lord's Temptations (1829); and he wrote the sections on insects in the Account of the Animals seen by the late Northern Expedition while within the Arctic Circle (1821), and in Fauna Boreali-Americana (1837). His Life by the Rev. John Freeman, published in 1852, contains a list of his works.

KIRCHER, ATHANASIUS (1601-1680), German scholar and mathematician, was born on the 2nd of May 1601, at Geisa near Fulda. He was educated at the Jesuit college of Fulda, and entered upon his noviciate in that order at Mainz in 16 18! He became professor of philosophy, mathematics, and Oriental languages at Wiirzburg, whence he was driven (1631) by the troubles of the Thirty Years' War to Avignon. Through the influence of Cardinal Barberini he next (1635) settled in Rome, where for eight years he taught mathematics in the Collegio Romano, but ultimately resigned this appointment to study hieroglyphics and other archaeological subjects. He died on the 28th of November 1680.

Kircher was a man of wide and varied learning, but singularly devoid of judgment and critical discernment. His voluminous writings in philology, natural history, physics and mathematics often accordingly have a good deal of the historical interest which attaches to pioneering work, however imperfectly performed ; other- wise they now take rank as curiosities of literature merely They include Ars Magnesia (1631); Magnes, sive de arte magnetica opus trtpartitum (1641); and Magneticum naturae regnum (1667)- Prodro- mes Coptus (1636); Lingua Aegyptiaca restituta (1643); Obeliscus Pamphihus (1650) ; and Oedipus Aegyptiacus, hoc est universalis doc- trinae hieroglyphuae mstauratio (1652-1655)— works which may claim the merit of having first called attention to Egyptian hieroglyphics- Ars magna lucis et umbrae in mundo (1645-1646) ; Musurgia univer- salis, sive ars magna consoni et dissoni (1650) ; Polygraphia, sen artifi- cium hnguarum quo cum omnibus mundi populis poterit quis respondere (1663); Mundus subterraneus, quo subterrestris mundi opificium universae denique naturae divitiae, abditorum effectuum causae demon- strantur (1665-1678); China illustrata (1667); Ars magna sciendi (1669) ; and Latium (1669), a work which may still be consulted

with advantage. The Specula Melitensis Encyclica (1638) gives an account of a kind of calculating machine of his invention. The valuable collection of antiquities which he bequeathed to the Collegio Romano has been described by Buonanni (Musaeum Kircherianum, 1700- republished by Battara in 1773).

KIRCHHEIM-UNTER-TECK, a town of Germany, in the kingdom of WUrttemberg, is prettily situated on the Lauter, at the north-west foot of the Rauhe Alb, 15 m. S.E. of Stuttgart by rail. Pop. (1905), 8830. The town has a royal castle built in 1538, two schools and several benevolent institutions. The manufactures include cotton goods, damask, pianofortes, machinery, furniture, chemicals and cement. The town also has wool-spinning establishments and breweries, and a corn exchange. It is the most important wool market in South Germany, and has also a trade in fruit, timber and pigs. In the vicinity are the ruins of the castle of Teck, the hereditary stronghold of the dukes of that name. Kirchheim has belonged to Wiirttemberg since 1381.

KIRCHHOFF, GUSTAV ROBERT (1824-1887), German physicist, was born at Konigsberg (Prussia) on the 12th of March 1824, and was educated at the university of his native town, where he graduated Ph.D. in 1847. After acting as privat-docent at Berlin for some time, he became extraordinary professor of physics at Breslau in 1850. Four years later he was appointed professor of physics at Heidelberg, and in 1875 he was transferred to Berlin, where he died on the 17th of October 1887. Kirchhoff's contributions to mathematical physics were numerous and important, his strength lying in his powers of stating a new physical problem in terms of mathematics, not merely in working out the solution after it had been so formu- lated. A number of his papers were concerned with electrical questions. One of the earliest was devoted to electrical conduction in a thin plate, and especially in a circular one, and it also contained a theorem which enables the distribution of currents in a network of conductors to be ascertained. Another discussed conduction in curved sheets; a third the distribution of electricity in two influencing spheres; a fourth the deter-

mination of the constant on which depends the intensity of induced currents; while others were devoted to Ohm's law, the motion of electricity in submarine cables, induced mag- netism, &c. In other papers, again, various miscellaneous topics were treated— the thermal conductivity of iron, crystal- line reflection and refraction, certain propositions in the thermo- dynamics ˆ of solution and vaporization, &c. An important part of his work was contained in his Vorlesungen uber malhe- matische Physik

(1876), in which the principles of dynamics, as well as various special problems, were treated in a somewhat novel and original manner. But his name is best known for the researches, experimental and mathematical, in radiation which led him, in company with R. W. von Bunsen, to the development of spectrum analysis as a complete system in 1859-1860. He can scarcely be called its inventor, for not only had many investigators already used the prism as an instrument of chemical inquiry, but considerable progress had been made towards the explanation of the principles upon which spectrum analysis rests. But to him belongs the merit of having, most probably without knowing what had already been done, enun- ciated a complete account of its theory, and of thus having firmly established it as a means by which the chemical constituents of celestial bodies can be discovered through the comparison of their spectra with those of the various elements that exist on this earth.

KIRCHHOFF, JOHANN WILHELM ADOLF (1826-1908), German classical scholar and epigraphist, was born in Berlin on the 6th of January 1826. In 1865 he was appointed pro- fessor of classical philology in the university of his native city. He died on the 26th of February 1908. He is the author of Die Homerische Odyssee (1859), putting forward an entirely new theory as to the composition of the Odyssey; editions of Plotinus (1856), Euripides (1855 and 1877-1878). Aeschylus (1880), Hesiod (Works and Days, 1889), Xenophon, On the Athenian Constitution (3rd ed., 1889); Uber die Entstehungszeit des Herodotischen Geschichtswerkes (2nd ed., 1878); Thukydides und sein Urkundenmaterial (1895).

The following works are the result of his epigraphical and palaeo- graphical studies: Die Umbrischen Sprachdenkmaler (1851); Das Stadtrecht von Bantia (1853), on the tablet discovered in 1790 at Oppido near Banzi, containing a plebiscite relating to the municipal attains of the ancient Bantia; Das Gotische Runenalphabet (18ˆ2)- Die Frankischen Runen (1855) ; Studien zur Geschichte des Griechischen Alphabets (4 th ed., 1887). The second part of vol. iv. of the Corpus Inscriptionum Graecarum (1859, containing the Christian inscrip- tions) and vol. i. of the C. I. Atticarum (1873, containing the in- scriptions before 403) with supplements thereto (vol. iv. nts 1-1 1877-1891) are edited by him. ‘ J ‘*

KIRGHIZ, a large and widespread division of the Turkish family, of which there are two main branches, the Kara-Kirghiz of the uplands and the Kirghiz-Kazaks of the steppe. They jointly number about 3,000,000, and occupy an area of perhaps the same number of square miles, stretching from Kulja west- wards to the lower Volga, and from the headstreams of the Ob southwards to the Pamir and the Turkoman country. They seem closely allied ethnically to the Mongolians and in speech to the Tatars. But both Mongols and Tatars belonged them- selves originally to one racial

stock and formed part of the same hordes, or nomadic armies: also the Western Turks have to a large extent lost their original physique and become largely assimilated to the regular " Caucasian " type. But the Kirghiz have either remained nearly altogether unmixed, as in the uplands, or else have intermingled in the steppe mainly with the Volga Kalmucks in the west, and with the Dzungarian nomads in the east, all alike of Mongol stock. Hence they have everywhere to a large extent preserved the common Mongolian features, while retaining their primitive Tatar speech. Physi- cally they are a middle-sized, square-built race, inclined to stout- ness, especially in the steppe, mostly with long black hair, scant beard or none, small, black and oblique eyes, though blue or grey also occur in the south, broad Mongoloid features, high cheek- bones, broad, flat nose, small mouth, brachycephalous head, very small hands and feet, dirty brown or swarthy complexion,

often yellowish, but also occasionally fair. These character- istics, while affiliating them directly to the Mongol stock, also betray an admixture of foreign elements, probably due to Finnish influences in the north, and Tajik or Iranian blood in the south. Their speech also, while purely Turkic in structure, possesses, not only many Mongolian and a few Persian and even Arabic words, but also some terms unknown to the other branches of the Mongolo-Tatar linguistic family, and which should perhaps be traced to the Kiang-Kuan, Wu-sun, Ting- ling, and other peoples of South Siberia partly absorbed by them.

The Kara-Kirghiz. — The Kara or " Black " Kirghiz, so called from the colour of their tents, are known to the Russians either as Chernyie (Black) or Dikokammenyie (Wild Stone or Rocky) Kirghiz, and are the Block Kirghiz of some English writers. They are on the whole the purest and best representatives of the race, and properly speaking to them alone belongs the distinctive national name Kirghiz or Krghiz. This term is commonly traced to a legendary chief, Kirghiz, sprung of Oghuz-Khan, ninth in descent from Japheth. It occurs in its present form for the first time in the account of the embassy sent in 569 by the East Roman emperor Justin II. to the Uighur Khan, Dugla- Ditubulu, where it is stated that this prince presented a slave of the Kirghiz tribe to Zemark, head of the mission. In the Chinese chronicles the word assumes the form Ki-li-ki-tz', and the writers of the Yuan dynasty (1 280-1367) place the territory of these people 10,000 li north-west of Pekin, about the head- streams of the Yenisei. In the records of the T'ang dynasty (618-907) they are spoken of under the name of Kha-kia-tz' (pronounced Khaka, and sometimes transliterated Haka), and

it is mentioned that these Khakas were of the same speech as the Khoei-khu. From this it follows that they were of Mongolo- Tatar stock, and are wrongly identified by some ethnologists with the Kiang-Kuan, Wu-sun, or Ting-ling, all of whom are described as tall, with red hair, " green " or grey eyes, and fair complexion, and must therefore have been of Finnish stock, akin to the present Soyotes of the upper Yenisei.

The Kara-Kirghiz are by the Chinese and Mongolians called Burnt, where ut is the Mongolian plural ending, as in Tangut, Yakut, modified to yat in Buryat, the collective name of the Siberian Mon- golians of the Baikal district. Thus the term Bur is the common Mongolian designation both of the Baikal Mongols and of the Kara- Kirghiz, who occupied this very region and the upper Yenisei valley generally till comparatively recent times. For the original home of their ancestors, the Khakas, lay in the south of the present govern- ments of Yeniseisk and Tomsk, stretching thence southwards beyond the Sayan range to the Tannuola hills in Chinese territory. Here the Russians first met them in the 17th century, and by the aid of the Kazaks exterminated all those east of the Irtish, driving the rest farther west and south-westwards. Most of them took refuge with their kinsmen, the Kara-Kirghiz nomad highlanders, whose homes, at least since the 13th century, have been the Ala-tau range, the Issyk-kul basin, the Tekes, Chu and Talass river valleys, the Tian-shan range, the uplands draining both to the Tarim and to the Jaxartes and Oxus, including Khokand, Karateghin and Shignan southwards to the Pamir table-land, visited by them in summer. They thus occupy most of the uplands along the Russo-Chinese frontier, between 35 ° and 50° N. lat. and between 70 and 85° E. long.

The Kara-Kirghiz are all grouped in two main sections — the On or " Right " in the east, with seven branches (Bogu, Sary-Bagishch, Son-Bagishch, Sultu or Solye, Cherik, Sayak, Bassinz), and the Sol or "Left" in the west, with four branches (Kokche or Kuchy, Soru, Mundus, Kitai or Kintai). The Sol section occupies the region between the Talass and Oxus headstreams in Ferghana (Khokand) and Bokhara, where they come in contact with the Galchas or Highland Tajiks. The On setftion lies on both sides of the Tian-shan, about Lake Issyk-kul, and in the Chu, Tekes and Narin (upper Jaxartes) valleys.

The total number of Kara-Kirghiz exceeds 800,000.

All are essentially nomads, occupied mainly with stock breeding, chiefly horses of a small but hardy breed, sheep of the fat-tailed species, oxen used both for riding and as pack animals, some goats, and camels of both species. Agriculture is limited chiefly to the cultivation of wheat, barley and millet, from the last of which a coarse vodka or brandy is distilled. Trade is

carried on chiefly by barter, cattle being taken by the dealers from China, Turkestan and Russia in exchange for manufactured goods.

The Kara-Kirghiz are governed by the " manaps," or tribal rulers, who enjoy almost unlimited authority, and may even sell or kill

their subjects. In religious matters they differ little from the Kazaks, whose practices are described below. Although generally recognizing Russian sovereignty since 1864, they pay no taxes.

The Kazaks. — Though not unknown to them, the term Kirghiz is never used by the steppe nomads, who always call themselves simply Kazaks, commonly interpreted as riders. The first authentic reference to this name is by the Persian poet and historian Firdousi (1020), who speaks of the Kazak tribes as much dreaded steppe marauders, all mounted and armed with lances. From this circumstance the term Kazak came to be gradually applied to all freebooters similarly equipped, and it thus spread from the Aralo-Caspian basin to South Russia, where it still survives under the form of Cossack, spelt Kazak or Kozak in Russian. Hence though Kazak and Cossack are originally the same word, the former now designates a Mongolo- Tatar nomad race, the latter various members of the Slav family. Since the 18th century the Russians have used the compound expression Kirghiz-Kazak, chiefly in order to dis- tinguish them from their own Cossacks, at that time overrunning Siberia. Siegmund Herberstein (1486-1 566) is the first European who mentions them by name, and it is noteworthy that he speaks of them as " Tartars," that is, a people rather of Turki than Mongolian stock.

In their present homes, the so-called " Kirghiz steppes," they are far more numerous and widespread than their Kara-Kirghiz kinsmen, stretching almost uninterruptedly from Lake Balkash round the Aral and Caspian Seas westwards to the lower Volga, and from the river Irtish southwards to the lower Oxus and Ust-Urt plateau. Their domain, which is nearly 2,000,000 sq. m. in extent, thus lies mainly between 45 and 55° N. lat. and from 45 to 80° E. long. Here they came under the sway of Jenghiz Khan, after whose death they fell to the share of his son Juji, head of the Golden Horde, but continued to retain their own khans. When the Uzbegs acquired the ascendancy, many of the former subjects of the Juji and Jagatai hordes fell off and joined the Kazaks. Thusabout the year 1500 were formed two powerful states in the Kipchak and Kheta steppes, the Mogul-Ulus and the Kazak, the latter of whom, under their khan Arslane, are said by Sultan Baber to have had as many as 400,000 fighting men. Their numbers continued to be swollen by voluntary or enforced accessions from the fragments of the Golden Horde, such as the Kipchaks, Naimans, Konrats, Jalairs, Kankali, whose names are still preserved in the tribal

divisions of the Kazaks. And as some of these peoples were undoubtedly of true Mongolian stock, their names have given a colour to the statement that all the Kazaks were rather of Mongol than of Turki origin. But the universal prevalence of a nearly pure variety of the Turki speech throughout the Kazak steppes is almost alone sufficient to show that the Tatar element must at all times have been in the ascendant. Very various accounts have been given of the relationship of the Kipchak to the Kirghiz, but at present they seem to form a subdivision of the Kir- ghiz-Kazaks. The Kara-Kalpaks are an allied but apparently separate tribe.

The Kirghiz-Kazaks have long been grouped in three large " hordes " or encampments, further subdivided into a number of so-called " races," which are again grouped in tribes, and these in sections, branches and auls, or communities of from five to fifteen tents. The division into hordes has been traditionally referred to a powerful khan, who divided his states amongst his three sons, the eldest of whom became the founder of the Ulu-Yuz, or Great Horde, the second of the Urta-Yuz, or Middle Horde, and the third of the Kachi-Yuz, or Little Horde. The last two under their common khan Abulkhair voluntarily submitted in 1730 to the Empress Anne. Most of the Great Horde were subdued by Yunus, khan of Ferghana, in 1798, and all the still independent tribes finally accepted Russian sovereignty in 1819.

Since 1801 a fourth division, known as the Inner or Bukeyev- skaya Horde, from the name of their first khan, Bukei, has been settled in the Orenburg steppe.

But these divisions affect the common people alone, all the higher orders and ruling families being broadly classed as White and Black Kost or Bones. The White Bones comprise only the khans and their descendants, besides the issue of the khojas or Moslem " saints." The Black Bones include all the rest, except the Telengul or servants of the khans, and the KM or slaves.

' The Kazaks are an honest and trustworthy people, but heavy, sluggish, sullen and unfriendly. Even the hospitality enjoined by the Koran is displayed only towards the orthodox Sunnite sect. So essentially nomadic are all the tribes that they cannot adopt a settled life without losing the very sentiment of their nationality, and becoming rapidly absorbed in the Slav popula- tion. They dwell exclusively in semicircular tents consistine

of a light wooden framework, and red cloth or felt covering, with an opening above for light and ventilation.

The camp life of the Kazaks seems almost unendurable to Europeans in winter, when they are confined altogether to the tent, and exposed to endless discomforts. In summer the day is spent mostly in sleep or drinking koumiss, followed at night by feasting and the recital of tales, varied with songs accompanied by the music of the flute and balalaika. But horsemanship is the great amusement of all true Kazaks, who may almost be said to be born in the saddle. Hence, though excellent riders, they are bad walkers. Though hardy and long-lived, they are uncleanly in their habits and often decimated by small-pox and Siberian plague. They have no fixed meals, and live mainly on mutton and goat and horse flesh, and instead of bread use the so-called balamyk, a mess of flour fried in dripping and diluted in water. The universal drink is koumiss, which is wholesome, nourishing and a specific against all chest diseases.

The dress consists of the chapan, a flowing robe of which one or two are worn in summer and several in winter, fastened with a silk or leather girdle, in which are stuck a knife, tobacco pouch, seal and a few other trinkets. Broad silk or cloth pantaloons are often worn over the chapan, which is of velvet, silk, cotton or felt, according to the rank of the wearer. Large black or red leather boots, with round white felt pointed caps, complete the costume, which is much the same for both sexes.

Like the Kara-Kirghiz, the Kazaks are nominally Sunnites, but Shamanists at heart, worshipping, besides the Kudai or good divinity, the Shaitan or bad spirit. Their faith is strong in the talchi or soothsayer and other charlatans, who know everything, can do everything, and heal all disorders at pleasure. But they are not fanatics, though holding the abstract doctrine that the " Kafir " may be lawfully oppressed, including in this category not only Buddhists and Christians, but even Mahommedans of the Shiah sect. There are no fasts or ablutions, mosques or mollahs, or regular prayers. Although Mussulmans since the beginning of the 16th century, they have scarcely yet found their way to Mecca, their pilgrims visiting instead the more con- venient shrines of the " saints " scattered over eastern Turkestan. Unlike the Mongolians, the Kazaks treat their dead with great respect, and the low steppe hills are often entirely covered with monuments raised above their graves.

Letters are neglected to such an extent that whoever can merely write is regarded as a savant, while he becomes a prodigy of learning if able to read the Koran in the original. Yet the Kazaks are naturally both musical and poetical, and possess a considerable number of national songs, which are usually repeated with variations from mouth to mouth.

The Kazaks still choose their own khans, who, though con- firmed by the Russian government, possess little authority beyond their respective tribes. The real rulers are the elders or umpires and sultans, all appointed by public election. Brig- andage and raids arising out of tribal feuds, which were formerly recognized institutions, are now severely punished, sometimes even with death. Capital punishment, usually by hanging or strangling, is inflicted for murder and adultery, while three, nine or twenty-seven times the value of the stolen property is exacted for theft.

The domestic animals, daily pursuits and industries of the Kazaks differ but slightly from those of the Kara-Kirghiz. Some of the wealthy steppe nomads own as many as 20,000 of the large fat-tailed sheep. Goats are kept chiefly as guides for these flocks; and the horses, though small, are hardy, swift, light-footed and capable of covering from 50 to 60 miles at a stretch. Amongst the Kazaks there are a few workers in silver, copper and iron, the chief arts besides, being skin dressing, wool spinning and dyeing, carpet and felt weaving. Trade is confined mainly to an exchange of live stock for woven and other goods from Russia, China and Turkestan.

Since their subjection to Russia the Kazaks have become less lawless, but scarcely less nomadic. A change of habit in this respect is opposed alike to their tastes and to the climatic and other outward conditions. See also Turks.

Literature. — Alexis Levshin, Description des hordes et des steppes des Kirghiz-Kazaks, translated from the Russian by Ferry de Cigny (1840) ; W. Radloff, Proben der Volksliteratur der Türkischen Stammc Slidsiberiens ; Ch. de Ujfalvy, Le Kohistan, le Ferghanah, et Kouldja; also Bull, de la Soc. de G&o. (1878-1879); Semenoff, paper in Peter- manris Mittheilungen (1859), No. 3; Valikhanov's Travels in 1858- 1859; Madame de Ujfalvy, papers in Tour du Monde (187 4) ; Vambery, Die primitive Cultur des Turko-Tatarischen Volkes; P. S. Pallas, Observations sur les Kirghiz (1769; French trans., 1803); Andriev, " La Horde Moyenne," in Bull, de la Soc. de Geogr. de St Petersburg (: 875); Radomtsev, Excursion dans le steppe Kirghiz; Lansdell, Russian Centralasia (1885); Jadrinzer, La Siberie (1886). Skrine and Ross, Heart of Asia (1899); E. H. Parker, A Thousand Years of the Tartars (1895). Various Russian works by Nalivkin, published in Turkestan, contain much valuable information, and N. N. Pantu- sov, Specimens of Kirghiz Popular Poetry, with Russian translations (Kazan, 1903-1904).

KIRIN, a province of central Manchuria, with a capital bear- ing the same name. The province has an area of 90,000 sq. m., and a population of 6,500,000. The chief towns besides the capital are Kwang-cheng-tsze, 80 m. N.W. of the capital, and Harbin on the Sungari river. The city of Kirin

is situated at the foot of the Lau-Ye-Ling mountains, on the left bank of the Sungari or Girin-ula, there 300 yds. wide, and is served by a branch of the Manchurian railway. The situation is one of exceptional beauty; but the streets are narrow, irregular and indescribably filthy. The western part of the town is built upon a swamp and is under water a great part of the year. The dockyards are supplied with machinery from Europe and are efficient. . Tobacco is the principal article of trade, the kind grown in the province being greatly prized throughout the Chinese empire under the name of " Manchu leaf." Formerly ginseng was also an important staple, but the supply from this quarter of the country has been exhausted. Outside the town lies a plain " thickly covered with open coffins containing the dead bodies of Chinese emigrants exposed for identification and removal by their friends; if no claim is made during ten years the remains are buried on the spot." Kirin was chosen by the emperor K'anghi as a military post during the wars with the Eleuths; and it owes its Chinese name of Ch'uen-ch'ang, i.e. Naval Yard, to his building there the vessels for the transport of his troops. The population was estimated at 300,000 in 1 8 1 2 ; in 1909 it was about 120,000.

KIRK, SIR JOHN (1832-), British naturalist and ad- ministrator, son of the Rev. John Kirk, was born at Barry, near Arbroath, on the 19th of December 1832. He was edu- cated at Edinburgh for the medical profession, and after serving on the civil medical staff throughout the Crimean War, was appointed in February 1858 physician and naturalist to David Livingstone's second expedition to Central Africa. He was by Livingstone's side in most of his journeyings during the next five years, and was one of the first four white men to behold Lake Nyassa (Sept. 16, 1859). He was finally in- valided home on the 9th of May 1863. The reputation he gained during this expedition led to his appointment in January 1866 as acting surgeon to the political agency at Zanzibar. In 1868 he became assistant political agent, being raised to the rank of consul-general in 1873 and agent in 1880. He retired from that post in 1887. The twenty-one years spent by Kirk in Zanzibar covered the most critical period of the history of European intervention in East Africa; and during the greater part of that time he was the virtual ruler of the country. With Seyyid Bargash, who became sultan in 1870, he had a con- trolling influence, and after the failure of Sir Bartle Frere's efforts he succeeded in obtaining (June 5, 1873) the sultan's signature to a treaty abolishing the slave trade in his dominions. In 1877 Bargash offered to a British merchant — Sir W. Mac- kinnon — a lease of his mainland territories, and he gave Kirk a declaration in which he bound himself not to cede territory to any other power than Great Britain, a declaration ignored by the British government. When Germany in 1885 claimed districts considered by the sultan to belong to Zanzibar, Kirk intervened to prevent Bargash going in

person to Berlin to protest and induced him to submit to the dismemberment of his dominions. In the delicate negotiations which followed

Kirk used his powers to checkmate the German designs to supplant the British in Zanzibar itself; this he did without destroying the Arab form of government. He also directed the efforts, this time successful, to obtain for Britain a portion of the mainland — Bargash in May 1887 granting to Mackinnon a lease of territory which led to the foundation of British East Africa. Having thus served both Great Britain and Zanzibar, Kirk resigned his post (July 1887), retiring from the consular service. In 1889-1890 he was a plenipotentiary at the slave trade conference in Brussels, and was one of the delegates who fixed the tariff duties to be imposed in the Congo basin. In 1895 he was sent by the British government on a mission to the Niger; and on his return he was appointed a member of the Foreign Office committee for constructing the Uganda railway. As a naturalist Kirk took high rank, and many species of the flora and fauna of Central Africa were made known by him, and several bear his name, e.g. the Otogale kirkii (a lemuroid), the Madoqua kirkii (a diminutive antelope), the Landolphia kirkii and the Clematis kirkii. For his services to geography he received in 1882 the patrons' medal of the Royal Geographical Society, of which society he became foreign secretary. Kirk was created K.C.B. in 1900. He married, in 1867, Miss Helen Cooke.

KIRKBY, JOHN (d. 1290), English ecclesiastic and states- man, entered the public service as a clerk of the chancery during the reign of Henry III. Under Edward I. he acted as keeper of the great seal during the frequent absences of the chancellor, Robert Burnell, being referred to as vice-chancellor. In 1282 he was employed by the king to make a tour through the counties and boroughs for the purpose of collecting money; this and his other services to Edward were well rewarded, and although not yet ordained priest he held several valuable benefices in the church. In 1283 he was chosen bishop of Rochester, but owing to the opposition of the archbishop of Canterbury, John Peckham, he did not press his claim to this see. In 1286, however, two years after he had become treasurer, he was elected bishop of Ely, and he was ordained priest and then consecrated by Peckham. He died at Ely on the 26th of March 1290. Kirkby was a benefactor to his see, to which he left some property in London, including the locality now known as Ely Place, where for many years stood the London residence of the bishop of Ely.

Kirkby' s Quest is the name given to a survey of various English counties which was made under the bishop's direction probably in 1284 and 1285. For this see Inquisitions and Assessments relating to Feudal Aids, 1284-1431, vol. i. (London, 1899).

KIRKCALDY (locally pronounced Kerkawdi), a royal, munici- pal and police burgh and seaport of Fifeshire, Scotland. Pop. (1901), 34,079. It lies on the Firth of Forth, 26 m. N. of Edinburgh by the North British railway, via the Forth Bridge. Although Columba is said to have planted a church here, the authori- tative history of the town does not begin for several centuries after the era of the saint. In 1240 the church was bestowed by David, bishop of St Andrews, on Dunfermline Abbey, and in 1334 the town with its harbour was granted by David II. to the same abbey, by which it was conveyed to the bailies and council in 1450, when Kirkcaldy was created a royal burgh. In the course of another century it had become an important commercial centre, the salt trade of the district being then the largest in Scotland. In 1644, when Charles I. raised it to a free port, it owned a hundred vessels, and six years later it was assessed as the sixth town in the kingdom. After the Union its shipping fell off, Jacobite troubles and the American War of Independence accelerating the decline. But its linen manufactures, begun early in the 18th century, gradually restored prosperity; and when other industries had taken root its fortunes advanced by leaps and bounds, and there is now no more flourishing com- munity in Scotland. The chief topographical feature of the burgh is its length, from which it is called the " lang toun." Formerly it consisted of little besides High Street, with closes and wynds branching off from it; but now that it has absorbed Invertiel, Linktown and Abbotshall on the west, and Pathhead,

Sinclairtown and Gallatown on the east, it has reached a length of nearly 4 m. Its public buildings include the parish church, in the Gothic style, St Brycedale United Free church, with a spire 200 ft. high, a town-hall, corn exchange, public libraries, assembly rooms, fever hospital, sheriff court buildings, people's club and institute, high school (1894) — on the site of the ancient burgh school (1582) — the Beveridge hall and free library, and the Adam Smith memorial hall. To the west lies Beveridge Park of no acres, including a large sheet of water, which was presented to the town in 1892. The harbour has an inner and outer division, with wet dock and wharves. Plans for its extension were approved in 1903. They include the extension of the east pier, the construction of a south pier 800 ft. in length, and of a tidal harbour 5 acres in area and a dock of 4 acres. Besides the manufacture of sheeting, towelling, ticks, dowlas and sail-cloth, the principal industries include flax-spin- ning, net-making, bleaching, dyeing, tanning, brewing, brass and iron founding, and there are potteries, flour-mills, engineering works, fisheries, and factories for the making of oil-cloth

and linoleum. In 1847 Michael Nairn conceived the notion of utilizing the fibre of cork and oil-paint in such a way as to produce a floor-covering more lasting than carpet and yet capable of taking a pattern. The result of his experiments was oil-cloth, in the manufacture of which " Kirkcaldy has kept the predominance to which Nairn's enterprise entitled it. Indeed, this and the kindred linoleum business (also due to Nairn, who in 1877 built the first linoleum factory in Scotland) were for many years the monopoly of Kirkcaldy. There is a large direct export trade with the United States. Among well- known natives of the town were Adam Smith, Henry Balnaves of Halhill, the Scottish reformer and lord of session in the time of Queen Mary; George Gillespie, the theologian and a leading member of the Westminster Assembly, and his younger brother Patrick (1617-1675), a friend of Cromwell and principal of Glasgow University; John Ritchie (1 778-1870), one of the founders of the Scotsman; General Sir John Oswald (1771-1840), who had a command at San Sebastian and Vittoria; Sir Michael Scott of Balwearie castle, about i| m. W. of the town, was sent with Sir David Wemyss to bring the Maid of Norway to Scotland in 1290; Sir Walter Scott was therefore in error in adopting the tradition that identified him with the wizard of the same name, who died in 1234. Carlyle and Edward Irving were teachers in the town, where Irving spent seven years, and where he made the acquaintance of the lady he afterwards married. Kirkcaldy combines with Dysart, Kinghorn and Burntisland to return one member to parliament.

KIRKCALDY OF GRANGE, SIR WILLIAM (c. 1520-1573), Scottish politician, was the eldest son of Sir James Kirkcaldy of Grange (d. 1556), a member of an old Fifeshire family. Sir James was lord high treasurer of Scotland from 1537 to 1543 and was a determined opponent of Cardinal Beaton, for whose murder in 1546 he was partly responsible. William Kirk-caldy assisted to compass this murder, and when the castle of St Andrews surrendered to the French in July 1547 he was sent as a prisoner to Normandy, whence he escaped in 1550. He was then employed in France as a secret agent by the advisers of Edward VI., being known in the cyphers as Corax; and later he served in the French army, where he gained a lasting reputa- tion for skill and bravery. The sentence passed on Kirkcaldy for his share in Beaton's murder was removed in 1556, and returning to Scotland in 1557 he came quickly to the front; as a Protestant he was one of the leaders of the lords of the con- gregation in their struggle with the regent, Mary of Lorraine, and he assisted to harass the French troops in Fife. He opposed Queen Mary's marriage with Darnley, being associated at this time with Murray, and was forced for a short time to seek refuge in England. Returning to Scotland, he was accessory to the murder of Rizzio, but he had no share in that of Darnley; and he was one of the lords who banded themselves together to rescue Mary after her marriage with

Bothwell. After the fight at Carberry Hill the queen surrendered herself to Kirkcaldy, and his generalship was mainly responsible for her defeat at Langside.

He seems, however, to have believed that an arrangement with Mary was possible, and coming under the influence of Maitland of Lethington, whom in September 1 569 he released by a strata- gem from his confinement in Edinburgh, he was soon " vehe- mently suspected of his fellows." After the murder of Murray Kirkcaldy ranged himself definitely among the friends of the imprisoned queen. About this time he forcibly released one of his supporters from imprisonment, a step which led to an alter- cation with his former friend John Knox, who called him a " murderer and throat-cutter." Defying the regent Lennox, Kirkcaldy began to strengthen the fortifications of Edinburgh castle, of which he was governor, and which he held for Mary, and early in 1573 he refused to come to an agreement with the regent Morton because the terms of peace did not include a section of his friends. After this some English troops arrived to help the Scots, and in May 1573 the castle surrendered. Strenuous efforts were made to save Kirkcaldy from the Vengeance of his foes, but they were unavailing; Knox had prophesied that he would be hanged, and he was hanged on the 3rd of August

1573-

See Sir James Melville's Memoirs, edited by T. Thomson (Edin- burgh, 1827); J. Grant, Memoirs and Adventures of Sir W. Kirkaldy (Edinburgh, 1849); L. A. Barbe, Kirkcaldy of Grange (1897); and A. Lang, History of Scotland, vol. ii. (1902).

KIRKCUDBRIGHT (pron. Ker-kti-bri) , a royal and police burgh, and county town of Kirkcudbrightshire, Scotland. Pop. (1901), 2386. It is situated at the mouth of the Dee, 6 m. from the sea and 30 m. S.W. of Dumfries by the Glasgow & South-Western railway, being the terminus of a branch line. The old form of the name of the town was Kilcudbrit, from the Gaelic Cil Cudbert, " the chapel of Cuthbert," the saint's body having lain here for a short time during the seven years that lapsed between its exhumation at Lindisfarne and the re-interment at Chester-le- Street. The estuary of the Dee is divided at its head by the peninsula of St Mary's Isle, but though the harbour is the best in south-western Scotland, the great distance to which the tide retreats impairs its usefulness. Among the public buildings are the academy, Johnstone public school, the county buildings,

town-hall, museum, Mackenzie hall and market cross, the last- named standing in front of the old court-house, which is now used as a drill hall and fire-station. No traces remain of the Greyfriars' or Franciscan convent founded by Alexander II., nor of the nunnery that was erected in the parish of Kirkcud- bright. The ivy-clad ruins of Bomby castle, founded in 1582 by Sir Thomas Maclellan, ancestor of the barons of Kirkcud- bright, stand at the end of the chief street. The town, which witnessed much of the international strife and Border lawless- ness, was taken by Edward I. in 1300. It received its royal charter in 1455. After the battle of Towton, Henry VI. crossed the Solway (August 1461) and landed at Kirkcudbright to join Queen Margaret at Linlithgow. It successfully withstood the English siege in 1547 under Sir Thomas Carleton, but after the country had been overrun was compelled to surrender at dis- cretion. Lord Maxwell, earl of Morton, as a Roman Catholic, mustered his tenants here to act in concert with the Armada; but on the approach of King James VI. to Dumfries he took ship at Kirkcudbright and was speedily captured. The burgh is one of the Dumfries district group of parliamentary burghs. On St Mary's Isle was situated the seat of the earl of Selkirk, at whose house Robert Burns gave the famous Selkirk grace:— " Some ha'e meat; and canna eat, And some wad eat that want it; But we ha'e meat, and we can eat, And sae the Lord be thankit."

Fergus, lord of Galloway, a celebrated church-builder of the 1 2th century, had his principal seat on Palace Isle in a lake called after him Loch Fergus, near St Mary's Isle, where he erected the priory de Trayle, in token of his penitence for rebellion againsl David I. The priory was afterwards united as a dependent cell to the abbey of Holyrood. Dundrennan Abbey, 4! m. S.E., was, however, his greatest achievement. It was a Cistercian house, colonized from Rievaulx, and was built in 1140. There now remain only the transept and choir, a uaiique example of

the Early Pointed style. Tongueland (or Tungland), 2J- m. N. by E., has interesting historical associations. It was the site of a Premonstratensian abbey built by Fergus, and it was here that Queen Mary rested in her flight from the field of Langside (May 13, 1568). The well near Tongueland bridge from which she drank still bears the name of the Queen's Well.

KIRKCUDBRIGHTSHIRE (also known as the Stewartry or Kirkcudbright and East Galloway), a south-western county of Scotland, bounded N. and N.W. by Ayrshire, W. and S.W. by Wigtownshire, S. and S.E. by the Irish Sea and Solway Firth, and E. and N.E. by Dumfriesshire. It includes the small islands of Hestan and Little Ross, which are utilized as light- house stations. It has an area of 575,565 acres or 899 sq. m. The north-western part of the shire is rugged, wild and desolate. In this quarter the principal mountains are Merrick (2764 ft.), the highest in the south of Scotland, and

the group of the Rinns of Kells, the chief peaks of which are Corscrine (2668), Carlins Cairn (2650), Meikle Millyea (2446) and Millfire (2350). To- wards the south-west the chief eminences are Lamachan (2349), Larg (2216), and the bold mass of Cairnsmore of Fleet (2331). In the south-east the only imposing height is Criffel (1866). In the north rises the majestic hill of Cairnsmuir of Carsphairn (2612), and close to the Ayrshire border is the Windy Standard (2287). The southern section of the shire is mostly level or undulating, but characterized by much picturesque scenery. The shore is generally bold and rocky, indented by numerous estuaries forming natural harbours, which however are of little use for commerce owing to the shallowness of the sea. Large stretches of sand are exposed in the Solway at low water and the rapid flow of the tide has often occasioned loss of life. The number of " burns " and " waters " is remarkable, but their length seldom exceeds 7 or 8 m. Among the longer rivers are the Cree, which rises in Loch Moan and reaches the sea near Creetown after a course of about 30 m., during which it forms tha boundary, at first of Ayrshire and then of Wigtownshire; the Dee or Black Water of Dee (so named from the peat by which it is coloured), which rises in Loch Dee and after a course mainly S.E. and finally S., enters the sea at St Mary's Isle below Kirk- cudbright, its length being nearly 36 m. ; the Urr, rising in Loch Urr on the Dumfriesshire border, falls into the sea a few miles south of Dalbeattie 27 m. from its source; the Ken, rising on the confines of Ayrshire, flows mainly in a southerly direction and joins the Dee at the southern end of Loch Ken after a course of 24 m. through lovely scenery; and the Deugh which, rising on the northern flank of the Windy Standard, pursues an extra- ordinarily winding course of 20 m. before reaching the Ken. The Nith, during the last few miles of its flow, forms the boundary with Dumfriesshire, to which county it almost wholly belongs. The lochs and mountain tarns are many and well distributed; but except Loch Ken, which is about 6 m. long by | m. wide, few of them attain noteworthy dimensions. There are several passes in the hill regions, but the only well-known glen is Glen Trool, not far from the district of Carrick in Ayrshire, the fame of which rests partly on the romantic character of its scenery, which is very wild around Loch Trool, and more especially on its associa- tions with Robert Bruce. It was here that when most closely beset by his enemies, who had tracked him to his fastness by sleuth hounds, Bruce with the aid of a few faithful followers won a surprise victory over the English in 1307 which proved the turning-point of his fortunes.

Geology. — Silurian and Ordovician rocks are the most important in this county; they are thrown into oft-repeated folds with their axes lying in a N.E. -S.W. direction. The Ordovician rocks are graptolitic black shales and grits of Llandeilo and Caradoc age. They occupy all the northern part of the county north-west of a line which runs some 3 m. N. of New Galloway

and just S. of the Rinns of Kells. South-east of this line graptolitic Silurian shales of Llandovery age prevail ; they are found around Dairy, Creetown, New Galloway, Castle Douglas and Kirkcudbright. Overlying the Llandovery beds on the south coast are strips of Wenlock rocks; they extend from Bridgehouse Bay to Auchinleck and are well exposed in Kirkcudbright Bay, and they can be traced farther round the coast between the granite and the younger rocks. Carboniferous rocks appear in small faulted tracts, unconformable on the Silurian, on

the shores of the Solway Firth. They are best developed about Kirkbean, where they include a basal red breccia followed by con- glomerates, grits and cement stones of Calciferous Sandstone age. Brick-red sandstones of Permian age just come within the county on the W. side of the Nith at Dumfries. Volcanic necks occur in the Permian and basalt dikes penetrate the Silurian at Borgue, Kirk- andrews, &c. Most of the highest ground is formed by the masses of granite which have been intruded into the Ordovician and Silurian rocks ; the Criffel mass lies about Dalbeattie and Bengairn, another mass extends east and west between the Cairnsmore of Fleet and Loch Ken, another lies N.W. and S.E. between Loch Doon and Loch Dee and a small mass forms the Cairnsmore of Carsphairn. Glacial deposits occupy much of the low ground ; the ice, having travelled in a southerly or south-easterly direction, has left abundant striae on the higher ground to indicate its course. Radiation of the ice streams took place from the heights of Merrick, Kells, &c. ; local moraines are found near Carsphairn and in the Deagh and Minnoch valleys. Glacial drumlins of boulder clay lie in the vales of the Dee, Cree and Urr.

Climate and Agriculture. — The climate and soil are better fitted for grass and green crops than for grain. The annual rainfall averages 45-7 in. The mean temperature for the year is 48° F.; for January 38-5°; for July 50°. The major part of the land is either waste or poor pasture. More than half the holdings con- sist of 50 acres and over. Oats is the predominant grain crop, the acreage under barley being small and that under wheat insignificant. Turnips are successfully cultivated, and potatoes are the only other green crop raised on a moderately large scale. Sheep-rearing has been pursued with great enterprise. The average is considerably in excess of that for Scotland. Black- faced and Cheviots are the most common on the high ground, and a cross of Leicester with either is also in favour. Cattle-breeding is followed with steady success; the black polled Galloway is the general breed, but Aryshires have been introduced for dairying, cheese-making occupying much of the farmers' attention. Horses are extensively

raised, a breed of small-sized hardy and spirited animals being specifically known as Gallo- ways. Most of the horses are used in agricultural work, but a large number are also kept for stock; Clydesdales are bred to some extent. Pig-rearing is an important pursuit, pork being supplied to the English markets in considerable quantities. During the last quarter of the 19th century the number of pigs increased 50%. Bee-keeping has been followed with special care and the honey of the shire is consequently in good repute. The proportion of woodland in the county is small.

Industries. — The shire ranks next to Aberdeen as a granite- yielding county and the quarries occupy a large number of hands. In some towns and villages there are manufactures of linen, woollen and cotton goods; at various places distilling, brewing, tanning and paper-making are carried on, and at Dalbeattie there are brick and tile works. There is a little ship-building at Kirkcudbright. The Solway fishery is of small account, but salmon fishing is prosecuted at the mouth of certain rivers, the Dee fish being notable for their excellence.

The only railway communication is by the Glasgow & South- western railway running from Dumfries to Castle Douglas, from which there is a branch to Kirkcudbright, and the Portpatrick and Wigtownshire railway, beginning at Castle Douglas and leaving the county at Newton Stewart. These are supplemented by coaches between various points, as from New Galloway to Carsphairn, from Dumfries to New Abbey and Dalbeattie, and from Auchencairn to Dalbeattie.

Population and Government. — The population was 39,985 in 1891 and 39,383 in 1901, when 98 persons spoke Gaelic and English. The chief towns are Castle Douglas (pop. in 1901, 3018), Dalbeattie (3469), Kirkcudbright (2386), Maxwelltown (5796) with Creetown (991), and Gatehouse of Fleet (1013). The shire returns one member to parliament, and the county town (Kirkcudbright) belongs to the Dumfries district group of parliamentary burghs, and Maxwelltown is combined with Dumfries. The county forms part of the sheriffdom of Dumfries and Galloway, and there is a resident sheriff-substitute at Kirkcudbright. The county is under school-beard jurisdic- tion. There is an academy at Kirkcudbright, high schools at Dumfries and Newton Stewart, and technical classes at Kirkcud-bright, Dalbeattie, Castle Douglas and Dumfries.

History. — The country west of the Nith was originally peopled by a trihe of Celtic Gaels called Novantae, or Atecott Picts, who, owing to their geographical position, which prevented any ready intermingling with the other Pictish tribes farther north, long retained their independence. After Agricola's invasion in a.d. 79 the country nominally formed part of the Roman province, but the evidence is against there ever having been a

prolonged effective Roman occupation. After the retreat of the Romans the Novantae remained for a time under their own chiefs, but in the 7th century accepted the overlordship of Northumbria. The Saxons, soon engaged in struggles with the Norsemen, had no leisure to look after their tributaries, and early in the 9th century the Atecotts made common cause with the Vikings. Henceforward they were styled, probably in contempt, Gall- gaidhel, or stranger Gaels {i.e. Gaels who fraternized with the foreigners), the Welsh equivalent for which, Gallwyddel, gave rise to the name of Galloway (of which Gal way is a variant), which was applied to their territory and still denotes the Stewartry of Kirkcudbright and the shire of Wigtown. When Scotland was consolidated under Kenneth MacAlpine (crowned at Scone in 844) , Galloway was the only district in the south that did not form part of the kingdom; but in return for the services rendered to him at this crisis Kenneth gave his daughter in marriage to the Galloway chief, Olaf the White, and also con- ferred upon the men of Galloway the privilege of marching in the van of the Scottish armies, a right exercised and recognized for several centuries. During the next two hundred years the country had no rest from Danish and Saxon incursions and the continual lawlessness of the Scandinavian rovers. When Malcolm Canmore defeated and slew Macbeth in 1057 he married the dead king's widow Ingibiorg, a Pictish princess, an event which marked the beginning of the decay of Norse influence. The Galloway chiefs hesitated for a time whether to throw ini their lot with the Northumbrians or with Malcolm; but language, race and the situation of their country at length induced them to become lieges of the Scottish king. By the close of the nth century the boundary between England and Scotland was roughly delimited on existing lines. The feudal system ulti- mately destroyed the power of the Galloway chiefs, who resisted the innovation to the last. Several of the lords or " kings " of Galloway, a line said to have been founded by Fergus, the greatest of them all, asserted in vain their independence of the Scottish crown; and in 1234 the line became extinct in the male branch on the death of Fergus's great-grandson Alan. One of Alan's daughters, Dervorguila, had married John de Baliol (father of the John de Baliol who was king of Scotland from 1292 until his abdication in 1296), and the people, out of affection for Alan's daughter, were lukewarm in support of Robert Bruce. In 1308 the district was cleared of the English and brought under allegiance to the king, when the lordship of Galloway was given, to Edward Bruce. Later in the 14th century Galloway espoused the cause of Edward Baliol, who surrendered several counties, including Kirkcudbright, to Edward III. In 1372 Archibald the Grim, a natural son of Sir James Douglas " the Good," became Lord of Galloway and received in perpetual fee the Crown lands between the Nith and Cree. He appointed a steward to collect his revenues and administer justice, and there thus arose the designation of the Stewartry of Kirkcudbright. The high-handed rule of the

Douglases created general discontent, and when their treason became apparent their territory was overrun by the king's men in 1455; Douglas was attainted, and his honours and estates were forfeited. In that year the great stronghold of the Thrieve, the most important fortress in Gallo- way, which Archibald the Grim had built on the Dee immediately to the west of the modern town of Castle Douglas, was reduced and converted into a royal keep. (It was dismantled in 1640 by order of the Estates in consequence of the hostility of its keeper, Lord Nithsdale, to the Covenant.) The famous cannon Mons Meg, now in Edinburgh Castle, is said, apparently on insufficient evidence, to have been constructed in order to aid James III. in this siege. As the Douglases went down the Maxwells rose, and the debateable land on the south-east of

Dumfriesshire was for generations the scene of strife and raid, not only between the two nations but also among the leading families, of whom the Maxwells, Johnstones and Armstrongs were always conspicuous. After the battle of Solway Moss (1542) the shires of Kirkcudbright and Dumfries fell under English rule for a short period. The treaty of Norham (March 24, 1550) established a truce between the nations forten years; and in 1552, the Wardens of the Marches consenting, the debateable land ceased to be matter for debate, the parish of Canonbie being annexed to Dumfriesshire, that of Kirkandrews to Cumberland. Though at the Reformation the Stewartry became fervent in its Protestantism, it was to Galloway, through the influence of the great landowners and the attachment of the people to them, that Mary owed her warmest adherents, and it was from the coast of Kirkcudbright that she made her luckless voyage to England. Even when'the crowns were united in 1603 turbulence continued; for trouble arose over the attempt to establish episcopacy, and nowhere were the Covenanters more cruelly persecuted than in Galloway. After the union things mended slowly but surely, curious evidence of growing com- mercial prosperity being the enormous extent to which smuggling was carried on. No coast could serve the " free traders " better than the shores of Kirkcudbright, and the contraband trade flourished till the 19th century. The Jacobite risings of 1715 and 1745 elicited small sympathy from the inhabitants of the shire.

See Sir Herbert Maxwell, History of Dumfries and Galloway (Edinburgh, 1896) ; Rev. Andrew Symson, A Large Description of Galloway (1684; new ed., 1823); Thomas Murray, The Literary History of Galloway (1822); Rev. William Mackenzie, History of Galloway (1841); P. H. McKerlie, History of the Lands and their Owners in Galloway (Edinburgh,

1870- 1879); Galloway Ancient and Modern (Edinburgh, 1 891) ; J. A. H. Murray, Dialect of the Southern Counties of Scotland (London, 1873).

KIRKE, PERCY (c. 1646-1691), English soldier, was the son of George Kirke, a court official to Charles I. and Charles II. In 1666 he obtained his first commission in the Lord Admiral's regiment, and subsequently served in the Blues. He was with Monmouth at Maestricht (1673), and was present during two campaigns with Turenne on the Rhine. In 1680 he became lieutenant-colonel, and soon afterwards colonel of one of the Tangier regiments (afterwards the King's Own Royal Lancaster Regt.) In 1682 Kirke became governor of Tangier, and colonel of the old Tangier regiment (afterwards the Queen's Royal West Surrey). He distinguished himself very greatly as governor, though he gave offence by the roughness of his manners and the wildness of his life. On the evacuation of Tangier " Kirke's Lambs " (so called from their badge) returned to England, and a year later their colonel served as a brigadier in Faversham's army. After Sedgemoor the rebels were treated with great severity; but the charges so often brought against the " Lambs " are now known to be exaggerated, though the regiment shared to the full in the ruthless hunting down of the fugitives. It is often stated that it formed Jeffreys's escort in the " Bloody Assize," but this is erroneous. Brigadier Kirke took a notable part in the Revolution three years later, and William III. promoted him. He commanded at the relief of Derry, and made his last campaign in Flanders in 1691. He died, a lieu- tenant-general, at Brussels in October of that year. His eldest son, Lieut.-General Percy Kirke (1684-1741), was also colonel of the " Lambs."

KIRKEE (or Kirki), a town and military cantonment of British India in Poona district, Bombay, 4 m. N.W. of Poona city. Pop. (1901), 10,797. It is the principal artillery station in the Bombay presidency, and has a large ammunition factory. It was the scene of a victory over Baji Rao, the last peshwa, in 1817.

KIRKINTILLOCH, a njunicipal and police burgh of Dumbar- tonshire, Scotland. Pop. (1901), 10,680. It is situated 8 m.N.E. of Glasgow, by the North British railway, a portion of the parish extending into Lanarkshire. It lies on the Forth & Clyde canal, and the Kelvin — from which Lord Kelvin, the distinguished scientist, took the title of his barony — flows past the town, xv. 27

where it receives from the north the Glazert and from the south the Luggie, commemorated by David Gray. The Wall of Antoninus ran through the site of the town, the Gaelic name of which (Caer, a fort, not Kirk, a church) means " the fort at the end of the ridge." The town became a burgh of barony under the Comyns in 11 70. The cruciform parish church with

crow- stepped gables dates from 1644. The public buildings include the town-hall, with a clock tower, the temperance hall, a con- valescent home, the Broomhill home for incurables (largely due to Miss Beatrice Clugston, to whom a memorial was erected in 1 89 1) , and the Westermains asylum. In 1 898 the burgh acquired as a private park the Peel, containing traces of the Roman Wall, a fort, and the foundation of Comyn's Castle. The leading industries are chemical manufactures, iron-founding, muslin-weaving, coal mining and timber sawing. Lenzie, a suburb, a mile to the south of the old town, contains the imposing towered edifice in the Elizabethan style which houses the Barony asylum. David Gray, the poet, was born at Merkland, near by, and is buried in' Kirkintilloch churchyard, where a monument was erected to his memory in 1865.

KIRK-KILISSEH (Kirk-Kilisse or Kirk-Kilissia), a town of European Turkey, in the vilayet of Adrianople, 35 m. E. of Adrianople. Pop. (1905), about 16,000, of whom about half are Greeks, and the remainder Bulgarians, Turks and Jews. Kirk- Kilisseh is built near the headwaters of several small tributaries of the river Ergene, and on the western slope of the Istranja Dagh. It owes its chief importance to its position at the southern outlet of the Fakhi defile over these mountains, through which passes the shortest road from Shumla to Constantinople. The name Kirk-Kilisseh signifies " four churches," and the town possesses many mosques and Greek churches. It has an im- portant trade with Constantinople in butter and cheese, and also exports wine, brandy, cereals and tobacco.

KIRKSVILLE, a city and the county-seat of Adair county, Missouri, U.S.A., about 129 m. N.-by W. of Jefferson City. Pop. (1900), 5966, including 112 foreign-born and 291 negroes; (1910), 6347. It is served by the Wabash and the Quincy, Omaha & Kansas City railways. It lies on a rolling prairie at an eleva- tion of 975 ft. above the sea. It is the seat of the First District Missouri State Normal School (1870); of the American School of Osteopathy (opened 1892); and of the related A. T. Still Infirmary (incorporated 1895), named in honour of its founder, Andrew Taylor Still (b. 1820), the originator of osteopathic treatment, who settled here in 1875. In 1908 the School of Osteopathy had 18 instructors and 398 students. Grain and fruit are grown in large quantities, and much coal is mined in the vicinity of Kirksville. Its manufactures are shoes, bricks, lumber, ice, agricultural implements, wagons and handles. Kirksville was laid out in 1842, and was named in honour of Jesse Kirk. It was incorporated as a town in 1857 and chartered as a city of the third class in 1892. In April 1899 a cyclone caused serious damage to the city.

KIRKWALL (Norse, Kirkjuvagr, " church bay "), a royal, municipal and police burgh, seaport and capital of the Orkney Islands, county of Orkney, Scotland. Pop. (1901), 3711. It is situated at the-head of a bay of the

same name on the east of the island of Potnona, or Mainland, 247 m. N. of Leith and 54 m. N. of Wick by steamer. Much of the city is quaint-looking and old-fashioned, its main street (nearly 1 m. long) being in parts so narrow that two vehicles cannot pass each other. The more modern quarters are built with great regularity and the suburbs contain several substantial villas surrounded by gardens. Kirk- wall has very few manufactures. The linen trade introduced in the middle of the 18th century is extinct, and a like fate has overtaken the kelp and straw-plaiting industries. Distilling however prospers, and the town is important not only as regards its shipping and the deep-sea fishery, but also as a distributing centre for the islands and the seat of the superior law courts. The port has two piers. Kirkwall received its first charter from James III. in i486, but the provisions of this instrument being disregarded by such men as Robert (d. 1592) and Patrick Stewart (d. 1614), 1st and 2nd earls of Orkney, and others, the Scottish

parliament passed an act in 1670 confirming the charter granted by Charles II. in 1661. The prime object of interest is the cathedral of St Magnus, a stately cruciform red sandstone struc- ture in the severest Norman, with touches of Gothic. It was founded by Jarl Rognvald (Earl Ronald) in 113 7 in memory of his uncle Jarl Magnus who was assassinated in the island of Egilshay in n 15, and afterwards canonized and adopted as the patron saint of the Orkneys. The remains of St Magnus were ultimately interred in the cathedral. The church is 234 ft. long from east to west and 56 ft. broad, 71 ft. high from floor to roof, and 133 ft. to the top of the present spire — the transepts being the oldest portion. The choir was lengthened and the beautiful eastern rose window added by Bishop Stewart in 1511, and the porch and the western end of the nave were finished in 1 540 by Bishop Robert Reid. Saving that the upper half of the original spire was struck by lightning in 1671, and not rebuilt, the cathe- dral is complete at all points, but it underwent extensive repairs in the 19th century. The disproportionate height and narrow- ness of the building lend it a certain distinction which otherwise it would have lacked. The sandstone has not resisted the effects of weather, and much of the external decorative work has perished. The choir is used as the parish church. The skellat, or fire-bell, is not rung now. The church of St Olaf, from which the town took its name, was burned down by the English in 1502; and of the church erected on its site by Bishop Reid — the greatest building the Orkneys ever had — little more than the merest fragment

survives. Nothing remains of the old castle, a fortress of remarkable strength founded by Sir Henry Sinclair (d. 1400), earl and prince of Orkney and 1st earl of Caithness, its last vestiges having been demolished in 1865 to provide better access to the harbour; and the earthwork to the east of the town thrown up by the Cromwellians has been converted into a battery of the Orkney Artillery Volunteers. Adjoining the cathedral are the ruins of the bishop's palace, in which King Haco died after his defeat at Largs in i26"3. The round tower, which still stands, was added in 1550 by Bishop Reid. It is known as the Mass Tower and contains a niche in which is a small effigy believed to represent the founder, who also endowed the grammar school which is still in existence. To the east of the remains of the bishop's palace are the ruins of the earl's palace, a structure in the Scottish Baronial style, built about 1600 for Patrick Stewart, 2nd earl of Orkney, and on his forfeiture given to the bishops for a residence. Tankerness House is a characteristic example of the mansion of an Orkney laird of the olden time. Other public buildings include the municipal buildings, the sheriff court and county buildings, Balfour hospital, and the fever hospital. There is daily communication with Scrabster pier (Thurso), via Scapa pier, on the southern side of the waist of Pomona, about ij m. to the S. of Kirkwall; and steamers sail at regular intervals from the harbour to Wick, Aberdeen and Leith. Good roads place the capital in touch with most places in the island and a coach runs twice a day to Stromness. Kirk- wall belongs to the Wick district group of parliamentary burghs, the others being Cromarty, Dingwall, Dornoch and Tain.

KIRRIEMUIR, a police burgh of Forfarshire, Scotland. Pop. (1901), 4096. It is situated on a height above the glen through which the Gairie flows, 6j m. N.W. of Forfar by a branch line of the Caledonian railway of which it is the terminus. There are libraries, a public hall and a park. The staple industry is linen- weaving. The hand-loom lingered longer here than in any other place in Scotland and is not yet wholly extinct. The Rev. Dr Alexander Whyte (b. 1837) and J. M. Barrie (b. i860) are natives, the latter having made the town famous under the name of " Thrums." The original Secession church — the kirk of the Auld Lichts — was founded in 1806 and rebuilt in 1893. Kinnordy, i| m. N.W., was the birthplace of Sir Charles Lyell the geologist; and Cortachy castle, a fine mansion in the Scottish Baronial style, about 4 m. N., is the seat of the earl 61 Airlie.

KIRSCH (or Kirschenwasser), a potable spirit distilled from cherries. Kirsch is manufactured chiefly in the Black Forest in Germany, and in the Vosges and Jura districts in France. Generally the raw material consists of the wild cherry known as

Cerasus avium. The cherries are subjected to natural fermenta- tion and subsequent distillation. Occasionally a certain quantity of sugar and water

are added to the cherries after crushing, and the mass so obtained is filtered or pressed prior to fermentation. The spirit is usually " run " at a strength of about 50% of absolute alcohol. Compared with brandy or whisky the charac- teristic features of kirsch are (a) that it contains relatively large quantities of higher alcohols and compound ethers, and (b) the presence in this spirit of small quantities of hydrocyanic acid, partly as such and partly in combination as benzaldehyde- cyanhydrine, to which the distinctive flavour of kirsch is largely due.

KIR-SHEHER, the chief town of a sanjak of the same name in the Angora vilayet of Asia Minor, situated on a tributary of the Kizil Irmak (Halys), on the Angora-Kaisarieh road. It is on the line of the projected railway from Angora to Kaisarieh. The town gives its name to the excellent carpets made in the vicinity. On the outskirts there is a hot chalybeate spring. Population about 9000 (700 Christians, mostly Armenians). Kir-sheher represents the ancient Mocissus, a small town which became im- portant in the Byzantine period: it was enlarged by the emperor Justinian, who re-named it Justinianopolis, and made it the capital of a large division of Cappadocia, a position it still retains.

KIRWAN, RICHARD (1733-1812), Irish scientist, was born at Cloughballymore, Co. Galway, in 1733. Part of his early life was spent-abroad, and in 1754 he entered the Jesuit novitiate either at St Omer or at Hesdin, but returned to Ireland in the following year, when he succeeded to the family estates through the death of his brother in a duel. In 1766, having conformed to the established religion two years previously, he was called to the Irish bar, but in 1768 abandoned practice in favour of scientific pursuits. During the next nineteen years he resided chiefly in London, enjoying the society of the scientific men living there, and corresponding with many savants on the conti- nent of Europe, as his wide knowledge of languages enabled him to do with ease. His experiments on the specific gravities and attractive powers of various saline substances formed a sub- stantial contribution to the methods of analytical chemistry, and in 1782 gained him the Copley medal from the Royal Society, of which he was elected a fellow in 1780; and in 1784 he was engaged in a controversy with Cavendish in regard to the latter's experiments on air. In 1787 he removed to Dublin, where four years later he became president of the Royal Irish Academy. To its proceedings he contributed some thirty-eight memoirs, dealing with meteorology, pure and applied chemistry, geology, magnetism, philology, &c. One of these, on the primi- tive state of the globe and its subsequent catastrophe, involved him in a lively dispute with the upholders of the Huttonian theory. His geological work was marred by an implicit belief in the universal deluge, and through finding fossils associated with the trap rocks near Portrush he maintained basalt was of aqueous origin. He was one of the last supporters in England of the

phlogistic hypothesis, for which he contended in his Essay on Phlogiston and the Constitution of Acids (1787), identi- fying phlogiston with hydrogen. This work, translated by Madame Lavoisier, was published in French with critical notes by Lavoisier and some of his associates; Kirwan attempted to refute their arguments, but they proved too strong for him, and he acknowledged himself a convert in 1791. His other books included Elements of Mineralogy (1784), which was the first systematic work on that subject in the English language, and which long remained standard; An Estimate of the Temperature of Different Latitudes (1787); Essay of the Analysis of Mineral Waters (1799), and Geological Essays (1799). In his later years he turned to philosophical questions, producing a paper on human liberty in 1798, a treatise t>n logic in 1807, and a volume of metaphysical essays in 181 1, none of any worth. Various stories are told of his eccentricities as well as of his conversational powers. He died in Dublin in June 1812.

KISFALUDY, KAROLY [Charles] (1788-1830), Hungarian author, was born at Tete. near RaaK on the 6th of February

1788. His birth cost his mother her life and himself his father's undying hatred. He entered the army as a cadet in 1804; saw active service in Italy, Servia and Bavaria (1805-1809), espe- cially distinguishing himself at the battle of Leoben (May 25, 1809), and returned to his quarters at Pest with the rank of first lieu tenant. It was during the war that he composed his first poems, e.g. the tragedy Gyilkos (" The Murder," 1808), and numerous martial songs for the encouragement of his comrades. It was now, too, that he fell hopelessly in love with the beautiful Katalin Heppler, the daughter of a wealthy tobacco merchant. Tiring of the monotony of a soldier's life, yet unwilling to sacri- fice his liberty to follow commerce or enter the civil service, Kisfaludy, contrary to his father's wishes, now threw up his commission and made his home at the house of a married sister at Vorrock, where he could follow his inclinations. In 1812 he studied painting at the Vienna academy and supported himself precariously by his brush and pencil, till the theatre at Vienna proved a still stronger attraction. In 18 12 he wrote the tragedy Kldra Zdch, and in 181 5 went to Italy to study art more thoroughly. But he was back again within six months, and for the next three years flitted from place to place, living on the charity of his friends, lodging in hovels and dashing off scores of daubs which rarely found a market. The united and repeated petitions of the whole Kisfaludy family failed to bring about a reconciliation between the elder Kisfaludy and his prodigal son. It was the success of his drama Ilka,

written for the Fehervar dramatic society, that first made him famous and prosperous. The play was greeted with enthusiasm both at Fehervar and Buda (1819). Subsequent plays, The Voivode Stiber and The Petitioners (the first original Magyar dramas), were equally successful. Kisfaludy's fame began to spread. He had found his true vocation as the creator of the Hungarian drama. In May 1820 he wrote three new plays for the dramatic society (he could always turn out a five-act drama in four days) which still further increased his reputa- tion. From 1820 onwards, under the influence of the great critic Kazinczy, he learnt to polish and refine his style, while his friend and adviser Gyorgy Gaal (who translated some of his dramas for the Vienna stage) introduced him to the works of Shakespeare and Goethe. By this time Kisfaludy had evolved a literary theory of his own which inclined towards romanticism ; and in collaboration with his elder brother Alexander (see below) he founded the periodical Aurora{i&22) , which he edited to the day of his death. The Aurora was a notable phenomenon in Magyar literature. It attracted towards it many of the rising young authors of the day (including Vorosmarty, Bajza and Czuczor) and speedily became the oracle of the romanticists. Kisfaludy's material position had now greatly improved, but he could not shake off his old recklessness and generosity, and he was never able to pay a tithe of his debts. The publication of Aurora so engrossed his time that practically he abandoned the stage. But he contributed to Aurora ballads, epigrams, short epic pieces, and, best of all, his comic stories. Kisfaludy was in fact the founder of the school of Magyar humorists and his comic types amuse and delight to this day. When the folk-tale became popular in Europe, Kisfaludy set to work upon folk-tales also and produced (1828) some of the masterpieces of that genre. He died on the 21st of November 1830. Six years later the great literary society of Hungary, the Kisfaludy Tdrsasdg, was founded to commemorate his genius. Apart from his own works it is the supreme merit of Kisfaludy to have revived and nationalized the Magyar literature, giving it a range and scope undreamed of before his time.

The first edition of Kisfaludy's works, in 10 volumes, appeared at Buda in 1831, shortly after his death, but the 7th edition (Budapest 1893) is the best and fullest. See Ferenc Toldy, Lives of the Magyar Poets (Hung.) (Budapest, 1870); Zsolt Beothy, The Father of Hun- garian Comedy (Budapest, 1882) ; Tamas Szana, The Two Kisfaludys (Hung.) (Budapest, 1876). Kisfaludy's struggles and adventures are also most vividly described in Jokai's novel, Eppur si muove (Hung.).

Sandor [Alexander] Kisfaludy (177 2-1844), Hungarian poet, elder brother of the preceding, was born at Zala on the 27th

of September 1772, educated at Raab, and graduated in philo- sophy and jurisprudence at Pressburg. He early fell under the influence of Schiller and

Kleist, and devoted himself to the resus- citation of the almost extinct Hungarian literature. Disgusted with his profession, the law, he entered the Life Guards (1793) and plunged into the gay life of Vienna, cultivating literature, learning French, German and Italian, painting, sketching, assiduously frequenting the theatre, and consorting on equal terms with all the literary celebrities of the Austrian capital. In 1796 he was transferred to the army in Italy for being con- cerned with some of his brother officers of the Vienna garrison in certain irregularities. When Milan was captured by Napoleon Kisfaludy was sent a prisoner of war to Vaucluse, where he studied Petrarch with enthusiasm and fell violently in love with Caroline D'Esclapon, a kindred spirit to whom he addressed his melancholy Himfy Lays, the first part of the subsequently famous sonnets. On returning to Austria he served with some distinction in the campaigns of 1798 and 1799 on the Rhine and in Switzerland; but tiring of a military life and disgusted at the slowness of his promotion, he quitted the army in September 1799, and married his old love Roza. Szegedy at the beginning of 1800. The first five happy years of their life were passed at Kam in Vas county, but in 1805 they removed to Siimeg where Kisfaludy gave himself up entirely to literature.

At the beginning of the 19th century he had published a volume of erotics which made him famous, and his reputation was still further increased by his Regek or Tales. During the troublous times of 1809, when the gentry of Zala county founded a confederation, the palatine appointed Kisfaludy one of his adjutants. Subsequently, by command, he wrote an account of the movement for presentation to King Francis, which was com- mitted to the secret archives, and Kisfaludy was forbidden to communicate its contents. In 1820 the Marczebanya Institute crowned his Tales and the palatine presented him with a prize of 400 florins in the hall of the Pest county council. In 1822 he started the Aurora with his younger brother Karoly (see above). When the academy was founded in 1830 Kisfaludy was the first county member elected to it. In 1835 he resigned because he was obliged to share the honour of winning the academy's grand prize with Vorosmarty. After the death of his first wife (1832) he married a second time, but by neither of his wives had he any child. The remainder of his days were spent in his Tusculum among the vineyards of Siimeg and Somla. He died on the 28th of October 1844. Alexander Kisfaludy stands alone among the rising literary schools of his day. He was not even influenced by his friend the great critic Kazinczy, who gave the tone to the young classical writers of his day. Kisfaludy's art was self-taught, solitary and absolutely independent. If he imitated any one it was Petrarch; indeed his famous Himfy szerelmei (" The Loves of Himfy"), as his collected sonnets are called, have won for him the title of " The Hungarian Petrarch." But the passion of Kisfaludy is far more sincere and real than

ever Petrarch's was, and he completely Magyarized everything he borrowed. After finishing the sonnets Kisfaludy devoted himself to more objective writing, as in the incomparable Regek, which reproduce the scenery and the history of the delightful counties which surround Lake Balaton. He also contributed numerous tales and other pieces to Aurora. Far less successful were his plays, of which Hunyddi Jdnos (1816), by far the longest drama in the Hungarian language, need alone be mentioned.

The best critical edition of Sandor Kisfaludy's works is the fourth complete edition, by David Angyal, in eight volumes (Budapest, 1893). See Tamas Szana, The two Kisfaludys (Hung.) (Budapest, 1876); Imre Sandor, The Infltience of the Italian on the Hungarian Literature (Hung.) (Budapest, 1878) ; Kalman Siimegi, Kisfaludy and his Tales (Hung.) (Budapest, 1877). (R. N. B,)

KlSH, or Kais (the first form is Persian and the second Arabic), an island in the Persian Gulf. It is mentioned in the 1 2th century as being the residence of an Arab pirate from Oman, who exacted a tribute from the pearl fisheries of the gulf and had the title of " King of the Sea," and it rose to importance in the

13th century with the fall of Siraf as a transit station of -the trade between India and the West. In the 14th century it was supplanted by Hormuz and lapsed into its former insignificance. The island is nearly 10 m. long and 5 m. broad, and contains a number of small villages, the largest, Mashi, with about 100 houses, being situated on its north-eastern corner in 26 34′ N. and 54 2′ E. The highest part of the island has an elevation of 1 20 ft. The inhabitants are Arabs, and nearly all pearl fishers, possessing many boats, which they take to the pearl banks on the Arabian coast. The water supply is scanty and there is little vegetation, but sufficient for sustaining some flocks of sheep and goats and some cattle. Near the centre of the north coast are the ruins of the old city, now known as Harira, with remains of a mosque, with octagonal columns, masonry, water- cisterns (two 1 50 ft. long, 40 ft. broad, 24 ft. deep) and a fine underground canal, or aqueduct, half a mile long and cut in the solid rock 20 ft. below the surface. Fragments of glazed tiles and brown and blue pottery, of thin white and blue Chinese porcelain, of green celadon (some with white scroll-work or figures in relief), glass beads, bangles, &c, are abundant. Klsh is the Kataia of Arrian; Chisi and Quis of Marco Polo; Quixi, Queis, Caez, Cais, &c, of Portuguese writers; and Khenn, or Kenn, of English.

KISHANGARH, a native state of India, in the Rajputana agency. Area, 858 sq. m.;pop. (1901), 90,970, showing a decrease of 27% in the decade, due to the famine of 1899-1900; estimated revenue, £34,000; there is no tribute. The state was founded in the reign of the emperor Akbar, by a younger son of the raja of Jodhpur. In 1818 Kishangarh first came into direct relations with the British government, by entering into a treaty, together with the other Rajput states, for the suppression of the Pindari marauders by whom the country was at that time overrun. The chief, whose title is maharaja, is a Rajput of the Rathor clan. Maharaja Madan Singh ascended the throne in 1900 at the age of sixteen, and attended the Delhi Durbar of 1903 as a cadet in the Imperial Cadet Corps. The administration, under the diwan, is highly spoken of. Irrigation from tanks and wells has been extended ; factories for ginning and pressing cotton have been started; and the social reform movement, for discouraging excessive expenditure on marriages, has been very successful. The state is traversed by the Rajputana railway. The town of Kishangarh is 18 m. N.W. of Ajmere by rail. Pop. (1901), 12,663. It is the residence of many Jain merchants.

KISHINEV {Kishlanow of the Moldavians) ,a town of south-west Russia, capital of the government of Bessarabia, situated on the right bank of the Byk, a tributary of the Dniester, and on the railway between Odessa and Jassy in Rumania, 120 m. W.N.W. from the former. At the beginning of the 19th century it was but a poor village, and in 181 2 when it was acquired by Russia from Moldavia it had only 7000 inhabitants; twenty years later its population numbered 35,000, while in 1862 it had with its suburbs 92,000 inhabitants, and in 1900 125,787, composed of the most varied nationalities — Moldavians, Walachians, Rus- sians, Jews (43%), Bulgarians, Tatars, Germans and Gypsies. A massacre {pogrom) of the Jews was perpetrated here in 1903. The town consists of two parts— the old or lower town, on the banks of the Byk, and the new or upper town, situated on high crags, 450 to 500 ft. above the river. The wide suburbs are remarkable for their gardens, which produce great quantities of fruits (especially plums, which are dried and exported), tobacco, mulberry leaves for silkworms, and wine. The buildings of the town are sombre, shabby and low, but built of stone; and the streets, though wide and shaded by acacias, are mostly unpaved. Kishinev is the seat of the archbishop of Bessarabia, and has a cathedral, an ecclesiastical seminary with 800 students, a college, and a gardening school, a museum, a public library, a botanic garden, and a sanatorium with sulphur springs. The town is adorned with statues of Tsar Alexander II. (1886) and the poet Pushkin (1885). There are tallow-melting houses, steam flour- mills, candle and soap works, distilleries and tobacco factories. The trade is very active and increasing, Kishinev being a centre for the Bessarabian trade in grain,' wine, tobacco,

tallow, wool

and skins, exported to Austria and to Odessa. The town played an important part in the war between Russia and Turkey in 1877-78, as the chief centre of the Russian invasion.

KISHM (also Arab. Jazirat ut-tawilak, Pers. Jazarih i daraz, i.e. Long Island), an island at the mouth of the Persian Gulf, separated from the Persian mainland by the Khor-i-Jafari, a strait which at its narrowest point is less than 2 m. broad. On British Admiralty charts it figures as " Clarence Strait," the name given to it by British surveyors in 1828 in honour of the duke of Clarence (William IV.). The island is 70 m. long, its main axis running E.N.E. by W.S.W. Its greatest breadth is 22 m. and the mean breadth about 7 m. A range of hills from 300 to 600 ft. high, with strongly marked escarpments, runs nearly parallel to- the southern coast; they are largely composed, like those of Hormuz and the neighbouring mainland, of rock salt, which is regularly quarried in several places, principally at Nimakdan {i.e. salt-cellar) and Salakh on the south coast, and forms one of the chief products of the island, finding its way to Muscat, India and Zanzibar. In the centre of the island some hills, consisting of sandstone and marl, rise to an elevation of 1300 ft. In its general aspect the island is parched and barren-looking, like the south of Persia, but it contains fertile portions, which produce grain, dates, grapes, melons, &c. Traces of naphtha were observed near Salakh, but extensive boring operations in 1892 did not lead to any result. The town of Kishm (pop. 5000) is on the eastern extremity of the island. The famous navigator, William Baffin, was killed here in January 1622 by a shot from the Portuguese castle close by, which a British force was then besieging. Lafit (Laft, Leit), the next place in importance (reduced by a British fleet in 1809), is situated about midway on the northern coast in the most fertile part of the island. There are also many flourishing villages. At Basidu or Bassadore (correct name Baba Sa'idu), on the western extremity of the island, the British government maintained until 1879 a sanatorium for the crews of their gunboats in the gulf, with barracks for a company of sepoys belonging to the marine battalion at Bombay, workshops, hospital, &c. The village is still British property, but its occupants are reduced to a couple of men in charge of a coal depot, a provision store and about 90 villagers. In December 1896 a terrible earthquake destroyed about four-fifths of the houses on the island and over 1000 persons lost their lives. The total population is generally estimated at about 15,000 to 20,000, but the German Admiralty's Segelhandbuch fur den Persischen Golf for 1907 has 40,000.

Kishm is the ancient Oaracta, or Uorochta, a name said to have survived until recently in a village called Brokt, or Brokht. It was also called the island of the Beni Kavan, from an Arab tribe of that name which came

from Oman. (A. H.-S.)

KISKUNFELEGYHAZA, a town of Hungary, in the county of Pest-Pilis-Solt-Kiskun, 80 m. S.S.E. of Budapest by rail. Pop. (1900), 33,242. Among the principal buildings are a fine town hall, a Roman Catholic gymnasium and a modern large parish church. The surrounding country is covered with vineyards, fruit gardens, and tobacco and corn fields. The town itself, which is an important railway junction, is chiefly noted for its great cattle-market. Numerous Roman urns and other ancient relics have been dug up in the vicinity. In the 17 th century the town was completely destroyed by the Turks, and it was not recolonized and rebuilt till 1743.

KISLOVODSK, a town and health-resort of Russian Caucasia, in the province of Terek, situated at an altitude of 2690 ft., in a deep caldron-shaped valley on the N. side of the Caucasus, 40 m. by rail S.W. of Pyatigorsk. Pop. (1897), 4078. The limestone hills which surround the town rise by successive steps or terraces, and contain numerous caves. The mineral waters are strongly impregnated with carbonic acid gas and have a temperature of 51 F. The principal spring is known as Narsan, and its water is called by the Circassians the " drink of heroes."

KISMET, fate, destiny, a term used by Mahommedans to express all the incidents and details of man's lot in life. The

word is the Turkish form of the Arabic gismat, from gasama, to divide.

KISS, the act of pressing or touching with the lips, cheek, hand or lips of another, as a sign or expression of love, affection, reverence or greeting. Skeat {Etym. Diet., 1898) connects the Teiit. base kussa with Lat. gustus, taste, and with Goth, kustus, test, from kinsan, to choose, and takes " kiss " as ultimately a doublet of " choice."

For the liturgical osculum pacts or " kiss of peace," see Pax. See further C. Nyrop, The Kiss and its History, trans, by W. F. Harvey (1902) ; J. J. Claudius, Dissertatio de salutationibus veterum (Utrecht, 1702); and " Baisers d'e'tiquette " (1689) in Archives curieuses de Vhistoire de France (1834-1890, series ii. torn. 12).

KISSAR, or Gytarah Barbaryeh, the ancient Nubian lyre, still in use in Egypt and Abyssinia. It consists of a body having instead of the traditional

tortoiseshell back a shallow, round bowl of wood, covered with a sound-board of sheepskin, in which are three small round sound-holes. The arms, set through the sound-board at points distant about the third of the diameter from the circumference, have the familiar fan shape. Five gut strings, knotted round the bar and raised from the sound-board by means of a bridge tailpiece similar to that in use on the modern guitar, are plucked by means of a plectrum by the right hand for the melody, while the left hand sometimes twangs some of the strings as a soft drone accompaniment.

KISSINGEN, a town and watering-place of Germany, in the kingdom of Bavaria, delightfully situated in a broad valley surrounded by high and well-wooded hills, on the Franconian Saale, 656 ft. above sea-level, 62 m. E. of Frankfort-on-Main, and 43 N.E.of Wurzburgby rail. Pop. (1900), 4757. Its streets are regular and its houses attractive. It has an Evangelical, an English, a Russian and three Roman Catholic churches, a theatre, and various benevolent institutions, besides all the usual buildings for the lodging, cure and amusement of the numerous visitors who are attracted to this, the most popular watering-place in Bavaria. In the Kurgarten, a tree-shaded expanse between the Kurhaus and the handsome colonnaded Konversations-Saal, are the three principal springs, the Rakoczy, the Pandur and the Maxbrunnen, of which the first two, strongly impregnated with iron and salt, have a temperature of 51-26° F.; the last (50-72°) is like Selters or Seltzer water. At short distances from the town are the intermittent artesian spring Solensprudel, the Schonbornsprudel and the Theresienquelle; and in the same valley as Kissingen are the minor spas of Bocklet and Bruckenau. The waters of Kissingen are prescribed for both internal and external use in a great variety of diseases. They are all highly charged with salt, and productive government salt-works were at one time stationed near Kissingen. The number of persons who visit the place amounts to about 20,000 a year. The manufactures of the town, chiefly carriages and furniture, are unimportant; there is also a trade in fruit and wine.

The salt springs were known in the 9th century, and their medicinal properties were recognized in the 16th, but it was only during the 19th century that Kissingen became a popular resort. The town belonged to the counts of Henneberg until 1394, when it was sold to the bishop of Wurzburg. With this bishopric it passed later to Bavaria. On the 10th of July 1866 the Prussians defeated the Bavarians with great slaughter near Kissingen. On the 13th of July 1874 the town was the scene of the attempt of the fanatic Kullmann to assassinate Prince Bismarck, to whom a statue has been erected. There are also monuments to Kings Louis I. and Maximilian I. of Bavaria.

See Balling, Die Heilquellen und]Bader zu Kissingen (Kissingen, 1886); A. Sotier, Bad Kissingen (Leipzig, 1883); Werner, Bad Kissingen als Kurort (Berlin, 1904); Leusser, Kissingen fur Herz- kranke (Wurzburg, 1902) ; Diruf, Kissingen und seine Heilquellen (Wurzburg, 1892) ; and Roth, Bad Kissingen (Wurzburg, 1901).

KISTNA, or Krishna, a large river of southern India. It rises near the Bombay sanatorium of Mahabaleshwar in the Western Ghats, Only about 40 m. from the Arabian Sea, and, as it discharges into the Bay of Bengal, it thus flows across almost the entire peninsula from west to east. It has an estimated

basin area of 97,000 sq. m., and its length is 800 m. Its source is held sacred, and is frequented by pilgrims in large numbers. From Mahabaleshwar the Kistna runs southward in a rapid course into the nizam's dominions, then turns to the east, and ultimately falls into the sea by two principal mouths, carrying with it the waters of the Bhima from the north and the Tunga- badhra from the south-west. Along this part of the coast runs an extensive strip of land which has been entirely formed by the detritus washed down by the Kistna and Godavari. The river channel is throughout too rocky and the stream too rapid to allow navigation even by small native craft. In utility for irri- gation the Kistna is also inferior to its two sister streams, the Godavari and Cauvery. By far the greatest of its irrigation works is the Bezwada anicut, begun by Sir Arthur Cotton in 1852. Bezwada is a small town at the entrance of the gorge by which the Kistna bursts through the Eastern Ghats and immediately spreads over the alluvial plain. The channel there is 1300 yds. wide. During the dry season the depth of water is barely 6 ft., but sometimes it rises to as much as 36 ft., the maximum flood discharge being calculated at 1,188,000 cub. ft. per second. Of the two main canals connected with the dam, that on the left bank breaks into two branches, the one running 39 m. to Ellore, the other 49 m. to Masulipatam. The canal on the right bank proceeds nearly parallel to the river, and also sends off two principal branches, to Nizampatam and Comamur. The total length of the main channels is 372 m. and the total area irrigated in 1903-1904 was about 700,000 acres.

KISTNA (or Krishna), a district of British India, in the N.E. of the Madras Presidency. Masulipatam is the district head- quarters. Area, 8490 sq. m. The district is generally a flat country, but the interior is broken by a few low hills, the highest being 1857 ft. above sea-level. The principal rivers are the Kistna, which cuts the district into two portions, and the Munyeru, Paleru and Naguleru (tributaries of the Gundlakamma and the Kistna) ; the last only is navigable. The Kolar lake, which covers an area of 21 by 14 m., and the Romparu swamp are natural receptacles for the drainage on the north and south sides of the Kistna respectively.

In 1901 the population was 2,154,803, showing an increase of 16% in the decade. Subsequently the area of the district was reduced by the formation of the new district of Guntur {q.v.), though Kistna received an accretion of territory from Godavari district. The population in 1901 on the area as reconstituted (5899 sq. m.) was 1,744,138. The Kistna delta system of irriga- tion canals, which are available also for navigation, connect with the Godavari system. The principal crops are rice, millets, pulse, oil-seeds, cotton, indigo, tobacco and a little sugar-cane. There are several factories for ginning and pressing cotton. The cigars known in England as Lunkas are partly made from to- bacco grown on lankas or islands in the Kistna. The manufacture of chintzes at Masulipatam is a decaying industry, but cotton is woven everywhere for domestic use. Salt is evaporated, under government supervision, along the coast. Bezwada, at the head of the delta, is a place of growing importance, as the central junction of the East Coast railway system, which crosses the inland portion of the district in three directions. Some sea- borne trade, chiefly coasting, is carried on at the open roadsteads of Masulipatam and Nizampatam, both in the delta. The Church Missionary Society supports a college at Masulipatam.

The early history of Kistna is inseparable from that of the northern Circars. Dharanikota and the adjacent town of Amra- vati were the seats of early Hindu and Buddhist govern- ments; and the more modern Rajahmundry owed its importance to later dynasties. The Chalukyas here gave place to the Cholas, who in turn were ousted by the Reddi kings, who flourished during the 14th century, and built the forts of Bellamkonda, Kondavi and Kondapalli in the north of the district, while the Gajapati dynasty of Orissa ruled in the north. Afterwards the entire district passed to the Kutb Shahis of Golconda, until annexed to the Mogul empire by Aurangzeb in 1687. Meantime the English had in 161 r established a small factory at Masulipa- tam, where they traded with varying fortune from 1759, when,

Masulipatam being captured from the French by Colonel Forde, with a force sent by Lord Clive from Calcutta, the power of the English in the greater part of the district was complete.

KIT (i) (probably an adaptation of the Middle Dutch kitte, a wooden tub, usually with a lid and handles; in modern Dutch kit means a tankard), a tub, basket or pail used for holding milk, butter, eggs, fish and other goods; also applied to similar recep- tacles for various domestic purposes, or for

holding a workman's tools, &c. By transference " kit " came to mean the tools them- selves, but more commonly personal effects such as clothing, especially that of a soldier or sailor, the word including the knap- sack or other receptacle in which the effects are packed. (2) The name (perhaps a corruption of " cittern " Gr. ladapa) of a small violin, about 16 in. long, and played with a bow of nearly the same length, much used at one time by dancing- masters. The French name is pochette, the instrument being small enough to go into the pocket.

KITAZATO, SHIBASABURO (1856-), Japanese doctor of medicine, was born at Kumamoto in 1856 and studied in Germany under Koch from 1885 to 1891. He became one of the foremost bacteriologists of the world, and enjoyed the credit of having discovered the bacilli of tetanus, diphtheria and plague, the last in conjunction with Dr Aoyama, who accompanied him to Hong-Kong in 1894 during an epidemic at that place.

KIT-CAT CLUB, a club of Whig wits, painters, politicians and men of letters, founded in London about 1703. The name was derived from that of Christopher Cat, the keeper of the pie- house in which the club met in Shire Lane, near Temple Bar. The meetings were afterwards held at the Fountain tavern in the Strand, and latterly in a room specially built for the purpose at Barn Elms, the residence of the secretary, Jacob Tonson, the publisher. In summer the club met at the Upper Flask, Hampstead Heath. The club originally consisted of thirty-nine, afterwards of forty-eight members, and included among others the duke of Marlborough, Lords Halifax and Somers, Sir Robert Walpole, Vanbrugh, Congreve, Steele and Addison. The por- traits of many of the members were painted by Sir Godfrey Kneller, himself a member, of a uniform size suited to the height of the Barn Elms room in which the club dined. The canvas, ,36 X 28 in., admitted of less than a half-length portrait but was sufficiently long to include a hand, and this is known as the kit-cat size. The club was dissolved about 1720.

KITCHEN (O.E. cycene; this and other cognate forms, such as Dutch keuken, Ger. Kiiche, Dan. kokken, Fr. cuisine, are formed from the Low Lat. cucina, Lat. coquina, coquere, to cook), the room or place in a house set apart for cooking, in which the culinary and other domestic utensils are kept. The range or cooking-stove fitted with boiler for hot water, oven and other appliances, is often known as a " kitchener " (see Cookery and Heating) . Archaeologists have used the term " kitchen-midden," i.e. kitchen rubbish-heap (Danish kokken-modding) for the rubbish heaps of prehistoric man, containing bones, remains of edible shell- fish, implements, &c. (see Shell-heaps). " Midden," in Middle English mydding, is a Scandinavian word, from myg, muck, filth, and dyng, heap; the latter word gives the English " dung." KITCHENER, HORATIO HERBERT KITCHENER, Viscount (1850-), British field marshal, was the son of

Lieut. -Colonel H. H. Kitchener and was born at Bally Longford, Co. Kerry, on the 24th of June 1850. He entered the Royal Military Academy, Woolwich, in 1868, and was commissioned second lieutenant, Royal Engineers, in 1871. As a subaltern he was employed in survey work in Cyprus and Palestine, and on promotion to captain in 1883 was attached to the Egyptian army, then in course of re-organization under British officers. In the following year he served on the staff of the British expeditionary force on the Nile, and was promoted successively major and lieutenant-colonel by brevet for'his services. From 1886 to 1888 he was commandant at Suakin, commanding and receiving a severe wound in the action of Handub in 1888. In 1888 he commanded a brigade in the actions of Gamaizieh and Toski. From 1889 to 1892 he served as adjutant-general of the army. He had become brevet-colonel in the British army in 1888, and

he received the C.B. in 1889 after the action of Toski. In 1892 Colonel Kitchener succeeded Sir Francis (Lord) Grenfell as sirdar of the Egyptian army, and three years later, when he had com- pleted his predecessor's work of re-organizing the forces of the khedive, he began the formation of an expeditionary force on the vexed military frontier of Wady Haifa. The advance into the Sudan (see Egypt, Military Operations) was prepared by thorough administrative work on his part which gained universal admiration. In 1896 Kitchener won the action of Ferket (June 7) and advanced the frontier and the railway to Dongola. In 1897 Sir Archibald Hunter's victory of Abu Hamed (Aug. 7) carried the Egyptian flag one stage farther, and in 1898 the resolve to destroy the Mahdi's power was openly indicated by the despatch of a British force to co-operate with the Egyptians. The sirdar, who in 1896 became a British major-general and received the K.C.B., commanded the united force, which stormed the Mahdist zareba on the river Atbara on the 8th of April, and, the outposts being soon afterwards advanced to Metemmeh and Shendy, the British force was augmented to the strength of a division for the final advance on Khartum. Kitchener's work was crowned and the power of the Mahdists utterly destroyed by the victory of Omdurman (Sept. 2), for which he was raised to the peerage as Baron Kitchener of Khartoum, received the G.C.B., the thanks of parliament and a grant of £30,000. Little more than a year afterwards, while still sirdar of the Egyptian army, he was promoted lieutenant-general and appointed chief- of-staff to Lord Roberts in the South African War (see Trans- vaal, History). In this capacity he served in the campaign of Paardeberg, the advance on Bloemfontein and the subsequent northward advance to Pretoria, and on Lord Roberts' return to England in November 1900 succeeded him as commander-in- chief, receiving at the same time the local rank of general. In June 1902 the long and harassing war came to its close, and Kitchener was rewarded by

advancement to the dignity of viscount, promotion to the substantive rank of general " for distinguished service," the thanks of parliament and a grant of £50,000. He was also included in the Order of Merit.

Immediately after the peace he went to India as commander- in-chief in the East Indies, and in this position, which he held for seven years, he carried out not only many far-reaching administrative reforms but a complete re-organization and strate- gical redistribution of the British and native forces. On leaving India in 1909 he was promoted field marshal, and succeeded the duke of Connaught as commander-in-chief and high commis- sioner in the Mediterranean. This post, not of great importance in itself, was regarded as a virtual command of the colonial as distinct from the home and the Indian forces, and on his appoint- ment Lord Kitchener (after a visit to Japan) undertook a tour of inspection of the forces of the empire, and went to Australia and New Zealand in order to assist in drawing up local schemes of defence. In this mission he was highly successful, and earned golden opinions. But soon after his return to England in April 1910 he declined to take up his Mediterranean appoint- ment, owing to his dislike of its inadequate scope, and he was succeeded in June by Sir Ian Hamilton.

KITE, 1 the Falco milvus of Linnaeus and Milvus ictinus of modern ornithologists, once probably the most familiar bird of prey in Great Britain, and now one of the rarest. Three or four hundred years ago foreigners were struck with its abundance in the streets of London. It was doubtless the scavenger in ordinary of that and other large towns (as kindred species now are in Eastern lands), except where its place was taken by the raven; for Sir Thomas Browne (c. 1662) wrote of the latter at Norwich — " in good plentie about the citty which makes so few kites to be seen hereabout." John Wolley has well remarked of the modern Londoners that few " who see the paper toys hovering over the parks in fine days of summer, have any idea that the bird from which they derive their name used to float all day in hot weather high over the heads of their ancestors." Even at the begin- ning of the 19th century the kite formed a feature of many

1 In O.E. is cfta; no related word appears in cognate languages. Glede, cognate with " glide," is also another English name.

a rural landscape in England, as they had done in the days when the poet Cowper wrote of them. But an evil time soon came upon the species. It must

have been always hated by the henwife, but the resources of civilization in the shape of the gun and the gin were denied to her. They were, however, employed with fatal zeal by the gamekeeper; for the kite, which had long afforded the supremest sport to the falconer, was now left friend- less," 1 and in a very few years it seems to have been exterminated throughout the greater part of England, certain woods in the Western Midlands, as well as Wales, excepted. In these latter a small remnant still exists; but the well-wishers of this beautiful species are naturally chary of giving information that might lead to its further persecution. In Scotland there is no reason to suppose that its numbers suffered much diminution until about 1835, or even later, when the systematic destruction of " vermin " on so many moors was begun. In Scotland, however, it is now as much restricted to certain districts as in England or Wales, and those districts it would be most inexpedient to indicate.

The kite is, according to its sex, from 25 to 27 in. in length, about one half of which is made up by its deeply forked tail, capable of great expansion, and therefore a powerful rudder, enabling the bird while soaring on its wide wings, more than S ft. in extent, to direct its circling course with scarcely a move- ment that is apparent to the spectator below. Its general colour is pale reddish-brown or cinnamon, the head being greyish-white, but almost each feather has the shaft dark. The tail feathers are broad, of a light red, barred with deep brown, and furnish the salmon fisher with one of the choicest materials of his "flies." The nest, nearly always built in the crotch of a large tree, is formed of sticks intermixed with many strange substances collected as chance may offer, but among them rags 2 seem always to have a place. The eggs, three or four in number, are of a dull white, spotted and blotched with several shades of brown, and often lilac. It is especially mentioned by old authors that in Great Britain the kite was resident throughout the year; whereas on the Continent it is one of the most regular and marked migrants, stretching its wings towards the south in autumn, wintering in Africa, and returning in spring to the land of its birth.

There is a second European species, not distantly related, the Milvus migrans or M. ater of most authors, 3 smaller in size, with a general dull blackish-brown plumage and a less forked tail. In some districts this is much commoner than the red kite, and on one occasion it has appeared in England. Its habits are very like those of the species already described, but it seems to be more addicted to fishing. Nearly allied to this black kite are the M. aegyptius of Africa, the M. govinda (the common pariah kite

1 George, third earl of Orford, died in 1791, and Colonel Thornton, who with him had been the latest follower of this highest branch of the art of falconry, broke up his hawking establishment not many years after. There is no evidence that the pursuit of the kite was in England or any other

country reserved to kings or privileged persons, but the taking of it was quite beyond the powers of the ordinary trained falcons, and in older days practically became limited to those of the sovereign. Hence the kite had attached to it, especially in France, the epithet of " royal," which has still survived in the specific appellation of regalis applied to it by many ornithologists. The scandalous work of Sir Antony Wcldon (Court and Character of King James, p. 104) bears witness to the excellence of the kite as a quarry in an amusing story of the " British Solomon," whose master-falconer, Sir Thomas Monson, being determined to outdo the performance of the French king's falconer, who, when sent to England to show sport, " could not kill one kite, ours being more magnanimous than the French kite," at last succeeded, after an outlay of £1000, in getting a cast of hawks that took nine kites running — " never missed one." On the strength of this, James was induced to witness a flight at Royston, " but the kite went to such a mountee as all the field lost sight of kite and hawke and all, and neither kite nor hawke were either seen or heard of to this present."

2 Thus justifying the advice of Shakespeare's Autolycus (Winter's Tale, iv. 3) — " When the kite builds, look to lesser linen " — very necessary in the case of the laundresses in olden time, when the bird commonly frequented their drying-grounds.

3 Dr R. Bowdler Sharpe (Cat. Birds Brit. Mus. i. 322) calls it M. korschun, but the figure of S. G. Gmelin's Accipiter Korschun, whence the name is taken, unquestionably represents the moor- buzzard (Circus aeruginosas).

of India) , 4 the M. meianotis of Eastern Asia, and the M. affinis and M. isurus; the last is by some authors removed to another genus or sub-genus as Lophoictinia, and is peculiar to Australia, while M . affinis also occurs in Ceylon, Burma, and some of the Malay countries as well. All these may be considered true kites, while those next to be mentioned are more aberrant forms. First there is Elanus, the type of which is E. caeruleus, a beautiful little bird, the black-winged kite of English authors, that comes to the south of Europe from Africa, and has several congeners — E. axillaris and E. scriptus of Australia being most worthy of notice. An extreme development of this form is found in the African Nauclerus riocourii, as well as in Elanoides furcatus, the swallow- tailed kite, a widely-ranging bird in America, and remarkable for its length of wing and tail, which gives it a marvellous power of flight, and serves to explain the unquestionable fact of its having twice appeared in Great Britain. To Elanus also Ictinia, another American form, is allied, though perhaps more remotely, and it is represented by 2". mississippiensis, the Mississippi kite, which is by some considered to be but the northern race of the Neotropical /. plumbs. Gampsonyx, Rostrhamus and Cymindis, all belonging to the Neotropical region, complete the series of forms that seem to compose the sub-family

Milvinae, though there may be doubt about the last, and some systematists would thereto add the perns or honey-buzzards, Perninae.

(A. N.) KITE-FLYING, the art of sending up into the air, by means of the wind, light frames of varying shapes covered with paper or cloth (called kites, after the bird — in German Drache, dragon), which are attached to long cords or wires held in the hand or wound on a drum. When made in the common diamond form, or triangular with a semicircular head, kites usually have a pendulous tail appended for balancing purposes. The tradition is that kites were invented by Archytas of Tarentum four centuries before the Christian era, but they have been in use among Asiatic peoples and savage tribes like the Maoris of New Zealand from time immemorial. Kite-flying has always been a national pastime of the Koreans, Chinese, Japanese, Tonkinese, Annamese, Malays and East Indians. It is less popular among the peoples of Europe. The origin of the sport, although obscure, is usually ascribed to religion. With the Maoris it still retains a distinctly religious character, and the ascent of the kite is accompanied by a chant called the kite-song. The Koreans attribute its origin to a general, who, hundreds of years ago, inspirited his troops by sending up a kite with a lantern attached, which was mistaken by his army for a new star and a token of divine succour. Another Korean general is said to have been the first to put the kite to mechanical uses by employing one to span a stream with a cord, which was then fastened to a cable and formed the nucleus of a bridge. In Korea, Japan and China, and indeed throughout Eastern Asia, even the tradespeople may be seen indulging in kite-flying while waiting for customers. Chinese and Japanese kites are of many shapes, such as birds, dragons, beasts and fishes. They vary in size, but are often as much as 7 ft. in height or breadth, and are constructed of bam- boo strips covered with rice paper or very thin silk. In China the ninth day of the ninth month is " Kites' Day," when men and boys of all classes betake themselves to neighbouring eminences and fly their kites. Kite-fighting is a feature of the pastime in Eastern Asia. The cord near the kite is usually stiffened with a mixture of glue and crushed glass or porcelain. The kite-flyer manoeuvres to get his kite to windward of that of his adversary, then allows his cord to drift against his enemy's, and by a sudden jerk to cut it through and bring its kite to grief. The Malays possess a large variety of kites, mostly without tails. The Sultan of Johor sent to the Columbian Exposition at Chicago in 1893 a collection of fifteen different kinds. Asiatic musical kites bear one or more perforated reeds or bamboos which emit a plaintive sound that can be heard for great distances. The ignorant, believing that these kites frighten away evil spirits, often keep them flying all night over their houses.

- *The Brahminy kite of India, Haliastur Indus, seems to be rather a fishing eagle.*

There are various metaphorical uses of the term " kite-flying," such as in commercial slang, when " flying a kite " means raising money on credit (cf. " raising the wind "), or in political slang for seeing " how the wind blows." And " flying-kites," in nautical language, are the topmost sails.

Kite-flying for scientific purposes began in the middle of the 1 8th century. In 1752 Benjamin Franklin made his memorable kite experiment, by which he attracted electricity from the air and demonstrated the electrical nature of lightning. A more systematic use of kites for scientific purposes may, however, be said to date from the experiments made in the last quarter of the 19th century. (E. B.)

Meteorological Use. — Many European and American meteoro- logical services employ kites regularly, and obtain information not only of the temperature, but also of the humidity and velocity of the air above. The kites used are mostly modifications of the so-called box-kites, invented by L. Hargrave. Roughly these kites may be said to resemble an ordinary box with the two ends removed, and also the middle part of each of the four sides. The original Hargrave kite, the form generally used, has a rectangular section; in' Russia a semicircular section with the curved part facing the wind is most in favour; in England the diamond- shaped section is preferred for meteorological purposes owing to its simplicity of construction. Stability depends on a multitude of small details of construction, and long practice and experience are required to make a really good kite. The sizes most in use have from 30 to 80 sq. ft. of sail area. There is no difficulty about raising a kite to a vertical height of one or even two miles on suitable days, but heights exceeding three miles are seldom reached. On the 29th of November 1905 at Lindenberg, the Prussian Aeronautical Observatory, the upper one of a train of six kites attained an altitude of just four miles. The total lifting surface of these six kites was nearly 300 sq. ft., and the length of wire a little over nine miles. The kites are invariably flown on a steel wire line, for the hindrance to obtaining great heights is not due so much to the weight of the line as to the wind pressure upon it, and thus it becomes of great importance to use a material that possesses the greatest possible strength, combined with the smallest possible size. Steel piano wire meets this requirement, for a wire of ˆ in. diameter will weigh about 16 ft to the mile, and stand a strain of some 250-280 ft before it breaks. Some stations prefer to use one long piece of wire of the same gauge throughout without a join, others prefer to start with a thin wire and join on thicker and thicker wire as more kites are added. The process of kite-flying is as follows. The first kite is started either

with the self-recording instruments secured in it, or hanging from the wire a short distance below it. Wire is then paid out, whether quickly or slowly depends on the strength of the wind, but the usual rate is from two to three miles per hour. The quantity that one kite will take depends On the kite and on the wind, but roughly speaking it may be said that each 10 sq. ft. of lifting surface on the kite should carry 1000 ft. of ˆj in. wire without difficulty. When as much wire as can be carried comfortably has run out another kite is attached to the line, and the paying out is continued; after a time a third is added, and so on. Each kite increases the strain upon the wire, and moreover adds to the height and makes it more uncertain what kind of wind the upper kites will encounter; it also adds to the time that is necessary to haul in the kites. In each way the risk of their breaking away is increased, for the wind is very uncertain and is liable to alter in strength. Since to attain an exceptional height the wire must be strained nearly to its break ing point, and under such conditions a small increase in the strength of the wind will break the wire, it follows that great heights can only be attained by those who are willing to risk the trouble and expense of frequently having their wire and train of kites break away. The weather is the essential factor in kite- flying. In the S.E. of England in winter it is possible on about two days out of three, and in summer on about one day out of three. The usual cause of failure is want of wind, but there are a few days when the wind is too strong. (For meteorological results, &c, see Meteorology.) (W. H. Di.)

Military Use. — A kite forms so extremely simple a method of lifting anything to a height in the air that it has naturally been suggested as being suitable for various military purposes, such as signalling to a long distance, carrying up flags, or lamps, or semaphores. Kites have been used both in the army and in the navy for floating torpedoes on hostile positions. As much as two miles of line have been paid out. For purposes of photo-graphy a small kite carrying a camera to a considerable height may be caused to float over a fort or other place of which a bird's-eye View is required, the shutter being operated by electric wire, or slow match, or clockwork. Many successful photographs have been thus obtained in England and America.

The problem of lifting a man by means of kites instead of by a captive balloon is a still more important one. The chief military advantages to be gained are: (1) less transport is required; (2) they can be used in a strong wind; (3) they are not so liable to damage, either from the enemy's fire or from trees, &c, and are easier to mend; (4) they can be brought into use more quickly; (5) they are very much cheaper, both in construction and in maintenance, not requiring any costly gas.

Captain B. F. S. Baden-Powell, of the Scots Guards, in June 1894

constructed, at Pirbright Camp, a huge kite 36 ft. high, with which he successfully lifted a man on different occasions. He afterwards improved the contrivance, using five or six smaller kites attached together in preference to one large one. With this arrangement he frequently ascended as high as 100 ft. The kites were hexagonal, being 12 ft. high and 12 ft. across. The apparatus, which could be packed in a few minutes into a simple roll, weighed in all about 1 cwt. This appliance was proved to be capable of raising a man even during a dead calm, the retaining line being fixed to a wagon and towed along. Lieut. H.D. Wise made some trials in America in 1897 with some large kites of the Hargrave pattern (Hargrave having previously Rim- self ascended in Australia), and succeeded in lifting a man 40 ft. above the ground. In the Russian army a military kite apparatus has also been tried, and was in evidence at the manoeuvres in 1898. Experiments have also been carried out by most of the European powers. (B. F. S. B.-P.)

KIT-FOX (Canis [Vulpes] velox), a small fox, from north- western America, measuring less than a yard in length, with a tail of nearly a third this length. There is a good deal of varia- tion in the colour of the fur, the prevailing tint being grey. A specimen in the Zoological Gardens of London had the back and tail dark grey, the tail tipped with black, and a rufous wash on the cheeks, shoulders, flanks and outer surface of the limbs, with the under surface white. The specific name was given on account of the extraordinary swiftness of the animal. (See Carnivora.)

KITTO, JOHN (1804-1854), English biblical scholar, was the son of a mason at Plymouth, where he was born on the 4th of December 1804. An accident brought on deafness, and in November 1819 he was sent to the workhouse, where he was employed in making list shoes. In 1823 a fund was raised on his behalf, and he was sent to board with the clerk of the guardians, having his time at his own disposal, and the privilege of making use of a public library. After preparing a small volume of miscellanies, which was published by subscription, he studied dentistry with Anthony Norris Groves in Exeter. In 1825 he obtained congenial employment in the printing office of the Church Missionary Society at Islington, and in 1827 was trans- ferred to the same society's establishment at Malta. There he remained for eighteen months, but shortly after his return to England he accompanied Groves and other friends on a private missionary enterprise to Bagdad, where he obtained personal knowledge of Oriental life and habits which he afterwards applied with tact and skill in the illustration of biblical scenes and incidents. Plague broke out, the missionary establishment was broken up, and in 1832 Kitto returned to England. On arriving in London he was engaged in the preparation of various serial publications of the Society for the Diffusion of Useful Knowledge, the most important of which were the Pictorial History of Palestine and the Pictorial Bible. The

edited under his superintendence, appeared in two volumes in 1843-1845 and passed through three editions. His Daily Bible Illustrations (8 vols. 1849-1853) received an appreciation which is not yet extinct. In 1850 he received an annuity of £100 from the civil list. In August 1854 he went to Germany for the waters of Cannstatt on the Neckar, where on the 25th of November he died.

See Kitto's own work, The Lost Senses (1845); J. E. Ryland's Memoirs of Kitto (1856); and John Eadie's Life of Kitto (1857).

KITTUR, a village of British India, in the Belgaum district of Bombay; pop. (1901), 4922. It contains a ruined fort, formerly the residence of a Mahratta chief. In connexion with a disputed succession to this chiefship in 1824, St John Thackeray, an uncle of the novelist, was killed when approaching the fort under a flag of truce; and a nephew of Sir Thomas Munro, governor of Madras, fell subsequently when the fort was stormed.

KITZINGEN, a town of Germany, in the kingdom of Bavaria on the Main, 95 m. S.E. of Frankfort-on-Main by rail, at the junction of the main-lines to Passau, Wurzburg and Schweinfurt. Pop. (1900), 8489. A bridge, 300 yards long, connects it with its suburb Etwashausen on the left bank of the river. A railway bridge also spans the Main at this point. Kitzingen is still surrounded by its old walls and towers, and has an Evangelical and two Roman Catholic churches, two municipal museums, a town-hall, a grammar school, a richly endowed hospital and two old convents. Its chief industries are brewing, cask- making and the manufacture of cement and colours. Con- siderable trade in wine, fruit, grain and timber is carried on by boats on the Main. Kitzingen possessed a Benedictine abbey in the 8th century, and later belonged to the bishopric of Wurzburg.

See F. Bernbeck, Kitzinger Chronik 745-1565 (Kitzingen, 1899).

KIU-KIANG FU, a prefecture and prefectural city in the province of Kiang-si, China. The city, which is situated on the south bank of the Yangtsze-kiang, 15 m. above the point where the Kan Kiang flows into that river from the Po-yang lake, stands in 29 42′ N. and 116 8′ E. The north face of the city is separated from the river by only the width of a roadway, and two large lakes lie on its west and south fronts. The walls are from 5 to 6

m. in circumference, and are more than usually strong and broad. As is generally the case with old cities in China, Kiu-Kiang has repeatedly changed its name. Under the Tsin dynasty (a.d. 265-420), it was known as Sin- Yang, under the Liang dynasty (502-557) as Kiang Chow, under the Suy dynasty (589-618) as Kiu-Kiang, under the Sung dynasty (960-1127) as Ting-Kiang, and under the Ming dynasty (1368- 1644) it assumed the name it at present bears. Kiu-Kiang has played its part in the history of the empire, and has been re- peatedly besieged and sometimes taken, the last time being in February 1853, when the T'ai-p'ing rebels gained possession of the city. After their manner they looted and utterly de- stroyed it, leaving only the remains of a single street to repre- sent the once flourishing town. The position of Kiu-Kiang on the Yangtsze-kiang and its proximity to the channels of internal communication through the Po-yang lake, more especially to those leading to the green-tea-producing districts of the provinces of Kiang-si and Ngan-hui, induced Lord Elgin to choose it as one of the treaty ports to be opened under the terms of his treaty (1861). Unfortunately, however, it stands above instead of below the outlet of the Po-yang lake, and this has proved to be a decided drawback to its success as a commerical port. The immediate effect of opening the town to foreign trade was to raise the population in one year from 10,000 to 40,000. The population in 1908, exclusive of foreigners, was officially esti- mated at 36,000. The foreign settlement extends westward from the city, along the bank of the Yangtsze-kiang, and is bounded on its extreme west by the P'un river, which there runs into the Yangtsze. The bund, which is 500 yards long, was erected by the foreign community. The climate is good, and though hot in the summer months is invariably cold and bracing in the winter. According to the customs returns the value of the

trade of the port amounted in 1902 to £2,854,704, and in 1904 to £3,489,816, of which £1,726,506 were imports and £1,763,310 exports. In 1904 322,266 lb. of opium were imported.

KIUSTENDIL, the chief town of a department in Bulgaria, situated in a mountainous country, on a small affluent of the Struma, 43 m. S.W. of Sofia by rail. Pop. (1906), 12,353. The streets are narrow and uneven, and the majority of the houses are of clay or wood. The town is chiefly notable for its hot mineral springs, in connexion with which there are nine bathing establishments. Small quantities of gold and silver are obtained from mines near Kiustendil, and vines, tobacco and fruit are largely cultivated. Some remains survive of the Roman period, when the town was known as Pautalia, Ulpia Pautalia, and Pautalia Aurelii. In the 10th century it became the seat of a bishopric, being then and during the later middle ages known by the Slavonic name of Velbuzhd. After the overthrow of the Seryian kingdom it came into the possession of Constantine, brother of the despot Yovan Dragash, who ruled over northern Macedonia.

Constantine was expelled and killed by the Turks in 1394. In the 15th century Kiustendil was known as Velbushka Banya, and more commonly as Konstantinova Banya (Constantine's Bath), from which has developed the Turkish name Kiustendil.

KIVU, a considerable lake lying in the Central African (or Albertine) rift-valley, about 60 m. N. of Tanganyika, into which it discharges its waters by the Rusizi River. On the north it is separated from the basin of the Nile by a line of volcanic peaks. The length of the lake is about 55 m., and its greatest breadth over 30, giving an area, including islands, of about 1 100 sq. m. It is about 4830 ft. above sea-level and is roughly triangular in outline, the longest side lying to the west. The coast-line is much broken, especially on the south-east, where the indentations present a fjord-like character. The lake is deep, and the shores are everywhere high, rising in places in bold precipitous cliffs of volcanic rock. A large island, Kwijwi or Kwichwi, oblong in shape and traversed by a hilly ridge, runs in the direction of the major axis of the lake, south- west of the centre, and there are many smaller islands. The lake has many fish, but no crocodiles or hippopotami. South of Kivu the rift-valley is blocked by huge ridges, through which the Rusizi now breaks its way in a succession of steep gorges, emerging from the lake in a foaming torrent, and descending 2000 ft. to the lacustrine plain at the head of Tanganyika. The lake fauna is a typically fresh-water one, presenting no affinities with the marine or " halolimnic " fauna of Tanganyika and other Central African lakes, but is similar to that shown by fossils to have once existed in the more northern parts of the rift-valley. The former outlet or extension in this direction seems to have been blocked in recent geological times by the elevation of the volcanic peaks which dammed back the water, causing it finally to overflow to the south. This volcanic region is of great interest and has various names, that most used being Mfumbiro (q.v.), though this name is sometimes restricted to a single peak. Kivu and Mfumbiro were first heard of by J. H. Speke in 1861, but not visited by a European until 1894, when Count von Gotzen passed through the country on his journey across the continent. The lake and its vicinity were sub- sequently explored by Dr R. Kandt, Captain Bethe, E. S. Grogan, J. E. S. Moore, and Major St Hill Gibbons. The ownership of Kivu and its neighbourhood was claimed by the Congo Free State and by Germany, the dispute being settled in 1910, after Belgium had taken over the Congo State. The frontier agreed upon was the west bank of the Rusizi, and the west shore of the lake. The island of Kwijwi also fell to Belgium.

See R. Kandt, Caput Nili (Berlin, 1904), and Karte des Kivusees, 1 : 285,000, with text by A. v. Bockelmann (Berlin, 1902) ; E. S. Grogan and A. H. Sharpe, From the Cape to Cairo (London, 1900) ; J. E. S. Moore, To the Mountains of the Moon (London, 1901); A. St H. Gibbons, Africa from

South to North, ii. (London, 1904).

KIWI, or Kiwi-Kiwi, the Maori name — first apparently introduced to zoological literature by Lesson in 1828 {Man.

IS

8 4 2

KIWI

d'Ornithologie, ii. 210, or Voy. de la " Coquille," zoologie, p. 418), and now very generally adopted in English — of one of the most characteristic forms of New Zealand birds, the Apteryx of scientific writers. This remarkable bird was unknown till George Shaw described and figured it in 1813 (Nat. Miscellany, pis. 1057, 1058) from a specimen brought to him from the southern coast of that country by Captain Barcley of the ship " Providence." At Shaw's death, in the same year, it passed

Kiwi.

into the possession of Lord Stanley, afterwards 13th earl of Derby, and president of the Zoological Society, and it is now with the rest of his collection in the Liverpool Museum. Con- sidering the state of systematic ornithology at the time, Shaw's assignment of a position to this new and strange bird, of which he had but the skin, docs him great credit, for he said it seemed " to approach more nearly to the Struthious and Gallinaceous tribes than to any other." And his credit is still greater when we find the venerable John Latham, who is said to have examined the specimen with Shaw, placing it some years later among the penguins (Gen, Hist. Birds, x. 394), being appar- ently led to that conclusion through its functionless wings and the backward situation of its legs. In this false allocation, James Francis Stephens also in 1826 acquiesced (Gen. Zoology, xiii. 70). Meanwhile in 1820 K.J. Temminck, who had never seen a specimen, had assorted it with the dodo in an order to which he applied the name of Inertes (Man. d'Ornithologie, i. cxiv.). In 1 83 1 R. P. Lesson, who had previously (loc. cit.) made some blunders about it, placed it (Traite d'Ornithologie, p. 12), though only, as he says, " par analogie et a priori,'" in his first division of birds, " Oiseaux Anomaux," which is equivalent to what we now call Ratitae, making of it a separate family " Nullipennes." At that time no second example was known, and some doubt was felt, especially on the Continent, as to the very existence of such a bird l — though Lesson had himself when in the Bay of Islands in April 1824 (Voy. " Coquille," ut supra) heard of it; and a few years later J. S. C. Dumont d'Urville had seen its skin, which the naturalists of his expedition

procured, worn as a tippet by a Maori chief at Tolaga Bay (Houa-houa), 2 and in 1830 gave what proves to be on the whole very accurate in- formation concerning it (Voy. " Astrolabe," ii. 107). To put all suspicion at rest, Lord Derby sent his unique specimen for exhibition at a meeting of the Zoological Society, on the 12th of February 1833 (Proc. Zool. Society, 1833, p. 24), and a few months later (torn, cit., p. 80) William Yarrell communicated to that body a complete description of it, which was afterwards published in full with an excellent portrait (Trans. Zool. Society, vol. i. p. 71, pi. 10). Herein the systematic place of the species, as akin to the

1 Cuvier in the second edition of his Regne Animal only referred to it in a footnote (i. 408).

2 Cruise in 1822 (Journ. Residence in New Zealand, p. '313) had spoken of an " emeu " found in that island, which must of course have been an Apteryx.

Struthious birds, was placed beyond cavil, and the author called upon all interested in zoology to aid in further research as to this singular form. In consequence of this appeal a legless skin was within two years sent to the society (Proceedings, 1835, p. 61) obtained by W. Yate of Waimate, who said it was the second he had seen, and that he had kept the bird alive for nearly a fortnight, while in less than another couple of years additional information (op. cit., 1837, p. 24) came from T. K. Short to the effect that he had seen two living, and that all Yarrell had said was substantially correct, except underrating its progressive powers. Not long afterwards Lord Derby received and in March 1838 transmitted to the same society the trunk and viscera of an Apteryx, which, being entrusted to Sir R. Owen, furnished that eminent anatomist, in conjunction with other specimens of the same kind received from Drs Lyon and George Bennett, with the materials of the masterly monograph laid before the society in instalments, and ultimately printed in its Transactions (ii. 257; iii. 277). From this time the whole structure of the kiwi has certainly been far better known than that of nearly any other bird, and by degrees other examples found their way to England, some of which were distributed to the variou? museums of the Continent and of America. 3

In 1847 much interest was excited by the reported discovery of another species of the genus (Proceedings, 1847, P- Si), and though the story was not confirmed, a second species was really soon after made known by John Gould (torn, cit., p. 93; Transac- tions, vol. iii-. p. 379, pi. 57) under the name of Apteryx oweni — a just tribute to the great master who had so minutely explained the anatomy of the group. Three years later A. D. Bartlett drew attention to the manifest difference existing among certain

examples, all of which had hitherto been regarded as specimens of A. australis, and the examination of a large series led him to conclude that under that name two distinct species were confounded. To the second of these, the third of the genus (according to his views), he gave the name of A. mantelli (Proceedings, 1850, p. 274), and it soon turned out that to this new form the majority of the specimens already obtained belonged. In 1851 the first kiwi known to have reached England alive was presented to the Zoological Society by Eyre, then lieutenant-governor of New Zealand. This was found to belong to the newly described A. mantelli, and some careful observations on its habits in captivity were published by John Wolley and another (Zoologist, pp. 3409, 360s). 4 Subsequently the society has received several other live examples of this form, besides one of the real A. australis (Proceedings, 1872, p. 861), some of A. oweni, and one of a supposed fourth species, A. haasti, characterized in 1871 by Potts (Ibis, 1872, p. 35; Trans. N. Zeal. Institute, iv. 204; v. 195). 5

The kiwis form a group of the subclass Ratitae to which the rank of an order may fitly be assigned, as they differ in many important particulars from any of the other existing forms of Ratite birds. The most obvious feature the Apteryges afford is the presence of a back toe, while the extremely aborted condition of the wings, the position of the nostrils — almost at the tip of the maxilla— and the absence of an after-shaft in the feathers, are characters nearly as manifest, and others not less determinative, though more recondite, will be found on examination. The kiwis are peculiar to New Zealand, and it

3 In 1842, according to Broderip (Penny Cyclopaedia, xxiii. 146), two had been presented to the Zoological Society by the New Zealand Company, and two more obtained by Lord Derby, one of which he had given to Gould. In 1844 the British Museum possessed three, and the sale catalogue of the Rivoli Collection, which passed in 1846 to the Academy of Natural Sciences at Philadelphia, includes a single specimen— probably the first taken to America.

4 This bird in 1859 laid an egg, and afterwards continued to lay one or two more every year. In 1865 a male of the same species was introduced, but though a strong disposition to breed was shown on the part of both, and the eggs, after the custom of the Ratitae, were incubated by him, no progeny was hatched (Proceedings, 1868, P- 329)-

5 A fine series of figures of all these supposed species is given by Rowley (Orn. Miscellany, vol. i. pis. 1-6). Some others, as A. maxima, A. mollis, and A. fusca have also been indicated, but proof of their validity has yet to be adduced.

is believed that A. mantelli is the representative in the North Island of the southern A . australis, both being of a dark reddish- brown, longitudinally striped with, light yellowish-brown, while A. oweni, of a light greyish-brown transversely barred with black, is said to occur in both islands. About the size of a large domestic fowl, they are birds of nocturnal habit, sleeping, or at least inactive, by day, feeding mostly on earth-worms, but occasionally swallowing berries, though in captivity they will eat flesh suitably minced. Sir Walter Buller writes (B. of New Zealand, p. 362): —

" The kiwi is in some measure compensated for the absence of wings by its swiftness of foot. When running it makes wide strides and carries the body in an oblique position, with the neck stretched to its full extent and inclined forwards. In the twilight it moves about cautiously and as noiselessly as a rat, to which, indeed, at this time it bears some outward resemblance. In a quiescent posture, the body generally assumes a perfectly rotund appearance; and it sometimes, but only rarely, supports itself by resting the point of its bill on the ground. It often yawns when disturbed in the daytime, gaping its mandibles in a very grotesque manner. When provoked it erects the body, and, raising the foot to the breast, strikes downwards with considerable force and rapidity, thus using its sharp and powerful claws as weapons of defence. . . . While hunting for its food the bird makes a continual sniffing sound through the nostrils, which are placed at the extremity of the upper mandible. Whether it is guided as much by touch as by smell I cannot safely say; but it appears to me that both senses are used in the action. That the sense of touch is highly developed seems quite certain, because the bird, although it may not be audibly sniffing, will always first touch an object with the point of its bill, whether in the act of feeding or of surveying the ground; and when shut up in a cage or confined in a room it may be heard, all through the night, tapping softly at the walls. ... It is interesting to watch the bird, in a state of freedom, foraging for worms, which constitute its principal food : it moves about with a slow action of the body ; and the long, flexible bill is driven into the soft ground, generally home to the very root, and is either immediately withdrawn with a worm held at the extreme tip of the mandibles, or it is gently moved to and fro, by an action of the head and neck, the body of the bird being perfectly steady. It is amusing to observe the extreme care and deliberation with which the bird draws the worm from its hiding- place, coaxing it out as it were by degrees, instead of pulling roughly or breaking it. On getting the worm fairly out of, the ground, it throws up its head with a jerk, and swallows it whole."

• *The foregoing extract refers to A. manlelli, but there is little doubt of the remarks being equally applicable to A. australis, and probably also to A. oweni, though the different proportion of the bill in the last points to some diversity in the mode of feeding. (A. N.)*

KIZILBASHES (Turkish, " Red-Heads "), the nickname given by the Orthodox Turks to the Shiitic Turkish immigrants from Persia, who are found chiefly in the plains from Kara- Hissar along Tokat and Amasia to Angora. During the wars with Persia the Turkish sultans settled them in these districts. They are strictly speaking persianized Turks, and speak pure Persian. There are many Kizilbashes in Afghanistan. Their immigration dates only from the time of Nadir Shah (1737). They are an industrious honest folk, chiefly engaged in trade and as physicians, scribes, and so on. They form the bulk of the amir's cavalry. Their name seems to have been first used in Persia of the Shiites in allusion to their red caps.

See Ernest Chantre, Recherches anihropologiques dans I'Asie occi- dentale (Lyons, 1895).

KIZIL IRMAK, i.e. " Red River " (anc. Halys), the largest river in Asia Minor, rising in the Kizil Dagh at an altitude of 6500 ft., and running south-west past Zara to Sivas. Below Sivas it flows south to the latitude of Kaisarieh, and then curves gradually round to the north. Finally, after a course of about 600 m., it discharges its waters into the Black Sea between Sinope and Samsun, where it forms a large delta. The only important tributaries are the Delije Irmak on the right and the Geuk Irmak on the left bank.

KIZLYAR (Kizliar, or Kizlar), a town of Russia, in Caucasia, in the province of Terek, 120 m. N.E. of Vladikavkaz, in the low -lying delta of the river Terek, about 35 m. from the Caspian. The population decreased from 8309 in 1861 to 7353 in 1897. The town lies to the left of the main stream between

two of the larger secondary branches, and is subject to flood- ing. The town proper, which spreads out round the citadel, has Tatar, Georgian and Armenian quarters. The public buildings include the Greek cathedral, dating from 1786; a Greek nunnery, founded by the Georgian chief Daniel in 1736; the Armenian church of SS Peter and Paul, remarkable for its size and wealth. The population is mainly supported by the gardens and vine-yards irrigated by canals from the river. A government vineyard and school of viticulture are situated 3 J m. from the town. About 1,200,000 gallons of Kizlyar wine are sold annually at the fair of Nizhniy-Novgorod. Silk and cotton are woven. Kizlyar is mentioned as early as 1616, but the most notable accession of inhabitants (Armenians, Georgians and Persians) took

place in 1715. Its importance as a fortress dates from 1736, but the fortress is no longer kept in repair.

KIZYL-KUM, a desert of Western Asia, stretching S.E. of the Aral Lake between the river Syr-darya on the N.E. and the river Amu-darya on the S.W. It measures some 370 by 220 m., and is in part covered with drift-sand or dunes, many of which are advancing slowly but steadily towards the S.W. In character they resemble those of the neighbouring Kara-kum desert (see Kara-kum). On the whole the Kizyl-kum slopes S.W. towards the Aral Lake, where its altitude is only about 160 ft. as com- pared with 2000 in the S.E. In the vicinity of that lake the surface is covered with Aralo-Caspian deposits; but in the S.E., as it ascends towards the foothills of the Tian-shan system, it is braided with deep accumulations of fertile loess.

KJERULF, HALFDAN (1815-1868), Norwegian musical com- poser, the son of a high government official, was born at Chris- tiania on the 15th of September 1815. His early education was at Christiania University, for a legal career, and not till he was nearly 26 — on the death of his father — was he able to devote him- self entirely to music. As a fact, he actually started on his career as a music teacher and composer of songs before ever having seriously studied music at all, and not for ten years did he attract any particular notice. Then, however, his Government paid for a year's instruction for him at Leipzig. For many years after his return to Norway Kjerulf tried in vain to establish serial classical concerts, while he himself was working with Bjdrnson and other writers at the composition of lyrical songs. His fame rests almost entirely on his beautiful and manly national part- songs and solos; but his pianoforte music is equally charming and simple. Kjerulf died at Grefsen, on the nth of August 1868.

KJERULF, THEODOR (1825-1888), Norwegian geologist, was born at Christiania on the 30th of March 1825. He was educated in the university at Christiania, and subsequently studied at Heidelberg, working in Bunsen's laboratory. In 1858 he became professor of geology in the university of his native city, and he was afterwards placed in charge of the geological survey of the country, then established mainly through his influence. His contributions to the geology of Norway were numerous and im- portant, especially in reference to the southern portion of the country, and to the structure and relations of the Archaean and Palaeozoic rocks, and the glacial phenomena. His principal results were embodied in his work Udsigt over det sydligc Norges Geologi (1879). He was author also of some poetical works. He died at Christiania on the 25th of October 1888.

KLADNO, a mining town of Bohemia, Austria, 18 m. W.N.W. of Prague by rail. Pop. (1900), 18,600, mostly Czech. It is situated in a region very rich

in iron-mines and coal-fields and possesses some of the largest iron and steel works in Bohemia. Near it is the mining town of Buschtehrad (pop. 3510), situated in the centre of very extensive coal-fields. Buschtehrad was originally the name of the castle only. This was from the 15th century to 1630 the property of the lords of Kolovrat, and came by devious inheritance through the grand-dukes of Tuscany, to the emperor Francis Joseph. The name Buschtehrad was first given to the railway, and then to the town, which had been called Buckow since its foundation in 1700. There is another castle of Buschtehrad near Hofic. Kladno, which for centuries had been a village of no importance, was sold in 1705 by the grand-duchess Anna Maria of Tuscany to the cloister in

Bfewnow, to which it still belongs. The mining industry began in 1842.

KLAFSKY, KATHARINA (1853-1896), Hungarian operatic singer, was born at Szt Janos, Wieselburg, of humble parents. Being employed at Vienna as a nurserymaid, her fine soprano voice led to her being engaged as a chorus singer, and she was given good lessons in music. By 1882 she became well-known in Wagnerian roles at the Leipzig theatre, and she increased her reputation at other German musical centres. In 1892 she appeared in London, and had a great success in Wagner's operas, notably as Briinnhilde and as Isolde, her dramatic as well as vocal gifts being of an exceptional order. She sang in America in 1895, but died of brain disease in 1896. A Life, by L. Ordemann, was published in 1903 (Leipzig).
KLAGENFURT (Slovene, Celovec), the capital of the Austrian auchy of Carinthia, 212 m. S.W. of Vienna by rail. Pop. (1900), 24,314. It is picturesquely situated on the river Glan, which is in communication with the Worther-see by the 3 m. long Lend canal. Among the more noteworthy buildings are the parish church of St ˆEgidius (1709), with a tower 298 ft. in height; the cathedral of SS Peter and Paul (1582-1593, burnt 1723, restored 1725); the churches of the Benedictines (1613), of the Capuchins (1646), and of the order of St Elizabeth (1710). To these must be added the palace of the prince-bishop of Gurk, the burg or castle, existing in its present form since 1777; and the Landhaus or house of assembly, dating from the end of the 14th century, and containing a museum of natural history, and collection of minerals, antiquities, seals, paintings and sculptures. The most interesting public monument is the great Lindwurm or Dragon, standing in the principal square (1590). The industrial establishments comprise white lead factories, machine and iron foundries, and commerce is active, especially in the mineral products of the region.

Upon the Zollfeld to the north of the city once stood the ancient Roman town of Virunum. During the Middle Ages Klagenfurt became the property of the crown, but by a patent of Maxi- milian I. of the 24th of April rsi8, it was conceded to the Carin- thian estates, and has since then taken the place of St Veit as capital of Carinthia. In 153s, 1636, 1723 and 1796 Klagenfurt suffered from destructive fires, and in 1690 from the effects of an earthquake. On the 29th of March 1797 the French took the city, and upon the following day it was occupied by Napoleon as his headquarters.

KLAJ (latinized Clajus), JOHANN (1616-1656), German poet, was born at Meissen in Saxony. After studying theology at Wittenberg he went to Nuremberg as a "candidate for holy orders," and there, in conjunction with Georg Philipp Hars- dorffer, founded in 1644 the literary society known as the Pegnitz order. In 1647 he received an appointment as master in the Sebaldus school in Nuremberg, and in 1650 became preacher at Kitzingen, where hediedini656. Klaj 's poems consist of dramas, written in stilted language and redundant with adventures, among which are Hollen- und Himmelfahrt Christi (Nuremberg, 1644), and Herodes, der Kindermorder (Nuremberg, 1645), and a poem, written jointly with Harsdorffer, Pegnesische Sckafer- gedicht (1644), which gives in allegorical form the story of his settlement in Nuremberg.

See Tittmann, Die Nurnberger Dichterschule (Gottingen, 1847).

KLAMATH, a small tribe of North American Indians of Lutua- mian stock. They ranged around the Klamath river and lakes, and are now on the Klamath reservation, southern Oregon.

See A. S. Gatschet, " Klamath Indians of Oregon," Contributions to North American Ethnology, vol. ii. (Washington, 1890).

KLAPKA, GEORG (1820-1892), Hungarian soldier, was born at Temesvar on the 7th of April 1820, and entered the Austrian army in 1838. He was still a subaltern when the Hungarian revolution of 1848 broke out, and he offered his services to the patriot party. He served in important staff appointments during the earlier part of the war which followed; then, early in 1849, he was ordered to replace General Meszaros, who had been defeated at Kaschau, and as general commanding an army corps

he had a conspicuous share in the victories of Kap61na, Isaszeg, Waitzen, Nagy Sarlo and Komarom. Then, as the fortune of war turned against the Hungarians, Klapka, after serving for a short time as minister of war, took command at Komarom, from which fortress he conducted a number of successful expeditions until the capitulation of Vilagos in August put an end to the war in the open field. He then brilliantly defended Komarom for two

months, and finally surrendered on honourable terms. Klapka left the country at once, and lived thenceforward for many years in exile, at first in England and afterwards chiefly in Switzerland. He continued by every means in his power to work for the inde- pendence of Hungary, especially at moments of European war, such as 1854, 1859 and 1866, at which an appeal to arms seemed to him to promise success. After the war of 1866 (in which as a Prussian major-general he organized a Hungarian corps in Silesia) Klapka was permitted by the Austrian government to return to his native country, and in 1867 was elected a member of the Hungarian Chamber of Deputies, in which he belonged to the Deak party. In 1877 he made an attempt to reorganize the Turkish army in view of the war with Russia. General Klapka died at Budapest on the 17th of May 1892. A memorial was erected to his memory at Komarom in 1896.

He wrote Memoiren (Leipzig, 1850) ; Der Nationalkrieg in Ungarn, &c. (Leipzig, 1851) ; a history of the Crimean War, Der Krieg im Orient . . . bis Ende Juli 1855 (Geneva, 1855); and Aus meinen Erinnerungen (translated from the Hungarian, Zurich, 1887).

KLAPROTH, HEINRICH JULIUS (1783-1835), German Orient- alist and traveller, was born in Berlin on the nth of October 1783, the son of the chemist Martin Heinrich Klaproth (?.».). He devoted his energies in quite early life to the study of Asiatic languages, and published in 1802 his Asiatisches Magazin (Weimar, 1802-1803) . He was in consequence called to St Peters- burg and given an appointment in the academy there. In 1805 he was a member of Count Golovkin's embassy to China. On his return he was despatched by the academy to the Caucasus on an ethnographical and linguistic exploration (1807-1808), and was afterwards employed for several years in connexion with the academy's Oriental publications. In 181 2 he moved to Berlin; but in 181 5 he settled in Pafls, and in 181 6 Humboldt procured him from the king of Prussia the title and salary of professor of Asiatic languages and literature, with permission to remain in Paris as long as was requisite for the publication of his works. He died in that city on the 28th of August 1835.

The principal feature of Klaproth 's erudition was the vastness of the field which it embraced. His great work Asia polyglotta (Paris, 1823 and 1 83 1, with Sprachallas) not only served as a resumi of all that was known on the subject, but formed a new departure for the classification of the Eastern languages, more especially those of the Russian Empire. To a great extent, however, his work is now super- seded. The Itinerary of a Chinese Traveller (1821), a series of documents in the military archives of St Petersburg purporting

to be the travels of George Ludwig von , and a similar series

obtained from him in the London foreign office, are all regarded as spurious.

Klaproth's other works include: Reise in den Kaukasus und Georgien in den Jahren 1807 und 1808 (Halle, 1812-1814; French translation, Paris, 1823); Geographisch-historische Beschreibung des ostlichen Kaukasus (Weimar, 1814); Tableaux historiques de VAsie (Paris, 1826); Memoires relatifs & VAsie (Paris, 1 824-1 828); Tableau historique, geographique, ethnographique et politique de Caucase (Paris, 1827); and Vocabulaire et grammaire de la langue georgienne (Paris,

1827). '

KLAPROTH, MARTIN HEINRICH (1743-18 17), German chemist, was born at Wernigerode on the 1st of December 1743. During a large portion of his life he followed the profession of an apothecary. After acting as assistant in pharmacies at Quedlin- burg, Hanover, Berlin and Danzig successively he came to Berlin on the death of Valentin Rose the elder in 1771 as manager of his business, and in 1780 he started an establishment on his own account in the same city, where from 1782 he was pharmaceutical assessor of the Ober- Collegium Medicum. In 1787 he was appointed lecturer in chemistry to the Royal Artillery, and when the university was founded in 1810 he was selected to be the professor of chemistry. He died in Berlin on the 1st of January 1817. Klaproth was the leading chemist of his time in Germany.

An exact and conscientious worker, he did much to improve and systematize the processes of analytical chemistry and mineralogy, and his appreciation of the value of quantitative methods led him to become one of the earliest adherents of the Lavoisierian doctrines outside France. He was the first to dis- cover uranium, zirconium and titanium, and to characterize them as distinct elements, though he did not obtain any of them in the pure metallic state; and he elucidated the com- position -of numerous substances till then imperfectly known, including compounds of the then newly recognized elements: tellurium, strontium, cerium and chromium.

His papers, over 200 in number, were collected by himself in Beitrdge zur chemischen Kenntniss der Mineralkorper (5 vols., 1795- 1810) and Chemische Abhandlungen gemischten Inhalts (1815). He also published a Chemisches Wbrterbuch (1807-1810), and edited a revised edition of F. A.

C. Gren's Handbuch der Chemie (1806).

KLEBER, JEAN BAPTISTE (1753-1800), French general, was born on the 9th of March 1753, at Strassburg, where his father was a builder. He was trained, partly at Paris, for the profession of architect, but his opportune assistance to two German nobles in a tavern brawl obtained for him a nomination to the mili- tary school of Munich. Thence he obtained a commission in the Austrian army, but resigned it in 1783 on finding his humble birth in the way of his promotion. On returning to France he was appointed inspector of public buildings at Belfort, where he studied fortification and military science. In 1792 he enlisted in the Haut-Rhin volunteers, and was from his military knowledge at once elected adjutant and soon afterwards lieutenant-colonel. At the defence of Mainz he so distinguished himself that though disgraced along with the rest of the garrison and imprisoned, he was promptly reinstated, and in August 1793 promoted general of brigade. He won considerable distinction in the Vendean war, and two months later was made a general of division. In these operations began his intimacy with Marceau, with whom he defeated the Royalists at Le Mans and Savenay. For openly expressing his opinion that lenient measures ought to be pursued towards the Vendeans he was recalled; but in April 1794 he was once more reinstated and sent to the Army of the Sambre- and-Meuse. He displayed his skill and bravery in the numerous actions around Charleroi, and especially in the crowning victory of Fleurus, after which in the winter of 1794-95 he besieged Mainz. In 1795 and again in 1796 he held the chief command of an army temporarily, but declined a permanent appointment as commander-in-chief. On the 13th of October 1795 he fought a brilliant rearguard action at the bridge of Neuwied, and in the offensive campaign of 1796 he was Jourdan's most active and successful lieutenant. Having, after the retreat to the Rhine (see French Revolutionary Wars), declined the chief com- mand, he withdrew into private life early in 1798. He accepted a division in the expedition to Egypt under Bonaparte, but was wounded in the head at Alexandria in the first engage- ment, which prevented his taking any further part in the campaign of the Pyramids, and caused him to be appointed governor of Alexandria. In the Syrian campaign of 1799, however, he commanded the vanguard, took El-Arish, Gaza and Jaffa, and won the great victory of Mount Tabor on the 15th of April 1799. When Napoleon returned to France towards the end of 1799 he left Kleber in command of the French forces. In this capacity, seeing no hope of bringing his army back to France or of consolidating his conquests, he made the convention of El-Arish. But when Lord Keith, the British admiral, refused to ratify the terms, he attacked the Turks at Heliopolis, though with but 10,000 men against 60,000, and utterly defeated them on the 20th of March 1800. He then retook Cairo, which had revolted from the French.

Shortly after these victories he was assassinated at Cairo by a fanatic On the 14th of June 1800, the same day on which his friend and comrade Desaix fell at Marengo. Kleber was un- doubtedly one of the greatest generals of the French revolutionary epoch. Though he distrusted his powers and declined the respon- sibility of supreme command, there is nothing in his career to show that be would have been unequal to it. As a second in

command he was not excelled by any general of his time. His conduct of affairs in Egypt at a time when the treasury was empty and the troops were discontented for want of pay, shows that his powers as an administrator were little — if at all — inferior to those he possessed as a general.

Ernouf, the grandson of Jourdan's chief of staff, published in 1867 a valuable biography of Kleber. See also Reynaud, Life of Merlin de Thionville; Ney, Memoirs; Dumas, Souvenirs; Las Casas, Memorial de Ste HMene; J. Charavaray, Les Generaux marts pour la patrie; General Pajol, Kleber; lives of Marceau and Desaix; M. F. Rousseau, KUber et Menou en Egypte (Paris, 1900).

KLEIN, JULIUS LEOPOLD (1810-1876), German writer of Jewish origin, was born at Miskolcz, in Hungary. He was educated at the gymnasium in Pest, and studied medicine in Vienna and Berlin. After travelling in Italy and Greece, he settled as a man of letters in Berlin, where he remained until his death on the 2nd of August 1876. He was the author of many dramatic works, among others the historical tragedies Maria von Medici (1841); Luines (1842); Zenobia (1847); Moreto (1859); Maria (i860); Strafford (1862) and Heliodora (1867); and the comedies DieHerzogin (1848) ; Ein Schiitzling (1850) ; and Voltaire (1862). The tendency of Klein as a dramatist was to become bombastic and obscure, but many of his characters are vigorously conceived, and in nearly all his tragedies there are passages of brilliant rhetoric. He is chiefly known as the author of the elaborate though uncompleted Geschichtedes Dramas (186 5-1 8 76), in which he undertook to record the history of the drama from the earliest times. He died when about to enter upon the Eliza- bethan period, to the treatment of which he had looked forward as the chief part of his task. The work, which is in thirteen bulky volumes, gives proof of immense learning, "but is marred by eccentricities of style and judgment.

Klein's Dramatische Werke were collected in 7 vols. (1871-1872).

KLEIST, BERND HEINRICH WILHELM VON (1777-1811), German poet, dramatist and novelist, was born at Frankfort-on- Oder on the 18th of October 1777. After a scanty education, he entered the Prussian army in 1792, served in the Rhine campaign of 1796 and retired from the service

in 1799 with the rank of lieutenant. He next studied law and philosophy at the university of Frankfort- on Oder, and in 1800 received a subordinate post in the ministry of finance at Berlin. In the following year his roving, restless spirit got the better of him, and procuring a lengthened leave of absence he visited Paris and then settled in Switzerland. Here he found congenial friends in Heinrich Zschokke (q.v.) and Ludwig Friedrich August Wieland (1777 18 19), son of the poet; and to them he read his first drama, a gloomy tragedy, Die Familie Schroffenstein (1803), originally entitled Die Familie Ghonorez. In the autumn of 1802 Kleist returned to Germany; he visited Goethe, Schiller and Wieland in Weimar, stayed for a while in Leipzig and Dresden, again pro- ceeded to Paris, and returning in 1804 to his post in Berlin was transferred to the Domanenkammer (department for the adminis- tration of crown lands) at Konigsberg. On a journey to Dresden in 1807 Kleist was arrested by the French as a spy, and being sent to France was kept for six months a close prisoner at Chilons-sur-Marne. On regaining his liberty he proceeded to Dresden, where in conjunction with Adam Heinrich M tiller (1779-1829) he published in 1808 the journal Phobus. In 1809 he went to Prague, and ultimately settled in Berlin, where he edited (1810-1811) the Berliner A bendblatter. Captivated by the intellectual and musical accomplishments of a certain Frau Henriette Vogel, Kleist, who was himself more disheartened and embittered than ever, agreed to do her bidding and die with her, carrying out this resolution by first shooting the lady and then himself on the shore of the Wannsee near Potsdam, on the 21st of November 1811. Kleist's whole life was filled by a restless striving after ideal and illusory happiness, and this is largely reflected in his work. He was by far the most important North German dramatist of the Romantic movement, and no other of the Romanticists approaches him in the energy with which he expresses patriotic indignation.

His first tragedy, Die Familie Schroffenstein, has been already re- ferred to; the material for the second, Penthesilea (1808), queen of the Amazons, is taken from a Greek source and presents a picture of wild passion. More successful than either of these was his romantic play, Das Kdthchen von Heilbronn,oder Die Feuerprobe (1808), a poetic drama full of medieval bustle and mystery, which has retained its popularity,- In comedy, Kleist made a name with Der zerbrochene Krug (181 1), while Amphitryon (1808), an adaptation of Moliere's comedy, is of less importance. Of Kleist's other dramas, Die Hermannschlacht (1809) is a dramatic

treatment of an historical subject and is full of references to the political conditions of his own times. In it he gives vent to his hatred of his country's oppressors. This, together with the drama Prinz Friedrich von Hamburg, the latter accounted Kleist's best work, was first published by Ludwig Tieck in Kleists hinterlassene Schriften (1821). Robert Guiskard, a drama conceived on a grand plan, was left a fragment. Kleist was also a master in the art of narrative, and of his Gesammelte Erzdhl- ungen (1810-1811), Michael Kohlhaas, in which the famous Branden- burg horse dealer in Luther's day (see Kohlhase) is immortalized, is one of the best German stories of its time. He also wrote some patriotic lyrics. His Gesammelte Schriften were published by Ludwig Tieck (3 vols. 1826) and by Julian Schmidt (new ed. 1874) ; also by F. Muncker (4 vols. 1882); by T. Zolling (4 vols. 1885); by K. Siegen, (4 vols. 1895) ; and in a critical edition by E. Schmidt (5 vols. 1904-1905). His Ausgewdhlte Dramen were published by K. Siegen (Leipzig, 1877); and his letters were first published by E. von Billow, Heinrich von Kleists Leben und Brief e (1848).

See further A. Wilbrandt, Heinrich von Kleist (1863); O. Brahm, Heinrich von Kleist (1884); R. Bonafous, Henri de Kleist, sa vie et ses ceuvres (1894); H. Conrad, Heinrich von Kleist als Mensch und Dichter (1896); G. Minde-Pouet, Heinrich von Kleist, seine Sprache und sein Stil (1897); R- Steig, Heinrich von Kleists Berliner Kdmpfe (1901); F. Servaes, Heinrich von Kleist (1902); S. Wukadinowic, Kleist- Studien (1904); S. Rahmer, H. von Kleist als Mensch und Dichter (1909).

KLEIST, EWALD CHRISTIAN VON (1715-1759), German poet, was born at Zeblin, near Koslin in Pomerania, on the 7th of March 171 5. After attending the Jesuit school in Deutschkrona and the gymnasium in Danzig, he proceeded in 1731 to the uni- versity of KSnigsberg, where he studied law and mathematics. On the completion of his studies, he entered the Danish army, in which he became an officer in 1736. Recalled to Prussia by Frederick II. in 1740, he was appointed lieutenant in a regiment stationed at Potsdam, where he became acquainted with J. W. L. Gleim (q.v.), who interested him in poetry. After dis- tinguishing himself at the battle of Mollwitz (April 10, 1741) and the siege of Neisse (1741), he was promoted captain in 1749 and major in 1756. Quartered during the winter of 1757-1758 in Leipzig, he found relief from his irksome military duties in the society of Gotthold Ephraim Lessing (q.v.). Shortly afterwards in the battle of Kunersdorf, on the 12th of August 1759, he was mortally wounded while leading the attack, and died at Frankfort-on-Oder on the 24th of August following.

Kleist's chief work is a poem in hexameters, Der Friihling (1749), for which Thomson's Seasons largely supplied ideas. In his description of the beauties of nature Kleist shows real poetical genius, an almost modern

sentiment and fine taste. He also wrote some charming odes, idylls and elegies, and a small epic poem Cissides und Paches (1759), the subject being two Thessalian friends who die an heroic death for their country in a battle against the Athenians.

Kleist published in 1756 the first collection of his Gedichte, which was followed by a second in 1758. After his death his friend Karl Wilhelm Ramler (q.v.) published an edition of Kleists sdmtliche Werke in 2 vols. (1760). A critical edition was published by A. Sauer, in 3 vols. (1880-1882). Cf. further, A. Chuquet, De Ewaldi Kleistii vita et scriptis (Paris, 1887), and H. Prohle, Friedrich der Grosse und die deulsche Literatur (1872).

KLERKSDORP, a town of the Transvaal, 118 m. S.W. of Johannesburg and 192 m. N.E. of Kimberley by rail. Pop. (1904), 4276 of whom 2203 were whites. The town, built on the banks of the Schoonspruit 10 m. above its junction with the Vaal, possesses several fine public buildings. In the neigh- bourhood are gold-mines, the reef appearing to form the western boundary of the Witwatersrand basin. Diamonds (green in colour) and coal are also found in the district. Klerksdorp was one of the villages founded by the first Boers who crossed the Vaal, dating from 1838. The modern town, which is on the side of the spruit opposite the old village, was founded in t888.

KLESL (or Khlesl), MELCHIOR (1 552-1630), Austrian states- man and ecclesiastic, was the son of a Protestant baker, and was born in Vienna. Under the influence of the Jesuits he was con- verted to Roman Catholicism, and having finished his education at the universities of Vienna and Ingolstadt, he was made chan- cellor of the university of Vienna; and as official and vicar- general of the bishop of Passau he exhibited the zeal of a convert in forwarding the progress of the counter-reformation in Austria. He became bishop of Vienna in 1598; but more important was his association with the archduke Matthias which began about the same time. Both before and after 161 2, when Matthias succeeded his brother Rudolph II. as emperor, Klesl was the originator and director of his policy, although he stoutly opposed the concessions to the Hungarian Protestants in 1606. He assisted to secure the election of Matthias to the imperial throne, and sought, but without success, to strengthen the new emperor's position by making peace between the Catholics and the Protes- tants. When during the short reign of Matthias the question of the imperial succession demanded prompt attention, the bishop, although quite as anxious as his opponents to retain the empire in the house of Habsburg and to preserve the dominance of the Roman Catholic Church, advised that this question should be shelved until some arrangement with the Protestant princes had been reached. This counsel was displeasing to the archduke Maxi- milian and to Ferdinand,

afterwards the emperor Ferdinand II. who believed that Klesl was hostile to the candidature of the latter prince. It was, however, impossible to shake his influence with the emperor; and in June 1618, a few months before the death of Matthias, he was seized by order of the archdukes and imprisoned at Ambras in Tirol. In 1622 Klesl, who had been a cardinal since 161 5, was transferred to Rome by order of Pope Gregory XV., and was released from imprisonment. In 1627 Ferdinand II. allowed him to return to his episcopal duties in Vienna, where he died on the 18th of September 1630.

See J. Freiherr von Hammer-Purgstall, Khlesls Leben (Vienna, 1847-1851); A. Kerschbaumer, Kardinal Klesl (Vienna, 1865); and Klesls Brief e an Rudolfs II. Obersthofmeister A . Freiherr von Dietrich- stein, edited by V. Bibl. (Vienna, 1900).

KLINGER, FRIEDRICH MAXIMILIAN VON (1752-1831), German dramatist and novelist, was born of humble parentage at Frankfort-on-Main, on the 17th of February 1752. His father died when he was a child, and his early years were a hard struggle. He was enabled, however, in 1774 to enter the univer- sity of Giessen, where he studied law; and Goethe, with whom he had been acquainted since childhood, helped him in many ways. In 1775 Klinger gained with his tragedy Die Zwillinge a prize offered by the Hamburg theatre, under the auspices of the actress Sophie Charlotte Ackermann (1714-1792) and her son the famous actor and playwright, Friedrich Ludwig Schroder (1744-1816). In 1776 Klinger was appointed Tkeaterdichter to the " Seylersche Schauspiel-Gesellschaft " and held this post for two years. In 1778 he entered the Austrian military service and took part in the Bavarian war of succession. In 1780 he went to St Petersburg, ' became an officer in the Russian army, was ennobled and attached to the Grand Duke Paul, whom he accompanied on a journey to Italy and France. In 1 785 he was appointed director of the corps of cadets, and having married a natural daughter of the empress Catharine, was made praeses of the Academy of Knights in 1799. In 1803 Klinger was nominated by the emperor Alexander curator of the university of Dorpat, an office he held until 1817; in 1811 he became lieutenant-general. He then gradually gave up his official posts, and after living for many years in honourable retirement, died at Dorpat on the 25th of February

1831.

Klinger was a man of vigorous moral character and full of fine feeling, though the bitter experiences and deprivations of his youth are largely reflected in his dramas. It was one of his earliest works, Sturm und Drang (1776), which gave its name to this literary epoch. In addition to this tragedy and Die Zwillinge (1776), the chief plays of his early period of passionate fervour and restless " storm and stress " are Die neue Arria (1776), Simsone Grisaldo (1776) and Stilpo und seine Kinder (1780). To

a later period belongs the fine double ˆagedy of Medea in Korinth and Medea auf dem Kaukasos (1791). In Russia he devoted himself mainly to the writing of philosophical romances, of which the best known are Fausts Leben, Taten und II ollenfahrt (1791), Geschichte Giafars des Barmeciden (1792) and Geschichte Raphaels de Aquillas (1793). This series was closed in 1803 with Betrachlungen und Gedanken iiber verschiedene Gegenstande der Welt und der Literatur. In these works Klinger gives calm and dignified expression to the leading ideas which the period of Sturm und Drang had bequeathed to German classical literature.

Klinger's works were published in twelve volumes (1809-1815), also 1 832-1 833 and 1 842 . The most recent edition is in eight volumes (i878-l88o);but noneof these is complete. A selection will be found in A. Sauer, Stunner und Dranger, vol. i. (1883). See E. Schmidt, Lenz und Klinger (1878); M. Rieger, Klinger in der Sturm- und Drangperiode (1880); and Klinger in seiner Reije (1896).

KLINGER, MAX (1857-), German painter, etcher and sculptor, was born at Plagwitz near Leipzig. He attended the classes at the Carlsruhe art school in 1874, and went in the follow- ing year to Berlin, where in 1878 he created a sensation at the Academy exhibition with two series of pen-and-ink drawings — the " Series upon the Theme of Christ " and " Fantasies upon the Finding of a Glove." The daring originality of these imaginative and eccentric works caused an outburst of indignation, and the artist was voted insane; nevertheless the " Glove " series was bought by the Berlin National Gallery. His painting of " The Judgment of Paris " caused a similar storm of indignant protest in 1887, owing to its rejection of all conventional attributes and the naive directness of the conception. His vivid and somewhat morbid imagination, with its leaning towards the gruesome and disagreeable, and the Goyaesque turn of his mind, found their best expression in his "cycles" of etchings: "Deliverances of Sacrificial Victims told in Ovid," " A Brahms Phantasy," " Eve and the Future," " A Life,"

and " Of Death "; but in his use of the needle he does not aim at the technical excellence of the great masters; it supplies him merely with means of expressing his ideas. After 1886 Klinger devoted himself more exclusively to painting and sculpture. In his painting he aims neither at classic beauty nor modern truth, but at grim impressiveness not without a touch of mysticism. His " Pieta," at the Dresden Gallery, the frescoes at the Leipzig University, and the " Christ in Olympus," at the Modern Gallery in Vienna, are characteristic examples of his art. The Leipzig Museum contains his sculptured " Salome " and " Cassandra." In sculpture he favours the use of vari- coloured materials in the manner of the Greek chryselephantine sculpture. His "Beethoven" is a notable instance of his work in this direction.

KLIPSPRINGER, the Boer name of a small African mountain- antelope (Oreolragus saltator), ranging from the Cape through East Africa to Somaliland and Abyssinia, and characterized by its blunt rounded hoofs, thick pithy hair and gold-spangled colouring. The klipspringer represents a genus by itself, the various local forms not being worthy of more than racial dis- tinction. The activity of these antelopes is marvellous.

KLONDIKE, a district in Yukon Territory, north-western Canada, approximately in 64 N. and 140° W. The limits are rather indefinite, but the district includes the country to the south of the Klondike River, which comes into the Yukon from the east and has several tributaries, as well as Indian River, a second branch of the Yukon, flowing into it some distance above the Klondike. The richer gold-bearing gravels are found along the creeks tributary to these two rivers within an area of about 800 eq. m. The Klondike district is a dissected peneplain with low ridges of rounded forms rising to 4250 ft. above the sea at the Dome which forms its centre. All of the gold-bearing creeks rise not far from the Dome and radiate in various directions toward the Klondike and Indian rivers, the most productive being Bonanza with its tributary Eldorado, Hunker, Dominion and Gold Run. Of these, Eldorado, for the two or three miles in which it was gold-bearing, was much the richest, and for its length probably surpassed any other known placer deposit.

Rich gravel was discovered on Bonanza Creek in 1896, and a wile rush to this almost inaccessible region followed, a populatior of 30,000 coming in within the next- three or four years with a rapidly increasing output of gold, reaching in 1900 the climax of $22,000,000. Since then the production has steadily declined, until in 1906 it fell to $5,600,000. The richest gravels were worked out before 1910, and most of the population had left the Klondike for Alaska and other regions; so that Dawson, which for a time was a bustling city of more than 10,000, dwindled to about 3000 inhabitants. As the ground was almost all frozen, the mines were

worked by a thawing process, first by setting fires, afterwards by using steam, new methods being introduced to meet the unusual conditions. Later dredges and hydraulic mining were resorted to with success.

The Klondike, in spite of its isolated position, brought to- gether miners and adventurers from all parts of the world, and it is greatly to the credit of the Canadian government and of the mounted police, who were entrusted with the keeping of order, that life and property were as safe as elsewhere and that no lawless methods were adopted by the miners as in placer mining camps in the western United States. The region was at first difficult of access, but can now be reached with perfect comfort in summer, travelling by well-appointed steamers on the Pacific and the Yukon River. Owing to its perpetually frozen soil, summer roads were excessively bad in earlier days, but good wagon roads have since been constructed to all the important mining centres. Dawson itself has all the resources of a civilized city in spite of being founded on a frozen peat-bog; and is sup- plied with ordinary market vegetables from farms just across the river. During the winter, when for some time the sun does not appear above the hills, the cold is intense, though usually without wind, but the well-chinked log houses can be kept comfortably warm. When winter travel is necessary dog teams and sledges are generally made use of, except on the stage route south to White Horse, where horses are used. A telegraph line connects Dawson with British Columbia, but the difficulties in keeping it in order are so great over the long intervening wilderness that communication is often broken. Gold is practially the only economic product of the Klondike, though small amounts of tin ore occur, and lignite coal has been mined lower down on the Yukon. The source of the gold seems to have been small stringers of quartz in the siliceous and sericitic schists which form the bed rock of much of the region, and no important quartz veins have been discovered; so that unlike most other placer regions the Klondike has not developed lode mines to continue the production of gold when the gravels are exhausted.

KLOPP, ONNO (1822-1903), German historian, was born at Leer on the 9th of October 1822, and was educated at the univer- sities of Bonn, Berlin and Gottingen. For a few years he was a teacher at Leer and at Osnabriick; but in 1858 he settled at Hanover, where he became intimate with King George V., who made him his Archivrat. Thoroughly disliking Prussia, he was in hearty accord with George in resisting her aggressive policy; and after the annexation of Hanover in 1866 he accompanied the exiled king to Hietzing. He became a Roman Catholic in 1874. He died at Penzing, near Vienna, on the 9th of August 1903. Klopp is best known as the author of Der Fall des Hauses Stuart (Vienna, 1875-1888), the fullest existing account of the later Stuarts.

His Der Konig Friedrich II. und seine Politik (Schaffhausen, 1867) and Geschichte Ostfrieslands (Hanover, 1 854-1 858) show his dislike of Prussia. His other works include Der dreissigjdhrige Krieg bis zum Tode Guslav Adolfs (Paderborn, 1891-1896); a revised edition of his Tilly im dreissigjdhrigen Kriege (Stuttgart, 1861); a life of George V., Konig, Georg V. (Hanover, 1878); Phillipp Melanchthon (Berlin, 1897). He edited Corrispondenza epistolare tra Leopoldo I. imperatore ed il P. Marco I'Aviano capuccino (Gratz, 1888). Klopp also wrote much in defence of George V. and his claim to Hanover, including the Offizieller Bericht iiber die Kriegsereignisse zwischen Hannover und Preussen im Juni 1866 (Vienna, 1867), and he edited the works of Leibnitz in eleven volumes (1861-1884). See W. Klopp, Onno Klopp: ein Lebenslauf (Wehberg, 1907).

KLOPSTOCK, GOTTLIEB FRIEDRICH (1724-1803), German poet, was born at Quedlinburg, on the 2nd of July 1 724, the eldest

son of a lawyer, a man of sterling character and of a deeply religious mind. Both in his birthplace and on the estate of Friedeburg on the Saale, which his father later rented, young Klopstock passed a happy childhood ; and more attention having been given to his physical than to his mental development he grew up a strong healthy boy and was an excellent horseman and skater. In his thirteenth year Klopstock returned to Quedlinburg where he attended the gymnasium, and in 1739 proceeded to the famous classical school of Schulpforta. Here he soon became an adept in Greek and Latin versification, and wrote some meritorious idylls and odes in German. His original intention of making the emperor Henry I. (" The Fowler ") the hero of an epic, was, under the influence of Milton's Paradise Lost. with which he became acquainted through Bodmer's translation, abandoned in favour of the religious epic. While yet at school, he had already drafted the plan of Der Messias, upon which his fame mainly rests. On the 21st of September 1745 he delivered on quitting school a remarkable " leaving oration " on epic poetry — Abschiedsrede iiber die epische Poesie, kultur- undliterar- geschichtlich erlautert — and next proceeded to Jena as a student of theology, where he elaborated the first three cantos of the Messias in prose. The life at this university being uncongenial to him, he removed in the spring of 1746 to Leipzig, and here joined the circle of young men of letters who contributed to the Bremer Beitrdge. In this periodical the first three cantos of the Messias in hexameters were anonymously published in 1 748. A new era in German literature had commenced, and the name of the author soon became

known. In Leipzig he also wrote a number of odes, the best known of which is An meine Freunde (1747), afterwards recast as Wingolf (1767). He left the university in 1748 and became a private tutor in the family of a relative at Langensalza. Here unrequited love for a cousin (the " Fanny " of his odes) disturbed his peace of mind. Gladly therefore he accepted in 1750 an invitation from Jakob Bodmer (q.v.), the translator of Paradise Lost, to visit him in Zurich. Here Klopstock was at first treated with every kindness and respect and rapidly recovered his spirits. Bodmer, however, was disappointed to find in the young poet of the Messias a man of strong worldly interests, and a coolness sprang up between the two friends.

At this juncture Klopstock received from Frederick V. of Denmark, on the recommendation of his minister Count von Bernstorff (1712-1772), an invitation to settle at Copenhagen, with an annuity of 400 talers, with a view to the completion of the Messias. The offer was accepted; on his way to the Danish capital Klopstock met at Hamburg the lady who in 1754 became his wife, Margareta (Meta) Moller, (the " Cidli " of his odes), an enthusiastic adntirer of his poetry. His happiness was short; she died in 1758, leaving him almost broken-hearted. His grief at her loss finds pathetic expression in the 15th canto of the Messias. The poet subsequently published his wife's writings, Hinterlassene Werkevon Margareta Klopstock (1750), which give evidence of a tender, sensitive and deeply religious spirit. Klopstock now relapsed into melancholy; new ideas failed him, and his poetry became more and more vague and unintelligible. He still continued to live and work at Copenhagen, and next, following Heinrich Wilhelm von Gerstenberg {q.v.), turned his attention to northern mythology, which he conceived should replace classical subjects in a new school of German poetry. In 1770, on the dismissal by King Christian VII. of Count Bern- storff from office, he retired with the latter to Hamburg, but retained his pension together with the rank of councillor of legation. Here, in 1773, he issued the last five cantos of the Messias. In the following year he published his strange scheme for the regeneration of German letters, Die Gelehrtenrepublik (1774). In 1775 he travelled south, and making the acquaint- ance of Goethe on the way, spent a year at the court of the margrave of Baden at Karlsruhe. Thence, in 1776, with the title of Hofrat and a pension from the margrave, which he retained together with that from the king of Denmark, he returned to Hamburg where he spent the remainder of his life. His latter years he passed, as had always been his inclination, in retirement,

only occasionally relieved by association with his most intimate friends, busied with philological studies, and hardly interesting himself in the new developments of German literature. The American War of Independence and the Revolution in France aroused him, however, to enthusiasm. The French Republic sent him the diploma of honorary citizenship; but,

horrified at the terrible scenes the Revolution had enacted in the place of liberty, he returned it. When 67 years of age he contracted a second marriage with Johanna Elisabeth von Winthem, a widow and a niece of his late wife, who for many years had been one of his most intimate friends. He died at Hamburg on the 14th of March 1803, mourned by all Germany, and was buried with great pomp and ceremony by the side of his first wife in the churchyard of the village of Ottensen.

Klopstock's nature was best attuned to lyrical poetry, and in it his deep, noble character found its truest expression. He was less suited for epic and dramatic representation ; for, wrapt up in himself, a stranger to the outer world, without historical culture, and without even any interest in the events of his time, he was lacking in the art of plastic representation such as a great epic requires. Thus the Messias, despite the magnificent passages which especially the earlier cantos contain, cannot satisfy the demands such a theme must necessarily make. The subject matter, the Redemption, presented serious difficulties to adequate epic treatment. The Gospel story was too scanty, and what might have been imported from without and interwoven with it was rejected by the author as profane. He had accordingly to resort to Christian mythology ; and here again, circumscribed by the dogmas of the Church, he was in danger of trespassing on the fundamental truths of the Christian faith. The personality of Christ could scarcely be treated in an individual form, still less could angels and devils — and in the case of God Himself it was impossible. The result was that, despite the groundwork — the Gospels, the Acts of the Apostles, the Revelation of St John, and the model ready to hand in Milton's Paradise Lost — material elements are largely wanting and the actors in the poem, Divine and human, lack plastic form. That the poem took twenty-five years to complete could not but be detrimental to its unity of design ; the original enthusiasm was not sustained until the end, and the earlier cantos are far superior to the later. Thus the intense public interest the work aroused in its commencement had almost vanished before its completion. It was translated into seventeen languages and led to numerous imitations. In his odes Klopstock had more scope for his peculiar talent. Among the best are An Fanny; Der Zurchersee; Die tote Klarissa; An Cidli; Die beiden Musen; Der Rheinivein; Die fruhen Grdber; Mein Vaterland. His religious odes mostly take the form of hymns, of which the most beautiful is Die Früihlingsfeier . His dramas, in some of which, notably Hermanns Schlacht (1769) and Hermann und die Filrsten (1784), he celebrated the deeds of the ancient German hero Arminius, and in others, Der Tod Adams (1757) and Salomo (1764), took his materials from the Old Testament, are essentially lyrical in character and deficient in action. In addition to Die Gelehrtenrepublik, he was also the author of Fragmente iüber Sprache und Dichtkunst (1779) and Grammatische Gesprdche

(1794), works in which he made important contributions to philology and to the history of German poetry.

Klopstock's Werke first appeared in seven quarto volumes (1798- 1809). At the same time a more complete edition in twelve octavo volumes was published (1798-1817), to which six additional volumes were added in 1830. More recent editions were published in 1844- 1845, 1854-1855, 1879 (ed. by R. Boxberger), 1884 (ed. by R. Hamel) and 1893 (a selection edited by F. Muncker). A critical edition of the Odes was published by F. Muncker and J. Pawel in 1889; a commentary on these by H. Diintzer (i860; 2nd ed., 1878). For Klopstock's correspondence see K. Schmidt, Klopstock und seine Freunde (1810) ; C. A. H. Clodius, Klopstocks Nachlass (1821) ; J. M. Lappenberg, Briefe von und an Klopstock (1867). Cf. further K. F. Cramer, Klopstock, er und iiber ihn (1780-1792); J. G. Gruber, Klopstocks Leben (1832); R. Hamel, Klopstock-Studien (1879-1880); F. Muncker, F. G. Klopstock, the most authoritative biography, (1888); E. Bailly, Etude sur la vie et les ceuvres de Klopstock (Paris, IS'"

KLOSTERNEUBURG, a town of Austria, in Lower Austria, 5 J m. N.W. of Vienna by rail. Pop. (1900), 11,595. It is situated on the right bank of the Danube, at the foot of the Kahlenberg, and is divided by a small stream into an upper and a lower town. As an important pioneer station Klosterneuburg has various military buildings and stores, and among the schools it possesses an academy of wine and fruit cultivation.

On a hill rising directly from the banks of the Danube stand the magnificent buildings (erected 1 730-1834) of the Augustine canonry, founded in 1 106 by Margrave Leopold the Holy. This foundation is the oldest and richest of the kind in Austria; it

*owns much of the land upon which the north-western suburbs of Vienna stand. Among the points of interest within it are the old chapel of 1318, with Leopold's tomb and the altar of Verdun, dating from the 12th century, the treasury and relic-chamber, the library with 30,000 volumes and many MSS., the picture gallery, the collection of coins, the theological hall, and the wine- cellar, containing an immense tun like that at Heidelberg. The inhabitants of Klosterneuburg are mainly occupied in making wine, of excellent quality. There is a large cement factory out- side the town. In Roman*times the castle of Citium stood in the region of Klosterneuburg. The town was founded by Charle- magne, and received its charter as a*

town in 1 298.

KLOTZ, REINHOLD (1807-1870), German classical scholar, was born near Chemnitz in Saxony on the 13th of March 1807. In 1849 he was appointed professor in the university of Leipzig in succession to Gottfried Hermann, and held this post till his death on the 10th of August 1870. Klotz was a man of unwearied industry, and devoted special attention to Latin literature.

He was the author of editions of several classical authors, of which the most important were: the complete works of Cicero (2nd ed., 1869-1874); Clement of Alexandria (1831-1834); Euripides (1841-1867), in continuation of Pflugk's edition, but unfinished; Terence (1838-1840), with the commentaries of Donatus and Eugraphius. Mention should also be made of : Handworlerbuch der lateinischen Sprache (5th ed., 1874); Rbmische Litteraturgeschichte (1847), of which only the introductory volume appeared ; an edition of the treatise De Graecae linguae particulis (1835-1842) of Mat- thaeus Deverius (Devares), a learned Corfiote (c. 1 500-1 570), and corrector of the Greek MSS. in the Vatican; the posthumous Index Ciceronianus (1872) and Handbuch der lateinischen Stilistik (1874). From 1 831-1855 Klotz was editor of the Neue Jahrbilcher fur Philologie (Leipzig). During the troubled times of 1848 and the following years he showed himself a strong conservative.

A memoir by his son Richard will be found in the Jahrbilcher for 1871, pp. 154-163.

KNARESBOROUGH, a market town in the Ripon parliament- ary division of the West Riding of Yorkshire, England, i6| m. \V. by N. from York by a branch of the North Eastern railway. Pop. of urban district (1901), 4979. Its situation is most picturesque, on the steep left bank of the river Nidd, which here follows a well- wooded valley, hemmed in by limestone cliffs. The church of St John the Baptist is Early English, but has numerous Decorated and Perpendicular additions; it is a cruciform building containing several interesting monuments. Knaresborough Castle was probably founded in 1070 by Serlo de Burgh. Its remains, however, are of the 14th century, and include a massive keep rising finely from a cliff above the Nidd. After the battle of Marston Moor it was taken by Fairfax, and in 1648 it was ordered to be dismantled. To the south of the castle is St Robert's chapel, an excavation in the rock constructed into an ecclesiastical edifice in the reign of Richard I. Several of the excavations in the limestone, which is extensively quarried, are incorporated in dwelling-houses. A little farther down the rivei is St Robert's cave, which is supposed to have been the residence of the hermit, and in 1744 was the scene of the murder of Daniel Clarke by Eugene Aram, whose story is told in Lytton's

well- known novel. Opposite the castle is the Dropping Well, the waters of which are impregnated with lime and have petrifying power, this action causing the curious and beautiful incrusta- tions formed where the water falls over a slight cliff. The Knaresborough free grammar school was founded in 1 6 1 6. There is a large agricultural trade, and linen and leather manufactures and the quarries also employ a considerable number of persons.

Knaresborough (Canardesburg, Cnarreburc, Cknareburg) , which belonged to the Crown before the Conquest, formed part of William the Conqueror's grant to his follower Serlo de Burgh. Being forfeited by his grandson Eustace Fitzjohn in the reign of Stephen, Knaresborough was granted to Robert de Stuteville, from whose descendants it passed through marriage to Hugh de Morville, one of the murderers of Thomas Becket, who with his three accomplices remained in hiding in the castle for a whole year. During the 13th and 14th centuries the castle and lordship changed hands very frequently; they were granted successively to Hubert de Burgh, whose son forfeited them after the battle of Evesham, to Richard, earl of Cornwall, whose son Edmund died

without issue; to Piers Gaveston, and lastly to John of Gaunt, duke of Lancaster, and so to the Crown as parcel of the duchy of Lancaster. In 13 17 John de Lilleburn, who was holding the castle of Knaresburgh for Thomas duke of Lancaster against the king, surrendered under conditions to William de Ros of Hamelak, but before leaving the castle managed to destroy all the records of the liberties and privileges of the town which were kept in the castle. In 1368 an inquisition was taken to ascertain these privileges, and the jurors found that the burgesses held " all the soil of their borough yielding 7s. 4d. yearly and doing suit at the king's court." In the reign of Henry VIII. Knaresborough is said by Leland to be " no great thing and meanely builded but the market there is quik." During the civil wars Knaresborough was held for some time by the Royalists, but they were obliged to surrender, and the castle was among those ordered to be destroyed by parliament in 1646. A market on Wednesday and a fortnightly fair on the same day from the Feast of St Mark to that of St Andrew are claimed under a charter of Charles II. con- firming earlier charters. Lead ore was found and worked on Knaresborough Common in the 16th century. From 1555 to 1867 the town returned two members to parliament, but in the latter year the number was reduced to one, and in 1885 the representation was merged in that of the West Riding.

KNAVE (O.E. cnafa, cognate with Ger. Knabe, boy), originally a male child, a boy (Chaucer, Canterbury Tales: " Clerk's Tale," 1. 388). Like Lat. puer, the word was early used as a name for any boy -or lad employed as a servant, and so of male servants in general (Chaucer: " Pardoner's

Tale," 1. 204). The current use of the word for a man who is dishonest and crafty, a rogue, was however an early usage, and is found in Layamon (c. 1205). In playing-cards the lowest court card of each suit, the " jack," representing a medieval servant, is called the " knave." (See also Valet.)

KNEBEL, KARL LUDWIG VON (1744-1834), German poet and translator, was born at the castle of Wallerstein in Franconia on the 30th of November 1744. After having studied law for a short while at Halle, he entered the regiment of the crown prince of Prussia in Potsdam and was attached to it as officer for ten years. Disappointed in his military career, owing to the slowness of promotion, he retired in 1774, and accepting the post of tutor to Prince Konstantin of Weimar, accompanied him and his elder brother, the hereditary prince, on a tour to Paris. On this journey he visited Goethe in Frankfort-on-Main, and intro- duced him to the hereditary prince, Charles Augustus. This meeting is memorable as being the immediate cause of Goethe's later intimate connexion with the Weimar court. After Knebel's return and the premature death of his pupil he was pensioned, receiving the rank of major. In 1798 he married the singer Luise von Rudorf, and retired to Ilmenau; but in 1805 he removed to Jena, where he lived until his death on the 23rd of February 1834. Knebel's Sammlung kleiner Gedichte (1815), issued anonymously, and Distichen (1827) contain many graceful sonnets, but it is as a translator that he is best known. His translation of the elegies of Propertius, Elegien des Properz (1798), and that of Lucretius' De rerum natura (2 vols., 1831) are deservedly praised. Since their first acquaintance Knebel and Goethe were intimate friends, and not the least interesting of Knebel's writings is his correspondence with the eminent poet, Briejwechsel mit Goethe (ed. G. E. Guhrauer, 2 vols., 1851).

Knebel's Literarischer Nachlass und Briefwechsel was edited by K. A. Varnhagen von Ense and T. Mundt in 3 vols. (1835; 2nd ed., 1840). See Hugo von Knebel-Doberitz, Karl Ludwig von Knebel

(1890).

KNEE (O. E. cneow, a word common to Indo-European languages, cf. Ger. Knie, Fr. genou, Span, hinojo, Lat. genu, Gr. 76ˆ1;, Sansk. janu), in human anatomy, the articulation of the upper and lower parts of the leg, the joint between the femur and the tibia (see Joints) . The word is also used of articulation resembling the knee-joint in shape or position in other animals; it thus is applied to the carpal articulation of the fore leg of a horse, answering to the ankle in man, or to the tarsal articulation or heel of a bird's foot.

IS

KNELLER, SIR GODFREY (1648-1723), a portrait painter whose celebrity belongs chiefly to England, was born in Liibeck in the duchy of Holstein, of an ancient family, on the 8th of August 1648. He was at first intended for the army, and was sent to Leyden to learn mathematics and fortification. Showing, however, a marked preference for the fine arts, he studied in the school of Rembrandt, and under Ferdinand Bol in Amsterdam. In 1672 he removed to Italy, directing his chief attention to Titian and the Caracci; Carlo Maratta gave him some guidance and encouragement. In Rome, and more especially in Venice, Kneller earned considerable reputation by historical paintings as well as portraits. He next went to Hamburg, painting with still increasing success. In 1674 he came to England at the invi- tation of the duke of Monmouth, was introduced to Charles II., and painted that sovereign, much to his satisfaction, several times. Charles also sent him to Paris, to take the portrait of Louis XIV. When Sir Peter Lely died in 1680, Kneller, who pro- duced in England little or nothing in the historical department, remained without a rival in the ranks of portrait painting; there was no native-born competition worth speaking of. Charles appointed him court painter; and he continued to hold the same post into the days of George I. Under William III. (1692) he was made a knight, under George I. (1715) a baronet, and by order of the emperor Leopold I. a knight of the Roman Empire. Not only his court favour but his general fame likewise was large: he was lauded by Dryden, Addison, Steele, Prior, Tickell and Pope. Kneller's gains also were very considerable; aided by habits of frugality which approached stinginess, he left property yielding an annual income of £2000. His industry was main- tained till the last. His studio had at first been in Covent Garden, but in his closing years he lived in Kneller Hall, Twicken- ham. He died of fever, the date being generally given as the 7th of November 1723, though some accounts say 1726. He was buried in Twickenham church, and has a monument in West- minster Abbey. An elder brother, John Zachary Kneller, an ornamental painter, had accompanied Godfrey to England, and had died in 1702. The style of Sir Godfrey Kneller as a portrait painter represented the decline of that art as practised by Vandyck ; Lely marks the first grade of descent, and Kneller the second. His works have much freedom, and are well drawn and coloured; but they are mostly slight in manner, and to a great extent monotonous, this arising partly from the habit which he had of lengthening the oval of all his heads. The colouring may be called brilliant rather than true. He indulged much in the common- places of allegory; and, though he had a quality of dignified elegance not unallied with simplicity, genuine simple nature is seldom to be traced in his works. His fame has greatly declined, and could not but do so after the advent of Reynolds. Among

Kneller's principal paintings are the "Forty-three Celebrities of the Kit-Cat Club," and the " Ten Beauties of the Court of William III.," now at Hampton Court; these were painted by order of the queen; they match, but match unequally, the " Beauties of the Court of Charles II.," painted by Lely. He executed altogether the likenesses of ten sovereigns, and fourteen of his works appear in the National Portrait Gallery. It is said that Kneller's own favourite performance was the portrait of the " Converted Chinese " in Windsor Castle. His later works are confined almost entirely to England, not more than two or three specimens having gone abroad after he had settled here.

(W. M. R.) KNICKERBOCKER, HARMEN JANSEN (c. 1650-c. 1720), Dutch colonist of New Netherland (New York), was a native of Wyhe (Wie), Overyssel, Holland. Before 1683 he settled near what is now Albany, New York, and there in 1704 he bought through Harme Gansevoort one-fourth of the land in Dutchess county near Red Hook, which had been patented in 1688 to Peter Schuyler, who in 1722 deeded seven (of thirteen) lots in the upper fourth of his patent to the seven children of Knickerbocker. The eldest of these children, Johannes Harmensen, received from the common council of the city of Albany a grant of 50 acres of meadow and 10 acres of upland on the south side of Schaghti-

coke Creek. This Schaghticoke estate was held by Johannes

Harmensen's son Johannes (1723-1802), a colonel in the Con- tinental Army in the War of Independence, and by his son Harmen (1779-1855), a lawyer, a federalist representative in Congress in 1809-1811, a member of the New York Assembly in 1816, and a famous gentleman of the old school, who for his courtly hospitality in his manor was called " the prince of Schaghticoke " and whose name was borrowed by Washington Irving for use in his (Diedrich) Knickerbocker's History of New York (1809). Largely owing to this book, the name " Knicker- bockers " has passed into current use as a designation of the early Dutch settlers in New York and their descendants. The son of Johannes, David Buel Knickerbacker (1833-1894), who returned to the earlier spelling of the family name, graduated at Trinity College in 1853 and at the General Theological Seminary in 1856, was a rector for many years at Minneapolis, Minnesota, and in 1883 was consecrated Protestant Episcopal bishop of Indiana.

See the series of articles by W. B. Van Alstyne on " The Knicker- bocker Family," beginning in vol. xxix., No. I (Jan. 1908) of the New York Genealogical and Biographical Record.

KNIFE (O. E. cnif, a word appearing in different forms in many Teutonic

languages, cf. Du. knijf, Ger. Kneif, a shoe- maker's knife, Swed. knif; the ultimate origin is unknown; Skeat finds the origin in the root of " nip," formerly " knip "; Fr. canif is also of Teutonic origin), a small cutting instrument, with the blade either fixed to the handle or fastened with a hinge so as to clasp into the handle (see Cutlery). For the knives chipped from flint by prehistoric man see Archaeology and Flint Implements.

KNIGGE, ADOLF FRANZ FRIEDRICH, Freiherr von (1752- 1796), German author, was born on the family estate of Breden- beck near Hanover on the 16th of October 1752. After studying law at Gottingen he was attached successively to the courts of Hesse-Cassel and Weimar as gentleman-in-waiting. Retiring from court service in 1777, he lived a private life with his family in Frankfort-on-Main, Hanau, Heidelberg and Hanover until 1 791, when he was appointed Oberhauptmann (civil adminis- trator) in Bremen, where he died on the 6th of May 1796. Knigge, under the name "Philo," was one of the most active members of the Illuminati, a mutual moral and intellectual improvement society founded by Adam Weishaupt (1748-1830) at Ingolstadt, and which later became affiliated to the Free- masons. Knigge is known as the author of several novels, among which Der Roman meines Lebens (1781-1787; new ed., 1805) and Die Reise nach Braunschweig (1792), the latter a rather coarsely comic story, are best remembered. His chief literary achievement was, however, tfber den Umgang mil Menschen (1788), in which he lays down rules to be observed for a peaceful, happy and useful life; it has been often reprinted.

Knigge's Schriften were published in 12 volumes (1804-1806). See K. Goedeke, Adolf, Freiherr von Knigge (1844) ; and H. Klencke, A us einer alten Kiste {Brief e, Handschriften und Dokumente aus dem Nachlasse Knigges) (1853).

KNIGHT, CHARLES (1791-1873), English publisher and author, the son of a bookseller and printer at Windsor, was born on the 15th of March 1791. He was apprenticed to his father, but on the completion of his indentures he took up journalism and interested himself in several newspaper specu- lations. In 1823, in conjunction with friends he had made as publisher (1820-1821) of The Etonian, he started Knight's Quarterly Magazine, to which W. M. Praed, Derwent Coleridge and Macaulay contributed. The venture was brought to a close with its sixth number, but it initiated for Knight a career as publisher and author which extended over forty years. In 1827 Knight was compelled to give up his publish- ing business, and became the superintendent of the publications of the Society for the Diffusion of Useful Knowledge, for which he projected and edited The British Almanack and Companion, begun in 1828. In i82g he resumed business on his own account with the publication of The

Library of Entertaining Knowledge, writing several volumes of the series himself. In 1832 and 1833 he started The Penny Magazine and

The Penny Cyclopaedia, both of which had a large circulation. The Penny Cyclopaedia, however, on account of the heavy excise duty, was only completed in 1844 at a great pecuniary sacrifice. Besides many illustrated editions of standard works, including in 1842 The Pictorial Shakespeare, which had appeared in parts (1838-1841), Knight published a variety of illustrated works, such as Old England and The Land we Live in. He also undertook the series known as Weekly Volumes. He himself contributed the first volume, a biography of William Caxton. Many famous books, Miss Martineau's Tales, Mrs Jameson's Early Italian Painters and G. H. Lewes's Biographical History of Philosophy, appeared for the first time in this series. In 1853 he became editor of The English Cyclopaedia, which was practically only a revision of The Penny Cyclopaedia, and at about the same time he began his Popular History of England (8 vols., 1856-1862). In 1864 he withdrew from the business of publisher, but he continued to write nearly to the close of his long life, publishing The Shadows of the Old Booksellers (1865), an autobiography under the title Passages of a Working Life during Half a Century (2 vols., 1864-1865), and an historical novel, Begg'd at Court (1867). He died at Addlestone, Surrey, on the 9th of March 1873.

See A. A. Clowes, Knight, a Sketch (1892) ; and F. Espinasse, in The Critic (May i860).

KNIGHT, DANIEL RIDGWAY (1845-), American artist, was born at Philadelphia, Penn., in 1845. He was a pupil at the Ecole des Beaux-Arts, Paris, under Gleyre, and later worked in the private studio of Meissonier. After 1872 he lived in France, having a house and studio at Poissy on the Seine. He painted peasant women out of doors with great popular success. He was awarded the silver medal and cross of the Legion of Honour, Exposition Universelle, Paris, 1889, and was made a knight of the Royal Order of St Michael of Bavaria, Munich, 1893, receiving the gold medal of honour from the Pennsylvania Academy of Fine Arts, Philadelphia, 1893. His son, Ashton Knight, is also known as a landscape painter.

KNIGHT, JOHN BUXTON (1843-1908), English landscape painter, was born at Sevenoaks, Kent; he started as a school- master, but painting was his hobby, and he subsequently de- voted himself to it. In 1861 he had his first picture hung at the Academy. He was essentially an open-air painter,

constantly going on sketching tours in the most picturesque spots of England, and all his pictures were painted out of doors. He died at Dover on the 2nd of January 1908. The Chantrey trustees bought his " December's Bareness Everywhere " for the nation in the following month. Most of his best pictures had passed into the collection of Mr Iceton of Putney (including " White Walls of Old England " and " Hereford Cathedral "), Mr Walter Briggs of Burley in Wharfedale (especially " Pinner "), and Mr S. M. Phillips of Wrotham (especially two water-colours of Richmond Bridge).

KNIGHTHOOD and CHIVALRY. These two words, which are nearly but not quite synonymous, designate a single subject of inquiry, which presents itself under three different although connected and in a measure intermingled aspects. It may be regarded in the first place as a mode or variety of feudal tenure, in the second place as a personal attribute or dignity, and in the third place as a scheme of manners or social arrangements. The first of these aspects is discussed under the headings Feu- dalism and Knight Service: we are concerned here only with the second and third. For the more important religious as distinguished from the military orders of knighthood or chivalry the reader is referred to the headings St John or Jerusalem, Knights of; Teutonic Knights; and Templars.

" The growth of knighthood " (writes Stubbs) " is a subject on which the greatest obscurity prevails": and, though J. H. Round has done much to explain the introduction of the system into England, 1 its actual origin on the continent of Europe is still obscure in many of its most important details.

The words knight and knighthood are merely the modern forms of the Anglo-Saxon or Old English cnihl and cnihthdd. Of these 1 Feudal England, pp. 225 sqq.

the primary signification of the first was a boy or youth, and of the second that period of life which intervenes between child- hood and manhood. But some time before the middle of the 12th century they had acquired the meaning they still retain of the French chevalier and chevalerie. In a secondary sense cniht meant a servant or attendant answering to the German Knecht, and in the Anglo-Saxon Gospels a disciple is described as a learning cniht. In a tertiary sense the word appears to have been occasionally employed as equivalent to the Latin miles — usually translated by thegn — which in the earlier middle ages was used as the designation of the domestic as well as of the martial officers or retainers of sovereigns and princes or great person- ages. 2 Sharon Turner suggests that cniht from meaning an attendant simply may have come to mean more

*especially a military attendant, and that in this sense it may have gradually superseded the word thegn. 3 But the word thegn itself, that is, when it was used as the description of an attendant of the king, appears to have meant more especially a military atten- dant. As Stubbs says " the thegn seems to be primarily the warrior gesith " — the gesithas forming the chosen band of com- panions (comites) of the German chiefs (principes) noticed by Tacitus — " he is probably the gesith who had a particular mili- tary duty in his master's service " ; and he adds that from the reign of Athelstan " the gesith is lost sight of except very occa- sionally, the more important class having become thegns, and the lesser sort sinking into the rank of mere servants of the king." * It is pretty clear, therefore, that the word cniht could never have superseded the word thegn in the sense of a military attendant, at all events of the king. But besides the king, the ealdormen, bishops and king's thegns themselves had their thegns, and to these it is more than probable that the name of cniht was applied. Around the Anglo-Saxon magnates were collected a crowd of retainers and dependants of all ranks and conditions; and there is evidence enough to show that among them were some called cnihtas who were not always the humblest or least considerable of their number. 6 The testimony of Domesday also establishes the existence in the reign of Edward the Confessor of what Stubbs describes as a " large class " of landholders who had commended themselves to some lord, and he regards it as doubt- ful whether their tenure had not already assumed a really feudal character. But in any event it is manifest that their condition was in many respects similar to that of a vast number of unques- tionably feudal and military tenants who made their appearance after the Norman Conquest. If consequently the former were called cnihtas under the Anglo-Saxon regime, it seems sufficiently probable that the appellation should have been continued to the latter — practically their successors — under the Anglo-Norman regime. And if the designation of knights was first applied to the military tenants of the earls, bishops and barons— who although they held their lands of mesne lords owed their services to the king — the extension of that designation to the whole body of military tenants need not have been a very violent or prolonged process. Assuming, however, that knight was originally used to describe the military tenant of a noble person, as cniht had sometimes been used to describe the thegn of a noble person, it would, to begin with, have defined rather his social status than the nature of his services. But those whom the English called knights the Normans called chevaliers, by which term the nature of their services was defined, while their social status was left out of consideration. And at first chevalier in its general and honorary signification seems to have been rendered not by knight but by rider, as may be inferred from the Anglo-Saxon Chronicle, wherein it is recorded under the year 1085 that William the Conqueror " dubbade his sunu Henric to ridere." 6 But, as E. A. Freeman says, " no such title is heard of in the earlier days of England. The*

thegn, the ealdorman, the king himself, fought on foot; the horse might bear him to the field, but when the fighting

2 Du Cange, Gloss., s.v. " Miles."

3 History of England, iii. 12. 1 Stubbs, Constitutional History, i. 156. 6 Ibid. i. 156, 366; Turner, iii. 125-129. 6 Ingram's edition, p. 290.

itself came he stood on his native earth to receive the onslaught of her enemies." 1 In this perhaps we may behold one of the most ancient of British insular prejudices, for on the Continent the importance of cavalry in warfare was already abundantly understood. It was by means of their horsemen that the Austrasian Franks established their superiority over their neigh- bours, and in time created the Western Empire anew, while from the word caballarius, which occurs in the Capitularies in the reign of Charlemagne, came the words for knight in all the Romance languages. 2 In Germany the chevalier was called Rilter, but neither rider nor chevalier prevailed against knight in England. And it was long after knighthood had acquired its present meaning with us that chivalry was incorporated into our language. It may be remarked too in passing that in official Latin, not only in England but all over Europe, the word miles held its own against both eques and caballarius.

Concerning the origin of knighthood or chivalry as it existed in the middle ages — implying as it did a formal assumption of Origin of and initiation into the profession of arms — nothing Medieval beyond more or less probable conjecture is possible. Kog

Before it was known that the chronicle ascribed to Ingulf of Croyland is really a fiction of the 13th or 14th century, the knighting of Heward or Hereward by Brand, abbot of Burgh

1 Comparative Politics, p. 74.

2 Baluze, Capitularia Regum Francorum, ii. 794, 1069.

3 Du Cange, Gloss., s.v. " Arma."

4 Freeman, Comparative Politics, p. 73. 6 Hallam, Middle Ages, iii. 392.

(now Peterborough), was accepted from Selden to Hallam as an historical fact, and knighthood was supposed, not only to have been known among

the Anglo-Saxons, but to have had a distinctively religious character which ln Bugiand. was contemned by the Norman invaders. The genuine evidence at our command altogether fails to support this view. When William of Malmesbury describes the knighting of Athelstan by his grandfather Alfred the Great, that is, his investiture " with a purple garment set with gems and a Saxon sword with a golden sheath," there is no hint of any religious observance. In spite of the silence of our records, Dr Stubbs thinks that kings so well acquainted with foreign usages as Ethelred, Canute and Edward the Confessor could hardly have failed to introduce into England the institution of chivalry then springing up in every country of Europe; and he is sup- ported in this opinion by the circumstance that it is nowhere mentioned as a Norman innovation. Yet the fact that Harold received knighthood from William of Normandy makes it clear either that Harold was not yet a knight, which in the case of so tried a warrior would imply that " dubbing to knighthood " was not yet known in England even under Edward the Confessor, or, as Freeman thinks, that in the middle of the nth century the custom had grown in Normandy into " something of a more special meaning " than it bore in England.

Regarded as a method of military organization, the feudal system of tenures was always far better adapted to the purposes of defensive than of offensive warfare. Against invasion it furnished a permanent provision both in men-at-arms and strong- holds; nor was it unsuited for the campaigns of neighbouring counts and barons which lasted for only a few weeks, and ex- tended over only a few leagues. But when kings and kingdoms were in conflict, and distant and prolonged expeditions became necessary, it was speedily discovered that the unassisted re- sources of feudalism were altogether inadequate. It became therefore the manifest interest of both parties that personal services should be commuted into pecuniary payments. Then there grew up all over Europe a system of fining the knights who failed to respond to the sovereign's call or to stay their full time in the field; and in England this fine developed, from the reign of Henry II. to that #f Edward II., into a regular war-tax called escuage or scutage (q.v.). In this way funds for war were placed at the free disposal of sovereigns, and, although the feudatories and their retainers still formed the most considerable portion of their armies, the conditions under which they served were altogether changed. Their military service was now far more the result of special agreement. In the reign of Edward I., whose warlike enterprises after he was king were confined within the four seas, this alteration does not seem to have proceeded very far, and Scotland and Wales were subjugated by what was in the main, if not exclusively, a feudal militia raised as of old by writ to the earls and barons and the sheriffs. 6 But the armies of Edward III., Henry V. and Henry VI. during the century of intermittent war- fare between England and France were

recruited and sustained to a very great extent on the principle of contract.[7] On the Continent the systematic employment of mercenaries was both an early and a common practice.

Besides consideration for the mutual convenience of sovereigns and their feudatories, there were other causes which materially contributed towards bringing about those changes in The the military system of Europe which were finally Crusades. accomplished in the 13th and 14th centuries. During the Crusades vast armies were set on foot in which feudal rights

6 Stubbs, Const. Hist. ii. 278; also compare Grosse, Military Antiquities, i. 65 seq.

7 There has been a general tendency to ignore the extent to which thearmiesof Edward III. were raised by compulsory levieseven after the system of raising troops by free contract had begun, Luce (ch. vi.) points out how much England relied at this time on what would now be called conscription : and his remarks are entirely borne out by the Norwich documents published by Mr W. Hudson (Norf. and Norwich Archaeological Soc. xiv. 263 sqq.), by a Lynn corporation document of 18th Edw. III. (Hist. MSS. Commission Report XI. Appendix pt. iii. p. 189), and by Smyth's Lives of the Berkeleys, i. 312, 319, 320.

and obligations had no place, and it was seen that the volun- teers who flocked to the standards of the various commanders were not less but even more efficient in the field than the vassals they had hitherto been accustomed to lead. It was thus established that pay, the love of enterprise and the prospect of plunder — if we leave zeal for the sacred cause which they had espoused for the moment out of sight — were quite as useful for the purpose of enlisting troops and keeping them together as the tenure of land and the solemnities of homage and fealty. Moreover, the crusaders who survived the difficulties and dangers of an expedition to Palestine were seasoned and experienced although frequently impoverished and landless soldiers, ready to hire themselves to the highest bidder, and well worth the wages they received. Again, it was owing to the crusades that the church took the profession of arms under her peculiar protection, and thenceforward the ceremonies of initiation into it assumed a religious as well as a martial character.

To distinguished soldiers of the cross the honours and benefits of knighthood could hardly be refused on the ground that they Knighthood did

not possess a sufficient property qualification — independent of which perhaps they had denuded themselves in of Feudal- order to their equipment for the Holy War. And thus the conception of knighthood as of something distinct from feudalism both as a social condition and a personal dignity arose and rapidly gained ground. It was then that the analogy was first detected between the order of knighthood and the order of priesthood, and that an actual union of monachism and chivalry was effected by the establish- ment of the religious orders of which the Knights Templars and the Knights Hospitallers were the most eminent examples. As comprehensive in their polity as the Benedictines or Franciscans, they gathered their members from, and soon scattered their possessions over, every country in Europe. And in their indifference to the distinctions of race and nationality they merely accommodated themselves to the spirit which had become characteristic of chivalry itself, already recognized, like the church, as a universal institution which knit together the whole warrior caste of Christendom into one great fraternity irrespective alike of feudal subordination and territorial boun- daries. Somewhat later the adoption of hereditary surnames and armorial bearings marked the existence of a large and noble class who either from the subdivision of fiefs or from the effects of the custom of primogeniture were very insufficiently provided for. To them only two callings were generally open, that of the churchman and that of the soldier, and the latter as a rule offered greater attractions than the former in aniera of much licence and little learning. Hence the favourite expedient for men of birth, although not of fortune, was to attach themselves to some prince or magnate in whose military service they were sure of an ade- quate maintenance and might hope for even a rich reward in the shape of booty or of ransom. 1 It is probably to this period and these circumstances that we must look for at all events the rudi- mentary beginnings of the military as well as the religious orders of chivalry. Of the existence of any regularly constituted companionships of the first kind there is no trustworthy evidence until between two and three centuries after fraternities of the second kind had been organized. Soon after the greater crusad- ing societies had been formed similar orders, such as those of St James of Compostella, Calatrava and Alcantara, were estab- lished to fight the Moors in Spain instead of the Saracens in the Holy Land. But the members of these orders were not less monks than knights, their statutes embodied the rules of the cloister, and they were bound by the ecclesiastical vows of celibacy, poverty and obedience. From a very early stage in the develop- ment of chivalry, however, we meet with the singular institution of brotherhood in arms; and from it the ultimate origin if not of the religious fraternities at any rate of the military companion- ships is usually derived. 2 By this institution a relation was

1 J. B. de Lacurne de Sainte Palaye, Memoires sur VAncienne Chevalerie,

i. 363, 364 (ed. 1781).

2 Du Cange, Dissertation sur Joinville, xxi. ; Sainte Palaye, Memoires, i. 272 ; G. F. Beltz, Memorials of the Order of the Garter (184 1,) p. xxvii.

created between two or more monks by voluntary agreement, which was regarded as of far more intimacy and stringency than any which the mere accident of consanguinity implied. Brothers in arms were supposed to be partners in all things save the affec- tions of their " lady-loves." They shared in every danger and in every success, and each was expected to vindicate the honour of another as promptly and zealously as his own. The plot of the medieval romance of Amis and Amiles is built entirely on such a brotherhood. Their engagements usually lasted through life, but sometimes only for a specified period or during the continuance of specified circumstances, and they were always ratified by oath, occasionally reduced to writing in the shape of a solemn bond and often sanctified by their reception of the Eucharist together. Romance and tradition speak of strange rites — the mingling and even the drinking of blood — as having in remote and rude ages marked the inception of these martial and fraternal associations. 3 But in later and less barbarous times they were generally evidenced and celebrated by a formal and reciprocal exchange of weapons and armour. In warfare it was customary for knights who were thus allied to appear similarly accoutred and bearing the same badges or cognisances, to the end that their enemies might not know with which of them they were in conflict, and that their friends might be unable to accord more applause to one than to the other for his prowess in the field. It seems likely enough therefore that there should grow up bodies of knights banded together by engagements of fidelity, although 'free from monastic obligations; wearing a uniform or livery, and naming themselves after some special symbol or some patron saint of their adoption. And such bodies placed under the command of a sovereign or grand master, regulated by statutes, and enriched by ecclesiastical endowments would have been precisely what in after times such orders as the Garter in England, the Golden Fleece in Burgundy, the Annunziata in Savoy and the St Michael and Holy Ghost in France actually were. 4

During the 14th and 15th centuries, as well as somewhat earlier and later, the general arrangements of a European army were always and everywhere pretty much the same. 5 Under the sovereign the constable and the marshal Knighthood or marshals held the chief commands, their authority being partly joint and partly several. Attendant on them were the heralds, who were the officers of their military court, wherein offences committed in the camp and field were tried and adjudged, and among whose duties it was to carry orders and messages, to deliver challenges and call truces, and to identify and number the wounded and the slain. The main divisions of the

army were distributed under the royal and other principal standards, smaller divisions under the banners of some of the greater nobility or of knights banneret, and smaller divisions still under the pennons of knights or, as in distinction from knights banneret they came to be called, knights bachelors. All knights whether bachelors or bannerets were escorted by their squires. But the banner of the banneret always implied a more or less extensive command, while every knight was en- titled to bear a pennon and every squire a pencel. All three flags were of such a size as to be conveniently attached to and carried on a lance, and were emblazoned with the arms or some portion of the bearings of their owners. But while the banner was square the pennon, which resembled it in other respects, was either pointed or forked at its extremity, and the pencel, which was considerably less than the others, always terminated in a single tail or streamer. 6

If indeed we look at the scale of chivalric subordination from another point of view, it seems to be more properly divisible into four than into three stages, of which two may be called provisional and two final. The bachelor and the banneret were both equally knights, only the one was of greater distinction and authority

3 Du Cange, Dissertation, xxi., and Lancelot du Lac, among other romances.

4 Anstis, Register of the Order of the Garter, i. 63.

5 Grose, Military Antiq. i. 207 seq. ; Stubbs, Const. Hist. ii. 276 seq., and iii. 278 seq.

Grose's Military Antiquities, ii. 256.

than the other. In like manner the squire and the page were both in training for knighthood, but the first had advanced further in the process than the second. It is true that the squire was a combatant while the page was not, and that many squires voluntarily served as squires all their lives owing to the insuffi- ciency of their fortunes to support the costs and charges of knighthood. But in the ordinary course of a chivalrous educa- tion the successive conditions of page and squire were passed through in boyhood and youth, and the condition of knighthood was reached in early manhood. Every feudal court and castle was in fact a school of chivalry,

and although princes and great personages were rarely actually pages or squires, the moral and physical discipline through which they passed was not in any important particular different from that to which less exalted candidates for knighthood were subjected. 1 The page, or, as he was more anciently and more correctly called, the " valet " or " damoiseau," commenced his service and instruction when he was between seven and eight years old, and the initial phase continued for seven or eight years longer. He acted as the con- stant personal attendant of both his master and mistress. He waited on them in their hall and accompanied them in the chase, served the lady in her bower and followed the lord to the camp. 2 From the chaplain and his mistress and her damsels he learnt the rudiments of religion, of rectitude and of love, 3 from his master and his squires the elements of military exercise, to cast a spear or dart, to sustain a shield, and to march with the measured tread of a soldier; and from his master and his huntsmen and falconers the " mysteries of the woods and rivers," or in other words the rules and practices of hunting and hawking. When he was between fifteen and sixteen he became a squire. But no sudden or great alteration was made in his mode of life. He continued to wait at dinner with the pages, although in a manner more dignified according to the notions of the age. He not only served but carved and helped the dishes, proffered the first or principal cup of wine to his master and his guests, and carried to them the basin, ewer or napkin when they washed their hands before and after meat. He assisted in clearing the hall for dancing or minstrelsy, and laid the tables for chess or draughts, and he also shared in the pastimes for which he had made preparation. He brought his master the " vin de coucher " at night, and made his early refection ready for him in the morning. But his military exercises and athletic sports occupied an always increasing portion of the day. He accustomed himself to ride the " great horse," to tilt at the quintain, to wield the sword and battle-axe, to swim and climb, to run and leap, and to bear the weight and overcome the embarrassments of armour. He inured himself to the vicissitudes of heat and cold, and volun- tarily suffered the pains or inconveniences of hunger and thirst, fatigue and sleeplessness. It was then too that he chose his " lady-love," whom he was expected to regard with an adoration at once earnest, respectful, and the more meritorious if concealed. And when it was considered that he had made sufficient advance- ment in his military accomplishments, he took his sword to the priest, who laid it on the altar, blessed it, and returned it to him. 4 Afterwards he either remained with his early master, relegating most of his domestic duties to his younger companions, or he entered the service of some valiant and adventurous lord or

1 Sainte Palaye, Memoires, i. 36; Froissart, bk. iii. ch. 9.

2 Sainte Palaye, Memoires, pt. i. and Mills, History of Chivalry, vol. i. ch.

2.

3 See the long sermon in the tomance of Petit Jehan de Saintre, pt. i. ch. v., and compare the theory there set forth with the actual behaviour of the chief personages. Even Gautier, while he contends that chivalry did much to refine morality, is compelled to admit the prevailing immorality to which medieval romances testify, and the extraordinary free behaviour of the unmarried ladies. No doubt these romances, taken alone, might give as unfair an idea as modern French novels give of Parisian morals, but we have abundant other evidence for placing the moral standard of the age of chivalry definitely below that of educated society in the present day.

4 Sainte Palaye, Memoires, i. n seq.: " C'est peut-gtre a cette ceremonie et non a celles de la chevalerie qu'on doit rapporter ce qui se lit dans nos historiens de la premiere et de la seconde race au sujet des premieres armes que les Rois et les Princes remettoient avec solemnity au ieunes Princes leurs enfans."

knight of his own selection. He now became a " squire of the body," and truly an "armiger" or " scutifer," for he bore the shield and armour of his leader to the field, and, what was a task of no small difficulty and hazard, cased and secured him in his panoply of war before assisting him to mount his courser or charger. It was his function also to display and guard in battle the banner of the baron or banneret or the pennon of the knight he served, to raise him from the ground if he were unhorsed, to supply him with another or his own horse if his was disabled or killed, to receive and keep any prisoners he might take, to fight by his side if he was unequally matched, to rescue him if cap- tured, to bear him to a place of safety if wounded, and to bury him honourably when dead. And after he had worthily and bravely, borne himself for six or seven years as a squire, the time came when it was fitting that he should be made a knight. This, at least, was the current theory; but it is specially dangerous in medieval history to assume too much corresf ~ > ndence between theory and fact. In many castles, and perhc, s in most, the discipline followed simply a natural and unwritten code of " fagging " and seniority, as in public schools or on board men-of-war some hundred years or so ago.

Two modes of conferring knighthood appear to have prevailed from a very early period in all countries where chivalry was known. In both of them the essential portion seems Modes of to have been the accolade or stroke of the sword, conferring But while in the one the accolade constituted the Ka, sl > thood. whole or nearly the whole of the ceremony, in the other it was surrounded with many additional observances. The former and simpler of these modes was naturally that used in war: the candidate knelt before " the chief of the army or some valiant knight," who struck him thrice with

the flat of a sword, pronouncing a brief formula of creation and of exhortation which varied at the creator's will. 5

In this form a number of knights were made before and after almost every battle between the nth and the 16th centuries, and its advantages on the score of both convenience and economy gradually led to its general adoption both in time of peace and time of war. On extraordinary occasions indeed the more elaborate ritual continued to be observed. But recourse was had to it so rarely that in England about the beginning of the 1 5th century it came to be exclusively appropriated to a special king of knighthood. When Segar, garter king of arms, wrote in the reign of Queen Elizabeth, this had been accomplished with such completeness that he does not even mention that there were two ways of creating knights bachelors. " He that is to be made a knight," he says, " is striken by the prince with a sword drawn upon his back or shoulder, the prince saying, ' Soys Chevalier,' and in times past was added ' Saint George.' And when the knight rises the prince sayeth 'Avencez.' This is the manner of dubbing knights at this present, and that term ' dubbing ' was the old term in this point, not 'creating.' This sort of knights are by the heralds called knights bachelors." In our days when a knight is personally made he kneels faefore the sovereign, who lays a sword drawn, ordinarily the sword of state, on either of his shoulders and says, " Rise," calling him by his Christian name with the addition of " Sir " before it.

5 There are several obscure points as to the relation of the longer and shorter ceremonies, as well as the origin and original relation of their several parts. There is nothing to show whence came " dub- bing " or the " accolade." It seems certain that the word " dub " means to strike, and the usage is as old as the knighting of Henry by William the Conqueror (supra, pp. 851, 852). So, too, in the Empire a dubbed knight is " ritter geschlagen." The " accolade " may etymologically refer to the embrace, accompanied by a blow with the hand, characteristic of the longer form of knighting. The derivation of " adouber," corresponding to " dub," from " adoptare," which is given by Du Cange, and would connect the ceremony with " adoptio per arma," is certainly inaccurate. The investiture with arms, which formed a part of the longer form of knighting, and which we have seen to rest on very ancient usage, may originally have had a distinct meaning. We have observed that Lanfranc invested Henry I. with arms, while William " dubbed him to rider." If there was a difference in the meaning cf the two cere- monies, the difficulty as to the knighting of Earl Harold (supra, . p. 852) is at least partly removed.

Very different were the solemnities which attended the creation of a knight when the complete procedure was observed. " The ceremonies and circumstances at the giving this dignity," says Selden, " in the elder time were of two kinds especially, which we may call courtly and sacred. The courtly were the feasts held at the creation, giving of robes, arms, spurs and the like. The sacred were the holy devotions and what else was used in the church at or before the receiving of the dignity. 1 But the leading authority on the subject is an ancient tract written in French, which will be found at length either in the original or translated by Segar, Dugdale, Byshe and Nicolas, among other English writers. 2 Daniel explains his reasons for transcribing it, " tant a cause du detail que de la naivete du stile et encore plus de la bisarrerie des ceremonies que se faisoient pourtant alors fort serieusement," while he adds that these ceremonies were essen- tially identical in England, France, Germany, Spain and Italy.

The process of inauguration was commenced in the evening by the placing of the candidate under the care of two "esquires of honour grave and well seen in courtship and nurture and also in the feats of chivalry," who were to be " governors in all things relating to him." " Under their direction, to begin with, a barber shaved him and cut his hair. He was then conducted by them to his appointed chamber, where a bath was prepared hung within and without with linen and covered with rich cloths, into which after they had undressed him he entered. While he was in the bath two " ancient and grave knights " attended him " to inform, instruct and counsel him touch- ing the order and feats of chivalry," and when they had fulfilled their mission they poured some of the water of the bath over his shoulders, signing the left shoulder with the cross, and retired. He was then taken from the bath and put into a plain bed without hangings, in which he remained until his body wai dry, when the two esquires put on him a white shirt and over that " a robe of russet with long sleeves having a hood thereto like unto that of an hermit." Then the " two ancient and grave knights " returned and led him to the chapel, the esquires going before them " sporting and dancing " with " the minstrels making melody." And when they had been served with wines and spices they went away leaving only the candidate, the esquires, " the priest, the chandler and the watch," who kept the vigil of arms until sunrise, the candidate pass- ing the night " bestowing himself in orisons and prayers." At daybreak he confessed to the priest, heard matins, and communicated in the mass, offering a taper and a piece of money stuck in it as near the lighted end as possible, the first " to the honour of God" and the second " to the honour of the person that makes him a knight." Afterwards he was taken back to his chamber, and remained in bed until the knights, esquires and minstrels went to him and aroused him. The knights then dressed him in distinctive garments, and they then mounted their horses and rode to the hall where the candidate

was to receive knighthood ; his future squire was to ride before him bareheaded bearing his sword by the point in its scabbard with his spurs hanging from its hilt. And when everything was prepared the prince or subject who was to knight him came into the hall, and, the candidate's sword and spurs having been presented to him, he delivered the right spur to the " most noble and gentle " knight present, and directed him to fasten it on the candidate's right heel, which he kneeling on one knee and putting the candidate's right foot on his knee accordingly did, signing the candidate's knee with the cross, and in like manner by another " noble and gentle " knight the left spur was fastened to his left heel. And then he who was to create the knight took the sword and girded him with it, and then embracing him he lifted his right hand and smote him on the neck or shoulder, saying, " Be thou a good knight," and kissed him. When this was done they all went to the chapel with much music, and the new knight laying his right hand on the altar promised to support and defend the church, and ungirding his sword offered it on the altar. And as he came out from the chapel the master cook awaited him at the door and claimed his spurs as his fee, and said,

1 Selden, Titles of Honor, 639.

5 Daniel, Histoire de la Milice Francoise, i. 99-104; Byshe's Upton, De Studio Militari, pp. 21-24; Dugdale, Warwickshire, ii. 708-710; Segar, Honor Civil and Military, pp. 69 seq. and Nicolas, Orders of Knighthood, vol. ii. (Order of the Bath) pp. 19 seq. . .It is given as" the order and manner of creating Knights of the Bath in time of peace according to the custom of England," and consequently dates from a period when the full ceremony of creating knights bachelors generally had gone out of fashion. But as Ashmole, speaking of Knights of the Bath, says, " if the ceremonies and circumstances of their creation be well considered, it will appear that this king [Henry IV.] did not institute but rather restore the ancient manner of making knights, and consequently that the Knights of the Bath are in truth no other than knights bachelors, that is to say, such as are created with those ceremonies wherewith knights bachelors were formerly created." (Ashmole, Order of the Garter, p. 15). See also Selden, Titles of Honor, p. 678, and the Archaeological Journal, v. 258 seq.

"If you do anything contrary to the order of chivalry (which God forbid), I shall hack the spurs from your heels." 3

The full solemnities for conferring knighthood seem to have been so largely and so early superseded by the practice of dubbing or giving the accolade alone that in England it became at last restricted to such knights as were made at coronations and some other occasions of state. And to them the particular name of Knights of the Bath was assigned, while knights made in

the ordinary way were called in distinction from them knights of the sword, as they were also called knights bachelors in dis- tinction from knights banneret. 4 It is usually supposed that the first creation of knights of the Bath under that designation was at the coronation of Henry IV.; and before the order of the Bath as a companionship or capitular body was instituted the last creation of them was at the coronation of Charles II. But all knights were also knights of the spur or " equites aurati," because their spurs were golden or gilt, — the spurs of squires being of silver or white metal, — and these became their peculiar badge in popular estimation and proverbial speech. In the form of their solemn inauguration too, as we have noticed, the spurs together with the sword were always employed as the leading and most characteristic ensigns of knighthood. 5

With regard to knights banneret, various opinions have been entertained as to both the nature of their dignity and the qualifications they were required to possess for receiving it at different periods and in different countries. On the Continent the distinction which is commonly but incorrectly made between the nobility and the gentry has never arisen, and it was unknown here while chivalry existed and heraldry was understood. Here, as elsewhere in the old time, a nobleman and a gentleman meant the same thing, namely, a man who under certain con- ditions of descent was entitled to armorial bearings. Hence Du Cange divides the medieval nobility of France and Spain into three classes: first, barons or ricos hombres; secondly, chevaliers or caballeros; and thirdly, ecuyers or infanzons; and to the first, who with their several special titles constituted the greater nobility of either country, he limits the designation of banneret and the right of leading their followers to war under a banner, otherwise a " drapeau quarre " or square flag. 6 Selden shows especially from the parliament rolls that the term banneret has been occasionally employed in England as equivalent to baron. 7 In Scotland, even as late as the reign of James VI., lords of parliament were always created bannerets as well as barons at their investiture, " part of the ceremony consisting in the display of a banner, and such ' barones majores ' were thereby entitled to the privilege of having one borne by a retainer before them to the field of a quadrilateral form." 8 In Scotland, too, lords of parliament and bannerets were also called bannerents, banrents or baronets, and in England banneret was often corrupted to baronet. " Even in a patent passed to Sir Ralph Fane, knight under Edward VI., he is called ' baronettus ' for ' bannerettus.' " 9 In this manner it is not improbable that the title of baronet may have been suggested to the advisers of James I. when the order of Baronets

3 As may be gathered from Selden, Favyn, La Colombiers, Mene- strier and Sainte Palaye, there were several differences of detail in the ceremony at different times and in different places. But in the main it was everywhere

the same both in its military and its ecclesiastical elements. In the Pontificale Romanum, the old Ordo Romanus and the manual or Common Prayer Book in use in England before the Reformation forms for the blessing or consecration of new knights are included, and of these the first and the last are quoted by Selden.

4 Selden, Titles of Honor, p. 678 ; Ashmole, Order of the Garter, p. 15; Favyn, Theatre d'Honneur, ii. 1035,

6 " If we sum up the principal ensigns of knighthood, ancient and modern, we shall find they have been or are a horse, gold ring, shield and lance, a belt and sword, gilt spurs and a gold chain or collar." — Ashmole, Order of the Garter, pp. 12, 13.

6 On the banner see Grose, Military Antiquities, ii. 257; and Nicolas, British Orders of Knighthood, vol. i. p. xxxvii.

7 Titles of Honor, pp. 356 and 608. See also Hallam, Middle Ages, iii. 126 seq. and Stubbs, Const. Hist. iii. 440 seq.

8 Riddell's Law and Practice in Scottish Peerages, p. 578 ; also Nisbet's System of Heraldry, ii. 49 and Selden's Titles of Honor, p. 702.

9 Selden, Titles of Honor, pp. 608 and 657.

INSIGNIA OF SOME OF THE PRINCIPAL ORDERS OF KNIGHTHOOD, DRAWN BY GRACIOUS PERMISSION FROM THOSE IN THE POSSESSION OF HIS LATE MAJESTY KING EDWARD VII AND ARRANGED IN ACCORDANCE WITH HIS MAJESTY'S WISHES AND COMMAND.

was originally created by him, for it was a question whether the recipients of the new dignity should be designated by that or some other name. 1 But there is no doubt that as previously used it was merely a corrupt synonym for banneret, and not the name of any separate dignity. On the Continent, however, there are several recorded examples of bannerets who had an hereditary claim to that honour and its attendant privileges on the ground of the nature of their feudal tenure. 2 And generally, at any rate to commence with, it seems probable that bannerets were in every country merely the more important class of feudatories, the " ricos hombres " in contrast to the knights bachelors, who in France in the time of St Louis were known as " pauvres hommes." In England all the barons or greater nobility were entitled to bear banners, and therefore Du Cange's

observations would apply to them as well as to the barons or greater nobility of France and Spain. But it is clear that from a comparatively early period bannerets whose claims were founded on personal distinction rather than on feudal tenure gradually came to the front, and much the same process of substitution appears to have gone on in their case as that which we have marked in the case of simple knights. According to the Sallade and the Division du Monde, as cited by Selden, bannerets were clearly in the beginning feudal tenants of a certain magnitude and importance and nothing more, and different forms for their creation are given in time of peace and in time of war. 3 But in the French Gesta Romanorum the warlike form alone is given, and it is quoted by both Selden and Du Cange. From the latter a more modern version of it is given by Daniel as the only one generally in force.

The knight bachelor whose services and landed possessions entitled him to promotion would apply formally to the com- mander in the field for the title of banneret. If this were granted, the heralds were called to cut publicly the tails from his pennon: or the commander, as a special honour, might cut them off with his own hands. 4 The earliest contemporary mention of knights banneret is in France, Daniel says, in the reign of Philip Augustus, and in England, Selden says in the reign of Edward I. But in neither case is reference made to them in such a manner as to suggest that the dignity was then regarded as new or even uncommon, and it seems pretty certain that its existence on one side could not have long preceded its existence on the other side of the Channel. Sir Alan Plokenet, Sir Ralph Daubeney and Sir Philip Daubeney are entered as bannerets on the roll of the garrison of Caermarthen Castle in 1282, and the roll of Carlaverock records the names and arms of eighty-five bannerets who accompanied Edward I. in his expedition into Scotland in 1300.

What the exact contingent was which bannerets were expected to supply to the- royal host is doubtful. 5 But, however this may be, in the reign of Edward III. and afterwards bannerets appear as the commanders of a military force raised by themselves and marshalled under their banners: their status and their relations both to the crown and to their followers were mainly the con- sequences of voluntary contract not of feudal tenure. It is from the reigns of Edward III. and Richard II. also that the two best descriptions we possess of the actual creation of a banneret have been transmitted to us. 6 Sir Thomas Smith, writing towards the end of the 16th century, says, after noticing the conditions to be observed in the creation of bannerets, " but this order is almost grown out of use in England"; 7 and, during the controversy which arose between the new order of

1 See " Project concerninge the conferinge of the title of vidom," wherein it is said that " the title of vidom (vicedominus) was an ancient title used in

this kingdom of England both before and since the Norman Conquest ” (State Papers, James I. Domestic Series, lxiii. 150 B, probable date April 161 1).

2 Selden, Titles of Honor, pp. 452 seq.

3 Ibid. pp. 449 seq.

4 Du Cange, Dissertation, ix. ; Selden, Titles of Honor, p. 452 ; Daniel, Milice Francoise, i. 86 (Paris, 1721).

6 Selden, Titles of Honor, p. 656 ; Grose, Military Antiquities, ii.206. 8 Froissart, Bk. I. ch. 241 and Bk. II. ch. 53. The recipients were

Sir John Chandos and Sir Thos. Trivet.

7 Commonwealth of England (ed. 1640), p. 48.

baronets and the crown early in the 17th century respecting their precedence, it was alleged without contradiction in an argument on behalf of the baronets before the privy council that ” there are not bannerets now in being, peradventure never shall be.” 8 Sir Ralph Fane, Sir Francis Bryan and Sir Ralph Sadler were created bannerets by the Lord Protector Somerset after the battle of Pinkie in 1547, and the better opinion is that this was the last occasion on which the dignity was conferred. It has been stated indeed that Charles I. created Sir John Smith a banneret after the battle of Edgehill in 1642 for having rescued the royal standard from the enemy. But of this there is no sufficient proof. It was also supposed that George III. had created several naval officers bannerets towards the end of the last century, because he knighted them on board ship under the royal standard displayed. This, however, is unquestionably an error. 9

On the continent of Europe the degree of knight bachelor disappeared with the military system which had given rise to it. It is now therefore peculiar to the British Empire, Existing where, although very frequently conferred by letters Orders of patent, it is yet the only dignity which is still even ^“izhthood. occasionally created — as every dignity was formerly created — by means of a ceremony in which the sovereign and the subject personally take part. Everywhere else dubbing or the accolade seems to have become obsolete, and no other species of knight- hood, if knighthood it can be called, is known except that which is dependent on admission to some particular order. It is a common error to suppose that baronets are hereditary knights. Baronets are not knights unless they are knighted like anybody else; and, so far from being knights because they are baronets, one of the privileges granted to them shortly after the institution of their dignity was that they, not being knights, and their successors and their

eldest sons and heirs-apparent should, when they attained their majority, be entitled if they desired to receive knighthood. 10 It is a maxim of the law indeed that, as Coke says, " the knight is by creation and not by descent," and, although we hear of such designations as the " knight of Kerry " or the " knight of Glin," they are no more than traditional nicknames, and do not by any means imply that the persons to whom they are applied are knights in a legitimate sense. Notwithstanding, however, that simple knighthood has gone out of use abroad, there are innumerable grand crosses, com- manders and companions of a formidable assortment of orders in almost every part of the world. 11 (See the section on " Orders of Knighthood " below.)

The United Kingdom has eight orders of knighthood — the Garter, the Thistle, St Patrick, the Bath, the Star of India, St Michael and St George, the Indian Empire and the Royal Victorian Order; and, while the first is undoubtedly the oldest as well as the most illustrious anywhere existing, a fictitious antiquity has been claimed and is even still frequently conceded

8 State Papers, Domestic Series, James the First, Ixvii. 119.

9 " Thursday, June 24th: His Majesty was pleased to confer the honour of knights banneret on the following flag officers and com- manders under the royal standard, who kneeling kissed hands on the occasion: Admirals Pye and Sprye; Captains Knight, Bickerton and Vernon," Gentleman's Magazine (1773) xliii. 299. Sir Harris Nicolas remarks on these and the other cases {British Orders of Knighthood, vol. xliii.) and Sir William Fitzherbert published anony- mously a pamphlet on the subject, A Short Inquiry into the Nature of the Titles conferred at Portsmouth, &c, which is very scarce, but is to be found under the name of " Fitzherbert " in the catalogue of the British Museum Library.

10 " Sir Henry Ferrers, Baronet, was indicted by the name of Sir Henry Ferrers, Knight, for the murther of one Stone whom one Nightingale feloniously murthered, and that the said Sir Henry was present aiding and abetting, &c. Upon this indictment Sir Henry Ferrers being arraigned said he never was knighted, which being confessed, the indictment was held not to be sufficient, where- fore he was indicted de novo by the name of Sir Henry Ferrers, Baronet." Brydall, Jus Imaginis apud Anglos, or the Law of Eng- land relating to the Nobility and Gentry (London, 1675), p. 20. Cf. Patent Rolls, 10 Jac. I., pt. x. No. 18 ; Selden, Titles of Honor, p. 687.

11 Louis XIV. introduced the practice of dividing the members of military orders into several degrees when he established the order of St Louis in 1693.

IS

KNIGHTHOOD AND CHIVALRY

Plate I.

Draw by IVUtfam Gj‘44,*

THE ORDER OF THE GARTER. (i.) The Garter; (ii.) The Collar and George; (iii.) Tim Lesser George a.vd Ribhox; (»v.) Star.

KNIGHTHOOD AND CHIVALRY

Plate I.

Drawn by William Gibb,

THE ORDER OF THE GARTER.

(i.) The Gartbk; fii.) The Collar and George; (iii.) The Lesser George and Ribuox; (iv.) Star.

KNIGHTHOOD

«57

to the second and fourth, although the third, fifth, sixth, seventh, and eighth appear to be as contentedly as they are unquestion- ably recent.

It is, however, certain that the ” most noble ” Order of the Garter at least was instituted in the middle of the 14th century, when English chivalry was outwardly brightest and the Carter. tne court most magnificent; But in what particular year this event occurred is and has been the subject of much difference of opinion. All the original records of the order until after 1416 have perished, and consequently the ques- tion depends for its settlement not on direct testimony but on inference from circumstances. The dates which have been selected vary from 1344 (given by Froissart, but almost cer- tainly mistaken) to 1351. The evidence may be examined at length in Nicolas and Beltz; it is indisputable that in the wardrobe account from September 1347 to January 1349, the 21st and 23rd Edward III., the issue of certain habits with garters and the motto embroidered on them is marked for St George’s Day; that the letters patent relating to the preparation of the royal chapel of Windsor are dated in August 1348; and that in the treasury accounts of the prince of Wales there is an entry in November 1348 of the gift by him of ” twenty-four garters to the knights of the Society of the Garter.” 1 But that the order, although from this mani-

festly already fully constituted in the autumn of 1348, was not in existence before the summer of 1346 Sir Harris Nicolas proves pretty conclusively by pointing out that nobody who was not a knight could under its statutes have been admitted to it, and that neither the prince of Wales nor several others of the original companions were knighted until the middle of that year.

Regarding the occasion there has been almost as much con- troversy as regarding the date of its foundation. The " vulgar and more general story," as Ashmole calls it, is that of the countess of Salisbury's garter. But commentators are not at one as to which countess of Salisbury was the heroine of the adventure, whether she was Katherine Montacute or Joan the Fair Maid of Kent, while Heylyn rejects the legend as " a vain and idle romance derogatory both to the founder and the order, first published by Polydor Vergil, a stranger to the affairs of England, and by him taken upon no better ground than jama vulgi, the tradition of the common people, too trifling a founda- tion for so great a building." 2

Another legend is that contained in the preface to theRegister or Black Book of the order, compiled in the reign of Henry VIII., by what authority supported is unknown, that Richard I., while his forces were employed against Cyprus and Acre, had been inspired through the instrumentality of St George with renewed courage and the means of animating his fatigued soldiers by the device of tying about the legs of a chosen number of knights a leathern thong or garter, to the end that being thereby reminded of the honour of their enterprise they might be encouraged to redoubled efforts for victory. This was supposed to have been in the mind of Edward III. when he fixed on the garter as the emblem of the order, and it was stated so to have been by Taylor, master of the rolls, in his address to Francis I. of France on his investiture in 1527. 3 According to Ashmole the true account of the matter is that " King Edward having given forth his own garter as the signal for a battle which sped fortunately (which with Du Chesne we conceive to be that of Crecy), the victory, we say, being happily gained, he thence took occasion to institute this order, and gave the garter (assumed by him for the symbol of unity and society) pre- eminence among the ensigns of it. But, as Sir Harris Nicolas points out — although Ashmole is not open to the correction — this hypothesis rests for its plausibility on the assumption that the order was established before the invasion of

1 G. F. Beltz, Memorials of the Most Noble Order of the Garter (1 84 1) ,

P- 385-

2 Heylyn, Cosmographie and History of the Whole World, bk. i. p. 286.

3 Beltz, Memorials, p. xlvi.

France in 1346. And he further observes that " a great variety of devices and mottoes were used by Edward III.; they were chosen from the most trivial causes and were of an amorous rather than of a military character. Nothing," he adds, " is more likely than that in a crowded assembly a lady should accidentally have dropped her garter; that the circumstance should have caused a smile in the bystanders; and that on its being taken up by Edward he should have reproved the levity of his courtiers by so happy and chivalrous an exclamation, placing the garter at the same time on his own knee, as ' Dishonoured be he who thinks ill of it.' Such a circumstance occurring at a time of general festivity, when devices, mottoes and conceits of all kinds were adopted as ornaments or badges of the habits worn at jousts and tournaments, would naturally have been commemo- rated as other royal expressions seem to have been by its con- version into a device and motto for the dresses at an approaching hastilude." 4 Moreover, Sir Harris Nicolas contends that the order had no loftier immediate origin than a joust or tour- nament. It consisted of the king and the. Black Prince, and 24 knights divided into two bands of 12 like the tilters in a hastilude — at the head of the one being the first, and of the other the second; and to the companions belonging to each, when the order had superseded the Round Table and had become a per- manent institution, were assigned stalls either on the sovereign's or the prince's side of St George's Chapel. That Sir Harris Nicolas is accurate in this conjecture seems probable from the selection which was made of the " founder knights." As Beltz observes, the fame of Sir Reginald Cobham, Sir Walter Manny and the earls of Northampton, Hereford and Suffolk was already established by their warlike exploits, and they would certainly have been among the original companions had the order been then regarded as the reward of military merit only. But, although these eminent warriors were subsequently elected as. vacancies occurred, their admission was postponed to that of several very young and in actual warfare comparatively unknown knights, whose claims to the honour may be most rationally explained on the assumption that they had excelled in the particular feats of arms which preceded the institution of the order. The original companionship had consisted of the sove- reign and 25 knights, and no change was made in this respect until 1786, when the sons of George III. and his successors were made eligible notwithstanding that the chapter might be complete. In 1805 another alteration was effected by the pro- vision that the lineal descendants of George II. should be eligible in the same manner, except the Prince of Wales for the time being, who was declared to be " a constituent part of the original institution "; and again in 1831 it was further ordained that the privilege accorded to the lineal descendants of George II. should extend to the lineal descendants of George I. Although, as Sir Harris Nicolas observes, nothing is now known of the

form of admitting ladies into the order, the description applied to them in the records during the 14th and 15th centuries leaves no doubt that they were regularly received into it. The queen consort, the wives and daughters of knights, and some other women of exalted position, were designated " Dames de la Fraternite de St George," and entries of the delivery of robes and garters to them are found at intervals in the Wardrobe Accounts from the 50th Edward III. (1376) to the 10th of Henry VII. (1495), the first being Isabel, countess of Bedford, • the daughter of the one king, and the last being Margaret and Elizabeth, the daughters of the other king. The effigies of Margaret Byron, wife of Sir Robert Harcourt, K.G., at Stanton Harcourt, and of Alice Chaucer, wife of William de la Pole, duke of Suffolk, K.G., at Ewelme, which date from the reigns of Henry VI. and Edward IV., have garters on their left arms. (See further under " Orders of Knighthood " below.)

It has been the general opinion, as expressed by Sainte Palaye and Mills, that formerly all knights were qualified to confer knighthood. 6 But it may be questioned whether the privilege

4 Orders of Knighthood, vol. i. p. lxxxiii.

6 Memoires, i. 67, i. 22 ; History of Chivalry ; Gibbon, Decline and Fall, vii. 200.

was thus indiscriminately enjoyed even in the earlier days of chivalry. It is true that as much might be inferred from Persons the testimony of the romance writers; historical empowered evidence, however, tends to limit the proposition, and to coaler t jj e sounc j er conclusion appears to be, as Sir Harris "Z °° "Nicolas S ays, that the right was always restricted in operation to sovereign princes, to those acting under their authority or sanction, and to a few other personages of exalted rank and station. 1 In several of the writs for distraint of knight- hood from Henry III. to Edward III. a distinction is drawn between those who are to be knighted by the king himself or by the sheriffs of counties respectively, and bishops and abbots could make knights in the nth and 12th centuries. 2 At all periods the commanders of the royal armies had the power of conferring knighthood; as late as the reign of Elizabeth it was exercised among others by Sir Henry Sidney in 1 583, and Robert, earl of Essex, in 1595, while under James I. an ordinance of 1622, confirmed by a proclamation of 1623, for the

registration of knights in the college of arms, is rendered applicable to all who should receive knighthood from either the king or any of his lieutenants. 3 Many sovereigns, too, both of England and of France, have been knighted after their accession to the throne by their own subjects, as, for instance, Edward III. by Henry, earl of Lancaster, Edward VI. by the lord protector Somerset, Louis XI. by Philip, duke of Burgundy, and Francis I. by the Chevalier Bayard. But when in 1543 Henry VIII. appointed Sir John Wallop to be captain of Guisnes, it was considered necessary that he should be authorized in express terms to confer knighthood, which was also done by Edward VI. in his own case when he received knighthood from the duke of Somerset. 4 But at present the only subject to whom the right of j conferring knighthood belongs is the lord-lieutenant of Ireland, and to him it belongs merely by long usage and established custom. But, by whomsoever conferred, knight- hood at one time endowed the recipient with the same status and attributes in every country wherein chivalry was recognized. In the middle ages it was a common practice for sovereigns and princes to dub each other knights much as they were after- wards, and are now, in the habit of exchanging the stars and ribbons of their orders. Henry II. was knighted by his great- uncle David I. of Scotland, Alexander III. of Scotland by Henry III., Edward I. when he was prince by Alphonso X. of Castile, and Ferdinand of Portugal by Edmund of Langley, earl of Cambridge. 5 And, long after the military importance of knighthood had practically disappeared, what may be called its cosmopolitan character was maintained: a knight's title was recognized in all European countries, and not only in that country in which he had received it. In modern times, how- ever, by certain regulations, made in 1823, and repeated and enlarged in 1855, not only is it provided that the sovereign's permission by royal warrant shall be necessary for the reception by a British subject of any foreign order of knighthood, but further that such permission shall not authorize " the assump- tion of any style, appellation, rank, precedence, or privilege appertaining to a knight bachelor of the United Kingdom." 6

Since knighthood was accorded either by actual investiture or its equivalent, a counter process of degradation was regarded Degrada- as necessary for the purpose of depriving anybody tion. w ho had once received it of the rank and condition

it implied. 7 The cases in which a knight has been formally degraded in England are exceedingly few, so few indeed that two only are mentioned by Segar, writing in 1602, and Dallaway

1 Orders of Knighthood, vol. i. p. xi.

2 Selden, Titles of Honor, p. 638.

3 Harleian MS. 6063 ; Hargrave MS. 325.

4 Patent Rolls, 35th Hen. VIII., pt. xvi., No. 24; Burnet, Hist.

of Reformation, i. 15.

5 Spelman, " De milite dissertatio," Posthumous Works, p. 181.

'London Gazette, December 6, 1823, and May 15, 1855.

7 On the Continent very elaborate ceremonies, partly heraldic and partly religious, were observed in the degradation of a knight, which are described by Sainte Palaye, Memoires, i. 316 seq., and after him by Mills. History of Chivalry, i. 60 seq. Cf. Titles of Honor, P- 653-

says that only three were on record in the College of Arms when he wrote in 1793. The last case was that of Sir Francis Michell in 162 1, whose spurs were hacked from his heels, his sword-belt cut, and his sword broken over his head by the heralds in Westminster Hall. 8

Roughly speaking, the age of chivalry properly so called may be said to have extended from the beginning of the crusades to the end of the Wars of the Roses. Even in the way of pageantry and martial exercise it did not long survive the middle ages. In England tilts and tourneys, in which her father had so much excelled, were patronized to the last by Queen Elizabeth, and were even occasionally held until after the death of Henry, prince of Wales. But on the Continent they were discredited by the fatal accident which befell Henry II. of France in 1559. The golden age of chivalry has been variously located. Most writers would place it in the early 13th century, but Gautier would remove it two or three generations further back. It may be true that, in the comparative scarcity of historical evidence, 12th-century romances present a more favourable picture of chivalry at that earlier time; but even such historical evidence as we possess, when carefully scrutinized, is enough to dispel the illusion that there was any period of the middle ages in which the unselfish championship of " God and the ladies " was anything but a rare exception.

It is difficult to describe the true spirit and moral influ- ence of knighthood, if only because the ages in which it flourished differed so widely from our own. At its very best, it was always hampered by the limitations of medieval society. Moreover, many of the noblest precepts of the knightly code were a legacy from earlier ages, and have survived the decay of knighthood just as they will survive all transitory human institutions, forming part of the eternal heritage of the race. Indeed, the most important of these precepts did not even attain to their highest development in the middle ages. 1 As a conscious effort to bring religion into daily life,

chivalry was less successful than later puritanism; while the educated classes of our own day far surpass the average medieval knight in discipline, self-control and outward or inward refinement. Freeman's estimate comes far nearer to the historical facts than Burke's: " The chivalrous spirit is above all things a class spirit. The good knight is bound to endless fantastic courtesies towards men and still more towards women of a certain rank; he may treat all below that rank with any decree of scorn and cruelty. The spirit of chivalry implies the arbitrary choice of one or two virtues to be practised in such an exaggerated degree as ' to become vices, while the ordinary laws of right and wrong are forgotten. The false code of honour supplants the laws of the commonwealth, the law of God and the eternal principles of right. Chivalry again in its military aspect not only encourages the love of war for its own sake without regard to the cause for which war is waged, it encourages also an extravagant regard for a fantastic show of personal daring which cannot in any way advance the objects of the siege or campaign which is going on. Chivalry in short is in morals very much what feudalism is in law: each substitutes purely personal obligations devised in the interests of an exclusive class, for the more homely duties of an honest man and a good citizen " (Norman Conquest, v. 482). The chivalry from which Burke drew his ideas was, so far as it existed at all, the product of a far later age. In its own age, chivalry rested practically, like the highest civilization of ancient Greece and Rome, on slave labour; 9 and if many of its

8 Dallaway's Heraldry, p. 303.

9 Even in 13th century England more than half the population were serfs, and as such had no claim to the privileges of Magna Carta ; disputes between a serf and his lord were decided in the latter's court, although the king's courts attempted to protect the serf's life and limb and necessary implements of work. By French feudal law, the villein had no appeal from his lord save to God (Pierre de Fontaines, Conseil, ch. xxi. art. 8) ; and, though common sense and natural good feeling set bounds in most cases to the tyranny of the nobles, yet there was scarcely any injustice too gross to be possible. " How mad are they who exult when sons are born to their lords ! " wrote Cardinal Jacques de Vitry early in the 13th century (Exempla, p. 64, Folk Lore Soc. 1890).

most brilliant outward attractions have now faded for ever, this is only because modern civilization tends so strongly to remove social barriers. The knightly ages will always enjoy the glory of having formulated a code of

honour which aimed at rendering the upper classes worthy of their exceptional privileges; yet we must judge chivalry not only by its formal code but also by its practical fruits. The ideal is well summed up by F. W. Cornish: " Chivalry taught the world the duty of noble service willingly rendered. It upheld courage and enterprise in obedi- ence to rule, it consecrated military prowess to the service of the Church, glorified the virtues of liberality, good faith, unselfish- ness and courtesy, and above all, courtesy to women. Against these may be set the vices of pride, ostentation, love of bloodshed, contempt of inferiors, and loose manners. Chivalry was an im- perfect discipline, but it was a discipline, and one fit for the times. It may have existed in the world too long: it did not come into existence too early; and with all its shortcomings it exercised a great and wholesome influence in raising the medieval world from barbarism to civilization" (p. 27). This was the ideal, but to give the reader a clear view of the actual features of knightly society in their -contrast with that of our own day, it is necessary to bring out one or two very significant shadows.

Far too much has been made of the extent to which the knightly code, and the reverence paid to the Virgin Mary, raised the position of women (e.g. Gautier, p. 360). As Gautier himself admits, the feudal system made it difficult to separate the woman's person from her fief: instead of the freedom of Christian marriage on which the Church in theory insisted, lands and women were handed over together, as a business bargain, by parents or guardians. In theory, the knight was the defender of widows and orphans; but in practice wardships and marriages were bought and sold as a matter of everyday routine like stocks and shares in the modern market. Lord Thomas de Berkeley (1245-1321) counted on this as a regular and considerable source of income (Smyth, Lives, i. 157). Late in the 15th century, in spite of the somewhat greater liberty of that age, we find Stephen Scrope writing nakedly to a familiar correspondent " for very need [of poverty], I was fain to sell a little daughter I have for much less than I should have done by possibility," i.e. than the fair market price (Gairdner, Paston Letters, Introduction, p. clxxvi; cf. ccclxxi). Startling as such words are, it is perhaps still more startling to find how frequently and naturally, in the highest society, ladies were degraded by personal violence. The proofs of this which Schultz and Gautier adduce from the Chansons de Geste might be multiplied indefinitely. The Knight of La Tour-Landry (1372) relates, by way of warning to his daughters, a tale of a lady who so irritated her husband by scolding him in company, that he struck her to the earth with his fist and kicked her in the face, breaking her nose. Upon this the good knight moralizes: "And this she had for her euelle and gret langage, that she was wont to saie to her husbonde. And therfor the wiff aught to suffre and lete her husbonde haue the wordes, and to be maister, for that is her worshippe; for it is shame to here striff betwene hem, and in

especial before folke. But y saie not but whanne thei be allone, but she may tolle hym with goodly wordes, and counsaile hym to amende yef he do amys " (La Tour, chap, xviii.; cf. xvii. and xix.). The right of wife-beating was formally recognized by more than one code of laws, and it was already a forward step when, in the 13th century, the Coutumes du Beauvoisis provided " que le mari ne doit battre sa femme que raisonnablement " (Gautier, p. 349). This was a natural consequence not only of the want of self-control which we see everywhere in the middle ages, but also of the custom of contracting child-marriages for unsentimental considerations. Between 1288 and 1500 five marriages are recorded in the direct line of the Berkeley family in which the ten contracting parties averaged less than eleven years of age: the marriage contract of another Lord Berkeley was drawn up before he was six years old. Moreover, the same business considerations which dictated those early marriages clashed equally with the strict theory of

knighthood. In the same Berkeley family, the lord Maurice IV. was knighted in 1338 at the age of seven to avoid the possible evils of wardship, and Thomas V. for the same reason in 1476 at the age of five. Smyth's record of this great family shows that, from the middle of the 13 th century onwards, the lords were not only statesmen and warriors, but still more distinguished as gentlemen-farmers on a great scale, even selling fruit from the castle gardens, while their ladies would go round on tours of inspection from dairy to dairy. The lord Thomas III. (1326-1361), who was noted as a special lover of tournaments, spent in two years only £90, or an average of about £15 per tournament; yet he was then laying money by at the rate of £450 a year, and, a few years later, at the rate of £11 so, or nearly half his income ! Indeed, economic causes contributed much to the decay of romantic chivalry. The old families had lost heavily from generation to generation, partly by personal extravagances, but also by gradual alienations of land to the Church and by the enormous expenses of the crusades. Already, in the 13th century, they were hard pressed by the growing wealth of the burghers, and even the greatest nobles could scarcely keep up their state without careful business manage- ment. It is not surprising therefore, to find that' at least as early as the middle of the 13th century the commercial side of knighthood became very prominent. Although by the code of chivalry no candidate could be knighted before the age of twenty-one, we have seen how great nobles like the Berkeleys obtained that honour for their infant heirs in order to avoid possible pecuniary loss; and French writers of the 14th century complained of this knighting of infants as a common and serious abuse. 1 Moreover, after the knight's liability to personal service in war had been modified in the 12th century by the scutage system, it became necessary in the first quarter of the 13th to compel landowners to take up the knighthood which in theory

they should have coveted as an honour — a compulsion which was soon systematically enforced (Distraint of Knighthood, 1278), and became a recognized source of royal income. An indirect effect of this system 2 was to break down another rule of the chivalrous code — that none could be dubbed who was not of gentle birth. 3 This rule, however, had often been broken before; even the romances of chivalry speak not infrequently of the knighting of serfs or jongleurs; 4 and other causes besides distraint of knighthood tended to level the old distinctions. While knighthood was avoided by poor nobles, it was coveted by rich citizens. It is recorded in 1298 as " an immemorial custom " in Provence that rich burghers enjoyed the honour of knighthood; and less than a century later we find Sacchetti complaining that the dignity is open to any rich upstart, however disreputable his antecedents. 5 Similar causes contributed to the decay of knightly ideas in warfare. Even in the 12th century, when war was still rather the pastime of kings and knights than.

1 Sainte Palaye, ii. 90.

2 Medley, English Constitutional History (2nd ed., pp. 291, 466), suggests that Edward might have deliberately calculated this degrada- tion of the older feudal ideal.

3 Being made to " ride the barriers " was the penalty for anybody who attempted to take part in a tournament without the qualification of name and arms. Guillim (Display of Heraldry, p. 66) and Nisbet (System of Heraldry, ii. 147) speak of this subject as concerning England and Scotland. See also Ashmole's Order of the Garter, p. 284.- But in England knighthood has always been conferred to a great extent independently of these considerations. At almost every period there have been men of obscure and illegitimate birth who have been knighted. Ashmole cites authorities for the con- tention that knighthood ennobles, insomuch that whosoever is a knight it necessarily follows that he is also a gentleman ; " for, when a king gives the dignity to an ignoble person whose merit he would thereby recompense, he is understood to have conferred whatsoever is requisite for the completing of that which he bestows." By the common law, if a villein were made a knight he was thereby enfran- chised and accounted a gentleman, and if a person under age and in wardship were knighted both his minority and wardship termi- nated. (Order of the Garter, p. 43 ; Nicolas, British Orders of Knight- hood, i. 5.)

- *Gautier, pp. 21, 249.*
- *Du Cange, s.v. miles (ed. Didot, t. iv. p. 402); Sacchetti, Novella, cliii. All the medieval orders of knighthood, however, insisted in their statutes on the noble birth of the candidate.*

INSIGNIA OF SOME OF THE PRINCIPAL ORDERS OF KNIGHTHOOD, DRAWN BY GRACIOUS PERMISSION FROM THOSE IN THE POSSESSION OF HIS LATE MAJESTY KING EDWARD VII AND ARRANGED IN ACCORDANCE WITH HIS MAJESTY'S WISHES AND COMMAND.

a national effort, the strict code of chivalry was more honoured in the breach than in the observance. 1 But when the Hundred Years' War brought a real national conflict between England and France, when archery became of supreme importance, and a large proportion even of the cavalry were mercenary soldiers, then the exigencies of serious warfare swept away much of that outward display and those class-conventions on which chivalry had always rested. Simeon Luce (chap, vi.) has shown how much the English successes in this war were due to strict business methods. Several of the best commanders (e.g. Sir Robert Knolles and Sir Thomas Dagworth) were of obscure birth, while on the French side even Du Guesclin had to wait long for his knighthood because he belonged only to the lesser nobility. The tournament again, which for two centuries had been under the ban of the Church, was often almost as definitely discouraged by Edward III. as it was encouraged by John of France; and while John's father opened the Crecy campaign by sending Edward a challenge in due form of chivalry, . Edward took advantage of this formal delay to amuse the French king with negotiations while he withdrew his army by a rapid march from an almost hopeless position. A couple of quotations from Froissart will illustrate the extent to which war had now become a mere business. Much as he admired the French chivalry, he recognized their impotence at Crecy. " The sharp, arrows ran into the men of arms and into their horses, and many fell, horse and men. . . . And also among the Englishmen there were certain rascals that went afoot with great knives, and they went in among the men of arms, and slew and murdered many as they lay on the ground, both earls, barons, knights and squires, whereof the king of England was after displeased, for he had rather they had been taken prisoners." How far Edward's solicitude was disinterested may be gauged from Froissart's parallel remark about the battle of Aljubarrota, where, as at Agincourt, the handful of victors were obliged by a sudden panic to slay their prisoners. " Lo, behold the great evil adventure that fell that Saturday. For they slew as many good prisoners as would well have been worth, one with another, four hundred thousand franks." In 1402 Lord Thomas de Berkeley bought, as a speculation, 24 Scottish prisoners. Similar practical considerations forced the nobles of other European

countries either to conform to less sentimental methods of warfare and to growing conceptions of nationality, or to become mere Ishmaels of the type which outlived the middle ages in Gotz von Berlichingen and his compeers.

Bibliography. — Froissart is perhaps the source from which we may gather most of chivalry in its double aspect, good and bad. The brilliant side comes out most clearly in Joinville, the Chronique de Du Guesclin, and the Histoire de Bayart ; the darker side appears in the earlier chronicles of the crusades, and is especially emphasized by preachers and moralists like Jacques de Vitry, Etienne de Bourbon, Nicole Bozon and John Gower. John Smyth's Lives of the Berkeleys (Bristol and Gloucs. Archaeol. Soc, 2 vols.) and the Book of the Knight of La Tour-Landry (ed. A. de Montaiglon, or in the old English trans, published by the Early English Text Soc.) throw a very vivid light on the inner life of noble families. Of modern books, besides those quoted by their full titles in the notes, the best are A. Schultz, Hofisches Leben z. Zeit der Minnesdnger (Leipzig, 1879) ; S. Luce, Hist, de Du Guesclin et de son fipoque (2nd ed., Paris, 1882), masterly but unfortunately unfinished at the author's death; L6on Gautier, La Chevalerie (Paris, 1883), written with a strong apologetic bias, but full and correct in its references; and F. W. Cornish, Chivalry (London, 1901), too little reference to the more prosaic historical documents, but candid and without intentional partiality. (G. G. Co.)

Orders or Knighthood

When orders ceased to be fraternities and became more and more marks of favour and a means of recognizing meritorious

1 Lecoy de la Marche (Chairefrancaiseaumoyendge, 2nded., p. 387) gives many instances to prove that "al chevalerie, au xiii" silcle, est deja sur son declin." But already about 1 160 Peter of Blois had written, " The so-called order of knighthood is nowadays mere disorder " (ordo militum nunc est, ordineni ncn tenere. Ep. xciv. : the whole letter should be read); and, half a century earlier still, Guibert of Nogent gives an equally unflattering picture of con- temporary chivalry in his De vita sua (Migne, Pat. Lat., torn. clvi.).

services to the Crown and country, the term "orders" became loosely applied to the insignia and decorations themselves. Thus " orders," irrespective of the title or other specific desig- nation they confer, fall in Great Britain generally into three main categories, according as the recipients are made " knights grand cross," " knights commander," or " companions." In some orders the classes are more numerous, as in the Royal Victorian, for instance, which has five, numerous foreign orders a like number, some six, while the Chinese " Dragon " boasts no less than

eleven degrees. Generally speaking, the insignia of the " knights grand cross " consist of a star worn on the left breast and a badge, usually some form either of the cross patie or of the Maltese cross, worn suspended from a ribbon over the shoulder or, in certain cases, on days of high ceremonial from a collar. The " commanders " wear the badge from a ribbon round the neck, and the star on the breast; the " com- panions " have no star and wear the badge from a narrow ribbon at the button-hole.

Orders may, again, be grouped according as they are (1) Prime Orders of Christendom, conferred upon an exclusive class only. Here belong, inter alia, the well-known orders of the Garter (England), Golden Fleece (Austria and Spain), Annunziata (Italy), Black Eagle (Prussia), St Andrew (Russia), Elephant (Denmark) and Seraphim (Sweden). Of these the first three only, which are usually held to rank inter se in the order given, are historically identified with chivalry. (2) Family Orders, bestowed upon members of the royal or princely class, or upon humbler individuals according to classes, in respect of " per sonal " services rendered to the family. To this category belong such orders as the Royal Victorian and the Hohenzollern (Prussia). (3) Orders of Merit, whether military, civil or joint orders. Such have, as a rule, at least three, oftener five classes, and here belong such as the Order of the Bath (British), Red Eagle (Prussia), Legion of Honour (France). There are also certain orders, such as the recently instituted Order of Merit (British), and the Pour le Merite (Prussia), which have but one class, all members being on an equality of rank within the order.

Of the three great military and religious orders, branches survive of two, the Teutonic Order (Der hohe deutsche Ritter Orden or Marianen Orden) and the Knights of St John of Jerusalem (Johanniter Orden, Malteser Orden), for the history of which and the present state see Teutonic Order and St John oe Jeru- salem, Knights oe the Order of.

Great Britain. — The history and constitution of the " most noble " Order of the Garter has been treated above. The officers of the order are five — the prelate, chancellor, registrar, king of arms and usher — the first, third and fifth having been attached to it from the commencement, while the fourth was added by Henry V. and the second by Edward IV. The prelate has always been the bishop of Winchester; the chancellor was formerly the bishop of Salisbury, but is now the bishop of Oxford; the registrarship and the deanery of Windsor have been united since the reign of Charles I.; the king of arms, whose duties were in the beginning discharged by Windsor herald, is Garter Principal King of Arms; and the usher is the gentleman usher of the Black Rod. The chapel of the order is St George's Chapel, Windsor. The insignia of the order are illustrated on Plate I.

The " most ancient " Order of the Thistle was founded by James II. in 1687, and dedicated to St Andrew. It consisted of the sovereign and eight knights companions, and fell into abeyance at the Revolution of 1688. In 1703 it was revived by Queen Anne, when it was ordained to consist of the sovereign and 12 knights companions, the number being in- creased to 16 by statute in 1827. The officers of the order are the dean, the secretary, Lyon King of Arms and the gentleman usher of the Green Rod. The chapel, in St Giles's, Edinburgh, was begun in 1909. The star, badge and ribbon of the order are illustrated on Plate II., figs. 5 and 6. The collar is formed of thistles, alternating with sprigs of rue, and the motto is Nemo me impune lacessil.

KNIGHTHOOD AND CHIVALRY

Plate II.

THE BATH. (L) Stak; (ii.l Grand Cetnw (.Mil.): (ft) 5i«»; fiv.) Gjund Cross (Civ.) TftE THISTI.K, (v.) Sia; (vi.) Hadce. (vii.) n*tK;i;: (viii) Sta*. THE ST. MICHAEL AND ST. GEORGE. (ii.> Star; (a.) OmHS Ceosa.*

PATRICK.

KNIGHTHOOD AND CHIVALRY

Plate II.

TilEBATH. {L) Siahj (ii.l Cuasd Cmiss (Mil.); (in.) Siah: Rtah. THE ST. MICtlAF.L AND ST. GEORGE. Star; (»•) Cranu Cboss.

The " most illustrious " Order of St Patrick was instituted by George III. in 1788, to consist of the sovereign, the lord lieutenant of Ireland as grand master and 15 knights companions, enlarged to 22 in 1833. The chancellor of the order is the chief secretary to the lord lieutenant of Ireland, and the king of arms is Ulster King of Arms; Black Rod is the usher. The chapel is in St Patrick's Cathedral, Dublin. The star, badge and ribbon are illustrated on Plate II., figs. 7 and 8. The collar is formed of alternate roses with red and white leaves, and gold harps linked by gold knots; the badge is suspended from a harp surmounted by an imperial jewelled crown. The motto is Quis separabit?

The " most honourable " Order of the Bath was established by George I. in 1725, to consist of the sovereign, a grand master and 36 knights companions. This was a pretended revival of an order supposed to have been created by Henry IV. at his coronation in 1399. But, as has been shown in the preceding section, no such order existed. Knights of the Bath, although they were allowed precedence before knights bachelors, were merely knights bachelors who were knighted with more elaborate ceremonies than others and on certain great occasions. In 1815 the order was instituted, in three classes, " to commemorate the auspicious termination of the long and arduous contest in which the Empire has been engaged "; and in 1847 the civil knights commanders and companions were added. Exclusive of the sovereign, royal princes and distinguished foreigners, the order is limited to 55 military and 27 civil knights grand cross, 145 military and 108 civil knights commanders, and 705 military and 298 civil companions. The officers of the order are the dean (the dean of Westminster), Bath King of Arms, the regis- trar, and the usher of the Scarlet Rod. The ribbon and badges of the knights grand cross (civil and military) and the stars are illustrated on Plate II., figs. 1, 2, 3 and 4.

The " most distinguished " Order of St Michael and St George was founded by the prince regent, afterwards George IV., in 1818, in commemoration of the British protectorate of the Ionian Islands, " for natives of the Ionian Islands and of the island of Malta and its dependencies, and for such other subjects of his majesty as may hold high and confidential situations in the Mediterranean." By statute of 1832 the lord high commis- sioner of the Ionian Islands was to be the grand master, and the order was directed to consist of 15 knights grand crosses, 20 knights commanders and 25 cavaliers or companions. After the repudiation of the British protectorate of the Ionian Islands, the order was placed on a new basis, and by letters patent of 1868 and 1877 it was extended and provided for such of " the natural born subjects of the Crown of the United Kingdom as may have held or shall hold high and confidential offices within her majesty's colonial possessions, and in reward for services rendered to the crown in relation to the foreign affairs of the Empire." It is now (by the enlargement of 1902) limited to 100 knights grand cross, of whom the first or principal is grand master, exclusive of extra and honorary members, of 300 knights commanders and 600 companions. The officers are the prelate, chancellor, registrar, secretary and officer of arms. The chapel of the order, in St Paul's Cathedral, was dedicated in 1906. The badge of the knights grand cross and the ribbon are illus- trated on Plate II., figs. 9 and 10. The star of the knights grand cross is a seven-rayed star of silver with a small ray of gold between each, in the centre is a red St George's cross bearing a medallion of St Michael encountering Satan, sur- rounded by a blue fillet with the motto Auspicium melioris aevi.

The Order of St Michael and St George ranks between the " most exalted " Order of the Star of India and the " most eminent " Order of the Indian Empire, of both of which the viceroy of India for the time being is ex officio grand master. Of these the first was instituted in 1861 and enlarged in 1876. 1897 and 1003, in three classes, knights grand commanders, knights commanders and companions, and the second was established (for " companions " only) in 1878 and enlarged in 1887, 1892, 1897 and 1903, also in the same three classes, in

commemoration of Queen Victoria's assumption of the imperial style and title of the Empress of India. The badges, stars and ribbons of the knights grand commanders of the two orders are illustrated on Plate III., figs. 3, 4, S and 6. The collar of the Star of India is composed of alternate links of the lotus flower, red and white roses and palm branches enamelled on gold, with an imperial crown in the centre; that of the Indian Empire is composed of elephants, peacocks and Indian roses.

The Royal Victorian Order was instituted by Queen Victoria on the 25th of April 1896, and conferred for personal services rendered to her majesty and her successors on the throne. It consists of the sovereign, chancellor, secretary and five classes — knights grand commanders, knights commanders, commanders and members of the fourth and fifth classes, the distinction between these last divisions lying in the badge and in the precedence enjoyed by the members. The knights of this order rank in their respective classes immediately after those of the Indian Empire, and its numbers are unlimited. The badge, star and ribbon of the knights grand cross are illustrated on Plate III., figs. 1 and 2.

To the class of orders without the titular appellation " knight " belongs the Order of Merit, founded by King Edward VII. on the occasion of his coronation. The order is founded on the lines of the Prussian Ordre pour le merite (see below), yet more com- prehensive, including those who have gained distinction in the military and naval services of the Empire, and such as have made themselves a great name in the fields of science, art and literature. The number of British members has been fixed at twenty-four, with the addition of such foreign persons as the sovereign shall appoint. The names of the first recipients were: Earl Roberts, Viscount Wolseley, Viscount Kitchener, Sir Henry Keppel, Sir Edward Seymour, Lord Lister, Lord Rayleigh, Lord Kelvin, John Morley, W. E. H. Lecky, G. F. Watts and Sir William Huggins. The only foreign recipients up to 1910 were Field Marshals Yamagata and Oyama and Admiral Togo. A lady, Miss Florence Nightingale, received the order in 1907. The badge is a cross of red and blue enamel sur- mounted by an imperial crown; the central blue medallion bears the inscription " For Merit " in gold, and is surrounded by a wreath of laurel. The badge of the military and naval mem- bers bears two crossed

swords in the angles of the cross. The ribbon is garter blue and crimson and is worn round the neck.

The Distinguished Service Order, an order of military merit, was founded on the 6th of September 1886 by Queen Victoria, its object being to recognize the special services of officers in the army and navy. Its numbers are unlimited, and its designation the letters D.S.O. It consists of one class only, who take precedence imme- diately after the 4th class of the Royal Victorian Order. The badge is a white and gold cross with a red centre bearing the imperial crown surrounded by a laurel wreath. The ribbon is red edged with blue. The Imperial Service Order was likewise instituted on the 26th of June 1902, and finally revised in 1908, to commemorate King Edward's coronation, and is specially designed as a recognition of faithful and meritorious services rendered to the British Crown by the administrative members of the civil service in various parts of the Empire, and is to consist of companions only. The numbers are limited to 475, of whom 250 belong to the home and 225 to the civil services of the colonies and protectorates (Royal Warrant, June 1909). Women as well as men are eligible. The members of the order have the distinction of adding the letters I.S.O. after their names. In precedence the order ranks after the Distinguished Service Order. The badge is a gold medallion bearing the royal cipher and the words " For Faithful Service " in blue; for men it rests on a silver star, for women it is surrounded by a silver wreath. The ribbon is one blue between two crimson stripes.

In addition to the above, there are two British orders confined to ladies. The Royal Order of Victoria and Albert, which was instituted in 1862, is a purely court distinction. It consists of four classes, and it has as designation the letters V.A. The Imperial Order of the Crown of India is conferred for like purposes as the Order of the Indian Empire. Its primary object is to recognize the services of ladies connected with the court of India. The letters C.I. are its designation.

The sovereign's permission by royal warrant is necessary before a British subject can receive a foreign order of knighthood. For other decorations, see under Medals.

The Golden Fleece {La Toison d'Or) ranks historically and in distinction as one of the great knightly orders of Europe. It is

INSIGNIA OF SOME OF THE PRINCIPAL ORDERS OF KNIGHTHOOD, DRAWN BY GRACIOUS PERMISSION FROM THOSE IN THE POSSES- SION OF HIS LATE MAJESTY KING EDWARD VII AND ARRANGED IN ACCORDANCE WITH HIS MAJESTY'S WISHES AND COMMAND.

now divided into two branches, of Austria and Spain. It was founded on the ioth of January, 1429/30 by Philip the Good, duke of Burgundy, on the day of his marriage with Isabella of Portugal at Bruges, in her honour and dedicated to the Virgin and St Andrew. No certain origin can be given for the name. It seems to have been in dispute even in the early history of the order. Four different sources have been suggested; the classical myth of the voyage of Jason and the Argonauts for the golden fleece, the scriptural story of Gideon, the staple trade of Flanders in wool, and the fleece of golden hair of Marie de Rambrugge, the duke's mistress. Motley (Rise of Dutch Rep., i. 48) says: "What could be more practical and more devout than the conception? Did not the Lamb of God, suspended at each knight's heart, symbolize at once the woollen fabrics to which so much of Flemish wealth and Burgundian power was owing, and the gentle humility of Christ which was ever to characterize the order? " At its constitution the number of the knights was limited to 24, exclusive oi the grand master, the sovereign. The members were to be genlilshommes de nom et d'armes et sans reproche, not knights of any other order, and vowed to join their sovereign in the defence of the Catholic faith, the protection of Holy Church, and the upholding of virtue and good morals. The sovereign undertook to consult the knights before embarking on a war, all disputes between the knights were to be settled by the order, at each chapter the deeds of each knight were held in review, and punishments and admonitions were dealt out to offenders; to this the sovereign was expressly subject. Thus we find that the emperor Charles V. accepted humbly the criticism of the knights of the Fleece on his over-centralization of the government and the wasteful personal attention to details (E. A. Armstrong, Charles V., 1902, ii. 373). The knights could claim as of right to be tried by their fellows on charges of rebellion, heresy and treason, and Charles V. conferred on the order exclusive jurisdiction over all crimes committed by the knights. The arrest of the offender had to be by warrant signed by at least six knights, and during the process of charge and trial he remained not in prison but dans Vaimable compagnie du dit ordre. It was in defiance of this right that Alva refused the claim of Counts Egmont and Horn to be tried by the knights of the Fleece in 1568. During the 16th century the order frequently acted as a consultative body in the state; thus in 1539 and 1540 Charles summons the knights with the council of state and the privy council to decide what steps should be taken in face of the revolt of Ghent (Arm- strong, op. cit., i. 302), in 1562 Margaret of Parma, the regent, summons them to Brussels to debate the dangerous condition of

the provinces (Motley, i. 48), and they were present at the abdication of Charles in the great hall at Brussels in 1555. The history of the order and its subsequent division into the two branches of Austria and Spain may be briefly summarized. By the marriage of Mary, only daughter of Charles the Bold of Burgundy to Maximilian, archduke of Austria, 1477, the grand mastership of the order came to the house of Habsburg and, with the Netherlands provinces, to Spain in 1504 on the accession of Philip, Maximilian's son, to Castile. On the extinction of the Habsburg dynasty in Spain by the death of Charles II. in 1700 the grand-rnastership, which had been filled by the kings of Spain after the loss of the Netherlands, was claimed by the emperor Charles VI., and he instituted the order in Vienna in 1 7 13. Protests were made at various times by Philip V., but the question has never been finally decided by treaty, and the Austrian and Spanish branches have continued as indepen- dent orders ever since as the principal order of knighthood in the respective states. It may be noticed that while the Austrian branch excludes any other than Roman Catholics from the order, the Spanish Fleece may be granted to Protestants. The badges of the two branches vary slightly in detail, more par- ticularly in the attachment of fire-stones (fusils or furisons) and steels by which the fleece is attached to the ribbon of the collar. The Spanish form is given on Plate IV., fig. 2. The collar is composed of alternate links of furisons and double steels interlaced to form the letter B for Burgundy. A magnificent

exhibition of relics, portraits of knights and other objects con- nected with the order of the Golden Fleece was held at Bruges in 1907.

The chief history of the order is Baron de Reiffenberg's Histoire de VOrdre de la Toison d'Or (1830); see also an article by Sir J. Balfour Paul, Lyon King of Arms, in the Scottish Historical Review (July 1908).

Austria-Hungary. — The following are the principal orders other than that of the Golden Fleece (supra). The Order of St Stephen of Hungary, the royal Hungarian order, founded in 1764 by the empress Maria Theresa, consists of the grand master (the sovereign), 20 knights grand cross, 30 knights commanders and 50 knights. The badge is a green enamelled cross with gold borders, suspended from the Hungarian crown ; the red enamelled medallion in the centre of the cross bears a white patriarchal cross issuing from a coroneted green mound; on either side of the cross are the letters M.T. in gold, and the whole is surrounded by a white fillet with the legend Publicum Meritorum Praemium. The ribbon is green with a crimson central stripe. The collar, only worn by the knights grand cross, is of gold, and consists of Hungarian crowns linked together alternately by the monograms of St Stephen, S.S., and the foundress, M.T. ; the centre of the collar is formed by a flying lark encircled by the motto Stringit amore. An illustration of the star of the grand cross is given on Plate V. fig. 4. The

Order of Leopold, for civil and military service, was founded in 1808 by the emperor Francis I. in memory of his father Leopold If. The three classes take precedence next after the corresponding classes of the order of St Stephen. The badge is a red enamelled cross bordered with white and gold and surmounted by the imperial crown ; the red medallion in the centre bears the letters F.I. A., and on the encircling white fillet is the inscription Integritati et Merito. When conferred for service in war the cross rests on a green laurel wreath. The ribbon is scarlet with two white stripes. The collar consists of imperial crowns, the initials F. and L. and oak wreaths. The Order of the Iron Crown, i.e. of Lombardy, was founded by Napoleon as king of Italy in 1809, and refounded as an Austrian order of civil and military merit in 1816 by the emperor Francis I.; the number of knights is limited to 100 — 20 grand cross, 30 commanders, 50 knights. The badge consists of the double-headed imperial eagle with sword and orb; below it is the jewelled iron crown of Lombardy, and above the imperial crown; on the breast of the eagle is a gold-bordered blue shield with the letter F. in gold. The military decoration for war service also bears two green laurel branches. The ribbon is yellow edged with narrow blue stripes. The collar is formed of Lombard crowns, oak wreaths and the monogram F. P. (Franciscus Primus). The Order of Francis Joseph, for personal merit of every kind, was founded in 1849 by the emperor Francis Joseph I. It is of the three usual classes and is unlimited in numbers. The badge is a black and gold imperial eagle surmounted by the imperial crown. The eagle bears a red cross with a white medallion, containing the letters F. J., and to the beaks of the two heads of the eagle is attached a chain on which is the legend Viribus Unitis. The ribbon is deep red. The Order of Maria Theresa was founded by the empress Maria Theresa in 1757. It is a purely military order and is given to officers for personal distinguished conduct in the field. There are three classes. There were originally only two, grand cross and knights. The emperor Joseph II. added a commanders' class in 1765. The badge is a white cross with gold edge, in the centre a red medallion with a white gold-edged fesse, surrounded by a fillet with the inscrip- tion Fortitudini. The ribbon is red with a white central stripe. The Order of Elizabeth Theresa, also a military order for officers, was founded in 1750 by the will of Elizabeth Christina, widow of the emperor Charles VI. It was renovated in 177 1 by her daughter, the empress Maria Theresa. The order is limited to 21 knights in three divisions. The badge is an oval star with eight points, enamelled half red and white, dependent from a gold imperial crown. The central medallion bears the initials of the founders, with the encircling inscription M. Theresa parentis gratiam perennem voluit. The ribbon is black. The Order of the Starry Cross, for high-born ladies of the Roman Catholic faith who devote themselves to good works, spiritual and temporal, was founded in 1668 by the empress Eleanor, widow of the emperor Ferdinand III. and mother of Leopold I., to commemorate the

recovery of a relic of the true cross from a dangerous fire in the imperial palace at Vienna. The relic was supposed to have been peculiarly treasured by the emperor Maximilian I. and the emperor Frederick III. The patroness of the order must be a princess of the imperial Austrian house. The badge is the black double-headed eagle surrounded by a blue-enamelled ornamented border, with the inscription Salus et Gloria on a white fillet ; the eagle bears a red Greek cross with gold and blue borders. The Order of Elizabeth, also for ladies, was founded in 1898.

Belgium. — The Order of Leopold, for civil and military merit, was founded in 1832 by Leopold I., with four classes, a fifth being added in 1838. The badge is a white enamelled cross, with gold borders and balls, suspended from a royal crown and resting on a green laurel and oak wreath. In the centre a medallion, surrounded by a red fillet with the motto of the order, L 'union fait la force, bears a golden Belgian lion on a black field. The ribbon is watered red.

KNIGHTHOOD AND CHIVALRY

Dram by William Gibi.

ROYAL VICTORIAN ORDER, (i.) Grand Cross; (ii.) Star. ORDER OF THE INDIAN EMPIRE, (iii.) Baoof. Of Knight Grand Commander; (iv.) Star. THE STAR OF INDIA, (v.) Star; (vi.) Badge of Knight Grand Comuasdbr.

KNIGHTHOOD AND CHIVALRY

Plate III.

Draan by iVilliam G!ih.

ROYAL VICTORIAN ORDER, (i.) Grand Cross; (ii.) Star. ORDER OF THE INDIAN EMPIRE, (iii.) Badge Of Knight Grand Commander; (iv.) Star. THE STAR OF INDIA, (v.) Star; (vi.) Badge of Knight Grand Commander.

ORDERS]

KNIGHTHOOD

863

The Order of the Iron Cross , the badge of which is a black cross with gold borders, with a gold centre bearing a lion, was instituted by Leopold II. in 1867 as an order of civil merit. The military cross was instituted in 1885. There are also the following orders insti- tuted by Leopold II. for service in the Congo State: the Order of the Ajrican Star (1888), the Royal Order of

the Lion (1891) and the Congo Star (1889).

Bulgaria. — The Order of SS Cyril and Methodius was insthuted in 1909 by King Ferdinand to commemorate the elevation of the principality to the position of an independent kingdom. It now takes precedence of the Order of St Alexander, which was founded by Prince Alexander in 1881, and reconstituted by Prince Ferdinand in 1888. There are six classes. The plain white cross, suspended from the Bulgarian crown, bears the name of the patron saint in old Cyrillic letters in the centre.

Denmark. — The Order of the Elephant, one of the chief European orders of knighthood, was, it is said, founded by Christian I. in 1462 ; a still earlier origin has been assigned to it, but its regular institution was that of Christian V. in 1693. The order, exclusive of the sove- reign and his sons, is limited to 30 knights, who must be of the Protestant religion. The badge of the order is illustrated on Plate IV. fig- 5- The ribbon is light watered blue, the collar of alternate gold elephants with blue housings and towers, the star of silver with a purple medallion bearing a silver or brilliant cross surrounded by a silver laurel wreath. The motto is MagnarAme pretium. The Order of the Dannebrog is, according to Danish tradition, of miracu- lous origin, and was founded by Valdemar II. in 1219 as a memorial of a victory over the Esthonians, won by the appearance in the sky of a red banner bearing a white cross. Historically the order dates from the foundation in 1671 by Christian V. at the birth of his son Frederick, the statutes being published in 1693. Originally re- stricted to 50 knights and granted as a family or court decoration, it was reconstituted as an unlimited order of merit in 1808 by Frederick VI.; alterations have been made in 181 1 and 1864. It now consists of three classes — grand cross, commander (two grades), knight, and of one rank of ordinary members {Dannebrogs maender). The badge of the order is, with variations for the different classes, a white enamelled Danish cross with red and gold borders, bearing in the centre the letter W (V) and onthe fourarms the inscription Gud og Kongen (For God and King). The ribbon is white with red edging.

France. — The Legion of Honour, the only order of France, and one which in its higher grades ranks in estimation with the highest European orders, was instituted by Napoleon Bonaparte on the 19th of May 1802 (29 Floreal of the year X.) as a general mili- tary and civil order of merit. All soldiers on whom ” swords of honour ” had been already conferred were declared legionaries ipso facto, and all citizens after 25 years’ service were declared eligible, whatever their birth, rank or religion. On admission all were to swear to co-operate so far as in them lay for the assertion of the principles of liberty and equality. The organiza- tion as laid down by Napoleon in 1804 was as follows: Napoleon was grand master; a grand council of 7 grand officers ad- ministered the order; the order was divided

into 15 ” cohorts ” of 7 grand officers, 20 commanders, 30 officers and 350 legion- aries, and at the headquarters of the cohorts, for which the territory of France was separated into 15 divisions, were main- tained hospitals for the support of the sick and infirm legionaries. Salaries (traitements) varying in each rank were attached to the order. In 1805 the rank of “Grand Eagle ” (now Grand Cross, or Grand Cordon) was instituted, taking precedence of the grand officers. At the Restoration many changes were made, the old military and religious orders were restored, and the Legion of Honour, novfOrdre Royale de la Legion d’Honneur, took thelowest rank. The revolution of July 1830 restored the order to its unique place. The constitution of the order now rests on the decrees of the 16th of March and 24th of November 1852, the law of the 25th of July 1873, the decree of the 29th of December 1892, and the laws of the 16th of April 1895 an d the 28th of January 1897, and a decree of the 26th of June 1900. The president of the republic is the grand master of the order; the administration is in the hands of a grand chancellor, who has a council of the order nominated by the grand ” master. The chancellery is housed in the Palais de la Legion de I’Honneur, which, burnt during the Commune, was rebuilt in 1878. The order consists of the five classes of grand cross (limited to 80), grand officer (200), commander (1000), officers (4000), and chevalier or knight, in which the number is unlimited. These limitations in number do not affect the foreign recipients of the order. Salaries (traite- ments) are attached to the military and naval recipients of the

order when on the active list, viz. 3000 francs for grand cross, 2000 francs for grand officers, 1000 francs for commanders, 250 francs for chevaliers. The numbers of the recipients of the order sans trailement are limited through all classes. In ordinary circumstances twenty years of military, naval or civil service must have been performed before a candidate can be eligible for the rank of chevalier, and promotions can only be made after definite service in the lower rank. Extraordinary service in time of war and extraordinary services in civil life admit to any rank. Women have been decorated, notably Rosa Bonheur, Madame Curie and Madame Bartet. The Napoleonic form of the grand cross and ribbon is illustrated on Plate IV, fig. 6; the cross from which the drawing was made was given to King Edward VII. when prince of Wales in 1863. In the present order of the French Republic the symbolical head of the Republic appears in the centre, and a laurel wreath replaces the imperial crown ; the inscription round the medallion is Republique fran- Qaise. Since 1805 there has existed an institution, Maison d’education de la Legion d’Honneur, for the education of the daughters, granddaughters, sisters and nieces of members of the Legion of Honour. There are three houses, at Saint Denis, at Ecouen and Les Loges (see Dictionnaire de I’ administration fran- chise, by M. Block and E. Magnero, 1905, s.v. ” Decorations “)•

Among the orders swept away at the French Revolution, restored in part at the Restoration, and finally abolished at the revolution of July 1830 were the following: The Order of St Michael was founded by Louis XL' in 1469 for a limited number of knights of noble birth. Later the numbers were so much increased under Charles IX. that it became known as Le Collier a toutes betes. In 1816 the order was granted for services in art and science. In view of the low esteem into which the Order of St Michael had fallen, Henry III. founded in 1578 the Order of the Holy Ghost (St Esprit). The badge of the order was a white Maltese cross decorated in gold, with the gold lilies of France at the angles, in the centre a white dove with wings outstretched, the ribbon was sky blue (cordon bleu). The motto of the order was Duce et auspice. The Order of St Louis was founded by Louis XIV. in 1693 for military merit, and the Order of Military Merit by Louis XV. in 1759, originally for Protestant officers.

Germany. — i. Anhalt. The Order of Albert the Bear, a family order or Hausorden, was founded in 1836 by the dukes Henry of Anhalt-Kothen, Leopold Frederick of Anhalt- Dessau and Alexander Charles of Anhalt-Bernburg. Changes in the constitution have been made at various dates. It now consists of five classes, grand cross, commander (2 classes) and knights (2 classes). The badge is a gold oval bearing in gold a crowned and collared bear on a crenel- lated wall ; below the ring by which the badge is attached to the ribbon is a shield with the arms of the house of Anhalt, on the reverse those of the house of Ascania. Round the oval is the motto Fiürchie Gott und folge seine Befehle. The ribbon is green with two red stripes. The grand master alone wears a collar.

ii. Baden. The Order of Fidelity or Loyalty (Hausorden der Treue) was instituted by William, margrave of Baden-Durlach in 1715, and reconstituted in 1803 by the elector Charles Frederick. There is now only one class, for princes of the reigning house, foreign sovereigns and eminent men of the state. The badge is a red enamelled cross with gold borders and double C's interlaced in the angles ; in the centre a white medallion with red monogram over a green mound surmounted by the word Fidelitas in black; the cross is suspended from a ducal crown. The ribbon is orange with silver edging. The military Order of Charles Frederick was founded in 1807. There are three classes. The badge is a white cross resting on a green laurel wreath, the ribbon is red with a yellow stripe bordered with white. The order is conferred for long and meritori- ous military service. The Order of the Zahringen Lion was founded in 1812 in commemoration of the descent of the reigning house of Baden from the dukes of Zahringen. It has been reconstituted in 1 840 and 1877. It now consists of five classes. The badge is a green enamel cross with gold clasps in the angles; in the central medallion an enamelled representation of the ruined castle of Zahringen. The ribbon is green with two orange stripes. Since 1896 the

Order of Berthold I. has been a distinct order; it was founded in 1877 as a higher class of the Zahringen Lion.

iii. Bavaria. The Order of St Hubert, one of the oldest and, most distinguished knightly orders, was founded in 1444 by duke Gerhard V. of Jiilich-Berg in honour of a victory oyer Count Arnold of Egmont at Ravensberg on the 3rd of November, St Hubert's day. The knights wore a collar of golden hunting horns, whence the order was also known as the Order of the Horn. Statutes were granted in 1476, but the order fell into abeyance at the extinction of the dynasty in 1609. It was revived in 1708 by the elector palatine, John William of Neuberg, and its constitution was altered aft various times, its final form being given by the elector Maximilian Joseph, first king of Bavaria, in 1808. Exclusive of the sovereign and

INSIGNIA OF SOME OF THE PRINCIPAL ORDERS OF KNIGHTHOOD, DRAWN BY GRACIOUS PERMISSION FROM THOSE IN THE POSSESSION OF HIS LATE MAJESTY KING EDWARD VII AND ARRANGED IN ACCORDANCE WITH HIS MAJESTY'S WISHES AND COMMAND.

princes of the blood, and foreign sovereigns and princes, it consists of twelve capitular knights of the rank of count or Freiherr. The badge of the order and the ribbon are illustrated in Plate V. fig. 3. The central medallion represents the conversion of St Hubert. The collar is composed of gold and blue enamel figures of the conversion linked by the Gothic monogram I.T.V., In Trau Vast, the motto of the order, alternately red and green. . The Order of St George, said to have been founded in the 12th cen- tury as a crusading order and revived by the emperor Maximilian I. in 1494, dates historically from its institution in 1729 by the elector Charles Albert, afterwards the emperor Charles VII. It was confirmed by the elector Charles Theodore in 1778 and by the elector Maximilian Joseph IV. as the second Bavarian order. Various new statutes have been granted from 1827 to 1875. The order is divided into two branches, " of German and foreign lan- guages," and it also has a " spiritual class." The members of the order must be Roman Catholics. The badge is a blue enamelled cross with white and gold edging suspended from the mouth of a gold lion's head; in the angles of the cross are blue lozenges containing the letters V.I. B.I. , Vtrgini Immaculatae Bavaria Immaculata. The central medallion contains a figure of the Immaculate Conception. The medallion on the reverse contains a

figure of St George and the Dragon and the corresponding initials J.U.P.F., Justus ut Palma Florebit, the motto of the order. Besides the above Bavaria possesses the Military Order of Maximilian Joseph, 1 806, and the Civil Orders of Merit of St Michael, 1693, and of the Bavarian Crown, 1808, and other minor orders and decorations, civil and military. There are also the two illustrious orders for ladies, the Order of Elizabeth, founded in 1766, and the Order of Theresa, in 1827. The foundations of St Anne of Munich and of St Anne of Wiirzburg for ladies are not properly orders.

iv. Brunswick. The Order of Henry the Lion, for military and civil merit, was founded by Duke William in 1834. There are five classes, and a cross of merit of two classes. The badge is a blue enamelled cross dependent from a lion surmounted by the ducal crown ; the angles of the cross are filled by crowned W's and the centre bears the arms of Brunswick, a crowned pillar and a white horse, between two sickles. The ribbon is deep red bordered with yellow.

v. Hanover, The Order of St George (one class only) was insti- tuted by King Ernest Augustus I. in 1839 as the family order of the house of Hanover ; the Royal Guelphic Order (three classes) by George, prince regent, afterwards George IV. of Great Britain, in 1815; and the Order of Ernest Augustus by George V. of Hanover in 1865. These orders have not been conferred since 1866, when Hanover ceased to be a kingdom, and the Royal Guelphic Order, which from its institution was more British than Hanoverian, not since the death of William IV. in 1837. The last British grand cross was the late duke of Cambridge.

vi. Hesse. Of the various orders founded by the houses of Hesse- Cassel and Hesse-Darmstadt the following are still bestowed in the grand duchy of Hesse. The Order of Louis, founded by the grand duke Louis I. of Hesse-Darmstadt in 1807; there are five classes; the black, red and gold bordered cross bears the initial L. in the centre, the ribbon is black with red borders ; the Order of Philip the Magnanimous, founded by the grand duke Louis II. in 1840 has five classes; the white cross of the badge bears the effigy of Philip sur- rounded by the motto Si Deus vobiscum quis contra nos. The Order of the Golden Lion was founded in 1 770 by the landgrave Frederick II. of Hesse-Cassel, the knights are 41 in number and take precedence of the members of the two former orders. The badge is an open oval of gold with the Hessian lion in the centre. The ribbon is crimson.

vii. Mecklenburg. The grand duchies of Mecklenburg-Schwerin and Mecklenburg-Strelitz possess jointly the Order of the Wendish Crown, founded in 1864 by the grand dukes Frederick Francis II. of Schwerin and Frederick William of Strelitz; there are four classes, with two divisions of the grand cross, and aiso an affiliated cross of merit; the grand cross can be granted to ladies. The badge is a white cross bearing on a blue centre the Wendish crown, surrounded by the motto, for the Schwerin knights, Per aspera ad astra, for the Strelitz knights, Avilo virel honore. The Order of the Griffin, founded in 1884 by Frederick Francis III. of Schwerin, was made common to the duchies in 1904.

viii. Oldenberg. The Order of Duke Peter Frederick Louis, a family order and order of merit, was founded by the grand duke Paul Frederick Augustus in memory of his father in 1838. It has two divisions, each of five classes, of capitular knights and honorary members. ‘ The badge is a white gold bordered cross suspended from a crown, in the centre the crowned monogram P.F.L. sur- rounded by the motto Ein Gott, Ein Recht, Eine Wahrheit; the ribbon is dark blue bordered with red.

ix. Prussia. The Order of the Black Eagle, one of the most distinguished of European orders, was founded in 1701 by theelector of Brandenburg, Frederick I., in memory of his coronation as king of Prussia. The order consists of one class only and the original statutes limited the number, exclusive of the princes of the royal house and foreign members, to 30. But the number has been exceeded. It is only conferred on those of royal lineage and upon high officers of state. It confers the nobiliary particle von. Only

those who have received the Order of the Red Eagle are eligible. An illustration of the badge of the order with ribbon is given on Plate IV. fig. 3. The star of silver bears the black eagle on an orange ground surrounded by a silver fillet on which is the motto of the order Suum Cuique. The collar is formed of alternate black eagles and a circular medallion with the motto on a white centre surrounded by the initials F.R. repeated in green, the whole in a circle of blue with four gold crowns on the exterior rim. The Order of the Red Eagle, the second of the Prussian orders, was founded originally as the Order of Sincerity (L’Ordre de la Sincerite) in 1 70s by George William, hereditary prince of Brandenburg-Bayreuth. The original constitu- tion and insignia are now entirely changed, with the exception of the red eagle which formed the centre of the cross of the badge. The order had almost fallen into oblivion when it was revived in 1734 by the margrave George Frederick Charles as the Order of the Bran- denburg Red Eagle. It consisted of 30 nobly born knights. The numbers were increased and a grand cross class added in 1759. On the cession of the principality to

Prussia in 1791 the order was transferred and King Frederick William raised it to that place in Prussian orders which it has since maintained. The order was divided into four classes in 1810 and there are now five classes with numerous sub-divisions. It is an order of civil and military merit. The grand cross resembles the badge of the Black Eagle, but is white and the eagles in the corners red, the central medallion bearing the initials W.R. (those of William I.) surrounded by a blue fillet with • the motto Sincere et Constanter. The numerous classes and sub- divisions have exceedingly complicated distinguishing marks, some bearing crossed swords, a crown, or an oak-leaf surmounting the cross. The ribbon is white with two orange stripes.

The Order for Merit (Ordre pour le Merite) , one of the most highly prized of European orders of merit, has now two divisions, military and for science and art. It was originally founded by the electoral prince Frederick, afterwards Frederick I. of Prussia, in 1667 as the Order of Generosity; it was given its present name and granted for civil and military distinction by Frederick the Great, 1740. In 1 8 10 the order was made one for military merit against the enemy in the field exclusively. In 1840 the class for distinction for science and art, or peace class (Friedensklasse) was founded by Frederick William IV., for those " who have gained an illustrious name by wide recognition in the spheres of science and art." The number is limited to 30 German and 30 foreign members. The Academy of Sciences and Arts on a vacancy nominates three candidates, from which one is selected by the king. It is interesting to note that this was the only distinction which Thomas Carlyle would accept. The badge of the military order is a blue cross with gold uncrowned eagles in the angles; on the topmost arm is the initial F., with a crown; on the other arms the inscription Pour le Merite. The ribbon is black with a silver stripe at the edges. In 1866 a special grand cross was instituted for the crown prince (afterwards Frederick ill.) and Prince Frederick Charles. It was in 1879 granted to Count von Moltke as a special distinction. The badge of the class for science or art is a circular medallion of white, with a gold eagle in the centre sur- rounded by a blue border with the inscription Pour le Merite ; on the white field the letters "3F. II. four times repeated, and four crowns in gold projecting from the rim. The ribbon is the same as for the military class. The Order of the Crown, founded by William I. in 1861, ranks with the Red Eagle. There are four classes, with many subdivisions. Other Prussian orders are the Order of William, instituted by William II. in 1896; a Prussian branch of the knights of St John of Jerusalem, Johanniter Orden, in its present form dating from 1893 ; and the family Order of the House of Hohenzollern, founded in 1 85 1 by Frederick William IV. There are two divisions, military and civil, divided into four classes. The military badge is a white cross with black and gold edging, resting on a green oak

and laurel wreath; the central medallion bears the Prussian Eagle with the arms of Hohenzollern, and is surrounded by a blue fillet with the motto Vom Fels zum Meer; the civil badge is a black eagle, with the head encircled with a blue fillet with the motto. There are also for ladies the Order of Service, founded in 1814 by Frederick William III., in one class, but enlarged in 1850 and in 1865. The decoration of merit for ladies {Verdienst-kreuz), founded in 1870, was raised to an order in 1907. For the famous military decoration, the Iron Cross, see Medals.

x. Saxony. — The Order of the Crown of Rue (Rauten Krone) was founded as a family order by Frederick Augustus I. in 1807. It is of one class only, and the sons and nephews of the sovereign are born knights of the order. It is granted to foreign ruling princes and subjects of high rank. The badge is a pale green enamelled cross resting on a gold crown with eight rue leaves, the centre is white with the crowned monogram of'the founder surrounded by a green circlet of rue; the star bears in its centre the motto Providentiae Memor. The ribbon is green. Other Saxon orders are the military Order of St Henry, for distinguished service in the field, founded in 1736 in one class; since 1829 it has had four classes; the ribbon is sky blue with two yellow stripes, the gold cross bears in the centre the effigy of the emperor Henry II.; the Order of Albert, for civil and military merit, founded in 1850 by Frederick Augustus II. in memory of Duke Albert the Bold, the founder of the Albertine line of Saxony, has six classes; the Order of Civil Merit, was founded in

Drawn by William Gftfc

Ci.) Tim St. ANOnitw (Ruiiin)- (ii> Ti« QoiMN Flebcb (Sjain). (uL) Tim Black Eacle (I'nuab). (iv.) Tim Toweh axb Swt>»»

KNIGHTHOOD AND CHIVALRY II.

Plate IV.

- 1

- J '

Dra&it by WWiem Gibb,

(t.) Tim St. AjJOkitvv (Russia), (ii) The Colurm Fleece (Ssmn). (in.) Tub Dlace Eacle (iYusab). (iv.J The Towek axd Svm»n

1815. For ladies there are the Order of Sidonia, 1870, in memory of the wife of Albert the Bold, the mother {Stamm- Mutter) of the Albertine line; and the Maria Anna Order, 1906.

xi. The duchies of Saxe Altenburg, Saxe Coburg Gotha and Saxe Meiningen have in common the family Order of Ernest, founded in 1833 in memory of Duke Ernest the Pious of Saxe Gotha and as a revival of the Order of German Integrity (Orden der deutschen Redlich- keit) founded in 1690. Saxe Coburg Gotha and Saxe Meiningen have also separate crosses of merit in science and art.

xii. Saxe Weimar. — The Order of the White Falcon or of Vigilante was founded in 1732 and renewed in 1815.

xiii. Wiirttemberg. — The Order of the Crown of Wiirttemberg was founded in 1818, uniting the former Order of the Golden Eagle and an order of civil merit. It has five classes. The badge is a white cross surmounted by the royal crown, in the centre the initial F surrounded by a crimson fillet on which is the motto Furchtlos und Treu; in the angles of the cross are four golden leopards; the ribbon is crimson with two black stripes. Besides the military Order of Merit founded in 1759, and the silver cross of merit, 1900, Wiirttemberg has also the Order of Frederick, 1830, and the Order of Olga, 1871, which is granted to ladies as well as men.

Greece. — The Order of the Redeemer was founded as such in 1833 by King Otto, being a conversion of a decoration of honour instituted in 1829 by the National Assembly at Argos. There are five classes, the numbers being regulated for each. An illustration of the badge and ribbon of the grand cross is given on Plate V. fig. I.

Holland. — The Order of William, for military merit, was founded in 1815 by William I.; there are four classes; the badge is a white cross resting on a green laurel Burgundian cross, in the centre the Burgundian flint-steel, as in the order of the Golden Fleece. The motto Voer Moed, Belied, Trouw (For Valour, Devotion, Loyalty), appears on the arms of the cross. The cross is surmounted by a jewelled crown; the ribbon is orange with dark blue edging. The Order of the Netherlands Lion, for civil merit, was founded in 1818; there are four classes. The family Order of the Golden Lion of Nassau passed in 1890 to the grand duchy of Luxembourg (see under Luxemburg). In 1892 Queen Wilhelmina instituted the Order of Orange-

Nassau with five classes. The Teutonic Order (q.v.), surviving in the Ballarde (Bailiwick) of Utrecht, was officially established in the Netherlands by the States General in 1580. It was abolished by Napoieon in 181 1 and was restored in 1815.

Italy. — The Order of the Annunziata, the highest order of knight- hood of the Italian kingdom, was instituted in 1362 by Amadeus VI., count of Savoy, as the Order of the Collare or Collar, from the silver collar made up of love-knots and roses, which was its badge, in honour of the fifteen joys of the Virgin; hence the number of the knights was restricted to fifteen, the fifteen chaplains recited fifteen masses each day, and the clauses of the original statute of the order were fifteen (Amadeus VIII. added five others in 1434). Charles III. decreed that the order should be called the Annunziata, and made some other alterations in 1518. His son and successor, Emmanuel Philibert, made further modifications in the statute and the costume. The church of the order was originally the Carthusian monastery of Pierre-chatel in the district of Bugey, but after Charles Emmanuel I. had given Bugey and Bresse to France in 1601 the church of the order was transferred to the Camaldolese monastery near Turin. That religious order having been suppressed at the time of the French Revolution, King Charles Albert decreed in 1840 that the Carthusian church of Collegno should be the chapel of the order. The knights of the Annunziata have the title of "cousins of the king," and enjoy precedence overall the other officials of the state. The costume of the order is of white satin embroidered in silk, with a purple velvet cloak adorned with roses and gold embroidery, but it is now never worn; in the collar the motto Fert is inserted, on the meaning of which there is great uncertainty, 1 and from it hangs a pendant enclosing a medallion representing the Annunciation (see Plate IV. fig. 7). An account of the order is given in Count Luigi Cibrario's Ordini Cavallereschi (Turin, 1846) with coloured plates of the costume and badges.

The Order of St Maurice and St Lazarus (SS Maurizio e Lazzaro), is a combination of two ancient orders. The Order of St Maurice was originally founded by Amadeus VIII., duke of Savoy, in 1434, when he retired to the hermitage of Ripaille, and consisted of a group of half-a-dozen councillors who were to advise him on such affairs of state as he continued to control. When he became pope as Felix V. the order practically ceased to exist. It was re-established at the instance of Emmanuel Philibert by Pope Pius V. in 1572 as a military and religious order, and the following year it was united to that of St Lazarus by Gregory XIII. The latter order had been founded as a military and religious community at the time of the Latin kingdom of Jerusalem with the object of assisting lepers, many of whom were among its members. ' Popes, princes and nobles endowed it with estates and privileges, including that of administering and succeeding to the property of

lepers, which eventually led to grave

1 It has been taken as the Latin word meaning ” he bears ” or as representing the initials of the legend Fortitudo Ejus Rhodum Tenuit, with an allusion to a defence of the island of Rhodes by an ancient count of Savoy.

abuses. With the advance of the Saracens the knights of St Lazarus, when driven from the Holy Land and Egypt, migrated to France (1291) and Naples (131 1), where they founded leper hospitals. The order in Naples, which alone was afterwards recognized as the legiti- mate descendant of the Jerusalem community, was empowered to seiEe and confine anyone suspected of leprosy, a permission which led to the establishment of a regular inquisitorial system of blackmail. In the 15th and 16th centuries dissensions broke out among the knights, and the order declined in credit and wealth, until finally the grand master, Giannotto Castiglioni, resigned his position in favour of Emmanuel Philibert, duke of Savoy, in 1571. Two years later the orders of St Lazarus and St Maurice were incorporated into one community, the members of which were to devote themselves to the defence of the Holy See and to fight its enemies as well as to continue assisting lepers. The galleys of the order subsequently took part in various expeditions against the Turks and the Barbary pirates. Leprosy, which had almost disappeared in the 17th cen- tury, broke out once more in the 18th, and in 1773 a hospital was established by the order at Aosta, made famous by Xavier de Maistre’s tale, Le Lepreux de la cite d’Aoste. The statutes were published in 1816, by which date the order had lost its military character; it was reformed first by Charles Albert (1831), and later by Victor Emmanuel II., king of Italy (1868). The knighthood of St Maurice and St Lazarus is now a dignity conferred by the king of Italy (the grand master) on persons distinguished in the public service, science, art and letters, trade, and above all in charitable works, to which its income is devoted. There are five classes. The badge of the combined order is composed of the white cross with trefoil termination of St Lazarus resting on the green cross of St Maurice; both crosses are bordered gold. The first four classes wear the badge suspended from a royal crown. The ribbon is dark green.

See L. Cibrario, Descrizione storica degli Ordini Cavallereschi, vol. i. (Turin, 1846); Calendario Reale, an annual publication issued in Rome.

The military Order of Savoy was founded in 1815 by Victor Emmanuel of Sardinia; badge modified 1855 and 1857. It has now five classes. The badge is a white cross, the arms of which expand and terminate in an

obtuse angle ; round the cross is a green laurel and oak wreath; the central medallion is red, bearing in gold two crossed swords, the initials of the founder and the date 1855. The ribbon is red with a central stripe of blue. The Civil Order of Savoy, founded in 1831 by Charles Albert of Sardinia, is of one class, and in statutes of 1868 is limited to 60 members. The badge is the plain Savoy cross in blue, with silver medallion, the ribbon is blue with white borders. The Order of the Crown of Italy was founded in 1868 by Victor Emmanuel II. in commemoration of the union of Italy into a kingdom. There are five classes.

Luxemburg. — The Order of the Golden Lion was founded as a family order of the house of Nassau by William III. of the Netherlands and Adolphus of Nassau jointly. On the death of William in 1890 it passed to the grand duke of Luxemburg; it has only one class. The Order of Adolphus of Nassau, for civil and military merit, in four classes, was founded in 1858, and the Order of the Oak Crown as a general order of merit, in five classes, in 1 841 , modified 1 858.

Monaco. — The Order of St Charles, five classes, was founded in 1858 by Prince Charles III. and remodelled in 1863. It is a general order of merit.

Montenegro. — The Order of St Peter, founded in 1852, is a family order, in one class, and only given to members of the princely family; the Order of Danilo, or of the Independence of Montenegro, is a general order of merit, in four classes, with subdivisions, also founded in 1852. Norway. — The Order of St Olaf was founded in 1847 by Oscar I. in honour of St Olaf, the founder of Christianity in Norway, as a general order of merit, military and civil. There are three classes, the last two being, in 1873 and 1890, subdivided into two grades each. The badge and ribbon is illustrated on Plate V, fig. 5. The reverse bears the motto Ret og Sandhed (Right and Truth). The Order of the Norwegian Lion, founded in 1904 by Oscar II., has only one class; foreigners on whom the order is conferred must be sovereigns or heads of- states or members of reigning houses.

Papal.' — The arrangement and constitution of the papal orders was remodelled by a brief of Pius X. in 1905. The Order of Christ, the supreme pontifical order, is of one class only; for the history of this ancient order see Portugal (infra). The badge and ribbon is the same as the older Portuguese form. The Order of Pius was founded in 1847 by Pius IX.; there are now three classes; the badge is an eight-pointed blue star with golden flames between the rays, a white centre bears the founder's name ; the ribbon is blue with two red stripes at each border. The Order of St Gregory the Great, founded in 1S31, is in two divisions, civil and military, each having three classes. The Order of St Sylvester was originally founded as the Order of the Golden Spur by Paul IV. in 1559 as a military body,

though tradition assigns it to Constantine the Great and Pope Sylvester. It was reorganized as an order of merit by Gregory XVl. in 1841. In 1905 the order was divided into three classes, and a separate order, that of the Golden Spur or Golden Legion (Militia Aurata) was established, in one class, with the numbers limited to a hundred. The cross Pro Ecdesia et Pontifice, instituted by Leo XHl.

INSIGNIA OF SOME OF THE PRINCIPAL ORDERS OF KNIGHTHOOD, DRAWN BY GRACIOUS PERMISSION FROM THOSE IN THE POSSESSION OF HIS LATE MAJESTY KING EDWARD VII AND ARRANGED IN ACCORDANCE WITH HIS MAJESTY'S WISHES AND COMMAND.

in 1888 is a decoration, not an order. There remains the venerable Order of the Holy Sepulchre, of which tradition assigns the foundation to Godfrey de Bouillon. It was, however, probably founded as a military order for the protection of the Holy Sepulchre by Alexander VI. in 1496. The right to nominate to the order was shared with the pope as grand master by the guardian of the Patres Minores in Jerusalem, later by the Franciscans, and then by the Latin patriarch in Jerusalem. In 1905 the latter was nominated grand master, but the pope reserves the joint right of nomination. The badge of the order is a red Jerusalem cross with red Latin crosses in the ˆngles.

Portugal. — The Order of Christ was founded on the abolition of the Templars by Dionysius or Diniz of Portugal and in 1318 in conjunc- tion with Pope John XXII., both having the right to nominate to the order. The papal branch survives as a distinct order. In 1522 it was formed as a distinct Portuguese order and the grand mastership vested in the crown of Portugal. In 1789 its original religious aspect was abandoned, and with the exception that its members must be of the Roman Catholic faith, it is entirely secularized. There are three classes. The original badge of the order was a long red cross with expanded flat ends bearing a small cross in white ; the ribbon is red. The modern badge is a blue enamelled cross resting on a green laurel wreath ; the central medallion, in white, con- tains the old red and white cross. The older form is worn with the collar by the grand-crosses. The Order of the Tower and Sword was founded in 1808 in Brazil by the regent, afterwards king John VI. of Portugal, as a revival of the old Order of the Sword, said to have been founded by Alfonso V. in 1459. It was remodelled in 1832 under its present name and constitution as a

general order of military and civil merit. There are five classes. The badge of the order and ribbon is illustrated on Plate IV. fig 4. The Order of St Benedict of Aviz (earlier of Evora), founded in 1 162 as a religious military order, was secularized in 1789 as an order of military merit, in four classes. The badge is a green cross fleury; the ribbon is green. The Order of St James of the Sword, or James of Compostella, is a branch of the Spanish order of that name (see under Spain). It also was secularized in 1789, and in 1862 was constituted an order of merit for science, literature and art, in five classes. The badge is the lily-hilted sword of St James, enamelled red with gold borders; the ribbon is violet. In 1789 these three orders were granted a common badge uniting the three separate crosses in a gold medallion ; the joint ribbon is red, green and violet, and to the separate crosses was added a red sacred heart and small white cross. There are also the Order of Our Lady of Villa Vicosa (1819), for both sexes, and the Order of St Isabella, 1801, for ladies.

Rumania. — The Order of the Star of Rumania was founded in 1877, and the Order of the Crown of Rumania in 1 88 1, both in five classes, for civil and military merit ; the ribbon of the first is red with blue borders, of the second light blue with two silver stripes.

Russia. — The Order of St Andrew was founded in 1698 by Peter the Great. It is the chief order cf the empire, and admission carries with it according to the statutes of 1720 the orders of St Anne, Alexander Nevsky, and the White Eagle; there is only one class. The badge and ribbon is illustrated in Plate IV. fig 5. The collar is composed of three members alternately, the imperial eagle bearing on a red medallion a figure of St George slaying the Dragon, the badge of the grand duchy of Moskow, the cipher of the emperor Paul I. in gold on a blue ground, surmounted by the imperial crown, and surrounded by a trophy of weapons and green and white flags, and a circular red and gold star with a blue St Andrew's cross. The Order of St Catherine, for ladies, ranks next to the St Andrew. It was founded under the name of the Order of Rescue by Peter the Great in 1 714 in honour of the empress Catherine and the part she had taken in rescuing him at the battle of the Pruth in 171 1. There are two classes. The grand cross is only for members of the imperial house and ladies of the highest nobility. The second class was added in 1797. The badge of the order is a cross of diamonds bearing in a medallion the effigy of St Catherine. The ribbon is red with the motto For Love and Fatherland in silver letters. The Order of St Alexander Nevsky was founded in 1725 by the empress Catherine I. There is only one class. The badge is a red enamelled cross with gold eagles in the angles, bearing in a medallion the mounted effigy of St Alexander Nevsky. The ribbon is red. The Order of the While Eagle was founded in 17 13 by Augustus II. of Poland and was adopted as a Russian order in 1831 ; there is one class. The Order of St

Anne was founded by Charles Frederick, duke of Holstein- Gottorp in 1735 in honour of his wife, Anna Petrovna, daughter of Peter the Great. It was adopted as a Russian order in 1797 by their grandson, the emperor Paul. There are four classes. Other orders are those of St Vladimir, founded by Catherine II., 1782, four classes, and of St Stanislaus, founded originally as a Polish order by Stanis- laus Augustus Poniatowski in 1765, and adopted as a Russian order in 1831.

The military Order of St George was founded by the empress Catherine II. in 1769 for military service on land and sea, with four classes; a fifth class for non-commissioned officers and men, the St George's Cross, was added in 1807. The badge is a white cross with gold borders, with a red central medallion on which is the figure of St George slaying the dragon. The ribbon is orange with three black stripes.

Servia. — The Order of the White Eagle, the principal order, was founded by Milan I. in 1882, statutes 1883, in five classes; the ribbon is blue and red ; the Order of St Sava, founded 1883, also in five classes, is an order of merit for science and art ; the Order of the Star of Karageorgevitch, four classes, was founded by Peter I. in 1904. The orders of Milosch the Great, founded by Alexander I. in 1898 and of Takovo, founded originally by Michael Obrenovitch in 1863, reconstituted in 1883, are since the dynastic revolution of 1903 no longer bestowed. The Order of St Lazarus is not a general order, the cross and collar being only worn by the king.

Spain. — The Spanish branch of the Order of the Golden Fleece has been treated above. The three most ancient orders of Spain — of St James of Compostella, or St James of the Sword, of Alcantara and of Calatrava — still exist as orders of merit, the first in three classes, the last two as orders of military merit in one class. They were all originally founded as military religious orders, like the crusading Templars and the Hospitallers, but to fight for the true faith against the Moors in Spain. The present badges of the orders represent the crosses that the knights wore on their mantles. That of St James of Compostella is the red lily-hilted sword of St James; the ribbon is also red. The other two orders wear the cross fleury — Alcantara red, Calatrava green, with corresponding ribbons. A short history of these orders may be here given. Tradition gives the foundation of the Order of Knights of St James of Compostella to Ramiro II., king of Leon, in the 10th century, to commemorate a victory over theMoors, but, historically the order dates from the confirmation in 1175 by Pope Alexander III. It gained great reputation in the wars against the Moors and became very wealthy. In 1493 the grand-mastership was annexed by Ferdinand the Catholic, and was vested permanently in the crown of Spain by Pope Adrian VI. in 1522.

The Order of Knights of Alcantara, instituted about 1 1 56 by the brothers

Don Suarez and Don Gomez de Barrientos for protection against the Moors. In 1 177 they were confirmed as a religious order of knighthood under Benedictine rule by Pope Alexander III. Until about 1213 they were known as the Knights of San Julian del Pereyro; but when the defence of Alcantara, newly wrested from the Moors by Alphonso IX. of Castile, was entrusted to them they took their name from that city. For a considerable time they were in some degree subject to the grand master of the kindred order of Calatrava. Ultimately, however, they asserted their indepen- dence by electing a grand master of their own, the first holder of the office being Don Diego Sanche. During the rule of thirty-seven successive grand masters, similarly chosen, the influence and wealth of the order gradually increased until the Knights of Alcantara were almost as powerful as the sovereign. In 1494-1495 Juan de Zufiiga was prevailed upon to resign the grand-mastership to Ferdinand, who thereupon vested it in his own person as king; and this arrange- ment was ratified by a bull of Pope Alexander VI., and was declared permanent by Pope Adrian VI. in 1523. The yearly income of Zufiiga at the time of his resignation amounted to 150,000 ducats. In 1540 Pope Paul III. released the knights from the strictness of Benedictine rule by giving them permission to marry, though second marriage was forbidden. The three vows were henceforth obedientia, castitas conjugalis and conversio morum. In modern times the his- tory of the order has been somewhat chequered. When Joseph Bonaparte became king of Spain in 1808, he deprived the knights of their revenues, which were only partially recovered on the restora- tion of Ferdinand VII. in 1814. The order ceased to exist as a spiritual body in 1835.

The Order of Knights of Calatrava was founded in 1 158 by Don Sancho III. of Castile, who presented the town of Calatrava, newly wrested from the Moors, to them to guard. In 1164 Pope Alexan- der III. granted confirmation as a religious military order under Cistercian rule. In 1197 Calatrava fell into the hands of the Moors and the order removed to the castle of Salvatierra, but recovered their town in 1212. In 1489 Ferdinand seized the grand- mastership, and it was finally vested in the crown of Spain in 1523. The order became a military order of merit in 1808 and was reorga- nized in 1874. The Royal and Illustrious Order of Charles III. was founded in 1771 by Charles III., in two classes; altered in 1804, it was abolished by Joseph Bonaparte in 1809, together with all the Spanish orders except the Golden Fleece, and the Royal Order of the Knights of Spain was established. In 1814 Ferdinand VII. revived the order, and in 1847 it received its present constitution, viz. of three classes (the commanders in two divisions). The badge of the order is a blue and white cross suspended from a green laurel wreath, in the angles are golden lilies, and the oval centre bears a figure of the Virgin in a golden glory. The ribbon is blue and white. The Order of Isabella the Catholic was founded in

18 15 under the patronage of St Isabella, wife of Diniz of Portugal; originally instituted to reward loyalty in defence of the Spanish possessions in America, it is now a general order of merit, in three classes. The badge is a red rayed cross with gold rays in the angles, in the centre a representation of the pillars of Hercules; the cross is attached to the yellow and white ribbon by a green laurel wreath. Other Spanish orders are the Maria Louisa, 1792, for noble ladies; the military and naval orders of merit of St Ferdinand, founded by the Cortes in 181 1, five classes; of St Ermenegild {Hermenegildo), 1814, three classes, of Military Merit and Naval Merit, 1866, and of Maria Christina, 1890; the Order of Beneficencia for civil merit, 1856; that of

Plate V.

i

(I.) The Redeemer (Greece), (ii.) The Order ofthkK.vightsofSt. John or Jerusalem (English Branch. Badge Df the Sovereign and Patron), (iii.) The St. Hubert (Bavaria), (iv.) The St. Stephen (Hungary), (v.) The St. Olak (Norway), (vi.) The Seraphim (Sweden).

KNIGHTHOOD AND CHIVALRY

i

Drmrn by William GM.

J

(L) The Rkdeejibr (Greece), (ii.) The Order of tub Knights of St. John of Jerusalem (English Branch. Badge of tbc Sovereign and Patron), (iii.) The St. Hubeht (Bavaria), (iv.) The St. Stephen (Hungary), (v.) The St. Olaf (Norway), (vi.) THESERAPiiiM(Swedcn).

Alfonso XII. for merit in science, literature and art, 1902, and the Civil Order of Alfonso XII., 1902.

Sweden. — The Order of the Seraphim (the ” Blue Ribbon “). Tradi- tion attributes the foundation of this most illustrious order of knight- hood to Magnus I. in 1280, more certainty attaches to the fact that the order was

in existence in 1336. In its modern form the order dates from its reconstitution in 1748 by Frederick I., modified by statutes of 1798 and 1814. Exclusive of the sovereign and the princes of the blood, the order is limited to 23 Swedish and 8 foreign members. The native members must be already members of the Order of the Sword or the Pole Star. There is a prelate of the order which is administered by a chapter; the chapel of the knights is in the Riddar Holmskyrka at Stockholm. The badge and ribbon of the grand cross is illustrated on Plate V. fig. 6. The collar is formed of alternate gold seraphim and blue enamelled patriarchal crosses. The motto is lesus Hominum Salvalor. The Order of the Sword (the " Yellow Ribbon "), the principal Swedish military order, was founded, it is said, by Gustavus I. Vasa in 1522, and was re-estab- lished by Frederick I., with the Seraphim and the Pole Star in 1748; modifications have been made in 1798, 1 8 14 and 1889. There are five classes, with subdivisions. The badge is a white cross, in the angles gold crowns, the points of the cross joined by gold swords entwined with gold and blue belts, in the blue centre an upright sword with the three crowns in gold, the whole surmounted by the royal crown The ribbon is yellow with blue edging. The Order of the Pole Star (Polar Star, North Star, the " Black Ribbon "), founded in 1748 for civil merit, has since 1844 three classes. The white cross bears a five-pointed silver star on a blue medallion. The ribbon is black. The Order of Vasa (the " Green Ribbon "), founded by Gustavus III. in 1772 as an order of merit for services rendered to the national industries and manufactures, has three classes, with subdivisions. The white cross badge bears on a blue centre the charge of the house of Vasa, a gold sheaf shaped like a vase with two handles. The ribbon is green. The Order of Charles XIII., founded in 181 1, is granted to Freemasons of high degree. It is thus quite unique.

Turkey. — The Nischan-i-Imtiaz, or Order of Privilege, was founded by Abdul Hamid II. in 1879 as a general order of merit in one class; the Nischan-el-Iftikhar, or Order of Glory, also one class, founded 1831 by Mahmoud II.; the Nischan-i-Mejidi, the Mejidieh, was founded as a civil and military' order of merit in 1851 by Abdul Medjid. There are five classes; the badge is a silver sun of seven clustered rays, with crescent and star between each cluster; on a gold centre is the sultan's name in black Turkish lettering, surrounded by a red fillet inscribed with the words Zeal, Devotion, Loyalty; it is suspended from a red crescent and star; the ribbon is red with green borders. The khedive of Egypt has authority, delegated by the sultan, to grant this order. The Nischan-i-Osmanie, the Osmanieh, for civil and military merit, was founded by Abdul Aziz in 1862 ; it has four classes. The badge is a gold sun with seven gold-bordered green rays; the red centre bears the crescent, and it is also suspended from a gold crescent and star; the ribbon is green bordered with red. The Nischan-i-Schefakat of Compassion or Benevolence, was instituted for ladies, in three classes, in

1878 by the sultan in honour of the work done for the non-combatant victims of the Russo-Turkish war of 1877 in connexion with the Turkish Compassionate Fund started by the late Baroness Burdett-Coutts. She was one of the first to receive the order. There are also the family order, for Turkish princes, the Hane'dani-Aii-Osman, founded in 1893, and theErtogroul, in 1903.

Non-European Orders. — Of the various states of Central and South America, Nicaragua has the American Order of San Juan or Grey Town, founded in 1857, > n three classes; and Venezuela that of the Bust of Bolivar, 1854, fi ve classes; the ribbon is yellow, blue and red. Mexico has abolished its former orders, the Mexican Eagle, 1865, and Our Lady of Guadalupe, 1853; as has Brazil those of the Southern Cross, 1822, Horn Pedro I., 1826, the Rose, 1829, and the Brazilian branches of the Portuguese orders of Christ, St Benedict of Aviz and St James. The republican Order of Columbus, founded in 1890, was abolished in 1891.

China. — There are no orders for natives, and such distinctions as are conferred by the different coloured buttons of the mandarins, the grades indicated by the number of peacocks' feathers, the gift of the yellow jacket and the like, are rather insignia of rank or per- sonal marks of honour than orders, whether of knighthood or merit, in the European sense. For foreigners, however, the emperor in 1882 established the sole order, that of the Imperial Double Dragon, in five classes, the first three of which are further divided into three grades each, making eleven grades in all. The recipients eligible for the various classes are graded, from the first grade of the first class for reigning sovereigns down to the fifth class for merchants and manufacturers. The insignia of the order are unique in shape and decoration. Of the three grades of the first class the badge is a rectangular gold and yellow enamel plaque, decorated with two upright blue dragons, with details in green and white, between the heads for the first grade a pearl, for the second a ruby, for the third a coral, set in green, white and gold circles. The size of the plaque varies for the different classes. The badges of the other four classes are round plaques, the first three with indented edges, the last plain ; in the second class the dragons are in silver on a yellow and gold

ground, the jewel is a cut coral ; the grades differ in the colour, shape, &c, of the borders and indentations; in the third class the dragons are gold, the ground green, the jewel a sapphire; in the fourth the silver dragons are on a blue ground, the jewel a lapis lazuli ; in the fifth green dragons on a silver ground, the jewel a pearl. The ribbons, decorated with embroidered dragons, differ for the various grades and classes.

Japan. — The Japanese orders have all been instituted by the emperor

Mutsu Hito. In design and workmanship the insignia of the orders are beautiful examples of the art of the native enamellers. The Order of the Chrysanthemum (Kikkwa Daijasho), founded in 1877, has only one class. It is but rarely conferred on others than members of the royal house or foreign rulers or princes. The badge of the order may be described as follows: From a centre of red enamel representing the sun issue 32 white gold-bordered rays in four sharply projecting groups, between the angles of which are four yellow conventional chrysanthemum flowers with green leaves forming a circle on which the rays rest; the whole is suspended from a larger yellow chrysanthemum. The ribbon is deep red bordered with purple. The collar, which may be granted with the order or later, is composed of four members repeated, two gold chrysanthemums, one with green leaves, the other surrounded by a wreath of palm, and two elaborate arabesque designs. The Order of the Paulownia Sun (Tokwa Daijasho), founded in 1888, in one class, may be in a sense regarded as the highest class of the Rising Sun (Kzokujitsasho) founded in eight classes, in 1875. The badge of both orders is essentially the same, viz. the red sun with white and gold rays; in the former the lilac flowers of the Paulownia tree, the flower of the Tycoon's arms, take a prominent part. The ribbon of the first order is deep red with white edging, of the second scarlet with white central stripe. The last two classes of the Rising Sun wear a decoration formed of the Paulownia flower and leaves. The Order of the _ Mirror or Happy Sacred Treasure iZaihosho) was founded in 1 888, with eight classes. The cross of white and gold clustered rays bears in a blue centre a silver star-shaped mirror. The ribbon is pale blue with orange stripes. There is also an order for ladies, that of the Crown, founded in five classes in 1888. The military order of Japan is the Order of the Golden Kile, founded in 1890, in seven classes. The badge has an elaborate design ; it consists of a star of purple, red, yellow, gold and silver rays, on which are displayed old Japanese weapons, banners and shields in various coloured enamels, the whole surmounted by a golenn kite with outstretched wings. The ribbon is green with white stripes.

Persia. — The Order of the Sun and [Lion, founded by Fath 'Ali Shah in 1808, has five classes. There is also the Nischan-i-Aftab, for ladies, founded in 1 873.

Siam. — The Sacred Order, or the Nine Precious Stones, was founded in 1869, in one class only, for the Buddhist princes of the royal house. The Order of the White Elephant, founded in 1861, is in five classes. This is the principal general order. The badge is a striking example of Oriental design adapted to a European conventional form. The circular plaque is formed of a triple circle of lotus leaves in gold, red and green, within a blue circlet with pearls a richly caparisoned white elephant on a gold ground, the whole surmounted by the jewelled gold pagoda crown of Siam ; the collar is

formed of alternate white elephants, red, blue and white royal monograms and gold pagoda crowns. The ribbon is red with green borders and small blue and white stripes. Other orders are the Siamese Crown (Mong- kut Siam), five classes, founded 1869; the family Order of Chulah- Chon-Clao, three classes, 1873; and the Maha Charkrkri, 1884, only for princes and princesses of the reigning family. (C. We.)

KNIGHT-SERVICE, the dominant and distinctive tenure of land under the feudal system. It is associated. in its origin with that development in warfare which made the mailed horseman, armed with lance and sword, the most important factor in battle. Till within recent years it was believed that knight-service was developed out of the liability, under the English system, of every five hides to provide one soldier in war. It is now held that, on the contrary, it was a novel system which was introduced after the Conquest by the Normans, who relied essentially on theii mounted knights, while the English fought on foot. They were already familiar with the principle of knight-service, the knight's fee, as it came to be termed in England, being represented in Normandy hy the fief du haubert, so termed from the hauberk or coat of mail (lorica) which was worn by the knight. Allusion is made to this in the coronation charter of Henry I. (noo), which speaks of those holding by knight-serVice as milites qui per loricam terras suas deserviunt.

The Conqueror, it is now held, divided the lay lands of England among his followers, to be held by the service of a fixed number of knights in his host, and imposed the same service on most of the great ecclesiastical bodies which retained their landed endow- ments. No record evidence exists of this action on his part, and the quota of knight-service exacted was lot determined by the

area or value of the lands granted (or retained), but was based upon the unit of the feudal host, the constabularia of ten knights. Of the tenants-in-chief or barons {i.e. those who held directly of the crown) , the principal were called on to find one or more of these units, while of the lesser ones some were called on for five knights, that is, half a constabularia. The same system was adopted in Ireland when that country was conquered under Henry II. The baron who had been enfeoffed by his sovereign on these terms could provide the knights required either by hiring them for pay or, more conveniently when wealth was mainly represented by land, by a process of subenfeoffment, analogous to that by which he himself had been enfeoffed. That is to say, he could assign to an under-tenant a certain

portion of his fief to be held by the service of finding one or more knights. The land so held would then be described as consisting of one or more knights' fees, but the knight's fee had not, as was formerly supposed, any fixed area. This process could be carried farther till there was a chain of mesne lords between the tenant-in-chief and the actual holder of the land; but the liability for perform- ance of the knight-service was always carefully defined.

The primary obligation incumbent on every knight was service in the field, when called upon, for forty days a year, with specified armour and arms. There was, however, a standing dispute as to whether he could be called upon to perform this service outside the realm, nor was the question of his expenses free from diffi- culty. In addition to this primary duty he had, in numerous cases at least, to perform that of " castle ward " at his lord's chief castle for a fixed number of days in the year. On certain baronies also was incumbent the duty of providing knights for the guard of royal castles, such as Windsor, Rockingham and Dover. Under the feudal system the tenant by knight-service had also the same pecuniary obligations to his lord as had his lord to the king. These consisted of (i) " relief," which he paid on succeeding to his lands; (2) " wardship," that is, the profits from his lands during a minority; (3) " marriage," that is, the right of giving in marriage, unless bought off, his heiress, his heir (if a minor) and his widow; and also of the three " aids " (see Aids).

The chief sources of information for the extent and develop- ment of knight-service are the returns (cartae) of the barons (i.e. the tenants-in-chief) in 1166, informing the king, at his request, of the names of their tenants by knight-service with the number of fees they held, supplemented by the payments for " scutage " (see Scutage) recorded on the pipe rolls, by the later returns printed in the Testa de Nevill, and by the still later ones collected in Feudal Aids. In the returns made in 1166 some of the barons appear as having enfeoffed more and some less than the number of knights they had to find. In the latter case they described the balance as being chargeable on their " demesne," that is, on the portion of their fief which remained in their own hands. These returns further prove that lands had already been granted for the service of a fraction of a knight, such service being in practice already commuted for a proportionate money payment; and they show that the total number of knights with which land held by military service was charged was not, as was formerly supposed, sixty thousand, but, probably, somewhere between five and six thousand. Similar returns were made for Normandy, and are valuable for the light they throw on its system of knight- service.

The principle of commuting for money the obligation of military service struck at the root of the whole system, and so complete was the change of

conception that " tenure by knight- service of a mesne lord becomes, first in fact and then in law, tenure by escuage (i.e. scutage)." By the time of Henry III., as Bracton states, the test of tenure was scutage; liability, however small, to scutage payment made the tenure military.

The disintegration of the system was carried farther in the latter half of the 13th century as a consequence of changes in warfare, which were increasing the importance of foot soldiers and making the service of a knight for forty days of less value to the king. The barons, instead of paying scutage, compounded for their service by the payment of lump sums, and, by a process

which is still obscure, the nominal quotas of knight-service due from each had, by the time of Edward I., been largely reduced. The knight's fee, however, remained a knight's fee, and the pecuniary incidents of military tenure, especially wardship, marriage, and fines on alienation, long continued to be a source of revenue to the crown. But at the Restoration (1660) tenure by knight-service was abolished by law (12 Car. II. c. 24), and with it these vexatious exactions were abolished.

Bibliography. — The returns of 1166 are preserved in the Liber Niger (13th cent.), edited by Hearne, and the Liber Rubeus or Red Book of the Exchequer (13 cent.), edited by H. Hall for the Rolls Series in 1896. The later returns are in Testa de Nevill (Record Commission, 1807) and in the Record Office volumes of Feudal Aids, arranged under counties. For the financial side of knight-service the early pipe rolls have been printed by the Record Commission and the Pipe Roll Society, and abstracts of later ones will be found in The Red Book of the Exchequer, which may be studied on the whole question ; but the editor's view must be received with caution and checked by J. H. Round's Studies on the Red Book of the Exchequer (for private circulation). The Baronia Anglica of Madox may also be consulted. The existing theory on knight-service was enunciated by Mr Round in English Historical Review, vi., vii., and reissued by him in his Feudal England (1895). It is accepted by Pollock and Maitland (History of English Law), who discuss the question at length; by Mr J. F. Baldwin in his Scutage and Knight-service in England (University of Chicago Press, 1897), a valuable monograph with bibliography ; and by Petit-Dutaillis, in his Studies supplement- ary to Stubbs' Constitutional History (Manchester University Series, 1908). (J. H. R.)

KNIGHTS OF THE GOLDEN CIRCLE, a semi-military secret society in the United States in the Middle West, 1861-1864, the purpose of which was to bring the Civil War to a close and restore the " Union as it was." There is some evidence that before the Civil War there was a Democratic secret organization of the same name, with its principal membership in the

Southern States. After the outbreak of the Civil War many of the Democrats of the Middle West, who were opposed to the war policy of the Republicans, organized the Knights of the Golden Circle, pledging themselves to exert their influence to bring about peace. In 1863, owing to the disclosure of some of its secrets, the organiza- tion took the name of Order of American Knights, and in 1864 this became the Sons of Liberty. The total membership of this order probably reached 250,000 to 300,000, principally in Ohio, Indiana, Illinois, Iowa, Wisconsin, Kentucky and south-western Pennsylvania. Fernando Wood of New York seems to have been the chief officer and in 1864 Clement L. Vallandigham became the second in command. The great importance of the Knights of the Golden Circle and its successors was due to its opposition to the war policy of the Republican administration. The plan was to overthrow the Lincoln government in the elections and give to the Democrats the control of the state and Federal governments, which would then make peace and invite the Southern States to come back into the Union on the old foot- ing. In order to obstruct and embarrass the Republican adminis- tration the members of the order held peace meetings to influence public opinion against the continuance of the war; purchased arms to be used in uprisings, which were to place the peace party in control of the Federal government, or failing in that to establish a north-western confederacy; and took measures to set free the Confederate prisoners in the north and bring the war to a forced close. All these plans failed at the critical moment, and the most effective work done by the order was in encouraging desertion from the Federal armies, preventing enlistments, and resisting the draft. Wholesale arrests of leaders and numerous seizures of arms by the United States authorities resulted in a general collapse of the order late in 1864. Three of the leaders were sentenced to death by military commissions, but sentence was suspended until 1866, when they were released under the decision of the United States Supreme Court in the famous case Ex parte Milligan.

Authorities. — An Authentic Exposition of the Knights of the Golden Circle (Indianapolis, 1863) ; J. F. Rhodes, History of the United States from the Compromise of 1850 (New York, 1905) vol. v. ; E. McPherson, Political History of the Rebellion (Washington, 1876) ; and W. D. Foulke, Life of O. P. Morton (2 vols., New York, 1899J.

(W. L. F.) .

KNIPPERDOLLINCK (or Knipperdolling) , BERNT (Berend or Bernhardt)

(c. 1490-1536), German divine, was a prosperous cloth-merchant at Miinster when in 1524 he joined Melchior Rinck and Melchior Hofman in a business journey to Stockholm, which developed into an abortive religious errand. Knipper- dollinck, a man of fine presence and glib tongue, noted from his youth for eccentricity, had the ear of the Minister populace when in 1527 he helped to break the prison of Tonies Kruse, in the teeth of the bishop and the civic authorities. For this he made his peace with the latter; but, venturing on another business journey, he was arrested, imprisoned for a year, and released on payment of a high fine — in regard of which treatment he began an action before the Imperial Chamber. Though his aims were political rather than religious, he attached himself to the reforming movement of Bernhardt Rothmann, once (1529) chaplain of St Mauritz, outside Miinster, now (1532) pastor of the city church of St Lamberti. A new bishop directed a mandate (April 17, 1532) against Rothmann, which had the effect of alienating the moderates in Miinster from the democrats. Knipperdollinck was a leader of the latter in the surprise (December 26, 1532) which made prisoners of the negoti- ating nobles at Telgte, in the territory of Miinster. In the end, Miinster was by charter from Philip of Hesse (February 14, 1533) constituted an evangelical city. Knipperdollinck was made a burgomaster in February 1 534. Anabaptism had already (Sep- tember 8, 1533) been proclaimed at Miinster by a journeyman smith; and, before this, Heinrich Roll, a refugee, had brought Rothmann (May 1533) to a rejection of infant baptism. From the 1st of January 1534 Roll preached Anabaptist doctrines in a city pulpit; a few days later, two Dutch emissaries of Jan Matthysz, or Matthyssen, the master-baker and Anabaptist prophet of Haarlem, came on a mission to Miinster. They were followed (January 13) by Jan Beukelsz (or Bockelszoon, or Buchholdt), better known as John of Leiden. It was his second visit to Miinster; he came now as an apostle of Matthysz. He was twenty-five, with a winning personality, great gifts as an organizer, and plenty of ambition. Knipperdollinck, whose daughter Clara was ultimately enrolled among the wives of John of Leiden, came under his influence. Matthysz himself came to Miinster (1534) and lived in Knipperdollinck's house, which became the centre of the new movement to substitute Miinster for Strassburg (Melchior Hofmann's choice) as the New Jerusalem. On the death of Matthysz, in a foolish raid (April 5, 1534), John became supreme. Knipperdollinck, with one attempt at revolt, when he claimed the kingship for himself, was his subservient henchman, wheedling the Miinster democracy into subjection to the fantastic rule of the " king of the earth." He was made second in com- mand, and executioner of the refractory. He fell in with the polygamy innovation, the protest of his wife being visited with a penance. In the military measures for resisting the siege of Miinster he took no leading part. On the fall of the city (June 25, i53S) he hid in a dwelling in the city wall, but was betrayed by his landlady. After six

months' incarceration, his trial, along with his comrades, took place on the 19th of January, and his execution, with fearful tortures, on the 22nd of January 1536. Knipperdollinck attempted to strangle himself, but was forced to endure the worst. His body, like those of the others, was hung in a cage on the tower of St Lamberti, where the cages are still to be seen. An alleged portrait, from an engraving of 1607, is reproduced in the appendix to A. Ross's Pansebeia,

1655.

See L. Keller, Geschichie der Wiedertaufer und ihres Reichs zu Miinster (1880); C. A. Cornelius, Hislorische Arbeiten (1899); E. Belfort Bax, Rise and Fall of the Anabaptists (1903). (A. Go.)*

KNITTING (from O.E. cnyttan, to knit; cf. Ger. Knutten; the root is seen in " knot ■'), the art of forming a single thread or strand of yarn into a texture or fabric of a loop structure, by employing needles or wires. " Crochet " work is an analogous art in its simplest form. It consists of forming a single thread into a single chain of loops. All warp knit fabrics are built on this structure. Knitting may be said to be divided into two principles, viz. (1) hand knitting and (2) frame-work knitting

(see Hosiery). In hand knitting, the wires, pins or needles used are of different lengths or gauges, according to the class of work wanted to be produced. They are made of steel, bone, wood or ivory. Some are headed to prevent the loops from slipping over the ends. Flat or selvedged work can only be produced on them. Others are pointed at both ends, and by employing three or more a circular or circular-shaped fabric can be made. In hand knitting each loop is formed and thrown off individually and in rotation and is left hanging on the new loop formed. The cotton, wool and silk fibres are the principal materials from which knitting yarns are manufactured, wool being the most important and most largely used. " Lamb's-wool," " wheeling," " finger- ing " and worsted yarns are all produced from the wool fibre, but may differ in size or fineness and quality. Those yarns are largely used in the production of knitted underwear. Hand knitting is to-day principally practised as a domestic art, but in some of the remote parts of Scotland and Ireland it is prosecuted as an industry to some extent. In the Shetland Islands the wool of the native sheep is spun, and used in its natural colour, being manu- factured into shawls, scarfs, ladies' jackets, &c. The principal trade of other districts is hose and half-hose, made from the wool of the sheep native to the district. The formation of the stitches in knitting may be varied in a great many ways, by " purling " (knitting or throwing loops to back and front in rib form) , " slipping " loops, taking up and casting off and working in various coloured yarns to form stripes, patterns, &c. The articles may be shaped

according to the manner in which the wires and yarns are manipulated.

KNOBKERRIE (from the Taal or South African Dutch, knop- kirie, derived from Du. knop, a knob or button, and kerrie, a Bushman or Hottentot word for stick), a strong, short stick with a rounded knob or head used by the natives of South Africa in warfare and the chase. It is employed at close quarters, or as a missile, and in time of peace serves as a walking-stick. The name has been extended to similar weapons used by the natives of Australia,ithe Pacific islands, and other places.

KNOLLES, RICHARD (c. 1545-1610), English historian, was a native of Northamptonshire, and was educated at Lincoln College, Oxford. He became a fellow of his college, and at some date subsequent to 1571 left Oxford to become master of a school at Sandwich, Kent, where he died in 1610. In 1603 Knolles published his Generall Historie of the Turkes, of which several editions subsequently appeared, among them a good one edited by Sir Paul Rycaut (1700), who brought the history down to 1699. It was dedicated to King James I., and Knolles availed himself largely of Jean Jacques Boissard's Vitae et Icones Sultan- orum Turcicorum (Frankfort, 1596). Although now entirely superseded, it has considerable merits as regards style and arrangement. Knolles published a translation of J. Bodin's De RepuUica in 1606, but the Grammatica Latina, Graeca et Hebraica, attributed to him by Anthony Wood and others, is the work of the Rev. Hanserd Knollys (c. 1599-1691), a Baptist minister.

See the Athenaeum, August 6, 1881.

KNOLLES (or Knollys), SIR ROBERT (c. 1325-1407), English soldier, belonged to a Cheshire family. In early life he served in Brittany, and he was one of the English survivors who were taken prisoners by the French after the famous " combat of the tfoirty " in March 1351. He was, however, quickly released and was among the soldiers of fortune who took advantage of the distracted state of Brittany, at this time the scene of a savage civil war, to win fame and wealth at the expense of the wretched inhabitants. After a time he transferred his operations to Normandy, when he served under the allied standards of England and of Charles II. of Navarre. He led the " great company " in their work of devastation along the valley of the Loire, fighting at this time for his own hand and for booty, and winning a terrible reputation by his ravages. After the conclusion of the treaty of Bretigny in 1360 Knolles returned to Brittany and took part in the struggle for the possession of the duchy between John of Montfort (Duke John IV.) and Charles of Blois, gaining great fame by his conduct in the fight at Auray (September 1364), where

Du Guesclin was captured and Charles of Blois was slain. In 1367 he marched with the Black Prince into Spain and fought at the battle of Najera; in 1369 he was with the prince in Aquitaine. In 1370 he was placed by Edward III. at the head of an expe- dition which invaded France and marched on Paris, but after exacting large sums of money as ransom a mutiny broke up the army, and its leader was forced to take refuge in his Breton castle of Derval and to appease the disappointed English king with a large monetary gift. Emerging from his retreat Knolles again assisted John of Montfort in Brittany, where he acted as John's representative; later he led a force into Aquitaine, and he was one of the leaders of the fleet sent against the Spaniards in 1377. In 1380 he served in France under Thomas of Woodstock, after- wards duke of Gloucester, distinguishing himself by his valour at the siege of Nantes; and in 1381 he went with Richard II. to meet Wat Tyler at Smithfield. He died at Sculthorpe in Norfolk on the 15th of August 1407. Sir Robert devoted much of his great wealth to charitable objects. He built a college and an almshouse at Pontefract, his wife's birthplace, where the alms- house still exists; he restored the churches of Sculthorpe and Harpley; and he helped to found an English hospital in Rome. Knolles won an immense reputation by his skill and valour in the field, and ranks as one of the foremost captains of his age. French writers call him Canolles, or Canole.

KNOLLYS, the name of an English family descended from Sir Thomas Knollys (d. 1435), lord mayor of London. The first distinguished member of the family was Sir Francis Knollys (c. 1514-1596), English statesman, son of Robert Knollys, or Knolles (d. 1521), a courtier in the service and favour of Henry VII. and Henry VIII. Robert had also a younger son, Henry, who took part in public life during the reign of Elizabeth and who died in 1583.

Francis Knollys, who entered the service of Henry VIII. before 1540, became a member of parliament in 1542 and was knighted in 1 547 while serving with the English army in Scotland. A strong and somewhat aggressive supporter of the?, reformed doctrines, he retired to Germany soon after Mary became queen, returning to England to become a privy councillor, vice-chamber- lain of the royal household and a member of parliament under Queen Elizabeth, whose cousin Catherine (d. 1569), daughter of William Carey and niece of Anne Boleyn, was his wife. After serving as governor of Plymouth, Knollys was sent in 1566 to Ireland, his mission being to obtain for the queen confidential reports about the conduct of the lord-deputy Sir Henry Sidney. Approving of Sidney's actions he came back to England, and in 1 568 was sent to Carlisle to take charge of Mary Queen of Scots, who had just fled from Scotland; afterwards he was in

charge of the queen at Bolton Castle and then at Tutbury Castle. He discussed religious questions with his prisoner, although the extreme Protestant views which he put before her did not meet with Elizabeth's approval, and he gave up the position of guardian just after his wife's death in January 1 569. In 1 584 he introduced into the House of Commons, where since 1572 he had represented Oxfordshire, the bill legalizing the national association for Elizabeth's defence, and he was treasurer of the royal household from 1572 until his death on the 19th of July 1596. His monu- ment may still be seen in the church of Rotherfield Grays, Oxfordshire. Knollys was repeatedly free and frank in his objections to Elizabeth's tortuous foreign policy; but, possibly owing to his relationship to the queen, he did not lose her favour, and he was one of her commissioners on such important occasions as the trials of Mary Queen of Scots, of Philip Howard earl of Arundel, and of Anthony Babington. An active and lifelong Puritan, his attacks on the bishops were not lacking in vigour, and he was also very hostile to heretics. He received many grants of land from the queen, and was chief steward of the city of Oxford and a knight of the garter.

Sir Francis's eldest son Henry (d 1583), and his sons Edward (d. c. 1580), Robert (d. 1625), Richard (d. 1596), Francis (d. c. 1648), and Thomas, were all courtiers and served the queen in parliament or in the field. His daughter Lettice (1 540-1634) married Walter Devereux, earl of Essex, and then Robert Dudley,

earl of Leicester; she was the mother of Elizabeth's favourite, the 2nd earl of Essex.

Some of Knollys's letters are in T. Wright's Queen Elizabeth and her Times (1838) and the Burghley Papers, edited by S. Haynes (1740) ; and a few of his manuscripts are still in existence. A speech which Knollys delivered in parliament against some claims made by the bishops was printed in 1608 and again in W. Stoughton's Assertion for True and Christian Church Policie (London, 1642).

Sir Francis Knollys's second son William (c. 1547-163 2) served as a member of parliament and a soldier during the reign of Queen Elizabeth, being knighted in 1586. His eldest brother Henry, having died without sons in 1583, William inherited his father's estates in Oxfordshire, becoming in 1 596 a privy council- lor and comptroller of the royal household; in 1602 he was made treasurer of the household. Sir William enjoyed the favour of the new king James I., whom he had visited in Scotland in 1585, and was made Baron Knollys in 1603 and Viscount Wallingford in 1616. But in this latter year his fortunes suffered a tem- porary reverse. Through his second wife Elizabeth (1586-1658), daughter of Thomas Howard, earl of

Suffolk, Knollys was related to Frances, countess of Somerset, and when this lady was tried for the murder of Sir Thomas Overbury her relatives were regarded with suspicion; consequently Lord Wallingford resigned the treasurership of the household and two years later the mastership of the court of wards, an office which he had held since 1614. However, he regained the royal favour, and was created earl of Banbury in 1626. He died in London on the 25th of May 1632.

His wife, who was nearly forty years her husband's junior, was the mother of two sons, Edward (1627-1645) and Nicholas (1631-1674), whose paternity has given rise to much dispute. Neither is mentioned in the earl's will, but in 1641 the law courts decided that Edward was earl of Banbury, and when he was killed in June 1645 his brother Nicholas took the title. In the Con- vention Parliament of 1660 some objection was taken to the earl sitting in the House of Lords, and in 1661 he was not summoned to parliament; he had not succeeded in obtaining his writ of summons when he died on the 14th of March 1674.

Nicholas's son Charles (1662-1740), the 4th earl, had not been summoned to parliament when in 1692 he killed Captain Philip Lawson in. a duel. This raised the question of his rank in a new form. Was he, or was he not, entitled to trial by the peers? The House of Lords declared that he was not a peer and therefore not so entitled, but the court of king's bench released him from his imprisonment on the ground that he was the earl of Banbury and not Charles Knollys a commoner. Nevertheless the House of Lords refused to move from its position, and Knollys had not received a writ of summons when he died in April 1 740. His son Charles (1703-1771), vicar of Burford, Oxfordshire, and his grandsons, William (1726-1776) and Thomas Woods (1727-1793), were successively titular earls of Banbury, but they took no steps to prove their title. However, in 1806 Thomas Woods's son William (1763-1824), who attained the rank of general in the

British army, asked for a writ of summons as earl of Banbury, but in 1 813 the House of Lords decided against the claim. Several peers, including the great Lord Erskine, protested against this decision, but General Knollys himself accepted it and ceased to call himself earl of Banbury. He died in Paris on the 20th of March T834. His eldest son, Sir William Thomas Knollys (1797-1883), entered the army and served with the Guards during the Peninsular War. Remaining in the army after the conclusion of the peace of 181 5 he won a good reputation and rose high in his profession. From 1855 to i860 he was in charge of the military camp at Aldershot, then in its infancy, and in 1861 he was made president of the council of military education. From 1862 to 1877 he was comptroller of the household of the prince of Wales, afterwards King Edward VII. From 1877 until his death on the 23rd of June 1883 he was gentleman usher of the black rod; he was also a privy councillor and colonel of the Scots Guards. His son Francis (b. 1837), private secretary to Edward VII. and George V., was created Baron Knollys in 1902; another son, Sir Henry Knollys (b. 1840), became private secretary to King I Edward's daughter Maud, queen of Norway. /

See Sir N. H. Nicolas, Treatise on the Law of Adulterine Bastardy 1833); and G. E. C(okayne), Complete Peerage (1887), vol. i.

KNOT, a Limicoline bird very abundant at certain seasons on the shores of

Britain and many countries of the northern hemisphere. Camden in the edition of his Britannia published in 1607 (p. 408) inserted a passage not found in the earlier issues of that work, connecting the name with that of King Canute, and this account of its origin has been usually received. But no other evidence in its favour is forthcoming, and Camden's state- ment is merely the expression of an opinion, 1 so that there is perhaps ground for believing him to have been mistaken, and that the clue afforded by Sir Thomas Browne, who (c. 1672) wrote the name " Gnatts or Knots," may be the true one. 2 Still the statement was so determinedly repeated by successive authors that Linnaeus followed them in calling the species Tringa canutus, rndso it remains with nearly all modern ornitho- logists.' Rather larger than a snipe, but with a shorter bill and legs, the knot visits the coasts of some parts of Europe, Asia and North America at times in vast flocks; and, though in tem- perate climates a good many remain throughout the winter, these are nothing in proportion to those that arrive towards the end of spring, in England generally about the 15th of May, and after staying a few days pass northward to their summer quar- ters, while early in autumn the young of the year throng to the same places in still greater numbers, being followed a little later by their parents. In winter the plumage is ashy-grey above (save the rump, which is white) and white beneath. In summer the feathers of the back are black, broadly margined with light orange-red, mixed with white, those of the rump white, more or less tinged with red, and the lower parts are of a nearly uniform deep bay or chestnut. The birds which winter in temperate climates seldom attain the brilliancy of colour exhibited by those which arrive from the south; the luxuriance generated by the heat of a tropical sun seems needed to develop the full richness of hue. The young when they' come from their birthplace are clothed in ashy-grey above, each feather banded with dull black and ochreous, while the breast is more or less deeply tinged with warm buff. Much curiosity has long existed among zoolo- gists as to the egg of the knot, of which not a single identified or authenticated specimen is known to exist in collections. The species was found breeding abundantly on the North Georgian (now commonly called the Parry) Islands by Parry's Arctic expedition, as well as soon after on Melville Peninsula by Captain Lyons, and again during the voyage of Sir George Nares on the northern coast of Grinnell Land and the shores of Smith Sound, where Major Feilden obtained examples of the newly hatched young (Ibis, 1877, p. 407), and observed that the parents fed largely on the buds of Saxifraga oppositifolia. These are the only localities in which this species is known to breed, for on none of the arctic lands lying to the north of Europe or Asia has it been unquestionably observed. 4 In winter its wanderings are very extensive, as it is recorded from Surinam, Brazil, Walfisch Bay in South Africa, China, Queensland and New Zealand. Formerly "this species was extensively netted in England, and the birds fattened for the table, where they were

1 His words are simply " Knotts, i. Canuti aues, vt opinor e Dania enimaduolarecreduntur." In the margin the name is spelt " Cnotts," and he possibly thought it had to do with a well-known story of that king. Knots undoubtedly frequent the sea-shore, where Canute is said on one occasion to have taken up his station, but they generally retreat, and that nimbly, before the advancing surf, which he is said in the story not to have done.

2 In this connexion we may compare the French maringouin, ordinarily a gnat or mosquito, but also, among the French Creoles of America, a small shore-bird, either a Tringa or an Aegialitis, according to Descourtilz (Voyage, ii. 249). See also Littre's Dictionnaire, s.v.

3 There are few of the Limicolae, to which group the knot belongs, that present greater changes of plumage according to age or season, and hence before these phases were understood the species became encumbered with many synonyms, as Tringa cinerea, ferruginea, grisea, islandica, naevia and so forth. The confusion thus caused was mainly cleared away by Montagu and Temminck.

4 The Tringa canutus of Payer's expedition seems more likely to have been T. maritima, which species is not named among the birds of Franz Josef Land, though it can hardly fail to occur there.

esteemed a great delicacy, as witness the entries in the Northum- berland and Le Strange Household Books; and the British Museum contains an old treatise on the subject: "The maner of kepyng of knotts, after Sir William Askew and my Lady, given to my Lord Darcy, 25 Hen. VIII." (MSS. Sloane, 1592, 8 cat. 663). (A. N.)

KNOT (O.E. cnolta, from a Teutonic stem knvM; cf. " knit," and Ger. knoten), an intertwined loop of rope, cord, string or other flexible material, used to fasten two such ropes, &c, to one another, or to another object. (For the various forms which such " knots " may take see below.) The word is also used for the distance-marks on a log-line, and hence as the equivalent of a nautical mile (see Log), and for any hard mass, resembling a knot drawn tight, especially one formed in the trunk of a tree at the place of insertion of a branch. Knots in wood are the remains of dead branches which have become buried in the wood of the trunk or branch on which they were borne. When a branch dies down or is broken off, the dead stump becomes grown over by a healing tissue, and, as the stem which bears it increases in thickness, gradually buried in the newer wood. When a sec- tion is made of the stem the dead stump appears" in the section as a knot; thus in a board it forms a circular piece of wood, liable to fall out and leave a " knot-hole." " Knot " or " knob " is an architectural term for a bunch of flowers, leaves or other ornamentation carved on a corbel or on

a boss. The word is also applied figuratively to any intricate problem, hard to dis- entangle, a use stereotyped in the proverbial " Gordian knot," which, according to the tradition, was cut by Alexander the Great (see Gordium).

Knots, Bends, Hitches, Splices and Seizings are all ways of fastening cords or ropes, either to some other object such as a spar, or a ring, or to one another. The " knot " is formed to make a knob on a rope, generally at the extremity, and by un- twisting the strands at the end and weaving them together. But it may be made by turning the rope on itself through a loop, as for instance, the " overhand knot " (fig. 1). A " bend " (from the same root as " bind "), and a " hitch " (an O.E. word), are ways of fastening or tying ropes together, as in the " Carrick bend" (fig. 21), or round spars as the Studding Sail Halyard Bend (fig. 19), and the Timber Hitch (fig. 20). A "splice"

Fig. 1.

Fig. 2.

(from the same root as " split ") is made by untwisting two rope ends and weaving them together. A " seizing " (Fr. saisir) is made by fastening two spars to one another by a rope, or two ropes by a third, or by using one rope to make a loop on another — as for example the Racking Seizing (fig. 41), the Round Seizing (fig. 40), and the Midshipman's Hitch (fig. 29). The use of the words is often arbitrary. There is, for instance, no difference in principle between the Fisherman's Bend (fig. 18) and the Timber Hitch (fig. 20). Speaking generally, the Knot and the Seizing are meant to be permanent, and must be unwoven in order to be unfastened, while the Bend and Hitch can be undone at once by pulling the ropes in the reverse direction from that in which they are meant to hold. Yet the Reef Knot (figs. 3 and 4) can be cast loose with ease, and is wholly different in principle, for instance, from the Diamond Knot (figs. 42 and 43). These various forms of fastening are employed in many kinds of industry, as for example in scaffolding, as well as in seamanship. The governing principle is that the strain which pulls against them shall draw them tighter. The ordinary " knots and splices " are described in every book on seamanship.

Overhand Knot (fig. 1). — Used at the end of ropes to prevent their unreeving and as the commencement of other knots. Take the end a round the end b.-

Figure-of-Eight Knot (fig. 2).— Used only to prevent ropes from unreeving ; it forms a large knob.

Reef Knot (figs. 3, 4). — Form an overhand knot as above. Then take the end a over the end b and through the bight. If the end a

Fig. 3. Fig. 4.

were taken under the end 6, a granny would be formed. This knot is so named from being used in tying the reef-points of a sail.

Bowhne (figs. 5-7).— Lay the end a of a rope over the standing part 6. Form with b a bight c over a. Take a round behind b and

Fig. 5. Fig. 6. Fig. 7.

down through the bight c. This is a most useful knot employed to lorm a loop which will not slip. Running bowlines are formed by

Fig. 8.

Fig. 9.

Fig. 10.

making a bowline round its own standing part above b. It is the most common and convenient temporary running noose

Bowline on a Bight (figs. 8, 9).— The first part is made similar to the above with the double part of the rope; then the bight a is pulled through sufficiently to allow it to be bent over past d and come up in the position shown in fig. 9. It makes a more comfortable sling tor a man than a single bight.

Half- Hitch (fig. 10).— Pass the end a of the rope round the standing part b and through the bight.

Two Half-Hitches (fig. 11).— The half-hitch repeated; this is commonly used, and is capable of resisting to the full strength of the rope. A stop from a to the standing part will prevent it iam- ming. ‘

Clove Hitch (figs. 12, 13).— Pass the end a round a spar and cross

Fig. 11.

Fig. 12.

Fig. 13.

it over b. Pass it round the spar again and put the end a through the second bight.

Blackball Hitch (fig. 14).— Form a bight at the end of a rope, and put the hook of a tackle through the bight so that the end of the rope may be jammed between the standing part and the back of the hook.

Double Blackwall Hitch (fig. 15).— Pass the end a twice round the hook and under the standing part 6 at the last cross.

*Cats-paw (fig 16).— Twist up two parts of a lanyard in opposite directions and hook the tackle in the eyes *, *. A piece of wood*

Fig. 14.

Fig. 15.

Fig. 16.

should be placed between the parts at g. A large lanyard should be clove-hitched round a large toggle and a strap passed round it below the toggle.

Marling-spike Hitch (fig. 17).— Lay the end a over c; fold the loop over on the standing part b; then pass the marline-spike through, over both parts of the bight and under the part 6. Used for tighten- ing each turn of a seizing.

Fisherman's Bend (fig. 18).— Take two turns round a spar, then a

, <•

Fig. 18. Fig. 19. Fig. 20.

half-hitch round the standing part and between the spar and the turns, lastly a half-hitch round the standing part.

Studding-sail Halyard Bend (fig. 19).— Similar to the above, except that the end is tucked under the first round turn ; this is more snug. A magnus hitch has two round turns and one on the other side of the standing part with the end through the bight.

Timber Hitch (fig. 20). — Take the end a of a rope round a spar, then round the standing part b, then several times round its own part c, against the lay of the rope.

Carrick Bend (fig. 21). — Lay the end of one hawser over its own P? rt to

form a bight as e', b; pass the end of another hawser up through that bight near b, going out over the first end at c, cross- ing under the first long part and over its end at d, then u "der both long parts, forming the loops, and above the first short part at b, terminating at the end e", in the opposite direction vertically and horizontally to the other end. The ends should be securely stopped to u C1 L res P ective standing parts, and also a stop put on the becket or extreme end to prevent it catching a pipe or chock ; in that form this is the best quick means of uniting two large hawsers, since they cannot jam. When large hawsers have to work through small pipes, good security may be obtained either by passing ten or twelve taut racking turns with a suitable strand and securing each end to a standing part of the hawser, or by taking half as many round turns taut, crossing the ends between the hawsers over the seizing and reef-knotting the ends. I his should be repeated in three places and the extreme ends well stopped. Connecting hawsers by bowline knots is very objectionable, as the bend is large and the knots jam.

Sheet Bend (fig. 22).— Pass the end of one rope through the bight of another, round both parts of the other, and under its own standing part. Used for bending small sheets to the clews of sails, which present bights ready for the hitch. An ordinary net is composed of a series of sheet bends. A weaver's knot is made like a sheet bend.

Single Wall Knot (fig. 23).— Unlay the end of a rope, and with the strand a form a bight. Take the next strand b round the end of a.

Fig.

KNOT

873

Take the last strand c round the end of 6 and through the bight made by a. Haul the ends taut.

Single Wall Crowned (fig. 24). — Form a single wall, and lay one of the ends, a, over the knot. Lay b over a, and c over b and through the bight of a. Haul the ends taut.

Fig. 22.

Fig. 23.

Fig. 24.

Double Wall and Double Crown (fig. 25). — Form a single wall crowned ;

then let the ends follow their own parts round until all the parts appear double. Put the ends down through the knot.

Matthew Walker (figs. 26, 27). — Unlay the end of a rope. Take the first strand round the rope and through its own bight; the second strand round the rope, through the bight of the first, and through its own bight; the third through all three bights. Haul the ends taut.

Inside Clinch (fig. 28). — The end is bent close round the standing part till it forms a circle and a half, when it is securely seized at a, b and c, thus making a running eye; when taut round anything it jams the end. It is used for securing hemp cables to anchors,

Fig. 25.

Fig. 26.

Fig. 27.

Fig. 28.

the standing parts of topsail sheets, and for many other purposes. If the eye were formed outside the bight an outside clinch would be made, depending entirely on the seizings, but more ready for slipping.

Midshipman's Hitch (fig. 29). — Take two round turns inside the bight, the same as a half-hitch repeated; stop up the end or let another half-hitch be taken or held by hand. Used for hooking a tackle for a temporary purpose.

Turk's Head (rig. 30). — With fine line (very dry) make a clove hitch round the rope; cross the bights twice, passing an end the re- verse way (up or down) each time ; then keeping the whole spread flat,

Fig. 29. Fig. 30.

Fig. 31.

Fig. 32.

let each end follow its own part round and round till it is too tight to receive any more. Used as an ornament variously on side-ropes and foot-ropes of jibbooms. It may also be made with three ends, two formed by the same piece of line secured through the rope and one single piece. Form with them a diamond knot; then each end crossed over its neighbour follows its own part as above.

Spanish Windlass (fig. 31). — An iron bar and two marling-spikes are

taken ; two parts of a seizing are twisted like a cat's-paw (fig. 16) , passed round the bar, and hove round till sufficiently taut. In heaving shrouds together to form an eye two round turns are taken with a strand and the two ends hove upon. When a lever is placed between the parts of a long lashing or frapping and hove round, we have what is also called a Spanish windlass.

Slings (fig. 32).-— This is simply the bight of a rope turned up over its own part ; it is frequently made of chain, when a shackle (bow up) takes the place of the bight at s and another at y, connecting the

two ends with the part which goes round the mast-head. Used to sling lower yards. For boat's yards it should be a grummet with a thimble seized in at y. As the tendency of all yards is to cant forward with the weight of the sail, the part marked by an arrow should be the fore-side — easily illustrated by a round ruler and a piece of twine.

Sprit-Sail Sheet Knot (fig. 33). — This knot consists of a double wall and double crown made by the two ends, consequently with six strands, with the ends turned down. Usedy formerly in the clews of sails, now as an excellent stopper, a lashing or shackle being placed at s and a lanyard round the head at I.

Turning in a Dead-Eye Cutter-Stay fashion (fig. 34). — A bend is made in the stay or shroud round its own part and hove together

Fig. 33.

Fig. 34.

Fig. 35.

with a bar and strand ; two or three seizings diminishing in size (one round and one or two either round or flat) are hove on taut and snug, the end being at the side of the fellow part. The dead-eye is put in and the eye driven down with a commander.

Turning in a Dead-Eye end up (fig. 35). — The shroud is measured round the dead-eye and marked where a throat-seizing is hove on; the dead-eye is then forced into its place, or it may be put in first. The end beyond a is taken up taut and secured with a round seizing; higher still the end is secured by another seizing. As it is important that the lay should always be kept in the rope as much as possible, these eyes should be formed conformably, either right-handed or left-handed. It is easily seen which way a rope would naturally kink by putting a little extra twist into it. A shroud whose dead- eye is turned in end up will bear a fairer strain, but is more

dependent on the seizings; the under turns of the throat are the first to break and the others the first to slip. With the cutter-stay fashion the standing part of the shroud gives way under the nip of the eye. A rope will afford the greatest resistance to strain when secured round large thimbles with a straight end and a sufficient number of flat or racking seizings. To splice shrouds round dead-eyes is objection- able on account of opening the strands and admitting water, thus hastening decay. In small vessels, especially yachts, it is admis- sible on the score of neatness; in that case a round seizing is placed between the dead-eye and the splice. The dead-eyes should be in diameter 1 1 times the circumference of a hemp shroud and thrice that of wire; the lanyard should be half the nominal size of hemp and the same size as wire: thus, hemp-shroud 12 in., wire 6 in., dead-eye 18 in., lanyard 6 in.

Short Splice (fig. 36). — The most common description of splice is when a rope is lengthened by another of the same size, or nearly so. Fig. 36 represents a splice of this kind: the strands have been unlaid, married and passed through with the assist- ance of a marling-spike, over one strand and under the next,

twice each way. The ends are ”-^ Fig. 36

then cut off close. To render the splice neater the strands should have been halved before turning them in a second time, the upper half of each strand only being turned in ; then all are cut off smooth. Eye Splice. — Unlay the strands and place them upon the same rope spread at such a distance as to give the size of the eye; enter the centre strand (unlaid) under a strand of the rope (as above), and the other two in a similar manner on their respective sides of the first; taper each end and pass them through again. If neatness is desired, reduce the ends and pass them through once more; cut off smooth and serve the part disturbed tightly with suitable hard line. Uses too numerous to mention. Cut Splice. — Made in a similar manner to an eye splice, but of two pieces of rope, therefore with two splices. Used for mast-head pendants, jib-guys, breast backstays, and even odd shrouds, to keep the eyes of the rigging lower by one part. It is not so strong as two separate eyes. Horseshoe Splice. — Made similar to the above, but one part much shorter than the other, or another piece of rope is spliced across an eye, forming a horseshoe with two long legs. Used for back-ropes on dolphin striker, back stays (one on each side) and cutter’s runner pendants. Long Splice. — The strands must be unlaid about three times as much as for a short splice and married — care being taken to preserve the lay or shape of each. Unlay one of the strands still further and follow up

the vacant space with the corresponding strand of the other part, fitting it firmly into the rope till only a few inches remain. Treat the other side in a.similar manner. There will then appear two long strands in the centre and a long and a short one on each side. The splice is practically divided into three distinct parts; at each the strands are divided and the corresponding halves knotted (as shown on the top of fig. 38) and turned in twice. The half strand may, if desired, be still further reduced before the halves are turned in for the second time. This and all other splices should be well stretched and hammered into shape before the ends are cut off. The long splice alone is adapted to running ropes.

Shroud Knot (fig. 37). — Pass a stop at such distance from each end of the broken shroud as to afford sufficient length of strands, when it

is unlaid, to form a single wall knot on each side after the parts have been married ; it will then appear as represented in A < ^^*-**f**Jb tne n S ure i tne strands having

^^ _ been well tarred and hove taut

ric 37. separately. The part a provides

the knot on the opposite side and the ends b, b; the part c pro- vides the knot and the ends d, d. After the knot has been well stretched the ends are tapered, laid smoothly between the strands of the shroud, and firmly served over. This knot is used when shrouds or stays are broken. French Shroud Knot. — Marry the parts with a similar amount of and as before; stop one set of strands taut up on the shroud (to keep the parts together), and turn the ends back on their own part, forming bights. Make a single wall knot with the other three strands round the said bights and shroud; haul the knot taut first and stretch the whole; then heave down the bights close: it will look like the ordinary shroud knot. It is very liable to slip. If the ends by which the wall knot is made after being hove were passed through the bights, it would make the knot stronger. The ends would be tapered and served.

Flemish Eye (fig. 38). — Secure a spar or toggle twice the circum- ference of the rope intended to be rove through the eye ; unlay the rope which is to form the eye about three times its circumference, at which part place a strong whipping. Point the rope vertically under the eye, and bind it taut up by the core if it is four- stranded rope, otherwise by a few yarns. YVhile doing so arrange six or twelve pieces of spun-yarn at equal distances on the wood and exactly halve the number of yarns that have been unlaid. If it is

a small rope, select two or three yarns from each side near the centre; cross them over the top at a, and half- knot them tightly. So continue till all are expended and drawn down tightly on the opposite side to that from which they came, being thoroughly intermixed. Tie the pieces of spun-yarn which were placed under the eye tightly round various parts, to keep the eye in shape when taken off the spar, till they are replaced by turns of marline hove on as taut as possible, the hitches forming a central line outside the eye. Heave on a good seizing of spun-yarn close below the spar, and another between six and twelve inches below the first ; it may then be parcelled and served ; the eye is served over twice, and well tarred each time. As large ropes are composed of so many yarns, a greater number must be knotted over the toggle each time; a 4-in. rope has 132 yarns, which would require 22 knottings of six each time; a 10-in. rope has 834 yarns, therefore, if ten are taken from each side every tine, about twice that number of hitches will be required ; sometimes only half the yarns are hitched, the others being merely passed over. The chief use of these eyes has been to form the collars of stays, the whole stay in each case having to be rove through it — a very inconvenient device. It is almost superseded for that purpose by a leg spliced in the stay and lashing eyes abaft the mast, for which it is commonly used at present. This eye is not always called by the same name, but the weight of evidence is in favour of calling it a Flemish eye. Ropemaker's Eye, which also has alternative names, is formed by taking out of a rope one strand longer by 6 in. or a foot than the required eye, then placing the ends of the two strands a similar distance below the disturbance of the one strand, that is, at the size of the eye ; the single strand is led back through the vacant space it left till it arrives at the neck of the eye, with a similar length of spare end to the other two strands. They are all seized together, scraped, tapered, marled and served. The principal merit is neatness. Mouse on a Stay. — Formed by turns of coarse spun-yarn hove taut round the stay, over parcelling at the requisite distance from the eye to form the collar; assistance is given by a padding of short yarns distributed equally round the rope, which, after being firmly secured, especially at what is to be the under part, are turned back over the first layer and seized down again, thus making a shoulder; sometimes it is formed with parcelling only. In either case it is finished by marling, followed by serving or grafting. The use is to prevent the Flemish eye in the end of the stay from slipping up any farther.

Rolling Hitch (fig. 39). — Two round turns are taken round a spar or large rope in the direction in which it is to be hauled and one half-

hitch on the other side of the hauling part. This is very useful, as it can be put on and off quickly.

Round Seizing (fig. 40). — So named when the rope it secures does not

cross another and there are three sets of turns. The size of the

Fig. 38.

KSS

Fig. 39.

Fig. 40.

seizing line is about one-sixth (nominal) that of the ropes to be secured, but varies according to the number of turns to be .taken. An eye is spliced in the line and the end rove through it, embracing both parts. If either part is to be spread open, commence farthest from that part; place tarred canvas under the seizing; pass the line round as many times (with much slack) as it is intended to have under- turns; and pass the end back through them all and through the eye. Secure the eye from rendering round by the ends of its splice; heave the turns on with a marling-spike (see fig. 17), perhaps seven or nine; haul the end through taut, and commence again the riding turns in the hollows of the first. If the end is not taken back through the eye, but pushed up between the last two turns (as is sometimes recommended), the riders must be passed the opposite way in order to follow the direction of the under-turns, which are always one more in number than the riders. When the riders are complete, the end is forced between the last lower turns and two cross turns are taken, the end coming up where it went down, when a wall knot is made with the strands and the ends cut close ; or the end may be taken once round the shroud. Throat. Seizing. — -Two ropes or parts of ropes are laid on each other parallel and receive a seizing similar to that shown in figure 35 — that is with upper and riding but no cross turns. As the two parts of rope are intended to turn up at right angles to the direction in which they were secured, the seizing should be of stouter line arid short, not exceeding seven lower and six riding turns. The end is better secured with a turn round the standing part. Used for turning in dead-eyes and variously. Flat Seizing. — Com- menced similarly to the above, but it has neither riding nor cross turns.*

Racking Seizing (fig. 41). — A running eye having been spliced round one part of the rope, the line is passed entirely round the other part,

Fig. 41.

Fig. 42.

Fig. 43.

crossed back round the first part, and so on for ten to twenty turns,

according to the expected strain, every turn being hove as tight as possible; after which round turns are passed to fill the spaces at the back of each rope, by taking the end a over both parts into the hollow at b, returning at c, and going over to d. When it reaches e a turn may be taken round that rope only, the end rove under it, and a half-hitch taken, which will form a clove-hitch; knot the end and cut it close. When the shrouds are wire (which is half the size of hemp) and the end turned up round a dead-eye of any kind, wire seizings are preferable. It appears very undesirable to have wire rigging combined with plates or screws for setting it up, as in case of accident — such as that of the mast going over the side, a shot or collision breaking the ironwork — the seamen are powerless.

Diamond Knot (figs. 42, 43). — The rope must be unlaid as far as the centre if the knot is required there, and the strands handled with great care to keep the lay in them. Three bights are turned up as in fig. 42, and the end of a is taken over 6 and up the bight c. The end of 6 is taken over c and up through a. The end c is taken over a and through b. When hauled taut and the strands are laid up again it will appear as in fig. 43. Any number of knots may be made on the same rope. They were used on man-ropes, the foot-ropes on the jib- boom, and similar places, where it was necessary to give a good hold for the hands or feet. Turk's heads are now generally used._ Double Diamond. — Made by the ends of a single diamond following their own part till the knot is repeated. Used at the upper end of a side rope as an ornamental stopper-knot.

Stropping-Blocks. — There are various modes of securing blocks to ropes; the most simple is to splice an eye at the end of the ropea little longer than the block and pass a round seizing to keep it in place; such is the case with iib-pendants. As a general rule, the parts of a strop combined should possess greater strength than the parts of the fall which act against it. The shell of an ordinary block

should be about three times the circumference of the rope which is to reeve through it, as a 9-in. block for a 3-in. rope; but small ropes require larger blocks in proportion, as a 4-in. block for a l-in. rope. When the work to be done is very important the blocks are much larger: brace-blocks are more than five times the nominal size of the brace. Leading-blocks and sheaves in racks are generally smaller than the blocks through which the ropes pass farther away, which appears to be a mistake, as more power is lost by friction. A clump- block should be double the nominal size of the rope. A single strop may be made by joining the ends of a rope of sufficient length

to go round the block and thimble by a common short splice, which rests on the crown of the block (the opposite end to the thimble) and is stretched into place by a jigger; a strand is then passed twice round

4&*

#fo

Fig. 44.

I Fig. 45-‘

the space between the block and the thimble and hove taut by a Spanish windlass to cramp the parts together ready for the reception of a small round seizing. The cramping or pinching into shape is sometimes done by machinery invented by a rigger in Portsmouth dockyard. The strop may be made the required length by a long splice, but it would not possess any advantage.

Grummet-Strop (fig. 44). — -Made by unlaying a piece of rope of the desired size about a foot more than three times the length required for the strop. Place the centre of the rope round the block and thimble; mark with chalk where the parts cross; take one strand out of the rope; bring the two chalk marks together; and cross the strand in the lay on both sides, continuing round and round till the two ends meet the third time ; they are then halved, and the upper halves half-knotted and passed over and under the next strands, exactly as one part of a long splice. A piece of worn or well-stretched rope will better retain its shape, upon which success entirely depends. The object is neatness, and if three or multiples of three strops are to be made it is economical.

Double Strop (fig. 45). — Made with one piece of rope, the splice being brought as usual to the crown of the block t, the bights fitting into scores some inches apart, converging to the upper part, above which the thimble receives the bights a, a; and the four parts of the strop are secured at s, s by a round seizing doubly crossed. If the block be not then on the right slew (the shell horizontal or vertical) a union thimble is used with another strop, which produces the de- sired effect; thus the fore and main brace-blocks, being very large and thin, are required (for appearance) to lie horizontally; a single strop round the yard vertically has a union thimble between it and the double strop round the block. The double strop is used for large blocks ; it gives more support to the shell than the single strop and admits of smaller rope being used. Wire rope is much used for block-strops; the fitting is similar. Metal blocks are also used in fixed positions; durability is their chief recommendation. Great care should be taken that they do not chafe the ropes which pass by them as well as those which reeve through.

Selvagee Strop. — Twine, rope-yarn or rope is warped round two or more pegs placed at the desired distance apart, till it assumes the requisite size and strength; the two ends are then knotted or spliced. Temporary firm seizings are applied in several places to bind the parts together before the rope or twine is removed from the pegs, after which it is marled with

suitable material. A large strop should be warped round four or six pegs in order to give it the shape in which it is to be used. This description of strop is much stronger and more supple than rope of similar size. Twine strops (covered with duck) are used for boats' blocks and in similar places requiring neatness. Rope-yarn and spun-yarn strops are used for attaching luff-tackles to shrouds and for many similar purposes. To bring to a shroud or hawser, the centre of the strop is passed round the rope and each part crossed three or four times before hooking the " luff " ; a spun-yarn stop above the centre will prevent slipping and is very necessary with wire rope. .As an instance of a large selvagee block-strop being used — when the " Melville " was hove down at Chusan (China), the main-purchase-block was double stropped with a selvagee containing 28 parts of 3-in. rope ; that would

produce 112 parts in the neck, equal to a breaking strain of 280 tons, which is more than four parts of a 19-in cable. The estimated strain it bore was 80 tons.

Stoppers for ordinary running ropes are made by splicing a piece of rope to a bolt or to a hook and thimble, unlaying 3 or 4 ft., tapering it by cutting away some of the yarns, and marling it down securely, with a good whipping also on the end. It is used by taking a half- hitch round the rope which is to be hauled upon, dogging the end up in the lay and holding it by hand. The rope can come through it when hauled, but cannot go back.

Whipping and Pointing. — 1 he end of every working rope should at least be whipped to prevent it fagging out; in ships of war and yachts they are invariably pointed. Whipping is done by placing the end of a piece of twine or knittle-stuff on a rope about an inch from the end, taking three or four turns taut over it (working towards the end) ; the twine is then laid on the rope again lengthways con- trary to the first, leaving a slack bight of twine; and taut turns are repeatedly passed round the rope, over the first end and over the bight, till there are in all six to ten turns; then haul the bight taut through between the turns and cut it close. To point a rope, place a good whipping a few inches from the end, according to size ; open out the end entirely; select all the outer yarns and twist them into knittles either singly or two or three together ; scrape down and taper the central part, marling it firmly. Turn every alternate knittle and secure the remainder down by a turn of twine or a smooth yarn hitched close up, which acts as the weft in weaving. The knittles are then reversed and another turn of the weft taken, and this is continued till far enough to look well. At the last turn the ends of the knittles which are laid back are led forward over and under the weft and hauled through tightly, making it present a circle of small bights, level with which the core is cut off smoothly. Hawsers and large ropes have a becket formed in their ends during the process of pointing. A piece of 1 to 1

J in. rope about ij to 2 ft. long is spliced into the core by each end while it is open : from four to seven yarns (equal to a strand) are taken at a time and twisted up ; open the ends of the becket only sufficient to marry them close in ; turn in the twisted yarns between the strands (as splicing) three times, and stop it above and below. Both ends are treated alike; when the pointing is completed a loop a few inches in length will protrude from the end of the rope, which is very useful for reeving it. A hauling line or reeving line should only be rove through the becket as a fair lead. Grafting is very similar to pointing, and frequently done the whole length of a rope, as a side-rope. Pieces of white line more than double the length of the rope, sufficient in number to encircle it,

*6 Fig. 46. **

are made up in hanks called foxes ; the centre of each is made fast by twine and the weaving process continued as in pointing. Block- strops are sometimes so covered; but, as it causes decay, a small wove mat which can be taken off occasionally is preferable.

Sheep-Shank (fig. 46). — Formed by making a long bight in a top- gallant back-stay, or any rope which it is desirable to shorten, and taking a half-hitch near each bend, as at a, a. Rope-yarn stops at b, b are desirable to keep it in place till the strain is brought on it. Wire rope cannot be so treated, and it is injurious to hemp rope that is large and stiff.

Knotting Yarns (fig. 47). — This operation becomes necessary when, a comparatively short piece of junk is to be made into spun-yarn, or large rope into small, which is called twice laid. The end of each yarn is divided, rubbed smooth and married (as for splicing). Two of the divided parts, as c, c and d, d, are passed in opposite directions round all the other parts and knotted. The ends e and / remain passive. The figure is drawn open, but the forks of A and B should be pressed close together, the knot hauled taut and the ends cut off.

Butt Slings (fig. 48). — Made of 4-in. rope, each pair being 26 ft. in length, with an eye spliced in one end, through which the other

47- Fig. 48.

is rove before being placed over one end of the cask; the rope is then passed round the opposite side of the cask and two half-hitches made with the end, forming another running eye, both of which are beaten down taut as the tackle receives the weight. Slings for smaller casks requiring care should be of this description, though of smaller rope, as the cask cannot possibly slip out. Bale Slings are made by splicing the ends of about 3 fathoms of 3-in.

rope together, which then looks like a long strop, similar to the double strop represented in fig' 45 — the bights t being placed under the cask or bale and one of the

8 7 6

bights a, a rove through the other and attached to the whip or tackle.

For a complete treatise on the subject the reader may be referred to The Book of Knots, being a Complete Treatise on the Art of Cordage, illustrated by 172 Diagrams, showing the Manner of making every Knot, Tie and Splice, by Tom Bowling (London, 1890).

Mathematical Theory of Knots.

In the scientific sense a knot is an endless physical line which cannot be deformed into a circle. A physical line is flexible and inextensible, and cannot be cut — so that no lap of it can be drawn through another.

The founder of the theory of knots is undoubtedly Johann Benedict Listing (1808-1882). In his " Vorstudien zur Topo- logie " (Gottinger Studien, 1847), a work in many respects of startling originality, a few pages only are devoted to the subject. 1 He treats knots from the elementary notion of twisting one physical line (or thread) round another, and shows that from the projection of a knot on a surface we can thus obtain a notion of the relative situation of its coils. He distinguishes " reduced " from " reducible " forms, the number of crossings in the reduced knot being the smallest possible. The simplest form of reduced knot is of two species, as in figs. 49 and 50. Listing points out that these are formed, the first by right-handed the second by left-banded twisting. In fact, if three half-twists be given to a long strip of paper, and the ends be then pasted together, the two edges become one line, which is the knot in question. We may free it by slitting the paper along its middle line; and then we have the juggler's trick of putting a knot on an endless un- knotted band. One of the above forms cannot be deformed into the other. The one is, in Listing's language, the " perversion " of the other, i.e. its image in a plane mirror. He gives a method of symbolizing reduced knots, but shows that in this method the same knot may, in certain cases, be represented by different symbols. It is clear that the brief notice he" published contains a mere sketch of his investigations.

The most extensive dissertation on the properties of knots is that of Peter Guthrie Tait {Trans. Roy. Soc. Edin., xxviii. 145, where the substance of a number of papers in the Proceedings of the same society is reproduced). It was for the most part written in ignorance of the work of Listing, and was

suggested by an inquiry concerning vortex atoms.

Tait starts with the almost self-evident proposition that, if any plane closed curve have double points only, in passing continuously along the curve from one of these to the same again an even number of double points has been passed through. Hence the crossings may be taken alternately over and under. On this he bases a scheme for the representation of knots of every kind, and employs it to find all the distinct forms of knots which have, in their simplest projec-

Fig. 49. Fig. 50. Fig. 51. Fig. 52.

tions, 3, 4, 5, 6 and 7 crossings only. Their numbers are shown to V' 1, I, 2, 4 and 8. The unique knot of three crossings has been already given as drawn by Listing. The unique knot of four cross- ings merits a few words, because its properties lead to a very singular conclusion. It can be deformed into any of the four forms — figs. 51 and 52 and their perversions. Knots which can be deformed into their own perversion Tait calls " amphicheiral " (from the Greek an4>i, on both sides, around, x«/p, hand), and he has shown that there is at least one knot of this kind for every even number of crossings. He shows also that " links " (in which two endless physical lines are linked together) possess a similar property; and he then points out that there is a third mode of making a complex figure of endless physical lines, without either knotting or linking. This may be called " lacing " or " locking." Its nature is obvious from fig. 53, in which it will be seen that no one of the three lines is knotted, no two are linked, and yet the three are inseparably fastened together.

_ The rest of Tait's paper deals chiefly with numerical character- istics of knots, such as their " knottiness," " beknottedness " and " knotfulness." He also shows that any knot, however complex,

1 See P. G. Tait " On Listing's Tofologie," Phil. Mag., xvii. 30.

can be fully represented by three closed plane curves, none of which has double points and no two of which intersect. It may be stated here that the notion of beknottedness is founded on a remark of Gauss, who in 1833 considered the problem of the number of inter- linkings of two closed circuits, and expressed it by the electro- dynamic measure of the work required to carry a unit magnetic pole round one of the interlinked curves, while a unit electric current is

Fig. 53. Fig. 54.

kept circulating in the other. This original suggestion has been developed at considerable length by Otto Boeddicker (Erweiterung der Gauss' schen Theorie der Verschlingungen (Stuttgart, 1876). This author treats also of the connexion of knots with Riemann's surfaces.

It is to be noticed that, although every knot in which the crossings are alternately over and under is irreducible, the converse is not generally true. This is obvious at once from fig. 54, which is merely the three-crossing knot with a doubled string — what Listing calls " paradromic."

Christian Felix Klein, in the Mathematische Annalen, ix. 478, has proved the remarkable proposition that knots cannot exist in space of four dimensions. (p. G. T.)

KNOUT (from the French transliteration of a Russian word of Scandinavian origin; cf. A.-S. cnotta, Eng. knot), the whip used in Russia for flogging criminals and political offenders. It is said to have been introduced under Ivan III. (1462-1505). The knout had different forms. One was a lash of raw hide, 16 in. long, attached to a wooden handle, 9 in. long. The lash ended in a metal ring, to which was attached a second lash as long, ending also in a ring, to which in turn was attached a few inches of hard leather ending in a beak -like hook. Another kind consisted of many thongs of skin plaited and interwoven with wire, ending in loose wired ends, like the cat-o'nine tails. The victim was tied to a post or on a triangle of wood and stripped, receiving the specified number of strokes on the back. A sen tence of 100 or 120 lashes was equivalent to a death sentence; but few lived to receive so many. The executioner was usually a criminal who had to pass through a probation and regular training; being let off his own penalties in return for his services. Peter the Great is traditionally accused of knouting his son Alexis to death, and there is little doubt that the boy was actually beaten till he died, whoever was the executioner. The emperor Nicholas I. abolished the earlier forms of knout and substituted the pleti, a three-thonged lash. Ostensibly the knout has been abolished throughout Russia and reserved for the penal settlements.

KNOWLES, SIR JAMES (1831-1908), English architect and editor, was born in London in 183 1, and was educated, with a view to following his father's profession, as an architect at University College and in Italy. His literary tastes also brought him at an early age into the field of authorship. In i860 he published The Story of King Arthur. In 1867 he was introduced to Tennyson, whose house, Aldworth, on Blackdown, he designed; this led to a close friendship, Knowles assisting Tennyson in business matters, and among other things helping to design scenery for The Cup, when Irving produced that play in 1880. Knowles became intimate with a number of the most interesting men of the day, and in 1869, with Tennyson's co-

operation, he started the Metaphysical Society, the object of which was to attempt some intellectual rapprochement between religion and science by getting the leading representatives of faith and unfaith to meet and exchange views.

The members from first to last were as follows: Dean Stanley. Seeley, Roden Noel, Martineau, W. B. Carpenter, Hinton, Huxlev Pritchard, Hutton, Ward, Bagehot, Froude, Tennyson, TyndiU Alfred Barry, Lord Arthur Russell, Gladstone, Manning, Knowles. Lord Avebury, Dean Alford, Alex. Grant, Bishop Thirlwall, F. Harrison, Father Dalgaims, Sir G. Grove, Shadworth Hodgson.

KNOWLES, J. S.— KNOW NOTHING PARTY

8 77

H. Sidgwick, E. Lushington, Bishop Ellicott, Mark Pattison, duke of Argyll, Ruskin, Robert Lowe, Grant Duff, Greg, A. C. Fraser, Henry Acland, Maurice, Archbishop Thomson, Mozley, Dean Church, Bishop Magee, Croom Robertson, Fitzjames Stephen, Sylvester, J. C. Bucknill, Andrew Clark, W. K. Clifford, St George Mivart, M. Boulton, Lord Selborne, John Morley, Leslie Stephen, F. Pollock, Gasquct, C. B. Upton, William Gull, Robert Clarke, A. J. Balfour, James Sully and A. Barratt.

Papers were read and discussed at the various meetings on such subjects as the ultimate grounds of belief in the objective and moral sciences, the immortality of the soul, &c. An interest- ing description of one of the meetings was given by Magee (then bishop of Peterborough) in a letter of 13th of February 1873: —

" Archbishop Manning in the chair was flanked by two Protestant bishops right and left ; on my right was Hutton, editor of the Spectator, an Arian ; then came Father Dalgairns, a very able Roman Catholic priest ; opposite him Lord A. Russell, a Deist ; then two Scotch metaphysical writers, Freethinkers; then Knowles, the very broad editor of the Contemporary; then, dressed as a layman and looking like a country squire, was Ward, formerly Rev. Ward, and earliest of the perverts to Rome; then Greg, author of The Creed of Christendom, a Deist; then Froude, the historian, once a deacon in our Church, now a Deist; then Roden Noel, an actual Atheist and red republican, and looking very like one ! Lastly Ruskin, who read a paper on miracles, which we discussed for an hour and a half! Nothing could be calmer, fairer, or even, on the whole, more reverent then the discussion. In my opinion, we, the Christians, had much the best of it. Dalgairns, the priest, was very masterly; Manning, clever and precise and weighty; Froude, very acute, and so was Greg. We only wanted a Jew and

a Mahommedan to make our Religious Museum complete " {Life, i. 284).

The last meeting of the society was held on 16th May 1880. Huxley said that it died " of too much love "; Tennyson, " be- cause after ten years of strenuous effort no one had succeeded in even denning metaphysics." According to Dean Stanley, " We all meant the same thing if we only knew it." The society formed the nucleus of the distinguished list of contributors who supported Knowles in his capacity as an editor. In 1870 he became editor of the Contemporary Review, but left it in 1877 and founded the Nineteenth Century (to the title of which, in 1901, were added the words And After). Both periodicals became very influential under him, and formed the type of the new sort of monthly review which came to occupy the place formerly held by the quarterlies. In 1004 he received the honour of knighthood. He died at Brighton on the 13th of February

1908.

KNOWLES, JAMES SHERIDAN (1784-1862), Irish dramatist and actor, was born m Cork, on the 1 2th of May 1 784. His father was the lexicographer, James Knowles (1750-1840), cousin- german of Richard Brinsley Sheridan. The family removed to London in 1793, and at the age of fourteen Knowles published a ballad entitled The Welsh Harper, which, set to music, was very popular. The boy's talents secured him the friendship of Hazlitt, who introduced him to Lamb and Coleridge. He served for some time in the Wiltshire and afterwards in the Tower Hamlets militia, leaving the service to become pupil of Dr Robert Willan (1757-1812). He obtained the degree of M.D., and was appointed vaccinator to the Jennerian Society. Although, however, Dr Willan generously offered him a share in his practice, he resolved to forsake medicine for the stage, making his first appearance probably at Bath, and playing Hamlet at the Crow Theatre, Dublin. At Wexford he married, in October 1809, Maria Charteris, an actress from the Edinburgh Theatre. In 1810 he wrote Leo, in which Edmund Kean acted with great success; another play, Brian Boroihme, written for the Belfast Theatre in the next year, also drew crowded houses, but his earnings were so small that he was obliged to become assistant to his father at the Belfast Academical Institution. In 1817 he removed from Belfast to Glasgow, where, besides conducting a flourishing school, he continued to write for the stage. His first important success was Caius Gracchus, produced at Belfast in 181 5; and his Virginius, written for Edmund Kean, was first performed in 1820 at Covent Garden. In William Tell (1825) Macready found one of his favourite parts. His best-known play, The Hunchback, was produced at Covent Garden in 1832; The Wife was brought out at the same theatre in 1833; and The

Love Chase in 1837. In his later years he forsook the stage for the pulpit,

and as a Baptist preacher attracted large audiences at Exeter Hall and elsewhere. He published two polemical works — the Rock of Rome and the Idol Demolished by its own Priests — in both of which he combated the special doctrines of the Roman CaAolic Church. Knowles was for some years in the receipt of an annual pension of £200, bestowed by Sir Robert Peel. He died at Torquay on the 30th of November 1862.

A full list of the works of Knowles and of the various notices of him will be found in the Life (1872), privately printed by his son, Richard Brinsley Knowles (1820-1882), who was well known as a journalist.

KNOW NOTHING (or American) PARTY, in United States history, a political party of great importance in the decade before i860. Its principle was political proscription of natural- ized citizens and of Roman Catholics. Distrust of alien immi- grants, because of presumptive attachment to European insti- tutions, has always been more or less widely diffused, and race antagonisms have been recurrently of political moment; while anti-Catholic sentiment went back to colonial sectarianism. These were the elements of the political " nativism " — i.e. hostility to foreign influence in politics — of 1830-1860. In these years Irish immigration became increasingly preponderant ; and that of Catholics was even more so. The geographical segregation and the clannishness of foreign voters in the cities gave them a power that Whigs and Democrats alike (the latter more successfully) strove to control, to the great aggravation of naturalization and election frauds. " No one can deny that ignorant foreign suffrage had grown to be an evil of immense proportions" (J. F. Rhodes). In labour disputes, political feuds and social clannishness, the alien elements — especially the Irish and German — displayed their power, and at times gave offence by their hostile criticism of American institutions. l In immigration centres like Boston, Philadelphia and New York, the Catholic Church, very largely foreign in membership and proclaiming a foreign allegiance of disputed extent, was really " the symbol and strength of foreign influence " (Scisco) ; many regarded it as a transplanted foreign institution, un-American in organization and ideas. 2 Thus it became involved in politics. The decade 1830-1840 was marked by anti-Catholic (anti-Irish) riots in various cities and by party organization of nativists in many places in local elections. Thus arose the American- Republican (later the Native- American) Party, whose national career begun practically in 1845, and which in Louisiana in 1841 first received a state organization. New York City in 1844 and Boston in 1845 were carried by the nativists, but their success was due to Whig support, which was not continued, 3 and the national organization was by 1847 — in which year it endorsed the Whig nominee for the presidency — practically dead. Though some Whig leaders had strong nativist leanings, and though the party secured a few representatives in Congress, it accomplished little at this time in national

politics. In the early 'fifties nativism was revivified by an unparalleled inflow of aliens. Catholics, moreover, had combated the Native-Americans defiantly. In 1852 both Whigs and Democrats were forced to defend their presidential nominees against charges of anti-Catholic sentiment. In 1853-1854 there was a wide-spread " anti-popery " propa- ganda and riots against Catholics in various cities. Meanwhile the KnowNothing Party had sprung from nativist secret societies, whose relations remain obscure. 4 Its organization was secret; and hence its name — for a member, when interrogated, always

1 E.g. for some extraordinary " reform " programmes among German immigrants see Schmeckebier (as below), pp. 48-50.

2 " The actual offence of the Catholic Church was its non-con- formity to American methods of church administration and popular education " (Scisco).

8 The Whigs bargained aid in New York city for "American " support in the state, and charged that the latter was not given. Millard Fillmore attributed the Whig loss of the state (see Liberty Party) to the disaffection of Catholic Whigs angered by the alliance with the nativists.

4 The Order of United Americans and the Order of the Star Spangled Banner, established in New York respectively in 1845 and 1850, were the most important sources of its membership.

answered that he knew nothing about it. Selecting candidates secretly from among those nominated by the other parties, and giving them no public endorsement, the Know Nothings, as soon as they gained the balance of power, could shatter at will Whig and Democratic calculations. Their power was evident by 1852 — from which time, accordingly, " Know^iothingism " is most properly dated. The charges they brought against naturalization abuses were only too well founded; and those against election frauds not less so — though, unfortunately, the Know Nothings themselves followed scandalous election methods in some cities. The proposed proscription of the foreign-born knew no exceptions: many wished never to concede to them all the rights of natives, nor to their children unless educated in the public schools. As for Catholics, the real animus of Know Nothingism was against political Romanism; therefore, secon- darily, against papal allegiance and episcopal church adminis- tration (in place of administration by lay trustees, as was earlier common

practice in the United States) ; and, primarily, against public aid to Catholic schools, and the alleged greed (i.e. the power and success) of the Irish in politics. The times were pro- pitious for the success of an aggressive third party; for the Whigs were broken by the death of Clay and Webster and the crushing defeat of 1852, and both the Whig and Democratic parties were disintegrating on the slavery issue. But the Know Nothings lacked aggression. In entering national politics the party abandoned its mysteries, without making compensatory gains; when it was compelled to publish a platform of principles, factions arose in its ranks; moreover, to draw recruits the faster from Whigs and Democrats, it " straddled " the slavery question, and this, although a temporary success, ultimately meant ruin. In 1854, however, Know Nothing gains were remarkable. 1 Thereafter the organization spread like wildfire in the South, in which section there were almost no aliens, and the Whig dissolu- tion was far advanced. The Virginia election of May 1855 proved conclusively, however, that Know Nothingism was no stronger against the Democrats than was the Whig party it had absorbed; it was the same organization under a new name. In the North it was even clearer that slavery must be faced. Know Nothing evasion probably helped the South, 2 but neither Repub- licans nor Democrats would endure the evasion; Douglas and Seward, and later (1855-1856) their parties, denounced it. In the North-West the Know Nothings were swept into the anti- slavery movement in 1854 without retaining their organization. In the state campaigns of 1855 professions were measured to the latitude. The national platform cf 1856 (adopted by a secret grand council), besides including anti-alien and anti-Catholic planks, offered sops to the North, the South and the " dough-faces " on the slavery issue. Millard Fillmore was nominated for the presidency. The anti-slavery delegates of eight Northern states bolted the convention, and eight months later the Repub- lican wave swept the Know Nothings out of the North. 3 The national field being thus lost, the state councils became supreme, and local opportunism fostered variation and weakness. By 1859 the party was confined almost entirely to the border states. The Constitutional Union — the " Do Nothing " — Party of i860 was mainly composed of Know Nothing remnants. 4 The year i860 practically marked, also, the disappearance of the party as a local power. 5

Except in city politics nativism had no vitality; in state and

1 This year " American Party " became the official name. Its strength in Congress was almost thirty-fold that of 1852. It elected governors, legislatures, or both, in four New England states, and in Maryland, Kentucky and California; minor officers elsewhere; and almost won six Southern states.

2 For it delayed anti-slavery organization in the North, and presumably

discouraged immigration, which was a source of strength to the North rather than to the South.

3 They carried only Maryland. The popular vote in the North was under one-seventh, in the South above three-sevenths, of the total vote cast.

4 Note the presidential vote. Seward's loss of the Republican nomination was partly due to Know Nothing hostility.

5 Its firmest hold was in Maryland. Its rule in Baltimore (1854- 1860) was marked by disgraceful riots and abuses.

national politics it really had no excuse. Race antipathies gave it local cohesive power in the North; various causes, already mentioned, advanced it in the South; and as a device to win offices it was of wide-spread attraction. Its only real contribu- tion to government was the proof that nativism is not American- ism. Public opinion has never accepted its estimate of the alien nor of Catholic citizens. Some of its anti-Church principles, however — as the non-support of denominational schools — have been generally accepted; others — as the refusal to exclude the (Protestant) Bible from public schools — have been generally rejected; others — as the taxation of all Church property — remain disputed.

See L. D. Scisco, Political Nativism in New York State (doctoral thesis, Columbia University, New York, 1901); L. F. Schmeckebier, Know Nothing Party in Maryland (Johns Hopkins University, Baltimore, 1899); G. H. Haynes, " A Know Nothing Legislature " (Mass., 1855), in American Historical Assoc. Report, pt. 1 (1896); J. B. McMaster, With the Fathers, including " The Riotous Career of the Know Nothings " (New York, 189&) ; H. F. Desmond, The Know Nothing Parly (Washington, 1905).

KNOX, HENRY (1750-1806), American general, was born in Boston, Massachusetts, of Scottish-Irish parentage, on the 25th of July 1750. He was prominent in the colonial militia and tried to keep the Boston crowd and the British soldiers from the clash known as the Boston massacre (1770). In 1771 he opened the " London Book-Store " in Boston. He had read much of tactics and strategy, joined the American army at the outbreak of the War of Independence, and fought at Bunker Hill, planned the defences of the camps of the army before Boston, and brought from Lake George and border forts much-needed artillery. At Trenton he crossed the river before the main body, and in the attack rendered such good service that he was made brigadier- general and chief of artillery in the Continental army on the following day. He was present at Princeton; was chiefly respon- sible for the mistake in attacking the " Chew House " at German- town; urged New York as the objective of the campaign of 1778;

served with efficiency at Monmouth and at Yorktown; and alter the surrender of Cornwallis was promoted major-general, and served as a commissioner on the exchange of prisoners. His services throughout the war were of great value to the American cause; he was one of General Washington's most trusted advisers, and he brought the artillery to a high degree of efficiency. From December 1783 until June 1784 he was the senior officer of the United States army. In April 1783 he had drafted a scheme of a society to be formed by the American officers and the French officers who had served in America during the war, and to be called the " Cincinnati "; of this society he was the first secretary- general (1 783-1 799) and in 1805 became vice-president-general. In 1785-1794 Knox was secretary of war, being the first man to hold this position after the organization of the Federal govern- ment in 1789. He urged ineffectually a national militia system, to enroll all citizens over 18 and under 60 in the " advanced corps," the " main corps " or the " reserve," and for this and his close friendship with Washington was bitterly assailed by the Republicans. In 1793 he had begun to build his house, Mont- pelier, at Thomaston, Maine, where he speculated unsuccess- fully in the holdings of the Eastern Land Association; and he lived there until his death on the 25th of October 1806.

See F. S. Drake, Memoir of General Henry Knox (Boston, 1873) ; and Noah Brooks, Henry Knox (New York, 1900) in the " American Men of Energy " series.

KNOX, JOHN (c. 1505-1572), Scottish reformer and historian. Of his early life very little is certainly known, in spite of the fact that his History of the Reformation and. his private letters, especially the latter, are often vividly autobiographical. Even the year of his birth, usually given as 1505, is matter of dispute. Beza, in his Icones, published in 1580, makes it 1515; Sir Peter Young (tutor to James VI. of Scotland), writing to Beza from Edinburgh in 1579, says 1513; and a strong case has been made out for holding that the generally accepted date is due to an error in transcription (see Dr Hay Fleming in the Bookman, Sept. 1905). But Knox seems to have been reticent about his early life, even to his contemporaries. What is known is that he

was a son of William Knox, who lived in or near the town of Haddington, that his mother's name was Sinclair, and that his forefathers on both sides had fought under the banner of the Bothwells. William Knox was " simple," not " gentle " — perhaps a prosperous East Lothian peasant. But

he sent his son John to school (no doubt the well-known grammar school of Haddington), and thereafter to the university, where, like his contemporary George Buchanan, he sat " at the feet " of John Major. Major was a native of Haddington, who had recently re- turned to Scotland from Paris with a great academical reputation. He retained to the last, as his History of Greater Britain shows, the repugnance characteristic of the university of Paris to the tyranny of kings and nobles; but like it, he was now alarmed by the revolt of Luther, and ceased to urge its ancient protest against the supremacy of the pope. He exchanged his " re- gency " or professorship in Glasgow University for one in that of St Andrews in 1523. If Knox's college time was later than that date (as it must have been, if he was born near 1515), it was no doubt spent, as Beza narrates, at St Andrews, and probably exclusively there. But in Major's last Glasgow session a " Joannes Knox " (not an uncommon name, however, at that time in the west of Scotland) matriculated there; and if this were the future reformer, he may thereafter either have followed his master to St Andrews or returned from Glasgow straight to Haddington. But till twenty years after that date his career has not been again traced. Then he reappears in his native district as a priest without a university degree (Sir John Knox) and a notary of the diocese of St Andrews. In 1543 he certainly signed himself " minister of the sacred altar " under the arch- bishop of St Andrews. But in 1546 he was carrying a two- handed sword in defence of the reformer George Wishart, on the day when the latter was arrested by the archbishop's order. Knox would have resisted, though the arrest was by his feudal superior, Lord Both well; but Wishart himself commanded his submission, with the words " One is sufficient for a sacrifice," and was handed over for trial at St Andrews. And next year the archbishop himself had been murdered, and Knox was preaching in St, Andrews a fully developed Protestantism.

Knox gives us no information as to how this startling change in himself was brought about. During those twenty years Scotland had been slowly tending to freedom in religious pro- fession, and to friendship with England rather than with France. The Scottish hierarchy, by this time corrupt and even profligate, saw the twofold danger and met it firmly. James V., the " Commons' King " had put himself into the hands of the Beatons, who in 1528 burned Patrick Hamilton. On James's death there was a slight reaction, but the cardinal-archbishop took possession of the weak regent Arran, and in 1546 burned George Wishart. England had by this time rejected the pope's supremacy. In Scotland by a recent statute it was death even to argue against it; and Knox after Wishart 's execution was fleeing from place to place, when, hearing that certain gentlemen of Fife had slain the cardinal and were in possession of his castle of St Andrews, he gladly joined himself to them. In St Andrews he taught " John's Gospel " and a certain catechism — probably that which Wishart had got from " Helvetia

” and translated; but his teaching was supposed to be private and tutorial and for the benefit of his friends’ ” bairns.” The men about him how- ever — among them Sir David Lindsay of the Mount, ” Lyon King ” and poet — saw his capacity for greater things, and, on his at first refusing ” to run where God had not called him,” planned a solemn appeal to Knox from the pulpit to accept ” the public office and charge of preaching.” At the close of it the speaker (in Knox’s own narrative) ” said to those that were present, ‘ Was not this your charge to me ? And do ye not approve this vocation ? ‘ They answered, ‘ It was, and we approve it.’ Whereat the said Johnne, abashed, burst forth in most abundant tears and withdrew himself to his chamber,” remaining there in ” heaviness ” for days, until he came forth resolved and prepared. Knox is probably not wrong in regarding this strange incident as the spring of his own public life. The St Andrews invitation was really one to danger and death;

John Rough, who spoke it, died a few years after in the flames at Smithfield. But it was a call which many in that ardent dawn were ready to accept, and it had now at length found, or made, a statesman and leader of men. For what to the others was chiefly a promise of personal salvation became for the indomitable will of Knox an assurance also of victory, even in this world, over embattled forces of ancient wrong. It is certain at least that from this date he never changed and scarcely even varied his public course. And looking back upon that course afterwards, he records with much complacency how his earliest St Andrews sermon built up a whole fabric of aggressive Protes- tantism upon Puritan theory, so that his startled hearers mut- tered, ” Others sned (snipped) the branches; this man strikes at the root.”

Meantime the system attacked was safe for other thirteen years. In June 1547 St Andrews yielded to the French fleet, and the prisoners, including Knox, were thrown into the galleys on the Loire, to remain in irons and under the lash for at least nineteen months. Released at last (apparently through the influence of the young English king, Edward VI.), Knox was appointed one of the licensed preachers of the new faith for England, and stationed in the great garrison of Berwick, and afterwards at Newcastle. In 1551 he seems to have been made a royal chaplain; in 1352 he was certainly offered an English bishopric, which he declined; and during most of this year he used his influence, as preacher at court and in London, to make the new English settlement more Protestant. To him at least is due the Prayer-book rubric which explains that, when kneeling at the sacrament is ordered, ” no adoration is intended or ought to be done.” While in Northumberland Knox had been betrothed to Margaret Bowes, one of the. fifteen children of Richard Bowes, the captain of Norham Castle. Her mother, Elizabeth, co-heiress of Aske in Yorkshire, was the earliest of that little band of women-friends whose correspondence with Knox on religious

matters throws an unexpected light on his discriminating tenderness of heart. But now Mary Tudor succeeded her brother, and Knox in March 1554 escaped into five years' exile abroad, leaving Mrs. Bowes a fine treatise on " Affliction," and sending back to England two editions of a more acrid " Faithful Admonition " on the crisis there. He first drifted to Frankfort, where the English congregation divided as English Protestants have always done, and the party opposed to Knox got rid of him at last by a complaint to the authorities of treason against the emperor Charles V. as well as Philip and Mary. At Geneva he found a more congenial pastorate. Christopher Goodman (c. 15 20-1 603) and he, with other exiles, began there the Puritan tradition, and prepared the earlier English version of the Bible, " the household book of the English-speaking nations " during the great age of Elizabeth. Here, and afterwards at Dieppe (where he preached in French), Knox kept in communication with the other Reformers, studied Greek and Hebrew in the interest of theology, and having brought his wife and her mother from England in 1555 lived for years a peaceful life.

But even here Knox was preparing for Scotland, and facing the difficulties of the future, theoretical as well as practical. In his first year abroad he consulted Calvin and Bullinger as to the right of the civil " authority " to prescribe religion to his sub- jects — in particular, whether the godly should obey "a magis- trate who enforces idolatry and condemns true religion," and whom should they join " in the case of a religious nobility resisting an idolatrous sovereign." In August 1555 be visited his native country and found the queen-mother, Mary of Lorraine, acting as regent in place of the real " sovereign," the youthful and better-known Mary, new being brought up at the court of France. Scripture-reading and the new views had spread widely, and the regent was disposed to wink at this in the case of the " religious nobility." Knox was accordingly allowed to preach privately for six months throughout the south of Scotland, and was listened to with an enthusiasm which made him break outi " O sweet were the death which should follow such forty days in Edinburgh as here I have had three! " Before leaving he

even addressed a letter to the regent, urging her to favour the Evangel. She accepted it jocularly as a " pasquil," and Knox on his departure was condemned and burned in effigy. But he left behind him a " Wholesome Counsel " to Scottish heads of families, reminding them that within their own houses they were "bishop and kings," and recommending the institution of something like the early apostolic worship in private congre- gations. Of the Protestant barons Knox, though in exile, seems to have been

henceforward the chief adviser; and before the end of 1557 they, under the name of the " Lords of the Con- gregation," had entered into the first of the religious " bands " or "covenants" afterwards famous in Scotland. In 1558 he published his " Appellation " to the nobles, estates and common- alty against the sentence of death recently pronounced upon him, and along with it a stirring appeal " To his beloved brethren, the Commonalty of Scotland," urging that the care of religion fell to them also as being " God's creatures, created and formed in His own image," and having a right to defend their conscience against persecution. About this time, indeed, there was in Scotland u remarkable approximation to that solution of the toleration difficulty which later ages have approved; for the regent was understood to favour the demand of the "congrega- tion " that at least the penal statutes against heretics " be suspended and abrogated," and " that it be lawful to us to use ourselves in matters of religion and conscience as we must answer to God." It was a consummation too ideal for that early date; and next year the regent, whose daughter was now queen of France and there mixed up with the persecuting policy of the Guises, forbade the reformed preaching in Scotland. A rupture ensued at once, and Knox appeared in Edinburgh on the 2nd of May 1 559 " even in the brunt of the battle." He was promptly " blown to the horn " at the Cross there as an outlaw, but escaped to Dundee, and commenced public preaching in the chief towns of central Scotland. At Perth and at St Andrews his sermons were followed by the destruction of the monasteries, institutions disliked in that age in Scotland alike by the devout and the profane. But while he notes that in Perth the act was that of " the rascal multitude," he was glad to claim in St Andrews the support of the civic " authority "; and indeed the burghs, which were throughout Europe generally in favour of freedom, soon became in Scotland a main support of the Refor- mation. Edinburgh was still doubtful, and the queen regent held the castle; but a truce between her and the lords for six months to the 1st of January 1560 was arranged on the footing that every man there " may have freedom to use his own con- science to the day foresaid " — a freedom interpreted to let Knox and his brethren preach publicly and incessantly.

Scotland, like its capital, was divided. Both parties lapsed from the freedom-of-conscience solution to which each when unsuccessful appealed; both betook themselves to arms; and the immediate future of the little kingdom was to be decided by its external alliances. Knox now took a leading part in the great transaction by which the friendship of France was ex- changed for that of England. He had one serious difficulty. Before Elizabeth's accession to the English crown, and after the queen mother in Scotland had disappointed his hopes, he had published a treatise against what he called " The Monstrous Regiment (regimen or government) of Women"; though the despotism of that despotic age was scarcely

appreciably worse when it happened to be in female hands. Elizabeth never for- gave him; but Cecil corresponded with the Scottish lords, and their answer in July 1559, in Knox's handwriting, assures England not only of their own constancy, but of " a charge and commandment to our posterity, that the amity and league between you and us, contracted and begun in Christ Jesus, may by them be kept inviolated for ever." The league was promised by England; but the army of France was first in the field, and towards the end of the year drove the forces of the " congre- gation " from Leith into Edinburgh, and then out of it in a midnight rout to Stirling — "that dark and dolorous night," as Knox long afterwards said, "wherein all ye, my lords, with shame and fear left this town," and from which only a memorable

sermon by their great preacher roused the despairing multitude into new hope. Their leaders renounced allegiance to the regent; she ended her not unkindly, but as Knox calls it " unhappy," life in the castle of Edinburgh; the English troops, after the usual Elizabethan delays and evasions, joined their Scots allies; and the French embarked from Leith. On the 6th of July 1560 a treaty was at last made, nominally between Elizabeth and the queen of France and Scotland; while Cecil instructed his mis- tress's plenipotentiaries to agree " that the government of Scot- land be granted to.the nation of the land." The revolution was in the meantime complete; and Knox, who takes credit for having done much to end the enmity with England which was so long thought necessary for Scotland's independence, was strangely enough destined, beyond all other men, to leave the stamp of a more inward independence upon his country and its history.

At the first meeting of the Estates, in August 1560, the Protes- tants were invited to present a confession of their faith. Knox and three others drafted it, and were present when it was offered and read to the parliament. The statute-book says it was " by the estates of Scotland ratified and approved, as wholesome and sound doctrine grounded upon the infallible truth of God's word." The Scots confession, though of course drawn up independently, is in substantial accord with the others then springing up in the countries of the Reformation, but is Calvinist rather than Lutheran. It remained for two centuries the authorized Scottish creed, though in the first instance the faith of only a fragment of the people. Yet its approval became the basis for three acts passed a week later; the first of which, abolishing the pope's authority and jurisdiction in Scotland, may perhaps have been consistent with toleration, as the second, rescinding old statutes which had established and enforced that and other catholic tenets, undoubtedly was. But the third, inflicting heavy penalties, with death on a third conviction, on those who should celebrate mass or even be present at it, showed that the reformer and his friends had crossed the line, and that their position could no longer be described as, in Knox's words, " requiring nothing but

the liberty of conscience, and our reli- gion and fact to be tried by the word of God." He was prepared indeed to fall back upon that, in the event of the Estates at any time refusing sanction to either church or creed, as their sover- eign in Paris promptly refused it. But the parliament of 1560 gave no express sanction to the Reformed Church, and Knox did not wait until it should do so. Already " in our towns and places reformed," as the Confession puts it, there were local or " par- ticular kirks," and these grew and spread and were provincially united, till, in the last month of this memorable year, the first General Assembly of their representatives met, and became the " universal kirk," or " the whole church convened." It had before it the plan for church government and maintenance, drafted in August at the same time with the Confession, under the name of The Book of Discipline, and by the same framers. Knox was even more clearly in this case the chief author, and he had by this time come to desire a much more rigid Presbyterian- ism than he had sketched in his " Wholesome Counsel " of 1555. In planning it he seems to have used his acquaintance with the " Ordonnances " of the Genevan Church under Calvin, and with the " Forma " of the German Church in London under John Laski (or A. Lasco). Starting with "truth" contained in Scripture as the church's foundation, and the Word and Sacra- ments as means of building it up, it provides ministers and elders to be elected by the congregations, with a subordinate class of " readers," and by their means sermons and prayers each " Sunday " in every parish. In large towns these were to be also on other days, with a weekly meeting for conference or " prophesying." The " plantation " of new churches is to go on everywhere under the guidance of higher church officers called superintendents. All are to help their brethren, "for no man may be permitted to live as best pleaseth him within the Church of God." And above all things the young and the ignorant are to be instructed, the former by a regular gradation or ladder of parish or elementary schools, secondary schools and universities. Even the poor were to be fed by the Church's hands; and behind

its moral influence, and a discipline over both poor and rich, was to be not only the coercive authority of the civil power but its money. Knox had from the first proclaimed that " the teinds (tithes of yearly fruits) by God's law do not appertain of necessity to the kirkmen." And this book now demands that out of them " must not only the ministers be sustained, but also the poor and schools." But Knox broadens his plan so as to claim also the property which had been really gifted to the Church by princes and nobles — given by them indeed, as he held, without any moral right and to the injury of the people, yet so as to be Church patrimony. From all such

property, whether land or the sheaves and fruits of land, and also from the personal property of burghers in the towns, Knox now held that the state should authorize the kirk to claim the salaries of the minis- ters, and the salaries of teachers in the schools and universities, but above all, the relief of the poor — not only of the absolutely " indigent " but of " your poor brethren, the labourers and handworkers of the ground." For the' danger now was that some gentlemen were already cruel in exactions of their tenants, " requiring of them whatever before they paid to the Church, so that the papistical tyranny shall only be changed into the tyranny of the lords or of the laird." The danger foreseen alike to the new Church, and to the commonalty and poor, began to be fulfilled a month later, when the lords, some of whom had already acquired, as others were about to acquire, much of the Church property, declined to make any of it over for Knox's magnificent scheme. It was, they said, " a devout imagination." Seven years afterwards, however, when the contest with the Crown was ended, the kirk was expressly acknowledged as the only Church in Scotland, and jurisdiction given it over all who should attempt to be outsiders; while the preaching of the Evangel and the plant- ing of congregations went on in all the accessible parts of Scot- land. Gradually too stipends for most Scottish parishes were assigned to the ministers out of the yearly teinds; and the Church received — what it retained even down to recent times — the ad- ministration both of the public schools and of the Poor Law of Scotland. But the victorious rush of 1560 was already some- what stayed, and the very next year raised the question whether the transfer of intolerance to the side of the new faith was as wise as it had at first seemed to be successful.

Mary Queen of Scots had been for a short time also queen of France, and in 1561 returned to her native land, a young widow on whom the eyes of Europe were fixed. Knox's objections to the " regiment of women " were theoretical, and in the present case he hoped at first for the best, favouring rather his queen's marriage with the heir of the house of Hamilton. Mary had put herself into the hands of her half-brother, Lord James Stuart afterwards earl of Moray, the only man who could perhaps have pulled her through. A proclamation now continued the " state of religion " begun the previous year; but mass was celebrated in the queen's household, and Lord James himself defended it with his sword against Protestant intrusion. Knox publicly protested; and Moray, who probably understood and liked both parties, brought the preacher to the presence of his queen. There is nothing revealed to us by " the broad clear light of that wonderful book," 1 The History of the Reformation in Scotland, more remarkable than the four Dialogues or inter- views, which, though recorded only by Knox, bear the strongest stamp of truth, and do almost more justice to his opponent than to himself. Mary took the aggressive and very soon raised the real question.

” Ye have taught the people to receive another religion than their princes can allow; and how can that doctrine be of God, seeing that God commands subjects to obey their princes?” The point was made keener by the fact that Knox’s own Confession of Faith (like all those of that age, in which an unbalanced monarchical power culminated) had held kings to be appointed ” for maintenance of the true religion,” and suppression of the false; and the reformer now fell back on

‘John Hill Burton {Hist, of Scotland, iii. 339). Mr Burton’s view (differing from that of Professor Hume Brown) was that the dialogues — the earlier of them at least — must have been spoken in the French tongue, in which Knox had recently preached for a year.

his more fundamental principle, that ” right religion took neither original nor authority from worldly princes, but from the Eternal God alone.” All through this dialogue too, as in another at Lochleven two years afterwards, Knox was driven to axioms, not of religion but of constitutionalism, which Buchanan and he may have learned from their teacher Major, but which were not to be accepted till a later age. ” ‘ Think ye,’ quoth she, ‘ that subjects, having power, may resist their princes? ‘ ‘ If their princes exceed their bounds, Madam, they may be resisted and even deposed,’ ” Knox replied. But these dialectics, creditable to both parties, had little effect upon the general situation. Knox had gone too far in intolerance, and Moray and Maitland of Lethington gradually withdrew their support. The court and parliament, guided by them, declined to press the queen or to pass the Book of Discipline; and meantime the negotiations as to the queen’s marriage with a Spanish, a French or an Austrian prince revealed the real difficulty and peril of the situation. Her marriage to a great Catholic prince would be ruinous to Scotland, probably also to England, and perhaps to all Protestantism. Knox had already by letter formally broken with the earl of Moray, ” committing you to your own wit, and to the conducting of those who better please you “; and now, in one of his greatest sermons before the assembled lords, he drove at the heart of the situation — the risk of a Catho lic marriage. The queen sent for him for the last time and burst into passionate tears as she asked, ” What have you to do with my marriage? Or what are you within this commonwealth? ” ” A subject born within the same,” was the answer of the son of the East Lothian peasant; and the Scottish nobility, while thinking him overbold, refused to find him guilty of any crime, even when, later on, he had ” convocated the lieges ” to Edinburgh to meet a crown prosecution. In 1564 a change came. Mary had wearied of her guiding statesmen, Moray and the more pliant Maitland; the Italian secretary David Rizzio, through whom she had corresponded with the pope, now more and more usurped their place; and a weak fancy for her handsome cousin, Henry Darnley, brought about a sudden marriage in 1565 and swept the opposing Protestant lords into exile. Darnley, though a

Catholic, thought it well to go to Knox's preaching; but was so unfortunate as to hear a very long sermon, with allusions not only to " babes and women " as rulers, but to Ahab who did not control his strong-minded wife. Mary and the lords still in her council ordered Knox not to preach while she was in Edinburgh, and he was absent or silent during the weeks in which the queen's growing distaste for her husband, and advance- ment of Rizzio over the nobility remaining in Edinburgh, brought about the conspiracy by Darnley, Morton and Ruthven. Knox does not seem to have known beforehand of Rizzio's " slaughter," which had been intended to be a semi-judicial act; but soon after it he records that "that vile knave Davie was justly punished, for abusing of the commonwealth, and for other villainy which we list not to express." The immediate effect how- ever of what Knox thus approved was to bring his cause to its lowest ebb, and on the very day when Mary rode from Holy- rood to her army, he sat down and penned the prayer, "Lord Jesus, put an end to this my miserable life, for justice and truth are not to be found among the sons of men! " He added a short autobiographic fragment, whose mingled self-abasement and exultation are not unworthy of its striking title — " John Knox, with deliberate mind, to his God." During the rest of the year he was hidden in Ayrshire or elsewhere, and throughout 1566 he was forbidden to preach when the court was in Edin- burgh. But he was influential at the December Assembly in the capital where a greater tragedy was now preparing, for Mary's infatuation for Bothwell was visible to all. At the Assem- bly's request, however, Knox undertook a long visit to England, where his two sons by his first wife were being educated, and were afterwards to be Fellows of St John's, Cambridge, the younger becoming a parish clergyman. It was thus during the reformer's absence that the murder of Darnley, the abduction and sub- sequent marriage of Mary, the flight of Bothwell, and the im- prisonment in Lochleven of the queen, unrolled themselves

before the eyes of Scotland. Knox returned in time to guide | the Assembly which sat on the 25th of June 1567 in dealing with this unparalleled crisis, and to wind up the revolution by preaching at Stirling on the 9th of July 1567, after Mary's abdication, at the coronation of the infant king.

His main work was now really done; for the parliament of 1567 made Moray regent, and Knox was only too glad to have his old friend back in power, though they seem to have differed on the question whether the queen should be allowed to pass into retirement without trial for her husband's death, as they had differed all along on the question of tolerating her private religion. Knox's victory had not come too early, for

his physical strength soon began to fail. But Mary's escape in 1 568 resulted only in her defeat at Langside, and in a long imprisonment and death in England. In Scotland the regent's assassination in 1570 opened a miserable civil war, but it made no permanent change. The massacre of St Bartholomew rather united English and Scottish Protestantism; and Knox in St Giles' pulpit, challenging the French ambassador to report his words, denounced God's vengeance on the crowned murderer and his posterity. When open war broke out between Edinburgh Castle, held by Mary's friends, and the town, held for her son, both parties agreed that the reformer, who had already had a stroke of paralysis, should remove to St Andrews. While there he wrote his will, and published his last book, in the preface to which he says, " I heartily take my good-night of the faithful of both realms … for as the world is weary of me, so am I of it." And when he now merely signs his name, it is " John Knox, with my dead hand and glad heart." In the autumn of 1 5 7 2 he returned to Edinburgh to die, probably in the picturesque house in the " throat of the Bow," which for generations has been called by his name. With him were his wife and three young daughters; for though he had lost Margaret Bowes at the close of his year of triumph 1560, he had four years after married Margaret Stewart, a daughter of his friend Lord Ochiltree. She was a bride of only seventeen and was related to the royal house; yet, as his Catholic biographer put it, " by sorcery and witchcraft he did so allure that poor gentlewoman that she could not live without him." But lords, ladies and burghers also crowded around his bed, and his colleague and his servant have severally transmitted to us the words in which his weakness daily strove with pain, rising on the day before his death into a solemn exultation — yet characteristically, not so much on his own account as for " the troubled Church of God." He died on the 24th of November 1572, and at his funeral in St Giles' Churchyard the new Regent Morton, speaking under the hostile guns of the castle, expressed the first surprise of those around as they looked back on that stormy life, that one who had " neither flattered nor feared any flesh " had now " ended his days in peace and honour." Knox himself had a short time before put in writing a larger claim for the historic future, " What I have been to my country, though this unthankful age will not know, yet the ages to come will be compelled to bear witness to the truth."

Knox was a rather small man, with a well-knit body; he had a powerful face, with dark blue eyes under a ridge of eyebrow, high cheek-bones, and a long black beard which latterly turned grey. This description, taken from a letter in 1579 by his junior contemporary Sir Peter Young, is very like Beza's fine engraving of him in the Icones — an engraving probably founded on a portrait which was to be sent by Young to Beza along with the letter. The- portrait, which was unfortunately adopted by Carlyle, has

neither pedigree nor probability. After his two years in the French galleys, if not before, Knox suffered perma- nently from gravel and dyspepsia, and he confesses that his nature " was for the most part oppressed with melancholy." Yet he was always a hard worker; as sole minister of Edinburgh studying for two sermons on Sunday and three during the week, besides having innumerable cares of churches at home and abroad. He was undoubtedly sincere in his religious faith, and most dis- interested in his devotion to it and to the good of his countrymen. But like too many of them, he was self-conscious, self-willed and

dogmatic; and his transformation in middle life, while it im- mensely enriched his sympathies as well as his energies, left him unable to put himself in the place of those who retained the views which he had himself held. All his training too, university, priestly and in foreign parts, tended to make him logical over- much. But this was mitigated by a strong sense of humour (not always sarcastic, though sometimes savagely so), and by tenderness, best seen in his epistolary friendships with women; and it was quite overborne by an instinct and passion for great practical affairs. Hence it was that Knox as a statesman so often struck successfully at the centre of the complex motives of his time, leaving it to later critics to reconcile his theories of action. But hence too he more than once took doubtful short- cuts to some of his most important ends; giving the ministry within the new Church more power over laymen than Protestant principles would suggest, and binding the masses outside who were not members of it, equally with their countrymen who were, to join in its worship, submit to its jurisdiction, and contribute to its support. And hence also his style (which contemporaries called anglicized and modern), though it occasionally rises into liturgical beauty, and often flashes into vivid historical por- traiture, is generally kept close to the harsh necessities of the few years in which he had to work for the future. That work was indeed chiefly done by the living voice; and in speaking, this " one man," as Elizabeth's very critical ambassador wrote from Edinburgh, was " able in one hour to put more life in us than five hundred trumpets continually blustering in our ears." But even his eloquence was constraining and constructive — a personal call for immediate and universal co-operation; and that personal influence survives to this day in the institutions of his people, and perhaps still more in their character. His country- men indeed have always believed that to Knox more than to any other man Scotland owes her political and religious individuality. And since his 19th century biography by Dr Thomas McCrie, or at least since his recognition in the following generation by Thomas Carlyle, the same view has taken its place in literature.

Bibliography. — Knox's books, pamphlets, public documents and letters are collected into the great edition in six volumes of Knox's Works, by David

Laing (Edinburgh, 1846-1864), with introductions, appendices and notes. Of his books the chief are the following: 1. — The History of the Reformation in Scotland, incorporating the Confession and the Book of Discipline. Begun by Knox as a party manifesto in 1560, it was continued and revised by himself in 1566 as so to form four books, with a fifth book appar- ently written after his death from materials left by him. It was partly printed in London in 1586 by Vautrollier, but was suppressed by authority and published by David Buchanan, with a Life, in 1664. 2. — On Predestination: an Answer to an Anabaptist (London, I 59 1)- 3- — Ore Prayer (1554). 4 — On Affliction (1556). 5. — Epistles, and Admonition, both to English Brethren in 1554. 6. — The First Blast of the Trumpet against the Monstrous Regiment of Women (1558). 7. — An Answer to a Scottish Jesuit (1572).

Knox's life is more or less touched upon by all the Scottish histories and Church histories which include his period, as well as in the mass of literature as to Queen Mary. Dr Laing's edition of the Works contains important biographical material. But among the many express biographies two especially should be consulted — those by Thomas McCrie (Edinburgh, 181 1 ; revised and enlarged in 1813, the later editions containing valuable notes by the author); and by P. Hume Brown (Edinburgh, 1895). John Knox and the Reformation, by Andrew Lang (London, 1905), is not so much a biography as a collection of materials, bearing upon many parts of the life, but nearly all on the unfavourable side. (A. T. I.)

KNOX, PHILANDER CHASE (1853-), American lawyer and political leader, was born in Brownsville, Pennsylvania, on the 4th of May 1853. He graduated from Mount Union College (Ohio) in 1872, and was admitted to the Pennsylvania bar in 1875. He settled in Pittsburg, where he continued in private practice, with the exception of two years' service (1876-1877) as assistant United States district attorney, acquiring a large practice as a corporation lawyer. In April 1901 he became attorney-general of the United States in the cabinet of President McKinley, and retained this position after the accession of President Roosevelt until June 1904, when he was appointed by Governor Pennypacker of Pennsylvania to fill the unexpired term of Matthew S. Quay in the United States Senate; in 1905 he

was re-elected to the Senate for the full term. In March 1909 he became secretary of state in the cabinet of President Taft.

KNOXVILLE, a city and the county-seat of Knox county, Tennessee, U.S.A., in the E. part of the state, 160 m. E. of Nashville, and about 190 m. S.E. of Louisville, Kentucky, on the right bank of the Tennessee river, 4 m. below the point where it is formed by the junction of the French Broad and Holston Rivers. Pop. (1880), 9693; (1890), 22,535; (1900), 32,637, of whom 7359 were negroes and 895 were foreign-born; (1910 cen- sus), 36,346. It is served by the main line and by branches of the Louisville & Nashville and the Southern railways, by the Knoxville & Bristol railway (Morristown to Knoxville, 58 m.), by the short Knoxville & Augusta railroad (Knoxville to Walland, 26 m.), and by passenger and freight steamboat lines on the Tennessee river, which is here navigable for the greater part of the year. A steel and concrete street-car bridge crosses the Tennessee at Knoxville. Knoxville is picturesquely situated at an elevation of from 850 to 1000 ft. in the valley between the Smoky Mountains and the Cumberland Mountains, and is one of the healthiest cities in the United States. There are several beautiful parks, of which Chilhowie and Fountain City are the largest, and among the public buildings are a city-hall, Federal building, court-house, the Knoxville general hospital, the Lincoln memorial hospital, the Margaret McClung industrial home, a Young Men's Christian Association building and the Lawson-McGhee public library. A monument to John Sevier stands on the site of the blockhouse first built there. Knoxville is the seat of Knoxville College (United Presbyterian, 1875) for negroes, East Tennessee institute, a secondary school for girls, the Baker-Himel school for boys, Tennessee Medical College (1889), two commercial schools and the university of Tennessee. The last, a state co-educational institution, was chartered as Blount College in 1794 and as East Tennessee College in 1807, but not opened until 1820 — the present name was adopted in 1879. It had in 1907-1908 106 instructors, 755 students (536 in academic departments), and a library of 25,000 volumes With the university is combined the state college of agriculture and engineering; and a large summer school for teachers is maintained. At Knoxville are the Eastern State insane asylum, state asylums for the deaf and dumb (for both while and negro), and a national cemetery in which more than 3200 soldiers are buried. Knoxville is an important commercial and industrial centre and does a large jobbing business. It is near hardwood forests and is an important market for hardwood mantels. Coal-mines in the vicinity produce more than 2,000,000 tons annually, and neighbouring quarries furnish the famous Tennessee marble, which is largely exported. Excellent building and pottery clays are found near Knoxville. Among the city's industrial establishments are flour and grist mills, cotton and woollen mills, furniture, desk, office supplies and sash, door, and blind factories, meat-packing establishments, clothing factories, iron, steel and boiler works, foundries and machine shops, stove works and brick and cement works. The value of the factory product increased from $6,201,840 in 1900 to

$12,432,880 in 1905, or 100-5 %. in 1905 the value of the flour and grist mill products alone being $2,048,509. Just outside the city the Southern railway maintains large car and repair shops. Knox- ville was settled in 1786 by James White (1737-1815), a North Carolina pioneer, and was first known as "White's Fort'; it was laid out as a town in 1791, and named in honour of General Henry Knox, then secretary of war in Washington's cabinet. In 1 791 the r Knoxville Gazette, the first newspaper in Tennessee (the early issue, printed at Rogersville) began publication. From 1792 to 1796 Knoxville was the capital of the " Territory South of the Ohio," and until 1811 and again in 1817 it was the capital of the state. In 1796 the convention which framed the constitu- tion of the new state of Tennessee met here, and here later in the same year the first state legislature was convened. Knox- ville was chartered as a city in 1815. In its early years it was several times attacked by the Indians, but was never captured. During the Civil War there was considerable Union sentiment in East Tennessee, and in the summer of 1863 the Federal*

authorities determined to take possession of Knoxville as well as Chattanooga and to interrupt railway communications between the Confederates of the East and West through this region. As the Confederates had erected only slight defences for the pro- tection of the city, Burnside, with about 12,000 men, easily gained possession on the 2nd of September 1863. Fortifications were immediately begun for its defence, and on the 4th of Novem- ber, Bragg, thinking his position at Chattanooga impregnable against Grant, Sherman, Thomas and Hooker, despatched a force of 20,000 men under Longstreet to engage Burnside. Longstreet arrived in the vicinity on the 16th of November, and on the following day began a siege, which was continued with numerous assaults until the 28th, when a desperate but unsuccessful attack was made on Fort Sanders, and upon the approach of a relief force under Sherman, Longstreet withdrew on the night of the 4th of December. The Confederate losses during the siege were 182 killed, 768 wounded and 192 captured or missing; the Union losses were 92 killed, 394 wounded and 207 captured or missing. West Knoxville (incorporated in 1888) and North Knoxville (incorporated in 1889) were annexed to Knoxville in 1898.

See the sketch by Joshua W. Caldwell in Historic Towns of the Southern States, edited by L. P. Powell (New York, 1900) ; and W. Rule, G. F. Mellen and J. Wooldridge, Standard History of Knoxville (Chicago, 1900).

KNUCKLE (apparently the diminutive of a word for " bone," found in Ger. Knochen), the joint of a finger, which, when the hand is shut,' is brought into prominence, In mechanical use the word is applied to the round projecting part of a hinge through which the pin is run, and in ship-building to an acute angle on some of the timbers. A " knuckle-duster," said to have

originally conie from the criminal slang of the United States, is a brass or metal instrument fitting on to the hand across the knuckles, with projecting studs and used for inflicting a brutal blow.

KNUCKLEBONES (Hucklebones, Dibs, Jackstones, Chuck- stones, Five-stones), a game of very ancient origin, played with five small objects, originally the knucklebones of a sheep, which are thrown up and caught in various ways. Modern " knucklebones " consist of six points, or knobs, proceeding from a common base, and are usually of metal. The winner is he who first completes successfully a prescribed series of throws, which, while of the same general character, differ widely in detail. The simplest consists in tossing up one stone, the jack, and picking up one or more from the table while it is in the air; and so on until all five stones have been picked up. Another consists in tossing up first one stone, then two, then three and so on, and catching them on the back of the hand. Different throws have received distinctive names, such as "riding the elephant," " peas in the pod," and " horses in the stable."

The origin of knucklebones is closely connected with that of dice, of which it is probably a primitive form, and is doubtless Asiatic. Sophocles, in a fragment, ascribed the invention of draughts and knucklebones (astragaloi) to Palamedes, who taught them to his Greek countrymen during the Trojan War. Both the Iliad and the Odyssey contain allusions to games simi- lar in character to knucklebones, and the Palamedes tradition, as flattering to the national pride, was generally accepted through- out Gteece, as is indicated by numerous literary and plastic evidences. Thus Pausanias {Corinth xx.) mentions a temple of Fortune in which Palamedes made an offering of his newly invented game. According to a still more ancient tradition, Zeus, perceiving that Ganymede longed for his playmates upon Mount Ida, gave him Eros for a companion and golden dibs with which to play, and even condescended sometimes to join in the game (Apollo nius). It is significant, however, that both Herodotus and Plato ascribe to the game a foreign origin. Plato {Phaedrus) names the Egyptian god Theuth as its inventor, while Herodotus relates that the Lydians, during a period of famine in the days of King Atys, originated this game and indeed almost all other games except chess. There were two methods of playing in ancient times. The first, and probably the primitive method, consisted in tossing up and catching the bones on the

back of the hand, very much as the game is played to-day. In the Museum of Naples may be seen a painting excavated at Pompeii, which represents

the goddesses Latona, Niobe, Phoebe, Aglaia and Hileaera, the last two being engaged in playing at Knucklebones (see Greek Art, fig. 42). According to an epigram of Asclepiodotus, astragals were given as prizes to school- children, and we are reminded of Plutarch's anecdote of the youthful Alcibiades, who, when a teamster threatened to drive over some of his knucklebones that had fallen into the wagon- ruts, boldly threw himself in front of the advancing team. This simple form of the game was generally played only by women and children, and was called pentalitha or five-stones. There were several varieties of it besides the usual toss and catch, one being called tropa, or hole-game, the object having been to toss the bones into a hole in the earth. Another was the simple and primitive game of " odd or even."

The second, probably derivative, form of the game was one of pure chance, the stones being thrown upon a table, either with the hand or from a cup, and the values of the sides upon which they fell counted. In this game the shape of the pastern-bones used for astralagoi, as well as for the tali of the Romans, with whom knucklebones was also popular, determined the manner of counting. The pastern-bone of a sheep, goat or calf has, be- sides two rounded ends upon which it cannot stand, two broad and two narrow sides, one of each pair being concave and one convex. The convex narrow side, called chios or " the dog " counted 1; the convex broad side 3; the concave broad side 4; and the concave narrow side 6. Four astragals were used and 35 different scores were possible at a single throw, many receiving distinctive names such as Aphrodite, Midas, Solon, Alexander, and, among the Romans, Venus, King, Vulture, &c. The highest throw in Greece, counting 40, was the Euripides, and was probably a combination throw, since more than four sixes could not be thrown at one time. The lowest throw, both in Greece and Rome, was the Dog.

See Cassell's Book of Sports and Pastimes (London, 1896); Games and. Songs of American Children, by W. W. Newell (1893); an d The Young Folks' Cyclopaedia of Games and Sports (New York, 1899), for the modern children's game. For the history see Les Jeux des Anciens, by L. Becq de Fouquieres (Paris, 1869); Das Knochelspiel der Alien, by Bolle (Wismar, 1886); Die Spiele der Griechen und Romer, by W. Richter (Leipzig, 1887).

KNUTSFORD, a market town in the Knutsford parliamentary division of Cheshire, England; on the London & North Western and Great Central railways, 24 m. E.N.E. of Chester, on the Chesire Lines and London & North Western railway. Pop. of urban district (190 1), 5172. It is pleasantly situated on an elevated ridge, with the fine domains of Tatton Park and Tabley respectively north and west of it. The meres in these domains are especially picturesque. Knutsford is noted in modern times as

the scene of Mrs Gaskell's novel Cranford. Among several ancient houses the most interesting are a cottage with the date 141 1 carved on its woodwork, and the Rose and Crown tavern, dated 1 641 . A number of curious old customs linger in the town, such as the practice of working designs in coloured sand, when a wedding takes place, before the bride's house. In what is probably the oldest Unitarian graveyard in the kingdom Mrs Gaskell lies buried; and in a churchyard a mile from the town stood the ancient church, which, though partially rebuilt in the time of Henry VIII., fell into ruin in 1741. The church of St John, built in 1744, and enlarged in 1879, was supplemented, in 1880, by St Cross Church, in Perpendicular style. The town has a grammar school, founded before the reign of Henry VIII., but reorganized in 1885. Lord Egerton built the Egerton schools in 1893. The industries comprise cotton, worsted and leather manufactures; but Knutsford is mainly a residential town, as many Manchester merchants have settled here, attracted by the fine climate and surroundings. Knutsford was the birthplace of Sir Henry Holland, Physician Extraordinary to Queen Victoria (1788-1873); and his son, the second Sir Henry, who was secretary of state for the colonies (1887-1892), was raised to the peerage in 1888 with the title of Baron Knutsford.

The name Knutsford (Cunetesford, Knotesford) is said to signify Cnut's ford, but there is no evidence of a settlement here previous to Domesday. In 1086 Erthebrand held Knutsford immediately of William FitzNigel, baron of Halton, who was himself a mesne lord of Hugh Lupus earl of Chester. In 1292 William de Tabley, lord of both Over and Nether Knutsford, granted free burgage to his burgesses in both Knutsfords. This charter is the only one which gives Knutsford a claim to the title of borough. It provided that the burgesses might elect a bailiff from amongst themselves every year. The office however carried little real power with it, and soon lapsed. In the same year as the charter to Knutsford the king granted to William de Tabley a market every Saturday at Nether Knutsford, and a three days' fair at the Feast of St Peter and St Paul. When this charter was con- firmed by Edward III. another market (Friday) and another three days' fair (Feast of St Simon and St Jude) were added. The Friday market was certainly dropped by 1592, if it was ever held. May-day revels are still kept up here and attract large crowds from the neighbourhood. A silk mill was erected here in 1770, and there was also an attempt to foster the cotton trade, but the lack of means of communication made the undertaking impossible.

See Henry Green, History of Knutsford (1859).

KOALA (Phascolarclus cinereus), a stoutly built marsupial, of the family Phascolmyidae, which also contains the wombats. This animal, which inhabits the south-eastern parts of the Aus- tralian continent, is about 2 ft.

in length, and of an ash-grey colour, an excellent climber, residing generally in lofty eucalyp- tus trees, the buds and tender shoots of which form its principal food, though occasionally it descends to the ground in the night in search of roots. From its shape the koala is called by the colonists the " native bear "; the term " native sloth " being also applied to it, from its arboreal habits and slow deliberate movements. The flesh is highly prized by the natives, and is palatable to Europeans. The skins are largely imported into England, for the manufacture of articles in which a cheap and durable fur is required.

KOBDO, a town of the Chinese Empire, in north-west Mongolia, at the northern foot of the Mongolian Altai, on the right bank of the Buyantu River, 13 m. from its entrance into Lake Khara-usu; 500 m. E.S.E. of Biysk (Russian), and 470 m. W. of Ulyasutai. It is situated amidst a dreary plain, and con- sists cf a fortress, the residence of the governor of the Kobdo district, and a small trading town, chiefly peopled by Chinese and a few Mongols. It is, however, an important centre for trade between the cattle-breeding nomads and Peking. It was founded by the Chinese in 1731, and pillaged by the Mussulmans in 1872. The district of Kobdo occupies the north-western corner of Mongolia, and is peopled chiefly by Mongols, and also by Kirghiz and a few Soyotes, Uryankhes and Khotons. It is governed by a Chinese commissioner, who has under him a special Mongol functionary (Mongol, dzurgan) . The chief monas- tery is at Ulangom. Considerable numbers of sheep (about 1,000,000), sheepskins, sheep and camel wool are exported to China, while Chinese cottons, brick tea and various small goods are imported. Leather, velveteen, cotton, iron and copper goods boxes, &c, are imported from Russia in exchange for cattle, furs and wool. The absence of a cart road to Biysk hinders the development of this trade.

KOBELL, WOLFGANG XAVER FRANZ, Baron von (1803- 1882), German mineralogist, was born at Munich on the 19th of July 1803. He studied chemistry and mineralogy at Landshut (1820-1823), and in 1826 became professor of mineralogy in the university of Munich. He introduced some new methods of mineral analyses, and in 1855 invented the stauroscope for the study of the optical properties of crystals. He contributed numerous papers to scientific journals, and described many new minerals. He died at Munich on the nth of November, 1882.

Publications. — Charakteristik der Mineralien (2 vols. 1830-1831) ; Tafeln zur Bestimmung der Mineralien &c. (1833 ; and later editions, ed. 12, by K. Oebbeke, 1884); Grundziige der Mineralogie (1838)? Geschichte der Mineralogie von i6$o-i86o (1864).

KOCH, ROBERT (1843-1910), German bacteriologist, was born at Klausthal, Hanover, on the nth of December 1843. He studied medicine at Gottingen, and it was while he was practising as a physician at Wollstein that he began those bacteriological researches that made his name famous. In 1876 he obtained a pure culture of the bacillus of anthrax, announcing a method of preventive inoculation against that disease seven years later. He became a member of the Sanitary Commission at Berlin and a professor at the School of Medicine in 1880, and five years later he was appointed to a chair in Berlin University and director of the Institute of Health. In 1882, largely as the result of'the . improved methods of bacteriological investigation he was able to elaborate, he discovered the bacillus of tuberculosis; and in the following year, having been sent on an official mission to Egypt and India to study the aetiology of Asiatic cholera, he identified the comma bacillus as the specific organism of that malady. In 1890 great hopes were aroused by the announce- ment that in tuberculin he had prepared an agent which exercised an inimical influence on the growth of the tubercle bacillus, but the expectations that were formed of it as a remedy for consump- tion were not fulfilled, though it came into considerable vogue as a means of diagnosing the existence of tuberculosis in animals intended for food. At the Congress on Tuberculosis held in London in 1901 he maintained that tuberculosis in man and in cattle is not the same disease, the practical inference being that the danger to men of infection from milk and meat is less than from other human subjects suffering from the disease. This statement, however, was not regarded as properly proved, and one of its results was the appointment of a British Royal Commission to study the question. Dr Koch also investigated the nature of riuderpest in South Africa in 1896, and found means of combating the disease. In 1897 he went to Bombay at the head of a commission formed to investigate the bubonic plague, and he subsequently undertook extensive travels in pursuit of his studies on the origin and treatment of malaria. He was summoned to South Africa a second time in 1903 to give expert advice on other cattle diseases, and on his return was elected a member of the Berlin Academy of Sciences. In 1906-1907 he spent eighteen months in East Africa, investigating sleeping- sickness. He died at Baden-Baden of heart-disease on the 28th of May 1910. Koch was undoubtedly one of the greatest bacteriologists ever known, and a great benefactor of humanity by his discoveries. Honours were showered upon him, and in 1905 he was awarded the Nobel prize for medicine.

Among his works may be mentioned: Weitere Mitteilungen uber ein Heilmittel gegen Tuberkulose (Leipzig, 1891); and Reiseberichte uber Rinderpest, Bubonenpest in Indien und Afrika, Tsetse- oder Surra-Krankheit, Texasfieber, tropische Malaria, Schwarzwasserfieber (Berlin,

1898). From 1886 onwards he edited, with Dr Karl Flugge, the Zeitschrift fur Hygiene und Infektionskrankheiten (published at Leipzig). See Loeffler, " Robert Koch, zum 6oten Geburtstage " in Deut. Medizin. Wochenschr. (No. 50, 1903).

KOCH, a tribe of north-eastern India, which has given its name to the state of Kuch Behar (q.v.). They are probably of Mongolian stock, akin to the Mech, Kachari, Garo and Tippera tribes, and originally spoke, like these, a language of the Bodo group. But since one of their chiefs established a powerful kingdom at Kuch Behar in the 16th century they have gradually become Hinduized, and now adopt the name of Rajbansi (= " of royal blood "). In 1901 the number in Eastern Bengal and Assam was returned at nearly 25 millions.

KOCK, CHARLES PAUL DE (1793-1871), French novelist, was born at Passy on the 21st of May 1793. He was a posthumous child, his father, a banker of Dutch extraction, having been a victim of the Terror. Paul de Kock began life as a banker's clerk. For the most part he resided on the Boulevard St Martin, and was one of the most inveterate of Parisians. He died in Paris on the 27th of April 1871. He began to write for the stage very early, and composed many operatic libretti. His first novel, L' Enfant de ma femme (1811), was published at his own expense. In 1820 he began his long and successful series of novels dealing with Parisian life with Georgette, ou la mire du

Tabellion. His period of greatest and most successful activity was the Restoration and the early days of Louis Philippe. He was relatively less popular in France itself than abroad, where he was considered as the special painter of life in Paris. Major Pendennis's remark that he had read nothing of the novel kind for thirty years except Paul de Kock, " who certainly made him laugh," is likely to remain one of the most durable of his testi- monials, and may be classed with the legendary question of a foreign sovereign to a Frenchman who was paying his respects, " Vous venez de Paris et vous devez savoir des nouvelles. Comment se porte Paul de Kock? " The disappearance of the grisette and of the cheap dissipation described by Henri Murger practically made Paul de Kock obsolete. But to the student of manners his portraiture of low and middle class life in the first half of the 19th century at Paris still has its value.

The works of Paul de Kock are very numerous. With the exception of a few not very felicitous excursions into historical romance and some miscellaneous works of which his share in La Grande ville, Paris (1842), is the chief, they are all stories of middle-class Parisian life, of guinguettes and cabarets and equivocal adventures of one sort or another. The most famous are Andri le Savoyard (1825) and Le Barbier de Paris (1826).

His Memoires were published in 1873. See also Th. Trimm, La Vie de Charles Paul de Kock (1873).

KODAIKANAL, a sanatorium of southern India, in the Madura district of Madras, situated in the Palni hills, about 7000 ft. above sea-level; pop. (1901), 1912, but the number in the hot season would be much larger. It is difficult of access, being 44 m. from a railway station, and the last 1 1 m. are impracticable for wheeled vehicles. It contains a government observatory, the appliances of which are specially adapted for the study of terrestrial magnetism, seismology and solar physics.

KODAMA, GENTARO, Count (1852-1907), Japanese general, was born in Choshu. He studied military science in Germany, and was appointed vice-minister of war in 1892. He became governor-general of Formosa in 1900, holding at the same time the portfolio of war. When the conflict with Russia became imminent in 1903, he gave up his portfolio to become vice-chief of the general staff, a sacrifice which elicited much public ap- plause. Throughout the Russo-Japanese War (1904-5)116 served as chief of staff to Field Marshal Oyama, and it was well under- stood that his genius guided the strategy of the whole campaign, as that of General Kawakami had done in the war with China ten years previously. General Kodama was raised in rapid succession to the ranks of baron, viscount and count, and his death in 1907 was regarded as a national calamity.

KODUNGALUR (or Cranganur), a town of southern India, in Cochin state, within the presidency of Madras. Though now a place of little importance, its historical interest is considerable. Tradition assigns to it the double honour of having been the first field of St Thomas's labours (a.d. 52) in India and the seat of Cheraman Perumal's government. The visit of St Thomas is generally considered mythical; but it is certain that the Syrian Church was firmly established here before the 9th century (Burnell), and probably the Jews' settlement was still earlier. The latter, in fact, claim to hold grants dated a.d. 378. The cruelty of the Portuguese drove most of the Jews to Cochin. Up to 13 14, when the Vypin harbour was formed, the only opening in the Cochin backwater, and outlet for the Periyar, was at Kodungalur, which must then have been the best harbour on the coast. In 1502 the Syrian Christians invoked the protection of the Portuguese. In 1523 the latter built their first fort there, and in 1565 enlarged it. In 1661 the Dutch took the fort, the possession of which for the next forty years was contested between this nation, the zamorin, and the raja of Kodungalur. In 1776 Tippoo seized the stronghold. The Dutch recaptured it two years later, and, having ceded it to Tippoo in 1784, sold it to the Travancore raja, and again in 1789 to Tippoo, who destroyed it in the following year. The country round Kodun- galur now forms an autonomous principality, tributary to the raja of Cochin.

KOENIG, KARL DIETRICH EBERHARD (1774-1851), German palaeontologist, was born at Brunswick in 1774, and was educated at Gottingen. In 1807 he became assistant keeper, and in 1813 he was appointed keeper, of the department of natural history in the British Museum, and afterwards of geology and mineralogy, retaining the post until the close of his life. He described many fossils in the British Museum in a classic work entitled Iconesjossilium sectiles (1820-1825). He died in London on the 6th of September 1851.

KOESFELD, a town of Germany, in the Prussian province of Westphalia, on the Berkel, 38 m. by rail N.N.W. of Dortmund. Pop. (1905), 8449. It has three Roman Catholic churches, one of which — the Gymnasial Kirche — is used by the Protestant community. Here are the ruins of the Ludgeri Castle, formerly the residence of the bishops of Mtinster, and also the castle of Varlar, the residence of the princes of Salm-Horstmar. The leading industries include the making of linen goods and machinery.

KOHAT, a town and district of British India, in the Peshawar division of the North-West Frontier Province. The town is 37 m. south of Peshawar by the Kohat Pass, along which a military road was opened in 1901. The population in 1901 was 30,762, including 12,670 in the cantonment, which is garri- soned by artillery, cavalry and infantry. In the Tirah campaign of 1897-98 Kohat was the starting-point of Sir William Lockhart's expedition against the Orakzais and Afridis. It is the military base for the southern Afridi frontier as Peshawar is for the northern frontier of the same tribe, and it lies in the heart of the Pathan country.

The District of Kohat has an area of 2973 sq. m. It consists chiefly of a bare and intricate mountain region east of the Indus, deeply scored with river valleys and ravines, but enclosing a few scattered patches of cultivated lowland. The eastern or Khattak country especially comprises a perfect labyrinth of ranges, which fall, however, into two principal groups, to the north and south of the Teri Toi river. The Miranzai valley, in the extreme west, appears by comparison a rich and fertile tract. In its small but carefully tilled glens, the plane, palm, fig and many orchard trees flourish luxuriantly; while a brushwood of wild olive, mimosa and other thorny bushes clothes the rugged ravines upon the upper slopes. Occasional grassy glades upon their sides form favourite pasture grounds for the Waziri tribes. The Teri Toi, rising on the eastern limit of Upper Miranzai, runs due eastward to the Indus, which it joins 1 2 m. N. of Makhad, dividing the district into two main portions. The drainage from the northern

half flows south- ward into the Teri Toi itself, and northward into the parallel stream of the Kohat Toi. That of the southern tract falls north-wards also into the Teri Toi, and southwards towards the Kurram and the Indus. The frontier mountains, continuations of the Safed Koh system, attain in places a considerable elevation, the two principal peaks, Dupa Sir and Mazi Garh, just beyond the British frontier, being 8260 and 7940 ft. above the sea respectively. The Waziri hills, on the south, extend like a wedge between the boundaries of Bannu and Kohat, with a general elevation of less than 4000 ft. The salt-mines are situated in the low line of hills crossing the valley of the Teri Toi, and extending along both banks of that river. The deposit has a width of a quarter of a mile, with a thickness of 1000 ft.; it sometimes forms hills 200 ft. in height, almost entirely composed of solid rock-salt, and may probably rank as one of the largest veins of its kind in the world. The most extensive exposure occurs at Bahadur Khel, on the south bank of the Teri Toi. The annual output is about 16,000 tons, yielding a revenue of £40,000. Petroleum springs exude from a rock at Panoba, 23 m. east of Kohat; and sulphur abounds in the northern range. In 1901 the population was 217,865, showing an increase of 1 1 % in the decade. The frontier tribes on the Kohat border are the Afridis, Orakzais, Zaimukhts and Turis. All these are described under their separate names. A railway runs from Kushalgarh through Kohat to Thai, and the river Indus has been bridged at Kushalgarh.

KOHAT PASS, a mountain pass in the North-West Frontier Province of India, connecting Kohat with Peshawar. From

the north side the defile commences at 45 m. S.W. of Fort Mackeson, whence it is about 12 or 13 m. to the Kohat entrance. The pass varies from 400 yds. to ij m. in width, and its summit is some 600 to 700 ft. above the plain. It is inhabited by the Adam Khel Afridis, and nearly all British relations with that tribe have been concerned with this pass, which is the only connexion between two British districts without crossing and recrossing the Indus (see Afridi). It is now traversed by a cart-road.

KOHISTAN, a tract of country on the Peshawar border of the North-West Frontier Province of India. Kohistan means the " country of the hills " and corresponds to the English word highlands; but it is specially applied to a district, which is very little known, to the south and west of Chilas, between the Kagan valley and the river Indus. It comprises an area of over 1000 sq. m., and is bounded on the N.W. by the river Indus, on the N.E. by Chilas, and on the S. by Kagan, the Chor Glen and Allai. It consists roughly of two main valleys running east and west, and separated from each other by a mountain range over 16,000 ft. high. Like the mountains of Chilas, those in Kohistan are snow-bound and rocky wastes from their crests downwards to 12,000 ft. Below this the hills are covered with fine forest and grass to

5000 or 6000 ft., and in the valleys, especially near the Indus, are fertile basins under cultivation. The Kohistanis are Mahommedans, but not of Pathan race, and appear to be closely allied to the Chilasis. They are a well-built, brave but quiet people who carry on a trade with British districts, and have never given the government much trouble. There is little doubt that the Kohistanis are, like the Kafirs of Kafiristan, the remnants of old races driven by Mahommedan invasions from the valleys and plains into the higher mountains. The majority have been converted to Islam within the last 200 years. The total population is about 16,000.

An important district also known as Kohistan lies to the north of Kabul in Afghanistan, extending to the Hindu Kush. The Kohistani Tajiks proved to be the most powerful and the best organized clans that opposed the British occupation of Kabul in 1879-80. Part of their country is highly cultivated, abound- ing in fruit, and includes many important villages. It is here that the remains of an ancient city have been lately discovered by the amir's officials, which may prove to be the great city of Alexander's founding, known to be to the north of Kabul, but which had hitherto escaped identification.

The name of Kohistan is also applied to a tract of barren and hilly country on the east border of Karachi district, Sind.

KOHL. (1) The name of the cosmetic used from the earliest times in the East by women to darken the eyelids, in order to increase the lustre of the eyes. It is usually composed of finely powdered antimony, but smoke black obtained from burnt almond-shells or frankincense is also used. The Arabic word kohl, from which has been derived " alcohol," is derived from kahala, to stain. (2) " Kohl " or " kohl-rabi " (cole-rape, from Lat. caulis, cabbage) is a kind of cabbage (q-v.), with a turnip- shaped top, cultivated chiefly as food for cattle.

KOHLHASE, HANS, a German historical figure about whose personality some controversy exists. He is chiefly known as the hero of Heinrich von Kleist's novel, Michael Kohlhaas. He was a merchant, and not, as some have supposed, a horsedealer, and he lived at Kolln in Brandenburg. In October 1532, so the story runs, whilst proceeding to the fair at Leipzig, he was attacked and his horses were taken from him by the servants of a Saxon nobleman, one Giinter von Zaschwitz. In consequence of the delay the merchant suffered some loss of business at the fair and on his return he refused to pay the small sum which Zaschwitz demanded as a condition of returning the horses. Instead Kohlhase asked for a substantial amount of money as compensation for his loss, and failing to secure this he invoked the aid of his sovereign, the elector of Brandenburg. Finding however that it was impossible to recover his horses, he paid Zaschwitz the sum required

for them, but reserved to himself the right to take further action. Then unable to obtain redress

in the courts of law, the merchant, in a Fehdebrief, threw down a challenge, not only to his aggressor, but to the whole of Saxony. Acts of lawlessness were soon attributed to him, and after an attempt to settle the feud had failed, the elector of Saxony, John Frederick I., set a price upon the head of the angry merchant. Kohlhase now sought revenge in earnest. Gathering around him a band of criminals and of desperadoes he spread terror throughout the whole of Saxony ; travellers were robbed, villages were burned and towns were plundered. For some time the authorities were practically powerless to stop these outrages, but in March 1540 Kohlhase and his principal associate, Georg Nagelschmidt, were seized, and on the 22nd of the month they were broken on the wheel in Berlin.

The life and fate of Kohlhase are dealt with in several dramas. See Burkhardt, Der historische Hans Kohlhase und H. von Kleists Michael Kohlhaas (Leipzig, 1864).

KOKOMO, a city and the county-seat of Howard county, Indiana, U.S.A., on the Wildcat River, about 50 m. N. of Indiana- polis. Pop. (1890), 8261; (1900), 10,609 of whom 499 were foreign-born and 359 negroes; (1910 census), 17,010. It is served by the Lake Erie & Western, the Pittsburg Cincinnati Chicago & St Louis, and the Toledo St Louis & Western railways, and by two interurban electric lines. Kokomo is a centre of trade in agricultural products, and has various manufactures, including flint, plate and opalescent glass, &c. The total value of the factory product increased from $2,062,156 in 1900 to $3,651,105 in 1905, or 77-1 %; and in 1905 the glass product was valued at $864,567, or 23-7 % of the total. Kokomo was settled about 1840 and became a city (under a state law) in 1865.

KOKO-NOR (or Kuku-Nor) (Tsing-hai of the Chinese, and Tso-ngombo of the Tanguts), a lake of Central Asia, situated at an altitude of 9975 ft., in the extreme N.E. of Tibet, 30 m. from the W. frontier of the Chinese province of Kan-suh, in ioo° E. and 37° N. It lies amongst the eastern ranges of the Kuen-lun, having the Nan-shan Mountains to the north, and the southern Kokonor range (10,000 ft.) on the south. It measures 66 m. by 40 m., and contains half a dozen islands, on one of which is a Buddhist (i.e. Lamaist) monastery, to which pilgrims resort. The water is salt, though an abundance of fish live in it, and it often remains frozen for three months

together in winter. The surface is at times subject to considerable variations of level. The lake is entered on the west by the river Buhain-gol. The nomads who dwell round its shores are Tanguts.

KOKSHAROV, NIKOLAI IVANOVICH VON (1818-1893), Russian mineralogist and major-general in the Russian army, was born at Ust-Kamenogork in Tomsk, on the 5th of December 1818 (o.s.). He was educated at the military school of mines in St Petersburg. At the age of twenty-two he was selected to accompany R. I. Murchison and De Verneuil, and afterwards De Keyserling, in their geological survey of the Russian Empire. Subsequently he devoted his attention mainly to the study of mineralogy and mining, and was appointed director of the Institute of Mines. In 1865 he became director of the Imperial Mineralogical Society of St Petersburg. He contributed numer- ous papers on euclase, zircon, epidote, orthite, monazite and other mineralogical subjects to the St Petersburg and Vienna academies of science, to Poggendorf's Annalcn, Leonhard and Brown's Jahrbuch, &c. He also issued as separate works Materialen zur Mineralogie Russlands (10 vols., 1853-1891), and Vorlesungen ilber Mineralogie (1865). He died in St Petersburg on the 3rd of January 1893 (o.s.).

KOKSTAD, a town of South Africa, the capital of Griqualand East, 236 m. by rail S.W. of Durban, no m. N. by W. of Port Shepstone, and 150 m. N. of Port St John, Pondoland. Pop. (1904), 2903, cf whom a third were Griquas. The town is built on the outer slopes of the Drakensberg and is 4270 ft. above the sea. Behind it Mount Currie rises to a height of 7297 ft. An excellent water supply is derived from the mountains. The town is well laid cut, and possesses several handsome public buildings. It is the centre of a thriving agricultural district and has a con- siderable trade in wool, grain, cattle and horses with Basutoland,

Pondoland and the neighbouring regions of Natal. The town is named after the Griqua chief Adam Kok, who founded it in 1869. In 1879 it came into the possession of Cape Colony and was granted municipal government in 1893. It is the residence of the Headman of the Griqua nation. (See Kaffraria and Griqualand.)

KOLA, a peninsula of northern Russia, lying between the Arctic Ocean on the N. and the White Sea on the S. It forms part of the region of Lapland and belongs administratively to the government of Archangel. The Arctic coast, known as the Murman coast (Murman being a corruption of Norman), is 260 m. long, and being subject to the influence of the North Atlantic drift, is free from ice all the year round. It is a rocky coast, built of granite, and rising to 650 ft., and is broken by several excellent bays. On one of these, Kola Bay, the Russian govern- ment founded in 1895 the

naval harbour of Alexandrovsk. From May to August a productive fishery is carried on along this coast. Inland the peninsula rises up to a plateau, 1000 ft. in general elevation, and crossed by several ranges of low mountains, which go up to over 3000 ft. in altitude. The lower slopes of these mountains are clothed with forest up to 1300 ft., and in places thickly studded with lakes, some of them of very con- siderable extent, e.g. Imandra (330 sq. m.), Ump-jaur, Nuorti- jarvi, Guolle-jaur or Kola Lake, and Lu-jaur. From these issue streams of appreciable magnitude, such as the Tuloma, Voronya, Yovkyok or Yokanka, and Ponoi, all flowing into the Arctic, and the Varsuga and Umba, into the White Sea. The area of the peninsula is estimated at 50,000 sq. m.

See A. O. Kihlmann and Palm6n, Die Expedition nach der Halbinsel Kola (1887-1892) (Helsingfors) ; A. O. Kihlmann, Bericht einer natur-wissenschaftlkhen Reise durch Russisch-Lappland (Helsingfors, 1890) ; and W. Ramsay, Geologische Beobachtungen auf der Halbinsel Kola (Helsingfors, 1899).

KOLABA (or Colaba), a district of British India, in the southern division of Bombay. Area, 2131 sq. m.; pop. (1901), 605,566, showing an increase of 2 % in the decade. The head- quarters are at Alibagh. Lying between the Western Ghats and the sea, Kolaba district abounds in hills, some being spurs running at right angles to the main range, while others are isolated peaks or lofty detached ridges. The sea frontage, of about 20 m., is throughout the greater part of its length fringed by a belt of coco-nut and betel-nut palms. Behind this belt lies a stretch of flat country devoted to rice cultivation. In many places along the banks of the salt-water creeks there are extensive tracts of salt marshland, some of them reclaimed, some still subject to tidal inundation, and others set apart for the manufacture of salt. The district is traversed by a few small streams. Tidal inlets, of which the principal are the Nagothna on the north, the Roha or Chaul in the west, and the Bankot creek in the south, run inland for 30 or 40 m., forming highways for a brisk trade in rice, salt, firewood, and dried fish. Near the coast especially, the district is well supplied with reservoirs. The Western Ghats have two remarkable peaks — Raigarh, where Sivaji built his capital, and Miradongar. There are extensive teak and black wood forests, the value of which is increased by their proximity to Bombay. The Great Indian Peninsula railway crosses part of the district, and communication with Bombay is maintained by a steam ferry. Owing to its nearness to that city, the district has suffered severely from plague. Kolaba district takes its name from a little island off Alibagh, which was one of the strongholds of Angria, the Mah- ratta pirate of the 18th century. The same island has given its name to Kolaba Point, the spur of Bombay Island running south that protects the entrance to the harbour. On Kolaba Point are the terminus of the Bombay & Baroda railway, barracks for a European regiment,

lunatic asylum and observatory.

KOLAR, a town and district of India, Li the state of Mysore. The town is 43 m. E. of Bangalore. Pop. (1901), 12,210. Although of ancient foundation, it has been almost completely modernized. Industries include the weaving of blankets and the breeding of turkeys for export.

The District or Kolar has an area of 3180 sq. m. It occupies the portion of the Mysore table-land immediately bordering the Eastern Ghats. The principal watershed lies in the north – west, around the hill of Nandidrug (4810 ft.), from which rivers radiate in all directions; and the whole country is broken by numerous hill ranges. The chief rivers are the Palar, the South Pinakini or Pennar, the North Pinakini, and the Papagani, which are industriously utilized for irrigation by means of anicuts and tanks. The rocks of the district are mostly syenite or granite, with a small admixture of mica and feldspar. The soil in the valleys consists of a fertile loam; and in the higher levels sand and gravel are found. The hills are covered with scrub, jungle and brushwood. In 1901 the population was 723,600, showing an increase of 22 % in the decade. The district is traversed by the Bangalore line of the Madras railway, with a branch 10 m. long, known as the Kolar Goldfields railway. Gold prospecting in this region began in 1876, and the industry is now settled on a secure basis. Here are situated the mines of the Mysore, Champion Reef, Ooregum, and Nandidrug companies. To the end of 1904 the total value of gold produced was 21 millions sterling, and there had been paid in dividends 9 millions, and in royalty to the Mysore state one million. The municipality called the Kolar Gold Fields had in 1901 a population of 38,204; it has suffered severely from plague. Electricity from the falls of the Cauvery (93 m. distant) is utilized as the motive power in the mines. Sugar manufacture and silk and cotton weaving are the other principal industries in the district. The chief historical interest of modern times centres round the hill fort of Nandidrug, which was stormed by the British in 1791, after a bombardment of 21 days.

KOLBE, ADOLPHE WILHELM HERMANN (1818-1884), German chemist, was born on the 27th of September 1818 at Elliehausen, near Gottingen, where in 1838 he began to study chemistry under F. Wohler. In 1842 he became assistant to R. W. von Bunsen at Marburg, and three years later to Lyon Playfair at London. From 1847 to 1851 he was engaged at Brunswick in editing the Dictionary of Chemistry started by Liebig, but in the latter year he went to Marburg as successor to Bunsen in the chair of

chemistry. In 1865 he was called to Leipzig in the same capacity, and he died in that city on the 25th of November 1884. Kolbe had an important share in the great development of chemical theory that occurred about the middle of the 19th century, especially in regard to the con- stitution of organic compounds, which he viewed as derivatives of inorganic ones, formed from the latter — in some cases directly — by simple processes of substitution. Unable to accept Berzelius's doctrine of the unalterability of organic radicals, he also gave a new interpretation to the meaning of copulae under the influence of his fellow-worker Edward Frankland's conception of definite atomic saturation-capacities, and thus contributed in an important degree to the subsequent establish- ment of the structure theory. Kolbe was a very successful teacher, a ready and vigorous writer, and a brilliant experi- mentalist whose work revealed the nature of many compounds the composition of which had not previously been understood. He published a Lehrbuch der organischen Chemie in 1854, smaller textbooks of organic and inorganic chemistry in 1877-1883, and Zur Entwickelungsgeschichte der theoretischen Chemie in 1881. From 1870 he was editor of the Journal fiir praktische Chemie, in which many trenchant criticisms of contemporary chemists and their doctrines appeared from his pen.

KOLBERG (or Colberg), a town of Germany, and seaport of the Prussian province of Pomerania, on the right bank of the Persante, which falls into the Baltic about a mile below the town, and at the junction of the railway lines to Belgard and Gollnow. Pop. (1905), 22,804. It has a handsome market- place with a statue of Frederick William III.; and there are extensive suburbs, of which the most important is Miinde. The principal buildings are the huge red-brick church of St Mary, with five aisles, one of the most remarkable churches in Pomerania, dating from the 14th century; the council-house

(Rathaus), erected after the plans of Ernst F. Zwirner; and the citadel. Kolberg also possesses four other churches, a theatre, a gymnasium, a school of navigation, and an exchange. Its bathing establishments are largely frequented and attract a considerable number of summer visitors. It has a harbour at the mouth of the Persante, where there is a lighthouse. Woollen cloth, machinery and spirits are manufactured; there is an extensive salt-mine in the neighbouring Zillenberg; the salmon and lamprey fisheries are important; and a fair amount of commercial activity is maintained. In 1903 a monument was erected to the memory of Gneisenau and the patriot, Joachim Christian Nettelbeck (1738-1824), through whose efforts the town was saved from the French in 1806-7.

Originally a Slavonic fort, Kolberg is one of the oldest places of Pomerania. At an early date it became the seat of a bishop, and although it soon lost

this distinction it obtained municipal privileges in 1255. From about 1276 it ranked as the most important place in the episcopal principality of Kamin, and from 1284 it was a member of the Hanseatic League. During the Thirty Years' War it was captured by the Swedes in 1631, passing by the treaty of Westphalia to the elector of Branden- burg, Frederick William I., who strengthened its fortifications. The town was a centre of conflict during the Seven Years' War. In 1758 and again in 1760 the Russians besieged Kolberg in vain, but in 1762 they succeeded in capturing it. Soon restored to Brandenburg, it was vigorously attacked by the French in 1806 and 1807, but it was saved by the long resistance of its inhabitants. In 1887 the fortifications of the town were razed, and it has since become a fashionable watering-place, receiving annually nearly 15,000 visitors.

See Riemann, Geschichte der Stadt Kolberg (Kolberg, 1873) ; Stoewer, Geschichte der Stadt Kolberg (Kolberg, 1897) ; Schonlein, Geschichte der Belagerungen Kolbergs in den Jahren 1758, 1760, 1761 und 1807 (Kolberg, 1878); and Kempin, Fiihrer durch Bad Kolberg (Kolberg, 1899).

KOLCSEY, FERENCZ (1790-1838), Hungarian poet, critic and orator, was born at Szodemeter, in Transylvania, on the 8th of August 1 790. In his fifteenth year he made the acquaintance of Kazinczy and zealously adopted his linguistic reforms. In 1809 Kolcsey went to Pest and became a " notary to the royal board." Law proved distasteful, and at Cseke in Szatmar county he devoted his time to aesthetical study, poetry, criticism, and the defence of the theories of Kazinczy. Kolcsey's early metrical pieces contributed to the Transylvanian Museum did not attract much attention, whilst his severe criticisms of Csokonai, Kis, and especially Berzsenyi, published in 1817, rendered him very unpopular. From 1821 to 1826 he published many separate poems of great beauty in the Aurora, Hebe, Aspasia, and other magazines of polite literature. He joined Paul Szemere in a new periodical, styled Elet es literatura (" Life and Literature "), which appeared from 1826 to 1829, in 4 vols., and gained for Kolcsey the highest reputation as a critical writer. From 1832 to 1835 he sat in the Hungarian Diet, where his extreme liberal views and his singular eloquence soon rendered him famous as a parliamentary leader. Elected on the 17 th of November 1830 a member of the Hungarian Academy of Sciences, he took part in its first grand meeting; in 1832, he delivered his famous oration on Kazinczy, and in 1836 that on his former opponent Daniel Berzsenyi. When in 1838 Baron Wesselenyi was unjustly thrown into prison upon a charge of treason,. Kolcsey eloquently though unsuccessfully conducted his defence; and he died about a week afterwards (August 24) from internal inflammation. His collected works, in 6 vols., were published at Pest, 1840-1848, and his journal of the diet of 1832-1836 appeared in 1848. A monument erected to the memory of Kolcsey was unveiled at Szatmar-Nemeti on the 25th of September 1864.

See G. Steinacker, Ungarische Lyriker (Leipzig, and Pest, 1874); F. Toldy, Magyar Koltdk elete (2 vols., Pest, 1871); J. Ferenczy and J. Danielik, Magyar Ir6k (2 vols., Pest, 1856-1858).

KOLDING, a town of Denmark in the amt (county) of Vejle, on the east coast of Jutland, on the Koldingfjord, an inlet of the

Little Belt, 9 m.N. of the German frontier. Pop. (1901), 12,516. It is on the Eastern railway of Jutland. The harbour throughout has a depth of over 20 ft. A little to the north-west is the splendid remnant of the royal castle Koldinghuus, formerly called Oernsborg or Arensborg. It was begun by Duke Abel in 1248; in 1808 it was burned. The large square tower was built by Christian IV. (15S8-1648), and was surmounted by colossal statues, of which one is still standing. It contains an anti- quarian and historical museum (1892). The name of Kolding occurs in the 10th century, but its earliest known town-rights date from 1321. In 1644 it was the scene of a Danish victory over the Swedes, and on the 22nd of April 1849 of a Danish defeat by the troops of Schleswig-Holsteˆn. A comprehensive view of the Little Belt with its islands, and over the mainland, is obtained from the Skamlingsbank, a slight elevation 8| m. S.E., where an obelisk (1863) commemorates the effort made to preserve the Danish language in Schleswig.

KOLGUEV, Kolgueit or Kalguyev, an island off the north- west of Russia in Europe, belonging to the government of Arch- angel. It lies about 50 m. from the nearest point of the mainland, and is of roughly oval form, 54 m. in length from N.N.E. to S.S. W. and 39 m. in extreme breadth. It lies in a shallow sea, and is quite low, the highest point being 250 ft. above the sea. Peat- bogs and grass lands cover the greater part of the surface; there are several considerable streams and a large number of small lakes. The island is of recent geological formation; it consists almost wholly of disintegrated sandstone or clay (which rises at the north-west into cliffs up to 60 ft. high), with scattered masses of granite. Vegetation is scanty, but bears, foxes and other Arctic animals, geese, swans, &c, provide means of livelihood for a few Samoyed hunters.

KOLHAPUR, a native state of India, within the Deccan division of Bombay. It is the fourth in importance of the Mah- ratta principalities, the other three being Baroda, Gwalior and Indore; and it is the principal state under the political control of the government of Bombay. Together with its jagirs or feudatories, it covers an area of 3165 sq. m. In 1901 the popula-

tion was 910,011. The estimated revenue is £300,000. Kolhapur stretches from the heart of the Western Ghats eastwards into the plain of the Deccan. Along the spurs of the main chain of the Ghats lie wild and picturesque hill slopes and valleys, producing little but timber, and till recently covered with rich forests. The centre of the state is crossed by several lines of low hills run- ning at right angles from the main range. In the east the country becomes more open and presents the unpicturesque uni- formity of a well-cultivated and treeless plain, broken only by an occasional river. Among the western hills are the ancient Mah- ratta strongholds of Panhala, Vishalgarh, Bavda and Rungna. The rivers, though navigable during the rains by boats of 2 tons burthen, are all fordable during the hot months. Iron ore is found in the hills, and smelting was formerly carried on to a con- siderable extent; but now the Kolhapur mineral cannot compete with that imported from Europe. There are several good stone quarries. The principal agricultural products are rice, millets, sugar-cane, tobacco, cotton, safBower and vegetables.

The rajas of Kolhapur trace their descent from Raja Ram, a younger son of Sivaji the Great, the founder of the Mahratta power. The prevalence of piracy caused the British government to send expeditions against Kolhapur in 1765 and 1792; and in the early years of the 19th century the misgovernment of the chief compelled the British to resort to military operations, and ultimately to appoint an officer to manage the state. In recent years the state has been conspicuously well governed, on the pattern of British administration. The raja Shahu Chhatra- pati, G. C.S.I, (who is entitled to a salute of 21 guns) was born in 1874, and ten years later succeeded to the throne by adoption. The principal institutions are the Rajaram college, the high school, a technical school, an agricultural school, and training- schools for both masters and mistresses. The state railway from Miraj junction to Kolhapur town is worked by the Southern Mahratta company. In recent years the state has suffered from both famine and plague.

The town of Kolhapur, or Karvir, is the terminus of a branch of the Southern Mahratta railway, 30 m. from the main line. Pop. (1901), 54,373. Besides a number of handsome modern public buildings, the town has many evidences of antiquity. Originally it appears to have been an important religious centre, and numerous Buddhist remains have been discovered in the neighbourhood.

KOLIN, or Neu-Kolin (also Kollin; Czech, Novy Kolln), a town of Bohemia, Austria, 40 m. E. of Prague by rail. Pop. (1900), 15,025, mostly Czech. It is situated on the Elbe, and amongst its noteworthy buildings may be specially mentioned the beautiful early Gothic church of St Bartholomew, erected during the latter half of the 14th century. The

industries of the town include sugar-refining, steam mills, brewing, and the manu- facture of starch, syrup, spirits, potash and tin ware. The neighbourhood is known for the excellence of its fruit and vege- tables. Kolin is chiefly famous on account of the battle here on the 18th of June 1757, when the Prussians under Frederick the Great were defeated by the Austrians under Daun (see Seven Years' War). The result was the raising of the siege of Prague and the evacuation of Bohemia by the Prussians. Kolin was colonized in the 13 th century by German settlers and made a royal city. In 142 1 it was captured by the men of Prague, and the German inhabitants who refused to accept " the four articles " were expelled. In 1427 the town declared against Prague, was besieged by Prokop the Great, and surrendered to him upon con- ditions at the close of the year.

KOLIS, a caste or tribe of Western India, of uncertain origin. Possibly the name is derived from the Turki kuleh a slave; and, according to one theory, this name has been passed on to the familiar word " cooly " for an agricultural labourer. They form the main part of the inferior agricultural population of Gujarat, where they were formerly notorious as robbers; but they also extend into the Konkan and the Deccan. In 1901 the number of Kolis in all India was returned as nearly 3! millions; but this total includes a distinct weaving caste of Kolis or Koris in northern India.

KOLLIKER, RUDOLPH ALBERT VON (1817-1905), Swiss anatomist and physiologist, was born at Zurich on the 6th of July 181 7. His father and his mother were both Zurich people, and he in due time married a lady from Aargau, so that Switzer- land can claim him as wholly her own, though he lived the greater part of his life in Germany. His early education was carried on in Zurich, and he entered the university there in 1836. After two years, however, he moved to the university of Bonn, and later to that of Berlin, becoming at the latter place the pupil of Johannes Miiller and of F. G. J. Henle. He graduated in philo- sophy at Zurich in 1841, and in medicine at Heidelberg in 1842. The first academic post which he held was that of prosector of anatomy under Henle; but his tenure of this office was brief, for in 1844 his native city called him back to its university to occupy a chair as professor extraordinary of physiology and comparative, anatomy. His stay here too, however, was brief, for in 1847 the university of Wiirzburg, attracted by his rising fame, offered him the post of professor of physiology and of microscopical and comparative anatomy. He accepted the appointment, and at Wiirzburg he remained thenceforth, refusing all offers tempting him to leave the quiet academic life of the Bavarian town, where he died on the 2nd of November 1905.

Kolliker's name will ever be associated with that of the tool with which during his long life he so assiduously and successfully worked, the microscope. The time at which he began his studies coincided with that of

the revival of the microscopic investigation of living beings. Two centuries earlier the great Italian Mal- pighi had started, and with his own hand had carried far the study by the help of the microscope of the minute structure of animals and plants. After Malpighi this branch of knowledge, though continually progressing, made no remarkable bounds for- ward until the second quarter of the 19th century, when the improvement of the compound microscope on the one hand, and the promulgation by Theodor Schwann and Matthias Schleiden of the " cell theory " on the other, inaugurated a new era of

microscopic investigation. Into this new learning Kolliker threw himself with all the zeal of youth, wisely initiated into it by his great teacher Henle, whose sober and exact mode of inquiry went far at the time to give the new learning a right direction and to counteract the somewhat fantastic views which, under the name of the cell theory, were tending to be prominent. Henle's labours were for the most part limited to the microscopic in- vestigation of the minute structure of the tissues of man and of the higher animals, the latter being studied by him mainly with the view of illustrating the former. But Kolliker had another teacher besides Henle, the even greater Johannes Muller, whose active mind was sweeping over the whole animal kingdom, striving to pierce the secrets of the structure of living creatures of all sorts, and keeping steadily in view the wide biological problems of function and of origin, which the facts of structure might serve to solve. We may probably trace to the influence of these two great teachers, strengthened by the spirit of the times, the threefold character of KSlliker's long-continued and varied labours. In all of them, or in almost all of them, the microscope was the instrument of inquiry, but the problem to be solved by means of the instrument belonged now to one branch of biology, now to another.

At Zurich, and afterwards at Wurzburg, the title of the chair which he held laid upon him the duty of teaching comparative anatomy, and very many of the numerous memoirs which he published, including the very first paper which he wrote, and which appeared in 1841 before he graduated, " On the Nature of the so-called Seminal Animalcules," were directed towards elucidating, by help of the microscope, the structure of animals of the most varied kinds — that is to say, were zoological in char- acter. Notable among these were his papers on the Medusae and allied creatures. His activity in this direction led him to make zoological excursions to the Mediterranean Sea and to the coasts of Scotland, as well as to undertake, conjointly with his friend C. T. E. von Siebold, the editorship of the

Zeitschrift fiir Wissenschaftliche Zoologie, which, founded in 1848, continued under his hands to be one of the most important zoological periodicals.

At the time when Kolliker was beginning his career the in- fluence of Karl Ernst von Baer's embryological teaching was already being v widely felt, men were learning to recognize the importance to morphological and zoological studies of a knowledge of the development of animals; and Kolliker plunged with enthusiasm into the relatively new line of inquiry. His earlier efforts were directed to the invertebrata, and his memoir on the development of cephalopods, which appeared in 1844, is a classical work; but he soon passed on to the vertebrata, and studied not only the amphibian embryo and the chick, but also the mammalian embryo. He was among the first, if not the very first, to introduce into this branch of biological inquiry the newer microscopic technique — the methods of hardening, section- cutting and staining. By doing so, not only was he enabled to make rapid progress himself, but he also placed in the hands of others the means of a like advance. The remarkable strides for- ward which embryology made during the middle and during the latter half of the 19th century will always be associated with his name. His Lectures on Development, published in 1861, at once became a standard work.

But neither zoology nor embryology furnished Kolliker's chief claim to fame. If he did much for these branches of science, he did still more for histology, the knowledge of the minute structure of the animal tissues. This he made emphatically his own. It may indeed be said that there is no fragment of the body of man and of the higher animals on which he did not leave his mark, and in more places than one his mark was a mark of fundamental importance. Among his earlier results may be mentioned the demonstration in 1847 that smooth or unstriated muscle is made up of distinct units, of nucleated muscle-cells. In this work he followed in the footsteps of his master Henle. A few years before this men were doubting whether arteries were muscular, and no solid histological basis as yet existed for those views as to the action of the nervous system on the circulation, which were soon

to be put forward, and which had such a great influence on the progress of physiology. By the above discovery Kolliker com- pleted that basis.

Even to enumerate, certainly to dwell on, all his contributions to histology would be impossible here: smooth muscle, striated muscle, skin, bone, teeth, blood-vessels and viscera were all investigated by him; and he touched none of them without striking out some new truths. The results at which he arrived were recorded partly in separate memoirs, partly in his great textbook on microscopical anatomy, which first saw the light in 1850, and

by which he advanced histology no less than by his own researches. In the case of almost every tissue our present knowledge contains something great or small which we owe to Kolliker; but it is on the nervous system that his name is written in largest letters. So early as 1845, while still at Zurich, he supplied what was as yet still lacking, the clear proof that nerve-fibres are continuous with nerve-cells, and so furnished the absolutely necessary basis for all sound specula- tions as to the actions of the central nervous system. From that time onward he continually laboured, and always fruitfully,, at the histology of the nervous system, and more especially at the .difficult problems presented by the intricate patterns in which fibres and cells are woven together in the brain and spinal cord. In his old age, at a time when he had fully earned the right to fold his arms, and to rest and be thankful, he still enriched neuro- logical science with results of the highest value. From his early days a master of method, he saw at a glance the value of the new Golgi method for the investigation of the central nervous system, and, to the great benefit of science, took up once more in his old age, with the aid of a new means, the studies for which he had done so much in his youth. It may truly be said that much of that exact knowledge of the inner structure of the brain, which is rendering possible new and faithful conceptions of its working, came from his hands.

Lastly, Kolliker was in his earlier years professor of physiology as well as of anatomy; and not only did his histological labours almost always carry physiological lessons, but he also enriched physiology with the results of direct researches of an experimental kind, notably those on curare and some other poisons. In fact, we have to go back to the science of centuries ago to find a man of science of so many-sided an activity as he. His life constituted in a certain sense a protest against that specialized differentiation which, however much it may under certain aspects be regretted, seems to be one of the necessities of modern development. In Johannes Miiller's days no one thought of parting anatomy and physiology; nowadays no one thinks of joining them together. Kolliker did in his work join them together, and indeed said himself that he thought they ought never to be kept apart.

Naturally a man of so much accomplishment was not left with- out honours. Formerly known simply as Kolliker, the title " von " was added to his name. He was made a member of the learned societies of many countries; in England, which he visited more than once, and where he became well known, the Royal Society made him a fellow in i860, and in 1897 gave him its highest token of esteem, the Copley medal. (M. F.)

KOLLONTAJ, HUGO (1730-1812), Polish politician and writer, was born in 1750 at Niecislawice in Sahdomir, and educated at Pinczow and Cracow. After taking orders he went (1770) to Rome, where he obtained

the degree of doctor of theology and common law, and devoted himself enthusiastically to the study of the fine arts, especially of architecture and painting. At Rome too he obtained a canonry attached to Cracow cathedral, and on his return to Poland in 1733 threw himself heart and soul into the question of educational reform. His efforts were impeded by the obstruction of the clergy of Cracow, who regarded him as an adventurer; but he succeeded in reforming the university after his own mind, and was its rector for three years (1782-1783). Kollontaj next turned his attention to politics. In 1786 he was appointed referendarius of Lithuania, and during the Four Years' Diet (1788-1792) displayed an amazing and many-sided activity as one of the reformers of the constitution. He grouped around him all the leading writers, publicists and progressive young men

of the day; declaimed against prejudices; stimulated the timid; inspired the lukewarm with enthusiasm; and never rested till the constitution of the 3rd of May 1791 had been carried through. In June 1 791 Kollontaj was appointed vice-chancellor. On the triumph of the reactionaries and the fall of the national party, he secretly placed in the king's hands his adhesion to the tri- umphant Confederation of Targowica, a false step, much blamed at the time, but due not to personal ambition but to a desire to save something from the wreck of the constitution. He then emigrated to Dresden. On the outbreak of Kosciuszko's in- surrection he returned to Poland, and as member of the national government and minister of finance took a leading part in affairs. But his radicalism had now become of a disruptive quality, and he quarrelled with and even thwarted Kosciuszko because the dictator would not admit that the Polish republic could only be saved by the methods of Jacobinism. On the other hand, the more conservative section of the Poles regarded Kollontaj as " a second Robespierre," and he is even suspected of complicity in the outrages of the 17th and i8thof June 1794, when the Warsaw mob massacred the political prisoners. On the collapse of the insurrection Kollontaj emigrated to Austria, where from 1795 to 1802 he was detained as a prisoner. He was finally released through the mediation of Prince Adam Czartoryski, and returned to Poland utterly discredited. The remainder of his life was a ceaseless struggle against privation and prejudice. He died at Warsaw on the 28th of February 1812.

Of his numerous works the most notable are: Political Speeches as Vice-Chancellor (Pol.) (in 6 vols., Warsaw, 1791); On the Erection and Fall of the Constitution of May (Pol.) (Leipzig, 1793; Paris, 1868); Correspondence with T. Czacki (Pol.) (Cracow, 1854); Letters •uritten

during Emigration, 1792-1794 (Pol.) (Posen, 1872).

See Ignacz Badeni, Necrology of Hugo Kollontaj (Pol.) (Cracow, 1819); Henryk Schmitt, Review of the Life and Works of Kollontaj (Pol.) (Lemberg, i860); Wojciek Grochowski, " Life of Kollontaj " (Pol.) in Tygod Jllus. (Warsaw, 1861). (R. N. B.)

KOLOMEA (Polish, Kolomyja), a town of Austria, in Galicia, 122 m. S. of Lemberg by rail. Pop. (1900), 34,188, of which half were Jews. It is situated on the Pruth, and has an active trade in agricultural products. To the N.E. of Kolomea, near the Dniester, lies the village of Czernelica, with ruins of a strongly fortified castle, which served as the residence of John Sobieski during his campaigns against the Turks. Kolomea is a very old town and is mentioned already in 1240, but the assertion that it was a Roman settlement under the name of Colonia is not proved. It was the principal town of the Polish province of Pokutia, and it suffered severely during the 15th and 16th centuries from the attacks of the Moldavians and the Tatars.

KOLOMNA, a town of Russia, in the government of Moscow, situated on the railway between Moscow and Ryazan, 72 m. S.E. of Moscow, at the confluence of the Moskva river with the Kolo- menka. Pop. (1897), 20,970. It is an old town, mentioned in the annals in 11 77, and until the 14th century was the capital of the Ryazan principality. It suffered greatly from the invasions of the Tatars in the 13 th century, who destroyed it four times, as well as from the wars of the 17th century; but it always recovered and has never lost its commercial importance. During the 19th century it became a centre for the manufacture of silks, cottons, ropes and leather. Here too are railway workshops, where locomotives and wagons are made. Kolomna carries on an active trade in grain, cattle, tallow, skins, salt and timber. It has several old churches of great archaeological interest, including two of the 14th century, one being the cathedral. One gate (restored in 1895) ˚f tne fortifications of the Kreml still survives.

KOLOZSVAR (Ger. Klausenburg; Rum. Cluj), a town of Hungary, in Transylvania, the capital of the county of Kolozs, and formerly the capital of the whole of Transylvania, 248 m. E.S.E. of Budapest by rail. Pop. (1900), 46,670. It is situated in a picturesque valley on the banks of the Little Szamos, and comprises the inner town (formerly surrounded with walls) and five suburbs. The greater part of the town lies on the right bank of the river, while on the other side is the so-called Bridge Suburb and the citadel (erected in 1715). Upon the slopes of the citadel hill there is a gipsy quarter.

With the exception of the old quarter, Kolozsvar is generally well laid out,

and contains many broad and fine streets, several of which diverge at right angles from the principal square. In this square is situated the Gothic church of St Michael (1396- 1432); in front is a bronze equestrian statue of King Matthias Corvinus by the Hungarian sculptor Fadrusz (1902). Other noteworthy buildings are the Reformed church, built by Matthias Corvinus in i486 and ceded to the Calvinists by Bethlen Gabor in 1622; the house in which Matthias Corvinus was born (1443), which contains an ethnographical museum; the county and town halls, a museum, and the university buildings. A feature of Kolozsvar is the large number of handsome mansions belonging to the Transylvanian nobles, who reside here during the winter. It is the seat of a Unitarian bishop, and of the superintendent of the Calvinists for the Transylvanian circle. Kolozsvar is the literary and scientific centre of Transylvania, and is the seat of numerous literary and scientific associations. It contains a university (founded in 1872), with four faculties — theology, phi- losophy, law and medicine — frequented by about 1900 students in 1905; and amongst its other educational establishments are a seminary for Unitarian priests, an agricultural college, two training schools for teachers, a commercial academy, and several secondary schools for boys and girls. The industry comprises establishments for the manufacture of woollen -and linen cloth, paper, sugar, candles, soap, earthenwares, as well as breweries and distilleries.

Kolozsvar is believed to occupy the site of a Roman settlement named Napoca. Colonized by Saxons in n 78, it then received its German name of Klausenburg, from the old word Klause, signifying a " mountain pass." Between the years 1545 and 1 570 large numbers of the Saxon population left the town in con- sequence of the introduction of Unitarian doctrines. In 1 798 the town was to a great extent destroyed by fire. As capital of Transylvania and the seat of the Transylvanian diets, Kolozsvar from 1830 to 1848 became the centre of the Hungarian national movement in the grand principality; and in December 1848 it was taken and garrisoned by the Hungarians under General Bern.

KOLPINO, one of the chief iron-works of the crown in Russia, in the government of St Petersburg, 16 m. S.E. of the city of St Petersburg, on the railway to Moscow, and on the Izhora river. Pop. (1897), 8076. A sacred image of St Nicholas in the Trinity church is visited by numerous pilgrims on the 22nd of May every year. Here is an iron-foundry of the Russian admiralty.

KOLS, a generic name applied by Hindus to the Munda, Ho and Oraon tribes of Bengal. The Mundas are an aboriginal tribe of Dra vidian physical type, inhabiting the Chota Nagpur division, and numbering 438,000 in 1901. The majority of them are ani- mists in religion, but Christianity is

making rapid strides among them. The village community in its primitive form still exists among the Mundas ; the discontent due to the oppression of their landlords led to the Munda rising cf 1899, and to the remedy of the alleged grievances by a new settlement of the district. The Hos, who are closely akin to the Mundas, also inhabit the Chota Nagpur division; in 1901 they numbered 386,000. They were formerly a very pugnacious race, who successfully defended their territory against all comers until they were subdued by the British in the early part of the 19th century, being known as the Larka (or fighting) Kols. They are still great sportsmen, using the bow and arrow. Like the Mundas they are animists, but they show little inclination for Christianity. Both Mundas and Hos speak dialects of the obscure linguistic family known as Munda or Kol.

See Imp. Gazetteer of India, vols, xiii., xviii. (Oxford, 1908).

KOLYVASf. (1) A town of West Siberia, in the government of Tomsk, on the Chaus river, 5 m. from the Ob and 120 m. S.S.W. of the city of Tomsk. It is a wealthy town, the merchants carrying on a considerable export trade in cattle, hides, tallow, corn and fish. It was founded in 1 7 1 3 under the name of Chausky Ostrog, and has grown rapidly. Pop. (1897), n,7°3- (2) Kolyvanskiy Zavod, another town of the same government, in the district of Biysk, Altai region, on the Byelaya river, 192 m.

S.E. of Barnaul; altitude, 1290 ft. It is renowned for its stone- cutting factory, where marble, jasper, various porphyries and breccias are worked into vases, columns, &c. Pop., 5000. (3) Old name of Reval (?.».).

KOMAROM (Ger., Komorn), the capital of the county of Komarom, Hungary, 65 m. W.N.W. of Budapest by rail. Pop. (1900), 16,816. It is situated at the eastern extremity of the island Csallokoz or Grosse Schiitt, at the confluence of the Waag with the Danube. Just below Komarom the two arms into which the Danube separates below Pressburg, forming the Grosse Schiitt island, unite again. Since 1896 the market-town of Uj-Sz6ny, which lies on the opposite bank of the Danube, has been incorporated with Komarom. The town is celebrated chiefly for its fortifications, which form the centre of the inland fortifications of the Austro-Hungarian monarchy. A brisk trade in cereals, timber, wine and fish is carried on. Komarom is one of the oldest towns of Hungary, having received its charter in 1265. The fortifications were begun by Matthias Corvinus, and were enlarged and strengthened during the Turkish wars (152 6-64) . New forts were constructed in 1 663 and were greatly

enlarged between 1805 and 1809. In 1543, 1594, 1598 and 1663 it was beleaguered by the Turks. It was raised to the dignity of a royal free town in 1751. During the revolutionary war of 1848-49 Komarom was a principal point of military operations, and was long unsuccessfully besieged by the Austrians, who on the nth of July 1849 were defeated there by General Gorgei, and on the 3rd of August by General Klapka. On the 27th of September the fortress capitulated to the Austrians upon honourable terms, and on the 3rd and 4th of October was evacu- ated by the Hungarian troops. The treasure of the Austrian national bank was removed here from Vienna in 1866, when that city was threatened by the Prussians.

KOMATI, a river of south-eastern Africa. It rises at an ele- vation of about 5000 ft. in the Ermelo district of the Transvaal, 1 1 m. W. of the source of the Vaal, and flowing in a general N. and E. direction reaches the Indian Ocean at Delagoa Bay, after a course of some 500 miles. In its upper valley near Steynsdorp are gold-fields, but the reefs are almost entirely of low grade ore. The river descends the Drakensberg by a pass 30 m. S. of Barber- ton, and at the eastern border of Swaziland is deflected north- ward, keeping a course parallel to the Lebombo mountains. Just W. of 32° E. and in 25° 25′ S. it is joined by one of the many rivers of South Africa named Crocodile. This tributary rises, as the Elands river, in the Bergendal (6437 ft.) near the upper waters of the Komati, and flows E. across the high veld, being turned northward as it reaches the Drakensberg escarpment. The fall to the low veld is over 2000 ft. in 30 m., and across the country between the Drakensberg and the Lebombo (100 m.) there is a further fall of 3000 ft. A mile below the junction of the Crocodile and Komati, the united stream, which from this point is also known as the Manhissa, passes to the coast plain through a cleft 626 ft. high in the Lebombo known as Komati Poort, where are some picturesque falls. At Komati Poort, which marks the frontier between British and Portuguese territory, the river is less than 60 m. from its mouth in a direct line, but in crossing the plain it makes a wide sweep of 200 m., first N. and then S., forming lagoon-like expanses and back- waters and receiving from the north several tributaries. In flood time there is a connexion northward through the swamps with the basin of the Limpopo. The Komati enters the sea 15 m. N. of Lourenco Marques. It is navigable from its mouth, where the water is from 12 to 18 ft. deep, to the foot of the Lebombo.

The railway from Lourenco Marques to Pretoria traverses the plain in a direct line, and at mile 45 reaches the Komati. It follows the south bank of the river and enters the high country at Komati Poort. At a small town with the same name, 2 m. VV. of the Poort, on the 23rd of September 1900, during the war with England, 3000 Boers crossed the frontier and surrendered to the Portuguese authorities. From the Poort westward the railway skirts the south bank of the Crocodile river throughout its length.

KOMOTAU (Czech, Chomtitov), a town of Bohemia, Austria 79 m. N.N.W. of Prague by rail. Pop. (1900), 15,925, almost exclusively German. It has an old Gothic church, and its town- hall was formerly a commandery of the Teutonic knights. The in- dustrial establishments comprise manufactories of woollen cloth, linen and paper, dyeing houses, breweries, distilleries, vinegar works and the central workshops of the Buschtehrad railway. Lignite is worked in the neighbourhood. Komotau was origin- ally a Czech market-place, but in 1252 it came into the possession of the Teutonic Order and was completely Germanized. In 1396 it received a town charter; and in 1416 the knights sold both town and lordship to Wenceslaus IV. On the 16th of March 142 1, the town was stormed by the Taborites, sacked and burned. After several changes of ownership, Komotau came in 1588 to Popel of Lobkovic, who established the Jesuits here, which led to trouble between the Protestant burghers and the over-lord. In 1594 the lordship fell to the crown, and in 1605 the town purchased its freedom and was created a royal city.

KOMURA, JUTARO, Count (1855-), Japanese states- man, was born in Hiuga. He graduated at Harvard in 1877, and entered the foreign office in Tokyo in 1884. He served as charge d'affaires in Peking, as Japanese minister in Seoul, in Washing- ton, in St Petersburg, and in Peking (during the Boxer trouble), earning in every post a high reputation for diplomatic ability. In 1901 he received the portfolio of foreign affairs, and held it throughout the course of the negotiations with Russia and the subsequent war (1904-5), being finally appointed by his sovereign to meet the Russian plenipotentiaries at Portsmouth, and subse- quently the Chinese representatives in Peking, on which occasions the Portsmouth treaty of September 1905 and the Peking treaty of November in the same year were concluded. For these services, and for negotiating the second Anglo-Japanese alliance, he received the Japanese title of count and was made a K.C.B. by King Edward VII. He resigned his portfolio in 1906 and became privy councillor, from which post he was transferred to the embassy in London, but he returned to Tokyo in 1908 and resumed the portfolio of foreign affairs in the second Katsura cabinet.

KONARAK or Kanarak, a ruined temple in India, in the Puri district of Orissa, which has been described as for its size " the most richly ornamented building— externally at least — in the whole world." It was erected in the middle of the 13th century, and was dedicated to the sun-god. It consisted of a tower, probably once over 180 ft. high, with a porch in front 140 ft. high, sculptured with figures of lions, elephants, horses, &c.

KONG, the name of a town, district and range of hills in the N.W. of the Ivory Coast colony, French West Africa. The hills are part of the band of high ground separating the inner plains of West Africa from the coast

regions. In maps of the first half of the 19th century the range is shown as part of a great moun- tain chain supposed to run east and west across Africa, and is thus made to appear a continuation of the Mountains of the Moon, or the snow-clad heights of Ruwenzori. The culminating point of the Kong system is the Pic des Kommono, 4757 ft. high. In general the summits of the hills are below 2000 ft. and not more than 700 ft. above the level of the country. The " circle of Kong," one of the administrative divisions of the Ivory Coast colony; covers 46,000 sq. m. and has a population of some 400,000. The inhabitants are negroes, chiefly Bambara and Mandingo. About a fourth of the population profess Mahom- medanism; the remainder are spirit worshippers. The town of Kong, situated in 9 N., 4°2o' W., is not now of great importance. Probably Rene Caillie, who spent some time in the western part of the country in 1827, was the first European to visit Kong. In 1888 Captain L. G. Binger induced the native chiefs to place themselves under the protection of France, and in 1893 the protectorate was attached to the Ivory Coast colony. For a time Kong was overrun by the armies of Samory (see Senegal), but the capture of that chief in 1898 was followed by the peaceful development of the district by France (see Ivory Coast).

KONGSBERG, a mining town of Norway in Buskerud ami (county), on the Laagen, 500 ft. above the sea, and 61 m. W.S.W.

of Christiania by rail. Pop. (1900), 5585. With the exception of the church and the town-house, the buildings are mostly of wood. The origin and whole industry of the town are connected with the government silver-mines in the neighbourhood. Their first discovery was made by a peasant in 1623, since which time they have been worked with varying success. During the 18th century Kongsberg was more important than now, and contained double its present population. Within the town are situated the smelting- works, the mint, and a Government weapon factory. Three miles below the Laagen forms a fine fall of 140 ft. (Labrofos). The neighbouring Jonksnut (2950 ft.) commands extensive views of the Telemark. A driving-road from Kongsberg follows a favourite route for travellers through this district, connecting with routes to Sand and Odde on the west coast.

KONIA. (1) A vilayet in Asia Minor which includes the whole, or parts of, Pamphylia, Pisidia, Phrygia, Lycaonia, Cilicia and Cappadocia. It was formed in 1864 by adding to the old eyalet of Karamania the western half of Adana, and part of south-eastern Anadoli. It is divided into five sanjaks: Adaiia, Buldur, Hamid-abad, Konia and Nigdeh. The population (990,000

Moslems and 80,000 Christians) is for the most part agricultural and pastoral. The only industries are carpet- weaving and the manufacture of cotton and silk stuffs. There are mines of chrome, mercury, cinnabar, argentiferous lead and rock salt. The principal exports are salt, minerals, opium, cotton, cereals, wool and live stock; and the imports cloth-goods, coffee, rice and petroleum. The vilayet is now traversed by the Anatolian railway, and contains the railhead of the Ottoman line from Smyrna.

(2) The chief town [anc. Iconium (g.v.)], altitude 3320 ft., situated at the S.W. edge of the vast central plain of Asia Minor, amidst luxuriant orchards famous in the middle ages for their yellow plums and apricots and watered by streams from the hills. Pop. 45,000, including 5000 Christians. There are interesting remains of Seljuk buildings, all showing strong traces of Persian influence in their decorative details. The principal ruin is that of the palace of Kilij Arslan II., which contained a famous hall. The most important mosques are the great Tekke, which contains the tomb of the poet Mevlana Jelal ed-din Rumi, a mystic (sufi) poet, founder of the order of Mevlevi (whirling) dervishes, and those of his successors, the " Golden " mosque and those of Ala ed-Din and Sultan Selim. The walls, largely the work of Ala ed-Din I., are preserved in great part and notable for the number of ancient inscriptions built into them. They once had twelve gates and were 30 ells in height. The climate is good — hot in summer and cold, with snow, in winter. Konia is connected by railway with Constantinople and is the starting-point of the extension towards Bagdad. After the capture of Nicaea by the Crusaders (1097), Konia became the capital of the Seljuk Sultans of Rum (see Seljuks and Turks). It was temporarily occupied by Godfrey, and again by Frederick Barbarossa, but this scarcely affected its prosperity. During the reign of Ala ed-Din I. (1219-1236) the city was thronged with artists, poets, historians, jurists and dervishes, driven westwards from Persia and Bokhara by the advance of the Mongols, and there was a brief period of great splendour. After the break up of the empire of Rum, Konia became a secondary city of the amirate of Karamania and in part fell to ruin. In 1472 it was annexed to the Osmanli empire by Mahommed II. In 1832 it was occupied by Ibrahim Pasha who defeated and captured the Turkish general, Reshid Pasha, not far from the walls. It had come to fill only part of its ancient circuit, but of recent years it has revived considerably, and, since the railway reached it, has acquired a semi-European quarter, with a German hotel, cafes and Greek shops, &c.

See W. M. Ramsay, Historical Geography of Asia Minor (1890); St Paul the Traveller (1895) ; G. Le Strange, Lands of the E. Caliphate (1905)- (D. G. rf)

KONIECPOLSKI, STANISLAUS (1 591-1646), Polish soldier, was the most illustrious member of an ancient Polish family which rendered great

services to the Republic. Educated at the academy of Cracow, he learned the science of war under the

great Jan Chodkiewicz, whom he accompanied on his Muscovite campaigns, and under the equally great Stanislaus Zolkiewski, whose daughter Catherine he married. On the death of his first wife he wedded, in 1619, Christina Lubomirska. In 1619 he took part in the expedition against the Turks which terminated so disastrously at Cecora, and after a valiant resistance was captured and sent to Constantinople, where he remained a close prisoner for three years. On his return he was appointed com- mander of all the forces of the Republic, and at the head of an army of 25,000 men routed 60,000 Tatars at Martynow, follow- ing up this success with fresh victories, for which he received the thanks of the diet and the palatinate of Sandomeria from the king. In 1625 he was appointed guardian of the Ukraine against the Tatars, but in 1626 was transferred to Prussia to check the victorious advance of Gustavus Adolphus. Swedish historians have too often ignored the fact that Koniecpolski's superior strategy neutralized all the efforts of the Swedish king, whom he defeated again and again, notably at Homerstein (April 1627) and at Trzciand (April 1629). But for the most part the fatal parsimony of his country compelled Koniecpolski to confine himself to the harassing guerrilla warfare in which he was an expert. In 1632 he was appointed to the long vacant post of hetman wielki koronny, or commander in chief of Poland, and in that capacity routed the Tatars at Sasowy Rogi (April 1633) and at Paniawce (April and October 1633), and the Turks, with terrific loss, at Abazd Basha. To keep the Cossacks of the Ukraine in order he also built the fortress of Kudak. As one of the largest proprietors in the Ukraine he suffered severely from Cossack depredations and offered many concessions to them. Only after years of conflict, however, did he succeed in reducing these unruly desperadoes to something like obedience. In 1644 he once more routed the Tatars at Ockmatow, and again in 1646 at Brody. This was his last exploit, for he died the same year, to the great grief of Wladislaus IV., who had already con- certed with him the plan for a campaign on a grand scale against the Turks, and relied principally upon the Grand Hetman for its success. Though less famous than his contemporaries Zolkiehwski and Chodkiewicz, Koniecpolski was fully their equal as a general, and his inexorable severity made him an ideal lord-marcher.

See an unfinished biography in the Tyg. Illus. of Warsaw for 1863; Stanislaw Przylenski, Memorials of the Koniecpolskis (Pol.) (Lemberg, 1842). (R. N. B.)

KONIG, KARL RUDOLPH (1832-1901), German physicist, was born at Konigsberg (Prussia) on the 26th of November 1832, and studied at the

university of his native town, taking the degree of Ph.D. About 1852 he went to Paris, and became apprentice to the famous violin-maker, J. B. Vuillaume, and some six years later he started business on his own account. He called himself a " maker of musical instruments," but the instruments for which his name is best known are tuning-forks, which speedily gained a high reputation among physicists for their accuracy and general excellence. From this business Konig derived his livelihood for the rest of his life. He was, however, very far from being a mere tradesman, and even as a manufacturer he regarded the quality of the articles that left his workshop as a matter of greater solicitude than the profits they yielded. Acous- tical research was his real interest, and to that he devoted all the time and money he could spare from his business. An exhibit which he sent to the London Exhibition of 1862 gained a gold medal, and at the Philadelphia Exposition at 1876 great admira- tion was expressed for a tonometric apparatus of his manufacture. This consisted of about 670 tuning-forks, of as many different pitches, extending over four octaves, and it afforded a perfect means for testing, by enumeration of the beats, the number of vibrations producing any given note and for accurately tuning any musical instrument. An attempt was made to secure this apparatus for the university of Pennsylvania, and Konig was induced to leave it behind him in America on the assurance that it would be purchased; but, ultimately, the m6ney not being forthcoming, the arrangement fell through, to his great dis- appointment and pecuniary loss. Some of the forks he disposed of to the university of Toronto and the remainder he used as a

nucleus for the construction of a still more elaborate tonometer. While the range of the old apparatus was only between 128 and 4096 vibrations a second, the lowest fork of the new one made only 16 vibrations a second, while the highest gave a sound too shrill to be perceptible by the human ear. Konig will also be remembered as the inventor and constructor of many other beautiful pieces of apparatus for the investigation of acoustical problems, among which may be mentioned his wave-sirens, the first of which was shown at Philadelphia in 1876. His original work dealt, among other things, with Wheatstone's sound-figures, the characteristic notes of the different vowels, manometric flames, &c; but perhaps the most important of his researches are those devoted to the phenomena produced by the interference of two tones, in which he controverted the views of H. von Helm- holtz as to the existence of summation and difference tones. He died in Paris on the 2nd of October 1001.

KONIGGRATZ (Czech, Hradec Kr&love), a town and episcopal see of

Bohemia, Austria, 74 m. E. of Prague by rail. Pop. (1900), 9773, mostly Czech. It is situated in the centre of a very fertile region called the " Golden Road," and contains many buildings of historical and architectural interest. The cathedral was founded in 1303 by Elizabeth, wife of Wenceslaus II; and the church of St John, built in 17 10, stands on the ruins of the old castle. The industries include the manufacture of musical instruments, machinery, colours, and carton-pierre, as well as gloves and wax candles. The original name of Koniggratz, one of the oldest settlements in Bohemia, was Chlumec Dobros- lavsky; the name Hradec, or " the Castle," was given to it when it became the seat of a count, and Kralove, " of the queen " (Ger. Konigin), was prefixed when it became one of the dower towns of the queen of Wenceslaus II., Elizabeth of Poland, who lived here for thirty years. It remained a dower town till 1620. Koniggratz was the first of the towns to declare for the national cause during the Hussite wars. After the battle of the White Mountain (1620) a large part of the Protestant population left the place. In 1639 the town was occupied for eight months by the Swedes. Several churches and convents were pulled down to make way for the fortifications erected under Joseph II. The fortress was finally dismantled in 1884. Near Koniggratz took place, on the 3rd of July 1866, the decisive battle (formerly called Sadowa) of the Austro-Prussian war (see Seven Weeks' War).

k6NIGINH0F {Dvur Kralove in Czech), the seat of a provincial district and of a provincial law-court, is situated in north-eastern Bohemia on the left bank of the Elbe, about 160 kilometres from Prague. Brewing, corn-milling and cotton-weaving are the principal industries. Pop. about 11,000. The city is of very ancient origin. Founded by King Wenceslaus II. of Bohemia (1 278-1305), it was given by him to his wife Elizabeth, and thus received the name of Dvur Kralove (the court of the queen). During the Hussite wars, Dvur Kralove was several times taken and retaken by the contending parties. In a battle fought partly within the streets of the town, the Austrian army was totally defeated by the Prussians on the 29th of June 1866. In the 19th century Dvur Kralove became widely known as the spot where a MS. was found that was long believed to be one of the oldest written documents in the Czech language. In 181 7 Wenceslas Hanka, afterwards for a long period librarian of the Bohemian museum, declared that he had found in the church tower in the town of Dvur Kralove when on a visit there, a very ancient MS. containing epic and lyric poems. Though Dobrovsky, the greatest Czech philologist of the time, from the first expressed suspicions, the MS. known as the Kralodvorsky Rukopis manu-script of Koniginhof was long accepted as genuine, frequently printed and translated into most European languages. Doubts as to the genuineness of the document never, however, ceased, and they became stronger when Hanka was convicted of having fabricated other false Bohemian

documents. A series of works and articles written by Professors Goll, Gebauer, Masoryk, and others have recently proved that the MS. is a forgery, and hardly any Bohemian scholars of the present day believe in its genuine- ness.

The discussion of the authenticity of the MS. of Dvur Kralove lasted with short interruptions about seventy years, and the Bohemian works written on the subject would fill a considerable library. Count Lutzow's History of Bohemian Literature gives a brief account of the controversy.

KONIGSBERG (Polish Krolewiec), a town of Germany, capital of the province of East Prussia and a fortress of the first rank. Pop. (1880), 140,800; (1890), 161,666; (1905), 219,862 (including the incorporated suburbs). It is situated on rising ground, on both sides of the Pregel, 45 m. from its mouth in the Frische Haff, 397 m. N. E. of Berlin, on the railway to Eydtkuhnen and at the junction of lines to Pillau, Tilsit and Kranz. It consists of three parts, which were formerly independent administrative units, the Altstadt (old town), to the west, Lobenicht to the east, and the island Kneiphof, together with numerous suburbs, all embraced in a circuit of 9! miles. The Pregel, spanned by many bridges, flows through the town in two branches, which .unite below the Griine Briicke. Its greatest breadth within the town is from 80 to 90 yards, and it is usually frozen from Novem- ber to March. Konigsberg does not retain many marks of antiquity. The Altstadt has long and. narrow streets, but the Kneiphof quarter is roomier. Of the seven market-places only that in the Altstadt retains something of its former appearance. Among the more interesting buildings are the Schloss, a long rectangle begun in 1253 and added to later, with a Gothic tower 277 ft. high and a chapel built in 1592, in which Frederick I. in 1701 and William I. in 1861 crowned themselves kings of Prussia; and the cathedral, begun in 1333 and restored in 1856, a Gothic building with a tower 164 ft. high, adjoining which is the tomb of Kant. The Schloss was originally the residence of the Grand Masters of the Teutonic order and later of the dukes of Prussia. Behind is the parade-ground, with the statues of Albert I. and of Frederick William III. by August Kiss, and the grounds also contain monuments to Frederick I. and William I. To the east is the Schlossteich, a long narrow ornamental lake covering 1 2 acres. The north-west side of the parade-ground is occupied by the new university buildings, completed in 1865; these and the new exchange on the south side of the Pregel are the finest architectural features of the town. The university (Collegium Albertinum) was founded in 1544 by Albert I., duke of Prussia, as a " purely Lutheran " place of learning. It is chiefly distinguished for its mathematical and philosophical studies, and possesses a famous observatory, established in 181 1 by Frederick William Bessel, a library of about 240,000 volumes, a zoological museum, a botanical garden, laboratories and valuable mathematical and other scientific collections.

Among its famous professors have been Kant (who was born here in 1724 and to whom a monument was erected in 1864), J. G. von Herder, Bessel, F. Neumann and J. F. Herbart. It is attended by about 1000 students and has a teaching staff of over 100. Among other educational establishments, Konigsberg numbers four classical schools (gymnasia) and three commercial schools, an academy of painting and a school of music. The hospitals and benevolent institutions are numerous. The town is less well equipped with museums and similar insti- tutions, the most noteworthy being the Prussia museum of antiquities, which is especially rich in East Prussian finds from the Stone age to the Viking period. Besides the cathedral the town has fourteen churches.

Konigsberg is a naval and military fortress of the first order. The fortifications were begun in 1843 and were only completed in 1905, although the place was surrounded by walls in early times. The works consist of an inner wall, brought into con- nexion with an outlying system of works, and of twelve detached forts, of which six are on the right and six on the left bank of the Pregel. Between them lie two great forts, that of Friedrichsburg on an island in the Pregel and that of the Kaserne Kronprinz on the east of the town, both within the environing ramparts. The protected position of its harbour has made Konigsberg one of the most important commercial cities of Germany. A new channel has recently been made between it and its port, Pillau, 29 miles distant, on the outer side of the Frische Haff, so as to admit vessels drawing 20 feet of water right up to the quays of

Konigsberg, and the result has been to stimulate the trade of the city. It is protected for a long distance by moles, in which a break has been left in the Fischhauser Wiek, to permit of freer circulation of the water and to prevent damage to the mainland.

The industries of Konigsberg have made great advances within recent years, notable among them are printing-works and manufactures of machinery, locomotives, carriages, chemicals, toys, sugar, cellulose, beer, tobacco and cigars, pianos and amber wares. The principal exports are cereals and flour, cattle, horses, hemp, flax, timber, sugar and oilcake. There are two pretty public parks, one in the Hufen, with a zoological garden attached, another the Luisenwahl which commemorates the sojourn of Queen Louisa of Prussia in the town in the disastrous year 1806.

The Altstadt of Konigsberg grew up around the castle built in 1255 by the

Teutonic Order, on the advice of Ottaker II. King of Bohemia, after whom the place was named. Its first site was near the fishing village of Steindamm, but after its destruction by the Prussians in 1263 it was rebuilt in its present position. It received civic privileges in 1286, the two other parts of the present town — Lobenicht and Kneiphof — receiving them a few years later. In 1340 Konigsberg entered the Hanseatic League. From 1457 it was the residence of the grand master of the Teutonic Order, and from 1525 till 1618 of the dukes of Prussia. The trade of Konigsberg was much hindered by the constant shifting and silting up of the channels leading to its harbour; and the great northern wars did it immense harm, but before the end of the 17th century it had almost recovered.

In 1724 the three independent parts were united into a single town by Frederick William I.

Konigsberg suffered severely during the war of liberation and was occupied by the French in 1807. In 1813 the town was the scene of the deliberations which led to the successful uprising of Prussia against Napoleon. During the 19th century the opening of a railway system in East Prussia and Russia gave a new impetus to its commerce, making it the principal outlet for the Russian staples — grain, seeds, flax and hemp. It has now regular steam communication with Memel, Stettin, Kiel, Amsterdam and Hull.

See Faber, Die Haupt- und Residenzstadt Konigsberg in Preussen (Konigsberg, 1840) ; Schubert, Zur 600-jdhrigen Jubelfeier Kbnigsbergs (Konigsberg. 1855); Beckherrn, Geschichte der Befestigungen Konigs- bergs (Konigsberg, 1890); H. G. Prutz, Die kbnigliche Alberlus- Universitdt zu Konigsberg im iq Jahrhundert (Konigsberg, 1894); Armstedt, Geschichte der kbniglichen Haupt- und Residenzstadt Konigsberg (Stuttgart, 1899) ;M.Schultze, Konigsbergund Ostpreussen zu Anfang 1813 (Berlin, 1901); and Gordak, Wegweiser dutch Konigsberg (Konigsberg, 1904).

KONIGSBORN, a spa of Germany, in the Prussian province of Westphalia, immediately to the N. of the town of Unna, of – which it practically forms a suburb. It has large saltworks, producing annually over 15,000 tons. The brine springs, in connexion with which there is a hydropathic establishment, have a temperature of 93° F., and are efficacious in skin diseases, rheumatism and scrofula.

See Wegelc, Bad Kbnigsborn und seine Heilmittel (Essen, 1902).

KONIGSHUTTE, a town of Germany, in the Prussian province of Silesia, situated in the middle of the Upper Silesian coal and iron district, 3 m. S. of Beuthen and 122 m. by rail S.E. of Breslau. Pop. (1852), 4495; (1875), 26,040; (1900), 57,919- In 1869 it was incorporated with

various neighbouring villages, and raised to the dignity of a town. It has two Protestant and three Roman Catholic churches and several schools and benevolent institutions. The largest iron-works in Silesia is situated at Konigshiitte, and includes puddling works, rolling- mills, and zinc-works. Founded in 1797, it was formerly in the hands of government, but is now carried on by a company. There are also manufactures of bricks and glass and a trade in wood and coal. Nearly one-half of the population of the town consists of Poles.

See Mohr, Geschichte der Stadt Konigshiitte (Konigshiitte, 1890).

KONIGSLUTTER, a town of Germany, in the duchy of Bruns- wick, on the Lutter 36 m. E. of Brunswick by the railway to Eisleben and Magdeburg. Pop. (1905), 3260. It possesses an Evangelical church, a castle and some interesting old houses. Its chief manufactures are sugar, machinery, paper and beer. Near the town are the ruins of a Benedictine abbey founded in 1 13 5. In its beautiful church, which has not been destroyed, are the tombs of the emperor Lothair II., his wife Richenza, and of his son-in-law, Duke Henry the Proud of Saxony and Bavaria.

KONIGSMARK, MARIA AURORA, Countess of (1662-1728), mistress of Augustus the Strong, elector of Saxony and king of Poland, belonged to a noble Swedish family, and was born on the 8th of May 1662. Having passed some years at Hamburg, where she attracted attention both by her beauty and her talents, Aurora went in 1694 to Dresden to make inquiries about her brother Philipp Christoph, count of Konigsmark, who had suddenly and mysteriously disappeared from Hanover. Here she was noticed by Augustus, who made her his mistress; and in October 1696 she gave birth to a son Maurice, afterwards the famous marshal de Saxe. The elector however quickly tired of Aurora, who then spent her time in efforts to secure the position of abbess of Quedlinburg, an office which carried with it the dignity of a princess of the Empire, and to recover the lost inheritance of her family in Sweden. She was made coadjutor abbess and lady-provost (Propstin) of Quedlinburg, but lived mainly in Berlin, Dresden and Hamburg. In 1702 she went on a diplomatic errand to Charles XII. of Sweden on behalf of Augustus, but her adventurous journey ended in failure. The countess, who was described by Voltaire as " the most famous woman of two centuries," died at Quedlinburg on the 16th of February 1728.

See F. Cramer, Denkwiirdigkeiten der Grdfin M. A. Konigsmark (Leipzig, 1836) ; and Biographische Nachrichten von der Grdfin M. A. Konigsmark (Quedlinburg, 1833); W. F. Palmblad, Aurora Konigs- mark und Hire Verwandte (Leipzig, 1848-1853); C. L. de Pollnitz, La Saxe galante (Amsterdam, 1734); and O. J. B. von Corvin- Wiersbitzki, Maria Aurora,

Grdfin von Konigsmark (Rudolstadt,

1902).

KONIGSMARK, PHILIPP CHRISTOPH, Count of (1665- 1694), was a member of a noble Swedish family, and is chiefly known as the lover of Sophia Dorothea, wife of the English king George I. then electoral prince of Hanover. Born on the 14th of March 1665, Konigsmark was a brother of the countess noticed above. After wandering and-fighting in various parts of Europe he entered the service of Ernest Augustus, elector of Hanover. Here he made the acquaintance of Sophia Dorothea, and assisted her in one or two futile attempts to escape from Hanover. Regarded, rightly or wrongly, as the lover of the princess, he was seized, and disappeared from history, probably by assas- sination, on the 1st of July 1694. One authority states that George. I. was accustomed to boast about this deed; but this statement is doubted, and the Hanoverian court resolutely opposed all efforts to clear up the mystery. It is not absolutely certain that Sophia Dorothea was guilty of a criminal intrigue with Konigsmark, as it is probable that the letters which purport to have passed between the pair are forgeries. The question of her guilt or innocence, however, has been and still remains a fruitful and popular subject for romance and speculation.

See Briefwechsel des Grafen Konigsmark und der Prinzessin Sophie Dorothea von Celle, edited by W. F. Palmblad (Leipzig, 184ˆ); A. Kocher, "Die Prinzessin von Ahlden," in the Historische Zeit- schrift (Munich, 1882); and W. H. Wilkins, The Love of an Uncrowned Queen (London, 1900).

KONIGSSEE, or Lake of St Bartholomew, a lake of Germany, in the kingdom of Bavaria, province of Upper Bavaria, about 25 m. S. from Berchtesgaden, 1850 ft. above sea-level. It has a length of s m., and a breadth varying from 500 yards to a little over a mile, and attains a maximum depth of 600 ft. The Konigssee is the most beautiful of all the lakes in the German Alps, pent in by limestone mountains rising to an altitude of 6500 ft., the flanks of which descend precipitously to the green I waters below. The lake abounds in trout, and the surrounding

country is rich in game. On a promontory by the side of the lake is a chapel to which pilgrimages are made on St Bar- tholomew's Day. Separated by a narrow strip of land from the Konigssee is the Obersee, a smaller lake.

KONIGSTEIN, a town of Germany, in the kingdom of Saxony, situated in a

deep valley on the left bank of the Elbe, at the influx of the Biela, in the centre of Saxon Switzerland, 25 m. S.E. of Dresden by the railway to Bodenbach and Testchen. It contains a Roman Catholic and a Protestant church, a monu- ment to the composer Julius Otto, and has some small manu- factures of machinery, celluloid, paper, vinegar and buttons. It is chiefly remarkable for the huge fortress, lying immediately to the north-west of the town, which crowns a sandstone rock rising abruptly from the Elbe to a height of 750 ft. Across the Elbe lies the Lilienstein, a similar formation, but unfortified. The fortress of Konigstein was probably a Slav stronghold as early as the 12th century, but it is not mentioned in chronicles before the year 1241, when it was a fief of Bohemia. In 1401 it passed to the margraves of Meissen and by the treaty of Eger in 1450 it was formally ceded by Bohemia to Saxony. About 1540 the works were strengthened, and the place was used as a point d'appui against inroads from Bohemia. Hence the phrase frequently employed by historians that Konigstein is " the key to Bohemia." As a fact, the main road from Dresden into that country lies across the hills several miles to the south- west, and the fortress has exercised little, if any, influence in strategic operations, either during the middle ages or in modern times. It was further strengthened under the electors Christian I., John George I. and Frederick Augustus II. of Saxony, the last of whom completed it in its present form. During the Prussian invasion of Saxony in 1756 it served as a place of refuge for the King of Poland, Augustus III., as it did also in 1849, during the Dresden insurrection of May in that year, to the King of Saxony, Frederick Augustus II. and his ministers. It was occupied by the Prussians in 1867, who retained posses- sion of it until the peace of 1871. It is garrisoned by detach- ments of several Saxon infantry regiments, and serves as a treasure house for the state and aiso as a place of detention for officers sentenced to fortress imprisonment. A remarkable feature of the place is a well, hewn out of the solid rock to a depth of 470 ft.

See Klemm, Der Konigstein in alter und neuer Zeit (Leipzig, 1905) ; and Gautsch, Aelteste Geschichte der sdchsischen Schweiz (Dresden,

1880).

KONIGSWINTER, a town and summer resort of Germany, in the Prussian Rhine province, on the right bank of the Rhine, 24 m. S.S.E. of Cologne by the railway to Frankfort-on-Main, atthefootof theSiebengebirge. Pop. (1905), 3944. Theromantic Drachenfels (1010 ft.), crowned by the ruins of a castle built early in the 12th century by the archbishop of Cologne, rises behind the town. From the summit, to which there is a funi- cular railway, there is a magnificent view, celebrated by Byron in Childe Harold's Pilgrimage. A cave in the hill is said to have sheltered the dragon which was slain by the hero Siegfried. The mountain is quarried, and from

1 267 onward supplied stone (trachyte) for the building of Cologne cathedral. The castle of Drachenburg, built in 1883, is on the north side of the hill. Konigswinter has a Roman Catholic and an Evangelical church, some small manufactures and a little shipping. It has a monu- ment to the poet, Wolfgang Miiller. Near the town are the rfiins of the abbey of Heisterbach.

KONINCK, LAURENT GUILLAUME DE (1809-1887), Belgian palaeontologist and chemist, was born at Louvain on the 3rd of May 1809. He studied medicine in the university of his native town, and in 1831 he became assistant in the chemical schools. He pursued the study of chemistry in Paris, Berlin and Giessen, and was subsequently engaged in teaching the science at Ghent and Liege. In 1856 he was appointed professor of chemistry in the Liege University, and he retained this post until the close of his life. About the year 1835 he began to devote his leisure to the investigation of the Carboniferous fossils around Liege, and ultimately he became distinguished for his researches on

the palaeontology of the Palaeozoic rocks, and especially for his descriptions of the mollusca, brachiopods, Crustacea and crinoids of the Carboniferous limestone of Belgium. In recognition of this work the Wollaston medal was awarded to him in 1875 by the Geological Society of London, and in 1876 he was appointed professor of palaeontology at Liege. He died at Liege on the 1 6th of July 1887.

Publications. — Elements de chimie inorganique (1839); Descrip- tion des animaux fossiles qui se trouvent dans le terrain Carbonifere de Belgique (1842-1844, supp. 1851); Recherch.es sur les animaux fossiles (1847, 1873). See Notice sur L. G. de Koninck, by E. Dupont; Annuaire de I'Acad. roy. de Belgique (1891), with portrait and bibliography.

KONINCK, PHILIP DE [de Coninck, de Koningh, van Koening] (1619-1688), Dutch landscape painter, was born in Amsterdam in 1619. Little is known of his history, except that he was a pupil of Rembrandt, whose influence is to be seen in all his work. He painted chiefly broad sunny landscapes, full of space, light and atmosphere. Portraits by him, somewhat in the manner of Rembrandt, also exist; there are examples of these in the galleries at Copenhagen and Christiania. Of his landscapes the principal are " Vue de I'embouchure d'une riviere," at the Hague; a slightly larger replica is in the National Gallery, London; " Lisiere d'un bois," and " Paysage " (with figures by A. Vandevelde) at Amsterdam; and landscapes in Brussels, Florence (Uffizi), Berlin and Cologne.

Several of his works have been falsely attributed to Rembrandt, and many more to his namesake and fellow- townsman 'Salomon de Koninck (1609-1656), who was also a disciple of Rembrandt; his paintings and etchings consist mainly of portraits and biblical scenes.

Both these painters are to be distinguished from David de Koninck (i636-? i687), who is also known as " Rammelaar." He was born in Antwerp. He studied there under Jan Fyt, and later settled in Rome, where he is stated to have died in 1687; this is, however, doubtful. His pictures are chiefly landscapes with animals, and still-life.

KONITZ, a town of Germany, in the province of West Prussia, at the junction of railways to Schneidemiihl and Gnesen, 68 m. S.W. of Danzig. Pop. (1905), 11,014. It is still surrounded by its old fortifications, has two Evangelical and two Roman Catholic churches, a new town-hall, handsome public offices, and a prison. It has iron-foundries, saw-mills, electrical works, and manufactures of bricks. Konitz was the first fortified post established in Prussia by Hermann Balk, who in 1230 had been commissioned as Landmeister, by the grand-master of the Teutonic order, to reduce the heathen Prussians. For a long time it continued to be a place of military importance.

See Uppenkamp, Geschichte der Stadt Konitz (Konitz, 1873).

KONKAN, or Concan, a maritime tract of Western India, situated within the limits of the Presidency of Bombay, and extending from the Portuguese

settlement of Goa on the S. to the territory of Daman, belonging to the same nation, on the N. On the E. it is bounded by the Western Ghats, and on the W. by the Indian Ocean. This tract comprises the three British districts of Thana, Ratnagiri and Kolaba, and the native states of Janjira and Sawantwari. It may be estimated at 300 m. in length, with an average breadth of about 40. From the mountains on its eastern frontier, which in one place attain a height of 4700 ft., the surface, marked by a succession of irregular hilly spurs from the Ghats, slopes to the westward, where the mean elevation of the coast is not more than 100 ft., above the level of the sea. Several mountain streams, but none of any magnitude, traverse the country in the same direction. One of the most striking characteristics of the climate is the vio- lence of the monsoon rains — the mean annual fall at Mahabalesh- war amounting to 239 in. The coast has a straight general outline, but is much broken into small bays and harbours. This, with the uninterrupted view along the shore, and the land and sea breezes, which force vessels steering along the coast to be always within sight of it, rendered this country from time immemorial the seat of piracy; and so formidable

had the pirates become in the 18th century, that all ships iuffered which did not receive a pass from their chiefs. The Great Mogul maintained a fleet for the express purpose of checking them, and they were frequently attacked by the Portuguese. British commerce was protected by occasional expeditions from Bombay; but the piratical system was not finally extinguished until 18 12. The southern Konkan has given its name to a dialect of Marathi, which is the vernacular of the Roman Catholics of Goa.

KONTAGORA, a province in the British protectorate of Northern Nigeria, on the east bank of the Niger to the north of Nupe and opposite Borgu. It is bounded W. by the Niger, S. by the province of Nupe, E. by that of Zaria, and N. by that of Sokoto. It has an area of 14,500 sq. m. and a population estimated at about 80,000. At the time of the British occupa- tion of Northern Nigeria the province formed a Fula emirate. Before the Fula domination, which was established in 1864, the ancient pagan kingdom of Yauri was the most important of the lesser kingdoms which occupied this territory. The Fula conquest was made from Nupe on the south and a tribe of independent and warlike pagans continued to hold the country between Kontagora and Sokoto on the north. The province was brought under British domination in 1901 as the result of a military expedition sent to prevent audacious slave- raiding in British protected territory and of threats directed against the British military station of Jebba on the Niger. The town

of Kontagora was taken in January of 1001. The emir Ibrahim fled, and was not captured till early in 1902. The province, after having been held for a time in military occupa- tion, was "organized for administration on the same system as the rest of the protectorate. In 1903 Ibrahim, after agreeing to take the oath of allegiance to the British crown and to accept the usual conditions of appointment, which include the abolition of the slave trade within the province, was reinstated as emir and the British garrison was withdrawn. Since then the de- velopment of the province has progressed favourably. Roads have been opened and Kontagora connected by telegraph with headquarters at Zungeru. British courts of justice have been established at the British headquarters, and native courts in every district. In 1904 an expedition reduced to submission the hitherto independent tribes in the northern belt, who had up to that time blocked the road to Sokoto. Their arms were confiscated and their country organized as a district of the province under a chief and a British assistant resident.

KOORINGA [Burra], a town of Burra county, South Australia on Burra Creek, 101 m. by rail N. by E. of Adelaide. Pop. (1901), 1994. It is the centre of a mining and agricultural district in which large areas are devoted to wheat-growing. The famous Burra Burra copper mine, discovered by a shepherd in 1844, is close to the town, while silver and lead ore is also found in the vicinity.

KOPENICK (Copenick), a town of Germany, in the Prussian province of Brandenburg, on an island in the Spree, 9 m. S.E. from Berlin by the railway to Fiirstenwalde. Pop. (1905), 27,721. It contains a royal residence, which was built on the site of a palace which belonged to the great elector, Frederick William. This is surrounded by gardens and contains a fine banqueting hall and a chapel. Other buildings are a Roman Catholic and a Protestant church and a teachers' seminary. The varied in- dustries embrace the manufacture of glass, linoleum, sealing-wax and ink. In the vicinity is Spindlersfeld, with important dye- works.

Kopenick, which dates from the 12th century, received municipal rights in 1225. Shortly afterwards, it became the bone of contention between Brandenburg and Meissen, but, at the issue of the feud, remained with the former, becoming a favourite residence of the electors of Brandenburg. In the palace the famous court martial was held in 1730, which con- demned the crown-prince of Prussia, afterwards Frederick the Great, to death. In 1906 the place derived ephemeral fame from the daring feat of a cobbler, one Wilhelm Voigt, who, attired as a captain in the army, accompanied by soldiers, whom

his apparent rank deceived, took the mayor prisoner, on a fictitious charge of having falsified accounts and absconded with a considerable sum of municipal money. The " captain of Kopenick " was arrested, tried, and sentenced to a term of imprisonment.

See Graf zu Dohna, Kurfilrstliche Schlosser in der Mark Branden- burg (Berlin, 1890).

KOPISCH, AUGUST (1799-1853), German poet, was born at Breslau on the 26th of May 1799. In 1815 he began the study of painting at the Prague academy, but an injury to his hand precluded the prospects of any great success in this profession, and he turned to literature. After a residence in Dresden Kopisch proceeded, in 1822, to Italy, where, at Naples, he formed an intimate friendship with the poet August, count of Platen Hallermund. He was an expert swimmer, a quality which enabled him in company with Ernst Fries to discover the blue grotto of Capri. In 1828 he settled at Berlin and was granted a pension by Frederick William IV., who in 1838 con- ferred upon him the title of professor. He died at Berlin on the 3rd of February 1853. Kopisch produced some very original poetry, light in language and in form. He especially treated legends and popular subjects, and among his Gedichte (Berlin, 1836) are some na'ive and humorous little pieces such as Die Historie von Noah, Die Heinzelmannchen, Das grime Tier and Der Scheiderjunge von Krippstedt, which became widely popular. He also published a translation of Dante's Divine Comedy (Berlin, 1840), and under the title Agrumi (Berlin, T838) a collection of translations of Italian folk songs.

Kopisch's collected works were published in 5 vols. (Berlin, 1856.)

KOPP, HERMANN FRANZ MORITZ (181 7-1892), German chemist, was born on the 30th of October 181 7 at Hanau, where his father, Johann Heinrich Kopp (1777-1858), a physician, was professor of chemistry, physics and natural history at the Lyceum.

After attending the gymnasium of his native town, he studied at Marburg and Heidelberg, and then, attracted by the fame of Liebig, went in 1839 to Giessen, where he became a privaldozent in 1 84 1, and professor of chemistry twelve years later. In 1864 he was called to Heidelberg in the same capacity, and he re- mained there till his death on the 20th of February 1892. Kopp devoted himself especially to physico-chemical inquiries, and in the history of chemical theory his name is associated with several of the most important correlations of the physical properties of substances with their chemical constitution. Much of his work was concerned with specific volumes, the conception of which he set forth in a paper published when he was only twenty-two years of age; and the

principles he established have formed the basis of subsequent investigations in that subject, although his results have in some cases undergone modification. Another question to which he gave much attention was the connexion of the boiling-point of compounds, organic ones in particular, with their composition. In addition to these and other laborious researches, Kopp was a prolific writer. In 1843-1847 he published a comprehensive History of Chemistry, in four volumes, to which three supplements were added in 1869-1875. The Development of Chemistry in Recent Times appeared in 1871-1874, and in 1886 he published a work in two volumes on Alchemy in Ancient and Modem Times. In addition he wrote (1863) on theoretical and physical chemistry for the Graham-Otto Lehrbuch der Chemie, and for many years assisted Liebig in editing the Annalen der Chemie and the Jahresbericht,

He must not be confused with Emil Kopp (1817-1875), who, born at Warselnheim, Alsace, became in 1847 professor of toxicology and chemistry at the Ecole superieure de Pharmacie at Strasburg, in T849 professor of physics and chemistry at Lausanne, in 1852 chemist to a Turkey-red factory near Man- chester, in 1868 professor of technology at Turin, and finally, in 1 87 1, professor of technical chemistry at the Polytechnic of Zurich, where he died in 1875.

KOPRULU, or Ktjprili (Bulgarian Valesa, Greek Velissa), a town of Macedonia, European Turkey, in the vilayet of Salonica,

situated 600 ft. above sea-level, on the river Vardar, and on the : Salonica-Mitrovitza railway, 25 m. S.E. of Uskub. Pop. (1905), about 22,000. Kopriilu. has a nourishing trade in silk; maize and mulberries are cultivated in the neighbourhood. The Greek and Bulgarian names of the town may be corrupt forms of the ancient Bylazora, described by Polybius as the chief city of Paeonia.

KORA, or Cora, an ancient town of Northern India, in the Fatehpur district of the United Provinces. Pop. (1901), 2806. As the capital of a Mahommedan province, it gave its name to part of the tract (with Allahabad) granted by Lord Clive to the titular Mogul emperor, Shah Alam, in 1765.

KORAN. The Koran (Kor'an) is the sacred Book of Islam, on which the religion of more than two hundred millions of Mahommedans is founded, being regarded by them as the immediate word of God. And since the use

of the Koran in public worship, in schools and otherwise, is much more extensive than, for example, the reading of the Bible in most Christian countries, it has been truly described as the most widely-read book in existence. This circumstance alone is sufficient to give it an urgent claim on our attention, whether it suit our taste and fall in with our religious and philosophical views or not. Besides, it is the work of Mahomet, and as such is fitted to afford a clue to the spiritual development of that most successful of all pro- phets and religious personalities. It must be owned that the first perusal leaves on a European an impression of chaotic confusion — not that the book is so very extensive, for it is not quite as large as the New Testament. This impression can in some degree be modified only by the application of a critical analysis with the assistance of Arabian tradition.

To the faith of the Moslems, as has been said, the Koran is the word of God, and such also is the claim which the book itself advances. For except in sur. i. — which is a prayer for men — and some few passages where Mahomet (vi. 104, 114; xxvii. 93; xlii.8) or the angels (xix. 65; xxxvii. 164 sqq.) speak in the first person without the intervention of the usual imperative " say " (sing, or pi.), the speaker throughout is God, either in the first person singular or more commonly the plural of majesty " we." The same mode of address is familiar to us from the prophets of 'he Old Testament; the human personality disappears, in the moment of inspiration, behind the God by whom it is filled. But all the greatest of the Hebrew prophets fall back speedily upon the unassuming human " I "; while in the Koran the divine " I " is the stereotyped form of address. Mahomet, however, really felt Mahomet's himself to be the instrument of God; this con- Wen' 0/ sciousness was no doubt brighter at his first appear- Reve a on. ance t nan jˆ afterwards became, but it never entirely forsook him. Nevertheless we cannot doubt his good- faith, not even in the cases in which the moral quality of his actions leaves most to be desired. In spite of all, the dominant fact remains, that to the end he was zealous for his God and for the salvation of his people, nay, of the whole of humanity, and that he never lost the unconquerable certainty of his divine mission.

The rationale of revelation is explained in the Koran itself as follows: In heaven is the original text (" the mother of the book," xliii. 3; "a concealed book," lv. 77; "a well-guarded tablet," Ixxxv. 22). By the process of " sending down " (tanzil), one piece after another was communicated to the Prophet. The mediator was an angel, who is called sometimes the " Spirit " (xxvi. 193), sometimes the " holy Spirit " (xvi. 104), and at a later time " Gabriel " (only in ii. 91, 92; lxvi. 4). This angel dictates the revelation to the Prophet, who repeats it after him, and after- wards proclaims it to the world (lxxxvii. 6, &c). It is plain that we have here a somewhat crude attempt of the Prophet to repre- sent to himself the more or less unconscious process by which his ideas arose and gradually took shape in

his mind. It is no wonder if in such confused imagery the details are not always self-consistent. When, for example, this heavenly archetype is said to be in the hands of " exalted scribes " (lxxx. 13 sqq.), this seems a transition to a quite different set of ideas, namely, the books of fate, or the record of all human actions — conceptions

which are actually found in the Koran. It is to be observed, at all events, that Mahomet's transcendental idea of God, as a Being exalted altogether above the world, excludes the thought of direct intercourse between the Prophet and God.

It is an explicit statemer 4 – of the Koran that the sacred book was revealed (" sent down ") by God, not all at once, but piece- meal and gradually (xxv. 34). This is evident Component from the actual composition of the book, and is Parts of the confirmed by Moslem tradition. That is to say, Koraa – Mahomet issued his revelations in fly-leaves of greater or less extent. A single piece of this kind was called either, like the entire collection, kor'an, i.e. " recitation," " reading," or, better still, is the equivalent of Aramaic geryana " lectionary "; or kitdb, " writing "; or sura, which is perhaps the late-Hebrew shura, and means literally " series." The last became, in the lifetime of Mahomet, the regular designation of the individual sections as distinguished from the whole collection; and accordingly it is the name given to the separate chapters of the existing Koran. These chapters are of very unequal length. Since many of the shorter ones are undoubtedly complete in themselves, it is natural to assume that the longer, which are sometimes very compre- hensive, have arisen from the amalgamation of various originally distinct revelations. This supposition is favoured by the numer- ous traditions which give us the circumstances under which this or that short piece, now incorporated in a larger section, was revealed; and also by the fact that the connexion of thought in the present suras often seems to be interrupted. And in reality many pieces of the long suras have to be severed out as originally independent; even in the short ones parts are often found which cannot have been there at first. At the same time we must beware of carrying this sifting operation too far, — as Noldeke now believes himself to have done in 'his earlier works, and as Sprenger also sometimes seems to do. That some suras were of considerable length from the first is seen, for example, from xii., which contains a short introduction, then the history of Joseph, and then a few concluding observations, and is therefore per- tectly homogeneous. In like manner, xx., which is mainly occupied with the history of Moses, forms a complete whole. The same is true of xviii., which at first sight seems to fall into several pieces; the history of the seven sleepers, the grotesque narrative about Moses, and that about Alexander " the Horned," are all connected together, and the same rhyme through the whole sura. Even in the separate narrations we may observe how readily

the Koran passes from one subject to another, how little care is taken to express all the transitions of thought, and how frequently clauses are omitted, which are almost indispens- able. We are not at liberty, therefore, in every case where the connexion in the Koran is obscure, to say that it is really broken, and set it down as the clumsy patchwork of a later hand. Even in the old Arabic poetry such abrupt transitions are of very frequent occurrence. It is not uncommon for the Koran, after a new subject has been entered on, to return gradually or sud- denly to the former theme, — a proof that there at least separa- tion is not to be thought of. In short, however imperfectly the Koran may have been redacted, in the majority of cases the present suras are identical with the originals.

How these revelations actually arose in Mahomet's mind is a question which it is almost as idle to discuss as it would be to analyse the workings of the mind of a poet. In his early career, sometimes perhaps in its later stages also, many revelations must have burst from him in uncontrollable excitement, so that he could not possibly regard them otherwise than as divine inspira- tions. We must bear in mind that he was no cold systematic thinker, but an Oriental visionary, brought up in crass supersti- tion, and without intellectual discipline; a man whose nervous temperament had been powerfully worked on by ascetic austeri- ties, and who was all the more irritated by the opposition he encountered, because he had little of the heroic in his nature. Filled with his religious ideas and visions, he might well fancy he heard the angel bidding him recite what was said to him. There may have been many a revelation of this kind which no one I ever heard but himself, as he repeated it to himself in the silence

of the night (lxxiii. 4). Indeed the Koran itself admits that he forgot some revelations (lxxxvii. 7). But by far the greatest part of the book is undoubtedly the result of deliberation, touched more or less with emotion, and animated by a certain rhetorical rather than poetical glow. Many passages are based upon purely intellectual reflection. It is said that Mahomet occasionally uttered such a passage immediately after one of those epileptic fits which not only his followers, but (for a time at least) he him- self also, regarded as tokens of intercourse with the higher powers. If that is the case, it is impossible to say whether the trick was in the utterance of the revelation or in the fit itself.

How the various pieces of the Koran took literary form is uncertain.

Mahomet himself, so far as we can discover, never wrote down anything. The question whether he could read and write has been much debated among Moslems, unfortunately more with dog- matic arguments and spurious traditions than authentic proofs. At present one is inclined to say that he was not altogether ignorant of these arts, but that from want of practice he found it convenient to employ some one else whenever he had anything to write. After the migration to Medina (a.d. 622) we are told that short pieces — chiefly legal decisions — were taken down immediately after they were revealed, by an adherent whom he summoned for the purpose; so that nothing stood in the way of their publication. Hence it is probable that in Mecca, where the art of writing was commoner than in Medina, he had already begun to have his oracles committed to writing. That even long portions of the Koran existed in written form from an early date may be pretty safely inferred from various indications; especially from the fact that in Mecca the Prophet had caused insertions to be made, and pieces to be erased in his previous revelations. For we cannot suppose that he knew the longer suras by heart so perfectly that he was able after a time to lay his finger upon any particular passage. In some instances, indeed, he may have relied too much on his memory. For example, he seems to have occasionally dictated the same sura to different persons in slightly different terms. In such cases, no doubt, he may have partly intended to introduce improvements; and so long as the differ- ence was merely in expression, without affecting the sense, it could occasion no perplexity to his followers. None of them had literary pedantry enough to question the consistency of the divine revelation on that ground. In particular instances, however, the difference of reading was too important to be overlooked. Thus the Koran itself confesses that the unbelievers cast it up as a reproach to the Prophet that God sometimes substituted one verse for another (xvi. 103). On one occasion, when a dispute arose between two of his own followers as to the true reading of a passage which both had received from the Prophet himself, Mahomet is said to have explained that the Koran was revealed in seven forms. In this apparently genuine dictum seven stands, of course, as in many other cases, for an indefinite but limited number. But one may imagine what a world of trouble it has cost the Moslem theologians to explain the saying in accordance with their dogmatic beliefs. A great number of explanations are current, some of which claim the authority of the Prophet himself; as, indeed, fictitious utterances of Mahomet play throughout a conspicuous part in the exegesis of the Koran. One very favourite, but utterly untenable interpretation is that the " seven forms," are seven different Arabic dialects.

When such discrepancies came to the cognizance of Mahomet it was doubtless his desire that only one of the conflicting texts should be considered authentic; only he never gave himself much trouble to have his

wish carried into effect. Although in theory he was an upholder of verbal inspiration, he did not push the doctrine to its extreme consequences; his practical good sense did not take these things so strictly as the theologians of later centuries. Sometimes, however, he did suppress whole sections or verses, enjoining his followers to efface or forget them, and declaring them to be " abrogated." A very remarkable case is that of the two verses in liii., when he had recognized three heathen goddesses as exalted beings, possessing influence with God. This had occurred

Abrogated Readings.

in a moment of weakness, in order that by such a promise, which yet left Allah in his lofty position, he might gain over his fellow- countrymen. This object he achieved, but soon his conscience smote him, and he declared these words to have been an inspira- tion of Satan.

So much for abrogated readings; the case is somewhat different when we come to the abrogation of laws and directions to the Moslems, which often occurs in the Koran. There is nothing in this at variance with Mahomet's idea ia ™^ a e of God. God is to him an absolute despot, who declares a thing right or wrong from no inherent necessity but by his arbitrary fiat. This God varies his commands at pleasure, prescribes one law for the Christians, another for the Jews, and a third for the Moslems; nay, he even changes his instructions to the Moslems when it pleases him. Thus, for example, the Koran contains very different directions, suited to varying circumstances, as to the treatment which idolaters are to receive at the hands of believers. But Mahomet showed no anxiety to have these superseded enactments destroyed. Believers could be in no uncertainty as to which of two contradictory passages remained in force; and they might still find edification in that which had become obsolete. That later generations might not so easily distinguish the " abrogated " from the " abrogating " did not occur to Mahomet, whose vision, naturally enough, seldom extended to the future of his religious community. Current events were invariably kept in view in the revelations. In Medina.it called forth the admiration of the Faithful to observe how often God gave them the answer to a question whose settle- ment was urgently required at the moment. The same naivete 1 appears in a remark of the Caliph Othman about a doubtful case: " If the Apostle of God were still alive, methinks there had been a Koran passage revealed on this point." Not unfrequently the divine word was found to coincide with the advice which Mahomet had received from his most intimate disciples. " Omar was many a time of a certain opinion," says one tradition, " and the Koran was then revealed accordingly."

The contents of the different parts of the Koran are extremely varied. Many passages consist of theological or moral reflec- tions. We are reminded of

the greatness, the contents goodness, the righteousness of God as manifested of the in Nature, in history, and in revelation through Koran. the prophets, especially through Mahomet. God is magnified as the One, the All-powerful. Idolatry and all deification of created beings, such as the worship of Christ as the Son of God, are unsparingly condemned. The joys of heaven and the pains of hell are depicted in vivid sensuous imagery, as is also the terror of the whole creation at the advent of the last day and the judgment of the world. Believers receive general moral instruction, as well as directions for special circumstances. The lukewarm are rebuked, the enemies threatened with terrible punishment, both temporal and eternal. To the 'sceptical the truth of Islam is held forth; and a certain, not very cogent, method of demonstration predominates. In many passages the sacred book falls into a diffuse preaching style, others seem more like proclamations or general orders. A great number contain ceremonial or civil laws, or even special commands to individuals down to such matters as the regulation of Mahomet's harem. In not a few definite questions are answered which had actually been propounded to the Prophet by believers or infidels. Mahomet himself, too, repeatedly receives direct injunctions, and does not escape an occasional rebuke. One sura (i.) is a prayer, two (cxiii. cxiv.) are magical formulas. Many suras treat of a single topic, others embrace several.

From the mass of material comprised in the Koran — and the account we have given is far from exhaustive — we should select

the histories of the ancient prophets and saints „

. . ■ 4. ,. Tn. 4- Narratives.

as possessing a peculiar interest. I he purpose of

Mahomet is to show from these histories how God in formei

times had rewarded the righteous and punished their enemies.

For the most part the old prophets only serve to introduce

a little variety in point of form, for they are almost in every

case facsimiles of Mahomet himself. They preach exactly like

him, they have to bring the very same charges against their opponents, who on their part behave exactly as the unbeliev- ing inhabitants of Mecca. The

Koran even goes so far as to make Noah contend against the worship of certain false gods, mentioned by name, who were worshipped by the Arabs of Mahomet's time. In an address which is put in the mouth of Abraham (xxvi. 7 5 sqq.) , the reader quite forgets that it is Abraham, and not Mahomet (or God himself) , who is speaking. Other narratives are intended rather for amusement, although they are always well seasoned with edifying phrases. It is no wonder that the godless Kor- rishites thought these stories of the Koran not nearly so enter- taining as those of Rostam and Ispandiar, related by Nadr the son of Harith, who had learned in the course of his trade journeys on the Euphrates the heroic mythology of the Persians. But the Prophet was so exasperated by this rivalry that when Nadr fell into his power after the battle of Badr, he caused him to be executed; although in all other cases he readily pardoned his fellow-countrymen.

These histories are chiefly about Scripture characters, espe- cially those of the Old Testament. But the deviations from the Relation to Biblical narratives are very marked. Many of the the old alterations are found in the legendary anecdotes and New f the Jewish Haggada and the New Testament Testaments. Apocrypha; but many more are due perhaps to misconceptions such as only a listener (not the reader of a book) could fall into. One would suppose that the most ignorant Jew could never have mistaken Haman, the minister of Ahasuerus, for the minister of Pharaoh, as happens in the Koran, or identified Miriam, the sister of Moses, with Mary (= Mariam), the mother of Christ. So long, however, as we have no closer acquaintance with Arab Judaism and Christianity, we must always reckon with the possibility that many of these mistakes were due to adherents of these religions who were his authorities, or were a naive reproduction of versions already widely accepted by his contemporaries. In addition to his misconceptions there are sundry capricious alterations, some of them very grotesque, due to Mahomet himself. For instance, in his ignorance of every- thing out of Arabia, he makes the fertility of Egypt — where rain is almost never seen and never missed — depend on rain instead of the inundations of the Nile (xii. 49).

It is uncertain whether his account of Alexander was borrowed from Jews or Christians, since the romance of Alexander be- longed to the stereotyped literature of that age. The description of Alexander as " the Horned " in the Koran is, however, in accordance with the result of recent researches, to be traced to a Syrian legend dating from a.d. 514-515 (Th. Noldeke, " Beitrage zur Gesch. des Alexanderromanes " in Denkschrijten Akad. Wien, vol. xxxviii. No. 5, p. 27, &c). According to this, God caused horns to grow on Alexander's head to enable him to overthrow all things. This detail of the legend is ultimately traceable, as Hottinger long ago supposed, to the numerous coins on which Alexander is represented with the ram's horns of

Ammon. 1 Besides Jewish and Christian histories there are a few about old Arabian prophets. In these he seems to have handled his materials even more freely than in the others.

The opinion has already been expressed that Mahomet did not make use of written sources. Coincidences and divergences alike can always be accounted for by oral communications from Jews who knew a little and Christians who knew next to nothing. Even in the rare passages where we can trace direct resemblances to the text of the Old Testament (cf. xxi. 105 with Ps. xxxvii. 29; i. 5 with Ps. xxvii. n) or the New (cf. vii. 48 with Luke xvi. 24; xlvi. 19 with Luke xvi. 25), there is nothing more than might readily have been picked up in conversation with any Jew or Christian. In Medina, where he had the opportunity of be- coming acquainted with Jews of some culture, he learned some things out of the Mishna, e.g. v. 35 corresponds almost word for

1 Reproductions of such Ptolemaic and Lysimachan coins are to be found in J. J. Bernouilli, Die erhaltenen Darstellungen Alexanders d. Gr. (Munich, 1905), Tab. VIII.; also in Theodor Schreiber, " Studien uber das Bildniss Alexanders des Gr." in the Abh. Sachs. Gesellschaft der Wissenschaften, Bd. xxi. (1903), Tab. XIII.

word with Mishna Sanhedrin iv. 5; compare also ii. 183 with Mishna Berak'hoth i. 2. That these are only cases of oral com- munication will be admitted by any one with the slightest know- ledge of the circumstances. Otherwise we might even conclude that Mahomet had studied the Talmud; e.g. the regulation as to ablution by rubbing with sand, where water cannot be obtained (iv. 46), corresponds to a talmudic ordinance {Berak'hoth 15 a). Of Christianity he can have been able to learn very little, even in Medina; as may be seen from the absurd travesty of the institu- tion of the Eucharist in v. 112 sqq. For the rest, it is highly improbable that before the Koran any real literary production — anything that could be strictly called a book — existed in the Arabic language.

In point of style and artistic effect, the different parts of the Koran are of very unequal value. An unprejudiced and critical reader will certainly find very few passages where his aesthetic susceptibilities are thoroughly satis- y

fied. But he will often be struck, especially in the older pieces, by a wild force of passion, and a vigorous, if not rich, imagination. Descriptions of heaven and hell, and allusions to God's working in Nature, not unfrequently show a certain amount of poetic power. In other places also the style is sometimes lively and impressive; though it is rarely indeed that we come across such strains of touching simplicity as in the middle of xciii. The greater part of the Koran is decidedly prosaic; much of it indeed is stiff

in style. Of course, with such a variety of material, we cannot expect every part to be equally vivacious, or imaginative, or poetic. A decree about the right of inheritance, or a point of ritual, must necessarily be expressed in prose, if it is to be intelligible. No one complains of the civil laws in Exodus or the sacrificial ritual in Leviticus, because they want the fire of Isaiah or the tenderness of Deuteronomy. But Mahomet's mistake consists in persistent and slavish adherence to the semi-poetic form which he had at first adopted in accordance with his own taste and that of his hearers. For instance, he employs rhyme in dealing with the most prosaic subjects, and thus produces the disagreeable effect of incongruity between style and matter. It has to be considered, however, that many of those sermonizing pieces which are so tedious to us, especially when we read two or three in succession (perhaps in a very inadequate translation), must have had a quite different effect when recited under the burning sky and on the barren soil of Mecca. There, thoughts about God's greatness and man's duty, which are familiar to us from childhood, were all new to the hearers — it is hearers we have to think of in the first instance, not readers — to whom, at the same time, every allusion had a meaning which often escapes our notice. When Mahomet spoke of the goodness of the Lord in creating the clouds, and bringing them across the cheerless desert, and pouring them out on the earth to restore its rich vegetation, that must have been a picture of thrilling interest to the Arabs, who are accustomed to see from three to five years elapse before a copious shower comes to clothe the wilder- ness once more with luxuriant pastures. It requires an effort for us, under our clouded skies, to realize in some degree the intensity of that impression.

The fact that scraps of poetical phraseology are specially numerous in the earlier suras, enables us to understand why the prosaic mercantile community of Mecca regarded Rhetorical their eccentric townsman as a "poet," or even a Form and " possessed poet." Mahomet himself had to Rby me – disclaim such titles, because he felt himself to be a divinely inspired prophet; but we too, from our standpoint, shall fully acquit him of poetic genius. Like many other predominantly religious characters, he had no appreciation of poetic beauty; and if we may believe one anecdote related of him, at a time when every one made verses, he affected ignorance of the most element- ary rules of prosody. Hence the style of the Koran is not poetical but rhetorical; and the powerful effect which some portions pro- duce on us is gained by rhetorical means. Accordingly the sacred book has not even the artistic form of poetry; which, among the Arabs, includes a stringent metre, as well as rhyme. The Koran is never metrical, and only a few exceptionally

eloquent portions fall into a sort of spontaneous rhythm. On the other hand, the rhyme is regularly maintained; although, especially in the later pieces, after a very slovenly fashion. Rhymed prose was a favourite form of composition among the Arabs of that day, and Mahomet adopted it; but if it imparts a certain sprightliness to some passages, it proves on the whole a burdensome yoke. The Moslems themselves have observed that the tyranny of the rhyme often makes itself apparent in derangement of the order of words, and in the choice of verbal forms which would not otherwise have been employed; e.g. an imperfect instead of a perfect. In one place, to save the rhyme, he calls Mount Sinai Sinin (xcv. 2) instead of Slna (xxiii. 20) ; in another Elijah is called Ilyasln (xxxvii. 130) instead of Ilyas (vi. 85; xxxvii. 123). The substance even is modified to suit exigencies of rhyme. Thus the Prophet would scarcely have fixed on the unusual number of eight angels round the throne of God (lxix. 17) if the word thamaniyah, " eight," had not happened to fall in so well with the rhyme. And when lv. speaks of two heavenly gardens, each with two fountains and two kinds of fruit, and again of two similar gardens, all this is simply because the dual termination (an) corresponds to the syllable that controls the rhyme in that whole sura. In the later pieces, Mahomet often inserts edifying remarks, entirely out of keeping with the context, merely to complete his rhyme. In Arabic it is such an easy thing to accumulate masses of words with the same termination, that the gross negligence of the rhyme in the Koran is doubly remarkable. One may say that this is another mark of the Prophet's want of mental training, and incapacity for introspective criticism.

On the whole, while many parts of the Koran undoubtedly have considerable rhetorical power, even over an unbelieving stylistic reader, the book, aesthetically considered, is by Weak- no means a first-rate performance. To begin with "esses. w hat we are most competent to criticize, let us look at some of the more extended narratives. It has already been noticed how vehement and abrupt they are where they ought to be characterized by epic repose. Indispensable links, both in expression and in the sequence of events, are often omitted, so that to understand these histories is sometimes far easier for us than for those who heard them first, because we know most of them from better sources. Along with this, there is a great deal of superfluous verbiage; and nowhere do we find a steady advance in the narration. Contrast in these respects the history of Joseph (xii.) and its glaring improprieties with the admirably conceived and admirably executed story in Genesis. Similar faults are found in the non-narrative portions of the Koran. The connexion of ideas is extremely loose, and even the syntax betrays great awkwardness. Anacolutha are of frequent occur- rence, and cannot be explained as conscious literary devices. Many sentences begin with a " when " or " on the day when" which seems to hover in the air, so that the commentators are driven to

supply a " think of this " or some such ellipsis. Again, there is no great literary skill evinced in the frequent and needless harping on the same words and phrases; in xviii., for example, " till that " (hattd idha) occurs no fewer than eight times. Mahomet, in short, is not in any sense a master of style. This opinion will be endorsed by any European who reads through the book with an impartial spirit and some knowledge of the language, without taking into account the tiresome effect of its endless iterations. But in the ears of every pious Moslem such a judgment will sound almost as shocking as downright atheism or polytheism. Among Dogma of ˆne Moslems, the Koran has always been looked on the Stylistic as the most perfect model of style and language. This Perfection feature of it is in their dogmatic the greatest of all ˚Koran. miracles, the incontestable proof of its divine origin. Such a view on the part of men who knew Arabic infinitely better than the most accomplished European Arabist will ever do, may well startle us. In fact, the Koran boldly challenged its opponents to produce ten suras, or even a single one, like those of the sacred book, and they never did so. That, to be sure, on calm reflection, is not so very surprising. Revela- tions of the kind which Mahomet uttered, no unbeliever could

produce without making himself a laughing-stock. However little real originality there is in Mahomet's doctrines, as against his own countrymen he was thoroughly original, even in the form of his oracles. To compose such revelations at will was beyond the power of the most expert literary artist; it would have required either a prophet or a shameless impostor. And if such a character appeared after Mahomet, still he could never be anything but an imitator, like the false prophets who arose about the time of his death and afterwards. That the adversaries should produce any sample whatsoever of poetry or rhetoric equal to the Koran is not at all what the Prophet demands. In that case he would have been put to shame, even in jthe eyes of many of his own followers, by the first poem that came to hand. Nevertheless, it is on a false interpretation of this challenge that the dogma of the incomparable excellence of the style and diction of the Koran is based. The rest has been accomplished by dogmatic prejudice, which is quite capable of working other miracles besides turning a defective literary production into an unrivalled masterpiece in the eyes of believers. This view once accepted, the next step was to find everywhere evidence of the perfection of the style and language. And if here and there, as one can scarcely doubt, there was among the old Moslems a lover of poetry who had his difficulties about this dogma, he had to beware of uttering an opinion which might have cost him his head. We know of at least one rationalistic theologian who de- fined the dogma in such a way that we can see he did not believe it (Shahrastam, p. 39). The truth is, it would have been a miracle indeed if the style of the Koran had been perfect. For although there was at that time a recognized poetical style, already

degenerating to mannerism, a developed prose style did not exist. All beginnings are difficult; and it can never be esteemed a serious charge against Mahomet that his book, the first prose work of a high order in the language, testifies to the awkwardness of the beginner. And further, we must always remember that entertainment and aesthetic effect were at most subsidiary objects. The great aim was persuasion and conver- sion; and, say what we will, that aim has been realized on the most imposing scale.

*Mahomet repeatedly calls attention to the fact that the Koran is not written, like other sacred books, in a strange language, but in Arabic, and therefore is intelligible to all. At that time, along with foreign ideas, many foreign words words had crept into the language; especially Aramaic terms for religious conceptions of Jewish or Christian origin. Some of these had already passed into general use, while others were confined to a more limited circle. Mahomet, who could not fully express his new ideas in the common language of his countrymen, but had frequently to find out new terms for himself, made free use of such Jewish and Christian words, as was done, though perhaps to a smaller extent, by certain thinkers and poets of that age who had more or less risen above the level of heathenism. In Mahomet's case this is the less wonderful because he was indebted to the instruction of Jews and Christians, whose Arabic — as the Koran pretty clearly intimates with regard to one of them — was very defective. On the other hand, it is yet more remarkable that several of such borrowed words in the Koran have a sense which they do not possess in the original language. It is not necessary that this phenomenon should in every case be due to the same cause. Just as the prophet often misunderstood traditional traits of the sacred history, he may, as an unlearned man, likewise have often employed foreign expressions wrongly. Other remarkable senses of words were possibly already acclimatized in the language of Arabian Jews or Christians. Thus, forqan means really " redemption," but Mahomet uses it for " revelation." The widespread opinion that this sense first asserted itself in reference to the Arab root v5 > * (faraqa), " sever," or " decide," is open to considerable doubt. There is, for instance, no difficulty in deriving the Arab meaning of " revelation " from the common Aramaic " salvation," and this transference must have taken place in a community for which salvation formed the central object of faith, i.e. either amongst those Jews who looked to the coming of a Messiah f*»*

more probably, among Christians, since Christianity is in a very peculiar sense the religion of salvation. Milla is properly " word " (= Aramaic melltha), but in the Koran " religion." It is actually used of the religion of

the Jews and Christians (once), of the heathen (5 times), but mostly (8 times) of the religion of Abraham, which Mahomet in the Medina period places on the same level with Islam. Although of the Aramaic dialects none employs the term Melltha in the sense of religion, it appears that the prophet found such a use. Illiyun, which Mahomet uses of a heavenly book (Sura 83; 18, 19), is clearly the Hebrew elyon, " high " or " exalted." It is, however, doubtful in what sense this word appeared to him, either as a name of God. as in the Old Testament it often occurs and regularly without the article, or actually as the epithet of a heavenly book, although this use cannot be substantiated from Jewish literature. .So again the word mathdni is, as Geiger has conjectured, the regular plural of the Aramaic mathnithd, which is the same as the Hebrew Mishnah, and denotes in Jewish usage a legal decision of some of the ancient Rabbins. But in the Koran Mahomet appears to have understood it in the sense of " saying " or " sentence " (cf. xxxix. 24). On the other hand, it is by no means certain that by " the Seven Mathani " (xv. 87) the seven verses of Sura i. are meant. Words of undoubtedly Christian origin are less frequent in the Koran. It is an interesting fact that of these a few have come over from the Abyssinian; such as hawariyun " apostles," mdida " table," mundfig " doubter, sceptic," ragun " cursed," mihrdb " temple "; the first three of these make their first appearance in suras of the Medina period. The word shaildn " Satan," which was likewise borrowed, at least in the first instance, from the Abyssinian, had probably been already introduced into the language. Sprenger has rightly observed that Mahomet makes a certain parade of these foreign terms, as of other peculiarly constructed expressions; in this he followed a favourite practice of contemporary poets. It is the tendency of the imperfectly educated to delight in out-of-the-way expres- sions, and on such minds they readily produce a remarkably solemn and mysterious impression. This was exactly the kind of effect that Mahomet desired, and to secure it he seems even to have invented a few odd vocables, as ghislin (Ixix. 36), sijjin (lxxxiii. 7, 8), tasnim (lxxxiii. 27), and salsabil (lxxvi. 18). But, of course, the necessity of enabling his hearers to understand ideas which they must have found sufficiently novel in them- selves, imposed tolerably narrow limits on such eccentricities.

The constituents of our present Koran belong partly to the Mecca period 1 (before a.d. 622), partly to the period commencing Date o/ffte Wltn the migration to Medina (from the autumn Several of 622 to 8th June 632). Mahomet's position in Parts. Medina was entirely different from that which he

had occupied in his native town. In the former he was from the first the leader of a powerful party, and gradually became the autocratic ruler of Arabia; in the latter he was only the despised preacher of a small congregation. This difference, as was to be expected, appears in the Koran.

The Medina pieces, whether entire suras or isolated passages interpolated in Meccan suras, are accordingly pretty broadly distinct, as to their contents, from those issued in Mecca. In the great majority of cases there can be no doubt whatever whether a piece first saw the light in Mecca or in Medina; and for the most part the internal evidence is borne out by Moslem tradition. And since the revelations given in Medina frequently take notice of events about which we have fairly accurate information, and whose dates are at least approximately known, we are often in a position to fix their date with at any rate considerable certainty; here again tradition renders valuable assistance. Even with regard to the Medina passages, however, a great deal remains uncertain, partly because the allusions to historical events and circumstances are generally rather obscure, partly because traditions about the occasion of the revelation of the various pieces are often fluctuating, and often rest on misunderstanding or arbitrary conjecture. An important criterion for judging the period during which individual

1 For the schemes of Noldeke and Grimm see Mahommedan Religion.

Meccan suras, interpolated in Medina revelations, arose {e.g. Silr. xvi. 124, vi. 162) is provided by the Ibrahim legend, the great importance of which, as throwing light on the evolution of Mahomet's doctrine in its relation to older revealed religions, has been convincingly set forth by Dr Snouck Hurgronje in his dissertation for the doctor's degree and in later essays. 2 Accord- ing to this, Ibrahim, after the controversy with the Jews, first of all became Mahomet's special forerunner in Medina, then the first Moslem, and finally the founder of the Ka'ba. But at all events it is far easier to arrange in some sort of chronological order the Medina suras than those composed in Mecca. There is, indeed, one tradition which professes to furnish a chronological list of all the suras. But not to mention that it occurs in several divergent forms, and that it takes no account of the fact that cj present suras are partly composed of pieces of different dates, it contains so many suspicious or undoubtedly false statements, that it is impossible to attach any great importance to it. Be- sides, it is a priori unlikely that a contemporary of Mahomet should have drawn up such a list; and if any one had made the attempt he would have found it almost impossible to obtain reliable information as to the order of the earlier Meccan suras. We have in this list no genuine tradition, but rather the lucubra- tions of an undoubtedly conscientious Moslem critic, who may have lived about a century after the Flight.*

Among the revelations put forth in Mecca there is a consider- able number of (for the most part) short suras, which strike every attentive reader as being the oldest. They are in an altogether different strain from many others, SB r aSm e

can be drawn from it. It is the same with other allusions in the Meccan suras to occurrences whose chronology can be partially ascertained. It is better, therefore, to rest satisfied with a merely relative determination of the order of even the three great clusters of Meccan revelations.

In the pieces of the first period the convulsive excitement of the Prophet often expresses itself with the utmost vehemence. oldest He is so carried away by his emotion that he cannot Meccan choose his words; they seem rather to burst from Suras. n ; m Many of these pieces remind us of the oracles of the old heathen soothsayers, whose style is known to us from imitations, although we have perhaps not a single genuine specimen. Like those other oracles, the suras of this period, which are never very long, are composed of short sentences with tolerably pure but rapidly changing rhymes. The oaths, too, with which many of them begin were largely used by the sooth- sayers. Some of these oaths are very uncouth and hard to understand, some of them perhaps were not meant to be under- stood, for indeed all sorts of strange things are met with in these chapters. Here and there Mahomet speaks of visions, and appears even to see angels before him in bodily form. There are some intensely vivid descriptions of the resurrection and the last day which must have exercised a demonic power over men who were quite unfamiliar with such pictures. Other pieces paint in glowing colours the joys of heaven and the pains of hell. How- ever, the suras of this period are not all so wild as these; and those which are conceived in a calmer mood appear to be the oldest. Yet, one must repeat, it is exceedingly difficult to make out any strict chronological sequence. For instance, it is by no means certain whether the beginning of xcvi. is really, what a widely circulated tradition calls it, the oldest part of the whole Koran. That tradition goes back to the Prophet's favourite wife Ayesha; but as she was not born at the time when the revelation is said to have been made, it can only contain at the best what Mahomet told her years afterwards, from his own not very clear recollec- tion, with or without fictitious additions, and this woman is little trustworthy. Moreover, there are other pieces mentioned by others as the oldest. In any case xcvi. i sqq. is certainly very early. According to the traditional view, which appears to be correct, it treats of a vision in which the Prophet receives an injunction to recite a revelation conveyed to him by the angel. It is interesting to observe that here already two things are brought forward as proofs of the omnipotence and care of God: one is the creation of man out of a seminal drop — an idea to which Mahomet often recurs; the other is the then recently introduced art of writing, which the Prophet instinctively seizes on as a means of propagating his doctrines. It was only after Mahomet

encountered obstinate resistance that the tone of the revelations became thoroughly passionate. In such cases he was not slow to utter terrible threats against those who ridiculed the preaching of the unity of God, of the resurrection, and of the judgment. His own uncle AbuLahab had rudely repelled him, and in a brief special sura (cxi.) he and his wife are consigned to hell. The suras of this period form almost exclusively the concluding portions of the present text. One is disposed to assume, how- ever, that they were at one time more numerous, and that many of them were lost at an early period.

Since Mahomet's strength lay in his enthusiastic and fiery imagination rather than in the wealth of ideas and clearness of abstract thought on which exact reasoning depends, it follows that the older suras, in which the former qualities have free scope, must be more attractive to us than the later. In the suras of the second period the imaginative glow perceptibly diminishes; there is still fire and animation, but the tone becomes gradually more prosaic. As the feverish restlessness subsides, the periods are drawn out, and the revelations as a whole become longer. The truth of the new doctrine is proved by accumulated instances of God's working in nature and in history; the objec- tions of opponents, whether advanced in good faith or in jest, are controverted by arguments; but the demonstration is often confused or even weak. The histories of the earlier prophets, which had occasionally been briefly touched on in the first period,

are now related, sometimes at great length. On the whole, the charm of the style is passing away.

There is one piece of the Koran, belonging to the beginning of this period, if not to the close of the former, which claims par- ticular notice. This is Sura i., the Lord's Prayer of _. _… .it.ii • i r ■ . r. ■> The Fatlha.

the Moslems, a vigorous hymn of praise to God,

the Lord of both worlds, which ends in a petition for aid and true guidance (kudo). The words of this sura, which is known as al-fdtiha (" the opening one "), are as follows: —

(i) In the name of God, the compassionate compassioner. (2) Praise be [literally " is "] to God, the Lord of the worlds, (3) the compassionate compassioner, (4) the Sovereign of the day of judgment. (5) Thee do we worship and of Thee do we beg assist- ance. (6) Direct us in the right way; (7) in the way of those to whom Thou hast been gracious, on whom there is no wrath, and who go not astray.

The thoughts are so simple as to need no explanation; and yet the prayer is

full of meaning. It is true that there is not a single original idea of Mahomet's in it. Of the seven verses of the sura no less than five (verses 1, 2, 3, 4, 6) have an extremely suspicious relationship with the stereotyped formulae of Jewish and Chris- tian liturgies. Verse 6 agrees, word for word, with Ps. xxvii. 11. On the other hand, the question must remain open whether Mahomet only gave free renderings of the several borrowed formulae, or whether in actually composing them he kept existing models. The designation of God as the " Compas- sioner," Rahman, is simply the Jewish Rahmdnd, which was a favourite name for God in the Talmudic period. The word had long before Mahomet's time been used for God in southern Arabia (cf. e.g. the Sabaean Inscriptions, Glaser, 554, line 32; 618, line 2).

Mahomet seems for a while to have entertained the thought of adopting al-Rahmd7i as a proper name of God, in place of Allah, which was already used by the heathens. 1 This purpose he ultimately relinquished, but it is just in the suras of the second period that the use of Rahman is specially frequent. If, for this reason, it is to a certain extent certain that Sura i. belongs to this period, yet we can neither prove that it belongs to the beginning of the Mecca period nor that the present introductory formula " In the name of God," &c.,' belonged to it from the first. It may therefore even be doubted whether Mahomet at the outset looked upon the latter as revealed. Tradition, of course, knows in this connexion no doubt, and looks upon the Fatiha precisely as the most exalted portion of the Koran. Every Moslem who says his five prayers regularly — as the most of them do — repeats it not less than twenty times a day.

The suras of the third Meccan period, which form a fairly large part of our present Koran, are almost entirely prosaic. Some of the revelations are of considerable extent, and the Latest single verses also are much longer than in the older Meccan suras. Only now and then a gleam of poetic power Suras. flashes out. A sermonizing tone predominates. The suras are very edifying for one who is already reconciled to their import, but to us at least they do not seem very well fitted to carry con- viction to the minds of unbelievers. That impression, however, is not correct, for in reality the demonstrations of these longer Meccan suras appear to have been peculiarly influential for the propagation of Islam. Mahomet's mission was not to Euro- peans, but to a people who, though quick-witted and receptive, were not accustomed to logical thinking, while they had out- grown their ancient religion.

When we reach the Medina period it becomes, as has been indicated, much easier to understand the revelations in their historical relations, since our knowledge of the history of

1 Since in Arabic also the root ja^} signifies " to have pity," the Arabs must have at once perceived the force of the new name. While the foreign word Rahman is, in accordance with its origin, everywhere in the Koran to be understood as " Merciful," there is some doubt as to Ralfim. The close connexion of the two expres- sions, it is true, makes it probable that Mahomet only added the adjective Rahim to the substantive Rahman in order to strengthen the conception. But the genuine Arab meaning of Raklm is " gracious," and thus, the old Mahommedan Arab papyri render this word by 4 > Chb.v8pmros.

Mahomet in Medina is tolerably complete. In many cases the historical occasion is perfectly clear, in others we can at least Medinaa recognize the general 'situation from which they Suras. arose, and thus approximately fix their time. There still remains, however, a remnant, of which we can only say that it belongs to Medina.

The style of this period bears a fairly close resemblance to that of the latest Meccan period. It is for the most part pure prose, enriched by occasional rhetorical embellishments. Yet even here there are many bright and impressive passages, especially in those sections which may be regarded as proclama- tions to the army of the faithful. For the Moslems Mahomet has many different messages. At one time it is a summons to do battle for the faith; at another, a series of reflections on recently experienced success or misfortune, or a rebuke for their weak faith; or an exhortation to virtue, and so on. He often addresses himself to the " doubters," some of whom vacillate between faith and unbelief, others make a pretence of faith, while others scarcely take the trouble even to do that. They are no con- solidated party, but to Mahomet they are all equally vexatious, because, as soon as danger has to be encountered, or a contribu- tion is levied, they all alike fall away. There are frequent out- bursts, ever increasing in bitterness, against the Jews, who were very numerous in Medina and its neighbourhood when Mahomet arrived. He has much less to say against the Christians, with whom he never came closely in contact; and as for the idolaters, there was little occasion in Medina to have many words with them. A part of the Medina pieces consists of formal laws belonging to the ceremonial, civil and criminal codes; or direc- tions about certain temporary complications. The most objec- tionable parts of the whole Koran are those which treat of Mahomet's relations with women. The laws and regulations were generally very concise revelations, but most of them have been amalgamated with other pieces of similar or dissimilar import, and are now found in very long suras.

Such is an imperfect sketch of the composition and the internal history of the Koran, but it is probably sufficient to show that the book is a very heterogeneous collection. If only those passages had been preserved which had a permanent value for the theology, the ethics, or the jurisprudence of the Moslems, a few fragments would have been amply sufficient. Fortunately for knowledge, respect for the sacredness of the letter has led to the collection of all the revelations that could possibly be collected — the " abrogating " along with the " abrogated," passages referring to passing circumstances as well as those of lasting importance. Every one who takes up the book in the proper religious frame of mind, like most of the Moslems, reads pieces directed against long-obsolete absurd customs of Mecca just as devoutly as the weightiest moral precepts — perhaps even more devoutly, because he does not understand them so well.

At the head of twenty-nine of the suras stand certain initial

letters, from which no clear sense can be obtained. Thus, before

ii. iii. xxxi. xxxii. we find jj\ (Alif Lam Mlm), before

Mysterious x i_ x i v ; ^. (//a Mint). Noldeke at one time suggested*

that these initials did not belong to Mahomet's text, but might be the monograms of possessors of codices, which, through negligence on the part of the editors, were incorporated in the final form of the Koran; he now deems it more probable that they are to be traced to the Prophet himself, as Sprenger, Loth and others suppose. One cannot indeed admit the truth of Loth's statement that in the proper opening words of these suras we may generally find an allusion to the accompanying initials; but it can scarcely be accidental that the first verse of the great majority of them (in iii. it is the second verse) contains the word " book," " revelation," or some equivalent. They usually begin with: " This is the book," or " Revelation (' down sending ') of the book," or something similar. Of suras which commence in this way only a few (xviii. xxiv. xxv. xxxix.) want the initials, while only xxix. and xxx. have the initials and begin differently. These few exceptions may easily have pro- ceeded from ancient corruptions; at all events they cannot neutralize the evidence of the greater number. Mahomet seems to have meant these letters for a mystic reference to the archetypal text in heaven. To a man who regarded the art of writing, of which at the best he had but a slight knowledge, as something supernatural, and who lived amongst illiterate people, an A B C may well have seemed more

significant than to us who have been initiated into the mysteries of this art from our childhood. The Prophet himself can hardly have attached any

particular meaning to these symbols: they served their purpose if they conveyed an impression of solemnity and enigmatical obscurity. In fact, the Koran admits that it contains many things which neither can be, nor were intended to be, under- stood (iii. 5). To regard these letters as ciphers is a precarious hypothesis, for the simple reason that cryptography is not to be looked for in the very infancy of Arabic writing. If they are actually ciphers, the multiplicity of possible explanations at once precludes the hope of a plausible interpretation. None of the efforts in this direction, whether by Moslem scholars or by Europeans, has led to convincing results. This remark applies even to the ingenious conjecture of Sprenger, that the letters yjaji^^s (KafHe YeAin^ai) before xix. (which treats of John and Jesus, and, according to tradi- tion, was sent to the Christian king of Abyssinia) stand for Jesus Nazarenus Rex Judaeorum. Sprenger arrives at this explanation by a very artificial method ; and besides, Mahomet was not so simple as the Moslem traditionalists, who imagined that the Abyssinians could read a piece of the Arabic Koran. It need hardly be said that the Moslems have from of old applied themselves with great assiduity to the decipherment of these initials, and have sometimes found the deepest mysteries in them. Generally, however, they are content with the prudent conclusion that God alone knows the meaning of these letters.

It is probable (see above) that Mahomet had already caused revelations to be written down at Mecca, and that this began from the moment when he felt certain that he was the trans- mitter of the actual text of a heavenly book to mankind. It is even true that he may at some time or another have formed the intention of collecting these revelations. The idea of a heavenly model would in itself have suggested such a course and, only in an inferior degree to this, the necessity of setting a new and uncorrupted document of the divine will over against the sacred scriptures of the Jews and Christians, the people of the Book, as the Koran calls them. In any case, when Mahomet died, the separate pieces of the Koran, notwithstanding their theoretical sacredness, existed only in scattered copies; they Trans- were consequently in great danger of being partially mission of or entirely destroyed. Many Moslems knew large tbeKoraa – portions by heart, but certainly no one knew the whole; and a merely oral propagation would have left the door open to all kinds of deliberate and inadvertent alterations. But now, after the death of the Prophet, most of the Arabs revolted against his successor, and had to be reduced to submission by force. Especially sanguinary was the struggle against the pro- phet Maslama (Mubarrad, fcamil 443, 5), commonly known by the derisive diminutive Mosailima. At that time (a.d. 633) many of the most devoted Moslems fell, the very men who knew most Koran pieces by heart. Omar then began to fear that the Koran might be entirely forgotten, and he induced the Caliph Abu Bekr to undertake the collection of all its parts. The Caliph laid the

duty on Zaid ibn Thabit, a native of Medina,

then about twenty-two years of age, who had often

i j • 4. A. t> v. I • u ■ Zald's First

acted as amanuensis to the Prophet, in whose service Koraam

he is even said to have learned the Jewish letters. The account of this collection of the Koran has reached us in several substantially identical forms, and goes back to Zaid him- self. According to it, he collected the revelations from copies written on flat stones, pieces of leather, ribs of palm-leaves (not palm-leaves themselves), and such-like material, but chiefly " from the breasts of men," i.e. from their memory. From these he wrote a fair copy, which he gave to Abu Bekr, from whom it came to his successor Omar, who again bequeathed it to his daughter Hafsa, one of the widows of the Prophet. This redac- tion, commonly called al-sohof (" the leaves "), had from the first no canonical authority; and its internal arrangement can only be conjectured.

The Moslems were as far as ever from possessing a uniform text of the Koran. The bravest of their warriors sometimes knew deplorably little about it; distinction on that field they cheerfully accorded to pious men like Ibn Mas'ud. It was inevitable, how- ever, that discrepancies should emerge between the texts of pro- fessed scholars, and as these men in their several localities were authorities on the reading of the Koran, quarrels began to break out between the levies from different districts about the true form

Othmaa's Koran.

of the sacred book. During a campaign in a.h. 30 (a.d. 650-651), Hodhaifa, the victor in the great and decisive battle of Nehaveand (see Caliphate; and Persia: History) perceived that such disputes might become dangerous, and therefore urged on the caliph Othman the necessity for a universally- binding text. The matter was entrusted to Zaid, who had made the former collection, with three lead- ing Koreishites. These brought together as many copies as they could lay their hands on, and prepared an edition which was to be canonical for all Moslems. To prevent any further disputes, they burned all the other codices except that of Haf sa, which, however, was soon afterwards destroyed by Merwan the governor of Medina. The destruction of the earlier codices was an irreparable loss to criticism; but, for the essentially political object of putting an end to

controversies by admitting only one form of the common book of religion and of law, this measure was necessary.

The result of these labours is in our hands; as to how they were conducted we have no trustworthy information, tradition being here too much under the influence of dogmatic presuppositions. The critical methods of a modern scientific commission will not be expected of an age when the highest literary education for an Arab consisted in ability to read and write. It now appears highly probable that this second redaction took this simple form : Zaid read off from the codex which he had previously written, and his associates, simultaneously or successively, wrote one copy each to his dictation. These three manuscripts will therefore be those which the caliph, according to trustworthy tradition, sent in the first instance as standard copies to Damascus, Basra and Kufa to the warriors of the provinces of which these were the capitals, while he retained one at Medina. Be that as it may, it is impossible now to distinguish in the present form of the book what belongs to the first redaction from what is due to the second. In the arrangement, of the separate sections, a classification according to contents was impracticable because of the variety of subjects often dealt with in one sura. A chronological arrange- ment was out of the question, because the chronology of the older pieces must have been imperfectly known, and because in some cases passages of different dates had been joined together. Indeed, systematic principles of this kind were altogether dis- regarded at that period. The pieces were accordingly arranged in indiscriminate order, the only rule observed being to place the long suras first and the shorter towards the end, and even that was far from strictly adhered to. The two magic formulae, suras cxiii., cxiv. owe their position at the end of the collection to their peculiar contents, which differ from all the other suras; they are protecting spells for the faithful. Similarly it is by reason of its contents that sura i. stands at the beginning: not only because it is in praise of Allah, as Psalm i. is in praise of the righteous man, but because it gives classical expression to im- portant articles of the faith. These are the only special traces of design. The combination of pieces of different origin may pro- ceed partly from the possessors of the codices from which Zaid compiled his first complete copy, partly from Zaid himself. The individual suras are separated simply by the superscription: " In the name of God, the compassionate Compassioner," which is wanting only in the ninth. The additional headings found in our texts (the name of the suras, the number of verses, &c.) were not in the original codices, and form no integral part of the Koran.

It is said that Othman directed Zaid and his associates, in cases of disagreement, to follow the Koreish dialect; but, though well attested , this account can scarcely be correct. The extremely primitive writing of those days was quite incapable of rendering such minute differences as can have

existed between the pro- nunciation of Mecca and that of Medina.

Othman's Koran was not complete. Some passages are evidently fragmentary; and a few detached pieces are still extant The Koran which were originally parts of the Koran, although not com- they have been omitted by Zaid. Amongst these are piete. some which there is no reason to suppose Mahomet

desired to suppress. Zaid may easily have overlooked a few stray

fragments, but that he purposely omitted anything which he believed to belong to the Koran is very unlikely. It has been con- jectured that in deference to his superiors he kept out of the book the names of Mahomet's enemies, if they or their families came afterwards to be respected. But it must be remembered that it was never Mahomet's practice to refer explicitly to contemporary persons and affairs in the Koran. Only a single friend, his adopted son Zaid (xxxiii. 37), and a single enemy, his uncle Abu Lahab (cxi.) — and these for very special reasons — are mentioned by name; and the name of the latter has been left in the Koran with a fearful curse annexed to it, although his son had embraced Islam before the death of Mahomet, and his descendants be- longed to the noblest families. So, on the other hand, there is no single verse or clause which can be plausibly made out to be an interpolation by Zaid at the instance of Abu Bekr, Omar, or Othman. Slight clerical errors there may have been, but the Koran of Othman contains none but genuine elements — though sometimes in very strange order. All efforts of European scholars to prove the existence of later interpolations in the Koran have failed.

Of the four exemplars of Othman's Koran, one was kept in Medina, and one was sent to each of the three metropolitan cities, Kufa, Basra, and Damascus. It can still be pretty clearly shown in detail that these four codices deviated from one another in points of orthography, in the insertion oromissionof aw (" and") and such-like minutiae; but these variations nowhere affect the sense. All'later manuscripts are derived from these four originals. At the same time, the other forms of the Koran did not at once become extinct. In particular we have some information about the codex of Ubay ibn Ka'b. If the list which gives the order of its suras is correct, it must have Editions. contained substantially the same materials as our text; in that case Ubay ibn Ka'b must have used the original collection of Zaid. The same is true of the codex of Ibn Mas'iid, of which we have also a catalogue. It appears that the principle of putting the longer suras before the shorter was more con- sistently carried out by him than by Zaid. He omits i. and the magical formulae of cxiii., cxiv. Ubay, on the other hand, had embodied two additional short prayers, which we may regard as Mahomet's. One can easily understand that differences of opinion may

have existed as to whether and how far formularies of this kind belonged to the Koran. Some of the divergent readings of both these texts have been preserved as well as a considerable number of other ancient variants. Most of them are decidedly inferior to the received readings, but some are quite as good, and a few deserve preference.

The only man who appears to have seriously opposed the general introduction of Othman's text is Ibn Mas'iid. He was one of the oldest disciples of the Prophet, and had often rendered him personal service; but he was a man of contracted views, although he is one of the pillars of Moslem Mas'Sd. theology. His opposition had no effect. Now when we consider that at that time there were many Moslems who had heard the Koran from the mouth of the Prophet, that other measures of the imbecile Othman met with the most vehement resistance on the part of the bigoted champions of the faith, that these were still further incited against him by some of his ambitious old comrades until at last they murdered him, and finally that in the civil wars after his death the several parties were glad of any pretext for branding their opponents as infidels; — when we consider all this, we must regard it as a strong testimony in favour of Othman's Koran that no party found fault with his conduct in this matter, or repudiated the text formed by Zaid, who was one of the most devoted adherents of Othman and his family, and that even among theShiites criticism of the caliph's action is only met with as a rare exception.

But this redaction is not the close of the textual history Oi the Koran. The ancient Arabic alphabet was very imperfect; it not only wanted marks for the short and in part even for the long vowels, but it often expressed several consonants by the same sign, e.g. one and the same character could mean B, T, Th at the begin- ning and N and J (I) in the middle of words. Hence there were

Manu- scripts.

many words which could be read in very different ways. This variety of possible readings was at first very great, and many readers seem to have actually made it their object to hf. V~ discover pronunciations which were new, provided they

the < Tet were at a " appropriate to the ambiguous text. There was also a dialectic licence in grammatical forms, which had not as yet been greatly restricted. An effort was made by many to establish a more refined

pronunciation for the Koran than was usual in common life or in secular literature. The various schools of " readers " differed very widely from one another; although for the most part there was no important divergence as to the sense of words. A few of them gradually rose to special authority, and the rest disappeared. Seven readers are generally reckoned chief authorities, but for practical purposes this number was continually reduced in process of time; so that at present only two " reading- styles " are in actual use, — the common style of Hafs, and that of Nafi' ; which prevails in Africa to the west of Egypt. There is, however, a very comprehensive massoretic literature in which a number of other styles are indicated. The invention of vowel-signs of diacritic points to distinguish similarly formed consonants, and of other orthographic signs, soon put a stop to arbitrary conjectures on the part of the readers. Many zealots objected to the introduc- tion of these innovations in the sacred text, but theological consis- tency had to yield to practical necessity. In accurate codices, indeed, all such additions, as well as the titles of the sura, &c, are written in coloured ink, while the black characters profess to repre- sent exactly the original of Othman. But there is probably no copy quite faithful in this respect. Moreover, the right recitation of the Koran is an art which even people of Arab tongue can only learn with great difficulty. In addition to the nuances of pronunciation already alluded to, there is a semi-musical modulation. In these matters also the various schools differ.

In European libraries, besides innumerable modern manuscripts of the Koran, there are also codices, or fragments, of high antiquity, some of them probably dating from the 1st century of the Flight. For the restoration of the text, however, the works of ancient scholars on its readings and modes of writing are more important than the manuscripts; which, however elegantly they may be written and ornamented, proceed from irre- sponsible copyists. The original, written by Othman himself, has indeed been exhibited in various parts of the Mahommedan world. The library of the India Office contains one such manuscript, bearing the subscription: " Written by 'Othman the son of "Affan." These, of course, are barefaced forgeries, although of very ancient date; so are those which profess to be from the hand of "All, one of wfiich is preserved in the same library. In recent times the Koran has been often printed and lithographed, both in the East and the West. In Mahommedan countries lithography alone is employed. Shortly after Mahomet's death certain individuals applied them- selves to the exposition of the Koran. Much of it was obscure from the beginning, other sections were unintelligible apart from a knowledge of the circumstances of their origin. Unfortunately, those who took possession of this field were not very honourable. Ibn 'Abbas, a cousin of Mahomet, and the chief source of the traditional exegesis of the Koran, has, on theolo- gical and other grounds, given currency to a number of falsehoods; and at

least some of his pupils have emulated his example. These earliest expositions dealt more with the sense and connexion of whole verses than with the separate words. Afterwards, as the knowledge of the old language declined, and the study of philology arose, more attention began to be paid to the explanation of vocables. A good many fragments of this older theological and philological exegesis have survived from the first two centuries of the Flight, although we have no complete commentary of this period. The great com- mentary of Tabari, a.d. 839-923, of which for the last few years we have possessed an Oriental edition in 30 parts (Cairo a.h. 1321 = a.d. 1903), is very full when it comes to speak of canonical law, as well as in its accounts of the occasions of the several revelations; for, as in his great historical work, he faithfully records a large number of traditions with the channels by which they have come down to us (genealogical trees, isnad). In other respects the hopes based upon this commentary have not been fulfilled.

Another very famous commentary is that of Zamakhsharl (a.d. 1 075-1 144), edited by Nassau-Lees, Calcutta, 1859 ; but this scholar, with his great insight and still greater subtlety, is too apt to read his own scholastic ideas into the Koran. The favourite commentary of Baidawl (d. A.D. 1286), edited by Fleischer (Leipzig, 1846-1848), is little more than an abridgment of Zamakhshari's. Thousands of commentaries on the Koran, some of them of prodigious size, have been written by Moslems; and even the number of those still extant in manuscript is by no means small. Although these works all con- tain much that is useless or false, yet they are invaluable aids to our understanding of the sacred book. An unbiased European can, no doubt, see many things at a glance more clearly than a good Moslem who is under the influence of religious prejudice; but we should still be helpless without the exegetical literature of the Mahommedans. Even the Arabian Moslems would only understand the Koran very dimly and imperfectly if they did not give special attention to the study of its interpretation. The advantage of being in a language commonly understood, which the holy book claims for

Commen- tators.

itself, has vanished in the course of thirteen centuries. According to the dominant view, however, the ritual use of the Koran is not in the least concerned with the sacred words being understood, but solely with their being quite properly recited. Nevertheless, a great deal remains to be accomplished by European scholarship for the correct interpretation of the Koran. We want, for example, an exhaustive classification and discussion of all the Jewish elements in the Koran ; a praiseworthy beginning was made in Geiger's youth- ful essay Was hat Mohamed aus dem Judenthum aufgenommen ? (Bonn, 1833; the " second revised edition," Leipzig, 1902,

is only a reprint). We want especially a thorough commentary, executed with the methods and resources of modern science. No European language, it would seem, can even boast of a Traas- translation which completely satisfies modern require- tetions. ments. The best are in English; where we have the extremely paraphrastic, but for its time admirable translation of George Sale (repeatedly printed), that of Rod well (1861), which seeks to give the pieces in chronological order, and that of Palmer (1880), who wisely follows the traditional arrangements. The introduction which accompanies Palmer's translation is not in all respects abreast of the most recent scholarship. Considerable extracts from the Koran are well translated in E. W. Lane's Selections from the Kur-an. Not much can be said in praise of the com- plete translations into the German language, neither of that of Ullmann, which has appeared in several editions, nor of that of Henning (Leipzig) and Grigull (Halle), all of them shallow amateurs who have no notion of the difficulties to be met with in the task, and are almost entirely dependent on Sale. Friedrich Ruckert's excel- lent version (published by August Miiller, Frankfort-on-Maine, 1888) gives only selections. M. Klamroth's translation of the fifty oldest suras, Die fiinfzig dltesten Suren (Hamburg, 1890) attempts successfully to reproduce the rhymed form of the originals. The publication- of the translation of the Koran by the great Leipzig Arabic scholar, H. L. Fleischer (d. 1888) has so far unfortunately been delayed. (For modern editions, commentaries, &c., see Mahommedan Religion: Bibliography).

Besides commentaries on the whole Koran, or on special parts and topics, the Moslems possess a whole literature bearing on their sacred book. There are works on the spelling and right pronun- ciation of the Koran, works on the beauty of its language, on the number of its verses, words and letters, &c. ; nay, there are even works which would nowadays be called " historical and critical introductions." Moreover, the origin of Arabic philology is inti- mately connected with the recitation and exegesis of the Koran. To exhibit the importance of the sacred book for the whole mental life of the Moslems would be simply to write the history of that life itself; for there is no department in which its all-pervading, but unfortunately not always salutary, influence has not been felt.

The unbounded reverence of the Moslems for the Koran reaches its climax in the dogma that this book, as the divine word, i.e. thought, is immanent in God, and consequently eternal and uncreated. This dogma, which was doubtless due ˆ er 5 ltyof to the influence of the Christian doctrine of the eternal taeKoran – Word of God, has been accepted by almost all Mahommedans since the beginning of the 3rd century. Some theologians did indeed protest against it with great energy; it was in fact too pre- posterous to declare that a book composed of unstable words and letters, and full _ of variants, was absolutely divine. But what were the distinctions

and sophisms of the theologians for, if they could not remove such contradictions, and convict their opponents of heresy?

Bibliography. — The following works may be especially con- sulted: Weil, Einleitung in den Koran (2nd ed., 1878) ; Th. Noldeke, Geschichte des Qoran's (Gottingen, i860; 2nd ed. by Friedrich Schwally, 1908) ; the Lives of Mahomet by William Muir and Aloys Sprenger (vols, i.-iii., Berlin, 1861-1865; 2nd ed., 1869); C. Snouck Hurgronje, Het mekkaansche Feest (Leiden, 1880), De Islam (de Gids, 1886, ii. 257-273, 454-498, iii. 90-134; " Une nouvelle biographie de Mohammed," Revue de I'histoire des religions, tome 29, p. 48 f., 149 sqq. ; Leone Ca.eta.ni, Annah dell'Islam,i. (Milan, 1905), ii. (Milan, 1907) ; Frants Buhl, Muhammeds Liv (Copenhagen, 1903).

(Th. N. ; Fr. Sy.)

KORAT, the capital of the provincial division (Monton) of Nakawn Racha Sema, or " the frontier country," in Siam; in 102° 5′ E., 14° 59′ N. Pop. about 7000, mixed Cambodian and Siamese. It is the headquarters of a high commissioner and of an army division. It is the terminus of a railway from Bangkok, 170 m. distant, and the distributing centre for the whole of the plateau district which forms the eastern part of Siam. There are copper mines of reputed wealth in the neighbourhood. It is the centre of a silk-growing district and is the headquarters of the government sericultural department, instituted in 1904 with the assistance of Japanese experts for the purpose of im- proving the quality of Siamese silk. The government is that of an ordinary provincial division of Siam. A French vice-consul resides here. Since the founding of Ayuthia in the 14th century,

Korat has been tributary to, or part of, Siam, with occasional lapses into independence or temporary subjection to Cambodia. Before that period it was probably part of Cambodia, as appears from the nature of the ruins still to be seen in its neighbour- hood. In 1896 the last vestige of its tributary condition vanished with the introduction of the present system of Siamese rural administration.

KORDOFAN, a country of north-east Africa, forming a mudiria (province) of the Anglo-Egyptian Sudan. It lies mainly between 12 and 16 W. and 29° and 32 \° E., and has an area of about 130,000 sq. m., being bounded W. by Darfur, N. by the Bayuda steppes, E. by the White Nile mudiria and S. by the country of the Shilluks and other negro tribes, forming part of the

Upper Nile mudiria.

The greater part of Kordofan consists of undulating plains, riverless, barren, monotonous, with an average altitude of 1500 ft. Thickets and small acacias dot the steppes, which, green during the kharij or rainy season, at other times present a dull brown burnt-up aspect. In the west, isolated peaks, such as Jebel Abu Senum and Jebel Kordofan, rise from 150 to 600 ft. above the plain. North-west are the mountain groups of Kaja and Katul (2000 to 3000 ft.), in the east are the Jebel Daier and Jebel Tagale (Togale), ragged granitic ranges with precipitous sides. In the south are flat, fertile and thickly wooded plains, which give place to jungle at the foot of the hills of Dar Nuba, the district forming the south- east part of Kordofan. Dar Nuba is well-watered, the scenery is diversified and pretty, affording a welcome contrast to that of the rest of the country. Some of the Nuba hills exceed 3000 ft. in height. The south-western part of the country, a vast and almost level plain, is known as Dar Homr. A granitic sand with abundance of mica and feldspar forms the upper stratum throughout the greater part of Kordofan; but an admixture of clay, which is observable in the north, becomes strongly marked in the south, where there are also stretches of black vegetable mould. Beneath there appears to be an unbroken surface of mica schist. Though there are no perennial rivers, there are watercourses (khors or wadis) in the rainy season; the chief being the Khor Abu Habl, which traverses the south- central region. In Dar Homr the Wadi el Ghalla and the Khor Shalango drain towards the Homr affluent of the Bahr el Ghazal. During the rainy season there is a considerable body of water in these channels, but owing partly to rapid evaporation and partly to the porous character of the soil the surface of the country dries rapidly. The water which has found its way through the granitic sand flows over the surface of the mica schist and settles in the hollows, and by sinking wells to the solid rock a supply of water can generally be obtained. It is estimated that (apart from those in a few areas where the sand stratum is thin and water is reached at the depth of a few feet) there are about 900 of these wells. They are narrow shafts going down usually 30 to 50 ft., but some are over 200 ft. deep. The water is raised by rope and bucket at the cost of enormous labour, and in few cases is any available for irrigation. The very cattle are trained to go a long time without drinking. Entire villages migrate after the harvest to the neighbourhood of some plentiful well. In a few localities the surface depressions hold water for the greater part of the year but there is only one permanent lake — Keilat, which is some four miles by two. As there is no highland area draining into Kordofan, the underground reservoirs are dependent on the local rainfall, and a large number of the wells are dry during many months. The rainy season lasts from mid- June to the end of September, rain usually falling every three or four days in brief but violent

showers. In general the climate is healthy except in the rainy season, when large tracts are converted into swamps and fever is very prevalent. In the shita or cold weather (October to February inclusive) there is a cold wind from the north. The self or hot weather lasts from March to mid-June; the temperature rarely exceeds 105° F.

The chief constituent of the low scrub which covers the northern part of the country is the grey gum acacia {hashob). In the south the red gum acacias {talk) are abundant. In Dar Hamid, in the

N.W. of Kordofan, date, dom and other palms grow. The basbab or calabash tree, known in the eastern Sudan as the lebeldi and locally Homr, is fairly common and being naturally hollow the trees collect water, which the natives regularly tap. Another common source of water supply is a small kind of water melon which grows wild and is also cultivated. In the dense jungles of the south are immense creepers, some of them rubber-vines. The cotton plant is also found. The fauna includes the elephant, rhinoceros, buffalo, giraffe, lion, leopard, cheetah, roan-antelope, hartebeeste, kudu and many other kinds of antelope, wart-hog, hares, quail, partridge, jungle-fowl, bustard and guinea-fowl. Nearly all the kinds of game mentioned are found chiefly in the western and southern districts. The ril or addra gazelle found in N. and N.W. Kordo- fan are not known elsewhere in the eastern Sudan. Reptiles, sand-flics and mosquitoes are common. Ostriches are found in the northern steppes. The chief wealth of the people consists in the gum obtained from the grey acacias, in oxen, camels and ostrich feathers. The finest cattle are of the humped variety, the bulls of the Baggara being trained to the saddle and to carry burdens. There are large herds of camel, the camel-owning Arabs usually owning also large numbers of sheep and goats. Dukhn, a species of millet which can grow in the arid northern districts is there the chief grain crop, its place in the south being taken by durra. Dukhn is, however, the only crop cultivated in Dar Homr. From this grain a beer called merissa is brewed. Barley and cotton are culti- vated in some districts. A little gold dust is obtained, but the old gold and other mines in the Tagale country have been, apparently, worked out. Iron is found in many districts and is smelted in a few places. In the absence of fuel the industry is necessarily a small one. There are large beds of hematite some 60 m. N.W. and the same distance N.E. of El Obeid.

Inhabitants. — The population of Kordofan was officially estimated in 1903 to be 550,000. The inhabitants are roughly divisible into two types — Arabs in the plains and Nubas in the hills. Many of the villagers of the plains are however of very mixed blood — Arab, Egyptian, Turkish, Levantine and Negro. It is said that some village communities are descended from the original negro inhabitants. They all speak Arabic. The

most important village tribe is the Gowama, who own most of the gum-producing country. Other large tribes are the Dar Hamid and the Bederia — the last-named living round El Obeid. The nomad Arabs are of two classes, camel owners (Siat El Ilbil) and cattle owners {Baggara), the first-named dwelling in the dry northern regions, the Baggara in southern Kordofan. Of the camel-owning tribes the chief are the Hamar and the Kabba- bish. Many of the Hamar have settled down in villages. The Baggara are great hunters, and formerly were noted slave raiders. They possess many horses, but when journeying place their baggage on their oxen. They use a stabbing spear, ■ small throwing spears, and a broad-bladed short sword. Some of the richer men possess suits of chain armour. The principal Baggara tribes are the Hawazma, Meseria, Kenana, Habbania, and Homr. The Homr are said to have entered Kordofan from Wadai about the end of the 18th century and to have come from North Africa. They speak a purer Arabic than the riverain tribes. The Nubas are split into many tribes, each under a mek or king, who is not uncommonly of Arab descent. The Nubas have their own language, though the inhabitants of each hill have usually a different dialect. They are a primitive race, very black, of small build but distinctive negro features. They have feuds with one another and with the Baggara. During the mahdia they maintained their independence. The Nubas appear to have been the aboriginal inhabitants of the country and are believed to be the original stock of the Nubians of the Nile Valley (see Nubia). In the northern hills are communities of black people with woolly hair but of non-negro features. They speak Arabic and are called Nuba Arabs. Some of the southern hills are occupied by Arab-speaking negroes, escaped slaves and their descendants, who called themselves after the tribe they formerly served and who have little intercourse with the Nubas.

The capital, El Obeid (q.v.), is centrally situated. On it converge various trade routes, notably from Darfur and from Dueim, a town on the White Nile 125 m. above Khartum, which served as port for the province. Thence was despatched the gum for the Omdurman market. But the railway from Khartum to El Obeid, via Sennar, built in 1909-1911, crosses the Nile some 60 m. farther south above Abba Island. Nahud

(pop. about 10,000), 165 m. W.S.W. of El Obeid, is a commercial centre which has sprung into importance since the fall of the dervishes. All the trade with Darfur passes through the town, the chief commerce being in cattle, feathers, ivory and cotton goods. Trade is largely in the hands of Greeks, Syrians, Danagla and Jaalin. Taiara, on the route between El

Obeid and the Nile, was destroyed by the dervishes but has been rebuilt and is a thriving mart for the gum trade. El Odoaiya or Eddaiya is the headquarters of the Homr country. It and Baraka in the Muglad district are on the trade road between Nahud and Shakka in Darfur.

Bara is a small town some 50 m. N.N.E. of Obeid. Talodi and Tendek are government stations in the Nuba country. The Nubas have no large towns. They live in villages on the hillsides or summits. The usual habitation built both by Arabs and Nubas is the tukl, a conical-shaped hut made of stone, mud, wattle and daub or straw. The Nuba tukls are the better built. In the chief towns houses are built of mud bricks with flat roofs.

History. — Of the early history of Kordofan there is little record. It never formed an independent state. About the beginning of the 16th century Funj from Sennar settled in the country; towards the end of that century Kordofan was con- quered by Suleiman Solon, sultan of Darfur. About 1775 it was conquered by the Funj, and there followed a considerable immigration of Arab tribes into the country. The Sennari however suffered a decisive defeat in 1784 and thereafter under Darfur viceroys the country enjoyed prosperity. In 1821 Kordofan was conquered by Mahommed Bey the defterdar, son-in-law of Mehemet Ali, pasha of Egypt. It rsmained under Egyptian ride till 1882 when Mahommed Ahmed, the mahdi, raised the country to revolt. It was in Kordofan that Hicks Pasha and his army, sent to crush the revolt, were annihilated (Nov. 1883). The Baggara of Kordofan from that time onward were the chief supporters of the mahdi, and his successor, the khalifa Abdullah, was a Baggara. In Kordofan in 1899 the khalifa met his death, the country having already passed into the hands of the new Sudan government. The chief difficulty experienced by the administration was to habituate the Arabs and Nubas, both naturally warlike, to a state of peace. In consequence of the anti-slave raiding measures adopted, the Arabs of Talodi in May 1906 treacherously massacred the mamur of that place and 40 men of the Sudanese regiment. The promptness with which this disturbance was suppressed averted what otherwise might have been a serious rising. (See Sudan: Anglo-Egyptian, § " History.")

See The A nglo-Egyptian Sudan, edited by Count Gleichen (London, 1905) ; H. A. MacMichael, Notes on the History of Kordofan before the Egyptian Conquest (Cairo, 1907) ; John Petherick, Egypt, the Sudan, and Central Africa (London, 1861); Ignaz Pallme, Beschreibung von Kordofan (Stuttgart, 1843; trans. Travels in Kordofan, London, 1844); Major H. G. Prout, General Report on Province of Kordofan (Cairo, 1877); Ernst Marno, Reise in der egypt. Equat. Provinz (Vienna, 1879); papers (with maps) by Capt. W. Lloyd in the Geog. Journ. (June 1907 and March 1910) ; and the bibliography given under Sudan: Anglo-Egyptian.

KOREA, or Corea (Ch'aO Hsien, Dai han). Its mainland portion consists of a peninsula stretching southwards from Manchuria, with an estimated length of about 600 m., an ex- treme breadth of 135 m., and a coast-line of 1740 m. It extends from 34 18′ to 43° N., and from 124 36′ to 130 47′ E. Its northern boundary is marked by the Tumen and Yalu-«vers; the eastern boundary by the Sea of Japanˆ _fckCsouthern boundary by Korea Strait; and the western'boundary by the Yalu and the Yellow Sea. For n m. along the Tumen river the north frontier is conterminous with Russia (Siberia); otherwise Korea has China (Manchuria) on its land frontier. Nearly the whole surface of the country is mountainous. (For map, see Japan.)

The south and west coasts are fringed by about 200 islands (exclusive of islets), two-thirds of which are inhabited; 100 of them are from 100 to 2000 ft. in height, and many consist of bold bare masses of volcanic rock. The most important are Quelpart and the Nan Hau group. The latter, 36 m. from the eastern

end of Quelpart, possesses the deep, well-sheltered and ioomy harbour of Port Hamilton, which lies between the north points of the large and well-cultivated islands of Sun-ho-dan and Se- dan, which have a population of 2000. Aitan, between their south-east points, completes this noble harbour. The east coast of Korea is steep and rock-bound, with deep water and a tidal rise and fall of 1 to 2 ft. The west coast is often low and shelving, and abounds in mud-banks, and the tidal rise and fall is from 20 to 36 ft. Korean harbours, except two or three which are closed by drift ice for some weeks in winter, are ice-free. Among them are Port Shestakov, Port Lazarev, and Won-san (Gensan), in Broughton Bay; 1 Fusan, Ma-san-po, at the mouth of the Nak-tong, on the south coast; Mok-po, Chin-nampo, near the mouth of the Tai-dong; and Chemulpo, near the mouth of the Han, the port of the capital and the sea terminus of the first Korean railway on the west coast.

Korea is distinctly mountainous, and has no plains deserving the name. In the north there are mountain groups with definite centres, the most notable being Paik-tu San or Pei-shan ($700 ft.) which contains the sources of the Yalu and Tumen. From these groups a lofty range runs southwards, dividing the empire into two unequal parts. On its east, between it and the coast, which it follows at a moderate distance, is a fertile strip difficult of access, and on the west it throws off so many lateral ranges and spurs as to break up the country into a chaos of corrugated and precipitous hills and steep-sided valleys, each with a rapid perennial stream. Farther south this axial range, which in- cludes the Diamond Mountain group, falls away towards the sea in treeless spurs and small and often infertile levels. The northern groups and the Diamond Mountain are heavily timbered, but the

hills are covered mainly with coarse, sour grass and oak and chestnut scrub. The rivers are shallow and rocky, and are usually only navigable for a few miles from the sea. Among the exceptions are the Yalu (Amnok), Tumen, Tai-dong, Naktong, Mok-po, and Han. The last, rising in Kang-won-do, 30 m. from the east coast, cuts Korea nearly in half, reaching the sea on the west coast near Chemulpo ; and, in spite of many serious rapids, is a valuable highway for commerce for over 150 miles.

Geology. — The geology of Korea is very imperfectly known. Crystalline schists occupy a large part of the country, forming all the higher mountain ranges. They are always strongly folded and it is in them that the mineral wealth of Korea is situated. Towards the Manchurian frontier they are covered unconformably by some 1600 ft. of sandstones, clay-slates and limestones, which contain Cambrian fossils and are the equivalents of a part of the Siniari system of China. Carboniferous beds, consisting chiefly of slates, sandstones and conglomerates, are found in the south-eastern provinces. They contain a few seams of coal, but the most impor- tant coal-bearing deposits of the country belong to the Tertiary period. Recent eruptive and volcanic rocks are met with in the interior of Korea and also in the island of Quelpart. The principal mountain in the latter, Hal-la-san (or Mount Auckland), according to Chinese stories, was in eruption in the year 1007. With this possible exception there are no active volcanoes in Korea, and the region has also been remarkably free from earthquakes throughout historic times.

Climate. — The climate is superb for nine months of the year, and the three months of rain, heat and damp are not injurious to health. Koreans suffer from malaria, but Europeans and their children are fairly free from climatic maladies, and enjoy robust health. The summer mean temperature of Seoul is about 75 F., that of winter about 33 ; the average rainfall, 36-3 in. in the year, and of the rainy season 21-86 in. The rains come in July and August on the west and north-east coasts, and from April to July on the south coast, the approximate mean annual rainfall of these localities being 30, 35 and 42 in. respectively. These averages are based on the observations of seven years only.

Flora. — The plants and animals await study and classification. Among the indigenous trees are the Abies excelsa, Abies micro- sperma, Pinus sinensis, Pinus pinea, three species of oak, five of maple, lime, birch, juniper, mountain ash, walnut, Spanish chestnut, hazel, willow, hornbeam, hawthorn, plum, pear, peach, Rhus verni- cifera, Q)Rhus semipinnata, Acanthopanax ricinifolia, Zelkawa, Thuja orientalis, Elaeagnus, Sophora Japonica, &c. Azaleas and rhodo- dendrons are widely distributed,' as well as other flowering shrubs and creepers, Ampelopsis Veitchii being universal. Liliaceous plants

1 Named after William Robert Broughton (1762-1821), an English navigator who explored these seas in 1795-1798.

ana cruciferae are numerous. The native fruits, except walnuts and chestnuts, are worthless. The persimmon attains perfection, and experiment has proved the suitability of the climate to many foreign fruits. The indigenous economic plants are few, and are of no commercial value, excepting wild ginseng, bamboo, which is applied to countless uses, and " tak-pul " (Hibiscus Manihol), used in the manufacture of paper.

Fauna. — The tiger takes the first place among wild animals. He is of great size, his skin is magnificent, and he is so widely distributed as to be a peril to man and beast. Tiger-hunting is a profession with special privileges. Leopards -are numerous, and have even been shot within the walls of Seoul. There are deer (at least five species), boars, bears, antelopes, beavers, otters, badgers, tiger-cats, marten, an inferior sable, striped squirrels, &c. Among birds there are black eagles, peregrines (largely used in hawking), and, specially protected by law, turkey bustards, three varieties of pheasants, swans, geese, common and spectacled teal, mallards, mandarin ducks white and pink ibis, cranes, storks, egrets, herons, curlews, pigeons, doves, nightjars, common and blue magpies, rooks, crows, orioles, halcyon and blue kingfishers, jays, nut-hatches, redstarts, snipe, grey shrikes, hawks, kites, &c. But, pending further observations,ˆ is not possible to say which of the smaller birds actually breed in Korea and which only make it a halting-place in their annual migrations.

Area and Population. — The estimated area is 82,000 sq. m. — somewhat under that of Great Britain. The first complete census was taken in 1897, and returned the population in round numbers at 17,000,000, females being in the majority. It was subsequently, however, estimated at a maximum of 12,000,000. There is a foreign population of about 65,000, of whom 60,000 are Japanese. It is estimated that little more than half the arable land is under cultivation, and that the soil could support an additional 7,000,000. The native population is absolutely homogeneous. Northern Korea, with its severe climate, is thinly peopled, while the rich and warm provinces of the south and west are populous. A large majority of the people are engaged in agriculture. There is little emigration, except into Russian and Chinese territory, but some Koreans have emigrated to Hawaii and Mexico.

The capital is the inland city of Seoul, with a population of nearly

200,000. Among other towns, Songdo (Kaisong), the capital from about oio to 1392, is a walled city of the first rank, 25 m. N.W. ol Seoul, with a population of 60,000. It possesses the stately remains of the palace of the Korean kings of the Wang dynasty, is a great centre of the grain trade and the sole centre of the ginseng manufacture, makes wooden shoes, coarse pottery and fine matting, and manufactures with sesamum oil the stout oiled paper for which Korea is famous. Phyong-yang, a city on the Tai-dong, had a population of 60,000 before the war of 1894, in which it was nearly destroyed; but it fast regained its population. It lies on rocky heights above a region of stoneless alluvium on the east, and with the largest and richest plain in Korea on the west. It has five coal-mines within ten miles, and the district is rich in iron, silk, cotton, and grain. It has easy communication with the sea (its port being Chin-nampo), and is important historically and commercially. Auriferous quartz is worked by a foreign company in its neighbourhood. Near the city is the illustrated standard of land measurement cut by Ki-tze in 11 24 B.C.

With the exceptions of Kang-hwa, Chong-ju, Tung-nai, Fusan, and Won-san, it is very doubtful if any other Korean towns reach a population of 15,000. The provincial capitals and many other cities are walled. Most of the larger towns are x in the warm and fertile southern provinces. One is very much '.ike another, and nearly all their streets are replicas of the better alleys of Seoul. The actual antiquities of Korea are dolmens, sepulchral pottery, and Korean and Japanese fortifications.

Race. — The origin of the Korean people is unknown. They are of the Mongol family; their language belongs to the so-called Turanian group, is polysyllabic, possesses an alphabet of 11 vowels and 14 consonants, and a script named En-mun. Lite- rature of the higher class and official and upper class corre- spondence are exclusively in Chinese characters, but since 1895 official documents have contained an admixture of En-mun. The Koreans are distinct from both Chinese and Japanese in physiognomy, though dark straight hair, dark oblique eyes, and v. tinge of bronze in the skin are always present. The

cheek-bones are high; the nose inclined to flatness; the mouth thin-lipped and refined among patricians, and wide and full- lipped among plebeians; the ears are small, and the brow fairly well developed. The expression indicates quick intelligence rather than force and mental calibre. The male height averages 5 ft. 4! in. The hands and feet are small and well-formed. The physique is good, and porters carry on journeys from 100 to 200 lb. Men marry at from 18 to 20 years, girls at 16, and have large families, in which a strumous taint is nearly universal. Women are secluded and occupy a very inferior position. The Koreans are rigid monogamists, but concubinage has a recognized status.

Production and Industries, i. Minerals. — Extensive coal- fields, producing coal of fair quality, as yet undeveloped, occur in Hwang-hai Do and elsewhere. Iron is abundant, especially in Phybng-an Do, and rich copper ore, silver and galena are found. Crystal is a noted product of Korea, and talc of good quality is also present. In 1885 the rudest process of " placer " washing produced an export of gold dust amounting to £120,000; quartz-mining methods were subsequently introduced, and the annual declared value of gold produced rose to about £450,000; but much is believed to have been sent out of the country clandestinely. The reefs were left untouched till 1897, when an American company, which had obtained a concession in Phyong-an Do in 1895, introduced the latest mining appliances, and raised the declared export of 1898 to £240,047, believed to represent a yield for that year of £600,000. Russian, German, English, French and Japanese applicants subsequently obtained concessions. The concessionnaires regard Korean labour as docile and intelligent. The privilege of owning mines in Korea was extended to aliens under the Mining Regulations of 1906.

ii. Agriculture. — Korean soil consists largely of light sandy loam, disintegrated lava, and rich, stoneless alluvium, from 3 to 10 ft. deep. The rainfall is abundant during the necessitous months of the year, facilities for the irrigation of the rice crop are ample, and drought and floods are seldom known. Land is held from the proprietors on the terms of receiving seed from them and returning half the produce, the landlord paying the taxes. Any Korean can become a landowner by reclaiming and cultivating unoccupied crown land for three years free of taxation, after which he pays taxes annually. Good land produces two crops a year. The implements used are two makes of iron-shod wooden ploughs; a large shovel, worked by three or five men, one working the handle, the others jerking the blade by ropes attached to it; a short sharp-pointed hoe, a bamboo rake, and a wooden barrow, all of rude construction. Rice is threshed by beating the ears on a log; other grains, with flails on mud threshing-floors. Winnowing is performed by throwing up the grain on windy days. Rice is hulled and grain coarsely ground in stone querns or by water pestles. There are provincial horse-breeding stations, where pony stallions, from 10 to 12 hands high, are bred for carrying burdens. Mag- nificent red bulls are bred by the farmers for ploughing and other farming operations, and for the transport of goods. Sheep and goats are bred on the imperial farms, but only for sacrifice. Small, hairy, black pigs, and fowls, are universal. The culti- vation does not compare in neatness and thoroughness with that of China and Japan. There are no trustworthy estimates of the yield of any given measurement of land. The farmers put the average yield of rice at thirty-fold, and of other grain at twenty-fold. Korea produces all cereals and root crops except the tropical, along with cotton, tobacco, a species of

the Rhea plant used for making grass-cloth, and the Brousonettia papyrifera. The articles chiefly cultivated are rice, millet, beans, ginseng (at Songdo), cotton, hemp, oil-seeds, bearded wheat, oats, barley, sorghum, and sweet and Irish potatoes. Korean agriculture suffers from infamous roads, the want of the exchange of seed, and the insecurity of the gains of labour. It occupies about three-fourths of the population.

iii. Other Industries. — The industries of Korea, apart from supplying the actual necessaries of a poor population, are few and rarely collective. They consist chiefly in the manufacture

of sea-salt, of varied and admirable paper, thin and poor silk, horse-hair crinoline for hats, fine split bamboo blinds, hats and mats, coarse pottery, hemp cloth for mourners, brass bowls and grass-cloth. Won-san and Fusan are large fishing centres, and salt fish and fish manure are important exports; but the prolific fishing-grounds are worked chiefly by Japanese labour and capital. Paper and ginseng are the only manufactured articles on the list of Korean exports. The arts are nil.

Commerce. — A commercial treaty" was concluded with Japan in 1876, and treaties with the European countries and the United States of America were concluded subsequently. An imperial edict of the 20th of May 1904 annulled all Korean treaties with Russia. After the opening of certain Korean ports to foreign trade, the customs were placed under the management of European commissioners nominated by Sir Robert Hart from Peking. The ports and other towns open are Seoul, Chemulpo, Fusan, Won-san, Chin-nampo, Mok-po, Kun-san, Ma-san-po, Song-chin, Wiju, Yong-ampo, and Phyong-yang. The value of foreign trade of the open ports has fluctuated considerably, but has shown a tendency to increase on the whole. For example, in 1884 imports were valued at £170,113 and exports at £95,377. By 1890 imports had risen to £790,261, and there- after fluctuated greatly, standing at only £473,598 in 1893, but at £1,017,238 in 1897, and £1,382,352 in 1901, but under ab- normal conditions in 1904 this last amount was nearly doubled. Exports in 1890 were valued at £591,746; they also fluctuated greatly, falling to £316, 072 in 1893, but standing at £863,828 in 1901, and having a further increase in some subsequent years. These figures exclude the value of gold dust. The principal imports are cotton goods, railway materials, mining supplies and metals, tobacco, kerosene, timber, and clothing. Japanese cotton yarns are imported to be woven into a strong cloth on Korean hand-looms. Beans and peas, rice, cowhides, and ginseng are the chief exports, apart from gold.

Communications . — Under Japanese auspices a railway from Che- mulpo to Seoul was completed in 1900. This became a branch of the longer line from Fusan to Seoul (286 m.), the concession for which was granted in 1898. This line was pushed forward rapidly on the outbreak of the Russo-Japanese War, and the whole was opened early in 1905. A railway from Seoul to Wiju was planned under French engineers, but the work was started by the Korean govern- ment. This line also, however, was taken over by the Japanese military authorities, and the first trains ran through early in 1905, in which year Japan obtained control of the whole of the Korean internal communications. The main roads centring in Seoul are seldom fit even for the passage of ox-carts, and the secondary roads are bad bridle-tracks, frequently degenerating into " rock ladders." Some improvements, however, have been effected under Japanese direction. The inland transit of goods is almost entirely on the backs of bulls carrying from 450 to 600 lb, on ponies carrying 200 lb, and on men carrying from 100 to 150 lb, bringing the average cost up to a fraction over 8d. per mile per ton. The corvee exists, with its usual hardships. Bridges are made of posts, carrying a framework either covered with timber or with pine branches and earth. They are removed at the beginning of the rainy season, and are not replaced for three months. The larger rivers are unbridged, but there are numerous government ferries. The infamous roads and the risks during the bridgeless season greatly hamper trade. Japanese steamers ply on the Han between Chemulpo and Seoul.

A postal system, established in 1 894-1 895, has been gradually extended. There are postage stamps of four values. The Japanese, under the agreement of 1905, took over the postal, telegraphic and telephone services. Korea is connected with the Chinese and Japanese telegraph systems by a Japanese line from Chemulpo via Seoul to Fusan, and by a line acquired by the empire between Seoul and Wiju. The state has also lines from Seoul to the open ports, &c. Korea has regular steam communication with ports in Japan, the Gulf of Pechili, Shanghai, &c. Her own mercantile marine is considerable.

Government. — From 1895, when China renounced her claims to suzerainty, to 1910 the king (since 1897 emperor) was in theory an independent sovereign, Japan in 1904 guaranteeing the welfare and dignity of the imperial house. Under a treaty signed at Seoul on the 17th of November 1905, Japan directed the external relations of Korea, and Japanese diplomatic and consular representatives took charge of Korean subjects and interests in foreign countries. Japan undertook the maintenance of existing treaties between Korea and foreign powers; and

Korea agreed that her future foreign treaties should be con- cluded through the medium of Japan. A resident-general rep- resented Japan at Seoul, to

direct diplomatic affairs, the first being the Marquis Ito. Under a further convention of July 1907, the resident-general's powers were enormously increased. In ad- ministrative reforms the Korean government followed his guid- ance; laws could not be enacted nor administrative measures undertaken without his consent; the appointment and dis- missal of high officials, and the engagement of foreigners in government employ, were subject to his pleasure. Each depart- ment of state has a Japanese vice-minister, and a large propor- tion of Japanese officials were introduced into these departments as well as Japanese chiefs of the bureaus of police and customs. By a treaty dated August 22nd 1910, which came into effect seven days later the emperor of Korea made " complete and per- manent cession to the emperor of Japan of all rights of sover- eignty over the whole of Korea." The entire direction of the administration was then taken over by the Japanese resident- general, who was given the title of governor-general. The jurisdiction of the consular courts was abolished but Japan guaranteed the continuance of the existing Korean tariff for ten years.

Local Administration. — Korea for administrative purposes is divided into provinces and prefectures or magistracies. Japanese reforms in this department have been complete. Each provincial government has a Japanese secretary, police inspector and clerks. The secretary may represent the governor in his absence.

Law.— A criminal code, scarcely equalled for barbarity, though twice mitigated by royal edict since 1785, remained in force in its main provisions till 1895. Subsequently, a mixed commission of revision carried out some good work. Elaborate legal machinery was devised, though its provisions were constantly violated by the imperial will and the gross corruption of officials. Five classes of law courts were established, and provision was made for appeals in both civil and criminal cases. Abuses in legal administration and in tax-collecting were the chief grievances which led to local insurrec- tions. Oppression by the throne and the official and noble classes prevailed extensively; but the weak protected themselves by the use of the Kyei, or principle of association, which developed among Koreans into powerful trading gilds, trades-unions, mutual benefit associations, money-lending gilds, &c. Nearly all traders, porters and artisans were members of gilds, powerfully bound together and strong by combined action and mutual helpfulness in time of need. Under the Japanese regime the judiciary and the executive were rigidly separated. The law courts, including the court of cassation, three courts of appeal, eight local courts, and 115 district courts, were put under Japanese judges, and the codification of the laws was undertaken. The prison system was also reformed.

Finance and Money. — Until 1904 the finances of Korea were completely

disorganized ; the currency was chaotic, and the budget was an official formality making little or no attempt at accuracy. By agreement of the 22nd of August 1904, Korea accepted a Japanese financial adviser, and valuable reforms were quickly entered upon under the direction of the first Japanese official, Mr T. Megata. He had to contend against corrupt officialdom, indiscriminate expendi- ture, and absence of organization in the collection of revenue, apart from the confusion with regard to the currency. This last was nominally on a silver standard. The coins chiefly in use were (i) copper cash, which were strung in hundreds on strings of straw, and, as about 9ft weight was equal to one shilling, were excessively cumbrous, but were nevertheless valued at their face value; (ii) nickel coins, which, being profitable to mint, were issued in enormous quantities, quickly depreciated, and were moreover extensively forged. _ The Dai Ichi Ginko (First Bank of Japan), which has a branch in Seoul and agencies in other towns, was made the govern- ment central treasury, and its notes were recognized as legal tender in Korea. The currency of Korea being thus fixed, the first step was to reorganize the nickel coinage. From the 1st of August 1905 the old nickels paid into the treasury were remitted and the issue carefully regulated; so also with the cash, which was retained as a subsidiary coinage, while a supplementary coinage was issued of silver 10-sen pieces and bronze l-sen and half-sen pieces. To aid the free circulation of money and facilitate trade, the government grants subsidies for the establishment of co-operative warehouse companies with bonded warehouses. Regulations have also been promulgated with respect to promissory notes, which have long existed in Korea. They took the form of a piece of paper about an inch broad and five to eight inches long, on which was written the sum, the date of payment and the name of the payer and payee, with their seals; the paper was then torn down its length, and one half given to each party. The debtor was obliged to pay the amount of the debt to any person who presented the missing half of the bill. The readiness with which they were accepted led to over-issue, and,

consequently, financial crises. The new regulations require the amount of the notes to be expressed in yen, not to be payable in old nickel coins or cash. The notes can only be issued by members of a note association, a body constituted under government regulations, whose members must uphold the credit and validity of their notes. The notes must also be made payable to a definite person and require endorsement, safeguards which were previously lacking. Adminis- trative reform was also taken in hand; the large number of super- fluous and badly paid officials was considerably reduced, and the status and salary of all existing government officials

considerably improved. An endeavour was made to publish an annual budget, in which the revenue and expenditure should accurately represent the sums actually received and expended. Regulations were framed for the purpose of establishing adequate supervision over the revenue and expenditure for the abolition of irregular taxation and extortions, as well as the practice of farming out the collection of the revenue to individuals, and, generally, to adapt the whole collection and expenditure of the national revenue to modern ideas of public finance. Down to 1910 the sum expended by Japan on Korean reforms was estimated to approach fifteen millions sterling. Among reforms not specifically referred to may be mentioned the improvement of coastwise navigation, the provision of posts, roads, railways, public buildings, hospitals and sanitary works, and the official advancement of industries.

Religion. — Buddhism, which swayed Korea from the 10th to the 14th century, has been discredited for three centuries, and its priests are ignorant, immoral and despised. Confucianism is the official cult, and all officials offer sacrifices and homage at stated seasons in the Confucian temples. Confucian ethics are the basis of morality and social order. Ancestor-worship is universal. The popular cult is, however, the propitiation of demons, a modification of the Shamanism of northern Asia. The belief in demons, mostly malignant, keeps the Koreans in constant terror, and much of their substance is spent on propitiations. Sorceresses and blind sorcerers are the intermediaries. At the close of the 19th century the fees annually paid to these persons were estimated at £150,000; there were in Seoul 1000 sorceresses, and very large sums are paid to the male sorcerers and geomancers.

Putting aside the temporary Christian work of a Jesuit chaplain to the Japanese Christian General Konishe, in 1594 during the Japanese invasion, as well as that on a larger scale by students who received the evangel in the Roman form from Peking in 1792, and had made 4000 converts by the end of 1793, the first serious attempt at the conversion of Korea was made by the French Societe des Missions Etrangeres in 1835. In spite of frequent persecutions, there were 16,500 converts in 1857 and 20,000 in 1866, in which year the French bishops and priests were martyred by order of the emperor's father, and several thousand native Christians were beheaded, banished or imprisoned. This mission in 1900 had about 30 missionaries and 40,000 converts. In 1884 and 1885, toleration being established, Protestant missionaries of the American Presby- terian and Methodist Episcopal Churches entered Korea, and were followed by a large number of agents of other denominations. An English bishop, clergy, doctors and nursing sisters arrived in 1890. Hospitals, orphanages, schools and an admirable college in Seoul have been founded, along with tri-lingual (Chinese, Korean and English) printing-presses; religious, historical and

scientific works and much of the Bible have been translated into En-mun, and periodicals of an enlightened nature in the Korean script are also circulated. The progress of Protestant missions was very slow for some years, but from 1895 converts multiplied.

Education. — The " Royal Examinations " in Chinese literature held in Seoul up to 1894, which were the entrance to official position, being abolished, the desire for a purely Chinese education diminished. In Seoul there were established an imperial English school with two foreign teachers, a reorganized Confucian college, a normal college under a very efficient foreign principal, Japanese, Chinese, Russian and French schools, chiefly linguistic, several Korean primary schools, mission boarding-schools, and thePai Chai College connected with the American Methodist Episcopal Church, under imperial patronage, and subsidized by government, in which a liberal education of a high class was given and En-mun receives much attention. The Koreans are expert linguists, and the government made liberal grants to the linguistic schools. In the primary schools boys learn arithmetic, and geography and Korean history are taught, with the outlines of the governmental systems of other civilized countries. The education department has been entirely reorganized under the Japanese regime, Japanese models being followed

History. — By both Korean and Chinese tradition Ki-tze — a councillor of the last sovereign of the 3rd Chinese dynasty, a sage, and the reputed author of parts of the famous Chinese classic, the Shu-King— is represented as entering Korea in 11 22 B.C. with several thousand Chinese emigrants, who made him their king. The peninsula was then peopled by savages living in caves and subterranean holes. By both learned and popular belief in Korea Ki-tze is recognized as the founder of Korean social order, and is greatly reverenced. He called the new kingdom Ch'ao-Hsien,

pacified and policed its borders, and introduced laws and Chinese etiquette and polity. Korean ancient history is far from satisfy- ing the rigid demands of modern criticism, but it appears that Ki-tze's dynasty ruled the peninsula until the 4th century B.C., from which period until the 10th century a.d. civil wars and foreign aggressions are prominent. Nevertheless, Hiaksai, which with Korai and Shinra then constituted Korea, was a centre of literary culture in the 4th century, through which the Chinese classics and the art of writing reached the other two kingdoms. Buddism, a forceful civilizing element, reached Hiaksai in a.d. 384, and from it the sutras and images of northern Buddhism were carried to Japan, as well as Chinese letters and ethics. Internecine wars were terminated about 913 by Wang the Founder, who unified the peninsula under the name Korai, made Song-do its capital, and endowed Buddhism as the state religion. In the nth century Korea was stripped of her territory west of the Yalu by a warlike

horde of Tungus stock, since which time her frontiers have been stationary. The Wang dynasty perished in 1392, an important epoch in the peninsula, when Ni Taijo, or Litan, the founder of the present dynasty, ascended the throne, after his country had suffered severely from Jenghiz and Khublai Khan. He tendered his homage to the first Ming emperor of China, received from him his investiture as sovereign, and accepted from him the Chinese calendar and chronology, in itself a declaration of fealty. He revived the name Ch'ao-Hsien, changed the capital from Song-do to Seoul, organ- ized an administrative system, which with some modifications continued till 1895, and exists partially still, carried out vigorous reforms, disestablished Buddhism, made merit in Chinese literary examinations the basis of appointment to office, made Confucian- ism the state religion, abolished human sacrifices and the burying of old men alive, and introduced that Confucian system of education, polity, and social order which has dominated Korea for five centuries. Either this king or an immediate successor introduced the present national costume, the dress worn by the Chinese before the Manchu conquest. The early heirs of this vigorous and capable monarch used their power, like him, for the good of the people; but later decay set in, and Japanese buccaneers ravaged the coasts, though for two centuries under Chinese protection Korea was free from actual foreign invasion. In 1592 occurred the epoch-making invasion of Korea by a Japanese army of 300,000 men, by order of the great regent Hideyoshi. China came to the rescue with 60,000 men, and six years of a gigantic and bloody war followed, in which Japan used firearms for the first time against a foreign foe. Seoul and several of the oldest cities were captured, and in some instances destroyed, the country was desolated, and the art treasures and the artists were carried to Japan. The Japanese troops were recalled in 1598 at Hideyoshi 's death. The port and fishing privileges of Fusan remained in Japanese possession, a heavy tribute was exacted, and until 1790 the Korean king stood in humiliating relations towards Japan. Korea never recovered from the effects of this invasion, which bequeathed to all Koreans an intense hatred of the Japanese.

In 1866, 1867, and 1871 French and American punitive expeditions attacked parts of Korea in which French missionaries and American adventurers had been put to death, and inflicted much loss of life, but retired without securing any diplomatic successes, and Korea continued to preserve her complete isolation. The first indirect step towards breaking it down had been taken in i860, when Russia obtained from China the cession of the Usuri province, thus bringing a European power down to the Tumen. A large emigration of famine-stricken Koreans and persecuted Christians into Russian territory followed. The emigrants were very kindly received, and many of them became thrifty and prosperous farmers. In 1876 Japan, with the consent of China, wrung a treaty from Korea by

which Fusan was fully opened to Japanese settlement and trade, and Wonsan (Gensan) and Inchiun (Chemulpo) were opened to her in 1880. In 1882 China promulgated her " Trade and Frontier Regulations," and America negotiated a commercial treaty, followed by Germany and Great Britain in 1883, Italy and Russia in 1884,

France in 1886, and Austria in 1892. A " Trade Convention " was also concluded with Russia. Seoul was opened in 1884 to foreign residence, and the provinces to foreign travel, and the diplomatic agents of the contracting powers obtained a recognized status at the capital. These treaties terminated the absolute isolation which Korea had effectually preserved. During the negotiations, although under Chinese suzerainty, she was treated with as an independent state. Between 1897 'and 1899, under diplomatic pressure, a number of ports were opened to foreign trade and residence. From 1882 to 1894 the chief event in the newly opened kingdom was a plot by the Tai-won- Kun, the father of the emperor, to seize on power, which led to an attack on the Japanese legation, the members of which were compelled to fight their way, and that not blood- lessly, to the sea. Japan secured ample compensation; and the Chinese resident, aided by Chinese troops, deported the Tai-won-Kun to Tientsin. In 1884 at an official banquet the leaders of the progressive party assassinated six leading Korean statesmen, and the intrigues in Korea of the banished or escaped conspirators created difficulties which were very slow to sub- side. In spite of a constant struggle for ascendancy between the queen and the returned Tai-won-Kun, the next decade was one of quiet. China, always esteemed in Korea, con- solidated her influence under the new conditions through a powerful resident; prosperity advanced, and certain reforms were projected by foreign " advisers." In May 1894 a more important insurrectionary rising than usual led the king to ask armed aid from China. She landed 2000 troops on the 10th of June, having previously, in accordance with treaty provisions, notified Japan of her intention. Soon after this Japan had 1 2 ,000 troops in Korea, and occupied the capital and the treaty ports. Then Japan made three sensible proposals for Korean reform, to be undertaken jointly by herself and China. China replied that Korea must be left to reform herself, and that the withdrawal of the Japanese troops must precede negotiations. Japan rejected this suggestion, and on the 23rd of July attacked and occupied the royal palace. After some further negotiations and fights by land and sea between Japan and China war was declared formally by Japan, and Korea was for some time the battleground of the belligerents. The Japanese victories resulted for Korea in the solemn renunciation of Chinese suze- rainty by the Korean king, the

substitution of Japanese for Chinese influence, the introduction of many important reforms under Japanese advisers, and of checks on the absolutism of the throne. Everything promised well. The finances flourished under the capable control of Mr (afterwards Sir) M'Leavy Brown, C.M.G. Large and judicious retrenchments were car- ried out in most of the government departments. A measure of judicial and prison reform was granted. Taxation was placed on an equable basis. The pressure of the trade gilds was relaxed. Postal and educational systems were introduced. An approach to a constitution was made. The distinction between patrician and plebeian, domestic slavery, and beating and slicing to death were abolished. The age for marriage of both sexes was raised. Chinese literary examinations ceased to be a passport to office. Classes previously degraded were enfranchised, and the alliance between two essentially corrupt systems of government was severed. For about eighteen months all the departments were practically under Japanese control. On the 8th of October 1895 the Tai-won-Kun, with Korean troops, aided by Japanese troops under the orders of Viscount Miura, the Japanese minister, captured the palace, assassinated the queen, and made a prisoner of the king, who, however, four months later, escaped to the Russian legation, where he remained till the spring of 1897. Japanese influence waned. The engagements of the advisers were not renewed. A strong retrograde movement set in. Reforms were dropped. The king, with the checks upon his absolutism removed, reverted to the worst traditions of his dynasty, and the control and arrangements of finance were upset by Russia.

At the close of 1897 the king assumed the title of emperor, and changed the official designation of the empire to Dai Han —

Great Han. By 1898 the imperial will, working under partially new conditions, produced continual chaos, and by 1900 suc- ceeded in practically overriding all constitutional restraints. Meanwhile Russian intrigue was constantly active. At last Japan resorted to arms, and her success against Russia in the war of 1904-5 enabled her to resume her influence over Korea. On the 23rd of February 1904 an agreement was determined whereby Japan resumed her position as administrative adviser to Korea, guaranteed the integrity of the country, and bound herself to maintain the imperial house in its position. Her interests were recognized by Russia in the treaty of peace (September 5, 1905), and by Great Britain in the Anglo- Japanese agreement of the 12th of August 1905. The Koreans did not accept the restoration of Japanese influence without demur. In August 1905 disturbances arose owing to an attempt by some merchants to obtain special assistance from the trea- sury on the pretext of embarrassment caused by Japanese financial reforms; these disturbances spread to some of the provinces, and the Japanese were compelled to make a show of force. Prolonged negotiations were necessary to the com- pletion

of the treaty of the 17th of November 1905, whereby Japan obtained the control of Korea's foreign affairs and relations, and the confirmation of previous agreements, the far-reaching results of which have been indicated. Nor was opposition to Japanese reforms confined to popular demonstration. In 1907 a Korean delegacy, headed by Prince Yong, a member of the imperial family, was sent out to lay before the Hague conference of that year, and before all the principal governments, a protest against the treatment of Korea by Japan. While this was of course fruitless from the Korean point of view, it indicated that the Japanese must take strong measures to suppress the intrigues of the Korean court.

At the instigation of the Korean ministry the emperor abdi- cated on the 19th of July 1907, handing over the crown to his son. Somewhat serious imeutes followed in Seoul and else- where, and the Japanese proposals for a new convention, increasing the powers of the resident general, had to be pre- sented to the cabinet under a strong guard. The convention was signed on the 25th of July. One of the reforms imme- diately undertaken was the disbanding of the Korean standing army, 'which led to an insurrection and an intermittent guerrilla warfare which, owing to the nature of the country, was not easy to subdue. Under the direction of Prince Ito (q.v.) the work of reform was vigorously prosecuted. In July 1909, General Teranchi, Japanese minister of war, became resident-general, with the mission to bring about annexation. This was effected peacefully in August 1910, the emperor of Korea by formal treaty surrendering his country and crown. (See Japan.)

Authorities. — The first Asiatic notice of Korea is by Khordad- beh, an Arab geographer of the 9th century A.D., in his Book of Roads and Provinces, quoted by Baron Richthofen in his great work on China, p. 575. The earliest European source of information is a narra- tive by H. Hamel, a Dutchman, who was shipwrecked on the coast of Quelpart in 1654, and held in captivity in Korea for thirteen years. The amount of papers on Korea scattered through English, German, French and Russian magazines, and the proceedings of geographical societies, is very great, and for the last three centuries Japanese writers have contributed largely to the sum of general knowledge of the peninsula. The list which follows includes some of the more recent works which illustrate the history, manners and customs, and awakening of Korea : British Foreign Office Reports on Korean Trade, Annual Series (London); Bibliographic koreanne (3 vols., Paris, 1897) ; Mrs. I. L. Bishop, Korea and her Neighbours (2 vols., London, 1897) ; M. von Brandt, Ostasiatische Fragen (Leipzig, 1897) ; A. E. J. Cavendish and H. E. Goold Adams, Korea, and the Sacred White Mountain (London, 1894); Stewart Culin, Korean Games (Philadel- phia, 1895); Curzon, Problems of the Far East (London, 1896); Dallet, Histoire de I'iglise de Koree (2 vols., Paris, 1874);!. S. Gale, Korean Sketches (Edinburgh,

1898); W. E. Griffis, The Hermit Nation (8th and revised edition, New York, 1907) ; H. Hamel, Relation du naufrage d'un vaisseau Halindois, &c, traduite du Flamond par M. Minutoli (Paris, 1670) ; Okoji Hidemoto, Der Feldzug der Japanir gegen Korea im Jahre 15971 translated from Japanese by Professor von Pfizmaier (2 vols., Vienna, 1875); M. Jametel, "La Kor6e: sesressources,son avenir commercial, " L'Econo- miste francaise (Paris, July 1881); Perciva! Lowell, Ckoson: The Land of the Morning Calm (London, Boston, 1886); L. J. Miln,

Quaint Korea (Harper, New York, 1895); V. de Laguerie, La Koree tndependante, russe ou japonaise? (Paris, 1898); J. Ross, Korea: Its History, Manners and Customs (Paisley, 1880) ; W. H. Wilkinson, The Korean Government: Constitutional Changes in Korea during the period 33rd July 1894 — 30th June 1896 (Shanghai, 1896) ; A. Hamil- ton, Korea (London, 1903) ; C. J. D. Taylor, Koreans at Home (Lon- don, 1904) ; E. Boudaret, En Coree (Paris, 1904) ; Laurent-Cremazy, Le Code penal de la Coree (Paris, 1904) ; G. T. Ladd, In Korea with Marquis Ito (London, 1908) ; Dictionaries and vocabularies by W. F. Myers (English secretary of Legation at Peking), the French mission- aries, and others, were superseded in 1898 by a large and learned volume by the Rev J. S. Gale, a Presbyterian missionary, who devoted some years to the work. On geology, see C. Gottsche, " Geologische Skizze von Korea," Sitz. preuss. Akad. Wiss. (Berlin, Jahrg. 1886, pp. 857-873, PI. viii.). A summary of this paper, with a reproduction of the map, is given by L. Pervinquiere in Rev. sci. Paris, 5th series, vol. i. (1904), pp. 545-552. (I. L. B. ; O. J. R. H.)

KOREA, a tributary state of India, transferred from Bengal to the Central Provinces in 1905; area, 1631 sq. m.; pop. (1901), 35,113, or only 22 persons per sq. m.; estimated revenue, £1200. It consists of an elevated table-land, with hills rising to above 3000 ft. Such traffic as there is is carried by means of pack- bullocks.

KORESHAN ECCLESIA, THE, or Church Archtriumphant, a communistic body, founded by Cyrus R. Teed, a medical practitioner, who was born at Utica, New York, in 1839. Teed was regarded by his adherents as " the new Messiah now in the World," and many other extravagant views both in science and economics are held by them. Two communities were founded: in Chicago (1886) and at Estero, in Lee county, Florida (1894), where in 1903 the Chicago community removed. Their name is derived from Koresh, the Hebrew form of Cyrus, and they have a journal, The

Flaming Sword.

KORIN, OGATA (c. 1657-1716), Japanese painter and lac- querer, was born at Koto, the son of a wealthy merchant who had a taste for the arts and is said to have given his son some elementary instruction therein. Korin also studied under Soken Yamamoto, Kano, Tsunenobu and Gukei Sumiyoshi; and he was greatly influenced by his predecessors Koyetsu and Sotatsu. On arriving at maturity, however, he broke away from all tradition, and developed a very original and quite distinctive style of his own, both in painting and in the decoration of lacquer. The characteristic of this is a bold- impressionism, which is expressed in few and simple highly idealized forms, with an absolute disregard either of realism or of the usual conventions. In lacquer Korin's use of white metals and of mother-of-pearl is notable; but herein he followed Koyetsu. Korin died on the 2nd of June 1716, at the age of fifty-nine. His chief pupils were Kagei Tatebashi and Shiko Watanable; but the present knowledge and appreciation of his work are largely due to the efforts of Hoitsu Sakai, who brought about a revival of Korin's style.

See A. Morrison, The Painters of Japan (1902) ; S. Tajima, Master- pieces selected from the Korin School (1903); S. Hoitsu, The 100 Designs by Korin [(1815) and More Designs by Korin (1826).

(E.F.S.)

KORKUS, an aboriginal tribe of India, dwelling on the Satpura hills in the Central Provinces. They are of interest as being the westernmost representatives of the Munda family of speech. They are rapidly becoming hinduized, as may be gathered from the figures of the census of 1901, which show 140,000 Korkus by race, but only 88,000 speakers of the Korku language.

K0RM0CZ3ANYA (German, Kremnitz), an old mining town, in the county of Bars, in Hungary, 158 m. N. of Budapest by rail. Pop. (1900), 4299. It is situated in a deep valley in the Hungarian Ore Mountains region. Among its principal build- ings are the castle, several Roman Catholic (from the 13th and 14th centuries) and Lutheran churches, a Franciscan monastery (founded 1634), the town-hall, and the mint where the celebrated Kremnitz gold ducats were formerly struck. The bulk of the inhabitants find employment in connexion with the gold and silve' mines. By means of a tunnel 9 m. in length, con- structed in 1851-1852, the water is drained off from the mines into the river Gran. According to tradition, Kormoczbanya was founded in the 8th century by Saxons. The place is mentioned

in documents in 1317, and became a royal free town in 1328, being

therefore one of the oldest free towns in Hungary.

KORNER, KARL THEODOR (1791-1813), German poet and patriot, often called the German " Tyrtaeus," was born at Dresden on the 23rd of September 1791. His father, Christian Gottfried Korner (1756-1831), a distinguished Saxon jurist, was Schiller's most intimate friend. He was educated at the Kreuz- schule in Dresden and entered at the age of seventeen the min- ing academy at Freiburg in Saxony, where he remained two years. Here he occupied himself less with science than with verse, a collection of which appeared under the title Knospen in 1810. In this year he went to the university of Leipzig, in order to study law; but he became involved in a serious conflict with the police and was obliged to continue his studies in Berlin. In August 18 1 1 Korner went to Vienna, where he devoted himself entirely to literary pursuits; he became engaged to the actress Antonie Adamberger, and, after the success of several plays pro- duced in 18 1 2, he was appointed poet to the Hofburgtheater. When the German nation rose against the French yoke, in 1813, Korner gave up all his prospects at Vienna and joined Liitzow's famous corps of volunteers at Breslau. On his march to Leipzig he passed through Dresden, where he issued his spirited Aufruf an die Sachsen, in which he called upon his countrymen to rise against their oppressors. He became lieutenant towards the end of April, and took part in a skirmish at Kitzen near Leipzig on the 7th of June, when he was severely wounded. After being nursed' by friends at Leipzig and Carlsbad, he rejoined his corps and fell in an engagement outside a wood near Gadebusch in Mecklenburg on the 26th of August 1813. He was buried by his comrades under an oak close to the village of Wobbelin, where there is a monument to him.

The abiding interest in Korner is patriotic and political rather than literary. His fame as a poet rests upon his patriotic lyrics, which were published by his father under the title Leier und Schwert in 18 14. These songs, which fired the poet's comrades to deeds of heroism in 1813, bear eloquent testimony to the intensity of the national feeling against Napoleon, but judged as literature they contain more bombast than poetry. Among the best known are " Liitzow's wilde verwegene Jagd," " Gebet wahrend der Schlacht " (set to music by Weber) and " Das Schwertlied." This last was written immediately before his death, and the last stanza added on the fatal morning. As a dramatist Korner was remarkably prolific, but his comedies hardly touch the level of Kotzebue's and his tragedies, of which the best is Zriny (1814), are rhetorical imitations of Schiller's.

His works have passed through many editions. Among the mpre recent are: Samtliche Werke (Stuttgart, 1890), edited by Adolf Stern; by H. Zimmer (2 vols., Leipzig, 1893) and by E. Goetze (Berlin, 1900). The most valuable contributions to our knowledge of the poet have been furnished by

E. Peschel, the founder and direc- tor of the Korner Museum in Dresden, in Theodor Korners Tagebuch und Kriegslieder , aus dem Jahre 1813 (Freiburg, 1893) and, in conjunction with E. Wildenow, Theodor Korner und die Seinen (Leipzig, 1898).

KORNEUBURG, a town of Austria, in Lower Austria, 9 m. N.W. of Vienna by rail. Pop. (1900), 8298. It is situated on the left bank of the Danube, opposite Klosterneuburg. It is a steamship station and an important emporium of the salt and corn trade. The industry comprises the manufacture of coarse textiles, pasteboard, &c. Its charter as a town dates from 1298, and it was a much frequented market in the preceding century. At the beginning of the 15th century it was surrounded by walls, and in 1450 a fortress was erected. It was frequently involved in the conflict between the Hungarian king Matthias Corvinus and the emperor Frederick William III., and also during the Thirty Years' War.

KOROCHA, a town of central Russia, in the government of Kursk, 75 m. S.S.E. of the city of Kursk, on the Korocha river. Pop. (1897), 14,405. Its inhabitants live by gardening, export- ing large quantities of dried cherries, by making candles and leather, and by trade; the merchants purchase cattle, grain and salt in the south and send them to Moscow. Founded in 1638, Korocha was formerly a small fort intended to check the Tatar invasions.

KORSOR, a seaport of Denmark, in the amt (county) of the island of Zealand, 69 m. by rail W.S.W. of Copenhagen, on the east shore of the Great Belt. Pop. (1901), 6054. The harbour, which is formed by a bay of the Baltic, has a depth throughout of 20 ft. It is the point of departure and arrival of the steam ferry to Nyborg on Fiinen, lying on the Hamburg, Schleswig, Fredericia and Copenhagen route. There is also regular com- munication by water with Kiel. The chief exports are fish, cereals, bacon; imports, petroleum and coal. A market town since the 14th century, Korsor has ruins of an old fortified castle, on the south side of the channel, dating from the 14th and 17th centuries.

KORTCHA (Slavonic, Gorilza or Koritza), a city of Albania, European Turkey, in the vilayet of Iannina, in a wide plain watered by the Devol and Dunavitza rivers, and surrounded by mountains on every side except the north, where Lake Malik constitutes the boundary. Pop. (1905), about 10,000, including Greeks, Albanians and Slavs. Kortcha is the see of an Orthodox Greek metropolitan, whose large cathedral is richly decorated in

the interior with paintings and statues. The Kortcha school for girls, conducted by American missionaries, is the only educa- tional establishment in which the Turkish government permits the use of Albanian as the language of instruction. The local trade is chiefly agricultural.

KORYAKS, a Mongoloid people of north-eastern Siberia, in- habiting the coast-lands of the Bering Sea to the south of the Anadyr basin and the country to the immediate north of the Kamchatka Peninsula, the southernmost limit of their range being Tigilsk. They are akin to the Chukchis, whom they closely resemble in physique and in manner of life. Thus they are divided into the settled fishing tribes and the nomad reindeer breeders and hunters. The former are described as being more morally and physically degraded even than the Chukchis, and hopelessly poor. The Koryaks of the interior, on the other hand, still own enormous reindeer herds, to which they are so attached that they refuse to part with an animal to a stranger at any price. They are in disposition brave, intelligent and self-reliant, and recognize no master. They have ever tenaciously resisted Russian aggression, and in their fights with the Cossacks have proved themselves recklessly brave. When outnumbered they would kill their women and children, set fire to their homes, and die fighting. Families usually gather in groups of sixes or sevens, forming miniature states, in which the nominal chief has no predominating authority, but all are equal. The Koryaks are polygamous, earning their wives by working for their fathers-in- law. The women and children are treated well, and Koryak courtesy and hospitality are proverbial. The chief wedding ceremony is a forcible abduction of the bride. They kill the aged and infirm, in the belief that thus to save them from pro- tracted sufferings is the highest proof of affection. The victims choose their mode of death, and young Koryaks practise the art of giving the fatal blow quickly and mercifully. Infanticide was formerly common, and one of twins was always sacrificed. They burn their dead. The prevailing religion is Shamanism; sacrifices are made to evil spirits, the heads of the victims being placed on stones facing east.

See G. Kennan, Tent Life in Siberia (1871); "Uber die Koriaken u. ihnen nahe verwandten Tchouktchen," in Bui. Acad. Sc. St. Petersburg, xii. 99.

KOSCIUSCO, the highest mountain in Australia, in the range of the Australian Alps, towards the south-eastern extremity of New South Wales. Its height is 7328 ft. An adjacent peak to the south, Mueller's Peak, long considered the highest in the con- tinent, is 7 268 ft. high. A meteorological station was established on Kosciusco in 1897.

KOSCIUSZKO, TADEUSZ ANDRZEJ BONAWENTURA (1746-1817), Polish soldier and statesman, the son of Ludwik Kosciuszko, sword-bearer of the palatinate of Brzesc, and Tekla Ratomska, was born in the village of

Mereczowszczyno. After being educated at home he entered the corps of cadets at Warsaw, where his unusual ability and energy attracted the notice of Prince Adam Casimir Czartoryski, by whose influence in 1769 he

was sent abroad at the expense of the state to complete his military education. In Germany, Italy and France he studied diligently, completing his course at Brest, where he learnt fortification and naval tactics, returning to Poland in 1 774 with the rank of captain of artillery. While engaged in teaching the daughters of the Grand Hetman, Sosnowski of Sosnowica, drawing and mathe- matics, he fell in love with the youngest of them, Ludwika, and not venturing to hope for the consent of her father, the lovers resolved to fly and be married privately. Before they could accomplish their design, however, the wooer was attacked by Sosnowski's retainers, but defended himself valiantly till, covered with wounds, he was ejected from the house. This was in 1776. Equally unfortunate was Kosciuszko's wooing of Tekla Zurowska in 1 79 1 , the father of the lady in this case also refusing his consent. In the interval between these amorous episodes Kosciuszko won his spurs in the New World. In 1776 he entered the army of the United States as a volunteer, and brilliantly distinguished himself, especially during the operations about New York and at Yorktown. Washington promoted Kosciuszko to the rank of a col- onel of artillery and made him his adjutant. His humanity and charm of manner made him moreover one the most popular of the American officers. In 1783 Kosciuszko was rewarded for his services and his devotion to the cause of American independence with the thanks of Congress, the privilege of American citizenship, a considerable annual pension with landed estates, and the rank of brigadier-general, which he retained in the Polish service.

In the war following upon the proclamation of the constitution of the 3rd of May 1791 and the formation of the reactionary Con- federation of Targowica (see Poland: History), Kosciuszko took a leading part. As the commander of a division under Prince Joseph Poniatowski he distinguished himself at the battle of Zielence in 1792, and at Dubienka (July 18) with 4000 men and 10 guns defended the line of the Bug for five days against the Russians with 18,000 men and 60 guns, subsequently retiring upon Warsaw unmolested. When the king acceded to the Targo- wicians, Kosciuszko with many other Polish generals threw up his commission and retired to Leipzig, which speedily became the centre of the Polish emigration. In January 1 793 , provided with letters of introduction from the French agent Perandier, Kosciu- .szko went on a political mission to Paris to induce the revolution- ary government to espouse the cause of Poland. In return for assistance he promised to make the future government of Poland as close a copy of the French government as possible; but the Jacobins, already intent on detaching Prussia from the anti- French coalition, had no serious intention of fighting Poland's battles. The fact that

Kosciuszko's visit synchronized with the execution of Louis XVI. subsequently gave the enemies of Poland a plausible pretext for accusing hef of Jacobinism, and thus pre- judicing Europe against her. On his return to Leipzig Kosciu- szko was invited by the Polish insurgents to take the command of the national armies, with dictatorial power. He hesitated at first, well aware that a rising in the circumstances was premature. " I will have nothing to do with Cossack raiding," he replied; " if war we have, it must be a regular war." He also insisted thai, the war must be conducted on the model of the American War of Independence, and settled down in the neighbourhood of Cracow to await events. When, however, he heard that the insurrection had already broken out, and that the Russian armies were con centrating to crush it, Kosciuszko hesitated no longer, but hastened to Cracow, which he reached on the 23rd of March 1 794. On the following day his arms were consecrated according to ancient custom at the church of the Capucins, by way of giving the insurrection a religious sanction incompatible with Jacobin- ism. The same day, amidst a vast concourse of people in the market-place, Kosciuszko took an oath of fidelity to the Polish nation; swore to wage war against the enemies of his country; but protested at the same time that he would fight only for the independence and territorial integrity of Poland.

The insurrection had from the first a purely popular character. We find none of the great historic names of Poland in the lists of the original confederates. For the most part the confederates of Kosciuszko were small squires, traders, peasants and men of

low degree generally. Yet the comparatively few gentlemen who joined the movement sacrificed everything to it. Thus, to take but a single instance, Karol Prozor sold the whole of his ancestral estates and thus contributed 1,000,000 thalers to the cause. From the 24th of March to the 1st of April Kosciuszko remained at Cracow organizing his forces. On the 3rd of April at Raclawice, with 4000 regulars, and 2000 peasants armed only with scythes and pikes, and next to no artillery, he defeated the Russians, who had 5000 veterans and 30 guns. This victory had an immense moral effect, and brought into the Polish camp crowds of waverers to what had at first seemed a desperate cause. For the next two months Kosciuszko remained on the defensive near Sandomir. He durst not risk another engagement with the only army which Poland so far possessed, and he had neither money, officers nor artillery. The country, harried incessantly during the last two years, was in a pitiable condition. There was nothing to feed the troops in the very provinces they occupied, and pro- visions had to be imported from

Galicia. Money could only be obtained-by such desperate expedients as the melting of the plate of the churches and monasteries, which was brought in to Kos- ciuszko's camp at Pinczow and subsequently coined at Warsaw, minus the royal effigy, with the inscription: " Freedom, Integrity and Independence of the Republic, 1794." Moreover, Poland was unprepared. Most of the regular troops were incorporated in the Russian army, from which it was very difficult to break away, and until these soldiers came in Kosciuszko had principally to depend on the valour of his scythemen. But in the month of April the whole situation improved. On the 17th of that month the 2000 Polish troops in Warsaw expelled the Russian garrison after days of street fighting, chiefly through the ability of General Mokronowski, and a provisional government was formed. Five days later Jakob Jasinski drove the Russians from Wilna.

By this time Kosciuszko's forces had risen to 14,000, of whom 10,000 were regulars, and he was thus able to resume the offensive. He had carefully avoided doing anything to provoke Austria or Prussia. The former was described in his manifestoes as a potential friend; the latter he never alluded to as an enemy. " Remember," he wrote, " that the only war we have upon our hands is war to the death against the Muscovite tyranny." Nevertheless Austria remained suspicious and obstructive; and the Prussians, while professing neutrality, very speedily effected a junction with the Russian forces. This Kosciuszko, misled by the treacherous assurances of Frederick William's ministers, never anticipated, when on the 4th of June he marched against General Denisov. He encountered the enemy on the 5th of June at Szczekociny, and then discovered that his 14,000 men had to do not merely with a Russian division but with the combined forces of Russia and Prussia, numbering 25,000 men. Nevertheless, the Poles acquitted themselves man- fully, and at dusk retreated in perfect order upon Warsaw un- pursued. Yet their losses had been terrible, and of the six Polish generals present three, whose loss proved to be irreparable, were slain, and two of the others were seriously wounded. A week later another Polish division was defeated at Kholm; Cracow was taken by the Prussians on the 22nd of June; and the mob at Warsaw broke upon the gaols and murdered the political prisoners in cold blood. Kosciuszko summarily punished the ringleaders of the massacres and had 10,000 of the rank and file drafted into his camp, which measures had a quieting effect. But now dissensions broke out among the members of the Polish government, and it required all the tact of Kosciuszko to restore order amidst this chaos of suspicions and recriminations. At this very time too he had need of all his ability and resource to meet the external foes of Poland. On the 9th of July Warsaw was invested by Frederick William of Prussia with an army of 25,000 men and 179 guns, and the Russian general Fersen with 16,000 men and 74 guns, while a third force of 11,000 occupied the right bank of

the Vistula. Kosciuszko for the defence of the city and its outlying fortifications could dispose of 35,000 men, of whom 10,000 were regulars. But the position, defended by 200 inferior guns, was a strong one, and the valour of the Poles and the engineering skill of

Kosciuszko, who was now in his element, frustrated all the efforts of the enemy. Two unsuccessful assaults were made upon the Polish positions on the 26th of August and the 1st of September, and on the 6th the Prussians, alarmed by the progress of the Polish arms in Great Poland, where Jan Henryk Dabrowski captured the Prussian fortress of Bydogoszcz and compelled General Schwerin with his 20,000 men to retire upon Kalisz, raised the siege. Elsewhere, indeed, after a brief triumph the Poles were everywhere worsted, and Suvarov, after driving them before him out of Lithuania was advancing by forced marches upon Warsaw. Even now, however, the situation was not desperate, for the Polish forces were still numerically superior to the Russian. But the Polish generals proved unequal to carrying out the plans of the dictator; they allowed themselves to be beaten in detail, and could not prevent the junction of Suvarov and Fersen. Kosciuszko himself, relying on the support of Poninski's division 4 m. away, attacked Fersen at Maciejowice on the 10th of October. But Poninski never appeared, and after a bloody encounter the Polish army of 7000 was almost annihilated by the 16,000 Russians; and Kosciuszko, seriously wounded and insensible, was made a prisoner on the field of battle. The long credited story that he cried "Finis Poloniae!" as he fell is a fiction.

Kosciuszko was conveyed to Russia, where he remained till the accession of Paul in 1796. On his return on the 19th of December 1796 he paid a second visit to America, and lived at Philadelphia till May 1798, when he went to Paris, where the FirsL Consul earnestly invited his co-operation against the Allies. But he refused to draw his sword unless Napoleon undertook to give the restoration of Poland a leading place in his plans; and to this, as he no doubt foresaw, Bonaparte would not consent. Again and again he received offers of high commands in the French army, but he kept aloof from public life in his house at Berville, near Paris, where the emperor Alexander visited him in 18 14. At the Congress of Vienna his importunities on behalf of Poland finally wearied Alexander, who preferred to follow the counsels of Czartoryski; and Kosciuszko retired to Solothurn, where he lived with his friend Zeltner. Shortly before his death, on the 2nd of April 181 7, he emancipated his serfs, insisting only on the maintenance of schools on the liberated estates. His remains were carried to Cracow and buried in the cathedral; while the people, reviving an ancient custom, raised a huge mound to his memory near the city.

Kosciuszko was essentially a democrat, but a democrat of the school of

Jefferson and Lafayette. He maintained that the republic could only be regenerated on the basis of absolute liberty and equality before the law; but in this respect he was far in advance of his age, and the aristocratic prejudices of his country- men compelled him to resort to half measures. He wrote Manoeuvres of Horse Artillery (New York, 1808) and a descrip- tion of the campaign of 1792 (in vol. xvi. of E. Raczynski's Sketch of the Poles and Poland (Posen, 1843).

See Jozef Zajaczek, History of the Revolution of 1794 (Pol.) (Lem- berg, 1881) ; Leonard Jakob Borejko Chodzko, Biographie du general Kosciuszko (Fontainebleau, 1837); Karol Falkenstein, Thaddaus Kosciuszko (2nd ed., Leipzig, 1834; French ed., Paris, 1839); Antoni Choloniewski, Tadeusz Kosciuszko (Pol.) (Lemberg, 1902) ; Franciszek Rychlicki, T. Kosciuszko and the Partition of Poland (Pol.) (Cracow, 1875). (R- N. B.)

KOSEN, a village and summer resort of Germany, in the Prussian province of Saxony, 33 m. by rail S. by W. of Halle, on the Saale. Pop. (1905), 2990. The town has a mineral spring, which is used for bathing, being efficacious for rheumatism and other complaints. Kosen, which became a town in 1869, has large mill- works; it has a trade in wood and wine. On the adjacent Rudelsburg, where there is a ruined castle, the German students have erected a monument to their comrades who fell in the Franco-German War of 1870-71. Hereon are also memorials to Bismarck and to the emperor William I. The town is famous as the central meeting-place of the German students' corps, which hold an annual congress here every Whitsuntide.

See Techow, Fiihrer durch Kosen und Vmgegend (Kosen, 1889); and Rosenberg, Kosen (Naumburg, 1877).

KOSHER, or Kasher (Hebrew clean, right, or fit), the Jewish term for any food or vessels for food made ritually fit for use, in contradistinction to those pasul, unfit, and terefah, forbidden. Thus the vessels used at the Passover are " kosher," as are also new metal vessels bought from a Gentile after they have been washed in a ritual bath. But the term is specially used of meat slaughtered in accordance with the law of Moses. The schochat or butcher must be a devout Jew and of high moral character, and be duly licensed by the chief rabbi. The slaughter- ing — the object of which is to insure the complete bleeding of the body, the Jews being forbidden to eat blood — is done by severing the windpipe with a long and razor-sharp

knife by one continuous stroke backwards and forwards. No unnecessary force is per- mitted, and no stoppage must occur during the operation. The knife is then carefully examined, and if there be the slightest flaw in its blade the meat cannot be eaten, as the cut would not have been clean, the uneven blade causing a thrill to pass through the beast and thus driving the blood again through the arteries. After this every portion of the animal is thoroughly examined, for if there is any organic disease the devout Jew cannot taste the meat. In order to soften meat before it is salted, so as to allow the salt to extract the blood more freely, the meat is soaked in water for about half an hour. It is then covered with salt for about an hour and afterwards washed three times. Kosher meat is labelled with the name of the slaughterer and the date of killing.

KOSLIN, or CoSlin, a town of Germany, in the Prussian province of Pomerania, at the foot of the Gollenberg (450 ft.), 5 m. from the Baltic, and 105 m. N.E. of Stettin by rail. Pop. (1905), 21,474. The town has two Evangelical and a Roman Catholic church, a gymnasium, a cadet academy and a deaf and dumb asylum. In the large market place is the statue of the Prussian king Frederick William I., erected in 1824, and there is a war memorial on the Friedrich Wilhelm Platz. The industries include the manufacture of soap, tobacco, machinery, paper, bricks and tiles, beer and other goods. Koslin was built about 1 188 by the Saxons, and raised to the rank of a town in 1266. In 1532 it accepted the doctrines of the Reformation. It was severely tried in the Thirty Years' War and in the Seven Years' War, and in 1720 it was burned down. On the Gollenberg stands a monument to the memory of the Pomeranians who fell in the war of 1813-15.

KOSSOVO, or Kosovo, a vilayet of European Turkey, com- prising the sanjak of Uskub in Macedonia, and the sanjaks of Prizren and Novibazar (q.v.) in northern Albania. Pop. (1905), about 1,100,000; area, 12,700 sq. m. For an account of the physical features of Kossovo, see Albania and Macedonia. The inhabitants are chiefly Albanians and Slavs, with smaller communities of Greeks, Turks, Vlachs and gipsies. A few good roads traverse the vilayet (see Uskub), and the railway from Salonica northward bifurcates at Uskiib, the capital, one branch going to Mitrovitza in Albania, the other to Nish in Servia. Despite the undoubted mineral wealth of the vilayet, the only mines working in 1907 were two chrome mines, at Orasha and Verbeshtitza. In the volume of its agricultural trade, however, Kossovo is unsurpassed by any Turkish province. The exports, worth about £950,000, include livestock, large quantities of grain and fruit, tobacco, vegetables, opium, hemp and skins. Rice is cultivated for local consumption, and sericulture is a growing industry, encouraged by the Administration of the Ottoman Debt. The yearly value of the imports is approximately £1,200,000; these include machinery and other

manufactured goods, metals, groceries, chemical products and petroleum, which is used in the flour-mills and factories on account of the pro- hibitive price of coal. There is practically no trade with Adriatic ports; two-thirds of both exports and imports pass through Salonica, the remainder going by rail into Servia. The chief towns, Uskiib (32,000), Prizren (30,000), Koprtilu (22,000), Ishtib [Slav. Stip] (21,000), Novibazar (12,000) and Prishtina (11,000) are described in separate articles.

In the middle ages the vilayet formed part of the Servian Empire, its northern districts are still known to the Serbs as Old

Servia {Star a Srbiya). The plain of Kossovo (Kossovopolje, " Field of Blackbirds "), a long valley lying west of Prishtina and watered by the Sibnitza, a tributary of the Servian Ibar, is famous in Balkan history and legend as the scene of the battle of Kossovo (1389), in which the power of Servia was destroyed by the Turks. (See Servia: History.)

KOSSUTH, FERENCZ LAJOS AKOS (1841-), Hungarian statesman, the son of Lajos Kossuth, was born on the 16th of November 1841, and educated at the Paris Polytechnic and the London University, where in 1859 he won a prize for political economy. After working as a civil engineer on the Dean Forest railway he went (1861) to Italy, where he resided for the next thirty-three years, taking a considerable part in the railway con- struction of the peninsula, and at the same time keeping alive the Hungarian independence question by a whole series of pamphlets and newspaper articles. At Cesena in 1876 he married Emily Hoggins. In 1885 he was decorated for his services by the Italian government. His last great engineering work was the construction of the steel bridges for the Nile. In 1894 he escorted his father's remains to Hungary, and the following year resolved to settle in his native land and took the oath of allegiance. As early as 1867 he had been twice elected a member of the Hun- garian diet, but on both occasions refused to accept the mandate. On the 10th of April 1895 he was returned for Tapolca and in 1896 for Cegled, and from that time took an active part in Hungarian politics. In the autumn of 1898 he became the leader of the obstructionists or " Independence Party," against the successive Szell, Khuen-Hadervary, Szapary and Stephen Tisza adminis- trations (1898 — 1904), exercising great influence not only in parliament but upon the public at large through his articles in the Egyetertes. The elections of 1905 having sent his party back with a large majority, he was received in audience by the king and helped to construct the Wekerle ministry, of which he was one of the most distinguished members.

See Sturm, The Almanack of the Hungarian Diet (1905-1910), art. "Kossuth" (Hung.) (Budapest, 1905).

KOSSUTH, LAJOS [Louis] (1802-1894), Hungarian patriot, was born at Monok, a small town in the county of Zemplin, on the 19th of September 1802. His father, who was descended from an old untitled noble family and possessed a small estate, was by profession an advocate. Louis, who was the eldest of four children, received from his mother a strict religious training. His education was completed at the Calvinist college of Sarospatak and at the university of Budapest. At the age of nineteen he returned home and began practice with his father. His talents and amiability soon won him great popularity, especially among the peasants. He was also appointed steward to the countess Szapary, a widow with large estates, and as her representative had a seat in the county assembly. This position he lost owing to a quarrel with his patroness, and he was accused of appro- priating money to pay a gambling debt. His fault cannot have been very serious, for he was shortly afterwards (he had in the meantime settled in Pesth) appointed by CountHunyadytobehis deputy at the National Diet in Pressburg (1825-1827, and again in 1832). It was a time when, under able leaders, a great national party was beginning the struggle for reform against the stagnant Austrian government. As deputy he had no vote, and he naturally took little share in the debates, but it was part of his duty to send written reports of the proceedings to his patron, since the government, with a well-grounded fear of all that might stir popular feeling, refused to allow any published reports. Kossuth's letters were so excellent that they were circulated in MS. among the Liberal magnates, and soon developed into an organized parliamentary gazette (Orszagyulesi tudositasok), of which he was editor. At once his name and influence spread. In order to increase the circulation, he ventured on lithographing the letters. This brought them under the official censure, and was forbidden. He continued the paper in MS., and when the government refused to allow it to be circulated through the post sent it out by hand. In 1836 the Diet was dissolved. Kossuth continued the agitation by reporting in letter form the debates of the county assemblies, to which he thereby gave a political

importance which they had not had when each was ignorant of the proceedings of the others. The fact that he embellished with his own great literary ability the speeches of the Liberals and Reformers only added to the influence of his news-letters. The government in vain attempted to suppress the letters, and other means having failed, he was in May 1837, with Weszelenyi and several others, arrested on a charge of high treason. After spending a year in prison at Ofen, he was tried and condemned to four more years' imprisonment. His confinement was strict and injured his

health, but he was allowed the use of books. He greatly increased his political information, and also acquired, from the study of the Bible and Shakespeare, a wonderful know- ledge of English. His arrest had caused great indignation. The Diet, which met in 1839, supported the agitation for the release of the prisoners, and refused to pass any government measures; Metternich long remained obdurate, but the danger of war in 1840 obliged him to give way. Immediately after his release Kossuth married Teresa Meszleny, a Catholic, who during his prison days had shown great interest in him. Henceforward she strongly urged him on in his political career; and it was the refusal of the Roman priests to bless their union that first prompted Kossuth to take up the defence of mixed marriages.

He had now become a popular leader. As soon as his health was restored he was appointed (January 1841) editor of the Pesti Hirlap, the newly founded organ of the party. Strangely enough, the government did not refuse its consent. The success of the paper was unprecedented. The circulation soon reached what was then the immense figure of 7000. The attempts of the government to counteract his influence by founding a rival paper, the Vilag, only increased his importance and added to the political excitement. The warning of the great reformer Szechenyi that by his appeal to the passions of the people he was leading the nation to revolution was neglected. Kossuth, indeed, was not content with advocating those reforms — the abolition of entail, the abolition of feudal burdens, taxation of the nobles — which were demanded by all the Liberals. By in- sisting on the superiority of the Magyars to the Slavonic inhabi- tants of Hungary, by his violent attacks on Austria (he already discussed the possibility of a breach with Austria), he raised the national pride to a dangerous pitch. At last, in 1844, the gov- ernment succeeded in breaking his connexion with the paper. The proprietor, in obedience to orders from Vienna (this seems the most probable account), took advantage of a dispute about salary to dismiss him. He then applied for permission to start a paper of his own. In a personal interview Metternich offered to take him into the government service. The offer was refused, and for three years he was without a regular position. He con- tinued the agitation with the object of attaining both the political and commercial independence of Hungary. He adopted the economic principles of List, and founded a society, the " Vede- gylet," the members of which were to consume none but home produce. He advocated the creation of a Hungarian port at Fiume. With the autumn of 1847 the great opportunity of his life came. Supported by the influence of Louis Batthyany, after a keenly fought struggle he was elected member for Buda- pest in the new Diet. " Now that I am a deputy, I will cease to be an agitator," he said. He at once became chief leader of the Extreme Liberals. Deak was absent. Batthyany, Szechenyi, Szemere, Eotvos, his rivals, saw how his intense personal ambition and egoism led him always to assume

the chief place, and to use his parliamentary position to establish himself as leader of the nation; but before his eloquence and energy all apprehensions were useless. His eloquence was of that nature, in its im- passioned appeals to the strongest emotions, that it required for its full effect the highest themes and the most dramatic situations. In a time of rest, though he could never have been obscure, he would never have attained the highest power. It was there- fore a necessity of his nature, perhaps unconsciously, always to drive things to a crisis. The crisis came, and he used it to the full. On the 3rd of March 1848, as soon as the news of the revolution

in Paris had arrived, in a speech of surpassing power he demanded parliamentary government for Hungary and constitutional government for the rest of Austria. He appealed to the hope of the Habsburgs, " our beloved Archduke Francis Joseph," to perpetuate the ancient glory of the dynasty by meeting half-way the aspirations of a free people. He at once became the leader of the European revolution; his speech was read aloud in the streets of Vienna to the mob by which Metternich was overthrown (March 13), and when a deputation from the Diet visited Vienna to receive the assent of the emperor to their petition it was Kossuth who received the chief ovation. Batthyany, who formed the first responsible ministry, could not refuse to admit Kossuth, but he gave him the ministry of finance, probably because that seemed to open to him fewest prospects of engrossing popularity. If that was the object, it was in vain. With wonderful energy he began developing the internal resources of the country: he established a separate Hungarian coinage — as always, using every means to increase the national self-consciousness; and it was characteristic that on the new Hungarian notes which he issued his own name was the most prominent inscription ; hence the name of Kossuth Notes, which was long celebrated. A new paper was started, to which was given the name of Kossuth Hirlapia, so that from the first it was Kossuth rather than the Palatine or the president of the ministry whose name was in the minds of the people associated with the new government. Much more was this the case when, in the summer, the dangers from the Croats, Serbs and the reaction at Vienna increased. In a great speech of nth July he asked that the nation should arm in self-defence, and demanded 200,000 men; amid a scene of wild enthusiasm this was granted by acclamation. When Jellachich was march- ing on Pesth he went from town to town rousing the people to the defence of the country, and the popular force of the Honved was his creation. When Batthyany resigned he was appointed with Szemere to carry on the government provisionally, and at the end of September he was made President of the Committee of National Defence. From this time he was in fact, if not in name, the dictator. With marvellous energy he kept in his own hands the direction of the whole government. Not a soldier himself, he had to control and direct the movements of armies; can we be surprised if

he failed, or if he was unable to keep control over the generals or to establish that military co-operation so essential to success? Especially it was Gorgei (q.v.) whose great abilities he was the first to recognize, who refused obedience; the two men were in truth the very opposite to one another: the one all feeling, enthusiasm, sensibility; the other cold, stoical, reckless of life. Twice Kossuth deposed him from the command; twice he had to restore him. It would have been well if Kossuth had had some- thing more of Gorgei's calculated ruthlessness, for, as has been truly said, the revolutionary power he had seized could only be held by revolutionary means; but he was by nature soft-hearted and always merciful; though often audacious, he lacked decision in dealing with men. It has been said that he showed a want of personal courage; this is not improbable, the excess of feeling which made him so great an orator could hardly be combined with the coolness in danger required of a soldier; but no one was able, as he was, to infuse courage into others. During all the terrible winter which followed, his energy and spirit never failed him. It was he who overcame the reluctance of the army to march to the relief of Vienna; after the defeat of Schwechat, at which he was present, he sent Bern to carry on the war in Transylvania. At the end of the year, when the Austrians were approaching Pesth, he asked for the mediation of Mr Stiles, the American envoy. Windischgratz, however, refused all terms, and the Diet and government fled to Debrecszin, Kossuth taking with him the regalia of St Stephen, the sacred Palladium of the Hungarian nation. Immediately after the accession of the Emperor Francis Joseph all the concessions of March had been revoked and Kossuth with his colleagues outlawed. In April 1849, when the Hungarians had won many successes, after sound- ing the army, he issued the celebrated declaration of Hungarian independence, in which he declared that " the house of Habsburg- Lorraine, perjured in the sight of God and man, had forfeited

the Hungarian throne." It was a step characteristic of his love for extreme and dramatic action, but it added to the dissensions between him and those who wished only for autonomy under the old dynasty, and his enemies did not scruple to accuse him of aiming at the crown himself. For the time the future form of government was left undecided, but Kossuth was appointed responsible governor. The hopes of ultimate success were frus- trated by the intervention of Russia; all appeals to the western powers were vain, and on the nth of August Kossuth abdicated in favour of Gorgei, on the ground that in the last extremity the general alone could save the nation. How Gorgei used his authority to surrender is well known; the capitulation was indeed inevitable, but a greater man than Kossuth would not have avoided

the last duty of conducting the negotiations so as to get the best terms.

With the capitulation of Villagos Kossuth's career was at an end. A solitary fugitive, he crossed the Turkish frontier. He was hospitably received by the Turkish authorities, who, supported by Great Britain, refused, notwithstanding the threats of the allied emperors, to surrender him and the other fugitives to the merciless vengeance of the Austrians. In January 1849 he was removed from Widdin, where he had been kept in honourable confinement, to Shumla, and thence to Katahia in Asia Minor. Here he was joined by his children, who had been confined at Pressburg; his wife (a price had been set on her head) had joined him earlier, having escaped in disguise. In September 1851 he was liberated and embarked on an American man-of-war. He first landed at Marseilles, where he received an enthusiastic welcome from the people, but the prince-president refused to allow him to cross France. On the 23rd of October he landed at Southampton and spent three weeks in England, where he was the object of extraordinary enthusiasm, equalled only by that with which Garibaldi was received ten years later. Addresses were presented to him at Southampton, Birmingham and other towns; he was officially entertained by the lord mayor of London; at each place he pleaded the cause of his unhappy country. Speaking in English, he displayed an eloquence and command of the language scarcely excelled by the greatest orators in their own tongue. The agitation had no immediate effect, but the indignation which he aroused against Russian policy had much to do with the strong anti-Russian feeling which made the Crimean War possible.

From England he went to the United States of America: there his reception was equally enthusiastic, if less dignified; an element of charlatanism appeared in his words and acts which soon destroyed his real influence. Other Hungarian exiles pro- tested against the claim he appeared to make that he was the one national hero of the revolution. Count Casimir Batthyany attacked him in The Times, and Szemere, who had been prime minister under him, published a bitter criticism of his acts and character, accusing him of arrogance, cowardice and duplicity. He soon returned to England, where he lived for eight years in close connexion with Mazzini, by whom, with some misgiving, he was persuaded to join the Revolutionary Committee. Quarrels of a kind only too common among exiles followed; the Hungarians were especially offended by his claim still to be called governor. He watched with anxiety every opportunity of once more freeing his country from Austria. An attempt to organize a Hungarian legion during the Crimean War was stopped ; but in 1859 he entered into negotiations with Napoleon, left England for Italy, and began the organization of a Hungarian legion, which was to make a descent on the coast of Dalmatia. The Peace of Villafranca made this impossible. From that time he resided in Italy; he refused to follow the other Hungarian

patriots, who, under the lead of Deak, accepted the composition of 1867; for him there could be no reconciliation with the house of Habsburg, nor would he accept less than full independence and a republic. He would not avail himself of the amnesty, and, though elected to the Diet of 1867, never took his seat. He never lost the affections of his countrymen, but he refrained from an attempt to give practical effect to his opinions, nor did he allow his name to become a new cause of dissension. A law of 1879, which deprived of citizenship

all Hungarians who had voluntarily been absent ten years, was a bitter blow to him.

He died in Turin on the 20th of March 1894; his body was taken to Pesth, where he was buried amid the mourning of the whole nation, Maurus Jokai delivering the funeral oration. A bronze statue, erected by public subscription, in the Kerepes cemetery, commemorates Hungary's purest patriot and greatest orator.

Many points in Kossuth's career and character will probably always remain the subject of controversy. His complete works were pub- lished in Hungarian at Budapest in 1880-1895. The fullest account of the Revolution is given in Helfcrt, Geschichte Oesterreichs (Leipzig, 1869, &c), representing the Austrian view, which may be compared with that of C. Gracza, History of the Hungarian War of Indepen- dence, 1848-1849 (in Hungarian) (Budapest, 1894). See also E. O. S., Hungary and its Revolutions, with a Memoir of Louis Kossuth (Bohn, 1854J; Horvath, 25 Jahre aus der Geschichte Ungarns, 1823- 1848 (Leipzig, 1 867) ;Maurice, Revolutions of 18 48-1 849 ; W.H. Stiles, Austria in 1848-1849 (New York, 1852) ; Szemere, Politische Charakterskizzen: III. Kossuth (Hamburg, 1853); Louis Kossuth, Memoirs of my Exile (London, 1880); Pulszky, Meine Zeit, mein Leben (Pressburg, 1880) ; A. Somogyi, Ludwig Kossuth (Berlin, 1894). (J. W. He.)

KOSTER (or Coster), LAURENS (c. 1370-1440), Dutch printer, whose claims to be considered at least one of the inventors of the art (see Typography) have been recognized by many investi- gators. His real name was Laurens Janssoen-Koster (i.e. sacristan) being merely the title which he bore as an official of the great parish church of Haarlem. We find him mentioned several times between 1417 and 1434 as a member of the great council, as an assessor (scabinus), and as the city treasurer. He probably perished in the plague that visited Haarlem in 1439-1440; his widow is mentioned in the latter year. His descendants, through his daughter Lucia, can be traced down to 1724.

See Peter Scriver, Beschryvinge der Stad Harlem (Haarlem, 1628) ; Scheltema, Levensschets van Laurens d. Koster (Haarlem, 1834); Van der Linde, De Haarlemsche Costerlegende (Hague, 1870).

KOSTROMA, a government of central Russia, surrounded by those of Vologda, Vyatka, Nizhniy-Novgorod, Vladimir and Yaroslav, lying mostly on the left bank of the upper Volga. It has an area of 32,480 sq. m. Its surface is generally undula- ting, with hilly tracts on the right bank of the Volga, and exten- sive flat and marshy districts in the east. Rocks of the Permian system predominate, though a small tract belongs to the Jurassic, and both are overlain by thick deposits of Quaternary clays. The soil in the east is for the most part sand or a sandy clay; a few patches, however, are fertile black earth. Forests, yield- ing excellent timber for ship-building, and in many cases still untouched, occupy 61 % of the area of the government. The export of timber is greatly facilitated by the navigable tributaries of the Volga, e.g. the Kostroma, Unzha, Neya, Vioksa and Vetluga. The climate is severe; frosts of 22 F. are common in January, and the mean temperature of the year is only 3°! (summer, 64°- 5; winter, —13° 3). The population,

which num bered 1,176,000 in 1870 and 1,424,171 in 1897, is almost entirely Russian. The estimated population in 1906 was 1,596,700. Out of 20,000,000 acres, 7,861,500 acres belong to private owners, 6,379,50° to the peasant communities, 3,660,800 to the crown, and 1,243,000 to the imperial family. Agriculture is at a low ebb; only 4,000,000 acres are under crops (rye, oats, wheat and barley) , and the yield of corn is insufficient for the wants of the population. Flax and hops are cultivated to an increasing extent. But market-gardening is of some importance. Bee-keeping was formerly an important industry. The chief articles of commerce are timber, fuel, pitch, tar, mushrooms, and wooden wares for building and household purposes, which are largely manufactured by the peasantry and exported to the steppe governments of the lower Volga and the Don. Boat-building is also carried on. Some other small industries, such as the manufacture of silver and copper wares, leather goods, bast mats and sacks, lace and felt boots, are carried on in the villages ; but the trade in linen and towelling, formerly the staple, is declining. There are cotton, flax and linen mills, engineering and chemical works, distilleries, tanneries and paper mills. The government of Kostroma is divided into twelve districts, the

chief towns of which, with populations in 1897, are Kostroma (g.v.), Bui (2626), Chukhloma (2200), Galich (6182), Kineshma (7564), Kologriv (2566), Makariev (6068), Nerekhta (3002), Soligalich (3420), Varnavin (1140), Vetluga (5200) and Yurievets (4778).

KOSTROMA, a town of Russia, capital of the government of the same name, 230 m. N.N.E. of Moscow and 57 m. E.N.E. from Yaroslav, on the left bank of the Volga, at the mouth of the navigable Kostroma, with suburbs on the opposite side of the Volga. Pop. (1897), 41,268. Its glittering gilded cupolas make it a conspicuous feature in the landscape as it climbs up the terraced river bank. It is one of the oldest towns of Russia, having been founded in 1152. Its fort was often the refuge of the princes of Moscow during war, but the town was plundered more than once by the Tatars. The cathedral, built in 1239 and rebuilt in 1773, is situated in the kreml, or citadel, and is a fine monument of old Russian architecture. In the centre of the town is a monument to the peasant Ivan Susanin and the tsar Michael (1851). The former sacrificed his own life in 1669 by leading the Poles astray in the forests in order to save the life of his own tsar Michael Fedeorovich. On the opposite bank of the Volga, close to the water's edge, stands the monastery of Ipati- yev, founded in 1330, with a cathedral built in 1586, both associ- ated with the election of Tsar Michael

(1669). Kostroma has been renowned since the 16th century for its linen, which was exported to Holland, and the manufacture of linen and linen-yarn is still kept up to some extent. The town has also cotton- mills, tanneries, saw-mills, an iron-foundry and a machine factory. It carries on an active trade — importing grain, and exporting linen, linen yarn, leather, and especially timber and wooden wares.

KOSZEG (Ger. Giins), a town in the county of Vas, in Hungary, 173 m. W. of Budapest by rail. Pop. (1900), 7422. It is pleasantly situated in the valley of the Giins, and is dominated towards the west by the peaks of Altenhaus (2000 ft.) and of the Geschriebene Stein (2900 ft.). It possesses a castle of Count Esterhazy, a modern Roman Catholic Church in Gothic style and two convents. It has important cloth factories and a lively trade in fruit and wine. The town has a special historical interest for the heroic and successful defence of the fortress by Nicolas Jurisics against a large army of Sultan Soliman, in July-August 1332, which frustrated the advance of the Turks to Vienna for that year.

To the south-east of Koszeg, at the confluence of the Giins with the Raab, is situated the town of Sarvar (pop. 3158), formerly fortified, where in 1526 the first printing press in Hungary was established.

KOTAH, a native state of India, in the Rajputana agency, with an area of 5684 sq. m. The country slopes gently north- wards from the high table-land of Malwa, and is drained by the Chambal with its tributaries, all flowing in a northerly or north-easterly direction. The Mokandarra range, from 1200 to 1600 ft. above sea-level, runs from south-east to north-west. The Mokandarra Pass through these hills, in the neighbourhood of the highest peak (1671 ft.), has been rendered memorable by the passage of Colonel Monson's army on its disastrous retreat in 1804. There are extensive game preserves, chiefly covered with grass. In addition to the usual Indian grains, wheat, cotton, poppy, and a little tobacco of good quality are cultivated. The manufactures are very limited. Cotton fabrics are woven, but are being rapidly superseded by the cheap products of Bombay, and Manchaster. Articles of wooden furniture are also constructed. The chief articles of export are opium and grain; salt, cotton and woollen cloth are imported.

Kotah is an offshoot from Bundi state, having been bestowed upon a younger son of the Bundi raja by the emperor Shah Jahan in return for services rendered him when the latter was in rebel- lion against his father Jahangir. In 1897 a considerable portion of the area taken to form Jhalawar (q.v.) in 1838 was restored to . Kotah. In 1901 the population was 544,879, showing a decrease of 24% due to the results of famine. The estimated revenue is £206,000; tribute, £28,000. The maharao Umad

Singh, was

born in 1873, and succeeded in 1889. He was educated at the Mayo College, Ajmere, and became a major in the British army. A continuation of the branch line of the Indian Midland rail- way from Goona to Baran passes through Kotah, and it is also traversed by a new line, opened in 1909. The state suffered from drought in 1896-1897, and again more severely in 1899-1900.

The town of Kotah is on the right bank of the Chambal. Pop. (1901), 33,679. It is surrounded and also divided into three parts by massive walls, and contains an old and a new palace of the maharao and a number of fine temples. Muslins are the chief articles of manufacture, but the town has no great trade, and this and the unhealthiness of the site may account for the decrease in population.

KOTAS (Kotar, Koter, Kohatur, Gauhatar), an aboriginal tribe of the Nilgiri hills, India. They are a well-made people, of good features, tall, and of a dull copper colour, but some of them are among the fairest of the hill tribes. They recognize no caste among themselves, but are divided into keris (streets), and a man must marry outside his keri. Their villages (of which there are seven) are large, averaging from thirty to sixty huts. They are agriculturists and herdsmen, and the only one of the hill tribes who practise industrial arts, being excellent as carpenters, smiths, tanners and basket-makers. They do menial work for the Todas, to whom they pay a tribute. They worship ideal gods, which are not represented by any images. Their language is an old and rude dialect of Kanarese. In 1901 they nurnbered 1267.

KOTKA, a seaport of Finland, in the province of Viborg, 35 m. by rail from Kuivola junction on the Helsingfors railway, on an island of the same name at the mouth of the Kymmene river. Pop. (1904), 7628. It is the chief port for exports from and imports to east Finland and a centre of the timber trade. KOTRI, a town of British India, in Karachi district, Sind, situated on the right bank of the Indus. Pop. (1901), 7617. Kotri is the junction of branches of the North- Western railway, serving each bank of the Indus, which is here crossed by a railway bridge. It was formerly the station for Hyderabad, which lies across the Indus, and the headquarters of the Indus steam flotilla, now abolished in consequence of the development of railway facilities. Besides its importance as a railway centre, however, Kotri still has a considerable general transit trade by river.

KOTZEBUE, AUGUST FRIEDRICH FERDINAND VON (1761-1819), German dramatist, was born on the 3rd of May, 1761, at Weimar. After attending the gymnasium of his native town, he went in his sixteenth year

to the university of Jena, and afterwards studied about a year in Duisburg. In 1780 he completed his legal course and was admitted an advocate. Through the influence of Graf Gortz, Prussian ambassador at the Russian court, he became secretary of the governor-general of St Petersburg, In 1783 he received the appointment of assessor to the high court of appeal in Reval, where he married the daughter of a Russian lieutenant-general. He was ennobled in 1785, and became president of the magistracy of the province of Esthonia. In Reval he acquired considerable reputation by his novels, Die Leiden der Orlenbergischen Famttie (1785) and Geschichte meines Vaters (1788), and still more by the plays Adelheid von Wulfingen (1789), Menschenhass und Reue (1790) and Die Indianer in England (1790). The good impression produced by these works was, however, almost effaced by a cynical dramatic satire, Doktor Bahrdt mit der eisernen Slim, which appeared in 1790 with the name of Knigge on the title- page. After the death of his first wife Kotzebue retired from the Russian service, and lived for a time in Paris and Mainz; he then settled in 1795 on an estate which he had acquired near Reval and gave himself up to literary work. Within a few years he published six volumes of miscellaneous sketches and stories (Die jiingsten Kinder meiner Laune, 1 793-1 796) and more than twenty plays, the majority of which were translated into several European languages. In 1798 he accepted the office of drama- tist to the court theatre in Vienna, but owing to differences with the actors he was soon obliged to resign. He now returned to

his native town, but as he was not on good terms with Goethe, and had openly attacked the Romantic school, his position in Weimar was not a pleasant one. He had thoughts of returning to St Petersburg, and on his journey thither he was, for some unknown reason, arrested at the frontier and transported to Siberia. Fortunately he had written a comedy which flattered the vanity of the emperor Paul I.; he was consequently speedily brought back, presented with an estate from the crown lands of Livonia, and made director of the German theatre in St Petersburg. He. returned to Germany when the em- peror Paul died, and again settled in Weimar; he found it, however, as impossible as ever to gain a footing in literary society, and turned his steps to Berlin, where in association with Garlieb Merkel (i 769-1850) he edited Der Freimiitige (1803-1807) and began his Almanack dramatischer Spiele (1803-1820). Towards the end of 1806 he was once more in Russia, and in the security of his estate in Esthonia wrote many satirical articles against Napoleon in his journals Die Biene and Die Grille. As councillor of state he was attached in 1816 to the department for foreign affairs in St Petersburg, and in 181 7 went to Germany as a kind of

spy in the service of Russia, with a salary of 15,000 roubles. In a weekly journal {Liter arisches Wochenblatt) which he published in Weimar he scoffed at the pretensions of those Germans who demanded free institutions, and became an object of such general dislike that he was obliged to move to Mannheim. He was especially de- tested by the young enthusiasts for liberty, and one of them, Karl Ludwig Sand, a theological student, stabbed him, in Mannheim, on the 23rd of March 1819. Sand was executed, and the govern- ment made his crime an excuse for placing the universities under strict supervision.

Besides his plays, Kotzebue wrote several historical works, which, however, are too one-sided and prejudiced to have much value. Of more interest are his autobiographical writings, Meine Flucht nach Paris im Winter 1790 (1791), Uber meinen Aufenthalt in Wien (1799), Das merkwurdigsle Jahr tneines Lebens (1801), Erinnerungen aus Paris (1804), and Erinnerungen von meiner Reise aus Liefland nach Rom und Neapel (1805). As a dramatist he was extraordinarily prolific, his plays number- ing over 200; his popularity, not merely on the German, but on the European stage, was unprecedented. His success, however, was due less to any conspicuous literary or poetic ability than to an extraordinary facility in the invention of effective situa- tions; he possessed, as few German playwrights before or since, the unerring instinct for the theatre; and his influence on the technique of the modern drama from Scribe to Sardou and from Bauernfeld to Sudermann is unmistakable. Kotzebue is to be seen to best advantage in his comedies, such as Der Wildfang, Die beiden Klingsberg and Die deutschen Kleinstddter, which contain admirable genre pictures of German life. These plays held the stage in Germany long after the once famous Menschen- hass und Reue (known in England as The Stranger), Graf Ben- jowsky, or ambitious exotic tragedies like Die Sonnenjungfrau and Die Spanier in Peru (which Sheridan adapted as Pizarro) were forgotten.

Two collections of Kotzebue's dramas were published during his lifetime: Schauspiele (5 vols., 1797); Neue Schauspiele (23 vols., 1798-1820). His Sdmtliche dramatische Werke appeared in 44 vols., in 1 827-1 829, and again, under the title Theater, in 40 vols., in 1 840-1 841. A selection of his plays in 10 vols, appeared at Leipzig in 1867-1868. Cp. H. Doring, A. von Kotzebues Leben (1830); W. von Kotzebue, A. von Kotzebue (1881); Ch. Rabany, Kotzebue, sa vie et son temps (1893); W. Sellier, Kotzebue in England (1901).

KOTZEBUE, OTTO VON (1787-1846), Russian navigator, second son of the foregoing, was born at Reval on the 30th of December 1787. After being educated at the St Petersburg school of cadets, he accompanied Krusenstern on his voyage of 1 803-1 806. After his promotion to

lieutenant Kotzebue was placed in command of an expedition, fitted out at the expense of the imperial chancellor, Count Rumantsoff , in the brig " Rurick." In this vessel, with only twenty-seven men, Kotzebue set out on the 30th of July 18 15 to find a passage across the Arctic Ocean and explore the less-known parts of Oceania. Proceeding

by Cape Horn, he discovered the Romanzov, Rurik and Krusen- stern Islands, then made for Kamchatka, and in the middle of July proceeded northward, coasting along the north-west coast of America, and discovering and naming Kotzebue Gulf or Sound and Krusenstern Cape. Returning by the coast of Asia, he again sailed to the south, sojourned for three weeks at the Sand- wich Islands, and en the 1st of January 181 7 discovered New Year Island. After some further cruising in the Pacific he again proceeded north, but a severe attack of illness compelling him to return to Europe, he reached the Neva on the 3rd of August 1818, bringing home a large collection of previously unknown plants and much new ethnological information. In 1823 Kot- zebue, now a captain, was entrusted with the command of an expedition in two ships of war, the main object of which was to take reinforcements to Kamchatka. There was, however, a staff of scientists on board, who collected much valuable in- formation and material in geography, ethnography and natural history. The expedition, proceeding by Cape Horn, visited the Radak and Society Islands, and reached Petropavlovsk in July 1824. Many positions along the coast were rectified, the Naviga- tor islands visited, and several discoveries made. The expe- dition returned by the Marianna, Philippine, New Caledonia and Hawaiian Islands, reaching Kronstadt on the 10th of July 1826. There are English translations of both Kotzebue's narratives: A Voyage of Discovery into the South Sea and Beering's Straits for the Purpose of exploring a North-East Passage, undertaken in the Years 1815-1818 (3 vols. 182 1), and A New Voyage Round the World in the Years 1823-1826 (1830). Three years after his return from his second voyage, Kotzebue died at Reval on the 15th of February 1846.

KOUMISS, milk-wine, or milk brandy, a fermented alco- holic beverage prepared from milk. It is of very ancient origin, and according to Herodotus was known to the Scythians. The name is said to be derived from an ancient Asiatic tribe, the Kumanes or Romans. It is one of the staple articles of diet of the Siberian and Caucasian races, but of late years it has also been manufactured on a considerable scale in western Europe, on account of its valuable medicinal properties. It is generally made from mares' or camels' milk by a process of fermentation set up by the addition to the fresh milk of a small quantity of the finished article. This fermentation, which appears to be of a symbiotic nature, being dependent on the action of two dis- tinct types of organisms, the one a fission fungus, the other a true yeast, eventuates in the conversion of a part of the milk

sugar into lactic acid and alcohol. Koumiss generally contains 1 to 2% of alcohol, 0-5 to 1-5% of lactic acid, 2 to 4% of milk sugar and 1 to 2 % of fat. Kefir is similar to koumiss, but is usually prepared from cows' milk, and the fermentation is brought about by the so-called Kefir Grains (derived from a plant) .

KOUMOUNDOUROS, ALEXANDROS (1814-1883), Greek statesman, whose name is commonly spelt Coumoundouros, was born in 18 14. His studies at the university of Athens were repeatedly interrupted for lack of means, and he began to earn his living as a clerk. He took part in the Cretan insurrection of 1841, and in the demonstration of 1843, by which the Greek constitution was obtained from King Otto, he was secretary to General Theodoraki Grivas. He then settled down to the bar at Kalamata in Messenia, where he married a lady belonging to the Mavromichalis family. He was elected to the chamber in 1851, and four years later his eloquence and ability had secured the president's chair for him. He became minister of finance in 1856, and again in 1857 and 1859. He adhered to the moder- ate wing of the Liberal party until the revolution of 1862 and the dethronement of King Otto, when he was minister of justice in the provincial government. He was twice minister of the interior under Kanaris, in 1864 and in 1865. In March 1865 he became prime minister, and he formed several subsequent admini- strations in the intervals of the ascendancy of Tricoupi. During the Cretan insurrection of 1866-68 he made active warlike preparations against Turkey, but was dismissed by King George, who recognized that Greece could not act without the support of the Powers. He was again premier at the time of the outbreak

of the insurrection in Thessaly in January 1878, and supported by Delyanni as minister of foreign affairs he sent an army of 10,000 men to help the insurgents against Turkey. The troops were recalled on the understanding that Greece should be repre- sented at the Congress of Berlin. In October 1880 the fall of the Tricoupi ministry restored him to power, when he resumed his warlike policy, but repeated appeals to the courts of Europe yielded little practical result, and Koumoundouros was obliged to reduce his territorial demands and to accept the limited cessions in Thessaly and Epirus, which were carried out in July 1881. His ministry was overturned in 1882 by the votes of the new Thessalian deputies, who were dissatisfied with the administra- tive arrangements of the new province, and he died at Athens on the 9th of March 1883.

KOUSSO (Kosso or Cusso), a drug which consists of the panicles of the

pistillate flowers of Brayera anthelmintica, a handsome rosaceous tree 60 ft. high, growing throughout the table-land of Abyssinia, at an elevation of 3000 to 8000 ft. above the sea-level. The drug as imported is in the form of cylindrical rolls, about 18 in. in length and 2 in. in diameter, and comprises the entire inflorescence or panicle kept in form by a band wound transversely round it. The active principle is koussin or kosin, C31H38O10, which is soluble in alcohol and alkalis, and may be given in doses of thirty grains. Kousso is also used in the form of an unstrained infusion of j to % oz. of the coarsely powdered flowers, which are swallowed with the liquid. It is considered to be an effectual vermifuge for Taenia solium. In its anthelmintic action it is nearly allied to male fern, but it is much inferior to that drug and is very rarely used in Great Britain.

KOVALEVSKY, SOPHIE (1850-1891), Russian mathemati- cian, daughter of General Corvin-Krukovsky, was born at Mos- cow on the 15th of January 1850. As a young girl she was fired by the aspiration after intellectual liberty that animated so many young Russian women at that period, and drove them to study at foreign universities, since their own were closed to them. This led her, in 1868, to contract one of those conventional marriages in vogue at the time, with a young student, Walde- mar Kovalevsky, and the two went together to Germany to continue their studies. In 1869 she went to Heidelberg, where she studied under H. von Helmholtz, G.R. Kirchhoff, L. Konigs- berger and P. du Bois-Reymond, and from 1871-1874 read pri- vately with Karl Weierstrass at Berlin, as the public lectures were not then open to women. In 1874 the university of Gottingen granted her a degree in absentia, excusing her from the oral examination on account of the remarkable excellence of the three dissertations sent in, one of which, on the theory of partial differential equations, is one of her most remarkable works. Another was an elucidation of P.S. Laplace's mathe- matical theory of the form of Saturn's rings. Soon after this she returned to Russia with her husband, who was appointed professor of palaeontology at Moscow, where he died in 1883. At this time Madame Kovalevsky was at Stockholm, where Gustaf Mittag Leffler, also a pupil of Weierstrass, who had been recently appointed to the chair of mathematics at the newly founded university, had procured for her a post as lecturer. She discharged her duties so successfully that in 1884 she was appointed full professor. This post she held till her death on the 10th of February 1891. In 1888 she achieved the greatest of her successes, gaining the Prix Bordin offered by the Paris Academy. The problem set was " to perfect in one important point the theory of the movement of a solid body round an im- movable point," and her solution added a result of. the highest interest to those transmitted to us by Leonhard Eulerand J. L. Lagrange. So remarkable was this work that the value of the prize was doubled as a recognition of unusual merit. Unfor- tunately Madame

Kovalevsky did not live to reap the full reward of her labours, for she died just as she had attained the height of her fame and had won recognition even in her own country by election to membership of the St Petersburg Academy of Science.

See E. de Kerbedz, " Sophie de Kowalevski," Benidiconti del tircolo mathematico di Palermo (1891); the obituary notice by

G. Mittag Leffler in the Acta mathemalica, vol. xvi. ; and J. C. Poggen-dorff, Biographisch-literarisches Handworterbuch.

KOVNO (in Lithuanian Kauna), a government of north- western Russia, bounded N. by the governments of Courland and Vitebsk, S.E. by that of Vilna, and S. and S.W. by Suwalki and the province of East Prussia, a narrow strip touching the Baltic near Memel. It has an area of 15,687 sq. m. The level uniformity of its surface is broken only by two low ridges which nowhere rise above 806 ft. The geological character is varied, the Silurian, Devonian, Jurassic and Tertiary systems being all represented : the Devonian is that which occurs most frequently, and all are covered with Quaternary boulder-clays. The soil is either a sandy clay or a more fertile kind of black earth. The government is drained by the Niemen, Windau, Courland Aa and Dvina, which have navigable tributaries. In the flat depressions covered with boulder-clays there are many lakes and marshes, while forests occupy about 25ˆ of the surface. The climate is comparatively mild, the mean temperature at the city of Kovno being44°F. The population was 1,156,040 in 1870, and 1,553,244 in 1897. The estimated population in 1906 was 1,683,600. It is varied, consisting of Lithuanians proper and Zhmuds (together 74), Jews (14%), Germans (2!), Poles (9), with Letts and Russians; 76-6% are Roman Catholics, 13-7 Jews, 4-5 Protestants, and 5% belong to the Greek Church. Of the total 788,102 were women in 1897 and 147,878 were classed as urban. The principal occupation of the inhabitants is agricul- ture, 63% of the surface being under crops; both grain (wheat, rye, oats and barley) and potatoes are exported. Flax is culti- vated and the linseed exported. Dairying flourishes, and horse and cattle breeding are attracting attention. Fishing is impor- tant, and the navigation on the rivers is brisk. A variety of petty domestic industries are carried on by the Jews, but only to a slight extent in the villages. As many as 18,000 to 24,000 men are compelled every year to migrate in search of work. The factories consist principally of distilleries, tobacco and steam flour-mills, and hardware manufactories. Trade, especially the transit trade, is brisk, from the situation of the government on the Prussian frontier, the custom-houses of Yerburg and Tau- roggen being amongst the most important in Russia. The chief towns of the seven districts into which the government is divided, with their populations in 1897, are Kovno (q.v.), (Novo-Alexan- drovsk (6370), Ponevyezh

(13,044), Rosieny (7455), Shavli (15,914), Telshi (6215) and Vilkcmir (13,509).

The territory which now constitutes the government of Kovno was formerly known as Samogitia and formed part of Lithuania. During the 13th, 14th and 15th centuries the Livonian and Teu- tonic Knights continually invaded and plundered it, especially the western part, which was peopled with Zhmuds. In 1569 it was annexed, along with the rest of the principality of Lithu- ania, to Poland; and it suffered very much from the wars of Russia with Sweden and Poland, and from the invasion of Charles XII. in 1701. In 1795 the principality of Lithuania was annexed to Russia, and until 1872, when the government of Kovno was constituted, the territory now forming it was a part of the government of Vilna.

KOVNO, a town and fortress of Russia, capital of the govern- ment of the same name, stands at the confluence of the Niemen with the- Viliya, 550 m. S.W. of St Petersburg by rail, and 55 m. from the Prussian frontier. Pop. (1863), 23,937; (^t 73>743> nearly one-half being Jews. It consists of a cramped Old Town and a New Town stretching up the side of the Niemen. It is a first-class fortress, being surrounded at a mean distance of 25 m. by a girdle of forts, eleven in number. The town lies for the most part in the fork and is guarded by three forts in the direction of Vilna, one covers the Vilna bridge, while the southern ap- proaches are protected by seven. Kovno commands and bars the railway Vilna-Eydikuhnen. Its factories produce nails, wire-work and other metal goods, mead and bone-meal. It is an important entrepot for timber, cereals, flax, flour, spirits, bone-meal, fish, coal and building-stone passing from and to Prussia. The city possesses some 15th-century churches. It was founded in the nth century; and from 1384 to 1398 belonged

to the Teutonic Knights. Tsar Alexis of Russia plundered and burnt it in 1655. Here the Russians defeated the Poles on the 26th of June 183 1.

KOVROV, a town of Russia, in the government of Vladimir, 40 m. N.E. of the city of Vladimir by the railway from Moscow to Nizhniy-Novgorod, and on the Klyazma River. It has railway- carriage works, cotton mills, steam flour mills, tallow works and quarries of limestone, and carries on an active trade in the export of wooden wares and in the import of grain, salt and fish, brought from the Volga governments. Pop. (1890), 6600;

(1900), 16,806.

KOWTOW, or Kotou, the Chinese ceremonial act of prostra- tion as a sign of homage, submission, or worship. The word is formed from ko, knock, and tou, head. To the emperor, the " kowtow " is performed by kneeling three times, each act accompanied by touching the ground with the forehead.

KOZLOV, a town of Russia, in the government of Tambov, on the Lyesnoi Voronezh River, 45 m. W.N.W. of the city of Tambov by rail. Pop. (1900), 41,555. Kozlov had its origin in a small monastery, founded in the forest in 1627; nine years later, an earthwork was raised close by, for the protection of the Russian frontier against the Tatars. Situated in a very fertile country, on the highway to Astrakhan and at the head of water com- munication with the Don, the town soon became a centre of trade; as the junction of the railways leading to the Sea of Azov, to Tsaritsyn on the lower Volga, to Saratov and to Orel, its importance has recently been still further increased. Its export of cattle, grain, meat, eggs (22,000,000), tallow, hides, &c, is steadily growing, and it possesses factories, flour mills, tallow works, distilleries, tanneries and glue works.

KRAAL, also spelt craal, kraul, &c. (South African Dutch, derived possibly from a native African word, but probably from the Spanish corral, Portuguese curral, an enclosure for horses, cattle and the like), in South and Central Africa, a native village surrounded by a palisade, mud wall or other fencing roughly circular in form; by transference, the community living within the enclosure. Folds for animals and enclosures made specially for defensive purposes are also called kraals.

KRAFFT (or Kraft), ADAM (c. 1455-1507), German sculptor, of the Nuremberg school, was born, probably at Nuremberg, about the middle of the 15th century, and died, some say in the hospital, at Schwabach, about 1507. He seems to have emerged as sculptor about 1490, the date of the seven reliefs of scenes from the life of Christ, which, like almost every other specimen of his work, are at Nuremberg. The date of his last work, an Entombment, with fifteen life-size figures, in the Holzschuher chapel of the St John's cemetery, is 1507. Besides these, Krafft's chief works are several monumental reliefs in the various churches of Nuremberg; he produced the great Schreyer monu- ment (1492) for St Sebald's at Nuremberg, a skilful though mannered piece of sculpture opposite the Rathaus, with realistic figures in the costume of the time, carved in a way more suited to wood than stone, and too pictorial in effect; Christ bearing the Cross, above the altar of the same church; and various works made for public and private buildings, as the relief over the door of the Wagehaus, a St George and the Dragon, several Madonnas, and some purely decorative pieces, as coats of arms. His master- piece is perhaps the magnificent tabernacle, 62 ft. high, in the church of St Laurence (1493-1500). He also made the great

tabernacle for the Host, 80 ft. high, covered with statuettes, in Ulm Cathedral, and the very spirited " Stations of the Cross " on the road to the Nuremberg cemetery.

See Adam Krafft und seine Schule, by Friedrich Wanderer (1869) ; Adam Krafft und die Kilnstler seiner Zeit, by Berthold Daun (1897) ; Albert Giimbel in Repertorium fiir Kunstwissenschaft, Bd. xxv. Heft 5,

1902.

KRAGUYEVATS (also written Kraguievatz and Kragu- jevac), the capital of the Kraguyevats department of Servia; situated 59 m. S.S.W. of Belgrade, in a valley of the Shumadia, or " forest-land," and on the Lepenitsa, a small stream flowing north-east to join the Morava. On the opposite bank stands the picturesque hamlet of Obilichevo, with a large powder factory.

Kraguyevats itself is the main arsenal of Servia, and possesses an iron-foundry and a steam flour-mill. It is the seat of the district prefecture, of a tribunal, of a fine library, and of a large garrison. It boasts the finest college building and the finest modern cathedral (in Byzantine style) in Servia. In the first years of Servia's autonomy under Prince Milosh, it was the residence of the prince and the seat of government (1818-1839). Even later, between 1868 and 1880, the national assembly (Narodna Skupshtina) usually met there. In 1885 it was connected by a branch line (Kraguyevats-Lapovo) with the principal railway (Belgrade-Nish), and thenceforward the prosperity of the town steadily increased. Pop. (1900), 14,160. KRAKATOA (Krakatao, Krakatau), a small volcanic island in Sunda Strait, between the islands of Java and Sumatra, celebrated for its eruption in 1883, one of the most stupendous ever recorded. At some early period a large volcano rose in the centre of the tract where the Sunda Strait now runs. Long before any European had visited these waters an explosion took place by which the mountain was so completely blown away that only the outer portions of its base were left as a broken ring of islands. Subsequent eruptions gradually built up a new series of small cones within the great crater ring. Of these the most important rose to a height of 2623 ft. above the sea and formed the peak of the volcanic island of Krakatoa. But com- pared with the great neighbouring volcanoes of Java and Suma-tra, the islets of the Sunda Strait were comparatively unknown. Krakatoa'was uninhabited, and no satisfactory map or chart of it had been made. In 1680 it appears to have been in eruption, when great earthquakes took place and large quantities of pumice were ejected. But the effects of this disturbance had been so concealed by the subsequent spread of tropical vegetation that the very occurrence of the eruption had sometimes been called in question. At last, about 1877, earthquakes began to occur

frequently in the Sunda Strait and continued for the next few years. In 1883 the manifestations of subterranean commotion became more decided, for in May Krakatoa broke out in erup- tion. For some time the efforts of the volcano appear to have consisted mainly in the discharge of pumice and dust, with the usual accompaniment of detonations and earthquakes. But on the 26th of August a succession of paroxysmal explosions began which lasted till the morning of the 28th. The four most violent took place on the morning of the 27th. The whole of the northern and lower portion of the island of Krakatoa,- lying within the original crater ring of prehistoric times, was blown away; the northern part of the cone of Rakata almost entirely disappeared, leaving a vertical cliff which laid bare the inner structure of that volcano. Instead of the volcanic island which had previously existed, and rose from 300 to 1400 ft. above the sea, there was now left a submarine cavity, the bottom of which was here and there more than 1000 ft. below the sea-level. This prodigious evisceration was the result of successive violent explosions of the superheated vapour absorbed in the molten magma within the crust of the earth. The vigour and repetition of these explosions, it has been suggested, may have been caused by sudden inrushes of the water of the ocean as the throat of the volcano was cleared and the crater ring was lowered and ruptured. The access of large bodies of cold water to the top of the column of molten lava would probably give rise at once to some minor explosions, and then to a chilling of the surface of the lava and a consequent temporary diminution or even cessation of the volcanic eructations. But until the pent-up water-vapour in the lava below had found relief it would only gather strength until it was able to burst through the chilled crust and overlying water, and to hurl a vast mass of cooled lava, pumice and dust into the air.

The amount of material discharged during the two days of paroxysmal energy was enormous, though there are no satis- factory data for even approximately estimating it. A large cavity was formed where the island had previously stood, and the sea-bottom around this crater was covered with a wide and thick sheet of fragmentary materials. Some of the surrounding islands received such a thick accumulation of ejected stones and

dust as to bury their forests and greatly to increase the area of the land. So much was the sea filled up that a number of new- islands rose above its level. But a vast body of the fine dust was carried far and wide by aerial currents, while the floating pumice was transported for many hundreds of miles on the sur- face of the ocean. At Batavia, 100 m. from the centre of

erup- tion, the sky was darkened by the quantity of ashes borne across it, and lamps had to be used in the houses at midday. The darkness even reached as far as Bandong, a distance of nearly 150 miles. It was computed that the column of stones, dust and ashes projected from the volcano shot up into the air for a height of 17 m. or more. The finer particles coming into the higher layers of the atmosphere were diffused over a large part of the surface of the earth, and showed their presence by the brilliant sunset glows to which they gave rise. Within the tropics they were at first borne along by air-currents at an estimated rate of about 73 m. an hour from east to west, until within a period of six weeks they were diffused over nearly the whole space between the latitudes 30° N. and 45 S. Eventually they spread northwards and southwards and were carried over North and South America, Europe, Asia, South Africa and Australasia. In the Old World they spread from the north of Scandinavia to the Cape of Good Hope.

Another remarkable result of this eruption was the world-wide disturbance of the atmosphere. The culminating paroxysm on the morning of the 27th of August gave rise to an atmospheric wave or oscillation, which, travelling outwards from the vol- cano as a centre, became a great circle at 180 from its point of origin, whence it continued travelling onwards and contracting till it reached a node at the antipodes to Krakatoa. It was then reflected or reproduced, travelling backwards again to the volcano, whence it once more returned in its original direction. " In this manner its repetition was observed not fewer than seven times at many of the stations, four passages having been those of the wave travelling from Krakatoa, and three those – of the wave travelling from its antipodes, subsequently to which its traces were lost " (Sir R. Strachey).

The actual sounds of the volcanic explosions were heard over a vast area, especially towards the west. Thus they were noticed at Rodriguez, nearly 3000 English miles away, at Bangkok (1413 m.), in the Philippine Islands (about 1450 m.), in Ceylon (2058 m.) and in West and South Australia (from 1300 to 2250 m.). On no other occasion have sound-waves ever been perceived at anything like the extreme distances to which the detonations of Krakatoa reached.

Not less manifest and far more serious were the effects of the successive explosions of the volcano upon the waters of the ocean. A succession of waves was generated which appear to have been of two kinds, long waves with periods of more than an hour, and shorter but higher waves, with irregular and much briefer intervals. The greatest disturbance, probably resulting from a combination of both kinds of waves, reached a height of about 50 ft. The destruction caused by the rush of such a body of sea-water along the coasts and low islands was enormous. All vessels lying in

harbour or near the shore were stranded, the towns, villages and settlements close to the sea were either at once, or by successive inundations, entirely destroyed, and more than 36,000 human beings perished. The sea-waves travelled to vast distances from the centre of propagation. The long wave reached Cape Horn (7818 geographical miles) and possibly the English Channel (11,040 m.). The shorter waves reached Ceylon and perhaps Mauritius (2900 m.).

See R. D. M. Verbeek, Krakalau (Batavia, 1886); " The Eruption of Krakatoa and Subsequent Phenomena," Report of the Krakatoa Committee of the Royal Society (London, 1888).

KRAKEN, in Norwegian folk-lore, a sea-monster, believed to haunt the coasts of Norway. It was described in 1752 by the Norwegian bishop Pontoppidan as having a back about a mile and a half round and a body which showed above the sea like an island, and its arms were long enough to enclose the largest ship. The further assertion that the kraken darkened the water

around it by an excretion suggests that the myth was based on the appearance of some gigantic cuttle-fish.

See J. Gibson, Monsters of the Sea (1887) ; A. S. Packard, " Colossal Cuttle-fishes," American Naturalist (Salem, 1873), vol. vii. ; A. E. Verrill, " The Colossal Cephalopods of the Western Atlantic," in American Naturalist (Salem, 1875), vol. ix. ; and " Gigantic Squids," in Trans, of Connecticut Academy (1879), vol. v.

KRALYEVO (sometimes written Kraljevo or Kealievo), a city of Servia, and capital of a department bearing the same name. Kralyevo is built beside the river Ibar, 4 m. W. of its con- fluence with the Servian Morava; and in the midst of an upland valley, between the Kotlenik Mountains, on the north, and the Stolovi Mountains, on the south. Formerly known as Karano- vats, Kralyevo received its present name, signifying " the King's Town," from King Milan (1868-1889), who also made it a bishop- ric, instead of Chachak, 22 m. W. by N. Kralyevo is a garrison town, with a prefecture, court of first instance, and an agricultural school. But by far its most interesting feature is the Coronation church belonging to Jicha monastery. Here six or seven kings are said to have been crowned. The church is Byzantine in style, and has been partially restored; but the main tower dates from the year 12 10, when it was founded by St Sava, the patron saint of Servia. Pop. (1900), about 3600.

The famous monastery of Studenitsa, 24 m. S. by W. of Kral- yevo, stands high up among the south-western mountains, overlooking the Studenitsa, a

tributary of the Ibar. It consists of a group of old-fashioned timber and plaster buildings, a tall belfry, and a diminutive church of white marble, founded in 1 190 by King Stephen Nemanya, who himself turned monk and was canonized as St Simeon. The carvings round the north, south and west doors have been partially defaced by the Turks. The inner walls are decorated with Byzantine frescoes, among which only a painting of the Last Supper, and the portraits of five saints, remain unrestored. The dome and narthex are modern additions. Besides the silver shrine of St Simeon, many gold and silver ornaments, church vessels and old manuscripts, there are a set of vestments and a reliquary, believed by the monks to have been the property of St Sava.

KRANTZ (or Crantz), ALBERT (c. 1450-1517), German his- torian, was a native of Hamburg. He studied law, theology and history at Rostock and Cologne, and after travelling through western and southern Europe was appointed professor, first of philosophy and subsequently of theology, in the university of Rostock, of which he was rector in 1482. In 1493 he returned to Hamburg as theological lecturer, canon and prebendary in the cathedral. By the senate of Hamburg he was employed on more than one diplomatic mission abroad, and in 1500 he was chosen by the king of Denmark and the duke of Holstein as arbiter in their dispute regarding the province of Dithmarschen. As dean of the cathedral chapter, to which office he was appointed in 1 508, Krantz applied himself with zeal to the reform of eccle- siastical abuses, but, though opposed to various corruptions connected with church discipline, he had little sympathy with the drastic measures of Wycliffe or Huss. With Luther's pro- test against the abuse of Indulgences he was in general sympathy, but with the reformer's later attitude he could not agree. When, on his death-bed, he heard of the ninety-five theses, he is said, on good authority, to have exclaimed: " Brother, Brother, go into thy cell and say, God have mercy upon me!" Krantz died on the 7th of December 151 7.

Krantz was the author of a number of historical works which for the period when they were written are characterized by exceptional impartiality and research. The principal of these are Chronica regnorum aquilonarium Daniae, Sueciae, et Norvagiae (Strassburg, 1546); Vandalia, sive Historia de Vandalorum vera origine, &c. (Cologne, 1518); Saxonia (1520); and Metropolis, sive Historia de ecclesiis sub Carolo Magno in Saxonia (Basel, 1548). See life by N. Wilckens (Hamburg, 1722).

KRASNOVODSK, a seaport of Russian Transcaspia, on the N. shore of Balkhan or Krasnovodsk Bay, on the S. side of the Caspian Sea, opposite to Baku, and at 69 ft. below sea-level. Pop. (1897), 6359. It is defended by a fort. Here begins the Transcaspian railway to Merv and Bokhara. There is a fishing

industry, and salt and sulphur are obtained. Krasnovodsk, which is the capital of the Transcaspian province, was founded in 1869.

KRASNOYARSK, a town of Eastern Siberia, capital of the government of Yeniseisk, on the left bank of the Yenisei River, at its confluence with the Kacha, and on the highway from Mos- cow to Irkutsk, 670 m. by rail N.W. from the latter. Pop. (1900), 33.337- It nas a municipal museum and a railway technical school. It was founded by Cossacks in 1628, and during the early years of its existence it was more than once besieged by the Tatars and the Kirghiz. Its- commercial importance depends entirely upon the gold-washings of the Yeniseisk district. Brick-making, soap-boiling, tanning and iron-founding are carried on. The climate is very cold, but dry. The Yenisei River is frozen here for 160 days in the year.

KRASZEWSKI, JOSEPH IGNATIUS (1812-1887), Polish novelist and miscellaneous writer, was born at Warsaw on the 28th of July 181 2, of an aristocratic family. He showed a precocious talent for authorship, beginning his literary career with a volume of sketches from society as early as 1829, and for more than half a century scarcely ever intermitting his literary production, except during a period of imprisonment upon a charge of complicity in the insurrection of 183 1. He narrowly escaped being sent to Siberia, but, rescued by the intercession of powerful friends, he settled upon his landed property near Grodno, and devoted himself to literature with such industry that a mere selection from his fiction alone, reprinted at Lemberg from 187 1 to 1875, occupies 102 volumes. He was thus the most conspicuous literary figure of his day in Poland. His extreme fertility was suggestive of haste and carelessness, but he declared that the contrivance of his plot gave him three times as much trouble as the composition o! his novel. Apart from his gifts as a story-teller, he did not possess extraordinary mental powers; the " profound thoughts " culled from his writings by his admir- ing biographer Bohdanowicz are for the most part mere truisms. His copious invention is nevertheless combined with real truth to nature, especially evinced in the beautiful little story of Jermola the Potter (1857), from which George Eliot appears to have derived the idea of Silas Marner, though she can only have known it at second hand. Compared with the exquisite art of Silas Marner, Jermola appears rude and unskilful, but it is not on this account the less touching in its fidelity to the tenderest elements of human nature. Kraszewski's literary activity falls into two well-marked epochs, the earlier when, residing upon his estate, he produced romances like Jermola, Ulana (1843), Kordecki (1852), devoid of any special tendency, and that after 1863, when the

suspicions of the Russian government compelled him to settle in Dresden. To this period belong several political novels published under the pseudonym of Boleslawita, historical fictions such as Countess Cosel, and the " culture " romances Morituri (1874-1875) and Resurrecturi (1876), by which he is perhaps best known out of his own country. In 1884 he was accused of plotting against the German government and sentenced to seven years' imprisonment in a fortress, but was released in 1886, and withdrew to Geneva, where he died on the 19th of March 1887. His remains were brought to Poland and interred at Cracow. Kraszewski was also a poet and dramatist; his most celebrated poem is his epic Anafielas (3 vols., 1840-1843) on the history of Lithuania. He was indefatigable as literary critic, editor and translator, wrote several historical works, and was conspicuous as a restorer of the study of national archaeo- logy in Poland. Among his most valuable works were Lilwa (Warsaw, 2 vols., 1847-1850), a collection of Lithuanian anti- quities; and an aesthetic history of Poland (Posen, 3 vols., 1873-1875)- (R-G.)

KRAUSE, KARL CHRISTIAN FRIEDRICH (1781-1832), German philosopher, was born at Eisenberg on the 4th of May 1781, and died at Munich on the 27th of September 1832. Educated at first at Eisenberg, he proceeded to Jena, where he studied philosophy under Hegel and Fichte and became privat- dozent in 1802. In the same year, with characteristic impru- dence, he married a wife without dowry. Two years after,

lack of pupils compelled him to move to Rudolstadt and later to Dresden, where he gave lessons in music. In 1805 his ideal of a universal world-society led him to join the Freemasons, whose principles seemed to tend in the direction he desired. He published two books on Freemasonry, Die drei alteslen Kunst- urkunden der Freimaurerbrudersehajt and Hohere Vergeisligung der echt iiberlieferlen Grundsymbole der Freimaurerei, but his opinions drew upon him the opposition of the Masons. He lived for a time in Berlin and became a torivatdozent, but was unable to obtain a professorship. He therefore proceeded to Gottingen and afterwards to Munich, where he died of apoplexy at the very moment when the influence of Franz von Baader had at last obtained a position for him.

One of the so-called " Philosophers of Identity," Krause en- deavoured to reconcile the ideas of a God known by Faith or Conscience and the world as known to sense. God, intuitively known by Conscience, is not a personality (which implies limita- tions), but an all-inclusive essence (Wesen), which contains the Universe within itself. This system he called Panentheism, a com- bination of Theism and Pantheism. His theory of the world and of humanity is universal and idealistic. The world itself and man- kind, its highest component, constitute an organism (Gliedbau), and the universe is therefore a divine organism (Wesengliedbau). The process of

development is the formation of higher unities, and the last stage is the identification of the world with God. The form which this development takes, according to Krause, is Right or the Perfect Law. Right is not the sum of the condi- tions of external liberty but of absolute liberty, and embraces all the existence of nature, reason and humanity. It is the mode, or rationale, of all progress from the lower to the highest unity or identification. By its operation the reality of nature and reason rises into the reality of humanity. God is the reality which transcends and includes both nature and humanity. Right is, therefore, at once the dynamic and the safeguard of progress. Ideal society results from the widening of the organic operation of this principle from the individual man to small groups of men, and finally to mankind as a whole. The differences disappear as the inherent identity of structure predominates in an ever- increasing degree, and in the final unity Man is merged in God.

The comparatively small area of Krause's influence was due partly to the overshadowing brilliance of Hegel, and partly to two intrinsic defects. The spirit of his thought is mystical and by no means easy to follow, and this difficulty is accentuated, even to German readers, by the use of artificial terminology. He makes use of germanized foreign terms which are unintelli- gible to the ordinary man. His principal works are (beside those quoted above): Entwurf des Systems der Philosophie (1804); System der Sittenlehre (1810); Das Urbild der Menschheit (181 1); and Vorlesungen iiber das System der Philosophie (1828). He left behind him at his death a mass of unpublished notes, part of which has been collected and published by his disciples, H. Ahrens (1808-1874), Leonhardi, Tiberghien and others.

See H. S. Lindemann, Uebersichtliche Darstellung des Lebens . . . Krauses (1839); P. Hohlfeld, Die Krausesche Philosophie (1879); A. Procksch, Krause, ein Lebensbild nach seinen Briefen (1880); R. Eucken, Zur Erinnerung an Krause (1881); B. Martin, Krauses Leben und Bedeutung (1881), and Histories of Philosophy by Zeller, Windelband and Hoffding.

KRAWANG, a residency of the island of Java, Dutch East Indies, bounded E. and S. by Charibcn and the Preanger, W. by Batavia, and N. by the Java Sea, and comprising a few insig- nificant islands. The natives are Sundanese, but contain a large admixture of Middle Javanese and Bantamers in the north, where they established colonies in the 17 th century. Like the residency of Batavia, the northern half of Krawang is flat and occasionally marshy, while the southern half is mountainous and volcanic. Warm and cold mineral, salt and sulphur springs occur in the hills. Salt is extracted by the government, though in smaller quantities now than formerly. The principal products are rice, coffee, sugar, vanilla, indigo and nutmeg. Fishing is practised along the coast and forest culture in the

hills, while the

industries also include the manufacture of coarse linen, sacks and leather tanning. Gold and silver were formerly thought to be hidden in the Parang mountain in the Gandasoli district south-west of Purwakarta, and mining was begun by the Dutch East India Company in 1722. The largest part of the residency consists of private lands, and only the Purwakarta and Krawang divisions forming the middle and north-west sections come directly under government control. The remainder of the residency is divided between the Pamanukan-Chiasem lands occupying – the whole eastern half of the residency and the Tegalwaru lands in the south-western corner. The former is owned by a company and forms the largest estate in Java. The Tegalwaru is chiefly owned by Chinese proprietors. Purwakarta is the capital of the residency. Subang and Pamanukan both lie at the junction of several roads near the borders of Cheribon and are the chief centres of activity in the east of the residency.

KRAY VON KRAJOVA, PAUL, Freiherr (1735-1804), Austrian soldier. Entering the Austrian army at the age of nineteen, he arrived somewhat rapidly at the grade of major, but it was many years before he had any opportunity of distin- guishing himself. In 1784 he suppressed a rising in Transyl- vania, and in the Turkish wars he took an active part at Porczeny and the Vulcan Pass. Made major-general in 1790, three years later he commanded the advanced guard of the Allies operating in France. He distinguished himself at Famars, Charleroi, Fleurus, Weissenberg,.end indeed at almost every encounter with the troops of the French Republic. In the celebrated campaign of 1796 on the Rhine and Danube he did conspicuous service as a corps commander. At Wetzlar he defeated Kleber, and at Amberg and Wiirzburg he was largely responsible for the victory of the archduke Charles. In the following year he was less successful, being twice defeated on the Lahn and the Main. Kray commanded in Italy in 1799, and reconquered from the French the plain of Lombardy. For his victories of Verona, Mantua, Legnago and Magnano he was promoted Feldzeugmeister, and he ended the campaign by further victories at Novi and Fossano. Next year he commanded on the Rhine against Moreau. (For the events of this memorable campaign see French Revolutionary Wars.) As a consequence of the defeats he underwent at Biberach, Messkirch, &c, Kray was driven into Ulm, but by a skilful march round Moreau's flank succeeded in escaping to Bohemia. He was relieved of his command by the Austrian government, and passed his remaining years in retirement. He died in 1804. Kray was one of the best representatives of the old Austrian

army. Tied to an obsolete system and unable from habit to realize the changed conditions of warfare, he failed, but his enemies held him in the highest respect as a brave, skilful and chivalrous opponent. It was he who at Altenkirchen cared for the dying Marceau, and the white uniforms of Kray and his staff mingled with the blue of the French in the funeral procession of the young general of the Republic.

KREMENCHUG, a town of south-west Russia, in the govern- ment of Poltava, on the left bank of the Dnieper (which periodi- cally overflows its banks), 73 m. S.W. of the city of Poltava, on the Kharkov-Nikolayev railway. Pop. (1887), 31,000; (1897, with Kryukov suburb), 58,648. The most notable public buildings are the cathedral (built in 1808), the arsenal and the town-hall. The town is supposed to have been founded in 1 57 1. From its situation at the southern terminus of the navigable course of the Dnieper, and on the highway from Moscow to Odessa, it early acquired great commercial importance, and by 1655 it was a wealthy town. From 1765 to 1789 it was the capital of " New Russia." It has a suburb, Kryukov, on the right bank of the Dnieper, united with the town by a railway bridge. Nearly all commercial transactions in salt with White Russia are effected at Kremenchug. The town is also the centre of the tallow trade with Warsaw; considerable quantities of timber are floated down to this place. Nearly all the trade in the brandy manufactured in the government of Kharkov, and destined for the governments of Ekaterinoslav and Taurida,

is concentrated here, as also is the trade in linseed between the districts situated on the left affluents of the Dnieper and the southern ports. Other articles of commerce are rye, rye-flour, wheat, oats and buckwheat, which are sent partly up the Dnieper to Pinsk, partly by land to Odessa and Berislav, but principally to Ekaterinoslav, on light boats floated down during the spring floods. The Dnieper is crossed at Kremenchug by a tubular bridge 1081 yds. long; there is also a bridge of boats. The manufactures consist of carriages, agricultural machinery, tobacco, steam flour-mills, steam saw-mills and forges.

KREMENETS (Polish, Krzemieniec) , a town of south-west Russia, in the government of Volhynia, 130 m. W. of Zhitomir, and 25 m. E. of Brody railway station (Austrian Galicia). Pop. (1900), 16,534. It is situated in a gorge of the Kremenets Hills, The Jews, who are numerous, carry on a brisk trade in tobacco and grain exported to Galicia and Odessa. The picturesque ruins of an old castle on a crag close by the town are usually known as the castle of Queen Bona, i.e. Bona Sforza (wife of Sigismund I. of Poland) ; it was built, however, in the 8th or 9th century. The Mongols vainly besieged it in 1241 and 1255. From that time Kremenets was under the dominion alternately of Lithuania and Poland, till 1648, when it was

taken by the Zaporogian Cossacks. From 1805 to 1832 its Polish lyceum was the centre of superior instruction for the western provinces of Little Russia; but after the Polish insurrection of 1831 the lyceum was transferred to Kiev, and is now the university of that town,

KREMS, a town of Austria, in lower Austria, 40 m. W.N.W. of Vienna by rail. Pop. (1900), 12,657. It is situated at the confluence of the Krems with the Danube. The manufactures comprise steel goods, mustard and vinegar, and a special kind of white lead (Kremser Weiss) is prepared from deposits in the neighbourhood. The trade is mainly in these products and in wine and saffron. The Danube harbour of Krems is at the adjoining town of Stein (pop., 4299).

KREMSIER, (Czech, Kromefiz), a town of Austria, in Moravia, 37 m. E. by N. of Briinn by rail. Pop. (1900), 13,991, mostly Czech. It is situated on the March, in the fertile region of the Hanna, and not far from the confluence of these two rivers. It is the summer residence of the bishop of Olmiitz, whose palace, surrounded by a fine park and gardens, and containing a picture gallery, library and various collections, forms the chief object of interest. Its industries include the manufacture of machi- nery and iron-founding, brewing and corn-milling, and there is a considerable trade in corn, cattle, fruit and manufactures. In 1 131 Kremsier was the seat of a bishopric. It suffered con- siderably during the Hussite war; and in 1643 it was taken and burned by the Swedes. After the rising of 1848 the Austrian parliament met in the palace at Kremsier from November 1S48 till March 1849. I n August 1885 a meeting took place here between the Austrian and the Russian emperors.

KREUTZER, KONRADIN (1780-1849), German musical composer, was born on the 22nd of November 1780 in Messkirch in Baden, and died on the 14th of December 1849 in Riga. He owes his fame almost exclusively to one opera, Das Nachtlager • von Granada (1834), which kept the stage for half a century in spite of the changes in musical taste. It was written in the style of Weber, and is remarkable especially for its flow of genuine melody and depth of feeling. The same qualities are found in Kreutzer's part-songs for men's voices, which at one time were extremely popular in Germany, and are still listened to with pleasure. Amongst these " Der Tag des Herrn " (" The Lord's Day") may be named as the most excellent. Kreutzer was a prolific composer, and wrote a number of operas for the theatre at Vienna, which have disappeared from the stage and are not likely to be revived. He was from 1812 to 1816 Kapellmeister to the king of Wurttemberg, and in 1840 became conductor of the opera at Cologne. His daughter, Cecilia Kreutzer, was a singer of some renown.

KREUTZER, RUDOLPH (1766-1831), French violinist, of German

extraction, was born at Versailles, his father being a musician in the royal chapel. Rudolph gradually became

famous as a violinist, playing with great success at various continental capitals. It was to him that in 1803 Beethoven dedicated his famous violin sonata (op. 47) known as the " Kreutzer." Apart, however, from his fame as a violinist, Kreutzer was also a prolific composer; he wrote twenty-nine operas, many of which were successfully produced, besides nineteen violin concertos and chamber music. He died at Geneva in 1831.

KREUZBURG, a town of Germany, in the Prussian province of Silesia, on the Stober, 24 m. N.N.E. of Oppeln. Pop. (1905), 10,919. It has an Evangelical and a Roman Catholic church, a gymnasium and a teacher's seminary. Here are flour-mills, distilleries, iron-works, breweries, and manufactories of sugar and of machinery. Kreuzburg, which became a town in 1252, was the birthplace of the novelist Gustav Freytag.

KREUZNACH (Creuznach), a town and watering-place of Germany, in the Prussian Rhine province, situated on the Nahe, a tributary of the Rhine, 9 m. by rail S. of Bingerbriück. Pop. (1900), 21,321. It consists of the old town on the right bank of the river, the new town on the left, and the Bade Insel (bath island), connected by a fine stone bridge. The town has two Evangelical and three Roman Catholic churches, a gymnasium, a commercial school and a hospital. There is a collection of Roman and medieval antiquities, among which is preserved a fine Roman mosaic discovered in 1893. On the Bade Insel is the Kurhaus (1872) and also the chief spring, the Elisabeth- quelle, impregnated with iodine and bromine, and prescribed for scrofulous, bronchial and rheumatic disorders. The chief industries are marble-polishing and the manufacture of leather, glass and tobacco. Vines are cultivated on the neighbouring hills, and there is a trade in wine and corn.

The earliest mention of the springs of Kreuznach occurs in 1478, but it was only in the early part of the 19th century that Dr Prieger, to whom there is a statue in the town, brought them into prominence. Now the annual number of visitors amounts to several thousands. Kreuznach was evidently a Roman town, as the ruins of a Roman fortification, the Heidenmauer, and various antiquities have been found in its immediate neighbour- hood. In the 9th century it was known as Cruciniacum, and it had a palace of the Carolingian kings. In 1065 the emperor Henry IV 7 . presented it to the bishopric of Spires; in the 13th century it obtained civic privileges and

passed to the counts of Sponheim; in 1416 it became part of the Palatinate. The town was ceded to Prussia in 1814. In 1689 the French reduced the strong castle of Kauzenberg to the ruin which now stands on a hill above Kreuznach.

See Schneegans, Historisch-lopographische Beschreibung Kreuz- nachs und seiner Umgebung (7th ed., 1904); Engelmann, Kreuznach und seine Heilquellen (8th ed., 1890); and Stabel, Das Solbad Kreuznach fiir Arzle dargesleilt (Kreuznach, 1887).

KRIEGSPIEL (Kriegsspiel), the original German name, still used to some extent in England, for the War Game (q.v.).

KRIEMHILD (Grimhild), the heroine of the Nibelungenlied and wife of the hero Siegfried. The name (from O. H. Ger. grlma, a mask or helm, and hiltja or hilta, war) means " the masked warrior woman," and has been taken to prove her to have been originally a mythical, daemonic figure, an impersonation of the powers of darkness and of death. In the north, indeed, the name Grimhildr continued to have a purely mythical character and to be applied only to daemonic beings; but in Germany, the original home of the Nibclungen myth, it certainly lost all trace of this significance, and in the Nibelungenlied Kriemhild is no more than a beautiful princess, the daughter of King Dancrat and Queen Uote, and sister of the Burgundian kings Gunther, Giselher and Gemot, the masters of the Nibelungen hoard. As she appears in the Nibelungen legend, however, Kriemhild would seem to have an historical origin, as the wife of Attila, king of the Huns, as well as sister of the Nibelung kings. Accord- ing to Jcrdanes (c. 49), who takes his information from the con- temporary and trustworthy account of Priscus, Attila died of a violent hemorrhage at night, as he lay beside a girl named Ildico [i.e. O. H. Ger. Hildiko). The story got abroad that he

had perished by the hand of a woman in revenge for her relations slain by him; according to some (e.g. Saxo Poeta and the Qued- linburg chronicle) it was her father whom she revenged; but when the treacherous overthrow of the Burgundians by Attila had become a theme for epic poets, she figured as a Burgundian princess, and her act as done in revenge for her brothers. Now the name Hildiko is the diminutive of Hilda or Hild, which again — in accordance with a custom common enough — may have been used as an abbreviation of Grimhild (cf. Hildr for Bryn- hildr). It has been suggested (Symons, Heldensage, p. 55) that when the legend of the overthrow of the Burgundians, which took place in 437, became attached to that of the death of Attila (4S3)i Hild, the supposed sister of the Burgundian kings, was identified with the daemonic Grimhild, the sister of the mythical Nibelung brothers, and thus helped the process by which the Nibelung myth became fused with the historical story of the fall of the

Burgundian kingdom. The older story, according to which Grimhild slays her husband Attila in revenge for her brothers, is preserved in the Norse tradition, though Grimhild's part is played by Gudrun, a change probably due to the fact, mentioned above, that the name Grimhild still retained in the north its sinister significance. The name of Grimhild is trans- ferred to Gudrun's mother, the " wise wife," a semi-daemonic figure, who brews the potion that makes Sigurd forget his love for Brunhild and his plighted troth. In the Nibelungenlied, however, the primitive supremacy of the blood-tie has given place to the more modern idea of the supremacy of the passion of love, and Kriemhild marries Attila (Etzel) in order to compass the death of her brothers, in revenge for the murder of Siegfried. Theodor Abeling, who is disposed to reject or minimize the mythical origins, further suggests a confusion of the story of Attila's wife Ildico with that of the murder of Sigimund the Burgundian by the sons of Chrothildis, wife of Clovis. (See Nibelungenlied.)

See B. Symons, Germanische Heldensage (Strassburg, 1905) ; F. Zarnke, Das Nibelungenlied, p. ii. (Leipzig, 1875); T. Abeling, Einleilung in das Nibelungenlied (Freiburg-im-Breisgau, 1909).

(W. A. P.)

KRILOFF (or Kruilov), IVAN ANDREEVICH (1768-1844), the great national fabulist of Russia, was born on the 14th of February 1 768, at Moscow, but his early years were spent at Oren- burg and Tver. His father, a distinguished military officer, died in 1 779 ; and young Kriloff was left with no richer patrimony than a chest of old books, to be brought up by the exertions of a heroic mother. In the course of a few years his mother removed to St Petersburg, in the hope of securing a government pension; and there Kriloff obtained a post in the civil service, but he gave it up immediately after his mother's death in 1788. Already in 1 783 he had sold to a bookseller a comedy of his own composition, and by this means had procured for himself the works of Moliere, Racine, Boileau; and now, probably under the influence of these writers, he produced Philomela and Cleopatra, which gave him access to the dramatic circle of Knyazhin. Several attempts he made to start a literary magazine met with little success; but, together with his plays, they served to make the author known in society. For about four years (1797-1801) Kriloff lived at the country seats of Prince Sergius Galitzin, and when the prince was appointed military governor of Livonia he accom- panied him as official secretary. Of the years which follow his resignation of this post little is known, the common opinion being that he wandered from town to town under the influence of a passion for card-playing. Before long he found his place as a fabulist, the first collection of his Fables, 23 in number, appearing in 1809. From 181 2 to 1841 he held a congenial appointment in the Imperial

Public Library — first as assistant, and then as head of the Russian books department. He died on the 21st of November 1844. His statue in the Summer Garden is one of the finest monuments in St Petersburg.

Honours were showered upon Kriloff while he yet lived: the Academy of Sciences admitted him a member in 1811, and be- stowed upon him its gold medal; in 1838 a great festival was held under imperial sanction to celebrate the jubilee of his first

appearance as an author; and the emperor assigned him a hand- some pension. Before his death about 77,000 copies of his Fables had found sale in Russia; and his wisdom and humour had become the common possession of the many. He was at once poet and sage. His fables for the most part struck root in some actual event, and they told at once by their grip and by their beauty. Though he began as a translator and imitator he soon showed himself a master of invention, who found abundant material in the life of his native land. To the Russian ear his verse is of matchless Quality; while word and phrase are direct, simple and eminently idiomatic, colour and cadence vary with the theme.

A collected edition of Kriloff's works appeared at St Petersburg, 1844. Of the numerous editions of his Fables, which have been often translated, may be mentioned that illustrated by Trutovski, 1872. The author's life has been written in Russian by Pletneff, by Lebanoff and by Grot, Liter, zhizn Kruilova. " Materials " for his life are published in vol. vi. of the Sbornik Statei of the literary department of the Academy of Sciences. W. R. S. Ralston prefixed an excellent sketch to his English prose version of the Fables (1868; 2nd ed. 1871). Another translation, by T. H. Harrison, appeared in 1883.

KRISHNA (the Dark One), an incarnation of Vishnu, or rather the form in which Vishnu himself is the most popular object of worship throughout northern India. In origin, Krishna, like Rama, was undoubtedly a deified hero of the Kshatriya caste. In the older framework of the Mahabharala he appears as a great chieftain and ally of the Pandava brothers; and it is only in the interpolated episode of the Bhagavad-gita that he is identified with Vishnu and becomes the revealer of the doctrine of bhakti or religious devotion. Of still later date are the popular developments of the modern cult of Krishna associated with Radha, as found in the Vishnu Purana. Here he is represented as the son of a king saved from a slaughter of the innocents, brought up by a cowherd, sporting with the milk- maids, and

performing miraculous feats in his childhood. The scene is laid in the neighbourhood of Muttra, on the right bank of the Jumna, where the whole country to the present day is holy ground. Another place associated with incidents of his later life is Dwarka, the westernmost point in the peninsula of Kathiawar. The two most famous preachers of Krishna-worship and founders of sects in his honour were Vallabha and Chaitanya, both born towards the close of the 15th century. The followers of the former are now found chiefly in Rajputana and Gujarat. They are known as Vallabhacharyas, and their gosains or high priests as maharajas, to whom semi-divine honours are paid. The licentious practices of this sect were exposed in a lawsuit before the high court at Bombay in 1862. Chaitanya was the Vaishnav reformer of Bengal, with his home at Nadiya. A third influential Krishna-preacher of the 19th century was Swami Narayan, who was encountered by Bishop Heber in Gujarat, where his followers at this day are numerous and wealthy. Among the names of Krishna are Gopal, the cow- herd; Gopinath, the lord of the milkmaids; and Mathuranalh, the lord of Muttra. His legitimate consort was Rukmini, daughter of the king of Berar; but Radha is always associated with him in his temples. (See Hinduism.)

KRISHNAGAR, a town of British India, headquarters of Nadia district in Bengal, situated on the left bank of the river Jalangi and connected with Ranaghat, on the Eastern Bengal railway, by a light railway. Pop. (1901), 24,547. It i s th e residence of the raja of Nadia and contains a government :ollege. Coloured clay figures are manufactured.

KRISTIANSTAD (Christianstad), a port of Sweden, chief town of the district {Ian) of Kristianstad, on a peninsula in Lake Sjovik, an expansion of the river Helge, 10 m. from the Baltic. Pop. (1900), 10,318. Its harbour, custom-house, &c, are at Ahus at the mouth of the river. It is among the first twelve manufacturing towns of Sweden as regards value of output, having engineering works, flour-mills, distilleries, weaving mills and sugar factories. Granite and wood-pulp are exported, and coal and grain imported. The town is the seat of the court of appeal for the provinces of Skane and Blekinge. It was founded

and fortified in 1614 by Christian IV. of Denmark, who built the fine ornate church. The town was ceded to Sweden in 1658, retaken by Christian V. in 1676, and again acquired by Sweden in 1678.

KRIVOY R06, a town of south Russia, in the government of Kherson, on the Ingulets River, near the station of the same name on the Ekaterinoslav railway, 113 m. S.W. of the city of Ekaterinoslav. Pop. (1900), about 10,000. It is the centre of a district very rich in minerals, obtained from a narrow stretch of crystalline schists underlying the Tertiary deposits. Iron

ores (60 to 70% of iron), copper ores, colours, brown coal, graphite, slate, and lithographic stone are obtained — nearly 2,000,000 tons of iron ore annually.

KROCHMAL, NAHMAN (1785-1840), Jewish scholar, was born at Brody in Galicia in 1785. He was one of the pioneers in the revival of Jewish learning which followed on the age of Moses Mendelssohn. His chief work was the Moreh Nebuche ha- zeman (" Guide for the Perplexed of the Age "), a title imitated from that of the 12th-century " Guide for the Perplexed " of Maimonides (q.v.). This book was not published till after the author's death, when it was edited by Zunz (1851). The book is a philosophy of Jewish history, and has a double importance. On the one side it was a critical examination of the Rabbinic literature and much influenced subsequent investigators. On the other side, Krochmal, in the words of N. Slouschz, " was the first Jewish scholar who views Judaism, not as a distinct and independent entity, but as a part of the whole of civilization." Krochmal, under Hegelian influences, regarded the nationality of Israel as consisting in its religious genius, its spiritual gifts. Thus Krochmal may be called the originator of the idea of the mission of the Jewish people, " cultural Zionism " as it has more recently been termed. He died at Tarnopol in 1840.

See S. Schechter, Studies in Judaism (1896), pp. 56 seq. ; N. Slouschz, Renascence of Hebrew Literature (1909), pp. 63 seq.

(I. A.)

KRONENBERG, a town of Germany in the Prussian Rhine Province, 6 m. S.W. from Elberfeld, with which it is connected by railway and by an electric tramway line. Pop. (1905), 11,340. It is a scattered community, consisting of an agglomeration of seventy-three different hamlets. It has a Roman Catholic and two Protestant churches, a handsome modern town-hall and considerable industries, consisting mainly of steel and iron manufactures.

KRONSTADT or Ceonstadt, a strongly fortified seaport town of Russia, the chief naval station of the Russian fleet in the northern seas, and the seat of the Russian admiralty. Pop. (1867), 45,115; (1897), 59,539. It is situated on the island of Kotlin, near the head of the Gulf of Finland, 20 m. W. of St Petersburg, of which it is the chief port, in 59 59′ ˆo" N. and 29 46′ 30″ E. Kronstadt, always strong, has been thoroughly refortified on modern principles. The old " three-decker " forts, five in number, which formerly constituted the principal defences of the place, and defied the Anglo-French fleets during the Crimean War, are now of secondary importance. From the plans of Todleben a new fort, Constantine, and four batteries were

constructed (1856-1871) to defend the principal approach, and seven batteries to cover the shallower northern channel. All these modern fortifications are low and thickly armoured earthworks, powerfully armed with heavy Krupp guns in turrets. The town itself is surrounded with an enceinte. The island of Kotlin, or Kettle (Finn., Retusari, or Rat Island) in general outline forms an elongated triangle, 75 m. in length by about 1 in breadth, with its base towards St Petersburg. The eastern or broad end is occupied by the town of Kronstadt, and shoals extend for a mile and a half from the western point of the island to the rock on which the Tolbaaken lighthouse is built. The island thus divides the seaward approach to St Petersburg into two channels; that on the northern side is obstructed by shoals which extend across it from Kotlin to Lisynos on the Finnish mainland, and is only passable by vessels drawing less than 15 ft. of water; the southern channel, the high- way to the capital, is narrowed by a spit which projects from

opposite Oranienbaum on the Russian mainland, and, lying close to Kronstadt, has been strongly guarded by batteries. The approach to the capital has been greatly facilitated by the construction in 1875-1885 of a canal, 23 ft. deep, through the shallows. The town of Kronstadt is built on level ground, and is thus exposed to inundations, from one of which it suffered in 1824. On the south side of the town there are three harbours — the large western or merchant harbour, the western flank of which is formed by a great mole joining the fortifications which traverse the breadth of the island on this side; the middle harbour, used chiefly for fitting out and repairing vessels; and the eastern or war harbour for vessels of the Russian navy. The Peter and Catherine canals, communi- cating with the merchant and middle harbours, traverse the town. Between them stood the old Italian palace of Prince Menshikov, the site of which is now occupied by the pilot school. Among other public buildings are the naval hospital, the British seaman's hospital (established in 1867), the civic hospital, admiralty (founded 1785), arsenal, dockyards and foundries, school of marine engineering, the cathedral of St Andrew, and the English church. The port is ice-bound for 140 to 160 days in the year, from the beginning of December till April. A very large proportion of the inhabitants are sailors, and large num- bers of artisans are employed in the dockyards. Kronstadt was founded in 17 10 by Peter the Great, who took the island of Kotlin from the Swedes in 1703, when the first fortifications were constructed. (P. A. K.; J. T. Be.)

KROONSTAD, a town of Orange River Colony, 127 m. by rail N.E. of

Bloemfontein and 130 m. S.W. of Johannesburg. Pop. (1904), 7191, of whom 3708 were whites. Kroonstad lies 4489 ft. above the sea and is built on the banks of the Valsch River, a perennial tributary of the Vaal. It is a busy town, being the centre of a rich agricultural district and of the diamond and coal-mining industry of the north-western parts of the colony. It is also a favourite residential place and resort of visitors from Johannesburg. It enjoys a healthy climate, affords opportunities for boating rare in South Africa, and boasts a golf-links. The principal building is the Dutch Reformed church in the centre of the market square.

On the capture of Bloemfontein by the British during the Anglo-Boer War of 1 899-1 902 Kroonstad was chosen by the Orange Free State Boers as the capital of the state, a dignity it held from the 13th of March to the nth of May 1900. On the following day the town was occupied by Lord Roberts. The linking of the town in 1906 with the Natal system made the route via Kioonstad the shortest railway connexion between Cape Town and Durban. Another line goes N.W. from Kroonstad to Klerksdorp, passing (17 miles) the Lace diamond mine and (45 miles) the coal mines at Vierfontein.

KROPOTKIN, PETER ALEXEIVICH, Prince (1842-), Russian geographer, author and revolutionary, was born at Moscow in 1842. His father, Prince Alexei Petrovich Kropotkin, belonged to the old Russian nobility; his mother, the daughter of a general in the Russian army, had remarkable literary and liberal tastes. At the age of fifteen Prince Peter Kropotkin, who had been designed by his father for the army, entered the Corps of Pages at St Petersburg (1857). Only a hundred and fifty boys — mostly children of the nobility belonging to the court — were educated jn this privileged corps, which combined the character of a military school endowed with special rights and of a Court institution attached to the imperial household. Here he remained till 1862, reading widely on his own account, and giving special attention to the works of the French encyclo- paedists and to modern French history. Before he left Moscow Prince Kropotkin had developed an interest in the condition of the Russian peasantry, and this interest increased as he grew older. The years 1857-1861 witnessed a rich growth in the in- tellectual forces of Russia, and Kropotkin came under the influence of the new Liberal-revolutionary literature, which indeed largely expressed his own aspirations. In 1862 he was promoted from the Corps of Pages to the army. The members of the corps had the prescriptive right of choosing the regiment to which they

would be attached. Kropotkin had never wished for a military career, but, as he had not the means to enter the St Petersburg University, he elected to join a Siberian Cossack regiment in the recently annexed Amur district, where there were prospects of administrative work. ‘ For some time he was

aide de camp to the governor of Transbaikalia at Chita, subsequently being appointed attache for Cossack affairs to the governor-general of East Siberia at Irkutsk. Opportunities for administrative work, however, were scanty, and in 1864 Kropotkin accepted charge of a geographical survey expedition, crossing North Manchuria from Transbaikalia to the Amur, and shortly afterwards was attached to another expedition which proceeded up the Sungari River into the heart of Manchuria. Both these expeditions yielded most valuable geographical results. The impossibility of obtaining any real administrative reforms in Siberia now induced Kropotkin to devote himself almost entirely to scientific exploration, in which he continued to be highly successful. In 1867 he quitted the army and returned to St Petersburg, where he entered the university, becoming at the same time secretary to the physical geography section of the Russian Geographical Society. In 1873 he published an important contribution to science, a map and paper in which he proved that the existing maps of Asia entirely misrepresented the physical formation of the country, the main structural lines being in fact from south-west to north-east, not from north to south, or from east to west as had been previously supposed. In 1871 he explored the glacial deposits of Finland and Sweden for the Russian Geographical Society, and while engaged in this work was offered the secretaryship of that society. But by this time he had determined that it was his duty not to work at fresh discoveries but to aid in diffusing existing knowledge among the people at large, and he accordingly refused the offer, and returned to St Petersburg, where he joined the revolutionary party. In 1872 he visited Switzerland, and became a member of the Inter- national Workingmen's Association at Geneva. The socialism of this body was not, however, advanced enough for his views, and after studying the programme of the more violent Jura Federation at Neuchatel and spending some time in the com- pany of the leading members, he definitely adopted the creed of anarchism (q.v.) and, on returning to Russia, took an active part in spreading the nihilist propaganda. In 1874 he was arrested and imprisoned, but escaped in 1876 and went to England, removing after a short stay to Switzerland, where he joined the Jura Federation. In 1877 he went to Paris, where he helped to start the socialist movement, returning to Switzerland in 1878, where he edited for the Jura Federation a revolutionary news- paper, Le Revolts, subsequently also publishing various revolu- tionary pamphlets. Shortly after the assassination of the tsar Alexander II. (1881) Kropotkin was expelled from Switzerland by the Swiss government, and after a short stay at Thonon (Savoy) went to London, where he remained for nearly a year, returning to Thonon towards the end of 1882. Shortly afterwards he was arrested by the French government, and, after a trial at Lyons, sentenced by a police-court magistrate (under a special law passed on the fall of the Commune) to five years' imprisonment, on the ground that he had belonged to the

International Workingmen's Association (1883). In 1886 however, as the result of repeated agitation on his behalf in the French Chamber, he was released, and settled near London.

Prince Kropotkin's authority as a writer on Russia is univer- sally acknowledged, and he has contributed largely to the Encyclopaedia Britannica. Among his other works may be named Paroles d'un rtvoltt (1884); La Conquite du pain (1888); L' Anarchie: sa philosophic, son ideal (1896); The Stale, its Part in History (1898); Fields, Factories and Workshops (1899); Memoirs of a Revolutionist (1900); Mutual Aid, a Factor of Evo- lution (1902); Modern Science and Anarchism (Philadelphia, 1903); The Desiccation of Asia (1904); The Orography of Asia (1904); and Russian Literature (1905).

KROTOSCHIN (in Polish, Krotoszyn), a town- of Germany, in the Prussian province of Posen,32m.S.E.of Posen. Pop. (1900), 12,373. It has three churches, a synagogue, steam saw-mill?,.

and a steam brewery, and carries on trade in grain and seeds. The castle of Krotoschin is the chief place of a mediatized prin- cipality which was formed in 1819 out of the domains of the Prussian crown and was granted to the prince of Thurn and Taxis in compensation for the relinquishment by him of the monopoly of the Prussian postal system, formerly held by his family.

KRUDENER, BARBARA JULIANA, Baroness von (1764- 1824), Russian religious mystic and author, was born at Riga in Livonia on the nth of November 1764. Her father, Otto Hermann von Vietinghoff, who had fought as a colonel in Catherine II. 's wars, was one of the two councillors for Livonia and a man of immense wealth; her mother, nee Countess Anna Ulrica von Miinnich, was a grand-daughter of the celebrated field marshal. Juliana, as she was usually called, was one of a numerous family. Her education, according to her own account, consisted of lessons in French spelling, deportment and sewing; and at the age of eighteen (Sept. 29, 1782) she was married to Baron Burckhard Alexis Constantin von Kriidener, a widower six- teen years her senior. The baron, a diplomatist of distinction, was cold and reserved; the baroness was- frivolous, pleasure-loving, and possessed of an insatiable thirst for attention and flattery; and the strained relations due to this incompatibility of temper were embittered by her limitless extravagance, which constantly involved herself and her husband in financial difficulties. At first indeed all went well. On the 31st

of January 1784 a son was born to them, named Paul after the grand-duke Paul (after-, wards emperor), who acted as god-father. The same year Baron Kriidener became ambassador at Venice, 1 where he remained until transferred to Copenhagen in 1786.

In 1787 the birth of a daughter (Juliette) aggravated the nervous disorders from which the baroness had for some time been suffering, and it was decided that she must go to the south for her health; she accordingly left, with her infant daughter and her step-daughter Sophie. In 1789 she was at Paris when the states general met; a year later, at Montpellier, she met a young cavalry captain, Charles Louis de Fregeville, and a passionate attachment sprang up between them. They returned together to Copenhagen, where the baroness told her husband that her heart could no longer be his. The baron was coldly kind; he refused to hear of a divorce and attempted to arrange a modus vivendi, which was facilitated by the departure of De Fregeville for the war. All was useless ; Juliana refused to remain at Copen- hagen, and, setting out on her travels, visited Riga, St Peters- burg — where her father had become a senator 2 — Berlin, Leipzig and Switzerland. In 1798 her husband became ambassador at Berlin, and she joined him there. But the stiff court society of Prussia was irksome to her; money difficulties continued; and by way of climax, the murder of the tsar Paul, in whose favour Baron Kriidener had stood high, made the position of the ambas- sador extremely precarious. The baroness seized the occasion to leave for the baths of Teplitz, whence she wrote to her husband that the doctors had ordered her to winter in the south. He died on the 14th of June 1802, without ever having seen her again.

Meanwhile the baroness had been revelling in the intellectual society of Coppet and of Paris. She was now thirty-six; her charms were fading, but her passion for admiration survived. She had tried the effect of the shawl dance, in imitation of Emma, Lady Hamilton; she now sought fame in literature, and in 1803, after consulting Chateaubriand and other writers of dis- tinction, published her Valerie, a sentimental romance, of which under a thin veil of anonymity she herself was the heroine. In January 1804 she returned to Livonia.

At Riga occurred her " conversion." A gentleman of her acquaintance when about to salute her fell dying at her feet. The shock overset her not too well balanced mind; she sought for consolation, and found it in the ministrations of her shoemaker, an ardent disciple of the Moravian Brethren. Though she had " found peace," however, the disorder of her nerves continued,

1 A portrait of Madame de Kriidener and her son as " Venus disarming Cupid," by Angelica Kauffmann, of this period, is in the Louvre.

% He died while she was there in 1792.

XV. ■:«

and she was ordered by her doctor to the baths of Wiesbaden. At Konigsberg she had an interview with Queen Louise, and, more important still, with one Adam Muller, a rough peasant, to whom the Lord had revealed a prophetic mission to King Frederick William III. " Chiliasm " was in the air. Napoleon was evidently Antichrist; and Che " latter days " were about to be accomplished. Under the influence of the pietistic movement the belief was widely spread, in royal courts, in country parsonages, in peasants' hovels: a man would be raised up " from the north . . . from the rising of the sun " (Isa. xli. 25); Antichrist would be overthrown, and Christ would come to reign a thousand years upon the earth. The interview determined the direction of the baroness's religious development. A short visit to the Moravians at Herrenhut followed; then she went, via Dresden, to Karlsruhe, to sit at the feet of Heinrich Jung-Stilling {q.v.) t the high priest of occultist pietism, whose influence was supreme at the court of Baden and infected those of Stockholm and St Petersburg. 3 By him she was instructed in the chiliastic faith and in the mysteries of the supernatural world. Then, hearing that a certain pastor in the Vosges, Jean Frederic Fontaines, was prophesying and working miracles, she determined to go to him. On the 5th of June 1801, accordingly, she arrived at the Protestant parsonage of Sainte Marie-aux-Mines, accompanied by her daughter Juliette, her step-daughter Sophie and a Russian valet.

This remained for two years her headquarters. Fontaines, half-charlatan, half-dupe, had introduced into his household a prophetess named Marie Gottliebin Kummer, 4 whose visions, carefully calculated for her own purposes, became the oracle of the divine mysteries for the baroness. Under this influence she believed more firmly than ever in the approaching millennium and her own mission to proclaim it. Her rank, her reckless charities, and her exuberant eloquence produced a great effect on the simple country folk; and when, in 1809, it was decided to found a colony of the " elect " in order to wait for " the coming of the Lord," many wretched peasants sold or distributed all they possessed and followed the baroness and Fontaines into Wiirt- temberg, where the settlement was established at Catharinen- plaisir and the chateau of Bonnigheim, only to be dispersed (May 1) by an unsympathetic government. 5 Further wanderings followed: to Lichtenthal near Baden; to Karlsruhe and the congenial society of pietistic princesses; to Riga, where she was present at the deathbed of her mother (Jan. 24, 1811); then back to Karlsruhe. The influence of Fontaines, to whom she had been "• spiritually married " (Madame Fontaines being content with the part of Martha in the

household, so long as the baroness's funds lasted), had now waned, and she had fallen under that of Johann Kaspar Wegelin (1 766-1833), a pious linen-draper of Strassburg, who taught her the sweetness of " complete anni- hilation of the will and mystic death." Her preaching and her indiscriminate charities now began to attract curious crowds from afar; and her appearance everywhere was accompanied by an epidemic of visions and prophesyings, which culminated in the appearance in 181 1 of the comet, a sure sign of the approaching end. In 181 2 she was at Strassburg, whence she paid more than one visit to J. F. Oberlin (q.v.), the famous pastor of Waldbach in Steinthal (Ban de la Roche), and where she had the glory of con- verting her host, Adrien de Lazay-Marnesia, the prefect. In 1 813 she was at Geneva, where she established the faith of a band of young pietists in revolt against the Calvinist Church authorities — notably Henri Louis Empeytaz, afterwards destined to be the companion of her crowning evangelistic triumph. In September 1814 she was again at Waldbach, where Empeytaz had preceded her; and at Strassburg, where the party was joined by Franz Karl von Berckheim, who afterwards married

3 The consorts of Alexander I. of Russia and of Gustavus Adolphus IV. of Sweden were princesses of Baden.

4 She had been condemned some years previously in Wtirttemberg to the pillory and three years' imprisonment as a " swindler " (Betrilgerin), on her own confession. Her curious history is given in detail by M. Muhlenbeck.

5 In 1809 it was obviously inconvenient to have people proclaiming Napoleon as " the Beast."

Juliette. 1 At the end of the year she returned with her daughters and Empeytaz to Baden, a fateful migration.

The empress Elizabeth of Russia was now at Karlsruhe; and she and the pietist ladies of her entourage hoped that the emperor Alexander might find at the hands of Madame de Kriidener the peace which an interview with Jung-Stilling had failed to bring him. The baroness herself wrote urgent letters to Roxane de Stourdza, sister of the tsar's Rumanian secretary, begging her to procure an interview. There seemed to be no result; but the correspondence paved the way for the opportunity which a strange chance was to give her of realizing her ambition. In the spring of 1815 the baroness was settled at Schliichtern, a piece of Baden territory enclave in

Wiirttemberg, busy persuading the peasants to sell all and fly from the wrath to come. Near this, at Heilbronn, the emperor Alexander established his head- quarters on the 4th of June. That very night the baroness sought and obtained an interview. To the tsar, who had been brooding alone over an open Bible, her sudden arrival seemed an answer to his prayers; for three hours the prophetess preached her strange gospel, while the most powerful mar. in Europe sat, his face buried in his hands, sobbing like a child; until at last he declared that he had " found peace." At the tsar's request she followed him to Heidelberg and later to Paris, where she was lodged at the Hotel Montchenu, next door to the imperial head- quarters in the Elysee Palace. A private door connected the establishments, and every evening the emperor went to take part in the prayer-meetings conducted by the baroness and Empeytaz. Chiliasm seemed to have found an entrance into the high councils of Europe, and the baroness von Kriidener had become a political force to be reckoned with. Admission to her religious gatherings was sought by a crowd of people celebrated in the intellectual and social world; Chateaubriand came, and Benjamin Constant, Madame Recamier, the duchesse de Bourbon, and Madame de Duras. The fame of the wonderful con- version, moreover, attracted other members of the chiliastic fraternity, among them Fontaines, who brought with him the prophetess Marie Kummer.

In this religious forcing-house the idea of the Holy Alliance germinated and grew to rapid maturity. On the 26th of Septem- ber the portentous proclamation, which was to herald the opening of a new age of peace and goodwill on earth, was signed by the sovereigns of Russia, Austria and Prussia (see Holy Alliance; and Europe: History). Its authorship has ever been a matter of dispute. Madame de Kriidener herself claimed that she had suggested the idea, and that Alexander had submitted the draft for her approval. This is probably correct, though the tsar later, when he had recovered his mental equilibrium, reproved her for her indiscretion in talking of the matter. His eyes, indeed, had begun to be opened before he left Paris, and Marie Kummer was the unintentional cause. At the very first seance the prophetess, whose revelations had been praised by the baroness in extravagant terms, had the evil inspiration to announce in her trance to the emperor that it was God's will that he should endow the religious colony to which she belonged! Alexander merely remarked that he had received too many such revelations before to be impressed. The baroness's influence was shaken but not destroyed, and before he left Paris Alexander gave her a passport to Russia. She was not, however, destined to see him again.

She left Paris on the 22nd of October 1815, intending to travel to St Petersburg by way of Switzerland. The tsar, however, offended by her indiscretions and sensible of the ridicule which his relations with her had

brought upon him, showed little dis- position to hurry her arrival. She remained in Switzerland, where she presently fell under the influence of an unscrupulous adventurer named J. G. Kellner. For months Empeytaz, an honest enthusiast, struggled to save her from this man's clutches, but in vain. Kellner too well knew how to flatter the baroness's

inordinate vanity: the author of the Holy Alliance could

be none other than the " woman clothed with the sun " of

1 Berckheim had been French commissioner of police in Mainz and had abandoned his post in 1813.

Rev. xii. 1. She wandered with Kellner from place to place, proclaiming her mission, working miracles, persuading her con- verts to sell all and follow her. Crowds of beggars and rapscal- lions of every description gathered wherever she went, supported by the charities squandered from the common fund. She became a nuisance to the authorities and a menace to the peace; Wiirttemberg had expelled her, and the example was followed by every Swiss canton she entered in turn. At last, in August 181 7, she set out for her estate in Livonia, accompanied by Kellner and a remnant of the elect.

The emperor Alexander having opened the Crimea to German and Swiss chiliasts in search of a land of promise, the baroness's son-in-law Berckheim and his wife now proceeded thither to help establish the new colonies. In November 1820 the baroness at last went herself to St Petersburg, where Berckheim was lying ill. She was there when the news arrived of Ypsilanti's invasion of the Danubian principalities, which opened the war of Greek independence. She at once proclaimed the divine mission of the tsar to take up arms on behalf of Christendom. Alexander, however, had long since exchanged her influence for that of Metternich, and he was far from anxious to be forced into even a holy war. To the baroness's overtures he replied in a long and polite letter, the gist of which was that she must leave St Petersburg at once. In 1823 the death of Kellner, whom to the last she regarded as a saint, was a severe blow to her. Her health was failing, but she allowed herself to be persuaded by Princess Galitzin to accompany her to the Crimea, where she had established a Swiss colony. Here, at Karasu Bazar, she died on the 25th of December 1824.

Sainte-Beuve said of Madame de Kriidener: " Elle avait un immense besoin que le monde s'occupat d'elle . . . ; l'amour propre, toujours l'amour propre . . . ! " A kindlier epitaph might, perhaps, be written in her own words, uttered after the revelation of the misery of the Crimean colonists had at last opened her eyes: " The good that I have done will endure; the evil that

I have done (for how often have I not mistaken for the voice of God that which was no more than the result of my imagination and my pride) the mercy of God will blot out."

Much information about Madame de Kriidener, coloured by the author's views, is to be found in H. L. Empeytaz's Notice sur Alexandre, empereur de Russie (2nd ed., Paris, 1840). The Vie de Madame de Krudener (2 vols., Paris, 1849), by the Swiss banker and Philhellene J. G. Eynard, was long the standard life and con- tains much material, but is far from authoritative. In English appeared the Life and Letters of Madame de Krudener, by Clarence Ford (London, 1893). The most authoritative, study, based on a wealth of original research, is E. Muhlenbeck's Etude sur les origines de la Sainte- Alliance (Paris, 1909), in which numerous references are given. (W. A. P.)

KRUG, WILHELM TRAUGOTT (1770-1842), German philo- sopher and author, was born at Radis in Prussia on the 22nd of June 1770, and died at Leipzig on the 12th of January 1842. He studied at Wittenberg under Reinhard and Jehnichen, at Jena under Reinhold, and at Gottingen. From 1801 to 1804 he was professor of philosophy at Frankfort-on-the-Oder, after which he succeeded Kant in the chair of logic and metaphysics at the university of Konigsberg. From 1809 till his death he was professor of philosophy at Leipzig. He was a prolific writer on a great variety of subjects, in all of which he excelled as a popularizer rather than as an original thinker. In philosophy his method was psychological; he attempted to explain the Ego by examining the nature of its reflection upon the facts of consciousness. Being is known to us only through its presen- tation in consciousness; consciousness only in its relation to Being. Both Being and Consciousness, however, are immediately known to us, as also the relation existing between them. By this Transcendental Synthesis he proposed to reconcile Realism and Idealism, and to destroy the traditional difficulty between transcendental, or pure, thought and " things in themselves." Apart from the intrinsic value of his work, it is admitted that it had the effect of promoting the study of philosophy and of stimulating freedom of thought in religion and politics. His principal works are: Brief e iiber den neuesten Idealismus

(1801); Versuch iiber die Principien der philosophischen Erkennt- niss (1801); Fundamentalphilosophie (1803); System der theoretischen Philosophie (1806-1810), System der praktischen Philosophie (1817-1819); Handbuch der Philosophie (1820; 3rd ed., 1828); Logik

oder Denklehre (1827); Geschichte der Philos. alter Zeit (1815; 2nd ed., 1825); Allgemeines Handwbrterbuch der philosophischen Wissenschaften (1827-1834; 2nd ed., 1832-1838); Universal-philosophische Vorlesungen fiir Gebildete beiderlei Geschlechts. His work Beitrage zur Geschichte der Philos. des XIX. Jahrh. (1835-1837) contains interesting criticisms of Hegel and Schelling.

See also his autobiography, Meine Lebensreise (Leipzig, 2nd ed.,

1840).

KRUGER, STEPHANUS JOHANNES PAULUS (1825-1904), president of the Transvaal Republic, was born in Colesberg, Cape Colony, on the 10th of October 1825. His father was Caspar Jan Hendrick Kruger, who was born in 1796, and whose wife bore the name of Steyn. In his ancestry on both sides occur Huguenot names. The founder of the Kruger family appears to have been a .German named Jacob Kruger, who in 17 13 was sent with others by the Dutch East India Company to the Cape. At the age of ten Paul Kruger — as he afterwards came to be known — accompanied his parents in the migration, known as the Great Trek, from the Cape Colony to the territories north of the Orange in the years 1835-1840. From boyhood his life was one of adventure. Brought up on the borderland between civiliza- tion and barbarism, constantly trekking, fighting and hunting, his education was necessarily of the most primitive character. He learnt to read and to write, and was taught the narrowest form of Dutch Presbyterianism. His literature was almost confined to the Bible, and the Old Testament was preferred to the New. It is related of Kruger, as indeed it has been said of Piet Retief and others of the early Boer leaders, that he believed himself the object of special Divine guidance. At about the age of twenty-five he is said to have disappeared into the veldt, where he remained alone for several days, under the influence of deep religious fervour. During this sojourn in the wilderness Kruger stated that he had been especially favoured by God, who had communed with and inspired him. Through- out his life he professed this faith in God's will and guidance, ard much of his influence over his followers is attributable to their belief in his sincerity and in his enjoyment of Divine favour. The Dutch Reformed Church in the Transvaal, pervaded by a spirit and faith not unlike those which distinguished the Cove- nanters, was divided in the early days intathree sects. Of these the narrowest, most puritanical, and most bigoted was the Dopper sect, to which Kruger belonged. His Dopper following was always unswerving in its support, and at all critical times in the internal quarrels of the state rallied round him. The charge of hypocrisy, frequently made against Kruger — if by this charge is meant the mere juggling with religion for purely political ends — does not appear entirely just. The subordina- tion of reason to a sense of superstitious

fanaticism is the keynote of his character, and largely the explanation of his life. Where faith is so profound as to believe the Divine guidance all, and the individual intelligence nil, a man is able to persuade himself that any course he chooses to take is the one he is directed to take. Where bigotry is so blind, reason is but dust in the balance. At the same time there were incidents in Kruger's life which but ill conform to any Biblical standard he might choose to adopt or feel imposed upon him. Even van Oordt, his eloquent historian and apologist, is cognisant of this fact.

When the lad, who had already taken part in fights with the Matabele and the Zulus, was fourteen his family settled north of the Vaal and were among the founders of the Transvaal state. At the age of seventeen Paul found himself an assistant field cornet, at twenty he was field cornet, and at twenty-seven held a command in an expedition against the Bechuana chief Sechele — the expedition in which David Livingstone's mission-house was destroyed.

In 1853 he took part in another expedition against Montsioa. When not fighting natives in those early days Kruger was

engaged in distant hunting excursions which took him as far north as the Zambezi. In 1852 the Transvaal secured the recognition of its independence from Great Britain in the Sand River convention. For many years after this date the con- dition of the country was one bordering upon anarchy, and into the faction strife which was continually going on Kruger freely entered. In 1856-185 7 he joined M. W. Pretorius in his attempt to abolish the district governments in the Transvaal and to overthrow the Orange Free State government and compel a federation between the two countries. The raid into the Free State failed; the blackest incident in connexion with it was the attempt of the Pretorius and Kruger party to induce the Basuto to harass the Free State forces behind, while they were attacking them in front.

From this time forward Kruger's life is so intimately bound up with the history of his country, and even in later years of South Africa, that a study of that history is essential to an understanding of it (see Transvaal and South Africa). In 1864, when the faction fighting ended and Pretorius was presi- dent, Kruger was elected commandant-general of the forces of the Transvaal. In 1870 a boundary dispute arose with the British government, which was settled by the Keate award (1871). The decision caused so much discontent in the Trans- vaal that it brought about the downfall of President Pretorius and his party; and Thomas Francois Burgers, an educated Dutch minister, resident in Cape Colony, was elected to succeed him. During the term of Burgers' presidency Kruger appeared to great disadvantage. Instead of loyally supporting the president in the difficult

task of building up a stable state, he did everything in his power to undermine his authority, going so far as to urge the Boers to pay no taxes while Burgers was in office. The faction of which he was a prominent member was chiefly responsible for bringing about that impasse in the government of the country which drew such bitter protest from Burgers and terminated in the annexation by the British in April 1877. At this period of Transvaal history it is impossible to trace any true patriotism in the action of the majority of the inhabitants. The one idea of Kruger and his faction was to oust Burgers from office on any pretext, and, if possible, to put Kruger in his place. When the downfall of Burgers was assured and annexation offered itself as the alternative resulting from his downfall, it is true that Kruger opposed it. But matters had gone too far. Annexation became an accomplished fact, and Kruger accepted paid office under the British government. He continued, however, so openly to agitate for the retrocession of the country, being a member of two deputations which went to England endeavouring to get the annexation annulled, that in 1878 Sir Theophilus Shepstone, the British administrator, dismissed him from his service. In 1880 the Boer rebellion occurred, and Kruger was one of the famous triumvirate, of which General Piet Joubert and Pretorius were the other members, who, after Majuba, negotiated the terms of peace on which the Pretoria convention of August 1881 was drafted. In 1883 he was elected president of the Transvaal, receiving 3431 votes as against 1171 recorded for Joubert.

In November 1883 President Kruger again visited England, this time for the purpose of getting another convention. The visit was successful, the London convention, which for years was a subject of controversy, being granted by Lord Derby in 1884 on behalf of. the British government. The government of the Transvaal being once more in the hands of the Boers, the country rapidly drifted towards that state of national bankruptcy fiom which it had only been saved by annexation in 1877. In 1886, the year in which the Rand mines were discovered, President Kruger was by no means a popular man even among his own followers; as an administrator of internal affairs he had shown himself grossly incompetent, and it was only the specious success of his negotiations with the British government which had retained him any measure of support. In 1888 he was elected president for a second term of office. In 1889 Dr. Leyds, a young Hol- lander, was appointed state secretary, and the system of state monopolies around which so much corruption grew up was sootj

in full course of development. The principle of government monopoly in

trade being thus established, President Kruger now turned his attention to the further securing of Boer political monopoly. The Uitlanders were increasing in numbers, as well as providing the state with a revenue. In 1890, 1891, 1892, and 1894 the franchise laws (which at the time of the convention were on a liberal basis) were so modified that all Uitlanders were practically excluded altogether. In 1893 Kruger had to face a third presidential election, and on this occasion the opposition he had raised among the burgers, largely by the favouritism he displayed to the Hollander party, was so strong that it was fully anticipated that his more liberal opponent, General Joubert, would be elected. Before the election was decided Kruger took care to conciliate the volksraad members, as well as to see that at all the volksraad elections, which occurred shortly before the presidential election, his supporters were returned, or, if not returned, that his opponents were objected to on some trivial pretext, and by this means prevented from actually sitting in the volksraad until the presidential election was over. The Hollander and concessionnaire influence, which had become a strong power in the state, was all in favour of President Kruger. In spite of these facts Kruger's position was insecure. " General Joubert was, without any doubt whatever, elected by a very considerable majority." 1 But the figures as announced gave Kruger a majority of about 700 votes. General Joubert accused the government of tampering with the returns, and appealed to the volksraad. The appeal, however, was fruitless, and Kruger retained office. The action taken by President Kruger at this election, and his previous actions in ousting President Burgers and in absolutely excluding the Uitlanders from the franchise, all show that at any cost, in his opinion, the govern- ment must remain a close corporation, and that while he lived he must remain at the head of it.

From 1877 onward Kruger's external policy was consistently anti-British, and on every side— in Bechuanaland, in Rhodesia, in Zululand — he attempted to enlarge the frontiers of the Transvaal at the expense of Great Britain. In these disputes he usually gained something, and it was not until 1895 that he was definitely defeated in his endeavours to obtain a seaport. His internal policy was blind, reckless and unscrupulous, and inevitably led to disaster. It may be summed up in his own words when replying to a deputation of Uitlanders, who desired to obtain the legalization of the use of the English language in the Transvaal. " This," said Kruger, " is my country, these are my laws. Those who do not like to obey my laws can leave my country." This rejection of the advances of the Uitlanders— by whose aid he could have built up a free and stable republic — led to his downfall, though the failure of the Jameson Raid in the first days of 1896 gave him a signal opportunity to secure the safety of his country by the grant of real reforms. But the Raid taught him no lesson of this kind, and despite the inter- vention of the British government the Uitlanders'

grievances were not remedied.

In 1898 Kruger was elected president of the Transvaal for the fourth and last time. In 1899 relations between the Trans- vaal and Great Britain had become so strained, by reason of the oppression of the foreign population, that a conference was arranged at Bloemfontein between Sir Alfred (afterwards Lord) Milner, the high commissioner, and President Kruger. Kruger was true to his principles. • At every juncture in his life his object had been to gain for himself and his own narrow policy everything that he could, while conceding nothing in return. It was for this reason that he invariably failed to come to any arrangement with Sir John Brand while the latter was president of the Free State. In 1889, the very year following President Brand's death, he was able to make a treaty with President Reitz, his successor, which bound each of the Boer republics to assist the other in case its independence was menaced, unless the quarrel could be shown to be an unjust one on the part of the state so menaced. In effect it bound the Free State to share all the hazardous risk of the reckless anti-British Transvaal policy, 1 Sir Percy Fitzpatrick, in The Transvaal from Within, ch. iii.

without the Free State itself receiving anything in return. Kruger thus achieved one of the objects of his life. With such a history of apparent success, it is not to be wondered at that the Transvaal president came to Bloemfontein to meet Sir Alfred Milner in no mood for concession. It is true that he made an ostensible offer on the franchise question, but that proposal was made dependent on so many conditions that it was a palpable sham. Every proposition which Sir Alfred Milner made was met by the objection that it threatened the independence of the Transvaal. This retort was President Kruger's rallying cry whenever he found himself in the least degree pressed, either from within or without the state. To admit Uitlanders to the franchise, to no matter how moderate a degree, would destroy the independence of the state. In October 1899, after a long and fruitless correspondence with the British government, war with Great Britain was ushered in by an ultimatum from the Transvaal. Immediately after the ultimatum Natal and the Cape Colony were invaded by the Boers both of the Transvaal and the Free State. Yet one of the most memorable utterances made by Kruger at the Bloem- fontein conference was couched in the following terms: " We follow out what God says, ' Accursed be he that removeth his neighbour's landmark.' As long as your Excellency lives you will see that we shall never be the attacking party on another man's land." The course of the war that followed is described under Transvaal. In 1900, Bloemfontein and Pretoria having been occupied' by British troops, Kruger, too old to go on commando, with the consent of his executive proceeded to Europe, where he endeavoured to induce the European powers to intervene on his behalf, but without success.

From this time he ceased to have any political influence. He took up his residence at Utrecht, where he dictated a record of his career, published in 1902 under the title of The Memoirs of Paul Kruger. He died on the 14th of July 1904 at Clarens, near Vevey, on the shores of the Lake of Geneva, whither he had gone for the sake of his health. He was buried at Pretoria on the following 16th of December, Dingaan's Day, the anni- versary of the day in 1838 when the Boers crushed the Zulu king Dingaan — a fight in which Kruger, then a lad of thirteen, had taken part. Kruger was thrice married, and had a large family. His second wife died in 189 1. When he went to Europe he left his third wife in Lord Roberts's custody at Pre- toria, but she gradually failed, and died there (July 1901). It was in her grave that the body of her husband was laid. It is recorded that when a statue to President Kruger at Pretoria was erected, it was by Mrs. Kruger's wish that the hat was left open at the top, in order that the rain-water might collect there for the birds to drink.

See J. F. van Oordt, P. Kruger en de opkomst d. Zuid-Afrikaansche Republiek (Amsterdam, 1898); the Memoirs already mentioned; F. R. Statham, Paul Kruger and his Times (1898); and, among works with a wider scope, G. M. Theal, History of South Africa (for events down to 1872 only) ; Sir J. P. Fitzpatrick, The Transvaal from Within (1899) ; The Times History of the War in South Africa (1900-9) ; and A. P. Hillier, South African Studies (1900).

KRUGERSDORP, a town of the Transvaal, 21 m. N.W. of Johannesburg by rail. Pop. (1904), 20,073, of whom 6946 were whites. It is built on the Witwatersrand at an elevation of 5709 ft. above the sea, and is a mining centre of some importance. It is also the starting-point of a railway to Zeerust and Mafeking. Krugersdorp was founded in 1887 at the time of the discovery of gold on the Rand and is named after President Kruger. Within the municipal area is the Paardekraal monument erected to commemorate the victory gained by the Boers under Andries Pretorius in 1838 over the Zulu king Dingaan, and on the 16th of December each year, kept as a public holiday, large numbers of Boers assemble at the monument to celebrate the event. Here in December 1880 a great meeting of Boers resolved again to proclaim the independence of the Transvaal. The formal proclamation was made on Dingaan's Day, and after the defeat of the British at Majuba Hill in 1881 that victory was also commemorated at Paardekraal on the 16th of December. The monument, which was damaged during the war of 1899-1902,

was restored by the British authorities. It was at Doomkop, near Krugersdorp, that Dr L. S. Jameson and his " raiders " surrendered to Commandant Piet Cronje on the 2nd of January 1896 (see Transvaal: History). At Sterkfontein, 8 m. N.W. of Krugersdorp, are limestone caves containing beautiful stalactites.

KRUMAU (in Czech, Krumlov), is a town in Bohemia situated on the banks of the Moldau (Vitava). It has about 8000 inhabitants, partly of Czech, partly of German nationality. Krumau is principally celebrated because its ancient castle was long the stronghold of the Rosenberg family, known also as pani 2 ruze, the lords of the rose. Henry II. of Rosenberg (d. 13 10) was the first member of the family to reside at Krumau. His son Peter I. (d. 1349) raised the place to the rank of a city. The last two members of the family were two brothers, William, created prince of Ursini-Rosenberg in 1556 (d. 1592), and Peter Vok, who played a very large part in Bohemian history. Their librarian was Wenceslas Brezan, who has left a valuable work on the annals of the Rosenberg family. Peter Vok of Rosenberg, a strong adherent of the Utraquist party, sold Krumau shortly before his death (1611), because the Jesuits had established themselves in the neighbourhood.

The lordship, one of the most extensive in the monarchy, was bought by the emperor Rudolph II. for his natural son, Julius of Austria. In 1622 the emperor Ferdinand II. presented the lordship to his minister, Hans Ulrich von Eggenberg, and in 1625 raised it to the rank of an hereditary duchy in his favour. From the Eggenberg family Krumau passed in 17 19 to Prince Adam Franz Karl of Schwarzenberg, who was created duke of Krumau in 1723. The head of the Schwarzenberg family bears the title of duke of Krumau. The castle, one of the largest and finest in Bohemia, preserves much of its ancient character.

See \V. Brezan, Zivot Vilema z Rosenberka (Life A William of Rosenberg), 1847; also Zivot Petra Voka z Rosenberka (I ife of Peter Vok of Rosenberg), 1880.

KRUMBACHER, CARL (1856-1909), German Byzantine scholar, was born at Kiirnach in Bavaria on the 23rd of Sep- tember 1856. He was educated at the universities of Munich and Leipzig, and held the professorship of the middle age and modern Greek language and literature in the former from 1897 to his death. His greatest work is his Geschichle der byzantini- schen Littcratur (from Justinian to the fall of the Eastern Empire, 1453), a second edition of which was published in 1897, with the collaboration of A. Ehrhard (section on theology) and H. Gelzer (general sketch of Byzantine history, a.d. 395-1453). The value of the work is greatly enhanced by the elaborate bibliographies contained in the body of

the work and in a special supplement. Krumbacher also founded the Byzanlini- sche Zeitschrift (1892) and the Byzantinisches Archiv (1898). He travelled extensively and the results of a journey to Greece appeared in his Griechische Reise (1886). Other works by him are: Casia (1897), a treatise on a gth-century Byzantine poetess, with the fragments; Michael Glykas (1894); "Die griechische Litteratur des Mittelalters " in P. Hinneberg's Die Kultur der Gegenwart, i. 8 (1905); Das Problem der neu-grieckischen Schriftsprachc (1902), in which he strongly opposed the efforts of the purists to introduce the classical style into modern Greek literature, and Populare Aufsdlze (1909).

KRUMEN (Kroomen, Krooboys, Krus, or Croos), a negro people of the West Coast of Africa. They dwell in villages scattered along the coast of Liberia from below Monrovia nearly to Cape Palmas. The name has been wrongly derived from the English word " crew," with reference to the fact that Krumen were the first West African people to take service in European vessels. It is probably from Kraoh, the primitive name of one of their tribes. Under Krumen are now grouped many kindred tribes, the Grebo, Basa, Nifu, &c, who collec- tively number some 40,000. The Krus proper live in the narrow strip of coast between the Sino riveˆand Cape Palmas, where are their five chief villages, Kruber, Little Kru, Settra Kru, Nana Kru and King William's Town. They are traditionally

from the interior, but have long been noted as skilful seamen and daring fishermen. They are a stout, muscular, broad- chested race, probably the most robust of African peoples. They have true negro features — skin of a blue-black hue and woolly and abundant hair. The women are of a lighter shade than negro women generally, and in several respects come much nearer to a European standard. Morally as well as physically the Krumen are one of the most remarkable races in Africa. They are honest, brave, proud, so passionately fond of freedom that they will starve or drown themselves to escape capture, and have never trafficked in slaves. Politically the Krus are divided into small commonwealths, each with an hereditary chief whose duty is simply to represent the people in their dealings with strangers. The real government is vested in the elders, who wear as insignia iron rings on their legs. Their president, the head fetish-man, guards the national symbols, and his house is sanctuary for offenders till their guilt is proved. Personal property is held in common by each family. Land also is communal, but the rights of the actual cultivator cease only when he fails to farm it.

At 14 or 15 the Kru " boys " eagerly contract themselves for voyages of twelve or eighteen months. Generally they prefer work near at home, and are to be found on almost every ship trading on the Guinea coast. As soon as they have saved enough to buy a wife they return home and settle down.

Krumen ornament their faces with tribal marks — black or blue lines on the forehead and from ear to ear. They tattoo their arms and mutilate the incisor teeth. As a race they are singularly intelligent, and exhibit their enterprise in numerous settlements along the coast. Sierra Leone, Grand Bassa and Monrovia all have their Kru towns. Dr Bleek classifies the Kru language with the Mandingo family, and in this he is followed by Dr R. G. Latham; Dr K6lle, who published a Kru grammar (1854), considers it as distinct.

See A. de Quatrefages and E. T. Hamy, Crania ethnica, ix. 363 (1878-1879); Schlagintweit-Sakunlunski, in the Sitzur.gsberichte of the academy at Munich (1875); Nicholas, in Bull, de ia Soc. d'An- throp. (Paris, 1872); J. Btittikofer, Reisebilder aus Liberia (Leiden, 1890); Sir H. H. Johnston, Liberia (London, 1906).

KRUMMACHER, FRIEDRICH ADOLF (1767-1845), German theologian, was born on the 13th of July 1767 at Tecklenburg, Westphalia. Having studied theology at Lingen and Halle, he became successively rector of the grammar school at Mors (1793), professor of theology at Duisburg (1800), preacher at Crefeld, and afterwards at Kettwig, Consistorialrath and super- intendent in Bernburg, and, after declining an invitation to the university of Bonn, pastor of the Ansgariuskirche in Bremen (1824). He died at Bremen on the 14th of April 1845. He was the author of many religious works, but is best known by his Parabeln (1805; 9th ed. 1876; Eng. trans. 1844).

A. W. Moller published his life and letters in 1849.

His brother Gottfried Daniel Krummacher (i774 _I 837), who studied theology at Duisburg and became pastor successively in Bad (1798), Wulfrath (1801) and Elberfeld (1816), was the leader of the " pietists " of Wupperthal, and published several volumes of sermons, including one entitled Die W anderungen Israels durch d. Wiiste nach Kanaan (1834).

Friedrich Wilhelm Krummacher (i 796-1868), son of Fried- rich Adolf, studied theology at Halle and Jena, and became pastor successively at Frankfort (1 8 1 9) , Ruhrort (1823), Gemarke, near Barmen in the Wupperthal (1825), and Elberfeld (1834). In 1847 he received an appointment to the Trinity Church in Berlin, and in 1853 he became court chaplain at Potsdam. He was an influential promoter of the Evangelical Alliance. His best-known works are Elias der Thisbiter (1828-1833; 6th ed. 1874; Eng. trans. 1838); Elisa (1837) and Das Passionsbuch, der leidende Christus (1854, in English The Suffering Saviour, 1870). His Autobiography was published in 1869 (Eng. trans. 1871).

Emil Wilhelm Krummacher (1798-1886), another son, was born at Mors in 1798. In 1841 he became pastor in Duisburg. He wrote, amongst other works, Herzensmanna aus Luthers

Werken (1852). His son Hermann (1828-1890), who was ap- pointed Consistorialrath in Stettin in 1877, was the author of Deulsches Lebeu in Nordamerika (1874).

KRUPP, ALFRED (1812-1887), German metallurgist, was born at Essen on the 26th of April 1812. His father, Friedrich Krupp (1787-1826), had purchased a small forge in that town about 1810, and devoted himself to the problem of manufactur- ing cast steel; but though that product was put on the market by him in 1815, it commanded but little sale, and the firm was far from prosperous. After his death the works were carried on by his widow, and Alfred, as the eldest son, found himself obliged, a boy of fourteen, to leave school and undertake their direction. For many years his efforts met with little success, and the concern, which in 1845 employed only 122 workmen, did scarcely more than pay its way. But in 1847 Krupp made a 3 pdr. muzzle-loading gun of cast steel, and at the Great Exhi- bition of London in 1851 he exhibited a solid flawless ingot of cast steel weighing 2 tons. This exhibit caused a. sensation in the industrial world, and the Essen works sprang into fame. Another successful invention, the manufacture of weldless steel tires for railway vehicles, was introduced soon afterwards. The profits derived from these and other steel manufactures were devoted to the expansion of the works and to the develop- ment of the artillery with which the name of Krupp is especially associated (see Ordnance). The model settlement, which is one of the best-known features of the Krupp works, was started in the 'sixties, when difficulty began to be found in housing the increasing number of workmen; and now there are various " colonies," practically separate villages, dotted about to the south and south-west of the town, with schools, libraries, recrea- tion grounds, clubs, stores, &c. The policy also was adopted of acquiring iron and coal mines, so that the firm might have command of supplies of the raw material required for its opera- tions. Alfred Krupp, who was known as the " Cannon King," died at Essen on the 14th of July 1887, and was succeeded by his only son, Friedrich Alfred Krupp (1854-1902), who was born at Essen on the 17th of February 1854. The latter devoted himself to the financial rather than to the technical side of the business, and under him it again underwent enormous expansion. Among other things he in 1896 leased the " Germania " ship- building yard at Kiel, and in 1902 it passed into the complete ownership of the firm. In

the latter year, which was also the year of his death, on the 22nd of November, the total number of men employed at Essen and its associated works was over 40,000. His elder daughter Bertha, who succeeded him, was married in October 1906 to Dr Gustav von Bohlen und Halbach, who on that occasion received the right to bear the name Krupp von Bohlen und Halbach. The enormous increase in the German navy involved further expansion in the operations of the Krupp firm as manufacturers of the armour plates and guns required for the new ships, and in 1908 its capital, then standing at £9,000,000, was augmented by £2,500,000.

KRUSENSTERN, ADAM IVAN (1770-1846), Russian navi- gator, hydrographer and admiral, was born at Haggud in Esthonia on the 19th of November 1770. In 1785 he entered the corps of naval cadets, after leaving which, in 1788, with the grade of midshipman, he served in the war against Sweden. Having been appointed to serve in the British fleet for several years (1793-1799), he visited America, India and China. After publishing a paper pointing out the advantages of direct com- munication between Russia and China by Cape Horn and the Cape of Good Hope, he was appointed by the emperor Alexander I. to make a voyage to the east coast of Asia to endeavour to carry out the project. Two English ships were bought, in which the expedition left Kronstadt in August 1803 and proceeded by Cape Horn and the Sandwich Islands to Kamchatka, and thence to Japan. Returning to Europe by the Cape of Good Hope, after an extended series of explorations, Krusenstern reached Kronstadt in August 1806, his being the first Russian ex- pedition to circumnavigate the world. The emperor conferred several honours upon him, and he ultimately became admiral. As director of the Russian naval school Krusenstern did much

useful work. He was also a member of the scientific committee of the marine department, and his contrivance for counter- acting the influence of the iron in vessels on the compass was adopted in the navy. He died at Reval on the 24th of August

1846.

Krusenstern's Voyage Round the World in 1803-1806 was published at St Petersburg in 1810-1814, in 3 vols., with folio atlas of 104 plates and maps (Eng. ed., 2 vols. 1813; French ed., 2 vols., and atlas of 30 plates, 1820). His narrative contains a good many important discoveries and rectifications, especially in the region of Japan, and the contributions made by the various savants were of much scientific importance. A valuable work is his Atlas de V Ocean Pacifique, with its accompanying Recueil des memoires hydrogra- phiques (St Petersburg, 1824-1827). See Memoir by his daughter, Madame Charlotte Bernhardi, translated by Sir John Ross

(1856).

KRUSHEVATS (or Krusevac), a town of Servia, lying in a fertile region of hills and dales near the right bank of the Servian Morava. Pop. (1900), about 10,000. Krushevats is the capital of a department bearing the same name, and has an active trade in tobacco, hemp, flax, grain and livestock, for the sale of which it possesses about a dozen markets. It was in Krushevats that the last Servian tsar, Lazar, assembled his army to march against the Turks, and lose his empire, at Kosovo, in 1389. The site of his palace is marked by a ruined enclosure containing a fragment of the tower of Queen Militsa, whither, according to legend, tidings of the defeat were brought her by crows from the battlefield. Within the enclosure stands a church, dating from the reign of Stephen Dushan (1336-1356), with beautiful rose windows and with imperial peacocks, dragons and eagles sculptured on the walls. Several old Turkish houses were left at the beginning of the 20th century, besides an ancient Turkish fountain and bath.

KSHATTRIYA, one of the four original Indian castes, the other three being the Brahman, the Vaisya and the Sudra. The Kshattriya was the warrior caste, and their function was to protect the people and abstain from sensual pleasures. On the rise of Brahmin ascendancy the Kshattriyas were repressed, and their consequent revolt gave rise to Buddhism and Jainism, the founders of both these religions belonging to the Kshattriya caste. Though, according to tradition, the Kshattriyas were all exterminated by Parasurama, the rank is now conceded to the modern Rajputs, and also to the ruling families of native states. (See Caste.)

KUBAN, a river of southern Russia, rising on the W. slope of the Elbruz, in the Caucasus, at an altitude of 13,930 ft., races down the N. face of the Caucasus as a mountain- torrent, but upon getting down to the lower-lying steppe country S. of Stavropol it turns, at 1075 ft. altitude, towards the N.W., and eventually, assuming a westerly course, enters the Gulf of Kyzyl-tash, on the Black Sea, in the vicinity of the Straits of Kerch. Its lower course lies for some distance through marshes, where in times of overflow its breadth increases from the normal 700 ft. to over half a mile. Its total length is 500 m., the area of its basin 21,480 sq. m. It is navigable for steamers for 73 m., as far as the confluence of its tributary, the Laba (200 m. long). This, like its other affluents, the Byelaya (155 m.), Urup, and Great and Little Zelenchuk, joins it from the left. The Kuban is the ancient Hypanis and Vardanes and the Pshishche of the Circassians.

KUBAft, a province of Russian Caucasia, having the Sea of Azov on the W., the territory of Don Cossacks on the N., th« government of Stavropol and the province of Terek on the E., and the government of Kutais and the

Black Sea district on the S. and S.W. It thus contains the low and marshy lowlands on the Sea of Azov, the western portion of the fertile steppes of northern Caucasia, and the northern slopes of the Caucasus range from its north-west extremity to the Elbruz. The area is 36,370 sq. m. On the south the province includes the parallel ranges of the Black Mountains (Kara-dagh), 3000 to 6000 ft. high, which are intersected by gorges that grow deeper and wider as the main range is approached. Owing to a relatively wet climate and numerous streams, these mountains are densely clothed with woods, under the shadow of which a thick

undergrowth of rhododendrons, " Caucasian palms " (Buxus sempervirens), ivy, clematis, &c, develops, so as to render the forests almost impassable. These cover altogether nearly 20% of the aggregate area. Wide, treeless plains, from 1000 to 2000 ft. high, stretch north of the Kuban, and are profusely watered by that river and its many tributaries — the Little and Great Zelenchuk, Urup, Laba, Byelaya, Pshish — mountain torrents that rush through narrow gorges from the Caucasus range. In its lower course the Kuban forms a wide, low delta, covered with rushes, haunted by wild boar, and very unhealthy. The same characteristics mark the low plains on the east of the Sea of Azov, dotted over with numerous semi-stagnant lakes. Malaria is the enemy of these regions, and is especially deadly on the Taman Peninsula, as also along the left bank of the lower and middle Kuban.

There is considerable mineral wealth. Coal is found on the Kuban and its tributaries, but its extraction is still insignificant (less than 10,000 tons per annum). Petroleum wells exist in the district of Maikop, but the best are in the Taman Peninsula, where they range over 570 sq. m. Iron ores, silver and zinc are found; alabaster is extracted, as also some salt, soda and Epsom salts. The best mineral waters are at Psekup and Taman, where there are also numbers of mud volcanoes, ranging from small hillocks to hills 365 ft. high and more. The soil is very fertile in the plains, parts of which consist of black earth and are being rapidly populated.

The population reached 1,928,419 in 1897; of whom 1,788,622 were Russians, 13,926 Armenians, 20,137 Greeks and 20,778 Germans. There were at the same date 945,873 women, and only 156,486 people lived in towns. The estimated population in 1906 was 2,275,400. The aborigines were represented by 100,000 Circassians, 5000 Nogai Tatars and some Ossetes. The Circassians or Adyghe, who formerly occupied the mountain valleys, were compelled, after the Russian conquest in 1861, either to settle

on the flat land or to emigrate; those who refused to move voluntarily were driven across the mountains to the Black Sea coast. Most of them (nearly 200,000) emigrated to Turkey, where they formed the Bashi-bazouks. Peasants from the interior provinces of Russia occupied the plains of the Kuban, and they now number over 1,000,000, while the Kubafi Cossacks in 1897 numbered 804,372 (405,428 women). In point of religion 90% of the population were in 1897 members of the Orthodox Greek Church, 4% Raskolniks and other Christians and 5-4% Mahommedans, the rest being Jews. Wheat is by far the chief crop (nearly three-quarters of the total area under crops are under wheat) ; rye, oats, barley, millet, Indian corn, some flax and potatoes, as also tobacco, are grown. Agricultural machinery is largely employed, and the province is a reserve granary for Russia. Livestock, especially sheep, is kept in large numbers on the steppes. Bee-keeping is general, and gardening and vine-growing are spreading rapidly. Fishing in the Black Sea and Sea of Azov, as also in the Kuban, is important.

Two main lines of railway intersect the province, one running N.W. to S.E., from Rostov to Vladikavkaz, and another starting from ihe former south-westwards to Novorossiysk on the north coast of the Black Sea. The province is divided into seven districts, the chief towns of which, with their populations in 1897, are Ekaterinodar, capital of the province (65,697), Anapa (6676), Labinsk (6388), Batalpashinsk (8100), Maikop (34,191), Temryuk (14,476) and Yeisk (35,446).

The history of the original settlements of the various native tribes, and their language and worship before the introduction of Mahommedanism, remain a blank page in the legends of the Caucasus. The peninsula of Taman, a land teeming with relics of ancient Greek colonists, has been occupied successively by the Cimmerians, Sarmatians, Khazars, Mongols and other nations. The Genoese, who established an extensive trade in the 13th century, were expelled by the Turks in 1484, and in 1784 Russia obtained by treaty the entire peninsula and the territory on the right bank of the Kubafi, the latter being granted by Cathe- rinell. in 1792 to theCossacksof theDnieper. Then commenced

the bloody struggle with the Circassians, which continued for more than half a century. Not only domestic, but even field work, is conducted mostly by the women, who are remarkable for their physical strength and endurance. The native moun- taineers, known under the general name of Circassians, but locally distinguished as the Karachai, Abadsikh, Khakuchy, Shapsugh, have greatly altered their mode of life since the pacification of the Caucasus, still, however, maintaining Mahom-medanism, speaking their vernacular, and strictly obseiving the customs of their ancestors. Exports include wheat, tobacco, leather, wool, petroleum,

timber, fish, salt and live cattle; imports, dry goods, grocery and hardware. Local industry is limited to a few tanneries, petroleum refineries and spirit distilleries. (P. A. K.; J. T. Be.)

KUBELIK, JAN (1880-), Bohemian violinist, was born near Prague, of humble parentage. He learnt the violin from childhood, and appeared in public at Prague in 1888, subsequently being trained at the Conservatorium by the famous teacher Ottakar Sevcik. From him he learnt an extraordinary tech- nique, and from 1898 onwards his genius was acclaimed at concerts throughout Europe. He first appeared in London in 1900, and in America in 1901, creating a furore everywhere. In 1903 he married the Countess Czaky Szell.

KUBERA (or Kuvera) , in Hindu mythology, the god of wealth. Originally he appears as king of the powers of evil, a kind of Pluto. His home is Alaka in Mount Kailasa, and his garden, the world's treasure-house, is Chaitraratha, on Mount Mandara. Kubera is half-brother to the demon Ravana, and was driven from Ceylon by the latter.

KUBLAI KHAN (or Kaan, as the supreme ruler descended from Jenghiz was usually distinctively termed in the 13th century) (1216-1294), the most eminent of the successors of Jenghiz (Chinghiz), and the founder of the Mongol dynasty in China. He was the second son of Tule, youngest of the four sons of Jenghiz by his favourite wife. Jenghiz was succeeded in the khanship by his third son Okkodai, or Ogdai (1229), he by his son Kuyuk (1246), and Kuyuk by Mangu, eldest son of Tule (1252). Kublai was born in 1216, and, young as he was, took part with his younger brother Hulagu (afterwards conqueror of the caliph and founder of the Mongol dynasty in Persia) in the last campaign of Jenghiz (1226-27). The Mongol poetical chronicler, Sanang Setzen, records a tradition that Jenghiz himself on his deathbed discerned young Kublai's promise and predicted his distinction.

Northern China, Cathay as it was called, had been partially conquered by Jenghiz himself, and the conquest had been followed up till the Kin or " golden " dynasty of Tatars, reigning at K'ai-feng Fu on the Yellow River, were completely subju- gated (1234). But China south of the Yangtsze-kiang remained many years later subject to the native dynasty of Sung, reigning at the great city of Lingan, or Kinsai (King-sz', "capital"), now known as Hang-chow Fu. Operations to subdue this region had commenced in 1235, but languished till Mangu's accession. Kublai was then named his brother's lieutenant in Cathay, and operations were resumed. By what seems a vast and risky strategy, of which the motives are not quite clear, the first campaign of Kublai was directed to the subjugation of the remote western province of Yunnan. After the capture of Tali Fu (well known in recent years as the capital of a Mahom- medan insurgent sultan), Kublai

returned north, leaving the war in Yunnan to a trusted general. Some years later (1257) the khan Mangu himself entered on a campaign in west China, and died there, before Ho-chow in Szech'uen (1259).

Kublai assumed the succession, but it was disputed by his brother Arikbugha and by his cousin Kaidu, and wars with these retarded the prosecution of the southern conquest. Doubt- less, however, this was constantly before Kublai as a great task to be accomplished, and its fulfilment was in his mind when he selected as the future capital of his empire the Chinese city that we now know as Peking. Here, in 1264, to the north-east of the old city, which under the name of Yenking had been an occasional residence of the Kin sovereigns, he founded his new

capital, a great rectangular plot of 18 m. in circuit. The (so- called) " Tatar city " of modern Peking is the city of Kublai, with about one-third at the north cut off, but Kublai's walls are also on this retrenched portion still traceable.

The new city, officially termed T'ai-tu (" great court "), but known among the Mongols and western people as Kaan- baligh (" city of the khan ") was finished in 1267. The next year war against the Sung Empire was resumed, but was long retarded by the strenuous defence of the twin cities of Siang-yang and Fan-cheng, on opposite sides of the river Han, and command- ing two great lines of approach to the basin of the Yangtsze- kiang. The siege occupied nearly five years. After this Bayan, Kublai's best lieutenant, a man of high military genius and noble character, took command. It was not, however, till 1276 that the Sung capital surrendered, and Bayan rode into the city (then probably the greatest in the world) as its conqueror. The young emperor, with his mother, was sent prisoner to Kaan-baligh; but twc younger princes had been despatched to the south before the fall of the city, and these successively were proclaimed emperor by the adherents of the native throne. An attempt to maintain their cause was made in Fu-kien, and afterwards in the province of Kwang-tung; but in 1279 these efforts were finally extinguished, and the faithful minister who had inspired them terminated the struggle by jumping with his young lord into the sea.

Even under the degenerate Sung dynasty the conquest of southern China had occupied the Mongols during half a century of intermittent campaigns. But at last Kublai was ruler of all China, and probably the sovereign (at least nominally) of a greater population than had ever acknowledged one man's supremacy. For, though his rule was disputed by the princes of his

house in Turkestan, it was acknowledged by those on the Volga, whose rule reached to the frontier of Poland, and by the family of his brother Hulagu, whose dominion extended from the Oxus to the Arabian desert. For the first time in history the name and character of an emperor of China were familiar as far west as the Black Sea and not unknown in Europe. The Chinese seals which Kublai conferred on his kinsmen reigning at Tabriz are stamped upon their letters to the kings of France, and survive in the archives of Paris. Adventurers from Turkestan, Persia, Armenia, Byzantium, even from Venice, served him as ministers, generals, governors, envoys, astronomers or physicians; soldiers from all Asia to the Cau- casus fought his battles in the south of China. Once in his old age (1287) Kublai was compelled to take the field in person against a serious revolt, raised by Nayan, a prince of his family, who held a vast domain on the borders of Manchuria. Nayan was taken and executed. The revolt had been stirred up by Kaidu, who survived his imperial rival, and died in 1301. Kublai himself died in 1294, at the age of seventy-eight.

Though a great figure in Asiatic history, and far from deserving a niche in the iong gallery of Asiatic tyrants, Kublai misses a record in the short list of the good rulers. His historical locus was a happy one, for, whilst he was the first of his race to rise above the innate barbarism of the Mongols, he retained the force and warlike character of his ancestors, which vanished utterly in the effeminacy of those who came after him. He had great intelligence and a keen desire for knowledge, with apparently a good deal of natural benevolence and magnanimity. But his love of splendour, and his fruitless expeditions beyond sea, created enormous demands for money, and he shut his eyes to the character and methods of those whom he employed to raise it. A remarkable narrative of the oppressions of one of these, Ahmed of Fenaket, and of the revolt which they pro- voked, is given by Marco Polo, in substantial accordance with the Chinese annals.

Kublai patronized Chinese literature and culture generally. The great astronomical instruments which he caused to be made were long preserved at Peking, but were carried off to Berlin in 1900. Though he put hardly any Chinese into the first ranks of his administration, he attached many to his confidence, and was personally popular among them. Had his endeavour

to procure European priests for the instruction of his people, of which we know through Marco Polo, prospered, the Roman Catholic church, which gained some ground under his successors, might have taken stronger root in China. Failing this momen- tary effort, Kublai probably saw in the organized force of Tibetan Buddhism the readiest instrument in the civilization of his countrymen, and that system received his special countenance. An early act of his reign had been to constitute a young lama

of intelligence and learning the head of the Lamaite Church, and eventually also prince of Tibet, an act which may be regarded as a precursory form of the rule of the " grand lamas " of Lassa. The same ecclesiastic, Mati Dhwaja, was employed by Kublai to devise a special alphabet for use with the Mongol language. It was chiefly based on Tibetan forms of Nagari; some coins and inscriptions in it are extant; but it had no great vogue, and soon perished. Of the splendour of his court and enter- tainments, of his palaces, summer and winter, of his great hunting expeditions, of his revenues and extraordinary paper currency, of his elaborate system of posts and much else, an account is given in the book of Marco Polo, whc passed many years in Kublai's service.

We have alluded to his foreign expeditions, which were almost all disastrous. Nearly all arose out of a hankering for the nominal extension of his empire by claiming submission and tribute. Expeditions against Japan were several times repeated; the last, in 1281, on an immense scale, met with huge discomfiture. Kublai's preparations to avenge it were abandoned owing to the intense discontent which they created. In 1278 he made a claim of submission upon Champa, an ancient state representing what we now call Cochin China. This eventually led to an attempt to invade the country through Tongking, and to a war with the latter state, in which the Mongols had much the worst of it. War with Burma (or Mien, as the Chinese called it) was provoked in very similar fashion, but the result was more favourable to Kublai's arms. The country was overrun as far as the Irrawaddy delta, the ancient capital, Pagan, with its magnificent temples, destroyed, and the old royal dynasty overthrown. The last attempt of the kind was against Java, and occurred in the last year of the old khan's reign. The envoy wh om he had commissioned to claim homage was sent back with ignominy. A great armament was equipped in the ports of Fu-kien to avenge this insult; but after some temporary success the force was compelled to re-embark with a loss .of 3000 men. The death of Kublai prevented further action.

Some other expeditions, in which force was not used, gratified the khan's vanity by bringing back professions of homage, with presents, and with the curious reports of foreign countries in which Kublai delighted. Such expeditions extended to the states of southern India, to eastern Africa, and even to Mada- gascar.

Of Kublai's twelve legitimate sons, Chingkim, the favourite and designated successor, died in 1284/5; an d Timur, the son of Chingkim, took his place. No great king arose in the dynasty after Kublai. He had in all nine successors of his house on the throne of Kaan-baligh, but the long and imbecile reign of the ninth, Toghon Timur, ended (1368) in disgrace and expulsion and the native dynasty of Ming reigned in their stead. (H. Y.)

KUBUS, a tribe inhabiting the central parts of Sumatra. They are nomadic savages living entirely in the forests in shelters of branches and leaves built on platforms. It has been suggested that they represent a Sumatran aboriginal race; but Dr J. G. Garson, reporting on Kubu skulls and skeletons submitted to him by Mr. H. O. Forbes, declared them decidedly Malay, though the frizzle in the hair might indicate a certain mixture of negrito blood {Jour. Anthrop. Instit., April 1884). They are of a rich olive-brown tint, their hair jet black and inclined to curl, and, though not dwarfs, are below the average height.

KUCHAN. a fertile and populous district of the province Khorasan in Persia, bounded N. by the Russian Transcaspian territory, W. by Bujnurd, S. by Isfarain, and extending in the E. to near Radkan. Its area is about 3000 sq. m. and its

population; principally composed of Zafaranlu Kurds, descen- dants of tribes settled there by Shah Abbas I. in the 17th century, is estimated at 100,000. About 3000 families are nomads and live in tents. The district produces much grain, 25,000 to 30,000 tons yearly, and contains two towns, Kuchan and Shirvan (pop. 6000), and many villages.

Kuchan, the capital of the district, has suffered much from the effects of earthquakes, notably in 1875, 1894 and 1895. The last earthquake laid the whole town in ruins and caused considerable loss of life. About 8000 of the survivors removed to a site 75 m. E. and there built a new town named Nasseriyeh after Nasr-ud-din Shah, but known better as Kuchan i jadid, i.e. New Kuchan, and about 1000 remained in the ruined city in order to be near their vineyards and gardens. The geoˆ graphical position of the old town is 37 8′ N., 58 25′ E., elevation 4100 ft. The new town has been regularly laid out with broad streets and spacious bazaars, and, situated as it is half-way between Meshed and Askabad on the cart-road con- necting those two places, has much trade. Its population is estimated at 10,000. There are telegraph and post offices.

KUCH BEHAR, or Cooch Behar, a native state of India, in Bengal, consisting of a submontane tract, not far from Darjeeling, entirely surrounded by British territory. Area, 1307 sq. m. Pop. (igor), 566,974; estimated revenue, £140,000. The state forms a level plain of triangular shape, intersected by numerous rivers. The greater portion is fertile and well cultivated, but tracts of jungle are to be seen in the north-east corner, which abuts upon Assam. The soil is uniform in char- acter throughout,

consisting of a light, friable loam, varying in depth from 6 in. to 3 ft., superimposed upon a deep bed of sand. The whole is detritus, washed down by torrents from the neigh- bouring Himalayas. The rivers all pass through the state from north to south, to join the main stream of the Brahmaputra. Some half-dozen are navigable for small trading boats throughout the year, and are nowhere fordable; and there are about twenty minor streams which become navigable only during the rainy season. The streams have a tendency to cut new channels for themselves after every annual flood, and they communicate with one another by cross-country watercourses. Rice is grown on three-fourths of the cultivated area. Jute and tobacco are also largely grown for export. The only special industries are the weaving of a strong silk obtained from worms fed on the castor-oil plant, and of a coarse jute cloth used for screens and bedding. The external trade is chiefly in the hands of Marwari immigrants from Rajputana. Among other improve- ments a railway has been constructed, with the assistance of a loan from the British government. The earthquake of the 1 2th of June 1897 caused damage to public buildings, roads, &c, in the state to the estimated amount of £100,000.

The Koch or Rajbansi, from which the name of the state is derived, are a widely spread tribe, evidently of aboriginal descent, found throughout all northern Bengal, from Purnea district to the Assam valley. They are akin to the Indo-Chinese races of the north-east frontier; but they have now become largely hinduized, especially in their own home, where the appellation " Koch " has come to be used as a term of reproach. Their total number in all India was returned in 1901 as nearly 2j millions.

As in the case of many other small native states, the royal family of Kuch Behar lays claim to a divine origin in order to conceal an impure aboriginal descent. The greatest monarch of the dynasty was Nar Narayan, the son of Visu Singh, who began to reign about 1550. He conquered the whole of Kamrup, built temples in Assam, of which ruins still exist bearing inscrip- tions with his name, and extended his power southwards over what is now part of the British districts of Rangpur and Purnea. His son, Lakshmi Narayan, who succeeded him in Kuch Behar, became tributary to the Mogul Empire. In 1772 a competitor for the throne, having been driven out of the country by his rivals, applied for assistance to Warren Hastings. A detach- ment cf sepoys was accordingly marched into the state; the Bhutias, whose interference had led to this intervention, were

expelled, and forced to sue for peace through the mediation of the lama of Tibet. By the treaty made on this occasion, April 1773, the raja acknowledged subjection to the Company, and made over to it one-half of his annual revenues. In 1863, on the death of the raja, leaving a son and heir only ten months old, a British commissioner was appointed to

undertake the direct management of affairs during the minority of the prince, and many important reforms were successfully introduced. The maharaja Sir Nripendra Narayan, G.C.I.E., born in 1862, was educated under British guardianship at Patna and Calcutta, and became hon. lieutenant-colonel of the 6th Bengal Cavalry. In 1897-98 he served in the Tirah campaign on the staff of General Yeatman-Biggs, and received the distinction of a C.B. He was present at the Jubilee in 1887, the Diamond Jubilee of 1897, and King Edward's Coronation in 1902, and became a well-known figure in London society. In 1878 he married a daughter of Keshub Chunder Sen, the Brahmo leader. His eldest son ,was educated in England.

The town of Kuch Behar is situated on the river Tursa, and has a railway station. Pop. (1901), 10,458. It contains a college affiliated to the Calcutta University.

KUDU {koodoo), the native name for a large species of African antelope (q.v.), with large corkscrew-like horns in the male,

*s** 1 **" •*

Male Kudu, and the body marked with narrow vertical white lines in both sexes. The female is hornless. Strepsiceros capensis (or 5. slrepsiceros) is the scientific name of the true kudu, which ranges from the Cape to Somaliland; but there is also a much smaller species (S. imberbis) in East and North-East Africa.

KUENEN, ABRAHAM (1828-1891), Dutch Protestant theo- logian, the son of an apothecary, was born on the 16th of Sep- tember 1828, at Haarlem, North Holland. On his father's death it became necessary for him to leave school and take a humble place in the business. By the generosity of friends he was educated at the gymnasium at Haarlem and afterwards at the university of Leiden. He studied theology, and won his doctor's degree by an edition of thirty-four chapters of Genesis from the Arabic version of the Samaritan Pentateuch. In 1853 he became professor extraordinarius of theology at Leiden, and in 1855 full professor. He married a daughter of W. Muurling, one of the founders of the Groningen school, which made the first pronounced breach with Calvinistic theology in the Reformed Church of Holland. Kuenen himself soon became one of the main supports of the modern theology, of which J. N. Scholten (i8ri-i885) and Karel Willem Opzoomer (b. 182 1) were the chief founders, and of which Leiden became the headquarters. His first great work, an historico-critical introduction to the Old Testament, Historisch-kritisch onder- zoek naar het onstaan en de verzameling van de boeken des Ouden Verbonds (3 vols., 1861-1865; 2nd ed., 1885-1893; German by T. Weber and C. T.

Muller, 1885-1894), followed the lines of ths

dominant school of Heinrich Ewald. But before long he came under the influence of J. W. Colenso, and learned to regard the prophetic narrative of Genesis, Exodus, and Numbers as older than what was by the Germans denominated Grundschrift ("Book of Origins")- In 1869-1870 he published his book on the religion of Israel, De godsdienst van Israel tot den ondergang van der Joodschen Slaat (Eng. trans., 1874-1875). This was fol- lowed in 1875 by a study of Hebrew prophecy, De profeten en de profetie onder Israel (Eng. trans., 1877), largely polemical in its scope, and specially directed against those who rest theological dogmas on the fulfilment of prophecy. In 1882 Kuenen went to England to deliver a course of Hibbert lectures, National Religions and Universal Religion; in the following year he presided at the congress of Orientalists held at Leiden. In 1886 his volume on the. Hexateuch was published in England. He died at Leiden on the 10th of December 1891.

Kuenen was also the author of many articles, papers and reviews; a series on the Hexateuch, which appeared in the Tkeologisch Tijdschrift, of which in 1866 he became joint editor, is one of the finest products of modern criticism. His collected works were translated into German and published by K. Budde in 1854. Several of his works have been translated into English by Philip Wicksteed. See the article in Herzog-Hauck, Realencyklopddie.

KUEN-LUN, or Kwen-Lun, a term used to designate gener- ally the mountain ranges which run along the northern edge of the great Tibetan plateau in Central Asia. In a wider application it means the succession of ranges which extend from the Pamirs on the W. to 113 ° E., until it strikes against or merges in the steep escarpments of the S.E. flank of the Mongolian plateau. In the narrower acceptation it applies only to those ranges which part the desert of Takla-makan on the N. from the Tibetan plateau on the S. between the Pamirs and the transverse glen of the Kara- muren, that is, nearly to the longitude of the town of Cherchen (about 855° E.). Although the use of the name is thus restricted in geographical usage, the mountain system so designated does, as a fact, extend eastwards as far as the great depression of Tsaidam (say 95° E.), though it is un- certain whether its direct orographical continuation eastwards is to be identified with the Astin-tagh, or, as F. Grenard and K. Bogdanovich believe — and with them Sven Hedin is inclined to agree — with the parallel ranges of Kalta-alaghan and Arka- tagh, which lie S. of the Astin-tagh. At any rate

the Astin- tagh, whether it is the principal continuation of the Kuen-lun or only a subsidiary flanking system, is itself the westward continuation of the Nan-shan or Southern Mountains, which reach down far into China (to 113 E.).

Taken in its widest meaning, the Kuen-lun Mountains thus stretch in a wavy line for nearly 2500 m. from E. to W., and while in the W. their constituent ranges are folded and squeezed by lateral compression into a breadth of some 150-200 m., their summits being forced up to correspondingly higher altitudes, in the E. they spread out to a breadth of some 600 m., the ranges being in that quarter less folded, and consequently both flatter and lower. In the tectonic structure of Asia the Kuen-lun forms, as it were, the backbone of the continent. In point of age it is very much older than either the Himalayas to the S. or the Tian-shan to the N. But although the crests of its component ranges reach altitudes of 21,500 to 22,000 ft., they are not as a rule overtopped by individual peaks of com- manding and towering elevation, as the Himalayas are, but run on the whole tolerably uniform and relatively at little greater altitude than the lofty valleys which separate them one from another. It is a strikingly marked characteristic of the northern edge of the Tibetan plateau that its outermost border-range (e.g. Western Kuen-lun and Astin-tagh) is throughout double; and this " twinning " of the mountain-ranges, as also of the inter- mont lake-basins among the Kuen-lun ranges, is a peculiar feature of the Tibetan plateau.

The supreme orographic importance of this great Central Asian mountain system was recognized in a fashion even by the geographers of ancient Greece. They used to suppose that an immense range of mountains crossed Asia from west to east on the parallel of the island of Rhodes, extending through Asia Minor, the Kurdish high- lands, the N. of Persia, the N. of Bactria (Afghanistan), the Hindu-

kush, and so on into China. This long range they supposed to separate the waters which flow N. to the Arctic from those which flow S. to the Indian Ocean. K. Ritter (Asien, ii.) was the first of modern geographers to recognize the true character of the Kuen-lun as a border range of the Tibetan plateau ; and Baron von Richthofen (China, i. 1876) still further defined and accentuated the conception of the system by representing it as a complex arrangement of several parallel ranges, running in wavy lines from the Pamirs (76 E.) eastwards to 118° E. But though von Richthofen's general concep- tion of the Kuen-lun system was broadly sound and in accordance with facts, the details both of his description and of that of his pupil Wegener 1 require now very considerable revision, and need even to be in part recast, as a consequence of explorations and investigations made since they wrote by, amongst others, the Russian explorers N. M.

Przhevalsky, M. V. Pyevtsov, V. I. Roboroysky, P. K. Kozlov, K. Bogdanovich, V. A. Obruchev, and (?) Skassi; by the Englishmen A. D. Carey, A. Dalgleish, St G. R. Littledale, H. Bower, H. H. P. Deasy and M. S. Wellby; by the American W. W. Rockhill; the Frenchmen J. L. Dutreuil de Rhins, F. Grenard, P. G. Bonvalot and Prince Henri d'Orleans; by the Hungarians L. von Loczy and Count Szechenyi; and above all by the Swede Sven Hedin.

Western Kuen-lun. — On the east the Pamir highlands are fenced off from the East Turkestan lowlands by the double border-ridge of Sarik-kol (the Sarik-kol range and the Muztagh or Kashgar range), which has its eastern foot down in the Tarim basin (4000-4500 ft.) and its western up on the Pamirs at 10,500 to 13,000 ft. above sea- level, while its own summits, e.g. the Muztagh-ata (25,780 ft.), shoot up far above the limits of perpetual snow. This double border- ridge is continued east of the meridian of Yarkand or Yarkent (77° E.) by a succession of twin ranges, all running, though under different names,- from the W.N.W. to the E.S.E. According to the investigations of F. Stoliczka and K. Bogdanovich, the same fossils occur in both sets of border ranges, in the Sarik-kol and in their eastward continuations, e.g. corals, Stromatophorae, Bryozoa, Atrypa reticularis, A. latilinguis and A. aspera, Spirifer verneuili, &c, and these the latter geologist assigns to the Devonian epoch. These eastward continuations of the double border-range of the Pamirs are the constituent ranges of the Kuen-lun proper. The names given to them are the Kilian or Kiliang, the Khotan and the Keriya Mountains in the more northerly range and the Raskem or Raskan, the Sughet and the Ullugh-tagh Mountains in the more southerly range. Although they all decrease in altitude from west to east, they nevertheless reach elevations of 19,000 ft., with individual peaks ascending some 2000-2500 ft. higher. From the East Turke- stan lowlands on the north the ascent is very steep, and the passes across both sets of ranges lie at great altitudes; for example, the pass of Sanju-davan in the lower range is 16,325 ft. above sea-level, and the Kyzyl-davan, farther east, is 16,900 ft., while the Sughet- davan in the higher range is 17,825 ft. The latter range is separated from the Karakorum Mountains by the deeply trenched gorge of the Raskem or Yarkand-darya, while the deep glen of the Kara-kash or Khotan-darya intervenes between the upper (Sughet Mountains) and the lower (Kilian Mountains) border-ranges. Altogether this western extremity of the Kuen-lun system is a very rugged moun- tainous region, a consequence partly of the intricacy of the flanking ranges and spurs, partly of the powerful lateral compression to which they have been subjected, and partly of the great and abrupt differences in vertical elevation between the crests of the ranges and the bottoms of the deep, narrow, rugged glens between them. In the broad orographical disposition of the ranges there is considerable similarity between north

Tibet and west Persia, in that in both cases the ranges are crowded together in the west, but spread out wider as they advance towards the east. To the two principal ranges in this part of the system F. Grenard, who accompanied J. L. Dutreuil de Rhins on his journey in 1890-1895, gives the names the Altyn-tagh and Ustun-tagh, though he names no less than six parallel ranges altogether. Now as Altyn-tagh 2 is an accepted, though in point of fact erroneous, name for Astin-tagh, it is clear that Grenard considers the main Kuen-lun ranges to be continued directly by the Astin-tagh.

From the transverse breach of the Keriya-darya (about 8iJ° E.) to that of the Kara-muren in the longitude of Cherchen (about 85J E.) the parallel border-ranges of the Tibetan plateau trend to the E.N.E., and here occur in the lower or outer range the passesof Dalai-kurghan-art (14,290 ft.), Choka-davan, i.e. Littledale'sChokur Pass (9530 ft.) and others at altitudes ranging from 8600 to

1 In " Orographie des Kwen-lun," in Zeitschrift der Gesellschaft fur Erdkunde zu Berlin (1891).

2 It is used, for instance, on the map of " Inner-Asien " (No. 62) of Stieler's Hand-atlas (ed. 1905) and in the Atlas of the Russian General Staff.^ Etymologically the correct form is Astin-tagh or Astun-tagh, meaning the Lower or Nearer Mountains. Ustun-tagh, which appears on Stieler's map as an alternative name for Altyn-tagh, means Higher or Farther Mountains, and though not used locally of any specific range, would be appropriately employed to designate the higher and more southerly of the twin border-ranges of the Tibetan plateau.

11,500 ft., while in the upper range are the At-to-davan (16,600 ft.), Yapkak-lik-davan (15,550 ft.), Sarshu-davan (15,680 ft.) and others not named at 16,590 and 17,300 ft.

Middle Kuen-lun. — Between the upper transverse glens of the Kafa-muren (or Mitt River) and the Cherchen-darya stretches the short range of Tokuz-davan. From it, on the east side of the Cher chen- daryt, in about 86° E., the component ranges of the middle Kuen-lun begin to diverge and radiate outwards (i.e. to north and to south) like the fingers of the outspread human hand. And here at least four principal ranges or groups of ranges admit of being discriminated, namely the Astin-tagh, the Chimen-tagh, the Kalta-alaghan and the Arka-tagh, all belonging to the

mountainous country which borders on the north the actual plateau region of Tibet. Although these several ranges, or systems of ranges, differ considerably in their orographical characteristics, the following description will apply generally to the entire region from the Astin-tagh southwards to the Arka-tagh. The broad features of the surface configuration are a series of nearly parallel mountain-ranges, running from VV.S.W. E.N.E. to W.N.W. E.S.E., and separated by high intermont valleys, which are choked with disintegrated material and divided into a chequered pattern of self-contained, shallow lacustrine basins. As a rule the crests of the ranges are worn down by aerial denudation and have the general appearance of rounded domes. Hard rock (mostly granite and crystalline schists, with red sandstone in places) appears only in the transverse glens, which are often choked with their debris in the form either of gravel-and-shinglc or loose blocks of stone or both. The flanks of the mountains are so deeply buried in disintegrated material that the difference in vertical altitude between the floors of the valleys and the summits of the ranges is comparatively small. But as each successive range, proceeding south, represents a higher step in the terraced ascent from the desert of Gobi to the plateau of Tibet, the ranges when viewed from the north frequently appear like veritable upstanding mountain ranges, and this appearance is accentuated by the general steepness of the ascent ; whereas, when viewed on the other hand from the south, these several ranges, owing to their long and gentle slope in that direction, have the appearance of comparatively gentle swellings of the earth's service rather than of well-defined mountain ranges. As a rule, the streams flow alternately east and west down the inter- mont latitudinal valleys, until they break through some transverse glen in the range on the northern side of the valley. In the western parts of the system they mostly go to feed the Kara-muren or the Cherchen-darya, while farther east they flow down into some larger self-contained basin of internal drainage, such as the Achik-kol, the two lakes Kara-kol, or the Ghaz-kol, and even yet farther east make their way, some of them into the lakes of the Tsaidam depres- sion or become lost in its sands or in those of the Kum-tagh desert on the north, or go to feed the headstreams of the great rivers, the Hwang-ho (Yellow River) and the Yangtsze-kiang (Blue River) in the south. It appears to be a rule that the rivers which eventually terminate in the deserts of Gobi and Takla-rnakan grow increasingly larger in magnitude from east to west. Another law appears to distin- guish the hydrography of at any rate the great latitudinal valleys of the Arka-tagh and the Chimen valley (north of the Chimen-tagh) : the streams flow close under the foot of the range that shuts in each individual valley on the north. But in respect of precipitation there is a very marked difference between the valleys of the north and those of the south. Whereas both the mountains and valleys of the Astin- tagh and of the Akato-tagh (the next large range to the Astin-tagh on the south) are arid and desolate in the extreme, smitten as it were

with the desiccating breath of the desert, those of the Arka-tagh and beyond are supersaturated with moisture, so that, at any rate in summer, the surface is in many parts little better than a quakuig quagmire. Throughout vegetation is scanty and faunal life poor in species, though in some respects certain of the species, e.g. wild yaks, wild asses (kulans), antelopes (orongo and others), marmots, hares and partridges exist locally in large numbers. The wild camei approaches the north outliers of the Astin-tagh, but rarely, if ever, ventures to enter their fastnesses. Bears, wolves, foxes, goats (kokmct), wild sheep (arkharis), lizards, earth-rats, and a small rodent (teshikan), with ravens, eagles, wild ducks and wild geese are the other varieties principally encountered. The vegetation consists almost entirely of scrubby bushes of several varieties, in- cluding tamarisks and wild briers, of reeds (kamish), and of grass on the yaylaks (pasture-grounds) of the middle ranges. On the Arka-tagh even the moss, the last surviving representative of the flora, disappears entirely. In the eastern Astin-tagh a variety of wild tea (amy, mountain tea) is used by the Mongols. Gold is obtained in very small quantities in a few places in the Astin-tagh and the Kalta-alaghan. The nomenclature of the numerous ranges in this part of the Kuen-lun is extremely confusing, owing to different travellers having applied the same name to different ranges and to different travellers have applied different names to what is probably often identically the same range. In this article the nomenclature adopted is that employed by the latest, and probably the most thorough, explorer of this part of Central Asia, namely, Sven Hedin. Nevertheless, owing to the fact that nearly all the longer and more important crossings of Tibet and its northern montane region have been made from north to south, or vice versa, that is, transversely across the ranges, and comparatively few from

east to west along the intermont latitudinal valleys, the identifica- tions between ranges in the east and ranges in the west are in more than one instance more or less doubtful.

The Astin-tagh, although it occupies a similar position to the twin ranges of the Western Kuen-lun, in that it forms the outermost escarpment or border-ridge on the north 6f the Tibetan plateau , would appear in the opinion oi the most competent judges (e.g. Grenard, Bogdanovich, Sven Hedin, Przhevalsky), to be only a branch or subsidiary range of the main range of the Kuen-lun. It is not however a single, long, continuous chain, as it is shown, for example, on the map of the Russian general staff, but consists of two parallel main ranges, and in the east of three, and even to theN.E. of Tsaidam of four, parallel main ranges, flanked throughout by several sub- sidiary chains, spurs and offshoots. Beyond that it swells out into the vast massif oi Anambaruin-ula, which is traversed by at least three minor parallel chains. But on the east of the Anambaruin-ula it once more contracts to two main ranges, the more southerly being that which Przhevalsky called the Humboldt Range (crossed by a pass at 13,200 ft.). This branch is probably continued in the range which overhangs the Koko-nor on the south, namely, the south Koko- nor Range. The northern branch merges eastwards into the Nan- shan or Southern Mountains. 1 The passes in the Lower Astin-tagh range from altitudes of 10,150 to 10,700 ft., and in the Upper Astin- tagh at 11,770 to 15,680 ft. (Tash-davan), though one pass beside the Charkhlik-su is only 9660 ft. high. And as the relative altitudes of crest and pass remain approximately, the same as in the Western Kuen-lun, it is evident how greatly the general elevation of the twin border ridge decreases towards the east. But there exists a striking difference between the crests of the Astin-tagh and those of the ranges which give rise to the gigantic ridge and furrow arrangement on the Tibetan plateau. " Here in the Astin-tagh the mountains, like those in the Kuruk-tagh, 2 are indeed severely weathered, but they always consist, from base to summit, of hard rock, bare and barren, most frequently piled up in eccentric, rugged masses, denti- culated, pinnacled crests and peaks. On the Tibetan plateau, on the other hand, most of the ranges are distinguished by their rounded outlines and soft consistency, and their striking poverty in hard rock, which in the best cases only crops out near the summits. There too disintegration has been to a remarkable extent operative. This gives rise to the great morphological difference, that in the former regions, the Astin-tagh and the Kuruk-tagh, the products of disintegration are almost always carried away by the wind, and so disappear; no matter how powerful or how active the disintegra- tion may be, none of the loosened material ever succeeds either in gathering amongst the mountains or in accumulating at their foot. The climate is so arid, and precipitation so extremely rare, that the fine powdery material falls a helpless prey to the winds. On the other

hand, the precipitation on the Tibetan plateau is so copious, and so uniformly distributed, that it is able to retain the loosened material in situ, and causes it to heap itself up in rounded masses on the flanks of the mountains that are its primitive source of origin,_ these projecting in great part like skeletons from the midst of their own ruins." 3 The twin ranges of the Astin-tagh are fairly equivalent in point of magnitude and regularity ; but while the Lower Range, on the north, sensibly decreases in altitude towards theeast, the Upper Range, on the south, maintains its general altitude in a remark- able way, and is gapped by steep, wild, deeply incised transverse glens directed towards the north, and generally fenced in by dark precipitous walls of rock. The great valley between the two is " cut up into a series of self-contained basins, each serving as the gathering ground of the brooks that run down off the adjacent mountains. Outside the lower end of each large transverse glen there is a scree of sedimentary matter. These screes are however very flat and their lower edges generally reach all the way down to the central part of the basin, which is occupied by an expanse of yellow clay, perfectly flat and fairly hard, as well as dry and barren, often cracked into polygonal cakes and drawn out in the direction of the long axis of the valley. . . . But though the great morphological features of this latitudinal valley forcibly recall the latitudinal valleys of Tibet, the climatic differences give rise to differences between the basins corresponding to the differences between the moun- tain-ranges themselves. For while the self-contained basins of Tibet generally possess a salt lake In the middle, into which brooks and streams of greater or less magnitude gather, often from very considerable distances, these self-contained basins of the Astin- tagh are very small in area, and it is extremely seldom that their central parts receive any water at all, only in fact after copious rain. These terminal lakes, or more accurately sedimentary plains, are therefore almost always dry." 4

The next parallel range on the south, the Akato-tagh, and the valley which separates it from the Astin-tagh, are equally arid and water- less. The valley, known by the general name of Kakir, meaning a " hard, dry, sterile expanse of clay," is chequered with shallow self- contained basins of the usual type and has remarkably gentle slopes

1 The Northern Mountains are the Pe-shan in the desert of Gobi (see Gobi).

2 On the opposite or north side of the desert of Lop (desert of Gobi).

3 Sven Hedin, Scientific Results, iii. 308.

4 Ibid. 310-31 1.

up to the mountains on both north and south. Its surface slopes from altitudes of 10,100 to 10,600 ft. in the west, where is the lakeof Uzun-shor (9650 ft.) to 9400 ft. in the east, in which direction it continues as far as the Anambaruin-ula (see below) and the plain or flat basin of Sartang, a north extension of Tsaidam. This range of Akato-tagh, the Altun Range of Carey, fe the same as that which on the map of the Russian general staff bears the name Chimen-tagh. Like the Astin-tagh it stretches towards the E.N.E., and, like it, appears to be built up of granite and schists, but its crest is greatly denuded, so that it is a mere crumbling skeleton protruding above the deep mantle of disintegrated material which masks its flanks. The slopes on both north and south are extremely gentle, but that on the south is eight to ten times as long as that on the north. In the east the range is mostly narrow, and dies away on the edge of the Tsaidam depres- sion ; but in the west it swells out into the lofty and imposing mass of the Ilve-chimen or Shia-manglay, which is capped with perpetual snow. This part of the range is crossed by the pass of Chopur-alik at an altitude of 16,160 ft., but farther east the passes lie at altitudes of 13,380 to 10,520 ft. The latitudinal valley that intervenes between the Akato-tagh and the next great range on the south, the Chimen-tagh, slopes for the most part eastwards, from 12,500 ft. down to the shallow salt lake of Ghaz-kol or Chimen-koli (9305 ft.). In the western part of this valley occurs the very important transverse water-divide of Gulcha-davan (14,150 ft.), which separates the basin of the Cherchen-darya that goes down into the Tarim basin from the area that drains down to the Ghaz-kol, which belongs to the Tsaidam depression. This, the Chimen valley, contains in places a good deal of drift-sand, which however is stationary in the mass and heaped up along the northern foot of the Chimen-tagh. Nevertheless the Akato-tagh is only of secondary importance in the general Kuen-lun system, being nothing more than a central ridge running along the broad Kakir valley that separates the Astin-tagh from the Chimen-

The latter range, the Chimen-tagh, is identical in its western parts with the Piazlik-tagh and in the east must be equated with the Tsai- dam chain of Przhevalsky ; and it is probably continued westwards by the range which the Russian explorers call the Moscow Range or the Achik-tagh, running north of the Achik-kol and, according to Przhevalsky, connecting on the west with the Tokuz-davan. The Chimen-tagh rises into imposing summits, some rounded, some pyramidal in outline, which are capped with snow, though the snow melts in summer. This range acts as a ” breakwater ” to the clouds, arresting and condensing the moisture which is carried north-wards by the south winds. Hence its slopes are not so arid as those of the

Akato-tagh and the Astin-tagh. Snow falls all the year round on the Chimen-tagh, even in July, and water is abundant everywhere. The southern slope of the range is gentle but short, the northern slope long and steep. Grass is able to grow, and animal life is more abundant. The range is crossed by passes at '3i97 . 13.230 and 13,760 ft., and the Piazlik-tagh by a pass at an altitude of 13,640 ft.

The next important range, still going south, is the Kalta-alaghan, Carey's Chimen-tagh Range, Przhevalsky's Columbus Range and the range which is variously designated {e.g. by Pyevtsov) as the Ambal-ashkan, Kalga-lagan and Ara-tagh. This last is, however, properly the name of a short secondary range which rises along the middle (ara = middle) of the valley between the Chimen-tagh and the Kalta-alaghan. Not only is it of lower elevation than them both, but it dies away towards the west, the valleys on each side of it meeting round its extremity to form one broad, open valley, with an altitude of 11,790 to 13,725 ft. The Ara-tagh is crossed by a pass at an altitude of 14,345 ft- In the Kalta-alaghan, which is the culminating range of this part of the Kuen-lun, and is over- topped by towering, snow-clad peaks, the passes climb to consider- ably higher altitudes, namely, 14,560, 14,470, 14,430 and 14,190 ft., while the pass of Avraz-davan ascends to 15,700 ft. This range appears to be linked on to the Tokuz-davan by the Muzluk-tagh, in which there are passes at 16,870 and 15,450 ft. It is possible however that the Muzluk-tagh belongs more intimately to the Chimen-tagh system, that is, to the Moscow or Achik-kol ranges. Indeed Bogdanovich considers that the Tokuz-davan, the Muzluk- tagh, the Moscow Range and the Chimen-tagh form one single closely connected chain, in which he also places Przhevalsky's isolated peak of Mount Kreml (15,055 ft.). Sven Hedin, whilst agreeing that this may possibly be the true conception, inclines to the view that the Achik-kol Range dies away towards the E., and that the Chimen-tagh and the Kalta-alaghan merge westwards into the border-ranges that lie north of the Muzluk-tagh and the Tokuz- davan. Unlike most of the other parallel ranges of N. Tibet, the Kalta-alaghan does not decrease, but it increases in elevation towards the east, where, like the Chimen-tagh, it abuts upon and merges in the ranges that border Tsaidam on the south.

Immediately south of the Kalta-alaghan comes a relatively deep depression, the Kum-kol valley, forming a very well-marked feature in the physical conformation of this region. It is crossed transversely by a water-divide which separates the basin of the twin-lakes of Kum-kol (12,700 ft.) from the basin of Tsaidam, some 3500 ft. lower. The floor of the valley consequently slopes away in both directions, like the Chimen valley between the Akato-tagh and the Chimen-tagh ; and in so far as it slopes westwards towards the Kum-

kol lakes it differs from nearly all the other great latitudinal valleys that run parallel with it, because they slope generally towards the east. Not far from the Kum-kol lakes there is a drift-sand area, though the dunes are stationary. The upper lake of Kum-kol (Chon-kum- kol) (12,730 ft.), which contains fresh Water, is of small area (8 sq. m.) and in depth nowhere exceeds 13 ft. ; but the lower lake (Ayak-kum- kol) (12,685 ft.), which is salt, is much bigger (283 sq. m.) and goes down to depths of 64 and 79 ft. Farther west, lying between the Muzluk-tagh and the Arka-tagh, is the lake of Achik-kol (13,940 ft.), l6| m. broad and 50 m. in circuit.

The next great parallel range is the lofty and imposing Arka-tagh, the Przhevalsky Range of the Russian geographers, which has its eastward continuations in the Marco Polo Range (general altitude 15,750-16,250 ft.) and Gurbu-naiji Mountains of Przhevalsky. The Arka-tagh 1 is the true backbone of the Kuen-lun system, and in Central Asia is exceeded in elevation only by the Tang-la, a long way farther south, this last being probably an eastern wing of the Kara- korum Mountains of the Pamirs region. At the same time the Arka- tagh is the actual border-range of the Tibetan plateau properly so- called ; to the south of it none of the long succession of lofty parallel ranges which ridge the Tibetan highlands seems to have any connexion with the Kuen-lun system. Of great length, the Arka-tagh, which is a mountain-system rather than a range, varies greatly in configura- tion in different parts, sometimes exhibiting a sharply defined main crest, with several lower flanking ranges, and sometimes consisting of numerous parallel crests of nearly uniform altitude. Amongst these it is possible to distinguish in the middle of the system four predominant ranges, of which the second from the north is probably the principal range, though the fourth is the highest. The passes across the first range (north) lie at altitudes of 15,675, 16,420, 17,320 and 18,300 ft.; across the second at 16,830, 17,020, 17,070 and 17,220 ft.; across the third at 16,800, 16,660, 17,065, 17,830 and 17,880 ft..; and across the fourth at 16,540, 16,765, 16,780, 18,100 and 18,110 ft. The crests of the ranges lie comparatively little higher than the valleys which separate them, the altitudes in the latter running at 14,940 to 16,700 ft., if not higher, and being only 500 to 1000 ft. lower than the crests of the accompanying ranges. The Arka-tagh ranges do not culminate in lofty jagged, pinnacled peaks, but in broad rounded, flattened domes, a characteristic feature of the system throughout. These Arka-tagh mountains are built up, at all events superficially, of sand and powdery, finely sifted disintegrated material. Where the hard rock does crop out on the surface, it is so excessively weathered as to be with difficulty recognized as rock at all. The culminating summits of the ranges generally present the appearance of a flat, rounded swelling, and when they are crowned with glaciers, as many of them are, these shape themselves into what may be described as a

mantle, a breast- plate, or a flat cap, from which lappets and fringes project at inter- vals ; nowhere do there exist any of the long, narrow, winding glacier tongues which are so characteristic of the Alps of Europe. But not the slightest indication has been discovered that these mountains were ever panoplied with ice. The process of disintegration and levelling down has reached such an advanced stage that, if ever there did exist evidences of former glaciation, they have now become entirely obliterated, even to the complete pulverization of the erratic blocks, supposing there were any. The view that meets the eye southwards from the heights of the Kalta-alaghan is the picture of a chaos of mountain chains, ridges, crests, peaks, spurs, detached masses, in fact, montane conformations of every possible description and in every possible arrangement. Immediately north of the Arka- tagh the country is studded with three or four exceptionally conspic- uous and imposing detached mountain masses, all capped with snow and some of them carrying small glaciers. Amongst them are Sfrapka Monomakha or the Monk's Cap ; the Chulak-akkan, which may however be only Shapka Monomakha seen from a different point of view; Tomurlik-tagh 2 (i.e. the Iron Mountain) ; and farther west, Ullugh-iuuz-tagh, which, according to Grenard, reaches an altitude of 24,140 ft. But the relations in which these detached mountain-masses stand to one another and to the Arka-tagh behind them have not yet been elucidated. In the vicinity of the Ullugh- muz-tagh there exist numerous indications of former volcanic activity, the eminences and summits frequently being capped with tuff, and smaller fragments of tuff are scattered over other parts of the Arka-tagh ranges.

The next succeeding parallel range, the Koko-shili, which is continued eastwards by the Bayan-khara-ula, between the upper headstreams of the Hwang-ho or Yellow River and the Yangtsze- kiang, belongs orographically to the plateau of Tibet.

The succession of ranges which follow one another from the deserts of Takla-makan and Gobi up to the plateau proper of Tibet rise in steps or terraces, each range being higher than the range to the north of it and lower than the range to the south of it. The difference in altitude between the lowest, most northerly range, the Lower Astin-tagh, and the most southerly of the Arka-tagh rrnges amounts to nearly 7500 ft. With one exception, namely the climb out of the Kum-kol valley to the Arka-tagh, the first three steps are

1 This is the correct form, Arka-tagh meaning the Farther of Remoter Mountains. The form Akka-tagh is incorrect.

2 The form Tumenlik-tagh is erroneous.

individually the biggest ; whereas the Upper Astin-tagh exceeds the Lower Astin-tagh by an altitude of some 1350 ft., it is itself exceeded by the Akato-tagh to the extent of 1760 ft. There is also a con- siderable rise of 880 ft. from the Akato-tagh to the Chimen-tagh. But between the Chimen-tagh, the Ara-tagh and the Kalta-alaghan there is comparatively little difference in point of elevation, namely, 730 ft. in all. The biggest ascent is that from the Kalta-alaghan to the Arka-tagh, namely, nearly 1850 ft. The ranges of the Arka- tagh, again, run at pretty nearly the same absolute general altitudes, namely, 16,470 to 17,260 ft. When the altitudes of the intermont latitudinal valleys are compared, the significance orographically of the Chimen valley and of the Kum-kol valley is strikingly empha- sized. Both are much more deeply excavated than all the other latitudinal valleys that run parallel to them, the Chimen valley being 875 ft. above the valley to the north of it, but no less than 2235 ft. below the valley to the south of it. The case of the Kum-kol valley is altogether exceptional, for it lies not higher, but 680 ft. lower, than the valley to the north of it, and consequently the climb up out of it to the first (on north) of the Arka-tagh valleys amounts to no less than 2900 ft. Hence these ten parallel ranges of the middle Kuen-lun system may be grouped in three divisions — (1) the more strictly border ranges of the Upper and Lower Astin-tagh and the Akato- tagh; (2) the three ranges of Chimen-tagh, Ara-tagh and Kalta-alaghan, which may be considered as forming a transitional system between the foregoing and the third division; (3) the Arka-tagh, which constitute the elevated rampart of the Tibetan plateau proper. . (J. T. Be.)

The Nan-shan Highlands overlook Tsaidam on the N.E. They embrace a region 380 m. long and 260 m. wide, entirely occupied with parallel mountain ranges all running from the N.W. to the S.E. Broad, fiat, longitudinal valleys, at altitudes of 12,000 to 14,000 ft. (9000 to 10,000 at the south-western border) and dotted with lakes (Koko-nor, 9970 ft. ; Khara-nor, 13,285 ft.), fill up the space between these mountain ranges. In the S.E. the Nan-shan highlands abut upon the highlands of the Chinese province of Kan- suh, and near the great northward bend of the Hwang-ho they meet the escarpments by which the Great Khingan and. the In-shan ranges are continued, and by which the Mongolian plateau steps down to the lowlands of China. On the N.E. the Nan-shan high- lands have their foot on the Mongolian plateau (average altitude, 4000 ft.), i.e. in the Ala-shan. On the N.W. they are fringed by a border range, the Da-sue-shan, a continuation of the Astin-tagh, which rises to 12,200-13,000 ft. in its passes, and is pierced by several rivers flowing west to Lake Khala-chi or Khara-nor. This border-range, which continues on to the 97th meridian,

separates the Nan-shan range from the Pe-shan range.

On the S.W. the Nan-shan mountains consist of short irregular chains, separated by broad plains, dotted with lakes, which differ but slightly in altitude from Tsaidam (8800-9000 ft.). Next a succession of narrow ranges intervene between this lower border terrace and the higher terrace (12,000-13,500 ft.). The first mountain range on this higher terrace is Ritter's range, covered in part with extensive snow-fields. The passes at both ends of this snow-clad massif lie at altitudes of 15,990 ft. and 14,680 ft. The next range is Humboldt or Ama-surgu range, which runs N.W. to S.E. from the Astin-tagh to about 38 N., and is perhaps continued by the southern Kuku (Koko)-nor range, which strikes the Hwang- ho with an elevation of 7440 ft. It includes, in fact, several other parallel ranges — e.g. the Mushketov, Scmenov, Suess, Alexander III., Bain-sarlyk — the mutual relations of which are, however, not yet definitely settled.

Small lateral chains of mountains, rising some 2000 ft. above the general level of that plateau, connect the central Nan-shan with the next parallel ranges, namely, those of the eastern Nan-shan. The mutual relations of the latter, as well as the names of the several constituent chains, are equally unsettled. Thus, one of them is named indiscriminately Nan-shan, Richthofen Range and Momo- shan. In fact, the region is dominated by three ranges of nearly equal altitude, all lifting many of their peaks above the snow-line. Finally, there is a range of mountains, about 10,000 ft. high, named Lung-shan by Obruchev, which borders the Kan-chow and Lian-chow valley on the N.E., and belongs to the Nan-shan system. But the string of oases in Kan-suh province, which stretches between the towns named, lies on the lower level of the Mongolian plateau (4000 to 5000 ft.), so that the Lung-shan ought possibly to be regarded as a continuation of the Pe-shan mountains of the Gobi. Generally speaking, the Nan-shan highlands are a region raised 12,000 to 14,000 ft. above the sea, and intersected by wild, stony and partly snow-clad mountains, towering another 4000 to 7000 ft. above its surface, and arranged in narrow parallel chains all running N.W. to S.E. The chains of mountains are severally from 8 to 17 m. wide, seldom as much as 35, while the broad, flat valleys between them attain widths of 20 to 27 m. As a rule the passes are at an altitude of 12,000 to 14,000 ft., and the peaks reach 18,000 to 20,000 ft. in the western portion of the high- lands, while in the eastern portion they may be about 2000 ft. lower. The glaciers also attain a greater development in the western portion of the Nan-shan, but the valleys are dry, and the slopes of both the mountains and the valleys, furrowed by deep ravines, are devoid of vegetation. Good pasture grounds are only found near the

streams. The soil is dry gravel and clay, upon which bushes of Ephedra,

Nitraria and Salsolaceae grow sparsely. In the north- eastern Nan-shan, on the contrary, a stream runs through each gorge, and both the mountain slopes and the bottoms of the valleys are covered with vegetation. Forests of conifers (Picea obovata) and deciduous trees — Przhevalsky's poplar, birch, mountain ash, &c, and a variety of bushes — are common everywhere. Higher up, in the picturesque gorges, grow rhododendrons, willows, Potentilla fruticosa, Spriaeae, Lonicereae, &c, and the rains must evidently be more copious and better distributed. In the central Nan-shan it is only the north-eastern slopes that bear forests. In the south, where the Nan-shan enters Kan-suh province, extensive accumulations of loess make their appearance, and it is only the northern slopes of the hills that are clothed with trees. (P. A. K.)

Authorities. — An enumeration of the works published before 1890, and a map of itineraries, will be found in Wegener's Versuch einer Orographie des Kuen-lun (Marburg, 1891), but his map is only approximately correct. Of the books published since a 890 the most important are Sven Hedin's Scientific Results of a Journey in Central Asia, 1899-1902 (Stockholm, 1905-1907, 6 vols.), with an elaborate atlas and a general map of Tibet on the scale of 1 : 1 ,000,000 ; H. H. P. Deasy's In Tibet and Chinese Turkestan (London, 1901), with a good map; F. Grenard's vol. (iii.) of J. L. Dutreuil de Rhins's Mission scientifique dans la haute Asie, 1890-1895 (n.p., 1897), also with a very useful map; W. W. Rockhill's Diary of a Journey through Mongolia and Tibet in 1891 and 1892 (Washington, 1894); M. S. Wellby's Through Unknown Tibet (London, 1898); P. G. Bonvalot's De Paris au Tonkin ct travers le Tibet inconnu (Paris, 1892) ; St G. R. Littledale's " A Journey across Tibet," in Geog. Journal (May 1896) ; H. Bower's Diary of a Journey across Tibet (London, 1894); the Izvestia of the Russian Geog. Soc. and Geog. Journal, both passim.

KUFA, a Moslem city, situated on the shore of the Hindieh canal, about 4 m. E. by N. of Nejef (32 4′ N., 44° 20′ E.), was founded by the Arabs after the battle of Kadesiya in a.d. 638 as one of the two capitals of the new territory of Irak, the whole country being divided into the saieads, or districts, of Basra and Kufa. The caliph 'Ali made it his residence and the capital of his caliphate. After the removal of the capital to Bagdad, in the middle of the following century, Kufa lost its importance and began to fall into decay. At the beginning of the 19th century, travellers reported extensive and important ruins as marking the ancient site. Since that time the ruins have served as quarries for bricks for the building of Nejef, and at the present time little remains but holes in the ground, representing excavations for bricks, with broken fragments of brick and glass strewn over a considerable area. A mosque still stands on the spot where 'Ali is reputed to have worshipped. (For history see Caliphate.)

KUHN, FRANZ FELIX ADALBERT (1812-1881), German philologist and folklonst, was born at Konigsberg in Neumark on the 19th of November 181 2. From 1841 he was connected with the Kollnisches Gymnasium at Berlin, of which he was appointed director in 1870. He died at Berlin on the 5th of May 1 88 1. Kuhn was the founder of a new school of comparative mythology, based upon comparative philology. Inspired by Grimm's Deutsche Mythologie, he first devoted himself to German stories and legends, and published Markische Sagen und Marchen (1842), Norddeutsche Sagen, Marchen und Gebrduche (1848), and Sagen, Gebrduche und Marchen aus Westfalen (1859). But it is on his researches into the language and history of the Indo- Germanic peoples as a whole that his reputation is founded. His chief works in this connexion are : Zur dltesten Geschichte der Indogermanischen V biker (1845), in which he endeavoured to give an account of the earliest civilization of the Indo-Germanic peoples before their separation into different families, by comparing and analysing the original meaning of the words and stems common to the different languages; Die Herabkunft des Feuers und des Gottertranks (1859; new ed. by E. Kuhn, under title of Mythologische Studien, 1886) ; and Uber Entwicklungs- stufen der Mythenbildung (1873), in which he maintained that the origin of myths was to be looked for in the domain of language, and that their most essential factors were polyonymy and homonymy. The Zeitschrift filr vergleichende Sprach-forschung auf dem Gebiete der Indogermanischen Sprachen, with which he was intimately connected, is the standard periodical on the subject.

See obituary notice by C. Bruchmann in Bursian's Biographisches Jahrbuch (1881) and J. Schmidt in the above Zeitschrift, xxvi. n.s. 6.

KUHNE, WILLY (1837-1900), German physiologist, was born at Hamburg on the 28th of March 1837. After attending the gymnasium at Liineburg, he went to Gottingen, where his master in chemistry was F. Wohler and in physiology R. Wagner. Having graduated in 1856, he studied under various famous physiologists, including E. Du Bois-Reymond at Berlin, Claude Bernard in Paris, and K. F. W. Ludwig and E. W. Brticke in Vienna. At the end of 1863 he was put in charge of the chemical department of the pathological laboratory at Berlin, under R. von Virchow; in 1868 he was appointed professor of physiology at Amsterdam; and in 187 1 he was chosen to succeed H. von Helmholtz in the same capacity at Heidelberg, where he died on the 10th of June 1900. His original work falls into two main groups — the physiology of muscle and nerve, which occupied the earlier years of his life, and the chemistry of digestion, which

he began to investigate while at Berlin with Virchow. He was also known for his researches on vision and the chemical changes occurring in the retina under the influence of light. The visual purple, described by Franz Boll in 1876, he attempted to make the basis of a photochemical theory of vision, but though he was able to establish its importance in connexion with vision in light of low intensity, its absence from the retinal area of most distinct vision detracted from the completeness of the theory and precluded its general acceptance.

KUKA, or Kukawa, a town of Bornu, a Mahommedan state of the central Sudan, incorporated in the British protectorate of Nigeria (see Bornu). Kuka is situated in 12 55′ N. and 13° 34′ E., 4ˆ m. from the western shores of Lake Chad, in the midst of an extensive plain. It is the headquarters of the British administration in Bornu, and was formerly the residence of the native sovereign, who in Bornu bears the title of shehu.

The modern town of Kuka was founded c. 1810 by Sheikh Mahommed al Amin al Kanemi, the deliverer of Bornu from the Fula invaders. It is supposed to have received its name from the kuka or monkey bread tree (Adansonia digi.tata) , of which there are extensive plantations in the neighbourhood. Kuka or Kaoukaou was a common name in the Sudan in the middle ages. The number of towns of this name gave occasion for much geographical confusion, but Idrisi writing in the 12th century, and Ibn Khaldun in the 14th century, both mention two important towns called Kaou Kaou, of which one would seem to have occupied a position very near to that of the modern Kuka. Ibn Khaldun speaks of it as the capital of Bornu and as situated on the meridian of Tripoli. In 1840 the present town was laid waste by Mahommed Sherif, the sultan of Wadai; and when it was restored by Sheikh Omar he built two towns separ ated by more than half a mile of open country, each town being surrounded by walls of white clay. It was probably owing to there being two towns that the plural Kukawa became the ordinary designation of the town in Kano and throughout the Sudan, though the inhabitants used the singular Kuka. The town became wealthy and populous (containing some 60,000 inhabitants) , being a centre for caravans to Tripoli and a stopping-place of pilgrims from the Hausa countries going across Africa to Mecca. The chief building was the great palace of the sheikh. Between 1823 and 1872 Kuka was visited by several English and German travellers. In 1893 Bornu was seized by the ex-slave Rabah (q.v.), an adventurer from the Bahr-el-Ghazal, who chose a new capital, Dikwa, Kuka falling into complete decay. The town was found in ruins in 1902 by the British expedition which replaced on the throne of Bornu a descendant of the ancient rulers. In the same year the rebuilding of Kuka was begun and the town speedily regained part of its former importance. It is now one of the principal British stations of eastern Bornu. Owing, however, to the increasing importance of Maidugari, a town

80 m. S. S. W. of Kuka, the court of the shehu was removed thither in 1908.

For an account of Kuka before its destruction by Rabah, see the Travels of Heinrich Barth (new ed., London, 1890); and Sahara und Sudan, by Gustav Nachtigal (Berlin, 1879), i- 581-748.

KU KLUX KLAN, the name of an American secret association of Southern whites united for self-protection and to oppose

the Reconstruction measures of the United States Congress, 1863-1876. The name is generally applied not only to the order of Ku Klux Klan, but to other similar societies that existed at the same time, such as the Knights of the White Camelia, a larger order than the Klan; the White Brotherhood; the White League; Pale Faces; Constitutional Union Guards; Black Cavalry; White Rose; The '76 Association; and hundreds of smaller societies that sprang up in the South after the Civil War. The object was to protect the whites during the disorders that followed the Civil War, and to oppose the policy of the North towards the South, and the result of the whole movement was a more or less successful revolution against the Reconstruction and an overthrow of the governments based on negro suffrage. It may be compared in some degree to such Euro- pean societies as the Carbonara, Young Italy, the Tugendbund, the Confreries of France, the Freemasons in Catholic countries, and the Vehmgericht.

The most important orders were the Ku Klux Klan and the Knights of the White Camelia. The former began in 1865 in Pulaski, Tennessee, as a social club of young men. It had an absurd ritual and a strange uniform. The members accidentally discovered that the fear of it had a great influence over the lawless but superstitious blacks, and soon the club expanded into a great federation of regulators, absorbing numerous local bodies that had been formed in the absence of civil law and partaking of the nature of the old English neighbourhood police and the ante-bellum slave patrol. The White Camelia was formed in 1867 in Louisiana and rapidly spread over the states of the late Confederacy. The period of organization and development of the Ku Klux movement was from 1865 to 1868; the period of greatest activity was from 1868 to 1870, after which came the decline.

The various causes assigned for the origin and development of this movement were: the absence of stable government in the South for several years after the Civil War; the corrupt and tyrannical rule of the alien, renegade and negro, and the belief that it was supported by the Federal troops which con- trolled elections and legislative bodies; the disfranchisement of whites; the spread of ideas of social and political

equality among the negroes; fear of negro insurrections; the arming of negro militia and the disarming of the whites; outrages upon white women by black men; the influence of Northern adven- turers in the Freedmen's Bureau (q.v.) and the Union League (q.v.) in alienating the races; the humiliation of Confederate soldiers after they had been paroled — in general, the insecurity felt by Southern whites during the decade after the collapse of the Confederacy.

In organization the Klan was modelled after the Federal Union. Its Prescript or constitution, adopted in 1867, and revised in 1868, provided for the following organization: The entire South was the Invisible Empire under a Grand Wizard, General N. B. Forrest; each state was a Realm under a Grand Dragon; several counties formed a Dominion under a Grand Titan; each county was a Province under a Grand Giant; the smallest division being a Den under a Grand Cyclops. The staff officers bore similar titles, relics of the time when the order existed only for amusement: Genii, Hydras, Furies, Goblins, Night Hawks, Magi, Monks and Turks. The private members were called Ghouls. The Klan was twice reorganized, in 1867 and in 1868, each time being more centralized; in 1869 the central organization was disbanded and the order then gradu- ally declined. The White Camelia with a similar history had a similar organization, without the queer titles. Its members were called Brothers and Knights, and its officials Commanders.

The constitutions and rituals of these secret orders have declara- tions of principles, of which the following are characteristic: to protect and succour the weak and unfortunate, especially the widows and orphans of Confederate soldiers; to protect members of the white race in life, honour and property from the encroach- ments of the blacks; to oppose the Radical Republican party and the Union League; to defend constitutional liberty, to prevent usurpation, emancipate the whites, maintain peace

and order, the laws of God, the principles of 1776, and the political and social supremacy of the white race — in short, to oppose African influence in government and society, and to prevent any intermingling of the races.

During the Reconstruction the people of the South were divided thus: nearly all native whites (the most prominent of whom were disfranchised) on one side irrespective of former political faith, and on the other side the ex-slaves organized and led by a few native and Northern whites called respectively scalawags and carpet-baggers, who were supported by the United States government and who controlled the Southern state governments. The Ku Klux movement in its wider aspects was the effort of

the first class to destroy the control of the second class. To control the negro the Klan played upon his superstitious fears by having night patrols, parades and drills of silent horsemen covered with white sheets, carry- ing skuljs with coals of fire for eyes, sacks of bones to rattle, and wearing hideous masks. In calling upon dangerous blacks at night they pretended to be the spirits of dead Confederates, " just from Hell," and to quench their thirst would pretend to drink gallons of water which was poured into rubber sacks con- cealed under their robes. Mysterious signs and warnings were sent to disorderly negro politicians. The whites who were re- sponsible for the conduct of the blacks were warned or driven away by social and business ostracism or by violence. Nearly all southern whites (except " scalawags"), whether members of the secret societies or not, in some way took part in the Ku Klux movement. As tne work of the societies succeeded, they gradu- ally passed out of existence. In some communities they fell into the control of violent men and became simply bands of outlaws, dangerous even to the former members; and the anarchical aspects of the movement excited the North to vigorous con- demnation. 1 The United States Congress in 1871-1872 enacted a series of " Force Laws " intended to break up the secret societies and to control the Southern elections. Several hundred arrests were made, and a few convictions were secured. The elections were controlled for a few years, and violence was checked, but the Ku Klux movement went on until it accom- plished its object by giving protection to the whites, reducing the blacks to order, replacing the whites in control of society and state, expelling the worst of the carpet-baggers and scala- wags, and nullifying those laws of Congress which had resulted in placing the Southern whites under the control of a party composed principally of ex-slaves.

Authorities. — J. C. Lester and D. L. Wilson, Ku Klux Klan (New York, 1905) ; W. L. Fleming, Civil War and Reconstruction in Alabama (New York, 1905), and Documentary History of Recon- struction (Cleveland, 1906) ; J. W. Garner, Reconstruction in Missis- sippi (New York, 1901); W. G. Brown, Lower South in American History (New York, 1901); J. M. Beard, Ku Klux Sketches (Phila- delphia, 1876); J. W. Burgess, Reconstruction and the Constitution (New York, 1901). (W. L. F.)

KUKU KHOTO (Chinese Kwei-hwa), a city of the Chinese province of Shan-si, situated to the north of the Great Wall, in 40° 50′ N. and ni° 45′ E., about 160 m. W. of Kalgan. It lies in the valley of a small river which joins the Hwang-ho 50 m. to the south. There are two distinct walled towns in Kuku Khoto, at an interval of a mile and a half; the one is the seat of the civil governor and is surrounded by the trading town, and the other

1 The judgment of the historian William Garrott Brown, himself a Southerner, is worth quoting: "That violence was often used cannot be

denied. Negroes were often whipped, and so were carpet- baggers. The incidents related in such stories as Tourgee's A Fool's Errand all have their counterparts in the testimony before congressional committees and courts of law. In some cases, after repeated warnings, men were dragged from their beds and slain by persons in disguise, and the courts were unable to find or to convict the murderers. Survivors of the orders affirm that such work was done in most cases by persons not connected with them or acting under their authority. It is impossible to prove or disprove their statements. When such outrages were committed, not on worthless adventurers, who had no station in the Northern communities from which they came, but on cultivated persons who had gone South from genuinely philanthropic motives — no matter how unwisely or tactlessly they went about their work — -the natural effect was to horrify and enrage the North."

943

is the seat of the military governor, and stands in the open country. In the first or old town more especially there are strong traces of western Asiatic influence; the houses are not in the Chinese style, being built all round with brick or stone and having flat roofs, while a large number of the people are still Mahommedans and, there is little doubt, descended from western settlers. The town at the same time is a great seat of Buddhism — the lamaseries containing, it is said, no less than 20,000 persons devoted to a religious life. As the southern terminus of the routes across the desert of Gobi from Ulyasutai and the Tian Shan, Kuku Khoto is a great mart for the exchange of flour, millet and manufactured goods for the raw products of Mongolia. A Catholic and a Protestant mission are main- tained in the town. Lieut. Watts-Jones, R.E., was murdered at Kwei-hwa during the Boxer outbreak in 1900.

Early notices of Kuku Khoto will be found in Gerbillon (1688-1698, in Du Halde (vol. ii., Eng. ed.), and in Astley's Collection (vol. iv.)

KULJA (Chinese, Ili-ho), a territory in north-west China; bounded, according to the treaty of St Petersburg of 1881, on the W. by the Semiryechensk province of Russian Turkestan, on the N. by the Boro-khoro Mountains, and on the S. by the mountains Khan-tengri, Muz-art, Terskei, Eshik-bashi and Narat. It comprises the valleys of the Tekez (middle and lower portion), Kunghez, the Hi as far as the Russian frontier and its tributary, the Kash, with the slopes of the mountains turned towards these rivers. Its area occupies about 19,000 sq. m. (Grum-Grzimailo). The valley of the Kash is about 160 m. long, and is cultivated in its lower parts, while the Boro-khoro Mountains are snow-clad in their eastern portion, and fall with very steep slopes to the valley. The Avral Mountains, which separate the Kash from the Kunghez, are lower, but rocky, naked and difficult of

access. The valley of the Kunghez is about 120 m. long; the river flows first in a gorge, then amidst thickets of rushes, and very small portions of its valley are fit for cultivation. The Narat Moun- tains in the south are also very wild, but are covered with forests of deciduous trees (apple tree, apricot tree, birch, poplar, &c.) and pine trees. The Tekez flows in the mountains, and pierces narrow gorges. The mountains which separate it from the Kunghez are also snow-clad, while those to the south of it reach 24,000 ft. of altitude in Khan-tengri, and are covered with snow and glaciers — the only pass through them being the Muzart. Forests and alpine meadows cover their northern slopes. Agriculture was formerly developed on the Tekez, as is testified by old irrigation canals. The Hi is formed by the junction of the Kunghez with the Tekez, and for 120 m. it flows through Kulja, its valley reaching a width of 50 m. at Horgos-koljat. This valley is famed for its fertility, and is admirably irrigated by canals, part of which, however, fell into decay after .55,000 of the inhabitants migrated to Russian territory in 1881. The climate of this part of the valley is, of course, continental — frosts of – 22 F. and heats of 170 F. being experienced — but snow lasts only for one and a half months, and the summer heat is tempered by the proximity of the high mountains. Apricots, peaches, pears and some vines are grown, as also some cotton-trees near the town of Kulja, where the average yearly temperature is 48°-5 F. (January 15°, July 77°). Barley is grown up to an altitude of 6500 ft.

The population may number about 125,000, of whom 75,000 are settled and about 50,000 nomads (Grum-Grzimailo). The Taranchis from East Turkestan represent about 40 % of the population; about 40,000 of them left Kulja when the Russian troops evacuated the territory, and the Chinese govern- ment sent some 8000 families from different towns of Kashgaria to take their place. There are, besides, about 20,000 Sibos and Solons, 3500 Kara-kidans, a few Dungans, and more than 10,000 Chinese. The nomads are represented by about 18,000 Kalmucks, and the remainder by Kirghiz. Agriculture is insufficient to satisfy the needs of the population, and food is imported from Semiryechensk. Excellent beds of coal are

found in different places, especially about Kulja, but the fairly rich copper ores and silver ores have ceased to be worked.

The chief towns are Suidun, capital of the province, and Kulja. The latter (Old Kulja) is on the Ili river. It is one of the chief cities of the region, owing to the importance of its bazaars, and is the seat of the Russian consul and a telegraph station. The walled town is nearly square, each side

being about a mile in length; and the walls are not only 30 ft. high but broad enough on the top to serve as a carriage drive. Two broad streets cut the enclosed area into four nearly equal sections. Since 1870 a Russian suburb has been laid out on a wide scale. The houses of Kulja are almost all clay-built and flat-roofed, and except in the special Chinese quarter in the eastern end of the town only a few public buildings show the influence of Chinese architecture. Of these the most noteworthy are the Taranchi and Dungan mosques, both with turned-up roofs, and the latter with a pagoda-looking minaret. The population is mainly Mahommedan, and there are only two Buddhist pagodas. A small Chinese Roman Catholic church has main- tained its existence through all the vicissitudes of modern times. Paper and vermicelli are manufactured with rude appliances in the town. The outskirts are richly cultivated with wheat, barley, lucerne and poppies. Schuyler estimated the population, which includes Taranchis, Dungans, Sarts, Chinese, Kalmucks and Russians, at 10,000 in 1873; it has since increased.

New Kulja, Manchu Kulja, or Ili, which lies lower down the valley on the same side of the stream, has been a pile of ruins since the terrible massacre of all its inhabitants by the insurgent Dungans in 1868. It was previously the seat of the Chinese government for the province, with a large penal establishment and strong garrison; its population was about

70,000.

History. — Two centuries B.C. the region was occupied by the fair and blue-eyed Ussuns, who were driven away in the 6th century of our era by the northern Huns. Later the Kulja territory became a dependency of Dzungaria. The Uighurs, and in the 12th century the Kara-Khitai, took possession of it in turn. Jenghiz Khan conquered Kulja in the 13th century, and the Mongol Khans resided in the valley of the Ili. It is supposed (Grum-Grzimailo) that the Oirads conquered it at the end of the 16th or the beginning of the 17th century; they kept it till 1755, when the Chinese annexed it. During the insurrection of 1864 the Dungans and the Taranchis formed here the Taranchi sultanate, and this led to the occupation of Kulja by the Russians in 1871. Ten years later the territory was restored to China. . . , ■ • – ;

KULM (Culm), (i) A town of Germany, in the province of West Prussia, 33 m. by rail N.W. of Thorn, on an elevation above the plain, and 1 m. E. of the Vistula. Pop. (1905), 11.665. It is surrounded by old walls, dating from the 13th century, and contains some interesting buildings, notably its churches, of which two are Roman Catholic and two Protestant, and its medieval town-hall. The cadet school, founded here in 1776 by Frederick the Great, was removed to Koslin in 1890. There are large oil mills, also

iron foundries and machine shops, as well as an important trade in agricultural produce, including fruit and vegetables. Kulm gives name to the oldest bishopric in Prussia, although the bishop resides at Pelplin. It was presented about 1220 by Duke Conrad of Masovia to the bishop of Prussia. Frederick II. pledged it in 1226 to the Teutonic order, to whom it owes its early develop- ment. By the second peace of Thorn in 1466 it passed to Poland, and it was annexed to Prussia in 1772. It joined the Hanseatic League, and used to carry on very extensive manufactures of cloth.

(2) A village of Bohemia about 3 m. N.E. of Teplitz, at the foot of the Erzgebirge, celebrated as the scene of a battle in which the French were defeated by the Austrians, Prussians and Russians on the 29th and 30th of August 1813 (see Napoleonic Campaigns).

KULMBACH, or Culmbach, a town of Germany, in the Bavarian province of Upper Franconia, picturesquely situated on the Weisser Main, and the Munich-Bamberg-Hof railway, 11 m. N.W. from Bayreuth. Pop. (1900), 9428. It contains a Roman Catholic and three Protestant churches, a museum and several schools. The town has several linen manufactories and a large cotton spinnery, but is chiefly famed for its many extensive breweries, which mainly produce a black beer, not unlike English porter, which is largely exported. Connected with these are malting and bottling works. On a rocky eminence, 1300 ft. in height, to the south-east of the town stands the former fortress of Plassenburg, during the 14th and 15th centuries the residence of the margraves of Bayreuth, called also mar- graves of Brandenburg-Kulmbach. It was dismantled in 1807, and is now used as a prison. Kulmbach and Plassenburg belonged to the dukes of Meran, and then to the counts of Orlamunde, from whom they passed in the 14th century to the Hohenzollerns, burgraves of Nuremberg, and thus to the margraves of Bayreuth.

See F. Stein, Kulmbach und die Plassenburg in alter und neuer Zeit (Kulmbach, 1903) ; Huther, Kulmbach und Umgebung (Kulm- bach, 1886) ; and C. Meyer, Quellen zur Geschichte der Stadt Kulmbach (Munich, 1895).

KULMSEE, a town of Germany, in the Prussian province of West Prussia, on a lake, 14 m. by rail N. of Thorn and at the junction of railways to Bromberg and Marienburg. Pop. (1900), 8987. It has a fine Roman Catholic, cathedral, which was built in the 13th, and restored in the 15th century, and' an Evangelical church. Until 1823 the town was the seat of the bishops of Kulm.

KULP, a town of Russian Transcaucasia, in the government of Erivan, 60 m. W.S.W. from the town of Erivan and 2 m. S. of the Aras river. Pop.

(1897), 3074. Close by is the Kulp salt mountain, about 1000 ft. high, consisting of beds of clay intermingled with thick deposits of rock salt, which has been worked from time immemorial. Regular galleries are cut in the transparent, horizontal salt layers, from which cubes of about 70 lb weight are extracted, to the amount of 27,500 tons every year.

KULU, a subdivision of Kangra district, Punjab, British India, which nominally includes the two Himalayan cantons or waziris of Lahul and Spiti. The tahsil of Kulu has an area of 1054 sq. m., of which only 60 sq. m. are cultivated; pop. (1901), 68,954. The Sainj, which joins the Beas at Largi, divides the tract into two portions, Kulu proper and Soraj. Kulu proper, north of the Sainj, together with inner Soraj, forms a great basin or depression in the midst of the Himalayan system, having the narrow gorge of the Beas at Largi as the only outlet for its waters. North and east the Bara Bangahal and mid-Himalayan ranges rise to a mean elevation of 18,000 ft., while southward the Jalori and Dhaoladhar ridges attain a height of 11,000 ft. The'lhigher villages stand 9000 ft. above the sea; and even the cultivated tracts have probably an average elevation of 5000 ft. The houses consist of four-storeyed chalets in little groups, huddled closely together on the ledges or slopes of the valleys, picturesquely built with projecting eaves and carved wooden verandas. The Beas, which, with its tributaries, drains the entire basin, rises at the crest of the Rohtang pass, 13,326 ft. above the sea, and has an average fall of 125 ft. per mile. Its course presents a succession of magnificent scenery, including cataracts, gorges, precipitous cliffs, and mountains clad with forests of deodar, towering above the tiers of pine on the lower rocky ledges. It is crossed by several suspension bridges. Great mineral wealth exists, but the difficulty of transport and labour prevents its development. Hot springs occui at three localities, much resorted to as places of pilgrimage. The character of the hillmen resembles that of most other mountaineers in its mixture of simplicity, independ- ence and superstition. Tibetan polyandry still prevails in Soraj, but has almost died out elsewhere. The temples are dedicated rather to local deities than to the greater gods of the Hindu pantheon. Kulu is an ancient Rajput principality, which was conquered by Ran jit Singh about 181 2. Its hereditary ruler,

with the title of rai, is now recognized by the British government as jagirdar of Rupi.

KUM, a small province in Persia, between Teheran on the N. and Kashan on the S. It is divided into seven buluk (districts) : (i) Humeh, with town;

(2) Kumrud; (3) Vazkerud; (4) KinarRud Khaneh; (5) Kuhistan; (6) Jasb; (7) Ardahal; has a population of 45,000 to 50,000, and pays a yearly revenue of about £8000. The province produces much grain and a fine quality of cotton with a very long staple.

Kum, the capital, in 34° 39′ N. and 50 55′ E., on the Anarbar river, which rises near Khunsar, has an elevation of 3100 ft. It owes much of its importance to the fact that it contains the tomb of Imam Reza's sister Fatmeh, who died there a.d. 816, and large numbers of pilgrims visit the city during six or seven months of the year. The fixed population is between 25,000 and 30,000. A carriage road 92 m. in length, constructed in 1890-1893, connects the city with Teheran. It has post and telegraph offices.

See Eastern Persian Irak, R. G. S. suppl. (London, 1896).

KUMAIT IBN ZAID (679-743), Arabian poet, was born in the reign of the first Omayyad caliph and lived in the reigns of nine others. He was, however, a strong supporter of the house of Hashim and an enemy of the South Arabians. He was imprisoned by the caliph Hisham for his verse in praise of the Hashimites, but escaped by the help of his wife and was pardoned by the intercession of the caliph's son Maslama. Taking part in a rebellion, he was killed by the troops of Khalid ul-Qasrl.

His poems, the Hdshimlyy&l, have been edited by J. Horovitz (Leiden, 1904). An account of him is contained in the Kit&b ul- Aghdni, xv. 113-130. (G. W. T.)

KUM AON, or Kumaun, an administrative division of British India, in the United Provinces, with headquarters at Naini Tal. It consists of a large Himalayan tract, together with two sub- montane strips called the Tarai and the Bhabhar; area 13,725 sq. m.; pop. (1901), 1,207,030, showing an increase of less than 2 % in the decade. The submontane strips were up to 1850 an almost impenetrable forest, given up to wild animals; but since then the numerous clearings have attracted a large population from the hills, who cultivate the rich soil during the hot and cold seasons, returning to the hills in the rains. The rest of Kumaon is a maze of mountains, some of which are among the loftiest known. In a tract not more than 140 m. in length and 40 m. in breadth there are over thirty peaks rising to elevations exceed- ing 18,000 ft. (see Himalaya). The rivers rise chiefly in the southern slope of the Tibetan watershed north of the loftiest peaks, amongst which they make their way down valleys of rapid declivity and extraordinary depth. The principal are the Sarda (Kali), the Pindar and Kailganga, whose waters join the Alak- nanda. The valuable timber of the yet uncleared forest tracts is now under official supervision. The chief trees are the chir, or three-leaved Himalayan pine, the cypress, fir, alder, sal or

iron-wood, and saindan. Limestone, sandstone, slate, gneiss and granite constitute the principal geological formations. Mines of iron, copper, gypsum, lead and asbestos exist; but they are not thoroughly worked. Except in the submontane strips and deep valleys the climate is mild. The rainfall of the outer Himalayan range, which is first struck by the monsoon, is double that of the central hills, in the average proportion of 80 in. to 40. No winter passes without snow on the higher ridges, and in some years it is universal throughout the moun- tain tract. Frosts, especially in the valleys, are often severe. Kumaon is occasionally visited by epidemic cholera. Leprosy is most prevalent in the east of the district. Goitre and cretinism afflict a small proportion of the inhabitants. The hill fevers at times exhibit the rapid and malignant features of plague.

In 1891 the division was composed of the three districts of Kumaon, Garhwal and the Tarai; but the two districts of Kumaon and the Tarai were subsequently redistributed and renamed after their headquarters, Naini Tal and Almora. Kumaon proper constituted an old Rajput principality, which became extinct at the beginning of the 19th century. The country was annexed after the Gurkha war of 1815, and was governed for seventy

years on the non-regulation system by three most successful administrators — Mr Traill, Mr J. H. Batten and Sir Henry Ramsay.

'KUMASI, or Coomassie, the capital of Ashanti, British West Africa, in 6° 34′ 50″ N., 2 12′ W., 168 m. by rail N. of Sekondi and 120 m. by road N.N.W. of Cape Coast. Pop. (1906), 6280; including suburbs, over 12,000. Kumasi is situated on a low rocky eminence, from which it extends across a valley to the hill opposite. It lies in a clearing of the dense forest which covers the greater part of Ashanti, and occupies an area about i-J- m. in length and over 3 m. in circumference. The land immediately around the town, once marshy, has been drained. On the north- west is the small river Dah, one of the headstreams of the Prah. The name Kum-asi, more correctly Kum-ase (under the okum tree) was given to the town because of the number of those trees in its streets. The most imposing building in Kumasi is the fort, built in 1896. It is the residence of the chief commissioner and is capable of holding a garrison of several hundred men. There are also officers' quarters and cantonments outside the fort, European and native hospitals, and stations of the Basel and Wesleyan missions. The native houses are built with red clay in the style universal throughout Ashanti. They are somewhat richly ornamented, and those of the better class are enclosed in compounds within which are several separate buildings. Near the railway station are the leading mercantile houses. The principal Ashanti chiefs own large houses, built in European style, and these are leased to strangers.

Before its destruction by the British in 1874 the city presented a handsome appearance and bore many marks of a comparatively high state of culture. The king's palace, built of red sandstone, had been modelled, it is believed, on Dutch buildings at Elmina. It was blown up by Sir Garnet (subsequently Viscount) Wolseley's forces on the 6th of February 1874, and but scanty vestiges of it remain. The town was only partially rebuilt on the withdrawal of the British troops, and it is difficult from the meagre accounts of early travellers to obtain an adequate idea of the capital of the Ashanti kingdom when at the height of its prosperity (middle of the 18th to middle of the 19th century). The streets were numerous, broad and regular; the main avenue was 70 yds. wide. A large market-place existed on the south-east, and behind it in a grove of trees was the Spirit House. This was the place of execution. Of its population before the British occupa- tion there is no trustworthy information. It appears not to have exceeded 20,000 in the first quarter of the 19th century. This is owing partly to the fact that the commercial capital of Ashanti, and the meeting-place of several caravan routes from the north and east, was Kintampo, a town farther north. The decline of Kumasi after 1874 was marked. A new royal palace was built, but it was of clay, not brick, and within the limits of the former town were wide stretches of grass-grown country. In 1896 the town again suffered at the hands of the British, when several of the largest and most ancient houses in the royal and priestly suburb of Bantama were destroyed by fire. In the revolt of 1900 Kumasi was once more injured. The rail- way from the coast, which passes through the Tarkwa and Obuassi gold-fields, reached Kumasi in September 1903. Many merchants at the Gold Coast ports thereupon opened branches in Kumasi. A marked revival in trade followed, leading to the rapid expan- sion of the town. By 1906 Kumasi had supplanted the coast towns and had become the distributing centre for the whole of Ashanti.

KUMISHAH, a district and town in the province of Isfahan, Persia. The district, which has a length of 5c and a breadth of 16 m., and contains about 40 villages, produces much grain. The town is situated on the high road from Isfahan to Shiraz, 52 m. S. of the former. It was a flourishing city several miles in circuit when it was destroyed by the Afghans in 1722, but is now a decayed place, with crumbled walls and mouldering towers and a population of barely 15,000. It has post and telegraph offices. South of the city and extending to the village Maksud- beggi, 16 m. away, is a level plain, which in 1835 (February 28) was the scene of a battle in which the army (2000 men, 16 guns)

of Mahommed Shah, commanded by Sir H. Lindsay-Bethune, routed the much superior combined forces (6000 men) of the shah's two rebellious uncles, Firman-Firma and Shuja es Saltana.

KUMQUAT (Citrus japonica), a much-branched shrub from 8 to 12 ft. high, the branches sometimes bearing small thorns, with dark green glossy leaves and pure white orange-like flowers standing singly or clustered in the leaf-axils. The bright orange- yellow fruit is round or ellipsoidal, about 1 in. in diameter, with a thick minutely tuberculate rind, the inner lining of which is sweet, and a watery acidulous pulp. It has long been culti- vated in China and Japan, and was introduced to Europe in 1846 by Mr Fortune, collector for the London Horticultural Society, and shortly after into North America. It is much hardier than most plants of the orange tribe, and succeeds well when grafted on the wild species, Citrus trifoliata. It is largely used by the Chinese as a sweetmeat preserved in sugar.

KUMTA, or Coompta, a sea-coast town of British India, in the North Kanara district of Bombay, 40 m. S. of Karwar. Pop. (1001), 10,8×8. It has an open roadstead, with a considerable trade. Carving in sandal-wood is a speciality. The commercial importance of Kumta has declined since the opening of the Southern Mahratta railway system.

KUMYKS, a people of Turkish stock in Caucasia, occupying the Kumyk plateau in north Daghestan and south Terek, and the lands bordering the Caspian. It is supposed that Ptolemy knew them under the name of Kami and Kamaks. Various explorers see in them descendants of the Khazars. A. Vambery supposes that they settled in their present quarters during the flourishing period of the Khazar kingdom in the 8th century. It is certain that some Kabardians also settled later. The Russians built forts in their territory in 1559 and under Peter I. Having long been more civilized than the surrounding Caucasian mountaineers, the Kumyks have always enjoyed some respect among them. The upper terraces of the Kumyk plateau, which the Kumyks occupy, leaving its lower parts to the Nogai Tatars, are very fertile. v >>■

KUNAR, a river and valley of Afghanistan, on the north-west frontier of British India. The Kunar valley (Khoaspes in the classics) is the southern section of that great river system which reaches from the Hindu Kush to the Kabul river near Jalalabad, and which, under the names of Yarkhun, Chitral, Kashkar, &c, is more extensive than the Kabul basin itself. The lower reaches of the Kunar are wide and comparatively shallow, the river meandering in a multitude of channels through a broad and fairly open valley, well cultivated and fertile, with large flourishing villages and a mixed population of Mohmand and other tribes of Afghan origin. Here the hills to the eastward are compara- tively low, though they shut in the valley

closely. Beyond them are the Bajour uplands. To the west are the great mountains of Kafiristan, called Kashmund, snow-capped, and running to 14,000 ft. of altitude. Amongst them are many wild but beautiful valleys occupied by Kafirs, who are rapidly submitting to Afghan rule. From 20 to 30 miles up the river on its left bank, under the Bajour hills, are thick clusters of villages, amongst which are the ancient towns of Kunar and Pashat. The chief tributary from the Kafiristan hills is the Pechdara, which joins the river close to Chagan Sarai. It is a fine, broad, swift-flowing stream, with an excellent bridge over it (part of Abdur Rahman's military road developments), and has been largely utilized for irrigation. The Pechdara finds its sources in the Kafir hills, amongst forests of pine and deodar and thick tangles of wild vine and ivy, wild figs, pomegranates, olives and oaks, and dense masses of sweet-scented shrubs. Above Chagan Sarai, as far as Arnawai, where the Afghan boundary crosses the river, and above which the valley belongs to Chitral, the river narrows to a swift mountain stream obstructed by boulders and hedged in with steep cliffs and difficult " parris " or slopes of rocky hill-side. Wild almond here sheds its blossoms into the stream, and in the dawn of summer much of the floral beauty of Kashmir is to be found. At Asmar there is a slight widening of the valley, and the opportunity for a large Afghan

military encampment, spreading to both sides of the river and connected by a very creditable bridge built on the cantilever system. There are no apparent relics of Buddhism in the Kunar, such as are common about Jalalabad or Chitral, or throughout Swat and Dir. This is probably due to the late occupation of the valley by Kafirs, who spread eastwards into Bajour within com- paratively recent historical times, and who still adhere to their fastnesses in the Kashmund hills. The Kunar valley route to Chitral and to Kafiristan is being developed by Afghan engineer- ing. It may possibly extend ultimately unto Badakshan, in which case it will form the most direct connexion between the Oxus and India, and become an important feature in the strate- gical geography of Asia. (T. H. H.)*

KUNBIS, the great agricultural caste of Western India, corre- sponding to the Kurmis in the north and the Kapus in the Telugu country. Ethnically they cannot be distinguished from the Mahrattas, though the latter name is sometimes confined to the class who claim higher rank as representing the descendants of Sivaji's soldiers. In some districts of the Deccan they form an actual majority of the population, which is not the case with any other Indian caste. In 1901 the total number of both Kunbis and Mahrattas in all India was returned at nearly 8$ millions.

KUNDT, AUGUST ADOLPH EDUARD EBERHARD (1839- 1894), German physicist, was born at Schwerin in Mecklenburg on the 1 8th of November 1839. He began his scientific studies at Leipzig, but afterwards

went to Berlin. At first he devoted himself to astronomy, but coming under the influence of H. G. Magnus, he turned his attention to physics, and graduated in 1864 with a thesis on the depolarization of light. In 1867 he became privatdozent in Berlin University, and in the following year was chosen professor of physics at the Zurich Polytechnic: then, after a year or two at Wurzburg,'he was called in 1872 to Strassburg, where he took a great part in the organization of the new university, and was largely concerned in the erection of the Physical Institute. Finally in 1 888 he went to Berlin as successor to H. von Helmholtz in the chair of experimental physics and directorship of the Berlin Physical Institute. He died after a protracted illness at Israelsdorf, near Liibeck, on the 21st of May 1894. As an original worker Kundt was especially success- ful in the domains of sound and light. In the former he developed a valuable method for the investigation of aerial waves within pipes, based on the fact that a finely divided powder — lycopo- dium, for example — when dusted over the interior of a tube in which is established a vibrating column of air, tends to collect in heaps at the nodes, the distance between which can thus be ascertained. An extension of the method renders possible the determination of the velocity of sound in different gases. In light Kundt 's name is widely known for his inquiries in anomalous dispersion, not only in liquids and vapours, but even in metals, which he obtained in very thin films by means of a laborious process of electrolytic deposition upon platinized glass. He also carried out many experiments in magneto-optics, and succeeded in showing, what Faraday had failed to detect, the rotation under the influence of magnetic force of the plane of polarization in certain gases and vapours.

KUNDUZ, a khanate and town of Afghan Turkestan. The khanate is bounded on the E. by Badakshan, on the W. by Tashkurghan, on the N. by the Oxus and on the S. by the Hindu Kush. It is inhabited mainly by Uzbegs. Very little is known about the town, which is the trade centre of a considerable district, including Kataghan, where the best horses in Afghan- istan are bred.

KUNENE, formerly known also as Nourse, a river of South- West Africa, with a length of over 700 m., mainly within Portu- guese territory, but in its lower course forming the boundary between Angola and German South- West Africa. The upper basin of the river lies on the inner versant of the high plateau region which runs southwards from Bihe parallel to the coast, forming in places ranges of mountains which give rise to many streams running south to swell the Kunene. The main stream rises in 12 30′ S. and about 160 m. in a direct line from the sea

at Benguella, runs generally from north to south through four degrees of latitude, but finally flows west to the sea through a break in the outer highlands. A little south of i6° S. it receives the Kulonga from the east, and in about i6° 50′ the Kakulovar from the west. The Kakulovar has its sources in the Serra da Chella and other ranges of the Humpata district behind Mossa- medes, but, though the longest tributary of the Kunene, is but a small river in its lower course, which traverses the arid region comprised within the lower basin of the Kunene. Between the mouths of the Kulonga and Kakulovar the Kunene traverses a swampy plain, inundated during high water, and containing several small lakes at other parts of the year. From this swampy region divergent branches run S.E. They are mainly inter- mittent, but the Kwamatuo, which leaves the main stream in about 1 5 8′ E., 17° 15′ S., flows into a large marsh or lake called Etosha, which occupies a depression in the inner table-land about 3400 ft. above sea-level. From the S.E. end of the Etosha lake streams issue in the direction of the Okavango, to which in times of great flood they contribute some water. From the existence of this divergent system it is conjectured that at one time the Kunene formed part of the Okavango, and thus of the Zambezi basin. (See Ngami.)

On leaving the swampy region the Kunene turns decidedly to the west, and descends to the coast plain by a number of cataracts, of which the chief (in 17° 25′ S., 14° 20′ E.) has a fall of 330 ft. The river becomes smaller in volume as it passes through an almost desert region with little or no vegetation. The stream is sometimes shallow and fordable, at others confined to a narrow rocky channel. Near the sea the Kunene traverses a region of sand-hills, its mouth being completely blocked at low water. The river enters the Atlantic in 17° 18′ S., n° 40′ E. There are indications that a former branch of the river once entered a bay to the south.

KUNERSDORF, a village of Prussia, 4 m. E. of Frankfurt- on-Oder, the scene of a great battle, fought on the 12th of August 1759, between the Prussian army commanded by Frederick the Great and the allied Russians under Soltykov and Austrians under Loudon, in which Frederick was defeated with enormous losses and his army temporarily ruined. (See Seven Years' War.)

KUNGRAD, a trading town of Asiatic Russia, in the province of Syr-darya, in the delta of the Amu-darya, 50 m. S. of Lake Aral; altitude 260 ft. It is the centre of caravan routes leading to the Caspian Sea and the Uralsk province.

KUNGUR, a town of eastern Russia, in the government of Perm, on the

highway to Siberia, 58 m. S.S.E. of the city of Perm. Pop. (1892), 12,400; (1897), 14,324- Tanneries and the manufacture of boots, gloves, leather, overcoats, iron castings and machinery are the chief industries. It has trade in boots, iron wares, cereals, tallow and linseed exported, and in tea imported direct from China.

KUNKEL (or Kunckel) VON LOWENSTJERN, JOHANN (1630-1703), German chemist, was born in 1630 (or 1638), near Rendsburg, his father being alchemist to the court of Holstein. He became chemist and apothecary to the dukes of Lauenburg, and then to the elector of Saxony, Johann Georg II., who put him in charge of the royal laboratory at Dresden. Intrigues engineered against him caused him to resign this position in 1677, and for a time he lectured on chemistry at Annaberg and Wittenberg. Invited to Berlin by Frederick William, in 1679 he be- came director of the laboratory and glass works of Brandenburg, and in 1688 Charles XI. brought him to Stockholm, giving him the title of Baron von Lowenstj'ern in 1693 and making him a member of the council of mines. He died on the 20th of March 1 703 (others say 1 702) at Dreissighufen, his country house near Pernau. Kunkel shares with Boyle the honour of having discovered the secret of the process by which Brand of Hamburg had prepared phosphorus in 1669, and he found how to make artificial ruby (red glass) by the incorporation of purple of Cassius. His work also included observations on putrefaction and fer- mentation, which he spoke of as sisters, on the nature of salts, and on the preparation of pure metals. Though he lived in an

atmosphere of alchemy, he derided the notion of the alkahest or universal solvent, and denounced the deceptions of the adepts who pretended to effect the transmutation of metals; but he believed mercury to be a constituent of all metals and heavy minerals, though he held there was no proof of the presence of " sulphur comburens."

His chief works were Oeffentliche Zuschrift von dem Phosphor Mirabil (1678)-; Ars vitriaria experimentalis (1689) and Laboratorium chymicum (1716).

KUNLONG, the name of a district and ferry on the Salween, in the northern Shan States of Burma. Both are insignificant, but the place has gained notoriety from being the nominal terminus in British territory of the railway across the northern Shan States to the borders of Yunnan, with its present terminus at Lashio. In point of fact, however, this terminus will be 7 m. below the ferry and outside of Kunlong circle. At present Kunlong ferry is little used, and the village was burnt by Kachins in 1893. It is served by dug-outs, three in number in 1899, and capable of carrying about fifteen men on a trip. Formerly the trade was very considerable, and

the Burmese had a customs station on the island, from which the place takes its name; but the rebellion in the great state of Theinni, and the southward movement of the Kachins, as well as the Mahommedan rebellion in Yunnan, diverted the caravans to the northern route to Bhamo, which is still chiefly followed. The Wa, who inhabit the hills immediately overlooking the Nam Ting valley, now make the route dangerous for traders. The great majority of these Wa live in unadministered British territory.

KUNZITE, a transparent lilac-coloured variety of spodumene, used as a gem-stone. It was discovered in 1902 near Pala, in San Diego county, California, not far from the locality which yields the fine specimens of rubellite and lepidolite, well known to mineralogists. The mineral was named by Dr C. Baskerville after Dr George F. Kunz, the gem expert of New York, who first described it. Analysis by R. O. E. Davis showed it to be a spodumene. Kunzite occurs in large crystals, some weighing as much as 1000 grams each, and presents delicate hues from rosy lilac to deep pink. It is strongly dichroic. Near the surface it may lose colour by exposure. Kunzite becomes strongly phosphorescent under the Rontgen rays, or by the action of radium or on exposure to ultra-violet rays. (See Spodumene.)

KUOPIO, a province of Finland, which includes northern Karelia, bounded on the N.W. and N. by Uleaborg, on the E. by Olonets, on the S.E. by Viborg, on the S. by St Michel and on the W. by Vasa. Its area covers 16,500 sq. m., and the population (1900) was 313,951, of whom 312,875 were Finnish-speaking, The surface is hilly, reaching from 600 to 800 ft. of altitude in the north (Suomenselka hills) , and from 300 to 400 ft. in the south. It is built up of gneisso-granites, which are covered, especially in the middle and east, with younger granites, and partly of gneisses, quartzite, and talc schists and augitic rocks. The whole is covered with glacial and later lacustrine deposits. The soil is of moderate fertility, but often full of boulders. Large lakes cover 16% of surface, marshes and peat bogs over 29% of the area, and forests occupy 2,672,240 hectares. Steamers ply along the lakes as far as Joensuu. The climate is severe, the average temperature being for the year 3 6° F., for January 13° and for July 63 . Only 2-3% of the whole surface is under cultivation. Rye, barley, oats and potatoes are the chief crops, and in good years these meet the needs of the population. Dairy farming and cattle breeding are of rapidly increasing importance. Nearly 38,800 tons of iron ore are extracted every year, and nearly 12,000 tons of pig iron and 6420 tons of iron and steel are obtained in ten iron- works. Engineering and chemical works, tanneries, saw-mills, paper-mills and distilleries are the chief industrial establishments. The preparation of carts, sledges and other wooden goods is an important domestic industry. Timber, iron, butter, furs and game are

exported. The chief towns of the government are Kuopio (13,519), Joensuu (3954) and Iisalmi

(1871).

KUOPIO, capital of the Finnish province of that name, situated on Lake Kalla-vesi, 180 m. by rail from the Kuivola junction of the St Petersburg-Helsingfors main line. Pop. (1904), 13,519. It is picturesquely situated, is the seat of a bishop, and has a cathedral, two lyceums and two gymnasia (both for boys and girls), a commercial and several professional schools. There is an agricultural school at Levais, close by. Kuopio, in conse- quence of its steamer communication with middle Finland and the sea (via Saima Canal), is a trading centre of considerable importance.

KUPRILI, spelt also Koprili, Koeprulu, Keuprulu, &c, the name of a family of Turkish statesmen.

1. Mahommed Kuprili (c. 1586-1661) was the grandson of an Albanian who had settled at Kupri in Asia Minor. He began life as a scullion in the imperial kitchen, became cook, then purse- bearer to Khosrev Pasha, and so, by wit and favour, rose to be master of the horse, " pasha of two tails," and governor of a series of important cities and sanjaks. In 1656 he was appointed governor of Tripoli; but before he had set out to his new post he was nominated to the grand vizierate at the instance of power- ful friends. He accepted office only on condition of being allowed a free hand. He signalized his accession to power by suppressing an entente of orthodox Mussulman fanatics in Constantinople (Sept. 22), and by putting to death certain favourites of the powerful Valide Sultana, by whose corruption and intrigues the administration bad been confused. A little later (January 1657) he suppressed with ruthless severity a rising of the spahis; a certain Sheik Salim, leader of the fanatical mob of the capital, was drowned in the Bosporus; and the Greek Patriarch, who had written to the voivode of Wallachia to announce the approaching downfall of Islam, was hanged. This impartial severity was a foretaste of Kuprili's rule, which was characterized throughout by a vigour which belied the expecta- tions based upon his advanced years, and by a ruthlessness which in time grew to be almost blood-lust. His justification was the new life which he breathed into the decaying bones of the Ottoman empire.

Having cowed the disaffected elements in the state, he turned his attention to foreign enemies. The victory of the Venetians off Chios (May 2, 1657)

was a severe blow to the Turkish sea- power, which Kuprili set himself energetically to repair. A second battle, fought in the Dardanelles (July 17-19), ended by a lucky shot blowing up the Venetian flag-ship; the losses of the Ottoman fleet were repaired, and in the middle of August Kuprili appeared off Tenedos, which was captured on the 31st and reincorporated permanently in the Turkish empire. Thus the Ottoman prestige was restored at sea, while Kuprili's ruthless enforcement of discipline in the army and suppression of revolts, whether in Europe or Asia, restored it also on land. It was, however, due to his haughty and violent temper that the traditional friendly relations between Turkey and France were broken. The French ambassador, de la Haye, had delayed bringing him the customary gifts, with the idea that he would, like his prede- cessors, speedily give place to a new grand vizier; Kuprili was bitterly offended, and, on pretext of an abuse of the immunities of diplomatic correspondence, bastinadoed the ambassador's son and cast him and the ambassador himself into prison. A special envoy, sent by Louis XIV., to make inquiries and demand reparation, was treated with studied insult; and the result was that Mazarin abandoned the Turkish alliance and threw the power of France on to the side of Venice, openly assisting the Venetians in the defence of Crete.

Kuprili's restless energy continued to the last, exhibiting itself on one side in wholesale executions, on the other in vast building operations. By his orders castles were built at the mouth of the Don and on the bank of the Dnieper, outworks against the ever-aggressive Tatars, as well as on either shore of the Dar- danelles. His last activity as a statesman was to spur the sultan on to press the war against Hungary. He died on the 31st of October 1661. The advice which, on his death-bed, he is said to have given to the sultan is characteristic of his Machiavellian statecraft. This was: never to pay attention to the advice of

women, to allow nobody to grow too rich, to keep his treasury well filled, and himself and his troops constantly occupied. Had he so desired, Kuprili might have taken advantage of the revolts of the Janissaries to place himself on the throne; instead, he recommended the sultan to appoint his son as his successor, and so founded a dynasty of able statesmen who occupied the grand vizierate almost without interruption for half a century.

2. Fazil Ahmed Kuprili (1635-1676), son of the preceding, succeeded his father as grand vizier in 166 1 (this being the first instance of a son succeeding his father in that office since the time of the Chenderelis). He began life in the clerical career, which he left, at the age of twenty-three, when he had attained the rank of muderris. Usually humane and generous, he sought to relieve the people of the excessive taxation and to secure them against unlawful exactions. Three years after his accession to office Turkey suffered a crushing defeat at the battle of St Gothard and was obliged to

make peace with the Empire. But Kuprili's influence with the sultan remained unshaken, and five years later Crete fell to his arms (1669). The next war in which he was called upon to take part was with Poland, in defence of the Cossacks, who had appealed to Turkey for protection. At first successful, Kuprili was defeated by the Poles under John Sobieski at Khotin and Lemberg; the Turks, however, continued to hold their own, and finally in October 1676 consented to honourable terms of peace by the treaty of Zurawno (October 16, 1676), retaining Kaminiec, Podolia and the greater part of the Ukraine. Three days later Ahmed Kuprili died. His military capacity was far inferior to his administrative qualities. He was a liberal pro- tector of art and literature, and the kindliness of his disposition formed a marked contrast to the cruelty of his father; but he was given to intemperance, and the cause of his death was dropsy brought on by alcoholic abuse.

3. Zade Mustafa Kuprili (1637-1691), surnamed Fazil, son of Mahommed Kuprili, became grand vizier to Suleiman II. in 1689. Called to office after disaster had driven Turkey's forces from Hungary and Poland and her fleets from the Mediterranean, he began by ordering strict economy and reform in the taxation ; himself setting the example, which was widely followed, of voluntary contributions for the army, which with the navy he reorganized as quickly as he could. His wisdom is shown by the prudent measures which he took by enacting the Nizam-i- jedid, or new regulations for the improvement of the condition of the Christian rayas, and for affording them security for life and property; a conciliatory attitude which at once bore fruit in Greece, where the people abandoned the Venetian cause and returned to their allegiance to the Porte. He met his death at the battle of Salankamen in 1691, when the total defeat of the Turks by the Austrians under Prince Louis of Baden led to their expulsion from Hungary.

4. Hussein Kuprili (surnamed Amuja-Zade) was the son of Hassan, a younger brother of Mahommed Kuprili. After occupying various important posts he became grand vizier in 1697, and owing to his ability and energy the Turks were able to drive the Austrians back over the Save, and Turkish fleets were sent into the Black Sea and the Mediterranean. The efforts of European diplomacy succeeded in inducing Austria and Turkey to come to terms by the treaty of Carlowitz, whereby Turkey was shorn of her chief conquests (1699). After this event Hussein Kuprili, surnamed " the Wise," devoted himself to the suppression of the revolts which had broken out in Arabia, Egypt and the Crimea, to the reduction of the Janissaries, and to the institution of administrative and financial reform. Un- fortunately the intrigues against him drove him from office in 1702, and soon afterwards he died.

5. Numan Kuprili, son of Mustafa Fazil, became grand vizier in 1 7 10. The expectations formed of him were not fulfilled, as although he was tolerant, wise and just like his father, he in- judiciously sought to take upon himself all the details of adminis- tration, a task which proved to be beyond his powers. He failed to introduce order into the administration and was dismissed from office in less than fourteen months after his appointment.

6. Abdullah Kuprili, a son of Mustafa Fazil Kuprili, was appointed Kaimmakam or locum tenens of the grand vizier in 1703. He commanded the Persian expedition in 1723 and captured Tabriz in 1725, resigning his office in 1726. In 1735 he again commanded against the Persians, but fell at the disas- trous battle of Bagaverd, thus emulating his father's heroic death at Selankamen.

KURAKIN, BORIS IVANOVICH, Prince (1676-1727), Russian diplomatist, was the brother-in-law of Peter the Great, their wives being sisters. He was one of the earliest of Peter's pupils. In 1697 he was sent to Italy to learn navigation. His long and honourable diplomatic career began in 1707, when he was sent to Rome to induce the pope not to recognize Charles XII. 's candidate, Stanislaus Leszczynski, as king of Poland. From 1708 to 1712 he represented Russia at London, Hanover, and the Hague successively, and, in 17 13, was the principal Russian plenipotentiary at the peace congress of Utrecht. From 17 16 to 1722 he held the post of ambassador at Paris, and when, in 1724, Peter set forth on his Persian campaign, Kurakin was appointed the supervisor of all the Russian ambassadors ac- credited to the various European courts. " The father of Russian diplomacy," as he has justly been called, was remarkable throughout his career for infinite tact and insight, and a wonder- fully correct appreciation of men and events. He was most useful to Russia perhaps when the Great Northern war (see Sweden, History) was drawing to a close. Notably he prevented Great Britain from declaring war against Peter's close ally, Denmark, at the crisis of the struggle. Kurakin was one of the best-educated Russians of his day, and his autobiography, carried down to 1709, is an historical document of the first im- portance. He intended to write a history of his own times with Peter the Great as the central figure, but got no further than the summary, entitled History of Tsar Peter Aleksievich and the People Nearest to Him (1682-1694) (Rus.).

Sec Archives of Prince A. Th. Kurakin (Rus.) (St Petersburg, 1890); A. Bruckner, A Russian Tourist in Western Europe in the beginning of the XVIIIth Century (Rus.) (St Petersburg, 1892). (R. N. B.)

KURBASH, or Kourbash (from the Arabic qurbash, a whip; Turkish qirbach; and French courbache), a whip or strap about a yard in length, made of the hide of the hippopotamus or rhinoceros. It is an instrument of punishment and torture used in various Mahommedan countries, especially in the Turkish empire. " Government by kurbash " denotes the oppression of a people by the constant abuse of the kurbash to maintain authority, to collect taxes, or to pervert justice. The use of the kurbash for such purposes, once common in Egypt, has been abolished by the British authorities.

KURDISTAN, in its wider sense, the " country of the Kurds" (Koords), including that part of Mount Taurus which buttresses the Armenian table-land (see Armenia), and is intersected by the Batman Su, the Bohtan Su, and other tributaries of the Tigris; and the wild mountain district, watered by the Great and Little Zab, which marks the western termination of the great Iranian plateau.

Population. — The total Kurd population probably exceeds two and a half millions, namely, Turkish Kurds 1,650,000, Persian 800,000, Russian 50,000, but there are no trustworthy statistics. The great mass of the population has its home in Kurdistan. But Kurds are scattered irregularly over the country from the river Sakarla on the west to Lake Urmia on the east, and from Kars on the north to Jebel Sinjar on the south. There is also an isolated settlement in Khorasan. The tribes, ashiret, into which the Kurds are divided, resemble in some respects the Highland clans of Scotland. Very few of them number more than 10,000 souls, and the average is about 3000. The sedentary and pastoral Kurds, Yerli, who live in villages in winter and encamp on their own pasture-grounds in summer, form an in- creasing majority of the population. The nomad Kurds, Kocher, who always dwell in tents, are the wealthiest and most inde- pendent. They spend the summer on the mountains and high plateaus, which they enter in May and leave in October; and pass the winter on the banks of the Tigris and on the great Dlain north

of Jebel Sinjar, where they purchase right of pasturage from the Shammar Arabs. Each tribe has its own pasture-grounds, and trespass by other tribes is a fertile source of quarrel. During the periodical migrations Moslem and Christian alike suffer from the predatory instincts of the Kurd, and disturbances are frequent in the districts traversed. In Turkey the sedentary Kurds pay taxes; but the nomads only pay the sheep tax, which is collected as they cross the Tigris on their way to their summer pastures.

Character. — The Kurd delights in the bracing air and un- restricted liberty of the mountains. He is rarely a muleteer or camel-man, and does not take kindly to handicrafts. The Kurds generally bear a very indifferent

reputation, a worse reputation perhaps, than they really deserve. Being aliens to the Turks in language and to the Persians in religion, they are everywhere treated with mistrust, and live as it were in a state of chronic warfare with the powers that be. Such a condition is not of course favourable to the development of the better qualities of human nature. The Kurds are thus wild and lawless; they are much given to brigandage; they oppress and frequently maltreat the Christian populations with whom they are brought in contact, — these populations being the Armenians in Diarbekr, Erzerum and Van, the Jacobites and Syrians in the Jebel-Tur, and the Nestorians and Chaldaeans in the Hakkari country.

Perhaps the most distinguishing characteristic of the Kurdish chief is pride of ancestry. This feeling is in many cases exagger- ated, for in reality the present tribal organization does not date from any great antiquity. In the list indeed of eighteen principal tribes of the nation which was drawn up by the Arabian historian Masudi, in the 10th century, only two or three names are to be recognized at the present day. A 14th-century list, however, translated by Quatremere, 1 presents a great number of identical names, and there seems no reason to doubt that certain Kurdish families can trace their descent from the Omayyad caliphs, while only in recent years the Baban chief of Suleimania, representing the old Sohrans, and the Ardelan chief of Sinna, 2 representing an elder branch of the Gurans, each claimed an ancestry of at least five hundred years. There was up to a recent period no more picturesque or interesting scene to be witnessed in the east than the court of one of these great Kurdish chiefs, where, like another Saladin, the bey ruled in partriarchal state, surrounded by an hereditary nobility, regarded by his clansmen with reverence and affection, and attended by a bodyguard of young Kurdish warriors, clad in chain armour, with flaunting silken scarfs, and bearing javelin, lance and sword as in the time of the crusades.

Though ignorant and unsophisticated the Kurd is not wanting in natural intelligence. In recent years educated Kurds have held high office under the sultan, including that of grand vizier, have assisted in translating the Bible into Turkish, and in editing a newspaper. The men are lithe, active and strong, but rarely of unusual stature. The women do not veil, and are allowed

1 See Notices et Extraits des MSS., xiii. 305. Of the tribes enumer- ated in this work of the 14th century who still retain a leading place among the Kurds, the following names may be quoted : Guranieh of Dartang, modern Gurans; Zengeneh, L_ Hamadan hills, now in Kermanshah; Hasnani of Kcrkuk and Arbil, now in the Dersim mountains, having originally come from Khorasan according to tradition; Sohrieh of Shekelabad and Tel-Haftun, modern Sohran, from whom descend the Baban of Suleimanieh ;

Zerzari of Hinjarin mountains, modern Zerzas of Ushnu (cuneiform pillars of Kel-i-shin and Sidek noticed by author) ; Julamerkien, modern Julamerik, said to be descended from the caliph Merwan-ibn-Hakam; Hakkarieh, Hakkari inhabiting Zuzan of Arab geography; Bokhtieh, modern Bohtan. The Rowadi, to whom Saladin belonged, are probably modern Rawendi, as they held the fortress of Arbil (Arbela). Some twenty other names are mentioned, but the orthography is so doubtful that it is useless to try to identify them.

2 The Sheref-nama, a history of the Kurds dating from the 16th century, tells us that " towards the close of the reign of the Jen- ghizians, a man named Baba Ardilan, a descendant ofthe governors of Diarbekr, and related to the famous Ahmed-ibn-Merwan, after remaining for some time among the Gurans, gained possession of the country of Shahrizor " and the Ardelan family history, with the gradual extension of their power over Persian Kurdistan, is then traced down to the Saffavid period.

great freedom. The Kurds as a race are proud, faithful and hospitable, and have rude but strict feeling's of honour. They are, however, much under the influence of dervishes, and when their fanaticism is aroused their habitual lawlessness is apt to degenerate into savage barbarity. They are not deficient in martial spirit, but have an innate dislike to the restraints of military service. The country is rich in traditions and legends, and in lyric and in epic poems, which have been handed down from earlier times and are recited in a weird melancholy tone.

Antiquities. — Kurdistan abounds in antiquities of the most varied and interesting character. But it has been very little opened up to modern research. A series of rock-cut cuneiform inscriptions extend from Malatia on the west to Miandoab (in Persia) on the east, and from the banks of the Aras on the north to Rowanduz on the south, which record the glories of a Turanian dynasty, who ruled the country of Nairi during the 8th and 7th centuries, B.C., contemporaneously with the lower Assyrian empire. Intermingled with these are a few genuine Assyrian inscriptions of an earlier date; and in one instance, at Van, a later tablet of Xerxes brings the record down to the period of Grecian history. The most ancient monuments of this class, however, are to be found at Holwan and in the neighbourhood, where the sculptures and inscriptions belong probably to the Guti and Luli tribes, and date from the early Babylonian period.

In the northern Kurdish districts which represent the Arzanene, Intilene,

Anzitene, Zabdicene, and Moxuene of the ancients, there are many interesting remains of Roman cities, e.g. at Arzen, Miyaf arikin (anc. Martyropolis) , Sisauronon, and the ruins of Dunisir near Dara, which Sachau identified with the Armenian capital of Tigranocerta. Of the Macedonian and Parthian periods there are remains both sculptured and in- scribed at several points in Kurdistan; at Bisitun or Behistun (q.v.), in a cave at Amadia, at the Mithraic temple of Kereftu, on the rocks at Sir Pul-o-Zohab near the ruins of Holwan, and probably in some other localities, such as the Balik country between Lahijan and Koi-Sanjak; but the most interesting site in all Kurdistan, perhaps in all western Asia, is the ruined fire temple of Pal Kuli on the southern frontier of Suleimama. Among the debris of this temple, which is scattered over a bare hillside, are to be found above one hundred slabs, inscribed with Parthian and Pahlavi characters, the fragments of a wall which formerly supported the eastern face of the edifice, and bore a bilingual legend of great length, dating from the Sassanian psriod. There are also remarkable Sassanian remains in other parts of Kurdistan — at Salmus to the north, and at Kerman- shah and Kasr-i-Shirln on the Turkish frontier to the south.

Language. — The Kurdish language, Kermanji, is an old Persian patois, intermixed to the north with Chaldaean words and to the south with a certain Turanian element which may not improbably have come down from Babylonian times. Several peculiar dialects are spoken in secluded districts in the mountains, but the only varieties which, from their extensive use, require to be specified are the Zaza and the Guran. The Zaza is spoken throughout the western portion of the Dersim country, and is said to be unintelligible to the KermanjI-speaking Kurds. It is largely intermingled with Armenian, and may contain some trace of the old Cappadocian, but is no doubt of the same Aryan stock as the standard Kurdish. The Guran dialect again, which is spoken throughout Ardelan and Kermanshiih 1 chiefly differs from the northern Kurdish in being entirely free from any Semitic intermixture. It is thus somewhat nearer to the Persian than the Kermanji dialect, but is essentially the same language. It is a mistake to suppose that there is no

1 The Guran are mentioned in the Mesalik-el-Absara.sthedcm\nant tribe in southern Kurdistan in the 14th century, occupying very much the same seats as at present, from the Hamadan frontier to Shah- rizor. Their name probably signifies merely " the mountaineers," being derived from gur or girt, " a mountain," which is also found in Zagros, i.e. za-giri, " beyond the mountain," or Pusht-i-koh, as the name is translated in Persian. They are a fine, active and hardy race, individually brave, and make excellent soldiers, though in appearance very inferior to the tribal Kurds of the northern dis- tricts. _ These latter indeed delight in gay colours, while the Gurans dress in the most homely costume, wearing coarse blue cotton vests,

with felt caps and coats. In a great part of Kurdistan the name Guran has become synonymous with an agricultural peasantry, as opposed to the migratory shepherds.

Kurdish literature. Many of the popular Persian poets have been translated into Kurdish, and there are also books relating to the religious mysteries of the Ali-Illahis in the hands of the Dersimlis to the north and of the Gurans of Kermanshfih to the south. The New Testament in Kurdish was printed at Constantinople in 1857. The Rev. Samuel Rhea published a grammar and vocabulary of the Hakkari dialect in 1872. In 1879 there appeared, rrnder the auspices of the imperial academy of St Petersburg a French-Kurdish dictionary compiled originally by Mons. Jaba, many years Russian consul at Erzerum, but completed oy Ferdinand Justi by the help of a rich assortment of Kurdish tales and ballads, collected by Socin and Prym in Assyria.

Religion. — The great body of the nation, in Persia as well as in Turkey, are Sunnis of the Shafi'ite sect, but in the recesses of the Dersim to the north and of Zagros to the south there are large half- pagan communities, who are called indifferently Ali-Illahi and Kizjil-bash, and who hold tenets of some obscurity, but of consider- able interest. Outwardly professing to be Shi'ites or " followers of Ali," they observe secret ceremonies and hold esoteric doctrines which have probably descended to them from very early ages, and of which the essential condition is that there must always be upon the earth a visible manifestation of the Deity. While paying reverence to the supposed incarnations of ancient days, to Moses, David, Christ, Ali and his tutor Salman-ul-Farisi, and several of the Shi'ite imams and saints, they have thus usually some recent local celebrity at whose shrine they worship and make vows; and there is, moreover, in every community of Ali-Illahis some living personage, not neces- sarily ascetic, to whom, as representing the godhead, the superstitious tribesmen pay almost idolatrous honours. Among the Gurans of the south the shrine of Baba Yadgar, in a gorge of the hills above the old city of Holwan, is thus regarded with a supreme veneration. Similar institutions are also found in other parts of the mountains, which may.be compared with the tenets of the Druses and Nosairis in Syria and the Ismailites in Persia.

History. — With regard to the origin of the Kurds, it was for- merly considered sufficient to describe them as the descendants of the Carduchi, who opposed the retreat of the Ten Thousand through the mountains, but modern research traces them far beyond the period of the Greeks. At the dawn of history the mountains overhanging Assyria were held by a people named Gutu, a title which signified " a warrior," and which was rendered in Assyrian by the synonym of Gardu or Kardu, the precise term quoted by Strabo to explain the name of the Cardaces (KapSa/ces). These Gutu were

a Turanian tribe of such power as to be placed in the early cuneiform records on an equality with the other nations of western Asia, that is, with the Syrians and Hittites, the Susians, Elamites, and Akkadians of Babylonia; and during the whole period of the Assyrian empire they seem to have preserved a more or less independent political position. After the fall of Nineveh they coalesced with the Medes, and, in common with all the nations inhabiting the high plateaus of Asia Minor, Armenia and Persia, became gradually Aryanized, owing to the immigration at this period of history of tribes in overwhelming numbers which, from whatever quarter they may have sprung, belonged certainly to the Aryan family.

The Gutu or Kurdu were reduced to subjection by Cyrus before he descended upon Babylon, and furnished a contingent of fighting men to his successors, being thus mentioned under the names of Saspirians and Alarodians in the muster roll of the army of Xerxes which was preserved by Herodotus.

In later times they passed successively under the sway of the Macedonians, the Parthians, and Sassanians, being especially befriended, if we may judge from tradition as well as from the remains still existing in the country, by the Arsacian monarchs, who were probably of a cognate race. Gotarzes indeed, whose name may perhaps be translated " chief of the Gutu," was traditionally believed to be the founder of the Gurans, the principal tribe of southern Kurdistan, 2 and his name and titles are still preserved in a Greek inscription at

2 " The Kalhur tribe are traditionally descended from Gudarz- ibn-Gio, whose son Roham was sent by Bahman Keiani to destroy Jerusalem and bring the Jews into captivity. This Roham is the individual usually called Bokht-i-nasser (Nebuchadrezzar) and he ultimately succeeded to the throne. The neighbouring country has ever since remained in the hands of his descendants, who are called Gurans " {Sheref-Nama, Persian MS.). The same popular tradition still exists in the country, and TfiTAPZHO TEOnoePOS is found on the rock at Behistun, showing that Gudarz-ibn-GIo was really an historic personage. See Journ. Roy. Geog. Soc. ix. 114.

Behistun near the Kurdish capital of Kermanshah. Under the caliphs of Bagdad the Kurds were always giving trouble in one quarter or another. In a.d. 838, and again in 905, there were formidable insurrections in northern Kurdistan; the amir, Aˆpd-addaula, was obliged to lead the forces of the caliphate against the southern Kurds, capturing the famous fortress

of Sermaj, of which the ruins are to be seen at the present day near Behistun, and reducing the province of Shahrizor with its capital city now marked by the great mound of Yassin Teppeh. The most flourishing period of Kurdish power was probably during the 12th century of our era, when the great Saladin, who belonged to the Rawendi branch of the Hadabani tribe, founded the Ayyubite dynasty of Syria, and Kurdish chiefehips were established, not only to the east and west of the Kurdistan mountains, but as far as Khorasan upon one side and Egypt and Yemen on the other. During the Mongol and Tatar domination of western Asia the Kurds in the mountains remained for the most part passive, yielding a reluctant obedience to the provincial governors of the plains. When Sultan Selim I., after defeating Shah Ismail, 1514, annexed Armenia and Kurdistan, he entrusted the organiza- tion of the conquered territories to Idris, the historian, who was a Kurd of Bitlis. Idris found Kurdistan bristling with castles, held by hereditary tribal chiefs of Kurd, Arab, and Armenian descent, who were practically independent, and passed their time in tribal warfare or in raiding the agricultural population. He divided the territory into sanjaks or districts, and, making no attempt to interfere with the principle of heredity, installed the local chiefs as governors. He also resettled the rich pastoral country between Erzerum and Erivan, which had lain waste since the passage of Timur, v/ith Kurds from the Hakkiari and Bohtan districts. The system of administration introduced by Idris remained unchanged until the close of the Russo-Turkish War of 1828-29. But the Kurds, owing to the remoteness of their country from the capital and the decline of Turkey, had greatly increased in influence and power, and had spread westwards over the country as far as Angora. After the war the Kurds attempted to free themselves from Turkish control, and in 1834 it became necessary to reduce them to subjection. This was done by Reshid Pasha. The principal towns were strongly garrisoned, and many of the Kurd beys were replaced by Turkish governors. A rising under Bedr Khan Bey in 1843 was firmly repressed, and after the Crimean War the Turks strengthened their hold on the country. The Russo-Turkish War of 1877-78 was followed by the attempt of Sheikh Obaidullah, 1880-81, to found an independent Kurd principality under the protection of Turkey. The attempt, at first encouraged by the Porte, as a reply to the projected creation of an Armenian state under the suzerainty of Russia (see Armenia), collapsed after Obaidullah's raid into Persia, when various circumstances led the central government to reassert its supreme authority. Until the Russo-Turkish War of 1828-29 there had been little hostile feeling between the Kurds and the Armenians, and as late as 1877-1878 the mountaineers of both races had got on fairly well together. Both suffered from Turkey, both dreaded Russia. But the national movement amongst the Armenians, a.nd its encourage- ment by Russia after the last war, gradually aroused race hatred and fanaticism. In 1891 the activity of the Armenian Committees

induced the Porte to strengthen the position of the Kurds by raising a body of Kurdish irregular cavalry, which was well armed and called Hamidieh after the Sultan. The opportunities thus offered for plunder and the gratification of race hatred brought out the worst qualities of the Kurds. Minor disturbances constantly occurred, and were soon followed by the massacre of Armenians at Sasun and other places, 1894-96, in which the Kurds took an active part. Authorities. — Rich, Narrative of a Residence in Koordistan (1836); Wagner, Reise nach Persien und dent Lande der Kurden (Leipzig. 1852) ; Consul Taylor in R. G. S. Journal (1865) ; Mil!ir>gen, Wild Life among the Koords (1870); Von Luschan, " Die Wander- vbiker Kleinasiens," in V". d. G. fur Anthropologie (Berlin, 1886); Clayton, " The Mountains of Kurdistan," in Alpine Journal (1887) ;

Binder, Au Kurdistan (Paris, 1887); Naumann, Vom Goldnen Horn zu den Quellen des Euphrat (Munich, 1893); Murray, Handbook to Asia Minor, &fc. (1895); Lerch, Forschungen iiber die Kurden (St Petersburg, 1857-58); Jaba, Diet. Kurde-Francais (St Peters- burg, 1879); Justi, Kurdische Grammatik (1880); Prym and Socin, Kurdische Sanvmlungen (1890); Makas, Kurdische Studien (1901); Earl Percy, Highlands of Asiatic Turkey (1901); Lynch, Armenia (1901); A. V. Williams Jackson, Persia, Past and Present (1906). (C. W. W. ; H. C. R.)

KURDISTAN, in the narrower sense, a province of Persia, situated in the hilly districts between Azerbaijan and Kerman- shah, and extending to the Turkish frontier on the W., and bounded on the E. by Gerrus and Hamadan. In proportion to its size and population it pays a very small yearly revenue — only about £14,000 — due to the fact that a great part of the population consists of wild and disorderly nomad Kurds. Some of these nomads pass their winters in Turkish territory, and have their summer pasture-grounds in the highlands of Kurd- istan. This adds much to the difficulty of collecting taxation. The province is divided into sixteen districts, and its eastern part, in which the capital is situated, is known as Ardelan. The capital is Senendij, usually known as Sinna (not Sihna, or Sahna, as some writers have it), situated 60 m. N.W. of Hamadan, in 35° 15′ N., 47° 18′ E., at an elevation of 5300 ft. The city has a population of about 35,000 and manufactures great quantities of carpets and felts for the supply of the province and for export. Some of the carpets are very fine and expen- sive, rugs 2 yards by i| costing £15 to £20. Post and telegraph offices have been established since 1879.

KURGAN, a town (founded 1553) of West Siberia, in the government of Tobolsk, on the Siberian railway, 160 m. E. of Chelyabinsk, and on the left bank of the Tobol, in a wealthy agricultural district. Pop. (1897), 10,579. Owing to its position at the terminus of steam navigation up the river Tobol, it has become second only to Tyumen as a commercial centre. It has

a public library and a botanic garden. There is a large trade in cattle with Petropavlovsk, and considerable export of grain, tallow, meat, hides, butter, game and fish, there being three large fairs in the year. In the vicinity are a great number of prehistoric kurgans or burial-mounds.

KURIA MURIA ISLANDS, a group of five islands in the Arabian Sea, close under the coast of Arabia, belonging to Britain and forming a dependency of Aden. They are lofty and rocky, and have a total area of 28 sq. m., that of the largest, Hallania, being 22 sq. m. They are identified with the ancient Insulae Zenobii, and were ceded by the sultan of Muscat to Britain in 1854 for the purposes of a cable station. They are inhabited by a few families of Arabs, who however speak a dialect differing considerably from the ordinary Arabic. The islands yield some guano.

KURILES (Jap. Chishima, " thousand islands "), a chain of small islands belonging to Japan, stretching in a north-easterly direction from Nemuro Bay, on the extreme east of the island of Yezo, to Chishima-kaikyo (Kuriles Strait), which separates them from the southernmost point of Kamchatka. They extend from 44 45′ to 50° 56′ N. and from 145 25′ to 156 32′ E. Their coasts measure 1496 m.; their area is 6159 sq. m.; their total number is 32, and the names of the eight principal islands, counting from the south, are Kunashiri, Shikotan, Etorofu (generally called Etorop, and known formerly to Europe as Staten Island), Urup, Simusir, Onnekotan, Paramoshiri (Paramusir) and Shumshiri. From Noshapzaki (Notsu-no-sake or Notsu Cape), the most easterly point of Nemuro province, to Tomari, the most westerly point in Kunashiri, the distance is 7! m., and the Kuriles Strait separating Shumshiri from Kamchatka is about the same width. The name " Kurile " is derived from the Russian kurit (to smoke), in allusion to the active volcanic character of the group. The dense fogs that envelop these islands, and the violence of the currents in their vicinity, have greatly hindered exploration, so that little is known of their physiography. They lie entangled in a vast net of sea-weed; are the resort of innumerable birds, and used to be largely frequented by seals and sea-otters, which, however, have been

almost completely driven away by unregulated hunting. Near the south-eastern coast of Kunashiri stands a mountain called Rausu- nobori (3005 ft. high), round whose base sulphur bubbles up in large quantities, and hot springs as well as a hot stream are found. On the west coast of the same island is a boiling lake, called Ponto, which deposits on its bed and round its shores black sand, consisting almost entirely of pure sulphur. This island

has several lofty peaks; Ponnobori-yama near the eastcoast, and Chachanobori and Rurindake in the north. Chachanobori (about 7382 ft.) is described by Messrs Chamberlain and Mason as " a cone within a cone, the inner and higher of the two being — so the natives say — surrounded by a lake." The island has extensive forests of conifers with an undergrowth of ferns and flowering plants, and bears are numerous. The chief port of Kunashiri is Tomari,onthesouthcoast. The island of Shikotan is remarkable for the growth of a species of bamboo (called Shikotan-chiku) , having dark brown spots on the cane. Etorof u has a coast-line broken by deep bays, of which the principal are Naibo-wan, Rubetsu-wan and Bettobuwan on the northern shore and Shitokap-wan on the southern. It is covered almost com- pletely with dense forest, and has anumberof streams abounding with salmon. Shana, the chief port, is in Rubetsu Bay. This island, the principal of the group, is divided into four provinces for administrative purposes, namely, Etorofu, Furubetsu, Shana and Shibetoro. Its mountains are Atosha-nobori (4035 ft.) in Etorofu; Chiripnupari (5009 ft.) in Shana; and Mokoro-nobori (3930 ft.) and Atuiyadake (3932 ft.) in Shibetoro. Among the other islands three only call fornoticeonaccountof their altitudes, namely, Ketoi-jima, Rashua-jima and Matua-jima, which rise to heights of 3944, 3304 and 5240 ft. respectively.

Population. — -Not much is known about the aborigines. By some authorities Ainu colonists are supposed to have been the first settlers, and to have arrived there via Yezo; by others, the earliest comers are believed to have been a hyperborean tribe travelling southwards by way of Kamchatka. The islands themselves have not been sufficiently explored to determine whether they furnish any ethnological evidences. The present population aggregates about 4400, or 0-7 per sq. m., of whom about 600 are Ainu (q.v.). There is little disposition to emigrate thither from Japan proper, the number of settlers being less than 100 annually.

History.— The Kurile Islands were discovered in 1634 by the Dutch navigator Martin de Vries. The three southern islands, Kunashiri, Etorofu, and Shikotan, are believed to have belonged to Japan from a remote date, but at the beginning of the 18th century the Russians, having conquered Kamchatka, found their way to the northern part of the Kuriles in pursuit of fur-bearing animals, with which the islands then abounded. Gradually these encroachments were pushed farther south, simultaneously with aggressions imperilling the Japanese settlements in the southern half of Sakhalin. Japan's occupation was far from effective in either region, and in 1875 she was not unwilling to conclude a convention by which she agreed to withdraw altogether from Sakhalin provided that Russia withdrew from the Kuriles.

An officer of the Japanese navy, Lieut. Gunji, left Tokyo with about forty

comrades in 1892, his intention being to form a settlement on Shumshiri, the most northerly of the Kurile Islands. They embarked in open boats, and for that reason, as well as because they were going to constitute themselves their country's extreme outpost, the enterprise attracted public enthusiasm. After a long struggle the immigrants became fairly prosperous.

See Capt. H. J. Snow, Notes on the Kurile Islands (London, 1896).

KURISCHES HAFF, a lagoon of Germany, on the Baltic coast of East Prussia, stretching from Labiau to Memel, a distance of 60 m., has an area of nearly 680 sq. m. It is mostly shallow and only close to Memel attains a depth of 23 ft. It is thus unnavig- able except for small coasting and fishing boats, and sea-going vessels proceed through the Memeler Tief (Memel Deep), which connects the Baltic with Memel and has a depth of 19 ft. and a breadth of 800 to 1900 ft. The Kurisches Haff is separated from the Baltic by a long spit, or tongue of land, the so-called Kurische Nehrung, 72 m. in length and with a breadth of 1 to 2

miles. The latter is fringed throughout its whole length by a chain of dunes, which rise in places to a height of nearly 200 ft. and threaten, unless checked, to be pressed farther inland and silt up the whole Haff.

See Berendt, Geologie des Kurischen Haffs (Konigsberg, iS Somraer, Das Kurische Haff (Danzig, 1889); A. Bezzenberger, Die Kurische Nehrung und ihre Bewohner (Stuttgart, 1889) ; and Lindner, Die Preussische Wilste einst und jetzt, Bilder von der Kurischen Nehrung (Osterwieck, i£

KURNOOL, or Karnul, a town and district of British India, in the Madras presidency. The town is built on a rocky soil at the junction of the Hindri and Tungabhadra rivers 33 m. from a railway station. The old Hindu fort was levelled in 1865, with the exception of one of the gates, which -te-ts preserved as a specimen of ancient architecture. Cotton cloth and carpets are manufactured. Pop. (1901), 25, 376, of whomhalf are Mussulmans.

The District of Kurnool has an area of 7578 sq. m., pop. (1901), 872,055, showing an increase of 6% in the decade. Two long mountain ranges, the Nallamalais and the Yellamalais, extend in parallel lines, north and south, through its centre. The principal heights of the Nallamalai range are Biranikonda (3149 ft.), Gundlabrahmeswaram (3055 ft.), and Durugapukonda (3086 ft.). The Yellamalai is a low range, generally flat-topped with scarped sides; the highest point is about 2000 ft. Several low ridges run parallel to the Nallamalais, broken here and there by gorges, through which mountain streams take their course. Several of these gaps were dammed across under native rule, to form tanks for purposes of irrigation. The principal rivers are the Tungabhadra and Kistna, which

bound the district on the north. When in flood, the Tungabhadra averages 900 yards broad and 15 ft. deep. The Kistna here flows chiefly through uninhabited jungles, sometimes in long smooth reaches, with intervening shingly rapids. The Bhavanasi rises on the Nalla- malais, and falls into the Kistna at Sungameswaram, a place of pilgrimage. During the 18th century Kurnool formed the jagir of a semi-independent Pathan Nawab, whose descendant was dispossessed by the British government for treason in 1838. The principal crops are millets, cotton, oil-seeds, and rice, with a little indigo and tobacco. Kurnool suffered very severely from the famine of 1876-1877, and to a slight extent in 1896-1897. It is the chief scene of the operations of the Madras Irrigation Com- pany taken over by government in 1882. The canal, which starts from the Tungabhadra river near Kurnool town, was constructed at a total cost of two millions sterling, but has not been a financial success. A more successful work is the Cumbum tank, formed under native rule by damming a gorge of the Gundlakamma river. Apart from the weaving of coarse cotton cloth, the chief industrial establishments are cotton presses, indigo vats, and saltpetre refineries. The district is served by the Southern Mahratta railway.

KUROKI, ITEI, Count (1844-), Japanese general, was born in Satsuma. He distinguished himself in the Chino- Japanese War of 1894-95. He commanded the I. Army in the Russo-Japanese War (1904-5), when he won the opening battle of the war at the Yalu river, and afterwards advanced through the mountains and took part with the other armies in the battles of Liao-Yang, Shaho and Mukden (see Russo- Japanese War). He was created baron for his services in the former war, and count for his services in the latter.

KUROPATKIN, ALEXEI NIKOLAIEVICH (1848-), Rus- sian general, was born in 1848 and entered the army in 1864. From 1872 to 1874 he studied at the Nicholas staff college, after which he spent a short time with the French troops in Algiers. In 1875 he was employed in diplomatic work in Kashgaria and in 1876 he took part in military operations in Turkistan, Kokan and Samerkand. Inthewarof i877-78againstTurkeyheearned a great reputation as chief of staff to the younger Skobelev, and after the war he wrote a detailed and critical history of the operations which is still regarded as the classical work on the subject and is available for other nations in the German transla- tion by Major Krahmer. After the war he served again on the south-eastern borders in command of the Turkestan Rifle Brigade,

and in 1881 he won further fame by a march of 500 miles from Tashkent to Geok-Tepg, taking part in the storming of the latter place. In 1882 he was promoted major-general, at the early age of 34, and he henceforth was regarded by the army as the natural successor of Skobelev. In 1890 he was promoted lieutenant- general, and thirteen years later, having acquired in peace and war the reputation of being one of the foremost soldiers in Europe, he quitted the post of minister of war which he then held and took command of the Russian army then gathering in Manchuria for the contest with Japan. His ill-success in the great war of 1904-5, astonishing as it seemed at the time, was largely attributable to his subjection to the superior command of Admiral Alexeiev, the tsar's viceroy in the Far East, and to internal friction amongst the generals, though in his history of the war (Eng. trans., 1909) he frankly admitted his own mistakes and paid the highest tribute to the gallantry of the troops who had been committed to battle under conditions unfavourable to success. After the defeat of Mukden and the retirement of the whole armytoTieling he resigned the command to General Linievich, taking the latter officer's place at the head of one of the three armies in Manchuria. (See Russo-Japanese War.)

KURO SIWO, or Kuro Shio (literally blue salt), a stream current in the Pacific Ocean, easily distinguishable by the warm temperature and blue colour of its waters, flowing north- eastwards along the east coast of Japan, and separated from it by a strip of cold water. The current persists as a stream to about 40 N., between the meridians of 150° E. and 160° E., when it merges in the general easterly drift of the North Pacific. The Kuro Siwo is the analogue of the Gulf Stream in the Atlantic.

KURRAM, a river and district on the Kohat border of the North-West Frontier province of India. The Kurram river drains the southern flanks of the Safed Koh, enters the plains a few miles above Bannu, and joins the Indus near Isa-Khel after a course of more than 200 miles. The district has an area of 1278 sq. m.; pop. (1901), 54,257. It lies between the Miranzai Valley and the Afghan border, and is inhabited by the Turis, a tribe of Turki origin who are supposed to have subjugated the Bangash Pathans five hundred years ago. It is highly irrigated, well peopled, and crowded with small fortified villages, orchards and groves, to which a fine background is afforded by the dark pine forests and alpine snows of the Safed Koh. The beauty and climate of the valley attracted some of the Mogul emperors of Delhi, and the remains exist of a garden planted by Shah Jahan. Formerly the Kurram valley was under the government of Kabul, and every five or six years a military expedition was sent to collect the revenue, the soldiers living meanwhile at free quarters on the people. It was not until about 1848 that the Turis were brought directly under the control of Kabul, when a governor was appointed, who established himself in Kurram. The Turis, being Shiah Mahommedans, never liked the Afghan rule. During the second

Afghan War, when Sir Frederick Roberts advanced by way of the Kurram valley and the Peiwar Kotal to Kabul, the Turis lent him every assistance in their power, and in consequence their independence was granted them in 1880. The administra- tion of the Kurram valley was finally undertaken by the British government, at the request of the Turis themselves, in 1890. Technically it ranks, not as a British district, but as an agency or administered area. Two expeditions in the Kurram valley also require mention: (1) The Kurram expedition of 1856 under Brigadier Chamberlain. The Turis on the first annexation of the Kohat district by the British had given much trouble. They had repeatedly leagued with other tribes to harry the Miranzai valley, harbouring fugitives, encouraging resistance, and frequently attacking Bangash and Khattak villages in the Kohat district. Accordingly in 1856 a British force of 4896 troops traversed their country, and the tribe entered into engagements for future good conduct. (2) The Kohat-Kurram expedition of 1897 under Colonel W. HilL During the frontier risings of 1897 the in- habitants of the Kiirram valley, chiefly the Massozai section of the Orakzais, were infected by the general excitement, and attacked the British camp at Sadda and other posts. A force of 14,230

British troops traversed the country, and the tribesmen were severely punished. In Lord Curzon's reorganization of the frontier in 1900-1901, the British troops were withdrawn from the forts in the Kurram valley, and were replaced by the Kurram militia, reorganized in two battalions, and chiefly drawn from the Turi tribe.

KURSEONG, or Karsiang, a sanatorium of northern India, in the Darjeeling district of Bengal, 20 m. S. of Darjeeling and 4860 ft. above sea-level; pop. (1901), 4469. It has a station on the mountain railway, and is a centre of the tea trade. It also contains boys' and girls' schools for Europeans and Eurasians.

KURSK, a government of middle Russia, bounded N. by the government of Orel, E. by that of Voronezh, S. by Kharkov and W. by Chernigov. Area, 17,932 sq. m. It belongs to the central plateau of middle Russia, of which it mostly occupies the southern slope, the highest parts being in Orel and Kaluga, to the north of Kursk. Its surface is 700 to 1100 ft. high, deeply trenched by ravines, and consequently assumes a hilly aspect when viewed from the river valleys. Cretaceous and Eocene rocks prevail, and chalk, iron-stone, potters' clay and phosphates are among the economic minerals. No fewer than four hundred streams are counted within its borders, but none of them is of any service as waterways. A layer of fertile loess covers the whole surface, and Kursk belongs almost entirely to the black-earth region. The flora is distinct from that of the .governments to the north, not only on account of the black-earth flora which enters into its composition,

but also of the plants of south-western Russia which belong to it, a characteristic which is accentuated in the southern portion of the government. The climate is milder than that of middle Russia generally, and winds from the south-east and the south-west prevail in winter. The average temperatures are — for the year42° F.,for January 14° F. and for July 67 F. The very interesting magnetic phenomenon, known as the Byelgorod anomaly, covering an oval area 20 m. long and 12 m.wide, has been studied near the town of this name. The population, 1,893,597 in 1862, was 2,391,091 in 1897, of whom 1,208,488 were women and 199,676 lived in towns. The estimated pop. in 1906 was 2,797,000. It is thoroughly Russian (76 % Great Russians and 24 % Little Russians), and 94 % are peasants who own over 59% of the land, and live mostly in large villages. Owing to the rapid increase of the peasantry and the small size of the allotments given at the eman- cipation of the serfs in 1861, emigration, chiefly to Siberia, is on the increase, while 80,000 to 100,000 men leave home every summer to work in the neighbouring governments. Three-quarters of the available land is under crops, chiefly rye, other crops being wheat, oats, barley, buckwheat, millet, potatoes, sugar-beets, hemp, flax, sunflowers and fruits. Grain is exported in considerable quantities. Bees are commonly kept, as also are large numbers of livestock. Factories (steam flour-mills, sugar-factories, distilleries, wool-washing, tobacco factories) give occupation to about 23,000 workers. Domestic and petty trades are on the increase in the villages, and new ones are being introduced, the chief products being boots, ikons (sacred images) and shrines, toys, caps, vehicles, baskets, and pottery. About 17 m. from the chief town is held the Korennaya fair, formerly the greatest in South Russia, and still with an annual trade valued at £900,000. The Kursk district contains more than sixty old town sites ; and barrows or burial mounds (kurgans) are extremely abundant. Notwithstanding the active efforts of the local councils (zemstvos), less than 10% of the population read and write. The government is crossed from north to south and from west to south by two main lines of railway. The trade in grain, hemp, hemp-seed oil, sheepskins, hides, tallow, felt goods, wax, honey and leather goods is very brisk. There are fifteen districts, the chief towns of which, with their populations in 1897, are Kursk (q.v.) Byelgorod (21,850), Dmitriev (7315ˆ, Fatezh (4959), Graivoron (7669), Korocha (14,405), Lgov (5376), Novyi Oskol (2762), Oboyaii (11872), Putivl (8965), Rylsk (11,415), Staryi Oskol (16,662), Shchigry (3329), Suja (12,856) and Tim (7380). There are more than twenty villages which have from 5000 to 12,000 inhabitants each. (P. A K. ; J. T. Be.)

KURSK, a town of Russia, capital of the government of the same name, at the junction of the railways from Moscow, Kiev and Kharkov, 330 m. S.S.W. from Moscow. Pop. (1897)', 52,896. It is built on two hills (750 ft.), the slopes of which are planted with orchards. The environs all round are well wooded and the woods are famous for their nightingales. Among the public buildings the more noticeable are a monastery with an image of the Virgin, greatly venerated since 1295; the Orthodox Greek cathedral (18th century); and the episcopal palace, Kursk being a bishopric of the national church. It is essentially a provincial town, and is revered as the birthplace of Theodosius, one of the most venerated of Russian saints. It has a public garden, and has become the seat of several societies (medical, musical, educa- tional and for sport). Its factories include steam flour-mills, distilleries, tobacco-works, hemp-crushing mills, tanneries, soap-works and iron-works. It has a great yearly fair (Korennaya) , and an active trade in cereals, linen, leather, fruit, horses, cattle, hides, sheepskins, furs, down, bristles, wax, tallow and manu- factured goods.

Kursk was in existence in 1032. It was completely destroyed by the Mongols in 1240. The defence of the town against an incursion of the Turkish Polovtsi (or Comans or Cumani) is celebrated in The Triumph of Igor, an epic which forms one of the most valuable relics of early Russian literature. From 1586 to the close of the 18th century the citadel was a place of consider- able strength; the remains are now comparatively few.

KURTZ, JOHANN HEINRICH (1 809-1 890), German Lutheran theologian, was born at Montjoie near Aix la Chapelle on the 13th of December 1809, and was educated at Halle and Bonn. Abandoning the idea of a commercial career, he gave himself to the study of theology and became religious instructor at the gymnasium of Mitau in 1835, and ordinary professor of theology (church history, 1850; exegesis, 1859) at Dorpat. He resigned his chair in 1870 and went to live at Marburg, where he died on the 26th of April 1890. Kurtz was a prolific writer, and many of his books, especially the Lehrbuch der heiligen Geschichte (1843) , became very popular. In the field of biblical criticism he wrote a Gesckichte des Alien Bundes (1848-1855), Zur Theologie der Psalmen (1865) and Erkldrung des Briefs an die Hebrder (1869). His chief work was done in church history, among his produc- tions being Lehrbuch der Kirckengeschichte filr Studierende (1849), Abriss der Kirckengeschichte (1852) and Handbuch der allgemeinen Kirchengeschichte (1853-1856). Several of his books have been translated into English.

KURUMAN, a town in the Bechuanaland division of Cape Colony, 120 m. N.W: of Kimberley and 85 m. S.W. of Vryburg. It is a station of the London Missionary Society, founded in 1818, and from 1821 to 1870 was the scene of the labours of Robert Moffat (q.v.) who here translated the

Bible into the Bechuana tongue. In the middle period of the 19th century Kuruman was the rendezvous of all travellers going north or south. Of these the best known is David Livingstone. The trunk railway line passing considerably to the east of the town, Kuruman is no longer a place of much importance. It is pleasantly situated on the upper course of the Kuruman river, being beautified by gardens and orchards, and presents a striking contrast to the desert conditions of the surrounding country. Its name is that of the son and heir of Mosilikatze, the founder of the Matabele nation. Kuruman disappeared during his father's lifetime and the succession passed to Loben- gula (see Rhodesia: History). In November 1899 the town was besieged by a Boer force. The garrison, less than a hun- dred strong, held out for six weeks against over 1000 of the enemy, but was forced to surrender on the 1st of January 1900. In June following it was reoccupied by the British.

KURUMBAS and KURUBAS, aboriginal tribes of southern India, by some thought to be of distinct races. There are two types of Kurumbas, those who live on the Nilgiri plateau, speak the Kurumba dialect and are mere savages; and those who live in the plains, speak Kanarese and are civilized. The former are a small people, with wild matted hair and scanty beard, sickly-looking, pot-bellied, large-mouthed, with projecting jaws,

prominent teeth and thick lips. Their villages are called motlas, groups of four or five huts, built in mountain glens or forests. At the 1 90 1 census the numbers were returned at 4083.

See James W. Breeks, An Account of Primitive Tribes of the Nilgiris (1873) ; Dr John Shortt, Hill Ranges of Southern India, pt. i. 47-53 ; Rev. F. Metz, Tribes Inhabiting the Neilgherry Hills (Mangalore,

1864).

KURUNEGALA, the chief town in the north-western province of Ceylon. Pop. of the town, 6483; of the district, 249,429. It was the residence of the kings of Ceylon from a.d. 1319 to 1347, and is romantically situated under the shade of Adagalla (the rock of the Tusked Elephant), which is 600 ft. high. It was in 1902 the terminus of the Northern railway (59 m. from Colombo, which has since been extended 200 m. farther, to the northern- most coast of the Jaffna Peninsula. Kurunegala is the centre of rice, coco-nut, tea, coffee and cocoa cultivation.

KURUNTWAD, or Kurandvad, a native state of India, in the Deccan division of Bombay, forming part of the Southern Mahratta jagirs. Originally created in 1772 by a grant from the peshwa, the state was divided in 181 1 into two parts, one of which, called Shedbal, lapsed to the

British government in 1857. In 1855 Kuruntwad was further divided between a senior and a junior branch. The territory of both is widely scattered among other native states and British districts. Area of the senior branch, 185 sq. m.; pop. (1901), 42,474; revenue, £13,000. Area of junior branch, 114 sq. m.; pop. (1901), 34,003; revenue, £9000. The joint tribute is £640. The chiefs are Brahmans by caste, of the Patwardhan family. The town of Kuruntwad, in which both branches have their residence, is on the right bank of the Panchganga river near its junction with the Kistna. Pop. (1901),

10,451.

KURZ, HERMANN (1813-1873), German poet and novelist, was born at Reutlingen on the 30th of November 1813. Having Studied at the theological seminary at Maulbronn and at the university of Tubingen, he was for a time assistant pa.stor at Ehningen. He then entered upon a literary career, and in 1863 was appointed university librarian at Tubingen, where he died on the 10th of October 1873. Kurz is less known to fame by his poems, Gedichte (1836) and Dichtungen (1839), than by his historical novels, Schillers Heimatjahre (1843, 3 r d ed., 1899) and Der Sonnenwirt (1854, 2nd ed., 1862), and his excellent translations from English, Italian and Spanish. He also published a successful modern German version of Gottfried von Strassburg's Tristan und Isolde (1844). His collected works were published in ten volumes (Stuttgart, 1874), also in twelve volumes (Leipzig, 1904).

His daughter, Isolde Kurz, born on the 21st of December 1853 at Stuttgart, takes a high place among contemporary lyric poets in Germany with her Gedichte (Stuttgart, 1888, 3rd ed. 1898) and Neue Gedichte (1903). Her short stories, Florentiner Novellen (1890, 2nd ed. 1893), Phantasien und Mdrchen (1890), Italienische Erzdhlungen (1895) and Von Dazumal (1900) are distinguished by a fine sense of form and clear-cut style.

KUSAN ("lake " or " inland bay "), a small group of North American Indian tribes, formerly living on the Coos river and the coast of Oregon. They call themselves Anasitch, and other names given them- have been Ka-us or Kwo-Kwoos, Kowes and Cook'-koo-oose. They appear to be in no way related to their neighbours. The few survivors, mostly of mixed blood, are on the Siletz reservation, Oregon.

KUSHALGARH, a village in the Kohat district of the North- West Frontier province of India. It is only notable as the point at which the Indus is bridged to permit of the extension of the strategic frontier railway from Rawalpindi to the Miranzai and Kurram valleys.

KUSHK, a river of Afghanistan, which also gives its name to the chief town in the Afghan province of Badghis, and to a military post on the border of Russian Turkestan. The river Kushk,during a portion of its course, forms the boundary between Afghan and Russian territory; but the town is some 20 m. from the border. Kushk, or Kushkinski Post, is now a fourth-class Russian fortress, on a Russian branch railway from Merv, the

terminus of which is 1 2 m. to the south, at Chahil Dukteran. It is served by both the Transcaspian and the Orenburg-Tashkent railways. The terminus is only 66 m. from Herat, and in the event of war would become an important base for a Russian advance. Some confusion has arisen through the popular application of the name of Kushk to this terminus, though it is situated neither at the Russian post nor at the old town. (T. H. H.)*

KUSTANAISK, a town of Asiatic Russia, in the province of Turgai, on the Tobol river, 410 m. E.N.E. of Orenburg, in a very fertile part of the steppes. Pop. (1897), 14,065. The first build- ings were erected in 1871, and it has since grown with American- like rapidity. The immigrants from Russia built a large village, which became the centre of the district administration in 1884, and a town in 1893, under the name of Nicolaevsk, changed later into Kustanaisk. It is an educational centre, and a cathedral has been built. There are tanneries, tallow works, potteries, and a fair for cattle, while its trade makes it a rival to Orenburg and Troitsk.

KUSTENLAND (coast-land or littoral), a common name for the three crown-lands of Austria, Gorz and Gradisca, Istria and Trieste. Their combined area is 3084 sq. m., and their popula- tion in 1900 was 755,183. They are united for certain adminis- trative purposes under the governor of Trieste, the legal and financial authorities of which also exercise jurisdiction over the entire littoral.

KUTAIAH, Kutaya, or Kiutahia, the chief town of a sanjak in the vilayet of Brusa (Khudavendikiar), Asia Minor, is situated on the Pursaksu, an affluent of the Sakaria (anc. Sangarius) . The town lies at an important point of the great road across Asia Minor from Constantinople to Aleppo, and is connected by a branch line with the main line from Eski-shehr to Afium Kara- Hissar, of the Anatolian railway. It has a busy trade; pop. estimated at 22,000. Kutaiah has been identified with the ancient Cotiaeum.

See V. Cuinet, Turquie d'Asie, vol. iv. (Paris, 1894). KUTAIS, a

*government of Russian Transcaucasia, situated between the Caucasus range on the N. and the Black Sea on the W., the government of Tiflis' on the E. and the province of Kars on the S. Area, 14,313 sq. m. The government includes the districts of Guria, Mingrelia, Imeretia, Abkhasia and Svanetia, and consists of four distinct parts: (1) the lowlands, drained by the Rion, and continued N.W. along the shore of the Black Sea; (2) the southern slopes of the main Caucasus range; (3) the western slopes of the Suram mountains, which separate Kutais from Tiflis; and (4) the slopes of the Armenian highlands, as well as a portion of the highlands themselves, drained by the Chorokh and its tributary, the Ajaris-tskhali, which formerly constituted the Batum province. Generally speaking, the government is mountainous in the north and south. Many secondary ridges and spurs shoot off the main range, forming high, narrow valleys (see Caucasus). The district of Batum and Artvin in the S.W., which in 1903 were in part separated for administration as the semi-military district of Batum, are filled up by spurs of the Pontic range, 9000 to 11,240 ft. high, the Arzyan ridge separating them from the plateau of Kars. Deep gorges, through which tributaries of the Chorokh force their passage to the main river, intersect these highlands, forming most picturesque gorges. The lowlands occupy over 2400 sq. m. They are mostly barren in the littoral region, but extremely fertile higher up the Rion. **

The climate is very moist and warm. The winters are often without frost at all in the lowlands, while the lowest temperatures observed are 18° F. at Batum and 9° at Poti. The mountains condense the moisture brought by the west winds, and the yearly amount of rain varies from 50 to 120 in. The chief rivers are the Rion, which enters the Black Sea at Poti; the Chorokh, which enters the same sea at Batum; and the Ingur, the Kodor and the Bzyb, also flowing into the Black Sea in Abkhasia. The vegetation is extremely rich, its character suggesting the sub-tropic regions of Japan (see Caucasia). The population belongs almost entirely to the Kartvelian or Georgian group,

and is distributed as follows: Imeretians, 41-2%; Mingrelians and Lazes, 22-5 %; Gurians, 7ˆ3 ; Ajars, 5-8; Svane- tians, 1-3 ; of other nationalities there are 6 of Abkhasians, 2-6% of Turks, 2ˆ3 % of Armenians, besides Russians, Jews, Greeks, Persians, Kurds, Ossetes and Germans. By religion 87% of the population are Greek Orthodox and only 10% Mus- sulmans. The total population was 933,773 in 1897, ˚f whom 508,468 were women and 77,702 lived in towns. The estimated population in 1906 was 924,800. The land is excessively sub- divided, and, owing to excellent cultivation, fetches very high prices. The chief crops are maize, wheat, barley, beans, rye, hemp, potatoes and tobacco. Maize, wine and timber are largely exported. Some cotton-trees have been planted. The vine, olive, mulberry and all sorts of fruit trees are cultivated, as also many exotic

plants (eucalyptus, cork-oak, camellia, and even tea). Manganese ore is the chief mineral, and is extracted for export to the extent of 160,000 to 180,000 tons annually, besides coal, lead and silver ores, copper, naphtha, some gold, litho- graphic stone and marble. Factories are still in infancy, but silk is spun. A railway runs from the Caspian Sea, via Tiflis and the Suram tunnel, to Kutais, and thence to Poti and Batum, and from Kutais to the Tkvibuli coal and manganese mines. The export of both local produce and goods shipped by rail from other ports of Transcaucasia is considerable, Batum and Poti being the two chief ports of Caucasia. Kutais is divided into seven districts, of which the chief towns, with their popula- tions in 1897, are Kutais, capital of the province (q.v.); Lailashi (834) , chief]town of Lechgum, of which Svanetia makes a separate administrative unit; Ozurgeti (4694); Oni, chief town of Racha; Senaki (101); Kvirili, of Sharopan district; Zugdidi; and two semi-military districts — Batum (28,512) with Artvin (7000) and Sukhum-kaleh (7809). (P. A. K.— J.T. Be.)

KUTAIS, a town of Russian Caucasia, capital of the govern- ment of the same name, 60 m. by rail E. of Poti and 5 m. from the Rion station of the railway between Poti and Tiflis. Pop. (1897), 32,492. It is one of the oldest towns of Caucasia, having been the ancient capital (Aea or Kutaea) of Colchis, and later the capital of Imeretia (from 792); Procopius mentions it under the name of Kotatision. Persians, Mongols, Turks and Russians have again and again destroyed the town and its fortress. In 1810 it became Russian. It is situated on both banks of the Rion river, which is spanned by three bridges. Its most re- markable building is the ruined cathedral, erected in the nth century by the Bagratids, the ruling dynasty of Georgia, and destroyed by the Turks in 1692; it is the most important repre- sentative extant of Georgian architecture. The fort, mentioned by Procopius, is now a heap of ruins, destroyed by the Russians in 1770. The inhabitants make hats and silks, and trade in agricultural produce and wine. On the right bank of the Rion is a government model garden, with a model farm.

KUT-EL-AMARA, a small town in Turkish Asia, on the east bank of the Tigris (32° 29′ 19″ N., 44 45′ 37″ E.) at the point where the Shatt-el-Hai leaves that stream. It is a coaling station of the steamers plying between Basra and Bagdad, and an important Turkish post for the control of the lower Tigris.

KUTENAI (Kutonaga), a group of North-American Indian tribes forming the distinct stock of Kitunahan. Their former range was British Columbia, along the Kootenay lake and river. They were always friendly to the whites and noted for their honesty. In 1904 there were some 550 in British Columbia; and in 1908 there were 606 on the Flathead Agency, Montana.

KUTTALAM, or Courtaixum, a sanatorium of southern India, in the Tinnevelly district of Madras; pop. (1901), 1197. Though situated only 450 ft. above sea-level, it possesses the climate of a much higher elevation, owing to the breezes that reach it through a gap in the Ghats. It has long been a favourite resort for European visitors, the season lasting from July to September; and it has recently been made more accessible by the opening of the railway from Tinnevelly into Travancore. The scenery is most picturesque, including a famous waterfall.

KUTTENBERG (Czech, Kutnd Hora), a town of Bohemia, Austria, 45 m. E. by S. of Prague. Pop. (1900), 14,799, mostly

Czech. Amongst its buildings are the Gothic five-naved church of St Barbara, begun in 1368, the Gothic church of St Jacob (14th century) and the Late Gothic Trinity church (end of 1 5 th century) . The Walscher Hof-, formerly a royal residence and mint, was built at the end of the 13th century, and the Gothic Steinerne Haus, which since 1849 serves as town-hall, contains one of the richest archives in Bohemia. The industry includes sugar- refining, brewing, the manufacture of cotton and woollen stuffs, leather goods and agricultural implements.

The town of Kuttenberg owes its origin to the silver mines, the existence of which can be traced back to the first part of the 13th century. The city developed with great rapidity, and at the outbreak of the Hussite troubles, early in the 14th century, was next to Prague the most important in Bohemia, having become the favourite residence of several of the Bohemian kings. It was here that, on the 18th of January 1410, Wenceslaus IV. signed the famous decree of Kuttenberg, by which the Bohemian nation was given three votes in the elections to the faculty of Prague University as against one for the three other " nations." In the autumn of the same year Kuttenberg was the scene of horrible atrocities. The fierce mining population of the town was mainly German, and fanatically Catholic, in contrast with Prague, which was Czech and utraquist. By way of reprisals for the Hussite outrages in Prague, the miners of Kuttenberg seized on any Hussites they could find, and burned, beheaded or threw them alive into the shafts of disused mines. In this way 1600 people are said to have perished, including the magistrates and clergy of the town of Kaufim, which the Kuttenbergers had taken. In 1420 the emperor Sigismund made the city the base for his unsuccessful attack on the Taborites; Kuttenberg was taken by 2izka, and after a temporary reconciliation of the warring parties was burned by the imperial troops in 1422, to prevent its falling again into the

hands of the Taborites. 2izka none the less took the place, and under Bohemian auspices it awoke to a new period of prosperity. In 1541 the richest mine was hopelessly flooded; in the insurrection of Bohemia against Ferdinand I. the city lost all its privileges; repeated visitations of the plague and the horrors of the Thirty Years' War completed its ruin. Half-hearted attempts after the peace to repair the ruined mines failed; the town became impoverished, and in 1770 was devas- tated by fire. The mines were abandoned at the end of the 18th century; one mine was again opened by the government in 1874, but the work was discontinued in 1903.

KUTUSOV [Golenishchev-Ktjttjsov], MIKHAIL LARION- OVICH, Prince of Smolensk (1745-1813), Russian field marshal, was born on the 16th of September 1745 at St Petersburg, and entered the Russian army in 1759 or 1760. He saw active service in Poland, 1764-69, and against the Turks, 1770-74; lost an eye in action in the latter year; and after that travelled for some years in central and western Europe. In 1784 he became major-general, in 1787 governor-general of the Crimea; and under Suvorov, whose constant companion he became, he won consider- able distinction in the Turkish War of 1788-91, at the taking of Ochakov, Odessa, Benda and Ismail, and the battles of Rimnik and Mashin. He was now (1791) a lieutenant-general, and suc- cessively occupied the positions of ambassador at Constan- tinople, governor-general of Finland, commandant of the corps of cadets at St Petersburg, ambassador at Berlin, and governor- general of St Petersburg. In 1805 he commanded the Russian corps which opposed Napoleon's advance on Vienna (see Napoleonic Campaigns), and won the hard-fought action of Durrenstein on the i8th-i9th of November.

On the eve of Austerlitz (q.v.) he tried to prevent the Allied generals from fighting a battle, and when he was overruled took so little interest in the event that he fell asleep during the reading of the orders. He was, however, present at the battle itself, and was wounded. From 1806 to 181 1 Kutusov was governor-general of Lithuania and Kiev, and in 181 1, being then commander- in-chief in the war against the Turks, he was made a prince. Shortly after this he was called by the unanimous voice of the army and the people to command the army that was retreating before Napoleon's advance. He gave battle at Borodino (q-v.),

and was defeated, but not decisively, and after retreating to the south-west of Moscow, he forced Napoleon to begin the celebrated retreat. The old general's cautious pursuit evoked much criti- cism, but at any rate he allowed only a remnant of the Grand Army to regain Prussian soil. He was now field marshal and prince of Smolensk — this title having been given him for a victory over part of the French army at that place in November 181 2. Early in the following year he carried the war into Germany, took com- mand of the allied Russians and Prussians, and prepared to raise all

central Europe in arms against Napoleon's domination, but before the opening of the campaign he fell ill and died on the 25th of March 1813 at Bunzlau. Memorials have been erected to him at that place and at St Petersburg.

Mikhailovsky-Danilevski's life of Kutusov (St Petersburg, 1850) was translated into French by A. Fizelier (Paris, 1850).

KUWET (Kuweit, Koweit), a port in Arabia at the north- western angle of the Persian Gulf in 29 20′ N. and 48″ E., about 80 m. due S. of Basra and 60 m. S.W. of the mouth of the Shat el Arab. The name Kuwet is the diminutive form of Kut, a common term in Irak for a walled village; it is also shown in some maps as Grane or Grain, a corruption of Kuren, the dimi- nutive of Karn, a horn. It lies on the south side of a bay 20 m. long and 5 m. wide, the mouth of which is protected by two islands, forming a fine natural harbour, with good anchorage in from 4 to 9 fathoms of water. The town has 15,000 inhabitants and is clean and well built; the country around being practically desert, it depends entirely on the sea and its trade, and its sailors have a high reputation as the most skilful and trustworthy on the Persian Gulf; while its position as the nearest port to Upper Nejd gives it great importance as the port of entry for rice, piece goods, &c, and of export for horses, sheep, wool and other products of the interior. Kuwet was recommended in 1850 by General F. R. Chesney as the terminus of his proposed Euphrates Valley railway, and since 1898, when the extension of the Anatolian railway to Bagdad and the Gulf has been under discussion, attention has again been directed to it. An alternative site for the terminus has been suggested in Um Khasa, at the head of the Khor 'Abd- allah, where a branch of the Shat el Arab formerly entered the sea; it lies some 20 m. N.E. of Kuwet and separated from it by the island of Bubian, which has for some time been in Turkish occupa- tion. An attempt by Turkey to occupy Kuwet in 1898 was met by a formal protest from Great Britain against any infringement of the status quo, and in 1899 Sheikh Mubarak of Kuwet placed his interests under British protection.

The total trade passing through Kuwet in 1904-1905 was valued at £160,000. The imports include arms and ammunition, piece goods, rice, coffee, sugar, &c; and the exports, horses, pearls, dates, wool, &c. The steamers of the British India Steamship Company call fortnightly. (R. A. W.)

KUZNETSK, two towns of Russia. (1) A town in the govern- ment of Saratov, 74 m. by rail east of Penza. It has grown rapidly since the development of the railway system in the Volga basin. It has manufactures of agricultural machinery and hard- ware, in a number cf small factories and workshops, besides tanneries, rope-works, boot and shoe making in

houses, and there is considerable trade in sheepskins, grain, salt and wooden goods exported to the treeless regions of south-east Russia. Pop. (1897), 21,740. (2) A town in West Siberia, in the government of Tomsk, 150 m. E.N.E. of Barnaul, on the Upper Tom river, at the head of navigation. It has trade in grain, cattle, furs, cedarwood, nuts, wax, honey and tallow, and is the centre of a coal-mining district. Pop. (1897), 3141.

KVASS, or Kwass (a Russian word for " leaven "), one of the national alcoholic drinks of Russia, and popular also in eastern Europe. It is made, by a simultaneous acid and alcoholic fermentation, of wheat, rye, barley and buckwheat meal or of rye-bread, with the addition of sugar or fruit. It has been a universal drink in Russia since the 16th century. Though in the large towns it is made commercially, elsewhere it is frequently an article of domestic production. Kvass is of very low alcoholic content (0-7 to 2-2 %). There are, beside the ordinary kind, superior forms of the drink, such as apple or raspberry kvass.

KWAKIUTL, a tribe of North-American Indians of Wakashan stock. They number about 2000. Formerly the term was used of the one tribe in the north-east of Vancouver, but now it is the collective name for a group of Wakashan peoples. The Kwakiutl Indians are remarkable for their conservatism in all matters and specially their adherence to the custom of Potlatch, which it is sometimes suggested originated with them. Tribal government is in the hands of secret societies. There are three social ranks, hereditary chiefs, middle and third estates, most of the latter being slaves or their descendants. Entry to the societies is forbidden the latter, and can only be obtained by the former after torture and fasting. The hamatsa or cannibal society is only open to those who have been mem- bers of a lower society for eight years.

KWANGCHOW BAY • (Kwangchow Wan), a coaling station on the south coast of China, acquired, along with other con- cessions, by the French government in April 1898. It is situated on the east side of the peninsula of Lienchow, in the province of Kwangtung, and directly north of the island of Hainan. It is held on lease for 99 years on similar terms to those by which Kiaochow is held by Germany, Port Arthur by Japan and Wei-hai-wei by Great Britain. The cession includes the islands lying in the bay; these enclose a roadstead 18 m. long by 6 m. wide, with admirable natural defences and a depth at no part of less than 33 ft. The bay forms the estuary of the Ma-Ts'e river, navigable by the largest men-of- war for 12 m. from the coast. The limits of the concession inland were fixed in

November 1899. On the left bank of the Ma-Ts'e France gained from Kow Chow Fu a strip of territory 11 m. by 6 m., and on the right bank a strip 15 m. by 11 m. from Lei Chow Fu. The country is well populated; the capital and 'chief town is Lei Chow. The cession carries with it full territorial jurisdiction during the continuance of the lease. In January 1900 it was placed under the authority of the governor-general of Indo-China, who in the same month ap- pointed a civil administrator over the country, which was divided into three districts. The population of the territory is about 189,000. A mixed tribunal has been instituted, but the local organization is maintained for purposes of administration. In addition to the territory acquired, the right has been given to connect the bay by railway with the city and harbour of Ompon, situated on the west side of the peninsula, and in consequence of difficulties which were offered by the provincial government on the occasion of taking possession, and which compelled the French to have recourse to arms, the latter demanded and obtained exclusive mining rights in the three adjoining prefectures. Two lines of French steamships call at the bay. By reason of the great strategical importance of the bay, and the presence of large coal-beds in the near neighbourhood, much importance is attached by the French to the acquirement of Kwangchow Wan.

KWANG-SI, a southern province of China, bounded N. by Kwei-chow and Hu-nan, E. and S. by Kwang-tung, S.W. and W. by French Indo-Chino and Yun-nan. It covers an area of 80,000 sq. m. It is the least populous province of China, its inhabitants numbering (1908) little over 5,000,000. The Skias, an aboriginal race, form two-thirds of the population. The provincial capital is Kwei-lin Fu, or City of the Forest of Cinnamon Trees, and there are besides ten prefectural cities. The province is largely mountainous. The principal rivers are the Si-kiang and the Kwei-kiang, or Cinnamon River, which takes its rise in the district of Ffing-gan, in the north of the province, and in the neighbourhood of that of the Siang river, which flows northward through Hu-nan to the Tung- t'ing Lake. The Kwei-kiang, on the other hand, takes a southerly course, and passes the cities of Kwei-lin, Yang-so Hien, P'ing-le Fu, Chao-p'ing Hien, and so finds its way to Wu-chow Fu, where it joins the waters of the Si-kiang. Another considerable river is the Liu-kiang, or Willow River, which rises in the mountains inhabited by the Miao-tsze,in Kwei-chow. Leaving its source it takes a south-easterly direction, and enters Kwang-si, in the district of Hwai-yuen. After encircling the

city of that name, it flows south as far as Liu-ch'eng Hien, where it forms a junction with the Lung-kiang, or Dragon River. Adopting the trend of this last-named stream, which has its head-waters in Kwei-chow, the mingled flow passes eastward, and farther on in a south-easterly direction, by Lai-chow Fu, Wu-suan Hien, and Sin-chow Fu, where it receives the waters of

the Si-kiang, and thenceforth changes its name for that of its affluent. The treaty ports in Kwang-si are Wuchow Fu, Lung-chow and Nanning Fu.

KWANG-TUNG, a southern province of China, bounded N. by Hu-nan, Kiang-si and Fu-kien, S. and E. by the sea, and W. by Kwang-si. It contains an area, including the island of Hainan, of 75,500 sq. m., and is divided into nine prefectures; and the population is estimated at about 30,000,000. Its name, which signifies " east of Kwang," is derived, according to Chinese writers, from the fact of its being to the east of the old province of Hu-kwang, in the same way that Kwang-si derives its name from its position to the west of Hu-kwang. Kwang-tung extends for more than 600 m. from east to west, and for about 420 from north to south. It may be described as a hilly region, forming part as it does of the Nan Shan ranges. These mountains, speaking generally, trend in a north-east and south-westerly direction, and are divided by valleys of great fertility. The principal rivers of the province are the Si-kiang, the Pei-kiang, or North River, which rises in the mountains to the north of the province, and after a southerly course joins the Si-kiang at San-shui Hien; the Tung-kiang, or East River, which, after flowing in a south-westerly direction from its source in the north-east of the province, empties itself into the estuary which separates the city of Canton from the sea; and the Han River, which runs a north and south course across the eastern portion of the province, taking its rise in the mountains on the western frontier of Fu-kien and emptying itself into the China Sea in the neighbourhood of Swatow. Kwang-tung is one of the most productive provinces of the empire. Its mineral wealth is very considerable, and the soil of the valleys and plains is extremely fertile. The principal article of export is silk, which is produced in the district forming the river delta, extending from Canton to Macao and having its apex at San-shui Hien. Three large coal-fields exist in the province, namely, the Shao-chow Fu field in the north; the Hwa Hien field, distant about 30 m. from Canton; and the west coast field, in the south-west. The last is by far the largest of the three and extends over the districts of Wu-ch'uen, Tien-pai, Yang-kiang, Yang-ch'un, Gan-p'ing, K'ai-p'ing, Sin-hing, Ho-shan, Sin-hwang, and Sin-ning. The coal from the two first-named fields is of an inferior quality, but that in the west coast field is of a more valuable kind. Iron ore is found in about twenty different districts, notably in Ts'ing-yuen, Ts'ung-hwa, Lung-men, and – Lu-feng. None, however, is exported in its raw state, as all which is produced is manu- factured in the province, and principally at Fat-shan, which has been called the Birmingham of China. The Kwang-tung coast abounds with islands, the largest of which is Hainan, which forms part of the prefecture of K'iung-chow Fu. This island extends for about 100 m. from north to south and the same distance from east to west. The southern and eastern portions of Hainan are mountainous, but on the north there is a plain of some extent. Gold is found in the central part; and

sugar, coco-nuts, betel-nuts, birds' nests, and agar agar, or sea vegetable, are among the other products of the island. Canton, Swatow, K'iung-chow (in Hainan), Pakhoi, San-shui are among the treaty ports. Three ports in the province have been ceded • or leased to foreign powers — Macao to Portugal, Hong-Kong (with Kowloon) to Great Britain, and Kwangchow to. France. KWANZA (Coanza or Quanza), a river of West Africa, with a course of about 700 m. entirely within the Portuguese territory of Angola. The source lies in about 13 40′ S., 17 30′ E. on the Bihe plateau, at an altitude of over 5000 ft. It runs first N.E. and soon attains fairly large dimensions. Just north of 12° it is about 60 yds. wide and 13 to 16 ft. deep. From this point to 10° it flows N.W., receiving many tributaries,

especially the Luando from the east. In about io°, and at intervals during its westerly passage through the outer plateau escarpments, its course is broken by rapids, the river flowing in a well-defined valley flanked by higher ground. The lowest fall is that of Kambamba, or Livingstone, with a drop of 70 ft. Thence to the sea, a distance of some 160 m., it is navigable by small steamers, though very shallow in the dry season. The river enters the sea in o° 15′ S., 13 20′ E., 40 m. S. of Loanda. There is a shifting bar at its mouth, difficult to cross, but the river as a waterway has become of less importance since the fertile district in its middle basin has been served by the railway from Loanda to Ambaca (see Angola).

KWEI-CHOW, a south-western province of China, bounded N. by Sze-ch'uen, E. by Hu-nan, S. by Kwang-si, and W. by Yun-nan. It contains 67,000 sq. m., and has a population of about 8,000,000. Kwei-yang Fu is the provincial capital, and besides this there are eleven prefectural cities in the pro- vince. With the exception of plains in the neighbourhood of Kwei-yang Fu, Ta-ting Fu, and Tsun-i Fu, in the central and northern regions, the province may be described as mountain- ous. The mountain ranges in the south are largely inhabited by Miao-tsze, who are the original owners of the soil and have been constantly goaded into a state of rebellion by the oppression to which they have been subjected by the Chinese officials. To this disturbing cause was added another in 1861 by the spread of the Mahommedan rebellion in Yun-nan into some of the south-western districts of the province. The devastating effects of these civil wars were most disastrous to the trade and the prosperity of Kwei-chow. The climate is by nature unhealthy, the supply of running water being small, and that of stagnant water, from which arises a fatal malaria, being considerable. The agricultural products of the province are very limited, and its chief wealth lies in its minerals. Copper, silver, lead, and zinc are found in considerable

quantities, and as regards quicksilver, Kwei-chow is probably the richest country in the world. This has been from of old the chief product of the province, and the belt in which it occurs extends through the whole district from south-west to north-east. One of the principal mining districts is K'ai Chow, in the prefecture of Kwei-yang Fu, and this district has the advantage of being situated near Hwang-p'ing Chow, from which place the products can be conveniently and cheaply shipped to Hankow. Cinna- bar, realgar, orpiment and coal form the rest of the mineral products of Kwei-chow. Wild silk is another valuable article of export. It is chiefly manufactured in the prefecture of Tsun-i Fu.

*KYAUKPYU, a district in the Arakan division of Lower Burma, on the eastern coast of the Bay of Bengal. It consists of, first, a strip of mainland along the Bay of Bengal, extending from the An pass, across the main range, to the Ma-i River, and, secondly, the large islands of Ramree and Cheduba, with many others to the south, lying off the coast of Sandoway. The mainland in the north and east is highly mountainous and forest-clad, arid the lower portion is cut up into numerous islands by a network of tidal creeks. Between the mainland and Ramree lies a group of islands separated by deep, narrow, salt-water inlets, forming the north-eastern shore of Kyaukpyu harbour, which extends for nearly 30 m. along Ramree in a south-easterly direction, and has an average breadth of 3 m. The principal mountains are the Arakan Yomas, which send out spurs and sub-spurs almost to the sea-coast. The An pass, an important trade route, rises to a height of 4664 ft. above sea-level. The Dha-let and the An * rivers are navigable by large boats for 25 and 45 m. respec- tively. Above these distances they are mere mountain torrents. Large forests of valuable timber cover an area of about 650 sq. m. Kyaukpyu contains numerous " mud volcanoes," from which marsh gas is frequently discharged, with occasional issue of flame. The largest of these is situated in the centre of Cheduba island. Earth-oil wells exist in several places in the district. The oil when brought to the surface has the appearance of a whitish-blue water, which gives out brilliant straw-coloured rays, and emits a strong pungent odour. Limestone, iron and coal*

are also found. Area 4387 sq. m.; pop. (1901), 168,827, showing an increase in the decade of 2-3%.

The chief town, Kyaukpyu, had a population in 1901 of 3145. It has a municipal committee of twelve members, three ex officio and nine appointed by the local government, and there is a third- class district gaol. Kyaukpyu is a port under the Indian Ports Act (X. of 1889), and the steamers of the British India Naviga- tion Company call there once a week going and coming between Rangoon and Calcutta.

KYAUKSE, a district in the Meiktila division of Upper Burma, with an area of 1274 sq. m., and a population in 1901 of 141,253. It is also known as the Ko-kayaing, so called from the original nine canals of the district. It consists of a generally level strip running north and south at the foot of the Shan Hills, and of a hilly region rising up these hills to the east, and including the Yeyaman tract, which lies between 21° 30′ and 21 40′ N. and 96 15′ and 96 45′ E., with peaks rising to between 4500 and 5000 ft. This tract is rugged and scored by ravines, and is very sparsely inhabited. The Panlaung and Zawgyi rivers from the Shan States flow through the district and are utilized for the numerous irrigation canals. Notwithstanding this, much timber is floated down, and the Panlaung is navigable for small boats all the year round. Rain is very scarce, but the canals supply ample water for cultivation and all other purposes. They are said to have been dug by King Nawrahta in 1092. He is alleged to have completed the system of nine canals and weirs in three years' time. Others have been constructed since the annexation of Upper Burma. At that time many were in serious disrepair, but most of them have been greatly improved by the construction of proper regulators and sluices. Two-thirds of the population are dependent entirely on cultivation for their support, and this is mainly rice on irrigated land. In the Yeyaman tracf the chief crop is rice. The great majority of the population is pure Burmese, but in the hills there are a good many Danus, a cross between Shans and Burmese. The railway runs through the centre of the rice-producing area, and feeder roads open up the country as far as the Shan foot-hills. The greater part of the district consists of state land, the cultivators being tenants of government, but there is a certain amount of hereditary freehold. Kyaukse town is situated on the Zawgyi River and on the Rangoon-Mandalay railway line, and is well laid out in regular streets, covering an area of about a square mile. It has a popula- tion (1901) of 5420, mostly Burmese, with a colony of Indian traders. Above it are some bare rocky hillocks, picturesquely studded with pagodas.

KYD, THOMAS (1558-1594), one of the most important of the English Elizabethan dramatists who preceded Shakespeare. Kyd remained until the last decade of the 19th century in what appeared likely to be impenetrable obscurity. Even his name was forgotten until Thomas Hawkins about r773 discovered it in connexion with The Spanish Tragedy in Thomas Heywood's Apologiefor Actors. But by the industry of English and German scholars a great deal of light has since been thrown on his life and writings. He was the son of Francis Kyd, citizen and scri- vener of London, and was baptized in the church of St Mary Woolnoth, Lombard Street, on the 6th of November 1558. His mother, who survived her son, was named Agnes, or Anna. In October 1565 Kyd entered the newly founded Merchant Taylors' School, where Edmund Spenser and perhaps Thomas Lodge were at

different times his school-fellows. It is thought that Kyd did not proceed to either of the universities; he apparently followed, soon after leaving school, his father's business as a scrivener. But Nashe describes him as a " shifting companion that ran through every art and throve by none." He showed a fairly wide range of reading in Latin. The author on whom he draws most freely is Seneca, but there are many reminiscences, and occasion- ally mistranslations of other authors. Nashe contemptuously said that " English Seneca read by candlelight yeeldes many good sentences," no doubt exaggerating his indebtedness to Thomas Newton's translation. John Lyly had a more marked influence on his manner than any of his contemporaries. It is believed that he produced his famous play, The Spanish Tragedy, between 1 584

and 1389; the quarto in the British Museum (which is probably- earlier than the Gottingen and Ellesmere quartos, dated 1594 and 1599) is undated, and the play was licensed for the press in 1592. The full title runs, The Spanish Tragedie containing the Lamentable End of Don Horatio and Bel-imperia; with the Pitiful Death of Old Hieronimo, and the play is commonly referred to by Henslowe and other contemporaries as Hieronimo. This drama enjoyed all through the age of Elizabeth and even of James I. and Charles I. so unflagging a success that it has been styled the most popular of all old English plays. Certain expressions in Nashe's preface to the 1589 edition of Robert Greene's Menaphon may be said to have started a whole world of speculation with regard to Kyd's activity. Much of this is still very puzzling; nor is it really understood why Ben Jonson called him " sporting Kyd." In 1 592 there was added a sort of prologue to The Spanish- Tragedy, called The First Part of Jeronimo, or The Wanes of Portugal, not printed till 1605. Professor Boas concludes that Kyd had nothing to do with this melodramatic production, which gives a different version of the story and presents Jeronimo as little more than a buffoon. On the other hand, it becomes more and more certain that what German criticism calls the Ur- Ha mlct, the original draft of the tragedy of the prince of Denmark, was a lost work by Kyd, probably composed by him in 1587. This theory has been very elaborately worked out by Professor Sarrazin, and confirmed by Professor Boas; these scholars are doubtless right in holding that traces of Kyd's play survive in the first two acts of the 1603 first quarto of Hamlet, but they probably go too far in attributing much of the actual language of the last three acts to Kyd. Kyd's next work was in all prob- ability the tragedy of Soliman and Perscda, written perhaps in 1588 and licensed for the press in 1592, which, although anony- mous, is assigned to him on strong internal evidence by Mr Boas.

No copy of the first edition has come down to us; but it was re- printed, after Kyd's death, in 1599. In the summer or autumn of 1590 Kyd seems to have given up writing for the stage, and to have entered the service of an unnamed lord, who employed a troop of " players." Kyd was probably the private secretary of this nobleman, in whom Professor Boas sees Robert Radcliffe, afterwards fifth earl of Sussex. To the wife of the earl (Bridget Morison of Cassiobury) Kyd dedicated in the last year of his life his translation of Garnier's Cornelia (1594), to the dedication of which he attached his initials. Two prose works of the dramatist have survived, a treatise on domestic economy, The Householder's Philosophy, translated from the Italian of Tasso (1588); and a sensational account of The Most Wicked and Secret Murdering of John Breu

times and privy broken passions." He must have died late in 1594, and on the 30th of December of that year his parents re- nounced their administration of the goods of their deceased son, in a document of great importance discovered by Professor Schick. The importance of Kyd, as the pioneer in the wonderful move- ment of secular drama in England, gives great interest to his works, and we are now able at last to assert what many critics have long conjectured, that he takes in that movement the position of a leader and almost of an inventor. Regarded from this point of view, The Spanish Tragedy is a work of extraordinary value, since it is the earliest specimen of effective stage poetry existing in English literature. It had been preceded only by the pageant- poems of Peele and Lyly, in which all that constitutes in the modern sense theatrical technique and effective construction was entirely absent. These gifts, in which the whole power of the theatre as a place cf general entertainment was to consist, were supplied earliest among English playwrights to Kyd, and were first exercised by him, so far as we can see, in 1586. This, then, is a more or less definite starting date for Elizabethan drama, and of peculiar value to its historians. Curiously enough, The Spanish Tragedy, which was the earliest stage-play of the great period, was also the most popular, and held its own right through the careers of Shakespeare, Ben Jonson, and Fletcher. It was not any shortcoming in its harrowing and exciting plot, but the tameness of its archaic versification, which probably led in 1602 to its receiving " additions," which have been a great stumbling- block to the critics. It is known that Ben Jonson was paid for these additional scenes, but they are extremely unlike all other known writings of his, and several scholars have independently conjectured that John Webster wrote them. Of Kyd himself it seems needful to point out that neither the Germans nor even Professor Boas seems to realize how little definite merit his poetry has. He is important, not in himself, but as a pioneer. The influence of Kyd is marked on all the immediate predecessors of Shakespeare, and the bold way in which scenes of violent crime were treated on the Elizabethan stage

appears to be directly owing to the example of Kyd's innovating genius. His relation to Hamlet has already been noted, and Titus Andronicus presents and exaggerates so many of his characteristics that Mr Sidney Lee and others have supposed that tragedy to be a work of Kyd's touched up by Shakespeare. Professor Boas, however, brings cogent objections against this theory, founding them on what he considers the imitative inferiority of Titus Andronicus to The Spanish Tragedy. The German critics have pushed too far their attempt to find indications of Kyd's influence on later plays of Shakespeare. The extraordinary interest felt for Kyd in Germany is explained by the fact that The Spanish Tragedy was long the best known of all Elizabethan plays abroad. It was acted at Frankfort in 1601, and published soon afterwards at Nuremberg. It continued to be a stock piece in Germany until the beginning of the 18th century; it was equally popular in Holland, and potent in its effect upon Dutch dramatic literature.

Kyd's works were first collected and his life written by Professor F. S. Boas in 1901. Of modern editions of The Spanish Tragedy may be mentioned that by Professor J. M. Manly in Specimens of the Pre-Shakespearean Drama, vol. ii. (Boston, 1897), and by J. Schick in the Temple Dramatists (1898). See also Cornelia (ed. H. Gassner, 1894) ; C. Markscheffel, T. Kyd's Tragodien (1885) ; Gregor Sarrazin, Thomas Kyd und sein Kreis (1892) ; G. O. Fleischer, " Bemerkungen uber Thomas Kyd's Spanish Tragedy " (Jahresbericht der Drei-Kbnig- schule zu Dresden-Neustadt (1896); J. Schick, " T. Kyd's Spanish Tragedy" (Liierarhistorische Forschungen, vol. 19,-1901); and R. Koppel, in Prolss, Altengl. Theater (vol. i., 1904). (E. G.)

KYFFHAUSER, a double line of hills in Thuringia, Germany. The northern part looks steeply down upon the valley of the Goldene Aue, and is crowned by two ruined castles, Rothenburg (1440 ft.) on the west, and Kyffhausen (1542 ft.) on the east. The latter, built probably in the 10th century, was frequently the residence of the Hohenstaufen emperors, and was finally destroyed in the 16th century. The existing ruins are those of the Oberburg with its tower, and of the Unterburg with its chapel. The hill is surmounted by an imposing monument to the emperor William I., the equestrian statue of the emperor being 31 ft.

high and the height of the whole 210 ft. This was erected j in 1896. According to an old and popular legend, the emperor Frederick Barbarossa sits asleep beside a marble table in the interior of the mountain, surrounded by his knights, awaiting the destined day when he shall awaken and lead

the united peoples of Germany against her enemies, and so inaugurate an era of unexampled glory. But G. Vogt has advanced cogent reasons (see Hist. Zeitschrift, xxvi. 13ˆ187) for believing that the real hero of the legend is the other great Hohen- staufen emperor, Frederick II., not Frederick I. Around him gradually crystallized the hopes of the German peoples, and to him they looked for help in the hour of their sorest need. But this is not the only legend of a slumbering future deliverer which lives on in Germany. Similar hopes cling to the memory of Charlemagne, sleeping in a hill near Paderborn; to that of the Saxon hero Widukind, in a hill in Westphalia; to Siegfried, in the hill of Geroldseck; and to Henry I., in a hill near Goslar.

See Richter, Das deutsche Kyffhdusergebirge (Eisleben, 1876); Lemcke, Der deutsche Kaisertraum und der Kyffhduser (Magdeburg, 1887) ; and Führer dutch das Kyffhdusergebirge (Sangerhausen, I 891); Baltzer, Das Kyffhdusergebirge (Rudoistadt, 1882); A. Fulda, Die Kyffhduser sage (Sangerhausen, 1889) ; and Anemuller, Kyffhduser und Rothenburg (Detmold, 1892).

KYNASTON, EDWARD (c. 1640-1706), English actor, was born in London and first appeared in Rhodes's company, having been, like Betterton, a clerk in Rhodes's book-shop before he set up a company in the Cockpit in Drury Lane. Kynaston was probably the last and certainly the best of the male actors of female parts, for which his personal beauty admirably fitted him. His last female part was Evadne in The Maid's Tragedy in 1661 with Killigrew's company. In 1665 he was playing important male parts at Covent Garden. He joined Betterton at Lincoln's Inn Fields in 1695, after which he received less important roles, retiring in 1699. He died in 1706, and was buried on the 18th of January.

KYNETON, a town of Dalhousie county, Victoria, Australia, on the river Campaspe, 56 m. by rail N.N.W. of Melbourne. Pop. (1001), 3274. It is the centre of a prosperous agricul- tural and pastoral district. Important stock sales and an annual exhibition of stock are held. There are, moreover, some rich gold quartz reefs in the neighbourhood. Kyneton lies at an elevation of 16S7 ft., and the scenery of the district, which includes some beautiful waterfalls, attracts visitors in summer.

KYOSAI, SHO-FU (1831-1889), Japanese painter, was born at Koga in the province of Shimotsuke, Japan, in 1831. After working for a short time, as a boy, with Kuniyoshi, he received his artistic training in the studio of Kano Dohaku, but soon abandoned the formal traditions of his master for the greater freedom of the popular school. During the political ferment which produced and followed the revolution of 1867, Kydsai attained a considerable reputation as a caricaturist. He was three times arrested and imprisoned by the authorities of the shogunate. Soon after the assumption

of effective power by the mikado, a great congress of painters and men of letters was held, at which Kyosai was present. He again expressed his opinion of the new movement in a caricature, which had a great popular success, but also brought him into the hands of the police — this time of the opposite party. Kyosai must be considered the greatest successor of Hokusai (of whom, however, he was not a pupil), and as the first political caricaturist of Japan. His work — like his life — is somewhat wild and undisciplined,

and "occasionally smacks of the sakS cup." But if he did not possess Hokusai's dignity, power and reticence, he sub- stituted an exuberant fancy, which always lends interest to draughtsmanship of very great technical excellence. In addition to his caricatures, Kyosai painted a large number of pictures and sketches, often choosing subjects from the folk-lore of his country. A fine collection of these works is preserved in the British Museum; and there are also good examples in the National Art Library at South Kensington, and the Musee Guimet at Paris. Among his illustrated books may be mentioned Yehon Taka-kagami, Illustrations of Hawks (5 vols., 1870, &c); Kyosai Gwafu (1880); Kyosai Dongwa; Kyosai Raku-gwa; Kydsai Riaku-gwa; Kyosai Mangwa (1881); Kyosai Suigwa (1882); and Kydsai Gwaden (1887). The latter is illustrated by him under the name of Kawanabe Toyoku, and two of its four volumes are devoted to an account of his own art and life. He died in 1889.

See Guimet (E.) andRegamey (F.), Promenades japonaises (Paris, 1880) ; Anderson (W.), Catalogue of Japanese Painting in the British Museum (London, 1886); Mortimer Menpes, "A Personal View of Japanese Art: A Lesson from Kyosai," Magazine of Art (1888).

(E. F. S.)

KYRIE (in full kyrie eleison, or eleeson, Gr. nvpie eherjcov; cf. Ps. exxii. 3, Matt. xv. 22, &c, meaning " Lord, have mercy "), the words of petition used at the beginning of the Mass and in other offices of the Eastern and Roman Churches. In the Anglican Book of Common Prayer the Kyrie is introduced into the orders for Morning and Evening Prayer, and also, with an additional petition, as a response made by the congregation after the reading of each of the Ten Commandments at the opening of the Communion Service. These responses are usually sung, and the name Kyrie is thus also applied to their musical setting. In the Lutheran Church the Kyrie is still said or sung in the original Greek. " Kyrielle," a shortened form of Kyrie eleison, is applied to eight-syllabled four-line verses, the last line in each verse being repeated as a refrain.

KYRLE, JOHN (1637-1724), " the Man of Ross," English philanthropist,

was born in the parish of Dymock, Gloucester- shire, on the 22 nd of May 1637. His father was a barrister and M.P., and the family had lived at Ross, in Herefordshire, for many generations. He was educated at Balliol College, Oxford, and having succeeded to the property at Ross took up his abode there. In everything that concerned the welfare of the little town in which he lived he took a lively interest — in the education of the children, the distribution of alms, in improving and embellishing the town. He delighted in mediating between those who had quarrelled and in preventing lawsuits. He was generous to the poor and spent all he had in good works. He lived a great deal in the open air working with the labourers on his farm. He died on the 7th of November 1724, and was buried in the chancel of Ross Church. His memory is pre- served by the Kyrie Society, founded in 1877, to better the lot of working people, by laying out parks, encouraging house decoration, window gardening and flower growing. Ross was eulogized by Pope in the third Moral Epistle (1732), and by Coleridge in an early poem (1794).

KYSHTYM, a town of Russia, in the government of Perm, 56 m. by rail N.N.W. of Chelyabinsk, on a river of the same name which connects two lakes. Pop. (1897), I2,33r. The official name is Verkhne-Kyshtymskiy-Zavod, or Upper Kyshtym Works, to distinguish it from the Lower (Nizhne) Kyshtym Works, situated two miles lower down the same river.

PRINTED IN U.S.A.

VOL16_L-LORD_ADVOCATE

Britannica

THE

ENCYCLOPEDIA BRITANNICA

ELEVENTH EDITION

FIRST

edition, published in three

volumes, 1768 — 1771.

SECOND

, ,, ten ,

1777— 1784

THIRD

, „ eighteen ,

1788— 1797

FOURTH

, ,, twenty ,

, 1801 — 1810

FIFTH

, ,, twenty ,

1815—1817

SIXTH

1 >> twenty ,

, 1823 — 1824

SEVENTH

, ,, twenty-one ,

, 1830 — 1842

EIGHTH

, „ twenty-two ,

1853-1860

NINTH

, ,, twenty-five ,

1875-1889

TENTH

, ninth edition and eleven

supplementary volumes,

1902— 1903

ELEVENTH

, published in twenty-nine volum <

:s, 1910 — 1911

COPYRIGHT

in all countries subscribing to the

Bern Convention

by

THE CHANCELLOR, MASTERS AND SCHOLARS

of the UNIVERSITY OF CAMBRIDGE

All rights reserved

THE

ENCYCLOPEDIA BRITANNICA

A

DICTIONARY

OF

ARTS, SCIENCES, LITERATURE AND GENERAL

INFORMATION

ELEVENTH EDITION

VOLUME XVI

L to LORD ADVOCATE

New York

Encyclopaedia Britannica, Inc.

342 Madison Avenue

Copyright, in the United States of America, 191 1,

by

The Encyclopaedia Britannica Company.

A.

B.

Ch

A.

B.

R.

A.

C.

F.

A.

C.

S.

A.

D.

A.

Fi

A.

F.

P.

A.

Go

.*

A.

G.

D.

A.

H.

S.

A.

J.

G.

Lambert, Francis; Lambert, Nicholson.

INITIALS USED IN VOLUME XVI. TO IDENTIFY INDIVIDUAL

CONTRIBUTORS,! WITH THE HEADINGS OF THE

ARTICLES IN THIS VOLUME SO SIGNED.

A. B. Chatwood, B.Sc, A. M.Inst. C.E., M.Inst.Elec.E. j Lock.

Alfred Barton Rendle, M.A., D.Sc, F.R.S., F.L.S. f

Keeper, Department of Botany, British Museum. Author of Text Book on Classifi- -> Leaf. cation of Flowering Plants, &fc. I

Alexander Campbell Fraser, LL.D. J £ 0C j{ e j onn-

See the biographical article: Fraser, A. C. ‘ I ‘

Algernon Charles Swinburne. f » a _j or

See the biographical article: Swinburne, A. C. \ i«anaor.

Henry Austin Dobson, LL.D. Iin-kpr-iamivinn

Sec the biographical article: Dobson, Henry Austin. I L04 – Ker ˆmpson.

Pierre Marie Auguste Filon. J T „■,,„,..

See the biographical articie : FlLON, P. M. A. I ˆ aDlcne –

Albert Frederick Pollard, M.A., F.R.Hist.Soc.

Professor of English History in the University of London. FeUow of All Souls’ College, Oxford. Assistant editor of the Dictionary of National Biography, 1893- 1901. Lothian Prizeman, Oxford, 1892; Arnold Prizeman, 1898. Author of England under the Protector Somerset; Henry VIII.; Life of Thomas Cranmer; &c.

A. Gl. Arnold Glover, M.A., LL.B. (d. 1905) f

Trinity College, Cambridge; Joint-editor of Beaumont and Fletcher for the Cam- J, Layard. bridge University Press. [

Rev. Alexander Gordon, M.A. (Laurentius, Paul;

Lecturer in Church History in the University of Manchester. ˆ Libertines.

Arthur George Doughiy, C.M.G., M.A.,Litt.D., F.R. Hist.S., F.R.S. (Canada), f

Dominion Archivist of Canada. Member of the Geographical Board of Canada. J Tofontaine Author of The Cradle of New France; &c. Joint editor of Documents relating to the 1 Constitutional History of Canada. I

Rev. Archibald Henry Sayce, Litt.D., LL.D. ˆTo n rt; PO o

See the biographical article: Sayce, A. H. I ˆ aoalcea –

Rev. Alexander James Grieve, M.A., B.D. f

Professor of New Testament and Church History, Yorkshire United Independent J t ._. (• t. r , vl \ College, Bradford. Sometime Registrar of Madras University, and Member of ” L0 ° 0S Vw pan) ‘ Mysore Educational Service. l

A. J. L. Andrew Jackson Lamoureux. f

Librarian, College of Agriculture, Cornell University. Editor of the Rio News -j Lima {Peru). (Rio de Janeiro), 1879-1901. _

A. L. Andrew Lang. f . _. .

See the biographical article: Lang, Andrew. \ ˆ a uocne –

A. M. An. Adelaide Mary Anderson, M.A. r

H.M. Principal Lady Inspector of Factories, Home Office. Clerk to the Royal , T .

Commission on Labour, 1892-1894. _ Gamble Gold Medallist, Girton College, Cam- i Labour Legislation. bridge, 1893. Author of various articles on Industrial Life and Legislation, &c. \

A. M. C. Agnes Mary Clerke. / Lagrange; Laplace;

See the biographical article: Clerke, A. M. \ Leverrier.

A. N. Alfred Newton, F.R.S. f Lammergeyer; Lapwing;

See the biographical article: Newton, Alfred. [Lark; Linnet; Loom.

A. P. C. Arthur Philemon Coleman, MA., Ph.D., F.R.S. {

Professor of Geology in the University of Toronto. Geologist, Bureau of Mines, i Labrador (in part). Toronto, 1893-1910. Author of Reports of the Bureau of Mines of Ontario. [_

1 A complete list, showing all individual contributors, appears in the final volume.

A. P. Lo.

A. Se.*

A. SI. A. So. A. S. C.

A. St H. G.

A. S. M. A. S. W.

A. T. T. A. W. H.* A. W. Hu.

A. W. R.

A. W. W.

B. D. J.

c.

c.

c.

W.

c.

Di

c.

D.

W.

c.

E.

-

c.

F.

A.

C. F.-Br.

C. H.* C. H. Ha.

C. J. B.* C. L. K.

CM.

INITIALS AND HEADINGS OF ARTICLES

Albert Peter Low. f

Deputy Minister of Department of Mines, Canada. Member of Geological Survey < Labrador (in part). of Canada. Author of Report on the Exploration in the Labrador Peninsula ; &c. I

Adah Sedgwick, M.A., F.R.S. f

Professor of Zoology at the Imperial College of Science and Technology, London. J T arva i i? nrm c Fellow, and formerly Tutor, of Trinity College, Cambridge. Professor of Zoology 1 ""V** *Orms. in the University of Cambridge, 1907-1909. I

Arthur Shadwell, M.A., M.D., LL.D., F.R.C.P. f

Member of Council of Epidemiological Society. Author of The London Water- \ Liquor Laws.

Supply; Industrial Efficiency; Drink, Temperance and Legislation. I

Albrecht Socin, Ph.D. (1844-1890). j"

Formerly Professor of Semitic Philology in the Universities of Leipzig and Tubingen. "1

Author of Arabische Crammatik; &e. I

Alan Summerly Cole, C.B. f

Assistant Secretary for Art, Board of Education, 1900-1908. Author of Ancient. Needle Point and Pillow Lace; Embroidery and Lace; Ornament in European Silks;

&c.

Alfred St Hill Gibbons.

Major, East Yorkshire Regiment. Explorer in South Central Africa. Author of ‘

Africa from South to North through Marotseland.

Alexander Stuart Murray, LL.D.

See the biographical article: Murray, Alexander Stuart.

Augustus Samuel Wilkins, M.A., LL.D., Litt.D. (1843-1905). f

Professor of Latin, Owens College, Manchester, 1869-1905. Author of Roman J Latin Language (in part).

Lebanon (in part).

Lace.

Lewanika.

Lamp.

Literature; &.c.

A. T. Thomson.

Official in Life Saving Service, U.S.A.

Arthur William Holland.

Formerly Scholar of St John’s College, Oxford. Bacon Scholar of Gray’s Inn, 1900.

Rev. Arthur Wollaston-Hutton, M.A.

Rector of Bow Church, Cheapside. Librarian National Liberal Club, 1889-1899. – Author of Life of Cardinal Newman; Life of Cardinal Manning; &c.

Alexander Wood Renton, M.A., LL.B.

Puisne Judge of the Supreme Court of Ceylon. Editor of Encyclopaedia of the Laws ~

of England.

Adoi.piiis William Ward, Litt.D., LL.D.

See the biographical article: Ward, Adolphus William.

Benjamin Daydon Jackson, Ph.D.

General Secretary of the Linnean Society. Secretary to Departmental Committee of II. M. Treasury on Botanical Work, 1900-1901. Author of Glossary of Botanic' Terms ; &c.

The Rt. Hon. the Earl of Crewe.

See the biographical article: Crewe, ist Earl of.

Charles Crawford Whine ry, A.M.

Cornell University. Assistant editor nth Edition of the Encyclopaedia Britanmca

Charles Dibdin, F.R.G.S.

Secretary of the Royal National Life-boat Institution. Hon. Secretary of the Civil Service Life-boat Fund, 1870-1906.

Hon. Carroll Davidson Wright.

See the biographical article: Wright, Hon. Carroll Davidson.

Charles F.veritt, M.A., F.C.S., F.G.S., F.R.A.S. Formerly Scholar of Magdalen College, Oxford.

Charles Francis Atkinson.

Formerly Scholar of Queen's College, Oxford. Captain, 1st City of London (Royal Fusiliers). Author of The Wilderness and Cold Harbour.

Charles Fortescue-Brickdale.

Barrister-at-Law, Lincoln's Inn. Registrar of the Office of the Land Registry, Lincoln's Inn Fields. Author of Registration of Title to Land; The Practice of the Land Registry; Land Transfer in Various Countries; &c.

Sir Charles Holroyd.

See the biographical article: Holroyd, Sir Charles.

Carlton Huntley Hayes, A.M., Ph.D.

Assistant Professor of History in Columbia University, New York City. Member of the American Historical Association.

Rev. Charles James Ball, M.A.

University Lecturer in !\ssyriology, Oxford. Author of Light from the East.

Charles Lethbridce Kingsford, M.A., F.R.Hist.S., F.S.A.

Assistant Secretary, Hoard of Education. Author of Life of Henry V. Editor of Chronicles of London and Stow's Survey of London.

Carl Theodor Mirbt, D.Tii.

Professor of Church History in the University of Marburg. Author of Publizistik im Zeitalter Cregor VII.; Quellen zur Geschichte des Papstlhums; &c.

Life-boat: United States.

[Leopold I. (Roman Emperor); \ Levellers.

\ Leo XIII.

f Landlord and Tenant; Letters Patent; Lodger and Lodgings.

Lodge, Thomas.

Linnaeus.

i

Laprade.

J La Salle;

\ Lincoln, Abraham (in part).

Life-boat: British.

Labour Legislation: United States.

Light: Introduction and History.

Long Island (Battle).

Land Registration.

Lamentations,

Lancaster, John of Gaunt, duke of.

Lateran Councils.

INITIALS AND HEADINGS OF ARTICLES

vn

C. Mo. C R. B.

DeB.

D. F. T.

D. G. H.

D. H. D. LI. T. D. Mn.

D. M. W.

E. B.*

E. C. B.

E. Da.

E. D. J.

W

E.G.

E. Ga.

E. He.

E. J. D.

E. 0.*

E. Pr.

E. R. L

4 Leighton, Lord.

Leif Ericsson; Leo, Johannes.

Lesseps, Ferdinand de.

Lasso, Orlando.

William Cosmo Monkhotjse.

See the biographical article: Monkhouse, W. C.

Charles Raymond Beazley, M.A., D.Litt., F.R.G.S., F.R.Hist.S.

Professor of Modern History in the University of Birmingham. Formerly Fellow of Merton College, Oxford, and University Lecturer in the History of Geography. Lothian Prizeman, Oxford, 1889. Lowell Lecturer, Boston, 1908. Author of Henry the Navigator; The Dawn of Modern Geography; &c.

Henri G. S. A. de Blowitz.

See the biographical article: Blowitz, H. de.

Donald Francis Tovey.

Author of Essays in Musical Analysis: comprising The Classical Concerto, The Goldberg Variations, and analysis of many other classical works. ˆ

David George Hogarth, M.A.

Keeper of the Ashmolean Museum, Oxford. Fellow of Magdalen College, Oxford. Latakia;

Fellow of the British Academy. Excavated at Paphos, 1888; Naucratis, 1899 and ■! Lebanon (* n bart)

1903; Ephesus, 1904-1905; Assiut, 1906-1907; Director, British School at

Athens, 1897-1900; Director, Cretan Exploration Fund, 1899. David Hannay. f La Hogue, Battle of;

Formerly British Vice-Consul at Barcelona. Author of Short History of the Royal 1 Lauria, Roger de;

Navy ; Life of Emilio Castelar ; &c. 1 Lepanto, Battle of; Lissa.

Daniel Lleufer Thomas. f

Barrister-at-Law, Lincoln's Inn. Stipendiary Magistrate at Pontypridd and -j Llantwit Major.

Rhondda. (_

Rev. Dugald Macfadyen, M".A. f

Minister of South Grove Congregational Church, Highgate. Author of Constructive J. Leighton, Robert (in pari). Congregational Ideals ; &c. l_

Sir Donald Mackenzie Wallace, K.C.I.E., K.C.V.O.

Extra Groom of the Bedchamber to H.M. King George V. Director of the Foreign Department of The Times, 1891-1899. Member of the Institut de Droit Inter-, national and Ofncier de l'lnstruction Publique (France). Joint-editor of New Volumes (10th ed.) of the Encyclopaedia Britannica. Author of Russia; Egypt and the Egyptian Question ; The Web of Empire ; &c.

Ernest Charles Francois Babelon.

Professor at the College de France. Keeper of the department of Medals and Antiquities at the Bibliotheque Nationale. Member of the Academie des Inscrip- . tions et de Belles Lettres, Paris. Chevalier of the Legion of Honour. Author of Descriptions Historiques des Monnaies de la Republique Romaine; Traites des Monnaies Grecques et Romaines ; Catalogue des Camees de la Bibliotheque Nationale.

Edward Cuthbert Butler, O.S.B., M.A., D.Litt. (Dublin). ["

Abbot of Downside Abbey, Bath. Author of " The Lausiac History of Palladius," < Leo, Brother. in Cambridge Texts and Studies, vol. vi. [

Edward George Dannreuther (i 844-1 905). f

Member of Board of Professors, Royal College of Music, 1895-1905. Conducted J x -. ± the first Wagner Concerts in London, 1873-1874., Author of The Music of the] ■ L,lszl " Future; &c. Editor of a critical edition of Liszt's Etudes. t

Edward D. J. Wilson.

Formerly Leader-writer on The Times.

Edmund Gosse, LL.D., D.C.L.

Lobanov-Rostovski.

Leptis.

Londonderry, 2nd Marquess of.

\ Lampoon; Lie, Jonas L. E.

Author of Manual of

1

Lighting: Electric (Commercial Aspects).

See the biographical article : Gosse, Edmund.

Emile Garcke, M.Inst.E.E.

Managing Director of British Electric Traction Co., Ltd. Electrical Undertakings; &c.

Edward Heawood, M.A. r

Gonville and Caius College, Cambridge. Librarian of the Royal Geographical J. Livingstone Mountains. Society, London. [

Edward Joseph Dent, M.A., Mus.Bac. r

Formerly Fellow of King's College, Cambridge. Author of A. Scarlatti: his Life -I Leo, Leonardo. and Works. [

Edmund Owen, M.B., F.R.C.S., LL.D., D.Sc.

Consulting Surgeon to St Mary's Hospital, London, and to the Children's Hospital Great Ormond Street, London. Chevalier of the Legion of Honour. Late Examiner – in Surgery at the Universities of Cambridge, London and Durham. Author of A Manual of A natomy for Senior Students.

Edgar Prestage.

Special Lecturer in Portuguese Literature in the University of Manchester. Examiner in Portuguese in the Universities of London, Manchester, &c. Com- . mendador, Portuguese Order of S. Thiago. Corresponding Member of Lisbon Royal Academy of Sciences, Lisbon

Geographical Society, &c. Author of Letters of a Portugtiese Nun ; A zurara's Chronicle of Guinea ; &c.

Sir Edwin Ray Lankester, K.C.B., F.R.S., D.Sc.

Hon. Fellow of Exeter College, Oxford. Director of the Natural History Depart- ments of the British Museum, 1898-1907. President of the British Association, 1906. Professor of Zoology and Comparative Anatomy in University College, London, 1874-1890. Linacre Professor of Comparative Anatomy at Oxford, 1891-1898. Vice-President of the Royal Society, 1896. Romanes Lecturer at Oxford, 1905. Author of Degeneration; The Advancement of Science; The King- dom of Man ; &c.

Liver: Surgery of Liver and Gall Bladder.

Lobo, F. R.; Lopes, FernSo.

Lamellibranchia (in part).

Mil

E. V. L.

F. E. B.

F. E. W.

F. G. M. B. F. G. P.

F. J. H.

F. L*

F. V. B. F. v. H.

F. Wa.

F. W. R.*

F. W. Ra.

G. A. Gr.

G. E.

G. F. B. G. F. K.

G. H. C.

INITIALS AND HEADINGS OF ARTICLES

G.

Sa

G.

S.

L.

G.

W

T.

H.

A.

L.

H.

B.

W.*

H

B.

Wo

Edward Verrall Lucas.

Editor of Works of Charles Lamb.

Author of Life of Charles Lamb.

■j Lamb, Charles.

Frank Evers Beddard, M.A., F.R.S.

Prosector of Zoological Society, London. Formerly Lecturer in Biology at Guy's . Hospital, London. Naturalist to " Challenger " Expedition Commission, 1882— 1884. Author of Monograph of the Oligochaeta; Animal Colouration; &c.

Rev. Frederick Edward Warren, M.A., B.D., F.S.A.

Rector of Bardwell, Bury St Edmunds. Fellow of St John's College, Oxford, 1865-1882. Author of The Old Catholic Ritual done into English and compared with ' the Corresponding Offices in the Roman and Old German Manuals; The Liturgy and Ritual of the Celtic Church ; &c.

Frederick George Meeson Beck, M.A.

Fellow and Lecturer in Classics, Clare College, Cambridge.

Frederick Gymer Parsons, F.R.C.S., F.Z.S., F.R.Anthrop.Inst.

Vice-President, Anatomical Society of Great Britain and Ireland. Lecturer on Anatomy at St Thomas's Hospital and the London School of Medicine for Women. Formerly Munterian Professor at the Royal College of Surgeons.

Francis John Havereield, M.A., LL.D., F.S.A.

Camden Professor of Ancient History in the University of Oxford. Fellow of Brasenose College. Ford's Lecturer, 1906-1907. Fellow of the British Academy. Author of Monographs on Roman History, especially Roman Britain; &c.

Sir Franklin Lushington, M.A.

Formerly Chief Police Magistrate for London.

Author of Wagers of Battle.

Leeeh.

Lection, Lectionary;

Lector;

Litany;

Liturgy.

-j Lombards (in part). ■I Liver: Anatomy.

Legion (in part) ; Limes Germanicus.

Lear, Edward.

F. Vincent Brooks.

Lithography.

Author j Loisy.

r

Scotland of '-j Law, John.

LL.D. (1842-1906). ,

1 898-1906. Joint-author of The New Practice; &c. \ lilen

J Labradorite; I Lapis Lazuli.

Baron Friedrich von Htjgf.l.

Member of Cambridge Philological Society; Member of Hellenic Society of 7″ he Mystical Element of Religion.

Francis Watt, M.A.

Barrister-at-Law, Middle Temple. Author of Law's Lumber Room; to-day; &c.

Frederick William Rudler, I.S.O., F.G.S.

Curator and Librarian of the Museum of Practical Geology, London, 1879-1902 President of the Geologists' Association, 1 887-1 889.

Francis William Raikes, K.C., Judge of County Courts, Hull

George Abraham Grierson. CLE., Ph.D., D.Litt. (Dubl.).

Member of the Indian Civil Service, 1873-1903. In charge of Linguistic Survey of

India, 1898-1902. Gold Medallist, Royal Asiatic Society, 1909. Vice-President of -' Lahnda.

the Royal Asiatic Society. Formerly Fellow of Calcutta University.

Author of

The Languages of India; &c.

Rev. George Edmcndson. M.A., F.R.Hist.S.

Formerly Fellow and Tutor of Brasenose College, Oxford. Ford's Lecturer, 1909- 19 10. Employed by British Government in preparation of the British Case in the' British Guiana- Venezuelan and British Guiana-Brazilian boundary arbitrations. ˆ

George Frederick Barwick. r

Assistant-Keeper of Printed Books and Superintendent of Reading-room, British -j Lavigerie.

Museum. [

George Frederick Kunz, A.M., Ph.D., D.Sc.

Gem Expert to Messrs Tiffany & Co., New York. Hon. Curator of Precious Stones, American Museum of Natural History, New York. Fellow of Geological Society of America. Author of Precious Stones of North America; &c. Senior Editor of Book of the Pearl.

George Herbert Carpenter, B.Sc. f

Professor of Zoology in the Royal College of Science, Dublin. Author of Insects: \ Lepidoptera.

Limburg.

Lapidary and Gem-cutting.

Their Structure and Life.

I

La Bruyere; La Fontaine;

Lamartine;

La Rochefoucauld; Le Sage.

Author of Charles J Linton, William James.

Labid.

George Saintsbury, D.C.L.. LL.D.

See the biographical article: Saintsbury, George E. B.

George Somes Layard.

Trinity College, Cambridge. Barrister-at-Law, Inner Temple

Kecne ; Shirley Brooks ; &c.

Rev. Grifeithes Wheeler Thatcher, M.A., B.D.

Warden of Camden College, Sydney, N.S.W. Formerly Tutor in Hebrew and Old Testament History at Mansfield College, Oxford.

Hendrik Antoon Lorentz. r

Professor of Physics in the University of Leiden. Author of La theorie electro- -j Light: Nature of. magnetique de Maxwell et son application aux corps mouvants. [_

Henry Benjamin .Wiif.atlf.y, F.S.A. f

Assistant Secretary, Royal Society of Arts, 1879-1909. President of the Samuel j London Pepys Club, 1903-19 10. Vice-President of the Bibliographical Society, 1908-1910. 1

Author of The Story of Loudon; London Past and Present; &c. [

Horace Bolingbroke Woodward, F.R.S. , F.G.S. (“Logan, Sir William E.;

Formerly Assistant Director of the Geological Survey of England and Wales, i Lonsdale William.

History.

President Geologists’ Association, 1893-1894. Wollaston Medallist, 1908.

INITIALS AND HEADINGS OF ARTICLES

IX

H. Ch.

H.

De.

H.

F. G.

H.

F. P.

H.

H.J.

H.

M.S.

H.

R. T.

H.

St.

H.

T. A.

U

W. B.*

H

W. C. D

H

Y.

I.

A.

J. An.

J. A. F.

J. A. F. M.

J. A. H.

J.

Dr

J.

D.

B.

J.

D.

Br

J.

F.

-K.

J. F. St.

J. Ga. J. G. F.

nh edition oH Lloyd George, D.

f Lawrence, St; \ Linus.

r

Lizard.

Livy (in part).

Liberia.

Hugh Chisholm, M.A.

Formerly Scholar of Corpus Christi College, Oxford. Editor of the the Encyclopaedia Britannica; Co-editor of the loth edition.

Rev. Hippolyte Delehaye, S.J.

Bollandist. Joint-author of the A eta Sanctorum. .

Hans Friedrich Gadow, M.A., F.R.S., Ph.D.

Strickland Curator and Lecturer on Zoology in the University of Cambridge. Author of Amphibia and Reptiles (Cambridge Natural History).

Henry Francis Pei.ham, LL.D.

See the biographical article: Peliiam, H. F.

Sir Henry Hamilton Johnston. K.C.B., G.C.M.G.

See the biographical article : Johnston, Sir Henry Hamilton.

Henry Morse Stephens, M.A., Litt.D.

Professor of History and Director of University Extension, University of California. Author of History of the French Revolution ; Revolutionary Europe ; &c.

Henry Richard Tedder, F.S.A.

Secretary and Librarian of the Athenaeum Club, London.

Henry Stukt, M.A.

Author of Idola Theatri; The Idea of a Free Church; and Personal Idealism.

Rev. Herbert Thomas Andrews.

Professor of New Testament Exegesis, New College, London. Author of the ” Commentary on Acts,” in the Westminster New Testament; Handbook on the Apocryphal Books in the ” Century Bible.”

Herbert- William Blunt, M.A.

Student, Tutor, and Librarian, Christ Church, Oxford. Formerly Fellow of All Souls’ College.

Henry William Carless Davis, M.A.

Fellow and Tutor of Balliol College, Oxford. Fellow of All Souls’ College, Oxford,

1895— 1902. Author of Charlemagne; England under the Normans and Angevins;

&c. Sir Henry Yule, K.C.S.I.

See the biographical article: Yule, Sir Henry.

Israel Abrahams.

Reader in Talmudic and Rabbinic Literature Formerly President, Jewish Historical Society History of Jewish Literature; Jewish Life in the Middle Ages; Judaism; &c.

Joseph Anderson, LL.D. f

Keeper of the National Museum of Antiquities, Edinburgh. Assistant Secretary to J Lake Dwellings the Society of Antiquaries of Scotland, and Rhind Lecturer, 1879-1882 and 1892.] Editor of Drummond's Ancient Scottish Weapons; &c. L

John Ambrose Fleming, M.A., J3.Sc., F.R.S.

Pender Professor of Electrical Engineering in the University of London. Fellow of University College, London. Formerly Fellow of St John's College, Cambridge. Vice-President of the Institution of Electrical Engineers. Author of The Principles of Electric Wave Telegraphy ; Magnets and Electric Currents ;

John Alexander Fuller Maitland, M.A., F.S.A.

Musical critic of The Times. Author of Life of Schumann; The Musician's Pil- grimage; Masters of German Music; English Music in the Nineteenth Century; The Age of Bach and Handel. Editor of Grove's Dictionary of Music and Musicians ; &c.

John Allen Howe, B.Sc.

Curator and Librarian of the Museum of Practical Geology, London. Author of The Geology of Building Stones ; &c.

in the University of Cambridge. _ of England. Author of A Short

. -j Littre.

- 1 , Libraries (in part).

j Lange, Friedrich Albert.

f Logia.

Logic: History.

Lanfranc; Laagton, Stephen.

Lhasa (in part).

Lazarus, Emma; Leon, Moses; , Leon of Modena.

Leyden Jar; Lighting: Electric.

Lind, Jenny.

J Lias;

1 Llandovery Group.

\ Liquid Gases.

Larissa.

Sir James Dewar, F.R.S., LL.D.

See the biographical article: Dewar, Sir J.

James David Bourchier, M.A., F.R.G.S.

King's College, Cambridge. Correspondent of The Times in South-Eastern Europe. Commander of the Orders of Prince Danilo of Montenegro and of the Saviour of Greece, and Officer of the Order of St Alexander of Bulgaria.

James Duff Brown. f

Borough Librarian, Islington Public Libraries. Vice-President of the Library » Libraries (in part). Association. Author of Guide to Librarianship; &c. L

James Fitzmaurice-Kelly, Litt.D., F.R.Hist.S.

Gilmour Professor of Spanish Language and Literature, Liverpool University. Norman McColl Lecturer, Cambridge University. Fellow of the British Academy. Member of the Royal Spanish Academy. Knight Commander of the Order of Alphonso XII. Author of A History of Spanish Literature; &c.

John Frederick Stenning, M.A. f

Dean and Fellow of Wadham College, Oxford. University Lecturer in Aramaic, •! Leviticus. Lecturer in Divinity and Hebrew at Wadham College. L

f Lancaster, House of;

\ Leicester, Robert Dudley, earl

[of.

La Cueva;

Larra;

Literature.

James Gairdner, C.B., LL.D.

See the biographical article: Gairdner, James.

Sir Joshua Girling Fitch, LL.D.

See the biographical article: Fitch, Sir J. G.

J Lancaster, Joseph.

X

INITIALS AND HEADINGS OF ARTICLES

J.

K.

I.

J.

Le

J.

L.

M.

J.

L.

W.

J.

Mu.

J.

M.

C.

J.

M

G.

J.Q.N. John George Nicolay (1832-1901). f

Marshal of the U.S. Supreme Court, 1872-1887. Joint-author of Abraham Lincoln: 1 Lincoln, Abraham (in part).

&«. I

J. G. P.* James Gordon Parker, D.Sc ; , F.C.S. _ f

Principal of Leathersellers Technical College, London. Gold Medallist, Society ■< Leather of Arts. Author of Leather for Libraries; Principles of Tanning; &c.

J. G. R. John George Robertson, M.A., Ph.D.

Professor of German Language and Literature, University of London. Editor of the

Modem Language Journal. Author of History of German Literature ; Schiller after

a Century; &c. J. Ha. Justus Hashacen, Ph.D. r Lang, Karl Heinrieh;

Privat-dozent in Medieval and Modern History, University of Bonn. Author of-! Ledochowski;

Das Rhcinland unter der franzbsische Herrschaft. (_ Leo, Heinrieh.

J. H. F. John Henry Freese M.A f Leo VL (Emperor of the East).

formerly fellow of St John s College, Cambridge. (_

J. HI. R. John Holland Rose, M.A., Litt.D. _ f

Lecturer on Modern History to the Cambridge University Local Lectures Syndicate. J Las Casas. Author of Life of Napoleon I. ; Napoleonic Studies; The Development of the European | Nations ; The Life of Pitt ; &c. I

J. J. L.* Rev. John James Lias, M.A. f

Chancellor of Llandaff Cathedral. Formerly Hulsean Lecturer in Divinity and -i Langen. Lady Margaret Preacher, University of Cambridge. I

John Kells Ingram, LL.D. Jipciip Thnmjw F fi

See the biographical article: Ingram, J. K. | Leslie, Thomas E. C.

Rev. James Legge, M.A. j L ao-Tsze

See the biographical article: Legge, James. \ ”

John Linton Myres, M.A., F.S.A., F.R.G.S. f

Wykeham Professor of Ancient History in the University of Oxford. Formerly j Leleges; Gladstone Professor of Greek and Lecturer in Ancient Geography, University of 1 Locri (Greece). Liverpool. Lecturer in Classical Archaeology in University of Oxford.

Jessie Laidlay Weston. f r an „ p i ot

Author of Arthurian Romances unrepresented in Malory. 1 lianceioi.

Sir John Murray, K.C.B., F.R.S. /Lake

See the biographical article: Murray, Sir John. \

Rev. James M. Crombie. f T . , ,. v

Author of Braemar: its Topography and Natural History; Lichenes Britannici. |_ Licnens (in part).

John Miller Gray (1850-1804). r

Art Critic and Curator of the Scottish National Portrait Gallery, 1884-1894. Author J Leech, John.

of David Scott, R.S.A.; James and William Tassie. [_

J. P. E. Jean Paul Hippolyte Emmanuel Adhemar Esmein. r

Professor of Law in the University of Paris. Officer of the Legion of Honour. J LettreS de Cachet.

Member of the Institute of France. Author of Cours elementaire d'histoire du droit 1 francais; &c. t

J. P. P. John Percival Postgate, M.A., Litt.D. f

Professor of Latin in the University of Liverpool. Fellow of Trinity College, J Latin Literature (in part).

Cambridge. Fellow of the British Academy. Editor of the Classical Quarterly. 1 Editor-in-chief of the Corpus Poetarum Latinorum; &c. I

J. P. Pe. Rev. John Punnett Peters, Ph.D., D.D.

Canon Residentiary, P. E. Cathedral of New York. Formerly Professor of Hebrew in Lagash; the University of Pennsylvania. Director of the University Expedition to Baby- ■< [Larsa. Ionia, 1888-1895. Author of Nippur, or Explorations and Adventures on the Euphrates ; Scriptures, Hebrew and Christian.

J. S. James Sully, LL.D. r

See the biographical article: Sully, James. \ Lewes, George Henry (in part).

J. SL James Sime, M.A. (1843-1895). iLessins (in barf)

Author of A History of Germany; &c. \ JLessln S V» P arl >-

J. S. F. John Smith Flett, D.Sc, F.G.S.

Petrographer to the Geological Survey. Formerly Lecturer on Petrology in _ Edinburgh University. Neill Medallist of the Royal Society of Edinburgh. Bigsby Medallist of the Geological Society of London.

Laccolite; Lamprophyres;

Laterite;

Leucite: Leucite Rocks;

Limestone.

J. S. K. John Scott Keltie, LL.D., F.S.S., F.S.A. (Scot.). _ . . f

Secretary, Royal Geographical Society. Hon. Member, Geographical Societies j Livingstone of Paris, Berlin, Rome, &c. Editor of the Statesman' s Year Book. Editor of the 1 °

Geographical Journal. _

J. S. W. John Stephen Willison, LL.D., F.R.S. (Canada). f

Editor of The News (Toronto). Canadian Correspondent of The Times. Author of -j Laurier. Sir Wilfrid Laurier and the Liberal Party; &c. _

J. T. Be. John Thomas Beai.by. [Ladoga (in part);

Joint-author of Stanford's Europe. Formerly Editor of the Scottish Geographical-! Livonia (in part); Magazine. Translator of Sven Hedin's Through Asia, Central Asia and Tibet; Sac. Lop-nor.

J. T. Br. J. Taylor Brown. | Leighton, Robert (in part).

INITIALS AND HEADINGS OF ARTICLES

XI

J. T. C.

J. T. S.* J. V.*

J. W. D. J. W. He.

J.

W.

L.

G

K

H.

K

S.

L.

A.

W

L.

B.

L.

D.

•

L. J. S.

L. T. D. L. V.*

M.Br. M. Ca.

M. H. S.

M. N. T.

M. 0. B.

C

M. P.*

N. G. G.

0. Hr.

P. A. K.

Fellow . in the

Joseph Thomas Cunningham, M.A., F.Z.S.

Lecturer on Zoology at the South-Western Polytechnic, London. Formerly of University College, Oxford. Assistant Professor of Natural

History University of Edinburgh. Naturalist to the Marine Biological Association.

James Thomson Shotweli., Ph.D.

Professor of History in Columbia University, New York City.

Jules Viard.

Archivist at the National Archives, Paris. Officer of Public Instruction, of La France sous Philippe VI. de Valois; &c.

Captain J. Whitly Dixon, R.N.

Nautical Assessor to the Court of Appeal.

James Wyclifpe Headlam, M.A.

Staff Inspector of Secondary Schools under the Board of Education. Formerly Fellow of King's College, Cambridge. Professor of Greek and Ancient History at Queen's College, London. Author of Bismarck and the Foundation of the German Empire; &c.

James Whitbread Lee Glaisher, M.A., D.Sc, F.R.S.

Fellow of Trinity College, Cambridge. Formerly President of the Cambridge Philosophical Society, and the Royal Astronomical Society. Editor of Messenger of Mathematics and the Quarterly Journal of Pure and Applied Mathematics.

Killingworth Hedges, M.Inst.C.E.. M.Inst. Elect. E.

Hon. Secretary of the Lightning Research Committee. Author of Modern Lightning Conductors; &c.

Kathleen Schlesinger.

Editor of The Portfolio of Musical Archaeology. Orchestra.

Lamellibranchia (in part).

Languedoc.

Author] Le Macon.

Log.

Lasker.

r

Legendre, A. M.; Logarithm.

Lightning Conductor.

Author of The Instruments of the < Lituus.

Laurence Austine Waddell, C.B., CLE., LL.D., M.B.

Lieut.-Colonel I. M.S. (retired). Author of Lhasa and its Mysteries; &c.

Laurence Binyon.

See the biographical article: Binyon, L.

Louis Marie Olivier Duchesne.

See the biographical article: Duchesne, L. M. 0.

Leonard James Spencer, M.A.

Assistant in the Department of Mineralogy, British Museum. Formerly Scholar of Sidney Sussex College, Cambridge, and Harkness Scholar. Editor of the Minera- logical Magazine.

Sir

Lhasa (in part).

\ Lawson, Cecil Gordon.

Liberius.

Leadhillite; Lepidolite; Leucite (in Liroconite.

part) ;

Lincoln Judgment, The.

Boston, U.S.A.,

Margaret Bryant.

Leonardo of Pisa.

Line Engraving (in part).

Lewis Tonna Dibdin, M.A., D.C.L., F.S.A.

Dean of the Arches; Master of the Faculties; and First Church Estates Com- missioner. Bencher of Lincoln's Inn. Author of Monasticism in England; &c.

Luigi Villari. r

Italian Foreign Office (Emigration Dept.). Formerly Newspaper Correspondent in J Leopold II. (Grand Duke of east of Europe. Italian Vice-Consul in New Orleans, 1906, Philadelphia, 1907, and 1 Tuscany). ~ 1907-1910. Author of Italian Life in Town and Country; &c. . (_

/ Landor: Bibliography; t La Sale.

Moritz Cantor, Ph.D. f

Honorary Professor of Mathematics in the University of Heidelberg. Author of – Vorlesungen iiber die Geschichte der Mathematik ; &c.

Marion H. Spielmann, F.S.A.

Formerly Editor of the Magazine of Art. Member of Fine Art Committee of Inter- national Exhibitions of Brussels, Paris, Buenos Aires, Rome, and the Franco- British Exhibition, London. Author of History of "Punch" ; British Portrait' Painting to the Opening of the Nineteenth Century; Works of G. F. Watts, R.A.; British Sculpture and Sculptors of To-day; Henriette Ronner; &c.

Marcus Niebuhr Tod. M.A. rLaconia >

Fellow and Tutor of Oriel College, Oxford. University Lecturer in Epigraphy, i T ., ' T , ... Joint-author of Catalogue of the Sparta M useum. [Leomcias, i-eotycmdes.

Maximilian Otto Bismarck Caspari, M.A. _ _ f Leo I.-V. (Emperors oj the

Reader in Ancient History at London University. Lecturer in Greek at Birmingham \ East) ;

University, 1905-1908. [Lesbos; Leuctra.

Leon Jacques Maxime Prinet. r

Formerly Archivist to the French National Archives. Auxiliary of the Institute of \ L'Allbespine.

France (Academy of Moral and Political Sciences). [

Nicholas G. Gedye.

Chief Engineer to the Tyne Improvement Commission.

Otto Henker, Ph.D.

On the Staff cf the Carl Zeiss Factory, Jena, Germany.

Prince Peter Alexeivttch Kropotkin.

See the biographical article: Kropotkin, Prince P. A.

Lighthouse (in part).

Lens.

Ladoga (in part); Lithuanians and Letts:

History ; Livonia (in part).

Xll P. C. M.

INITIALS AND HEADINGS OF ARTICLES

P. C. Y.

P.

G.

P.

Gi

P.

G.

H.

R.

A

S.

M

R.

G.

R

I,

P.

R

J.

M.

R. K. D.

R. L.*

R. M'L. R. M. B. R. N. B.

R. S. C.

R. We.

R. W. C. S. A. C.

s. c.

St c.

S. D. F. S.

S.N.

Peter Chalmers Mitchell, M.A., F.R.S., D.Sc, LL.D.

Secretary to the Zoological Society of London. University Demonstrator in Comparative Anatomy and Assistant to Linacre Professor at Oxford, 1888— 1891. Lecturer on Biology at Charing Cross Hospital, 1892-1894; at London Hospital, 1894. Examiner in Biology to the Royal College of Physicians, 1892-1896, 1901- 1903. Examiner in Zoology to the University of London, 1903.

Philip Chesney Yorke, M.A. Magdalen College, Oxford.

Life; Longevity.

Percy Gardner. Litt.D., LL.D., F.S.A.

See the biographical article: Gardner, Percy.

Peter Giles, M.A., LL.D., Litt.D.

Fellow and Classical Lecturer of Emmanuel College, Cambridge, and University Reader in Comparative Philology. Late Secretary of the Cambridge Philological Society. Author of Manual of Comparative Philology; &c.

Philip Gilbert Hamerton.

See the biographical article: Hamerton, Philip Gilbert.

Robert Alexander Stewart Macalister, M.A., F.S.A.

St John's College, Cambridge. Director of Excavations for the Palestine Explora- tion Fund.

Richard Garnett, LL.D.

See the biographical article: Garnett, Richard.

Reginald Innes Pocock, F.Z.S.

Superintendent of the Zoological Cardens, London.

Ronald John McNeill, M.A.

Christ Church, Oxford. Barrister-at-Law. Gazette, London.

f Laud, Archbishop; -j Lauderdale, Duke of; [Leeds, 1st Duke of.

i Leochares.

L.

Line Engraving {in part).

Lachish.

i Leopardi.

Formerly Editor of the St James's

Sir Robert Kennaway Douglas.

Formerly Professor of Chinese, King's College, London. Keeper of Oriental Printed Books and MSS. at British Museum, 1892-1907. Member of the Chinese Consular Service, 1 858- 1865. Author of The Language and Literature of China; Eurobe and the Far East ; &c.

Leaf-insect;

Locust (in part).

Lawn Tennis;

Leicester, R. Sidney, earl of;

Lockhart, George.

Li Hung Chang.

Richard I^ydekker, F.R.S., F.G.S., F.Z.S.

Member of the Staff of the Geological Survey of India, 1874-1882. Author of Catalogue of Fossil Mammals, Reptiles and Birds in the British Museum; The Veer of all Lands; The Game Animals of Africa; &c.

Langur;

Lemming (in part);

Lemur;

Leopard (in part);

Lion (in part);

Litopterna.

/Locust (in part).

\ Life-boat: British (in part).

Robert M'Lachlan.

Editor of the Entomologists' Monthly Magazine.

Robert Michael Bai.lantyne.

See the biographical article: Ballantyne, R. M.

Robert Nisbet Bain (A. 1909).

Assistant Librarian, British Museum, 1883-1909. Author of Scandinavia: the Political History of Denmark, Norway and Sweden, 1513—1900; The First Romanovs, 1613-1725 ; Slavonic Europe: the Political History of Poland and Russia from 1469 to 1796; &c.

Robert Seymour Conway, M.A., D.Litt. (Cantab.).

Professor of Latin and Indo-European Philology in the University of Manchester. Formerly Professor of Latin in University College, Cardiff; and Fellow of Gonville and Cains College, Cambridge. Author of The Italic Dialects.

Richard Webster, A.M.

Formerly Fellow in Classics, Princeton University. Editor of The Elegies of Maximianus; &c.

The Very Rev. R. W. Church, D.D.

See the biographical article: Church, R. W. *

Stanley Arthur Cook, M.A.

Lecturer in Hebrew and Syriac, and formerly Fellow, Gonville and Caius College, Cambridge. Editor for Palestine Exploration Fund.

Examiner in Hebrew and Aramaic, London University, 1904-1908. Author of Glossary of Aramaic In- scriptions; The Lazus of Moses and the Code of Hammurabi; Critical Notes on Old Testament History; Religion of Ancient Palestine; &c.

Sidney Colvin, LL.D.

See the biographical article: Colvin, Sidney.

Viscount St Cyres.

See the biographical article: Iddesleigh, ist Earl of.

Rev. Stewart Dingwall Fordyce Salmon, M.A., D.D. (1838-1905).

Professor of Systematic Theology and Exegesis of the Epistles, U.F.C. College ˆJ Logos (in part). Aberdeen, 1876-1905. Author of The Parables of our Lord; &c. Editor ot The \ International Library of Theology; &c. ■ * I

f Latitude;

Ladislaus I. and IV. of

Hungary; Laski.

f Latin Language (in part); ■j Liguria: Archaeology and I Philology.

Long Island.

Lombards:

The Kingdom in Italy.

Levites.

Leonardo da Vinci.

Liguori.

Simon Newcomb, LL.D., D.Sc.

See the biographical article: Newcomb, Simon.

1 Light: Velocity.

INITIALS AND HEADINGS OF ARTICLES

xm

T. As.

Thomas Ashby, M.A., D.Litt., F.S.A.

Director of the British School of Archaeology at Rome. Corresponding Member of the Imperial German Archaeological Institute. Formerly Scholar of Christ Church, Oxford. Craven Fellow, Oxford, 1897. Author of The Classical Topo- graphy of the Roman Campagna ; &c.

T. A. I. T. Ca.

T. C. A.

T.

Da

T.

F.

C.

T.

F.

H.

T.

H.

H.

T. K.

T. Mo.

T. M. L.

T. Se.

T. W. R. D.

T. Wo. V. B. L. V. H. B. W. A. B. C.

W. A. P. W. E. Co.

W. F. I.

Thomas Allan Ingram, M.A., LL.D. Trinity College, Dublin.

Thomas Case, M.A.

President of Corpus Christi College, Oxford. Formerly Waynflete Professor of Moral and Metaphysical Philosophy at Oxford and Fellow of Magdalen College. Author of Physical Realism; &c. I

Sir Thomas Clifford Allbutt, K.C.B., M.A., M.D., D.Sc., LL.D., F.R.S. f

Regius Professor of Physic in the University of Cambridge. Physician to Adden- J brooke's Hospital, Cambridge. Fellow of Gonville and Caius College, Cambridge. I Editor of Systemsˆof Medicine. \

Thomas Davidson, LL.D. j

Theodore Freylinghuysen Collier, Ph.D.

Assistant Professor of History, Williams College, Williamstown, Mass., U.S.A.

Thomas F. Henderson.

Author of Mary Queen of Scots and the Casket Letters; &c.

Sir Thomas Hungerford Holdich, K.C.M.G., K.C. I.E., D.Sc, F.R.G.S.

Colonel in the Royal Engineers. Superintendent, Frontier Surveys, India, 1892- 1898. Gold Medallist, R.G.S. (London), 1887. H.M. Commissioner for the Perso- Beluch Boundary, 1896. Author of The Indian Borderland; The Gates of India; &c.

Thomas Kirkup, M.A., LL.D.

Author of An Inquiry into Socialism; Primer of Socialism; &c.

Thomas Moore, F.L.S. (1821-1887).

Curator of the Garden of the Apothecaries Company at Chelsea, 1848-1887. Editor of the Gardeners' Magazine of Botany; Author of Handbook of British Ferns; Index Filicum ; Illustrations of Orchidaceous Plants.

Rev. Thomas Martin Lindsay, LL.D., D.D.

Principal of the United Free Church College, Glasgow. Formerly Assistant to the Professor of Logic and Metaphysics in the University of Edinburgh. Author of History of the Reformation ; Life of Luther; &c.

Thomas Seccombe, M.A.

Lecturer in History, East London and Birkbeck Colleges, University of London. Stanhope Prizeman, Oxford, 1887. Assistant Editor of Dictionary of National Biography, 1 891 -1900. Author of The Age of Johnson; &c.

Thomas William Rhys Davids, LL.D., Ph.D.

Professor of Comparative Religion, Manchester University. Professor of Pali and Buddhist Literature, University College, London, 1882-1904. President of the Pali Text Society. Fellow of the British Academy. Secretary and Librarian of Royal Asiatic Society, 1885-1902. Author of Buddhism; Sacred Books of the Buddhists; Early Buddhism; Buddhist India; Dialogues of the Buddha; &c.

Thomas Woodhouse.

Head of the Weaving and Textile Designing Department, Technical College, Dundee.

Vivian Byam Lewes, F.I.C., F.C.S.

Professor of Chemistry, Royal Naval College. Chief Superintendent Gas Examiner to the Corporation of the City of London.

Vernon Herbert Blackman, M.A., D.Sc.

Professor of Botany in the University of Leeds. Formerly Fellow of St John’s College, Cambridge.

Rev. William Augustus Brevoort Coolidge, M.A., F.R.G.S.

Fellow of Magdalen College, Oxford. Professor of English History, St David’s College, Lampeter, 1880-1881. Author of Guide to Switzerland; The Alps in Nature and in History; &c. Editor of The Alpine Journal, 1880-1889.

Walter Alison Phillips, M.A.

Formerly Exhibitioner of Merton College and Senior Scholar of St John's College, Oxford. Author of Modern Europe; &c.

The Rt. Rev. William Edward Collins, M.A., D.D.

Bishop of Gibraltar. Formerly Professor of Ecclesiastical History, King's College, London. Lecturer of Selwyn and St John's Colleges, Cambridge. Author of The Study of Ecclesiastical History; Beginnings of English Christianity; &c.

Wixliam Fergusson Irvine, Hon. M.A. (Liverpool.

Hon. Secretary and General Editor of Historical Society of Lancashire and Cheshire. Hon. Local Secretary for Cheshire of the Society of Antiquaries. Author of Liver- pool in the reign of Charles II.; Old Halls of Wirral; &c.

Labicana, Via; Labici:

Lampedusa; Laficiano;

Lanuvium; Larino;

Latina, Via; Latium;

Laurentina, Via; Lavinium;

Lecee; Leghorn; Leontini;

Licodia Eubea;

Ligures Baebiani; ˆLiguria: History; Loeri: Italy. f Livery Companies; I London: Finance.

Logic.

Lister, 1st Baron.

Longfellow.

Laodicea, Synod of.

Latimer.

Ladakh and Baltistan

-i Lassalle.

Labyrinth.

Lollards.

Lever, Charles.

Lamaism.

j Linen and Linen Manu- j factures.

\ Lighting: Oil and Gas.

\ Lichens (in part).

j Lausanne; Leuk; i Liechtenstein; Linth; [Loearno; Locle, Le.

J Laibach, Congress of;

[Lights, Ceremonial use at

\ Libellatici.

Liverpool.

XIV

W. H. Be.

W. H. F.

W. M. R. W. P. T.

W. R. So.

W. R. S.-R. W. T. Ca. W. T. D.

W. W. R.* W. W. S. W. Y. S.

INITIALS AND HEADINGS OF ARTICLES

William Henry Bennett, M.A., D.D., D.Litt. (Cantab.).

Professor of Old Testament Exegesis in New and Hackney Colleges, London. Formerly Fellow of St John's College, Cambridge. Lecturer in Hebrew at Firth College, Sheffield. Author of Religion of the Post-Exilic Prophets ; &c.

Sir William Henry Flower, F.R.S.

See the biographical article: Flower, Sir W. H.

Lamech.

rLemming {in part); ■< Leopard {in part); I Lion {in part). fLely, Sir Peter; 1 Lippi.

of English i Lanier.

Leibnitz.

William Michael Rossetti.

See the biographical article: Rossetti, Dante Gabriel.

William Petereield Trent, LL.D., D.C.L.

Professor of English Literature. Columbia University. Autho: Culture in Virginia; A Brief History of American Literature; &c.

William Ritchie Sorley, M.A., Litt.D., LL.D. .

Professor of Moral Philosophy in the University of Cambridge. Fellow of King's College, Cambridge. Fellow of the British Academy. Formerly Fellow of Trinity College. Author of The Ethics of Naturalism; The Interpretation of Evolution; &c. I

William Ralston Shedden-Ralston, M.A. f

Formerly Assistant in the Department of Printed Books, British Museum. Author-ˆ Lermontov. of Russian Folk Tales; &c. t

William Thomas Calman. D.Sc, F.Z.S. * f

Assistant in charge of Crustacea, Natural History Museum, South Kensington, -j Lobster. Author of " Crustacea" in A Treatise on Zoology, edited by Sir E. Ray Lankester. I

William Tregarthen Douglass, M.Inst.CE., M.I.M.E. f

Consulting Engineer to Governments of Western Australia, New South Wales, J t iwhthnimo f;« *,„rt\ Victoria, Cape of Good Hope, &c. Erected the Eddystone and Bishop Rock Light- 1 w S nlnouse U» Vˆri). houses. Author of The New Eddystone Lighthouse; Sac. I

William Walker Rockwell, Lic.Theol.

Assistant Professor of Church History, Union Theological Seminary, New York.

Walter William Skeat, Litt.D.. LL.D., D.C.L. See the biographical article : Skeat, W. W.

William Young Sellar, LL.D.

See the biographical article: Sellar, William Young.

< Leo XI. and XII. {popes).

-j Layamon.

A Latin Literature {in part).

PRINCIPAL UNSIGNED ARTICLES

Labiatae.

Lancashire.

Legitimacy.

Lent.

Lily.

Lacrosse.

Lantern.

Lenjuminosae.

Leprosy.

Limitation, Statutes

•

Lagos.

Lapland.

Leicestershire.

Libel.

Lincoln.

Lahore.

Larceny.

Leipzig.

Liberal Party.

Lincolnshire.

Lake District.

Larch.

Leith.

Liliaceae.

Lippe.

Lambeth Conferences.

Lead Poisoning.

Lemnos.

Lille.

Lisbon.

Lanarkshire.

Leeds.

Lemon.

ENCYCLOPEDIA BRITANNICA

ELEVENTH EDITION

VOLUME XVI

La letter which was the twelfth letter of the Phoenician alphabet. It has in its history passed through many changes of form, ending curiously enough in its usual manuscript form with a shape almost identical with that which it had about 900 B.C. (£, L). As was the

case with B and some other letters the Greeks did not everywhere keep the symbol in the position in which they had borrowed it \, . This, which was its oldest form in Attica and in the Chalcidian colonies of Italy, was the form adopted by the Romans, who in time converted it into the rectangle L, which passed from them to the nations of western Europe. In the Ionic alphabet, however, from which the ordinary Greek alphabet is derived it appeared as A- A still more common form in other parts of Greece was /* , with the legs of unequal length. The editors of Herodotus have not always recognized that the name of Labda, the mother of Cypselus, in the story (v. 92) of the founding of the great family of Corinthian despots, was derived from the fact that she was lame and so suggested the form of the Corinthian /* . Another form /• or h was practically confined to the west of Argolis. The name of the Greek letter is ordinarily given as Lambda, but in Herodotus (above) and in Athenaeus x. p. 453 e, where the names of the letters are given, the best authenticated form is Labda. The Hebrew name, which was probably identical with the Phoenician, is Lamed, which, with a final vowel added as usual, would easily become Lambda, b being inserted between m and another consonant. The pronunciation of / varies a great deal according to the point at which the tongue makes contact with the . roof of the mouth. The contact, generally speaking, is at the same point as for d, and this accounts for an interchange between these sounds which occurs in various languages, e.g. in Latin lacrima from the same root as the Greek Sanpv and the English tear. The change in Latin occurs in a very limited number of cases and one explanation of their occurrence is that they are borrowed (Sabine) words. In pro- nunciation the breath may be allowed to escape at one or both sides of the tongue. In most languages I is a fairly stable sound. Orientals, however, have much difficulty in distinguishing between / and r. In Old Persian / is found in only two foreign words, and in Sanskrit different dialects employ r and / differently in the same words. Otherwise, however, the interchanges between r and / were somewhat exaggerated by the older philo- logists. Before other consonants / becomes silent in not a few languages, notably in French, where it is replaced by u, and in English where it has occasionally been restored in recent times,

XVI. 1

e.g. in fault which earlier was spelt without / (as in French whence it was borrowed), and which Goldsmith could still rhyme with aught. In the 15th century the Scottish dialect of English dropped I largely both before consonants and finally after a and u, a’ = all, fa’ = fall, £«’ = pull, ‘00′ = wool, bulk pronounced like book, &c, while after it appears as w, row (pronounced rau) — roll, know — knoll, &c. It is to

be observed that L = So does not come from this symbol, but was an adaptation of ˆ , the western Greek form of x, which had no corresponding sound in Latin and was therefore not included in the ordinary alphabet. This symbol was first rounded into J, and then changed first to 1 and ultimately to L. (P. Gl.)

LAACHER SEE, a lake of Germany, in the Prussian Rhine Province, 5 m. W. of Brohl on the Rhine, and N. of the village of Niedermendig. It occupies what is supposed to be a crater of the Eifel volcanic formation, and the pumice stone and basalt found in great quantities around it lend credence to this theory. It lies 850 ft. above the sea, is 5 m. in circumference and 160 ft. deep, and is surrounded by an amphitheatre of high hills. The water is sky blue in colour, very cold and bitter to the taste. The lake has no natural outlet and consequently is subjected to a considerable rise and fall. On the western side lies the Benedictine abbey of St Maria Laach (Abbatia Lacensis) founded in 1093 by Henry II., count palatine of the Rhine. The abbey church, dating from the 12th century, was restored in 1838. The history of the monastery down to modern times appears to have been uneventful. In 1802 it was abolished and at the close of the Napoleonic wars it became a Prussian state demesne. In 1863 it passed into the hands of the Jesuits, who, down to their expulsion in 1873, published here a periodical, which still appears, entitled Stimmen aus Maria Laach. In 1892 the monastery was again occupied by the Benedictines.

LAAGER, a South African Dutch word (Dutch leger, Ger. lager, connected with Eng. ” lair “) for a temporary defensive encampment, formed by a circle of wagons. The English word is ” leaguer,” an armed camp, especially that of a besieging or “beleaguering” army. The Ger. lager, in the sense of “store,” is familiar as the name of a light beer (see Brewing).

LAAS, ERNST (1837-1885), German philosopher, was born on the 16th of June 1837 at Fiirstenwalde. He studied theology and philosophy under Trendelenburg at Berlin, and eventually became professor of philosophy in the new university of Strass- burg. In Kant’s Analogien der Erfahrung (1876) he keenly criticized Kant’s transcendentalism, and in his chief work Idealismus und Positivismus (3 vols., 1879-1884), he drew a

clear contrast between Platonism, from which he derived trans- cendentalism, and positivism, of which he considered Protagoras the

founder. Laas in reality was a disciple of Hume. Throughout his philosophy he endeavours to connect meta- physics with ethics and the theory of education.

His chief educational works were Der dcutsche Aufsatz in den obern Gymnasialklassen (1868; 3rd ed., part i., 1898, part ii., 1894), and Der deutsche Unterricht aufh.bh.ern Lehranstalten (1872; 2nd ed. 1886). He contributed largely to the Vierteljahrsschr. f. wiss. Philos. (1880-1882); the Litterarischer Nachlass, a posthumous collection, was published at Vienna (1887). See Hanisch, Der Positivismus von Ernst Laas (1902); Gjurits, Die Erkenntnistheorie des Ernst Laas (1903); Falckenberg, Hist, of Mod. Philos. (Eng. trans., 1895).

LA BADIE, JEAN DE (1610-1674), French divine, founder of the school known as the Labadists, was born at Bourg, not far from Bordeaux, on the 13th of February 1610, being the son of Jean Charles de la Badie, governor of Guienne. He was sent to the Jesuit school at Bordeaux, and when fifteen entered the Jesuit college there. In 1626 he began to study philosophy and theology. He was led to hold somewhat extreme views about the efficacy of prayer and the direct influence of the Holy Spirit upon believers, and adopted Augustinian views about grace, free will and predestination, which brought him into collision with his order. He therefore separated from the Jesuits, and then became a preacher to the people, carrying on this work in Bordeaux, Paris and Amiens. At Amiens in 1640 he was appointed a canon and teacher of theology. The hostility of Cardinal Mazarin, however, forced him to retire to the Car- melite hermitage at Graville. A study of Calvin's Institutes showed him that he had more in common with the Reformed than with the Roman Catholic Church, and after various adventures he joined the Reformed Church of France and became professor of theology at Montauban in 1650. His reasons for doing so he published in the same year in his Declaration de Jean de la Badie. His accession to the ranks of the Pro- testants was deemed a great triumph; no such man since Calvin himself, it was said, had left the Roman Catholic Church. He was called to the pastorate of the church at Orange on the Rhone in 1657, and at once became noted for his severity of discipline. He set his face zealously against dancing, card- playing and worldly entertainments. The unsettled state of the country, recently annexed to France, compelled him to leave Orange, and in 1659 he became a pastor in Geneva. He then accepted a call to the French church in London, but after various wanderings settled at Middelburg, where he was pastor to the French-speaking congregation at a Walloon church. His peculiar opinions were by this time (1666) well known, and he and his congregation found themselves in conflict with the ecclesiastical authorities. The result was that la Badie and his

followers established a separate church in a neighbouring town. In 1669 he moved to Amsterdam. He had enthusiastic disciples, Pierre Yvon (1646-1707) at Montauban, Pierre Dulignon (d. 1679), Francois Menuret (d. 1670), Theodor Untereyk (d. 1693), F. Spanheim (1632-1701), and, more important than any, Anna Maria v. Schurman (1607-1678), whose book Eucleria is perhaps the best exposition of the tenets of her master. At the head of his separatist congregation, la Badie developed his views for a reformation of the Reformed Churches: the church is a communion of holy people who have been born again from sin; baptism is the sign and seal of this regeneration, and is to be administered only to believers; the Holy Spirit guides the regenerate into all truth, and the church possesses throughout all time those gifts of prophecy which it had in the ancient days; the community at Jerusalem is the continual type of every Christian congregation, therefore there should be a community of goods, the disciples should live together, eat together, dance together; marriage is a holy ordinance between two believers, and the children of the regenerate are born without original sin, marriage with an unregenerate person is not binding. They did not observe the Sabbath, because — so they said — their life was a continual Sabbath. The life and separatism of the community brought them into frequent collision with their neighbours and with the magistrates, and in 1670 they accepted

the invitation of the princess Elizabeth, abbess of Herford in Westphalia, to take up their abode within her territories, and settled in Herford to the number of about fifty. Not finding the rest they expected they migrated to Bremen in 1672, and afterwards to Altona, where they were dispersed on the death of the leaders. Small communities also existed in the Rhineland, and a missionary settlement was established in New York. Jean de la Badie died in February 1674.

La Badie's works include La Prophetie (1668), Manuel de piete" (1669), Protestation de bonne foi et saine doctrine (1670), Brieve declaration de nos sentiments touchant VEglise (1670). See H. van Berkum, De Labadie en de Labadisten (Sneek, 1851); Max Gobel (1811-1857), Gesch. d. christl. Lebens in der rheinisch-westphdlischen Kirche (Coblenz, 3 vols., 1 849-1 860) ; Heinrich Heppe (1820-1879), Geschichte des Pietismus (Leiden, 1879) ; Albrecht Ritschl, Geschichte des Pietismus, vol. i. (Bonn, 1880); and especially Peter Yvon, A brege precis de la vie et de la conduite et des vrais sentiments de feu Mr de Labadie, and Anna Maria v. Schurman, Eucleria (Altona, 1673, 1678). Cf. the article in Herzog-Hauck, Realencyklopddie.

LABARUM, the sacred military standard of the early Christian Roman emperors, first adopted by Constantine the Great after his miraculous vision in 312, although, according to Gibbon, he did not exhibit it to the army till 323. The name seems to have been known before, and the banner was simply a Christian- ized form of the Roman cavalry standard. Eusebius (Life of Const, i. 31) describes the first labarum as consisting of a long gilded spear, crossed at the top by a bar from which hung a square purple cloth, richly jewelled. At the upper extremity of the spear was a golden wreath encircling the sacred monogram, formed of the first two letters of the name of Christ. In later banners the monogram was sometimes embroidered on the cloth. A special guard of fifty soldiers was appointed to protect the sacred standard. The derivation of the word labarum is disputed; it appears to be connected with the Basque labarva, signifying standard. See Flag.

LABE, LOUISE CHARLIN PERRIN (c. 1525-1566), French poet, called La Belle Cordiere, was born at Lyons about 1525, the daughter of a rich ropemaker, named Charley or Charlin. At the siege of Perpignan she is said to have fought on horse- back in the ranks of the Dauphin, afterwards Henry II. Some time before 1551 she married Ennemond Perrin, a ropemaker. She formed a library and gathered round her a society which included many of the learned ladies of Lyons, — Pernette du Guillet, Claudine and Sibylle Sceve and Clemence de Bourges, and the poets Maurice Sceve, Charles Fontaine, Pontus de Tyard; and among the occasional visitors were Clement Marot and his friend Melin de Saint-Gelais, with probably Bonaventure des Periers and Rabelais. About 1550 the poet Olivier de Magny passed through Lyons on his way to Italy in the suite of Jean d'Avanson, the French envoy to the Holy See. As the friend of Ronsard, " Prince of Poets," he met with an enthusiastic reception from Louise, who straightway fell in love with him. There seems little doubt that her passion for Magny inspired her eager, sincere verse, and the elegies probably express her grief at his first absence. A second short visit to Lyons was followed by a second longer absence. Magny's influence is shown more decisively in her Sonnets, which, printed in. 1555, quickly attained great popularity. During his second visit to Italy Magny had apparently consoled himself, and Louise, despair- ing of his return, encouraged another admirer, Claude Rubys, when her lover returned unexpectedly. Louise dismissed Rubys, but Magny's jealousy found vent in an ode addressed to the Sire Aymon (Ennemond), which ruined her reputation; while Rubys, angry at his dismissal, avenged himself later in his Histoire Writable de Lyons (1573). This scandal struck a fatal blow at Louise's position. Shortly afterwards her

husband died, and she returned to her country house at Parcieu, where she died on the 25th of April 1566, leaving the greater part of the fortune she was left to the poor. Her works include, besides the Elegies and Sonnets mentioned, a prose Debat de folie et d'amour (translated into English by Robert Greene in 1608).

See editions of her (Euvres by P. Blanchemain (1875), and by C. Boy (2 vols., 1887). A sketch ot Louise Lab6 and of the Lyonnese

Society is in Miss Edith Sichel's Women and Men of the French, Renaissance (1901). See also J. Favre, Olivier de Magny (1885).

LABEL (a French word, now represented by lambeau, possibly a variant; it is of obscure origin and may be connected with a Teutonic word appearing in the English " lap," a flap or fold), a slip, ticket, or card of paper, metal or other material, attached to an object, such as a parcel, bottle, &c, and containing a name, address, description or other information, for the purpose of identification. Originally the word meant a band or ribbon of linen or other material, and was thus applied to the fillets (iufulae) attached to a bishop's mitre. In heraldry the " label " is a mark of " cadency."

In architecture the term " label " is applied to the outer projecting moulding over doors, windows, arches, &c, sometimes called " Dripstone " or " Weather Moulding," or " Hood Mould." The former terms seem scarcely applicable, as this moulding is often inside a building where no rain could come, and consequently there is no drip. In Norman times the label frequently did not project, and when it did it was very little, and formed part of the series of arch mouldings. In the Early English styles they were not very large, sometimes slightly undercut, sometimes deeply, sometimes a quarter round with chamfer, and very frequently a " roll " or " scroll-moulding," so called because it resembles the part of a scroll where the edge laps over the body of the roll. Labels generally resemble the string-courses of the period, and, in fact, often return horizontally and form strings. They are less common in Continental archi- tecture than in English.

LABEO, MARCUS ANTISTIUS (c. 50 b.c.a.d. 18), Roman jurist, was the son of Pacuvius Antistius Labeo, a jurist who caused himself to be slain after the defeat of his party at Philippi. A member of the plebeian nobility, and in easy circumstances, the younger Labeo early entered public life, and soon rose to the praetorship; but his undisguised antipathy to the new regime, and the somewhat brusque

manner in which in the senate he occasionally gave expression to his republican sym pathies — what Tacitus (Ann. iii. 75) calls his incorrupta libertas — proved an obstacle to his advancement, and his rival, Ateius Capito, who had unreservedly given in his adhesion to the ruling powers, was promoted by Augustus to the consulate, when the appointment should have fallen to Labeo; smarting under the wrong done him, Labeo declined the office when it was offered to him in a subsequent year (Tac. Ann. iii. 75; Pompon, in fr. 47, Dig. i. 2). From this time he seems to have devoted his whole time to jurisprudence. His training in the science had been derived principally from Trebatius Testa. To his knowledge of the law he added a wide general culture, devoting his attention specially to dialectics, philology (gram- matica), and antiquities, as valuable aids in the exposition, expansion, and application of legal doctrine (Gell. xiii. 10). Down to the time of Hadrian his was probably the name of greatest authority; and several of his works were abridged and annotated by later hands. While Capito is hardly ever referred to, the dicta of Labeo are of constant recurrence in the writings of the classical jurists, such as Gaius, Ulpian and Paul; and no inconsiderable number of them were thought worthy of preservation in Justinian's Digest. Labeo gets the credit of being the founder of the Proculian sect or school, while Capito is spoken of as the founder of the rival Sabinian one (Pomponius in fr. 47, Dig. i. 2); but it is probable that the real founders of the two scholae were Proculus arid Sabinus, followers respectively of the methods of Labeo and Capito.

Labeo's most important literary work was the Libri Posteriorum, so called because published only after his death. It contained a systematic exposition of the common law. His Libri ad Edictum embraced a commentary, not only on the edicts of the urban and peregrine praetors, but also on that of the curulc aediles. His Probabilium (-KidavGiv) lib. VIII., a collection of definitions and axiomatic legal propositions, seems to have been one of his most characteristic productions.

See van Eck, " De vita, moribus, et studiis M. Ant. Labeonis " (Franeker, 1692), in Oelrichs's Thes. nov., vol. i. ; Mascovius, De sectis Sabinianor. et Proculianor. (1728); Pernice, M. Antistius Labeo. Das rbni. Privalrecht im ersten Jahrhunderte der Kaizerzeit (Halle, 1873-1892).

LABERIUS, DECIMUS (c. 105-43 B.C.), Roman knight and writer of mimes. He seems to have been a man of caustic wit, who wrote for his own pleasure. In 45 Julius Caesar ordered him to appear in one of his own mimes in a public contest with the actor Publilius Syrus. Laberius

pronounced a dignified prologue on the degradation thus thrust on his sixty years, and directed several sharp allusions against the dictator. Caesar awarded the victory to Publilius, but restored Laberius to his equestrian rank, which he had forfeited by appearing as a mimus (Macrobius, Sat. ii. 7). Laberius was the chief of those who introduced the mimus into Latin literature towards the close of the republican period. He seems to have been a man of learning and culture, but his pieces did not escape the coarseness inherent to the class of literature to which they belonged; and Aulus Gellius (xvi. 7, 1) accuses him of extravagance in the coining of new words. Horace (Sal. i. 10) speaks of him in terms of qualified praise.

In addition to the prologue (in Macrobius), the titles of forty-four of his mimi have been preserved ; the fragments have been collected by O. Ribbeck in his Comicorum Latinorum reliquiae (1873).

LABIATAE (i.e. “lipped,” Lat. labium, lip), in botany, a natural order of seed-plants belonging to the series Tubiflorae of the dicotyledons, and containing about 150 genera with 2800 species. The majority are annual or perennial herbs

Fig. I. — Flowering Shoot of Dead-nettle (Lamium album). 1, Flower cut lengthwise, enlarged; 2 calyx, enlarged; 3, floral diagram.

inhabiting the temperate zone, becoming shrubby in warmer climates. The stem is generally square in section and the simple cxstipulate leaves are arranged in decussating pairs (i.e. each pair is in a plane at right angles to that of the pairs immediately above and below it) ; the blade is entire, or toothed, lobed or more or less deeply cut. The plant is often hairy, and the hairs are frequently glandular, the secretion containing a scent characteristic of the genus or species. The flowers are borne in the axils of the leaves or bracts; they are rarely solitary as in Scutellaria (skull-cap), and generally form an apparent whorl (verticillaster) at the node, consisting of a pair of cymose inflorescences each of which is a simple three-flowered dichasium as in Brunella, Salvia, &c, or more generally a dichasium passing over into a pair of monochasial cymes as in Lamium (fig. 1), Ballota, Nepcta, &c. A number of whorls may be crowded at the apex of the stem and the subtending leaves reduced to small bracts, the whole forming a raceme- or spike-like inflorescence as in Mentha (fig. 2, 5) Brunella, &c; the bracts are sometime* large and coloured as in Monarda, species of Salvia, &c, in the latter the apex of the stem is sometimes occupied with a cluster of sterile coloured bracts. The plan of the flower is remarkably uniform (fig. 1, 3); it is bisexual, and zygomorphic in the

median plane, with 5 sepals united to form a persistent cup- like calyx, s petals united to form a two-lipped gaping corolla, 4 stamens inserted on the corolla-tube, two of which, generally the anterior pair, are longer than the other two (didynamous arrangement)— sometimes as in Salvia, the posterior pair is aborted — and two superior median carpels, each very early divided by a constriction in a vertical plane, the pistil consisting of four cells each containing one erect anatropous ovule attached to the base of an axile placenta; the style springs from the centre of the pistil between the four segments (gynobasic) , and is simple with a bifid apex. The fruit comprises four one-seeded nutlets included in the persistent calyx; the seed has a thin testa and the embryo almost or completely fills it. Although the general form and plan of arrangement of the flower is very uniform, there are wide variations in detail. Thus the calyx may be tubular, bell-shaped, or almost spherical, or straight or bent, and the length and form of the teeth or lobes varies also; it may be equally toothed as in mint (Mentha) (fig. 2, 8), and marjoram (Origanum), or two-lipped as in thyme (Thymus), Lamium (fig. 1) and Salvia (fig. 2, 1); the number of nerves affords useful characters for distinction of genera, there are normally five main nerves between which simple or forked secondary nerves are more or less developed. The shape

Fig. 2. — 1, Flower of Sage (Salvia officinalis). 2, Corolla of same cut open showing the two stamens; 3, flower of spearmint (Mentha viridis) ; 4, corolla of same cut open showing stamens ; 5, flower- ing shoot of same, reduced ; 6, floral diagram of Salvia.

of the corolla varies widely, the differences being doubtless intimately associated with the pollination of the flowers by insect- agency. The tube is straight or variously bent and often widens towards the mouth. Occasionally the limb is equally five-toothed, or forms, as in Mentha (fig. 2, 3, 4) an almost regular four-toothed corolla by union of the two posterior teeth. Usually it is two-lipped, the upper lip being formed by the two posterior, the lower lip by the three anterior petals (see fig. 1, and fig. 2, 1,6); the median lobe of the lower lip is generally most developed and forms a resting-place for the bee or other insect when probing the flower for honey, the upper lip shows great variety in form, often, as in Lamium (fig. 1), Stachys, &c, it is arched forming a protection from rain for the stamens, or it may be flat as in thyme. In the tribe Ocimoideae the four upper petals form the upper lip, and the single anterior one the lower lip, and in Teucrium the upper lip is absent, all five lobes being pushed forward to form the lower. The posterior stamen is sometimes present as a

staminode, but generally suppressed; the upper pair are often reduced to staminodes or more or less completely suppressed as in Salvia (fig. 2, 2, 6); rarely are these developed and the anterior pair reduced. In Colcus the stamens are monadelphous. In Nepela and allied genera the posterior pair are the longer, but this is rare, the didynamous character being generally the result of the anterior pair being the longer. The anthers are two-celled, each cell splitting lengthwise; the connective may be more or less developed between the cells; an extreme case is seen in Salvia

(fig. 2, 2). where the connective is filiform and jointed to the filament, while the anterior anther-cell is reduced to a sterile appendage. Honey is secreted by a hypogynous disk. In the more general type of flower the anthers and stigmas are pro- tected by the arching upper lip as in dead-nettle (fig. 1) and many other British genera; the lower lip affords a resting-place for the insect which in probing the flower for the honey, secreted on the lower side of the disk, collects pollen on its back. Numerous variations in detail are found in the different genera; in Salvia (fig. 2), for instance, there is a lever mechanism, the barren half of each anther forming a knob at the end of a short arm which when touched by the head of an insect causes the anther at the end of the longer arm to descend on the insect's back. In the less common type, where the anterior part of the flower is more developed, as in the Ocimoideae, the stamens and style lie on the under lip and honey is secreted on the upper side of the hypogynous disk; the insect in probing the flower gets smeared with pollen on its belly and legs. Both types include brightly-coloured flowers with longer tubes adapted to the visits of butterflies and moths, as species of Salvia, Stachys, Monarda, &c; some South American species of Salvia are pollinated by humming-birds. In Mentha (fig. 2, 3), thyme, marjoram (Origanum) , and allied genera, the flowers are nearly regular and the stamens spread beyond the corolla.

The persistent calyx encloses the ripe nutlets, and aids in their distribution in various ways, by means of winged spiny or hairy lobes or teeth; sometimes it forms a swollen bladder. A scanty endosperm is sometimes present in the seed; the embryo is generally parallel to the fruit axis with a short inferior radicle and generally flat cotyledons.

The order occurs in all warm and temperate regions; its chief centre is the Mediterranean region, where some genera such as Lavandula, Thymus, Rosmarinus and others form an important feature in the vegetation. The tribe Ocimoideae is exclusively tropical and subtropical and occurs in both hemispheres. The order is well represented in Britain by seventeen native genera; Mentha (mint)

including also M. piperita (peppermint) and M. Pulegium (pennyroyal) ; Origanum vulgare (marjoram) ; Thymus Serpyllum (thyme); Calamintha (calamint), including also C. Clinopodium (wild basil) and C. Acinos (basil thyme) ; Salvia (sage), including 5. Verbenaca (clary); Nepeta Cataria (catmint), N. Glechoma (ground-iyy) ; Brunella (self-heal) ; Scutellaria (skull-cap) ; Stachys (woundwort) ; S. Betonica is wood betony ; Galeopsis (hemp-nettle) ; Lamium (dead-nettle) ; Ballota (black horehound) ; Teucrium (germander); and Ajuga (bugle).

Labiatae are readily distinguished from all other orders of the series excepting Verbenaceae, in which, however, the style is terminal ; but several genera, e.g. Ajuga, Teucrium and Rosmarinus, approach Verbenaceae in this respect, and in some genera of that order the style is more or less sunk between the ovary lobes. The fruit-character indicates an affinity with Boraginaceae from which, however, they differ in habit and by characters of ovule and embryo. The presence of volatile oil renders many genera of economic use, such are thyme, marjoram (Origanum), sage (Salvia), lavender (Lavandula), rosemary (Rosmarinus), patchouli (Pogostemon) . The tubers of Stachys Sieboldi are eaten in France.

LABICANA, VIA, an ancient highroad of Italy, leading E.S.E. from Rome. It seems possible that the road at first led to Tusculum, that it was then prolonged to Labici, and later still became a road for through traffic; it may even have superseded the Via Latina as a route to the S.E., for, while the distance from Rome to their main junction at Ad Bivium (or to another junction at Compitum Anagninum) is practically identical, the summit level of the former is 725 ft. lower than that of the latter, a little to the west of the pass of Algidus. After their junction it is probable that the road bore the name Via Latina rather than Via Labicana. The course of the road after the first six miles from Rome is not identical with that of any modern road, but can be clearly traced by remains of pavement and buildings along its course.

See T. Ashby in Papers of the British School at Rome, i. 215 sqq.

(T. As}

LABICHE, EUGENE MARIN (1815-1888), French dramatist, was born on the 5th of May 181 5, of bourgeois parentage. He read for the bar, but literature had more powerful attractions, and he was hardly twenty when he gave to the Chirubin — an impertinent little magazine, long vanished and forgotten — a

short story, entitled, in the cavalier style of the period, Les plus belies sont les plus fausses. A few others followed much in the same strain, but failed to catch the attention of the public. He tried his hand at dramatic criticism in the Revue des thedtres, and in 1838 made a double venture on the stage. The small Theatre du Pantheon produced, amid some signs of popular favour, a drrfma of his, L'Avocat Loubet, while a vaudeville, Monsieur de Coislin ou I'homme infiniment poll, written in collaboration with Marc Michel, and given at the Palais Royal, introduced for the first time to the Parisians a provincial actor who was to become and to remain a great favourite with them, Grassot, the famous low comedian. In the same year Labiche, still doubtful about his true vocation, published a romance called La Cle des champs. M. Leon Halevy, his successor at the Academy and his panegyrist, informs us that the publisher became a bankrupt soon after the novel was out. "A lucky misadventure, for," the biographer concludes, " this timely warning of Destiny sent him back to the stage, where a career of success was awaiting him." There was yet another obstacle in the way. When he married, he solemnly promised his wife's parents that he would renounce a profession then considered incompatible with moral regularity and domestic happiness. But a year afterwards his wife spontaneously released him from his vow, and Labiche recalled the incident when he dedicated the first edition of his complete works: " To my wife." Labiche, in conjunction with Varin, 1 Marc Michel, 2 Clairville, 3 Dumanoir, 4 and others contributed comic plays interspersed with couplets to various Paris theatres. The series culminated in the memor- able farce in five acts, Un Chapeau de paille d'ltalie (August 185 1). It remains an accomplished specimen of the French imbroglio, in which some one is in search of something, but does not find it till five minutes before the curtain falls. Prior to that date Labiche had been only a successful vaudevilliste among a crowd of others; but a twelvemonth later he made a new departure in Le Misanthrope et VAuvergnat. All the plays given for the next twenty-five years, although constructed on the old plan, contained a more or less appreciable dose of that comic observation and good sense which gradually raised the French farce almost to the level of the comedy of character and manners. " Of all the subjects," he said, " which offered themselves to me, I have selected the bourgeois. Essentially mediocre in his vices and in his virtues, he stands half-way between the hero and the scoundrel, between the saint and the profligate." During the second period of his career Labiche had the collaboration of Delacour, 5 Choler, 6 and others. When it is asked what share in the authorship and success of the plays may be claimed for those men, we shall answer in Emile Augier's words: " The distinctive qualities which secured a lasting

vogue for the plays of Labiche are to be found in all the comedies written by him with different collaborators, and are conspicuously absent from those which they wrote without him." A more useful and more important collaborator he found in Jean Marie Michel Geoffroy (1813-1883) whom he had known as a debutant in his younger days, and who remained his faithful interpreter to the last. Geoffroy impersonated the bourgeois not only to the public, but to the author himself; and it may be assumed that Labiche, when writing, could see and hear Geoffroy acting the character and uttering, in his pompous, fussy way, the words that he had just committed to paper. Celimare le bien-aime (1863), Le Voyage de M. Perrichon (i860), La Grammaire, Un Pied dans le crime, La Cagnotte (1864), may be quoted as the happiest productions of Labiche.

In 1877 he brought his connexion with the stage to a close, and retired to his rural property in Sologne. There he could be

1 Victor Varin, pseudonym of Charles Voirin (1798-1869).

2 Marc Antoine Amedee Michel (1812-1868), vaudevillist.

3 Louis Francois Nicolaise, called Clairville (1811-1879), part- author of the famous Fille de Mme Angot (1872).

4 Philippe Frangois Pinel, called Dumanoir (1806-1865).

5 Alfred Charlemagne Lartigue, called Delacour (1815-1885). For a list of this author's pieces see O. Lorenz, Catalogue General (vol. ii., 1868).

6 Adolphe Joseph Choler (1822-1889).

seen, dressed as a farmer, with low-brimmed hat, thick gaiters and an enormous stick, superintending the agricultural work and busily engaged in reclaiming land and marshes. His life- long friend, Augier, visited him in his principality, and, being left alone in the library, took to reading his host's dramatic productions, scattered here and there in the shape of theatrical brochures. He strongly advised Labiche to publish a collected and revised edition of his works. The suggestion, first declined as a joke and long resisted, was finally accepted and carried into effect. Labiche's comic plays, in ten volumes, were issued during 1878 and 1879. The success was even greater than had been expected by the author's most sanguine friends. It had been commonly believed that these plays owed their popularity in great measure to the favourite actors who had appeared in them; but it was now discovered that all, with the exception of Geoffroy, had

introducecHnto them a grotesque and caricatural element, thus hiding from the spectator, in many cases, the true comic vein and delightful delineation of human character. The amazement turned into admiration, and the engouemeni became so general that very few dared grumble or appear scandalized when, in 1880, Labiche was elected to the French Academy. It was fortunate that, in former years, he had never dreamt of attaining this high distinction; for, as M. Pailleron justly observed, while trying to get rid of the little faults which were in him, he would have been in danger of losing some of his sterling qualities. But when the honour was bestowed upon him, he enjoyed it with his usual good sense and quiet modesty. He died in Paris on the 23rd of January 1888.

Some foolish admirers have placed him on a level with Moliere, but it will be enough to say that he was something better than a public amuseur. Many of his plays have been transferred to the English stage. They are, on the whole, as sound as they are entertaining. Love is practically absent from his theatre. In none of his plays did he ever venture into the depths of feminine psychology, and womankind is only represented in them by pretentious old maids and silly, insipid, almost dumb, young ladies. He ridiculed marriage according to the invariable custom of French playwrights, but in a friendly and good-natured manner which always left a door open to repentance and timely amendment. He is never coarse, never suggestive. After he died the French farce, which he had raised to some- thing akin to literature, relapsed into its former grossness and unmeaning complexity. (A. Fi.)

His Theatre complet (10 vols., 1878-1879) contains a preface by Emile Augier.

LABICI, an ancient city of Latium, the modern Monte Compatri, about 17 m. S.E. from Rome, on the northern slopes of the Alban Hills, 1739 ft. above sea-level. It occurs among the thirty cities of the Latin League, and it is said to have joined the Aequi in 419 B.C. and to have been captured by the Romans in 418. After this it does not appear in history, and in the time of Cicero and Strabo was almost entirely deserted if not destroyed. Traces of its ancient walls have been noticed. Its place was taken by the respublicaLavicanorum Quintanensium, the post-station established in the lower ground on the Via Labicana (see Labicana, Via), a little S.W. of the modern village of Colonna, the site of which is attested by various inscriptions and by the course of the road itself.

See T. Ashby in Papers of the British School at Rome, i. 256 sqq. (T.

As.)

LABID (Abu ‘Aqll Labid ibn Rabi’a) (c. 560-c. 661), Arabian poet, belonged to the Bam ‘Amir, a division of the tribe of the Hawazin. In his younger years he was an active warrior and his verse is largely concerned with inter-tribal disputes. Later, he was sent by a sick uncle to get a remedy from Mahomet at Medina and on this occasion was much influenced by a part of the Koran. He accepted Islam soon after, but seems then to have ceased writing. In Omar’s caliphate he is said to have settled in Kufa. Tradition ascribes to him a long life, but dates given are uncertain and contradictory. One of his poems is contained in the Mo’allakat (q.v.).

Twenty of his poems were edited by Chalidi (Vienna, 1880); another thirty-five, with fragments and a German translation of the

whole, were edited (partly from the remains of A. Huber) by C. Brockelmann (Leiden, 1892); cf. A. von Kremer, Vber die Cedichle des Lebyd (Vienna, 1881). Stories of Labid are contained in the Kitdbul-Aghdni, xiv. 93 ff. and xv. 137 ff. (G. W. T.)

LABIENUS, the name of a Roman family, said (without authority) to belong to the gens Atia. The most important member was Titus Labienus. In 63 B.C., at Caesar’s instigation, he prosecuted Gaius Rabirius (q.v.) for treason; in the same year, as tribune of the plebs, he carried a plebiscite which in- directly secured for Caesar the dignity of pontifex maximus (Dio Cassius xxxvii. 37). He served as a legatus throughout Caesar’s Gallic campaigns and took Caesar’s place whenever he went to Rome. His chief exploits in Gaul were the defeat of the Treviri under Indutiomarus in 54, his expedition against Lutetia (Paris) in 52, and his victory over Camulogenus and the Aedui in the same year. On the outbreak of the civil war, however, he was one of the first to desert Caesar, probably owing to an overweening sense of his own importance, not adequately recognized by Caesar. He was rapturously welcomed on the Pompeian side; but he brought no great strength with him, and his ill fortune under Pompey was as marked as his success had been under Caesar. From the defeat at Pharsalus, to which he had contributed by affecting to despise his late comrades, he fled to Corcyra, and thence to Africa. There he was able by mere force of numbers to inflict a slight check upon Caesar at Ruspina in 46. After the defeat at Thapsus he joined the younger Pompey in Spain, and was killed at Munda (March 17th, 45).

LABLACHE, LUIGI (1794-1858), Franco-Italian singer, was born at Naples on the 6th of December 1 794, the son of a merchant of Marseilles who had married an Irish lady. In 1806 he entered the Conservatorio della Pieta de Turchini, where he studied music under Gentili and singing under Valesi, besides learning to play the violin and violoncello. As a boy he had a beautiful alto voice, and by the age of twenty he had developed a magnifi- cent bass with a compass of two octaves from Eb below to Eb above the bass stave. After making his first appearance at Naples he went to Milan in 181 7, and subsequently travelled to Turin, Venice and Vienna. His first appearances in London and Paris in 1830 led to annual engagements in both the English and French capitals. His reception at St Petersburg a few years later was no less enthusiastic. In England he took part in many provincial musical festivals, and was engaged by Queen Victoria to teach her singing. On the operatic stage he was equally successful in comic or tragic parts, and with his wonderfully powerful voice he could express either humour or pathos. Among his friends were Rossini, Bellini, Donizetti and Mercadante. He was one of the thirty-two torch-bearers chosen to surround the coffin at Beethoven's funeral in 1827. He died at Naples on the 23rd of January 1858 and was buried at Maison Lafitte, Paris. Lablache's Leporello in Don Giovanni was perhaps his most famous impersonation; among his principal other roles were Dandini in Cenerentola (Rossini), Assur in Semiramide (Rossini), Geronimo in La Gazza Ladra (Rossini), Henry VIII. in Anna Bolena (Donizetti), the Doge in Marino Faliero (Donizetti), the title-role in Don Pasquale (Donizetti), Geronimo in 77 Matrimonio Segreto (Cimarosa), Gritzenko in L'Etoile du Nord (Meyerbeer), Caliban in The Tempest (Halevy).

LABOR DAY, in the United States, a legal holiday in nearly all of the states and Territories, where the first Monday in September is observed by parades and meetings of labour organizations. In 1882 the Knights of Labor paraded in New York City on this day; in 1884 another parade was held, and it was decided that this day should be set apart for this purpose. In 1887 Colorado made the first Monday in September a legal holiday; and in 1909 Labor Day was observed as a holiday throughout the United States, except in Arizona and North Dakota; in Louisiana it is a holiday only in New Orleans (Orleans parish), and in Maryland, Wyoming and New Mexico it is not established as a holiday by statute, but in each may be proclaimed as such in any year by the governor.

LA BOURBOULE, a watering-place of central France, in the department of Puy-de-D6me, 4! m. W. by N. of Mont-Dore

by road. Pop. (1906) 1401. La Bourboule is situated on the right bank of the Dordogne at a height of 2790 ft. Its waters, of which arsenic is the characteristic constituent, are used in cases of diseases of the skin and respiratory organs, rheumatism, neuralgia, &c. Though known to the Romans they were not in much repute till towards the end of the 19th century. The town has three thermal establishments and a casirib.

LABOUR CHURCH, THE, an organization intended to give expression to the religion of the labour movement. This religion is not theological — it leaves theological questions to private individual conviction — but ” seeks the realization of universal well-being by the establishment of Socialism — a commonwealth founded upon justice and love.” It asserts that ” improvement of social conditions and the development of personal character are both essential to emancipation from social and moral bondage, and to that end insists upon the duty of studying the economic and moral forces of society.” The first Labour Church was founded at Manchester (England) in October 1891 by a Unitarian minister, John Trevor. This has disappeared, but vigorous successors have been established not only in the neighbourhood, but in Bradford, Birmingham, Nottingham, London, Wolverhampton and other centres of industry, about 30 in all, with a membership of 3000. Many branches of the Independent Labour Party and the Social Democratic Federation also hold Sunday gatherings for adults and children, using the Labour Church hymn-book and a similar form of service, the reading being chosen from Dr Stanton Coit’s Message of Man. There are special forms for child-naming, marriages and burials. The separate churches are federated in a Labour Church Union, which holds an annual conference and business meeting in March. At the conference of 1909, held in Ashton-under-Lyne, the name ” Labour Church ” was changed to ” Socialist Church.”

LA BOURDONNAIS, BERTRAND FRANQOIS, Count Mahe de (1699-1753), French naval commander, was born at Saint Malo on the 11th of February 1699. He went to sea when a boy, and in 1 718 entered the service of the French India Company as a lieutenant. In 1724 he was promoted captain, and displayed such bravery in the capture of Mahe of the Malabar coast that the name of the town was added to his own. For two years he was in the service of the Portuguese viceroy of Goa, but in r 735 he returned to French service as governor of the lie de France and the lie de Bourbon. His five years’ administration of the islands was vigorous and successful. A visit to France in 1740 was interrupted by the outbreak of hostilities with Great Britain, and La Bourdonnais was put at the head of a fleet in Indian waters. He saved Mahe, relieved General Dupleix at

Pondicherry, defeated Lord Peyton, and in 1746 participated in the siege of Madras. He quarrelled with Dupleix over the conduct of affairs in India, and his anger was increased on his return to the lie de France at finding a successor to himself installed there by his rival. He set sail on a Dutch vessel to present his case at court, and was captured by the British, but allowed to return to France on parole. Instead of securing a settlement of his quarrel with Dupleix, he was arrested (1748) on a charge of gubernatorial peculation and maladministration, and secretly imprisoned for over two years in the Bastille. He was tried in 17 51 and acquitted, but his health was broken by the imprisonment and by chagrin at the loss of his property. To the last he made unjust accusations against Dupleix. He died at Paris on the 10th of November 1753. The French government gave his widow a pension of 2400 livres.

La Bourdonnais wrote Traite de la mdture des vaisseaux (Paris 1723), and left valuable memoirs which were published by his grandson, a celebrated chess player, Count L. C. Mahe de la Bourdonnais (1795-1840) (latest edition, Paris, 1890). His quarrel with Dupleix has given rise to much debate; for a long while the fault was generally laid to the arrogance and jealousy of Dupleix, but W. Cartwright and Colonel Malleson have pointed out that La Bourdonnais was proud, suspicious and over-ambitious.

LABOUR EXCHANGE— LABOUR LEGISLATION

See P. de Gennes, Memoire pour le sieur de la Bourdonnais, avec les pieces justificatives (Paris, 1750); The Case of Mde la Bourdon-, nais, in a Letter to a Friend (London, 1748); Fantin des Odoards, Revolutions de I'lnde (Paris, 1796); Collin de Bar, Histoire de VInde ancienne et moderne (Paris, 1814); Barchou de Penhoen, Histoire de la conquete et de la fondation de V empire anglais dans VInde (Paris, 1840) ; Margry, " Les Isles de France et de Bourbon sous le gouvernement de La Bourdonnais," in La Revue maritime et coloniale (1862); W. Cartwright, " Dupleixet l'lndefrancaise," in La Revue britannique (1882); G. B. Malleson, Dupleix (Oxford, 1895); Anandaranga Pillai, Les Franqais dans VInde, Dupleix et Labour donnais, extraits du journal d'Anandaran-gappoulle 1736-1748, trans, in French by Vinsor in Ecole speciale des langues orientales vivantes, series 3, vol. xv. (Paris, 1894).

LABOUR EXCHANGE, a term very frequently applied to registries having for their principal object the better distribution of labour (see Unemployment). Historically the term is applied to the system of equitable labour exchanges established in England between 1832 and

1834 by Robert Owen and his followers. The idea is said to have originated with Josiah Warren, who communicated it to Owen. Warren tried an experiment in 1828 at Cincinnati, opening an exchange under the title of a ” time store.” He joined in starting another at Tuscarawas, Ohio, and a third at Mount Vernon, Indiana, but none were quite on the same line as the English exchanges. The funda- mental idea of the English exchanges was to establish a currency based upon labour; Owen in The Crisis for June 1832 laid down that all wealth proceeded from labour and knowledge; that labour and knowledge were generally remunerated according to the time employed, and that in the new exchanges it was proposed to make time the standard or measure of wealth. This new currency was represented by ” labour notes,” the notes being measured in hours, and the hour reckoned as being worth sixpence, this figure being taken as the mean between the wage of the best and the worst paid labour. Goods were then to be exchanged for the new currency. The exchange was opened in extensive premises in the Gray’s Inn Road, near King’s Cross, London, on the 3rd of September 1832. For some months the establishment met with considerable success, and a consider- able number of tradesmen agreed to take labour notes in payment for their goods. At first, an enormous number of deposits was made, amounting in seventeen weeks to 445,501 hours. But difficulties soon arose from the lack of sound practical valuators, and from the inability of the promoters to distinguish between the labour of the highly skilled and that of the unskilled. Trades- men, too, were quick to see that the exchange might be worked to their advantage; they brought unsaleable stock from their shops, exchanged it for labour notes, and then picked out the best of the saleable articles. Consequently the labour notes began to depreciate; trouble also arose with the pro- prietors of the premises, and the experiment came to an untimely end early in 1834.

See F. Podmore’s Robert Owen, ii. c. xvii. (1906) ; B. Jones, Co-operative Production, c. viii. (1894); G. J. Holyoake, History of Co-operation, c. viii. (1906).

LABOUR LEGISLATION. Regulation of labour, 1 in some form or another, whether by custom, royal authority, ecclesi- astical rules or by formal legislation in the interests of a com- munity, is no doubt as old as the most ancient forms of civiliza- tion. And older than all civilization is the necessity for the greater part of mankind to labour for maintenance, whether freely or in bonds, whether for themselves and their families or for the requirements or superfluities of others. Even while it is clear, however, that manual labour, or the application of the bodily forces — with or without mechanical aid — to personal

mainten- ance and the production of goods, remains the common lot of the majority of citizens of the most developed modern com- munities, still there is much risk of confusion if modern technical terms such as ” labour,” ” employer,” ” labour legislation ” are freely applied to conditions in bygone civilizations with wholly different industrial organization and social relationships.

1 The term ” labour ” (Lat. labor) means strictly any energetic work, though in general it implies hard work, but in modern

Earlance it is specially confined to industrial work of the kind done y the ” working-classes.”

In recent times in England there has been a notable disappearance from current use of correlative terms implying a social relation- ship which is greatly changed, for example, in the rapid passage from the Master and Servant Act 1867 to the Employer and Workman Act 1875. In the 18th century the term ‘ manu- facturer ” passed from its application to a working craftsman to its modern connotation of at least some command of capital, the employer being no longer a small working master. An even more significant later change is seen in the steady develop- ment of a labour legislation, which arose in a clamant social need for the care of specially helpless ” protected ” persons in factories and mines, into a wider legislation for the promotion of general industrial health, safety and freedom for the worker from fraud in making or carrying out wage contracts.

If, then, we can discern these signs of important changes within so short a period, great caution is needed in rapidly reviewing long periods of time prior to that industrial revolution which is traced mainly to the application of mechanical power to machinery in aid of manual labour, practically begun and completed within the second half of the 18th century. ” In 1740 save for the fly-shuttle the loom was as it had been since weaving had begun . . . and the law of the land was” (under the Act of Apprentices of 1563) “that wages in each district should be assessed by Justices of the Peace.” 2 Turning back to still earlier times, legislation — whatever its source or authority — must clearly be devoted to aims very different from modern aims in regulating labour, when it arose before the labourer, as a man dependent on an ” employer ” for the means of doing work, had appeared, and when migratory labour was almost unknown through the serfdom of part of the population and the special status secured in towns to the artisan.

In the great civilizations of antiquity there were great aggrega- tions

of labour which was not solely, though frequently it was predominantly, slave labour; and some of the features of manufacture and mining on a great scale arose, producing the same sort of evils and industrial maladies known and regulated in our own times. Some of the maladies were described by Pliny and classed as ” diseases of slaves.” And he gave descriptions of processes, for example in the metal trades, as belonging entirely to his own day, which modern archaeological discoveries trace back through the earliest known Aryan civilizations to a pre- historic origin in the East, and which have never died out in western Europe, but can be traced in a concentrated manu- facture with almost unchanged methods, now in France, now in Germany, now in England.

Little would be gained in such a sketch as this by an endeavour to piece together the scattered and scanty materials for a com- parative history of the varying conditions and methods of labour regulation over so enormous a range. While our knowledge continually increases of the remains of ancient craft, skill and massed labour, much has yet to be discovered that may throw light on methods of organization of the labourers. While much, and in some civilizations most, of the labour was compulsory or forced, it is clear that too much has been sometimes assumed, and it is by no means certain that even the pyramids of Egypt, much less the beautiful earliest Egyptian products in metal work, weaving and other skilled craft work, were typical products of slave labour. Even in Rome it was only at times that the proportion of slaves valued as property was greater than that of hired workers, or, apart from capture in war or self-surrender in discharge of a debt, that purchase of slaves by the trader, manufacturer or agriculturist was generally considered the cheapest means of securing labour, As in early England the various stages of village industrial life, medieval town manufacture, and organization in craft gilds, and the beginnings of the mercantile system, were parallel with a greater or less prevalence of serfdom and even with the presence in part of slavery, so in other ages and civilizations the various methods of organization of labour are found to some extent together. The Germans in their primitive settlements were accustomed to the notion of slavery, and in the decline of the 2 H. D. Traill, Social England, v. 602 (1896).

Roman Empire Roman captives from among the most useful craftsmen were carried away by their northern conquerors.

The history and present details of the labour laws of various countries are dealt with below in successive sections: (i) history of legislation in the United Kingdom; (2) the results as shown by the law in force in 1909, with the corresponding facts for (3) Continental Europe and (4) the United States. Under other headings (Trade-Unions, Strikes and Lock-0#ts, Arbitra- tion and Conciliation, &c, &c.) are many details on cognate subjects.

1. History in the United Kingdom

1 . Until the Close of the 15th Century. — Of the main conditions of industrial labour in early Anglo-Saxon England details are scanty. Monastic industrial communities were added in Christian times to village industrial communities. While generally husbandry was the first object of toil, and developed under elaborate regulation in the manorial system, still a con- siderable variety of industries grew up, the aim being expressly to make each social group self-sufficing, and to protect and regulate village artisans in the interest of village resources. This pro- tective system, resting on a communal or co-operative view of labour and social life, has been compared as analogous to the much later and wider system under which the main purpose was to keep England as a whole self sufficing. 1 It has also been shown how greatly a fresh spirit of enterprise in industry and trade was stimulated first by the Danish and next by the Norman invasion; the former brought in a vigour shown in growth of villages, increase in number of freemen, and formation of trading towns; the latter especially opened up new communications with the most civilized continental people, and was followed by a considerable immigration of artisans, particularly of Flemings. In Saxon England slavery in the strictest sense existed, as is shown in the earliest English laws, but it seems that the true slave class as distinct from the serf class was com- paratively small, and it may well be that the labour of an ordinary serf was not practically more severe, and the remunera- tion in maintenance and kind not much less than that of agri- cultural labourers in recent times. In spite of the steady protest of the Church, slavery (as the exception, not the general rule) did not die out for many centuries, and was apt to be revived as a punishment for criminals, e.g. in the fierce provisions of the statute of Edward VI. against beggars, not repealed until 1 597. At no time, however, was it general, and as the larger village and city populations grew the ratio of serfs and slaves to the freemen in the whole population rapidly diminished, for the city populations ” had not the habit and use of

slavery," and while serfs might sometimes find a refuge in the cities from exceptionally severe taskmasters, " there is no doubt that free-men gradually united with them under the lord's protection, that strangers engaged in trade sojourned among them, and that a race of artisans gradually grew up in which original class feelings were greatly modified." From these conditions grew two parallel tendencies in regulation of labour. On the one hand there was, under royal charters, the burgh or municipal organiza- tion and control of artisan and craft labour, passing later into the more specialized organization in craft gilds; on the other hand, there was a necessity, sometimes acute, to prevent undue diminution in the numbers available for husbandry or agricul- tural labour. To the latter cause must be traced a provision appearing in a succession of statutes (see especially an act of Richard II., 1388), that a child under twelve years once employed in agriculture might never be transferred to apprenticeship in a craft. The steady development of England, first as a wool- growing, later as a cloth-producing country, would accentuate this difficulty. During the 13 th century, side by side with de- velopment of trading companies for the export of wool from England, may be noted many agreements on the part of monas- teries to sell their wool to Florentines, and during the same century absorption of alien artisans into the municipal system was practically completed. Charters of Henry I. provided for 1 W. Cunningham, Growth of English Commerce and Industry.

naturalization of these aliens. From the time of Edward I. to Edward III. a gradual transference of burgh customs, so far as recognized for the common good, to statute law was in pro- gress, together with an assertion of the rights of the crown against ecclesiastical orders. " The statutes of Edward I.," says Dr. Cunningham, " mark the first attempt to deal with Industry and Trade as a public matter which concerns the whole state, not as the particular affair of leading men in each separate locality." The first direct legislation for labour by statute, however, is not earlier than the twenty-third year of the reign of Edward III., and it arose in an attempt to control the decay and ruin, both in rural and urban districts, which followed the Hundred Years' War, and the pestilence known as the Black Death. This first " Statute of Labourers " was designed for the benefit of the community, not for the protection of labour or prevention of oppression, and the policy of enforcing customary wages and compelling the able-bodied labourer, whether free or bond, not living in merchandise or exercising any craft, to work for hire at recognized rates of pay, must be reviewed in the circumstances and ideals of the time. Regulation generally in the middle ages aimed at preventing any individual or section of the

community from making what was considered an excep- tional profit through the necessity of others. 2 The scarcity of labour by the reduction of the population through pestilence was not admitted as a justification for the demands for increased pay, and while the unemployed labourer was liable to be com- mitted to gaol if he refused service at current rates, the lords of the towns or manors who promised or paid more to their servants were liable to be sued treble the sum in question. Similar restrictions were made applicable to artificers and workmen. By another statute, two years later, labourers or artificers who left their work and went into another county were liable to be arrested by the sheriff and brought back. These and similar provisions with similar aims were confirmed by statutes of 1360, 1368 and 1388, but the act of 1360, while prohibiting " all alliances and covins of masons, carpenters, congregations, chapters, ordinances and oaths betwixt them made," allowed "every lord to bargain or covenant for their works in gross with such labourers and artificers when it pleaseth them, so that they perform such works well and lawfully according to the bargain and covenant with them thereof made." Powers were given by the acts of 1368 and 1388 to justices to determine matters under these statutes and to fix wages. Records show that workmen of various descriptions were pressed by writs addressed to sheriffs to work for their king at wages regardless of their will as to terms and place of work. These proceedings were founded on notions of royal prerogative, of which impress- ment of seamen survived as an example to a far later date. By an act of 1388 no servant or labourer, man or woman, however, could depart out of the hundred to serve elsewhere unless bearing a letter patent under the king's seal stating the cause of going and time of return. Such provisions would appear to have widely failed in their purpose, for an act of 1414 declares that the servants and labourers fled from county to county, and justices were empowered to send writs to the sheriffs for fugitive labourers as for felons, and to examine labourers, servants and their masters, as well as artificers, and to punish them on con- fession. An act of 1405, while putting a property qualification on apprenticeship and requiring parents under heavy penalties to put their children to such labour as their estates required, made a reservation giving freedom to any person " to send their children to school to learn literature." Up to the end of the 1 5th century a monotonous succession of statutes strengthening, modifying, amending the various attempts (since the first Statute of Labourers) to limit free movement of labour, or demands by labourers for increased wages, may be seen in the acts of 1411, 1427, 1444, 1495. It was clearly found extremely difficult, if not impracticable, to carry out the minute control of wages considered desirable, and exceptions in favour of certain occupations were in

some of the statutes themselves. In 151 2 the penalties for giving wages contrary to law were repealed so 2 W. Cunningham, Growth of English Commerce and Industry.

far as related to masters, but it also appears that London work- men would not endure the prevalent restrictions as to wages, and that they secured in practice a greater freedom to arrange rates when working within the city. Several of these statutes, and especially one of 1514, fixed the hours of labour when limiting wages. During March to September the limits were 5 a.m. to 7 or 8 p.m., with half an hour off for breakfast and an hour and a half off for midday dinner. In winter the outside limits were fixed by the length of daylight.

Throughout the 15th century the rapidly increasing manu- facture of cloth was subject to a regulation which aimed at maintaining the standard of production and prevention of bad workmanship, and the noteworthy statute 4 Edward IV. c. 1, while giving power to royal officers to supervise size of cloths, modes of sealing, &c, also repressed payment to workers in ” pins, girdles and unprofitable wares,” and ordained payment in true and lawful money. This statute (the first against ” Truck “) gives an interesting picture of the way in which clothiers — or, as we should call them, wholesale merchants and manufacturers — delivered wool to spinners, carders, &c, by weight, and paid for the work when brought back finished. It appears that the work was carried on in rural as well as town districts. While this industry was growing and thriving other trades remained backward, and agriculture was in a depressed condition. Craft gilds had primarily the same purpose as the Edwardian statutes, that is, of securing that the public should be well served with good wares, and that the trade and manu- facture itself should be on a sound basis as to quality of products and should flourish. Incidentally there was considerable regula- tion by the gilds of the conditions of labour, but not primarily in the interests of the labourer. Thus night work was prohibited because it tended to secrecy and so to bad execution of work; working on holidays was prohibited to secure fair play between craftsmen and so on. The position of apprentices was made clear through indentures, but the position of journeymen was less certain. Signs are not wanting of a struggle between journey- men and masters, and towards the end of the 15th century masters themselves, in at least the great wool trade, tended to develop from craftsmen into something more like the modern capitalist employer; from an act of 1555 touching weavers it

is quite clear that this development had greatly advanced and that cloth-making was carried on largely by employers with large capitals. Before this, however, while a struggle went on between the town authorities and the craft gilds, journey- men began to form companies' of their own, and the result of the various conflicts may be seen in an act of Henry VI., providing that in future new ordinances of gilds shall be submitted to justices of the peace — a measure which was strengthened in

2. From Tudor Days until the Close of the i8lh Century. — A detailed history of labour regulation in the 16th century would include some account of .the Tudor laws against vagrancy and methods of dealing with the increase of pauperism, attributable, at least in part, to the dissolution of the monasteries under Henry VIII., and to the confiscation of craft gild funds, which proceeded under Somerset and Edward VI. It is sufficient here to point to the general recognition of the public right to compel labourers to work and thus secure control of unemployed as well as employed. The statutes of Henry VIII. and Edward VI. against vagrancy differed rather in degree of severity than in principle from legislation for similar purposes in previous and subsequent reigns. The Statute of Labourers, passed in the fifth year of Elizabeth 's reign (1562), as well as the poor law of the same year, was to a considerable extent both a consolidating and an amending code of law, and was so securely based on public opinion and deeply rooted custom that it was maintained in force for two centuries. It avowedly approves of principles and aims in earlier acts, regulating wages, punishing refusal to work, and preventing free migration of labour. It makes, however, a great advance in its express aim of protecting the poor labourer against insufficient wages, and of devising a machinery, by frequent meeting of justices, which might yield

"unto the hired person both in time of scarcity and in time of plenty a convenient proportion of wages." Minute regulations were made governing the contract between master and servant, and their mutual rights and obligations on parallel lines for (a) artificers, (b) labourers in husbandry. Hiring was to be by the year, and any unemployed person qualified in either calling was bound to accept service on pain of imprisonment, if required, unless possessed of property of a specified amount or engaged in art, science or letters, or being a " gentleman." Persons leaving a service were bound to obtain a testimonial, and might not be taken into fresh employment without produc- ing such testimonial, or, if in a new district, until after showing it to the authorities of. the place. A master might be fined £5, and a labourer imprisoned, and if contumacious, whipped, for breach

of this rule. The carefully devised scheme for technical training of apprentices embodied to a considerable extent the methods and experiences of the craft gilds. Hours of labour were as follows: “All artificers and labourers being hired for wages by the day or week shall, betwixt the midst of the months of March and September, be and continue at their work at or before 5 o ‘clock in the morning and continue at work and not depart until betwixt 7 and 8 o ‘clock at night, except it be in the time of breakfast, dinner or drinking, the which time at the most shall not exceed two hours and a half in a day, that is to say, at every drinking half an hour, for his dinner one hour and for his sleep when he is allowed to sleep, the which is from the midst of May to the midst of August, half an hour; and all the said artificers and labourers betwixt the midst of September and the midst of March shall be and continue at their work from the spring of the day in the morning until the night of the same day, except it be in time afore appointed for breakfast and dinner, upon pain to lose and forfeit one penny for every hour’s absence, to be deducted and defaulked out of his wages that shall so offend.” Although the standpoint of the Factory Act and Truck Act in force at the beginning of the 20th century as regards hours of labour or regulation of fines deducted from wages is completely reversed, yet the difference is not great between the average length of hours of labour permissible under lihe present law for women and those hours imposed upon the adult labourer in Elizabeth ‘s statute. Apart from the stand- point of compulsory imposition of fines, one advantage in the defmiteness of amount deductable from wages would appear to lie on the side of the earlier statute.

Three points remain to be touched on in connexion with the Elizabethan poor law. In addition to (a) consolidation of measures for setting vagrants to work, we find the first com- pulsory contributions from the well-to-do towards poor relief there provided for, (&) at least a theoretical recognition of a right as well as an obligation on the part of the labourer to be hired, (c) careful provision for the apprenticing of destitute children and orphans to a trade.

One provision of considerable interest arose in Scotland, which was nearly a century later in organizing provisions for fixing conditions of hire and wages of workmen, labourers and servants, similar to those consolidated in the Elizabethan Statute of Labourers. In 1617 it was provided (and reaffirmed in i66r) that power should be given to the sheriffs to compel payment of wages, ‘ that servants may be the more willing to obey the ordinance.” The difficulties in regulation of compulsory labour in Scotland must, however, have been great, for in 1672 houses of correction were erected for disobedient servants, and

masters of these houses were empowered to force them to work and to correct them according to their demerits. While servants in manufacture were compelled to work at reasonable rates they might not enter on a new hire without their previous master's consent.

Such legislation continued, at least theoretically, in force until the awakening effected by the beginning of the industrial revolution — that is, until the combined effects of steady con- centration of capital in the hands of employers and expansion of trade, followed closely by an unexampled development of invention in machinery and application of oower to its use.

completely altered the face of industrial England. From time to time, in respect of particular trades, provisions against truck and for payment of wages in current coin, similar to the act of Edward IV. in the woollen industry, were found necessary, and this branch of labour legislation developed through the reigns of Anne and the four Georges until consolidation and amendment were effected, after the completion of the industrial revolution, in the Truck Act of 1831. From the close of the 17th century and during the 18th century the legislature is no longer mainly engaged in devising means for compelling labourers and artisans to enter into involuntary service, but rather in regulating the summary powers of justices of the peace in the matter of dispute between masters and servants in relation to contracts and agreements, express or implied, presumed to have been entered into voluntarily on both sides. While the movement to refer labour questions to the jurisdiction of the justices thus gradually developed, the main subject matter for their exercise of jurisdiction in regard to labour also changed, even when theoretically for a time the two sets of powers — such as (a) moderation of craft gild ordinances and punishment of workers refusing hire, or (b) fixing scales of wages and enforce- ment of labour contracts — might be concurrently exercised. Even in an act of George II. (1746) for settlement of disputes and differences as to wages or other conditions under a contract of labour, power was retained for the justices, on complaint of the masters of misdemeanour or ill-behaviour on the part of the servant, to discharge the latter from service or to send him to a house of correction " there to be corrected," that is, to be held to hard labour for a term not exceeding a month or to be corrected by whipping. In

an act with similar aims of George IV. (1823), with a rather-wider scope, the power to order corporal punishment, and in 1867 to hard labour, for breach of labour contracts had disappeared, and soon after the middle of the 19th century the right to enforce contracts of labour also dis- appeared. Then breach of such labour contracts became simply a question of recovery of damages, unless both parties agreed that security for performance of the contract shall be given instead of damages.

While the endeavour to enforce labour apart from a contract died out in the latter end of the 18th century, sentiment for some time had strongly grown in favour of developing early industrial training of children. It appears to have been a special object of charitable and philanthropic endeavour in the 17th century, as well as the 18th, to found houses of industry, in which little children, even under five years of age, might be trained for apprenticeship with employers. Connected as this development was with poor relief, one of its chief aims was to prevent future unemployment and vagrancy by training in habits and knowledge of industry, but not unavowed was another motive: ” from children thus trained up to constant labour we may venture to hope the lowering of its price.” l The evils and excesses which lay enfolded within such a move- ment gave the first impulse to the new ventures in labour legislation which are specially the work of the 19th century. Evident as it is ” that before the Industrial Revolution very young children were largely employed both in their own homes and as apprentices under the Poor Law,” and that ” long before Peel’s time there were misgivings about the apprenticeship system,” still it needed the concentration and prominence of suffering and injury to child life in the factory system to lead to parliamentary intervention.

3. From 1800 to the Codes of 1872 and 1878. — A serious out- break of fever in 1784 in cotton mills near Manchester appears to have first drawn widespread and influential public opinion to the overwork of children, under terribly dangerous and insanitary conditions, on which the factory system was then largely being carried on. A local inquiry, chiefly by a group of medical men presided over by Dr Percival, was instituted by the justices of the peace for Lancashire, and in the forefront of the resulting report stood a recommendation for limitation

1 From an ” Essay on Trade ” (1770) , quoted in History of Factory Legislation, by B. L. Hutchinsand A. Harrison (1903). pp. 5, 6.

and control of the working hours of the children. A resolution by the county justices followed, in which they declared their intention in

future to refuse ” indentures of parish Apprentices whereby they shall be bound to Owners of Cotton Mills and other works in which children are obliged to work in the night or more than ten hours in the day.” In 1795 the Manchester Board of Health was formed, which, with fuller information, mere definitely advised legislation for the regulation of the hours and conditions of labour in factories. In 1802 the Health and Morals of Apprentices Act was passed, which in effect formed the first step towards prevention of injury to and protection of labour in factories. It was directly aimed only at evils of the apprentice system, under which large numbers of pauper children were worked in cotton and woollen mills without education, for excessive hours, under wretched conditions. It did not apply to places employing fewer than twenty persons or three apprentices, and it applied the principle of limitation of hours (to twelve a day) and abolition of night work, as well as educational require- ments, only to apprentices. Religious teaching and suitable sleeping accommodation and clothing were provided for in the act, also as regards apprentices. Lime-washing and ventilation provisions applied to all cotton and woollen factories employing more than twenty persons. ” Visitors ” were to be appointed by county justices for repression of contraventions, and were empowered to ” direct the adoption of such sanitary regulations as they might on advice think proper.” The mills were to be registered by the clerk of the peace, and justices had power to inflict fines of from £2 to £5 for contraventions. Although enforcement of the very limited provisions of the act was in many cases poor or non-existent, in some districts excellent work was done by justices, and in 1803 the West Riding of Yorkshire justices passed a resolution substituting the ten hours’ limit for the twelve hours’ limit of the act, as a condition of permission for indenturing of apprentices in mills.

Rapid development of the application of steam power to manu- facture led to growth of employment of children in populous centres, otherwise than on the apprenticeship system, and before long the evils attendant on this change brought the general question of regulation and protection of child labour in textile factories to the front. The act of 1819, limited as it was, was a noteworthy step forward, in that it dealt with this wider ■ scope of employment of children in cotton factories, and it is satisfactory to record that it was the outcome of the efforts and practical experiments of a great manufacturer, Robert Owen. Its provisions fell on every point lower than the aims he put forward on his own experience as practicable, and notably in its application only to cotton mills instead of all textile factories. Prohibition of child labour under nine years of age and limitation of

the working day to twelve in the twenty-four (without specifying the precise hour of beginning and closing) were the main provisions of this act. No provision was made for enforce- ment of the law beyond such as was attempted in the act of 1802. Slight amendments were attempted in the acts of 1825 and 1 83 1, but the first really important factory act was in 1833 applying to textile factories generally, limiting employment of young persons under eighteen years of age, as well as children, prohibiting night work between 8.30 p.m. and 5.30 a.m., and first providing for ” inspectors ” to enforce the law. This is the act which was based on the devoted efforts of Michael Sadler, with whose name in this connexion that of Lord Ashley, afterwards earl of Shaftesbury, was from 1832 associated. The importance of this act lay in its provision for skilled inspec- tion and thus for enforcement of the law by an independent body of men unconnected with the locality in which the manu- factures lay, whose specialization in their work enabled them to acquire information needed for further development of legislation for protection of labour. Their powers were to a certain extent judicial, being assimilated to those possessed by justices; they could administer oaths and make such ” rules, regulations and orders ” as were necessary for execution of the act, and could hear complaints and impose penalties under the act. In 1844 a textile factory act modified these extensive

inspectoral powers, organizing the service on lines resembling those of our own time, and added provision for certifying surgeons to examine workers under sixteen years of age as to physical fitness for employment and to grant certificates of age and ordinary strength. Hours of labour, by the act of 1833, were limited for children under eleven to 9 a day or 48 in the week, and for young persons under eighteen to 12 a day or 69 in the week. Between 1833 and 1844 the movement in favour of a ten hours’ day, which had long been in progress, reached its height in a time of great commercial and industrial distress, but could not be carried into effect until 1847. By the act of 1844 the hours of adult women were first regulated, and were limited (as were already those of ” young persons “) to 12 a day; children were permitted either to work the same hours on alter- nate days or ” half-time,” with compulsory school attendance as a condition of their employment. The aim in thus adjusting the hours of the three classes of workers was to provide for a practical standard

working-day. For the first time detailed provisions for health and safety began to make their appearance in the law. Penal compensation for preventible injuries due to unfenccd machinery was also provided, and appears to have been the outcome of a discussion by witnesses before the Royal Commission on Labour of Young Persons in Mines and Manu- factures in 1841.

From this date, 1841, begin the first attempts at protective legislation for labour in mining. The first Mines Act of 1842 following the terrible revelations of the Royal Commission referred to excluded women and girls from underground working, and limited the employment of boys, excluding from underground working those under ten years, but it was not until 1850 that systematic reporting of fatal accidents and until 1855 that other safeguards for health, life and limb in mines were seriously provided by law. With the exception of regulations against truck there was no protection for the miner before 1842; before 1814 it was not customary to hold inquests on miners killed by accidents in mines. From 1842 onwards considerable inter- action in the development of the two sets of acts (mines and factories), as regards special protection against industrial injury to health and limb, took place, both in parliament and in the department (Home Office) administering them. Another strong influence tending towards ultimate development of scientific protection of health and life in industry began in the work and reports of the series of sanitary commissions and Board of Health reports from 1843 onwards. In 1844 the mines inspector made his first report, but two years later women were still employed to some extent underground. Organized inspec- tion began in 1850, and in 1854 the Select Committeeon Accidents adopted a suggestion of the inspectors for legislative extension of the practice of several colliery owners in framing special safety rules for working in mines. The act of 1855 provided seven general rules, relating to ventilation, fencing of disused shafts, proper means for signalling, proper gauges and valve for steam-boiler, indicator and brake for machine lowering and raising; also it provided that detailed special rules submitted by mine-owners to the secretary of state, might, on his approval, have the force of law and be enforceable by penalty. The Mines Act of i860, besides extending the law to ironstone mines, following as it did on a series of disastrous accidents and explosions, strengthened some of the provisions for safety. At several inquests strong evidence was given of incompetent management and neglect of rules, and a demand was made for enforcing employment only of certificated managers of coal mines. This was not met until the act of 1872, but in i860 certain sections relating to wages and education were introduced. Steady development of the coal industry,

increasing association among miners, and increased scientific knowledge of means of ventilation and of other methods for securing safety, all paved the way to the Coal Mines Act of 1872, and in the same year health and safety in metalliferous mines received their first legislative treatment in a code of similar scope and character to that of the Coal Mines Act. This act was amended in 1886, and repealed and recodified in 1887; its principal provisions

are still in force, with certain revised special rules and modifica- tions as regards reporting of accidents (1906) and employment of children (1903). It was based on the recommendations of a Royal Commission, which had reported in 1864, and which had shown the grave excess of mortality and sickness among metal- liferous miners, attributed to the inhalation of gritty particles, imperfect ventilation, great changes of temperature, excessive physical exertion, exposure to wet, and other causes. The pro- hibition of employment of women and of boys under ten years underground in this class of mines, as well as in coal mines, had been effected by the act of 1842, and inspection had been provided for in the act of i860; these were in amended form included in the code of 1872, the age of employment of boys underground being raised to twelve. In the Coal Mines Act of 1872 we see the first important effort to provide a complete code of regulation for the special dangers to health, life and limb in coal mines apart from other mines; it applied to ” mines of coal, mines of stratified ironstone, mines of shale and mines of fire-clay.” Unlike the companion act — applying to all other mines — it maintained the age limit of entering under- ground employment for boys at ten years, but for those between ten and twelve it provided for a system of working analogous to the half-time system in factories, including compulsory school attendance. The limits of employment for boys from twelve to sixteen were 10 hours in any one day and 54 in anyone week. The chief characteristics of the act lay in extension of the ” general ” safety rules, improvement of the method of formulat- ing ” special ” safety rules, provision for certificated and com- petent management, and increased inspection. Several important matters were transferred from the special to the general rules, such as compulsory use of safety lamps where needed, regulation of use of explosives, and securing of roofs and sides. Special rules, before being submitted to the secretary of state for approval, must be posted in the mine for two weeks, with a notice that objections might be sent by any person employed to the district inspector. Wilful neglect of safety provisions became punishable in the case of employers as well as miners by imprisonment with hard labour. But the most important new step lay in the sections relating to daily control and super- vision of every

mine by a manager holding a certificate of com- petency from the secretary of state, after examination by a board of examiners appointed by the secretary of state, power being retained for him to cause later inquiry into competency of the holder of the certificate, and to cancel or suspend the certificate in case of proved unfitness.

Returning to the development of factory and workshop law from the year 1844, the main line of effort — after the act of 1847 had restricted hours of women and young persons to 10 a day and fixed the daily limits between 6 a.m. and 6 P.M. (Saturday 6 a.m. to 2 p.m.) — lay in bringing trade after trade in some degree under the scope of this branch of law, which had hitherto only regulated conditions in textile factories. Bleaching and dyeing works were included by the acts of i860 and 1862; lace factories by that of 1861; calendering and finishing by acts of 1863 and 1864; bakehouses became partially regulated by an act of 1863, with special reference to local authorities for administration of its clauses. The report of the third Children's Employment Commission brought together in accessible form the miserable facts relating to child labour in a number of un- regulated industries in the year 1862, and the act of 1864 brought some of (these earthenware-making, lucifer match-making, percussion cap and cartridge making, paper-staining, and fustian cutting) partly under the scope of the various textile factory acts in force. A larger addition of trades was made three years later, but the act of 1864 is particularly interesting in that it first embodied some of the results of inquiries of expert medical and sanitary commissioners, by requiring ventilation to be applied to the removal of injurious gases, dust, and other im- purities generated in manufacture, and made a first attempt to engraft part of the special rules system from the mines acts. The provisions for framing such rules disappeared in the Con- 1 solidating Act of 1878, to be revived in a better form later.

The Sanitary Act of 1866, administered by local authorities, provided for general sanitation in any factories and workshops not under existing factory acts, and the Workshops Regulation Act of 1867, similarly to be administered by local authorities, amended in 1870, practically completed the application of the main principle of the factory acts to all places in which manual labour was exercised for gain in the making or finishing of articles or parts of articles for sale.

A few specially dangerous or injurious trades brought under regulation in 1864 and 1867 (e.g. earthenware and lucifer match making, glass-making) ranked as “factories,” although not using mechanical power, and for a time employment of less than fifty persons relegated certain work-places to the category of “workshops,” but broadly the presence or absence of such motor power in aid of process was made and has remained the distinction between factories and workshops. The Factory Act of 1874, the last of the series before the great Consolidating Act of 1878, raised the minimum age of employment for children to ten years in textile factories. In most of the great inquiries into conditions of child labour the fact has come clearly to light, in regard to textile and non- textile trades alike, that parents as much as any employers have been responsible for too early employment and excessive hours of employment of children, and from early times until to-day in factory legislation it has been recognized that they must to some extent be held responsible for due observation of the limits imposed. For example, in 1831 it was found necessary to protect occupiers against parental responsibility for false certificates of age, and in 1833 parents of a child or ” any Person having any benefit from the wages of such child ” were made to share responsibility for employment of children without school attendance or beyond legal hours.

During the discussions on the bill which became law in 1874, it had become apparent that revision and consolidation of the multiplicity of statutes then regulating manufacturing industry had become pressingly necessary; modifications and exceptions for exceptional conditions in separate industries needed re- consideration and systematization on clear principles, and the main requirements of the law could with great advantage be applied more generally to all the industries. In particular, the daily limits as to period of employment, pauses for meals, and holidays, needed to be unified for non-textile factories and workshops, so as to bring about a standard working-day, and thus prevent the tendency in “the larger establishments to farm out work among the smaller, where it is done under less favourable conditions both sanitary and educational. ” 1 In these main directions, and that of simplifying definitions, sum- marizing special sanitary provisions that had been gradually introduced for various trades, and centralizing and improving the organization of the inspectorate, the Commission of 1876 on the Factory Acts made its recommendations, and the Factory Act of 1878 took effect. In the fixed working-day, provisions for pauses, holidays, general and special exceptions, distinctions between systems of employment for children, young persons and women, education of children and certificates of fitness

for children and young persons, limited regulation of domestic workshops, general principles of administration and definitions, the law of 1878 was made practically the same as that embodied in the later principal act of 1001. More or less completely revised are: (a) the sections in the 1878 act relating to mode of control- ling sanitary conditions in workshops (since 1891 primarily enforced by the local sanitary authority); (b) provision for reporting accidents and for enforcing safety (other than fencing of mill gearing and dangerous machinery); (c) detailed regula- tion of injurious and dangerous process and trades; (d) powers of certifying surgeons; (e) amount of overtime permissible (greatly reduced in amount and now confined to adults) ; (/) age for permissible employment of a child has been raised from ten years to twelve years. Entirely new since the act of 1878 are the provisions: (a) for control of outwork; (b) for supplying particulars of work and wages to piece-workers, enabling them

1 Minutes of Evidence, House of Commons, 1876; quoted in History of Factory Legislation, by Harrison and Hutchinson, p. 179.

to compute the total amount of wages payable to them; (e) extension of the act to laundries; (/) a tentative effort to limit the too early employment of mothers after childbirth.

II. Law of United Kingdom, 1910

Factories and Workshops.— The act of 1878 remained until 1001, although much had been meanwhile superimposed, a monument to the efforts of the great factory reformers of the first half of the 19th century, and the general groundwork of safety for workers in factories and workshops in the main divisions of sanitation, security against accidents, physical fitness of workers, general limitation of hours and times of employ ment for young workers and women. The act of 1901, which came into force 1st January 1902 (and became the principal act), was an amending as well as a consolidating act. Comparison of the two acts shows, however, that, in spite of the advantages of further consolidation and helpful changes in arrangement of sections and important additions which tend towards a specialized hygiene for factory life, the fundamental features of the law as fought out in the 19th century remain undisturbed. So far as the law has altered in character, it has done so chiefly by gradual development of certain sanitary features, originally subordinate, and by strengthening provision for security against accidents and not by retreat from its earlier aims. At the same time a basis for possible new developments can be seen in the protection of ” outworkers ” as well as factory workers against fraudulent or defective particulars of piece-work rates

of wages. Later acts directly and indirectly affecting the law are certain acts of 1903, 1906, 1907, to be touched on presently.

The act of 1878, in a series of acts from 1883 to 1895, received striking additions, based (1) on the experience gained in other branches of protective legislation, e.g. development of the method of regulation of dangerous trades by ˆ ddl ^°° s “special rules ” and administrative inquiry into j 8 fs. accidents under Coal Mines Acts; (2) on the findings of royal commissions and parliamentary inquiries, e.g. increased control of “outwork ” and domestic workshops, and limitation of “overtime “; (3) on the development of administrative machinery for enforcing the more modern law relating to public health, e.g. transference of administration of sanitary provisions in workshops to the local sanitary authorities; (4) on the trade- union demand for means for securing trustworthy records of wage-contracts between employer and workman, e.g. the section requiring particulars of work and wages for piece-workers. The first additions to the act of 1878 were, however, almost purely attempts to deal more adequately than had been attempted in the code of 1878 with certain striking instances of trades injurious to health. Thus the Factory and Workshop Act of 1883 provided that white-lead factories should not be carried on without a certificate of conformity with certain conditions, and also made provision for special rules, on lines later superseded by those laid down in the act of 1891, applicable to any employ- ment in a factory or workshop certified as dangerous or injurious by the secretary of state. The act of 1883 also dealt with sanitary conditions in bakehouses. Certain definitions and explanations of previous enactments touching overtime and employment of a child in any factory or workshop were also included in the act. A class of factories in which excessive heat and humidity seriously affected the health of operatives was next dealt with in the Cotton Cloth Factories Act 1889. This provided for special notice to the chief inspector from all occupiers of cotton cloth factories (i.e. any room, shed, or workshop or part thereof in which weaving of cotton cloth is carried on) who intend to produce humidity by artificial means; regulated both tempera- ture of workrooms and amount of moisture in the atmosphere, and provided for tests and records of the same; and fixed a standard minimum volume of fresh air (600 cub. ft.) to be ad- mitted in every hour for every person employed in the factory. Power was retained for the secretary of state to modify by order the standard for the maximum limit of humidity of the atmo- sphere at any given temperature. A short act in 1870 extended this power to other measures for the protection of health.

*3

The special measures from 1878 to 1889 gave valuable pre- cedents for further developments of special hygiene in factory life, but the next advance in the Factory and Workshop Act 1891, following the House of Lords Committee on the sweating system and the Berlin International Labour Conference, extended over much wider ground. Its principal objects were: (a) to render administration of the law relating to workshops more efficient, particularly as regards sanitation; with this end in view it made the primary controlling authority for sanitary matters in workshops the local sanitary authority (now the district council), acting by their officers, and giving them the powers of the less numerous body of factory inspectors, while at the same time the provisions of the Public Health Acts replaced in workshops the very similar sanitary provisions of the Factory Acts; (6) to provide for greater security against accidents and more efficient fencing of machinery in factories; (c) to extend the method of regulation of unhealthy or dangerous occupations by application of special rules and requirements to any incident of employment (other than in a domestic workshop) certified by the secretary of state to be dangerous or injurious to health or dangerous to life or limb; (d) to raise the age of employment of children and restrict the employment of women immediately after childbirth; (e) to require particulars of rate of wages to be given with work to piece-workers in certain branches of the textile industries; (/) to amend the act of 1878 in various subsidiary ways, with the view of improving the administration of its principles, e.g. by increasing the means of checking the amount of overtime worked, empowering inspectors to enter work-places used as dwellings without a justice's warrant, and the imposition of minimum penalties in certain cases. On this act followed four years of greatly accelerated administrative activity. No fewer than sixteen trades were scheduled by the secretary of state as dangerous to health. The manner of pre- paring and establishing suitable rules was greatly modified by the act of 1901 and will be dealt with in that connexion.

The Factory and Workshop Act 1895 followed thus on a period of exercise of new powers of administrative regulation (the period being also that during which the Royal Commission on Labour made its wide survey of industrial conditions), and after two successive annual reports of the chief inspector of factories had embodied reports and recommendations from the women inspectors, who in 1893 were first added to the inspector- ate. Again, the chief features of an even wider legislative effort than that of 1891 were the increased stringency and definiteness of the measures for securing hygienic and safe conditions

of work. Some of these measures, however, involved new principles, as in the provision for the prohibition of the use of a dangerous machine or structure by the order of a magistrate's court, and the power to include in the special rules drawn up in pursuance of section 8 of the act of 1891, the prohibition of the employment of any class of persons, or the limitation of the period of employ- ment of any class of persons in any process scheduled by order of the secretary of state. These last two powers have both been exercised, and with the exercise of the latter passed away, without opposition, the absolute freedom of the employer of the adult male labourer to carry on his manufacture without legislative limitation of the hours of labour. Second only in significance to these new developments was the addition, for the first time since 1867, of new classes of workplaces not covered by the general definitions in section 93 of the Con- solidating Act of 1878, viz. : (a) laundries (with special conditions as to hours, &c.) ; (b) docks, wharves, quays, warehouses and premises on which machinery worked by power is temporarily used for the purpose of the construction of a building or any structural work in connexion with the building (for the purpose only of obtaining security against accidents). Other entirely new provisions in the act of 1895, later strengthened by the act of 1 901, were the requirement of a reasonable temperature in workrooms, the requirement of lavatories for the use of -persons employed in any department where poisonous substances are vsed, the obligation on occupiers and medical practitioners to report cases of industrial poisoning; and the penalties imposed

on an employer wilfully allowing wearing apparel to be made, cleaned or repaired in a dwelling-house where an inmate is suffering from infectious disease. Another provision empowered the secretary of state to specify classes of outwork and areas with a view to the regulation of the sanitary condition of premises in which outworkers are employed. Owing to the conditions attached to its exercise, no case was found in which this power could come into operation, and the act of 1901 deals with the matter on new lines. The requirement of annual returns from occupiers of persons employed, and the competency of the person charged with infringing the act to give evidence in his defence, were important new provisions, as was also the adoption of the powers to direct a formal investigation of any accident on the lines laid down in section 45 of the Coal Mines Regulation Act 1887. Other sections, relating to sanitation and safety, were developments of previous regulations, e.g. the fixing of a standard of overcrowding, provision of sanitary accommodation separate for each sex where the standard of the Public Health Act

Amend- ment Act of 1890 had not been adopted by the competent local sanitary authority, power to order a fan or other mechanical means to carry off injurious gas, vapour or other impurity (the previous power covering only dust). The fencing of machinery and definition of accidents were made more precise, young persons were prohibited from cleaning dangerous machinery, and additional safeguards against risk of injury by fire or panic were introduced. On the question of employment the foremost amendments lay in the almost complete prohibition of overtime for young persons, and the restriction of the power of an employer to employ protected persons outside his factory or workshop on the same day that he had employed them in the factory or workshop. Under the head of particulars of work and wages to piece-workers an important new power, highly valued by the workers, was given to apply the principle with the necessary modifications by order of the secretary of state to industries other than textile and to outworkers as well as to those employed inside factories and workshops.

In 1899 an indirect modification of the limitation to employ- ment of children was effected by the Elementary Education Amendment Act, which, by raising from eleven to twelve the minimum age at which a child may, by l90U the by-laws of a local authority, obtain total or partial exemption from the obligation to attend school, made it unlawful for an occupier to take into employment any child under twelve in such a manner as to prevent full-time attendance at school. The age of employment became generally thereby the same as it has been for employment at a mine above ground since 1887. The act of 1901 made the prohibition of employ- ment of a child under twelve in a factory or workshop direct and absolute. Under the divisions of sanitation, safety, fitness for employment, special regulation of dangerous trades, special control of bakehouses, exceptional treatment of creameries, new methods of dealing with home work and outworkers, important additions were made to the general law by the act of 1901, as also in regulations for strengthened administrative control. New general sanitary provisions were those prescribing : (a) ventilation per se for every workroom, and empowering the secretary of state to fix a standard of sufficient ventilation; (b) drainage of wet floors; (c) the power of the secretary of state to define in certain cases what shall constitute sufficient and suitable sanitary accommodation. New safety provisions were those relating to — (a) Examination and report on steam boilers; (b) prohibition of employment of a child in cleaning below machinery in motion; (c) power of the district council to make by-laws for escape in case of fire. The most important administrative alterations were : (a) a justice engaged in the same

trade as, or being officer of an association of persons engaged in the same trade as, a person charged with an offence may not act at the hearing and determination of the charge; (b) ordinary supervision of sanitary conditions under which outwork is carried on was transferred to the district council, power being reserved to the Home Office to intervene in case of neglect or default by any district council.

[FACTORIES AND WORKSHOPS

Defini- tions.

The Employment of Children Act 1903, while primarily (jroviding for industries outside the scope of the Factory Act, incidentally secured that children employed as half- *o!n “ioda t ™ ers should not also be employed in other occupa- \907. ‘ tions.. The Notice of Accidents Act 1906 amended the whole system of notification of accidents, simultaneously in mines, quarries, factories and workshops, and wil] be set out in following paragraphs. The Factory and Workshop Act of 1907 amended the law in respect of laundries by generally applying the provisions of 1901 to trade laundries while granting them choice of new exceptional periods, and by extending the provisions of the act (with certain powers to the Home Office by Orders laid before parliament to allow variations) to institution laundries carried on for charitable or reformatory purposes. The Employment of Women Act 1907 repealed an exemption in the act of 1901 (and earlier acts) relating to employment of women in flax scutch mills, thus bringing this employment under the ordinary provisions as to period of employment.

The following paragraphs aim at presenting an idea of the scope of the modified and amended law, as a whole, adding where clearly necessary reference to the effect of acts, which ceased to apply after the 31st of December 1901: —

The workplaces to which the act applies are, first, ” factories ” and “workshops”; secondly, laundries, docks, wharves, &c, enumerated above as introduced and regulated partially only by the act of 1895 and subsequent acts. Apart from this secondary list, and having regard to workplaces which remain undefined by the law, the act may broadly be said to apply to premises, rooms or places in which manual labour, with or without the aid of mechanical power, is exercised for

gain in or incidental to the making, altering, repairing, ornamenting, washing, cleaning or finishing or adapting for sale of any article or part of any article. If steam, water or other mechanical power is used in aid of the manufacturing process, the workplace is a factory; if not, it is a workshop. There is, however, a list of eighteen classes of works (brought under the factory law for reasons of safety, &c. s before workshops generally were regulated) which are defined as factories whether power is used in them or not. Factories are, again, sub-divided into textile and non-textile: they are textile if the machinery is employed in preparing, manufacturing or finishing cotton, wool, hair, silk, flax, hemp, jute, tow, China grass, cocoanut fibre or other like material either separately or mixed together, or mixed with any other material, or any fabric made thereof; all other factories are non-textile. The distinction turns on the historical origin of factory regulation and the regulations in textile factories remain in some respects slightly more stringent than in the non-textile factories and workshops, though the general provisions are almost the same. Three special classes of workshops have for certain purposes to be distinguished from ordinary workshops, which include tenement workshops: (a) Domestic workshops, i.e. any private house, room or place, which, though used as a dwelling, is by reason of the work carried on there a workshop, and in which the only persons employed are members of the same family, dwelling there alone — in these women's hours are unrestricted; (b) Women's workshops, in which neither children nor young persons are employed — in these a more elastic arrangement of hours is permissible than in ordinary work-shops ; (c) Workshops in which men only are employed — these come under the same general regulations in regard to sanitation as other workshops, also under the provisions of the Factory Act as regards security, and, if certified by the secretary of state, may be brought under special regulations. They are otherwise outside the scope of the act of 1901.

The person to whom the regulations apply in the above-defined workplaces are children, i.e. persons between the ages of twelve and fourteen, young persons, i.e. boys or girls between the ages of fourteen (or if an educational certificate has been obtained, thirteen) and eighteen years of age, and women, i.e. females above the age of eighteen; these are all " protected " persons to whom the general provisions of the act, inclusive of the regulation of hours and times of employment, apply. To adult men generally those provisions broadly only apply which are aimed at securing sanitation and safety in the conduct of the manufacturing process.

The person generally responsible for observance of the provisions of

the law, whether these relate to health, safety, limitation of the hours of labour or other matters, is the occupier (a term un- defined in the act) of the factory, workshop or laundry. There are, however, limits to his responsibility: (a) generally, where the occupier has used due diligence to enforce the execution of the act, and can show that another person, whether agent, servant, workman or other person, is the real offender; (b) specially in a factory the sections relating to employment of protected persons, where the owner or hirer of a machine or implement driven by mechanical power is some person other than the occupier of the factory, the

Sanita- tion.

owner or hirer, so far as respects any offence against the act com- mitted in relation to a person who is employed in connexion with the machine or implement, and is in the employment or pay of the owner or hirer, shall be deemed to be the occupier of the factory; (c) for the one purpose of reporting accidents, the actual employer of the person injured in any factory or workshop is bound under penalty immediately to report the same to the occupier; (d) so far as relates to sanitary conditions, fencing of machinery, affixing of notices in tenement factories, the owner (as defined by the Public Health Act 1875), generally speaking, takes the place of the occupier. Employment in a factory or workshop includes work whether for wages or not: (a) in a manufacturing process or handicraft, (6) in cleaning any place used for the same, (c) in cleaning or oiling any part of the machinery, (d) any work whatsoever incidental to the process or handicraft, or connected with the article made. Persons found in any part of the factory or workshop, where machinery is used or manufacture carried on, except at meal-times, or when machinery is stopped, are deemed to be employed until the contrary is proved. The act, however, does not apply to employment for the sole purpose of repairing the premises or machinery, nor to the process of pre- serving and curing fish immediately upon its arrival in the fishing boats in order to prevent the fish from being destroyed or spoiled, nor to the process of cleaning and preparing fruit so far as is necessary to prevent it from spoiling during the months of June, July, August and September. Certain light handicrafts carried on by a family only in a private house or room at irregular intervals are also outside the scope of the act.

The foremost provisions are those relating to the sanitary con- dition of the workplaces and the general security of every class of worker. Every factory must be kept in a cleanly con- dition, free from noxious effluvia, ventilated in such a manner as to render harmless, so far as

practicable, gases, vapours, dust or other impurities generated in the manufacture ; must be provided with sufficient and suitable sanitary conveniences separate for the sexes; must not be overcrowded (not less than 250 cubic ft. during the day, 400 during overtime, for each worker). In these matters the law of public health takes in workshops the place of the Factory Act, the requirements being substantially the ‘same. Although, however, primarily the officers of the district council enforce the sanitary provisions in workshops, the government factory inspectors may give notice of any defect in them to the district council in whose district they are situate ; and if proceedings are not taken within one month by the latter, the factory inspector may act in default and recover expenses from the district council. This power does not extend to domestic workshops which are under the law relating to public health so far as general sanitation is concerned. General powers are reserved to the secretary of state, where he is satisfied that the Factory Act or law relating to public health as regards workplaces has not been carried out by any district council, to authorize a factory inspector during a period named in his order to act instead of the district council. Other general sanitary provisions administered by the government inspectors are the re- quirement in factories and workshops of washing conveniences where poisonous substances are used ; adequate measures for securing and maintaining a reasonable temperature of such a kind as will not interfere with the purity of the air in each room in which any person is employed ; maintenance of sufficient means of ventilation in every room in a factory or workshop (in conformity with such standard as may be prescribed by order of the secretary of state) ; provision of a fan to carry off injurious dust, gas or other impurity, and prevent their inhalation in any factory or workshop; drainage of floors where wet processes are carried on. For laundries and bakehouses there are further sanitary regulations ; e.g. in laundries all stoves for heating irons shall be sufficiently separated from any ironing-room or ironing-table, and the floors shall be ” drained in such a manner as will allow the water to flow off freely “; and in bakehouses a cistern supplying water to a bakehouse must be quite separate from that supplying water to a water-closet, and the latter may not communicate directly with the bakehouse. Use of underground bakehouses (i.e. a baking room with floor more than 3 ft. below the ground adjoining) is prohibited, except where already used at the passing of the act; further, in these cases, after 1st January 1904, a certificate as to suitability in light, ventilation, &c, must be ob- tained from the district council. In other trades certified by the secretary of state further sanitary regulations may be made to increase security for health by special rules to be presently touched on. The secretary of state may

also make sanitary requirements a condition of granting such exceptions to the general law as he is empowered to grant. In factories, as distinct from workshops, a periodical lime washing (or washing with hot water and soap where paint and varnish have been used) of all inside walls and ceilings once at least in every fourteen months is generally required (in bakehouses once in six months). As regards sufficiency and suitability' of sanitary accommodation, the standards determined by order of the secretary of state shall be observed in the districts to which it is made applic- able. An order was made called the Sanitary Accommodation Order, on the 4th of February 1903, the definitions and standards in which have also been widely adopted by local sanitary authorities in districts where the Order itself has no legal force, the local authority having parallel power under the Public Health Act of 1890.

Security in the use of machinery is provided for by precautions as regards the cleaning of machinery in motion and working between . the fixed and traversing parts, of self-acting machines

Securi y j r i ven by power, by fencing of machinery, and by em- * .. powering inspectors to obtain an order from a court of

accidents. summar y jurisdiction to prohibit the use, temporarily or absolutely, of machinery, ways, works or plant, including use of a steam boiler, which cannot be used without danger to life and limb. Every hoist and fly-wheel directly connected with mechanical power, and every part of a water-wheel or engine worked by mechanical power, and every wheel race, must be fenced, whatever its position, and every part of mill-gearing or dangerous machinery must either be fenced or be in such position that it is as safe as if fenced. No protected persons may clean any part of mill-gearing in motion, and children may further not clean any part of or below manufacturing machinery in motion by aid of mechanical power; young persons further may not clean any machinery if the inspector notifies it to the occupier as dangerous. Security as regards the use of dangerous premises is provided for by empowering courts of summary jurisdiction, on the application of an inspector, to prohibit their use until the danger has been removed. The district council, or, in London, the county council, or in case of their default the factory inspector, can require certain provisions for escape in case of fire in factories and workshops in which more than forty persons are em- ployed ; special

powers to make by-laws for means of escape from fire in any factory or workshop are, in addition to any powers for prevention of fire that they possess, given to every district council, in London to the county council. The means of escape must be kept free from obstruction. Provisions are made for doors to open, out- wards in each room in which more than ten persons are employed, ind to prevent the locking, bolting or fastening of doors so that they cannot easily be opened from inside when any person is employed or at meals inside the workplace. Further, provisions for security may be provided in special regulations. Every boiler for generating steam in a factory or workshop or place where the act applies must have a proper safety valve, a steam gauge, and a water gauge, and every such boiler, valve and gauge must be maintained in proper condition. Examination by a competent person must take place at least once in every fourteen months. The occupier of any factory or workshop may be liable for penal compensation not exceeding £100 in case of injury or death due to neglect of any provision or special rule, the whole or any part of which may be applied for the benefit of the injured person or his family, as the secretary of state deter- mines. When a death has occurred by accident in a factory or workshop, the coroner must advise the factory inspector for the district of the place and time of the inquest. The secretary of state may order a formal investigation of the circumstances of any accident as in the case of mines. Careful and detailed provisions are made for the reporting by occupiers to inspectors, and entry in the registers at factories and workshops of accidents which occur in a factory or workshop and (a) cause loss of life to a person employed there, or (b) are due to machinery moved by mechanical power, molten metal, hot liquid, explosion, escape of gas or steam, electricity, so disabling any person employed in the factory or workshop as to cause him to be absent throughout at least one whole day from his ordinary work, (c) are due to any other special cause which the secretary of state may determine, (d) not falling under the previous heads and yet cause disablement for more than seven days' ordinary work to any person working in the factory or workshop. In the case of (a) or (b) notice has also to be sent to the certifying surgeon by the occupier. Cases of lead, phosphorus, arsenical and mercurial poisoning, or anthrax, contracted in any factory or workshop must similarly be reported and registered by the occupier, and the duty of reporting these cases is also laid on medical practitioners under whose observation they come. The list of classes of poisoning can be extended by the secretary of state's order.

Certificates of physical fitness for employment must be obtained by the occupier from the certifying surgeon for the district for all Physical

persons under sixteen years of age employed in a factory, fit s of am ‘ m an y c ‘ ass °f workshops to which the requirement . has been extended by order of the secretary of state, and

an inspector may suspend any such persons for re-ex- amination in a factory, or for examination in a workshop, when ” disease or bodily infirmity ” unfits the person, in his opinion, for the work of the place. The certifying surgeon may examine the process as well as the person submitted, and may qualify the certifi- cate he grants by conditions as to the work on which the person is fit to be employed. An occupier of a factory or workshop or laundry shall not knowingly allow a woman to be employed therein within four weeks after childbirth.

The employment of children, young persons and women is regu- lated as regards ordinary and exceptional hours of work, ordinary Hours of anc ‘ exceptional meal-times, length of spells and holidays. protected T ne outs ‘de limits of ordinary periods of employment and persons. holidays are, broadly, the same for textile factories as for non-textile factories and workshops; the main difference lies in the requirement of not less than a total two hours’ interval for meals out of the twelve, and a limit of four and a half hours for any spell of work, a longer weekly half holiday, and a prohibition of overtime, in textile factories, as compared with a total one and a half

hours’ interval for meals and a limit of five hours for spells and (conditional) permission of overtime in non-textile factories. The hours of work must be specified, and from Monday to Friday may be between 6 a.m. and 6 p.m., or 7 A.M. to 7 p.m. ; in non-textile factories and workshops the hours also may be taken between 8 a.m. and 8 P.M. or by order of the secretary of state for special industries 9 A.M. to 9 P.M. Between these outside limits, with the proviso that meal- times must be fixed and limits as to spells observed, women and young persons may be employed the full time, children on the contrary only half time, on alternate days, or in alternate sets attending school half time regularly. On Saturdays, in textile factories in which the period commences at 6 a.m. all manufactur- ing work must cease at 12 if not less than one hour is given for meals, or 11.30 if less than one hour is given for meals (half an hour extra allowed for cleaning), and in non-textile factories and workshops at 2 P.M., 3 P.M. or 4 p.m., according as the hour of beginning is 6 A.M., 7 a.m. or 8 a.m. In ” domestic workshops ” the total number of hours for young persons and children must not exceed those allowed in ordinary workshops, but the outside limits for beginning and ending are wider; and the case is similar as regards hours of women in ” women’s workshops.” Employment outside a factory or workshop in the

business of the same is limited in a manner similar to that laid down in the Shop Hours Act, to be touched on presently. Overtime in certain classes of factories, workshops and warehouses attached to them is permitted, under conditions specified in the acts, for women, to meet seasonal or unforeseen pressure of business, or where goods of a perishable nature are dealt with, for young persons only in a very limited degree in factories liable to stoppage for drought or flood, or for an unfinished process. These and other cases of exceptional working are under minute and careful adminis- trative regulations. Broadly these same regulations as to exceptional overtime may apply in laundries but the act of 1907 granted to laundries not merely ancillary to the manufacture carried on in a factory or workshop (e.g. shirt and collar factories), additional power to fix different periods of employment for different days of the week, and to make use of one or other of two exceptional methods of arranging the daily periods so as to permit of periods of different length on different days; these exceptional periods cannot be worked in addition to overtime permissible under the general law. Laundries carried on in connexion with charitable or reformatory institutions were brought in 1907 within the scope of the law, but special schemes for regulation as to hours, meals, holidays, &c, may be submitted by the managers to the secretary of state, who is em- powered to approve them if he is satisfied that they are not less favourable than the corresponding provisions of the principal act; such schemes shall be laid as soon as possible before both Houses of Parliament.

Night work is allowed in certain specified industries, under con- ditions, for male young persons, but for no other workers under eighteen, and overtime for women may never be later than Dajiff eroos 10 P.M. or before 6 a.m. Sunday work is prohibited except, anaua . under conditions, for Jews; and in factories, workshops «, ea i»t„ and laundries six holidays (generally the Bank holidays) i B a U stries must be allowed in the year. In creameries in which women and young persons are employed the secretary of state may by special order vary the beginning and end of the daily period of employment, and allow employment for not more than three hours on Sundays and holidays.

The general provisions of the act may be supplemented where specially dangerous or unhealthy trades are carried on, by special regulations. This was provided for in the law in force until 31st December 1901, as in the existing principal act, and the power to establish rules had been exercised between 1892 and 1 901 in twenty-two trades or processes where injury arose either from handling of dangerous substances, such as lead and lead compounds, phosphorus,

arsenic or various chemicals, or where there is inhalation of irritant dust or noxious fumes, or where there is danger of explosion or infection of anthrax. Before the rule could be drawn up under the acts of 1891 to 1895, the secretary of state had to certify that in the particular case or class of cases in question (e.g. process or machinery), there was, in his opinion, danger to life or limb or risk of injury to health ; thereupon the chief inspector might propose to the occupier of the factory or workshop such special rules or measures as he thought necessary to meet the circumstances. The occupier might object or propose modifications, but if he did not the rules became binding in twenty-one days; if he objected, and the secretary of state did not assent to any proposed modification, the matters in difference had to be referred to arbitration, the award in which finally settled the rules or requirement to be observed. In November 1901, in the case of the earthenware and china industry, the last arbitration of the kind was opened and was finally concluded in 1903. The parties to the arbitration were the chief inspector, on behalf of the secretary of state, and the occupier or occupiers, but the workmen interested might be and were represented on the arbitration. In the establishing of the twenty-two sets of existing special rules only thrice has arbitration been resorted to, and only on two of these occasions were workmen represented. The provisions as to the arbitration were laid down in the first schedule to the Act of 1891, and were similar to those under the Coal Mines Regulation Acts. Many of these codes have still the force of law and will continue until in due

course revised under the amended procedure of the act of 1901. They might not only regulate conditions of employment, but also restrict or prohibit employment of any class of workers; where such restriction or prohibition affected adult workers the rules had to be laid for forty days before both Houses of Parliament before coming into operation. The obligation to observe the rules in detail lies on Workers as well as on occupiers, and the section in the act of 1891 providing a penalty for non-observance was drafted, as in the case of the mines, so as to provide for a simultaneous fine for each (not exceeding two pounds for the worker, not exceeding ten pounds for the employer).

The provisions as to special regulations of the act of 1901 touch primarily the method of procedure for making the regulations, but

they also covered for the first time domestic workshops and added a power as to the kind of regulations that may be made; further, they strengthened the sanction for observance of any rules that may be established, by placing the occupier in the same general position as regards penalty for non-observance as in other matters under the act. On the certificate of the secretary of state that any manu- facture, machinery, plant, process or manual labour used in factories or workshops is dangerous or injurious to life, health or limb, such regulations as appear to the secretary of state to meet the necessity of the case may be made by him after he has duly published notice : (1) of his intention; (2) of the place where copies of the draft regu- lations can be obtained; and (3) of the time during which objections to them can be made by persons affected. The secretary of state may modify the regulations to meet the objections made. If not, unless the objection is withdrawn or appears to him frivolous, he shall, before making the regulations, appoint a competent person to hold a public inquiry with regard to the draft regulations and to report to him thereon. The inquiry is to be made under such rules as the secretary of state may lay down, and when the regulations are made, they must be laid as soon as possible before parliament. Either House may annul these regulations or any of them, without prejudice to the power of the secretary of state to make new regulations. The regulations may apply to all factories or workshops in which the certified manufacture, process, &c, is used, or to a specified class. They may, among other things, (a) prohibit or limit employment of any person or class of persons; (b) prohibit, limit, or control use of any material or process; (c) modify or extend special regulations contained in the Act. Regulations have been established among others in the following trades and processes: felt hat-making where any inflammable solvent is used ; file-cutting by hand ; manu- facture of electric accumulators; docks, processes of loading, un- loading, &c. ; tar distilling ; factories in which self-acting mules are used ; use of locomotives ; spinning and weaving of flax, hemp and jute; manufacture of paints and colours; heading of yarn dyed by means of lead compounds.

Although the Factory and Workshop Acts have not directly regulated wages, they have made certain provision for securing to the worker that the amount agreed upon shall be received : Measures ˆ D y extending every act in force relating to the inspec- a £f/’ ar ~ *’ on °ˆ we ‘ght s ‘ measures and weighing machines for use tlculars ; n ˆ e sa [e f g 00c j s j- those used in a factory or workshop to piece- £ of (.Recking or ascertaining the wages of persons em- wor ers. pl G y e d; (£) by ensuring that piece-workers in the textile trades (and other trades specified by the secretary of state) shall receive, before

commencing any piece of work, clear particulars of the wages applicable to the work to be done and of the work to which that rate is to be applied. Unless the particulars of work are ascer- tainable by an automatic indicator, they must be given to textile workers in writing, and in the case of weavers in the cotton, worsted and woollen trades the particulars of wages must be supplied separately to each worker, and also shown on a placard in a con- spicuous position. In other textile processes, it is sufficient to furnish the particulars separately to each worker. The secretary of state has used his powers to extend this protection to non-textile workers, with suitable modifications, in various hardware industries, including pen-making, locks, chains, in wholesale tailoring and making of wearing apparel, in fustian cutting, umbrella-making, brush-making and a number of other piece-work trades. He further has in most of these and other trades used his power to extend this protection to outworkers.

With a view to efficient administration of the act (a) certain notices have to be conspicuously exhibited at the factory or work- shop, (b) registers and lists kept, and © notices sent Admlais- to the j nspe ctor by the occupier. Among the first the tration. most important are the prescribed abstract of the act, the names and addresses of the inspector and certifying surgeon, the period of employment, and specified meal-times (which may not be changed without fresh notice to the inspector), the air space and number of persons who may legally be employed in each room, and prescribed particulars of exceptional employment; among the second are the general registers of children and young persons em- ployed, of accidents, of limewashing, of overtime, and lists of out- workers; among the third are the notice of beginning to occupy a factory or workshop, _ which the occupier must send within one month, report of overtime employment, notice of accident, poisoning or anthrax, and returns of persons employed, with such other par- ticulars as may be prescribed. These must be sent to the chief

inspector at intervals of not less than one and not more than three years, as may be directed by the secretary of state.

The secretary of state for the Home Department controls the administration of the acts, appoints the inspectors referred to in the acts, assigns to them their duties, and regulates the manner and cases in which they are to exercise the powers of inspectors. The act, however, expressly assigns certain duties and powers to a chief inspector and certain to district inspectors. Many provisions of the acts depend as to their operation on the making of orders by the secretary of state. These orders may impose special obligations on occupiers and

increase the stringency of regulations, may apply exceptions as to employment, and may modify or relax regulations to meet special classes of circumstances. In certain cases, already indicated, his orders guide or determine the action of district councils, and, generally, in case of default by a council he may empower his inspectors to act as regards workplaces, instead of the council, both under the Factory Acts and Public Health Acts.

The powers of an inspector are to enter, inspect and examine, by day or by night, at any reasonable time, any factory or workshop (or laundry, dock, &c), or part of one, when he has reason to believe that any person is employed there; to take with him a constable if he has reasonable cause to expect obstruction ; to require production of registers, certificates, &c, under the acts; to examine, alone or in the presence of any other person, as he sees fit, every person in the factory or workshop, or in a school where the children employed are being educated; to prosecute, conduct or defend before a court of summary jurisdiction any proceeding under the acts; and to exercise such other powers as are necessary for carrying the act into effect. The inspector has also the duty of enforcing the Truck Acts in places, and in respect of persons, under the Factory Acts. Certifying surgeons are appointed by the chief inspector subject to the regula- tions of the secretary of state, and their chief duties are (a) to examine workers under sixteen, and persons under special rules, as to physical fitness for the daily work during legal periods, with power to grant qualified certificates as to the work for which the young worker is fit, and (b) to investigate and report on accidents and cases of lead, phosphorus or other poisoning and anthrax.

In 1907 there were registered as under inspection 110,276 factories, including laundries with power, 146,917 workshops (other than men's workshops), including laundries without power; of works under special rules or regulations (included in the figures just given) there were 10,586 and 19,687 non- textile works under orders for supply of particulars to piece- workers. Of notices of accidents received there were 124,325, of which 1 1 79 were fatal; of reported cases of poisoning there were 653, of which 40 were fatal. Prosecutions were taken by inspectors in 4474 cases and convictions obtained in 42 n cases. Of persons employed there were, according to returns of occupiers, 1904, 4,165,791 in factories and 688,756 in workshops.

Coal Mines. — The mode of progress to be recorded in the regulation of coal mines since 1872 can be contrasted in one aspect with the progress just recorded of factory legislation since 1878. Consolidation was again earlier adopted when large amendments were found

necessary, with the result that by far the greater part of the law is to be found in the act of 1887, which repealed and re-enacted, with amendments, the Coal Mines Acts of 1872 and 1886, and the Stratified Ironstone Mines (Gunpowder) Act, 1881. The act of 1881 was simply concerned with rules relating to the use of explosives underground. The act of 1886 dealt with three questions: (a) The election and payment of checkweighers (i.e. the persons appointed and paid by miners in pursuance of section 13 of the act of 1887 for the purpose of taking a correct account on their behalf of the weight of the mineral gotten by them, and for the correct determination of certain deductions for which they may be liable) ; (b) provision for new powers of the secretary of state to direct a formal investigation of any explosion or accident, and its causes and circumstances, a provision which was later adopted in the law relating to factories; (c) provision enabling any relatives of persons whose death may have been caused by explosions or accidents in or about mines to attend in person, or by agent, coroners' inquests thereon, and to examine witnesses. The act of 1887, which amended, strengthened and consolidated these acts and the earlier Consolidating Act of 1872, may also be contrasted in another aspect with the general acts of factory legislation. In scope it formed, as its principal forerunner had done, a general code; and in some measure it went farther in the way of consolidation than the Factory Acts had done, inasmuch as certain questions, which in factories are dealt with

by statutes distinct from the Factory Acts, have been included in the Mines Regulation Acts, e.g. the prohibition of the payment of wages in public-houses, and the machinery relating to weights and measures whereby miners control their payment; further, partly from the less changing nature of the industry, but probably mainly from the power of expression gained for miners by their organization, the code, so far as it went, at each stage answered apparently on the whole more nearly to the views and needs of the persons protected than the parallel law relating to factories. This was strikingly seen in the evidence before the Royal Com- mission on Labour in 1892-1804, where the repeated expression of satisfaction on the part of the miners with the provisions as distinct from the administration of the code (" with a few trifling exceptions ") is in marked contrast with the long and varied series of claims and contentions put forward for amend-

ment of the Factory Acts.

Since the act of 1887 there have followed five minor acts, based on the recommendation of the officials acting under the acts, while two of them give effect to claims made by the miners before the Royal Commission on Labour. Thus, in 1894, the Coal Mines (Checkweigher) Act rendered it illegal for an employer (" owner, agent, or manager of any mine, or any person employed by or acting under the instructions of any such owner, agent, or manager ") to make the removal of a particular checkweigher a condition of employment, or to exercise improper influence in the appointment of a checkweigher. The need for this provision was demonstrated by a decision of the Court of Session in Edinburgh, which upheld an employer in his claim to the right of dismissing all the workmen and re-engaging them on condition that they would dismiss a particular checkweigher. In 1896 a short act extended the powers to propose, amend and modify special rules, provided for representation of workmen on arbitration under the principal act on any matter in difference, modified the provision for plans of mines in working and abandoned mines, amended three of the general rules (inspection before commencing work, use of safety lamp and non-inflamm- able substances for stemming), and empowered the secretary of state by order to prohibit or regulate the use of any explosive likely to become dangerous. In 1900 another brief act raised the age of employment of boys underground from twelve to thirteen. In 1903 another amending act allowed as an alternative qualification for a manager's certificate a diploma in scientific and mining training after at least two years' study at a university mining school or other educational institution approved by the secretary of state, coupled with practical experience of at least three years in a mine. In the same year the Employment of Children Act affected children in mines to the extent already indicated in connexion with factories. In 1905 a Coal Mines (Weighing of Minerals) Act improved some provisions relating to appointment and pay of checkweighers and facilities for them and their duly appointed deputies in carrying out their duties. In 1906 the Notice of Accidents Act provided for improved annual returns of accidents and for immediate reporting to the district inspector of accidents under newly-defined conditions as they arise in coal and metalliferous mines.

While the classes of mines regulated by the act of 1887 are the same as those regulated by the act of 1872 (i.e. mines of coal, of stratified ironstone, of shale and of fire-clay, including works above ground where the minerals are prepared for use by screening, washing, &c.) the interpretation of the term " mine " is wider and simpler, including " every shaft in the course of being sunk, and every level and inclined

plane in the course of being driven, and all the shafts, levels, planes, works, tramways and sidings, both below ground and above ground, in and adjacent to and belonging to the mine." Of the persons responsible under penalty for the observance of the acts the term " owner " is defined precisely as in the act of 1872, but the term " agent " is modified to mean " any person appointed as the representative of the owner in respect of any mine or any part thereof, and, as such, superior to a manager appointed in pursuance of this act." Of the persons protected, the term " young person " disappeared from the act,, and " boy," i.e. " a male under the age of sixteen years," and " girl," i.e. " a female under the age of sixteen years," take their place, and the term " woman " means, as before, " a female of the age of sixteen years and upwards." The prohibition of employment underground of women and girls remains untouched, and the pro-

Actot

1887.

hibition of employment underground of boys has been successively extended from boys of the age of ten in 1872 to boys of twelve in 1887 and to boys of thirteen in 1900. The age of employment of boys and girls above ground in connexion with any mine is raised from ten years in 1872 to twelve years since 1887. The hours of employment of a boy below ground may not exceed fifty four in any one week, nor "ten in any one day from the time of leaving the surface to the time of returning to the surface. Above ground any boy or girl under thirteen (and over twelve) may not be employed on more than six days in any one week ; if employed on more than three days in one week, the daily total must not exceed six hours, or in any other case ten hours. Protected persons above thirteen are limited to the same daily and weekly total of hours as boys below ground, but there are further provisions with regard to intervals for meals and pro hibiting employment for more than five hours without an interval of at least half an hour for a meal. Registers must be kept of all protected persons, whether employed above or below ground. Section 38 of the Public Health Act 1875, which requires separate and sufficient sanitary conveniences for persons of each sex, was first extended by the act of 1887 to the portions of mines above ground in which girls and women are employed ; underground this matter is in metalliferous mines in Cornwall now provided for by special rules. Ventilation, the only other requirement in the acts that can be classed as sanitary, is provided for in every mine in the " general rules " which are aimed at securing safety of mines, and which, so far as ventilation is concerned, seek to dilute and render harmless noxious or inflammable gases. The

provision which prohibits employment of any persons in mines not provided with at least two shafts is made much more stringent by the act of 1887 than in the previous code, by increasing the distance between the two shafts from 10 to 15 yds., and increasing the height of communications between them. Other provisions amended or strengthened are those relating to the following points: (a) Daily personal supervision of the mine by the certificated manager; (6) classes of certificates and constitution of board for granting certificates of competency ; (c) plan of workings of any mine to be kept up to a date not more than three months previously at the office of the mine; (d) notice to be given to the inspector of the district by the owner, agent or manager, of accidents in or about any mine which cause loss of life or serious personal injury, or are caused by explosion of coal or coal dust or any explosive or electricity or any other special cause that the secretary of state specifies by order, and which causes any personal injury to any person employed in or about the mine ; it is provided that the place where an explosion or accident occurs causing loss of life or serious personal injury shall be left for inspection for at least three days, unless this would tend to increase or continue a danger or impede working of the mine: this was new in the act of 1887; (e) notice to be given of opening and abandonment of any mine: this was extended to the opening or abandonment of any seam ; (/) plan of an abandoned mine or seam to be sent within three months; (g) formal investigation of any ex plosion or accident by direction of the secretary of state: this provision, first introduced by the act of 1886, was modified in 1887 to admit the appointment by the secretary of state of ” any com- petent person ” to hold the investigation, whereas under the earlier section only an inspector could be appointed.

The ” general rules ” for safety in mines have been strengthened in many ways since the act of 1872. Particular mention may be made of rule 4 of the act of 1887, relating to the inspection of conditions as to gas ventilation beyond appointed stations Oeaeral at the entrance to the mine or different parts of the mine; ru es ‘ this rule generally removed the earlier distinction between mines in which inflammable gas has been found within the preceding twelve months, and mines in which it has not been so found; of rules 8, 9, 10 and 11, relating to the construction, use, &c, of safety lamps, which are more detailed and stringent than rule 7 of the act of 1872, which they replaced; of rule 12, relating to the use of explosives below ground; of rule 24, which requires the appointment of a competent male person not less than twenty-two years of age for working the machinery for lowering and raising persons at the mine ; of rule 34, which first required provision of ambulances or stretchers with splints and bandages at the mine ready for immediate use ; of rule 38, which strengthened the provision for periodical inspection of the mine by practical miners on behalf of the workmen at their own cost. With reference to the last-cited rule, during 1898 a Prussian mining commission visited Great Britain, France and Belgium, to study and compare the various methods of inspection by working miners established in these three countries. They found that, so far as the method had been applied, it was most satisfactory in Great Britain, where the whole cost is borne by the workers’ own organiza- tions, and they attributed part of the decrease in number of accidents per thousand employed since 1872 to the inauguration of this system.

The provisions as to the proposal, amendment and modification of ” special rules,” last extended by the act of 1896, may be con- trasted with those of the Factory Act. In the latter it is not until an industry or process has been scheduled Special as dangerous or injurious by the secretary of state’s ro es ” order that occasion arises for the formation of special rules, and then the initiative rests with the Factory Department whereas in ‘ mines it is incumbent in every case on the owner, agent or manager

to propose within three months of the commencement of any work- ing, for the approval of the secretary of state, special rules best

calculated to prevent dangerous accidents, and to provide for the safety, convenience and proper discipline of the persons employed in or about the mine. These rules may, if they relate to lights and lamps used in the mine, description of explosives, watering and damping of the mine, or prevention of accidents from inflammable gas or coal dust, supersede any general rule in the principal act. Apart from the initiation of the rules, the methods of establishing them, whether by agreement or by resort to arbitration of the parties (i.e. the mine owners and the secretary of state), are practic- ally the same as under the Factory Act, but there is special provision in the Mines Acts for enabling the persons working in the mine to transmit objections to the proposed rules, in addition to their subse- quent right to be represented on the arbitration, if any.

Of the sections touching on wages questions, the prohibition of the payment of wages in public-houses remains unaltered, being re-enacted in 1887; the sections relating to payment by weight for amount of mineral gotten by persons employed, and for check-weighing the amount by a ” checkweigher ” stationed by the majority of workers at each place appointed for the weighing of the material, were revised, particularly as to the determination of deductions by the act of 1887, with a view to meeting some problems raised by decisions on cases under the act of 1872. The attempt seems not to have been wholly successful, the highest legal authorities having expressed conflicting opinions on the precise meaning of the terms ” mineral contracted to be gotten.” The whole history of the de- velopment of this means of securing the fulfilment of wage contract to the workers may be compared with the history of the sections affording protection to piece-workers by particulars of work and wages in the textile trades since the Factory Act of 1891.

As regards legal proceedings, the chief amendments of the act of 1872 are: the extension of the provision that the “owner, agent, Adrvlnis- or manager ” charged in respect of any contravention tratioa. by another person might be sworn and examined as an ordinary witness, to any person charged with any offence under the act. The result of the proceedings against workmen by the owner, agent or manager in respect of an offence under the act is to be reported within twenty-one days to the inspector of the district. The powers of inspectors were extended to cover an inquiry as to the care and treatment of horses and other animals in the mine, and as to the control, management or direction of the mine by the manager.

An important act was passed in 1908 (Coal Mines Regulation Act 1908) limiting the hours of work for workmen below ground. It

enacted that, subject to various provisions, a workman was not to be below ground in a mine for the purpose of his work, and of going to and from his work, for more than eight hours in any consecutive twenty-four hours. Exception was made in the case of those below ground for the purpose of rendering assistance in the event of an accident, or for meeting any danger, or for dealing with any emergency or work incompleted, through unforeseen circumstances, which requires to be dealt with to avoid serious interference in the work of the mine. The authorities of every mine must fix the times for the lowering and raising of the men to begin and be completed, and such times must be conspicuously posted at the pit head. These times must be approved by an inspector. The term ” workman ” in the act means any person employed in a mine below ground who is not an official of the mine (other than a fireman, examiner or deputy), or a mechanic or a horse keeper or a person engaged solely in surveying or measuring. In the case of a fireman, examiner, deputy, onsetter, pump minder, fanman or furnace man, the maximum period for which he may be below ground is nine hours and a half. A register must be kept by the authorities of the mine of the times of descent and ascent, while the workmen may, at their own cost, station persons (whether holding the office of checkweigher or not) at the pit head to observe the times. The authorities of the mine may extend the hours of working by one hour a day on not more than sixty days in one calendar year (s. 3). The act may be suspended by order in council in the event of war or of imminent national danger or great emergency, or in the event of any grave economic disturbance due to the demand for coal exceeding the supply available at any time. The act came into force on the 1st of July 1909 except for the counties of Northumberland and Durham where its operation was postponed until the 1st of January 1910. In 1905 the number of coal-mines reported on was 3126, and the number of persons employed below ground was 691,112 of whom 43,443 were under 16 years of age. Above ground 167,261 were employed, of whom 6154 were women and girls. The number of

separate fatal accidents was 1006, causing the loss of 1205 lives. Of prosecutions by far the greater number were against workmen, numbering in coal and metalliferous mines 953 ; owners and managers were prosecuted in 72 cases, and convictions obtained in 43 cases.

Quarries. — From 1878 until 1894 open quarries (as distinct from underground quarries regulated by the Metalliferous Mines . Regulation Act) were regulated only by the Factory Acts so far as they then applied. It was laid down in section 93 of the act of 1878 (41

Vict. c. 16), that ” any premises or place shall not be excluded from the definition of a factory or workshop by reason only that such premises, &c, are or is in the open air,” thereby overruling the decision in Kent v. Astley that quarries in which the work, as a whole, was carried on in the open air were not factories; in a schedule to the same act quarries were defined as ” any place not being a mine in which persons work in getting slate, stone, coprolites or other minerals.” The Factory Act of 189 1 made it possible to bring these places in part under ” special rules ” adapted to meet the special risks and dangers of the operations carried on in them, and by order of the secretary of state they were certified, December 1892, as dangerous, and thereby subject to special rules. Until then, as reported by one of the inspectors of factories, quarries had been placed under the Factory Acts without insertion of appro- priate rules for their safe working, and many of them were ” developed in a most dangerous manner without any regard for safety, but merely for economy,” and managers of many had ” scarcely seen a quarry until they became managers.” In his report for 1892 it was recommended by the chief inspector of factories that quarries should be subject to the jurisdiction of the government inspectors of mines. At the same time currency was given, by the published reports of the evidence before the Royal Commission on Labour, to the wish of large numbers of quarrymen that open as well as underground quarries should come under more specialized government inspection. In 1893 a committee of experts, including inspectors of mines and of factories, was appointed by the Home Office to investigate the conditions of labour in open quarries, and in 1894 the Quarries Act brought every quarry, as defined in the Factory Act 1878, any part of which is more than 20 ft. deep, under certain of the provisions of the Metalliferous Mines Acts, and under the inspection of the inspectors appointed under those acts; further, it transferred the duty of enforcing the Factory and Workshop Acts, so far as they apply in quarries over 20 ft. deep, from the Factory to the Metalliferous Mines inspectors.

The provisions of the Metalliferous Mines Acts 1872 and 1875,” applied to quarries, are those relating to payment of wages in public-houses, notice of accidents to the inspector, appointment and powers of inspectors, arbitration, coroners’ inquests, special rules, penalties, certain of the definitions, and the powers of the secretary of state finally to decide disputed questions whether places come within the application of the acts. For other matters, and in particular fencing of machinery and employment of women and young persons, the Factory Acts apply, with a proviso that nothing shall prevent the employment of young persons (boys) in three shifts for not more than eight hours

each. In 1899 it was reported by the inspectors of mines that special rules for safety had been established in over 2000 quarries. In the reports for 1905 it was reported that the accounts of blast- ing accidents indicated that there was ” still much laxity in observance of the Special rules, and that many irregular and dangerous practices are in vogue.” The absence or deficiency of external fencing to a quarry dangerous to the public has been since 1887 (50 & 51 Vict. c. 19) deemed a nuisance liable to be dealt with summarily in the manner provided by the Public Health Act 1875.

In 1905, 94,819 persons were employed, of whom 59,978 worked* inside the actual pits or excavations, and 34,841 outside. Compared with 1900, there was a total increase of 924 in the number of persons employed. Fatal accidents resulted in 1900 in 127 deaths ; compared with 1899 there was an increase of 10 in the number of deaths, and, as Professor Le Neve Foster pointed out, this exceeded the average death-rate of underground workers at mines under the Coal Mines Acts during the previous ten years, in spite of the quarrier ” having

nothing to fear from explosions of gas, underground fires or inunda- tions.” He attributed the difference to a lax observance of pre- cautions which might in time be remedied by stringent administra- tion of the law. In 1905 there were 97 fatal accidents resulting in 99 deaths. In 1900 there were 92 prosecutions against owners or agents, with 67 convictions, and 13 prosecutions of workers, with 12 convictions, and in 1905 there were 45 prosecutions of owners or agents with 43 convictions and 9 prosecutions of workmen with 5 convictions.

In 1883 a short act extended to all ” workmen ” who are manual labourers other than miners, with the exception of domestic or Payment men ‘ a ‘ servants, the prohibition of payment of wages in of waxes P u W’ c -h° uses i beer-shops and other places for the sale la public- ot spirituous or fermented liquor, laid down in the Coal houses. Mines Regulations and Metalliferous Mines Regulation Acts. The places covered by the prohibition include any office, garden or place belonging to or occupied with the places named, but the act does not apply to such wages as are paid by the resident, owner or occupier of the public-house, beer-shop and other places included in

the prohibition to any workman bona fide em- ployed by him. The penalty for an offence against this act is one not exceeding £10 (compare the limit of £20 for the corresponding offence under the Coal Mines Act), andall offences maybe prosecuted and penalties recovered in England and Scotland under the Summary Jurisdiction Acts. The act does not apply to Ireland, and no special inspectorate is charged with the duty of enforcing its provisions.

Shop Hours. — In four brief acts, 1892 to 1899, still in force, the first very limited steps were taken towards the positive regulation of the employment of shop assistants. In the act of 1904 certain additional optional powers were given to any local authority making a ” closing order ” fixing the hour (not earlier than 7 p.m. or on one day in the week 1 p.m.) at which shops shall cease to serve customers throughout the area of the authority or any specified part thereof as regards all shops or as regards any specified class of shops. Before such an order can be made (1) a prima facie case for it must appear to the local authority; (2) the local authority must inquire and agree; (3) the order must be drafted and sent for confirmation or other- wise to the central authority, that is, the secretary of state for the Home Department; (4) the order must be laid before both Houses of Parliament. The Home Office has given every encouragement to the making of such orders, but their number in England is very small, and the act is practically inoperative in London and many large towns where the need is greatest. As the secretary of state pointed out in the House of Commons on the 1st of May 1907, the local authorities have not taken enough initiative, but at the same time there is a great difficulty for them in obtaining the required two-thirds majority, among occupiers of the shops to be affected, in favour of the order, and at the same time shop assistants have no power to set the law in motion. In England 364 local authorities have taken no steps, but in Scotland rather better results have been obtained. The House resolved, on the date named, that more drastic legislation is required. As regard? shops, therefore, in place of such general codes as apply to factories, laundries, mines — only three kinds of protective requirement are binding on employers of shop assistants: (1) Limitation of the weekly total of hours of work of persons under eighteen years of age to seventy-four inclusive of meal-times; (2) prohibition of the employment of such persons in a shop on the same day that they have, to the knowledge of the employer, been employed in any factory or workshop for a longer period than would, in both classes of employment together, amount to the number of hours permitted to such persons in a factory or workshop; (3) provision for the supply of seats by the employer, in all rooms of a shop or other

premises where goods are retailed to the public, for the use of female assistants employed in retailing the goods — the seats to be in the proportion of not fewer than one to every three female assistants. The first two requirements are contained in the act of 1892, which also prescribed that a notice, referring to the provisions of the act, and stating the number of hours in the week during which a young person may be lawfully employed in the shop, shall be kept exhibited by the employer; the third requirement was first provided by the act of 1899. The intervening acts of 1893 and 1895 are merely supplementary to the act of 1892; the former providing for the salaries and expenses of the inspectors which the council of any county or

borough (and in the City of London the Common Council) were empowered by the act of 1892 to appoint; the latter pro- viding a penalty of 40s. for failure of an employer to keep exhibited the notice of the provisions of the acts, which in the absence of a penalty it had been impossible to enforce. The penalty for employment contrary to the acts is a fine not exceeding £1 for each person so employed, and for failure to comply with the requirements as to seats, a fine not exceeding £3 for a first offence, and for any subsequent offence a fine of not less than £1 and not exceeding £5.

A wide interpretation is given by the act of 1892 to the class of workplace to which the limitation of hours applies. ” Shop ” means retail and wholesale shops, markets, stalls and ju ean j n „ warehouses in which assistants are employed for hire, /<« s /, o " and includes licensed public-houses and refreshment houses of any kind. The person responsible for the observance of the acts is the " employer " of the " young persons " (i.e. persons under the age of eighteen years), whose hours are limited, and of the " female assistants " for whom seats must be provided. Neither the term "employer " nor " shop assistant " (used in the title of the act of 1899) is defined; but other terms have the meaning assigned to them in the Factory and Workshop Act 1878. The " employer " has, in case of any contravention alleged, the same power as the " occupier " in the Factory Acts to exempt himself from fine on proof of due diligence and of the fact that some other person is the actual offender. The provisions of the act of 1892 do not apply to members of the same family living in a house of which the shop forms part, or to members of the employer's family, or to any one wholly employed as a domestic servant.

In London, where the County Council has appointed men and women inspectors to apply the acts of 1892 to 1899, there were, in 1900, 73,929 premises, and in 1905, 84,269, under inspection. In the latter

year there were 22,035 employing persons under 18 years of age. In 1900 the number of young persons under the acts were: indoors, 10,239 boys and 4428 girls; outdoors, 35,019 boys, 206 girls. In 1905 the ratio between boys and girls had decidedly altered : indoors, 6602 boys, 4668 girls; outdoors, 22,654 boys, 308 girls. The number of irregularities reported in 1900 were 9204 and the pro- secutions were 117; in 1905 the irregularities were 6966 and the prosecutions numbered 34. As regards the act of 1899, in only 1088 of the 14,844 shops affected in London was there found in 1900 to be failure to provide seats for the women employed in retailing goods. The chief officer of the Public Control Department reported that with very few exceptions the law was complied with at the end of the first year of its application.

As regards cleanliness, ventilation, drainage, water-supply and sanitary condition generally, shops have been since 1878 (by 41 Vict. c. 16, s. 101) subject to the provisions of the Public Health Act 1875, which apply to all buildings, except factories under the Factory Acts, in which any persons, whatever their number be, are employed. Thus, broadly, the same sanitary provisions apply in shops as in workshops, but in the former these are enforced solely by the officers of the local authority, without reservation of any power, as in workshops for the Home Office inspectorate, to act in default of the local authority.

Shop assistants, so far as they are engaged in manual, not merely clerical labour, come under the provisions of the Truck Acts 1831 to 1887, and in all circumstances they fall within the sections directed against unfair and unreasonable fines in the Truck Act of 1896; but, unlike employes in factories, workshops, laundries and mines, they are left to apply these provisions so far as they can themselves, since neither Home Office inspectors nor officers of the local authority have any specially assigned powers to administer the Truck Acts in shops.

Truck. — Setting aside the special Hosiery Manufacture (Wages) Act 1874, aimed at a particular abuse appearing chiefly in the hosiery industry — the practice of making excessive charges on wages for machinery and frame rents — only two acts, those of 1887 and 1896, have been added to the general law against truck since the act of 1831, which repealed all prior Truck Acts and which remains the principal act. Further amendments of the law have been widely and strenuously de- manded, and are hoped for as the result of the long inquiry by a departmental committee appointed early in 1906. The Truck Act Amendment Act 1887, amended and extended the act without adding any distinctly new principle; the Truck Act of 1896 was directed towards providing remedies for matters shown by

decisions under the earlier Truck Acts to be outside the scope of the principles and provisions of those acts. Under the earlier acts the main objects were: (1) to make the wages of workmen, i.e. the reward of labour, payable only in current coin of the realm, and to prohibit whole or part payment of wages in food or drink or clothes or any other articles; (2) to

forbid agreements, express or implied, between employer and workmen as to the manner or place in which, or articles on which, a workman shall expend his wages, or for the deduction from wages of the price of articles (other than materials to be used in the labour of the workmen) supplied by the employer. The act of 1887 added a further prohibition by making Act 1887. i*- illegal for an employer to charge interest on any advance of wages, ” whenever by agreement, custom, or otherwise a workman is entitled to receive in anticipation of the regular period of the payment of his wages an advance as part or on account thereof.” Further, it strengthened the section of the principal act which provided that no employer shall have any action against his workman for goods supplied at any shop belonging to the employer, or in which the employer is interested, by (a) securing any workman suing an employer for wages against any counter-claim in respect of goods supplied to the workman by any person under any order or direction of the employer, and (b) by expressly prohibiting an employer from dismissing any worker on account of any particular time, place or manner of expending his wages. Certain exemptions to the prohibition of payment otherwise than in coin were provided for in the act of 1 83 1, if an agreement were made in writing and signed by the worker, viz. rent, victuals dressed and consumed under the employer’s roof, medicine, fuel, provender for beasts of burden used in the trade, materials and tools for use by miners, advances for friendly societies or savings banks; in the case of fuel, pro- vender and tools there was also a proviso that the charge should not exceed the real and true value. The act of 1887 amended these provisions by requiring a correct annual audit in the case of deductions for medicine or tools, by permitting part payment of servants in husbandry in food, drink (not intoxicants) or other allowances, and by prohibiting any deductions for sharpen- ing or repairing workmen’s tools except by agreement not forming part of the condition of hiring. Two important administrative amendments were made by the act of 1887: (1) a

section similar to that in the Factory and Mines Acts was added, empower- ing the employer to exempt himself from penalty for contra- vention of the acts on proof that any other person was the actual offender and of his own due diligence in enforcing the execution of the acts; (2) the duty of enforcing the acts in factories, workshops, and mines was imposed upon the inspectors of the Factory and Mines Departments, respectively, of the Home Office, and to their task they were empowered to bring all the authorities and powers which they possessed in virtue of the acts under which they are appointed; these inspectors thus prosecute defaulting employers and recover penalties under the Summary Jurisdiction Acts, but they do not undertake civil proceedings for improper deductions or payments, proceedings for which would lie with workmen under the Employers and Persons Workmen Act 1875. The persons to whom the benefited benefits of the act applied were added to by the act b yJ~nick f 1887, which repealed the complicated list of trades contained in the principal act and substituted the simpler definition of the Employers and Workmen Act, 1875. Thus the acts 183 1 to 1887, and also the act of 1896, apply to all workers (men, women and children) engaged in manual labour, except domestic servants; they apply not only in mines, factories and workshops, but, to quote the published Home Office Memorandum on the acts, ” in all places where work- people are engaged in manual labour under a contract with an employer, whether or no the employer be an owner or agent or a parent, or be himself a workman; and therefore a workman who employsˆ and pays others under him must also observe the Truck Acts.” The law thus in certain circumstances covers outworkers for a contractor or sub-contractor. A decision of the High Court at Dublin in igoo (Squirev. Sweeney) strengthened the inspectors in investigation of offences committed amongst outworkers by supporting the contention that inquiry and exercise of all the powers of an inspector could legally take place in parts of an employer’s premises other than those in which the work is given out. It defined for Ireland, in a narrower sense than had hitherto been understood and acted upon by

the Factory Department, the classes of outworkers protected, by deciding that only such as were under a contract personally to execute the work were covered. In 1905 the law in England was similarly declared in the decided case of Squire v. The Midland Lace Co. The judges (Lord Alverstone, C.J.; and Kennedy and Ridley, J.J.) stated that they came to the con- clusion with “reluctance,” and said: ” We venture to express the hope that some amendment of the law may be made so as to extend the protection of the Truck Act to a class of work- people indistinguishable from those already within its

provisions.” The workers in question were lace-clippers taking out work to do in their homes, and in the words of the High Court decision ” though they do sometimes employ assistants are evidently, as a class, wage-earning manual labourers and not contractors in the ordinary and popular sense.” The principle relied on in the decision was that in the case of Ingram v. Barnes.

At the time of the passing of the act of 1887 it seems to have been generally believed that the obligation under the principal act to pay the ” entire amount of wages earned ” in coin rendered „ . . illegal any deductions from wages in respect of fines. «) bad work and damaged goods, (c) materials, machines, and any other thing provided by the employer in relation to the work shall be reasonable, and that particulars of the same in writing shall be given to the workman. In none of the cases men- tioned is the employer to make any profit; neither by fines, for they may only be imposed in respect of acts or omissions which cause, or are likely to cause, loss or damage; nor by sale of materials, for the price may not exceed the cost to the employer; nor by deduc- tions or payments for damage, for these may not exceed the actual or estimated loss to the employer. Fines and charges for damage must be ” fair and reasonable having regard to all the circumstances of the case,” and no contract could make legal a fine which a court held to be unfair to the workman in the sense of the act. The contract between the employer and workman must either be in writing signed by the workman, or its terms must be clearly stated in a notice constantly affixed in a place easily accessible to the workman to whom, if a party to the contract, a copy shall be given at the time of making the contract, and who shall be entitled, on request, to obtain from the employer a copy of the notice free of charge. On each occasion when a deduction or payment is made, full particulars in writing must be supplied to the workman. The employer is bound to keep a register of deductions or payments, and to enter therein particulars of any fine made under the contract, specifying the amount and nature of the act or omission in respect of which the fine was imposed. This register must be at all times open to inspectors of mines or factories, who are entitled to make a copy of the contract or any part of it. This act as a whole applies to all workmen in- cluded under the earlier Truck Acts; the sections relating to fines apply also to shop assistants. The latter, however, apparently are left to enforce the provisions of the law themselves, as no inspectorate is empowered to intervene on their behalf. In these and other cases a prosecution under the Truck Acts may be instituted by any person. Any workman or shop assistant may recover any sum deducted by or paid to his employer contrary to the act of 1896, provided that proceedings are commenced

within six months, and that where he has acquiesced in the deduction or payment he shall only recover the excess over the amount which the court may find to have been fair and reasonable in all the circumstances of the case. It is ex- pressly declared in the act that nothing in it shall affect the provisions

of the Coal Mines Acts with reference to payment by weight, or legalize any deductions, from payments made, in pursuance of those provisions. The powers and duties of inspectors are extended to cover the case of a laundry, and of any place where work is given out by the occupier of a factory or workshop or by a contractor or sub-contractor. Power is reserved for the secretary of state to exempt by order specified trades or branches of them in specified areas from the provisions of the act of 1 896, if he is satisfied that they are un-necessary for the protection of the workmen. This power has been exercised only in respect of one highly organized industry, the Lancashire cotton industry. The effect of the exemption is not to prevent fines and deductions from being made, but the desire for it demonstrated that there are cases where leaders among workers have felt competent to make their own terms on their own lines without the specific conditions laid down in this act. The reports of the inspectors of factories have demonstrated that in other in- dustries much work has had to be done under this act, and knowledge of a highly technical character to be gradually acquired, before opinions could be formed as to the reasonableness and fairness, or the contiary, of many forms of deduction. Owing partly to diffi- culties of legal interpretation involving the necessity of taking test cases into court, partly to the margin for differences of opinion as to what constitutes ” reasonableness ” in a deduction, the average number of convictions obtained on prosecutions is not so high as under the Factory Acts, though the average penalty imposed is higher. In 1904, 61 cases were taken into court resulting in 34 convictions with an average penalty of £1, 10s. In 1905, 38 cases resulting in 34 convictions were taken with an average penalty of £1, 3s. In 1906, 37 cases resulting in 25 convictions were taken with an average penalty of £1, 10s.

Reference should here be made to the Shop Clubs Act of 1902 as closely allied with some of the provisions of the Truck Acts by its provision that employers shall not make it a condition of employment

that any workman shall become a member of a shop club unless it is registered under the Friendly Societies Act of 1896. As in the case of payment of wages in Public Houses Act, no special inspectorate has the duty of enforcing this act.

III. Continental Europe

In comparing legislation affecting factories, mines, shops and truck in the chief industrial countries of the continent with that of Great Britain, it is essential to a just view that inquiry should be extended beyond the codes themselves to the general social order and system of law and administration in each country. Further, special comparison of the definitions and the sanctions of each industrial code must be recognized as necessary, for these vary in all. In so brief a summary as is appended here no more is possible than an outline indication of the main general requirements and prohibitions of the laws as regards: (1) hours and times of employment, (2) ordinary sanitation and special requirements for unhealthy and dangerous industries, (3) security against accidents, and (4) prevention of fraud and oppression in fulfilment of wage contracts. As regards the first of these sub-divisions, in general in Europe the ordinary legal limit is rather wider than in Great Britain, being in several countries not less than n hours a day, and while in some, as in France, the normal limit is 10 hours daily, yet the administrative discretion in- granting exceptions is rather more elastic. The weekly half- holiday is a peculiarly British institution. On the other hand, in several European countries, notably France, Austria, Switzer- land and Russia, the legal maximum day applies to adult as well as youthful labour, and not only to specially protected classes of persons. As regards specialized sanitation for un-healthy factory industries, German regulations appear to be most nearly comparable with British. Mines' labour regulation in several countries, having an entirely different origin linked with ownership of mines, is only in few and most recent develop- ments comparable with British Mines Regulation Acts. In regulation of shops, Germany, treating this matter as an integral part of her imperial industrial code, has advanced farther than has Great Britain. In truck legislation most European countries (with the exception of France) appear to have been influenced by the far earlier laws of Great Britain, although in some respects Belgium, with her rapid and recent industrial development, has made interesting original experiments. The rule of Sunday rest (see Sunday) has been extended in several countries, most recently in Belgium and Spain. In France this partially attempted rule has been so modified as to be practically a seventh day rest, not necessarily Sunday.

France. — Hours of labour were, in France, first limited in factories (usines et manufactures) for adults by the law of the 9th of September 1848 to 12 in the 24. Much uncertainty existed as to the class of workplaces covered. Finally, in 1885, an authoritative decision defined them as including: (1) Industrial establishments with motor power or continual furnaces, (2) workshops employing over 20 workers. In 1851, under condition of notification to the local authorities, exceptions, still in force, were made to the general limitation, in favour of certain industries or processes, among others for letterpress and lithographic printing, engineering works, work at furnaces and in heating workshops, manufacture of projectiles of war, and any work for the government in the interests of national defence or security. The limit of 12 hours was reduced, as regards works in which women or young workers are employed, in 1900 to 11, and was to be successively reduced to io| hours and to 10 hours at intervals of two years from April 1900. This labour law for adults was pre- ceded in 1841 by one for children, which prevented their employment in factories before 8 years of age and prohibited night labour for any child under 13. This was strengthened in 1874, particularly as regards employment of girls under 21, but it was not until 1892 that the labour of women was specially regulated by a law, still in force, with certain amendments in 1900. Under this law factory and work- shop labour is prohibited for children under 13 years, though they may begin at 12 if qualified by the prescribed educational certificate and medical certificate of fitness. The limit of daily hours of em- ployment is the same as for adult labour, and, similarly, from the 1st of April 1902 was ioj, and two years later became 10 hours in the 24. Notice of the hours must be affixed, and meal-times or pauses with absolute cessation of work of at least one hour must be specified. By the act of 1892 one day in the week, not necessarily Sunday, had to be given for entire absence from work, in addition to eight recog- nized annual holidays, but this was modified by a law of 1906 which generally requires Sunday rest, but allows substitution of another day in certain industries and certain circumstances. Night labour — work between 9 p.m. and 5 a.m. — is prohibited for workers under 18, and only exceptionally permitted, under conditions, for girls and women over 18 in specified trades. In mines and underground quarries employment of women and girls is prohibited except at surface works, and at the latter is subject to the same limits as in factories. Boys of 13 may be employed in certain work underground, but under 16 may not be employed more than 8 hours in the 24 from bank to bank. A law of 1905 provided for miners a 9 hours' day and in 1907 an 8 hours' day from the foot of the entrance gallery back to the same point.

As in Great Britain, distinct services of inspection enforce the law in factories and mines respectively. In factories and workshops an inspector may order re-examination as to physical fitness for the work imposed of any worker under 16; certain occupations and processes are prohibited — e.g. girls under 16 at machines worked by treadles, and the weights that may be lifted, pushed or carried by girls or boys under 18 are carefully specified. The law applies generally to philanthropic and religious institutions where industrial work is carried on, as in ordinary trading establishments; and this holds good even if the work is by way of technical instruction. Domestic workshops are not controlled unless the industry is classed as dangerous or unhealthy ; introduction of motor power brings them under inspection. General sanitation in industrial establishments is provided for in a law of 1893, amended in 1903, and is supplemented by administrative regulations for special risks due to poisons, dust, explosive substances, gases, fumes, &c. Ventilation, both general and special, lighting, provision of lavatories, cloakrooms, good drinking water, drainage and cleanliness are required in all work- places, shops, warehouses, restaurant kitchens, and where workers are lodged by their employers hygienic conditions are prescribed for dormitories. In many industries women, children and young workers are either absolutely excluded from specified unhealthy pro- cesses, or are admitted only under conditions. As regards shops and offices, the labour laws are: one which protects apprentices against overwork (law of 22nd February 1851), one (law of 29th December 1900) which requires that seats shall be provided for women and girls employed in retail sale of articles, and a decree of the 28th of July 1904 defining in detail conditions of hygiene in dormitories for work- men and shop assistants. The law relating to seats is enforced by the inspectors of factories. In France there is no special penal legisla- tion against abuses of the truck system, or excessive fines and deductions from wages, although bills with that end in view have frequently been before parliament. Indirect protection to workers is no doubt in many cases afforded in organized industries by the action of the Conseils de Prud'hommes.

Belgium. — In 1848 in Belgium the Commission on Labour pro- posed legislation to limit, as in France, the hours of labour for adults, but this proposal was never passed. Belgian regulation of labour in industry remains essentially, in harmony with its earliest begin- nings in 1863 and onwards, a series of specialized provisions to meet particular risks of individual trades, and did not, until 1889, give any adherence to a common principle of limitation of hours and times of labour for " protected " persons. This was in the law of the 13th of

December 1889, which applies to mines, quarries, factories, work-shops classed as unhealthy, wharves and docks, transports. As in France, industrial establishments having a charitable or philanthropic

or educational character are included. The persons protected are girls and women under 21 years, and boys under 16; and women over 21 only find a place in the law through the prohibition of their employment within four weeks after childbirth. As the hours of labour of adult women remain ordinarily unlimited by law, so are the hours of boys from 16 to 21. The law of Sunday rest dated the 17th of July 1905, however, applies to labour generally in all in- dustrial and commercial undertakings except transport and fisheries, with certain regulated exceptions for (a) cases of breakdown or urgency due to force majeure, (b) certain repairs and cleaning, (c) perishable materials, (d) retail food supply. Young workers are excluded from the exceptions. The absolute prohibitions 6f em- ployment are: for children under 12 years in any industry, manu- facturing or mining or transport, and for women and girls under 21 years below the surface in working of mines. Boys under 16 years and women and girls under 21 years may in general not be em- ployed before 5 a.m. or after 9 p.m., and one day in the seven is to be set apart for rest from employment; to these rules exception may be made either by royal decree for classes or groups of processes, or by local authorities in exceptional cases. The exceptions may be applied, generally, only to workers over 14 years, but in mines, by royal decree, boys over 12 years may be employed from 4 A.M. The law of 1889 fixes only a maximum of 12 hours of effective work, to be interrupted by pauses for rest of not less than ij hours, empowering the king by decree to formulate more precise limits suited to the special circumstances of individual industries. Royal decrees have accordingly laid down the conditions for many groups, including textile trades, manufacture of paper, pottery, glass, clothing, mines, quarries, engineering and printing works. In some the daily limit is 10 hours, but in more iOj or 11 hours. In a few exceptionally un- healthy trades, such as the manufacture of lucifer matches, vulcaniza- tion of india-rubber by means of carben bi-sulphide, the age of ex- clusion from employment has been raised, and in the last-named process hours have been reduced to 5, broken into two spells of 2\ hours each. As a rule the conditions of health and safeguarding of employments in

exceptionally injurious trades have been sought by a series of decrees under the law of 1863 relating to public health in such industries. Special regulations for safety of workers have been introduced in manufactures of white-lead, oxides of lead, chromate of lead, lucifer match works, rag and shoddy works; and for dangers common to many industries, provisions against dust, poisons, accidents and other risks to health or limb have been codified in a decree of 1896. A royal decree of the 31st of March 1903 prohibits employment of persons under 16 years in fur-pulling and in carotting of rabbit skins, and another of the 13th of May 1905 regulates use of lead in house-painting. In 1898 a law was passed to enable the authorities to deal with risks in quarries under the same procedure. Safety in mines (which are not private property, but state conces- sions to be worked under strict state control) has been provided for since 1810. In matters of hygiene, until 1899 the powers of the public health authorities to intervene were insufficient, and a law was passed authorizing the government to make regulations for every kind of risk in any undertaking, whether classed under the law of public health or not. By a special law of 1888 children and young persons under 18 years are excluded from employment as pedlars, hawkers or in circuses, except by their parents, and then only if they have attained 14 years. Abuses of the truck system have, since 1887, been regulated with care. The chief objects of the law of 1887 were to secure payment in full to all workers, other than those in agri- culture or domestic service, of wages in legal tender, to prohibit payment of wages in public-houses, and to secure prompt payment of wages. Certain deductions were permitted under careful control for specific customary objects: lodging, use of land, uniforms, food, firing. A royal order of the 10th of October 1903 required use of automatic indicators for estimating wages in certain cases in textile processes. The law of the 15th of June 1896 regulates the affixing in workplaces, where at least five workers are employed, of a notice of the working rules, the nature and rate of fines, if any, and the mode of their application. Two central services the mines inspectorate and the factory and workshop inspectorate, divide the duties above indicated. There is also a system of local administration of the regulations relating to industries classed as unhealthy, but the tendency has been to give the supreme control in these matters to the factory service, with its expert staff.

Holland. — The first law for regulation of labour in manufacture was passed in 1874, and this related only to employment of children. The basis of all existing regulations was established in the law of the 5th of May 1889, which applies to all industrial undertakings, ex- cluding agriculture and forestry, fishing, stock-rearing. Employ- ment of

children under 12 years is prohibited, and hours are limited for young persons under 16 and for women of any age. These pro- tected persons may be excluded by royal decree from unhealthy industries, and such industries are specified in a decree of 1897 which supersedes other earlier regulations. Hours of employment must not exceed 1 1 in the 24, and at least one hour for rest must be given between 11 A.M. and 3 p.m., which hour must not be spent in a workroom. Work before 5 A.M. or after 7 p.m., Sunday work, and work on recognized holidays is generally prohibited, but there are exceptions. Overtime from 7 to 10 p.m., under conditions, is allowed for women and young workers, and Sunday work for women, for

example, in butter and cheese making, and night work for boys over 14 in certain industries. Employment of women within four weeks of childbirth is prohibited. Notices of working hours must be affixed in workplaces. Underground work in mines is prohibited for women and young persons under 16, but in Holland mining is a very small industry. In 1895 the first legislative provision was made for protection of workers against risk of accident or special injury to health. Sufficient cubic space, lighting, ventilation, sanitary ac- commodation, reasonable temperature, removal of noxious gases or dust, fencing of machinery, precautions against risk from fire and other matters are provided for. The manufacture of lucifer matches by means of white phosphorus was forbidden and the export, importa- tion and sale was regulated by a law of the 28th of May 1901. By a regulation of the 16th of March 1904 provisions for safety and health of women and young workers were strengthened in processes where lead compounds or other poisons are used, and their employ- ment at certain dangerous machines and in cleaning machinery or near driving belts was prohibited. No penal provision against truck exists in Holland, but possibly abuses of the system are pre- vented by the existence of industrial councils representing both employers and workers, with powers to mediate or arbitrate in case of disputes.

Switzerland. — In Switzerland separate cantonal legislation pre- pared the way for the general Federal labour law of 1877 on which subsequent legislation rests. Such legislation is also cantonal as well as Federal, but in the latter there is only amplification or interpretation of the principles contained in the law of 1877, whereas cantonal legislation covers industries not included under the Federal law, e.g. single workers employed in a trade (metier) and employment in shops, offices and hotels. The Federal law is applied to factories, workshops employing young persons under 18 or more than 10 workers, and workshops in which unhealthy or dangerous processes are carried on. Mines are not included, but are regulated in some respects as regards

health and safety by cantonal laws. Further, the Law of Employers' Liability 1881-1887, which requires in all industries precautions against accidents and reports of all serious accidents to the cantonal governments, applies to mines. This led, in 1896, to the creation of a special mining department, and mines, of which there are few, have to be inspected once a year by a mining engineer. The majority of the provisions of the Federal labour law apply to adult workers of both sexes, and the general limit of the 1 1 -hours' day. exclusive of at least one hour for meals, applies to men as well as women. The latter have, however, a legal claim, when they have a household to manage, to leave work at the dinner-hour half an hour earlier than the men. Men and unmarried women may be employed in such subsidiary work as cleaning before or after the general legal limits. On Saturdays and eves of the eight public holidays the 11-hours' day is reduced to 10. Sunday work and night work are forbidden, but exceptions are permitted conditionally. Night work is defined as 8 p.m. to 5 a.m. in summer, 8 p.m. to 6 A.M. in winter. Children are excluded from employment in workplaces under the law until 14 years of age, and until 16 must attend con- tinuation schools. Zurich canton has fixed the working day for women at 10 hours generally, and 9 hours on Saturdays and eves of holidays. Bale-Ville canton has the same limits and provides that the very limited Sunday employment permitted shall be compen- sated by double time off on another day. In the German-speaking cantons girls under 18 are not permitted to work overtime; in all cantons except Glarus the conditional overtime of 2 hours must be paid for at an enhanced wage.

Sanitary regulations and fencing of machinery are" provided for with considerable minuteness in a Federal decree of 1897. The plans of every new factory must be submitted to the cantonal govern- ment. In the case of lucifer match factories, not only the building but methods of manufacture must be submitted. Since 1901 the manufacture, sale and import of matches containing white phosphorus have been forbidden. Women must be absent from employment during eight weeks before and after childbirth. In certain dangerous occupations, e.g. where lead or lead compounds are in use, women may not legally be employed during pregnancy. A resolution of the federal council in 1901 classed thirty four different substances in use in industry as dangerous and laid down that in case of clearly defined illness of workers directly caused by use of any of these substances the liability provided by article 3 of the law of the 25th of June 1881, and article I of the law of the 26th of April 1887, should apply to the manufacture. Legislative provision against abuses of the truck system appears to be of earlier origin in Switzerland (17th century) than any other

European country outside England (15th century). The Federal Labour Law 1877 generally prohibits payment of wages otherwise than in current coin, and provides that no deduc tion shall be made without an express contract. Some of the cantonal laws go much farther than the British act of 1896 in' for- bidding certain deductions; e.g. Zurich prohibits any charge for cleaning, warming or lighting workrooms or for hire of machinery. By the Federal law fines may not exceed half a day's wage. Ad- ministration of the Labour laws is divided between inspectors appointed by the Federal Government and local authorities, under supervision of the cantonal governments. The Federal Govern- ment forms a court of appeal against decisions of the cantonal governments.

Germany. — Regulation of the conditions of labour in industry throughout the German empire is provided for in the Imperial Industrial Code and the orders of the Federal Council based thereon. By far the most important recent amendment socially is the law regulating child-labour, dated the 30th of March 1903, which relates to establishments having industrial character in the sense of the Industrial Code. This Code is based on earlier industrial codes of the separate states, but more especially on the Code of 1869 of the North German Confederation. It applies in whole or in part to all trades and industrial occupations, except transport, fisheries and agriculture. Mines are only included so far as truck, Sunday and holiday rest, prohibition of employment underground of female labour, limitation of the hours of women and young workers are concerned ; otherwise the regulations for protection of life and limb of miners vary, as do the mining laws of the different states. To estimate the force of the Industrial Code in working, it is necessary to bear in mind the complicated political history of the empire, the separate administration by the federated states, and the generally considerable powers vested in administration of initiating regula- tions. The Industrial Code expressly retains power for the states to initiate certain additions or exceptions to the Code which in any given state may form part of the law regulating factories there. The Code (unlike the Austrian Industrial Code) lays down no general limit for a normal working day for adult male workers, but since 1891 full powers were given to the Imperial government to limit hours for any classes of workers in industries where excessive length of the working day

endangers the health of the worker (R.G.O. § l2oe). Previously application had been made of powers to reduce the working day in such unhealthy industries as silvering of mirrors by mercury and the manufacture of white-lead. Separate states had, under mining laws, also limited hours of miners. Sunday rest was, in 1 891, secured for every class of workers, commercial, industrial and mining. Annual holidays were also secured on church festivals. These provisions, however, are subject to exceptions under con- ditions. An important distinction has to be shown when we turn to the regulations for hours and times of labour for protected persons (women, young persons and children). Setting aside for the moment hours of shop assistants (which are under special sections since 1900), it is to ” factory workers ” and not to industrial workers in general that these limits apply, although they may be, and in some instances have been, further extended — for instance, in ready-made clothing trades — by imperial decree to workshops, and by the Child Labour Law of 1903 regulation of the scope and duration of employment of children is much strengthened in workshops, commerce, transport and domestic industries. The term ” factory ” (Fabrik) is not de- fined in the Code, but it is clear from various decisions of the supreme court that it only in part coincides with the English term, and that some workplaces, where processes are carried on by aid of mechanical power, rank rather as English workshops. The distinction is rather between wholesale manufacturing industry, with subdivision of labour, and small industry, where the employer works himself. Certain classes of undertaking, viz. forges, timber-yards, dock- yards, brickfields and open quarries, are specifically ranked as factories. Employment of protected persons at the surface of mines and underground quarries, and in salt works and ore-dressing works, and of boys underground comes under the factory regulations. These exclude children from employment under 13 years, and even later if an educational certificate has not been obtained; until 14 years hours of employment may not exceed 6 in the 24. In processes and occupations under the scope of the Child Labour Law children may not be employed by their parents or guardians before 10 years of age or by other employers before 12 years of age; nor between the hours of 8 p.m. and 8 a.m., nor otherwise than in full compliance with requirements of educational authorities for school attendance and with due regard to prescribed pauses. In school term time the daily limit of employment for children is three hours, in holiday time three hours. As regards factories Germany, unlike Great Britain, France and Switzerland, requires a shorter day for young persons than for women — 10 hours for the former, 11 hours for the latter. Women over 16 years may be employed 11 hours. Night work is forbidden, i.e. work between 8.30

p.m. and 5.30 a.m. Overtime may be granted to meet unforeseen pressure or for work on perishable articles, under conditions, by local authorities and the higher ad- ministrative authorities. Prescribed meal-times are — an unbroken half-hour for children in their 6 hours; for young persons a mid-day pause of one hour, and half an hour respectively in the morning and afternoon spells; for women, an hour at mid-day, but women with the care of a household have the claim, on demand, to an extra half- hour, as in Switzerland. No woman may be employed within four weeks after childbirth, and unless a medical certificate can then be produced, the absence must extend to six weeks. Notice of working periods and meal-times must be affixed, and copies sent to the local authorities. Employment of protected persons in factory industries where there are special risks to health or morality may be forbidden or made dependent on special conditions. By the Child Labour Law employment of children is forbidden in brickworks, stone breaking, chimney sweeping, street cleaning and other processes and occupa- tions. By an order of the Federal Council in 1902 female workers were excluded from main processes in forges and rolling mills. All industrial employers alike are bound to organize labour in such a

manner as to secure workers against injury to health and to ensure good conduct and propriety. Sufficient light, suitable cloakrooms and sanitary accommodation, and ventilation to carry off dust, vapours and other impurities are especially required. Dining- rooms may be ordered by local authorities. Fencing and provision for safety in case of fire are required in detail. The work of the trade accident insurance associations in preventing accidents is especially recognized in provisions for special rules in dangerous or unhealthy industries. Officials of the state factory departments are bound to give opportunity to trustees of the trade associations to express an opinion on special rules. In a large number of industries the Federal Council has laid down special rules comparable with those for unhealthy occupations in Great Britain. Among the regulations most recently revised and strengthened are those for manufacture of lead colours and lead compounds, and for horse-hair and brush- making factories. The relations between the state inspectors of factories and the ordinary police authorities are regulated in each state by its constitution. Prohibitions of truck in its original sense- that is, payment of wages otherwise than in current coin — apply to any persons under a contract of service with an employer for a specified time for industrial purposes; members of a family working for a parent or husband are not included ; outworkers are covered. Control of fines and deductions from wages applies only in factory industries and

shops employing at least 20 workers. Shop hours are regulated by requiring shops to be closed generally between 9 p.m. and 5 a.m., by requiring a fixed mid-day rest of 1 J hours and at least 10 hours' rest in the 24 for assistants. These limits can be modified by administrative authority. Notice of hours and working rules must be affixed. During the hours of compulsory closing sale of goods on the streets or from house to house is forbidden. Under the Commercial Code, as under the Civil Code, every employer is bound to adopt every possible measure for maintaining the safety, health and good conduct of his employes. By an order of the Imperial Chancellor under the Commercial Code seats must be pro- vided for commercial assistants and apprentices.

Austria. — The Industrial Code of Austria, which in its present outline (modified by later enactments) dates from 1883, must be carefully distinguished from the Industrial Code of the kingdom of Hungary. The latter is, owing to the predominantly agricultural character of the population, of later origin, and hardly had practical force before the law of 1893 provided for inspection and preven- tion of accidents in factories. No separate mining code exists in Hungary, and conditions of labour are regulated by the Austrian law of 1854. The truck system is repressed on lines similar to those in Austria and Germany. As regards limitation of hours of adult labour, Hungary may be contrasted with both those empires in that no restriction of hours applies either to men's or women's hours, whereas in Austrian factories both are limited to an n-hours' day with exceptional overtime for which payment must always be made to the worker. The Austrian Code has its origin, however, like the British Factory Acts, in protection of child labour. Its present scope is determined by the Imperial " Patent " of 1859, and all industrial labour is included except mining, transport, fisheries, forestry, agriculture and domestic industries. Factories are defined as including industries in which a " manufacturing process is carried on in an enclosed place by the aid of not less than twenty workers working with machines, with subdivision of labour, and under an employer who does not himself manually assist in the work." In smaller handicraft industries the compulsory gild system of organization still applies. In every industrial establishment, large or small, the sanitary and safety provisions, general requirement of Sunday rest, and annual holidays (with conditional exceptions), prohibition of truck and limitation of the ages of child labour apply. Night work for women, 8 p.m. to 5 a.m., is prohibited only in factory industries ; for young workers it is prohibited in any industry. Pauses in work are required in all industries; one hour at least must be given at mid-day, and if the morning and afternoon spells exceed 5 hours each, another half-hour's

rest at least must be given. Children may not be employed in industrial work before 12 years, and then only 8 hours a day at work that is not injurious and if educational requirements are observed. The age of employment is raised to 14 for " factories," and the work must be such as will not hinder physical development. Women may not be employed in regular industrial occupation within one month after childbirth. In certain scheduled unhealthy industries, where certificates of authorization from local authorities must be obtained by intending occupiers, conditions of health and safety for workers can be laid down in the certificate. The Minister of the Interior is empowered to draw up regulations prohibiting or making conditions for the employment of young workers or women in dangerous or unhealthy industries. The pro- visions against truck cover not only all industrial workers engaged in manual labour under a contract with an employer, but also shop- assistants ; the special regulations against fines and deductions apply to factory workers and shops where at least 20 workers are employed. In mines under the law of 1884, which supplements the general mining law, employment of women and girls underground is pro- hibited; boys from 12 to 16 and girls from 12 to 18 may only be employed at light work above ground; 14 is the earliest age of admission for boys underground. The shifts from bank to bank must not exceed 12 hours, of which npt more than 10 may be effective

work. Sunday rest must begin not later than 6 A.M., and must be of 24 hours' duration. These last two provisions do not hold in case of pressing danger for safety, health or property. Sick and accident funds and mining associations are legislated for in minutest detail. The general law provides for safety in working, but special rules drawn up by the district authorities lay down in detail the conditions of health and safety. As regards manufacturing industry, the Industrial Code lays no obligation on employers to report accidents, and until the Accident Insurance Law of 1889 came into force no statistics were available. In Austria, unlike Germany, the iactory inspectorate is organized throughout under a central chief inspector. Scandinavian Countries. — In Sweden the Factory Law was amended in January 1901 ; in Denmark in July 1901. Until that year, however, Norway was in some respects in advance of the other two countries by its law of 1892, which applied to industrial works, including metal works of

all kinds and mining. Women were thereby prohibited from employment : (a) underground ; (b) in cleaning or oiling machinery in motion; (c) during six weeks after childbirth, unless provided with a medical certificate stating that they might return at the end of four weeks without injury to health; (d) in dangerous, unhealthy or exhausting trades during pregnancy. Further, work on Sundays and public holidays is prohibited to all workers, adult and youthful, with conditional exceptions under the authority of the inspectors. Children over 12 are admitted to industrial work on obtaining certificates of birth, of physical fitness and of elementary education. The hours of children are limited to 6, with pauses, and of young persons (of 14 to 18 years) to 10, with pauses. Night work between 8 p.m. and 6 A.M. is prohibited. All workers are entitled to a copy of a code of factory rules containing the terms of the contract of work drawn up by representatives of employes with the employers and sanctioned by the inspector. Health and safety in working are provided for in detail in the same law of 1892. Special rules may be made for dangerous trades, and in 1899 such rules were established for match factories, similar to some of the British rules, but notably providing for a dental examination four times yearly by a doctor. In Denmark, regulation began with un- healthy industries, and it was not until the law of 1901 came into force, on the 1st of January 1902, that children under 12 years have been excluded from factory labour. Control of child labour can be strengthened by municipal regulation, and this has been done in Copenhagen by an order of the 23rd of May 1903. In Sweden the 12 years' limit had for some time held in the larger factories; the scope has been extended so that it corresponds with the Norwegian law. The hours of children are, in Denmark, 65 for those under 14 years; in Sweden 6 for those under 13 years. Young persons may not in either country work more than 10 hours daily, and night work, which is forbidden for persons under 18 years, is now defined as in Norway. Women may not be employed in industry within four weeks of childbirth, except on authority of a medical certificate. All factories in Sweden where young workers are employed are subject to medical inspection once a year. Fencing of machinery and hygienic conditions (ventilation, cubic space, temperature, light) are regulated in detail. In Denmark the use of white phosphorus in manufacture of lucifer matches has been prohibited since 1874, and special regula- tions have been drawn up by administrative orders which strengthen control of various unhealthy or dangerous industries, e.g. dry-cleaning works, printing works and type foundries, iron foundries and engineer- ing works. A special act of the 6th of April 1906 regulates labour and sanitary conditions in bakehouses and confectionery works.

Italy and Spain. — The wide difference between the industrial development of these southern Latin countries and the two countries with which this summary begins, and the far greater importance of the agricultural interests, produced a situation, as regards labour legislation until as recently as 1903, which makes it convenient to touch on the comparatively limited scope of their regulations at the close of the series. It was stated by competent and impartial observers from each of the two countries, at the International Congress on Labour Laws held at Brussels in 1897, that the lack of adequate measures for protection of child labour and inefficient administration of such regulations as exist was then responsible for abuse of their forces that could be found in no other European countries. ” Their labour in factories, workshops, and mines constitutes a veritable martyrdom ” (Spain). ” I believe that there is no country where a sacrifice of child life is made that is comparable with that in certain Italian factories and industries ” (Italy). In both countries im- portant progress has since been made in organizing inspection and preventing accidents. In Spain the first step in the direction of limitation of women’s hours of labour was taken by a law of 1900, which took effect in 1902, in regulations for reduction of hours of labour for adults to 1 1 , normally, in the 24. Hours of children under 14 must not exceed 6 in any industrial work nor 8 in any commercial undertaking. Labour before the age of 10 years and night work between 6p.m. and 5 A.M. was prohibited, and powers were taken to extend the prohibition of night work to young persons under 16 years. The labour of children in Italy was until 1902 regulated in the main by a law of 1886, but a royal decree of 1899 strengthened it by classing night work for children under 12 years as ” injurious,” such work being thereby generally prohibited for them, though exceptions are admitted; at the same time it was laid down that children from 12 to 15 years might not be employed for more than 6 hours at night.

The law of 1886 prohibits employment of children under 9 years in ‘industry and under 10 years in underground mining. Night work for women was in Italy first prohibited by the law of the 19th of June 1902, and at the same time also for boys under 15, but this regulation was not to take full effect for 5 years as regards persons already so employed; by the same law persons under 15 and women of any age were accorded the claim to one day’s complete rest of 24 hours in the week; the age of employment of children in factories, workshops, laboratories, quarries, mines, was raised to 12 years generally and 14 years for underground work; the labour of female workers of any age was prohibited in underground work, and power was reserved to further restrict and regulate their employment as well as that of male

workers under 15. Spain and Italy, the former by the law of the 13th of March 1900, the latter by the law of the 19th of June 1902, prohibit the employment of women within a fixed period of child-birth; in Spain the limit is three weeks, in Italy one month, which may be reduced to three weeks on a medical certificate of fitness. Sunday rest 'is secured in industrial works, .with regulated excep- tions in Spain by the law of the 3rd of March 1904. It is in the direction of fencing and other safeguards against accidents and as regards sanitary provisions, both in industrial workplaces and in mines, that Italy has made most advance since her law of 1890 for prevention of accidents. Special measures for prevention of malaria are required in cultivation of rice by a ministerial circular of the 23rd of April 1903; work may not begin until an hour after sunrise and must cease an hour before sunset; children under 13 may not be employed in this industry. (A. M. An.)

IV. United States

Under the general head of Labour Legislation all American statute laws regulating labour, its conditions, and the relation of employer and employe must be classed. It includes what is properly known as factory legislation. Labour legislation belongs to the latter haif of the 19th century, so far as the United States is concerned. Like England in the far past, the Americans in colonial days undertook to regulate wages and prices, and later the employment of apprentices. Legislation relating to wages and prices was long ago abandoned, but the laws affecting the employment of apprentices still exist in some form, although conditions of employment have changed so materially that apprenticeships are not entered as of old; but the laws regulating the employment of apprentices were the basis on which English legislation found a foothold when parliament wished to regulate the labour of factory operatives. The code of labour laws of the present time is almost entirely the result of the industrial revolution during the latter part of the 1 8th century, under which the domestic or hand-labour system was displaced through the introduction of power machinery. As this revolution took place in the United States at a somewhat later date than in England, the labour legislation necessitated by it belongs to a later date. The factory, so far as textiles are concerned, was firmly established in America during the period from 1820 to 1840, and it was natural that, the English legislation found friends and advocates in the United States, although the more objectionable conditions accompanying the English factory were not to be found there.

The first attempt to secure legislation regulating factory employment

related to the hours of labour, which were very long — from twelve to thirteen hours a day. As machinery £ ar / y was introduced it was felt that the tension resulting attempts from speeded machines and the close attention re- *° “Sˆate quired in the factory ought to be accompanied by a shorter work-day. This view took firm hold of the operatives, and was the chief cause of the agitation which has resulted in a great body of laws applying in very many directions. As early as 1806 the caulkers and shipbuilders of New York City agitated for a reduction of hours to ten per day, but no legislation followed. There were several other attempts to secure some regulation relative to hours, but there was no general agitation prior to 183 1. As Massachusetts was the state which first recognized the necessity of regulating employment (following in a measure, and so far as conditions demanded, the English labour or factory legislation), the history of such legislation in that state is indicative of that in the United. States, and as it would be impossible in this article to give a detailed history of the origin of laws in the different states, the dates of their enactment, and their provisions, it is best to follow primarily the course of the Eastern states, and especially that of Massachusetts, where the first general agitation

took place and the first laws were enacted. That state in 1836 regulated by law the question of the education of young persons employed in manufacturing establishments. The regulation of hours of labour .was warmly discussed in 1832, and several legislative committees and commissions reported upon it, but no specific action on the general question of hours of labour secured the indorsement of the Massachusetts legislature until 1874, although the day’s labour of children under twelve years of age was limited to ten hours in 1842. Ten hours constituted a day’s labour, on a voluntary basis, in many trades in Massachusetts and other parts of the country as early as 1853, while in the shipbuilding trades this was the work-day in 1844. In April 1840 President Van Buren issued an order ” that all public establishments will hereafter be regulated, as to working hours, by the ten-hours system.” The real aggressive movement began in 1845, through numerous petitions to the Massachusetts legislature urging a reduction of the day’s labour to eleven hours, but nothing came of these petitions at that time. Again, in 1850, a similar effort was made, and also in 1851 and 1852, but the bills failed. Then there was a

period of quiet until 1865, when an unpaid commission made a report relative to the hours of labour, and recommended the establishment of a bureau of statistics for the purpose of collecting data bearing upon the labour question. This was the first step in this direction in any country. The first bureau of the kind was established in Massachusetts in i86q, but meanwhile, in accordance with reports of commissions and the address of Governor Bullock in 1866, and the general sentiment which then prevailed, the legislature passed an act regulating in a measure the conditions of the employment of children in manufacturing establishments; and this is one of the first laws of the kind in the United States, although the first legislation in the United States relating to the hours of labour which the writer has been able to find, and for which he can fix a date, was enacted by the state of Pennsylvania in 1849, the law providing that ten hours should be a day's work in cotton, woollen, paper, bagging, silk and flax factories.

The Massachusetts law of 1866 provided, firstly, that no child under ten should be employed in any manufacturing establish- ment, and that no child between ten and fourteen Employ- should be so employed unless he had attended some children, public or private school at least six months during the year preceding such employment, and, further, that such employment should not continue unless the child attended school at least six months in each and every year; secondly, a penalty not exceeding $50 for every owner or agent or other person knowingly employing a child in violation of the act; thirdly, that no child under the age of fourteen should be employed in any manufacturing establishment more than eight hours in any one day; fourthly, that any parent or guardian allowing or consent- ing to employment in violation of the act should forfeit a sum not to exceed $50 for each offence; fifthly, that the Governor instruct the state constable and his deputies to enforce the provisions of all laws for regulating the employment of children in manufacturing establishments. The same legislature also created a commission of three persons, whose duty it was to investigate the subject of hours of labour in relation to the social, educational and sanitary condition of the working classes. In 1867 a fundamental law relating to schooling and hours of labour of children employed in manufacturing and mechanical establishments was passed by the Massachusetts legislature. It differed from the act of the year previous in some respects, going deeper into the general question. It provided that, no child under ten should be employed in any manufacturing or mechanical establishment of the commonwealth, and that no child between ten and fifteen should be so employed unless he had attended school, public or private, at least three months during the year next

preceding Tiis employment. There were provisions relating to residence, &c, and a further provision that no time less than 120 half-days of actual schooling should be deemed an equivalent of three months, and that no child under fifteen should be employed in any manufacturing or mechanical establishment more than sixty hours any one week. The law

also provided penalties for violation. It repealed the act of

1866.

In 1869 began the establishment of that chain of offices in the United States, the principle of which has been adopted by other countries, known as bureaus of statistics of labour, their especial purpose being the collection and dissemination of information relating to all features of industrial employment. As a result of the success of the first bureau, bureaus are in existence in thirty-three states, in addition to the United States Bureau of Labour.

A special piece of legislation which belongs to the common- wealth of Massachusetts, so far as experience shows, was that in 1872, providing for cheap morning and evening trains for the accommodation of working men living in the vicinity of Boston. Great Britain had long had such trains, which were called parliamentary trains. Under the Massachusetts law some of the railways running out of Boston furnished the accommodation required, and the system has since been in operation.

In different parts of the country the agitation to secure legisla- tion regulating the hours of labour became aggressive again in 1870 and the years immediately following, there being a constant repetition of attempts to secure the f 1 “?? 1 ? enactment of a ten-hours law, but in Massachusetts tloa igjf t all the petitions failed till 1874, when the legislature of that commonwealth established the hours of labour at sixty per week not only for children under eighteen, but for women, the law providing that no minor under eighteen and no woman over that age should be employed by any person, firm or corporation in any manufacturing establishment more than ten hours in any one day. In 1876 Massachusetts reconstructed its laws relating to the employment of children, although it did not abrogate the principles involved in earlier legislation, while in 1877 the commonwealth passed Factory Acts covering the general pro- visions of the British laws. It provided for the general inspec- tion of factories and public buildings, the provisions of the law relating to dangerous machinery, such as belting, shafting, gear- ing, drums, &c, which the legislature

insisted must be securely guarded, and that no machinery other than steam engines should be cleaned while running. The question of ventilation and cleanliness was also attended to. Dangers connected with hoistways, elevators and well-holes were minimized by their protection by sufficient trap-doors, while fire-escapes were made obligatory on all establishments of three or more storeys in height. All main doors, both inside and outside, of manufactur- ing establishments, as well as those of churches, school-rooms, town halls, theatres and every building used for public assemblies, should open outwardly whenever the factory inspectors of the commonwealth deemed it necessary. These provisions remain in the laws of Massachusetts, and other states have found it wise to follow them.

The labour legislation in force in 1910 in the various states of the Union might be classified in two general branches: (A) protective labour legislation, or laws for the aid of workers who, on account of their economic dependence, are not in a position fully to protect themselves; (B) legislation having for its purpose the fixing of the legal status of the worker as an employ*;, such as laws relating to the making and breaking of the labour contract, the right to form organizations and to assemble peaceably, the settlement of labour disputes, the licensing of occupations, &c.

(A) The first class includes factory and workshop acts, laws relating to hours of labour, work on Sundays and holidays, the payment of wages, the liability of employers for injuries to their employes, &c. Factory acts have been passed by

Factory and work-

nearly all the states of the Union. These may be considered in two groups — first, laws which relate to con- s °P a s * ditions of employment and affect only children, young persons and women; and second, laws which relate to the sanitary condition of factories and workshops and to the safety of employes generally. The states adopting such laws have usually made provision for factory inspectors, whose duties are to enforce these laws and who have power to enter and inspect factories and workshops. The most common provisions of the factory acts in the various states are those which fix an age limit below which employment is unlawful. All but five states have enacted such provisions, and these five states have practically no manufacturing industries. In some states the laws fixing an age limit are restricted in their application to factories, while in others they extend also to workshops, bakeries, mercantile

establishments and other work places where children are employed 1 he prescribed age limit varies from ten to fourteen years. Provisions concerning the education of children in factories and workshops may be considered m two groups, those relating to apprenticeship and hose requiring a certain educational qualification as a pre-requisite to employment. Apprenticeship laws are numerous, but they do not now nave great force, because of the practical abrogation of the apprenticeship system through the operation of modern methods of production Most states have provisions prohibiting illiterates under a specified age, usually sixteen, from being employed in

C ™ S nM a r° rksh0 , PS — I he P r r isions of the factory acts relating m,n? „f labour and night work generally affect only the employ rnent of women and young persons. Most of the states have enacted such provisions, those limiting the hours of children occurring more oAvork- Tn ˆV h ° Se hmitin S the hours of women. The ho.fr Hm t vv, h, UC , h Case – S ranges from S1X P er da V to sixty-six per week Where the working time of children is restricted, the minimum age prescribed for such children ranges from twelve to twenty-one year? In some cases the restriction of the hours of labour of women and children is general, while in others it applies only to employment “n one or more classes of industries. Other provisions ofkwTor the protection of women and children, but not usually confined in their operation to factories and workshops, are such as require seats for females and separate toilet facilities for the sexes, and prohibit em- ployment in certain occupations as in mines, places .where intoxicants are manufactured or sold, in cleaning or operatinrdaneerous machinery, &c. Provisions of factory acts relatˆg to the sanhary condition of factories and workshops and the safety of employes have been enacted in nearly all the manufacturing state To f the Lnion. They prohibit overcrowding, and require proper ventila- tion, sufficient light and heat, the lime- washing or painting of walls and ceilings, the provision of exhaust fans and blowers in places where dust or dangerous fumes are generated, guards on machinery

wavsˆnd r* P and t g?arin fi g ShifterS ‘ g” ar ds on elevators and hoist- ways, hand-rails on stairs, fire-escapes, &c

The statutes relating to hours of labour may be considered nnd P ; five groups namely: (,) general laws which Merely “fix what shall Hours of ?, e /? ga rde . d as . a day’s labour in the absence of a contract ;

labour. (2 { , laws defining what shall constitute a day's work on

public roads; (3) laws limiting the hours of labour oer day on public works; (4) laws limiting the hours of labour in certain occupations; and (5) laws which specify the hours per day or per week during which women and children may be employed The statutes included m the first two groups place no restrictions upon and eZf e 7 f h °" re * h,cl ! ma y °e agreed upon between employers and employes, while those in the other three groups usually limit the freedom o contract and provide penalties for their violation A considerable number of states have enacted laws which fixaday^s abour m the absence of any contract, some at eight and others at enhours, so that when an employer and an employe make a contract and they do not specify what shall constituted day's labour ekht or ten hours respectively would be ruled as the day's labour in an action which might come before the courts. In a number of the states

cash D av m n P nts W o r V he CI . tiZEnS t0 Hqui ? ate certain taxes e *her by cash payments or by rendering personal service. In the latter case the length of the working day is defined by law, eight hours befng usually specified. The Federal government and nearly one-half of hf w a rWn aVe T S P rovldln g. th at eight hours shall constitute a day's work or employes on public works. Under the Federal Act it is unlawful for any officer of the government or of any contractor or subcontractor for public works to permit labourers and mechanics to

hours clThˆrYˆ ˆT *" ˆ The State ˆ concern ng hour,, of labour have similar provisions. Exceptions are provided

for cases of extraordinary emergencies, such as danger to human life or property. In many states the hours of labour have been limited by law ,n occupations in which, on account of their dangerous or insanitary character the health of the employes would be jeopardized by long hours of labour, or in which the fatigue occasionedby long hours would endanger the lives of the employes or of the pˆbH? The occupations for which such special legislation has been enacted are those of employes on steam and street railways, in mines and other underground workings, smelting and refining works, bakeries and cotton and woollen mills. Laws limiting the hours of labour of shopTctT considered under factory and work-

Nearly all states and Territories of the Union have laws prohibiting the employment of labour on Sunday. These laws usually make it Sunday f misdemeanour for persons either to labour themselvesor labour. to com Pel or permit their apprentices, servants or other employes to

labour on the first day of the week Ex- ceptions are made in the case of householdduties o7 works of necessity or charity, and in the case of members of religious societies who observe some other than the first day of the week SOCletles

statutes concerning the payment of wages of employfe mav be cons.dered ,n two groups: (1) those which relate to the employment Payment contrac t> such as laws fixing the maximum period of wage of wages. Pfyments prohibiting the payment of wages in scrip or ,,., other evidences of indebtedness in lieu of lawful money machine r v g F* ded f tions on account of fines, breakage Tf machinery, discounts for prepayments, medical attendance, relief

[UNITED STATES

iTgts r £% P) U lTd S s L S ti r o e n qU:rin ?- the giYing ° f notice o f eduction of wages

special protection to working people with respect 1 o their ™=, g such as laws exempting wales from attarhmˆ t • Wages ‘ claims in assignments, fnd i%nti™wˆˆ P ˆ?« n ™& and other constructions on which they have been emToyed gS Employers’ liability laws have been passed to enahll =„ 1 –

to recover damages from his employer under cerˆ?nˆv em P lo 7 e he has been injured through SnˆurriS ‘f ons wh en works of the employer. The common-law maxim that the Employers’ principal is responsible for the acts of his agent does not ffa6 ”” apply where two or more persons are working together under caˆSneST fiS tllˆrˆtlt ˆˆTZ SteˆretoS ˆ ˆ ˆ £?<=* ft

A lˆl • The ln J ustlce of this rule is seen by a single illustration A weaver in a cotton factory, where there are hundred! of operatives’

s injured by the neglect or carelessness of the enginee nSS the motive power. Under the common law the weaver 21 recover damages from the employer, because he was the c ° employe’ of the engineer. So, one of thousands of employes o a raE who e m m hf Stammg in J urie ˆ through the careleS of a switchman whom he never saw, could recover no damages from the railwav company, both being co-employes of the sfme employer The injustice of this application of the common-law ruleTas been recog- nized, but the only way to avoid the difficulty was through “3c legislation providing that under such conditions as those related

s? t h r=n= saˆrSia™- ˆ*»™&z&

ESZSt S i0 A tˆfot stats’ t [tlfˆ “T™* in enacted statutes fixing the liaCilitT of eˆˆLSS conditions and relieving the employe from theapplicarion of the common-law ru e. Where the employe himself is coSr bCtory to the injuries resulting from an accident he cannot recover nor can he recover in some cases where he knows of the danger from the drfectl of tools or implements employed by him. The legislation upon the subject involves many features of legislation which need not be described here, such as those concerning the power of employes to

which a iea d nt to C the a lb h ,> e ˆT* ˆr ndi ˆˆˆˆ wnich lead to the liability of the employer and the duties of the

employe, and the relations in which damages for injuries sustained

in employment may be recovered from the employer SUStamed

(rJ) 1 he statutes thus far considered may be regarded as protective

labour legislationˆ There is, besides, a large body of statutory laws

enacted in the various states for the purposl of fixing the legal Status

of employers and employes and defining their righfs and |r!vileges

A great variety of statutes have been enacted in the various states relating to the labour contract. Among these are laws He fining the abour contract, requiring notice of termination ot contract, making it a misdemeanour to break a contract Labour 01 service and thereby endanger human life or expose «”>”•«*.

In d Ua ˆ£T erty t0 . Se – i0US iniury ‘ or to make a contract of service oVfL,?S P tra . n K s .P. ort ation or pecuniary advancements with intent to defraud prohibiting contracts of employment whereby emˆloUs waive the right to damages in case of injury, &c. A Federals? atote makes it a misdemeanour for any one to prepay the transportation or in any way assist or encourage the importation , o ‘ aHens Sunder

The Federal government and nearly all the states and territories have statutory provisions requiring the examination and Tensing of persons practising certain trades other than those in the ” CenSmg class of recognized professions. The Federal statute re- Licensed lates only to engineers on steam vessels, masters, mates “ccupa- pilots, &c. The occupations for which examinations and tions – licences are required by the various state laws are those of barbers horseshoers, elevator

operators, plumbers, stationary firemen steam engineers telegraph operators on railroads and certefn classes ™f mine workers and steam and street railway employls

The right of combination and peaceable assembly on the part of employes is recognized at common law throughout the United btates. Organizations of working-men formed for their mutual benefit, protection and improvement Labour such as for endeavouring to secure higher wages' °^ aniza – shorter hours of labour or better working conditions' are nowhere regarded as unlawful. A number of states and the federal government have enacted statutes providing for the incorporation of trade unions, but owing to the freedom from regulatwn or inspection enjoyed by unincorporated trade unions

very few have availed themselves of this privilege. A number of states have enacted laws tending to give special protection to and encourage trade unions. Thus, nearly one-half of the states have passed acts declaring it unlawful for employers to discharge workmen for joining labour organizations, or to make it a con- dition of employment that they shall not belong to such bodies. Laws of this kind have generally been held to be unconstitu- tional. Nearly all the states have laws protecting trade unions in the use of the union label, insignia of membership, credentials, &c, and making it a misdemeanour to counter- feit or fraudulently use them. A number of the states exempt labour organizations from the operations of the anti-trust and insurance acts.

Until recent years all legal action concerning labour dis- turbances was based upon the principles of the common law. Some of the states have now fairly complete statutory disputes, enactments concerning labour disturbances, while others have little or no legislation of this class. The right of employes to strike for any cause or for no cause is sus- tained by the common law everywhere in the United States. Likewise an employer has a right to discharge any or all of his employes when they have no contract with him, and he may refuse to employ any person or class of persons for any reason or for no reason. Agreements among strikers to take peaceable means to induce others to remain away from the works of an employer until he yields to the demands of the strikers are not held to be conspiracies under the

common law, and the carrying out of such a purpose by peaceable persuasion and without violence, intimidation or threats, is not unlawful. However, any interference with the constitutional rights of another to employ whom he chooses or to labour when, where or on what terms he pleases, is illegal. The boycott has been held to be an illegal conspiracy in restraint of trade. The statutory enactments of the various states concerning labour disturbances are in part re-enactments of the rules of common law and in part more or less departures from or additions to the established principles. The list of such statutory enactments is a large one, and includes laws relating to blacklisting, boy- cotting, conspiracy against working-men, interference with employment, intimidation, picketing and strikes of railway employes; laws requiring statements of causes of discharge of employes and notice of strikes in advertisements for labour; laws prohibiting deception in the employment of labour and the hiring of armed guards by employers; and laws declaring that certain labour agreements do not constitute conspiracy. Some of these laws have been held to be unconstitutional, and some have not yet been tested in the courts.

The laws just treated relate almost entirely to acts either of employers or of employes, but there is another form of law, namely, Arbltra- t ‘ lat P rov idmg for action to be taken by others in the effort tlon and to P revent working people from losing employment, either concilia- by their own acts or by those of their employers, or to tlon. settle any differences which arise out of controversies

relating to wages, hours of labour, terms and conditions of employment, rules, &c. These laws provide for the mediation and the arbitration of labour disputes (see Arbitration and Concilia- tion). Twenty-three states and the Federal government have laws or constitutional provisions of this nature. In some cases they pro- vide for the appointment of state boards, and in others of local boards only. A number of states provide for local or special boards in addition to the regular state boards. In some states it is required that a member of a labour organization must be a member of the board, and, in general, both employers and employes must be represented. Nearly all state boards are required to attempt to mediate between the parties to a dispute when information is re- ceived of an actual or threatened labour trouble. Arbitration may be undertaken in some states on application from either party, in others on the application of both parties. An agreement to maintain the status quo pending arbitration is usually required. The modes of enforcement of obedience to the awards of the boards are various. Some states depend on publicity alone, some give the decisions the effect of judgments of courts of law

which may be enforced by execution, while in other states disobedience to such decisions is punishable as for contempt of court. The Federal statute applies only to common carriers engaged in interstate commerce, and provides for an attempt to be made at mediation by two designated govern- ment officials in controversies between common carriers and their

employes, and, in case of the failure of such an attempt, for the formation of a board of arbitration consisting of the same officials together with certain other parties to be selected. Such arbitration boards are to be formed only at the request or upon the consent of both parties to the controversy.

The enforcement of laws by executive or judicial action is an important matter relating to labour legislation, for without action such laws would remain dead letters. Under the constitutions of the states, the governor is the judicial commander-in-chief of the military forces, and he has enforce- the power to order the militia or any part of it into ment ot active service in case of insurrection, invasion, tumult, i a „ˆ riots or breaches of the peace or imminent danger thereof. Frequent action has been taken in the case of strikes with the view of preventing or suppressing violence threatened or happening to persons or property, the effect being, however, that the militia protects those working or desiring to work, or the employers. The president of the United States may use the land and naval forces whenever by reason of insurrection, domestic violence, unlawful obstructions, conspiracy, combina- tions or assemblages of persons it becomes impracticable to enforce the laws of the land by the ordinary course of judicial proceedings, or when the execution of the laws is so hindered by reason of such events that any portion or class of the people are deprived thereby of their rights and privileges under the constitution and laws of the country. Under this general power the United States forces have been used for the protection of both employers and employes indirectly, the purpose being to protect mails and, as in the states, to see that the laws are carried out.

The power of the courts to interfere in labour disputes is through the injunction and punishment thereunder for contempt of court. It is a principle of law that when there are interferences, actual or threatened, with property or with rights of a pecuniary nature, and the common or statute law offers no adequate and immediate remedy for the prevention of injury, a court of equity may interpose and issue its order or injunction as to what must or must not be done, a violation of which writ gives the court which issued it the power to punish for contempt. The doctrine is that something is necessary to be

done to stop at once the destruction of property and the obstruction of business, and the injunction is immediate in its action. This writ has been resorted to frequently for the indirect protection of employes and of employers. (C. D. W.)

Autsorities. — English: (a) Factory Legislation: Abraham and Davies, Law relating to Factories and Workshops (London, 1897 and 1902); Redgrave, Factory Acts (London, 1897); Royal Commission on Labour, Minutes of Evidence and Digests, Group ” C ” (3 vols., 1892-1893), Assistant Commissioner’s Report on Employment of Women (1893), Fifth and Final Report of the Com- mission (1894); International Labour Conference at Berlin, Correspondence, Commercial Series (C, 6042) (1890); House of Lords Committee on the Sweating System, Report (1891); Home Office Reports: Annual Reports of H.M. Chief Inspector of Factories (1879 to 1901), Committee on White Lead and Various Lead Industries (1894), Working of the Cotton Cloth Factories Acts (1897), Dangerous Trades (Anthrax) Committee, Do., Miscellaneous Trades (1896-97-98-99), Conditions of Work in Fish-Curing Trade (1898), Lead Compounds in Pottery (1899), Phosphorus in Manufacture of Lucifer Matches (1899), &c, &c. ; Whately Cooke-Taylor, Modern Factory System (London, 1891); Oliver, Dangerous Trades (London, 1902) ; Cunningham, Growth of English Commerce and Industry (1907); Hutchins and Harrison, History of Factory Legislation (1903); Traill, Social England, &c, &c. (b) Mines and Quarries: Statutes: Coal Mines Regulation Acts 1886, 1894, 1896, 1899; Metalliferous Mines Regulation Acts 1872, 1875; Quarries Act 1894; Royal Commission on Labour, Minutes of Evidence and Digests, Group “A” (1892-1893, 3 vols.); Royal Commission on Mining Royalties, Appendices (1894); Flome Office Reports : Annual General Report upon the Mining Industry (1894-1897), Mines and Quarries, General Reports and Statistics (1898 to 1899), Annual Reports of H.M. Chief Inspector of Factories (1 893-1 895) (Quarries); Macswinney and Bristowe, Coal Mines Regulation Act 188/ (London, 1888). (c) Shops: Statutes: Shop Hours Acts 1892, 1893, 1896, Seats for Shop Assistants Act 1899; Report of Select Committee of House of Commons on the Shop Hours Regulation Bill 1886 (Eyre and Spottiswoode). (d) Truck: Home Office Reports: Annual Reports of H.M. Chief Inspector of Factories, especially 1895-1900, Memorandum on the Law relating to Truck

and Checkweighing Clauses of the Coal Mines Acts 1896, Memor-

andum relating to the Truck Acts, by Sir Kenelm Digby, with text of Acts (1897).

Continental Europe: Annuaire de la legislation du travail (Bruxelles, 1898-1905); Hygiene et securite des travailleurs dans les ateliers industrials (Paris, 1895) ; Bulletin de I' inspection, du travail (Paris, 1895-1902); Bulletin de I' office international du travail (Paris, 1902-1906); Congres international de legislation du travail (1898)' Die Gewerbeordnung fur das deutsche Reich. (1) Landmann (1897) : (2) Neukamp (1901); Gesetz betr. Kinderarbeit in gewerblichen Betneben, 30. Mdrz 1903 ; Konrad Agahd, Manz'sche Gesetzausgabe erster Band und siebenter Band (Wien, 1897-1898); Legge sugli mfortunii del lavoro (Milan, 1900).

United States: See the Twenty-Second Annual Report of the Commissioner of Labor (1907) giving all labour laws in force in the United States in 1907, with annotations of decisions of courts- bi-monthly Bulletins of the U.S. Bureau of Labor, containing laws passed since those published in the foregoing, and decisions of courts relating to employers and employes; also special articles in these Bulletins on ' Employer and Employe under the Common Law " (No. 1), Protection of Workmen in their Employment " (No. 26) " Government Industrial Arbitration " (No. 60), " Laws relating to the Employment of Women and Children, and to Factory In- spection and the Health and Safety of Employes " (No. 74), Wages and Hours of Labor in Manufacturing Industries, 1890 to 1907 "(No. 77)," Review of Labor Legislation of 1908 and 1909 "(No. 85); also " Report of the Industrial Commission on Labor Legisla- tion (vol. v U.S. Commission's Report) ; C. D. Wright, Industrial hvotutionin the United States (1887) ; Stimson, Handbook to the Labor Laws of the United States, and Labor in its Relation to Law- Adams and Sumner, Labor Problems; Labatt, Commentaries on the Law of Master and Servant.

LABOUR PARTY, in Great Britain, the name given to the party in parliament composed of working-class representatives. As the result of the Reform Act of 1884, extending the franchise to a larger new working-class electorate, the votes of " labour " became more and more a matter of importance for politicians; and the Liberal party, seeking for the support of organized labour in the trade unions, found room for a few working-class representatives, who, however, acted and voted as Liberals. It was not till 1893 that the Independent Labour party, splitting off under Mr J. Keir Hardie (b. 1856) from the socialist organiza- tion known as the Social Democratic Federation (founded 1881), was formed at Bradford, with the object of getting independent candidates returned to parliament on a socialist programme. In 1900

Mr Keir Hardie, who as secretary of the Lanarkshire Miners' Union had stood unsuccessfully as a labour candidate for Mid-Lanark in 1888, and sat as M.P. for West Ham in 1892-1895, was elected to parliament for Merthyr-Tydvil by its efforts, and in 1906 it obtained the return of 30 members, Mr Keir Hardie being chairman of the group. Meanwhile in 1899 the Trade Union Congress instructed its parliamentary com- mittee to call a conference on the question of labour representa- tion; and in February 1900 this was attended by trade union delegates and also by representatives of the Independent Labour party, the Social Democratic Federation and the Fabian Society. A resolution was carried " to establish a distinct labour group in parliament, who shall have their own whips, and agree upon their own policy, which must embrace a readiness to co-operate with any party which for the time being may be engaged in promoting legislation in the direct interest of labour," and the committee (the Labour Representation Committee) was elected for the purpose. Under their auspices 29 out of 51 candidates were returned at the election of 1906. These groups were distinct from the Labour members (" Lib.Labs ") who obeyed the Liberal whips and acted with the Liberals. In 1908 the attempts to unite the parliamentary representatives of the Independent Labour party with the Trades Union members were successful. In June of that year the Miners' Federation, returning 15 members, joined the Independent Labour party, now known for parliamentary purposes as the "Labour Party"; other Trades Unions, such as the Amalgamated Society of Railway Servants, took the same step. This arrangement came into force at the general election of 1910, when the bulk of the miners' representatives signed the constitution of the Labour party, which after the election numbered 40 members of parlia ment.

LABRADOR, 1 a great peninsula in British North America, bounded E. by the North Atlantic, N. by Hudson Strait, W. by Hudson and James Bays, and S. by an arbitrary line extending eastwards from the south-east corner of Hudson Bay, near 51° N, to the mouth of the Moisie river, on the Gulf of St Lawrence, in 50° N, and thence eastwards by the Gulf of St Lawrence. It extends from 50° to 63 N., and from 55° to 8o° W., and embraces an approximate area of 511,000 sq. m. Recent explorations and surveys have added greatly to the knowledge of this vast region, and have shown that much of the peninsula is not a land of " awful desolation," but a well-wooded country, contain- ing latent resources of value in its forests, fisheries and 'minerals.

_ Physical Geography.— Labrador forms the eastern limb of the V m the Archaean protaxis of North America (see Canada), and in- cludes most of the highest parts of that area. Along some portions 1 1 S°l StS

Hudson and also of Ungava Bay there is a fringe of lowland, but most of the interior is a plateau rising toward the south and east. The highest portion extends east and west between 52 ° and 54 N., where an immense granite area lies between the head- waters of the larger rivers of the four principal drainage basins- the lowest area is between Hudson Bay and Ungava Bay in the north- west, where the general level is not more than 500 ft. above the sea The only mountains are the range along the Atlantic coast, extending from the Strait of Belle Isle to Cape Chidley; in their southern half they rarely exceed 1500 ft., but increase in the northern half to a general elevation of upwards of 2000 ft., with numerous sharp peaks between 3000 and 5000 ft., some say 7000 or 8000 ft. The coasts are deeply indented by irregular bays and fringed with rocky islands especially along the high Atlantic coast, where long narrow fiords penetrate inland. Hamilton Inlet, 250 m. north of the Strait of Belle Isle, is the longest of these bays, with a length of 1-50 m. and a breadth varying from 2 to 30 m. The surface of the outer portions ot the plateau is deeply seamed by valleys, cut into the crystalline rocks by the natural erosion of rivers, depending for their length and depth upon the volume of water flowing through them. The valley of the Hamilton river is the greatest, forms a continuation of the valley of the Inlet and extends 300 m. farther inland, while its bottom lies from 500 to 1500 ft. below the surface of the plateau into which it is cut. The depressions between the low ridges of the interior are occupied by innumerable lakes, many of great size including Mistassini, Mishikamau, Clearwater, Kaniapiskau and Seal, all from 50 to 100 m. long. The streams discharging these lakes before entering their valleys, flow on a level with the country and occupy all depressions, so that they frequently spread out into lake- expansions and are often divided into numerous channels by large islands. The descent into the valleys is usually abrupt, being made by heavy rapids and falls; the Hamilton, from the level interior in a course of 12 m. falls 760 ft. into the head of its valley, this descent including a sheer drop of 315 ft. at the Grand Falls, which, taken with the large volume of the river, makes it the greatest fall' in North America. The rivers of the northern and western watersheds drain about two-thirds of the peninsula; the most important of the former are the Koksoak, the largest river of Labrador (over 500 m. long) the George, Whale and Payne rivers, all flowing into Ungava Bay The large rivers flowing westwards into Hudson Bay are the Povungnituk, Kogaluk, Great Whale, Big, East Main and Rupert, varying in length from 300 to 500 m. The rivers flowing south are exceed- ingly rapid, the Moisie, Romaine, Natashkwan and St Augustine being the most important ; all are about 300 m. long. The Atlantic coast range throws most of the drainage northwards into the Ungava basin, and

only small streams fall into the ocean, except the Hamilton, North-west and Kenamou, which empty into the head of Hamilton Inlet.

Geology— The peninsula is formed largely of crystalline schists and gneisses associated with granites and other igneous rocks, all of archaean age; there are also large areas of non-fossiliferous, strati- fied limestones, cherts, shales and iron ores, the unaltered equivalents of part of the schists and gneisses. Narrow strips of Animikie (Upper Huroman or perhaps Cambrian) rocks occur along the low- lying southern and western shores, but there are nowhere else indications of the peninsula having been below sea-level since “an exceedingly remote time. During the glacial period the country waa covered by a thick mantle of ice, which flowed out radially from a central collecting-ground. Owing to the extremely long exposure to denudation, to the subsequent removal of the greater part of the decomposed rock by glaciers, and to the unequal weathering of the component rocks, it is now a plateau, which ascends somewhat abruptly within a few miles of the coast-line to heights of between

From the Portuguese llavrador (a yeoman farmer). The name was originally given to Greenland (1st half of 16th century) and was transferred to the peninsula in the belief that it formed part of the same country as Greenland. The name was bestowed ” because he who first gave notice of seeing it [Greenland] was a farmer {llavrador) from the Azores.” See the historical sketch of Labrador by W. S. Wallace in Grenf ell’s Labrador, &c, 1909.

500 and 2000 ft. The interior is undulating, and traversed by ridges of low, rounded hills, seldom rising more than 500 ft. above the surrounding general level.

Minerals. — The mineral wealth is undeveloped. Thick beds of excellent iron ore cover large aieas in the interior and along the shores ot Hudson and Ungava Bays. Large areas of mineralized Huronian rocks have also been discovered, similar to areas in other parts of Canada, where they contain valuable deposits of gold, copper, nickel and lead ; good prospects of these metals have been found.

Climate. — The climate ranges from cold temperate on the southern coasts to arctic on Hudson Strait, and is generally so rigorous that it is doubtful if the country is fit for agriculture north of 51°, except on the

low grounds near the coast. On James Bay good crops of potatoes and other roots are grown at Fort George, 54° N., while about the head of Hamilton Inlet, on the east coast, and in nearly the same latitude, similar crops are easily cultivated. On the outer coa.sts the climate is more rigorous, being affected by the floating ice borne southwards on the Arctic current. In the interior at Mistassini, 50 30′ N , a crop of potatoes is raised annually, but they rarely mature. No attempts at agriculture have been made elsewhere inland. Owing to the absence of grass plains, there is little likeli- hood that it will ever be a grazing district. There are only two seasons in the interior: winter begins early in October, with the freezing of the small lakes, and lasts until the middle of June, when the ice on rivers and lakes melts and summer suddenly bursts forth. From unconnected observations the lowest temperatures of the interior range from -50 F. to 6o° F., and are slightly higher along the coast. The mean summer temperature of the interior is about 55 F., with frosts during every month in the northern portion. On the Atlantic coast and in Hudson Bay the larger bays freeze. solid between the 1st and 15th of December, and these coasts remain ice bound until late in June. Hudson Strait is usually sufficiently open for navigation about the 10th of July.

Vegetation. — The southern half is included in the sub-Arctic forest belt, and nine species of trees constitute the whole arborescent flora of this region; these species are the white birch, poplar, aspen, cedar. Banksian pine, white and black spruce, balsam fir and larch. The forest is continuous over the southern portion to 53 N., the only exceptions being the summits of rocky hills and the outer islands of the Atlantic and Hudson Bay, while the low margins and river valleys contain much valuable timber. To the northward the size and number of barren areas rapidly increase, so that in 55 N. more than half the country is treeless, and two degrees farther north the limit of trees is reached, leaving, to the northward, only barrens covered with low Arctic flowering plants, sedges and Hchens.

Fisheries. — The fisheries along the shores of the Gulf of St Lawrence and of the Atlantic form practically the only industry of the white population scattered along the coasts, as well as of, a large proportion of the inhabitants of Newfoundland. The census (1891) of New-foundland gave 10,478 men, 208 1 women and 828 children employed in the Labrador fishery in 861 vessels, of which the tonnage amounted to 33,689; the total catch being 488,788 quintals of cod, 1275 tierces of salmon and 3828 barrels of herring, which, compared with the customs returns for 1880, showed an increase of cod and decreases of salmon and herring. The salmon fishery along the Atlantic coast is now very small, the decrease being probably due to

excessive use of cod-traps. The cod fishery is now carried on along the entire Atlantic coast and into the eastern part of Ungava Bay, where excellent catches have been made since 1893. The annual value of the fisheries on the Canadian portion of the coast is about $350,000. The fisheries of Hudson Bay and of the interior are wholly unde- veloped, though both the bay and the large lakes of the interior are well stocked with several species of excellent fish, including Arctic trout, brook trout, lake trout, white fish, sturgeon and cod.

Population. — The population is approximately 14,500, or about one person to every 3 5 sq. m. ; it is made up of 3 500 Indians, 2000 Eskimo and 9000 whites. The last are confined to the coasts and to the Hudson Bay Company's trading posts of the interior. On the Atlantic coast they are largely immigrants from Newfoundland, together with descendants of English fishermen and Hudson Bay Company's servants. To the north of Hamilton Inlet they- are of more or less mixed blood from marriage with Eskimo women. The Newfoundland census of 1901 gave 3634 as the number of permanent white residents along the Atlantic coast, and the Canadian census (1891) gave a white population of 5728, mostly French Canadians, scattered along the north shore of the Gulf of St Lawrence, while the whites living at the inland posts did not exceed fifty persons. It is difficult to give more than a rough approximation of the number of the native population, owing to their habits of roving from one trading post to another, and the consequent liability of counting the same family several times if the returns are computed from the books of the various posts, the only available data for an enumeration. The following estimate is arrived

at in this manner: Indians — west coast, 1200; Ungava Bay, 200; east coast, 200; south coast, 1900. Eskimo — Atlantic coast, 1000; south shore of Hudson Strait, 800; east coast of Hudson Bay, 500. The Indians roam over the southern interior in small bands, their northern limit being determined by that of the trees on which they depend for fuel. They live wholly by the chase, and their numbers are dependent upon the deer and other animals; as a consequence there is a constant struggle between the Indian and the lower animals for exist- ence, with great slaughter of the latter, followed by periodic famines among the natives, which greatly reduce their numbers and maintain an equilibrium. The native population has thus remained about stationary for the last two centuries. The Indians belong to the Algonquin family, and speak dialects of the Cree language. By contact with missionaries and fur-traders they are more or less civilized, and the great majority of them are Christians. Those living north of the St Lawrence are Roman Catholic, while the Indians of the western watershed have been converted by the missionaries of the Church

Mission Society; the eastern and northern bands have not yet been reached by the missionaries, and are still pagans. The Eskimo of the Atlantic coast have long been under the guidance of the Moravian missionaries, and are well advanced in civilization; those of Hudson Bay have been taught by the Church Mission Society, and promise well; while the Eskimo of Hudson Strait alone remain without teachers, and are pagans. The Eskimo live along the coasts, only going inland for short periods to hunt the barren-ground caribou for their winter clothing; the rest of the year they remain on the shore or the ice, hunting seals and porpoises, which afford them food, clothing and fuel. The christianized Indians and Eskimo read and write in their own language; those under the teaching of the Church Mission Society use a syllabic character, the others make use of the ordinary alphabet.

Political Review. — The peninsula is divided politically between the governments of Canada, Newfoundland and the province of Quebec. The government of Newfoundland, under Letters Patent of the 28th of March 1876, exercises jurisdiction along the Atlantic coast; the boundary between its territory and that of Canada is a line running due north and south from Anse Sablon, on the north shore of the Strait of Belle Isle, to 52 N., the remainder of the boundary being as yet undetermined. The northern boundary of the province of Quebec follows the East Main river to its source in Patamisk lake, thence by a line due east to the Ashuanipi branch of the Hamilton river; it then follows that river and Hamilton Inlet to the coast area under the jurisdiction of Newfoundland. The remainder of the peninsula, north of the province of Quebec, by order in council dated the 18th of December 1897, was constituted Ungava District, an unorganized territory under the jurisdiction of the government of the Dominion of Canada.

Authorities. — W. T. Grenfell and others, Labrador: the Country and the People (New York, 1909) ; R. F. Holmes, ” A Journey in the Interior of Labrador,” Proc. R.G.S. x. 189-205 (1887); A. S. Packard, The Labrador Coast (New York, 1891); Austen Cary, ” Exploration on Grand River, Labrador,” Bui. Am. Geo. Soc. vol. xxiv., 1892; R. Bell, ” The Labrador Peninsula,” Scottish Geo. Mag. July 1895. Also the following reports by the Geological Survey of Canada: — R. Bell, ” Report on an Exploration of the East Coast of Hudson Bay,” 1877-1878; ” Observations on the Coast of Labrador and on Hudson Strait and Bay,” 1882-1884; A. P. Low, ” Report on the Mistassini Expedition,” 1885; ” Report on James Bay and the Country East of Hudson Bay,” 1887-1888; ” Report on Explorations in the Labrador Peninsula, 1892-1895,” 1896; ” Re- port on a Traverse of the Northern Part of the Labrador Peninsula,” 1898; ” Report on the South Shore of

Hudson Strait," 1899. For History: W. G. Gosling, Labrador (1910). (A. P. Lo.; A. P. C.)

LABRADORITE, or Labrador Spar, a lime-soda felspar of the plagioclase (q.v.) group, often cut and polished as an ornamental stone. It takes its name from the coast of Labrador, where it was discovered, as boulders, by the Moravian Mission about 1770, and specimens were soon afterwards sent to the secretary in London, the Rev. B. Latrobe. The felspar itself is generally of a dull grey colour, with a rather greasy lustre, but many specimens exhibit in certain directions a magnificent

play of colours — blue, green, orange, purple or red; the colour in some specimens changing when the stone is viewed in different directions. This optical effect, known sometimes as " labrador-escence," seems due in some cases to the presence of minute laminae of certain minerals, like gothite or haematite, arranged parallel to the surface which reflects the colour; but in other cases it may be caused not so much by inclusions as by a delicate lamellar structure in the felspar. An aventurine effect is pro- duced by the presence of microscopic enclosures. The original labradorite was found in the neighbourhood of Nain, notably in a lagoon about 50 m. inland, and in St Paul's Island. Here it occurs with hypersthene, of a rich bronzy sheen, forming a coarse-grained norite. When wet, the stones are remarkably brilliant, and have been called by the natives " fire rocks." Russia has also yielded chatoyant labradorite, especially near Kiev and in Finland; a fine blue labradorite has been brought from Queensland; and the mineral is also known in several localities in the United States, as at Keeseville, in Essex county, New York. The ornamental stone from south Norway, now largely used as a decorative material in architecture, owes its beauty to a felspar with a blue opalescence, often called labra- dorite, but really a kind of orthoclase which Professor W. C. Brogger has termed cryptoperthite, whilst the rock in which it occurs is an augite-syenite called by him laurvigite, from its chief locality, Laurvik in Norway. Common labradorite, without play of colour, is an important constituent of such rocks as gabbro, diorite, andesite, dolerite and basalt. (See Plagioclase.) Ejected crystals of labradorite are found on Monti Rossi, a double parasitic cone on Etna.

The term labradorite is unfortunately used also as a rock- name, having been applied by Fouque and Levy to a group of basic rocks rich

in augite and poor in olivine. (F. W. R.*)

LABRADOR TEA, the popular name for a species of Ledum, a small evergreen shrub growing in bogs and swamps in Greenland and the more northern parts of North America. The leaves are tough, densely covered with brown wool on the under face, fragrant when crushed and have been used as a substitute for tea. The plant is a member of the heath family (Ericaceae).

LABRUM (Lat. for ” lip “), the large vessel of the warm bath in the Roman thermae. These were cut out of great blocks of marble and granite, and have generally an overhanging lip. There is one in the Vatican of porphyry over. 12 ft. in diameter. The term labrum is used in zoology, of a lip or lip-like part; in entomology it is applied specifically to the upper lip of an insect, the lower lip being termed labium.

LA BRUYERE, JEAN DE (1645-1696), French essayist and moralist, was born in Paris on the 16th of August 1645, and not, as was once the common statement, at Dourdan (Seine-et-Oise) in 1639. His family was of the middle class, and his reference to a certain Geoffroy de la Bruyere, a crusader, is only a satirical illustration of a method of self-ennoblement common in France as in some other countries. Indeed he himself always signed the name Delabruyere in one word, thus avowing his roture. His progenitors, however, were of respectable position, and he could trace them back at least as far as his great-grandfather, who had been a strong Leaguer. La Bruyere’s own father was controller- general of finance to the Hotel de Ville. The son was educated by the Oratorians and at the university of Orleans; he was called to the bar, and in 1673 bought a post in the revenue department at Caen, which gave the status of noblesse and a certain income. In 1687 he sold this office. His predecessor in it was a relation of Bossuet, and it is thought that the transaction was the cause of La Bruyere’s introduction to the great orator. Bossuet, who from the date of his own preceptorship of the dauphin, was a kind of agent-general for tutorships in the royal family, introduced him in 1684 to the household of the great Conde, to whose grandson Henri Jules de Bourbon as well as to that prince’s girl-bride Mile de Nantes, one of Louis XIV. ‘s natural children, La Bruyere became tutor. The rest of his life was passed in the household of the prince or else at court, and he seems to have profited by the inclination which all the Conde family had for the society of men of letters. Very little is known

of the events of this part — or, indeed, of any part— of his life. The impression derived from the few notices of him is of a silent,

observant, but somewhat awkward man, resembling in manners Joseph Addison, whose master in literature La Bruyere un- doubtedly was. Yet despite the numerous enemies which his book raised up for him, most of these notices are favourable — notably that of Saint-Simon, an acute judge and one bitterly prejudiced against roturiers generally. There is, however, a curious passage in a letter from Boileau to Racine in which he regrets that ” nature has not made La Bruyere as agreeable as he would like to be.” His Caracteres appeared in 1688, and at once, as Nicolas de Malezieu had predicted, brought him ” bien des lecteurs et bien des ennemis.” At the head of these were Thomas Corneille, Fontenelle and Benserade, who were pretty clearly aimed at in the book, as well as innumerable other persons, men and women of letters as well as of society, on whom the cap of La Bruyere’s fancy-portraits was fitted by -manuscript “keys ” compiled by the scribblers of the day. The friendship of Bossuet and still more the protection of the Condes sufficiently defended the author, and he continued to insert fresh portraits of his contemporaries in each new edition of his book, especially in the 4th (1689). Those, however, whom he had attacked were powerful in the Academy, and numerous defeats awaited La Bruyere before he could make his way into that guarded hold. He was defeated thrice in 1691, and on one memorable occasion he had but seven votes, five of which were those of Bossuet, Boileau, Racine, Pellisson and Bussy-Rabutin. It was not till 1693 that he was elected, and even then an epigram, which, considering his admitted insignificance in conversation, was not of the worst, haesit lateri: —

” Quand la Bruyere se prˆsente

Pourquoi faut il crier haro ? Pour faire un nornbre de quarante

Ne falloit il pas un zero ? ”

His unpopularity was, however, chiefly confined to the subjects of his sarcastic portraiture, and to the hack writers of the time, of whom he was wont to speak with a disdain only surpassed by that of Pope. His description of the Mercure galant as ” immediatement au dcssous de Hen ” is the best-remembered specimen of these unwise attacks; and would of itself account for the enmity of the editors, Fontenelle and the younger Corneille. La Bruyere’s discourse of admission at the Academy, one of the best of its kind, was, like his admission itself, severely criticized, especially by the partisans of the ” Moderns ” in the ” Ancient and Modern ” quarrel. With the Caracteres, the translation of Theophrastus, and a few letters, most of them addressed to the prince de Conde, it completes the list of his literary work, with

the exception of a curious and much-disputed posthumous treatise. La Bruyere died very suddenly, and not long after his admission to the Academy. He is said to haye been struck with dumbness in an assembly of his friends, and, being carried home to the Hotel de Conde, to have expired of apoplexy a day or two afterwards, on the 10th of May 1696. It is not surprising that, considering the recent panic about poisoning, the bitter personal enmities which he had excited and the peculiar circumstances of his death, suspicions of foul play should have been entertained, but there was apparently no foundation for them. Two years after his death appeared certain Dialogues sur le Quietisme, alleged to have been found among his papers in- complete, and to have been completed by the editor. As these dialogues are far inferior in literary merit to La Bruyere's other works, their genuineness has been denied. But the straight- forward and circumstantial account of their appearance given by this editor, the Abbe du Pin, a man of acknowledged probity, the intimacy of La Bruyere with Bossuet, whose views in his contest with Fenelon these dialogues are designed to further, and the entire absence, at so short a time after the alleged author's death, of the least protest on the part of his friends and repre- sentatives, seem to be decisive in their favour.

Although it is permissible to doubt whether the value of the Caracteres has not been somewhat exaggerated by traditional French criticism, they deserve beyond all question a high place.

LABUAN

The plan of the book is thoroughly original, if that term may be accorded to a novel and skilful combination of existing elements. The treatise of Theophrastus may have furnished the first idea, but it gave little more. With the ethical generalizations and social Dutch painting of his original La Bruyere combined the peculiarities of the Montaigne essay, of the Pensees and Maximes of which Pascal and La Rochefoucauld are the masters respect- ively, and lastly of that peculiar 17th-century product, the " portrait " or elaborate literary picture of the personal and mental characteristics of an individual. The result was quite unlike anything that had been before seen, and it has not been exactly reproduced since, though the essay of Addison and Steele resembles it very closely, especially in the introduction of fancy portraits. In the titles of his work, and in its extreme desultori- ness, La Bruyere reminds the reader of Montaigne, but he aimed too much at sententiousness to attempt even the apparent con- tinuity of the great essayist. The short paragraphs of which his chapters consist are made up of maxims proper, of criticisms literary and ethical, and above all of the celebrated sketches of individuals baptized with

names taken from the plays and romances of the time. These last are the great feature of the work, and that which gave it its immediate if not its enduring popularity. They are wonderfully piquant, extraordinarily life-like in a certain sense, and must have given great pleasure or more frequently exquisite pain to the originals, who were in many cases unmistakable and in most recognizable.

But there is something wanting in them. The criticism of Charpentier, who received La Bruyere at the Academy, and who was of the opposite faction, is in fact fully justified as far as it goes. La Bruyere literally ” est [trop] descendu dans le particulier.” He has neither, like Moliere, embodied abstract peculiarities in a single life-like type, nor has he, like Shakespeare, made the individual pass sub speciem aeternitatis, and serve as a type while retaining his individuality.’ He is a photographer rather than an artist in his portraiture. So, too, his maxims, admirably as they are expressed, and exact as their truth often is, are on a lower level than those of La Rochefoucauld. Beside the sculpturesque precision, the Roman brevity, the profound- ness of ethical intuition ” piercing to the accepted hells beneath,” of the great Frondeur, La Bruyere has the air of a literary pctit-maltre dressing up superficial observation in the finery of esprit. It is indeed only by comparison that he loses, but then it is by comparison that he is usually praised. His abundant wit and his personal ” malice ” have done much to give him his rank in French literature, but much must also be allowed to his purely literary merits. With Racine and Massillon he is probably the very best writer of what is somewhat arbitrarily styled classical French. He is hardly ever incorrect—the highest merit in the eyes of a French academic critic. He is always well-bred, never obscure, rarely though sometimes ” precious ” in the turns and niceties of language in which he delights to indulge, in his avowed design of attracting readers by form, now that, in point of matter, ” tout est dit.” It ought to be added to his credit that he was sensible of the folly of impoverish- ing French by ejecting old words. His chapter on ” Les ouvrages de l’esprit ” contains much good criticism, though it shows that, like most of his contemporaries except Fenelon, he was lamentably ignorant of the literature of his own tongue.

The editions of La Bruyere, both partial and complete, have been extremely numerous. Les Caracteres de Theophraste traduits du Grec, avec Us caracteres et les mceurs de ce siecle, appeared for the first time in 1688, being published by Michallet, to whose little daughter, according to tradition, La Bruyere gave the profits of the book as a dowry. Two other editions, little altered, were published in the same year. In thefollowing year, and in each year until 1694, with the

exception of 1693, a fresh edition appeared, and, in all these five, additions, omissions and alterations were largely made. A ninth edition, not much altered, was put forth in the year of the author's death. The Academy speech appeared in the eighth edition. ■ 1 9-uletlst dialogues wer e published in 1699; most of the letters, including those addressed to Conde, not till 1867. In recent times numerous editions of the complete works have appeared, notably those of Walckenaer (1845), Servois (1867, in the series of Grands ecrwams de la France), Asselineau (a scholarly reprint of the last •riginal edition, 1872) and finally Chassang (1876) ; the last is one

3*

of the most generally useful, as the editor has collected almost everything of value in his predecessors. The literature of " keys " to La Bruyere is extensive and apocryphal. Almost everything that can be - done in this direction and in that of general illustration was done by Edouard Fourmer in his learned and amusing Comedie de La Bruyere (1866); M. Paul Morillot contributed a monograph on La Bruyere to the series of Grands ecrivains francais in 1904

(G. Sa.)

LABUAN (a corruption of the Malay word labuh-an, signifying an " anchorage "), an island of the Malay Archipelago, off the north-west coast of Borneo in 5 16′ N., 115° 15′ E. Its area is 30-23 sq. m.; it is distant about 6 m. from the mainland of Borneo at the nearest point, and lies opposite to the northern end of the great Brunei Bay. The island is covered with low hills rising from flats near the shore to an irregular plateau near the centre. About 1500 acres are under rice cultivation, and there are scattered patches of coco-nut and sago palms and a few vegetable gardens, the latter owned for the most part by Chinese. For the rest Labuan is covered over most of its extent by vigorous secondary growth, amidst which the charred trunks of trees rise at frequent intervals, the greater part of the forest of the island having been destroyed by great accidental conflagrations. Labuan was ceded to Great Britain in 1846, chiefly^ through the instrumentality of Sir James Brooke, the first raja of Sarawak, and was occupied two years later.

At the time of its cession the island was uninhabited, but in 1881 the population numbered 5731, though it had declined to 5361 in 1891. The census returns for 1901 give the population at 841 1. The native population consists of Malay fishermen, Chinese, Tamils and small shifting communities of Kadayans, Tutongs and other natives of the

neighbouring Bornean coast. There are about fifty European residents. At the time of its occupation by Great Britain a brilliant future was predicted for Labuan, which it was thought would become a second Singapore. These hopes have not been realized. The coal deposits, which are of somewhat indifferent quality, have been worked with varying degrees of failure by a succession of com- panies, one of which, the Labuan & Borneo Ltd., liquidated in 1902 after the collapse of a shaft upon which large sums had been expended. It was succeeded by the Labuan Coalfields Ltd. The harbour is a fine one, and the above-named company possesses three wharves capable of berthing the largest Eastern- going ocean steamers. To-day Labuan chiefly exists as a trading depot for the natives of the neighbouring coast of Borneo, who sell their produce— beeswax, edible birds-nests, camphor, gutta, trepang, &c. ,— to Chinese shopkeepers, who resell it in Singapore. There is also a considerable trade in sago, much of which is produced on the mainland, and there are three small sago-factories on the island where the raw product is converted into flour. The Eastern Extension Telegraph Company has a central station at Labuan with cables to Singapore, Hong- Kong and British North Borneo. Monthly steam communication is maintained by a German firm between Labuan, Singapore and the Philippines. The colony joined the Imperial Penny Postage Union in 1889. There are a few miles of road on the island and a metre-gauge railway from the harbour to the coal mines, the property of the company. There is a Roman Catholic church with a resident priest, an Anglican church, visited periodic- ally by a clergyman from the mainland, two native and Chinese schools, and a sailors' club, built by the Roman Catholic mission. The bishop of Singapore and Sarawak is also bishop of Labuan. The European graveyard has repeatedly been the scene of outrages perpetrated, it is believed, by natives from the mainland of Borneo, the graves being rifled and the hair of the head and other parts of the corpses being carried off to furnish ornaments to weapons and ingredients in the magic philtres of the natives. Pulau Dat, a small island in the near neighbourhood of Labuan, is the site of a fine coco-nut plantation whence nuts and copra are exported in bulk. The climate is hot and very humid.

_ Until 1869 the expenditure of the colony was partly defrayed by imperial grants-in-aid, but after that date it was left to its own resources. A garrison of imperial troops was maintained until 1871, when the troops were withdrawn after many deaths from fever and dysentery had occurred among them. Since then law and order

have been maintained without difficulty by a small mixed police force of Punjabis and Malays. From the 1st of January 1890 to the 1st of January 1906 Labuan was transferred for administrative purposes to the British North Borneo Company, the governor for the time being of the company's territories holding also the royal com- mission as governor of Labuan. This arrangement did not work satisfactorily and called forth frequent petitions and protests from the colonists. Labuan was then placed under the government of the Straits Settlements, and is administered by a deputy governor who is a member of the Straits Civil Service.

LABURNUM, known botanically as Laburnum vulgare (or Cytisus Laburnum), a familiar tree of the pea family (Legu- minosae); it is also known as " golden chain " and " golden rain." It is a native of the mountains of France, Switzerland, southern Germany, northern Italy, &c, has long been cultivated as an ornamental tree throughout Europe, and was introduced into north-east America by the European colonists. Gerard records it as growing in his garden in 1597 under the names of anagyris, laburnum or beane trefoyle (Herball, p. 1239), but the date of its introduction into England appears to be unknown. In France it is called I'aubour — a corruption from laburnum according to Du Hamel — as also arbois, i.e. arc-bois, " the wood having been used by the ancient Gauls for bows. It is still so employed in some parts of the Maconnois, where the bows are found to preserve their strength and elasticity for half a century " (Loudon, Arboretum, ii. 590).

Several varieties of this tree are cultivated, differing in the size of the flowers, in the form of the foliage, &c, such as the "oak-leafed" (quercifolium) , pendulum, crispum, &c; var. aureum has golden yellow leaves. One of the most remarkable forms is Cytisus Adami (C. purpurascens), which bears three kinds of blossoms, viz. racemes of pure yellow flowers, others of a purple colour and others of an intermediate brick-red tint. The last are hybrid blossoms, and are sterile, with malformed ovules, though the pollen appears to be good. The yellow and purple " reversions " are fertile. It originated in Paris in 1828 by M. Adam, who inserted a " shield " of the bark of Cytisus purpureus into a stock of Laburnum. A vigorous shoot from this bud was subsequently propagated. Hence it would appear that the two distinct species became united by their cambium layers, and the trees propagated therefrom subsequently reverted to their respective parentages in bearing both yellow and purple flowers, but produce as well blossoms of an inter- mediate or hybrid character. Such a result

may be called a ” graft -hybrid.” For full details see Darwin’s Animals and Plants under Domestication.

The laburnum has highly poisonous properties. The roots taste like liquorice, which is a member of the same family as the laburnum. It has proved fatal to cattle, though hares and rabbits eat the bark of it with avidity {Gardener’s Chronicle, 1881, vol. xvi. p. 666). The seeds also are highly poisonous, possessing emetic as well as acrid narcotic principles, especially in a green state. Gerard {loc. cit.) alludes to the powerful effect produced on the system by taking the bruised leaves medicinally. Pliny states that bees will not visit the flowers {N.H. xvi. 31), but this is an error, as bees and butterflies play an important part in the fertilization of the flowers, which they visit for the nectar.

The heart wood of the laburnum is of a dark reddish-brown colour, hard and durable, and takes a good polish. Hence it is much prized by turners, and used with other coloured woods for inlaying purposes. The laburnum has been called false ebony from this character of its wood.

LABYRINTH (Gr. Xa/Siiputfos, Lat. labyrinthus) , the name given by the Greeks and Romans to buildings, entirely or partly subterranean, containing a number of chambers and intricate passages, which rendered egress puzzling and difficult. The word is considered by some to be of Egyptian origin, while others connect it with the Gr. XaBpa, the passage of a mine. Another derivation suggested is from \a/3pvs, a Lydian or Carian word meaning a ” double-edged axe ” {Journal of Hellenic Studies, xxi. 109, 268), according to which the Cretan labyrinth or palace of Minos was the house of the double axe, the symbol of Zeus.

Pliny {Nat. Hist, xxxvi. 19, 91) mentions the following as the four famous labyrinths of antiquity.

1. The Egyptian: of which a description is given by Herodotus (ii. 148) and Strabo (xvii. 811). It was situated to the east of Lake Moeris, opposite the ancient site of Arsinoe’ or Crocodilo- polis. According to Egyptologists, the word means ” the temple at the entrance of the lake.” According to Herodotus, the entire building, surrounded by a single wall, contained twelve courts and 3000 chambers, 1500 above and 1500 below ground. The roofs were wholly of stone, and the walls covered with sculpture. On one side stood a pyramid 40 orgyiae, or about 243 ft. high. Herodotus himself went through the upper chambers, but was not permitted to visit those underground, which he was told contained the tombs of the kings who had built the labyrinth,

and of the sacred crocodiles. Other ancient authorities considered that it was built as a place of meeting for the Egyptian nomes or political divisions; but it is more likely that it was intended for sepulchral purposes. It was the work of Amenemhe III., of the 12th dynasty, who lived about 2300B.C. It was first located by the Egyptologist Lepsius to the north of Hawara in the Fayum, and (in 1888) Flinders Petrie discovered its foundation, the extent of which is about 1000 ft. long by 800 ft. wide. Immediately to the north of it is the pyramid of Hawara, in which the mummies of the king and his daughter have been found (see W. M. Flinders Petrie, Hawara, Biahmu, and Arsinoe, 1889).

2. The Cretan: said to have been built by Daedalus on the plan of the Egyptian, and famous for its connexion with the legend of the Minotaur. It is doubtful whether it ever had any real existence and Diodorus Siculus says that in his time it had already disappeared. By the older writers it was placed near Cnossus, and is represented on coins of that city, but nothing corresponding to it has been found during the course of the recent excavations, unless the royal palace was meant. The rocks of Crete are full of winding caves, which gave the first idea of the legendary labyrinth. Later writers (for instance, Claudian, De sexto Cons. Honorii, 634) place it near Gortyna, and a set of winding passages and chambers close to that place is still pointed out as the labyrinth; these are, however, in reality ancient quarries.

3. The Lemnian: similar in construction to the Egyptian. Remains of it existed in the time of Pliny. Its chief feature was its 150 columns.

4. The Italian: a series of chambers in the lower part of the tomb of Porsena at Clusium. This tomb was 300 ft. square and 50 ft. high, and underneath it was a labyrinth, from which

Fig. 1. — Labyrinth of London and Wise.

it was exceedingly difficult to find an exit without the assistance of a clew of thread. It has been maintained that this tomb is to be recognized in the mound named Poggio Gajella near Chiusi.

Lastly, Pliny (xxxvi. 19) applies the word to a rude drawing on the ground or pavement, to some extent anticipating the modern or garden maze.

On the Egyptian labyrinth see A. Wiedemann, Agyptische Ges- chichte (1884), p. 258, and his edition of the second book of Herodotus

(1890); on the Cretan, C. Hock, Kreta (1823-1829), and

A. J. Evans in Journal of Hellenic Studies; on the subject generally, articles in Roscher's Lexikon der Mythologie and Daremberg and Saglio's Dictionnaire des antiquMs.

In gardening, a labyrinth or maze means an intricate network of pathways enclosed by hedges or plantations, so that those

Fig. 2. — Labyrinth of Batty Langley. who enter become bewildered in their efforts to find the centre or make their exit. It is a remnant of the old geometrical style of gardening. There are two methods of forming it. That which is perhaps the more common consists of walks, or alleys as they

to the centre, which is often raised, and generally contains a covered seat, a fountain, a statue or even a small group of trees. After reaching this point the next thing is to return to the entrance, when it is found that egress is as difficult as ingress. To every design of this sort there should be a key, but even those who know the key are apt to be perplexed. Sometimes the design consists of alleys only, as in fig. i, published in 1706 by London and Wise. In such a case, when the farther end is reached, there only remains to travel back again. Of a more pretentious character was a design published by Switzer in 1742.

Fig. 3. — Labyrinth at Versailles.

were formerly called, laid out and kept to an equal width or nearly so by parallel hedges, which should be so close and thick that the eye cannot readily penetrate them. The task is to get

Fig. 4. — Maze at Hampton Court.

This is of octagonal form, with very numerous parallel hedges and paths, and " six different entrances, whereof there is but one that leads to the centre, and that is attended with some difficulties and a great many stops." Some of the older designs for laby- rinths, however, avoid this close parallelism of the alleys, which, though equally involved and intricate in their windings, are carried through blocks of thick planting, as shown in fig. 2, from a design published in 1728 by Batty Langley. These blocks of shrubbery have been called

wildernesses. To this latter class belongs the celebrated labyrinth at Versailles (fig. 3), of which Switzer observes, that it “is allowed by all to be the noblest of its kind in the world.”

Whatever style be adopted, it is essential that there should be a thick healthy growth of the hedges or shrubberies that confine the wanderer. The trees used should be impenetrable to the eye, and so tall that no one can look over them ; and the paths should be of gravel and well kept. The trees chiefly used for the hedges, and the best for the purpose, are the hornbeam among deciduous trees, or the yew among evergreens. The beech might be used instead of the hornbeam on suitable soil. The green holly might be planted

Fig. 5. — Maze at Somerleyton Hall.

as an evergreen with very good results, and so might the American arbor vitae if the natural soil presented no obstacle. The ground must be well prepared, so as to give the trees a good start, and a mulching of manure during the early years of their growth would be of much advantage. They must be kept trimmed in or clipped, especially in their earlier stages; trimming with the kniie is much to be preferred to clipping with shears. Any plants getting much in advance of the rest should be topped, and the whole kept to some 4 ft. or 5 ft. in height until the lower parts are well thickened, when it may be allowed to acquire the allotted height by moderate annual increments. In cutting, the hedge (as indeed all hedges) should be

kept broadest at the base and narrowed upwards, which prevents it from getting thin and bare below by the stronger growth being drawn to the tops.

The maze in the gardens at Hampton Court Palace (fig. 4) is considered one of the finest examples in England. It was planted in the early part of the reign of William III., though it has been sup- posed that a maze had existed there since the time of Henry VIII. It is constructed on the hedge and alley system, and was, it is believed, originally planted with hornbeam, but many of the plants have been replaced by hollies, yews, &c, so that the vegetation is mixed. The walks are about half a mile in length, and the ground occupied is a little over a quarter of an acre. The centre contains two large trees,

with a seat beneath each. The key to reach this resting place is to keep the right hand continuously in contact with the hedge from first to last, going round all the stops.

The maze in the gardens at Somerleyton Hall, near Lowestoft (fig. 5), was designed by Mr John Thomas. The hedges are of English

approach to a ” reproductive ” state is the approximation of the amoebae, and their separate encystment in an irregular heap,

Fig. 6. — Labyrinth in Horticultural Society’s Garden.

yew, are about 6| ft. high, and have been planted about sixty years. In the centre is a grass mound, raised to the height of the hedges, and on this mound is a pagoda, approached by a curved grass path. At the two corners on the western side are banks of laurels 15 or 16 ft. high. On each side of the hedges throughout the labyrinth is a small strip of grass.

There was also a labyrinth at Theobald’s Park, near Cheshunt, when this place passed from the earl of Salisbury into the possession of James I. Another is said to have existed at Wimbledon House, the seat of Earl Spencer, which was probably laid out by Brown in the 1 8th century. There is an interesting labyrinth, somewhat after the plan of fig 2, at Mistley Place, Manningtree.

When the gardens of the Royal Horticultural Society at South Kensington were being planned, Albert, Prince Consort, the president of the society, especially desired that there should be a maze formed in the ante-garden, which was made in the form shown in fig. 6. This labyrinth, designed by Lieut. W. A. Nesfield, was for many years the chief point of attraction to the younger visitors to the gardens ; but it was allowed to go to ruin, and had to be destroyed. The gardens themselves are now built over. (T. Mo.)

LABYRINTHULIDEA, the name given by Sir Ray Lankester (1885) to Sarcodina (q.v.) forming a reticulate plasmodium, the denser masses united by fine pseudopodical threads, hardly distinct from some Proteomyxa, such as Archcrina.

This is a small and heterogeneous group. Labyrinthula, discovered by L. Cienkowsky, forms a network of relatively stiff threads on which are scattered large spindle-shaped enlarge- ments, each representing an amoeba, with a single nucleus. The threads are pseudopods, very slowly emitted and withdrawn. The amoebae multiply by fission in the active state. The nearest

Labyrinthulidea.

A colony or ” cell-heap ” of Labyrinthula vitellina, Cienk., crawling upon an Alga.

A colony or ” cell-heap ” of Chlamydomyxa labyrinthul- oides, Archer, with fully ex- panded network of threads on which the oat-shaped corpuscles (cells) are moving. 0, Is an ingested food particle ; at c a portion of the general protoplasm has detached it- self and become encysted.

A portion of the network of Labyrinthula vitellina, Cienk., more highly magnified, p, Pro- toplasmic mass apparently produced by fusion of several filaments. p’ , Fusion of

several cells which have lost their definite spindle-shaped contour, s, Corpuscles which have become spherical and are no longer moving (perhaps about to be encysted).

4. A single spindle cell and threads

of Labyrinthula macrocystis, Cienk. n, Nucleus.

5. A group of encysted cells of L.

Macrocystis, embedded in a tough secretion.

6. 7. Encysted cells of L. macro-

cystis, with enclosed proto- plasm divided into four spores. 8, 9. Transverse division of a non- encysted spindle-cell of L. macrocystis.

recalling the Acrasieae. From each cyst ultimately emerges a single amoebae, or more rarely four (figs. 6, 7). The saprophyte Diplophrys (?) stercorea (Cienk.) appears closely allied to this.

Chlamydomyxa (W. Archer) resembles Labyrinthitis in its freely branched Plasmodium, but contains yellowish chromato- phores, and minute oval vesicles (” physodes “) filled with a substance allied to tannin — possibly phloroglucin — which glide along the plasmodial tracks. The cell-body contains numerous nuclei; but in its active state is not resolvable into distinct oval amoeboids. It is amphitrophic, ingesting and digesting other Protista, as well as ” assimilating” by its

chromatophores, the product being oil, not starch. The whole body may form a laminated cellulose resting cyst, from which it may only tem- porarily emerge (fig. 2) , or it may undergo resolution into nucleate cells which then encyst, and become multinucleate before ruptur- ing the cyst afresh.

Leydcnia (F. Schaudinn) is a parasite in malignant diseases of the pleura. The pseudopodia of adjoining cells unite to form a network; but its affinities seem to such social naked Fora- minifera as Mikrogromia.

SeeCienkowsky.ylrcfoV/. Micro scopische Anatomie, iii. 274 (1867), xii. 44 (1876); VV. Archer, Quart. Jour. Microscopic Science, xv. 107 (!875); E. R- Lankester, Ibid., xxxix., 233 (1896); Hieronymus and Jenkinson, Ibid., xlii. 89 (1899); W. Zopf, Beitrage zur Physiologie und Morphologie niederer Organismen, ii. 36 (1892), iv. 60 (1894); Pdnard, Archil! fur Protistenkunde, iv. 296 (1904); F. Schaudinn and Leyden, Sitzungsberichte der Koniglich preussischen Akademie der Wissenschaft, vi. (1896).

LAC, a resinous incrustation formed on the twigs and young branches of various trees by an insect, Coccus lacca, which infests them. The term lac (laksha, Sanskrit; lakh, Hindi) is the same as the numeral lakh — a hundred thousand — and is indicative of the countless hosts of insects which make their appearance with every successive generation. Lac is a product of the East Indies, coming especially from Bengal, Pegu, Siam and Assam, and is produced by a number of trees of the species Ficus, particularly F. religiosa. The insect which yields it is closely allied to the cochineal insect, Coccus cacti; kermes, C. ilicis and Polish grains, C. polonicus, all of which, like the lac insect, yield a red colouring matter. The minute larval insects fasten in myriads on the young shoots, and, inserting their long pro- boscides into the bark, draw their nutriment from the sap of the plant. The insects begin at once to exude the resinous secretion over their entire bodies; this forms in effect a cocoon, and, the separate exudations coalescing, a continuous hard resinous layer regularly honeycombed with small cavities is deposited over and around the twig. From this living tomb the female insects, which form the great bulk of the whole, never escape. After their impregnation, which takes place on the liberation of the males, about three months from their first appearance, the females develop into a singular amorphous organism consisting in its main features of a large smooth shining crimson-coloured sac — the ovary — with a beak stuck into the bark, and a few papillary processes projected above the resinous surface. The red fluid in the ovary is the substance which forms the lac dye of commerce. To

obtain the largest amount of both resin and dye-stuff it is necessary to gather the twigs with their living inhabitants in or near June and November. Lac encrusting the twigs as gathered is known in commerce as “stick lac”; the resin crushed to small fragments and washed in hot water to free it from colouring matter constitutes ” seed lac “; and this, when melted, strained through thick canvas, and spread out into thin layers, is known as ” shellac,” and is the form in which the resin is usually brought to European markets. Shellac varies in colour from a dark amber to an almost pure black; the palest, known as ” orange-lac,” is the most valuable; the darker varieties — ” liver-coloured,” ” ruby,” ” garnet,” &c. — diminish in value as the colour deepens. Shellac may be bleached by dissolv- ing it in a boiling lye of caustic potash and passing chlorine through the solution till all the resin is precipitated, the product being known as white shellac. Bleached lac takes light delicate shades of colour, and dyed a golden yellow it is much used in the East Indies for working into chain ornaments for the head

and for other personal adornments. Lac is a principal ingredienj in sealing-wax, and forms the basis of some of the most valuable varnishes, besides being useful in various cements, &c. Average stick lac contains about 68 % of resin, 10 of lac dye and 6 of a waxy substance. Lac dye is obtained by evaporating the water in which stick lac is washed, and comes into commerce in the form of small square cakes. It is in many respects similar to, although not identical with, cochineal.

LACAILLB, NICOLAS LOUIS DE (1713-1762), French astro- nomer, was born at Rumigny, in the Ardennes, on the 15th of March 1713. Left destitute by the death of his father, who held a post in the household of the duchess of Vendome, his theological studies at the College de Lisieux in Paris were prosecuted at the expense of the duke of Bourbon. After he had taken deacon’s orders, however, he devoted himself exclusively to science, and, through the patronage of J. Cassini, obtained employment, first in surveying the coast from Nantes to Bayonne, then, in 1739, in remeasuring the French arc of the meridian. The success of this difficult operation, which occupied two years, and achieved the correction of the anomalous result published by J. Cassini in 17 18, was mainly due to Lacaille’s industry and skill. He was rewarded by admission to the Academy and the appointment of mathematical professor in Mazarin college, where he worked in a small observatory fitted for his use. His desire to observe the southern heavens led him to propose, in 1750, an astronomical expedition to the Cape of Good Hope, which was officially sanctioned, and fortunately executed. Among its results were determinations of the

lunar and of the solar parallax (Mars serving as an intermediary), the first measurement of a South African arc of the meridian, and the observation of 10,000 southern stars. On his return to Paris in 1754 Lacaille was distressed to find himself an object of public attention; he withdrew to Mazarin college, and there died, on the 21st of March 1762, of an attack of gout aggravated by unremitting toil. Lalande said of him that, during a compara- tively short life, he had made more observations and calculations than all the astronomers of his time put together. The quality of his work rivalled its quantity, while the disinterestedness and rectitude of his moral character earned him universal respect.

His principal works are: Astronomiae Fundamenta (1757), containing a standard catalogue of 398 stars, re-edited by F. Baily {Memoirs Roy. Astr. Society, v. 93) ; Tabulae Solares (1758) ; Coelum auslrale stelliferum (1763) (edited by J. D. Maraldi), giving zone-observations of 10,000 stars, and describing fourteen new constellations; ” Observations sur 515 etoiles du Zodiaque ” (published in t. vi. of his Uphemerides, 1763); Lecons elementaires de Mathematiques (1741), frequently reprinted; ditto de Mecanique (1743), &c. ; ditto d Asironomie (1746), 4th edition augmented by Lalande (1779) ; ditto d’Optique (1750), &c. Calculations by him of eclipses for eighteen hundred years were inserted in L’Art de verifier les dates (175c); he communicated to the Academy in 1755 a classed catalogue of forty-two southern nebulae, and gave in t. ii. of his £,phemerides (1755) practical rules for the employment of the lunar method of longitudes, proposing in his additions to Pierre Bouguer’s Traiti de Navigation (1760) the model of a nautical almanac.

See G. de Fouchy, “Eloge de Lacaille,” Hist, de V Acad, des Sciences, p. 197 (1762); G. Brotier, Preface to Lacaille’s Coelum austraie; Claude Carlier, Discours historique, prefixed to Lacaille’s Journal historique du voyage fait au Cap (1763); J. J. Lalande, Connoissance des temps, p. 185 (1767); Bibl. astr. pp. 422, 456, 461, 482’; J. Delafnbre, Hist, de I’astr. au XVIII” sibcle, pp. 457-542 ; J. S. Bailly, Hist, de I’astr. moderne, tomes ii., iii., passim; J. C. Poggendorff, Biog. Lit. Handworterbuch; R. Grant, Hist, of Physical Astronomy, pp. 486, &c. ; R. Wolf, Geschichte der Astronomic A catalogue of 9766 stars, reduced from Lacaille’s observations by T. Henderson, under the supervision of F. Baily, was published in London in 1847.

LACAITA, SIR JAMES [Giacomo] (1813-1895), Anglo-Italian politician and writer. Born at Manduria in southern Italy, he practised law in Naples, and having come in contact with a number of prominent Englishmen and Americans in that city, he acquired a desire to study

the English language. Although a moderate Liberal in politics, he never joined any secret society, but in i85r after the restoration of Bourbon autocracy he was arrested for having supplied Gladstone with information or Bourbon misrule. Through the intervention of the British and Russian ministers he was liberated, but on the publication

of Gladstone's famous letters to Lord Aberdeen he was obliged to leave Naples. He first settled in Edinburgh, where he married Maria Carmichael, and then in London where he made numerous friends in literary and political circles, and was professor of Italian at Queen's College from 1853 to 1856. In the latter year he accompanied Lord Minto to Italy, on which occasion he first met Cavour. From 1857 to 1863 he was private secretary (non-political) to Lord Lansdowne, and in 1858 he accompanied Gladstone to the Ionian Islands as secretary, for which services he was made a K.C.M.G. the following year. In i860 Francis II. of Naples had implored Napoleon III. to send a squadron to prevent Garibaldi from crossing over from Sicily to Calabria; the emperor expressed himself willing to do so provided Great Britain co-operated, and Lord John Russell was at first inclined to agree. At this juncture Cavour, having heard of the scheme, entrusted Lacaita, at the suggestion of Sir James Hudson, the British minister at Turin, with the task of inducing Russell to refuse co-operation. Lacaita, who was an intimate friend both of Russell and his wife, succeeded, with the help of the latter, in winning over the British statesman just as he was about to accept the Franco-Neapolitan proposal, which was in consequence abandoned. He returned to Naples late in i860 and the following year was elected member of parliament for Bitonto, although he had been naturalized a British subject in 1855. He took little part in parliamentary politics, but in 1876 was created senator. He was actively interested in a number of English companies operating in Italy, and was made one of the directors of the Italian Southern Railway Co. He had a wide circle of friends in many European countries and in America, including a number of the most famous men in politics and literature. He died in 1895 at Posilipo near Naples.

An authority on Dante, he gave many lectures on Italian literature and history while in England; and among his writings may be mentioned a large number of articles on Italian subjects in the Encyclopaedia Britannica (1857-1860), and an edition of Benvenuto da Imola's Latin lectures on Dante delivered in 1375; he co- operated with Lord Vernon

in the latter's great edition of Dante's Inferno (London, 1 858-1 865), and he compiled a catalogue in four volumes of the duke of Devonshire's library at Chatsworth (London,

1879).

LA CALLE, a seaport of Algeria, in the arrondissement of Bona, department of Constantine, 56 m. by rail E. of Bona and 10 m. W. of the Tunisian frontier. It is the centre of the Algerian and Tunisian coral fisheries and has an extensive industry in the curing of sardines; but the harbour is small and exposed to the N.E. and W. winds. The old fortified town, now almost abandoned, is built on a rocky peninsula about 400 yds. long, connected with the mainland by a bank of sand. Since the occupation of La Calle by the French in 1836 a new town has grown up along the coast. Pop. (1906) of the town, 2774; of the commune, 4612.

La Calle from the times of its earliest records in the 10th century has been the residence of coral merchants. In the 16th century exclusive privileges of fishing for coral were granted by the dey of Algiers to the French, who first established themselves on a bay to the westward of La Calle, naming their settlement Bastion de France; many ruins still exist of this town. In 1677 they moved their headquarters to La Calle. The company — Compagnie d'Afrique — who owned the concession for the fishery was suppressed in 1798 on the outbreak of war between France and Algeria. In 1806 the British consul-general at Algiers obtained the right to occupy Bona and La Calle for an annual rent of £11,000; but though the money was paid for several years no practical effect was given to the agreement. The French regained possession in 181 7, were expelled during the wars of 1827, when La Calle was burnt, but returned and rebuilt the place in 1836. The boats engaged in the fishery were mainly Italian, but the imposition, during the last quarter of the 19th century, of heavy taxes on all save French boats drove the foreign vessels away. For some years the industry was abandoned, but was restarted on a small scale in 1903.

See Abbe Poiret, Voyage en Barbarie . . . (Paris, 1789); E. Broughton, Six Years' Residence in Algiers (London, 1839) and Sir R. L. Playfair, Travels in the Footsteps of Bruce (London, 1877).

LA CALPRENEDE, GAUTHIER DE COSTES, Seigneur de (c. 1610-1663), French novelist and dramatist, was born at the Chateau of Tolgou, near Sarlat (Dordogne), in 1609 or 1610. After studying at Toulouse, he came to Paris and entered the regiment of the guards, becoming in 1650 gentleman-in-ordinary of the royal household. He

died in 1663 in consequence of a kick from his horse. He was the author of several long heroic romances ridiculed by Boileau. They are: Cassandre (10 vols., 1642-1650); Cleopatre (1648); Faramond (1661); and Les Nouvelles, ou les Divertissements de la princesse Alcidiane (1661) published under his wife's name, but generally attributed to him. His plays lack the spirit and force that occasionally redeem the novels. The best is Le Comte d' Essex, represented in 1638, which supplied some ideas to Thomas Corneille for his tragedy of the same name.

LA CARLOTA, a town of the province of Negros Occidental, Philippine Islands, on the W. coast of the island and the left bank of San Enrique river, about 18 m. S. of Bacolod, the capital of the province. Pop. (1903), after the annexation of San Enrique, 19,192. There are fifty-four villages or barrios in the town; the largest had a population in 1903 of 3254 and two others had each more than 1000 inhabitants. The Panayano dialect of the Visayan language is spoken by most of the inhabi- tants. At La Carlota the Spanish government established a station for the study of the culture of sugar-cane; by the American government this has been converted into a general agricultural experiment station, known as " Government Farm." LACCADIVE ISLANDS, a group of coral reefs and islands in the Indian Ocean, lying between io° and 12° 20′ N. and 71 40′ and 74 E. The name Laccadives (laksha dwipa, the " hundred thousand isles ") is that given by the people of the Malabar coast, and was probably meant to include the Maldives; they are called by the natives simply Divi, " islands," or Amendivi, from the chief island. There are seventeen separate reefs, " round each of which the 100-fathom line is continuous " (J. S. Gardiner). There are, however, only thirteen islands, and of these only eight are inhabited. They fall into two groups — the northern, belonging to the collectorate of South Kanara, and including the inhabited islands of Amini, Kardamat, Kiltan and Chetlat; and the southern, belonging to the administrative district of Malabar, and including the inhabited islands of Agatti, Kavaratti, Androth and Kalpeni. Between the Laccadives and the Maldives to the south lies the isolated Minikoi, which physically belongs to neither group, though somewhat nearer to the Maldives (q.v.). The principal submerged banks lie north of the northern group of islands; they are Munyal, Coradive and Sesostris, and are of greater extent than those on which the islands lie. The general depth over these is from 23 to 28 fathoms, but Sesostris has shallower soundings " indicating patches growing up, and some traces of a rim " (J. S. Gardiner). The islands have in nearly all cases emerged from the eastern and protected side of the reef, the western being completely exposed to the S.W. monsoon. The islands

are small, none exceeding a mile in breadth, while the total area is only about 80 sq. m. They lie so low that they would be hardly discernible but for the coco-nut groves with which they are thickly covered. The soil is light coral sand, beneath which, a few feet down, lies a stratum of coral stretching over the whole of the islands. This coral, generally a foot to a foot and a half in thickness, has been in the principal islands wholly excavated, whereby the underlying damp sand is rendered available for cereals. These excavations — a work of vast labour — were made at a remote period, and according to the native tradition by giants. In these spaces (totam, ” garden “) coarse grain, pulse, bananas and vegetables are cultivated; coco-nuts grow abundantly everywhere. For rice the natives depend upon the mainland.

Population and Trade. — The population in 1901 was 10,274. The people are Moplas, i.e. of mixed Hindu and Arab descent, and are Mahommedans. Their manners and customs are similar to those of the coast Moplas; but they maintain their own ancient caste distinctions. The language spoken is Malayalim, but it is written in the Arabic character. Reading and writing

are common accomplishments among the men. The chief industry is the manufacture of coir. The various processes are entrusted to the women. The men employ themselves with boatbuilding and in conveying the island produce to the coast. The exports from the Laccadives are of the annual value of about £17,000.

History. — No data exist for determining at what period the Laccadives were first colonized. The earliest mention of them as distinguished from the Maldives seems to be by Albiruni (c. 10×0), who divides the whole archipelago (Dibajat) into the Divah Kuzah or Cowrie Islands (the Maldives), and the Divah Kanbar or Coir Islands (the Laccadives). (See Journ. Asiat. Soc, September 1844, p. 265). The islanders were converted to Islam by an Arab apostle named Mumba Mulyaka, whose grave at Androth still imparts a peculiar sanctity to that island. The kazee of Androth was in 1847 still a member of his family, and was said to be the twenty-second who had held the office in direct line from the saint. This gives colour to the tradition that the conversion took place about 1250. It is also further corroborated by the story given by the Ibn Batuta of the conversion of the Maldives, which occurred, as he heard, four generations (say one hundred and

twenty years) before his visit to these islands in 1342. The Portuguese discovered the Laccadives in May 1498, and built forts upon them, but about 1545 the natives rose upon their oppressors. The islands subsequently became a suzerainty of the raja of Cannanore, and after the peace of Seringa- patam, 1792 the southern group was permitted to remain under the management of the native chief at a yearly tribute. This was often in arrear, and on this account these islands were sequestrated by the British government in 1877.

See The Fauna and Geography of the Maldive and Laccadive Archipelagoes, ed. J. Stanley Gardiner (Cambridge 1901-1905); Malabar District Gazetteer (Madras, 1908) ; G. Pereira, ” As Ilhas de Dyve ” (Boletim da Soc. Geog., Lisbon, 1 898-1 899) gives details relating to the Laccadives from the 16th-century MS. volume De insulis et peregrinatione lusitanorum in the National Library, Lisbon.
LACCOLITE (Gr. Xdx/cos, cistern, \idos, stone), iin geology, the name given by Grove K. Gilbert to intrusive masses of igneous rock possessing a cake-like form, which he first described from the Henry Mountains of southern Utah. Their characteristic is that they have spread out along the bedding planes of the strata, but are not so broad and thin as the sheets or intrusive sills which, consisting usually of basic rocks, have spread over immense distances without attaining any great thickness. Laccolites cover a comparatively small area and have greater thickness. Typically they have a domed upper surface while their base is flat. In the Henry Mountains they are from 1 to 5 m. in diameter and range in thickness up to about 5000 ft. The cause of their peculiar shape appears to be the viscosity of the rock injected, which is usually of inter- mediate character and comparatively rich in alkalis, belonging to the trachytes and similar lithological types. These are much less fluid than the basalts, and the latter in consequence spread out much more readily along the bedding planes, forming thin fiat-topped sills. At each side the laccolites thin out rapidly so that their upper surface slopes steeply to the margins. The strata above them which have been uplifted and bent are often cracked by extension, and as the igneous materials well into the fissures a large number of dikes is produced. At the base of the laccolite, on the other hand, the strata are flat and dikes are rare, though there may be a conduit up which the magma has flowed into the laccolite. The rocks around are often much affected by contact alteration, and great masses of them have sometimes sunk into the laccolite, where they may be partly melted and absorbed.

Gilbert obtained evidence that these laccolites were filled at depths of 7000 to 10,000 ft. and did not reach the surface, giving rise to volcanoes. From the effects on the drainage of the country it seemed

probable that above the laccolites the strata swelled up in flattish eminences. Often they occur side by side in groups belonging to a single period, though all the members of each group are not strictly of the same age. One laccolite may be formed on the side of an earlier one, and com- pound laccolites also occur. When exposed by erosion they give rise to hills, and their appearance varies somewhat with the stage of development.

In the western part of South America laccolites agreeing in all essential points with those described by Gilbert occur in considerable numbers and present some diversity of types. Occasionally they are

asymmetrical, or have one steep or vertical side while the other is gently inclined. In other cases they split into a number of sheets spreading outwards through the rocks around. But the term laccolite has also been adopted by geologists in Britain and elsewhere to describe a variety of intrusive masses not strictly identical in character with those of the Henry Mountains. Some of these rest on a curved floor, like the gabbro masses of the Cuillin Hills in Skye; others are injected along a flattish plane of unconformability where one system of rocks rests on the upturned and eroded edges of an older series. An example of the latter class is furnished by the felsite mass of the Black Hill in the Pentlands, near Edinburgh, which has followed the line between the Silurian and the Old Red Sandstone, forcing the rocks upwards without spreading out laterally to any great extent.

The term laccolite has also been applied to many granite intrusions, such as those of Cornwall. We know from the evidence of mining shafts which have been sunk in the country near the edge of these granites that they slope downwards underground with an angle of twenty to thirty degrees. They have been proved also to have been injected along certain wall-marked horizons; so that although the rocks of the country have been folded in a very complicated manner the granite can often be shown to adhere closely to certain members of the stratigraphical sequence for a considerable distance. Hence it is clear that their upper surfaces are convex and gently arched, and it is conjectured that the strata must extend belo.v them, though at a great depth, forming a floor. The definite proof of this has not been attained for no borings have penetrated the granites and reached sedimentary rocks beneath them. But often in ; mountainous countries where there are deep valleys the bases of great granite laccolites are exposed to view in the hill sides. These granite sills have a considerable thickness in proportion to their length, raise the rocks above them and fill them with dikes, and behave generally like typical laccolites. In contradistinction to intrusions of this type with a well-defined floor

we may place the batholiths, bysmaliths, plutonic plugs and stocks, which have vertical margins and apparently descend to unknown depths. It has been conjectured that masses of this type eat their way upwards by dissolving the rock above them and ab- sorbing it, or excavate a passage by breaking up the roof of the space they occupy while the fragments detached sink downwards and are lost in the ascending magma. (J. S. F.)

LACE (corresponding to Ital. merletto, trina; Genoese pizzo; Ger. spitzen; Fr. denlelle; Dutch kanten; Span, encaje; the English word owes something to the Fr. lassis or lads, but both are connected with the earlier Lat. laqueus; early French laces were also called passements or insertions and dents or edgings), the name applied to ornamental open work formed of threads of flax, cotton, silk, gold or silver, and occasionally of mohair or aloe fibre, looped or plaited or twisted together by hand, (1) with a needle, when the work is distinctively known as ” needlepoint lace “; (2) with bobbins, pins and a pillow or cushion, when the work is known as “pillow lace”; and- (3) by steam-driven machinery, when imitations of both needlepoint and pillow laces are produced. Laceˆmaking implies the production of ornament and fabric concurrently. Without a pattern or design the fabric of lace cannot be made.

The publication of patterns for needlepoint and pillow laces dates from about the middle of the 16th century. Before that period lace described such articles as cords and narrow braids of plaited and twisted threads, used not only to fasten shoes, sleeves and corsets together, but also in a decorative manner to braid the hair, to wind round hats, and to be sewn as trimmings upon costumes. In a Harleian MS. of the time of Henry VI. and Edward IV., about 1471, directions are given for the making of ” lace Bascon, lace indented, lace bordered, lace covert, a brode lace, a round lace, a thynne lace, an open lace, lace for hattys,” &c. The MS. opens with an illuminated capital letter, in which is the figure of a woman making these articles. The MS. supplies a clear description how threads in combinations of twos, threes, fours, fives, to tens and fifteens, were to be twisted and plaited together. Instead of the pillow, bobbins and pins with which pillow lace soon afterwards was made, the hands were used, each finger of a hand serving as a peg upon which was placed a ” bowys ” or ” bow,” or little ball of thread. Each ball might be of different colour from the other. The writer of the MS. says that the first finger next the thumb shall be called A, the next B, and so on. According to the sort of cord or braid to be made, so each of the four fingers, A, B, C, D might be called into service. A ” thynne lace ” might be made with three threads, and then only fingers A, B, C would be required. A

” round ” lace, stouter than the ” thynne ” lace, might require the service of four or more fingers. By occasionally dropping the use of threads from certain fingers a sort of indented lace or braid might be made. But when laces of more importance were wanted, such as a broad lace for ” hattys,” the fingers on the hands of assistants were required. The smaller cords or ” thynne laces,” when fastened in simple or fantastic loops along the edges of collars and cuffs, were called ” purls ” (see the small edge to the collar worn by Catherine de’ Medici, PI. II. fig. 4). In another direction from which some suggestion may be derived as to the evolution of lace-making, notice should be taken of the fact that at an early period the darning of varied ornamental devices, stiff and geometric in treatment into hand-made network of small square meshes (see squares of ” lacis,” PI. I. fig. 1) became specialized in many European countries. This is held by some writers to be “opus filatorium,” or ” opus araneum ” (spider work). Examples of this ” opus filatorium,” said to date from the 13 th century exist in public collections. The produc- tions of this darning in the early part of the 16th century came to be known as ” punto a maglia quadra ” in Italy and as ” lacis ” in France, and through a growing demand for household and wearing linen, very much of the ” lacis ” was made in white threads not only in Italy and France but also in Spain. In appearance it is a filmy fabric. With white threads also were the ” purlings ” above mentioned made, by means of leaden bobbins or ” fuxii,” and were called ” merletti a piombini ” (see lower border, PI. II. fig. 3). Cut and drawn thread linen work (the latter known as ” tela tirata ” in Italy and as ” deshilado ” in Spain) were other forms of embroidery as much in vogue as the darning on net and the ” purling.” The ornament of much of this cut and drawn linen work (see collar of Catherine de’ Medici, PI. II. fig. 4), more restricted in scope than that of the darning on net, was governed by the recurrence of open squares formed by the withdrawal of the threads. Within these squares and rectangles radiating devices usually were worked by means of whipped and buttonhole stitches (PI. fig. 5). The general effect in the linen was a succession of insertions or borders of plain or enriched reticulations, whence the name ” punto a reticella ” given to this class of embroidery in Italy. Work of similar style and especially that with whipped stitches was done rather earlier in the Grecian islands, which derived it from Asia Minor and Persia. The close connexion of the Venetian republic with Greece and the eastern islands, as well as its commercial relations with the East, sufficiently explains an early transplant- ing of this kind of embroidery into

Venice, as well as in southern Spain. At Venice besides being called " reticella," cut work was also called " punto tagliato." Once fairly established as home industries such arts were quickly exploited with a beauty and variety of pattern, complexity of stitch and delicacy of execu- tion, until insertions and edgings made independently of any linen as a starting base (see first two borders, PI. II. fig. 3) came into being under the name of " Punto in aria " (PI. II. fig. 7). This was the first variety of Venetian and Italian needlepoint lace in the middle of the 16th century, 1 and its appearance then almost coincides in date with that of the " merletti a piombini," which was the earliest Italian cushion or pillow lace (see lower edging, PI. II. fig. 3).

The many varieties 01 needlepoint and pillow laces will be

1 The prevalence of fashion in the above-mentioned sorts of em- broidery during the 16th century is marked by the number of pattern-books then published. In Venice a work of this class was issued by Alessandro Pagannino in 1527; another of a similar nature, printed by Pierre Quinty, appeared in the same year at Cologne; and La Fleur de la science de pourtraicture et patrons de broderie,facon arabicque et ytalique, was published at Paris in 1530. From these early dates until the beginning of the 17th century pattern-books for embroidery in Italy, France, Germany and England were published in great abundance. The designs contained- in many of those dating from the early 16th century were to be worked for costumes and hangings, and consisted of scrolls, arabesques, birds, animals, flowers, foliage, herbs and grasses. So far, however, as their reproduction as laces might be concerned, the execution of complicated work was involved which none but practised lace-workers, such as those who arose a century later, could be expected to undertake.

touched on under the heading allotted to each of these methods of making lace. Here, however, the general circumstances of their genesis may be briefly alluded to. The activity in cord and braid-making and in the particular sorts of ornamental needlework already mentioned clearly postulated such special labour as was capable of being converted into lace-making. And from the 16th century onwards the stimulus to the industry in Europe was afforded by regular trade demand, coupled with the exertions of those who encouraged their dependents ot proteges to give their spare time to remunerative home occupa- tions. Thus the origin and perpetuation of the industry have come to be associated with the women folk of peasants and fishermen in circumstances which present little dissimilarity whether in regard to needle lace workers now making lace in whitewashed cottages and cabins at Youghal and Kenmare in the south of Ireland, or those who

produced their ” punti in aria ” during the 16th century about the lagoons of Venice, or French- women who made the sumptuous ” Points de France ” at Alencon and elsewhere in the 17th and 18th centuries; or pillow lace workers to be seen at the present day at little seaside villages tucked away in Devonshire dells, or those who were engaged more than four hundred years ago in ” merletti a piombini ” in Italian villages or on ” Dentelles au fuseau ” in Flemish low- lands. The ornamental character, however, of these several laces would be found to differ much; but methods, materials, appliances and opportunities of work would in the main be alike. As fashion in wearing laces extended, so workers came to be drawn together into groups by employers who acted as channels for general trade. 2 Nuns in the past as in the present have also devoted attention to the industry, often providing in the convent precincts workrooms not only for peasant women to carry out commissions in the service of the church or for the trade, but also for the purpose of training children in the art. Elsewhere lace schools have been founded by benefactors or organized by some leading local lace-maker 3 as much for trading as for education. In all this variety of circumstance, development of finer work has depended upon the abilities of the workers being exercised under sound direction, whether derived through their own intuitions, or supplied by intelligent and tasteful employers. Where any such direction has been absent the industry viewed commercially has suffered, its productions being devoid of artistic effect or adaptability to the changing tastes of demand.

It is noteworthy that the two widely distant regions of Europe where pictorial art first flourished and attained high perfection, north Italy and Flanders, were precisely the localities where lace-making first became an industry of importance both from an artistic and from a commercial point ˆof view. Notwithstand- ing more convincing evidence as to the earlier development of pillow lace making in Italy the invention of pillow lace is often credited to the Flemings; but there is no distinct trace of the time or the locality. In a picture said to exist in the church of St Gomar at Lierre, and sometimes attributed to Quentin Matsys (1495), is introduced a girl apparently working at some sort of lace with pillow, bobbins, &c, which are somewhat similar to the implements in use in more recent times. 4 From the very infancy of Flemish art an active intercourse was main- tained between the Low Countries and the great centres of Italian art; and it is therefore only what might be expected that the wonderful examples of the art and handiwork of Venice in lace-making should soon have come to be known to and rivalled among the equally industrious, thriving and artistic Flemings. At the end of the 16th century pattern-

books were issued in Flanders having the same general character as those published for the guidance of the Venetian and other Italian lace-makers.

2 A very complete account of how these conditions began and developed at Alengon, for instance, is given in Madame Despierre's Histoire du Point d % Alencon (1886) to which is appended an interesting and annotated list of merchants, designers and makers of Point d'Alencon.

3 E.g. The family of Camusat at Alencon from 1602 until 1795.

4 The picture, however, as Seguin has pointed out, was probably painted some thirty years later, and by Jean Matsys.

LACE

Plate I.

t . ,!•'.'.

Ifapi W

SSL™

Fig. i. -PORTION OF A COVERLET COMPOSED OF SQUARES OF "LACIS" OR DARNED NETTING, DIVIDED BY

The squares are worked with groups representing the twelve months, and with scenes from the old Spanish dramatic story "Celcst:

16th century. (Victoria and Albert Museum.)

LINEN CUT-WORK BANDS.

na." Spanish or Portuguese.

Fro. 2.- CORNER OF A BED-COVER OF PILLOW-MADE LACE OF A TAPE-LIKE TEXTURE WITH CHARACTERISTICS IN THE TWISTED AND

PLAITED THREADS RELATING THE WORK TO ITALIAN "MERLETTI A PIOMBINI OR EARLY ENGLISH "BONE LACE "

Possibly made in I- landers or italy during the early part of the 17th or at the end of the 16th century.-' The design includes the Imperial double-headed eagle of Austria

with the ancient crown of the German Empire. (Victoria and Albert Museum.}

Plate 11.

LACE

Fig. 3.— THREE VANDYKE OR DENTATED BORDERS OF ITALIAN LACE OF THE LATE i6th CENTURY. Style usually called ” Reticella ” on account of the patterns being based on repeated squares or reticulations. The two first borders are of needlepoint work; the lower border is of such pillow lace as was known in Italy as ” merletti a piombini.”

Fig. 4.— CATHERINE DE MEDICI, WEARING A LINEN UPTURNED COLLAR OF CUT WORK AND NEEDLE- POINT LACE. LouTre. About 1540.

Fig. 7.— BORDER OF FLAT NEEDLEPOINT LACE OF FULLER TEXTURE THAN THAT OF FIG. 3, AND FROM A FREER STYLE OF DESIGN IN WHICH CONVENTIONALIZED FLORAL FORMS HELD TO- GETHER BY SMALL BARS OR TYES ARE USED. Style called ” Punto in Aria,” chiefly on account of its indepen- dence of squares or reticulations. Italian. Early 17th century.

Fig. 5.— CORNER OF A NAPKIN OR HANDKERCHIEF Fig. 6.— AMELIE ELISABETH, COMTESSE DE HAINAULT, BORDERED WITH “RETICELLA” NEEDLEPOINT WEARING A RUFF OF NEEDLEPOINT RETICELLA

LACE IN THE DESIGN OF WHICH ACORNS AND LACE. By Morcelse. The Hague. About 1600..

CARNATIONS ARE MINGLED WITH GEOMETRIC (Figs. 4 and 6 by permission of Messrs Braun, Clement & Co.,

RADIATIONS. Probably of English early 17th century. Dornach (Alsace), and Paris.)

LACE

France and England were not far behind Venice and Flanders in making needle and pillow lace. Henry III. of France (1574- 1589) appointed a Venetian, Frederic Vinciolo, pattern maker for varieties of

linen needle works and laces to his court. Through the influence of this fertile designer the seeds of a taste for lace in France were principally sown. But the event which par excellence would seem to have fostered the higher development of the French art of lace-making was the aid officially given it in the following century by Louis XIV., acting on the advice

done on a pillow or cushion and with the needle, in the style of the laces made at Venice, Genoa, Ragusa and other places; these French imitations were to be called ” points de France.” By 1671 the Italian ambassador at Paris writes, ” Gallantly is the minister Colbert on his way to bring the ‘ lavori d’aria’ to perfection.” Six years later an Italian, Domenigo Contarini, alludes to the ” punto in aria,” ” which the French can now do to admiration.” The styles of design which emanated from the chief of the French lace centre, Alencon, were more fanciful

Fig. 24. — Portion of a Flounce of Needlepoint Lace, French, early sidered to be a peculiarity of ” Point d’Argentan “: some of the

of his minister Colbert. Intrigue and diplomacy were put into action to secure the services of Venetian lace-workers; and by an edict dated 1665 the lace-making centres at Alencon, Quesnoy, Arras, Reims, Sedan, Chateau Thierry, Loudun and elsewhere were selected for the operations of a company in aid of which the state made a contribution of 36,000 francs; at the same time the importation of Venetian, Flemish and other laces was strictly forbidden. 1 The edict contained instructions that the lace-makers should produce all sorts of thread work, such as those

1 See the poetical skit Revolte des passentents et broderies, written by Mademoiselle de la Tousse, cousin of Madame de Sevigne, in the middle of the 17th century, which marks the favour which foreign laces at that time commanded amongst the leaders of French fashion.

18th century, ” Point de France.” The honeycomb ground is con- fillings are made in the manner of the ” Point dAlencon ” reseau.

and less severe than the Venetian, and it is evident that the Flemish lace-makers later on adopted many of these French patterns for their own use. The provision of French designs (fig. 24) which owes so much to the state patronage, contrasts with the absence of corresponding provision in England and was noticed early in the 18th century by Bishop Berkeley. ” How,” he asks, ” could France and Flanders have drawn so much money from other countries for figured

silk, lace and tapestry, if they had not had their academies of design?”

It is fairly evident too that the French laces themselves, known as ” bisette,” ” gueuse,” ” campane ” and ” mignonette,” were small and comparatively insignificant works, without pretence to design.

4°

LACE

The humble endeavours of peasantry in England (which could boast of no schools of design), Germany, Sweden, Russia and Spain could not result in work of so high artistic pretension as that of France and Flanders. In the 18th century good lace was made in Devonshire, but it is only in recent years that to some extent the hand lace-makers of England and Ireland have become impressed with the necessity of well-considered designs for their work. Pillow lace making under the name of ” bone lace making ” was pursued in the 17th century in Buckingham- shire, Hertfordshire and Bedfordshire, and in 1724 Defoe refers to the manufacture of bone lace in which villagers were ” wonder- fully exercised and improved within these few years past.” ” Bone ” lace dates from the 17th century in England and was practically the counterpart of Flemish ” dentelles au fuseau,” and related also to the Italian ” merletti a piombini ” (see PI. fig. 10). In Germany, Barbara Uttmann, a native of Nuremberg, instructed peasants of the Harz mountains to twist and plait threads in 1561. She was assisted by certain refugees from Flanders. A sort of ” purling ” or imitation of the Italian ” merletti a piombini ” was the style of work produced then.

Lace of comparatively simple design has been made for centuries in villages of Andalusia as well as in Spanish conventual estab- lishments. The ” point d’Espagne,” however, appears to have been a commercial name given by French manufacturers of a class of lace made in France with gold or silver threads on the pillow and greatly esteemed by Spaniards in the 17 th century. No lace pattern-books have been found to have been published in Spain. The needle-made laces which came out of Spanish monasteries in 1830, when these institutions were dissolved, were mostly Venetian needle-made laces. The lace vestments preserved at the cathedral at Granada hitherto presumed to be of Spanish work are verified as being Flemish of the 17th century (similar in style to PI. fig. 14). The industry is not alluded to in Spanish ordinances of the 15th, 16th or 17th centuries, but traditions which throw its origin back to the Moors or Saracens are still current in Seville and its neighbourhood, where a twisted and

knotted arrangement of fine cords is often worked x under the name of ” Morisco ” fringe, elsewhere called macram6 lace. Black and white silk pillow laces, or ” blondes,” date from the 1 8th century. They were made in considerable quantity in the neighbourhood of Chantilly, and imported for mantillas by Spain, where corresponding silk lace making was started. Although after the 18th century the making of silk laces more or less ceased at Chantilly and the neighbourhood, the craft is now carried on in Normandy — at Bayeux and Caen — as well as in Auvergne, which is also noted for its simple ” torchon ” laces. Silk pillow lace making is carried on in Spain, especially at Barcelona. The patterns are almost entirely imitations from 18th-century French ones of a large and free floral character. Lace-making is said to have been promoted in Russia through the patronage of the court, after the visit of Peter the Great to Paris in the early days of the 18th century. Peasants in the districts of Vologda, Balakhua (Nijni-Novgorod), Bieleff (Tula) and Mzensk (Orel) make pillow laces of simple patterns. Malta is noted for producing a silk pillow lace of black or white, or red threads, chiefly of patterns in which repetitions of circles, wheels and radiations of shapes resembling grains of wheat are the main features. This characteristic of design, appearing in white linen thread laces of similar make which have been identified as Genoese pillow laces of the early 17th century, reappears in Spanish and Paraguayan work. Pillow lace in imitation of Maltese, Buckinghamshire and Devonshire laces is made to a small extent in Ceylon, in different parts of India and in Japan. A successful effort has also been made to re- establish the industry in the island of Burano near Venice, and pillow and needlepoint lace of good design is made there.

At present the chief sources of hand-made lace are France, Belgium, Ireland and England.

France is faithful to her traditions in maintaining a lively

1 Useful information has been communicated to the writer of the present article on lace by Mrs B. Wishaw of Seville.

and graceful taste in lace-making. Fashion of late years has called for ampler and more boldly effective laces, readily produced with both braids and cords and far less intricate needle or pillow work than was required for the dainty and smaller laces of earlier date.

In Belgium the social and economic conditions are, as they have been in the past, more conducive and more favourable than elsewhere to lace-making at a sufficiently remunerative

Fig. 25. — Collar and Berthe of Irish Crochet Lace.

rate of wages. The production of hand-made laces in Belgium was in 1900 greater than that of France. The principal modern needle-made lace of Belgium is the ” Point de Gaze “; ” Duchesse ” and Bruges laces are the .chief pillow-made laces; whilst ” Point Applique ” and ” Plat Applique ” are frequently the results not only of combining needle-made and pillow work, but also of using them in conjunction with machine-made net. Ireland is the best producer of that substantial looped-thread

Fig. 26. — Collar of Irish Crochet Lace.

work known as crochet (see figs. 25, 26, 27), which must be regarded as a hand-made lace fabric although not classifiable as a needlepoint or pillow lace. It is also quite distinct in char- acter from pseudo-laces, which are really embroideries with a lace-like appearance, e.g. embroideries on net, cut and embroidered cambrics and fine linen. For such as these Ireland maintains a reputation in its admirable Limerick and Carrickmacross laces, made not only in Limerick and Carrickmacross, but also

LACE

Plate III.

Fig. o.— HENRI II..DUCDE MONTMORENCY, WEARING A

FALLING LACE COLLAR. By Le Naix. Louvre. About 1628.

(By permission of Messrs Braun, Clement & Co.,

Dornach (Alsace), and Paris.)

Fig.

i.— MARY, COUNTESS OF PEMBROKE, WEARING A COIF AND CUFFS OF RETICELLA LACE. National Portrait Gallery. Dated 1614.

Fig. 10.— SCALLOPPED COLLAR OF TAPE-LIKE PILLOW-MADE LACE. Possibly of English early 17th-century work. Its texture is typical of a development in pillow-lace-making later than that of the lower edge of ” merletti a piombini” in PI. II. fig. 3.

Fig. 11.— JAMES II. WEARING A JABOT AND CUFFS

OF RAISED NEEDLEPOINT LACE.

By Riley. National Portrait Gallery. About 1685.

(Figs. 8 and 1 1 , photo by Emery Walker.)

Fig. 12.— JABOT OF NEEDLEPOINT LACE WORKED PARTLY IN RELIEF, AND USUALLY KNOWN AS “GROS POINT DE VENISE.” Middle of 17th century. Conventional scrolling stems with off-shooting psepdo-blossoms and leafs are specially characteristic

Plate IV.

LACE

Fig. 13 From the

— MME VERBIEST, WEARING PILLOW-MADE

LACE J RESEAU. family group by Gonzales Coquer. Buckingham Palace.

About 1664. (By permission of Messrs Braun, Clement £f Co., Dornack {Alsace), and Paris.)

Fig. 15— PRINCESS MARIA TERESA STUART, WEARING A FLOUNCE OR TABLIER OF LACE SIMILAR TO THAT IN FIG. 17. Dated 1695.

From a group by Largilliere. National Portrait Gallery. (Photo by Emery Walker.)

mmmmmfmy ■-.•■ ,. — >jj!LLJ:l^.*

aM

Fig

FLOUNCE OF PILLOW-MADE LACE A RESEA V.

Flemish, of the middle of the 17th century. This lace is usually thought to be the earliest type of “Point d Angleterre” in contra-distinction to the “Point de Flandres” (fig. 14).

Fig. 14.— PIECE OF PILLOW-MADE LACE USUALLY

KNOWN AS “POINT DE FLANDRES A BRIDES.” Of the middle of the 17th century, the designs for which were ofren adaptations from those made for such needlepoint lace as that of the Jabot in fig. 12.

Fig 17.— VERY DELICATE NEEDLEPOINT LACE WITH CLUSTERS OF SMALL RELIEF WORK.

Venetian, middle of the 17th century, and often called “rose point lace,” and sometimes ” Point de Neige.”

in Kinsale, Newry, Crossmaglen and elsewhere. The demand from France for Irish crochet is now far beyond the supply, a condition which leads not only to the rapid repetition by Irish workers of old patterns, but tends also to a gradual debasement of both texture and ornament. Attempts have been made to

counteract this tend- ency, with some success, as the speci- mens of Irish crochet in figs. 25, 26 and 27 indicate.

An a p p r e ciable amount of pillow- made lace is annu- ally supplied from

,..,,,.. Devonshire, Buck-

Fig. 27.— Lady s Sleeve of Irish Crochet Lace. inghamsh ; re) Bed- fordshire and Northampton, but it is bought almost wholly for home use. The English laces are made almost entirely in accord- ance with the precedents of the 19th century— that is to say, in definite lengths and widths, as for borders, insertions and flounces, although large shaped articles, such as panels for dresses, long sleeves complete skirts, jackets, blouses, and fancifully shaped collars of considerable dimensions have of late been freely made elsewhere. To make such things entirely of lace necessitates many modifications in the ordinary methods; the English lace-workers are slow to adapt their work in the manner requisite, and hence are far behind in the race to respond to the fashionable demand. No countries succeed so well in promptly answering the variable call of fashion as France and Belgium.

As regards trade in lace, America probably buys more from Belgium than from France; France and England come next as purchasers of nearly equal quantities, after which come Russia and Italy.

The greatest amount of lace now made is that which issues from machines in England, France and Germany. The total number of persons employed in the lace industry in England in 1871 was 49,370, and in 1901 about 34,929, of whom not more than 5000 made lace by

hand.

The early history 1 of the lace-making machine coincides with that of the stocking frame, that machine having been adapted about the year 1768 for producing open-looped fabrics which had a net-like appearance. About 1 786 frames for making point nets by machinery first appear at Mansfield and later at Ashbourne and Nottingham and soon afterwards modifications were introduced into such frames in order to make varieties of meshes in the point nets which were classed as figured nets. In 1808 and 1809 John Heathcoat of Nottingham obtained patents for machines for making bobbin net with a simpler and more readily produced mesh than that of the point net just mentioned. For at least thirty years thousands of women had been employed in and about Nottingham in the embroidery of simple ornament on net. In 1813 John Leavers began to improve the figured net weaving machines above mentioned, and from these the lace-making machines in use at the present time were developed. But it was the application of the cele- brated Jacquard apparatus to such machines that enabled manufacturers to produce all sorts of patterns in thread-work in imitation of the patterns for hand-made lace. A French machine called the ” dentelliere ” was devised (see La Nature for the 3rd of March 1881), and the patterns produced by it were of plaited threads. The expense, however, attending the production of plaited lace by the ” dentelliere ” is as great as that of pillow lace made by the hand, and so the machine has not succeeded for ordinary trade purposes. More successful results have been secured by the new patent circular lace machine of Messrs. Birkin & Co. of Nottingham, the productions of which, all of simple design, cannot be distinguished from hand-made pillow lace of the same style (see figs. 57, 58, 59).

Before dealing with technical details in processes of making lace whether by hand or by the machine, the component parts of different makes of lace may be considered. These are governed

1 See Felkin’s Machine-wrought Hosiery and Lace Manttfactures.

by the ornaments or patterns, which may be so designed, as they were in the earlier laces, that the different component parts may touch one another without any intervening ground-work. But as a wish arose to vary the effect of the details in a pattern ground-works were gradually developed and at first consisted of links or ties between the substantial parts of the pattern. The bars or ties were succeeded by grounds of meshes, like nets. Sometimes the substantial parts of a pattern were outlined with a single thread or by a strongly marked raised edge of buttonhole- stitched or of plaited work. Minute fanciful devices were

then introduced to enrich various portions of the pattern. Some of the heavier needle-made laces resemble low relief carving in ivory, and the edges of the relief portions are often decorated with clusters of small loops. For the most part all this elabora- tion was brought to a high pitch of variety and finish by French designers and workers; and French terms are more usual in speaking of details in laces. Thus the solid part of the pattern is called the toile or clothing, the links or ties are called brides, the meshed grounds are called reseaux, the outline to the edges of a pattern is called cordonnet or brodS, the insertions of fanciful devices modes, the little loops picots. These terms are applicable to the various portions of laces made with the needle, on the pillow or by the machine.

The sequence of patterns in lace (which may be verified upon referring to figs. 1 to 23) is roughly as follows. From about 1540 to 1590 they were composed of geometric forms set within squares, or of crossed and radiating line devices, resulting in a very open fabric, stiff and almost wiry in effect, without brides or riseaux. From 1590 may be dated the introduction into patterns of very conventional floral and even human and animal forms and slender scrolls, rendered in a tape-like texture, held together by brides. To the period from 1620 to T670 belongs the development of long continuous scroll patterns with riseaux and brides, accompanied in the case of needle- made laces with an elaboration of details, e.g. cordonnet with massings of picots. Much of these laces enriched with fillings or modes was made at this time. From 1650 to 1700 the scroll patterns gave way to arrangements of detached ornamental details (as in PI. VI. fig. 22): and about 1700 to 1760 more important schemes or designs were made (as in PI. fig. 19, and in fig. 24 in text), into which were introduced naturalistic renderings Of garlands, flowers, birds, trophies, architectural ornament and human figures. Grounds composed entirely of varieties of modes as in the case of the riseau rosaci (PI. V. fig. 21) were sometimes made then. From 1760 to 1800 small details consisting of bouquets, sprays of flowers, single flowers, leaves, buds, spots and such like were adopted, and sprinkled over meshed grounds, and the character of the texture was gauzy and filmy (as in figs. 40 and 42). Since that time variants of the foregoing styles of pattern and textures have been used according to the bent of fashion in favour of simple or complex ornamentation, or of stiff, compact or filmy textures.

Needlepoint Lace. — The way in which the early Venetian ” punto in aria ” was made corresponds with that in which needlepoint lace is now worked. The pattern is first drawn upon a piece of parchment. The parchment is then stitched to two pieces of linen. Upon the leading lines drawn on the parchment a thread is laid, and fastened

through to the parch- ment and linen by means of stitches, thus constructing a skeleton thread pattern (see left-

hand part of fig. 30). Those portions which are to be represented as the ” clothing ” or toile are usually worked as indicated in the en-* Urged diagram (fig. 29),

Fig. 28.

Fig. 29.

and then edged as a” rule With buttonhole stitching (fig. 28). Between these toils portions of the pattern are worked ties (brides) or meshes (riseaux), and thus the various parts united into one fabric are wrought on to the face of the parchment pattern and reproducing it (see right-hand part of fig. 30). A knife is

passed between the two pieces of linen at the back of the parch- ment, cutting the stitches which have passed through the parch- ment and linen, and so releasing the lace itself from its pattern parchment. In the earlier stages, the lace was made in lengths to serve as insertions (passements) and also in Vandykes (dentelles)

Fig. 30. — Parchment Pattern showing work in progress: the more complete lace is on the right half of the pattern.

to serve as edgings. Later on insertions and Vandykes were made in one piece. All of such were at first of a geometric style of pattern (PI. figs. 3-5 and 6).

Following closely upon them came the freer style of design already mentioned, without and then with links or ties — brides — interspersed between the various details of the patterns (PI. II. fig- 7)) which were of flat tapelike texture. In elaborate speci- mens of this flat point lace some lace workers occasionally used gold thread with the white thread. These flat laces (” Punto in Aria “) are also called ” flat Venetian point.” About 1640 ” rose (raised) point ” laces began to be made (PI. III. fig. 12). They were done in relief and those of bold design with stronger reliefs are called ” gros point de Venise.” Lace of this latter class was used for altar cloths, flounces, jabots or neckcloths which hiing – beneath the chin over the breast (PI. III. fig. n), as well as for trimming the turned-over tops of jack boots. Tabliers and ladies’

aprons were also made of such lace. In these no regular ground was introduced. All sorts of minute embellishments, like little knots, stars and loops or picots, were worked on to the irregularly arranged brides or ties holding the main patterns together, and the more dainty of these raised laces (PI. fig. 17) exemplify the most subtle uses to which the buttonhole stitch appears capable of being put in making ornaments. But about 1660 came laces with brides or ties arranged in a honeycomb reticulation or regular ground. To them succeeded lace in which the compact relief gave place to daintier and lighter material combined with a ground of meshes or reseau. The needle-made meshes were sometimes of single and sometimes of double threads. A diagram is given of an ordinary method of making such meshes (fig- 31). At the end of the 17th century the lightest of the Venetian needlepoint laces were made; and this class which was of the filmiest texture is usually known as ” point de Venise a. reseau ” (PI. V. fig. 20a). It was contemporary with the needle-made French laces of Alen- con and Argentan 1 that became famous towards the latter part of the 17th century (PI. V. fig. 206). “Point d’ Argentan” has been thought to be especially distinguished on account of its delicate honeycomb ground of hexagonally arranged brides (fig. 32), a peculiarity already referred to in certain antecedent Venetian point laces. Often intermixed with this hexagonal brides ground is the fine- meshed ground or reseau (fig. 206), which has been held to be distinctive of ” point d’Alencon.” But the styles of patterns and the methods of working them, with rich variety of insertions or modes, with the brode or cordonnet of raised buttonhole stitched edging, are alike in Argentan and Alencon needle-made laces (PI. V. fig. 20b and fig. 32). Besides the hexagonal brides

1 After 1650 the lace-workers at Alencon and its neighbourhood produced work of a daintier kind than that which was being made by the Venetians. As a rule the hexagonal bride grounds of Alencon laces are smaller than similar details in Venetian laces. The average size of a diagonal taken from angle to angle in an Alencon (or so- called Argentan) hexagon was about one-sixth of an inch, and each side of the hexagon was about one-tenth of an inch. An idea of the minuteness of the work can be formed from the fact that a side of a hexagon would be overcast with some nine or ten buttonhole stitches.

ground and the ground of meshes another variety of grounding (reseau rosact) was used in certain Alencon designs. This ground consisted of -buttonhole-stitched skeleton hexagons within each of which was worked a small hexagon of toile connected with the outer surrounding hexagon by means of six little ties or brides (PI. V. fig. 21). Lace with this particular ground has been called ” Argentella,”

and some writers have thought that it was a specialty of Genoese or Venetian work. But the character of the work and the style of the floral patterns are those of Alencon laces. The industry at Argentan was virtually an off- shoot of that nurtured at Alencon, where ” lacis,” ” cut work ” and ” velin ” (work on parchment) had been made for years before the well-developed needle-made ” point d’Alencon ” came into vogue under the favouring patronage of the state- aided lace company mentioned as having been formed in 1665.

Fig. 32. — Border of Needlepoint Lace made in France about 1740-1750, the clear hexagonal mesh ground, which is compactly stitched, being usually regarded as characteristic of the point de France made at Argentan.

Madame Despierre in her Histoire du point d’Alencon gives an interesting and trustworthy account of the industry.

In Belgium, Brussels has acquired some celebrity for needle- made laces. These, however, are chiefly in imitation of those made at Alencon, but the toile is of less compact texture and sharpness in definition of pattern. Brussels needlepoint lace is often worked with meshed grounds made on a pillow, and a plain

Fig. 33. — Shirt decorated with Insertions of Flat Needlepoint Lace. (English, 17th century. Victoria and Albert Museum.)

thread is used as a cordonnet for their patterns instead of a thread overcast with buttonhole stitches as in the French needlepoint laces. Note the bright sharp outline to the various ornamental details in PL V. fig. 206. Needlepoint lace has also been occasionally produced in

LACE

Plate V.

Fig. 18.— CHARLES GASPARD Gl’ILLAUME DE VINTI MILLE, WEARING LACE SIMILAR IN STYLE OF DESIGN SHOWN IN FIG. 19. About 1730.

Fig. 19.— PORTION OF FLOUNCE, NEEDLEPOINT LACE COPIED AT THE BURANO LACE SCHOOL FROM THE ORIGINAL OF THE SO-CALLED “POINT DE VENISE A BRIDES PICOTEES.”

17th century. Formerly belonging to Pope Clement XIII. , but now the property of the queen of Italy. The design and work, however, are indistinguishable from those of important flounces of ” Point de F

ranee.” The pattern consists of repetitions of two vertically-arranged groups of fantastic pine-apples and vases with flowers, intermixed with bold rococo bands and large leaf devices. The hexagonal meshes of the ground, although similar to the Venetian ” brides picotees,” arc much akin to the button-hole Stitched ground of “Point d’Atgentan.” (Victoria and Albert Museum.)

A.— A LAPPET OF

Fig. 20. b

‘POINT DE VENISE A RESEAU.’

The conventional character of the pseudo-leaf and floral forms contrasts with that of the realistic designs of contemporary French laces. Italian. Early 18th century.

B.— A LAPPET OF FIXE “POINT D’ALENgON.” Louis XV. period. The variety of the fillings of geometric design is_partic,ularly remarkable in this specimen, as is the button-hole stitched cordonnat or outline to the various ornamental forms

Fig. 21.— BORDER OF FRENCH NEEDLEPOINT LACE WITH GROUND OF “RESEAU ROSACE.” 18th century.

PlATE VI.

LACE

Fig. 22.-JABOT OR CRAVAT OF PILLOW-MADE LACE. Brussels. Late 17th century. (Victoria and Albert Museum.)

Fig. 23.— JABOT OR CRAVAT OF PILLOW-MADE LACE OF FANTASTIC FLORAE DESIGN, THE GROUND OF WHICH IS COMPOSED OF LITTLE FLOWERS AND LEAVES ARRANGED WITHIN SMALL OPENWORK VERTICAL STRIPS. Brussels. 18th century. (Victoria and Albert Museum.)

England. Whilst the character of its design in the early 17th century was rather more primitive, as a rule, than that of the contemporary Italian, the method of its workmanship is virtually the same and an interesting specimen of English needle-made lace inset into an early

17th-century shirt is illustrated in fig. 33. Specimens of needle-made work done by English school children may be met with in samplers of the 17th and 18th centuries. Needlepoint lace is successfully made at Youghal, Kenmare and New Ross in Ireland, where of late years attention has been given to the study of designs for it. The lace-making school at Burano near Venice produces hand-made laces which are, to a great extent, careful reproductions of the more celebrated classes of point laces, such as ” punto in aria,” ” rose point de Venise,” ” point de Venise a reseau,” “point d’Alencon,” “point d’Argentan” and others. Some good needlepoint lace is made in Bohemia and elsewhere in the Austrian empire.

Pillow-made Lace. — Pillow-made lace is built upon no sub- structure corresponding with a skeleton thread pattern such as is used for needlepoint lace, but is the representation of a pattern obtained by twisting and plaiting threads.

These patterns .were never so strictly geometric in style as those adopted for the earliest point lace making from the ante- cedent cut linen and drawn thread embroideries. Curved forms, almost at the outset of pillow lace, seem to have been found easy of execution (see lower border, PI. II. fig. 3); its texture was more lissom and less crisp and wiry in appearance than that of contemporary needle-made lace. The early twisted and plaited thread laces, which had the appearance of small cords merging into one another, were soon succeeded by laces of similar make but with flattened and broader lines more like fine braids or tapes (PI. I. fig. 2, and PI. fig. 10). But pillow laces of this tapey' character must not be confused with laces in which actual tape or braid is used. That peculiar class of lace- work does not arise until after the beginning of the 17th century when the weaving of tape is said to have commenced in Flanders. In England this sort of tape-lace dates no farther back than 1747, when two Dutchmen named Lanfort were invited by an English firm to set up tape looms in Manchester.

The process by which lace is made on the pillow is roughly and briefly as follows. A pattern is first drawn upon a piece of paper or parchment. It is then pricked with holes by a skilled " pattern pricker," who determines where the principal pins shall be stuck for guid- ing the threads. This pricked pattern is then fastened to the pillow. The pillow or cushion varies in shape in different countries. Some lace-makers use a circular pad, backed with a flat board, in order that it may be placed upon a table and easily moved. Other lace-workers use a well-stuffed round pillow or short bolster, flattened at the two ends, so that they may hold it conveniently on their laps. From the upper part of pillow with the pattern fastened on it hang the threads from the bobbins. The bobbin threads thus hang across the pattern. Fig. 34 shows the commence- ment, for instance, of a double set of three-thread plaitings. The compact portion in a pillow lace J has a woven appearance (fig. 35).

About the middle of the 17 th century pillow ' lace of formal scroll patterns somewhat in imita- tion of those for point lace was made, chiefly in Flanders. The earlier of these had grounds of ties or brides and was often called "point de Flandres" (PI. fig. 14) in contradistinction to scroll patterns with a mesh ground, which were called "point d' Angleterre " (PI. fig. 16). Into Spain and France much lace from Venice and Flanders was imported as well as into England, where from the 16th century the manufacture of the simple pattern " bone lace " by peasants in the midland and southern counties was still being carried on. In Charles II. 's time its manufacture was threatened

with

Fig. 34. — Diagram show- ing six Bobbins in use.

extinction by the preference given to the more artistic and finer Flemish laces. The importation of the latter was accord- ingly prohibited. Dealers in Flemish lace sought to evade the prohibitions by calling certain of their laces ‘ ‘ point d’ Angleterre,’?

Fig. 36. — Border of English Pillow-made (Devonshire) Lace in the style of a Brussels design of the middle of the 18th century.

and smuggling them into England. But smuggling was made so difficult that English dealers were glad to obtain the services of Flemish lace-makers and to induce them to settle in England. It is from some such cause that the better 17th- and 18th-century

Fig. 37. — Border of English (Bucks, or Beds.) Pillow-made Lace in the style of a Mechlin design of the latter part of the 18th century.

English pillow laces bear resemblance to pillow laces of Brussels, of Mechlin and of Valenciennes.

As skin in the European lace-making developed soon after the middleof the 17th century, patterns and particular plaitings

<*. «

ˆSS.

f5TSˆˆˆHKˆE?5H

%£&*

w

3pfcˆ3i2|2Q Imp*

Fig. 38. — Border of Pillow-made Lace, Mechlin, from a design similar to such as was used for point d’Alencon of the Louis XV. peri’od. \

came to be identified with certain localities. Mechlin,. .for instance, enjoyed a high reputation, for her productions. The chief technical features of. this pillow lace lie in the plaiting of the meshes, and the outlining of the clothing c% toils with & thread cordonnet. The ordinary Mechlin mesh is- hexagonal in shape. Four of the sides are of double twisted threads, two are of four threads plaited three times

(% 39)-

In Brussels pillow lace, which has greater variety of design, the mesh is also hexagonal; but in contrast with the Mechlin mesh whilst four of its sides are of double-twisted threads the other two are of four threads plaited four times (fig. 41). The finer specimens of Brussels lace are remarkable for the fidelity and grace with which the botanical forms in many of its patterns are rendered (PL VI. fig. 23). These are mainly reproductions or adaptations of designs for point d'Alencon, and the soft quality imparted to them in the texture of pillow-made lace contrasts with the harder and more crisp appearance in needlepoint

Fig. 39. — Mechlin Mesh.

lace. An example of dainty Brussels pillow lace is given in fig. 42. In the Brussels pillow lace a delicate modelling effect

Fig. 40. — Border of Pillow-made Lace, Mechlin, end of the 18th century.

is often imparted to the close textures of the flowers by means of pressing them with a bone instrument which gives concave shapes to petals and leaves, the edges of which consist in part of slightly raised cordonnet of compact plaited work.

Honiton pillow lace resembles Brussels lace, but in most of the English pillow laces (Devonshire, Buckinghamshire, Bedfordshire) the reseau is of a simple character (fig. 43). As a rule, English lace is made with a rather coarser thread than that used in the older Flemish laces. In real Flemish Valenciennes lace there are no twisted sides to the mesh; all are closely plaited (fig. 44) and as a rule the shape of the mesh is diamond but without the openings as Fig. 41 . — Enlargement shown in fig. 44. No outline or cordonpet of Brussels Mesh. to define the pattern is used in Valen- ciennes lace (see fig. 45). Much lace of the Valenciennes type (fig. 54) is made at Ypres. Besides these distinctive classes of pillow-like laces, there are others in which equal care in plait-

Fig. 42. — Portion of a Wedding Veil, 7 ft. 6 in.X6 ft. 6 in., of Pillow-made Lace, Brussels, late 18th century. The design consists of light leafy garlands of orange blossoms and other flowers daintily

festooned. Little feathery spirals and stars are powdered over the ground, which is of Brussels vrai reseau. In the centre upon a more open ground of pillow-made hexagonal brides is a group of two birds, one flying towards the other which appears ready to take wing from its nest; an oval frame containing two hearts pierced by an arrow, and a hymeneal torch. Throughout this veil is a profusion of pillow renderings of various modes, the reseau rosace, star devices, &c. The ornamental devices are partly applied and partly worked into the ground (Victoria and Albert Museum).

ing and twisting threads is displayed, though the character of the design is comparatively simple, as for instance in ordinary pillow laces from Italy, from the Auvergne, from Bucking- hamshire, or rude and primitive as in laces from Crete, southern Spain and Russia. Pillow lace-making in Crete is now said to be extinct. The laces were made chiefly of silk. The

Fig. 43.

Fig. 44.

patterns in many specimens are outlined with one, two or three bright-coloured silken threads. Uniformity in simple character of design may also be observed in many Italian, Spanish, Bohemian, Swedish and Russian pillow laces (see the lower edge of fig. 46).

Guipure. — This name is often applied to needlepoint and pillow laces in which the ground consists of ties or brides, but it more properly designates a kind of lace or ” passementerie,” made with gimp of fine wires whipped round with silk, and with cotton thread. An earlier kind of gimp was formed with ” Cartisane,” a little strip of thin parchment or vellum covered

with silk, gold or silver thread. These

stiff gimp threads, formed into a

pattern, were held together by

stitches worked with the needle. Gold

and silver thread laces have been usually made on the pillow, though gold thread has been used with fine effect in 17th-century Italian needle- point laces.

Machine-made Lace. — We have already seen that a technical peculiarity in making needlepoint lace is that a single thread and needle are alone used to form the pattern, and that the buttonhole stitch and other loopings which can be worked by means of a needle and thread mark a distinction between lace made in this manner and lace made on the pillow. For the process of pillow lace making a series of threads are in constant employment, plaited and twisted the one with another. A buttonhole stitch is not producible by it. The Leavers lace machine does not make either a buttonhole stitch or a plait. An essential principle of this machine-made work is that the threads are twisted together as in stocking net. The Leavers lace machine is that generally in use at Nottingham and Calais. French in- genuity has developed improvements in this machine whereby laces of deli- cate thread are made; but as fast as France makes an improvement England follows with another, and

both countries virtually maintain an equal position in this branch of industry. The number of threads brought into opera- tion in a Leavers machine is regulated by the pattern to be produced, the threads being of two sorts, beam or wa.rp threads

Fig. 45. — Lappet of deli- cate Pillow-made Lace, Valenciennes, about 1750. The peculiarity of Valen- ciennes lace is the filmy cambric-like texture and the absence of any cordon- net to define the separate parts of the ornament such as is used in needlepoint lace of Alengon, and in pillow Mechlin and Brussels lace.

and bobbin or weft threads. Upwards of 8880 are sometimes used, sixty pieces of lace being made simultaneously, each piece requiring 148 threads — 100 beam threads and 48 bobbin threads. The ends of

both sets of threads are fixed to a cylinder upon which as the manufacture proceeds the lace becomes wound.

and the warp thread slack, the warp thread a will be twisted upon the weft threads. But if the warp thread a be tight and the weft threads b, b, b, b, be slack, as in fig. 48, then the weft threads will be twisted on the warp thread. At the same time

Fig. 46. — Border to a Cloth. The wide part bearing the double-headed eagle of Russia is of drawn thread embroidery : the scalloped edging is of Russian pillow-made lace, though the style of its pattern is often seen in pillow laces made by peasants in Danubian provinces as well as in the south of Spain.

The supply of the beam or warp threads is held upon reels, and that of the bobbins or weft threads is held in bobbins. The beam or warp thread reels are arranged in frames or trays beneath the stage, above which and between it and the cylinder the twisting of the bobbin or weft with beam or warp threads „ ..,.. takes place. The bobbins

eˆr* 1 * c= 1yN£ : 1H) F ?r =s containing the bobbin or

weft threads are flat- tened in shape so as to pass conveniently be- tween the stretched beam or warp threads. Each bobbin can contain about 120 yds. of thread. By most ingenious mechan- ism varying degrees of tension can be imparted to warp and weft threads as required. As the bob- bins or weft threads pass like pendulums between the warp threads the latter are made to oscil- late, thus causing them to become twisted with the bobbin threads. As the twistings take place, combs passing through both warp and weft threads compress the twistings. Thus the tex- ture of the clothing or

Fig. 47

toils in machine-made lace may generally be detected by its ribbed appearance, due to the compressed twisted threads. Figs. 47 and 48 are intended to show effects obtained by varying the tensions of weft and warp threads. For in- stance, if the weft, as threads b, b, b, b in fig. 47, be tight

Fig. 49. — Section of Lace Machine.

the twisting in both these cases arises from the conjunction of movements given to the two sets of threads, namely, an Oscilla- tion or movement from side to side of the beam or warp threads, and the swinging or pendulum-like movement of the bobbin or weft threads

between the warp threads. Fig. 49 is a diagram of a sectional elevation of a lace machine repre- senting its more essential parts. E is the cylinder or beam upon which the lace is rolled as made, and upon which the ends of both warp and weft threads are fastened at starting. Beneath are w, w, w, a series of trays or beams, one above the other, containing the reels of the supplies of warp threads; c, c represent the slide bars for the passage of the bobbin b with its thread from k to k, the landing bars, one on each side of the rank of warp threads; s, t are the combs which take it in turns to press together the twistings as they are made. The combs come away clear from the threads as soon as they have pressed them together and fall into positions ready

Fig. 50.-ˆMachine-made Lace in imitation of 16th-century Needle-point ” Reticella ” Lace.

to perform their pressing operations again. The contrivances for giving each thread a particular tension and movement at a certain time are connected with an adaptation of the Jacquard system of pierced cards. The machine lace pattern drafter has to calculate how many holes shall be punched in a card, and to

.determine the position of such holes. Each hole regulates the mechanism for giving movement to a thread. Fig. 54 displays a piece of hand-made Valen- ciennes (Ypres) lace and fig. 55 a corresponding piece woven by the machine. The latter shows the advantage that can be gained by using very fine gauge machines, thus enabling a very close imitation of the real lace to be made by securing a very open and clear riseau or net, such as would be made on a coarse machine, and at the same time to keep the pattern fine and solid and standing out well from the net, as is the case with the real lace, which cannot be done by using a coarse gauge machine. In this example the machine used is a 16 point (that is 32 carriages to the inch), and the ground is made half gauge, that is 8 point,

Fig. 51 . — Border of Machine-made Lace in the style of 17th-century Pillow Guipure Lace.

made lace. In another branch of lace-making by machinery, mechanical ingenuity, combined with chemical treatment, has

Fig. 52. — Border of Machine-made Lace in imitation of 17th- century Pillow Lace.

and the weaving is made the full gauge of the machine, that is 16 point. Fig. 56 gives other examples of hand- and machine- made Valenciennes lace. The machine-made lace (b) imitating the real (a) is made on a 14-point machine (that is 28 carriages to the inch), the ground being 7 point and the pattern being full

gauge or 14 point. Although the principle in these examples of machine work is exactly the same, in so far that they use half gauge net and full gauge clothing to produce the contrast as mentioned above, the fabrication of these two examples is quite different, that in fig. 55 being an example of tight bobbins or weft, and slack warp threads as shown in fig. 47. Whereas the ex- ample in fig. 56 is made with slack bobbins or weft threads and tight warp threads as in fig. 48. In fig. 57 is a piece of hand-made lace of stoutthread, very similar to much Cluny lace made in the Auvergne and to the Buckinghamshire "Maltese" lace. Close to it are specimens of lace (figs. 58 and 59) made by. the new patent circular lace machine of Messrs Birkin of Notting- ham. This machine although very slow in production actually reproduces the real lace, at a cost slightly below that of the hand-

Fig. 53. — Machine-made Trim- ming Border in imitation of Irish Crochet Lace.

Fig. 54. — A Piece of Hand-made Pillow Lace, Belgian (Ypres), 20th century. (The machine imitation is given in fig. 55.)

led to surprising results (figs. 53 and 50). Swiss, German and other manufacturers use machines in which a principle of the sewing-machine is involved. A fine silken tissue is thereby

Fig. 56. — Small Borders (a) Hand-made and (b) Machine-made Lace Valen-

ciennes. (Nottingham, 20th

Fig. 55. — Machine-made Lace in century.) imitation of the Hand-made Speci- men of fig. 54. (Nottingham, 20th century.)

enriched with an elaborately raised cotton or thread embroidery. The whole fabric is then treated with chemical mordants which, whilst dissolving the silky web, do not attack the cotton or

Fig. 57. — Speci- Fig. 58. — Specimen of Machine-made Lace in men of Hand-made which the twisting and plaiting of the threads Pillow Lace. are identical with those of the hand-made speci-

men of fig. 57. (Nottingham, 20th century.)

thread embroidery. A relief embroidery possessing the appear- ance of hand-made raised needlepoint lace is thus produced.

LACE

Fig. 59. — Specimens of Machine-made Torchon Lace, in the same manner as such lace is made on the pillow by hand. (Nottingham

20th century.) ‘

Figs. 60 and 61 give some idea of the high quality to which this admirable counterfeit has been brought.

Collections of hand-made lace chiefly exist in museums and technical institutions, as for instance the Victoria and Albert

Fig. 60. — Machine-made Lace of Modern Design.

Museum in London, the Musee des Arts Decoratifs in Paris, and museums at Lyons, Nuremberg, Berlin, Turin and elsewhere.

Fig. 6 1. —Machine-made Lace in imitation of 17th-century Needlepoint Lace, ” Gros point de Venise.”

In such places the opportunity is presented of tracing in chrono- logical sequence the stages of pattern and texture development. Literature.— ?The literature of the art of lace-making is considerable. The series of 16th- and 17th-century lace pattern-books, of which the more important are perhaps those by F. Vinciolo (Paris, 1587), Cesare Vecellio (Venice, 1592), and Isabetta Catanea Parasole (Venice, 1600), not to mention several kindred works of earlier and later date published in Germany and the Netherlands, supplies a large field For exploration. Signor Ongania of Venice published a limited number of facsimiles of the majority of such works. M. Alvin of Brussels issued a brochure in 1863 upon these patterns, and in the same year the marquis Girolamo d’Adda contributed two biblio- graphical essays upon the same subject to the Gazette des Beaux-Arts (vol. xv. p. 342 seq., and vol. xvii. p. 421 seq.). In 1864 Cavaliere A. Merli wrote a pamphlet (with illustrations) entitled Orieine ed uso delle trine afilo di rete; Mons F. de Fertiault compiled a brief and rather fanciful Histoire de la dentelle in 1843, in which he reproduced statements to be found in Diderot’s Encyclopedic, subsequently quoted by Roland de la Platiere. The first Report of the Department

of Practical Art (1853) contains a ” Report on Cotton Print Works and Lace-Making ” by Octavius Hudson, and in the first Report of the Department of Science and Art are some ” Observations on Lace. Reports upon the International Exhibitions of 1851 (London) and 1867 (Paris), by M. Aubry, Mrs Palliser and others contain information concerning lace-making. The most important work first issued upon the history of lace-making is that by Mrs Bury Palliser (History of Lace, 1869). In this work the history is treated rather from an antiquarian than a technical point of view; and wardrobe accounts, inventories, state papers, fashionable journals, diaries, plays, poems, have been laid under contribution with surprising diligence. A new edition published in 1902 presents the work as entirely revised, re-written and enlarged under the editorship of M. Jourdain and Alice Dryden. In 1875 the Arundel Society brought out Ancient Needle-point and Pillow Lace, a folio volume ofjpermanently printed photographs taken from some of the finest specimens of ancient lace collected for the International Exhibition of 1874. These were accompanied by a brief history of lace, written from the technical aspect of the art, by Alan S. Cole. At the same time appeared a bulky imperial 4to volume by Seguin, entitled La Dentelle, illustrated with wood-cuts and fifty photo-typographical plates. Seguin divides his work into four sections. The first is devoted to a sketch of the origin of laces; the second deals with pillow laces, bibliography of lace and a review of sumptuary edicts; the third relates to needle- made lace ; and the fourth contains an account of places where lace has been and is made, remarks upon commerce in lace, and upon the industry of lace makers. Without sufficient conclusive evidence Seguin accords to France the palm for having excelled in producing practically all the richer sorts of laces, notwithstanding that both before and since the publication of his otherwise valuable work, many types of them have been identified as being Italian in origin. De- scriptive catalogues are issued of the lace collections at South Kensington Museum, at the Science and Art Museum, Dublin, and at the Industrial Museum, Nuremberg. In 1881 a series of four Cantor Lectures on the art of lace-making were delivered before the Society of Arts by Alan S. Cole.

A Technical History of the Manufacture of Venetian Laces, by G. M. Urbani de Gheltof, with plates, was translated by Lady Layard, and published at Venice by Signor Ongania. The History of Machine-wrought Hosiery and Lace Manufacture (London, 1867), by Felkin, has already been referred to. There is also a technological essay upon lace made by machinery, with diagrams of lace stitches and patterns (Technologische Studien im sachsischen Erzgebirge, Leipzig, 1878), by Hugo Fischer. In 1886 the Libraire Renouard, Paris, published a

History of Point d'Alencon, written by Madame G. Despierres, which gives a close and interesting account of the industry, together with a list, compiled from local records, of makers and dealers from 1602 onwards. — Embroidery and Lace: their manu- facture and history from the remotest antiquity to the present day, by Ernest Lefebure, lace-maker and administrator of the Ecole des Arte Decoratifs, translated and enlarged with notes by Alan S. Cole, wai published in London in 1888. It is a well-illustrated handbook for amateurs, collectors and general readers. — Irish laces made from modern designs are illustrated in a Renascence of the Irish Art of Lace-making, published in 1888 (London).— Anciennes Dentelles beiges formant la collection de feue madame Augusta Baronne Liedts et donnees au Musee de Grunthuis a Bruges, published at Antwerp in 1889, consists of a folio volume containing upwards of 181 photo-types — many full size— of fine specimens of lace. The ascriptions of country and date of origin are occasionally inaccurate, on account of a too obvious desire to credit Bruges with being the birthplace of all sorts of lace-work, much of which shown in this work is distinctly Italian in style. — The Encyclopaedia of Needlework, by Therese de Dillmont-Dornach (Alsace, 1891), is a detailed guide to several kinds of embroidery, knitting, crochet, tatting, netting and most of the essential stitches for needlepoint lace. It is well illustrated with wood-cuts and process blocks. — An exhaustive history of Russian lace-making is given in La Dentelle russe, by Madame Sophie Davidoff, published at Leipzig, 1895. Russian lace is principally pillow-work with rather heavy thread, and upwards of eighty specimens are reproduced by photo-lithography in this book.

A short account of the best-known varieties of Point and Pillow Lace, by A. M. S. (London, 1899), is illustrated with typical specimens of Italian, Flemish, French and English laces, as well as with magni- fied details of lace, enabling any one to identify the plaits, the twists and loops of threads in the actual making of the fabric. — V Industrie

des tulles et dentelles mecaniques dans le Pas de Calais, 1815-1900, by Henri H6non (Paris, 1900), is an important volume of over 600 pages of letterpress, interspersed with abundant process blocks of the several kinds of machine nets and laces made at Calais since 1815. It opens with a short account of the Arras hand-made laces, the pro-duction of which is now almost extinct. The book was sold for the benefit of a public subscription towards the erection of a statue in

Calais to Jacquard, the inventor of the apparatus by means of which all figured textile fabrics are manufactured. It is of some interest to note that machine net and lace-making at Calais owe their origin to Englishmen, amongst whom " le sieur R. Webster arriveˆ a St Pierre-les-Calais en Decembre, 1816, venant d'Angleterre, est l'un des premiers qui ont etabli dans la communaute une fabrique de tulles/' &c. Lace-making in the Midlands: Past and Present, by C. C. Channer and M. E. Roberts (London, 1900) upon the lace-making industry in Buckinghamshire, Bedforshire and Northamptonshire contains many illustrations of laces made in these counties from the 17th century to the present time. Musee retrospectif. Dentelles a V exposition universelle internationale de 1900 & Paris. Rapport de Mons. E. Lefebvre contains several good illustrations, especially of important specimens of Point de France of the 17th and 1 8th centuries. Le Point de France et les autres dentelliers au X VII' et au XVIII' siecles, by Madame Laurence deLaprade (Paris, 1905), brings together much hitherto scattered information throwing light upon operations in many localities in France where the industry has been carried on for considerable periods. The book is well and usefully illustrated.

See also Irische Spitzen (30 half-tone plates), with a short historical introduction by Alan S. Cole (Stuttgart, 1902); Pillow Lace, a practical handbook by Elizabeth Mincoff and Margaret S. Marriage (London, 1907); The Art of Bobbin Lace, a practical text-book of workmanship, &c, by Louisa Tebbs (London, 1907) ; Antiche trine italiane, by Elisa Ricci (Bergamo, 1908), well illustrated; Seven Centuries of Lace, by Mrs John Hungerford Pollen (London and New York, 1908), very fully illustrated. (A. S. C.)

LACE-BARK TREE, a native of Jamaica, known botanically as Lagetta lintearia, from its native name lagetto. The inner bark consists of numerous concentric layers of interlacing fibres resembling in appearance lace. Collars and other articles of apparel have been made of the fibre, which is also used in the manufacture of whips, &c. The tree belongs to the natural order Thymelaeaceae, and is grown in hothouses in Britain.

LACEDAEMON, in historical times an alternative name of Laconia (q.v.). Homer uses only the former, and in some passages seems to denote by it the Achaean citadel, the Therapnae of later times, in contrast to the lower town Sparta (G. Gilbert, Studien zur altspartanischen Geschichte, Gottingen, 1872, p. 34 foil.) . It is described by the epithets icolXr] (hollow) and Ktirkeeoa (spacious or hollow), and is probably connected etymologically with \aKKos, lacus, any hollow place. Lacedaemon is now the name of a separate

department, which had in 1907 a population of 87,106.

LACEPEDE, BERNARD GERMAIN ETIENNE DE LA VILLE, Comte de (1756-1825), French naturalist, was born at Agen in Guienne on the 26th of December 1756. His education was carefully conducted by his father, and the early perusal of Buffon's Natural History awakened his interest in that branch of study, which absorbed his chief attention. His leisure he devoted to music, in which, besides becoming a good performer on the piano and organ, he acquired considerable mastery of composition, two of his operas (which were never published) meeting with the high approval of Gluck; in 1781-1785 he also brought out in two volumes his Poelique de la musique. Mean- time he wrote two treaties, Essai sur I' electricite (1781) and Physique genirale et particuliere (1 782-1 784), which gained him the friendship of Buffon, who in 1785 appointed him sub- demonstrator in the Jardin du Roi, and proposed to him to become the continuator of his Histoire naturelle. This continuation was published under the titles Histoire des quadrupedes ovipares el des serpents (2 vols., 1788-1789) and Histoire naturelle des reptiles (1789). After the Revolution Lacepede became a member of the legislative assembly, but during the Reign of Terror he left Paris, his life having become endangered by his disapproval of the massacres. When the Jafdin du Roi was reorganized as the Jardin des Plantes, Lacepede was appointed to the chair allocated to the study of reptiles and fishes. In 1798 he published the first volume of Histoire naturelle des potssons, the fifth volume appearing in 1803; and in 1804

appeared his Histoire des cetacSs. From this period till his death the part he took in politics prevented him making any further contribution of importance to science. In 1799 he became a senator, in 1801 president of the senate, in 1803 grand chancellor of the legion of honour, in 1804 minister of state, and at the Restoration in 1819 he was created a peer of France. He died at Epinay on the 6th of October 1825. During the latter part of his life he wrote Histoire gtn&rale physique et civile de V Europe, published posthumously in 18 vols., 1826.

A collected edition of his works on natural history was published in 1826.

LACEWING-FLY, the name given to neuropterous insects of the families Hemerobiidae and Chrysopidae, related to the ant- lions, scorpion-flies, &c, with long filiform antennae, longish bodies and two pairs of large similar richly veined wings. The larvae are short grubs beset with hair-tufts and tubercles. They feed upon Aphidae or " green

fly ” and cover themselves with the emptied skins of their prey. Lacewing-flies of the genus Chrysopa are commonly called golden-eye flies.

LA CHAISE, FRANCOIS DE (1624-1709), father confessor of Louis XIV., was born at the chateau of Aix in Forey on the 25th of August 1624, being the son of Georges d’Aix, seigneur de la Chaise, and of Renee de Rochefort. On his mother’s side he was a grandnephew of Pere Coton, the confessor of Henry IV. He became a novice of the Society of Jesus before completing his studies at the university of Lyons, where, after taking the final vows, he lectured on philosophy to students attracted by * his fame from all parts of France. Through the influence of Camille de Villeroy, archbishop of Lyons, Pere de la Chaise was nominated in 1674 confessor of Louis XIV., who intrusted him during the lifetime of Harlay de Champvallon, archbishop of Paris, with the administration of the ecclesiastical patronage of the crown. The confessor united his influence with that of Madame de Maintenon to induce the king to abandon his liaison with Madame de Montespan. More than once at Easter he is said to have had a convenient illness which dispensed him from granting absolution to Louis XIV. With the fall of Madame de Montespan and the ascendancy of Madame de Maintenon his influence vastly increased. The marriage between Louis XIV. and Madame de Maintenon was celebrated in his presence at Versailles, but there is no reason for supposing that the subsequent coolness between him and Madame de Maintenon arose from his insistence on secrecy in this matter. During the long strife over the temporalities of the Gallican Church between Louis XIV. and Innocent XL Pere de la Chaise supported the royal prerogative, though he used his influence at Rome to conciliate the papal authorities. He must be held largely responsible for the revocation of the Edict of Nantes, but not for the brutal measures applied against the Protestants. He exercised a moderating influence on Louis XIV. ‘s zeal against the Jansenists, and Saint-Simon, who was opposed to him in most matters, does full justice to his humane and honourable character. Pere de la Chaise had a lasting and unalterable affection for Fenelon, which remained unchanged by the papal condemnation of the Maximes. In spite of failing faculties he continued his duties as confessor to Louis XIV. to the end of his long life. He died on the 20th of January 1709. The cemetery of Pere-la-Chaise in Paris stands on property acquired by the Jesuits in 1826, and not, as is often stated, on property personally granted to him.

See R. Chantelauze, Le Pere de la Chaize. £tudes d’histoire re- ligieuse (Paris and Lyons, 1859).

LA CHAISE-DIEU, a town of central France, in the depart- ment of Haute Loire, 29 m. N.N.W. of Le Puy by rail. Pop. (1906) 1203. The town, which is situated among fir and pine woods, 3500 ft. above the sea, preserves remains of its ramparts and some houses of the 14th and 15th centuries, but owes its celebrity to a church, which, after the cathedral of Clermont- Ferrand, is the most remarkable Gothic building in Auvergne. The west facade, approached by a flight of steps, is flanked by two massive towers. The nave and aisles are of equal height and are separated from the choir by a stone rood screen. The

choir, terminating in an apse with radiating chapel, contains the fine tomb and statue of Clement VI., carved stalls and some admirable Flemish tapestries of the early 16th century. There is a ruined cloister on the south side. The church, which dates from the 14th century, was built at the expense of Pope Clement VI., and belonged to a powerful Benedictine abbey founded in 1043. There are spacious monastic buildings of the 18th century. The abbey was formerly defended by fortifications, the chief survival of which is a lofty rectangular keep to the south of the choir. Trade in timber and the making of lace chiefly occupy the inhabitants of the town.

LA CHALOTAIS, LOUIS REN£ DE CARADEUC DE (1701- 1785), French jurist, was born at Rennes, on the 6th of March 1701. He was for 60 years procureur general at the parliament of Brittany. He was an ardent opponent of the Jesuits; drew up in 1761 for the parliament a memoir on the constitu- tions of the Order, which did much to secure its suppression in France; and in 1763 published a remarkable ” Essay on National Education,” in which he proposed a programme of scientific studies as a substitute for those taught by the Jesuits. The same year began the conflict between the Estates of Brittany and the governor of the province, the due d’Aiguillon (q.v.). The Estates refused to vote the extraordinary imposts demanded by the governor in the name of the king. La Chalotais was the personal enemy of d’Aiguillon, who had served him an ill turn with the king, and when the parliament of Brittany sided with the Estates, he took the lead in its opposition. The parliament forbade by decrees the levy of imposts to which the Estates had not consented. The king annulling these decrees, all the members of the parliament but twelve resigned (October 1764 to May 1765). The government considered La Chalotais one of the authors of this affair. At this time the secretary of state who

administered the affairs of the province, Louis Philypeaux, due de la Vrilliere, comte de Saint-Florentin (1705-1777), received two anonymous and abusive letters. La Chalotais was suspected of having written them, and three experts in handwriting declared that they were by him. The government therefore arrested him, his son and four other members of the parliament. The arrest made a great sensation. There was much talk of ” despotism.” Voltaire stated that the procureur general, in his prison of Saint Malo, was reduced, for lack of ink, to write his defence with a toothpick dipped in vinegar — which was apparently pure legend; but public opinion all over France was strongly aroused against the government. On the 16th of November 1765 a commission of judges was named to take charge of the trial. La Chalotais maintained that the trial was illegal; being procureur general he claimed the right to be judged by the parliament of Rennes, or failing this by the parliament of Bordeaux, according to the custom of the province. The judges did not dare to pronounce a condemnation on the evidence of experts in handwriting, and at the end of a year, things remained where they were at the first. Louis XV. then decided on a sovereign act, and brought the affair before his council, which without further formality decided to send the accused into exile. That expedient but increased the popular agitation; philosophes, members of the parliament, patriot Bretons and Jansenists all declared that La Chalotais was the victim of the personal hatred of the due d’Aiguillon and of the Jesuits. The govern- ment at last gave way, and consented to recall the members of the parliament of Brittany who had resigned. This parliament, when it met again, after the formal accusation of the due d’Aiguillon, demanded the recall of La Chalotais. This was accorded in 1775, and La Chalotais was allowed to transmit his office to his son. In this affair public opinion showed itself stronger than the absolutism of the king. The opposition to the royal power gained largely through it, and it may be regarded as one of the preludes to the revolution of 1789. La Chalotais, who was personally a violent, haughty and unsympathetic character, died at Rennes on the 12th of July 1785.

See, besides the Comptes-Rendus des Constitutions des Jesuites and the Essai d’ education nationale, the Memoires de la Chalotais (3 vols., 1766-1767). Two works containing detailed bibliographies are

Marion, La Bretagne et le due d’Aiguillon (Paris, 1893), and B. Pocquet, Le Due d’Aiguillon et La Chalotais (Paris, 1901). See also a controversy between these two authors in the Bulletin critique for

1902.

LA CHARITE, a town of central France in the department of Nievre, on the right bank of the Loire, 17 m. N.N.W. of Nevers on the Paris-Lyon-Mediterranee railway. Pop. (1906) 3990. La Charite possesses the remains of a fine Romanesque basilica, the church of Sainte-Croix, dating from the nth and early 12th centuries. The plan consists of a nave, rebuilt at the end of the 17th century, transept and choir with ambulatory and side chapels. Surmounting the transept is an octagonal tower of one story, and a square Romanesque tower of much beauty flanks the main portal. There are ruins of the ramparts, which date from the 14th century. The manufacture of hosiery, boots and shoes, files and iron goods, lime and cement and woollen and other fabrics are among the industries; trade is chiefly in wood and iron.

La Charite owes its celebrity to its priory, which was founded in the 8th century and reorganized as a dependency of the abbey of Cluny in 1052. It became the parent of many priories and monasteries, some of them in England and Italy. The possession of the town was hotly contested during the wars of religion of the 16th century, at the end of which its fortifications were dismantled.

LA CHAUSSEE, PIERRE CLAUDE NIVELLE DE (1692- 1754), French dramatist, was born in Paris in 1692. In 1731 he published an Epttre a Clio, a didactic poem in defence of Leriget de la Faye in his dispute with Antoine Houdart de la Motte, who had maintained that verse was useless in tragedy. La Chaussee was forty years old before he produced his first play, La Fausse Antipathie (1734). His second play, Le Prejugi a la mode (1735) turns on the fear of incurring ridicule felt by a man in love with his own wife, a prejudice dispelled in France, according to La Harpe, by La Chaussee's comedy. L'Ecole des amis (1737) followed, and, after an unsuccessful attempt at tragedy in Maximinien, he returned to comedy in Melanide (1741). In Melanide the type known as comedie larmoyante is fully developed. Comedy was no longer to provoke laughter, but tears. The innovation consisted in destroying the sharp distinction then existing between tragedy and comedy in French literature. Indications of this change had been already offered in the work of Marivaux, and La Chaussee's plays led naturally to the domestic drama of Diderot and of Sedaine. The new method found bitter enemies. Alexis Piron nicknames the author " le Reverend Pere Chaussee," and ridiculed him in one of his most famous epigrams. Voltaire maintained that the comedie larmoyante was a proof of the inability of the author to produce either of the recognized kinds of drama, though he himself produced a play of similar character in L' Enfant prodigue. The hostility of the critics did not prevent the public from shed- ding tears nightly over the sorrows of La

Chaussee's heroine. L'Ecole des meres (1744) and La Gouvernante (1747) form, with those already mentioned, the best of his work. The strict moral aims pursued by La Chaussee in his plays seem hardly consistent with his private preferences. He frequented the same gay society as did the comte de Caylus and contributed to the Recueils de ces messieurs. La Chaussee died on the 14th of May 1754. Villemain said of his style that he wrote prosaic verses with purity, while Voltaire, usually an adverse critic of his work, said he was " un des premiers apres ceux qui ont du genie."

For the comedie larmoyante see G. Lanson, Nivelle de la Chaussie et la comedie larmoyante (1887).

LACHES (from Anglo-French lachesse, negligence, from lasche, modern Idche, unloosed, slack), a term for slackness or negligence, used particularly in law to signify negligence on the part of a person in doing that which he is by law bound to do, or unreasonable lapse of time in asserting a right, seeking relief, or claiming a privilege. Laches is frequently a bar to a remedy which might have been had. if prosecuted in proper time. Statutes of limitation specify the time within which various classes of actions may be brought. Apart from statutes of limitation courts of equity will often refuse relief to those

who have allowed unreasonable time to elapse in seeking it, on the principle vigilantibus ac non dorntientibus jura sub- veniunt.

LACHINE, an incorporated town in Jacques Cartier county, Quebec, Canada, 8 m. W. of Montreal, on Lake St Louis, an expansion of the St Lawrence river, and at the upper end of the Lachine canal. Pop. (1901) 5561. It is a station on the Grand Trunk railway and a port of call for steamers plying between Montreal and the Great Lakes. It is a favourite summer resort for the people of Montreal. It was named in 1669 in mockery of its then owner, Robert Cavelier de la Salle (1643-1687), who dreamed of a westward passage to China. In 1689 it was the scene of a terrible massacre of the French by the Iroquois.

LACHISH. a town of great importance in S. Palestine, often mentioned in the Tell el-Amarna tablets. It was destroyed by Joshua for joining the league against the Gibeonites (Joshua x 31-33) and assigned to the tribe of Judah (xv. 39). Rehoboam fortified it (2 Chron. xi. 9). King Amaziah having fled hither, was here murdered by conspirators (2

Kings xiv. 19). Sennacherib here conducted a campaign (2 Kings xviii. 13) during which Hezekiah endeavoured to make terms with him: the campaign is commemorated by bas-reliefs found in Nineveh, now in the British Museum (see G. Smith's History oj Sennacherib, p. 69) . It was one of the last cities that resisted Nebuchadnezzar (Jer. xxxiv. 7). The meaning of Micah's denunciation (i. 13) of the city is unknown. The Onomasticon places it 7 m. from Eleutheropolis on the S. road, which agrees with the generally received identification, Tell el-Hesi, an important mound excavated for the Palestine Exploration Fund by Petrie and Bliss, 1890-1893. The name is preserved in a small Roman site in the neighbourhood, Umm Lakis, which probably repre- sents a later dwelling-place of the descendants of the ancient inhabitants of the city.

See W. M. Flinders Petrie, Tell el-Hesy, and F.J. Bliss, A Mound of many Cities, both published by the Palestine Exploration Fund. ' (R A. S, M.)

LACHMANN, KARL KONRAD FRIEDRICH WILHELM

(1793-1851), German philologist and critic, was born at Bruns- wick on the 4th of March 1793. He studied at Leipzig and Gottingen, devoting himself mainly to philological studies. In 181 s he joined the Prussian army as a volunteer chasseur and accompanied his detachment to Paris, but did not encounter the enemy. In 1816 he became an assistant master in the Friedrich Werder gymnasium at Berlin, and a privat-docent at the university. The same summer he became one of the principal masters in the Friedrichs-Gymnasium of Konigsberg, where he assisted his colleague, the Germanist Friedrich Karl K6pke (1785-1863) with his edition of Rudolf von Ems' Barlaam und Josaphat (18 18), and also assisted his friend in a contemplated edition of the works of Walther von der Vogelweide. In January 1818 he became professor extraordinarius of classical philology in the university of Konigsberg, and at the same time began to lecture on Old German grammar and the Middle High German poets. He devoted himself during the following seven years to an extraordinarily minute study of those subjects, and in 1824 obtained leave of absence in order that he might search the libraries of middle and south Germany for further materials. In 1825 Lachmann was nominated extraordinary professor of classical and German philology in the university of Berlin (ordinary professor 1827); and in 1 830 he was admitted a member of the Academy of Sciences. The remainder of his laborious and fruitful life as an author and a teacher was uneventful. He died on the 13th of March 1851.

Lachmann, who was the translator of the first volume of P. E. Muller's Sagabibhothek des skandmamschen AUerlums (1816), is a figure of considerable importance in the history of German philology (see Rudolf von Raumer ; Geschichte der gcrmanischen Philologie, 1870) 7„ u:- " vj-.i-,;i;«-i*-,'^r»cc^VtT-;ff- " Tlhpv die iirsforunolir.he Gestalt de

advance in that branch of investigation. The rigidly scientific character of his method becomes increasingly apparent in the Auswahl aus den hochdeutschen Dichtern des dreizehnten Jahrhunderts (1820), the edition of Hartmann's Iwein (1827), in those of Walther

In hi? " Habilitationsschrift " Uber die urspriingliche Gestalt des Gedichts der Ntbelunge Not (1816), and still more in his review of Hagen's Ntbelungen and Benecke's Bonerius, contributed in 1817 to the Jenaische Liter atuneitung he had already laid down the rules of textual criticism and elucidated the phonetic and metrical principles of Middle High German in a manner which marked a distinct

von der Vogelweide (1827) and Wolfram von Eschenbach (1833), in the papers " fjber das Hildebrandslied," " Uber althochdeutsche Betommg und Verskunst," " fiber den Eingang des Parzivals," and " Uber drei Bruchstilcke niederrheinischer Gedichte " published in the Abhandlungen of the Berlin Academy, and in Der Nibelunge Not und die Klage (1826, nth ed., 1892), which was followed by a critical commentary in 1836. Lachmann's Betrachtungen uber Homer's Ilias, first published in the A~bhandlungen of the Berlin Academy in 1837 and 1 841, in which he sought to show that the Iliad consists of sixteen independent " lays " variously enlarged and interpolated, have had considerable influence on modern Homeric criticism (see Homer), although his views are no longer accepted. His smaller edition of the New Testament appeared in 1 83 1 , 3rd ed. 1 846 ; the larger, in two volumes, in 1842-1850. The plan of Lachmann's edition, explained by himself in the Stud. u. Krit. of 1830, is a modi- fication of the unaccomplished project of Bentley. It seeks to restore the most ancient reading current in Eastern MSS., using the consent of the Latin authorities (Old Latin and Greek Western Uncials) as the main proof of antiquity of a reading where the oldest Eastern authorities differ. Besides Propertius (1816), Lachmann edited Catullus (1829); Tibullus (1829); Genesius (1834); Teren- tianus Maurus (1836) ; Babrius (1845) ; Avianus (1845) ■ Gaius (1841- 1842); the Agrimensores Romani (1848-1852); Lucilius (edited after his death by Vahlen, 1876); and Lucretius (1850). The last, which was the main occupation of the closing years of his life, from 1845, was perhaps his greatest achievement, and has been character- ized by Munro as " a work

which will be a landmark for scholars as long as the Latin language continues to be studied." Lachmann also translated Shakespeare's sonnets (1820) and Macbeth (1829).

See M. Hertz, Karl Lachmann, eine Biographic (1851), where a full list of Lachmann's works is given; F. Leo, Rede zur Sacularfeier K. Lachmanns (1893); J. Grimm, biography in Kleine Schrtften; W. Scherer in Allgemeine deutsche Biographie, xvii., and J. E. Sandys, Hist, of Classical Scholarship, iii. (1908), pp. 127-131.

LACINIUM, PROMUNTURIUM (mod. Capo delle Colonne), 7 m S.E. of Crotona (mod. Cotrone); the easternmost point of Bruttii (mod. Calabria). On the cape still stands a single column of the temple erected to Hera Lacinia, which is said to have been fairly complete in the 16th century, but to have been destroyed to build the episcopal palace at Cotrone. It is a Doric column with capital, about 27 ft. in height. Remains of marble roof-tiles have been seen on the spot (Livy xlii. 3) and architectural fragments were excavated in 1886-1887 by the Archaeological Institute of America. The sculptures found were mostly buried again, but a few fragments, some decorative terra-cottas and a dedicatory inscription to Hera of the 6th century B.C., in private possession at Cotrone, are described by F. von Duhn in Notizie degli scavi, 1897, 343 seq. The date of the erection of the temple may be given as 480-440 B.C.; it is not recorded by any ancient writer.

See R. Koldewey and O. Puchstein, Die griechischen Tempel in Unteritalien und Sicilien (Berlin 1899, 41).

LA CIOTAT, a coast town of south-eastern France in the department of Bouches-du-Rhone, on the west shore of the Bay of La Ciotat, 26 m. S.E. of Marseilles by rail. Pop. (1906) 10,562. The port is easily accessible and well sheltered. The large shipbuilding yards and repairing docks of the Messageries Maritimes Company give employment to between 2000 and 3000 workmen. Fishing and an active coasting trade are carried on; the town is frequented for sea-bathing. La Ciotat was in ancient times the port of the neighbouring town of Citharista (now the village of Ceyreste).

LA CLOCHE, JAMES DE ["Prince James Stuart "] (1644 ?- 1669), a character who was brought into the history of England by Lord Acton in 1862 {Home and Foreign Review, i. 146- 174: "The Secret History of Charles II."). From informa- tion discovered by Father Boero in the archives of the Jesuits in Rome, Lord Acton averred that Charles II., when a lad at Jersey, had a natural son, James. The evidence follows. On the 2nd of April 1668, as the register of the Jesuit House of

Novices at Rome attests, ” there entered Jacobus de la Cloche;” His baggage was exiguous, his attire was clerical. He is described as ” from the island of Jersey, under the king of England, aged 24.” He possessed two documents in French, purporting to have been written by Charles II. at Whitehall, on the 25th of

September 1665, and on the 7th of February 1667. In both Charles acknowledges James to be his natural son, he styles him ” James de la Cloche de Bourg du Jersey,” and avers that to recognize him publicly ” would imperil the peace of the kingdoms ” — why is not apparent. A third certificate of birth, in Latin, undated, was from Christina of Sweden, who declares that James, previously a Protestant, has been received into the church of Rome at Hamburg (where in 1667-1668 she was residing) on the 29th of July 1667. The next paper purports to be a letter from Charles II. of August 3/13 to Oliva, general of the Jesuits. The king writes, in French, that he has long wished to be secretly received into the church. He therefore desires that James, his son by a young lady ” of the highest quality,” and born to him when he was about sixteen, should be ordained a priest, come to England and receive him. Charles alludes to previous attempts of his own to be secretly admitted (1662). James must be sent secretly to London at once, and Oliva must say nothing to Christina of Sweden (then meditating a journey to Rome), and must never write to Charles except when James carries the letter. Charles next writes on August 29/September 9. He is most anxious that Christina should not meet James; if she knows Charles’s design of changing his creed she will not keep it secret, and Charles will infallibly lose his life. With this letter there is another, written when the first had been sealed. Charles insists that James must not be accompanied, as novices were, when travelling, by a Jesuit socius or guardian. Charles’s wife and mother have just heard that this is the rule, but the rule must be broken. James, who is to travel as ” Henri de Rohan,” must not come by way of France. Oliva will supply him with funds. On the back of this letter Oliva has written the draft of his brief reply to Charles (from Leghorn, October 14, 1668). He merely says that the bearer, a French gentleman (James spoke only French), will inform the king that his orders have been executed. Besides these two letters is one from Charles to James, of date August 4/14. It is addressed to ” Le Prince Stuart,” though none of Charles’s bastards was allowed to bear the Stuart name. James is told that he may desert the clerical profession if he pleases. In that case ” you may claim higher titles from us than the

duke of Monmouth.” (There was no higher title save prince of Wales!) If Charles and his brother, the duke of York, die childless, ” the kingdoms belong to you, and parliament cannot legally oppose you, unless as, at present, they can only elect Protestant kings.” This letter ought to have opened the eyes of Lord Acton and other historians who accept the myth of James de la Cloche. Charles knew that the crown of England was not elective, that there was no Exclusion Act, and that there were legal heirs if he and his brother died without issue. The last letter of Charles is dated November 18/28, and purports to have been brought from England to Oliva by James de la Cloche on his return to Rome. It reveals the fact that Oliva, despite Charles’s orders, did send James by way of France, with a socius or guardian whom he was to pick up in France on his return to England. Charles says that James is to com- municate certain matters to Oliva, and come back at once. Oliva is to give James all the money he needs, and Charles will later make an ample donation to the Jesuits. He acknow- ledges a debt to Oliva of £800, to be paid in six months. The reader will remark that the king has never paid a penny to James or to Oliva, and that Oliva has never communicated directly with Charles. The truth is that all of Charles’s letters are forgeries. This is certain because in all he writes frequently as if his mother, Henrietta Maria, were in London, and constantly in company with him. Now she had left England for France in 1665, and to England she never returned. As the letters — including that to ” Prince Stuart “■ — are all forged, it is clear that de la Cloche was an impostor. His aim had been to get money from Oliva, and to pretend to travel to England, meaning to enjoy himself. He did not quite succeed, for Oliva sent a socius with him into France. His precautions to avoid a meeting with Christina of Sweden were necessary. She knew no more of him than did Charles, and would have exposed him.

The name of James de la Cloche appears no more in documents. He reached Rome in December 1668, and in January a person calling himself ” Prince James Stuart ” appears in Naples, accompanied by a socius styling himself a French knight of Malta. Both are on their way to England, but Prince James falls ill and stays in Naples, while his companion departs. The knight of Malta may be a Jesuit. In Naples, Prince James marries a girl of no position, and is arrested on suspicion of being a coiner. To his confessors (he had two in succession) he says that he is a son of Charles II. Our sources are the despatches of Kent, the English agent at Naples, and the Lettere, vol. iii., of Vincenzo Armanni (1674), who had his information from one of the confessors of the ” Prince.” The viceroy of Naples communicated with Charles II., who disowned the impostor; Prince James, however, was released,

and died at Naples in August 1669, leaving a wild will, in which he claims for his son, still unborn, the ” apanage ” of Monmouth or W r ales, ” which it is usual to bestow on natural sons of the king.” The son lived till about 1750, a penniless pretender, and writer of begging letters.

It is needless to pursue Lord Acton’s conjectures about later mysterious appearances of James de la Cloche at the court of Charles, or to discuss the legend that his mother was a lady of Jersey — or a sister of Charles! The Jersey myths may be found in The Man of the Mask (1908), by Monsignor Barnes, who argued that James was the man in the iron mask (see Iron Mask). Later Monsignor Barnes, who had observed that the letter of Charles to Prince James Stuart is a forgery, noticed the impossi- bility that Charles, in 1668, should constantly write of his mother as resident in London, which she left for ever in 1665.

Who de la Cloche really was it is impossible to discover, but he was a bold and successful swindler, who took in, not only the general of the Jesuits, but Lord Acton and a generation of guileless historians. (A. L.)

LA CONDAMINE, CHARLES MARIE DE (1701-1774), French geographer and mathematician, was born at Paris on the 28th of January 170-1. He was trained for the military profession, but turned his attention to science and geographical exploration. After taking part in a scientific expedition in the Levant (1731), he became a member with Louis Godin and Pierre Bouguer of the expedition sent to Peru in 1735 to determine the length of a degree of the meridian in the neighbourhood of the equator. His associations with his principals were unhappy; the expedi- tion was beset by many difficulties, and finally La Condamine separated from the rest and made his way from Quito down the Amazon, ultimately reaching Cayenne. His was the first scientific exploration of the Amazon. He returned to Paris in 1744 and published the results of his measurements and travels with a map of the Amazon in Mem. de I’academie des sciences, 1745 (English translation 1745-1747). On a visit to Rome La Condamine made careful measurements of the ancient buildings with a view to a precise determination of the length of the Roman foot. The journal of his voyage to South America was published in Paris in 1751. He also wrote in favour of inoculation, and on various other subjects, mainly connected with his work in South America. He died at Paris on the 4th of February 1774.

LACONIA (Gr. Aclkuvlkti) , the ancient name of the south- eastern district of the Peloponnese, of which Sparta was the capital. It has an

area of some 1,048,000 acres, slightly greater than that of Somersetshire, and consists of three well-marked zones running N. and S. The valley of the Eurotas, which occupies the centre, is bounded W. by the chain of Taygetus (mod. Pentedaktylon, 7900 ft.), which starts from the Arcadian mountains on the N., and at its southern extremity forms the promontory of Taenarum (Cape Matapan). The eastern portion of Laconia consists of a far more broken range of hill country, rising in Mt. Parnon to a height of 6365 ft. and terminating in the headland of Malea. The range of Taygetus is well watered and was in ancient times covered with forests which afforded excellent hunting to the Spartans, while it had also large iron mines and quarries of an inferior bluish marble, as well as of the famous rosso antico of Taenarum. Far poorer are the slopes of

Parnon, consisting for the most part of barren limestone uplands scantily watered. The Eurotas valley, however, is fertile, and produces at the present day maize, olives, oranges and mulberries in great abundance. Laconia has no rivers of importance except the Eurotas and its largest tributary the Oenus (mod. Kelefina). The coast, expecially on the east, is rugged and dangerous. Laconia has few good harbours, nor are there any islands lying off its shores with the exception of Cythera (Cerigo), S. of Cape Malea. The most important towns, besides Sparta and Gythium, were Bryseae, Amyclae and Pharis in the Eurotas plain, Pellana and Belbina on the upper Eurotas, Sellasia on the Oenus, Caryae on the Arcadian frontier, Prasiae, Zarax and Epidaurus Limera on the east coast, Geronthrae on the slopes of Parnon, Boeae, Asopus, Helos, Las and Teuthrone on the Laconian Gulf, and Hippola, Messa and Oetylus on the Messenian Gulf.

The earliest inhabitants of Laconia, according to tradition, were the autochthonous Leleges (q.v.). Minyan immigrants then settled at various places on the coast and even appear to have penetrated into the interior and to have founded Amyclae. Phoenician traders, too, visited the shores of the Laconian Gulf, and there are indications of trade at a very early period between Laconia and Crete, e.g. a number of blocks of green Laconian porphyry from the quarries at Croceae have been found in the palace of Minos at Cnossus. In the Homeric poems Laconia appears as the realm of an Achaean prince, Menelaus, whose capital was perhaps Therapne on the left bank of the Eurotas, S.E. of Sparta; the Achaean conquerors, however, probably contented themselves with a suzerainty over Laconia and part of Messenia (q.v.)

and were too few to occupy the whole land. The Achaean kingdom fell before the incoming Dorians, and throughout the classical period the history of Laconia is that of its capital Sparta (q.v.). In 195 B.C. the Laconian coast towns were freed from Spartan rule by the Roman general T. Quinctius Flamininus, and became members of the Achaean League. When this was dissolved in 146 B.C., they remained independent under the title of the ” Confederation of the Lacedaemonians ” or “of the Free-Laconians ” (kolvov rwv AaKeSai/ jioviiav or ‘EX«i > 0epo- \aK03vo > v) , the supreme officer of which was a ar partly 6s (general) assisted by a rajuias (treasurer). Augustus seems to have reorganized the league in some way, for Pausanias (iii. 21, 6) speaks of him as its founder. Of the twenty-four cities which originally composed the league, only eighteen remained as members by the reign of Hadrian (see Achaean League). In a.d. 395 a Gothic horde under Alaric devastated Laconia, and subsequently it was overrun by large bands of Slavic immigrants. Throughout the middle ages it was the scene of vigorous struggles between Slavs, Byzantines, Franks, Turks and Venetians, the chief memorials of which are the ruined strongholds of Mistra near Sparta, Geraki (anc. Geronthrae) and Monemvasia, ” the Gibraltar of Greece,” on the east coast, and Passava near Gythium. A prominent part in the War of Independence was played by the Maniates or Mainotes, the inhabitants of the rugged peninsula formed by the southern part of Taygetus. They had all along maintained a virtual independence of the Turks and until quite recently retained their medieval customs, living in fortified towers and practising the vendetta or blood-feud.

The district has been divided into two departments (nomes), Lacedaemon and Laconia, with their capitals at Sparta and Gythium respectively. Pop. of Laconia (1907) 61,522.

Archaeology. — Until 1904 archaeological research in Laconia was carried on only sporadically. Besides the excavations under- taken at Sparta, Gythium and Vaphio (q.v.), the most important were those at the Apollo sanctuary of Amyclae carried out by C. Tsountas in 1890 (‘Ecfnifj.. &pxcuo. 1892, 1 ff.) and in 1904 by A. Furtwangler. At Kampos, on the western side of Taygetus, a small domed tomb of the ” Mycenean ” age was excavated in 1890 and yielded two leaden statuettes of great interest, while at Arkina a similar tomb of poor construction was unearthed in the previous year. Important inscriptions were found at Geronthrae (Geraki), notably five long fragments of the Edictum Diocletiani, and elsewhere. In 1904 the British Archaeological school at Athens undertook a systematic investigation of the

ancient and medieval remains in Laconia. The results, of which the most important are summarized in the article Sparta, are published in the British School Annual, x. ff. The acropolis of Geronthrae, a hero-shrine at Angelona in the south-eastern highlands, and the sanctuary of Ino-Pasiphae at Thalamae have also been investigated.

Bibliography.— Besides the Greek histories and many of the works cited under Sparta, see W. M. Leake, Travels in the Morea (London, 1830), cc. iv.-vui., xxii., xxiii. ; E. Curtius, PeloPonnesos Gotna, 1852) u. 203 ff.; C. Bursian, Geographie von Griechenland (Leipzig, 1868), 11. 102 ff.; Strabo viii. 5; Pausanias iii. and the commentary in J. G. Frazer, Pausanias's Description of Greece (London, 1898), vol. iii. ; W. G. Clark, Peloponnesus (London, 1858), \ 5 , 5 V – ',£• ?• Bobla Y e . Recherches geographiques sur les mines de la Morte (Pans, 1835), 65 ff. ; L. Ross, Reisen im Peloponnes (Berlin 1 841), ,158 ff.; W Vischer, Erinnerungen u. Eindriicke aus Griechen- land (Basel, 1857) 360 ff.; J. B. G. M. Bory de Saint-Vincent, Relation du voyage de I expedition scientifique de Moree (Paris, 1836), cc. 9, 10; G. A. Blouet, Expedition scientifique de Moree ' (Paris! 1831-1838), 11. 58 ff. ; A. Philippson, Der Peloponnes (Berlin, 1892) 155 ff. ; Annual of British School at Athens, 1907-8.

Inscriptions: Le Bas-Foucart, Voyage archeologique: Inscriptions Nos. 160-290; Inscriptions Graecae, v.; Corpus Inscriptionum Graecarum . (Berlin, 1828), Nos. 1237-1510; Collitz-Bechtel, Samm- lung der griech. Dialektmschriften, iii. 2 (Gottingen, 1898), Nos 4400- 4613. Coins: Catalogue of Greek Coins in the British Museum- Peloponnesus (London, 1887), xlvi. ff., 121 ff . ; B. V. Head, Historic, Numorum (Oxford, 1887), 363 ff. Cults: S. Wide, Lakonische Kulte (Leipzig ,1893). Ancient roads: W. Loring, "Some Ancient Routes in the Peloponnese " in Journal of Hellenic Studies, xv. 25 ff

(M. N. T.)

LACONIA, a city and the county-seat of Belknap county, New Hampshire, U.S.A., on both sides of the Winnepesaukee river, 28 m. N.N.E. of Concord. Pop. (1900) 8042 (1770 foreign-born) ; (1910) 10,183. Laconia is served by two divisions of the Boston & Maine railway, which has a very handsome granite passenger station (1892) and repair shops here. It is pleasantly situated in the lake district of central New Hampshire, and in the summer season Lake Winnisquam on the S. and w! and Lake Winnepesaukee on the N.E. attract many visitors. The city covers an area of 24-65 sq. m. (5-47 sq. m. annexed since 1890). Within the city limits, and about 6 m. from its centre, are the grounds of the Winnepesaukee Camp-Meeting Association, and the

camping place for the annual reunions of the New Hampshire Veterans of the Civil War, both at The Weirs, the northernmost point in the territory claimed by colonial Massachusetts; about 2 m. from the centre of Laconia is Lakeport (pop. 1900, 2137), which, like The Weirs, is a summer resort and a ward in the city of Laconia. Among the public institutions are the State School for Feeble-minded Children, a cottage hospital and the Laconia Public Library, lodged in the Gale Memorial Library building (1903). Another fine building is the Congregational Church (1906). The New Hamp- shire State Fish Hatchery is in Laconia. Water-power is furnished by the river. In 1905 Laconia ranked first among the cities of the state in the manufacture of hosiery and knit goods, and the value of these products for the year was 48-4% of the total value of the city's factory product; among its other manufactures are yarn, knitting machines, needles, sashes and blinds, axles, paper boxes, boats, gas and gasolene engines, and freight, passenger and electric cars. The total value of the factory products increased from $2,152,379 in 1900 to $3,096,878 in 1905, or 43-9%. The portion of the city N. of the river, formerly known as Meredith Bridge, was set apart from the town- ship of Meredith and incorporated as a township under the name of Laconia in 1855; a section S. of the river was taken from the township of Gilford in 1874; and Lakeport was added in 1893, when Laconia was chartered as a city. The same Laconia was first applied in New England to the region granted in 1629 to Mason and Gorges (see Mason, John).

LACONICUM (i.e. Spartan, sc. balneum, bath), the dry sweating room of the Roman thermae, contiguous to the caldarium or hot room. The name was given to it as being the only form of warm bath that the Spartans admitted. The laconicum was usually a circular room with niches in the axes of the diagonals and was covered by a conical roof with a circular opening at the top,

according to Vitruvius (v. 10), "from which a brazen shield is suspended by chains, capable of being so lowered and raised as to regulate the temperature." The walls of the laconicum were plastered with marble stucco and polished, and the conical roof covered . with plaster and painted blue with gold stars. Sometimes, as in the old baths at Pompeii, the laconicum was provided in an apse at one end of the caldarium, but as a rule it was a separate room raised to a higher temperature and had no bath in it. In addition to the hypocaust under the floor the wall was lined with flue tiles. The largest laconicum,

about 75 ft. in diameter, was that built by Agrippa in his thermae on the south side of the Pantheon, and is referred to by Cassius (liii. 23), who states that, in addition to other works, ” he con- structed the hot bath chamber which he called the Laconicum Gymnasium.” All traces of this building are lost; but in the additions made to the thermae of Agrippa by Septimius Severus another laconicum was built farther south, portions of which still exist in the so-called Arco di Giambella.

LACORDAIRE, JEAN BAPTISTE HENRI (1802-1861), French ecclesiastic and orator, was born at Recey-sur-Ource, Cdte d’Or, on the 1 2th of March 1802. He was the second of a family of four, the eldest of whom, Jean Theodore (1801-1870), travelled a great deal in his youth, and was afterwards professor of com- parative anatomy at Liege. For several years Lacordaire studied at Dijon, showing a marked talent for rhetoric; this led him to the pursuit of law, and in the local debates of the advocates he attained a high celebrity. At Paris he thought of going on the stage, but was induced to finish his legal training and began to practise as an advocate (1817-1824). Meanwhile Lamennais had published his Essai sur V Indifference, — a passionate plea for Christianity and in particular for Roman Catholicism as necessary for the social progress of mankind. Lacordaire read, and his ardent and believing nature, weary of the theological negations of the Encyclopaedists, was convinced. In 1823 he became a theological student at the seminary of Saint Sulpice; four years later he was ordained and became almoner of the college Henri IV. He was called from it to co-operate with Lamennais in the editorship of L’Avenir, a journal estab- lished to advocate the union of the democratic principle with ultramontanism. Lacordaire strove to show that Catholicism was not bound up with the idea of dynasty, and definitely allied it with a well-defined liberty, equality and fraternity. But the new propagandism was denounced from Rome in an encyclical. In the meantime Lacordaire and Montalembert, believing that, under the charter of 1830, they were entitled to liberty of instruction, opened an independent free school. It was closed in two days, and the teachers fined before the court of peers. These reverses Lacordaire accepted with quiet dignity; but they brought his relationship with Lamennais to a close. He now began the course of Christian conferences at the College Stanislas, which attracted the art and intellect of Paris; thence he went to Notre Dame, and for two years his sermons were the delight of the capital. His presence was dignified, his voice capable of indefinite modulation, and his gestures animated and attractive. He still preached the gospel of the people’s sovereignty in civil life and the pope’s supremacy in religion, but brought to his propagandism the full resources of a mind familiar with philo- sophy, history and

literature, and indeed led the reaction against Voltairean scepticism. He was asked to edit the Univers, and to take a chair in the university of Louvain, but he declined both appointments, and in 1838 set out for Rome, revolving a great scheme for christianizing France by restoring the old order of St Dominic. At Rome he donned the habit of the preaching friar and joined the monastery of Minerva. His Mimoire pour le retablissement en France de I'ordre des freres pricheurs was then prepared and dedicated to his country; at the same time he collected the materials for the life of St Dominic. When he returned to France in 1841 he resumed his preaching at Notre Dame, but he had small success in re-establishing the order of which he ever afterwards called himself monk. His funeral orations are the most notable in their kind of any delivered during his time, those devoted to Marshal Drouet and Daniel

O'Connell being especially marked by point and clearness. He next thought that his presence in the National Assembly would be of use to his cause; but being rebuked by his ecclesiastical superiors for declaring himself a republican, he resigned his seat ten days after his election. In 1850 he went back to Rome and was made provincial of the order, and for four years laboured to make the Dominicans a religious power. In 1854 he retired to Sorreze to become director of a private lyceum, and remained there until he died on the 22nd of November 1861. He had been elected to the Academy in the preceding year.

The best edition of Lacordaire's works is the (Euvres completes (6 vols., Paris, 1 872-1 873), published by C. Poussielgue, which contains, besides the Conferences, the exquisitely written, but uncritical, Vie de Saint Dominique and the beautiful Lettres a unjeune homme sur la vie chritienne. For a complete list of his published correspondence see L. Petit de Julleville's Histoire de la langue et de la litterature francaise, vii. 598.

The authoritative biography is by Ch. Foisset (2 vols., Paris, 1870). The religious aspect of his character is best shown in Pere B. Chocarne's Vie du Pere Lacordaire (2 vols. , Paris, 1 866 — English translation by A. Th. Drane, London, 1868) ; see also Count C. F. R. de Montal- embert's Un Moine au XIX lme siecle (Paris, 1862 — English transla- tion by F. Aylward, London, 1867). There are lives by Mrs H. L. Lear (London, 1882) ; by A. Ricard (1 vol. of L'Ecole menaisienne, Paris, 1883); by Comte O. d'Haussonville (1 vol., Les Grands Scrivains Frangais series, Paris, 1897) ; by Gabriel Ledos (Paris, 1901); by Dora Greenwell (1867); and by the due de Broglie (Paris, 1889). The Correspondance inedite du Pere Lacordaire, edited by H. Villard

(Paris, 1870), may also be consulted. See also Saint- Beuve in Causeries de Lundi. Several of Lacordaire's Conferences have been translated into English, among these being, Jesus Christ (1869) ; God (1870); God and Man (1872); Life (1875). For a theological study of the Conferences de Notre Dame, see an article by Bishop J. C. Hedley in Dublin Review (October 1870).

LACQUER, or Lacker, a general term for coloured and frequently opaque varnishes applied to certain metallic objects and to wood. The term is derived from the resin lac, which substance is the basis of lacquers properly so called. Technically, among Western nations, lacquering is restricted to the coating of polished metals or metallic surfaces, such as brass, pewter and tin, with prepared varnishes which will give them a golden, bronze-like or other lustre as desired. Throughout the East Indies the lacquering of wooden surfaces is universally practised, large articles of household furniture, as well as small boxes, trays, toys and papier-mache objects, being decorated with bright- coloured and variegated lacquer. The lacquer used in the East is, in general, variously coloured sealing-wax, applied, smoothed and polished in a heated condition; and by various devices intricate marbled, streaked and mottled designs are produced. Quite distinct from these, and from all other forms of lacquer, is the lacquer work of Japan, for which see Japan, § Art.

LACRETELLE, PIERRE LOUIS DE (1751-1824), French politician and writer, was born at Metz on the 9th of October 1 751. He practised as a barrister in Paris; and under the Revolution was elected as a depute suppliant in the Constituent Assembly, and later as deputy in the Legislative Assembly. He belonged to the moderate party known as the " Feuillants," but after the 10th of August 1792 he ceased to take part in public life. In 1803 he became a member of the Institute, taking the place of La Harpe. Under the Restoration he was one of the chief editors of the Minerve francaise; he wrote also an essay, Sur le 18 Brumaire (1799), some Fragments politiques et littiraires (1817), and a treatise Des partis politiques et des factions de la pretendue aristocrat ie d'aujourd'hui (181 9). t

His younger brother, Jean Charles Dominique de Lacre- telle, called Lacretelle le jeune (1 766-1855), historian and journalist, was also born at Metz on the 3rd of September 1 766. He was called to Paris by his brother in 1787, and during the Revolution belonged, like him, to the party of the Feuillants. He was for some time secretary to the due de la Rochefoucauld- Liancourt, the celebrated philanthropist, and afterwards joined the staff of the Journal de Paris, then managed by Suard, and where he had as colleagues Andr6 Chenier and Antoine

Roucher. He made no attempt to hide his monarchist sympathies, and this, together with the way in which he reported the trial and I death of Louis XVI., brought him in peril of his life; to avoid this

danger he enlisted in the army, but after Thermidor he returned to Paris and to his newspaper work. He was involved in the royalist movement of the 13th Vendemiaire, and condemned to deportation after the 18th Fructidor; but, thanks to powerful influence, he was left ” forgotten ” in prison till after the 18th Bru- maire, when he was set at liberty by Fouche. Under the Empire he was appointed a professor of history in the Faculty des lettres of Paris (1809), and elected as a member of the Academie fran- chise (1811). In 1827 he was prime mover in the protest made by the French Academy against the minister Peyronnet’s law on the press, which led to the failure of that measure, but this step cost him, as it did Villemain, his post as censeur royal. Under Louis Philippe he devoted himself entirely to his teaching and literary work. In 1848 he retired to Macon; but there, as in Paris, he was the centre of a brilliant circle, for he was a wonderful causeur, and an equally good listener, and had many interesting ex- periences to recall. He died on the 26th of March 1855. His son Pierre Henri (1815-1899) was a humorous writer and politician of purely contemporary interest.

J. C. Lacretelle’s chief work is a series of histories of the 18th century, the Revolution and its sequel: Precis historique de la Revolution francaise, appended to the history of Rabaud St Etienne, and partly written in the prison of La Force (5 vols., 1801-1806); Histoire de France pendant le XVIII’ Steele (6 vols., 1808); Histoire de I’Assemblee Constituante (2 vols., 1821); L’Assemblee Legislative (1822); La Convention Nationale (3 vols., 1824-1825); Histoire de France depuis la restauration (1 829-1 835); Histoire du consulat et de I’ empire (4 vols., 1846). The author was a moderate and fair- minded man, but possessed neither great powers of style, nor striking historical insight, nor the special historian’s power of writing minute accuracy of detail with breadth of view. Carlyle’s sarcastic remark on Lacretelle’s history of the Revolution, that it ” exists, but does hot profit much,” is partly true of all his books. He had been an eye- witness of and an actor in the events which he describes, but his testimony must be accepted with caution.

LACROIX, ANTOINE FRANCOIS ALFRED (1863-),

French mineralogist and geologist, was born at Macon, Saone et Loire, on the 4th of February 1863. He took the degree of D. es Sc. in Paris, 1889. In 1893 he was appointed professor of mineralogy at the Jardin des Plantes, Paris, and in 1896 director of the mineralogical laboratory in the Hcole des Hautes Etudes. He paid especial attention to minerals connected with volcanic phenomena and igneous rocks, to the effects of metamorphism, and to mineral veins, in various parts of the world, notably in the Pyrenees. In his numerous contributions to scientific journals he dealt with the mineralogy and petrology of Mada- gascar, and published an elaborate and exhaustive volume on the eruptions in Martinique, La Montagne Pelee el ses Erup- tions (1904). He also issued an important work entitled Miner a- logie de la France et de ses Colonies (1 893-1 898), and other works in conjunction with A. Michel Levy. He was elected member of the Academie des sciences in 1904.

LACROIX, PAUL (1806-1884), French author and journalist, was born in Paris on the 27th of April 1806, the son of a novelist. He is best known under his pseudonym of P. L. Jacob, bibliophile, or " Bibliophile Jacob," suggested by the constant interest he took in public libraries and books generally. Lacroix was an extremely prolific and varied writer. Over twenty historical romances alone came from his pen, and he also wrote a variety of serious historical works, including a history of Napoleon III., and the life and times of the Tsar Nicholas I. of Russia. He was the joint author with Ferdinand Sere of a five-volume work, Le Moyen Age et La Renaissance (1847), a standard work on the manners, customs and dress of those times, the chief merit of which lies in the great number of illustrations it contains. He also wrote many monographs on phases of the history of culture. Over the signature Pierre Dufour was published an exhaustive Histoire de la Prostitution (1851-1852), which has always been attributed to Lacroix. His works on bibliography were also extremely numerous. In 1885 he was appointed librarian of the Arsenal Library, Paris. He died in Paris on the 16th of October

1884.

LACROMA (Serbo-Croatian Lokrum), a small island in the Adriatic Sea, forming part of the Austrian kingdom of Dalmatia,

and lying less than half a mile south of Ragusa. Though barely i\ m. in length, Lacroma is remarkable for the beauty of its sub- tropical vegetation. It was a favourite resort of the archduke Maximilian, afterwards emperor of Mexico (1832-1867), who restored the chateau and park ; and of the Austrian crown prince Rudolph (1857-1889). It

contains an nth-century Benedictine monastery; and the remains of a church, said by a very doubtful local tradition to have been founded by Richard I. of England (n 57-1 199), form part of the imperial chateau.

See Lacroma, an illustrated descriptive work by the crown princess Stephanie (afterwards Countess Lonyay) (Vienna, 1892).

LA CROSSE, a city and the county-seat of La Crosse county, Wisconsin, U.S.A., about 180 m. W.N.W. of Milwaukee, and about 1 20 m. S.E. of St Paul, Minnesota, on the E. bank of the Mississippi river, at the mouth of the Black and of the La Crosse rivers. Pop. (1900) 28,895; (1910 census) 30,417. Of the total population in 1900, 7222 were foreign-born, 3130 being German and 2023 Norwegian, and 17,555 were of foreign- parentage (both parents foreign-born), including 7853 of German parentage, 4422 of Norwegian parentage, and 1062 of Bohemian parentage. La Crosse is served by the Chicago & North Western, the Chicago, Milwaukee & St Paul, the Chicago, Burlington & Quincy, the La Crosse & South Eastern, and the Green Bay & Western railways, and by river steamboat lines on the Mississippi. The river is crossed here by a railway bridge (CM. & St P.) and wagon bridge. The city is situated on a prairie, extending back from the river about 2\ m. to bluffs, from which fine views may be obtained. Among the city's buildings and institutions are the Federal Building (1886-1887), the County Court House (1902- 1903), the Public Library (with more than 20,000 volumes), the City Hall (1891), the High School Building (1905-1906), the St Francis, La Crosse and Lutheran hospitals, a Young Men's Christian Association Building, a Young Women's Christian Association Building, a U.S. Weather Station (1907), and a U.S. Fish Station (1905). La Crosse is the seat of a state Normal School (1909). Among the city's parks are Pettibone (an island in the Mississippi), Riverside, Burns, Fair Ground and Myrick. The city is the see of a Roman Catholic bishop. La Crosse is an important lumber and grain market, and is the principal wholesale distributing centre for a large territory in S.W. Wis- consin, N. Iowa and Minnesota. Proximity to both pine and hardwood forests early made it one of the most important lumber manufacturing places in the North-west; but this industry has now been displaced by other manufactures. The city has grain elevators, flour mills (the value of flour and grist mill products in 1905 was $2,166,116), and breweries (product value in 1905, $1,440,659). Other important manufactures are agricultural implements ($542,425 in 1905), lumber and planing mill products, leather, woollen, knit and rubber goods, tobacco, cigars and cigarettes, carriages, foundry and machine-shop products, copper and iron products, cooperage, pearl buttons, brooms and brushes. The

total value of the factory product in 1905 was $8,139,432, as against $7,676,581 in 1900. The city owns and operates its water-works system, the wagon bridge (1890-1891) across the Mississippi, and a toll road (25 m. long) to the village of La Crescent, Minn.

Father Hennepin and du Lhut visited or passed the site of La Crosse as early as 1680, but it is possible that adventurous coureurs-des-bois preceded them. The first permanent settlement was made in 1841, and La Crosse was made the county-seat in 1855 and was chartered as a city in 1856.

LACROSSE, the national ball game of Canada. It derives its name from the resemblance of its chief implement used, the curved netted stick, to a bishop's crozier. It was borrowed from the Indian tribes of North America. In the old days, according to Catlin, the warriors of two tribes in their war-paint would form the sides, often 800 or 1000 strong. The goals were placed from 500 yds. to 5 m. apart with practically no side boundaries. A solemn dance preceded the game, after which the ball was tossed into the air and the two sides rushed to catch it on " crosses," similar to those now in use. The medicine-men acted as umpires, and the squaws urged on the men by beating

them with switches. The game attracted much attention from the early French settlers in Canada. In 1763, after Canada had become British, the game was used by the aborigines to carry out an ingenious piece of treachery. On the 4th of June, when the garrison of Fort Michilimackinac (now Mackinac) was celebrating the king's birthday, it was invited by the Ottawas, under their chief Pontiac, to witness a game of " baggataway " (lacrosse). The players gradually worked their way close to the gates, when, throwing aside their crosses and seizing their tomahawks which the squaws suddenly produced from under their blankets, they rushed into the fort and massacred all the inmates except a few Frenchmen.

The game found favour among the British settlers, but it was not until 1867, the year in which Canada became a Dominion, that G. W. Beers, a prominent player, suggested that Lacrosse should be recognized as the national game, and the National Lacrosse Association of Canada was formed. From that time the game has flourished vigorously in Canada and to a less extent in the United States. In 1868 an English Lacrosse Association was formed, but, although a team of Indians

visited the United Kingdom in 1867, it was not until sometime later that the game became at all popular in Great Britain. Its progress was much encouraged by visits of teams representing the Toronto Lacrosse Club in 1888 and 1902, the methods of the Canadians and their wonderful " short-passing " exciting much admiration. In 1907 the Capitals of Ottawa visited England, playing six matches, all of which were won by the Canadians. The match North v. South has been played annually in England since 1882. A county championship was inaugurated in 1905. A North of England League, embracing ten clubs, began playing league matches in 1897; and a match between the universities of Oxford and Cambridge has been played annually since 1903. A match between England and Ireland was played annually from 1881 to 1904.

Implements of the Game. — The ball is made of indiarubber sponge, weighs between 4J and 4J oz., and measures 8 to 8J in. in circumference. The " crosse " is formed of a light staff of hickory wood, the top being bent to form a kind of hook, from the tip of which a thong is drawn and made fast to the shaft about 2 ft. from the other end. The oval triangle thus formed is covered with a network of gut or rawhide, loose enough to hold the ball but not to form a bag. At no

The Crosse.

part must the crosse measure more than 12 in. in breadth, and no metal must be used in its manufacture. It may be of any length to suit the player. The goals are set up not less than 100 nor more than 150 yds. apart, the goal-posts being 6 ft. high and the same distance apart. They are set up in the middle of the " goal-crease," a space of 12 ft. square marked with chalk. A net extends from the top rail and sides of the posts back to a point 6 ft. behind the middle of the line between the posts. Boundaries are agreed upon by the captains. Shoes may have indiarubber soles, but must be without spikes.

The Game. — The object of the game is to send the ball, by means of the crosse, through the enemy's goal-posts as many times as possible during the two periods of play, precisely as in football and hockey. There are twelve players on each side. In every position save that of goal there are two men, one of each side, whose duties are to " mark " and neutralize each other's efforts. The game is opened by the act of " facing," in which the two centres, each with his left shoulder towards his opponents' goal, hold their crosses, wood down- wards, on the ground, the ball being placed between them. When the signal is given the centres draw their crosses sharply inwards in order to gain possession of the ball. The ball may be kicked or struck with the

crosse, as at hockey, but the goal-keeper alone may handle it, and then only to block and not to throw it. Although the ball may be thrown with the crosse for a long distance — 220 yds. is about the limit — long throws are seldom tried, it being generally more advantageous for a player to run with the ball resting on the crosse, until he can pass it to a member of his side who proceeds with the attack, either by running, passing to another, or trying to throw the ball through the opponents' goal. The crosse, usually held in both hands, is made to retain the ball by an ingenious rocking motion only acquired by practice. As there is no " off-side " in Lacrosse, a

player may pass the ball to the front, side or rear. No charging is allowed, but one player may interfere with another by standing directly in front of him (" body-check "), though without holding, tripping or striking with the crosse. No one may interfere with a player who is not in possession of the ball. Fouls are penalized either by the suspension of the offender until a goal has been scored or until the end of the game; or by allowing the side offended against a " free position." When a " free position " is awarded each player must stand in the position where he is, excepting the goal-keeper who may get back to his goal, and any opponent who may be nearer the player getting the ball than 5 yds.; this player must retire to that distance from the one who has been given the " free position," who then proceeds with the game as he likes when the referee says " play." This penalty may not be carried out nearer than 10 yds. from the goal. If the ball crosses a boundary the referee calls " stand," and all players stop where they are, the ball being then " faced " not less than 4 yds. within the boundary line by the two nearest players.

See the official publications of the English Lacrosse Union; and Lacrosse by W. C. Schmeisser, in Spalding's " Athletic Library." Also Manners, Customs and Condition of the North American Indians, by George Catlin.

LA CRUZ, RAMON DK (1 731-1794), Spanish dramatist, was born at Madrid on the 28th of March 1731. He was a clerk in the ministry of finance, and is the author of three hundred sainetes, little farcical sketches of city life, written to be played between the acts of a longer play. He published a selection in ten volumes (Madrid, 1786-1791), and died on the 5th of March 1794. The best of his pieces, such as Las Tertulias de Madrid, are delightful specimens of satiric observation.

See E. Cotardo y Mori, Don Ramon de la Cruz y sus obras (Madrid, 1899); C. Cambronero, Sainttes inedites existentes en la Biblioteca Municipal de Madrid (Madrid, 1900).

LACRYMATORY (from Lat. lacrima, a tear), a class of small vessels of terra-cotta, or, more frequently, of glass, found in Roman and late Greek tombs, and supposed to have been bottles into which mourners dropped their tears. They contained unguents, and to the use of unguents at funeral ceremonies the finding of so many of these vessels in tombs is due. They are shaped like a spindle, or a flask with a long small neck and a body in the form of a bulb.

LACTANTIUS FIRMIANUS (c. 260-c. 340), also called Lucius Caelius (or Caecilius) Lactantius Firmianus, was a Christian writer who from the beauty of his style has been called the ” Christian Cicero.” His history is very obscure. He was born of heathen parents in Africa about 260, and became a pupil of Arnobius, whom he far excelled in style though his knowledge of the Scriptures was equally slight. About 290 he went to Nicomedia in Bithynia while Diocletian was emperor, to teach rhetoric, but found little work to do in that Greek-speaking city. In middle age he became a convert to Christianity, and about 306 he went to Gaul (Treves) on the invitation of Constan- tine the Great, and became tutor to his eldest son, Crispus. He probably died about 340.

Lactantius’ chief work, Divinarum Instilulionum Libri Septent, is an ” apology ” for and an introduction to Christianity, written in exquisite Latin, but displaying such ignorance as to have incurred the charge of favouring the Arian and Manichaean heresies. It seems to have been begun in Nicomedia about 304 and finished in Gaul before 311. Two long eulogistic addresses and most of the brief apostrophes to the emperor are from a later hand, which has added some dualistic touches. The seven books of the institutions have separate titles given to them either by the author or by a later editor. The first, De Falsa Religione, and the second, De Origine Erroris, attack the polytheism of heathendom, show the unity of the God of creation and providence, and try to explain how men have been corrupted by demons. The third book, De Falsa Sapientia, describes and criticizes the various systems of prevalent philosophy. The fourth book, De Vera Sapientia et Religione, insists upon the inseparable union of true wisdom and true religion, and maintains that this union is made real in the person of Christ. The fifth book, De Justitia, maintains that true righteousness is not to be found apart from Christianity, and that it springs from piety which consists in the knowledge of God. The sixth book, De Vera Cultu, describes the true worship of God, which is righteousness,

and consists chiefly in the exercise of Christian love towards God and man. The seventh book, De Vita Beata, discusses, among a variety of subjects, the chief good, immortality, the second advent and the resurrection. Jerome states that Lactantius wrote an epitome of these Institutions, and such a work, which may well be authentic, was discovered in MS. in the royal library at Turin in 1711 by C. M. Pfaff.

Besides the Institutions Lactantius wrote several treatises: (1) De Ira Dei, addressed to one Donatus and directed against the Epicurean philosophy. (2) De Opificio Dei sive de Formatione Hominis, his earliest work, and one which reveals very little Christian influence. He exhorts a former pupil, Demetrianus, not to be led astray by wealth from virtue; and he demonstrates the providence of God from the adaptability and beauty of the human body. (3) A celebrated incendiary treatise, De Mortibus Persecutorum, which describes God's judgments on the persecutors of his church from Nero to Diocletian, and has served as a model for numberless writings. De Mort. Persecut. is not in the earlier editions of Lactantius; it was discovered and printed by Baluze in 1679. Many critics ascribe it to an unknown Lucius Caecilius; there are certainly serious differences of grammar, style and temper between it and the writings already mentioned. It was probably composed in Nicomedia, c. 315. Jerome speaks of Lactantius as a poet, and several poems have been attributed to him: — De Ave Phoenice (which Harnack thinks makes use of

1 Clement), De Passione Domini and De Resurrectione (Domini) or De Pascha ad Felicem Episcopum. The first of these may belong to Lactantius's heathen days^the second is a product of the Renaissance (c. 1500), the third was written by Venantius Fortunatus in the 6th century.

Editions: O. F. Fritzsche in E. G. Gersdorf's Bibl. pair. eccl. x., xi. (Leipzig, 1842-1844); Migne, Pair. Lat. vi.,vii. ; S. Brandt and G. Laubmann in the Vienna Corpus Script. Eccles. Lat. xix., xxvii. 1 and

2 (1890-93-97). 'Translation: W. Fletcher in Ante-Nicene Fathers, vii. Literature: the German histories of early Christian literature, by A. Harnack, O. Bardenhewer, A. Ebert, A. Ehrhard, G. Kruger's Early Chr. Lit. p. 307 and Hauck-Herzog's Realencyk. vol. xi., give guides to the copious literature on the subject.

LACTIC ACID (hydroxypropionic acid), $C_3H_6O_3$. Two lactic acids are known, differing from each other in the position occupied by the hydroxyl group in the molecule; they are known respectively as a-hydroxypropionic acid (fermentation or inactivelactic acid) , CH_3 –

CH(OH) • C0 2 H, and/3-hydroxypropionic acid (hydracrylic acid), (q.v.), CH 2 (OH)-CH 2 -C0 2 H. Although on structural grounds there should be only two hydroxypropionic acids, as a matter of fact four lactic acids are known. The third isomer (sarcolactic acid) is found in meat extract (J. v. Liebig), and may be prepared by the action of Penicillium glaucum on a solution of ordinary ammonium lactate. It is identical with a-hydroxypropionic acid in almost every respect, except with regard to its physical properties. The fourth isomer, formed by the action of Bacillus laevo-lacti on cane-sugar, resembles sarcolactic acid in every respect, except in its action on polarized light (see Stereoisomerism).

Fermentation, or ethylidene lactic acid, was isolated by K. W. Scheele (Trans. Stockholm Acad. 1780) from sour milk (Lat. lac,lactis, milk, whence the name). About twenty-four years later Bouillon Lag- range, and independently A. F. de Fourcroy and L. N. Vauquelin, maintained that Scheele's new acid was nothing but impure acetic acid. This notion was combated by J. Berzelius, and finally refuted (in 1832) by J. v. Liebig and E. Mitscherlich, who, by the elementary analyses of lactates, proved the existence of this acid as a distinct compound. It may be prepared by the lactic fermentation of starches, sugars, gums, &c, the sugar being dissolved in water and acidified by a small quantity of tartaric acid and then fermented by the addition of sour milk, with a little putrid cheese. Zinc carbonate is added to the mixture (to neutralize the acid formed), which is kept warm for some days and well stirred. On boiling and filtering the product, zinc lactate crystallizes out of the solution. The acid may also be synthesized by the decomposition of alanine (a-aminopro- pionic acid) by nitrous acid (K. Strecker, Ann., 1850, 75, p. 27); by the oxidation of propylene glycol (A. Wurtz) ; by boiling a-chlor- propionic acid with caustic alkalis, or with silver oxide and water; by the reduction of pyruvic acid with sodium amalgam; or from acetaldehyde by the cyanhydrin reaction (J. Wislicenus, Ann., 1863, 128, p. 13)

CHs-CHO > CH 3 -CH(OH)-CN J> CH 8 -CH(OH)-COuH.

It forms a colourless syrup, of specific gravity i'2485 (i5°/4°)i a "d decomposes on distillation under ordinary atmospheric pressure; but at very low pressures (about 1 mm.) it distils at about 85° C, and then sets to a crystalline solid, which melts at about 18° C. It possesses the properties both of an acid and of an alcohol. When heated with dilute sulphuric acid to 130° C, under pressure, it is resolved into formic acid and acetaldehyde. Chromic acid oxidizes it to acetic acid and carbon dioxide; potassium permanganate oxidizes it to pyruvic acid; nitric acid to oxalic acid, and a mixture of manganese dioxide and sulphuric

acid to acetaldehyde and carbon dioxide. Hydrobromic acid converts it into a-brompropionic acid, and hydriodic acid into propionic acid.

Lactide, OˆCO-CHfCHa) ˆ >0 ‘ a cr y stalune soud > of melting-point 124° C, is one of the products obtained by the distillation of lactic acid.

LACTONES, the cyclic esters of hydroxy acids, resulting from the internal elimination of water between the hydroxyl and carboxyl groups, this reaction taking place when the hydroxy acid is liberated from its salts by a mineral acid. The a and /3- hydroxy acids do not form lactones, the tendency for lactone formation appearing first with the 7-hydroxy acids, thus 7- hydroxybu tyric acid, CH 2 0H -CH 2 -CH 2 -C0 2 H, yields 7-butyro-

lactone, CH 2 -CH2’CH 2 -CO-0. These compounds may also be prepared by the distillation of the 7-halogen fatty acids, or by the action of alkaline carbonates on these acids, or from 167- or 75-unsaturated acids by digestion with hydrobromic acid or dilute sulphuric acid. The lactones are mostly liquids which are readily soluble in alcohol, ether and water. On boiling with water, they are partially reconverted into the hydroxy acids. They are easily saponified by the caustic alkalis.

On the behaviour of lactones with ammonia, see H. Meyer, Monatshefte, 1899, 20, p. 717; and with phenylhydrazine and hydrazine hydrate, see R. Meyer, Ber., 1893, 26, p. 1273; L. Gattermann, Ber., 1899, 32, p. 1 133, E. Fischer, Ber., 1889, 22, p. 1889.

■y-Butyrolactone is a liquid which boils at 206 C. It is miscible with wat er in all proportions and is volatile in steam, y-valero-

lactone, CH 3 -CH-CH 2 -CH 2 ‘CO-0, is a liquid which boilsat 207-208 C. ˆ-lactones are also known, and may be prepared by distilling the S-chlor acids.

LA CUEVA, JUAN DE (isso?-i6o9?), Spanish dramatist and poet, was born at Seville, and towards 1579 began writing for the stage. His plays, fourteen in number, were published in 1588, and are the earliest manifestations of the dramatic methods developed by Lope de Vega. Abandoning the Senecan model hitherto universal in Spain, Cueva took for his themes matters of national legend, historic tradition, recent victories and the actualities of contemporary life: this amalgam of epical and realistic elements, and the introduction of a great variety of metres, prepared the way for the Spanish romantic

drama ofthei7th century. A peculiar interest attaches to El Infamador, a play in which the character of Leucino anticipates the classic type of Don Juan. As an initiative force, Cueva is a figure of great historical importance; his epic poem, La Conquista de Betica (1603), shows his weakness as an artist. The last work to which his name is attached is the Ejemplar poetico (1609), and he is believed to have died shortly after its publication.

See the editions of Saco de Roma and El Infamador, by E. de Ochoa, in the Tesoro del teatro espanol (Paris, 1838), vol. i. pp. 251-285; and of Ejemplar poetico, by J. J. Lopez de Sedano, in the Parnaso espanol, vol. viii. pp. 1-68; also E. Walberg, ” Juan de la Cueva et son Ejemplar poetico ” in the Acta Universitatis Lundensis (Lund, 1904), vol. xxix. ; ” Poemes inedits de Juan de la Cueva (Viaje de Sannio,) ” edited by F. A. Wulff, in the Acta Universitatis Lundensis (Lund, 1886-1887), vol. xxiii. ; F. A. Wulff, ” De la rimas de Juan de la Cueva, Primera Parte ” in the Homenaje a Menendez y Pelayo (Madrid, 1899), vol. ii. pp. 143-148. (J. F.-K.)

LACUNAR, the Latin name in architecture for a panelled or coffered ceiling or soffit. The word is derived from lacuna, a cavity or hollow, a blank, hiatus or gap. The panels or coffers of a ceiling are by Vitruvius called lacunaria.

LACUZON (O. Fr. la cuzon, disturbance), the name given to the Franc-Comtois leader Claude Prost (1607-1681), who was born at Longchaumois (department of Jura) on the 17 th of June 1607. He gained his first military experience when the French invaded Burgundy in 1636, harrying the French

troops from the castles of Montaigu and St Laurent-la-Roche, and devastating the frontier districts of Bresse and Bugey with fire and sword (1640-1642). In the first invasion of Franche- Comte by Louis XIV. in 1668 Lacuzon was unable to make any effective resistance, but he played an important part in Louis’s second invasion. In 1673 he defended Salins for some time; after the capitulation of the town he took refuge in Italy. He died at Milan on the 21st of December 1681.

LACY, FRANZ MORITZ, Count (1725-1801), Austrian field marshal, was born at St Petersburg on the 21st of October 1725. His father, Peter, Count Lacy, was a distinguished Russian soldier, who belonged

to an Irish family, and had followed the fortunes of the exiled James II. Franz Moritz was educated in Germany for a military career, and entered the Austrian service. He served in Italy, Bohemia, Silesia and the Netherlands during the War of the Austrian Succession, was twice wounded, and by the end of the war was a lieut. -colonel. At the age of twenty-five he became full colonel and chief of an infantry regiment. In 1756 with the opening of the Seven Years' War he was again on active service, and in the first battle (Lobositz) he distinguished himself so much that he was at once promoted major-general. He received his third wound on this occasion and his fourth at the battle of Prague in 1757. Later in 1757 Lacy bore a conspicuous part in the great victory of Breslau, and at Leuthen, where he received his fifth wound, he covered the retreat of the defeated army. Soon after this began his association with Field-Marshal Daun, the new generalissimo of the empress's forces, and these two commanders, powerfully assisted later by the genius of Loudon, made head against Frederick the Great for the remainder of the war. A general staff was created, and Lacy, a lieutenant field-marshal at thirty-two, was made chief of staff (quartermaster-general) to Daun. That their cautiousness often degenerated into timidity may be admitted — Leuthen and many other bitter defeats had taught the Austrians to respect their great opponent — but they showed at any rate that, having resolved to wear out the enemy by Fabian methods, they were strong enough to persist in their resolve to the end. Thus for some years the life of Lacy, as of Daun and Loudon, is the story of the war against Prussia (see Seven Years' War). After Hochkirch (October 15, 1758) Lacy received the grand cross of the Maria Theresa order. In 1759 both Daun and Lacy fell into disfavour for failing to win victories, and Lacy owed his promotion to Feldzeugmeister only to the fact that Loudon had just received this rank for the brilliant conduct of his detachment at Kunersdorf. His responsi- bilities told heavily on Lacy in the ensuing campaigns, and his capacity for supreme command was doubted even by Daun, who refused to give him the command when he himself was wounded at the battle of Torgau.

After the peace of Hubertusburg a new sphere of activity was opened, in which Lacy's special gifts had the greatest scope. Maria Theresa having placed her son, the emperor Joseph II., at the head of Austrian military affairs, Lacy was made a field- marshal, and given the task of reforming and administering the army (1766). He framed new regulations for each arm, a new code of military law, a good supply system. As the result of his work the Austrian army was more numerous, far better equipped, and cheaper than it had ever been before. Joseph soon became very intimate with his military adviser,

but this did not prevent his mother, after she became estranged from the young emperor, from giving Lacy her full confidence. His activities were not confined to the army. He was in sympathy with Joseph's innovations, and was regarded by Maria Theresa as a prime mover in the scheme for the partition of Poland. But his self-imposed work broke down Lacy's health, and in 1773, in spite of the remonstrances of Maria Theresa and of the emperor, he laid down all his offices and went to southern France. On returning he was still unable to resume office, though as an unofficial adviser in political and military matters he was far from idle. In the brief and uneventful War of the Bavarian Succession, Lacy and Loudon were the chief Austrian commanders against the king of Prussia, and when Joseph II. at Maria

Theresa's death, became the sovereign of the Austrian dominions as well as emperor, Lacy remained his most trusted friend. More serious than the War of the Bavarian Succession was the Turkish war which presently broke out. Lacy was now old and worn out, and his tenure of command therein was not marked by any greater measure of success than in the case of the other Austrian generals. His active career was at an end, although he continued his effective interest in the affairs of the state and the army throughout the reign of Joseph's successor, Leopold I. His last years were spent in retirement at his castle of Neuwaldegg near Vienna. He died at Vienna on the 24th of November 1801.

See memoir by A. v. Arneth in Allgemeine deutsche Biographie (Leipzig, 1883).

LACY, HARRIETTE DEBORAH (1807-1874), English actress, was born in London, the daughter of a tradesman named Taylor. Her first appearance on the stage was at Bath in 1827 as Julia in The Rivals, and she was immediately given leading parts there in both comedy and tragedy. Her first London appearance was in 1830 as Nina, in Dimond's Carnival of Naples. Her Rosalind, Aspatia (to Macready's Melantius) in The Bridal, and Lady Teazle to the Charles Surface of Walter Lacy (1 809-1 898) — to whom she was married in 1839 — confirmed her position and popularity. She was the original Helen in The Hunchback (1832), and also created Nell Gwynne in Jerrold's play of that name, and the heroine in his Housekeeper. She was considered the first Ophelia of her day. She retired in 1848.

LACY, MICHAEL ROPHINO (1795-1867), Irish musician, son of a merchant, was born at Bilbao and appeared there in public as a violinist in 1801. He was sent to study in Paris under Kreutzer, and soon began a successful career, being known as " Le Petit Espagnol."

He played in London for some years after 1805, and then became an actor, but in 1818 resumed the musical profession, and in 1820 became leader of the ballet at the King's theatre, London. He composed or adapted from other composers a number of operas and an oratorio, The Israelites in Egypt. He died in London on the 20th of September 1867.

LACYDES OF CYRENE, Greek philosopher, was head of the Academy at Athens in succession to Arcesilaus about 241 B.C. Though some regard him as the founder of the New Academy, the testimony of antiquity is that he adhered in general to the theory of Arcesilaus, and, therefore, that he belonged to the Middle Academy. He lectured in a garden called the Lacydeum, which was presented to him by Attalus I. of Pergamum, and for twenty-six years maintained the traditions of the Academy. He is said to have written treatises, but nothing survives. Before his death he voluntarily resigned his position to his pupils, Euander and Telecles. Apart from a number of anecdotes distinguished rather for sarcastic humour than for probability, Lacydes exists for us as a man of refined character, a hard worker and an accomplished orator. According to Athenaeus (x. 438) and Diogenes Laertius (iv. 60) he died from excessive drinking, but the story is discredited by the eulogy of Eusebius (Praep. Ev. xiv. 7), that he was in all things moderate.

See Cicero, Acad. ii. 6; and Aelian, V.H.' ii. 41; also articles Academy, Arcesilaus, Carneades.

LADAKH AND BALTISTAN, a province of Kashmir, India. The name Ladak, commonly but less correctly spelt Ladakh, and sometimes Ladag, belongs primarily to the broad valley of the upper Indus in West Tibet, but includes several surrounding districts in political connexion with it; the present limits are between 75 40′ and 8o° 30′ E., and between 32° 25′ and 36 N. It is bounded N. by the Kuenlun range and the slopes of the Karakoram, N.W. and W. by the dependency of Baltistan or Little Tibet, S. W. by Kashmir proper, S. by British Himalayan territory, and E. by the Tibetan provinces of Ngari and Rudok. The whole region lies very high, the valleys of Rupshu in the south-east being 15,000 ft., and the Indus neat Leh 11,000 ft., while the average height of the surrounding ranges is 19,000 ft. The proportion of arable and even possible pasture land to barren rock and gravel is very small. Pop., including Baltistan (1901)

165,992, of whom 30,2i6inLadakh proper are Buddhists, whereas the Baltis have adopted the Shiah form of Islam.

The natural features of the country may be best explained by reference to two native terms, under one or other of which every part is included; viz. changtang, i.e. ” northern, or high plain,” where the amount of level ground is considerable, and rong, i.e. ” deep valley,” where the contrary condition prevails. The former predominates in the east, diminishing gradually westwards. There, although the vast alluvial deposits which once filled the valley to a remarkably uniform height of about 15,000 ft. have left their traces on the mountain sides, they have undergone immense denudation, and their debris now forms secondary deposits, flat bottoms or shelving slopes, the only spots available for cultivation or pasture. These masses of alluvium are often either metamorphosed to a subcrystalline rock still showing the composition of the strata, or simply con- solidated by lime.

Grand scenery is exceptional, for the valleys are confined, and from the higher points the view is generally of a confused mass of brown or yellow hills, absolutely barren, and of no great apparent height. The parallelism characteristic of the Himalayan ranges continues here, the direction being north-west and south- east. A central range divides the Indus valley, here 4 to 8 m. wide, from that of its north branch the Shyok, which with its fertile tributary valley of Nubra is again bounded on the north by the Karakorajn. This central ridge is mostly syenitic gneiss, and north-east from it are found, successively, Silurian slates, Carboniferous shales and Triassic limestones, the gneiss recurring at the Turkestan frontier. The Indus lies along the line which separates the crystalline rocks from the Eocene sandstones and shales of the lower range of hills on the left bank, the lofty mountains behind them consisting of parallel bands of rocks from Silurian to Cretaceous.

Several lakes in the east districts at about 14,000 ft. have been of much greater extent, and connected with the river systems of the country, but they are now mostly without outlet, saline, and in process of desiccation.

Leh is the capital of Ladakh, and the road to Leh from Srinagar lies up the lovely Sind valley to the sources of the river at the Zoji La Pass (11,300 ft.) in the Zaskar range. This is the range which, skirting the southern edge of the upland plains of Deosai in Baltistan, divides them from the valley of Kashmir, and then continues to Nanga Parbat (26,620 ft.) and beyond that mountain stretches to the north of Swat and Bajour. To the south-east it is an unbroken chain till it merges into the line of snowy peaks seen from Simla and the plains of India

— the range which reaches past Chini to the famous peaks of Gangotri, Nandadevi and Nampa. It is the most central and conspicuous range in the Himalaya. The Zoji La, which curves from the head of the Sind valley on to the bleak uplands of Dras (where lies the road to the trough of the Indus and Leh), is, in spite of its altitude, a pass on which little snow lies; but for local accumulations, it would be open all the year round. It affords a typical instance of that cutting-back process by which a river-head may erode a channel through a watershed into the plateau behind, there being no steep fall towards the Indus on the northern side of the range. From the Zoji La the road continues by easy gradients, following the line of the Dras drainage, to the Indus, when it turns up the valley to Leh. From Leh there are many routes into Tibet, the best known being that from the Indus valley to the Tibetan plateau, by the Chang La, to Lake Pangkong and Rudok (14,000 ft.). Rudok occupies a forward position on the western Tibetan border analogous to that of Leh in Kashmir. The chief trade route to Lhasa from Leh, however, follows the line offered by the valleys of the Indus and the Brahmaputra (or Tsanpo), crossing the divide between these rivers north of Lake Mana- sarowar.

The observatory at Leh is the most elevated observatory in Asia. ” The- atmosphere of the Indus valley is remarkably clear and transparent, and the heat of the sun is very great. There is generally a difference of more than 6o° between the read- ing of the exposed sun thermometer in vacuo and the air tempera-

ture in the shade, and this difference has occasionally exceeded 90° .... The mean annual temperature at Leh is 40°, that of the coldest months (January and February) only 18 and 19 , but it rises rapidly from February to July, in which month it reaches 62° with a mean diurnal maximum of 80° both in that month and August, and an average difference of 29° or 30 between the early morning and afternoon. The mean highest temperature of the year is 90°, varying between 84 and 93 in the twelve years previous to 1893. On the other hand, in the winter the minimum thermometer falls occasionally below o°, and in 1878 reached as low as 17° below zero. The extreme range of recorded temperature is therefore not less than no°. The air is as dry as-Quetta, and rather more uniformly so. . . . The amount of rain and snow is insignificant. The average rain (and snow) fall is only 2-7 in. in the year.” 1 The winds are generally light, and depend on the local direction of the valleys. At Leh, which stands at the entrance of the valley leading to the Kardang Pass, the most common directions are between south and west in the daytime and summer, and from north-east in the night, especially in the later months of the year. In January and February the air is generally calm, and April and May are the

most windy months of the year.

Vegetation is confined to valleys and sheltered spots, where a stunted growth of tamarisk and Myricaria, Hippophae and Elaeagnus, furze, and the roots of burtsi, a salsolaceous plant, supply the traveller with much-needed firewood. The trees are the pencil cedar (Juniperus excelsa), the poplar and willow (both extensively planted, the latter sometimes wild), apple, mulberry, apricot and walnut. Irrigation is skilfully managed, the principal products being wheat, a beardless variety of barley called grim, millet, buckwheat, pease, beans and turnips. Lucerne and prangos (an umbelliferous plant) are used as fodder.

Among domestic animals are the famous shawl goat, two kinds of sheep, of which the larger (huniya) is used for carrying burdens, and is a principal source of wealth, the yak and the dso, a valuable hybrid between the yak and common cow Among wild animals are the kiang' or wild ass, ibex, several kinds of wild sheep, antelope (Pantholops), marmot, hare and other Tibetan fauna.

The present value of the trade between British India and Tibet passing through Ladakh is inconsiderable Ladakh, however, is im- proving in its trade prospects apart from Tibet. It is curious that both Ladakh and Tibet import a considerable amount of treasure, for on the borders of western Tibet and within a radius of 100 or 200 m. of Leh there centres a gold-mining industry which apparently only requires scientific development to render it enorm- ously productive. Here the surface soil has been for many centuries washed for gold by bands of Tibetan miners, who never work deeper than 20 to 50 ft., and whose methods of washing are of the crudest description. They work in winter, chiefly because of the binding power of frost on the friable soil, suffering great hardships and ob- taining but a poor return for their labour. But the remoteness of Ladakh and its extreme altitude still continue to bar the way to substantial progress, though its central position naturally entitles it to be a great trade mart.

The adjoining territory of Baltistan forms the west extremity of Tibet, whose natural limits here are the Indus from its abrupt south- ward bend in 74 45′ E., and the mountains to the north and west, separating a comparatively peaceful Tibetan population from the fiercer Aryan tribes beyond. Mahommedan writers about the 16th century speak of Baltistan as " Little Tibet," and of Ladakh as " Great Tibet," thus ignoring the really Great Tibet altogether. The Balti call Gilgit " a Tibet," and DrLeitner says that the Chilasi call themselves Bot or Tibetans; but, although these districts may have been overrun by the

Tibetans, or have received rulers of that race, the ethnological frontier coincides with the geographical one given. Baltistan is a mass of lofty mountains, the prevailing forma- tion being gneiss. In the north is the Baltoro glacier, the largest out of the arctic regions, 35 m. long, contained between two ridges whose highest peaks to the south are 25,000 and to the north 28,265 ft. The Indus, as in Lower Ladakh, runs in a narrow gorge, widening for nearly 20 m. after receiving the Shyok. The capital, Skardu, a scattered collection of houses, stands here, perched on a rock 7250 ft. above the sea. The house roofs are flat, occupied only in part hy a second story, the remaining space being devoted to drying apricots, the chief staple of the main valley, which supports little cultivation. But the rapid slope westwards is seen generally in the vegetation. Birch, plane, spruce and Pinus excelsa appear; the fruits are finer, including pomegranate, pear, peach, vine and melon, and where irrigation is available, as in the North Shigar, and at the deltas of the tributary valleys, the crops are more luxuriant and varied.

History. — The earliest notice of Ladakh is by the Chinese pilgrim Fa-hien, a.d. 400, who, travelling in search of a purer 1 H. F. Blandford, Climate and Weather of India (London, 1889).

faith, found Buddhism flourishing there, the only novelty to him being the prayer-cylinder, the efficacy of which he declares is incredible. Ladakh formed part of the Tibetan empire until its disruption in the 10th century, and since then has continued ecclesiastically' subject, and sometimes tributary, to Lhasa. Its inaccessibility saved it from any Mussulman invasion until 1 53 1, when Sultan Said of Kashgar marched an army across the Karakoram, one division fighting its way into Kashmir and wintering there. Next year they invaded eastern Tibet, where nearly all perished from the effects of the climate.

Early in the 17th century Ladakh was invaded by its Mahom- medan neighbours of Baltistan, who plundered and destroyed the temples and monasteries; and again, in 1685-1688, by the Sokpa, who were expelled only by the aid of the lieutenant of Aurangzeb in Kashmir, Ladakh thereafter becoming tributary. The gyalpo or king then made a nominal profession of Islam, and allowed a mosque to be founded at Leh, and the Kashmiris have ever since addressed his successors by a Mahommedan title. When the Sikhs took Kashmir, Ladakh, dreading their approach, offered allegiance to Great Britain. It was, however,

conquered and annexed in 1834-1841 by Gulab Singh of Jammu — the unwar- like Ladakhis, even with nature fighting on their side, and against indifferent generalship, being no match for the Dogra troops. These next turned their arms successfully against the Baltis (who in the 18th century were subject to the Mogul), and were then tempted to revive the claims of Ladakh to the Chinese provinces of Rudok and Ngari. This, however, brought down an army from Lhasa, and after a three days' fight the Indian force was almost annihilated — chiefly indeed by frostbite and other sufferings, for the battle was fought in mid- winter, 15,000 ft. above the sea. The Chinese then marched on Leh, but were soon driven out again, and peace was finally made on the basis of the old frontier. The widespread prestige of China is illustrated by the fact that tribute, though disguised as a present, is paid to her, for Ladakh, by the maharaja of Kashmir.

The principal works to be consulted are F. Drew, The Jummoo and Kashmir Territories; Cunningham, Ladak; Major J. Biddulph, The Tribes of the Hindoo Koosh; Ramsay, Western Tibet; Godwin- Austen, " The Mountain Systems of the Himalaya," vol. vi., Proc. R.G.S. (1884); W. Lawrence, The Valley of Kashmir (1895); H. F. Blandford, The Climate and Weather of India (1889). (T. H. H.*)

LADD, GEORGE TRUMBULL (1842-), American philos-

opher, was born in Painesville, Lake county, Ohio, on the 19th of January 1842. He graduated at Western Reserve College in 1864 and at Andover Theological Seminary in 1869; preached in Edinburg, Ohio, in 1869-1871, and in the Spring Street Congregational Church of Milwaukee in 1871-1879; and was professor of philosophy at Bowdoin College in 1879- 1 88 1 , and Clark professor of metaphysics and moral philosophy at Yale from 1881 till 1901, when he took charge of the graduate department of philosophy and psychology; he became professor emeritus in 1905. In 1879-1882 he lectured on theology at Andover Theological Seminary, and in 1883 at Harvard, where in 1895-1896 he conducted a graduate seminary in ethics. He lectured in Japan in 1892, 1899 (when he also visited the uni- versities of India) and 1906-1907. He was much influenced by Lotze, whose Outlines of Philosophy he translated (6 vols., 1877), and was one of the first to introduce (1879) the study of experi- mental psychology into America, the Yale psychological laboratory being founded by him.

Publications. — The Principles of Church Polity (1882); The Doctrine of Sacred Scripture (1884) ;What is the Bible? (1888); Essays on the Higher Education (1899), defending the " old " (Yale) system against

the Harvard or ” new ” education, as praised by George H. Palmer; Elements of Physiological Psychology (1889, rewritten as Out- lines of Physiological Psychology, in 1890) ; Primer of Psychology (1894) : Psychology, Descriptive and Explanatory (1894); and Outlines of Descriptive Psychology (1898); in a “system of philosophy,” Philosophy of the Mind (1891); Philosophy of Knowledge (1897); A Theory of Reality (1 899) ; Philosophy of Conduct (1902) ; and Philosophy of Religion (2 vols., 1905); In Korea with Marquis Ito (1908); and Knowledge, Life and Reality (1909).

LADDER, (O. Eng. klaeder; of Teutonic origin, cf. Dutch leer, Ger. Leiter; the ultimate origin is in the root seen in ” lean,” Gr. /cXtˆa£), a set of steps or ” rungs ” between two supports

to enable one to get up and down; usually made of wood and sometimes of metal or rope. Ladders are generally movable, and differ from a staircase also in having only treads and no ” risers.” The term ” Jacob’s ladder,” taken from the dream of Jacob in the Bible, is applied to a rope ladder with wooden steps used at sea to go aloft, and to a common garden plant of the genus Polemonium on account of the ladder-like formation of the leaves. The flower known in England as Solomon’s seal is in some countries called the ” ladder of heaven.”

LADING (from ” to lade,” 0. Eng. hladan, to put cargo on board; cf. ” load “), BILL OF, the document given as receipt by the master of a merchant vessel to the consignor of goods, as a guarantee for their safe delivery to the consignee. (See Affreightment.)

LADISLAUS [I.], Saint (1040-1095), king of Hungary, the son of Bela I-., king of Hungary, and the Polish princess Richeza, was born in Poland, whither his father had sought refuge, but was recalled by his elder brother Andrew I. to Hungary (1047) and brought up there. He succeeded to the throne on the death of his uncle Geza in 1077, as the eldest member of the royal family, and speedily won for himself a reputation scarcely inferior to that of Stephen I., by nationalizing Christianity and laying the foundations of Hungary’s political greatness. Instinctively recognizing that Germany was the natural enemy of the Magyars, Ladislaus formed a close alliance with the pope and all the other enemies of the emperor Henry IV., including the anti-emperor Rudolph of Swabia and his chief supporter Welf, duke of Bavaria, whose daughter Adelaide he married. She bore him one son and three daughters, one of whom, Piriska, married the Byzantine emperor John Comnenus. The collapse of the German emperor in his struggle with the pope left Ladislaus free to extend his dominions towards the south, and colonize and Christianize the wildernesses of

Transylvania and the lower Danube. Hungary was still semi-savage, and her native barba- rians were being perpetually recruited from the hordes of Peche- negs, Rumanians and other races which swept over her during the nth century. Ladislaus himself had fought valiantly in his youth against the Pechenegs, and to defend the land against the Rumanians, who now occupied Moldavia and Wallachia as far as the Alt, he built the fortresses of Turnu-Severin and Gyula Fehervar. He also planted in Transylvania the Szeklers, the supposed remnant of the ancient Magyars from beyond the Dnieper, and founded the bishoprics of Nagy-Varad, or Gross- Wardein, and of Agram, as fresh foci of Catholicism in south Hungary and the hitherto uncultivated districts between the Drave and the Save. He subsequently conquered Croatia, though here his authority was questioned by the pope, the Venetian republic and the Greek emperor. Ladislaus died suddenly in 1095 when about to take part in the first Crusade. No other Hungarian king was so generally beloved. The whole nation mourned for him for three years, and regarded him as a saint long before his canonization. A whole cycle of legends is associated with his name.

See J. Babik, Life of St Ladislaus (Hung.) (Eger, 1892); Gyorgy Pray, Dissertatio de St Ladislao (Pressburg, 1774); Antal Ganoczy, Diss. hist. crit. de St Ladislao (Vienna, 1775). ^4 (R. N. B.)

LADISLAUS IV., The Rumanian (1262-1290), king of Hungary, was the son of Stephen V., whom he succeeded in 1272. From his tenth year, when he was kidnapped from his father's court by the rebellious vassals, till his assassination eighteen years later, his whole life, with one bright interval of military glory was unrelieved tragedy. His minority, 1272-1277, was an alternation of palace revolutions and civil wars, in the course of which his brave Rumanian mother Elizabeth barely contrived to keep the upper hand. In this terrible school Ladislaus matured precociously. At fifteen he was a man, resolute, spirited, enter- prising, with the germs of many talents and virtues, but rough, reckless and very imperfectly educated. He was married betimes to Elizabeth of Anjou, who had been brought up at the Hungarian court. The marriage was a purely political one, arranged by his father and a section of the Hungarian magnates to counterpoise hostile German and Czech influences. During

the earlier part of his reign, Ladislaus obsequiously followed the direction of the Neapolitan court in foreign affairs. In Hungary itself a

large party was in favour of the Germans, but the civil wars which raged between the two factions from 1276 to 1278 did not prevent Ladislaus, at the head of 20,000 Magyars and Rumanians, from co-operating with Rudolph of Habsburg in the great battle of Durnkriit (August 26th, 1278), which destroyed, once for all, the empire of the Pfemyslidae. A month later a papal legate arrived in Hungary to inquire into the conduct of the king, who was accused by his neighbours, and many of his own subjects, of adopting the ways of his Rumanian kinsfolk and thereby undermining Christianity. Ladislaus was not really a pagan, or he would not have devoted his share of the spoil of Durnkriit to the building of the Franciscan church at Pressburg, nor would he have venerated as he did his aunt St Margaret. Political enmity was largely responsible for the movement against him, yet the result of a very careful investigation (1279-1281) by Philip, bishop of Fermo, more than justified many of the accusations brought against Ladislaus. He clearly preferred the society of the semi-heathen Rumanians to that of the Christians; wore, and made his court wear, Rumanian dress; surrounded himself with Rumanian concubines, and neglected and ill-used his ill-favoured Neapolitan consort. He was finally compelled to take up arms against his Rumanian friends, whom he routed at Hodmezo (May 1282) with fearful loss; but, previously to this, he had arrested the legate, whom he subse- quently attempted to starve into submission, and his conduct generally was regarded as so unsatisfactory that, after repeated warnings, the Holy See resolved to supersede him by his Angevin kinsfolk, whom he had also alienated, and on the 8th of August 1288 Pope Nicholas IV. proclaimed a crusade against him. For the next two years all Hungary was convulsed by a horrible civil war, during which the unhappy young king, who fought for his heritage to the last with desperate valour, was driven from one end of his kingdom to the other like a hunted beast. On the 25th of December 1289 he issued a manifesto to the lesser gentry, a large portion of whom sided with him, urging them to continue the struggle against the magnates and their foreign supporters; but on the 10th of July 1290 he was murdered in his camp at Rorosszeg by the Rumanians, who never forgave him for deserting them.

See Karoly Szab6, Ladislaus the Cumanian (Hung.), (Budapest, 1886) ; and Acsady, History of the Hungarian Realm, i. 2 (Budapest, 1903). The latter is, however, too favourable to Ladislaus.

(R. N. B.)

LADISLAUS V. (1440-1457), king of Hungary and Bohemia, the only son of Albert, king of Hungary, and Elizabeth, daughter of the

emperor Sigismund, was born at Romarom on the 22nd of February 1440, four months after his father's death, and was hence called Ladislaus Posthumus. The estates of Hungary had already elected Wladislaus III. of Poland their king, but Ladislaus's mother caused the holy crown to be stolen from its guardians at Visegrad, and compelled the primate to crown the infant king at Szekesfejervar on the 15th of May 1440; where- upon, for safety's sake, she placed the child beneath the guardian- ship of his uncle the emperor Frederick III. On the death of Wladislaus III. (Nov. 10th, 1444), Ladislaus V. was elected king by the Hungarian estates, though not without considerable opposition, and a deputation was sent to Vienna to induce the emperor to surrender the child and the holy crown; but it was not till 1452 that Frederick was compelled to relinquish both. The child was then transferred to the pernicious guardianship of his maternal grandfather Ulrich Cillei, who corrupted him soul and body and inspired him with a jealous hatred of the Hunyadis. On the 28th of October 1453 he was crowned king of Bohemia, and henceforth spent most of his time at Prague and Vienna. He remained supinely indifferent to the Turkish peril; at the instigation of Cillei did his best to hinder the defensive preparations of the great Hunyadi, and fled from the country on the tidings of the siege of Belgrade. On the death of Hunyadi he made Cillei governor of Hungary at the diet of Futtak (October 1456), and when that traitor paid with his life

for his murderous attempt on Laszlo Hunyadi at Belgrade, Ladislaus procured the decapitation of young Hunyadi (16th of March 1457), after a mock trial which raised such a storm in Hungary that the king fled to Prague, where he died suddenly (Nov. 23rd, 1457), while making preparations for his marriage with Magdalena, daughter of Charles VII. of France. He is supposed to have been poisoned by his political opponents in Bohemia.

See F. Palacky, Zeugenverhdr ilber den Tod Konig Ladislaus von Ungarn u. Bbhmen (Prague, 1856); Ignacz Acsady, History of the Hungarian State (Hung.), vol. i. (Budapest, 1903).

LA DIXMERIE, NICOLAS BRICAIRE DE (c. 1 730-1 791), French man of letters, was born at Lamothe (Haute-Marne). While still young he removed to Paris, where the rest of his life was spent in literary activity. He died on the 26th of November 1791. His numerous works include Contes philo- sophiques et moraux (1765), Les Deux Ages du gout et du genie sous Louis XI V. et sj)us Louis X V. (1 769) , a parallel and contrast, in which the decision is given in favour of the latter; L'Espagne litteraire (1774); Eloge de Voltaire (1779) and Eloge de Montaigne

(1781).

LADO ENCLAVE, a region of the upper Nile formerly ad- ministered by the Congo Free State, but since 19 10 a province of the Anglo-Egyptian Sudan. It has an area of about 15,000 sq. m., and a population estimated at 250,000 and consisting of Bari, Madi, Ruku and other Nilotic Negroes. The enclave is bounded S.E. by the north-west shores of Albert Nyanza — as far south as the port of Mahagi — E. by the western bank of the Nile (Bahr-el-Jebel) to the point where the river is intersected by 5° 30′ N., which parallel forms its northern frontier from the Nile westward to 30 E. This meridian forms the west frontier to 4° N., the frontier thence being the Nile-Congo watershed to the point nearest to Mahagi and from that point direct to Albert Nyanza.

The country is a moderately elevated plateau sloping north- ward from the higher ground marking the Congo-Nile watershed. The plains are mostly covered with bush, with stretches of forest in the northern districts. Traversing the plateau are two parallel mountainous chains having a general north to south direction. One chain, the Ruku Mountains (average height 2000 ft.), approaches close to the Nile and presents, as seen from the river, several apparently isolated peaks. At other places these mountains form precipices which stretch in a continuous line like a huge wall. From Dufile in 3 34′ N. to below the Bedden Rapids in 4 40′ N. the bed of the Nile is much obstructed and the river throughout this reach is unnavigable (see Nile) . Below the Bedden Rapids rises the conical hill of Rejaf, and north of that point the Nile valley becomes flat. Ranges of hill, however, are visible farther westwards, and a little north of 5° N. is Jebel Lado, a conspicuous mountain 2500 ft. high and some 12 m. distant from the Nile. It has given its name to the district, being the first hill seen from the Nile in the ascent of some 1000 m. from Rhartum. On the river at Rejaf, at Lado, and at Riro, 28 m. N. of Lado, are government stations and trading establishments. The western chain of hills has loftier peaks than those of Ruku, Jebel Loka being about 3000 ft. high. This western chain forms a secondary watershed separating the basin of the Yei, a large river, some 400 m. in length, which runs almost due north to join the Nile, from the other streams of the enclave, which have an easterly or north-easterly direction and join the Nile, after comparatively short courses.

The northern part of the district was first visited by Europeans in 1841-1842, when the Nile was ascended by an expedition despatched by Mehemet Ali to the foot of the rapids at Bedden. The neighbouring posts of Gondokoro, on the east bank of the Nile, and Lado, soon

became stations of the Rhartum ivory and slave traders. After the discovery of Albert Nyanza by Sir Samuel Baker in 1864, the whole country was overrun by Arabs, Levantines, Turks and others, whose chief occupation was slave raiding. The region was claimed as part of the Egyptian Sudan, but it was not until the arrival of Sir Samuel Baker at Gondokoro in 1870 as governor of the equatorial provinces,

that any effective control of the slave traders was attempted. Baker was succeeded by General C. G. Gordon, who established a separate administration for the Bahr-el-Ghazal. In 1878 Emin Pasha became governor of the Equatorial Province, a term henceforth confined to the region adjoining the main Nile above the Sobat confluence, and the region south of the Bahr-el-Ghazal province. (The whole of the Lado Enclave thus formed part of Emin's old province.) Emin made his headquarters at Lado, whence he was driven in 1885 by the Mahdists. He then removed to Wadelai, a station farther south, but in 1889 the pasha, to whose aid H. M. Stanley had conducted an expedition from the Congo, evacuated the country and with Stanley made his way to the east coast. While the Mahdists remained in possession at Rejaf, Great Britain in virtue of her position in Uganda claimed the upper Nile region as within the British sphere; a claim admitted by Germany in 1890. In February 1894 the union jack was hoisted at Wadelai, while in May of the same year Great Britain granted to Leopold II., as sovereign of the Congo State, a lease of large areas lying west of the upper Nile inclusive of the Bahr-el-Ghazal and Fashoda. Pressed however by France, Leopold II. agreed to occupy only that part of the leased area east of 30° E. and south of 5° 30′ N., and in this manner the actual limits of the Lado Enclave, as it was thereafter called, were fixed. Congo State forces had penetrated to the Nile valley as early as 1891, but it was not until 1897, when on the 17th of February Commandant Chaltin inflicted a decisive defeat on the Mahdists at Rejaf, that their occupation of the Lado Enclave was assured. After the with- drawal of the French from Fashoda, Leopold II. revived (1899) his claim to the whole of the area, leased to him in 1894. In this claim he was unsuccessful, and the lease, by a new agreement made with Great Britain in 1906, was annulled (see Africa, § 5). The king however retained the enclave, with the stipulation that six months after the termination of his reign it should be handed over to the Anglo-Sudanese government (see Treaty Series, No. 4, 1906).

See Le Mouvement geographique (Brussels) passim, and especially

articles in the 1910 issues.

LADOGA (formerly Nevo), a lake of northern Russia, between 59 56′ and 61° 46′ N., and 29 53′ and 32 50′ E., surrounded by the governments of St Petersburg and Olonets, and of Viborg in Finland. It has the form of a quadrilateral, elongated from N.W. to S.E. Its eastern and southern shores are flat and marshy, the north-western craggy and fringed by numerous small rocky islands, the largest of which are Valamo and Konne- vitz, together having an area of 14 sq. m. Ladoga is 7000 sq. m. in area, that is, thirty-one times as large as the Lake of Geneva; but, its depth being less, it contains only nineteen times as much water as the Swiss lake. The greatest depth, 730 ft., is in a trough in the north-western part, the average depth not exceeding 250 to 350 ft. The level of Lake Ladoga is 55 ft. above the Gulf of Finland, but it rises and falls about 7 ft., according to atmospheric conditions, a phenomenon very similar to the seiches of the Lake of Geneva being observed in connexion with this.

The western and eastern shores consist of boulder clay, as well as a narrow strip on the southern shore, south of which runs a ridge of crags of Silurian sandstones. The hills of the north-western shore afford a variety of granites and crystalline slates of the Laurentian system, whilst Valamo island is made up of a rock which Russian geologists describe as orthoclastic hypersthenite. The granite and marble of Serdobol, and the sandstone of Putilovo, are much used for buildings at St Petersburg; copper and tin from the Pitkaranta mine are exported.

No fewer than seventy rivers enter Ladoga, pouring into it the waters of numberless smaller lakes which lie at higher levels round it. The Volkhov, which conveys the waters of Lake Ilmen, is the largest; Lake Onega discharges its waters by the Svir; and the Saima system of lakes of eastern Finland contributes the Vuoxen and Taipale rivers; the Syas brings the waters from the smaller lakes and marshes of the Valdai plateau. Ladoga discharges its surplus water by means of the Neva, which flows from its south-western corner into the Gulf of Finland, rolling down its broad channel 104,000 cubic ft. of water per second.

The water of Ladoga is very pure and cold; in May the surface temperature does not exceed 36 Fahr., and even in August it reaches

only 50 and 53 , the average yearly temperature of the air at Valamo being 36-8°. The lake begins to freeze in October, but it is only about the end of December that it is frozen in its deeper parts ; and it remains ice-bound until the end of March, though broad ice- fields

continue to float in the middle of the lake until broken up by gales. Only a small part of the Ladoga ice is discharged by the Neva ; but it is enough to produce in the middle of June a return of cold in the northern capital. The thickness of the ice does not exceed 3 or 4 ft.; but during the alternations of cold and warm weather, with strong gales, in winter, stacks of ice, 70 and 80 ft. high, are raised on the shores and on the icefields. The water is in continuous rotatory motion, being carried along the western shore from north to south, and along the eastern from south to north. The vegetation on the shores is poor; immense forests, which formerly covered them, are now mostly destroyed. But the fauna of the lake is somewhat rich ; a species of seal which inhabits its waters, as well as several species of arctic crustaceans, recall its former connexion with the Arctic Ocean. The sweet water Diatomaceae which are found in great variety in the ooze of the deepest parts of the lake also have an arctic character.

Fishing is very extensively carried on. Navigation, which is practicable for only one hundred and eighty days in the year, is rather difficult owing to fogs and gales, which are often accompanied, even in April and September, with snow-storms. The prevailing winds blow from N.W. and S.W. ; N.E. winds cause the water to rise in the south-western part, sometimes 3 to 5 ft. Steamers ply regularly in two directions from St Petersburg — to the monasteries of Konnevitz and Valamo, and to the mouth of the Svir, whence they go up that river to Lake Onega and Petrozavodsk; and small vessels transport timber, firewood, planks, iron, kaolin, granite, marble, fish, hay and various small wares from the northern shore to Schliisselburg, and thence to St Petersburg. Navigation on the lake being too danger- ous for small craft, canals with an aggregate length of 104 m. were dug in 1718-1731, and others in 1861-1886 having an aggregate length of 101 m. along its southern shore, uniting with the Neva at Schliisselburg the mouths of the rivers Volkhov, Syas and Svir, all links in the elaborate system of canals which connect the upper Volga with the Gulf of Finland.

The population (35,000) on the shores of the lake is sparse, and the towns — Schliisselburg (5285 inhabitants in 1897); New Ladoga (4144); Kexholm (1325) and Serdobol — are small. The monasteries of Valamo, founded in 992, on the island of the same name, and Konnevskiy, on Konnevitz island, founded in 1393, are visited every year by many thousands of pilgrims. (P. A. K. ; J. T. Be.)

LADY (0. Eng. hlaefdige, Mid. Eng. Idfdi, lavedi; the first part of the word is hid}, loaf, bread, as in the corresponding hldford, lord ; the second part is usually taken to be from the root dig-, to knead, seen

also in ” dough “; the sense development from bread-kneader, bread-maker, to the ordinary meaning, though not clearly to be traced historically, may be illustrated by that of ” lord “), a term of which the main applications are two, (1) as the correlative of ” lord ” (q.v.) in certain of the usages of that word, (2) as the correlative of ” gentleman ” (q.v.). The primary meaning of mistress of a household is, if not obsolete, in present usage only a vulgarism. The special use of the word as a title of the Virgin Mary, usually ” Our Lady,” represents the Lat. Domina Nostra. In Lady Day and Lady Chapel the word is properly a genitive, representing the 0. Eng. hlaejdigan. As a title of nobility the uses of ” lady ” are mainly paralleled by those of ” lord.” It is thus a less formal alternative to the full title giving the specific rank, of marchioness, countess, vis- countess or baroness, whether as the title of the husband’s rank by right or courtesy, or as the lady’s title in her own right. In the case of the younger sons of a duke or marquess, who by courtesy have lord prefixed to their Christian and family name, the wife is known by the husband’s Christian and family name with Lady prefixed, e.g. Lady John B.; the daughters of dukes, marquesses and earls are by courtesy Ladies; here that title is prefixed to the Christian and family name of the lady, e.g. Lady Mary B., and this is preserved if the lady marry a commoner, e.g. Mr and Lady Mary C. ” Lady ” is also the customary title of the wife of a baronet or knight; the proper title, now only used in legal documents or on sepulchral monuments, is ” dame ” (q.v.); in the latter case the usage is to prefix Dame to the Christian name of the wife followed by the surname of the husband, thus Dame Eleanor B., but in the former, Lady with the surname of the husband only, Sir A. and Lady B. During the 15th and 16th centuries “princesses” or daughters of the blood royal were usually known by their Christian names with “the Lady ” prefixed, e.g. the Lady Elizabeth.

While ” lord ” has retained its original application as a title of nobility or rank without extension, an example which has been followed in Spanish usage by ” don,” ” lady ” has been extended in meaning. to be the feminine correlative of “gentleman” throughout its sense developments, and in this is paralleled by Dame in German, madame in French, donna in Spanish, &c. It is the general word for any woman of a certain social position (see Gentleman).

LADYBANK, a police burgh of Fifeshire, Scotland, si m – S.W. of Cupar by the North British railway, 5 m. from the left bank of the Eden. Pop.

(1901) 1340. Besides having a station on the main line to Dundee, it is also connected with Perth and Kinross and is a railway junction of some importance and possesses a locomotive depot. It is an industrial centre, linen weaving, coal mining and malting being the principal industries. Kettle, a village 1 m. S., has prehistoric barrows and a fort. At Collessie, 2§ m. N. by W., a standing stone, a mound and traces of ancient camps exist, while urns and coins have been found. Between the parishes of Collessie and Monimail the boundary line takes the form of a crescent known as the Bow of Fife. Monimail contains the Mount, the residence of Sir David Lindsay the poet (1490-1555). Its lofty site is now marked by a clump of trees. Here, too, is the Doric pillar, 100 ft. high, raised to the memory of John Hope, 4th earl of Hopetoun. Melville House, the seat of the earls of Leven, lies amidst beautiful woods.

LADYBRAND, a town of the Orange Free State, 80 m. E. of Bloemfontein by rail. Another railway connects it with Natal via Harrismith. Pop. (1904) 3862, of whom 2334 were whites. The town is pleasantly situated at the foot of a flat-topped hill (the Platberg), about 4 m. W. of the Caledon river, which separates the province from Basutoland. Ladybrand is the centre of a rich arable district, has a large wheat market and is also a health resort, the climate, owing to the proximity of the Maluti Mountains, being bracing even during the summer months (November-March). Coal and petroleum are found in the neighbourhood. It is named after the wife of Sir. J. H. Brand, president of the Orange Free State.

LADY-CHAPEL, the chapel dedicated to the Blessed Virgin and attached to churches of large size. Generally the chapel was built eastward of the high altar and formed a projection from the main building, as in Winchester, Salisbury, Exeter, Wells, St Albans, Chichester, Peterborough and Norwich cathedrals, — in the two latter cases now destroyed. The earliest Lady-chapel built was that in the Saxon cathedral of Canterbury; this was transfered in the rebuilding by Archbishop Lanfranc to the west end of the nave, and again shifted in 1450 to the chapel on the east side of the north transept. The Lady-chapel at Ely cathedral is a distinct building attached to the north transept; at Rochester the Lady-chapel is west of the south transept. Probably the largest Lady-chapel was that built by Henry III. in 1220 at Westminster Abbey, which was 30 ft. wide, much in excess of any foreign example, and extended to the end of the site now occupied by Henry VII. ‘s chapel. Among other notable English examples of Lady-chapels are those at Ottery- St-Mary, Thetford, Bury St Edmund’s, Wimborne, Christ- church, Hampshire; in Compton Church, Surrey, and Compton Martin, Somersetshire, and Darenth, Kent, it was built

over the chancel. At Croyland Abbey there were two Lady-chapels. Lady-chapels exist in most of the French cathedrals and churches, where they form part of the chevet; in Belgium they were not introduced before the 14th century; in some cases they are of the same size as the other chapels of the chevet, but in others, probably rebuilt at a later period, they became much more important features, and in Italy and Spain during the Renais- sance period constitute some of its best examples.

LADY DAY, originally the name for all the days in the church calendar marking any event in the Virgin Mary's life, but now restricted to the feast of the Annunciation, held on the 25th of March in each year. Lady Day was in medieval and later times the beginning of the legal year in England. In 1752 this was altered to the 1st of January, but the 25th of March remains one

of the Quarter Days; though in some parts old Lady Day, on the 6th of April, is still the date for rent paying. See Annunciation.

LADYSMITH, a town of Natal, 189 m. N.W. of Durban by rail, on the left bank of the Klip tributary of the Tugela. Pop. (1904) 5568, of whom 2269 were whites. It lies 3284 ft. above the sea and is encircled by hills, while the Drakensberg are some 30 m. distant to the N.W. Ladysmith is the trading centre of northern Natal, and is the chief railway junction in the province, the main line from the south dividing here. One line crosses Van Reenen's pass into the Orange Free State, the other runs north- wards to the Transvaal. There are extensive railway workshops. Among the public buildings are the Anglican church and the town hall. The church contains tablets with the names of 3200 men who perished in the defence and relief of the town in the South African War (see below), while the clock tower of the town hall, partially destroyed by a Boer shell, is kept in its damaged condition.

Ladysmith, founded in 1851, is named after Juana, Lady Smith, wife of Sir Harry Smith, then governor of Cape Colony. It stands near the site of the camp of the Dutch farmers who in 1848 assembled for the purpose of trekking across the Drakens- berg. Here they were visited by Sir Harry Smith, who induced the majority of the farmers to remain in Natal. The growth of the town, at first slow, increased with the opening of the railway from Durban in 1886 and the subsequent extension of the line to Johannesburg.

In the first and most critical stage of the South African War of 1899-1902 (see Transvaal) Ladysmith was the centre of the struggle.

During the British concentration on the town there were fought the actions of Talana (or Dundee) on the 20th, Elandslaagte on the 21st and Rietfontein on the 24th of October 1899. On the 30th of October the British sustained a serious defeat in the general action of Lombard's Kop or Farquhar's Farm, and Sir George White decided to hold the town, which had been fortified, against investment and siege until he was relieved directly or indirectly by Sir Redvers Buller's advance. The greater portion of Buller's available troops were despatched to Natal in November, with a view to the direct relief of Ladysmith, which meantime the Boers had closely invested. His first attempt was repelled on the 15th of December in the battle of Colenso, his second on the 24th of January 1900 by the successful Boer counterstroke against Spion Kop, and his third was abandoned without serious fighting (Vaalkranz, Feb. 5). But two or three days after Vaalkranz, almost simultaneously with Lord Roberts's advance on Bloemfontein Sir Redvers Buller resumed the offensive in the hills to the east of Colenso, which he gradually cleared of the enemy, and although he was checked after reaching the Tugela below Colenso (Feb. 24) he was finally successful in carrying the Boer positions (Pieter's Hill) on the 27th and relieving Ladysmith, which during these long and anxious months (Nov. i-Feb. 28) had suffered very severely from want of food, and on one occasion (Caesar's Camp, Jan. 6, 1900) had only with heavy losses and great difficulty repelled a powerful Boer assault. The garrison displayed its unbroken resolution on the last day of the investment by setting on foot a mobile column, composed of all men who were not too enfeebled to march out, in order to harass the Boer retreat. This expedition was however countermanded by Buller.

LAELIUS, the name of a Roman plebeian family, probably settled at Tibur (Tivoli). The chief members were: —

Gaius Laelius, general and statesman, was a friend of the elder Scipio, whom he accompanied on his Spanish campaign (210-206 B.C.). In Scipio's consulship (205), Laelius went with him to Sicily, whence he conducted an expedition to Africa. In 203 he defeated the Massaesylian prince Syphax, who, breaking his alliance with Scipio, had joined the Carthaginians, and at Zama (202) rendered considerable service in command of the cavalry. In 197 he was plebeian aedile and in 1 96 praetor of Sicily. As consul in 190 he was employed in organizing the recently conquered territory in Cisalpine Gaul. Placentia and Cremona were repeopled, and a new colony founded at Bononia.

He is last heard of in 170 as ambassador to Transalpine Gaul. Though little is known of his personal qualities, his intimacy with Scipio is proof that he must have been a man of some importance. Silius Italicus {Punica, xv. 450) describes him as a man of great endowments, an eloquent orator and a brave soldier.

See Index to Liyy; Polybius x. 3. 9, 39, xi. 32, xiv. 4. 8, xv. 9. 12, 14; Appian, Hisp. 25-29; Cicero, Philippica, xi. 7.

His son, Gaius Laelius, is known chiefly as the friend of the younger Scipio, and as one of the speakers in Cicero's De senectute, De amicitia (or Laelius) and De Republica. He was surnamed Sapiens (" the wise "), either from his scholarly tastes or because, when tribune, he " prudently " withdrew his proposal (151 B.C.) for the relief of the farmers by distributions of land, when he saw that it was likely to bring about disturbances. In the third Punic War (147) he accompanied Scipio to Africa, and dis- tinguished himself at the capture of the Cothon, the military harbour of Carthage. In 145 he carried on operations with moderate success against Viriathus in Spain; in 140 he was elected consul. During the Gracchan period, as a staunch supporter of Scipio and the aristocracy, Laelius became obnoxious to the democrats. He was associated with P. Popillius Laenas in the prosecution of those who had supported Tiberius Gracchus, and in 131 opposed the bill brought forward by C. Papirius Carbo to render legal the election of a tribune to a second year of office. The attempts of his enemies, however, failed to shake his reputa- tion. He was a highly accomplished man and belonged to the so-called " Scipionic circle." He studied philosophy under the Stoics Diogenes Babylonius and Panaetius of Rhodes; he was a poet, and the plays of Terence, by reason of their elegance of diction, were sometimes attributed to him. With Scipio he was mainly instrumental in introducing the study of the Greek language and literature into Rome. He was a gifted orator, though his refined eloquence was perhaps less suited to the forum than to the senate. He delivered speeches De Collegiis (145) against the proposal of the tribune C. Licinius Crassus to deprive the priestly colleges of their right of co-optation and to transfer the power of election to the people; Pro Publicanis (139), on behalf of the farmers of the revenue; against the proposal of Carbo noticed above; Pro Se, a speech in his own defence, delivered in answer to Carbo and Gracchus; funeral orations, amongst them two on his friend Scipio. Much informa- tion is given concerning him in Cicero, who compares him to Socrates.

See Index to Cicero; Plutarch, Tib. Gracchus, 8; Appian, Punica, 126; Horace, Sat. ii. 1. 72; Quintilian, Instit. xii. 10. 10; Suetonius, Vita Terentii; Terence, Adelphi, Prol. 15, with the commentators.

LAENAS, the name of a plebeian family in ancient Rome, notorious for cruelty and arrogance. The two most famous of the name 1 are: —

Gaius Popillius Laenas, consul in 172 b.c. He was sent to Greece in 174 to allay the general disaffection, but met with little success. He took part in the war against Perseus, king of Macedonia (Livy xliii. 17, 22). When Antiochus Epiphanes, king of Syria, invaded Egypt, Laenas was sent to arrest his progress. Meeting him near Alexandria, he handed him the decree of the senate, demanding the evacuation of Egypt. Antiochus having asked time for consideration, Laenas drew a circle round him with his staff, and told him he must give an answer before he stepped out of it. Antiochus thereupon submitted (Livy xlv. 12; Polybius xxix. 11; Cicero, Philippica, viii. 8; Veil. Pat. i. 10).

Publius Popillius Laenas, son of the preceding. When consul in 132 B.C. he incurred the hatred of the democrats by his harsh measures as head of a special commission appointed to take measures against the accomplices of Tiberius Gracchus. In 123 Gaius Gracchus brought in a bill prohibiting all such commissions, and declared that, in accordance with the old laws of appeal, a magistrate who pronounced sentence of death 1 The name is said by Cicero to be derived from laena, the sacer- dotal cloak carried by Marcus Popillius (consul 359) when he went to the forum to quell a popular rising.

against a citizen, without the people's assent, should be guilty of high treason. It is not known whether the bill contained a retrospective clause against Laenas, but he left Rome and sentence of banishment from Italy was pronounced against him. After the restoration of the aristocracy the enactments against him were cancelled, and he was recalled (121).

See Cicero, Brutus, 25. 34, and De domo sua, 31; Veil. Pat. ii. 7; Plutarch, C. Gracchus, 4.

LAER (or Laar), PIETER VAN (1613-c. 1675), Dutch painter, was born at Laaren in Holland. The influence of a long stay in Rome begun at an early age is seen in his landscape and back- grounds, but in his subjects he remained true to the Dutch tradition, choosing generally lively scenes from peasant life^ as markets, feasts, bowling scenes, farriers' shops, robbers, hunting scenes and peasants with cattle. From this taste, or from his personal deformity, he was nicknamed

Bamboccio by the Italians. On his return to Holland about 1639, ne lived chiefly at Amsterdam and Haarlem, in which latter city he died in 1674 or 1675. His pictures are marked by skilful composition and good drawing; he was especially careful in perspective. His colouring, according to Crowe, is ” generally of a warm, brownish tone, sometimes very clear, but oftener heavy, and his execution broad and spirited.” Certain etched plates are also attributed to him.

LAESTRYGONES, a mythical race of giants and cannibals. According to the Odyssey (x. 80) they dwelt in the farthest north, where the nights were so short that the shepherd who was driving out his flock met another driving it in. This feature of the tale contains some hint of the long nightless summer in the Arctic regions, which perhaps reached the Greeks through the merchants who fetched amber from the Baltic coasts. Odysseus in his wanderings arrived at the coast inhabited by the Laestry- gones, and escaped with only one ship, the rest being sunk by the giants with masses of rock. Their chief city was Telepylus, founded by a former king Lamus, their ruler at that time being Antiphates. This is a purely fanciful name, but Lamus takes us into a religious world where we can trace the origin of the legend, and observe the god of an older religion becoming the subject of fairy tales (see Lamia) in a later period.

The later Greeks placed the country of the Laestrygones in Sicily, to the south of Aetna, near Leontini; but Horace {Odes, iii. 16. 34) and other Latin authors speak of them as living in southern Latium, near Formiae, which was supposed to have been founded by Lamus.

LAETUS, JULIUS POMPONIUS [Giulio Pomponio Leto], (142 5-1498), Italian humanist, was born at Salerno. He studied at Rome under Laurentius Valla, whom he succeeded (1457) as professor of eloquence in the Gymnasium Romanum. About this time he founded an academy, the members of which adopted Greek and Latin names, met on the Quirinal to discuss classical questions and celebrated the birthday of Romulus. Its constitu- tion resembled that of an ancient priestly college, and Laetus was styled pontifex maximus. The pope (Paul II.) viewed these proceedings with suspicion, as savouring of paganism, heresy and republicanism. In 1468 twenty of the academicians were arrested during the carnival; Laetus, who had taken refuge in Venice, was sent back to Rome, imprisoned and put to the torture, but refused to plead guilty to the charges of infidelity and immorality. For want of evidence, he was acquitted and allowed to resume his professorial duties; but it was for- bidden to utter the name of the academy even in jest. Sixtus IV. permitted the resumption of its meetings, which continued to be held till the sack of Rome (1527) by

Constable Bourbon during the papacy of Clement VII. Laetus continued to teach in Rome until his death on the 9th of June 1498. As a teacher, Laetus, who has been called the first head of a philological school, was extraordinarily successful; in his own words, like Socrates and Christ, he expected to live on in the person of his pupils, amongst whom were many of the most famous scholars of the period. His works, written in pure and simple Latin, were published in a collected form {Opera Pomponii Laeti varia, 1521). They contain treatises on the Roman magistrates, priests and lawyers, and a compendium of Roman history from

the death of the younger Gordian to the time of Justin III. Laetus also wrote commentaries on classical authors, and pro- moted the publication of the editio princeps of Virgil at Rome in 1469.

See The Life of Leto by Sabellicus (Strassburg, 1510) ; G. Voigt, Die Wiederbelebung des klassischen Alterthums, ii. ; F. Gregorovius, Geschichte der Stadt Rom im Mittelalter, vii. (1894), p. 576, for an account of the academy; Sandys, History of Classical Scholarship (1908), ii. 92.

LAEVIUS (? c. 80 B.C.), a Latin poet of whom practically nothing is known. The earliest reference to him is perhaps in Suetonius {De grammaticis, 3), though it is not certain that the Laevius Milissus there referred to is the same person. Definite references do not occur before the 2nd century (Fronto, Ep. ad M. Caes. i. 3; Aulus Gellius, Noct. Att. ii. 24, xii. 10, xix. 9 ; Apuleius, De magia, 30; Porphyrion, Ad Horat. carm. iii. 1,2). Some sixty miscellaneous lines are preserved (see Bahrens, Fragm. poet. rom. pp. 287-293), from which it is difficult to see how ancient critics could have regarded him as the master of Ovid or Catullus. Gellius and Ausonius state that he composed an Erotopaegnia, and in other sources he is credited with Adonis, Alcestis, Centauri, Helena, Ino, Protesilaudamia, Sirenocirca, Phoenix, which may, however, be only the parts of the Eroto- paegnia. They were not serious poems, but light and often licentious skits on the heroic myths.

See O. Ribbeck, Geschichte der romischen Dichtung, i.; H. de la Ville de Mirmont, Htude biographique et litteraire surle poete Laevius

(Paris, 1900), with critical ed. of the fragments, and remarks on vocabulary and syntax; A. Weichert, Poetarum latinorum reliquiae (Leipzig, 1830); M. Schanz, Geschichte der romischen Litteratur (2nd ed.), pt*. i. p. 163; W. Teuffel, Hist, of Roman Literature (Eng. tr.), § 150, 4; a convenient summary in F.PIessis, La Poesie latine (1909), pp. 139-142-

LAEVULINIC ACID ((3-acetopropionic acid), C 5 H 8 3 or CH 3 COCH 2 CH 2 -C0 2 H, a ketonic acid prepared from laevulose, inulin, starch, &c, by boiling them with dilute hydrochloric or sulphuric acids. It may be synthesized by condensing sodium acetoacetate with monochloracetic ester, the acetosuccinic ester produced being then hydrolysed with dilute hydrochloric acid (M. Conrad, Ann., 1877, 188, p. 222).

CH s -CO-CH-Na CH 3 -CO-CH-CH 2 -C0 2 R

1 -> I -ˆCH 3 COCH 2 -CH 2 -C0 2 OH.

C0 2 R C0 2 R

It may also be prepared by heating the anhydride of -y-methyloxy-glutaric acid with concentrated sulphuric acid, and by oxidation of methyl heptenone and of geraniol. It crystallizes in plates, which melt at 32-5-33° C. and boil at 148-149 (15 mm.) (A. Michael, Jour. prak. Chem., 1891 [2], 44, p. 114). It is readily soluble in alcohol, ether and water. The acid, when distilled slowly, is decomposed and yields a and ˆ-angelica lactones. When heated with hydriodic acid and phosphorus, it yields ˆ-valeric acid; and with iodine and caustic soda solution it gives iodoform, even in the cold. With hydroxylamine it yields an oxime, which by the action of concentrated sulphuric acid rearranges itself to N-methylsuccinimide [CH 2 CO] 2 N-CH 3 .

LA FARGE, JOHN (1835-1910), American artist, was born in New York, on the 31st of March 1835, of French parentage. He received instruction in drawing from his grandfather, Binsse de St Victor, a painter of miniatures; studied law and architecture; entered the atelier of Thomas Couture in Paris, where he remained a short time, giving especial attention to the study and copying of old masters at the Louvre; and began by making illustrations to the poets (1859). An intimacy with the artist William M. Hunt had a strong influence on him, the two working together at Newport, Rhode Island. La Farge painted landscape, still life and figure alike in the early sixties. But from 1866 on he was for some time incapacitated for work, and when he regained strength he did some decorative work for Trinity church,

Boston, in 1876, and turned his attention to stained glass, becoming president of the Society of Mural Painters. Some of his important commissions include windows for St Thomas's church (1877), St Peter's church, the Paulist church, the Brick church (1882), the churches of the Incarnation (1885) and the Ascension (1887), New York; Trinity church,

Buffalo, and the " Battle Window " in Memorial Hall at Harvard; ceilings and windows for the house of Cornelius Vanderbilt, windows for the houses of W. H. Vanderbilt and D. 0. Mills, and panels for the house of Whitelaw Reid, New York; panels for the Congressional Library, Washington; Bowdoin College, the Capitol at St Paul, Minn., besides designs for many stained glass windows. He was also a prolific painter in oil and water colour, the latter seen notably in some water-colour sketches, the result of a voyage in the South Seas, shown in 1895. His influence on American art was powerfully exhibited in such men as Augustus St Gaudens, Wilton Lockwood, Francis Lathrop and John Humphreys Johnston. He became president of the Society of American Artists, a member of the National Academy of Design in 1869; an officer of the Legion of Honour of France; and received many medals and decorations. He published Considerations on Painting (New York, 1895), HokHsai: A Talk about Hoksuai (New York, 1897), and An Artist's Letters from Japan (New York, 1897).

See Cecilia Waern, John La Farge, Artist and Writer (London, 1896, No. 26 of The Portfolio).

LA FARINA, GIUSEPPE (1815-1863), Italian author and politician, was born at Messina. On account of the part he took in the insurrection of 1837 he had to leave Sicily, but returning in 1839 he conducted various newspapers of liberal tendencies, until his efforts were completely interdicted, when he removed to Florence. In 1840 he had published Messina ed i suoi monu- menti, and after his removal to Florence he brought out La Germania coi suoi monumenti (1842), V Italia coi suoi monu- menti (1842), La Svizzera storica ed artistica (1842-1843), La China, 4 vols. (1843-1847), and Storia d' Italia, 7 vols. (1846-1854). In 1847 he established at Florence a democratic journal, L' Alba, in the interests of Italian freedom and unity, but on the outbreak of the revolution in Sicily in 1848 he returned thither and was elected deputy and member of the committee of war. In August of that, year he was appointed minister of public instruction and later of war and marine. After vigorously conducting a campaign against the Bourbon troops, he was forced into exile, and repaired to France in 1849. In 1850 he published his Storia documentata della Rivoluzione Siciliana del 1848-1849, and in 1851-1852 his Storia d'

Italia dal 1815 al 184.8, in 6 vols. He returned to Italy in 1854 and settled at Turin, and in 1856 he founded the Piccolo Corriere d' Italia, an organ which had great influence in propagating the political sentiments of the Societa Nazionale Italiana, of which he ulti- mately was chosen president. With Daniele Manin (q.v.), one of the founders of that society, he advocated the unity of Italy under Victor Emmanuel even before Cavour, with whom at one time he had daily interviews, and organized the emigration of volunteers from all parts of Italy into the Piedmontese army. He also negotiated an interview between Cavour and Garibaldi, with the result that the latter was appointed commander of the Cacciatori delle Alpi in the war of 1859. Later he supported Garibaldi's expedition to Sicily, where he himself went soon after the occupation of Palermo, but he failed to bring about the immediate annexation of the island to Piedmont as Cavour wished. In i860 he was chosen a member of the first Italian parliament and was subsequently made councillor of state. He died on the 5th of September 1863.

See A. Franchi, Epistolario di Giuseppe La Farina (2 vols., 1869) and L. Carpi, // Risorgimento Italiano, vol. i. (Milan, 1884).

LA FAYETTE, GILBERT MOTIER DE (1380-1462), marshal of France, was brought up at the court of Louis II., 3rd duke of Bourbon. He served under Marshal Boucicaut in Italy, and on his return to France after the evacuation of Genoa in 1409 became seneschal of the Bourbonnais. In the English wars he was with John I., 4th duke of Bourbon, at the capture of Soubise in 14 13, and of Compiegne in 141 5. The duke then made him lieutenant-general in Languedoc and Guienne. He failed to defend Caen and Falaise in the interest of the dauphin (after- wards Charles VII.) against Henry V. in 1417 and 1418, but in the latter year he held Lyons for some time against Jean sans Peur, duke of Burgundy. A series of successes over the English

and Burgundians on the Loire was rewarded in 1420 with the government of Dauphiny and the office of marshal of France. La Fayette commanded the Franco-Scottish troops at the battle of Bauge (1422), though he did not, as has been sometimes stated, slay Thomas, duke of Clarence, with his own hand. In 1424 he was taken prisoner by the English at Verneuil, but was released shortly afterwards, and fought with Joan of Arc at Orleans and Patay in 1429. The marshal had become a member of the grand council of Charles VII., and with the exception of a short disgrace about 1430, due to the ill-will of Georges de la Tremouille, he retained the royal favour all his life. He

took an active part in the army reform initiated by Charles VII., and the establishment of military posts for the suppression of brigand- age. His last campaign was against the English in Normandy in 1449. He died on the 23rd of February 1462. His line was continued by Gilbert IV. de La Fayette, son of his second marriage with Jeanne de Joyeuse.

LA FAYETTE, LOUISE DE (c. 1616-1665), was one of the fourteen children of John, comte de La Fayette, and Marguerite de Bourbon-Busset. Louise became maid of honour to Anne of Austria, and Richelieu sought to attract the attention of Louis XIII. to her in the hope that she might counterbalance the influence exercised over him by Marie de Hautefort. The affair did not turn out as the minister wished. The king did indeed make her the confidante of his affairs and of his resentment against the cardinal, but she, far from repeating his confidences to the minister, set herself to encourage the king in his resistance to Richelieu's dominion. She refused, nevertheless, to become Louis's mistress, and after taking leave "of the king in Anne of Austria's presence retired to the convent of the Filles de Sainte- Marie in 1637. Here she was repeatedly visited by Louis, with whom she maintained a correspondence. Richelieu intercepted the letters, and by omissions and falsifications succeeded in destroying their mutual confidence. The cessation of their intercourse was regretted by the queen, who had been reconciled with her husband through the influence of Louise. At the time of her death in January 1665 Mile de La Fayette was superior of a convent of her order which she had founded at Chaillot.

See Memoires de Madame de Motteville; Victor Cousin, Madame de Hautefort (Paris, 1868); LAbbe Sorin, Louise-Angele de La Fayette (Paris, 1893).

LA FAYETTE, MARIE JOSEPH PAUL YVES ROCH GILBERT DU MOTIER, Marquis de (i 757-1834), was born at the chateau of Chavaniac in Auvergne, France, on the 6th of September 1757. His father 1 was killed at Minden in 1759, and his mother and his grandfather died in 1770, and thus at the age of thirteen he was left an orphan with a princely fortune. He married at sixteen Marie Adrienne Francoise de Noailles (d. 1807), daughter of the due d'Ayen and granddaughter of the due de Noailles, then one of the most influential families in the kingdom. La Fayette chose to follow the career of his father, and entered the Guards.

La Fayette was nineteen and a captain of dragoons when the English colonies in America proclaimed their independence. " At the first news of this quarrel," he afterwards wrote in his memoirs, " my heart was

enrolled in it." The count de Broglie, whom he consulted, discouraged his zeal for the cause of liberty. Finding his purpose unchangeable, however, he presented the young enthusiast to Johann Kalb, who was also seeking service in America, and through Silas Deane, American agent in Paris, an arrangement was concluded, on the 7th of December 1776, by which La Fayette was to enter the American service as major- general. At this moment the news arrived of grave disasters to the American arms. La Fayette's friends again advised him to abandon his purpose. Even the American envoys, Franklin and Arthur Lee, who had superseded Deane, withheld further encouragement and the king himself forbade his leaving. At the instance of the British ambassador at Versailles orders were issued to seize the ship La Fayette was fitting out at Bordeaux, and La Fayette himself was arrested. But the ship was sent

1 The family of La Fayette, to the cadet branch of which he be- longed, received its name from an estate in Aix, Auvergne, which belonged in the 13th century to the Motier family.

from Bordeaux to a neighbouring port in Spain, La Fayette escaped from custody in disguise, and before a second lettre de cachet could reach him he was afloat with eleven chosen companions. Though two British cruisers had been sent in pursuit of him, he landed safely near Georgetown, S.C., after a tedious voyage of nearly two months, and hastened to Phila- delphia, then the seat of government of the colonies.

When this lad of nineteen, with the command of only what little English he had been able to pick up on his voyage, pre- sented himself to Congress with Deane's authority to, demand a commission of the highest rank after the commander-in-chief, his reception was a little chilly. Deane's contracts were so numerous, and for officers of such high rank, that it was impossible for Congress to ratify them without injustice to Americans who had become entitled by their service to promotion. La Fayette appreciated the situation as soon as it was explained to him, and immediately expressed his desire to serve in the American army upon two conditions — that he should receive no pay, and that he should act as a volunteer. These terms were so different from those made by other foreigners, they had been attended with such substantial sacrifices, and they promised such import- ant indirect advantages, that Congress passed a resolution, on the 31st of July 1777, " that his services be accepted, and that, in consideration of his zeal, illustrious family and connexions, he have the rank and

commission of major-general of the United States." Next day La Fayette met Washington, whose lifelong friend he became. Congress intended his appointment as purely honorary, and the question of giving him a command was left entirely to Washington's discretion. His first battle was Brandy- wine (q.v.) on the nth of September 1777, where he showed courage and activity and received a wound. Shortly afterwards he secured what he most desired, the command of a division — the immediate result of a communication from Washington to Congress of November 1, 1777, in which he said: —

" The marquis de La Fayette is extremely solicitous of having a command equal to his rank. I do not know in what light Congress will view the matter, but it appears to me, from a consideration of his illustrious and important connexions, the attachment which he has manifested for our cause, and the consequences which his return in disgust might produce, that it will be advisable to gratify his wishes, and the more so as several gentlemen from France who came over under some assurances have gone back disappointed in their expectations. His conduct with respect to them stands in a favourable point of view — having interested himself to remove their uneasiness and urged the impropriety of their making any unfavour- able representations upon their arrival at home. Besides, he is sensible, discreet in his manners, has made great proficiency in our language, and from the disposition he discovered at the battle of Brandywine possesses a large share of bravery and military ardour." Of La Fayette's military career in the United States there is not much to be said. Though the commander of a division, he never had many troops in his charge, and whatever military talents he possessed were not of the kind which appeared to conspicuous advantage on the theatre to which his wealth and family influence rather than his soldierly gifts had called him. In the first months of 1778 he commanded troops detailed for the projected expedition against Canada. His retreat from Barren Hill (May 28, 1778) was commended as masterly; and he fought at the battle of Monmouth (June 28,) and received from Congress a formal recognition of his services in the Rhode Island expedition (August 1778).

The treaties of commerce and defensive alliance, signed by the insurgents and France on the 6th of February 1778, were promptly followed by a declaration of war by England against the latter, and La Fayette asked leave to revisit France and to consult his king as to the further direction of his services. This leave was readily granted; it was not difficult for Washington to replace the major-general, but it was impossible to find another equally competent, influential and devoted champion of the American cause near the court of Louis XVI. In fact,

he went on a mission rather than a visit. He embarked on the nth of January 1779, was received with enthusiasm, and was made a colonel in the French cavalry. On the 4th of March following Franklin wrote to the president of Congress: ” The marquis de La Fayette. . . is infinitely esteemed and beloved here, and I am persuaded will

do everything in his power to merit a continuance of the same affection from America.” He won the confidence of Vergennes. La Fayette was absent from America about six months, and his return was the occasion of a complimentary resolution of Congress. From April until October 1781 he was charged with the defence of Virginia, in which Washington gave him the credit of doing all that was possible with the forces at his disposal; and he showed his zeal by borrowing money on his own account to provide his soldiers with necessaries. The battle of Yorktown, in which La Fayette bore an honourable if not a distinguished part, was the last of the war, and terminated his military career in the United States. He immediately obtained leave to return to France, where it was supposed he might be useful in negotiations for a general peace. He was also occupied in the preparations for a combined French and Spanish expedition against some of the British West India Islands, of which he had been appointed chief of staff, and a formidable fleet assembled at Cadiz, but the armistice signed on the 20th of January 1783 between the belligerents put a stop to the expedition. He had been pro- moted (1781) to the rank of marechal de camp (major-general) in the French army, and he received every token of regard from his sovereign and his countrymen. He visited the United States again in 1784, and remained some five months as the guest of the nation.

La Fayette did not appear again prominently in public life until 1787, though he did good service to the French Protestants, and became actively interested in plans to abolish slavery. In 1787 he took his seat in the Assembly of Notables. He demanded, and he alone signed the demand, that the king convoke the states-general, thus becoming a leader in the French Revolution. He showed Liberal tendencies both in that assembly and after its dispersal, and in 1788 was de- prived, in consequence, of his active command. In 1789 La Fayette was elected to the states-general, and took a prominent part in its proceedings. He was chosen vice-president of the National Assembly, and on the nth of

July 1789 presented a declaration of rights, modelled on Jefferson's Declaration of Independence in 1776. On the 15th of July, the second day of the new regime, La Fayette was chosen by acclamation colonel-general of the new National Guard of Paris. He also proposed the combination of the colours of Paris, red and blue, and the royal white, into the famous tricolour cockade of modern France (July 17). For the succeeding three years, until the end of the constitutional monarchy in 1792, his history is largely the history of France. His life was beset with very great responsibility and perils, for he was ever the minister of humanity and order among a frenzied people who had come to regard order and humanity as phases of treason. He rescued the queen from the hands of the populace on the 5th and 6th of October 1789, saved many humbler victims who had been condemned to death, and he risked his life in many unsuccessful attempts to rescue others. Before this, disgusted with enormities which he was powerless to prevent, he had resigned his commission; but so impossible was it to replace him that he was induced to resume it. In the Constituent Assembly he pleaded for the abolition of arbitrary imprisonment, for religious tolerance, for popular representation, for the establishment of trial by jury, for the gradual emancipation of slaves, for the freedom of the press, for the abolition of titles of nobility, and the suppression of privileged orders. In February 1790 he refused the supreme command of the National Guard of the kingdom. In May he founded the " Society of 1789 " which afterwards became the Feuillants Club. He took a prominent part in the celebration of July 14, 1790, the first anniversary of the destruction of the Bastille. After suppressing an imeute in April 1791 he again resigned his commission, and was again compelled to retain it. He was the friend of liberty as well as of order, and when Louis XVI. fled to Varennes he issued orders to stop him. Shortly afterwards he was made lieutenant-general in the army. He commanded the troops in the suppression of another emeute, on the occasion of the proclamation of the constitution (September 18, 1791), after which, feeling that his task was done, he retired into private life. This did not prevent

his friends from proposing him for the mayoralty of Paris in opposition to Petion.

When, in December 1791, three armies were formed on the western frontier to attack Austria, La Fayette was placed in command of one of them. But events moved faster than La Fayette's moderate and humane republicanism, and seeing that the lives of the king and queen were each day more and more in danger, he definitely opposed himself to the further advance of the Jacobin party, intending eventually to use his army for the restoration of a limited monarchy.

On the 19th of August 1792 the Assembly declared him a traitor. He was compelled to take refuge in the neutral territory of Liege, whence as one of the prime movers in the Revolution he was taken and held as a prisoner of state for five years, first in Prussian and afterwards in Austrian prisons, in spite of the intercession of America and the pleadings of his wife. Napoleon, however, though he had a low opinion of his capacities, stipulated in the treaty of Campo Formio (1797) for La Fayette's release. He was not allowed to return to France by the Directory. He returned in 1799; in 1802 voted against the life consulate of Napoleon; and in 1804 he voted against the imperial title. He lived in retirement during the First Empire, but returned to public affairs under the First Restoration and took some part in the political events of the Hundred Days. From 1818 to 1824 he was deputy for the Sarthe, speaking and voting always on the Liberal side, and even becoming a carbonaro. He then revisited America (July 1824-September 1825) where he was overwhelmed with popular applause and voted the sum of $200,000 and a township of land. From 1825 to his death he sat in the Chamber of Deputies for Meaux. During the revolution of 1830 he again took command of the National Guard and pursued the same line of conduct, with equal want of success, as in the first revolution. In 1834 he made his last speech — on behalf of Polish political refugees. He died at Paris on the 20th of May 1834. In 1876 in the city of New York a monument was erected to him, and in 1883 another was erected at Puy.

Few men have owed more of their success and usefulness to their family rank than La Fayette, and still fewer have abused it less. He never achieved distinction in the field, and his political career proved him to be incapable of ruling a great national movement; but he had strong convictions which always impelled him to study the interests of humanity, and a pertinacity in maintaining them, which, in all the strange vicissi- tudes of his eventful life, secured him a very unusual measure of public respect. No citizen of a foreign country has ever had so many and such warm admirers in America, nor does any states- man in France appear to have ever possessed uninterruptedly for so many years so large a measure of popular influence and respect. He had what Jefferson called a " canine appetite " for popularity and fame, but in him the appetite only seemed to make him more anxious to merit the fame which he enjoyed. He was brave to rashness; and he never shrank from danger or responsibility if he saw the way open to spare life or suffering, to protect the defenceless, to sustain the law and preserve order. His son, Georges Washington Motier de La Fayette (1779-1849), entered the army and was aide-de-camp to General Grouchy through the Austrian, Prussian and Polish (1805-07)

campaigns. Napoleon's distrust of his father rendering promo- tion improbable, Georges de La Fayette retired into private life in 1807 until the Restoration, when he entered the Chamber of Representatives and voted consistently on the Liberal side. He was away from Paris during the revolution of July 1830, but he took an active part in the " campaign of the banquets," which led up to that of 1848. He died in December of the next year. His son, Oscar Thomas Gilbert Motier de La Fayette (1815-1881), was educated at the Ecole Polytechnique, and served as an artillery officer in Algeria. He entered the Chamber of Representatives in 1846 and voted, like his father, with the extreme Left. After the revolution of 1848 he received a post in the provisional government, and as a member of the Con- stituent Assembly he became secretary of the war committee. After the dissolution of the Legislative Assembly in 1851, he retired from public life, but emerged on the establishment of

the third republic, becoming a life senator in 1875. His brother Edmond Motier de La Fayette (1818-1890) shared his political opinions. He was one of the secretaries of the Constituent Assembly, and a member of the senate from 1876 to 1888.

See Memoires historiques et pieces authentiques sur M. de La Fayette pour servir a I'histoire des revolutions (Paris, An II., 1793- 1794); B. Sarrans, La Fayette et la Revolution de 1830, histoire des choses et des hommes de Juillet (Paris, 1834); Memoires, correspond- ances et manuscrits de La Fayette, published by his family (6 vols., Paris, 1837-1838); Regnault Warin, Memoires pour servir a la vie du general La Fayette (Paris, 1824) ; A. Bardoux, La jeunesse de La Fayette (Paris, 1892); Les Demieres annees de La Fayette (Paris, 1893); E. Charavaray, Le General La Fayette (Paris, 1895); A. Levasseur, La Fayette en Amerique 1824 (Paris, 1829); J. Cloquet, Souvenirs de la vie privee du general La Fayette (Paris, 1836); Max Budinger, La Fayette in Oesterreich (Vienna, 1898); and M. M. Crawford, The Wife of Lafayette (1908) ; Bayard Tuckerman, Life of Lafayette (New York, 1889) ; Charlemagne Tower, The Marquis de La Fayette in the American Revolution (Philadelphia, 1895).

LA FAYETTE, MARIE-MADELEINE PIOCHE DE LA VERGNE, Comtesse de (1634-1692), French novelist, was baptized in Paris, on the 18th of March 1634. Her father, Marc Pioche de la Vergne, commandant of Havre, died when she was sixteen, and her mother seems to have been

more occupied with her own than her daughter's interests. Mme de la Vergne married in 1651 the chevalier de Sevigne, and Marie thus became connected with Mme de Sevigne, who was destined to be a lifelong friend. She studied Greek, Latin and Italian, and in- spired in one of her tutors, Gilles de Menage, an enthusiastic admiration which he expressed in verse in three or four languages. Marie married in 1655 Francois Motier, comte de La Fayette. They lived on the count's estates in Auvergne, according to her own account (in a letter to Menage) quite happily; but after the birth of her two sons her husband disappeared so effectually that it was long supposed that he died about 1660, though he really lived until 1683. Mme de La Fayette had returned to Paris, and about 1665 contracted an intimacy with the due de la Rochefoucauld, then engaged on his Maximes. The con- stancy and affection that marked this liaison on both sides justified it in the eyes of society, and when in 1680 La Rochefou- cauld died Mme de La Fayette received the sincerest sympathy. Her first novel, La Princesse de Montpensier, was published anonymously in 1662; Zayde appeared in 1670 under the name of J. R. de Segrais; and in 1678 her masterpiece, La Princesse de Cleves, also under the name of Segrais. The history of the modern novel of sentiment begins with the Princesse de Cleves. The interminable pages of Mile de Scudery with the Precieuses and their admirers masquerading as Persians or ancient Romans had already been discredited by the burlesques of Paul Scarron and Antoine Furetiere. It remained for Mme de La Fayette to achieve the more difficult task of substituting something more satisfactory than the disconnected episodes of the roman comique. This she accomplished in a story offering in its short- ness and simplicity a complete contrast to the extravagant and lengthy romances of the time. The interest of the story depends not on incident but on the characters of the personages. They act in a perfectly reasonable way and their motives are analysed with the finest discrimination. No doubt the semi- autobiographical character of the material partially explains Mme de La Fayette's refusal to acknowledge the book. Con- temporary critics, even Mme de Sevigne amongst them, found fault with the avowal made by Mme de Cleves to her husband. In answer to these criticisms, which her anonymity prevented her from answering directly, Mme de La Fayette wrote her last novel, the Comtesse de Tende.

The character of her work and her history have combined to give an impression of melancholy and sweetness that only represents one side of her character, for a correspondence brought to light comparatively recently showed her as the acute diplomatic agent of Jeanne de Nemours, duchess of Savoy, at the court of Louis XIV. She had from

her early days also been intimate with Henrietta of England, duchess of Orleans, under whose immediate direction she wrote her Histoire de Madame Henrieltc d'Angleterre, which only appeared in 1720. She wrote

memoirs of the reign of Louis XIV., which, with the exception of two chapters, for the years 1688 and 1689 (published at Amsterdam, 173 1), were lost through her son's carelessness. Madame de La Fayette died on the 25th of May 1692.

See Sainte-Beuve, Portraits de femmes; the comte d'Haussonville, Madame de La Fayette (1891), in the series of Grands ecrivains francais; M. de Lescure's notice prefixed to an edition of the Princesse de Cleves (188 1); and a critical edition of the historical memoirs by Eugene Asse (1890). See also L. Rea, Marie Madeleine, comtesse de La Fayette (1908).

LAFAYETTE, a city and the county-seat of Tippecanoe county, Indiana, U.S.A., situated at the former head of naviga- tion on the Wabash river, about 64 m. N.W. of Indianapolis. Pop. (1900) 18,116, of whom 2266 were foreign-born; (1910 census) 20,081. It is served by the Chicago, Indianapolis & Louisville, the Cleveland, Cincinnati, Chicago & St Louis, the Lake Erie & Western, and the Wabash railways, and by the Terre Haute, Indianapolis & Eastern (electric), and the Fort Wayne & Wabash Valley (electric) railways. The river is not now navigable at this point. Lafayette is in the valley of the Wabash river, which is sunk below the normal level of the plain, the surrounding heights being the walls of the Wabash basin. The city has an excellent system of public schools, a good public library, two hospitals, the Wabash Valley Sanitarium (Seventh Day Adventist), St Anthony's Home for old people and two orphan asylums. It is the seat of Purdue University, a co-educa- tional, technical and agricultural institution, opened in 1874 and named in honour of John Purdue (1802-1876), who gave it $150,000. This university is under state control, and received the proceeds of the Federal agricultural college grant of 1862 and of the second Morrill Act of 189c; in connexion with it there is an agricultural experiment station. It had in 1908-1909 180 instructors, 1900 students, and a library of 25,000 volumes and pamphlets. Just outside the city is the State Soldiers' Home, where provision is also made for the wives and widows of soldiers; in 1908 it contained 553 men and 700 women. The city lies in the heart of a rich agricultural region, and is an important market for grain, produce and horses. Among its manufactures are beer, foundry and machine shop products (the Chicago, Indianapolis & Louisville railway has shops here), straw board, telephone apparatus, paper, wagons,

packed meats, canned goods, flour and carpets; the value of the factory product increased from $3,514,276 in 1900 to $4,631,415 in 1905, or 31-8%. The municipality owns its water works.

Lafayette is about 5 m. N.E. of the site of the ancient Wea (Miami) Indian village known as Ouiatanon, where the French established a post about 1720. The French garrison gave way to the English about 1760; the stockade fort was destroyed during the conspiracy of Pontiac, and was never rebuilt. The head-quarters of Tecumseh and his brother, the ” Prophet,” were established 7 m. N. of Lafayette near the mouth of the Tippecanoe river, and the settlement there was known as the ” Prophet’s Town.” Near this place, and near the site of the present village of Battle Ground (where the Indiana Methodists now have a summer encampment and a camp meeting in August), was fought on the 7 th of November 181 1 the battle of Tippecanoe, in which the Indians were decisively defeated by Governor William Henry Harrison, the whites losing 188 in killed and wounded and the Indians about an equal number. The battle ground is owned by the state; in 1907 the state legislature and the United States Congress each appropriated $12,500 for a monument, which took the form of a granite shaft; 90 ft. high. The first American settlers on the site of Lafayette appeared about 1820, and the town was laid out in 1825, but for many years its growth was slow. The completion of the Wabash and Erie canal marked a new era in its development, and in 1854 Lafayette was incorporated.

LA FERT6, the name of a number of localities in France, differentiated by agnomens. La Ferte Imbault (department of Loir-et-Cher) was in the possession of Jacques d’fitampes (1590-1668), marshal of France and ambassador in England,

who was known as the marquis of La Ferte Imbault. La Ferte Nabert (the modern La Ferte Saint Aubin, department of Loiret) was acquired in the 16th century by the house of Saint Nectaire (corrupted to Senneterre), and erected into a duchy in the peerage of France (duche-pairie) in 1665 for Henri de Saint Nectaire, marshal of France. It was called La Ferte Lowendal after it had been acquired by Marshal Lowendal in 1748.

LA FERT13-BERNARD, a town of western France, in the department of Sarthe, on the Huisne, 27 m. N.E. of Le Mans, on the railway from

Paris to that town. Pop. (1906) 4358. La Ferte carries on cloth manufacture and flour-milling and has trade in horses and cattle. Its church of Notre Dame has a choir (16th century) with graceful apse-chapels of Renaissance architecture and remarkable windows of the same period; the remainder of the church is in the Flamboyant Gothic style. The town hall occupies the superstructure and flanking towers of a fortified gateway of the 15th century.

La Ferte-Bernard owes its origin and name to a stronghold (jermeti) built about the nth century and afterwards held by the family of Bernard. In 1424 it did not succumb to the English troops till after a four months' siege. It belonged in the 16th century to the family of Guise and supported the League, but was captured by the royal forces in 1590.

LA FERTˆ-MILON, a town of northern France in the depart- ment of Aisne on the Ourcq, 47 m. W. by S. of Reims by rail. Pop. (1906) 1563. The town has imposing remains comprising one side flanked by four towers of an unfinished castle built about the beginning of the 15th century by Louis of Orleans, brother of Charles VI. The churches of St Nicholas and Notre- Dame, chiefly of the 16th century, both contain fine old stained glass. Jean Racine, the poet, was born in the town, and a statue by David d' Augers has been erected to him.

LAFFITTE, JACQUES (1767-1844), French banker and politician, was born at Bayonne on the 24th of October 1767, one of the ten children of a carpenter. He became clerk in the banking house of Perregaux in Paris, was made a partner in the business in 1800, and in 1804 succeeded Perregaux as head of the firm. The house of Perregaux, Laffitte et Cie. became one of the greatest in Europe, and Laffitte bejame regent (1809), then governor (1814) of the Bank of France and president of the Chamber of Commerce (1814). He raised large sums of money for the provisional government in 18 14 and for Louis XVIII. during the Hundred Days, and it was with him that Napoleon deposited five million francs in gold before leaving France for the last time. Rather than permit the govern- ment to appropriate the money from the Bank he supplied two million from his own pocket for the arrears of the imperial troops after Waterloo. He was returned by the department of the Seine to the Chamber of Deputies in 1816, and took his seat on the Left. He spoke chiefly on financial questions; his known Liberal views did not prevent Louis XVIII. from insisting on his inclusion on the commission on the public finances. In 18 1 8 he saved Paris from a financial crisis by buying a large amount of stock, but next year, in consequence of his heated defence of the liberty of the press and the electoral law of 1867, the governorship of the Bank was

taken from him. One of the earliest and most determined of the partisans of a constitutional monarchy under the duke of Orleans, he was deputy for Bayonne in July 1830, when his house in Paris became the headquarters of the revolutionary party. When Charles X., after retracting the hated ordinances, sent the comte d'Argout 1 to Laffitte to negotiate a change of ministry, the banker replied, " It is too late. There is no longer a Charles X.," and it was he who secured the nomination of Louis Philippe as lieutenant-general of the kingdom. On the 3rd of August he became president of the Chamber of Deputies, and on the 9th he received in this capacity Louis Philippe's oath to the new constitution. The clamour of the Paris mob for the death of the imprisoned ministers of Charles X., which in October culminated in riots, induced the

1 Apoilinaire Antoine Maurice, comte d'Argout (1782-1858), afterwards reconciled to the July monarchy, and a member of the Laffitte, Casimir-Perier and Thiers cabinets.

more moderate members of the government — including Guizot, the due de Broglie and Casimir-Perier — to hand over the administration to a ministry which, possessing the confidence of the revolutionary Parisians, should be in a better position to save the ministers from their fury. On the 5th of November, accordingly, Laffitte became minister-president of a government pledged to progress (mouvement), holding at the same time the portfolio of finance. The government was torn between the necessity for preserving order and the no less pressing necessity (for the moment) of conciliating the Parisian populace; with the result that it succeeded in doing neither one nor the other. The impeached ministers were, indeed, saved by the courage of the Chamber of Peers and the attitude of the National Guard; but their safety was bought at the price of Laffitte's popularity. His policy of a French intervention -in favour of the Italian revolutionists, by which he might have regained his popularity, was thwarted by the diplomatic policy of Louis Philippe. The resignation of Lafayette and Dupont de l'Eure still further undermined the government, which, incapable even of keeping order in the streets of Paris, ended by being discredited with all parties. At length Louis Philippe, anxious to free himself from the hampering control of the agents of his fortune, thought it safe to parade his want of confidence in the man who had made him king. Thereupon, in March 1831, Laffitte resigned, begging pardon of God and man for the part he had played in raising Louis Philippe to the throne. He left office politically and financially a ruined man. His affairs were wound up in 1836, and next year he created a credit bank, which prospered as long as he lived, but failed in 1848. He died in Paris on the 26th of May 1844.

See P. Thureau-Dangin, La Monarchic de Juillet (vol. i. 1884).

LAFFITTE, PIERRE (1823-1903), French Positivist, was born on the 21st of February 1823 at Beguey (Gironde). Residing at Paris as a teacher of mathematics, he became a disciple of Comte, who appointed him his literary executor. On the schism of the Positivist body which followed Comte's death, he was recognized as head of the section which accepted the full Comtian doctrine; the other section adhering to Littre, who rejected the religion of humanity as inconsistent with the materialism of Comte's earlier period. From 1853 Laffitte delivered Positivist lectures in the room formerly occupied by Comte in the rue Monsieur le Prince. He published Les Grands Types de Vhumanite (1875) and Cours de philosophic premiere (1889). In 1893 he was appointed to the new chair founded at the College de France for the exposition of the general history of science, and it was largely due to his inspiration that a statue to Comte was erected in the Place de la Sorbonne in 1902. He died on the 4th of January 1903.

LA FLECHE, a town of western France, capital of an arrond- issement in the department of Sarthe on the Loire, 31 m. S.S.W. of Le Mans by rail. Pop. (1906) town 7800; commune 10,663. The chief interest of the town lies in the Prytanee, a famous school for the sons of officers, originally a college founded for the Jesuits in 1607 by Henry IV. The buildings, including a fine chapel, were erected from 1620 to 1653 and are surrounded by a park. A bronze statue of Henry IV. stands in the market- place. La Fleche is the seat of a sub-prefect and of a tribunal of first instance, and carries on tanmng, flour-milling, and the manufacture of paper, starch, wooden shoes and gloves. It is an agricultural market.

The lords of La Fleche became counts of Maine about 1100, but the lordship became separate from the county and passed in the 16th century to the family of Bourbon and thus to Henry IV.

LAFONT, PIERRE CHERI (1797-1873), French actor, was born at Bordeaux on the 15th of May 1797. Abandoning his profession as assistant ship's doctor in the navy, he went to Paris to study singing and acting. He had some experience at a small theatre, and was preparing to appear at the Opera Comique when the director of the Vaudeville offered him an engagement. Here he made his debut in 182 1 in La Somnambule, and his good looks and excellent voice soon brought him into

public favour. After several years at the Nouveaut6s and the Vaudeville, on the burning of the latter in 1838 he went to England, and married, at Gretna Green, Jenny Colon, from whom he was soon divorced. On his return to Paris he joined the Varietes, where he acted for fifteen years in such plays as Le Chevalier de Saint Georges, Le Lion empaille, Une derniere conquete, &c. Another engagement at the Vaudeville followed, and one at the Gaiete, and he ended his brilliant career at the Gymnase in the part of the noble father in such plays as Les Vieux GarQons and Nos bons villageois. He died in Paris on the 19th of April 1873.

LA FONTAINE, JEAN DE (1621-1695), French poet, was born at Chateau Thierry in Champagne, probably on the 8th of July 1621. His father was Charles de La Fontaine, ” maitre des eaux et forets ” — a kind of deputy-ranger — of the duchy of Chateau Thierry; his mother was Francoise Pidoux. On both sides his family was of the highest provincial middle class, but was not noble; his father was also fairly wealthy. Jean, the eldest child, was educated at the college (grammar-school) of Reims, and at the end of his school days he entered the Oratory in May 1641, and the seminary of Saint-Magloire in October of the same year; but a very short sojourn proved to him that he had mistaken his vocation. He then apparently studied law, and is said to have been admitted as avocat, though there does not seem to be actual proof of this. He was, however, settled in life, or at least might have been so, somewhat early. In 1647 his father resigned his rangership in his favour, and arranged a marriage for him with Marie Hericart, a girl of sixteen, who brought him twenty thousand livres, and expectations. She seems to have been both handsome and intelligent, but the two did not get on well together. There appears to be absolutely no ground for the vague scandal as to her conduct, which was, for the most part long afterwards, raised by gossips or personal enemies of La Fontaine. All that is positively said against her is that she was a negligent housewife and an inveterate novel reader; La Fontaine himself was constantly away from home, was certainly not strict in point of conjugal fidelity, and was so bad a man of business that his affairs became involved in hopeless difficulty, and a separation de biens had to take place in 1658. This was a perfectly amicable transaction for the benefit of the family; by degrees, however, the pair, still without any actual quarrel, ceased to live together, and for the greater part of the last forty years of La Fontaine’s life he lived in Paris while his wife dwelt at Chateau Thierry, which, however, he frequently visited. One son was born to them in 1653, and was educated and taken care of wholly by his

mother.

Even in the earlier years of his marriage La Fontaine seems to have been much at Paris, but it was not till about 1656 that he became a regular visitor to the capital. The duties of his office, which were only occasional, were compatible with this non-residence. It was not till he was past thirty that his literary career began. The reading of Malherbe, it is said, first awoke poetical fancies in him, but for some time he attempted nothing but trifles in the fashion of the time — epigrams, ballades, rondeaux, &c. His first serious work was a translation or adaptation of the Eunuchus of Terence (1654). At this time the Maecenas of French letters was the Superintendant Fouquet, to whom La Fontaine was introduced by Jacques Jannart, a connexion of his wife's. Few people who paid their court to Fouquet went away empty-handed, and La Fontaine soon received a pension of 1000 livres (1659), on the easy terms of a copy of verses for each quarter's receipt. He began too a medley of prose and poetry, entitled Le Songe de Vaux, on Fouquet's famous country house. It was about this time that his wife's property had to be separately secured to her, and he seems by degrees to have had to sell everything of his own; but, as he never lacked powerful and generous patrons, this was of small importance to him. In the same year he wrote a ballad, Les Rieurs du Beau-Richard, and this was followed by many small pieces of occasional poetry addressed to various personages from the king downwards. Fouquet soon incurred the royal displeasure, but La Fontaine, like most of his literary proteges, was not unfaithful

to him, the well-known elegy Pleurez, nymphes de Vaux, being by no means the only proof of his devotion. Indeed it is thought not improbable that a journey to Limoges in 1663 in company with Jannart, and of which we have an account written to his wife, was not wholly spontaneous, as it certainly was not on Jannart's part. Just at this time his affairs did not look promis- ing. His father and himself had assumed the title of esquire, to which they were not strictly entitled, and, some old edicts on the subject having been put in force, an informer procured a sentence against the poet fining him 2000 livres. He found, however, a new protector in the duke and still more in the duchess of Bouillon, his feudal superiors at Chateau Thierry, and nothing more is heard of the fine. Some of La Fontaine's liveliest verses are addressed to the duchess, Anne Mancini, the youngest of Mazarin's nieces, and it is even probable that the taste of the duke and duchess for Ariosto had something to do with'the writing of his first work of real importance, the first book of the Contes, which appeared in 1664. He was then forty-three years old, and his previous printed productions had been comparatively trivial, though much of his work

was handed about in manuscript long before it was regularly published. It was about this time that the quartette of the Rue du Vieux Colombier, so famous in French literary history, was formed. It consisted of La Fontaine, Racine, Boileau and Moliere, the last of whom was almost of the same age as La Fontaine, the other two considerably younger. Chapelle was also a kind of outsider in the coterie. There are many anecdotes, some pretty obviously apocryphal, about these meetings. The most character- istic is perhaps that which asserts that a copy of Chapelain's unlucky Pucelle always lay on the table, a certain number of lines of which was the appointed punishment for offences against the company. The coterie furnished under feigned names the personages of La Fontaine's version of the Cupid and Psyche story, which, however, with Adonis, was not printed till 1669. Meanwhile the poet continued to find friends. In 1664 he was regularly commissioned and sworn in as gentleman to the duchess dowager of Orleans, and was installed in the Luxembourg. He still retained his rangership, and in 1666 we have something like a reprimand from Colbert suggesting that he should look into some malpractices at Chateau Thierry. In the same year appeared the second book of the Contes, and in 1668 the first six books of the Fables, with more of both kinds in 1671. In this latter year a curious instance of the docility with which the poet lent himself to any influence was afforded by his officiating, at the instance of the Port-Royalists, as editor of a volume of sacred poetry dedicated to the prince de Conti. A year after- wards his situation, which had for some time been decidedly flourishing, showed signs of changing very much for the worse. The duchess of Orleans died, and he apparently had to give up his rangership, probably selling it to pay debts. But there was always a providence for La Fontaine. Madame de la Sabliere, a woman of great beauty, of considerable intellectual power and of high character, invited him to make his home in her house, where he lived for some twenty years. He seems to have had no trouble whatever about his affairs thenceforward; and could devote himself to his two different lines of poetry, as well as to that of theatrical composition.

In 1682 he was, at more than sixty years of age, recognized as one of the first men of letters of France. Madame de Sevign6, one of the soundest literary critics of the time, and by no means given to praise mere novelties, had spoken of his second collection of Fables published in the winter of 1678 as divine; and it is pretty certain that this was the general opinion. It was not unreasonable, therefore, that he should present himself to the Academy, and, though the subjects of his Contes were scarcely calculated to propitiate that decorous assembly, while his attachment to Fouquet and to more than one

representative of the old Frondeur party made him suspect to Colbert and the king, most of the members were his personal friends. He was first proposed in 1682, but was rejected for Dangeau. The next year Colbert died and La Fontaine was again nominated. Boileau was also a candidate, but the first ballot gave the fabulist

sixteen votes against seven only for the critic. The king, whose assent was necessary, not merely for election but for a second ballot in case of the failure of an absolute majority, was ill-pleased, and the election was left pending. Another vacancy occurred, however, some months later, and to this Boileau was elected. The king hastened to approve the choice effusively, adding, ” Vous pouvez incessamment recevoir La Fontaine, il a promis d’etre sage.” His admission was indirectly the cause of the only serious literary quarrel of his life. A dispute took place between the Academy and one of its members, Antoine Furetiere, on the subject of the latter’s French dictionary, which was decided to be a breach of the Academy’s corporate privileges. Furetiere, a man of no small ability, bitterly assailed those whom he considered to be his enemies, and among them La Fontaine, whose unlucky Contes made him peculiarly vulnerable, his second collection of these tales having been the subject of a police condemnation. The death of the author of the Roman Bourgeois, however, put an end to this quarrel. Shortly after- wards La Fontaine had a share in a still more famous affair, the celebrated Ancient-and-Modern squabble in which Boileau and Perrault were the chiefs, and in which La Fontaine (though he had been specially singled out by Perrault for favourable comparison with Aesop and Phaedrus) took the Ancient side. About the same time (1685-1687) he made the acquaintance of the last of his many hosts and protectors, Monsieur and Madame d’Hervart, and fell in love with a certain Madame Ulrich, a lady of some position but of doubtful character. This acquaintance was accompanied by a great familiarity with Vendome, Chaulieu and the rest of the libertine coterie of the Temple; but, though Madame de la Sabliere had long given herself up almost entirely to good works and religious exercises, La Fontaine continued an inmate of her house until her death in 1693. What followed is told in one of the best known of the many stories bearing on his childlike nature. Hervart on hearing of the death, had set out at once to find La Fontaine. He met him in the street in great sorrow, and begged him to make his home at his house. ” J’y allais ” was La Fontaine’s answer. He had already undergone the process of conversion during a severe illness the year before. An energetic young

priest, M. Poucet, had brought him, not indeed to understand, but to acknowledge the impropriety of the Contes, and it is said that the destruction of a new play of some merit was demanded and submitted to as a proof of repentance. A pleasant story is told of the young duke of Burgundy, Fenelon's pupil, who was then only eleven years old, sending 50 louis to La Fontaine as a present of his own motion. But, though La Fontaine recovered for the time, he was broken by age and infirmity, and his new hosts had to nurse rather than to entertain him, which they did very carefully and kindly. He did a little more work, com- pleting his Fables among other things; but he did not survive Madame de la Sabliere much more than two years, dying on the 13th of April 1695, at the age of seventy-three. He was buried in the cemetery of the Holy Innocents. His wife survived him nearly fifteen years.

The curious personal character of La Fontaine, like that of some other men of letters, has been enshrined in a kind of legend by literary tradition. At an early age his absence of mind and indifference to business gave a subject to Tallemant des Reaux. His later contemporaries helped to swell the tale, and the 18th century finally accepted it, including the anecdotes of his meeting his son, being told who he was, and remarking, " Ah, yes, I thought I had seen him somewhere! " of his insisting on fighting a duel with a supposed admirer of his wife, and then imploring him to visit at his house just as before; of his going into company with his stockings wrong side out, &c, with, for a contrast, those of his awkwardness and silence, if not positive rudeness, in company. It ought to be remembered, as a comment on the unfavourable description by La Bruyere, that La Fontaine was a special friend and ally of Benserade, La Bruyere's chief literary enemy. But after all deductions much will remain, especially when it is remembered that one of the chief authorities for these anecdotes is Louis Racine, a man who possessed intelligence

and moral worth, and who received them from his father, La Fontaine's attached friend for more than thirty years. Perhaps the best worth recording of all these stories is one of the Vieux Colombier quartette, which tells how Moliere, while Racine and Boileau were exercising their wits upon " le bonhomme " or " le bon " (by both which titles La Fontaine was familiarly known), remarked to a bystander," Nos beaux esprits ont beau faire, ils n'effaceront pas le bonhomme." They have not.

The works of La Fontaine, the total bulk of which is considerable, fall no less naturally than traditionally into three divisions, the Fables, the Contes and the miscellaneous works. Of these the first may be said to

be known universally, the second to be known to all lovers of French literature, the third to be with a few exceptions practically forgotten. This distribution of the judgment of posterity is as usual just in the main, but not wholly. There are excellent things in the CEuvres Diver ses, but their excellence is only occasional, and it is not at the best equal to that of the Fables or the Contes. Itiwas thought by contemporary judges who were both competent and friendly that La Fontaine attempted too many styles, and there is something in the criticism. His dramatic efforts are especially weak. The best pieces usually published under his name — Ragotin, Le Florentin, La Coupe enchantee, were originally fathered not by him but by Champmesle, the husband of the famous actress who captivated Racine and Charles de Sevigne. His avowed work was chiefly in the form of opera, a form of no great value at its best. Psyche has all the advantages of its charming story and of La Fontaine's style, but it is perhaps principally interesting nowadays because of the framework of personal conversation already alluded to. The mingled prose and verse of the Songe de Vaux is not uninterest- ing, but its best things, such as the description of night —

" Laissant tomber les fleurs et ne les semant pas,"

which has enchanted French critics, are little more than conceits, though as in this case sometimes very beautiful conceits. The elegies, the epistles, the epigrams, the ballades, contain many things which would be very creditable to a minor poet or a writer of vers de societe, but even if they be taken according to the wise rule of modern criticism, each in its kind, and judged simply according to their rank in that kind, they fall far below the merits of the two great collections of verse narratives which have assured La Fontaine's immortality.

Between the actual literary merits of the two there is not much to choose, but the change of manners and the altered standard of literary decency have thrown the Contes into the shade. These tales are identical in general character with those which amused Europe from the days of the early fabliau writers. Light love, the mis- fortunes of husbands, the cunning of wives, the breach of their vows by ecclesiastics, constitute the staple of their subject. In some respects La Fontaine is the best of such tale-tellers, while he is certainly the latest who deserves such excuse as may be claimed by a writer who does not. choose indecent subjects from a deliberate knowledge that they are considered indecent, and with a deliberate desire to pander to a vicious taste. No one who followed him in the style can claim this excuse ; he can, and the way in which contempor- aries of stainless virtue such as Madame de Sevign6 speak of his work shows that,

though the new public opinion was growing up, it was not finally accepted. In the Contes La Fontaine for the most part attempts little originality of theme. He takes his stories (varying them, it is true, in detail not a little) from Boccaccio, from Marguerite, from the Cent Nouvelles Nouvelles, &c. He applies to them his marvellous power of easy sparkling narration, and his hardly less marvellous faculty of saying more or less outrageous things in the most polite and gentlemanly manner. These Contes have indeed certain drawbacks. They are not penetrated by the half pagan ardour for physical beauty and the delights of sense which animates and excuses the early Italian Renaissance. They have not the subtle mixture of passion and sensuality, of poetry and appetite, which distinguishes the work of Marguerite and of the Pleiade. They are emphatically contes pour rire, a genuine expression • of the esprit gaulois of the fabliau writers and of Rabelais, destitute of the gross- ness of envelope which had formerly covered that spirit. A com- parison of “La Fiancee du roi de Garbe ” with its original in Boccaccio (especially if the reader takes M. Emile Montegut’s ad- mirable essay as a commentary) will illustrate better than anything else what they have and what they have not. Some writers have pleaded hard for the admission of actual passion of the poetical sort in such pieces as “La Courtisane amoureuse,” but as a whole it must be admitted to be absent.

The Fables, with hardly less animation and narrative art than the Contes, are free from disadvantages (according to modern notions) of subject, and exhibit the versatility and fecundity of the author’s talent perhaps even more fully. La Fontaine had many predecessors in the fable and especially in the beast fable. In his first issue, comprising what are now called the first six books, he adhered to the path of these predecessors with some closeness; but in the later collections he allowed himself far more liberty, and it is in these parts that his genius is most fully manifested. The boldness of the politics is as much to be considered as the ingenuity of the moralizing, as the intimate knowledge of human nature displayed in the substance cf

the narratives, or as the artistic mastery shown in their form. It has sometimes been objected that the view of human character which La Fontaine expresses is unduly dark, and resembles too much that of La Rochefoucauld, for whom the poet certainly had a profound admiration. The discussion of this point would lead us too far here. It may only be said that satire (and La Fontaine is eminently a satirist) necessarily concerns itself with the darker rather than with the lighter shades. Indeed the objection has become pretty nearly obsolete with the obsolescence of what may be called the sentimental- ethical school of criticism. Its last overt expression was made by Lamartine, excellently answered by Sainte-Beuve. Exception has also been taken to the Fables on more purely literary, but hardly less purely arbitrary grounds by Lessing. Perhaps the best criticism ever passed upon La Fontaine's Fables is that of Silvestre de Sacy, to the effect that they supply three several delights to three several ages: the child rejoices in the freshness and vividness of the story, the eager student of literature in the consummate art with which it is told, the experienced man of the world in the subtle reflections on character and life which it conveys. Nor has any one, with the ex- ception of a few paradoxers like Rousseau and a few sentimentalists like Lamartine, denied that the moral tone of the whole is as fresh and healthy as its literary interest is vivid. The book has therefore naturally become the standard reading book of French both at home and abroad, a position which it shares in verse with the Telemaque of Fenelon in prose. It is no small testimony to its merit that not even this use or misuse has interfered with its popularity.

The general literary character of La Fontaine is, with allowance made for the difference of subject, visible equally in the Fables and in the Contes. Perhaps one of the hardest sayings in French literature for an English student is the dictum of Joubert to the effect that " II y a dans La Fontaine une plenitude de poesie qu'on ne trouve nulle part dans les autres auteurs franqais." The difficulty arises from the ambiguity of the terms. For inventiveness of fancy and for diligent observation of the rules of art La Fontaine deserves, if not the first, almost the first place among French poets. In his hands the oldest story becomes novel, the most hackneyed moral piquant, the most commonplace details fresh and appropriate. As to the second point there has not been such unanimous agreement. It used to be con- sidered that La Fontaine's ceaseless diversity of metre, his archaisms, his licences in rhyme and orthography, were merely ingenious devices for the sake of easy writing, intended to evade the trammels of the stately couplet

and rimes difficiles enjoined by Boileau. Lamartine in the attack already mentioned affects contempt of the ” vers boiteux, disloques, inegaux, sans symmetric ni dans l’oreille ni sur la page.” This opinion may be said to have been finally exploded by the most accurate metrical critic and one of the most skilful metrical practitioners that France has ever had, Theodore de Banville; and it is only surprising that it should ever have been entertained by any professional maker of verse. La Fontaine’s irregularities are strictly regulated, his cadences carefully arranged, and the whole effect may be said to be (though, of course, in a light and tripping measure instead of a stately one) similar to that of the stanzas of the English pindaric ode in the hands of Dryden or Collins. There is therefore nothing against La Fontaine on the score of invention and nothing on the score of art. But something more, at least according to English standards, is wanted to make up a ” plenitude of poesy,” and this something more La Fontaine seldom or never exhibits. In words used by Joubert himself elsewhere, he never ” transports.” The faculty of transporting is possessed and used in very different manners by different poets. In some it takes the form of passion, in some of half mystical enthusiasm for nature, in some of commanding elo- quence, in some of moral fervour. La Fontaine has none of these things: he is always amusing, always sensible, always clever, some- times even affecting, but at the same time always more or less prosaic, were it not for his admirable versification. He is not a great poet, perhaps not even a great humorist; but he is the most admirable teller of light tales in verse that has ever existed in any time or country; and he has established in his verse-tale a model which is never likely to be surpassed.

La Fontaine did not during his life issue any complete edition of his works, nor even of the two greatest and most important divisions of them. The most remarkable of his separate publications have already been noticed. Others were the Po’eme de la captivite de St Male (1673), one of the pieces inspired by the Port-Royalists, the Po’eme du Quinquina (1692), a piece of task work also, though of a very different kind, and a number of pieces published either in small pamphlets or with the works of other men. Among the latter may be singled out the pieces published by the poet with the works of his friend Maucroix (1685). The year after his death some post- humous works appeared, and some years after his son’s death the scattered poems, letters, &c, with the addition of some unpublished work bought from the family in manuscript, were carefully edited and published as CEuvres diverses (1729). During the 18th century two of the most magnificent illustrated editions ever published of any poet reproduced the two chief works of La Fontaine. The Fables were

illustrated by Oudry (1 755-1 759), the Contes by Eisen (1762). This latter under the title of ” Edition des Fermiers- Generaux ” fetches a high price. During the first thirty years of the 19th century Walckenaer, a great student of French 17th-century classics, published for the house of Didot three successive editions of

La Fontaine, the last (1826-182 7) being perhaps entitled to the rank of the standard edition, as his Histoire de la vie et des ouvrages de La Fontaine is the standard biography and bibliography. The later editions of M. Marty-Laveaux in the Bibliotheque elzhirienne, A. Pauly in the Collection des classiques francaises of M. Lemerre and L. Moland in that of M. Gamier supply in different forms all that can be wished. The second is the handsomest, the third, which is com- plete, perhaps the most generally useful. Editions, selections, trans- lations, &c, of the Fables, especially for school use, are innumerable; but an illustrated edition published by the Librairie des Bibliophiles (1874) deserves to be mentioned as not unworthy of its 18th-century predecessors. The works of M. Grouchy, Documents inedits sur La Fontaine (1893); -of G. Lafenestre, Jean de La Fontaine (1895); and of Emile Faguet, Jean de La Fontaine (1900), should be mentioned. (G. Sa.)

LAFONTAINE, SIR LOUIS HIPPOLYTE, Bart. (1807-1864), Canadian statesman and judge, third son of Antoine Menard LaFontaine (1772-1813) and Marie-J-Fontaine Bienvenue, was born at Boucherville in the province of Quebec on the 4th of October 1807. LaFontaine was educated at the College de Montreal under the direction of the Sulpicians, and was called to the bar of the province of Lower Canada on the 18th of August 1829. He married firstly Adele, daughter of A. Berthelot of Quebec; and, secondly, Jane, daughter of Charles Morrison, of Berthier, by whom he had two sons. In 1830 he was elected a member of the House of Assembly for the county of Terrebonne, and became an ardent supporter of Louis Joseph Papineau in opposing the administration of the governor-in-chief, which led to the rebellion of 1837. LaFontaine, however, did not approve the violent methods of his leader, and after the hostilities at Saint Denis he presented a petition to Lord Gosford requesting him to summon the assembly and to adopt measures to stem the revolutionary course of events in Lower Canada. The rebellion broke out afresh in the autumn of 1838; the constitution of 1 79 1 was suspended; LaFontaine was imprisoned for a brief period; and Papineau, who favoured annexation by the United States, was in exile. At this crisis in Lower Canada the French Canadians turned to LaFontaine as their leader, and under his direction maintained their opposition to the special council, composed of nominees of the crown.

In 1839 Lord Sydenham, the governor-general, offered the solicitor generalship to LaFontaine, which he refused; and after the Union of 1841 LaFontaine was defeated in the county of Terrebonne through the governor's influence. During the next year he obtained a seat in the assembly of the province of Canada, and on the death of Sydenham he was called by Sir Charles Bagot to form an administration with Robert Baldwin. The ministry resigned in November 1843, as a protest against the actions of Lord Metcalfe, who had succeeded Bagot. In 1848 LaFontaine formed a new administration with Baldwin, and remained in office until 1851, when he retired from public life. It was during the ministry of LaFontaine-Baldwin that the Amnesty Bill was passed, which occasioned grave riots in Montreal, personal violence to Lord Elgin and the destruction of the parliament buildings. After the death of Sir James Stuart in 1853 La- Fontaine was appointed chief justice of Lower Canada and president of the seigneurial court, which settled the vexed question of land tenure in Canada; and in 1854 he was created a baronet. He died at Montreal on the 26th of February 1864.

LaFontaine was well versed in constitutional' history and French law ; he reasoned closely and presented his conclusions with directness. He was upright in his conduct, sincerely attached to the traditions of his race, and laboured conscientiously to establish responsible government in Canada. His principal works are : L' Analyse de I ' ordonnance du conseil special sur les bureaux d" hypotheques (Montreal, 1842); Observations sur les questions seigneuriales (Montreal, 1854); see La-Fontaine, by A. DeCelles (Toronto, 1906). (A. G. D.)

LAFOSSE, CHARLES DE (1640-1716), French painter, was born in Paris. He was one of the most noted and least servile pupils of Le Brun, under whose direction he shared in the chief of the great decorative works undertaken in the reign of Louis XIV. Leaving France in 1662, he spent two years in Rome and three in Venice, and the influence of his prolonged studies of Veronese is evident in his " Finding of Moses " (Louvre), and in his " Rape of Proserpine " (Louvre), which he presented to the Royal Academy as hisjdiploma picture in 1673. He was

at once named assistant professor, and in 1674 the full responsibilities of the office devolved on him, but his engagements did not prevent his accepting in 1689 the invitation of Lord Montagu to

decorate Montagu House. He visited London twice, remaining on the second occasion — together with Rousseau and Monnoyer — more than two years. William III. vainly strove to detain him in England by the proposal that he should decorate Hampton Court, for Le Brun was dead, and Mansart pressed Lafosse to return to Paris to take in hand the cupola of the Invalides. The decorations of Montagu House are destroyed, those of Versailles are restored, and the dome of the Invalides (engraved, Picart and Cochin) is now the only work existing which gives a full measure of his talent. During his latter years Lafosse executed many other important decorations in public buildings and private houses, notably in that of Crozat, under whose roof he died on the 13 th of December 1716.

LAGARDE, PAUL ANTON DE (1827-1891), German biblical scholar and orientalist, was born at Berlin on the 2nd of November 1827. His real name was Botticher, Lagarde being his mother's name. At Berlin (1844-1846) and Halle (1846- 1847) he studied theology, philosophy and oriental languages. In 1852 his studies took him to London and Paris. In 1854 he became a teacher at a Berlin public school, but this did not interrupt his biblical studies. He edited the Didascalia apostolorum syriace (1854), and other Syriac texts collected in the British Museum and in Paris. In 1866 he received three years' leave of absence to collect fresh materials, and in 1869 succeeded Heinrich Ewald as professor of oriental languages at Gottingen. Like Ewald, Lagarde was an active worker in a variety of subjects and languages; but his chief aim, the elucidation of the Bible, was almost always kept in view. He edited the Aramaic translation (known as the Targum) of the Prophets according to the Codex Reuchlinianus preserved at Carlsruhe, Prophetae chaldaice (1872), the Hagiographa chaldaice (1874), an Arabic translation of the Gospels, Die vier Evangelien, arabisch aus der Wiener Handschrift herausgegeben (1864), a Syriac translation of the Old Testament Apocrypha, Libri V. T. apocryphi syriace (1861), a Coptic translation of the Pentateuch, Der Pentateuch koplisch (1867), and a part of the Lucianic text of the Septuagint, which he was able to reconstruct from manu- scripts for nearly half the Old Testament. He devoted himself ardently to oriental scholarship, and published Zur Urgeschichte der Armenier (1854) and Armenische Studien (1877). He was also a student of Persian, publishing Isaias persice (1883) and Persische Studien (1884). He followed up his Coptic studies with Aegyptiaca (1883), and published many minor contributions to the study of oriental languages in Gesammelte Abhandlungen (1866), Symmicta (i. 1877, ii. 1880), Semitica (i. 1878, ii. 1879), Orientalia (1879-1880) and Miltheilungen (1884). Mention should also be made of the valuable Onomastica

sacra (1870; 2nd ed., 1887). Lagarde also took some part in politics. He belonged to the Prussian Conservative party, and was a violent anti-Semite. The bitterness which he felt appeared in his writings. He died at Gottingen on the 22nd of December 1891. See the article in Herzog-Hauck, Realencyklopddie ; and cf. Anna de Lagarde, Paul de Lagarde (1894).

LAGASH, or Sirpurla, one of the oldest centres of Sumerian civilization in Babylonia. It is represented by a rather low, long line of ruin mounds, along the dry bed of an ancient canal, some 3 m. E. of the Shatt-el-Haii and a little less than 10 m. N. of the modern Turkish town of Shatra. These ruins were dis- covered in 1877 by Ernest de Sarzec, at that time French consul at Basra, who was allowed, by the Montefich chief, Nasir Pasha, the first Wali-Pasha, or governor-general, of Basra, to excavate at his pleasure in the territories subject to that official. At the outset on his own account, and later as a representative of the French government, under a Turkish firman, de Sarzec continued excavations at this site, with various intermissions, until his death in 1901, after which the work was continued under the supervision of the Commandant Cros. The principal excava- tions were made in two larger mounds, one of which proved to be the site of the temple, E-Ninnu, the shrine of the patron god

of Lagash, Nin-girsu or Ninib. This temple had been razed and a fortress built upon its ruins, in the Greek or Seleucid period, some of the bricks found bearing the inscription in Aramaic and Greek of a certain Hadad-nadin-akhe, king of a small Babylonian kingdom. It was beneath this fortress that the numerous statues of Gudea were found, which constitute the gem of the Babylonian collections at the Louvre. These had been decapitated and otherwise mutilated, and thrown into the foundations of the new fortress. From this stratum came also various fragments of bas reliefs of high artistic excellence. The excavations in the other larger mound resulted in the discovery of the remains of buildings containing objects of all sorts in bronze and stone, dating from the earliest Sumerian period onward, and enabling us to trace the art history of Babylonia to a date some hundreds of years before the time of Gudea. Apparently this mound had been occupied largely by store houses, in which were stored not only grain, figs, &c, but also vessels, weapons, sculptures and every possible object connected with the use and administration of palace and temple. In a small outlying mound de Sarzec discovered the archives of the temple, about 30,000 inscribed clay tablets, containing the business records, and revealing with extraordinary minute- ness the administration of an ancient Babylonian temple, the character of its property, the method of farming its lands, herding its flocks, and its

commercial and industrial dealings and enter- prises; for an ancient Babylonian temple was a great industrial, commercial, agricultural and stock-raising establishment. Un- fortunately, before these archives could be removed, the galleries containing them were rifled by the Arabs, and large numbers of the tablets were sold to antiquity dealers, by whom they have been scattered all over Europe and America. From the inscrip- tions found at Tello, it appears that Lagash was a city of great importance in the Sumerian period, some time probably in the 4th millennium B.C. It was at that time ruled by independent kings, Ur-Nina and his successors, who were engaged in contests with the Elamites on the east and the kings of Kengi and Kish on the north. With the Semitic conquest it lost its independence, its rulers becoming patesis, dependent rulers, under Sargon and his successors; but it still remained Sumerian and continued to be a city of much importance, and, above all, a centre of artistic development. Indeed, it was in this period and under the immediately succeeding supremacy of the kings of Ur, Ur-Gur and Dungi, that it reached its highest artistic development. At this period, also, under its patesis, Ur-bau and Gudea, Lagash had extensive commercial communications with distant realms. According to his own records, Gudea brought cedars from the Amanus and Lebanon mountains in Syria, diorite or dolorite from eastern Arabia, copper and gold from central and southern Arabia and from Sinai, while his armies, presumably under his over-lord, Ur-Gur, were engaged in battles in Elam on the east. His was especially the era of artistic development. Some of the earlier works of Ur-Nina, En-anna-tum, Entemena and others, before the Semitic conquest, are also extremely interesting, especially the famous stele of the vultures and a great silver vase ornamented with what may be called the coat of arms of Lagash, a lion-headed eagle with wings outspread, grasping a lion in each talon. After the time of Gudea, Lagash seems to have lost its importance; at least we know nothing more about it until the construction of the Seleucid fortress mentioned, when it seems to have become part of the Greek kingdom of Characene. The objects found at Tello are the most valuable art treasures up to this time discovered in Babylonia. See E. de Sarzec, Dfoouvertes en Chaldee (1887 foil.).

(J. P- Pe.) LAGHMAN, a district of Afghanistan, in the province of Jalalabad, between Jalalabad and Kabul, on the northern side of the Peshawar road, one of the richest and most fertile tracts in Afghanistan. It is the valley of the Kabul river between the Tagao and the Kunar and merges on the north into Kafiristan. The inhabitants, Ghilzais and Tajiks, are supposed to be the cleverest business people in the country. Sugar, cotton and rice are exported to Kabul. The Laghman route between Kabul

and India crossing the Kunar river into the Mohmand country is the route followed by Alexander the Great and Baber; but it has now been supplanted by the Khyber.

LAGOON (Fr. lagune, Lat. lacuna, a pool), a term applied to (i) a sheet of salt or brackish water near the sea, (2) a sheet of fresh water of no great depth or extent, (3) the expanse of smooth water enclosed by an atoll. Sea lagoons are formed only where the shores are low and protected from wave action. Under these conditions a bar may be raised above sea-level or a spit may grow until its end touches the land. The enclosed shallow water is then isolated in a wide stretch, the seaward banks broaden, and the lagoon becomes a permanent area of still shallow water with peculiar faunal features. In the old lake plains of Australia there are occasional wide and shallow depressions where water collects permanently. Large numbers of aquatic birds, black swans, wild duck, teal, migrant spoon-bills or pelicans, resort to these fresh-water lagoons.

LAGOS, the western province of Southern Nigeria, a British colony and protectorate in West Africa. The province consists of three divisions: (1) the coast region, including Lagos Island, being the former colony of Lagos; (2) small native states adjacent to the colony; and (3) the Yoruba country, farther inland. The total area is some 27,000 sq. m., or about the size of Scotland. The province is bounded S. by the Gulf of Guinea, (from 2 46′ 55″ to 4° 30′ E.); W. by the French colony of Dahomey; N. and E. by other provinces of Nigeria.

Physical Features. — The coast is low, marshy and malarious, and all along the shore the great Atlantic billows cause a dangerous surf. Behind the coast-line stretches a series of lagoons, in which are small islands, that of Lagos having an area of 3! sq. m. Beyond the lagoons and mangrove swamps is a broad zone of dense primeval forest — ” the bush ” — which completely separates the arable lands from the coast lagoons. The water-parting of the streams flowing north to the Niger, and south to the Gulf of Guinea, is the main physical feature. The general level of Yorubaland is under 2000 ft. But towards the east, about the upper course of the river Oshun, the elevation is higher. Southward from the divide the land, which is intersected by the nearly parallel courses of the rivers Ogun, Omi, Oshun, Oni and Oluwa, falls in continuous undulations to the coast, the open cultivated ground gradually giving place to forest tracts, where the

most characteristic tree is the oil-palm. Flowering trees, certain kinds of rubber vines, and shrubs are plentiful. In the northern regions the shea-butter tree is found. The fauna resembles that of the other regions of the Guinea coast, but large game is becoming' scarce. Leopards, antelopes and monkeys are common, and alligators infest the rivers.

The lagoons, lying between the outer surf-beaten beach and the inner shore line, form a navigable highway of still waters, many miles in extent. They are almost entirely free from rock, though they are often shallow, with numerous mud banks. The most extensive are Lekki in the east, and Ikoradu (Lagos) in the west. At its N.W. extremity the Lagos lagoon receives the Ogun, the largest river in Yorubaland, whose current is strong enough to keep the seaward channel open throughout the year. Hence the importance of the port of Lagos, which lies in smooth water at the northern end of this channel. The outer entrance is obstructed by a dangerous sand bar. Climate and Health. — The climate is unhealthy, especially for Europeans. The rainfall has not been ascertained in the interior. In the northern districts it is probably considerably less than at Lagos, where it is about 70 in. a year. The variation is, however, very great. In 1901 the rainfall was 112 in., in 1902 but 47, these figures being respectively the highest and lowest recorded in a period of seventeen years. The mean temperature at Lagos is 82-5° F., the range being from 68 ° to 9 1 °. At certain seasons sudden heavy squalls of wind and rain that last for a few hours are common. The hurri- cane and typhoon are unknown. The principal diseases are malarial fever, smallpox, rheumatism, peripheral neuritis, dysentery, chest diseases and guinea-worm. Fever not unfrequently assumes the dangerous form known as " black-water fever." The frequency of smallpox is being much diminished outside the larger towns in the interior, in which vaccination is neglected. The absence of plague, yellow fever, cholera, typhoid fever and scarlatina is noteworthy. A mild form of yaws is endemic.

Inhabitants. — The population is estimated at 1,750,000. The Yoruba people, a Negro race divided into many tribes, form the majority of the inhabitants. Notwithstanding their political feuds and their proved capacity as fighting men, the Yoruba are distinguished above all the surrounding races for their generally peaceful disposition, industry, friendliness, courtesy and hospitality towards strangers. They are also intensely patriotic. Physically they resemble closely their Ewe and

Dahomey neighbours, but are of somewhat lighter complexion, taller and of less pronounced Negro features. They exhibit high administrative ability, possess a marked capacity for trade, and have

made remarkable progress in the industrial arts. The different tribes are distinguished by tattoo markings, usually some simple pattern of two or more parallel lines, disposed horizontally or vertically on the cheeks or other parts of the face. The feeling for religion is deeply implanted among the Yoruba. The majority are pagans, or dominated by pagan beliefs, but Islam has made great progress since the cessation of ttie Fula wars, while Protestant and Roman Catholic missions have been at work since 1848 at Abeokuta, Oyo, Ibadan and other large towns. Samuel Crowther, the first Negro bishop in the Anglican church, who was distinguished as an explorer, geo- grapher and linguist, was a native of Yorubaland, rescued (1822) by the English from slavery and educated at Sierra Leone (see Yoeubas).

Towns. — Besides Lagos (q.v.), pop. about 50,000, the chief towns in the colony proper are Epe, pop. 16,000, on the northern side of the lagoons, and Badagry (a notorious place during the slave-trade period) and Lekki, both on the coast. Inland the chief towns are Abeokuta (q.v.), pop. about 60,000, and Ibadan (q.v.), pop. estimated at 150,000.

Agriculture and Trade.- — The chief wealth of the country consists in forest produce, the staple industries being the collec- tion of palm-kernels and palm oil. Besides the oil-palm forests large areas are covered with timber trees, the wood chiefly cut for commercial purposes being a kind of mahogany. The destruc- tion of immature trees and the fluctuations in price render this a very uncertain trade. The rubber industry was started in 1894, and in 1896 the rubber exported was valued at £347,000. In 1899, owing to reckless methods of tapping the vines, 75% of the rubber plants died. Precautions were then taken to preserve the remainder and allow young plants to grow. The collection of rubber recommenced in 1904 and the industry again became one of importance. A considerable area is devoted to cocoa plantations, all owned by native cultivators. Coffee and tobacco of good quality are cultivated and shea-butter is largely used as an illuminant. The Yoruba country is the greatest agricultural centre in West Africa. For home consumption the Yoruba grow yams, maize and millet, the chief articles of food, cassava, sweet potatoes, sesame and beans. Model farms have been established for experimental culture and for the tuition of the natives. A palatable wine is obtained from the Raphia vinifera and native beers are also brewed. Imported spirits are largely consumed. There are no manufactures on a large scale save the making of ” country cloths ” (from cotton grown, spun and woven in the country) and mats. Pottery and agricultural implements are made, and tanning, dyeing and forging practised in the towns, and along the rivers and lagoons boats and canoes are built. Fishing is

extensively engaged in, the fish being dried and sent up country. Except iron there are no valuable minerals in the country.

The cotton plant from which the ” country cloths ” are made is native to the country, the soil of which is capable of producing the very finest grades of cotton. The Egba branch of the Yoruba have always grown the plant. In 1869 the cotton exported was valued at £76,957, but owing to low prices the natives ceased to grow cotton for export, so that in 1879 the value of exported cotton was only £526. In 1902 planting for export was recom- menced by the Egba on scientific lines, and was started in the Abeokuta district with encouraging results.

The Yoruba profess to be unable to alienate land in per- petuity, but native custom does not preclude leasing, and land concessions have been taken up by Europeans on long leases. Some concessions are only for cutting and removing timber; others permit of cultivation. The northern parts of the pro- tectorate are specially suitable for stock raising and poultry culture.

The chief exports are palm-kernels, palm-oil, timber, rubber and cocoa. Palm-kernels alone constitute more than a half in value of the total exports, and with palm-oil over three-fourths.

The trade in these products is practically confined to Great Britain and Germany, the share of the first-named being 25 % to Germany’s 75%. Minor exports are coffee, “country cloths,” maize, shea-butter and ivory.

Cotton goods are the most important of the imports, spirits coming next, followed by building material, haberdashery and hardware and tobacco. Over 90% of the cotton goods are imported from Great Britain, whilst nearly the same proportion of the spirit imports come from Germany. Nearly all the liquors consist of ” Trade Spirits,” chiefly gin, rum and a con- coction called ” alcohol,” introduced (1901) to meet the growing taste of the people for stronger liquor. This stuff contained 90 % of pure alcohol and sometimes over 4% of fusel oil. To hinder the sale of this noxious compound legislation was passed in 1903 prohibiting the import of liquor containing more than §% of fusel oil, whilst the states of Abeokuta and Ibadan prohibited the importation of liquor stronger than proof. The total trade of the country in 1905 was valued at £2,224,754, the imports slightly

exceeding the exports. There is a large transit trade with Dahomey.

Communications.— Lagos is well supplied with means of communication. A 3 ft. 6 in. gauge railway starts from Iddo Island, and extends past Abeokuta, 64 m. from Lagos, Ibadan (123 m.), Oshogbo (175 m.), to Illorin (247 m.) in Northern Nigeria, whence the line is continued to Jebba and Zunguru (see Nigeria). Abeokuta is served by a branch line, ijm. long, from Aro on the main line. Railway bridges connect Iddo Island both with the mainland and with Lagos Island (see Lagos, town). This line was begun in 1896 and opened to Ibadan in 1901. In 1905 the building of the section Ibadan- Illorin was undertaken. The railway was built by the government and cost about £7000 per mile. The lagoons offer convenient channels for numerous small craft, which, with the exception of steam- launches, are almost entirely native-built canoes. Branch steamers run between the Forcados mouth of the Niger and Lagos, and also between Lagos and Porto Novo, in French territory, and do a large transit trade. Various roads through the bush have been made by the government. There is telegraphic communication with Europe, Northern Nigeria and South Africa, and steamships ply regularly between Lagos and Liverpool, and Lagos and Hamburg (see Lagos, town).

Administration, Justice, Education, &c. — The small part of the province which constitutes ” the colony of Southern Nigeria ” is governed as a crown colony. Elsewhere the native governments are retained, the chiefs and councils of elders receiving the advice and support of British commissioners. There is also an advisory native central council which meets at Lagos. The great majority of the civil servants are natives of the country, some of whom have been educated in England. The legal status of slavery is not recognized by the law courts and dealing in slaves is suppressed. As an institu- tion slavery is dying out, and only exists in a domestic form.

The cost of administration is met, mainly, by customs, largely derived from the duties on imported spirits. From the railways, a government monopoly, a considerable net profit is earned. Expenditure is mainly under the heads of railway administration, other public works, military and police, health, and education. The revenue increased in the ten years 1895-1905 from £142,049 to £410,250. In the same period the expenditure rose from £144,484

to £354,254-

The defence of the province is entrusted to the Lagos battalion of the West African Frontier Force, a body under the control of the Colonial

Office in London and composed of Hausa (four-fifths) and Yoruba. It is officered from the British army.

The judicial system in the colony proper is based on that of England. The colonial supreme court, by agreement with the rulers of Abeokuta, Ibadan and other states in the protectorate, tries, with the aid of native assessors, all cases of importance in those countries. Other cases are tried by mixed courts, or, where Yoruba alone are concerned, by native courts.

There is a government board of education which maintains a few schools and supervises those voluntarily established. These are chiefly those of various missionary societies, who, besides primary schools, have a few secondary schools. The Mahommedans have their own schools. Grants from public funds are made to the voluntary schools. Considerable attention is paid to manual train- ing, the laws of health and the teaching of English, which is spoken by about one-fourth of the native population.

History. — Lagos Island was so named by the Portuguese explorers of the 15th century, because of the numerous lagoons or lakes on this part of the coast. The Portuguese, and after them the French, had settlements here at various points. In the 1 8th century Lagos Lagoon became the chief resort of slavers frequenting the Bight of Benin, this portion of the Gulf of

Guinea becoming known pre-eminently as the Slave Coast- British traders established themselves at Badagry, 40 m. W. of Lagos, where in 1851 they were attacked by Kosoko, the Yoruba king of Lagos Island. As a result a British naval force seized Lagos after a sharp fight and deposed the king, placing his cousin, Akitoye, on the throne. A treaty was concluded under which Akitoye bound himself to put down the slave trade. This treaty was not adhered to, and in 1861 Akitoye's son and successor, King Docemo, was induced to give up his territorial jurisdiction and accept a pension of 1200 bags of cowries, afterwards commuted to £1000 a year, which pension he drew until his death in 1885. Immediately after the proclama- tion of the British annexation, a steady current of immigration from the mainland set in, and a flourishing town arose on Lagos Island. Iddo Island was acquired at the same time as Lagos Island, and from 1862 to 1894 various additions by purchase or cession were made to the colony. In 1879 the small kingdom of Kotonu was placed under British protection. Kotonu lies south and east of the Denham Lagoon (see Dahomey). In 1889 it was exchanged with the French for the kingdom of Pokra which is to the north of Badagry. In the early years of the colony Sir John Glover,

R.N., who was twice governor (1864-1866 and 1871-1872), did much pioneer work and earned the confidence of the natives to a remarkable degree. Later Sir C. A. Moloney (governor 1886-1890) opened up relations with the Yoruba and other tribes in the hinterland. He despatched two com- missioners whose duty it was to conclude commercial treaties and use British influence to put a stop to intertribal fighting and the closing of the trade routes. In 1892 the Jebu, who acted as middlemen between the colony and the Yoruba, closed several trade routes. An expedition sent against them resulted in their subjugation and the annexation of part of their country. An order in council issued in 1899 extended the protectorate over Yorubaland. The tribes of the hinterland have largely welcomed the British protectorate and military expeditions have been few and unimportant. (For the history of the Yoruba states see Yorubas.)

Lagos was made a separate government in 1863; in 1866 it was placed in political dependence upon Sierra Leone; in 1874 it became (politically) an integral part of the Gold Coast Colony, whilst in 1886 it was again made a separate government, ad- ministered as a crown colony. In Sir William Macgregor, M.D., formerly administrator of British New Guinea, governor 1899- 1904, the colony found an enlightened ruler. He inaugurated the railway system, and drew much closer the friendly ties between the British and the tribes of the protectorate. Mean- time, since 1884, the whole of the Niger delta, lying immediately east of Lagos, as well as the Hausa states and Bornu, had been acquired by Great Britain. Unification of the British possessions in Nigeria being desirable, the delta regions and Lagos were formed in 1906 into one government (see Nigeria).

See C. P. Lucas, Historical Geography of the British Colonies, vol. iii. West Africa (Oxford, 1896) ; the annual Reports issued by the Colonial Office, London; A. B. Ellis, The Yoruba-speaking Peoples (London, 1894); Lady Glover, The Life of Sir John Hawley Clover (London, 1897). Consult also the works cited under Nigeria and Dahomey.

LAGOS, a seaport of West Africa, capital of the British colony and protectorate of Southern Nigeria, in 6° 26′ N., 3 23′ E. on an island in a lagoon named Lagos also. Between Lagos and the mainland is Iddo Island. An iron bridge for road and rail- way traffic 2600 ft. long connects Lagos and Iddo Islands, and another iron bridge, 917 ft. long, joins Iddo Island to the main- land. The town lies but a foot or two above sea-level. The principal buildings are a large government house, the law courts, the memorial hall erected to commemorate the services of Sir John Glover, used for public meetings and entertainments, an elaborate club-house provided from public funds,

and the police quarters. There are many substantial villas that serve as quarters for the officers of the civil service, as well as numerous solidly-built handsome private buildings. The streets are well kept; the town is supplied with electric light, and there is a good water service. The chief stores and dep6ts for goods are

all on the banks of the lagoon. The swamps of which originally Lagos Island entirely consisted have been reclaimed. In connexion with this work a canal, 25 ft. wide, has been cut right through the island and a sea-wall built round its western half. There is a commodious public hospital, of the cottage type, on a good site. There is a racecourse, which also serves as a general public recreation ground. Shifting banks of sand form a bar at the sea entrance of the lagoon. Extensive works were undertaken in 1908 with a view to making Lagos an open port. A mole has been built at the eastern entrance to the harbour and dredgers are at work on the bar, which can be crossed by vessels drawing 13 ft. Large ocean-going steamers anchor not less than 2 m. from land, and goods and passengers are there transhipped into smaller steamers for Lagos. Heavy cargo is carried by the large steamers to Forcados, 200 m. farther down the coast, transhipped there into branch boats, and taken via the lagoons to Lagos. The port is 4279 m. from Liverpool, 1203 from Freetown, Sierra Leone (the nearest safe port west- ward), and 315 from Cape Coast.

The inhabitants, about 50,000, include, besides the native tribes, Sierra Leonis, Fanti, Krumen and the descendants of some 6000 Brazilian emancipados who were settled here in the early days of British rule. The Europeans number about 400. Rather more than half the populace are Moslems.

LAGOS, a seaport of southern Portugal, in the district of Faro (formerly the province of Algarve) ; on the Atlantic Ocean, and on the estuary of the small river Lagos, here spanned by a fine stone bridge. Pop. (1900) 8291. The city is defended by fortifi- cations erected in the 17th century. It is supplied with water by an aqueduct 800 yds. long. The harbour is deep, capacious, and completely sheltered on the north and west; it is frequently visited by the British Channel fleet. Vines and figs are extensively cultivated in the neighbourhood, and Lagos is the centre of important sardine and tunny fisheries. Its trade is chiefly carried on by small coasting vessels, as there is no railway. Lagos is on or near the site of the Roman Lacobriga. Since the 15th

century it has held the formal rank and title of city. Cape St Vincent, the ancient Promontorium Sacrum, and the south- western extremity of the kingdom, is 22 m. W. It is famous for its connexion with Prince Henry (q.v.), the Navigator, who here founded the town of Sagres in 1421; and for several British naval victories, the most celebrated of which was won in 1797 by Admiral Jervis (afterwards Earl St Vincent) over a larger Spanish squadron. In 1759 Admiral Boscawen defeated a French fleet off Lagos. The great earthquake of 1 755 destroyed a large part of the city.

LA GRACE, or Les GrAces, a game invented in France during the first quarter of the 19th century and called there le jeu dcs Grdces. It is played with two light sticks about 16 in. long and a wicker ring, which is projected into the air by placing it over the sticks crossed and then separating them rapidly. The ring is caught upon the stick of another player and thrown back, the object being to prevent it from falling to the ground.

LA GRAND' COMBE, a town of southern France, in the depart- ment of Gard on the Gardon, 39 m. N.N.W. of Nimes by rail. Pop. (1906) town, 6406; commune, 11,292. There are extensive coal mines in the vicinity.

LAGRANGE, JOSEPH LOUIS (1736-1813), French mathe- matician, was born at Turin, on the 25th of January 1736. He was of French extraction, his great grandfather, a cavalry captain, having passed from the service of France to that of Sardinia, and settled in Turin under Emmanuel II. His father, Joseph Louis Lagrange, married Maria Theresa Gros, only daughter of a rich physician at Cambiano, and had by her eleven children, of whom only the eldest (the subject of this notice) and the youngest survived infancy. His emoluments as treasurer at war, together with his wife's fortune, provided him with ample means, which he lost by rash speculations, a circumstance regarded by his son as the prelude to his own good fortune; for had he been rich, he used to say, he might never have known mathematics.

The genius of Lagrange did not at once take its true bent.

His earliest tastes were literary rather than scientific, and he learned the rudiments of geometry during his first year at the college of Turin, without difficulty, but without distinction. The perusal of a tract by Halley (Phil. Trans, xviii. 960) roused his enthusiasm for the analytical method, of which he was destined to develop the utmost capabilities. He now entered, unaided save by his own unerring tact and vivid apprehension, upon a course of study which, in two years,

placed him on a level with the greatest of his contemporaries. At the age of nineteen he communicated to Leonhard Euler his idea of a general method of dealing with ” isoperimetrical ” problems, known later as the Calculus of Variations. It was eagerly welcomed by the Berlin mathematician, who had the generosity to withhold from publication his own further researches on the subject, until his youthful correspondent should have had time to complete and opportunity to claim the invention. This prosperous opening gave the key-note to Lagrange’s career. Appointed, in 1754, professor of geometry in the royal school of artillery, he formed with some of his pupils — for the most part his seniors — friend- ships based on community of scientific ardour. With the aid of the marquis de Saluces and the anatomist G. F. Cigna, he founded in 1758 a society which became the Turin Academy of Sciences. The first volume of its memoirs, 1 published in the following year, contained a paper by Lagrange entitled Recherches sur la nature et la propagation du son, in which the power of his analysis and his address in its application were equally con- spicuous. He made his first appearance in public as the critic of Newton, and the arbiter between d’Alembert and Euler. By considering only the particles of air found in a right line, he reduced the problem of the propagation of sound to the solution of the same partial differential equations that include the motions of vibrating strings, and demonstrated the insufficiency of the methods employed by both his great contemporaries in dealing with the latter subject. He further treated in a masterly manner of echoes and the mixture of sounds, and explained the pheno- menon of grave harmonics as due to the occurrence of beats so rapid as to generate a musical note. This was followed, in the second volume of the Miscellanea Taurinensia (1762) by his ” Essai d’une nouvelle methode pour determiner les maxima et les minima des formules integrates indefinies,” together with the application of this important development of analysis to the solution of several dynamical problems, as well as to the demon- stration of the mechanical principle of ” least action.” The essential point in his advance on Euler’s mode of investigating curves of maximum or minimum consisted in his purely analytical conception of the subject. He not only freed it from all trammels of geometrical construction, but by the introduction of the symbol 5 gave it the efficacy of a new calculus. He is thus justly regarded as the inventor of the ” method of variations ” — a name supplied by Euler in 1766.

By these performances Lagrange found himself, at the age of twenty-six, on the summit of European fame. Such a height had not been reached without cost. Intense application during early youth had

weakened a constitution never robust, and led to accesses of feverish exaltation culminating, in the spring of 1 761, in an attack of bilious hypochondria, which permanently lowered the tone of his nervous system. Rest and exercise, however, temporarily restored his health, and he gave proof of the undiminished vigour of his powers by carrying off, in 1764, the prize offered by the Paris Academy of Sciences for the best essay on the libration of the moon. His treatise was remark- able, not only as offering a satisfactory explanation of the coin- cidence between the lunar periods of rotation and revolution, but as containing the first employment of his radical formula of mechanics, obtained by combining with the principle of d'Alembert that of virtual velocities. His success encouraged the Academy to propose, in 1766, as a theme for competition, the hitherto unattempted theory of the Jovian system. The prize was again awarded to Lagrange; and he earned the same dis- tinction with essays on the problem of three bodies in 1772, on the secular equation of the moon in- 1774, and in 1778 on the theory of cometary perturbations.

He had in the meantime gratified a long felt desire by a visit to Paris, where he enjoyed the stimulating delight of conversing with such mathematicians as A. C. Clairault, d'Alembert, Condorcet and the Abbe Marie. Illness prevented him from visiting London. The post of director of the mathematical department of the Berlin Academy (of which he had been a member since 1759) becoming vacant by the removal of Euler to St Petersburg, the latter and d'Alembert united to recommend Lagrange as his successor. Euler's eulogium was enhanced by his desire to quit Berlin, d'Alembert's by his dread of a royal command to repair thither; and the result was that an invita- tion, conveying the wish of the " greatest king in Europe " to have the " greatest mathematician " at his court, was sent to Turin. On the 6th of November 1766, Lagrange was installed in his new position, with a salary of 6000 francs, ample leisure for scientific research, and royal favour sufficient to secure him respect without exciting envy. The national jealousy of foreigners, was at first a source of annoyance to him; but such prejudices were gradually disarmed by the inoffensiveness of his demeanour. We are told that the universal example of his colleagues, rather than any desire for female society, impelled him to matrimony; his choice being a lady of the Conti family, who, by his request, joined him at Berlin. Soon after marriage his wife was attacked by a lingering illness, to which she suc- cumbed, Lagrange devoting all his time, and a considerable store of medical

knowledge, to her care.

The long series of memoirs — some of them complete treatises of great moment in the history of science — communicated by Lagrange to the Berlin Academy between the years 1767 and 1787 were not the only fruits of his exile. His Mecanique analytique, in which his genius most fully displayed itself, was produced during the same period. This great work was the perfect realization of a design conceived by the author almost in boyhood, and clearly sketched in his first published essay. 1 Its scope may be briefly described as the reduction of the theory of mechanics to certain general formulae, from the simple development of which should be derived the equations necessary for the solution of each separate problem. 2 From the funda- mental principle of virtual velocities, which thus acquired a new significance, Lagrange deduced, with the aid of the calculus of variations, the whole system of mechanical truths, by pro- cesses so elegant, lucid and harmonious as to constitute, in Sir William Hamilton's words, " a kind of scientific poem." This unification of method was one of matter also. By his mode of regarding a liquid as a material system characterized by the unshackled mobility of its minutest parts, the separation between the mechanics of matter in different forms of aggregation finally disappeared, and the fundamental equation of forces was for the first time extended to hydrostatics and hydrodynamics. 3 Thus a universal science of matter and motion was derived, by an unbroken sequence of deduction, from one radical principle; and analytical mechanics assumed the clear and complete form of logical perfection which it now wears.

A publisher having with some, difficulty been found, the book appeared at Paris in 1 788 under the supervision of A. M. Legendre. But before that time Lagrange himself was on the spot. After the death of Frederick the Great, his presence was competed for by the courts of France, Spain and Naples, and a residence in Berlin having ceased to possess any attraction for him, he removed to Paris in 1787. Marie Antoinette warmly patronized him. He was lodged in the Louvre, received the grant of an income equal to that he had hitherto enjoyed, and, with the title of " veteran pensioner " in lieu of that of " foreign associate " (conferred in 1772), the right of voting at the deliberations of the Academy. In the midst of these distinctions, a profound melancholy seized upon him. His mathematical enthusiasm was for the time completely quenched, and during two years the printed volume of his Mecanique, which he had seen only in manuscript, lay unopened beside him. He relieved his dejection

1 (Euvres, i. 15. 2 Mec. An., Advertisement to 1st ed.

3 E. Duhring, Kritische Gesch. der Mechanik, 220, 367; Lagrange, Mec. An. i. 166-172, 3rd ed.

with miscellaneous studies, especially with that of chemistry, which, in the new form given to it by Lavoisier, he found ” aisee comme l’algebre.” The Revolution roused him once more to activity and cheerfulness- Curiosity impelled him to remain and watch the progress of such a novel phenomenon; but curiosity was changed into dismay as the terrific character of the phenomenon unfolded itself. He now bitterly regretted his temerity in braving the danger. ” Tu l’as voulu” he would repeat self-reproachfully. Even from revolutionary tribunals, however, the name of Lagrange uniformly commanded respect. His pension was continued by the National Assembly, and he was partially indemnified for the depreciation of the currency by remunerative appointments. Nominated president of the Academical commission for the reform of weights and measures, his services were retained when its ” purification ” by the Jacobins removed his most distinguished colleagues. He again sat on the commission of 1 799 for the construction of the metric system, and by his zealous advocacy of the decimal principle largely contributed to its adoption.

Meanwhile, on the 31st of May 1792 he married Mademoiselle Lemonnier, daughter of the astronomer of that name, a young and beautiful girl, whose devotion ignored disparity of years, and formed the one tie with life which Lagrange found it hard to break. He had no children by either marriage. Although specially exempted from the operation of the decree of October 1793, imposing banishment on foreign residents, he took alarm at the fate of J. S. Bailly and A. L. Lavoisier, and prepared to resume his former situation in Berlin. His design was frus- trated by the establishment of and his official connexion with the Ecole Normale, and the Ecole Polytechnique. The former institution had an ephemeral existence; but amongst the benefits derived from the foundation of the Ecole Polytechnique one of the greatest, it has been observed, 4 was the restoration of Lagrange to mathematics. The remembrance of his teachings was long treasured by such of his auditors — amongst whom were J. B. J. Delambre and S. F. Lacroix — as were capable of appreciating them. In expounding the principles of the differ- ential calculus, he started, as it were, from the level of his pupils, and ascended with them by almost insensible gradations from elementary to abstruse conceptions. He seemed, not a professor amongst students, but a learner amongst learners; pauses for thought alternated with luminous exposition; invention accompanied demonstration; and thus originated his Theorie des fonctions analytiques (Paris, 1797). The leading idea of this work was contained in a paper published in the Berlin Memoirs for 1772. 5 Its object was

the elimination of the, to some minds, unsatisfactory conception of the infinite from the metaphysics of the higher mathematics, and the substitution for the differential and integral calculus of an analogous method depending wholly on the serial development of algebraical functions. By means of this ” calculus of derived functions ” Lagrange hoped to give to the solution of all analytical problems the utmost ” rigour of the demonstrations of the ancients”; 6 but it cannot be said that the attempt was successful. The validity of his fundamental position was impaired by the absence of a well-constituted theory of series; the notation employed was inconvenient, and was abandoned by its inventor in the second edition of his Mecanique; while his scruples as to the admission into analytical investigations of the idea of limits or vanishing ratios have long since been laid aside as idle. Nowhere, however, were the keenness and clearness of his intellect more conspicuous than in this brilliant effort, which, if it failed in its immediate object, was highly effective in secondary results. His purely abstract mode of regarding functions, apart from any mechanical 01 geometrical considerations, led the way to a new and sharply characterized development of the higher analysis in the hands of A. Cauchy, C. G. Jacobi, and others. 7 The Theorie des fonctions is divided into three parts, of which the first explains the general doctrine of functions, the second deals with its

4 Notice by J. Delambre, CEuvres de Lagrange, i. p. xlii.

5 CEuvres, iii. 441. 6 Theorie des fonctions, p. 6. 7 H. Suter, Ceschichte der math. Wiss. ii. 222-223.

application to geometry, and the third with its bearings on mechanics.

On the establishment of the Institute, Lagrange was placed at the head of the section of geometry; he was one of the first members of the Bureau des Longitudes; and his name appeared in 1791 on the list of foreign members of the Royal Society. On the annexation of Piedmont to France in 1796, a touching compliment was paid to him in the person of his aged father. By direction of Talleyrand, then minister for foreign affairs, the French commissary repaired in state to the old man’s residence in Turin, to congratulate him on the merits of his son, whom they declared ” to have done honour to mankind by his genius, and whom Piedmont was proud to have produced, and France to possess.” Bonaparte, who styled him ” la haute pyramide des sciences

mathematiques," loaded him with personal favours and official distinctions. He became a senator, a count of the empire, a grand officer of the legion of honour, and just before his death received the grand cross of the order of reunion. The preparation of a new edition of his Mecanique exhausted his already failing powers. Frequent fainting fits gave presage of a speedy end, and on the 8th of April 1813 he had a final interview with his friends B. Lacepede, G. Monge and J. A. Chaptal. He spoke with the utmost calm of his approaching death; " c'est une derniere fonction," he said, "qui n'est ni penible ni desagreable." He nevertheless looked forward to a future meeting, when he promised to complete the autobio- graphical details which weakness obliged him to interrupt. They remained untold, for he died two days later on the 10th of April, and was buried in the Pantheon, the funeral oration being pronounced by Laplace and Lacepede.

Amongst the brilliant group of mathematicians whose magnani- mous rivalry contributed to accomplish the task of generalization and deduction reserved for the 18th century, Lagrange occupies an eminent place. It is indeed by no means easy to distinguish and apportion the respective merits of the competitors. This is especially the case between Lagrange and Euler on the one side, and between Lagrange and Laplace on the other. The calculus of variations lay undeveloped in Euler's mode of treating isoperimetrical problems. The fruitful method, again, of the variation of elements was intro- duced by Euler, but adopted and perfected by Lagrange, who first recognized its supreme importance to the analytical investigation of the planetary movements. Finally, of the grand series of researches by which the stability of the solar system was ascertained, the glory must be almost equally divided between Lagrange and Laplace. In analytical invention, and mastery over the calculus, the Turin mathematician was admittedly unrivalled. Laplace owned that he had despaired of effecting the integration of the differential equations relative to secular inequalities until Lagrange showed him the way. But Laplace unquestionably surpassed his rival in practical sagacity and the intuition of physical truth. Lagrange saw in the problems of nature so many occasions for analytical triumphs; Laplace re- garded analytical triumphs as the means of solving the problems of nature. One mind seemed the complement of the other; and both, united in honourable rivalry, formed an instrument of unexampled perfection for the investigation of the celestial machinery. What may be called Lagrange's first period of research into planetary perturbations extended from 1774 to 1784 (see Astronomy : History). The notable group of treatises communicated, 1781-1784, to the Berlin Academy was designed, but did not prove to be his final contribution to the

theory of the planets. After an interval of twenty-four years the subject, re-opened by S. D. Poisson in a paper read on the 20th of June 1808, was once more attacked by Lagrange with all his pristine vigour and fertility of invention. Resuming the inquiry into the invariability of mean motions, Poisson carried the approximation, with Lagrange's formulae, as far as the squares of the disturbing forces, hitherto neglected, with the same result as to the stability of the system. He had not attempted to include in his calculations the orbital variations of the disturbing bodies; but Lagrange, by the happy artifice of transferring the origin of co- ordinates from the centre of the sun to the centre of gravity of the sun and planets, obtained a simplification of the formulae, by which the same analysis was rendered equally applicable to each of the planets severally. It deserves to be recorded as one of the numerous coincidences of discovery that Laplace, on being made acquainted by Lagrange with his new method, produced analogous expressions, to which his independent researches had led him. The final achieve- ment of Lagrange in this direction was the extension of the method of the variation of arbitrary constants, successfully used by him in the investigation of periodical as well as of secular inequalities, to any system whatever of mutually interacting bodies. 1 " Not

1 (Euvres, vi. 771.

without astonishment," even to himself, regard being had to the great generality of the differential equations, he reached a result so wide as to include, as a particular case, the solution of the planetary problem recently obtained by him. He proposed to apply the same principles to the calculation of the disturbances produced in the rotation of the planets by external action on their equatorial pro- tuberances, but was anticipated by Poisson, who gave formulae for the variation of the elements of rotation strictly corresponding with those found by Lagrange for the variation of the elements of revolu- tion. The revision of the Mecanique analytique was undertaken mainly for the purpose of embodying in it these new methods and final results, but was interrupted, when two-thirds completed, by the death of its author.

In the advancement of almost every branch of pure mathematics Lagrange took a conspicuous part. The calculus of variations is indissolubly associated with his name. In the theory of numbers he furnished solutions of many of P. Fermat's theorems, and added some of his own. In algebra he discovered the method of approxi- mating to the real roots of an equation by means of continued frac- tions, and imagined a general process of solving algebraical equations of every degree. The method indeed fails for equations of an order above the

fourth, because it then involves the solution of an equa- tion of higher dimensions than they proposed. Yet it possesses the great and characteristic merit of generalizing the solutions of his predecessors, exhibiting them all as modifications of one principle. To Lagrange, perhaps more than to any other, the theory of differ- ential equations is indebted for its position as a science, rather than a collection of ingenious artifices for the solution of particular problems. To the calculus of finite differences he contributed the beautiful formula of interpolation which bears his name; although substantially the same result seems to have been previously obtained by Euler. But it was in the application to mechanical questions of the instrument which he thus helped to form that his singular merit lay. It was his just boast to have transformed mechanics (defined by him as a ” geometry of four dimensions “) into a branch of analysis, and to have exhibited the so-called mechanical ” principles ” as simple results of the calculus. The method of ” generalized co- ordinates,” as it is now called, by which he attained this result, is the most brilliant achievement of the analytical method. Instead of following the motion of each individual part of a material system, he showed that, if we determine its configuration by a sufficient number of variables, whose number is that of the degrees of freedom to move (there being as many equations as the system has degrees of freedom), the kinetic and potential energies of the system can be expressed in terms of these, and the differential equations of motion thence deduced by simple differentiation. Besides this most im- portant contribution to the general fabric of dynamical science, we owe to Lagrange several minor theorems of great elegance, — among which may be mentioned his theorem that the kinetic energy im- parted by given impulses to a material system under given con- straints is a maximum. To this entire branch of knowledge, in short, he successfully imparted that character of generality and com- pleteness towards which his labours invariably tended.

His share in the gigantic task of verifying the Newtonian theory would alone suffice to immortalize his name. His co-operation was indeed more indispensable than at first sight appears. Much as was done by him, what was done through him was still more import- ant. Some of his brilliant rival’s most conspicuous discoveries were implicitly contained in his writings, and wanted but one step for completion. But that one step, from the abstract to the concrete, was precisely that which the character of Lagrange’s mind indisposed him to make. As notable instances may be mentioned Laplace’s discoveries relating to the velocity of sound and the secular accelera- tion of the moon, both of which were led close up to by Lagrange’s analytical demonstrations.

In the Berlin Memoirs for 1778 and 1783 Lagrange gave the first direct and theoretically perfect method of determining cometary orbits. It has not indeed proved practically available; but his system of calculating cometary perturbations by means of ” mechanical quadratures ” has formed the starting- point of all subsequent researches on the subject. His determina- tion 2 of maximum and minimum values for the slowly varying planetary eccentricities was the earliest attempt to deal with the problem. Without a more accurate knowledge of the masses of the planets than was then possessed a satisfactory solution was im- possible; but the upper limits assigned by him agreed closely with those obtained later by U. J. J. Leverrier. 3 As a mathematical writer Lagrange has perhaps never been surpassed. His treatises are not only storehouses of ingenious methods, but models of sym- metrical form. The clearness, elegance and originality of his mode of presentation give lucidity to what is obscure, novelty to what is familiar, and simplicity to what is abstruse. His genius was one of generalization and abstraction; and the aspirations of the time towards unity and perfection received, by his serene labours, an embodiment denied to them in the troubled world of politics.

Bibliography. — Lagrange’s numerous scattered memoirs have been collected and published in seven 4to volumes, under the title

2 (Euvres, v. 211 seq. 3 Grant, History of Physical Astronomy, p. 117.

CEuvresde Lagrange, publUes sous les soins de M. J. A. Serret (Paris, 1867-1877). The first, second and third sections of this publication comprise respectively the papers communicated by him to the Academies of Sciences of Turin, Berlin and Paris; the fourth in- cludes his miscellaneous contributions to other scientific collections together with his additions to Euler’s Algebra, and his Lecons ilementatres at the Ecole Normale in 1795. Delambre’s notice of his hie, extracted from the Mem. de VInstitut, 1812, is prefixed to the first volume. Besides the separate works already named are Resolu- tion des equations numeriques (1798, 2nd ed., 1808, 3rd ed., 1826) and Lecons sur le calcul des fonctions (1805, 2nd ed., 1806), designed as a commentary and supplement to the first part of the Theorie des fonctions. The first volume of the enlarged edition of the Mecanique a pff a £ “i 181 1, the second, of which the revision was completed by MM Prony and Binet, in 1815. A third edition, in 2 vols., 4 to, was

issued in 1853-1855, and a second of the Theorie des fonctions in 1813 bee also J. J. Virey and Potel, Precis Mstorique (1813); Th 1 nomson s Annals of Philosophy (1813-1820), vols. ii. and iv • H. buter, Geschichte der math. Wiss. (1873); E. Diihring, Kritische Uesch. der allgemeinen Principien der Mechanik (1877, 2nd ed.) ; A. Gautier, Essai historique sur le probleme des trois corps (1817)' R. Grant, Mstory of Physical Astronomy, &c; Pietro Cossali, ttlog'e I. ua, / l8 I3 l ; L ,- Mar tini, Cenni biogrdfici (1840); Moniteur du 26 Fevner (1814); W. Whewell, Hist, of the Inductive Sciences, ii. passim; J. Clerk Maxwell, Electricity and Magnetism, ii. 184- A Berry, Short Hist, of Astr., p. 313; J. S. Bailly, Hist.de Tastr. moderne, 111. 156, 185, 232; J. C. Poggendorff, Biog. Lit. Hand- worterbuch. 1ˆ jˆ q ■,

LAGRANGE-CHANCEL [Chancel], FRANCOIS JOSEPH

(1 6 7 7-1 7 58) , French dramatist and satirist, was born at Perigueux on the 1 st of January 1677. He was an extremely precocious boy, and at Bordeaux, where he was educated, he produced a play when he was nine years old. Five years later his mother took him to Paris, where he found a patron in the princesse de Conti, to whom he dedicated his tragedy of Jugurtha or, as it was called later, Adherbal (1694). Racine had given him advice and was present at the first performance, although he had long lived m complete retirement. Other plays followed: Oreste et Pylade (1697), Meleagre (1699), Amasis (1701), and Ino et Meli- certe (1715). Lagrange hardly realized the high hopes raised by his precocity, although his only serious rival on the tragic stage was Campistron, but he obtained high favour at court, becoming mallre d'hdtel to the duchess of Orleans. This prosperity ended with the publication in 1720 of his Philippiques, odes accusing the regent, Philip, duke of Orleans, of the most odious crimes. He might have escaped the consequences of this libel but for the bitter enmity of a former patron, the due de La Force. Lagrange found sanctuary at Avignon, but was enticed beyond the boundary of the papal jurisdiction, when he was arrested and sent as a prisoner to the isles of Sainte Marguerite. He contrived, however, to escape to Sardinia and thence to Spain and Holland, where he produced his fourth and fifth Philippiques. On the death of the Regent he was able to return to France. He was part author of a Histoire de Perigord left unfinished, and made a further contribution to history, or perhaps, more exactly to romance, in a letter to Elie Freron on the identity of the Man with the Iron Mask. Lagrange's family life was embittered by a long lawsuit against his son. He died at Perigueux at the end of December 1758.

He had collected his own works (5 vols., 1758) some months before ms death. His most famous work, the Philippiques, was edited bv M.

de Lescure in 1858, and a sixth philippic by M. Diancourt in 1886.

LA GRANJA, or San Ildefonso, a summer palace of the kings of Spain; on the south-eastern border of the province of Segovia, and on the western slopes of the Sierra de Guadarrama, 7 m' by road S.E. of the city of Segovia. The royal estate is 3905 ft above sea-level. The scenery of this region, especially in the gorge of the river Lozoya, with its granite rocks, its dense forest of pmes, firs and birches, and its red-tiled farms, more nearly resembles the highlands of northern Europe than any other part of Spain. La Granja has an almost alpine climate, with a clear, cool atmosphere and abundant sunshine. Above the palace rise the wooded summits of the Guadarrama, culminat- ing in the peak of Penalara (7891 ft.); in front of it the wide plains of Segovia extend northwards. The village of San Ildefonso, the oldest part of the estate, was founded in 1450 by Henry IV., who built a hunting lodge and chapel here. In

1477 the chapel was presented by Ferdinand and Isabella to the monks of the Parral, a neighbouring Hieronymite monastery. The original granja (i.e. grange or farm), established by the monks, was purchased in 17 19 by Philip V., after the destruction of his summer palace at Valsain, the ancient Vallis Sapinorum, 2 m. S. Philip determined to convert the estate into a second Versailles. The palace was built between 1721 and 1723. Its facade is fronted by a colonnade in which the pillars reach to the roof. The state apartments contain some valuable 18th-century furniture, but the famous collection of sculptures was removed to Madrid in 1836, and is preserved there in the Museo del Prado. At La Granja it is represented by facsimiles in plaster. The collegiate church adjoining the palace dates from 1724, and con- tains the tombs of Philip V. and his consort Isabella Farnese. An artificial lake called El Mar, 4095 ft. above sea-level, irrigates the-gardens, which are imitated from those of Versailles, and supplies water for the fountains. These, despite the anti- quated and sometimes tasteless style of their ornamentation, are probably the finest in the world; it is noteworthy that, owing to the high level of the lake, no pumps or other mechanism are needed to supply pressure. There are twenty-six fountains besides lakes and waterfalls. Among the most remarkable are the group of " Perseus, Andromeda and the Sea-Monster," which sends up a jet of water no ft. high, the " Fame," which reaches 125 ft., and the very elaborate " Baths of Diana." It is of the last that Philip V. is said to have remarked, " It has cost me three millions and amused me three minutes." Most of the fountains were made by order of Queen Isabella in 1727, during the king's absence. The glass factory of San Ildefonso was founded by Charles III.

. It was in La Granja that Philip V. resigned the crown to his son in January 1724, to resume it after his son's death seven months later; that the treaties of 1777, 1778, 1796 and 1800 were signed (see Spain: History) ; that Ferdinand VII. summoned Don Carlos to the throne in 1832, but was induced to alter the succession in favour ot his own infant daughter Isabella, thus involving Spain in civil war; and that in 1836 a military revolt compelled the Queen- regent Christina to restore the constitution of 1812.

LAGRENEE, LOUIS JEAN FRANCOIS (1724-1805), French painter, was a pupil of Carle Vanloo. Born at Paris on the 30th of December 1724, in 1755 he became a member of the Royal Academy, presenting as his diploma picture the " Rape of Deiamra " (Louvre). He visited St Petersburg at the call of the empress Elizabeth, and on his return was named in 1781 director of the French Academy at Rome; he there painted the " Indian Widow," one of his best-known works. In 1804 Napoleon conferred on him the cross of the legion of honour, and on the 19th of June 1805 he died in the Louvre, of which he was honorary keeper.

LA GUAIRA, or La Gtjayra (sometimes Laguaira, &c) a town and port of Venezuela, in the Federal district 23 m' byrail and 6f m. in a direct line N.'of Caracas. Pop. (1904, estimate) 14,000. It is situated between a precipitous mountain side and a broad, semicircular indentation of the coast line which forms the roadstead of the port. The anchorage was long con- sidered one of the most dangerous on the Caribbean coast, and landing was attended with much danger. The harbour has been improved by the construction of a concrete breakwater running out from the eastern shore line 2044 ft., built up from an extreme depth of 46 ft. or from an average depth of 29A ft., and rising 195 ft. above sea-level. This encloses an area of 76ˆ acres having an average depth of nearly 28 ft. The harbour is further improved by 1870 ft. of concrete quays and 1397 ft. of retaining sea-wall, with several piers (three covered) projecting into deep water. These works were executed by a British company, known as the La Guaira Harbour Corporation, Ltd., and were completed in 189 1 at a cost of about one million sterling. The concession is for 99 years and the additional charges which the company is authorized to impose are necessarily heavy. These improvements and the restrictions placed upon the direct trade between West Indian ports and the Orinoco have greatly increased the foreign trade of La Guaira, which in 1903 was 52% of that of the four puertos habilitados of the republic. The shipping

entries of that year numbered 217, of which 203 entered with general cargo and 14 with coal exclusively. The exports included 152,625 bags coffee, 114,947 bags cacao and 152,891 hides. For 1905-1906 the imports at La Guaira were valued officially at £767,365 and the exports at £663,708. The city stands on sloping ground stretching along the circular coast line with a varying width of 130 to 330 ft. and having the appearance of an amphitheatre. The port improvements added 18 acres of reclaimed land to La Guaira ‘s area, and the removal of old shore batteries likewise increased its available breadth. In this narrow space is built the town, composed in great part of small, roughly- made cabins, and narrow, badly-paved streets, but with good business houses on its principal street. From the mountain side, reddish-brown in colour and bare of vegetation, the solar heat is reflected with tremendous force, the mean annual temperature being 84° F. The seaside towns of Maiquetia, 2 m. VV. and Macuto, 3 m. E., which have better climatic and sanitary conditions and are connected by a narrow-gauge railway, are the residences of many of the wealthier merchants of La Guaira. La Guaira was founded in 1588, was sacked by filibusters under Amias Preston in 1595, and by the French under Gram- mont in 1680, was destroyed by the great earthquake of the 26th of March 181 2, and suffered severely in the war for independence. In 1903, pending the settlement of claims of Great Britain, Germany and Italy against Venezuela, La Guaira was blockaded by a British-German-Italian fleet.

LA GUERONNIERE, LOUIS ETIENNE ARTHUR DUBREUIL HllLION, Vicomte de (1816-1875), French politician, was the scion of a noble Poitevin family. Although by birth and educa- tion attached to Legitimist principles, he became closely associated with Lamartine, to whose organ, Le Bien Public, he was a principal contributor. After the stoppage of this paper he wrote for La Presse, and in 1850 edited Le Pays. A character sketch of Louis Napoleon in this journal caused differences with Lamartine, and La Gueronniere became more and more closely identified with the policy of the prince president. Under the Empire he was a member of the council of state (1853), senator (1861), ambassador at Brussels (1868), and at Constantinople (1870), and grand officer of the legion of honour (1866). He died in Paris on the 23rd of December 1875. Besides his Etudes el portraits politiques contemporains (1856) his most important works are those on the foreign policy of the Empire: La France, Rome et Italie (1851), L’ Abandon de Rome (1862), De la politique interieure et exterieure de la France (1862).

His elder brother, Alfred Dubreuil Helton, Comte de La Gueronniere (1810-1884), who remained faithful to the Legitimist party, was also a well-known writer and journalist. He was con- sistent in his opposition to the July Monarchy and the Empire, but in a series of books on the crisis of 1870-1871 showed a more favourable attitude to the Republic.

LAGUERRE, JEAN HENRI GEORGES (1858-), French lawyer and politician, was born in Paris on the 24th of June 1858. Called to the bar in 1879, he distinguished himself by brilliant pleadings in favour of socialist and anarchist leaders, defending Prince Kropotkine at Lyons in 1883, Louise Michel in the same year; and in 1886, with A. Millerand as colleague he defended Ernest Roche and Due Quercy, the instigators of the Decazeville strike. His strictures on the procureur de la Republique on this occasion being declared libellous he was sus- pended for six months and in 1890 he again incurred suspension for an attack on the attorney-general, Quesnay de Beaurepaire. He also pleaded in the greatest criminal cases of his time, though from 1893 onwards exclusively in the provinces, his exclusion from the Parisian bar having been secured on the pretext of his connexion with La Presse. He entered the Chamber of Deputies for Apt in 1883 as a representative of the extreme revisionist programme, and was one of the leaders of the Boulangist agitation. He had formerly written for Georges Clemenceau's organ La Justice, but when Clemenceau refused to impose any shibboleth on the radical party he became director of La Presse. He rallied to the republican party in May 1891, some months before General Boulanger's suicide. He was not

re-elected to the Chamber in 1893. Laguerre was an excellent lecturer on the revolutionary period of French history, concerning which he had collected many valuable and rare documents. He interested himself in the fate of the " Little Dauphin " (Louis XVII.}, whose supposed remains, buried at Ste Marguerite, he proved to be those of a boy of fourteen.

LAGUNA, or La Laguna, an episcopal city and formerly the capital of the island of Teneriffe, in the Spanish archipelago of the Canary Islands. Pop. (1900) 13,074. Laguna is 4 m. N. by W. of Santa Cruz, in a plain 1800 ft. above sea-level, sur- rounded by mountains. Snow is unknown here, and the mean annual temperature exceeds 63° F.; but the rainfall is very heavy, and in winter the plain is sometimes flooded. The humidity of the atmosphere, combined with the warm climate and rich volcanic soil, renders the district exceptionally fertile; wheat, wine and tobacco, oranges and other fruits, are produced in abundance. Laguna is the favourite summer residence of the wealthier

inhabitants of Santa Cruz. Besides the cathedral, the city contains several picturesque convents, now secularized, a fine modern town hall, hospitals, a large public library and some ancient palaces of the Spanish nobility. Even the modern buildings have often an appearance of antiquity, owing to the decay caused by damp, and the luxuriant growth of climbing plants.

LA HARPE, JEAN FRANCOIS DE (1739-1803), French critic, was born in Paris of poor parents on the 20th of November 1 739. His father, who signed himself Delharpe, was a descendant of a noble family originally of Vaud. Left an orphan at the age of nine, La Harpe was taken care of for six months by the sisters of charity, and his education was provided for by a scholarship at the College d'Harcourt. When nineteen he was imprisoned for some months on the charge of having written a satire against his protectors at the college. La Harpe always denied his guilt, but this culminating misfortune of an early life spent entirely in the position of a dependent had possibly something to do with the bitterness he evinced in later life. In 1763 his tragedy of Warwick was played before the court. This, his first play, was perhaps the best he ever wrote. The many authors whom he afterwards offended were always able to observe that the critic's own plays did not reach the standard of excellence he set up. Timoleon (1764), Pharamond (1765) and Gustave Wa sa (1766) were failures. Melanie was a better play, but was never represented. The success of Warwick led to 'a correspondence with Voltaire, who conceived a high opinion of La Harpe, even allowing him to correct his verses. In 1764 La Harpe married the daughter of a coffee house keeper. This marriage, which proved very unhappy and was dissolved, did not improve his position. They were very poor, and for some time were guests of Voltaire at -Ferney. When, after Voltaire's death, La Harpe in his praise of the philosopher ventured on some reasonable, but rather ill-timed, criticism of individual works, he was accused of treachery to one who had been his constant friend. In 1768 he returned from Ferney to Paris, where he began to write for the Mercure. He was a born fighter and had small mercy on the authors whose work he handled. But he was himself violently attacked, and suffered under many epigrams, especially those of Lebrun- Pindare. No more striking proof of the general hostility can be given than his reception (1776) at the Academy, which Sainte- Beuve calls his " execution." Marmontel, who received him, used the occasion to eulogize La Harpe's predecessor, Charles Pierre Colardeau, especially for his pacific, modest and indulgent disposition. The speech was punctuated by the applause of the audience, who chose to regard it as a series of sarcasms on the new member. Eventually La Harpe was compelled to

resign from the Mercure, which he had edited from 1770. On the stage he produced Les Barmecides (1778), Philoctete, Jeanne de Naples (1781), Les Brames (1783), Ccriolan (1784), Virginie (1786). In 1786 he began a course of literature at the newly- established Lycee. In these lectures, published as the Cours de litterature ancienne et moderne, La Harpe is at his best, for he found a standpoint more or less independent of contemporary polemics. He is said to be inexact in dealing with the ancients,

and he had only a superficial knowledge of the middle ages, but he is excellent in his analysis of 1 7th-century writers. Sainte-Beuve found in him the best critic of the French school of tragedy, which reached its perfection in Racine. La Harpe was a disciple of the ” philosophes”; he supported the extreme party through the excesses of 170/2 and 1793. In 1793 he edited the Mercure de France which adhered blindly to the revolutionary leaders. But in April 1794 he was nevertheless seized as a ” suspect.” In prison he underwent a spiritual crisis which he described in convincing language, and he emerged an ardent Catholic and a reactionist in politics. When he resumed his chair at the Lycee, he attacked his former friends in politics and literature. He was imprudent enough to begin the publication (1801-1807) of his Correspondence lilteraire (1774-1791) with the grand-duke, afterwards the emperor Paul of Russia. In these letters he surpassed the brutalities of the Mercure. He contracted a second marriage, which was dissolved after a few weeks by his wife. He died on the nth of February 1803 in Paris, leaving in his will an incongruous exhortation to his fellow countrymen to maintain peace and concord. Among his posthumous works was a Prophetie de Cazotte which Sainte-Beuve pronounces his best work. It is a sombre description of a dinner-party of notables long before the Revolution, when Jacques Cazotte is made to prophesy the frightful fates awaiting the various individuals of the company.

Among his works not already mentioned are: — Commentaire sur Racine (1795-1796), published in 1807; Commentaire sur le theatre de Voltaire of earlier date (published posthumously in 1814), and an epic poem La Religion (1814). His Cours de litterature has been often reprinted. To the edition of 1825-1826 is prefixed a notice by Pierre Daunou. See also Sainte-Beuve, Causeries du lundi, vol. v.; G. Peignot, Recherches historiques, bibliographiques et litteraires . . . sur La Harpe (1820).

LAHIRE, LAURENT DE (1606-1656), French painter, was born at Paris on the 27th of February 1606. He became a pupil of Lallemand, studied the works of Primaticcio at Fontaine- bleau, but never visited Italy, and belongs wholly to that transi- tion period which preceded the school of Simon Vouet. His picture of Nicolas V. opening the crypt in which he discovers the corpse of St Francis of Assisi standing (Louvre) was executed in 1630 for the Capuchins of the Marais; it shows a gravity and sobriety of character which marked Lahire's best work, and seems not to have been without influence on Le Sueur. The Louvre contains eight other works, and paintings by Lahire are in the museums of Strasburg, Rouen and Le Mans. His drawings, of which the British Museum possesses a fine example, " Pre- sentation of the Virgin in the Temple," are treated as seriously as his paintings, and sometimes show simplicity and dignity of effect. The example of the Capuchins, for whom he executed several other works in Paris, Rouen and Fecamp, was followed by the goldsmiths' company, for whom he produced in 1635 " St Peter healing the Sick " (Louvre) and the " Conversion of St Paul " in 1637. In 1646, with eleven other artists, he founded the French Royal Academy of Painting and Sculpture. Richelieu called Lahire to the Palais Royal; Chancellor Seguier, Tallemant de Reaux and many others entrusted him with important works of decoration; for the Gobelins he designed a series of large compositions. Lahire painted also a great number of portraits, and in 1654 united in one work for the town-hall of Paris those of the principal dignitaries of the municipality. He died on the 28th of December 1656.

LAHN, a river of Germany, a right-bank tributary of the Rhine. Its source is on the Jagdberg, a summit of the Rothaar Mountains, in the cellar of a house (Lahnhof), at an elevation of 1975 ft. It flows at first eastward and then southward to Giessen, then turns south-westward and with a winding course reaches the Rhine between the towns of Oberlahnstein and Niederlahnstein. Its valley, the lower part of which divides the Taunus hills from the Westerwald, is often very narrow and picturesque; among the towns and sites of interest on its banks are Marburg and Giessen with their universities, Wetzlarwith its cathedral, Runkel with its castle, Limburg with its cathedral, the castles of Schaumburg, Balduinstein, Laurenburg, Langenau,

Burgstein and Nassau, and the well-known health resort of Ems. The Lahn is about 135 m. long; it is navigable from its mouth to Giessen, and is partly canalized. A railway follows the valley practically throughout. In 1796 there were here several en- counters between the French under General Jourdan and the troops of the archduke Johan, which resulted in the retreat of the French across the Rhine.

LAHNDA (properly Lahndd or Lahindd, western, or Lahnde-di boll, the language of the West), an Indo- Aryan language spoken in the western Punjab. In 1901 the number of speakers was 3,337 >9 l 7- Its eastern boundary is very indefinite as the language gradually merges into the Panjabi immediately to the east, but it is conventionally taken as the river Chenab from the Kashmir frontier to the town of Ramnagar, and thence as a straight line to the south-west corner of the district of Montgomery. Lahnda is also spoken in the north of the state of Bahawalpur and of the province of Sind, in which latter locality it is known as Siraiki. Its western boundary is, roughly speaking, the river Indus, across which the language of the Afghan population is Pashto (Pushtu), while the Hindu settlers still speak Lahnda. In the Derajat, however, Lahnda is the principal language of all classes in the plains west of the river.

Lahnda is also known as Western Panjabi and as Jatki, or the language of the Jats, who form the bulk of the population whose mother-tongue it is. In the Derajat it is called Hindko or the language of Hindus. In 18 19 the Serampur missionaries published a Lahnda version of the New Testament. They called the language Uchchi, from the important town of Uch near the confluence of the Jhelam and the Chenab. This name is commonly met with in old writings. It has numerous dialects, which fall into two main groups, a northern and a southern, the speakers of which are separated by the Salt Range. The principal varieties of the northern group are Hindki (the same in meaning as Hindko) and Pothwari. In the southern group the most important are Khetra.ni, MultanI, and the dialect of Shahpur. The language possesses no literature.

Lahnda belongs to the north-western group of the outer band of Indo-Aryan languages (q.v.), the other members being Kashmiri (q.v.) and Sindhi, with both of which it is closely connected. See Sindhi; also Hindostani. (G. A. Gr.)

LA HOGUE, BATTLE OF, the name now given to a series of encounters which took place from the 19th to the 23rd (O.S.) of May 1692, between an allied British and Dutch fleet and a French force, on the northern and eastern sides of the Cotentin in Normandy. A body of French troops, and a number of Jacobite exiles, had been collected in the Cotentin. The government of Louis XIV. prepared a naval armament to cover their passage across the Channel. This force was to have been composed of the French ships at Brest commanded by the count of Tourville, and of a squadron which was to have joined him from Toulon. But the Toulon ships were scattered by a gale, and the combination was not effected. The count of Tourville, who had put to

sea to meet them, had with him only 45 or 47 ships of the line. Yet when the reinforcement failed to join him, he steered up Channel to meet the allies, who were known to be in strength. On the 15th of May the British fleet of 63 sail of the line, under command of Edward Russell, after- wards earl of Orford, was joined at St Helens by the Dutch squadron of 36 sail under Admiral van Allemonde. The apparent rashness of the French admiral in seeking an encounter with very superior numbers is explained by the existence of a general belief that many British captains were discontented, and would pass over from the service of the government established by the Revolution of 1688 to their exiled king, James II. It is said that Tourville had orders from Louis XIV. to attack in any case, but the story is of doubtful authority. The British government, aware of the Jacobite intrigues in its fleet, and of the prevalence of discontent, took the bold course of appealing to the loyalty and patriotism of its officers. At a meeting of the flag-officers on board the " Britannia," Russell's flag-ship, on the 15th of May, they protested their loyalty, and the whole allied fleet put to sea on the 18th. On the 19th of May, when Cape Barfleur, the

north-eastern point of the Cotentin, was 21 m. S.W. of them, they sighted Tourville, who was then 20 m. to the north of Cape La Hague, the north-western extremity of the peninsula, which must not be confounded with La Houque, or La Hogue, the place at which the fighting ended. The allies were formed in a line from S.S.W. to N.N.E. heading towards the English coast, the Dutch forming the White or van division, while the Red or centre division under Russell, and the Blue or rear under Sir John Ashby, were wholly composed of British ships. The wind was from the S.W. and the weather hazy. Tourville bore down and attacked about mid-day, directing his main assault on the centre of the allies, but telling off some ships to watch the van and rear of his enemy. As this first encounter took place off Cape Barfleur, the battle was formerly often called by the name. On the centre, where Tourville was directly opposed to Russell, the fighting was severe. The British flag-ship the " Britannia " (100), and the French, the " Soleil Royal " (100), were both completely crippled. After several hours of conflict, the French admiral, seeing himself outnumbered, and that the allies could outflank him and pass through the necessarily wide intervals in his extended line, drew off without the loss of a ship. The wind now fell and the haze became a fog. Till the 23rd, the two fleets remained off the north coast of the Cotentin, drifting west with the ebb tide or east with the flood, save when they

anchored. During the night of the ioth/2oth some British ships became entangled, in ■ the fog, with the French, and drifted through them on the tide, with loss. On the 23rd both fleets were near La Hague. About half the French, under D'Amfreville, rounded the cape, and fled to St Malo through the dangerous passage known as the Race of Alderney (le Ras Blanchard). The others were unable to get round the cape before the flood tide set in, and were carried to the eastward. Tourville now trans- ferred his own flag, and left his captains free to save themselves as they best could. He left the " Soleil Royal," and sent her with two others to Cherbourg, where they were destroyed by Sir Ralph Delaval. The others now ran round Cape Barfleur, and sought refuge on the east side of the Cotentin at the anchorage of La Houque, called by the English La Hogue, where the troops destined for the invasion were encamped. Here 13 of them were burnt by Sir George Rooke, in the presence of the French generals and of the exiled king James II. From the name of the place where the last blow was struck, the battle has come to be known by the name of La Hogue.

Sufficient accounts of the battle may be found in Lediard's Naval History (London, 1735), and for the French side in Tronde's Batailles navales de la France (Paris, 1867). The escape of D'Amfreville's squadron is the subject of Browning's poem " Herve Riel."

_ (D. H.) LAHORE, an ancient city of British India, the capital of the Punjab, which gives its name to a district and division. It lies in 31 35′ N. and 74 20′ E. near the left bank of the River Ravi, 1706 ft. above the sea, and 1252 m. by rail from Calcutta. It is thus in about the same latitude as Cairo, but owing to its inland position is considerably hotter than that city, being one of the hottest places in India in the summer time. In the cold season the climate is pleasantly cool and bright. The native city is walled, about ij m. in length W. to E. and about f m. in breadth N. to S. Its site has been occupied from early times, and much of it stands high above the level of the surrounding country, raised on the remains of a succession of former habita- tions. Some old buildings, which have been preserved, stand now below the present surface of the ground. This is well seen in the mosque now called Masjid Niwin (or sunken) built in 1 560, the mosque of Mullah Rahmat, 7 ft. below, and the Shivali, a very old Hindu temple, about 12 ft. below the surrounding ground. Hindu tradition traces the origin of Lahore to Loh or Lava, son of Rama, the hero of the Ramayana. The absence of mention of Lahore by Alexander's historians, and the fact that coins of the Graeco-Bactrian kings are not found among the ruins, lead to the belief that it was not a place of any import- ance during the earliest period of Indian history. On the other hand, Hsiian Tsang, the Chinese Buddhist, notices the city in his Itinerary (a.d. 630); and it

seems probable, therefore, that

Lahore first rose into prominence between the 1st and 7th centuries a.d. Governed originally by a family of Chauhan Rajputs, a branch of the house of Ajmere, Lahore fell successively under the dominion of the Ghazni and Ghori sultans, who made it the capital of their Indian conquests, and adorned it with numerous buildings, almost all now in ruins. But it was under the Mogul empire that Lahore reached its greatest size and magnificence.. The reigns of Humayun, Akbar, Jahangir, Shah Jahan and Aurangzeb form the golden period in the annals and architecture of the city. Akbar enlarged and repaired the fort, and surrounded the town with a wall, portions of which remain, built into the modern work of Ranjit Singh. Lahore formed the capital of the Sikh empire of that monarch. At the end of the second Sikh War, with the rest of the Punjab, it came under the British dominion.

The architecture of Lahore cannot compare with that of Delhi. Jahangir in 1622-1627 erected the Khwabgah or ” sleep- ing-place,” a fine palace much defaced by the Sikhs but to some extent restored in modern times; the Moti Masjid or ” pearl mosque ” in the fort, used by Ranjit Singh and afterwards by the British as a treasure-house; and also the tomb of Anarkali, used formerly as the station church and now as a library. Shah Jahan erected a palace and other buildings near the Khwabgah, including the beautiful pavilion called the Naulakha from its cost of nine lakhs, which was inlaid with precious stones. The mosque of Wazir Khan (1634) provides the finest example of kashi or encaustic tile work. Aurangzeb’s Jama Masjid, or ” great mosque,” is a huge bare building, stiff in design, and lacking the detailed ornament typical of buildings at Delhi. The buildings of Ranjit Singh, especially his mausoleum, are common and meretricious in style. He was, moreover, responsible for much of the despoiling of the earlier buildings. The streets of the native city are narrow and tortuous, and are best seen from the back of an elephant. Two of the chief features of Lahore lie outside its walls at Shahdara and Shalamar Gardens respectively. Shahdara, which contains the tomb of the emperor Jahangir, lies across the Ravi some 6 m. N. of the city. It consists of a splendid marble cenotaph surrounded by a grove of trees and gardens. The Shalamar Gardens, which were laid out in a.d. 1637 by Shah Jahan, lie 6 m. E. of the city. They are somewhat neglected except on festive occasions, when the fountains are playing and the trees are lit up by lamps at night.

The modern city of Lahore, which contained a population of 202,964 in 1901, may be divided into four parts: the native city, already described; the civil station or European quarter, known as Donald

Town; the Anarkali bazaar, a suburb S. of the city wall; and the cantonment, formerly called Mian Mir. The main street of the civil station is a portion of the grand trunk road from Calcutta to Peshawar, locally known as the Mall. The chief modern buildings along this road, west to east, are the Lahore museum, containing a fine collection of Graeco- Buddhist sculptures, found by General Cunningham in the Yusufzai country, and arranged by Mr Lockwood Kipling, a former curator of the museum; the cathedral, begun by Bishop French, in Early English style, and consecrated in 1887; the Lawrence Gardens and Montgomery Halls, surrounded by a garden that forms the chief meeting-place of Europeans in the afternoon; and opposite this government house, the official residence of the lieutenant-governor of the Punjab; next to this is the Punjab club for military men and civilians. Three miles beyond is the Lahore cantonment, where the garrison is stationed, except a company of British infantry, which occupies the fort. It is the headquarters of the 3rd division of the northern army. Lahore is an important junction on the North- Western railway system, but has little local trade or manufacture. The chief industries are silk goods, gold and silver lace, metal work and carpets which are made in the Lahore gaol. There are also cotton mills, flour mills, an ice-factory, and several factories for mineral waters, oils, soap, leather goods, &c. Lahore is an important educational centre. Here are the Punjab University with five colleges, medical and law colleges, a central training

college, the Aitchison Chiefs' College for the sons of native noblemen, and a number of other high schools and technical and special schools.

The District of Lahore has an area of 3704 sq. m., and its population in 1901 was 1,162,109, consisting chiefly of Punjabi Mahommedans with a large admixture of Hindus and Sikhs. In the north-west the district includes a large part of the barren Rechna Doab, while south of the Ravi is a desolate alluvial tract, liable to floods. The Manjha plateau, however, between the Ravi and the Beas, has been rendered fertile by the Bari Doab canal. The principal crops are wheat, pulse, millets, maize, oil-seeds and cotton. There are numerous factories for ginning and pressing cotton. Irrigation is provided by the main line of the Bari Doab canal and its branches, and by inundation- cuts from the Sutlej. The district is crossed in several directions by lines of the North- Western railway. Lahore, Kasur, Chunian and Raiwind are the chief trade centres.

The Division or Lahore extends along the right bank of the Sutlej from the Himalayas to Multan. It comprises the six districts of Sialkot, Gujranwala, Montgomery, Lahore, Amritsar and Gurdaspur. Total area, 17,154 sq.m.;pop. (1901) 5,598,463. The commissioner for the division also exercises political control over the hill state of Chamba. The common language of the rural population and of artisans is Punjabi; while Urdu or Hindustani is spoken by the educated classes. So far from the seaboard, the range between extremes of winter and summer temperature in the sub-tropics is great. The mean temperature in the shade in June is about 92 F., in January about 50 . In midsummer the thermometer sometimes rises to 115 in the shade, and remains on some occasions as high as 105° throughout the night. In winter the morning temperature is sometimes as low as 20 . The rainfall is uncertain, ranging from 8 in. to 25, with an average of 15 in. The country as a whole is parched and arid, and greatly dependent on irrigation. . LA HOZ Y MOTA, JUAN CLAUDIO DE (i63o?i7io?), Spanish dramatist, was born in Madrid. He became a knight of Santiago in 1653, and soon afterwards succeeded his father as regidor of Burgos. In 1665 he was nominated to an important post at the Treasury, and in his later years acted as official censor of the Madrid theatres. On the 13th of August 1709 he signed his play entitled Josef, Salvador de Egipto, and is pre sumed to have died in the following year. Hoz is not remark- able for originality of conception, but his recasts of plays by earlier writers are distinguished by an adroitness which accounts for the esteem ‘in which he was held by his contemporaries. El Montanfs Juan Pascal and El castigo de la miseria, reprinted in the Biblioteca de Aulores Espanoles, give a just idea of his adaptable talent.

LAHR, a town in the grand-duchy of Baden, on the Schutter, about 9 m. S. of Offenburg, and on the railway Dinglingen-Lahr. Pop. (1900) 13,577. One of the busiest towns in Baden, it carries on manufactures of tobacco and cigars, woollen goods, chicory, leather, pasteboard, hats and numerous other articles, has considerable trade in wine, while among its other industries are printing and lithography. Lahr first appears as a town in 1278, and after several vicissitudes it passed wholly to Baden in 1803.

See Stein, Geschichte und Beschreibung der Stadt Lahr (Lahr, 1827) ; and Sutterlin, Lahr und seine Umgebung (Lahr, 1904).

LAIBACH (Slovenian, Ljubljana), capital of the Austrian duchy of Carniola, 237 m. S.S.W. of Vienna by rail. Pop. (1900) 36,547, mostly Slovene. It is situated on the Laibach, near its influx into the Save, and consists of the town proper and eight suburbs. Laibach is an episcopal

see, and possesses a cathedral in the Italian style, several beautiful churches, a town hall in Renaissance style and a castle, built in the 15th century, on the Schlossberg, an eminence which commands the town. Laibach is the principal centre of the national Slovenian movement, and it contains a Slovene theatre and several societies for the promotion of science and literature in the native tongue. The Slovenian language is in general official use, and the municipal administration is purely Slovenian. The industries include

manufactures of pottery, bricks, oil, linen and woollen cloth, fire-hose and paper.

Laibach is supposed to occupy the site of the ancient Emona or Aemona, founded by the emperor Augustus in 34 B.C. It was besieged by Alaric in 400, and in 451 it was desolated by the Huns. In 900 Laibach suffered much from the Magyars, who were, however, defeated there in 914. In the 12th century the town passed into the hands of the dukes of Carinthia; in 1270 it was taken by Ottocar of Bohemia; and in 1277 it came under the Habsburgs. In the early part of the 15th century the town was several times besieged by the Turks. The bishopric was founded in 1461. On the 17th of March 1797 and again on the 3rd of June 1809 Laibach was taken by the French, and from 1809 to 1813 it became the seat of their general government of the Illyrian provinces. From 1816 to 1849 Laibach was the capital of the kingdom of Illyria. The town is also historic- ally known from the congress of Laibach, which assembled here in 1821 (see below). Laibach suffered severely on the 14th of April 1895 from an earthquake.

Congress or Conference of Laibach. — Before the break-up of the conference of Troppau (q.v.), it had been decided to adjourn it till the following January, and to invite the attendance of the king of Naples, Laibach being chosen as the place of meet- ing. Castlereagh, in the name of Great Britain, had cordially approved this invitation, as ” implying negotiation ” and there- fore as a retreat from the position taken up in the Troppau Protocol. Before leaving Troppau, however, the three autocratic powers, Russia, Austria and Prussia, had issued, on the 8th of December 1820, a circular letter, in which they reiterated the principles of the Protocol, i.e. the right and duty of the powers responsible for the peace of Europe to intervene to suppress any revolutionary movement by which they might conceive that peace to be endangered (Hertslet, No. 105). Against this view Castlereagh once more protested in a circular despatch of the 19th of January 182 1, in which he clearly differentiated between the objectionable general principles advanced by the three powers, and the particular case of

the unrest in Italy, the immediate concern not of Europe at large, but of Austria and of any other Italian powers which might consider themselves endangered (Hertslet, No. 107).

The conference opened on the 26th of January 1821, and its constitution emphasized the_ divergences revealed in the above circulars. The emperors of Russia and Austria were present in person, and with them were Counts Nesselrode and Capo d'Istria, Metternich and Baron Vincent; Prussia and France were represented by plenipotentiaries. But Great Britain, on the ground that she had no immediate interest in the Italian question, was represented only by Lord Stewart, the ambassador at Vienna, who was not armed with full powers, his mission being to watch the proceedings and to see that nothing was done beyond or in violation of the treaties. Of the Italian princes, Ferdinand of Naples and the duke of Modena came in person; the rest were represented by plenipotentiaries.

It was soon clear that a more or less open breach between Great Britain and the other powers was inevitable, Metternich was anxious to secure an apparent unanimity of the powers to back the Austrian intervention in Naples, and every device was used to entrap the English representative into subscribing a formula which would have seemed to commit Great Britain to the principles of the other allies. When these devices failed, attempts were made unsuccessfully to exclude Lord Stewart from the conferences on the ground of defective powers. Finally he was forced to an open protest, which he caused to be inscribed on the journals, but the action of Capo d'Istria in reading to the assembled Italian ministers, who were by no means reconciled to the large claims implied in the Austrian intervention, a declaration in which as the result of the " intimate union established by solemn acts between all the European powers " the Russian emperor offered to the allies " the aid of his arms, should new revolutions threaten new dangers," an attempt to revive that idea of a " universal union " based on the Holy Alliance (q.v.) against which Great Britain had consistently protested.

The obiections of Great Britain were, however, not so much to an Austrian intervention in Naples as to the far-reaching principles by which it was sought to justify it. King Ferdinand had been invited to Laibach, according to the circular of the

8th of December, in order that he might be free to act as ” mediator between his erring peoples and the states whose tranquillity they threatened.” The cynical use he made of his ” freedom ” to repudiate obligations solemnly contracted is described elsewhere (see Naples, History). The result of this action was the Neapolitan declaration of war and the occupa- tion of Naples by Austria, with the sanction of the congress. This was preceded, on the 10th of March, by the revolt of the garrison of Alessandria and the military revolution in Piedmont, which in its turn was suppressed, as a result of negotiations at Laibach, by Austrian troops. It was at Laibach, too, that, on the 19th of March, the emperor Alexander received the news of Ypsilanti’s invasion of the Danubian principalities, which heralded the outbreak of the War of Greek Independence, and from Laibach Capo d’Istria addressed to the Greek leader the tsar’s repudiation of his action.

The conference closed on the 12th of May, on which date Russia, Austria and Prussia issued a declaration (Hertslet, No. 108) ” to proclaim to the world the principles which guided them ” in coming ‘.’ to the assistance of subdued peoples,” a declaration which once more affirmed the principles of the Troppau Protocol. In this lay the European significance of the Laibach conference, of which the activities had been mainly confined to Italy. The issue of the declaration without the signatures of the representatives of Great Britain and France proclaimed the disunion of the alliance; within which — to use Lord Stewart’s words — there existed ” a triple understanding which bound the parties to carry forward their own views in spite of any difference of opinion between them and the two great constitutional governments.”

No separate history of the congress exists, but innumerable refer- ences are to be found in general histories and in memoirs, correspond- ence, &c, of the time. See Sir E. Hertslet, Map of Europe (London, 1875); Castlereagh, Correspondence; Metternich, Memoirs; N. Bianchi, Storia documentata delta diplomazia Europea in Italia (8 vols., Turin, 1865-1872); Gentz’s correspondence (see Gentz, F. von). Valuable unpublished correspondence is preserved at the Record Office in the volumes marked F. O., Austria, Lord Stewart, January to February 182 1, and March to September 1 82 1. (W. A. P.)

LAIDLAW, WILLIAM (1780-184 5), friend and amanuensis of Sir Walter Scott, was born at Blackhouse, Selkirkshire, on the 19th of November 1780, the son of a sheep farmer. After an elementary education in Peebles he returned to work upon his father’s farm. James Hogg, the shepherd poet, who was employed at Blackhouse for some years, ‘ became Laidlaw’s friend and appreciative critic.

Together they assisted Scott by supplying material for his Border Minstrelsy, and Laidlaw, after two failures as a farmer in Midlothian and Peebleshire, became Scott's steward at Abbotsford. He also acted as Scott's amanuensis at different times, taking down a large part of The Bride of Lammermoor, The Legend of Montrose and Ivanhoe from the author's dictation. He died at Contin near Dingwall, Ross-shire, on the 18th of May 1845. Of his poetry, little is known except Lucy's Flittin' in Hogg's Forest Minstrel.

LAING, ALEXANDER GORDON (1 793-1826), Scottish explorer, the first European to reach Timbuktu, was born at Edinburgh on the 27th of December 1793. He was educated by his father, William Laing, a private teacher of classics, and at Edinburgh University. In 181 1 he went to Barbados as clerk to his maternal uncle Colonel (afterwards General) Gabriel Gordon. Through General Sir George Beckwith, governor of Barbados, he obtained an ensigncy in the York Light Infantry. He was employed in the West Indies, and in 1822 was promoted to a company in the Royal African Corps. In that year, while with his regiment at Sierra Leone, he was sent by the governor, Sir Charles MacCarthy, to the Mandingo country, with the double object of opening up commerce and endeavouring to abolish the slave trade in that region. Later in the same year Laing visited Falaba, the capital of the Sulima country, and ascertained the source of the Rokell. He endeavoured to reach the source of the Niger, but was stopped by the natives. He was, however, enabled to fix it with approximate accuracy. He took an active part in the Ashanti War of 1823-24, and was sent home with the

despatches containing the news of the death in action of Sir Charles MacCarthy. Henry, 3rd Earl Bathurst, then secretary for the colonies, instructed Captain Laing to undertake a journey, via Tripoli and Timbuktu, to further elucidate the hydrography of the Niger basin. Laing left England in February 1825, and at Tripoli on the 14th of July following he married Emma Warring- ton, daughter of the British consul. Two days later, leaving his bride behind, he started to cross the Sahara, being accompanied by a sheikh who was subsequently accused of planning his murder. Ghadames was reached, by an indirect route, in October 1825, and in December Laing was in the Tuat territory, where he was well received by the Tuareg. On the 10th of January 1826 he left Tuat, and made for Timbuktu across the desert of Tanezroft. Letters from him written in May and July following told of sufferings from fever and the plundering of his caravan by Tuareg, Laing being wounded in twenty-four places in the fighting. Another letter dated from Timbuktu on the 2 1 st of September announced his arrival in that city on the preceding 18th of August, and the insecurity

of his position owing to the hostility of the Fula chieftain Bello, then ruling the city. He added that he intended leaving Timbuktu in three days' time. No further news was received from the traveller. From native information it was ascertained that he left Timbuktu on the day he had planned and was murdered on the night of the 26th of September 1826. His papers were never recovered, though it is believed that they were secretly brought to Tripoli in 1828. In 1903 the French government placed a tablet bearing the name of the explorer and the date of his visit on the house occupied by him during his thirty-eight days' stay in Timbuktu.

While in England in 1824 Laing prepared a narrative of his earlier journeys, which was published in 1825 and entitled Travels in the Timannee, Kooranko and Soolima Countries, in Western Africa.

LAING, DAVID (1793-1878), Scottish antiquary, the son of William Laing, a bookseller in Edinburgh, was born in that city on the 20th of April 1793. Educated at the Canongate Grammar School, when fourteen he was apprenticed to his father. Shortly after the death of the latter in 1837, Laing was elected to the librarianship of the Signet Library, which post he retained till his death. Apart from an extraordinary general bibliographical knowledge, Laing was best known as a lifelong student of the literary and artistic history of Scotland. He published no original volumes, but contented himself with editing the works of others. Of these, the chief are — Dunbar's Works (2 vols., .1834), with a supplement added in 1865; Robert Baillie's Letters and Journals (3 vols., 1841-1842); John Knox's Works (6 vols., 1846-1864); Poems and Fables of Robert Henryson (1865); Andrew of Wyntoun's Orygynale Cronykil of Scotland (3 vols., 1872-1879); Sir David Lyndsay's Poetical Works (3 vols., 1879). Laing was for more than fifty years a member of the Society of Antiquaries of Scotland, and he contributed upwards of a hundred separate papers to their Proceedings. He was also for more than forty years secretary to the Bannatyne Club, many of the publications of which were edited by him. He was struck with paralysis in 1878 while in the Signet Library, and it is related that, on recovering consciousness, he looked about and asked if a proof of Wyntoun had been sent from the printers. He died a few days afterwards, on the 18th of October, in his eighty-sixth year. His library was sold by auction, and realized £16,137. To the university of Edinburgh he bequeathed his collection of MSS.

See the Biographical Memoir prefixed to Select Remains of Ancient, Popular and Romance Poetry of Scotland, edited by John Small (Edinburgh, 1885); also T. G. Stevenson, Notices of David Laing with

List of his Publications, &c. (privately printed 1878).

LAING, MALCOLM (1762-1818), Scottish historian, son of Robert Laing, and elder brother of Samuel Laing the elder, was born on his paternal estate on the Mainland of Orkney. Having studied at the grammar school of Kirkwall and at Edinburgh University, he was called to the Scotch bar in 1785, but devoted his time mainly to historical studies. In 1793 he completed the sixth and last volume of Robert Henry's History of Great Britain, the portion which he wrote being in its strongly

liberal tone at variance with the preceding part of the work; and in 1802 he published his History of Scotland from the Union of the Crowns to the Union of the Kingdoms, a work showing consider- able research. Attached to the History was a dissertation on the Gowrie conspiracy, and another on the supposed authenticity of Ossian's poems. In another dissertation, prefixed to a second and corrected edition of the History published in 1804, Laing endeavoured to prove that Mary, queen of Scots, wrote the Casket Letters, and was partly responsible for the murder of Lord Darnley. In the same year he edited the Life and Historie of King James VI., and in 1805 brought out in two volumes an edition of Ossian's poems. Laing, who was a friend of Charles James Fox, was member of parliament for Orkney and Shetland from 1807 to 181 2. He died on the 6th of November 1818.

LAING, SAMUEL (1810-1807), British author and railway administrator, was born at Edinburgh on the 12th of December 1810. He was the nephew of Malcolm Laing, the historian of Scotland; and his father, Samuel Laing (1780-1868), was also a well-known author, whose books on Norway and Sweden attracted much attention. Samuel Laing the younger entered St John's College, Cambridge, in 1827, and after graduating as second wrangler and Smith's prizeman, was elected a fellow, and remained at Cambridge temporarily as a coach. He was called to the bar in 1837, and became private secretary to Mr Labouchere (afterwards Lord Taunton), the president of the Board of Trade. In 1842 he was made secretary to the railway department, and retained this post till 1847. He had by then become an authority on railway working, and had been a member of the Dalhousie Railway Commission; it was at his suggestion that the " parliamentary " rate of a penny a mile was instituted. In 1848 he was appointed chairman and managing director of the London, Brighton &

South Coast Railway, and his business faculty showed itself in the largely increased prosperity of the line. He also became chairman (1852) of the Crystal Palace Company, but retired from both posts in 1855. In 1852 he entered parliament as a Liberal for Wick, and after losing his seat in 1857, was re-elected in 1859, in which year he was ap- pointed financial secretary to the Treasury; in i860 he was made finance minister in India. On returning from India, he was re-elected to parliament for Wick in 1865. He was defeated in 1868, but in 1873 he was returned for Orkney and Shetland, and retained his seat till 1885. Meanwhile he had been re- appointed chairman of the Brighton line in 1867, and continued in that post till 1 894, being generally recognized as an admirable administrator. He was also chairman of the Railway Debenture Trust and the Railway Share Trust. In later life he became well known as an author, his Modern Science and Modern Thought (1885), Problems of the Future (1889) and Human Origins (1892) being widely read, not only by reason of the writer's influential position, experience of affairs and clear style, but also through their popular and at the same time well-informed treatment of the scientific problems of the day. Laing died at Sydenham on the 6th of August 1897.

LAING'S [or Lang's] NEK, a pass through the Drakensberg, South Africa, immediately north of Majuba (q.v.), at an elevation of 5400 to 6000 ft. It is the lowest part of a ridge which slopes from Majuba to the Buffalo river, and before the opening of the railway in 1891 the road over the nek was the main artery of communication between Durban and Pretoria. The railway pierces the nek by a tunnel 2213 ft. long. When the Boers rose in revolt in December 1880 they occupied Laing's Nek to oppose the entry of British reinforcements into the Transvaal. On the 28th of January 1881 a small British force endeavoured to drive the Boers from the pass, but was forced to retire.

LAIRD, MACGREGOR (1808-1861), Scottish merchant, pioneer of British trade on the Niger, was born at Greenock in 1808, the younger son of William Laird, founder of the Birken- head firm of shipbuilders of that name. In 1831 Laird and certain Liverpool merchants formed a company for the commercial development of the Niger regions, the lower course of the Niger having been made known that year by Richard and John Lander. In 1832 the company despatched two small ships to the Niger,

one, the " Alburkah," a paddle-wheel steamer of 55 tons designed by Laird, being the first iron vessel to make an ocean voyage. Macgregor Laird went with the expedition, which was led by Richard Lander and numbered forty-eight Europeans, of whom all but nine died from fever

or, in the case of Lander, from wounds. Laird went up the Niger to the confluence of the Benue (then called the Shary or Tchadda), which he was the first white man to ascend. He did not go far up the river but formed an accurate idea as to its source and course. The expedi- tion returned to Liverpool in 1834, Laird and Surgeon R. A. K. Oldfield being the only surviving officers besides Captain (then Lieut.) William Allen, R.N., who accompanied the expedition by order of the Admiralty to survey the river. Laird and Oldfield published in 1837 in two volumes the Narrative of an Expedition into the Interior of Africa by the River Niger . . . in 1832, 1833, 1834. Commercially the expedition had been unsuccessful, but Laird had gained experience invaluable to his successors. He never returned to Africa but henceforth devoted himself largely to the development of trade with West Africa and especially to the opening up of the countries now forming the British protectorates of Nigeria. One of his principal reasons for so doing was his belief that this method was the best means of stopping the slave trade and raising the social condition of the Africans. In 1854 he sent out at his own charges, but with the support of the British government, a small steamer, the ” Pleiad,” which under W. B. Baikie made so successful a voyage that Laird induced the government to sign contracts for annual trading trips by steamers specially built for navigation of the Niger and Benue. Various stations were founded on the Niger, and though government support was withdrawn after the death of Laird and Baikie, British traders continued to frequent the river, which Laird had opened up with little or no personal advantage. Laird’s interests were not, however, wholly African. In 1837 he was one of the promoters of a company formed to run steamships between England and New York, and in 1838 the ” Sirius,” sent out by this company, was the first ship to cross the Atlantic from Europe entirely under steam. Laird died in London on the 9th of January 1861.

His elder brother, John Laird (1805-1874), was one of the first to use iron in the construction of ships; in 1829 he made an iron lighter of 60 tons which was used on canals and lakes in Ireland; in 1834 he built the paddle steamer ” John Randolph” for Savannah, U.S.A., stated to be the first iron ship seen in America. For the East India Company he built in 1839 the first iron vessel carrying guns and he was also the designer of the famous ” Birkenhead.” A Conservative in politics, he repre- sented Birkenhead in the House of Commons from 1861 to his death.

LAiS, the name of two Greek courtesans, generally distin- guished as follows. (1) The elder, a native of Corinth, born c. 480 B.C., was famous for her greed and hardheartedness, which gained her the

nickname of Axine (the axe). Among her lovers were the philosophers Aristippus and Diogenes, and Eubatas (or Aristoteles) of Cyrene, a famous runner. In her old age she became a drunkard. Her grave was shown in the Craneion near Corinth, surmounted by a lioness tearing a ram. (2) The younger, daughter of Timandra the mistress of Alcibiades, born at Hyccara in Sicily c. 420 B.C., taken to Corinth during the Sicilian expedition. The painter Apelles, who saw her drawing water from the fountain of Peirene, was struck by her beauty, and took her as a model. Having followed a handsome Thessalian to his native land, she was slain in the temple of Aphrodite by women who were jealous of her beauty. Many anecdotes are told of a Lais by Athenaeus, Aelian, Pausanias, and she forms the subject of many epigrams in the Greek Anthology; but, owing to the similarity of names, there is considerable uncertainty to whom they refer. The name itself, like Phryne, was used as a general term for a courtesan.

See F. Jacobs, Vermischte Schriften, iv. (1830).

LAISANT, CHARLES ANNE (1841-), French politician, was born at Nantes on the 1st of November 1841, and was educated at the Ecole Polytechnique as a military engineer.

He defended the fort of Issy at the siege of Paris, and served in Corsica and in Algeria in 1873. In 1876 he resigned his commission to enter the Chamber as deputy for Nantes in the republican interest, and in 1879 he became director of the Petit Parisien. For alleged libel on General Courtot de Cissey in this paper he was heavily fined. In the Chamber he spoke chiefly on army questions; and was chairman of a commission appointed to consider army legislation, resigning in 1887 on the refusal of the Chamber to sanction the abolition of exemptions of any kind. He then became an adherent of the revisionist policy of General Boulanger and a member of the League of Patriots. He was elected Boulangist deputy for the 18th Parisian arron- dissement in 1889. He did not seek re-election in 1893, but devoted himself thenceforward to mathematics, helping to make known in France the theories of Giusto Bellavitis. He was attached to the staff of the ficole Poly technique, and in 1903- 1904 was president of the French Association for the Advance- ment of Science.

In addition to his political pamphlets Pourquoi et comment je suis Boulangiste (1887) and L'Anarchie bourgeoise (1887), he published

mathematical works, among them- Introduction d, Vitude des quart- ernions (1881) and Theorie et applications des iquipollences (1887).

LAI-YANG, a city in the Chinese province of Shan-tung, in 37° N., 120° 55′ E., about the middle of the eastern peninsula, on the highway running south from Chi-fu to Kin-Kia or Ting- tsu harbour. It is surrounded by well-kept walls of great antiquity, and its main streets are spanned by large pailous or monumental arches, some dating from the time of the emperor Tai-ting-ti of the Yuan dynasty (1324). There are extensive suburbs both to the north and south, and the total population is estimated at 50,000. The so-called Ailanthus silk produced by Salurnia cynthia is woven at Lai-yang into a strong fabric; and the manufacture of the peculiar kind of wax obtained from the la-shu or wax-tree insect is largely carried on in the vicinity.

LAKANAL, JOSEPH (1762-1845), French politician, was born at Serres (Ariege) on the 14th of July 1762. His name, origin- ally Lacanal, was altered to distinguish him from his Royalist brothers. He joined one of the teaching congregations, and for fourteen years taught in their schools. When elected by his native department to the Convention in 1792 he was acting as vicar to his uncle Bernard Font (1723-1800), the constitutional bishop of Pamiers. In the Convention he held apart from the various party sections, although he voted for the death of Louis XVI. He rendered great service to the Revolution by his practical knowledge of education. He became a member of the Committee of Public Instruction early in 1793, and after carrying many useful decrees on the preservation of national monuments, on the military schools, on the reorganization of the Museum of Natural History and other matters, he brought forward on the 26th of June his Projet d ‘education nationale (printed at the Imprimerie Nationale), which proposed to lay the burden or primary education on the public funds, but to leave secondary education to private enterprise. Provision was also made for public festivals, and a central commission was to be entrusted with educational questions. The scheme, in the main the work of Sieyes, was refused by the Convention, who submitted the whole question to a special commission of six, which under the influence of Robespierre adopted a report by Michel le Peletier de Saint Fargeau shortly before his tragic death. Lakanal, who was a member of the commission, now began to work for the organization of higher education, and abandoning the principle of his Projet advocated the establish- ment of state-aided schools for primary, secondary and university education. In October 1793 he was sent by the Convention to the south-western departments and did not return to Paris until after the revolution of Thermidor. He now became president of the Education Committee and promptly abolished the

system which had had Robespierre's support. He drew up schemes for departmental normal schools, for primary schools (reviving in substance the Projet) and central schools. He presently acquiesced in the supersession of his own system, but continued his educational reports after his election to the

Council of the Five Hundred. In 1799 he was sent by the Directory to organize the defence of the four departments on the left bank of the Rhine threatened by invasion. Under the Consulate he resumed his professional work, and after Waterloo retired to America, where he became president of the university of Louisiana. He returned to France in 1834, and shortly afterwards, in spite of his advanced age, married a second time. He died in Paris on the 14th of February 1845; his widow survived till 1881. Lakanal was an original member of the Institute of France. He published in 1838 an Expose sommaire des travaux de Joseph Lakanal.

His eJoge at the Academy of Moral and Political Science, of which he was a member, was pronounced by the comte de Remusat (February 16, 1845), and a Notice historique by F. A. M. Mignet was read on the 2nd of May 1857. See also notices by Emile Darnaud (Paris, 1874), " Marcus " (Paris, 1879), P. Legendre in Hommes de la revolution (Paris, 1882), E. Guillon, Lakanal et V instruction publique (Paris, 1881). For details of the reports submitted by him to the government see M. Tourneux, " Histoire de l'instruction publique, actes et deliberations de la convention, &c." in Bibliog. de I'hist. de Paris (vol. iii., 1900); also A. Robert and G. Cougny, Dictionnaire des parlementaires (vol. ii., 1890).

LAKE, GERARD LAKE, ist Viscount (1744-1808), British general, was born on the 27th of July 1744. He entered the foot guards in 1758, becoming lieutenant (captain in the army) 1762, captain (Lieut.-colonel) in 1776, major 1784, and lieut.- colonel in 1 792, by which time he was a general officer in the army. He served with his regiment in Germany in 1 760-1 762 and with a composite battalion in the Yorktown campaign of 1781. After this he was equerry to the prince of Wales, afterwards George IV. In 1790 he became a major-general, and in 1793 was appointed to command the Guards Brigade in the duke of York's army in Flanders. He was in command at the brilliant affair of Lincelles, on the 18th of August 1793, and served on the continent (except for a short time when seriously ill) until April 1794. He had now sold his lieut.-colonelcy in the guards, and had become colonel of the 53rd foot and governor of Limerick. In 1797 he was promoted lieut.-general. In the following year the Irish rebellion broke out. Lake, who was then serving in Ireland, succeeded Sir Ralph

Abercromby in command of the troops in April 1798, issued a proclamation ordering the surrender of all arms by the civil population of Ulster, and on the 21st of June routed the rebels at Vinegar Hill (near Enniscorthy, Co. Wexford). He exercised great, but perhaps not unjustified, severity towards all rebels found in arms. Lord Cornwallis now assumed the chief command in Ireland, and in August sent Lake to oppose the French expedition which landed at Killala Bay. On the 29th of the same month Lake arrived at Castlebar, but only in time to witness the disgraceful rout of the troops under General Hely-Hutchinson (afterwards 2nd earl of Donough- more) ; but he retrieved this disaster by compelling the surrender of the French at Ballinamuck, near Cloone, on the 8th of September. In 1799 Lake returned to England, and soon after- wards obtained the command in chief in India. He took over his duties at Calcutta in July 1801, and applied himself to the improvement of the Indian army, especially in the direction of making all arms, infantry, cavalry and artillery, more mobile and more manageable. In 1802 he was made a full general.

On the outbreak of war with the Mahratta confederacy in 1803 General Lake took the field against Sindhia, and within two months defeated the Mahrattas at Coel, stormed Aligahr, took Delhi and Agra, and won the great victory of Laswari (November ist, 1803), where the power of Sindhia was completely broken, with the loss of thirty-one disciplined battalions, trained and officered by Frenchmen, and 426 pieces of ordnance. This defeat, followed a few days later by Major-General Arthur Wellesley's victory at Argaum, compelled Sindhia to come to terms, and a treaty with him was signed in December 1803. Operations were, however, continued against his confederate, Holkar, who, on the 17th of November 1804, was defeated by Lake at Farrukhabad. But the fortress of Bhurtpore held out against four assaults early in 1805, and Cornwallis, who succeeded Wellesley as governor-general in July of that year — superseding Lake at the same time as commander-in-chief — determined

to put an end to the war. But after the death of Cornwallis in October of the same year, Lake pursued Holkar into the Punjab and compelled him to surrender at Amritsar in December 1805. Wellesley in a despatch attributed much of the success of the war to Lake's " matchless energy, ability and valour." For his services Lake received the thanks of parliament, and was rewarded by a peerage in

September 1804. At the conclusion of the war he returned to England, and in 1807 he was created a viscount. He represented Aylesbury in the House of Commons from 1790 to 1802, and he also was brought into the Irish parlia- ment by the government as member for Armagh in 1799 to vote for the Union. He died in London on the 20th of February

1808.

See H. Pearse, Memoir of the Life and Services of Viscount Lake (London, 1908) ; G. B. Malleson, Decisive Battles of India (1883) ; J. Grant Duff, History of the Mahrattas (1873); short memoir in From Cromwell to Wellington, ed. Spenser Wilkinson.

LAKE. Professor Forel of Switzerland, the founder of the science of limnology (Gr. Xinvrj, a lake), defines a lake (Lat. lacus) as a mass of still water situated in a depression of the ground, without direct communication with the sea. The term is sometimes applied to widened parts of rivers, and sometimes to bodies of water which lie along sea-coasts, even at sea-level and in direct communication with the sea. The terms pond, tarn, loch and mere are applied to smaller lakes according to size and position. Some lakes are so large that an observer cannot see low objects situated on the opposite shore, owing to the lake -surface assuming the general curvature of the earth's surface. Lakes are nearly universally distributed, but are more abundant in high than in low latitudes. They are abundant in mountainous regions, especially in those which have been recently glaciated. They are frequent along rivers which have low gradients and wide flats, where they are clearly connected with the changing channel of the river. Low lands in proximity to the sea, especially in wet climates, have numerous lakes, as, for instance, Florida. Lakes may be either fresh or salt, according to the nature of the climate, some being much more salt than the sea itself. They occur in all altitudes; Lake Titicaca in South America is 12,500 ft. above sea-level, and Yellowstone Lake in the United States is 7741 ft. above the sea; on the other hand, the surface of the Caspian Sea is 86 ft., the Sea of Tiberias 682 ft. and the Dead Sea 1 292 ft. below the level of the ocean.

The primary source of lake water is atmospheric precipitation, which may reach the lakes through rain, melting ice and snow, springs, rivers and immediate run-off from the land-surfaces. The surface of the earth, with which we are directly in touch, is composed of lithosphere, hydrosphere and atmosphere, and these interpenetrate. Lakes, rivers, the water-vapour of the atmosphere and the water of

hydration of the lithosphere, must all be regarded as outlying portions of the hydrosphere, which is chiefly made up of the great oceans. Lakes may be compared to oceanic islands. Just as an oceanic island presents many peculiarities in its rocks, soil, fauna and flora, due to its isolation from the larger terrestrial masses, so does a lake present peculi- arities and an individuality in its physical, chemical and biological features, owing to its position and separation from the waters of the great oceans.

Origin of Lakes. — From the geological point of view, lakes may be arranged into three groups: (A) Rock-Basins, (B) Barrier- Basins and © Organic Basins.

A. Rock-Basins have been formed in several ways: —

1. By slow movements of the earth's crust, during the formation of mountains; the Lake of Geneva in Switzerland and the Lake of Annecy in France are due to the subsidence or warping of part of the Alps; on the other hand, Lakes Stefanie, Rudolf, Albert Nyanza, Tanganyika and Nyasa in Africa, and the Dead Sea in Asia Minor, are all believed to lie in a great rift or sunken valley.

2. By Volcanic Agencies.- — Crater-lakes formed on the sites of dormant volcanoes may be from a few yards to several miles in width, have generally a circular form, and are often without visible outlet. Excellent examples of such lakes are to be seen in the pro- vince of Rome (Italy) and in the central plateau of France, where M. Delebecque found the Lake of Issarles 329 ft. in depth. The most splendid crater-lake is found on the summit of the Cascade range of Southern Oregon (U.S.A.). This lake is 2000 ft. in depth.

3. By Subsidence due to Subterranean Channels and Caves in Lime-

stone Rocks. — When the roofs of great limestone caves or underground lakes fall in, they produce at the surface what are called limestone sinks. Lakes similar to these are also found in regions abounding in rock-salt deposits; the Jura range offers many such lakes.

4. By Glacier Erosion. — A. C. Ramsay has shown that innumerable lakes of the northern hemisphere do not lie in fissures produced by underground disturbances, nor in areas of subsidence, nor in syn- clinal folds of strata, but are the results of glacial erosion. Many flat alluvial plains above gorges in Switzerland, as well as in the Highlands of Scotland, were, without doubt, what Sir Archibald Geikie

calls glen-lakes, or true rock-basins, which have been filled up by sand and mud brought into them by their tributary streams.

B. Barrier-Basins. — These may be due to the following causes : —

1. A landslip often occurs in mountainous regions, where strata, dipping towards the valley, rest on soft layers; the hard rocks slip into the valley after heavy rains, damming back the drainage, which then forms a barrier-basin. Many small lakes high up in the Alps and Pyrenees are formed by a river being dammed back in this way.

2. By a Glacier. — In Alaska, in Scandinavia and in the Alps a glacier often bars the mouth of a tributary valley, the stream flowing therein is dammed back, and a lake is thus formed. The best-known lake of this kind is the Marjelen Lake in the Alps, near the great Aletsch Glacier. Lake Castain in Alaska is barred by the Malaspina Glacier; it is 2 or 3 m. long and I m. in width when at its highest level ; it discharges through a tunnel 9 m. in length beneath the ice- sheet. The famous parallel roads of Glen Roy in Scotland are suc- cessive terraces formed along the shores of a glacial lake during the waning glacial epoch. Lake Agassiz, which during the glacial period occupied the valley of the Red River, and of which the present Lake Winnipeg is a remnant, was formed by an ice-dam along the margin of two great ice-sheets. It is estimated to have been 700 m. in length, and to have covered an area of 110,000 sq. m., thus exceeding the total area of the five great North American lakes: Superior (31,200), Michigan (22,450), Huron with Georgian Bay (23,800), Erie (9960) and Ontario (7240).

3. By the Lateral Moraine of an Actual Glacier. — These lakes some-times occur in the Alps of Central Europe and in the Pyrenees Mountains.

4. By the Frontal Moraine of an Ancient Glacier. — The barrier in this case consists of the last moraine left by the retreating glacier. Such lakes are abundant in the northern hemisphere, especially in Scotland and the Alps.

5. By Irregular Deposition of Glacial Drift. — After the retreat of continental glaciers great masses of glacial drift are left on the land-surfaces, but, on account of the manner in which these masses were deposited, they abound in depressions that become filled with water. Often these lakes are without visible outlets, the water frequently percolating through the glacial drift. These lakes are so numerous in the north-eastern part of North America that one can trace the

southern boundary of the great ice-sheet by following the southern limit of the lake-strewn region, where lakes may be counted by tens of thousands, varying from the size of a tarn to that of the great Laurentian lakes above mentioned.

6. By Sand drifted into Dunes. — ft is a well-known fact that sand may travel across a country for several miles in the direction of the prevailing winds. When these sand-dunes obstruct a valley a lake may be formed. A good example of such a lake is found in Moses Lake in the state of Washington ; but the sand-dunes may also fill up or submerge river-valleys and lakes, for instance, in the Sahara, where the Shotts are like vast lakes in the early morning, and in the afternoon, when much evaporation has taken place, like vast plains of white salt.

7. By Alluvial Matter deposited by Lateral Streams. — If the current of a main river be not powerful enough to sweep away detrital matter brought down by a lateral stream, a dam is formed causing a lake. These lakes are frequently met with in the narrow valleys of the Highlands of Scotland.

8. By Flows of Lava. — Lakes of this kind are met with in volcanic regions.

C. Organic Basins. — In the vast tundras that skirt the Arctic Ocean in both the old and the new world, a great number of frozen ponds and lakes are met with, surrounded by banks of vegetation. Snow-banks are generally accumulated every season at the same spots. During summer the growth of the tundra vegetation is very rapid, and the snow-drifts that last longest are surrounded by luxuriant vegetation. When such accumulations of snow finally melt, the vegetation on the place they occupied is much less than along their borders. Year after year such places become more and more depressed, comparatively to the general surface, where vegetable growth is more abundant, and thus give origin to lakes.

It is well known that in coral-reef regions small bays are cut off from the ocean by the growth of corals, and thus ultimately fresh- water basins are formed.

Life History of Lakes. — From the time of its formation a lake is destined to disappear. The historical period has not been long enough to enable man to have watched the birth, life and death of any single lake of considerable size, still by studying the

various stages of development a fairly good idea of the course they run can be obtained.

In humid reg'ons two processes tend to the extinction of a lake, viz. the deposition of detrital matter in the lake, and the lowering of the lake by the cutting action of the outlet stream on the barrier. These outgoing streams, however, being very pure and clear, all detrital matter having been deposited in the lake, have less eroding power than inflowing streams. One of the best examples of the action of the filling-up process is presented by Lochs Doine, Voil and Lubnaig in the Callander district of Scotland. In post-glacial times these three lochs formed, without doubt, one continuous sheet of water, which subsequently became divided into three different basins by the deposition of sediment. Loch Doine has been separated from Loch Voil by alluvial cones laid down by two opposite streams. At the head of Loch Doine there is an alluvial fiat that stretches for ij m., formed by the Lochlarig river and its tributaries. The long stretch of alluvium that separates Loch Voil from Loch Lubnaig has been laid down by Calair Burn in Glen Buckie, by the Kirkton Burn at Balquhidder, and by various streams on both sides of Strathyre. Loch Lubnaig once extended to a point f m. beyond its present outlet, the level of the loch being lowered about 20 ft. by the denuding action of the river Leny on its rocky barrier.

In arid regions, where the rainfall is often less than 10 ins. in the year, the action of winds in the transport of sand and dust is more in evidence than that of rivers, and the effects of evapora-

change of climate in the direction of aridity reduced the level of the lake below the level of the outlet, the waters became gradually salt, and the former great fresh-water lake has been reduced gradually to the relatively small Great Salt Lake of the present day. The sites of extinct salt lakes yield salt in commercial quantities.

The Water of Lakes. — (a) Composition. — It is interesting to compare the quantity of solid matter in, and the chemical composition of, the water of fresh and salt lakes: —

Total Solids by Evaporation expressed in Grams per Litre. Great Salt Lake (Russell) .... 238-12 Lake of Geneva (Delebecque) . . 0-1775

The following analysis of a sample of the water of the Great Salt Lake

(Utah, U.S.A.) is given by I. C. Russell:—

Na

K

Li

Mg

Ca

CI

S0 3

O in sulphates

Fe 2 3 +Al 2 3

Si0 2 .

Bo 2 3 .

Br 3 .

The following analyses of the waters of other salt lakes are given by Mr J. Y. Buchanan (Art. ” Lake,” Ency. Brit., 9th Ed.), an analy- sis of sea-water from the Suez Canal being added for comparison : — ■

Grams per Litre.

Probable Combination.

• 75-825 ,

NaCl .

192-860

3-925

K 2 SO„ .

8-756

0-021

Li 2 S0 4

0-166

4-844

MgCl 2 .

15-044

2-424

MgS0 4

5-216

. I28-278

CaS0 4

8-240

I2-522

Fe 2 3 +Al 2 3

0-004

2-494

Si0 2

0-018

0-004

Surplus

S0 3

0-051

0-018

trace

faint trace

Koko-nor.

Aral Sea.

Caspian Sea.

Dead Sea.

Lake Van.

Suez Canal, Ismailia.

Open.

Karabugas.

Specific Gravity …. Percentage of Salt …

1-00907

i-ii

1-09

1 -01 106 1-30

1-26217 28-5

1-17500 22-28

22-13

1-01800 1-73

1-03898 5-1

Name of Salt.

Grams of Salt per 1000 Grams of Water.

Bicarbonate of Lime . „ Iron . ,, Magnesia

Carbonate of Soda

Phosphate of Lime

Sulphate of Lime

„ Magnesia ,, Soda

Potash .

Chloride of Sodium . „ Potassium „ Rubidium ,, Magnesium „ Calcium .

Bromide of Magnesium

Silica

0-6804 0-0053 0-6598

0-0028

0-9324 1-7241

6-9008 0-2209 0-0055

0-0045 0-0098

0-2185

1-3499 2-9799

6-2356 0-1145

0-0003

0-1123 0-0014

0-002I

0-9004 3-0855

8-Il6 3

0-1339 0-0034 0-6115

0-0081 0-0024

61-9350

83-2840

9-956o

0-2510

129-3770

0-193°

13

192

15

7570 5460

4100

4610 5990

o-86oo

76-5000 23-3000

95-6000

22-4500

2-3100

0-2400

0-4031 5-3976

0-2595 2-5673 0-5363 8-0500

0-0761

0-0072 0-0069

0-0029

1-8593 3-2231

40-4336 0-6231 0-0265 4-7632

0-0779 0-0027

Total Solid Matter

11-1463

10-8987

12-9773

284-9960

222-7730

221-2600

17-2899

51-0264

tion greater than of precipitation. Salt and bitter lakes prevail in these regions. Many salt lakes, such as the Dead Sea and the Great Salt Lake, are descended from fresh-water ancestors, while others, like the Caspian and Aral Seas, are isolated portions of the ocean. Lakes of the first group have usually become salt through a decrease in the rainfall of the region in which they occur. The water begins to get salt when the evaporation from the lake exceeds the inflow. The inflowing waters bring in a small amount of saline and alkaline matter, which becomes more and more concentrated as the evaporation increases. In lakes of the second group the waters were salt at the outset. If inflow exceeds evaporation they become fresher, and may ultimately become quite fresh. If the evaporation exceeds the inflow they diminish in size, and their waters become more and more salt and bitter. The first lake which occupied the basin of the Great Salt Lake of Utah appears to have been fresh, then with a change of climate to have become a salt lake. Another change of climate taking place, the level of the lake rose until it overflowed, the outlet being by the Snake river; the lake then became fresh. This expanded lake has been called Lake Bonneville, which covered an area of about 17,000 sq. m. Another

This table embraces examples of several types of salt lakes. In the Koko-nor, Aral and open Caspian Seas we have examples of the moderately salt, non-saturated waters. In the Karabugas, a branch gulf of the Caspian, Urmia and the Dead Seas we have examples of saturated waters containing principally chlorides. Lake Van is an example of the alkaline seas which also occur in Egypt, Hungary and other countries. Their peculiarity consists in the quantity of carbonate of soda dissolved in their waters, which is collected by the inhabitants for domestic and commercial purposes.

The following analyses by Dr Bourcart give an idea of the chemical composition of the water of fresh-water lakes in grams per litre: —

Tanay.

Bleu.

Marjelen.

St Gothard.

Si0 2 ….

0-003

0-0042

0-0014

0-0008

Fe 2 3 +Al 2 3

0-0012

0-0006

0-0008

trace

NaCl . . .

0-0017

Na 2 S0 4

0-0011

0-0038

0-0031

0-00085

Na 2 C0 3

0-00128

K 2 S0 4

0-0021

0-0028

0-0044

K 2 CO,

0-0003

0-00130

MgS0 4

0-006

0-0305

MgC0 3

0-0046

0-0158

o-oco8

0-00015

CaS0 4

CaC0 3

0-107

0-1189

0-0061

0-00178

MnO .

0-001

88

LAKE

(b) Movements and Temperature of Lake- Waters. — (i) In addition to the rise and fall of the surface-level of lakes due to rainfall and evaporation, there is a transference of water due to the action of wind which results in raising the level at the end to which the wind is blowing. In addition to the well-known progressive waves there are also stationary waves or ” seiches ” which are less apparent. A seiche is a standing oscillation of a lake, usually in the direction of the longest diameter, but occasionally transverse. In a motion of this kind every particle of the water of the lake oscillates syn- chronously with every other, the periods and phases being the same for all, and the orbits similar but of different dimensions and not similarly situated. Seiches were first discovered in 1730 by Fatio de Duillier, a well-known Swiss engineer, and were first systematically studied by Professor Forel in the Lake of Geneva. Large numbers of observations have been made by various observers in lakes in many parts of the world. Henry observed a fifteen-hour seiche in Lake Erie, which is 396 kilometres in length, and Endros recorded a seiche of fourteen seconds in a small pond only in metres in length. Although these waves cause periodical rising and falling of the water-level, they are generally inconspicuous, and can only be recorded by a registering apparatus, a limnograph. Standard work has been done in the study of seiches by the Lake Survey of Scot- land under the immediate direction of Professor Chrystal, who has given much attention to the hydrodynamical theories of the pheno- menon. Seiches are probably due to several factors acting together or separately, such as sudden variations of atmospheric pressure, changes in the strength or direction of the wind. Explanations such as lunar attraction and earthquakes have been shown to be un- tenable as a general cause of seiches.

2. The water temperature of lakes may change with the season from place to place and from layer to layer; these changes are brought about by insolation, by terrestrial radiation, by contract with the atmosphere, by rain, by the inflow of rivers and other factors, but the most important of all these are insolation and terrestrial radiation. Fresh water has its greatest density at a temperature of 39-2° F., so that water both above and below this temperature floats to the surface, and this physical fact largely determines the water stratification in a lake. In salt lakes the maximum density point is much lower, and does not come into play. In the tropical type of fresh-water lake the temperature is always higher than 39° F., and the temperature decreases as the depth increases. In the polar type the temperature is always lower than 39 F., and the temperature increases from the surface downwards. In the temperate type the distribution of

temperature in winter resembles the polar type, and in summer the tropical type. In Loch Ness and other deep Scottish lochs the temperature in March and April is 41 ° to 42 ” F., and is then nearly uniform from top to bottom. As the sun comes north, and the mean air temperature begins to be higher than the surface temperature, the surface waters gain heat, and this heating goes on till the month of August. About this time the mean air temperature falls below the surface temperature, and the loch begins to part with its heat by radiation and conduction. The temperature of the deeper layers beyond 300 ft. is only slightly affected throughout the whole year. In the autumn the waters of the loch are divided into two compartments, the upper having a temperature from 49° to 55° F., the deeper a temperature from 41° to 45°. Between these lies the discontinuity-layer (Sprungschicht of the Germans), where there is a rapid fall of temperature within a very short distance. In August this discontinuity-layer is well marked, and lies at a depth of about 150 ft.; as the season advances this layer gradually sinks deeper, and the layer of uniform temperature above it increases in depth, and slowly loses heat, until finally the whole loch assumes a nearly uniform temperature. Many years ago Sir John Murray showed by means of temperature observations the manner in which large bodies of water were transferred from the windward to the lee- ward end of a loch, and subsequent observations seem to show that, before the discontinuity-layer makes its appearance, the currents produced by winds are distributed through the whole mass of the loch. When, however, this layer appears, the loch is divided into two current-systems, as shown in the following diagram : —

Direction of Wind

Current systems in a loch induced by wind at the surface. (After Wedderburn.)

AB, Discontinuity layer. E, Secondary surface current.

C, Surface current. F, Secondary return current.

D, Primary return current.

Another effect of the separation of the loch into two compartments by the surface of discontinuity is to render possible the temperature-seiche. The surface-current produced by the wind transfers a large quantity of warm water to the lee end of the loch, with the result that the surface of discontinuity is deeper at the lee than at the windward

end. When the wind ceases, a temperature-seiche is started, just as an ordinary seiche is started in a basin of water which has been tilted. This temperature-seiche has been studied experimentally and rendered visible by superimposing a layer of paraffin on a layer of water.

Wedderburn estimates the quantity of heat that enters Loch Ness and is given out again during the year to be approximately sufficient to raise about 30,000 million gallons of water from freezing-point to boiling-point. Lakes thus modify the climate of the region in which they occur, both by increasing its humidity and by decreasing its range of temperature. They cool and moisten the atmosphere by evaporation during summer, and when they freeze in winter a vast amount of latent heat is liberated, and moderates the fall of temperature.

Lakes act as reservoirs for water, and so tend to restrain floods, and to promote regularity of flow. They become sources of mechanical power, and as their waters are purified by allowing the sediment which enters them to settle, they become valuable sources of water-supply for towns and cities. In temperate regions small and shallow lakes are likely to freeze all over in winter, but deep lakes in similar regions do not generally freeze, owing to the fact that the low temperature of the air does not continue long enough to cool down the entire body of water to the maximum density point. Deep lakes are thus the best sources of water-supply for cities, for in summer they supply relatively cool water and in winter relatively warm water. Besides, the number of organisms in deep lakes is less than in small shallow lakes, in which there is a much higher temperature in summer, and consequently much greater organic growth. The deposits, which are formed along the shores and on the floors of lakes, depend on the geological structure and nature of the adjacent shores.

Biology. — Compared with the waters of the ocean those of lakes may safely be said to contain relatively few animals and plants. Whole groups of organisms — the Echinoderms, for instance — are unrepresented. In the oceans there is a much greater uniformity in the physical and chemical conditions than obtains in lakes. In lakes the temperature varies widely. To underground lakes light does not penetrate, and in these some of the organisms may be blind, for example, the blind crayfish (Cambarus pellucidus) and the blind fish (Amblyopsis spelaeus) of the Kentucky caves. The majority of lakes are fresh, while some are so salt that no organisms have been found in them. ‘ The peaty matter in other lakes is so abundant that light does not penetrate to any great depth, and the humic acids in solution prevent the development of some species. Indeed, every lake has an

individuality of its own, depending upon climate, size, nature of the bottom, chemical composition and connexion with other lakes. While the ocean contains many families and genera not represented in lakes, almost every genus in lakes is represented in the ocean.

The vertebrates, insects and flowering plants inhabiting lakes vary much according to latitude, and are comparatively well known to zoologists and botanists. The micro-fauna and flora have only recently been studied in detail, and we cannot yet be said to know much about tropical lakes in this respect. Mr James Murray, who has studied the Scottish lakes, records in over 400 Scottish lochs 724 species (the fauna including 447 species, all invertebrates, and the flora comprising 277 species) belonging to the following groups; the list must not be regarded as in any way complete : —

Fauna. Mollusca . Hydrachnida . Tardigrada Insecta Crustacea Bryozoa Worms Rotifera Gastrotricha . Coelenterata . Porifera Protozoa .

Flora.

7 species Phanerogamia .

65 species

17

, Equisetaceae

1 .,

30

, Selaginellaceae

1 t<

7

, Characeae

6 „

78

, Musci

18 „

7

, Hepaticae

2 ,,

25

, Florideae

2 ,,

181

, Chlorophyceae

142 ,,

2

, Bacillariaceae

26 „

1

, Myxophyceae

10 ,,

1

, Peridiniaceae

4 ..

91

■

447

277

These organisms are found along the shores, in the deep waters, and in the surface waters of the lakes.

The littoral region is the most populous part of lakes ; the existence of a rooted vegetation is only possible there, and this in turn supports a rich littoral fauna. The greater heat of the water along the margins also favours growth. The great majority of the species in Scottish lochs are met with in this region. Insect larvae of many kinds are found under stones or among weeds. Most of the Cladocera, and the

LAKE

89

Mollusc: Crustacea :

3 Worms:

Insect: Infusoria:

Copepoda of the genus Cyclops, and the Harpacticidae are only found in this region. Water-mites, nearly all the Rotifers, Gastrotricha, Tardigrada and Molluscs are found here, and Rhizopods are abundant. A large number of the littoral species in Loch Ness extends down to a depth of about 300 ft.

The abyssal region, in Scottish lochs, lies, as a rule, deeper than 300 ft., and in this deep region a well-marked association of animals appears in the muds on the bottom, but none of them are peculiar to it: they all extend into the littoral zone, from which they were originally derived. In Loch Ness the following sparse population was recorded: —

Pisidium pusillum (Gmel). Cyclops viridis, J urine. Candona Candida (Mull). Cypria ophthalmica, Jurine. Stylodrilus gabreteae, Vejd. Oligochaete, not determined. Automolos morgiensis (Du Plessis). Chironomus (larva).

Several, ectoparasites on Pisidium and Cyclops, not determined.

In addition, the following were found casually at great depths in Loch Ness: Hydra, Limnaea peregra, Proales daphnicola and Lynceus aflinis.

The pelagic region of the Scottish lakes is occupied by numerous microscopic organisms, belonging to the Zooplankton and Phyto-plankton. Of the former group 30 species belonging to the Crustacea, Rotifera and Protozoa were recorded in Loch Ness. Belonging to the second group 150 species were recorded, of which 120 were Desmids. Some of these species of plankton organisms are almost universal in the Scottish lochs, while others are quite local. Some of the species occur all the year through, while others have only been recorded in summer or in winter. The great development of Algae in the surface waters, called ” flowering of the water ” (Wasserbliithe) , was observed in August in Loch Lomond; a distinct ” flowering,” due to Chloro- phyceae, has been observed in shallow lochs as early as July. It is most common in August and September, but has also been observed in winter.

The plankton animals which are dominant or common, both over Scotland and the rest of Europe, are : — Diaptomus gracilis. Daphnia hyalina. Diaphanosoma brachyurum. Leptodora kindtii. Conochilus unicornis. Asplanchna priodonla. Polyarthra platyptera. Anuraea cochlearis. Notholca longispina. Ceratium hirundinella. Asterionella. All of these, according to Dr Lund, belong to the genera! plankton association of the European plain, or are even cosmopolitan.

The Scottish plankton on the whole differs from the plankton of the central European plateau, and from the cosmopolitan fresh- water plankton, in the extraordinary richness of the Phytoplankton in species of Desmids, in the conspicuous arctic element among the Crustacea, in the absence or comparative rarity of the species

commonest in the general European plankton. Another peculiarity is the local distribution of some of the Crustacea and many of the Desmids.

The derivation of the whole lacustrine population of the Scottish lochs does not seem to present any difficulty. The abyssal forms have been traced to the littoral zone without any perceptible modi- fications. The plankton organisms are a mingling of European and arctic species. The cosmopolitan species may enter the lochs by ordinary migration. It is probable that if the whole plankton could be annihilated, it would be replaced by ordinary migration within a few years. The eggs and spores of many species can be dried up without injury, and may be carried through the air as dust from one lake to another; others, which would not bear desiccation, might be carried in mud adhering to the feet 0/ aquatic birds and in various other ways. The arctic species may be survivors from a period when arctic conditions prevailed over a great part of Europe. What are known as ” relicts ” of a marine fauna have not been found in the Scottish fresh-water lochs.

It is somewhat remarkable that none of the organisms living in fresh-water lochs has been observed to exhibit the phenomenon of phosphorescence, although similar organisms in the salt-water lochs a few miles distant exhibit brilliant phosphorescence. At similar depths in the sea-lochs there is usually a great abundance of life when compared with that found in fresh-water lochs.

length, Depth, Area and Volume of Lakes. — In the following table will be found the length, depth, area and volume of some of the principal lakes of the world. 1 Sir John Murray estimates 1 Divergence between certain of these figures and those quoted elsewhere in this work may be accounted for by the slightly different results arrived at by various authorities.

the volume of water in the 560 Scottish lochs recently surveyed at 7 cub. m., and the approximate volume of water in all the lakes of the world at about 2000 cub. m., so that this last number is but a small fraction of the volume of the ocean, which he previously estimated at 324 million cub. m. It may be recalled that the total rainfall on the land of the globe is estimated at 29,350 cub. m., and the total discharge from the rivers of the globe at 6524 cub. m.

British Lakes

Length

Depth

Area

Volume in

in

in

in

million

- ;

Miles.

Feet.

sq. m.

cub. ft.

I. England —

Max.

Mean.

Windermere

10-50

219

78-5

5-69

12,250

Ullswater .

7-35

205

83

3-44

7,870

Wastwater

3-00

258

134-5

I-I2

4,128

Coniston W

iter 5-41

184

79

1-89

4,000

Crummock

Water .

2-50

144

87-5

0-97

2,343

Ennerdale

Water .

2-40

148

62

I-I2

1.978

Bassenthwa

ite

Water .

3-83

70

18

2-06

1,023

Derwentwal

Ler 2-87

72

18

2-06

1,010

Haweswatei

■ • 2-33

103

39-5

o-54

589

Buttermere

1-26

94

54-5

0-36

537

II. Wales—

Llyn Cawly

d . 1-62

222

109-1

0-18

941

Llyn C welly

n . 1-20

122

74-1

o-35

713

Llyn Padan

1 . 2-00

94

52-4

o-43

632

Llyn Llydaˆ

V . I-II

190

77-4

0-19

409

Llyn Peris

I-IO

114

63-9

0-19

344

Llyn Dulyn

0-31

189

104-2

0-05

156

III. Scotland-

Ness

24-23

754

433-02

21-78

263,162

Lomond

22-64

623

121-29

27-45

92,805

Morar .

n-68

1017

284-00

10-30

81,482

Tay

H-55

508

199-08

10-19

56,550

Awe

25-47

307

104-95

14-85

43,451

Maree .

13-46

367

125-30

11-03

38,539

Lochy .

9-78

53i

228-95

5-91

37,726

Rannoch .

9-70

440

167-46

7-37

34,387

Shiel . .

17-40

420

132-73

7-56

27,986

Arkaig

12-00

359

152-71

6-24

26,573

Earn .

6-46

287

I37-83

3-91

14,421

Treig . .

5-10

436

207-37

2-41

13,907

Shin

17-22

162

51-04

8-70

12,380

Fannich

6-92

282

108-76

3-60

10,920

Assynt

6-36

282

IOI-IO

3-10

8,73i

Quoich

6-95

281

104-60

2-86

8,345

Glass .

4-03

365

159-07

1-86

” 8,265

Fionn (Ca

rn-

more)

5-76

144

57-79

3-52

5,667

Laggan

7-04

174

67-68

2-97

■v6oi

Loyal .

4-46

217

65-21

2-55

4,628

IV. Ireland —

Neagh .

17

102

40

153

161,000

Erne (Lowe

r) . 24

226

43

43

62,000

Erne (Uppt

r) ■ 13

89

10

15

5,000

Corrib .

27

152

30

68

59,000

Mask .

10

191

52

35

55,ooo

Derg .

24

119

3°

49

47,000

European C

ONTINEt

Length

De

pth

Area

Volume in

in

i

n

in

million

Miles.

F

;et.

sq. m.

cub. ft.

Max.

Mean.

Ladoga

• • 125

732

300

7000

43,200,000

Onega

• ■ H5

740

200

3800

2 1 ,000,000

Vener

■ • 93

292

108

2149

6,357,ooo

Geneva .

• • 45

1015

506

225

3,175,000

Vetter

. . 68

413

128

733

2,543,000

Mjosen .

■ • 57

1483

139

2,882,000

Garda

. – 38

1 124

446

143

1,766,000

Constance

42

827

295

208

1,711,000

Ochrida .

- • 19

942

479

105

1,391,000

Maggiore

■ • 42

1220

574

82

1,310,000

Como

• ■ 30

1345

513

56

794,000

Hornafvan

• • 7

1391

253

93

1 777,000

9°

LAKE CHARLES— LAKE DISTRICT

African Lakes

Length

in Miles.

Depth

in Feet.

Area

in

sq. m.

Volume in million cub. ft.

Victoria Nyanza Nyasa Tanganyika .

200 350 420

Max.

. 240 2580 2100

Mean.

26,200 14,200 12,700

5,800,000 396,000,000 283,000,000

Asiatic Lakes

Length

in Miles.

Depth

in Feet.

Area

in sq. m.

Volume in million cub. ft.

Aral …. Baikal . . . Balkash . Urmia

265 330

323 80

Max.

222

5413 33 50

Mean.

52

15

24,400

11,580

7,000

1.750

43,600,000

274,000,000

4,880,000

732,000

American Lakes

Length

Depth

Area

Volume in

in

in

in

million

Miles.

Feet.

sq. m.

cub. ft.

Max.

Mean.

Superior .

412

1008

475

31,200

413,000,000

Huron

263

730

250

23,800

166,000,000

Michigan

335

870

325

22,450

203,000,000

Erie ….

240

210

70

9,960

19,500,000

Ontario .

190

738

300

7,240

61,000,000

Titicaca .

120

924

347

3,200

30,900,000

New Zealand Lakes

Length

Depth

Area

Volume in

in

in

in

million

Miles

Feet.

sq. m.

cub. ft.

Max.

Mean.

Taupo

25

534

367

238-0

2,435,000

Wakatipu

49

1242

707

1 12-3

2,205,000

Manapouri .

19

1458

328

56-0

512,000

Rotorua .

7-5

120

39

31-6

34,000

\ aikarimoana .

7-25

846

397

14 -7

166,000

Wairaumoana

5-25

375

175

61

30,000

Rotoiti . . .

107

230

69

14-2

27,000

Authorities.— F. A. Forel, ” Handbuch der Seenkunde: allge- meine Limnologie,” Bibliothek geogr. Handbilcher (Stuttgart, 1901), Le Leman, monographie limnologique (3 vols., Lausanne, 1892-1901); A. Delebecque, Les Lacs francais, text and plates (Paris, 1898); H. R. Mill, ” Bathymetrical Survey of the English Lakes,” Geogr. Journ. vol. vi. pp. 46 and 135 (1895); Jehu, ” Bathymetrical and Geological Study of the Lakes of Snowdonia,” Trans. Roy. Soc. Edin. vol. xl. p. 419 (1902); Sir John Murray and Laurence Pullar, ” Bathymetrical Survey of the Freshwater Lochs of Scotland,” Geogr. Journ. (1900 to 1908, re-issued in six volumes, Edinburgh, 1910); W. Halbfass, ” Die Morphometrie der europaischen Seen,” Zeitschr. Gesell. Erdkunde Berlin (Jahrg. 1903, p. 592; 1904, p. 204); I. C. Russell, Lakes of North America (Boston and London, 1895); O. Zacharias, ” Forschungsberichte aus der biologischen Station zu Plon ” (Stuttgart); F. E. Bourcart, Les Lacs alpins suisses: etude chimique et physique (Geneva, 1906); G. P. Magrini, Limnologia (Milan, 1907). (J. Mo.)

LAKE CHARLES, a city of Louisiana, U.S.A., capital of Calcasieu Parish, 30 m. from the Gulf of Mexico and about 218 m. (by rail) W. of New Orleans. Pop. (1889) 838, (1890) 3442, (1900) 6680 (2407 negroes); (1910) 11,449. It is served by the Louisiana & Texas

(Southern Pacific System), the St Louis, Watkins & Gulf, the Louisiana & Pacific and the Kansas City Southern railways. The city is charmingly situated on the shore of Lake Charles, and on the Calcasieu river, which with some dredging can be made navigable for large vessels for 132 m. from the Gulf. It is a winter resort. Among the principal buildings are a Carnegie library, the city hall, the Government building, the court house, St Patrick's sanatorium, the masonic temple and the Elks' club. Lake Charles is in the prairie region of southern Louisiana, to the N. of which, covering a large part of the state, are magnificent forests of long-leaf pine, and lesser lowland

growths of oak, ash, magnolia, cypress and other valuable timber. The Watkins railway extending to the N.E. and the Kansas City Southern extending to the N.W. have opened up the very best of the forest. The country to the S. and W. is largely given over to rice culture. Lake Charles is the chief centre of lumber manufacture in the state, and has rice mills, car shops and an important trade in wool. Ten miles W. are sulphur mines (product in 1907 about 362,000 tons), which with those of Sicily produce a large part of the total product of the world. Jennings, about 34 m. to the E., is the centre of oil fields, once very productive but now of diminishing importance. Welsh, 23 m. E., is the centre of a newer field; and others lie to the N. Lake Charles was settled about 1852, largely by people from Iowa and neighbouring states, was incorporated as a town in 1857 under the name of Charleston and again in 1867 under its present name, and was chartered as a city in 1886. The city suffered severely by fire in April 1910.

LAKE CITY, a town and the county-seat of Columbia county, Florida, U.S.A., 59 m. by rail W. by S. of Jacksonville. Pop. (1900) 4013, of whom 2159 were negroes; (1905) 6509; (1910) 5032. Lake City is served by the Atlantic Coast Line, the Seaboard Air Line and the Georgia Southern & Florida railways. There are ten small lakes in the neighbourhood, and the town is a winter and health resort. It is the seat of Columbia College (Baptist, 1907); the Florida Agricultural College was opened here in 1883, became the university of Florida in 1903, and in 1905 was abolished by the Buckman Law. Vegetables and fruits grown for the northern markets, sea-island cotton and tobacco are important products of the surrounding country, and Lake City has some trade in cotton, lumber, phosphates and turpentine. The town was first settled about 1826 as Alligator; it was incorporated in 1854; adopted the present name in 1859; and in 1901, with an enlarged area, was re-incorporated.

LAKE DISTRICT, in England, a district containing all the principal English lakes, and variously termed the Lake Country, Lakeland and ” the Lakes.” It falls within the north-western counties of Cumberland, Westmorland and Lancashire (Furness district), about one-half being within the first of these. Although celebrated far outside the confines of Great Britain as a district of remarkable and strongly individual physical beauty, its area is only some 700 sq. m., a circle with radius of 15 m. from the central point covering practically the whole. Within this circle, besides the largest lake, Windermere, is the highest point in England, Scafell Pike; yet Windermere is but 10J m. in length, and covers an area of 5-69 sq. m., while Scafell Pike is only 3210 ft. in height. But the lakes show a wonderful variety of character, from open expanse and steep rock-bound shores to picturesque island-groups and soft wooded banks; while the mountains have always a remarkable dignity, less from the profile of their summits than from the bold sweeping lines of their flanks, unbroken by vegetation, and often culminating in sheer cliffs or crags. At their feet, the flat green valley floors of the higher elevations give place in the lower parts to lovely woods. The streams are swift and clear, and numerous small waterfalls are characteristic of the district. To the north, west and south, a flat coastal belt, bordering the Irish Sea, with its inlets Morecambe Bay and Solway Firth, and broadest in the north, marks off the Lake District, while to the east the valleys of the Eden and the Lune divide it from the Pennine mountain system. Geologically, too, it is individual. Its centre is of volcanic rocks, complex in character, while the Coal-measures and New Red Sandstone appear round the edges. The district as a whole is grooved by a main depression, running from north to south along the valleys of St John, Thirlmere, Grasmere’ and Windermere, ■ surmounting a pass (Dunmail Raise) of only 783 ft.; while a secondary depression, in the same direction, runs along Derwentwater, Borrowdale, Wasdale and Wastwater, but here Sty Head Pass, between Borrowdale and Wasdale, rises to 1600 ft. The centre of the 15-m. radius lies on the lesser heights between Langstrath and Dunmail Raise, which may, however, be the crown of an ancient dome of rocks, ” the dissected skeleton of which, worn by the warfare of air and rain

and ice, now alone remains ” (Dr H. R.Mill, ” Bathymetrical Survey of the English Lakes,” Geographical Journal, vi. 48). The principal features of the district may be indicated by follow- ing this circle round from north, by west, south and east.

The river' Derwent (q.v.), rising in the tarns and “gills” or ” ghylls ” (small streams running in deeply-grooved clefts) north of Sty Head Pass and the Scafell mass flows north through the wooded Borrowdale and forms Derwentwater and B assent hwaite. These two lakes are in a class apart from all the rest, being broader for their length, and quite shallow (about 18 ft. average and 70 ft. maximum), as distinct from the long, narrow and deep troughs occupied by the other chief lakes, which average from 40 to 135 ft. deep. Derwent- water (q.v.), studded with many islands, is perhaps the most beautiful of all. Borrowdale is joined on the east by the bare wild dale of Langstrath, and the Greta joins the Derwent immediately below Derwentwater; the town of Keswick lying near the junction. Derwentwater and Bassenthwaite occupy a single depression, a flat alluvial plain separating them. From Seatoller in Borrowdale a road traverses Honister Pass (1100 ft.), whence it descends westward, beneath the majestic Honister Crags, where green slate is quarried, into the valley containing Buttermere (94 ft. max. depth) and Crummock Water (144 ft.), drained by the Cocker. Between this and the Derwent valley the principal height is Grasmoor (2791 ft.) ; southward a steep narrow ridge (High Style, 2643) divides it from Ennerdale, containing Ennerdale Water (148 ft. max. depth), which is fed by the Liza and drained by the Ehen. A splendid range separates this dale from Wasdale and its tributary Mosedale, including Great Gable (2949 ft.), Pillar (2927), with the precipitous Pillar Rock on the Ennerdale flank and Steeple (2746). Wasdale Head, between Gable and the Scafell range, is peculiarly grand, with dark grey screes and black crags frowning above its narrow bottom. On this side of Gable is the fine detached rock, Napes Needle. Wastwater, 3 m. in length, is the deepest lake of all (258 ft.), its floor, like those of Windermere and Ullswater, sinking below sea-level. Its east shore consists of a great range of screes. East of Wasdale lies the range of Scafell (q.v.), its chief points being Scafell (3162 ft.), Scafell Pike (3210), Lingmell (2649) and Great End (2984), while the line is continued over Esk Hause Pass (2490) along a fine line of heights (Bow Fell, 2960; Crinkle Crags, 2816), to embrace the head of Eskdale. The line then descends to Wrynose Pass (1270 ft.), from which the Duddon runs south through a vale of peculiar richness in its lower parts; while the range continues south to culminate in the Old Man of Coniston (2633) with the splendid Dow Crags above Goats Water. The pleasant vale of Yewdale drains south to Coniston Lake ($§ m. long, 184 ft. max. depth), east of which a lower, well- wooded tract, containing two beautiful lesser lakes, Tarn Hows and Esthwaite Water, extends to Windermere (q.v.). This lake collects waters by the Brathay from Langdale, the head of which, between Bow Fell and Langdale Pikes (2401 ft.), is very fine; and by the Rothay from

Dunmail Raise and the small lakes of Grasmere and Rydal Water, embowered in woods. East of the Rothay valley and Thirlmere lies the mountain mass including Helvellyn (3118 ft.), Fairfield (2863) and other points, with magnificent crags at several places on the eastern side towards Grisedale and Patterdale. These dales drain to Ullswater (205 ft. max., second to Windermere in area), and so north-east to the Eden. To the east and south-east lies the ridge named High Street (2663 ft.), from the Roman road still trace- able from south to north along its summit, and sloping east again to * the sequestered Hawes Water (103 ft. max.), a curiously shaped lake nearly divided by the delta of the Measand Beck. There remains the Thirlmere valley. Thirlmere itself was raised in level, and adapted by means of a dam at the north end, as a reservoir for the water- supply of Manchester in 1890-1894. It drains north by St John's Vale into the Greta, north of which again rises a mountain-group of which the chief summits are Saddleback or Blencathra (2847 ft.) and the graceful peak of Skiddaw (3054). The most noteworthy water- falls are — Scale Force (Dano-Norwegian fors, foss) , besidesCrummock, Lodore near Derwentwater, Dungeon Gill Force, beside Langdale, Dalegarth Force in Eskdale, Aira near Ullswater, sung by Words- worth, Stock Gill Force and Rydal Falls near Ambleside.

The principal centres in the Lake District are Keswick (Derwent-water), Ambleside, Bowness, Windermere and Lakeside (Winder-mere), Coniston and Boot (Eskdale), all of which, except Ambleside and Bowness (which nearly joins Windermere) are accessible by rail. The considerable village of Grasmere lies beautifully at the head of the lake of that name; and above Esthwaite is the small town of Hawkshead, with an ancient church, and picturesque houses curiously built on the hill-slope and sometimes spanning the streets. There are regular steamer services on Windermere and Ullswater. Coaches and cars traverse the main roads during the summer, but many of the finest dales and passes are accessible only on foot or by ponies. All the mountains offer easy routes to pedestrians, but some of them, as Scafell, Pillar, Gable (Napes Needle), Pavey Ark above Langdale and Dow Crags near Coniston, also afford ascents for experienced climbers.

This mountainous district, having the sea to the west, records an unusually heavy rainfall. Near Seathwaite, below Styhead Pass, the largest annual rainfall in the British Isles is recorded, the average

(1870-1899) being 133-53 in., while 173-7 was measured in 1903 and 243-98 in. in 1872. At Keswick the annual mean is 60-02, at Grasmere about 80 ins. The months of maximum rainfall at Seath. waite are November, December and January and September.

Fish taken in the lakes include perch, pike, char and trout in Windermere, Ennerdale, Bassenthwaite, Derwentwater, &c, and the gwyniad or fresh-water herring in Ullswater. The industries of the Lake District include slate quarrying and some lead and zinc mining, and weaving, bobbin-making and pencil-making.

Setting aside London and Edinburgh, no locality in the British Isles is so intimately associated with the history of English literature as the Lake District. In point of time the poet whose name is first connected with the region is Gray, who wrote a journal of his tour in 1769. But it was Wordsworth, a native of Cumberland, born on the outskirts of the Lake District itself, who really made it a Mecca for lovers of English poetry. Out of his long life of eighty years, sixty were spent amid its lakes and mountains, first as a schoolboy at Hawkshead, and afterwards as a resident at Grasmere (1799-1813) and Rydal Mount (1813-1850). In the churchyard of Grasmere the poet and his wife lie buried ; and very near to them are the remains of Hartley Coleridge (son of the poet), who himself lived many years at Keswick, Ambleside and Grasmere. Southey, the friend of Words- worth, was a resident of Keswick for forty years (1803-1843), and was buried in Crosthwaite churchyard. Samuel Taylor Coleridge lived some time at Keswick, and also with the Wordsworths at Grasmere. From 1807 to 1815 Christopher North (John Wilson) was settled at. Windermere. De Quincey spent the greater part of the years 1809 to 1828 at Grasmere, in the first cottage which Words- worth had inhabited. Ambleside, or its environs, was also the place of residence of Dr Arnold (of Rugby), who spent there the vacations of the last ten years of his life; and of Harriet Martineau, who built herself a house there in 1845. At Keswick Mrs Lynn Linton was born in 1822. Brantwood, a house beside Coniston Lake, was the home of Ruskin during the last years of his life. In addition to these residents or natives of the locality, Shelley, Scott, Nathaniel Hawthorne, Clough, Crabb Robinson, Carlyle, Keats, Tennyson, Matthew Arnold, Mrs Hemans, Gerald Massey and others of less reputation made longer or shorter visits, or were bound by ties of friendship with the poets already mentioned. The Vale of St John, near Keswick, recalls Scott's Bridal of Triermain. But there is a deeper connexion than this between the Lake District and English letters. German literature tells of several literary schools, or groups of writers animated by the same ideas, and working in the spirit of the same principles and by the same poetic methods. The most notable instance — indeed it is almost the only instance — of the kind in English literature is the Lake School of Poets. Of this school the acknowledged head and founder was Wordsworth, and the tenets it professed are those laid down by the poet himself in the famous

preface to the edition of The Lyrical Ballads which he published in 1800. Wordsworth's theories of poetry — the objects best suited for poetic treatment, the characteristics of such treatment and the choice of diction suitable for the purpose — may be said to have grown out of the soil and substance of the lakes and mountains, and out of the homely lives of the people, of Cumberland and Westmore- land.

See Cumberland, Lancashire, Westmorland. The following is a selection from the literature of the subject: Harriet Martineau, The English Lakes (Windermere, 1858) ; Mrs Lynn Linton, The Lake Country (London, 1864); E. Waugh, Rambles in the Lake Country (1861) and In the Lake Country (1880); W. Knight, Through the Wordsworth Country (London, 1890) ; H. D. Rawnsley, Literary Associations of the English Lakes (2 vols., Glasgow, 1894) and Life and Nature of the English Lakes (Glasgow, 1899); Stopford Brooke, Dove Cottage, Wordsworth' s Home from 1800 to 1808; A. G. Bradley, The Lake District, its Highways and Byeways (London, 1901); Sir John Harwood, History of the Thirlmere Water Scheme (1895); for mountain-climbing, Col. J. Brown, Mountain Ascents in Westmor- land and Cumberland (London, 1888); Haskett-Smith, Climbing in the British Isles, part. i. ; Owen G. Jones, Rock-climbing in the English Lake District, 2nd ed. by W. M. Crook (Keswick, 1900).

LAKE DWELLINGS, the term employed in archaeology for habitations constructed, not on the dry land, but within the margins of lakes or creeks at some distance from the shore.

The villages of the Guajiros in the Gulf of Maracaibo are described by Goering as composed of houses with low sloping roofs perched on lofty piles and connected with each other by bridges of planks. Each house consisted of two apartments; the floor was formed of split stems of trees set close together and covered with' mats; they were reached from the shore by dug-out canoes poled over the shallow waters, and a notched tree trunk served as a ladder. The custom is also common in the estuaries of the Orinoco and Amazon. A similar system prevails in New Guinea. Dumont d'Urville describes four such villages in the Bay of Dorei, containing from eight to fifteen blocks or clusters of houses, each block separately built on piles,

and consisting of a row of distinct dwellings. C. D. Cameron describes three villages thus built on piles in Lake Mohrya, or Moria, in Central

Africa, the motive here being to prevent surprise by bands of slave-catchers. Similar constructions have been described by travellers, among the Dyaks of Borneo, in Celebes, in the Caroline Islands, on the Gold Coast of Africa, and in other places.

Hippocrates, writing in the 5th century B.C., says of the people of the Phasis that their country is hot and marshy and subject to frequent inundations, and that they live in houses of timber and reeds constructed in the midst of the waters, and use boats of a single tree trunk. Herodotus, writing also in the 5th century B.C., describes the people of Lake Prasias as living in houses constructed on platforms supported on piles in the middle of the lake, which are approached from the land by a single narrow bridge. Abulfeda the geographer, writing in the 13th century, notices the fact that part of the Apamaean Lake was inhabited by Christian fishermen who lived on the lake in wooden huts built on piles, and Sir John Lubbock (Lord Avebury) mentions that the Rumelian fishermen on Lake Prasias ” still inhabit wooden cottages built over the water, as in the time of Herodotus.”

The records of the wars in Ireland in the 16th century show that the petty chieftains of that time had their defensive strong- holds constructed in the ” freshwater lochs ” of the country, and there is record evidence of a similar system in the western’ parts of Scotland. The archaeological researches of the past fifty years have shown that such artificial constructions in lakes were used as defensive dwellings by the Celtic people from an early period to medieval times (see Crannog) . Similar researches have also established the fact that in prehistoric times nearly all the lakes of Switzerland, and many in the adjoining countries — in Savoy and the north of Italy, in Austria and Hungary and in Mecklenburg and Pomerania — were peopled, so to speak, by lake-dwelling communities, living in villages constructed on platforms supported by piles at varying distances from the shores. The principal groups are those in the Lakes of Bourget, Geneva, Neuchatel, Bienne, Zurich and Constance lying to the north of the Alps, and in the Lakes Maggiore, Varese, Iseo and Garda lying to the south of that mountain range. Many smaller lakes, however, contain them, and they are also found in peat moors on the sites of ancient lakes now drained or silted up, as at Laibach in Carniola. In some of the larger lakes the number of settlements has been very great. Fifty are enumerated in the Lake of Neuchatel, thirty-two in the Lake of Constance, twenty-four in the Lake of Geneva, and twenty in the Lake of Bienne. The site of the lake dwelling of Wangen, in the Untersee, Lake of Constance, forms a parallelogram more than 700 paces in length by about 120 paces in breadth. The settlement at Morges, one of the largest in the Lake of Geneva, is 1200 ft. long by 150 ft. in breadth. The settlement

of Sutz, one of the largest in the Lake of Bienne, extends over six acres, and was connected with the shore by a gangway nearly 100 yds. long and about 40 ft. wide.

The substructure which supported the platforms on which the dwellings were placed was most frequently of piles driven into the bottom of the lake. Less frequently it consisted of a stack of brushwood or fascines built up from the bottom and strengthened by stakes penetrating the mass so as to keep it from spreading. When piles were used they were the rough stems of trees of a length proportioned to the depth of the water, sharpened sometimes by fire and at other times chopped to a point by hatchets. On their level tops the beams supporting the platforms were laid and fastened by wooden pins, or inserted in mortices cut in the heads of the piles. In some cases the whole construction was further steadied and strengthened by cross beams, notched into the piles below the supports of the platform. The platform itself was usually composed of rough layers of unbarked stems, but occasionally it was formed of boards split from larger stems. When the mud was too soft to afford foothold for the piles they were mortised into a framework, of tree trunks placed horizontally on the bottom of the lake.

On the other hand, when the bottom was rocky so that the piles could not be driven, they were steadied at their bases by being enveloped in a mound of loose stones, in the manner in which the foundations of piers and breakwaters are now constructed. In cases where piles have not been used, as at Niederwil and Wauwyl, the substructure is a mass of fascines or faggots laid parallel and crosswise upon one another with intervening layers of brushwood or of clay and gravel, a few piles here and there being fixed throughout the mass to serve as guides or stays. At Niederwil the platform was formed of split boards, many of which were 2 ft. broad and 2 or 3 in. in thickness.

On these substructures were the huts composing the settle- ment; for the peculiarity of these lake dwellings is that they were pile villages, or clusters of huts occupying a common platform. The huts themselves were quadrilateral in form. The size of each dwelling is in some cases marked by boards resting edgeways on the platform, like the skirting boards over the flooring of the rooms in a modern house. The walls, which were supported by posts, or by piles of greater length, were formed of wattle-work, coated with clay. The floors were of clay, and in each floor there was a hearth constructed of flat slabs of stone. The roofs were thatched with bark, straw, reeds or rushes. As the superstructures are mostly gone, there is no evidence as to the position and form of the doorways, or the size, number and position of

the windows, if there were any. In one case, at Schussenried, the house, which was of an oblong quad- rangular form, about S3 by 23 ft., was divided into two rooms by a partition. The outer room, which was the smaller of the two, was entered by a doorway 3 ft. in width facing the south. The access to the inner room was by a similar door through the partition. The walls were formed of split tree-trunks set upright and plastered with clay; and the flooring of similar timbers bedded in clay. In other cases the remains of the gangways or bridges connecting the settlements with the shore have been discovered, but often the village appears to have been accessible only by canoes. Several of these single-tree canoes have been found, one of which is 43 ft. in length and 4 ft. 4 in. in its greatest width. It is impossible to estimate with any degree of certainty the number of separate dwellings of which any of these villages may have consisted, but at Niederwil they stood almost con- tiguously on the platform, the space between them not exceeding 3 ft. in width. The size of the huts also varied considerably. At Niederwil they were 20 ft. long and 12 ft. wide, while at Robenhausen they were about 27 ft. long by about 22 ft. wide.

The character of the relics shows that in some cases the settle- ments have been the dwellings of a people using no materials but stone, bone and wood for their implements, ornaments and weapons; in others, of a people using bronze as well as stone and . bone; and in others again the occasional use of iron is disclosed. But, though the character of the relics is thus changed, there is no corresponding change in the construction and arrangements of the dwellings. The settlement in the Lake of Moosseedorf, near Bern, affords the most perfect example of a lake dwelling of the Stone age. It was a parallelogram 70 ft. long by 50 ft. wide, supported on piles, and having a gangway built on faggots connecting it with the land. The superstructure had been destroyed by fire. The implements found in the relic bed under it were axe-heads of stone, with their haftings of stag's horn and wood; a flint saw, set in a handle of fir wood and fastened with asphalt; flint flakes and arrow-heads; harpoons of stag's horn with barbs; awls, needles, chisels, fish-hooks and other imple- ments of bone; a comb of yew wood 5 in. long; and a skate made out of the leg bone of a horse. The pottery consisted chiefly of roughly-made vessels, some of which were of large size, others had holes under the rims for suspension, and many were covered with soot, the result of their use as culinary vessels. Burnt wheat, barley and linseed, with many varieties of seeds and fruits, were plentifully mingled with the bones of the s'tag, the ox, the swine, the sheep and the goat, representing the ordinary food of the inhabitants, while remains of the

beaver, the fox, the hare, the dog, the bear, the horse, the elk and the bison were also found.

LAKE DWELLINGS

93

The settlement of Robenhausen, in the moor which was formerly the bed of the ancient Lake of Pfaffikon, seems to have continued in occupation after the introduction of bronze. The site covers nearly 3 acres, and is estimated to have contained 100,000 piles. In some parts three distinct successions of inhabited platforms have been traced. The first had been destroyed by fire. It is represented at the bottom of the lake by a layer of charcoal mixed with implements of stone and bone and other relics highly carbonized. The second is represented above the bottom by a series of piles with burnt heads, and in the bottom by a layer of charcoal mixed with corn, apples, cloth, bones, pottery and implements of stone and bone, separated from the first layer of charcoal by 3 ft. of peaty sediment inter- mixed with relics of the occupation of the platform. The piles of the third settlement do not reach down to the shell marl, but are fixed in the layers representing the first and second settlements. They are formed of split oak trunks, while those of the two first settlements are round stems chiefly of soft wood. The huts of this last settlement appear to have had cattle stalls between them, the droppings and litter forming heaps at the lake bottom. The bones of the animals consumed as food at this station were found in such numbers that 5 tons were collected in the construction of a watercourse which crossed the site. Among the wooden objects recovered from the relic beds were tubs, plates, ladles and spoons, a flail for threshing corn, a last for stretching shoes of hide, celt handles, clubs, long-bows of yew, floats and implements of fishing and a dug-out canoe 12 ft. long. No spindle-whorls were found, but there were many varieties of cloth, platted and woven, bundles of yarn and balls of string. Among the tools of bone and stag's horn were awls, needles, harpoons, scraping tools and haftings for stone axe-heads. The implements of stone were chiefly axe-heads and arrow-heads. Of clay and earthenware there were many varieties of domestic dishes, cups and pipkins, and crucibles or melting pots made of clay and horse dung and still retaining the drossy coating of the melted bronze.

The settlement of Auvernier in the Lake of Neuchatel is one of the richest and most considerable stations of the Bronze age. It has yielded four bronze swords, ten socketed spear-heads, forty celts or axe-heads and sickles, fifty knives, twenty socketed chisels, four

hammers and an anvil, sixty rings for the arms and legs, several highly ornate torques or twisted neck rings, and upwards of two hundred hair pins of various sizes up to 16 in. in length, some having spherical heads in which plates of gold were set. Moulds for sickles, lance-heads and bracelets were found cut in stone or made in baked clay. From four to five hundred vessels of pottery finely made and elegantly shaped are indicated by the fragments recovered from the relic bed. The Lac de Bourget, in Savoy, has eight settlements, all of the Bronze age. These have yielded upwards of 4000 implements, weapons and ornaments of bronze, among which were a large proportion of moulds and founders' materials. A few stone implements suggest the transition from stone to bronze; and the occasional occurrence of iron weapons and pottery of Gallo-Roman origin indicates the survival of some of the settlements to Roman times.

The relative antiquity of the earlier settlements of the Stone and Bronze ages is not capable of being deduced from existing evidence. " We may venture to place them," says Dr F. Keller, " in an age when iron and bronze had been long known, but had not come into our districts in such plenty as to be used for the common purposes of household life, at a time when amber had already taken its place as an ornament and had become an object of traffic." It is now considered that the people who erected the lake dwellings of Central Europe were also the people who were spread over the mainland. The forms and the ornamenta- tion of the implements and weapons of stone and bronze found in the lake dwellings are the same as those of the implements and weapons in these materials found in the soil of the adjacent regions, and both groups must therefore be ascribed to the industry of one and the same people. Whether dwelling on the land or dwelling in the lake, they have exhibited so many •indications of capacity, intelligence, industry and social organi-

zation that they cannot be considered as presenting, even in their Stone age, a very low condition of culture or civilization. Their axes were made of tough stones, sawn from the block and ground to the fitting shape. They were fixed by the butt in a socket of stag's horn, mortised into a handle of wood. Their knives and saws of flint were mounted in wooden handles and fixed with asphalt. They made and used an endless variety of bone tools. Their pottery, though roughly finished, is well made, the vessels often of large size and capable of standing the fire as cooking utensils. For domestic dishes they also made wooden tubs, plates, spoons, ladles and the like. The industries of spinning and weaving were largely practised. They made nets and fishing lines, and used canoes. They practised agriculture, cultivating several varieties of wheat and barley, besides millet and flax. They

kept horses, cattle, sheep, goats and swine. Their clothing was partly of linen and partly of woollen fabrics and the skins of their beasts. Their food was nutritious and varied, their dwellings neither unhealthy nor incommodious. They lived in the security and comfort obtained by social organization, and were apparently intelligent, industrious and progressive communities.

There is no indication of an abrupt change from the use of stone to the use of metal such as might have occurred had the knowledge of copper and bronze, and the methods of working them, been introduced through the conquest of the original inhabitants by an alien race of superior culture and civilization. The improved cultural conditions become apparent in the multiplication of the varieties of tools, weapons and ornaments made possible by the more adaptable qualities of the new material; and that the development of the Bronze age culture in the lake dwellings followed the same course as in the surround- ing regions where the people dwelt on the dry land is evident from the correspondence of the types of implements, weapons, ornaments and utensils common to both these conditions of life.

Other classes of prehistoric pile-structures akin to the lake dwellings are the Terremare of Italy and the Terpen of Holland. Both of these are settlements of wooden huts erected on piles, not over the water, but on flat land subject to inundations. The terremare (so named from the marly soil of which they are composed) appear as mounds, sometimes of very considerable extent, which when dug into disclose the remains and relic beds of the ancient settlements. They are most abundant in the plains of northern Italy traversed by the Po and its tributaries, though similar constructions have been found in Hungary in the valley of the Theiss. These pile-villages were often surrounded by an earthen rampart within which the huts were erected in more or less regular order. Many of them present evidence of having been more than once destroyed by fire and reconstructed, while others show one or more reconstructions at higher levels on the same site. The contents of the relic beds indicate that they belong for the most part to the age of bronze, although in some cases they may be referred to the latter part of the Stone age. Their inhabitants practised agriculture and kept the common domestic animals, while their tools, weapons and ornaments were mainly of similar character to those of the contemporary lake dwellers of the adjoining regions. Some of the Italian terremare show quadrangular constructions made like the modern log houses, of undressed tree trunks superposed longitudinally and overlapping at the ends, as at Castione in the province of Parma. A similar mode of construction is found in the pile-village on the banks of the Save, near Donja Dolina in Bosnia, described in 1904 by

Dr Truhelka. Here the larger houses had platforms in front of them forming terraces at different levels descending towards the river. There was a cemetery adjacent to the village in which both unburnt and cremated interments occurred, the former predominating. From the general character of the relics this settlement appeared to belong to the early Iron age. The Terpen of Holland appear as mounds somewhat similar to those of the terremare, and were also pile structures, on low or marshy lands subject to inundations from the sea. Unlike the terremare and the lake dwellings they do

not seem .to belong to the prehistoric ages, but yield indications of occupation in post-Roman and medieval times.

Authorities. — The materials for the investigation of this singular phase of prehistoric life were first collected and systematized by Dr Ferdinand Keller (1800-1881), of Zurich, and printed in Mittheilungen der Antiquarischen Gesellschafl in Zurich, vols, ix.xxii., 4to (1855 1886). The substance of these reports has been issued as a separate work in England, The Lake Dwellings of Switzerland and other parts of Europe, by Dr Ferdinand Keller, translated and arranged by John Edward Lee, 2nd ed. (2 vols. 8vo, London, 1878). Other works on the same subject are Frederic Troyon, Habitations lacustres des temps anciens et modernes (Lausanne, i860) ; E. Desor, Les Palafittes ou constructions lacustres du lac de Neuch&tel (Paris, 1865) ; E. Desor and L. Favre, Le Bel Age du bronze lacustre en Suisse (Paris, 1874); A. Perrin, Etude prehislorique sur la Savoie specialement a I' epoque lacustre (Les Palafittes du lac de Bourget, Paris, 1870); Ernest Chantre, Les Palafittes ou constructions lacustres du lac de Paladru (Chambery, 1871); Bartolomeo Gastaldi, Lake Habitations and prehistoric Remains in the Turbaries and Marl-beds of Northern and Central Italy, translated by C. H. Chambers (London, 1865); Sir John Lubbock (Lord Avebury), Prehistoric Times (4th ed., London, 1878); Robert Munro, The Lake-Dwellings of Europe (London, 1890), with a bibliography of the subject. (J. An.)

LAKE GENEVA, a city of Walworth county, Wisconsin, U.S.A., 65 m. N.W. of Chicago. Pop. (iqoo) 2585, of whom 468 were foreign-born; (1905) 3449; (1910) 3079. It is served by the Chicago & Northwestern railway. Tdie city is pictur- esquely situated on the shores of Lake Geneva (9 m. long and i| to 3 m. wide), a beautiful body of remarkably clear water, fed by springs, and encircled by rolling hills

covered with thick groves of hardwood trees. The region is famous as a summer resort, particularly for Chicago people. The city is the seat of Oakwood Sanitarium, and at Williams Bay, 6 m. distant, is the Yerkes Observatory of the University of Chicago. Dairying is the most important industrial interest. The first settlement on Lake Geneva was made about 1833. The city was chartered in 1893.

LAKE OF THE WOODS, a lake in the south-west of the province of Ontario, Canada, bordering west on the province of Manitoba, and south on the state of Minnesota. It is of extremely irregular shape, and contains many islands. Its length is 70 m., breadth 10 to 50 m., area 1500 sq. m. It lies in the centre of the Laurentian region between Lakes Winnipeg and Superior, and an area of 36,000 sq. m. drains to it. It collects the waters of many rivers, the chief being Rainy river from the east, draining Rainy Lake. By the Winni- peg river on the north-east it discharges into Lake Winnipeg. At its source Winnipeg river is 1057 ft. above the sea, and drops 347 ft. in its course of 165 m. The scenery both on and around the lake is exceedingly beautiful, and the islands are largely occupied by the summer residences of city merchants. Kenora, a flourishing town at the source of the Winnipeg river, is the centre of the numerous lumbering and mining enterprises of the vicinity.

LAKE PLACID, a village in Essex county, New York, U.S.A., on the W. shore of Mirror Lake, near the S. end of Lake Placid, about 42 m. N.W. of Ticonderoga. Pop. (1905) 1514; (1910) 1682. The village is served by the Delaware & Hudson railway. The region is one of the most attractive in the Adirondacks, and is a much frequented summer resort. There are four good golf courses here, and the village has a well-built club house, called the ” Neighborhood House.” The village lies on the narrow strip of land (about | m.) between Mirror Lake (about 1 m. long, N. and S., and \ m. wide), and Lake Placid, about 5 m. long (N.N.E. by S.S.W.), and about 15 m. (maximum) broad; its altitude is 1864 ft. The lake is roughly divided, from N. to S. by three islands — Moose, the largest, and Hawk, both privately owned, and Buck — and is a beautiful sheet of water in a picturesque setting of forests and heavily wooded hills and mountains. Among the principal peaks in the vicinity are Whiteface Mountain (4871 ft.), about 3 m. N.W. of the N. end of the lake; McKenzie Mountain (3872 ft.), about 1 m. to the W., and Pulpit Mountain (2658 ft.), on the E. shore. The summit of Whiteface Mountain commands a fine view, with Gothic (4738 ft.), Saddleback (4530 ft.), Basin (4825 ft.), Marcy (5344 ft.), and Mclntyre (5210 ft.) mountains about 10 m.

to the S. and Lake Champlain to the E., and to the N.E. may be seen,

on clear days, the spires of Montreal. In the valleys E. and S. are the headwaters of the famous Ausable river. About 2 m. E. of the village, at North Elba, is the grave of the aboli- tionist, John Brown, with its huge boulder monument, and near it is another monument which bears the names of the 20 persons who bought the John Brown farm and gave it to the state. The railway to the village was completed in 1893. The village was incorporated in 1900.

LAKEWOOD, a village of Ocean county, New Jersey, U.S.A., in the township of Lakewood, 59 m. S. by W. of New York city, and 8 m. from the coast, on the Central Railroad of New Jersey. Pop. (1900) of the township, including the village, 3094; (1905) 4265; (1910) 5149. Lakewood is a fashionable health and winter resort, and is situated in the midst of a pine forest, with two small lakes, and maay charming walks and drives. In the village there are a number of fine residences, large hotels, a library and a hospital. ‘The winter temperature is 10-12 F. warmer than in New York. The township of Lakewood was incorporated in 1892.

LAKH (from the Sans, laksha, one hundred thousand), a term used in British India, in a colloquial sense to signify a lakh of rupees (written 1,00,000), which at the face value of the rupee would be worth £10,000, but now is worth only £6666. The term is also largely used in trade returns. A hundred lakhs make a crore.

LAKHIMPUR, a district of British India in the extreme east of the province of Eastern Bengal and Assam. Area, 4529 sq. m. It lies along both banks of the Brahmaputra for about 400 m.; it is bounded N. by the Daphla, Miri, Abor and Mishmi hills, E. by the Mishmi and Kachin hills, S. by the watershed of the Patkai range and the Lohit branch of the Brahmaputra, and W. by the districts of Darrang and Sibsagar. The Brahmaputra is navigable for steamers in all seasons as far as Dibrugarh, in the rainy season as far as Sadiya; its navigable tributaries within the district are the Subansiri, Dibru and Dihing. The deputy-commissioner in charge exercises political control over numerous tribes beyond the inner surveyed border. The most important of these tribes are the Miris, Abors, Mishmis, Khamtis, Kachins and Nagas. In 1901 the population was 371,396, an increase of 46 % in the decade. The district has enjoyed remarkable and continuous prosperity. At each successive census the percentage of increase has been over 40, the present population being more than three times as great as that of 1872. This increase is chiefly due to the numerous tea gardens and to the coal mines and other enterprises of the Assam Railways and Trading Company. Lakhimpur was the first district into which tea cultivation was introduced by the government,

and the Assam Company began operations here in 1840. The railway, known as the Dibru-Sadiya line, runs from Dibrugarh to Makum, with two branches to Talap and Margherita, and has been connected across the hills with the Assam-Bengal railway. The coal is of excellent quality, and is exported by river as far as Calcutta. The chief oil-wells are at Digboi. The oil is refined at Margherita, producing a good quality of kerosene oil and first-class paraffin, with wax and other by-products. The company also manufactures bricks and pipes of various kinds. Another industry is cutting timber, for the manufacture of tea-chests, &c.

Lakhimpur figures largely in the annals of Assam as the region where successive invaders from the east first reached the Brahma- putra. The Bara Bhuiyas, originally from the western provinces of India, were driven out by the Chutias (a Shan race), and these in their turn gave place to their more powerful brethren, the Ahoms, in the 13th century. The Burmese, who had ruined the native kingdoms, at the end of the 18th century, were in 1825 expelled by the British, who placed the southern part of the country, together with Sibsagar under the rule of Raja Purandhar Singh; but it was not till 1838 that the whole was taken under direct British adminis- tration. The headquarters are at Dibrugarh. See Lakhimpur District Gazetteer (Calcutta, 1905).

LAKSHMI (Sans, for ” mark,” ” sign,” generally used in composition with punya, “prosperous”; hence “good sign,” ” good fortune “), in Hindu mythology, the wife of Vishnu ”

worshipped as the goddess of love, beauty and prosperity. She has many other names, the chief being Loka mata (” mother of the world “), Padma (” the lotus “), Padma laya (” she who dwells on a lotus “) and Jaladhija (” the ocean-born “). She is represented as of a bright golden colour and seated on a lotus. She is said to have been born from the sea of milk when it was churned from ambrosia. Many quaint myths surround her birth. In the Rig Veda her name does not occur as a goddess. LALAING, JACQUES DE (c. 1420-1453), Flemish knight, was originally in the service of the duke of Cleves and afterwards in that of the duke of Burgundy, Philip III., the Good, gaining great renown by his prowess in the tiltyard. The duke of Burgundy entrusted him with embassies to the pope and the king of France (145 1), and subsequently sent him to put down the revolt of the

inhabitants of Ghent, in which expedition he was killed. His biography, Le Livre des faits de messire Jacques de Lalaing, which has been published several times, is mainly the work of the Burgundian herald and chronicler Jean le Fevre, better known as Toison d'or; the Flemish historiographer Georges Chastellain and the herald Charolais also took part in its compilation.

LALANDE, JOSEPH JEROME LEFRANCAIS DE (1732-1807), French astronomer, was born at Bourg (department of Ain), on the nth of July 1732. His parents sent him to Paris to study law; but the accident of lodging in the H6tel Cluny, where J. N. Delisle had his observatory, drew him to astronomy, and he became the zealous and favoured pupil of both Delisle and Pierre Lemonnier. He, however, completed his legal studies, and was about to return to Bourg to practise there as an advocate, when Lemonnier obtained permission to send him to Berlin, to make observations on the lunar parallax in concert with those of N. L. Lacaille at the Cape of Good Hope. The successful execution of his task procured for him, before he was twenty-one, admission to the Academy of Berlin, and the post of adjunct astronomer to that of Paris. He now devoted himself to the improvement of the planetary theory, publishing in 1759 a corrected edition of Halley's tables, with a history of the cele- brated comet whose return in that year he had aided Clairault to calculate. In 1762 J. N. Delisle resigned in his favour the chair of astronomy in the College de France, the duties of which were discharged by Lalande for forty-six years. His house became an astronomical seminary, and amongst his pupils were J. B. J. Delambre, G. Piazzi, P. Mechain, and his own nephew Michel Lalande. By his publications in connexion with the transit of 1769 he won great and, in a measure, deserved fame. But his love of notoriety and impetuous temper com- promised the respect due to his scientific zeal, though these faults were partially balanced by his generosity and benevolence. He died on the 4th of April 1807.

Although his investigations were conducted with diligence rather than genius, the career of Lalande must be regarded as of eminent service to astronomy. As a lecturer and writer he gave to the science unexampled popularity; his planetary tables, into which he introduced corrections for mutual perturbations, were the best available up to the end of the 18th century; and the Lalande prize, instituted by him in 1802 for the chief astronomical performance of each year, still testifies to his enthusiasm for his favourite pursuit. Amongst his voluminous works are Traite a" astronomic (2 vols., I7 6 4; enlarged .edition, 4 vols., 1771-1781 ; 3rd ed., 3 vols., 1792) ; Histoire cileste francaise (1801), giving the places of 50,000 stars; Biblio- graphie astronomique

(1803), with a history of astronomy from 1781 to 1802 ; Astronomie des dames (1785) ; Abrege de navigation (1793) ; Voyage d'un franqois en Italie (1769), a valuable record of his travels in 1765-1766. He communicated above one hundred and fifty papers to the Paris Academy of Sciences, edited the Connoissance des temps (1759-1774), and again (1794-1807), and wrote the concluding 2 vols, of the 2nd edition of Montucla's Histoire des mathematiques

(1802).

See Memoires de I'Institut, t. viii. (1807) (J. B. J. Delambre); Delambre, Hist, de Vastr. au XVIII' sibcle, p. 547; Magazin encyclo-pedique, ii. 288 (1810) (Mme de Salm); J. S. Bailly, Hist, de I'astr. moderne, t. iii. (ed. 1785); J. Madler, Geschichte der Himmelskunde, ii. 141; R. Wolf, Gesch. der Astronomie; J. J. Lalande, Bibl. astr. p. 428; J. C. Poggendorff, Biog. Lit. Handworterbuch ; M. Marie, Hist, des sciences, ix. 35.

LAIJN, a town of north-western Spain, in the province of Pontevedra. Pop. (1900) 16,23s. Lalin is the centre of the

trade in agricultural products of the fertile highlands between the Deza and Arnego rivers. The local industries are tanning and the manufacture of paper. Near Lalin are the ruins of the Gothic abbey of Carboeiro.

LA LINEA, or La Linea de la Concepcion, a town of Spain, in the province of Cadiz, between Gibraltar and San Roque. Pop. (1900) 31,802. La Linea, which derives its name from the line or boundary dividing Spanish territory from the district of Gibraltar, is a town of comparatively modern date and was formerly looked upon as a suburb of San Roque. It is now a distinct frontier post and headquarters of the Spanish com- mandant of the lines of Gibraltar. The fortifications erected here in the 16th century were dismantled by the British in 1810, to prevent the landing of French invaders, and all the existing buildings are modern. They include barracks, casinos, a theatre and a bull-ring, much frequented by the inhabitants and garrison of Gibraltar. La Linea has some trade in cereals, fruit and vegetables; it is the residence of large numbers of labourers employed in Gibraltar.

LALITPUR, a town of British India, in Jhansi district, United Provinces. Pop. (1901) 11,560. It has a station on the Great Indian Peninsula railway, and a large trade in oil-seeds, hides and ghi. It contains several beautiful Hindu and Jain temples. It was formerly the headquarters of a district of the same name, which was incorporated

with that of Jhansi in 1891. The Bundela chiefs of Lalitpur were among those who most eagerly joined the Mutiny, and it was only after a severe struggle that the district was pacified.

LALLY, THOMAS ARTHUR, Comte de, Baron de Tollendal (1 702-1 766), French general, was born at Romans, Dauphin6, in January 1702, being the son of Sir Gerard O'Lally, an Irish Jacobite who married a French lady of noble family, from whom the son inherited his titles. Entering the French army in 1721 he served in the war of 1734 against Austria; he was present at Dettingen (1743), and commanded the regiment de Lally in the famous Irish brigade at Fontenoy (May 1745). He was made a brigadier on the field by Louis XV. He had previ- ously been mixed up in several Jacobite plots, and in 1745 accompanied Charles Edward to Scotland, serving as aide-de-camp at the battle of Falkirk (January 1746). Escaping to France, he served with Marshal Saxe in the Low Countries, and at the capture of Maestricht (1748) was made a marSchal de camp. When war broke out with England in 1756 Lally was given the command of a French expedition to India. He reached Pondicherry in April 1758, and at the outset met with some trifling military success. He was a man of courage and a capable general; but his pride and ferocity made him disliked by his officers and hated by his soldiers, while he regarded the natives as slaves, despised their assistance, arid trampled on their traditions of caste. In consequence everything went wrong with him. He was unsuccessful in an attack on Tanjore, and had to retire from the siege of Madras (1758) owing to the timely arrival of the British fleet. He was defeated by Sir Eyre Coote at Wandiwash (1760), and besieged in Pondicherry and forced to capitulate (1761). He was sent as a prisoner of war to England. While in London, he heard that he was accused in France of treachery, and insisted, against advice, on returning on parole to stand his trial. He was kept prisoner for nearly two years before the trial began; then, after many painful delays, he was sentenced to death (May 6, 1766), and three days later beheaded. Louis XV. tried to throw the responsibility for what was un- doubtedly a judicial murder on his ministers and the public, but his policy needed a scapegoat, and he was probably well content not to exercise his authority to save an almost friendless foreigner.

See G. B. Malleson, The Career of Count Lally (1865); " Z's " (the marquis de Lally-Tollendal) article in the Biographie Michaud; and Voltaire's CEuvres completes. The legal documents are pre- served in the Bibliotheque Nationale.

LALLY-TOLLENDAL, TROPHIME GERARD, Marquis de (1751-1830), was born at Paris on the 5th of March 1751. He was the legitimized

son of the comte de Lally and only discovered

the secret of his birth on the day of his father's execution, when he resolved to devote himself to clearing his father's memory. He was supported by Voltaire, and in 1778 succeeded in persuad- ing Louis XVI. to annul the decree which had sentenced the comte de Lallyj but the parlement of Rouen, to which the case was referred back, in 1784 again decided in favour of Lally's guilt. The case was retried by other courts, but Lally's innocence was never fully admitted by the French judges. In 1779 Lally- Tollendal bought the office of Grand bailli of Etampes, and in 1789 was a deputy to the states-general for the noblesse of Paris. He played some part in the early stages of the Revolution, but was too conservative to be in sympathy with all even of its earlier developments. He threw himself into opposition to the " tyranny " of Mirabeau, and condemned the epidemic of re- nunciation which in the session of the 4th of August 1789 destroyed the traditional institutions of France. Later in the year he emigrated to England. During the trial of Louis XVI. by the National Convention (1793) he offered to defend the king, but was not allowed to return to France. He did not return till the time of the Consulate. Louis XVIII. created him a peer of France, and in 18 16 he became a member of the French Academy. From that time until his death, on the nth of March 1830, he devoted himself to philanthropic work, especially identifying himself with prison reform.

See his Plaidoyer pour Louis XVI. (London, 1793); Lally- Tollendal was also in part responsible for the Memoires, attributed to Joseph Weber, concerning Marie Antoinette (1804); he further edited the article on his father in the Biographie Michaud; see also Arnault, Discours prononce aux funerailles de M. le marquis de Lally- Tollendal le 13 mars 1830 (Paris) ; Gautbier de Brecy, Necrologie de M. le marquis de Lally-Tollendal (Paris, undated); Voltaire, CEuvres completes (Paris, 1889), in which see the analytical table of contents, vol. ii.

LALO, EDOUARD (1823-1892), French composer, was born at Lille, on the 27th of January 1823. He began his musical studies at the conservatoire at Lille, and in Paris attended the violin classes of Habeneck. For several years Lalo led a modest and retired existence, playing the viola in the quartet party organized by Armingaud and Jacquard, and in composing chamber music. His early works include two trios, a quartet, and several pieces for violin and pianoforte. In

1867 he took part in an operatic competition, an opera from his pen, entitled Fiesque, obtaining the third place out of forty-three. This work was accepted for production at the Paris Opera, but delays occurred, and nothing was done. Fiesque was next offered to the Theatre de la Monnaie, Brussels, and was about to be produced there when the manager became bankrupt. Thus, when nearly fifty years of age, Lalo found himself in difficulties. Fiesque was never performed, but the composer published the pianoforte score, and eventually employed some of the music in other works. After the Franco-German war French composers found their opportunity in the concert-room. Lalo was one of these, and during the succeeding ten years several interesting works from his pen were produced, among them a sonata for violoncello, a " divertissement " for orchestra, a violin concerto and the Symphonie Espagnole for violin and orchestra, one of his best-known compositions. In the meanwhile he had written a second opera, Le Roi d'Ys, which he hoped would be produced at the Opera. The administration offered him the " scenario " of a ballet instead. Lalo was obliged to be content with this, and set to work with so much energy that he fell ill, the last scenes of the ballet being orchestrated by Gounod. Namouna, the ballet in question, was produced at the Opera in 1882. Six years later, on the 7th of May 1888, Le Roi d'Ys was brought out at the Opera Comique, and Lalo was at last enabled to taste the sweets of success. Unfortunately, fame came to him too late in life. A pianoforte concerto and the music to Niron, a pantomimic piece played at the Hippodrome in 1 891, were his last two works. He had begun a new opera, but had, only written the first act when, on the 23rd of April 1892, he died. This opera, La Jacquerie, was finished by Arthur Coquard, and was produced in 1895 at Monte Carlo, Aix-les-Bains and finally in Paris. Lalo had distinct originality, discernible in his

employment of curious rhythmic devices. His music is ever ingenious and brilliantly effective.

LA MADDALENA, an island 25 m. from the N.E. coast of Sardinia. Pop. (1901) 8361. Napoleon bombarded it in 1793 without success, and Nelson made it his headquarters for some time. It is now an important naval station of the Italian fleet, the anchorage being good, and is strongly fortified. A bridge and an embankment connect it with Caprera. It appears to have been inhabited in Roman times.

LAMAISM, a system of doctrine partly religious, partly political. Religiously it is the corrupt form of Buddhism prevalent in Tibet and Mongolia. It stands in a relationship to primitive Buddhism similar to that in which Roman .Catholicism, so long as the temporal power of

the pope was still in existence, stood to primitive Christianity. The ethical and metaphysical ideas most conspicuous in the doctrines of Lamaism are not confined to the highlands of central Asia, they are accepted in great measure also in Japan and China. It is the union of these ideas with a hierarchical system, and with the temporal sovereignty of the head of that system in Tibet, which constitutes what is distinctively understood by the term Lamaism. Lamaism has acquired a special interest to the student of comparative history through the instructive parallel which its history presents to that of the Church of Rome.

The central point of primitive Buddhism was the doctrine of ” Arahatship ” — a system of ethical and mental self-culture, in which deliverance was found from all the mysteries and sorrows of life in a change of heart to be reached The

” Great

here on earth. This doctrine seems, to have been vehicle.” held very nearly in its original purity from the time when it was propounded by Gotama in the 6th century B.C. to the period in which northern India was conquered by the Huns about the commencement of the Christian era. Soon after that time there arose a school of Buddhist teachers who called their doctrine the ” Great Vehicle.” It was not in any contradic- tion to the older doctrine, which they contemptuously called the ” Little Vehicle,” but included it all, and was based upon it. The distinguishing characteristic of the newer school was the importance which it attached to ” Bodhisatship.” The older school had taught that Gotama, who had propounded the doctrine of Arahatship, was a Buddha, that only a Buddha is capable of discovering that doctrine, and that a Buddha is a man who by self-denying efforts, continued through many hundreds of different births, has acquired the so-called Ten Paramitds or cardinal virtues in such perfection that he is able, when sin and ignorance have gained the upper hand throughout the world, to save the human race from impending ruin. But until the process of perfection has been completed, until the moment when at last the sage, sitting under the Wisdom tree acquires that particular insight or wisdom which is called Enlightenment or Buddhahood, he is still only a Bodhisat. The link of connexion between the various Bodhisats in the future Buddha’s successive births is not a soul which is transferred from body to body, but the karma, or character, which each successive Bodhisat inherits from his predecessors in the long chain of existences. Now the older school also held, in the first place, that, when a man had, in this life, attained to Arahatship, his karma would not pass on to any other individual in

another life — or in other words, that after Arahatship there would be no rebirth; and, secondly, that four thousand years after the Buddha had pro- claimed the Dhamma or doctrine of Arahatship, his teaching would have died away, and another Buddha would be required to bring mankind once more to a knowledge of the truth. The leaders of the Great Vehicle urged their followers to seek to attain, not so much to Arahatship, which would involve only their own salvation, but to Bodhisatship, by the attainment of which they would be conferring the blessings of the Dhamma upon countless multitudes in the long ages of the future. By thus laying stress upon Bodhisatship, rather than upon Arahat- ship, the new school, though they doubtless merely thought themselves to be carrying the older orthodox doctrines to their logical conclusion, were really changing the central point of

Buddhism, and were altering the direction of their mental vision. It was of no avail that they adhered in other respects in the main to the older teaching, that they professed to hold to the same ethical system, that they adhered, except in a few unimportant details, to the old regulations of the order of the Buddhist mendi- cant recluses. The ancient books, preserved in the Pali Pitakas, being mainly occupied with the details of Arahatship, lost their exclusive value in the eyes of those whose attention was being directed to the details of Bodhisatship. And the opinion that every leader in their religious circles, every teacher distinguished among them for his sanctity of life, or for his extensive learning, was a Bodhisat, who might have and who probably had inherited the karma of some great teacher of old, opened the door to a flood of superstitious fancies.

It is worthy of note that the new school found its earliest professors and its greatest expounders in a part of India outside the districts to which the personal influence of Gotama and of his immediate followers had been confined. The home of early Buddhism was round about Kosala and Magadha; in the district, that is to say, north and south of the Ganges between where Allahabad now lies on the west and Rajgir on the east. The home of the Great Vehicle was, at first, in the countries farther to the north and west. Buddhism arose in countries where Sanskrit was never more than a learned tongue, and where the exclusive claims of the Brahmins had never been universally admitted. The Great Vehicle arose in the very stronghold of Brahminism, and among a people to whom Sanskrit, like Latin in the middle ages in Europe, was the literary lingua franca. The new

literature therefore, which the new movement called forth, was written, and has been preserved, in Sanskrit — its principal books of Dharma, or doctrine, being the following nine: (i) Prajnd-pdramitd; (2) Garida-vyuha; (3) Dasa-bhumiS-vara; (4) Samddhi-rdja; (5) Lankdvatdra; (6) Saddharma-pundarika; (7) Tathdgata-guhyaka; (8) Lalita-vistara; (o) Suvarna-prabhdsa. The date of none of these works is known with any certainty, but it is highly improbable that any one of them is older than the 6th century after the death of Gotama. Copies of all of them were brought to Europe by Mr B. H. Hodgson, and other copies have been received since then; but only one of them has as yet been published in Europe (the Lalita Vistara, edited by Lofmann), and only two have been translated into any European language. These are the Lalita Vistara, translated into French, through the Tibetan, by M. Foucaux, and the Saddharma Putidarika, translated into English by Professor Kern. The former is legendary work, partly in verse, on the life of Gotama, the historical Buddha; and the latter, also partly in verse, is devoted to proving the essential identity of the Great and the Little Vehicles, and the equal authenticity of both as doctrines enunciated by the master himself.

Of the authors of these nine works, as of all the older Buddhist works with one or two exceptions, nothing has been ascertained. The founder of the system of the Great Vehicle is, however, often referred to under the name of Nagarjuna, whose probable date is about a.d. 200.

Together with Nagarjuna, other early teachers of the Great V'ehicle whose names are known are Vasumitra, Vasubandhu, Aryadeva, Dharmapala and Guriamati — all of whom were looked upon as Bodhisats. As the newer school did not venture so far as to claim as Bodhisats the disciples stated in the older books to have been the contemporaries of Gotama (they being precisely the persons known as Arahats), they attempted to give the appearance of age to the Bodhisat theory by representing the Buddha as being surrounded, not only by his human com- panions the Arahats, but also by fabulous beings, whom they represented as the Bodhisats existing at that time. In the opening words of each Mahayana treatise a list is given of such Bodhisats, who were beginning, together with the historical Bodhisats, to occupy a position in the Buddhist church of those times similar to that occupied by the saints in the corre- sponding period of the history of Christianity in the Church of Rome. And these lists of fabulous Bodhisats have now a distinct historical importance. For they grow in length in the later

works; and it is often possible by comparing them one with another to fix, not the date, but the comparative age of the books in which they occur. Thus it is a fair inference to draw from the shortness of the list in the opening words of the Lalita Vistara, as compared with that in the first sections of the Sad- dharma Putidarika, that the latter work is much the younger of the two, a conclusion supported also by other considerations. Among the Bodhisats mentioned in the Saddharma Pundarika, and not mentioned in the Lalita Vistara, as attendant on the Buddha are Manju-srI and Avalokitesvara. That these saints were already acknowledged by the followers of the Great Vehicle at the beginning of the 5th century is clear from the fact that Fa Hien, who visited India about that time, says that ” men of the Great Vehicle ” were then worshipping them at Mathura, not far from Delhi (F. H., chap. xvi.). These were supposed to be celestial beings who, inspired by love of the human race, had taken the so-called Great Resolve to become future Buddhas, and who therefore descended from heaven when the actual Buddha was on earth, to pay reverence to him, and to learn of him. The belief in them probably arose out of the doctrine of the older school, which did not deny the existence of the various creations of previous mythology and speculation, but allowed of their actual existence as spiritual beings, and only deprived them of all power over the lives of men, and declared them to be temporary beings liable, like men, to sin and ignor- ance, and requiring, like men, the salvation of Arahatship. Among them the later Buddhists seem to have placed their numerous Bodhisats; and to have paid especial reverence to Manju-srI as the personification of wisdom, and to Avalokite- swara as the personification of overruling love. The former was afterwards identified with the mythical first Buddhist missionary, who is supposed to have introduced civilization into Tibet about two hundred and fifty years after the death of the Buddha.

The way was now open to a rapid fall from the simplicity of early Buddhism, in which men’s attention was directed to the various parts of the system of self-culture, to a belief in a whole pantheon of saints or angels, mys uc which appealed more strongly to the half-civilized trinities. races among whom the Great Vehicle was now pro- fessed. A theory sprang up which was supposed to explain the marvellous powers of the Buddhas by representing them as only the outward appearance, the reflection, as it were, or emanation, of ethereal Buddhas dwelling in the skies. These were called Dhydni Buddhas, and their number was supposed to be, like that of the Buddhas, innumerable. Only five of them, however, occupied any space in the speculative world in which the ideas of the later Buddhists had now begun to move. But, being Buddhas, they were supposed to have their

Bodhisats; and thus out of the five last Buddhas of the earlier teaching there grew up five mystic trinities, each group con- sisting of one of these five Buddhas, his prototype in heaven the Dhyani Buddha, and his celestial Bodhisat. Among these hypothetical beings, the creations of a sickly scholasticism, hollow abstractions without life or reality, the particular trinity in which the historical Gotama was assigned a subordinate place naturally occupied the most exalted rank. Amitabha, the Dhyani-Buddha of this trinity, soon began to fill the largest place in the minds of the new school; and Avalokiteswara, his Bodhisat, was looked upon with a reverence somewhat less than his former glory. It is needless to add that, under the overpowering influence of these vain imaginations, the earnest moral teachings of Gotama became more and more hidden from view. The imaginary saints grew and flourished. Each new creation, each new step in the theory, demanded another, until the whole sky was filled with forgeries of the brain, and the nobler and simpler lessons of the founder of the religion were hidden beneath the glittering stream of metaphysical subtleties.

Still worse results followed on the change of the earlier point of view. The acute minds of the Buddhist pandits, no longer occupied with the practical lessons of Arahatship, turned their

attention, as far as it was not engaged upon their hierarchy of mythological beings, to questions of metaphysical speculation, which, in the earliest Buddhism, are not only discouraged but forbidden. We find long treatises on the nature of being, idealistic dreams which have as little to do with the Bodhisatship that is concerned with the salvation of the world as with the Arahatship that is concerned with the perfect life. Only one lower step was possible, and that was not long in being taken. The animism common alike to the untaught Huns and to their Hindu conquerors, but condemned in early Buddhism, was allowed to revive. As the stronger side of Gotama's teaching was neglected, the debasing belief in rites and ceremonies, and charms and incantations, which had been the especial object of his scorn, began to spread like the Birana weed warmed by a tropical sun in marsh and muddy soil. As in India, after the expulsion of Buddhism, the degrading worship of Siva and his dusky bride had been incorporated into Hinduism from the savage devil worship of Aryan and of non-

Aryan tribes, so, as pure Buddhism died away in the north, the Tantra system, a mixture of magic and witchcraft and sorcery, was incorporated into the corrupted Buddhism.

The founder of this system seems to have been Asanga, an influential monk of Peshawar, who wrote the first text-book of

the creed, the Yogdchchdra Bhumi Sdstra, in the 6th Tantra century a.d. Hsuan Tsang, who travelled in the first system. half of the 7th, found the monastery where Asanga had

lived in ruins, and says that he had lived one thousand years after the Buddha. 1 Asanga managed with great dexterity to reconcile the two opposing systems by placing a number of Saivite gods or devils, both male and female, in the inferior heavens of the then prevalent Buddhism, and by representing them as worshippers and supporters of the Buddha and of Avalokitesvara. He thus made it possible for the half-converted and rude tribes to remain Buddhists while they brought offerings, and even bloody offerings, to these more congenial shrines, and while their practical belief had no relation at all to the Truths or the Noble Eightfold Path, but busied itself almost wholly with obtaining magic powers (Siddhi), by means of magic phrases {Dhdrani), and magic circles (Mandala). Asanga's happy idea bore but too ample fruit. In his own country and Nepal, the new wine, sweet and luscious to the taste of savages, completely disqualified them from enjoying any purer drink; and now in both countries Saivism is supreme, and Buddhism is even nomin- ally extinct, except in some outlying districts of Nepal. But this full effect has only been worked out in the lapse of ages; the Tantra literature has also had its growth and its development, and some unhappy scholar of a future age may have to trace its loathsome history. The nauseous taste repelled even the self-sacrificing industry of Burnouf, when he found the later Tantra books to be as immoral as they are absurd. " The pen," he says, " refuses to transcribe doctrines as miserable in respect of form as they are odious and degrading in respect of meaning." Such had been the decline and fall of Buddhism considered as an ethical system before its introduction into Tibet. The manner in which its order of mendicant recluses, at first founded to afford better opportunities to those who wished to carry out that system in practical life, developed at last into a hier- archical monarchy will best be understood by a sketch of the history of Tibet.

Its real history commences with Srong Tsan Gampo, who was born a little after 6oo a.d., and who is said in the Chinese chronicles to have entered, in 634, into diplomatic ooiitical relationship with Tai Tsung,

one of the emperors of history. the Tang dynasty. He was the founder of the present capital of Tibet, now known as Lhasa; and in the year 622 (the same year as that in which Mahomet fled from Mecca) he began the formal introduction of Buddhism into Tibet. For this purpose he sent the minister Thumi Sambhota, afterwards looked upon as an incarnation of Manju-sri, to India, there to collect the sacred books, and to learn and translate them.

1 Watters's Yuan Chwang, edited by Rhys Davids and Bushell, i. 210, 356, 271.

Thumi Sambhota accordingly invented an alphabet for the Tibetan language on the model of the Indian alphabets then in use. And, aided by the king, who is represented to have been an industrious student and translator, he wrote the first books by which Buddhism became known in his native land. The most famous of the works ascribed to him is the Mani Kambum, "the Myriad of Precious Words" — a treatise chiefly on religion, but which also contains an account of the introduction of Buddhism into Tibet, and of the closing part of the life of Srong Tsan Gampo- He is also very probably the author of another very ancient standard work of Tibetan Buddhism, the Samatog, a short digest of Buddhist morality, on which the civil laws of Tibet have been founded. It is said in the Mani Kambum to have fallen from heaven in a casket (Tibetan, samatog), and, like the last-mentioned work, is only known to us in meagre abstract. King Srong Tsan Gampo's zeal for Buddhism was shared and supported by his two queens, Bribsun, a princess from Nepal, and Wen Ching, a princess from China. They are related to have brought with them sacred relics, books and pictures, for whose better preservation two large monasteries were erected. These are the cloisters of La Brang (Jokhang) and Ra Moche, still, though much changed and enlarged, the most sacred abbeys in Tibet, and the glory of Lhasa. The two queens have become semi-divine personages, and are worshipped under the name of the two Ddrd-Eke, the " glorious mothers," being regarded as incarnations of the wife of Siva, representing respectively two of the qualities which she personifies, divine vengeance and divine love. The former is worshipped by the Mongolians as Okkin Tengri, " the Virgin Goddess "; but in Tibet and China the r61e of the divine virgin is filled by Kwan Yin, a personification of Avalokitesvara as the heavenly word, who is often represented with a child in her arms. Srong Tsan Gampo has also become a saint, being looked upon as an incarnation of Avalokitesvara; and the description in the ecclesiastical historians of the measures he took for the welfare of his subjects do great credit to their ideal of the perfect Buddhist king. He is said to have spent his long reign in the building of reservoirs, bridges and canals; in the

promotion of agriculture, horticulture and manufactures; in the establishment of schools and colleges; and in the maintenance of justice and the encouragement of virtue. But the degree of his success must have been slight. For after the death of himself and of his wives Buddhism gradu- ally decayed, and was subjected by succeeding kings to cruel persecutions; and it was not till more than half a century afterwards, under King Kir Song de Tsan, who reigned 740-786, that true religion is acknowledged by the ecclesiastical historians to have become firmly established in the land.

This monarch again sent to India to replace the sacred books that had been lost, and to invite Buddhist pandits to translate them. The most distinguished of those who came j-/, e were Santa Rakshita, Padma Sambhava and Kamala Tibetan Sila, for whom, and for their companions, the king sacred built a splendid monastery still existing, at Samje, about three days' journey south-east of Lhasa. It was to them that the Tibetans owed the great collection of what are still regarded as their sacred books — the Kandjur. It consists of 100 volumes containing 689 works, of which there are two or three complete sets in Europe, one of them in the India Office library. A detailed analysis of these scriptures has been pub- lished by the celebrated Hungarian scholar Csoma de Koros, whose authoritative work has been republished in French with complete indices and very useful notes by M. Leon Feer. These volumes contain about a dozen works of the oldest school of Buddhism, the Hinayana, and about 300 works, mostly very short, belonging to the Tantra school. But the great bulk of the collection consists of Mahayana books, belonging to all the previously existing varieties of that widely extended Buddhist sect; and, as the Sanskrit originals of many of these writings are now lost, the Tibetan translations will be of great value, not only for the history of Lamaism, but also for the history of the later forms of Indian Buddhism.

The last king's second son, Lang Darma, concluded in May 822

a treaty with the then emperor of China (the twelfth of the Tang dynasty), a record of which was engraved on a stone put up in the above-mentioned great convent of La Brang (Jokhang), and is still to be seen there. 1 He is described in the church chronicles as an*

incarnation of the evil spirit, and is said to have succeeded in suppressing Buddhism throughout the greater part of the land. The period from Srong Tsan Gampo down to the death of Lang Darma, who was murdered about a.d. 850, in a civil war, is called in the Buddhist books ” the first introduction of religion.” It was followed by more than a century of civil disorder and wars, during which the exiled Buddhist monks attempted unsuccessfully again and again to return. Many are the stories of martyrs and confessors who are believed to have lived in these troublous times, and their efforts were at last crowned with success, for in the century commencing with the reign of Bilamgur in 971 there took place ” the second introduction of religion ” into Tibet, more especially under the guidance of the pandit Atisha, who came to Tibet in 1041, and of his famous native pupil and follower Brom Ston. The long period of depression seems not to have been without a beneficial influence on the persecuted Buddhist church, for these teachers are reported to have placed the Tantra system more in the background, and to have adhered more strongly to the purer forms of the Mahayana development of the ancient faith.

For about three hundred years the Buddhist church of Tibet was left in peace, subjecting the country more and more com- pletely to its control, and growing in power and in wealth. During this time it achieved its greatest victory, and underwent the most important change in reigntyot ; ts c }j arac ter and organization. After the reintroduc- ‘ tion of Buddhism into the ” kingdom of snow,” the ancient dynasty never recovered its power. Its representatives continued for some time to claim the sovereignty; but the country was practically very much in the condition of Germany at about the same time — chieftains of almost independent power ruled from their castles on the hill-tops over the adjacent valleys, engaged in petty wars, and conducted plundering expeditions against the neighbouring tenants, whilst the great abbeys were places of refuge for the studious or religious, and their heads were the only rivals to the barons in social state, and in many respects the only protectors and friends of the people. Meanwhile Jenghiz Khan had founded the Mongol empire, and his grandson Kublai Khan became a convert to the Buddhism’ of the Tibetan Lamas. He granted to the abbot of the Sakya monastery in southern Tibet the title of tributary sovereign of the country, head of the Buddhist church, and overlord over the numerous barons and abbots, and in return was officially crowned by the abbot as ruler over the extensive domain of the Mongol empire. Thus was the foundation laid at one and the same time of the temporal sovereignty of the Lamas of Tibet, and of the suzerainty over Tibet of the emperors of China. One of the first acts of the ” head of the church ” was the

printing of a carefully revised edition of the Tibetan Scriptures — an undertaking which occupied altogether nearly thirty years and was not completed till 1306.

Under' Kublai's successors in China the Buddhist cause flourished greatly, and the Sakya Lamas extended their power both at home and abroad. The dignity of abbot at Sakya became hereditary, the abbots breaking so far the Buddhist rule of celibacy that they remained married until they had begotten a son and heir. But rather more than half a century afterwards their power was threatened by a formidable rival at home, a Buddhist reformer.

Tsongkapa, the Luther of Tibet, was born about 1357 on the spot where the famous monastery of Kunbum now stands. He very early entered the order, and studied at Sakya, 1° Brigung and other monasteries. He then spent eight

of Tibet. years as a hermit in Takpo in southern Tibet, where the comparatively purer teaching of Atisha (referred to above) was still prevalent. About 1390 he appeared as a public

1 Published with facsimile and translation and notes in the Journal of the Royal Asiatic Society for 1 879-1 880, vol. xii.

teacher and reformer in Lhasa, and before his death in 1419 there were three huge monasteries there containing 30,000 of his disciples, besides others in other parts of the country. His voluminous works, of which the most famous are the Svmbuii and the Lam Nim Tshenpo, exist in printed Tibetan copies in Europe, but have not yet been translated or analysed. But the principal lines on which his reformation proceeded are sufficiently attested. He insisted in the first place on the complete carrying out of the ancient rules of the order as to the celibacy of its members, and as to simplicity in dress. One result of the second of these two reforms was to make it necessary for every monk openly to declare himself either in favour of or against the new views. For Tsongkapa and his followers wore the yellow or orange-coloured garments which had been the distinguishing mark of the order in the lifetime of its founder, and in support of the ancient rules Tsongkapa reinstated the fortnightly rehearsal of the Patimokkha or " disburdenment " in regular assemblies of the order at Lhasa — a practice which had fallen into desuetude. He also restored the custom of the first disciples to hold the so-called Vassa or yearly retirement, and the public meeting of the order at its close. In all these respects he was simply following the directions of the Vinaya, or regulations of the order, as established probably in the time of Gotama himself, and

as certainly handed down from the earliest times in the pitakas or sacred books. Further, he set his face against the Tantra system, and against the animistic superstitions which had been allowed to creep into life again. He laid stress on the self-culture involved in the practice of the paramitas or cardinal virtues, and established an annual national fast or week of prayer to be held during the first days of each year. This last institution indeed is not found in the ancient Vinaya, but was almost certainly modelled on the traditional account of the similar assemblies convoked by Asoka and other Buddhist sovereigns in India every fifth year. Laymen as well as monks take part in the proceedings, the details of which are unknown to us except from the accounts of the Catholic mission- aries — Fathers Hue- and Gabet — who describe the principal ceremonial as, in outward appearance, wonderfully like the high mass. In doctrine the great Tibetan teacher, who had no access to the Pali Pitakas, adhered in the main to the purer forms of the Mahayana school; in questions of church govern- ment he took little part, and did not dispute the titular supremacy of the Sakya Lamas. But the effects of his teaching weakened their power. The ” orange-hoods,” as his followers were called, rapidly gained in numbers and influence, until they so over-shadowed the ” red-hoods,” as the followers of the older sect were called, that in the middle of the 15th century the emperor of China acknowledged the two leaders of the new sect at that time as the titular overlords of the church and tributary rulers over the realm of Tibet. These two leaders were then known as the Dalai Lama and the Pantshen Lama, and were the abbots of the great monasteries at Gedun Dubpa, near Lhasa, and at Tashi Lunpo, in Farther Tibet, respectively. Since that time the abbots of these monasteries have continued to exercise the sovereignty over Tibet.

As there has been no further change in the doctrine, and no further reformation in discipline, we may leave the ecclesiastical history of Lamaism since that date unnoticed, and consider some principal points on the constitution of the ^° nstI j u ” Lamaism of to-day. And first as to the mode of lamaism. electing successors to the two Great Lamas. It will have been noticed that it was an old idea of the northern Buddhists to look upon distinguished members of the order as incarnations of Avalokitesvara, of MafLju-srl, or of Amitabha. These beings were supposed to possess the power, whilst they continued to live in heaven, of appearing on earth in a Nirmdna- kaya, or apparitional body. In the same way the Pantshen Lama is looked upon as an incarnation, the Nirmana-kaya, of Amitabha, who had previously appeared under the outward form of Tshonkapa himself; and the Dalai Lama is looked upon as an incarnation of

Avalokitesvara. Theoretically, therefore, the former, as the spiritual successor of the great teacher and also of

Amitabha, who occupies the higher place in the mythology of the Great Vehicle, would be superior to the latter, as the spiritual representative of Avalokitesvara. But practically the Dalai Lama, owing to his position in the capital, 1 has the political supremacy, and is actually called the Gyalpo Rinpotshe, ” the glorious king ” — his companion being content with the title Panlshen Rinpotshe, ” the glorious teacher.” When either of them dies it is necessary for the other to ascertain in whose body the celestial being whose outward form has been dissolved has been pleased again to incarnate himself. For that purpose the names of all male children born just after the death of the deceased Great Lama are laid before his survivor. He chooses three out of the whole number; their names are thrown into a golden casket provided for that purpose by a former emperor of China. The Chutuktus, or abbots of the great monasteries, then assemble, and after a week of prayer, the lots are drawn in their presence and in presence of the surviving Great Lama and of the Chinese political resident. The child whose name is first drawn is the future Great Lama; the other two receive each of them 500 pieces of silver* The Chutuktus just mentioned correspond in many respects to the Roman cardinals. Like the Great Lamas, they bear the title of Rinpotshe or Glorious, and are looked upon as incarnations of one or other of the celestial Bodhisats of the Great Vehicle mythology. Their number varies from ten to a hundred; and it is uncertain whether the honour is inherent in the abbacy of certain of the greatest cloisters, or whether the Dalai Lama exercises the right of choosing them. Under these high officials of the Tibetan hierarchy there come the Chubil Khans, who fill the post of abbot to the lesser monasteries, and are also incarnations. Their number is very large; there are few monasteries in Tibet or in Mongolia which do not claim to possess one of these living Buddhas. Besides these mystical persons there are in the Tibetan church other ranks and degrees, corresponding to the deacon, full priest, dean and doctor of divinity in the West. At the great yearly festival at Lhasa they make in the cathedral an imposing array, not much less magnificent than that of the clergy in Rome; for the ancient simplicity of dress has disappeared in the growing differences of rank, and each division of the spiritual army is distinguished in Tibet, as in the West, by a special uniform. The political authority of the Dalai Lama is confined to Tibet itself, but he is the acknowledged head also

of the Buddhist church throughout Mongolia and China. He has no supremacy over his co-religionists in Japan, and even in China

by half a mile in breadth, has narrow and dirty streets, and conˆ tains a population of about 26,000. Unlike the ordinary Chinese town of the same rank, it is not walled. A busy trade is carried on between the Chinese and the Mongolians, who bring in their cattle, sheep, camels, hides and wool to barter for tea, tobacco, cotton and silk. At some distance from the Chinese town lies the Mongolian quarter, with two groups of lama temples and villages occupied by about 2300 priests. Dr Williamson {Journeys in North China, 1870) described the chief temple as a huge oblong building with an interior not unlike a Gothic church. Lama- miao is the seat of a manufactory of bronze idols and other articles of ritual, which find their way to all parts of Mongolia and Tibet. The craftsmen work in their own houses.

LAMAR, LUCIUS QUINTUS CINCINNATUS (1825-1893), American statesman and judge, was born at the old ” Lamar Homestead,” in Putnam county, Georgia, on the 17th of September 1825. His father, Lucius Q. C. Lamar (1797-1834), was an able lawyer, a judge of the superior court of Georgia, and the compiler of the Laws of Georgia from 1810 to 1S19 (1821). In 1845 young Lamar graduated from Emory College (Oxford, Ga.), and in 1847 was admitted to the bar. In 1849 he removed to Oxford, Mississippi, and in 1850-1852 was adjunct professor of mathematics in the state uni- versity. In 1852 he removed to Covington, Ga., to practise law, and in 1853 was elected a member of the Georgia House of Representatives. In 1855 he returned to Mississippi, and two years later became a member of the National House of Repre- sentatives, where he served until December r86o, when he with- drew to become a candidate for election to the ” secession ” convention of Mississippi. He was elected to the convention, and drafted for it the Mississippi ordinance of secession. In the summer of i860 he had accepted an appointment to the chair of ethics and metaphysics in the university of Mississippi, but, having been appointed a lieutenant-colonel in the Confederate Army in the spring of 1861, he resigned his professorship. The colonel of his regiment (Nineteenth Mississippi) was killed early in the battle of Williamsburg, on the 5th of May 1862, and the command then fell to Lamar, but in October he resigned from the army. In November 1862 he was appointed by President Jefferson Davis special commissioner of the Confederacy to Russia; but he did not proceed farther than Paris, and his mission was soon terminated by the refusal of the Confederate Senate to confirm his appointment. In 1866 he was again

there are many Buddhists who are not practically under his appointed

to the chair of ethics and metaphysics in the uni-

control or influence.

The best work on La maism is still Koppen's Die Lamaische Hierarcliie und Kirche (Berlin, 1859). See also Bushell, " The Early History of Tibet," in the Journal of the Royal Asiatic Society, 1879-1880, vol. xii.; Sanang Setzen's History of the East Mongols (in Mongolian, translated into German by J. Schmidt, Geschichte der Ost-Mongolen); " Analyse du Kandjur," by M. Leon Feer, in Annates du Musee Gaimet (1881); Schott, Ueber den Buddhismus in Hoch-Asien; Gutzlaff, Geschichte des Chinesischen Reiches; Hue and Gabet, Souvenirs Sun voyage dans la Tartarie, le Tibet, et la Chine (Paris, 1858); Pallas's Sammlung historischer Nachrichten iiber die Mongolischen Vblkerschaften; Babu Sarat Chunder Das's " Contri- butions on the Religion and History of Tibet," in the Journal of the Bengal Asiatic Society, 1881; L. A. Waddell, The Buddhism of Tibet (London, 1895); A. H. Francke, History of Western Tibet (London, 1907); A. Grunwedel, Mythologie des Buddhismus in Tibet und der Mongolei (Berlin, 1900). (T. W. R. D.)

LAMALOU-LES-BAINS, a watering-place of southern France in the department of Herault, 535 m. W. of Montpellier by rail, in a valley of the southern Cevennes. Pop. (1906) 720. The waters, which are both hot and cold, are used in cases of rheu- matism, sciatica, locomotor ataxy and nervous maladies.

LAMA-MIAO, or Dolon-nor, a city of the province of Chih-li, China, 150 m. N. of Peking, in a barren sandy plain watered by the Urtingol, a tributary of the Shang-tu-ko. The town proper, almost exclusively occupied by Chinese, is about a mile in length

1 This statement representing the substantial and historical position, is retained, in spite oi the crises of March 1910, when the Dalai Lama took refuge from the Chinese in India, and of 1904, when the British expedition occupied Lhasa and the Dalai Lama fled to China (see Tibet).

versity of Mississippi, and in the next year was transferred to the chair of law, but in 1870, Republicans having become trustees of the university upon the readmission of the state into the Union, he resigned. From 1873 to 1877 he was again a Demo- cratic representative in Congress; from 1877 to 1885 he was a United States senator; from 1885 to January 1888 he was secretary of the interior; and from 1888 until his death at Macon, Ga., on the 23rd of January

1893, he was an associate justice of the Supreme Court of the United States. In Congress Lamar fought the silver and greenback craze and argued forcibly against the protective tariff; in the department of the interior he introduced various reforms; and on the Supreme Court bench his dissenting opinion in the N eagle Case (based upon a denial that certain powers belonging to Congress, but not exercised, were by implication vested in the department of justice) is famous. But he is perhaps best known for the part he took after the Civil War in helping to effect a reconciliation between the North and the South. During the early secession movement he strove to arouse the white people of the South from their indifference, declaring that secession alone could save them from a doom similar to that of the former whites of San Domingo. He probably never changed his convictions as to the righteousness of the “lost cause”; but he accepted the result of the war as a final settlement of the differences leading to it, and strove to restore the South in the Union, and to effect the reunion of the nation in feeling as well as in government. This is in part seen from such speeches as his eulogy on Charles Sumner (27th of April 1874), his leadership in reorganizing the Democratic

party of his own state, and his counsels of peace in the disputed presidential election of 1876.

See Edward Mayes, Lucius Q. C. Lamar: His Life, Times and Speeches (Nashville, Term., 1896).

LAMARCK, JEAN BAPTISTE PIERRE ANTOINE DE MONET, Chevalier de (1744-1829), French naturalist, was born on the 1st of August 1 744, at Bazantin, a village of Picardy. He was an eleventh child; and his father, lord of the manor and of old family, but of limited means, having placed three sons in the army, destined this one for the church, and sent him to the Jesuits at Amiens, where he continued till his father’s death. After this he would remain with the Jesuits no longer, and, not yet seventeen years of age, started for the seat of war at Bergen- op-Zoom, before which place one of his brothers had already been killed. Mounted on an old horse, with a boy from the village as attendant, and furnished by a lady with a letter of introduction to a colonel, he reached his destination on the evening before a battle. Next morning the colonel found that the new and very diminutive volunteer had posted himself in the front rank of a body of grenadiers, and could not be induced to quit the position. In the battle, the

company which he had joined became exposed to the fire of the enemy's artillery, and in the confusion of retreat was forgotten. All the officers and subalterns were killed, and not more than fourteen men were left, when the oldest grenadiers seeing there were no more French in sight proposed to the young volunteer so soon become commandant to withdraw his men. This he refused to do without orders. These at last arrived; and for his bravery he was made an officer on the spot, and soon after was named to a lieutenancy. After the peace, the regiment was sent to Monaco. There one of his comrades playfully lifted him by the head, and to this it was imputed that he was seized with disease of the glands of the neck, so severe as to put a stop to his military career. He went to Paris and began the study of medicine, supporting himself by working in a banker's office He early became interested in meteorology and in physical and chemical speculations of a chimerical kind, but happily threw his main strength into botany, and in 1778 published his Flore franˆaise, a work in which by a dichotomous system of contesting characters he enabled the student with facility to determine species. This work, which went through several editions and long kept the field, gained for its author immediate popularity as well as admission to the Academy of Sciences.

In 17S1 and 1782, under the title of botanist to the king, an appointment obtained for him by Buffon, whose son accompanied him. he travelled through various countries of Europe, extending his knowledge of natural history; and on his return he began those elaborate contributions to botany on which his reputation in that science principally rests, namely, the Dictionnaire de Botanique and the Illustrations de Genres, voluminous works contributed to the Encyclopedic Methodique (1785). In 1703, in consequence of changes in the organization of the natural history department at the Jardin du Roi, where he had held a botanical appointment since 1788, Lamarck was presented to a zoological chair, and called on to lecture on the Insecta and Vermes of Linnaeus, the animals for which he introduced the term In- vcrlcbrata. Thus driven, comparatively late in life, to devote his principal attention to zoology instead of botany, he had the misfortune soon after to suffer from impaired vision; and the malady resulted subsequently in total blindness. Yet his greatest zoological work, the Histoire naturelle des animaux sans vertebres, was published from 1815 to 1822, with the assistance, in the last two volumes, of his eldest daughter and of P. A. Latreille (1 762-1833). A volume of plates of the fossil shells of the neighbourhood of Paris was collected in 1823 from his memoirs in the Annales des Museums. He died on the 18th of December 1S20.

The

iracter of Lamarck as a naturalist is remarkable alike

for its excellences and its defects. His excellences were width of scope, fertility of ideas and a pre-eminent faculty of precise description, arising not only from a singularly terse style, but from a clear insight into both the distinctive features and the

resemblances of forms. That part of his zoological work which constitutes his solid claim to the highest honour as a zoologist is to be found in his extensive and detailed labours in the depart- ments of living and fossil Invertebrata. His endeavours at classification of the great groups were necessarily defective on account of the imperfect knowledge possessed in his time in regard to many of them, e.g. echinoderms, ascidians and in- testinal worms; yet they are not without interest, particularly on account of the comprehensive attempt to unite in one great division as Articulata all those groups that appeared to present a segmented construction. Moreover, Lamarck was the first to distinguish vertebrate from invertebrate animals by the presence of a vertebral column, and among the Invertebrata to found the groups Crustacea, Arachnida and Annelida. In 1785 {Hist, del' Acad.) he evinced his appreciation of the necessity of natural orders in botany by an attempt at the classification of plants, interesting, though crude and falling immeasurably short of the system which grew in the hands of his intimate friend A. L. de Jussieu. The problem of taxonomy has never been put more philosophically than he subsequently put it in his Animaux sans vertebres: " What arrangement must be given to the general distribution of animals to make it conformable to the order of nature in the production of these beings? "

The most prominent defect in Lamarck must be admitted to have been want of control in speculation. Doubtless the specula- tive tendency furnished a powerful incentive to work, but it outran the legitimate deductions from observation, and led him into the production of volumes of worthless chemistry without experimental basis, as well as into spending much time on fruitless meteorological predictions. His Annuaires Meteor ologiques were published yearly from r8oo to 1810, and were not discontinued until after an unnecessarily public and brutal tirade from Napoleon, administered on the occasion of being presented with one of his works on natural history.

To the general reader the name of Lamarck is chiefly interesting on account of his theory of the origin of life and of the diversities of

animal forms. The idea, which appears to have been favoured by Buffon before him, that species were not throiigh all time unalterable, and that the more complex might have been developed from pre-existent simpler forms, became with Lamarck a belief or, as he imagined, a demonstration. Spontaneous generation, he considered, might be easily conceived as resulting from such agencies as heat and electricity causing in small gelatinous bodies an utricular structure, and inducing a ” singular tension,” a kind of ” erethisme ” or ” orgasme “; and, having thus accounted for the first appearance of life, he explained the whole organization of animals and formation of different organs by four laws (introduction to his Histoire naturelle des animaux sans vertebres, 181 5): —

1. ” Life by its proper forces tends continually to increase the volume of every body possessing it, and to enlarge its parts, up to a limit which it brings about.

2. ” The production of a new organ in an animal body results from the supervention of a new want (besoin) continuing to make itself felt, and a new movement which this want gives birth to and en- courages.

3. ” The development of organs and their force of action are con-stantly in ratio to the employment of these organs.

4. ” All which has been acquired, laid down, or changed in the organization of individuals in the course of their life is conserved by generation and transmitted to the new individuals which proceed from those which have undergone those changes.’

The second law is often referred to as Lamarck’s hypothesis of the evolution of organs in animals by appetence or longing, although he does not teach that the animal’s desires affect its conformation directly, but that altered wants lead to altered habits, which result in the formation of new organs as well as in modification, growth or dwindling of those previously existing. Thus, he suggests that, ruminants being pursued by carnivora, their legs have grown slender; and, their legs being only fit for support, while their jaws are weak, they have made attack with the crown of the head, and the determination of fluids thither has led to the growth of horns. So also the stretching of the giraffe’s neck to reach the foliage he supposes to have led

to its elongation; and the kangaroo, sitting upright to support the young in its pouch, he imagines to have had its fore-limbs dwarfed by disuse, and its hind legs and tail exaggerated by using them in leaping. The fourth law expresses the inheritance of acquired characters, which is denied by August Weismann and his followers. For a more detailed account of Lamarck's place in the history of the doctrine of evolution, see Evolution. LA MARGHERITA, CLEMENTE SOLARO, Count del (1702- 1 869) , Piedmontese statesman, was born at Mondovi. He studied law at Siena and Turin, but Piedmont was at that time under French domination, and being devoted to the house of Savoy he refused to take his degree, as this proceeding would have obliged him to recognize the authority of the usurper; after the restoration of the Sardinian kingdom, however, he graduated. In 18 16 he entered the diplomatic service. Later he returned to Turin, and succeeded in gaining the confidence and esteem of King Charles Albert, who in 1835 appointed him minister of foreign affairs. A fervent Roman Catholic, devoted to the pope and to the Jesuits, friendly to Austria and firmly attached to the principles of autocracy, he strongly opposed every attempt at political innovation, and was in consequence bitterly hated by the liberals. When the popular agitation in favour of con- stitutional reform first broke out the king felt obliged to dispense with La Margherita's services, although he had conducted public affairs with considerable ability and absolute loyalty, even upholding the dignity of the kingdom in the face of the arrogant attitude of the cabinet of Vienna. He expounded his political creed and his policy as minister to Charles Albert (from February 1835 to October 1847) in his Memorandum storico-politico, published in 185 1, a document of great interest for the study of the conditions of Piedmont and Italy at that time. In 1853 he was elected deputy for San Quirico, but he persisted in regarding his mandate as derived from the royal authority rather than as an emanation of the popular will. As leader of the Clerical Right in the parliament he strongly opposed Cavour's policy, which was eventually to lead to Italian unity, and on the estab- lishment of the kingdom of Italy he retired from public life.

LA MARMORA, ALFONSO FERRERO (1804-1878), Italian general and statesman, was born at Turin on the 18th of November 1804. He entered the Sardinian army in 1823, and was a captain in March 1848, when he gained distinction and the rank of major at the siege of Peschiera. On the 5th of August 1848 he liberated Charles Albert, king of Sardinia, from the Milan revolutionaries, and in October was promoted general and appointed minister of war. After suppressing the revolt of Genoa in 1849, he again assumed in November 1849 the

portfolio of war, which, save during the period of his command of the Crimean expedition, he retained until 1859. Having recon- structed the Piedmontese army, he took part in the war of 1859 against Austria; and in July of that year succeeded Cavour in the premiership. In i860 he was sent to Berlin and St Peters- burg to arrange for the recognition of the kingdom of Italy, and subsequently he held the offices of governor of Milan and royal lieutenant at Naples, until, in September 1864, he succeeded Minghetti as premier. In this capacity he modified the scope of the September Convention by a note in which he claimed for Italy full freedom of action in respect of national aspirations to the possession of Rome, a document of which Visconti Venosta afterwards took advantage when justifying the Italian occupation of Rome in 1870. In April 1866 La Marmora concluded an alliance with Prussia against Austria, and, on the outbreak of war in June, took command of an army corps, but was defeated at Custozza on the 23rd of June. Accused of treason by his fellow- countrymen, and of duplicity by the Prussians, he eventually published in defence of his tactics (1873) a series of documents entitled Un po' piii di luce sugli eventi dell' anno 1866 (More light on the events of 1866) a step which caused irritation in Germany, and exposed him to the charge of having violated state secrets. Meanwhile he had been sent to Paris in 1867 to oppose the French expedition to Rome, and in 1870, after the occupation of Rome by the Italians, had been appointed lieu- tenant-royal of the new capital. He died at Florence on the 5th

of January 1878. La Marmora's writings include Un episodio del risorgimento italiano (Florence, 1875); and i" segreti di stato nel governo constituzionale (Florence, 1877).

See G. Massani, // generate Alfonso La Marmora (Milan, 1880).

LAMARTINE, ALPHONSE MARIE LOUIS DE PRAT DE

(1790-1869), French poet, historian and statesman, was born at Macon on the 21st of October 1790. The order of his surnames is a controversial matter, and they are sometimes reversed. The family of Lamartine was good, and the title of Prat was taken from an estate in Franche Comte. His father was im- prisoned during the Terror, and only released owing to the events of the 9th Thermidor. Lamartine's early education was received from his mother. He was sent to school at Lyons in 1805, but not being happy there was transferred to the care of the Peres de la Foi at Belley, where he remained until 1809. For some time afterwards he lived at home, reading romantic and poetical literature, but in 181 1 he set out for Italy, where he seems to have sojourned nearly two years. His family having been steady

royalists, he entered the Gardes du corps at the return of the Bourbons, and during the Hundred Days he sought refuge first in Switzerland and then at Aix-en-Savoie, where he fell in love, with abundant result's of the poetical kind. After Waterloo he re- turned to Paris. In 1818-1819 he revisited Switzerland, Savoy and Italy, the death of his beloved affording him new subjects for verse. After some difficulties he had his first book, the Meditations, poetiques et religieuses, published (1820). It was exceedingly popular, and helped him to make a position. He had left the army for some time; he now entered the diplomatic service and was appointed secretary to the embassy at Naples. On his way to his post he married, in 1823, at Geneva a young English lady, Marianne Birch, who had both money and beauty, and in the same year his Nouvelles meditations poetiques appeared. In 1824 he was transferred to Florence, where he remained five years. His Last Canto of Childe Harold appeared in 1825, and he had to fight a duel (in which he was wounded) with an Italian officer, Colonel Pepe, in consequence of a phrase in it. Charles X., on whose coronation he wrote a poem, gave him the order of the Legion of Honour. The Harmonies poetiques et religieuses appeared in 1829, when he had left Florence. Having refused an appointment in Paris under the Polignac ministry, he went on a special mission to Prince Leopold of Saxe-Coburg. In the same year he was elected to the Academy. Lamartine was in Switzer- land, not in Paris, at the time of the Revolution of July, and, though he put forth a pamphlet on " Rational Policy," he did not at that crisis take any active part in politics, refusing, however, to continue his diplomatic services under the new government. In 1832 he set out with his wife and daughter for Palestine, having been unsuccessful in his candidature for a seat in the chamber. His daughter Julia died at Beirut, and before long he received the news of his election by a constituency (Bergues) in the department of the Nord. He returned through Turkey and Germany, and made his first speech shortly after the beginning of 1834. Thereafter he spoke constantly, and acquired considerable reputation as an orator, — bringing out, moreover, many books in prose and verse. His Eastern travels {Voyage en Orient) appeared in 1835, his Chute d'un ange and Jocelyn in 1837, and his Recueillements, the last remarkable volume of his poetry, in 1839. As the reign of Louis Philippe went on, Lamartine, who had previously been a liberal royalist, something after the fashion of Chateaubriand, became more and more democratic in his opinions. He set about his greatest prose work, the Histoire des Cirondins, which at first appeared periodically, and was published as a whole in 1847. Like many other French histories, it was a pamphlet as well as a chronicle, and the subjects of Lamartine's pen became his models in politics.

At the revolution of February Lamartine was one of the first to declare for a provisional government, and became a member of it, with the post of minister for foreign affairs. He was elected for the new constituent assembly in ten different departments, and was chosen one of the five members of the Executive Com- mittee. For a few months indeed Lamartine, from being a

distinguished man of letters, an official of inferior rank in diplo- macy, and an eloquent but unpractical speaker in parliament, became one of the foremost men in Europe. His inexperience in the routine work of government, the utterly unpractical nature of his colleagues, and the turbulence of the Parisian mob, proved fatal to his chances. He gave some proofs of statesman- like ability, and his eloquence was repeatedly called into requisi- tion to pacify the Parisians. But no one can permanently carry on the government of a great country by speeches from the balcony of a house in the capital, and Lamartine found himself in a dilemma. So long as he held aloof from Ledru-Rollin and the more radical of his colleagues, the disunion resulting weakened the government; as soon as he effected an approxima- tion to them the middle classes fell off from him. The quelling of the insurrection of the 15th of May was his last successful act. A month later the renewal of active disturbances brought on the fighting of June, and Lamartine's influence was extin- guished in favour of Cavaignac. Moreover, his chance of renewed political pre-eminence was gone. He had been tried and found wanting, having neither the virtues nor the vices of his situation. In January 1849, though he was nominated for the presidency, only a few thousand votes were given to him, and three months later he was not even elected to the Legislative Assembly.

The remaining story of Lamartine's life is somewhat melancholy. He had never been a rich man, nor had he been a saving one, and during his period of popularity and office he had incurred great expenses. He now set to work to repair his fortune by un- remitting literary labour. He brought out in the Presse (1849) a series of Confidences, and somewhat later a kind of autobiography, entitled Raphael. He wrote several historical works of more or less importance, the History of the Revolution of 1848, The History of the Restoration, The History of Turkey, The History of Russia, besides a large number of small biographical and miscellaneous works. In 1858 a subscription was opened for his benefit. Two years afterwards, following the example of

Chateaubriand, he supervised an elaborate edition of his own works in forty-one volumes. This occupied five years, and while he was engaged on it his wife died (1863). He was now over seventy; his powers had deserted him, and even if they had not the public taste had entirely changed. His efforts had not succeeded in placing him in a position of independence; and at last, in 1867, the government of the Empire (from which he had perforce stood aloof, though he never considered it necessary to adopt the active protesting attitude of Edgar Quinet and Victor Hugo) came to his assistance, a vote of £20,000 being proposed in April of that year for his benefit by Emile Ollivier. This was creditable to both parties, for Lamartine, both as a distinguished man of letters and as a past servant of the state, had every claim to the bounty of his country. But he was reproached for accepting it by the extreme republicans and irreconcilables. He did not enjoy it long, dying on the 28th of February 1869. „ _ …

As a statesman Lamartine was placed during his brief tenure of office in a position from which it would have been almost impossible for any man, who was not prepared and able to play the dictator, to emerge with credit. At no time in history were unpractical crotchets so rife in the heads of men as in 1848. But Lamartine could hardly have guided the ship of state safely even in much calmer weather. He was amiable and even estimable, the chief fault of his character being vanity and an incurable tendency towards theatrical effect, which makes his travels, memoirs and other personal records as well as his historical works radically untrustworthy. Nor does it appear that he had any settled political ideas. He did good by moderating the revolutionary and destructive ardour of the Parisian populace in 1848; but he had been perhaps more responsible than any other single person for bringing about the events of that year by the vague and frothy republican declamation of his Histoire des Girondins.

More must be said of his literary position. Lamartine had the advantage of coming at a time when the literary field, at least in the departments of belles lettres, was almost empty. The feeble school of descriptive writers, epic poets of the extreme decadence, fabulists and miscellaneous verse-makers, which the Empire had nourished could satisfy no one. Madame de Stael was dead; Chateaubriand, though alive, was something of a classic, and had not effected a full

revolution. Lamartine did not himself go the complete length of the Romantic revival, but he went far in that direction. He availed himself of the reviving interest in legitimism and Catholicism which was represented by Bonald and Joseph de Maistre, of the nature worship of Rousseau and Bernardin de Saint Pierre, of the senti- mentalism of

Madame de Stael, of the medievalism and the romance of Chateaubriand and Scott, of the maladie du Steele of Chateaubriand and Byron. Perhaps if his matter be very closely analysed it will be found that he added hardly anything of his own. But if the parts of the mixture were like other things the mixture itself was not. It seemed indeed to the immediate generation so original that tradition has it that the Meditations were refused by a publisher because they were in none of the accepted styles. They appeared when Lamartine was nearly thirty years old. The best of them, and the best thing that Lamartine ever did, is the famous Lac, describing his return to the little mountain tarn of Le Bourget after the death of his mistress, with whom he had visited it in other days. The verse is exquisitely harmonious, the sentiments conventional but refined and delicate, the imagery well chosen and gracefully expressed. There is an un-questionable want of vigour, but to readers of that day the want of vigour was entirely compensated by the presence of freshness and grace. Lamartine's chief misfortune in poetry was not only that his note was a somewhat weak one, but that he could strike but one. The four volumes of the Meditations, the Harmonies and the Recueille-ments, which contained the prime of his verse, are perhaps the most monotonous reading to be found anywhere in work of equal bulk by a poet of equal talent. They contain nothing but meditative lyrical pieces, almost any one of which is typical of the whole, though there is considerable variation of merit. The two narrative poems which succeeded the early lyrics, Jocelyn and the Chute d'un ange, were, according to Lamartine's original plan, parts of a vast " Epic of the Ages," some further fragments of which survive. Jocelyn had at one time more popularity in England than most French verse. La Chute d'un ange, in which the Byronic influence is more obvious than in any other of Lamartine's works, and in which some have also seen that of Alfred de Vigny, is more ambitious in theme, and less regu- lated by scrupulous conditions of delicacy in handling, than most of its author's poetry. It does, however, little more than prove that such audacities were not for him.

As a prose writer Lamartine was very fertile. His characteristics in his prose fiction and descriptive work are not very different from those of his poetry. He is always and everywhere sentimental, though very frequently, as in his shorter prose tales {The Stone Mason of Saint-Point, Graziella, &c), he is graceful as well as sentimental. In his histories the effect is worse. It has been hinted that Lamartine's personal narratives are doubtfully trust- worthy; with regard to his Eastern travels some of the episodes were stigmatized as mere inventions. In his histories proper the special motive for

embellishment disappears, but the habit of in- accuracy remains. As an historian he belongs exclusively to the rhetorical school a.s distinguished from the philosophical on the one hand and the documentary on the other.

It is not surprising when these characteristics of Lamartine's work are appreciated to find that his fame declined with singular rapidity in France. As a poet he had lost his reputation many years before he died. He was entirely eclipsed by the brilliant and vigorous school who succeeded him with Victor Hugo at their head. His power of initiative in poetry was very small, and the range of poetic ground which he could cover strictly limited. He could only carry the picturesque sentimentalism of Rousseau, Bernardin de Saint Pierre and Chateaubriand a little farther, and clothe it in language and verse a little less antiquated than that of Chfinedolle and Mille- voye. He has been said to be a French Cowper, and the parallel holds good in respect of versification and of his relative position to the more daringly innovating school that followed, though not in respect of individual peculiarities. Lamartine in short occupied a kind of half-way house between the 18th century and the Romantic move- ment, and he never got any farther. When Matthew Arnold questioned his importance in conversation with Sainte-Beuve, the answer was, " He is important to us," and it was a true answer; but the limitation is obvious. In more recent years, however, efforts have been made by Brunetiere and others to remove it. The usual revolution of critical as of other taste, the oblivion of personal and political unpopularity, and above all the reaction against Hugo and the extreme Romantics, have been the main agents in this. La- martine has been extolled as a pattern of combined passion and restraint, as a model of nobility of sentiment, and as a harmonizer of pure French classicism in taste and expression with much, if not all, the better part of Romanticism itself. These oscillations of opinion are frequent, if not universal, and it is only after more than one or two swings that the pendulum remains at the perpendicular. The above remarks are an attempt to correct extravagance in either direction. But it is difficult to believe that Lamartine can ever permanently take rank among the first order of poets.

The edition mentioned is the most complete one of Lamartine, but there are many issues of his separate works. After his death some poems and Memoir es inedits of his youth were published, and also two volumes of correspondence, while in 1893 Mile V. de Lamartine added a volume of Lettres to him. The change of views above re- ferred to may be studied in the detached articles of MM. Brunetiere,

Faguet, Lemaitre, &c, and in the more substantive work of Ch. de Pomairols, Lamartine (1889); E. Deschanel, Lamartine (1893); E. Zyrowski, Lamartine (1896); and perhaps best of all in the Preface to Emile Legouis' Clarendon Press edition of Jocelyn (1906), where a vigorous effort is made to combat the idea of Lamartine's sentimentality and femininity as a poet. (G. Sa.)

LAMB, CHARLES (1775-1834), English essayist and critic, was born in Crown Office Row, Inner Temple, London, on the 10th of February 1775. His father, John Lamb, a Lincolnshire man, who filled the situation of clerk and servant-companion to Samuel Salt, a member of parliament and one of the benchers of the Inner Temple, was successful in obtaining for Charles, the youngest of three surviving children, a presentation to Christ's Hospital, where the boy remained from his eighth to his fifteenth year (1782-1789). Here he had for a schoolfellow Samuel Taylor Coleridge, his senior by rather more than two years, and a close and tender friendship began which lasted for the rest of the lives of both. When the time came for leaving school, where he had learned some Greek and acquired consider- able facility in Latin composition, Lamb, after a brief stay at home (probably spent, as his school holidays had often been, over old English authors in Salt's library) was condemned to the labours of the desk — " an inconquerable impediment " in his speech disqualifying him for the clerical profession, which, as the school exhibitions were usually only given to those preparing for the church, thus deprived him of the only means by which he could have obtained a university education. For a short time he was in the office of Joseph Paice, a London merchant, and then for twenty-three weeks, until the 8th of February 1792, he held a small post in the Examiner's Office of the South Sea House, where his brother John was established, a period which, although his age was but sixteen, was to provide him nearly thirty years later with materials for the first of the Essays of Elia. On the 5th of April 1792, he entered the Accountant's Office in the East India House, where during the next three and thirty years the hundred official folios of what he used to call his true " works " were produced.

Of the years 1792-1795 we know little. At the end of 1794 he saw much of Coleridge and joined him in writing sonnets in the Morning Post, addressed to eminent persons: early in 1795 he met Southey and was much in the company of James White, whom he probably helped in the composition of the Original Letters of Sir John Falstajf; and at

the end of the year for a short time he became so unhinged mentally as to necessitate confinement in an asylum. The cause, it is probable, was an unsuccessful love affair with Ann Simmons, the Hertfordshire maiden to whom his first sonnets are addressed, whom he would have seen when on his visits as a youth to Blakesware House, near Widford, the country home of the Plumer family, of which Lamb's grandmother, Mary Field, was for many years, until her death in 1792, sole custodian.

It was in the late summer of 1796 that a dreadful calamity came upon the Lambs, which seemed to blight all Lamb's prospects in the very morning of life. On the 22 nd of September his sister Mary, " worn down to a state of extreme nervous misery by attention to needlework by day and to her mother at night," was suddenly seized with acute mania, in which she stabbed her mother to the heart. The calm self-mastery and loving self-renunciation which Charles Lamb, by constitution excitable, nervous and self-mistrustful, displayed at this crisis in his own history and in that of those nearest him, will ever give him an imperishable claim to the reverence and affection of all who are capable of appreciating the heroisms of common life. With the help of friends he succeeded in obtaining his sister's release from the life-long restraint to which she would otherwise have been doomed, on the express condition that he himself should undertake the responsibility for her safe keeping. It proved no light charge: for though no one was capable of affording a more intelligent or affectionate companionship than Mary Lamb during her periods of health, there was ever present the apprehension of the recurrence of her malady; and when from time to time the premonitory symptoms had become unmistakable, there was no alternative but her removal, which

took place in quietness and tears. How deeply the whole course of Lamb's domestic life must have been affected by his singular loyalty as a brother needs not to be pointed out.

Lamb's first appearance as an author was made in the year of the great tragedy of his life (1796), when there were published in the volume of Poems on Various Subjects by Coleridge four sonnets by " Mr Charles Lamb of the India House." In the following year he contributed, with Charles Lloyd, a pupil of Coleridge, some pieces in blank verse to the second edition of Coleridge's Poems. In 1797 his short summer holiday was spent with Coleridge at Nether Stowey, where he met the Wordsworths, William and Dorothy, and established a friendship with both which only his own death terminated. In 1798, under the influence of Henry Mackenzie's novel Julie de Roubigni, he published

a short and pathetic prose tale entitled Rosamund Gray, in which it is possible to trace beneath disguised conditions references to the misfortunes of the author's own family, and many personal touches; and in the same year he joined Lloyd in a volume of Blank Verse, to which Lamb contributed poems occasioned by the death of his mother and his aunt Sarah Lamb, among them being his best-known lyric, " The Old Familiar Faces." In this year, 1798, he achieved the unexpected publicity of an attack by the Anti- Jacobin upon him as an associate of Coleridge and Southey (to whose Annual Anthology he had contributed) in their Jacobin machinations. In 1799, on the death of her father, Mary Lamb came to live again with her brother, their home then being in Pentonville; but it was not until 1800 that they really settled together, their first independent joint home being at Mitre Court Buildings in the Temple, where they lived until 1809. At the end of 1801, or beginning of 1802, appeared Lamb's first play John Woodvil, on which he set great store, a slight dramatic piece written in the style of the earlier Elizabethan period and containing some genuine poetry and happy delineation of the gentler emotions, but as a whole deficient in plot, vigour and character; it was held up to ridicule by the Edinburgh Review as a specimen of the rudest condition of the drama, a work by " a man of the age of Thespis." The dramatic spirit, however, was not thus easily quenched in Lamb,

and his next effort was a farce, Mr H , the point of which lay

in the hero's anxiety to conceal his name "Hogsflesh"; but it did not survive the first night of its appearance at Drury Lane, in December 1806. Its author bore the failure with rare equanimity and good humour — even to joining in the hissing — and soon struck into new and more successful fields of literary exertion. Before, however, passing to these it should be men- tioned that he made various efforts to earn money by journalism, partly by humorous articles, partly as dramatic critic, but chiefly as a contributor of sarcastic or funny paragraphs, " sparing neither man nor woman," in the Morning Post, principally in

1803.

In 1807 appeared Tales founded on the Plays of Shakespeare, written by Charles and Mary Lamb, in which Charles was responsible for the tragedies and Mary for the comedies; and in 1808, Specimens of English Dramatic Poets who lived about the time of Shakespeare, with short but felicitous critical notes. It was this work which laid the foundation of Lamb's reputation as a critic, for it was filled with imaginative understanding of the old playwrights, and a warm,

discerning and novel apprecia- tion of their great merits. In the same year, 1808, Mary Lamb, assisted by her brother, published Poetry for Children, and a collection of short school-girl tales under the title Mrs Leicester's School; and to the same date belongs The Adventures of Ulysses, designed by Lamb as a companion to The Adventures of Telemachus. In 1810 began to appear Leigh Hunt's quarterly periodical, The Reflector, in which Lamb published much (includ- ing the fine essays on the tragedies of Shakespeare and on Hogarth) that subsequently appeared in the first collective edition of his Works, which he put forth in 1818.

Between 1811, when The Reflector ceased, and 1820, he wrote almost nothing. In these years we may imagine him at his most social period, playing much whist and entertaining his friends on Wednesday or Thursday nights; meanwhile gathering

that reputation as a conversationalist or inspirer of conversation in others, which Hazlitt, who was at one time one of Lamb's closest friends, has done so much to celebrate. When in 1818 ap- peared the Works in two volumes, it may be that Lamb considered his literary career over. Before coming to 1820, and an event which was in reality to be the beginning of that career as it is generally known — the establishment of the London Magazine — it should be recorded that in the summer of 1819 Lamb, with his sister's full consent, proposed marriage to Fanny Kelly, the actress, who was then in her thirtieth year. Miss Kelly could not accept, giving as one reason her devotion to her mother. Lamb bore the rebuff with characteristic humour and fortitude. The establishment of the London Magazine in 1820 stimulated Lamb to the production of a series of new essays (the Essays of Elia) which may be said to form the chief corner-stone in the small but classic temple of his fame. The first of these, as it fell out, was a description of the old South Sea House, with which Lamb happened to have associated the name of a "gay light-hearted foreigner " called Elia, who was a clerk in the days of his service there. The pseudonym adopted on this occasion was retained for the subsequent contributions, which appeared collectively in a volume of essays called Elia, in 1823. After a career of five years the London Magazine came to an end; and about the same period Lamb's long connexion with the India House terminated, a pension of £450 (£441 net) having been assigned to him. The increased leisure, however, for which he had long sighed, did not prove favourable to literary pro-

duction, which henceforth was limited to a few trifling contribu- tions to the New Monthly and other serials, and the excavation of gems from the mass of dramatic literature bequeathed to the British Museum by David Garrick, which Lamb laboriously read through in 1827, an occupation which supplied him for a time with the regular hours of work he missed so much. The malady of his sister, which continued to increase with ever shortening intervals of relief, broke in painfully on his lettered ease and comfort; and it is unfortunately impossible to ignore the deteriorating effects of an over-free indulgence in the use of alcohol, and, in early life, tobacco, on a temperament such as his. His removal on account of his sister to the quiet of the country at Enfield, by tending to withdraw him from the stimulating society of the large circle of literary friends who had helped to make his weekly or monthly ” at homes ” so remarkable, doubtless also tended to intensify his listlessness and helplessness. One of the brightest elements in the closing years of his life was the friendship and companionship of Emma Isola, whom he and his sister had adopted, and whose marriage in 1833 to Edward Moxon, the publisher, though a source of unselfish joy to Lamb, left him more than ever alone. While living at Edmonton, whither he had moved in 1833 so that his sister might have the continual care of Mr and Mrs Walden, who were accustomed to patients of weak intellect, Lamb was overtaken by an attack of erysipelas brought on by an accidental fall as he was walking on the London road. After a few days’ illness he died on the 27th of December, 1834. The sudden death of one so widely known, admired and beloved, fell on the public as well as on his own attached circle with all the poignancy of a personal calamity and a private grief. His memory wanted no tribute that affection could bestow, and Wordsworth com- memorated in simple and solemn verse the genius, virtues and fraternal devotion of his early friend.

Charles Lamb is entitled to a place as an essayist beside Montaigne, Sir Thomas Browne, Steele and Addison. He unites many of the characteristics of each of these writers — refined and exquisite humour, a genuine and cordial vein of pleasantry and heart-touching pathos. His fancy is distinguished by great delicacy and tenderness; and even his conceits are imbued with human feeling and passion. He had an extreme and almost exclusive partiality for earlier prose writers, particularly for Fuller, Browne and Burton, as well as for the dramatists of Shake- speare’s time; and the care with which he studied them is apparent in all he ever wrote. It shines out conspicuously in his style, which has an antique air and is redolent of the

peculiarities of the 17th century. Its quaintness has subjected the author to the charge of affectation, but there is nothing really affected

in his writings. His style is not so much an imitation as a reflexion of the older writers; for in spirit he made himself their contemporary. A confirmed habit of studying them in preference to modern literature had made something of their style natural to him; and long experience had rendered it not only easy and familiar but habitual. It was not a masquerade dress he wore, but the costume which showed the man to most advantage. With thought and meaning often profound, though clothed in simple language, every sentence of his essays is pregnant.

He played a considerable part in reviving the dramatic writers of the Shakesperian age; for he preceded Gifford and others in wiping the dust of ages from their works. In his brief comments on each specimen he displays exquisite powers of discrimination: his discernment of the true meaning of his author is almost infallible. His work was a departure in criticism. Former editors had supplied textual criticism and alternative readings: Lamb's object was to show how our ancestors felt when they placed themselves by the power of imagination in trying situations, in the conflicts of duty or passion or the strife of contending duties; what sorts of loves and enmities theirs were.

As a poet Lamb is not entitled to so high a place as that which can be claimed for him as essayist and critic. His dependence on Elizabethan models is here also manifest, but in such a way as to bring into all the greater prominence his native deficiency in " the accomplishment of verse." Yet it is impossible, once having read, ever to forget the tenderness and grace of such poems as " Hester," " The Old Familiar Faces," and the lines " On an infant dying as soon as born " or the quaint humour of " A Farewell to Tobacco." As a letter writer Lamb ranks very high, and when in a nonsensical mood there is none to touch him.

Editions and memoirs of Lamb are numerous. The Letters, with a sketch of his life by Sir Thomas Noon Talfourd, appeared in 1837; the Final Memorials of Charles Lamb by the same hand, after Mary Lamb's death, in 1848; Barry Cornwall's Charles Lamb: A Memoir, in 1866. Mr P. Fitzgerald's Charles Lamb: his Friends, his Haunts and his Boohs (1866); W. Carew Hazlitt's Mary and Charles Lamb (1874). Mr Fitzgerald and Mr Hazlitt have also both edited the Letters, and Mr Fitzgerald brought Talfourd to date with an edition of Lamb's works in 1870-1876. Later and fuller editions are those of Canon Ainger in 12 volumes, Mr Macdonald in 12 volumes and Mr E. V. Lucas in 7 volumes, to which in 1905 was added The Life of Charles Lamb, in 2 volumes. (E. V. L.)

LAMB (a word common to Teutonic languages; cf. Ger. Lamm), the young of sheep. The Paschal Lamb or Agnus Dei is used as a symbol of Jesus Christ, the Lamb of God (John i. 29), and ” lamb,” like ” flock,” is often used figuratively of the members of a Christian church or community, with an allusion to Jesus’ charge to Peter (John xxi. 15). The “lamb and flag” is an heraldic emblem, the dexter fore-leg of the lamb supporting a staff bearing a banner charged with the St George’s cross. This was one of the crests of the Knights Templars, used on seals as early as 1241; it was adopted as a badge or crest by the Middle Temple, the Inner Temple using another crest of the Templars, the winged horse or Pegasus. The old Tangier regiment, now the Queen’s Royal West Surrey Regiment, bore a Paschal Lamb as its badge. From their colonel, Percy Kirke (q.v.), they were known as Kirke’s Lambs. The exaggerated reputation of the regiment for brutality, both in Tangier and in England after Sedgmoor, lent irony to the nickname.

LAMBALLE, MARIE THERfcSE LOUISE OF SAVOY- CARIGNANO, Princesse de (1749-1792), fourth daughter of Louis Victor of Carignano (d. 1774) (great-grandfather of King Charles Albert of Sardinia), and of Christine Henriette of Hesse- Rheinfels-Rothenburg, was born at Turin on the 8th of September 1749. In 1767 she was married to Louis Alexandre Stanislaus de Bourbon, prince of Lamballe, son of the duke of Penthievre, a grandson of Louis XIV. ‘s natural son the count of Toulouse. Her husband dying the following year, she retired with her father-in- law to Rambouillet, where she lived until the marriage of the

dauphin, when she returned to court. Marie Antoinette, charmed by her gentle and naive manners, singled her out for a companion and confidante. The impetuous character of the dauphiness found in Madame de Lamballe that submissive temperament which yields to force of environment, and the two became fast friends. After her accession Marie Antoinette, in spite of the king’s opposition, had her appointed superintendent of the royal household. Between 1776 and 1785 the comtesse de Polignac succeeded in supplanting her; but when the queen tired of the avarice of the Polignacs, she turned again to Madame de Lamballe. From 1785 to the Revolution she was Marie Antoinette’s closest friend and the pliant instrument of her caprices. She came with the queen to the Tuileries and as her salon served as a meeting-place for the queen and the members of the Assembly whom she wished to gain over, the people believed her to be the soul of all

the intrigues. After a visit to England in 1791 to appeal for help for the royal family she made her will and returned to the Tuileries, where she continued her services to the queen until the 10th of August, when she shared her imprisonment in the Temple. On the 19th of August she was transferred to La Force, and having refused to take the oath against the monarchy, she was on the 3rd of September delivered over to the fury of the populace, after which her head was placed on a pike and carried before the windows of the queen.

See George Bertin, Madame de Lamballe (Paris, 1888); Austin Dobson, Four Frenchwomen (1890); B. C. Hardy, Princesse de Lamballe (1908); Comte de Lescure, La Princesse de Lamballe. . . . d'apres des documents inedits (1864) ; some letters of the princess published by Ch. Schmidt in La Revolution francaise (vol. xxxix., 1900); L. Lambeau, Essais sur la mort de madame la princesse de Lamballe (1902) ; Sir F. Montefiore, The Princesse de Lamballe (1896). The Secret Memoirs of the Royal Family of France . . . now first published from the Journal, Letters and Conversations of the Princesse de Lamballe (London, 2 vols., 1826) have since appeared in various editions in English and in French. They are attributed to Catherine Hyde, Marchioness Govion-Broglio-Solari, and are apocryphal.

LAMBALLE, a town of north-western France, in the depart- ment of C6tes-du-Nord, on the Gouessant 13 m. E.S.E. of St Brieuc by rail. Pop. (1906) 4347. Crowning the eminence on which the town is built is a beautiful Gothic church (13th and 14th centuries), once the chapel of the castle of the counts of Penthievre. La Noue, the famous Huguenot leader, was mortally wounded in 1591 in the siege of the castle, which was dismantled in 1626 by Richelieu. Of the other buildings, the church of St Martin (nth, 15th and 16th centuries) is the chief. Lamballe has an important haras (depot for stallions) and carries on trade in grain, tanning and leather-dressing; earthenware is manu- factured in the environs. Lamballe was the capital of the terri- tory of the counts of Penthievre, who in 1569 were made dukes.
LAMBAYEQUE, a coast department of northern Peru, bounded N. by Piura, E. and S. by Cajamarca and Libertad. Area, 4614 sq. m. Pop. (1906 estimate) 93,070. It belongs to the arid region of the coast, and is settled along the river valleys where irrigation is possible. It is one of the chief sugar-producing departments of Peru, and in some valleys, especially near Ferrenafe, rice is largely produced. Four railways connect its principal producing centres with the small ports of Eten and Pimentel, viz.: Eten to Ferrenafe, 27 m.; Eten to Cayalti, 23 m.; Pimentel to Lambayeque, 15m.; and Chiclayo to Patapo, 15 m. The principal towns are Chiclayo, the departmental capital, with a population (1906 estimate) of 10,500, Ferrenafe 6000, and

Lambayeque 4500.

LAMBEAUX, JEF (Joseph Marie Thomas), (1852-1908), Belgian sculptor, was born at Antwerp. He studied at the Antwerp Academy of Fine Arts, and was a pupil of Jean Geefs. His first work, ” War,” was exhibited in 1871, and was followed by a long series of humorous groups, including ” Children dancing,” ” Say ‘ Good Morning,’ ” ” The Lucky Number ” and ” An Accident ” (1875). He then went to Paris, where he executed for the Belgian salons ” The Beggar ” and ” The Blind Pauper,” and produced ” The Kiss ” (1881), generally regarded as his masterpiece. After visiting Italy, where he was much impressed by the works of Jean- Bologne, he showed a strong predilection for effects of force and motion. Other notable works

are his fountain at Antwerp (1886), “Robbing the Eagle’s Eyrie ” (1890), ” Drunkenness ” (1893), ” The Triumph of Woman,” ” The Bitten Faun ” (which created a great stir at the Exposition Universelle at Liege in 1905), and “The Human Passions,” a colossal marble bas-relief, elaborated from a sketch exhibited in 1889. Of his numerous busts may be mentioned those of Hendrik Conscience, and of Charles Bals, the burgomaster of Brussels. He died on the 6th of June 1908.

LAMBERMONT, AUGUSTE, Baron (1819-1905), Belgian statesman, was born at Dion-le-Val in Brabant on the 25th ol March 1819. He came of a family of small farmer proprietors, who had held land during three centuries. He was intended for the priesthood and entered the seminary of Floreffe, but his energies claimed a more active sphere. He left the monastery for Louvain University. Here he studied law, and also prepared himself for the military examinations. At that juncture the first Carlist war broke out, and Lambermont hastened to the scene of action. His services were accepted (April 1838) and he was entrusted with the command of two small cannon. He also acted as A.D.C. to Colonel Durando. He greatly distinguished himself, and for his intrepidity on one occasion he was decorated with the Cross of the highest military Order of St Ferdinand. Returning to Belgium he entered the Ministry for Foreign Affairs in 1842. He served in this department sixty-three years. He was closely associated with several of the most important questions in Belgian history during the last half of the 19th century — notably the freeing of the Scheldt. He was one of the very first Belgians to see the importance of developing the trade of their country, and at his own request he was attached to the commercial branch of the foreign office. The tolls imposed by the Dutch on navigation on the Scheldt strangled Belgian” trade, for Antwerp was the only port of the country. The Dutch had the right to make this levy under treaties going back to the treaty of Munster in

1648, and they clung to it still more tenaciously after Belgium separated herself in 1830-183 1 from the united kingdom of the Netherlands— the London conference in 1839 fixing the toll payable to Holland at 1-50 florins (3s.) per ton. From 1856 to 1863 Lambermont devoted most of his energies to the removal of this impediment. In 1856 he drew up a plan of action, and he prosecuted it with untiring perseverance until he saw it embodied in an international convention seven years later. Twenty-one powers and states attended a conference held on the question at Brussels in 1863, and on the 15th of July the treaty freeing the Scheldt was signed. For this achievement Lambermont was made a baron. Among other important conferences in which Lambermont took a leading part were those of Brussels (1874) on the usages of war, Berlin (1884-1885) on Africa and the Congo region, and Brussels (1890) on Central African Affairs and the Slave Trade. He was joint reporter with Baron de Courcel of the Berlin conference in 1884-1885, and on several occasions he was chosen as arbitrator by one or other of the great European powers. But his great achievement was the freeing of the Scheldt, and in token of its gratitude the city of Antwerp erected a fine monument to his memory. He died on the 7th of March 1905.

LAMBERT, DANIEL (1 770-1809), an Englishman famous for his great size, was born near Leicester on the 13th of March 1770, the son of the keeper of the jail, to which post he succeeded in 1 791. About this time his size and weight increased enor- mously, and though he had led an active and athletic life he weighed in 1793 thirty-two stone (448 lb). In 1806 he resolved to profit by his notoriety, and resigning his office went up to London and exhibited himself. He died on the 21st of July 1809, and at the time measured 5 ft. n in. in height and weighed 52! stone (739 lb). His waistcoat, now in the Kings Lynn Museum, measures 102 in. round the waist. His coffin contained 112 ft. of elm and was built on wheels. His name has been used as a synonym for immensity. George Meredith describes London as the “Daniel Lambert of cities,” and Herbert Spencer uses the phrase ” a Daniel Lambert of learning.” His enormous proportions were depicted on a number of tavern signs, but the best portrait of him, a large mezzotint, is preserved at the British Museum in Lyson’s Collectanea.

LAMBERT, FRANCIS (c 1486-1530), Protestant reformer, was the son of a papal official at Avignon, where he was bom between 1485 and 1487. At the age of 15 he entered the Franciscan monastery at

Avignon, and after 1517 he was an itinerant preacher, travelling through France, Italy and Switzer- land. His study of the Scriptures shook his faith in Roman Catholic theology, and by 1522 he had abandoned his order, and became known to the leaders of the Reformation in Switzer- land and Germany. He did not, however, identify himself either with Zwinglianism or Lutheranism; he disputed with Zwingli at Zurich in 1522, and then made his way to Eisenach and Wittenberg, where he married in 1523. He returned to Strassburg in 1524, being anxious to spread the doctrines of the Reformation among the French-speaking population of the neighbourhood. By the Germans he was distrusted, and in 1526 his activities were prohibited by the city of Strassburg. He was, however, befriended by Jacob Sturm, who recommended him to the Landgraf Philip of Hesse, the most liberal of the German reforming princes. With Philip's encouragement he drafted that scheme of ecclesiastical reform for which he is famous. Its basis was essentially democratic and congregational, though it provided for the government of the whole church by means of a synod. Pastors were to be elected by the congregation, and the whole system of canon-law was repudiated. This scheme was submitted by Philip to a synod at Homburg; but Luther intervened and persuaded the Landgraf to abandon it. It was far too democratic to commend itself to the Lutherans, who had by this time bound the Lutheran cause to the support of princes rather than to that of the people. Philip continued to favour Lambert, who was appointed professor and head of the theo- logical faculty in the Landgraf's new university of Marburg. Patrick Hamilton (q. v.), the Scottish martyr, was one of his pupils; and it was at Lambert's instigation that Hamilton composed his Loci communes, or Patrick's Pleas as they were popularly called in Scotland. Lambert was also one of the divines who took part in the great conference of Marburg in 1529; he had long wavered between the Lutheran and the Zwinglian view of the Lord's Supper, but at this conference he definitely adopted the Zwinglian view. He died of the plague on the 18th of April 1530, and was buried at Marburg.

A catalogue of Lambert's writings is given in Haag's La France protestante. See also lives of Lambert by Baum (Strassburg, 1840); F. W. Hessencamp (Elberfeld, 1860), Stieve (Breslau, 1867) and Louis Ruffet (Paris, 1873); Lorimer, Life of Patrick Hamilton (1857); A. L. Richter, Die evangelischen Kirchenordnungen des 16. Jahrh. (Weimar, 1846); Hessencamp, Hessische Kirchenordnungen im Zeitalter der Reformation; Philip of Hesse's Correspondence with Bucer, ed. M. Lenz; Lindsay, Hist. Reformation; Allgemeine deutsche Biographic (A. F. P.)

LAMBERT, JOHANN HEINRICH (1728-1777), German physicist, mathematician and astronomer, was born at Mul- hausen, Alsace, on the 26th of August 1728. He was the son of a tailor; and the slight elementary instruction he obtained at the free school of his native town was supplemented by his own private reading. He became book-keeper at Montbeliard ironworks, and subsequently (1745) secretary to Professor Iselin, the editor of a newspaper at Basel, who three years later recom- mended him as private tutor to the family of Count A. von Salis of Coire. Coming thus into virtual possession of a good library, Lambert had peculiar opportunities for improving himself in his literary and scientific studies. In 1759, after completing with his pupils a tour of two years' duration through Gottingen, Utrecht, Paris, Marseilles and Turin, he resigned his tutorship and settled at Augsburg. Munich, Erlangen, Coire and Leipzig became for brief successive intervals his home. In 1764 he removed to Berlin, where he received many favours at the hand of Frederick the Great and was elected a member of the Royal Academy of Sciences of Berlin, and in 1774 edited the Berlin Ephemeris. He died of consumption on the 25th of September 1777- His publications show him to have been a man of original and active mind with a singular facility in applying mathematics to practical questions.

His mathematical discoveries were extended and over-

shadowed by his contemporaries. His development of the equation x m --px = q in an infinite series was extended by Leonhard Euler, and particularly by Joseph Louis Lagrange. In 1761 he proved the irrationality of rr; a simpler proof was given somewhat later by Legendre. The introduction of hyperbolic functions into trigonometry was also due to him. His geometri- cal discoveries are of great value, his Die frcie Perspective (1759- 1 774) being a work of great merit. Astronomy was also enriched by his investigations, and he was led to several remarkable theorems on conies which bear his name. The most important . are: (1) To express the time of describing an elliptic arc under the Newtonian law of gravitation in terms of the focal distances of the initial and final points, and the length of the chord joining them. (2) A theorem relating to the apparent curvature of the geocentric path of a comet.

Lambert's most important work, Pyrometrie (Berlin, 1779), is a systematic treatise on heat, containing the records and full discus- sion of many of his own experiments. Worthy of special notice also are Photometria (Augsburg, 1760), Jnsigniores orbitae come- tarum proprietates (Augsburg, 1761), and Beitrdge zum Gebrauche der Mathematik und deren Anwendung (4 vols., Berlin, 1765-1772).

The Memoirs of the Berlin Academy from 1761 to 1784 contain many of his papers, which treat of such subjects as resistance of fluids, magnetism, comets, probabilities, the problem of three bodies, meteorology, &c. In the Acta Helvetica (1752-1760) and in the Nova acta erudita (1763-1769) several of his contributions appear. In Bode's Jahrbuch (1 776-1 780) he discusses nutation, aberration of light, Saturn's rings and comets; in the Nova acta Helvetica (1787) he has a long paper " Sur le son des corps elastiques," in Bernoulli and Hindenburg's Magazin (1787-1788) he treats of the roots of equation and of parallel lines; and in Hindenburg's Archiv (1798- 1799) he writes on optics and perspective. Many of these pieces were published posthumously. ' Recognized as among the first mathematicians of his day, he was also widely known for the uni- versality and depth of his philological and philosophical knowledge. The most valuable of his logical and philosophical memoirs were published»collectively in 2 vols. (1782).

See Huber's Lambert nach seinem Leben und Wirken ; M. Chasles, Geschichte der Geometric; and Baensch, Lamberts Philosophie und seine Stellung zu Kant (1902).

LAMBERT [alias Nicholson], JOHN (d. 1538), English Protestant martyr, was born at Norwich and educated at Cambridge, where he graduated B.A. and was admitted in 1521 a fellow of Queen's College on the nomination of Catherine of Aragon. After acting for some years as a " mass-priest," his views were unsettled by the arguments of Bilney and Arthur; and episcopal persecution compelled him, according to his own account, to assume the name Lambert instead of Nicholson. He likewise removed to Antwerp, where he became chaplain to the English factory, and formed a friendship with Frith and Tyndale. Returning to England in 1531, he came under the notice of Archbishop Warham, who questioned him closely on his religious beliefs. Warham 's death in August 1532 relieved Lambert from immediate danger, and he earned a living for some years by teaching Latin and Greek near the Stocks Market in London. The duke of Norfolk and other reactionaries accused him of heresy in 1536, but reforming tendencies were still in the ascendant, and Lambert escaped. In 1538, however, the reaction had begun, and Lambert was its first victim. He singled himself out for persecution by denying the Real Presence: and Henry VIIL, who had just rejected the Lutheran proposals for a theological union, was in no mood to tolerate worse heresies. Lambert had challenged some views expressed by Dr John Taylor, afterwards bishop of Lincoln; and Cranmer as arch- bishop condemned Lambert's opinions. He appealed to the king as supreme head of the Church, and on the 16th of November Henry heard the

case in person before a large assembly of spiritual and temporal peers. For five hours Lambert disputed with the king and ten bishops; and then, as he boldly denied that the Eucharist was the body of Christ, he was condemned to death by Cromwell as vicegerent. Henry's condescension and patience produced a great impression on his Catholic subjects; but Cromwell is said by Foxe to have asked Lambert's pardon before his execution, and Cranmer eventually adopted the views he condemned in Lambert. Lambert was burnt at Smithfield on the 22nd of November.

io8

LAMBERT, JOHN

See Letters and Papers of Henry VIII.; Foxe's Acts and Monu- ments; Froude, History; Dixon, Church History; Gairdner, Lollardy and the Reformation, Diet, of Nat. Biog. and authorities there cited. (A. F. P.)

LAMBERT, JOHN (1619-1694), English general in the Great Rebellion, was born at Calton Hall, Kirkby Malham, in the West Riding of Yorkshire. His family was of ancient lineage, and long settled in the county. He studied law, but did not make it his profession. In 1639 he married Frances, daughter of Sir William Lister. At the opening of the Civil War he took up arms for the parliament, and in September 1642 was appointed a captain of horse in the army commanded by Ferdinando, Lord Fairfax. A year later he had become colonel of a regiment of horse, and he distinguished himself at the siege of Hull in October, 1643. Early in 1644 he did good service at the battles of Nantwich and Bradford. At Marston Moor Lambert's own regiment was routed by the charge of Goring's horse; but he cut his way through with a few troops and joined Cromwell on the other side of the field. When the New Model army was formed in the beginning of 1645, Colonel Lambert was appointed to succeed Fairfax in command of the northern forces. General Poyntz, however, soon replaced him, and under this officer he served in the Yorkshire campaign of 1645, receiving a wound before Pontefract. In 1646 he was given a regiment in the New Model, serving with Fairfax in the west of England, and he was a commissioner, with Cromwell and others, for the surrender of Oxford in the same year. " It is evident," says C. H. Firth {Diet. Nat. Biog.), " that he was from the first regarded as an officer of exceptional capacity and specially selected for semi- political employments."

When the quarrel between the army and the parliament began, Lambert threw himself warmly into the army's cause. He assisted

Ireton in drawing up the several addresses and remonstrances issued by the army, both men having had some experience in the law, and being ” of a subtle and working brain.” Early in August 1647 Lambert was sent by Fairfax as major- general to take charge of the forces in the northern counties. His wise and just managing of affairs in those parts is commended by Whitelocke. He suppressed a mutiny among his troops, kept strict discipline and hunted down the moss-troopers who infested the moorland country.

When the Scottish army under the marquis of Hamilton invaded England in the summer of 1648, Lambert was engaged in suppressing the Royalist rising in his district. The arrival of the Scots obliged him to retreat; but Lambert displayed the greatest energy and did not cease to harass the invaders till Cromwell came up from Wales and with him destroyed the Scottish army in the three days’ fighting from Preston to Warring- ton. After the battle Lambert’s cavalry headed the chase, pursuing the defeated army & outrance, and finally surrounded it at Uttoxeter, where Hamilton surrendered to Lambert on the 25th of August. He then led the advance of Cromwell’s army into Scotland, where he was left in charge on Cromwell’s return. From December 1648 to March 1649 he was engagedinthe siege of Pontefract Castle; Lambert was thus absent from London at the time of Pride’s Purge and the trial and execution of the king.

When Cromwell was appointed to the command of the war in Scotland (July 1650), Lambert went with him as major- general and second in command. He was wounded at Mussel- burgh, but returned to the front in time to take a conspicuous share in the victory of Dunbar. He himself defeated the ” Protesters ” or ” Western Whigs ” at Hamilton, on the 1st of December 1650. In July 1651 he was sent into Fife to get in the rear and flank of the Scottish army near Falkirk, and force them to decisive action by cutting off their supplies. This mission, in the course of which Lambert won an important victory at Inverkeithing, was executed with entire success, whereupon Charles II., as Lambert had foreseen, made for England. For the events of the Worcester campaign, which quickly followed, see Great Rebellion. Lambert’s part in the general plan was carried out most brilliantly, and in the crowning victory of Worcester he commanded the right wing of

the English army, and had his horse shot under him. Parliament now conferred on him a grant of lands in Scotland worth £1000 per annum.

In October 1651 Lambert was made a commissioner to settle the

affairs of Scotland, and on the death of Ireton he was appointed lord deputy of Ireland (January 1652). He accepted the office with pleasure, and made magnificent preparations; parliament, however, soon afterwards reconstituted the Irish administration and Lambert refused to accept office on the new terms. Henceforward he began to oppose the Rump. In the council of officers he headed the party desiring representative government, as opposed to Harrison who favoured a selected oligarchy of ” God-fearing ” men, but both hated what remained of the Long parliament, and joined in urging Cromwell to dissolve it by force. At the same time Lambert was consulted by the parliamentary leaders as to the possibility of dismissing Cromwell from his command, and on the 15th of March 1653 Cromwell refused to see him, speaking of him contemptuously as ” bottom- less Lambert.” On the 20th of April, however, Lambert accom- panied Cromwell when he dismissed the council of state, on the same day as the forcible expulsion of the parliament. Lambert now favoured the formation of a small executive council, to be followed by an elective parliament whose powers should be limited by a written instrument of government. Being at this time the ruling spirit in the council of state, and the idol of the army, there were some who looked on him as a possible rival of Cromwell for the chief executive power, while the royalists for a short time had hopes of his support. He was invited, with Cromwell, Harrison and Desborough, to sit in the nominated parliament of 1653; and when the unpopularity of that assembly increased, Cromwell drew nearer to Lambert. In November 1653 Lambert presided over a meeting of officers, when the question of constitutional settlement was discussed, and a proposal made for the forcible expulsion of the nominated parliament. On the 1st of December he urged Cromwell to assume the title of king, which the latter refused. On the 12th the parliament resigned its powers into Cromwell’s hands, and on the 13th Lambert obtained the consent of the officers to the Instrument of Government (q.v.), in the framing of which he had taken a leading part. He was one of the seven officers nominated to seats in the council created by the Instrument. In the foreign policy of the protectorate he was the most clamorous of those who called for alliance with Spain and war with France in 1653, and he firmly withstood Cromwell’s design for an expedition to the West Indies.

In the debates in parliament on the Instrument of Govern- ment in 1654 Lambert proposed that the office of protector should be made hereditary, but was defeated by a majority which included members of Cromwell’s family. In the parlia- ment of this year, and again in 1656, Lord Lambert, as he was now styled, sat as member for the West

Riding. He was one of the major-generals appointed in August 1655 to command the militia in the ten districts into which it was proposed to divide England, and who were to be responsible for the maintenance of order and the administration of the law in their several districts. Lambert took a prominent part in the committee of council which drew up instructions to the major-generals, and he was probably the originator, and certainly the organizer, of the system of police which these officers were to control. Gardiner conjectures that it was through divergence of opinion between the protector and Lambert in connexion with these ” instruc- tions ” that the estrangement between the two men began. At all events, although Lambert had himself at an earlier date requested Cromwell to take the royal dignity, when the proposal to declare Oliver king was started in parliament (February 1657) he at once declared strongly against it. A hundred officers headed by Fleetwood and Lambert waited on the protector, and begged him to put a stop to the proceedings. Lambert was not convinced by Cromwell’s arguments, and their complete estrange- ment, personal as well as political, followed. On his refusal to take the oath of allegiance to the protector, Lambert was deprived of his commissions, receiving, however, a pension of

log

£2000 a year. He retired to his garden at Wimbledon, and appeared no more in public during Oliver Cromwell's lifetime; but shortly before his death Cromwell sought a reconciliation, and Lambert and his wife visited him at Whitehall.

When Richard Cromwell was proclaimed protector his chief difficulty lay with the army, over which he exercised no effective control. Lambert, though holding no military commission, was the most popular of the old Cromwellian generals with the rank and file of the army, and it was very generally believed that he would instal himself in Oliver's seat of power. Richard's adherents tried to conciliate him, and the royalist leaders made overtures to him, even proposing that Charles II. should marry Lambert's daughter. Lambert at first gave a lukewarm support to Richard Cromwell, and took no part in the intrigues of the officers at Fleetwood's residence, Wallingford House. He was a member of the parliament which met in January 1659, and when it was dissolved in April under compulsion of Fleetwood and Desborough, he was restored to his commands. He headed the deputation to Lenthall in May inviting the return of the Rump, which led to the tame retirement of Richard Cromwell into obscurity; and he was appointed a member of the com- mittee of safety and of the council of state. When the parlia- ment, desirous of controlling the power of the army, withheld from Fleetwood the right of nominating officers, Lambert was named one of a council of seven charged with this duty. The parliament's evident distrust of the soldiers caused much dis- content in the army; while the entire absence of real authority encouraged the royalists to make overt attempts to restore Charles II., the most serious of which, under Sir George Booth and the earl of Derby, was crushed by Lambert near Chester on the 19th of August. He promoted a petition from his army that Fleetwood might be made lord-general and himself major- general. The republican party in the House took offence. The Commons (October 12th, 1659) cashiered Lambert and other officers, and retained Fleetwood as chief of a military council under the authority of the speaker. On the next day Lambert caused the doors of the House to be shut and the members kept out. On the 26th a "committee of safety" was appointed, of which he was a member. He was also appointed major-general of all the forces in England and Scotland, Fleetwood being general. Lambert was now sent with a large force to meet Monk, who was in command of the English forces in Scotland, and either negotiate with him or force him to terms. Monk, however, set his army in motion southward. Lambert's army began to melt away, and he was kept in suspense by Monk till his whole army fell from him and he returned to London almost alone. Monk marched to London

unopposed. The ” excluded ” Presbyterian members were recalled. Lambert was sent to the Tower (March 3rd, 1660), from which he escaped a month later. He tried to rekindle the civil war in favour of the Commonwealth, but was speedily recaptured and sent back to the Tower (April 24th). On the Restoration he was exempted from danger of life by an address of both Houses to the king, but the next parliament (1662) charged him with high treason. Thenceforward for the rest of his life Lambert remained in custody in Guernsey. He died in 1694.

Lambert would have left a better name in history if he had been a cavalier. His genial, ardent and excitable nature, easily raised and easily depressed, was more akin to the royalist than to the puritan spirit. Vain and sometimes overbearing, as well as ambitious, he believed that Cromwell could not stand without him ; and when Cromwell was dead, he imagined himself entitled and fitted to succeed him. Yet his ambition was less selfish than that of Monk. Lambert is accused of no ill faith, no want of generosity, no cold and calcu- lating policy. As a soldier he was far more than a fighting general and possessed many of the qualities of a great general. He was, moreover, an able writer and speaker, and an accomplished negotiator and took pleasure in quiet and domestic pursuits. He learnt his love of gardening from Lord Fairfax, who was also his master in the art of war. He painted flowers, besides cultivating them, and incurred the blame of Mrs Hutchinson by ” dressing his flowers in his garden and working at the needle with his wife and his maids.” He made no special profession of religion; but no imputation is cast upon his moral character by his detractors. It has been said that he became a Roman Catholic before his death. _

LAMBERT OF HERSFELD (d. c. 1088), German chronicler, was probably a Thuringian by birth and became a monk in the Benedictine abbey of Hersfeld in 1058. As he was ordained priest at Aschaffenburg he is sometimes called Lambert of Aschaffenburg, or Schafnaburg. He made a pilgrimage to the Holy Land, and visited various monasteries of his order; but he is famous as the author of some Annates. From the creation of the world until about 1040 these Annates are a jejune copy of other annals, but from 1040 to their conclusion in 1077 they are interesting for the history of Germany and the papacy. The important events during the earlier part of the reign of the emperor Henry IV., including the visit to Canossa and the battle of Hohenburg, are vividly described. Their tone is hostile to Henry IV. and friendly to the papacy; their Latin style is excellent. The Annates were first published in 15: j and are printed in the Monumenta Germaniae historica, Bande iii. and v. (Hanover and Berlin, 1826 fol.). Formerly Lambert’s

reputation for accuracy and impartiality was very high, but both qualities have been somewhat discredited.

Lambert is also regarded as the author of the Historia Hersfeld- ensis, the extant fragments of which are published in Band v. of the Monumenta of a Vita Lulli, Lullus, archbishop of Mainz, being the founder of the abbey of Hersfeld; and of a Carmen de hello Saxonico. His Opera have been edited with an introduction by O. Holder- Egger (Hanover, 1894).

See H. Delbruck, Uber die Glaubwurdigkeit Lamberts von Hersfeld (Bonn, 1873) ; A. Eigenbrodt, Lampert von Hersfeld und die neuere Quellenforsckung (Cassel, 1896) ; L. von Ranke, Zur Kritik frankisch-deutscher Reichsannalisten (Berlin, 1854) ; W. Watten- bach, Deutschlands Geschichtsquellen Band ii. (Berlin, 1906) and A. Potthast, Bibliotheca Historica (Berlin, 1896).

LAMBESSA, the ancient Lambaesa, a village of Algeria, in the arrondissement of Batna and department of Constantine, 7 m. S.E. of Batna and 17 W. of Timgad. The modern village, the centre of an agricultural colony founded in 1 848, is noteworthy for its great convict establishment (built about 1850). The remains of the Roman town, and more especially of the Roman camp, in spite of wanton vandalism, are among the most interest- ing ruins in northern Africa. They are now preserved by the Service des Monuments historiques and excavations have resulted in many interesting discoveries. The ruins are situated on the lower terraces of the Jebel Aures, and consist of triumphal arches (one to Septimius Severus, another to Commodus), temples, aqueducts, vestiges of an amphitheatre, baths and an immense quantity of masonry belonging to private houses. To the north and east lie extensive cemeteries with the stones standing in their original alignments; to the west is a similar area, from which, however, the stones have been largely removed for building the modern village. Of the temple of Aesculapius only one column is standing, though in the middle of the 19th century its facade was entire. The capitol or temple dedicated to Jupiter, Juno and Minerva, which has been cleared of debris, has a portico with eight columns. On level ground about two- thirds of a mile from the centre of the ancient town stands the camp, its site now partly occupied by the penitentiary and its gardens. It measures 1640 ft. N. to S. by 1476 ft. E. to W., and in the middle rise the ruins of a building commonly called, but incorrectly, the praetorium. This noble building, which dates from a.d. 268, is 92 ft. long by 66 ft. broad and 49 ft. high; its southern facade has a splendid peristyle half the height of the wall, consisting of a front row of massive Ionic columns and an engaged

row of Corinthian pilasters. Behind this building (which was roofed), is a large court giving access to other buildings, one being the arsenal. In it have been found many thousands of projectiles. To the S.E. are the remains of the baths. The ruins of both city and camp have yielded many inscriptions (Renier edited 1 500, and there are 4185 in the Corpus Inscr. Lat. vol. viii.); and, though a very large proportion are epitaphs of the barest kind, the more important pieces supply an outline of the history of the place. Over 2500 inscriptions relating to the camp have been deciphered. In a museum in the village are objects of antiquity discovered in the vicinity. Besides inscriptions, statues, &c, are some fine mosaics found in 1905 near the arch of Septimius Severus. The statues include

those of Aesculapius and Hygieia, taken from the temple of Aesculapius.

Lambaesa was a military foundation. The camp of the third legion (Legio III. Augusta), to which it owes its origin, appears to have been established between A.D. 123 and 129, in the time of Hadrian, whose address to his soldiers was found inscribed on a pillar in a second camp to the west of the great camp still extant. By 166 mention is made of the decurions of a vicus, 10 curiae of which are known by name; and the vicus became a municipium probably at the time when it was made the capital of the newly founded province of Numidia. The legion was removed by Gordianus, but restored by Valerianus and Gallienus; and its final departure did not take place till after 392. The town soon afterwards declined. It never became the seat of a bishop, and no Christian inscriptions have been found among the ruins.

About 2 m. S. of Lambessa are the ruins of Markuna, the ancient Verecunda, including two triumphal arches.

See S. Gsell, Les Monuments antiques de I'Algerie (Paris, 1901) and L'Algerie dans I'antiquitS (Algiers, 1903) ; L. Renier, Inscriptions romaines de I'Algerie (Paris, 1855); Gustav Wilmann, "Die rom. Lagerstadt Afrikas," in Commentationes phil. in honorem Th. Mommseni (Berlin, 1877); Sir L. Playfair, Travels in the Footsteps 0} Bruce (London, 1877) ; A. Graham, Roman Africa (London, 1902).

LAMBETH, a southern metropolitan borough of London, England, bounded N.W. by the river Thames, N.E. by Southwark, E. by

Camberwell and W. by Wandsworth and Battersea, and extending S. to the boundary of the county of London. Pop. (1901) 301,895. The name is commonly confined to the northern part of the borough, bordering the river; but the principal districts included are Kennington and Vauxhall (north central), Brixton (central) and part of Norwood (south). Four road-bridges cross the Thames within the limits of the borough, namely Waterloo, Westminster, Lambeth and Vauxhall, of which the first, a fine stone structure, dates from 181 7, and is the oldest Thames bridge standing within the county of London. The main thoroughfare runs S. from Westminster Bridge Road as Kennington Road, continuing as Brixton Road and Brixton Hill, Clapham Road branching S.W. from it at Kennington. Several thoroughfares also converge upon Vauxhall Bridge, and from a point near this down to Westminster Bridge the river is bordered by the fine Albert Embankment.

Early records present the name Lamb-hythe in various forms. The suffix is common along the river in the meaning of a haven, but the prefix is less clear; a Saxon word signifying mud is suggested. Brixton and Kennington are mentioned in Domesday; and in Vauxhall is concealed the name of Falkes de Breaute, an unscrupulous adventurer of the time of John and Henry III. exiled in 1225. The manor of North Lambeth was given to the bishopric of Rochester in the time of Edward the Confessor, and the bishops had a house here till the 16th century. They did not, however, retain the manor beyond the close of the 12th century, when it was acquired by the see of Canterbury. The palace of the archbishops is still here, and forms, with the parish church, a picturesque group of buildings, lying close to the river opposite the majestic Houses of Parliament, and to some extent joining with them to make of this reach of the Thames one of the finest prospects in London. The oldest part of the palace remaining is the Early English chapel. The so-called Lollard's Tower, which retains evidence of its use as a prison, dates c. 1440. There is a fine Tudor gatehouse of brick, and the hall is dated 1663. The portion now inhabited by the archbishops was erected in 1834 and fronts a spacious quadrangle. Among .he portraits of the archbishops here are examples by Holbein, V'an Dyck, Hogarth and Reynolds. There is a valuable library. The church of St Mary was rebuilt c. 1850, though the ancient monuments preserved give it an appearance of antiquity. Here are tombs of some of the archbishops, including Bancroft (d. 1 610), and of the two Tradescants, collectors, and a memorial to Elias Ashmole, whose name is preserved in the Ashmolean Museum at Oxford University, to which he presented the collec- tions of his friend the younger Tradescant (d. 1662). In the present Westminster Bridge

Road was a circus, well known in the later 18th and early 19th centuries as Astley's, and near Vauxhall Bridge were the celebrated Vauxhall Gardens.

The principal modern pleasure grounds are Kennington Park (20 acres), and Brockwell Park (127 acres) south of Brixton, and near the

southern end of Kennington Road is Kennington Oval, the ground of the Surrey County Cricket Club, the scene of its home matches and of other important fixtures. Among institutions the principal is St Thomas' Hospital, the extensive buildings of which front the Albert Embankment. The original foundation dated from 12-13, was situated in Southwark, and was connected with the priory of Bermondsey. The existing buildings, subsequently enlarged, were opened in 1871, are divided into a series of blocks, and include a medical school. Other hospitals are the Royal, for children and women, Waterloo Road, the Lying-in Hospital, York Road, and the South-western fever hospital in Stockwell. There are technical institutes in Brixton and Norwood; and on Brixton Hill is Brixton Prison. In the northern part of the borough are numerous factories, including the great Doulton pottery works. The parliamentary borough of Lambeth has four divisions, North, Kennington, Brixton and Norwood, each returning one member. The borough council consists of a mayor, 10 aldermen and 60 councillors. Area, 4080-4 acres.

LAMBETH CONFERENCES, the name given to the periodical assemblies of bishops of the Anglican Communion (Pan-Anglican synods), which since 1867 have met at Lambeth Palace, the London residence of the archbishop of Canterbury. The idea of these meetings was first suggested in a letter to the archbishop of Canterbury by Bishop Hopkins of Vermont in 1851, but the immediate impulse came from the colonial Church in Canada. In 1865 the synod of that province, in an urgent letter to the archbishop of Canterbury (Dr Longley), represented the unsettle- ment of members of the Canadian Church caused by recent legal decisions of the Privy Council, and their alarm lest the revived action of Convocation " should leave us governed by canons different from those in force in England and Ireland, and thus cause us to drift into the status of an independent branch of the Catholic Church." They therefore requested him to call a " national synod of the bishops of the Anglican Church at home and abroad," to meet under his leadership. After consult- ing both houses of the Convocation of Canterbury, Archbishop Longley assented, and convened all the bishops of the Anglican Communion (then 144 in number) to meet at Lambeth in 1867. Many Anglican bishops (amongst them the archbishop of York and most of his suffragans) felt

so doubtful as to the wisdom of such an assembly that they refused to attend it, and Dean Stanley declined to allow Westminster Abbey to be used for the closing service, giving as his reasons the partial character of the assembly, uncertainty as to the effect of its measures and ” the presence of prelates not belonging to our Church.” Archbishop Longley said in his opening address, however, that they had no desire to assume ” the functions of a general synod of all the churches in full communion with the Church of England,” but merely to ” discuss matters of practical interest, and pro- nounce what we deem expedient in resolutions which may serve as safe guides to future action.” Experience has shown how valuable and wise this course was. The resolutions of the Lambeth Conferences have never been regarded as synodical decrees, but their weight has increased with each conference. Apprehensions such as those which possessed the mind of Dean Stanley have long passed away.

Seventy-six bishops accepted the primate’s invitation to the first conference, which met at Lambeth on the 24th of September 1867, and sat for four days, the sessions being in private. The archbishop opened the conference with an address: deliberation followed; committees were appointed to report on special questions; resolutions were adopted, and an encyclical letter was addressed to the faithful of the Anglican Communion. Each of the subsequent conferences has been first received in Canterbury cathedral and addressed by the archbishop from the chair of St Augustine. It has then met at Lambeth, and after sitting for five days for deliberation upon the fixed subjects and appointment of committees, has adjourned, to meet again at the end of a fortnight and sit for five days more, to receive reports, adopt resolutions and to put forth the encyclical letter.

I. First Conference (September 24-28, 1867), convened and pre- sided over by Archbishop Longley. The proposed order of subjects was entirely altered in view of the Colenso case, for which urgency was claimed; and most of the time was spent in discussing it. Of the thirteen resolutions adopted by the conference, two have direct

in

reference to this case; the rest have to do with the creation of new sees and missionary jurisdictions, commendatory letters, and a ” voluntary spiritual tribunal ” in cases of doctrine and the due subordination of synods. The reports of the committees were not ready, and were carried forward to the conference of 1878.

II. Second Conference (July 2-27, 1878), convened and presided over by Archbishop Tait. On this occasion no hesitation appears to have been felt; 100 bishops were present, and the opening sermon was preached by the archbishop of York. The reports of the five special committees (based in part upon those of the committee of 1867) were embodied in the encyclical letter, viz. on the best mode of maintaining union, voluntary boards of arbitration, missionary bishops and missionaries, continental chaplains and the report of a committee on difficulties submitted to the conference.

III. Third Conference (July 3-27, 1888), convened and presided over by Archbishop Benson; 145 bishops present; the chief subject of consideration being the position of communities which do not possess the historic episcopate. In addition to the encyclical letter, nineteen resolutions were put forth, and the reports of twelve special committees are appended upon which they are based, the subjects being intemperance, purity, divorce, polygamy, observance of Sunday, socialism, care of emigrants, mutual relations of dioceses of the Anglican Communion, home reunion, Scandinavian Church, Old Catholics, &c, Eastern Churches, standards of doctrine and worship. Perhaps the most important of these is the famous ” Lambeth Quadrilateral,” which laid down a fourfold basis for home reunion — the Holy Scriptures, the Apostles’ and Nicene creeds, the two sacraments ordained by Christ himself and the historic episcopate.

IV. Fourth Conference (July 5-31, 1897), convened by Archbishop Benson, presided over by Archbishop Temple; 194 bishops present. One of the chief subjects for consideration was the creation of a ” tribunal of reference “; but the resolutions on this subject were withdrawn, owing, it is said, to the opposition of the American bishops, and a more general resolution in favour of a ” consultative body ” was substituted. The encyclical letter is accompanied by sixty-three resolutions (which include careful provision for provincial organization and the extension of the title ” archbishop ” to all metropolitans, a ” thankful recognition of the revival of brotherhoods and sisterhoods, and of the office of deaconess,” and a desire to promote friendly relations with the Eastern Churches and the various Old Catholic bodies), and the reports of the eleven committees are subjoined.

V. Fifth Conference (July 6-August 5, 1908), convened by Archbishop Randall Davidson, who presided; 241 bishops were present. The chief subjects of discussion were: the relations of faith and modern thought, the supply and training of the clergy, education, foreign missions, revision and ” enrichment ” of the Prayer-Book, the

relation of the Church to ” ministries of healing ” (Christian Science, &c), the questions of marriage and divorce, organization of the Anglican Church, reunion with other Churches. The results of the deliberations were embodied in seventy-eight resolutions, which were appended to the encyclical issued, in the name of the conference, by the Archbishop of Canterbury on the 8th of August.

The fifth Lambeth conference, following as it did close on the great Pan-Anglican congress, is remarkable mainly as a proof of the growth of the influence and many-sided activity of the Anglican Church, and as a conspicuous manifestation of her characteristic principles. Of the seventy-eight resolutions none is in any sense epoch-making, and their spirit is that of the traditional Anglican via media. In general they are characterized by a firm adherence to the funda- mental articles of Catholic orthodoxy, tempered by a tolerant attitude towards those not of ” the household of the faith.” The report of the committee on faith and modern thought is ” a faithful attempt to show how the claim of our Lord Jesus Christ, which the Church is set to present to each generation, may, under the character- istic conditions of our time, best command allegiance.” On the question of education (Res. 11-19) the conference reaffirmed strongly the necessity for definite Christian teaching in schools, ” secular systems” being condemned as “educationally as well as morally unsound, since they fail to co-ordinate the training of the whole nature of the child ‘ (Res. n). The resolutions on questions affect- ing foreign missions (20-26) deal with e.g. the overlapping of episcopal jurisdictions (22) and the establishment of Churches on lines of race or colour, which is condemned (20). The resolutions on questions of marriage and divorce (37-43) reaffirm the traditional attitude of the Church ; it is, however, interesting to note that the resolution (40) deprecating the remarriage in church of the innocent party to a divorce was carried only by eighty-seven votes to eighty-four. In resolutions 44 to 53 the conference deals with the duty of the Church towards modern democratic ideals and social problems; affirms the responsibility of investors for the character and conditions of the concerns in which their money is placed (49); ” while frankly ac- knowledging the moral gains sometimes won by war ” strongly supports the extension of international arbitration (52) ; and emphasizes the duty of a stricter observance of Sunday (53). On the question of reunion, the ideal of corporate unity was reaffirmed (58). It was decided to send a deputation of bishops with a letter of greeting to the national council of the Russian Church about to be assembled (60) and certain conditions were laid down for inter- communion with certain of the Churches of the Orthodox Eastern

Communion (62) and the ” ancient separated Churches of the East ” (63-65) . Resolution 67 warned Anglicans from contracting marriages, under actual conditions, with Roman Catholics. By resolution 68 the conference stated its desire to ” maintain and strengthen the friendly relations ” between the Churches of the Anglican Com- munion and “the ancient Church of Holland ” (Jansenist, see Utrecht) and the old Catholic Churches; and resolutions 70-73 made elaborate provisions for a projected corporate union between the Anglican Church and the Unitas Fratrum (Moravian Brethren). As to ” home reunion,” however, it was made perfectly clear that this would only be possible ” on lines suggested by such precedents as those of 1610,” i.e. by the Presbyterian Churches accepting the episcopal model. So far as the organization of the Anglican Church is concerned, the most important outcome of the conference was the reconstruction of the Central Consultative Body on representative lines (54-56) ; this body to consist of the archbishop of Canterbury and seventeen bishops appointed by the various Churches of the Anglican Communion throughout the world. A notable feature of the conference was the presence of the Swedish bishop of Kalmar, who presented a letter from the archbishop of Upsala, as a tentative advance towards closer relations between the Anglican Church and the Evangelical Church of Sweden.

See Archbishop R. T. Davidson, The Lambeth Conferences of 1867, 1878 and 1888 (London, 1896) ; Conference of Bishops of the Anglican Communion, Encyclical Letter, &c. (London, 1897 and 1908).

LAMBINUS, DIONYSIUS, the Latinized name of Denis Lambin (1520-1572), French classical scholar, born at Montreuil- sur-mer in Picardy. Having devoted several years to classical studies during a residence in Italy, he was invited to Paris in 1650 to fill the professorship of Latin in the College de France, which he soon afterwards exchanged for that of Greek. His lectures were frequently interrupted by his ill-health and the religious disturbances of the time. His death (September 1572) is said to have been caused by his apprehension that he might share the fate of his friend Peter Ramus (Pierre de la Ramee), who had been killed in the massacre of St Bartholomew. Lambinus was one of the greatest scholars of his age, and his editions of classical authors are still useful. In textual criticism he was a conservative, but by no means a slavish one; indeed, his opponents accused him of rashness in emendation. His chief defect is that he refers vaguely to his MSS. without specifying the source of his readings, so that their relative importance cannot be estimated. But his commentaries, with their wealth of illustration and parallel passages, are a mine of information. In the opinion of the best

scholars, he preserved the happy mean in his annotations, although his own countrymen have coined the word lambiner to express trifling and diffuseness.

His chief editions are: Horace (1561); Lucretius (1564), on which see H. A. J. Munro's preface to his edition; Cicero (1566); Cornelius Nepos (1569); Demosthenes (1570), completing the unfinished work of Guillaume Morel; Plautus (1576).

See Peter Lazer, De Dionysio Lambino narratio, printed in Orelli's Onomasticon Tullianum (i. 1836), and Trium disertissimorum virorum praefationes ac epistolae familiares aliquot: Mureti, Lambini, Regii (Paris, 1579) ; also Sandys, Hist, of Classical Scholar- ship (1908, ii. 188), and A. Horawitz in Ersch and Gruber's Allge-. meine Encyclopadie.

LAMBOURN, a market town in the Newbury parliamentary division of Berkshire, England, 65 m. W. of London, the terminu3 of the Lambourn Valley light railway from Newbury. Pop. (1901) 2071. It lies high up the narrow valley of the Lambourn, a tributary of the Kennet famous for its trout-fishing, among the Berkshire Downs. The church of St Michael is cruciform and principally late Norman, but has numerous additions of later periods and has been considerably altered by modern restoration. The inmates of an almshouse founded by John Estbury, c. 1500, by his desire still hold service daily at his tomb in the church. A Perpendicular market-cross stands without the church. The town has agricultural trade, but its chief importance is derived from large training stables in the neighbourhood. To the north of the town is a large group of tumuli known as the Seven Barrows, ascertained by excavation to be a British burial-place.

LAMECH (w?), the biblical patriarch, appears in each of the antediluvian genealogies. Gen. iv. 16-24 J-, and Gen. v. P. In the former he is a descendant of Cain, and through his sons the author of primitive civilization; in the latter he is the father of Noah. But it is now generally held that these two genealogies are variant adaptations of the Babylonian list of primitive

kings (see Enoch). It is doubtful whether Lamech is to be identified with the name of any one of these kings; he may- have been introduced into the genealogy from another tradition. In the older

narrative in Gen. iv. Lamech's family are the originators of various advances in civilization; he himself is the first to marry more than one wife, 'Adah (" ornament," perhaps specially " dawn ") and Zillah (" shadow ")• He has three sons Jabal, Jubal, and Tubal, the last-named qualified by the addition of Cain (= "smith" 1). The assonance of these names is probably intentional, cf. the brothers Hasan and Hosein of early Mahommedan history. Jabal institutes the life of nomadic shepherds, Jubal is the inventor of music, Tubal-Cain the first smith. Jabal and Jubal may be forms of a root used in Hebrew and Phoenician for ram and ram's horn (i.e. trumpet), and underlying our " jubilee." Tubal may be the eponymous ancestor of the people of that name mentioned in Ezekiel in connexion with "vessels of bronze." 2 All three names are sometimes derived from ' a ' in the sense of offspring, so that they would be three different words for "son," and there are numerous other theories as to their etymology. Lamech has also a daughter Naamah (" gracious," " pleasant," " comely "; cf. No'man, a name of the deity Adonis). This narrative clearly intends to account for the origin of these various arts as they existed in the narrator's time; it is not likely that he thought of these discoveries as separated from bis own age by a universal flood; nor does the tone of the narrative suggest that the primitive tradition thought of these pioneers of civilization as members of an accursed family. Probably the passage was originally independent of the document which told of Cain and Abel and of the Flood; Jabal may be a variant of Abel. An ancient poem is connected with this genealogy: " Adah and Zillah, hear my voice ;

Ye wives of Lamech, give ear unto my speech.

I slay a man for a wound,

A young man for a stroke ;

For Cain's vengeance is sevenfold,

But Lamech's seventy-fold and seven."

In view of the connexion, the poem is interpreted as expressing Lamech's exultation at the advantage he expects to derive from Tubal-Cain's new inventions; the worker in bronze will forge for him new and formidable weapons, so that he will be able to take signal vengeance for the least injury. But the poem probably had originally nothing to do with the genealogy. It may have been a piece of folk-song celebrating the prowess of the tribe of Lamech; or it may have had some relation to a story of Cain and Abel in which Cain was a

hero and not a villain.

The genealogy in Gen. v. belongs to the Priestly Code, c. 450 B.C., and may be due to a revision of ancient tradition in the light of Babylonian archaeology. It is noteworthy that according to the numbers in the Samaritan MSS. Lamech dies in the year of the Flood.

The origin of the name Lamech and its original meaning are doubtful. It was probably the name of a tribe or deity, or both. According to C. J. Ball, 3 Lamech is an adaptation of the Babylonian Lamga, a title of Sin the moon god, and synonymous with Ubara in the name Ubara-Tutu, the Otiartes of Berossus, who is the ninth of the ten primitive Babylonian kings, and the father of the hero of the Babylonian flood story, just as Lamech is the ninth patriarch, and the father of Noah. Spurrell 4 states that Lamech cannot be explained from the Hebrew, but may possibly be connected with the Arabic yalmakun, ” a strong young man.”

Outside of Genesis, Lamech is only mentioned in the Bible in 1 Chron. i. 3, Luke iii. 36. Later Jewish tradition expanded and inter- preted the story in its usual fashion. (W. H. Be.)

LAMEGO, a city of northern Portugal, in the district of Vizeu and formerly included in the province of Beira; 6 m. by road S. of the river Douro and 42 m. E. of Oporto. Pop. (1900)

1 The text of Gen. iv. 22 is partly corrupt ; and it is possible that the text used by the Septuagint did not contain Cain.

2 Gen. x. 2, Ezek. xxvii. 13.

3 Genesis, in Haupt’s Sacred Books of the Old Testament on iv. 19, cf. also the notes on 20-22, for Lamech’s family. The identification of Lamech with Lamga is also suggested by Sayce, Expository Times, vii. 367. Cf. also Cheyne, ” Cainites ” in Encyc. Biblica.

4 Notes on the Hebrew Text of Genesis, in loco.

9471. The nearest railway station is Peso da Regoa, on the opposite side of the Douro and on the Barca d’Alva-Oporto railway. Lamego is an ancient and picturesque city, in the midst of a beautiful mountain region. Its principal buildings are the 14th-century Gothic cathedral, Moorish citadel, Roman baths and a church which occupies the site of a mosque, and, though intrinsically commonplace, is celebrated in Portugal as the seat of the legendary cortes of 1143 or 1144 (see Portugal, History). The principal industries are viticulture and the

rearing of swine, which furnish the so-called ” Lisbon hams.” Lamego was a Moorish frontier fortress of some importance in the 9th and 10th centuries. It was captured in 1057 by Ferdinand I. of Castile and Leon.

LAMELLIBRANCHIA (Lat. lamella, a small or thin plate, and Gr. fipayxLa, gills), the fourth of the five classes of animals constituting the phylum Mollusca (q.v.). The Lamellibranchia are mainly characterized by the rudimentary condition of the head, and the retention of the primitive bilateral symmetry, the latter feature being accentuated by the lateral compression of the body and the development of the shell as two bilaterally symmetrical plates or valves covering each one side of the animal. The foot is commonly a simple cylindrical or plough- share-shaped organ, used for boring in sand and mud, and more rarely presents a crawling disk similar to that of Gastropoda; in some forms it is aborted. The paired ctenidia are very greatly developed right and left of the elongated body, and form the most prominent organ of the group. Their function is chiefly not respiratory but nutritive, since it is by the currents produced by their ciliated surface that food-particles are brought to the feebly-developed mouth and buccal cavity.

The Lamellibranchia present as a whole a somewhat uniform structure. The chief points in which they vary are — (1) in the structure of the ctenidia or branchial plates; (2) in the presence of one or of two chief muscles, the fibres of which run across the animal’s body from one valve of the shell to the other (adductors) ; (3) in the greater or less elaboration of the posterior portion of the mantle-skirt so as to form a pair of tubes, by one of which water is introduced into the sub-pallial chamber, whilst by the other it is expelled; (4) in the perfect or deficient symmetry of the two valves of the shell and the connected soft parts, as compared with one another; (5) in the development of the foot as a disk-like crawling organ (Area, Nucula, Pectunculus, Trigonia, Lepton, Galeomma), as a simple plough-like or tongue- shaped organ (Unionidae, &c), as a re-curved saltatory organ (Cardium, &c), as a long burrowing cylinder (Solenidae, &c), or its partial (Mytilacea) or even complete abortion (Ostraeacea). The essential Molluscan organs are, with these exceptions, uniformly well developed. The mantle-skirt is always long, and hides the rest of the animal from view, its dependent margins meeting in the middle line below the ventral surface when the animal is retracted; it is, as it were, slit in the median line before and behind so as to form two flaps, a right and a left; on these the right and the left calcareous valves of the shell are borne respectively, connected by an uncalcified part of the shell called the ligament. In many embryo Lamellibranchs

a centro-dorsal primitive shell-gland or follicle has been detected. The mouth lies in the median line anteriorly, the anus in the median line posteriorly.

Both ctenidia, right and left, are invariably present, the axis of each taking origin from the side of the body as in the schematic archi-Mollusc (see fig. 15). A pair of renal tubes opening right and left, rather far forward on the sides of the body, are always present. Each opens by its internal extremity into the peri- cardium. A pair of genital -apertures, connected by genital ducts with the paired gonads, are found right and left near the nephridial pores, except in a few cases where the genital duct joins that of the renal organ (Spondylus). The sexes are often, but not always, distinct. No accessory glands or copulatory organs are ever present in Lamellibranchs. The ctenidia often act as brood-pouches.

A dorsal contractile heart, with symmetrical right and left I auricles receiving aerated blood from the ctenidia and mantle-

skirt, is present, being unequally developed only in those few foims which are inequivalve. T,he typical pericardium is well developed. It, as in other Mollusca, is not a blood-space but develops from the coelom, and it communicates with the exterior by the pair of renal tubes. As in Cephalopoda (and possibly other Mollusca) water can be introduced through the nephridia into this space. The alimentary canal keeps very nearly to the median vertical plane whilst exhibiting a number of flexures and loopings in this plane. A pair of large glandular outgrowths, the so-called ” liver ” or great digestive gland, exists as in other Molluscs. A pair of pedal otocysts, and a pair of osphradia at the base of the gills, appear to be always present. A typical nervous system is present (fig. 19), consisting of a cerebro-pleural ganglion-pair, united by connectives to a pedal ganglion-pair and a visceral ganglion-pair (parieto- splanchnic).

A pyloric caecum connected with the stomach is commonly found, containing a tough flexible cylinder of transparent cartilaginous appearance, called the ” crystalline style ” (Mactra). In many Lamellibranchs a gland is found on the hinder surface of the foot in the mid line, which secretes a substance which sets into the form of threads — the so-called ” byssus ” — by means of which the animal can fix itself. Sometimes this gland is found in the young and not in

the adult (Anodonla, Ur.io, Cyclas). In some Lamellibranchs (Pecten, Spondylus, Pholas, Mactra, Tellina, Pectunculus, Galeomma, &c), although cephalic eyes are generally absent, special eyes are developed on the free margin of the mantle-skirt, apparently by the modification of tentacles commonly found there. There are no pores in the foot or elsewhere in Lamellibranchia by which water can pass into and out of the vascular system, as formerly asserted.

The Lamellibranchia live chiefly in the sea, some in fresh waters. A. very few have the power of swimming by opening and shutting the valves of the shell {Pecten, Lima); most can crawl slowly or burrow rapidly; others are, when adult, permanently fixed to stones or rocks either by the shell or the byssus. In develop- ment some Lamellibranchia pass through a free-swimming trochosphere stage with preoral ciliated band; other fresh-

(l]l(‘*H? rn I

aij rj

Fig. I. — Diagrams of the external form and anatomy of Anodonta cygnea, the Pond-Mussel; in figures I, 3, 4, 5, 6 the animal is seen from the left side, the centro-dorsal region uppermost. (1) Animal removed from its shell, a probe g passed into the sub-pallial chamber through the excurrent siphonal notch. (2) View from the ventral surface of an Anodon with its foot expanded and issuing from between the gaping shells. (3) The left mantle-flap reflected upwards so as to expose the sides of the body. (4) Diagrammatic section of Anodon to show the course of the alimentary canal. (5) The two gill-plates of the left side reflected upwards so as to expose the fissure between

foot and gill where the probe g passes. (6) Diagram to show the positions of the nerve-ganglia, heart and nephridia. Letters in all the figures as follows :

a, Centro-dorsal area. of the inner lamella of the

b, Margin of the left mantle- inner gill-plate and the side

flap. of the foot, through which

c, Margin of the right mantle- the probe g passes into the

flap. upper division of the sub-

d, Excurrent siphonal notch of pallial space.

the mantle margin. aa, Line of concrescence of the

e, Incurrent siphonal notch of inner lamella of the right

the mantle margin. inner gill-plate with the

/, Foot. inner lamella of the left

g, Probe passed into the inner gill-plate.

superior division of the sub- ah, ac, ad, Three pit-like depres-

pallial chamber through the sions in the median line

excurrent siphonal notch, of the foot supposed by

and issuing by the side of some writers to be pores ad-

the foot into the inferior mitting water into the

division of the sub-pallial vascular system,

chamber. ae, Left shell valve.

h, Anterior (pallial) adductor af, Space occupied by liver,

muscle of the shells. ag, Space occupied by gonad.

/, Anterior retractor muscle of ah, Muscular substance of the

the foot. . foot.

k, Protractor muscle of the foot. ai, Duct of the liver on the wall

/, Posterior (pedal) adductor of the stomach,

muscle of the shells. ak, Stomach.

m, Posterior retractor muscle of at, Rectum traversing the ven-

the foot. tricle of the heart.

n, Anterior labial tentacle. am, Pericardium.

0, Posterior labial tentacle. an, Glandular portion of the left

p, Base-line of origin of the re- nephridium.

fleeted mantle-flap from the ap, Ventricle of the heart.

side of the body. aq, Aperture by which the left

q, Left external gill-plate. auricle joins the ventricle.

r, Left internal gill-plate. ar, Non-glandular portion of the

rr, Inner lamella of the right left nephridium.

inner gill-plate. as, Anus.

rg, Right outer gill-plate. at, Pore leading from the peri-

s, Line of concrescence of the cardium into the glandular outer lamella of the left sac of the left nephridium. outer gill-plate with the left au, Pore leading from the gland- mantle-flap, ular into the non-glandular

t, Pallial tentacles. portion of the left neph-

u; The thickened muscular ridium.

pallial margin which ad- av, Internal pore leading from

heres to the shell and forms the non-glandular portion

the pallial line of the left of the left nephridium to the

side. external pore x.

v, That of the right side. aw, Left cerebro-pleuro-visceral

iv, The mouth. ganglion.

x, Aperture of the left organ ax, Left pedal ganglion,

of Bojanus (nephridium) ay, Left otocyst.

exposed by cutting the az, Left olfactory ganglion

attachment of the inner (parieto-splanchnic).

lamella of the inner gill- bb, Floor of the pericardium

plate. separating that space from

y, Aperture of the genital duct. the non-glandular portion of

z, Fissure between the free edge the nephridia.

water forms which carry the young in brood-pouches formed by the ctenidia have suppressed this larval phase.

As an example of the organization of a Lamellibranch, we shall review the structure of the common pond-mussel or swan mussel (Anodonta cygnea), comparing it with other Lamelli- branchia.

The swan-mussel has superficially a perfectly developed bilateral . symmetry. The left side of the animal is seen as when removed from its shell in fig. I (1). The valves of the shell have been removed by severing their adhesions to the muscular areae h, i, k, I, m, u. The free edge of the left half of the mantle-skirt b is represented as a little contracted in order to show the exactly similar free edge of the right half of the mantle-skirt c. These edges are not attached to, although they touch, one another; each flap (right or left) can be freely thrown back in the way carried out in fig. 1 (3) for that of the left side. This is not always the case with Lamellibranchs; there is in the group a tendency for the corresponding edges of the mantle-skirt to fuse together by concrescence, and so to form a more or less completely closed bag, as in the Scaphopoda (Dentalium). In this way the notches d, e of the hinder part of the mantle-skirt of Anodonta axe in the siphonate forms converted into two separate holes, the edges of the mantle being elsewhere fused together along this hinder margin. Further than this, the part of the mantle-skirt bounding the two holes is frequently drawn out so as to form a pair of tubes which project from the shell (figs. 8, 29). In such Lamellibranchs as the oysters, scallops and many others which have the edges of the mantle- skirt quite free, there are numerous tentacles upon those edges.

*H

LAMELLIBRANCHIA

‘:> lunule

width

In Anodonta these pallial tentacles are confined to a small area sur- rounding the inferior siphonal notch (fig. I [3], t). When the edges of the mantle ventral to the inhalant orifice are united, an anterior aperture is left for the protrusion of the foot, and thus there are three pallial apertures altogether, and species in this condition are called ” Tripora.” This is the usual condition in the Eulamellibranchia and Septibranchia. When the pedal aperture is small and far forward there

may be a fourth aperture in the region of the fusion behind the pedal aperture. This occurs in Solen, and such forms are called ” Quadrifora.”

The centro-dorsal point a of the animal of Anodonta (fig. I [1]) is called the umbonal area; tjje great anterior muscular surface h is that of the anterior adductor muscle, the posterior similar surface i is that of the posterior adductor muscle; the long line of attachment « is the simple pallial muscle,” — a thickened ridge which is seen to run parallel to the margin of the mantle-skirt in this Lamellibranch. In siphonate forms the pallial muscle is not simple, but is in- dented posteriorly by a sinus formed by the muscles which retract the siphons.

It is the approximate equality in the size of the anterior and posterior ad- ductor muscles which led to the name Isomya for the group to which Anodonta belongs. The hinder adductor muscle is always large in Lamellibranchs, but the anterior adductor may be very small (Heteromya), or absent altogether (Monomya). The anterior adductor r „ v i.l.,,,, muscle is in front of the mouth and FiG.2.-Viewof thetwo aliment tract a l toget her, and must Va ves of the Shell of foe ˆ as ˆ and liar

Cyherea (one of the Sinu- devel J t of the Median anterior part

palliate Isomya), from the of the P ma ntle-flap. The posterior ad- dorsal aspect. ˆ ductor is ventral and anterior to the anus. The former classification based on these differences in the adductor muscles is now abandoned, having proved to be an un- natural one. A single family may include isomyarian, anisomyarian and monomyarian forms, and the latter in development pass through stages in which they resemble the first two. In fact all Lamellibranchs begin with a condition in which there is only one adductor, and that not the posterior but the anterior. This is called the protomono- myarian stage. Then the posterior adductor develops, and becomes equal to the anterior, and finally in some cases the anterior becomes smaller or disappears. The single adductor muscle of the Monomya is separated by a difference of fibre into two portions, but neither of these can be regarded as possibly representing the anterior adductor of the other Lamellibranchs. One of these portions is more liga- mentous and

ligament

.rnnlo \ lunule

Fig. 3. — Right Valve of the same Shell from the Outer Face.

concavity of the shells act upon the long arms of the lever at a mechanical advantage; their contraction keeps the shells shut, and stretches the ligament or spring K. On the other hand, the ligament h acts upon the short arm formed by the umbonal ridge of the shells; whenever the adductors relax, the elastic substance of the ligament contracts, and the shells gape. It is on this account that the valves of a dead Lamellibranch always gape; the elastic ligament is no longer counteracted by the effort of the adductors. The state of closure of the valves of the shell is not, therefore, one of rest; when it is at rest — that is,

Kpamenz

-lunate

Fig. 4. — Left Valve of the same Shell from the Inner Face. (Figs. 2, 3, 4 from Owen.)

serves to keep the two shells con- stantly attached to one another, whilst the more fleshy portion serves to close the shell rapidly when it has been gaping. In removing the valves of the shell from an A nodonta, it is necessary not only to cut through the mus- cular attachments of the body-wall to the shell but to sever also a strong elastic ligament, or spring resem- bling india-rubber, joining the two shells about the umbonal area. The shell of Anodonta does not present these parts in the most strongly marked condition, and accordingly our figures (figs. 2, 3, 4) represent the valves of the sinupalliate genus Cytherea. The corre- sponding parts are recognizable in Anodonta. Referring to the figures (2, 3) for an explanation of terms applicable to the parts of the valve and the markings on its inner surface — corresponding to the muscular areas already noted on the surface of the animal's body— we must specially note here the position of that denticulated thickening of the dorsal margin of the valve which is called the hinge (fig. 4). By this hinge one valve is closely fitted to the other. Below this hinge each shell becomes concave, above it each shell rises a little to form the umbo, and it is into this ridge-like upgrowth of each valve that the elastic ligament or spring is fixed (fig.' 4). As shown in the diagram (fig. 5) representing a transverse section of the two valves of a Lamellibranch, the two shells form a double lever, of which the toothed-hinge is the fulcrum. The adductor muscles placed in the

when there is no mus- cular effort — the valves of a Lamellibranch are

slightly gaping, and are closed by the action of the adductors when the animal is disturbed. The ligament is simple in Anodonta; in many Lam- ellibranchs it is separated into two layers, an outer and an inner (thicker and denser). That the con- dition of gaping of the shell-valves is essential to the life of the Lamelli- branch. appears from the fact that food to nourish it, water to aerate its blood, and spermatozoa to fertilize its eggs, are all introduced into this gaping chamber by currents of water, set going by the highly- developed ctenidia. The current of water enters into the sub-pallial space at the spot marked e in fig. 1 (1), and, after passing as far for- ward as the mouth w in fig. 1 (5), takes an outward course and leaves the sub-pallial space by the upper notch d. These notches are known in Anodonta as the afferent and efferent siphonal notches respectively, and correspond to the long tube-like afferent inferior and efferent superior ” siphons ” formed by the mantle in many other Lamellibranchs (fig. 8).

Whilst the valves of the shell are equal in Anodonta we find in many Lamellibranchs (Ostraea, Ckama, Corbula, &c.) one valve

larger, and the other smaller and sometimes

flat, whilst the larger shell may be fixed to

rock or to stones (Ostraea, &c). A further

variation consists in the development of

additional shelly plates upon the dorsal line

between the two large valves (Pholadidae) . In

Pholas dactylus we find a pair of umbonal

plates, a dors-umbonal plate and a dorsal

plate. It is to be remembered that the whole ˆ

of the cuticular hard product produced on

the dorsal surface and on the mantle-flaps

is to be regarded as the ” shell,” of which a

median band-like area, the ligament, usually

remains uncalcified, so as to result in the pro- duction of two valves united by the elastic

ligament. But the shelly substance does not

always in boring forms adhere to this form

after its first growth. In Aspergillum the

whole of the tubular mantle area secretes a

continuous shelly tube, although in the young

condition two valves were present. These

are seen (fig. 7) set in the firm substance of

the adult tubular shell, which has even re- placed the ligament, so that the tube is f

complete. In Teredo a similar tube is formed

as the animal elongates (boring in wood)

Fig. 5. — Diagram

a section of a

Lamellibranch’s

shells, ligament and

the original shell-valves not adhering to it adductor muscle.

a, b, right and left valves of the shell; the umbones or

but remaining movable and provided with a special muscular apparatus in place of a

ligament. In the shell of Lamellibranchs v tuv _ u „i„«.«-<. ul three distinct layers can be distinguished: sn0 rt arms of the an external chitinous, hon-calcified layer, the lever; e, /, the long periostracum ; a middle layer composed of arms' of' the lever; calcareous prisms perpendicular to the surface, „ the hinge; h, the the prismatic layer ; and an internal layer ligament ; i, 'the ad- composed of laminae parallel to the surface, ductor muscle, the nacreous layer. The last is secreted by the

whole surface of the mantle except the border, and additions to its thickness continue to be made through life. The periostracum is

produced by the extreme edge of the mantle border, the prismatic layer by the part of the border within the edge. These two layers, therefore, when once formed cannot increase in thickness; as the mantle grows in extent its border passes beyond the formed parts of the two outer layers, and the latter are covered internally by a deposit of nacreous matter. Special deposits of the nacreous matter around foreign bodies form pearls, the foreign nucleus being usually of parasitic origin (see Pearl).

LAMELLIBRANCHIA

IJ 5

Let us now examine the organs which lie beneath the mantle-skirt of Anodonta, and are bathed by the current of water which circulates through it. This can be done by lifting up and throwing back the left half of the mantle-skirt as is represented in fig. I (3). We thus expose the plough-like foot (/), the two left labial tentacles, and the two left gill-plates or left ctenidium. In fig. I (5), one of the labial tentacles n is also thrown back to show the mouth w, and the two left gill-plates are reflected to show the gill-plates of the right side (rr, ra) pro- jecting behind the foot, the inner or median plate of each side being united by concrescence to its fellow of the opposite side along a continuous line (aa). The left inner gill-plate is also snipped to show the subjacent orifices of the left renal organ x, and of the genital gland (testis or ovary) y. The foot thus exposed in Anodonta is a simple muscular tongue-like organ. It can be pro- truded between the flaps of the mantle (fig. I [1] [2]) so as to issue from the shell, and by its action the Anodonta can slowly crawl or burrow in soft mud or sand. Other Lamelli- branchs may have a larger foot relatively than has Anodonta. In Area it has a sole-like surface. In Area too and many others it carries a byssus-forming gland and a byssus- cementing gland. In the cockles, in Cardium and in Trigonia, it is capable of a sudden stroke, which causes the animal to jump when out of the water, in the latter genus to a

:a_v.

Fig. 6.— Shell of A spergillum vagini- ferunt. (FromOwen.)

Fig. 7. — Shell of Aspergillum vaginiferum to show the original valves a, now embedded in a con- tinuous calcification of tubular form. (From Owen.)

height of four feet. In Mytilus the foot is reduced to little more than a

tubercle carrying the apertures of these glands. In the oyster it is absent altogether.

The labial tentacles or palps of Anodonta (re, in fig. 1 [3], [5]) are highly vascular flat processes richly supplied with nerves. The left anterior tentacle (seen in the figure) is joined at its base in front of the mouth (w) to the right anterior tentacle, and similarly the left (0) and right posterior tentacles are joined behind the mouth. Those of Area (i, k in fig. 9) show this relation to the mouth (a). These organs are characteristic of all Lamellibranchs; they do not vary except in

condition in the ancestors of the whole series of living Lamelli- branchia. The phenomenon of ” concrescence ” which we have already had to note as showing itself so importantly in regard to the free edges of the mantle-skirt and the formation of the siphons, is what, above all things, has complicated the structure of the Larhellibranch ctenidium. Our present knowledge of the interest- ing series of modifications through which the Lamellibranch gill- plates have developed to their most complicated form is due to R. H. Peck, K. Mitsukuri and W. G. Ridewood. The Molluscan ctenidium is typically a plume- like structure, consisting of a vascular axis, on each side of which is set a row of numerous lamelliform or filamentous pro- cesses. These processes are hollow, and receive the venous blood from, and return it again aerated into, the hollow axis, in which an afferent and an efferent blood-vessel may be differentiated. In the genus Nucula (fig. 10) we have an example of a Lamellibranch retaining this plume-like form of gill. In the Arcacea (e.g. Area and Pectunculus) the lateral processes which are set on the axis of the ctenidium are not lamellae, but are slightly flat- tened, very long tubes or hollow filaments. These filaments are so fine and are set so closely together that they appear to form a continuous membrane until examined with a lens. The microscope shows that the neighbouring filaments are held together by patches of cilia, called ” ciliated junctions,” which interlock with one another just as two brushes may be made to do. In fig. 11, A a portion of four filaments of a ctenidium of the sea-mussel (Mytilus) is represented, having precisely the same structure as those of Area. The filaments of the gill (ctenidium) of Mytilus and Area thus form two closely set rows which depend from the axis of the gill like two parallel plates. Further, their structure is profoundly modified by the curious condition of the free ends of the depending filaments.

Fig. 8. — Psammobia florida, right side, showing ex- panded foot e, and g incurrent and g’ excurrent siphons. (From Owen.)

size, being sometimes drawn out to streamer-like dimensions. Their

appearance and position suggest that they are in some way related morphologically to the gill-plates, the anterior labial tentacle being a continuation of the outer gill-plate, and the posterior a continuation of the inner gill-plate. There is no embryological evidence to support this suggested connexion, and, as will appear immediately, the history of the gill-plates in various forms of Lamellibranchs does not directly favour it. The palps are really derived from part of the velar area of the larva.

The gill-plates have a structure very different from that of the labial tentacles, and one which in Anodonta is singularly complicated as compared with the condition presented by these organs in some other Lamellibranchs, and with what must have been their original

Fig. 9. — View from the ventral (pedal) aspect of the animal of Area noae, the mantle-flap and gill-filaments having been cut away. (Lankester.)

a, Mouth.

b, Anus.

c, Free spirally turned extremity of the gill-axis or ctenidial axis of the right side.

d, Do. of the left side.

e, f, Anterior portions of these axes fused by concrescence to the wall of the body.

Anterior adductor muscle. Posterior adductor. Anterior labial tentacle. Posterior labial tentacle. Base line of the foot. Sole of the foot. Callosity.

These are actually reflected at a sharp angle — doubled on themselves in fact — and thus form an additional row of filaments (see fig. 11 B). Consequently, each primitive filament has a descending and an ascend- ing ramus, and instead of each row forming a simple plate, the plate is double, consisting of a descending and an ascending lamella. As the axis of the ctenidium lies by the side of the body, and is very frequently connate with the body, as so often happens in Gastropods also, we find it convenient to speak of the two plate-like structures formed on each ctenidial axis as the outer and the inner gill-plate ; each of these is composed of two lamellae, an outer (the reflected) and an adaxial in the case of the outer gill- plate, and an adaxial and an inner (the reflected) in the case of the inner gill-plate. This is the

condition seen in Area and Mytilus, the so-called plates dividing upon the slightest touch into their constituent filaments, which are but loosely conjoined by their ” ciliated junctions.” Complications follow upon this in other forms. Even in Mytilus and Area a connexion is here and there formed between the ascending and descending rami of a filament by hollow extensible outgrowths called ” interlamellar junctions ” (il.j in B, fig. 11). Nevertheless the filament is a complete tube formed of chitinous substance and ˆ clothed externally by ciliated epithelium, internally by endothelium and lacunar tissue — a form of connective tissue — as shown in fig. 1 1 , C Now let us supposeas happens in the genus Dreissensid — a genus not far removed from Mytilus — that the ciliated inter-filamentar junctions (fig. 12) give place to solid permanent inter-filamentar junctions, so that the filaments are converted, as it were, into a trellis- work. Then let us suppose that the inter-lamellar junctions already noted in Mytilus become very numerous, large and irregular; by them the two trellis-works of filaments would be united so as to leave only a sponge-like set of spaces between them. Within the trabeculae of the sponge- work blood circulates, and between the trabeculae the water passes, having entered by the apertures left in the trellis- work formed by the united gill-filaments (fig. 14). The larger the

intralamellar spongy growth becomes, the more do the original gill-filaments lose the character of blood-holding tubes, and tend to become dense elastic rods for the simple purpose of supporting the spongy growth. This is seen both in the section of Dreissensia gill (fig. 12) and in those of Anodonta (fig. 13, A,B,C). In the drawing of Dreiss- ensia the individual filaments/,/,/ are cut across in one lamella at the

Fig. 10. — Structure of the Ctenidia of Nucula. See also fig. 2.

(After Mitsukuri.)

A. Section across the axis of a

ctenidium with a pair of plates — flattened and

shortened filaments — at- tached. ij,k,g Are placed on or near the membrane which attaches the axis of the ctenidium to the side of the body.

Free extremities of the plates (filaments).

Mid-line of the inferior border.

Surface of the plate.

Its upper border.

Chitinous lining of the plate.

Dilated blood-space.

Fibrous tract.

Upper blood-vessel of the axis.

Lower blood-vessel of the axis.

Chitinous framework of the axis. cp, Canal in the same.

A, B, Line along which the cross-

section C of the plate is taken.

B. Animal of a male Nucula

proxima, Say, as seen when

a,b, d,

e,

t, h,

a,a,

p.a,

v.m,

f,

i<

I,

La,

lb,

n,

s,

C.

i.O;

d.a,

l-f, e,

the left valve of the shell

and the left half of the mantle-skirt are removed.

Anterior adductor muscle.

Posterior adductor muscle.

Visceral mass.

Foot.

Gill.

Labial Tentacle.

Filamentous appendage of the labial tentacle.

Hood-like appendage of the labial tentacle.

Membrane suspending gill and attached to body along the line x w.

Posterior end of the (ctenidium).

Section across one of the gill- plates (A, B, in A) com- parable with fig. 11 C.

Outer border.

Axial border.

Latero-frontal epithelium.

Epithelium of general sur- face.

Dilated blood-space. Chitinous lining (compare A).

the the

y, z,

gill

filament. Although the structure> of the ctenidium is thus highly complicated in Anodonta, it is yet more so in some of the siphonate genera of Lamellibranchs. The filaments take on a secondary grouping, the surface of the lamella being thrown into a series of half-cylindrical ridges, each consisting of ten or twenty filaments; a filament of much greater strength and thickness than the others may be placed between each pair of groups. In Anodonta, as in many other Lamellibranchs, the ova and hatched embryos are carried for a time in the ctenidia or gill apparatus, and in this particular case the space between the two lamellae of the outer gill-plate is that which serves to receive the ova (fig. 13, A). The young are nourished by a substance formed by the cells which cover the spongy inter-lamellar outgrowths.

Other points in the modification of the typical ctenidium must be noted in order to understand the ctenidium of Anodonta. The axis of each ctenidium, right and left, starts from a point well forward

Sd«

horizon of an inter-filamentar junction, in the other (lower in the figure) at a point where they are free. The chitinous substance ch is observed to be greatly thickened as compared with what it is in fig. 11, C, tending in fact to obliterate altogether the lumen of the filament. And in Anodonta (fig. 13, C) this obliteration is effected. In Anodonta, besides being thickened, the skeletal substance of the filament develops a specially dense, rod-like body on each side of each

1« v} f^f

¥1

Fig. 11. — Filaments of the Ctenidium of Mytilus edulis. (After R. H. Peck.)

A.Part of four filaments seen from the outer face in order to show the ciliated junctions c.j.

B , Diagram of the posterior face of a single complete filament with

descending ramus and ascending ramus ending in a hook-like pro- cess ;ep. ,ep. ,the ciliated j unctions ; U,j., inter-lamellar junction.

C, Transverse section of a fila-

ment taken so as to cut neither a ciliated junction nor an inter-lamellar junction, f.e., Frontal epithelium; l.f.e'., l.f.e"., the two rows of latero-frontal epithelial cells with long cilia ; ch, chitinous tubular lining of the filament; lac, blood lacuna traversed by a few processes of connective tissue cells; b.c, blood-corpuscle.

near the labial tentacles, but it is at first only a ridge, and does not project as a free cylindrical axis until the back part of the foot is reached. This is difficult to see in Anodonta, but if the mantle-skirt be entirely cleared away, and if the dependent lamellae which spring from the ctenidial axis be carefully cropped so as to leave the%xis itself intact, we obtain the form shown in fig. 15, where g and h are respectively the left and the right ctenidial axes projecting freely beyond the body. In Area this can be seen with far less trouble, for the filaments are more easily removed than are the consolidated lamellae formed by the filaments of Anodonta, and in Area the free axes of the ctenidia are large and firm in texture (fig. 9, c,d).

If we were to make a vertical section across the long axis of a Lamellibranch which had the axis of its ctenidium free from its origin onwards, we should find such relations as are shown in the diagram fig. 16, A. The gill axis d is seen lying in the sub-pallial chamber between the foot ft and the mantle c. From it depend the gill-filaments or lamellae — formed by united filaments — drawn as black lines/. On the left side these lamellae are represented as having only a small reflected growth, on the right side the reflected ramus or lamella is complete (Jr and er). The actual condition in Anodonta at the region where the gills begin anteriorly is shown in fig. 16, B. The axis of the ctenidium is seen to be adherent to, or fused by con- crescence with, the body-wall, and moreover on each side the outer lamella of the outer gill-plate is fused to the mantle, whilst the inner lamella of the inner gill-plate is fused to the foot. If we take another I section nearer the hinder margin of the foot, we get the arrangement

A }%'

i

f – f f f ‘ / s

Fig. 12. — Transverse Section of the Outer Gill-plate of Dreissensia polymorpha.

Constituent gill-filaments. Fibroussub-epidermic tissue. Chitonous substance of the filaments. nch, Cells related to the chitonous

substance. lac, Lacunar tissue. pig, Pigment-cells.

(After R. H. Peck.) be, Blood-corpuscles. fe, Frontal epithelium. Ife’, // e”,Tworowsoflatero-frontal epithelial cells with long cilia. Irf, Fibrous, possibly muscular, i substance of the inter- filamentar junctions.

A, B, C,

o.l, i.l, v,

Fig. 13. — Transverse Sections of Gill-plates of Anodonta. (After R. H. Peck.)

Outer gill-plate. /,

Inner gill-plate. lac,

A portion of B more highly ch, Outer lamella. [magnified.

Inner lamella. chr, Blood-vessel.

shown diagrammatically in fig. 16, C, and more correctly in fig. 17. In this region the inner lamellae of the inner gill-plates are no longer

lit

- f ~~~mmˆf f. f f f f fill

Constituent filaments.

Lacunar tissue.

Chitonous substance of the

filament. Chitonous rod embedded in

the softer substance ch,’

Fig. 14.— Gill-lamellae of Anodonta. (After R. H. Peck.)

Diagram of a block cut from the outer lamella of the outer gill-plate and seen from the inter- lamellar surface. /, Constituent filaments ; trf, fibrous tissue of the transverse inter-filamentar junc- tions; v, blood-vessel tij, Inter-

lamellar junction. The series ot oval holes on the back of the lamella are the water-pores which open between the filaments in irregular rows separated hori- zontally by the transverse inter- filmentar junctions.

affixed to the foot Passing still farther back behind the foot, we

find in Anodonta the condition shown in the section D, fig. 16. The

axes i are now free; the

outer lamellae of the outer

gill-plates (er) still adhere

by concrescence to the

mantle-skirt, whilst the

inner lamellae of the inner

gill-plates meet one another

and fuse by concrescence at ˆ

g. In the lateral view of

the animal with reflected

mantle-skirt and gill-plates,

the line of concrescence of

the inner lamellae of the

inner gill-plates is readily

seen ; it is marked aa in

fig- J (5)- I n tne same

figure the free part of the _ ._, . . t

inner lamella of the inner Fp- I.5-— Diagram 1 of a view from

gill-plate resting on the foot the Ieft s ‘ de of th _e animal of Anodonta

is marked z, whilst the at- cygnaea, from which the mantle-skirt,

tached part the most tne ‘ aD,a ‘ tentacles and the gill-fila-

anterior— has’ been snipped ™ents have been entirely removed so with scissors so as to show a f *° show t he relations of the axis the genital and nephridial of * h . e g‘11-plumes or ctenidia g, h. apertures x and y. The con- (Original.) crescence then of the free a > Lentro- dorsal area, edge of the reflected lamellae b < Anterior adductor muscle, of the gill-plates of Anodon c > Posterior adductor muscle, is very extensive. It is im- “> portant, because such a ‘• concrescence is by no means h Jl 00 ˆ . ,

universal, and does not «• Free Portion of the axis of left for example

Mouth. Anus.

h.

ctenidium.

Axis of right ctenidium.

Portion of the axis of the left

ctenidium which is fused with the

base of the foot, the two dotted

lines indicating the origins of the

two rows of gill-filaments.

m, Line of origin of the anterior labia’

tentacle.

occur

Mytilus or in Area; further, because when its occurrence is once appreciated, the re- duction of the gill-plates of Anodonta to the plume-type of the simplest ctenidium presents no difficulty; and, lastly, it has importance in .

reference to its physiological «. Nephridial aperture, significance. The mechani- “, Genital aperture cal result of the concrescence of the outer lamellae to the mantle-flap, and of the inner

lamellae to one another as shown in section D, fig. 16, is that the sub-pallial space is divided into two spaces by a horizontal septum: The upper space (i) communicates with the outer world

Line of origin of the posterior labial tentacle.

n8

LAMELLIBRANCHIA

by the excurrent or superior siphonal notch of the mantle (fig. i, d); the lower space communicates by the lower siphonal

Fig. i 6. — Diagrams of Transverse Sections of a Lamellibranch to show the Adhesion, by Concrescence, of the Gill-Lamellae to the iMantle-flaps, to the foot and to. one another. (Lankester.)

A.

with

Shows two conditions free gill-axis.

B, Condition at foremost region

in Anodonta. [donta.

C, Hind region of foot in Ano-

D, Region altogether posterior to

the foot in Anodonta.

a, Visceral mass.

b, Foot.

c, Mantle flap.

d, Axis of gill or ctenidium.

e, Adaxial lamella of outer gill-

plate.

er, Reflected lamella of outer gill- plate.

/, Adaxial lamella of inner gill- plate.

fr, Reflected lamella of inner gill-plate.

g, Line of concrescence of the reflected lamellae of the two inner gill-plates.

h, Rectum.

i, Supra-branchial space of the sub-pallial chamber.

notch (e in fig. i). The only communication between the two spaces, excepting through the trellis-work of the gill-plates, is by

the slit (z in fig. I (5)) left by the non-concrescence of a part of the inner lamella of the inner gill-plate with the foot, A probe (g) is introduced through this slit-like passage, and it is seen to pass out by the excurrent siphonal notch. It is through this passage, or in- directly through the pores of the gill-plates, that the water introduced into the lower sub- pallial space must pass on its way to the excurrent siphonal notch. Such a subdivision of the pallial chamber, and direc- tionof thecurrentssetupwithin it do not exist in a number of Lamellibranchs which have the gill-lamellae comparatively free {Mytilus, Area, Trigonia, &c), and it is in these forms that t- ._ it .. , o ,.• ..v. u there is least modification by ˆ•JˆL.t'l-H ” 8 ˆncrescence of the primary ˆAnodonta, about the nud-region filamentous elements of the

of the Foot. m, Mantle-flap.

br

f.

Outer, b'r', inner gill-plate- composed of two lamellae.

Foot.

Ventricle of the heart. a. Auricle.

p,p', Pericardial cavity. i, Intestine.

each

excurrent stream passes. The coil of the intestine in Anodonta is similar to that of other Lamellibranchs. The rectum traverses the

pericardium, and has the ventricle of the heart wrapped, as it were, around it. This is not an unusual arrangement in Lamellibranchs, and a similar disposition occurs in some Gastropoda (HaUolis). A pair of ducts (o«) lead from the first enlargement of the alimentary tract called stomach into a pair of large digestive glands, the so- called liver, the branches of which are closely packed in this region (a/). The food of the Anodonta, as of other Lamellibranchs, consists of microscopic animal and vegetable organisms, brought to the mouth by the stream which sets into the sub-pallial chamber at the lower siphonal notch (e in fig. 1). Probably a straining of water from solid particles is effected by the lattice-work of the ctenidia or gill-plates.

The heart of Anodonta consists of a median ventricle embracing the rectum (fig. 18, A), and giving off an anterior and a posterior artery,

lamellae.

In the 9th edition of this Encyclopaedia Professor (Sir) E. R. Lankester suggested that these differences of gill-struc- ture would furnish characters of classificatory value, and this suggestion has been followed out by Dr Paul Pelseneer in the classification now generally adopted.

The alimentary canal of Anodonta is shown in fig. I (4). The mouth is placed between the anterior adductor and the foot; the anus opens on a median papilla overlying the posterior adductor, and discharges into the superior pallial chamber along which the

A.

Fig. 18. — Diagrams showing the Relations of Pericardium Nephridia in a Lamellibranch such as Anodonta.

and

B,

Pericardium opened dorsally so as to expose the heart and the floor of the pericardial chamber d.

Heart removed and floor of the pericardium cut away on the left side so as to open the non-glandular sac of the nephridium, exposing the glandular sac b, which is also cut into so as to show the probe /.

C, Ideal pericardium and neph-

ridium viewed laterally.

D, Lateral view showing the

actual relation of the glandu- lar and non-glandular sacs of the nephridium. The arrows indicate the course of fluid

Ventricle of the heart.

Auricle.

Cut remnant of the auricle.

Dorsal wall of the pericardium cut and reflected.

Reno-pericardial orifice.

Probe introduced into the left reno-pericardial orifice.

Non-glandular sac of the left nephridium.

Glandular sac of the left nephridium. i, Pore leading from the glandu- lar into the non-glandular sac of the left nephridium. k, Pore leading from the non- glandular sac to the exterior. ac, Anterior.

ab, Posterior, cut remnants of the intestine and ventricle.

h,

from the pericardium out- wards.

and of two auricles which open into the ventricle by orifices pro- tected by valves.

The blood is colourless, and has colourless amoeboid corpuscles floating in it. In Ceratisolen legumen, various species of Area and a few other species the blood is crimson, owing to the presence of corpuscles impregnated with haemoglobin. In Anodonta the blood is driven by the ventricle through the arteries into vessel-like spaces, which soon become irregular lacunae surrounding the viscera, but in parts — e.g. the labial tentacles and walls of the gut— very fine vessels with endothelial cell-lining are found. The blood makes its way by large veins to a venous sinus which lies in the middle line below the heart, having the paired renal organs (nephridia) placed between it and that organ. Hence it passes through the vessels of the glandular walls of the nephridia right and left into the gill- lamellae, whence it returns through many openings into the widely- stretched auricles. In

the filaments of the gill of Protobranchia and many Filibranchia the tubular cavity is divided by a more or less complete fibrous septum into two channels, for an afferent and efferent blood-current. The ventricle and auricles of A nodonta lie in a pericardium which is clothed with a pavement endothelium (d, fig. 18).

Fig Cords

It does not contain blood or communicate directly with the blocd- 1 system; this isolation of the pericardium we have noted already in Gastropods and Cephalopods. A good case for the examination of the question as to whether blood enters the pericardium of Lamelli- branchs, or escapes from the foot, or by the renal organs when the animal suddenly contracts, is furnished by the Ceratisolen legumen, which has red blood-corpuscles. According to observations made by Penrose on an uninjured Ceratisolen legumen, no red corpuscles are

to be seen in the pericardial space, although the heart is filled with them, and no such corpuscles are ever discharged by the animal when it is irritated.

The pair of renal organs of Anodonta, called in Lamelli- branchs the organs of Bojanus, lie below the membranous floor of the pericardium, and open into it by two well-marked apertures (e and / in fig. 18). Each nephridium, after being bent upon itself as shown in fig. 18, C, D, opens to the exterior by a pore placed at the point marked x in fig. 1 (5) (6). One half of each nephridium is of a dark-green colour and glandular {h in fig. 18). This opens into the reflected portion which overlies it as shown in the diagram fig. 18, D, i; the 19. — Nerve- ganglia and latter has non-glandular walls, of three Lamellibranchs. and opens by the pore k to the (From Gegenbaur.) exterior. The renal organs

A Of Teredo md Y ˆ e more ramified in other

B, Of Anodonta. Lamellibranchs than they are

C Of Pecten ln Anodonta. In some they

a’, Cerebral ganglion-pair (= cere- are difficult to discover. That bro- pleuro-visceral). of * e 1 «’ mm < > n ˚y ste * w f de ”

b, Pedal ganglion-pair. seabed by Hoek. Each ne-

c, Olfactory (osphradial) ganglion- Phndium in the oyster is a

• J pynrorm sac, which communi-

*” ‘ cates by a narrow canal with

the urino-genital groove placed to the front of the great ad- ductor muscle; by a second narrow canal it communicates with the pericardium. From all parts of the pyriform sac narrow stalk-like tubes are given off, ending in abundant widely-spread branching glandular caeca, which form the essential renal secreting apparatus. The genital duct opens by a pore into the urino-genital groove of the oyster (the same arrangement being repeated on each side of the body) close to but distinct from the aperture of the nephridial canal. Hence, except for the formation of a urino-genital groove, the aper- tures are placed as they are in Anodonta. Previously to Hoek’s discovery a brown-coloured investment of the auricles of the heart of the oyster had been supposed to represent the nephridia in a rudi- mentary state. This investment, which occurs also in many Fili- branchia, forms the pericardial glands, comparable to the pericardial accessory glandular growths of Cephalopoda. In Unionidae and several other forms the pericardial glands are extended into diverti- cula of the pericardium which penetrate the mantle and constitute the organ of Heber. The glands secrete bippuric acid which passes from the pericardium into the renal organs.

Nervous System and Sense-Organs. — In Anodonta there are three well-developed pairs of nerve ganglia (fig. 19, B, and fig. 1 (6)). An anterior pair, lying one on each side of the mouth (fig. 19, B, a) and connected in front of it by a commissure, are the repre- sentatives of the cerebral and pleural ganglia of the typical Mollusc, which are not here differentiated as they are in Gastropods. A pair placed close together in the foot (fig. 19, B, b, and fig. 1 (6), ax) are the typical pedal ganglia ; they are joined to the cerebro- pleural ganglia by connectives. Posteriorly beneath the posterior adductors, and covered only by a thin layer of elongated epidermal cells, are the visceral ganglia. United with these ganglia on the outer sides are the osphradial ganglia, above which the epithelium is modified to form a pair of sense-organs, corresponding to the osphradia of other Molluscs. In some Lamellibranchs the osphradial ganglia receive nerve-fibres, not from the visceral ganglia, but from the cerebral ganglia along the visceral commissure. Formerly the posterior pair of ganglia were identified as simply the osphradial ganglia, and the anterior pair as

the cerebral, pleural and visceral ganglia united into a single pair. But it has since been discovered that in the Protobranchia the cerebral ganglia and the pleural are distinct, each giving origin to its own connective which runs to the pedal ganglion. The cerebro-

-Otocyst (From

Fig. 20.- of Cyclas. Gegenbaur.) c, Capsule, e, Ciliated cells lining

the same. 0, Otolith.

pedal and pleuro-pedal connectives, however, in these cases are only separate in the initial parts of their course, and unite together for the lower half of their length, or for nearly the whole length. Moreover, in many forms, in which in the adult condition there is only a single pair of anterior ganglia and a single pedal connective, a pleural ganglion distinct from the cerebral has been recognized in the course of development. There is, however, no evidence of the union of a visceral pair with the cerebro-pleural.

The sense-organs of Anodonta other than the osphradia consist of a pair of otocysts attached to the pedal ganglia (fig. I (6), ay). The otocysts of Cyclas are peculiarly favourable for study on account of the transparency of the small foot in which they lie, and may be taken as typical of those of Lamellibranchs generally. The structure of

Fig. 21. — Pallial Eye of Spondylus. (From Hickson.) ,

a, Prae-corneal epithelium. /, Retinal nerve.

b, Cellular lens. g, Complementary nerve.

c, Retinal body. h, Epithelial cells filled with

d, Tapetum. pigment.

e, Pigment. k, Tentacle.

one is exhibited in fig. 20. A single otolith is present as in the veliger embryos of Opisthobranchia. In Filibranchia and many Protobranchia the otocyst (or statocyst) contains numerous particles (otoconia). The organs are developed as invaginations of the epidermis of the foot, and in the majority of the Protobranchia the orifice of invagination remains open throughout life; this is also the case in Mytilus including the common mussel.

Anodonta has no eyes of any sort, and the tentacles on the mantle edge are limited to its posterior border. This deficiency is very usual in the class; at the same time, many Lamellibranchs have tentacles on the edge of the mantle supplied by a pair of large well-developed nerves, which are given off from the cerebro-pleural ganglion-pair,

-p-act

auv Ol

Fig. 22. — Two Stages in the Development of Anodonta. (From Balfour.) Both figures represent the glochidium stage.

A, When free swimming, shows

the two dentigerous valves widely open.

B, A later stage, after fixture to

the fin of a fish. sh, Shell.

ad, Adductor muscle. s, Teeth of the shell.

by, Byssus.

a.ad,Anterior adductor.

ad. Posterior- adductor.

mt, Mantle-flap.

/, Foot.

br, Branchial filaments.

au.v, Otocyst.

al, Alimentary canal.

and very frequently some of these tentacles have undergone a special metamorphosis converting them into highly-organized eyes. Such eyes on the mantle-edge are found in Pecten, Spondylus, Lima, Pinna, Pectunculus, Modiola, Cardium, Tellina, Mactra, Venus, Solen, Pholas and Galeomma. They are totally distinct from the cephalic eyes of typical Mollusca, and have a different structure and historical development. They have originated not as pits but as tentacles. They agree with the dorsal eyes of Oncidium (Pulmonata) in the curi- ous

fact that the optic nerve penetrates the capsule of the eye and passes in front of the retinal body (fig. 21), so that its fibres join the anterior faces of the nerve-end cells as in Vertebrates, instead of their posterior faces as in- the cephalic eyes of Mollusca and Arthro- poda; moreover, the lens is not a cuticular product but a cellular structure, which, again, is a feature of agreement with the Vertebrate

eye. It must, however, be distinctly borne in mind that there is a fundamental difference between the eye of Vertebrates and of all other groups in the fact that in the Vertebrata the retinal body is itself a part of the central nervous system, and not a separate

Fig. 23. — Development of the Oyster, Ostrea edulis. (Modified from Horst.)

bl, en,

ec, C,

eaten its way into the in- vaginated endodermal sac, and the cells pushed in with it constitute the stomodae- um. The shell-gland, sk, is flattened out, and a delicate shell, s, appears on its sur- face. The ciliated velar ring is cut in the section, as shown by the two projecting cilia on the upper part of the figure. The embryo is now a Trochosphere.

E, Surface view of an embryo at a period almost identical with that of D.

F, Later embryo seen as a trans- m, Mouth. [parent object. //, Foot. a, Anus. e, Intestine. st, Stomach. tp, Velar area of the prostomium.

The extent of the shell and commencing upgrowth of the mantle-skirt is indicated by a line forming a curve from a to F.

N.B. — In this development, as in that of Pisidium (fig. 25), no part of the blastopore persists either as mouth or as anus, but the aperture closes — the pedicle of invagination, or narrow neck of the invaginated arch-enteron, becoming the intestine. The mouth and the anus are formed as independent in-pushings, the mouth with stomodaeum first, and the short anal proctodaeum much later. This interpretation of the appearances is contrary to that of Horst, from

whom our drawings of the oyster's development are taken. The account given by the American William K. Brooks differs greatly as to matter of fact from that of Horst, and appears to be erroneous in some respects.

modification of the epidermis — myelonic as opposed to epidermic. The structure of the reputed eyes of several of the above-named genera has not been carefully examined. In Pecten and Spondylus, however, they have been fully studied (see fig. 21, and explanation). Rudimentary cephalic eyes occur in the Mytilidae and in Avicula at the base of the first filament of the inner gill, each consisting of a

D

Blastulastage(one-cell-layered sac), with commencing in- vagination of the wall of the sac at bl, the blastopore.

Optical section of a somewhat later stage, in which a second invagination has be- gun — namely, that of the shell-gland sk.

Blastopore.

I nvaginated endoderm (wall of the future arch-enteron).

Ectoderm.

Similar optical section at a little later stage. The in- vagination connected with the blastopore is now more contracted, d; and cells, me, forming the mesoblast from which the ccelom and muscu- lar and skeleto-trophic tissues develop, are separated.

Similar section of a later stage. The blastopore, bl, has closed; the anus will sub- sequently perforate the cor- responding area. A new aperture, m, the mouth, has

pigmented epithelial fossa containing a cuticular lens. In the Arcidae the pallial eyes are compound or faceted somewhat like those of Arthropods.

Generative Organs. — The gonads of Anodonta are placed in distinct male and female individuals. In some Lamellibranchs — for in- stance, the European Oyster and the Pisidium pusillum — the sexes are united in the same individual; but here, as in most hermaphro- dite animals, the two sexual elements are not ripe in the same individual at the same moment. It has been conclusively shown that the Ostrea edulis does not fertilize itself. The American Oyster (0. virginiana) and the

Portuguese Oyster (0. angulata) have the sexes separate, and fertilization is effected in the open water after the dis- charge of the ova and the sperma- tozoa from the females and males respectively. In the Ostrea edulis fertilization of the eggs is effected at the moment of their escape from the uro- genital groove, or even before, by means of spermatozoa drawn into the sub-pallial chamber by the incurrent ciliary stream, and the embryos pass through the early stages of development whilst en- tangled between the gill-lamellae of the female parent (fig. 23). In Anodonta the eggs pass into the space between the two lamellae of the outer gill-plate, and are there fertilized, and advance whilst still in this position to the glochidium phase of development (fig. 22). They may be found here in thousands in the summer and autumn months. The gonads themselves are extremely simple arborescent glands which open to the exterior by two simple ducts, one right and one left, continu- ous with the tubular branches of the gonads. In the most primitive Lamellibranchs there is no separate generative aperture but the gonads discharge into the renal cavity, as in Patella among Gastro- pods. This is the case in the Protobranchia, e.g. Solenomya, in which the gonad opens into the reno-pcricardial duct. But the generative products do not pass through the whole length of 'the renal tube: there is a direct opening from the pericardial end of the tube to the distal end, and the ova or sperms pass through this. In Area, in Anomiidae and in Pectinidae the gonad opens into the external part of the renal tube. The next stage of modification is seen in Ostraea, Cyclas and some Lucinidae, in which the generative and renal ducts

Fig. 24. — Embryo of Pisid- ium pusillum in the diblastula stage, surface view (after Lan- kester). The embryo has increased in size by accumula- tion of liquid between the outer and the invaginated cells. The blastopore has closed.

Fig. 25. — B, Same embryo as fig. 24, in optical median section, showing the invaginated cells hy which form the arch-enteron, and the mesoblastic cells me which are budded off from the surface of the mass hy, and apply themselves to the inner surface of the epiblastic cell-layer ep. C, The same embryo focused so as to show the meso- blastic cells which immediately underlie the outer cell-layer.

open into a cloacal slit on the surface of the body. In Mytilus the two apertures are on a common papilla, in other cases the two aper- tures are as in Anodonta. The Anatinacea and Poromya among the Septibranchia are, however, peculiar in having two genital apertures on each side, one male and one female. These forms are hermaphro- dite, with an ovary and testis completely separate from each other on

each side of the body, each having its own duct and aperture.

The development of Anodonta is remarkable for the curious larval form known as glochidium (fig. 22). The glochidium quits the gill-pouch of its parent and swims by alternate opening and shutting of the valves of its shell, as do adult Pecten and Lima, trailing at the same time a long byssus thread. This byssus is not homologous with

that of other Lamellibranchs, but originates from a single glandular epithelial cell embedded in the tissues on the dorsal anterior side of the adductor muscle. By this it is brought into contact with the fin of a fish, such as perch, stickleback or others, and effects a hold thereon by means of the toothed edge of its shells. Here it becomes encysted, and is nourished by the exudations of the fish. It remains in this condition for a period of two to six weeks, and during this time the permanent organs are developed from the cells of two sym- metrical cavities behind the adductor muscle. The early larva of Anodonta is not unlike the trochosphere of other Lamellibranchs, but the mouth is wanting. The glochidium is formed by the precocious development of the anterior adductor and the retardation of all the other organs except the shell. Other Lamellibranchs exhibit either . a trochosphere larva which

- becomes a veliger differing only

from the Gastropod's and Pteropod's veliger in having bilateral shell-calcifications in- stead of a single central one; or, like Anodonta, they may develop within the gill-plates of the mother, though without presenting such a specialized larva as the glochidium. An example of the former is seen in the development of the Euro- pean oyster, to the figure of which and its explanation the reader is specially referred (fig. 23). An example of the latter is seen in a common little fresh- water bivalve, the Pisidium pusillum, which has been studied by Lankester. The gastrula is formed in this case by invagina- tion. The embryonic cells con- tinue to divide, and form an oval vesicle containing liquid (fig. 24) ; within this, at one pole, is seen the mass of in- vaginated cells (fig. 25, hy). These invaginated cells are the archenteron ; they proliferate and give off branching cells, which apply themselves (fig. 25, C) to the inner face of the vesicle, thus forming the mesoblast. The outer single layer of cells which constitutes the surface of the vesicle is the ectoderm or epiblast. The little mass of hypoblast or enteric cell-

mass now enlarges, but remains connected with the cicatrix of the blastopore or orifice of invagination by a stalk, the rectal peduncle. The enteron itself becomes bilobed and is joined by a new invagination, that of the mouth and stomodaeum. The mesoblast multiplies its cells, which become partly muscular and partly skeleto- trophic. Centro-dorsally now appears the em- byronic shell-gland. The pharynx or stomodaeum is still small, the foot not yet prominent. A later stage is seen in fig. 26, where the pharynx is widely open and the foot prominent. No ciliated

Fig. 26. — Diagram of Embryo of Pisidium. The unshaded area gives the position of the shell-valve. (After Lankester.) m, Mouth. x, Anus.

Foot.

Branchial filaments. mn, Margin of the mantle-skirt. B, Organ of Bojanus.

f, br,

An extraordinary modification of the veliger occurs in the de- velopment of Nucula and Yoldia and probably other members of the same families. After the formation of the gastrula by epibole the larva becomes enclosed by an ectodermic test covering the whole of the original surface of the body, including the shell-gland, and leaving only a small opening at the posterior end in which the stomo- daeum and proctodaeum are formed. In Yoldia and Nucula proxima the test consists of five rows of flattened cells, the three median rows bearing circlets of long cilia. At the anterior end of the test is the apical plate from the centre of which projects a long flagellum as in many other Lamellibranch larvae. In Nucula delphinodonta the test is uniformly covered with short cilia, and there is no flagellum. When the larval development is completed the test is cast off, its cells breaking apart and falling to pieces leaving the young animal with a well-developed shell exposed and the internal organs in an advanced state. The test is really a ciliated velum developed in the normal position at the apical pole but reflected backwards in such a way as to cover the original ectoderm except at the posterior end. In Yoldia and Nucula proxima the ova are set free in the water and the test-larvae are free-swimming, but in Nucula delphinodonta the female forms a thin-walled egg-case of mucus attached to the posterior end of the shell and in communication with the pallial chamber; in this case the eggs develop and the test-larva is en- closed. A similar modification of the velum occurs in Dentalium and in Myzomenia among the Amphineura.

Classification of Lamellibranchia

The classification originally based on the structure of the gills by P. Pelseneer included five orders, viz. : the Protobranchia in which the gill-filaments are flattened and not reflected; the Filibranchia in which the filaments are long and reflected, with non-vascular junctions; the Pseudo-lamellibranchia in which the gill-lamellae are vertically folded, the interfilamentar and interlamellar junctions being vascular or non-vascular; the Eulamellibranchia in which the interfilamentar and inter- lamellar junctions are vascular; and lastly the Septibranchia in which the gills are reduced to a horizontal paitition. The Pseudolamellibranchia included the oyster, scallop and their allies which formerly constituted the order Monomyaria, having only a single large adductor muscle or in addition a very small anterior adductor. The researches of W. G. Ridewood have shown that in gill-structure the Pectinacea agree with the Fili- branchia and the Ostraeacea with the Eulamellibranchia, and accordingly the order Pseudolamellibranchia is now suppressed and its members divided between the two other orders mentioned. The four orders now retained exhibit successive stages in the modification of the ctenidia by reflection and concrescence of the filament, but other organs, such as the heart, adductors, renal organs, may not show corresponding stages. On the contrary considerable differences in these organs may occur within any single order. The Protobranchia, how- ever, possess several primitive characters besides that of the branchiae. In them the foot has a flat ventral sur- face used for creeping, as in Gastropods, the byssus gland is but slightly developed, the pleural ganglia are distinct, – ... there is a relic of the pharyngeal cavity, in some forms with a pair of glandular sacs, the gonads retain their primitive connexion with the renal cavities, and the otocysts are open.

After Drew, in Lankester's Treatise on Zoology. (A. & C. Black.) '

Fig. 27. — Surface view of a forty-five hour embryo of Yoldia limatula. a.c. Apical cilia, bl, Blastopore, x, Depression where the cells that form the cerebral ganglia come to the surface.

velum or pre-oral (cephalic) lobe ever develops. The shell-gland disappears, the mantle-skirt is raised as a ridge, the paired shell-valves are secreted, the anus opens by a proctodaeal ingrowth into the rectal peduncle, and the rudiments of the gills (br) and of the renal organs (B) appear (fig. 26, lateral view), and thus the chief organs and general form of the adult are acquired. Later changes consist in the growth of the shell-valves over the whole area of the mantle-flaps, and in the multiplication of the gill-filaments and their consolidation to

form gill-plates. It is important to note that the gill-filaments are formed one by one posteriorly. The labial tentacles are formed late. In the allied genus Cyclas, a byssus gland is formed in the foot and subsequently disappears, but no such gland occurs in Pisidium,

Order I. Protobranchia

In addition to the characters given above, it may be noted that the mantle is provided with a hypobranchial gland on the outer side of each gill, the auricles are muscular, the kidneys are glandular through their whole length, the sexes are separate.

Fam. I. Solenomyidae. — One row of branchial filaments is directed dorsally, the other ventrally; the mantle has a long postero- ventral suture and a single posterior aperture; the labial palps of each side are fused together; shell elongate; hinge without teeth ; periostracum thick. Solenomya.

Fam. 2. Nuculidae. — Labial palps free, very broad, and provided with a posterior appendage; branchial filaments transverse; shell has an angular dorsal border; mantle open along its whole border. Nucula. Acila. Pronucula.

Fam. 3. Ledidae. — Like the Nuculidae, but mantle has two posterior sutures and two united siphons. Leda. Yoldia. Mallelia.

Fam. 4. Ctenodontidae. — Extinct; Silurian.

The fossil group Palaeoconcha is connected with the Proto- branchia through the Solenomyidae. It contains the following extinct families.

Fam. I. Praecardiidae. — Shell equivalve with hinge dentition as in

Area. Praecardium ; Silurian and Devonian. Fam. 2. Antipleuridae. — Shell inequivalve. Antipleura; Silurian. Fam. 3. Cardiolidae. — Shell equivalve and ventricose; hinge

without teeth. Cardiola; Silurian and Devonian. Fam. 4. Grammysiidae. — Shell thin, equivalve, oval or elongate;

hinge without teeth. Grammysia; Silurian and Devonian.

Protomya; Devonian. Cardiomorpha; Silurian to Carbon- iferous. Fam.

5. Vlastidae. — Shell very inequivalve; hinge without teeth.

Vlasta ; Silurian. Fam. 6. Solenopsidae. — Shell equivalve, greatly elongated, urn-

bones very far forward. Solenopsis ; Devonian to Trias.

Order II. Filibranchia Gill-filament ventrally directed and reflected, connected by ciliated junctions. Foot generally provided with a highly developed byssogenous apparatus.

Sub-order I. — Anomiacea. Very asymmetrical, with a single large posterior adductor. The heart is not contained in the pericardium, lies dorsad of the rectum and gives off a single aorta anteriorly. The reflected borders of the inner gill-plates of either side are fused together in the middle line. The gonads open into the kidneys and the right gonad extends into the mantle. Shell thin; animal fixed.

Fam. I. Anomiidae. — Foot small; inferior (right) valve of adult perforated to allow passage of the byssus. Anomia; byssus large and calcified; British. Placuna; byssus atrophied in adult. Hypotrema. Carolia. Ephippium. Placunanomia. Sub-order II. — Arcacea. Symmetrical; mantle open throughout its extent; generally with well developed anterior and posterior adductors. The heart lies in the pericardium and gives off two aortae. Gills without inter- lamellar junctions. Renal and genital apertures separate.

Fam. 1. Arcidae. — Borders of the mantle bear compound pallial eyes. The labial palps are direct continuations of the lips. Hinge pliodont, that is to say, it has numerous teeth on either side of the umbones and the teeth are perpendicular to the edge. Area; foot byssiferous; British. Pectunculus ; foot without byssus; British. Seaphula; freshwater; India. Argina. Bathyarca. Barbatia. Senilia. Anadara. Adacnarea. Fam. 2. Parallelodontidae. — Shell as in Area, but the posterior hinge teeth elongated and parallel to the cardinal border. Cucullaea; recent and fossil from the Jurassic. All the other genera are fossil: Parallelodon; Devonian to Tertiary. Car- bonaria ; Carboniferous, &c. Fam. 3. Limopsidae. — Shell orbicular, hinge curved, ligament longer transversely than antero-posteriorly ; foot elongate, pointed anteriorly and posteriorly. Limopsis. Trinacria; Tertiary. Fam. 4. Philobryidae. — Shell thin, very inequilateral, anterior part

atrophied, umbones projecting. Pkilobrya. Fam. 5. Cyrtodontidae. — Extinct; shell equivalve and inequi- lateral, short, convex. Cyrtodonta; Silurian and Devonian. Cypricardites , Silurian. Vanuxemia; Silurian.

Fam. 6. Trigoniidae. — Shell thick; foot elongated, pointed in front and behind, ventral border sharp; byssus absent. Tri- gonia; shell sub-triangular, umbones directed backwards. This genus was very abundant in the Secondary epoch, especially in Jurassic seas. There are six living species, all in Australian seas. Living specimens were first discovered in 1827. Schiz- odus ; Permian. Myophoria ; Trias. Fam. 7. Lyrodesmidac. — Extinct; shell inequilateral, posterior side shorter; hinge short, teeth in form of a fan. Lyrodesma; Silurian.

Sub-order III. — Mytilacea. Symmetrical, the anterior adductor small or absent. Heart gives off only an anterior aorta. Surface of gills smooth, gill-filaments all similar, with interlamellar junctions. Gonads generally extend into mantle and open at sides of kidneys. Foot linguiform and byssiferous. Fam. 1. Mytilidae. — Shell inequilateral, anterior end short; hinge without teeth ; ligament external. Mantle has a posterior ‘ suture. Cephalic eyes present. Mytilus; British. Modiola; British. Lithodomus. Modiolaria; British. Crenella. Stavelia. Daerydium. Myrina. Idas. SepUfer. Fam. 2. Modiolopsidae. — Extinct; Silurian to Cretaceous; ad- ductor muscles sub-equal. Modiolopsis. — Modiomorpha. Myo- concha. Fam. 3. Pernidae. — Shell very inequilateral ; ligament sub- divided; mantle open throughout; anterior adductor absent. Perna. Crenatula; inhabits sponges. Bakewellia. Gervilleia; Trias to Eocene. Odontoperna ; Trias. Inoceramus; Jurassic to Cretaceous.

Sub-order IV. — Pectinacea.

Monomyarian.‘with open mantle. Gills folded and the filaments at summits and bases of the folds are different from the others. Gonads contained in the visceral mass and generally open into renal cavities. Foot usually rudimentary.

Fam. 1. Vulsellidae. — Shell high; hinge toothless; foot without byssus. Vulsella.

Fam. 2. Aviculidae. — Shell very inequilateral; cardinal border straight with two auriculae, the posterior the longer. Foot with a very stout byssus. Gills fused to the mantle. Avicula; British. Meleagrina. Pearls are obtained from a species of this genus in the Persian Gulf, Indian Ocean, &c. Malleus. Several extinct genera.

Fam. 3. Prasinidae. — Shell inequilateral, with anterior umbones and prominent anterior auricula; cardinal border arched. Prasina.

Fam. 4. Pterineidae. — Extinct ; Palaeozoic.

Fam. 5. Lunulicardiidae. — Extinct ; Silurian and Devonian.

Fam. 6. Conocardiidae. — Extinct ; Silurian to Carboniferous.

Fam. 7. Ambonychiidae. — Extinct; Silurian and Devonian. The last two families are dimyarian, with small anterior adductor.

Fam. 8. Myalinidae. — Extinct; Silurian to Cretaceous; ad- ductors sub-equal.

Fam. 9. Amussiidae. — Shell orbicular, smooth externally with radiating costae internally. Gills without interlamellar junc- tions. Amussium.

Fam. 10. Spondylidae. — 'Shell very inequivalve, fixed by the right valve which is the larger. No byssus. Spondylus; shell with spiny ribs, adherent by the spines. Plicatula.

Fam. 11. Pectinidae. — Shell with radiating ribs; dorsal border with two auriculae. Foot byssiferous. Mantle borders with well developed eyes. Pecten; shell orbicular, with equal auriculae; without a byssal sinus; British. Chlamys; an- terior auricula the larger and with a byssal sinus; British. Pedum. Hinnites. Pseudamussium. Camptonectes. Hyalo- pecten; abyssal.

Sub-order V. — Dimyacea. Dimyarian, with orbicular and almost equilateral shell ; adherent ; hinge without teeth and ligament internal. Gills with free non reflected filaments.

Fam. Dimyidae. — Characters of the sub-order. Dimya; recent in abyssal depths and fossil since the Jurassic.

Order III. Eulameixibranchia

Edges of the mantle generally united by one or two sutures. Two adductors usually present. Branchial filaments united by vascular interfilamentar junctions and vascular interlamellar junctions; the latter contain the afferent vessels. The gonads always have their own proper external apertures.

Sub-order I. — Ostraeacea.

Monomyarian or with a very small anterior adductor. Mantle open; foot rather small ; branchiae folded ; shell inequivalve.

Fam. 1. Limidae. — Shell with auriculae. Foot digitiform, with byssus.

Borders of mantle with long and numerous tentacles. Gills not united with mantle. Lima; members of this genus form a nest by means of the byssus, or swim by clapping the valves of the shell together. Limaea.

Fam. 2. Ostraeidae. — Foot much reduced and without byssus. Heart usually on the ventral side of the rectum. Gills fused to the mantle. Shell irregular, fixed in the young by the left and larger valve. Ostraea; foot absent in the adult; edible and cultivated ; some species, as the British 0. edulis, are hermaphro- dite.

Fam. 3. Eligmidae. — Extinct; Jurassic.

Fam. 4. Pinnidae. — Shell elongated, truncated and gaping posteriorly. Dimyarian, with a very small anterior adductor. Foot with byssus. Pinna; British. Cyrtopinna. Avieulo- pinna; fossil, Carboniferous and Permian. Pinnigena; Jurassic and Cretaceous. Atrina; fossil and recent, from Carboniferous to present day.

Sub-order II. — Submytilaeea. Mantle only slightly closed ; usually there is only a single suture. Siphons absent or very short. Gills smooth. Nearly always di- myarian. Shell equivalve, with an external ligament.

Fam. 1. Dreissensiidae. — Shell elongated; hinge without teeth;

summits of valves with an internal septum. Siphons short.

Dreissensia; lives in fresh water, but originated from the

Caspian Sea; introduced into England about 1824.

Fam. 2. Modiolareidae. — Foot with a plantar surface; the two

branchial plates serve as incubatory pouches. Modiolarea. Fam. 3. Astartidae. — Shell concentrically striated; foot elongate, without byssus. Astarte; British. Woodia. Opis; Secondary. Prosocoelus ; Devonian.

Fam. 4. Crassatellidae. — Shell thick, with concentric striae, liga- ment external ; foot short. Crassatella. Cuna. Fam. 5. Carditidae. — Shell thick, with radiating costae ; foot carinated, often byssiferous. Cardita. Thecalia. Milneria. Venericardiq. Fam. 6. Condylocardiidae.

— Like Carditidae, but with an external

ligament. Condylocardia. Carditella. Carditopsis. Fam. 7. Cyprinidae. — Mantle open in front, with two pallial sutures; external gill-plates smaller than the internal. Cyprina; British. Cypricardia. Pleurophorus; Devonian to Trias. Anisocardia; Jurassic to Tertiary. Veniella; Cretaceous to Tertiary. Fam. 8. Isocardiidae. — Mantle largely closed, pedal orifice small; gill-plates of equal size; shell globular, with prominent and coiled umbones. Isocardia; British. Fam. 9. Callocardiidae. — Siphons present; external gill-plate smaller than the internal ; umbones not prominent. Callo- cardia; abyssal. Fam. 10. Lucinidae. — Labial palps very small; gills without an external plate. Lucina; British. Montacuta; British. Cryptodon. Fam. 11. Corbidae. — Shell thick, with denticulated borders; anal aperture with valve but no siphon; foot elongated and pointed. Corbis. Gonodon; Trias and Jurassic. Mutiella; Upper Cretaceous. Fam. 12. Ungulinidae. — Foot greatly elongated, vermiform, end- ing in a glandular enlargement. Vngulina. Diplodonta; British. Axinus; British. Fam. 13. Cyrenellidae. — Two elongated, united, non-retractile

siphons; freshwater. Cyrenella. Joanisiella. Fam. 14. Tancrediidae. — Shell elongate, sub-triangular. Extinct.

Tancredia ; Trias to Cretaceous. Meekia ; Cretaceous. Fam. 15. Unicardiidae. — Shell sub-orbicular, nearly equilateral, with concentric striae. Extinct, Carboniferous to Cretaceous. Unicardium. Scaldia. Pseudedmondia. Fam. 16. Leptonidae. — Shell thin; no siphons; foot long and byssiferous; marine; hermaphrodite and incubatory. Kellya; British. Lepton; commensal with the Crustacean Gebia; British. Erycina; Tertiary. Pythina. Scacchia. Sportella. Cyamium. Fam. 17. Galeommidae. — Mantle reflected over shell; shell thin, gaping; adductors much reduced. Galeomma; British. Scintilla. Hindsiella. Ephippodonta; commensal with shrimp Axius. The three following genera with an internal shell prob- ably belong to this family: — Chlamydoconcha. Scioberetia; com- mensal with a Spatangid. Entovalva; parasitic in Synapta. Fam. 18. Kellyellidae. — Shell ovoid; anal aperture with very short siphon; foot elongated. Kellyella. Turtonia; British. Allopagus; Eocene. Lutetia; Eocene. Fam. 19. Cyrenidae. — Two siphons, more or less united, with

papillose orifices; pallial line with, a sinus; freshwater. Cyrena. Corbicula. Batissa. Velorita. Galatea. Fischeria. Fam. 20. Cycladidae. — One siphon or two free siphons with simple orifices; pallial line simple; her- maphrodite, embryos incubated in external gill-plate; fresh- water, Cyclas; British. Pisid- ium; British. Fam. 21. ,Rangiidae.

— Two short siphons; shell with prominent umbones and internal ligament. Rangia; brackish water, Florida. Fam. 22. Cardiniidae. — Shell elon- gated, inequilateral. Extinct. Cardinia; Trias and Jurassic. Anthracosia; Carboniferous and Permian. Anoplophora; Trias. Pachycardia; Trias. Fam. 23. Megalodontidae. — Shell inequilateral, thick; posterior

Sub-order III. — Tellinacea.

m-r c / J*

Fig. 28. — Lateral view of a

Mactra, the right valve of the

shell and right mantle-flap

removed, and the siphons

retracted. (From Gegen-

baur.)

br, br', Outer and inner gill- plates.

/, Labial tentacle.

ta, tr, Upper and lower siphons

ms, Siphonal muscle of the mantle-flap.

ma. Anterior adductor muscle.

mp, Posterior adductor muscle.

Foot.

v. Umbo.

adductor impression on a myo- phorous apophysis. Extinct. Megalodon; Devonian to Jur- assic. Pachyrisma; Trias and Jurassic. Durga; J urassic. Dicer ocardium; Jurassic. Fam. 24. Unionidae. — Shell equi- lateral; mantle with a single pallial suture and no siphons;

freshwater; larva a glochidium. Unio; British. Anodonta;

British. Pseudodon. Quadrula. Arconaia. Monocondylea.

Solenaia. Mycetopus. Fam. 25. Mutelidae. — Differs from Unionidae in having two

pallial sutures; freshwater. Mutela. Pliodon. Spatha.

Iridina. Hyria. Castalia. Aplodon. Plagiodon. Fam. 26. Aetheriidae. — Shell irregular, generally fixed in the

adult ; foot absent ; freshwater. Aetheria. Mulleria. Bartlettia.

Mantle not extensively closed ; two pallial sutures and two well-developed siphons. Gills smooth. Foot compressed and elongated. Labial palps very large. Dimyarian; pallial line with a deep sinus. Fam. I. Tellinidae. — External gill-plate directed upwards; siphons

separate and elongated ; foot with byssus ; palps very large ;

ligament external. Tellina; British. Gastrana; British.

Capsa. Macoma. Fam. 2. Scrobiculariidae. — External gill-plates directed upwards;

siphons separate and excessively long; foot without byssus.

Scrobicularia; estuarine; British. Syndosmya; British.

Cumingia. Fam. 3. Donacidae. — External gill-plate directed ventrally;

siphons separate, of moderate length, anal siphon the longer.

Donax; British. Iphigeneia. Fam. 4. Mesodesmatidae. — External gill-plate directed ventrally ;

siphons separate and equal. Mesodesma. Ervilia; British.

Fig. 29. — The same animal as fig. 28, with its foot and siphons expanded. Letters as in fig. 28. (From Gegenbaur.)

Fam. 5. Cardiliidae. — Shell very high and short; dimyarian;

posterior adductor impression on a prominent apophysis.

Cardilia. Fam. 6. Mactridae. — External gill-plate directed ventrally;

siphons united, invested by a chitinous sheath; foot long, bent

at an angle, without byssus. Mactra; British (figs. 28, 29).

Mulinia. Harvella. Raeta. Eastonia. Heterocardia. Van-

ganella.

Sub-order IV. — Veneracea. Two pallial sutures, siphons somewhat elongated and partially or wholly united. Gills slightly folded. A bulb on the posterior aorta. Ligament external.

Fam. I. Veneridae. — Foot well developed; pallial sinus shallow or

absent. Venus; British. Dosinia; British. Tapes; British.

Cyclina. Lucinopsis; British. Meretrix. Circe; British. Vene-

rupis. Fam. 2. Petricolidae. — Boring forms with a reduced foot; shell

elongated, with deep pallial sinus. Petricola. P. pholadiformis,

originally an inhabitant of the coast of the United States, has

been acclimatized for some years in the North Sea. Fam. 3. Glaucomyidae. — Siphons very long and united; foot

small; shell thin, with deep pallial sinus; fresh or brackish

water. Glaucomya. Tanysiphon.

Sub-order V. — Cardiacea. Two pallial sutures. Siphons generally short. Foot cylindrical, more or less elongated, byssogenous. Gills much folded. Shell equivalve, with radiating costae and external ligament.

Fam. 1 . Cardiidae. — Mantle slightly closed ; siphons very short, surrounded by papillae which often bear eyes; foot very long, geniculated; pallial line without sinus; two adductors, Cardium; British. Pseudo-kellya. Byssocardium; Eocene. Lithocdrdium; Eocene. Fam. 2. Limnocardiidae. — Siphons very long, united throughout; shell gaping; two adductors; brackish waters. Limnocardium; Caspian Sea and fossil from the Tertiary. Archicardium; Tertiary. Fam. 3. Tridacnidae. — Mantle closed to a considerable extent ; apertures distant from each other; no siphons; a single ad- ductor ; shell thick. Tridacna. Hippopus.

Sub-order VI. — Chamacea.

Asymmetrical, inequivalve, fixed, with extensive pallial sutures; no siphons. Two adductors. Foot reduced and without byssus. Shell thick,

without pallial sinus.

Fam. 1. Chamidae. — Shell with sub-equal valves and prominent umbones more or less spirally coiled ; ligament external. Chama. Diceras; Jurassic. Requienia; Cretaceous. Mather- onia; Cretaceous.

Fam. 2. Caprinidae. — Shell inequivalve; fixed valve spiral or conical ; free valve coiled or spiral ; Cretaceous. Caprina. Caprotina. Caprinula, &c.

Fam. 3. Monopleuridae. — Shell very inequivalve; fixed valve conical or spiral; free valve operculiform ; Cretaceous. Mono- pleuron. Baylea. The two following families, together known as Rudistae, are closely allied to the preceding; they are extinct marine forms from Secondary deposits. They were fixed by the

conical elongated right valve; the free left valve is not spiral, and is furnished with prominent apophyses to which the adductors were attached. Fam. 4. Radiolitidae. — Shell conical or biconvex, without canals

in the external layer. Radiolites. Biradiolites. Fam. 5. Hippuritidae. — Fixed valve long, cylindro-conical, with three longitudinal furrows which correspond internally to two pillars for support of the siphons. Hippurites. Arnaudia. Sub-order VII. — Myacea. Mantle closed to a considerable extent; siphons well developed; gills much folded and frequently prolonged into the branchial siphon. Foot compressed and generally byssiferous. Shell gaping, with a pallial sinus.

Fam. 1. Psammobiidae. — Siphons very long and quite separate; foot large; shell oval, elongated, ligament external. Psam- mobia; British. Sanguinolaria. Asaphis. Elizia. Soleno- tellina. Fam. 2. Myidae. — Siphons united for the greater part of their length, and with a circlet of tentacles near their extremities; foot reduced; shell gaping; ligament internal. Mya; British. Sphenia; British. Tugonia. Platyodon. Cryptomya. Fam. 3. Corbulidae. — Shell sub-trigonal, inequivalve; pallial sinus shallow; siphons short, united, completely retractile; foot large, pointed, often byssiferous. Corbulomya. Paramya. Erodona and Himella axe fluviatile forms from South America. Fam. 4. Lutrariidae. — Mantle extensively closed; a fourth pallial aperture behind the foot; siphons long and united; shell elongated, a spoon-shaped projection for the ligament on each valve. Lutraria; British. Tresus. Standella.

Fam. 5. Solenidae. — Elongated burrowing forms; foot cylindrical, powerful, without byssus; shell long, truncated and gaping at each end. Solenocurtus ; British. Tagelus; estuarine. Cerati- solen; British. Cultellus; British. Siliqua. Solen; British. Ensis; British. Fam. 6. Saxicaviiae. — Mantle extensively closed, with a small pedal orifice; siphons long, united, covered by a chitinous sheath ; gills prolonged into the branchial siphon ; foot small ; shell gaping. Saxicava; British. Glycimeris. Cyrtodaria. Fam 7. Gastrochaenidae. — Shell thin, gaping widely at the posterior end; anterior adductor much reduced; mantle ex- tensively closed; siphons long, united. Gastrochaena; British. Fistulana.

Sub-order VIII. — Adesmacea. Ligament wanting; shell gaping, with a styloid apophysis in the umbonal cavities. Gills prolonged into the branchial siphon. Mantle largely closed, siphons long, united. Foot short, truncated, discoid, without byssus.

Fam. I. Pholadidae. — Shell containing all the organs; heart traversed by the rectum; two aortae. Shell with a pallial sinus; dorsal region protected by accessory plates. Pholas; British. Pholadidea; British. Jouannetia. Xylophaga; British. Martesia. Fam. 2. Teredinidae. — Shell globular, covering only a small portion of the vermiform body; heart on ventral side of rectum; a single aorta; siphons long, united and furnished with two posterior calcareous ” pallets.” Teredo; British. Xylotrya.

Sub-order IX. — Anatinacea. Hermaphrodite, the ovaries and testes distinct, with separate apertures. Foot rather small. Mantle frequently presents a fourth orifice. External gill-plate directed dorsally and without reflected lamella. Hinge without teeth.

Fam. I. Thracidae. — Mantle with a fourth aperture; siphons long, quite separate, completely retractile and invertible. Thracia; British. Aslhenothaerus. Fam. 2. Periplomidae. — Siphons separate, naked, completely re- tractile but not invertible. Periploma. Cochlodesma. Tyleria. Fam. 3. Anatinidae. — Siphons long, united, covered by a chitinous sheath, not completely retractile. Anatina. . Plectomya; Jurassic and Cretaceous. Fam. 4. Pholadomyidae. — Mantle with fourth aperture; siphons very long, completely united, naked, incompletely retractile; foot small, with posterior appendage. Pholadomya. Fam. 5. A rcomyidae. — Extinct; Secondary and Tertiary. Arco-

mya. Goniomya. Fam. 6. Pholadellidae. — Extinct; Palaeozoic. Pholadetta. Phy-

limya. Allorisma. Fam. 7. Pleuromyidae. — Extinct; Secondary. Pleuromya. Gres-

slya. Ceromya. Fam. 8. Pandoridae. — Shell thin, inequivalve, free; ligament internal ; siphons very short. Pandora ; British. Coelodon. Clidiophora. Fam. 9. Myochamidae. — Shell very inequivalve, solid, with a pallial sinus; siphons short; foot small. Myockama. Myodora. Fam. 10. Chamostraeidae. — A fourth pallial aperture present; pedal aperture small; siphons very short and separate; shell fixed by the right valve, irregular. Chamostraea. Fam. 11. Clavagellidae.— Pedal aperture very small, foot rudi-

mentary; valves continued backwards into a calcareous tube secreted by the siphons. Clavagella. Brechites (Aspergillum).

Fam. 12. Lyonsiidae. — Foot byssiferous; siphons short, in- vertible. Lyonsia; British. Entodesma. Mytilimeria.

Fam. 13. Verticordiidae. — Siphons short, gills papillose; foot small; shell globular. Many species abyssal. Verlicordia. Euciroa. Lyonsiella. Halicardia.

Order IV. Septibranchia

Gills have lost their respiratory function, and are transformed into a muscular septum on each side between mantle and foot. All marine, live at considerable depths, and are carnivorous.

Fam. 1. Poromyidae. — Siphons short and separate; branchial

siphon with a large valve; branchial septum bears two groups

of orifices on either side; hermaphrodite. Poromya; British.

Dermatomya. Liopistha; Cretaceous.

Fam. 2. Cetoconchidae. — Branchial septum with three groups of

orifices on each side; siphons short, separate, branchial siphon

with a valve. Cetoconcha (Silenia).

Fam. 3. Cuspidariidae. — Branchial septum with four or five pairs

of very narrow symmetrical orifices ; siphons long, united, their

extremities surrounded by tentacles; sexes separate. Cuspi-

daria; British.

Authorities. — T. Barrois, ” Le Stylet crystallin des Lamelli-

branches,” Revue biol. Nord France, i. (1890); Jameson, “On the

Origin of Pearls,” Proc. Zool. Soc. (London, 1902) ; R. H. Peck,

” The Minute Structure of the Gills of Lamellibranch Mollusca,”

Quart. Journ. Micr. Sci. xvii. (1877); W. G. Ridewood, “On the

Structure of the Gills of the Lamellibranchia,” Phil. Trans. B. cxcv.

(1903); K. Mitsukuri, ” On the Structure and Significance of some

aberrant forms of Lamellibranchiate Gills,” Quart. Journ. Micr. Sci.

xxi. (1881); A. H. Cooke, ” Molluscs,” Cambridge Natural History,

vol. iii. ; Paul Pelseneer, ” Mollusca,” Treatise on Zoology, edited by

E. Ray Lankesfer, pt. v. (E. R. L. ; J. T. C.)

LAMENNAIS, HUGUES FELICITE ROBERT DE (1782-1854), French priest, and philosophical and political writer, was born at Saint Malo, in Brittany, on the 19th of June 1782. He- was the son of a shipowner of Saint. Malo ennobled by Louis XVI. for public services, and was intended by his father to follow mercantile pursuits. He spent long hours in the library of an uncle, devouring the writings of Rousseau, Pascal and others. He thereby acquired a vast and varied, though superficial, erudition, which determined his subsequent career. Of a sickly and sensitive nature, and impressed by the horrors of the French Revolution, his mind was early seized with a morbid view of life, and this temper characterized him throughout all his changes of opinion and circumstance. He was at first inclined towards rationalistic views, but partly through the influence of his brother Jean Marie (1775-1861), partly as a result of his philo- sophical and historical studies, he felt belief to be indispensable to action and saw in religion the most powerful leaven of the community. He gave utterance to these convictions ‘ in the Reflexions sur I’etat de I’eglise en France pendant le j8 iime siecle el sur sa situation actuelle, published anonymously in Paris in 1808. Napoleon’s police seized the book as dangerously ideo- logical, with its eager recommendation of religious revival and active clerical organization, but it awoke the ultramontane spirit which has since played so great a part in the

politics of churches and of states.

As a rest from political strife, Lamennais devoted most of the following year to a translation, in exquisite French, of the Speculum Monachorum of Ludovicus Blosius (Louis de Blois) which he entitled Le Guide spiriluel (1809). In 181 1 he received the tonsure and shortly afterwards became professor of mathe- matics in an ecclesiastical college founded by his brother at Saint Malo. Soon after Napoleon had concluded the Concordat with Pius VII. he published, in conjunction with his brother, De la tradition de I'iglise sur I'institution des eviques (1814), a writing occasioned by the emperor's nomination of Cardinal Maury to the archbishopric of Paris, in which he strongly condemned the Gallican principle which allowed bishops to be created irrespective of the pope's sanction. He was in Paris at the first Bourbon restoration in 1814, which he hailed with satisfaction, less as a monarchist than as a strenuous apostle of religious regeneration. Dreading the Cent Jours, he escaped to London, where he obtained a meagre livelihood by giving French lessons in a school founded by the abbe Jules Carron for French emigres;

he also became tutor at the house of Lady Jerningham, whose first impression of him as an imbecile changed into friendship. On the final overthrow of Napoleon in 1815 he returned to Paris, and in the following year, with many misgivings as to his calling, he yielded to his brother's and Carron's advice, and was ordained priest by the bishop of Rennes.

The first volume of his great work, Essai sur I'indiference en matiere de religion, appeared in 1817 (Eng. trans, by Lord Stanley of Alderley, London, 1898), and affected Europe like a spell, investing, in the words of Lacordaire, a humble priest with all the authority once enjoyed by Bossuet. Lamennais denounced toleration, and advocated a Catholic restoration to belief. The right of private judgment, introduced by Descartes and Leibnitz into philosophy and science, by Luther into religion and by Rousseau and the Encyclopaedists into politics and society, had, he contended, terminated in practical atheism and spiritual death. Ecclesiastical authority, founded on the absolute revelation delivered to the Jewish people, but supported by the universal tradition of all nations, he proclaimed to be the sole hope of regenerating the European communities. Three more volumes (Paris, 1818-1824) followed, and met with ?. mixed reception from

the Gallican bishops and monarchists, but with the enthusiastic adhesion of the younger clergy. The work was examined by three Roman theologians, and received the formal approval of Leo XII. Lamennais visited Rome at the pope's request, and was offered a place in the Sacred College, which he refused. On his return to France he took a prominent part in political work, and together with Chateaubriand, the vicomte de Villele, was a regular contributor to the Conservateur, but when Villele became the chief of the supporters of absolute monarchy, Lamennais withdrew his support and started two rival organs, Le Drapeau blanc and Le Memorial catholique. Various other minor works, together with Dela religion consideree dans ses rapports avec I'ordre civil el politique (2 vols., 1825- 1826), kept his name before the public.

He retired to La Chenaie and gathered round him a host of brilliant disciples, including C. de Montalembert, Lacordaire and Maurice de Guerin, his object being to form an organized body of opinion to persuade the French clergy and laity to throw off the yoke of the state connexion. With Rome at his back, as he thought, he adopted a frank and bold attitude in denouncing the liberties of the Gallican church. His health broke down and he went to the Pyrenees to recruit. On his return to La Chenaie in 1827 he had another dangerous illness, which power- fully impressed him with the thought that he had only been dragged back to life to be the instrument of Providence. Les Progres de la revolution et de la guerre contre I'iglise (1828) marked Lamennais's complete renunciation of royalist principles, and henceforward he dreamt of the advent of a theocratic democracy. Togiveeffect to these viewshefoundedL'j4»e«j>, the first number of which appeared on the 16th of October 1830, with the motto " God and Liberty." From the first the paper was aggressively democratic; it demanded rights of local administration, an jnlarged suffrage, universal freedom of conscience, freedom of instruction, of meeting, and of the press. Methods of worship were to be criticized, improved or abolished in absolute sub- mission to the spiritual, not to the temporal authority. With the help of Montalembert, he founded the Agence generate pour la defense de la liberie religieuse, which became a far-reaching organization, it had agents all over the land who noted any violations of religious freedom and reported them to head-quarters. As a result, L'Avenir's career was stormy, and the opposition of the Conservative bishops checked its circulation; Lamennais, Montalembert and Lacordaire resolved to suspend it for a while, and they set out to Rome in November 1831 to obtain the approval of Gregory XVI. The " pilgrims of liberty " were, after much opposition, received in audience by the pope, but only on the condition that the

object which brought them to Rome should not be mentioned. This was a bitter disappointment to such earnest ultramontanes, who received, a few days after the audience, a letter from Cardinal Pacca, advising their departure from Rome and suggesting that the

Holy See, whilst admitting the justice of their intentions, would like the matter left open for the present. Lacordaire and Montal- embert obeyed; Lamennais, however, remained in Rome, but his last hope vanished with the issue of Gregory's letter to the Polish bishops, in which the Polish patriots were reproved and the tsar was affirmed to be their lawful sovereign. He then " shook the dust of Rome from off his feet." At Munich, in 1832, he received the encyclical Mirari vos, condemning his policy; as a result L'Avenir ceased and the Agence was dissolved. Lamennais, with his two lieutenants, submitted, and deeply wounded, retired to La Chenaie. His genius and prophetic insight had turned the entire Catholic church against him, and those for whom he had fought so long were the fiercest of his opponents. The famous Paroles d'un croyant, published in 1834 through the intermediary of Sainte-Beuve, marks Lamennais's severance from the church. " A book, small in size, but immense in its perversity," was Gregory's criticism in a new encyclical letter. A tractate of aphorisms, it has the vigour of a Hebrew prophecy and contains the choicest gems of poetic feeling lost in a whirlwind of exaggerations and distorted views of kings and rulers. The work had an extraordinary circulation and was translated into many European languages. It is now forgotten as a whole, but the beautiful appeals to love and human brother- hood are still reprinted in every hand-book of French literature.

Henceforth Lamennais was the apostle of the people alone. Les Affaires de Rome, des maux de I'eglise et de la societe (1837) came from old habit of religious discussions rather than from his real mind of 1837, or at most it was but a last word. Le Livre du peuple (1837), De I'esclavage moderne (1839), Politique d I'usage du peuple (1839), three volumes of articles from the journal of the extreme democracy, Le Monde, are titles of works which show that he had arrived among the missionaries of liberty, equality and fraternity, and he soon got a share of their martyrdom. Le Pays et le gouvernement (1840) caused him a year's imprisonment. He struggled through difficulties of lost friendships, limited means and personal illnesses, faithful to the last to his hardly won dogma of the sovereignty of the people, and, to judge by his contribution to Louis Blanc's Revue du progres was ready for something like communism. He was named president of the " Societe de la solidarite r6publicaine," which counted half a million adherents in fifteen days. The Revolution of 1848 had his sympathies, and he started Le Peuple constituant; however, he was compelled to stop it on

the 10th of July, complaining that silence was for the poor, but again he was at the head of La Revolution dimocratique et sociale, which also succumbed. In the constituent assembly he sat on the left till the coupe d'etat of Napoleon III. in 1851 put an end to all hopes of popular freedom. While deputy he drew up a constitution, but it was rejected as too radical. There- after a translation of Dante chiefly occupied him till his death, which took place in Paris on the 27th of February 1854. He refused to be reconciled to the church, and was buried according to his own directions at Pere La Chaise without funeral rites, being mourned by a countless concourse of democratic and literary admirers.

During the most difficult time of his republican period he found solace for his intellect in the composition of Une voix de prison, written during his imprisonment in a similar strain to Les paroles d'un croyant. This is an interesting contribution to the literature of captivity; it was published in Paris in 1846. He also wrote Esquisse de philosophic (1840). Of the four volumes of this work the third, which is an exposition of art as a development from the aspirations and necessities of the temple, stands pre-eminent, and remains the best evidence of his thinking power and brilliant style. ■

There are two so-called (Euvres completes de Lamennais, the first in 10 volumes (Paris, 1836-1837), and the other in 10 volumes (Paris, 1844); both these are very incomplete and only contain the works mentioned above. The most noteworthy of his writings subse- quently published are: Amschaspands et Darvands (1843), Le Deuil de la/ Pologne (1846), Melanges philosophiques et politiques (1856), Les Evangiles (1846) and La Divine Comedie, these latter being trans- lations of the Gospels and of Dante.

Part of his voluminous correspondence has also appeared. The most interesting volumes are the following: Correspondance de F. de Lamennais, edited by E. D. Forgues (2 vols., 1855-1858); CEuvres inedites de F. Lamennais, edited by Ange Blaize (2 vols.., 1866); Correspondance inedite entre Lamennais et le baron de Vitrolles, edited by E. D. Forgues (1819-1853); Confidences de Lamennais, lettres inedites de 1821 a 184.8, edited by A. du Bois de la Villerabel (1886) ; Lamennais d'apris des documents inedits, by Alfred Roussel (Rennes, 2 vols., 1892); Lamennais intime, d'apris une correspondance inedite, by A. Roussel (Rennes, 1897) ; Un Lamennais inconnu, edited

by A. Laveille (1898); Lettres de Lamennais & Montalembert, edited by

E. D. Forgues (1898); and many other letters published in the Revue bleue. Revue britannique, &c.

A list of lives or studies on Lamennais would fill several columns. The following may be mentioned. A Blaize, Essai biographique sur M. de Lamennais (1858); E. D. Forgues, Notes et souvenirs (1859);

F. Brunetiere, Nouveaux es,sais sur la literature contemporaine (1893) ‘<

E. Faguet, Politiques et moralistes, ii. (1898) ; P. Janet, La Philosophic de Lamennais (1890); P. Mercier, S.J., Lamennais d’apris sa correspondance et les travaux les plus recents (1893); A. Mollien et

F. Duine, Lamennais, sa vie et ses idees; Pages choisies (Lyons. 1898) ; The Hon. W. Gibson, The Abbe de Lammenais and the Liberal Catholic Movement in France (London, 1896) ; E. Renan Essais de morale et de critique (1857) ; E. Scherer, Melanges de critique religieuse (1859); G. E. Spuller, Lamennais, etude d’histoire et de politique religieuse (1892); Mgr. Ricard, L’ecole menaisienne (1882), and Sainte-Beuve, Portraits contemporains, tome i. (1832), and Nouveaux Lundis, tome i. p. 22 ; tome xi. p. 347.

LAMENTATIONS (Lamentations of Jeremiah), a book of the Old Testament. In Hebrew MSS. and editions this little collec- tion of liturgical poems is entitled m’K Ah how!, the first word of ch. i. (and chs. ii., iv.); cf. the books of the Pentateuch, and the Babylonian Epic of Creation (a far older example). In the Septuagint it is called Qprjvot., ” Funeral-songs ” or “Dirges,” the usual rendering of Heb. nirp (Am. v. 1; Jer. vii. 29; 2 Sam. i. 17), which is, in fact, the name in the Talmud (Baba Bathra 15a) and other Jewish writings; and it was known as such to the Fathers (Jerome, Cinoth). The Septuagint (B) introduces the book thus: ” And it came to pass, after Israel was taken captive and Jerusalem laid waste, Jeremiah sat weeping, and lamented with this lamentation over Jerusalem, and said . . .,” a notice which may have related originally to the first poem only. Some Septuagint MSS., and the Syriac and other versions, have the fuller title Lamentations of J eremiak. In the Hebrew Bible Lamentations is placed among the Cetubim or Hagiographa, usually as the middle book of the five Megilloth or Ferial Rolls (Canticles, Ruth, Lamentations, Ecclesiastes, Esther) according to the order of the days on which they are read in the Synagogue, Lamentations being read on

the 9th of Ab (6th of August), when the destruction of the Temple is commemorated (Mass. Sopherim 18). But the Septuagint appends the book to Jeremiah (Baruch intervening), just as it adds Ruth to Judges; thus making the number of the books of the Hebrew Canon the same as that of the letters of the Hebrew alphabet, viz. twenty-two (so Jos. c. Ap. i. 8), instead of the Synagogal twenty-four (see Baba Bathra 14ft).

External features and poetical structure. — These poems exhibit a peculiar metre, the so-called ” limping verse,” of which Am. v. 2 is a good instance:

” She is fallen, to rise no more —

Maid Israel ! Left lorn upon her land —

none raising her ! ”

A longer line, with three accented syllables, is followed by a shorter with two. Chs. i.iii. consist of stanzas of three such couplets each; chs. iv. and v. of two like Am. v. 2. This metre came in time to be distinctive of elegy. The text of Lamenta tions, however, so often deviates from it, that we can only affirm the tendency of the poet to cast his couplets into this type (Driver). Some anomalies,, both of metre and of sense, may be removed by judicious emendation; and many lines become smooth enough, if we assume a crasis of open vowels of the same class, or a diphthongal pronunciation of others, or contraction or silence of certain suffixes as in Syriac. The oldest elegiac utterances are not couched in this metre; e.g. David’s (2 Sam. iii. a f. Abner; ib. i. 19-27 Saul and Jonathan). Yet the refrain of the latter, ‘ Eik ndf ‘lu gibborim, ” Ah how are heroes fallen! ” agrees with our longer line. The remote ancestor of

this Hebrew metre may be recognized in the Babylonian epic of Gilgamesh, written at least a thousand years earlier: — Ea-bdni ibri huidni \ Nimru sha ceri. “Eabani, my friend, my little brother ! | Leopard of the Wild!” and- again: —

Kiki luskut [Kiki luqul-ma Ibri sha ardmmu \ Itemi tittish ” How shall I be dumb ? | How shall I bewail ? The friend whom I love | Is turned to clay ! ”

Like a few of the Psalms, Lamentations i.-iv. are alphabetical acrostics. Each poem contains twenty-two stanzas, correspond- ing to the twenty-two letters of the Hebrew alphabet ; and each stanza begins with its proper letter. (In ch. iii. each of the three couplets in a stanza

begins with the same letter, so that the alphabet is repeated thrice: cf. Psalm cxix. for an eight-fold repetition.) The alphabet of Lamentations ii. iii. iv. varies from the usual order of the letters by placing Pe before Ain. The same was doubtless the case in ch. i. also until some scribe altered it. He went no further, because the sense forbade it in the other instances. The variation may have been one of local use, either in Judea or in Babylonia; or the author may have had some fanciful reason for the transposition, such as, for example, that Pe following Samech (sa) might suggest the word tied, ” Wail ye! ” (2 Sam. iii. 31). Although the oldest Hebrew elegies are not alphabetic acrostics, it is a curious 5 fact that the word ˆi-n, ” Was he a coward? ” (Sc. to 1 ? ; Is. vii. 4), is formed by the initial letters of the four lines on Abner (om. i, line 3); and the initials of the verses of David’s great elegy are nsk z>mn un, which may be read as a sentence meaning, perhaps, ” Lo, I the Avenger ” (cf. Deut. xxxii. 41, 43) ” will go forth! “; or the first two letters (Vrt) may stand for tin ‘in, ” Alas, my brother! ” (Jer. xxii. 18; cf. xxxiv. 5). In cryptic fashion the poet thus registers a vow of vengeance on the Philistines. Both kinds of acrostic occur side by side in the Psalms. Psalm ex., an acrostic of the same kind as David’s elegy, is followed by Psalms cxi. cxii., which are alphabetical acrostics, like the Lamentations. Such artifices are not in them- selves greater clogs on poetic expression than the excessive alliteration of old Saxon verse or the strict rhymes of modern lyrics. (Alliteration, both initial and internal, is common in Lamentations.) .

As the final piece, ch. v. may have suffered more in transmission than those which precede it — even to the extent of losing the acrostic form (like some of the Psalms and Nahum i.), besides half of its stanzas. If we divide the chapter into quatrains, like ch. iv., we notice several vestiges of an acrostic. The Aleph stanza (verses 7, 8) still precedes the Beth (verses 9, 10), and the Ain is still quite clear (verses 17, 18; cf. i. 16). Transposing verses 5, 6, and correcting their text, we see that the Jod stanza (verses 3, 4) precedes the Lamed (verses 6, 5), Caph having disappeared between them. With this clue, we may rearrange the other quatrains in alphabetical sequence, each according to its initial letter. We thus get a broken series of eleven stanzas, beginning with the letters « (verses 7, 8), a (9, 10), n (21, 22), 1 (19, cf. Psalm cii. 13; and 20), 1 (1, 2), n (13, Dnin; 14), < (3, 4), b (6, on6; 5, lvan . . ._ bv), 3 (11, 12), y (17, 18), and e (15, 16), successively. An internal connexion will now be apparent in all the stanzas.

General subject and outline of contents. — The theme of Lamentations is the final siege and fall of Jerusalem (586 B.C.), and the attendant and subsequent miseries of the Jewish people.

In ch. i. we have a vivid picture of the distress of Zion, after all is over. The poet does not describe the events of the siege, nor the horrors of the capture, but the painful experience of subjection and tyranny which followed. Neither this nor ch. ii. is strictly a ” dirge.” Zion is not dead. She is personified as a widowed princess, bereaved and desolate, sitting amid the ruins of her former joys, and brooding over her calamities. From verse 11c to the end (except verse 17) she herself is the speaker: —

” O come, ye travellers all ! Behold and see If grief there be like mine ! ”

She images her sorrows under a variety of metaphors (cf. ch. iii. 1-18); ascribing all her woes to Yahweh’s righteous wrath, provoked by her sins, and crying for vengeance on the malicious rivals who had rejoiced at her overthrow.

The text has suffered much. Verse 5c read: ‘3*3 (v. 18), ” into captivity,” ens (v. 7), ” adversaries.” For verse 7, see Budde, V. 14: ipffj, read “iiypj, ” was bound.” Verse 19c read: wpa ‘3 ikxo kSi e’dj 2’arb bix ” For they sought food to restore life, and found it not:” cf. Septuagint; and verses 11, 16. Verse 20: the incongruous wm na ‘3, ” For I grievously re belled,” should be ‘Dm nn3i, “My inwards burn”; Hos. xi. 8. Verses 21 f . : “All my foes heard, rejoiced That IT” (cf. Psalm ix. 13), “Thou didst. Bring Thou” (tin N3n), “the Day Thou hast proclaimed ; Let them become like me! Let the time ” (“ > >; see Septuagint) ” of their calamity come! ”

Chapter ii. — “Ah how in wrath the Lord | Beclouds Bath- Sion! ” The poet laments Yahweh’s anger as the true cause which destroyed city and kingdom, suspended feast and Sabbath, rejected altar and sanctuary. He mentions the uproar of the victors in the Temple; the dismantling of the walls; the exile of king and princes (verses 1-9). He recalls the mourning in the doomed city; the children dying of hunger in the streets; the prophets deluding the people with vain hopes. Passers-by jeered at the fallen city; and all her enemies triumphed over her (verses 10-17). Sion is urged to cry to the Lord in protest against His pitiless work (verses 18-22).

Here too emendation is necessary. Verse 4a: ixn 3’xn, ” He fixed His arrow,” sc. on the string (Septuagint, iaTtpkwaiv) <; cf. Psalm xi. 2.

Add at the end idn (nx) rta, " He spent His anger:" see iv. 11; Ezek. vii. 8, xx. 8, 21. Verse 6: U3K'D to ps'i, " And He broke down the wall of His dwelling- place " (Septuagint to oK-Qvuij.a. aiirov; cf. Psalm lxxxiv. 7/., where iV'13 follows, as here). Is. v. 5; Psalms lxxx. 13, lxxxix. 41. Perhaps di.vi, verses 2, 17. But Septuagint Kal SiexeTcwei' = ens'i (i. 13, i7) = Di2'i (iv. 4) or even ps'i. Verse 9, perhaps: " He sunk (y?o) her gates in the ground, — He shattered her bars ; He made her king and her princes wander (n3x, Jer. xxiii. 1) — Among the nations without Torah " (cf. Ezek. vii. 26 f.). Verse 18: " Cry much " (nai; or bitterly, -o, Zeph. i. 14) " unto the Lord, O Virgin Daughter of Zion! " Verse 19 is metrically redundant, and the last clauses do not agree with what follows. " For the life of thy children " was altered from " for what He hath done to thee" ("A Vrrjv *?y) ; and then the rest was added. The uniform gloom of this, the most dirge-like of all the pieces, is unrelieved by a single ray of hope, even the hope of vengeance; cf. chapters i. iii. iv. ad fin.

Chapter iii. — Here the nation is personified as a man (cf. Hos. xi. 1), who laments his own calamities. In view of i. 12-22, ii. 20-22, this is hardly a serious deviation from the strict form of elegy (Klagelied). Budde makes much of “the close external connexion with ch. ii.” The truth is that the break is as great as between any two of these poems. Chapter ii. ends with a mother’s lament over her slaughtered children; chapter iii. makes an entirely new beginning, with its abruptly independent ” I am the Man! ” The suppression of the Divine Name is intentional. Israel durst not breathe it, until compelled by rhe climax, verse 18: cf. Am. vi. 10. Contrast its frequency afterwards, when ground of hope is found in the Divine pity and purpose (verses 22-40), and when the contrite nation turns to its God in prayer (verses 55-66). The spiritual aspect of things is now the main topic. The poet deals less with incident, and more with the moral significance of the nation’s sufferings. It is the religious culmination of the book. His poem is rather lyrical than narrative, which may account for some obscurities in the connexion of thought; but his alphabetic scheme proves that he designed twenty-two stanzas, not sixty-six detached couplets. There is something arresting in that bold ” I am the Man “; and the lyrical intensity, the religious depth and beauty of the whole, may well blind us to occasional ruggedness of metre and language, abrupt transitions from figure to figure and other alleged blemishes, some of which may not have seemed such to the poet’s contemporaries (e.g. the repetition of the acrostic word, far more frequent in Psalm cxix.); and some disappear on revision of the text.

Verse 5, perhaps: ” He swallowed me up ” (Jer. Ii. 34) ” and begirt my head ” (Septuagint) ” with gloom ” (.i?sn Is. lviii. 10, cf.

verse 6, yet cf. also fixWi, Neh. ix. 32). Verse 14: “all my people,” rather all peoples (Heb. MSS. and Syr.). Verse 16b, rd. ‘jeˆsn, “He made me bore” (i.e. grovel) “in the ashes:” cf. Jer. vi. 26; Ezek. xxvti. 30. Verse 17a should be: ran •its: ohiyb ” And He cast off my soul for ever:” see verse 31; Psalm Ixxxviii. 15. Verse 26: “It is good to wait” (toil 1 ?) “in silence ” (n-n Is. xlvii. 5); or “It is good that he wait and be silent” (doii to 1 -3; cf. verse 27). Verse 31, add wsi, “his soul.” The verse is a reply to 17a. Verses 34-36 render: ” To crush under His feet . . . Adonai purposed not ” (Gen. xx. 10; Psalm lxvi. 18). Verse 39, ‘n (Gen. v. 5; or .rn Neh. ix. 29) is the necessary second verb: “Why doth a mortal complain?” (or ” What . . . lament? “). ” Doth a man live by his sins? “: Man ” lives by ” righteousness (Ezek. xxxiii. 19). For the wording, cf. Psalm lxxxix. 49. Verse 430: ” Thou didst encompass with ‘ (rg. nni3D; Hos. xii. 1) “anger and pursue us.” Syntax as verse 660. Verse 49, rd. njiun (cf. ii. 18 also). Verse 51: “Mine eye did hurt to herself ” (nvsih), ” By weeping over my people:” Verse 48: ch. i. 16; Jer. xxxi. 15. Verse 52: “They quelled my life in the pit” (Sheol; Psalms xxx. 4, Ixxxviii. 4, 7; verse 55); “They brought me down to Abaddon” (jn3« win; cf. Psalm Ixxxviii. 12). Verse 58: ” O plead, Lord, the cause of my soul! O redeem my life! “; cf. Psalm cxix. 154. If the prayer for vengeance begins here, Budde’s ” deep division in the middle of an acrostic letter-group ” vanishes. Verse 59, rd. ‘my, ” my pervert- ing; ” inf. pi. c. suff. obj.; cf. verse 36. Verse 616 repeated by mistake from 606. Perhaps: ” Wherewith they dogged my steps: ” ‘mpy ls-irw: Psalm lxxxix. 51 f. Verse 63, rd. DDip, as usual, and Dnra:, as in verse 14 and Job xxx. 9. Verse 65: ” Thou wilt give them madness ” (cf. Arab, gunun; magniln, mad) ” of heart; Thou wilt curse, and consume them! ” (oˆ3n n«n). Chapter iv. ” Ah, how doth gold grow dim, —

The finest ore change hue! ”

The poet shows how famine and the sword desolated Zion (verses 1-10). All was Yahweh’s work; a wonder to the heathen world, but accounted for by the crimes of prophets and priests (Jer. xxiii. n, 14, xxvi. 8, 20 ff., xxix. 21-23), who, like Cain, became homeless wanderers and outcasts (verses n-16). Vainly did the besieged watch for succours from Egypt (Jer. xxxvii. 5 ff.); and even the last forlorn hope, the flight of ” Yahweh’s Anointed,” King Zedekiah, was doomed to fail (verses 17-20; Jer. xxxix. 4 ff). Edom rejoiced in her ruin (Ezek. xxv. 12; xxxv. 15; Obad.; Psalm exxxvii. 7); but Zion’s sin is now atoned for (cf . Is. xl. 2) , and she may look forward to the judgment of her foe (verses 21-22).

Verse 6d, perhaps: “And their ruin tarried not” (to n 1 ?! dvsj) ; cf.

Pro. xxiv. 22. Verse yd: “Their body” (rd. Diru) ” was a sapphire: ” see Ct. v. 14; Dn. x. 6. Verse 9: “Happier were the slain of the sword Than the slain of famine! For they ” (Septuagint om.), “they passed away” (uˆn Septuagint; Psalm xxxix. 14) “with a stab ” (Ju. ix. 54; Is. xiii. 15; Jer. Ii. 4), ” Suddenly, in the field ” (V3 Duns; Jer. xiv. 18). Verse 13, add N’n after fwaj; cf. Ju. xiv. 4; Jer. xxii. 16. Verse 17c: “While we watched” (Septuagint) “continually:” ura umsxa. Verse 18: “Our steps were curbed” (nx MSS.; see Pro. iv. 12; Job xviii. 7) ” from walking In our open places ” (before the city gates: Neh. viii. 1, 3); ” The completion of our days drew nigh ” (u’C nm’ra dv a-ip; cf. Lev. viii. 33; Job xx. 22), “For our end was come ” (Ezek. vii. 2, 6, &c). Verse 21, Septuagint om. Uz (dittogr. ?); “Settler in the Land! ” (i.e. of Judah; cf. Ezek. xxxv. 10, xxxvi. 5. Perhaps ‘xn wiv ” Seizer of the Land “).

Chapter v. — A sorrowful supplication, in which the speakers deplore, not the fall of Jerusalem, but their own state of galling dependence and hopeless poverty. They are still suffering for the sins of their fathers, who perished in the catastrophe (verse 7). They are at the mercy of ” servants ” (verse 8; cf. 2 Kings xxv. 24; Neh. v. 15: ” Yea, even their ‘ boys ‘ lorded it over the people “), under a tyranny of pashas of the worst type (verses n f.). The soil is owned by aliens; and the Jews have to buy their water and firewood (verses 2, 4; cf. Neh. ix. 36 f.). While busy harvesting, they are exposed to the raids of the Bedouins (verse 9). Jackals prowl among the ruins of Zion (verse 18; cf. Neh. iv. 3). And this condition of things has already lasted a very long time (verse 20).

Verses 5 f. transpose and read: “To adversaries” (D’nx 1 ?) ” we submitted, Saying ” (“ton 1 ?), ” ‘ We shall be satisfied with bread’” (cf. Jer. xlii. 14); “The yoke of our neck they made heavy” (Neh. v. 15: oyn hy n‘33,i) ; “We toil, and no rest is allowed us.” Verse 13: ” Noblss endured to grind, And princes staggered under logs ” (D’lin for a’lim, which belongs to verse 14; d’mv for D”ip. Eccl. x. 7; Is. xxxiv. 12; Neh. iv. 14;

v. 7 ; vi. 17). Verse 19, ” But Thou …” Psalm cii. 13 (1 fell out after preceding 1, verse 18). Verse 22, omit ok; dittogr. of following *o.

Authorship and date. — The tradition of Jeremiah’s authorship cannot be traced higher than the Septuagint version. The prefatory note there

may come from a Hebrew MS., but perhaps refers to chapter i. only ("Jeremiah sang this dirge"). The idea that Lamentations was originally appended to Jeremiah in the Hebrew Canon, as it is in the old versions, and was after- wards separated from it and added to the other Megilloth for the liturgical convenience of the Synagogue, rests on the fact that Josephus (Ap. i. 1, 8) and, following him, Jerome and Origen reckon 22 books, taking Ruth with Judges and Lamenta- tions with Jeremiah; whereas the ordinary Jewish reckoning gives 24 books, as in our Hebrew Bibles. There is no evidence that this artificial reckoning according to the number of letters in the Hebrew alphabet was ever much more than a fanciful suggestion. Even in the Septuagint the existing order may not be original. It appears likely that Lamentations was not translated by the same hand as Jeremiah (Noldeke) Unlike the latter, the Septuagint Lamentations sticks closely to the Massoretic text. The two books can hardly have been united from the first. On the strength of 2 Chron. xxxv. 25, some ancient writers (e.g. Jerome ad Zech. xii. 11) held that Jeremiah composed Lamentations. When, however, Josephus (Ant. x. 5, 1) states that Jeremiah wrote an elegy on Josiah still extant in his day, he may be merely quoting a little too much of Chron. loc. cit.; and it is obvious that he need not mean our book (see Whiston's note) . It is urged, indeed, that the author of Chronicles could not have imagined a prophet to have sympathized with such a king as Zedekiah so warmly as is implied by Lamentations iv. 20; and, therefore, he must have connected the passage with Josiah, the last of the good kings. However that may have been, the Chronicler neither says that Jeremiah wrote all the elegies comprised in The Qinoth, nor does he imply that the entire collection consisted of only five pieces. Rather, the contrary; for he implies that The Qinoth contained not only Jeremiah's single dirge on Josiah, but also the elegies of " all the singing men and singing women," from the time of Josiah's death (608) down to his own day (3rd century). The untimely fate of Josiah became a stock allusion in dirges. It is not meant that for three centuries the dirge-writers had nothing else to sing of; much less, that they sang of the fall of Jerusalem (pre- supposed by our book) before its occurrence. Upon the whole, it does not seem probable, either that the Chronicler mistook Lamentations iv. for Jeremiah's dirge on Josiah, or that the book he calls The Qinoth was identical with our Qinoth. Later writers misunderstood him, because — on the ground of certain obtrusive similarities between Jeremiah and Lamentations (see Driver, L.O.T. p. 433 f.), and the supposed reference in Lamentations iii. 53 ff. to Jeremiah xxxviii. 6 ff., as well as the fact that Jeremiah was the one well-known inspired writer who had lived through the siege of Jerusalem — they naturally enough ascribed this little book to

the prophet. It is certainly true that the same emotional temperament, dissolving in tears at the spectacle of the country's woes, and expressing itself to a great extent in the same or similar language, is noticeable in the author(s) of Lamentations i.-iv. and in Jeremiah, And both refer these woes to the same cause, viz. the sins of the nation, and particularly of its prophets and priests.

This, however, is not enough to prove identity of authorship; and the following considerations militate strongly against the tradition, (i.) The language and style of Lamentations are in general very unlike those of Jeremiah (see the details in Nagelsbach and Lohr); whatever allowance may be made for conventional differences in the phraseology of elegiac poetry and prophetic prose, even of a more or less lyrical cast, (ii.) Lamentations i.-iv. show a knowledge of Ezekiel (cf . Lamentations ii. 4c; Ez. xx. 8, 21; Lam. ii. 14; Ez. xii. 24; xiii. 10, 14; Lam. ii. 15; Ez. xxvii. 3; xxviii. 12; Lam. iv. 20; Ez. xix. 4, 8) and of Is. xl.-lxvi. (Lam. i. 10, micro; Is. lxiv. 10; Lam. i. 15; Is. lxiii. 2; Lam. ii. 1; Is. lxvi. 1; Lam. ii. 2c; Is. xliii. 28; Lam. ii. 13 the 3 verbs; Is. xl. 18, 25; Lam. ii. 15c;

Is. \x."i$b; Lam. iii. 26 Don; Is. xlvii. 5; Lam. iii. 30; Is. i. 6; Lam. iv. 14; Is. lix. 3, 10; Lam. iv. 15; Is. Iii. 11; Lam. iv. 17c; Is. xlv. 20; Lam. iv. 22; Is. xl. 2). Jeremiah does not quote Ezekiel; and he could hardly have quoted writings of the age of Cyrus, (iii.) The coincidences of language between Lamentations and certain late Psalms, such as Psalms lxix., lxxiv., lxxx., lxxxviii., lxxxix., cxix., are numerous and signifi- cant, at least as a general indication of date, (iv.) The point of view of Lamentations sometimes differs from that of the prophet. This need not be the case in i. 21 f. where the context shows that the " enemies " are not the Chaldeans, but Judah's ill neighbours, Edom, Ammon, Moab and the rest (cf. iv. 21 f.; iii. 59-66 may refer to the same foes). Ch. ii. oc may refer to popular prophecy (" her prophets "; cf. verse 14), which would naturally be silenced by the overwhelming falsification of its comfortable predictions (iv. 14 ff. ; cf. Jer. xiv. 13; Ezek. vii. 26 f.; Psalm lxxiv. 9). But though Jeremiah was by no means disloyal (Jer. xxxiv. 4 f.), he would hardly have spoken of Zedekiah in the terms of Lam. iv. 20; and the prophet never looked to Egypt for help, as the poet of iv. 1 7 appears to have done. It must be admitted that Lamentations exhibits, upon the whole, " a poet (more) in sympathy with the old life of the nation, whose attitude towards the temple and the king is far more popular than Jeremiah's" (W. Robertson Smith); cf. i. 4, 10, 19, ii. 6, 7, 20c. (v.) While we find in Lamentations some things that we should not have expected from Jeremiah, we miss other things characteristic of the prophet. There is no trace of his confident faith in the restoration of both Israel and

Judah (Jer. iii. 14-18, xxiii. 3-8, xxx.-xxxiii.), nor of his unique doctrine of the New Covenant (Jer. xxxi. 31-34), as a ground of hope and consolation for Zion. The only hope ex- pressed in Lamentations i. is the hope of Divine vengeance on Judah's malicious rivals (i. 21 f.); and even this is wanting from ch. ii. Chapter iii. finds comfort in the thought of Yahweh's unfailing mercy; but ends with a louder cry for vengeance. Chapter iv. suggests neither hope nor consolation, until the end, where we have an assurance that Zion's punishment is complete, and she will not again be exiled (iv. 21 f.). The last word is woe for Edom. In chapter v. we have a prayer for restoration: "Make us return, O Yahweh, and we shall return!" (i.e. to our pristine state). Had Jeremiah been the author, we should have expected something more positive and definitely prophetic in tone and spirit. (The author of chapter iii. seems to have felt this. It was apparently written in view of chapter ii. as a kind of religious counterpoise to its burden of despair, which it first takes up, verses -1-20. and then dissipates, verses 21 ff.). (vi.) It seems almost superfluous to add that, in the brief and troubled story of the prophet's life after the fall of the city Jer. xxxix.xliv.), it is difficult to specify an occasion when he may be supposed to have enjoyed the necessary leisure and quiet for the composition of these elaborate and carefully con structed pieces, in a style so remote from his ordinary freedom and spontaneity of utterance. And if at the very end of his stormy career he really found time and inclination to write any- thing of this nature, we may wonder why it was not included in the considerable and somewhat miscellaneous volume of his works, or at least mentioned in the chapters which relate to his public activity after the catastrophe.

Budde's date, 550 B.C., might not be too early for chapter v., if it stood alone. But it was evidently written as the close of the book, and perhaps to complete the number of five divisions, after the model of the Pentateuch; which would bring it below the date of Ezra (457 B.C.). And this date is supported by internal indications. The Divine forgetfulness has already lasted a very long time since the catastrophe (" for ever," verse 20); which seems to imply the lapse of much more than thirty-six years (cf. Zech. i. 12). The hill of Zion is still a deserted site haunted by jackals, as it was when Nehemiah arrived, 445 B.C. (Neh. i. 3, ii. 3, 13, 17, iv. 3). And the condi- tions, political and economic, seem to agree with what is told us by Nehemiah of the state of things which he found, and which pre- vailed before his coming: cf. esp. Neh. v. 2-5 with Lamentations

y. 2, 10, and Neh. v. 15 with Lamentations v. 5, 8. There is nothing in chapter i. which Nehemiah himself might not have written, had he been a poet (cf. Neh. i. 4). The narrative of Neh. xiii. throws light on verse 10; and there are many coin- cidences of language, e.g. ” The Province ” (of Judea), Neh. i. 3, cf. verse 1; “adversaries” (ens), of Judah’s hostile neigh- bours, verse 7, Neh. iv. n; “made my strength stumble,” verse 14, cf.-Neh. iv. 4 (Heb.); the prayers, verses 21 f., Neh. iv. 4 f. (Heb. iii. 36 f.), are similar. The memory of what is told in Neh. iv. 5 (11), Ezra iv. 23 f., v. 5, may perhaps have suggested the peculiar term rows, stoppage, arrest, verse 7. With verse 3 ” Judah migrated from oppression; From greatness of servitude; She settled among the nations, Without finding a resting-place,” cf. Neh. v. 18 end, Jer. xl. n f. The “remnant of the captivity” (Neh. i. 2 f.) became much attenuated (cf. verse 4), because all who could escape from the galling tyranny of the foreigner left the country (cf. verse 6). Verses 11, 19 (dearth of food), 20 (danger in the field, starvation in the house) agree curiously with Neh. v. 6, 9 f.

Chapters ii. and iv. can hardly be dated earlier than the beginning of the Persian period. They might then have been written by one who, as a young man of sixteen or twenty, had witnessed the terrible scenes of fifty years before. If, however, as is generally recognized, these poems are not the spontaneous and unstudied outpourings of passionate grief, but compositions of calculated art and studied effects, written for a purpose, it is obvious that they need not be contemporary. A poet of a later generation might have sung of the great drama in this fashion. The chief incidents and episodes would be deeply graven in the popular memory; and it is the poet’s function to make the past live again. There is much metaphor (i. 13- 15, ii- i-4, iii. 1-18, iv. 1 ff.), and little detail beyond the horrors usual in long sieges (see Deut. xxviii. 52 ff.; 2 Kings vi. 28 f.) Acquaintance with the existing literature and the popular reminiscences of the last days of Jerusalem would supply an ample foundation for all that we find in these poems.

Literature. — The older literature is fully given by Nagelsbach in Lange’s Bibelwerk A.T. xv. (1868, Eng. trans., 1871, p. 17). Among commentaries may be noticed those of Kalkar (in Latin) (1836); O. Thenius in Kurzgefasstes Exeg. Handbuch (1855), who ascribes chapters ii. and iv. tc Jeremiah (comp. K. Budde in Z.A.T.W., 1882, p. 45); Vaihinger (1857); Neumann (1858); H. Ewald in his Duhter, vol. 1. pt. ii. (2nd ed., 1866); Engelhardt (1867); Nagels- bach, op. cit. (1868); E. Gerlach, Die Klagelied. Jer. (1868); A. Kamphausen in Bunsen’s Bibelwerk iii. (1868) ; C. F. Keil (1872) (Eng. trans., 1874); Payne Smith in The Speaker’s Commentary; Reuss, La Bible: poesie lyrique (1879) ; T. K. Cheyne, at end of ” Jeremiah,” Pulptt

Commentary (1883-1885); E. H. Plumptre, in Ellicott's O.T. for English Readers (1884); S. Oettli in Strack-Zockler's Kurzgef. Komm. A.T. vii. (1889); M. Lohr (1891) and againHand- kommentar zum A.T. (1893); F. Baethgen ap. Kautzsch, Die Heilige Schrift d. A.T. (1894); W. F. Adeney, Expositor's Bible (J895); S. Minocchi, Le Lamentazioni di Geremia (Rome, 1897); and K. Budde," Funf Megillot," in Kurzer Hd.-Comm. zum A. T. (1898).

For textual and literary criticism see also Houbigant, Notae Crihcae, ii. 477-483 (1777); E. H. Rodhe, Num Jeremias Threnos scnpserit quaestiones (Lundae, 1871); F. Montet, Htude sur le livre des Lamentations (Geneva, 1875); G. Bickell, Carmina V. T. metrice, 1 12-120 (1882), and Wiener Zeitschrift filr Kunde des Morgenlandes, viii. 101 ff. (1894) (cf. also his Dichtungen der Hebrder, i. 87-108, 1882); Merkel, Uber das A.T. Buck der Klagelieder (Halle, 1889); J. Dysennck, Theologisch Tijdschrift, xxvi. 359 ff. (1892) ; S. A. Fries, " Parallele zwischen Thr. iv., v. und der Makkabaerzeit,".i'.^.r.W. > xiii. no ff. (1893) (chaps, iv. v. Maccabean; i.iii. Jeremiah's); and on the other side Lohr, Z.A.T.W. xiv. 51 ff. (1894); id ib., p. 31 ff., Der Sprachgebrauch des Buches der Klagelieder ; and Lohr, " Threni iii. und die jeremianische Autorschaft des Buches der Klagelieder," Z.A.T.W., xxiv. 1 ff. (1904).

On the prosody, see (besides the works of Bickell and Dyserinck) K. Budde, " Das hebraische Klagelied," Z.A.T.W., ii. 1 ff. (1882), iii. 299 ff. (1883), xi. 234 ff. (1891), xii. 31 ff. 261 ff. (1892) ; Preussische Jahrbilcher, lxxiii. 461 ff. (1893); and C. J. Bail, "The Metrical Structure of Qinoth," P.S.B.A. (March 1887). (The writer was then unacquainted with Budde's previous labours.)

The following may also be consulted, Noldeke, Die A.T. Literatur, pp. 142-148 (1868) ; Seinecke, Gesch. des Volkes Israel, ii. 29 ff. (1884) ; Stade, Gesch. p. 701, n. 1 (1887); Smend in Z.A.T.W. (1888), p. 62 f. ; Steinthal, "Die Klagelieder Jer." in Bibel und Rel.-philosophie, 16-33 (1890) ; Driver, L.O. T. (1891), p. 428, "The Lamentations" ; and Lheyne s article " Lamentationsˆ(Book)," in Enc. Bibl. iii. (C. J. B.*) xvi. 1

LAMETH, ALEXANDRE THEODORE VICTOR, Comte de (1760-1829), French soldier and politician, was born in Paris on the 20th of October 1760. He served in the American War of Independence under Rochambeau, and in 1789 was sent as deputy to the States General by the nobles of the bailliage of Peronne. In the Constituent Assembly he formed with Barnave and Adrien Duport a sort of association called the " Triumvirate," which controlled a group of about forty deputies

forming the advanced left of the Assembly. He presented a famous report in the Constituent Assembly on the organization of the army, but is better known by his eloquent speech on the 28th of February 1791, at the Jacobin Club, against Mirabeau, whose relations with the court were beginning to be suspected, and who was a personal enemy of Lameth. However, after the flight of the king to Varennes, Lameth became reconciled with the court. He served in the army as marechal-de-camp under Luckner and Lafayette, but was accused of treason on the 15th of August 1792, fled the country, and was imprisoned by the Austrians. After his release he engaged in commerce at Hamburg with his brother Charles and the due d'Aiguillon, and did not return to France until the Consulate. Under the Empire he was made prefect successively in several departments, and in 1810 was created a baron. In 18 14 he attached himself to the Bourbons, and under the Restoration was appointed prefect of Somme, deputy for Seine-Inferieure and finally deputy for Seine-et-Oise, in which capacity he was a leader of the Liberal opposition. He died in Paris on the 18th of March 1829. He was the author of an important History of the Constituent Assembly (Paris, 2 vols., 1828-1829).

Of his two brothers, Theodore Lameth (1756-1854) served in the American war, sat in the Legislative Assembly as deputy from the department of Jura, and became marechal-de-camp; and Charles Malo Francois Lameth (1757-1832), who also served in America, was deputy to the States General of 1789, but emigrated early in the Revolution, returned to France under the Consulate, and was appointed governor of Wurzburg under the Empire. Like Alexandre, Charles joined the Bourbons, succeeding Alexandre as deputy in 1829.

See F. A. Aulard, Les Orateurs de I'Assemblee Constiluante (Paris, I9 5); also M. Tourneux, Bibliog. de I'histoire de Paris (vol. iv., 1906, s.v. " Lameth ").

LAMETTRIE, JULIEN OFFRAY DE (1700-1751), French physician and philosopher, the earliest of the materialistic writers of the Illumination, was born at St Malo on the 25th of December 1709. After studying theology in the Jansenist schools for some years, he suddenly decided to adopt the profession of medicine. In 1 733 he went to Leiden to study under Boerhaave, and in 1742 returned to Paris, where he obtained the appointment of surgeon to the guards. During an attack of fever he made observations on himself with reference to the action of quickened circulation upon thought, which led him to the conclusion that psychical phenomena were to be accounted for as the effects of organic changes in the brain and nervous system. This conclusion he worked out in his earliest philo-

sophical work, the Histoire naturelle de Fame, which appeared about 1745. So great was the outcry caused by its publication that Lamettrie was forced to take refuge in Leiden, where he developed his doctrines still more boldly and completely, and with great originality, in L'Homme machine (Eng. trans., London, 1750; ed. with introd. and notes, J. Assezat, 1865), and L'Homme plante, treatises based upon principles of the most consistently materialistic character. The ethics of these principles were worked out in Discours sur le bonheur, La Volupte, and L' Art de jouir, in which the end of life is found in the pleasures of the senses, and virtue is reduced to self-love. Atheism is the only means of ensuring the happiness of the world, which has been rendered impossible by the wars brought about by theologians. The soul is only the thinking part of the body, and with the body it passes away. When death comes, the farce is over {la farce est joute), therefore let us take our pleasure while we can. Lamettrie has been called " the Aristippus of modern materialism." So strong was the feeling against him

that in 1748 he was compelled to quit Holland for Berlin, where Frederick the Great not only allowed him to practise as a physician, but appointed him court reader. He died on the nth of November 1751. His collected (Euvres philosophiques appeared after his death in several editions, published in London, Berlin and Amsterdam respectively.

The chief authority for his life is the Hloge written by Frederick the Great (printed in Assezat's ed. of Homme machine). In modern times Lamettrie has been judged less severely; see F. A. Lange, Geschichle des Materialismus (Eng. trans, by E. C. Thomas, ii. 1880); Ne>ee Qu6pat (i.e. Rene Paquet), La Mettrie, savieel ses ceuvres (1873, with complete history of his works); J. E. Poritzky, /. O.de Lamettrie, Sein Leben und seine Werke (1900); F. Picavet, "La Mettrie et la critique allemande," in Compte rendu des stances de I Acad, des Sciences morales et politiques, xxxii. (1889), a reply to German re-habilitations of Lamettrie.

LAMIA, in Greek mythology, queen of Libya. She was beloved by Zeus, and when Hera robbed her of her children out of jealousy, she killed every child she could get into her power (Diod. Sic. xx. 41;

Schol. Aristophanes, Pax, 757). Hence Lamia came to mean a female bogey or demon, whose name was used by Greek mothers to frighten their children; from the Greek she passed into Roman demonology. She was repre- sented with a woman's face and a serpent's tail. She was also known as a sort of fiend, the prototype of the modern vampire, who in the form of a beautiful woman enticed young men to her embraces, in order that she might feed on their life and heart's blood. In this form she appears in Goethe's Die Braut von Corinth, and Keats's Lamia. The name Lamia is clearly the feminine form of Lamus, king of the Laestrygones (q.v.). At some early period, or in some districts, Lamus and Lamia (both, according to some accounts, children of Poseidon) were worshipped as gods; but the names did not attain general currency. Their history is remarkably like that of the malignant class of demons in Germanic and Celtic folk-lore. Both names occur in the geographical nomenclature of Greece and Asia Minor; and it is probable that the deities belong to that religion which spread from Asia Minor over Thrace into Greece.

LAMMAS (0. Eng. hlammaesse, hlafmaesse, from hlaf, loaf, and maesse, mass, "loaf-mass"), originally in England the festival of the wheat harvest celebrated on the 1st of August, O.S. It was one of the old quarter-days, being equivalent to midsummer, the others being Martinmas, equivalent to Michaelmas, Candle- mas (Christmas) and Whitsuntide (Easter). Some rents are still payable in England at Lammastide, and in Scotland it is generally observed, but on the 1 2th of August, since the altera- tion of the calendar in George II. 's reign. Its name was in allusion to the custom that each worshipper should present in the church a loaf made of the new wheat as an offering of the first-fruits.

A relic of the old " open-field " system of agriculture survives in the so-called " Lammas Lands." These were lands enclosed and held in severalty during the growing of corn and grass and thrown open to pasturage during the rest of the year for those who had common rights. These commoners might be the several owners, the inhabitants of a parish, freemen of a borough, tenants of a manor, &c. The opening of the fields by throwing down the fences took place on Lammas Day (12 th of August) for corn-lands and on Old Midsummer Day (6th of July) for grass. They remained open until the following Lady Day. Thus, in law, " lammas lands " belong to the several owners in fee-simple subject for half the year to the rights of pasturage of other people (Baylis v. Tyssen-Amherst, 1877, 6 Ch. D., 50).

See further F. Seebohm, The English Village Community; C. I. Elton, Commons and Waste Lands; P. Vinogradoff, Villainage in England.

LAMMERGEYER (Ger. Lammergeier, Lamm, lamb, and Geier, vulture), or bearded vulture, the Falco barbatus of Linnaeus and the Gypaetus barbatus of modern ornithologists, one of the grandest birds-of-prey of the Palaearctic region — inhabiting lofty mountain chains from Portugal to the borders of China, though within historic times it has been exterminated in several of its ancient haunts. Its northern range in Europe does not »eem to have extended farther than the southern frontier of

Bavaria, or the neighbourhood of Salzburg; 1 but in Asia it formerly reached a higher latitude, having been found even so lately as 1830 in the Amur region where, according to G. F. Radde (Beitr. Kenntn. Russ. Reichs, xxiii. p. 467), it has now left but its name. It is not uncommon on many parts of the Himalayas, where it breeds; and on the mountains of Kumaon and the Punjab, and is the ” golden eagle ” of most Anglo- Indians. It is’ found also in Persia, Palestine, Crete, and Greece, the Italian Alps, Sicily, Sardinia and Mauritania.

In some external characters the lammergeyer is intermediate between the families Vulturidae and Falconidae, and the opinion of systematists has from time to time varied as to its proper position. It is now generally agreed, however, that it is more closely allied with the eagles than with the vultures, and the sub-family Gypaetinae of the Falconidae has been formed to contain it.

The whole length of the bird is from 43 to 46 in., of which, however, about 20 are due to the long cuneiform tail, while the pointed wings measure more than 30 in. from the carpal joint to the tip. The top of the head is white, bounded by black, which, beginning in stiff bristly feathers turned forwards over the base of the beak, proceeds on either side of the face in a well-defined band to the eye, where it bifurcates into two narrow stripes, of which the upper one passes above and beyond that feature till just in front of the scalp it suddenly turns upwards across the head and meets the corresponding stripe from the opposite side, enclosing the white forehead already mentioned, while the lower stripe extends beneath the eye about as far backwards and then suddenly stops. A tuft of black, bristly feathers projects beardlike from the base of the mandible, and gives the bird one of its commonest epithets in many languages. The rest of the head, the neck, throat and lower parts generally are clothed with lanceolate feathers of a pale tawny colour — sometimes so pale as to be nearly white beneath; while the scapulars, back and wing-coverts generally, are of a glossy greyish-black, most of the feathers having a white shaft and a median tawny line. The quill-feathers, both of the wings and tail, are of a dark blackish-grey. The irides are of a light orange, and

the sclerotic tunics — equivalent to the ” white of the eye ” in most animals — which in few birds are visible, are in this very conspicuous and of a bright scarlet, giving it an air of great ferocity. In the young of the year the whole head, neck and throat are clothed in dull black, and most of the feathers of the mantle and wing-coverts are broadly tipped and mesially streaked with tawny or lightish-grey.

The lammergeyer breeds early in the year. The nest is of large size, built of sticks, lined with soft material and placed on a ledge of rock — a spot being chosen, and often occupied for many years, which is nearly always difficult of access. Here in the month of February a single egg is usually laid. This is more than 3 in. in length by nearly 2J in breadth, of a pale but lively brownish-orange. The young when in the nest are clad in down of a dirty white, varied with grey on the head and neck, and with ochraceous in the iliac region.

There is much discrepancy as to the ordinary food of the lammergeyer, some observers maintaining that it lives almost entirely on carrion, offal and even ordure; but there is no question of its frequently taking living prey, and it is reasonable to suppose that this bird, like so many others, is not everywhere uniform in its habits. Its name shows it to be the reputed enemy of shepherds, and it is in some measure owing to their hostility that it has been exterminated in so many parts of its European range. But the lammergeyer has also a great partiality for bones, which when small enough it swallows. When they are too large, it is said to soar with them to a great height and drop them on a rock or stone that they may be broken into pieces of convenient size. Hence its name ossifrage, 2 by which the

1 See a paper by Dr Girtanner on this bird in Switzerland (Ver- handl. St-Gall. naturw. Gesellschaft, 1869-1870, pp. 147-244).

2 Among other crimes attributed to the species is that, according to Pliny (Hist. Nat. x. cap. 3), of having caused the death of the poet Aeschylus, by dropping a tortoise on his bald head! In the

Hebrew Peres is rightly translated in the Authorized Version of the Bible (Lev. xi. 13; Deut. xiv. 12) — a word corrupted into osprey, and applied to a bird which has no habit of the kind.

The lammergeyer of north-eastern and south Africa is specific- ally distinct, and is known as Gypaetus meridionalis or G. nudipes. In

habits it resembles the northern bird, from which it differs in little more than wanting the black stripe below the eye and having the lower part of the tarsus bare of feathers. It is the ” golden eagle ” of Bruce’s Travels, and has been beautifully figured by Joseph Wolf in E. Riippell’s Syst. Ubers. der Vogel Nord-Ost-Afrika’s (Taf. 1). (A. N.)

LAMOIGNON, a French family, which takes its name from Lamoignon, a place said to have been in its possession since the 13 th century. One of its several branches is that of Lamoignon de Malesherbes. Several of the Lamoignons have played important parts in the history of France and the family has been specially distinguished in the legal profession. Guillaume de Lamoignon (1617-1677), attained eminence as a lawyer and became president of the parlement of Paris in 1658. First on the popular, and later on the royalist side during the Fronde, he presided at the earlier sittings of the trial of Fouquet, whom he regarded as innocent, and he was associated with Colbert, whom he was able more than once to thwart. Lamoignon tried to simplify the laws of France and sought the society of men of letters like Boileau and Racine. Having received rich rewards for his public services, he died in Paris on the 10th of D ecember 1677. Guillaume’s second son, Nicolas de Lamoignon (1648-1724), took the surname of Basville. Following his hereditary calling he filled many public offices, serving as intend- ant of Montauban, of Pau, of Poitiers and of Languedoc before his retirement in 17 18. His administration of Languedoc was chiefly remarkable for vigorous measures against the Camisards and other Protestants, but in other directions his work in the south of France was more beneficent, as, following the example of Colbert, he encouraged agriculture and industry generally and did something towards improving the means of communica- tion. He wrote a Memoire, which contains much interesting information about his public work. This was published at Amsterdam in 1724. Lamoignon, who is called by Saint Simon, ” the king and tyrant of Languedoc,” died in Paris on the 17th of May 1724. Chretien Francois de Lamoignon (1735-1789) entered public life at an early age and was an actor in the troubles which heralded the Revolution. First on the side of the parle- ment and later on that of the king he was one of the assistants of Lomenie de Brienne, whose unpopularity and fall he shared. He committed suicide on the 15th of May 1789.

LAMONT, JOHANN VON (1805-1879), Scottish-German astronomer and magnetician, was born at Braemar, Aberdeen- shire, on the 13th of December 1805. He was sent at the age of twelve to be educated at the Scottish monastery in Regensburg, and apparently never afterwards returned to his native country. His strong bent for scientific studies was recognized by the head of the monastery, P. Deasson, on

whose recommendation he was admitted in 1827 to the then new observatory of Bogen- hausen (near Munich), where he worked under J. Soldner. After the death of his chief in 1835 he was, on H. C. Schumacher's recommendation, appointed to succeed him as director of the observatory. In 1852 he became professor of astronomy at the university of Munich, and held both these posts till his death, which took place on the 6th of August 1879. Lamont was a member of the academies of Brussels, Upsala and Prague, of the Royal Society of Edinburgh, of the Cambridge Philosophical Society and of many other learned corporations. Among his contributions to astronomy may be noted his eleven zone- catalogues of 34,674 stars, his measurements, in 1836-1837, of nebulae and clusters, and his determination of the mass of Uranus from observations of its satellites {Mem. Astron. Soc. xi. 51, 1838). A magnetic observatory was equipped at Bogen-

Atlas range the food of this bird is said to consist chiefly of the Testudo mauritanica, which " it carries to some height in the air, and lets fall on a stone to break the shell " (Ibis, 1859, p. 177). It was the opu-17 and ˆijvij of Greek classical writers.

hausen in 1840 through his initiative; he executed compre- hensive magnetic surveys 1849-1858; announced the magnetic decennial period in 1850, and his discovery of earth-currents in 1862. His Handbuch des Erdmagnetismus (Berlin, 1849) is a standard work on the subject.

See Allgemeine Deutsche Biographie (S. Giinther) ; V. J. Schrift, Astr. Gesellschaft, xv. 60; Monthly Notices Roy. Astr. Society, xl. 203; Nature, xx. 425; Quart. Journal Meteor. Society, vi. 72; Proceedings Roy. Society of Edinburgh, x. 358; The Times (12 Aug., 1879); Sir F. Ronalds's Cat. of Books relating to Electricity and Magnetism, pp. 281-283; Royal Society's Cat. of Scientific Papers, vols. iii. vii.

LAMORICIERE, CHRISTdPHE LEON LOUIS JUCHAULT

DE (1806-1865), French general, was born at Nantes on the nth of September 1806, and entered the Engineers in 1828. He served in the Algerian campaigns from 1830 onwards, and by 1840 he had risen to the grade of marSchal-de-camp (major- general). Three years later he was made a general of division. He was one of the most distinguished and efficient of Bugeaud's generals, rendered special service at Isly (August 14, 1844), acted temporarily as governor-general of Algeria, and finally effected the capture of Abd el-Kader in 1847. Lamoriciere took some part in the political events of 1848, both as a member of the Chamber of Deputies and as a military commander. Under the

regime of General Cavaignac he was for a time minister of war. From 1848 to 1851 Lamoriciere was one of the most conspicuous opponents of the policy of Louis Napoleon, and at the coup d'itat of the 2nd of December 1851 he was arrested and exiled. He refused to give in his allegiance to the emperor Napoleon III., and in i860 accepted the command of the papal army, which he led in the Italian campaign of i860. On the 1 8th of September of that year he was severely defeated by the Italian army at Castelfidardo. His last years were spent in complete retirement in France (he had been allowed to return in 1857), and he died at Prouzel (Somme) on the nth of September 1865.

See E. Keller, Le General de Lamoriciere (Paris, 1873).

LA MOTHE LE VAYER, FRANCOIS DE (1 588-1672), French writer, was born in Paris of a noble family of Maine. His father was an avocat at the parlement of Paris and author of a curious treatise on the functions of ambassadors, entitled Legatus, seu De legatorum privilegiis, officio et munere Hbellus (1579) and illustrated mainly from ancient history. Francois succeeded his father at the parlement, but gave up his post about 1647 and devoted himself to travel and belles lettres. His Considerations sur I' eloquence franqaise (1638) procured him admission to the Academy, and his De V instruction de Mgr. le Dauphin (1640) attracted the attention of Richelieu. In 1649 Anne of Austria entrusted him with the education of her second son and subsequently with the completion of Louis XIV.'s education, which had been very much neglected. The outcome of his pedagogic labours was a series of books comprising the Geographie, Rhetorique, Morale, Economique, Politique, Logique, and Physique du prince (1651-1658). The king rewarded his tutor by appointing him historiographer of France and councillor of state. La Mothe Le Vayer died in Paris. Modest, sceptical,, and occasionally obscene in his Latin pieces and in his verses, he made himself a persona grata at the French court, where libertinism in ideas and morals was hailed with relish. Besides his educational works, he wrote Jugement sur les anciens et principaux historiens grecs et latins (1646); a treatise entitled Du peu de certitude qu'il y a en histoire (1668), which in a sense marks the beginning of historical criticism in France; and sceptical Dialogues, published posthumously under the pseudo- nym of Orosius Tubero. An incomplete edition of his works was published at Dresden in 17 56-1 7 59.

See Bayle, Dictionnaire critique, article " Vayer " ; L. Etienne, Essai sur La Mothe Le Vayer (Paris, 1849).

LA MOTTE, ANTOINE HOUDAR DE (1672-1731), French author, was

born in Paris on the 18th of January 1672. In 1693 his comedy Les Originaux proved a complete failure, which so depressed the author that he contemplated joining the Trappists, but four years later he again began writing operas and ballets, e.g. L'Europe galante (1697), and tragedies, one of

which, Inis de Castro (1723), was produced with immense success at the Theatre Francais. He was a champion of the moderns in the revived controversy of the ancients and moderns. Madame Dacier had published (1699) a translation of the Iliad, and La Motte, who knew no Greek, made a translation (1714) in verse founded on her work. The nature of his work may be judged from his own expression: " I have taken the liberty to change what I thought disagreeable in it." He defended the moderns in the Discours sur Homere prefixed to his translation, and in his Reflexions sur la critique (17 16). Apart from the merits of the controversy, it was conducted on La Motte's side with a wit and politeness which compared very favourably with his opponent's methods. He was elected to the Academy in 1 7 10, and soon after became blind. La Motte carried on a correspondence with the duchesse du Maine, and was the friend of Fontenelle. He had the same freedom from prejudice, the same inquiring mind as the latter, and it is on the excellent prose in which his views are expressed that his reputation rests. He died in Paris on the 26th of December 1731.

His (Euvres du thedtre (2 vols.) appeared in 1730, and his CEuvres (10 vols.) in 1754. See A. H. Rigault, Histoire de la querelle des anciens et des modernes (1859).

LAMOUREUX, CHARLES (1834-1899), French conductor and violinist, was born at Bordeaux on the 28th of September 1834. He studied at the Pau Conservatoire, was engaged as violinist at the Opera, and in 1864 organized a series of concerts devoted to chamber music. Having journeyed to England and assisted at a Handel festival, he thought he would attempt something similar in Paris. At his own expense he founded the " Societe de l'Harmonie Sacree," and in 1873 conducted the first performance in Paris of Handel's Messiah. He also gave performances of Bach's St Matthew Passion, Handel's Judas Maccabaeus, Gounod's Gallia, and Massenet's Eve. In 1875 he conducted the festival given at Rouen to celebrate the centenary of Boieldieu. The following year he became chef d'orchestre at the Opera Comique. In 1881 he founded the famous concerts associated with his

name, which contributed so much to popularize Wagner's music in Paris. The perform- ances of detached pieces taken from the German master's works did not, however, satisfy him, and he matured the project to produce Lohengrin, which at that time had not been heard in Paris. For this purpose he took the Eden Theatre, and on the 3rd of May 1887 he conducted the first performance of Wagner's opera in the French capital. Owing to the opposition of the Chauvinists, the performance was not repeated; but it doubtless prepared the way for the production of the same masterpiece at the Paris Opera a few years later. Lamoureux was successively second chef d'orchestre at the Conservatoire, first chef d'orchestre at the Opera Comique, and twice first chef d'orchestre at the Opera. He visited London on several occasions, and gave successful concerts at the Queen's Hall. Lamoureux died at Paris on the 21st of December 1899. Tristan und Isolde had been at last beard in Paris, owing to his initiative and under his direction. After conducting one of the performances of this masterpiece he was taken ill and succumbed in a few days, having had the consolation before his death of witnessing the triumph of the cause he had so courageously championed.

LAMP (from Gr. Xajux&s, a torch, Xafiiruv, to shine), the general term for an apparatus in which some combustible substance, generally for illuminating purposes, is held. Lamps are usually associated with lighting, though the term is also employed in connexion with heating (e.g. spirit-lamp) ; and as now employed for oil, gas and electric light, they are dealt with in the article on Lighting. From the artistic point of view, in modern times, their variety precludes detailed reference here; but their archaeo- logical history deserves a fuller account.

A ncient Lamps. — Though Athenaeus states (xv. 700) that the lamp (Mxvos) was not an ancient invention in Greece, it had come into general use there for domestic purposes by the 4th century b.c, and no doubt had long before been employed for temples or other places where a permanent light was required in room of the torch of Homeric times. Herodotus (ii. 62)

sees nothing strange in the " festival of lamps," Lychnokaie, which was held at Sais in Egypt, except in the vast number of them. Each was filled with oil so as to burn the whole night. Again he speaks of evening as the time of lamps (irepl Mxˆoiv, vii. 215). Still, the scarcity of lamps in a style anything like that of an early period, compared with the immense number of them from the late Greek and Roman age, seems to justify the remark of Athenaeus. The commonest sort of domestic lamps were of terra-cotta and of the shape seen in figs. 1 and 2 with a spout or nozzle (jmvkttip) in which the wick (BpvaWis)

burned, a round hole on the top to pour in oil by, and a handle to carry the lamp with. A lamp with two or more spouts was 5ijuu£os, rptjUDˆos, &c, but these terms would not apply strictly to the large class of lamps with numerous holes for wicks but without nozzles. Decoration was con- fined to the front of the handle, or more commonly to the circular space on the top of the lamp, and it consisted almost always of a design in relief, taken from mythology or legend, from objects of daily life or scenes such as displays of gladiators or chariot races, from animals and the chase. A lamp in the British Museum has a view of the interior of a Roman circus with spectators looking on at a chariot race. In other cases the lamp is made altogether of a fantastic shape, as in the form of an animal, a bull's head, or a human foot. Naturally colour was excluded from the ornamenta- tion except in the form of a red or black glaze, which would resist the heat. The typical form of hand lamp (figs, r, 2) is a combination of the flatness necessary for carrying steady and remaining steady when set dcwn, with the roundness evolved from the working in clay and characteristic of vessels in that material. In the bronze lamps this same type is retained, though the roundness was less in keeping with metal. Fanciful shapes are equally common in bronze. The standard form of handle consists of a ring for the forefinger and above it a kind

Fig. 2.

Fig. 3.

of palmette for the thumb. Instead of the palmette is sometimes a crescent, no doubt in allusion to the moon. It would only be with bronze lamps that the cover protecting the flame from the wind could be used, as was the case out of doors in Athens. Such a lamp was in fact a lantern. Apparently it was to the lantern that the Greek word lampas, a torch, was first transferred, probably from a custom of having guards to protect the torches also. Afterwards it came to be employed for the lamp itself (Xvxvos, lucerna). When Juvenal (Sat. iii. 277) speaks of the aenca lampas, he may mean a torch with a bronze handle, but more probably either a lamp or a lantern. Lamps used for suspension were mostly of bronze, and in such cases the decora- tion was on the under part, so as to be seen from below. Of this the best example is the lamp at Cortona, found there in

1840 (engraved, Monumenti d. inst. arch. iii. pis. 41, 42, and in Dennis, Cities and Cemeteries of Etruria, 2nd ed. ii. p. 403). It is set round with sixteen nozzles ornamented alternately with a siren and a satyr playing on a double flute. Between each pair of nozzles is a head of a river god, and on the bottom of the lamp is a large mask of Medusa, surrounded by bands of animals. These designs are in relief, and the workmanship,

Fig. 4. — Bronze Lamp in British Museum.

which appears to belong to the beginning of the 5th century B.C., justifies the esteem in which Etruscan lamps were held in antiquity (Athenaeus xv. 700). Of a later but still excellent style is a bronze lamp in the British Museum found in the baths of Julian in Paris (figs. 3, 4, 5). The chain is attached by means of two dolphins very artistically combined. Under the nozzles are heads of Pan (fig. 3); and from the sides project the fore- parts of lions (fig. 5). To what extent lamps may have been used in temples is unknown. Probably the Erechtheum on the acropolis of Athens was an exception in having a gold one kept burning day and night, just as this lamp itself must have been an exception in its artistic merits. It was the work of the sculptor Callimachus, and was made apparently for the newly rebuilt temple a little before 400 B.C. When once filled with oil and lit it burned continu- ously for a whole year. The wick was of a fine flax called Carpasian (now understood to have been a kind of cotton), which proved to be the least combustible of all flax (Pausanias i. 26. 7). Above the lamp a palm tree of bronze rose to the roof for the purpose of carrying off the fumes. But how this was managed it is not easy to determine unless the palm be supposed to have been inverted and to have hung above the lamp spread out like a reflector, for which purpose the polished bronze would have served fairly well. The stem if left hollow would collect the fumes and carry them out through the roof.

Fig. 5.

This lamp was refilled on exactly the same day each year, so that there seems to have been an idea of measuring time by it, such as may also have been the case in regard to the lamp stand (\irxyaov) capable of holding as many lamps as there were days of the year, which Dionysius the Sicilian tyrant placed in the Prytaneum of Tarentum. At Pharae in Achaia there was in the market-place an oracular statue of Hermes with a marble altar before it to which bronze lamps were attached by means of lead. Whoever desired to consult the statue went there in the evening and first filled the lamps and lit them, placing

also a bronze coin on the altar. A similar custom prevailed at the oracle of Apis in Egypt (Pausanias vii. 22. 2). At Argos he speaks of a chasm into which it was a custom continued to his time to let down burning lamps, with some reference to the goddess of the lower world, Persephone (ii. 22. 4). At Cnidus a large number of terra-cotta lamps were found crowded in one place a little distance below the surface, and it was conjectured that there must have been there some statue or altar at which it had been a custom to leave lamps burning at night (Newton, Dis- coveries at Halicarnassus, &c, ii. 394). These lamps are of terra-cotta, but with little ornamentation, and so like each other in workmanship that they must all have come from one pottery, and may have been all brought to the spot where they were found on one occasion, probably the funeral of a person with many friends, or the celebration of a festival in his honour, such as the parentalia among the Romans, to maintain which it was a common custom to bequeath property. For example, a marble slab in the British Museum has a Latin inscription describing the property which had been left to provide among other things that a lighted lamp with incense on it should be placed at the tomb of the deceased on the kalends, nones and ides of each month (Mus. Marbles, v. pi. 8, fig. 2). For birthday presents terra-cotta lamps appear to have been frequently employed, the device generally being that of two figures of victory holding between them a disk inscribed with a good wish for the new year: annv nov favstv felix. This is the inscription on a lamp in the British Museum, which besides the victories has among other symbols a disk with the head of Janus. As the torch gave way to the lamp in fact, so also it gave way in mythology. In the earlier myths, as in that of Demeter, it is a torch with which she goes forth to search for her daughter, but in the late myth of Cupid and Psyche it is an oil lamp which Psyche carries, and from which to her grief a drop of hot oil falls on Cupid and awakes him. Terra-cotta lamps have very frequently the name of the maker stamped on the foot. .Clay moulds from which the lamps were made exist in considerable numbers. (A. S. M.)

LAMP-BLACK, a deep black pigment consisting of carbon in a very fine state of division, obtained by the imperfect com- bustion of highly carbonaceous substances. It is manufactured from scraps of resin and pitch refuse and inferior oils and fats, and other similar combustible bodies rich in carbon, the finest lamp-black being procured by the combustion of oils obtained in coal-tar distillation (see Coal-Tar) . Lamp-black is extensively used in the manufacture of printing ink, as a pigment for oil painting and also for ” ebonizing ” cabinet work, and in the waxing and lacquering of leather. It is the principal constituent

of China ink.

LAMPEDUSA, a small island in the Mediterranean, belonging to the province of Girgenti, from which it is about 112 m. S.S.W. Pop. (1901, with Linosa — see below) 2276. Its greatest length is about 7 m., its greatest width about 2 m.; the highest point is 400 ft. above sea-level. Geologically it belongs to Africa, being situated on the edge of the submarine platform which extends along the east coast of Tunisia, from which (at Mahadia) it is 90 m. distant eastwards. The soil is calcareous; it was covered with scrub (chiefly the wild olive) until comparatively recent times, but this has been cut, and the rock is now bare. The valleys are, however, fairly fertile. On the south, near the only village, is the harbour, which has been dredged to a depth of 13 ft. and is a good one for torpedo boats and small craft. The island was, as remains of hut foundations show, inhabited

in prehistoric times. Punic tombs and Roman buildings also exist near the harbour. The island is the Lopadusa of Strabo, and the Lipadosa of Ariosto's Orlando Furioso, the scene of the landing of Roger of Sicily and of his conversion by the hermit. A thousand slaves were taken from its population in 1553. In 1436 it was given by Alfonso of Aragon to Don Giovanni de Caro, baron of Montechiaro. In 1661, Ferdinand Tommasi, its then owner, received the title of prince from Charles II. of Spain. In 1737 the earl of Sandwich found only one inhabitant upon it; in 1760 some French settlers established themselves there. Catherine II. of Russia proposed to buy it as a Russian naval station, and the British government thought of doing the same if Napoleon had succeeded in seizing Malta. In 1800 a part of it was leased to Salvatore Gatt of Malta, who in 18 10 sublet part of it to Alessandro Fernandez. In 1843 onwards Ferdinand II. of Naples established a colony there. There is now an Italian penal colony for domicilio coatto, with some 400 convicts (see B. Sanvisente, L'lsola di Lampedusa eretta a colonia, Naples, 1849). Eight miles W. is the islet of Lampione. Linosa, some 30 m. to the N.N.E., measures about 2 by 2 m., and is entirely volcanic; its highest point is 61b ft. above sea-level. Pop. (1901) about 200. It has landing-places on the S. and W., and is more fertile than Lampedusa; but it suffers from the lack of springs. Sanvisente says the water in Lampedusa is good. A few fragments of undoubtedly Roman pottery and some Roman coins have been found there, but the cisterns and the ruins of houses are probably of later date (P. Calcara, Descrizione dell' isola di Linosa, Palermo,

1851, 29). (T. As.)

LAMPERTHEIM, a town in the grand-duchy of Hesse- Darmstadt, 8 m. N. from Mannheim by the railway to Frankfort- on-Main via Biblis, and at the junction of lines to Worms and Weinheim. It contains a Roman Catholic church and a fine Evangelical church, and has chemical and cigar factories. Pop.

(1900) 8020.

LAMPETER {Llanbedr-pont-Stephan) , a market town, muni- cipal borough and assize town of Cardiganshire, Wales, on the right bank of the Teifi, here crossed by an ancient stone bridge. Pop. (1901) 1722. Lampeter is a station on the so- called Manchester-and-Milford branch line of the Great Western railway. Though of ancient origin, the town is entirely modern in appearance, its most conspicuous object being the Gothic buildings of St David's College, founded in 1822, which cover a large area and contain a valuable library of English, Welsh and foreign works (see Universities). The modernized parish church of St Peter, or Pedr, contains some old monuments of the Lloyd family. North of the town are the park and mansion of Falcondale, the seat of the Harford family.

The name of Llanbedr-pont-Stephan goes to prove the early foundation of the place by St Pedr, a Celtic missionary of the 6th century, while one Stephen was the original builder of the bridge over the Teifi. As an important outpost in the upper valley of the Teifi, Lampeter possessed a castle, which was demolished by Owen Gwynedd in the 12th century. In 11 88 the town was visited by Archbishop Baldwin on his way from Cardigan to Strata-Florida Abbey, and the Crusade was vigor- ously preached at this spot. Lampeter was first imcorporated under Edward II., but the earliest known charter dates from the reign of Henry VI., whereby the principal officer of the town, a portreeve, was to be appointed annually at the court -leet of the manor. The town was subsequently governed under a confirmatory charter of 1814, but in 1884 a new charter was obtained, whereby the corporation was empowered to consist of a mayor, 4 aldermen and 12 councillors. Although only a small agricultural centre, Lampeter has since 1886 become the assize town of Cardiganshire owing to its convenient position. Until the Redistribution Act of 1885 Lampeter formed one of the group of boroughs comprising the Cardigan parliamentary district.

LAMPOON, a virulent satire either in prose or verse; the idea of injustice and unscrupulousness seems to be essential to its definition.

Although in its use the word is properly and almost exclusively English, the derivation appears to be French.

Littre derives it from a term of Parisian argot, tamper, to drink greedily, in great mouthfuls. This word appears to have begun to be prevalent in the middle of the 17th century, and Furetiere has preserved a fragment from a popular song, which says : —

Jacques fuyant de Dublin

Dit a Lauzun, son cousin,

” Prenez soin de ma couronne,

J’aurai soin de ma personne, Lampons! lampons! ”

— that is to say, let us drink heavily, and begone dull care. Scarron speaks of a wild troop, singing leridas and lampons. There is, also, a rare French verb, lamponner, to attack with ridicule, used earlier in the 17th century by Brantome. In its English form, lampoon, the word is used by Evelyn in 1645, ” Here they still paste up their drolling lampoons and scurrilous papers,” and soon after it is a verb, — ” suppose we lampooned all the pretty women in Town.” Both of these forms, the noun and the verb, have been preserved ever since in English, without modification, for violent and reckless literary censure. Tom Brown (1663-1704) was a past master in the art of lampooning, and some of his attacks on the celebrities of his age have a certain vigour. When Dryden became a Roman Catholic, Brown wrote: —

Traitor to God and rebel to thy pen, Priest-ridden Poet, perjured son of Ben, If ever thou prove honest, then the nation May modestly believe in transubstantiation.

Several of the heroes of the Dunciad, and in particular John Oldmixon (1673-1742), were charged without unfairness with being professional lampooners. The coarse diatribes which were published by Richard Savage (1697-1743), mainly against Lady Macclesfield, were nothing more nor less than lampoons, and the word may with almost equal justice be employed to describe the coarser and more personal portions of the satires of Churchill. As a rule, however, the lampoon possessed no poetical graces, and in its very nature was usually anonymous. The notorious Essay on Woman (1764) of John Wilkes was a lampoon, and was successfully proceeded against as an obscene libel. The progress of civilization and the discipline of the law made it more and more impossible for private malice to take the form of

baseless and scurrilous attack, and the lampoon, in its open shape, died of public decency in the 18th century. Malice, especially in an anonymous form, and passing in manuscript from hand to hand, has continued, however, to make use of this very unlovely form of literature. It has constantly reappeared at times of political disturbance, and the French have seldom failed to exercise their wicked wit upon their unpopular rulers. See also Pasquinade. (E. G.) .

LAMPREY, a fish belonging to the family Petromyzontidae (from verpos and /xvfa, literally, stone-suckers), which with the hag-fishes or Myxinidae forms a distinct subclass of fishes, the Cydostomata, distinguished by the low organization of their skeleton, which is cartilaginous, without vertebral segmentation, without ribs or real jaws, and without limbs. The lampreys are readily recognized by their long, eel-like, scaleless body, terminating anteriorly in the circular, suctorial mouth character- istic of the whole sub-class. On each side, behind the head, there is a row of seven branchial openings, through which the water is conveyed to and from the gills. By means of their month they fasten to stones, boats, &c, as well as to other fishes, their object being to obtain a resting-place on the former, whilst they attach themselves to the latter to derive nourishment from them. The inner surface of their cup-shaped mouth is armed with pointed teeth, with which they perforate the integu- ments of the fish attacked, scraping off particles of the flesh and sucking the blood. Mackerel, cod, pollack and flat-fishes are the kinds most frequently attacked by them in the sea; of river-fish the migratory Salmonidae and the shad are some-times found with the marks of the teeth of the lamprey, or with the fish actually attached to them. About fifteen species are known from the coasts and rivers of the temperate regions of the northern and southern hemispheres. In Great Britain and Europe generally three species occur, viz. the large spotted

sea-lamprey (Petromyzon marinus), the river-lamprey or lampern (P. fiuviatilis), and the small lampern or ” pride ” or ” sand-piper ” (P. branchialis). The first two are migratory, entering rivers in the spring to spawn; of the river-lamprey, however, specimens are met with in fresh water all the year round. In North America about ten species of lamprey occur, while in South America and Australasia still others are found. Lampreys, especially the sea-lamprey, are esteemed as food, formerly more so than at present; but their flesh is not easy of digestion. Henry I. of England is said to have fallen a victim to this,

his favourite dish. The species of greatest use is the river-lamprey, which as bait is preferred to all others in the cod and turbot fisheries of the North Sea. Yarrell states that formerly the Thames alone supplied from 1,000,000 to 1,200,000 lamperns annually, but their number has so much fallen off that, for instance, in 1876 only 40,000 were sold to the cod- fishers. That year, however, was an unusually bad year; the lamperns, from their scarcity, fetched £8, 10s. a thousand, whilst in ordinary years £5 is considered a fair price. The season for catching 'amperns closes in the Thames about the middle of March. The origin of the name lamprey is obscure; it is an adaptation of Fr. lamproie, Med. Lat. lampreda; this has been taken as a variant of another Med. Lat. form Lampetra, which occurs in ichthyological works of the middle ages; the derivation from lambere petras, to lick stones, is a specimen of etymological ingenuity. The development of lampreys has received much attention on the part of naturalists, since Aug. Miiller discovered that they undergo a metamorphosis, and that the minute worm-like lamperns previously known under the name of Ammocoetes, and abundant in the sand and mud of many streams, were nothing but the undeveloped young of the river-lampreys and small lamperns. See Cyclostomata.

LAMPROPHYRES (from Gr. Xanirpos, bright, and the terminal part of the word porphyry, meaning rocks containing bright porphyritic crystals), a group of rocks containing phenocrysts, usually of biotite and hornblende (with bright cleavage surfaces) , often also of olivine and augite, but not of felspar. They are thus distinguished from the porphyries and porphyrites in which the felspar has crystallized in two generations. They are essenti- ally " dike rocks," occurring as dikes and thin sills, and are also found as marginal facies of plutonic intrusions. They furnish a good example of the correlation which often exists between petrographical types and their mode of occurrence, showing the importance of physical conditions in determining the minera- logical and structural characters of rocks. They are usually dark in colour, owing to the abundance of ferro-magnesian silicates, of relatively high specific gravity and liable to decom- position. For these reasons they have been defined as a melano- crate series (rich in the dark minerals); and they are often accompanied by a complementary leucocrate series (rich in the white minerals felspar and quartz) such as aplites, porphyries and felsites. Both have been produced by differentiation of a parent magma, and if the two complementary sets of rocks could be mixed in the right proportions, it is presumed that a mass of similar chemical composition to the parent magma would be produced.

Both in the hand specimens and in microscopic slides of lamprophyric

rocks biotite and hornblende are usually con- spicuous. Though black by reflected light they are brown by transmitted light and highly pleochroic. In some cases they are yellow-brown, in other cases chestnut-brown and reddish brown; in the same rock the two minerals have strikingly similar colour and pleochroism. Augite, when it occurs, is sometimes green, at other times purple. Felspar is restricted to the ground mass; quartz occurs sometimes but is scarce. Although porphyritic structure is almost universal, it is some- times not very marked. The large biotites and hornblendes are not sharply distinct from those of intermediate size, which in turn graduate into the small crystals of the same minerals in the ground mass. As a rule all the ingredients have rather perfect crystalline forms (except quartz) , hence these rocks have been called ” panidiomorphic.” In many lamprophyres the pale

quartz and felspathic ingredients tend to occur in rounded spots, or ocelli, in which there has been progressive crystalliza- tion from the margins towards the centre. These spots may consist of radiate or brush-like felspars (with some mica and hornblende) or of quartz and felspar. A central area of quartz or of analcite probably represents an original miarolitic cavity infilled at a later period.

There are two great groups of lamprophyres differing in com- position while retaining the general features of the class. One of these accompanies intrusions of granite and diorite and includes the minettes, kersantites, vogesites and spessartites. The other is found in association with nepheline syenites, essexites and teschenites, and is exemplified by camptonites, monchiquites and alnoites. The complementary facies of the first group is the aplites, porphyrites and felsites; .that of the second group includes bostonites, tinguaites and other rocks.

The granito-dioritic-lamprophyres (the first of these two groups) are found in many districts where granites and diorites occur, e.g. the Scottish Highlands and Southern Uplands, the Lake district, Ireland, the Vosges, Black Forest, Harz, &c. As a rule they do not proceed directly from the granite, but form separate dikes which may be later than, and consequently may cut, the granites and diorites. In other districts where granites are abundant no rocks of this class are known. It is rare to find only one member of the group present, but minettes, vogesites, kersantites, &c, all appear and there are usually transitional forms. For this reason these rock species must not be regarded as sharply distinct from one another. The group as a whole is a well-characterized one and shows few transitions to porphyries, porphyrites and other dike types; its subdivisions, however, tend to

merge into one another and especially when they are weathered are hard to differentiate. The presence or absence of the four dominant minerals, orthoclase, plagioclase, biotite and hornblende, determines the species. Minettes contain biotite and orthoclase ; kersantites, biotite and plagioclase. Vogesites contain hornblende and orthoclase; spessartites, hornblende and plagio- clase. Each variety of lamprophyre may and often does contain all four minerals but is named according to the two which pre- ponderate. These rocks contain also iron oxides (usually titamfer- ous), apatite, sometimes sphene, augite and olivine. The hornblende and biotite are brown or greenish brown, and as a rule their crystals even when small are very perfect and give the micro-sections an easily recognizable character. Green hornblende occurs in some of these rocks. The augite builds eumorphic crystals of pale green colour, often zonal and readily weathering. Olivine in the fresh state is rare; it forms rounded, corroded grains; in many cases it is decomposed to green or colourless hornblende in radiating nests (pilite). The plagioclase occurs as small rectangular crystals; orthoclase may have similar shapes or may be fibrous and grouped in sheaflike. aggregates which are narrow in the middle and spread out towards both ends. If quartz is present it is the last product of crystallization and the only mineral devoid of idiomorphism ; it fills up the spaces between the other ingredients of the rock. As all lamprophyres are prone to alteration by weathering a great abund- ance of secondary minerals is usually found in them; the principal are calcite and other carbonates, limonite, chlorite, quartz and kaolin.

Ocellar structure is common; the ocelli consist mainly of ortho- clase and quartz, and may be a quarter of an inch in diameter. Another feature of these rocks is the presence of large foreign crystals or xenocrysts of felspar and of quartz. Their forms are rounded, indicating partial resorption by the solvent action of the lamprophyric magma ; and the quartz may be surrounded by corrosion borders of minerals such as augite and hornblende produced where the magma is attacking the crystal. These crystals are of doubtful origin ; they are often of considerable size and may be conspicuous in hand- specimens of the rocks. It is supposed that they did not crystallize in the lamprophyre dike but in some way were caught up by it. Other enclosures, more certainly of foreign origin, are often seen, such as quartzite, schists, garnetiferous rocks, granite, &c. These may be baked and altered or in other cases partly dissolved. Cordierite may be formed either in the enclosure or in the lamprophyre ; where it takes the shape of hexagonal prisms which in polarized light break up into six sectors, triangular in shape, diverging from the centre of the crystal.

The second group of lamprophyric dike rocks {the camptonite, monchiquite, alnoile series) is much less common than those above described. As a rule they occur together, and there are transitions between the different sub-groups as in the granito-dioritic lampro- phyres. In Sweden, Brazil, Portugal, Norway, the north of Scotland, Bohemia, Arkansas and other places this assemblage of rock, types has been met with, always presenting nearly identical features. In most cases, though not in all, they have a close association with nepheline or leucite syenites and similar rocks rich in alkalies. This indicates a genetic affinity like that which exists between the granites and the minettes, &c, and further proof of this connexion is furnished

by the occasional occurrence in those lamprophyres of leucite, haiiyne and other felspathoid minerals.

The camptonites (called after Campton, New Hampshire) are dark brown, nearly black rocks often with large hornblende phenocrysts. Their essential minerals in thin section are hornblende of a strong reddish-brown colour; augite purple, pleochroic and rich in titanium, olivine and plagioclase felspar. They have the porphyritic and panidiomorphic structures described in the rocks of the previous

group, and like them also have an ocellar character, often very conspicuous under the microscope. The accessory minerals are biotite, apatite, iron oxides and analcite. They decompose readily and are then filled with carbonates. Many of these rocks prove on analysis to be exceedingly rich in titanium ; they may contain 4 or 5 % of titanium dioxide.

The monchiquites (called after the Serra de Monchique, Portugal) are fine-grained and devoid of felspar. Their essential constituents are olivine and purplish augite. Brown hornblende, like that of the camptonites, occurs in many of them. An interstitial substance is present, which may sometimes be a brown glass, but at other times is colourless and is believed by some petrographers to be primary crystalline analcite. They would define the monchiquites as rocks consisting of olivine, augite and analcite; others regard the analcite as secondary, and consider the base as essentially glassy. Some monchiquites contain haiiyne; while in others small leucites are found. Ocellar structure is occasionally present, though less marked than in the camptonites. A special group of monchiquites rich in deep brown biotite has been called fourchites (after the Fourche Mountains, Arkansas).

The alnoites (called after the island of Aln6 in Norway) are rare rocks found in Norway, Montreal and other parts of North America and in the north of Scotland. They contain olivine, augite, brown biotite and melilite. They are free from felspar, and contain very low percentages of silica.

The chemical composition of some of these rocks will be indicated by the analyses of certain well-known examples.

I. 1

Si0 2

Ti0 2

A1 2 3

Fe 2 03

FeO

MgO

CaO

Na 2

K 2

52-70

1-71

I5-07

8-41

7-23

5-33

3-12

4-81

11.

52-12

1-20

13-52

2-56

4-53

6-36

5-7«

2-34

5-36

111.

45-15

15-39

2-76

5-64

6-3*

8-83

2-67

2-77

IV.

54-67

12-68

n-68

2-13

6-n

4-96

3-85

3-65

V.

41-96

4- i.S

I5-36

3-27

9-89

5-01

9-47

5-15

0-19

VI.

43-74

2-80

14-82

2-40

7-52

6-98

io-8i

3-06

2-90

Vll.

29-25

2-54

8-8o

3-92

5-42

17-66

17-86

0-77

2-45

In addition to the oxides given these rocks contain small quantities of water (combined and hygroscopic), C0 2 , S, MnO, P 2 6 , Ca 2 3 , &c.

(J.S.F.)

LAMPSACUS, an ancient Greek colony in Mysia, Asia Minor, known as Pityusa or Pityussa before its colonization by Ionian Greeks from Phocaea and Miletus, was situated on the Hellespont, opposite

Callipolis (Gallipoli) in Thrace. It possessed a good harbour; and the neighbourhood was famous for its wine, so that, having fallen into the hands of the Persians during the Ionian revolt, it was assigned by Artaxerxes I. to Themistocles to provide him with wine, as Percote did with meat and Magnesia with bread. After the battle of Mycale (479 B.C.), Lampsacus joined the Athenians, but, having revolted from them in 411, was reduced by force. It was defended in 196 B.C. against Antiochus the Great of Syria, after which its inhabitants were received as allies of Rome. Lampsacus was the chief seat of the worship of Priapus, a gross nature-god closely connected with the culture of the vine. The ancient name is preserved in that of the modern village of Lapsaki, but the Greek town possibly lay at Chardak immediately opposite Gallipoli.

See A. L. Castellan, Lettres sur la Moree, V Hellespont, &c. (Paris, 1820); Choiseul Gouffier, Voyage pittoresque dans V empire ottoman

(1842).

LAMPSTAND, a pillar, tripod or figure extending to the floor for supporting or holding a lamp. The lampstand (lampa- d'ere) is probably of French origin; it appears to have been in use in France before the end of the 1 7th century.

LANARK, a royal, municipal and police burgh, and county town of Lanarkshire, Scotland, standing on high ground about half a mile from the right bank of the Clyde, 31 m. S.E. of Glasgow by the Caledonian railway. Pop. (1901) 6440. It is

1 I. Minette (Weiler, Alsace). II. Kersantite (Neubrunn, Thur- ingia). III. Vogesite (Castle Mountain, Montana). IV. Spes- sartite (Waldmichael, Spessart). V. Camptonhe (Campton Falls). VI. Monchiquite (Ria do Ouro, Serra de Tingua). VII. Alnoite (Alno, Sweden).

a favourite holiday resort, being the point from which- the falls of the Clyde are usually visited. The principal buildings are the town hall, the county buildings, the assembly rooms, occupy- ing the site of an old Franciscan monastery, three hospitals, a convalescent home, the Smyllum orphanage and the Queen Victoria Jubilee fountain. The industries include cotton-spin- ning, weaving, nail-making and oilworks, and there are frequent markets for cattle and sheep. Lanark is a place of considerable antiquity. Kenneth II. held a parliament here in 978, and it was sometimes the residence of the Scottish kings, one of whom, William the Lion (d. 12 14), granted it a charter. Several of

the earlier exploits of William Wallace were achieved in the neighbourhood. He burned the town and slew the English sheriff William Hezelrig. About 1 m. N.W. are Cartland Craigs, where Mouse Water runs through a precipitous red sandstone ravine, the sides of which are about 400 ft. high. The stream is crossed by a bridge of single span, supposed to be Roman, and by a three-arched bridge, designed by Thomas Telford and erected in 1823. On the right bank, near this bridge, is the cave in which Wallace concealed himself after killing Hezelrig and which still bears his name. Lanark was the centre of much activity in the days of the Covenanters. William Lithgow (1582-1645), the traveller, William Smellie (1697-1763), the obstetrician and Gavin Hamilton (1 730-1 797), the painter, were born at Lanark. The town is one of the Falkirk district group of parliamentary burghs, the other constituents being Airdrie, Hamilton, Falkirk and Linlithgow.

New Lanark (pop. 795), 1 m. S., is famous in connexion with the socialist experiments of Robert Owen. The village was founded by David Dale (1739-1806) in 1785, with the support of Sir Richard Arkwright, inventor of the spinning-frame, who thought the spot might be made the Manchester of Scotland. In ten years four cotton mills were running, employing nearly 1400 hands. They were sold in 1799 to a Manchester company, who appointed Owen manager. In the same year he married Dale's daughter. For many years the mills were successfully conducted, but friction ultimately arose and Owen retired in 1828. The mills, however, are still carried on.

There are several interesting places near Lanark. Braxfield, on the Clyde,gave the title of Lord Braxfield to Robert Macqueen (1722— T 799)i who was born in the mansion and acquired on the bench the character of the Scottish Jeffreys. Robert Baillie, the patriot who was executed for conscience' sake (1684), belonged to Jerviswood, an estate on the Mouse. Lee House, the home of the Lockharts, is 3 m. N.W. The old castle was largely rebuilt in the 19th century. It contains some fine tapestry and portraits, and the Lee Penny — familiar to readers of Sir Walter Scott's Talisman — which was brought from Palestine in the 14th century by the Crusading knight. Sir Simon Lockhart. It is described as a cornelian encased in a silver coin. Craignethan Castle on the Nethan, a left-hand tributary joining the Clyde at Crossford, is said to be the original of the " Tillietudlem " of Scott's Old Mortality.

LANARKSHIRE, a south-western county of Scotland, bounded N. by the shires of Dumbarton and Stirling, E. by Linlithgowshire, Mid-Lothian and Peeblesshire, S. by Dumfries- shire and W. by the counties

of Ayr, Renfrew and Dumbarton. Its area is 879 sq. m. (562,821 acres). It may be described as embracing the valley of the Clyde; and, in addition to the gradual descent from the high land in the south, it is also characterized by a gentle slope towards both banks of the river. The shire is divided into three wards, the Upper, comprising all the southern section, or more than half the whole area (over 330,000 acres); the Middle, with Hamilton for its chief town, covering fully 190,000 acres; and the Lower, occupying the northern area of about 40,000 acres. The surface falls gradually from the uplands in the south to the Firth of Clyde. The highest hills are nearly all on or close to the borders of Peeblesshire and Dumfriesshire, and include Culter Fell (2454 ‘ft.) and Lowther Hill (2377). The loftiest heights exclusively belonging to Lanarkshire are Green Lowther (2403), Tinto (2335), Ballen- cleuch Law (2267), Rodger Law (2257), Dun Law (2216), Shiel Dod (2190), Dungrain Law (2186) and Comb Law (2107). The principal rivers are the Clyde and its head waters and affluents (on the right, the Medwjn, Mouse, South Calder, North

Calder and Kelvin; on the left, the Douglas, Nethan, Avon, Rotten Calder and Cart). There are no lochs of considerable size, the few sheets of water in the north — Woodend Reservoir, Bishop Loch, Hogganfield Loch, Woodend Loch, Lochend Loch — mainly feeding the Monkland and the Forth and Clyde Canals. The most famous natural features are the Falls of Clyde at Bonnington, Corra, Dundaff and Stonebyres.

Geology. — The southern upland portion is built up of Silurian and Ordovician rocks; the northern lower-lying tracts are formed of Carboniferous and Old Red Sandstone rocks. Ordovician strata cross the county from S.W. to N.‘E. in a belt 5-7 m. in breadth which is brought up by a fault against the Old Red and the Silurian on the northern side. This fault runs by Lamington, Roberton and Crawfordjohn. The Ordovician rocks lie in a synclinal fold with beds of Caradoc age in the centre flanked by graptolitic shales, grits and conglomerates, including among the last-named the local ” Haggis-rock ” ; the well-known lead mines of Leadhills are worked in these formations. Silurian shales and sandstones, &c, extend south of the Ordovician belt to the county boundary ; and again, on the northern side of the Ordovician belt two small tracts appear through the Old Red Sandstone on the crests of anticlinal folds. The Old Red Sandstone covers an irregular tract north of the Ordo- vician belt; a lower

division consisting of sandstone, conglomerates and mud-stones is the most extensively developed; above this is found a series of contemporaneous porphyrites and melaphyres, con- formable upon the lower division in the west of the county but are not so in the east. An upper series of sandstones and grits is seen for a short distance west of Lamington. Lanark stands on the Old Red Sandstone and the Falls of Clyde occur in the same rocks. Economic- ally the most important geological feature is the coal basin of the Glasgow district. The axis of this basin lies in a N.E.S.W. direc tion; in the central part, including Glasgow, Airdrie, Motherwell, Wishaw, Carluke, lie the coal-measures, consisting of sandstones, shales, marls and fireclays with seams of coal and ironstone. There are eleven beds of workable coal, the more important seams being the EH, Main, Splint, Pyotshaw and Virtuewell. Underlying the coal-measures is the Millstone Grit seen on the northern side between Glenboig and Hogganfield — here the fireclays of Garnkirk, Gartcosh and Glenboig are worked — and on the south and south-east of the coal-measures, but not on the western side, because it is there cut out by a fault. Beneath the last-named formation comes the Carbon- iferous Limestone series with thin coals and ironstones, and again beneath this is the Calciferous Sandstone series which in the south- east consists of sandstones, shales, &c, but in the west the greater part of the series is composed of interbedded volcanic rocks — porphyrites and melaphyres. It will be observed that in general the younger formations lie nearer the centre of the basin and the older ones crop out around them. Besides the volcanic rocks mentioned there are intrusive basalts in the Carboniferous rocks like that in the neighbourhood of Shotts, and the smaller masses at Hogganfield near Glasgow and elsewhere. Volcanic necks are found in the Carluke and Kilcadzow districts, marking the vents of former volcanoes and several dikes of Tertiary age traverse the older rocks. An intrusion of pink felsite in early Old Red times has been the cause of Tinto Hill. Evidences of the Glacial period are abundant in the formof kames and other deposits of gravel, sand and boulder clay. The ice in flowing northward and southward from the higher ground took an easterly direction when it reached the lower ground. In the lower reaches of the Clyde the remains of old beaches at 25, 50 and 100 ft. above the present sea-level are to be observed.

Climate and Agriculture. — The rainfall averages 42 in. annually, being higher in the hill country and lower towards the north. The temperature for the year averages 48* F., for January 38 and for July 59 °- The area under grain has shown a downward tendency since 1880. Oats is the principal crop, but barley and wheat are also grown. Potatoes and turnips are raised on a large scale. In the Lower Ward

market-gardening has increased considerably, and the quantity of vegetables, grapes and tomatoes reared under glass has reached great proportions. An ancient industry in the vale of the Clyde for many miles below Lanark is the cultivation of fruit, several of the orchards being said to date from the time of Bede. The apples and pears are of good repute. There has been a remark- able extension in the culture of strawberries, hundreds of acres being laid down in beds. The sheep walks in the upper and middle wards are heavily stocked and the herds of cattle are extensive, the favoured breeds being Ayrshire and a cross between this and ” improved Lanark.” Dairy-farming flourishes, the cheeses of Carnwath and Lesmahagow being in steady demand. Clydesdale draught-horses are of high class. They are supposed to have been bred from Flanders horses imported early in the 18th century by the 5th duke of Hamilton. Most of the horses are kept for agricultural work, but a considerable number of unbroken horses and mares are maintained for stock. Pigs are numerous, being extensively reared by the miners. The largest farms are situated in the Upper Ward, but the general holding runs from 50 to 100 acres. More than 21,000 acres are under wood .

Other Industries. — The leading industries are those in connexion

with the rich and extensive coal and iron field to the east and south-east of Glasgow; the shipbuilding at Govan and Partick and in Glasgow harbour; the textiles at Airdrie, Blantyre, Hamilton, Lanark, New Lanark, Rutherglen and Glasgow; engineering at Cambuslang, Carluke, Coatbridge, Kinning Park, Motherwell and Wishaw, and the varied and flourishing manufactures centred in and around Glasgow.

Communications. — In the north of the county, where population is most dense and the mineral field exceptionally rich, railway facilities are highly developed, there being for 10 or 12 m. around Glasgow quite a network of lines. The Caledonian Railway Company’s main line to the south runs through the whole length of the shire, sending off branches at several points, especially at Carstairs Junction. The North British Railway Company serves various towns in the lower and middle wards and its lines to Edinburgh cross the north- western corner and the north of the county. Only in the immediate neighbourhood of Glasgow does the Glasgow and South Western system compete for Lanarkshire traffic, though it combines with the Caledonian to work the Mid-Lanarkshire and Ayrshire railway. The Monkland Canal in the far north and the Forth and Clyde Canal in the north and north-west carry a considerable amount of goods, and before the days of railways afforded one of the principal means of communication between east and west.

Population and Administration. — The population amounted in 1891 to 1,105,899 and in 1901 to 1,339,327, or 1523 persons to the sq. m. Thus though only tenth in point of extent, it is much the most populous county in Scotland, containing within its bounds nearly one-third of the population of the country. In 1901 there were 104 persons speaking Gaelic only, and 26,905 speaking Gaelic and English. The chief towns, with populations in 1901, apart from Glasgow, are Airdrie (22,288), Cambuslang (12,252), Coatbridge (36,991), Govan (82,174), Hamilton (32,775), Kinning Park (13,852), Larkhall (11,879), Motherwell (30,418), Partick (54,298), Rutherglen (17,220), Shettleston (12,154), Wishaw (20,873). Among smaller towns are Bellshill, Carluke, Holytown, Lanark, Stonefield, Toll- cross and Uddingston; and Lesmahagow and East Kilbride are populous villages and mining centres. The county is divided into six parliamentary divisions: — North-east, North-west, Mid and South Lanark, Govan and Partick each returning one member. The royal burghs are Glasgow, Lanark and Rutherglen; the municipal and police burghs Airdrie, Biggar, Coatbridge, Glasgow, Govan, Hamilton, Kinning Park, Lanark, Motherwell, Partick, Rutherglen and Wishaw. Glasgow returns seven members to Parlia- ment; Airdrie, Hamilton and Lanark belong to the Falkirk group and Rutherglen to the Kilmarnock group of parliamentary burghs. Lanarkshire is a sheriffdom, whose sheriff-principal is confined to his judicial duties in the county, and he has eight substitutes, five of whom sit constantly in Glasgow, and one each at Airdrie, Hamilton and Lanark. The shire is under school-board jurisdiction, many schools earning grants for higher education. For advanced educa- tion, besides the university and many other institutions in Glasgow there are a high school in Hamilton, and technical schools at Coat- bridge and Wishaw. The county council expends the ” residue ” grant in supporting lectures and classes in agriculture and agri- cultural chemistry, mining, dairying, cookery, laundry work, nursery and poultry-keeping, in paying fees and railway fares and pro- viding bursaries for technical students, and in subsidizing science and ait and technical classes in day and evening schools. A director of technical education is maintained by the council. Lanark, Motherwell and Biggar entrust their shares of the grant to the county council, and Coatbridge and Airdrie themselves subsidize science and art and evening classes and continuation schools.

History. — At an early period Lanarkshire was inhabited by a Celtic tribe, the Damnonii, whose territory was divided by the wall of Antoninus between the Forth and Clyde (remains of which are found in the parish of Cadder) , but who were never wholly subjugated by

the Romans. Traces of their fortifications, mounds and circles exist, while stone axes, bronze celts, querns and urns belonging to their age are occasionally unearthed. Of the Romans there are traces in the camp on Beattock summit near Elvanfoot, in the fine bridge over the Mouse near Lanark, in the road to the south of Strathaven, in the wall already mentioned and in the coins and other relics that have been dug up. After their departure the country which included Lanarkshire formed part of the kingdom of Strathclyde, which, in the 7th century, was subdued by Northumbrian Saxons, when great numbers of the Celts migrated into Wales. The county once embraced a portion of Renfrewshire, but this was disjoined in the time of Robert III. The shire was then divided into two wards, the Over (with Lanark as its chief town) and the Nether (with Rutherglen as its capital). The present division into three wards was not effected till the 18th century. Independently of Glasgow, Lanarkshire has not borne any part continuously in the general history of Scotland, but has been the scene of

several exciting episodes. Many of Wallace's daring deeds were performed in the county, Queen Mary met her fate at Langside (1568) and the Covenanters received constant support from the people, defeating Claverhouse at Drumclog (1679), but suffering defeat themselves at Bothwell Brig (1679).

See W. Hamilton, Description of the Sheriffdoms of Lanark and Renfrew, Maitland Club (1831); C. V. Irving and. A. Murray, The Upper Ward of Lanarkshire (Glasgow, 1864); The Clydesdale Stud Book (Glasgow); W. A. Cowan, History of Lanark (Lanark, 1867); Extracts from the Records of the Burgh of Lanark (Glasgow, 1893).

LANCASHIRE, a north-western county of England, bounded N.E. by Westmorland, E. by Yorkshire, S. by Cheshire, W. by the Irish Sea and N.W. by Cumberland. The area is 1880-2 sq. m., the county being the sixth in size in England. The coast is generally flat, and broken by great inlets, with wide expanses of sandy foreshore at low tide. The chief inlets, from N. to S., are — the estuary of the river Duddon, which, with the river itself, separates the county from Cumberland; Morecambe Bay; and the estuaries of the Ribble and the Mersey. Morecambe Bay receives the rivers Crake and Leven in a common estuary, and the Kent from Westmorland; while the Lune and the Wyre discharge into Lancaster Bay, which is only partially separated

from Morecambe Bay by the promontory of Red Nab. Morecambe Bay also detaches from the rest of the county the district of Furness (q.v.), extending westward to the Duddon, and having off its coast the island of Walney, 8 m. in length, and several small isles within the strait between Walney and the mainland. The principal seaside resorts and watering-places, from S. to N., are Southport, Lytham, St Anne's-on-the-Sea, Blackpool, Fleetwood and Morecambe; while at the head of Morecambe Bay are several pleasant villages frequented by visitors, such as Arnside and Grange. Of the rivers the Mersey (q.v.), separating the county from Cheshire, is the principal, and receives from Lancashire the Irwell, Sankey and other small streams. The Ribble, which rises in the mountains of the West Riding of Yorkshire, forms for a few miles the boundary with that county, and then flows S.W. to Preston, receiving the Hodder from the N. and the Calder and Darwen from the S. Lancashire has a share in two of the English districts most famous for their scenery, but does not include the finest part of either. Furness, entirely hilly except for a narrow coastal tract, extends N. to include the southern part of the Lake District (q.v.); it contains Coniston Lake and borders Winder- mere, which are drained respectively by the Leven and Crake, with some smaller lakes and such mountains as the Old Man and Wetherlam. Another elevated district, forming part of a mountainous chain stretching from the Scottish border, covered by the name of Pennine uplands in its broader application, runs along the whole eastern boundary of the main portion of the county, and to the south of the Ribble occupies more than half the area, stretching west nearly to Liverpool. The moorlands in the southern district are generally bleak and covered with heather. Towards the north the scenery is frequently beautiful, the green rounded elevated ridges being separated by pleasant cultivated valleys variegated by woods and watered by rivers. None of the summits of the range within Lancashire attains an elevation of 2000 ft., the highest being Blackstone Edge (1323 ft.), Pendle Hill (1831 ft.) and Boulsworth Hill (1700 ft.). Along the sea-coast from the Mersey to Lancaster there is a continuous plain formerly occupied by peat mosses, many of which have been reclaimed. The largest is Chat Moss between Liverpool and Manchester. In some instances these mosses have exhibited the phenomenon of a moving bog. A large district in the north belonging to the duchy of Lancaster was at one time occupied by forests, but these have wholly dis- appeared, though their existence is recalled in nomenclature, as in the Forest of Rossendale, near the Yorkshire boundary somewhat south of the centre.

Geology. — The greater part of Lancashire, the central and eastern

portions, is occupied by Carboniferous rocks; a broad belt of Triassic strata fringes the west and south; while most of the detached northern portion is made up of Silurian and Ordovician formations. The Carboniferous system includes the great coal-field in which are gathered all the principal manufacturing towns, Colne, Burnley,

Blackburn, Chorley, Wigan, Bolton, Preston, Oldham, Rochdale and Manchester. In the centre of the coal-field is an elevated moor- land tract formed of the grits and shales of the Millstone Grit series. Part of the small coal-field of Ingleton also lies within the county. Between these two coal basins there is a moderately hilly district in which grits and black shales predominate, with a broad tract of limestone and shales which are well exposed in the quarries at Clitheroe and at Longridge, Chipping, Whalley and Downham. The limestone again appears in the north at Bolton-le-Sands, Burton-in- Kendall, Grange, Ulverston and Dalton-in-Furness. Large pockets of rich iron ore are worked in the limestone in the Furness district. The belt of Trias includes the Bunter sandstone and conglomerate, which ranges from Barrow-in-Furness, through Garstang, Preston, Ormskirk, Liverpool, Warrington and Salford; and Keuper marls, which underlie the surface between the Bunter outcrop and the sea. On the coast there is a considerable development of blown sand between Blackpool and Lytham and between Southport and Sea- forth. North of Broughton-in-Furness, Ulverston and Cartmel are the Silurian rocks around Lakes Windermere and Coniston Water, including the Coniston grits and flags and the Brathay flags. These rocks are bounded by the Ordovician Coniston limestone, ranging north-east and south-west, and the volcanic series of Borrowdale. A good deal of the solid geology is obscured in many places by glacial drift, boulder clay and sands.

The available coal supply of Lancashire has been estimated at about five thousand millions of tons. In 1852 the amount raised was 8,225,000 tons; in 1899 it was 24,387,475 tons. In the production of coal Lancashire vies with Yorkshire, but each is about one-third below Durham. There are also raised in large quantities — fireclay, limestone, sandstone, slate and salt, which is also obtained from brine. The red hematitic iron obtained in the Furness district is very valuable, but is liable to decrease. The district also produces a fine blue slate. Metals, excepting iron, are unimportant.

Climate and Agriculture. — The climate in the hilly districts is frequently cold, but in the more sheltered parts lying to the south and west it is mild and genial. From its westerly situation and the attraction of the hills there is a high rainfall in the hilly districts {e.g.

at Bolton the average is 58-71 in.), while the average for the other districts is about 35. The soil after reclamation and drainage is fertile; but, as it is for the most part a strong clayey loam it requires a large amount of labour. In some districts it is more of a peaty nature, and in the Old Red Sandstone districts of the Mersey there is a tract of light sandy loam, easily worked, and well adapted for wheat and potatoes. In many districts the ground has been rendered unfit for agricultural operations by the rubbish from coal-pits. A low proportion (about seven-tenths) of the total area is under cultivation, and of this nearly three-fourths is in permanent pasture, cows being largely kept for the supply of milk to the towns, while in the uplands many sheep are reared. In addition to the cultivated area, about 92,000 acres are under hill pasturage. A gradual increase is noticeable in the acreage under oats, which occupy more than seven-tenths of the area under grain crops, and in that under wheat, to the exclusion of the cultivation of barley. Of green crops the potato is the chief.

Industries and Trade.— South Lancashire is the principal seat of the cotton manufacture in the world, the trade centring upon Manchester, Oldham and the neighbouring densely popu- lated district. It employs upwards of 400,000 operatives. The worsted, woollen and silk manufactures, flax, hemp and jute industries, though of less importance, employ considerable numbers. Non-textile factories employ about 385,000 hands. The manufacture of machines, appliances, conveyances, tools, &c, are very important, especially in supplying the needs “of the immense weaving and spinning industries. For the same purpose there is a large branch of industry in the manufacture of bobbins from the wood grown in the northern districts of the county. Of industries principally confined to certain definite centres there may be mentioned — the manufacture of iron and steel at Barrow-in-Furness, a town of remarkably rapid growth since the middle of the 19th century; the great glass works at St Helens; the watch-making works at Prescot and the leather works at Warrington. Printing, bleaching and dyeing works, paper and chemical works, india-rubber and tobacco manufactures are among the chief of the other resources of this great industrial region. Besides the port of Liverpool, of world- wide importance, the principal ports are Manchester, brought into communication with the sea by the Manchester Ship Canal opened in 1894, Barrow-in-Furness and Fleetwood, while Preston and Lancaster have docks and a considerable shipping trade by the rivers Lune and Ribble respectively. The sea fisheries, for which Fleetwood and Liverpool are the chief ports, are of considerable value.

J39

B

lomtontf I »jyEfainbl«ion 0ul RawcUI(e o yiˆV Caller4!1 ‘^

C

2 JO

D

. ,, Greenhalgh) Wrurle

ˆCUoshton | , , Hcsketh ^^ ^”” ˆ Z77£teiTˆ&l 7 1

CoHgrrWg’e

i^^s s^’ i Y*^ Low < r B "»'i*i

patfonm, ,

oidplumpu Banle & Cottem

IT Clitherce:

CattAi PJfinBlo

En x ton ,EccIesion

- -v-Tr* l*?5tTpoteh3’ ;— , i , ‘.- i ‘r ! ww/ lm 5 !. a”iR*Br*s # j ‘ XoSi ˆ /del> s%K”™=ir3©?ll \\ “t? f vSKrk I f«&Atiw#Ai» s /

Rufford

K

\ˆ~ Burscou

I roadhursl

oWood” %ˆ/’ , • , (. \ “* ˆ t lH Iey ^^F ^^^ S j –

Wj/.* Ecwlesitanˆv, Four Uhel l_ li (&$. W^”^* ll ˆkJsJaiut_ V "~i ”■■

. ” AspuU,

_„·„ _ ·„„ ˆ AtlipftifiˆiilCˆitooˆ

IS?

Smtpool MstlityCKcn?giiT

IS’” s»

Kochdafl

■Set

OBIwkYey G i Qpuefeley J

Clucburv

SCAct Moss ,

Irumi

Longitude Wesl 3 of Greenwich g

Inf. ri u .ttaBroilMdiMl“amir > « Or-laM > e*8ur*«r.hjr parn.iwion of th« SontralUr or H.bl.aiot > uner« orriot.

EmnjrValkcc Ki

Communications. — Apart from the Manchester Ship Canal, canal-traffic plays an important part in the industrial region. In 1760 the Sankey canal, 10 m. long, the first canal opened in Britain (apart from very early works) , was constructed to carry coal from St Helens to Liverpool. Shortly afterwards the duke of Bridgewater projected the great canal from Manchester across the Irwell to Worsley, com- pleted in 1761 and bearing the name of its originator. The Leeds and Liverpool canal, begun in 1770, connects Liverpool and other important towns with Leeds by a circuitous route of 130 m. The other principal canals are the Rochdale, the Manchester (to Hudders- field) and the Lancaster, connecting Preston and Kendal. A short canal connects Ulverston with Morecambe Bay. A network of rail- ways covers the industrial region. The main line of the London and North Western railway enters the county at Warrington, and runs north through Wigan, Preston, Lancaster and Carnforth. It also serves Liverpool and Manchester, providing the shortest route to each of these cities from London, and shares with the Lancashire and Yorkshire company joint lines to Southport, to Blackpool and to Fleetwood, whence there is regular steamship communication with Belfast. The Lancashire and Yorkshire line serves practically all the important centres as far north as Preston and Fleetwood. All

the northern trunk lines from London have services to Manchester and Liverpool. The Cheshire Lines system, worked by a committee of the Great Northern, Great Central and Midland companies, links their systems with the South Lancashire district generally, and maintains lines between Liverpool and Manchester, both these cities with Southport, and numerous branches. Branches of the Midland railway from its main line in Yorkshire serve Lancaster, Morecambe, and Heysham and Carnforth, where connexion is made with the Furness railway to Ulverston, Barrow, Lake Side, Coniston, &c.

Population and Administration. — The area of the ancient county is 1,203,365 acres. Its population in‘1801 was 673,486; in 1891, 3,926,760; and in 1901, 4,406,409. The area of the administrative county is 1,196,753 acres. The distribution of the industrial population may be best appreciated by showing the parliamentary divisions, parliamentary, county and muni- cipal boroughs and urban districts as placed among the four divisions of the ancient county. In the case of urban districts the name of the great town to which each is near or adjacent

follows where necessary. The figures show population in

IQOI.

Northern Division.— This embraces almost all the county N. ot the Kibble, including Fumess, and a small area S. of the Ribble estuary. It is considerably the largest of the divisions. Parlia- mentary divisions, from N. to S.— North Lonsdale, Lancaster, Blackpool, Lhorley. Parliamentary, county and municipal boroughs— Barrow-in-Furness (57,586; one member); Preston (112,080; two members). Municipal boroughs— Blackpool (county borough- 47,34»). Chorley (26,852), Lancaster (40,329; county town), More- cambe (11,798). Urban districts— Adlington (4523; Chorley) Bispham-with-Norbreck (Blackpool), Carnforth (3040I Lancaster tˆS\ k 2I ,° 2; Chorley) Dalton-in-Furness (13,020), Fleetwood (12,082), Fulwood (5238; Preston), Grange (1993), Heysham (3381 ; Morecambe), Kirkham (3693; Preston), Leyland (6865; Chorley) Longndge (4304; Preston), Lytham (7185), Poulon-le-Fylde (2223 Blackpool) Preesall-with-Hackinsall (1423; Fleetwood), St Anne’s- on-the-Sea (6838 a. watering-place between Blackpool and Lytham), I hornton (3108 ; Fleetwood), Ulverston (10,064, in Furness), Withneli (3349; Chorley).

, m ?n P R t H fˆ AS r RN “ˆ IV 5 SI ° N – _This lies E – of Preston ‘ an d ; s the smallest of the four Parliamentary divisions— Accrington, Clitheroe

RiˆTl Kosse ” dale – Parliamentary, county and municipal boroughs

—Blackburn (127,626; two members); Burnley (97,043; one

member). Municipal boroughs-A CC r\ngton (43,122), Bacup (22,505),

Clitheroe (11,414), Colne (23,000), Darwen (38,212), Haslingden

(18,543, extending into South-Eastern division), Nelson (32,816)

Rawtenstall (31,053). Urban rfw/ncˆ-Barrowford (4959; Colne

Bnerfield (7288; Burnley), Church (6463; Accrington), Clayton-le-

Moors (8153; Accrington), Great Harwood (12,015; Blackburnl

Oswaldtw.stle (14 ,92; Blackburn), Padiham (12,205; BurnW

ltXˆk?S Wn) ‘ TraWden (264I: Colne)? Wahon-ˆ South-Western Division.— This division represents roughly a Iw?/™ W R .? t 0l 20 T m — d , rawn f rom Liverpool. Parliamentary Wiring P° 0t / e ‘ ˆ L , elghl Newton ” Ormskirk, Southport, Widnes Parliamentary boroughs — the city, and county and rnun lcip al boro h of Liverpool (684,958 ; nine members) ; the county a 6o-ˆ C ‘ Pal horo »8te of St Helens (84,410; one member) ; Wigan (60764, one member) Warrington (64,242; a part only of the

BootHˆˆ™ˆ 1S “Vˆ C 2 Unty) 7 Municipal bloughs- Bootle (58,566) Leigh (40,001), Southport (county borough; 48,083) Widnes 28,580 Urban districts— Kbn.m (6306; Wigan), Allerton

Rimni Ll 7 erP ° 0l) uˆ Sht ri n -ˆ akerfield (l8 ‘ 68 7). Atherton K Bihnge (4232; Wigan), Birkdale (14,197; Southport), Childwa (219; Liverpool , Formby (6060), Golborne (6789; St Helens) Great Crosby (7555; Liverpool), Haydock (8575 St Helens’ Hindley (23,504; Wigan), Huyton-with-Roby (4661; St Helens) Ince-in-Makerfield (21,262), Lathom-and-Burscough (7113 Orm ˆ ˆ ■ Vˆfˆˆ IO ‘ 59 , 2; Liver Pool), Little Crosby (565 Liver- pool), Little Woolton (1091; Liverpool), Much Woolton (4731- feˆW 5 ”’ ˆ”’”’”’”’Makerfield (16,699), Ormskirk (6857), Orrell (5436; Wigan), Prescot (7855; St Helens), Rainford (3359 St

&°” W ke! T rsd r a! L (f” ; • ? r ™ kirk). Standish-with-Lang’tree fS’% 1 ,W’, Tyldesley-with-Shakerley (14,843), Upholland (4773; Wigan), Waterloo-with-Seaforth (23,102 ; Liverpool) Sn ^™- E t A5T ™ DivisiON.-This is of about the sameTea as the South-Western diviswn, and it constitutes the heart of the industrial region. Parliamentary divisions-Eccles, Gorton, Heywood Midd e ton Prestwich Radc hffe-cum-Farnworth, Stretford, Westhoughton Parhamentary boroughs-the city and county of a city of Manchester (543,872 , six members) ; with which should be correlated the ad- jo.mng county and municipal borough of Salford (220,957- three

Til8 2 % S ‘two ™ V°rg Md , r nid P al boroughs ‘ 9 ofBokon IfZiil 5 ‘ T b f S A’, J ? ury (58,029; one member), Rochdale

mnn r?n ; a lT mett ^ er) ‘ °> dham (‘37.246; two members), and the municipal borough of Ashton-under-Lyne (43,890). Part only of the last parliamentary borough is within the county, and this

hriHtT/H 50 ^ ! 131 ” 5 Pa £ ° f the Parliamentary boroughs of Staly-bridge and Stockport. Municipal boroughs— Eccles (%d 16a) H™

-As d o (ulf ‘ 4 (5 8 8 ,) 88 Mi W dlet T (2 4 5,.78) Moss/ey (13 JsS Wl’isTrcl Bla^krod f& w’ gan ' £ U u de J\ shaw (72‘6; Ashton-under-Lyne), ton f, d i 3 7 75 (Sl^ Iga ^’ Chadderton (24,892; Oldham), Cromp’ ton (13,427, Oldham), Denton (14,934; Ashton-under-Lvne) Drovlsden (,1,087; Manchester), FausworVh (14 152; Manchester ‘

AshTon ?^H 4 ‘i ^P?”, ‘ Norwich (15,084; Bolton), Hurst (7145; LLs (62, oVd^ T am (43 , 35 , ; Ea > les) ‘ Parsley (9218; Bolton) borouih rr’r ?£ t^’T‘T 6 A 1 l ‘^ 5 ; Manchester), Little- borough (11,166; Rochdale), Little Hulton (7294; Bolton Little

u7Z { ?V 9 b B0[t0a h Milnrow (82 4l; Rochdale! Norden (W7 Burv d H’ P . res ‘ wich (“.839= Manchester), Radcliflc ^aM •’

ftret fird U?o^fi M (l5 y? 2 ?\ B l ry)’ R °y ton (‘4.88i; OldLm) kS fT’ 4 ^ ; .Manchester), Swinton-and-Pendlebury (2700s- Manchester), Tottington (61 18; Bury), Turton (12,355- Bolton) Urmston (6594; Manchester), Wardle (4427; Rochdlle) West houghton (14,377; Bolton), Whitefield oY S and (6588 • Bury ” Whitworth (9578; Rochdale), Worsley (12,462- Eccles)

Lancashire is one of the counties palatine. It is attached to the duchy of Lancaster, a crown office, and retains the chancery court for the county palatine. The chancery of the duchy of Lancaster was once a court of appeal for the chancery of the county palatine, but now even

its jurisdiction in regard to the estates of the duchy is merely nominal. The chancery of the county palatine has concurrent jurisdiction with the High Court of Chancery in all matters of equity within the county palatine and independent jurisdiction in regard to a variety of other matters. The county palatine comprises six hundreds.

Lancashire is in the northern circuit, and assizes are held at

ouTrfofThi the ™ r ! r h 1 ; and at Liver P° o1 and Manchester for the south of the county. There is one court of quarter sessions, and the county is divided into 33 petty sessional divisions. The boroughs

Salford a nd rn wf.?' UrnlCy ' LˆP 00 – 1 ' Manchester, Oldham! baltord and Wigan have separate commissions of the peace and courts of quarter sessions; and those of Accrington, Ashton-under-

barwen a Fˆ" m H UrneSS U B1 T ackp ° o1 ' Bolton ' Bur y. Clitheroe, Colne, Uarwen, Eccles, Heywood, Lancaster, Middleton, Mossley, Nelson Preston, Rochdale, St Helens, Southport and Warrington have separate.commiss.ons of the peace only. There are 430 civif parishes thˆnf ?■ 1S raal , nl y ln ,. the dˆese of Manchester, but parts areTn ˆ«° f Ll Y er .P°°. ! . Carlisle Ripon, Chester and Wakefield. There

the county S ' PanSheS ° f distfictS who "y or in P art withi " Manchester and Liverpool are each seats of a university and of other important educational institutions. Within the bounds of the county there are many denominational colleges, and near Clitheroe is the famous Roman Catholic college of Stonvhurst There is a day training college for schoolmasters in connexfon w?th University College, Liverpool, and a day training college for both schoolmasters and schoolmistresses in connexion with Owens College Manchester. At Edgehill, Liverpool, there is a residendal training college for schoolmistresses which takes day pupils, at Liverpool!

af'fcfn t ° man C -f h ° 1C i trai – ni – n S college y for schoolmasters, and at Warrington a residential training college (Chester, Manchester and Liverpool diocesan) for schoolmistresses.

History. —The district afterwards known as Lancashire was after the departure of the Romans for many years apparently little better than a waste. It was not until the victory of ˆthel-

fw , m ? ° f D , eira ' near Chester in 6l 3 cu t off the Britons of Wales from those of Lancashire and Cumberland that even Lancashire south of the Ribble was conquered. The part north of the Ribble was not absorbed in the Northumbrian kingdom till the reign of Ecgfrith

(670-685). Of the details of this long struggle we know nothing, but to the stubborn resistance made by the British leaders are due the legends of Arthur- and of the twelve great battles he is supposed to have fought against the English, four are traditionally, though probably erroneously, said to have taken place on the river Douglas near Wigan In the long struggle for supremacy between Mercia and Northumbria, the country between the Mersey and Kibble was sometimes under one, sometimes under the other kingdom During the 9 th century Lancashire was constantly invaded by the Danes, and after the peace of Wedmore (878) it was included in the Danish kingdom of Northumbria. The Vu nut™ , reCOrds the rec ˚nquest of the district between the Ribble and Mersey in 923 by the English king, when it appears to have been severed from the kingdom of Northumbria and united to Mercia, but the districts north of the Ribble now comprised m the county belonged to Northumbria until its incorporation with the kingdom of England. The names on »». La £ ca f˜re coast ending in by, such as Crosby, Formby, Roby, Kirkby Derby, show where the Danish settlements were thickest. Wilham the Conqueror gave the lands between the Kibble and Mersey, and Amounderness to Roger de Poictou but at the time of Domesday Book these had passed out of his nand and belonged to the king.

The name Lancashire does not appear in Domesday; the lands between the Rrbble and Mersey were included in Cheshire and those north of the Ribble in Yorkshire. Roger de Poictou soon regained his lands, and Rufus added to his possessions the rest of Lonsdale south of the Sands, of which he already held a part; and as he had the Furness fells as well, he owned a that is now known as Lancashire. In 1102 he finally forfeited all his lands which Henry I. held till, in in8, he created the Honour of Lancaster by incorporating with Roger's forfeited

hiids certain escheated manors in the counties of Nottingham, Derby and Lincoln, and certain royal manors, and bestowed it upon his nephew Stephen, afterwards king. During Stephen's reign the history of the honour presents certain difficulties, for David of Scotland held the lands north of the Ribble for a time, and in 1147 the earl of Chester held the district between the Ribble and Mersey. Henry II. gave the whole honour to William, Stephen's son, but in 1164 it came again into the king's hands until 1189, when Richard I. granted it to his brother John. In 1 194, owing to John's rebellion, it was confiscated and the honour remained with the crown till 1267. In

1229, however, all the crown demesne between the Ribble and Mersey was granted to Ranulf, earl of Chester, and on his death in 1232 ;ame to William Ferrers, earl of Derby, in right of his wife Agnes, sister and co-heir of Ranulf. The Ferrers held it till 1266, when it was confiscated owing to the earl's rebellion. In] 267 Henry III. granted the honour and county and all the royal demesne therein to his son Edmund, who was created earl of Lancaster. His son, Earl Thomas, married the heiress of Henry de Lacy, earl of Lincoln, and thus obtained the great estates belonging to the de Lacys in Lancashire. On the death of Henry, the first duke of Lancaster, in 136 1, the estates, title and honour fell to John of Gaunt in right of his wife Blanche, the duke's elder daughter, and by the accession of Henry IV., John of Gaunt's only son, to the throne, the duchy and honour became merged in the crown.

The county of Lancaster is first mentioned in n 69 as contribut- ing 100 marks to the Royal Exchequer for defaults and fines. The creation of the honour decided the boundaries, throwing into it Furness and Cartmel, which geographically belong to Westmorland; Lonsdale and Amounderness, which in Domesday had been surveyed under Yorkshire; and the land between the Ribble and Mersey. In Domesday this district south of the Ribble was divided into the six hundreds of West Derby, . Newton, Warrington, Blackburn, Salford andLeyland, but before Henry II. 's reign the hundreds of Warrington and Newton were absorbed in that of West Derby. Neither Amounderness nor Lonsdale was called a hundred in Domesday, but soon after that time the former was treated as a hundred. Ecclesiastically the whole of the county originally belonged to the diocese of York, but after the reconquest of the district between the Ribble and Mersey in 923 this part was placed under the bishop of Lich- field in the archdeaconry of Chester, which was subdivided into the rural deaneries of Manchester, Warrington and Leyland. Up to 1 541 the district north of the Ribble belonged to the archdeaconry of Richmond in the diocese of York, and was subdivided into the rural deaneries of Amounderness, Lonsdale and Coupland. In 1541 the diocese of Chester was created, including all Lancashire, which was divided into two arch- deaconries: Chester, comprising the rural deaneries of Man- chester, Warrington and Blackburn, and Richmond, comprising the deaneries of Amounderness, Furness, Lonsdale and Kendal. In 1847 the diocese of Manchester was created, which included all Lancashire except parts of West Derby, which still belonged to the diocese of Chester, and Furness and Cartmel, which were added to Carlisle in 1856. In 1878 by the creation of the diocese of Liverpool the south-eastern part of the county was subtracted from the Manchester diocese.

No shire court was ever held for the county, but as a duchy and county palatine it has its own special courts. It may have enjoyed palatine jurisdiction under Earl Morcar before the Conquest, but these privileges, if ever exercised, remained in abeyance till 1351, when Henry, duke of Lancaster, received power to have a chancery in the county of Lancaster and to issue writs therefrom under his own seal, as well touching pleas of the crown as any other relating to the common laws, and to have all Jura Regalia belonging to a county palatine. In 1377 the county was erected into a palatinate for John of Gaunt's life, and in 1396 these rights of jurisdiction were extended and settled in perpetuity on the dukes of Lancaster. The county palatine courts consist of a chancery which dates back at least to 1376, a court of common pleas, the jurisdiction of which was

transferred in 1873 by the Judicature Act to the high court of justice, and a court of criminal jurisdiction which in no way differs from the king's ordinary court. In 1407 the duchy court of Lancaster was created, in which all questions of revenue and dignities affecting the duchy possessions are settled. The chancery of the duchy has been for years practically obsolete. The duchy and county palatine each has its own seal. The office of chancellor of the duchy and county palatine dates back to 1351.

Lancashire is famed for the number of old and important county families living within its borders. The most intimately connected with the history of the county are the Stanleys, whose chief seat is Knowsley Hall. Sir John Stanley early in the 15th century married the heiress of Lathom and thus obtained possession of Lathom and Knowsley. In 1456 the head of the family was created a peer by the title of Baron Stanley and in 1485 raised to the earldom of Derby. The Molyneuxes of Sephton and Croxteth are probably descended from William de Molines, who came to England with William the Conqueror, and is on the roll of Battle Abbey. Roger de Poictou gave him the manor of Sephton, and Richard de Molyneux who held the estate under Henry II. is undoubtedly an ancestor of the family. In 1628 Sir Richard Molyneux was advanced to the peerage of Ireland by the title of Viscount Maryborough, and in 1771 Charles, Lord Maryborough, became earl of Sefton in th% peerage of Ireland. His son was created a peer of the United Kingdom as Baron Sefton of Croxteth. The Bootle Wilbrahams, earls of Lathom, are, it is said, descended from John Botyll of Melling, who was alive in I42i,and from the Wilbrahams of Cheshire, who date back at least to Henry III.'s reign. In 1755 the two families intermarried. In 1828 the title of Baron Skelmersdale was bestowed on the head of the family and in 1880 that of earl of Lathom. The Gerards of Bryn are said to be

descended from an old Tuscan family, one of whom came to England in Edward the Confessor's time, and whose son is mentioned in Domesday. Bryn came into this family by marriage early in the 14th century. Sir Thomas Gerard was created a baronet by James I. in 161 1, and in 1876 a peerage was conferred on Sir Robert Gerard. The Gerards of Ince were a collateral branch. The Lindsays, earls of Crawford and Balcarres, are representative on the female side of the Bradshaighs of Haigh Hall, who are said to be of Saxon origin. Other great Lancashire families are the Hoghtons of Hoghton Tower, dating back to the 12th century, the Blundells of Ince Blundell, who are said to have held the manor since the 12th century, now repre- sented by the Weld-Blundells, the Tyldesleys of Tyldesley, now extinct, and the Butlers of Bewsey, barons of Warrington, of whom the last male heir died in 1586.

At the close of the 12th and during the 13th century there was a considerable advance in the importance of the towns; in 1 199 Lancaster became a borough, in 1207 Liverpool, in 1230 Salford, in 1246 Wigan, and in 1301 Manchester. The Scottish wars were a great drain to the county, not only because the north part was subject to frequent invasions, as in 1322, but because some of the best blood was taken for these wars. In 1297 Lancashire raised 1000 men, and at the battle of Falkirk (1298) 1000 Lancashire soldiers were in the vanguard, led by Henry de Lacy, earl of Lincoln. In 1349 the county was visited by the Black Death and a record exists of its ravages in Amounder- ness. In ten parishes between September 1349 and January 1350, 13,180 persons perished. At Preston 3000 died, at Lancaster 3000, at Garstang 2000 and at Kirkham 3000. From the effects of this plague Lancashire was apparently slow to recover; its boroughs ceased to return members early in the 14th century and trade had not yet made any great advance. The drain of the Wars of the Roses on the county must also have been heavy, although none of the battles was fought within its borders; Lord Stanley's force of 5000 raised in Lancashire and Cheshire virtually decided the battle of Bosworth Field. The poverty of the county is shown by the fact that out of £40,000 granted in 1504 by parliament to the king, Lancashire's share was only £318. At the battle of Flodden (1513) the Lancashire archers led by Sir Edward Stanley almost totally destroyed the High- landers on the right Scottish wing and greatly contributed to the victory. Under the Tudors the county prospered; the parliamentary boroughs once more began to return members, the towns increased in size, many halls were built by the gentry and trade increased.

In 1617 James I. visited Lancashire, and in consequence of a petition presented to him at Hoghton, complaining of the restrictions imposed

upon Sunday amusements, he issued in 1618 the famous Book of Sports. Another of James's works, the Daemonologie, is

closely connected with the gross superstitions concerning witches which were specially prevalent in Lancashire. The great centre of this witchcraft was Pendle Forest, in the parish of Whalley, and in 1612 twelve persons from Pendle and eight from Samlesbury were tried for witchcraft, nine of whom were hanged. In 1633 another batch of seventeen witches from Pendle were tried and all sentenced to be executed, but the king pardoned them. This was the last important case of witchcraft in Lancashire.

In the assessment of ship money in 1636 the county was put down for £1000, towards which Wigan was to raise £50, Preston £40, Lancaster £30, and Liverpool £25, and these figures com- pared with the assessments of £140 on Hull and £200 on Leeds show the comparative unimportance of the Lancashire boroughs. On the eve of the Great Rebellion in 1641 parliament resolved to take command of the militia, and Lord Strange, Lord Derby's eldest son, was removed from the lord lieutenancy. On the whole, the county was Royalist, and the moving spirit among the Royalists was Lord Strange, who became Lord Derby in 1642. Manchester was the headquarters of the Parliamentarians, and was besieged by Lord Derby in September 1642 for seven days, but not taken. Lord Derby himself took up his head- quarters at Warrington ˆnd garrisoned Wigan. At the opening of 1643 Sir Thomas Fairfax made Manchester his headquarters. Early in February the Parliamentarians from Manchester successfully assaulted Preston, which was strongly Royalist; thence the Parliamentarians marched to Hoghton Tower, which they took, and within a few days captured Lancaster. On the Royalist side Lord Derby made an unsuccessful attack on Bolton from Wigan. In March a large Spanish ship, laden with ammunition for the use of parliament, was driven by a storm on Rossall Point and seized by the Royalists; Lord Derby ordered the ship to be burned, but the parliament forces from Preston succeeded in carrying off some of the guns to Lancaster castle. In March Lord Derby captured the town of Lancaster but not the castle, and marching to Preston regained it for the king, but was repulsed in an attack on Bolton. In April Wigan, one of the chief Royalist strongholds in the county, was taken by the parliament forces, who also again captured Lancaster, and the guns from the Spanish ship were moved for use against Warrington, which was obliged to surrender in May after a

week's siege. Lord Derby also failed in an attempt on Liverpool, and the tide of war had clearly turned against the Royalists in Lancashire. In June Lord Derby went to the Isle of Man, which was threatened by the king's enemies. Soon after, the Parliamentarians captured Hornby castle, and only two strong- holds, Thurland castle and Lathom house, remained in Royalist hands. In the summer, after a seven weeks' siege by Colonel Alexander Rigby, Thurland castle surrendered and was demo- lished. In February 1644 the Parliamentarians, under Colonel Rigby, Colonel Ashton and Colonel Moore, besieged Lathom house, the one refuge left to the Royalists, which was bravely defended by Lord Derby's heroic wife, Charlotte de la Tremoille. The siege lasted nearly four months and was raised on the approach of Prince Rupert, who marched to Bolton and was joined on his arrival outside the town by Lord Derby. Bolton was carried by storm; Rupert ordered that no quarter should be given, and it is usually said at least 1500 of the garrison were slain. Prince Rupert advanced without delay to Liverpool, which was defended by Colonel Moore, and took it after a siege of three weeks. After the battle of Marston Moor Prince Rupert again appeared in Lancashire and small engagements took place at Ormskirk, Upholland and Preston; in November Liverpool surrendered to the Parliamentarians. Lathom house was again the only strong place in Lancashire left to the Royalists, and in December 1645 after a five months' siege it was compelled to surrender through lack of provisions, and was almost entirely destroyed. For the moment the war in Lancashire was over. In 1648, however, the Royalist forces under the duke of Hamilton and Sir Marmaduke Langdale marched through Lancaster to Preston, hoping to reach Manchester; but near Preston were defeated by Cromwell in person. The remnant retreated through Wigan towards Warrington, and after being again defeated at Winwick surrendered at Warrington, In 1651 Charles II.

advanced through Lancaster, Preston and Chorley on his south- ward march, and Lord Derby after gathering forces was on his way to meet him when he was defeated at Wigan. In 1658, after Cromwell's death, a Royalist rebellion was raised in which Lancashire took a prominent part, but it was quickly suppressed. During the Rebellion of 171 5 Manchester was the chief centre of Roman Catholic and High Church Toryism. On the 7th of November the Scottish army entered Lancaster, where the Pretender was proclaimed king, and advanced to Preston, at which place a considerable body of Roman Catholics joined it. The rebels remained at Preston a few days, apparently unaware of the advance of the government troops, until General Wills from Manchester and General Carpenter from Lancaster surrounded the town, and on the 13th of November the town and the rebel garrison

surrendered. Several of the rebels were hanged at Preston, Wigan, Lancaster and other places. In 1745 Prince Charles Edward passed through the county and was joined by about 200 adherents, called the Manchester regiment and placed under the command of Colonel Townley, who was afterwards executed.

The first industry established in Lancashire was that of wool, and with the founding of Furness abbey in n 27 wool farming on a large scale began here, but the bulk of the wool grown was exported, not worked up in England. In 1282, however, there was a mill for fulling or bleaching wool in Man- chester, and by the middle of the 16th century there was quite a flourishing trade in worsted goods. In an act of 1552 Manchester ” rugs and frizes ” are specially mentioned, and in 1566 another act regulated the fees of the aulnager who was to have his deputies at Manchester, Rochdale, Bolton, Blackburn and Bury; the duty of the aulnagers was to prevent ” cottons frizes and rugs ” from being sold unsealed, but it must be noted that by cottons is not meant what we now understand by the word, but woollen goods. The 17th century saw the birth of the class of clothiers, who purchased the wool in large quantities . or kept their own sheep, and delivered it to weavers who worked it up into cloth in their houses and returned it to the employers. The earliest mention of the manufacture of real cotton goods is in 1 64 1, when Manchester made fustians, vermilions and dimities, but the industry did not develop to any extent until after the invention of the fly shuttle by John Kay in 1733, of the spinning jenny by James Hargreaves of Blackburn in 1765, of the water frame throstle by Richard Arkwright of Bolton in 1769, and of the mule by Samuel Crompton of Hall-in-the-Wood near Bolton in 1779. So rapid was the development of the cotton manufacture that in 1787 there were over forty cotton mills in Lancashire, all worked by water power. In 1789, however, steam was applied to the industry in Manchester, and in 1790 in Bolton a cotton mill was worked by steam. The increase in the import of raw cotton from 3,870,000 ft> in 1769 to 1,083,600,000 in i860 shows the growth of the industry. The rapid growth was accompanied with intermittent periods of depression, which in 181 9 in particular led to the formation of various political societies and to the Blanketeers’ Meeting and the Peterloo Massacre. During the American Civil War the five years’ cotton famine caused untold misery in the county, but public and private relief mitigated the evils, and one good result was the introduction of machinery capable of dealing with the shorter staple of Indian cotton, thus rendering the trade less dependent for its supplies on America.

During the 1 8th century the only town where maritime trade increased was Liverpool, where in the last decade about 4500 ships

arrived annually of a tonnage about one-fifth that of the London shipping. The prosperity of Liverpool was closely bound up with the slave trade, and about one-fourth of its ships were employed in this business. With the increase of trade the means of communication improved. In 1758 the duke of Bridgewater began the Bridgewater canal from Worsley to Salford and across the Irwell to Manchester, and before the end of the century the county was intersected by canals. In 1830 the first railway in England was opened between Manchester and Liverpool, and other railways rapidly followed.

LANCASTER, HOUSE OF

i43

‘The first recorded instance of parliamentary representation in Lancashire was in 1295, when two knights were returned for the county and two burgesses each for the boroughs of Lancaster, Preston, Wigan and Liverpool. The sheriff added to this return ” There is no city in the county of Lancaster.” The boroughs were, however, excused one after another from parliamentary repre- sentation, which was felt as a burden owing to the compulsory payment of the members’ wages. Lancaster ceased to send members in 1 33 1 after making nineteen returns, but renewed its privileges in 1529; from 1529 to 1547 there are no parliamentary returns, but from 1547 to 1867 Lancaster continued to return two members. Preston similarly was excused after 1 331, after making eleven returns, but in 1529 and from 1547 onwards returned two members. Liverpool and Wigan sent members in 1295 and 1307, but not again till 1547. To the writ issued in 1362 the sheriff in his return says: ” There is not any City or Borough in this County from which citizens or burgesses ought or are accustomed to come as this Writ requires.” In 1559 Clitheroe and Newton-le-Willows first sent two members. Thus in all Lancashire returned fourteen members, and, with a brief exception during the Commonwealth, this continued to be the parliamentary representation till 1832. By the Reform Act of 1832 Lancashire was assigned four members, two for the northern and two for the southern division. Lancaster, Preston, Wigan and Liverpool continued to send two members, Clitheroe returned one and Newton was disfranchised. The following new boroughs were created: Manchester, Bolton, Blackburn, Oldham, returning two members each ; Ashton-under-Lyne, Bury, Rochdale, Salford and Warrington, one each. In 1861 a third member was given to South Lancashire and in 1867 the county was divided into four con- stituencies, to each of which four members were assigned; since 1885 the county returns twenty-three members. The boroughs returned from 1867 to 1885 twenty-five members, and since 1885 thirty-four.

Antiquities. — The Cistercian abbey of Furness (q.v.) is one of the finest and most extensive ecclesiastical ruins in England. Whalley abbey, first founded at Stanlawe in Cheshire in 1178, and removed in 1296, belonged to the same order. There was a priory of Black Canons at Burscough, founded in the time of Richard I., one at Conishead dating from Henry II. 's reign, and one at Lancaster. A convent of Augustinian friars was founded at Cartmel in 1188, and one at Warrington about 1280. There are some remains of the Benedictine priory of Upholland, changed from a college of secular priests in 1318; and the same order had a priory at Lancaster founded in 1094, a cell at Lytham, of the reign of Richard I., and a priory at Penwortham, founded shortly after the time of the Con- queror. The Premonstratensians had Cockersand abbey, changed in 1 190 from a hospital founded in the reign of Henry II., of which the chapter-house remains. At Kersal, near Manchester, there was a cell of Cluniac monks founded in the reign of John, while at Lan- caster there were convents of Dominicans and Franciscans, and at Preston a priory of Grey Friars built by Edmund, earl of Lancaster, son of Henry III.

Besides the churches mentioned under the several towns, the more interesting are those of Aldingham, Norman doorway; Aughton; Cartmel priory church (see Furness); Hawkshead; Heysham, Norman with traces of earlier date; Hoole; Huyton; Kirkby, rebuilt, with very ancient font; Kirkby Ireleth, late Perpendicular, with Norman doorway; Leyland; Melling (in Lonsdale), Perpendicular, with stained-glass windows; Middleton, rebuilt in 1524, but containing part of the Norman church and several monuments; Ormskirk, Perpendicular with traces of Norman, having two towers, one of which is detached and surmounted by a spire; Overton, with Norman doorway; Radcliffe, Norman; Sefton, Perpendicular, with fine brass and recumbent figures of the Molyneux family, also a screen exquisitely carved; Stidd, near Ribchester, Norman arch and old monuments; Tunstall, late Perpendicular; Upholland priory church, Early English, with low massy tower; Urswick, Norman, with embattled tower and several old monuments; Walton-on-the-hill, anciently the parish church of Liverpool; Walton-le-Dale; Warton, with old font; Whalley abbey church, Decorated and Perpendicular, with Runic stone monuments.

The principal old castles are those of Lancaster; Dalton, a small rude tower occupying the site of an older building; two towers of Gleaston castle, built by the lords of Aldingham in the 14th century; the ruins of Greenhalgh castle, built by the first earl of Derby, and demolished after a siege by order of parliament in 1649; the ruins of Fouldrey in Piel Island near the entrance to Barrow harbour, erected in the reign of Edward III., now most dilapidated. There are many old timber

houses and mansions of interest, as well as numerous modern seats.

See Victoria History of Lancashire (1906-1907) ; E. Baines, The History of the County Palatine and Duchy of Lancaster (1888); H. Fishwick, A History of Lancashire (1894); W. D. Pink and A. B. Beavan, The Parliamentary Representation of Lancashire (1889).

LANCASTER, HOUSE OF. The name House of Lancaster is commonly used to designate the line of English kings immediately descended from John of Gaunt, the fourth son of Edward III. But the history of the family and of the title goes back to

the reign of Henry III., who created his second son. Edmund, earl of Lancaster in 1267. This Edmund received in his own day the surname of Crouchback, not, as was afterwards supposed, from a personal deformity, but from having worn a cross upon his back in token of a crusading vow. He is not a person of much importance in history except in relation to a strange theory raised in a later age about his birth, which we shall notice presently. His son Thomas, who inherited the title, took the lead among the nobles of Edward II. ‘s time in opposition to Piers Gaveston and the Despensers, and was beheaded for treason at Pontefract. At the commencement of the following reign his attainder was reversed and his brother Henry restored to the earldom; and Henry being appointed guardian to the young king Edward III., assisted him to throw off the yoke of Mortimer. On this Henry’s death in 1345 he was succeeded by a son of the same name, sometimes known as Henry Tort-Col or Wryneck, a very valiant commander in the French wars, whom the king advanced to the dignity of a duke. Only one duke had been created in England before, and that was fourteen years previously, when the king’s son Edward, the Black Prince, was made duke of Cornwall. This Henry Wryneck died in 1361 without heir male. His second daughter, Blanche, became the wife of John of Gaunt, who thus succeeded to the duke’s inheritance in her right; and on the 13th of November 1362, when King Edward attained the age of fifty, John was created duke of Lancaster, his elder brother, Lionel, being at the same time created duke of Clarence. It was from these two dukes that the rival houses of Lancaster and York derived their respective claims to the crown. As Clarence was King Edward’s third son, while John of Gaunt was his fourth, in ordinary course on the failure of the elder line the issue of Clarence should have taken precedence of that of Lancaster in the succession. But the rights of Clarence were conveyed in the first instance to an only daughter, and the ambition and policy of the house of Lancaster, profiting by advantageous circumstances, enabled them not only to gain possession of the throne but to maintain

themselves in it for three generations before they were dispossessed by the repre- sentatives of the elder brother.

As for John of Gaunt himself, it can hardly be said that this sort of politic wisdom is very conspicuous in him. His ambition was generally more manifest than his discretion; but fortune favoured his ambition, even as to himself, somewhat beyond expectation, and still more in his posterity. Before the death of his father he had become the greatest subject in England, his three elder brothers having all died before him. He had even added to his other dignities the title of king of Castile, having married, after his first wife's death, the daughter of Peter the Cruel. The title, however, was an empty one, the throne of Castile being actually in the possession of Henry of Trastamara, whom the English had vainly endeavoured to set aside. His military and naval enterprises were for the most part disastrous failures, and in England he was exceedingly unpopular. Never- theless, during the later years of his father's reign the weakness of the king and the declining health of the Black Prince threw the government very much into his hands. He even aimed, or was suspected of aiming, at the succession to the crown; but in this hope he was disappointed by the action of the Good Parliament a year before Edward's death, in which it was settled that Richard the son of the Black Prince should be king after his grandfather. Nevertheless the suspicion with which he was regarded was not altogether quieted when Richard came to the throne, a boy in the eleventh year of his age. The duke himself complained in parliament of the way he was spoken of out of doors, and at the outbreak of Wat Tyler's insurrection the peasants stopped pilgrims on the road to Canterbury and made them swear never to accept a king of the name of John. On gaining possession of London they burnt his magnificent palace of the Savoy. Richard found a convenient way to get rid of John of Gaunt by sending him to Castile to make good his barren title, and on this expedition he was away three years. He succeeded so far as to make a treaty with his rival, King John, son of Henry of Trastamara, for the succession, by virtue

of which his daughter Catherine became the wife of Henry III. of Castile some years later. After his return the king seems to have regarded him with greater favour, created him duke of Aquitaine, and employed him in repeated embassies to France, which at length resulted in a treaty of peace, and Richard's marriage to the French king's daughter.

Another marked incident of his public life was the support which he gave on one occasion to the Reformer Wycliffe. How far this was due to religious and how far to political considerations may be a question; but not only John of Gaunt but his immediate descendants, the three kings of the house of Lancaster, all took deep interest in the religious movements of the times. A re- action against Lollardy, however, had already begun in the days of Henry IV., and both he and his son felt obliged to dis- countenance opinions which were believed to be politically and theologically dangerous.

Accusations had been made against John of Gaunt more than once during the earlier part of Richard II. 's reign of entertaining designs to supplant his nephew on the throne. But these Richard never seems to have wholly credited, and during his three years' absence his younger brother, Thomas of Woodstock, duke of Gloucester, showed himself a far more dangerous intriguer. Five confederate lords with Gloucester at their head took up arms against the king's favourite ministers, and the Wonderful Parliament put to death without remorse almost every agent of his former administration who had not fled the country. Gloucester even contemplated the dethronement of the king, but found that in this matter he could not rely on the support of his associates, one of whom was Henry, earl of Derby, the duke of Lancaster's son. Richard soon afterwards, by declaring himself of age, shook off his uncle's control, and within ten years the acts of the Wonderful Parliament were reversed by a parlia- ment no less arbitrary. Gloucester and his allies were then brought to account; but the earl of Derby and Thomas Mowbray, earl of Nottingham, were taken into favour as having opposed the more violent proceedings of their associates. As if to show his entire confidence in both these noblemen, the king created the former duke of Hereford and the latter duke of Norfolk. But within three months from this time the one duke accused the other of treason, and the truth of the charge, after much consideration, was referred to trial by battle according to the laws of chivalry. But when the combat was about to commence it was interrupted by the king, who, to preserve the peace of the kingdom, decreed by his own mere authority that the duke of Hereford should be banished for ten years — a term immediately afterwards reduced to five — and the duke of Norfolk for life.

This arbitrary sentence was obeyed in the first instance by both parties, and Norfolk never returned. But Henry, duke of Hereford, whose milder sentence was doubtless owing to the fact that he was the popular favourite, came back within a year, having been furnished with a very fair pretext for doing so by a new act of injustice on the part of Richard. His father, John of Gaunt, had died in the interval,

and the king, troubled with a rebellion in Ireland, and sorely in want of money, had seized the duchy of Lancaster as forfeited property. Henry at once sailed for England, and landing in Yorkshire while King Richard was in Ireland, gave out that he came only to recover his inheritance. He at once received the support of the northern lords, and as he marched southwards the whole kingdom was soon practically at his command. Richard, by the time he had recrossed the channel to Wales, discovered that his cause was lost. He was conveyed from Chester to London, and forced to execute a deed by which he resigned his crown. This was recited in parliament, and he was formally deposed. The duke of Lancaster then claimed the kingdom as due to himself by virtue of his descent from Henry III.

The claim which he put forward involved, to all appearance, a strange falsification of history, for it seemed to rest upon the supposition that Edmund of Lancaster, and not Edward I., was the eldest son of Henry III. A story had gone about, even in the days of John of Gaunt, who, if we may trust the rhymer John Hardyng (Chronicle, pp. 290, 291), had got it

inserted in chronicles deposited in various monasteries, that this Edmund, surnamed Crouchback, was .really hump-backed, and that he was set aside in favour of his younger brother Edward on account of his deformity. No chronicle, however, is known to exist which actually states that Edmund Crouchback was thus set aside; and in point of fact he had no deformity at all, while Edward was six years his senior. Hardyng's testimony is, moreover, suspicious as reflecting the prejudices of the Percys after they had turned against Henry IV., for Hardyng himself expressly says that the earl of Northumberland was the source of his information (see note, p. 353 of his Chronicle). But a statement in the continuation of the chronicle called the Eulogium (vol. iii. pp. 369, 370) corroborates Hardyng to some extent; for we are told that John of Gaunt had once desired in parlia- ment that his son should be recognized on this flimsy plea as heir to the crown; and when Roger Mortimer, earl of March, denied the story and insisted on his own claim as descended from Lionel, duke of Clarence, Richard imposed silence on both parties. However this may be, it is certain that this story, though not directly asserted to be true, was indirectly pointed at by Henry when he put forward his claim, and no one was then bold enough to challenge it.

This was partly due, no doubt, to the fact that the true lineal heir after Richard was then a child, Edmund, who had just succeeded his father as earl of March. Another circumstance was unfavourable to the house of Mortimer — that it derived its title through a woman. No case

precisely similar had as yet arisen, and, notwithstanding the precedent of Henry II., it might be doubted whether succession through a female was favoured by the constitution. If not, Henry could say with truth that he was the direct heir of his grandfather, Edward III. If, on the other hand, succession through females was valid, he could trace his descent through his mother from Henry III. by a very illustrious line of ancestors. And, in the words by which he formally made his claim, he ventured to say no more than that he was descended from the king last mentioned " by right line of the blood." In what particular way that " right line " was to be traced he did not venture to indicate.

A brief epitome of the reigns of the three successive kings belonging to the house of Lancaster (Henry IV., V. and VI.) will be found elsewhere. With the death of Henry VI. the direct male line of John of Gaunt became extinct. But by his daughters he became the ancestor of more than one line of foreign kings, while his descendants by his third wife, Catherine Swynford, conveyed the crown of England to the house of Tudor. It is true that his children by this lady were born before he married her; but they were made legitimate by act of parliament, and, though Henry IV. in confirming the privilege thus granted to them endeavoured to debar them from the succession to the crown, it is now ascertained that there was no such reservation in the original act, and the title claimed by Henry VII. was probably better than he himself supposed.

We show on the following page a pedigree of the royal and illustrious houses that traced their descent from John of Gaunt. (J. Ga.)

LANCASTER, HENRY, Earl of (c. 1281-1345), was the second son of Edmund, earl of Lancaster (d. 1296), and con- sequently a grandson of Henry III. During his early days he took part in campaigns in Flanders, Scotland and Wales, but was quite overshadowed by his elder brother Thomas (see below). In 1324, two years after Thomas had lost his life for opposing the king, Henry was made earl of Leicester by his cousin, Edward II., but he was not able to secure the titles and estates of Lancaster to which he was heir, and be showed openly that his sympathies were with his dead brother. When Queen Isabella took up arms against her husband in 1326 she was joined at once by the earl, who took a leading part in the pro- ceedings against the king and his favourites, the Despensers, being Edward's gaoler at Kenilworth castle. Edward III. being now on the throne, Leicester secured the earldom of Lancaster and his brother's lands, becoming also steward of England; he knighted the young king and was the foremost

*45

H S3

<

O

o

S3

o

I— >

o

c/3 H S3

<

P S3 W

u

W Q

<

Cm

u

S3

I— I

w

W

PQ

a! b

0£

aj ^ 3 S

- >,cn

52 1 J5 .SO, be C u 3

OJ .3 -H

J3C/1″ 1 -‘

IS — .is

OJ O

bo o

co ‘r* TO ?

i- o

■S.S

OJ

tt -s-§§

C > to oj

°z”S =

3^ o *

-^ E

> 8 *

1 :«>. -sjs c

is r^

ro u ^

•* « §

■OS

« rfe.S

•ogrt

■Sy.S-S

j “f 3 *

-m h — -w t! •

to J in –

•a , oj 3 aJ.Ss co

TO OJ OJ

K ˆ _

to

oj s a

co « uJA

£■« to

TO

O

＜-T 3 3 -M OJ

oj a o coO

►2,-1

3

to

ˆ|1

oj 3ˆo

L.T5I”

- 1 OJ S o

UTO °

s s sj£ £ •

•- „ (UM

co a

St: -^ – ^ SJ^ |— £?1

n d) 1- P

CQ «l

*^ Hi

Co o

< OJ OJ

pa

c

3

w

■*-■ *- .r >.

: o o jj c

_, 3 u, OJ m 3 ti 1 ”

“So I ° u >,- •

►-3 ^3 > s

e’B

OJ

Kg

3

^| TO

■ to

- s

C 3

‘3.2

Si > > > -^

rt cu a > m

SKKU

« ^ O 3

w,’- U <5 OJ u u >-.

_ U ig u. U 1«« 3

c O O^ £ bf O

n! O-o S OJCQ

Ti 3_ SjJ^-S ”

M ETC P p V

I — , be c

3

_-5 8

N-0

:— aj

.- 3

O

- s » > §

5-c ^S 5 – ^ ^ a v

^, > <-S>.3 S,ca

oj bo

■D

CO

0)

•-＞3 1TJZ”

•Supaˆ Z;

3

J3 C OTO O c

＞＞ b

nl

O c3 C3 . , OJ ro_

« 3 A’ 3 o « ™ g-S Skmeu II

-TO OJˆ ˆˆH e

0.._ u ™“T0

T3 ˆ I— I 3 ＞

js «j .m oj’Ocn ˆE2＞Q,,‘o

C”T3 u 3 g

O 0)ˆ c3

- «2 oj a -ˆ •§

WˆJ-o g

■ h r” 3

- SO

_ 3

to OJ

(J- a >

to u. to +j O

S OJ OJ = toˆi

? > - 3 ca o”to

b-, ■ + - < O

OJ $&S

O o Sen

OS2

— rt o ►J

K oj j

TO

3

T fl

“8

Eo

TO

3

■§T0-^«

~-E rt O

jj o M. i-< o 3

C3

B S 3

■ °^ to oj J-

g TO.Sffe ^ • OJ

,^ l ~ H **- 3 to aj ■-**

i— ,t« p jaw

" O 3

,>• be ja

-g c be

>> h

OJ»+h OJ

^ o «

(-•to "S OJ OJ

5 = o 3T0^

K O

hn, :e of ford.

O-*T0

►— > 3

•on

mas, e of ence.

°-* a

-3 3ˆ2

H-ccj

＞＞M . ■

.r m o s

rine :er o sIV

• Cathe daught Charle

.

OJ i- i_ˆ3

i; t«.- 3

■q oi Ec/)H

＞

c

II

OJ

“ˆ O 3

ffi

H- 1

3

C

＞

c

TO

c

c

OJ

d

TO

3

-JS J3”3)

w SI

3

to-

ol

TO

w

. C3 2ˆ

TO

w

S U

•C M -2 g 3 be

oj’-S,ˆ

3

‘C

O,

OJ 4J U-

K nl U

t i (D 4J 1- J 3 OJ > cfl OJ

L

be .

. O C-J

co *■ 3 be to ‘•x “3

g-TO-* 3 Jo ° bo .2*. Si J’u— 2 b0 3_

3ˆ

CO?*

-3

— 3ˆ to

TO ° ~ Jr; oj

b 3

TO

b ˆ a „ 3

ˆ ,« 3 O «•-

.H v.a li Cl d 1

■-; CO u OJ .3 M bo to ˆ< cj to

ˆ“co .“to

n be —I be S3 – 3 _ u — 3 u

go ja o <'o

member of the royal council, but he was soon at variance with Isabella and her paramour, Roger Mortimer, and was practically deprived of his power. In 1328 his attempt to overthrow Mortimer failed, and he quietly made his peace with the king; a second essay, against Mortimer was more successful. About this time Lancaster became blind; he retired from public life and died on the 22nd of September ,1345.

His son and successor, Henry, 1st duke of Lancaster (c. 1300-1361), was a soldier of unusual distinction. Probably from his birthplace in Monmouthshire he was called Henry of Grosmont. He fought in the naval fight off Sluys and in the one off Winchelsea in 1350; he led armies into Scotland, Gascony and Normandy, his exploits in Gascony in 1345 and 1346 being especially successful; he served frequently under Edward III. himself; and he may be fairly described as one of the most brilliant and capable of the English warriors during the earlier part of the Hundred Years' War. During a brief respite from the king's service he led a force into Prussia and he was often employed on diplomatic business. In 1354 he was at Avignon negotiating with Pope Innocent VI., who wished to make peace between England and France, and one of his last acts was to assist in arranging the details of the treaty of Brfitigny in 1360. In 1337 he was made earl of Derby; in 1345 he succeeded to his father's earldoms of Lancaster and Leicester; in 1349 he was created earl of Lincoln, and in 13 51 he was made duke of Lancaster. He was steward of England and one of the original knights of the order of the garter. He died at Leicester on the 13th of March 1361. He left no sons; one of his daughters, Maud (d. 1362), married William V., count of Holland, a son of the emperor Louis the Bavarian, and the other, Blanche (d. 1369), married Edward III.'s son, John of Gaunt, who obtained his father-in-law's titles and estates.

LANCASTER, SIR JAMES (fl. 1591-1618), English navigator and statesman, one of the foremost pioneers of the British Indian trade and empire. In early life he fought and traded in Portugal. On the 10th of April 1591 he started from Plymouth, with Raymond and Foxcroft, on his first great voyage to the East Indies; this fleet of three ships is the earliest of English oversea Indian expeditions. Reaching Table Bay (1st of August 1591), and losing one ship off Cape Corrientes on the 12th of September, the squadron rested and refitted at Zanzibar (February 1592), rounded Cape Comorin in May following, and was off the Malay Peninsula in June. Crossing later to Ceylon, the crews insisted on returning home; the voyage back was disastrous; only twenty-five officers and men reappeared in England in 1594. Lancaster himself reached Rye on the 24th of May 1594; in the same year he led a military expedition against Pernambuco, without much success; but his Indian voyage, like Ralph Fitch's overland explorations and trading, was an important factor in the foundation of the East India Company. In 1600 he was given command of the company's first fleet (which sailed from Torbay towards the end of April 1601); he was also accredited as Queen Elizabeth's special envoy to various Eastern potentates. Going by the Cape of Good Hope (1st of November 1601) Lancaster visited the Nicobars (from the 9th of April 1602), Achin and

other parts of Sumatra (from the 5th of June 1602), and Bantam in Java; an alliance was con- cluded with Achin, a factory established at Bantam and a commercial mission despatched to the Moluccas. The return voyage (20th of February to nth of September 1603) was speedy and prosperous, and Lancaster (whose success both in trade and in diplomacy had been brilliant) was rewarded with knighthood (October 1603). He continued to be one of the chief directors of the East India Company till his death in May 1618; most of the voyages of the early Stuart time both to India and in search of the North- West passage were undertaken under his advice and direction; Lancaster Sound, on the north-west of Baffin's Bay (in 74° 20′ N.), was named by William Baffin after Sir James (July 1616).

East Indies . . . , ed. Sir Clements Markham, Hakluyt Soc. (1877), Calendars of State Papers, East Indies. The original journals of Lancaster's voyage of 1601-1603 have disappeared, and here we have only Purchas to go on.

See Hakluyt, Principal Navigations, vol. ii. pt. ii. pp. vol. iii. pp. 708-715 (1599); Purchas, Pilgrims, vol. 1 pp. 147-164; also The Voyages of Sir James Lancaster .

102-110,

. pt. ii. . to the

LANCASTER, JOHN OF GAUNT, Dtjke of (1340-1399), fourth son of Edward III. and Queen Philippa, was born in March 1340 at Ghent, whence his name. On the 29th of September 1342 he was made earl of Richmond; as a child he was present at the sea fight with the Spaniards in August 1350, but his first military service was in 1355, when he was knighted. On the 19th of May 1359 he married his cousin Blanche, daughter and ultimately sole heiress of Henry, duke of Lancaster. In her right he became earl of Lancaster in 1361, and next year was created duke. His marriage made him the greatest lord in England, but for some time he took no prominent part in public affairs. In 1366 he joined his eldest brother, Edward the Black Prince, in Aquitaine, and in the year after led a strong contingent to share in the campaign in support of Pedro the Cruel of Castile. With this began the connexion with Spain, which was to have so great an influence on his after-life. John fought in the van at Najera on the 3rd of April 1367, when the English victory restored Pedro to his throne. He returned home at the end of the year. . Pedro proved false to his English allies, and was finally over- thrown and killed by his rival, Henry of Trastamara, in 1369. The disastrous Spanish enterprise led

directly to renewed war between France and England. In August 1369 John had com- mand of an army which invaded northern France without success. In the following year he went again to Aquitaine, and was present with the Black Prince at the sack of Limoges. Edward's health was broken down, and he soon after went home, leaving John as his lieutenant. For a year John maintained the war at his own cost, but whilst in Aquitaine a greater prospect was opened to him. The duchess Blanche had died in the autumn of 1369 and now John married Constance (d. 1394), the elder daughter of Pedro the Cruel, and in her right assumed the title of king of Castile and Leon. For sixteen years the pursuit of his kingdom was the chief object of John's ambition. No doubt he hoped to achieve his end, when he commanded the great army which invaded France in 1373. But the French would not give battle, and though John marched from Calais right through Champagne, Burgundy and Auvergne, it was with disastrous results; only a shattered remnant of the host reached Bordeaux.

The Spanish scheme had to wait, and when John got back to England he was soon absorbed in domestic politics. The king was prematurely old, the Black Prince's health was broken. John, in spite of the unpopularity of his ill-success, was forced into the foremost place. As head of the court party he had to b'ear the brunt of the attack on the administration made by the Good Parliament in 1376. It was not perhaps altogether just, and John was embittered by reflections on his loyalty. As soon as the parliament was dissolved he had its proceedings reversed, and next year secured a more subservient assembly. There came, however, a new development. The duke's politics were opposed by the chief ecclesiastics, and in resisting them he had made use of Wycliffe. With Wycliffe's religious opinions he had no sympathy. Nevertheless when the bishops arraigned the reformer for heresy John would not abandon him. The con- flict over the trial led to a violent quarrel with the Londoners, and a riot in the city during which John was in danger of his life from the angry citizens. The situation was entirely altered by the death of Edward III. on the 21st of June. Though his enemies had accused him of aiming at the throne, John was without any taint of disloyalty. In his nephew's interests he accepted a compromise, disclaimed before parliament the truth of the malicious rumours against him, and was reconciled form- ally with his opponents. Though he took his proper place in the ceremonies at Richard's coronation, he showed a tactful modera- tion by withdrawing for a time from any share in the govern- ment. However, in the summer of 1378, he commanded in an attack on St Malo, which through no fault of his failed. To add to this misfortune, during his absence some of his supporters

violated the sanctuary at Westminster. He vindicated himself somewhat bitterly in a parliament at Gloucester, but still avoiding a prominent part in the government, accepted the command on the Scottish border. He was there engaged when his palace of the Savoy in London was burnt during the peasants' revolt in June 1381. Wild reports that even the government had declared him a traitor made him seek refuge in Scotland. Richard had, however, denounced the calumnies, and at once recalled his uncle.

John's self-restraint had strengthened his position, and he began again to think of his Spanish scheme. He urged its undertaking in parliament in 1382, but nearer troubles were more urgent, and John himself was wanted on the Scottish border. There he sought to arrange peace, but against his will was forced into an unfortunate campaign in 1384. His ill-success renewed his unpopularity, and the court favourites of Richard II. intrigued against him. They were probably responsible for the allegation, made by a Carmelite, called Latemar, that John was conspiring against his nephew. Though Richard at first believed it, the matter was disposed of by the friar's death. However, the court party soon after concocted a fresh plot for the duke's destruction; John boldly denounced his traducers, and the quarrel was appeased by the intervention of the king's mother. The intrigue still continued, and broke out again during the Scottish campaign in 1385. John was not the man to be forced into treason to his family, but the impossibility of the position at home made his foreign ambitions more feasible.

The victory of John of Portugal over the king of Castile at Aljubarrota, won with English help, offered an opportunity. In July 1386 John left England with a strong force to win his Spanish throne. He landed at Corunna, and during the autumn conquered Galicia. Juan, who had succeeded his father Henry as king of Castile, offered a compromise by marriage. John of Gaunt refused, hoping for greater success with the help of the king of Portugal, who now married the duke's eldest daughter Philippa. In the spring the allies invaded Castile. They could achieve no success, and sickness ruined the English army. The conquests of the previous year were lost, and when Juan renewed his offers, John of Gaunt agreed to surrender his claims to his daughter by Constance of Castile, who was to marry Juan's heir. After some delay the peace was concluded at Bayonne in 1388. The next eighteen months were spent by John as lieutenant of Aquitaine, and it was not till November 1389 that he returned to England. By his absence he had avoided implication in the troubles at home. Richard, still insecure of his own position, welcomed his uncle, and early in the

following year marked his favour by creating him duke of Aquitaine. John on his part was glad to support the king's government; during four years he exercised his influence in favour of pacification at home, and abroad was chiefly responsible for the conclusion of a truce with France. Then in 1395 he went to take up the government of his duchy; thanks chiefly to his lavish expenditure his administra- tion was not unsuccessful, but the Gascons had from the first objected to government except by the crown, and secured his recall within less than a year. Almost immediately after his return John married as his third wife Catherine Swynford; Constance of Castile had died in 1394. Catherine had been his mistress for many years, and his children by her, who bore the name of Beaufort, were now legitimated. In this and in other matters Richard found it politic to conciliate him. But though John presided at the trial of the earl of Arundel in September 1397, he took no active part in affairs. The exile of his son Henry in 1398 was a blow from which he did not recover. He died on the 3rd of February 1399, and was buried at St Paul's near the high altar.

John was neither a great soldier nor a statesman, but he was a chivalrous knight and loyal to what he believed were the interests of his family. In spite of opportunities and provocations he never lent himself to treason. He deserves credit for his protection of Wycliffe, though he had no sympathy with his religious or political opinions. He was also the patron of Chaucer, whose Boke of the Duchesse was a lament for Blanche of Lancaster.

The chief original sources for John's life are Froissart, the

maliciously hostile Chronicon Angliae (1328-1388), and the eulogistic Chronicle of Henry Knighton (both the latter in the Rolls Series). But fuller information is to be found in the excellent biography by S. Armytage-Smith, published in 1904. For his descendants see the table under Lancaster, House of. (C. L. K.)

LANCASTER, JOSEPH (1778-1838), English educationist, was born in Southwark in 1778, the son of a Chelsea pensioner. He had few opportunities of regular instruction, but he very early showed unusual seriousness and desire for learning. At sixteen he looked forward to the dissenting ministry; but soon after his religious views altered, and he attached himself to the Society of Friends, with which he remained associated for many years, until long afterwards he was disowned by that body. At the age of twenty he began to gather a few poor children under his father's roof, and to give them the rudiments of instruction,

without a fee, except in cases in which the parent was willing to pay a trifle. Soon a thousand children were assembled in the Borough Road; and, the attention of the duke of Bedford, Mr Whitbread, and others having been directed to his efforts, he was provided with means for building a schoolroom and supplying needful materials. The main features of his plan were the employment of older scholars as monitors, and an elaborate system of mechanical drill, by means of which these young teachers were made to impart the rudiments of reading, writing and arithmetic to large numbers at the same time. The material appliances for teaching were very scanty — a few leaves torn out of spelling-books and pasted on boards, some slates and a desk spread with sand, on which the children wrote with their fingers. The order and cheerfulness of the school and the military precision of the children's movements began to attract much public observation at a time when the education of the poor was almost entirely neglected. Lancaster inspired his young monitors with fondness for their work and with pride in the institution of which they formed a part. As these youths became more trustworthy, he found himself at leisure to accept invitations to expound what he called " his system " by lectures in various towns. In this way many new schools were established, and placed under the care of young men whom he had trained. In a memorable interview with George III., Lancaster was encouraged by the expression of the king's wish that every poor child in his dominions should be taught to read the Bible. Royal patronage brought in its train resources, fame and public responsibility, which proved to be beyond Lancaster's own powers to sustain or control. He was vain, reckless and im- provident. In 1808 a few noblemen and gentlemen paid his debts, became his trustees and founded the society at first called the Royal Lancasterian Institution, but afterwards more widely known as the British and Foreign School Society. The trustees soon found that Lancaster was impatient of control, and that his wild impulses and heedless extravagance made it impossible to work with him. He quarrelled with the committee, set up a private school at Tooting, became bankrupt, and in 1818 emigrated to America. There he met at first a warm recep- tion, gave several courses of lectures which were well attended, and wrote to friends at home letters full of enthusiasm. But his fame was short-lived. The miseries of debt and disappointment were aggravated by sickness, and he settled for a time in the warmer climate of Caracas. He afterwards visited St Thomas and Santa Cruz, and at length returned to New York, the corporation of which city made him a public grant of 500 dollars in pity for the misfortunes which had by this time reduced him to lamentable poverty. He afterwards visited Canada, where he gave lectures at Montreal, and was encouraged to open a school which enjoyed an

ephemeral success, but was soon abandoned. A small annuity provided by his friends in England was his only means of support. He formed a plan for returning home and giving a new impetus to his ” system,” by which he declared it would be possible ” to teach ten thousand children in different schools, not knowing their letters, all to read fluently in three weeks to three months.” But these visions were never realized. He was run over by a carriage in the streets of New York on the 24th of October 1838, and died in a few hours.

14.8

LANCASTER, T.— LANCASTER

As one of the two rival inventors of what was called the ” moni- torial ” or ” mutual ” method of instruction, Lancaster’s name was prominent for many years in educational controversy. Dr Andrew Bell (q.v.) had in 1797 published an account of his experiments in teaching; and Lancaster in his first pamphlet, published in 1803, frankly acknowledges his debt to Bell for some useful hints. The two worked independently, but Lancaster was the first to apply the system of monitorial teaching on a large scale. As an economical experiment his school at the Borough Road was a signal success. He had one thousand scholars under discipline, and taught them to read, write and work simple sums at a yearly cost of less than 5s. a head. His tract Improvements in Education described the gradation of ranks, the system of signals and orders, the functions of the monitors, the method of counting and of spelling and the curious devices he adopted for punishing offenders. Bell’s educational aims vere humbler, as he feared to ” elevate above their station those who were doomed to the drudgery of daily labour,” and therefore did not desire to teach even writing and ciphering to the lower classes. The main difference between them was that the system of the one was adopted by ecclesiastics and Conservatives, — the ” National Society for the Education of the Poor in the principles of the Established Church ” having been founder in 1811 for its propagation ; while Lancaster’s method was patronized by the Edinburgh Review, by Whig statesmen, by a few liberal Churchmen and by Nonconformists generally. It was the design of Lancaster and his friends to make national education Christian, but not sectarian, — to cause the Scriptures to be read, explained and reverenced in the schools, without seeking by catechisms or other- wise to attract the children to any particular church or sect. This principle was at first vehemently denounced as deistic and mis- chievous, and as especially hostile to the Established Church. To do them justice, it must be owned that the rival claims and merits of Bell and Lancaster were urged with more passion and

unfairness by their friends than by themselves. Yet neither is entitled to hold a very high place among the world's teachers. Bell was cold, shrewd and self-seeking. Lancaster had more enthusiasm, a genuine and abounding love for children, and some ingenuity in devising plans both for teaching and governing. But he was shift- less, wayward and unmethodical, and incapable of sustained and high-principled personal effort. His writings were not numerous. They consist mainly of short pamphlets descriptive of the successes he attained at the Borough Road. His last publication, An Epitome of the Chief Events and Transactions of my Own Life, appeared in America in 1833, and is characterized, even more strongly than his former writings, by looseness and incoherency of style, by egotism and by a curious incapacity for judging fairly the motives either of his friends or his foes. We have since come to believe that intelligent teaching requires skill and previous training, and that even the humblest rudiments are not to be well taught by those who have only just acquired them for themselves, or to be attained by mere mechanical drill. But in the early stages of national education the monitorial method served a valuable purpose. It brought large numbers of hitherto neglected children under discipline, and gave them elementary instruction at a very cheap rate. Moreover, the little monitors were often found to make up in brightness, tracta-' bility and energy for their lack of experience, and to teach the arts of reading, writing and computing with surprising success. And one cardinal principle of Bell and Lancaster is of prime importance. They regarded a school, not merely as a place to which individual pupils should come for guidance from teachers, but as an organized community whose members have much to learn from each other. They sought to place their scholars from the first in helpful mutual relations, and to make them feel the need of common efforts towards the attainment of common ends. (j. G. F.)

LANCASTER, THOMAS, Earl of (c. 1277-1322), was the eldest son of Edmund, earl of Lancaster and titular king of Sicily, and a grandson of the English king, Henry III.; while he was related to the royal house of France both through his mother, Blanche, a granddaughter of Louis VIII., and his step-sister, Jeanne, queen of Navarre, the wife of Philip IV. A minor when Earl Edmund died in 1296, Thomas received his father's earldoms of Lancaster and Leicester in 1298, but did not become prominent, in English affairs until after the accession of his cousin, Edward II., in July 1307. Having married Alice (d. 1348), daughter and heiress of Henry Lacy, earl of Lincoln, and added the earldom of Derby to those which he already held, he was marked out both by his wealth and position as the leader of the barons in their resistance to the new king. With his associates he produced the

banishment of the royal favourite, Piers Gaveston, in 1308; compelled Edward in 13 10 to surrender his power to a committee of " ordainers," among whom he himself was numbered; and took up arms when Gaveston returned to England in January 1312. Lancaster, who had just obtained the earldoms of Lincoln and Salisbury on the

death of his father-in-law in 13 1 1 , drove the king and his favourite from Newcastle to Scarborough, and was present at the execu- tion of Gaveston in June 1312. After lengthy efforts at media- tion, he made his submission and received a full pardon from Edward in October 1313; but he refused to accompany the king on his march into Scotland, which ended at Bannockburn, and took advantage of the English disaster to wrest the control of affairs from the hands of Edward. In 13 15 he took command of the forces raised to fight the Scots, and was soon appointed to the " chief place in the council," while his supporters filled the great offices of state, but his rule was as feeble as that of the monarch whom he had superseded. Quarrelling with some of the barons, he neglected both the government and the defence of the kingdom, and in 13 17 began a private war with John, Earl Warrenne, who had assisted his countess to escape from her husband. The capture of Berwick by the Scots, however, in April 1318 led to a second reconciliation with Edward. A formal treaty, made in the following August, having been ratified by parliament, the king and earl opened the siege of Berwick; but there was no cohesion between their troops, and the under- taking was quickly abandoned. On several occasions Lancaster was suspected of intriguing with the Scots, and it is significant that his lands were spared when Robert Bruce ravaged the north of England. He refused to attend the councils or to take any part in the government until 1321, when the Despensers were banished, and war broke out again between himself and the king. Having conducted some military operations against Lancaster's friends on the Welsh marches, Edward led his troops against the earl, who gradually fell back from Burton -on -Trent to Pontefract. Continuing this movement, Lancaster reached Boroughbridge, where he was met by another body of royalists under Sir Andrew Harclay. After a skirmish he was deserted by his troops, and was obliged to surrender. Taken to his own castle at Pontefract, where the king was, he was condemned to death as a rebel and a traitor, and was beheaded near the town on the 22nd of March 1322. He left no children.

Although a coarse, selfish and violent man, without any of the attributes of a statesman, Lancaster won a great reputation for patriotism; and his memory was long cherished, especially in the north of England, as that of a defender of popular liberties. Over a hundred years after his death miracles were said to have been worked

at his tomb at Pontefract; thousands visited his effigy in St Paul's Cathedral, London, and it was even proposed to make him a saint.

See Chronicles of the Reigns of Edward I. and Edward II., edited with introduction by W. Stubbs (London, 1882-1883); and W. Stubbs, Constitutional History, vol. ii. (Oxford, 1896).

LANCASTER, a market town and municipal borough, river port, and the county town of Lancashire, England, in the Lancaster parliamentary division, 230 m. N.W. by N. from London by the London & North- Western railway (Castle Station) ; served also by a branch of the Midland railway (Green Ayre station). Pop. (1S91) 33,256,' (1901) 40,329. It lies at the head of the estuary of the river Lune, mainly on its south bank, 7 m. from the sea. The site slopes sharply up to an eminence crowned by the castle and the church of St Mary. Fine views over the rich valley and Morecambe Bay to the west are com- manded from the summit. St Mary's church was originally attached by Roger de Poictou to his Benedictine priory founded at the close of the nth century. It contains some fine Early English work in the nave arcade, but is of Perpendicular work- manship in general appearance, while the tower dates from 1759. There are some beautiful Decorated oak stalls in the chancel, brought probably from Cockersand or Furness Abbey.

The castle occupies the site of a Roman caslrum. The Saxon foundations of a yet older structure remain, and the tower at the south-west corner is supposed to have been erected during the reign of Hadrian. The Dungeon Tower, also supposed to be of Roman origin, was taken down in 1818. The greater part of the old portion of the present structure was built by Roger de Poictou, who utilized some of the Roman towers and the old walls. In 1322 much damage was done to the castle by Robert

Bruce, whose attack it successfully resisted, but it was restored and strengthened by John of Gaunt, who added the greater part of the Gateway Tower as well as a turret on the keep or Lungess Tower, which on that account has been named " John o' Gaunt's Chair." During the Civil War the castle was captured by Cromwell. Shortly after this it was put to public use, and now, largely modernized, contains the assize courts and gaol. Its appearance, with massive buildings surrounding a quadrangle, is picturesque and dignified.

Without the walls is a pleasant terrace walk. Other buildings include several handsome modern churches and chapels (notably the Roman Catholic church) ; the Storey Institute with art gallery, technical and art schools, museum and library, presented to the borough by Sir Thomas Storey in 1887; Palatine Hall, Ripley hospital (an endowed school for the children of residents in Lancaster and the neighbourhood), the asylum, the Royal Lancaster infirmary and an observatory in the Williamson Park. A new town hall, presented by Lord Ashton in 1909, is a handsome classical building from designs of E. W. Mountford. The Ashton Memorial in William- son Park, commemorating members of the Ashton family, is a lofty domed structure. The grammar school occupies modern buildings, but its foundation dates from the close of the 15th century, and in its former Jacobean house near the church William Whewell and Sir Richard Owen were educated. A horseshoe inserted in the pavement at Horseshoe Corner in the town, and renewed from time to time, is said to mark the place where a shoe was cast by John of Gaunt's horse.

The chief industries are cotton-spinning, cabinet-making, oil cloth-making, railway wagon-building and engineering. Glasson Dock, 5 m. down the Lune, with a graving dock, is accessible to vessels of 600 tons. The Kendal and Lancaster canal reaches the town by an aqueduct over the Lune, which is also crossed by a handsome bridge dated 1788. The town has further connexion by canal with Preston. The corporation consists of a mayor, 8 aldermen and 24 councillors. Area, 3506 acres.

History. — Lancaster (Lone-caster or Lunecastrum) was an important Roman station, and traces of the Roman fortification wall remain. The Danes left few memorials of their occupation, and the Runic Cross found here, once supposed to be Danish, is now conclusively proved to be Anglo-Saxon. At the Conquest, the place, reduced in size and with its Roman castrum almost in ruins, became a possession of Roger de Poictou, who founded or enlarged the present castle on the old site. The town and castle had a somewhat chequered ownership till in 1266 they were granted by Henry III. to his son Edmund, first earl of 'Vancaster, and continued to be a part of the duchy of Lancaster till the present time. A town gathered around the castle, and in 1 193 John, earl of Mertoun, afterwards king, granted it a charter, and another in 1199 after his accession. Under these charters the burgesses claimed the right of electing a mayor, of holding a yearly fair at Michaelmas and a weekly market on Saturday. Henry III. in 1226 confirmed the charter of 1199; in 1 291 the style of the corporation is first mentioned as Ballivus et communitas burgi, and Edward III.'s confirmation and exten- sion (1362) is issued to the mayor, bailiffs

and commonalty. Edward III.‘s charter was confirmed by Richard II. (1389), Henry IV. (1400), Henry V. (1421), Henry VII. (1488) and Elizabeth (1563). James I. (1604) and Charles II. (1665 and 1685) ratified, with certain additions, all previous charters, and again in 1819 a similar confirmation was issued. John of Gaunt in 1362 obtained a charter for the exclusive right of holding the sessions of pleas for the county in Lancaster itself, and up to 1873 the duchy appointed a chief justice and a puisne justice for the court of common pleas at Lancaster. In 1322 the Scots burnt the town, the castle alone escaping; the town was rebuilt but removed from its original position on the hill to the slope and foot. Again in 1389, after the battle of Otterburn, it was destroyed by the same enemy. At the outbreak of the Great Rebellion the burgesses sided with the king, and the town and castle were captured in February 1643 by the Parliamentarians. In March 1,643 Lord Derby assaulted and took the town with

great slaughter, but the castle remained in the hands of the Parliamentarians. In May and June of the same year the castle was again besieged in vain, and in 1648 the Royalists under Sir Thomas Tyldesley once more fruitlessly besieged it. During the rebellion of 171 5 the northern rebels occupied Lancaster for two days and several of them were later executed here. During the 1745 rebellion Prince Charles Edward’s army passed through the town in its southward march and again in its retreat, but the inhabitants stood firm for the Hanoverians.

Two chartered markets are held weekly on Wednesday and Saturday and three annual fairs in April, July and October. A merchant gild existed here, which was ratified by Edward III.‘s charter (1362), and in 1688 six trade companies were incorporated. The chief manufactures used to be sailcloth, cabinet furniture, candles and cordage. The borough returned two members to parliament from 1295 to 1331 and again from some time in Henry VIII. ‘s reign before 1529 till 1867, when it was merged in the Lan- caster division of north Lancashire. A church existed here, probably on the site of the parish church of St Mary’s, in Anglo-Saxon times, but the present church dates from the early 15th century. An act of parliament was passed in 1792 to make the canal from Kendal through Lancaster and Preston, which is carried over the Lune about a mile above Lancaster by a splendid aqueduct.

See Fleury, Time-Honoured Lancaster (1891); E. Baines, History of Lancashire (1888).

LANCASTER, a city and the county-seat of Fairfield county, Ohio,

U.S.A., on the Hocking river (non-navigable), about 32 m. S.E. of Columbus. Pop. (1900) 8991, of whom 442 were foreign- born and 212 were negroes; (1910 census) 13,093. Lancaster is served by the Hocking Valley, the Columbus & Southern and the Cincinnati & Muskingum Valley (Pennsylvania Lines) railways, and by the electric line of the Scioto Valley Traction Company, which connects it with Columbus. Near the centre of the city is Mt. Pleasant, which rises nearly 200 ft. above the surrounding plain and about which cluster many Indian legends; with 70 acres of woodland and fields surrounding it, this has been given to the city for a park. On another hill is the county court house. Lancaster has a public library and a children's home; and 6 m. distant is the State Industrial School for Boys. The manufactures include boots and shoes, glass and agricultural implements. The total value of the city's factory product in 1905 was $4,159,410, being an increase of 118-3% over that of 1900. Lancaster is the trade centre of a fertile agricultural region, has good transportation facilities, and is near the Hocking Valley and Sunday Creek Valley coal-fields; its commercial and industrial importance increased greatly, after 1900, through the development of the neighbouring natural gas fields and, after 1907-1908, through the discovery of petroleum near the city. Good sandstone is quarried in the vicinity. The municipality owns and operates its waterworks and natural gas plant. Lancaster was founded in 1800 by Ebenezer Zane (1747-1811), who received a section of land here as part compensation for opening a road, known as " Zane's Trace," from Wheeling, West Virginia, to Limestone (now Maysville) , Kentucky. Some of the early settlers were from Lancaster, Pennsylvania, whence the name. Lancaster was incorporated as a village in 1831 and twenty years later became a city of the third class.

LANCASTER, a city and the county-seat of Lancaster county, Pennsylvania, U.S.A., on the Conestoga river, 68 m. W. of Philadelphia. Pop. (1900) 41,459, of whom 3492 were foreign- born and 777 were negroes; (1910 census) 47,227. It is served by the Pennsylvania, the Philadelphia & Reading and the Lancaster, Oxford & Southern railways, and by tramways of the Conestoga Traction Company, which had in 1909 a mileage of 152 m. Lancaster has a fine county court house, a soldiers' monument about 43 ft. inheight,two fine hospitals, the Thaddeus Stevens Industrial School (for orphans), a children's home, the Mechanics' Library, and the Library of the Lancaster Historical Society. It is the seat of Franklin and Marshal 1 College (Reformed Church), of the affiliated Franklin and Marshall Academy, and of the Theological Seminary of the Reformed Church, conducted in connexion wi h the college. The college was founded in

1852 by the consolidation of Franklin College, founded at Lancaster in 1787, and Marshall College, founded at Mercersburg in 1836, both of which had

earned a high standing among the educational institutions of Pennsylvania. Franklin College was named in honour of Benjamin Franklin, an early patron; Marshall College was founded by the Reformed Church and was named in honour of John Marshall; The Theological Seminary was opened in 1825 at Carlisle, Pa., and was removed to York, Pa., in 1829, to Mercersburg, Pa., in 1837 and to Lancaster in 1871; in 1831 it was chartered by the Pennsylvania legislature. Among its teachers have been John W. Nevin and Philip Schaff, whose names, and that of the seminary, are associated with the so- called " Mercersburg Theology." At Millersville, 4 m. S.W. of Lancaster, is the Second Pennsylvania State Normal School. At Lancaster are the graves of General John F. Reynolds, who was born here; Thaddeus Stevens, who lived here after 1842; and President James Buchanan, who lived for many years on an estate, " Wheatland," near the city and is buried in the Woodward Hill Cemetery. The city is in a productive tobacco and grain region, and has a large tobacco trade and important manufactures. The value of the city's factory products increased from $12,750,429 in 1900 to $14,647,681 in 1905, or 14-9 %. In 1905 the principal products were umbrellas and canes (valued at $2,782,879), cigars and cigarettes ($1,95ˆ971), and foundry and machine-shop products ($1,036,526). Lancaster county has long been one of the richest agricultural counties in the United States, its annual products being valued at about $10,000,000; in 1906 the value of the tobacco crop was about $3,225,000, and there were 824 manufactories of cigars in the county.

Lancaster was settled about 1717 by English Quakers and Germans, was laid out as a town in 1730, incorporated as a borough in 1742, and chartered as a city in 1818. An important treaty with the Iroquois Indians was negotiated here by the governor of Pennsylvania and by commissioners from Maryland and Virginia in June 1 744. Some of General Burgoyne's troops, surrendered at Saratoga, were confined here after the autumn of 1780. The Continental Congress sat here on the 27th of September 1777 after being driven from Philadelphia by the British; and subsequently, after the organization of the Federal government, Lancaster was oneof the places seriously considered when a national capital was to be chosen. From 1799 to 1812

Lancaster was the capital of Pennsylvania.

LANCE, a form of spear used by cavalry (see Spear). The use of the lance, dying away on the decay of chivalry and the introduction of pistol-armed cavalry, was revived by the Polish and Cossack cavalry who fought against Charles XII. and Frederick the Great. It was not until Napoleon's time, how- ever, that lancer regiments appeared in any great numbers on European battlefields. The effective use of the weapon — long before called by Montecucculi the " queen of weapons " — by Napoleon's lancers at Waterloo led to its introduction into the British service, and except for a short period after the South African War, in which it was condemned as an anachronism, it has shared, or rather contested, with the sword the premier place amongst cavalry arms. In Great Britain and other countries lances are carried by the front rank of cavalry, except light cavalry, regiments, as well as by lancer regiments. In Germany, since 1889, the whole of the cavalry has been armed with the lance. In Russia, on the other hand, line cavalry being, until recently, considered as a sort of mounted infantry or dragoons, the lance was restricted to the Cossacks, and in Austria it enjoys less favour than in Germany. Altogether there are few questions of armament or military detail more freely disputed, in the present day as in the past, than this of sword versus lance.

The lances used in the British service are of two kinds, those with ash and those with bamboo staves. The latter are much pre- ferred and are generally used, the " male " bamboo being peculiarly tough and elastic. The lance is provided with a sling, through which the trooper passes his right arm when the lance is carried slung, the point of the steel shoe fitting into a bucket attached to the right stirrup. A small " dee " loop is also provided, by which the lance can be attached to the saddle when the trooper dismounts. The small flag is removed on service. The head is of the best steel. The Germans, doubtless owing to difficulty in obtaining bamboos, or ash in large quantity straight enough in the grain over a consider-

able length, for lance staves, have adopted a stave of steel tubing as well as one of pine (figs. 2, 3 and 4).

As to the question of the relative efficiency of the lance and the sword as the principal arm for cavalry, it is alleged that the former is heavy and fatiguing to carry, conspicuous, and much in the way when reconnoitring in close country, working through woods and the like; that, when unslung ready for the charge, it is awkward to handle, and may be positively dangerous if a horse becomes restive and the rider has to use both hands on the reins; that unless the thrust be delivered

at full speed, it is easily parried; and, lastly, that in the melee, when the trooper has not room to use his lance, he will be helpless until he either throws it away or slings it, and can draw his sword. While admitting the last-mentioned objection, those who favour the lance contend that success in the first shock of contact is all-important, and that this success the lancer will certainly obtain, owing

fig.3. fig.4.

to his long reach en- abling him to deliver a blow before the swords- man can retaliate, while, when the melee com- mences, the rear rank will come to the assist- ance of the front rank. Further, it is claimed that the power of de- livering the first blow gives confidence to the young soldier; that the appearance of a lancer regiment, preceded as it were by a hedge of steel, has an immense moral effect; that in single combat a lancer, with room to turn, can always defeat an oppo- nent armed with a sword; and, lastly, that in pursuit a lancer is terrible to an enemy, whether the latter be mounted or on foot. As in the case of the peren- nial argument whether a sword should be de- signed mainly for cut- ting or thrusting, it is unlikely that the dis- pute as to the merits of the lance over the sword will ever be definitely settled, since so many other factors — horse- manship, the training of the horse, the skill and courage of the adver- s a r y — determine the trooper's success quite as much as the weapon he happens to wield. The following passage from Cavalry : its His- tory and\ Tactics (Lon- don, 1853), by Captain Nolan, explains how the lance gained popularity in Austria: — " In the

Fi'g.2.

_

KSrrtnq binding \iorarip

-Shot

Types of British and German Lances. Fig. I is the British bamboo lance; figs. 2 and 3 the German steel tubular lance, and fig. 4 the German pine-wood lance. _ The full length of the German lance is 11 ft. 9 in., that of the Cossacks 9 ft. 10 in., that of the Austrian lancers ■8 ft. 8 in., and the French lance II ft. The British lance is 9 ft. long. The weight of a lance varies but slightly. The steel- last Hungarian war staved lance weighs 4 lb, the bamboo 43. (1848-49) the Hungarian

Hussars were . . . generally successful against the Austrian heavy cavalry — cuirassiers and dragoons; but when they met the Polish

Lancers, the finest regiments of light horse in the Austrian service, distinguished for their discipline, good riding, and, above all, for their esprit de corps and gallantry in action, against those the Hungarians were not successful, and at once attributed this to the lances of their opponents. The Austrians then extolled the lance above the sword, and armed all their light cavalry regiments with it.”

The lancer regiments in .the British “service are the 5th, the 9th, the 12th, the 16th, the 17th and the 21st. All these were converted at different dates from hussars and light dragoons, the last-named in 1896. The typical lancer uniform is a light-fitting short-skirted tunic with a double-breasted front, called the plastron, of a different colour, a girdle, and a flat-topped lancer ” cap,” adapted from the Polish czapka (see Uniforms: Naval and Military). The British lancers, with the exception of the 16th, who wear scarlet with blue facings, are clad in blue, the 5th, 9th and 12th having scarlet facings and green, black and red plumes respectively, the 17th (famous as the ” death or glory boys ” and wearing a skull and crossbones badge)white facings and white plume, and the 21st light-blue facings and plume.

LANCELOT (Lancelot du Lac, or Lancelot of the Lake), a famous figure in the Arthurian cycle of romances. To the great majority of English readers the name of no knight of King Arthur’s court is so familiar as is that of Sir Lancelot. The mention of Arthur and the Round Table at once brings him to mind as the most valiant member of that brotherhood and the secret lover of the Queen. Lancelot, however, is not an original member of the cycle, and the development of his story is still a source of considerable perplexity to the critic.

Briefly summarized, the outline of his career, as given in the German Lanzekt and the French prose Lancelot, is as follows: Lancelot was the only child of King Ban of Benoic and his queen Helaine. While yet an infant, his father was driven from his kingdom, either by a revolt of his subjects, caused by his own harshness (Lanzelet), or by the action of his enemy Claudas de la Deserte (Lancelot). King and queen fly, carrying the child with them, and while the wife is tending her husband, who dies of a broken heart on his flight, the infant is carried off by a friendly water-fairy, the Lady of the Lake, who brings the boy up in her mysterious kingdom. In the German poem this is a veritable ” Isle of Maidens,” where no man ever enters, and where it is perpetual spring. In the prose Lancelot, on the other hand, the Lake is

but a mirage, and the Lady's court does not lack its complement of gallant knights; moreover the boy has the companionship of his cousins, Lionel and Bohort, who, like himself, have been driven from their kingdom by Claudas. When he r eaches the customary age (which appears to be fifteen), the young Lancelot, suitably equipped, is sent out into the world. In both versions his name and parentage are concealed, in the Lanzelet he is genuinely ignorant of both; here too his lack of all knightly accomplishments (not unnatural when we remember he has here been brought up entirely by women) and his inability to handle a steed are insisted upon. Here he rides forth in search of what adventure may bring. In the prose Lancelot his education is complete, he knows his name and parentage, though for some unexplained reason he keeps both secret, and he goes with a fitting escort and equipment to Arthur's court to demand knighthood. The subsequent adventures differ widely: in the Lanzelet he ultimately re- conquers his kingdom, and, with his wife Iblis, reigns over it in peace, both living to see their children's children, and dying on the same day, in good old fairy-tale fashion. In fact, the whole of the Lanzelet has much more the character of a fairy or folk-tale than that of a knightly romance.

In the prose version, Lancelot, from his first appearance at court, conceives a passion for the queen, who is very considerably his senior, his birth taking place some time after her marriage to Arthur. This infatuation colours all his later career. He frees her from imprisonment in the castle of Meleagant, who has carried her off against her will — (a similar adventure is related in Lanzelet, where the abductor is Valerin, and Lanzelet is not the rescuer) — and, although he recovers his kingdom from Claudas, he prefers to remain a simple knight of Arthur's court, bestowing the lands on his cousins and half-brother Hector. Tricked into a liaison with the Fisher King's daughter Elaine, he becomes the father of Galahad, the Grail winner, and, as a result of the queen's jealous anger at his relations with the lady, goes mad, and remains an exile from the court for some years. He takes part, fruitlessly, in the Grail quest, only being vouch- safed a fleeting glimpse of the sacred Vessel, which, however, is sufficient to cast him into unconsciousness, in which he remains for as many days as he has spent years in sin. Finally, his relations with Guenevere are revealed to Arthur by the sons of King Lot, Gawain, however, taking no part in the disclosure. Surprised together, Lancelot escapes, and the queen is condemned to be burnt alive. As the sentence is about to be carried into execution Lancelot and his kinsmen come to her rescue, but in the fight that ensues many of Arthur's knights, including three of Gawain's brothers, are slain. Thus converted into an enemy, Gawain

urges his uncle to make war on Lancelot, and there follows a desperate struggle between Arthur and the race of Ban. This is interrupted by the tidings of Mordred's treachery,

and Lancelot, taking no part in the last fatal conflict, outlives both king and queen, and the downfall of the Round Table. Finally, retiring to a hermitage, he ends his days in the odour of sanctity.

The process whereby the independent hero of the Lanzelet (who, though his mother is Arthur's sister, has but the slightest connexion with the British king), the faithful husband of Iblis, became converted into the principal ornament of Arthur's court, and the devoted lover of the queen, is by no means easy to follow, nor do other works of the cycle explain the trans- formation. In the pseudo-chronicles, the Hisioria of Geoffrey and the translations by Wace and Layamon, Lancelot does not appear at all; the queen's lover, whose guilty passion is fully returned, is Mordred. Chretien de Troyes' treatment of him is contradictory; in the Erec, his earliest extant poem, Lancelot's name appears as third on the list of the knights of Arthur's court. (It is well, however, to bear in mind the possibility of later addition or alteration in such lists.) In Cliges he again ranks as third, being overthrown by the he.ro of the poem. In Le Chevalier de la Charrette, however, which followed Cliges, we find Lancelot alike as leading knight of the court and lover of the queen, in fact, precisely in the position he occupies in the prose romance, where, indeed, the section dealing with this adventure is, as Gaston Paris clearly proved, an almost literal adaptation of Chretien's poem. The subject of the poem is the rescue of the queen from her abductor Meleagant; and what makes the matter more perplexing is that Chretien handles the situation as one with which his hearers are already familiar; it is Lancelot, and not Arthur or another, to whom the office of rescuer naturally belongs. After this it is surprising to find that in his next poem, Le Chevalier au Lion, Lancelot is once, and only once, casually referred to, and that in a passing refer- ence to his rescue of the queen. In the Perceval, Chretien's last work, he does not appear at all, and yet much of the action passes at Arthur's court.

In the continuations added at various times to Chretien's unfinished work the role assigned to Lancelot is equally modest. Among the fifteen knights selected by Arthur to accompany him to Chastel Orguellous he only ranks ninth. In the version of the Luite Tristran inserted by Gerbert in his Perceval, he is publicly overthrown and shamed by Tristan. Nowhere is he treated with anything approaching the importance assigned to him in the prose versions. Welsh tradition does not know him; early Italian records, which have preserved the

names of Arthur and Gawain, have no reference to Lancelot; among the group of Arthurian knights figured on the architrave of the north doorway of Modena cathedral (a work of the 12th century) he finds no place; the real cause for his apparently sudden and triumphant rise to popularity is extremely difficult to determine. What appears the most probable solution is that which regards Lancelot as the hero of an independent and widely diffused folk-tale, which, owing to certain special circumstances, was brought into contact with, and incorporated in, the Arthurian tradition. This much has been proved certain of the adventures recounted in the Lanzelet; the theft of an infant by a water-fairy; the appearance of the hero three consecutive days, in three different disguises, at a tournament; the rescue of a queen, or princess, from an Other- World prison, all belong to one well- known and widely-spread folk-tale, variants of which are found in almost every land, and of which numerous examples have been collected alike by M. Cosquin in his Contes Lorrains, and by Mr J. F. Campbell in his Tales of the West Highlands.

The story of the loves of Lancelot and Guenevere, as related by Chretien, has about it nothing spontaneous and genuine; in no way can it be compared with the story of Tristan and Iseult. It is the exposition of a relation governed by artificial and arbitrary rules, to which the principal actors in the drama must perforce conform. Chretien states that he composed the poem (which he left to be completed by Godefroi de Leigni) at the request of the countess Marie of Champagne, who provided him with matiere et san. Marie was the daughter of Louis VII. of France and of Eleanor of Aquitaine, subsequently wife of

Henry II. of Anjou and England. It is a matter of history that both mother and daughter were active agents in fostering that view of the social relations of the sexes which found its most famous expression in the ” Courts of Love,” and which was responsible for the dictum that love between husband and wife was impossible. The logical conclusion appears to be that the Charrette poem is a “Tendenz-Schrift,” composed under certain special conditions, in response to a special demand. The story of Tristan and Iseult, immensely popular as it was, was too genuine — (shall we say too crude?) — to satisfy the taste of the court for which Chretien was writing. Moreover, the Arthurian story was the popular story of the day, and Tristan did not belong to the magic circle, though he was ultimately introduced,

somewhat clumsily, it must be admitted, within its bounds. The Arthurian cycle must have its own love-tale; Guenevere, the leading lady of that cycle, could not be behind the courtly ladies of the day and lack a lover; one had to be found for her. Lancelot, already popular hero of a tale in which an adventure parallel to that of the Charrette figured prominently, was pressed into the service, Modred, Guenevere's earlier lover, being too unsympathetic a character; moreover, Modred was required for the final role of traitor.

But to whom is the story to be assigned? Here we must distinguish between the Lancelot proper and the Lancelot- Guenevere versions; so far as the latter are concerned, we cannot get behind the version of Chr6tien, — nowhere, prior to the composition of the Chevalier de la Charrette is there any evidence of the existence of such a story. Yet Chretien does not claim to have invented the situation. Did it spring from the fertile brain of some court lady, Marie, or another? The authorship of the Lancelot proper, on the other hand, is invariably ascribed to Walter Map (see Map), the chancellor of Henry II., but so also are the majority of the Arthurian prose Romances. The trend of modern critical opinion is towards accepting Map as the author of a Lancelot romance, which formed the basis for later developments, and there is a growing tendency to identify this hypothetical original Lancelot with the source of the German Lanzelet. The author, Ulrich von Zatzikhoven, tells us that he translated his poem from a French (welsches) book in the posses- sion of Hugo de Morville, one of the English hostages, who, in 1 194, replaced Richard Cceur de Lion in the prison of Leopold of Austria. Further evidence on the point is, unfortunately, not at present forthcoming. To the student of the original texts Lancelot is an infinitely less interesting hero than Gawain, Perceval or Tristan, each of whom possesses a well-marked personality, and is the centre of what we may call individual adventures. Saving and excepting the incident of his being stolen and brought up by a water-fairy (from a Lai relating which adventure the whole story probably started), there is absolutely nothing in Lancelot's character or career to distin- guish him from any other romantic hero of the period. The language of the prose Lancelot is good, easy and graceful, but the adventures lack originality and interest, and the situations repeat themselves in a most wearisome manner. English readers, who know the story only through the medium of Malory's noble prose and Tennyson's melodious verse, carry away an impression entirely foreign to that produced by a study of the origimal literature. The Lancelot story, in its rise and development, belongs exclusively to the later stage of Arthurian romance; it was a story for the court, not for the folk, and it lacks alike the dramatic force and

human appeal of the genuine “popular” tale.

The prose Lancelot was frequently printed ; J. C. Brunet chronicles editions of 1488, 1494, 1513, 1520 and 1533 — of this last date there are two, one published by Jehan Petit, the other by Philippe Lenoire, this last by far the better, being printed from a much fuller manuscript. There is no critical edition, and the only version available for the general reader is the modernized and abridged text published by Paulin Paris in vols. iii. to v. of Romans de la Table Rond’e. A Dutch verse translation of the 13th century was published by M. W. J. A. Jonckbloet in 1850, under the title of Roman van Lance- loet._ This only begins with what Paulin Paris terms the Agravain section, all the part previous to Guenevere’s rescue from Meleagant having been lost ; but the text is an excellent one, agreeing closely

with the Lenoire edition of 1533. The Books devoted by Malory to Lancelot are also drawn from this latter section of the romance; there is no sign that the English translator had any of the earlier part before him. Malory’s version of the Charrette adventure differs in many respects from any other extant form, and the source of this special section of his work is still a question of debate among scholars. The text at his disposal, especially in the Queste section, must have been closely akin to that used by the Dutch translator and the compiler of Lenoire, 1533. Unfortunately, Dr Sommer, in his study on the Sources of Malory, omitted to consult these texts, with the result that the sections dealing with Lancelot and Queste urgently require revision.

Bibliography. — Lanzelet (ed. Hahn, 1845, out of print and extremely difficult to obtain) . Chretien’s poem has been published by Professor Wendelin Foerster, in his edition of the works of that poet, Der Karrenritter (1899). A Dutch version of a short episodic poem, Lancelot et le cerf au pied blanc will be found in M. Jonckbloet’s volume, and a discussion of this and other Lancelot poems, by Gaston Paris, is contained in vol. xxx. of Histoire litteraire de la France. For critical studies on the subject cf . Gaston Paris’s articles in Romania, vols. x. and xii. ; Wechssler, Die verschiedenen Redak- tionen des Graal-Lancelot Cycklus; J. L. Weston, The Legend of Sir Lancelot du Lac (Grimm Library, vol. xii.) ; and The Three Days’ Tournament (Grimm Library, vol. xv.) an appendix to the previous vol. (J. L. W.)

LANCET (from Fr. lancette, dim. of lance, lance), the name given to a surgical instrument, with a narrow two-edged blade and a lance-shaped point, used for opening abscesses, &c. The term is applied, in architecture, to a form of the pointed arch, and to a window of which the head is a lancet-arch.

LANCEWOOD, a straight-grained, tough, light elastic wood obtained from the West Indies and Guiana. It is brought into commerce in the form of taper poles of about 20 ft. in length and from 6 to 8 in. in diameter at the thickest end. Lancewood is used by carriage-builders for shafts; but since the practice of employing curved shafts has come largely into use it is not in so great demand as formerly. The smaller wood is used for whip-handles, for the tops of fishing-rods, and for various minor purposes where even-grained elastic wood is a desideratum. The wood is obtained from two members of the natural order Anonaceae. The black lancewood or carisiri of Guiana (Guatteria virgata) grows to a height of 50 ft., is of remarkably slender form, and seldom yields wood more than 8 in. diameter. The yellow lancewood tree (Duguetia quitarensis, yari-yari, of Guiana) is of similar dimensions, found in tolerable abundance throughout Guiana, and used by the Indians for arrow-points, as well as for spars, beams, &c.

LAN-CHOW-FU, the chief town of the Chinese province of Kan-suh, and one of the most important cities of the interior part of the empire, on the right bank of the Hwang-ho. The population is estimated at 175,000. The houses, with very few exceptions, are built of wood, but the streets are paved with blocks of granite and marble. Silks, wood-carvings, silver and jade ornaments, tin and copper wares, fruits and tobacco are the chief articles of the local trade. Tobacco is very extensively cultivated in the vicinity.

LANCIANO (anc. Anxanum), a town and episcopal see of the Abruzzi, Italy, in the province of Chieti, situated on three hills, 984 ft. above sea-level, about 8 m. from the Adriatic coast and 12 m. S.E. of Chieti. Pop. (1901) 7642 (town), 18,316 (commune). It has a railway station on the coast railway, 19 m. S.E. of Castellammare Adriatico. It has broad, regular streets, and several fine buildings. The cathedral, an imposing structure with a fine clock-tower of 1619, is built upon bridges of brickwork, dating perhaps from the Roman period (though the inscription attributing the work to Diocletian is a forgery), that span the gorge of the Feltrino, and is dedicated to S. Maria del Ponte, Our Lady of the Bridge. The Gothic church of S. Maria Maggiore dates from 1227 and has a fine facade, with a portal of 13 17 by a local sculptor. The processional cross by the silversmith Nicola di Guardiagrele (1422) is very beautiful. In S. Nicola is a fine reliquary of 1445 by Nicola di Francavilla. The church of the Annunziata has a good rose window of 1362. The industries of the town, famous in the middle ages, have declined. Anxanum belonged originally to the tribe of the Frentani and later became a municipium. It lay on the ancient highroad,

which abandoned the coast at Ortona 10 m. to the N. and returned to it at Histonium (Vasto). Remains of a Roman theatre exist under the bishop’s palace.

SeeV. Bindi, Monumenli degli Abruzzi (Naples, 1889, 690 sqq.), and for discoveries in the neighbourhood see A. de Nino in Notizie degli scavi (1884), 431. (T. As.)

LANCRET, NICOLAS (1660-1743), French painter, was born in Paris on the 22nd of January 1660, and became a brilliant depicter of light comedy which reflected the tastes and manners of French society under the regent Orleans. His first master was Pierre d’Ulin, but his acquaintance with and admiration for Watteau induced him to leave d’Ulin for Gillot, whose pupil Watteau had been. Two pictures painted by Lancret and exhibited on the Place Dauphine had a great success, which laid the foundation of his fortune, and, it is said, estranged Watteau, who had been complimented as their author. Lancret’s work cannot now, however, be taken for that of Watteau, for both in drawing and in painting his touch, although intelligent, is dry, hard and wanting in that quality which distinguished his great model; these characteristics are due possibly in part to the fact that he had been for some time in training under an engraver. The number of his paintings (of which over eighty have been engraved) is immense; he executed a few portraits and attempted historical composition, but his favourite subjects were balls, fairs, village weddings, &c. The British Museum possesses an admirable series of studies by Lancret in red chalk, and the National Gallery, London, shows four paintings — the ” Four Ages of Man ” (engraved by Desplaces and PArmessin), cited by d’Argenville amongst the principal works of Lancret. In 1 7 19 he was received as Academician, and became councillor in 1735; in 1741 he married a grandchild of Boursault, author of Aesop at Court. He died on the 14th of September 1743.

See d’Argenville, Vies des peintres; and Ballot de Sovot, EJoge de M. Lancret (1743, new ed. 1874).

LAND, the general term for that part of the earth’s surface which is solid and dry as opposed to sea or water. The word is common to Teutonic languages, mainly in the same form and with essentially the same meaning. The Celtic cognate forms are Irish lann, Welsh llan, an enclosure, also in the sense of ” church,” and so of constant

occurrence in Welsh place-names, Cornish Ian and Breton lann, health, which has given the French lande, an expanse or tract of sandy waste ground. The ultimate root is unknown. From its primary meaning have developed naturally the various uses of the word, for a tract of ground or country viewed either as a political, geographical or ethnographical division of the earth, as property owned by the public or state or by a private individual, or as the rural as opposed to the urban or the cultivated as opposed to the built on part of the country; of particular' meanings may be mentioned that of a building divided into tenements or flats, the divisions being known as " houses," a Scottish usage, and also that of a division of a ploughed field marked by the irrigating channels, hence transferred to the smooth parts of the bore of a rifle between the grooves of the rifling.

For the physical geography of the land, as the solid portion of the earth's surface, see Geography. For land as the subject of cultivation see Agriculture and Soil, also.RECLAMATioNOFLAND. For the history of the holding or tenure of land see Village Com- munities and Feudalism; a particular form of land tenure is dealt with under Metayage. The article Agrarian Laws deals with the disposal of the public land (Ager publicus) in Ancient Rome, and further information with regard to the part played by the land question in Roman history will be found under Rome: § History. The legal side of the private ownership of land is treated under Real Property and Conveyancing (see also Landlord and Tenant, and Land Registration).

LANDAU, a town in the Bavarian Palatinate, on the Queich, lying under the eastern slope of the Hardt Mountains, 32 m. by rail S.W. from Mannheim, at the junction of lines to Neustadt an der Hardt, Weissenburg and Saarbriicken. Pop. (1905) 17,165. Among its buildings are the Gothic Evangelical church, dating from 1285; the chapel of St Catherine built in 1344; the church of the former Augustinian monastery, dating from 1405; and the Augustinian monastery itself, founded in 1276

and now converted into a brewery. There are manufactures of cigars, beer, hats, watches, furniture and machines, and a trade in wine, fruit and cereals. Large cattle-markets are held here. Landau was founded in 1224, becoming an imperial city fifty years later. This dignity was soon lost, as in 13 17 it passed to the bishopric of Spires and in 133 1 to the Palatinate, recovering its former position in 1511. Captured eight times during the Thirty Years' War the town was ceded to France by the treaty of Westphalia in 1648, although with certain ill-defined reserva- tions. In 1679 Louis XIV. definitely took possession of Landau. Its fortifications were greatly strengthened; nevertheless it was twice

taken by the Imperialists and twice recovered by the French during the Spanish Succession War. In 181 5 it was given to Austria and in the following year to Bavaria. The fortifications were finally dismantled in 187 1.

The town is commonly supposed to have given its name to the four-wheeled carriage, with an adjustable divided top for use either open or closed, known as a ” landau ” (Ger. Landauer). But this derivation is doubtful, the origin of the name being also ascribed to that of an English carriage-builder, Landow, who introduced this form of equipage.

See E. Heuser, Die Belagerungen von Landau in den Jahren 1702 und 1703 (Landau, 1894); Lehmann, Geschichte der ehemaligen freien Reichsstadt Landau (1851); and Jost, Interessante Daten aus der 600 jdhrigen Geschichte der Stadt Landau (Landau, 1879).

LANDECK, a town’ and spa in the Prussian province of Silesia, on the Biele, 73 m. by rail S. of Breslau and close to the Austrian frontier. Pop. (1905) 3,481. It is situated at an altitude of 1400 ft. It has manufactures of gloves. Landeck is visited by nearly 10,000 people annually on account of its warm sulphur baths, which have been known since the 13th century. In the neighbourhood are the ruins of the castle of Karpenstein.

See Langner, Bad Landeck (Glatz, 1872); Schiitze, Die Thermen von Landeck (Berlin, 1895); Wehse, Bad, Landeck (Breslau, 1886); Joseph, Die Thermen von Landeck (Berlin, 1887), and Patschovsky, Filhrer durch Bad Landeck und Umgebung (Schweidnitz, 1902).

LANDEN, JOHN (1719-1790), English mathematician, was born at Peakirk near Peterborough in Northamptonshire on the 23rd of January 1719, and died on the 15th of January 1790 at Milton in the same county. He lived a very retired life, and saw little or nothing of society; when he did mingle in it, his dogmatism and pugnacity caused him to be generally shunned. In 1762 he was appointed agent to the Earl Fitz- william, and held that office to within two years of his death. He was first known as a mathematician by his essays in the Ladies’ Diary for 1744. In 1766 he was elected a fellow of the Royal Society. He was well acquainted with the works of the mathematicians of his own time, and has been called the ” English d’Alembert.” In his Discourse on the ” Residual Analysis,” he proposes to avoid the metaphysical difficulties of the method of fluxions by a purely algebraical method. The idea may be compared with that of Joseph Louis Lagrange’s Calcul des Fonctions. His memoir (1775) on the

rotatory motion of a body contains (as the author was aware) conclusions at variance with those arrived at by Jean le Rond, d'Alembert and Leonhard Euler in their researches on the same subject. He reproduces and further develops and defends his own views in his Mathematical Memoirs, and in his paper in the Philosophical Transactions for 1785. But Landen's capital discovery is that of the theorem known by his name (obtained in its complete form in the memoir of 1775, and reproduced in the first volume of the Mathematical Memoirs) for the expression of the arc of an hyperbola in terms of two elliptic arcs. His researches on elliptic functions are of considerable elegance, but their great merit lies in the stimulating effect which they had on later mathematicians. He also snowed that the roots of a cubic equation can be derived by means of the infinitesimal calculus.

The list of his writings is as follows : — Ladies' Diary, various communications (1744-1760); papers in the Phil. Trans. (1754, 1760, 1768, 1771, 1775, I777 > 1785); Mathematical Lucubrations (1755); A Discourse concerning the Residual Analysis (1758); The Residual Analysis, book i. (1764); Animadversions on Dr Stewart's Method of computing the Sun's Distance from the Earth (1771) ; Mathematical Memoirs (1780, 1789).

LANDEN, a town in the province of Li6ge, Belgium, an im- portant junction for lines of railway from Limburg, Liege and Louvain. Pop. (1904) 2874. It is the birthplace of the first Pippin, distinguished as Pippin of Landen from his grandson Pippin of Herstal. In 1693 tn e French under Marshal Luxemburg defeated here the Anglo-Dutch army under William III. This battle is also called Neerwinden from a village 3 m. W. of Landen. Here in 1793 the Austrians under Frederick of Saxe-Coburg and Clerfayt defeated the French under Dumouriez.

LANDER, RICHARD LEMON (1804-1834) and JOHN (1807- 1839), English explorers of the Niger, were natives of Cornwall, sons of an innkeeper at Truro. At the age of eleven Richard went to the West Indies in the service of a merchant. Returning to England after an absence of three years he took service with various wealthy families, with whom he travelled on the continent. In 1823-1824 he accompanied Major (afterwards General Sir) W. M. Colebrooke, on a tour through Cape Colony. In 1825 Richard offered his services to Hugh Clapperton, then preparing for his second expedition to West

Africa. He was Clapperton's devoted servant and companion in this expedition, and on Clapperton's death near Sokoto in April 1827 Richard Lander, after visiting Kano and other parts of the Hausa states, returned to the Guinea coast through Yoruba bringing with him Clapper- ton's journal. To this on its publication (1829) was added The Journal of Richard Lander from Kano to the Coast, and in the next year Lander published another account of the expedi- tion entitled Records of Captain Clapperton's Last Expedition to Africa . . . with the subsequent Adventures of the Author. To this narrative he prefixed an autobiographical note. Richard Lander, though without any scientific attainments, had ex- hibited such capacity for exploration that the British government decided to send him out to determine the course of the lower Niger. In the expedition he was accompanied by his brother John, by trade a printer, and better educated than Richard, who went as an unsalaried volunteer. Leaving England in January 1830, the brothers landed at Badagry on the Guinea coast on the 22nd of March. They then travelled by the route previously taken by Clapperton to Bussa on the right bank of the Niger, reached on the 17th of June. Thence they ascended the river for about 100 m. Going back to Bussa the travellers began, on the 20th of September, the descent of the river, not knowing whither it would lead them. They journeyed in canoes accom- panied by a few negroes, their only scientific instrument a common compass. They discovered the Benue river, ascertaining when passing its confluence, by paddling against its stream, that their course was not in that direction. At the beginning of the delta they were captured by the Ibos, from whom they were ransomed by " King Boy " of Brass Town; by him they were taken to the Nun mouth of the river, whence a passage was obtained to Fernando Po, reached on the 1st of December. The Landers were thus able to lay down with approximate correctness the lower course of the Niger — a matter till then as much in dispute as was the question of the Nile sources. In the attack by the Ibos the Landers lost many of their records, but they published a narrative of their discoveries in 1832, in three small volumes — Journal of an Expedition to Explore the Course and Termination of the Niger. In recognition of his services the Royal Geographical Society — formed two years previously — granted Richard Lander in 1832 the royal medal, he being the first recipient of such an award. In the same year Richard went to Africa again as leader of an expedition organized by Macgregor Laird and other Liverpool merchants to open up trade on the Niger and to found a commercial settlement at the junction of the Benue with the main stream. The expedition encountered many difficulties, suffered great mortality from fever, and was not able to reach Bussa. Lander made several journeys up and down stream, and while going up the river in

a canoe was attacked by the natives on the 20th of January 1834 at a spot about 84 m. above the Nun mouth, and wounded by a musket ball in the thigh. He was removed to Fernando Po, where he died on the 6th of February. John Lander, who on his return to England in 1 83 1 obtained a situation at the London customs house,

died on the 16th of November 1839 of a disease contracted in Africa.

See, besides the books mentioned, the Narrative of the Niger expedition of 1 832-1 834, published in 1837 by Macgregor Laird and R. A. K. Oldfield.

LANDES, a department in the south-west of France, formed in 1790 of portions of the ancient provinces of Guyenne (Landes, Condomios Chalosse),' Gascony and Beam, and bounded N. by Gironde, E. by Lot- et- Garonne and Gers, S. by Basses Pyrenees, and W. (for 68 m.) by the Bay of Biscay. Pop. (1906) 293,397. Its area, 3615 sq. m., is second only to that of the department of Gironde. The department takes its name from the Landes, which occupy three-quarters of its surface, or practically the whole region north of the Adour, the chief river of the depart- ment. They are separated from the sea by a belt of dunes fringed on the east by a chain of lakes. South of the Adour lies the Chalosse — a hilly region, intersected by the Gabas, Luy and Gave de Pau, left-hand tributaries of the Adour, which descend from the Pyrenees. On the right the Adour is joined by the Midouze, formed by the junction of the Douze and the Midou. The climate of Landes is the Girondine, which prevails from the Loire to the Pyrenees. Snow is almost unknown, the spring is rainy, the summer warm and stormy. The prevailing wind is the south-west, and the mean temperature of the year is 53° F., the thermometer hardly ever rising above 82° or falling below 14°. The annual rainfall in the south of the department in the neigh- bourhood of the sea reaches 55 in., but diminishes by more than half towards the north-east.

The fertility of La Chalosse is counterbalanced by the com- parative poorness of the soil of the Landes, and small though the population is, the department does not produce wheat enough for its own consumption. The chief cereal is maize; next in importance are rye, wheat and millet. Of vegetables, the bean is most cultivated. The vine is grown in the Chalosse, sheep are numerous, and the " Landes " breed of horses is well known. Forests, chiefly composed of pines, occupy more than half the department, and their exploitation forms the chief industry. The resin of the maritime pine furnishes by distillation essence of turpentine, and from the residue are obtained various qualities of resin, which serve to make varnish, tapers, sealing-

wax and lubricants. Tar, and an excellent charcoal for smelting purposes, are also obtained from the pine-wood. The depart- ment has several mineral springs, the most important being those of Dax, which were frequented in the time of the Romans, and of Eugenie-les-Bains and Prechacq. The cultivation of the cork tree is also important. There are salt- workings and stone quarries. There are several iron-works in the department; those at Le Boucau, at the mouth of the Adour, are the most important. There are also saw-mill's, distilleries, flour-mills, brick and tile works and potteries. Exports include resinous products, pine-timber, metal, brandy; leading imports are grain, coal, iron, millinery and furniture. In its long extent of coast the department has no considerable port. Opposite Cape Breton, however, where the Adour formerly entered the sea, there is, close to land, a deep channel where there is safe anchorage. It was from this once important harbour of Capbreton that the discoverers of the Canadian island of that name set out. Landes includes three arrondissements (Mont-de-Marsan, Dax and St Sever), 28 cantons and 334 communes.

Mont-de-Marsan is the capital of the department, which comes within the circumscription of the appeal court of Pau, the academie (educational division) of Bordeaux and the archbishopric of Auch, and forms part of the region of the 18th army corps. It is served by the Southern railway; there is some navigation on the Adour, but that upon the other rivers is of little importance. Mont-de-Marsan, Dax, St Sever and Aire-sur-PAdour, the most noteworthy towns, receive separate notice. Hagetmau has a church built over a Romanesque crypt, the roof of which is supported on columns with elaborately-carved capitals. Sorde has an interesting abbey-church of the 13th and 14th centuries.

LANDES, an extensive natural region of south-western France, known more strictly as the Landes de Gascogne. It has an area

of 5400 sq. m., and occupies three-quarters of the department of Landes, half of that of Gironde, and some 175,000 acres of Lot-et-Garonne. The Landes, formerly a vast tract of moorland and marsh, now consist chiefly of fields and forests of pines. They form a plateau, shaped like a triangle, the base of which is the Atlantic coast while the apex is situated slightly west of Nerac (Lot-et-Garonne). Its limits are, on the S. the river Adour; on the E. the hills of Armagnac, Eauzan, Condomois, Agenais and Bazadais; and on the N.E. the Garonne, the

hills of Medoc and the Gironde. The height of the plateau ranges in general from 130 to 260 ft.; the highest altitude (498 ft.) is found in the east near Baudignan (department of Landes), from which point there is a gradual slope towards north, south, east and west. The soil is naturally sterile. It is composed of fine sand resting on a subsoil of tufa (alios) impermeable by water; for three- quarters of the year, consequently, the waters, settling on the almost level surface and unable to filter through, used to trans- form the country into unwholesome swamps, which the Landesats could only traverse on stilts. About the middle of the 18th century an engineer, Francois Chambrelent, instituted a scheme of draining and planting to remedy these evils. As a result about 1600 m. of ditches have been dug which carry off superficial water either to streams or to the lakes which fringe the landes on the west, and over 1,600,000 acres have been planted with maritime pines and oaks. The coast, for a breadth of about 4 m., and over an area of about 225,000 acres, is bordered by dunes, in ranges parallel to the shore, and from 100 to 300 ft. in height. Driven by the west wind, which is most frequent in these parts, the dunes were slowly advancing year by year towards the east, burying the cultivated lands and even the houses. Nicolas Thomas Bremontier, towards the end of the 18th century, devised the plan of arresting this scourge by plant- ing the dunes with maritime pines. Upwards of 210,000 acres have been thus treated. In the south-west, cork trees take the place of the pines. To prevent the formation of fresh dunes, a “dune littorale” has been formed by means of a palisade. This barrier, from 20 to 30 ft. high, presents an obstacle which the sand cannot cross. On the eastern side of the dunes is a series of lakes (Hourtin et Carcans, Lacanau, Cazau or Sanguinet, Biscarrosse, Aureilhan, St Julien, Leon and Soustons) separated from the sea by the heaping up of the sand. The salt water has escaped by defiltration, and they are now quite fresh. The Basin of Arcachon, which lies midway between the lakes of Lacanau and Cazau, still communicates with the ocean, the current of the Leyre which flows into it having sufficient force to keep a passage open.

LANDESHUT, a town in the Prussian province of Silesia, at the north foot of the Riesengebirge, and on the river Bober, ■65 m. S.W. of Breslau by rail. Pop. (1905) 9000. Its main industries are flax-spinning, linen-weaving and manufactures of cloth, shoes and beer. The town dates from the 13th century, being originally a fortress built for protection against the Bohemians. There the Prussians defeated the Austrians in May 1745, and in June 1760 the Prussians were routed by a greatly superior force of Austrians.

See Perschke, Beschreibung und Geschichte der Stadt Landeshut

(Breslau, 1829).

LANDGRAVE (Ger. Landgraf, from Land, ” a country” and Graf, “count”), a German title of nobility surviving from the times of the Holy Roman Empire. It originally signified a count of more than usual power or dignity, and in some cases implied sovereignty. The title is now rare; it is borne by the former sovereign of Hesse-Homburg, now incorporated in Prussia, the heads of the various branches of the house of Hesse, and by a branch of the family of Furstenberg. In other cases the title of landgrave is borne by German sovereigns as a subsidiary title; e.g. the grand-duke of Saxe-Weimar is landgrave of Thuringia.

LANDLORD AND TENANT. In Roman Law, the relationship of landlord and tenant arose from the contract of letting and hiring (localio conductio), and existed also with special incidents, under the forms of tenure known as emphyteusis — the long lease of Roman law — and precarium, or tenancy at will (see Roman Law).

Leases.

Law of England. — The law of England — and the laws of Scotland and Ireland agree with it on this point — recognizes no absolute private ownership of land. The absolute and ultimate owner of all land is the crown, and the highest interest that a subject can hold therein — viz. an estate in fee simple — is only a tenancy. But this aspect of the law, under which the landlord, other than the crown, is himself always a tenant, falls beyond the scope of the present article, which is restricted to those holdings that arise from the hiring and leasing of land.

The legal relationship of landlord and tenant is constituted by a lease, or an agreement for a lease, by assignment, by attorn- ment and by estoppel. And first of a lease and an agreement for a lease. All kinds of interests and property, whether corporeal, such as lands or buildings, or incorporeal, such as rights of common or of way, may be let. The Benefices Act 1898, however, now prohibits the grant of a lease of an advowson. Titles of honour, offices of trust or relating to the administration of justice, and pensions granted by the crown for military services are also inalienable. Generally speaking, any person may grant or take a lease. But there are a number of common-law and statutory qualifications and exceptions. A lease by or to an infant is voidable at his option. But extensive powers of leasing the property of infants have been created by the Settled Estates Act 1877 and the Settled Land Act 1882. A person of unsound mind can grant or take a lease if he is capable of contracting. Leases may be made on behalf of

lunatics subject to the jurisdiction in lunacy under the pro- visions of the Lunacy Act 1890 and the Settled Land Act 1882. A married woman can lease her “separate property” apart from or under the Married Women’s Property Acts, as if she were a single woman (feme sole). As regards other property, the concurrence of her husband is generally necessary. An alien was, at common law, incapable of being either a lessor or a lessee. But this disqualification is removed by the Naturaliza- tion Act 1870. The right to deal with the property of a convict while he is undergoing sentence (but not while he is out of prison on leave) is, by the Forfeiture Act 1870, vested in his admini- strator. Leases by or to corporations must be by deed under their common seal, and the leasing powers of ecclesiastical corporations in particular are subject to complicated statutory restrictions which cannot here be examined (see Phillimore, Eccl. Law, 2nd ed., p. 1281). Powers of granting building and other leases have been conferred by modern legislation on muni- cipal corporations and other local authorites.

A person having an interest in land can, in general, create a valid interest only to the extent of that interest. Thus a tenant for years, or even from year to year only, may stand in his turn as landlord to another tenant. If he profess, however, to create a tenancy for a period longer than that to which his own interest extends, he does not thereby give to his tenant an interest available against the reversioner or remainder man. The subtenant’s interest will expire with the interest of the person who created it. But as between the subtenant and his immediate lessor the subtenancy will be good, and should the interest of the lessor become greater than it was when the subtenancy was created the subtenant will have the benefit of it. On his side, again, the subtenant, by accepting that position, is estopped from denying that his lessor’s title (whatever it be) is good. There are also special rules of law with reference to leases by persons having only a limited interest in the property leased, e.g. a tenant for life under the Settled Land Acts, or a mortgagor or mortgagee.

The Letting. — To constitute the relationship of landlord and tenant in the mode under consideration, it is necessary not only that there should be parties capable of entering into the contract, but that there should be a letting, as distinct from a mere agreement to let, and that the right conveyed should be a right to the exclusive possession of the subject of the letting and not a simple licence to use it. Whether a particular instru- ment is a lease, or an agreement for a lease, or a bare licence, is a question the answer to which depends to a large extent on the circumstances of individual cases; and the only general rule

is that in a lease there must be an expression of intention on the part of the lessor to convey, and of the lessee to accept, the exclusive possession of the thing let for the prescribed term and on the prescribed conditions. The landlord must not part with the whole of his interest, since, if he does so, the instrument is not a lease but an assignment. Where a tenant enters under an agreement for a lease and pays rent, the agreement will be regarded as a lease from year to year; and if the agreement is one of which specific performance would be decreed (i.e. if it contains a complete contract between the parties and satisfies the provisions — to be noted immediately — of the Statute of Frauds, and if, in all the circumstances, its enforcement is just and equitable), the lessee is treated as having a lease for the term fixed in the agreement from the time that he took possession under it, just as if a valid lease had been executed. At common lav/ a lease for a term of years (other than a lease by a corporation) might be made by parol. But under the Statute of Frauds (1677), ss., 1, 2) leases, except those the term of which does not exceed three years, and in which the reserved rent is equal to two-thirds at least of the improved value of the premises, were required to be in writing signed by the parties or their lawfully authorized agents; and, under the Real Property Act 1845, a lease required by law to be in writing is void unless made by deed. The Statute of Frauds also prohibits an action from being brought upon any agreement for a lease, for any term, unless such agreement is in writing and signed by the party to be charged therewith or by some agent lawfully authorized by him.

Forms of Tenancy. — The following are the principal forms of tenancy: (i.) Tenancy for Life. — A lease for life must be made by deed, and the term may be the life of the lessee and the life or lives of some other person or persons, and in the latter case either for their joint lives or for the life of the survivor; also for the lives of the lessee himself and of some other person or persons, and this consti- tutes a single estate. A tenant for life under a settlement has extensive powers of leasing under the Settled Land Act 1882. He may lease the settled land, or any part of it, for any time not ex- ceeding (a) in the case of a building lease, 99 years ; (b) in the case of a mining lease, 60 years, (c) in the case of any other lease, 21 years. He may also grant either a lease of the surface of settled land, re- serving the mines and minerals, or a lease of the minerals without the surface. A lease under the Settled Land Act 1882 must be by deed and must be made to take effect in possession not later than 12 months after its date ; the best

rent that can reasonably be obtained must be reserved and the lease must contain a covenant by the lessee for payment of the rent, and a condition of re-entry on non- payment within a specified time not exceeding 30 days, (ii.) Tenancy for Years, i.e. for a term of years. — This tenancy is created by an express contract between the parties and never by implication, as in the case of tenancy from year to year and tenancy at will. Here the tenancy ends on the expiry of the prescribed term, without notice to quit or any other formality, (iii.) Tenancy from Year to Year. — This tenancy may be created by express agreement between the parties, or by implication as, e.g. where a person enters and pays rent under a lease for years, void either by law or by statute, or without any actual lease or agreement, or holds over after the determination of a lease whether for years or otherwise. In the absence of express agreement or custom or statutory provision (such as is made by the Agricultural Holdings Act 1883), a tenancy from year to year is determinable on half a year's notice expiring at the end of some current year of the tenancy. Where there is no express stipulation creating a yearly tenancy, if the parties have contracted that the tenant may be dispossessed by a notice given at any time, effect will be given to this provision. The common law doctrine of a six months' notice being required to terminate a tenancy from year to year of a corporeal hereditament, does not apply to an incorporeal hereditament such as a right to shoot, (iv.) Tenancies for Shorter Periods. — Closely associated with tenancies from year to year are various other tenancies for shorter periods than a year — weekly, monthly or quarterly. Questions of considerable importance frequently arise as to the notice necessary to terminate tenancies of this character. The issue is one of fact; the date at which the rent is payable is a material circumstance, but it may be said generally that a week's notice should be given to determine a weekly tenancy, a month's to determine a monthly tenancy, and a quarter's to determine a quarterly tenancy. It is chiefly in connexion with the letting of lodgings, flats, &c, that tenancies of this class arise (see Flats, Lodger and Lodgings), (v.) Tenancy at Will. — A tenancy at will is one which endures at the will of the parties only, i.e. at the will of both, for if a demise be made to hold at the will of the lessor, the law implies that it is at the will of the lessee also and vice versa. Any signification of a desire to terminate the tenancy, whether expressed as " notice " or not, will bring it to an end. This form of tenancy, like tenancy from year to year, may be treated either by

express contract or by implication, as where premises are occupied with the consent of the owner, but without any express or implied agreement as to the duration of the tenancy, or where a house is lent

rent free by one person to another. A tenancy at will is determined by either party alienating his interest as soon as such alienation comes to the knowledge of the other, (vi.) Tenancy at Sufferance. — A tenant who comes into possession by a lawful demise, but ” holds over ” or continues in possession after his estate is ended, is said to be a ” tenant at sufferance.” Properly speaking, tenancy at sufferance is not a tenancy at all, inasmuch as if the landlord acquiesces in it, it becomes a tenancy at will; and it is to be regarded merely as a legal fiction which prevented the rightful owner from treating the tenant as a trespasser until he had himself made an actual entry on or had brought an action to recover the land. The Distress for Rent Act 1737, however, enables a landlord to recover double rent from a tenant who holds over after having himself given notice to quit; while another statute in the reign of George II. — the Land- lord and Tenant Act 1730 — makes a tenant who holds over after receiving a notice from his landlord liable to the extent of double the value of the premises. There is no tenancy by sufferance against the crown.

Form of a Lease. — The component parts of a lease are the parties, the recitals (when necessary) setting out such matters as the title of the lessor; the demise or actual letting (the word ” demise ” is ordinarily used, but any term indicating an express intention to make a present letting is sufficient); the parcels in which the extent of the premises demised is stated; the habendum (which defines the commencement and the term of the . lease), the reddendum or reservation of rent, and the covenants and conditions. The Conveyancing Act 1881 provides that, as regards conveyances subsequent to 1881, unless a contrary intention is expressed, a lease of ” land ” is to be deemed to include, all buildings, fixtures, easements, &c, appertaining to it; and, if there are houses or other buildings on the land demised, all out-houses, erections, &c, are to pass with the lease of the land. Rights which the landlord desires to retain over the lands let are excepted or reserved. Sporting rights will pass to the lessee unless reserved (see Game Laws). A grant or reservation of mines in general terms confers, or reserves, a right to work the mines, subject to the obligation of leaving a reasonable support to the surface as it exists at the time of the grant or reservation. It is not necessary that a lease should be dated. In the absence of a date, it will take effect from the day of delivery.

Covenants in Leases. — These may be roughly divided into four

groups: (i.) Implied Covenants. — A covenant is said to be implied

when it is raised by implication of law without any express provision

being made for it in the lease. Thus a lessee is under an implied obligation to treat the premises demised in a tenant-like or ” husband-like ” manner, and again, where in a lease by deed the word ” demise ” is used, the lessor probably covenants impliedly for his own title and for the quiet enjoyment of the premises by the lessee, (ii.) ” Usual ” Covenants. — Where an agreement for a lease specifies only such essential conditions as the payment of rent, and either mentions no other terms, or provides that the lease shall contain the ” usual ” covenants, the parties are entitled to have inserted in the lease made in pursuance of the agreement such other provisions as are ” usual ” in leases of property of the same character, and in the same district, not being provisions tending to abridge or qualify the legal incidents of the estate intended to be granted to the lessee. The question what covenants are ” usual ” is a question of fact. A covenant by the lessor, limited to his own acts and those of persons claiming under or through him, for the “quiet enjoyment” by the lessee of the demised premises, and covenants by the lessee to pay rent, to pay taxes, except such as fall upon the landlord, to keep the premises in repair, and to allow the landlord to enter and view the condition of the premises may be taken as typical instances of ” usual ” covenants. Covenants by the lessee to build and repair, not to assign or underlet without license, or to insure, or not to carry on a particular trade on the premises leased, have been held not to be ” usual.” Where the agreement provides for the insertion in the

lease of ” proper ” covenants, such covenants only are pointed at as are calculated to secure the full effect of the contract, and a covenant against assignment or under-letting would not ordinarily be included. (iii.) The Covenants running with the Land. — A covenant is said to ” run with the land ” when the rights and duties which it creates are not merely personal to the immediate parties (in which case a covenant is said to be ” collateral “), but pass also to their assignees. At common law, it was said that covenants ” ran with the land ” but not with the reversion, the assignee of the reversion not having the rights of the original lessor. But the assignees of both parties were placed on the same footing by a statute of Henry VIII. (1540). A covenant ” runs with the land ” if it relates either to a thing in esse,

which is part and parcel of the demise, e.g. the payment of rent, the repair of houses or fixtures or machinery already built or set up, or to a thing not in esse at the time of the demise, but touching the land, provided that the word ” assigns ” is used in the covenant. All implied covenants run with the land. As instances of ” collateral ” covenants, we may take a covenant by a lessor to give the lessee a right of pre-emption over a piece of land adjoining the subject of the demise, or in the case of a lease of a beer-shop, not to keep any similar shop within a prescribed distance from the premises demised, or a covenant by a lessee to pay rates on premises not demised. A covenant not to assign without the lessor’s assent runs “with the land and applies to a re-assignment to the original lessee, (iv.) Restrictive Covenants. — These may be subdivided into two classes — covenants not to assign or underlet without the lessor’s consent (it may be noted that such consent must be applied for even if, under the covenant, it cannot be withheld) ; and covenants in restraint of trade, e.g. not to use the demised premises for certain trading purposes, and in the case of ” tied houses ” a covenant by the lessees to purchase all beer required from the lessors.

In addition a lease frequently contains covenants for renewal of the lease at the option of the lessee, and for repairs or insurance against damage by fire by the lessee. Leases frequently contain a covenant by the lessee to bear and pay rates, taxes, assessments and other ” impositions ” or ” charges,” or ” duties ” or ” outgoings,” or ” burdens ” (except property tax) imposed upon the demised premises during the term. Considerable difficulty has arisen as to the scope of the terms ” impositions,” ” charges,” ” duties,” ” outgoings,” ” burdens.” The words, ” rates, taxes, assessments ” point to payments of a periodical or recurring character. Are the latter words in such covenants limited to payments of this kind, or do they include single and definite payments demanded, for example, by a local authority, acting under statutory powers, for improvements of a permanent kind affecting the premises demised? The decisions on the point are numerous and difficult to reconcile, but the main test is whether, on the true construction of the particular covenant, the lessee has undertaken to indemnify the landlord against payments of all kinds. The stronger current of modern authority is in favour of the landlords and not in favour of restricting the meaning of cove- nants of this class. It may be added that, if a lessee covenants to pay rates and taxes, no demand by the collector apparently is necessary to constitute a breach of the covenant; where a rate is duly made and published it is the duty of the parties assessed to seek out the collector and pay it.

Mutual Rights and Liabilities of Landlord and Tenant. — These are to a large extent regulated by the covenants of the lease, (i.) The landlord generally covenants — and, in the absence of such a proviso, a covenant will be implied from the fact of letting —that the tenant shall have quiet enjoyment of the premises for the time agreed upo,n. This obligation makes the landlord responsible for any lawful eviction of the tenant during the term, but not for wrongful eviction unless he is himself the wrong- doer or has expressly made himself responsible for evictions of all kinds. It may be noted here that at common law no lease for years is complete till actual entry has been made by the lessee. Till then, he has only a right of entry or interesse termini, (ii.) The tenant, on his part, is presumed to under- take to use the property in a reasonable manner, according to the purposes for which it was let, and to do reasonable repairs. Repairs. ˆ landlord is not presumed to have undertaken to put the premises in repair, nor to execute repairs. But the respective obligations of parties where repairs are, as they always are in leases for years, the subject of express covenant, may vary indefinitely. The obligation is generally imposed upon the tenant to keep the premises in ” good condition ” or ” tenantable repair.” The amount and quality of the repairs necessary to fulfil the

covenant are always relative to the age, class and condition of the premises at the time of the lease. A tenant is not responsible, under such a covenant, for deterioration due to diminution in value caused by lapse of time or by the elements. Where there is an unqualified covenant to repair, and the premises during the tenancy are burnt down, or destroyed by some other inevitable calamity, the tenant is bound to rebuild and restore them at his own expense, even although the landlord has taken out a policy on his own account and been paid by the insurance company in respect of it. A covenant to keep in repair requires the tenant to put the premises in repair if they are out of it, and to maintain them in that condition up to and at the end of the tenancy. A breach of the covenant to repair gives the landlord an action for damages which will be measured by the estimated injury to the reversion if the action be brought

during the tenancy, and by the sum necessary to execute the repairs, if the action be brought later, (iii.) The improper user of the premises to the ihjury of the reversioner is waste (q.v.). (iv.) Covenants by the tenants to insure the premises and keep them insured are also common; and if the premises are left uninsured for the smallest portion of the term, though there is no damage by fire, the covenant is broken, (v.) Covenants to bear and pay rates and taxes have been discussed above, (vi.) As to the tenant's obligation to pay rent, see Rent.

Assignment, Attornment, Estoppel. — The relationship of land- lord and tenant may be altered either voluntarily, by the act of the parties, or involuntarily, by the operation of law, and may also be dissolved. The principal mode of voluntary altera- tion is an assignment either by the tenant of his term or by the landlord of his reversion. An assignment which creates the relationship of landlord and tenant between the lessor or lessee and the assignee, must be by deed, but the acceptance by a landlord of rent from a tenant under an invalid assignment may create an implied tenancy from year to year; and similarly payment of rent by a tenant may amount to an acknowledgment of his landlord's title. This is one form of tenancy by estoppel. The principle of all tenancies of this kind is that something has been done by the party estopped, amounting to an admission which he cannot be allowed to contradict. " Attornment," or the agreement by a tenant to become tenant to a new land- lord, is a term now often used to indicate an acknowledgment of the existence of the relationship of landlord and tenant. It may be noted that it is still common to insert in mortgage deeds what is called an " attornment clause," by which the mortgagor "attorns" tenant to the mortgagee, and the latter thereupon acquires a power of distress as an additional

security. If the lands assigned are situated in Middlesex or Yorkshire, the assign- ment should be registered under the Middlesex Registry or Yorkshire Registries Acts, as the case may be; and similar provision is now made for the registration by an assignee of his title under the Land Transfer Acts 1875 and 1897.

Underlease. — Another form of alteration in a contract of tenancy is an under-lease, which differs from assignment in this — that the lessor parts with a portion of his estate instead of, as in assignment, with the whole of it. There is no privity of contract between an underlessee and the superior landlord, but the latter can enforce against the former restrictive covenants of which he had notice; it is the duty of the underlessee to inform himself as to the covenants of the original lease, and, if he enters and takes possession, he will be considered to have had full notice of, and will be bound by, these covenants.

Bankruptcy, Death. — The contract of tenancy may also be altered by operation of law. If a tenant become bankrupt, his interest passes to his trustee in bankruptcy — unless, as is frequently the case, the lease makes the occurrence of that 1 contingency determine the lease. So, on the death of a tenant, his interest passes to his legal representatives.

Dissolution oj Tenancy. — Tenancy is dissolved by the expiry of the term for which it was created, or by forfeiture of the tenant's interest on the ground of the breach of some condition by the tenant and re-entry by the landlord. A breach of condition may, however, be waived by the landlord, and the legislature has made provision for the relief of the tenant from the conse- quences of such breaches in certain cases. Relief from forfeiture and rights of re-entry are now regulated chiefly by the Convey- ancing Acts 1881 and 1882. Under these acts a right of re- entry or forfeiture is not to be enforceable unless and until the lessor has served on the lessee a written notice specifying the breach of covenant or condition complained of, and requiring him to remedy it or make compensation, and this demand has not within a reasonable time been complied with; and when a lessor is proceeding to enforce such a right the court may, if it think fit, grant relief to the lessee. A forfeiture is also waived if the landlord elects not to take advantage of it — and shows his election either expressly or impliedly by some act, which acknowledges the continuance of the tenancy, e.g. by the accept- ance of, or even by an absolute and unqualified demand for,

rent, which has accrued due since the forfeiture, by bringing an action for such rent, or by distraining for rent whether due before or after the forfeiture.

A tenancy may also be determined by merger, i.e. where a greater and a less estate coincide and meet in one and the same person, without any intermediate estate, as, for instance, when a tenant for years obtains the fee simple. There may also be a surrender, either voluntary or by operation of law, which will determine a tenancy, as, for example, when a tenant is party to some act, the validity of which he is legally estopped from denying and which would not have been valid had the tenancy continued to exist.

The land, on the expiration of the tenancy, becomes at common law the absolute property of the landlord, no matter how it may have been altered or improved during the occupation. In certain cases, however, the law has discriminated between the contending claims of landlord and tenant, (i) In respect of fixtures (which may be shortly defined as movables so affixed to the soil as to become part thereof), the tenant may sometimes remove them, e.g. when they have been brought on the premises for the purpose of being used in business (see Fixtures). (2) In respect of emblements, i.e. the profits of sown land, a tenant may be entitled to these whose term comes to an end by the happening of an uncertain contingency (see Emblements). (3) A similar right is very generally recognized by custom in tenants whose term expires in the ordinary way. The custom of the district, in the absence of stipulations between the parties, would be imported into their contract — the tenant going out on the same conditions as he came in. Such customary tenant right only arises at the expiration of the lease, and on the sub- stantial performance of the covenants; and is forfeited if the tenant abandons his tenancy during the term. Tenant right is assignable, and will pass under an assignment of “all the estate and interest” of the outgoing tenant in the farm. But, with the exceptions noted, the land in its improved condition passes over at common law to the landlord. The tenant may have added to its value by buildings, by labour applied to the land, or by the use of fertilizing manures, but, whatever be the amount of the additional value, he is not entitled to any compensation whatever. This again is a matter which the parties may, if they please, regulate for themselves.

Theiaw as to Ejectment is dealt with under that heading.

Statutory Provisions. — Reference may be made, in conclusion, to a

few modern statutes which have affected the law of landlord and tenant. The Agricultural Holdings Act 1908 (which repeals the Agricultural Holdings Acts of 1883, 1900 and 1906) gives to the agri- cultural tenant a right to compensation for (i.) certain specified improvements made by him with the landlord's previous consent in writing; and (ii.) certain other classes of improvements although the landlord's consent has not been obtained. As examples of class (i.) may be mentioned — erection or enlargement of buildings, laying down of permanent pasture, making of gardens or fences, planting of hops, embankments and sluices; as examples of (ii.) — chalking of land, clay burning, application to land of purchased artificial or purchased manure, except they have been made for the purpose of making provision to protect the holding from injury or deterioration. In the case of proposed drainage improvements, notice in writing must be given to the landlord, who may then execute the improve- ments himself and charge the tenant with interest not exceeding 5 % per annum on the outlay, or such annual instalments, payable for a period of twenty-five years, and recoverable as rent, as will repay the outlay, with interest at the rate of 3 % a year. Under s. 1 1 of the act a tenant is entitled to compensation for disturbance, when he is compelled to quit without good and sufficient cause, and for reasons inconsistent with good estate management. An agri- cultural tenant may not contract himself out of his statutory right to compensation, but " contracting out " is apparently not pro- hibited with regard to the right given him by the acts of 1883 and 1900 to remove fixtures which he has erected and for which he is not otherwise entitled to compensation, after reasonable notice to the landlord, unless the latter elects to purchase such fixtures at a valuation. The Agricultural Holdings Act 1906 conferred upon every tenant (with slight exceptions) entire freedom of cropping and of disposal of produce, notwithstanding any custom of the county or explicit agreement to the contrary. (See further the articles Ejectment, Fixtures, Rent.) The Small Holdings and Allotments Act 1908, which repealed previous acts of 1887, 1890 and 1907, deals, on terms similar to those of the Agricultural Holdings Act 1908, with small holdings and allotments Cthe expression " small holding "

meaning an agricultural holding which exceeds one acre, and either does not exceed fifty acres, or, if exceeding fifty acres, is at the date of sale or letting of an annual value for the purposes of income tax not exceeding fifty pounds; the expression " allotment " includes a field garden). Section 47 of the act gives the tenant the same rights to compensation as if his holding had been a holding under the Agricultural Holdings Act 1908 {vide supra). Compensa- tion was

given to market gardeners for unexhausted improvements by the Market Gardeners' Compensation Act 1895 and by the Agricultural Holdings Act 1906 for improvements effected before the commencement of that act on a holding cultivated to the know- ledge of the landlord as a market garden, if the landlord had not dissented in writing to the improvements. The important sections of these acts were incorporated in the Agricultural Holdings Act 1908, s. 42.

Scots Law. — The original lease in Scots law took the form of a grant by the proprietor or lessor. But, with advancing civiliza- tion and the consequent increase in the number of the conditions to be imposed on both parties, leases became mutual contracts, bilateral in form. The law of Scotland as to landlord and tenant may be considered under two main heads: — I. Ordinary Leases, Common Law and Statutory; II. Building or Long Leases.

I. Ordinary Leases, Common Law and Statutory. — A verbal lease for a year is good. Such a lease for more than a year is not effectual even for a year, except where the lessee has taken possession. At common law, while a lease was binding on the grantor and his heirs, it was not good against " singular successors," i.e. persons acquiring by purchase or adjudication, and the lessee was liable to be ejected by such persons, unless (a precaution usually taken) sasine of the subjects demised was expressly conferred on him by the lease. To obviate this difficulty, the Scots Act 1449, c. 18, made possession of the subjects of the lease equivalent to sasine. This enactment applies to leases of agricultural subjects, houses, mills, fisheries and whatever is fundo annexum ; provided that (a) the lease, when for more than one year, must be in writing, (6) it must be definite as to subject, rent (which may consist of money, grain or services, if the reddendum is not illusory) and term of duration, (c) possession must follow on the lease. Special powers of granting leases are conferred by statute on trustees. (Trusts [Scotland] Act 1867, s. 2), curatores bonis (Judicial Factors [Scotland] Act 1889) and heirs of entail (cf. Entail Act 1882, ss. 5, 6, 8, 9). The requisites of the statutory leases, last mentioned, are similar to those imposed in England upon tenants for life by the Settled Land Acts (v. sup. p. 3). The rent stipulated for must not be illusory, and must fairly represent the value of the subjects leased, and the term of the lease must not be excessive (as to rent generally, see Rent). A life-renter can only grant a lease that is effectual during the subsistence of the life-rent. There is practically no limitation, but the will of the parties, as to the persons to whom a lease may be granted. A lease granted to a tenant by name will pass, on his death during the subsistence of the term to his heir-at-law, even if the lease contains no destination to heirs. The rights and obligations of the lessor and the

tenant {e.g. as to the use of the produce, the payment of rent, the quiet possession of the subjects demised, and as to the payment of rates and taxes) pre similar to those existing under English law. An agricultural lease does not, apart from stipulation, confer any right to kill game, other than hares and rabbits (as to which, see the Ground Game Act 1880, and Game Laws) or any right of fishing. A tenant is not entitled, without the landlord's consent, to change the character of the subjects demised, and, except under an agricultural lease, he is bound to quit the premises on the expiration of the lease. In the case of urban leases, however, ejectment {q.v.) — called in Scots Law " removing " — will not be authorized unless the tenant received 40 days' warning before the term of removal. In the absence of such notice, the parties are held, if there be nothing in their conduct or in the lease inconsistent with this presumption, to renew their agreement in all its terms, and so on from year to year till due notice is given. This is called " tacit relocation." A lease may be trans- mitted (i.) by " assignation," intimated to the landlord, and followed by possession on the part of the assignee; (ii.) by sub-lease — the effect of which is equivalent to that of under-lease in English law ; (iii.) by succession, as of the heir of a tenant; (iv.) in the case of agricultural holdings, by bequest (Agricultural Holdings [Scotland] Act 1883, s – 2 9)- A lease terminates (i.) by the expiration of its term or by advantage being taken by the party in whose favour it is stipulated, of a " break " in the term; (ii.) by the occurrence of an " irritancy " of ground of forfeiture, either conventional, or statutory, e.g. where a tenant's rent is in arrear, or he fails to remove on the expiry of his lease (Act of Sederunt, 14th of Dec. 1756: Agricultural Holdings Act 1883, s. 27); (iii.) by the bankruptcy or insolvency of the tenant, at the landlord's option, if it is so stipulated in the lease; (iv.) by the destruction, e.g. by fire, of the subject leased, unless the landlord is bound to restore it. Complete destruction of the subject leased, e.g. where a house is burnt down, or a farm is reduced to " sterility " by flood or hurricane, discharges the tenant from the obligation to pay rent. The effect of partial destruction has given rise to some uncertainty. " The distinction seems to be that if the

destruction be permanent, though partial, the failure of the subject let will give relief by entitling the tenant to renounce the lease, unless a deduction shall be allowed, but that if it be merely temporary or occasional, it will not entitle the tenant to relief " (Bell's Prin. s. 1208). Agricultural leases usually contain special provisions as to the

order of cropping, the proper stocking of the farm, and the rights of the incoming and outgoing tenant with regard to the way- going crop. Where the rent is in money, it is generally payable at Whitsunday and Martinmas — the two ” legal terms.” Sometimes the term of payment is before the crop is reaped, sometimes after. ” The terms thus stipulated are called ‘ the conventional terms ‘; the rent payable by anticipation being called ‘ forehand rent,’ that which is payable after the crop is reaped, ‘ back rent.’ Where the rent is in grain, or otherwise payable in produce, it is to be satisfied from the produce of the farm, if there be any. If there be none the tenant is bound and entitled to deliver fair marketable grain of the same kind.” (Bell’s Principles, ss. 1204, 1205). The general rule with regard to ” waygoing crops ” on arable farms is that the tenant is entitled to reap the crop sown before the term of removal (whether or net that be the natural termination of the lease), the right of exclusive possession being his during seed time. But he is not en- titled to the use of the barns in threshing, &c, the corn.

The Agricultural Holdings (Scotland) Acts 1883 and 1900, already referred to incidentally, contain provisions — similar to those of the English acts — as to a tenant’s right to compensation for unexhausted improvements, removal for non-payment of rent, notice to quit at the termination of a tenancy, and a tenant’s property in fixtures. The Crofters’ Holdings (Scotland) Acts 1886, 1887 and 1888, confer on ” crofters ” special rights. A crofter is defined as ” a tenant of a holding ” — being arable or pasture land, or partly arable and partly pasture land — ” from year to year who resides on his holding, the annual rent of which does not exceed £30 in money, and which is situated in a ‘ crofting parish.’ ”’ Nearly all the parishes in Argyll, Inverness, Ross, Cromarty, Sutherland, Caithness and Orkney and Shetland answer to this description. The crofter enjoys a perpetual tenure subject to the fulfilment of certain conditions as to payment of rent, non-assignment of tenancy, &c, and to defeasance at his own option on giving one year’s notice to the landlord. A Crofters’ Commission constituted under the acts has power to fix fair rents, and the crofter on renunciation of his tenancy or removal from his holding is entitled to compensation for permanent improvements. The Small Holdings Act 1892 applies to Scotland.

bnder the law of Scotland down to 1880, a landlord had as security for rent due on an agricultural lease a ” hypothec ” — i.e. a prefer- ential right over ordinary creditors, and extending, subject to certain limitations, over the whole stock and crop of the tenant. This right was enforceable by sequestration and sale. It was abolished in 1880 as regards all leases entered into after the nth of November 1881, where

the land demised exceeded two acres in extent, and the land- lord was left to remedies akin to ejectment (Hypothec Abolition, Scotland, Act 1880).

II. Building or LongLeases. — Under these leases, the term of which is usually 99 and sometimes 999 years, the tenant is to a certain extent in the position of a fee simple proprietor, except that his right is terminable, and that he can only exercise such rights of ownership as are conferred on him either by statute or by the terms of his lease. Extensive powers of entering into such leases have been given by statute to trustees subject to the authority of the Court (Trusts [Scotland] Act 1867, s. 3) and to heirs of entail (Entail Acts 1840, 1849, 1882). Where long leases are ” probative,” i.e. holograph or duly tested, do not exceed 31 years, or, except as regards leases of mines and minerals, and of lands held by burgage tenure, relate to an extent of land exceeding 50 acres, and contain provisions for renewal, they may be recorded for publication in the Register of Sasincs, and such publication has the effect of possession (Registra- tion of Leases [Scotland] Act 1857).

Ireland. — The law of landlord and tenant was originally substanti- ally the same as that described for England is. But the modern Land Acts have readjusted the relation between landlords and tenants, while the Land Purchase Acts have aimed at abolishing those relations by enabling the tenant to become the owner of his holding. The way was paved for these changes by the existence in Ulster of a local custom having virtually the force of law, which had two main features — fixity of tenure, and free right of sale by the tenant of his interest. These principles, with the addition of that of fair rents settled by judicial means, were gradually established by the Land Acts of 1870 and subsequent years, and the whole system was re- modelled by the Land Purchase Acts (see Ireland).

United States. — The law of landlord and tenant in the United States is in its principles similar to those of English law. It is only possible to indicate, by way of example, some of the points of similarity. The relationship of landlord and tenant is created, altered and dissolved in the same way, and the rights and duties of parties are substantially identical. A lease must contain, either in itself or by clear reference, all the terms of a complete contract — the names of the parties, description of the property let, the rent (see Rent) and the conditions. The date

is not essential. That is a matter of identification as to time only. In Pennsylvania, parol evidence of the date is allowed. The general

American doctrine is that where the contract is contained in separate writings they must connect themselves by reference, and that parol evidence is not admissible to connect them. The English doctrine that a verbal lease may be specific- ally enforced if there has been part performance by the person seeking the remedy has been fully adopted in nearly all the American states. The law as to the rights and obligations of assignees and sub-lessees and as to surrender is the same as in England. Forfeiture only renders a lease void as regards the lessee; it may be waived by the lessor, and acceptance by the landlord of rent due after forfeiture, with notice of such forfeiture, amounts to waiver. Where there is a lease for a certain period, no notice to quit is necessary. In uncertain tenancies there must be reasonable notice — i.e. at common law six months generally. The notice necessary to determine a monthly or weekly tenancy is generally a month or a week (see further under Lodger; Lodgings). In the United States, as in England, the covenant for quiet enjoyment only extends, so far as relates to the acts of third parties, to lawful acts of disturbance in the enjoyment of the subject agreed to be let.

Laws of other Countries.' — It is impossible here to deal with the systems of land tenure in force in other countries. Only the question of the legal relations between landlord and tenant can be touched upon. In France, the Code Civil recognizes two such relationships, the letting to hire of houses {bail d loyer) and the letting to farm of rural properties {bail dferme). To a certain extent, both forms of tenancy are governed by the same rules. The letting may be either written or verbal. But a verbal lease presents this disadvantage that, if it is unperformed and one of the parties denies its existence, it cannot be proved by witnesses. The party who denies the letting can only be put to his oath (Arts. 1714-1715). It may further be noted that in the case of a verbal lease, notice to quit is regulated by the custom of the place (Art. 1736). The tenant or farmer has the right of underletting or assigning his lease, in the absence of prohibiting stipulation (Art. 171 7). The lessor is bound by the nature of his contract and without the need ot any particular stipulation (i.) to deliver to the lessee the thing hired in a good state of repair; (ii.) to maintain it in a state to serve the purpose for which it has been hired; (iii.) to secure to the lessee peaceable enjoyment during the continuance of the lease (Arts. 1719-1720). He is bound to warrant the lessee against, and to indemnify him for, any loss arising from any faults or defects in the thing hired which prevent its use, even though he was not aware of them at the time of the lease (Art. 1721). If during the continuance of the letting, the thing hired is entirely destroyed by accident, the lease is cancelled. In case of partial destruction, the lessee may, according

to circumstances, demand either a diminution of the price, or the cancellation of the lease. In neither case is there ground for damages (Art. 1722). The lessor cannot, during the lease, change the form of the thing hired (Art. 1723). The lessee is bound, on his side (i.) to use the thing hired like a good head of a household {bon pere de famille), in accordance with the express or presumed purpose of the hiring; (ii.) to pay the price of the hiring at the times agreed (Art. 1728). On breach of the former obligation, the lease may be judicially cancelled (Art. 1729). As to the con- sequences of breach of the latter, see Rent. If a statement of the condition of the property {Stat des lieux) has been prepared, the lessee must give it up such as he received it according to the statement, except what has perished or decayed by age or by means of force majeure (Art. 1730). In the absence of an Hat des lieux, the lessee is presumed to have received the thing hired in a good state of tenantable repair, and must so yield it up, saving proof to the contrary (Art. 1731). He is'liable for injuries or losses happening during his enjoyment, unless he prove that they have taken place without his fault (Art. 1732); in particular, for loss by fire unless he show that the fire happened by accident, force majeure, or defect of construction, or through communica- tion from a neighbouring house (Art. 1733). The lessee is

liable for injuries and losses happening by the act of persons belonging to his house or of his sub-tenants (Art. 1735). A lease terminates (i.) at the expiration of the prescribed term (Art. 1737) — if at that period the lessee remains and is left in posses- sion, there is, in the case of written leases, a tacit renewal (tacite recondnctior.) of the lease as a verbal lease (Arts. 1 738-1 739); (ii.) by the loss of the thing hired and by the default of the lessor or lessee in the fulfilment of their respective obligations (Art. 1741), but (iii.) not by the death either of the lessor or of the lessee (1742). The conditions of Ejectment are stated under that heading. The special rules (Arts. 1752-1762) relative to the hire of houses are touched upon in Lodger and Lodgings. It only remains here to refer to those applicable to leases to farm. The lessee is bound to stock the farm with the cattle and implements necessary for its husbandry (Art. 1766), and to stack in the places appointed for the purpose in the lease (Art. 1767). A lessee, who farms on condition of dividing the produce with the lessor, can only underlet or assign if he is expressly empowered to do so by the lease (Art. 1763). The lessee must give notice to the lessor of any acts of usurpation committed on the property (Art. 1768). If at

least half of the harvest in any year is destroyed by accident, the lessee (a) in the case of a lease for several years, obtains, at the end of his lease, a refund of rent, by way of indemnity, unless he has been indemnified by preceding harvests; (b) in the case of a lease for a year only, may secure a proportional abatement of the current rent. No refund is payable if the produce was severed before the accident, unless the lessor was entitled to a portion of it, when he must bear his share of the loss, provided the lessee was not in mord as regards the delivery of the lessor's portion. The lessee has no right to a refund when the cause of damage was existing and known at the date of the lease (Arts. 1760-1771). Liability for loss by " accidents " may be thrown on the lessee by express stipulation (Art. 1772). "Accidents" here mean ordinary accidents only, such as hail, lightning or frost, and the lessee will not be answerable for loss caused by extraordinary accidents such as war or floods, unless he has been made liable for all accidents, foreseen or unforeseen (Art. 1773). A verbal lease is deemed to be for the term necessary to enable the lessee to gather in all the produce, thus for a year in the case of a meadow or vineyard; in the case of lands leased in tillage, where they are divided into shifts or seasons, for as many years as there are shifts (Art. 1774). The outgoing must leave for the incoming tenant convenient housing and other facilities for the labours of the year following; the incoming must procure for the outgoing tenant conveniences for the consumption of his fodder and for the harvests remaining to be got in. In either case the custom of the place is to be followed (Art. 1777). The outgoing tenant must leave the straw and manure of the year, if he received them at the beginning of his lease, and even where he has not so received them, the owner may retain them according to valuation (Art. 1778). A word must be added as to letting by cheptel (bail a cheptel) — a contract by which one of the parties gives to the other a stock of cattle to keep under conditions agreed on between them (Art. 1800). There are several varieties of the contract,* 1 (i.) simple cheptel (cheptel simple) in which the whole stock is supplied by the lessor — the lessee taking half the profit and bearing half the loss (Art. 1804); (ii.) cheptel by moiety (cheptel d moietie) — here each of the contracting parties furnishes half of the stock, which remains common for profit or loss (Art. 1818); (iii.) cheptel given to a farmer (fermier) or participating cultivator (colon partiaire) — in the cheptel given to the farmer (also called cheptel de fer) stock of a value equal to the estimated price of the stock given must be left at the expiry of the lease (Art. 1821); cheptel given to the partici- pating cultivator resembles simple cheptel, except in points of detail (Arts. 1827-1830); (iv.) the term "cheptel" is also improperly applied to a contract by which cattle are given to be housed and fed — here the

lessor retains the ownership, but has only the profit of the calves (Art. 1831).

The French system just described is in force in its entirety in Belgium (Code Civil, Arts. 17 13 et seq.) and has been followed

to some extent in Italy (Civil Code, Arts. 1568 et seq.), Spain (Civil Code, Arts 1542 et seq.), and Portugal (Civil Code, Arts. 1298 et seq., 1595 et seq.). In all these countries there are varieties of emphyteutic tenure; and in Italy the mezzadria or metayer system (see Civil Code, Arts. 1647 et seq.) exists. The German Civil Code adopts the distinction between bail dloyer (Miehl, Arts. 535 et seq.) and bail a fer me (Pacht, Arts. 581 etseq.). Dutch law also (Civil Code, Arts. 1583 etseq.) is similar to the French.

The Indian law of landlord and tenant is described in the article Indian Law. The laws of the various British colonies on the subject are too numerous and too different to be dealt with here. In Mauritius, the provisions of the Code Civil are in force without modification. In Quebec (Civil Code, Arts. 1605 et seq.) and St Lucia (Civil Code, Arts. 1512 et seq.) they have been reproduced by the local law. In many of the colonies, parts of the English law of landlord and tenant, common law and statutory, have been introduced by local enactments (cf. British Guiana, Ord. 4 of 1846; Jamaica, 1 Vict. c. 26). In others (e.g. Victoria, Landlord and Tenant Act 1890, No. 1108; Ontario, Rev. Stats. 1897, c. 170) consolidating statutes have been passed.

Authorities.— English Law: Wolstenholme, Brinton and Cherry, Conveyancing and Settled Land Acts (London, 9th ed., 1905); Hood and Challis, Conveyancing and Settled Land Acts (London, 7th ed., 1909) ; Foa, on Landlord and Tenant (London, 4th ed., 1907) ; Woodfall, on Landlord and Tenant (London, 18th ed., 1907) ; Fawcett, Landlord and Tenant (London, 3rd ed., 1905). Scots Law: Hunter, on Landlord and Tenant (Edinburgh, 4th ed., 1876); Rankine, on Land Ownership (Edinburgh, 3rd ed., 1891); Rankine, on Leases (Edinburgh, 2nd ed., 1893); Hunter, Landlord and Tenant (4th ed. G. Guthrie, Edinburgh, 1876). Irish Law: Kelly's Statute Law of Landlord and Tenant in Ireland (Dublin, 1898) ; Barton and Cherry's Land Act 1896 (Dublin, 1896); Quill, Hamilton and Longworth, Irish Land Acts of ipoj and IQ04 (Dublin, 1904). American Law: Bouvier, Law Dictionary (ed. Rawle) (London, 1897); McAdam, Rights, Remedies and Liabilities of Landlord and Tenant (New York, 1900); Wood, Law of Landlord and Tenant (New York, 1888). Foreign and Colonial Laws: Field, Landholding and the relation of Landlord and Tenant in various Countries ; Ruling Cases (American Notes), (London and Boston,

1894-1901). (A. W. R.)

LANDON, CHARLES PAUL (1 760-1826), French painter and art-author, was born at Nonant in 1760. He entered the studio of Regnault, and won the first prize of the Academy in 1792. After his return from Italy, disturbed by the Revolution, he seems to have abandoned painting for letters, but he began to exhibit in 1795, and continued to do so at various intervals up to 1814. His ” Leda ” obtained an award of merit in 1801, and is now in the Louvre. His ” Mother’s Lesson,” ” Paul and Virginia Bathing,” and ” Daedalus and Icarus ” have been engraved; but his works on painting and painters, which reach nearly one hundred volumes, form his chief title to be remembered. In spite of a complete want of critical accuracy, an extreme care- lessness in the biographical details, and the feebleness of the line engravings by which they are illustrated, Landon’s Annales du Muste, in S3 vols., form a vast repertory of compositions by masters of every age and school of permanent value. Landon also published Lives of Celebrated Painters, in 22 vols.; An Historical Description of Paris, 2 vols.; a Description of London, with 42 plates; and descriptions of the Luxembourg, of the Giustiniani collection, and of the gallery of the duchesse de Berry. He died at Paris in 1826.

LANDON, LETITIA ELIZABETH (1802-1838), English poet and novelist, better known by her initials L. E. L. than as Miss Landon or Mrs Maclean, was descended from an old Hereford- shire family, and was born at Chelsea on the 14th of August 1802. She went to a school in Chelsea where Miss Mitford also received her education. Her father, an army agent, amassed a large property, which he lost by speculation shortly before his death. About 1815 the Landons made the acquaintance of William Jerdan, and Letitia began her contributions to the Literary Gazette and to various Christmas annuals. She also published some volumes of verse, which soon won for her a wide literary fame. The gentle melancholy and romantic sentiment her writings embodied suited the taste of the period, and would

in any case have secured her the sympathy and approval of a wide class of readers. She displays richness of fancy and aptness of language, but her work suffered from hasty production, and has not stood the test of time. The large sums she earned by her literary labours were expended on the support of her family. An engagement to John Forster, it is said, was broken off through the intervention of

scandalmongers. In June 1838 she married George Maclean, governor of the Gold Coast, but. she only sur- vived her marriage, which proved to be very unhappy, by a few months. She died on the 1 5th of October 1838 at Cape Coast from an overdose of prussic acid, which, it is supposed, was taken accidentally.

For some time L. E. L. was joint editor of the Literary Gazette. Her first volume of poetry appeared in 1820 under the title The Fate of Adelaide, and was followed by other collections»of verses with similar titles. She also wrote several novels, of which the best is Ethel Churchill (1837). Various editions of her Poetical Works have been published since her death, one in 1880 with an intro- ductory memoir by W. B. Scott. The Life and Literary Remains of Letitia Elizabeth Landon, by Laman Blanchard, appeared in 1841, ind a second edition in 1855.

LANDOR, WALTER SAVAGE (1775-1864), English writer, eldest son of Walter Landor and his wife Elizabeth Savage, was born at Warwick on the 30th of January 1775. [He was sent to Rugby school, but was removed at the headmaster's request and studied privately with Mr Langley, vicar of Ashbourne. In 1793 he entered Trinity College, Cambridge. He adopted republican principles and in 1794 fired a gun at the windows of a Tory for whom he had an aversion. He was rusticated for a year, and, although the authorities were willing to condone the offence, he refused to return. The affair led to a quarrel with his father in which Landor expressed his intention of leaving home for ever. He was, however, reconciled with his family through the efforts of his friend Dorothea Lyttelton. He entered no profession, but his father allowed him £150 a year, and he was free to live at home or not as he pleased.]

In 1795 appeared in a small volume, divided into three books, The Poems of Walter Savage Landor, and, in pamphlet form of nineteen pages, an anonymous Moral Epistle, respectfully dedicated to Earl Stanhope. No poet at the age of twenty ever had more vigour of style and fluency of verse; nor perhaps has any ever shown such masterly command of epigram and satire, made vivid and vital by the purest enthusiasm and most generous indignation. Three years later appeared the first edition of the first great work which was to inscribe his name for ever among the great names in English poetry. The second edition of Gebir appeared in 1803, with a text corrected of grave errors and improved by magnificent additions. About the same time the whole poem was also published in a Latin form, which for might and melody of line, for power and perfection of language, must always dispute the palm of precedence with the English version. [His father's death in

1805 put him in possession of an independent fortune. Landor settled in Bath. Here in 1808 he met Southey, and the mutual appreciation of the two poets led to a warm friendship.] In 1808, under an impulse not less heroic than that which was afterwards to lead Byron to a glorious death in redemption of Greece and his own good fame, Landor, then aged thirty-three, left England for Spain as a volunteer to serve in the national army against Napoleon at the head of a regiment raised and supported at his sole expense. After some three months' campaigning came the affair of Cintra and its disasters; " his troop," in the words of his biographer, " dispersed or melted away, and he came back to England in as great a hurry as he had left it," but bringing with him the honourable recollection of a brave design unselfishly attempted, and the material in his memory for the sublimest poem published in our language, between the last masterpiece of Milton and the first masterpiece of Shelley — one equally worthy to stand unchallenged beside either for poetic perfection as well as moral majesty — the lofty tragedy of Count Julian, which appeared in 181 2, without the name of its author. No comparable work is to be found in English poetry between the date of Samson AgonUtes and the date of Prometheus Unbound; and with both xvi. 6

these great works it has some points of greatness in common. The superhuman isolation of agony and endurance which en- circles and exalts the hero is in each case expressed with equally appropriate magnificence of effect. The style of Count Julian, if somewhat deficient in dramatic ease and the fluency of natural dialogue, has such might and purity and majesty of speecn as elsewhere we find only in Milton so long and so steadily sustained.

In May 1 8 1 1 Landor had suddenly married M iss Julia Thuillier, with whose looks he had fallen in love at first sight in a ball-room at Bath; and in June they settled for a while at Llanthony Abbey in Monmouthshire, from whence he was worried in three years' time by the combined vexation of neighbours and tenants, lawyers and lords-lieutenant; not before much toil and money had been nobly wasted on attempts to improve the sterility of the land, to relieve the wretchedness and raise the condition of tlie peasantry. He left England for France at first, but after a brief residence at Tours took up his abode for three years at Como; " and three more wandering years he passed," says his biographer, " between Pisa and Pistoja, before he pitched his tent in Florence in 1821."

In 1835 he had an unfortunate difference with his wife which ended in a complete separation. In 1824 appeared the first series of his Imaginary Conversations, in 1826 " the second edition, corrected and

enlarged “; a supplementary third volume was added in 1828; and in 1829 the second series was given to the world. Not until 1846 was a fresh instalment added, in the second volume of his collected and selected works. During the interval he had published his three other most famous and greatest books in prose: The Citation and Examination of William Shakespeare (1834), Pericles and Aspasia (1836), The Pentameron (1837). To the last of these was originally appended The Pentalogia, containing five of the very finest among his shorter studies in dramatic poetry. In 1847 he published his most important Latin work, Poemata et inscriptiones , comprising, with large additions, the main contents of two former volumes of idyllic, satiric, elegiac and lyric verse; and in the same golden year of his poetic life appeared the very crown and flower of its manifold labours, the Hellenics of Walter Savage Landor, enlarged and completed. Twelve years later this book was re-issued, with additions of more or less value, with alterations generally to be regretted, and with omissions invariably to be deplored. In 1853 he put forth The Last Fruit off an Old Tree, containing fresh conversations, critical and controversial essays, miscellaneous epigrams, lyrics and occasional poems of various kind and merit, closing with Five Scenes on the martyrdom of Beatrice Cenci, unsurpassed even by their author himself for noble and heroic pathos, for subtle and genial, tragic and profound, ardent and compassionate insight into character, with consummate mastery of dramatic and spiritual truth. In 1856 he published Antony and Oclavius — Scenes for the Study, twelve consecutive poems in dialogue which alone would suffice to place him high among the few great masters of historic drama.

In 1858 appeared a metrical miscellany bearing the title of Dry Sticks Fagoted by W. S. Landor, and containing among other things graver and lighter certain epigrammatic and satirical attacks which reinvolved him in the troubles of an action for libel; and in July of the same year he returned for the last six years of his life to Italy, which he had left for England in 1835. [He was advised to make over his property to his family, on whom he was now dependent. They appear to have refused to make him an allowance unless he returned to England. By the exertions of Robert Browning an allowance was secured. Browning settled him first at Siena and then at Florence.] Embittered and distracted by domestic dissensions, if brightened and relieved by the affection and veneration of friends and strangers, this final period of his troubled and splendid career came at last to a quiet end on the 17th of September 1864. In the preceding year he had published a last volume of Heroic Idyls, with Additional Poems, English and Latin, — the better part of them well worthy to be indeed

the ” last fruit ” of a genius which after a life of eighty-eight years had lost nothing

of its majestic and pathetic power, its exquisite and exalted loveliness.

A complete list of Landor’s writings, published or privately printed, in English, Latin and Italian, including pamphlets, fly-sheets and occasional newspaper correspondence on political or literary questions, it would be difficult to give anywhere and impossible to give here. From nineteen almost to ninety his intellectual and literary activity was indefatigably incessant; but, herein at least like Charles Lamb, whose cordial admiration he so cordially returned, he could not write a note of three lines which did not bear the mark of his ” Roman hand ” in its matchless and inimitable command of a style at once the most powerful and the purest of his age. The one charge which can ever seriously be brought and maintained against it is that of such occasional obscurity or difficulty as may arise from excessive strictness in condensation of phrase and expurgation of matter not always superfluous, and sometimes almost indispensable. His English prose and his Latin verse are perhaps more frequently and more gravely liable to this charge than either his English verse or his Latin prose. At times it is well-nigh impossible for an eye less keen and swift, a scholarship less exquisite and ready than his own, to catch the precise direction and follow the perfect course of his rapid thought and radiant utterance. This apparently studious pursuit and preference of the most terse and elliptic expression which could be found for anything he might have to say could not but occasionally make even so sovereign a master of two great languages appear “dark with excess of light”; but from no former master of either tongue in prose or verse was ever the quality of real obscurity, of loose and nebulous incertitude, more utterly alien or more naturally remote. There is nothing of cloud or fog about the path on which he leads us; but we feel now and then the want of a bridge or a handrail; we have to leap from point to point of narrative or argument without the usual help of a connecting plank. Even in his dramatic works, where least of all it should have been found, this lack of visible connexion or sequence in details of thought or action is too often a source of sensible perplexity. In his noble trilogy on the history of Giovanna queen of Naples it is sometimes actually difficult to realize on a first reading what has happened or is happening, or how, or why, or by what agency — a defect alone sufficient, but unhappily sufficient in itself, to explain the

too general ignorance of a work so rich in subtle and noble treatment of character, so sure and strong in its grasp and rendering of ” high actions and high passions,” so rich in humour and in pathos, so royally serene in its command- ing power upon the tragic mainsprings of terror and of pity. As a poet, he may be said on the whole to stand midway between Byron and Shelley — about as far above the former as below the latter. If we except Catullus and Simonides, it might be hard to match and it would be impossible to overmatch the flawless and blameless yet living and breathing beauty of his most perfect elegies, epigrams or epitaphs. As truly as prettily was he likened by Leigh Hunt ” to a stormy mountain pine which should produce lilies.” His passionate compassion, his bitter and burning pity for all wrongs endured in all the world, found only their natural and inevitable outlet in his lifelong defence or advocacy of tyrannicide as the last resource of baffled justice, the last discharge of heroic duty. His tender and ardent love of children, of animals and of flowers makes fragrant alike the pages of his writing and the records of his life. He was as surely the most gentle and generous as the most headstrong and hot-headed of heroes or of men. Nor ever was any man’s best work more thoroughly imbued and informed with evidence of his noblest qualities. His loyalty and liberality of heart were as inexhaustible as his bounty and beneficence of hand. Praise and encouragement, deserved or undeserved, came yet more readily to his lips than challenge or defiance. Reviled and ridiculed by Lord Byron, he retorted on the offender living less readily and less warmly than he lamented and extolled him dead. On the noble dramatic works of his brother Robert he lavished a magnificence of sympathetic praise which his utmost self- estimate would never have exacted for his own. Age and the

lapse of time could neither heighten nor lessen the fulness of this rich and ready generosity. To the poets of his own and of the next generation he was not readier to do honour than to those of a later growth, and not seldom of deserts far lower and far lesser claims than theirs. That he was not unconscious of his own, and avowed it with the frank simplicity of nobler times, is not more evident or more certain than that in com- parison with his friends and fellows he was liable rather to undervalue than to overrate himself. He was a classic, and no formalist; the wide range of his just and loyal admiration had room for a genius so far from classical as Blake’s. Nor in his own highest mood or method of creative as of critical work was he a classic only, in any narrow or exclusive sense of the term. On either side, immediately or hardly below his mighty master- piece of Terides and Aspasia, stand the two scarcely less beautiful and vivid studies of

medieval Italy and Shakespearean England. The very finest flower of his immortal dialogues is probably to be found in the single volume comprising only ” Imaginary Conversations of Greeks and Romans “; his utmost command of passion and pathos may be tested by its transcendent success in the distilled and concentrated tragedy of Tiberius and Vipsania, where for once he shows a quality more proper to romantic than classical imagination — -the subtle and sublime and terrible power to enter the dark vestibule of distraction, to throw the whole force of his fancy, the whole fire of his spirit, into the ” shadowing passion ” (as Shakespeare calls it) of gradually imminent insanity. Yet, if this and all other studies from ancient history or legend could be subtracted from the volume of his work, enough would be left whereon to rest the foundation of a fame which time could not sensibly impair.

(A. C. S.) Bibliography. — See The Works and Life of Waller Savage Landor (8 vols., 1846), the life being the work of John Forster. Another edition of his works (1891-1893), edited by C. G. Crump, comprises Imaginary Conversations, Poems, Dialogues in Verse and Epigrams and The Longer Prose Works. His Letters and other Unpublished Writings were edited by Mr Stephen Wheeler (1897). There are many volumes of selections from his works, notably one (1882) for the ” Golden Treasury ” series, edited by Sidney Colvin, who also con- tributed the monograph on Landor (1881) in the ” English Men of Letters ” series. A bibliography of his works, many of which are very rare, is included in Sir Leslie Stephen’s article on Landor in the Dictionary of National Biography (vol. xxxii., 1892). (M. Br.)

LANDOUR, a hill station and sanatorium in India, in Dehra Dun district of the United Provinces, adjoining Mussoorie. Pop. (1901) 1720, rising to 3700 in the hot season. Since 1827 it has been a convalescent station for European troops, with a school for their children.

LAND REGISTRATION, a legal process connected with the transfer of landed property, comprising two forms — registration of deeds and registration of title, which may be best described as a species of machinery for assisting a purchaser or mortgagee in his inquiries as to his vendor’s or mortgagor’s title previously to completing his dealing, and for securing his own position afterwards. The expediency of making inquiry into the vendor’s title before completing a purchase of land (and the case of a mortgage is precisely similar) is obvious. In the case of goods possession may ordinarily be relied on as proof of full ownership; in the case of land, the person in ostensible possession is

very seldom the owner, being usually only a tenant, paying rent to someone else. Even the person to whom the rent is paid is in many cases — probably, in England, in most cases — not the full owner, but only a life owner, or a trustee, whose powers of disposing of the property are of a strictly limited nature. Again, goods are very seldom the subject of a mortgage, whereas land has from time immemorial been the frequent subject of this class of transaction. Evidently, therefore, some sort of inquiry is necessary to enable a purchaser to obtain certainty that the land for which he pays full price is not subject to an unknown mortgage or charge which, if left undiscovered, might afterwards deprive him of a large part or even the whole of its value. Again, the probability of serious consequences to the purchaser ensuing from a mistake as to title is infinitely greater in the case of land than in the case of goods. Before the rightful owner can recover

misappropriated goods, he has to find out where they are. This is usually a matter of considerable difficulty. By the time they have reached the hands of a bond fide purchaser all chance of their recovery by the true owner is practically at an end. But with land the case is far otherwise. A dispossessed rightful owner never has any difficulty in tracing his property, for it is immovable. All he has to do is to bring an action for ejectment against the person in possession. For these reasons, among others, any attempt to deal with land on the simple and unsuspecting principles which obtain in regard to goods would be fraught with grave risks. . –

Apart from very early and primitive social conditions, there appear to be only two ways in which the required certainty as to title to land can be obtained. Either the purchaser must satisfy himself, by an exhaustive scrutiny and review of all the deeds, wills, marriages, heirships and other documents and events by which the property has been conveyed, mortgaged, leased, devised or transmitted during a considerable period of time, that no loophole exists whereby an adverse claim can enter or be made good — this is called the system of private investigation of title — or the government must keep an authoritative list or register of the properties within its jurisdiction, together with the names of the owners and particulars of the encumbrances in each case, and must protect purchasers and others dealing with land, on the faith of this register, from all adverse claims. This second system is called Registration of Title. To these two alternatives may perhaps be added a third, of very recent growth —

Insurance of Title. This is largely used in the United States. But it is in reality only a phase of the system of private investigation. The insurance company investigates the title, and charges the purchaser a premium to cover the expense and the risk of error. Registration of deeds is an adjunct of the system of private investigation, and, except in England, is a practically invariable feature of it. It consists in the establish- ment of public offices in which all documents affecting land are to be recorded — partly to preserve them in a readily accessible place, partly to prevent the possibility of any material deˆ‘d or document being dishonestly concealed by a vendor. Where registration is effected by depositing a full copy of the deed, it also renders the subsequent falsification of the original document dangerous. Registration of deeds does not (except perhaps to a certain extent indirectly) cheapen or simplify the process of investigation — the formalities at the registry add something to the trouble and cost incurred — but it prevents the particular classes of fraud mentioned.

The history of land registration follows, as a general rule, a fairly uniform course of development. In very early times, and in small and simple communities, the difficulty afterwards found in establishing title to land does not arise, owing to the primitive habit of attaching ceremony and publicity to all dealings. The parties meet on the land, with witnesses; symbolical acts (such as handing over a piece of earth, or the bough of a tree) are performed; and a set form of words is spoken, expressive of the intention to convey. By this means the ownership of each estate in the community becomes to a certain extent a matter of common knowledge, rendering fraud and mistake difficult. But this method leaves a good deal to be desired in point of security. Witnesses die, and memory is uncertain; and one of the earliest improvements consists in the establishment of a sort of public record kept by the magistrate, lord or other local authority, containing a series of contemporary notes of the effect of the various transactions that take place. This book becomes the general title-deed of the whole community, and as long as transactions remain simple, and not too numerous, the results appear to be satisfactory. Of this character are the Manorial Court Rolls, which were in the middle ages the great authorities on title, both in England and on the continent. The entries in them in early times were made in a very few words. The date, the names of the parties, the name or short verbal description of the land, the nature of the transaction, are all that appear. In the land registry at Vienna there is a continuous series of registers of this kind going back to 1368, in Prague

to 1377, in Munich to 1440. No doubt there are extant (though in a less easily accessible form) manorial records in England of equal or

greater antiquity. This may be considered the first stage in the history of Land Registration. It can hardly be said to be in active operation at the present day in any civilized country — in the sense in which that term is usually understood. Where dealings become more numerous and complicated, written instruments are required to express the intentions of the parties, and afterwards to supply evidence of the landowner's title. It appears, too, that as a general rule the public books already described continue to be used, notwithstanding this change; only (as would be expected) the entries in them, once plain and simple, either grow into full copies of the long and intricate deeds, or consist of mere notes stating that such and such deeds have been executed, leaving the persons interested to inquire for the originals, in whose custody soever they may be found. This system, which may be regarded as the second stage in the history of land registration, is called Registration of Deeds. It prevails in France, Belgium, parts of Switzerland, in Italy, Spain, India, in almost all the British colonies (except Australasia and Canada), in most of the states of the American Union, in the South American republics, in Scotland and Ireland, and in the English counties of Yorkshire and Middlesex. Where it exists, there is generally a law to the effect that in case of dispute a registered deed shall prevail over an unregistered one. The practical effect is that a purchaser can, by searching the register, find out exactly what deeds he ought to inquire for, and receives an assurance that if, after completion, he registers his own conveyance, no other deeds — even if they exist — will prevail against him.

The expenses and delays, not to mention the occasional actual losses of property through fraud or mistake, attendant on the system of making every purchaser responsible for the due examination of his vendor's title — whether or not assisted by registration of deeds — have induced several governments to establish the more perfect system of Registration of Title, which consists in collecting the transactions affecting each separate estate under a separate head, keeping an accurate account of the parcels of which each such estate is composed, and summarizing authoritatively, as each fresh transaction occurs, the subsisting rights of all parties in relation to the land itself. This system prevails in Germany, Austria, Hungary, parts of Switzerland, the Australasian colonies, nearly the whole of Canada, some of the states of the American Union, to a certain extent in Ireland, and is in course of establishment in England and Wales. The Register consists of three portions: — (1) The description of the land, usually, but not necessarily, accompanied by a reference to a map; (2) the ownership, giving the name and address of the person who can sell and dispose of the land; and (3) the encumbrances, in their order

of priority, and the nai#es of the persons for the time being entitled to them. When any fresh transaction takes place the instrument effecting it is produced, and the proper alterations in, or additions to, the register are made: if it be a sale, the name of the vendor is cancelled from the register, and that of the purchaser is entered instead; if it be a mortgage, it is added to the list of encumbrances; if a discharge, the encumbrance discharged is cancelled; if it is a sale of part of the land, the original description is modified or the plan is marked to show the piece conveyed, while a new descrip- tion or plan is made and a new register is opened for the detached parcel. In the English and Australian registries a ” land certificate ” is also issued to the landowner containing copies of the register and of the plan. This certificate takes the place more or less of the old documents of title. On a sale, the process is as follows: The vendor first of all produces to the purchaser his land certificate, or gives him the number of his title and an authority to inspect the register. In Austria and in some colonial registries this is not necessary, the register being open to public inspection, which in England is not the case. The purchaser, on inspecting this, can easily see for himself whether the land he wishes to buy is comprised in the registered description or plan, whether the vendor’s name appears on the register as the owner

bf the land, and whether there are any encumbrances or other burdens registered as affecting it. If there are encumbrances, the register states their amount and who are entitled to them. The purchaser then usually 1 prepares a conveyance or transfer of the land (generally in a short printed form issued by the registry) , and the vendor executes it in exchange for the purchase money. If there are mortgages, he pays them off to the persons named in the register as their owners, and they concur in a discharge. He then presents the executed instruments at the registry, and is entered as owner of the land instead of the vendor, the mortgages, if any, being cancelled. Where ” land certificates ” are used (as in England and Australia), a new land certificate is issued to the purchaser showing the existing state of the register and containing a copy of the registered plan of the land. The above is only a brief outline of the processes employed. For further information as to practical details reference may be made to the treatises mentioned at the end of this article.

England and Wales. — The first attempt to introduce general regis- tration of conveyances appears to have been made by the Statute of

Enrolments, passed in the 27th year of Henry VIII. But this was soon found to be capable of evasion, and it became a dead letter. A Registration Act applying to the counties of Lancaster, Chester and Durham was passed in Queen Elizabeth's reign, but failed for want of providing the necessary machinery for its observance. The subject reappeared in several bills during the Commonwealth, but these failed to pass, owing, it would seem, to the objection of landowners to publicity. In 1669 a committee of the House of Lords reported that one cause of the depreciation of landed property was the uncertainty of titles, and proposed registration of deeds as a remedy, but nothing was done.

During the next thirty years numerous pamphlets for and against a general registry were published. In 1704 the first Deed Registry Act was passed, applying to the West Riding of Yorkshire. In 1707 the system was extended to the East Riding, and in 1708 to Middlesex. These Middlesex and Yorkshire registries (modified considerably in practice, but not seriously in principle, by the Yorkshire Registries Acts 1884, 1885, and Land Registry [Middlesex Deeds] Act 1891) remain in operation, and are greatly valued by the smaller pro- prietors and mortgagees, owing to the security against fraud which they provide at a trifling cost. The selection of these counties seems capricious: its probable explanation is that in them trade was flourishing, and the fortunes made were frequently invested in land, and a protection against secret encumbrances was most in demand. In 1728 and 1732 Surrey and Derby petitioned, unsuccessfully, for local registries. In 1735 the North Riding Deed Registry Act was passed. In 1739 a General Registry bill passed the Commons, but did not reach the Lords. Next year the Lords passed a similar bill, but it did not reach the Commons. In 1759 a General Registry bill was thrown out by a majority of one. In 1784 Northumberland un- successfully petitioned for a local registry. After this the subject went almost out of sight till the Real Property Commission of 1828. They reported in 1830 in favour of a general register of deeds, but though several bills were introduced, none were passed. In 1846 a committee of the House of Lords reported that the marketable value of real property was seriously diminished by the tedious and ex- pensive process of the transfer of land, and that a registry of title to all real property was essential to the success of any attempt to simplify tne system of conveyancing. In 1850 a Royal Commission reported in favour of a general register of deeds, and in 185 1 Lord Campbell introduced a bill accordingly, but it was opposed, and was dropped. In 1853 Lord Cranworth introduced a bill, which passed the Lords but not the Commons.

Hitherto only registration of deeds had been considered, but in 1854 a new Royal Commission was appointed, which reported in 1857 in favour of a register of title. The scheme they recommended was substantially embodied in a bill introduced in 1859 by Lord Cairns — then Solicitor-General — but a dissolution stopped its pro- gress. In 1862 Lord Westbury had the satisfaction of carrying the first act for registration of title. This act enabled any landowner to register an indefeasible title on production of strict proof. The proof required was to be such as the court of chancery would force an unwilling purchaser to accept. Only a few hundred titles were registered under this act, and in 1868 a Royal Commission was ap- pointed to inquire into the causes of its failure. They reported in 1870, making various suggestions of detail, and especially adverting to the great expense caused by the strictness of the official investiga- tion of title before a property could be admitted to the register. In the same year Lord Hatherley introduced a Transfer of Land Bill, but it was not proceeded with. In 1873 Lord Selborne introduced a Land Titles and Transfer Bill, following more or less the recom- mendations of the report of 1870, proposing for the first time com- pulsory registration of title upon every next sale after a prescribed

1 In Prussia all conveyances are verbal, made in person or by attorney before the registrar, who forthwith notes them in his books.

date. Lord Cairns again introduced this bill (with some modifica- tions) in 1874, but it had to be dropped. In 1875 Lord Cairns's Land Transfer Act of that year was passed, which was much the same as the former bill, but without compulsion. This act had no better success in the way of voluntary general adoption than the act of 1862, but as its adoption has since been made compulsory, its pro- visions are important. Its most noticeable feature, from a practical point of view, is the additional prominence given to an expedient called " Possessory " registration (which also existed under another name in Lord Westbury 's Act), whereby is removed the great initial difficulty of placing titles on the register in the first instance. Two sorts of registration were established, " Absolute "and " Possessory." The effect of an absolute registration was immediately to destroy all claims adverse to the registered title. Butthis was only to be granted on a regular investigation of title, which, though not so strict as under the former act, yet necessarily involved time and cost. Possessory registration, however, was to be granted to any one who could show a prima facie title — a quick and cheap process. But the effect of such registration would not be immediately felt. It would not destroy existing adverse claims. It would only prevent new diffi- culties from arising. In course of time such a title would be practic- ally as good as

an absolute one. In 1885 the duke of Marlborough introduced a bill for a registry of titles, and in the following vacation Lord Davey wrote three letters to The Times advocating the same thing on the general lines afterwards adopted. 2 In 1887 Lord Halsbury, by introducing his Land Transfer Bill, commenced a struggle with the opponents of reform, which, after ten years of almost continuous effort, resulted in the passing of his act of 1897, establishing compulsory registration of title. Lord Halsbury intro- duced bills in 1887, 1888 and 1889. Lord Herschell, who succeeded him after the change of government, introduced bills in 1893, x ˆ94 and 1895, these last three being unanimously passed by the House of Lords on every occasion. The bill of 1895 reached committee in the Commons, but was stopped by the dissolution of parliament. In 1897 Lord Halsbury (who had returned to the woolsack) again intro- duced the same bill with certain modifications which caused the Incorporated Law Society to withdraw its opposition in the House of Commons, and the act was finally passed on the last day of the session. Under it the Privy Council has power to issue orders declaring that on a certain date registration of title is to be com- pulsory on sale in a given district. The effect of such an order is to oblige every purchaser of land in the district after that date to register a ” possessory title,” immediately after his purchase. The compulsory provisions of the act extend to freeholds and (by a rule afterwards made) to leaseholds having forty years to run. No order except the first can be made, save on the request of a county council. The first order was made in July 1898. It embraced the whole administrative county of London (including the City of London), proceeding gradually by groups of parishes. Under this order upwards of 122,000 titles had been registered by 1908, representing a value exceeding one hundred millions sterling.

Under the operation of this act, at the expense of a slightly increased cost on all transactions during a few years, persons dealing with land in the county will ultimately experience great relief in the matter both of cost and of delay. The costs of a sale (including professional assistance, if required) will ultimately be for the vendor about one fifth, and for the purchaser (at the most usual values) less than half, of the present expenses. The delay will be no more than in dealings with stock. Mortgagees will also be protected from risks of fraud, which at present are very appreciable, and of which the Redgrave and Richards cases are recent examples. Further par ticulars of the practical operation of the acts will be found in the Registrar’s Reports of 1902 and 1906, embracing the period from 1899 to 1905 inclusive, with comments on the general position, suggestions for future legislation, &c. In the autumn of 1908 a Royal Commission under the

chairmanship of Lord St Aldwyn, was appointed to inquire into the working of the Land Transfer Acts. The evidence given before them in October, November and December 1908 comprised a general exposition by the registrar of the origin and history of the acts, and the principles of their working, and suggestions for amendments in certain details. It also com- prised the experience of several landowners and others, who had found the acts highly beneficial, and who had carried through a large number of dealings under absolute titles, without professional help, very quickly, and at a greatly reduced cost.

Scotland. — In Scotland registration of deeds was established b} an act of 1617, which remained unaltered till 1845. There are alsd acts of 1868 and 1874. The registry is in Edinburgh. Deeds are registered almost invariably by full copy. The deeds are indexed according to properties — each property having a separate number and folio called a ” search sheet,” on which all deeds affecting it are referred to. About 40,000 deeds are registered annually. The consequence of the existence of this register is to render fraud in title absolutely unknown. Forty years is the usual period investigated. The investigation can, if desired, be made from the records in the

2 This summary is an abridgement (with permission) of pp. 7 to 26 of Mr R. Burnet Morris’s book referred to at the end of this article.

registry alone. The fees are trifling, but suffice to pay the expenses of the office, which employs between 70 and 80 permanent officers in addition to temporary assistants. The total costs of conveyancing amount, roughly speaking, to between I and 2 % on the purchase money, and are equally shared between vendor and purchaser. In 1900 a royal commission was appointed, with Lord Dunedin as chairman, to inquire into the expediency of instituting in Scotland a system of registration of title.

Australia and New Zealand. — These states now furnish the most conspicuous examples in the British empire of the success of registra- tion of title. But prior to the year 1857 they had only registration of deeds, and the expense, delay. and confusion resulting from the frequent dealings appear to have been a crying evil. Sir Robert Torrens, then registrar of deeds in South Australia, drew up and carried an act establishing a register of title similar to the shipping

register. The act rapidly became popular, and was adopted (with variations) in all the other Australasian states in the years 1861, 1862, 1870 and 1874. Consolidating and amending acts have since been passed in most of these states. Only absolute title is registered. All land granted by government, after the passing of the several acts, is placed on the register compulsorily. But voluntary applications are also made in very large numbers. It is said ordinary purchasers will not buy land unless the vendor first registers the title. The fees are very low — £1 to £3 is a usual maximum — though in some states, e.g. Victoria, the fees rise indefinitely, ad valorem, at a rate of about 10s. per £1000. Insurance funds are established to provide compensation for errors. At a recent date they amounted to over £400,000, while only £14,600 odd had been paid in claims. All the registries pay their own expenses. Bankers and men of business generally are warm in their appreciation of the acts, which are popularly called Torrens Acts, after their originator, who, though not a lawyer, originated and carried through this important and difficult legal work.

Canada. — Registration of title was introduced in Vancouver Island in 1861, was extended to the rest of British Columbia in 1870, and was in 1885 adopted by Ontario, Manitoba and the North-West Territories. Only Quebec, Nova Scotia, New Brunswick and Prince Edward Island retain the old English system, plus registration of deeds. The three provinces which have adopted registration of title have adopted it in somewhat different forms. In British Columbia it is similar to Lord Westbury's Act of 1862. The North-West Territories follow closely the Torrens Acts. The Ontario Act is almost a transcript of Lord Cairns's Act of 1875. The fees are very low, seldom exceeding a few shillings, but all expenses of the office are paid from this source. The Ontario registry has five district offices, as well as the central one at Toronto. This is apparently the only colonial registry not open to public inspection.

Other British Colonies. — In the other British colonies private investigation of title, plus registration of deeds, is the prevailing system, but registration of title has been introduced in one or two instances.

Germany and Austria-Hungary. — By far the most important examples of registration of title at present existing — because they show how the system works when applied to large European com- munities, with all the intricacies and complications of modern civilized life — are to be found in Germany and Austria-Hungary. In some parts of these countries registration of title has been established for several centuries

— notably in Bohemia; in most parts it has existed for the greater part of the 19th century; in some districts, again, notably Tirol and the Rhine Provinces, it is still in course of intro- duction. In all cases it appears to have been preceded by a system of deed registration, which materially facilitated its introduction. In some cases, Prussia, for instance, the former registers were kept in such a way as to amount in themselves to little short of a registry of title. Very low scales of fees suffice to pay all official expenses. In Prussia the fees for registering sales begin at 5d. for a value of £1 ; at £20 the fee is 2s 7d.; at £100 it is 7s. 3d.; at £1000 it is £1, 10s. ; at £5000, £4, 5s. , and so on. I n case of error, the officials are personally liable; failing these, the state. Other states are very similar. In 1894, 1,159,995 transactions were registered in Prussia. In 1893, 938,708 were registered in Austria. Some idea of the extent to which small holdings prevail in these countries may be gathered from the fact that 36% of the sales and mortgages in Austria were for under £8, 6s. 8d. value — 74% were for under £50. Owing to the ease and simplicity of the registers, it is not always necessary to employ professional help. When such help is required, the fees are low. In Vienna £1 is a very usual fee for the purchaser's lawyer. £10 is seldom reached. In Germany the register is private. In Austria it is open to public inspection. In these registers may be found examples of large estates in the country with numerous charges and encumbrances and dealings therewith; peasants' properties, in numerous scattered parcels, acquired and disposed of at different times, and variously mortgaged; town and suburban properties, flats, small farms, rights to light and air, rights of way, family settlements, and dealings of all sorts — inheritances and wills, partitions, bankruptcies, mortgages, and a great variety of dealings therewith. The Continental systems are usually administered locally in districts, about.20 to 30 m. across, attached to the local law courts. In Baden and Wiirttemberg every parish (commune) has its own

registry. All ordinary dealings are transacted with tne greatest expedition. Security is absolute. 1

The United States. — Up to a late date the ordinary English system, with registration of deeds, was universal in the United States. The registries appear to go back practically to the original settlement of the country. Registration is by full copy. It is said that in the large towns the name indexes were often much overgrown owing to the want of subdivision into smaller areas corresponding to the parishes into which the Middlesex and Yorkshire indexes are divided. In the New York registry not many years ago 25,000 deeds were registered annually. At the same time 35,000 were registered in Middlesex. Complaints are made by American lawyers of want of accuracy in the

indexes also. In 1890 an act was passed in New York for splitting the indexes into ” blocks,” which is believed to have given much relief. The average time and cost of an examina- tion of title, as estimated by a committee of the Bar Association of New York in 1887, was about thirty days and 150 dollars (about £30). A later State Commission in Illinois estimates the law costs of a sale there at about 25 dollars (£5) ; the time may run into many months. Allusion has already been made to the insurance of title companies. The rates of insurance are substantial, e.g. 65 dollars (£13) on the first 3000 dollars (£600), and 5 dollars (£1) on each additional 1000 dollars (£200). This would amount to £20 on £2000 value, £110 on £20,000, £510 on £100,000. The guarantee given is very ample, and may be renewed to subsequent owners at one-third of the fee. Registration of title has lately been introduced, on a voluntary basis, into the states of California, Oregon, Illinois, Massachusetts, Minnesota and Colorado, and also into Hawaii and the Philippines.

France. — In France registration of deeds is universal. Sales, mortgages, gifts and successions; easements, leases of over eighteen years, and transactions affecting the land to the extent of three years’ rent may lose priority if not registered. Wills need not be registered. Mortgages must be re-registered every ten years. Purchase deeds are registered by filing full copies. Registries are established in all the considerable towns. The duty on sales amounts to the high figure of about 65 % on the value. Part of this is allocated to registration, in addition to which a fixed fee of one franc, and stationers’ charges averaging 6 francs are also chargeable. The title can usually be fully investigated from the documents in the registry. Official searches for mortgages are commonly resorted to, at a cost of about 5 francs. Under the monarchy the land system was prac- tically copyhold tenure, but greater validity was attached to the Court Rolls than was the case in England. The present system was established by a law of 1790 after the abolition of seigniorial institu- tions in 1789. This was modified by the Code Napoleon, and further perfected by a law of 1855. The average value of transactions in France is very small. Probably at the present time four-fifths of the properties are of under £25 value. The costs of a sale for 200 francs (£8) would be about as follows: Duty, 13 fr. ; Notary (1%), 2 fr. ; expenses, 12 fr. — total 27 fr. A sale for 1000 fr. (£40) would cost about no fr. Taking all values, the cost of conveyance and duty reaches the high figure of 10% in the general run of transactions. The vendor as a rule has no costs. Indefeasible title is not obtainable, but frauds are almost unknown. A day or two usually suffices for all formalities. On large sales a further process known as the ” purge ” is undergone, which requires a few

weeks and more expense, in order to guard against possible claims against which the deed registries afford no protection, such as dowries of wives, claims under guardian- ships, &c. A commission (Commission Extraparlementaire du Cadastre), appointed in 1891 to consider the revision of the govern- ment cadastral maps (which are in very serious arrear) and the establishment of registration of title, collected, in nine volumes of Comptes Rendus, a great mass of most interesting particulars relat- ing to land questions in France, and in 1905 reported in favour of the general establishment of a register of title, with a draft of the necessary enactment.

Authorities. — A very complete list of some 114 English publica- tions from 1653 to 1895 will be found in R. Burnet Morris, Land Registration (1895); Parliamentary Publications: Second Report of the Real Property Commissioners (1831); Report of the Registration and Conveyancing Commission (1850); Report of the Registration of Title Commission (1857); Report of the Land Transfer Commission (1870); Reports on Registration of Title in Australasian Colonies (187 1 and 1881); Report on Registration of Title in Germany and Austria-Hungary (1896) ; The Registrar's Reports of 1902 and 1906 on the Formation of a Register in London ; Royal Commission on the Land Transfer Acts, Minutes of Evidence (1909). General reviews of land registration in the British Isles, the Colonies, and in foreign countries: R. Burnet Morris, as above, and C. F. Brickdale, Land Transfer in Various Countries (1894). Books on practice: England — Brick- dale and Sheldon, The Land Transfer Acts (2nd ed., 1905); Cherry and Marigold, The Land Tranfer Acts (1898); Hay, Land Registra- tion under the Land Transfer Acts (1904) ; Land Transfer, &c. (1901) ; C. F. Brickdale, Registration in Middlesex (1892). Australia — The Australian Torrens System; Hogg, The Transfer of Land Act 1890

1 Full information as to the German and Austrian systems is to be found in a Parliamentary Report of 1896 (C— 8139) on the subject.

(Melbourne). Prussia — Oberneck, Die Preussischen Grundbuch-gesetze (Berlin). Austria — Das allgemeine Grundbuchsgesetz, &c. (Vienna) ; Bartsch, Das Oesterreichische allgemeine Grundbuchsgesetz in seiner practischen Anwendung (Vienna). Saxony — Siegmann, Sachsische Ilypothekenrecht (Leipzig). Statistics — Oesterreichische Statistik (Grundbuchs-dmter) (Vienna, annually). (C. F.-Br.)

LANDSBERG AM LECH, a town in the kingdom of Bavaria, on the river Lech, 38 m. by rail W. by S. of Munich. Pop. (1905) 6505. It has eight Roman Catholic churches, among them the Liebfrauen Kirche dating from 1498, several monasteries, and a fine medieval town-hall, with frescoes by Karl von Piloty and a painting by Hubert von Herkomer. Here also are a fine gateway, the Bayer-Tor, an agricultural and other schools. Brewing, tanning and the manufacture of agricultural machinery are among the principal industries.

See Schober, Landsberg am Lech und Umgebung (1902); and Zwerger, Geschichte Landsbergs (1889).

LANDSBERG-AN-DER-WARTHE, a town in the Prussian province of Brandenburg, at the confluence of the Warthe and the Kladow, 80 m. N.E. of Berlin by rail. Pop. (1905) 36,934. It has important engine and boiler works and iron-foundries; there are also manufactures of tobacco, cloth, carriages, wools, spirits, jute products and leather. An active trade is carried on in wood, cattle and the produce of the surrounding country. Landsberg obtained civic privileges in 1257, and later was besieged by the Poles and then by the Hussites.

See R. Eckcrt, Geschichte von Landsberg- Warthe (1890).

LANDSBERG BEI HALLE, a town in Prussia on the Streng- bach, on the railway from Berlin to Weissenfels. Pop. (1905) 1770. Its industries include quarrying and malting, and the manufacture of sugar and machinery. Landsberg was the capital of a small margraviate of this name, ruled in the 12th century by a certain Dietrich, who built the town. Later it belonged to Meissen and to Saxony, passing to Prussia in 1814. LANDSEER, SIR EDWIN HENRY (1802-1873), English painter, third son of John Landseer, A.R.A., a well-known engraver and writer on art, was born at 71 Queen Anne Street East (afterwards 33 Foley Street), London, on March 7th 1802. His mother was Miss Potts, who sat to Sir Joshua Reynolds as the reaper with a sheaf of corn on her head, in ” Macklin’s Family Picture,” or ” The Gleaners.” 1 Edwin Henry Landseer began his artistic education under his father so successfully that in his fifth year he drew fairly well, and was familiar with animal character and passion. Drawings of his, at South Kensington, dated by his father, attest that he drew excellently at eight years of age; at ten he was an admirable draughtsman and his work shows considerable sense of humour. At thirteen he drew a majestic St Bernard dog so finely that his brother Thomas engraved and published the work. At this date (1815) he sent two pictures to the Royal Academy, and was described in the catalogue as ” Master E. Landseer, 33 Foley Street.” Youth forbade his being reckoned among

practising artists, and caused him to be considered as the ” Honorary Exhibitor ” of ” No. 443, Portrait of a Mule,” and ” No. 584, Portraits of a Pointer Bitch and Puppy.” Adopting the advice of B. R. Haydon, he studied the Elgin Marbles, the animals in the Tower of London and Exeter ‘Change, and dissected every animal whose carcass he could obtain. In 1816 Landseer was admitted a student of the Royal Academy schools. In 1817 he sent to the Academy a portrait of ” Old Brutus,” a much-favoured dog, which, as well as its son, another Brutus, often appeared in his later pictures. Even at this date Landseer enjoyed considerable reputation, and had more work than he could readily perform, his renown having been zealously fostered by his father in James Elmes’s Annals of the Fine Ark. At the Academy he was a diligent student and a favourite of Henry Fuseli’s, who would 1 John Landseer died February 29, 1852, aged ninety-one (or eighty-three, according to Cosmo Monkhouse). Sir Edwin’s eldest brother Thomas, an A. R.A. and a famous engraver, whose interpre- tations of his junior’s pictures have made them known throughout the world, was born in 1795, and died January 20, 1880. Charles Landseer, R.A., and Keeper of the Royal Academy, the second brother, was born in 1799, and died July 22, 1879. John Landseer’s brother Henry was a painter of some reputation, who emigrated to Australia.

look about the crowded antique school and ask, ” Where is my curly-headed dog-boy ? ” Although his pictures sold easily from the first, the prices he received at this time were compara- tively small. In 18 18 Landseer sent to the Society of Painters in Oil and Water Colours, which then held its exhibitions in Spring Gardens, his picture of ” Fighting Dogs getting Wind.” The sale of this work to Sir George Beaumont vastly enhanced the fame of the painter, who soon became ” the fashion.” This picture illustrates the prime strength of Landseer’s earlier style. Unlike the productions of his later life, it displays not an iota of sentiment. Perfectly drawn, solidly and minutely finished, and carefully composed, its execution attested the skill acquired during ten years’ studies from nature. Between 1818 and 1825 Landseer did a great deal of work, but on the whole gained little besides facility of technical expression, a greater zest for humour and a larger style. The work of this stage ended with the production of the painting called ” The Cat’s Paw,” which was sent to the British Institution in 1824, and made an enormous sensation. The price obtained for this picture, £100, enabled Landseer to set up for himself in the house No. 1 St John’s Wood Road, where he lived nearly fifty years and in which he died. During this period Landseer’s principal pictures were ” The Cat Disturbed”; “Alpine Mastiffs reanimating a Distressed Traveller,” a famous work engraved by his father; ” The Ratcatchers ” ; ” Pointers

to be " ; " The Larder Invaded " ; and " Neptune," the head and shoulders of a Newfoundland dog. In 1824 Landseer and C. R. Leslie made a journey to the High- lands — a momentous visit for the former, who thenceforward rarely failed annually to repeat it in search of studies and subjects. In 1826 Landseer was elected an A. R.A. In 1827 appeared " The Monkey who has seen the World," a picture which marked the growth of a taste for humorous subjects in the mind of the painter that had been evoked by the success of the " Cat's Paw." " Taking a Buck " (1825) was the painter's first Scottish picture. Its execution marked a change in his style which, in increase of largeness, was a great improvement. In other respects, however, there was a decrease of solid qualities; indeed, finish, searching modelling, and elaborate draughtsmanship rarely appeared in Landseer's work after 1823. The subject, as such, soon after this time became a very distinct element in his pictures; ultimately it dominated, and in effect the artist enjoyed a greater degree of popularity than technical judgment justified, so that later criticism has put Landseer's position in art much lower than the place he once occupied. Sentiment gave new charm to his works, which had previously depended on the expression of animal passion and character, and the exhibition of noble qualities of draughtsmanship. Sentimentality ruled in not a few pictures of later dates, and g«a«- human humour, or pathos, superseded that masculine animalism which rioted in its energy, and enabled the artist to rival Snyders, if not Velazquez, as a painter of beasts. After " High Life " and " Low Life," now in the Tate Gallery, London, Landseer's dogs, and even his lions and birds, were sometimes more than half civilized. It was not that these later pictures were less true to nature than their forerunners, but the models were chosen from different grades of animal society. As Landseer prospered he kept finer company, and his new patrons did not care about rat-catching and dog- fighting, however vigorously and learnedly those subjects might be depicted. It cannot be said that the world lost much when, in exchange for the " Cat Disturbed " and " Fighting Dogs getting Wind," came " Jack in Office," " The Old Shepherd's Chief Mourner," and " The Swannery invaded by Eagles," three pictures which are types of as many diverse moods of Landseer's art, and each a noble one.

Landseer was elected a Royal Academician in 1831. " Chevy Chase" (1826), which is at Woburn, "The Highland Whisky Still" (1829), "High Life" (1829) and "Low Life" (1829), besides other important works, had appeared in the interval. Landseer had by this time attained such amazing mastery that he painted "Spaniel and Rabbit " in two hours and a half, and " Rabbits," which was at the British

Institution, in three- I quarters of an hour; and the fine dog-picture ” Odin ” (1836)

was the work of one sitting, i.e. painted within twelve hours. But perhaps the most wonderful instance of his rapid but sure and dexterous brush-handling was ” The Cavalier’s Pets ” (1845), the picture of two King Charles’s spaniels in the National Gallery, which was executed in two days. Another remarkable feat consisted in drawing, simultaneously, a stag’s head with one hand and a head of a horse with the other. ” Harvest in the Highlands,” and that masterpiece of humour, ” Jack in Office,” were exhibited in 1833. In 1834 a noble work of senti- ment was given to the world in ” Suspense,” which is now at South Kensington, and shows a dog watching at the closed door of his wounded master. Many think this to be Landseer’s finest work, others prefer “The Old Shepherd’s Chief Mourner” (1837). The over-praised and unfortunate ” Bolton Abbey in the Olden Time,” a group of portraits in character, was also shown in 1834, and was the first picture for which the painter received £400. A few years later he sold ” Peace ” and ” War ” for £1500, and for the copyrights alone obtained £6000. In 1881 ” Man proposes, God Disposes ” (1864) was resold for 6300 guineas, and a cartoon of ” The Chase ” (1866) fetched 5000 guineas. ” A Distinguished Member of the Humane Society,” a dog reclining on a quay wall (i838),wassucceededby ” Dignity and Impudence ” (1839). The ” Lion Dog of Malta,” and ” Laying down the Law ” appeared in 1840. In 1842 was finished the capital ” Highland Shepherd’s Home ” (Sheep-shanks Gift), together with the beautiful ” Eos,” a portrait of Prince Albert’s most graceful of greyhounds, to which Thomas Landseer added an ineffable charm and solidity not in the paint- ing. The ” Rout of Comus ” was painted in the summerhouse of Buckingham Palace garden in 1843. The ” Challenge ” was accompanied (1844) by ” Shoeing the Bay Mare ” (Bell Gift), and followed by ” Peace ” and ” War,” and the ” Stag at Bay ” (1846). ” Alexander and Diogenes,” and a ” Random Shot,” a dˆad kid lying in the snow, came forth in 1848. In 1850 Landseer received a national commission to paint in the Houses of Parliament three subjects connected with the chase. Although they would have been worth three times as much money, the House of Commons refused to grant £1500 for these pictures, and the matter fell through, more to the artist’s profit than the nation’s gain. The famous ” Monarch of the Glen ” (1851) was one of these subjects. ” Night ” and ” Morning,” romantic and pathetic deer

subjects, came in due order (1853). For ” The Sanctuary ” (1842) the Fine Arts jury of experts awarded to the artist the great gold medal of the Exposition Universelle, Paris, 1855.

The ” Dialogue at Waterloo ” (1850), which he afterwards regarded with strong disapproval, showed how Landseer, like nearly all English artists of original power and considerable fertility, owed nothing to French or Italian training. In the same year he received the honour of knighthood. Next came ” Geneva ” (1851), ” Titania and Bottom ” (1851), which com- prises a charming queen of the fairies, and the ” Deer Pass ” (1852), followed by ” The Children of the Mist “(1853), “Saved” (1856), ” Braemar,” a noble stag, ” Rough and Ready,” and ” Uncle Tom and his Wife for Sale ” (18.57). ” The Maid and the Magpie ” (1858), the extraordinarily large cartoon called ” Deer Browsing ” (1857), ” The Twa Dogs ” (1858), and one or two minor paintings were equal to any previously produced by the artist. Nevertheless, signs of failing health were remarked in “Doubtful Crumbs” and a “Kind Star” (1859). The immense and profoundly dramatic picture called ” A Flood in the Highlands ” (i860) more than reinstated the painter before’ the public, but friends still saw ground for uneasiness. Extreme nervous excitability manifested itself in many ways, and in the choice (1864) of the dreadful subject of ” Man Proposes, God Disposes,” bears clumsily clambering among relics of Sir John Franklin’s party, there was occult pathos, which some of the artist’s intimates suspected, but did not avow. In 1862 and 1863 Landseer produced nothing; but ” A Piper and a Pair of Nutcrackers ” (1864) revealed his old power. He declined the presidentship of the Royal Academy in 1865, in succession to Sir Charles Eastlake. In 1867 the four lions which he had

modelled for the base of the Nelson Monument in Trafalgar Square, London, were unveiled, and with ” The Swannery invaded by Eagles ” (1869) he achieved his last triumph. After four years more, full of suffering, mainly of broken art and shattered mental powers, Sir Edwin Landseer died on the 1st of October 1873, and was buried, ten days later, in St Paul’s Cathedral. Those who would see the full strength of Landseer’s brush should examine his sketches and the like in the Victoria and Albert Museum and similar works. In these he shows himself endowed with the strength of Paul Potter.

See Algernon Graves’s Catalogue of the Works of the late Sir Edwin Landseer, R.A. (London, n.d.); Frederic G. Stephens’s Sir Edwin Landseer (1880) ; W. Cosmo Monkhouse’s The Studies of Sir Edwin Landseer, R.A., with a History of his Art-Life (London, n.d.) ; W. P Frith’s My Autobiography and Reminiscences (1887) ; Vernon Heath’s

Recollections (1892) ; and James A. Manson's " Sir Edwin Landseer, R.A.," The Makers of British Art (London, 1902).

LAND'S END, a promontory of Cornwall, forming the western most point of England. It is a fine headland of granite, pierced by a natural arch, on a coast renowned for its cliff scenery. Dangerous reefs lie off the point, and one group a mile from thw mainland is marked by the Longships Lighthouse, in 50° 4′ N. 5° 43′ W. The Land's End is the westernmost of the granite masses which rise at intervals through Cornwall from Dartmooj^, The phenomenon of a raised beach may be seen here, but indica- tions of a submerged forest have also been discovered in the neighbourhood.

LANDSHUT, a town in the kingdom of Bavaria, on the right bank of the Isar, 40 m. N.E. of Munich on the main line of rail- way to Regensburg. Pop. (1905) 24,217. Landshut is still a quaint, picturesque place; it consists of an old and a new town and of four suburbs, one part of it lying on an island in the Isar. It contains a fine street, the Altstadt, and several interesting medieval buildings. Among its eleven churches the most note- worthy are those of St Martin, with a tower 432 ft. high, of St Jodocus, and of the Holy Ghost, or the Hospital church, all three begun before 1410. The former Dominican convent, founded in 1 27 1, once the seat of the university, is now used as public offices. The post-office, formerly the meeting-house of the Estates, a building adorned with old frescoes; the royal palace, which contains some very fine Renaissance work ; and the town- hall, built in 1446 and restored in i860, are also noteworthy. The town has monuments to the Bavarian king, Maximilian II., and to other famous men; it contains a botanical garden and a public park. On a hill overlooking Landshut is the castle of Trausnitz, called also Burg Landshut, formerly a stronghold of the dukes of Lower Bavaria, whose burial-place was at Seligenthal also near the town. The original building was erected early in the 13th century, but the chapel, the oldest part now existing, dates from the 14th century. The upper part of the castle has been made habitable. The industries of Landshut are not important; they include brewing, tanning and spinning, and the manufacture of tobacco and cloth. Market gardening and an extensive trade in grain are also carried on.

Landshut was founded about 1204, and from 1255 to 1503 it was the principal residence of the dukes of Lower Bavaria and of their successors, the dukes of Bavaria-Landshut. During the Thirty Years' War it was captured several times by the Swedes and in the 18th century by the Austrians. In April 1809 Napoleon defeated the Austrians here and the town was stormed by his troops. From 1800 to

1826 the university, formerly at Ingolstadt and now at Munich, was located at Lands- hut. Owing to the three helmets which form its arms the town is sometimes called ” Dreihelm Stadt.”

See Staudenraus, Chronik der Stadt Landshut, (Landshut 1832); Wiesend, Topographische Geschichte von Landshut (Landshut, 1858) ; Rosenthal, Zur Rechts geschichte der Stadte Landshut und Straubing (Wiirzberg, 1883); Kalcher, Fuhrer durch Landshut (Landshut, 1887) ; Haack, Die gotische Architektur und Plastik der Stadt Lands- hut (Munich, 1894); and Geschichte der Stadt Landshut (Landshut,

1835)- . –

LANDSKNECHT, a German mercenary foot-soldier of the 16th century. The name (German for ” man of the plains “) was given to mark the contrast between the force of these

soldiers, formed by the emperor Maximilian I. about the end of the 15th century, and the Swiss, the ” men of the mountains,” at that time the typical mercenary infantry of Europe. After the battles of Marignan and Pavia, where the military reputa- tion of the Swiss had been broken, the Swabian landsknechte came to be considered the best fighting troops in Europe. Though primarily a German force and always the mainstay of imperial armies, they served in organized bodies as mercenaries elsewhere in Europe; in France they fought for the League and for the Protestants indiscriminately. In fact landsknecht, and more particularly its French corruption lansquenet, became in western Europe a general term for mercenary foot-soldiers. It is owing to the lange Spiesse (long pike or lance), the typical weapon with which they were armed, that the corrupted French form, as well as a German form, lanzknecht, and an English “lance- knight ” came into use.

The landsknechts were raised by colonels (Oberst), to whom the emperor issued recruiting commissions corresponding to the English ” indents “; they were organized in regiments made up of a colonel, lieut. colonel and regimental staff, with a varying number of companies, “colours” (Fdhnlein), commanded by captains (Hauptmann); subaltern officers were lieutenants and ensigns {Fdhnrich). In thus defining the titles and duties of each rank, and in almost every detail of regimental customs and organization, discipline

and interior economy, the lands knechts may be considered as the founders of the modern military system on a regimental basis (see further Army).

LANDSKRONA, a seaport of Sweden, on the east side of the Sound, 15 m. N.E. of Copenhagen. Pop. (1900) 14,399. The harbour is excellent, giving a depth of 35 ft., with 15 ft. beside the quays. The town is among the first twelve manufacturing centres of Sweden in value of output, the principal industries being tanning and sugar manufacture and refining from beetroot. On the little island of Hven, immediately opposite the town, Tycho Brahe built his famous subterranean observatory of Uranien- borg in the second half of the 16th century. Landskrona, originally called Landora or Landor, owed its first importance to King Erik XIII., who introduced a body of Carmelite monks from Germany in 1410, and bestowed on the place the privileges of a town. During the wars of the 16th and 17th centuries it played too conspicuous a part for its own prosperity. On the 24th of July 1677 a great naval battle was fought in the neigh- bourhood in which the Swedes defeated the Danes.

LANDSTURM, the German equivalent of the levee en masse, or general levy of all men capable of bearing arms and not included in the other regularly organized forces, standing army or its second line formations, of Continental nations.

LANDWEHR, a German word meaning ” defence of the country”; but the term as applied to an insurrectional militia is very ancient, and ” lantveri ” are mentioned in Baluzii Capitularia, as quoted in Hallam’s Middle Ages, i. 262, 10th ed. The landwehr in Prussia was first formed by a royal edict of the 17th 01 March 1813, which called up all men capable of bearing arms between the ages of eighteen and forty-five, and not serving in the regular army, for the defence of the country. After the peace of 181 5 this force was made an integral part of the Prussian army, each brigade being composed of one line and one landwehr regiment. This, however, retarded the mobiliza- tion and diminished the value of the first line, and by the re-organization of 1859 the landwehr troops were relegated to the second line. In Austria the landwehr is a totally different organization. It is in reality a cadre force existing alongside the regular army, and to it are handed over such recruits as, for want of vacancies, cannot be placed in the latter. In Switzer- land the landwehr is a second line force, in which all citizens serve for twelve years, after passing twelve in the ” Auszug ” or field army.

LANE, EDWARD WILLIAM (1801-1876), English Arabic scholar, son of

Dr Theophilus Lane, prebendary of Hereford, was born on the 17th of September 1801. He was educated at Bath and Hereford grammar schools, where he showed marked mathematical ability, and was designed for Cambridge and the

church, but this purpose was abandoned, and for some time he studied the art of engraving. Failure of health compelled him to throw aside the burin, and in 1 8 2 5 he started for Egypt, where he spent three years, twice ascended the Nile, proceeding as far as the second cataract, and composed a complete description of Egypt, with a portfolio of one hundred and one drawings. This work was never published, but the account of the modern Egyptians, which formed a part of it, was accepted for separate publication by the Society for the Diffusion of Useful Knowledge. To perfect this work Lane again visited Egypt in 1833-1835, residing mainly in Cairo, but retiring to Luxor during the plague of 1835. Lane took up his residence in the Mahommedan quarter, and under the name of Mansur Effendi lived the life of an Egyptian scholar. He was fortunate in the time when he took up his work, for Cairo had not then become a modern city, and he was thus able to describe aspects of Arabian fife that no longer exist there. Perfected by the additional observations collected during these years, the Modern Egyptians appeared in 1836, and at once took the place which it has never lost as the best description of Eastern life and an Eastern country ever written. It was followed from 1838 to 1840 by a translation of the Arabian Nights, with notes and illustrations, designed to make the book a sort of encyclopaedia of Eastern manners. The translation itself is an admirable proof of scholarship, but is characterized by a somewhat stilted mannerism, which is not equally appropriate to all parts of the motley-coloured original. The character of some of the tales and the tedious repetitions of the same theme in the Arabic collection induced Lane to leave considerable parts of the work untranslated. The value of his version is increased by the exhaustive notes on Mahommedan life and customs. In 1840 Lane married a Greek lady. A useful volume of Selections from the Kur-an was published in 1843, but before it passed through the press Lane was again in Egypt, where he spent seven years (1842-1849) collecting materials for a great Arabic lexicon, which the munificence of Lord Prudhoe (afterwards duke of Northumberland) enabled him to undertake. The most important of the materials amassed during this sojourn (in which he was accompanied by his wife and by his sister, Mrs Poole, authoress of the Englishwoman in Egypt, with her two sons, afterwards well known in Eastern letters) was a copy in 24 thick quarto volumes of Sheikh Mur-tada's great lexicon, the Taj el ' Arus, which, though itself a

compilation, is so extensive and exact that it formed the main basis of Lane's subsequent work. The author, who lived in Egypt in the 18th century, used more than a hundred sources, interweaving what he learned from them with the al-Qamus of Fairuzabadl in the form of a commentary. By far the larger part of this commentary was derived from the Lisdn el 'Arab of Ibn Mokarram, a work of the 13th century, which Lane v/as also able to use while in Cairo.

Returning to England in 1849, Lane devoted the remaining twenty-seven years of his life to digesting and translating his Arabic material in the form of a great thesaurus of the lexico- graphical knowledge of the Arabs. In spite of weak health he continued this arduous task with unflagging diligence till a few days before his death at Worthing on the 10th of August 1876. Five parts appeared during his lifetime (1863-1874), and three posthumous parts were afterwards edited from his papers by S. Lane-Poole. Even in its imperfect state the Lexicon is an enduring monument, the completeness and finished scholarship with which it is executed making each article an exhaustive monograph. Two essays, the one on Arabic lexicography and the other on Arabic pronunciation, contributed to the magazine of the German Oriental Society, complete the record of Lane's publications. His scholarship was recognized by many learned European societies. He was a member of the German Oriental Society, a correspondent of the French Institute, &c. In 1863 he was awarded a small civil list pension, which was after his death continued to his widow. Lane was not an original mind; his powers were those of observation, industry and sound judgment. His personal character was elevated and pure, his strong sense of religious and moral duty being of the type that

characterized the best circles of English evangelicalism in the early part of the 19th century.

A Memoir, by his grand-nephew, S. Lane-Poole, was prefixed to part vi. of the Lexicon. It was published separately in 1877.

LANE, GEORGE MARTIN (1823-1897), American scholar, was born at Charlestown, Massachusetts, on the 24th of December 1823. He graduated in 1846 at Harvard, and in 1847-1851 studied at the universities of Berlin, Bonn, Heidelberg and Gottingen. In 1851 he received his doctor's degree at Gottingen for his dissertation Smymaeorum Res Gestae et Anliquitates, and on his return to America

he was appointed University Professor of Latin in Harvard College. From 1869 until 1894, when he resigned and became professor emeritus, he was Pope Professor of Latin in the same institution. His Latin Pro- nunciation, which led to the rejection of the English method of Latin pronunciation in the United States, was published in 1871. He died on the 30th of June 1897. His Latin Grammar, com- pleted and published by Professor M. H. Morgan in the following year, is of high value. Lane's assistance in the preparation of Harper's Latin lexicons was also invaluable. English light verse he wrote with humour and fluency, and his song Jonah and the Ballad of the Lone Fishball were famous.

LANE, JAMES HENRY (1814-1866), American soldier and politician, was born at Lawrenceburg, Indiana, on the 22nd of June 1814. He was the son of Amos Lane (1778-1849), a political leader in Indiana, a member of the Indiana House of Representatives in 1816-1818 (speaker in 1817-1818), in 1821- 1822 and in 1839-1840, and from 1833 to 1837 a Democratic representative in Congress. The son received a common school education, studied law and in 1840 was admitted to the bar. In the Mexican War he served as a colonel under General Taylor, and then commanded the Fifth Indiana regiment (which he had raised) in the Southern Campaign under General Scott. Lane was lieutenant-governor of Indiana from 1849 to 1853, and from 1853 to 1855 was a Democratic representative in Congress. His vote in favour of the Kansas-Nebraska Bill ruined his political future in his own state, and he emigrated in 1855 to the Territory of Kansas, probably as an agent of Stephen A.Douglas to organize the Democratic party there. He soon joined the Free State forces, however, was a member of the first general Free State convention at Big Springs in September 1855, and wrote its " platform," which deprecated abolitionism and urged the exclusion of negroes from the Territory; and he presided over the Topeka Constitutional Convention, composed of Free State men, in the autumn of 1855. Lane was second in command of the forces in Lawrence during the " Wakarusa War "; and in the spring of 1856 was elected a United States senator under the Topeka Constitution, the validity of which, however, and therefore the validity of his election, Congress refused to recognize. In May 1856, with George Washington Deitzler (1826-1884), Dr Charles Robinson, and other Free State leaders, he was indicted for treason; but he escaped from Kansas, made a tour of the northern cities, and by his fiery oratory aroused great enthusiasm in behalf of the Free State movement in Kansas. Returning to the Territory with John Brown in August 1856, he took an active part in the domestic feuds of 1856-1857. After Kansas became a state, Lane was elected in 1861 to

the United States Senate as a Republican. Immediately on reaching Washington he organized a company to guard the President; and in August 1861, having gained the ear of the Federal author- ities and become intimate with President Lincqln, he went to Kansas with vague military powers, and exercised them in spite of the protests of the governor and the regular departmental com- manders. During the autumn, with a brigade of 1500 men, he conducted a devastating campaign on the Missouri border, and in July 1862 he was appointed commissioner of recruiting for Kansas, a position in which he rendered faithful service, though he frequently came into conflict with the state authorities. At this time he planned a chimerical ” great Southern expedition ” against New Mexico, but this came to nothing. In 1864 he laboured earnest ly for the re-election of Lincoln. When President Johnson quarrelled with the Radical Republicans, Lane deserted

the latter and defended the Executive. Angered by his defection, certain senators accused him of being implicated in Indian contracts of a fraudulent character; and in a fit of depression following this accusation he took his own life, dying near Fort Leavenworth, Kansas, on the nth of July 1866, ten days after he had shot himself in the head. Ambitious, unscrupulous, rash and impulsive, and generally regarded by his contemporaries as an unsafe leader, Lane was a man of great energy and personal magnetism, and possessed oratorical powers of a high order.

See the article by L. W. Spring entitled ” The Careen of a Kansas Politician,” in vol. iv. (October 1898) of the American Historical Review ; and for the commoner view, which makes him not a coward as does Spring, but a ” grim chieftain ” and a hero, see John Speer, Life of Gen. James H. Lane, ” The Saviour of Kansas,” (Garden City, Kansas, 1896).

Senator Lane should not be confused with James Henry Lane (1833-1907), who served on the Confederate side during the Civil War, attaining the rank of brigadier-general in 1862, and after the war was professor of natural philosophy and military tactics in the Virginia Agricultural and Mechanical College from 1872 to 1880, and professor of civil engineering and drawing in the Alabama Poly- technic Institute from 1882 until his death.

LANESSAN, JEAN MARIE ANTOINE DE (1843-), French statesman and naturalist, was born at Sainte-Andre de Cubzac (Gironde) on the 13th of July 1843. He entered the navy in 1862, serving on the East African and Cochin-China stations in the medical department until the

Franco-German War, when he resigned and volunteered for the army medical service. He now completed his studies, taking his doctorate in 1872. Elected to the Municipal Council of Paris in 1879, he declared in favour of communal autonomy a”nd joined with Henri Rochefort in demanding the erection of a monument to the Communards; but after his election to the Chamber of Deputies for the 5th arrondissement of Paris in 1881 he gradually veered from the extreme Radical party to the Republican Union, and identified himself with the cause of colonial expansion. A government mission to the French colonies in 1886-1887, in connexion with the approaching Paris exhibition, gave him the opportunity of studying colonial questions, on which, after his return, he published three works: La Tunisie (Paris, 1887); L’Expansion coloniale de la France (ib., 1888), L’Indo-Chine franQaise (ib., 1889). In 1891 he was made civil and military governor of French Indo-China, where his administration, which involved him in open rupture with Admiral Fournier, was severely criticized. Nevertheless he consolidated French influ- ence in Annam and Cambodia, and secured a large accession of territory on the Mekong river from the kingdom of Siam. He was recalled in 1894, and published an apology for his administration (La Colonisation francaise en Indo-Chine) in the following year. In the Waldeck-Rousseau cabinet of 1899 to 1902 he was minister of marine, and in 1901 he secured the passage of a naval programme intended to raise the French navy during the next six years to a level befitting the place of France among the great powers. At the general election of 1906 he was not re-elected. He was political director of the Siecle, and president of the French Colonization Society, and wrote, besides the books already mentioned, various works on political and biological questions.

LANFRANC (d. 1089), archbishop of Canterbury, was a Lombard by extraction. He was born in the early years of the nth century at Pavia, where his father, Hanbald, held the rank of a magistrate. Lanfranc was trained in the legal studies for which northern Italy was then becoming famous, and acquired such proficiency that tradition links him with Irnerius of Bologna as a pioneer in the renaissance of Roman law. Though designed for a public career Lanfranc had the tastes of a student. After his father’s death he crossed the Alps to found a school in France; but in a short while he decided that Normandy would afford him a better field. About 1039 he became the master of the cathedral school at Avranches, where he taught for three ‘years with conspicuous success. But in 1142 he embraced the monastic profession in the newly founded house of Bee. Until 1145 he lived at Bee in absolute seclusion. He was then persuaded by Abbot Herluin to open a school in the

monastery. From the first he was celebrated (totius Latinitatis magister). His pupils were drawn not only from France and Normandy, but also from Gascony, Flanders, Germany and Italy. Many of them afterwards attained high positions in the Church; one, Anselm of Badagio, became pope under the title of Alexander II. In this way Lanfranc set the seal of intellectual activity on the reform movement of which Bee was the centre. The favourite subjects of his lectures were logic and dogmatic theology. He was therefore naturally invited to defend the doctrine of transubstantiation against the attacks of Berengar of Tours. He took up the task with the greatest zeal, although Berengar had been his personal friend; he was the protagonist of orthodoxy at the councils of Vercelli (1050), Tours (1054) and Rome (1059). To his influence we may attribute the desertion of Berengar's cause by Hildebrand and the more broad-minded of the cardinals. Our knowledge of Lanfranc's polemics is chiefly derived from the tract De corpore el sanguine Domini which he wrote many years later (after 1079) when Berengar had been finally condemned. Though betraying no signs of metaphysical ability, his work was regarded as conclusive and became a text-book in the schools. It is the most important of the works attributed to Lanfranc; which, considering his reputation, are slight and disappointing.

In the midst of his scholastic and controversial activities Lanfranc became a political force. While merely a prior of Bee he led the opposition to the uncanonical marriage of Duke William with Matilda of Flanders (1053) and carried matters so far that he incurred a sentence of exile. But the quarrel was settled when he was on the point of departure, and he undertook the difficult task of obtaining the pope's approval of the marriage. In this he was successful at the same council which witnessed his third victory over Berengar (1059), and he thus acquired a lasting claim on William's gratitude. In 1066 he became the first abbot of St Stephen's at Caen, a house which the duke had been enjoined to found as a penance for his disobedience to the Holy See. Henceforward Lanfranc exercised a perceptible influence on his master's policy. William adopted the Cluniac programme of ecclesiastical reform, and obtained the support of Rome for his English expedition by assuming the attitude of a crusader against schism and corrup- tion. It was Alexander II., the former pupil of Lanfranc, who gave the Norman Conquest the papal benediction — a notable advantage to William at the moment, but subsequently the cause of serious embarrassments.

Naturally, when the see of Rouen next fell vacant (1067), the thoughts of the electors turned to Lanfranc. But he declined the honour, and he was nominated to the English primacy as soon as Stigand had been canonically deposed (1070). The new archbishop at once began a policy of reorganization and reform. His first difficulties were with Thomas of Bayeux, archbishop- elect of York, who asserted that his see was independent of Canterbury and claimed jurisdiction over the greater part of midland England. Lanfranc, during a visit which he paid the pope for the purpose of receiving his pallium, obtained an order from Alexander that the disputed points should be settled by a council of the English Church. This was held at Winchester in 1072. Thanks to a skilful use of forged documents, the primate carried the council's verdict upon every point. Even if he were not the author of the forgeries he can scarcely have been the dupe of his own partisans. But the political dangers to be apprehended from the disruption of the English Church were sufficiently serious to palliate the fraud. This was not the only occasion on which Lanfranc allowed his judgment to be warped by considerations of expediency. Although the school of Bee was firmly attached to the doctrine of papal sovereignty, he still assisted William in maintaining the independence of the English Church; and appears at one time to have favoured the idea of maintaining a neutral attitude on the subject of the quarrels between papacy and empire. In the domestic affairs of England the archbishop showed more spiritual zeal. His grand aim was to extricate the Church from the fetters of the state and of secular interests. He was a generous patron of

monasticism. He endeavoured to enforce celibacy upon the secular clergy. He obtained the king's permission to deal with the affairs of the Church in synods which met apart from the Great Council, and were exclusively composed of ecclesiastics. Nor can we doubt that it was his influence which shaped the famous ordinance separating the ecclesiastical from the secular courts (c. 1076). But even in such questions he allowed some weight to political considerations and the wishes of his sovereign. He acknowledged the royal right to veto the legislation of national synods. In the cases of Odo of Bayeux (1082) and of William of St Calais, bishop of Durham (1088), he used his legal ingenuity to justify the trial of bishops before a lay tribunal. He acceler- ated the process of substituting Normans for Englishmen in all preferments of importance; and although his nominees were usually respectable, it cannot be said that all of them were better than the men whom they superseded. For this admixture of secular with spiritual aims there was considerable excuse. By long tradition the primate was entitled to a leading position in the king's councils; and

the interests of the Church demanded that Lanfranc should use his power in a manner not displeasing to the king. On several occasions when William I. was absent from England Lanfranc acted as his vicegerent; he then had opportunities of realizing the close connexion between religious and secular affairs.

Lanfranc's greatest political service to the Conqueror was rendered in 1075, when he detected and foiled the conspiracy which had been formed by the earls of Norfolk and Hereford. But this was not the only occasion on which he turned to good account his influence with the native English. Although he regarded them as an inferior race he was just and honourable towards their leaders. He interceded for Waltheof's life and to the last spoke of the earl as an innocent sufferer for the crimes of others; he lived on terms of friendship with Bishop Wulfstan. On the death of the Conqueror (1087) he secured the succession for William Rufus, in spite of the discontent of the Anglo-Norman baronage; and in 1088 his exhortations induced the English militia to fight on the side of the new sovereign against Odo of Bayeux and the other partisans of Duke Robert. He exacted promises of just government from Rufus, and was not afraid to remonstrate when the promises were disregarded. So long as he lived he was a check upon the worst propensities of the king's administration. But his restraining hand was too soon removed. In 1089 he was stricken with fever and he died on the 24th of May amidst universal lamentations. Notwithstand- ing some obvious moral and intellectual defects, he was the most eminent and the most disinterested of those who had co-operated with William I. in riveting Norman rule upon the English Church and people. As a statesman he did something to uphold the traditional ideal of his office; as a primate he elevated the standards of clerical discipline and education. Conceived in the Hildebrandine spirit, his reforms led by a natural sequence to strained relations between Church and State; the equilibrium which he established was unstable, and depended too much upon his personal influence with the Conqueror. But of all the Hildebrandine statesmen who applied their teacher's ideas within the sphere of a particular national church he was the most successful.

The chief authority is the Vita Lanfranci by Milo , Crispin, who was precentor at Bee and died in 1149. Milo drew largely upon the Vila Herluini, composed by Gilbert Crispin, abbot of Westminster. The Chronicon Beccensis abbatiae, a 14th-century compilation, should also be consulted. The first edition of these two sources, and of Lanfranc's writings, is that of L. dAchery, Beati Lanfranci opera omnia (Paris, 1648). Another edition, slightly enlarged, is that of J. A. Giles, Lanfranci opera (2 vols., Oxford, 1844). The correspondence between

Lanfranc and Gregory VII. is given in the Monumenta Gregoriana (ed. P. Jaff6, Berlin, 1865). Of modern works A. Charma' s Lanfranc (Paris, 1849), H. Boehmer'sZWe Fdlschungen Erzbischof Lanf ranks von Canterbury (Leipzig, 1902), and the same author's Kirche una Staat in England und in der Normandie (Leipzig, 1899) are useful. See also the authorities cited in the articles on William I. and William II. (H. W. C. D.)

LANFREY, PIERRE (1828-1877), French historian and politician, was born at Chambery (Savoie) on the 26th of October

1828. His father had been one of Napoleon's officers. The son studied philosophy and history in Paris and wrote historical works of an anti-clerical and rationalizing tendency. These included L'Eglise et les philosophes ou XVIII" siecle (1855; new edition, with a notice of the author by E. de Pressense, 1879); Essai sur la revolution francaise (1858); Histoire politique des papes (i860); Lettres d' Everard (i860), a novel in the form of letters; Le Ritablissement de la Pologne (1863). His magnum opus was his Histoire de Napoleon I" (5 vols., 1867-1875 and 1886; Eng. trans., 4 vols., 1871-1870), which ceased unfortunately at the end of 181 1 with the preparations for the Russian campaign of 18 1 2. This book, based on the emperor's correspondence published in 1858-1870, attempted the destruction of the legends which had grown up around his subject, and sought by a critical examination of the documents to explain the motives of his policy. In his desire to controvert current misconceptions and exaggerations of Napoleon's abilities Lanfrey unduly minimized his military and administrative genius. A stanch republican, he was elected to the National Assembly in 187 1, became ambassador at Bern (1871-1873), and life senator in 1875. He died at Pau on the 15th of November 1877.

HisOEuvres completes were published in 12 vols. (1879 seq.), and his Correspondance in 2 vols. (1885).

LANG, ANDREW (1844-), British man of letters, was born on the 31st of March 1844, at Selkirk, Scotland. He was educated at the Edinburgh Academy, St Andrews University and at Balliol College, Oxford, where he took a first class in the final classical schools in 1868, becoming a fellow and subse- quently honorary fellow of Merton College. As a journalist, poet, critic and historian, he soon made a reputation as one of the ablest and most versatile writers of the day. His first publication was a volume of metrical experiments, The Ballads and Lyrics of Old France (1872), and this was followed at intervals by other volumes of dainty verse, xxii. Ballades in Blue China (1880, enlarged edition, 1888), Ballads and Verses Vain (1884), selected by Mr Austin Dobson; Rhymes a la Mode (1884), Grass of Parnassus (1888), Ban and Arriere Ban (1894), New Collected Rhymes (1905). He collaborated with S. II. Butcher in a prose translation (1879) of the Odyssey, and with E. Myers and Walter Leaf in a prose version (1883) of the Iliad, both of them remark- able for accurate scholarship and excellence of style. As a Homeric scholar, of conservative views, he took a high rank. His Homer and the Epic appeared in 1893; anew prose translation of The Homeric Hymns in 1899, with essays literary and mytho- logical, in which parallels to the Greek myths are given from the traditions of savage races; and his Homer and his Age in 1906. His purely journalistic activity was from the first of a varied description, ranging from sparkling ” leaders ” for the Daily News to miscellaneous articles for the Morning Post, and for many years he was literary editor of Longman’s Magazine; no critic was in more request, whether for occasional articles and introductions to new editions or as editor of dainty reprints. To the study of Scottish history Mr Lang brought a scholarly care for detail, a piquant literary style, and a gift for disentangl- ing complicated questions. The Mystery of Mary Stuart (1901, new and revised ed., 1904) was a consideration of the fresh light thrown on Mary’s history by the Lennox MSS. in the University library, Cambridge, strengthening her case by restating the perfidy of her accusers. He also wrote monographs on The Portraits and Jewels of Mary Stuart (1906) and James VI. and the Cowrie Mystery (1902). The somewhat unfavourable view of John Knox presented in his book John Knox and the Reformation (1905) aroused considerable controversy. He gave new informa- tion about the continental career of the Young Pretender in Pickle the Spy (1897), an account of Alastair Ruadh Macdonell, whom he identified with Pickle, a notorious Hanoverian spy. This was followed in 1898 by The Companions of Pickle, and in 1900 by a

monograph. on Prince Charles Edward. In 1900 he began a History of Scotland from the Roman Occupation, the fourth volume of which (1907) brought Scottish history down to 1 746. The Valet's Tragedy (1903), which takes its title from an essay on the" Man with the Iron Mask," (see Ikon Mask), collects

twelve papers on historical mysteries, and A Monk of Fife

(1896) is a fictitious narrative purporting to be written by

a young Scot in France in 1429-1431. Mr Lang's versatility

was also shown in his valuable works on folk-lore and on primitive

religion. The earliest of these works was Custom and Myth

(1884); in Myth, Literature and Religion (2 vols., 1887, French

trans., 1896) he explained the irrational elements of mythology

as survivals from earlier savagery; in The Making of Religion

(an idealization of savage animism) he maintained the existence

of high spiritual ideas among savage races, and instituted

comparisons between savage practices and the 'occult phenomena

among civilized races; he dealt with the origins of totemism (q.v.)

in Social Origins, printed (1903) together with J. J. Atkinson's

Primal Law. He was one of the founders of the study of

" Psychical Research," and his other writings on anthropology

include The Book of Dreams and Ghosts (1 897) , Magic and Religion

(1001) and The Secret of the Totem (1905). He carried the

humour and sub-acidity of discrimination which marked his

criticism of fellow folk-lorists into the discussion of purely

literary subjects in his Books and Bookmen (1886), Letters to

Dead Authors (1886), Letters on Literature (1889), &c. His Blue

Fairy Talc Book (1889), beautifully produced and illustrated, was followed annually at Christmas by a book of fairy tales and romances drawn from many sources. He edited The Poems and Songs of Robert Burns (1896), and was responsible for the Life and Letters (1897) of J. G. Lockhart, and The Life, Letters and Diaries (1890) of Sir Stafford Northcote, first earl of Iddesleigh.

LANG, KARL HEINRICH, Ritter von (1 764-1835), German historian, was born on the 7th of June 1764 at Balgheim, near Nordlingen. From the first he was greatly attracted towards historical studies, and this was shown when he began to attend the gymnasium of Oettingen, and in 1782, when he went to the university of Altdorf, near Nuremberg. At the same time he studied jurisprudence, and in 1782 became a government clerk at Oettingen. About the same period began his activities as a journalist and publicist. But Lang did not long remain an official. He was of a restless, changeable character, which constantly involved him in personal quarrels, though he was equally quick to retire from them. In 1788 he obtained a position as private tutor in Hungary, and in 1789 became private secretary to Baron von Biihler, the envoy of Wurttemberg at Vienna. This led to further travels and to his entering the service of the prince of Oettingen-Wallerstein. In 1792 Lang again betook himself to a university, this time to Gottingen. Here he came under the influence of the historian, Ludwig

Timotheus Spittler, from whom, as also from Johannes von Miiller and Friedrich Schlegel, his historical studies received a fresh impulse. At intervals from 1793 to 1801 Lang was closely connected with the Prussian statesman Hardenberg, who employed him as his private secretary and archivist, and in 1797 he was present with Hardenberg at the congress of Rastadt as secretary to the legation. He was occupied chiefly with affairs of the principalities of Anspach and Bayreuth, newly acquired by Prussia, and especially in the settlement of disputes with Bavaria as to their boundaries.

When in 1805 the principalities became part of Bavaria, Lang entered the Bavarian service (1806), was ennobled in 1808 and from i8iotoi8i7 held the office of archivist in Munich. He again devoted himself with great enthusiasm to historical studies, which naturally dealt chiefly with Bavarian history. He evolved the theory, among other things, that the boundaries of the old counties or pagi (Gaue) were identical with those of the dioceses. This theory was combated in later days, and caused great confusion in the province of historical geography. For the rest, Lang did great service to the study of the history of Bavaria, especially by bringing fresh material from the archives to bear upon it. He also kept up his activity as a publicist, in 1814 defending in a detailed and somewhat biassed pamphlet the policy of the minister Montgelas, and he undertook critical studies in the history of -the Jesuits. In 1817 Lang retired from active life, and until his death, which took place on the 26th of March 1835, lived chiefly in Ansbach.

Lang is best known through his Memoiren, which appeared at Brunswick in two parts in 1842, and were republished in 1881 in a second edition. They contain much of interest for the history of the period, but have to be used with the greatest caution on account of their pronounced tendency to satire. Lang’s character, as can be

gathered especially from a considera- tion of his behaviour at Munich, is darkened by many shadows. He did not scruple, for instance, to strike out of the lists of witnesses to medieval charters, before publishing them, the names of families which he disliked.

Of his very numerous literary productions the following may be mentioned : Beitrdge zur Kenntnis der nalilrlichen und politischen Verfassung des oettingischen Vaterlandes (1786); Ein Votum liber den Wucher von einem Manne sine voto (1791); Historische Entwicklung der dentschen Steuerverfassungen (1793); Historische Prufung des icrmeintlichen Alters der deutschen Landstdnde (1796); Neuere Geschichte des Filrstentums Bayreuth (1486-1603) (1798-1811); Tabellen fiber Fldcheninha.lt &c. und bevorstehende Verluste de v deutschen Reichsstdnde. (On the occasion of the congress of Rastadt, 1798); Der Minister Graf von Monlgelas (1814); Geschichte der Jesuiten in Bayern (1819) ; and Bayerns Gauen (Nuremberg, 1830).

See K. Th. v. Heigel, Augsburger allgemeine Zeitung for 1878, p. 1969 et scq., 1986 et seq. (Beilage of the 14th and 15th of May) ; F. Muncker, in Allgemeine deutsche Biographie, vol. xvii. (1883); F. X. v. Wegele, Geschichte der deutschen Historiographie (1885).

(J. Hn.)

LANGDELL, CHRISTOPHER COLUMBUS (1826-1906), American jurist, was born in New Boston, Hillsborough county, New Hampshire, on the 22nd of May 1826, of English and Scotch-Irish ancestry. He studied at Phillips Exeter Academy in 1845-1848, at Harvard College in 1848-1850 and in the Harvard Law School in 1851-1854. He practised law in 1854- 1870 in New York City, but he was almost unknown when, in January 1870, he was appointed Dane professor of law (and soon afterwards Dean of the Law Faculty) of Harvard University, to succeed Theophilus Parsons, to whose Treatise on the Law of Contracts (1853) he had contributed as a student. He resigned the deanship in 1895, in 1900 became Dane professor emeritus, and on the 6th of July 1906 died in Cambridge. He received the degree of LL.D. in 1875; in 1903 a chair in the law school was named in his honour; and after his death one of the school's buildings was named Langdell Hall. He made the Harvard Law School a success by remodelling its administration and by introducing the " case " system of instruction.

Langdell wrote Selection of Cases on the Law of Contracts (1870, the first book used in the "case" system; enlarged, 1877); Cases on Sales (1872); Summary of Equity Pleading (1877, 2nd ed., 1883); Cases in

Equity Pleading (1883); and Brief Survey of Equity Juris- diction (1905).

LANGDON, JOHN (1741-1819), American statesman, was born in Portsmouth, New Hampshire, on the 25th of June 1741. After an apprenticeship in a counting-house, he led a seafaring life for several years, and became a shipowner and merchant. In December 1774, as a militia captain he assisted in the capture of Fort William and Mary at New Castle, New Hampshire, one of the first overt acts of the American colonists against the property of the crown. He was elected to the House of Repre- sentatives of the last Royal Assembly of New Hampshire and then to the second Continental Congress in 1775, and was a member of the first Naval Committee of the latter, but he resigned in 1776, and in June 1776 became Congress's agent of prizes in New Hampshire and in 1778 continental (naval) agent of Congress in this state, where he supervised the building of John Paul Jones's "Ranger" (completed in June 1777), the " America," launched in 1782, and other vessels. He was a judge of the New Hampshire Court of Common Pleas in 1776- 1777, a member (and speaker) of the New Hampshire House of Representatives from 1776 until 1782, a member of the state Constitutional Convention of 1778 and of the state Senate in 1 784-1 785, and in 1 783-1 784 was again a member of Congress. He contributed largely to raise troops in 1777 to meet Burgoyne; and he served as a captain at Bennington and at Saratoga. He was president of New Hampshire in 1785-1786 and in 1788-1789; a member of the Federal Constitutional Convention in 1787, where he voted against granting to Congress the power of issuing paper money; a member of the state convention which

ratified the Federal Constitution for New Hampshire; a member of the United States Senate in 1789-1801, and its president pro tern, during the first Congress and the second session of the second Congress; a member of the New Hampshire House of Representatives in 1801-1805 and its speaker in 1803-1805; and governor of the state in 1805-1809 and in 1810-1812. He received nine electoral votes for the vice-presidency in 1808, and in 181 2 was an elector on the Madison ticket. He died in Portsmouth on the 18th of September 1819. He was an able leader during the Revolutionary period, when his wealth and social position were of great assistance to the patriot party. In the later years of his life in New Hampshire he was the most prominent of the local Republican leaders and built up his party by partisan appointments. He refused the naval portfolio in Jefferson's cabinet.

His elder brother, Woodbury Langdon (1 739-1805), was a delegate to the Continental Congress in 1779-1780, a member of the executive

council of New Hampshire in 1781-1784, judge of the Supreme Court of the state in 1782 and in 1 786-1 790 (although he had had no legal training), and a state senator in

1784-1785.

Alfred Langdon Elwyn has edited Letters by Washington, Adams, Jefferson and Others, Written During and After the Revolution, to John Langdon of New Hampshire (Philadelphia, 1880), a book of great interest and value. See a biographical sketch of John Langdon by Charles R. Corning in the New England Magazine, vol. xxii. (Boston,

1897).

LANGE, ANNE FRANQOISE ELIZABETH (1772-1816), French actress, was born in Genoa on the 17th of September 1772, the daughter of a musician and an actress at the Comedie Italienne. She made her first appearance on the stage at Tours in 1787 and a successful debut at the Comedie Francaise in 1788 in L' Ecossaise and L'Oracle. She followed Talma and the others in 1 79 1 to the Rue Richelieu, but returned after a few months to the Comedie Francaise. Here her talent and beauty gave her an enormous success in Francois dc Neuchateau's Pamela, the performance of which brought upon the theatre the vials of wrath of the Committee of Safety. With the author and the other members of the caste, she was arrested and imprisoned. After the 9th Thermidor she rejoined her comrades at the Feydeau, but retired on the 16th of December 1797, reappear- ing only for a few performances in 1807. She had, meantime, married the son of a rich Belgian named Simons. She died on the 25th of May 1816.

LANGE, ERNST PHILIPP KARL (1813-1899), German novelist, who wrote under the pseudonym Philipp Galen, was born at Potsdam on the 21st of December 1813. He studied medicine at Berlin (1835-1840), and on taking his degree, in 1840, entered the Prussian army as surgeon. In this capacity he saw service in the Schleswig-Holstein campaign of 1849. He settled at Bielefeld as medical practitioner and here issued his first novel, Der Inselkonig (1852. 3rd ed., 1858), which enjoyed considerable popularity. In Bielefeld he continued to work at his profession and to write, until his retirement, with the "rank of Oberstabsarzt (surgeon -general) to Potsdam in 1878; there he died on the 20th of February 1899. Lange's novels are distinguished by local colouring and pretty, though not powerful, descriptions of manners and customs. He particularly favoured scenes of English life, though he had never been in that country, and on the whole he succeeded well in his descriptions. Chief among his novels

are, Der Irre von St James (1853, 5th ed., 1871), and Emery Glandon (3rd ed., Leip., 1865), while of those dealing with the Schleswig-Holstein campaign Andreas Burns (1856) and Die Tochter des Diplomaten (1865) commanded considerable attention.

His Gesammelte Schriften appeared in 36 vols. (1857-1866).

LANGE, FRIEDRICH ALBERT (1828-1875), German phil- osopher and sociologist, was born on the 28th of September 1828, at Wald, near Solingen, the son of the theologian, J. P. Lange (q.v.). He was educated at Duisburg, Zurich and Bonn, where he distinguished himself by gymnastics as much as by study. In 1852 he became schoolmaster at Cologne; in 1855 privatdozent in philosophy at Bonn; in 1858 schoolmaster

at Duisburg, resigning when the government forbade school- masters to take part in political agitation. Lange then entered on a career of militant journalism in the cause of political and social reform. He was also prominent in the affairs of his town, yet found leisure to write most of his best-known books, Die Leibesiibungen (1863), Die Arbeiterfrage (1865, 5th ed. 1894), Geschichte des Materialismus und Kritik seiner Bedeutung in der Gegemcart (1866; 7th ed. with biographical sketch by H. Cohen, 1902; Eng. trans., E. C. Thomas, 1877), and /. 5. Mill's Ansichten ilber die sociale Frage (1866). In 1866, dis- couraged by affairs in Germany, he moved to Winterthur, near Zurich, to become connected with the democratic newspaper, W 'inter -thurer Landbote. In 1869 he was Privatdozent at Zurich, and next year professor. The strong French sympathies of the Swiss in the Franco-German War led to his speedy resignation. Thenceforward he gave up politics. In 1872 he accepted a professorship at Marburg. Unhappily, his vigorous frame was already stricken with disease, and, after a lingering illness, he died at Marburg, on the 23rd of November 1875, diligent to the end. His Logische Studien was published by H. Cohen in 1877 (2nded., 1894). His main work, the Geschichte des M aterialismus, which is brilliantly written, with wide scientific knowledge and more sympathy with English thought than is usual in Germany, is rather a didactic exposition of principles than a history in the proper sense. Adopting the Kantian standpoint that we can know nothing but phenomena, Lange maintains that neither materialism nor any other metaphysical system has a valid claim to ultimate truth. For empirical phenomenal knowledge, however, which is all that man can

look for, materialism with its exact scientific methods has done most valuable service. Ideal metaphysics, though they fail of the inner truth of things, have a value as the embodiment of high aspirations, in the same way as poetry and religion. In Lange's Logische Studien, which attempts a reconstruction of formal logic, the leading idea is that reasoning has validity in so far as it can be represented in terms of space. His Arbeiterfrage advocates an ill-defined form of socialism. It protests against contemporary industrial selfishness, and against the organization of industry on the Darwinian principle of struggle for existence.

See O. A. Ellissen, F. A. Lange (Leipzig, 1891), and in Monatsch. d. Comeniusgesell. in., 1894, 210 ff.; H. Cohen in Preuss. Jahrb. xxvii., 1876, 353 ff. ; Yaihinger, Hartmann, Diihring und Lange (Iserlohn, 1876); J. M. Bosch, F. A. Lange und sein Standpunkt d. Ideals (Frauenield, 1890); H. Braun, F. A. Lange, als Socialbkonom (Halle, 1881). (H. St.)

LANGE, JOHANN PETER (1802-1884), German Protestant theologian, was of peasant origin and was born at Sonneborn near Elberfeld on the 10th of April 1802. He studied theology at Bonn (from 1822) under K. I. Nitzsch and G. C. F. Liicke, held several pastorates, and eventually (1854) settled at Bonn as professor of theology in succession to Isaac A. Dorner, becoming also in i860 counsellor to the consistory. He died on the 9th of July 1884. Lange has been called the poetical theologian par excellence: " It has been said of him that his thoughts succeed each other in such rapid and agitated waves that all calm reflection and all rational distinction become, in a manner, drowned " (F. Lichtenberger). As a dogmatic writer he belonged to the school of Schleiermacher. His Christ- liche Dogmatik (3 vols., 1849-1852, new edition, 1870) " contains many fruitful and suggestive thoughts, which, however, are hidden under such a mass of bold figures and strange fancies, and suffer so much from want of clearness of presentation, that they did not produce any lasting effect " (Otto Pfleiderer).

His other works include Das Leben Jesu (3 vols., 1844-1847), Das apostolische Zeitalter (2 vols., 1853-1854), Grundriss der theologischen Enzyklopddie (1877), Grundriss der christlichen Ethik (1878), and Grundriss der Bibelkunde (1881). In 1857 he undertook with other scholars a Theologisch-homiletisches Bibelwerk, to which he contributed commentaries on the first four books of the Pentateuch, Haggai, Zechariah, Malachi, Matthew, Mark, Revelation. The Bibelwerk has been translated, enlarged and revised under the general editorship of Dr Philip Schaft.

LANGEAIS, a town of west-central France in the department of Indre-et-Loire, on the right bank of the Loire, 16 m. W.S.W. of Tours by rail. Pop. (1906) town, 1755; commune, 3550.

Langeais has a church of the nth, 12th and 15th centuries but is chiefly interesting for the possession of a large chateau built soon after the middle of the 15th century by Jean Bourre, minister of Louis XL Here the marriage of Charles VIII. and Anne of Brittany took place in 1491. In the park are the ruins of a keep of late 10th-century architecture, built by Fulk Nerra, count of Anjou.

LANGEN, JOSEPH (1837-1901), German theologian, was born at Cologne on the 3rd of June 1837. He studied at Bonn, was ordained priest in 1859, was nominated professor extraordinary at the university of Bonn in 1864, and a professor in ordinary of the exegesis of the New Testament in 1867 — an office which he held till his death. He was one of the able band of professors who in 1870 supported Dollinger in his resistance to the Vatican decrees, and was excommunicated with Ignaz v. Dollinger, Johann Huber, Johann Friedrich, Franz Heinrich Reusch, Joseph Hubert Reinkens and others, for refusing to accept them. In 1878, in consequence of the permission given to priests to marry, he ceased to identify himself with the Old Catholic movement, although he was not reconciled with the Roman Catholic Church. Langen was more celebrated as a writer than as a speaker. His first work was an inquiry into the authorship of the Commentary on St Paul's Epistles and the Treatise on Biblical Questions, ascribed to Ambrose and Augustine re- spectively. In 1868 he published an Introduction to the New Testament, a work of which a second edition was called for in 1873. He also published works on the Last Days of the Life of Jesus, on Judaism in the Time of Christ, on John of Damascus (1879) and an Examination of the Vatican Dogma in the Light of Patristic Exegesis of the New Testament. But he is chiefly famous for his History of the Church of Rome to the Pontificate of Innocent III. (4 vols., 1881-1893), a work of sound scholarship, based directly upon the authorities, the most important sources being woven carefully into the text. He also contributed largely to the Internationale theologische Zeitschrift, a review started in 1893 by the Old Catholics to promote the union of National Churches on the basis of the councils of the Undivided Church, and admitting articles in German, French and English. Among other subjects, he wrote on the School of Hierotheus, on Romish falsifications of the Greek Fathers, on Leo XIII., on Liberal Ultramontanism, on the Papal Teaching in regard to Morals, on Vincentius of-Lerins and he carried on a controversy with Professor Willibald Beyschlag, of the German Evangelical Church, on the respective merits of Protestantism and Old Catholicism

regarded as a basis for teaching the Christian faith. An attack of apoplexy put an end to his activity as a teacher and hastened his death, which occurred in July 1901. (J. J. L.*)

LANGENBECK, BERNHARD RUDOLF KONRAD VON (1810- 1887), German surgeon, was born at Horneburg on the 9th of November 1810, and received his medical education at Gottingen, where he took his doctor's degree in 1835 with a thesis on the structure of the retina. After a visit to France and England, he returned to Gottingen as Privatdozent, and in 1842 became professor of surgery and director of the Friedrichs Hospital at Kiel. Six years later he succeeded J. F. Dieffenbach (1794-1847) as director of the Clinical Institute for Surgery and Ophthal- mology at Berlin, and remained there till 1882, when failing health obliged him to retire. He died at Wiesbaden on the 30th of September 1887. Langenbeck was a bold and skilful operator, but was disinclined to resort to operation while other means afforded a prospect of success. He devoted particular attention to military surgery, and was a great authority in the treatment of gunshot wounds. Besides acting as general field-surgeon of the army in the war with Denmark in 1848, he saw active service in 1864, 1866, and again in the Franco-German campaign of 1870-71. He was in Orleans at the end of 1870, after the city had been taken by the Prussians, and was unwearied in his attentions, whether as operator or consultant, to wounded men with whom every public building was packed. He also utilized the opportunities for instruction that thus arose, and the " Militar-Aerztliche Gesellschaft," which met twice a week for some months, and in the discussions of which every surgeon

in the city was invited to take part, irrespective of nationality, was mainly formed by his energy and enthusiasm. He was ennobled for his services in the Danish War of 1864.

LANGENSALZA, a town in the Prussian province of Saxony, on the Salza, about 20 m. N. W. from Erfurt. Pop. (1905) 12,545. Near it are the remains of the old Benedictine monastery of Homburg or Hohenburg, where the emperor Henry IV. defeated the Saxons in 1075. The manufacture of cloth is the chief industry; lace, starch, machines, cigars and chemicals are also produced, while spinning, dyeing, brewing and printing are carried on. There is a sulphur bath in the neighbourhood, situated in a pleasant park, in which there are monuments to those who fell in the war of 1866. Langensalza became

a town in 1 21 1 and was afterwards part of the electorate of Saxony. In 18 1 5 it came into the possession of Prussia. It is remarkable in history as the scene of three battles: (1) the victory of the Prussians and English over the imperial army on the 15th of February 1761; (2) that of the Prussians over the Bavarians on the 17th of April 1813; and (3) the engagement on the 27th of June 1866 between the Prussians and the Hanoverians, in which the latter, though victorious in the field, were compelled to lay down their arms on the arrival of overwhelming Prussian reinforcements.

See Goschel, Chronik der Stadt Langensalza (Langensalza, 1818- 1842) ; G. and H. Schiitz, Chronik der Stadt Langensalza (Langensalza, 1 901); andGutbier,Schwefelbad Langensalza (Langensalza, 1900).

LANGHAM, SIMON (d. 1376), archbishop of Canterbury and cardinal, was born at Langham in Rutland, becoming a monk in the abbey of St Peter at Westminster, and later prior and then abbot of this house. In 1360 he was made treasurer of England and in 1361 he became bishop of Ely; he was appointed chan- cellor of England in 1363 and was chosen archbishop of Canter- bury in 1366. Perhaps the most interesting incident in his primacy was when he drove the secular clergy from their college of Canterbury Hall, Oxford, and filled their places with monks. The expelled head of the seculars was a certain John de Wiclif, who has been identified with the great reformer Wycliffe. Not- withstanding the part Langham as chancellor had taken in the anti-papal measures of 1365 and 1366 he was made a cardinal by Pope Urban V. in 1368. This step lost him the favour of Edward III., and two months later he resigned his archbishopric and went to Avignon. He was soon allowed to hold other although less exalted positions in England, and in 1374 he was elected archbishop of Canterbury for the second time; but he withdrew his claim and died at Avignon on the 22nd of July 1376. Langham's tomb is the oldest monument to an ecclesiastic in Westminster Abbey; he left the residue of his estate — a large sum of money — to the abbey, and has been called its second founder.

LANGHOLM, a burgh of barony and police burgh of Dumfries- shire, Scotland. Pop. (1901) 3142. It is situated on both sides of the Esk, 16 m. N.E. of Annan, the terminus of a branch line connecting with the North British railway system at Riddings Junction. The Esk is crossed by a three-arched stone bridge, uniting the old town on the left bank with the new on the right, and a suspension bridge. Ewes Water, which falls into the river, is spanned by a two-arched bridge, 1 m. N. of the town. The public buildings include the town hall — a substantial edifice with a tower rising in three tiers from the body of

the structure, the Telford library, and the Hope hospital for aged poor. Already famous for its plaids and blankets, the prosperity of the burgh advanced when it took up the manufacture of tweeds. Distilling, brewing, dyeing and tanning are also important industries. The Esk and Liddel being favourite fishing streams, Langholm is the headquarters of the association which protects the rights of anglers. About im. to the N.W. stands Langholm Lodge, a seat of the duke of Buccleuch, and some 4 m. S.E. is Gilnockie Tower, the peel-house that belonged to Johnny Armstrong, the free- booter, who was executed by order of James V. in 1530.

LANGHORNE, JOHN (1735-1779). English poet and translator of Plutarch, was born at Kirkby Stephen, Westmorland. He at first supported himself as a private tutor and schoolmaster,

and, having taken orders, was appointed (1766) to the rectory of Blagdon, Somerset, where he died on the 1st of April 1779. His poems (original and translations), and sentimental tales, are now forgotten, but his translation of Plutarch's Lives (1770), in which he had the co-operation of his elder brother William (1721-1772), is not yet superseded. It is far less vigorous than Sir Thomas North's version (translated from Amyot) but is free from its inaccuracies. His poems were published in 1804 by his son, J. T. Langhorne, with a memoir of the author; they will also be found in R. Anderson's Poets of Great Britain, xi. (1794) and A. Chalmers's English Poets, xvi. (1810), with memoir. Of his poems, The Country Justice, a plea for the neglected poor, and The Fables of Flora, were the most successful; of his prose writings, The Correspondence between Theodosius and Constantia, founded on a well-known story in the Spectator (No. 164).

LANGIEWICZ, MARYAN (1827-1887), Polish patriot, was born at Krotoszyn, in the province of Posen, on the 5th of August 1827, his father being the local doctor. Langiewicz was educated at Posen, Breslau and Prague, and was compelled to earn his daily bread by giving lectures. He subsequently entered the Prussian Landwehr and served for a year in the royal guard. In i860 he migrated to Paris and was for a time professor in the high school founded there by Mieroslawski. The same year he took part in Garibaldi's Neapolitan campaign, and was then a professor in the military school at Cuneo till the establishment was closed. In 1862 he entered into communication with the central Polish committee at Warsaw, and on the outbreak of the insurrection of the 22nd of January 1863, took the command of the armed bands. He defeated the Russians at Wachock and Slupia (February), capturing 1000 muskets and 8 cannon. This victory drew hundreds of young recruits to his standard, till at last he had 12,000

men at his disposal. On the 23rd of February he again defeated the Russians, at Malogoszcza, and captured 500 muskets and 2 cannon. On the 10th of March he proclaimed himself dictator and attempted to form a regular government; but either he had insufficient organizing talent, or had not time enough to carry out his plans, and after a fresh series of engagements his army was almost annihilated at Zagosc (18th of March), whereupon he took refuge in Austrian territory and was interned at Tarnow. He was subsequently transferred to the fortress of Josephstadt, from which he was released in 1865. He then lived at Solothurn as a citizen of the Swiss Republic, and subsequently entered the Turkish service as Langie Bey. He died at Constantinople on the nth of May 1887.

See Boleslaw Limanowski, The National Insurrection of 1863-64 (Pol.) (Lemberg, 1900) ; Paolo Mazzolcni, / Bergamaschi in Polonia nel 1863 (Bergamo, 1893) ; W. H. Bavink, De Poolsche opstand 1863, &c. (Haarlem, 1864).

LANGLAND, WILLIAM (c. 1332-c. 1400), the supposed English poet, generally regarded until recently as the single author of the remarkable 14th-century poem Piers the Plowman. Its full title is — The Vision of William concerning Piers the Plowman, together with Vita de Do-wel, Do-bet, el Do-best, secundum Wit et Resoun; usually given in Latin as Visio Willelmi de Petro Plowman, &c; the whole work being sometimes briefly described as Liber de Petro Plowman. We know nothing of William Langland except from the supposed evidence of the MSS. of the poem and the text itself, and it will be convenient first to give a brief general description of them.

The poem exists in three forms. If we denote these by the names of A-text (or Vernon), B-text (or Crowley), and C-text (or Whitaker), we find, of the first, ten MSS., of the second fourteen, and of the third seventeen, besides seven others of a mixed type. It will be seen that we thus have abundance of material, a circumstance which proves the great popularity of the poem in former times. Owing to the frequent expressions which indicate a desire for reformation in religion, it was, in the time of Edward VI., considered worthy of being printed. Three impres- sions of the B-text were printed by Robert Crowley in 1550; and one of these was badly reprinted by Owen Rogers in 1561. In 1813 the best MS. of the C-text was printed by Dr E. Whitaker. In 1842 Mr Thomas Wright printed an edition from an excellent

MS. of the B-text in the library of Trinity College, Cambridge (2nd ed., 1856, new ed., 1895). A complete edition of all three texts was printed for the Early English Text Society as edited by the Rev. W. W. Skeat, with the addition of Richard the Redeless, and containing full notes to all three texts, with a glossary and indexes, in 1867-1885. The Clarendon Press edition, by the same editor, appeared in 1886.

The A-text contains a prologue and 12 passus or cantos (i.-iv., the vision of the Lady Meed; v.-viii., the vision of Piers the Plowman; ix.-xii., the vision of Do-wel, Do-bet and Do-best), with 2567 lines. The B-text is much longer, containing 7242 lines, with additional passus following after xi. of A, the earlier passus being altered in various respects. The C-text, with 7357 lines, is a revision of B.

The general contents of the poem may be gathered from a brief description of the C-text. This is divided into twenty-three passus, nominally comprising four parts, called respectively Yisio de Petro Plowman, Visio de Do-wel, Visio de Do-bet and Visio de Do-best. Here Do-bet signifies ” do better ” in modern English; the explanation of the names being that he who does a kind action does well, he who teaches others to act kindly does better, whilst he who combines both practice and theory, both doing good himself and teaching others to do the same, does best. But the visions by no means closely correspond to these descrip- tions; and Skeat divides the whole into a set of eleven visions, which may be thus enumerated: (1) Vision of the Field Full of Folk, of Holy Church, and of the Lady Meed (passus i. -v.) ; (2) Vision of the Seven Deadly Sins, and of Piers the Plowman (pass, vi.-x.); (3) Wit, Study, Clergy and Scripture (pass, xi., xii.); (4) Fortune, Nature, Recklessness and Reason (pass, xiii., xiv.); (5) Vision of Imaginative (pass, xv.); (6) Conscience, Patience and Activa-Vita (pass, xvi., xvii.); (7) Free-will and the Tree of Charity (pass, xviii., xix.); (8) Faith, Hope and Charity (pass, xx.); (9) The Triumph of Piers the Plowman, i.e. the Crucifixion, Burial and Resurrection of Jesus Christ (pass, xxi.); (10) The Vision of Grace (pass, xxii.); (n) The Vision of Antichrist (pass, xxiii.).

The bare outline of the C-text gives little idea of the real nature of the poem. The author’s object, as Skeat describes it, was to ” afford himself opportunities (of which he has amply availed himself) for describing the life and manners of the poorer classes; for inveighing against clerical abuses and the rapacity of the friars; for representing the miseries caused by the great pestilences then prevalent and by the hasty and ill-advised marriages consequent thereupon; and for denouncing lazy workmen and sham beggars, the corruption and bribery then too common in the law courts, and all the numerous

forms of falsehood which are at all time the fit subjects for satire and indignant exposure. In describing, for example, the seven deadly sins, he gives so exact a description of Glutton and Sloth that the reader feels them to be no mere abstractions, but drawn from the life; and it becomes hardly more difficult to realize Glutton than it is to realize Sir John Falstaff. The numerous allegorical personages so frequently introduced, such as Scripture, Clergy, Conscience, Patience and the like, are all mouthpieces of the author himself, uttering for the most part his own senti- ments, but sometimes speaking in accordance with the character which each is supposed to represent. The theological disquisi- tions which are occasionally introduced are somewhat dull and tedious, but the earnestness of the author's purpose and his energy of language tend to relieve them, and there are not many passages which might have been omitted without loss. The poem is essentially one of those which improve on a second reading, and as a linguistic monument it is of very high value. Mere extracts from the poem, even if rather numerous and of some length, fail to give a fair idea of it. The whole deserves, and will repay, a careful study; indeed, there are not many single works from which a student of English literature and of the English language may derive more substantial benefit.

" The metre is alliterative, and destitute of final rhyme. It is not very regular, as the author's earnestness led him to use the fittest words rather than those which merely served the purpose

of rhythm. The chief rule is that, in general, the same letter or combination of letters should begin three stressed syllables in the same line, as, for example, in the line which may be modernized thus: ' Of all wanner of men, the wean and the rich.' Sometimes there are but two such rhyme-letters, as: ' Might of the commons made him to reign.' Sometimes there are four, as: ' In a summer season, when soft was the sun. ' There is invariably a pause, more or less distinct, in the middle of each line " (Ency. Brit., 9th ed., art. Langland).

The traditional view, accepted by such great authorities as Skeat and Jusserand, that a single author — and that author Langland — was responsible for the whole poem, in all its versions, has been so recently disputed that it seems best to state it in Skeat's own words, before giving briefly the alternative view, which propounds a theory of composite authorship, denying any real existence to " William Langland." The account of the single-author theory is repeated from Professor Skeat's article in the 9th edition of this work, slightly revised by him in 1905 for this edition.

” The author’s name is not quite certain, and the facts concern- ing his life are few and scanty. As to his Christian name we are sure, from various allusions in the poem itself, and the title Visio Willelmi, &c, in many MSS.; so that we may at once reject the suggestion that his name may have been Robert. In no less than three MSS. [of the C-text; one not later than 1427] occurs the following colophon: ‘ Explicit visio Willelmi W. de Petro le Plowman.’ What is here meant by W. it is difficult to conjecture; but it is just possible that it may repre- sent Wychwood (of which more presently), or W T igornensis, i.e. of Worcester. As to the surname, we find the note that ‘ Robert or William Langland made pers ploughman,’ in a handwriting of the 15th century, on the fly-leaf of a MS. copy [of the B-text] formerly belonging to Lord Ashburnham, and now in the British Museum; and in a Dublin MS. [of the C-text] is the note [in a 15th-century hand] : ‘Memorandum, quod Stacy de Rokayle, pater Willielmi de Langlond, qui Stacius fuit generosus et morabatur in Schiptone-under-Whicwode, tenens domini le Spenser in comitatu Oxon., qui predictus Willielmus fecit librum qui vocatur Perys Ploughman.’ There is no trace of any Langland family in the midland counties, while the Langley family were wardens of Wychwood forest in Oxfordshire between the years 1278 and 1362; but this consideration can hardly set aside the above statement. According to Bale, our author was born at Cleobury Mortimer, which is quite consistent with the supposition that his father may have removed from that place to Shipton in Oxfordshire, as there seems to have been a real connexion between the families in those places.

” The internal evidence concerning the author is fuller and more satisfactory. By piecing together the various hints concerning himself which the poet gives us, we may compile the following account. His name was William (and probably Langland), and he was born about 1332, perhaps at Cleobury Mortimer in Shropshire. His father, who was doubtless a franklin or farmer, and his other friends put him to school, made a ‘ clerk ‘ or scholar of him, and taught him what Holy Writ meant. In 1362, at the age of about thirty, he found himself wandering upon the Malvern hills, and fell asleep beside a stream, and saw in a vision a field full of folk, i.e. this present world, and many other remarkable sights which he duly records. From this supposed circumstance he named his poem The Vision of William, though it is really a succession of visions, since he mentions several occasions on which he awoke, and afterwards again fell asleep; and he even tells us of some adventures which befel him in his waking moments. In some of these visions there is no mention of Piers the Plowman, but in others he describes him as being the coming reformer who was to

remedy all abuses, and restore the world to a right condition. It is remarkable that his conception of this reformer changes from time to time, and becomes more exalted as the poem advances. At first he is no more than a ploughman, one of the true and honest labourers who are the salt of the earth; but at last he is identified with the great reformer who has come already, the regenerator of the

world in the person of Jesus Christ ; in the author's own phrase — 'Petrus est Christus.' If this be borne in mind, it will not be possible to make the mistake into which so many have fallen, of speaking of Piers the Plowman as being the author, not the subject, of the poem. The author once alludes to the nickname of Long Will bestowed upon him from his tallness of statures- just as the poet Gascoigne was familiarly called Long George. Though there is mention of the Malvern hills more than once near the beginning of the poem, it is abundantly clear that the poet lived for ' many years in Cornhill (London), with his wife Kitte and his daughter Calote.' He seems to have come to London soon after the date of the first commencement of his work, and to have long continued there. He describes himself as being a tall man, one who was loath to reverence lords or ladies or persons in gay apparel, and not deigning to say ' God save you ' to the sergeants whom he met in the street, insomuch that many people took him to be a fool. He was very poor, wore long robes, and had a shaven crown, having received the clerical tonsure. But he seems only to have taken minor orders, and earned a precarious living by singing the placebo, dirige and seven psalms for the good of men's souls. The fact that he was married may explain why he never rose in the church. But he had another source of livelihood in his ability to write out legal documents, and he was extremely familiar with the law courts at Westminster. His leisure time must have been entirely occupied with his poem, which was essentially the work of his lifetime. He was not satisfied with rewriting it once, but he actually re-wrote it twice; and from the abundance of the MSS. which still exist we can see its development from the earliest draught (A-text), written about 1362, to its latest form (C-text), written about

I393- 1

" In 1399, just before the deposition of Richard II., appeared a poem addressed to the king, who is designated as ' Richard the Redeless,' i.e. devoid of counsel. This poem, occurring in only one MS. [of the B-

text] in which it is incomplete, breaking off abruptly in the middle of a page, may safely be attributed to Langland, who was then in Bristol. As he was at that time about sixty-seven years of age, we may be sure that he did not long survive the accession of Henry IV. It may here be observed that the well-known poem, entitled Pierce Ploughman's Crede, though excellently written, is certainly an imitation by another hand; for the Pierce Ploughman of the Crede is very different in conception from the subject of ' William's Vision.' "

On the other hand, the view taken by Professor J. M. Manly, of Chicago, which has recently obtained increasing acceptance among scholars, is that the early popularity of the Piers Plowman poems has resulted in " the confusion of what is really the work of five different men," and that Langland himself is " a mythical author." The argument for the distinction in authorship rests on internal evidence, and on analysis of the style, diction and " visualizing " quality within the different texts. Whereas Skeat, regarding the three texts as due to the same author, gives most attention to the later versions, and considers B the intermediate form, as on the whole the best, Manly recognizes in A the real poet, and lays special stress on the importance of attention to the A-text, and particularly pass, i.-viii. In this A-text the two first visions are regarded as by a single author of genius, but the third is assigned to a continuator who tried to imitate him, the whole conclusion of the 12th passus being, moreover, by a third author, whose name, John But, is in fact given towards the end, but in a way leading Skeat only to credit him with a few lines. The same process of analysis leads to crediting the B-text and the C-text to separate and different authors, B working over the three visions of the A- text and making additions of his own, while C again worked over the B-text. The supposed references to the original author A, introduced by B and C, are then to be taken as part of the fiction. Who were the five authors ? That question is left unsolved. John But, according to Professor Manly, was " doubt- less a scribe " or " a minstrel." B, C and the continuator of A " seem to have been clerics, and, from their criticisms 1 According to Jusserand, 1398.

of monks and friars, to have been of the secular clergy," C being "a better scholar than either the continuator of A or B." A, who " exempts from his satire no order of society except monks," may have been himself a monk, but " as he exhibits no special technical knowledge or interests " he " may have been a layman." As regards Richard the Redeless, Professor Manly attributes this to another imitator; he regards identity of authorship as out of the question, in consequences of differences in style and thought, apart altogether from the conclusion as to the authorship of Piers the Plowman. <*•■*

See the editions already referred to: The Deposition of Richard II., ed. T. Wright (Camden Society), which is the same poem as Richard, the Redeless; Warton, Hist, of Eng. Poetry; Rev. H. H. Milman, Hist, of Latin Christianity; G. P. Marsh, Lectures on English; H. Morley, English Writers; B. ten Brink, Early English Literature; J. J. Jusserand, Observations sur la vision de P. P. (Paris, 1879); Les Anglais an moyen age: L' Epopee mystique de William Langland (1893, Eng. trans. Piers Plowman, revised and enlarged by another 1894); J. M. Manly in Cambridge Hist, of English Lit., vol. ii. and bibliography. A long and careful summary of the whole poem is given in Morley's English Writers, and is repeated in his Illustrations of English Religion, ch. iii.

LANGLEY, SAMUEL PIERPONT (1834-1906), American physicist and astronomer, was born at Roxbury, Boston, Massachusetts, on the 22nd of August 1834. After acting for a short time as assistant in Harvard College Observatory, he was appointed assistant professor of mathematics in the U.S. Naval Academy in 1 866, and in the following year became director of the Allegheny Observatory at Pittsburg, a position which he held until his selection in 1887 as secretary of the Smithsonian Institution at Washington. His name is especially associated with two main branches of investigation — aeronautics, and the exploration of the infra-red portions of the solar spectrum. The study of the latter he took up as a result of the publication in 1871 of an energy-curve of the spectrum by S. I. Lamansky. The imperfections of the thermopile, with which he began his work, led him, about 1880, to the invention of the bolometer, an instrument of extraordinary delicacy, which in its most refined form is believed to be capable of detecting a change of temperature amounting to less than one-hundred-millionth of a degree Centigrade. Depending on the fact that the electrical conductivity of a metallic conductor is decreased by heat, it consists of two strips of platinum, arranged to form the two arms of a Wheatstone bridge; one strip being exposed to a source of radiation from which the other is shielded, the heat causes a change in the resistance of one arm, the balance of the bridge is destroyed, and a deflection is marked on the galvanometer. The platinum strips are exceedingly minute, being in some cases only -5-J-j in. in width, and less than one-tenth of that amount in thickness. By the aid of this instrument, Langley, working on Mount Whitney, 12,000 ft. above sea-level, discovered in 1881 an entirely unsuspected extension of the invisible infra-red rays, which he called the " new spectrum." The importance of his achievement may be judged from the fact that, while the visible spectrum includes rays having wave-lengths of from about 0-4 /j, to 0-76 n, and no invisible heat-rays were known before 1881 having a wave-length greater than 1-8 /*, he

detected rays having a wave-length of 5-3 p. In addition, taking advantage of the accuracy with which the bolometer can determine the position of a source of heat by which it is affected, he mapped out in this infra-red spectrum over 700 dark lines or bands resembling the Fraunhofer lines of the visible spectrum, with a probable accuracy equal to that of refined astronomical observations. In aeronautics he succeeded in demonstrating the practicability of mechanical flight. He first undertook a preliminary inquiry into the principles upon which flight depends, and established at Allegheny a huge " whirling table," the revolving arm of which could be driven by a steam- engine at any circumferential speed up to 70 m. an hour. The construction of a flying machine was next attempted. The first difficulty was to make it sufficiently light in relation to the power its machinery could develop; and several machines were built in which trials were made of steam, and of compressed air and carbonic acid gas as motive agents. About 1893 a

satisfactory machine was ready, and a new series of troubles had to be faced, for it had to be launched at a certain initial speed, and in the face of any wind that might be blowing. To enable these conditions to be fulfilled, as well as to ensure that the machine, when it fell, should fall on water, the experiments were carried out on the Potomac river, some 30 m. below Washing- ton. It was not till the autumn of 1894 that an efficient launching apparatus was devised, and then the wings were found not to be strong enough to bear the pressures to which they were subjected. Various other delays and mishaps followed, but ultimately, on the 6th of May 1896, a successful flight was made. On that day an aerodrome, weighing about 30 lb and about 16 ft. in length, with wings measuring between 12 and 13 ft. from tip to tip, twice sustained itself in the air for i| minutes (the full time for which it was supplied with fuel and water), and traversed on each occasion a distance of over half a mile, falling gently into the water when the engines stopped. Later in the same year, on the 28th of November, a similar aerodrome flew about three-quarters of a mile, attaining a speed of 30 m. an hour. In 1903 he experimented with an aerodrome capable of carrying a man, but repeated accidents prevented it from being launched, and finally through lack of funds the experiments had to be abandoned without the machine ever having been free in the air (see also Flight and Flying). Langley died on the 27th of Februarv 1906.

LANGLOIS, HIPPOLYTE (1839-), French general, was born at Besancon in 1839, and, after passing through the Ecole Polytechnique, was appointed to the artillery as sub-lieutenant in 1858, attaining the rank of captain in 1866. He served in the army of Metz in the war of 1870. Eight years later he became major, in 1887 lieutenant-colonel and in 1888 colonel. At this time he was appointed professor of artillery at the Ecole de Guerre, and in this post he devoted himself to working out the tactical principles of the employment of field artillery under the new conditions of armament of which he foresaw the advent. The public re:aK of his work was the great treatise L'Artillerie de campagne (1891-1892), which may still be regarded as the classic of the arm. In 1894 he became general of brigade, and in 1898 general of division. For two years after this he was the com- mandant of the Ecole de Guerre at the time that the modern French strategical and tactical " doctrine " was being developed and taught. He was, however, regarded as a leader as well as a theorist, and in 1901 he was selected to command the XX. Army Corps on the German frontier, popularly called the " iron " corps. In 1902 he became a member of the Conseil superieur de la Guerre, consisting of senior generals marked out for the higher commands in war. He retired from the active list in 1904 on reaching the age limit, and devoted himself with the greatest energy to critical military literature. In 1907 he began the publication of a monthly journal of military art and history, the Revue militaire generate. The most important of his other works are Enseignements de deux guerres recentes and Consequences tactiques du progres de I'armement.

LANGPORT, a market town in the eastern parliamentary division of Somersetshire, England, 135 m. E. of Taunton by the Great Western railway. Pop. (1901) 890. It lies on the right (east) bank of the river Parret, near the point where that river debouches from the hills on to the plain through which it flows to the Bristol Channel. The main street leads up a slope from the river to the fine Perpendicular church of All Saints. Close to this an archway crosses the road, bearing a Perpendicular building known as the hanging chapel. After serving this purpose it housed first the grammar-school (founded 1675), then the Quekett museum, named after John Thomas Quekett (1815-1861) the histologist, a native of the town, whose father was master of the school. The hanging chapel afterwards became a masonic hall. Not far distant is the church of Huish Episcopi, with one of the finest of the Perpendicular towers for which Somersetshire is noted. Langport has a considerable general and agricultural trade.

Langport (Llongborlh, Langeberga, Langeport) owed its origin to its defensible position on a hill, and its growth to its facilities for trade

on the chief river of Somerset. It occupies the site of the British town of Llongborth, and was important during the Roman occupation. It was a royal borough in Saxon times, and in 1086 had 34 resident burgesses. The first charter, given by Elizabeth in 1562, recognized that Langport was a borough of great antiquity, which had enjoyed considerable privileges, being governed by a portreve. It was incorporated by James I. in 1617, but the corporation was abolished in 1883. Langport was represented in parliament in 1304 and 1306. The charter of 1562 granted three annual fairs to Langport, on the 28th of June, the 1 ith of November and the second Monday in Lent. One fair only is now held, on the 3rd of September, which is a horse and cattle fair. A Saturday market was held under the grant of 1562, but in the 19th century the market day was changed to Tuesday.

LANGREO, a town of northern Spain, in the province of Oviedo, in very hilly country, on the left bank of the river Nalon, and on a branch railway from Oviedo to Labiana. Pop. (1900) 18,714. In the neighbourhood large quantities of wheat, hemp, fruit and cider are produced; and there are important coal and iron mines, foundries, and factories for the manufacture of coarse cloth.

LANGRES, a town of eastern France, capital of an arrondisse- ment in the department of Haute-Marne, 22 m. S.S.E. of Chau- mont on the eastern railway to Belfort. Pop. (1906) town, 6663; commune, 9803. Langres stands at a height of some 1550 ft. on a jutting promontory of the tableland known as the plateau de Langres, and overlooks eastward and westward respectively the valleys of the Marne and its tributary the Bonnelle. From the cathedral tower and the ramparts which surround the town there is an extensive view over the valley of the Marne, the Vosges and the Cote d'Or, and in clear weather Mt Blanc (160 m. distant) is visible. The cathedral of St Mammes, for the most part in the Transitional style of the 12th century, has a west front in the Graeco-Roman style of the 18th century and a fine Renaissance chapel. The church of St Martin (13th, 15th and 18th centuries) possesses a figure of Christ of the 16th century, one of the finest wood carvings known. The ramparts are protected by several towers, most of which date from the 16th century. The Gallo-Roman gate, one of four entrances in the Roman period, is preserved, but is walled up. The Porte des Moulins (17th century) is the most interesting of the other gates. The town possesses a museum rich in Gallo-Roman antiquities, a picture gallery and an important library. The birth of Denis Diderot here is commemorated by a statue. Langres is the seat of a bishop and a sub-prefect, and has tribunals of first instance and of commerce, a higher ecclesiastical seminary and communal colleges for both sexes. It manufactures well-known cutlery

and grind-stones. Trade is in grain and other farm-produce, live stock, wine, &c.

Langres, the ancient Andematunum, was capital of the Lingones. Under Roman rule it was at first to some extent autonomous, but was reduced to the rank of colony after the revolt of the chief Sabinus in a.d. 71. The bishopric was founded about 200 and in the middle ages its holders became peers of the realm and enjoyed the temporal power in the town. In 301 the Alemanni were defeated at Langres by the Romans, but in the next century it was burnt by the Vandals and by Attila.

The ” plateau of Langres ” appears frequently in the military history of the 18th and 19th centuries as a dominant strategic point, though its importance as such has appealed chiefly to the advocates of wars of positions and passive defence. The modern fortifications of Langres, which serves as a second line fortress, consist of (a) Fort St Menge or Ligniville on high ground above the confluence of the Marne and the Neuilly brook, about 5 m. N. by W. of the town; (b) the west front, comprising Humes battery (2| m. N.W. of Langres), Fort de la Pointe de Diamant, and the redoubts of Perrancey, Le Fays and Noidant (the last 4 m. S.W. of the town), overlooking the deep valley of the Mouche brook (this front was attacked in the mock siege of August 1907) ; (c) the south front, comprising Fort de la Bonnelle or Decres (2 m. S.S.W. of the town), a small work commanding the Chalon-Langres road, Le Mont and Le Pailly batteries, Fort Vercingetorix, the last, 5 m. S.W. of the place, standing on a steep and narrow spur of the main plateau, and in second line the old fort de la Marnotte, and the large bastioned citadel (the town enceinte is “declassee”) ; (d) the east front, marked by Forts Montlandon and Plesnoy at the north and south ends respectively of a long steep ridge, 6 m. E. of Langres, the bridges over the Marne leading ;? these works being commanded by Fort Peigney,

a work about half a mile east of the town ; (e) Fort Dampierre, 8 m. N.E. of the town, which commands all the main approaches from the north, and completes the circle by crossing its fire with that of Fort St Menge.

LANGTOFT, PETER (d. c. 1307), English chronicler, took his name from the village of Langtoft in Yorkshire, and was a canon of the Augustinian priory in Bridlington. His name is also given as Langetoft

and Langetost. He wrote in French verse a Chronicle dealing with the history of England from the earliest times to the death of Edward I. in 1307. It consists of three parts and contains about 9000 rhyming verses. The earlier part of the Chronicle is taken from Geoffrey of Monmouth and other writers; for the period dealing with the reign of Edward I. Langtoft is a contemporary and valuable authority, especially for affairs in the north of England and in Scotland. Langtoft's Chronicle seems to have enjoyed considerable popu- larity in the north, and the latter part of it was translated into English by Robert Mannyng, sometimes called Robert of Brunne, about 1330. It has been edited for the Rolls Series by T. Wright

(1866-1868).

See Wright's preface, and also O. Prcussner, Robert Mannyng of Brunne' s Ubersetmng von Pierre de Langtofts Chronicle und ihr Verhdltniss zum Originate (Breslau, 1891).

LANGTON, JOHN (d. 1337), chancellor of England and bishop of Chichester, was a clerk in the royal chancery, and became chancellor in 1292. He obtained several ecclesiastical appoint- ments, but owing to the resistance of Pope Boniface VIII. he failed to secure the bishopric of Ely in 1298, although he was supported by Edward I. and visited Rome to attain his end. Resigning his office as chancellor in 1302, he was chosen bishop of Chichester in 1305, and again became chancellor shortly after the accession of Edward II. in 1307. Langton was one of the " ordaincrs " elected in 13 10, and it was probably his connexion with this body that led to his losing the office of chancellor about this time. He continued, however, to take part in public affairs; mediating between the king and Earl Thomas of Lancaster in 1318, and attempting to do so between Edward and his rebellious barons in 1321. He died in June or July 1337. Langton built the chapterhouse at Chichester, and was a benefactor of the university of Oxford.

LANGTON, STEPHEN (d. 1228)-, cardinal and archbishop of Canterbury, was the son of English parents; but the date and place of his birth are unknown. Since he became early in his career a prebendary of York, and since his brother Simon (d. 1248) was elected 1 to that see in 121 5, we may suppose the family to have been of northern extraction. Stephen, however, migrated to Paris, and having graduated in that university became one of its most celebrated theologians. This was probably the time when he composed his voluminous com- mentaries (many of which still exist in manuscript) and divided the Bible into chapters. At Paris also he contracted the friend- ship with Lothar of Segni, the future Innocent III., which

played so important a part in shaping his career. Upon becoming pope, Innocent summoned Langton to Rome, and in 1206 designated him as cardinal-priest of S. Chrysogonus. Immediately after- wards Langton was drawn into the vortex of English politics. Archbishop Hubert Walter had died in 1205, and the election of his successor had raised thorny questions. The suffragans of Canterbury claimed a share in choosing the new primate, although that right had been exclusively reserved to the monks of Canterbury by a papal privilege; and John supported the bishops since they were prepared to give their votes for his candidate, John de Gray, bishop of Norwich. A party of the younger monks, to evade the double pressure of the king and bishops, secretly elected their sub-prior Reginald and sent him to Rome for confirmation. The plot leaked out; the rest of the monks were induced to elect John de Gray, and he too was despatched to Rome. After hearing the case Innocent 1 Pope Innocent, however, would not confirm this election, and the disappointed candidate threw himself into the contest between the English barons on the one side and King John and the pope on the other. Later Simon made peace with Henry III. and was appointed archdeacon of Canterbury; he was consulted by Pope Gregory IX. and was sent to France on diplomatic business by Henry III.

declared both elections void; and with John's consent ordered that a new election should be made in his presence by the representatives of the monks. The latter, having confessed that they had given John a secret pledge to elect none but the bishop of Norwich, were released from the promise by Innocent; and at his suggestion elected Stephen Langton, who was con- secrated by the pope on the 17th of June 1207. On hearing the news the king banished the monks of Canterbury and lodged a protest with the pope, in which he threatened to prevent any English appeals from being brought to Rome. Innocent replied by laying England under an interdict (March 1208), and ex- communicating the king (November 1209). As John still remained obstinate, the pope at length invited the French king Philip Augustus to enter England and depose him. It was this threat which forced John to sue for a reconciliation; and the first condition exacted was that he should acknowledge Langton as archbishop. During these years Langton had been residing at Pontigny, formerly the refuge of Becket. He had addressed to the English people a dignified protest against the king's conduct, and had at last pressed the pope to take extreme measures. But he had consistently adopted towards John as conciliatory an attitude as his duty to the church would allow, and had more than once entered upon negotiations for a peaceful compromise. Immediately after entering England (July 1 2

13) he showed his desire for peace by absolving the king. But, unlike the pope, he gave ear to the popular cry for redress of political grievances; and persisted in associating with the baronial opposition, even after he was ordered by Innocent to excommunicate them as disturbers of the peace. Langton encouraged the barons to formulate their demands, and is said to have suggested that they should take their stand upon the charter of Henry I. It is uncertain what further share he took in drafting Magna Carta. At Runnymede he appeared as a commissioner on the king's side, and his influence must therefore be sought in those clauses of the Charter which differ from the original petitions of the barons. Of these the most striking is that which confirms the " liberties " of the church; and this is chiefly remarkable for its moderation.

Soon after the issue of the charter the archbishop left England to attend the Fourth Lateran Council. At the moment of his departure he was suspended by the representatives of Innocent for not enforcing the papal censures against the barons. Innocent confirmed the sentence, which remained in force for two years. During this time the archbishop resided at Rome. He was allowed to return in 1218, after the deaths of Innocent and John. From that date till his death he was a tower of strength to the royal party. Through his influence Pandulf was recalled to Rome (1221) and Honorius III. promised that no legate should be sent to reside in England during the archbishop's lifetime. In 1222, in a synod held at Oseney, he promulgated a set of Constitutions still recognized as forming a part of the law of the English Church. Beyond this little is recorded of his latter years. He died on the 9th of July 1228, and was buried in Canterbury Cathedral, where his tomb, unless tradition errs, may still be seen.

The authorities are mainly those for the reign of John. No contemporary biography has come down to us. Some letters, by Langton and others, relating to the quarrel over his election are preserved in a Canterbury Chronicle (ed. W. Stubbs in the " Rolls " edition of Gervase of Canterbury, vol. ii.). There are many references to him in the correspondence of Innocent III. (Migne's Patrologia Latina, vols, ccxiv.-ccxvii.). Of modern works see F. Hurter, Geschichte Papst Innocenz III. (Hamburg, 1 841-1844) ; W. F. Hook, Lives of the Archbishops of Canterbury (London, 1860-1876), and W. Stubbs's preface to the second volume of Walter of Coventry (" Rolls " ed.), which devotes special attention to Langton. The MSS. of Langton's writings are noticed in J. Bale's Index Britanniae scriptorum (ed. R. L. Poole, 1902); his Constitutions are printed in D. Wilkin's Concilia, vol. ii. (London, 1737). _ (H.W. C. D.)

Another English prelate who bore the name of Langton was Thomas Langton, bishop of Winchester, chaplain to Edward IV. In 1483 he was chosen bishop of St Davids; in 1485 he was made bishop of Salisbury and provost of Queen's College, Oxford, and he became bishop of Winchester in 1493. In 1501 he was elected arch- bishop of Canterbury, but he died on the 27th of January 1501, before his election had been confirmed.

LANGTON, WALTER (d. 13 21), bishop of Lichfield and treasurer of England, was probably a native of Langton West in Leicestershire. Appointed a clerk in the royal chancery, he became a favourite servant of Edward I., taking part in the suit over the succession to the Scottish throne in 1292, and visiting France more than once on diplomatic business. He obtained several ecclesiastical preferments, became treasurer in 1295, and in 1296 bishop of Lichfield. Having become unpopular, the barons in 1301 vainly asked Edward to dismiss him; about the same time he was accused of murder, adultery and simony. Suspended from his office, he went to Rome to be tried before Pope Boniface VIII., who referred the case to Winchelsea, archbishop of Canterbury; the archbishop, although Langton's lifelong enemy, found him innocent, and this sentence was confirmed by Boniface in 1303. Throughout these diffi- culties, and also during a quarrel with the prince of Wales, afterwards Edward II., the treasurer was loyally supported by the king. Visiting Pope Clement V. on royal business in 1305, Langton appears to have persuaded Clement to suspend Winchel- sea; after his return to England he was the chief adviser cf Edward I., who had already appointed him the principal executor of his will. His position, however, was changed by the king's death in July 1307. The accession of Edward II. and the return of Langton's enemy, Piers Gaveston, were quickly followed by the arrest of the bishop and his removal from office. His lands, together with a great hoard of movable wealth, were seized, and he was accused of misappropriation and venality. In spite of the intercession of Clement V. and e'ven of the restored arch- bishop, Winchelsea, who was anxious to uphold the privileges of his order, Langton, accused again by the barons in 1309, remained in prison after Edward's surrender to the " ordainers " in 13 10. He was released in January 13 12 and again became treasurer; but he was disliked by the " ordainers," who forbade him to discharge the duties of his office. Excommunicated by Winchelsea, he appealed to the pope, visited him at Avignon, and returned to England after the archbishop's death in May 13 13. He

was a member of the royal council from this time until his dismissal at the request of parliament in 1315- He died in November 1321, and was buried in Lichfield cathedral, which was improved and enriched at his expense. Langton appears to have been no relation of his contemporary, John Langton, bishop of Chichester.

LANGTRY, LILLIE (1852-), English actress, was the daughter of the Rev. W. C. le Breton, dean of Jersey, and married in 1874 Edward Langtry (d. 1897). For many years she was famous as one of the most beautiful women in England. It was not till 1881 that she definitely went on the stage, appearing from that time under her own management both in London and in America. In 1899 she married Sir Hugo de Bathe, Bart.

LANGUAGE (adapted from the Fr. langage, from langue, tongue, Lat. lingua), the whole body of words and combina- tions of words as used in common by a nation, people or race, for the purpose of expressing or communicating their thoughts; also, more widely, the power of expressing thought by verbal utterance. See generally undei Philology, Phonetics, Voice, Writing, Grammar, &c; and the articles on the various languages, or under headings of countries and races.

LANGUEDOC, one of the old provinces of France, the name of which dates from the end of the 13th century. In 1290 it was used to refer to the country in whose tongue {langue) the word for ” yes ” was oc, as opposed to the centre and north of France, the langue d’oil (the out of to-day). Territorially Languedoc varied considerably in extent, but in general from 1360 until the French Revolution it included the territory of the following departments of modern France: part of Tarn et Garonne, Tarn, most of Haute-Garonne, Ariege, Aude, Pyrenees-Orientales, Herault, Gard, Lozere, part of Ardeche and Haute-Loire. The country had no natural geographical unity. Stretching over the Cevennes into the valleys of the upper Loire on the north and into that of the upper Garonne on the west, it reached the Pyrenees on the south and the rolling

hills along the Rhone on the east. Its unity was entirely a political creation, but none the less real, as it was the great state of the Midi, the representative of its culture and, to some degree, the defence of its peculiar civilization. Its climate, especially in Herault (Montpellier), is especially delightful in spring and early summer, and the scenery still holds enough ruined remains of Roman and feudal times to recall the romance and the tragedy of its history.

Although the name is of comparatively late medieval origin, the

history of Languedoc, which had little in common with that of northern France, begins with the Roman occupation. Toulouse was an important place as early as 119 B.C.; the next year Narbonne, the seaport, became a Roman colony. By the time of Julius Caesar the country was sufficiently Romanized to furnish him with men and money, and though at first involved in the civil wars which followed, it prospered under Roman rule as perhaps no other part of the empire did. While it corresponded exactly to no administrative division of the Roman empire, it was approximately the territory included in Gallia Narbonensis, one of the seventeen provinces into which the empire was divided at the death of Augustus. It was rich and flourishing, crowded with great and densely populated towns, Nimes, Narbonne, Beziers, Toulouse; with schools of rhetoric and poetry still vigorous in the 5th century; theatres, amphitheatres and splendid temples. In the 5th century this high culture was an open prize for the barbarians; and after the passing of the Vandals, Suebi and Visigoths into Spain, the Visigoths returned under Wallia, who made his capital at Toulouse in 419. This was the foundation of the Visigothic kingdom which Clovis dis- membered in 507, leaving the Visigoths only Septimania — the country of seven cities, Narbonne, Carcassonne, Elne, Beziers, Maguelonne, Lodeve and Agde — that is, very nearly the area occupied later by the province of Languedoc. At the council of Narbonne in 589 five races are mentioned as living in the province, Visigoths, Romans, Jews — of whom there were a great many — Syrians and Greeks. The repulse of the Arabs by Charles Martel in 732 opened up the country for the Frankish conquest, which was completed by 768. Under the Carolingians Septimania became part of the kingdom of Aquitaine, but became a separate duchy in 817.

Until the opening of the 13th century there is no unity in the history of Languedoc, the great houses of Toulouse and Car- cassonne and the swarm of warlike counts and barons practically ignoring the distant king of France, and maintaining a chronic state of civil war. The feudal regime did not become at all universal in the district, as it tended to become in the north of France. Allodial tenures survived in sufficient numbers to con- stitute a considerable class of non-vassal subjects of the king, with whose authority they were little troubled. By the end of the nth century the house of the counts of Toulouse began to play the predominant role; but their court had been famous almost a century before for its love of art and literature and its extravagance in dress and fashions, all of which denoted its wealth. Constance, wife of King Robert II. and daughter of the count of Toulouse, gave great offence to the monks by her following of gallant gentlemen. They owed their tastes, not only to their Roman blood, and the survival of

their old love for rhetoric and poetry, but also to their intercourse with the Mahommedans, their neighbours and enemies, and their friends when they were not fighting. Under Raymond of Saint Gilles, at the end of the nth century, the county of Toulouse began its great career, but Raymond's ambition to become an Oriental prince, which led him — and the hundred thousand men who, according to the chroniclers, followed him — away on the first crusade, left a troubled heritage to his sons Bertrand and Alphonse Jourdain. The latter successfully beat off William IX., duke of Aquitaine, and won from the count of Barcelona that part of Provence between the Drome and the Durance. The reign of Alphonse lasted from noc to 1148. By the opening of the 13th century the sovereignty of the counts of Toulouse was recognized through about half of Provence, and they held the rich cities of the most cultured and wealthiest portion of France,

cities which had a high degree of local independence. Their local governments, with their consuls at the head, show, at least in name, the influence of Roman ideas. It is still an open question how much of their autonomy had remained untouched by the barbarian invasions from the Roman period. The citizens of these free cities were in continual intercourse with Saracens of Palestine and Moors of Spain; they had never entirely abandoned pagan customs; their poetry — the poetry of the troubadours — taught them the joys of life rather than the fear of death, the licence of their chivalry with its courts of love led to the other extreme of asceticism in such as were of religious temperament; all things combined to make Languedoc the proper soil for heresy. The Church never had the hold upon the country that it had in the north, the people of the Midi were always lukewarm in the faith; there was no noteworthy ecclesi- astical literature in Languedoc from the end of the Carolingian period until after the Albigensian crusade, no theological centre like Paris, Bee or Laon. Yet Languedoc furnished the most heroic martyrs for the ascetic Manichaean creed. The era of heresy began with the preaching of Peter de Brueys and his follower, Henry of Lausanne, who emptied the churches and taught contempt for the clergy. Saint Bernard himself was able to make but temporary headway against this rebellion from a sacramental and institutionalized Christianity. In the first decade of the 13th century came the inevitable conflict. The whole county of Toulouse, with its fiefs of Narbonne, Beziers, Foix, Montpellier and Quercy, was in open and scornful secession from the Catholic Church, and the suppression of this Manichaean or Cathar religion was the end of the brilliant

culture of Languedoc. (See Albigenses, Cathars, Inquisition.) The crusade against the Albigenses, as the Cathars were locally termed, in 1200, resulted in the union to the crown of France in 1229 of all the country from Carcassonne to the Rhone, thus dividing Languedoc into two. The western part left to Raymond VII., by the treaty of 1229, included the Agenais, Quercy, Rouergue, the Toulousain and southern Albigeois. He had as well the Venaissin across the Rhone. From 1229 to his death in 1249 Raymond VII. worked tirelessly to bring back prosperity to his ruined country, encouraging the foundation of new cities, and attempting to gain reconciliation with the Church. He left only a daughter, Jeanne, who was married to Alphonse of Poitiers. Alphonse, a sincere Catholic, upheld the Inquisition, but, although ruling the country from Paris, maintained peace. Jeanne died without heirs four days after her husband, upon their return from the crusade in Africa, in 1271, and although she attempted by will to prevent the reversion of her lands to the crown, they were promptly seized by King Philip III., who used the opposition of Roger Bernard, count of Foix, as an excuse to appear with a formidable army, which had little to do to secure entire submission. Thus the county of Toulouse passed to the crown, though Philip III. turned over the Agenais to Edward I. of England in 1279. Ir. 1274 he ceded the county of Venaissin to Pope Gregory X., the papacy having claimed it, without legal grounds, since the Albigensian crusade (see Avignon).

Such was the fate of the reduced county of Toulouse. At the division of Languedoc in 1229 Louis IX. was given all the country from Carcassonne to the Rhone. This royal Languedoc was at first subject to much trickery on the part of northern speculators and government officials. In 1248 Louis IX. sent royal enqueteurs, much like Charlemagne's missi dominici, to correct all abuses, especially to inquire concerning peculation by royal agents. On the basis of their investigations the king issued royal edicts in 1254 and 1259 which organized the admini- stration of the province. Two senSchaussees were created — one at Nimes, the other at Carcassonne — each with its lesser divisions of vigueries and bailliages. During the reign of Philip III. the enqueteurs were busily employed securing justice for the conquered, preventing the seizure of lands, and in 1279 a supreme court of justice was established at Toulouse. In 1302 Philip IV. convoked the estates of Languedoc, but in the centurv which followed thev wee Jess an instrument for self-

government than one for securing money, thus aiding the enqutteurs, who during the Hundred Years' War became mere revenue hunters for the king. In 1355 the Black Prince led a savage plundering raid across the country to Narbonne. After the battle of Poitiers, Languedoc

supported he count of Armagnac, but there was no enthusiasm for a national cause. Under Charles V., Louis of Anjou, the king's brother, was governor of Languedoc, and while an active opponent of the English, he drained the country of money. But his extortions were surpassed by those of another brother, the due de Berry, after the death of Charles V. In 1382 and 1383 the infuriated peasantry, abetted by some nobles, rose in a rebellion — known as the Tuchins — which was put down with frightful butchery, while still greater sums were demanded from the impoverished country. In the anarchy which followed brigandage increased. Redress did not come until 1420, when the dauphin, afterwards Charles VII., came to Languedoc and reformed the administration. Then the country he saved furnished him with the means for driving out the English in the north. For the first time, in the climax of its miseries, Languedoc was genuinely united to France. But Charles VII. was not able to drive out the brigands, and it was not until after the English were expelled in 1453 tr,at Languedoc had even comparative peace. Charles VII. united Comminges to the crown; Louis XL Roussillon and Cerdagne, both of which were ceded to Aragon by Charles VIII. as the price of its neutrality during his expedition into Italy. From the reign of Louis XL until 1523 the governorship of Languedoc was held by the house erf Bourbon. After the treason of the constable Bourbon it was held by the Montmorency family with but slight interruption until 1632.

The Reformation found Languedoc orthodox. Persecution had succeeded. The Inquisition had had no victims since 1340, and the cities which had been centres of heresy were now strongly orthodox. Toulouse was one of the most fanatically orthodox cities in Europe, and remained so in Voltaire's day. But Calvin- ism gained ground rapidly in the other parts of Languedoc, and by 1560 the majority of the population was Protestant. It was, however, partly a political protest against the misrule of the Guises. The open conflict came in 1561, and from that until the edict of Nantes (1598) there was intermittent civil war, accompanied with iconoclasm on the one hand, massacres on the other and ravages on both.

The main figure in this period is that of Henri de Montmorency, seigneur de PJamville, later ducde Montmorency, governor of the province from 1563, who was, at first, hostile to the Protestants, then from 1574 to 1577, as leader of the " Politiques," an advocate of compromise. But peace was hardly ever established, although there was a yearly truce for the ploughing. By the edict of Nantes, the Protestants were given ten places of safety in Languedoc; but civil strife did not come to an end, even under Henry IV. In 1620 the Protestants in Languedoc rose under Henri, due de Rohan

(1579-1638), who for two years defied the power of Louis XIII. When Louis took Montpellier in 1622, he attempted to reconcile the Calvinists by bribes of money and office, and left Montauban as a city of refuge. Richelieu's extinction of Huguenotism is less the history of Languedoc than of the Huguenots (q.v.). By 1629 Protestantism was crushed in the Midi as a political force. Then followed the tragic episode of the rebellion of Henri II., due de Montmorency, son of the old governor of Languedoc. As a result, Languedoc lost its old provincial privilege of self-assessment until 1649, and was placed under the governorship of Marshal Schomberg. During Louis XIV. 's reign Languedoc prospered until the revocation of the edict of Nantes. Industries and agriculture were encouraged, roads and bridges were built, and the great canal giving a water route from the Atlantic to the Mediterranean increased the trade of its cities. Colbert especially encouraged its manufactures. The religious persecutions which accompanied the revocation of the edict of Nantes bore hardest on Languedoc, and resulted in a guerilla warfare known as the rebellion of the Camisards (q.v.). On the eve of the Revolution some of the brightest scenes of contentment and prosperity which surprised

Arthur Young, the English traveller in France, were those of the grape harvests in Languedoc vineyards.

In 1790 Languedoc disappeared from the map of France, with the other old provinces; and the departments mentioned took its place'. But the peculiar characteristics of the men of the Midi remain as clearly distinct from those of the north as the Scottish type is distinct from the English. The " peaceful insurrection " of the Languedoc vine-growers in the summer of 1907 revealed to the astonished Parisians the same spirit of independence as had underlain the resistance to Simon de Montfort and Richelieu.

The one monumental history of Languedoc is that of the Bene-dictines, Dom Claude Devic and Dom J.J. Vaissete, Ilistoire generate de la province de Languedoc (5 vols., Paris, 1 730-1 745). This has been re-edited, and continued and increased by the addition of important monographs, to 15 volumes (Toulouse, 1872-1892). It is the great library of sources, critical apparatus and bibliographies concerning Languedoc, and carries the history up to 1790. The fine article " Languedoc " in La Grande Encyclopedic is by A. Molinicr, perhaps the greatest modern authority on Languedoc. (J. T. S.*)

LANGUET, HUBERT (1518-1581), French Huguenot writer and diplomat, was born at Vitteaux in Burgundy, of which town his father was governor. He received his early education from a distinguished Hellenist, Jean Perelle, and displayed remarkable ability in Greek and Latin. He studied law, theology and science; at the university of Poitiers from 1536 to 1539; then, after some travel, attended the universities of Bologna and Padua, receiving the doctorate from the latter in 1548, At Bologna he read Melanchthon's Loci communes theologiae and was so impressed by it that in 1549 he went to Wittenberg to see the author, and shortly afterwards became a Protestant. He made his headquarters at Wittenberg until the death of Melanchthon in 1560, although during that period, as well as throughout the rest of his life, he travelled extensively in France, Italy, Spain, Germany, Sweden, and even Finland and Lapland. In 1557 he declined the invitation of Gustavus I. to enter the service of Sweden, but two years later accepted a similar invita- tion of Augustus I., elector of Saxony. He showed great ability in diplomacy, particularly in organizing the Protestants. He represented the elector at the French court from 1561 to 1572 except when the religious and political troubles in France occasionally compelled him temporarily to withdraw. He performed many minor diplomatic missions for the elector, and in 1567 accompanied him to the siege of Gotha. He delivered a violent harangue before Charles IX. of France in 1570 on behalf of the Protestant princes, and escaped death on St Bartholomew's Day (1572) only through the intervention of Jean de Morvilliers, the moderate and influential bishop of Orleans. He represented the elector of Saxony at the imperial court from 1573 to 1577. Financial embarrassment and disgust at the Protestant controversies in which he was forced to partici- pate caused him to seek recall from the imperial court. His request being granted, Languet spent the last years of his life mainly in the Low Countries, and though nominally still in the service of the elector, he undertook a mission to England for John Casimir of Bavaria and was a valuable adviser to William the Silent, prince of Orange. Languet died at Antwerp on the 30th of September 1581.

His correspondence is important for the history of the 16th century. Three hundred and twenty-nine letters to Augustus of Saxony dating from the 17th of November 1565 to the 8th of September 1581, and one hundred and eleven letters to the chancellor Mordeisen dating from November 1559 to the summer of 1565, are preserved in MS. in the Saxon archives, and were published by Ludovicus at Halle in 1699 uncter the title Arcana secuii decimi sexti. One hundred and eight letters to Camerarius were published at Groningen in 1646 under the

title Langueti Epistolae ad Joach. Camerarium, patrem el filium; and ninety-six to his great friend Sir Philip Sidney, dating from the 22nd of April 1573 to the 28th of October 1580, appeared at Frankfort in 1633 and have been trans- lated into English by S. A. Pears (London, 1845). The Historica Descriptio of the siege and capture of Gotha appeared in 1568 and has been translated into French and German. The authorship of the work by which Languet is best known has been disputed. It is entitled Vindiciae contra tyrannos, sive de principis in populum populique in principem legitima potestate, Stephana Junto Bruto Celta auctore, and is thought to have been published at Basel (1579)

although it bears the imprint of Edinburgh. It has been attributed to Beza, Hotman, Casaubon and Duplessis-Mornay, by divers writers on various grounds — to the last-named on the very respectable authority of Grotius. The authorship of Languet was supported by Peter Bayle (for reasons stated in the form of a supplement to trie Dictionnaire) and confirmed by practically all later writers. The work has been frequently reprinted, the Leipzig edition (1846) containing a life of Languet by Treitschke. A French translation appeared in 1 58 1 and an English translation in 1689. The work upholds the doctrine of resistance, but affirms that resistance must come from properly constituted authorities and objects to anything which savours of anabaptism or other extreme views. The Apologie ou defence du tres illustre Prince Guillaume conlre le ban el Vedit du rot d'Espagne (Leiden, 1581) is sometimes attributed to Languet. There seems little doubt, however, that it was really the work of the prince himself, with the help either of Languet (Groen van Prinsterer, Archives) or of Pierre de Villiers (Motley, Rise of the Dutch Republic; and Blok, History of the People of the Netherlands).

See Ph. de la Mare, Vie d'Hubert Languet (Halle, 1700); E. and E. Haag, La France protestante; H. Chevreul, Hubert Languet (Paris, !^5 2); J- Blasel, Hubert Languet (Breslau, 1872); O. Scholz, Hubert Languet als kursdehsischer Berichterstatter u. Gesandter in Frankreich •wahrend l$6a-iS72 (Halle, 1875); G. Touchard, De politica Huberti Langueti (Paris, 1898). There is a good article on Languet by P. Tschackert in Hauck's Real-Encyklopddie, 3rd ed., xi. 274-280.

LANGUR, one of the two Hindu names (the other being hanuman) of the sacred Indian monkey scientifically known as Semnopithecus entellus, and hence sometimes called the entellus monkey. A prodigiously long tail, beetling eyebrows with long black hairs, black ears, face, feet and hands, and a general greyish-brown colour of the fur are the distinctive characteristics of the langur. These monkeys roam at will in the bazaars of Hindu cities, where they help

themselves freely from the stores of the grain-dealers, and they are kept in numbers at the great temple in Benares. In a zoological sense the term is extended to embrace all the monkeys of the Asiatic genus Semnopithecus, which includes a large number of species, ranging from Ceylon, India and Kashmir to southern China and the Malay countries as far east as Borneo and Sumatra. These monkeys are character- ized by their lank bodies, long slender limbs and tail, well-developed thumbs, absence of cheek-pouches, and complex stomachs. They feed on leaves and young shoots. (R. L.*)

LANG VON WELLENBURG, MATTHAUS (1469-1540), German statesman and ecclesiastic, was the son of a burgher of Augsburg. He afterwards assumed the name of Wellenburg from a castle that came into his possession. After studying at Ingolstadt, Vienna and Tubingen he entered the service of the emperor Frederick III. and quickly made his way to the front. He was also one of the most trusted advisers of Frederick's son and successor Maximilian I., and his services were rewarded in 1 500 with the provostship of the cathedral at Augsburg and in the following year with the bishopric of Gurk. In 1511 he was made a cardinal by Pope Julius II., and in 15 14 he became coadjutor to the archbishop of Salzburg, whom he succeeded in 1 5 19. He also received the bishopric of Cartagena in Murcia in i52i,and that of Albano in 1535. Lang's adherence to the older faith, together with his pride and arrogance, made him very unpopular in his diocese of Salzburg; in 1523 he was involved in a serious struggle with his subjects, and in 1525, during the Peasants' War, he had again to fight hard to hold his own. He was one of the chief ministers of Charles V.; he played an important part in the tangled international negotiations of his time; and he was always loyal to his imperial masters. Not without reason has he been compared with Cardinal Wolsey. He died on the 30th of March 1540.

LANIER, SIDNEY (1842-1881), American poet, was born at Macon, Georgia, on the 3rd of February 1842. He was of Huguenot descent on his father's side, and of Scottish and Virginian on his mother's. From childhood he was passionately fond of music. His subsequent mastery of the flute helped to support him and greatly increased his reputation. At the age of fourteen he entered Oglethorpe College, where, after graduating with distinction, he held a tutorship. He enlisted in the Con- federate army in April 1861, serving first in Virginia, and finding opportunities to continue his studies. After the Seven Days' battles around Richmond, he was transferred to the signal service.

About this time the first symptoms of consumption appeared. He subsequently served in a blockade-runner, but his vessel was captured, and he was confined for five months in a Federal prison, his flute proving the best of companions. Exchanged early in 1865, he started home on foot, arriving in a state of exhaustion that led to a severe illness. In 1867 he visited New York in connexion with his novel Tiger Lilies — an immature work, dealing in part with his war experiences, and now difficult to obtain. Later in the same year he took charge of a country school in Alabama, and was married to Miss Mary Day of his native town. The next year he returned to Macon in low health, and began to study and practise law with his father. In 1872 he went to Texas for his health, but was forced to return, and he secured an engagement as first flute in the Peabody concerts at Baltimore (December 1873). He wrote a guide-book to Florida (1876), and tales for boys from Froissart, Malory, the Mabinogion and Percy's Reliques (1878-1882). He now made congenial friends, such as Bayard Taylor, his reputation gradually in- creased, and he was enabled to study music and literature, especially Anglo-Saxon poetry. In 1876 he wrote his ambitious cantata for the Centennial Exhibition, and brought his family north. A small volume of verse appeared in the next year. In 1879 he was made lecturer on English literature at Johns Hopkins University. His lectures became the basis of his Science of English Verse (1880) — his most important prose work, and an admirable discussion of the relations of music and poetry — and also of his English Novel (New York, 1883), which, devoted largely to George Eliot, is suggestive, but one-sided. Work had to be abandoned on – account of growing feebleness, and in the spring of 1881 he was carried to Lynn, North Carolina, to try camp life, and died there on the 7th of September. Since his death his fame has grown steadily and greatly, an enlarged and final edition (1884) of his poems, prepared by his wife, his Letters, 1866-1881 (1899), and several volumes of miscellaneous prose having assisted in keeping his name before the public. A posthumous work on Shakspere and his Forerunners (London, 2 vols., 1902) was edited by H. W. Lanier. Among his more noteworthy poems are " Corn, " " The Revenge of Hamish," " Song of the Chattahoochee " and " The Marshes of Glynn." By some his genius is regarded as musical rather than poetic, and his style is considered hectic; by others he is held to be one of the most original and most talented of modern American poets. He is considered the leading writer of the New South, the greatest Southern poet since Poe, and a man of heroic and exquisite character.

See a " Memorial," by William Hayes Ward, prefixed to the Poems

(1884); Letters of Sidney Lanier 1866-1881 (1899), edited by H. VV. Lanier and Mrs Sidney Lanier; E. Mims, Sidney Lanier (1905). There is a bibliography of Lanier's scattered writings in Select Poems (New York, 1896; Toronto, 1900) edited by Morgan Callaway.

(W. P. T.)

LANJUINAIS, JEAN DENIS, Comte (1 753-1827), French politician, was born at Rennes (Ille-et-Vilaine) on the 12th of March 1753. After a brilliant college career, which made him doctor of laws and a qualified barrister at nineteen, he was appointed counsel to the Breton estates and in 1775 professor of ecclesiastical law at Rennes. At this period he wrote two important works which, owing to the distracted state of public affairs, remained unpublished, Institutiones juris ecclesiastici and Praelectiones juris ecclesiastici. He had begun his career at the bar by pleading against the feudal droit du colombier, and when he was sent by his fellow-citizens to the states-general of 1 789 he demanded the abolition of nobility and the substitution of the title of king of the French and the Navarrese for king of France and Navarre, and helped to establish the civil constitution of the clergy. Returned to the Convention in September 1792 he developed moderate, even reactionary views, becoming one of the fiercest opponents of the Mountain, though he never wavered in his support of republican principles. He refused to vote for the death of Louis XVI., alleging that the nation had no right to despatch a vanquished prisoner. His daily attacks on the Mountain resulted, on the 15th of April 1793, in a demand

by the commune for his exclusion from the assembly, but, undaunted, when the Parisian populace invaded the Chamber on the 2nd of June, Lanjuinais renewed his defiance of the victorious party. Placed under arrest with the Girondins, he escaped to Rennes where he drew up a pamphlet denouncing the constitution of 1793 under the curious title Le Dernier Crime de Lanjuinais (Rennes, 1793). Pursued by J. B. Carrier, who was sent to stamp out resistance in the west, he lay hidden until some time after the revolution of Thermidor (July 1794), but he was re- admitted to the Convention on the 8th of March 1795. He maintained his liberal and independent attitude in the Conseil des Anciens, the Senate and the Chamber of Peers, being president of the upper house during the Hundred Days. Together with G. J. B. Target, J. E. M. Portalis and others he founded under the empire an academy of legislation in Paris, himself lecturing on Roman law. Closely associated with oriental scholars, and a keen student of oriental religions, he entered the Academy of Inscriptions in 1808. After the Bourbon restoration Lanjuinais consistently defended the

principles of constitutional monarchy, but most of his time was given to religious and political subjects. Besides many contributions to periodical literature he wrote, among other works, Constitutions de la nation francaise (1819) ; Appreciation du pro jet de loi relalif aux trois concordats (1806, 6th ed. 1827), in defence of Gallicanism; and Etudes bio- graphiques et litter aires sur Antoine Arnauld, P. Nicole et Jacques Necker (1823). He died in Paris on the 13th of January 1827.

His son, Victor Ambroise, Vicomte de Lanjuinais (1802- 1869), was also a politician, becoming a deputy in 1838. His interests lay chiefly in financial questions and in 1849 he became minister of commerce and agriculture in the cabinet of Odilon Barrot. He wrote a Notice historique sur la vie et les ouvrages du comte de Lanjuinais, which was prefixed to an edition of his father's CEuvres (4 vols., 1832).

For the life of the comte de Lanjuinais see also A. Robert and G. Cougny, Dictionnaire des parlementaires, vol. ii. (1890); and F. A. Aulard, Les Orateurs de la Legislative et de la Convention (Paris, 1885- 1886). For a bibliography of his works see J. M. Querard, La France litteraire, vol. iii. (1829).

LANMAN, CHARLES ROCKWELL (1850-), American Sanskrit scholar, was born in Norwich, Connecticut, on the 8th of July 1850. He graduated at Yale in 1871, was a graduate student there (1871-1873) under James Hadley and W. D. Whitney, and in Germany (1873-1876) studied Sanskrit under Weber and Roth and philology under Georg Curtius and Leskien. He was pro- fessor of Sanskrit at Johns Hopkins University in 1876-1880 and subsequently at Harvard University. In 1889 he travelled in India and bought for Harvard University Sanskrit and Prakrit books and manuscripts, which, with those subsequently bequeathed to the university by Fitzedward Hall, make the most valuable collection of its kind in America, and made possible the Harvard Oriental Series, edited by Professor Lanman. In 1879-1884 he was secretary and editor of the Transactions, and in 1889-1890 president of the American Philological Associa- tion, and in 1884-1894 he was corresponding secretary of the American Oriental Society, in 1897-1907 vice-president, and in 1907-1908 president. In the Harvard Oriental Series he trans- lated (vol. iv.) into English Rajacekhara's Karpura-Manjari (1900), a Prakrit drama, and (vols. vii. and viii.) revised and edited Whitney's translation of, and notes on, the Atharva- Veda Samhitd (2 vols., 1905); he published A Sanskrit Reader, with Vocabulary and Notes (2 vols., 1884-1888); and he wrote on early Hindu pantheism and contributed the section on Brahmanism to Messages of the World's Religions.

LANNES, JEAN, duke of Montebello (1760-1809), marshal of France, was born at Lectoure (Gers) on the nth of April 1769. He was the son of a livery stables keeper, and was apprenticed to a dyer. He had had little education, but his great strength and proficiency in all manly sports caused him in 1792 to be elected sergeant-major of the battalion of volunteers of Gers, which he had joined on the breaking out of war between Spain and the French republic. He served through the cam- paigns in the Pyrenees in 1793 and 1794, and rose by distinguished

conduct to the rank of chef de brigade. However, in 1795, on the reform of the army introduced by the Thermidorians, he was dismissed from his rank. He re-enlisted as a simple volunteer in the army of Italy, and in the famous campaign of 1796 he again fought his way up to high rank, being eventually made a general of brigade by Bonaparte. He was distinguished in every battle, and was wounded at Areola. He was chosen by Bona- parte to accompany him to Egypt as commander of one of Kleber's brigades, in which capacity he greatly distinguished himself, especially on the retreat from Syria. He went with Bonaparte to France, assisted at the 18th Brumaire, and was appointed general of division, and commandant of the consular guard. He commanded the advanced guard in the crossing of the Alps in 1800, was instrumental in winning the battle of Montebello, from which he afterwards took his title, and bore the brunt of the battle of Marengo. In 1801 Napoleon sent him as ambassador to Portugal. Opinions differ as to his merits in this capacity; Napoleon never made such use of him again. On the establishment of the empire he was created a marshal of France, and commanded once more the advanced guard of a great French army in the campaign of Austerlitz. At Austerlitz he had the left of the Grand Army. In the 1806-07 campaign he was at his best, commanding his corps with the greatest credit in the march through the Thuringian Forest, the action of Saalfeld (which is studied as a model to-day at the French Staff College) and the battle of Jena. His leadership of the advanced guard at Friedland was even more conspicuous. He was now to be tried as a commander-in-chief, for Napoleon took him to Spain in 1808, and gave him a detached wing of the army, with which he won a victory over Castanos at Tudela on November 22. In January 1809 he was sent to attempt the capture of Saragossa, and by February 21, after one of the most stubborn defences in history, was in possession of the place. Napoleon then created him due de Montebello, and in 1809, for the

last time, gave him command of the advanced guard. He took part in the engage- ments around Eckmuhl and the advance on Vienna. With his corps he led -the French army across the Danube, and bore the brunt, with Massena, of the terrible battle of Aspern-Essling (q.v.). On the 22nd of May he had to retreat. During- the retreat Lannes exposed himself as usual to the hottest fire, and received a mortal wound, to which he succumbed at Vienna on the 31st of May. As he was being carried from the field to Vienna he met the emperor hurrying to the front. It was reported that the dying man reproached Napoleon for his ambition, but this rests on little evidence save the fact that Lannes was the most blunt 'and outspoken of all Napoleon's marshals. Fie was one of the few men for whom the emperor felt a real and deep affection, and at this their last meeting Napoleon gave way to a passionate burst of grief, even in the midst of the battle. His eldest son was made a peer of France by Louis XVIII.

Lannes ranks with Davout and Massdna as the ablest of all Napoleon's marshals, and consciously or unconsciously was the best exponent of the emperor's method of making war. Hence his constant employment in tasks requiring the utmost resolution and daring, and more especially when the emperor's combinations de- pended upon the vigour and self-sacrifice of a detachment or fraction of the army. It was thus with Lannes at Friedland and at Aspern as it was with Davout at Austerlitz and Auerstadt, and Napoleon's estimate of his subordinates' capacities can almost exactly be judged by the frequency with which he used them to prepare the way for his own shattering blow. Routine generals with the usual military virtue, or careful and exact troop leaders like Soult and Macdonald, Napoleon kept under his own hand for the final assault which he himself launched, but the long hours of preparatory fighting against odds of two to one, which alone made the final blow possible, he en- trusted only to men of extraordinary courage and high capacity for command. In his own words, he found Lannes a pigmy, and lost him a giant. Lannes's place in his affections was never filled. See R. P6rin, Vie militaire de Jean Lannes (Paris, 1809).

LANNION, a town of north-western France, capital of an arrondissement in the department of C6tes-du-Nord, on the right bank of the Leguer, 45 m. W.N.W. of St Brieuc by rail. Pop. (1906) 5336. Lannion is 5 m. in direct line from the mouth of the Leguer; its port does a small trade (exports of agricultural produce, imports of wine, salt, timber, &c), and there is an

active fishing industry. The town contains many houses of the 15th and 16th centuries and other old buildings, the chief of which is the

church of St Jean-du-Baly (16th and 17th cen- turies). On an eminence close to Lannion is the church of Brelevenez of the 12th century, restored in the 15th or 16th century; it has an interesting 16th-century Holy Sepulchre.

Some 6 m. S.E. of the town are the imposing ruins of the chateau of Tonquedec (c. 1400) styled the ” Pierrefonds of Brittany,” and there are other buildings of antiquarian interest in the vicinity. The coast north of Lannion at Tregastel and Ploumanac presents curious rock formations.

Lannion is the seat of a subprefect and has a tribunal of first instance and a communal college. Its industries include saw-milling, tanning and the manufacture of farm implements. The town was taken in 1346 by the English; it was defended against them by Geoffroy de Pontblanc whose valour is com- memorated by a cross close to the spot where he was slain.

LANNOY, GU.ILLEBERT DE (1386-1462), Flemish diplomatist, was chamberlain to the duke of Burgundy, governor of the fort of Sluys, and a knight of the Golden Fleece. He discharged several diplomatic missions in France, England, Prussia, Poland and Lithuania, and was one of the negotiators of the treaty of Troyes (1420). In 1421 he was sent by Henry V. of England to Palestine to inquire into the possibility of reviving the kingdom of Jerusalem, and wrote an account of his travels, Les Pelerinages de Surye et de Egipte, which was published in 1826 and again in

1842.

LANOLIN (Lat. lana, wool, and oleum, oil), the commercial name of the preparation styled adeps lanae hydrosus in the British Pharmacopoeia, and which consists of 7 oz. of neutral wool-fat (adeps lanae) mixed with 3 fluid oz. of water. The wool-fat is obtained by purification of the ” brown grease,” ” recovered grease ” or degras extracted from raw sheep’s wool in the process of preparing it for the spinner. It is a translucent unctuous substance which has the property of taking up large quantities of water and forming emulsions which are very slow to separate into their constituents. Owing to the ease with which it pene- trates the skin, wool-fat both in the anhydrous form and as lanolin, sometimes mixed with such substances as vaseline or fatty oils, is largely employed as a basis for ointments. It is slightly antiseptic and does not become rancid.

LA NOUE, FRANgOIS DE (1531-1591), called Bras-de-Fer, one of the

Huguenot captains of the 16th century, was born near Nantes in 1531, of an ancient Breton family. He served in Italy under Marshal Brissac, and in the first Huguenot war, but his first great exploit was the capture of Orleans at the head of Only fifteen cavaliers in 1567, during the second war. At the battle of Jarnac in March 1569 he commanded the rearguard, and at Moncontour iˆ the following October he was taken prisoner; but he was exchanged in time to resume the governor- ship of Poitou, and to inflict a signal defeat on the royalist troops before Rochefort. At the siege of Fontenay (1570) his left arm was shattered by a bullet; but a mechanic of Rochelle made him an iron arm (hence his sobriquet) with a hook for holding his reins. When peace was made in France in the same year, La Noue carried his sword against the Spaniards in the Netherlands, but was taken at the recapture of Mons by the Spanish in 1572. Permitted to return to France, he was com- missioned by Charles IX., after the massacre of St Bartholomew, to reconcile the inhabitants of La Rochelle, the great stronghold of the Huguenots, to the king. But the Rochellois were too much alarmed to come to terms; and La Noue, perceiving that war was imminent, and knowing that his post was on the Huguenot side, gave up his royal commission, and from 1574 till 1578 acted as general of La Rochelle. When peace was again concluded La Noue once more went to aid the Protestants of the Low Countries. He took several towns and captured Count Egmont in 1580; but a few weeks afterwards he fell into the hands of the Spaniards. Thrust into a loathsome prison at Lim- burg, La Noue, the admiration of all, of whatever faith, for his gallantry, honour and purity of character, was kept confined for five years by a powerful nation, whose reluctance to set him

free is one of the sincerest tributes to his reputation. It was in captivity that he wrote his celebrated Disconrs politiques et militaires, a work which was published at Basel in 1587 [re- published at La Rochelle 1590, Frankfurt on Main (in German) 1592 and 161 2; and London (in English) 1597] and had an immense influence on the soldiers of all nations. The abiding value of La Noue's " Discourses " lies in the fact that he wrote of war as a human drama, before it had been elaborated and codified. At length, in June 1585, La Noue was exchanged for Egmont and other prisoners of consideration, while a heavy ransom and a pledge not to bear arms against his Catholic majesty were also exacted from him. Till 1589 La Noue took no part in public matters, but in that year he joined Henry of Navarre against

the Leaguers. He was present at both sieges of Paris, at Ivry and other battles. At the siege of Lamballe in Brittany he received a wound of which he died at Moncontour on the 4th of August 1 59 1.

He wrote, besides the Discourses, Declaration pour prise d'armes et hi defense de Sedan et Jamets (1588); Observations sur Vhistoire de Guicciardini (2 vols., 1592); and notes on Plutarch's Lives. His Correspondance was published in 1854. See La Vie de Francois, seigneur de La Noue, by Moyse Amirault (Leiden, 1661); Bran- tome's Vies des Capitaines francais; C. Vincen's Les Heros de la Reforme. Fr. de La Noue (1875); and Hauser, Frangois de La Noue (Paris, 1892).

LANSDOWNE, WILLIAM PETTY FITZMAURICE, ist

Marquess of (1 737-1805) , British statesman, better known under his earlier title of earl of Shelburne, was born at Dublin on the 20th of May 1737. He was a descendant of the lords of Kerry (dating from 1181), and his grandfather Thomas Fitzmaurice, who was created earl of Kerry (1723), married the daughter of Sir William Petty (q.v.). On the death without issue of Sir William Petty's sons, the first earls of Shelburne, the estates passed to his nephew John Fitzmaurice (advanced in 1753 to the earldom of Shelburne), who in 17 31 took the additional name of Petty. His son William spent his childhood " in the remotest parts of the south of Ireland," and, according to his own account, when he entered Christ Church, Oxford, in 1755, he had both " everything to learn and everything to unlearn." From a tutor whom he describes as " narrow-minded " he received advantageous guidance in his studies, but he attributes his improvement in manners and in knowledge of the world chiefly to the fact that, as was his " fate through life," he fell in " with clever but unpopular connexions." Shortly after leaving the university he served in Wolfe's regiment during the Seven Years' War, and so distinguished himself at Minden and Kloster-Kampen that he was raised to the rank of colonel and appointed aide-de- camp to the king (1760). Being thus brought into near com- munication with Lord Bute, he was in 1761 employed by that nobleman to negotiate for the support of Henry Fox, Lord Holland. He was returned to the House of Commons as member for Wycombe, but in 1761 he succeeded his father as earl of Shelburne in the Irish peerage, and Baron Wycombe in the peerage of Great Britain (created 1760). Though he declined to take office under Bute he undertook negotiations to induce C. J. Fox to gain the consent of the Commons to the peace of 1763. Fox affirmed that he had been duped, and, although Shelburne always asserted that he had acted in thorough good faith, Bute spoke of the affair as a " pious fraud." Shelburne joined the Grenville ministry in 1763 as president of the Board of Trade, but, failing in his efforts to replace Pitt in the cabinet, he in a few months resigned office. Having moreover on account of his support of Pitt on the question of Wilkes's expulsion from the House of

Commons incurred the displeasure of the king, he retired for a time to his estate. After Pitt's return to power in 1766 he became secretary of state, but during Pitt's illness his conciliatory policy towards America was completely thwarted by his colleagues and the king, and in 1768 he was dismissed from office. In 1782 he consented to take office under the marquess of Rockingham on condition that the king would recognize the United States. On the death of Lord Rockingham in the same year he became premier; but the secession of Fox and his supporters led to the famous coalition of Fox with

North, which caused his resignation in the following February, his fall being perhaps hastened by his plans for the reform of the public service. He had also in contemplation a bill to pro- mote free commercial intercourse between England and the United States. When Pitt acceded to office in 1784, Shelburne, instead of receiving a place in the cabinet, was created marquess of Lansdowne. Though giving a general support to the policy of Pitt, he from this time ceased to take an active part in public affairs. He died on the 7th of May 1805. During his lifetime he was blamed for insincerity and duplicity, and he incurred the deepest unpopularity, but the accusations came chiefly from those who were dissatisfied with his preference of principles to party, and if he had had a more unscrupulous regard to his personal ambition, his career as a statesman would have had more outward success. He was cynical in his estimates of character, but no statesman of his time possessed more en- lightened political views, while his friendship with those of his contemporaries eminent in science and literature must be allowed considerable weight in qualifying our estimate of the moral defects with which he has been credited. He was twice married, first to Lady Sophia (1745-1771), daughter of John Carteret, Earl Granville, through whom he obtained the Lans- downe estates near Bath, and secondly to Lady Louisa (1755— 1789), daughter of John Fitzpatrick, ist earl of Upper Ossory. John Henry Petty Fitzmaurice (1765-1809), his son by the first marriage, succeeded as 2nd marquess, after having sat in the House of Commons for twenty years as member for Chipping Wycombe.

Henry Petty Fitzmaurice, 3rd marquess of Lansdowne (1780-1863), son of the ist marquess by his second marriage, was born on the 2nd of July 1780 and educated at Edinburgh University and at Trinity College, Cambridge. He entered the House of Commons in 1802 as member for the family borough of Calne and quickly showed his mettle as a politician. In February 1806, as Lord Flenry Petty, he became chancellor of the exchequer in the ministry of " All the Talents," being at this time member for the university of Cambridge; but he lost both his seat and his office in 1807. In 1809 he became

marquess of Lansdowne; and in the House of Lords and in society he continued to play an active part as one of the Whig leaders. His chief interest was perhaps in the question of Roman Catholic emancipation, a cause which he consistently championed, but he sympathized also with the advocates of the abolition of the slave-trade and with the cause of popular education. Lansdowne, who had succeeded his cousin, Francis Thomas Fitzmaurice, as 4th earl of Kerry in 18 18, took office with Canning in* May 1827 and was secretary for home affairs from July of that year until January 1828; he was lord president of the council under Earl Grey and then under Lord Melbourne from November 1830 to August 1841, with the exception of the few months in 1835 when Sir Robert Peel was prime minister. He held the same office during the whole of Lord John Russell's ministry (1846- 1852), and, having declined to become prime minister, sat in the cabinets of Lord Aberdeen and of Lord Palmerston, but without office. In 1857 he refused the offer of a dukedom, and he died on the 31st of January 1863. Lansdowne's social influence and political moderation made him one of the most powerful Whig statesmen of the time; he was frequently consulted by Queen Victoria on matters of moment, and his long official experience made his counsel invaluable to his party. He married Louisa (1785-1851), daughter of the 2nd earl of Ilchester, and was succeeded by his son Henry, the 4th marquess (1816-1866). The latter, who was member of parliament for Calne for twenty years and chairman of the Great Western railway, married for his second wife Emily (1819-1895), daughter of the comte de Flahaut de la Billarderie, a lady who became Baroness Nairne in her own right in 1867. By her he had two sons, the 5th marquess and Lord Edmond Fitzmaurice (Baron Fitzmaurice of Leigh).

Henry Charles Keith Petty Fitzmaurice, 5th marquess of Lansdowne (b. 1845), was educated at Balliol, Oxford, where he became one of Jowett's favourite pupils. In 1869 he married

the daughter of the 1st duke of Abercorn. As a member of the Liberal party he was a lord of the treasury (1869-1872), under- secretary of war (1872-1874), and under-secretary of India (1880); in 1883 he was appointed governor-general of Canada, and from 1888 to 1893 he was viceroy of India. He joined the Liberal Unionist party when Mr Gladstone proposed home rule for Ireland, and on returning to England became one of its most influential leaders. He was secretary

of state for war from 1895 to 1900, and foreign secretary from 1900101906, becoming leader of the Unionist party in the House of Lords on Lord Salisbury's death.

His brother Edmond George Fitzmaurice, Baron Fitz- maurice (b. 1846), was educated at Trinity, Cambridge, where he took a first class in classics. Unlike Lord Lansdowne, he remained a Liberal in politics and followed Mr Gladstone in his home rule policy. As Lord Edmond Fitzmaurice he entered the House of Commons in 1868, and was under-secretary for foreign affairs from 1882 to 1885. He then had no seat in parlia- ment till 1898, when he was elected for the Cricklade division of Wilts, and retiring in 1905, he was created Baron Fitzmaurice of Leigh in 1906, and made under-secretary for foreign affairs in Sir Henry Campbell-Bannerman's ministry. In 1908 he became chancellor of the duchy of Lancaster and a member of the Liberal cabinet, but resigned his post in 1909. He devoted much time to literary work, and was the author of excellent biographies of the 1st marquess, of Sir William Petty (1895), and of Lord Granville (1905), under whom he had served at the foreign office.

For the 1st marquess, see Lord Fitzmaurice, Life of William, Earl of Shelburne (3 vols., London, 1875-1876).

LANSDOWNE, a hill cantonment in India, in Garhwal dis- trict of the United Provinces, about 6000 ft. above the sea, 19 m. by cart road from the station of Kotdwara on the Oudh and Rohilkhand railway. Pop. (1901) 3943. The cantonment, founded in 1887, extends for more than 3 m. through pine and oak forests, and can accommodate three Gurkha battalions.

LANSING, the capital of Michigan, U.S.A., in Ingham county, at the confluence of the Grand and Cedar rivers, about 85 m. W.N.W. of Detroit and about 64 m. E.S.E. of Grand Rapids. Pop. (1900) 16,485, of whom 2397 were foreign-born; (1910 census) 31,229. It is served by the Michigan Central, the Lake Shore & Michigan Southern, the Grand Trunk and the Pere Marquette railways, and by interurban electric lines. The Grand river on its way through the city makes a horse-shoe bend round a moderately elevated plateau; this is the commercial centre of the city, and here, in a square covering 10 acres, is the State Capitol, erected in 1873-1878 and containing the State library. On the opposite side of the river, farther N., and also extending across the southern portion of the city, are districts devoted largely to manufacturing. Lansing has a public library and a city hospital. About 3 m. E. of the city, at East Lansing, is the State Agricultural College (coeducational), the oldest agricultural college in

the United States, which was provided for by the state constitution of 1850, was organized in 1855 and opened in 1857. Its engineering course was begun in 1885; a course in home economics for women was established in 1896; and a forestry course was opened in 1902. In connexion with the college there is an agricultural experiment station. Lansing is the seat of the Michigan School for the Blind, and of the State Industrial School for Boys, formerly the Reform School. The city has abundant water-power and is an important manu- facturing centre. The value of the factory products increased from $2,942,306 in 1900 to $6,887,415 in 1904, or 134-1%. The municipality owns and operates the water-works and the electric- lighting plant. The place was selected as the site for the capital in 1847, when it was still covered with forests, and growth was slow until 1862, when the railways began to reach it. Lansing was chartered as a city in 1859 and rechartered in

1893.

LANSING MAN, the term applied by American ethnologists to certain human remains discovered in 1902 during the digging of a cellar near Lansing, Kansas, and by some authorities believed

to represent a prehistoric type of man. They include a skull and several large adult bones and a child's jaw. They were found beneath 20 ft. of undisturbed silt, in a position indicat- ing intentional burial. The skull is preserved in the U. S. National Museum at Washington. It is similar in shape to those of historic Indians of the region. Its ethnological value as indicating the existence of man on the Missouri in the glacial period is very doubtful, it being impossible accurately to determine the age of the deposits.

See Handbook of American Indians (Washington, 1907).

LANSQUENET, the French corrupted form of the German Landsknecht {q.v.), a mercenary foot-soldier of the 16th century. It is also the name of a card game said to have been introduced into France by the Landsknechte. The pack of 52 cards is cut by the player at the dealer's right. The dealer lays the two first cards face upwards on the table to his left; the third he places in front of him and the fourth, or rejouissance card, in the middle of the table. The players, usually called (except in the case of the dealer) punters, stake any sum within the agreed limit upon this rejouissance card; the dealer, who is also the banker, covers the bets and then turns up the next card. If this fails to match any of the cards already exposed, it is laid beside the rejouissance card and then punters may stake upon it. Other cards not

matching, are treated in the same manner. When a card is turned which matches the rejouissance card, the banker wins everything staked on it, and in like manner he wins what is staked on any card (save his own) that is matched by the card turned. The banker pays all stakes, and the deal is over as soon as a card appears that matches his own; excepting that should the two cards originally placed at his left both be matched before his own, he is then entitled to a second deal. In France matching means winning, not losing, as in Great Britain. There are other variations of play on the continent of Europe. •

LANTARA, SIMON MATHURIN (1729-1778), French land- scape painter, was born at Oncy on the 24th of March 1729. His father was a weaver, and he himself began life as a herdboy; but, having attracted the notice of Gille de Reumont, a son of his master, he was placed under a painter at Versailles. Endowed with great facility and real talent, his powers found ready recognition; but he found the constraint of a regular life and the society of educated people unbearably tiresome; and as long as the proceeds of the last sale lasted he lived careless of the future in the company of obscure workmen. Rich amateurs more than once attracted him to their houses, only to find that in ease and high living Lantara could produce nothing. He died in Paris on the 22nd of December 1778. His works, now much prized, are not numerous; the Louvre has one land- scape, ” Morning,” signed and dated 1761. Bernard, Joseph Vernet, and others are said to have added figures to his land- scapes and sea-pieces. Engravings after Lantara will be found in the works of Lebas, Piquenot, Duret, Mouchy and others. In 1809 a comedy called Lantara, or the Painter in the Pothouse, was brought out at the Vaudeville with great success.

See E. Bcllier de la Chavignerie, Recherches sur le peintre Lantara (Paris, 1852).

LANTERN (an adaptation of the Fr. lanterne from Lat. lanterna or laterna, supposed to be from Gr. Xa/nmjp, a torch or lamp, \afi-Kuv, to shine, cf. ” lamp “; the 16th- and 17th-century form ” lanthorn ” is due to a mistaken derivation from ” horn,” as a material frequently used in the making of lanterns), a metal case filled in with some transparent material, and used for holding a light and protecting it from rain or wind. The appliance is of two kinds — the hanging lantern and the hand lantern — both of which are ancient. At Pompeii and Herculaneum have been discovered two cylindrical bronze lanterns, with ornamented pillars, to which chains are attached for carrying or hanging the lantern. Plates of horn surrounded the bronze lamp within, and the cover at the top can be removed for lighting and for the escape of smoke. The hanging lantern for lighting rooms was

composed of ornamental metal work, of which iron and brass were perhaps

most frequently used. Silver, and even gold, were, however, sometimes employed, and the artificers in metal of the 17th and 18th centuries produced much exceedingly artistic work of this kind. Oriental lanterns in open-work bronze were often very beautiful. The early lantern had sides of horn, talc, bladder or oiled paper, and the primitive shape remains in the common square stable lantern with straight glass sides, to carry a candle. The hand lantern was usually a much more modest appliance than the hanging lantern, although in great houses it was some- times richly worked and decorated. As glass grew cheaper it gradually ousted all other materials, but the horn lantern which was already ancient in the 13th century was still being used in the early part of the 19th. By the end of the 18th century lanterns in rooms had been superseded by the candlestick. The collapsible paper lanterns of China and Japan, usually known as Chinese lanterns, are globular or cylindrical in shape, and the paper is pleated and when not in use folds flat. For illuminative and decorative purposes they are coloured with patterns of flowers, &c. The lanterns carried by the ordinary foot passenger are made of oiled paper. In China the “Feast of Lanterns” takes place early in the New Year and lasts for four days. In Japan the festival of Bon is sometimes known as the ” feast of lanterns.” It is then that the spirits of the dead ancestors return to the household altar. The festival takes place in July. The ” bull’s-eye ” lantern has a convex lens which concentrates the light and allows it to be thrown in the shape of a diverging cone. The ” dark lantern ” has a shutter or slide arrangement by which the light can be shut off at will. Ships’ lanterns are used as masthead or other signal lights. On Trajan’s column is a repre- sentation of a heavy poop-lantern on a ship. The ships’ lanterns of the 16th and 17th centuries were highly ornamental, especially when placed on the poop. At the Armeria Real in Madrid is a collection of these 16th-century ships’ lanterns. The protected cages which contain the lights used in lighthouses are also known as ” lanterns ” (see Lighthouses).

In architecture a lantern is primarily a framework of timber, with windows all round, to admit ample light, placed on the top of a roof. In a broader sense, it is applied to those portions of buildings which are largely perforated with windows, and more especially to the upper part of the towers of cathedrals and churches, as in the octagon of Ely

cathedral, or the tower of Boston church, Lincolnshire. The term is also applied to the entire church, as in the case of Bath Abbey church, which was called the ” lantern of England,” from the number of its windows, and St John’s Priory at Kilkenny, the ” lantern of Ireland,” on account of the window on the south side of the choir which was 54 ft. long. In the Renaissance style the lantern was looked upon as a decorative feature surmounting the dome, as in St Peter’s, Rome, the Invalides, Paris, and St Paul’s, London.

Magic or Optical Lantern.

The magic or optical lantern is an instrument for projecting on a white wall or screen largely magnified representations of transparent pictures painted or photographed on glass, or of objects— crystals, animals, &c— carried on glass slides or in glass vessels. If the light traverses the object, the projection is said to be diascopic, if by reflected light, episcopic.

The invention of the magic lantern is usually attributed to Athanasius Kircher, who described it in the first edition (1646) of his Ars magna lucis et umbrae, but it is very probably of earlier discovery. For a long period the magic lantern was used chiefly to exhibit comic pictures, or in the hands of so-called wizards to summon up ghosts and perform other tricks, astonishing to those ignorant of the simple optical principles employed. Within recent years, however, the optical lantern has been greatly improved in construction, and its use widely extended. By its means finely executed photographs on glass can be shown greatly magnified to large audiences, thus saving the trouble and expense of preparing large diagrams. When suitably constructed, it can be used in the form of a microscope to exhibit on a screen the forms and movements of minute living organisms, or to show to an audience delicate physical and chemical experi-

ments which could otherwise be seen only by a few at a time Another application of the optical lantern is found in the cinematograph (q.v.).

The optical lantern, in its simpler forms, consists of the following parts: (1) the lantern body, (2) a source of light, (3) an optical system for projecting the images. The lantern body is a rectangular casing usually made of Russian iron, but sometimes covered with wood (which must be protected by asbestos at parts liable to damage by heat), provided with the openings necessary to the insertion of the source of light, windows for viewing the same, a chimney for conveying away the products of combustion, fittings to carry the slides and the optical system. In the earlier and simpler lanterns, oil lamps

were commonly used, and in the toy forms either an oil flame or an ordinary gas jet is still employed. Natural petroleum burnt in a specially constructed lamp by means of two or three parallel wicks set edgeways to the lenses was employed in the sciopticon, an im- proved lantern invented in America which gave well-defined pictures 6 to 10 ft. in diameter. The Argand gas burner also found application. A great improvement attended the introduction of lime-light, i.e. the light emitted by a block of lime made incandescent by an im- pinging oxyhydrogen or oxygen-coal-gas flame, and the readiness with which hydrogen and oxygen can be prepared and rendered available by compression in steel cylinders and the increased com- mercial supply of coal-gas greatly popularized these illuminants. Many improvements have been made on the original apparatus. The lime-cylinders are specially prepared to withstand better the disintegrating effects of the flame, and are mounted on a rotating pin in order that fresh surfaces may be brought into play. Cones of zircoma are also used in the same way; or a thorium mantle in conjunction with alcohol vapour may be employed. Two types of burner are in use: (1) the ” blow-through jet,” in which the oxygen is forced through the jet of the burning gas (this is the safest type), and (2) where the gases are mixed before combustion (this is the more dangerous but also the more powerful type). Ether burners are also in use. In one type the oxygen supply is divided into two streams, one of which passes through a chamber containing cotton wool soaked with ether, and then rejoins the undiverted stream at the jet. The application of the incandescent gas mantle is limited by the intensity of the heat emitted and the large area of the source. Of electrical illuminants the platinum and carbon filament lamps are not much used, the Nernst lamp (in which the preliminary heating is effected by a spirit lamp and not by an auxiliary coil) being preferred. But the arc light is undoubtedly the best illuminant for use in the projecting lantern. The actual size of the source is comparatively small, and hence it is necessary to mount the carbons so that the arc remains at one point on the axis of the optical system. It is also advisable to set back the carbons relatively to one another and to tilt them, so that the brightest part of the ” crater ” faces the lens.

Optical System. — In the ordinary (or vertically) projecting lantern the rays are transmitted through a lens termed the “condenser,” then through the object, and finally through another lens termed the ” objective.” In the horizontally projecting types the light, after passing through the condenser, is reflected vertically by a plane mirror inclined at 45° to the direction of the light; it then traverses another lens, then the object, then the objective, and is finally projected

horizontally by a plane mirror inclined at 45 °, or by a right angled glass prism, the hypothenuse face of which is silvered. In episcopic projection, the light, having traversed the condenser, is reflected on to the object, placed horizontally, by an inclined mirror. The rays reflecting the object then traverse the objective, and are then projected horizontally.by a mirror or prism. This device inverts the object ; a convenient remedy is to place an erecting prism before the lens. The object of the condenser is to collect as much light as possible from the source, and pass it through the object in a uniform beam. For this purpose the condenser should subtend as large an angle as possible at the source of light. To secure this, it should be tolerably large, and its distance from the light, that is, its focal length, small. Since effective single lenses of large diameter are necessarily of long focus, a really good condenser of considerable diameter and yet of short focus must be a combination of two or more lenses. It is essential that the condenser be white and limpid and free from defects or striae.

In the earlier lanterns, as still in the cheaper forms, only a single plano-convex lens or bull's-eye was employed as a condenser. A good compound condenser for ordinary work is that proposed by Herschel, consisting of a biconvex lens and a meniscus mounted together with the concave side of the meniscus next the light. Other types employ two plano-convex lenses, the curved surfaces nearly in contact; or a concavo-convex and a plano-convex lens. Or' it may be a triple combination, the object always being to increase the aperture. The focus must not be so short as to bring the lens too near the light, and render it liable to crack from the intense heat. In some lanterns this is guarded against by placing a plate of thin glass between the condenser and the light. If the source of light be broad, an iris diaphragm may be introduced so as to eliminate inequalities in illumination.

The function of the objective is to produce a magnified inverted image of the picture on the screen. In toy lanterns it is a simple double-convex lens of short focus. This, however, can only produce

a small picture, and that not very distinct at the edges. The best objective is the portrait combination lens usually of the Petzval type as used in ordinary photographic cameras. These are carefully corrected both for spherical and chromatic aberration, which is absolutely essential in the objective, although not so necessary in the condenser.

Objects. — The commonest objects used for exhibiting with the optical lantern are named” slides ” and consist of pictures printed on transparent surfaces. Solid objects mounted on glass after the ordinary manner of mounting microscopic objects are also possible of exhibition, and hollow glass tanks containing organisms or substances undergoing some alteration are also available for use with the lantern. If it be necessary to eliminate the heat rays, which may act deleteriously on the object, a vessel is introduced containing either water or a 5 % solution of ferric chloride. In the ordinary slide the pictures are painted with transparent water or oil colours, or photographed on pieces of glass. If parts of the picture are to be movable, two disks of glass are employed, the one movable in front of the other, the fixed part of the picture being painted on the fixed disk and the movable part on the other. By means of a lever the latter disk is moved in its own plane; and in this way a cow, for instance, can be represented drinking, or a donkey cutting amusing capers. In the chromatrope slide two circular disks of glass are placed face to face, each containing a design radiating from the centre, and painted with brilliant transparent colours. By a small pinion gearing in toothed wheels or endless bands the disks are made to move in opposite directions in their own plane. The effect pro- duced is a singularly beautiful change of design and colour. In astronomical slides the motions of the heavenly bodies, eclipses, the phases of the moon or the like are similarly represented by mechanical means.

Dissolving Views. — For this purpose two magic lanterns are necessary, arranged either side by side or the one on the top of the other. The fronts of the lanterns are slightly inclined to each other so as to make the illuminated disks on the screen due to each lantern coincide. By means of a pair of thin metallic shutters terminating in comb-like teeth, and movable by a rack or lever, the light from either lantern can be gradually cut off at the same time that the light from the other is allowed gradually to fall on the screen. In this way one view appears to melt or dissolve into another. This arrange- ment was first adopted by Childe in 181 1.

Phantasmagoria. — In this arrangement the pictures on the screen appear gradually to increase or diminish in size and brightness. To effect this a semi-transparent screen of cotton or other material is used, the lantern being behind and the audience in front. The lantern is mounted on wheels so that it can be rapidly moved up to or withdrawn from the screen ; and an automatic arrangement is provided whereby simultaneously with this the objective is made to approach or recede from the slide so as to focus the picture on the screen in any position of the lantern. In this way a very small picture

appears gradually to grow to enormous dimensions.

See L. Wright, Optical Projection (1891); E. Trutat, Traite des Projections (Paris, 1897 and 1901) ; P. E. Liesegang, Die Projektions-Kunst (Leipzig, 1909).

LANTERN-FLY, the name given to insects belonging to the homopterous division of the Hemiptera, and referable to the genus Fulgora and allied forms. They are mostly of large size, with a superficial resemblance to lepidoptera due to their brilliant and varied coloration. Characteristic of the group is the presence on the front of the head of a hollow process, simulating a snout, which is sometimes inflated and as large as the rest of the insect, sometimes elongated, narrow and apically upturned. It was believed, mainly on the authority of Marie Sibylle de Merian, that this process, the so-called ” lantern,” was luminous at night. Linnaeus adopted the statement without question and made use of a number of specific names, such as lanternaria, phosphorea, candclaria, &c, to illustrate the supposed fact, and thus aided in disseminating a belief which subsequent observations have failed to establish and which is now generally rejected.

LANTERNS OF THE DEAD, the architectural name for the small towers in stone, found chiefly in the centre and west of France, pierced with small openings at the top, where a light was exhibited at night to indicate the position of a cemetery. These towers were usually circular, with a small entrance in the lower part giving access to the interior, so as to raise the lamps by a pulley to the required height. One of the most perfect in France is that at Cellefrouin (Charente), which consists of a series of eight attached semicircular shafts, raised on a pedestal, and is crowned with a conical roof decorated with fir cones; it has only one aperture, towards the main road. Other examples exist at Ciron (Indre) and Antigny (Vienne).

Lantern of the Dead at Cellefrouin (Charente).

• LANTHANUM [symbol La, atomic weight 139-0 (0 = i6j] one of the metals of the cerium group of rare earths. Its name is derived from the Gr. \avdavav, to lie hidden. It was first isolated in 1839 by C. G. Mosander from the ” cerium ” of J. Berzelius. It is found in the minerals gadolinite, cerite, samarskite and fergusonite, and is usually obtained from cerite. For details of the complex process for the separation of the lanthanum salts from cerite, see R. Bunsen (Pogg. Ann., 1875, 155, p. 377); P. T. Cleve (Bull, de la soc. chim., 1874, 21, p. 196); and A. v. Wclsbach (Monals. f. Chem., 1884, 5, p. 508). The metal was obtained by Mosander on heating its chloride with

potassium, and by W. F. Hillebrand and T. Norton (Pogg. Ann., 1875, 156, p. 466) on electrolysis of the fused chloride, while C. Winkler (Ber., 1890, 23, p. 78) prepared it by heating the oxide with a mixture of- magnesium and magnesia. Muthmann and Weiss (Ann., 1904, 331, p. 1) obtained it by electrolysing the anhydrous chloride. It may be readily hammered, but cannot be drawn. Its specific gravity is 6-1545, and it melts at 8io°. It decomposes cold water slowly, but hot water violently. It burns in air, and also in chlorine and bromine, and is readily oxidized by nitric acid.

Lanthanum oxide, La 2 03, is a white powder obtained by burning the metal in oxygen, or by ignition of the carbonate, nitrate or sulphate. It combines with water with evolution of heat, and on heating with magnesium powder in an atmosphere of hydrogen forms a hydride of probable composition La 2 H 3 (C. Winkler, Ber. 1891, 24, p. 890). Lanthanum hydroxide, La(OH) 3 , is a white amorphous powder formed by precipitating lanthanum salts by potassium hydroxide. It decomposes ammonium salts. Lanthanum chloride, LaCl 3 , is obtained in the anhydrous condition by heating lanthanum ammonium chloride or, according to C. Matignon (Compt. rend., 1905, 40, p. 1 181), by the action of chlorine or hydrochloric acid on the residue obtained by evaporating the oxide with hydrochloric acid. It forms a deliquescent crystalline mass. By evaporation of a solution of lanthanum oxide in hydrochloric acid to the consistency of a syrup, and allowing the solution to stand, large colourless crystals of a hydrated chloride of the composition 2LaCl 3 T5H 2 are obtained. La.nthanum sulphide, La 2 S 3 , is a yellow powder, obtained when the oxide is heated in the vapour of carbon bisulphide. It is decomposed by water, with evolution of sulphuretted hydrogen. Iˆanthanum sulphate, La 2 (SO,i)3-9H 2 0, forms six-sided prisms, isomorphous with those of the corresponding cerium salt. By careful

heating it may be made to yield the anhydrous salt. Lanthanum nitrate, La(N03)3-6H 2 0, is obtained by dissolving the oxide in nitric acid. It crystallizes in plates, and is soluble in water and alcohol. Lanthanum carbide, LaC 2 , is prepared by heating the oxide with carbon in the electric furnace (H. Moissan, Compt. rend., 1896, 123, p. 148). It is decomposed by water with the formation of acetylene, methane, ethylene, &c. Lanthanum carbonate, La 2 COs-8H 2 0, occurs as the rare mineral lanthanite, forming greyish-white, pink or yellowish rhombic prisms. The atomic weight of lanthanum has been

determined by B. Brauner (Proc. Chem. Soc, 1901, 17, p. 63) by ignition of lanthanum sulphate at 500° C, the value obtained being 139 (0 = i6).

LANUVIUM (more frequently Lanivium in imperial times, mod. Civita Lavinia), an ancient city of Latium, some 19 m. S.E. of Rome, a little S.W. of the Via Appia. It was situated on an isolated hill projecting S. from the main mass of the Alban Hills, and commanding an extensive view over the low country between it and the sea. It was one of the members of the Latin League, and remained independent until conquered by Rome in 338 B.C. At first it did not enjoy the right of Roman citizen- ship, but acquired it later; and even in imperial times its chief magistrate and municipal council kept the titles of dictator and senatus respectively. It was especially famous for its rich and much venerated temple of Juno Sospes, from which Octavian borrowed money in 31 B.C., and the possessionsof which extended as far as the sea-coast (T. Ashby in Melanges de Vecolefrdnqaise, 1905, 203). It possessed many other temples, repaired by Antoninus Pius, who was born close by, as was also Commodus. Remains of the ancient theatre and of the city walls exist in the modern village, and above it is an area sur- rounded by a portico, in opus reticulatum, upon the north side of which is a rectangular building in opus quadratum, probably connected with the temple of Juno. Here archaic decorative terra-cottas were discovered in excavations carried on by Lord Savile. The acropolis of the primitive city was probably on the highest point above the temple to the north. The neighbour- hood, which is now covered with vineyards, contains remains of many Roman villas, one of which is traditionally attributed to Antoninus Pius.

See Notizie degli Scavi, passim. (T. As.)

LANZA, DOMENICO GIOVANNI GIUSEPPE MARIA (1810- 1882), Italian politician, was born at Casale, Piedmont, on the 15th of February 1810. He studied medicine at Turin, and practised for some years in his native place. He was one of the promoters of the agrarian association in Turin, and took an active part in the rising of 1848. He was elected to the Pied- montese parliament in that year, and attached himself to the party of Cavour, devoting his attention chiefly to questions of economy and finance. He became minister of public instruction in 1855 in the cabinet of Cavour, and in 1858 minister of finance. He followed Cavour into his temporary retirement in July 1859 after the peace of Villafranca, and for a year (1860-1861) was president of the Chamber. He was minister of the interior (1864-1865) in the La Marmora cabinet, and arranged the trans- ference of the

capital to Florence. He maintained a resolute opposition to the financial policy of Menabrea, who resigned when Lanza was a second time elected, in 1869, president of the Chamber. Lanza formed a new cabinet in which he was himself minister of the interior. With Quintino Sella as minister of finance he sought to reorganize Italian finance, and resigned office when Sella's projects were rejected in 1873. His cabinet had seen the accomplishment of Italian unity and the installa- tion of an Italian government in Rome. He died in Rome on the 9th of March 1882.

See Enrico Tavallini, La Vita ed i tempi ii Giovanni Lanza (2 vols., Turin and Naples, 1887).

LANZAROTE, an island in the Atlantic Ocean, forming part of the Spanish archipelago of the Canary Islands (q.v.). Pop. (1900) 17,546; area, 326 sq. m. Lanzarote, the most easterly of the Canaries, has a length of 31 m. and a breadth varying from 5 to 10 m. It is naked and mountainous, bearing every- where marks of its volcanic origin. Montana Blanca, the highest point (2000 f t.) , is cultivated to the summit. In 1 730 the appear- ance of half the island was altered by a volcanic outburst. A

violent earthquake preceded the catastrophe, by which nine villages were destroyed. In 1825 another volcanic eruption took place accompanied by earthquakes, and two hills were thrown up. The port of Naos on the south-east of the island affords safe anchorage. It is protected by two forts. A short distance inland is the town of Arrecife (pop. 3082). The climate is hot and dry. There is only a single spring of fresh water on the island, and that in a position difficult of access. From the total failure of water the inhabitants were once compelled to abandon the island. Dromedaries are used as beasts of burden. Teguise (pop. 3786), on the north-west coast, is the residence of the local authorities. A strait about 6 m. in width separates Lanzarote from Fuerteventura.

Graciosa, a small uninhabited island, is divided from the north-eastern extremity of Lanzarote by a channel 1 m. in width, which affords a capacious and safe harbour for large ships; but basaltic cliffs, 1500 ft. high, prevent intercourse with the inhabited part of Lanzarote. A few persons reside on the little island Allegranza, a mass of lava and cinders ejected at various times from a now extinct volcano, the crater of which has still a well-defined edge.

LANZI, LUIGI (1732-1810), Italian archaeologist, was born in 1732 and educated as a priest. In 1773 he was appointed keeper of the

galleries of Florence, and thereafter studied Italian painting and Etruscan antiquities and language. In the one field his labours are represented by his Sloria Pittorica della Italia, the first portion of which, containing the Florentine, Sienese, Roman and Neapolitan schools, appeared in 1792, the rest in 1796. The work is translated by Roscoe. In archae- ology his great achievement was Saggio di lingua Etrusca (1789), followed by Saggio delle lingue Ilal. antiche (1806). In his memoir on the so-called Etruscan vases {Dei vasi antichi dipinti volgarmenle chiamati Elruschi, 1806) Lanzi rightly perceived their Greek origin and characters. What was true of the anti- quities would be true also, he argued, of the Etruscan language, and the object of the Saggio di lingua Etrusca was to prove that this language must be related to that of the neighbouring peoples — Romans, Umbrians, Oscans and Greeks. He was allied with E. Q. Visconti in his great but never accomplished plan of illustrating Antiquity altogether from existing literature and monuments. His notices of ancient sculpture and its various styles appeared as an appendix to the Saggio di lingua Etrusca, and arose out of his minute study of the treasures then added to the Florentine collection from the Villa Medici. The abuse he met with from later writers on the Etruscan language led Corssen (Sprache der Etrusker, i. p. vi.) to protest in the name of his real services to philology and archaeology. Among his other productions was an edition of Hesiod's Works and Days, with valuable notes, and a translation in terza rima. Begun in 1785, it was recast and completed in 1808. The list of his works closes with his Opere sacre, a series of treatises on spiritual subjects. Lanzi died on the 30th of March 1810. He was buried in the church of the Santa Croce at Florence by the side of Michelangelo. \

LAOAG, a town, port for coasting vessels, and capital of the province of Ilocos Norte, Luzon, Philippine Islands, on the Laoag river, about 5 m. from its mouth, and in the N.W. part of the island. Pop. (1903) 34,454; in 1903, after the census had been taken, the municipality of San Nicolas (pop. 1903, 10,880) was added to Laoag. Laoag is on an extensive coast plain, behind which is a picturesque range of hills; it is well built and is noted for its fine climate, the name " Laoag " signifying " clear." It is especially well equipped for handling rice, which is shipped in large quantities; Indian corn, tobacco and sugar are also shipped. Cotton is grown in the vicinity, and is woven by the women into fabrics, which find a ready sale among the pagan tribes of the mountains. The language is Ilocano.

LAOCOON, in Greek legend a brother of Anchises, who had been a priest of Apollo, but having profaned the temple of the god he and his two sons were attacked by serpents while preparing to sacrifice a bull

at the altar of Poseidon, in whose service Laocoon was then acting as priest. An additional motive for

his punishment consisted in his having warned the Trojans against the wooden horse left by the Greeks. But, whatever his crime may have been, the punishment stands out even among the tragedies of Greek legend as marked by its horror — particularly so as it comes to us in Virgil (Aeneid, ii. 199 sq.), and as it is represented in the marble group, the Laocoon, in the Vatican. In the oldest existing version of the legend — that of Arctinus of Miletus, which has so far been preserved in the excerpts of Proclus — the calamity is lessened by the fact that only one of the two sons is killed; and this, as has been pointed out (Arch. Zeitung, 1879, p. 167), agrees with the interpretation which Goethe in his Propylaea had put on the marble group without reference to the literary tradition. He says: ” The younger son struggles and is powerless, and is alarmed; the father struggles ineffectively, indeed his efforts only increase the opposition; the elder son is least of all injured, he feels neither anguish nor pain, but he is horrified at what he sees happening to his father, and he screams while he pushes the coils of the serpent off from his legs. He is thus an observer, witness, and participant in the incident, and the work is then complete.” Again, ” the gradation of the incident is this: the father has become powerless among the coils of the serpent; the younger son has still strength for resistance but is wounded; the elder has a prospect of escape.” Lessing, on the other hand, main- tained the view that the marble group illustrated the version of the legend given by Virgil, with such differences as were necessary from the different limits of representation imposed on the arts of sculpture and of poetry. These limits required a new definition, and this he undertook in his still famous work, Laokoon (see the edition of Hugo Blumner, Berlin, 1876, in which the subsequent criticism is collected). The date of the Laocoon being now fixed (see Agesander) to 40-20 B.C., there can be no question of copying Virgil. The group represents the extreme of a pathetic tendency in sculpture (see Greek Art, Plate I. fig. 52).

LAODICEA, the name of at least eight cities, founded or renovated in the later Hellenic period. Most of them were founded by the, Seleucid kings of Syria. Seleucus, founder of the dynasty, is said by Appian to have named five cities after his mother Laodice. Thus in the immense realm of the Seleucidae from the Aegean Sea to the borders of India we find cities called Laodicea. as also Seleucia (q.v.). So long as Greek

civilization held its ground, these were the commercial and social centres. The chief are Laodicea ad Lycum (see below); Combusta on the borders of Phrygia, Lycaonia and Pisidia; a third in Pontus; a fourth, ad mare, on the coast of Syria; a fifth, ad Libanum, beside the Lebanon mountains; and three others in the far east — Media, Persia and the lower Tigris valley. In the latter countries Greek civilization was short-lived, and the last three cities dis- appeared; the other five continued great throughout the Greek and Roman period, and the second, third and fourth retain to the present day the ancient name under the pronunciation Ladik, Ladikiyeh or Latakia (q.v.).

Laodicea ad Lycum (mod. Denizli, q.v.) was founded probably by Antiochus II. Theos (261-46 B.C.), and named after his wife Laodice. Its site is close to the station of Gonjeli on the Anatolian railway. Here was one of the oldest homes of Christ- ianity and the seat of one of the seven churches of the Apocalypse. Tliny states (v. 29) that the town was called in older times Diospolis and Rhoas; but at an early period Colossae, a few miles to the east, and Hierapolis, 6 m. to the north, were the great cities of the neighbourhood, and Laodicea was of no import- ance till the Seleucid foundation (Strabo, p. 578). A favourable site was found on some low hills of alluvial formation, about 2 m. S. of the river Lycus (Churuk Su) and 9 m. E. of the confluence of the Lycus and Maeander. The great trade route from the Euphrates and the interior passed to it through Apamea. There it forked, one branch going down the Maeander valley to Magnesia and thence north to Ephesus, a distance of about 90 m., and the other branch crossing the mountains by an easy pass to Philadelphia and the Hermus valley, Sardis, Thyatira and at last Pergamum. St Paul (Col. iv. 15) alludes to the situation of Laodicea beside

Colossae and Hierapolis; and the order in which the last five churches of the Apocalypse are enumerated (Rev. i. n) is explained by their position on the road just described. Placed in this situation, in the centre of a very fertile district, Laodicea became a rich city. It was famous for its money transactions (Cic. Ad Fam. ii. 17, iii. 5), and for the beautiful soft wool grown by the sheep of the country (Strabo 578). Both points are referred to in the message to the church (Rev. iii. 17, 18).

Little is known of the history of the town. It suffered greatly from a siege in the Mithradatic war, but soon recovered its pro- sperity under the Roman empire. The Zeus of Laodicea, with the curious epithet Azeus or Azeis, is a frequent symbol on the city coins. He is represented standing, holding in the extended right hand an eagle, in the left a spear, the hasta pura. Not far from the city was the temple of

Men Karou, with; a great medical school; while Laodicea itself produced some famous Sceptic philosophers, and gave origin to the royal family of Polemon and Zenon, whose curious history has been illustrated in recent times (W. H. Waddington, Melanges de Numism. ser. ii. ; Th. Mommsen, Ephem. Epigraph, i. and ii.; M. G. Rayet, Milet et le Golfe Latmique, chap. v.). The city fell finally into decay in the frontier wars with the Turkish invaders. Its ruins are of wide extent, but not of great beauty or interest; there is no doubt, however, that much has been buried beneath the surface by the frequent earthquakes to which the district is exposed (Strabo 580; Tac. Ann. xiv. 27).

See W. M. Ramsay, Cities and Bishoprics of Phrygia, i.-ii. (1895); Letters to the Seven Churches (1904); and the beautiful drawings of Cockerell in the Antiquities of Ionia, vol. iii. pi. 47-51. (A. H. S.)

LAODICEA, SYNOD OF, held at Laodicea ad Lycum in Phrygia, some time between 343 and 381 (so Hefele; but Baronius argues for 314, and others for a date as late as 399), adopted sixty canons, chiefly disciplinary, which were declared ecumenical by the council of Chalcedon, 451. The most signifi- cant canons are those directly affecting the clergy, wherein the clergy appear as a privileged class, far above the laity, but with sharply differentiated and carefully graded orders within itself. For example, the priests are not to be chosen by the people; penitents are not to be present at ordinations (lest they should hear the failings of candidates discussed) ; bishops are to be appointed by the metropolitan and his suffragan; sub-deacons may not distribute the elements of the Eucharist; clerics are forbidden to leave a diocese without the bishop's permission. Other canons treat of intercourse with heretics, admission of penitent heretics, baptism, fasts, Lent, angel-worship (for- bidden as idolatrous) and the canonical books, from which the Apocrypha and Revelation are wanting.

See Mansi ii. 563-614; Hardouin i. 777-792; Hefele, 2nd ed., i. 746-777 (Eng. trans, ii. 295-325). (T. F. C.)

LAOMEDON, in Greek legend, son of Ilus, king of Troy and father of Podarces (Priam). The gods Apollo and Poseidon served him for hire, Apollo tending his herds, while Poseidon built the walls of Troy. When Laomedon refused to pay the reward agreed upon, Apollo visited the land with a pestilence, and Poseidon sent up a monster from the sea, which ravaged the land. According to the oracle, the wrath of Poseidon could only be appeased by the sacrifice of one of the king's daughters. The lot fell upon Hesione, who was chained to a rock to

await the monster's coming. Heracles, on his way back from the land of the Amazons, offered to slay the monster and release Hesione, on condition that he should receive the wonderful horses presented by Zeus to Tros, the father of Ganymede, to console him for the loss of his son. Again Laomedon broke his word; whereupon Heracles returned with a band of warriors, attacked Troy, and slew Laomedon and all his sons except Priam. According to Diodorus Siculus, Laomedon aggravated his offence by imprisoning Iphiclus and Telamon, who had been sent by Heracles to demand the surrender of the horses. Lao- medon was buried near the Scaean gate, and it was said that so long as his grave remained undisturbed, so long would the walls of Troy remain impregnable.

See Homer, Iliad, v. 265, 640, vii. 452, xxi. 443; Apollodorus ii. 5. 9 and 6. 4; Diod. Sic. iv. 32, 42, 49; Hyginus, Fab. 89; Horace, Odes iii. 3, 22; Ovid, Metam. xi. 194.

LAON, a town of northern France, capital of the department of Aisne, 87 m. N.E. of Paris on the Northern railway. Pop. (1906), town, 9787, commune (including troops) 15,288. It is

situated on an isolated ridge, forming two sides of a triangle, which rises some 330 ft. above the surrounding plain and the little river of Ardon. The suburbs of St Marcel and Vaux extend along the foot of the ridge to the north. From the railway station, situated in the plain to the north, a straight staircase of several hundred steps leads to the gate of the town, and all the roads connecting Laon with the surrounding district are cut in zigzags on the steep slopes, which are crowned by promenades on the site of the old ramparts. The r3th-century gates of Ardon, Chenizelles and Soissons, the latter in a state of ruin, have been preserved. At the eastern extremity of the ridge rises the citadel; at its apex is the parade-ground of St Martin, and at the southern end stands the ancient abbey of St Vincent. The deep depression between the arms of the ridge, known as the Cuve St Vincent, has its slopes covered with trees, vegetable gardens and vineyards. From the promenade along the line of the ramparts there is an extensive view northward beyond St Quentin, westward to the forest of St Gobain, and southward over the wooded hills of the Laonnais and Soissonnais.

The cathedral of Laon (see Architecture, Romanesque and Gothic

Architecture in France) is one of the most important creations of the art of the 12th and 13th centuries. It took the place of the old cathedral, burned at the beginning of the com- munal struggles mentioned below. The building is cruciform, and the choir terminates in a straight wall instead of in an apse. Of the six towers flanking the facades, only four are complete to the height of the base of the spires, two at the west front with hugh figures of oxen beneath the arcades of their upper portion, and one at each end of the transept. A square central tower forms a lantern within the church. The west front, with three porches, the centre one surmounted by a fine rose window, ranks next to that of Notre-Dame at Paris in purity. The cathedral has stained glass of the 13th century and a choir grille of the 18th century. The chapter-house and the cloister contain beautiful specimens of the architecture of the beginning of the 13th century. The old episcopal palace, contiguous to the cathedral, is now used as a court-house. The front, flanked by turrets, is pierced by great pointed windows. There is also a Gothic cloister and an old chapel of two storeys, of a date anterior to the cathedral. The church of St Martin dates from the middle of the 1 2th century. The old abbey buildings of the same foundation are now used as the hospital. The museum of Laon had collections of sculpture and painting. In its garden there is a chapel of the Templars belonging to the 12th century. The church of the suburb of Vaux near the railway station dates from the nth and 12th centuries. Numerous cellars of two or three storeys have taken the place of the old quarries in the hill-side. Laon forms with La Fere and Reims a triangle of important fortresses. Its fortifications consist of an inner line of works on the eminence of Laon itself, and two groups of detached forts, one some 2j m. S.E. about the village of Bruyeres, the other about 3 m. W.S.W., near Laniscourt. To the S.S.W. forts Malmaison and Conde connect Laon with the Aisne and with Reims.

Laon is the seat of a prefect and a court of assizes, and possesses a tribunal of first instance, a lycee for boys, a college for girls, a school of agriculture and training colleges. Sugar-making and metal-founding are carried on, but neither industry nor trade, which is in grain and wine, are of much importance.

The hilly district of Laon (Laudunum) has always had some strategic importance. In the time of Caesar there was a Gallic village where the Remi (inhabitants of the country round Reims) had to meet the onset of the confederated Belgae. Whatever may have been the precise locality of that battlefield, Laon was fortified by the Romans, and successively checked the invasions of the Franks, Burgundians, Vandals, Alani and Huns. St Remigius, the arch- bishop of Reims who baptized Clovis, was born in the Laonnais, and it was he who, at the

end of the 5th century, instituted the bishopric of the town. Thenceforward Laon was one of the principal towns of the kingdom of the Franks, and the possession of it was often dis- puted. Charles the Bald had enriched its church with the gift of very numerous domains. After the fall of the Carolingians Laon took the part of Charles of Lorraine, their heir, and Hugh Capet only succeeded in making himself master of the town by the connivance of the bishop,

who, in return for this service, was made second ecclesiastical peer of the kingdom. Early in the 12th century the communes of France set about emancipating themselves, and the history of the commune of Laon is one of the richest and most varied. The citizens had profited by a temporary absence of Bishop Gaudry to secure from his representatives a communal charter, but he, on his return, purchased from the king of France the revocation of this document, and re-commenced his oppressions. The consequence was a revolt, in which the episcopal palace was burnt and the bishop and several of his partisans were put to death. The fire spread to the cathedral, and reduced it to ashes. Uneasy at the result of their victory, the rioters went into hiding outside the town, which was anew pillaged by the people of the neighbourhood, eager to avenge the death of their bishop. The king alternately interfered in favour of the bishop and of the inhabitants till 1239. After that date the liberties of Laon were no more contested till 133 1, when the commune was abolished. During the Hundred Years' War it was attacked and taken by the Burgundians, who gave it up to the English, to be retaken by the French after the consecration of Charles VII. Under the League Laon took the part of the Leaguers, and was taken by Henry IV. During the campaign of 1814 Napoleon tried in vain to dislodge Bliicher from it. In 1870 an engineer blew up the powder magazine of the citadel at the moment when the German troops were entering the town. Many lives were lost; and the cathedral and the old episcopal palace were damaged. At the Revolution Laon per- manently lost its rank as a bishopric.

LAOS, a territory of French Indo-China, bounded N. by the Chinese province of Yun-nan, W. by the British Shan states and Siam, S. by Cambodia and Annam, E. by Annam and N.E. by Tongking. Northern Laos is traversed by the Mekong (q.v .) which from Chieng-Khan to a point below Stung-Treng forms the boundary between Laos (on the left bank) and Siam and Cam- bodia (on the right). French Laos constitutes a strip of territory between 700 and 800 m. in length with an average breadth of 155 m., an approximate area of 88,780 sq. m., and a population of about 550,000. Its northern region between the Mekong and Tongking is covered by a tangle of mountain chains

clothed with dense forests and traversed by the Nam-Hou, the Nam-Ta and other tributaries of the Mekong. The culminating point exceeds 6500 ft. in height. South of this is the extensive wooded plateau of Tran-Ninh with an average altitude of between 3000 and 5000 ft. Towards the 18th degree of latitude this mountain system narrows into a range running parallel to and closely approaching the coast of the China Sea as it descends south. The boundary between Laos and Annam follows the crest-line of this range, several peaks of which exceed 6500 ft. (Pu-Atwat, over 8000 ft.). On the west its ramifications extend to the Mekong enclosing wide plains watered by the affluents of that river.

Laos is inhabited by a mixed population falling into three main groups — the Thais (including the Laotions (see below)); various aboriginal peoples classed as Khas; and the inhabitants of neighbouring countries, e.g. China, Annam, Cambodia, Siam, Burma, &c.

Laos has a rainy season lasting from June to October and corresponding to the S.W. monsoon and a dry season coinciding with the N.E. monsoon and lasting from November to May. Both in northern and southern Laos the heat during April and May is excessive, the thermometer reaching 104 F. and averaging 95 F. With the beginning of the rains the heat becomes more tolerable. December, January and February are cool months, the temperature in south Laos (south of 19°) averaging 77 , in north Laos from 50° to 53°. The plateau of Tran-Ninh and, in the south, that of the Bolovens are distinguished by the whole- someness of their climate.

The forests contain bamboo and many valuable woods amongst which only the teak of north Laos and rattan are exploited to any extent; other forest products are rubber, stick lac, gum, benjamin, cardamoms, &c. Rice and maize, and cotton, indigo, tobacco, sugar-cane and cardamoms are among the cultivated plants. Elephants are numerous and the forests are inhabited by tigers, panthers, bears, deer and buffalo. Hunting and fishing are leading occupations of the inhabitants. Many species of monkeys, as well as peacocks, pheasants and woodcock are found, and the reptiles include crocodiles, turtles, pythons and cobras.

Scarcity of labour and difficulty of communication hinder

the working of the gold, tin, copper, argentiferous lead, precious stones and other minerals of the country and the industries in general are of a primitive kind and satisfy only local needs.

The buffalo, the ox, the horse and the elephant are domesti- cated, and these together with cardamoms, rice, tobacco and the products of the forests form the bulk of the exports. Swine are reared, their flesh forming an important article of diet. Imports are inconsiderable, comprising chiefly cotton fabrics, garments and articles for domestic use. Trade is chiefly in the hands of the Chinese and is carried on for the most part with Siam. The Mekong is the chief artery of transit; elsewhere communication is afforded by tracks sometimes passable only for pedestrians. Luang-Prabang (q.v.) is the principal commercial town. Before the French occupation of Laos, it was split up into small princi- palities (muongs) of which the chief was that of Vien-Tiane. Yien-Tiane was destroyed in 1828 by the Siamese who annexed the territory. In 1893 they made it over to the French, who grouped the muongs into provinces. Of these there are twelve each administered by a French commissioner and, under his surveillance, by native officials elected by the people from amongst the members of an hereditary nobility. At the head of the administration there is a resident-superior stationed at Savannaket. Up till 1896 Laos had no special budget, but was administered by Cochin-China, Annam and Tongking. The budget for 1899 showed receipts £78,988 and expenditure £77,417. For 1904 the budget figures were, receipts £82,942, expenditure £76,344. The chief sources of revenue are the direct taxes (£15,606 in 1904), especially the poll-tax, and the contribu- tion from the general budget of Indo-China (£54,090 in 1904). The chief items of expenditure in 1904 were Government house, &c, £22,558, transport, £19,191, native guard, £17,327-

See M. J. F. Gamier, Voyage d' exploration en Indo-Chine (Paris, 1873); C. Gosselin, Le Laos et le protectorat francais (Paris, 1900); L. de Reinach, Le Laos (Paris, 1902) and Notes sur le Laos (Paris, 1906) ; and bibliography under Indo-China, French.

LAOS, or Laotions, an important division of the widespread Thai or Shan race found throughout Indo-China from 28 N. and the sources of the Irrawaddy as far as Cambodia and 7 N. in the Malay Peninsula. This Thai family includes the Shans proper, and the Siamese. The name Lao, which appears to mean simply " man," is the collective Siamese term for all the Thai peoples subject to Siam, while Shan, said to be of Chinese origin, is the collective Burmese term for those subject to Burma. Lao is therefore rather a political than an ethnical title, and the people cordially dislike the name, insisting on their right

to be called Thai. Owing to the different circumstances which have attended their migrations, the Thai peoples have attained to varying degrees of civilization. The Lao, who descended from the mountain districts of Yunnan, Szechuen and Kweichow to the highland plains of upper Indo-China, and drove the wilder Kha peoples whom they found in possession into the hills, mostly adopted Buddhism, and formed small settled communities or states in which laws were easy, taxes light and a very fair degree of comfort was attained. There are two main divisions, the Lao Pong Dam (" Black Paunch Laos "), so-called from their habit of tattooing the body from the waist to the knees, and the Lao Pong Kao (" White Paunch Laos ") who do not tattoo. Lao tattooing is of a most elaborate kind. The Lao Pong Dam now form the western branch of the Lao family, inhabiting the Siamese Lao states of Chieng Mai Lapaun, 'Tern Pre and Nan, and reaching as far south as 17 N. Various influences have contributed to making the Lao the pleasant, easy-going, idle fellow that he is. The result is that practically all the trade of these states is in the hands of Bangkok Chinese firms, of a certain number of European houses and others, while most of the manual labour connected with the teak industry is done by Ka Mus, who migrate in large numbers from the left bank of the Mekong. The Lao Pong Kao, or eastern branch, appear to have migrated southwards by the more easterly route of the Nam-u and the Mekong valley. In contradistinction to the Lao Pong Dam, who have derived their written language from the Burmese character, the eastern race has retained what appears to be the early form of

the present Siamese writing, from which it differs little. They formed important settlements at various points on the Mekong, notably Luang Prabang, Wieng Chan (Vien-Tiane) Ubon and Bassac; and, heading inland as far as Korat on the one side and the Annamite watershed in the east, they drove out the less civilized Kha peoples, and even the Cambodians, as the Lao Pong Dam did on the west. Vien-Tiane during the 18th century was the most powerful of the Lao principalities, and was feared and respected throughout Indo-China. It was destroyed by the Siamese in 1828. The inhabitants, in accordance with the Indo-Chinese custom of the day, were transported to Lower Siam. The Lao Pong Kao below 18 N. are a less merry and less vivacious people, and are for the most part shorter and more thick-set than those of Luang Prabang and the north. If possible, they are as a race lazier than the western Lao, as they are certainly more musical. The " khen," or mouth organ, which is universal among them, is the sweetest-toned of eastern instruments.

After 1828 the Laos became entirely subject to Siam, and were governed partly by khiao, or native hereditary princes, partly by

mandarins directly nominated by the Bangkok authorities. The khiao were invested by a gold dish, betel-box, spittoon and teapot, which were sent from Bangkok and returned at their death or deposition. Of all the khiao the most powerful was the prince of Ubon (i5°N., 105 E.), whose jurisdiction extended nearly from Bassac on the Mekong northwards to the great southern bend of that river. Nearly all the Laos country is now divided between France and Siam, and only a few tribes retain a nominal independence.

The many contradictory accounts of the Laos are due to the fact that the race has become much mixed with the aboriginal inhabitants. The half-castes sprung from alliances with the wild tribes of Caucasic stock present every variety between that type and the Mongolian. But the pure Laos are still distinguished by the high cheek-bones, small flat nose, oblique eyes, wide mouth, black lank hair, sparse beard, and yellow complexion of the Thai and other branches of the Mongol family. In dis- position the Laos are an apathetic, peace-loving, pleasant- mannered race. Though the women have to work, they are free and well treated, and polygamy is rare. The Laos are very superstitious, believe in wer-wolves, and that all diseases are caused by evil spirits. Their chief food is rice and fish. Men, women and children all smoke tobacco. The civilized Laos were long addicted to slave-hunting, not only with the sanction but even with the co-operation of their rulers, the Lao mandarins heading regular expeditions against the wilder tribes.

Closely allied with the Lao are a number of tribes found throughout the hill regions of the upper Mekong, between Yunnan and Kwangsi in China and the upper waters of the Menam in Siam. They have all within recent times been partakers in the general movement towards the south-west from the highland districts of southern China, which has produced so many recruits for the peopling of the Indo-Chinese peninsula. Of this group of people, among whom may be named the Yao, Yao Yin, Lanten, Meo, Musur (or Muhso) and Kaw, perhaps the best known and most like the Lao are the Lu — both names meaning originally ” man ” — who have in many cases adopted a form of Buddhism (flavoured strongly by their natural respect for local spirits as well as tattooing) and other relatively civilized customs, and have forsaken their wandering life among the hills for a more settled village existence. Hardy, simple and industrious, fond of music, kind-hearted, and with a strangely artistic taste in dress, these people possess in a wonderful degree the secret of cheerful contentment.

Authorities. — M. J. F. Gamier, Voyage d’ exploration en Indo- Chine; A. H. Mouhot, Travels in the Central Parts of Indo-China, Cambodia

and Laos (1864) ; Holt S. Hallett, A Thousand Miles on an Elephant in the Shan States (1890); A. R. Colquhoun, Amongst the Shdns (1885); Lord Lamington, Proc. R.G.S. vol. xiii. No. 12; Archer, Report on a Journey in the Mekong Valley; Prince Henri d'Orleans, Around Tonkin and Siam (1894) ; M'Carthy, Report on a Survey in Siam (1894); Bulletins, Paris Geographical Society: H. Warington Smyth, Notes of a Journey on the Upper Mekong (!895) ; Five Years in Siam (1898) ; Harmand, Le Laos et les popu- lations sauvages de V Indo-Chine (1880). See also bibliography to preceding article.

LAO-TSZE, or Laotj-Tsze, the designation of the Chinese author of the celebrated treatise called Tdo Teh King, and the reputed founder of the religion called Tdoism. The Chinese

characters composing the designation may mean either " the Old Son," which commonly assumes with foreigners the form of " the Old Boy," or " the Old Philosopher." The latter signifi- cance is attached to them by Dr Chalmers in his translation of the treatise published in 1868 under the title of The Speculations on Metaphysics, Polity and Morality of " the Old Philosopher ," Lao-tsze. The former is derived from a fabulous account of Lao-tsze in the Sh&n Hsien Chwan; " The Account of Spirits and Immortals," of Ko Hung in the 4th century a.d. According to this, his mother, after a supernatural conception, carried him in her womb sixty-two years (or seventy-two, or eighty-one — ten years more or fewer are of little importance in such a case), so that, when he was born at last, his hair was white as with age, and people might well call him " the old boy." The other meaning of the designation rests on better authority. We find it in the Kid Yil, or " Narratives of the Confucian School," compiled in the 3rd century a.d. from documents said to have been preserved among the descendants of Confucius, and also in the brief history of Lao-tsze given in the historical records of Sze-ma Ch'ien (about 100 B.C.). In the latter instance the designation is used by Confucius, and possibly it originated with him. It should be regarded more as an epithet of respect than of years, and is equivalent to "the Venerable Philosopher."

All that Ch'ien tells us about L&o-tsze goes into small compass. His surname was Li, and his name Urh. He was a native of the state of Ch'u, and was born in a hamlet not far from the present prefectural city of Kwei-te in Ho-nan province. He was one of the recorders or

historiographers at the court of Chow, his special department being the charge of the whole or a portion of the royal library. He must thus have been able to make himself acquainted with the history of his country. Ch'ien does not mention the year of his birth, which is often said, though on what Chinese authority does not appear, to have taken place in the third year of King Phing, corresponding to 604 B.C. That date cannot be far from the truth. That he was contemporary with Confucius is established by the concurrent testimony of the Li Kl and the Kid Yii on the Confucian side, and of Chwang-tsze and Sze-ma Ch'ien on the Taoist. The two men whose influence has been so great on all the subsequent generations of the Chinese people — Kung-tsze (Confucius) and Lao-tsze — had at least one interview, in 517 B.C., when the former was in his thirty-fifth year. The conversation between them was interesting. Lao was in a mocking mood_; Kung appears to the greater advantage. If it be true that Confucius, when he was fifty-one years old, visited L&o-tsze as Chwang-tsze says (in the Thien Yun, the fourteenth of his treatises), to ask about the Tdo, they must have had more than one interview. Dr Chalmers, however, has pointed out that both Chwang-tsze and Lieh-tsze (a still earlier Taoist writer) produce Confucius in their writings, as the lords of the Philistines did the captive Samson on . their festive occasions, " to make sport for them." Their testimony is valueless as to any matter of fact. There may have been several meetings between the two in 517 B.C., but we have no evidence that they were together in the same place after that time. Ch'ien adds : — " Lao-tsze cultivated the Tdo and virtue, his chief aim in his studies being how to keep himself concealed and unknown. He resided at (the capital of) Chow; but after a long time, seeing the decay of the dynasty, he left it, and went away to the Gate (leading from the royal domain into the regions beyond — at the entrance of the pass of Han-ku, in the north-west of Ho-nan). Yin Hsi, the warden of the Gate, said to him, ' You are about to withdraw yourself out of sight; I pray you to compose for me a book (before you go).' On this Lao-tsze made a writing, setting forth his views on the tdo and virtue, in two sections, containing more than 5000 characters. He then went away, and it is not known where he died." The historian then mentions the names of two other men whom some regarded as the true Lao-tsze. One of them was a Lao Lai, a contemporary of Confucius, who wrote fifteen treatises (or sections) on the practices of the school of Tdo. Subjoined to the notice of him is the remark that Lao-tsze was more than one hundred and sixty years old, or, as some say, more than two hundred, because by the cultivation of the Tdo he nourished his longevity. The other was " a grand historiographer " of Chow, called Tan, one hundred and twenty-nine (? one hundred and nineteen) years after the death of Confucius.

The introduction of these disjointed notices detracts from the verisimilitude of the whole narrative in which they occur.

Finally, Ch'ien states that " Lao-tsze was a superior man, who liked to keep in obscurity," traces the line of his posterity down to the 2nd century B.C., and concludes with this important statement: — " Those who attach themselves to the doctrine of Lao-tsze condemn that of the literati (and the literati on their part condemn Lao-tsze, thns verifying the saying, ' Parties whose principles are different cannot take counsel together.' Li Urh taught that transformation follows, as a matter of course, the doing nothing (to bring it about), and rectification errsnes in the same way from being pure and still."

Accepting the Tdo Teh King as the veritable work of Lao-tsze, we may now examine its contents. Consisting of not more than between five and six thousand characters, it is but a short treatise — not half the size of the Gospel of St Mark. The nature of the subject, however, the want of any progress of thought or of logical connexion between its different parts, and the condensed style, with the mystic tendencies and poetical temperament of the author, make its meaning extraordinarily obscure. Divided at first into two parts, it has subsequently and conveniently been subdivided into chapters. One of the oldest, and the most common, of these arrangements makes the chapters eighty-two.

Some Roman Catholic missionaries, two centuries ago, fancied that they found a wonderful harmony between many passages and the teaching of the Bible. Montucci of Berlin ventured to say in 1808: " Many things about a harmony Triune God are so clearly expressed that no one who with has read this book can doubt that the mystery of the ' Blblla, t Holy Trinity was revealed to the Chinese five centuries esc ag ' before the coming of Jesus Christ." Even Remusat, the first occupant of a Chinese chair in Europe, published at Paris in 1823 his Memoire sur la vie et les opinions de Lao-tsze, to vindicate the view that the Hebrew name Yahweh was phonetic- ally represented in the fourteenth chapter by Chinese characters. These fancies were exploded by Stanislas Julien, when he issued in 1842 his translation of the whole treatise as Le Livre de la voie et de la vertu.

The most important thing is to determine what we are to understand by the Tdo, for Teh is merely its outcome, especially in man, and is rightly translated by " virtue." julien translated Tdo by " la voie." Chalmers leaves it untranslated. " No English word," he says (p. xi.), " is its exact equivalent. Three terms suggest themselves — the way, reason and the word; but they are all liable to objection. Were we

guided by ety- mology, ‘ the way ‘ would come nearest the original, and in one or two passages the idea of a way seems to be in the term; but this is too materialistic to serve the purpose of a translation. ‘ Reason,’ again, seems to be more like a quality or attribute of some conscious being than Tdo is. I would translate it by ‘ the Word,’ in the sense of the Logos, but this would be like settling the question which I wish to leave open, viz. what resemblance there is between the Logos of the New Testament and this Chinese Tao.” Later Sinologues in China have employed ” nature ” as our best analogue of the term. Thus Watters (Ldo-tsze, A Study in Chinese Philosophy, p. 45) says: — “In the Tdo Teh King the originator of the universe is referred to under the names Non-Existence, Existence, Nature (Tdo) and various designations — all which, however, represent one idea in various manifestations. It is in all cases Nature (Tdo) which is meant.” This view has been skilfully worked out; but it only hides the scope of ” the Venerable Philosopher.” ” Nature ” cannot be accepted as a translation of Tdo. That character was, primarily, the symbol of a way, road or path; and then, figura- tively, it was used, as we also use way, in the senses of means and method — the course that we pursue in passing from one thing or concept to another as its end or result. It is the name of a quality. Sir Robert Douglas has well said (Confucianism and Tdoism, p. 189): “If we were compelled to adopt a single word to represent the Tdo of Lao-tsze, we should prefer the sense in which it is used by Confucius, ‘ the way,’ that is, ixkBoSos.”

What, then, was the quality which Lao-tsze had in view, and which he thought of as the Tdo — there in the library of Chow, at the pass of the valley of Han, and where he met Tb the end of his life beyond the limits of the civilized doctrine state? It was the simplicity of spontaneity, action of “the (which might be called non-action) without motive, way ‘ free from all selfish purpose, resting in nothing but its own accomplishment. This is found in the phenomena of the material world. ” All things springlup without a word spoken, and grow without a claim for their production. They go through their processes without any display of pride in them; and the results are realized without any assumption of ownership. It is owing to the absence of such assumption that the results and their

processes do not disappear ” (chap. ii.). It only needs the same quality in the arrangements and measures of government to make society beautiful and happy. ” A government conducted by sages would free

the hearts of the people from inordinate desires, fill their bellies, keep their ambitions feeble and strengthen their bones. They would constantly keep the people without knowledge and free from desires; and, where there were those who had knowledge, they would have them so that they would not dare to put it in practice ” (chap. hi.). A corresponding course observed by individual man in his government of himself becoming again “as a little child” (chaps, x. and xxviii.) will have corresponding results. ” His constant virtue will be complete, and he will return to the primitive simplicity ” (chap, xxviii.).

Such is the subject matter of the Tdo Teh King — the operation of this method or Tdo, ” without striving or crying,” in nature, in society and in the individual. Much that is very beautiful and practical is inculcated in connexion with its working in the individual character. The writer seems to feel that he cannot say enough on the virtue of humility (chap, viii., &c). There were three things which he prized and held fast — gentle com- passion, economy and the not presuming to take precedence in the world (chap, lxvii.). His teaching rises to its highest point in chap, lxiii.: — ” It is the way of Tdo not to act from any personal motive, to conduct affairs without feeling the trouble of them, to taste without being aware of the flavour, to account the great as small and the small as great, to recompense injury with kindness.” This last and noblest characteristic of the Tdo, the requiting ” good for evil,” is not touched on again in the treatise; but we know that it excited general attention at the time, and was the subject of conversation between Confucius and his disciples (Confucian Analects, xiv. 36).

What is said in the Tdo on government is not, all of it, so satisfactory. The writer shows, indeed, the benevolence of his heart. He seems to condemn the infliction of capital punish- ment (chaps, lxxiii. and lxxiv.), and he deplores the practice of war (chap, lxix.) ; but he had no sympathy with the progress of society or with the culture and arts of life. He says (chap, lxv.) : — ” Those who anciently were skilful in practising the Tdo did not use it to enlighten the people; ‘their object rather was to keep them simple. The difficulty in governing the people arises from their having too much knowledge, and therefore he who tries to govern a state by wisdom is a scourge to it, while he who does not try to govern thereby is a blessing.” The last chapter but one is the following: — ” In a small state with a few inhabitants, I would so order it that the people, though supplied with all kinds of implements, would not (care to) use them; I would give them cause to look on death as a most grievous thing, while yet they would not go away to a distance to escape from it. Though they had boats and carriages, they should have no occasion to ride in them. Though they had buff-coats

and sharp weapons, they should not don or use them. I would make them return to the use of knotted cords (instead of written characters). They should think their coarse food sweet, their plain clothing beautiful, their poor houses places of rest and their common simple ways sources of enjoyment. There should be a neighbouring state within sight, and the sound of the fowls and dogs should be heard from it to us without interruption, but I would make the people to old age, even to death, have no intercourse with it."

On reading these sentiments, we must judge of Lao-tsze that, with all his power of thought, he was only a dreamer. But thus far there is no difficulty arising from his language in regard to the Tdo. It is simply a quality, descriptive of the style of character and action, which the individual should seek to attain in himself, and the ruler to impress on his administration. The language about the Tdo in nature is by no means so clear. While Sir Robert Douglas says that " the way " would be the best translation of Tdo, he immediately adds: — " But Tdo is more than the way. It is the way and the way-goer. It is an eternal road; along it all beings and things walk; but no being made it, for it is being itself; it is everything, and nothing xvi. 7

and the cause and effect of all. All things originate from Tdo> conform to Tdo and to Tdo at last they return."

Some of these representations require modification; but no 1 houghtful reader of the treatise can fail to be often puzzled by what is said on the point in hand. Julien, indeed, A

says with truth (p. xiii.) that " it is impossible to take ˆthe Tdo for the primordial Reason, for the sublime In- Deity. telligence, which has created and governs the world "; but many of Lao-tsze's statements are unthinkable if there be not behind the Tdo the unexpressed recognition of a personal creator and ruler. Granted that he does not affirm positively the existence of such a Being, yet certainly he does not deny it, and his language even implies it. It has been said, indeed, that he denies it, and we are referred in proof to the fourth chapter: — " Tdo is like the emptiness of a vessel; and the use of it, we may say, must be free from all self-sufficiency. How deep and mysterious it is, as if it were the author of all things! We should make our sharpness blunt, and unravel the com- plications of things; we should attemper our brightness, and assimilate ourselves to the obscurity caused by dust. How still and clear is Tdo, a phantasm with the semblance of permanence! I do not know whose son it is. It might appear to have been before God (Ti)."

The reader will not overlook the cautious and dubious manner in which the predicates of Tdo are stated in this remarkable passage. The author does not say that it was before God, but that ” it might appear ” to have been so. Nowhere else in his treatise does the nature of Tdo as a method or style of action come out more clearly. It has no positive existence of itself; it is but like the emptiness of a vessel, and the manifesta- tion of it by men requires that they endeavour to free themselves from all self-sufficiency. Whence came it? It does not shock Lao-tsze to suppose that it had a father, but he cannot tell whose son it is. And, as the feeling of its mysteriousness grows on him, he ventures to say that ” it might appear to have been before God.”

There is here no denial but express recognition of the existence of God, so far as it is implied in the name Ti, which is the personal name for the concept of heaven as the ruling power, by means of which the fathers of the Chinese people rose in prehistoric time to the idea of God. Again and again Lao-tsze speaks of heaven just as ” we do when we mean thereby the Deity who presides over heaven and earth.” These last words are taken from Watters (p. 81) ; and, though he adds, ” We must not forget that this heaven is inferior and subsequent to the mysterious Tdo, and was in fact produced by it,” it has been shown how rash and unwarranted is the ascription of such a sentiment to ” the Venerable Philosopher.” He makes the Tdo prior to heaven and earth, which is a phrase denoting what we often call ” nature,” but he does not make it prior to heaven in the higher and im- material usage of that name. The last sentence of his treatise is: — “It is the Tdo — the way — of Heaven to benefit and not injure; it is the Tdo — the way — of the sage to do and not strive.”

Since Julien laid the Tdo Teh King fairly open to Western readers in 1842, there has been a tendency to overestimate rather than to underestimate its value as a scheme of thought and a discipline for the individual and society. There are in it lessons of unsurpassed value, such as the inculcation of simplicity, humility _ and self- abnegation, and especially the brief enunciation of the divine duty of returning good for ill; but there are also the regretful repre- sentations of a primitive society when men were ignorant of the rudi- ments of culture, and the longings for its return.

When it was thought that the treatise made known the doctrine of the Trinity, and even gave a phonetic representation of the Hebrew name for God, it was natural, even necessary, to believe that its author had had communication with more western parts of Asia, and there was much speculation about visits to India and Judaea, and even to Greece. The necessity for assuming such travels has passed away. If we

can receive Sze-ma Ch'ien's histories as trustworthy, Lao-tsze might have heard, in the states of Chow and among the wild tribes adjacent to them, views about society and government very like his own. Ch'ien relates how an envoy came in 624 B.C. — twenty years before the date assigned to thebirth of Lao-tsze — to the court of Duke Mu of Ch'in, sent by the king of some rude hordes on the west. The duke told him of the histories.

poems, codes of rites, music and laws which they had in the middle states, while yet rebellion and disorder were of frequent occurrence, and asked how good order was secured among the wild people, who had none of those appliances. The envoy smiled, and replied that the troubles of China were occasioned by those very things of which the duke vaunted, and that there had been a gradual degenera- tion in the condition of its states, as their professed civilization had increased, ever since the days of the ancient sage, Hwang Ti, whereas in the land he came from, where there was nothing but the primitive simplicity, their princes showed a pure virtue in their treatment of the people, who responded to them with loyalty and good faith. " The government of a state," said he in conclusion, " is like a man's ruling his own single person. He rules it, and does not know how he does so; and this was indeed the method of the sages." Lao-tsze did not need to go further afield to find all that he has said about government.

We have confined ourselves to the Taoism of the Tdo Teh King without touching on the religion Taoism now existing in China, but j. which did not take shape until more than five hundred

Taoism years after the death of Lao-tsze, though he now occupies of to-day. tne second place in its trinity of "The three Pure or Holy Ones." There is hardly a word in his treatise that savours either of superstition or religion. In the works of Lieh-tsze and Chwang-tsze, his earliest followers of note, we find abundance of grotesque superstitions; but their beliefs (if indeed we can say that they had beliefs) had not become embodied in any religious institu- tions. When we come to the Ch'in dynasty (221-206 B.C.), we meet with a Taoism in the shape of a search for the fairy islands of the eastern sea, where the herb .of immortality might be gathered. In the 1st century a.d. a magician, called Chang Tao-ling, comes before us as the chief professor and controller of this Taoism, preparing in retirement " the pill " which renewed his youth, supreme over all spirits, and

destroying millions of demons by a stroke of his pencil. He left his books, talismans and charms, with his sword and seal, to his descendants, and one of them, professing to be animated by his soul, dwells on the Lung-hu mountain in Kiang-si, the acknowledged head or pope of Taoism. But even then the system was not yet a religion, with temples or monasteries, liturgies and forms of public worship. It borrowed all these from Buddhism, which first obtained public recognition in China between A.D. 65 and 70, though at least a couple of centuries passed before it could be said to have free course in the country.

Even still, with the form of a religion, Taoism is in reality a conglomeration of base and dangerous superstitions. Alchemy, geomancy and spiritualism have dwelt and dwell under its shadow. Each of its ” three Holy Ones ” has the title of Thien Tsun, ” the Heavenly and Honoured,” taken from Buddhism, and also of Shang Ti or God, taken from the old religion of the country. The most popular deity, however, is not one of them, but has the title of Yil Wang Sha? ig Ti, ” God, the Perfect King.” But it would take long to tell of all its “celestial gods,” “great gods,” ” divine rulers ” and others. It has been doubted whether Lao-tsze acknowledged the existence of God at all, but modern Taoism is a system of the wildest polytheism. The science and religion of the : West meet from it a most determined opposition. The ” Venerable Philosopher ” himself would not have welcomed them; but he ought not to bear the obloquy of being the founder of the Taoist religion. (J. Le.)

LA PAZ, a western department of Bolivia, bounded N. by the national territories of Caupolican and El Beni, E. by El Beni and Cochabamba, S. by Cochabamba and Oruro and W. by Chile and Peru. Pop. (1900) 445,616, the majority of whom are Indians. Area 53,777 sq. m. The department belongs to the great Bolivian plateau, and its greater part to the cold, bleak, puna climatic region. The Cordillera Real crosses it N.W. to S.E. and culminates in the snow-crowned summits of Sorata and Illimani. The west of the department includes a part of the Titicaca basin with about half of the lake. This elevated plateau region is partially barren and inhospitable, its short, cold summers permitting the production of little besides potatoes, quinoa (Chenopodium quinod) and barley, with a little Indian corn and wheat in favoured localities. Some atten- tion is given to the rearing of llamas, and a few cattle, sheep and mules are to be seen south of Lake Titicaca. There is a considerable Indian population in this region, living chiefly in small hamlets on the products of their own industry. In the lower valleys of the eastern slopes, where climatic conditions range from temperate to tropical, wheat, Indian corn, oats and the fruits and vegetables of the

temperate zone are cultivated. Farther down, coffee, cacao, coca, rice, sugar cane, tobacco, oranges, bananas and other tropical fruits are grown, and the forests yield cinchona bark and rubber. The mineral wealth nf La Paz includes gold, silver, tin, copper and bismuth. Tin and ropper are the most important of these, the principal tin

mines being in the vicinity of the capital and known under the names of Huayna-Potosi, Milium and Chocoltaga. The chief copper mines are the famous Corocoro group, about 75 m. S.S.E. of Lake Titicaca by the Desaguadero river, the principal means of transport. The output of the Corocoro mines, which also includes gold and silver, finds its way to market by boat and rail to Mollendo, and by pack animals to Tacna and rail to Arica. There are no roads in La Paz worthy of the name except the 5 m. between the capital and the ” Alto,” though stage-coach communication with Oruro and Chililaya has been main- tained by the national government. The railway opened in 1905 between Guaqui and La Paz (54 m.) superseded the latter of these stage lines, and a railway is planned from Viacha to Oruro to supersede the other. The capital of the department is the national capital La Paz. Corocoro, near the Desaguadero river, about 75 m. S.S.E. of Lake Titicaca and 13,353 ft. above sea-level, has an estimated population (1906) of 15,000, chiefly Aymara Indians.

LA PAZ (officially La Paz de Ayacucho), the capital of Bolivia since 1898, the see of a bishopric created in 1605 and capital of the department of La Paz, on the Rio de la Paz or Rio Chuquiapo, 42 m. S.E. of Lake Titicaca (port of Chililaya) in 16 30′ S., 68° W. Pop. (1900) 54,713, (1906, estimate) 67,235. The city is built in a deeply-eroded valley of the Cordillera Real which is believed to have formed an outlet of Lake Titicaca, and at this point descends sharply to the S.E., the river making a great bend southward and then flowing northward to the Beni. The valley is about 10 m. long and 3 m. wide, and is singularly barren and forbidding. Its precipitous sides, deeply gullied by torrential rains and diversely coloured by mineral ores, rise 1500 ft. above the city to the margin of the great plateau surrounding Lake Titicaca, and above these are the snow-capped summits of Illimani and other giants of the Bolivian Cordillera. Below, the valley is fertile and covered with vegetation, first of the temperate and then of the tropical zone. The elevation of La Paz is 12,120 ft. above sea-level, which places it within the puna climatic region, in which the summers are short and cold. The mean annual temperature is a little above the puna average, which is 54° F., the extremes ranging from 19° to 75 . Pneumonia and bronchial complaints are common, but consumption is said to be rare. The surface of the valley is very uneven, rising sharply from the river on both sides, and the transverse

streets of the city are steep and irregular. At its south-eastern extremity is the Alameda, a handsome public promenade with parallel rows of exotic trees, shrubs and flowers, which are maintained with no small effort in so inhospitable a climate. The trees which seem to thrive best are the willow and eucalyptus. The streets are generally narrow and roughly paved, and there are numerous bridges across the river and its many small tributaries. The dwellings of the poorer classes are commonly built with mud walls and covered with tiles, but stone and brick are used for the better structures. The cathedral, which was begun in the 17th century when the mines of Potosi were at the height of their productiveness, was never finished because of the revolutions and the comparative poverty of the city under the republic. It faces the Plaza Mayor and is distinguished for the finely-carved stonework of its facade. Facing the same plaza are the government offices and legislative chambers. Other notable edifices and institutions are the old university of San Andres, the San Francisco church, a national college, a seminary, a good public library and a museum rich in relics of the Inca and colonial periods. La Paz is an important commercial centre, being connected with the Pacific coast by the Peruvian railway from Mollendo to Puno (via Arequipa), and a Bolivian extension from Guaqui to the Alto de La Paz (Heights of La Paz) — the two lines being connected by a steamship service across Lake Titicaca. An electric railway 5 m. long connects the Alto de La Paz with the city, 1493 ft. below. This route is 496 m. long, and is expensive because of trans-shipments and the cost of handling cargo at Mollendo. The vicinity of La Paz abounds with mineral wealth; most important are the tin deposits of Huayna-Potosi, Milluni

and Chocoltaga. The La Paz valley is auriferous, and since the foundation of the city gold has been taken from the soil washed down from the mountain sides.

La Paz was founded in 1548 by Alonzo de Mendoza on the site of an Indian village called Chuquiapu. It was called the Pueblo Nuevo de Nuestra Senora de la Paz in commemoration of the recon- ciliation between Pizarro and Almagro, and soon became an im- portant colony. At the close of the war of independence (1825) it was rechristened La Paz de Ayacucho, in honour of the last decisive battle of that protracted struggle. It was made one of the four capitals of the republic, but the revolution of 1898 permanently established the seat of government here because of its accessibility, wealth, trade and political influence.

LA PEROUSE, JEAN-FRANQOIS DE GALAUP, Comte de (1741-e. 1788), French navigator, was born near Albi, on the 22nd of August 1 741. His family name was Galaup, and La Perouse or La Peyrouse was an addition adopted by himself from a small family estate near Albi. As a lad of eighteen he was wounded and made prisoner on board the ” Formidable ” when it was captured by Admiral Hawke in 1759; and during the war with England between 1778 and 1783 he served with dis- tinction in various parts of the world, more particularly on the eastern coasts of Canada and in Hudson’s Bay, where he captured Forts Prince of Wales and York (August 8th and 21st, 1782). In 1785 (August 1st) he sailed from Brest in command of the French government expedition of two vessels (” La Boussole ” under La Perouse himself, and ” L’Astrolabe,” under de Langle) for the discovery of the North- West Passage, vainly essayed by Cook on his last voyage, from the Pacific side. He was also charged with the further exploration of the north-west coasts of America, and the north-cast coasts of Asia, of the China and Japan seas, the Solomon Islands and Australia; and he was ordered to collect information as to the whale fishery in the southern oceans and as to the fur trade in North America. • He reached Mount St Elias, on the coast of Alaska, on the 23rd of June 1786. After six weeks, marked by various small discoveries, he was driven from these regions by bad weather; and after visiting the Hawaiian Islands, and discovering Necker Island (November 5th, 1786), he crossed over to Asia (Macao, January 3rd, 1787). Thence he passed to the Philippines, and so to the coasts of Japan, Korea and ” Chinese Tartary,” where his best results were gained. Touching at Quelpart, he reached De Castries Bay, near the modern Vladivostok, on the 28th of July 1787; and on the 2nd of August following discovered the strait, still named after him, between Sakhalin and the Northern Island of Japan. On the 7th of September he put in at Petro- pavlovsk in Kamchatka, where he was well received by special order of the Russian empress, Catherine II. ; thence he sent home Lesseps, overland, with the journals, notes, plans and maps recording the work of the expedition. He left Avacha Bay on the 29th of September, and arrived at Mauna in the Samoan group on the 8th of December; here de Langle and ten of the crew of the ” Astrolabe ” were murdered. He quitted Samoa on the 14th of December, touched at the Friendly Islands and Norfolk Island and arrived in Botany Bay on the 26th of January 1788. From this place, where he interchanged courtesies with some of the English pioneers in Australia, he wrote his last letter to the French Ministry of Marine (February 7th). After this no more was heard of him and his squadron till in 1826 Captain Peter Dillon found the wreckage of what must have been the ” Boussole ” and the ‘ Astrolabe ” on the reefs of Vanikoro, an island to the north of

the New Hebrides. In 1828 Dumont d'Urville visited the scene of the disaster and erected a monu- ment (March 14th).

See Milet Mureau, Voyage de la Perouse autour du tnonde (Paris, 1 797) 4 vols.; Gerard, Vies . . . des . . . marins francais (Paris, 1825), 197-200; Peter Dillon, Narrative . . . of a Voyage in the South Seas for the Discovery of the Fate of La Perouse (London, 1829), 2 vols.; Dumont d'Urville, Voyage pittoresque autour du monde; Quoy and Paul Gaimard, Voyage de . . . I Astrolabe; Domeny de Rienzi, Oceanie; Van Tcnac, Histoire general de la marine, iv. 258- 264; Moniteur universel, 13th of February 1847.

LAPIDARY, and GEM CUTTING (Lat. lapidarius, lapis, a stone). The earliest examples of gem cutting and carving known (see also Gem) are the ancient engraved seals, which are

of two principal types, the cylindrical or " rolling " seals of Babylonia and Assyria, suggested by a joint of the bamboo or the central whorl of a conch-like shell, and the peculiar scara- baeoid seals of Egypt. Recent researches make it appear that both these types were in use as far back as 4500 B.C., though with some variations. The jewels of Queen Zer, and other jewels consisting of cut turquoise, lapis lazuli and amethyst, found by the F'rench mission, date from 4777 B.C. to 4515 B.C. Until about 2500 B.C., the cylinder seals bore almost wholly animal designs; then cuneiform inscriptions were added. In the 6th century B.C., the scarabaeoid type was introduced from Egypt, while the rolling seals began to give place to a new form, that of a tall cone. These, in a century or two, were gradually shortened; the hole by which they were suspended was enlarged until it could admit the finger, and in time they passed into the familiar form of seal-rings. This later type, which prevailed for a long period, usually bore Persian or Sassanian inscriptions. The scarabaeoid seals were worn as rings in Egypt apparently from the earliest times.

The most ancient of the cylinder seals were cut at first from shell, then largely from opaque stones such as diorite and serpentine. After 2500 B.C., varieties of chalcedony and milky quartz were employed, translucent and richly coloured; some- times even rock crystal, and also frequently a beautiful compact haematite. Amazone stone, amethyst and fossil coral were used, but no specimen is believed to be known of ruby, sapphire, emerald, diamond, tourmaline or spinel.

The date of about 500 B.C. marks the beginning of a period of great

artistic taste and skill in gem carving, which extended throughout the ancient civilized world, and lasted until the 3rd or 4th century a.d. Prior to this period, all the work appears to have been done by hand with a sapphire point, or else with a bow-drill ; thenceforward the wheel came to be largely employed. The Greek cutters, in their best period, the 5th and 6th centuries B.C., knew the use of disks and drills, but preferred the sapphire point for their finest work, and continued to use it for two or three hundred years. Engraving by the bow-drill was introduced in Assyrian and Babylonian work as early as perhaps 3000 B.C., the earlier carving being all done with the sapphire point, which was secured in a handle for convenient application. This hand- work demanded the utmost skill and delicacy of touch in the artist. The bow-drill consisted of a similar point fastened in the end of a stick, which could be rotated by means of a horizontal cross-bar attached at each end to a string wound around the stick; as the cross-bar was moved up and down, the stick was made to rotate alternately in opposite directions. This has been a frequent device for such purposes among many peoples, both ancient and modern, civilized and uncivilized. The point used by hand, and the bow-drill, were afterwards variously combined in executing such work. Another modification was the sub- stitution for the point, in either process, of a hollow tube or drill, probably in most cases the joint of a hollow reed, whereby very accurate circles could be made, as also crescent figures and the like. This process, used with fine hard sand, has also been widely employed among many peoples. It may perhaps have been suggested by the boring of other shells by carnivorous molluscs of the Murex type, examples of which may be picked up on any sea-beach. It is possible that the cylinder seals were drilled in this way out of larger pieces by means of a hollow reed or bamboo, the cylinder being left as the core.

The Egyptian scarabs were an early and very characteristic type of seal cutting. The Greek gem cutters modified them by adding Greek and Etruscan symbols and talismanic signs; many of them also worked in Egypt and for Egyptians. Phoenician work shows a mixture of Assyrian and Egyptian designs; and Cypriote seals, principally on the agate gems, are known that are referred to the 9th century B.C.

Scarabs are sometimes found that have been sliced in two, and the new flat faces thus produced carved with later inscriptions and set in rings. This secondary work is of many kinds. An Assyrian cylinder in the Metropolitan Museum, New York, referred to 3000 B.C., bears such a cutting of Mediterranean

character, of the 2nd or 3rd century B.C. In the early Christian era, also, many Greek and Roman gems were recut with Gnostic and other peculiar and obscure devices.

In the later Roman period, the 3rd and 4th centuries, a great decline in the art is seen — so great that Castellani terms it ” the idiotic age.” Numbers of gems of this kind have been found together, as though they were the product of a single manu- facturer, carved in the crudest manner, both in design and execution. Yet remarkable results are sometimes produced in these by a few touches of the drill, which under the glass appear very crude but nevertheless yield strong effects. The same thing may be seen now in many of the Japanese sketches and lacquer designs, where a whole landscape is depicted, or rather suggested, by a few simple but powerful strokes. It is now thought that some of these seals may be of earlier origin than has been supposed, and also that they may have been worn by the poorer classes, who could not afford the more finished work. They must have been made by the hundred thousand. The decline of the art went on until in the Byzantine period, especially the 6th century, it had reached a very low point. Most of the gems of this period show drill-work of poor quality, although hand-work is occasionally seen.

With the Renaissance, the art of gem carving revived, and the engravers from that time and onward have produced results that equal the best Greek and Roman work; copies of ancient gem carvings made by some of the 18th-century masters are only distinguishable from true antiques by experts of great proficiency. It is in fact extremely difficult to judge positively as to the age of engraved gems. The materials of which they are made are hard and resistant to any change through time, and there are many ingenious devices for producing the appear- ances usually believed to indicate great age, such as slightly dulled or scratched surfaces and the like. There are also the gems with secondary carving, already alluded to, and the ancient gems that have been partially recut by modern engravers for the purpose of fraudulently enhancing their price. All these elements enter into the problem and make it an almost hopeless one for any but a person of great experience in the study of such objects; and even he may not be able in all cases to decide.

Until the 14th century, almost all the gems were cut en cabochon — that is, smoothly rounded, as carbuncles and opals are still — or else in the form of beads drilled from both sides for suspension or attachment, the two perforations often meeting but imperfectly. These

latter may be of Asiatic origin, brought into Europe by commerce during the Crusades. Some of the finest gems in the Austrian, Russian and German crowns are stones of this perforated or bead type. An approach, or transi- tion, to the modern facetting is seen in a style of cutting often used for rock-crystal in the 10th and nth centuries: an oval cabochon was polished fiat, and the sides of the dome were also trimmed flat, with a rounded back, and the upper side with a ridge in the centre, tapering off to the girdle of the stone below.

The plane facetted cutting is altogether modern; and hence the pictures which represent the breastplate of the ancient Jewish high-priest as set with facetted stones are wholly imaginary and probably incorrect, as we have no exact knowledge of the forms of the gems. The Orientals polish gems in all sorts of irregular, rounded shapes, according to the form of the piece as found, and with the one object of preserving as much of its original size and colour as possible. The greatest ingenuity is used to make a speck of colour, as in a sapphire, tone up an entire gem, by cutting it so that there is a point of high colour at the lower side of the gem.

In later times a few facets are sometimes cut upon a generally rounded stone. The cabochon method is still used for opaque or translucent stones, as opal, moonstone, turquoise, carbuncle, &c; but for transparent gems the facetted cutting is almost always employed, on account of its fine effect in producing brilliancy, by reflection or refraction of light from the under side of the gem. Occasionally the ancients used natural crystals with polished faces, or perhaps at times polished these to some extent artificially. This use of crystals was frequent with prisms

of emerald, which were drilled and suspended as drops. Those the French call ” primes d’emeraudes.” These were often natural crystals from Zaborah, Egypt or the Tirol Mountains, drilled through the height of the prism, and with little or no polishing. In rare instances perfect and brilliant crystals may now be seen mounted as gems.

The modern method is that of numerous facets, geometrically disposed to bring out the beauty of light and colour to the best advantage. This is done at the sacrifice of material, often to the extent of half the stone or even more — the opposite of the Oriental idea. There are various forms of such cutting, but three are specially employed, known as the brilliant, the rose and the table-cut. The last, generally made from cleavage pieces, usually square or oblong, with a single facet or edge on each side, and occasionally four or more facets on the lower side of the stone, is used chiefly for emeralds, rubies and sapphires; the two

former for diamonds in particular. The brilliant is essentially a low, double cone, its top truncated to form a large flat eight- sided face called the table, and its basal apex also truncated by a very small face known as the culette or cttllet. The upper and lower slopes are cut into a series of triangular facets, 32 above the girdle, in four rows of eight, and 24 below, in three rows, making 56 facets in all. The rose form is used for diamonds not thick enough to cut as brilliants; it is flat below and has 12 to 24, or sometimes 32, triangular facets above, in three rows, meeting in a point. Stones thus cut are also known as ” roses couronnees “; others with fewer facets, twelve or even six, are called ” roses d’Anvers,” and are a specialty, as their name implies, at Antwerp. These, however, are only cut from very thin or shallow stones. None of the rose-cut diamonds is equal in beauty to the brilliants. There are several other forms, among which are the ” briolette,” ” marquise,” oval and pear- shaped stones, &c, but they are of minor importance. The pear- shaped brilliant is a facetted ball or drop, being a brilliant in style of cutting, although the form of the gem is elongated or drop-shaped. The ” marquise ” or ” navette ” form is an elliptical brilliant of varying width in proportion to its length. The ” rondelle ” form consists of flat, circular gems with smooth sides pierced, like shallow beads, with facetted edges, and is sometimes used between pearls, or gem beads, and in the coloured gems, such as rubies, sapphires, emeralds, &c. The mitred gems fitted to a gauge are much used and are closely set together, forming a continuous line of colour.

Modern gem cutting and engraving are done by means of the lathe, which can be made to revolve with extreme rapidity, carrying a point or small disk of soft iron, with diamond-dust and oil. The disks vary in diameter from that of a pin-head to a quarter of an inch. Better than the lathe, also, is the S. S. White dental engine, which the present writer was the first to suggest for this use. The flexibility and sensitiveness of this machine enables it to respond to the touch of the artist and to impart a personal quality to his work not possible with the mechanical action of the lathe, and more like the hand-work with the sapphire point. The diamond-dust and oil, thus applied, will carve any stone softer than the diamond itself with com- parative ease.

We may now review some of the special forms of cutting and working gems and ornamental stones that have been developed in Europe since the period of the Renaissance.

Garnets (g.v.) have been used and worked from remote antiquity; but in modern times the cutting of them has been carried on chiefly in Bohemia, in the region around Merowitz and Dlaskowitch. The stones

occur in a trap rock, and are weathered out by its decom- position and gathered from gravels and beds of streams. They are of the rich red variety known as pyrope (g.v.), or Bohemian garnet; it is generally valued as a gem-stone. Such are the so-called ” Cape rubies,” of South Africa, found in considerable quantity in German East Africa, and the beautiful garnets known as the ” Arizona rubies.” Garnets are so abundant in Bohemia as to constitute an important industry, employing some five hundred miners, an equal number of cutters and as many as three thousand dealers. Extensive garnet cutting is also done in India, especially at Jeypore, where there are large works employing natives who have been taught by Europeans. The Indian garnets, however, are mostly of another variety, the almandine (q.v.) ; it is equally rich in colour, though

inclining more to a violet cast than the pyrope, and can be obtained in larger pieces. The ancient garnets, from Etruscan and Byzantine remains, some of which are flat plates set in gold, or carved with mythological designs, were probably obtained from India or perhaps from the remarkable locality for large masses of garnet in German East Africa. Many are cut with the portraits of Sassanian kings with their characteristic pearl earrings. The East Indians carve small dishes out of a single garnet.

The carving of elegant objects from transparent quartz, or rock crystal, has been carried on since the 16th century, first in Italy, by the greatest masters of the time, and afterwards in Prague, under Rudolph II., until the Thirty Years’ War, when the industry was wiped out. Splendid examples of this work are in the important museums of Europe. Many of these are reproduced now in Vienna, and fine examples are included in some American museums. Among them are rock-crystal dishes several inches across, beautifully en- graved in intaglio and mounted in silver with gems. Other varieties of quartz minerals, such as agate, jasper, &c, and other ornamental stones of similar hardness, are likewise wrought into all manner of art objects. Caskets, vases, ewers, coupes and animal and other fanciful forms, are familiar in these opaque and semi-transparent stones, either carved out of single masses or made of separate pieces united with gold, silver or enamel in the most artistic manner. Cellini, and other masters in the 16th and 17th centuries, vied with each other in such work.

The greatest development of agate (g.f.), however, has been seen in

Germany, at Waldkirch in Breisgau, and especially at Idar and Oberstein on the Nahe, in Oldenburg. The industry began in the 14th century, at the neighbouring town of Freiburg, but was trans- ferred to Waldkirch, where it is still carried on, employing about 120 men and women, the number of workmen having increased nearly threefold since the middle of the 19th century. The Idar and Oberstein industry was founded somewhat later, but is much more extensive. Mills run by water-power line the Nahe river for over 30 m., from above Kreuznach to below Idar, and gave employment in 1908 to some 5000 people — 1625 lapidaries, 160 drillers, 100 engravers, 2900 cutters, &c. , besides 300 jewellers and 300 dealers. The industry began here in consequence of the abundance of agates in the amygda- loid rocks of the vicinity; and it is probable that many of the Cinque Cento gems, and perhaps even some of the Roman ones, were ob- tained in this region. By the middle of the 18th century the best material was about exhausted, but the industry had become so firmly established that it has been kept up and increased by import- ing agates. In 1540 there were only three mills; in 1740, twenty- five; in 1840, fifty; in 1870, one hundred and eighty-four. Agents and prospectors are sent all over the world to procure agates and other ornamental stones, and enormous quantities are brought there and stored. The chief source of agate supply has been in Uruguay, but much has been brought from other distant lands. It was esti- mated that fifty thousand tons were stored at Salto in Uruguay at one time.

The grinding is done on large, horizontal wheels like grindstones, some 6 ft. in diameter and one-fourth as thick, run by water-wheels. The faces of some of these grindstoi.es are made with grooves of different sizes so that round objects or convex surfaces can be ground very easily and rapidly. An agate ball or marble, for instance, is made from a piece broken to about the right size and held in one of these semicircular grooves until one-half of it is shaped, and then turned over and the other half ground in the same way. The polishing is done on wooden wheels, with tripoli found in the vicinity ; any carving or ornamentation is then put on with a wheel-edge or a drill by skilled workmen.

In the United States the Drake Company at Sioux Falls, South Dakota, has done cutting and polishing in hard materials on a grand scale. It is here, and here only, that the agatized wood from Chalce- dony Park, Arizona, has been cut and polished, large sections of tree-trunks having been made into table-tops and columns of wonderful beauty, with a polish like that of a mirror.

Much of the finest lapidary work, both on a large and a small scale, is

done in Russia. Catherine II. sought to develop the precious stone resources of the Ural region, and sent thither two Italian lapidaries. This led to the founding of an industry which now em- ploys at least a thousand people. The work is done either at the great imperial lapidary establishment at Ekaterinburg, or in the vicinity of the mines by lapidary masters, as they are called, each of whom has his peculiar style. The products are sold to dealers at the great Russian fairs at Nizhniy Novgorod, Moscow and Ekaterinburg. The imperial works at the last-named place have command of an immense water-power, and are on such a scale that great masses of hard stones can be worked as marble is in other countries. Much of the machinery is primitive, but the applications are ingenious and the results unsurpassed anywhere. The work done is of several classes, ranging from the largest and most massive to the smallest and most delicate. There is (1) the cutting of facetted gems, as topaz, aquamarine, amethyst, &c, from the mines of the Ural, and of other gem-stones also; this is largely done by means of the cadrans, a small machine held in the hand, by which the angle of the facets can be adjusted readily when once the stone has been set, and which produces work of great beauty and accuracy. Then there is (2) a vast variety of ornamental objeats, large and small,

some weighing 2000 lb and over, and requiring years to complete; they are made from the opaque minerals of the Ural and Siberia — – malachite, rhodonite, lapis-lazuli, aventurine and jasper. A peculiar type of work is (3) the production of beautiful groups of fruit, flowers and leaves, in stones selected to match exactly the colour of each object represented. These are chosen with great care and skill, somewhat as in the Florentine mosaics, not to produce a flat inlaid picture, however, but a perfect reproduction of form, size and colour. These groups are carved and polished from hard stones, whereas the Florentine mosaic work includes' many substances that are much softer, as glass, shell, &c.

Enormous masses of material are brought to these works; the supply of rhodonite, jade, jaspers of various colours, &c, sometimes amounting to hundreds of tons. One mass of Kalkansky jasper weighed nearly 9 tons, and a mass of rhodonite above 50 tons; the latter required a week of sledging, with ninety horses, to bring it from the quarry, only 14 m. from the works. About seventy-five men are employed, at twenty-five roubles a month (£2, us. 6d.), and ten boys, who earn from two to ten roubles (4s. to £1). A training school is connected with the works, where over fifty boys are pupils; on graduating they may remain *as government lapidaries or set up on their own account.

There are two other great Russian imperial establishments of the same

kind. One of these, founded by Catherine II., is at Peterhof, a short distance from the capital; it is a large building fitted up with imperial elegance. Here are made all the designs and models for the work done at Ekaterinburg; these are returned and strictly preserved. In the Peterhof works are to be seen the largest and most remarkable achievements of the lapidarian art, vases and pedestals and columns of immense size, made from the hardest and most elegant stones, often requiring the labour of years for their com- pletion. The third great establishment is at Kolyvan, in Siberia, bearing a like relation to the minerals and gem-stones of the Altai region that the works of Ekaterinburg do to the Ural. The three establishments are conducted at large expense, from the private revenue of the tsar. The Russian emperors have always taken special interest in lapidary work, and the products of these establish- ments have made that country famous throughout the world. The immense monolithic columns of the Hermitage and of St Isaac's Cathedral, of polished granite and other hard and elegant stones, are among the triumphs of modern architectural work; and the Alexander column at St Petersburg is a single polished shaft, 13 ft. in diameter and 82 ft. in height, of the red Finland granite.

The finest lapidary work of modern France is done at Moulin la Vacherie Saint Simon, Seine-et-Marne, where some seventy-five of the most skilful artisans are engaged. The products are all manner of ornamental objects of every variety of beautiful stone, all finished with absolute perfection of detail. Columns and other ornaments of porphyry and the like, of ancient workmanship, are brought hither from Egypt and elsewhere, and recut into smaller objects for modern artistic tastes. Here, too, are made spheres of transparent quartz — ■ " crystal balls " — up to 6 in. in diameter, the material for which is obtained in Madagascar.

A few words may be said, by way of comparison and contrast, about the lapidary art of Japan and China, especially in relation to the crystal balls, now reproduced in France and elsewhere. The tools are the simplest, and there is no machinery; but the lack of it is made up by time and patience, and by hereditary pride, as a Japanese artisan can often trace back his art through many generations continuously. To make a quartz ball, a large crystal or mass is chipped or broken into available shape, and then the piece is trimmed into a spherical form with a small steel hammer. The polishing is effected by grinding with emery and garnet-powder and plenty of water, in semi-cylindrical pieces of cast iron, of sizes varying with that of the ball to be ground, which is kept constantly turning as it is rubbed. Small balls are fixed in the end of a bamboo tube, which the worker continually

revolves. The final brilliant polish is given by the hand, with rouge-powder (haematite). This process is evidently very slow, and only the cheapness of labour prevents the cost from being too great.

The spheres are now made quite freely but very differently in France, Germany and the United States. They are ground in semi- circular grooves in a large horizontal wheel of hard stone, such as is used for grinding garnets at Oberstein and Idar, or else by gradually revolving them on a lathe and fitting them into hollow cylinders. Plenty of water must be used, to prevent heating and cracking. The polishing is effected on a wooden wheel with tripoli. Work of this kind is now done in the United States, in the production of the spheres and carved ornaments of rock-crystal, that is equal to any in the world. But most of the material for these supposed Japanese balls now comes from Brazil or Madagascar, and the work is done in Germany or France.

The cutting of amber is a special branch of lapidary work developed along the Baltic coast of Germany, where amber is chiefly obtained. The amber traffic dates back to prehistoric times ; but the cutting industry in northern Europe cannot be definitely traced further back than the 14th century, when gilds of amber-workers were known at Bruges and Lubeck. Fine carving was also done at Konigsberg as early as 1399. The latter city and Danzig have become the chief seats of the amber industry, and the business has increased immensely

within a recent period. Articles are made there, not only for all the civilized world, but for exportation to half-civilized and even barbarous nations, in great variety of shapes, styles and colours

Diamond Cutting. — On account of its extreme hardness, the treatment of the diamond in preparation for use in jewelry constitutes a separate and special branch of the lapidary's art. Any valuable gem must first be trimmed, cleaved or sawed into suitable shape and size, then cut into the desired form, and finally polished upon the faces which have been cut. The stages in diamond working are, therefore, (i) cleavage or division; (2) cutting; (3) polishing; but in point of fact there are four processes, as the setting of the stone for cutting is a somewhat distinct branch, and the workers are classed in four groups — cleavers, setters, cutters and polishers.

1. Cleaving or Dividing. — Diamonds are always found as crystals,

usually octahedral in form, though often irregular or distorted. The problem involved in each case is twofold: (1) to obtain the largest perfect stone possible, and (2) to remove any portions containing flaws or defects. These ends are generally met by cleaving the crystal, i.e. causing it to split along certain natural planes of structural weakness, which are parallel with the faces of the octahedron. This process requires the utmost judgment, care and skill on the part of the operator, as any error would cause great loss of valuable material; hence expert cleavers command very high wages. The stone is first examined closely, to determine the directions of the cleavage planes, which are recognizable only by an expert. The cleaver then cuts a narrow notch at the place selected, with another diamond having a sharp point; a rather dull iron or steel edge is then laid on this line, and a smart blow struck upon it. If all has been skilfully done, the diamond divides at once in the direction desired. De Boot in 1609 mentions knowing some one who could part a diamond like mica or talc. In this process, each of the diamonds is fixed in cement on the end of a stick or handle, so that they can be held firmly while one is applied to the other. When the stone is large and very valuable, the cleaving is a most critical process. Wollaston in 1790 made many favourable transactions by buying very poor-looking flawed stones and cleaving off the good parts. In the case of the immense Excelsior diamond of 971 carats, which was divided at Amsterdam in 1904, and made into ten splendid stones, the most elaborate study extending over two months was given to the work before- hand, and many models were made of the very irregular stone and divided in different ways to determine those most advan- tageous. This process was in 1908 applied to the most remark- able piece of work of the kind ever undertaken — the cutting of the gigantic Cullinan diamond of 302 5! English carats. The stone was taken to Amsterdam to be treated by the old-fashioned hand method, with innumerable precautions of every kind at every step, and the cutting was successfully accomplished after nine months' work (see The Times, Nov. 10, 1908). The two principal stones obtained (see Diamond), one a pendeloque or drop brilliant, and the other a square brilliant, were given 72 and 64 facets respectively (exclusive of the table and cullet) instead of the normal 56.

This process of cleavage is the old-established one, still used to a large extent, especially at Amsterdam. But a different method has recently been introduced, that of sawing, 1 which is now generally employed in Antwerp. The stone is placed in a small metal receptacle which is filled with melted aluminium; thus embedded securely, with only the part to be cut exposed, it is pressed firmly against the edge of a

metallic disk or thin wheel. 4 or 5 in. in diameter, made of copper, iron or phosphor bronze, which is charged with diamond dust and oil, and made to revolve with great velocity. This machine was announced as an American invention, but the form now principally employed at Antwerp was invented by a Belgian diamond cutter in the United States, and is similar to slitting wheels used by gem

1 The Universal Magazine of Knowledge and Pleasure for 1 749 states that diamond dust, ” well ground and diluted with water and vinegar, is used in the sawing of diamonds, which is done with an iron or brass wire, as fine as a hair.” — Ed.

cutters for centuries. Two patents were taken out, however, by different parties, with some distinctions of method. The process is much slower than hand-cleavage, but greatly diminishes the loss of material involved. It is claimed that not only can flaws or defective portions be thus easily taken off, but that any well-formed crystal of the usual octahedral shape (known in the trade as ” six-point “) can be divided in half very perfectly at the ” girdle,” making two stones, in each of which the sawed face can be used with advantage to form the ” table ” of a brilliant. By another method the stone is sawed at a tangent with the octahedron, and then each half into three pieces; for this Wood method a total saving of 5% is claimed. Occasionally the finest material is only a small spot in a large mass of impure material, and this is taken out by most skilful cleaving.

After the cleaving or sawing, however, the diamond is rarely yet in a form for cutting the facets, and requires considerable shaping. This rough ” blocking-out ” of the final form it is to assume, by removing irregularities and making it symmetrical, is called ” brutage.” Well-shaped and flawless crystals, indeed may not require to be cleaved, and then the brutage is the first process. Here again, the old hand methods are beginning to give place to mechanism. In either case two diamonds are taken, each fixed in cement on the end of a handle or support, and are rubbed one against the other until the irregularities are ground away and the general shape desired is attained. The old method was to do this by hand — an extremely tedious and laborious process. The machine method, invented about 1885 and first used by Field and Morse of Boston, is. now used at Antwerp exclusively. In this, one diamond is fixed at the centre of a rotating apparatus, and the other, on an arm or handle, is placed so as to press steadily against the other stone at the proper angle. The rotating diamond thus becomes rounded and smoothed; the other one is then put in its place at the centre and their mutual action reversed.

At Amsterdam a hand-process is employed, which lies between the cleavage and the brutage. This consists in cutting or trim- ming away angles and irregularities all over the stone by means of a sharp-edged or pointed diamond, both being mounted in cement on pear-shaped handles for firm holding. This work is largely done by women. In all these processes the dust and fragments are caught and carefully saved.

2. Cutting and Setting. — The next process is that of cutting the facets; but an intervening step is the fixing or ” setting ” of the stone for that purpose. This is done by embedding it in a fusible alloy, melting at 440° Fahr., in a little cup-shaped depression on the end of a handle, the whole being called a ” dop. ” Only the portion to be ground off is left exposed; and two such mounted diamonds are then rubbed against each other until a face is produced. This is the work of the cutter; it is very laborious, and requires great care and skill. The hands must be protected with leather gloves. The powder produced is carefully saved, as in the former processes, for use in the final polishing. When one face has been produced, the alloy is softened by heating, and the stone re-set for grinding another surface; and as this process is necessary for every face cut, it must be repeated many times for each stone. An improved dop has lately been devised in which the diamond is held by a system of claws so that all this heating and resetting can, it is claimed, be obviated, and the cutting completed with only two changes.

3. Polishing. — The faces having thus been cut, the last stage is the polishing. This is done upon horizontal iron wheels called ” skaifs,” made to rotate up to 2500 revolutions per minute. The diamond-powder saved in the former operations, and also made by crushing very inferior diamonds, here comes into use as the only material for polishing. It is applied with oil, and the stones are fixed in a ” dop ” in much the same way as in the cutting process. Again, the utmost skill and watchful- ness are necessary, as the angles of the faces must be mathematic- ally exact, in order to yield the best effects by refraction and reflection of light, and their sizes must be accurately regulated to preserve the symmetry of the stone, In this process, also,

the old hand method is already replaced in part by an improved device whereby the diamond is held by adjustable claws, on a base that can be rotated, so as to apply it in any desired position. By this means the time and trouble of repeated re-setting in the dop are

saved, as well as the liability to injury from the heating and cooling; the services of special ” setters ” are also made needless.

The rapid development of mechanical devices for the several stages of diamond cutting has already greatly influenced the art. A very interesting comparison was brought out in the thirteenth report of the American Commissioner of Labour, as to the aspects and relations of hand-work and machinery in this branch of industry. It appeared from the data gathered that the advantage lay with machinery as to time and with hand-work as to cost, in the ratios respectively of 1 to 3-38 and 1-76 to 1. In other words, about half the gain in time is lost by increased expense in the use of machine methods. A great many devices and applications have been developed within the last few years, owing to the immense increase in the production of diamonds from the South African mines, and their consequent widespread use.

History of Diamond Cutting. — The East Indian diamonds, many of which are doubtless very ancient, were polished in the usual Oriental fashion by merely rounding off the angles. Among church jewels in Europe are a few diamonds of unknown age and source, cut four-sided, with a table above and a pyramid below. Several cut diamonds are recorded among the treasures of Louis of Anjou in the third quarter of the 14th century. But the first definite accounts of diamond polishing are early in the century following, when one Hermann became noted for such work in Paris. The modern method of ” brilliant ” cutting, however, is generally ascribed to Louis de Berquem, of Bruges, who in 1475 cut several celebrated diamonds sent to him by Charles the Bold, duke of Burgundy. He taught this process to many pupils, who afterwards settled in Antwerp and Amsterdam, which have been the chief centres of diamond cutting ever since. Peruzzi was the artist who worked out the theory of the well-proportioned brilliant of 58 facets. Some very fine work was done early in London also, but most of the workmen were Jews, who, being objectionable in England, finally betook themselves to Amsterdam and Antwerp. Efforts have been lately made to re- establish the art in London, where, as the great diamond mart of the world, it should peculiarly belong.

The same unwise policy was even more marked in Portugal. That nation had its colonial possessions in India, following the voyages and discoveries of Da Gama, and thus became the chief importer of diamonds into Europe. Early in the 18th century, also, the diamond-mines were discovered in Brazil, which was then likewise a Portuguese possession; thus the whole diamond product of the world came to Portugal, and there was naturally developed in Lisbon an

active industry of cutting and polishing diamonds. But in time the Jews were forced away, and went to Holland and Belgium, where diamond cutting has been concentrated since the middle of the 18th century.

It is of interest to trace the recent endeavours to establish diamond cutting in the United States. The pioneer in this move- ment was Henry D. Morse of Boston, associated with James W. Yerrington of New York. He opened a diamond-cutting establish- ment about i860 and carried it on for some years, training a number of young men and women, who became the best cutters in the country. But the chief importance of his work lay in its superior quality. So ,r >ng had it been a monopoly of the Dutch and Belgians that it was declining into a mere mechanical trade. Morse studied the diamond scientifically and taught his pupils how important mathematical exactitude in cutting was to the beauty and value of the gem. He thus attained a perfection rarely seen before, and gave a great stimulus to the art. Shops were opened in London as well, in con- sequence of Morse's success; and many valuable diamonds were recut in the United States after his work became known. This fact in turn reacted upon the cutter abroad, especially in France and Switzerland; and thus the general standard of the art was greatly advanced.

Diamond cutting in the United States is now a well-established industry. From 1882 to 1885 a number of American jewelers under- took such work, but for various reasons it was not found practicable then. Ten years later, however, there were fifteen firms engaged in diamond cutting, giving employment to nearly 150 men in the various processes involved. In the year 1894 a number of European diamond workers came over; some foreign capital became engaged; and a rapid development of diamond cutting took place. This movement was caused by the low tariff on uncut diamonds as compared with that on cut stones. It went so far as to be felt seriously abroad ; but in a year or two it declined, owing partly to strikes and partly to legal questions as to the application of some of the tariff provisions. At the close of 1895, however, there were still some fourteen establish- ments in and near New York, employing about 500 men. Since then

the industry has gradually developed. Many of the European diamond workers who came over to America remained and carried on their art; and the movement then begun has become permanent. New York is now recognized as one of the chief diamond-cutting centres; there are some 500 cutters, and the quality of work done is fully equal, if not superior, to any in the Old World. So well is this fact established that American-cut diamonds are exported and sold in Europe to a

considerable and an increasing extent.

In the Brazilian diamond region of Minas Geraes an industry of cutting has grown up since 1 875. Small mills are run by water power, and the machinery, as well as the methods, are from Holland. This Brazilian diamond work is done both well and cheaply, and supplies the local market.

The leading position in diamond working still belongs to Amster- dam, where the number of persons engaged in the industry has trebled since about 1875, in consequence of the enormous increase in the world's supply of diamonds. The number now amounts to 1 5,000, about one-third of whom are actual cleavers, cutters, polishers, &c. The number of cutting establishments in Amsterdam is about seventy, containing some 7000 mills.

Antwerp comes next with about half as many mills and a total of some 4500 persons engaged in all departments, including about seventy women. These are distributed among thirty-five or forty establishments. A majority of the workers are Belgians, but there are many Dutch, Poles and Austro-Hungarians, principally Jews. Among these numerous employees there is much opportunity for dishonesty, and but little surveillance, actual or possible; yet losses from this cause are almost unknown. The wages paid are good, averaging from £2, 9s. 6d. to £2, 17s. 6d. a week. Sorters receive from 28s. to £2; cutters from £2, 9s. 6d to £3, 6s., and cleavers from £3, 14s. upwards.

With the recent introduction of electricity in diamond cutting there has been a revolution in that industry. Whereas formerly wheels were made to revolve by steam, they are now placed in direct connexion with electric motors, although there is not a motor to each machine. The saws for slitting the diamond can thus be made to revolve much more rapidly, and there is a cleanliness and a speed about the work never before attained. (G. F. K.)

LAPILLI (pi. of Ital. lapillo, from Lat. lapillus, dim. of lapis, a stone), a name applied to small fragments of lava ejected from a volcano. They are generally subangular in shape and vesicular in structure, varying in size from a pea to a walnut. In the Neapolitan dialect the word becomes rapilli — a form sometimes used by English writers on volcanoes. (See Volcanoes.)

LAPIS LAZULI, or azure stone, 1 a mineral substance valued for decorative purposes in consequence of the fine blue colour which it usually presents. It appears to have been the sapphire of ancient

writers: thus Theophrastus describes the aaircptipos as being spotted with gold-dust, a description quite inappropriate to modern sapphire, but fully applicable to lapis lazuli, for this stone frequently contains disseminated particles of iron-pyrites of gold-like appearance. Pliny, too, refers to the sapphirus as a stone sprinkled with specks of gold; and possibly an allusion to . the same character may be found in Job xxviii. 6. The Hebrew sappir, denoting a stone in the High Priest's breastplate, was probably lapis lazuli, as acknowledged in the Revised Version of the Bible. With the ancient Egyptians lapis lazuli was a favourite stone for amulets and ornaments such as scarabs; it was also used to a limited extent by the Assyrians and Baby- lonians for cylinder seals. It has been suggested that the Egyptians obtained it from Persia in exchange for their emeralds. When the lapis lazuli contains pyrites, the brilliant spots in the deep blue matrix invite comparison with the stars in the firma- ment. The stone seems to have been sometimes called by ancient writers Kvavos. It was a favourite material with the Italians, of the Cinquecento for vases, small busts and other ornaments. Magnificent examples of the decorative use of lapis lazuli are to be seen in St Petersburg, notably in the columns of St Isaac's cathedral. The beautiful blue colour of lapis lazuli led to its employment, when ground and levigated, as a valuable pigment known as ultramarine (q.v.), a substance now practically dis- placed by a chemical product (artificial ultramarine).

Lapis lazuli occurs usually in compact masses, with a finely granular structure; and occasionally, but only as a great rarity,

1 The Med. Gr. \a£o\ipLov, Med. Lat. lazurius or lazulus, as the names of this mineral substance, were adaptations of the Arab. al-lazward, Pers. lajward, blue colour, lapis lazuli. The same word appears in Med. Lat. as azura, whence O.F. azur, Eng. " azure," blue, particularly used of that colour in heraldry (q.v.) and represented conventionally in black and white by horizontal lines.

it presents the form of the rhombic dodecahedron. Its specific gravity is 2-38 to 2-45, and its hardness about 5-5, so that being comparatively soft it tends, when polished, to lose its lustre rather readily. The colour is generally a fine azure or rich Berlin blue, but some varieties exhibit green, violet and even red tints, or may be altogether colourless. The colour is sometimes improved by heating the stone. Under artificial illumination the dark-blue stones may appear almost black. The mineral is opaque, with only slight translucency at thin edges.

Analyses of lapis lazuli show considerable variation in com- position, and this led long ago to doubt as to its homogeneity. This doubt was confirmed by the microscopic studies of L. H. Fischer, F. Zirkel and H. P. J. Vogelsang, who found that sections showed bluish particles in a white matrix; but it was reserved for Professor \V. C. Brogger and H. Backstrom, of Christiania, to separate the several constituents and subject them to analysis, thus demonstrating the true constitution of lapis lazuli, and proving that it is a rock rather than a definite mineral species. The essential part of most lapis lazuli is a blue mineral allied to sodalite and crystallized in the cubic system, which Brogger distinguishes as lazurite, but this is intimately associated with a closely related mineral which has long been known as haiiyne, or haiiynite. The lazurite, sometimes regarded as true lapis lazuli, is a sulphur-bearing sodium and aluminium silicate, having the formula: Na 4 (NaS 3 Al) Al 2 (Si0 4)3. As the lazurite and the haiiynite seem to occur in molecular intermixture, various kinds of lapis lazuli are formed; and it has been proposed to distinguish some of them as lazurite-lapis and hatiyne-lapis, according as one or the other mineral prevails. The lazurite of lapis lazuli is to be carefully distinguished from lazulite, an aluminium-magnesium phosphate, related to turquoise. In addition to the blue cubic minerals in lapis lazuli, the following minerals have also been found: a non-ferriferous diopside, an amphibole called, from the Russian mineralogist, koksharovite, orthoclase, plagioclase, a muscovite-like mica, apatite, titanite, zircon, calcite and pyrite. The calcite seems to form in some cases a great part of the lapis; and the pyrite, which may occur in patches, is often altered to limonite.

Lapis lazuli usually occurs in crystalline limestone, and seems to be a product of contact metamorphism. It is recorded from Persia, Tartary,

Tibet and China, but many of the localities are vague and some doubtful. The best known and probably the most important locality is in Badakshan. There it occurs in limestone, in the valley of the river Kokcha, a tributary to the Oxus, south of Firgamu. The mines were visited by Marco Polo in 1271, by J. B. Fraser in 1825, and by Captain John Wood in 1837-1838. The rock is split by aid of fire. Three varieties of the lapis lazuli are recognized by the miners: nili of indigo- blue colour, asmani sky-blue, and sabzi of green tint. Another locality for lapis lazuli is in Siberia near the western extremity of Lake Baikal, where it occurs in limestone at its contact with granite. Fine masses of lapis lazuli occur in the Andes, in the vicinity of Ovalle, Chile. In Europe lapis lazuli is found as a rarity in the peperino of Latium, near Rome, and in the ejected blocks of Monte Somma, Vesuvius. (F. W. R.*)

LAPITHAE, a mythical race, whose home was in Thessaly in the valley of the Peneus. The genealogies make them a kindred race with the Centaurs, their king Peirithoiis being the son, and the Centaurs the grandchildren (or sons) of Ixion. The best-known legends with which they are connected are those of Ixion (q.v.) and the battle with the Centaurs {g.v.). A well- known Lapith was Caeneus, said to have been originally a girl named Caenis, the favourite of Poseidon, who changed her into a man and made her invulnerable (Ovid, Metam. xii. 146 ff). In the Centaur battle, having been crushed by rocks and trunks of trees, he was changed into a bird; or he disappeared into the depths of the earth unharmed. According to some, the Lapithae are representatives of the giants of fable, or spirits of the storm; according to others, they are a semi-legendary; semi-historical race, like the Myrmidons and other Thessalian tribes. The Greek sculptors of the school of Pheidias conceived of the battle of the Lapithae and Centaurs as a struggle between mankind

and mischievous monsters, and symbolical of the great conflict between the Greeks and Persians. Sidney Colvin (Journ. Hellen. Stud. i. 64) explains it as a contest of the physical powers of nature, and the mythical expression of the terrible effects of swollen waters.

LA PLACE (Lat. Placaeus), JOSUE DE (i6o6?i665), French Protestant divine, was born in Brittany. He studied and after wards taught philosophy at Saumur. In 1625 he became pastor of the Reformed Church at Nantes, and in 1632 was appointed professor of theology at Saumur, where he had as his colleagues, appointed at the same time, Moses Amyraut and Louis Cappell. In 1640 he published a work, Theses theologicae de statu hominis lapsi ante graliam, which was looked upon with some suspicion as containing liberal ideas about the

doctrine of original sin. The view that the original sin of Adam was not imputed to his descendants was condemned at the synod of Charenton (1645), without special reference being made to La Place, whose position perhaps was not quite clear. As a matter of fact La Place distinguished between a direct and indirect imputation, and after his death his views, as well as those of Amyraut, were rejected in the Formula consensus of 1675. He died on the 17th of August 1665.

La Place's defence was published with the title Disputationes academicae (3 vols., 1649-1651 ; and again in 1665); his work De imputatione primi peccati Adami in 1655. A collected edition of his works appeared at Franeker in 1699, and at Aubencit in 1702.

LAPLACE, PIERRE SIMON, Marquis de (1749-1827), French mathematician and astronomer, was born at Beaumont-en-Auge in Normandy, on the 28th of March 1749. His father was a small farmer, and he owed his education to the interest excited by his lively parts in some persons of position. His first dis- tinctions are said to have been gained in theological controversy, but at an early age he became mathematical teacher in the military school of Beaumont, the classes of which he had attended as an extern. He was not more than eighteen when, armed with letters of recommendation, he approached J. B. d'Alembert, then at the height of his fame, in the hope of finding a career in Paris. The letters remained unnoticed, but Laplace was not crushed by the rebuff. He wrote to the great geometer a letter on the principles of mechanics, which evoked an immediate and enthusi- astic response. " You," said d'Alembert to him, " needed no introduction; you have recommended yourself; my support is your due." He accordingly obtained for him an appointment as professor of mathematics in the Ecole Militaire of Paris, and continued zealously to forward his interests.

Laplace had not yet completed his twenty-fourth year when he entered upon the course of discovery which earned him the title of " the Newton of France." Having in his first published paper ' shown his mastery of analysis, he proceeded to applv its resources to the great outstanding problems in celestial mechanics. Of these the most conspicuous was offered by the opposite inequalities of Jupiter and Saturn, which the emulous efforts of L. Euler and J. L. Lagrange had failed to bring within the bounds of theory. The discordance of their results incited Laplace to a searching examination of the whole subject of planetary perturbations, and his maiden effort was rewarded with a discovery which constituted, when developed and com- pletely demonstrated by his own further labours and those of his illustrious rival Lagrange, the most important advance made in physical

astronomy since the time of Newton. In a paper read before the Academy of Sciences, on the 10th of February 1773 (Mem. presentes par divers savans, torn, vii., 1776), Laplace announced his celebrated conclusion of the invariability of planetary mean motions, carrying the proof as far as the cubes of the eccentricities and inclinations. This was the first and most important step in the establishment of the stability of the solar system. It was followed by a series of profound investiga- tions, in which Lagrange and Laplace alternately surpassed and supplemented each other in assigning limits of variation to the several elements of the planetary orbits. The analytical tourna- ment closed with the communication to the Academy by Laplace, 1 ” Recherches sur le calcul integral,” Melanges de la Soc. Roy. de Turin (1 766-1 769).

in 1787, of an entire group of remarkable discoveries. It would be difficult, in the whole range of scientific literature, to point to a memoir of equal brilliancy with that published (divided into three parts) in the volumes of the Academy for 1784, 1785 and 1786. The long-sought cause of the “great inequality” of Jupiter and Saturn was found in the near approach to com- mensurability of their mean motions; it was demonstrated in two elegant theorems, independently of any except the most general considerations as to mass, that the mutual action of the planets could never largely affect the eccentricities and inclina- tions of their orbits; and the singular peculiarities detected by him in the Jovian system were expressed in the so-called ” laws of Laplace.” He completed the theory of these bodies in a treatise published among the Paris Memoirs for 1788 and 1789; and the striking superiority of the tables computed by J. B. J. Delambre from the data there supplied marked the profit derived from the investigation by practical astronomy. The year 1787 was rendered further memorable by Laplace’s announcement on the 19th of November {Memoirs, 1786), of the dependence of lunar acceleration upon the secular changes in the eccentricity of the earth’s orbit. The last apparent anomaly, and the last threat of instability, thus disappeared from the solar system.

With these brilliant performances the first period of Laplace’s scientific career may be said to have closed. If he ceased to make striking discoveries in celestial mechanics, it was rather their subject-matter than his powers that failed. The general working of the great machine was now laid bare, and it needed a further advance of

knowledge to bring a fresh set of problems within reach of investigation. The time had come when the results obtained in the development and application of the law of gravitation by three generations of illustrious mathematicians might be presented from a single point of view. To this task the second period of Laplace's activity was devoted. As a monument of mathematical genius applied to the celestial revolutions, the Mecanique celeste ranks second only to the Principle, of Newton.

The declared aim of the author x was to offer a complete solution of the great mechanical problem presented by the solar system, and to bring theory to coincide so closely with observation that empirical equations should no longer find a place in astronomical tables. His success in both respects fell little short of his lofty ideal. The first part of the work (2 vols. 4to, Paris, 1799) contains methods for calculating the movements of translation and rotation of the heavenly bodies, for determining their figures, and resolving tidal problems; the second, especially dedicated to the improvement of tables, exhibits in the third and fourth volumes (1802 and 1805) the application of these formulae; while a fifth volume, published in three instalments, 1 823-1 825, comprises the results of Laplace's latest researches, together with a valuable history of progress in each separate branch of his subject. In the delicate task of appor- tioning his own large share of merit, he certainly does not err on the side of modesty ; but it would perhaps be as difficult to produce an instance of injustice, as of generosity in his estimate of others. Far more serious blame attaches to his all but total suppression in the body of the work — and the fault pervades the whole of his writings — of the names of his predecessors and contemporaries. Theorems and formulae are appropriated wholesale without acknow- ledgment, and a production which may be described as the organized result of a century of patient toil presents itself to the world as the offspring of a single brain. The Mecanique celeste is, even to those most conversant with analytical methods, by no means easy reading. J. B. Biot, who assisted in the correction of its proof sheets, re- marked that it would have extended, had the demonstrations been fully developed, to eight or ten instead of five volumes; and he saw at times the author himself obliged to devote an hour's labour to recovering the dropped links in the chain of reasoning covered by the recurring formula. "II est aise a voir." 2

The Exposition du systeme du mondc (Paris, 1796) has been styled by Arago " the Mecanique celeste disembarrassed of its analytical paraphernalia." Conclusions are not merely stated in it, but the methods pursued for their attainment are indicated. It has the strength of an analytical treatise, the charm of a popular dissertation. The style

is lucid and masterly, and the summary of astronomical history with which it terminates has been reckoned one of the masterpieces of the language. To this linguistic excellence the writer owed the place accorded to him

1 ” Plan de l’Ouvrage,” CEuvres, torn. i. p I.

2 Journal des savants (1850).

in 1816 in the Academy, of which institution he became president in the following year. The famous ” nebular hypothesis ” of Laplace made its appearance in the Systeme du monde. Although relegated to a note (vii.), and propounded ” Avec la defiance que doit inspirer tout ce qui n’est point un resultat de l’observation ou du calcul,” it is plain, from the complacency with which he recurred to it 3 at a later date, that he regarded the speculation with considerable interest. That it formed the starting-point, and largely prescribed the course of thought on the subject of planetary origin is due to the simplicity of its assumptions, and the clearness of the mechanical principles involved, rather than to any cogent evidence of its truth. It is curious that Laplace, while bestowing more attention than they deserved on the crude conjectures of Buffon, seems to have been unaware that he had been, to some extent, anticipated by Kant, who had put forward in 1755, in his Allgemeine Naturgeschichte, a true though defective nebular cosmogony.

The career of Laplace was one of scarcely interrupted prosperity. Admitted to the Academy of Sciences as an associate in 1773, he became a member in 1785, having, about a year previously, succeeded E. Bezout as examiner to the royal artillery. During an access of revolutionary suspicion, he was removed from the commission of weights and measures; but the slight was quickly effaced by new honours. He was one of the first members, and became president of the Bureau of Longitudes, took a prominent place at the Institute (founded in 1796), professed analysis at the Ecole Normale, and aided in the organization of the decimal system. The publication of the Micanique celeste gained him world-wide celebrity, and his name appeared on the lists of the principal scientific associations of Europe, including the Royal Society. But scientific distinctions by no means satisfied his ambition. He aspired to the role of a politician, and has left a memorable example of genius degraded to servility for the sake of a riband and a title. The ardour of his republican principles gave place, after the 18th Brumaire, to devotion towards the first consul, a sentiment promptly rewarded with the post of minister of the interior. His incapacity for affairs was, however, so flagrant that it became

necessary to supersede him at the end of six weeks, when Lucien Bonaparte became his successor. ” He brought into the administration,” said Napoleon, ” the spirit of the infinitesimals.” His failure was consoled by elevation to the senate, of which body he became chancellor in September 1803. He was at the same time named grand officer of the Legion of Honour, and obtained in 1813 the same rank in the new order of Reunion. The title of count he had acquired on the creation of the empire. Nevertheless he cheer- fully gave his voice in 1814 for the dethronement of his patron, and his ” suppleness ” merited a seat in the chamber of peers, and, in 1817, the dignity of a marquisate. The memory of these tergiversations is perpetuated in his writings- The first edition of the Systeme du monde was inscribed to the Council of Five Hundred; to the third volume of the Mecanique celeste (1802) was prefixed the declaration that, of all the truths contained in the work, that most precious to the author was the expression of his gratitude and devotion towards the ” pacificator of Europe “; upon which noteworthy protestation the suppression in the editions of the Theorie des probabilites subsequent to the restoration, of the original dedication to the emperor formed a fitting commentary.

During the later years of his life, Laplace lived much at Arcueil, where he had a country-place adjoining that of his friend C. L. Berthollet. With his co-operation the Societe d’Arcueil was formed, and he occasionally contributed to its Memoirs. In this peaceful retirement he pursued his studies with unabated ardour, and received with uniform courtesy- distinguished visitors from all parts of the world. Flere, too, he died, attended by his physician, Dr Majendie, and his mathe- matical coadjutor, Alexis Bouvard, on the 5th of March 1827. His last words were: ” Ce que nous connaissons est peu de chose, ce que nous ignorons est immense.”

Expressions occur in Laplace’s private letters inconsistent 3 Mec. eel., torn. v. p. 346.

With the atheistical opinions he is commonly believed to have held. His character, notwithstanding the egotism by which it was disfigured, had an amiable and engaging side. Young men of science found in him an active benefactor. His relations with these ” adopted children of his thought ” possessed a singular charm of affectionate simplicity; their intellectual progress and material interests were objects of equal

solicitude to him, and he demanded in return only diligence in the pursuit of knowledge. Biot relates that, when he himself was beginning his career, Laplace introduced him at the Institute for the purpose of explaining his supposed discovery of equations of mixed differences, and afterwards showed him, under a strict pledge of secrecy, the papers, then yellow with age, in which he had long before obtained the same results. This instance of abnegation is the more worthy of record that it formed a marked exception to Laplace's usual course. Between him and A. M. Legendre there was a feeling of " more than coldness," owing to his appropriation, with scant acknowledgment, of the fruits of the other's labours; and Dr Thomas Young counted himself, rightly or wrongly, amongst the number of those similarly aggrieved by him. With Lagrange, on the other hand, he always remained on the best of terms. Laplace left a son, Charles Emile Pierre Joseph Laplace (i 789-1874), who succeeded to his title, and rose to the rank of general in the artillery.

It might be said that Laplace was a great mathematician by the original structure of his mind, and became a great discoverer through the sentiment which animated it. The regulated enthusiasm with which he regarded the system of nature was with him from first to last. It can be traced in his earliest essay, and it dictated the ravings of his final illness. By it his extra- ordinary analytical powers became strictly subordinated to physical investigations. To this lofty quality of intellect he added a rare sagacity in perceiving analogies, and in detecting the new truths that lay concealed in his formulae, and a tenacity of mental grip, by which problems, once seized, were held fast, year after year, until they yielded up their solutions. In every branch of physical astronomy, accordingly, deep traces of his work are visible. " He would have completed the science of the skies," Baron Fourier remarked," had the science been capable of completion."

It may be added that he first examined the conditions of stability of the system formed by Saturn's rings, pointed out the necessity for their rotation, and fixed for it a period (lo h 33 m) virtually identical with that established by the observations of Herschel; that he detected the existence in the solar system of an invariable plane such that the sum of the .products of the planetary masses by the pro- jections upon it of the areas described by their radii vectores in a given time is a maximum; and made notable advances in the theory of astronomical refraction (Mec. eel. torn. iv. p. 258), besides construct- ing satisfactory formulae for the barometrical determination of heights {Mec. eel. torn. iv. p. 324). His removal of the considerable discrepancy between the actual and Newtonian velocities of sound, 1 by taking into account the increase of elasticity due to the heat of

compression, would alone have sufficed to illustrate a lesser name. Molecular physics also attracted his notice, and he announced in 1824 his purpose of treating the subject in a separate work. With A. Lavoisier he made an important series of experiments on specific heat (1782-1784). in the course of which the ” ice calorimeter ” was invented; and they contributed jointly to the Memoirs of the Academy (1781) a paper on the development of electricity by evapora- tion. Laplace was, moreover, the first to offer a complete analysis of capillary action based upon a definite hypothesis— that of forces ” sensible only at insensible distances “; and he made strenuous but unsuccessful efforts to explain the phenomena of light on an identical principle. It was a favourite idea of his that chemical affinity and capillary attraction would eventually be included under the same law, and it was perhaps because of its recalcitrance to this cherished generalization that the undulatory theory of light was distasteful to him.

The investigation of the figure of equilibrium of a rotating fluid mass engaged the persistent attention of Laplace. His first memoir was communicated to the Academy in 1773, when he was only twenty-four, his last in 1817, when he was sixty-eight. The results of his many papers on this subject — characterized by him as ” un des points les plus interessans du systeme du monde ” — are embodied in the Mccanique celeste, and furnish one of the most remarkable proofs of his analytical genius. C. Maclaurin, Legendre and d’Alembert had furnished partial solutions of the problem, confining their

1 Annates de chimie et de physique (1816), torn. iii. p. 238.

attention to the possible figures which would satisfy the conditions of equilibrium. Laplace treated the subject from the point of view of the gradual aggregation and cooling of a mass of matter, and demonstrated that the form which such a mass would ultimately assume must be an ellipsoid of revolution whose equator was determined by the primitive plane of maximum areas.

The related subject of the attraction of spheroids was also signally promoted by him. Legendre, in 1783, extended Maclaurin’s theorem concerning ellipsoids of revolution to the case of any spheroid of revolution where the attracted point, instead of being limited to the axis or equator, occupied any position in space; and Laplace, in his treatise Theorie du mouvement et de la figure elliptique des planetes (published in 1784), effected a still further generalization by proving, what had been suspected by Legendre, that the theorem was equally true for any confocal ellipsoids. Finally, in a celebrated memoir,

Theorie des attractions des spheroides et de la figure des planetes] published in 1785 among the Paris Memoirs for the year 1782I although written after the treatise of 1784, Laplace treated ex haustively the general problem of the attraction of any spheroid upon a particle situated outside or upon its surface.

These researches derive additional importance from having introduced two powerful engines of analysis for the treatment of physical problems, Laplace's coefficients and the potential function. By his discovery that the attracting force in any direction of a mass upon a particle could be obtained by the direct process of differentiating a single function, Laplace laid the foundations of the mathematical sciences of heat, electricity and magnetism. The expressions designated by Dr Whewell, Laplace's coefficients (see Spherical Harmonics) were definitely introduced in the memoir of 1785 on attractions above referred to. In the figure of the earth, the theory of attractions, and the sciences of electricity and magnetism this powerful calculus occupies a prominent place. C. F. Gauss in particular employed it in the calculation of the magnetic potential of the earth, and it received new light .from Clerk Maxwell's interpretation of harmonics with reference to poles on the sphere.

Laplace nowhere displayed the massiveness of his genius more conspicuously than in the theory of probabilities. The science which B. Pascal and P. de Fermat had initiated he brought very nearly to perfection; but the demonstrations are so involved, and the omissions in the chain of reasoning so frequent, that the Theorie analylique (1812) is to the best mathematicians a work requiring most arduous study. The theory of probabilities, which Laplace described as common sense expressed in mathematical language, engaged his attention from its importance in physics and astronomy ; and he applied his theory, not only to the ordinary problems of chances, but also to the inquiry into the causes of phenomena, vital statistics and future events.

The device known as the method of least squares, for reducing numerous equations of condition to the number of unknown quantities to be determined, had been adopted as a practically convenient rule by Gauss and Legendre ; but Laplace first treated it as a problem in probabilities, and proved by an intricate and difficult course of reasoning that it was also the most advantageous, the mean of the probabilities of error in the determination of the elements being thereby reduced to a minimum.

Laplace published in 1779 the method of generating functions, the

foundation of his theory of probabilities, and the first part of his Theorie analytique is devoted to the exposition of its principles, which in their simplest form consist in treating the successive values' of any function as the coefficients in the expansion of another function with reference to a different variable. The latter is there- fore called the generating function of the former. A direct and an inverse calculus is thus created, the object of the former being to determine the coefficients from the generating function, of the latter to discover the generating function from the coefficients. The one is a problem of interpolation, the other a step towards the solution of an equation in finite differences. The method, however, is now obsolete owing to the more extended facilities afforded by the calculus of operations.

The first formal proof of Lagrange's theorem for the development in a series of an implicit function was furnished by Laplace, who gave to it an extended generality. He also showed that every equation of an even degree must have at least one real quadratic factor, reduced the solution of linear differential equations to definite integrals, and furnished an elegant method by which the linear partial differential equation of the second order might be solved. He was also the first to consider the difficult problems involved in equations of mixed differences, and to prove that an equation in finite differences of the first degree and the second order might always be converted into a continued fraction.

In 1842, the works of Laplace being nearly out of print, his widow was about to sell a farm to procure funds for a new impression, when the government of Louis Philippe took the matter in hand. A grant of 40,000 francs having been obtained from the chamber, a national edition was issued in seven 4to vols., bearing the title (Euvres de Laplace (1 843-1 847). The Mecanique celeste with its four supple- ments occupies the first 5 vols., the 6th contains the Systeme du monde, and the 7th the Th. des probabilites, to which the more popular Essai philosophique forms an introduction. Of the four supplements added by the author (1816-1825) he tells us that the problems in the

last were contributed by his son. An enumeration of Laplace's memoirs and papers (about one hundred in number) is rendered superfluous by their embodiment in his principal works. The Th. des prob. was first published in 1812, the Essai in 1814; and both works

as well as the Systeme du monde went through repeated editions. An English version of the Essai appeared in New York in 1902. Laplace's first separate work, Theorie du mouvement el de la figure elliptique des planetes (1784), was published at the expense of President Bochard de Saron. The Precis de Vhisioire de I'astro- nomie (1821), formed the fifth book of the 5th edition of the Systeme du monde. An English translation, with copious elucidatory notes, of the first 4 vols, of the Mecanique celeste, by N. Bowditch, was published at Boston, U.S. (1829-1839), in 4 vols. 4to.-, a compendium of certain portions of the same work by Mrs Somerville appeared in 1 83 1, and a German version of the first 2 vols, by Burckhardt at Berlin in 1801. English translations of the Systeme du monde by J. Pond and H. H. Harte were published, the first in 1809, the second in 1830. An edition entitled Les CEuvres completes de Laplace (1878), &c, which is to include all his memoirs as well as his separate works, is in course of publication under the auspices of the Academy of Sciences. The thirteenth 4to volume was issued in 1904. Some of Laplace's results in the theory of probabilities are simplified in S. F. Lacroix's Traite elcmentaire du calcul des probabilites and De Morgan's Essay, published in Lardner's Cabinet Cyclopaedia. For the history of the subject see A History of the Mathematical Theory of Probability, by Isaac Todhunter (1865). Laplace's treatise on specific heat was published in German in 1892 as No. 40 of W. Ostwald's Klassiker der exacten Wissenschaften.

Authorities. — Baron Fourier's Eloge, Memoires de Vinstitut, x. Ixxxi. (1831); Revue encyclopedique, xliii. (1829); S. D. Poisson's Funerai Oration (Conn, des Temps, 1830, p. 19); F. X. von Zach, Allg. geographische Ephemeriden, iv. 70 (1799); F. Arago, Annuaire du Bureau des Long. 1844, p. 271, translated among Arago's Biographies of Distinguished Men (1857); J. S. Bailly, Hist, de I'astr. moderne, t. iii.; R. Grant, Hist, of Phys. Astr. p. 50, &c. ; A. Berry, Short Hist, of Astr. p. 306; Max Marie, Hist, des sciences t. x. pp. 69-98; R. Wolf, Geschichte der Aslronomie; J. Madler, Gesch. der Himmtiskunde, i. 17; W. VVhewell, Hist, of the Inductive Sciences, ii. passim; J. C. Poggendorff, Biog-lil. Handwbrterbuch. (A. M. C.)

LAPLAND, or Lappland, a name used to indicate the region of northern Europe inhabited by the Lapps, though not applied to any administrative district. It covers in Norway the division (amter) of Fihmarken and the higher inland parts of Tromso and Nordland; in Russian territory the western part of the govern- ment of Archangel as far as the White Sea and the northern part of the Finnish district of Uleaborg; and in Sweden the inland and northern parts of the old province of Norrland, roughly coincident with the districts {Ian) of Norbotten and Vesterbotten, and divided into five divisions — Torne

Lappmark, Lule Lappmark, Pite Lappmark, Lycksele Lappmark and Asele Lappmark. The Norwegian portion is thus insignificant; of the Russian only a little lies south of the Arctic circle, and the whole is less accessible and more sparsely populated than the Swedish, the southern boundary of which may be taken arbit- rarily at about 64 N., though scattered families of Lapps occur much farther south, even in the Hardanger Fjeld in Norway.

The Scandinavian portion of Lapland presents the usual characteristics of the mountain plateau of that peninsula — on the west side the bold headlands and fjords, deeply-grooved valleys and glaciers of Norway, on the cast the long mountain lakes and great lake-fed rivers of Sweden. Russian Lapland is broadly similar to the lower-lying parts of Swedish Lapland, but the great lakes are more generally distributed, and the valleys are less direct. The country is low and gently undulating, broken by detached hills and ridges not exceeding in elevation 2500 ft. In the uplands of Swedish Lapland, and to some extent in Russian Lapland, the lakes afford the principal means of com- munication; it is almost impossible to cross the forests from valley to valley without a native guide. In Sweden the few farms of the Swedes who inhabit the region are on the lake shores, and the traveller must be rowed from one to another in the typical boats of the district, pointed at bow and stern, unusually low amidships, and propelled by short sculls or paddles. Sailing is hardly ever practised, and squalls on the lakes are often dangerous to the rowing-boats. On a few of the lakes wood-fired steam-launches are used in connexion with the timber trade, which is considerable, as practically the whole region is forested. Between the lakes all journeying is made on foot. The heads of the Swedish valleys are connected with the Norwegian fjords

by passes generally traversed only by tracks; though from the head of the Ume a driving road crosses to Mo on Ranen Fjord. Each principal valley has a considerable village at or near the tail of the lake-chain, up to which a road runs along the valley. The village consists of wooden cottages with an inn (gastgifvaregard), a church, and frequently a collection of huts without windows, closed in summer, but inhabited by the Lapps when they come down from the mountains to the winter fairs. Sometimes there is another church and small settlement in the upper valley, to which, once or twice in a summer, the Lapps come from great distances to attend service. To these, too, they sometimes bring their dead for burial, bearing them if necessary on a journey of many days. Though Lapland gives little scope for husbandry, a bad summer being commonly followed by a winter famine, it is richly furnished with much that is serviceable to man.

There are copper-mines at the mountain of Sulitelma, and the iron deposits in Norrland are among the most extensive in the world. Their working is facilitated by the railway from Stockholm to Gellivara, Kirunavara and Narvik on the Nor- wegian coast, which also connects them with the port of Lulea on the Gulf of Bothnia. The supply of timber (pine, fir, spruce and birch) is unlimited. Though fruit-trees will not bear there is an abundance of edible berries; the rivers and lakes abound with trout, perch, pike and other fish, and in the lower waters with salmon; and the cod, herring, halibut and Greenland shark in the northern seas attract numerous Norwegian and Russian fishermen.

The climate is thoroughly Arctic. In the northern parts unbroken daylight in summer and darkness in winter last from two to three months each; and through the greater part of the country the sun does not rise at mid-winter or set at midsummer. In December and January in the far north there is little more daylight than a cold glimmer of dawn; by February, however, there are some hours of daylight; in March the heat of the sun is beginning to modify the cold, and now and in April the birds of passage begin to appear. In April the snow is melting from the branches; spring comes in May; spring flowers are in blossom, and grain is sown. At the end of this month or in June the ice is breaking up on the lakes, woods rush into leaf, and the unbroken daylight of the northern summer soon sets in. July is quite warm; the great rivers come down full from the melting snows in the mountains. August is a rainy month, the time of harvest; night-frosts may begin already about the middle of the month. All preparations for winter are made during September and October, and full winter has set in by November.

The Lapps. — The Lapps (Swed. Lappar; Russian Lopari; Norw. Firmer) call their country Sabme or Same, and themselves Samelats — names almost identical with those employed by the Finns for their country and race, and probably connected with a root signifying ” dark.” Lapp is almost certainly a nickname imposed by foreigners, although some of the Lapps apply it contemptuously to those of their countrymen whom they think to be less civilized than themselves. 1

In Sweden and Finland the Lapps are usually divided into fisher, mountain and forest Lapps. In Sweden the first class includes many impoverished mountain Lapps. As described by Laestadius (1827-1832), their condition was very miserable; but since his time matters have improved. The principal colony has its summer quarters on the Stora-Lule Lake, possesses good boats and nets, and, besides catching and drying fish, makes money by the shooting of wild fowl

and the gathering of eggs. When he has acquired a little means it is not unusual for the fisher to settle down and reclaim a bit of land. The mountain and forest Lapps are the true representatives of the race. In the wandering life of the mountain Lapp his autumn residence, on the borders of the forest district, may be considered as the central point; it is there that he erects his njalla, a small wooden storehouse raised high above the ground by one or more piles. About the beginning of November he begins to wander south or east into the forest land, and in the winter he may visit, not only

1 The most probable etymology is the Finnish lappu, and in this case the meaning would be the " land's end folk."

such places as Jokkmokk and Arjepluog, but even Gefle, Upsala or Stockholm. About the beginning of May he is back at his njalla, but as soon as the weather grows warm he pushes up to the mountains, and there throughout the summer pastures his herds and prepares his store of cheese. By autumn or October he is busy at his njalla killing the surplus reindeer bulls and curing meat for the winter. From the mountain Lapp the forest (or, as he used to be called, the spruce-fir) Lapp is mainly distinguished by the narrower limits within which he pursues his nomadic life. He never wanders outside of a certain district, in which he possesses hereditary rights, and maintains a series of camping-grounds which he visits in regular rotation. In May or April he lets his reindeer loose, to wander as they please; but immediately after midsummer, when the mosquitoes become troublesome, he goes to collect them. Catching a single deer and belling it, he drives it through the wood; the other deer, whose instinct leads them to gather into herds for mutual protection against the mosquitoes, are attracted by the sound. Should the summer be very cool and the mosquitoes few, the Lapp finds it next to impossible to bring the creatures together. About the end of August they are again let loose, but they are once more collected in October, the forest Lapp during winter pursuing the same course of life as the mountain Lapp.

In Norway there are three classes — the sea Lapps, the river Lapps and the mountain Lapps, the first two settled, the third nomadic. The mountain Lapps have a rather ruder and harder life than the same class in Sweden. About Christmas those of Kautokeino and Karasjok are usually settled in the neighbourhood of the churches; in summer

they visit the coast, and in autumn they return inland. Previous to 1852, when they were forbidden by imperial decree, they were wont in winter to move south across the Russian frontiers. It is seldom possible for them to remain more than three or four days in one spot. Flesh is their favourite, in winter almost their only food, though they also use reindeer milk, cheese and rye or barley cakes. The sea Lapps are in some respects hardly to be distinguished from the other coast dwellers of Finmark. Their food consists mainly of cooked fish. The river Lapps, many of whom, however, are descendants of Finns proper, breed cattle, attempt a little tillage and entrust their reindeer to the care of mountain Lapps.

In Finland there are comparatively few Laplanders, and the great bulk of them belong to the fisher class. Many are settled in the neighbourhood of the Enare Lake. In the spring they go down to the Norwegian coast and take part in the sea fisheries, returning to the lake about midsummer. Formerly they found the capture of wild reindeer a profitable occupation, using for this purpose a palisaded avenue gradually narrowing towards a pitfall.

The Russian Lapps are also for the most part fishers, as is natural in a district with such an extent of coast and such a number of lakes, not to mention the advantage which the fisher has over the reindeer keeper in connexion with the many fasts of the Greek Church. They maintain a half nomadic life, very few having become settlers in the Russian villages. It is usual to distinguish them according to the district of the coast which they frequent, as Murman (Murmanski) and Terian (Terski) Lapps. A separate tribe, the Filmans, i.e Finnmans, wander about the Pazyets, Motov and Pechenga tundras, and retain the peculiar dialect and the Lutheran creed which they owe to a former connexion with Sweden. They were formerly known as the ” twice and thrice tributary ” Lapps, because they paid to two or even three states — Russia, Denmark and Sweden.

The Lapps within the historical period have considerably recruited themselves from neighbouring races. Shortness of stature 1 is their most obvious characteristic, though in regard to this much exaggeration has prevailed. Diiben found an average of 4-9 ft. for males and a little less for females; Mante- gazza, who made a number of anthropological observations in Norway in 1879, gives 5 ft. and 4-75 ft., respectively (Archivio

1 Hence they have been supposed by many to be the originals of the ” little folk ” of Scandinavian legend.

per Pantrop., 1880). Individuals much above or much below the average are rare. The body is usually of fair proportions, but the legs are rather short, and in many cases somewhat bandy. Dark, swarthy, yellow, copper-coloured are all adjectives employed to describe their complexion — the truth being that their habits of life do not conduce either to the preservation or display of the natural colour of their skin, and that some of them are really fair, and others, perhaps the majority, really dark. The colour of the hair ranges from blonde and reddish to a bluish or greyish black; the eyes are black, hazel, blue or grey. The shape of the skull is the most striking peculiarity of the Lapp. He is the most brachycephalous type of man in Europe, perhaps in the world. 2 According to Virchow, the women in width of face are more Mongolian in type than the men, but neither in men nor women does the opening of the eye show any true obliquity. In children the eye is large, open and round. The nose is always low and broad, more markedly retrousse among the females than the males. Wrinkled and puckered by exposure to the weather, the faces even of the younger Lapps assume an appearance of old age. The muscular*system is usually well developed, but there is deficiency of fatty tissue, which affects the features (particularly by giving relative prominence to the eyes) and the general character of the skin. The thinness of the skin, indeed, can but rarely be paralleled among other Europeans. Among the Lapps, as among other lower races, the index is shorter than the ring finger.

The Lapps are a quiet, inoffensive people. Crimes of violence are almost unknown, and the only common breach of law is the killing of tame reindeer belonging to other owners. In Russia, however, they have a bad reputation for lying and general untrustworthiness, and drunkenness is well-nigh a universal vice. In Scandinavia laws have been directed against the importation of intoxicating liquors into the Lapp country since 1723.

Superficially at least the great bulk of the Lapps have been Christianized — those of the Scandinavian countries being Pro- testants, those of Russia members of the Greek Church. Al- though the first attempt to convert the Lapps to Christianity seems to have been made in the nth century, the worship of heathen idols was carried on openly in Swedish Lappma'k as late as 1687, and secretly in Norway down to the first quarter of the 18th century, while the practices of heathen rites survived into the 19th century, if indeed they are extinct even yet. Lapp graves, prepared in the heathen manner, have been discovered in upper Namdal (Norway), belonging to the years 1820 and 1826. In education the Scandinavian Lapps are far ahead of their Russian brethren, to whom reading and writing are arts as unfamiliar

as they were to their pagan ancestors. The general manner of life is patriarchal. The father of the family has complete authority over all its affairs; and on his death this authority passes to the eldest son. Parents are free to disinherit their children; and, if a son separates from the family without his father's permission, he receives no share of the property except a gun and his wife's dowry. 3

The Lapps are of necessity conservative in most of their habits, many of which can hardly have altered since the first taming of the reindeer. But the strong current of mercantile enterprise has carried a few important products of southern civilization into their huts. The lines in which James Thomson describes their simple life —

The reindeer form their riches: these their tents, Their robes, their beds, and all their homely wealth Supply ; their wholesome fare and cheerful cups — "

are still applicable in the main to the mountain Lapps; but even they have learned to use coffee as an ordinary beverage and to wear stout Norwegian cloth (vadmal).

Linguistically the Lapps belong to the Finno-Ugrian group {q.v.) ; the similarity of their speech to Finnish is evident though

2 Bertillon found in one instance a cephalic index of 94. The average obtained by Pruner Bey was 84-7, by Virchow 82-5.

3 A valuable paper by Ephimenko, on " The Legal Customs of the Lapps, especially in Russian Lapland," appeared in vol. viii. of the Mem. of Russ. Geog. Soc, Ethnog. Section, 1878.

the phonetics are different and more complicated. It is broken up into very distinct and even mutually unintelligible dialects, the origin of several of which is, however, easily found in the political and social dismemberment of the people. Diiben distinguishes four leading dialects; but a much greater number are recognizable. In Russian Lapland alone there are three, due to the influence of Norwegian, Karelian and Russian (Lonnrot, Acta Soc. Sci. Fennicae, vol. iv.). "The Lapps," says Castren, " have had the misfortune to come into close contact with foreign races while their language was yet in its tenderest infancy, and consequently it has not only adopted an endless number of foreign words, but in many gram- matical aspects fashioned itself

after foreign models." That it began at a very early period to enrich itself with Scandinavian words is shown by the use it still makes of forms belonging to a linguistic stage older even than that of Icelandic. Diiben Language. j iag su bjected the vocabulary to a very interesting analysis for the purpose of discovering what stage of culture the people had reached before their contact with the Norse. Agricultural terms, the names of the metals and the word for smith are all of Scandi- navian origin, and the words for " taming " and " milk " would suggest that the southern strangers taught the Lapps how to turn the reindeer to full account. The important place, however, which this creature must always have held in their estimation is evident from the existence of more than three hundred native words in con- nexion with reindeer.

The Lapp tongue was long ago reduced to writing by the mission- aries ; but very little has been printed in it except school-books and religious works. A number of popular tales and songs, indeed, have been taken down from the lips of the people. The songs are similar to those of the Finns, and a process of mutual borrowing seems to have gone on. In one of the saga-like pieces — Pishan-Peshan's son — there seems to be a mention of the Baikal Lake, and possibly also of the Altai Mountains. The story of Njavvisena, daughter of the Sun, is full of quaint folk-lore about the taming of the reindeer. Giants, as well as a blind or one-eyed monster, are frequently intro- duced, and the Aesopic fable is not without its representatives. Many of the Lapps are able to speak one or even two of the neigh- bouring tongues.

The reputation of the Laplanders for skill in magic and divination is of very early date, and in Finland is not yet extinct. When Erik Blood- axe, son of Harold Haarfager, visited Bjarmaland in 922, he found Gunhild, daughter of Asur Tote, living among the Lapps, to whom she had been sent by her father for the purpose of being trained in witchcraft; and Ivan the Terrible of Russia sent for magicians from Lapland to explain the cause of the appearance of a comet. One of the powers with which they were formerly credited was that of raising winds. " They tye three knottes," says old Richard Eden, " on a strynge hangyng at a whyp. When they lose one of these they rayse tollerable wynds. When they lose an other the wynde is more vehement; but by losing the thyrd they rayse playne tempestes as in old tyme they were accustomed to rayse thunder and lyghtnyng " (Hist, of Trauayle, 1577). Though we are familiar in English with allusions to " Lapland witches," it appears that the art, according to native custom, was in the hands of the men. During his divination the wizard fell into a state of trance or ecstasy, his soul being held to run at large to pursue its wit ˆ ,m inquiries. Great use was made of a curious divining- cra '

drum, oval in shape and made of wood, I to 4 ft. in length.

Over the upper surface was stretched a white-dressed reindeer skin, and at the corners (so to speak) hung a variety of charms — tufts of wool, bones, teeth, claws, &c. The area was divided into several spaces, often into three, one for the celestial gods, one for the terrestrial and one for man. A variety of figures and conventional signs were drawn in the several compartments: the sun, for in- stance, is frequently represented by a square and a stroke from each corner, Thor by two hammers placed crosswise; and in the more modern specimens symbols for Christ, the Virgin, and the Holy Ghost are introduced. An arpa or divining-rod was laid on a definite spot, the drum beaten by a hammer, and conclusions drawn from the position taken up by the arpa. Any Lapp who had attained to manhood could in ordinary circumstances consult the drum for himself, but in matters of unusual moment the professional wizard (naid, noide or noaide) had to be called in.

History. — The Lapps have a dim tradition that their ancestors lived in a far eastern land, and they tell rude stories of conflicts with Norsemen and Karelians. But no answer can be obtained from them in regard to their early distribution and movements. It has been maintained that they were formerly spread over the whole of the Scandinavian peninsula, and they have even been considered the remnants of that primeval race of cave-dwellers which hunted the reindeer over the snow-fields of central and western Europe. But much of the evidence adduced for these theories is highly questionable. The contents of the so-called Lapps' graves found in various parts of Scandinavia are often sufficient in themselves to show that the appellation must be a misnomer, and the syllable Lap or Lapp found in many names

of places can often be proved to have no connnexion with the Lapps. 1 They occupied their present territory when they are first mentioned in history. According to Diiben the name first occurs in the 13th century — in the Fundinn Noregr, composed about 1200, in Saxo Grammaticus, and in a papal bull of date 1230; but the people are probably to be identified with those Finns of Tacitus whom he describes as wild hunters with skins for clothing and rude huts as only means of shelter, and certainly with the Skrithiphinoi of Procopius (Goth. ii. 15), the Scritobini of Paulus Warnefridus, and the Scridifinni of the geographer of Ravenna. Some of the details given by Procopius, in regard for instance to the treatment of infants, show that his informant was acquainted with certain characteristic customs of the Lapps. In the 9th century the Norsemen from Norway began to treat

their feeble northern neighbours as a subject race. The wealth of Ottar, ” northmost of the northmen,” whose narrative has been preserved by King Alfred, consisted mainly of six hundred of those ” deer they ‘call hrenas ” and in tribute paid by the natives; and the Eigils saga tells how Brynjulf Bjargulfson had his right to collect contributions from the Finns (i.e. the Lapps) recognized by Harold Haarfager. So much value was attached to this source of wealth that as early as 1050 strangers were excluded from the fur- trade of Finmark, and a kind of coast-guard prevented their intrusion. Meantine the Karelians were pressing on the eastern Lapps, and in the course of the nth century the rulers of Novgorod began to treat them as the Norsemen had treated their western brethren. The ground-swell of the Tatar invasion drove the Karelians west- ward in the 13th century, and for many years even Finmark was so unsettled that the Norsemen received no tribute from the Lapps. At length in 1326 a treaty was concluded between Norway and Russia by which the supremacy of the Norwegians over the Lapps was recognized as far east as Vol jo beyond Kandalax on the White Sea, and the supremacy of the Russians over the Karelians as far as Lyngen and the Malself. The relations of the Lapps to their more powerful neighbours were complicated by the rivalry of the different Scandinavian kingdoms. After the disruption of the Calmar Union (1523) Sweden began to assert its rights with vigour, and in 1595 the treaty of Teusina between Sweden and Russia decreed “that the Lapps who dwell in the woods between eastern Bothnia and Varanger shall pay their dues to the king of Sweden.” It was in vain that Christian IV. of Denmark visited Kola and exacted homage in 1599, and every year sent messengers to protest against the collection of his tribute by the Swedes (a custom which continued down to 1806). Charles of Sweden took the title of ” king of the Kajans and Lapps,” and left no means untried to establish his power over all Scandinavian Lapland. By the peace of Knarod (1613) Gustavus Adolphus gave up the Swedish claim to Finmark; and in 1751 mutual renunciations brought the relations of Swedish and Norwegian (Danish) Lapland to their present position. Mean- while Russian influence had been spreading westward ; and in 1809, when Alexander I. finally obtained the cession of Finland, he also added to his dominions the whole of Finnish Lapland to the east of the Muonio and the Kongama. It may be interesting to mention that Lapps, armed with bows and arrows, were attached to certain regiments of Gustavus Adolphus in Germany during the Thirty Years’ War.

The Lapps have had the ordinary fate of a subject and defenceless people; they have been utilized with little regard to their own interest

or inclinations. The example set by the early Norwegians was followed by the Swedes: a peculiar class of adventurers known as the Birkarlians (from Bjark or Birk, ” trade “) began in the 13th century to farm the Lapps, and, receiving very extensive privileges from the kings, grew to great wealth and influence. In 1606 there were twenty-two Birkarlians in Tornio, seventeen in Lule, sixteen in Pite, and sixty-six in Ume Lappmark. They are regularly spoken of as having or owning Lapps, whom they dispose of as any other piece of property. In Russian Lapland matters followed much the same course. The very institutions of the Solovets monastery, in- tended by St Tryphon for the benefit of the poor neglected pagans, turned out the occasion of much injustice towards them. By a charter of Ivan Vasilivitch (November 1556), the monks are declared masters of the Lapps of the Motoff and Petchenga districts, and they soon sought to extend their control over those not legally assigned to them (Ephimenko). Other monasteries were gifted

1 The view that the Lapps at one time occupied the whole of the Scandinavian peninsula, and have during the course of centuries been driven back by the Swedes and Norwegians is disproved by the recent investigations of Yngvar Nielsen, K. B. Wiklund and others. The fact is, the Lapps are increasing in numbers, as well as pushing their way farther and farther south. In the beginning of the 1 6th century their southern border-line in Norway ran on the upper side of 64 N. In 1890 they forced their way to the head of the Hardanger Fjord in 60° N. In Sweden the presence of Lapps as far south as Jamtland (or Jemtland) is first mentioned in 1564. In 1881 they pushed on into the north of Dalecarlia, about 61 ° 45’N.

with similar proprietary rights ; and the supplication of the patriarch Nikon to Alexis Mikhaelovitch, for example, shows clearly the oppression to which the Lapps were subjected.

It is long, however, since these abuses were abolished; and in Scandinavia more especially the Lapps of the present day enjoy the advantages resulting from a large amount of philanthropic legisla- tion on the part of their rulers. There seems to be no fear of their becoming extinct, except it may be by gradual amalgamation with their more powerful neighbours. In Norway the total number of Lapps was 20,786 in 1891, and in Sweden in 1904 it was officially estimated that there were 7000. Add to these some 3000 for Russian Lapland, and

the total Lapp population approximates to 30,000. In Sweden the Lapps are gradually abandoning their nomadic habits and becoming merged in the Swedish population. The majority of the Norwegian Lapps lead a semi-nomadic existence; but the number of inveterate nomads can scarcely reach 1500 at the present day. In Sweden there are about 3500 nomads.

Authorities.— G. von Duben, Om Lappland och Lapparne (Stockholm, _ 1873), with list of over 200 authorities; C. Rabot, ‘ La Laponie suedoise d’apres les recentes explorations de MM. Svenomus et Hamberg,” La Geographic, Soc. Geog. de Paris VII. (1903) ; S. Passarge, Fahrten in Schweden, besonders in Nordschweden und Lappland (Berlin, 1897); Bayard Taylor, Northern Travel (London, 1858); E. Rae, The White Sea Peninsula (London, 1882) and Land of the North Wind (London, 1875); P- B. du Chaillu, Land of the Midnight Sun (London, 1881); S. Tromholt, Under the Rays of the Aurora Borealis (London, 1885); Y. Nielsen, Det Norske geogr. Selskabs Aarbog (1891); H. H. Reusch, Folk og natur 1 Fmmarken (1895); K. B. Wicklund, De Svenska nomadlapparnas ttyttningar till Norge i dlore och nyare tid (Upsala, 1908); see also Sweden. Among older works may be mentioned Scheffer, Lapponia (Frankfurt, 1673, English trans. Oxford, 1674); Regnard, Voyage de Laponie, English version in Pinkerton’s Voyages, vol. i.; Leem, Beskrivelse over Finmarkens Lapper (Copenhagen, 1767), in Danish and Latin; see also Pinkerton, loc. cit.; Sir A. de C. Brooke, A Winter in Lapland (London, 1827); Laestadius, Journal (1831).

As to the language, J. A. Friis, professor of Lapp in the university of Christiania, has published Lappiske Sprogprover: en sanding lapp. eventyr, ordsprog, og gdder (Christiania, 1856), and Lappish mythologi eventyr og folkesagn (Christiania, 1871). See also G. Donner, Lieder der Lappen (Helsingfors, 1876); Poestion, Lapp-landischc Marchen, &c. (Vienna, 1885). Grammars of the Lapp tongue have been published by Fjellstrom (1738), Leem (1748), Rask (1832), Stockfleth (1840); lexicons by Fjellstrom (1703), Leem U768-1781), Lindahl (1780), Stockfleth (1852). Among more recent works may be mentioned a dictionary (1885), by J. A. Friis; a reader, with German translations (1888), by J. Qvigstad; a dictionary (1890) and two grammars (1891 and 1897) of the Lu’lea dialect, and a chrestomathy of Norwegian Lappish (1894), by K. B. Wiklund; a dictionary of Russian Lappish, or the Kola dialect (1891), by A. Genetz; readers of different dialects (1885-1896), by J. Halasz; and a grammar of Norwegian Lappish (1882), by S. Nielsen; further, a comparative study of Lappish and Finnish by Qvigstad in the Acts of the Finnish Academy of Science, vol. xii., 1883; the same author’s Nordische

Lehnworter im Lappischen (1893); Wiklund, Entwurf einer urlappischen Lautlehre (1896); see also various articles by these writers, Paasonen and others in the Journal de la Societe Finno-Ougrienne and the Finnisch-U grische Forschungen; Qvigstad and Wiklund, Bibliographie der lappischen Liter atur (1900).

The older literature on the Lapps received a notable addition by the discovery in 1896, among the letters of Linnaeus preserved in the British Museum, of a MS. diary of a journey made in 1695 to the north of Swedish Lappmark by Olof Rudbcck the younger. On missionary work see Stockfleth, Dagbog over mine missions Reiser (i860); E. Haller, Svenska Kyrkans mission i Lappmarken (1896). It was not until 1840 that the New Testament was translated into Norwegian Lappish, and not until 1895 that the entire Bible was printed m the same dialect. In the Russian dialect of Lappish there exist only two versions of St Matthew's gospel.

LA PLATA, a city of Argentina and capital of the province of Buenos Aires, 5 m. inland from the port of Ensenada, or La Plata, and about 31 m. S.E. of the city of Buenos Aires, with which it is connected by rail. Pop. (1895) 45,609; (1907, estimate) 84,000. La Plata was founded in 1882, two years after Buenos Aires had been constituted a federal district and made the national capital. This necessitated the selection of another provincial capital, which resulted in the choice of an open plain near the former port of Ensenada de Barragan, on which a city was laid out after the plan of Washington. The streets are so wide that they seem out of proportion to the low brick buildings. The principal public buildings, constructed of brick and stucco, are the government-house, assembly building, treasury, municipal hall, cathedral, courts of justice, police headquarters, provincial, museum and railway station. The

museum, originally presented by Dr Moreno, has become one of the most important in South America, its palaeontological and anthropological collections being unique. There are also a university, national college, public library, astronomical observatory, several churches, two hospitals and two theatres. A noteworthy public park is formed by a large plantation of eucalyptus trees, which have grown to a great height and present an imposing appearance on the level, treeless plain. Electricity is in general use for public and private lighting, and tramways are laid down in the principal streets and extend eastward to the port. The harbour of the port of La Plata consists of a large artificial basin, 1450 yds. long by 150 yds. wide, with approaches, in addition to the old port of Ensenada, which are capable of receiving the largest vessels that can navigate the La Plata

estuary. Up to the opening of the new port works of Buenos Aires a large part of the ocean-going traffic of Buenos Aires passed through the port of La Plata. It has good railway con- nexions with the interior, and exports cattle and agricultural produce.

LAPORTE, ROLAND (1675-1704), Camisard leader, better known as " Roland," was born at Mas Soubeyran (Gard) in a cottage which has become the property of the Societe de l'Histoire du Protestantisme francais, and which contains relics of the hero. He was a nephew of Laporte, the Camisard leader who was hunted down and shot in October 1702, and he himself became the leader of a band of a thousand men which he formed into a disciplined army with magazines, arsenals and hospitals. For daring in action and rapidity of movement he was second only to Cavalier. These two leaders in 1702 secured entrance to the town of Sauve under the pretence of being royal officers, burnt the church and carried off provisions and ammunition for their forces. Roland, who called himself " general of the children of God," terrorized the country between Nimes and Alais, burning churches and houses, and slaying those suspected of hostility against the Huguenots, though without personally taking any part of the spoil. Cavalier was already in negotiation with Marshal Villars when Roland cut to pieces a Catholic regiment at Fontmorte in May 1704. He refused to lay down his arms without definite assurance of the restoration of the privileges accorded by the Edict of Nantes. Villars then sought to negotiate, offering Roland the command of a regiment on foreign service and liberty of conscience, though not the free exercise of their religion, for his co-religionists. This parley had no results, but Roland was betrayed to his enemies, and on the 14th of August 1704 was shot while defending himself against his captors. The five officers who were with him surrendered, and were broken on the wheel at Nimes. Roland's death put an end to the effective resistance of the Cevenols.

See A. Court, Histoire des troubles des Cevennes (Villefranche, 1760) ; H. M. Baird, The Huguenots and the revocation of the Edict of Nantes (2 vols., London, 1895), and other literature dealing with the Camisards.

LA PORTE, a city and the county seat of La Porte county, Indiana, U.S.A., 12 m. S. of Lake Michigan and about 60 m. S.E. of Chicago. Pop. (1890) 7126; (1900) 7113 (1403 foreign- born); (1910) 10,525. It is served by the Lake Erie & Western, the Lake Shore & Michigan Southern, the Pere Marquette, the Chicago, South Bend & Northern Indiana (electric), and the Chicago-New York Electric Air Line railways. La Porte lies in the midst of a fertile agricultural region, and

the shipment of farm and orchard products is one of its chief industries. There are also numerous manufactures. La Porte's situation in the heart of a region of beautiful lakes (including Clear, Pine and Stone lakes) has given it a considerable reputation as a summer resort. The lakes furnish a large supply of clear ice, which is shipped to the Chicago markets. La Porte was settled in 1830, laid out in 1833, incorporated as a town in 1835, and first chartered as a city in 1852.

LAPPA, an island directly opposite the inner harbour of Macao, the distance across being from 1 to i| m. It is a station of the Chinese imperial maritime customs which collects duties on vessels trading between China and the Portuguese colony

of Macao. The arrangement is altogether abnormal, and was consented to by the Portuguese government in 1887 to assist the Chinese authorities in the suppression of opium smuggling. A similar arrangement prevails at the British colony of Hong- Kong, where the Chinese customs station is Kowloon. In both cases the customs stations levy duties on vessels entering and leaving the foreign port in lieu of levying them, as ought to be done, on entering or leaving a Chinese port.

LAPPARENT, ALBERT AUGUSTE COCHON DE (1839-1908), French geologist, was born at Bourges on the 30th of December 1839. After studying at the Ecole Polytechnique from 1858 to i860 he became ingenieur au corps des mines, and took part in drawing up the geological map of France; and in 1875 he was appointed professor of geology and mineralogy at the Catholic Institute, Paris. In 1879 he prepared an important memoir for the geological survey of France on Le Pays de Bray, a subject on which he had already published several memoirs, and in 1880 he served as president of the French Geological Society. In 1881-1883 he published his Traite de geologie (5th ed., 1905), the best European text-book of stratigraphical geology. His other works include Cows de mineralogie (1884, 3rd ed., 1899), La Formation des combustibles mineraux (1886), Le Niveau de la mer et ses variations (1886), Les Tremblements de terre (1887), La Geologie en chemin de fer (1888), Precis de mineralogie (1888), Le Siicle du fer (1890), Les Anciens Glaciers (1893), Lecons de geographie physique (1896), Notions generates sur Vecorce terrestre (1S97), Le Globe terrestre (1899), and Science et apologetique (1905). With Achille Delesse he was for many years editor of the Revue de geologie and

contributed to the Exiraits de geologie, and he joined with A. Potier in the geological surveys undertaken in connexion with the Channel Tunnel proposals. He died in Paris on the 5th of May 1908.

LAPPENBERG, JOHANN MARTIN (1794-1865), German historian, was born on the 30th of July 1 794 at Hamburg, where his father, Valentin Anton Lappenberg (1759-1819), held an official position. He studied medicine, and afterwards history, at Edinburgh. He continued to study history in London, and at Berlin and Gottingen, graduating as doctor of laws at Gottingen in 1816. In 1820 he was sent by the Hamburg senate as resident minister to the Prussian court. In 1823 he became keeper of the Hamburg archives; an office in which he had the fullest opportunities for the laborious and critical research work upon which his reputation as an historian rests. He retained this post until 1863, when a serious affection of the eyes compelled him to resign. In 1850 he represented Hamburg in the German parliament at Frankfort, and bis death took place at Hamburg on the 28th of November 1865. Lappenberg's most important work is his Geschichte von England, which deals with the history of England from the earliest times to 1154, and was published in two volumes at Hamburg in 1834-1837. It has been trans- lated into English by B. Thorpe as History of England under the Anglo-Saxon Kings (London 1845, and again 1881), and History of England under the Norman Kings (Oxford, 1857), and has been continued in three additional volumes from n 54 to 1509 by R. Pauli. His other works deal mainly with the history of Hamburg, and include Hamburgische Chroniken in Nieder- sdchsischer Sprache (Hamburg, 1852-1861); Geschichlsquellen des Erzstiftes und der Stadt Bremen (Bremen, 1841); Hamburgisches Urkundenbiich (Hamburg, 1842); Urkundliche Geschichte des Hansischen Stahlhofes zu London (Hamburg, 1851); Hambur- gische Rechtsalterthiimer (Hamburg, 1845); and Urkundliche Geschichte des Ursprunges der deutschen Hanse (Hamburg, 1830), a continuation of the work of G. F. Sartorius. For the Monu- menta Germaniae historica he edited the Chronicon of Thietmar of Merseburg, the Gesta Hammenburgensis ecclesiae pontificum of Adam of Bremen and the Chronica Slavorum of Helmold, with its continuation by Arnold of Liibeck. Lappenberg, who was a member of numerous learned societies in Europe, wrote many other historical works.

See E. H. Meyer, Johann Martin Lappenberg (Hamburg, 1867); and R. Pauli in the Allgemeine deutsche Biographic, Band xvii. (Leipzig, 1883).

LAPRADE, PIERRE MARTIN VICTOR RICHARD DE (1812- 1883), known as Victor de Laprade, French poet and critic, was born on the

13th of January 1812 at Montbrison, in the department of the Loire. He came of a modest provincial family. After completing his studies at Lyons, he produced in 1839 a small volume of religious verse, Les Parfums de Madeleine. This was followed in 1840 by La Colore de Jesus, in 1841 by the religious fantasy of Psyche, and in 1844 by Odes et poemes. In 1845 Laprade visited Italy on a mission of literary research, and in 1847 he was appointed professor of French literature at Lyons. The French Academy, by a single vote, preferred Emile Augier at the election in 1857, but in the following year Laprade was chosen to fill the chair of Alfred de Musset. In 1 86 1 he was removed from his post at Lyons owing to the publication of a political satire in verse (Les Muses d'Etat), and in 187 1 took his seat in the National Assembly on the benches of the Right. He died on the 13th of December 1883. A statue has been raised by his fellow-townsmen at Montbrison. Besides those named above, Laprade's poetical works include Poemes evangeliques (1852), Ldylles hiro'iques (1858), Les Voix de silence (1864), Pemette (1868), Poemes civiles (1873), Le Livre d'un pere (1877), Varia and Livre des adieux (1878-1879). In prose he published, in 1840, Des habitudes intellectuelles de I'avocat. Questions d'art et de morale appeared in 1861, succeeded by Le Sentiment de la nature, avant le Christianisme in 1866, and Chez les modernes in 1868, Education liberate in 1873. The material for these books had in some cases been printed earlier, after delivery as a lecture. He also contributed articles to the Revue des deux mondes and the Revue de Paris. No writer represents more perfectly than Laprade the admirable genius of French provincial life, its homely simplicity, its culture, its piety and its sober patriotism. As a poet he belongs to the school of Chateaubriand and Lamartine. Devoted to the best classical models, inspired by a sense of the ideal, and by worship of nature as revealing the divine — gifted, too, with a full faculty of expression — he lacked only fire and passion in the equipment of a romantic poet. But the want of these, and the pressure of a certain chilly facility and of a too conscious philosophizing have prevented him from reaching the first rank, or from even attain ing the popularity due to his high place in the second. Only in. his patriotic verse did he shake himself clear from these trammels. Speaking generally, he possessed some of the qualities, and many of the defects, of the English Lake School. Laprade's prose criticisms must be ranked high. Apart from his classical and metaphysical studies, he was widely read in the literatures of Europe, and built upon the groundwork of a naturally correct taste. His dislike of irony and scepticism probably led him to underrate the product of the 18th century, and there are signs of a too fastidious dread of Philistinism. But a constant love of the best, a joy in nature and a lofty patriotism are not less evident than in

his poetry. Few writers of any nation have fixed their minds so steadily on whatsoever things are pure, and lovely and of good report.

See also Edmond Bire, Victor de Laprade, sa vie et ses ceuvres. (C.)

LAPSE (Lat. lapsus, a slip or departure), in law, a term used in several senses. (1) In ecclesiastical law, when a patron has neglected to present to a void benefice within six months next after the avoidance, the right of presentation is said to lapse. In such case the patronage or right of presentation devolves from the neglectful patron to the bishop as ordinary, to the metropolitan as superior and to the sovereign as patron para- mount. (2) The failure of a testamentary disposition in favour of any person, by reason of the decease of its object in the testator's lifetime, is termed a lapse. See Legacy, Will.

LAPWING (O.Eng. hledpewince= "one who turns about in running or flight "V a bird, the Tringa vanellus of Linnaeus and the Vanellus vulgaris or V. cristalus of modern ornithologists.

1 Skeat, Etym. Diet. (1898), s.v. Caxton in 1481 has " lapwynches " (Reynard the Fox, cap. 27). The first part of the word is from Meapah, to leap; the second part is " wink " (O.H.G. winchan, Ger. wanken, to waver) . Popular etymology has given the word its present form, as if it meant " wing-flapper," from " lap," a fold or flap of a garment.

In the temperate parts of the Old World this species is perhaps the most abundant of the plovers, Charadriidae, breeding in almost every suitable place from Ireland to Japan — the majority migrating towards winter to southern countries, as the Punjab, Egypt and Barbary — though in the British Islands some are always found at that season. As a straggler it has occurred within the Arctic Circle (as on the Varanger Fjord in Norway), as well as in Iceland and even Greenland; while it not unfrequently appears in Madeira and the Azores. Conspicuous as the strongly contrasted colours of its plumage and its very] peculiar flight make it, it is remarkable that it maintains its ground when so many of its allies have been almost exterminated, for the lap- wing is the object perhaps of greater persecution than any other European bird that is not a plunderer. Its eggs are the well-known " plovers' eggs " of commerce, 1 and the bird, wary and wild at other times of the year, in the breeding-season becomes easily approachable, and is shot to be sold in the markets for " golden

plover.” Its growing scarcity in Great Britain was very perceptible until the various acts for the protection of wild birds were passed. It is now abundant and is of service both for the market and to agriculture. What seems to be the secret of the lapwing holding its position is the adaptability of its nature to various kinds of localities. It will find sustenance equally on the driest of soils as on the fattest pastures; upland and fen, arable and moorland, are alike to it, provided only the ground be open enough. The wailing cry 2 and the frantic gestures of the cock bird in the breeding-season will tell any passer-by that a nest or brood is near; but, unless he knows how to look for it, nothing save mere chance will enable him to find it. The nest is a slight hollow in the ground, wonderfully inconspicuous even when deepened, as is usually the case, by incubation, and the black- spotted olive eggs (four in number) are almost invisible to the careless or untrained eye. The young when first hatched are clothed with mottled down, so as closely to resemble a stone, and to be overlooked as they squat motionless on the approach of danger. At a distance the plumage of the adult appears to be white and black in about equal proportions, the latter predominating above; but on closer examination nearly all the seeming black is found to be a bottle-green gleaming with purple and copper; the tail-coverts, both above and below, are of a bright bay colour, seldom visible in flight. The crest consists of six or eight narrow and elongated feathers, turned slightly upwards at the end, and is usually carried in a horizontal position, extending in the cock beyond the middle of the back; but it is capable of being erected so as to become nearly vertical. Frequenting parts of the open country so very divergent in character, and as remarkable for the peculiarity of its flight as for that of its cry, the lapwing is far more often observed in nearly all parts of the British Islands than any other of the group Limicolae. The peculiarity of its flight seems due to the wide and rounded wings it possesses, the steady and ordinarily

1 There is a prevalent belief that many of the eggs sold as ” plovers’ ” are those of rooks, but no notion can be more absurd, since the appearance of the two is wholly unlike. Those of the redshank, of the golden plover (to a small extent), and enormous numbers of those of the black-headed gull, and in certain places of some of the terns are, however, sold as lapwings’, having a certain similarity of shell to the latter, and a difference of flavour only to be detected by a fine palate.

2 This sounds like pee-weet, with some variety of intonation. Hence the names peewit, peaseweep and teuchit, commonly ap- plied in some parts of Britain to this bird — though the first is that by which one of the smaller gulls, Larus ridibundus (see Gull), is known in the districts it frequents. In Sweden Vipa, in Germany Kiebitz, in Holland

Kiewiet, and in France Dixhuit, are names of the lapwing, given to it from its usual cry. Other English names are green plover and hornpie — the latter from its long hornlike crest and pied plumage. The lapwing's conspicuous crest seems to have been the cause of a common blunder among English writers of the middle ages, who translated the Latin word Upupa, property hoopoe, by lapwing, as being the crested bird with which they were best ac- quainted. In like manner other writers of the same or an earlier period latinized lapwing by Egrettides (plural), and rendered that again into English as egrets — the tuft of feathers misleading them also. The word Vanellus is from vannus, the fan used for winnowing corn, and refers to the audible beating of the bird's wings.

somewhat slow flapping of which impels the body at each stroke with a manifest though easy jerk. Yet on occasion, as when performing its migrations, or even its almost daily transits from one feeding-ground to another, and still more when being pursued by a falcon, the speed with which it moves through the air is very considerable. On the ground this bird runs nimbly, and is nearly always engaged in searching for its food, which is wholly animal.

Allied to the lapwing are several forms that have been placed by ornithologists in the genera Hoplopterus, Chettusia, Lobi- vanellus, Defilippia. In some of them the hind toe. which has already ceased to have any function in the lapwing, is wholly wanting. In others the wings are armed with a tubercle or even a sharp spur on the carpus. Few have any occipital crest, but several have the face ornamented by the outgrowth of a fleshy lobe or lobes. With the exception of North America, they are found in most parts of the world, but perhaps the greater number in Africa. Europe has three species — Hoplopterus spinosus, the spur-winged plover, and Chettusia gregaria and C. leucura; but the first and last are only stragglers from Africa and Asia. (A. N.)

LAPWORTH, CHARLES (1842-), English geologist, was born at Faringdon in Berkshire on the 30th of September 1842. lie was educated partly in the village of Buckland in the same county, and afterwards in the training college at Culham, near Oxford (1862-1864). He was then appointed master in a school connected with the Episcopal church at Galashiels, where he remained eleven years. Geology came to absorb all his leisure time, and he commenced to investigate the Silurian rocks of the Southern Uplands, and to study the graptolites and other fossils which mark horizons in the great series of Lower Palaeozoic rocks. His first paper on the Lower Silurian rocks of Galashiels was published in 1870, and from that date

onwards he continued to enrich our knowledge of the southern uplands of Scotland until the publication by the Geological Society of his masterly papers on The Mojfat Series (1878) and The Girvan Succession (1882-). Meanwhile in 1875 he became an assistant master in the Madras College, St Andrews, and in 1881 professor of geology and mineralogy (afterwards geology and physiography) in the Mason College, now University of Birmingham. In 1882 he started work in the Durness-Eriboll district of the Scottish Highlands, and made out the true succession of the rocks, and interpreted the complicated structure which had baffled most of the previous observers. His results were published in " The Secret of the Highlands " {Geol. Mag., 1883). His subsequent work includes papers on the Cambrian rocks of Nuneaton and the Ordovician rocks of Shropshire. The term Ordovician was introduced by him in 1879 for the strata between the base of the Lower Llandovery formation and that of the Lower Arenig; and it was intended to settle the confusion arising from the use by some wricers of Lower Silurian and by others of Upper Cambrian for the same set of rocks. The term Ordovician is now generally adopted. Professor Lapworth was elected F.R.S. in 1888, he received a royal medal in 1891, and was awarded the Wollaston medal by the Geological Society in 1899. He was president of the Geological Society, 1902-1904. His Inter- mediate Text-book of Geology was published in 1899.

See article, with portrait and bibliography, in Geol. Mag. (July

1901).

LAR, a city of Persia, capital of Laristan, in 27° 30′ N., 53 58′ E., 180 m. from Shiraz and 75 from the coast at Bander Lingah. It stands at the foot of a mountain range in an extensive plain covered with palm trees, and was once a flourishing place, but a large portion is in ruins, and the population which early in the 1 8th century numbered 50,000 is reduced to 8000. There are still some good buildings, of which the most prominent are the old bazaar consisting of four arcades each 180 ft. long, 14 broad and 22 high, radiating from a domed centre 30 ft. high, an old stone mosque and many cisterns. The crest of a steep limestone hill immediately behind the town and rising 150 ft. above the plain is crowned by the ruins of a castle formerly deemed im- pregnable. Just below the castle is a well sunk 20×3 ft. in the

rock. The tower-flanked mud wall which surrounds the town is for the most part in ruins.

LARA, western state of Venezuela, lying in the angle formed by the parting of the N. and N.E. ranges of the Cordillera de Merida and extending N.E. with converging frontiers to the Caribbean. Pop. (1905 estimate) 272,252. The greater part of its surface is mountainous, with elevated fertile valleys which have a temperate climate. The Tocuyo river rises in the S.W. angle of the state and flows N.E. to the Caribbean with a total length of 287 m. A narrow-gauge railway, the ” South-western,” owned by British capitalists, runs from the port of Tucacas 55 m. S.W. to Barquisimeto by way of the Aroa copper-mining district. Lara produces wheat and other cereals, coffee, sugar, tobacco, neat cattle, sheep and various mineral ores, including silver, copper, iron, lead, bismuth and antimony. The capital, Barquisi- meto, is one of the largest and most progressive of the inland cities of Venezuela. Carora is also prominent as a commercial centre. Tocuyo (pop. in 1801, 15,383), 40 m. S.W. of Barquisi- meto, is an important commercial and mining town, over 2000 ft. above sea-level, in the midst of a rich agricultural and pastoral region. Yaritagua (pop. about 12,000), 20 m. E. of Barquisimeto, and 1026 ft. above the sea, is known for its cigar manufactories. LARAISH {El Araish), a port in northern Morocco on the Atlantic coast in 35° 13′ N., 6° 9′ W., 43 m. by sea S. by W. of Tangier, picturesquely situated on the left bank of the estuary of the Wad Lekkus. Pop. 6000 to 7000. The river, being fairly deep inside the bar, made this a favourite port for the Salli rovers to winter in, but the quantity of alluvial soil brought down threatens to close the port. The town is well situated for defence, its walls are in fair condition, and it has ten forts, all supplied with old-fashioned guns. Traces of the Spanish occupation from 1610-1689 are to be seen in the towers whose names are given by Tissot as those of St Stephen, St James and that of the Jews, with the Castle of Our Lady of Europe, now the kasbah or citadel. The most remarkable feature of Laraish is its fine large market-place inside the town with a low colonnade in front of very small shops. The streets, though narrow and steep, are generally paved. Its chief exports are oranges, millet, dra and other cereals, goat-hair and skins, sheepskins, wool and fullers’ earth. The wool goes chiefly to Marseilles. The annual value of the trade is from £400,000 to £500,000.

In 1780 all the Europeans in Laraish were expelled by Mohammed XVI., although in 1786 the monopoly of its trade had been granted to Holland, even its export of wheat. In 1787 the Moors were still building pirate vessels here, the timber for which came from the neighbouring forest of M’amora. . Not far from the town are the

remains of what is believed to be a Phoenician city, Shammish, mentioned by Idrisi, who makes no allusion to Laraish. It is not, however, improbable from a passage in Scylax that the site of the present town was occupied by a Libyan settlement. Tradition also connects Laraish with the garden of the Hesperides, ‘Arasi being the Arabic for ” pleasure-gardens,” and the ” golden apples ” perhaps the familiar oranges.

LARAMIE, a city and the county-seat of Albany county, Wyoming, U.S.A., on the Laramie river, 57 m. by rail N.W. of Cheyenne. Pop. (1900) 8207, of whom 1280 were foreign-born; (1905) 7601; (1910) 8237. It is served by the Union Pacific and the Laramie, Hahn’s Peak & Pacific railways, the latter extending from Laramie to Centennial (30 m.). The city is situated on the Laramie Plains, at an elevation of 7165 ft., and is hemmed in on three sides by picturesque mountains. It has a public library, a United States Government building and hospitals, and is the seat of the university of Wyoming and of a Protestant Episcopal missionary bishopric. There is a state fish hatchery in the vicinity. The university (part of the public school system of the state) was founded in 1886, was opened in 1887, and embraces a College of Liberal Arts and Graduate School, a Normal School, a College of Agriculture and the Mechanic Arts, an Agricultural Experiment Station (estab- lished by a Federal appropriation), a College of Engineering, a School of Music, a Preparatory School and a Summer School.

Laramie is a supply and distributing centre for a live-stock raising and mining region — particularly coal mining, though gold, silver, copper and iron are also found. The Union Pacific Railroad Company has machine shops, repair shops and rolling mills at Laramie, and, a short distance S. of the city, ice-houses and a tie-preserving plant. The manufactures include glass, leather, flour, plaster and pressed brick, the brick being made from shale obtained in the vicinity. The municipality owns and operates the water- works; the water is obtained from large springs about 25 m. distant. Laramie was settled in 1868, by people largely from New England, Michigan, Wisconsin and Iowa, and was named in honour of Jacques Laramie, a French fur trader. It was first chartered as a city in 1868 by the legisla- ture of Dakota, and was rechartered by the legislature of Wyoming in 1873.

LARBERT, a parish and town of Stirlingshire, Scotland. Pop. of parish (1901) 6500, of town, 1442. The town is situated on the Carron, 8 m. S. by E. of Stirling by the North British and Caledonian railways, the junction being an important station for traffic from the south by the West Coast route. Coal-mining is the chief industry. The principal

buildings are the church, finely placed overlooking the river, the Stirling district asylum and the Scottish National Institution for imbecile children. In the churchyard is a monument to James Bruce, the Abyssinian traveller, who was born and died at Kinnaird House, 25 m. N.E. Two m. N. by W. are the ruins of Torwood Castle and the remains of Torwood forest, to which Sir William Wallace retired after his defeat at Falkirk (1298). Near ” Wallace’s oak,” in which the patriot concealed himself, Donald Cargill (1619-1681), the Covenanter, excommunicated Charles II. and James, duke of York, in 1680. The fragment of an old round building is said to be the relic of one of the very few ” brochs,” or round towers, found in the Lowlands.

LARCENY (an adaptation of Fr. larcin, O. Fr. larrecin, from Lat. latrocinium, theft, latio, robber), the unlawful taking and carrying away of things personal, with intent to deprive the rightful owner of the same. The term theft, sometimes used as a synonym of larceny, is in reality a broader term, applying to all cases of depriving another of his property whether by removing or withholding it, and includes larceny, robbery, cheating, embezzlement, breach of trust, &c.

Larceny is, in modern legal systems, universally treated as a crime, but the conception of it as a crime is not one belonging to the earliest stage of law. To its latest period Roman law regarded larceny or theft {furtum) as a delict prima facie pursued by a civil remedy — the actio furti for a penalty, the vindicatio or condictio for the stolen property itself or its value. In later times, a criminal remedy to meet the graver crimes gradually grew up by the side of the civil, and in the time of Justinian the criminal remedy, where it existed, took precedence of the civil {Cod. iii. 8. 4). But to the last criminal proceedings could only be taken in serious cases, e.g. against stealers of cattle {abigei) or the clothes of bathers {balnearii). The punishment was death, banishment, or labour in the mines or on public works. In the main the Roman law coincides with the English law. The definition as given in the Institutes (iv. 1. 1) is ” furtum est contrectatio rei fraudulosa, vel ipsius rei, vel etiam ejus usus possessionisve,” to which the Digest (xlvii. 2. 1, 3) adds ” lucri faciendi gratia.” The earliest English definition, that of Bracton (1506), runs thus: “furtum est secundum leges contrectatio rei alienae fraudulenta cum animo’ furandi invito illo domino cujus res ilia fuerit.” Bracton omits the ” lucri faciendi gratia ” of the Roman definition, because in English law the motive is immaterial, 1 and the ” usus ejus possessionisve,” because the definition includes an intent to deprive the owner of his property permanently. The ” animo furandi ” and ” invito domino ” of Bracton’s definition are expansions for the sake of greater clear- ness. They seem to have been implied in Roman law. Furtum is on the whole a more

comprehensive term than larceny. This

1 Thus destruction of a letter by a servant, with a view of suppressing inquiries into his or her character, makes the servant guilty of larceny in English law.

difference no doubt arises from the tendency to extend the bounds of a delict and to limit the bounds of a crime. Thus it was furtum (but it would not be theft at English common law) to use a deposit of pledge contrary to the wishes of the owner, to retain goods found, or to steal a human being, such as a slave or filius familias (a special form of furtum called plagium). The latter would be in English law an abduction under certain circumstances but not a theft. One of two married persons could not commit furtum as against the other, but larceny may be so committed in England since the Married Women's Property Act 1882. As a furtum was merely a delict, the obligatio ex delicto could be extinguished by agreement between the parties; this cannot be done in England. In another direction English law is more considerate of the rights of third parties than was Roman. The thief can give a good title to stolen goods; in Roman law he could not do so, except in the single case of a hereditas acquired by usucapio. The development of the law of furtum at Rome is historically interesting, for even in its latest period is found a relic of one of the most primitive theories of law adopted by courts of justice: " They took as their guide the measure of vengeance likely to be exacted by an aggrieved person under the circumstances of the case " (Maine, Ancient Law, ch. x.). This explains the reason of the division of furtum into tnani- festum and nee manifestum. The manifest thief was one taken red-handed — " taken with the manner," in the language of old English law. The Twelve Tables denounced the punishment of death against the manifest thief, for that would be the penalty demanded by the indignant owner in whose place the judge stood. The severity of this penalty was afterwards mitigated by the praetor, who substituted for it the payment of quadruple the value of the thing stolen. The same penalty was also given by the praetor in case of theft from a fire or a wreck, or of prevention of search. The Twelve Tables mulcted the non-manifest thief in double the value of the thing stolen. The actions for penalties were in addition to the action for the stolen goods themselves or their value. The quadruple and double penalties still remain in the legislation of Justinian. The search for stolen goods, as it existed in the time of Gaius, was a survival of a period when the

injured person was, as in the case of summons {in jus vocatio), his own executive officer. Such a search, by the Twelve Tables^ might be conducted in the house of the supposed thief by the owner in person, naked except for a cincture, and carrying a platter in his hand, safeguards apparently against any possi- bility of his making a false charge by depositing some of his own property on his neighbour's premises. This mode of search became obsolete before the time of Justinian. Robbery (bona vi rapta) was violence added to furtum. By the actio vi bonorum raptorum quadruple the value could be recovered if the action were brought within a year, only the value if brought after the expiration of a year. The quadruple value included the stolen thing itself, so that the penalty was in effect only a triple one. It was inclusive, and not cumulative, as in furtum.

In England theft or larceny appears to have been very early regarded by legislators as a matter calling for special attention. The pre-Conquest compilations of laws are full of provisions on the subject. The earlier laws appear to regard it as a delict which may be compounded for by payment. Considerable distinctions of person are made, both in regard to the owner and the thief. Thus, by the laws of ^thelberht, if a freeman stole from the king he was to restore ninefold, if from a freeman or from a dwelling, threefold. If a theow stole, he had only to make a twofold reparation. In the laws of Alfred ordinary theft was still only civil, but he who stole in a church was punished by the loss of his hand. The laws of Ina named as the penalty death or redemption according to the wer-gild of the thief. By the same laws the thief might be slain if he fled or resisted. Gradually the severity of the punishment increased. By the laws of ^Ethelstan death in a very cruel form was inflicted. At a later date the Leges Henrici Primi placed a thief in the king's mercy, and his lands were forfeited. Putting out the eyes and other kinds of mutilation were sometimes the punish- ment. The principle of severity continued down to the 19th

century, and until 1827 theft or larceny of certain kinds re- mained capital. Both before and after the Conquest local jurisdiction over thieves was a common franchise of lords of manors, attended with some of the advantages of modern summary jurisdiction.

Under the common law larceny was a felony. It was affected by numerous statutes, the main object of legislation being to bring within the law of larceny offences which were not larcenies at common law, either because they were thefts of things of which there could be no larceny at common law, e.g. beasts ferae naturae, title deeds or choses in action, or because the common law regarded them merely as delicts for which the remedy was by civil action, e.g. fraudulent breaches of

trust. The earliest act in the statutes of the realm dealing with larceny appears to be the Carta Forestae of 1225, by which fine or imprisonment was inflicted for stealing the king's deer. The next act appears to be the statute of Westminster the First (1275), dealing again with stealing deer. It seems as though the beginning of legislation on the subject was for the purpose of protecting the chases and parks of the king and the nobility. A very large number of the old acts are named in the repealing act of 1827. An act of the same date removed the old distinction between grand and petit larceny. 1 The former was theft of goods above the value of twelve pence, in the house of the owner, not from the person, or by night, and was a capital crime. It was petit larceny where the value was twelve pence or under, the punishment being imprisonment or whipping. The gradual depreciation in the value of money afforded good ground for Sir Henry Spelman's sarcasm that, while everything else became dearer, the life of man became continually cheaper. The distinction between grand and petit larceny first appears in statute law in the Statute of Westminster the First, c. 15, but it was not created for the first time by that s t, atu te. It is found in some of the pre-Conquest codes, as that of A-thelstan, and it is recognized in the Leges Henrici Primi. A distinction between simple and compound larceny is still found in the books. The latter is larceny accompanied by circumstances of aggravation, as that it is in a dwelling-house or from the person. The law of larceny is now contained chiefly in the Larceny Act 186 1 (which extends to Englandand Ireland), a comprehensive enactment including larceny, embezzlement, fraud by bailees, agents, bankers, factors, and trustees, sacrilege, burglary, housebreaking, robbery, obtaining money by threats or by false pretences, and receiving stolen goods, and prescribing procedure, both civil and criminal. There are, however, other acts in force dealing with special cases of larceny, such as an actof Henry VIII. as to stealing the goods of the king, and the Game, Post-Office and Merchant Shipping Acts. There are separate acts providing for larceny by a partner of partnership property, and by a husband or wife of the property of the other (Married Women's Property Act 1882). Proceedings against persons subject to naval or military law depend upon the Naval Discipline Act 1866 and the Army Act 1881. There are several acts, both before and after 1861, directing how the property is to be laid in indictments for stealing the goods of counties, friendly societies, trades unions, &c. The principal conditions which must exist in order to constitute larceny are these: (1) there must be an actual taking into the possession of the thief, though the smallest removal is sufficient ; (2) there must be an intent to deprive the owner of his property for an indefinite period, and to assume the entire dominion over it, an intent

often described in Bracton's words as animus furandi; (3) this intent must exist at the time of taking; (4) the thing taken must be one capable of larceny either at common law or by statute. One or two cases falling under the law of larceny are of special interest. It was held more than once that a servant taking corn to feed his master's horses, but without any intention of applying it for his own benefit, was guilty of larceny. To remedy this hardship, the Misappropriation of Servants Act 1863 was passed to declare such an act not to be felony. The case of appro- priation of goods which have been found has led to some difficulty. It now seems to be the law that in order to constitute a larceny of lost goods there must be a felonious intent at the time of finding, that is, an intent to deprive the owner of them, coupled with reason- able means at the same time of knowing the owner. The mere retention of the goods when the owner has become known to the finder does not make the retention criminal. Larceny of money may be committed when the money is paid by mistake, if the prisoner took it animo furandi. In two noteworthy cases the question was argued before a very full court for crown cases re- served, and in each case there was a striking difference of opinion. In R. v. Middleton, 1873, L.R. 2 C.C.R., 38, the prisoner, a de- positor in a post-office savings bank, received by the mistake of the clerk a larger sum that he was entitled to. The jury found that he had the animus furandi at the time of taking the money, and that he knew it to be the money of the postmaster-general. The majority of the court held it to be larceny. In a case in 1885 (R. v. Ashwell, L.R. 16 Q.B.D. 190), where the prosecutor gave the prisoner a sovereign believing it to be a shilling, and the prisoner

1 This provision was most unnecessarily repeated in the Larcenv Act of 1 861.

took it under that belief, but afterwards discovered its value and retained it, the court was equally divided as to whether the prisoner was guilty of larceny at common law, but held that he was not guilty of larceny as a bailee. Legislation has considerably affected the procedure in prosecutions for larceny. The inconveniences of the common law rules of interpretation of indictments led to certain amendments of the law, now contained in the Larceny Act, for the purpose of avoiding the frequent failures of justice owing to the strictness with which indictments were construed. Three larcenies of property of the same person within six months may now be charged in

one indictment. On an indictment for larceny the prisoner may be found guilty of embezzlement, and vice versa; and if the prisoner be indicted for obtaining goods by false pretences, and the offence turn out to be larceny, he is not entitled to be acquitted of the misdemeanour. A count for receiving may be joined with the count for stealing. In many cases it is unnecessary to allege or prove ownership of the property the subject of the indictment. The act also contains numerous provisions as to venue and the apprehension of offenders. In another direction the powers of courts of Summary Jurisdiction (q.v.) have been extended, in the case of charges of larceny, embezzlement and receiving stolen goods, against children and young persons and against adults plead- ing guilty or waiving their right to trial by jury. The maximum punishment for larceny is fourteen years' penal servitude, but this can only be inflicted in certain exceptional cases, such as horse or cattle stealing and larceny by a servant or a person in the service of the crown or the police. The extreme punishment for simple larceny after a previous conviction for felony is ten years' penal servitude. Whipping may be part of the sentence on boys under sixteen.

Scotland. — A vast number of acts of the Scottish parliament dealt with larceny. The general policy of the acts was to make larceny what was not larceny at common law, e.g. stealing fruit, dogs, hawks or deer, and to extend the remedies, e.g. by giving the justiciar authority throughout the kingdom, by making the master in the case of theft by the servant liable to give the latter up to justice, or by allowing the use of firearms against thieves. The general result of legislation in England and Scotland has been to assimilate the law of larceny in both kingdoms. As a rule, what would be larceny in one would be larceny in the other.

United States. — The law depends almost entirely upon state legislation, and is in general accordance with that of England. The only acts of Congress bearing on the subject deal with larceny in the army and navy, and with larceny and receiving on the high seas or in any place under the exclusive jurisdiction of the United States, e.g. Alaska.

Alaska. — Stealing any goods, chattels, government note, bank note, or other thing in action, books of account, &c, is larceny: punishment, imprisonment for not less than one nor more than ten years if the property stolen is in value over $35. Larceny in any dwelling-house, warehouse, steamship, church, &c, is punishable by imprisonment for not less than one nor more than seven years. Larceny of a horse, mule, ass, bull, steer, cow or reindeer is punish- able by imprisonment for

not less than one nor more than fifteen years. Wilfully altering or defacing marks or brands on such animals is larceny (Pen. Code Alaska, § 45, 1899).

Arizona. — Appropriating property found without due inquiry for the owner is larceny (Penal Code, § 442). ” Dogs are property and of the value of one dollar each within the meaning of the terms ‘ property ‘ and ‘ value ‘ as used in this chapter ” (id. § 448). Pro- perty includes a passage ticket though never issued. Persons stealing property in another state or county, or who receive it knowing it to be stolen and bring it into Arizona, may be convicted and punished as if the offence was committed there (id. § 454). Stealing gas or water from a main is a misdemeanour.

Iowa. — It is larceny to steal electricity, gas or water from wires, meters or mains (L. 1903, ch. 132).

New York.— Larceny as defined by § 528 of the Penal Code in- cludes also embezzlement, obtaining property by false pretences, and felonious breach of trust (People v. Dumar, 106 N.Y. 508), but the method of proof required to establish these offences has not been changed. Grand larceny in the first degree is (a) stealing property of any value in the night time; (b) of $25 in value or more at night from a dwelling house, vessel or railway car; (c) of the value of more than $500 in any manner; in the second degree (a) stealing in any manner property of the value of over $25 and under $500; (b) taking from the person property of any value; (c) stealing any record of a court or other record filed with any public officer. Every other larceny is petit larceny. ” Value ” of any stock, bond or security having a market value is the amount of money due thereon or what, in any contingency, might be collected thereon; of any passenger ticket the price it is usually sold at. The value of any- thing else not fixed by statute is its market value. Grand larceny, in the first degree, is punishable by imprisonment not exceeding ten

years; in the second degree, not exceeding five years. Petit larceny is a misdemeanour (Penal Code, §§ 530-535). Bringing stolen goods into the state knowing them to be stolen is punishable as larceny within the state (id. § 540). A ” pay ticket ” for removing a load of snow may be the subject of larceny and its value the amount to be paid on it. (People v. Fletcher [1906] no App. D. 231).

Kansas. — The owner of goods who takes them from a railroad company with intent to defeat its lien for transportation charges is guilty of larceny. (Atchison Co. v. Hinsdell [1907] 90 Pac. Rep. 800).

Massachusetts. — Larceny includes embezzlement and obtaining money by false pretences. (Rev. L. 1902, ch. 218, § 40.) The failing to restore to or to notify the owner of property removed from premises on fire is larceny (id. ch. 208, § 22). It is larceny to purchase property (payment for which is to be made on or before delivery) by means of a false pretence as to means or ability to pay, provided such pretence is signed by the person to be charged. Indictment for stealing a will need not contain an allegation of value (id. § 29). A person convicted either as accessory or principal of three distinct larcenies shall be adjudged " a common and notorious thief " and may be imprisoned for not more than twenty years (id. 31). On second conviction for larceny of a bicycle, the thief may be im- prisoned for not more than five years. Larceny of things annexed to realty is punishable as if it were a larceny of personal property (id. §§ 33, 35).

Ohio. — Stealing " anything of value " is larceny (Bates Stats. § 6856). Tapping gas pipes is punishable by fine or imprisonment for not more than thirty days. Stealing timber having " timber dealers' " trade mark, or removing it from a stream, is punishable by a fine of not less than $20.

Utah. — It is grand larceny to alter the mark or brand on an animal (L. 1905, ch. 38).

Wyoming. — For branding or altering or defacing the brand on cattle with intent to steal, the penalty is imprisonment for not more than five years. It is larceny for a bailee to convert with intent to steal goods left with or found by him (Rev. Stats. §§ 4986,

4989).

Washington. — A horse not branded, but under Code § 6861 an " outlaw," the owner being unknown, can be the subject of a larceny, having been held to be property of the state. (State v. Eddy [1907], 90 Pac. Rep. 641). For the third offence of such a larceny the penalty is imprisonment for life (L. 1903, ch. 86).

See also Embezzlement; Cheating; False Pretences; Robbery; Stolen Goods.

LARCH (from the Ger. Larche, M.H.G. Lerche, Lat. larix), a name applied to a small group of coniferous trees, of which the common larch of Europe is taken, as the type. The members of the genus Larix are distinguished from the firs, with which they were formerly placed, by their deciduous leaves, scattered singly, as in Abies, on the young

shoots of the season, but on all older branchlets growing in whorl-like tufts, each surrounding the extremity of a rudimentary or abortive branch; they differ from cedars (Cedrus), which also have the fascicles of leaves on arrested branchlets, not only in the deciduous leaves, but in the cones, the scales of which are thinner towards the apex, and are persistent, remaining attached long after the seeds are discharged. The trees of the genus are closely allied in botanic features, as well as in general appearance, so that it is sometimes difficult to assign to them determinate specific characters, and the limit between species and variety is not always very accur- ately defined. Nearly all are natives of Europe, or the northern plains and mountain ranges of Asia and North America, though one (Larix Griffithii) occurs only on the Himalayas.

The common larch (L. europaea) is, when grown in perfection, a stately tree with tall erect trunk, gradually tapering from root to summit, and horizontal branches springing at irregular intervals from the stem, and in old trees often becoming more or less drooping, but rising again towards the extremities; the branchlets or side shoots, very slender and pendulous, are pretty thickly studded with the spurs each bearing a fascicle of thirty or more narrow linear leaves, of a peculiar bright light green when they first appear in the spring, but becoming of a deeper hue when mature. The yellow stamen-bearing flowers are in sessile, nearly spherical catkins; the fertile ones vary in colour, from red or purple to greenish-white, in different varieties; the erect cones, which remain long on the branches, are above an inch in length and oblong-ovate in shape, with reddish-brown scales somewhat waved on the edges, the lower bracts usually rather longer than the scales. The tree flowers in April or May, and the winged seeds are shed the following autumn. When standing in an open space, the larch grows of a nearly conical

shape, with the lower branches almost reaching the ground, while those above gradually diminish in length towards the top of the trunk, presenting a very symmetrical form; but in dense woods the lower parts become bare of foliage, as with the firs under similar circumstances. When springing up among rocks or on ledges, the stem sometimes becomes much curved, and, with its spreading boughs and pendent branchlets, often forms a striking and picturesque object in alpine passes and steep ravines. In the prevalent European varieties the bark is reddish-grey, and rather rough and scarred in old trees,

which are often much lichen-covered. The trunk attains a height of from 80 to 140 ft., with a diameter of from 3 to 5 ft. near the ground, but in close woods is comparatively slender in proportion to its altitude. The larch abounds on the Alps of Switzerland, on which it flourishes at an elevation of 5000 ft., and also on those of Tirol and Savoy, on the Carpathians, and in most of the hill regions of central Europe; it is not wild on the Apennine

Branchlet of Larch (Larix europaea).

chain, or the Pyrenees, and in the wild state is unknown in the Spanish peninsula. It forms extensive woods in Russia, but does not extend to Scandinavia, where its absence is somewhat remarkable, as the tree grows freely in Norway and Sweden where planted, and even multiplies itself by self-sown seed, according to F. C. Schubeler, in the neighbourhood of Trondhjem. In the north-eastern parts of Russia, in the country towards the Petchora river, and on the Ural, a peculiar variety prevails, regarded by some as a distinct species (L. sibirica) ; this form is abundant nearly throughout Siberia, extending to the Pacific coast of Kamchatka and the hills of the Amur region. The Siberian larch has smooth grey bark and smaller cones, approach- ing in shape somewhat to those of the American hackmatack; it seems even hardier than the Alpine tree, growing up to latitude 68°, but, as the inclement climate of the polar shores is neared, dwindling down to a dwarf and even trailing bush.

The larch, from its lofty straight trunk and the high quality of its wood, is one of the most important of coniferous trees; its growth is extremely rapid, the stem attaining a large size in from sixty to eighty years, while the tree yields good useful timber at forty or fifty; it forms firm heartwood at an early age, and the sapwood is less perishable than that of the firs, rendering it more valuable in the young state. •

The wood of large trees is compact in texture, in the best varieties of a deep reddish colour varying to brownish-yellow, but apt to be lighter in tint, and less hard in grain, when grown in rich soils or

in low sheltered situations. It is remarkably tough, resisting a rending strain better than any of the fir or pine woods in common use, though not as elastic as some; properly seasoned, it is as little liable to shrink as to split; the boughs being small compared to the trunk, the timber is more free from large knots, and the small knots remain firm and undecayed. The only drawback to these good qualities is a certain liability to warp and bend, unless very carefully seasoned; for this

purpose it is recommended to be left floating in water for a year after felling, and then allowed some months to dry slowly and completely before sawing up the logs; barking the trunk in winter while the tree is standing, and leaving it in that state till the next year, has been often advised with the larch as with other timber, but the practical inconveniences of the plan have prevented its adoption on any large scale. When well prepared for use, larch is one of the most durable of coniferous woods. Its strength and toughness render it valuable for naval purposes, to which it is largely applied; its freedom from any tendency to split adapts it for clinker-built boats. It is much employed for house-building; most of the picturesque log-houses in Vaud and the adjacent cantons are built of squared larch trunks, and derive their fine brown tint from the hardened resin that slowly exudes from the wood after long exposure to the summer sun ; the wooden shingles, that in Switzerland supply the place of tiles, are also frequently of larch. In Germany it is much used by the cooper as well as the carpenter, while the form of the trunk admirably adapts it for all purposes for which long straight timber is needed. It answers well for fence-posts and river piles; many of the founda- tions of Venice rest upon larch, the lasting qualities of which were well known and appreciated, not only in medieval times, but in the days of Vitruvius and Pliny. The harder and darker varieties are used in the construction of cheap solid furniture, being fine in grain and taking polish better than many more costly woods. A peculiarity of larch wood is the difficulty with which it is ignited, although so resinous; and, coated with a thin layer of plaster, beams and pillars of larch might probably be found to justify Caesar's epithet " igni impenetrable lignum"; even the small branches are not easily kept alight, and a larch fire in the open needs considerable care. Yet the forests of larch in Siberia often suffer from con- flagration. When these fires occur while the trees are full of sap, a curious mucilaginous matter is exuded from the half-burnt stems; when dry it is of pale reddish 'colour, like some of the coarser kinds of gum-arabic, and is soluble in water, the solution resembling gum- water, in place of which it is sometimes used ; considerable quantities are collected and sold as " Orenburg gum "; in Siberia and Russia it is occasionally employed as a semi-medicinal food, being esteemed an antiscorbutic. For burning in close stoves and furnaces, larch makes tolerably good fuel, its value being estimated by Hartig as only one-fifth less than that of beech; the charcoal is compact, and is in demand for iron-smelting and other metallurgic uses in some parts of Europe.

In the trunk of the larch, especially when growing in climates where the sun is powerful in summer, a fine clear turpentine exists in great

abundance; in Savoy and the south of Switzerland, it is collected for sale, though not in such quantity as formerly, when, being taken to Venice for shipment, it was known in commerce as ” Venice turpentine.” Old trees are selected, from the bark of which it is observed to ooze in the early summer; holes are bored in the trunk, somewhat inclined upward towards the centre of the stem, in which, between the layers ‘of wood, the turpentine is said to collect in small lacunae; wooden gutters placed in these holes convey the viscous fluid into little wooden pails hung on the end of each gutter; the secretion flows slowly all through the summer months, and a tree in proper condition yields from 6 to 8 Id a year, and will continue to give an annual supply for thirty or forty years, being, however, rendered quite useless for timber by subjection to this process. In Tirol, a single hole is made near the root of the tree in the spring; this is stopped with a plug, and the turpentine is removed by a scoop in the autumn ; but each tree yields only from a few ounces to | lb by this process. Real larch turpentine is a thick tenacious fluid, of a deep yellow colour, and nearly trans- parent; it does not harden by time; it contains 15% of the essential oil of turpentine, also resin, succinic, pinic and sylvic acids, and a bitter extractive matter. According to Pereira, much sold under the name of Venice turpentine is a mixture of common resin and oil of turpentine. On the French Alps a sweet exudation is found on the small branchlets of young larches in June and July, resembling manna in taste and laxative properties, and known as Manna de Briangon or Manna Brigantina ; it occurs in small whitish irregular granular masses, which are removed in the morning before they are too much dried by the sun; this manna seems to differ little in composition from the sap of the tree, which also contains mannite; its cathartic powers are weaker than those of the manna of the manna ash {Fraximus ornus), but it is employed in France for the same purposes. .

The bark of the larch is largely used in some countries for tanning; it is taken from the trunk only, being stripped from the trees when felled; its value is about equal to that of birch bark; but, according to the experience of British tanners, it is scarcely half as strong as that of the oak. The soft inner bark is occasionally used in Siberia as a ferment, by hunters and others, being boiled and mixed with

rye-meal, and buried in the snow for a short time, when it is em- ployed as a substitute for other leaven, and in making the sour liquor

called ” quass.” In Germany a fungus (Polyporus Laricis) grows on the roots and stems of decaying larches, which was formerly in esteem as a drastic purgative. The young shoots of the larch are sometimes given in Switzerland as fodder to cattle.

The larch, though mentioned by Parkinson in 1629 as “nursed up “by a few “lovers of variety” as a rare exotic, does not seem to have been much grown in England till early in the 18th century. In Scotland the date of its introduction is a disputed point, but it seems to have been planted at Dunkeld by the 2nd duke of Athole in 1727, and about thirteen or fourteen years later considerable plantations were made at that place, the commence- ment of one of the largest planting experiments on record; it is estimated that 14 million larches were planted on the Athole estates between that date and 1826. The cultivation of the tree rapidly spread, and the larch has become a conspicuous feature of the scenery in many parts of Scotland. It grows as rapidly and attains as large a size in British habitats suited to it as in its home on the Alps, and often produces equally good timber. The larch of Europe is essentially a mountain tree, and requires not only free air above, but a certain moderate amount of moisture in the soil beneath, with, at the same time, perfect drainage, to bring the timber to perfection. Where there is complete freedom from stagnant water in the ground, and abundant room for the spread of its branches to light and air, the larch will nourish in a great variety of soils, stiff clays, wet or mossy peat, and moist alluvium being the chief exceptions; in its native localities it seems partial to the debris of primitive and metamorphic rocks, but is occasionally found growing luxuriantly on calcareous subsoils; in Switzerland it attains the largest size, and forms the best timber, on the northern declivities of the mountains; but in Scotland a southern aspect appears most favourable.

The best variety for culture in Britain is that with red female flowers; the light-flowered kinds are said to produce inferior wood, and the Siberian larch does not grow in Scotland nearly as fast as the Alpine tree. The larch is raised from seed in immense numbers in British nurseries; that obtained from Germany is preferred, being more perfectly ripened than the cones of home growth usually are. The seeds are sown in April, on rich ground, which should not be too highly manured; the young larches are planted out when two years old, or sometimes transferred to a nursery bed to attain a larger size; but, like all conifers, they succeed best when planted young; on the mountains, the seedlings are usually put into a mere slit made in the ground by a spade with a triangular blade, the place being first cleared of any heath, bracken, or tall herbage that might smother the young tree; the plants should be from 3 to 4 ft. apart, or even more,

according to the growth intended before thinning, which should be begun as soon as the boughs begin to overspread much; little or no pruning is needed beyond the careful removal of dead branches. The larch is said not to succeed on arable land, especially where corn has been grown, but experience does not seem to support this view; that against the previous occupation of the ground by Scotch fir or Norway spruce is probably better founded, and, where timber is the object, it should not be planted with other conifers. On the Grampians and neighbouring hills the larch will flourish at a greater elevation than the pine, and will grow up to an altitude of 1700 or even 1800 ft.; but it attains its full size on lower slopes. In very dry and bleak localities, the Scotch fir will probably be more successful up to 900 ft. above the sea, the limit of the luxuriant growth of that hardy conifer in Britain; and in moist valleys or on imperfectly drained acclivities Norway spruce is more suitable. The growth of the larch while young is exceedingly rapid; in the south of England it will often attain a height of 25 ft. in the first ten years, while in favourable localities it will grow upwards of 80 ft. in half a century or less; one at Dunkeld felled sixty years after planting was no ft. high; but usually the tree does not increase so rapidly after the first thirty of forty years. Some larches in Scotland rival in size the most gigantic specimens standing in their native woods; a tree at Dalwick, Peeblesshire, attained 5 ft. in diameter; one at Glenarbuck, near the Clyde, grew above 140 ft. high, with a circumference of 13 ft. The annual increase in girth is often considerable even in large trees; the fine larch near the abbey of Dunkeld figured by Strutt in his Sylva Britannica increased 2\ ft. between 1796 and 1825, its measure- ment at the latter date being 13 ft., with a height of 97! ft.

In the south of England, the larch is much planted for the supply of hop-poles, though in parts of Kent and Sussex poles formed of Spanish chestnut are regarded as still more lasting. In plantations made with this object, the seedlings are placed very close (from i§ to 2 ft. apart), and either cut down all at once, when the required

height is attained or thinned out, leaving the remainder to gain a greater length; the land is always well trenched before planting. The best month for larch planting, whether for poles or timber, is November; larches are sometimes planted in the spring, but the practice cannot be commended, as the sap flows early, and, if a dry period follows, the growth is sure to be checked. The thinnings of the larch woods in the Highlands are in demand for railway sleepers, scaffold poles, and mining timber, and are applied to a variety of agricultural purposes. The tree generally succeeds on the Welsh hills.

The young seedlings are sometimes nibbled by the hare and rabbit; and on parts of the highland hills both bark and shoots are eaten in the winter by the roe-deer; larch woods should always be fenced in to keep out the hill-cattle, which will browse upon the shoots in spring. The ” woolly aphis,” ” American blight,” or ” larch blight ” (Eriosoma laricis) often attacks the trees in close valleys, but rarely spreads much unless other unhealthy conditions are present. The larch suffers from several diseases caused by- fungi ; the most important is the larch-canker caused by the parasit- ism of Peziza Willkommii. The spores germinate on a damp surface and enter the cortex through small cracks or wounds in the protecting layer. The fungus-mycelium will go on growing indefinitely in the cambium layer, thus killing and destroying a larger area year by year. The most effective method of treatment is to cut out the diseased branch or patch as early as possible. Another disease which is sometimes confused with that caused by the Peziza is ” heart-rot “; it occasionally attacks larches only ten years old or less, but is more common when the trees have acquired a considerable size, sometimes spreading in a short time through a whole plantation. The trees for a considerable period show little sign of unhealthiness, but eventually the stem begins to swell somewhat near the root, and the whole tree gradually goes off as the disease advances; when cut down, the trunk is found to be decayed at the centre, the ” rot ” usually com- mencing near the ground. Trees of good size are thus rendered nearly worthless, often showing little sign of unhealthiness till felled. Great difference of opinion exists among foresters as to the cause of this destructive malady; but it is probably the direct result of unsuitable soil, especially soil containing insufficient nourishment.

Considerable quantities of larch timber are imported into Britain for use in the dockyards, in addition to the large home supply. The quality varies much, as. well as the colour and density; an Italian sample in the museum at Kew (of a very dark red tint) weighs about 24J lb to the cub. ft., while a Polish specimen, of equally deep hue, is 44 lb 1 oz. to the same measurement.

For the landscape gardener, the larch is a valuable aid in the formation of park and pleasure ground; but it is never seen to such advantage as when hanging over some tumbling burn or rocky pass among the mountains. A variety with very pendent boughs, known as the ” drooping ” larch var. pendula, is occasionally met with in gardens.

The bark of the larch has been introduced into pharmacy, being given, generally in the form of an alcoholic tincture, in chronic bronchitic

affections and internal haemorrhages. It contains, in addition to tannin, a peculiar principle called larixin, which may be obtained in a pure state by distillation from a concentrated infusion of the bark; it is a colourless substance in long crystals, with a bitter and astringent taste, and a faint acid reaction; hence some term it larixinic acid.

The European larch has long been introduced into the United States, where, in suitable localities, it flourishes as luxuriantly as in Britain. Plantations have been made in America with an economic view, the tree growing much faster, and producing good timber at an earlier age than the native hackmatack (or tamarack), while the wood is less ponderous, and therefore more generally applicable.

The genus is represented in the eastern parts of North America by the hackmatack (L. americana), of which there are several varieties, two so well marked that they are by some botanists considered specifically distinct. In one (L. microcarpa) the cones are very small, rarely exceeding J in. in length, of a roundish- oblong shape; the scales are very few in number, crimson in the young state, reddish-brown when ripe; the tree much re- sembles the European larch in general appearance but is of more slender growth; its trunk is seldom more than 2 ft. in diameter and rarely above 80 ft. high; this form is the red larch, the epinette rouge of the French Canadians. The black larch (L. pendula) has rather larger cones, of an oblong shape, about f in. long, purplish or green in the immature state, and dark brown when ripe, the scales somewhat more numerous, the bracts all shorter than the scales. The bark is dark bluish-grey, smoother than in the red larch, on the trunk and lower boughs often glossy; the branches are more or less pendulous and very slender.

The red larch grows usually on higher and drier ground, ranging from the Virginian mountains to the shores of Hudson Bay; the black larch is found often on moist land, and even in swamps. The hackmatack is one of the most valuable timber trees of America; it is in great demand in the ports of the St Lawrence for shipbuilding. It is far more durable than any of the oaks of that region, is heavy and close-grained, and much stronger, as well as more lasting, than that of the pines and firs of Canada. In many parts all the finer trees have been cut down, but large woods of it still exist in the less accessible districts; it abounds especially near Lake St John, Quebec, and in Newfoundland is the prevalent tree in some of the forest tracts; it is

likewise common in Maine and Vermont. In the timber and building yards the ” red ” hackmatack is the kind preferred, the produce, probably, of L. microcarpa; the ” grey ” is less esteemed; but the varieties from which these woods are obtained cannot always be traced with certainty. Several fine specimens of the red larch exist in English parks, but its growth is much slower than that of L. europaea; the more pendulous forms of L. pendula are elegant trees for the garden. The hackmatacks might perhaps be grown with advantage in places too wet for the common larch.

In western America’ a larch (L. occidentalis) occurs more nearly resembling L. europaea. The leaves are short, thicker and more rigid than in any of the other larches; the cones are much larger than those of the hackmatacks, egg-shaped or oval in outline; the scales are of a fine red in the immature state, the bracts green and extending far beyond the scales in a rigid leaf-like point. The bark of the trunk has the same reddish tint as that of the common larch of Europe. It is the largest of all larches and one of the most useful timber trees of North America. Some of the trees are 250 ft. high and 6 to 8 ft. in diameter. The wood is the hardest and strongest of all the American conifers; it is durable and adapted for construction work or household furniture.

LARCHER, PIERRE HENRI (1726-1812), French classical scholar and archaeologist, was born at Dijon on the 12th of October 1726. Originally intended for the law, he abandoned it for the classics. His (anonymous) translation of Chariton’s Chaereas and Callirrhoe (1763) marked him as an excellent Greek scholar. His attack upon Voltaire’s Philosophie de I’historie (published under the name of l’Abbe Bazin) created considerable interest at the time. His archaeological and mytho- logical Memoire stir Venus (1775), which has been ranked with similar works of Heyne and Winckelmann, gained him admission to the Academie des Inscriptions (1778). After the imperial university was founded, he was appointed professor of Greek literature (1809) with Boissonade as his assistant. He died on the 22nd of December 1812. Larcher’s best work was his translation of Herodotus (1786, new ed. by L. Humbert, 1880) on the preparation of which he had spent fifteen years. The translation itself, though correct, is dull, but the com- mentary (translated into English, London, 1829, new ed. 1844, by W. D. Cooley) dealing with historical, geographical and chronological questions, and enriched by a wealth of illus- tration from ancient and modern authors, is not without value. See J. F. Bois&onade, Notice sur la vie et les ecrits de P. L. (1813) ; F. A. Wolf, Literarische Analecten, i. 205; D. A. Wyttenbach, Philomathia, iii. (1817).

LARCIUS (less accurately Lartius), TITUS, probably sur- named Flavus, a member of an Etruscan family (cf. Lars Tolumnius, Lars Porsena) early settled in Rome. When consul in 501 B.C. he was chosen dictator (the title and office being then introduced for the first time) to command against the thirty Latin cities, which had sworn to reinstate Tarquin in Rome. Other authorities put the appointment three years later, when the plebeians refused to serve against the Latins until they had been released from the burden of their debts. He opposed harsh measures against the Latins, and also inte- rested himself in the improvement of the lot of the plebeians. His brother, Spurius, is associated with Horatius Codes in the defence of the Sublician bridge against the Etruscans.

See Livy ii. 10, 18, 21, 29; Dion. Halic. v. 50-77, vi. 37; Cicero, De Re Publica, ii. 32.

LARD (Fr. lard, from Lat. laridum, bacon fat, related to Gr. Xapieos fat, Xapos dainty or sweet), the melted and strained fat of the common hog. Properly it is prepared from the ” leaf ” or fat of the bowel and kidneys, but in commerce the term as applied to products which include fat obtained from other parts of the animal and sometimes containing no ” leaf ” at all. Lard of various grades is made in enormous quantities by the great pork-packing houses at Chicago and elsewhere in

America. “Neutral lard” is prepared at a temperature of 4o°-5o° C. from freshly killed hogs; the finest quality, used for making oleomargarine, is got from the leaf, while the second, employed by biscuit and pastry bakers, is obtained from the fat of the back. Steam heat is utilized in extracting inferior qualities, such as “choice lard” and “prime steam lard,” the source of the latter being any fat portion of the animal. Lard is a pure white fat of a butter-like consistence; its specific gravity is about 0-93, its solidifying point about 27°-3o° C, and its melting point 3S°∼45°C. It contains about 60% of olein and 40% of palmitin and stearin. Adulteration is common, the substances used including ” stearin ” both of beef and of mutton, and vegetable oils such as cotton seed oil: indeed, mixtures have been sold as lard that contain nothing but such adulterants. In the pharmacopoeia lard figures as adeps and is employed as a basis for ointments. Benzoated lard, used for the same purpose, is prepared by heating lard with 3% of powdered benzoin for two hours; it keeps better than ordinary lard, but has slightly irritant, properties.

Lard oil is the limpid, clear, colourless oil expressed by hydraulic pressure and gentle heat from lard; it is employed for burning and for

lubrication. Of the solid residue, lard ” stearine,” the best qualities are utilized for making oleomargarine, the inferior ones in the manufacture of candles.

See J. Lewkowitsch, Oils, Fats and Waxes (London, 1909).

LARDNER, DIONYSIUS (1793-1859), Irish scientific writer, was born at Dublin on the 3rd of April 1793. His father, a solicitor, wished his son to follow the same calling. After some years of uncongenial desk work, Lardner entered Trinity College, Dublin, and graduated B.A. in 1817. In 1828 he became professor of natural philosophy and astronomy at University College, London, a position he held till 1840, when he eloped with a married lady, and had to leave the country. After a lecturing tour through the principal cities of the United States, which realized £40,000, he returned to Europe in 1845. He settled at Paris, and resided there till within a few months of his death, which took place at Naples on the 29th of April

1859-

Though lacking in originality or brilliancy, Lardner showed himself to be a successful popularizer of science. He was the author of numerous mathematical and physical treatises on such subjects as algebraic geometry (1823), the differential and integral calculus (1825), the steam engine” (1828), besides hand-books on various departments of natural philosophy (1854-1856) ; but it is as the editor of Lardner’s Cabinet Cyclopaedia (1830-1844) that he is best remembered. To this scientific library of 134 volumes many of the ablest savants of the day contributed, Lardner himself being the author of the treatises on arithmetic, geometry, heat, hydrostatics and pneumatics, mechanics (in conjunction with Henry Kater) and’ electricity (in conjunction with C. V. Walker). The Cabinet Library (12 vols., 1830-1832) and the Museum of Science and Art (12 vols., 1854-1856) are his other chief undertakings. A few original papers appear in the Royal Irish Academy’s Transactions (1824), in the Royal Society’s Proceedings (1831-1836) and in the Astronomical Society’s Monthly Notices (1852-1853); and two Reports to the British Association on railway constants (1838, 1841) are from his pen.

LARDNER, NATHANIEL (1684-1768), English theologian, was born at Hawkhurst, Kent. After studying for the Presby- terian ministry in London, and also at Utrecht and Leiden, he took licence as a preacher in 1709, but was not successful. In 1 7 13 he entered the family of a lady of rank as tutor and domestic chaplain, where he remained until 1721. In 1724 he was appointed to deliver the Tuesday evening

lecture in the Presbyterian chapel, Old Jewry, London, and in 1729 he became assistant minister to the Presbyterian congregation in Crutched Friars. He was given the degree of D.D. by Marischal College, Aberdeen, in 1745. He died at Hawkhurst on the 24th of July

1768.

An anonymous volume of Memoirs appeared in 1769; and a life by Andrew Kippis is prefixed to the edition of the Works of Lardner, published in 11 vols., 8vo in 1788, in 4 vols. 4to in 1817, and 10 vols. 8vo in 1827. The full title of his principal work — a work which, though now out of date, entitles its author to be regarded as the founder of modern critical research in the field of early Christian literature — is The Credibility of the Gospel History; or the Principal Facts of the New Testament confirmed by Passages of Ancient Authors,

who were contemporary with our Saviour or his Apostles, or lived near their time. Part i., in 2 vols. 8vo, appeared in 1727; the publication of part ii., in 12 vols. 8vo, began in 1733 and ended in 1755. In 1730 there wasa second edition of part i., and the Additions and Alterations were also published separately. A Supplement, otherwise entitled A History of the Apostles and Evangelists, Writers of the New Testa- ment, was added in 3 vols. (1756-1757), and reprinted in 1760. Other works by Lardner are A Large Collection of Ancient Jewish and Heathen Testimonies to the Truth of the Christian Revelation, with Notes and Observations (4 vols., 4to, 1764-1767); The History of the Heretics of the two first Centuries after Christ, published post- humously in 1780 and a considerable number of occasional sermons.

LAREDO, a city and the county-seat of Webb county, Texas, U.S.A., and a sub-port of entry, on the Rio Grande opposite Nuevo Laredo, Mexico, and 150 m. S. of San Antonio. Pop. (1900) 13,429, of whom 6882 were foreign-born (mostly Mexi- cans) and 82 negroes; (1910 census) 14,855. It is served by the International & Great Northern, the National of Mexico, the Texas Mexican and the Rio Grande & Eagle Pass railways, and is connected by bridges with Nuevo Laredo. Among the principal buildings are the U.S. Government Building, the City Hall and the County Court House; and the city's institu- tions include the Laredo Seminary (1882) for boys and girls, the Mercy Hospital,

the National Railroad of Mexico Hospital and an Ursuline Convent. Loma Vista Park (65 acres) is a pleasure resort, and immediately W. of Laredo on the Rio Grande is Fort Mcintosh (formerly Camp Crawford), a United States military post. Laredo is a jobbing centre for trade between the United States and Mexico, and is a sub-port of entry in the Corpus Christi Customs District. It is situated in a good farming and cattle-raising region, irrigated by water from the Rio Grande. The principal crop is Bermuda onions; in 1909 it was estimated that 1500 acres in the vicinity were devoted to this crop, the average yield per acre being about 20,000 lb. There are coal mines about 25 m. above Laredo on the Rio Grande, and natural gas was discovered about 28 m. E. in 1908. The manufacture of bricks is an important industry. Laredo was named from the seaport in Spain, and was founded in 1767 as a Mexican town; it originally included what is now Nuevo Laredo, Mexico, and was long the only Mexican town on the left bank of the river. It was captured in 1846 by a force of Texas Rangers, and in 1847 was occupied by U.S. troops under General Lamar. In 1852 it was chartered as a city of Texas.

LA R£OLE, a town of south-western France, capital of an arrondissement in the department of Gironde, on the right bank of the Gironde, 38 m. S.E. of Bordeaux by rail. Pop. (1906) 3469. La Reole grew up round a monastery founded in the 7th or 8th century, which was reformed in the nth century and took the name of Regula, whence that of the town. A church of the end of the 12th century and some of the buildings (18th century) are left. There is also a town hall of the 12th and 14th centuries. The town fortifications were dismantled by order of Richelieu, but remains dating from the 12th and 14th centuries are to be seen, as well as a ruined chateau built by Henry II. of England. La Reole has a sub-prefecture, a tribunal of first instance, a communal college and an agricultural school. The town is the centre of the district in which the well-known breed of Bazadais cattle is reared. It is an agricultural market and carries on trade in the wine of the region together with liqueur distillery and the manufacture of casks, rope, brooms, &c. LARES (older form Lases), Roman tutelary deities. The word is generally supposed to mean ” lords,” and identified with Etruscan larlh, lar; but this is by no means certain. The attempt to harmonize the Stoic demonology with Roman religion led to the Lares being compared with the Greek ” heroes ” during the period of Greco-Roman culture, and the word is frequently translated rjpcoes. In the later period of the republic they are confounded with the Penates (and other deities), though the distinction between them was probably more sharply marked in earlier times. They were originally gods of the cultivated fields, worshipped by each household

where its allotment joined those of others (see below). The distinction between public and private Lares existed from early times. The latter were worshipped in the house by the family alone, and the household

Lar (jamiliaris) was conceived of as the centre-point of the family and of the family cult. The word itself (in the singular) came to be used in the general sense of ” home.” It is certain that originally each household had only one Lar; the plural was at first only used to include other classes of Lares, and only gradually, after the time of Cicero, ousted the singular. The image of the Lar, made of wood, stone or metal, sometimes even of silver, stood in its special shrine {lararium), which in early times was in the atrium, but was afterwards transferred to other parts’ of the house, when the family hearth was removed from the atrium. In some of the Pompeian houses the lararium was represented by a niche only, containing the imagcof the lar. It was usually a youthful figure, dressed in a short, high-girt tunic, holding in one hand a rhyton (drinking-horn), in the other a patera (cup). Under the Empire we find usually two of these, one on each side of the central figure of the Genius of the head of the household, sometimes of Vesta the hearth-deity. The whole group was called indifferently Lares or Penates. A prayer was said to the Lar every morning, and at each meal offerings of food and drink were set before him; a portion of these was placed on the hearth and afterwards shaken into the fire. Special sacrifices were offered on the kalends, nones, and ides of every month, and on the occasion of important family events. Such events were the birthday of the head of the household; the assumption of the toga virilis by a son; the festival of the Caristia in memory of deceased members of the household; recovery from illness; the entry of a young bride into the house for the first time; return home after a long absence. On these occasions the Lares were crowned with garlands, and offerings of cakes and honey, wine and incense, but especially swine, were laid before them. Their worship persisted throughout the pagan period, although its character changed considerably in later times. The emperor Alexander Severus had images of Abraham, Christ and Alexander the Great among his household Lares.

The public Lares belonged to the state religion. Amongst these must be included, at least after the time of Augustus, the Lares compitales. Originally two. in number, mythologically the sons of Mercurius and Lara (or Larunda), they were the presiding deities of the cross-roads (compita), where they had their special chapels. It has been maintained by some that they are the twin brothers so frequent in early religions, the Romulus and Remus of the Roman foundation legends. Their sphere of influence included not only the cross-roads,

but the whole neighbouring district of the town and country in which they were situated. They had a special annual festival, called Compitalia, to which public games were added some time during the republican period. When the colleges of freedmen and slaves, who assisted the presidents of the festival, were abolished by Julius Caesar, it fell into disuse. Its importance was revived by Augustus, who added to these Lares his own Genius, the religious personi- fication of the empire.

The state itself had its own Lares, called praeslites, the protect- ing patrons and guardians of the city. They had a temple and altar on the Via Sacra, near the Palatine, and were represented on coins as young men wearing the chlamys, carrying lances, seated, with a dog, the emblem of watchfulness, at their feet. Mention may also be made of the Lares gmndules, whose worship was connected with the white sow of Alba Longa and its thirty young (the epithet has been connected with grunnire, to grunt) : the viales, who protected travellers; the hostilii, who kept off the enemies of the state; the permarini, connected with the sea, to whom L. Aemilius Regillus, after a naval victory over Antiochus (190 B.C.), vowed a temple in the Campus Martius, which was dedicated by M. Aemilius Lepidus the censor in

179.

The old view that the Lares were the deified ancestors of the family has been rejected lately by Wissowa, who holds that the Lar was originally the protecting spirit of a man's lot of arable land, with a shrine at the compitum, i.e. the spot where the path bounding his arable met that of another holding; and thence found his way into the house, j

In addition to the manuals of Marquardt and Preller-Jordan, and Roscher's Lexikon der Mythologie, see A. de Marchi, II Culto privato di Roma antica (1896-1903), p. 28 foil.; G. Wissowa, Religion und Kultus der Rbmer (1902), p. 148 foil.; Archiv fur Religions-wissenschaft (1904, p. 42 foil.) and W. Warde Fowler in the same periodical (1906-, p. 529).

LA REVELLIERE-LEPEAUX, LOUIS MARIE DE (1753- 1824), French politician, member of the Directory, the son of J. B. de la Revelliere, was born at Montaign (Vendee), on the 24th of August 1753. The

name of Lepeaux he adopted from a small property belonging to his family, and he was known locally as M. de Lepeaux. He studied law at Angers and Paris, being called to «the bar in 1775. A deputy to the states-general in 1 789, he returned at the close of the session to Angers, where with his school-friends J. B. Leclerc and Urbain Rene Pilastre he sat on the council of Maine-et-Loire, and had to deal with the first Vendeen outbreaks. In 1792 he was returned by the department to the Convention, and on the 19th of November he proposed the famous decree by which France offered protec- tion to foreign nations in their struggle for liberty. Although La Revelliere-Lepeaux voted for the death of Louis XVI., he was not in general agreement with the extremists. Proscribed with the Girondins in 1793 he was in hiding until the revolution of 9-10 Thermidor (27th and 28th of July 1794). After serving on the commission to prepare the initiation of the new constitution he became in July 1795 president of the Assembly, and shortly afterwards a member of the Committee of Public Safety. His name stood first on the list of directors elected, and he became president of the Directory. Of his colleagues he was in alliance with Jean Francois Rewbell and to a less degree with Barras, but the greatest of his fellow-directors, Lazare Carnot, was the object of his undying hatred. His policy was marked by a bitter hostility to the Christian religion, which he proposed to supplant as a civilizing agent by theophilanthropy, a new religion invented by the English deist David Williams. The credit of the coup d'etat of 18 Fructidor (4th of September 1797), by which the allied directors made themselves supreme, La Revelliere arrogated to himself in his Memoires, which in this as in other matters must be read with caution. Compelled to resign by the revolu- tion of 30 Prairial (18th of June 1799) he lived in retirement in the country, and even after his return to Paris ten years later took no part in public affairs.' He died on the 27th of March 1824.

The Memoires of La Revelliere-Lepeaux were edited by R. D. D'Angers (Paris, 3 vols., 1895). See also E. Charavay, La Revelliere- Lepeaux el ses memoires (1895) and A. Meynier, Un Representant de la bourgeoisie angevine (1905).

LARGENTIERE, a town of south-eastern France, capital of an arrondissement in the department of Ardeche, in the narrow valley of the Ligne, 29 rn. S.W. of Privas by road. Pop. (1906) 1690. A church of the 12th, 13th and 15th centuries and the old castle of the bishops of Viviers, lords of Largentiere, now used as a hospital, are the chief buildings. The town is the seat of a sub-prefect and of a tribunal of first instance; and has silk-mills, and carries on silk-spinning, wine-growing and trade in fruit and silk. It owes its name to silver-mines

worked in the vicinity in the middle ages.

LARGILLIERE, NICOLAS (1656-1746), French painter, was born at Paris on the 20th of October 1656. His father, a merchant, took him to Antwerp at the age of three, and while a lad he spent nearly two years in London. The attempt to turn his attention to business having failed, he entered, some time after hii return to Antwerp, the studio of Goubeau, quitting this at the age of eighteen to seek his fortune in England, where he was befriended by Lely, who employed him for four years at Windsor. His skill attracted the notice of Charles II., who wished to retain him in his service, but the fury aroused against Roman Catholics by the Rye House Plot alarmed Largilliere, and he went to Paris, where he was well received by Le Brun and Van der Meulen. In spite of his Flemish training, his reputation, especially as a portrait-painter, was soon established; his brilliant colour and lively touch attracted all the celebrities of the day — actresses, public men and popular preachers flocking to his studio. Huet, bishop of Avranches, Cardinal de Noailles, the Duclos and

President Lambert, with his beautiful wife and daughter, are amongst his most noted subjects. It is said that James II. recalled Largilliere to England on his accession to the throne in 1685, that he declined the office of keeper of the royal collections, but that, during a short stay in London, he painted portraits of the king, the queen and the prince of Wales. This last is impossible, as the birth of the prince did not take place till 1688; the three portraits, therefore, painted by Largilliere of the prince in his youth must all have been executed in Paris, to which city he returned some time before March 1686, when he was received by the Academy as a member, and presented as his diploma picture the fine portrait of Le Brun, now in the Louvre. He was received as an historical painter; but, although he occasionally produced works of that class (" Crucifixion," engraved by Roettiers), and also treated subjects of still life, it was in historical portraits that he excelled. Horace Walpole states that he left in London those of Pierre van der Meulen and of Sybrecht. Several of his works are at Versailles. The church of St Etienne du Mont at Paris contains the finest example of Largilliere's work when dealing with large groups of figures; it is an ex voto offered by the city to St Genevieve, painted in 1694, and containing por- traits of all the leading officers of the municipality. Largilliere passed through every post of honour in the Academy, until in 1743 he was made chancellor. He died on the 20th of March 1746. Jean Baptiste Oudry was the most distinguished of his pupils. Largilliere's work found skilful interpreters in Van Schuppen, Edelinck, Desplaces, Drevet, Pitou and other engravers.

LARGS, a police burgh and watering place of Ayrshire, Scotland. Pop. (1901) 3246. It is situated 43 m. W. by S. of Glasgow by the Glasgow & South-Western railway. Its fine beach and dry, bracing climate have attracted many wealthy residents, and the number of summer visitors is also large. The public buildings include the Clark hospital, the Victoria infirmary convalescent home and the Stevenson institute and mechanics' library. Skelmorlie Aisle, the sole relic of the old parish church of St Columba, was converted into a mausoleum in 1636. Near it a mound covers remains, possibly those of the Norwegians who fell in the battle (1263) between Alexander III. and Haco, king of Norway. The harbour is used mainly by Clyde passenger steamers and yachtsmen. From the quay a – broad esplanade has been constructed northwards round the bay, and there is an excellent golf course. Kelburne Castle, 2 m. S., a seat of the earl of Glasgow, stands in romantic scenery. Fairlie, 3 m. S., another seaside resort, with a station on the Glasgow & South-Western railway, is the connecting-point for Millport on Great Cumbrae. Once a fishing village, it has acquired a great reputation for its yachts.

LARGUS, SCRIBONIUS, court physician to the emperor Claudius. About a.d. 47, at the request of Gaius Julius Callistus, the emperor's freedman, he drew up a list of 271 prescriptions (Cotnpositiones) , most of them his own, although he acknowledged his indebtedness to his tutors, to friends and to the writings of eminent physicians. Certain old wives' remedies are also in- cluded. The work has no pretensions to style, and contains many colloquialisms. The greater part of it was transferred without acknowledgment to the work of Marcellus Empiricus (c. 410), De Medicamentis Empiricis, Physicis, et Rationabilibus, which is of great value for the correction of the text of Largus. See the edition of the Compositiones by G. Helmreich (Teubner series, 1887).

LARINO (anc. Larinum) a town and episcopal see of the Molise (province of Campobasso), Italy, 32 m. N.E. of Campobasso by rail (20 m. direct), 984 ft. above sea-level. Pop. (1901) 7044. The cathedral, completed in 1319, has a good Gothic facade; the interior has to some extent been spoilt by later restoration. The campanile rests upon a Gothic arch erected in 1451- The Palazzo Comunale has a courtyard of the 16th century. That the ancient town (which is close to the modern) existed before the Roman supremacy had extended so far is proved by the coins. It lay in the 2nd Augustan region (Apulia), but the people belonged to the Frentani by race. Its strong position gave

it importance in the military history of Italy from the Hanni- balic wars onwards. The town was a municipiiim, situated on the main road to the S.E., which left the coast at Histonium (Vasto) and ran from Larinum E. to Sipontum. From Larinum a branch road ran to Bovianum Vetus. Remains of its city walls, of its amphitheatre and also of baths, &c, exist, and it did not cease to be inhabited until after the earthquake of 1300, when the modern city was established. Cluentius, the client of Cicero, who delivered a speech in his favour, was a native of Larinum, his father having been praetor of the allied forces in the Social War. (T.As.)

LARISSA (Turk. Yeni Shehr, ” new town “), the most im- portant town of Thessaly, situated in a rich agricultural district on the right bank of the Salambria (Peneios, Peneus, Peneius), about 35 m. N.W. of Volo, with which it is connected by rail. Pop. (1889) 13,610, (1907) 18,001. Till 1881 it was the seat of a pasha in the vilayet of Jannina; it is now the capital of the Greek province and the seat of a nomarch. Its long subjection to Turkey has left little trace of antiquity, and the most striking features in the general view are the minarets of the disused mosques (only four are now in use) and the Mahommedan burying-grounds. It was formerly a Turkish military centre and most of the people were of Turkish blood. In the outskirts is a village of Africans from the Sudan — a curious remnant of the forces collected by Ali Pasha. The manufactures include Turkish leather, cotton, silk and tobacco; trade and industry, however, are far from prosperous, though improving owing to the immigra- tion of the Greek commercial element. Fevers and agues are prevalent owing to bad drainage and the overflowing of the river; and the death-rate is higher than the birth-rate. A considerable portion of the Turkish population emigrated in 1881; a further exodus took place in 1898. The department of Larissa had in 1907 a population of 95,066.

Larissa, written Larisa on ancient coins and inscriptions, is near the site of the Homeric Argissa. It appears in early times, when Thessaly was mainly governed by a few aristocratic families, as an important city under the rule of the Aleuadae, whose authority extended over the whole district of Pelasgiotis. This powerful family possessed for many generations before 369 B.C. the privilege of furnishing the Tagus, or generalissimo, of the combined Thessalian forces. The principal- rivals of the Aleuadae were the Scopadae of Crannon, the remains of which (called by the Turks Old Larissa) are about 14 m. to the S.W. The inhabitants sided with Athens during the Peloponnesian War, and during the Roman invasion their city was of considerable

importance. Since the 5th. century it has been the scat of an archbishop, who has now fifteen suffragans. Larissa was the headquarters of Ali Pasha during the Greek War of Independ- ence, and of the crown prince Constantine during the Greco-Turkish War; the flight of the Greek army from this place to Pharsala took place on the 23rd of April 1897. Notices of some ancient inscriptions found at Larissa are given by Miller in Melanges philologiques (Paris, 1880) ; several sepulchral reliefs were found in the neighbourhood in 1882. A few traces of the ancient acropolis and theatre are still visible.

The name Larissa was common to many ” Pelasgian ” towns, and apparently signified a fortified city or burg, such as the citadel of Argos. Another town of the name in Thessaly was Larissa Cremaste, surnamed Pelasgia (Strabo ix. p. 440), situa'.ed on the slope of Mt. Othrys. (J. D. B.)

LARISTAN, a sub-province of the province of Fars in Persia, bounded E. and N.E. by Kerman and S. by the Persian Gulf. It lies between 26 30′ and 28 25′ N. and between 52 30′ and 55 30′ E. and has an extreme breadth and length of 120 and 210 m. respectively, with an area of about 20,000 sq. m. Pop. about 90,000. Laristan consists mainly of mountain ranges in the north and east, and of arid plains varied with rocky hills and sandy valleys stretching thence to the coast. In the highlands, where some fertile upland tracts produce corn, dates and other fruits, the climate is genial, but elsewhere it is extremely sultry, and on the low-lying coast lands malarious. Good water is everywhere so scarce that but for the rain preserved in cisterns the country would be mostly uninhabitable. Many cisterns are infested with Guinea worm {filaria medinensis, Gm.). The coast is chiefly occupied by Arab tribes who were virtually inde- pendent, paying merely a nominal tribute to the shah's govern- ment until 1898. They reside in small towns and mud forts scattered along the coast. The people of the interior are mostly

of the old Iranian stock, and there are also a few nomads of the Turkish Baharlu tribe which came to Persia in the nth century when the province was subdued by a Turkish chief. Laristan remained an independent state under a Turkish ruler until 1602, when Shah Ibrahim Khan was deposed and put to death by Shah 'Abbas the Great. The province is subdivided into eight districts: (1) Lar, the capital and environs, with 34 villages; (2) Bikhah Ihsham with n; (3) Bikhah Fal with 10; (4) Jehangiriyeh with 30; (s) Shibkuh with 36; (6) Fumistan with 13; (7) Kauristan with 4; (8) Mazayijan with 6 villages. Lingah, with its principal place Bander Lingah and n villages, formerly a part of Laristan, is now included in the ” Persian Gulf Ports,” a separate

administrative division. Laristan is famous for the condiment called mahiabeh (fish-jelly), a com- pound of pounded small sprat-like fish, salt, mustard, nutmeg, cloves and other spices, used as a relish with nearly all foods.

LARIVEY, PIERRE (c. 1550-1612), French dramatist, of Italian origin, was the son of one of the Giunta, the famous printers of Florence and Venice. The family was established at Troyes and had taken the name of Larivey or L'Arrivey, by way of translation from giunto. Pierre Larivey appears to have cast horoscopes, and to have acted as clerk to the chapter of the church of St Etienne, of which he eventually became a canon. He has no claim to be the originator of French comedy. The Corrivaux of Jean de la Taille dates from 1562, but Larivey naturalized the Italian comedy of intrigue in France. He adapted, rather than translated, twelve Italian comedies into French prose. The first volume of the Comedies facetieuses appeared in 1579, and the second in 161 1. Only nine in all were printed. 1 The licence of the manners depicted in these plays is matched by the coarseness of the expression. Larivey's merit lies in the use of popular language in dialogue, which often rises to real excellence, and was not without influence on Moliere and Regnard. Moliere's L'Avare owes something to the scene in Larivey's masterpiece, Les Esprits, where Severin laments the loss of his purse, and the opening scene of the piece seems to have suggested Regnard's Retour imprevu. It is uncertain whether Larivey's plays were represented, though they were evidently written for the stage. In any case prose comedy gained very little ground in popular favour before the time of Moliere. Larivey was the author of many translations, varying in subject from the Facetieuses nuits (1573) of Straparola to the Humanite de Jesus-Christ (1604) from Pietro Aretino.

LARK (O. Eng. lawerce, Ger. Lerche, Dan. Laerke, Dutch Leeu- werik), a bird's name used in a rather general sense, the specific meaning being signified by a prefix, as skylark, titlark, woodlark. It seems to be nearly conterminous with the Latin Alauda as used by older authors; and, though this was to some extent limited by Linnaeus, several of the species included by him under the genus he so designated have long since been referred elsewhere. By Englishmen the word lark, used without qualifica- tion, almost invariably means the skylark, Alauda arvensis, which, as the best-known and most widely spread species through- out Europe, has been invariably considered the type of the genus. Of all birds it holds unquestionably the foremost place in English literature. It is one of the most favourite cage birds, as it will live for many years in captivity, and, except in the season of moult, will pour forth its thrilling song many times in an hour for weeks or

months together. The skylark is probably the most plentiful of the class in western Europe. Not only does it frequent almost all unwooded districts in that quarter of the globe, but, unlike most birds, its numbers increase with the spread of agricultural improvement. Nesting chiefly in the growing corn, its eggs and young are protected in a great measure from molestation; and, as each pair of birds will rear several broods

1 Le Laquais, from the Ragazzo of Ludovico Dolce ; La Veuve, from the Vedova of Nicolo Buonaparte; Les Esprits, from the Aridosio of Lorenzino de Medicis; Le Morfondu, from the Gelosia of Antonio Grazzini; Les Jaloux, from the Gelosi of Vincent Gabbiani; and Les Escolliers, from the Cecca of Girolamo Razzi, in the first volume; and in the second, Constance, from the Costanza of Razzi; Le Fidele, from the Fedele of Luigi Pasqualigo; and Les Tromperies, from the Inganni of N. Secchi.

in the season, their produce on the average may be set down as at least quadrupling the original stock — the eggs in each nest varying from five to three. Young larks leave their birth- place as soon as they can shift for themselves. When the stubbles are cleared, old and young congregate in flocks.

In Great Britain in the autumn they give place to others coming from more northerly districts, and then as winter succeeds in great part vanish, leaving but a tithe of the numbers previously present. On the approach of severe weather great flocks arrive from the continent of Europe. On the east coast of both Scotland and England this immigration has been noticed as occurring in a constant stream for as many as three days in succession. Farther inland the birds are observed ” in numbers simply incalculable,” and ” in countless hundreds.” In these migrations enormous numbers are netted for the markets, but the rate of reproduction is so rapid, and the conditions of life so favourable in Europe that there is no reason to fear any serious diminution in the numbers of the species.

The skylark’s range extends across the Old World from the Faeroe to the Kurile Islands. In winter it occurs in North China, Nepal, the Punjab, Persia, Palestine, Lower Egypt and Barbary. It sometimes strays to Madeira, and has been killed in Bermuda, though its unassisted appearance there is doubtful. It has been successfully

introduced on Long Island, in the state of New York, into Hawaii and into New Zealand — in which latter it has become as troublesome a denizen as are some other subjects upon which acclimatization societies have exercised their activity.

Fig. i.— A, Alauda agrestis ; B, Alauda arvensis.

Allied to the skylark a considerable number of species have been described, of which perhaps a dozen may be deemed valid, besides a supposed local race, Alauda agrestis, the difference between which and the normal bird is shown in the annexed woodcut (fig. i), kindly lent to this work by H. E. Dresser, in whose Birds of Europe it is described at length. These are found in various parts of Africa and Asia.

The woodlark, Luttula arborea, is a much more local and, there- fore, a far less numerous bird than the skylark, from which it may be easily distinguished by its finer bill, shorter tail, more spotted breast and light superciliary stripe. Though not actually inhabiting woods, as its common name might imply, it is seldom found far from trees. Its song wants the variety and power of the skylark's, but has a resonant sweetness peculiarly its own. The bird, however, requires much care in captivity. It has by no means so wide a range as the skylark, and perhaps the most eastern locality recorded for it is Erzerum, while its appearance in Egypt and even in Algeria must be accounted rare.

Not far removed from the foregoing is a group of larks char- acterized by a larger crest, a stronger and more curved bill, a rufous lining to the wings, and some other minor features. This group has been generally termed Galerita, and has for its type the crested lark, the Alauda cristata of Linnaeus, a bird common enough in parts of France and some other countries of the European continent, and one which has been obtained several times in the British Islands. Many of the birds of this group frequent the borders if not the interior of deserts, and such as do so exhibit a more or less pale coloration, whereby they are

assimilated in hue to that of their haunts. The same character- istic may be observed in several other groups — especially those known as belonging to the genera Calandrella, Ammomanes and Certhilauda, some species of which are of a light sandy or cream colour. The genus last named is of very peculiar appearance, presenting in some respects an extraordinary resemblance to the hoopoes, so much so that the first specimen described was referred to the genus Upupa, and named U. alaudipes. The resemblance, however, is merely one of analogy.

-A, Luttula arborea ; B Certhilauda.

Fig. 3. — A, Melanocorypha cal- andra; B ,Rhamphocorys clot-bey.

There is, however, abundant evidence of the susceptibility of the Alaudine structure to modification from external circum- stances — in other words, of its plasticity; and perhaps no homogeneous group of Passeres could be found which better displays the working of natural selection. Almost every character that among Passerine birds is accounted most sure is in the larks found subject to modification. The form of the bill varies in an extraordinary degree. In the woodlark (fig.

2, A), already noticed, it is almost as slender as a warbler's; in Ammomanes it is short; in Certhilauda (fig. 2, B) it is elon- gated and curved; in Pyrrhulauda and Melanocorypha (fig.

3, A) it is stout and finchlike; while in Rhamphocorys (fig. 3, B) it is exaggerated to an extent that surpasses almost any Fringilline form, exceeding in its development that found in some members of the perplexing genus Paradoxomis, and even presenting a resemblance to the same feature in the far-distant Anastomus — the tomia of the maxilla not meeting those of the mandibula along their whole length, but leaving an open space between them. The hind claw, generally greatly elongated in larks, is in Calandrella (fig. 4) and some other genera reduced

Fig. 4. — Calandrella brachydactyla.

to a very moderate size. The wings exhibit almost every modification, from the almost entire abortion of the first primary in the skylark to its considerable development (fig. 5), and from tertials and scapulars of ordinary length to the extreme elonga- tion found in the Motacillidae and almost in certain Limicolae. The most constant character indeed of the Alaudidae would seem to be that afforded by the podotheca or covering of the tarsus, which is scutellate behind as well as in front, but a character easily overlooked. 1

In the Old World larks are found in most parts of the

1 By assigning far too great an importance to this superficial char- acter (in comparison with others), C. J. Sundevall (Tentamen, pp. 53-63) was induced to array the larks, hoopoes and several other heterogeneous groups in one " series," to which he applied the name of Scutelliplantares.

Palaearctic, Ethiopian and Indian regions; but only one genus, Mirafra, inhabits Australia, where it is represented by, so far as is ascertained, a single species, M. horsfieldi; and there is no true lark indigenous to New Zealand. In the New World there is also only one genus, Otocorys, where it is represented by many races, some of which closely approach the Old World shore-lark, O. alpeslris. The shore-lark is in Europe a native of only the extreme north, but is very common near the shores of the Varanger Fjord, and likewise breeds on mountain-tops farther south-west, though still well within the Arctic circle. The mellow tone of its call-note has obtained for it in Lapland a name signifying ” bell-bird,” and the song of the ccck is lively, though not very loud. The bird trustfully resorts to

the neighbourhood of houses, and even enters the villages of East Finmark in search of its food. It produces at least two broods in the season, and towards autumn migrates to lower latitudes in large flocks. These have been observed in winter on the east coast of Great Britain, and the species instead of being regarded, as it Fig. 5. — A, Alauda arborea; B, Certhi- once was, in the light lauda; C, Melanocorypha calandra. of an accidental

visitor to the United Kingdom, must now be deemed an almost regular visitor, though in very varying numbers. The observa- tions on its habits made by Audubon in Labrador have long been known, and often reprinted. Other congeners of this bird are the O. penicillata of south-eastern Europe, Palestine and central Asia — to which are referred by H. E. Dresser (B. Europe, iv. 401) several other forms originally described as distinct. All these- birds, which have been termed horned larks, from the tuft of elongated black feathers growing on each side of the head, form a little group easily recognized by their peculiar coloration, which calls to mind some of the ringed plovers, Aegialitis.

The name of lark is also frequently applied to many birds which do not belong to the Alaudidae as now understood. The mud-lark, rock-lark, tit-lark and tree-lark are pipits (q.v.). The grasshopper-lark is one of the aquatic warblers (q.v.), while the so-called meadow-lark of America is an Icterus (q.v.). Sand-lark and sea-lark are likewise names often given to some of the smaller members of the Limicolae. Of the true larks, Alaudidae, there may be perhaps about one hundred species, and it is believed to be a physiological character of the family

that they moult but once in the year, while the pipits, which in general appearance much resemble them, undergo a double moult, as do others of the Motacillidae, to which they are most nearly allied. (A. N.)

LARKHALL, a mining and manufacturing town of Lanark- shire, Scotland, near the left bank of the Clyde, 1 m. S.E. of Glasgow by the Caledonian railway. Pop. (1901) 11,879. The highest bridge in Scotland has been thrown across the river Avon, which flows close by. Brick-making is carried on at several of the adjoining collieries. Other industries include bleach- ing, silk-weaving, fire-clay and enamelling works, and a sanitary appliances factory. The town has a public hall and baths.

LARKHANA, a town and district of British India, in Sind, Bombay. The town is on a canal not far from the Indus, and has a station on the North-Western railway, 281 m. N. by E. of Karachi. It is pleasantly situated in a fertile locality, and is well laid out with wide streets and spacious gardens. It is a centre of trade, with manufactures of cotton, silk, leather, metal-ware and paper. Pop. (1901) 14,543.

The District of Larkhana, lying along the right bank of the Indus, was formed out of portions of Sukkur and Karachi districts in 1901, and has an area of 5091 sq. m.; pop. (1901) 656,083, showing an increase of 10% in the decade. Its western part is mountainous, but the remainder is a plain of alluvium watered by canals and well cultivated, being the most fertile part of Sind. The staple grain-crops are rice, wheat and millets, which are exported, together with wool, cotton and other agricul- tural produce. Cotton cloth, carpets, salt and leather goods are manufactured, and dyeing is an important industry. The district is served by the North-Western railway.

LARKSPUR, in botany, the popular name for species of Delphinium, a genus of hardy herbaceous plants belonging to the natural order Ranunculaceae (q.v.). They are of erect branching habit, with the flowers in terminal racemes, often of considerable length. Blue is the predominating colour, but purple, pink, yellow (D. Zalil or sulphureum) , scarlet (D. cardinale) and white also occur; the “spur” is produced by the elongation of the upper sepal. The field or rocket larkspur (D. Ajacis), the branching larkspur (D. consolida), D. cardio-petalum and their varieties, are charming annuals; height about 18 in. The spotted larkspur (D. requienii) and a few others are biennials. The perennial larkspurs, however, are the most gorgeous of the family. There are numerous species of this group, natives of the old and new worlds, and a great number of varieties, raised chiefly from D.

exaltatum, D. formosum and D. grandiflorum. Members of this group vary from 2 ft. to 6 ft. in height.

The larkspurs are of easy cultivation, either in beds or herbace- ous borders; the soil should be deeply dug and manured. The annual varieties are best sown early in April, where they are intended to flower, and suitably thinned out as growth is made. The perennial kinds are increased by the division of existing plants in spring, or by cuttings taken in spring or autumn and rooted in pots in cold frames. The varieties cannot be perpetuated with certainty by seed. Seed is the most popular means, however, of raising larkspurs in the majority of gardens, and is suitable for all ordinary purposes; it should be sown as soon as gathered, preferably in rows in nursery beds, and the young plants transplanted when ready. They should be fit for the borders in the spring of the following year, and if strong, should be planted in groups about 3 ft. apart. Del- phiniums require exposure to light and air. Given plenty of space in a rich soil, the plants rarely require to be staked except in windy localities.

LARNACA, Larnica or Larneca (anc. Citium, Turk. Tuzla), a town of the island of Cyprus, at the head of a bay on the south coast, 23 m. S.S.E. from Nicosia. Pop. (1901) 7964. It is the principal port of the island, exporting barley, wheat, cotton, raisins, oranges, lemons and gypsum. There is an iron pier 450 ft. long, but vessels anchor in the bay in from 16 to 70 ft. of water. Larnaca occupies the site of the ancient Citium, but the citadel of the ancient city was used to fill up the ancient harbour in 1879. The modern and principal resi- dential part of the town is called Scala. Mycenaean tombs and other antiquities have been found (see Cyprus).

LA ROCHE, a small town in the Belgian Ardennes, notice- able for its antiquity and its picturesque situation. Pop. (1904) 2065. Its name is derived from its position on a rock command- ing the river Ourthe, which meanders round the little place, and skirts the rock on which are the interesting ruins of the old castle of the nth century. This is supposed to have been the site of a hunting box of Pippin, and certainly the counts of La Roche held it in fief from his descendants, the Carolingian rulers. In the 12th century they sold it to the counts of Luxem- burg. In the 1 6th and 17th centuries the French and Imperial- ists frequently fought in its neighbourhood, and at Tenneville, not far distant, is shown the tomb of an English officer named Barnewall killed in one of these encounters in 1692. La Roche is famous as a tourist centre on account of its fine sylvan scenery. Among the local curiosities is the Diable-Chateau, a freak of nature, being the apparent replica of a medieval castle. La

Roche is connected by steam tramway with Melreux, a station on the main line from Marloie to Liege.

LA ROCHEFOUCAULD, the name of an old French family which is derived from a castle 1 in the province of Angoumois (department of Charente), which was in its possession in the nth century. Francois de La Rochefoucauld (1494-1517), godson of King Francis I., was made count in 1515. At the time of the wars of religion the family fought for the Protestant cause. Francois (1 588-1650) was created duke and peer of France by Louis XIII. in 1622. His son Francois was the author of the Maxims, and the son of the latter acquired for his house the estates of La Roche-Guyon and Liancourt by his marriage with Jeanne Charlotte du Plessis-Liancourt. Alexandre, due de La Rochefoucauld (d. 1762), left two daughters, who married into the Roye branch of the family. Of the numerous branches of the family the most famous are those of Roucy, Roye, Bayers, Doudeauville, Randan and Estissac, which all furnished distin- guished statesmen and soldiers.

LA ROCHEFOUCAULD, FRANCOIS DE (1613-1680), the greatest maxim writer of France, one of her best memoir writers, and perhaps the most complete and accomplished representative of her ancient nobility, was born at Paris in the Rue des Petits Champs on the 15th of September 1613. The author of the Maxims, who during the lifetime of his father (see above) and part of his own most stirring years bore the title of prince de Marcillac, was somewhat neglected in the matter of education, at least of the scholastic kind; but he joined the army before he was sixteen, and almost immediately began to make a figure in public life. He had been nominally married a year before to Andree de Vivonne, who seems to have been an affectionate wife, while not a breath of scandal touches her — two points in which La Rochefoucauld was perhaps more fortunate than he deserved. For some years Marcillac continued to take part in the annual campaigns, where he displayed the utmost bravery, though he never obtained credit for much military skill. Then he passed under the spell of Madame de Chevreuse, the first of three celebrated women who successively influenced his life. Through Madame de Chevreuse he became attached to the queen, Anne of Austria, and in one of her quarrels with Richelieu and her husband a wild scheme seems to have been formed, according to which Marcillac was to carry her off to Brussels on a pillion. These caballings against Richelieu, however, had no more serious results (an eight days' experience of the Bastille excepted) than occasional exiles, that is to say, orders to retire to his father's estates. After the death of the great minister (1642),

opportunity seemed to be favourable to the vague ambition which then animated half the nobility of France. Marcillac became one of the so-called imporlants, and took an active part in reconciling the queen and Conde in a league against Gaston of Orleans. But the growing credit of Mazarin came in his way, and the liaison in which about this time (1645) he became entangled with the beautiful duchess of Longueville made him irrevocably a Frondeur. He was a conspicuous figure in the siege of Paris, fought desperately in the desultory engagements which were constantly taking place, and was severely wounded at the siege of Mardyke. In the second Fronde Marcillac followed the fortunes of Conde, and the death of his father, which happened at the time (1650), gave rise to a characteristic incident. The nobility of the province gathered to the funeral, and the new duke de La Rochefoucauld took the opportunity of persuading them to follow him in an attempt on the royalist garrison of Saumur, which, however, was not successful. We have no space to follow La Rochefoucauld through the tortuous cabals and negotiations of the later Fronde; it is sufficient to say that he was always brave and generally unlucky. His run of bad fortune reached its climax in the battle of the Faubourg Saint Antoine (1652), where he was shot through the head, and it was thought that he would lose the sight of both eyes. It was nearly a year before he recovered, and then he found himself at his country seat of Verteuil, with no result of twenty years'

1 The castle was largely rebuilt in the reign of Francis I., and is one of the finest specimens of the Renaissance architecture in France.

fighting and intriguing except impaired health, a seriously embarrassed fortune, and some cause for bearing a grudge against almost every party and man of importance in the state. He spent some years in this retirement, and he was fortunate enough (thanks chiefly to the fidelity of Gourville, who had been in his service, and who, passing into the service of Mazarin and of Conde, had acquired both wealth and influence) to be able to repair in some measure the breaches in his fortune. He did not, however, return to court life much before Mazarin's death, when Louis XIV. was on the eve of assuming absolute power, and the turbulent aristocratic anarchy of the Fronde was a thing utterly of the past.

Somewhat earlier, La Rochefoucauld had taken his place in the salon of Madame de Sable, a member of the old Rambouillet coterie, and the founder of a kind of successor to it. It was known that he, like almost all his more prominent contemporaries, had spent his solitude in writing memoirs, while the special literary employment of the Sable salon was the fabrication of Sentences and Maxims. In 1662, however,

more trouble than reputation, and not a little of both, was given to him by a surreptitious publication of his memoirs, or what purported to be his memoirs, by the Elzevirs. Many of his old friends were deeply wounded, and he hastened to deny flatly the authenticity of the publication, a denial which (as it seems, without any reason) was not very generally accepted. Three years later (1665) he published, though without his name, the still more famous Maxims, which at once established him high among the men of letters of the time. • About the same date began the friendship with Madame de la Fayette, which lasted till the end of his life. The glimpses which we have of him henceforward are chiefly derived from the letters of Madame de Sevigne, and, though they show him suffering agonies from gout, are on the whole pleasant. He had a circle of devoted friends; he was recognized as a moralist and man of letters of the first rank; he might have entered the Academy for the asking; and in the altered measure of the times his son, the prince de Marcillac, to whom some time before his death he resigned his titles and honours, enjoyed a considerable position at court. Above all, La Rochefoucauld was generally recognized by his contemporaries from the king downward as a type of the older noblesse as it was before the sun of the great monarch dimmed its brilliant qualities. This position he has retained until the present day. He died at Paris on the 17th of March 1680, of the disease which had so long tormented him.

La Rochefoucauld's character, if considered without the prejudice which a dislike to his ethical views has sometimes occasioned, is thoroughly respectable and even amiable. Like almost all his contemporaries, he saw in politics little more than a chessboard where the people at large were but pawns. The weight of testimony, however, inclines to the conclusion that he was unusually scrupulous in his conduct, and that his comparative ill-success in the struggle arose more from this scrupulousness than from anything else. He has been charged with irresolution, and there is some ground for admitting the charge so far as to pronounce him one of those the keenness of whose intellect, together with their apprehension of both sides of a question, interferes with their capacity as men of action. But there is no ground whatever for the view which represents the Maxims as the mere outcome of the spite of a disappointed intriguer, disappointed through his own want of skill rather than of fortune.

His importance as a social and historical figure is, however, far inferior to his importance in literature. His work in this respect consists of three parts — letters, Memoirs and the Maxims. His letters exceed one hundred in number, and are biographically valuable, besides displaying not a few of his literary character- istics; but they

need not further detain us. The Memoirs, when they are read in their proper form, yield in literary merit, in interest, and in value to no memoirs of the time, not even to those of Retz, between whom and La Rochefoucauld there was a strange mixture of enmity and esteem which resulted in a couple of most characteristic ” portraits.” But their history is

unique in its strangeness. It has been said that a pirated edition appeared in Holland, and this, despite the author’s protest, continued to be reprinted for some thirty years. It has been now proved to be a mere cento of the work of half a dozen different men, scarcely a third of which is La Rochefoucauld’s, and which could only have been possible at a time when it was the habit of persons who frequented literary society to copy pell- mell in commonplace books the MS. compositions of their friends and others. Some years after La Rochefoucauld’s death a new recension appeared, somewhat less incorrect than the former, but still largely adulterated, and this held its ground for more than a century. Only in 1817 did anything like a genuine edition (even then by no means perfect) appear. The Maxims, however, had no such fate. The author re-edited them frequently during his life, with alterations and additions; a few were added after his death, and it is usual now to print the whole of them, at whatever time they appeared, together. Thus taken, they amount to about seven hundred in number, in hardly any case exceeding half a page in length, and more frequently confined to two or three lines. The view of conduct which they illustrate is usually and not quite incorrectly summed up in the words ” everything is reducible to the motive of self-interest.” But though not absolutely incorrect, the phrase is misleading. The Maxims are in no respect mere deductions from or applications of any such general theory. They are on the contrary independent judg- ments on different relations of life, different affections of the human mind, and so forth, from which, taken together, the general view may be deduced or rather composed. Sentimental moralists have protested loudly against this view, yet it is easier to declaim against it in general than to find a flaw in the several parts of which it is made up. With a few exceptions La Rochefoucauld’s maxims represent the matured result of the reflection of a man deeply versed in the business and pleasures of the world, and possessed of an extraordinarily fine and acute intellect, on the conduct and motives which have guided himself and his fellows. There is as little trace in them of personal spite as of forfanleric de ‘dec. But the astonishing excellence of the literary medium in which they are conveyed is even more remarkable than the general soundness of their

ethical import. In uniting the four qualities of brevity, clearness, fulness of meaning and point, La Rochefoucauld has no rival. His Maxims are never mere epigrams; they are never platitudes; they are never dark sayings. He has packed them so full of meaning that it would be impossible to pack them closer, yet there is no undue compression; he has sharpened their point to the utmost, yet there is no loss of substance. The comparison which occurs most frequently, and which is perhaps on the whole the justest, is that of a bronze medallion, and it applies to the matter no less than to the form. Nothing is left unfinished, yet none of the workmanship is finical. The sentiment, far from being merely hard, as the sentimentalists pretend, has a vein of melancholy poetry running through it which calls to mind the traditions of La Rochefoucauld's devotion to the romances of chivalry. The maxims are never shallow; each is the text for a whole sermon of application and corollary which any one of thought and experience can write. Add to all this that the language in which they are written is French, still at almost its greatest strength, and chastened but as yet not emasculated by the reforming influence of the 17th century, and it is not necessary to say more. To the literary critic no less than to the man of the world La Rochefoucauld ranks among the scanty number of pocket-books to be read and re-read with ever new admiration, instruction and delight.

The editions of La Rochefoucauld's Maxims (as the full title runs, Reflexions on sentences et maximes morales) published in his lifetime bear the dates 1665 (editio princeps), 1666, 1671, 1675, 1678. An important edition which appeared after his death in 1693 may rank almost with these. As long as the Memoirs remained in the state above described, no edition of them need be mentioned, and none of the complete works was possible. The previous more or less complete editions are all superseded by that of MM Gilbert and Gourdault (1868-1883), in the series of " Grands Ecrivains dela France," 3 vols. There are still some puzzles as to the text; but this edition supplies all available material in regard to them. The handsomest separate

edition of the Maxims is the so-called Edition des bibliophiles (1870); but cheap and handy issues are plentiful. See the English version by G. H. Powell (1903). Nearly all the great French critics of the 19th century have dealt more or less with La Rochefoucauld: the chief recent monograph on him is that of J. Bourdeau in the Grands ecrivains francais (1893). (G. Sa.)

LA ROCHEFOUCAULD-LIANCOURT, FRANCOIS ALEX- ANDRE FREDERIC, Due de (1747-1827), French social re- former, was born at La Roche Guyon on the nth of January 1747, the son of Francois

Armand de La Rochefoucauld, due d'Estissac, grand master of the royal wardrobe. The due de Liancourt became an officer of carbineers, and married at seventeen. A visit to England seems to have suggested the establishment of a model farm at Liancourt, where he reared cattle imported from England and Switzerland. He also set up spinning machines on his estate, and founded a school of arts and crafts for the sons of soldiers, which became in 1788 the Ecole des Enfants de la Patrie under royal protection. Elected to the states-general of 1789 he sought in vain to support the cause of royalty while furthering the social reforms he had at heart. On the 1 2th of July, two days before the fall of the Bastille, he warned Louis XVI. of the state of affairs in Paris, and met his exclamation that there was a revolt with the answer, " Non, sire, e'est une revolution." On the 18th of July he became president of the Assembly. Established in command of a military division in Normandy, he offered Louis a refuge in Rouen, and, failing in this effort, assisted him with a large sum of money. After the events of the 10th of August 1792 he fled to England, where he was the guest of Arthur Young, and thence passed to America. After the assassination of his cousin, Louis-Alexandre, due de La Rochefoucauld d'Enville, at Gisors on the 14th of September 1792 he assumed the title of due de La Rochefoucauld. He returned to Paris in 1799, but received small favour from Napoleon. At the Restoration he entered the House of Peers, but Louis XVIII. refused to reinstate him as master of the wardrobe, although his father had paid 400,000 francs for the honour. Successive governments, revolutionary and otherwise, recognized the value of his institutions at Liancourt, and he was for twenty-three years government inspector of his school of arts and crafts, which had been removed to Chalons. He was one of the first promoters of vaccination in France; he established a dispensary in Paris, and he was an active member of the central boards of administration for hospitals, prisons and agriculture. His opposition to the government in the House of Peers led to his removal in 1823 from the honorary positions he held, while the vaccination committee, of which he was president, was suppressed. The academies of science and of medicine admitted him to their membership by way of protest. Official hostility pursued him even after his death (27th of March 1827), for the old pupils of his school were charged by the military at his funeral. His works, chiefly on economic questions, include books on the English system of taxation, poor-relief and education.

His eldest son, Frangois, due de La Rochefoucauld (1765-1848), succeeded his father in the House of Peers. The second, Alexandre, comte de La Rochefoucauld (1767-1841), married a San Domingo heiress allied to the Beauharnais family. Mine de La Rochefoucauld

became dame d'honneur to the empress Josephine, and their eldest daughter married a brother-in-law of Pauline Bonaparte, Princess Borghese. La Rochefoucauld became ambassador successively to Vienna (1805) and to the Hague (1808-1810), where he negotiated the union of Holland with France. During the " Hundred Days " he was made a peer of France. He subsequently devoted himself to philanthropic work, and in 1 822 became deputy to the Chamber and sat with the constitutional royalists. He was again raised to the peerage in 1831.

The third son, Frederic Gaetan, marquis de La Rochefoucauld-Liancourt (1 779-1 863), was a zealous philanthropist and a partisan of constitutional monarchy. He took no part in politics after 1848. The marquis wrote on social questions, notably on prison administra- tion; he edited the works of La Rochefoucauld, and the memoirs of Condorcet; and he was the author of some vaudevilles, tragedies and poems.

LA ROCHEJACQUELEIN, DE, the name of an ancient French family of La Vendee, celebrated for its devotion to the throne during and after the Revolution. Its original name was Duverger, derived from a fief near Bressuire in Poitou, and its pedigree

is traceable to the 13th century. In 1505 Gui Duverger married Renee, heiress of Jacques Lemartin, seigneur de La Rochejacquelein, whose name he assumed. His grandson, Louis Duverger, seigneur de La Rochejacquelein, was a devoted adherent of Henry II., and was badly wounded at the battle of Arques; other members of the family were also distinguished soldiers, and the seigniory was raised to a countship and mar- quisate in reward for their services.

At the outbreak of the Revolution the chief of the family was Henri Louis Auguste, marquis de La Rochejacquelein, marichal de camp in the royal army, who had three sons named after himself — Henri, Louis and Auguste. The marquis fled abroad with his second son Louis at the time of the emigration of the nobles. He entered the service of Great Britain, and died in San Domingo in 1802.

Henri, comte de La Rochejacquelein, born at Dubertien, near Chatillon, sur Sevres, on the 20th of August 1772, did not emigrate with his father. He served in the constitutional guard of the king, and

remained in Paris till the execution of Louis XVT. He then took refuge with the marquis de Lescure on his own estates in Poitou. When the anti-clerical policy of the revolutionary powers provoked the rising of the peasantry of La Vendee, he put himself at the head of the men of his neighbourhood, and came rapidly to the front among the gentlemen whom the peasants took for leaders. In spite of his youth and his reluctance to assume the responsibility, he was chosen as commander-in-chief after the defeat of the Vendeans by the republicans at Cholet. His brilliant personal courage, his amiability and his loyalty to the cause make him a very attractive figure, but a commander-in-chief of the Vendeans, who came and went as they pleased, had little real power or opportunity to display the. qualities of a general. The comte de La Roche- jacquelein had in fact to obey his army, and could only display his personal valour in action. He could not avert the mistaken policy which led to the rout at Le Mans, and was finally shot in an obscure skirmish at Nouaille on the 4th of March 1794.

Louis, marquis de La Rochejacquelein, the younger brother of Henri, accompanied his father in the emigration, served in the army of Conde, and entered the service of England in America. He returned to France during the Consulate, and in 1801 married the marquise de Lescure, widow of his brother's friend, who was mortally wounded at Cholet. Marie Louise Victoire de Donnissan, born at Versailles on the 25th of October 1772, belonged to a court family and was the god-daughter of Mme Victoire, daughter of Louis XV. At the age of seventeen she married the marquis de Lescure, whom she accompanied in the war of La Vendee. After his death she went through various adventures recorded in her memoirs, first published at Bordeaux in 181 5. They are of extreme interest, and give a remarkable picture of the war and the fortunes of the royalists. She saved much of her own property and her first husband's, when a conciliatory policy was adopted after the fall of the Terrorists. After her second marriage she lived with her husband on her estates, both refusing all offers to take service with Napoleon. In 1814 they took an active part in the royalist movement in and about Bordeaux. In 181 5 the marquis endeavoured to bring about another Vendean rising for the king, and was shot in a skirmish with the Imperialist forces at the Pont des Marthes on the 4th of June 181 5. The marquis died at Orleans in 1857.

Their eldest son, Henri Auguste Georges, marquis de La Rochejacquelein, born at Chateau Citran in the Gironde on the 28th of September 1805, was educated as a soldier, served in Spain in 1822, and as a volunteer in the Russo-Turkish War of 1828. During the reign of Louis Philippe he adhered to the legitimist policy of his family, but

he became reconciled to the government of Napoleon III. and was mainly known as a clerical orator and philanthropist. He died on the 7th of January

1867.

His son and successor, Julien Marie Gaston, born at Chartres on the 27th of March 1833, was an active legitimist deputy in (the Assembly chosen at the close of the German War of

1870-1871. He was a strong opponent of Thiers, and continued to contest constituencies as a legitimist with varying fortunes till his death in 1897.

Authorities. — Henri de La Rochejacquelein et la guerre de la Vendee d'apres des documents inedits (Niort, 1890) ; A. F. Nettement, Vie de Mine la Marquise de La Rochejacquelein (Paris, 1876). The Memoirs of the marquise were translated into English by Sir Walter Scott, and issued as a volume of " Constable's Miscellany " (Edinburgh, 1827).

LA ROCHELLE, a seaport of western France, capital of the department of Charente-Inferieure, 90 m. S. by E. of Nantes on the railway to Bordeaux. Pop. (1906) town 24,524, commune 33,858. La Rochelle is situated on the Atlantic coast on an inlet opening off the great bay in which lie the islands of Re and Oleron. Its fortifications, constructed by Vauban, have a circuit of 35 m. with seven gates. Towards the sea are three towers, of which the oldest (1384) is that of St Nicholas. The apartment in the first storey was formerly used as a chapel. The Chain Tower, built towards the end of the 14th century, is so called from the chain which guarded the harbour at this point; the entrance to the tidal basin was at one time spanned by a great pointed arch between the two towers. The lantern tower (1445-1476), seven storeys high, is surmounted by a lofty spire and was once used as a lighthouse. Of the ancient gateways only one has been preserved in its entirety, that of the " Grosse Horloge," a huge square tower of the 14th or 15th century, the corner turrets of which have been surmounted with trophies since 1746. The cathedral of La Rochelle (St Louis or St Bartholomew) is a heavy Grecian building (1742-1762) with a dome above the transept, erected on the site of the old church of St Bartholomew, destroyed in the 16th century and now represented by a solitary tower dating from the 14th century. Externally the town-house is in the Gothic style of the latter years of the 15th century and has the appearance of a fortress, though its severity is much relieved by the beautiful carving of the two entrances, of the machicolations and of the two belfries. The buildings looking into the inner court are

in the Renaissance style (16th and early 17th centuries) and contain several fine apartments. In the old episcopal palace (which was in turn the residence of Sully, the prince of Conde, Louis XIII., and Anne of Austria, and the scene of the marriage of Alphonso VI. of Portugal with a princess of Savoy) accommoda- tion has been provided for a library, a collection of records and a museum of art and antiquities. Other buildings of note are an arsenal with an artillery museum, a large hospital, a special Protestant hospital, a military hospital and a lunatic asylum for the department. In the botanical gardens there are museums of natural history. Medieval and Renaissance houses give a peculiar character to certain districts: several have French, Latin or Greek inscriptions of a moral or religious turn and in general of Protestant origin. Of these old houses the most interesting is one built in the midddle of the 16th century and wrongly known as that of Henry II. The parade-ground, which forms the principal public square, occupies the site of the castle demolished in 1 590. Some of the streets have side-arcades ; the public wells are fed from a large reservoir in the Champ de Mars; and among the promenades are the Cours des Dames with the statue of Admiral Duperre, and outside the Charruyer Park on the west front of the ramparts, and the Mail, a beautiful piece of greensward. In this direction are the sea-bathing establishments.

La Rochelle is the seat of a bishopric and a prefect, and has tribunals of first instance and of commerce, a chamber of com- merce and a branch of the Bank of France; its educational establishments include an ecclesiastical seminary, a lycee and a training college for girls. Ship-building, saw-milling and the manufacture of briquettes and chemicals, sardine and tunny- preserving and petroleum-refining are among the industries. The rearing of oysters and mussels and the exploitation of salt marshes is carried on in the vicinity.

The inlet of La Rochelle is protected by a stone mole con- structed by Richelieu and visible at low tide. The harbour, one of the safest on the coast, is entered by a channel 2730 yds. long,

and comprises an outer harbour opening on the one hand into a floating basin, on the other into a tidal basin with another floating basin adjoining it. Behind the tidal basin is the Maubec reservoir, the waters of which, along with those of the Marans canal, help to scour the port and navigable channel. Some 200 sailing ships are engaged in the fisheries, and the fish market of La Rochelle is the most important

on the west coast. The harbour is, however, inaccessible to the largest vessels, for the accommodation of which the port of La Pallice, inaugurated in 1891, was created. Lying about 3 m. W.S.W. of La Rochelle, this port opens into the bay opposite the eastern extremity of the island of Re. It was artificially excavated and affords safe anchorage in all weathers. The outer port, protected by two jetties, has an area of 29 acres and a depth of 165 ft. below lowest tide-level. At the extremity of the breakwater is a wharf where ships may discharge without entering the basin. A lock connects with the inner basin, which has an area of 27 acres, with 5900 ft. of quayage, a minimum depth of 28 ft., and depths of 29J ft. and 36 ft. at high, neap and spring tides. Connected with the basin are two graving docks. La Pallice has regular communication with South America by the vessels of the Pacific Steam Naviga- tion Company and by those of other companies with London, America, West Africa, Egypt and the Far East. The port has petroleum refineries and chemical manure works.

In 1906 there entered the port of La Rochelle, including the dock of La Pallice, 441 vessels with a tonnage of 629,038, and cleared 468 vessels with a tonnage of 664,861 (of which 235 of 241,146 tons cleared with ballast). These figures do not include vessels entering from, or clearing for, other ports in France. The imports (value, £1,276,000 in 1900 as compared with £1,578,000 in 1907) include coal and patent fuel, superphosphates, natural phosphates, nitrate of soda, pyrites, building-timber, wines and alcohol, pitch, dried codfish, petroleum, jute, wood- pulp. Exports (value, £1,294,000 in 1900; £1,979,000 in 1907) include wine and brandy, fancy goods, woven goods, garments, skins, coal and briquettes, furniture, potatoes.

La Rochelle existed at the close of the 10th century under the name of Rupella. It belonged to the barony of Chatelaillon, which was annexed by the duke of Aquitaine and succeeded Chatelaillon as chief town in Aunis. In 1 199 it received a communal charter from Eleanor, duchess of Guienne, and it was in its harbour that John Lackland disembarked when he came to try to recover the domains seized by Philip Augustus. Captured by Louis VIII. in 1224, it was restored to the English in 1360 by the treaty of Brctigny, but it shook off the yoke of the foreigner when Du Guesclin recovered Saintonge. During the 14th, 15th and 16th centuries La Rochelle, then an almost independent commune, was one of the great maritime cities of France. From its harbour in 1402 Jean de Bethencourt set out for the conquest of the Canaries, and its seamen were the first to turn to account the discovery of the new world. The salt- tax provoked a rebellion at Rochelle which Francis I. repressed in person; in 1568 the town secured exemption by the payment of a large sum. At the Reformation

La Rochelle early became one of the chief centres of Calvinism, and during the religious wars it armed privateers which preyed on Catholic vessels in the Channel and on the high seas. In 1571 a synod of the Protestant churches of France was held within its walls under the presidency of Beza for the purpose of drawing up a confession of faith. After the massacre of St Bartholomew, La Rochelle held out for six and a half months against the Catholic army, which was ultimately obliged to raise the siege after losing more than 20,000 men. The peace of the 24th of June 1573, signed by the people of La Rochelle in the name of all the Protestant party, granted the Calvinists full liberty of worship in several places of safety. Under Henry IV. the town remained quiet, but under Louis XIII. it put itself again at the head of the Huguenot party. Its vessels blockaded the mouth of the Gironde and stopped the commerce of Bordeaux, and also seized the islands of Re and Oleron and several vessels of the royal fleet. Richelieu then resolved to subdue the town once for all. In spite of the assistance rendered by the English troops under Buckingham and in spite of the fierce energy of their mayor Guiton, the people of La Rochelle were obliged to capitulate after a year's siege (October 1628). During this investment Richelieu raised the celebrated mole which cut off the town from the open sea. La Rochelle then became the principal port for the trade between France and the colony of Canada. But the revocation of the Edict of Nantes (1685) deprived it of some thousands 01 its most industrious inhabitants, and the loss of Canada by France completed for the timt the ruin of its commerce. Its privateers, however, maintained a vigorous struggle with the English during the republic and the empire.

See P. Suzanne, La Rochelle pitloresque (La Rochelle, 1903), and E. Couneau, La 'Rochelle disparue (La Rochelle, 1904).

LA ROCHE-SUR-YON, a town of western France, capital of the department of Vendee, on an eminence on the right bank of the Yon, 48 m. S. of Nantes on the railway to Bordeaux. Pop. (1906) town 10,666, commune 13,685. The castle of La Roche, which probably existed before the time of the crusades, and was frequently attacked or taken in the Hundred Years' War and in the wars of religion, was finally dismantled under Louis XIII. When Napoleon in 1804 made this place, then of no importance, the chief town of a department, the stones from its ruins were employed in the erection of the administrative buildings, which, being all produced at once after a regular plan, have a monotonous effect. The equestrian statue of NapoJeon I. in an immense square overlooking the rest of the town; the statue of General Travot, who was engaged in the " pacification " of La Vendee; the museum, with several paintings by P. Baudry, a

native artist, of whom there is a statue in the town, are the only objects of interest. Napoleon- Vendee and Bourbon- Vendee, the names borne by the town according to the dominance of either dynasty, gave place to the original name after the revolution of 1870. The town is the seat of a prefect and a court of assizes, and has a tribunal of first instance, a chamber of commerce, a branch of the Bank of France, a lycee for boys and training colleges for both sexes. It is a market for farm-produce, horses and cattle, and has flour-mills. ˆ The dog fairs of La Roche are well known.

LAROMIGUIERE, PIERRE (1756-1837), French philosopher, was born at Livignac on the 3rd of November 1756, and died on the 1 2th of August 1837 in Paris. As professor of philosophy at Toulouse he was unsuccessful and incurred the censure of the parliament by a thesis on the rights of property in connexion with taxation. Subsequently he came to Paris, where he was appointed professor of logic in the Ecole Normale and lectured in the Prytanee. In 1799 he was made a member of the Tri- bunate, and in 1833 of the Academy of Moral and Political Science. In 1793 he published Projetd' elements de metaphysique, a work characterized by lucidity and excellence of style. He wrote also two Memoires, read before the Institute, Les Paradoxes de Condittac (1805) and Lecons de philosophie (1815-1818). Laromiguiere's philosophy is interesting as a revolt against the extreme physiological psychology of the natural scientists, such as Cabanis. He distinguished between those psychological phenomena which can be traced directly to purely physical causes, and the actions of the soul which originate from within itself. Psychology was not for him a branch of physiology, nor on the other hand did he give to his theory an abstruse metaphysical basis. A pupil of Condillac and indebted for much of his ideology to Destutt de Tracy, he attached a fuller importance to Attention as a psychic faculty. Attention provides the facts, Comparison groups and combines them, while Reason systematizes and explains. The soul is active in its choice, i.e. is endowed with free- will, and is, therefore, immortal. For natural science as a method of discovery he had no respect. He held that its judgments are, at the best, statements of identity, and that its so-called dis- coveries are merely the reiteration, in a new form, of previous truisms. Laromiguiere was not the first to develop these views; he owed much to Condiilac, Destutt de Tracy and Cabanis. But, owing to the accuracy of his language and the purity of his style, his works had great influence, especially over Armand Marrast, Cardaillac and Cousin. A lecture of his in the Ecole Normale impressed Cousin so strongly that he at once devoted himself to the study of philosophy. Jouffroy and Taine agree in describing him as one of the great

thinkers of the 19th century.

See Damiron, Essai sur la philosophie en France au XIX' Steele; Biran, Examen des lemons de philosophie ; Victor Cousin, De Methodo sivo de Analyst; Daunou, Notice sur Laromiguiere; H. Taine, Les Philosophes classiques du XIX' siecle; Gatien Arnoult, £tude sur Laromiguiire; Compayre, Notice sur Laromiguiere ;Ferra.z, Spiritualisme et Liberalisme ; F. Picavet, Les Ideologues.

LARRA, MARIANO JOSE DE (1800-1837), Spanish satirist, was born at Madrid in 1809. His father served as a regimental doctor in the French army, and was compelled to leave the

Peninsula with his family in 1 812. Ini8i7 Larra returned to Spain, knowing less Spanish than French. His nature was disorderly, his education was imperfect, and, after futile attempts to obtain a degree in medicine or law, he made an imprudent marriage at the age of twenty, broke with his relatives and became a journalist. On the 27th of April 1831 he produced his first play, No m&s mostrador, based on two pieces by Scribe and Dieulafoy. Though wanting in originality, it is brilliantly written, and held the stage for many years. On the 24th of September 1834 he produced Macias, a play based on his own historical novel, El Doncel de Don Enrique el Doliente (1834). The drama and novel are interesting as experiments, but Larra was essentially a journalist, and the increased liberty of the press after the death of Ferdinand VII. gave his caustic talent an ampler field. He was already famous under the pseudonyms of " Juan Perez de Munguia " and " Figaro " which he used in El Pobrecito Hablador and La Revista Espanola respectively. Madrid laughed at his grim humour; ministers feared his vitriolic pen and courted him assiduously; he was elected as deputy for Avila, and a great career seemed to lie before him. But the era of military pronunciamientos ruined his personal prospects and patriotic plans. His writing took on a more sombre tinge; domestic troubles increased his pessimism, and, in consequence of a disastrous love-affair, he committed suicide on the 13th of February 1837. Larra lived long enough to prove himself the greatest prose-writer that Spain can boast during the 10th century. He wrote at great speed with the constant fear of the censor before his eyes, but no sign of haste is discernible in his work, and the dexterity with which he aims his venomous shafts is amazing. His political instinct, his abundance of ideas and his forcible, mordant style would have given him a foremost

position at any time and in any country; in Spain, and in his own period, they placed him beyond all rivalry. (J. F.-K.)

LARSA (Biblical Ellasar, Gen. xiv. i), an important city of ancient Babylonia, the site of the worship of the sun-god, Shamash, represented by the ancient ruin mound of Senkereh (Senkera). It lay 15 m. S.E. of the ruin mounds of Warka (anc. Erech), near the east bank of the Shatt-en-Nil canal. Larsa is mentioned in Babylonian inscriptions as early as the time of Ur-Gur, 2700 or 2800 B.C., who built or restored the ziggurat (stage-tower) of E-Babbar, the temple of Shamash. Politically it came into special prominence at the time of the Elamite conquest, when it was made the centre of Elamite dominion in Babylonia, perhaps as a special check upon the neighbouring Erech, which had played a prominent part in the resistance to the Elamites. At the time of Khammurabi's successful struggle with the Elamite conquerors it was ruled by an Elamite king named Eriaku, the Arioch of the Bible, called Rim-Sin by his Semitic subjects. It finally lost its in- dependence under Samsu-iluna, son of Khammurabi, c. 1900 B.C., and from that time until the close of the Babylonian period it was a subject city of Babylon. Loftus conducted excavations at this site in 1854. He describes the ruins as consisting of a low, circular platform, about 4! m. in circum- ference, rising gradually from the level of the plain to a central mound 70 ft. high. This represents the ancient ziggurat of the temple of Shamash, which was in part explored by Loftus. From the inscriptions found there it appears that, besides the kings already mentioned, Khammurabi, Burna-buriash (buryas) and the great Nebuchadrezzar restored or rebuilt the temple of Shamash. The excavations at Senkereh were peculiarly successful in the discovery of inscribed remains, consisting of clay tablets, chiefly contracts, but including also an im- portant mathematical tablet and a number of tablets of a description almost peculiar to Senkereh, exhibiting in bas- relief scenes of everyday life. Loftus found also the remains of an ancient Babylonian cemetery. From the ruins it would appear that Senkereh ceased to be inhabited at or soon after the Persian conquest.

See W. K. Loftus, Chaldaea and Susiana (1857). (J. P. Pe.)

LARTET, EDOUARD (1801-1871), French archaeologist, was born in 1801 near Castelnau-Barbarens, department of

Gers, France, where his family had lived for more than five hundred years. He was educated for the law at Audi and Toulouse, but having private means elected to devote himself to science. The then recent work of Cuvier on fossil mammalia encouraged Lartet in excavations

which led in 1834 to his first discovery of fossil remains in the neighbourhood of Auch. Thenceforward he devoted his whole time to a systematic examination of the French caves, his first publication on the subject being The Antiquity of Man in Western Europe (i860), followed in 1861 by New Researches on the Coexistence of Man and of the Great Fossil Mammifers characteristic of the Last Geological Period. In this paper he made public the results of his discoveries in the cave of Aurignac, where evidence existed of the contemporaneous existence of man and extinct mammals. In his work in the Perigord district Lartet had the aid of Henry Christy (q.v.) . The first account of their joint researches appeared in a paper descriptive of the Dordogne caves and contents, published in Revue archeologique (1864). The important dis- coveries in the Madeleine cave and elsewhere were published by Lartet and Christy under the title Reliquiae Aquitanicae, the first part appearing in 1865. Christy died before the com- pletion of the work, but Lartet continued it until his breakdown in health in 1870. The most modest and one of the most illus- trious of the founders of modern palaeontology, Lartet's work had previously been publicly recognized by his nomination as an officer of the Legion of Honour; and in 1848 he had had the offer of a political post. In 1857 he had been elected a foreign member of the Geological Society of London, and a few weeks before his death he had been made professor of palaeontology at the museum of the Jardin des Plantes. He died at Seissan in January 1871.

LARVAL FORMS, in biology. As is explained in the article on Embryology (q.v.), development and life are coextensive, and it is impossible to point to any period in the life of an organism when the developmental changes cease. Nevertheless it is customary to speak of development as though it were confined to the early period of life, during which the important changes occur by which the uninucleated zygote acquires the form characteristic of the species. Using the word in this restricted sense, it is pointed out in the same article that the developmental period frequently presents two phases, the em- bryonic and the larval. During the embryonic phase the development occurs under protection, either within the egg envelopes, or within the maternal body, or in a brood pouch. At the end of this phase the young organism becomes free and uses, as a rule, its own mouth and digestive organs. If this happens before it has approximately acquired the adult form, it is called a larva (Lat. larva, ghost, spectre, mask), and the subsequent development by which the adult form is acquired constitutes the larval phase. In such forms the life-cycle is divided into three phases, the embryonic, the larval and the adult. The transition between the first two of these is always abrupt; whereas the second

and third, except in cases in which a metamorphosis occurs (see Metamorphosis), graduate into one another, and it is not possible to say when the larval stage ends and the adult begins. This is only what would be expected when it is remembered that the developmental changes never cease. It might be held that the presence of functional repro- ductive organs, or the possibility of rapidly acquiring them, marks off the adult phase of life from the larval. But this test sometimes fails. In certain of the Ctenophora there is a double sexual life; the larva becomes sexually mature and lays eggs, which are fertilized and develop; it then loses its generative organs and develops into the adult, which again develops reproductive organs (dissogony; see Chun, Die Cteno- phoren des Golfes von Neapel, 1880). In certain Amphibia the larva may develop sexual organs and breed (axolotl), but in this case (neoteny) it is doubtful whether further development may occur in the larva. A very similar phenomenon is found in certain insect larvae (Cecidomyia), but in this case ova alone are produced and develop parthenogenetically (paedogenesis). Again in certain Trematoda larval stages known as the sporocyst

and redia produce ova which have the power of developing unfertilized; in this case the larva probably has not the power of continuing its development. It is very generally held by philosophers that the end of life is reproduction, and there is much to be said for this view; but, granting its truth, it is difficult to see why the capacity for reproduction should so generally be confined to the later stages of life. We know by more than one instance that it is possible for the larva to reproduce by sexual generation; why should not the phenomenon be more common? It is impossible in the present state of our knowledge to answer this question.

The conclusion, then, that we reach is that the larval phase of life graduates into the later phases, and that it is impossible to characterize it with precision, as we can the embryonic phase. Nevertheless great importance has been attached, in certain cases, to the forms assumed by the young organism when it breaks loose from its embryonic bonds. It has been widely held that the study of larvae is of greater importance in determin- ing genetic affinity than the study of adults. What justifi- cation is there for this view? The phase of life, chosen for the ordinary anatomical and physiological studies and labelled as the adult phase, is merely one of the large number of stages of structure through which the organism passes during its free

life. In animals with a well-marked larval phase, by far the greater number of the stages of structure are included in the larval period, for the developmental changes are more numerous and take place with greater rapidity at the beginning of life than in its later periods. As each of the larval stages is equal in value for the purposes of our study to the adult phase, it clearly follows that, if there is anything in the view that the anatomical study of organisms is of importance in determining their mutual relations, the study of the organism in its various larval stages must have a greater importance than the study of the single and arbitrarily selected stage of life called the adult.

The importance, then, of the study of larval forms is admitted, but before proceeding to it this question may be asked: What is the meaning of the larval phase? Obviously this is part of a larger problem: Why does an organism, as soon as it is estab- lished at the fertilization of the ovum, enter upon a cycle of transformations which never cease until death puts an end to them? It is impossible to give any other answer to this question than this, viz. that it is a property of living matter to react in a remarkable way to external forces without undergoing destruc- tion. As is explained in Embryology, development consists of an orderly interaction between the organism and its environ- ment. The action of the environment produces certain morpho- logical changes in the organism. These changes enable the organism to move into a new environment, which in its turn produces further structural changes in the organism. These in their turn enable, indeed necessitate, the organism to move again into a new environment, and so the process continues until the end of the life-cycle. The essential condition of success in this process is that the organism should always shift into the environment to which its new structure is suited, any failure in this leading to impairment of the organism. In most cases the shifting of the environment is a very gradual process, and the morphological changes in connexion with each step of it are but slight. In some cases, however, jumps are made, and whenever such jumps occur we get the morphological phenomenon termed metamorphosis. It would be foreign to our purpose to consider this question further here, but before leaving it we may suggest, if we cannot answer, one further question. Has the duration and complexity of the life-cycle expanded or contracted since organisms first appeared on the earth? According to the current view, the life-cycle is continually being shortened at one end by the abbreviation of embryonic development and by the absorption of larval stages into the embryonic period, and lengthened at the other by the evolutionary creation of new adult phases. What was the condition of the earliest organisms? Had they the property of reacting

to external forces to the same extent and in the same orderly manner that organisms have to-day ? xvi, 8

For the purpose of obtaining light upon the genetic affinities of an organism, a larval stage has as much importance as has the adult stage. According to the current views of naturalists, which are largely a product of Darwinism, it has its counterpart, as has the adult stage, in the ancestral form from which the living organism has been derived by descent with modification. Just as the adult phase of the living form differs owing to evolutionary modification from the adult phase of the ancestor, so each larval phase will differ for the same reason from the corresponding larval phase in the ancestral life-history. Inasmuch as the organism is variable at every stage of its existence, and is exposed to the action of natural selection, there is no reason why it should escape modification at any stage. But, as the characters of the ancestor are unknown, it is impossible to ascertain what the modification has been, and the determination of which of the characters of its descendant (whether larval or adult) are new and which ancient must be conjectural. It has been customary of late years to distinguish in larvae those characters which are supposed to have been recently acquired as caeno genetic, the ancient characters being termed palingenetic. These terms, if they have any value, are applicable with equal force to adults, but they are cumbrous, and the absence of any satisfactory test which enables us to distinguish between a character which is ancestral and one which has been recently acquired renders their utility very doubtful. Just as the adult may be supposed, on evolution doctrine, to be derived from an ancestral adult, so the various larval stages may be supposed to have been derived from the corresponding larval stage of the hypothetical ancestor. If we admit organic evolution at all, we may perhaps go so far, but we are not in a position to go further, and to assert that each larval stage is representative of and, so to speak, derived from some adult stage in the remote past, when the organism progressed no further in its life-cycle than the stage of structure revealed by such a larval form. We may perhaps have a right to take up this position, but it is of no advantage to us to do so, because it leads us into the realm of pure fancy. Moreover, it assumes that an answer can be given to the question asked above — has the life-cycle of organisms contracted or expanded as the result of evolution? This question has not been satisfactorily answered. Indeed we may go further and say that naturalists have answered it in different ways according to the class of facts they were contemplating at the moment. If we are to consider larvae at all from the evolution point of view, we must treat them as being representative of ancestral larvae from which they have been

derived by descent with modification; and we must leave open the question whether and to what extent the first organisms themselves passed through a complicated life-cycle.

From the above considerations it is not surprising to find that the larvae of different members of any group resemble each other to the same kind of degree as do the adults, and that the larvae of allied groups resemble one another more closely than do the larvae of remote groups, and finally that a study of larvae does in some cases reveal affinities which would not have been evident from a study of adults alone. Though it is impos- sible to give here an account of the larval forms of the animal kingdom, we may illustrate these points, which are facts of fundamental importance in the study of larvae, by a reference to specific cases.

The two great groups, Annelida and Mollusca, which by their adult structure present considerable affinity with one another, agree in possessing a very similar larval form, known as the trochosphere or trochophore.

A typical trochosphere larva (figs. I, 2) possesses a small, trans- parent body divided into a large preoral lobe and a small postoral region. The mouth (4) is on the ventral surface at the junction of the preoral lobe with the hinder part of the body, and there is an anus (7) at the hind end. Connecting the two is a curved alimentary canal which is frequently divided into oesophagus, stomach and intestine. There is a preoral circlet of powerful cilia, called the ” velum ” (2), which encircles the body just anterior to the mouth and marks off the preoral lobe, and there is very generally a second ring of cilia immediately behind the mouth (3). At the anterior end of the preoral lobe is a nervous thickening of the ectoderm called

the apical plate (i). This usually carries a tuft of long cilia or sen- sory hairs, and sometimes rudimentary visual organs. Mesoblastic bands are present, proceeding a short distance forwards from the anus on each side of the middle ventral line (6), and at the anterior end of each of these structures is a tube (5) which more or less branches internally and opens on the ventral surface. The branches of this tube end internally in peculiar cells containing a flame- shaped flagellum and floating in the so-called body cavity, into which, however, they do not open. These are the primitive kid- neys. The body cavity, which is

a space between the ectoderm and ali- mentary canal, is not lined by mesoderm and is traversed by a few muscular fibres. Such a larva is found, almost as described, in many Chaetopods (fig. 1), in Echiurus (fig. 2), in many Gastro- pods (fig. 3), and Lamelli branch iates (fig. 4). This typical structure of the larva is often departed from, and the molluscan tro- chosphere can be dis- tinguished from the annelidan by the pos- session of a rudiment at least of the shell- gland and foot (figs. 3 and 4) ; but in all cases in which the young leaves the egg at an early stage of development it has a form which can be referred without much difficulty to the trochosphere type just described. A larva similar to the trocho- sphere in some features, particularly in possessing a preoral

After V. Drasche in Beitrage zur Entwickelung der Polychaeten, Enlwickelung von Pomatoceros.

Fig. 1. — Trochosphere Larva Chaetopod Pomatoceros trigueler, L. acid preparation.)

1. The apical plate.

2. Long cilia of preoral ba.»d (velu;

3. Long cilia of postoral band.

4. Mouth.

5. Excretory organ.

6. Mesoblastic band.

7. Anus.

of the (Osmic

ring of cilia and an apical plate in adult Rotifera, which latter, cretory organs, present some resemblance to the trocho- sphere, and are sometimes de- scribed as permanent adult trochospheres. But in these phases the resemblance to the

is found in the Polyzoa, and n their ciliary ring and ex-

After Hatschek, ” Echiurus ” in

Claus’s Arbeiten atts dem zoolog.

Institul der Wien.

V,r -> V„„r,rr T™,-t,„ After Patten, ” Patella ” in Claus’s Arbeiten

r IG. 2.— 1 oung 1 rocno- am dem m log. Instilul der Wien.

spbereLarvaoftheGephyrean F 3 ._ Larva of the Gastropod

Echiurus, seen in optical PateUa * ^ –

section. section.

1. Apical plate.

2. Muscle-bands.

seen in longitudinal vertical

1. Apical plate.

_ ,,,,.,• 2 – Cilia of preoral circlet (velum).

3. Preoral band of ciha(velum). 3. Mouth.

4. Mouth. 4. Foot.

5. Mesoblastic band. 5. Anal tuft of cilia.

6. Anus. 6. Shell-gland covered by shell.

typical forms is not nearly so close as it is in the case of the larva of Annelida and Mollusca.

In the Echinodermata there are two distinct larval forms which cannot be brought into relation with one another. The one of these is found in the Asteroids, Ophiuroids, Echinoids and Holothuroids ; the other in the Crinoids.

The first is, in its most primitive form, a small transparent creature, with a mouth and anus and a postoral longitudinal ciliated band (fig. 5, A). In Asteroids the band of cilia becomes divided in such a way as to give rise to two bands, the one preoral, encircling the preoral lobe, and the other remaining postoral (fig. 5, B). In the other groups the band remains single and longitudinal. In all cases the edges of the body carrying the ciliary bands become sinuous (fig 6) and sometimes pro- longed into arms (figs. 7-9), and each of the four groups has its own type of larva. In Asteroids, in which the band divides, the larva is known as the bipinnaria (fig. 7); in Holo- thurians it is called the auricularia (fig. 6) ; in Echinoids and Ophiuroids, in which the arms

‘ in Claus’s Arbeiten aus dem

pluteus, the echinopluteus (fig. 9) and ophio- pluteus (fig. 8) respectively.

After Hatschek on ” Teredo ‘ zoolog. Instilul der Wien.

Fig. 4. — A, Embryo, and B, Young Trocho- sphere Larva of the Lamellibranch Teredo.

__ ___ In A the shell-gland (1) and the mouth (2)

are well marked, an d the rudiment of the enteron (3) are shown; it is known as the (4) primitive mesoderm cells.

In B the shell-gland has flattened out and the shell is formed. 1, Apical plate; 2, mus- cles; 3, shell; 4, anal invagination; 5, meso- blast; 6, mouth; 7, foot. _ _ . . _., . The cilia of the preoral and postoral bands are

All these forms not clearly differentiated at this stage, were obviously distinct but as obviously modifications of a common type and related to one another. They present certain remarkable structural features which differentiate them from other larval types except the tornaria larvae of the Enteropneusta. They possess an alimentary canal with a mouth and anus as does the trochosphere, but they differ altogether from that larva in having a diverticulum of the alimentary canal which gives rise to the coelom and to a considerable part of the meso-
1

blast. Further, they are without an i

apical plate with its tuft of sensory hairs. In Crinoids the type is different (fig. 10), and might belong to a different phylum. The body is opaque, and encircled by five ciliary bands, and is without either mouth, anus or arms, and there is a tuft of cilia on the preoral lobe. A resemblance to the other Echinoderm larvae is found in the fact that coelomic diverticula of the enteron are present.

The larvae of two other groups present certain resemblances to the typical Echino- derm larvae. The one of these is the tor-

After J. Miiller. Fig. 6. — Auricularia stelligera, ventral view, somewhat diagrammatic. The larva of a Holo- thurian.

1. Frontal area.

2. Preoral arm.

3. Anterior transverse

portion of ciliary band.

4. Posterior transverse portion of same.

Postoral arm. Anal area.

Posterior lateral arm. Posterior dorsal arm. Oral depression. Middle dorsal arm.

11. Anterior dorsal arm.

12. Anterior lateral arm.

13. Ventral median arm.

14. Dorsal median arm.

15. Unpaired posterior

5- 6.

7-

10.

Comparative _

by permission of Macmillan & Co.

Fig. 5. — Diagrams of side views

of two young Echinoderm Larvae,

showing the course of the ciliary

bands. A, auricularia larva of a

Holothurian; B, bipinnaria larva

of an Asteroid; a, anus; l.c, in A

primitive longitudinal ciliary band,

in B postoral longitudinal ciliary

band ; m, mouth ; pr.c, preoral

ciliary band ; st, stomach. „

arm.

naria larva of the Enteropneusta (fig. 11), which recalls Echinoderms in the possession of two ciliary bands, the one preoral and the other postoral and partly longitudinal, and in the presence of gut diverticula which give rise to the coelom; but, like the trochosphere, it possesses an apical plate with sensory organs on the preoral lobe. The resemblance of _ the tornaria to the bipinnaria is so close that, taking into consideration certain additional resemblances in the arrangement

of the coelomic vesicles which arise from the original gut diverticulum, it is impossible to resist the conclusion that there is affinity between the Echinoderm and Enteropneust phyla. Here we have a case like that of the Tunicata in which an affinity which is not

Alter J. Muller. Fig. 7. — Bipinnaria ele- gans, the Larva of aStar-fish. Description and lettering as in fig. 6.

evident from a study of the adult alone is revealed by a study of the young form. The other larva which recalls the Echinoderm type is the Actinotrocha of Phoronis (fig. 12), but the resemblance

After J. Miiller.

Fig. 8. — Ophiopluteus bimaculatus, the Larva of an Ophiurid. Descrip- tion and lettering as in fig. 6.

After Seeligeron “Antedon”in Spengel’s Zoohgische Jahrbucher.

Fig. 10. — A free-swimming

Larva of Antedon, ventral view.

It has an apical tuft of cilia, five

After J. Muller. ciliated bands, and a depression — •

Fig. 9. — Echinopluteus, the the vestibular depression — on its

Larva of a Spatangid. Descrip- ventral surface, v, Vestibular de-

tion and lettering as in fig. 6. pression ; /, adhesive pit.

is not nearlv so close, being confined to the presence of a postoral

longitudinal’ band of cilia which is prolonged into arm-like processes.

The following groups have larvae which cannot be related

to other larvae: the Porifera, Coelenterata, Turbellaria and

of

After Metschnikoff.

Fig. 11. — Tornaria Larva an Enteropneust, side view. ee, Apical plate. aa, Preoral ciliary band. bb, Postoral ciliary band. dd, Mouth. //, Anterior coelomic vesicle and

pore, gp, Alimentary canal. kh, Anus.

presented by the adult, viz. the presence of a strong cuticle and of articulated appendages and the absence of cilia. They are re- markable among larvae for the number of stages which they pass through in attaining the adult state. However numerous these may be, they

almost always have, when first set free from the egg, one of two forms, that of the nauplius (fig. 13, A) or that of the zoaea (fig. 13, B). The nauplius is found throughout the group and is the more important of the two; the zoaea is confined to the higher members, in some of which it merely forms a stage through which the larva, hatched as a nauplius, passes in its gradual development. The nauplius larva is of classic interest because its occurrence has enabled zoo- logists to determine with pre- cision the position in the animal kingdom of a group, the Cirripedia, which was placed by the illustrious Cuvier among the Mollusca. In the Tunicata the re- markable tadpole larva, the structure and development of which was first elucidated by the great Russian natur- alist, A. Kowalevsky, pos- sesses a similar interest to that of the nauplius larva of Cirripeds, and of the tornaria larva of the Enteropneusta, in that it pointed the way to the recognition of the affinities of the Tunicata, affinities which were entirely unsus- pected till they were revealed by a study of the larvae.

With regard to the oc- currence of larvae, three general statements may be made. (1) They are always associated with a small egg in which the amount of food yolk is not sufficient to enable the animal to complete its development in the embryonic state. (2) A free-swimming larva is usually found in cases in which the adult is attached to foreign objects. (3) A larval stage is, as a rule, associated with internal parasitism of the adult. The object gained by the occurrence of a larva in the two last cases is to en- able the species to distribute itself over as wide an area as possible. It may further be asserted that land and fresh-water animals develop without a larval stage much more frequently than marine forms. This is probably partly due to the fact that the conditions of land and

Fig. 12. — Actinotrocha Larva of Phoronis, side view. (Modified after Benham.)

1. Apical plate.

2. Mouth.

3. Postoral ciliary band and arms.

4. Perianal ciliary band.

Nemertea,Brachiopoda,Myriapoda,Insecta,Crustacea,Tunicata. We may shortly notice the larvae of the two latter.

In the Crustacea the larvae are highly peculiar and share, in a striking manner, certain of the important features of specialization

Fig. 13. — A, Nauplius of the Crus- tacean Penaeus, dorsal view. B, Zoaea Larva of the same animal, ventral view.

I. 2. 3. The three pairs of appen- dages of the nauplius larva (the future first and second antennae and mandibles).

3. Mandible.

4. First maxilla.

5. Second maxilla.

6. First maxilliped.

7. Second maxilliped.

8. Third maxilliped. fresh-water life are not so

favourable for the spread of a species over a wide area by means of simply-organized larvae as are those of marine life, and partly to the fact that, in the case of iresh- water forms at any rate, a feebly-swimming larva would be in danger of being swept out to sea by currents.

I. The association of larvae with small eggs. This is a true state- ment as far as it goes, but in some cases small eggs do not give rise to larvae, some special form of nutriment being provided by the parent, e.g. Mammalia, in which there is a uterine nutrition by means of a placenta; some Gastropoda (e.g. Helix waltoni, Bulimus), in which, though the ovum is not specially large, it floats in a large quantity of albumen at the expense of which the development is com- pleted; some Lamellibranchiata (Cyclas, &c), Echinodermata (many Ophiurids, &c), &c, in which development takes place in a brood

pouch. In the majority of cases, however, in which there is a small amount of food yolk and no special arrangements for parental care, a larva is formed. No better group than the Mollusca can be taken to illustrate this point, for in them we find every kind of develop- ment from the completely embryonic development of the Cephalo- poda, with their large heavily-yolked eggs, to the development of most marine Lamellibranchiata and many Gastropoda, in which the embryonic period is short and there is a long larval development. The

Mollusca are further specially interesting for showing very clearly cases in which, though the young are born or hatched fully developed, the larval stages are passed through in the egg, and the larval organs (e.g. velum) are developed but without function (e.g. Paludina, Cyclas, Onchidium). *As already mentioned, the larval form of the Mollusca is the trochosphere.

2. Free-swimming larvae are usually formed when the adult is fixed. We need only refer to the cases of the Cirripedia with their well-marked nauplius and cypris larvae, to Phoronis with its re- markable actinotrocha, to the Crinoidea, Polyzoa, &c. There are a few exceptions to this rule, e.g. the Molgulidae amongst the fixed Tunicata, Tubularia, Myriothela, &c, among the Hydrozoa.

3. Internal parasites generally have a stage which may be called larval, in which they are transferred either by active or passiye migration to a new host. In most Nematoda, some Cestoda, and in Trematoda this larva leads a free life; but in some nematodes (Trichina) and some cestodes the larva does not become free.

(A. SE.*) LARYNGITIS, an inflammation of the mucus of the larynx. There are three chief varieties: acute, chronic, and oedematous. The larynx is also liable to attacks of inflammation in connexion with tubercle or syphilis.

Acute Laryngitis may be produced by an independent catarrh, or by one extending either from the nasal or the bronchial mucous membrane into that of the larynx. The causes are various, ” catching cold ” being the most common. Excessive use of the voice either in speaking or singing sometimes gives rise to it. The inhalation of irritating particles, vapours, &c, and swallow- ing very hot fluids or corrosive poisons are well-recognized causes. It may also occur in connexion with diseases, notably measles and influenza. As a result of the inflammation there is a general swelling of the parts about the larynx and the epiglottis, the result being a narrowing of the channel for the entrance of the air, and to this the chief dangers are due. The symptoms vary with the intensity of the attack; there is first a sense of tickling, then of heat, dryness, and pain in the throat, with some difficulty in swallowing. There is a dry cough, with expectoration later; phonation becomes painful, while the voice is husky, and may be completely lost. In children there is some dyspnoea. In favourable cases, which form the majority, the attack tends to abate in a few days, but the inflammation may become of the oedematous variety, and death may occur suddenly from an asphyxial paroxysm. Many cases of acute laryngitis are so slight as to make themselves known

only by hoarseness and the character of the cough, nevertheless in every instance the attack demands serious attention. The diagnosis is not, in adults, a matter of much difficulty, especially if an examination is made with the laryngoscope; in children, however,. it is more difficult, and the question of diphtheria must not be lost sight of. The treatment is, first and foremost, rest; no talking must be allowed. The patient should be kept in bed, in a room at an even temperature, and the air saturated with moisture. An ice-bag round the throat gives much relief, while internally diaphoretics may be given, and a full dose of Dover's powder if there be much pain or cough.

Chronic Laryngitis usually occurs as a result of repeated attacks of the acute form. It is extremely common in people who habitually over-use the voice, and is the cause of the hoarse voice one associates with street sellers. The constant inhalation of irritating vapours, such as tobacco smoke, may also cause it. There is usually little or no pain, only the unpleasant sensation of tickling in the larynx, with a constant desire to cough. The changes in the mucous membrane are more permanent than in the acute variety, and there nearly always accompanies this a chronic alteration of the membrane of the pharynx (granular pharyngitis). The treatment consists in stopping the cause, where known, e.g. the smoking or shouting. Careful examination should be made to see if there is any nasal obstruction, and the larynx should be treated locally with suitable astringents,

by means of a brush, spray or insufflation. Overheated and ill-ventilated rooms must be avoided, as entrance into them immediately aggravates the trouble and causes a paroxysm of coughing.

Oedematous Laryngitis is a very fatal condition, which may occur, though rarely, as a sequence of acute laryngitis. It is far more commonly seen in syphilitic and tubercular con- ditions of the larynx, in kidney disease, in certain fevers, and in cases of cellulitis of the neck. The larynx is also one of the sites of Angeioneurotic oedema. In this form of laryngitis there are all the symptoms of acute laryngitis, but on a very much exaggerated scale. The dyspnoea, accompanied by marked stridor, may arise and reach a dangerous condition within the space of an hour, and demand the most prompt treatment. On examination the mucous membrane round the epiglottis is seen to be enormously swollen. The treatment is ice round the throat and internally, scarification of the swollen parts, and should that not relieve the asphyxial symptoms, tracheotomy must be performed immediately.

Tubercular Laryngitis is practically always associated with phthisis.

The mucous membrane is invaded by the tubercles, which first form small masses. These later break down and ulcerate; the ulceration then spreads up and down, causing an immense amount of destruction. The first indication is hoarse- ness, or, in certain forms, pain on swallowing. The cough is, as a rule, a late symptom. A sudden oedema may bring about a rapid fatal termination. The general treatment is the same as that advised for phthisis; locally, the affected parts may be removed by one or a series of operations, generally under local anaesthesia, or they may be treated with some destructive agent such as lactic acid. The pain on swallowing can be best alleviated by painting with a weak solution of cocaine. The condition is a very grave one; the prognosis depends largely on the associated pulmonary infection — if that be extensive, a very small amount of laryngeal mischief resists treatment, while, if the case be. the contrary, a very extensive mischief may be successfully dealt with.

Syphilitic Laryngitis. — Invasion of the larynx in syphilis is very common. It may occur in both stages of the disease and in the inherited form. In the secondary stage the damage is superficial, and the symptoms those of a slight acute laryngitis. The injury in the tertiary stage is much more serious, the deeper structures are invaded with the formation of deep ulcers, which may when they heal form strong cicatrices, which produce a narrowing of the air-passage which may eventually require surgical interference. Occasionally a fatal oedema may arise. The treatment consists of administering constitutional remedies, local treatment being of comparatively slight importance.

Paroxysmal Laryngitis, or Laryngismus stridulus, is a nervous affection of the larynx that occurs in infants. It appears to be associated with adenoids. The disease consists of a reflex spasm of the glottis, which causes a complete blocking of the air- passages. The attacks, which are recurrent, cause acute asphyxia- tion. They may cease for no obvious reason, or one may prove fatal. The whole attack is of such short duration that the infant has either recovered or succumbed before assistance can be called. After an attack, careful examination should be made, and the adenoids, if present, removed by operation.

LA SABLIERE, MARGUERITE DE (c. 1640-1693), friend and patron of La Fontaine, was the wife of Antoine Rambouillet, sieur de la Sabliere (1624-1670), a Protestant financier entrusted with the administration of the royal estates, her maiden name being Marguerite Hessein. She received an excellent education in Latin, mathematics, physics and anatomy from the best scholars of her time, and her house became a meeting-place for poets, scientists and men of letters, no less than for

brilliant members of the court of Louis XIV. About 1673 Mme de la Sabliere received into her house La Fontaine, whom for twenty years she relieved of every kind of material anxiety. Another friend and inmate of the house was the traveller and physician Francois Bernier, whose abridgment of the works of Gassendi was written for Mme de la Sabliere. The abbe Chaulieu and

his fellow-poet, Charles Auguste, marquis de La Fare, were among her most intimate associates. La Fare sold his commission in the army to be able to spend his time with her. This liaison, which seems to have been the only serious passion of her life, was broken in 1679. La Fare was seduced from his allegiance, according to Mme de Sevigne by his love of play, but to this must be added a new passion for the actress La Champmesle. Mme de la Sabliere thenceforward gave more and more attention to good works, much of her time being spent in the hospital for in- curables. Her husband's death in the same year increased her serious tendencies, and she was presently converted to Roman Catholicism. She died in Paris on the 8th of January 1693.

LA SALE (or La Salle), ANTOINE DE (c. 1388-1462?), French writer, was born in Provence, probably at Aries. He was a natural son of Bernard de la Salle, 1 a famous soldier of fortune, who served many masters, among others the Angevin dukes. In 1402 Antoine entered the court of Anjou, probably as a page, and in 1407 he was at Messina with Duke Louis II., who had gone there to enforce his claim to the kingdom of Sicily. The next years he perhaps spent in Brabant, for he was present at two tournaments given at Brussels and Ghent. With other gentlemen from Brabant, whose names he has preserved, he took part in the expedition of 1415 against the Moors, organized by John I. of Portugal. In 1420 he accompanied Louis III. on another expedition to Naples, making in that year an excursion from Norcia to the Monte della Sibilla, and the neighbouring Lake of Pilate. The story of his adventures on this occasion, and an account, with some sceptical comments, of the local legends regarding Pilate, and the Sibyl's grotto, 2 form the most interest- ing chapter of La Salade, which is further adorned with a map of the ascent from Montemonaco. La Sale probably returned with Louis III. of Anjou, who was also comte de Provence, in 1426 to Provence, where he was acting as viguier of Aries in 1429. In 1434 Rene, Louis's successor, made La Sale tutor to his son Jean d'Anjou, due de Calabre, to whom he dedicated, between the years 1438 and 1447, his La Salade, which

is a text-book of the studies necessary for a prince. The primary intention of the title is no doubt the play on his own name, but he explains it on the ground of the miscellaneous character of the book — a salad is composed ” of many good herbs.” In 1439 he was again in Italy in charge of the castle of Capua, with the due de Calabre and his young wife, Marie de Bourbon, when the place was besieged by the king of Aragon. Rene abandoned Naples in 1442, and Antoine no doubt returned to France about the same time. His advice was sought at the tournaments which celebrated the marriage of the unfortunate Margaret of Anjou at Nancy in 1445; and in 1446, at a similar display at Saumur, he was one of the umpires. La Sale’s pupil was now twenty years of age, and, after forty years’ service of the house of Anjou, La Sale left it to become tutor to the sons of Louis de Luxem- bourg, comte de Saint Pol, who took him to Flanders and presented him at the court of Philippe le Bon, duke of Burgundy. For his new pupils he wrote at Chatelet-sur-Oise, in 1451, a moral work entitled La Salle.

He was nearly seventy years of age when he wrote the work that has made him famous, L’Hysloire et plaisanle cronicque du petit Jehan de Saintre et de la jeune dame des Belles-Cousines, Sans autre nom nommer, dedicated to his former pupil, Jean de Calabre. An envoi in MS. 10,057 (nouv. acq. fr.) in the Bibliotheque Nationale, Paris, states that it was completed at Chatelct on the 6th of March 1453 (i.e. 1456). La Sale also announces an intention, never fulfilled, apparently, of writing a romance of Paris et Vienne. The MSS. of Petit Jehan de Saintre usually contain in addition Floridam et Elvide, translated by Rasse de Brunhamel from the Latin of Nicolas de Clamange,

1 For his career, see Paul Durrieu, Les Gascons en Italie (Auch, 1885, pp. 107-71). _

2 For the legend of the Sibyl current in Italy at the time, given by La Sale, and its inter-relation with the Tannhauser story, see W. Soederhjelm, ” A. de la Salle et la legende de Tannhauser ” in Memoires de la soc. neo-philologique a” Helsingfors (1897, vol. ii.); and Gaston Paris, ” Le Paradis de la Reine Sibylle,” and ” La LSgende du Tannhauser,” in the Revue de Paris (Dec. 1897 and March 1898).

and dedicated to La Sale; also Addiction extraite des Cronicques de Flandres, of which only a few lines are original. Brunhamel says in his dedication that La Sale had delighted to write honour- able histories from the time of his ” florie jeunesse,” which confirms a reasonable inference from the style of Petit Jehan de Saintri that its author was no novice in the art of romance- writing. The Reconfort a Madame de Neujville, a consolatory epistle including two stories of parental

fortitude, was written at Vendeuil-sur-Oise about 1458, and in 1459 La Sale produced his treatise Des anciens toumois et faictz d'armes and the Journee d'Onneur et de Prouesse. He followed his patron to Genappe in Brabant when the Dauphin (afterwards Louis XL) took refuge at the Burgundiah court.

La Sale is generally accepted as the author of one of the most famous satires in the French language, Les Quinze Joyes de mariage, because his name has been disengaged from an acrostic at the end of the Rouen MS. He is also supposed to have been the " acteur " in the collection of licentious stones supposed to be narrated by various persons at the court of Philippe le Bon, and entitled the Cent Nouvelles Nouvelles. One only of the stories is given in his name, but he is credited with the compilation of the whole, for which Louis XL was long held responsible. A completed copy of this was presented to the Duke of Burgundy at Dijon in 1462. If then La Sale was the author, he probably was still living; otherwise the last mention of him is in 1461.

Petit Jehan de Saintre gives, at the point when the traditions of chivalryˆ were fast disappearing, an account of the education of an ideal knight and rules for his conduct under many different circumstances. When Petit Jehan, aged thirteen, is persuaded by the Dame des Belles-Cousines to accept her as his lady, she gives him systematic instruction in religion, courtesy, chivalry and the arts of success. She materially advances his career until Saintre 1 becomes an accomplished knight, the fame of whose prowess spreads through- out Europe. This section of the romance — apparently didactic in intention — fits in with the author's other works of edification. But in the second part this virtuous lady falls a victim to a vulgar intrigue with Damp Abb6. One of La Sale's commentators, M. Joseph Neve, ingeniously maintains that the last section is simply to show how the hero, after passing through the other grades of education, learns at last by experience to arm himself against coquetry. The book may, however, be fairly regarded as satirizing the whole theory of " courteous " love, by the simple method of fastening a repulsive conclusion on an ideal case. The contention that the fabliau-like ending of a romance begun in idyllic fashion was due to the corrupt influences of the Dauphin's exiled court, is inadmissible, for the last page was written when the prince arrived in Brabant in 1456. That it is an anti-clerical satire seems unlikely. The profession of the seducer is not necessarily chosen from that point of view. The language of the book is not disfigured by coarseness of any kind, but, if the brutal ending was the expression of the writer's real views, there is little difficulty in accepting him as the author of the Quinze Joyes .de

mariage and the Cent Nouvelles Nouvelles. — Both these are masterpieces in their way and exhibit a much greater dramatic power and grasp of dialogue than does Petit Jehan. Some light is thrown on the romance by the circumstances of the due de Calabre, to whom it was dedicated. His wife, Marie de Bourbon, was one of the ” Belles-Cousines ” who contended for the favour of Jacques or Jacquet de Lalaing in the Livre des faits de Jacques Lalaing which forms the chief source of the early exploits of Petit Jehan.

The incongruities of La Sale’s aims appear in his method of construction. The hero is not imaginary. Jehan de Saintre flourished in the Hundred Years’ War, was taken prisoner after Poitiers, with the elder Boucicaut, and was employed in negotiating the treaty of Bretigny. Froissart mentioned him as ” le meilleur et le plus vaillant chevalier de France.” His exploits as related in the romance are, however, founded on those of Jacques de Lalaing (c. 1422-1453), who was brought up at the Burgundian court, and became such a famous knight that he excited the rivalry of the ” Belles-Cousines,” Marie de Bourbon and Marie deCleves, duchessed’Orleans. Lalaing’s exploits are related by more than one chronicler, but M. Gustave Raynaud thinks that the Livre des faits de Jacques de Lalaing, published among the works of Georges Chastelain, to which textual parallels may be found in Petit Jehan, should also be attributed to La Sale, who in that case undertook two accounts of the same hero, one historical and the other fictitious. To complicate matters, he drew, for the later exploits of Petit Jehan, on the Livres des faits de Jean Boucicaut, which gives the history of the younger Boucicaut. The atmosphere of the book is not the rough realities of the English wars in which the real Saintre figured but that of the courts to which La Sale was accustomed.

The title of Les Quinze Joyes de mariage is, with a profanity characteristic of the time, borrowed from a popular litany, Les Quinze Joies de Notre Dame, and each chapter terminates with a liturgical

refrain voicing the miseries of marriage. Evidence in favour of La Sale’s authorship is brought forward by M. E. Gossart {Bibliophile beige, 1871, pp. 83-7), who quotes from his didactic treatise of La Salle a passage paraphrased from St Jerome’s treatise against Jovinian which contains the chief elements of the satire. Gaston Paris (Revue de Paris, Dec. 1897) expressed an opinion that to find anything like the malicious penetration by which La Sale divines the most intimate

details of married life, and the painful exactness of the description, it is necessary to travel as far as Balzac. The theme itself was common enough in the middle ages in France, but the dialogue of the Quinze Joyes is unusually natural and pregnant. Each of the fifteen vignettes is perfect in its kind. There is no re- dundance. The diffuseness of romance is replaced by the methods of the writers of the fabliaux.

In the Cent Nouvelles Nouvelles the Italian novella is naturalized in France. The book is modelled on the Decameron of Boccaccio, and owes something to the Latin Facetiae of the contemporary scholar Poggio; but the stories are rarely borrowed, and in cases where the Nouvelles have Italian parallels they appear to be independent variants. In most cases the general immorality of the conception is matched by the grossness of the details, but the ninety-eighth story narrates what appears to be a genuine tragedy, and is of an entirely different nature from the other contes. It is another version of the story of Floridam et Elvide already mentioned.

Not content with allowing these achievements to La Sale, some critics have proposed to ascribe to him also the farce of Maltre Pathelin.

The best editions of La Sale's undoubted and reputed works are: — Petit Jehan de Saintre by J. M. Guichard (1843); Les Cent Nouvelles Nouvelles by Thomas Wright (Bibl. elzeVerienne, 1858); Les Quinze Joyes de manage by P. Jannet (Bibl. elzev., 1857). La Salade was printed more than once during the 16th century. La Salle was never printed. For its contents see E. Gossart in the Bibliophile beige (1871, pp. 77 et seq.). See also the authorities quoted above, and Joseph Neve, Antoine de la Salle, sa vie et ses ouvrages . . . suivi du Reconfort de Madame de Fresne . . . et de fragments et documents inedits (1903), who argues for the rejection of Les Quinze Joyes and the Cent Nouvelles Nouvelles from La Sale's works; Pietro Toldo, Contributo alio studio della novella francese del XV e XVI secolo (1895), and a review of it by Gaston Paris in the Journal des Savants (May 1895); L. Stern, " Versuch tlber Antoine de la Salle," in Archiv fur das Studium der neueren Sprachen, vol. xlvi. ; and G. Raynaud, " Un Nouveau Manuscrit du Petit Jehan de Saintre," in Romania, vol. xxxi. (M. Br.)

LASALLE, ANTOINE CHEVALIER LOUIS COLLINET,

Count (1775-1809), French soldier, belonged to a noble family in Lorraine. His grandfather was Abraham Fabert, marshal of France. Entering the French army at the age of eleven, he had reached the rank of lieutenant when the Revolution broke out. As an aristocrat, he lost his commission, but he enlisted in the ranks, where his desperate

bravery and innate power of command soon distinguished him. By 1795 he had won back his grade, and was serving as a staff-officer in the army of Italy. On one occasion, at Vicenza, he rivalled Seydlitz's feat of leaping his horse over the parapet of a bridge to avoid capture, and, later, in Egypt, he saved Davout's life in action. By 1800 he had become colonel, and in one combat in that year he had two horses killed under him, and broke seven swords. Five years later, having attained the rank of general of brigade, he was present with his brigade of light cavalry at Austerlitz. In the pursuit after Jena in 1806, though he had but 600 hussars and not one piece of artillery with him, he terrified the com- mandant of the strong fortress of Stettin into surrender, a feat rarely equalled save by that of Cromwell on Bletchingdon House. Made general of division for this exploit, he was next in the Polish campaign, and at Heilsberg saved the life of Murat, grand duke of Berg. When the Peninsular War began, Lasalle was sent out with one of the cavalry divisions, and at Medina de Rio Seco, Gamonal and Medellin broke every body of troops which he charged. A year later, at the head of one of the cavalry divisions of the Grande Armee he took part in the Austrian war. At Wagram he was killed at the head of his men. With the possible exception of Curely, who was in 1809 still unknown, Napoleon never possessed a better leader of light horse. Wild and irregular in his private life, Lasalle was far more than a beau sabreur. To talent and experience he added that power of feeling the pulse of the battle which is the true gift of a great leader. A statue of him was erected in Luneville in , 1893. His remains were brought from Austria to the Invalides in 1891.

LA SALLE, REN6 ROBERT CAVELIER, Sieur de (1643- 1687), French explorer in North America, was born at Rouen on the 22 nd of November 1643. He taught for a time in a school (probably Jesuit) in France, and seems to have forfeited his claim to his father's estate by his connexion with the Jesuits. In 1666 he became a settler in Canada, whither his brother, a Sulpician abbe, had preceded him. From the Seminary of St Sulpice in Montreal La Salle received a grant on the St Lawrence about 8 m. above Montreal, where he built a stockade and established a fur-trading post. In 1669 he sold this post (partly to the Sulpicians who had granted it to him) to raise funds for an expedition to China 1 by way of the Ohio, 2 which he supposed, from the reports of the Indians, to flow into the Pacific. He passed up the St Lawrence and through Lake Ontario to a Seneca village on the Genesee river; thence with an Iroquois guide he crossed the mouth of the Niagara (where he heard the noise of the distant falls) to Ganastogue, an Iroquois colony at the head of Lake Ontario, where he met Louis Joliet and received from him a map of parts of the Great Lakes. La Salle's

missionary comrades now gave up the quest for China to preach among the Indians. La Salle discovered the Ohio river, descended it at least as far as the site of Louisville, Kentucky, and possibly, though not probably, to its junction with the Mississippi, and in 1669-1670, abandoned by his few followers, made his way back to Lake Erie. Apparently he passed through Lake Erie, Lake Huron and Lake Michigan, and some way down the Illinois river. Little is known of these explorations, for his journals are lost, and the description of his travels rests only on the testimony of the anonymous author of a Histoire de M. de la Salle. Before 1673 La Salle had returned to Montreal. Becoming convinced, after the explorations of Marquette and Joliet in 1673, that the Mississippi flowed into the Gulf of Mexico, he conceived a vast project for exploring that river to its mouth and extending the French power to the lower Mississippi Valley. He secured the support of Count Frontenac, then governor of Canada, and in 1674 and 1677 visited France, obtaining from Louis XIV. on his first visit a patent of nobility and a grant of lands about Fort Frontenac, on the site of the present Kingston, Ontario, and on his second visit a patent empowering him to explore the West at his own expense, and giving him the buffalo- hide monopoly. Late in the year 1678, at the head of a small party, he started from Fort Frontenac. He established a post above Niagara Falls, where he spent the winter, and where, his vessel having been wrecked, he built a larger ship, the ” Griffon,” in which he sailed up the Great Lakes to Green Bay (Lake Michigan), where he arrived in September 1679. Sending back the ” Griffon ” freighted with furs, by which he hoped to satisfy the cl?ims of his creditors, he proceeded to the Illinois river, and near what is now Peoria, Illinois, built a fort, which he called Fort Crevecceur. Thence he detached Father Hennepin, with one companion, to explore the Illinois to its mouth, and, leaving his lieutenant, Henri de Tonty (c. 1650-c. 1702), 3 with about fifteen men, at Fort Crevecceur, he returned by land, afoot, to Canada to obtain needed supplies, discovering the fate of the ” Griffon ” (which proved to have been lost), thwarting the intrigues of his enemies and appeasing his creditors. In July 1680 news reached him at Fort Frontenac that nearly all Tonty’s men had deserted, after destroying or appropriating most of the supplies; and that twelve of them were on their way to kill him as the surest means of escaping punishment.

1 The name La Chine was sarcastically applied to La Salle’s settlement on the St Lawrence.

2 The Iroquois seem to have used the name Ohio for the Mississippi, or at least for its lower part ; and this circumstance makes the story of La Salle’s exploration peculiarly difficult to disentangle.

3 Tonty (or Tonti), an Italian, born at Gaeta, was La Salle's principal lieutenant, and was the equal of his chief in intrepidity. Before his association with La Salle he had engaged in military service in Europe, during which he had lost a hand. He accompanied La Salle to the mouth of the Mississippi, and was in command of Fort St Louis from ths time of its erection until 1702, except during his journeys down the Mississippi in search of his chief. In 1702 he joined d'Iberville in lower Louisiana, and soon after was despatched on a mission to the Chickasaw Indians. This is the last authentic trace of him.

These he met and captured or killed. He then returned to the Illinois, to find the country devastated by the Iroquois, and his post abandoned. He formed a league of the Western Indians to fight the Iroquois, then went to Michilimackinac, where he found Tonty, proceeded again to Fort Frontenac to obtain supplies and organize his expedition anew, and returned in December 1681 to the Illinois. Passing down the Illinois to the Mississippi, which he reached in February 1682, he floated down that stream to its mouth, which he reached on the 9th of April, and, erecting there a monument and a cross, took formal possession in the name of Louis XIV., in whose honour he gave the name " Louisiana " to the region. He then returned to Michilimackinac, whence, with Tonty, he went again to the Illinois and established a fort, Fort St Louis, probably on Starved Rock (near the present Ottawa, Illinois), around which nearly 20,000 Indians (Illinois, Miamis and others seeking protection from the Iroquois) had been gathered. La Salle then went to Quebec, and La Barre, who had succeeded Frontenac, being unfriendly to him, again visited France (1684), where he succeeded in interesting the king in a scheme to establish a fort at the mouth of the Mississippi and to seize the Spanish posts in the vicinity. On the 24th of July 1684, with four vessels under the command of himself and Captain Beaujeu, a naval officer, he sailed from La Rochelle. Mistaking, it appears, the inlets of Matagorda Bay (which La Salle called St Louis's Bay) in the present state of Texas, for the mouth of an arm of the Mississippi, he landed there, and Beaujeu, soon afterwards returned to France. The expedition had met with various misfortunes", one vessel had been captured by the Spaniards and another had been wrecked; and throughout La Salle and Beaujeu had failed to work in harmony. Soon finding that he was not at the mouth of the Mississippi, La Salle established a settlement and built a fort, Fort St Louis, on the Lavaca (he called it La Vache) river, and leaving there the greater part of his

force, from October 1685 to March 1686 he vainly sought for the Mississippi. He also made two attempts to reach the Illinois country and Canada, and during the second, after two months of fruitless wanderings, he was assassinated, on the iqth of March 1687, by several of his followers, near the Trinity river in the present Texas.

His colony on the Lavaca, after suffering terribly from priva- tion and disease and being attacked by the Indians, was finally broken up, and a force of Spaniards sent against it in 1689 found nothing but dead bodies and a dismantled fort; the few sur- vivors having become domesticated in the Indian villages near by. Some writers, notably J. G. Shea, maintain that La Salle never intended to fortify the mouth of the Mississippi, but was instructed to establish an advanced post near the Spanish possessions, where he was to await a powerful expedi- tion under a renegade Spaniard, Penalosa, with whom he was to co-operate in expelling the Spaniards from this part of the continent. 1

La Salle was one of the greatest of the explorers in North America. Besides discovering the Ohio and probably the Illinois, he was the first to follow the Mississippi from its upper course to its mouth and thus to establish the connexion between the discoveries of Radisson, Joliet and Marquette in the north with those of De Soto in the south. He was stern, indomitable and full of resource.

The best accounts of La Salle's explorations may be found in Francis Parkman's La Salle and the Discovery of the Great West (Boston, 1870; later revised editions), in Justin Winsor's Cartier to

1 Although La Salle and Don Diego de Penalosa (1624-1687) presented to the French government independent plans for an expedition against the Spaniards and Penalosa afterwards proposed their co-operation, there is no substantial evidence that this project was adopted. Parkman is of the opinion that La Salle proposed his expedition against the Spaniards in the hope that the conclusion of peace between France and Spain would prevent its execution and that he might then use the aid he had thus received in establishing a fortified commercial colony at the mouth of the Mississippi. See E. T. Miller, " The Connection of Penalosa with the La Salle Expe- dition," in the Quarterly of the Texas State Historical Association, vol. v. (Austin, Tex., 1902).

Frontenac (Boston, 1894), and in J. G. Shea's Discovery and Explora- tion of the Mississippi Valley (New York, 1852); see also P. Chesnel, Histoire de Cavelier de La Salle, explorations et conquete du bassin du Mississippi (Paris, 1901). Of the early narratives see Louis Hennepin,

Description de la Louisiane (1683); Joutel, Journal historique du dernier voyage que feu M. de la Salle fit dans le Golfe de Mexique, &c. (Paris, 1713); and Henri de Tonty, Derniers De- couvertes dans VAmerique septentrionale de M. de La Salle (Paris, 1697). Original narratives may be found, translated into English, in The Journeys of Rene Robert Cavelier, Sieur de La Salle, as related by his Faithful Lieutenant, Henri de Tonty, £fc. (2 vols., New York, 1905), edited by I. J. Cox; in Benjamin P. French's Historical Collections of Louisiana (6 series, New York, 1846-1853), and in Shea's Early Voyages Up and Down the Mississippi (Albany, 1861); and an immense collection of documents relating to La Salle may be found in Pierre Margry's Dicouvertes et etablissements des Francais dans I'ouest et dans le sud de VAmerique septentrionale, 1614-1754; Memoir es et documents originaux recueillis et publies (6 vols., Paris, 1 875-1 886), especially in vol. ii. (C. C. W.)

■LA SALLE, ST JEAN BAPTISTE DE (1651-1710), founder of the order of Christian Brothers, was born at Reims. The son of a rich lawyer, his father's influence early secured him a canonry in the cathedral; there he established a school, where free elementary instruction was given to poor children. The enterprise soon broadened in scope; a band of enthusiastic assistants gathered round him; he resolved to resign his canonry, and devote himself entirely to education. His assistants were organized into a community, which gradually rooted itself all over France; and a training-school for teachers, the College de Saint- Yon, was set up at Rouen. In 1725, six years after the founder's death, the society was recognized by the pope, under the official title of " Brothers of the Christian Schools"; its members took the usual monastic vows, but did not aspire to the priesthood. During the first hundred years of its existence its activities were mainly confined to France; during the 19th century it spread to most of the countries of western Europe, and has been markedly successful in the United States. When La Salle was canonized in 1900, the total number of brothers was estimated at 15,000. Although the order has been chiefly concerned with elementary schools, it undertakes most branches of secondary and technical education; and it has served as a model for other societies, in Ireland and elsewhere, slightly differing in character from the original institute.

LA SALLE, a city of La Salle county, Illinois, U.S.A., on the Illinois river, near the head of navigation, 99 m. S.W. of Chicago. Pop. (1900) 10,446, of whom 3471 were foreign-born; (1910 census) 11,537. The city is served by the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, and the Illinois Central railways, and by the Illinois & Michigan Canal, of which La Salle is the western terminus. The city

has a public library. The principal industries are the smelting of zinc and the manufacture of cement, rolled zinc, bricks, sulphuric acid and clocks; in 1905 the city's factory products were valued at $3,158,173. In the vicinity large quantities of coal are mined, for which the city is an important shipping point. The muni- cipality owns and operates the waterworks and the electric light- ing plant. The first settlement was made here in 1830; and the place which was named in honour of the explorer, Ren6 Robert Cavelier, Sieur de La Salle, was chartered as a city in 1852 and rechartered in 1876.

LASAULX, ARNOLD CONSTANTIN PETER FRANZ VON (1839-1886), German mineralogist and petrographer, was born at CasteEaun near Coblenz on the 14th of June 1839. He was educated at Berlin, where he took his Ph. D. in 1868. In 1875 he became professor of mineralogy at Breslau, and in 1880 professor of mineralogy and geology at Bonn. He was distin- guished for his researches on minerals and on crystallography, and he was one of the earlier workers on microscopic petrography. He described in 1878 the eruptive rocks of the district of Saar and Moselle. In 1880 he edited Der Aetna from the MSS. of Dr W. Sartorius von Waltershausen, the results of observations made between the years 1834-1869. He was author of Elemente der Petrographie (1875), Einfiihrung in die Gesteinslehre (1885), and Precis de petrographie (1887). He died at Bonn on the 25th of January 1886.

LASCAR, the name in common use for all oriental, and especially Indian, sailors, which has been adopted in England into the Merchant Shipping Acts, though without any definition. It is derived from the Persian lashkar = army, or camp, in which sense it is still used in India, e.g. Lashkar, originally the camp, now the permanent capital, of Sindhia at Gwalior. It would seem to have been applied by the Portuguese, first to an inferior class of men in military service (cf. " gun-lascars "), and then to sailors as early as the 17 th century. The form askari on the east coast of Africa, equivalent to " sepoy," comes from the Arabic 'askar= army, which is believed to be itself taken from the Persian.

LASCARIS, CONST ANTINE (d. 1493 or 1500), Greek scholar and grammarian, one of the promoters of the revival of Greek learning in Italy, was born at Constantinople. He was a member of the noble Bithynian family, which had furnished three em- perors of Nicaea

during the 13th century. After the fall of Constantinople in 1453, he took refuge first in Corfu and then in Italy, where Francesco Sforza, duke of Milan, appointed him Greek tutor to his daughter. Here was published his Grammatica Graeca, sive compendium octo orationis partium, remarkable as being the first book entirely in Greek issued from the printing press. After leaving Milan, Lascaris taught in Rome under the patronage of Cardinal Bessarion, and in Naples, whither he had been summoned by Ferdinand I. to deliver a course of lectures on Greece. Ultimately, on the invitation of the inhabitants, he settled in Messina, Sicily, where he continued to teach publicly until his death. Among his numerous pupils here was Pietro Bembo. Lascaris bequeathed his library of valuable MSS. to the senate of Messina; the collection was afterwards carried to Spain and lodged in the Escurial.

The Grammatica, which has often been reprinted, is the only work of value produced by Lascaris. Some of his letters are given by J. Iriarte in the Regiae Bibliothecae Matritensis codices Graeci manu- scripli, i. (Madrid, 1769). His name is known to modern readers in the romance of A. F. Villemain, Lascaris, ou les Grecs du quinzieme siecle (1825). See also J. E. Sandys, Hist. Class. Schol., ed. 2, vol. ii. (1908), pp. 76 foil.

LASCARIS, JOANNES [John], or Janus (c. 1445-1535), Greek scholar, probably the younger brother of Constantine Lascaris, surnamed Rhyndacenus from the river Rhyndacus in Bithynia, his native province. After the fall of Constantinople he was taken to the Peloponnese, thence to Crete, and ultimately found refuge in Florence at the court of Lorenzo de' Medici, whose intermediary he was with the sultan Bayezid II. in the purchase of Greek MSS. for the Medicean library. On the expulsion of the Medici from Florence, at the invitation of Charles VIII. of France, Lascaris removed to Paris (1495), where he gave public instruction in Greek. By Louis XII. he was several times employed on public missions, amongst others to Venice (1503-1508), and in 1515 he appears to have accepted the invitation of Leo X. to take charge of the Greek college he had founded at Rome. We afterwards (15 18) find Lascaris employed along with Budaeus (Bude) by Francis I. in the formation of the royal library at Fontainebleau, and also again sent in the service of the French crown to Venice. He died at Rome, whither he had been summoned by Pope Paul III., in 1535. Among his pupils was Musurus.

Amongst other works, Lascaris edited or wrote: Anthologia epigrammatum Graecorum (1494), in which he ascribed the collection of the Anthology to Agathias, not to Planudes; Didytni Alexandrini scholia in Iliadem (15 17); Porphyrius of Tyre's Homericarum

quaestionum liber (1518); De veris Graecarum liUerarum formis ac causis apnd antiques (Paris, 1556). See H. Hody, De Graecis illustribus (London, 1742); W. Roscoe, Life of_ Leo X. ii. (1846); C. F. Borner, De doctis hominibus Graecis (Leipzig, 1750); A. Horawitz in Ersch & Gruber's Allgemeine Encyclopddie; J. E. Sandys, Hist. Class. Schol., ed. 2, vols. ii. (1908), p. 78.

LAS CASAS, BARTOLOMlS DE (1474-1566), for some time bishop of Chiapa in Mexico, and known to posterity as " The Apostle of the Indies," was a native of Seville. His father, one of the companions of Columbus in the voyage which resulted in the discovery of the New World, sent him to Salamanca, where he graduated. In 1498 he accompanied his father in

an expedition under Columbus to the West Indies, and in 1502 he went with Nicolas de Ovando, the governor, to Hayti, where in 1 5 10 he was admitted to holy orders, being the first priest ordained in the American colonies. In 1511 he passed over to Cuba to take part in the work of " population and pacifi- cation," and in 1 5 13 or 1 5 14 he witnessed and vainly endeavoured to check the massacre of Indians at Caonao. Soon afterwards there was assigned to him and his friend Renteria a large village in the neighbourhood of Zagua, with a number of Indians attached to it in what was known as repartimiento (allotment); like the rest of his countrymen he made the most of this opportunity for growing rich, but occasionally celebrated mass and preached. Soon, however, having become convinced of the injustice con- nected with the repartimiento system, he began to preach against it, at the same time giving up his own slaves. With the consent of his partner he resolved to go to Spain on behalf of the op- pressed natives, and the result of his representations was that in 1 5 1 6 Cardinal Jimenes caused a commission to be sent out for the reform of abuses, Las Casas himself, with the title of " protector of the Indians," being appointed to advise and report on them. This commission had not been long at San Domingo before Las Casas perceived the indifference of his coadjutors to the cause which he himself had at heart, and July 1517 found him again in Spain, where he developed his scheme for the complete liberation of the Indians — a scheme which not only included facilities for emigration from Spain, but was intended to give to each Spanish resident in the colonies the right of importing twelve negro slaves. The emigration movement proved a failure, and Las Casas lived long enough to express his shame for having been so slow to see that Africans were as much entitled to freedom as were the natives of the New World. Overwhelmed with disappointment, he retired to the Dominican monastery in Haiti; he joined the order in 1522 and devoted eight years to study. About 1530 he appears to have

revisited the Spanish court, but on what precise errand is not known; the confusion concerning this period of his life extends to the time when, after visits to Mexico, Nicaragua, Peru and Guatemala, he undertook an expedition in 1537 into Tuzulutlan, the inhabitants of which were, chiefly through his tact, peaceably converted to Christianity, mass being cele- brated for the first time amongst them in the newly founded town of Rabinal in 1538. In 1539 Las Casas was sent to Spain to obtain Dominican recruits, and through Loaysa, general of the order, and confessor of Charles V., he was successful in obtaining royal orders and letters favouring his enterprise. During this stay in Europe, which lasted more than four years, he visited Germany to see the emperor; he also (1542) wrote his Veynle Razones, in defence of the liberties of the Indians and the Brevisima Relacion de la Destruycion des las Indias occidentales, the latter of which was published some twelve years later. In 1543 he refused the Mexican bishopric of Cuzco, but was prevailed upon to accept that of Chiapa, for which he sailed in 1544. Thwarted at every point by the officials, and outraged by his countrymen in his attempt to carry out the new laws which his humanity had procured, he returned to Spain and resigned his dignity (1547). In 1550 he met Sepul- veda in public debate on the theses drawn from the recently published Apologia pro libro de juslis belli causis, in which the latter had maintained the lawfulness of waging unprovoked war upon the natives of the New World. The course of the discussion may be traced in the account of- the Disputa con- tained in the Obras (1552). In 1565 Las Casas successfully remonstrated with Philip II. against the financial project for selling the reversion of the encomiendas — a project which would have involved the Indians in hopeless bondage. In July of the following year he died at Madrid, whither he had gone to urge (and with success) the necessity of restoring a court of justice which had been suppressed in Guatemala. His Historia de las Indias was not published till 1875-1876.

Sir Arthur Helps' Life of Las Casas (London, 1868) has not been superseded ; but see also F. A. MacNutt, Bartholomew de Las Casas

(1909).

LAS CASES, EMMANUEL AUGUSTIN DIEUDONNt MARIN JOSEPH, Marquis (1766-1842), French official, was born at the castle of Las Cases near Revel in Languedoc. He was educated at the military

schools of Vendome and Paris; he entered the navy and took part in various engagements of the years 1781- 1782. The outbreak of the Revolution in 1789 caused him to ” emigrate,” and he spent some years in Germany and England, sharing in the disastrous Quiberon expedition (1795). He was one of the few survivors and returned to London, where he lived in poverty. He returned to France during the Consulate with other royalists who rallied to the side of Napoleon, and stated afterwards to the emperor that he was ” conquered by his glory.” Not until 1810 did he receive much notice from Napoleon, who then made him a chamberlain and created him a count of the empire (he was marquis by hereditary right). After the first abdication of the emperor (nth of April 1814), Las Cases retired to England, but returned to serve Napoleon during the Hundred Days. The second abdication opened up for Las Cases the most noteworthy part of his career. He withdrew with the ex-emperor and a few other trusty followers to Rochefort; and it was Las Cases who first proposed and strongly urged the emperor to throw himself on the generosity of the British nation. Las Cases made the first overtures to Captain Maitland of H.M.S. ” Belle- rophon ” and received a guarded reply, the nature of which he afterwards misrepresented. Las Cases accompanied the ex-emperor to St Helena and acted informally but very assiduously as his secretary, taking down numerous notes of his conversations which thereafter took form in the famous Mimorial de Ste Helene. The limits of this article preclude an attempt at assessing the value of this work. It should be read with great caution, as the compiler did not scruple to insert his own thoughts and to colour the expressions of his master. In some cases he misstated facts and even fabricated documents. It is far less trustworthy than the record penned by Gourgaud in his Journal. Disliked by Montholon and Gourgaud, Las Cases seems to have sought an opportunity to leave the island when he had accumu- lated sufficient literary material. However that may be, he infringed the British regulations in such a way as to lead to his expulsion by the governor, Sir Hudson Lowe (November, 1816). He was sent first to the Cape of Good Hope and thence to Europe, but was not at first allowed by the government of Louis XVIII. to enter France. He resided at Brussels; but, gaining per- mission to come to Paris after the death of Napoleon, he took up his residence there, published the Memorial, and soon gained an enormous sum from it. He died in 1842 at Passy.

See Memoires de E A. D., comie de Las Cases (Brussels, 1818); Memorial de Ste Httene (4 vols., London and Paris, 1823; often republished and translated) ; Suite au memorial de Ste HeTene, ou observations critiques, &c. (2 vols., Paris, 1824), anonymous, but known to be by Grille and Musset-Pathay. See too Gourgaud,

Montholon, and Lowe, Sir Hudson. (J. Hl. R.)

LASHIO, the headquarters of the superintendent, northern Shan States, Burma, situated in 22 56′ N. and 97 45′ E. at an altitude of 3100 ft., on a low spur overlooking the valley of the Nam Yao. It is the present terminus of the Mandalay-Kun Long railway and of the government cart road from Mandalay, from which it is 178 m. distant. It consists of the European station, with court house and quarters for the civil officers; the military police post, the headquarters of the Lashio battalion of military police; the native station, in which the various nationalities, Shans, Burmans, Hindus and Mahommedans, are divided into separate quarters, with reserves for government servants and for the temporary residences of the five sawbwas of the northern Shan States; and a bazaar. Under Burmese rule Lashio was also the centre of authority for the northern Shan States, but the Burmese post in the valley was close to the Nam Yao, in an old Chinese fortified camp. The Lashio valley was formerly very populous; but a rebellion, started by the sawbwa of Hsenwi, about ten years before the British occupation, ruined it, and it is only slowly approaching the prosperity it formerly enjoyed; pop. (1901) 2565. The annual rainfall averages 54 in. The average maximum temperature is 80-5° and the average minimum 55-5°.

LASKER, EDUARD (1829-1884), German publicist, was born on the 14th of October 1829, at Jarotschin, a village in Posen, being the son of a Jewish tradesman. He attended the gym- nasium, and afterwards the university of Breslau. In 1848, after the outbreak of the revolution, he went to Vienna and entered the students' legion which took so prominent a part in the disturbances; he fought against the imperial troops during the siege of the city in October. He then continued his legal studies at Breslau and Berlin, and after a visit of three years to England, then the model state for German liberals, entered the Prussian judicial service. In 1870 he left the government service, and in 1873 was appointed to an administrative post in the service of the city of Berlin. He had been brought to the, notice of the political world by some articles he wrote from 1 86 1 to 1864, which were afterwards published under the title Zur Verfassungsgeschichte Preussens (Leipzig, 1874), and in 1865 he was elected member for one of the divisions of Berlin in the Prussian parliament. He joined the radical or Fortschritts party, and in 1867 was also elected to the German parliament, but he helped to form the national liberal party, and in con- sequence lost his seat in Berlin, which remained faithful to the radicals; after this he represented Magdeburg and Frankfort-on-Main in the Prussian, and Meiningen in the German, parliament. He threw himself with great energy into his parliamentary duties, and

quickly became one of its most popular and most influential members. An optimist and idealist, he joined to a fervent belief in liberty an equal enthusiasm for German unity and the idea of the German state. His motion that Baden should be included in the North German Confederation in January 1870 caused much embarrassment to Bismarck, but was not without effect in hastening the crisis of 1870. His great work, however, was the share he took in the judicial reform during the ten years 1867-1877. To him more than to any other single individual is due the great codification of the law. While he again and again was able to compel the government to withdraw or amend proposals which seemed dangerous to liberty, he opposed those liberals who, unable to obtain all the concessions which they called for, refused to vote for the new laws as a whole. A speech made by Lasker on the 7th of February 1873, in which he attacked the management of the Pomeranian railway, caused a great sensation, and his exposure of the financial mismanagement brought about the fall of Hermann Wagener, one of Bismarck's most trusted assistants. By this action he caused, however, some embarrassment to his party. This is generally regarded as the beginning of the reaction against economic liberalism by which he and his party were to be deprived of their influence. He refused to follow Bismarck in his financial and economic policy after 1878; always un- sympathetic to the chancellor, he was now selected for his most bitter attacks. Between the radicals and socialists on the one side and the government on the other, like many of his friends, he was unable to maintain himself. In 1879 he lost his seat in the Prussian parliament; he joined the Sezcssion, but was ill at ease in his new position. Broken in health and spirits by the incessant labours of the time when he did " half the work of the Reichstag," he w£nt in 1883 for a tour in America, and died suddenly in New York on the 5th of January 1884.

Lasker's death was the occasion of a curious episode, which caused much discussion at the time. The American House of Representa- tives adopted a motion of regret, and added to it these words: " That his loss is not alone to be mourned by the people of his native land, where his firm and constant exposition of, and devotion to, free and liberal ideas have materially advanced the social, political and economic conditions of these people, but by the lovers of liberty throughout the world." This motion was sent through the American minister at Berlin to the German foreign office, with a request that it might be communicated to the president of the Reichstag. It was to ask Bismarck officially to communicate a resolution in which a foreign parliament expressed an opinion in German affairs exactly opposed to that which the emperor at his advice had always followed. Bismarck

therefore refused to communicate the resolution, and re- turned it through the German minister at Washington.

Among Lasker's writings may be mentioned : Zur Geschichte der parlamentarischen Entwickelung Preussens (Leipzig, 1873), Die Zukunft des Deulschen Reichs (Leipzig, 1877) and Wege und Ziele der

Kulturentwickelung (Leipzig, 1881). After his death his Fiinfzehn Jahre parlamentarischer Geschichte 1866-1880 appeared edited by W. Cahn (Berlin, 1902). See also L. Bamberger, Eduard Lasher, Gedenkrede (Leipzig, 1884); A. Wolff, Zur Erinnerung an Eduard Lasker (Berlin, 1884); Freund, Einiges uber Eduard Lasker (Leipzig, 1885); and Eduard Lasker, seine Biographie und letzte bffentliche Rede, by various writers (Stuttgart, 1884). (J. W. He.)

LASKI, the name of a noble and powerful Polish family, is taken from the town of Lask, the seat of their lordship.

Jan Laski, the elder (1456-1531), Polish statesman and ecclesiastic, appears to have been largely self-taught and to have owed everything to the remarkable mental alertness which was hereditary in the Laski family. He took orders betimes, and in 1495 was secretary to the Polish chancellor Zawisza Kurozwecki, in which position he acquired both influence and experience. The aged chancellor entrusted the sharp-witted young ecclesiastic with the conduct of several important missions. Twice, in 1495 and again in 1500, he was sent to Rome, and once on a special embassy to Flanders, of which he has left an account. On these occasions he had the opportunity of displaying diplomatic talent of a high order. On the accession to the Polish throne in 1501 of the indolent Alexander, who had little knowledge of Polish affairs and chiefly resided in Lithuania, Laski was appointed by the senate the king's secretary, in which capacity he successfully opposed the growing separatist tendencies of the grand-duchy and maintained the influence of Catholicism, now seriously threatened there by the Muscovite propaganda. So struck was the king by his ability that on the death of the Polish chancellor in 1503 he passed over the vice-chancellor Macics Dzewicki and confided the great seal to Laski. As chancellor Laski supported the szlackta, or country-gentlemen, against the lower orders, going so far as to pass an edict excluding henceforth all plebeians from the higher benefices of the church. Nevertheless he approved himself such an excellent public

servant that the new king, Sigismund I., made him one of his chief counsellors. In 1511 the chancellor, who ecclesiastically was still only a canon of Cracow, obtained the coveted dignity of archbishop of Gnesen which carried with it the primacy of the Polish church. In the long negotiations with the restive and semi-rebellious Teutonic Order, Laski rendered Sigismund most important political services, proposing as a solution of the question that Sigismund should be elected grand master, while he, Laski, should surrender the primacy to the new candidate of the knights, Albert of Brandenburg, a solution which would have been far more profitable to Poland than the ultimate settlement of 1525. In 1513 Laski was sent to the Lateran council, convened by Pope Julius II., to plead the cause of Poland against the knights, where both as an orator and as a diplomatist he brilliantly distinguished himself. This mission was equally profitable to his country and himself, and he succeeded in obtain- ing from the pope for the archbishops of Gnesen the title of legali nali. In his old age Laski's partiality for his nephew, Hieronymus, led him to support the candidature of John Zapolya, the protege of the Turks, for the Hungarian crown so vehemently against the Habsburgs that Clement VII. excommunicated him, and the shock of this disgrace was the cause of his sudden death in 1531. Of his numerous works the most noteworthy are his collection of Polish statutes entitled : Statula provinciae gnesnensis antiqua, &*c. (Cracow, 1525-1528) and De Ruthenorum nationibus eorumque ,erroribus, printed at Nuremberg.

See Heinrich R. von Zeissberg, Joh. Laski, Erzbischof in Gnesen (Vienna, 1874); and Jan Korytkowski, Jan Laski, Archbishop of Gnesen (Gnesen, 1880).

Hieronymus Jaroslaw Laski (1496-1542), Polish diplo- matist, nephew of Archbishop Laski, was successively palatine of Inowroclaw and of Sieradia. His first important mission was to Paris in 1524, ostensibly to contract an anti-Turkish league with the French king, but really to bring about a matrimonial alliance between the dauphin, afterwards Henry II., and the daughter of King Sigismund I., a project which failed through no fault of Laski's. The collapse of the Hungarian monarchy at Mohacs (1526) first opened up a wider career to Laski's adventurous activity. Contrary to the wishes of his own sovereign, Sigismund I., whose pro-Austrian policy he detested,

Laski entered the service of John Zapolya, the Magyar com- petitor for the Hungarian throne, thereby seriously compromising Poland both with the emperor and the pope. Zapolya despatched him on an embassy to Paris, Copenhagen and Munich for help, but on his return he found his patron a refugee in Transylvania, whither he had retired

after his defeat by the German king Ferdinand I. at Tokay in 1527. In his extremity Zapolya placed himself under the protection of the sultan, Laski being sent to Constantinople as his intermediary. On his way thither he was attacked and robbed of everything, including his credentials and the rich presents without which no negotiations were deemed possible at the Porte. But Laski was nothing if not audacious. Proceeding on his way to the Turkish capital empty-handed, he nevertheless succeeded in gaming the confidence of Gritti, the favourite of the grand vizier, and ultimately persuaded the sultan to befriend Zapolya and to proclaim him king of Hungary. He went still further, and without the slightest authority for his action concluded a ten years' truce between his old master King Sigismund of Poland and the Porte. He then returned to Hungary at the head of 10,000 men, with whose aid he enabled Zapolya to re-establish his position and defeat Ferdinand at Saros-Patak. He was rewarded with the countship of Zips and the governor-generalship of Transylvania. But his influence excited the jealousy of the Magyars, and Zapolya was persuaded to imprison him. On being released by the interposition of the Polish grand hetman, Tarnowski, he became the most violent opponent of Zapolya. Shortly after his return to Poland, Laski died suddenly at Cracow, probably poisoned by one of his innumerable enemies.

See Alexander Hirschberg, Hieronymus Laski (Pol.) (Lemberg,

1888).

Jan Laski, the younger (1499-1560), also known as Johannes a Lasco, Polish reformer, son of Jaroslaw (d. 1323) voivode of Sieradia and nephew of the famous Archbishop Laski. During his academical course abroad he made the acquaintance of Zwingli and Erasmus and returned to Poland in 1526 saturated with the new doctrines. Nevertheless he took orders, and owing to the influence of his uncle obtained the bishopric of Veszprem in Hungary from King John Zapolya, besides holding a canonry of Cracow and the office of royal secretary. In 1 53 1 he resigned all his benefices rather than give up a woman whom he had secretly married, and having incurred general reprobation and the lasting displeasure of his uncle the archbishop, he fled to Germany, where ultimately (1543) he adopted the Augsburg Confession. For the next thirteen years Laski was a wandering apostle of the new doctrines. He was successively superintendent at Emden and in Friesland, passed from thence to London where he became a member of the so-called ecclesia peregrinorum, a congregation of foreign Protestants exiled in consequence of the Augsburg Interim of 1548 and, on being expelled by Queen Mary, took refuge first in

Denmark and subsequently at Frank- fort-on-Main, where he was greatly esteemed. From Frankfort he addressed three letters (printed at Basel) to King Sigismund, Augustus, and the Polish gentry and people, urging the con- version of Poland to Protestantism. In 1556, during the brief triumph of the anti-catholics, he returned to his native land, took part in the synod of Brzesc, and published a number of polemical works, the most noteworthy of which were Forma ac ratio tola ecclesiastici ministcrii in peregrinorum Ecclesiae instituta (Pinczow, 1560), and in Polish, History of the Cruel Persecution of the Church of God in 1567, republished in his Opera, edited by A. Kuyper at Amsterdam in 1866. He died at Pinczow in January 1560 and was buried with great pomp by the Polish Protestants, who also struck a medal in his honour. Twice married, he left two sons and two daughters. His nephew (?) Albert Laski, who visited England in 1583, wasted a fortune in aid of Dr Dee's craze for the " philosopher's stone." Laski's writings are important for the organization of the ecclesia peregrinorum, and he was concerned in the Polish version of the Bible, not published till 1563.

See H. Dalton, Johannes a Lasco (1881), English version of the earlier portion by J. Evans (1886); Bartels, Johannes a Lasco (i860) ; Harboe, Schicksale des Johannes a Lasco (1758) ; R. Wallace,

Antitrinitarian Biography (1850); Bonet-Maury, Early Sources of Eng. Unit. Christianity (1884); W. A. J. Archbold in Diet. Nat. Biog. (1892) under " Laski," George Pascal, Jean de Lasco (Paris, 1894); Life in Polish by Antoni Walewski (Warsaw, 1872); and Julian Bukowski, History of the Reformation in Poland (Pol.) (Cracow, 1883). (R. N. B.)

LAS PALMAS, the capital of the Spanish island of Grand Canary, in the Canary archipelago, and of an administrative district which also comprises the islands of Lanzarote and Fuerteventura; on the east coast, in 28 7′ N. and 5° 24′ W. Pop. (1900) 44,517. Las Palmas is the largest city in the Canary Islands, of which it was the capital until 1833. It is the seat of a court of appeal, of a brigadier, who commands the military forces in the district, of a civil lieutenant-governor, who is independent of the governor-general except in connexion with elections and municipal administration, and of a bishop, who is subordinate to the archbishop of Seville. The palms from which the city derives its name are still characteristic of the fertile valley which it occupies. Las Palmas is built on both banks of a small river, and

although parts of it date from the 16th century, it is on the whole a clean and modern city, well drained, and supplied with pure water, conveyed by an aqueduct from the highlands of the interior. Its principal buildings include a handsome cathedral, founded in the 16th century but only completed in the 19th, a theatre, a museum, an academy of art, and several hospitals and good schools. The modern development of Las Palmas is largely due to the foreign merchants, and especially to the British who control the greater portion of the local commerce. La Luz, the port, is connected with Las Palmas by a railway 4 m. long; it is a free port and harbour of refuge, officially considered the third in importance of Spanish ports, but actually the first in the matter of tonnage. It is strongly fortified. The harbour, protected by the promontory of La Isleta, which is connected with the mainland by a narrow bar of sand, can accommodate the largest ships, and affords secure anchorage in all weathers. Ships can discharge at the breakwater (1257 yds. long) or at the Santa Catalina mole, constructed in 1883-1902. The minimum depth of water alongside the quays is 4J ft. There are floating water-tanks, numerous lighters, titan and other cranes, repairing workshops, and very large supplies of coal afloat and ashore. La Luz is one of the principal Atlantic coaling stations, and the coal- trade is entirely in British hands. Other important industries are shipbuilding, fishing, and the manufacture of glass, leather and hats. The chief exports are fruit, vegetables, sugar, wine and cochineal; coal, iron, cement, timber, petroleum, manure, textiles and provisions are the chief imports. (See also Canary Islands.)

LASSALLE, FERDINAND (1825-1864), German socialist, was born at Breslau on the nth of April 1825, of Jewish ex- traction. His father, a prosperous merchant in Breslau, intended Ferdinand for a business career, and sent him to the commercial school at Leipzig; but the boy got himself transferred to the university, first at Breslau, and afterwards at Berlin. His favourite studies were philology and philosophy; he became an ardent Hegelian. Having completed his university studies in 1845, he began to write a work on Heraclitus from the Hegelian point of view; but it was soon interrupted by more stirring interests, and did not see the light for many years. It was in Berlin, towards the end of 1845, that he met the lady with whom his life was to be associated in so remarkable a way, the Countess Hatzfeldt. She had been separated from her husband for many years, and was at feud with him on questions of property and the custody of their children. Lassalle attached himself to the cause of the countess, whom he believed to have been outrageously wronged, made special study of law, and, after bringing the case before thirty-six tribunals, reduced the powerful count to a compromise on terms most

favourable to his client. The process, which lasted ten years, gave rise to not a little scandal, especially that of the Cassettengeschichte which pursued Lassalle all the rest of his life. This ” affair of the casket ” arose out of an attempt by the countess’s friends to get possession of a bond for a large life annuity settled by the count on his mistress, a Baroness Meyendorf, to the prejudice

of the countess and her children. Two of Lassalle’s comrades succeeded in carrying off the casket, which contained the lady’s jewels, from the baroness’s room at an hotel in Cologne. They were prosecuted for theft, one of them being condemned to six months’ imprisonment. Lassalle, accused of moral com- plicity, was acquitted on appeal. He was not so fortunate in 1849, when he underwent a year’s durance for resistance to the authorities of Diisseldorf during the troubles of that stormy period. But going to prison was a familiar experience in Lassalle’s life. Till 1859 Lassalle resided mostly in the Rhine country, prosecuting the suit of the countess, finishing the work on Heraclitus, which was not published till 1858, taking little part in political agitation, but ever a helpful friend of the working men. He was not allowed to live in Berlin because of his connexion with the disturbances of ‘48. In 1859, however, he entered the city disguised as a carter, and, through the influence of Humboldt with the king, got permission to stay there. The same year he published a remarkable pamphlet on the Italian War and the Mission of Prussia, in which he warned his countrymen against going to the rescue of Austria in her war with France. He pointed out that if France drove Austria out of Italy she might annex Savoy, but could not prevent the restoration of Italian unity under Victor Emmanuel. France was doing the work of Germany by weakening Austria; Prussia should form an alliance with France to drive out Austria and make herself supreme in Germany. After their realization by Bismarck these ideas have become sufficiently commonplace; but they were nowise obvious when thus published by Lassalle. In 1 86 1 he published a great work in two volumes, System der erworbenen Rechte {System of Acquired Rights).

Now began the short-lived activity which was to give him an historical significance. It was early in 1862, when the struggle of Bismarck with the Prussian liberals was already begun. Lassalle, a democrat of the most advanced type, saw that an opportunity had come for asserting a third great cause — that of the working men — which would outflank the liberalism of the middle classes, and might even command the sympathy of the government. His political programme was, however, entirely subordinate to the social, that of bettering the condition of the working classes, for which he believed the schemes of Schulze-Delitzsch were utterly inadequate. Lassalle flung himself into the

career of agitator with his accustomed vigour. His worst difficulties were with the working men themselves, among whom he met the most discouraging apathy. His mission as organizer and emancipator of the working class lasted only two years and a half. In that period he issued about twenty separate publications, most of them speeches and pamphlets, but one of them, that against Schulze-Delitzsch, a considerable treatise, and all full of keen and vigorous thought. He founded the ” Allgemeiner Deutscher Arbeiterverein,” was its president and almost single-handed champion, conducted its affairs, and carried on a vast correspondence, not to mention about a dozen state prosecutions in which he was during that period involved. Berlin, Leipzig, Frankfort and the industrial centres on the Rhine were the chief scenes of his activity. His greatest success was on the Rhine, where in the summers of 1S63 and 1864 his travels as missionary of the new gospel resembled a triumphal procession. The agitation was growing rapidly, but he had achieved little substantial success when a most unworthy death closed his career.

While posing as the messiah of the poor, Lassalle was a man of decidedly fashionable and luxurious habits. His suppers were well known as among the most exquisite in Berlin. It was the most piquant feature of his life that he, one of the gilded youth, a connoisseur in wines, and a learned man to boot, had become agitator and the champion of the working man. In one of the literary and fashionable circles of Berlin he had met a Fraulein von Donniges, for whom he at once felt a passion, which was ardently reciprocated. In the summer of 1864 he met her again on the Rigi, when they resolved to marry. She was a young lady of twenty, decidedly unconventional and original in character, but the daughter of a Bavarian

diplomatist then resident at Geneva, who would have nothing to do with Lassalle. The lady was imprisoned in her own room, and soon, apparently under the influence of very questionable pressure, renounced Lassalle in favour of another admirer, a Wallachian, Count von Racowitza. Lassalle sent a challenge both to the lady’s father and her betrothed, which was accepted by the latter. At the Carouge, a suburb of Geneva, the meeting took place on the morning of August 28, 1864, when Lassalle was mortally wounded, and he died on the 31st of August. In spite of such a foolish ending, his funeral was that of a martyr, and by many of his adherents he has been regarded since with feelings almost of religious devotion.

Lassalle did not lay claim to any special originality as a socialistic thinker, nor did he publish any systematic statement of his views. Yet his leading ideas are sufficiently clear and simple. Like a true Hegelian he saw three stages in the development of labour: the ancient and feudal period, which, through the subjection of the labourer, sought solidarity without freedom ; the reign of capital and the middle classes, established in 1789, which sought freedom by destroying solidarity; and the new era, beginning in 1848, which would reconcile solidarity with freedom by introducing the principle of association. It was the basis and starting-point of his opinions that, under the empire of capital and so long as the working man was merely a receiver of wages, no improvement in his condition could be expected. This position he founded on the law of wages formulated by Ricardo, and accepted by all the leading economists, that wages are controlled by the ordinary relations of supply and demand, that a rise in wages leads to an increase in the labouring population, which, by increasing the supply of labour, is followed by a corresponding fall of wages. Thus population increases or decreases in fixed relation to the rise or fall of wages. The condition of the working man will never permanently rise above the mere standard of living required for his subsistence, and the continued supply of his kind. Lassalle held that the co-operative schemes of Schulze- Delitzsch on the principle of " self-help " were utterly inadequate, for the obvious reason that the working classes were destitute of capital. The struggle of the working man helping himself with his empty pockets against the capitalists he compared to a battle with teeth and nails against modern artillery. In short, Lassalle ac- cepted the orthodox political economy to show that the inevitable operation of its laws left no hope for the working classes, and that no remedy could be found but by abolishing the conditions in which these laws had their validity — in other words, by abolishing the present relations of labour and capital altogether. And this could only be done by the productive association of the working men with money provided by the state. And he held that such association should be the voluntary act of the working men, the government merely reserving the right to examine the books of the various societies. All the arrangements should be carried out according to the rules of business usually followed in such transactions. But how move the government to grant such a loan ? Simply by introducing (direct) universal suffrage. The working men were an overwhelming majority; they were the state, and should control the government. The aim of Lassalle, then, was to organize the working classes into a great political power, which in the way thus indicated, by peaceful resolute agitation, without violence or insurrection, might attain the goal of productive association. In this

way the fourth estate would be emancipated from the despotism of the capitalist, and a great step taken in the solution of the great " social question,"

It will be seen that the net result of Lassalle's life was to produce a European scandal, and to originate a socialistic movement in Germany, which, at the election of 1903, returned to the Reichstag eighty-one members and polled 3,010,771 votes, and at the election of 1907 returned forty-three members and polled 3,258,968 votes. (The diminution in the number of members returned in 1907 was due mostly to combination among the different political groups.) This result, great as it was, would hardly have been commensurate with his ambition, which was boundless. In the heyday of his passion for Fraulein von Donniges, his dream was to be enthroned as the president of the German republic with her seated at his side. With his energy, ability and gift of dominating and organizing, he might indeed have done a great deal. Bismarck coquetted with him as the representative of a force that might help him to combat the Prussian liberals; in 1878, in a speech before the Reichstag, he spoke of him with deep respect, as a man of the greatest amiability and ability from whom much could be learned. Even Bishop Ketteler of Mainz had declared his sympathy for the cause he advocated.

Lassalle's Die Philosophic Herakleitos des Dunklen von Ephesos (Berlin, 1858), and the System der erworbenen Rechte (Leipzig, 1861) are both marked by great learning and intellectual power. But of far more historical interest are the speeches and pamphlets con- nected with his socialistic agitation, of which the most important are — Ueber Verfassungswesen; Arbeiterprogramm ; Offenes Ant- wortschreiben; Zur Arbeiterfrage; Arbeiterlesebuch; Herr Bastiat-Schulze von Delitzsch, oder Kapital und Arbeit. His drama, Franz von Sickingen, published in 1859, is a work of no poetic value. His Collected Works were issued at Leipzig in 1899-1901.

The best biography of Lassalle is H. Oncken's Lassalle (Stuttgart, 1904) ; another excellent work on his life and writings is George Brandes's Danish work, Ferdinand Lassalle (German translation, 4th ed., Leipzig, 1900). See also A. Aaberg, Ferdinand Lassalle (Leipzig, 1883); C. v. Plener, Lassalle (Leipzig, 1884); G. Meyer, Lassalle als Sozialokonom (Berlin, 1894) ; Brandt, F. Lassalles sozialokonomische Anschauungen und praktische Vorschldge (Jena, !895); Seilliere, Etudes sur Ferdinand Lassalle (Paris, 1897); E. Bernstein, Ferd. Lassalle und seine Bedeutung filr die Arbeiterklasse (Berlin, 1904). There is a considerable literature on his love affair and death; the most notable books are: Meine Beziehungen zu F. Lassalle, by Helene

von Racowitza, a very strange book; Ent- hullungen iiber das tragische Lebensende F. Lassalle's by B. Becker; Im Anschluss an die Memoiren der H. von Racowitza, by A. Kutsch- bach, and George Meredith's Tragic Comedians (1880). (T. K.)

LASSEN, CHRISTIAN (1800-1876), German orientalist, was born on the 22nd of October 1800, at Bergen in Norway. Having received his earliest university education at Christiania, he went to Germany, and continued his studies at Heidelberg and Bonn. In the latter university Lassen acquired a sound knowledge of Sanskrit. He next spent three years in Paris and London, engaged in copying and collating MSS., and collecting materials for future research, especially in reference to the Hindu drama and philosophy. During this period he published, jointly with E. Burnouf, his first work, Essai sur le P&li (Paris, 1826). On his return to Bonn he studied Arabic, and took the degree of Ph.D., his dissertation discussing the Arabic notices of the geography of the Punjab (Commentatio geographica atque historica de Pentapotamia Indica, Bonn, 1827). Soon after he was admitted Privatdozent, and in 1830 was appointed extraordinary and in 1840 ordinary professor of Old Indian language and literature. In spite of a tempting offer from Copenhagen, in 1841, Lassen remained faithful to the university of his adoption to the end of his life. He died at Bonn on the 8th of May 1876, having been affected with almost total blindness for many years. As early as 1864 he was relieved of the duty of lecturing.

In 1 829-1 83 1 he brought out, in conjunction with August W. von Schlegel, a critical annotated edition of the Hitopades'a. The ap- pearance of this edition marks the starting-point of the critical study of Sanskrit literature. At the same time Lassen assisted von Schlegel in editing and translating the first two cantos of the epic Ramayana (1829-1838). In 1832 he brought out the text of the first act of Bhavabhuti's drama, Mdlatlmddhava, and a complete edition, with a Latin translation, of the Sdnkhya-karika. In 1837 followed his edition and translation of Jayadeva's charming lyrical drama, Gitagovinda and his Institutiones linguae Pracriticae. His A nthologia Sanscritica, which came out the following year (new ed. by Johann Gildemeister, 1868), contained several hitherto unpublished texts, and did much to stimulate the study of Sanskrit in German uni- versities. In 1846 Lassen brought out an improved edition of Schlegel's text and translation of the " Bhagavadgita." He did not confine himself to the study of Indian languages, but acted likewise as a scientific pioneer in other fields of philological inquiry. In his Beitrage zur Deutung der Eugubinischen Tafeln (1833) he prepared the way for the correct interpretation of the Umbrian inscriptions; and the Zeitschrift filr die Kunde des Morgenlandes (7 vols., 1837- 1850), started and largely

conducted by him, contains, among other valuable papers from his pen, grammatical sketches of the Beluchi and Brahui languages, and an essay on the Lycian inscriptions.

Soon after the appearance of Burnouf ‘s Commentaire sur le Yacna (1833), Lassen also directed his attention to the Zend, and to Iranian studies generally; and in Die altpersischen Keilinschriften von Persepolis (1836) he first made known the true character of the Old Persian cuneiform inscriptions, thereby anticipating, by one month, Burnouf’s Memoire on the same subject, while Sir Henry Rawlinson’s famous memoir on the Behistun inscription, though drawn up in Persia, independently of contemporaneous European research, at about the same time, did not reach the Royal Asiatic Society until three years later. Subsequently Lassen published, in the sixth volume of his journal (1845), a collection of all the Old Persian cunei- form inscriptions known up to that date. He also was the first scholar in Europe who took up, with signal success, the decipherment of the newly-discovered Bactrian coins, which furnished him the materials for Zur Geschichte der griechischen und indo-skythischen Konige in Bakterien, Kabul, und Indien (1838). He contemplated bringing out a critical edition of the Vendidad ; but, after publishing the first five fargards (1852), he felt that his whole energies were re- quired for the successful accomplishment of the great undertaking of his life — his Indische Altertumskunde. In this work — completed in four volumes, published respectively in 1847 (2nd ed., 1867), 1849 (2nd ed., 1874), 1858 and 1861 — which forms one of the greatest monuments of untiring industry and critical scholarship, everything that could be gathered from native and foreign sources, relative to the political, social and intellectual development of India, from the

earliest times down to the Mahommedan invasion, was worked up by him into a connected historical account.

LASSEN, EDUARD (1830-1904), Belgian musical composer, was born in Copenhagen, but was taken as a child to Brussels and educated at the Brussels Conservatoire. He won the prix de Rome in 1851, and went for a long tour in Germany and Italy. He settled at Weimar, where in 1861 he succeeded Liszt as conductor of the opera, and he died there on the 15th of January 1904. Besides many well-known songs, he wrote operas — Landgraf Ludwig’s Brautfahrt (1857), Frauenlob (1861), Le Captif (1868) — instrumental music to dramas,

notably to Goethe's Faust (1876), two symphonies and various choral works. LASSO (Lassus), ORLANDO (c. 1530-1594), Belgian musical composer, whose real name was probably Roland Delattre, was born at Mons, in Hainault, probably not much earlier than 1532, the date given by the epitaph printed at the end of the volumes of the Magnum opus musicum; though already in the 16th century the opinions of his biographers were divided between the years 1520 and 1530. Much is reported, but very little known, of his connexions and his early career. The discrepancy as to the date of his birth appears also in connexion with his appointment at the church of St John Lateran in Rome. If he was born in 1530 or 1532 he could not have obtained that appointment in 1 541. What is certain is that his first book of madrigals was published in Venice in 1555, and that in the same year he speaks of himself in the preface of Italian and French songs and Latin motets as if he had recently come from Rome. He seems to have visited England in 1554 and to have been introduced to Cardinal Pole, to whom an adulatory motet appears in 1556. (This is not, as might hastily be supposed, a confusion resulting from the fact that the ambassador from Ferdinand, king of the Romans, Don Pedro de Lasso, attended the marriage of Philip and Mary in England in the same year.) His first book of motets appeared at Antwerp in 1556, containing the motet in honour of Cardinal Pole. The style of Orlando had already begun to purify itself from the speculative and chaotic elements that led Burney, who seems to have known only his earlier works, to call him "a dwarf on stilts " as compared with Palestrina. But where he is orthodox he is as yet stiff, and his secular compositions are, so far, better than his more serious efforts.

In 1557, if not before, he was invited by Albrecht IV., duke of Bavaria, to go to Munich. The duke was a most intelligent patron of all the fine arts, a notable athlete, and a man of strict principles. Munich from henceforth never ceased to be Orlando's home; though he sometimes paid long visits to Italy and France, whether in response to royal invitations or with projects of his own. In 1558 he made a very happy marriage by which he had four sons and two daughters. The four sons all became good musicians, and we owe an inestimable debt to the pious industry of the two eldest sons, who (under the patronage of Duke Maxi- milian I., the second successor of Orlando's master) published the enormous collection of Orlando's Latin motets known as the Magnum opus musicum.

Probably no composer has ever had more ideal circumstances for artistic inspiration and expression than had Orlando. His duty was to make music all day and every day, and to make it according to his own taste. Nothing was too good, too severe or too new for the duke.

Church music was not more in demand than secular. Instrumental music, which in the 16th century had hardly any independent existence, accompanied the meals of the court; and Orlando would rise from dessert to sing trios and quartets with picked voices. The daily prayers included a full mass with polyphonic music. This amazing state of things becomes more intelligible and less alarming when we consider that 16th-century music was no sooner written than it could be performed. With such material as Orlando had at his disposal, musical performance was as unattended by expense and tedious preliminaries as a game of billiards in a good billiard room. Not even Haydn's position at Esterhaz can have enabled him, as has been said, to " ring the bell " for musicians to come and try a new orchestral effect with such ease as that with which Orlando could produce his work at Munich. His fame soon

became world-wide, and every contemporary authority is i

of the acclamation with which Orlando was greeted wherever his travels took him.

Very soon, with this rapid means of acquiring experience, Orlando's style became as pure as Palestrina's; while he always retained his originality and versatility. His relations to the literary culture of the time are intimate and fascinating; and during his stay at the court of France in 1571 he became a friend of the poet Ronsard. In 1579 Duke Albrecht died. Orlando's salary had already been guaranteed to him for life, so that his outward circumstances did not change, and the new duke was very kind to him. But the loss of his master was a great grief and seems to have checked his activity for some time. In 1589, after the publication of six Masses, ending with a beautiful Missa pro defunclis, his strength began to fail; and a sudden serious illness left him alarmingly depressed and inactive until his death on the 14th of June 1594.

If Palestrina represents the supreme height attained by 16th- century music, Orlando represents the whole century. It is impossible to exaggerate the range and variety of his style, so long as we recognise the limits of 16th-century musical language. Even critics to whom this language is unfamiliar cannot fail to notice the glaring differences between Orlando's numerous types of art, though such critics may believe all those types to be equally crude and archaic. The swiftness of Orlando's intellectual and artistic development is astonishing. His first four volumes of madrigals show a very intermittent sense of beauty. Many a number in them is one compact mass of the fashionable harsh play upon the " false relation " between twin major

and minor chords, which is usually believed to be the unenviable distinction of the English madrigal style from that of the Italians. It must be confessed that in the Italian madrigal (as distinguished from the villanella and other light forms), Orlando never attained complete certainty of touch, though some of his later madrigals are indeed glorious. But in his French chansons, many of which are settings of the poems of his friend Ronsard, his wit and lightness of touch are unfailing. In setting other French poems he is sometimes unfortunately most witty where the words are most gross, for he is as free from modern scruples as any of his Elizabethan contemporaries. In 1562, when the Council of Trent was censuring the abuses of Flemish church music, Orlando had already purified his ecclesi- astical style; though he did not go so far as to Italianize it in order to oblige those modern critics who are unwilling to believe that anything appreciably unlike Palestrina can be legitimate. At the same time Orlando's Masses are not among his greatest works. This is possibly partly due to the fact that the proportions of a musical Mass are at the mercy of the local practice of the liturgy; and that perhaps the uses of the court at Munich were not ' quite so favourable to broadly designed proportion (not length) as the uses of Rome. Differences which might cramp the 16th-century composer need not amount to anything that would draw down the censure of ecclesiastical authorities. Be this as it may, Orlando's other church music is always markedly different irom Palestrina's, and often fully as sublime. It is also in many ways far more modern in resource. We frequently come upon things like the Justorum animae [Magnum Opus, No. 260 (301)] which in their way are as overpoweringly touching as, for example, the Benedictus of Beethoven's Mass in D or the soprano solo in Brahms's Deutsches Requiem.

No one has approached Orlando in the ingenuity, quaintness and humour of his tone-painting. He sometimes descends to extremely elaborate musical puns, carrying farther than any other composer since the dark ages the absurd device of setting syllables that happened to coincide with the sol-fa system to the corresponding sol-fa notes. But in the most absurd of such cases he evidently enjoys twisting these notes into a theme of pregnant musical meaning. The quaintest instance is the motet Quid estis pusillanimes [Magnum Opus, No. 92 (69)] where extra sol-fa syllables are introduced into the text to make a good theme in combination with the syllables already there by accident ! {An nescitis Justiliae Ut Sol [Fa Mi] Re Laxatas

habenas possit denuo cohiberet). The significance of these euphuistic jokes is that they always make good music in Orlando's hands. There is musical fun even in his voluminous parody of the stammering style of word-setting in the burlesque motet S.U.Su. PER. per. super F.L.U., which gets through one verse of a psalm in fifteen minutes.

When it was a question of purely musical high spirits Orlando was unrivalled; and his setting of Walter de Mape's Fertur in conviviis (given in the Magnum opus with a stupid moral derangement of the text), and most of his French chansons, are among the most deeply humorous music in the world.

But it is in the tests of the sublime that Orlando shows himself one of the greatest minds that ever found expression in art. Nothing sublime was too unfamiliar to frighten him into repress- ing his quaint fancy, though he early repressed all that thwarted his musical nature. His Penitential Psalms stand with Josquin's Miserere and Palestrina's first book of Lamentations as artistic monuments of 16th-century penitential religion, just as Bach's Matthew Passion stands alone among such monuments in later art. Yet the passage (quoted by Sir Hubert Parry in vol. 3 of the Oxford History of Music) " Nolite fieri sicut mulus " is one among many traits which are ingeniously and grotesquely descriptive without losing harmony with the austere profundity of the huge works in which they occur. It is impossible to read any large quantity of Orlando's mature music without feeling that a mind like his would in modern times have covered a wider field of mature art than any one classical or modern composer known to us. Yet we cannot say that anything has been lost by his belonging to the 16th century. His music, if only from its peculiar technique of crossing parts and unexpected intervals, is exceptionally difficult to read; and hence intelligent conducting and performance of it is rare. But its impressiveness is beyond dispute; and there are many things which, like the Justorum animae cannot even be read, much less heard, without emotion.

Orlando's works as shown by the plan of Messrs Breitkopf & Hartel's complete critical edition (begun in 1894) comprise: (1) the Magnum opus musicum, a posthumous collection containing Latin pieces for from two to twelve voices, 516 in number (or, counting by single movements, over 700). Not all of these are to the original texts. The Magnum opus fills eleven volumes. (2) Five volumes of madrigals, containing six books, and a large number of single madrigals, and about half a volume of lighter Italian songs (vilia- nellas, &c). (3) Three volumes (not four as in the "prospectus) of French chansons. (4) Two volumes of German four-part and five- part Lieder. (5) Serial

church music: three volumes, containing Lessons from the Book of Job (two settings). Passion according to St Matthew {i.e. like the Passions of Victoria and Soriano, a setting of the words of the crowds and of the disciples) ; Lamentations of Jeremiah; Morning Lessons; the Officia printed in the third volume of the Patroncinium (a publication suggested and supported by Orlando's patrons and containing eight entire volumes of his works) ; the Seven Penitential Psalms; German Psalms and Prophetiae Sibyllarum, (6) one hundred Magnificats (Jubilus B. M. Virginis) 3 vols., (7) eight volumes of Masses, (8) two volumes of Latin songs not in the Magnum opus, (9) five volumes of unpublished works.

(D. F. T.)

LASSO (Span, lazo, snare, ultimately from Lat. laqueus, cf. " lace "), a rope 60 to 100 ft. in length with a slip-noose at one end, used in the Spanish and Portuguese parts of America and in the western United States for catching wild horses and cattle. It is now less employed in South America than in the vast grazing country west of the Mississippi river, where the herders, called locally cow-boys or cow-punchers, are provided with it. When not in use, the lasso, called rope in the West, is coiled at the right of the saddle in front of the rider. When an animal is to be caught the herder, galloping after it, swings the coiled lasso round his head and casts it straight forward in such a manner that the noose settles over the head or round the legs of the quarry, when it is speedily brought into submission. A shorter rope called lariat (Span, la reata) is used to picket horses.

LAST. i. (A syncopated form of "latest," the superlative of O.E. laet, late), an adjective applied to the conclusion of anything, all that remains after everything else has gone, or that which has just occurred. In theology the "four last things " denote the final scenes of Death, Judgment, Heaven

and Hell; the " last day " means the Day of Judgment (see Eschatology).

2. (O.E. last, footstep; the word appears in many Teutonic languages, meaning foot, footstep, track, &c; it is usually referred to a Teutonic root lais, cognate with Lat. lira, a furrow; from this root, used figuratively, came " learn " and " lore "), originally a footstep, trace or track, now only used of the model of a foot in wood on which a shoemaker makes boots and shoes; hence the proverb " let the cobbler stick to his last," " ne sutor ultra crepidam."

3. (O.E. hlaest; the work is connected with the root seen in ” lade,” and is used in German and Dutch of a weight; it is also seen in ” ballast “), a commercial weight or measure of quantity, varying according to the commodity and locality; originally applied to the load of goods carried by the boat or wagon used in carrying any particular commodity in any particular locality, it is now chiefly used as a weight for fish, a ” last ” of herrings being equal to from 10,000 to 12,000 fish. The German Last = 4000 lb, and this is frequently taken as the nominal weight of an English ” last.” A ” last ” of wool = 12 sacks, and of beer = 12 barrels.

LASUS, Greek lyric poet, of Hermione in Argolis, flourished about 510 B.C. A member of the literary and artistic circle of the Peisistratidae, he was the instructor of Pindar in music and poetry and the rival of Simonides. The dithyramb (of which he was sometimes considered the actual inventor) was developed by him, by the aid of various changes in music and rhythm, into an artistically constructed choral song, with an accompaniment of several flutes. It became more artificial and mimetic in character, and its range of subjects was no longer confined to the adventures of Dionysus. Lasus further increased its popularity by introducing prize contests for the best poem of the kind. His over-refinement is shown by his avoidance of the letter sigma (on account of its hissing sound) in several of his poems, of one of which (a hymn to Demeter of Hermione) a few lines have been preserved in Athenaeus (xiv. 624 E). Lasus was also the author of the first theoretical treatise on music.

See Sui’das s.v. ; Aristophanes, -Wasps, 1410, Birds, 1403 and schol.; Plutarch, De Musica, xxix. ; Miiller and Donaldson, Hist, of Greek Literature, i. 284; G. H. Bode, Geschichte der hettenischen Dichtkunst, ii. pt. 2, p. Ill ; F. W. Schneidewin, De Laso Hermidnensi Comment. (Gottingen, 1842) ; Fragm. in Bergk, Poet. Lyr.

LAS VEGAS, a city and the county-seat of San Miguel county, New Mexico, U.S.A., in the north central part of New Mexico, on the Gallinas river, and 83 m. by rail E. of Santa Fe. Though usually designated as a single municipality, Las Vegas consists of two distinct corporations, the old town on the W. bank of the river and the city proper on the E. bank. Pop. of the city (1890) 2385; (1900) 3552 (340 being foreign-born and 116 negroes); (1910) 3755. According to local estimates, the combined population of the city and the old town in 1908 was 10,000. Las Vegas is served by the Atchison, Topeka & Santa Fe railway, and is its division headquarters in New Mexico. The city lies in a valley at the foot of the main range of the Rocky Mountains, and is about 6400 ft. above the sea. There are high peaks to the W.

and within a short distance of the city much beautiful mountain scenery, especially along the " Scenic Route," a highway from Las Vegas to Santa Fe, traversing the Las Vegas canyon and the Pecos Valley forest reserve. The country E. of the city consists of level plains. The small amount of rainfall, the great elevation and the southern latitude give the region a dry and rarified air, and Las Vegas is a noted health resort. Six miles distant, and connected with the city by rail, are the Las Vegas Hot Springs. The old town on the W. bank of the Gallinas river retains many features of a Mexican village, with low adobe houses facing narrow and crooked streets. Its inhabitants are largely of Spanish-American descent. The part on the E. bank or city proper is thoroughly modern, with well-graded streets, many of them bordered with trees. The most important public institutions are the New Mexico insane asylum, the New Mexico normal university (chartered 1893, opened 1898), the county court house (in the old town), the academy of the Immaculate Conception, conducted by the Sisters of Loretto, Saint Anthony's

sanatorium, maintained by the Sisters of Charity, La Salle institute, conducted by the Christian Brothers, a Presbyterian mission school and a Methodist manual training and commercial school. There are railway machine-shops, and various manu- factories. Las Vegas lies in the centre of an extensive grazing region, has large stockyards and annually ships great quantities of wool. Three at the local newspapers are published in Spanish. Las Vegas was founded in 1835, under the government of the Mexican Republic. On the 15th of August 1846, during the war between Mexico and the United States, Gen. Stephen W. Kearny entered the town, and its alcalde took the oath of allegiance to the United States. There was but little progress or development until the arrival of the railway in 1879. In 1888 the part east of the river was incorporated as a town under the name of East Las Vegas, and in 1896 it was chartered as the city of Las Vegas. The old Las Vegas, west of the river, was incorporated as a town in 1903.

LASWARI, one of the decisive battles of India. It was fought on the 1 st of November 1803 between the British under General Lake, and the Mahratta troops of Sindia, consisting of the remnant of Perron's battalions. Laswari is a village in the state of Alwar some 80 m. S. of Delhi, and here Lake overtook the enemy and attacked them with his cavalry before the infantry arrived. The result was indecisive, but when the infantry came up there ensued one of the most evenly

contested battles ever fought between the British and the natives of India, which ended in a complete victory for the British.

LATACUNGA (Llactacunga, or, in local parlance, Tactjnga), a plateau town of Ecuador, capital of the province of Leon, 46 m. S. of Quito, near the confluence of the Alagues and Cutuchi to form the Patate, the headstream of the Pastaza. Pop. (1900, estimate) 12,000, largely Indian. Latacunga stands on the old road between Guayaquil and Quito and has a station on the railway between those cities. It is 9141 ft. above sea-level; and its climate is cold and unpleasant, owing to the winds from the neighbouring snowclad heights, and the barren, pumice- covered table-land on which it stands. Cotopaxi is only 25 m. distant, and the town has suffered repeatedly from eruptions. Founded in 1534, it was four times destroyed by earthquakes between 1698 and 1798. The neighbouring ruins of an older native town are said to date from the Incas.

LA TAILLE, JEAN DE (c. 1540-1608), French poet and dramatist, was born at Bondaroy. He studied the humanities in Paris under Muret, and law at Orleans under Anne de Bourg. He began his career as a Huguenot, but afterwards adopted a mild Catholicism. He was wounded at the battle of Arnay-Ie Due in 1570, and retired to his estate at Bondaroy, where he wrote a political pamphlet entitled Histoire abregee des singeries de la ligue, often published with the Satire Menippee. His chief poem is a satire on the follies of court life, Le Courtisan retire; he also wrote a political poem, Le Prince ntiessaire. But his fame rests on his achievements in drama. In 1572 appeared the tragedy of Saul lefurieux, with a preface on L'Art de la tragedie. Like Jodelle, Grevin, La Peruse and their followers, he wrote, not for the general public to which the mysteries and farces had addressed themselves, but for the limited audience of a lettered aristocracy. He therefore depreciated the native drama and insisted on the Senecan model. In his preface La Taille enunciates the unities of place, time and action; he maintains that each act should have a unity of its own and that the scenes composing it should be continuous; he objects to deaths on the stage on the ground that the representation is un- convincing, and he requires as subject of the tragedy an incident really terrible, developed, if possible, by elaborate intrigue. He criticizes e.g. the subject of the sacrifice of Abraham, chosen by Theodore de Beze for his tragedy (1551), as unsuitable because " pity and terror " are evoked from the spectators without real cause. If in Saiil lefurieux he did not completely carry out his own convictions he developed his principal character with great ability. A second tragedy, La Famine ou les Gabeonites (1573), is inferior in construction, but is redeemed by the character of Rizpah. He was also the author of two

comedies, Le Negromant

and Les Corrivaux, both written apparently by 1562 but not published until 1573. Les Corrivaux is remarkable for its collo- quial prose dialogue, which foreshadows the excellence of later French comedy.

His brother, Jacques de la Taille (1542-1562), composed a number of tragedies, of which La Mort de Daire and La Molt d' Alexandre (both published in 1573) are the chief. He is best known by his Maniere de faire des vers en francais comme en grec et en latin, an attempt to regulate French verse by quantity. He died of plague at the age of 20. His Poesies diverses were published in 1572.

The works of Jean de la Taille were edited by Rene de Maulde (4 vols., 1878-1882). See also E. Faguet, La Tragedie francaise au XVI.' Steele (1883).

LATAKIA (anc. Laodicea), the chief town of a sanjak in the Beirut vilayet of Syria, situated on the coast, opposite the island of Cyprus. The oldest name of the town, according to Philo Herennius, was Pd/ uda or AeuKi) aurii; it received that of Laodicea (ad mare) from Seleucus Nicator, who re- founded it in honour of his mother as one of the four " sister " cities of the Syrian Tetrapolis (Antioch, Seleucia, Apamea, Laodicea). In the Roman period it was favoured by Caesar, and took the name of Julia; and, though it suffered severely when the fugitive Dolabella stood his last siege within its walls (43 B.C.), Strabo describes it as a flourishing port, which supplied, from the vineyards on the mountains, the greater part of the wine imported to Alexandria. The town received the privileges of an Italian colony from Severus, for taking his part against Antioch in the struggle with Niger. Laodicea was the seat of an ancient bishopric, and even had some claim to metro- politan rights. At the time of the crusades, " Liche," as Jacques de Vitry says it was popularly called, was a wealthy city. It fell to Tancred with Antioch in 1102, and was recovered by Saladin in 1188. A Christian settlement was afterwards per- mitted to establish itself in the town, and to protect itself by fortifications; but it was expelled by Sultan Kala'un and the defences destroyed. By the 16th century Laodicea had sunk very low; the revival in the beginning of the 17th was due to the new trade in tobacco. The town has several times been almost destroyed by earthquakes — in 11 70, 1287 and 1822.

The people are chiefly employed in tobacco cultivation, silk and oil culture, poultry rearing and the sponge fishery. There is a large export of eggs to Alexandria; but the wealth of the place depends most on the famous " Latakia " tobacco, grown in the plain behind the town and

on the Ansarieh hills. There are three main varieties, of which the worst is dark in colour and strong in flavour; the best, grown in the districts of Diryus and Amamareh, is light and aromatic, and is exported mainly to Alexandria; but much goes also to Constantinople, Cyprus and direct to Europe. After the construction of a road through Jebel Ansarieh to Hamah, Latakia drew a good deal of traffic from upper Syria; but the Hamah-Homs railway has now diverted much of this again. The products of the surrounding district, however, cause the town to increase steadily, and it is a regular port of call for the main Levantine lines of steamers. The only notable object of antiquity is a triumphal arch, prob- ably of the early 3rd century, in the S.E. quarter of the modern town. Latakia and its neighbourhood formerly produced a very beautiful type of rug, examples of which are highly prized. (D. G. H.)

LATEEN (the Anglicized form of Fr. latine, i.e. voile latine, Latin sail, so-called as the chief form of rig in the Mediterranean), a certain kind of triangular sail, having a long yard by which it is suspended to the mast. A ” lateener ” is a vessel rigged with a lateen sail and yard. This rig was formerly much used, and is still the typical sail of the felucca of the Mediterranean, and dhow of the Arabian Sea.

LA TENE (Lat. tenuis, shallow), the site of a lake-dwelling at the north end of Lake Neuchatel, between Marin and Pre- fargier. According to some, it was originally a Helvetic op- pidum; according to others, a Gallic commercial settlement. R. Forrer distinguishes an older semi-military, and a younger

civilian settlement, the former a Gallic customs station, the latter, which may be compared to the canabae of the Roman camps, containing the booths and taverns used by soldiers and sailors. He also considers the older station to have been, not as usually supposed, Helvetic, but pre- or proto-Helvetic, the character of which changed with the advance of the Helvetii into Switzerland (c. 1 10-100 B.C.). La Tene has given its name to a period of culture (c. 500 b.c.a.d. 100), the phase of the Iron age succeeding the Hallstatt phase, not as being its starting point, but because the finds are the best known of their kind. The latter are divided into early (c. 500-250 B.C.), middle (250-100 B.C.) and late (100 b.c.-a.d. 100), and chiefly belong to the middle period. They are mostly of iron, and consist of swords, spear-heads, axes, scythes and knives, which exhibit a remark- able

agreement with the description of the weapons of the southern Celts given by Diodorus Siculus. There are also brooches, bronze kettles, torques, small bronze ear-rings with little glass pearls of various colours, belt-hooks and pins for fastening articles of clothing. The La Tene culture made its way through France across to England, where it has received the name of ” late Celtic “; a remarkable find has been made at Aylesford in Kent.

See F. Keller, Lake Dwellings of Switzerland, vi. (Eng. trans., 1878) ; V. Gross, La Tene un oppidum helvete (1886) ; E. Vouga, Les Helvites (L La Tene (1886) ; P.. Reinecke, Zur Kenntnis der la Tene Denkmaler der Zone nordwdrts der Alpen (Mainzer Festschrift, 1902) ; R. Forrer, Reallexikon der prahistorischen . . . Altertiimer (1907), where many illustrations are given.

LATERAN COUNCILS, the ecclesiastical councils or synods held at Rome in the Lateran basilica which was dedicated to Christ under the title of Salvator, and further called the basilica of Constantine or the church of John the Baptist. Ranking as a papal cathedral, this became a much-favoured place of assembly for ecclesiastical councils both in antiquity (313, 487) and more especially during the middle ages. Among these numerous synods the most prominent are those which the tradition of the Roman Catholic church has classed as ecumenical councils.

1. The first Lateran council (the ninth ecumenical) was opened by Pope Calrxtus II. on the 18th of March n 23; its primary object being to confirm the concordat of Worms, and so close the conflict on the question of investiture {q.v.). In addition to this, canons were enacted against simony and the marriage of priests; while resolutions were passed in favour of the crusaders, of pilgrims to Rome and in the interests of the truce of God. More than three hundred bishops are reported to have been present.

For the resolutions see Monumenta Germaniae, Leges, iv., i. 574- 576 (1893); Mansi, Collectio Conciliorum, xxi. p. 281 sq.; Hefele, Conciliengeschichte, v. 378-384 (ed. 2, 1886).

2. The second Lateran, and tenth ecumenical, council was held by Pope Innocent II. in April 1139, and was attended by close on a thousand clerics. Its immediate task was to neutralize the after-effects of the schism, which had only been terminated in the previous year by the death of Anacletus II. (d. 25th January 1138). All consecrations received at his hands were declared invalid, his adherents were deposed, and King Roger of Sicily was excommunicated. Arnold of

Brescia, too, was removed from office and banished from Italy.

Resolutions, ap. Mansi, op, oil. xxi., 525 sq.; Hefele, Conciliengeschichte, v. 438-445 (ed. 2).

3. At the third Lateran council (eleventh ecumenical), which met in March n 79 under Pope Alexander III., the clergy present again numbered about one thousand. The council formed a sequel to the peace of Venice (1177), which marked the close of the struggle between the papacy and the emperor Frederick I. Barbarossa; its main object being to repair the direct or in- direct injuries which the schism had inflicted on the life of the church and to display to Christendom the power of the see of Rome. Among the enactments of the council, the most important concerned the appointment to the papal throne (Canon 1), the electoral law of 1059 being supplemented by a further pro- vision declaring a two-thirds majority to be requisite for the validity of the cardinals' choice. Of the participation of the

Roman clergy and populace, or of the imperial ratification, there was no longer any question. Another resolution, of importance for the history of the treatment of heresy, was the canon which decreed that armed force should be employed against the Cathari in southern France, that their goods were liable to confiscation and their persons to enslavement by the princes, and that all who took up weapons against them should receive a two years' remission of their penance and be placed — like the crusaders — ■ under the direct protection of the church.

Resolutions, ap. Mansi, op. cit. xxii. 212 sq. ; Hefele, Conciliengeschichte, v. 710-719 (ed. 2).

4. The fourth Lateran council (twelfth ecumenical), convened by Pope Innocent III. in 121 5, was the most brilliant and the most numerously attended of all, and marks the culminating point of a pontificate which itself represents the zenith attained by the medieval papacy. Prelates assembled from every country in Christendom, and with them the deputies of numerous princes. The total included 412 bishops, with 800 priors and abbots, besides the representatives of absent prelates and a number of inferior clerics. The seventy decrees of the council begin with a confession of faith directed against the Cathari and Waldenses, which is significant if only for the mention of a transubstantiation of the elements in the Lord's Supper. A series of resolutions provided in detail for the organized sup- pression of heresy and for the institution of the episcopal in- quisition (Canon 3). On every Christian, of either sex, arrived at years of discretion, the duty

was imposed of confessing at least once annually and of receiving the Eucharist at least at Easter (Canon 21). Enactments were also passed touching procedure in the ecclesiastical courts, the creation of new monastic orders, appointments to offices in the church, marriage-law, conventual discipline, the veneration of relics, pilgrimages and intercourse with Jews and Saracens. Finally, a great crusade was resolved upon, to defray the expenses of which it was determined that the clergy should lay aside one-twentieth — the pope and the cardinals one-tenth — of their revenues for the next three years; while the crusaders were to be held free of all burdens during the period of their absence.

Resolutions, ap. Mansi, op. cit. xxii. 953 sq. ; Hefele, Conciliengeschichte, v. 872-905 (ed. 2). See also Innocent III.

5. The fifth Lateran council (eighteenth ecumenical) was convened by Pope Julius II. and continued by Leo X. It met from the 3rd of May 1512 to the 16th of March 1517, and was the last great council anterior to the Reformation. The change in the government of the church, the rival council of Pisa, the ecclesiastical and political dissensions within and without the council, and the lack of disinterestedness on the part of its members, all combined to frustrate the hopes which its convoca- tion had awakened. Its resolutions comprised the rejection of the pragmatic sanction, the proclamation of the pope's superi- ority over the council, and the renewal of the bull Unam sanctam of Boniface VIII. The theory that it is possible for a thing to be theologically true and philosophically false, and the doctrine of the mortality of the human soul, were both repudiated; while a three years' tithe on all church property was set apart to provide funds for a war against the Turks.

See Hardouin, Coll. Cone. ix. 1570 sq.; Hefele-Hergenrother, Conciliengeschichte, viii. 454 sq. ; (1887). Cf. bibliography under Leo X. (C. M.)

LATERITE (Lat. later, a brick), in petrology, a red or brown superficial deposit of clay or earth which gathers on the surface of rocks and has been produced by their decomposition; it is very common in tropical regions. In consistency it is generally scft and friable, but hard masses, nodules and bands often occur in it. These are usually rich in iron. The superficial layers of laterite deposits are often indurated and smooth black or dark- brown crusts occur where the clays have long been exposed to a dry atmosphere; in other cases the soft clays are full of hard nodules, and in general the laterite is perforated by tubules, sometimes with veins of different composition and appearance from

the main mass. The depth of the laterite beds varies up to 30 or 40 ft., the deeper layers often being soft when the surface is hard or stony; the transition to fresh, sound rock

below may be very sudden. That laterite is merely rotted crystalline rock is proved by its often preserving the structures, veins and even the outlines of the minerals of the parent mass below; the felspars and other components of granite gneiss having evidently been converted in situ into a soft argillaceous material.

Laterite occurs in practically every tropical region of the earth, and is very abundant in Ceylon, India, Burma, Central and West Africa, Central America, &c. It is especially well developed where the underlying rock is crystalline and felspathic (as granite gneiss, syenite and diorite), but occurs also on basalts in the Deccan and in other places, and is found even on mica schist, sandstone and quartzite, though in such cases it tends to be more sandy than argillaceous. Many varieties have been recognized. In India a calcareous laterite with large concretion- ary blocks of carbonate of lime is called kankar (kunkar), and has been much used in building bridges, &c, because it serves as a hydraulic cement. In some districts (e.g. W. Indies) similar types of laterite have been called ” puzzuolana ” and are also used as mortar and cement. Kankar is also known and worked in British East Africa. The clay called cabook in Ceylon is essentially a variety of laterite. Common laterite contains very little lime, and it seems that in districts which have an excessive rainfall that component may be dissolved out by percolating water, while kankar, or calcareous laterite, is formed in districts which have a smaller rainfall. In India also a distinction is made between ” high-level ” and ” low-level ” laterites. The former are found at all elevations up to 5000 ft. and more, and are the products of the decomposition of rock in situ; they are often fine-grained and sometimes have a very well-marked concretionary structure. These laterites are subject to removal by running water, and are thus carried to lower grounds forming transported or ” low-level ” laterites. The finer particles tend to be carried away into the rivers, while the sand is left behind and with it much of the heavy iron oxides. In such situations the laterites are sandy and ferruginous, with a smaller proportion of clay, and are not intimately connected with the rocks on which they lie. On steep slopes laterite also may creep or slip when soaked with rain, and if exposed in sections on roadsides or river banks has a bedded appearance, the

stratification being parallel to the surface of the ground.

Chemical and microscopical investigations show that laterite is not a clay like those which are so familiar in temperate regions; it does not consist of hydrous silicate of alumina, but is a mechanical mixture of fine grains of quartz with minute scales of hydrates of alumina. The latter are easily soluble in acid while clay is not, and after treating laterite with acids the alu- mina and iron leave the silica as a residue in the form of quartz. The alumina seems to be combined with variable proportions of water, probably as the minerals hydrargillite, diaspore and gibbsite, while the iron occurs as goethite, turgite, limonite, haematite. As already remarked, there is a tendency for the superficial layers to become hard, probably by a loss of the water contained in these aluminous minerals. These chemical changes may be the cause of the frequent concretionary structure and veining in the laterite. The great abundance of alumina in some varieties of laterite is a consequence of the removal of the fine particles of gibbsite, &c, from the quartz by the action of gentle currents of water. We may also point out the essential chemical similarity between laterite and the seams of bauxite which occur, for example, in the north of Ireland as reddish clays between flows of Tertiary basalt. The bauxite is rich in alumina combined with water, and is used as an ore of aluminium. It is often very ferruginous. Similar deposits occur at Vogelsberg in Germany, and we may infer that the bauxite beds are layers of laterite produced by sub-aerial de- composition in the same manner as the thick laterite deposits which are now in course of formation in the plateau basalts of the Deccan in India.

The conditions under which laterite are formed include, first, a high seasonal temperature, for it occurs only in tropical districts and in plains or mountains up to about 5000 ft. in height; secondly, a heavy rainfall, with well-marked alternation of wet and dry seasons

(in arid countries laterite is seldom seen, and where the rainfall is moderate the laterite is often calcareous) ; third, the presence of rocks containing aluminous minerals such as felspar, augite, horn- blende and mica. On pure limestones such as coral rocks and on quartzites laterite deposits do not originate except where the material has been transported.

Many hypotheses have been advanced to account for the essential difference between lateritization and the weathering processes exhibited by rocks in temperate and arctic climates. In the tropics the rank growth of vegetation produces large amounts of humus and carbonic acid which greatly promote rock decomposition; igneous and

crystalline rocks of all kinds are deeply covered under rich dark soils, so that in tropical forests the underlying rocks are rarely to be seen. In the warm soil nitrification proceeds rapidly and bacteria of many kinds flourish. It has also been argued that the frequent thunderstorms produce much nitric acid in the atmosphere and that this may be a cause of lateritization, but it is certainly not a necessary factor, as beds of laterite occur in oceanic islands lying in regions of the ocean where lightning is rarely seen. Sir Thomas Holland has brought forward the suggestion that the development of laterite may depend on the presence in the soil of bacteria which are able to decompose silicate of alumina into quartz and hydrates of alumina. The restricted distribution of laterite deposits might then be due to the inhibiting effect of low temperatures on the reproduction of these organisms. This very ingenious hypothesis has not yet received the experimental confirmation which seems necessary before it can be regarded as established. Malcolm Maclaren, rejecting the bacterial theory, directs special attention to the alternate saturation of the soil with rain water in the wet season and desiccation in the subsequent drought. The laterite beds are porous, in fact they are traversed by innumerable tubules which are often lined with deposits of iron oxide and aluminous minerals. We may be certain that, as in all soils during dry weather, there is an ascent of water by capillary action towards the surface, where it is gradually dissipated by evaporation. The soil water brings with it mineral matter in solution, which is deposited in the upper part of the beds. If the alumina be at one time in a soluble condition it will be drawn upwards and concentrated near the surface. This process explains many peculiarities of laterites, such as their porous and slaggy structure, which is often so marked that they have been mistaken for slaggy volcanic rocks. The concretionary structure is undoubtedly due to chemical re- arrangements, among which the escape of water is probably one of the most important; and many writers have recognized that the hard ferruginous crust, like the induration which many soft laterites undergo when dug up and exposed to the air, is the result of desicca- tion and exposure to the hot sun of tropical countries. Thebrecciated structure which many laterites show may be produced by great expansion of the mass consequent on absorption of water after heavy rains, followed by contraction during the subsequent dry season.

Laterites are not of much economic use. They usually form a poor soil, full of hard concretionary lumps and very unfertile because the potash and phosphates have been removed in solution, while only alumina, iron and silica are left behind. They are used as clays for puddling, for making tiles, and as a mortar in rough work. Kankar has filled an

important part as a cement in many large engineering works in India. Where the iron concretions have been washed out by rains or by artificial treatment (often in the form of small shot- like pellets) they serve as an iron ore in parts of India and Africa. Attempts are being made to utilize laterite as an ore of aluminium, a purpose for which some varieties seem well adapted. There are also deposits of manganese associated with some laterites in India which may ultimately be valuable as mineral ores. (J. S. F.)

LATH (O. Eng. laett, Mid. Eng. lappe, a form possibly due to the Welsh Hath; the word appears in many Teutonic languages, cf. Dutch lat, Ger. Latte, and has passed into Romanic, cf. Ital. latta, Fr. latte), a thin flat strip of wood or other material used in building to form a base or groundwork for plaster, or for tiles, slates or other covering for roofs. Such strips of wood are employed to form lattice-work, or for the bars of Venetian blinds or shutters. A ” lattice ” (O. Fr. lattis) is an interlaced structure of laths fastened together so as to form a screen with diamond-shaped or square interstices. Such a screen was used, as it still is in the East, as a shutter for a window admitting air rather than light; it was hence used of the window closed by such a screen. In modern usage the term is applied to a window with diamond-shaped panes set in lead-work. A window with a lattice painted red was formerly a common inn-sign (cf. Shakespeare, 2 Hen. IV. ii. 2. 86); frequently the window was dispensed with, and the sign remained painted on a board.

LATHE. (1) A mechanical appliance in which material is held and rotated against a tool for cutting, scraping, polishing or other purpose (see Tools). This word is of obscure origin. It may be a modified form of ” lath,” for in an early form of lathe the rotation is given by a treadle or spring lath attached

to the ceiling. The New English Dictionary points out a possible source of the word in Dan. lad, meaning apparently a supporting framework, found in the name of the turning-lathe, drejelad, and also in savelad, saw-bench, vaeverlad, loom, &c. (2) One of five, formerly six, districts containing three or more hundreds, into whi;h the county of Kent was divided. Though the division survives, it no longer serves any administrative purpose. It was formerly a judicial division, the court of the lathe being superior to that of the hundred. In this it differs from the rape (q.v.) of Sussex, which was a. geographical rather than

an administrative division. In O. Eng. the word was lags, the origin of which is doubtful. The New English Dictionary considers it almost certainly identical with O. Norse lad, landed possessions, territory, with a possible association in meaning with such words as leiS, court, mdtlaeafta, attendance at a meeting or moot, or with Mod. Dan. laegd, a division of the country for military purposes.

LATHROP, FRANCIS (1 849-1 909), American artist, was born at sea, near the Hawaiian Islands, on the 22nd of June 1849, being the great-grandson of Samuel Holden Parsons, and the son of George Alfred Lathrop (1819-1877), who for some time was United States consul at Honolulu. He was a pupil of T. C. Farrar (1838-1891) in New York, and studied at the Royal academy of Dresden. In 1870-1873 he was in England, studying under Ford Madox Brown and Burne- Jones, and working in the school of William Morris, where he devoted particular attention to stained glass. Returning to America in 1873, he became known as an illustrator, painted portraits, designed stained glass, and subsequently confined himself to decorative work. He designed the chancel of Trinity church, Boston, and decorated the interior of Bowdoin college chapel, at Brunswick, Maine, and several churches in New York. The Marquand memorial window, Princeton chapel, is an example of his work in stained glass. His latest work was a series of medallions for the building of the Hispanic-American society in New York. He was one of the charter members of the Society of American Artists, and became an, associate of the National Academy of Design, New York, of which also William L. Lathrop (b. 1859) an artist who is to be distinguished from him, became a member in 1907. He died at Woodcliff, New Jersey, on the 18th of October 1909.

His younger brother, George Parsons Lathrop (1851-1898), born near Honolulu on the 25th of August 1851, took up litera- ture as a profession. He was an assistant editor of the Atlantic Monthly in 1875-1877, and editor of the Boston Courier in 1877- 1879. He was one of the founders (1883) of the American copyright league, was prominent in the movement for Roman Catholic summer schools, and wrote several novels, some verse and critical essays. He .was the author of A Study of Nathaniel Hawthorne (1876), and edited the standard edition (Boston, 1883) of Hawthorne's works. In 1871 he married in London the second daughter of Nathaniel Hawthorne — Rose Hawthorne Lathrop (b. 1851). After his death Mrs Lathrop devoted herself entirely to charity. She was instru- mental in establishing (1896) and subsequently conducted St Rose's free home for cancer in New York City. In 1900 she joined the Dominican order, taking the name of Mother Mary Alphonsa and becoming superioress of the Dominican community of the third order; and she established in

1901 and subsequently conducted this order's Rosary Hill home (for cancerous patients) at Hawthorne, N.Y. She published a volume of poems (1888); Memories of Hawthorne (1897); and, with her husband, A Story of Courage: Annals of the Georgetown Convent of the Visitation of the Blessed Virgin Mary (1894).

LATIMER, HUGH (c. 1490-1555), English bishop, and one of the chief promoters of the Reformation in England, was born at Thurcaston, Leicestershire. He was the son of a yeoman, who rented a farm " of three or four pounds by year at the uttermost." Of this farm he " tilled as much as kept half a dozen men," retaining also grass for a hundred sheep and thirty cattle. The year of Latimer's birth is not definitely known. In the Life by Gilpin it is given as 1470, a palpable error, and

possibly a misprint for 1490. 1 Foxe states that at " the age of fourteen years he was sent to the university of Cambridge," and as he was elected fellow of Clare in 1509, his year of entrance was in all likelihood 1505. Latimer himself also, in mentioning his conversion from Romanism about 1523, says that it took place after he was thirty years of age. According to Foxe, Latimer went to school " at the age of four or thereabout." The purpose of his parents was to train him up " in the knowledge of all good literature," but his father " was as diligent to teach him to shoot as any other thing." As the yeomen of England were then in comparatively easy circumstances, the practice of sending their sons to the universities was quite usual; indeed Latimer mentions that in the reign of Edward VI., on account of the increase of rents, the universities had begun wonderfully to decay. He graduated B.A. in 1510 and M.A. in 1514. Before the latter date he had taken holy orders. While a student he was not unaccustomed " to make good cheer and be merry," but at the same time he was a punctilious observer of the minutest rites of his faith and "as obstinate a Papist as any in England." So keen was his opposition to the new learning that his oration on the occasion of taking his degree of bachelor of divinity was devoted to an attack on the opinions of Melanchthon. It was this sermon that determined his friend Thomas Bilney to go to Latimer's study, and ask him " for God's sake to hear his confession," the result being that " from that time forward he began to smell the word of God, and forsook the school doctors and such fooleries." Soon his discourses exercised a potent influence on learned and unlearned alike; and, although he restricted himself, as indeed was principally his custom through life, to the inculcation of practical righteousness, and the censure of clamant abuses, a rumour of his heretical tendencies reached the bishop of Ely, who resolved to become unexpectedly one of his audience. Latimer, on seeing him enter the church, boldly changed his theme to a portrayal of Christ as

the pattern priest and bishop. The points of comparison were, of course, deeply distasteful to the prelate, who, though he professed his ” obliga- tions for the good admonition he had received,” informed the preacher that he ” smelt somewhat of the pan.” Latimer was prohibited from preaching in the university or in any pulpits of the diocese, and on his occupying the pulpit of the Augustinian monastery, which enjoyed immunity from episcopal control, he was summoned to answer for his opinions before Wolsey, who, however, was so sensible of the value of such discourses that he gave him special licence to preach throughout England.

At this time Protestant opinions were being disseminated in England chiefly by the surreptitious circulation of the works of Wycliffe, and especially of his translations of the New Testa- ment. The new leaven had begun to communicate its subtle influence to the universities, but was working chiefly in secret and even to a great extent unconsciously to those affected by it, for many were in profound ignorance of the ultimate tendency of their own opinions. This was perhaps, as regards England, the most critical conjuncture in the history of the Reformation, both on this account and on account of the position in which Henry VIII. then stood related to it. In no small degree its ultimate fate seemed also to be placed in the hands of Latimer. In 1526 the imprudent zeal of Robert Barnes had resulted in an ignominious recantation, and in 1527 Bilney, Latimer’s most trusted coadjutor, incurred the displeasure of Wolsey, and did humiliating penance for his offences. Latimer, however, besides possessing sagacity, quick insight into character, and a ready and formidable wit which thoroughly disconcerted and confused his opponents, had naturally a distaste for mere theological discussion, and the truths he was in the habit of inculcating could scarcely be controverted, although, as he stated them, they were diametrically contradictory of prevailing errors both in

1 The only reasons for assigning an earlier date are that he was commonly known as ” old Hugh Latimer,” and that Bernher, his Swiss servant, states incidentally that he was ” above threescore and seven years ” in the reign of Edward VI. Bad health and anxieties probably made him look older than his years, but under Edward VI. his powers as an orator were in full vigour, and he was at his book winter and summer at two o’clock in the morc;i > g.

LATINA, VTA

doctrine and practice. In December 1529 he preached his two ” sermons on the cards,” which awakened a turbulent controversy in the university, and his opponents, finding that they were unable to cope with the dexterity and keenness of his satire, would undoubtedly have succeeded in getting him silenced by force, had it not been reported to the king that Latimer ” favoured his cause,” that is, the cause of the divorce. While, therefore, both parties were imperatively commanded to refrain from further dispute, Latimer was invited to preach before Henry in the Lent of 1530. The king was so pleased with the sermon that after it ” he did most familiarly talk with him in a gallery.” Of the special regard which Henry seemed to have conceived for him Latimer took advantage to pen the famous letter on the free circulation of the Bible, an address remarkable, not only for what Froude justly calls ” its almost unexampled grandeur,” but for its striking repudiation of the aid of temporal weapons to defend the faith,, “for God,” he says, “will not have it defended by man or man’s power, but by His Word only, by which He hath evermore defended it, and that by a way far above man’s power and reason.” Though the appeal was without effect on the immediate policy of Henry, he could not have been displeased with its tone, for shortly afterwards he appointed Latimer one of the royal chaplains. In times so ” out of joint ” Latimer soon became ” weary of the court,” and it was with a sense of relief that he accepted the living of West Kington, or West Kineton, Wiltshire, conferred on him by the king in 1 53 1. Harassed by severe bodily ailments, encompassed by a raging tumult of religious conflict and persecution, and aware that the faint hopes of better times which seemed to gild the horizon of the future might be utterly darkened by a failure either in the constancy of his courage or in his discernment and discretion, he exerted his eloquence with unabating energy in the furtherance of the cause he had at heart. At last a sermon he was persuaded to preach in London exasperated John Stokesley, bishop of the diocese, and seemed to furnish that fervent perse- cutor with an opportunity to overthrow the most dangerous champion of the new opinions. Bilney, of whom Latimer wrote, ” if such as he shall die evil, what shall become of me?” perished at the stake in the autumn of 1531, and in January following Latimer was summoned to answer before the bishops in the consistory. After a tedious and captious examination, he was in March brought before convocation, and, on refusing to subscribe certain articles, was excommunicated and imprisoned; but through the interference of the king he was finally released after he had voluntarily signified his acceptance of all the articles except two, and confessed that he had erred not only ” in discretion but in doctrine.” If in this confession he to some extent tampered with his conscience, there is every reason to believe that his

culpable timidity was occasioned, not by personal fear, but by anxiety lest by his death he should hinder instead of promoting the cause of truth. After the consecration of Cranmer to the archbishopric of Canterbury in 1533 Latimer's position was completely altered. A commission appointed to inquire into the disturbances caused by his preaching in Bristol severely censured the conduct of his opponents; and, when the bishop prohibited him from preaching in his diocese, he obtained from Cranmer a special licence to preach throughout the province of Canterbury. In 1 534 Henry formally repudiated the authority of the pope, and from this time Latimer was the chief co-operator with Cranmer and Cromwell in advising the king regarding the series of legislative measures which rendered that repudiation complete and irrevocable.

It was, however, the preaching of Latimer more than the edicts of Henry that established the principles of the Reformation in the minds and hearts of the people; and from his preaching the movement received its chief colour and complexion. The sermons of Latimer possess a combination of qualities whiˆh constitute them unique examples of that species of literature. It is possible to learn from them more regarding the social and political condition of the period than perhaps from any other source, for they abound, not only in exposures of religious abuses, and of the prevailing corruptions of society, but in

references to many varieties of social injustice and unwise customs, in racy sketches of character, and in vivid pictures of special features of the time, occasionally illustrated by interesting incidents in his own life. The homely terseness of his style, his abounding humour — rough, cheery and playful, but irresistible in its simplicity, and occasionally displaying sudden and dangerous barbs of satire — his avoidance of dogmatic subtle- ties, his noble advocacy of practical righteousness, his bold and open denunciation of the oppression practised by the powerful, his scathing diatribes against ecclesiastical hypocrisy, the transparent honesty of his fervent zeal, tempered by sagacious moderation — these are the qualities which not only rendered his influence so paramount in his lifetime, but have transmitted his memory to posterity as perhaps that of the one among his contemporaries most worthy of our interest and admiration.

In September 1535 Latimer was consecrated bishop of Worcester. While holding this office he was selected to officiate as preacher when the friar, John Forest, whom he vainly en- deavoured to move to submission, was burned at the stake for denying the royal supremacy. In 1539, being opposed to the " act of the six articles," Latimer resigned his bishopric, learning from Cromwell that this was the wish

of the king. It would appear that on this point he was deceived, but as he now declined to accept the articles he was confined within the precincts of the palace of the bishop of Chichester. After the attainder of Cromwell little is known of Latimer until 1546, when, on account of his connexion with the preacher Edward Crome, he was summoned before the council at Greenwich, and committed to the Tower of London. Henry died before his final trial could take place, and the general pardon at the accession of Edward VI. procured him his liberty. He declined to resume his see, notwithstanding the special request of the Commons, but in January 1548 again began to preach, and with more effectiveness than ever, crowds thronging to listen to him both in London and in the country. Shortly after the accession of Mary in 1553 a summons was sent to Latimer to appear before the council at Westminster. Though he might have escaped by flight, and though he knew, as he quaintly remarked, that " Smithfield already groaned for him," he at once joyfully obeyed. The pursuivant, he said, was " a welcome messenger." The hardships of his imprisonment, and the long disputations at Oxford, told severely on his health, but he endured all with unbroken cheerfulness. On the 16th of October 1555 he and Ridley were led to the stake at Oxford. Never was man more free than Latimer from the taint of fanaticism or less dominated by " vainglory," but the motives which now inspired his courage not only placed him beyond the influence of fear, but enabled him to taste in dying an ineffable thrill of victorious achievement. Ridley he greeted with the words, " Be of good comfort, Master Ridley, and play the man; we shall this day light such a candle by God's grace in England as (I trust) shall never be put out." He " received the flame as it were embracing it. After he had stroked his face with his hands, and (as it were) bathed them a little in the fire, he soon died (as it appeared) with very little pain or none."

Two volumes of Latimer's sermons were published in 1549. A complete edition of his works, edited by G. E. Corrie for the Parker Society, appeared in two volumes (1844-1845). His Sermon on the Ploughers and Seven Sermons preached before Edward VI. were reprinted by E. Arber (1869). The chief contemporary authorities for his life are his own Sermons, John Stow's Chronicle and Foxe's Book of Martyrs. In addition to memoirs prefixed to editions of his sermons, there are lives of Latimer by R. Demaus (1869, new and revised ed. 1881), and by R. M. and A. J. Carlyle (1899). (T – F. H.)

LATINA, VIA, an ancient highroad of Italy, leading S.E. from Rome. It was probably one of the oldest of Roman roads, leading to the pass of Algidus, so important in the early military history of Rome; and it must have preceded the Via Appia as a route to Campania, inasmuch

as the Latin colony at Cales was founded in 334 B.C. and must have been accessible from Rome by road, whereas the Via Appia was only made twenty- two years later. It follows, too, a far more natural line of communication, without the engineering difficulties which the Via Appia had to encounter. As a through route it no doubt

preceded the Via Labicana (see Labicana, Via), though the latter may have been preferred in later times. After their junction, the Via Latina continued to follow the valley of the Trerus (Sacco), following the line taken by the modern railway to Naples, and passing below the Hernican hill-towns, Anagnia, Ferentinum, Frusino, &c. At Fregellae it crossed the Liris, and then passed through Aquinum and Casinum, both of them comparatively low-lying towns. It then entered the interval between the Apennines and the volcanic group of Rocca Monfina, and the original road, instead of traversing it, turned abruptly N.E. over the mountains to Venafrum, thus giving a direct communication with the interior of Samnium by roads to Aesernia and Telesia. In later times, however, there was in all probability a short cut by Rufrae along the line taken by the modern highroad and railway. The two lines rejoined near the present railway station of Caianello and the road ran to Teanum and Cales, and so to Casilinum, where was the crossing of the Volturnus and the junction with the Via Appia. The distance from Rome to Casilinum was 129 m. by the Via Appia, 135 m. by the old Via Latina through Venafrum, 126 m. by the short cut by Rufrae. Considerable remains of the road exist in the neighbourhood of Rome; for the first 40 m., as far as Compitum Anagninum, it is not followed by any modern road; while farther on in its course it is in the main identical with the modern high- road.

See T. Ashby in Papers of the British School at Rome iv. 1 sq., v. I sq. (T. As.)

LATINI, BRUNETTO (c. 1210-c. 1294), Italian philosopher and scholar, was born in Florence, and belonged to the Guelph party. After the disaster of Montaperti he took refuge for some years (1 261-1268) in France, but in 1269 returned to Tuscany and for some twenty years held successive high offices. Giovanni Villani says that ” he was a great philosopher and a consummate master of rhetoric, not only in knowing how to speak well, but how to write well. ... He both began and directed the growth of the Florentines, both in making them ready in speaking well and in knowing how to guide and direct our republic

according to the rules of politics." He was the author of various works in prose and verse. While in France he wrote in French his prose TrGsor, a summary of the encyclopaedic knowledge of the day (translated into Italian as Tesoro by Bono Giamboni in the 13th century), and in Italian his poem Tesoretto, rhymed couplets in heptasyllabic metre, a sort of abridgment put in allegorical form, the earliest Italian didactic verse. He is famous as the friend and counsellor of Dante (see Inferno, xv. 82-87).

For the Tresor see P. Chabville's edition (1863); for the Tesoro, Gaiter's edition (1878); for the Tesoretto, B. Wiese's study in Zeitschrift fiir romanische Philologie, vii. See also the biographical and critical accounts of Brunetto Latini by Thoe Sundby (1884), and Marchesini (1887 and 1890).

LATIN LANGUAGE. 1. Earliest Records of its Area.— Latin was the language spoken in Rome and in the plain of Latium in the 6th or 7th century B.C. — the earliest period from which we have any contemporary record of its existence. But it is as yet impossible to determine either, on the one hand, whether the archaic inscription of Praeneste (see below), which is as- signed with great probability to that epoch, represents exactly the language then spoken in Rome; or, on the other, over how much larger an area of the Italian peninsula, or even of the lands to the north and west, the same language may at that date have extended. In the 5th century B.C. we find its limits within the peninsula fixed on the north-west and south-west by Etruscan (see Etruria: Language); on the east, south-east, and probably north and north-east, by Safine (Sabine) dialects (of the Marsi, Paeligni, Samnites, Sabini and Picenum, qq.v.) ; but on the north we have no direct record of Sabine speech, nor of any non-Latinian tongue nearer than Tuder and Asculum or earlier f han the 4th century b.c. (see Umbria, Iguvtum, Picenum). \~>; know however, both from tradition and from the archaeo- logical data, that the Safine tribes were in the 5th century B.C. migrating, or at least sending off swarms of their younger folk, farther and farther southward into the peninsula. Of the 'anguages they were then displacing we have no explicit record

save in the case of Etruscan in Campania, but it may be reason- ably inferred from the evidence of place-names and tribal names, combined with that of the Faliscan inscriptions, that before the Safine invasion some idiom, not remote from Latin, was spoken by the pre-Etruscan tribes down the length of the west coast (see Falisci; Volsci; also Rome: History; Liguria; Siculi).

2. Earliest Roman Inscriptions. — At Rome, at all events, it is clear from the unwavering voice of tradition that Latin was spoken from the beginning of the city. Of the earliest Latin inscriptions found in Rome which were known in 1909, the oldest, the so-called ” Forum inscription,” can hardly be re- ferred with confidence to an earlier century than the 5th; the later, the well-known Duenos (= later Latin bonus) inscription, certainly belongs to the 4th; both of these are briefly described below (§§ 40, 41). ‘At this date we have probably the period of the narrowest extension of Latin; non-Latin idioms were spoken in Etruria, Umbria, Picenum and in the Marsian and Volscian hills. But almost directly the area begins to expand again, and after the war with Pyrrhus the Roman arms had planted the language of Rome in her military colonies throughout the peninsula. When we come to the 3rd century B.C. the Latin inscriptions begin to be more numerous, and in them (e.g. the oldest epitaphs of the Scipio family) the language is very little removed from what it was in the time of Plautus.

3. The Italic Group of Languages. — For the characteristics and affinities of the dialects that have just been mentioned, see the article Italy: Ancient Languages and Peoples, and to the separate articles on the tribes. Here it’ is well to point out that the only one of these languages which is not akin to Latin is Etruscan; on the other hand, the only one very closely resembling Latin is Faliscan, which with it forms what we may call the Latinian dialect of the Italic group of the Indo-European family of languages. Since, however, we have a far more complete knowledge of Latin than of any other member of the Italic group, this is the most convenient place in which to state briefly the very little than can be said as yet to have been ascertained as to the general relations of Italic to its sister groups. Here, as in many kindred questions, the work of Paul Kretschmer of Vienna (Einleitung in die Geschichte der griechischen Sprache, Gottingen, 1896) marked an important epoch in the historical aspects of linguistic study, as the first scientific attempt to interpret critically the different kinds of evidence which the Indo-European languages give us, not in vocabulary merely, but in phonology, morphology, and especially in their mutual borrowings, and to combine it with the non-linguistic data of tradition and archaeology. A certain number of the results so obtained have met with general acceptance and may be briefly treated here. It is, however, extremely dangerous to draw merely from linguistic kinship deductions as to racial identity, or even as to an original contiguity of habitation. Close re- semblances in any two languages, especially those in their inner structure (morphology), may be due to identity of race, or to long neighbourhood in the earliest

period of their development; but they may also be caused by temporary neighbourhood (for a longer or shorter period) , brought about by migrations at a later epoch (or epochs). A particular change in sound or usage may spread over a whole chain of dialects and be in the end exhibited alike by them all, although the time at which it first began was long after their special and distinctive characteristics had become clearly marked. For example, the limitation of the word-accent to the last three syllables of a word in Latin and Oscan (see below) — a phenomenon which has left deep marks on all the Romance languages — demonstrably grew up between the 5th and 2nd centuries B.C.; and it is a permissible conjecture that it started from the influence of the Greek colonies in Italy (especially Cumae and Naples), in whose language the same- limitation (although with an accent whose actual character was probably more largely musical) had been established some centuries sooner.

4. Position of the Italic Group. — The Italic group, then, when compared with the other seven main ” families ” of Indo-

European speech, in respect of their most significant differences, ranges itself thus:

(i.) Back-palatal and Velar Sounds. — In point of its treatment of the Indo-European back-palatal and velar sounds, it belongs to the western or centum group, the name of which is, of course, taken from Latin ; that is to say, like German, Celtic and Greek, it did not sibilate original k and g, which in Indo-Iranian, Armenian, Slavonic and Albanian have been converted into various types of sibilants (Ind.-Eur.* kmtom = *Ld£. centum, Gr. (i)-Karbv, Welsh cant, Eng. hund-(red), but Sans. tatam, Zend satim) ; but, on the other hand, in company with just the same three western groups, and in contrast to the eastern, the Italic languages labialized the original velars (Ind.-Eur. * qod = La.t. quod, Osc. pod, Gr. 7ro8- (euros), Welsh pwy, Eng. what, but Sans, has,, ” who ?”).

(ii.) Indo-European Aspirates. — Like Greek and Sanskrit, but in contrast to all the other groups (even to Zend and Armenian), the Italic group largely preserves a distinction between the Indo-European mediae aspiratae and mediae (e.g. between Ind.-Eur. dh and d, the former when initial becoming initially regularly Lat. / as in Lat. fec-l [cf. Umb. feia, ” faciat “], beside Gr. i-dr/K-a [cf. Sans. da-dhd-H,

” he places “], the latter simply d as in domus, Gr. 56ˆios). But the aspiratae, even where thus distinctly treated in Italic, became fricatives, not pure aspirates, a character which they only retained in Greek and Sanskrit.

(iii.) Indo-European 6. — With Greek and Celtic, Latin preserved the Indo-European 0, which in the more northerly groups (Germanic, Balto- Slavonic), and also in Indo-Iranian, and, curiously, in Messapian, was confused with &. The name for olive-oil, which spread with the use of this commodity from Greek (tXcuFov) to Italic speakers and thence to the north, becoming by regular changes (see below) in Latin first *Slaivom, then *6hivom, and then taken into Gothic and becoming alev, leaving its parent form to change further (not later than 100 B.C.) in Latin to oleum, is a particularly important example, because (a) of the chronological limits which are implied, however roughly, in the process just described, and (b) of the close association in time of the change of to a with the earlier stages of the ” sound-shifting ” (of the Indo-European plosives and aspirates) in German; see Kretschmer, Einleit. p. 116, and the authorities he cites.

(iv.) Accentuation. — One marked innovation common to the western groups as compared with what Greek and Sanskrit show to have been an earlier feature of the Indo-European parent speech was the development of a strong expiratory (sometimes called stress) accent upon the first syllable of all words. This appears early in the history of Italic, Celtic, Lettish (probably, and at a still later period) in Germanic, though at a period later than the beginning of the ” sound-shifting.” This extinguished the complex system of Indo- European accentuation, which is directly reflected in Sanskrit, and was itself replaced in Latin and Oscan by another system already mentioned, but not in Latin till it had produced marked effects upon the language (e.g. the degradation of the vowels in compounds as in conficio from con-facio, incliido from in-claudo). This curious wave of accentual change (first pointed out by Dieterich, Kuhn’s Zeitschrift, i., and later by Thurneysen, Revue celtique, vi. 312, Rheinisches Museum, xliii. 349) needs and deserves to be more closely investi- gated from a chronological standpoint. At present it is not clear how far it was a really connected process in all the languages. (See further Kretschmer, op. cit. p. 115, K. Brugmann, Kurze verglei- chende Grammatik (1902-1904), p. 57, and their citations, especially Meyer-Liibke, Die Betonung im Gailischen (1901).)

To these larger affinities may be added some important points in which the Italic group shows marked resemblances to other groups.

5. Italic and Celtic. — It is now universally admitted that the Celtic languages stand in a much closer relation than any other group to the Italic. It may even be doubted whether there was any real frontier-line at all between the two groups before the Etruscan invasion of Italy (see Etruria: Language; Liguria). The number of morphological innovations on the Indo-European system which the two groups share, and which are almost if not wholly peculiar to them, is particularly striking. Of these the chief are the following.

(i.) Extension of the abstract-noun stems in fa' (like Greek <£citis with Attic jScWis, &c.) by an n suffix, as in Lat. mentio (stem menli-6n-) = Ir. (er-)mitiu (stem miti-n-), contrasted with the same word without the re-suffix in Sans, mati-, Lat. mens, Ind.-Eur. *mn-ti-. A similar extension (shared also by Gothic) appears in Lat. iuventil-t-, O. Ir. oitiu (stem oiliut-) beside the simple tu in nouns like senalus. (ii.) Superlative formation in -is-mmo- as in Lat. aegerrimus for *aegr-istnmos, Gallic Oii&o aiit\ the name of a town meaning " the highest.'

(iii.) Genitive singular of the o-stems (second declension) in -t Lat. agri, O. Ir .(Ogam inscriptions) magi, " of a son."

(iv.) Passive and deponent formation in -r, Lat. sequitur = \r. sechedar, " he follows." The originally active meaning of this curious -r suffix was first pointed out by Zimmer (Kuhn's Zeitschrift, 1888,

xxx. 224), who thus explained the use of the accusative pronouns with these " passive " forms in Celtic; Ir. -m-berar, " I am carried," literally " folk carry me "; Umb. pir ferar, literally ignem feratur, though as pir is a neuter word (= Gr. irO/>) this example was not so convincing. But within a twelvemonth of the appearance of Zimmer's article, an Oscan inscription (Conway, Camb. Philol. Society's Proceedings, 1890, p. 16, and Italic Dialects, p. 113) was dis- covered containing the phrase ultiumam (iuvilam) sakrafir, "ulti- mam (imaginem) consecraverint " (or " ultima consecretur ") which demonstrated the nature of the suffix in Italic also. This originally active meaning of the r form (in the third person singular passive) is the cause of the remarkable fondness for the " im personal " use of the passive in Latin (e.g.,itur inantiquam silvam, instead of eunt), which was naturally extended to all tenses of the passive (venttim est, &c), so soon as its origin was forgotten. Fuller details of the development will be found in Conway, op. cit. p. 561, and the authorities there cited (very little is added by K. Brugmann, Kurze vergl. Gramm. 1904, p. 596).

(v.) Formation of the perfect passive from the to past participle, Lat. monitus (est), &c, Ir. leic-the, " he was left," ro-leiced, " he has been

left.” In Latin the participle maintains its distinct adjectival character; in Irish (J. Strachan, Old Irish Paradigms, 1905, p. 50) it has sunk into a purely verbal form, just as the perfect participles in -us in Umbrian have been absorbed into the future perfect in -ust (entelust, ” intenderit ” ; benust, ” venerit “) with its impersonal passive or third plural active -us(s)so (probably standing for -ussor) as in benuso, ” ventum erit ” (or ” venerint “).

To these must be further added some striking peculiarities in phonology.

(vi.) Assimilation of p to a g!{ in a following syllable as in Lat. quinque = lr. coic, compared with Sans, pdnca, Gr. vivre, Eng. five, Ind.-Eur. *penqe.

(vii.) Finally — and perhaps this parallelism is the most important of all from the historical standpoint — both Italic and Celtic are divided into two sub-families which differ, and differ in the same way, in their treatment of the Ind.-Eur. velar tenuis q. In both halves of each group it was labialized to some extent ; in one half of each group it was labialized so far as to become p. This is the great line of cleavage (i.) between Latinian (Lat. quod, quando, quinque; Falisc. cuando) and Osco-Umbrian, better called Safine (Osc. pod, Umb. panit- [for *pandd \, Osc.Umb. pompe, ” five,” in Osc. pitmperias ” nonae,” Umb. pumpeglia-, ” fifth day of the month “); and (ii.) between Goidelic (Gaelic) (O. Ir. coic, ” five,” maq, ” son “; modern Irish and Scotch Mac as in MacPherson) and Brythonic (Britannic) (Welsh pump, ” five,” Ap for map, as in Powel for Ap Howel) .

The same distinction appears elsewhere; Germanic belongs, broadly described, to the g-group, and Greek, broadly described, to the p-group. The ethnological bearing of the distinction within Italy is considered in the articles Sabini and Volsci; but the wider questions which the facts suggest have as yet been only scantily discussed ; see the references for the ” Sequanian ” dialect of Gallic (in the inscription of Coligny, whose language preserves q) in the article Celts: Language.

From these primitive affinities we must clearly distinguish the numerous words taken into Latin from the Celts of north Italy within the historic period ; for these see especially an interesting study by J. Zwicker, De vocabulis et rebus Gallicis sive Transpadanis dpud Vergilium (Leipzig dissertation, 1905).

6. Greek and Italic. — We have seen above (§ 4, i., ii.,iii.) certain broad characteristics which the Greek and the Italic groups of

language have in common. The old question of the degree of their affinity may be briefly noticed. There are deep-seated differences in morphology, phonology and vocabulary between the two languages — such as (a) the loss of the forms of the ablative in Greek and of the middle voice in Latin ; (b) the decay of the fricatives (s, v, i) in Greek and the cavalier treatment of the aspirates in Latin; and © the almost total discrepancy of the vocabularies of law and religion in the two languages — which altogether forbid the assumption that the two groups can ever have been completely identical after their first dialectic separation from the parent language. On the other hand, in the first early periods of that dialectic development in the Indo-European family, the precursors of Greek and Italic cannot have been separated by any very wide boundary. To this primitive neighbourhood may be referred such peculiarities as (a) the genitive plural feminine ending in -asom (Gr. -aav, later in various dialects -kuv, -G > v, -av; cf. Osc. egmazum “rerum”; Lat. mensamm, with -r- from-s-), (b) the feminine gender of many nouns of the 0 declension, cf. Gr. 77 656s, Lat. haec fdgus; and some important and ancient syntactical features, especially in the uses of the cases (e.g. (c) the genitive of price) of the (d) infinitive and of the (e) participles passive (though in

each case the forms differ widely in the two groups), and perhaps (/) of the dependent moods (though here again the forms have been vigorously reshaped in Italic). These syntactic parallels, which are hardly noticed by Kretschmer in his otherwise careful discussion (Einleit. p. 155 seq.), serve to confirm his general conclusion which has been here adopted; because syntactic peculiarities have a long life and may survive not merely complete revolutions in morphology, but even a complete change in the speaker’s language, e.g. such Celticisms in Irish-English as ” What are you after doing?” for ” What have you done?” or in Welsh-English as ” whatever ” for ” anyhow.” A few isolated correspondences in vocabulary, as in remus from *ret-s-mo-, with eperfios and in a few plant-names (e.g. irpaaov and porrum), cannot disturb the general conclusion, though no doubt they have some historical significance, if it could be determined.

7. Indo-Iranian and Italo-Celtic. — Only a brief reference can here be made to the strik’.,g list of resemblances between the Indo-Iranian and Italv-Celtic groups, especially in vocabulary, which Kretschmer has collected (ibid. pp. 126-144). The most striking of these are rex, O. Ir.

rig-, Sans. rdj-, and the political meaning of the same root in the corresponding verb in both languages (contrast regere with the merely physical meaning of Gr. bpeyvvni); Lat. fldmen (for * ‘flag-men) exactly = Sans. brahman- (neuter), meaning probably “sacrificing,” “worship- ping,” and then ” priesthood,” ” priest,” from the Ind.Eur. root *bhelgh, ” blaze,” ” make to blaze “; res, rem exactly = Sans. rds, ram in declension and especially in meaning; and Ario-, ” noble,” in Gallic Ariomanus, &c, = Sans, drya-, ” noble ” (whence ” Aryan “). So argentum exactly = Sans. rajata-, Zend erezata-; contrast the different (though morphologically kindred) suffix in Gr. apyvpos. Some forty-two other Latin or Celtic words (among them credere, caesaries, probus, castus (cf. Osc. kasit, Lat. caret, Sans. Hista-), Volcdnus, Neptunus, ensis, erus, pruina, rus, novdcula) have precise Sanskrit or Iranian equival- ents, and none so near in any other of the eight groups of languages. Finally the use of an -r suffix in the third plural is common to both Italo-Celtic (see above) and Indo-Iranian. These things clearly point to a fairly close, and probably in part political, intercourse between the two communities of speakers at some early epoch. A shorter, but interesting, list of corre- spondences in vocabulary with Balto-Slavonic (e.g. the words mentiri, rds, ignis have close equivalents in Balto-Slavonic) suggests that at the same period the precursor of this dialect too was a not remote neighbour.

8. Date of the Separation of the Italic Group. — The date at which the Italic group of languages began to have (so far as it had at all) a separate development of its own is at present only a matter of conjecture. But the combination of archaeological and linguistic research which has already begun can have no more interesting object than the approximate determination of this date (or group of dates); for it will give us a point of cardinal importance in the early history of Europe. The only consideration which can here be offered as a starting-point for the inquiry is the chronological relation of the Etruscan invasion, which is probably referable to the 12th century B.C. (see Etruria), to the two strata of Indo-European population — the CO folk (Falisci, Marruci, Volsci, Hernici and others), to whom the Tuscan invaders owe the names Etrusci and Tusci, and the NO folk, who, on the West coast, in the centre and south of Italy, appear at a distinctly later epoch, in some places (as in the Bruttian peninsula, see Bruttii) only at the beginning of our historical record. If the view of Latin as mainly the tongue of the CO folk prove to be correct (see Rome: History; Italy: Ancient Languages and Peoples; Sabini; Volsci) we must regard it (a) as the southern or earlier half of the Italic group, firmly rooted in Italy in the 12th century B.C., but (b) by no means yet isolated from contact with the northern or later half; such is at least

the suggestion of the striking peculiarities in morphology which it shares with not merely Oscan and Umbrian, but also, as we have seen, with Celtic. The progress in time of this isolation ought before long to be traced with some approach to certainty.

The History of Latin

9. We may now proceed to notice the chief changes that arose in Latin after the (more or less) complete separation of the Italic group whenever it came about. The contrasted features of Oscan and Umbrian, to some of which, for special reasons, occasional reference will be here made, are fully described under Osca Lingua and Iguvium respectively.

It is rarely possible to fix with any precision the date at which a particular change began or was completed, and the most serviceable form for this conspectus of the development will be to present, under the heads of Phonology, Morphology and Syntax, the chief characteristics of Ciceronian Latin which we know to have been developed after Latin became a separate language. Which of these changes, if any, can be assigned to a particular period will be seen as we proceed. But it should be remembered that an enormous increase of exact knowledge has accrued from the scientific methods of research introduced by A. Leskien and K. Brugmann in 1879, and finally established by Brugmann's great Grundriss in 1886, and that only a brief enumeration can be here attempted. For adequate study reference must be made to the fuller treatises quoted, and especially to the sections bearing on Latin in K. Brugmann's Kurze vergleichende Grammatik (1902).

I. Phonology

10. The Latin Accent. — It will be convenient to begin with some account of the most important discovery made since the application of scientific method to the study of Latin, for, though it is not strictly a part of phonology, it is wrapped up with much of the development both of the sounds and, by consequence, of the in- flexions. It has long been observed (as we have seen § 4, iv. above) that the restriction of the word-accent in Latin to the last three syllables of the word, and its attachment to a long syllable in the penult, were certainly not its earliest traceable condition; between this, the classical system, and the comparative freedom with which the word-accent was placed in pro-ethnic Indo-European, there had intervened a period of first-syllable accentuation to which were due many of the characteristic contractions of Oscan and Umbrian, and in Latin the degradation of

the vowels in such forms as accentus from ad + cantus or praecipitem from prae + caput- (§ 19 below). R. von Planta (Osk.-l mbr. Grammatik, 1893, i. p. 594) pointed out that in Oscan also, by the 3rd century B.C., this first-syllable-accent had probably given way to a system which limited the word-accent in some such way as in classical Latin. But it remained for C. Exon, in a brilliant article (Hermathena (1906), xiv. 117, seq.), to deduce from the more precise stages of the change (which had been gradually noted, see e.g. F. Skutsch in Kroll's Altertumswissenschaft in letzten Vierteljahrkundert, 1905) their actual effect on the language.

11. Accent in Time_ of Plautus. — The rules which have been established for the position of the accent in the time of Plautus are these :

(i.) The quantity of the final syllable had no effect on accent, (ii.) If the penult was long, it bore the accent (amdbdmus). (iii.) If the penult was short, then

(a) if the ante-penult was long, it bore the accent (amabimus) ;

(b) if the ante-penult was short, then

(i.) if the ante-ante-penult was long, the accent was

on the ante-penult (amlcitia) ; but (ii.) if the ante-ante-penult was also short, it bore the accent (columine, puiritia).

Exon's Laws of Syncope. — With these facts are now linked what may be called Exon's Laws, viz : —

In pre-Plautine Latin in all words or word-groups of four or more syllables whose chief accent is on one long syllable, a short un-accented medial vowel was syncopated; thus *quinquedecem became *quinqdecem and thence quindecim (for the -im see § 19), *sups-emere became *siipsmere and that sumere (on psm v. inf.) *siirregere, * surreghnus , and the like became surgere, surgemus, and the rest of the paradigm followed ; so probably validi bonus became valdi bonus, extern viam became extra viam; so *supo-tendo became subtendo (pronounced sup-tendo), '*dridere, *avidere (from dridus, avidus) became drdtre, audire. But the influence of cognate forms often interfered; posteri-die became postridie, but in posterorum, posterarum the short syllable was restored by the. influence of the tri-syllabic cases, posterus, posterl, &c, to which the law did not apply. Conversely, the nom. *iridor (more correctly at this period *dridos), which would not have been contracted, followed the form of drdorem

(from *aridorem), drdire, &c.

The same change produced the monosyllabic forms nee, ac, neu, seu,_ from neque, &c, before consonants, since they had no accent of their own, but were always pronounced in one breath with the following word, neque tdnlum becoming nee tantum, and the like. So in Plautus (and probably always in spoken Latin) the words nemp(e), ind(e), quipp(e), ill(e), are regularly monosyllables.

LATIN LANGUAGE

12 Syncope of Final Syllables.— It is possible that the frequent but far from universal syncope of final syllables in Latin (especially before -j as in mens, which represents both Gr. M eros and Sans matis = Ind.Eur. mnhs, Eng. mind) is due also to this law operating on such combinations as bona mens and the like, but this has not yet been clearly shown. In any case the effects of any such phonetic change have been very greatly modified by analogical changes. 1 he Uscan and Umbrian syncope of short vowels before final s seems to be an independent change, at all events in its detailed ˆiˆl J e out break of the unconscious affection of slurring nnal syllables may have been contemporaneous.

13. Inˆ post-Plautine Latin words accented on the ante-antc-

«, \\ SU fˆ syncope in the short syllable following the accented syllable (bahncae became balneae, pueritia became puertia (Horace) columine, tegimme, &c, became culmine, tegmine, &c, beside the trisyllabic columen, tegimen) unless

(ii.) that short vowel was e ori , followed by another vowel (as in pdrietem mulierem Piiteoh), when, instead of contraction the accent shifted to the penult, which at a later stage of the language became lengthened panetem giving Ital. parite, Fr. parol, Puteoli giving Ital. Pozzuoh.

ˆuTˆK eS ˆ iCt ‘°1 ° f the a u- e ? t J ?? the last three syllables was completed by these changes which did away with all the cases in which it had stood on the fourth syllable.

14- The Law of the Brevis Brevians.— Next must be mentioned another great phonetic change, also dependent upon accent, which had come about before the time of Plautus, the law long known to students as the Brevis Brevians, which may be stated as follows \rˆ n ‘„ ■ m r at t ena L (l ?° 3 ,) ‘ X1K 491, following Skutsch in, e.g., Vollmoller s Jahresbencht fur romanische Sprachwissenschaft, i -i-f) ■

a syllable long by nature or position, and preceded by a short syllable, was itself shortened if the word-accent fell immediately before or immediately after it-that is, on the preceding short syllable or on the next following syllable. The sequence of syllables need not be m the same word, but must be as closely connected in ““V-ffwˆ aS ‘L wer » , Thus m6d ° bec ame modo, voluptatem became volu(p)tatem, quid est? became quid est? either the s or the I or both being but faintly pronounced.

It is clear that a great number of flexional syllables so shortened would have their quantity immediately restored by the analogy of the same inflexion occurring in words not of this particular shape- thus for instance, the long vowel of dma and the like is due to that in other verbs (pulsa, agita) not of iambic shape. So ablatives like modo, sono get back their -0, while in particles like modo, ” onlv ” quomodo, how, the shortened form remains. Conversely the shortening of the final -a in the nom. sing. fern, of the a-declension ˆcontrast luna with Gr. x <»pi) was probably partly due to the influence ol common forms like ea, bona, mala, which had come under trie liiw.

15- Effect on Verb Inflexion.— These processes had far-reaching effects on Latin inflexion. The chief of these was the creation of the type of conjugation known as the capio-c\ass. All these verbs were originally inflected like audio, but the accident of their short root-syllable (in such early forms as *fugis, Jugiturus, Jugisetis, &c becoming \zter fugis , fugilurus , fugeritis) brought great parts of their paradigm under this law, and the rest followed suit; but true forms ike jugire, cuplre, moriri, never altogether died out of the spoken language. St Augustine, for instance, confessed in -587 A D (E-bist 111. 5, quoted by Exon, Hermathena (1901), xi. 383,) that he does not know whether cupi or cv.pin is the pass. inf. of cupio. Hence we have Ital. fuggire, morire, Fr. fuir, mourir. (See further on this conjugation, C. Exon, I.e., and F. Skutsch, Archiv fur lat. Lexico- graphy; xu. 2io,.two papers which were written independently)

16. 1 he question has been raised how far the true phonetic shortening appears in Plautus, produced not by word-accent but by metrical ictus— e.g whether the reading is to be trusted in such lines as Ambh 761, which gives us dedisse as the first foot (tribrach) of a trochaic line because the metrical ictus fell on the syllable ded- “—but this remarkable theory cannot be discussed here. See the articles cited and also K Skutsch, Forschungen zu Latein. Grammatik und Metrik

X r *,- • / r X °”’ He r. mathen a (1903) xii. p. 492, W. M. Lindsay, Laptwi (1900), appendix, y ‘

In the history of the vowels and diphthongs in Latin we must distinguish the changes which came about independently of accent and those produced by the preponderance of accent in another syllable

17 Vowel Changes independent of Accent.- -In the former category the following are those of chief importance ■—

(1.) i became e (a) when final, as in ant-e beside Gr. &mi, trlste besides tristi-s, contrasted with e.g., the Greek neuter IS P l (the final -e of the infinitive— regere, &c— is the -i of the locative, just as in the so-called ablatives genere, &c); (b) before r which has arisen from s, as in cmeris beside cmis, cinisculus; serb beside Gr. t(a reduplicated non-thematic present)

(u.) Final 5 became e; imperative sequere = Gr. *7rc(

ˆtXlVˆtiˆTˆ ‘ ” hC ”’ Gr – * SanS – - Otherwise (111.) el became ol : when followed by any sound save e, i or / as in volo, volt beside velle; cold beside Gr. T*XXo M ai, xoX«„, Att. ViXof cotonus for “quelonus, beside inquilinus for *en-quelenus

247

(iv.) e became * (i.) before a nasal followed by a palatal or velar consonant (tingo, Gr. rtyya,; in-cipio from *en-capio); (ii) under certain conditions not yet precisely defined, one of wh ch was i in a following syllable (nihil, nisi, initium). From these forms in- spread and banished en-, the earlier form

(v.) The ” neutral vowel ” (” schwa Indo-Germanicum “) which arose m pro-ethnic Indo-European from the reduction of Ion? a, e or o in unaccented syllables (as in the tos participles of such root! as sta dhe-, do- *st*to / s, *dh 3 t6s, *d a tos) became 7 in Latin (sta°us conduus [from ˆcon-dhatos], datus), and it is the same tctund wh ch

? pr f S wˆ d by ? m m ° st of the forrns of d5 (**«««. dabo, &c) (vi.) When a long vowel came to stand before another vowel in the same word through loss of i or u, it was always shortened this the -w pf intransitive verbs like candeo, Caleb is for -eio (where the I » identical with the , m Gr. *#&,,„„ kˆ v) and was’thus confused with the causative -eio (as in moneo, ” I make to think,” &c), where

rthet™ Vy” gma \a u° aU % Ul became * awm and thenceS (the form audlvi would have disappeared altogether but for being

audit) fn°Z% dtveram l& c —< conversely audieram is formed from audn) In certain cases the vowels contracted, as in Ires, partes, &c. with -es from e-j.es, *amo from ama(i)o.

18. Of the Diphthongs.

(vii.) eu became ou in pro-ethnic Italic, Lat. novus: Gr vie, Lat. novem,V mb. nuviper (i.e. noviper, “usque ad noviens : Gr. (iv-)vka ; in unaccented syllables this c * a T s of ov sank to «&,) as in dinuoirom di novo, suus (which is thlalfl’n. rarely anything but an enclitic word), Old Lat. sovos-.Tˆ lVent (sri(F)os. of accent.

(vm.) ou, whether original or from eu, when in one syllable

Goth m ˆt’„ Pr i? b , y ab T° U , t l?° B iS- aS in dUc5 > ° ld Lat – douc6 > Uoth. huhan, Eng. tow, Ind.-Eur. *deuco

(ix.) et became? (as [in died, Old Lˆdeico: Gr. Mk-vvi*, fldo : Gr.

Ifonai Ind l.-Eur. *bheidhb) just before the time of Lucilius, who

prescribes the spellings puerei (nom. plur.) but pueri (gen. sing)

tiMfftW ˆ tw ?j orms ˆ Pronounced alike in his time, but that the traditional distinction in spelling had been more or less preserved.. But after his time, since the sound of ““wis merely that of 1, ei is continually used merely to denote a long 1 even sound at an /03Ce ” f ° r faxis> there never had been an Y diphthongal (x.) In rustic Latin (Volscian and Sabine) au became oas in the vulgar terms explbdere, plostrum. Hence arose interesting doublets of meaning; — lautus (the Roman form), “elegant,” but lotus yiddrf frjit ” UStUS ‘ ” draUght ’” but hdstus (Cat °)’ “the season’s

unul’ Old b T e a C f me ° e a “r th , ei } c ?, ˆ some time after Plautus, as in nearl’v in h P T ˆ ˆ> ˆ e ‘ ˆ‘Plautus the forms have

nearly all been modernized, save in special cases, e.g. in Trin i 1, 2, immoene f acinus, “a thankless task, “has not been changed to immune because that meaning had died out of the adjective so tha? immune f acinus would have made nonsense; but at the end of the 3 ‘J” e u l* has “Placed oetile. Similarly in a small group of

rTr reli± “l/ ™ WaS P re u serVed th , r . OU S h their Sequent usf in legal or religious documents where tradition was strictly preserved— Poena, foedus (neut.), foedus (adj.), ” ill-omened.” So the archaic ™L P0 *TI- m ° 6m u’ i rara P art s.” beside the true classical form munia

duties ; the historic Poeni beside the living and frequently used Pumcum (bellum)— an example which demonstrates con- clusively (pace Sommer) that the variation between Tand oe is not due to any difference in the surrounding sounds

(xn.) ai became ae and this in rustic and later Latin (2nd or ˆrd century a.d.) simp e ˆthough of an open quality-Gr. aWos, aL of W dW i° n f naUy 5 he Place for the fir « “): the country forms LatLan’ { ˆˆ Pret ” r {Vm °’ Ling ‘ LaL v ” 97 ‘ Lin dsayt

19. Vowels and Diphthongs in unaccented Syllables.— -The changes of the short vowels and of the diphthongs in unaccented syllables Ire underThfT * nd «™P lex to be ˆ forth here. Some took place under the first-syllable system of accent, some later (§5 9, 10)

L P n2Jh a (mP T arC WErc V mm ‘Ptparci and onustus from frnm *JrlT t r° cons ° n a?ts) ; conclno from *concano and hospitls fe m 7 . h ° sh P° >. le ,ˆ«f beside Gr. \ky otl .ev (before one consonant) ; Sicvh from *Siceloi (before a thick /, see § 17, 3); dihgit from *dislege (contrast however, the preservation of the second e in neglEgit); occvpat from *opcapat (contrast accipit with i in the following syllable); the varying spelling in monumentum and monimentum, maxumus and maximus, points to an intermediate sound

r„«t ˆˆ ? ˆiˆfSˆ 1 -} 4 – 8 ‘ readin S <#*«««« sand optimum [not opimum] with W. M. Lindsay, Latin Language §§ 14 16 sea) which could not be correctly represented in spelling; this difference may however, be due merely to the effect of differences in the neighbouring sounds, an effect greatly obscured by analogical influ-

Inscriptions of the 4 th or 3rd century, B.C. which show original -es and -os in final syllables (e.g. Veneres, gen. sing., navebos abl pi) compared with the usual forms in -is, -us a century later, give us roughly the date of these changes. But final -os, -om, remained after u (and v) down to 50 B.C. as in servos.

20. Special mention should be made of the change of ri and ro to er (incertus from *encritos; ager, acer from *agros, *acris- the

feminine acris was restored in Latin (though not in North Oscan) by the analogy of other adjectives, like tristis, while the masculine deer was protected by the parallel masculine forms of the 0 declension, like

tener, niger [from *teneros, *nigros\).

21. Long vowels generally remained unchanged, as in compdgo, condono.

22. Of the diphthongs, ai and oi both sank to ei, and with original ei further to i, in unaccented syllables, as in Achivi from Gr. ‘Ax<"foi, olivom, earlier *oleivom (borrowed into Gothic and there becoming alev) from Gr. i\atFov. This gives us interesting chronological data, since the el- must have changed to ol- (§ 16. 3) before the change of ai to ei, and that before the change of the accent from the first syllable to the penultimate (§ 9) ; and the borrowing took place after ai had become ei, but before -eivom had become eum, as it regu larly did before the time of Plautus.

But cases of ai, ae, which arose later than the change to ei , t, were unaffected by it; thus the nom. plur. of the first declension originally ended in -as (as in Oscan), but was changed at some period before Plautus to -ae by the influence of the pronominal nom. plur. ending ae in quae? hoe, &c, which was accented in these mono syllables and had therefore been preserved. The history of the -ae of the dative, genitive and locative is hardly yet clear (see Exon, Hermathena (1905), xiii. 555; K. Brugmann, Grundriss, 1st ed. ii.

571, 601).

The diphthongs au, oil in unaccented syllables sank to u, as in includo beside claudo; the form cludo, taken from the compounds, superseded claudo altogether after Cicero’s time. So cudo, taken from incudo, excudo, banished the older *caudo, ” I cut, strike,” with which is probably connected Cauda, ” the striking member, tail,” and from which comes caussa, ” a cutting, decision, legal case,” whose ss shows that it is derived from a root ending in a dental (see §25 (b) below and Conway, Verner’s Law in Italy, p. 72).

Consonants. — Passing now to the chief changes of the consonants we may notice the following points: — ■

23. Consonant i (wrongly written j; there is no g-sound in the letter), conveniently written j by phoneticians,

(i.) was lost between vowels, as in tres for *trejes, &c. (§ 17. 6) ;

(ii.) in combination: m% became ni, as in venio, from Ind.Eur. *6S m{o, ” I come,” Sans, gam, Eng. come; ni probably (under certain conditions at least) became -nd~, as in tendo beside Gr. rdvos, fendo

= Gr. Bdvw, and in the gerundive stem -endus, -undus, probably for -enios, -onips; cf. the Sanskrit gerundive in -an-lya-s; gi, dj_ became i as in mdior from *mag-ior, peior from *ped-ior ;

(iii.) otherwise i after a consonant became generally syllabic (ii), as in capio (trisyllabic) beside Goth, hafya.

24. Consonant u (formerly represented by English v), conveniently written u,

(i.) was lost between similar vowels when the first was accented, as in audiui, which became audil (§ 17 [6]), but not in amaul, nor in avarus.

(ii.) in combination: du- became b, as in bonus, bellum, O. Lat. duonus, *duellum (though the poets finding this written form in old literary sources treated it as trisyllabic) ; pu-, fy,, bu, lost the X, as in ap-erio, op-erio beside Lith. -veriu, ” I open,” Osc. veru, ” gate,” and in the verbal endings -bam, -bo, from -bhu-am, -bhuo (with the root of Lat. fui), and flo, du-bius, super-bus, vasta-bundus, &c, from the same; su between vowels (at least when the second was accented) disappeared (see below § 25 (a), iv.), as in prulna for prus- uina, cf. Eng. fros-t, Sans. pru$va, “hoar-frost.” Contrast Minerva from an earlier *menes-ud, sue-, suo-, both became so-, as in soror(em) beside Sans, svasar-am, Ger. schwes-t-er, Eng. sister, sordes, beside O. Ger. swarl-s, mod. schwarz. y,o in final syllables became u, as in cum from quom, parum from paruom ; but in the declensional forms uu was commonly restored by the analogy of the other cases, thus (a) seriws seruom, serui became (b) *serus, *serum, “serui, but finally © seruus, seruum, serui.

(iii.) In the 2nd century A.D., Lat. v (i.e. u) had become a voiced labio-dental fricative, like Eng. v; and the voiced labial plosive b had broken down (at least in certain positions) into the same sound; hence they are frequently confused as in spellings like vene for bene, Bictorinus for Victorinus.

25. (a) Latin s

(i.) became r between vowels between 450 and 350 B.C. (for the date see R. S. Conway, Verner’s Law in Italy, pp. 61-64), as in ora, beside O. Lat. asa, generis from *geneses, Gr. yivtos; eram, ero for *esdm, *eso, and so in the verbal endings -eram, -ero, erim. But a considerable number of words came into Latin, partly from neigh bouring dialects, with 5 between vowels, after 350 B.C., when the

change ceased, and so show s, as rosa (probably from S. Oscan for *rodia ” rose-bush ” cf. Gr. pb&ov), caseus, ” cheese,” miser, a term of abuse, beside Gr. pvaapos (probably also borrowed from south Italy), and many more, especially the participles in -sus (fusus), where the s was is at the time of the change of s to r (so in causa, see above). All attempts to explain the retention of the j otherwise must be said to have failed (e.g. the theory of accentual difference in Verner’s Law in Italy, or that of dissimilation, given by Brugmann, Kurze vergl. Gram. p. 242).

(ii.) sr became]>r (= Eng. thr in throw) in pro-ethnic Italic, and this became initially fr- as in frigus, Gr. piyos (Ind.-Eur. *srigos), but medially br, as in funebris, homfunus, stem funes-.

(iii.) rs, Is- became rr, U, as in ferre, velle, for *fer-se, *vel-se (cf. esse).

(iv.) Before m, n, I, and v, s vanished, having previously caused the loss of any preceding plosive or n, and the preceding vowel, if short, was lengthened as in

primus from *prismos, Paelig. prismu, ” prima,” beside pris-cus. iumentum from 0. Lat. iouxmentum, older *ieugsmentom ; cf .

Gr. feG7/ua, £vyov, Lat. iugum, iungo. luna from *leucsna-, Praenest, losna, Zend raoxˆna- ; cf . Gr. Xewcos, ” white-ness ” neut. e.g. Xevnos, ” white,” Lat. luceo. telum from *tens-lom or *tends-lom, trandre from *trans-nare. seviri from *sex-viri, eveho from *ex-veho, and so e-mitto, e-lido, e-numero, and from these forms arose the proposition e instead of ex. (v.) Similarly sd became d, as in idem from is-dem. (vi.) Before n-, m-, 1-, initially s- disappeared, as in niibo beside Old Church Slavonic snubiti, ” to love, pay court to ” ; miror beside Sans, smdyate, ” laughs,” Eng. smi-le; lubricus beside Goth, sliupan, Eng. slip.

(b) Latin 55 arose from an original t + t, d +/, dh +/ (except before -r) , as in missus, earlier *mit-tos ; tbnsus, earlier *tond-tos, but tonstrix from *tond-trix. After long vowels this ii became a single i some time before Cicero (who wrote caussa [see above], divissio, &c, but probably only pronounced them with i,since the-ij- came to be written single directly after his time).

26. Of the Indo-European velars the breathed q was usually pre-served in Latin with a labial addition of u (as in sequor, Gr. iironai, Goth, saihvan, Eng. see; quod, Gr. iro8-(a7r6s), Eng. what); but the

voiced S s remained (as gu) only after n (unguo beside Ir. imb, ” butter “) and (as g) before r, I, and u (as in gravis, Gr. /3ap6s; glans, Gr. fiaXavos; legumen, Gr. Xo/36s, \tfiiv60s). Elsewhere it became v, as in venio (see § 23, ii.), niLdus from *novedos, Eng. naked. Hence bos (Sans, gaus, Eng. cow) must be regarded as a farmer’s word borrowed from one of the country dialects (e.g. Sabine) ; the pure Latin would be *vos, and its oblique cases, e.g. ace. *vovem, would be inconveniently close in sound to the word for sheep ovem.

27. The treatment of the Indo-European voiced aspirates (bh dh, gh, c,h)‘m Latin is one of the most marked characteristics of the language, which separates it from all the other Italic dialects, since the fricative sounds, which represented the Indo-European aspirates in pro-ethnic Italic, remained fricatives medially if they remained at all in that position in Oscan and Umbrian, whereas in Latin they were nearly always changed into voiced explosives. Thus —

Ind.Eur. bh: initially Lat./ (fero; Gr. <#>epu).

medially Lat. b (tibi; Umb. tefe; Sans. tubhy-(am), ” to thee ” ; the same suffix in Gr. (3Lri-i, &c). Ind.Eur. dh: initially Lat./ (fa-c-ere, fe-c-i; Gr. Sctos (instead of *da.Tos), Wri-Ka). medially d (medius; Osc. mefio-; Gr. iikooos, ukaos from *iu£jps) ; except after u (iubere beside iussus for *j,udh-tos; Sans, yddhati, ” rouses to battle”); before / (stabulum, but Umb. staflo-, with the suffix of Gr. orkpyrftpov, &c.) ; before or after r (verbum: Umb. verfale; Eng. word. Lat. glaber [v. inf]. : Ger. glatt: Eng. glad). Ind.Eur. gh: initially h (humi: Gr. xii/mi) ; except before u (fundo: Gr. x’(f)n, xurpa). medially h (veho: Gr. tx”, °Xos; cf. Eng. wagon) ; except after n (fingere: Osc. feiho-, “wall”: Gr. Biyyavw: Ind.Eur. dheigh, dhingh-); and before / (fig(u)lus, from the same root). Ind.Eur g’i.h: initially / (formus and furnus, ” oven “, Gr. Btp/ios, Bkpiit), cf. Ligurian Bormio, ” a place with hot springs,” Bormanus, “a god of hot springs”; fendo: Gr. delvoi, 4>6vos, irp6a-a.Tos) . medially v, gu or g just as Ind.Eur. 9% (ninguere, nivem beside Gr. vl4>a, vei4>ei; frdgrare beside Gr. 6a4>pcdvofxat. [6a for ods-, cf. Lat. odor], a re- duplicated verb from a root SXhrd-). For the ” non-labializing velars ” (Hostis, conGius, Glaber) refer- ence must be made to the fuller accounts in the handbooks.

28. Authorities. — This summary account of the chief points in Latin phonology may serve as an introduction to its principles, and give some insight into the phonetic character of the language. For systematic study reference must be made to the standard books, Karl Brugmann, Grundriss der vergleichenden Grammatik der Indo-Germanischen Sprachen (vol. i., Lautlehre, 2nd ed. Strassburg, 1897;

Eng. trans, of ed. I by Joseph Wright, Strassburg, 1888) and his Kurze vergleichende Grammatik (Strassburg, 1902) ; these contain still by far the best accounts of Latin; Max Niederman, Precis de phonetique du Latin (Paris, 1906), a very convenient handbook, excellently planned; F. Sommer, Lateinische Laut- und Flexionslehre (Heidelberg, 1902), containing many new conjectures; W. M. Lindsay, The Latin Language (Oxford, 1894), translated into German (with corrections) by Nohl (Leipzig, 1 897) , a most valuable collection of material, especially from'the ancient grammarians, but not always accurate in phonology; F. Stolz, vol. i. of a joint Historische Gram- matik d. lat. Sprache by Blase, Landgraf, Stolz and others (Leipzig, 1894) ; Neue-Wagener, Formenlehre d. lat. Sprache (3 vols., 3rd ed..

Leipzig, 1888, foil.); H. J. Roby's Latin Grammar (from Plautus to Suetonius; London, 7th ed., 1896) contains a masterly collection of material, especially in morphology, which is still of great value. W. G. Hale and C. D. Buck's Latin Grammar (Boston, 1903), though on a smaller scale, is of very great importance, as it contains the fruit of much independent research on the part of both authors; in the difficult questions of orthography it was, as late as 1907, the only safe guide.

II. Morphology In morphology the following are the most characteristic Latin innovations: — 29. In nouns.

(i.) The complete loss of the dual number, save for a survival in the dialect of Praeneste (C.I.L. xiv. 2891, = Conway, Ital. Dial. p. 285, where Q. k. Cestio Q. f. seems to be nom. dual) ; so C.I.L. xi. 67065, T. C. Vomanio, see W. Schulze, Lat. Eigennamen, p. 117.

(ii.) The introduction of new forms in the gen. sing, of the 0 stems (domini), of the a stems (mensae) and in the nom. plural of the same two declensions; innovations mostly derived from the pro- nominal declension.

(iii.) The development of an adverbial formation out of what was either an instrumental or a locative of the 0 stems, as in longe. And here may be added the other adverbial developments, in -m (palam, sensim) probably accusative, and iter, which is simply the accusative of iter, " way," crystallized, as is shown especially by the fact that though in the end it attached itself particularly to adjectives of the

third declension (molliter), it appears also from adjectives of the second declension whose meaning made their com bination with iter especially natural, such as longiter, firmiter, largiter (cf. English straightway, longways). The only objections to this derivation which had any real weight (see F. Skutsch, De nomini- bus no- suffixi ope formatis, 1890, pp. 4-7) have been removed by Exon's Law (§ 11), which supplies a clear reason why the contracted type constanter arose in and was felt to be proper to Participial adverbs, while firmiter and the like set the type for those formed from adjectives.

(iv.) The development of the so-called fifth declension by a re-ad- justment of the declension of the nouns formed with the suffix ie: ia- (which appears, for instance, in all the Greek feminine participles, and in a more abstract sense in words like materies) to match the inflexion of two old root-nouns res and dies, the stems of which were originally rej- (Sans, ras, rayas, cf. Lat. rear) and dieu-.

(v.) The disuse of the ti suffix in an abstract sense. The great number of nouns which Latin inherited formed with this suffix were either (1) marked as abstract by the addition of the further suffix on (as in natio beside the Gr. yvqcTi-os, &c.) or else (2) confined to a concrete sense; thus vectis, properly " a carrying, lifting," came to mean " pole, lever "; ratis, properly a " reckoning, devising," came to mean " an (improvised) raft " (contrast ratio) ; poslis, a " placing," came to mean " post."

(vi.) The confusion of the consonantal stems with stems ending in *. This was probably due very largely to the forms assumed through phonetic changes by the gen. sing, and the nom. and ace. plural. Thus at say 300 B.C. the inflexions probably were: conson. stem i stem

Nom. plur. *reg-es host-es

Ace. plur. reg-es host-Is

The confusing difference of signification of the long -es ending led to a levelling of these and other forms in the two paradigms.

(vii.) The disuse of the u declension (Gr. i)56s, o-tAxus) in ad- jectives; this group in Latin, thanks to its feminine form (Sans. fem. svddvi, " sweet "), was transferred to the i declension {suavis, gravis, levis, didcis). 30. In verbs.

(i.) The disuse of the distinction between the personal endings of primary and secondary tenses, the -t and -nt, for instance, being used for the third person singular and plural respectively in all tenses and

moods of the active. This change was completed after the archaic period, since we find in the oldest inscriptions -d regularly used in the third person singular of past tenses, e.g. deded, feced in place of the later dedit, fecit; and since in Oscan the distinction was preserved to the end, both in singular and plural, e.g. faamat (perhaps meaning ” auctionatur “), but deded(” dedit “). It is commonly assumed from the evidence of Greek and Sanskrit (Gr. tan, Sans, asti beside Lat. est) that the primary endings in Latin have lost a final -i, partly or wholly by some phonetic change.

(ii.) The non-thematic conjugation is almost wholly lost, sur- viving only in a few forms of very common use, est, “is”; est, ” eats ” ; volt, ” wills,” &c.

(iii.) The complete fusion of the aorist and perfect forms, and in the same tense the fusion of active and middle endings; thus tutudl, earlier *tutudai, is a true middle perfect ; dixl is an J aorist with the same ending attached; dixit is an aorist active; tutudisti is a conflation of perfect and aorist with a middle personal ending.

(iv.) The development of perfects in -ui and -vi, derived partly from true perfects of roots ending in v or u, e.g. movi rut. For the origin of momii see Exon, Hermatfiena (1901), xi. 396 sq.

(v.) The complete fusion of conjunctive and optative into a single mood, the subjunctive; regam, &c, are conjunctive forms, whereas rexerim, rexissem are certainly and regerem most probably optative;

the origin of amem and the like is still doubtful. Notice, however, that true conjunctive forms were often used as futures, regis, reget, &c, and also the simple thematic conjunctive in forms like erb, rexero, &c.

(vi.) The development of the future in -bo and imperfect in -bam by compounding some form of the verb, possibly the Present Participle with forms from the root of fui, *amans-fuo becoming am’abo, *amans-fuam becoming amdbam at a very early period of Latin; see F. Skutsch, Atti d. Congresso Storico Intern. (1903), vol. ii. p. 191.

(vii.) We have already noticed the rise of the passive in -r (§ 5 (d)). Observe, however, that several middle forms have been pressed into the service, partly because the r in them which had come from .s seemed to give them a passive colour (legere — Gr. \k~a(a)o, Attic \iyov). The interesting forms in -mini are a confusion of two distinct inflexions, namely, an old infinitive in -menai, used for the imperative, and the participial -menoi, masculine, -menai, feminine,

used with the verb ” to be” in place of the ordinary inflexions. Since these forms had all come to have the same shape, through phonetic change, their meanings were fused; the imperative forms being restricted to the plural, and the participial forms being restricted to the second person.

31. Past Participle Passive. — Next should be mentioned the great development in the use of the participle in -tos (j “actus, fusus, &c). This participle was taken with sum to form the perfect tenses of the passive, in which, thanks partly to the fusion of perfect and aorist active, a past aorist sense was also evolved. This reacted on the participle itself giving it a prevailingly past colour, but its originally timeless use survives in many places, e.g. in the participle ratus, which has as a rule no past sense, and more definitely still in such passages as Vergil, Georg. i. 206 {vectis), Aen. vi. 22 (ductis), both of which passages demand a present sense. It is to be noticed also that in the earliest Latin, as – in Greek and Sanskrit, the passive meaning, though the commonest, is not universal. Many traces of this survive in classical Latin, of which the chief are

1. The active meaning of deponent participles, in spite of the

fact that some of them (e.g. adeptus, emensus, expertus) have also a passive sense, and

2. The familiar use of these participles by the Augustan poets

with an accusative attached (galeam indutus, traiectus lora). Here no doubt the use of the Greek middle influenced the Latin poets, but no doubt they thought also that they were reviving an old Latin idiom.

32. Future Participle.— Finallyˆ may be mentioned together (a) the development of the future participle active (in -urus, never so freely used as the other participles, being rare in the ablative absolute even ‘ in Tacitus) from an old infinitive in -urum (” scio inimicos meos hoc dicturum,” C. Gracchus (and others) apud Gell. 1. 7, and Priscian ix. 864 (p. 475 Keil), which arose from combining the dative or locative of the verbal noun in -tu with an old infinitive esom ” esse ” which survives in Oscan, *dictu esom becoming dicturum. This was discovered by J. P. Postgate (Class. Review, v. 301, and Wg. Forschungen iv. 252). (b) From the same infinitival accusative with the post-position -do , meaning ” to,” ” for,” ” in ” (cf. quando for *quam-do, and Eng. to, Germ, zu) was formed the so-called gerund agen-do, ” for doing,” ” in doing,” which was taken for a Case, and so gave rise to the accusative and genitive in -dum and -dl. The form in -

do still lives in Italian as an indeclinable present participle. The modal and purposive meanings of -do appear in the uses of the gerund.

The authorities giving a fuller account of Latin morphology are the same as those cited in § 28 above, save that the reader must consult the second volume of Brugmann's Grundriss, which in the English translation (by Conway and Rouse, Strassburg, 1 890-1 896) is divided into volumes ii, iii. and iv. ; and that Niedermann does not deal with morphology.

III. Syntax

The chief innovations of syntax developed in Latin may now be briefly noted.

33. In nouns.

(i.) Latin restricted the various Cases to more sharply defined uses than either Greek or Sanskrit ; the free use of the internal accusative in Greek (e.g. dj3pAc paivuv, Tv\os to. o > to.) is strange to Latin, save in poetical imitations of Greek; and so is the freedom of the Sanskrit instrumental, which often covers meanings expressed in Latin by cum, ah, inter.

(ii.) The syncretism of the so-called ablative case, which combines the uses of (a) the true ablative which ended in -d (O. Lat. praidad) ; (b) the instrumental sociative (plural forms like dominis, the ending being that of Sans, civais) ; and © the locative (noct-e, " at night "; itiner-e, " on the road," with the ending of Greek ˆXtLS-i). The so- called absolute construction is mainly derived from the second of these, since it is regularly attached fairly closely to the subject of the clause in which it stands, and when accompanied by a passive participle most commonly denotes an action performed by that subject. But the other two sources cannot be altogether excluded (orto sole, " starting from sunrise "; campo patente, " on, in sight of, tfle open plain ").

34. In verbs.

(i.) The rich development and fine discrimination of the uses of the subjunctive mood, especially (a) in indirect questions (based on

direct deliberative questions and not fully developed by the time of

Plautus, who constantly writes such phrases as die quis es for the Ciceronian die quis sis) ; (b) after the relative of essential definition (non is sum qui negem) and the circumstantial cum (" at such a time as that "). The two uses (a) and (b) with © the common Purpose and Consequence-clauses spring from the " prospective " or " antici- patory " meaning of the mood, (d) Observe further its use in sub- ordinate oblique clauses [irascitur quod abierim, " he is angry because, as he asserts, I went away "). This and all the uses of the mood in oratio cfoliqua are derived partly from (a) and (b) and partly from the ifi) Unreal Jussive of past time (Non Mi argentum redderem? Non redderes, " Ought I not to have returned the money to him?" " You certainly ought not to have," or, more literally, " You were not

to ' :)-

On this interesting chapter of Latin syntax see W.G.Hale's " Cum-

constructions " (Cornell University Studies in Classical Philology,

No. I, 1887-1889), and The Anticipatory Subjunctive (Chicago, 1894).

(ii.) The complex system of oratio obliqua with the sequence of tenses (on the growth of the latter see Conway, Livy II., Appendix ii., Cambridge, 1901).

(iii.) The curious construction of the gerundive (ad capiendam urbem), originally a present (and future?) passive participle, but re- stricted in its use by being linked with the so-called gerund (see § 32,6). The use, but probably not the restriction, appears in Oscan and Umbrian.

(iv.) The favourite use of the impersonal passive has already been mentioned (§ 5, iv.).

35. The chief authorities for the study of Latin syntax are: Brugmann's Kurze vergl. Grammatik, vol. ii. (see § 28) ; Landgraf 's Historische lat. Syntax (vol. ii. of the joint Hist. Gram., see § 28); Hale and Buck's Latin Grammar (see § 28) ; Draeger's Historische lat. Syntax, 2 vols. (2nd ed., Leipzig, 1878-1881), useful but not always trustworthy ; the Latin sections in Delbriick's Vergleichende Syntax, being the third volume of Brugmann's Grundriss (§ 28).

IV. Importation of Greek Words

36. It is convenient, before proceeding to describe the develop- ment of the language in its various epochs, to notice briefly the debt of its

vocabulary to Greek, since it affords an indication of the steadily increasing influence of Greek life and literature upon the growth of the younger idiom. Corssen (Lat. Aus- sprache, ii. 814) pointed out four different stages in the process, and though they are by no means sharply divided in time, they do correspond to different degrees and kinds of intercourse.

(a) The first represents the period of the early intercourse of Rome with the Greek states, especially with the colonies in the south of Italy and Sicily. To this stage belong many names of nations, countries and towns, as Siculi, Tarentum, Graeci, Achivi, Poenus; and also names of weights and measures, articles of industry and terms connected with navigation, as mina, talentum, purpura, patina, ancora, aplustre, nausea. Words like amurca, scutula, pessulus, balineum, tarpessita represent familiarity with Greek customs and bear equally the mark of naturalization. To these may be added names of gods or heroes, like Apollo, Pollux and perhaps Hercules. These all became naturalized Latin words and were modified by the phonetic changes which took place in the Latin language after they had come into it (cf. §§ 9-27 supra), (b) The second stage was probably the result of the closer intercourse re- sulting from the conquest of southern Italy, and the wars in Sicily, and of the contemporary introduction of imitations of Greek litera- ture into Rome, with its numerous references to Greek life and culture. It is marked by the free use of hybrid forms, whether made by the addition of Latin suffixes to Greek stems as ballistarius , hepatarius, subbasilicdnus, sycophantiosus , comissarl or of Greek suffixes to Latin stems as plagipatidas, pernonides ; or by derivation, as thermo polar e, supparasltdri ; or by composition as ineuscheme, thyrsigerae, flagritribae, scrophipasci. The character of many of these words shows that the comic poets who coined them must have been able to calculate upon a fair knowledge of colloquial Greek on the part of a considerable portion of their audience. The most remarkable instance of this is supplied by the burlesque lines in Plautus (Pers. 702 seq.), where Sagaristio describes himself as Vaniloquidorus, Virginisvendonides, Nugipiloquides, Argentumexterebronides, Tedigniloquides, Nummosexpalponides, Quodsemelarripides, Nunquameripides. During this period Greek words are still generally inflected according to the Latin usage.

(c) But with Accius (see below) begins a third stage, in which the Greek inflexion is frequently preserved, e.g. Hectora, Oresten,_ Ci- thaeron; and from this time forward the practice wavers. Cicero generally prefers the Latin case-endings, defending, e.g., Piraeeum as against Piraeea (ad Alt. vii. 3, 7), but not without some fluctua- tion, while Varro takes the opposite side, and prefers poemasin to die

Ciceronian poematis. By this time also y and z were introduced, a”d the representation of the Greek aspirates by th, ph, ch, so that words newly borrowed from the Greek could be more faithfully reproduced.

This is equally true whatever was the precise nature of the sound which at that period the Greek aspirates had reached in their secular process of change from pure aspirates (as in Eng. ant-hill, &c.) to fricatives (like Eng. th in thin). (See Arnold and Conway, The Restored Pronunciation of Greek and Latin, 4th ed., Cambridge, 1908, p. 21.)

(d) A fourth stage is marked by the practice of the Augustan poets, who, especially when writing in imitation of Greek originals, freely use the Greek inflexions, such as Arcades, Tethy, Aegida, Echus, &c. Horace probably always used the Latin form in his Satires and Epistles, the Greek in his Odes. Later prose writers for the most part followed the example of his Odes. It must be added, however, in regard to these literary borrowings that it is not quite clear whether in this fourth class, and even in the unmodified forms in the preceding class, the words had really any living use in spoken Latin.

V. Pronunciation This appears the proper place for a rapid survey of the pronuncia- tion 1 of the Latin language, as spoken in its best days.

37. Consonants. — (i.) Back palatal. Breathed plosive c, pro- nounced always as k (except that in some early inscriptions — • probably none much later, if at all later, than 300 B.C. — the char- acter is used also for g) until about the 7th century after Christ. K went out of use at an early period, except in a few old abbreviations for words in which it had stood before a, e.g., kal. for kalendae. Q, always followed by the consonantal u, except in a few old inscrip- tions, in which it is used. for c before the vowel u, e.g. pequnia. X, an abbreviation for cs; xs is, however, sometimes found. Voiced plosive g, pronounced as in English gone, but never as in English gem before about the 6th century after Christ. Aspirate h, the rough breathing as in English.

(ii.) Palatal. — The consonantal i, like the English y; it is only in late inscriptions that we find, in spellings like Zanuario, Giove, any definite indication of a pronunciation like the English j. The precise date of the change is difficult to determine (see Lindsay's Latin Lang. p. 49) , especially as we may, in isolated cases, have before us merely a dialectic variation ; see Paeligni.

(iii.) Lingual. — r as in English, but probably produced more with the point of the tongue. I similarly more dental than in English, s always breathed (as Eng. ce in ice), z, which is only found in the transcription of Greek words in and after the time of Cicero, as dz or zz.

(iv.) Dental. — Breathed, / as in English. Voiced, d as in English; but by the end of the 4th century di before a vowel was pronounced like our j (cf. diurnal and journal). Nasal, n as in English ; but also (like the English n) a guttural nasal (ng) before a guttural. Apparently it was very lightly pronounced, and easily fell away before s.

(v.) Labial. — Breathed, p as in English. Voiced, b as in English; but

occasionally in inscriptions of the later empire v is written for b, showing that in some cases b had already acquired the fricative sound of the contemporary /3 (see § 24, iii.). b before a sharp 5 was pronounced p, e.g. in urbs. Nasal, m as in English, but very slightly pronounced at the end of a word. Spirant, v like the ou in French oui, but later approximating to the w heard in some parts of Germany, Ed. Sievers, Grundzilge d. Phonetik, ed. 4, p. 117, i.e. a labial v, not (like the English v) a labio-dental v.

(vi.) Labio-dental. — Breathed fricative, /as in English.

38. Vowels. — a, il, l, as the English ah, 00, ee; 0, a sound coming nearer to Eng. aw than to Eng. 0; ea close Italian e, nearly as the a of Eng. mate, ee of Fr. passee. The short sound of the vowels was not always identical in quality with the long sound, a was pronounced as in the French chatte, ii, nearly as in Eng. pull, i nearly as in pit, 6 as in dot, e nearly as in pet. The diphthongs were produced by pronouncing in rapid succession the vowels of which they were composed, according to the above scheme. This gives, au somewhat broader than ou in house; eu like ow in the ” Yankee ” pronunciation of town; ae like the vowel in hat lengthened, with perhaps somewhat more approximation to the i in wine; oe, a diphthongal sound approximating to Eng. oi ; ui, as the French oui.

To this it should be added that the Classical Association, acting

1 The grounds for this pronunciation will be found best stated in Postgate, How to pronounce Latin (1907), Arnold and Conway, The Restored Pronunciation of Greek and Latin (4th ed., Cambridge, 1908) ; and in the grammars enumerated in § 28 above, especially the preface to vol. i. of Roby’s Grammar. The chief points about c may be briefly given as a specimen of the kind of evidence. (1) In some words the letter following c varies in a manner which makes it impossible to believe that the pronunciation of the c depended upon this, e.g. decumus and decimus, die from Plaut. dice; (2) if c was pronounced before e and i otherwise than before a, and u, it is hard to see why k should not have been retained for the latter use; (3) no ancient writer gives any hint of a varying pronunciation of c ; (4) a Greek k is always transliterated by c, and c by k; (5) Laan words containing c borrowed by Gothic and early High German are always spelt with k ; (6) the varying pronunciations of ce, ci in the Romance languages are inexplicable except as derived independently from an original ke, ki.

on the advice of a committee of Latin scholars, has recommended for the diphthongs ae and oe the pronunciation of English i (really ai) in wine and oi in boil, sounds which they undoubtedly had in the time of Plautus and probably much later, and which for practical use in teaching have been proved far the best.

VI. The Language as recorded

39. Passing now to a survey of the condition of the language at various epochs and in the different authors, we find the earliest monument of it yet discovered in a donative inscription on a fibula or brooch found in a tomb of the 7th century B.C. at Praeneste. It runs ” Manios med fhefhaked Numasioi,” i.e. ” Manios made me for Numasios.” The use of/ (fh) to denote the sound of Latin / supplied the explanation of the change of the symbol / from its Greek value (= Eng. w) to its Latin value /, and shows the Chalcidian Greek alphabet in process of adapta- tion to the needs of Latin (see Writing). The reduplicated perfect, its 3rd sing, ending -ed, the dative masculine in -oi (this is one of the only two recorded examples in Latin), the s between vowels (§ 25, 1), and the a in what was then (see §§ 9, 10) certainly an unaccented syllable and the accusative med, are all interesting marks of antiquity. 1

40. The next oldest fragment of continuous Latin is furnished by a vessel dug up in the valley between the Quirinal and the Viminal early in 1880. The vessel is of a dark brown clay, and consists of three small round pots, the sides of which are con- nected together. All round this vessel runs an inscription, in three clauses, two nearly continuous, the third written below; the writing is from right to left, and is still clearly legible; the characters include one sign not belonging to the later Latin alphabet, namely R for R, while the M has five strokes and the Q has the form of a Koppa.

The inscription is as follows: —

” iovesat deivos qoi med mitat, nei ted endo cosmis virco sied, asted noisi opetoitesiai pacari vois.

dvenos med feced en manom einom duenoi ne med malo statod.”

The general style of the writing and the phonetic peculiarities make it fairly certain that this work must nave been produced not later than 300 B.C. Some points in its interpretation are still open to doubt, 2 but the probable interpretation is —

” Deos iurat ille (or iurant illi) qui me mittat (or mittant) ne in te Virgo (i.e. Proserpina) comis sit, nisi quidem optimo (?) Theseae (?) pacari vis. Duenos me fecit contra Manum, Dueno autem ne per me malum stato (= imputetur, imponatur).”

” He (or they) who dispatch me binds the gods (by his offer- ing) that Proserpine shall not be kind to thee unless thou wilt make terms with (or “for”) Opetos Thesias (?). Duenos made me against Manus, but let no evil fall to Duenos on my account.”

41. Between these two inscriptions lies in point of date the famous stele discovered in the Forum in 1899 (G. Boni, Notiz. d. scavi, May 1899). The upper half had been cut off in order to make way for a new pavement or black stone blocks (known to archaeologists as the niger lapis) on the site of the comitium, just to the north-east of the Forum in front of the Senate House. The inscription was written lengthwise along the (pyramidal) stele from foot to apex, but with the alternate lines in reverse directions, and one line not on the full face of any one of the four sides, but up a roughly-flattened fifth side made by slightly broadening one of the angles. No single sentence is complete and the mutilated fragments have given rise to a whole literature of conjectural ” restorations.”

1 The inscription was first published by Helbig and Dummler in Mittheilungen des deutschen archdol. Inst. Rom. ii. 40; since in C.I.L. xiv. 4123 and Conway, Italic Dial. 280,- where other refer- ences will be found.

2 This inscription was first published by Dressel, Annali dell’ Inst. Archeol. Romano (1880), p. 158, and since then by a multitude of commentators. The view of the inscription as a curse, translating a Greek cursing-formula, which has been generally adopted, was first put forward by R. S. Conway in the American Journal of Philology, x. (1889), 453; see further his commentary Italic Dialects, p. 329, and since then G. Hempl, Trans. Amer. Philol. Assoc, xxxiii. (1902), 150, whose interpretation of iouesat = iurat and Opetoi Tesiai has been here adopted, and who gives other references.

R. S. Conway examined it in situ in company with F. Skutsch in 1903 (cf. his article in VollmSller’s Jahresbericht, vi. 453), and the only words that can be regarded as reasonably certain are regei (regi) on face 2, kalatorem and iouxmenta on face 3, and iouestod (iusto) on face 4. 3 The date may be said to be fixed by the variation of the sign for m between m and \l\[\ (with a for r) and other alphabetic indications which suggest the 5th century B.C. It has been suggested

also that the reason for the destruction of the stele and the repavement may have been either (1) the pollution of the comitium by the Gallic invasion of 390 B.C., all traces of which, on their departure, could be best removed by a repaving; or (2) perhaps more probably, the Augustan restorations (Studniczka, Jahresheft d. Osterr. Institut, 1903, vi. 129 ff.). _ … . (R – S – C -)

42. Of the earlier long inscriptions the most important would be the Columna Rostrata, or column of Gaius Duilius (q.v.), erected to commemorate his victory over the Carthaginians in 260 B.C., but for the extent to which it has suffered from the hands of restorers. The shape of the letters plainly shows that the inscription, as we have it, was cut in the time of the empire. Hence Ritschl and Mommsen pointed out that the language was modified at the same time, and that, although many archaisms have been retained, some were falsely introduced, and others replaced by more modern forms. The most noteworthy features in it are — C always written for G (Ceset = gessit) , single for double consonants (clases-classes) , d retained in the ablative (e.g., in altod marid), for u in inflexions (pritnos, exfocionT = exfugiunt) , e for i (navebos = navibus , exemet = exemit) ; of these the first is probably an affected archaism, G having been introduced some time before the assumed date of the inscription. On the other hand, we have praeda where we should have expected praida ; no final consonants are dropped ; and the forms -es, -eis and -is for the accusative plural are interchanged capriciously. The doubts hence arising preclude the possibility of using it with confidence as evidence for the state of the language in the 3rd century B.C.

43. Of unquestionable genuineness and the greatest value are the Scipionum Elogia. inscribed on stone coffins, found in the monument of the Scipios outside the Capene gate (C.I.L. 1 i. 32). The earliest of the family whose epitaph has been preserved is L. Cornelius Scipio Barbatus (consul 298 B.C.), the latest C. Cornelius Scipio Hispanus (praetor in 139 B.C.); but there are good reasons for believing with Ritschl that the epitaph of the first was not contemporary, but was somewhat later than that of his son (consul 259 B.C.). This last may therefore be taken as the earliest specimen of any length of Latin and it was written at Rome; it runs as follows: —

honcoino . ploirume . cosentiont . t[omai] duonoro . optumo . fuise . uiro [virorum] luciom . scipione . filios . barbati co]nsol . censor . aidilis . hie . fuet a [pud vos] he]c . cepit . Corsica . aleriaque . urbefra] de]dct . tempestatebus. aide . mereto[<2 votam]. The archaisms in this inscription are — (1) the retention of for u in the inflexion of both nouns and verbs; (2) the diphthongs oi (= later u)

and ai (= later ae) ; (3) -et for -it, hec for hie, and -ebus for ibus ; (4) duon for bon ; and (5) the dropping of a final m in every case except in Luciom, a variation which is a marked characteristic of the language of this period.

44. The oldest specimen of the Latin language preserved to us in any literary source is to be found in two fragments of the Carmina Saliaria (Varro, De ling. Lat. vii. 26, 27), and one in Terentianus Scaurus, but they are unfortunately so corrupt as to give us little real information (see B. Maurenbrecher, Carminum Saliarium reliquiae, Leipzig, 1894; G. Hempl, American Philol. Assoc. Transactions, xxxi., 1900, 184). Rather better evidence is supplied in the Carmen Fratrum Arvalium, which was found in 1778 engraved on one of the numerous tablets recording the transactions of the college of the Arval brothers, dug up on the site of their grove by the Tiber, 5 m. from the city of Rome; but this also has been so corrupted in its oral tradition that even its general meaning is by no means clear (C.I.L. 1 i. 28; Jordan, Krit. Beitrage, pp. 203-211).

45. The text of the Twelve Tables (451-450 B.C.), if preserved in its integrity, would have been invaluable as a record of antique Latin; but it is known to us only in quotations. R. Schoell, whose edition and commentary (Leipzig, 1866) is the most complete, notes the following traces, among others, of an archaic syntax: (1) both the subject and the object of the verb are often left to be understood from the context, e.g. ni it antestamino, igitur, em capito; (2) the imperative is used even for permissions, ” si volet, plus dato,” ” if he choose, he may give him more “; (3) the subjunctive is apparently never used in conditional,

3 The most important writings upon it are those of Domenico Comparetti, Iscriz. arcaica del Foro Romano (Florence- Rome, 1900) ; Hiilsen, Berl. philolog. Wochenschrift (1899), No. 40; and Thurney-sen, Rheinisches Museum (Neue Folge), iii. 2. Prof. G. Tropea gives a Cronaca delta discussione in a series of very useful articles in the Rivista di storia antica (Messina, 1900 and 1901). Skutsch’s article already cited puts the trustworthy results in an exceedingly brief compass.

only in final sentences, but the future perfect is common; (4) the connexion between sentences is of the simplest kind, and conjunctions

are rare. There are, of course, numerous isolated archaisms of form and meaning, such as calvitur, pacunt, endo, escit. Later and less elaborate editions are contained in Fontes Iuris Romani, by Bruns-Mommsen-Gradenwitz (1892); and P. Girard, Texles de droit romain (1895).

46. Turning now to the language of literature we may group the Latin authors as follows: — l

I. Ante-Classical (240-80 B.C.). — Naevius (? 269-204), Plautus (254-184), Ennius (239-169), Cato the Elder (234-149), Terentius (? 195-159), Pacuvius (220-132), Accius (170-94), Lucilius (? 168-103).

II. Classical — Golden Age (80 b.c.-a.d. 14). — Varro (116-28), Cicero (106-44), Lucretius (99-55), Caesar (102-44), Catullus (87-? 47), Sallust (86-34), Virgil (70-19), Horace (65-8), Pro- pertius (?■ 50- ?), Tibullus (? 54-? 18), Ovid (43 b.c.-a.d. 18), Livy (59 b.c.-a.d. 18).

III. Classical — Silver Age (a.d. 14-180). — Velleius (? 19 B.a- ? a.d. 31), M. Seneca (d. c. a.d. 30), Persius (34-62), Petronius (d. 66), Lucan (30-65), L. Seneca (d. a.d. 65), Plinius major (23-A.D. 79), Martial (40-101), Quintilian (42-118), Pliny the Younger (61-? 113), Tacitus (? 60-? 118), Juvenal (? 47-? 138), Suetonius (75-160), Fronto (c. 90-170).

47. Naevius and Plautus. — In Naevius we find, archaisms proportionally much more numerous than in Plautus, especially in the retention of the original length of vowels, and early forms of inflexion, such as the genitive in -as and the ablative in -d. The number of archaic words preserved is perhaps due to the fact that so large a proportion of his fragments have been preserved only by the grammarians, who cited them for the express purpose of explaining these.

Of the language of Plautus important features have already been mentioned (§§ 10-16); for its more general characteristics see Plautus.

48. Ennius. — The language of Ennius deserves especial study because of the immense influence which he exerted in fixing the literary style. He first established the rule that in hexameter verse all vowels followed by two consonants (except in the case of – mute and a liquid), or a double consonant, must be treated as lengthened by position. The number of varying quantities is also much diminished, and the elision of final -in becomes the rule, though not without exceptions. On the other hand he very commonly retains the original

length of verbal terminations (esset. faciei) and of nominatives in or and a, and elides final s before an initial consonant. In declension he never uses -ae as the genitive, but -ai or -as; the older and shorter form of the gen. plur. is -um in common; obsolete forms of pronouns are used, as mis, olli, sum (= eum), sas, sos, sapsa; and in verbal inflexion there are old forms like morimur (§ i$),fuimus(§ 17, vi.), poteslur (cf. § 5, iv.). Some experiments in the way of tmesis {saxo cere comminuit-bmra) and apocope (divum domus altisonum cael, replet te laetificum gau) were happily regarded as failures, and never came into real use. His syntax is simple and straight- forward, with the occasional pleonasms of a rude style, and con- junctions are comparatively rare. From this time forward the literary language of Rome parted company with the popular dialect. Even to the classical writers Latin was in a certain sense a dead language. Its vocabulary was not identical with that of ordinary life. Now and again a writer would lend new vigour to his style by phrases and constructions drawn from homely speech. But on the whole, and in ever-increasing measure, the language of literature was the language' of the schools, adapted to foreign models. The genuine current of Italian speech is almost lost to view with Plautus and Terence, and reappears clearly only in the semi-barbarous products of the early Romance literature.

49. Pacuvius, Accius and Lucilius.-— Pacuvius is noteworthy especially for his attempt to introduce a free use of compounds after the fashion of the Greek, which were felt in the classical

1 For further information see special articles on these authors, and Latin Literature.

times to be unsuited to the genius of the Latin language, Quintilian censures severely his line —

Nerei repandirostrum incurvicervicum pecus.

Accius, though probably the greatest of the Roman tragedians, is only preserved in comparatively unimportant fragments. We know that he paid much attention to grammar and ortho- graphy; and his language is much more finished than that of Ennius. It shows no marked' archaisms of form, unless the infinitive in -ier is to be accounted as such.

Lucilius furnishes a specimen of the language of the period, free from the restraints of tragic diction and the imitation of Greek originals. Unfortunately the greater part of his fragments are preserved only by a grammarian whose text is exceptionally corrupt; but they leave no

doubt as to the justice of the criticism passed by Horace on his careless and ” muddy ” diction. The urbanitas which is with one accord conceded to him by ancient critics seems to indicate that his style was free from the taint of provincial Latinity, and it may be regarded as reproducing the language of educated circles in ordinary life; the numerous Graecisms and Greek quotations with which it abounds show the familiarity of his readers with the Greek language and literature. Varro ascribes to him the gracile genus dicendi, the distinguishing features of which were venustas and subtilitas. Hence it appears that his numerous archaisms were regarded as in no way inconsistent with grace and precision of diction. But it may be remembered that Varro was himself something of an archaizer, and also that the grammarians' quotations may bring this aspect too much into prominence. Lucilius shares with the comic poets the use of many plebeian expressions, the love for diminutives, abstract terms and words of abuse; but occasionally he borrows from the more elevated style of Ennius forms like simitu (= simul), noenu (= non), facul (= facile), and the genitive in -ai, and he ridicules the contemporary tragedians for their zetematia, their high-flown diction and sesquipedalia verba, which make the characters talk ” not like men but like portents, flying winged snakes.” In his ninth book he discusses questions of grammar, and gives some interesting facts as to the tendencies of the language. For instance, when he ridicules a praetor urbanus for calling himself pretor, we see already the intrusion of the rustic degradation of ae into e, which afterwards became universal. He shows a great command of technical language, and (partly owing to the nature of the fragments) a7ra£ Xeyoyuei'a are very numerous. *

50. Cato. — The treatise of Cato the elder, De re rustica, would have afforded invaluable material, but it has unfortunately come down to us in a text greatly modernized, which is more of interest from the point of view of literature than of language. We find in it, however, instances of the accusative with uti, of the old imperative praefamino and of the fut. sub. servassis, prohibessis and such interesting subjunctive constructions as dato bubus bibant omnibus, ” give all the oxen (water) to drink.”

51. Growth of Latin Prose. — It is unfortunately impossible to trace the growth of Latin prose diction through its several stages with the same clearness as in the case of poetry. The fragments of the earlier Latin prose writers are too scanty for us to be able to say with certainty when and how a formed prose style was created. But the impulse to it was undoubtedly given in the habitual practice of oratory. The earliest orators, like Cato, were distinguished for strong common sense, biting wit and vigorous language, rather than for any

graces of style; and probably personal auctoritas was of far more account than rhetoric both in the law courts and in the assemblies of the people. The first public speaker, according to Cicero, who aimed at a polished style and elaborate periods was M. Aemilius Lepidus Porcina, in the middle of the 2nd century b.c. 2 On his model the Gracchi and Carbo fashioned themselves, and, if we may judge from the fragments of the orations of C. Gracchus which are preserved, there were few traces of archaism remaining. A more perfect example of the urbanitas at which good speakers aimed was supplied by a famous speech of C. Fannius against C. Gracchus,

2 Cicero also refers to certain scripta dulcissima of the son of Scipio Africanus Maior, which must have possessed some merits of style.

which Cicero considered the best oration of the time. No small part of the urbanitas consisted in a correct urban pronunciation; and the standard of this was found in the language of the women of the upper classes, such as Laelia and Cornelia.

In the earliest continuous prose work which remains to us the four books De Rhetorica ad Herennium, we find the language already almost indistinguishable from that of Cicero. There has been much discussion as to the authorship of this work, now commonly, without very convincing reasons, ascribed to Q. Corni- ficius; but, among the numerous arguments which prove that it cannot have been the work of Cicero, none has been adduced of any importance drawn from the character of the language. It is worth while noticing that not only is the style in itself perfectly finished, but the treatment of the subject of style, elocutio (iv. 12. 17), shows the pains which had already been given to the question. The writer lays down three chief re- quisites — (1) elegantia, (2) compositio and (3) dignitas. Under the first come Latinitas, a due avoidance of solecisms and barbar- isms, and explanatio, clearness, the employment of familiar and appropriate expressions. The second demands a proper arrange- ment ; hiatus, alliteration, rhyme, the repetition or displacement of words, and too long sentences are all to be eschewed. Dignity depends upon the selection of language and of sentiments.

52. Characteristics of Latin Prose. — Hence we see that by the time of Cicero Latin prose was fully developed. We may, there- fore, pause here to notice the characteristic qualities of the language at its most

perfect stage. The Latin critics were themselves fully conscious of the broad distinction in character between their own language and the Greek. Seneca dwells upon the stately and dignified movement of the Latin period, and uses for Cicero the happy epithet of gradarius. He allows to the Greeks gratia, but claims potentia for his own countrymen. Quintilian (xii. 10. 27 seq.) concedes to Greek more euphony and variety both of vocalization and of accent; he admits that Latin words are harsher in sound, and often less happily adapted to the expression of varying shades of meaning. But he too claims ” power ” as the distinguishing mark of his own language. Feeble thought may be carried off by the exquisite harmony and subtleness of Greek diction; his countrymen must aim at fulness and weight of ideas if they are not to be beaten off the field. The Greek authors are like lightly moving skiffs; the Romans spread wider sails and are wafted by stronger breezes; hence the deeper waters suit them. It is not that the Latin language fails to respond to the calls made upon it. Lucretius and Cicero concur, it is true, in complaints of the poverty of their native language; but this was only because they had had no predecessors in the task of adapting it to philosophic utterance; and the long life of Latin technical terms like qualitas, species, genus, ratio, shows how well the need was met when it arose. H. A. J. Munro has said admirably of this very period: —

” The living Latin for all the higher forms of composition, both prose and verse, was a far nobler language than the living Greek. During the long period of Grecian pre-eminence and literary glory, from Homer to Demosthenes, all the manifold forms of poetry and prose which were invented one after the other were brought to such exquisite perfection that their beauty of form and grace of language were never afterwards rivalled by Latin or any other people. But hardly had Demosthenes and Aristotle ceased to live when that Attic which had been gradually formed into such a noble instrument of thought in the hands of Aristophanes, Euripides, Plato and the orators, and had superseded for general use all the other dialects, became at the same time the language of the civilized world and was stricken with a mortal decay. . . . Epicurus, who was born in the same year as Menander, writes a harsh jargon that does not deserve to be called a style; and others of whose writings anything is left entire or in fragments, historians and philosophers alike, Polybius, Chrysippus, Philodemus, are little if any better. When Cicero deigns to translate any of their sentences, see what grace and life he instils into their clumsily expressed thoughts, how satisfying to the ear and taste are the periods of Livy when he is putting into Latin the heavy and uncouth clauses of Polybius ! This may explain what Cicero means

when at one time he gives to Greek the preference over Latin, at another to Latin over Greek; in reading Sophocles or Plato he could acknowledge their unrivalled excellence; in trans- lating Panaetius or Philodemus he would feel his own immeasurable superiority.”

The greater number of long syllables, combined with the

paucity of diphthongs and the consequent monotony of vocaliza- tion, and the uniformity of the accent, lent a weight and dignity of movement to the language which well suited the national gravila* The precision of grammatical rules and the entire absence of dialectic forms from the written literature contributed to maintain the character of unity which marked the Roman republic as com- pared with the multiplicity of Greek states. It was remarked by Francis Bacon that artistic and imaginative nations indulge freely in verbal compounds, practical nations in simple concrete terms. In this respect, too, Latin contrasts with Greek. The attempts made by some of the earlier poets to indulge in novel compounds was felt to be out of harmony with the genius of the language. Composition, though necessarily employed, was kept within narrow limits, and the words thus produced have a sharply defined meaning, wholly unlike the poetical vagueness of some of the Greek compounds. The vocabulary of the language, though receiving accessions from time to time in accordance with practical needs, was rarely enriched by the products of a spontaneous creativeness. In literature the taste of the educated town circles gave the law; and these, trained in the study of the Greek masters of style, required something which should reproduce for them the harmony of the Greek period. Happily the orators who gave form to Latin prose were able to meet the demand without departing from the spirit of their own language. 1

53. Cicero and Caesar. — To Cicero especially the Romans owed the realization of what was possible to their language in the way of artistic finish of styld He represents a protest at one and the same time against the inroads of the plebeius sermo, vulgarized by the constant influx of non-Italian provincials into Rome, and the ” jargon of spurious and partial culture ” in vogue among the Roman pupils of the Asiatic rhetoricians. His essential service was to have caught the tone and style of the true Roman urbanitas, and to have fixed it in extensive and widely read speeches and treatises as the final model of classical prose. The influence of Caesar was wholly in the same direction. His cardinal principle was that every new-fangled and affected expression, from whatever quarter it might come, should be avoided by the writer, as rocks by the mariner. His own style for straightforward simplicity and purity has never been sur- passed; and

it is not without full reason that Cicero and Caesar are regarded as the models of classical prose. But, while they fixed the type of the best Latin, they did not and could not alter its essential character. In subtlety, in suggestiveness, in many- sided grace and versatility, it remained far inferior to the Greek. But for dignity and force, for cadence and rhythm, for clearness and precision, the best Latin prose remains unrivalled.

It is needless to dwell upon the grammar or vocabulary of Cicero. His language is universally taken as the normal type of Latin; and, as hitherto the history of the language has been traced by marking differences from his usage, so the same method may be followed for what remains.

54. Varro, ” the most learned of the ancients,” a friend and contemporary of Cicero, seems to have rejected the periodic rhythmical style of Cicero, and to have fallen back upon a more archaic structure. Mommsen says of one passage ” the clauses of the sentence are arranged on the thread of the relative like dead thrushes on a string.” But, in spite (some would say, because) of his old-fashioned tendencies, his language shows great vigour and spirit. In his Menippean satires he intentionally made free use of plebeian expressions, while rising at times to a real grace and showing often fresh humour. His treatise De Re Ruslica, in the form of a dialogue, is the most agreeable of his works, and where the nature of his subject allows it there is

1 The study of the rhythm of the Clausulae, i.e. of the last dozen (or half-dozen) syllables of a period in different Latin authors, has been remarkably developed in the last three years, and is of the highest importance for the criticism of Latin prose. It is only possible to refer to Th. Zielinski’s Das Clauselgesetz in Cicero’s Reden (St. Petersburg, 1904), reviewed by A. C. Clark in Classical Review, 1905, p. 164, and to F. Skutsch’s important comments in Vollmoller’s Jahresberichten iiber die Fortschrilte der romanischen Philologie (1905) and Glotta (i. 1908, esp. p. 413), also to A. C. Clark’s Fonles Prosae Numerosae (Oxford, 1909), The Cursus in Mediaeval and Vulgar Latin {ibid. 1910), and article Cicero.

much vivacity and dramatic picturesqueness, although the precepts are necessarily given in a terse and abrupt form. His sentences are as a

rule co-ordinated, with but few connecting links; his diction contains many antiquated or unique words.

55. Sallust. — In Sallust, a younger contemporary of Cicero, we have the earliest complete specimen of historical narrative. It is probably due to his subject-matter, at least in part, that his style is marked by frequent archaisms; but something must be ascribed to intentional imitation of the earlier chroniclers, which led him to be called priscorum Catonisque verborum ineruditissimus fur. His archaisms consist partly of words and phrases used in a sense for which we have only early authorities, e.g. cum animo habere, &c, animos tollere, bene factum, considtor, prosapia, dolus, venerium, obsequela, inquies, sallere, occipere, collibeo, and the like, where we may notice especially the fondness for frequentatives, which he shares with the early comedy; partly in inflections which were growing obsolete, such as senati, solui, comperior (dep.), neglegisset, vis (ace. pi.) nequitur. In syntax his constructions are for the most part those of the contemporary writers.

56. Lucretius is largely archaic in his style. We find im for eum, endo for in, illae, ullae, unae and aliae as genitives, alii for aliud, rabies as a genitive by the side of genitives in -at, ablatives in -i like colli, orbi, parti, nominatives in 5 for r, like colos, vapos, humos. In verbs there are scatit, fulgit, quaesit, confluxet = confluxisset, recesse = recessisse, induiacere for inicere; simple forms like fligere, .lacere, cedere, stinguere for the more usual compounds, the infinitive passive in -ier, and archaic forms from esse like siet, escit, fuat. Sometimes he indulges in tmesis which reminds us of Ennius: inque pediri, disque supata, ordia prima. But this archaic tinge is adopted only for poetical purposes, and as a proof of his devotion to the earlier masters of his art ; it does not affect the general substance of his style, which is of the freshest and most vigorous stamp. But the purity of his idiom is not gained by any slavish adherence to a recognized vocabulary: he coins words freely; Munro has noted more than a hundred cbraf \ey6ˆeva, or words which he alone among good writers uses. Many of these are formed on familiar models, such as compounds and frequentatives; others are directly borrowed from the Greek apparently with a view to sweetness of rhythm (ii. 412, v. 334, 505); others again (forty or more in number) are compounds of a kind which the classical language refused to adopt, such as silvifragus, terriloquus, perterricrepus. He represents not so much a stage in the history of the language as a protest against the tendencies fashionable in his own time. But his influence was deep upon Virgil, and through him upon all subsequent Latin literature.

57. Catullus gives us the type of the language of the cultivated circles, lifted into poetry by the simple directness with which it is used to express emotion. In his heroic and elegiac poems he did not escape the influence of the Alexandrian school, and his genius is ill suited for long-continued flights; but in his lyrical poems his language is altogether perfect. As Macaulay says: ” No Latin writer is so Greek. The simplicity, the pathos, the perfect grace, which I find in the great Athenian models are all in Catullus, and in him alone of the Romans.” The language of these poems comes nearest perhaps to that of Cicero’s more intimate letters. It is full of colloquial idioms and familiar language, of the diminutives of affection or of playfulness. Greek words are rare, especially in the lyrics, and those which are employed are only such as had come to be current coin. Archaisms are but sparingly introduced; but for metrical reasons he has four instances of the inf. pass., in -ier, and several contracted forms; we find also alls and olid, uni (gen.), and the antiquated tetuli and recepso. There are traces of the popular language in the shortened imperatives cave and mang, in the analytic perfect paratam habes, and in the use of unus approaching that of the indefinite article.

58. Horace. — The poets of the Augustan age mark the opening of a new chapter in the history of the Latin language. The influence of Horace was less than that of his friend and con- temporary Virgil; for Horace worked in a field of his own, and,

although Statius imitated his lyrics, and Persius and Juvenal, especially the former, his satires, on the whole there are few traces of any deep marks left by him on the language of later writers. In his Satires and Epistles the diction is that of the contemporary urbaniias, differing hardly at all from that of Cicero in his epistles and dialogues. The occasional archaisms, such as the syncope in erepsemus, evasse, surrexe, the infinitives in -ier, and the genitives deum, divum, may be explained as still conversationally allowable, though ceasing to be current in literature; and a similar explanation may account for plebeian terms, e.g. balatro, blatero, giarrio, mutto, vappa, caldus, soldus, surpite, for the numerous diminutives, and for such pronouns, adverbs, conjunctions and turns of expression as were common in prose, but not found, or found but rarely, in elevated poetry. Greek words are used sparingly, not with the licence which he censures in Lucilius, and in his hexameters are framed according to Latin rules. In the Odes, on the other hand, the language is much more precisely limited. There are practically no archaisms (spargier in Carm. iv. n. 8 is a doubtful exception), or plebeian expressions; Greek inflections are employed, but not with the licence of Catullus; there are no datives in i or sin like Tethyi or Dryasin; Greek constructions are fairly

numerous, e.g. the genitive with verbs like regnare, abstinere, desinere, and with adjectives, as integer vitae, the so-called Greek accusative, the dative with verbs of cqntest, like luctari, decertare, the transitive use of many intransitive verbs in the past participle, as regnatus, Iriumphatus; and finally there is a ” prolative ” use of the infinitive after verbs and adjectives, where prose would have employed other constructions, which, though not limited to Horace, is more common with him than with other poets. Compounds are very sparingly employed, and apparently only when sanctioned by authority. His own innovations in voca- bulary are not numerous. About eighty cfora£ \ey6fieva have been noted. Like Virgil, he shows his exquisite skill in the use of language rather in the selection from already existing stores, than in the creation of new resources: tantum series iuncturaque pallet. But both his diction and his syntax left much less marked traces upon succeeding writers than did those of either Virgfi or Ovid.

59. Virgil. — In Virgil the Latin language reached its full maturity. What Cicero was to the period, Virgil was to the hexameter; indeed the changes that he wrought were still more marked, inasmuch as the language of verse admits of greater subtlety and finish than even the most artistic prose. For the straightforward idiomatic simplicity of Lucretius and Catullus he substituted a most exact and felicitous diction, rich with the suggestion of the most varied sources of inspiration. Sometimes it is a phrase of Homer’s “conveyed” literally with happy boldness, sometimes it is a line of Ennius, or again some artistic Sophoclean combination. Virgil was equally familiar with the great Greek models of style and with the earlier Latin poets. This learning, guided by an unerring sense of fitness and harmony, enabled him to give to his diction a music which recalls at once the fullest tones of the Greek lyre and the lofty strains of the most genuinely national song. His love of antiquarianism in language has often been noticed, but it never passes into pedantry. His vocabulary and constructions are often such as would have conveyed to his contemporaries a grateful flavour of the past, but they would never have been unintelligible. Forms like iusso, olle or admittier can have delayed no one.

In the details of syntax it is difficult to notice any peculiarly Virgilian points, for the reason that his language, like that of Cicero, became the canon, departures from which were accounted irregularities. But we may notice as favourite constructions a free use of oblique cases in the place of the more definite con- struction with prepositions usual in prose, e.g. it clamor caelo, flet noctem, rivis currentia vina, bacchatam iugis Naxon, and many similar phrases; the employment of some

substantives as adjectives, like venator canis, and vice versa, as plurimus volitans; a proleptic use of adjectives, as tristia torquebit; idioms involving ille, atque, deinde, haud, quin, vix, and the frequent occurrence of passive verbs in their earlier reflexive sense, as induor, velor, pastor.

60. Livy. — In the singularly varied and beautiful style of Livy we find Latin prose in rich maturity. To a training in the rhetorical schools, and perhaps professional experience as a teacher of rhetoric, he added a thorough familiarity with con- temporary poetry and with the Greek language; and these attainments have all deeply coloured his language. It is probable that the variety of style naturally suggested by the wide range of his subject matter was increased by a half-unconscious adoption of the phrases and constructions ‘ of the different authorities whom he followed in different parts of his work; and the industry of German critics has gone far to demonstrate a conclusion likely enough in itself. Hence perhaps comes the fairly long list of archaisms, especially in formulae (cf. Kiihnast, Liv. Synt. pp. 14-18). These are, however, purely isolated phenomena, which do not affect the general tone. It is different with the poetical constructions and Graecisms, which appear on every page. Of the latter we find numerous instances in the use of the cases, e.g. in genitives like via praedae omissae, oppidum Antiochiae, aequum campi; in datives like quibusdam volentibus erat; in accusatives like iurare calumniam, certare multam; an especially frequent use of transitive verbs absolutely; and the constant omission of the reflexive pronoun as the subject of an infinitive in reported speech. To the same source must be assigned the very frequent pregnant construction with preposi- tions, an attraction of relatives, and the great extension of the employment of relative adverbs of place instead of relative pronouns, e.g. quo = in quern. Among his poetical characteristics we may place the extensive list of words which are found for the first time in his works and in those of Virgil or Ovid, and perhaps his common use of concrete words for collective, e.g. eques for equitatus, of abstract terms such as remigium, servitia, robora, and of frequentative verbs, to say nothing of poetical phrases like haec ubi dicta dedit, adversum montium, &c. Indications of the extended use of the subjunctive, which he shares with con- temporary writers, especially poets, are found in the construction of ante quam, post quam with this mood, even when there is no underlying notion of anticipation, of donee, and of cum meaning ” whenever.” On the other hand, forsitan and quamvis, as in

the poets, are used with the indicative in forgetfulness of their original force. Among his individual peculiarities may be noticed the large number of verbal nouns in -tus (for which Cicero prefers forms in -tio) and in tor, and the extensive use of the past passive participle to replace an abstract substantive, e.g. ex dictatorio imperio concusso. In the arrangement of words Livy is much more free than any previous prose writer, aiming, like the poets, at the most effective order. His periods are con structed with less regularity than those of Cicero, but they gain at least as much in variety and energy as they lose in uniformity of rhythm and artistic finish. His style cannot be more fitly described than in the language of Quintilian, who speaks of his mira iucunditas and lactea ubertas.

61. Propertius. — The language of Propertius is too distinctly his own to call for detailed examination here. It cannot be taken as a specimen of the great current of the Latin language; it is rather a tributary springing from a source apart, tinging to some slight extent the stream into which it pours itself, but soon ceasing to affect it in any perceptible fashion. ” His obscurity, his indirectness and his incoherence ” (to adopt the words of J. P. Postgate) were too much out of harmony with the Latin taste for him to be regarded as in any sense representa- tive; sometimes he seems to be hardly writing Latin at all. Partly from his own strikingly independent genius, partly from his profound and not always judicious study of the Alexandrian writers, his poems abound in phrases and constructions which are without a parallel in Latin poetry. His archaisms and Graecisms, both in diction and in syntax, are very numerous; but frequently there is a freedom in the use of cases and pre- positions which can only be due to bold and independent innova- tions. His style well deserves a careful study for its own sake (cf. J. P. Postgate’s Introduction, pp. lvii.-cxxv.) ; but it is of comparatively little significance in the history of the language.

62. Ovid. — The brief and few poems of Tibullus supply only

what is given much more fully in the works of Ovid. In these we have the language recognized as that best fitted for poetry by the fashionable circles in the later years of Augustus. The style of Ovid bears many traces of the imitation of Virgil, Horace and Propertius, but it is not less deeply affected by the rhetoric of the schools. His never-failing fertility of fancy and command of diction often lead him into a diffuseness which mars the effect of his best works; according to Quintilian it was only in his (lost) tragedy of Medea that he showed what real excellence he might have reached if he had chosen to control his natural powers. His influence on later poets was largely for

evil; if he taught them smoothness of versification and polish of language, he also co-operated powerfully with the practice of recitation to lead them to aim at rhetorical point and striking turns of ex- pression, instead of a firm grasp of a subject as a whole, and due subordination of the several parts to the general impression. Ovid's own influence on language was not great; he took the diction of poetry as he found it, formed by the labours of his predecessors; the conflict between the archaistic and the Graecizing schools was already settled in favour of the latter; and all that he did was to accept the generally accepted models as supplying the material in moulding which his luxuriant fancy could have free play. He has no deviations from classical syntax but those which were coming into fashion in his time {e.g. forsitan and quamvis with the indie, the dative of the agent with passive verbs, the ablative for the accusative of time, the infinitive after adjectives like certus, aptus, &c), and but few peculiarities in his vocabulary. It is only in the letters from the Pontus that laxities of construction are detected, which show that the purity of his Latin was impaired by his residence away from Rome, and perhaps by increasing carelessness of com- position.

63. The Latin of Daily Life. — While the leading writers of the Ciceronian and Augustan eras enable us to trace the gradual development of the Latin language to its utmost finish as an instrument of literary expression, there are some less important authors who supply valuable evidence of the character of the sermo plebeius. Among them may be placed the authors of the Bellum Africanum and the Bellum Hispaniense appended to Caesar's Commentaries. These are not only far inferior to the exquisite urbanitas of Caesar's own writings; they are much rougher in style even than the less polished Bellum Alexandrinwm and De Bello Gallico Liber VIII., which are now with justice ascribed to Hirtius. There is sufficient difference between the two to justify us in assuming two different authors; but both freely employ words and constructions which are at once anti- quated and vulgar. The writer of the Bellum Alexandrinum uses a larger number of diminutives within his short treatise than Caesar in nearly ten times the space; postquam and ubi are used with the pluperfect subjunctive; there are numerous forms unknown to the best Latin, like tristimonia, exporrigere, cruciabiliter and convulnero; potior is followed by the accusative, a simple relative by the subjunctive. There is also a very common use of the pluperfect for the imperfect, which seems a mark of this plebeius sermo (Nipperdey, Quaest. Caes. pp. 13-30).

Another example of what we may call the Latin of business life is supplied by Vitruvius. Besides the obscurity of many of his technical

expressions, there is a roughness and looseness in his language, far removed from a literary style; he shares the incorrect use of the pluperfect, and uses plebeian forms like calefaciuntur, faciliter, expertiones and such careless phrases as rogavit Archimedem uti in se sumeret sibi de eo cogitationem. At a somewhat later stage we have, not merely plebeian, but also provincial Latin represented in the Satyricon of Petronius. The narrative and the poems which are introduced into it are written in a style distinguished only by the ordinary peculiarities of silver Latinity; but in the numerous conversations the distinctions of language appropriate to the various speakers are accurately preserved; and we have in the talk of the slaves and provincials a perfect storehouse of words and constructions of the greatest linguistic value. Among the unclassical forms and constructions may be noticed masculines like faius, vinus, balneus, fericulus and lactem (for lac), striga for strix, gauiimonium and tristimonium, sanguen, manducare, nutricare, melestare, nesapius (sapius = Fr. sage) , rostrum (= os), ipsimus (= master) , scordalias, baro, and numerous diminutives like camella, audaculus, potiuncula.

savunculum, offla, peduclus, corcillum, with constructions such as maledicere ana persuadere with the accusative, and adiutare with the dative, and the deponent forms pudeatur and ridetur. Of especial interest for the Romance languages are astrum (desastre), berbex (brebis), boiellus (boyau), improperare, muttus, naufragare.

Suetonius {Aug. c. 87) gives an interesting selection of plebeian words employed in conversation by Augustus, who for the rest was something of a purist in his written utterances: ponit assidue et pro stulto baceolum, et pro pullo pulleiaceum, et pro cerrito vacerrosum, et vapide se habere pro male, et betizare pro languere, quod vulgo lachani- zare dicitur.

The inscriptions, especially those of Pompeii, supply abundant evidence of the corruptions both of forms and of pronunciation common among the vulgar. It is not easy always to determine whether a mutilated form is evidence of a letter omitted in pro- nunciation, or only in writing; but it is clear that the ordinary man habitually dropped final m, s, and t, omitted n before s, and pro- nounced t like e. There are already signs of the decay of ae to e, which later on became almost universal. The additions to our vocabulary are slight

and unimportant (cf. Corpus Inscr. hat. iv., with Zangemeister s Indices).

64. To turn to the language of literature. In the dark days of Tiberius and the two succeeding emperors a paralysis seemed to have come upon prose and poetry a.like. With the one ex- ception of oratory, literature had long been the utterance of a narrow circle, not the expression of the energies of national life; and now, while all free speech in the popular assemblies was silenced, the nobles were living under a suspicious despotism, which, whatever the advantage which it brought to the poorer classes and to the provincials, was to them a reign of terror. It is no wonder that the fifty years after the accession of Tiberius are a blank as regards all higher literature. Velleius Paterculus, Valerius Maximus, Celsus and Phaedrus give specimens of the Latin of the time, but the style of no one of these, classical for the most part in vocabulary, but occasionally approaching the later usages in syntax, calls for special analysis. The elder Seneca in his collection of suasoriae and controversial supplies examples of the barren quibblings by which the young Romans were trained in the rhetorical schools. A course of instruction, which may have been of service when its end was efficiency in active public life, though even then not without its serious draw- backs, as is shown by Cicero in his treatise De Oratore, became seriously injurious when its object was merely idle display. Prose came to be overloaded with ornament, and borrowed too often the language, though not the genius, of poetry; while poetry in its turn, partly owing to the fashion of recitation, became a string of rhetorical points.

65- Seneca, Persius and Lucan. — In the writers of Nero's age there are already plain indications of the evil effects of the rhetorical schools upon language as well as literature. The leading man of letters was undoubtedly Seneca the younger, " the Ovid of prose"; and his style set the model which it became the fashion to imitate. But it could not commend itself to the judgment of sound critics like Quintilian, who held firmly to the great masters of an earlier time. He admits its brilliance, and the fertility of its pointed reflections, but charges the author justly with want of self-restraint, jerkiness, frequent repetitions and tawdry tricks of rhetoric. Seneca was the worst of models, and pleased by his very faults. In his tragedies the rhetorical elaboration of the style only serves to bring into prominence the frigidity and frequent bad taste of the matter. But his diction is on the whole fairly classical; he is, in the words of Muretus, vetusti sermonis diligentior quam quidam inepte fastidiosi suspicantur. In Persius there is a constant straining after rhetorical effect, which fills his verses with harsh and obscure expressions. The careful choice of

diction by which his master Horace makes every word tell is exaggerated into an endeavour to gain force and freshness by the most contorted phrases. The sin of allusiveness is fostered by the fashion of the day for epigram, till his lines are barely intelligible after repeated read- ing. Conington happily suggested that this style was assumed only for satiric purposes, and pointed out that when not writing satire Persius was as simple and unaffected as Horace himself. This view, while it relieves Persius of much of the censure which has been directed against his want of judgment, makes him all the more typical a representative of this stage of silver

Latinity. In his contemporary Lucan we have another example of the faults of a style especially attractive to the young, handled by a youth of brilliant but ill-disciplined powers. The Pharsalia abounds in spirited rhetoric, in striking epigram, in high sounding declamation; but there are no flights of sustained imagination, no ripe wisdom, no self-control in avoiding the exaggerated or the repulsive, no mature philosophy of life or human destiny. Of all the Latin poets he is the least Virgilian. It has been said of him that he corrupted the style of poetry, not less than Seneca that of prose.

66. Pliny, Quintilian, Frontinus. — In the elder Pliny the same tendencies are seen occasionally breaking out in the midst of the prosaic and inartistic form in which he gives out the stores of his cumbrous erudition. Wherever he attempts a loftier tone than that of the mere compiler, he falls into the tricks of Seneca. The nature of his encyclopaedic subject matter naturally makes his vocabulary very extensive; but in syntax and general tone of language he does not differ materially from contemporary writers. Quintilian is of interest especially for the sound judg- ment which led him to a true appreciation of the writers of Rome's golden age. He set himself strenuously to resist the tawdry rhetoric fashionable in his owh time, and to hold up before his pupils purer and loftier models. His own criticisms are marked by excellent taste, and often by great happiness of expression, which is pointed without being unduly epigrammatic. But his own style did not escape, as indeed it hardly could, the influences of his time; and in many small points his language falls short of classical purity. There is more approach to the simplicity of the best models in Frontinus, who furnishes a striking proof that it was rather the corruption of literary taste than any serious change in the language of ordinary cultivated men to which the prevalent style was due. Writing on practical matters — the art of war and the water-supply of Rome — he goes straight to the point without rhetorical flourishes; and the ornaments of style which he occasionally introduces serve to embellish but not to distort his thought.

67. The Flavian Age. — The epic poets of the Flavian age present a striking contrast to the writers of the Claudian period. As a strained originality was the cardinal fault of the one school, so a tame and slavish following of authority is the mark of the other. The general correctness of this period may perhaps be ascribed (with Merivale) partly to the political conditions, partly to the establishment of professional schools. Teachers like Quintilian must have done much to repress extravagance of thought and language; but they could not kindle the spark of genius. Valerius Flaccus, Silius Italicus and Papinius Statius are all correct in diction and in rhythm, and abound in learning; but their inspiration is drawn from books and not from nature or the heart; details are elaborated to the injury of the impression of the whole; every line is laboured, and overcharged with epigrammatic rhetoric. Statius shows by far the greatest natural ability and freshness; but he attempts to fill a broad canvas with drawing and colouring suited only to a miniature. Juvenal exemplifies the tendencies of the language of his time, as moulded by a singularly powerful mind. A careful study of the earlier poets, especially Virgil and Lucan, has kept his language up to a high standard of purity. His style is eminently rhetorical; but it is rhetoric of real power. The concise brevity by which it is marked seems to have been the result of a deliberate attempt to mould his natural diffuseness into the form recognized as most appropriate for satire. In his verses we notice a few metrical peculiarities which represent the pronunciation of his age, especially the shortening of the final -0 in verbs, but as a rule they conform to the Virgilian standard. In Martial the tendency of this period to witty epigram finds its most perfect embodiment, combined with finished versification.

68. Pliny the Younger and Tacitus. — The typical prose-writers of this time are Pliny the younger and Tacitus. Some features of the style of Tacitus are peculiar to himself; but on the whole the following statement represents the tendencies shared in greater or less degree by all the writers of this period. The gains lie mainly in the direction of a more varied and occasionally

more effective syntax; its most striking defect is a lack of harmony in the periods, of arrangements in words, of variety in particles arising from the loose connexion of sentences The vocabulary is extended, but there are losses as well as gains. Quintilian’s remarks are fully borne out by the evidence of extant authorities: on the one hand, quid quod

nihil iam proprium placet, dum parum creditur disertum, quod et alius dixisset (viii. prooem. 24) ; a corruptissimo quoque poetarum €guras seu transla- tiones mutuamur; turn demum ingeniosi scilicet, si ad intelligendos nos opus sit ingenio (ib. 25); sordet omne quod natura dictavit (ib. 26); on the other hand, nunc utique, cum haec exercitatio procul a veritate seiuncta laboret incredibili verborum fastidio, ac sibi magnam partem sermonis absciderit iym. 3, 23), multa cotidie ab antiquis ficta moriunlur (ib. 6, 32). A writer like Suetonius therefore did good service in introducing into his writings terms and phrases borrowed, not from the rhetoricians, but from the usage of daily life.

69. In the vocabulary of Tacitus there are to be noted : —

1. Words borrowed (consciously or unconsciously) from the classical poets, especially Virgil, occurring for the most part also in contemporary prose. Of these Drager gives a list, of ninety-five (Syntax und Stil des Tacitus, p. 96).

2. Words occurring only, or for the first time, in Tacitus. These are for the most part new formations or compounds from stems already in use, especially verbal substantives in -tor and -sor, -tus and -sus, -tura and -mentum, with new frequentatives.

3. Words used with a meaning (a) not found in earlier prose, but sometimes borrowed from the poets, e.g. componere, ” to bury ” ; scriplura, ” a writing”; ferratus “armed with a sword”; (b) peculiar to later writers, e.g. numerosus, “numerous”; famosus, “famous”; decollate, “to behead”; imputare, “to take credit for,” &c. ; (c) restricted to Tacitus himself, e.g. dispergere — divolgare.

Generally speaking, Tacitus likes to use a simple verb instead of a compound one, after the fashion of the poets, employs a pluperfect for a perfect, and (like Livy and sometimes Caesar) aims at vividness and variety by retaining the present and perfect subjunctive in indirect speech even after historical tenses. Collective words are followed by a plural far more commonly than in Cicero. The ellipse of a verb is more frequent. The use of the cases approximates to that of the poets, and is even more free. The accusative of limitation is common in Tacitus, though never found in Quintilian. Compound verbs are frequently followed by the accusative where the dative might have been expected; and the Virgilian construction of an accusative with middle and passive verbs is not unusual. The dative of purpose and the dative with a substantive in place of a genitive are more common with Tacitus than with any writer. The ablative of separation is used without a preposition, even with names of countries and with

common nouns; the ablative of place is employed similarly without a preposition; the ablative of time has sometimes the force of duration; the instrumental ablative is employed even of persons. A large extension is given to the use of the quantitative genitive after neuter adjectives and pronouns, and even adverbs, and to the genitive with active participles; and the genitive of relation after adjectives is (probably by a Graecism) very freely employed. In regard to prepositions, there are special uses of extra, erga, iuxta and tenus to be noted, and a frequent tendency to interchange the use of a preposition with that of a simple case in corresponding clauses. In subordinate sentences quod is used for ” the fact that,” and sometimes approaches the later use of “that ” ; the infinitive follows many verbs and adjectives that do not admit of this construction in classical prose; the accusative and infinitive are used after negative expressions of doubt, and even in modal and hypothetical clauses.

Like Livy, the writers of this time freely employ the subjunctive of repeated action with a relative, and extend its use to relative conjunctions, which he does not. In clauses of comparison and proportion there is frequently an ellipse of a verb (with nihil aliud ijuam, ut, tanquam) ; tanquam, quasi and velut are used to imply not comparison but alleged reason; quin and quominus are inter- changed at pleasure. Quamquam and quamvis are commonly followed by the subjunctive, even when denoting facts. The free use of the genitive and dative of the gerundive to denote purpose is common in Tacitus, the former being almost limited to him. Livy’s practice in the use of participles is extended even beyond the limits to which he restricts it. It has been calculated that where Caesar uses five participial clauses, Livy has sixteen, Tacitus twenty-four.

In his compressed brevity Tacitus may be said to be individual; Lilt in the poetical colouring of his diction, in the rhetorical cast of h;3 sentences, and in his love for picturesqueness and variety he is a true representative of his time.

70. Suetonius. — The language of Suetonius is of interest as giving a specimen of silver Latinity almost entirely free from personal idiosyncrasies; his expressions are regular and straight- forward, clear and business-like; and, while in grammar he

does not attain to classical purity, he is comparatively free from rhetorical affectations.

71. The African Latinity. — A new era commences with the accession of Hadrian (117). As the preceding half century had been marked by the influence of Spanish Latinity (the Senecas, Lucan, Martial, Quintilian), so in this the African style was paramount. This is the period of affected archaisms and pedantic learning, combined at times with a reckless love of innovation and experiment, resulting in the creation of a large number of new formations and in the adoption of much of the plebeian dialect. Fronto and Apuleius mark a strong reaction against the culture of the preceding century, and for evil far more than for good the chain of literary tradition was broken. The language which had been unduly refined and elaborated now relapsed into a tasteless and confused patch-work, without either harmony or brilliance of colouring. In the case of the former the subject matter is no set-off against the inferiority of the style. He deliberately attempts to go back to the obsolete diction of writers like Cato and Ennius. We find compounds like altipendulus, nudiustertianus, tolutiloquentia, diminutives such as matercella, anulla, passercula, studiolum, forms like congarrire, disconcinnus, pedetemptius, desiderantissimus (passive), conticinium\ gaudeo, oboedio and perfungor are used with an accusative, modestus with a genitive. On the other hand he actually attempts to revive the form asa for ara. In Apuleius the archaic element is only one element in the queer mixture which constitutes his style, and it probably was not intended to give the tone to the whole. Poetical and prosaic phrases, Graecisms, solecisms, jingling assonances, quotations and coinages apparently on the spur of the moment, all appear in this wonderful medley. There are found such extraordinary genitives as sitire beatitudinis , cenae pignerarer, incoram omnium, foras corporis, sometimes heaped one upon another as fluxos vestium Arsacidas et frugum pauper es Ityraeos et odorum divites Arabas. Diminutives are coined with reckless freedom, e.g. diutule, longule, mundule amicta el altiuscule sub ipsas papillas succinctula. He confesses himself that he is writing in a language not familiar to him' In urbe Latia advena studiorum Quiritium indigenam sermonem aerumnabili labore, nullo magislro praeeunte, aggressus excolui; and the general impression of his style fully bears out his confession. Melanchthon is hardly too severe when he says that Apuleius brays like his own ass. The language of Aulus Gellius is much superior in purity; but still it abounds in rare and archaic words, e.g. edulcare, recentari, aeruscator, and in meaningless frequentatives like solitavisse. He has some admirable remarks on the pedantry of those who delighted in obsolete expressions (xi. 7) such as apluda, flocus and bovinator; but his practice falls far short of his theory.

72. The Lawyers. — The style of the eminent lawyers of this period,

foremost among whom is Gaius, deserves especial notice as showing well one of the characteristic excellences of the Latin language. It is for the most part dry and unadorned, and in syntax departs occasionally from classical usages, but it is clear, terse and exact. Technical terms may cause difficulty to the ordinary reader, but their meaning is always precisely defined; new compounds are employed whenever the subject requires them, but the capacities of the language rise to the demands made upon it; and the conceptions of jurisprudence have never been more adequately expressed than by the great Romanist jurists. (A. S. W.; R. S. C.)

For the subsequent history of the language see Romance Languages.

LATIN LITERATURE. The germs of an indigenous literature had existed at an early period in Rome and in the country dis- tricts of Italy, and they have an importance as indicating natural wants in the Italian race, which were ultimately satisfied by regular literary forms. The art of writing was first employed in the service of the state and of religion for books of ritual, treaties with other states, th° laws of the Twelve Tables and the like. An approach to literature was made in the Annates Maximi, records of private families, funeral orations and in-, scriDtions on busts and tombs such as those of the Scipios in

u

the Appian Way. In the satisfaction they afforded to the commemorative and patriotic instincts they anticipated an office afterwards performed by the national epics and the works of regular historians. A still nearer approach to literature was probably made in oratory, as we learn from Cicero that the famous speech delivered by Appius Claudius Caecus against concluding peace with Pyrrhus (280 B.C.) was extant in his time. Appius also published a collection of moral maxims and reflections in verse. No other name associated with any form of literature belonging to the pre-literary age has been preserved by tradition. But it was rather in the chants and litanies of the ancient religion, such as those of the Salii and the Fratres Arvales, and the dirges for the dead (neniae), and in certain extemporaneous effusions, that some germs of a native poetry might have been detected; and finally in the use of Saturnian verse, a metre of pure native origin, which by its rapid and lively movement gave expression to the vivacity and quick apprehension of the Italian race. This metre

was employed in ritual hymns, which seem to have assumed definite shapes out of the exclamations of a primi- tive priesthood engaged in a rude ceremonial dance. It was also used by a class of bards or itinerant soothsayers known by the name of vates, of whom the most famous was one Marcius, and in the " Fescennine verses," as sung at harvest-homes and weddings, which gave expression to the coarse gaiety of the people and to their strong tendency to personal raillery and satiric comment. The metre was also employed in commemorative poems, accompanied with music, which were sung at funeral banquets in celebration of the exploits and virtues of distin- guished men. These had their origin in the same impulse which ultimately found its full gratification in Roman history, Roman epic poetry, and that form of Roman oratory known as laudationes, and in some of the Odes of Horace. The latest and probably the most important of these rude and inchoate forms was that of dramatic saturae (medleys), put together without any regular plot and consisting apparently of contests of wit and satiric invective, and perhaps of comments on current events, accom- panied with music (Livy vii. 2). These have a real bearing on the subsequent development of Latin literature. They prepared the mind of the people for the reception of regular comedy. They may have contributed to the formation of the style of comedy which appears at the very outset much more mature than that of serious poetry, tragic or epic. They gave the name and some of the characteristics to that special literary product of the Roman soil, the satura, addressed to readers, not to spectators, which ultimately was developed into pure poetic satire in Lucilius, Horace, Persius and Juvenal, into the prose and verse miscellany of Varro, and into something approaching the prose novel in Petronius.

First Period : from 240 to about 80 . B.C.

The historical event which brought about the greatest change in the intellectual condition of the Romans, and thereby exercised a decisive influence on the whole course of human culture, was the capture of Tarentum in 272. After the capture many Greek slaves were brought to Rome, and among them the young Livius Andronicus (c. 284-204), who was employed in teaching Greek in the family of his master, a member of the Livian gens. From that time to learn Greek became a regular part of the education of a Roman noble. The capture of Tarentum was followed by the complete Romanizing of all southern Italy. Soon after came the first Punic war, the principal scene of which was Sicily, where, from common hostility to the Carthaginian, Greek and Roman were brought into friendly relations, and the Roman armies must have become familiar with the spectacles and performances of the Greek theatre. In the year after the war (240),

when the armies had returned and the people were at leisure to enjoy the fruits of victory, Livius Andronicus substituted at one of the public festivals a regular drama, translated or adapted from the Greek, for the musical medleys {saturae) hitherto in use. From this time dramatic performances became a regular accompaniment of the public games, and came more and more to encroach on

Livius

Aadroni

cus.

the older kinds of amusement, such as the chariot races. The dramatic work of Livius was mainly of educative value. The same may be said of his translation of the Odyssey, which was still used as a school-book in the days of Horace, and the religious hymn which he was called upon to compose in 207 had no high literary pretensions. He was, however, the first to familiarize the Romans with the forms of the Greek drama and the Greek epic, and thus to determine the main lines which Latin literature followed for more than a century afterwards.

His immediate successor, Cn. Naevius (d. c. 200 B.C.), was not, like Livius, a Greek, but either a Roman citizen or, more probably, a Campanian who enjoyed the limited citizenship of a Latin and who had served in the Roman army in the first Punic war. His first appearance as a dramatic author was in 235. He adapted both tragedies and comedies from the Greek, but the bent of his genius, the tastes of his audience, and the condition of the language developed through the active intercourse and business of life, gave a greater impulse to comedy than to tragedy. Naevius tried to use the theatre, as it had been used by the writers of the Old Comedy of Athens, for the purposes of political waTfare, and thus seems to have anticipated by a century the part played by Lucilius. But his attacks upon the Roman aristocracy, especially the Metelli, were resented by their objects; and Naevius, after being imprisoned, had to retire in his old age into banishment. He was not only the first in point of time, and according to ancient testimony one of the first in point of merit, among the comic poets of Rome, and in spirit, though not in form, the earliest of the line of Roman satirists, but he was also the oldest of the national poets. Besides cele- brating the success of M . Claudius Marcellus in 222 over the Gauls in a play called Clastidium, he gave the first specimen of the Jabula praetexta in his Alimonium Romuli et Remi, based on the most national of all Roman traditions. Still more important service was rendered by him in his long Saturnian poem on

the first Punic war, in which he not only told the story of contemporary events but gave shape to the legend of the settlement of Aeneas in Latium, — the theme ultimately adopted for the great national epic of Rome.

His younger contemporary T. Maccius Plautus (c. 254-184) was the greatest comic dramatist of Rome. He lived and wrote only to amuse his contemporaries, and thus, although more popular in his lifetime and more fortunate than any of the older authors in the ultimate survival of a large number of his works, he is less than any of the great writers of Rome in sympathy with either the serious or the caustic spirit in Latin literature. Yet he is the one extant witness to the humour and vivacity of the Italian temperament at a stage between its early rudeness and rigidity and its subsequent degeneracy.

Thus far Latin literature, of which the predominant character- istics are dignity, gravity and fervour of feeling, seemed likely to become a mere vehicle of amusement adapted to all classes of the people in their holiday mood. But a new spirit, which henceforth became predominant, appeared in the time of Plautus. Latin literature ceased to be in close sympathy with the popular spirit, either politically or as a form of amusement, but became the expression of the ideas, sentiment and culture of the aristo- cratic governing class. It was by Q. Ennius (239-169) of Rudiae in Messapia, that a new direction was given to Latin literature. Deriving from his birthplace the culture, literary and philosophical, of Magna Graecia, and having gained the friendship of the greatest of the Romans living in that great age, he was of all the early writers most fitted to be the medium of conciliation between the serious genius of ancient Greece and the serious genius of Rome. Alone among the older writers he was endowed with the gifts of a poetical imagination and animated with enthusiasm for a great ideal.

First among his special services to Latin literature was the fresh impulse which he gave to tragedy. He turned the eyes of his contemporaries from the commonplace social humours of later Greek life to the .contemplation of the heroic age. But he did not thereby denationalize the Roman drama. He animated the heroes of early Greece with the martial spirit of Roman

Plautus.

24°-&> B. C.J

soldiers and the ideal magnanimity and sagacity of Roman senators, and imparted weight and dignity to the language and verse in which their sentiments and thoughts were expressed. Although Rome, wanted creative force to add a great series of tragic dramas to the literature of the world, yet the spirit of elevation and moral authority breathed into tragedy by Ennius passed into the ethical and didactic writings and the oratory of a later time.

Another work was the Saturae, written in various metres, but chiefly in the trochaic tetrameter. He thus became the inventor of a new form of literature; and, if in his hands the satura was rude and indeterminate in its scope, it became a vehicle by which to address a reading public on matters of the day, or on the materials of his wide reading, in a style not far removed from the language of common life. His greatest work, which made the Romans regard him as the father of their litera- ture, was his epic poem, in eighteen books, the Annates, in which the record of the whole career of Rome was unrolled with idealiz- ing enthusiasm and realistic detail. The idea which inspired Ennius was ultimately realized in both the national epic of Virgil and the national history of Livy. And the metrical vehicle which he conceived as the only one adequate to his great theme was a rude experiment, which was ultimately de- veloped into the stately Virgilian hexameter. Even as a gram- marian he performed an important service to the literary language of Rome, by fixing its prosody and arresting the tendency to decay in its final syllables. Although of his writings only fragments remain, these fragments are enough, along with what we know of him from ancient testimony, to justify us in regarding him as the most important among the makers of Latin literature before the age of Cicero.

There is still one other name belonging partly to tins, partly to the next generation, to be added to those of the men of original force of mind and character who created Latin litera- ture, that of M. Porcius Cato the Censor (234-149), the younger contemporary of Ennius, whom he brought to Rome. More than Naevius and Plautus he represented the pure native element in that literature, the mind and character of Latium, the plebeian pugnacity, which was one of the great forces in the Roman state. His lack of imagination and his narrow patriotism made him the natural leader of the reaction against the new Hellenic culture. He strove to make literature ancillary to politics and to objects of practical utility, and thus started prose

literature on the chief lines that.it afterwards followed. Through his industry and vigorous understanding he gave a great impulse to the creation of Roman oratory, history and systematic didactic writing. He was one of the first to publish his speeches and thus to bring them into the domain of literature. Cicero, who speaks of 150 of these speeches as extant in his day, praises them for their acuteness, their wit, their conciseness. He speaks with emphasis of the impressiveness of Cato's eulogy and the satiric bitterness of his invective.

Cato was the first historical writer of Rome to use his native tongue. His Origines, the work of his old age, was written with that thoroughly Roman conception of history which regarded actions and events solely as they affected the continuous and progressive life of a state. Cato felt that the record of Roman glory could not be isolated from the story of the other Italian communities, which, after fighting against Rome for their owa independence, shared with her the task of conquering the world. To the wider national sympathies which stimulated the re- searches of the old censor into the legendary history of the Italian towns we owe some of the most truly national parts of Virgil's Aeneid.

In Naevius, Plautus, Ennius and Cato are represented the contending forces which strove for ascendancy in determining what was to be the character of the new literature. The work, begun by them, was carried on by younger contemporaries and successors; by Statius Caecilius (c. 2 20-1 68), an Insubrian Gaul, in comedy; in tragedy by M. Pacuvius (c. 220-132), the nephew of Ennius, called by Cicero the greatest of Roman tragedians;

and, in the following generation, by L. Accius (c. 170-86), who was more usually placed in this position. The impulse given to oratory by Cato, Ser. Sulpicius Galba and others, and along with it the development of prose composition, went on with increased momentum till the age of Cicero. But the interval between the death of Ennius (169) and the beginning of Cicero's career, while one of progressive advance in the appreciation of literary form and style, was much less distinguished by original force than the time immediately before and after the end of the second Punic war. The one complete survival of the generation after the death of Ennius, the comedy of P. Terentius „ Afer or Terence (c. 185-159), exemplifies the gain in literary accomplishment and the loss in literary freedom. Ter- ence has nothing Roman or Italian except his pure and idiomatic Latinity. His Athenian elegance affords the strongest contrast to the Italian rudeness of Cato's De Re Rustica. By looking at them together we understand how much the comedy of Terence was able to do to refine

and humanize the manners of Rome, but at the same time what a solvent it was of the discipline and ideas of the old republic. What makes Terence an im- portant witness of the culture of his time is tl ±at he wrote from the centre of the Scipionic circle, in which what was most humane and liberal in Roman statesmanship was combined with the appreciation of what was most vital in the Greek thought and literature of the time. The comedies of Terence may therefore be held to give some indication of the tastes of Scipio, Laelius and their friends in their youth. The influence of Panaetius and Polybius was more adapted to their maturity, when they led the state in war, statesmanship and oratory, and when the humaner teaching of Stoicism began to enlarge the sympathies of Roman jurists. But in the last years during which this circle kept together a new spirit appeared in Roman politics and a new power in Roman literature, — the revolutionary spirit evoked by the Gracchi in opposition to the long-continued ascendancy of the senate, and the new power of Roman satire, which was exercised impartially and unsparingly against both the excesses of the revolutionary spirit and the arrogance and incompetence of the extreme party among the nobles. Roman satire, though in form a legitimate development of the indigenous dramatic satura through the written satura of Ennius and Pacuvius, is really a birth of this time, and its author was the youngest of those admitted into the intimacy of the Scipionic circle, C. Lucilius of Suessa Aurunca (c. 180-103). Among the writers before the age of Cicero he alone deserves to be named with Naevius, Plautus Ennius and Cato as a great originative force in literature. For about thirty years the most important event in Roman literature was the production of the satires of Lucilius, in which the politics, morals, society and letters of the time were criticized with the utmost freedom and pungency, and his own personality was brought immediately and familiarly before his contemporaries. The years that intervened between his death and the beginning of the Ciceronian age are singularly barren in works of original value. But in one direction there was some novelty. The tragic writers had occasionally taken their subjects from Roman life (Jabulae praetextae) , and in comedy we find the corresponding togatae of Lucius Afranius and others, in which comedy, while assuming a Roman dress, did not assume the virtue of a Roman matron.

The general results of the last fifty years of the first period (130 to 80) may be thus summed up. In poetry we have the satires of Lucilius, the tragedies of Accius and of a a eaera / few successors among the Roman aristocracy, who results thus exemplified the affinity of the Roman stage to ˆJf* Roman oratory; various annalistic poems intended to serve as continuations of the great poem of Ennius; minor poems of

an epigrammatic and erotic character, unimportant anticipations of the Alexandrian tendency operative in the following period; works of criticism in trochaic tetrameters by Porcius Licinus and others, forming part of the critical and grammatical movement which almost from the first accompanied the creative movement in Latin literature, and which may be

Lucilius.

130 to 89

regarded as rude precursors of the didactic epistles that Horace devoted to literary criticism.

The only extant prose work which may be assigned to the end of this period is the treatise on rhetoric known by the title Ad Herennium (c. 84) a work indicative of the attention bestowed on prose style and rhetorical studies during the last century of the republic, and which may be regarded as a precursor of the oratorical treatises of Cicero and of the work of Quintilian. But the great literary product of this period was oratory, developed indeed with the aid of these rhetorical studies, but Oratory. itself the immediate outcome of the imperial interests, the legal conflicts, and the political passions of that time of agitation. The speakers and writers of a later age looked back on Scipio and Laelius, the Gracchi and their con- temporaries, L. Crassus and M. Antonius, as masters of their art. In history, regarded as a great branch of prose literature, it is not probable that much was accomplished, although, with History. tne advance of oratory and grammatical studies, there must have been not only greater fluency of composition but ‘he beginning of a richer and more ornate style. Yet Cicero denies to Rome the existence, before his own time, of any adequate historical literature. Nevertheless it was by the work of a number of Roman chroniclers during this period that the materials of early Roman history were systematized, and the record of the state, as it was finally given to the world in the artistic work of Livy, was extracted from the early annals, state documents and private memorials, combined into a coherent unity, and supplemented by invention and reflection. Amongst these chroniclers may be mentioned L. Calpurnius Piso Frugi (consul 133, censor 108), C. Sempronius

Tuditanus (consul 129), Cn. Gellius, C. Fannius (consul 122), L. Coelius Antipater, who wrote a narrative of the second Punic war about 120, and Sempronius Asellio, who wrote a history of his own times, have a better claim to be considered historians. There were also special works on antiquities and contemporary memoirs, and autobiographies such as those of M. Aemilius Scaurus, the elder, Q. Lutatius Catulus (consul 102 B.C.), and P. Rutilius Rufus, which formed the sources of future his- torians. (See further Annales; and Rome: History, Ancient, § " Authorities."

Although the artistic product of the first period of Latin literature which has reached us in a complete shape is limited to the comedies of Plautus and Terence, the influence of'the*** °^ tne l° st literature in determining the spirit, form period. and style of the eras of more perfect accomplishment which followed is unmistakable. While humour and vivacity characterize the earlier, and urbanity of tone the later development of comedy, the tendency of serious literature had been in the main practical, ethical, commemorative and satirical. The higher poetical imagination had appeared only in Ennius, and had been called forth in him by sympathy with the grandeur of the national life and the great personal qualities of its repre- sentative men. Some of the chief motives of the later poetry, e.g. the pleasures and sorrows of private life, had as yet found scarcely any expression in Latin literature. The fittest metrical vehicle for epic, didactic, and satiric poetry had been discovered, but its movement was as yet rude and inharmonious. The idiom of ordinary life and social intercourse and the more fervid and elevated diction of oratorical prose had made great progress, but the language of imagination and poetical feeling was, if vivid and impressive in isolated expressions, still incapable of being wrought into consecutive passages of artistic composition. The influences of Greek literature to which Latin literature owed its birth had not as yet spread beyond Rome and Latium. The Sabellian races of central and eastern Italy and the Italo-Celtic and Venetian races of the north, in whom the poetic susceptibility of Italy was most manifest two generations later, were not, until after the Social war, sufficiently in sympathy with Rome, and were probably not as yet sufficiently educated to induce them to contribute their share to the national literature. Hence the end of the Social war, and of the Civil war, which arose out of it, is most clearly a determining factor in Roman literature, and

may most appropriately be taken as marking the end of one period and the beginning of another.

Second Period: from 80 to 42 B.C.

The last age of the republic coincides with the first half of the Golden age of Roman literature. It is generally known as the Ciceronian age from the name of its greatest literary represent- ative, whose activity as as peaker and writer was unremitting during nearly the whole period. It is the age of purest excellence in prose, and of a new birth of poetry, characterized rather by great original force and artistic promise than by perfect accom- plishment. The five chief representatives of this age who still hold their rank among the great classical writers are Cicero, Caesar and Sallust in prose, Lucretius and Catullus in verse. The works of other prose writers, Varro and Cornelius Nepos, have been partially preserved; but these writers have no claim to rank with those already mentioned as creators and masters of literary style. Although literature had not as yet become a trade or profession, an educated reading public already existed, and books and intellectual intercourse filled a large part of the leisure of men actively engaged in affairs. Even oratory was intended quite as much for readers as for the audiences to which it was immediately addressed; and some of the greatest speeches which have come down from that great age of orators were never delivered at all, but were published as manifestoes after the event with the view of influencing educated opinion, and as works of art with the view of giving pleasure to educated taste. Thus the speeches of M.Tullius Cicero (106-43) belong to the domain of literature quite as much as to that of forensic or political oratory. And, although Demosthenes is a cicero master of style unrivalled even by Cicero, the literary interest of most of Cicero's speeches is stronger than that of the great mass of Greek oratory. It is urged with justice that the greater part of Cicero's Defence of Archias was irrelevant to the issue and would not have been listened to by a Greek court of justice or a modern jury. But it was fortunate for the interests of literature that a court of educated Romans could be influenced by the considerations there submitted to them. In this way a question of the most temporary interest, concerning an individual of no particular eminence or importance, has produced one of the most impressive vindications of literature ever spoken or written. Oratory at Rome assumed a new type from being cultivated as an art which endeavoured to produce persuasion not so much by intellectual conviction as by appeal to general human sympathies. In oratory, as in every other intellectual province, the Greeks had a truer sense of the limits and conditions of their art. But command over form is only one element in the making of an orator or poet. The largeness and dignity of the matter with which he has to deal are at least as important. The Roman oratory of the law courts had to deal not with petty questions of disputed property, of fraud, or violence, but with great imperial questions, with matters affecting the well-being of large provinces and

the honour and safety of the republic; and no man ever lived who, in these respects, was better fitted than Cicero to be the representative of the type of oratory demanded by the condition of the later republic. To his great artistic accomplishment, perfected by practice and elaborate study, to the power of his patriotic, his moral, and personal sympathies, and his passionate emotional nature, must be added his vivid imagination and the rich and copious stream of his language, in which he had no rival among Roman writers or speakers. It has been said that Roman poetry has produced few, if any, great types of character. But the Verres, Catiline, Antony of Cicero are living and permanent types. The story told in the Pro Clnentio may be true or false, but the picture of provincial crime which it presents is vividly dramatic. Had we only known Cicero in his speeches we should have ranked him with Demosthenes as one who had realized the highest literary ideal. We should think of him also as the creator and master of Latin style — and, moreover, not only as a great orator but as a just and appreciative critic of oratory. But to his services to Roman oratory we have to add his services not indeed

to philosophy but to the literature of philosophy. Though not a philosopher he is an admirable interpreter of those branches of philosophy which are fitted for practical application, and he presents us with the results of Greek reflection vivified by his own human sympathies and his large experience of men. In giving a model of the style in which human interest can best be imparted to abstract discussions, he used his great oratorical gift and art to persuade the world to accept the most hopeful opinions on human destiny and the principles of conduct most conducive to elevation and integrity of character.

The Letters of Cicero are thoroughly natural — colloquia absenlium amicorum, to use his own phrase. Cicero's letters to Atticus, and to the friends with whom he was completely at his ease, are the most sincere and immediate expression of the thought and feeling of the moment. They let us into the secret of his most serious thoughts and cares, and they give a natural outlet to his vivacity of observation, his wit and humour, his kindliness of nature. It shows how flexible an instrument Latin prose had become in his hand, when it could do justice at once to the ample and vehement volume of his oratory, to the calmer and

more rhythmical movement of his philosophical meditation, and to the natural interchange of thought and feeling in the everyday intercourse of life.

Among the many rival orators of the age the most eminent were Quintus Hortensius Ortalus and C. Julius Caesar. The c former was the leading representative of the Asiatic

or florid style of oratory, and, like other members of the aristocracy, such as C.Memmius and L. Manlius Torquatus, and like Q. Catulus in the preceding generation, was a kind of dilettante poet and a precursor of the poetry of pleasure, which attained such prominence in the elegiac poets of the Augustan age. Of C. Julius Caesar (102-44) as an orator we can judge only by his reputation and by the testimony of his great rival and adversary Cicero; but we are able to appreciate the special praise of perfect taste in the use of language attributed to him. 1 In his Commentaries, by laying aside the ornaments of oratory, he created the most admirable style of prose narrative, the style which presents interesting events in their sequence of time and dependence on the will of the actor, rapidly and vividly, with scarcely any colouring of personal or moral feeling, any oratorical passion, any pictorial illustration. While he shows the persuasive art of an orator by presenting the subjugation of Gaul and his own action in the Civil War in the light most favourable to his claim to rule the Roman world, he is entirely free from the Roman fashion of self laudation or disparagement of an adversary. The character of the man reveals itself especially in a perfect simplicity of style, the result of the clearest intelligence and the strongest sense of personal dignity. He .avoids not only every unusual but every superfluous word; and, although no writing can be more free from rhetorical colouring, yet there may from time to time be detected a glow of sympathy, like the glow of generous passion in Thucydides, the more effective from the reserve with which it betrays itself whenever he is called on to record any act of personal heroism or of devotion to military duty. In the simplicity of his style, the directness of his narrative, the entire absence of any didactic tendency, Caesar presents a marked contrast to another prose writer of that age — the historian C. Sallustius Crispus or Sallust (c. 87-36). Like Varro, he survived Cicero by some years, but the tone and spirit in which his works are written assign him to the republican era. He was the first of the purely artistic historians, as distinct from the annalists and the writers of personal memoirs. He imitated the Greek historians in taking particular actions — the Jugurthan War and the Catilinarian Conspiracy — as the subjects of artistic treatment. He wrote also a continuous work, Historiae, treating of the events of the twelve years following the death of Sulla, of which only fragments are

preserved. His two extant works are more valuable as artistic studies of the rival parties in the state and of personal character than as trustworthy narratives of facts. His style aims at effectiveness by pregnant expression, sententiousness, archaism. He produces the impression of 1 Latine loqui elegantissime.

Varro.

Sallust.

caring more for the manner of saying a thing than for its truth. Yet he has great value as a painter of historical portraits, some of them those of his contemporaries, and as an author who had been a political partisan and had taken some part in making history before undertaking to write it; and he gives us, from the popular side, the views of a contemporary on the politics of the time. Of the other historians, or rather annalists, who belong to this period, such as Q. Claudius Quadrigarius, Q. Valerius Antias, and C. Licinius Macer, the father of Calvus, we have only frag- ments remaining.

The period was also remarkable for the production of works which we should class as technical or scientific rather than literary. The activity of one of these writers was so great that he is entitled to a separate mention. This was M. Terentius Varro, the most learned not only of the Romans but of the Greeks, as he has been called. The list of Varro's writings includes over seventy treatises and more than six hundred books dealing with topics of every conceivable kind. His Menippeae Saturae, miscellanies in prose and verse, of which unfortunately only fragments are left, was a work of singular literary interest.

Since the Annals of Ennius no great and original poem had appeared. The powerful poetical force which for half a century continued to be the strongest force in literature, and i ucretlus which created masterpieces of art and genius, first revealed itself in the latter part of the Ciceronian age. The conditions which enabled the poetic genius of Italy to come to maturity in the person of T. Lucretius Carus (96-55) were entire seclusion from public life and absorption in the ideal pleasures of contemplation and artistic production. This isolation from the familiar ways of his contemporaries, while it was, according to tradition and the internal evidence of his poem, destructive to his spirit's health, resulted in a work of genius, unique in character, which still stands forth as the greatest philosophical poem in any language. In the form of his poem he followed a Greek original; and the stuff out of which the texture of his philosophical argument is framed was

derived from Greek science; but all that is of deep human and poetical meaning in the poem is his own. While we recognize in the De Rerum Natura some of the most powerful poetry in any language and feel that few poets have penetrated with such passionate sincerity and courage into the secret of nature and some of the deeper truths of human life, we must acknowledge that, as compared with the great didactic poem of Virgil, it is crude and unformed in artistic design, and often rough and unequal in artistic execu- tion. Yet, apart altogether from its independent value, by his speculative power and enthusiasm, by his revelation of the life and spectacle of nature, by the fresh creativeness of his diction and the elevated movement of his rhythm, Lucretius exeicised a more powerful influence than any other on the art of his more perfect successors.

While the imaginative and emotional side of Roman poetry was so powerfully represented by Lucretius, attention was directed to its artistic side by a younger genera- catalhs. tion, who moulded themselves in a great degree on Alexandrian models. Such were Valerius Cato also a dis- tinguished literary critic, and C. Licinius Calvus, an eminent orator. Of this small group of poets one only has survived, fortunately the man of most genius among them, the bosom-friend of Calvus, C. Valerius Catullus (84-54). He too was a new force in Roman literature. He was a provincial by birth, although early brought into intimate relations with members of the great Roman families. The subjects of his best art are taken immediately from his own life — his loves, his friendships, his travels, his animosities, personal and political. His most original contribution to the substance of Roman literature was that he first shaped into poetry the experience of his own heart, as it had been shaped by Alcaeus and Sappho in the early days of Greek poetry. No poet has surpassed him in the power of vitally reproducing the pleasure and pain of the passing hour, not recalled by idealizing reflection as in Horace, nor overlaid with mythological ornament as in Propertius, but in all the keenness

of immediate impression. He also introduced into Roman literature that personal as distinct from political or social satire which appears later in the Epodes of Horace and the Epigrams of Martial. He anticipated Ovid in recalling the stories of Greek mythology to a

second poetical life. His greatest contribution to poetic art consisted in the perfection which he attained in the phalaecian, the pure iambic, and the scazon metres, and in the ease and grace with which he used the language of familiar intercourse, as distinct from that of the creative imagination, of the rostra, and of the schools, to give at once a lifelike and an artistic expression to his feelings. He has the interest of being the last poet of the free republic. In his life and in his art he was the precursor of those poets who used their genius as the interpreter and minister of pleasure; but he rises above them in the spirit of personal independence, in his affection for his friends, in his keen enjoyment of natural and simple pleasures, and in his power of giving vital expression to these feelings.

Third Period: Augustan Age, 42 B.C. to a.d. 17. ‘ ,

The poetic impulse and culture communicated to Roman literature in the last years of the republic passed on without influence an y k rea k of continuity into the literature of the of imperial succeeding age. One or two of the circle of Catullus institu- survived into that age; but an entirely new spirit tions. came over the literature of the new period, and it is

by new men, educated indeed under the same literary influences, but living in an altered world and belonging originally to a different order in the state, that the new spirit was expressed. The literature of the later republic reflects the sympathies and prejudices of an aristocratic class, sharing in the conduct of national affairs and living on terms of equality with one another; that of the Augustan age, first in its early serious enthusiasm, and then in the licence and levity of its later development, represents the hopes and aspirations with which the new mon- archy was ushered into the world, and the pursuit of pleasure and amusement, which becomes the chief interest of a class cut off from the higher energies of practical life, and moving in the refining and enervating atmosphere of an imperial court. The great inspiring influence of the new literature was the enthusiasm produced first by the hope and afterwards by the fulfilment of the restoration of peace, order, national glory, under the rule of Augustus. All that the age longed for seemed to be embodied ti a man who had both in his own person and by inheritance the natural spell which sways the imagination of the world. The sentiment of hero-worship was at all times strong in the Romans, and no one was ever the object of more sincere as well as simulated hero-worship than Augustus. It was not, however, by his equals in station that the first feeling was likely to be entertained. The earliest to give expression to it was Virgil; but the spell was soon acknowledged by the colder and more worldly-wise

Horace. The disgust aroused by the anti-national policy of Antony, and the danger to the empire which was averted by the result of the battle of Actium, com- bined with the confidence inspired by the new ruler to reconcile the great families as well as the great body of the people to the new order of things.

While the establishment of the empire produced a revival of national and imperial feeling, it suppressed all independent political thought and action. Hence the two great forms of prose literature which drew their nourishment from the struggles Of political life, oratory and contemporary history, were arrested in their development. The main course of literature was thus for a time diverted into poetry. That poetry in its most elevated form aimed at being the organ of the new empire and of realizing the national ideals of life and character under its auspices; and in carrying out this aim it sought to recall the great memories of the past. It became also the organ of the pleasures and interests of private life, the chief motives of which were the love of nature and the passion of love. It sought also to make the art and poetry of Greece live a new artistic life. Satire, debarred from comment on political action, turned to social and individual life, and combined with the newly-developed

taste for ethical analysis and reflection introduced by Cicero. One great work had still to be done in prose — a retrospect of the past history of the state from an idealizing and romanticizing point of view. For that work the Augustan age, as the end of one great cycle of events and the beginning of another, was eminently suited, and a writer who, by his gifts of imagination and sympathy, was perhaps better fitted than any other- man of antiquity for the task, and who through the whole of this period lived a life of literary leisure, was found to do justice to the subject.

Although the age did not afford free scope and stimulus to individual energy and enterprise, it furnished more material and social advantages for the peaceful cultivation of letters. The new influence of patronage, which in other times has chilled the genial current of literature, become, in the person of Maecenas, the medium through which literature and the imperial policy were brought into union. Poetry thus acquired the tone of the world, kept in close connexion with the chief source of national life, while it was cultivated to the highest pitch of artistic per- fection under the most favourable conditions of leisure and freedom from the distractions and anxieties of life.

The earliest in the order of time of the poets who adorn this age — P.

Vergilius Maro or Virgil (70-19) — is also the greatest in genius, the most richly cultivated, and the most vlmil. perfect in art. He is the idealizing poet of the hopes and aspirations and of the purer and happier life of which the age seemed to contain the promise. He elevates the present by associating it with the past and future of the world, and sanctifies it by seeing in it the fulfilment of a divine purpose. Virgil is the true representative poet of Rome and Italy, of national glory and of the beauty of nature, the artist in whom all the efforts of the past were made perfect, and the unapproach- able standard of excellence to future times. While more richly endowed with sensibility to all native influences, he was more deeply imbued than any of his contemporaries with the poetry, the thought and the learning of Greece. The earliest efforts of his art (the Eclogues) reproduce the cadences, the diction and the pastoral fancies of Theocritus; but even in these imi- tative poems of his youth Virgil shows a perfect mastery of his materials. The Latin hexameter, which in Ennius and Lucretius was the organ of the more dignified and majestic emotions, became in his hands the most perfect measure in which the softer and more luxurious sentiment of nature has been ex- pressed. The sentiment of Italian scenery and the love which the Italian peasant has for the familiar sights and sounds of his home found a voice which never can pass away.

In the Georgics we are struck by the great advance in the originality and self-dependence of the artist, in the mature perfection of his workmanship, in the deepening and strengthen- ing of all his sympathies and convictions. His genius still works under forms prescribed by Greek art, and under the disadvantage of having a practical and utilitarian aim imposed on it. But he has ever in form so far surpassed his originals that he alone has gained for the pure didactic poem a place among the highest forms of serious poetry, while he has so transmuted his material that, without violation of truth, he has made the whole poem alive with poetic feeling. The homeliest details of the farmer's work are transfigured through the poet's love of nature; through his religious feeling and his pious sympathy with the sanctities of human affection; through his patriotic sympathy with the national greatness; and through the rich allusiveness of his art to everything in poetry and legend which can illustrate and glorify his theme.

In the Eclogues and Georgics Virgil is the idealizing poet of the old simple and hardy life of Italy, as the imagination could conceive of it in an altered world. In the Aeneid he is the idealizing poet of national glory, as manifested in the person of Augustus. The epic of national life, vividly conceived but rudely executed by Ennius, was perfected in

the years that followed the decisive victory at Actium. To do justice to his idea Virgil enters into rivalry with a greater poet than those whom he had equalled or surpassed in his previous works. And,

Horace*

though he cannot unroll before us the page of heroic action with the power and majesty of Homer, yet by the sympathy with which he realizes the idea of Rome, and by the power with which he has used the details of tradition, of local scenes, of religious usage, to embody it, he has built up in the form of an epic poem the most enduring and the most artistically constructed monument of national grandeur.

The second great poet of the time— Q. Horatius Flaccus or Horace (68-8) is both the realist and the idealist of his age. If we want to know the actual lives, manners and ways of thinking of the Romans of the generation succeeding the overthrow of the republic it is in the' Satires and partially in the Epistles of Horace that we shall find them. If we ask what that time provided to stir the fancy and move the mood of imaginative reflection, it is in the lyrical poems of Horace that we shall find the most varied and trustworthy answer. His literary activity extends over about thirty years and naturally divides itself into three periods, each marked by a distinct character. The first — extending from about 40 to 29 — is that of the Epodes and Satires. In the former he imitates the Greek poet Archilochus, but takes his subjects from the men, women and incidents of the day. Personality is the essence of his Epodes; in the Satires it is used merely as illustrative of general tendencies'. In the Satires we find realistic pictures of social life, and the conduct and opinions of the world submitted to the standard of good feeling and common sense. The style of the Epodes is pointed and epigrammatic, that of the Satires natural and familiar. The hexameter no longer, as in Lucilius, moves awk- wardly as if in fetters, but, like the language of Terence, of Catullus in his lighter pieces, of Cicero in his letters to Atticus, adapts itself to the everyday intercourse of life. The next period is the meridian of his genius, the time of his greatest lyrical inspiration, which he himself associates with the peace and leisure secured to him by his Sabine farm. The life of pleasure which he had lived in his youth comes back to him, not as it was in its actual distractions and disappointments, but in the

idealiz- ing light of meditative retrospect. He had not only become reconciled to the new order of things, but was moved by his intimate friendship with Maecenas to aid in raising the world to sympathy with the imperial rule through the medium of his lyrical inspiration, as Virgil had through the glory of his ep;c art. With the completion of the three books of Odes he cast aside for a time the office of the vates, and resumed that of the critical spec- tator of human life, but in the spirit of a moralist rather than a satirist. He feels the increasing languor of the time as well as the languor of advancing years, and seeks to encourage younger men to take up the role of lyrical poetry, while he devotes himself to the contemplation of the true art of living. Self-culture rather than the fulfilment of public or social duty, as in the moral teaching of Cicero, is the aim of his teaching; and in this we recognize the influence of the empire in throwing the individual back on himself. As Cicero tones down his oratory in his moral treatises, so Horace tones down the fervour of his lyrical utter- ances in his Epistles, and thus produces a style combining the ease of the best epistolary style with the grace and concentration of poetry — the style, as it has been called, of ” idealized common sense,” that of the urbanus and cultivated man of the world who is also in his hours of inspiration a genuine poet. In the last ten years of his life Horace resumed his lyrical function for a time, under pressure of the imperial command, and produced some of the most exquisite and mature products of his art. But his chief activity is devoted to criticism. He first vindicates the claims of his own age to literary pre-eminence, and then seeks to stimulate the younger writers of the day to what he regarded as the manlier forms of poetry, and especially to the tragic drama, which seemed for a short time to give promise of an artistic revival.

But the poetry of the latter half of the Augustan age destined to survive did not follow the lines either of lyrical or of dramatic art marked out by Horace. The latest form of poetry adopted from Greece and destined to gain and permanently to hold the ear of the world was the elegy. From the time of Mimnermus this

Tibullus-

form seems to have presented itself as the most natural vehicle for the poetry of pleasure in an age of luxury, refinement and incipient decay. Its facile flow and rhythm seem to adapt it to the expression and illustration of personal feeling. It goes to the mind of the reader through a medium of sentiment rather than of continuous thought or imaginative illustration. The greatest masters of this kind of poetry are the elegiac poets of the Augustan age — Tibullus, Propertius and

Ovid.

Of the ill-fated C. Cornelius Gallus, their predecessor, we have but a single pentameter remaining. Of the three Tibullus (c. 54-19) is the most refined and tender. As the poet of love he gives utterance to the pensive melancholy rather than to the pleasures associated with it. In his sympathy with the life and beliefs of the country people he shows an affinity both to the idyllic spirit and to the piety of Virgil. There is something, too, in his fastidious refinement and in his shrinking from the rough contact of life that reminds us of the English poet Gray.

A poet of more strength and more powerful imagination, but of less refinement in his life and less exquisite taste in his art, is Sextus Propertius (c. 50-c. 15). His youth was a prgpgˆ,,ˆ more stormy one than that of Tibullus, and was passed, not like his, among the ” healthy woods ” of his country estate, but amid all the licence of the capital. His passion for Cynthia, the theme of his most finished poetry, is second only in interest to that of Catullus for Lesbia; and Cynthia in her fascination and caprices seems a more real and intelligible personage than the idealized object first of the idolatry and afterwards of the malediction of Catullus. Pro- pertius is a less accomplished artist and a less equably pleasing writer than either Tibullus or Ovid, but he shows more power of dealing gravely with a great or tragic situation than either of them, and his diction and rhythm give frequent proof of a con entrated force of conception and a corresponding movement of imaginative feeling which remind us of Lucretius.

The most facile and brilliant of the elegiac poets and the least serious in tone and spirit is P. Ovidius Naso or Ovid (43 b.c.ˆ a.d. 18). As an amatory poet he is the poet of pleasure OW(t

and intrigue rather than of tender sentiment or absorbing passion. Though he treated his subject in relation to himself with more levity and irony than real feeling, yet by his sparkling wit and fancy he created a literature of sentiment and adventure adapted to amuse the idle and luxurious society of which the elder Julia was the centre. His power of continuous narrative is best seen in the Metamorphoses, written in hexameters to which he has imparted a rapidity and precision of movement more suited to romantic and picturesque narrative than the weighty self-restrained verse of Virgil. In his Fasti he treats a subject of national interest; it is not, however, through the strength of Roman sentiment but through the power of vividly conceiving and narrating stories of strong human interest that the poem lives. In his latest works — the Tristia and Ex Ponto — he

imparts the interest of personal confessions to the record of a unique experience. Latin poetry is more rich in the expression of personal feeling than of dramatic realism. In Ovid we have both. We know him in the intense liveliness of his feeling and the human weakness of his nature more intimately than any other writer of antiquity, except perhaps Cicero. As Virgil marks the point of maturest excellence in poetic diction and rhythm, Ovid marks that of the greatest facility.

The Augustan age was one of those great eras in the world like the era succeeding the Persian War in Greece, the Eliza- bethan age in England, and the beginning of the 19th Llvy ˆ century in Europe, in which what seems a new spring of national and individual life calls out an idealizing retrospect of the past. As the present seems full of new life, the past seems rich in glory and the future in hope. The past of Rome had always a peculiar fascination for Roman writers. Virgil in a supreme degree, and Horace, Propertius and Ovid in a less degree, had expressed in their poetry the romance of the past. But it was in the great historical work of T. Livius or Livy (59 b.c.-a.d. 17) that the record of the national life received its

most systematic exposition. Its execution was the work of a life prolonged through the languor and dissolution following so soon upon the promise of the new era, during which time the past became glorified by contrast with the disheartening aspect of the present. The value of the work consists not in any power of critical investigation or weighing of historical evidence but in the intense sympathy of the writer with the national ideal, and the vivid imagination with which under the influence of this sympathy he gives life to the events and personages, the wars and political struggles, of times remote from his own. He makes us feel more than any one the majesty of the Roman state, of its great magistracies, and of the august council by which its policy was guided. And, while he makes the words senatus populusque Romanus full of significance for all times, no one realizes with more enthusiasm all that is implied in the words imperium Romanum, and the great military qualities of head and heart by which that empire was acquired and maintained. The vast scale on which the work was conceived and the thoroughness of artistic execution with which the details are finished are characteristically Roman. The prose style of Rome, as a vehicle for the continuous narration of events coloured by

a rich and picturesque imagina- tion and instinct with dignified emotion, attained its perfection in Livy.

Fourth Period: The Silver Age, from a.d. 17 to about 130.

For more than a century after the death of Augustus Roman literature continues to flow in the old channels. Though drawing Cbarao f rom tne provinces, Rome remains the centre of the teristics literary movement. The characteristics of the great of post- writers are essentially national, not provincial nor Augustan cosmo p iit a n. In prose the old forms — oratory, history, the epistle, treatises or dialogues on ethical and literary questions — continue to be cultivated. Scientific and practical subjects, such as natural history, architecture, medicine, agriculture, are treated in more elaborate literary style. The old Roman satura is developed into something like the modern prose novel. In the various provinces of poetry, while there is little novelty or inspiration, there is abundance of industry and ambitious effort. The national love of works of large compass shows itself in the production of long epic poems, both of the historic and of the imitative Alexandrian type. The imitative and rhetorical tastes of Rome showed themselves in the composition of exotic tragedies, as remote in spirit and character from Greek as from Roman life, of which the only extant specimens are those attributed to the younger Seneca. The composition of didactic, lyrical and elegiac poetry also was the accomplishment and pastime of an educated dilettante class, the only extant specimens of any interest being some of the Silvae of Statius. The only voice with which the poet of this age can express himself with force and sincerity is that of satire and satiric epigram. We find now only imitative echoes of the old music created by Virgil and others, as in Statius, or powerful declamation, as in Lucan and Juvenal. There is a deterioration in the diction as well as in the music of poetry. The elaborate literary culture of the Augustan age has done something to impair the native force of the Latin idiom. The language of literature, in the most elaborate kind of prose as well as poetry, loses all ring of popular speech. The old oratorical tastes and aptitudes find their outlet in public recitations and the practice of declamation. Forced and distorted expression, exaggerated emphasis, point and antithesis, an affected prettiness, are studied with the view of gaining the applause of audiences who thronged the lecture and recitation rooms in search of temporary excite- ment. Education is more widely diffused, but is less thorough, less leisurely in its method, derived less than before from the purer sources of culture. The precocious immaturity of Lucan's career affords a marked contrast to the long preparation of Virgil and Horace for their high office. Although there are some works of this so-called Silver Age of

considerable and one at least of supreme interest, from the insight they afford into the experience of a century of organized despotism and its effect on the spiritual life of the ancient world, it cannot be doubted that

the steady literary decline which characterized the last centuries of paganism was beginning before the death of Ovid and Livy.

The influences which had inspired republican and Augustan literature were the artistic impulse derived from a familiarity with the great works of Greek genius, becoming more intimate with every new generation, the spell of Rome over the imagina- tion of the kindred Italian races, the charm of Italy, and the vivid sensibility of the Italian temperament. These influences were certainly much less operative in the first century of the empire. The imitative impulse, which had much of the character of a creative impulse, and had resulted in the appropriation of the forms of poetry suited to the Roman and Italian character and of the metres suited to the genius of the Latin language, no longer stimulated to artistic effort. The great sources of Greek poetry were no longer regarded, as they were by Lucretius and Virgil, as sacred, untasted springs, to be approached in a spirit of enthusiasm tempered with reverence. We have the testimony of two men of shrewd common sense and masculine understanding — Martial and Juvenal — to the stale and lifeless character of the art of the Silver Age, which sought to reproduce in the form of epics, tragedies and elegies the bright fancies of the Greek mythology.

The idea of Rome, owing to the antagonism between the policy of the government and the sympathies of the class by which literature was favoured and cultivated, could no longer be an inspiring motive, as it had been in the literature of the republic and of the Augustan age. The spirit of Rome appears only as animating the protest of Lucan, the satire of Persius and Juvenal, the sombre picture which Tacitus paints of the annals of the empire. Oratory is no longer an independent voice appealing to sentiments of Roman dignity, but the weapon of the " informers " {delator es), wielded for their own advancement and the destruc- tion of that class which, even in their degeneracy, retained most sympathy with the national traditions. Roman history was no longer a record of national glory, stimulating the patriotism and flattering the pride of all Roman citizens, but a personal eulogy or a personal invective, according as servility to a present or hatred of a recent ruler was the motive which animated it.

The charm of Italian scenes still remained the same, but the fresh and inspiring feeling of nature gave place to the mere sensuous gratification derived from the luxurious and artificial beauty of the country villa. The idealizing poetry of passion, which found a genuine voice in Catullus and the elegiac poets, could not prolong itself through the exhausting licence of suc- cessive generations. The vigorous vitality which gives interest to the personality of Catullus, Propertius and Ovid no longer characterizes their successors. The pathos of natural affection is occasionally recognized in Statius and more rarely in Martial, but it has not the depth of tenderness found in Lucretius and Virgil. The wealth and luxury of successive generations, the monotonous routine of life, the separation of the educated class from the higher work of the world, have produced their enervating and paralysing effect on the mainsprings of poetic and imaginative feeling.

New elements, however, appear in the literature of this period. As the result of the severance from the active interests of life, a new interest is awakened in the inner life of the individual. The immorality of Roman society not]Jˆ ary only affords abundant material to the satirist, but elements. deepens the consciousness of moral evil in purer and more thoughtful minds. To these causes we attribute the patho- logical observation of Seneca and Tacitus, the new sense of purity in Persius called out by contrast with the impurity around him, the glowing if somewhat sensational exaggeration of Juvenal, the vivid characterization of Martial. The literature of no time presents so powerfully the contrast between moral good and evil. In this respect it is truly representative of the life of the age. Another new element is

the influence of a new race. In the two preceding periods the rapid diffusion of literary culture following the Social War and the first Civil War was seen to awaken into new life the elements of original genius in Italy an.d. Cisalpine Gaul, In the first century of the empire a similar

result was produced by the diffusion of that culture in the Latinized districts of Spain. The fervid temperament of a fresh and vigorous race, which received the Latin discipline just as Latium had tw9 or three centuries previously received the Greek discipline,- revealed itself in the writings of the Senecas, Lucan, Quintilian, Martial and others, who in their own time added literary distinction to the Spanish towns from which they came. The new extraneous element introduced into Roman literature draws into greater prominence the characteristics of the last great representatives of the genuine Roman and Italian spirit — the historian Tacitus and the satirist Juvenal.

On the whole this century shows, in form, language and substance, the signs of literary decay. But it is still capable of producing men of original force; it still maintains the tradi- tions of a happier time; it is still alive to the value of literary culture, and endeavours by minute attention to style to produce new effects. Though it was not one of the great eras in the annals of literature, yet the century which produced Martial, Juvenal and Tacitus cannot be pronounced barren in literary originality, nor that which produced Seneca and Quintilian devoid of culture and literary taste.

This fourth period is itself subdivided into three divisions:

(1) from the accession of Tiberius to the death of Nero, 68 — the most important part of it being the Neronian age, 54 to 68;

(2) the Flavian era, from the death of Nero to the death of Domitian, 96; (3) the reigns of Nerva and Trajan and part of the reign of Hadrian.

1. For a generation after the death of Augustus no new original literary force appeared. The later poetry of the Augus- Period tan age had ended in trifling dilettantism, for the from continuance of which the atmosphere of the court

Tiberius was n0 longer favourable. The class by which litera- te ero. £ Ure was encoura g ec j na d become both enervated and terrorized. The most remarkable poetical product of the time is the long-neglected astrological poem of Manilius which was written at the beginning of Tiberius's reign. Its vigour and originality have had scanty justice done to them owing to the difficulty of the subject-matter and the style, and the corruptions which still disfigure its text. Very different has been the fate of the Fables of Phaedrus. This slight work of a Macedonian freedman, destitute of national significance and representative in its morality only of the spirit of cosmopolitan individualism, owes its vogue to its easy Latinity and popular subject-matter. Of the prose writers C. Velleius Paterculus, the historian, and Valerius Maximus, the collector of anecdotes, are the most important. A. Cornelius Celsus composed a series of technical handbooks, one of which, upon medicine, has survived. Its purity of style and the fact that it was long a standard work entitle it to a mention here. The traditional culture was still, however, maintained, and the age was rich in grammarians and rhetoricians. The new profession of the delator must have given a stimulus to oratory. A high ideal of culture, literary as well as practical, was realized in Germanicus, which seems to have been transmitted to his daughter Agrippina, whosfe patronage of Seneca had important results in the next generation. The reign of Claudius was a time in which antiquarian learning, gram- matical studies, and jurisprudence were cultivated, but no important additions were made to literature. A fresh impulse was given to letters on the accession of Nero, and this was partly due to the theatrical and artistic tastes of the young emperor. Four writers of the Neronian age still possess considerable interest, — L. Annaeus Seneca, M. Annaeus Lucanus, A. Persius Flaccus and Petronius Arbiter. The first three represent the spirit of their age by exhibiting the power of the Stoic philosophy as a moral, political and religious force; the last is the most cynical exponent of the depravity of the time. Seneca (c. 5 b.c- a.d. 65) is less than Persius a pure Stoic, and more of a moralist and pathological observer of man's inner life. He makes the commonplaces of a cosmopolitan philosophy interesting by his abundant illustration drawn from the private and social life of his contemporaries. He has knowledge of the world, the suppleness of a courtier, Spanish vivacity, and the ingenium

amoenum attributed to him by Tacitus, the fruit of which is sometimes seen in the " honeyed phrases " mentioned by Petronius — pure aspirations combined with inconsistency of purpose — the inconsistency of one who tries to make the best of two worlds, the ideal inner life and the successful real life in the atmosphere of a most

corrupt court. The Pharsalia of Lucan (39-65), with Cato as its hero, is essentially a Stoic mani- festo of the opposition. It is written with the force and fervour of extreme youth and with the literary ambition of a race as yet new to the discipline of intellectual culture, and is charac- terized by rhetorical rather than poetical imagination. The six short Satires of Persius (34-62) are the purest product of Stoicism — a Stoicism that had found in a contemporary, Thrasea, a more rational and practical hero than Cato. But no important writer of antiquity has less literary charm than Persius. In avoiding the literary conceits and fopperies which he satirizes he has recourse to the most unnatural contortions of expression. Of hardly greater length are the seven eclogues of T. Calpurnius Siculus, written at the beginning of the reign of Nero, which are not without grace and facility of diction. Of the works of the time that which from a human point of view is perhaps the most detestable in ancient literature has the most genuine literary quality, the fragment of a prose novel — the Satyricon — of Petronius (d. 66). It is most sincere in its representation, least artificial in diction, most penetrating in its satire, most just in its criticism of art and style.

2. A greater sobriety of tone was introduced both into life and literature with the accession of Vespasian. The time was, however, characterized rather by good sense and industry than by original genius. Under Vespasian ^*" of C. Plinius Secundus, or Pliny the elder (compiler of the tlsa

Natural History, an encyclopaedic treatise, 23-79), is the most important prose writer, and C. Valerius Flaccus Setinus Balbus, author of the Argonautica (d. c. 90), the most important among the writers of poetry. The reign of Domitian, although it silenced the more independent spirits of the time, Tacitus and Juvenal, witnessed more important contributions to Roman literature than any age since the Augustan, — among them the Institutes of Quintilian, the Punic War of Silius Italicus, the epics and the Silvae of Statius, and the Epigrams of Martial. M. FabiusQuintilianus, or Quintilian (£.35-95), is brought forward by Juvenal as a unique instance of a thoroughly successful man of letters, of one not belonging by birth to the rich or official class, who had risen to wealth and honours through literature. He was well adapted to his time by his good sense and sobriety of judgment. His criticism is just and true rather than subtle or ingenious, and has thus stood the test of the judgment of after-times. The poem of Ti. Catius Silius Italicus (25-101) is a proof of the industry and literary ambition of members of the rich official class. Of the epic poets of the Silver Age P. Papinius Statius (c. 45-96) shows the greatest technical skill and the richest pictorial fancy in the execution of detail; but his

epics have no true inspiring motive, and, although the recitation of the Thebaid could attract and charm an audience in the days of Juvenal, it really belongs to the class of poems so unsparingly condemned both by him and Martial. In the Silvae, though many of them have little root in the deeper feelings of human nature, we find occasionally more than in any poetry after the Augustan age something of the purer charm and pathos of life. But it is riot in the Silvae, nor in the epics and tragedies of the time, nor in the cultivated criticism of Quintilian that the age of Domitian lives for us. It is in the Epigrams of M. Valerius Martialis or Martial (c. 41-104) that we have a true image of the average sensual frivolous life of Rome at the end of the 1st century, seen through a medium of wit and humour, but undistorted by the exaggeration which moral indignation and the love of effect add to the representation of Juvenal. Martial represents his age in his Epigrams, as Horace does his in his Satires and Odes, with more variety and incisive force in his sketches, though with much less poetic charm and serious meaning. We know the daily life, the familiar personages, the outward aspect of Rome in the age of Domitian

and Hadrian.

better than at any other period of Roman history, and this knowledge we owe to Martial.

3. But it was under Nerva and Trajan that the greatest and most truly representative works of the empire were written. Period of Theˆ MMafo and Histories of Cornelius Tacitus (54-1 19), Nerva, with the supplementary Life of Agricola and the Trajan Germania, and the Satires of D. Iunius Iuvenalis or Juvenal (c. 47-130), sum up for posterity the moral experience of the Roman world from the accession of Tiberius to the death of Domitian. The generous scorn and pathos of the historian acting on extraordinary gifts of imaginative insight and characterization, and the fierce indigna- tion of the satirist finding its vent in exaggerating realism, doubtless to some extent warped their impressions; nevertheless their works are the last voices expressive of the freedom and manly virtue of the ancient world. In them alone among the writers of the empire the spirit of the Roman republic seems to revive. The Letters of C. Plinius Caecilius Secundus or Pliny

the Younger (61-c. 115), though they do not contradict the representation of Tacitus and Juvenal regarded as an exposure of the political degradation and moral corruption of prominent individuals and classes, do much to modify the pervadingly tragic and sombre character of their representation.

With the death of Juvenal, the most important part of whose ■activity falls in the reign of Trajan, Latin literature as an original and national expression of the experience, character, and sentiment of the Roman state and empire, and as one of the great literatures of the world, may be considered closed.

Later Writers.

What remains to describe is little but death and decay. Poetry died first; the paucity of writings in verse is matched by their insignificance. For two centuries after Juvenal there are no names but those of Q. Serenus Sammonicus, with his pharmacopoeia in verse (c. 225), and M. Aurelius Olympius Nemesianus, who wrote a few feeble eclogues and (283) a dull piece on the training of dogs for the chase. Towards the middle of the 4th century we have Decimus Magnus Ausonius, a professor of Bordeaux and afterwards consul (379), whose style is as little like that of classical poetry as is his prosody. His Mosella, a detailed description of the river Moselle, is the least unattractive of his works. A little better is his contemporary, Rufius Festus Avienus, who made some free translations of astronomical and geographical poems in Greek. A generation later, in what might be called the expiring effort of Latin poetry, appeared two writers of much greater merit. The first is Claudius Claudianus (c. 400), a native of Alexandria and the court poet of the emperor Honorius and his minister Stilicho. Claudian may be properly styled the last of the poets of Rome. He breathes the old national spirit, and his mastery of classical idiom and versification is for his age extraordinary. Something of the same may be seen in Rutilius Namatianus, a Gaul by birth, who wrote in 416 a description of his voyage from the capital to his native land, which contains the most glowing eulogy of Rome ever penned by an ancient hand. Of the Christian ” poets ” only Aurelius Prudentius Clemens (c. 348-410) need be mentioned. He was well read in the ancient literature; hut the task of embodying the Christian spirit in the classical form was one far beyond his powers.

The vitality of the prose literature was not much greater though its complete extinction was from the nature of the case impossible. The most important writer in the age succeeding Juvenal was the biographer C. Suetonius Tranquillus (c. 75-160), whose work is more

valuable for its matter than its manner. His style is simple and direct, but has hardly any other merit. A little later the rise of M. Cornelius Fronto (c. 100-175), a native of Cirta, marks the beginning of an African influence. Fronto, a distinguished orator and intimate friend of the emperor M. Aurelius, broke away from the traditional Latin of the Silver and Golden ages, and took as his models the pre-classical authors. The reaction was shortlived; but the same affectation of antiquity is seen in the writings of Apuleius,

Apulelus.

also an African, who lived a little later than Fronto and was a man of much greater natural parts. In his Metamorphoses, which were based upon a Greek original, he takes the wonderful story of the adventures of Lucius of Madaura, and interweaves the famous legend of Cupid and Psyche. His bizarre and mystical style has a strange fascination for the reader; but there is nothing Roman or Italian about it. Two epitomists of previous histories may be mentioned: Justinus (of uncertain date) who abridged the history of Pompeius Trogus, an Augustan writer; and P. Annius Florus, who wrote in the reign of Hadrian a rhetorical sketch based upon Livy. The Historia Augusta, which includes the lives of the emperors from Hadrian to Numerianus (117-284), is the work of six writers, four of whom wrote under Diocletian and two under Constantine. It is a collection of personal memoirs of little historical importance, and marked by puerility and poverty of style. Ammianus Marcellinus (c. 330-400) had a higher conception of the historian's function. His narrative of the years 353-378 (all that now remains) is honest and straightfor- ward, but his diction is awkward and obscure. The last pagan prose writer who need be mentioned is Q. Aurelius Symmachus (c 35° _ 4i°)) the author of some speeches and a collection of letters. All the art of his ornate and courtly periods cannot disguise the fact that there was nothing now for paganism to say.

It is in Christian writers alone that we find the vigour of life. The earliest work of Christian apologetics is the Octavius or Minucius Felix, a contemporary of Fronto. It is written in pure Latin and is strongly tinged by classical writers'." influences. Quite different is the work of " the fierce Tertullian," Q. Septimius Florens Tertullianus {c. 150-230), a native of Carthage, the most vigorous of the Latin champions of the new faith. His style shows the African revolt of which we have already spoken, and in its medley of archaisms, Graecisms and Hebraisms reveals the strength of the disintegrating forces at work upon the Latin language. A more commanding figure is that of Aurelius Augustinus or St Augustine (354-430), bishop of

Hippo, who for comprehensiveness and dialectical power stands out in the same way as Hieronymus or St Jerome (c.331 or 340-420), a native of Stridon in Dalmatia, does for many- sided learning and scholarship.

The decline of literature proper was attended by an increased output of grammatical and critical studies. From the time of L. Aelius Stilo Praeconinus, who was the teacher of Varro and Cicero, much interest had been taken in

Claudiaa.

Gram- marians.

Suetonius.

literary and linguistic problems at Rome. Varro under the republic, and M. Verrius Flaccus in the Augustan age, had busied themselves with lexicography and etymology. The grammarian M. Valerius Probus (c. a.d. 60) was the first critical editor of Latin texts. In the next century we have Velius Longus's treatise De Orthographia, and then a much more important work, the Nodes Atticaeoi Aulus Gellius, and (c. 200) a treatise in verse by Terentianus, an African, upon Latin pronunciation, prosody and metre. Somewhat later are the commentators on Terence and Horace, Helenius Aero and Pomponius Porphyrio. The tradition was continued in the 4th century by Nonius Marcellus and C. Marius Victorinus, both Africans; Aelius Donatus, the grammarian and commen- tator on Terence and Virgil, Flavius Sosipater Charisius and Diomedes, and Servius, the author of a valuable commentary on Virgil. Ambrosius Macrobius Theodosius (c. 400) wrote a treatise on Cicero's Somnium Scipionis and seven books of miscellanies {Saturnalia); and Martianus Capella (c. 430), a native of Africa, published a compendium of the seven liberal arts, written in a mixture of prose and verse, with some literary pretensions. The last grammarian who need be named is the most widely known of all, the celebrated Priscianus, who pub- lished his text-book at Constantinople probably in the middle of the 5th century.

In jurisprudence, which may be regarded as one of the outlying regions of literature, Roman genius had had some of its greatest triumphs, and, if we take account of the " codes," was activs to the end. The most distinguished of the early jurists (whost

works are lost) were Q. Mucius Scaevola, who died in 82 B.C., and following him Ser. Sulpicius Rufus, who died in 43 B.C. Jurists In the Augustan a 8 e M – Antistius Labeo and C. Ateius Capito headed two opposing schools in jurispru- dence, Labeo being an advocate of method and reform, and Capito being a conservative and empiricist. The strife, which reflects the controversy between the ” analogists ” and the ” anomalists ” in philology, continued long after their death. Salvius Julianus was entrusted by Hadrian with the task of reducing into shape the immense mass of law which had grown up in the edicts of successive praetors — thus taking the first step towards a code. Sex. Pomponius, a contemporary, wrote an important legal manual of which fragments are preserved. The most celebrated handbook, however, is the Institutiones of Gaius, who lived under Antonius Pius — a model of what such treatises should be. The most eminent of all the Roman jurists was Aemilius Papinianus, the intimate friend of Septimius Severus; of his works only fragments remain. Other consider- able writers were the prolific Domitius Ulpianus (c. 215) and Julius Paulus, his contemporary. The last juristical writer of note was Herennius Modestinus (c. 240). But though the line of great lawyers had ceased, the effects of their work remained and are clearly visible long after in the ” codes ” — the code of Theodosius (438) and the still more famous code of Justinian (529 and 533), with which is associated the name of Tribonianus.

Bibliography. — The most full and satisfactory modern account of Latin literature is M. Schanz’s Geschichte der rbmischen Litteratur. The best in English is the translation by C. C. Warr of W. S. Teuffel and L. Schwabe’s History of Roman Literature. J. W. Mackail’s short History _ of Latin Literature is full of excellent literary and aesthetic criticisms on the writers. C. Lamarre’s Histoire de la litterature latine (1901, with specimens) only deals with the writers of the republic. W. Y. Sellar’s Roman Poets of the Republic and Poets of the Augustan Age, and R. Y. Tyrrell’s Lectures on Latin Poetry, will also be found of service. A concise account of the various Latin writers and their works, together with bibliographies, is given in J. E. B. Mayor’s Bibliographical Clue to Latin Literature (1879), which is based on a German work by E. Hiibner. See also the separate bibliographies to the articles on individual writers.

(W.Y.S.;J. P. P.)

LATINUS, in Roman legend, king of the aborigines in Latium, and eponymous hero of the Latin race. In Hesiod (Theogony, 1013) he is the son of Odysseus and Circe, and ruler of the Tyr- senians; in Virgil, the son of Faunus and the nymph Marica, a national genealogy being

substituted for the Hesiodic, which probably originated from a Greek source. Latinus was a shadowy personality, invented to explain the origin of Rome and its relations with Latium, and only obtained importance in later times through his legendary connexion with Aeneas and the foundation of Rome. According to Virgil (Aeneid, vii.xii.), Aeneas, on landing at the mouth of the Tiber, was welcomed by Latinus, the peaceful ruler whose seat of govern ment was Laurentum, and ultimately married his daughter Lavinia.

Other accounts of Latinus, differing considerably in detail, are to be found in the fragments of Cato's Origines (in Servius's commentary on Virgil) and in Dionysius of Halicarnassus; see further authorities in the article by J. A. Hild, in Daremberg and Saglio, Dictionnaire des anliquites.

LATITUDE (Lat. latitudo, latus, broad), a word meaning breadth or width, hence, figuratively, freedom from restriction, but more generally used in the geographical and astronomical sense here treated. The latitude of a point on the earth's surface is its angular distance from the equator, measured on the curved surface of the earth. The direct measure of this distance being impracticable, it has to be determined by astronomical observa- tions. As thus determined it is the angle between the direction of the plumb-line at the place and the plane of the equator. This is identical with the angle between the horizontal planes at the place and at the equator, and also with the elevation of the celestial pole above the horizon (see Astronomy). Latitude thus determined by the plumb-line is termed astronomical. The geocentric latitude of a place is the angle which the line from the earth's centre to the place makes with the plane of the equator. Geographical latitude, which is used in mapping, is based on the supposition that the earth is an elliptic spheroid

of known compression, and is the angle which the normal to this spheroid makes with the equator. It differs from the astro- nomical latitude only in being corrected for local deviation of the plumb-line.

The latitude of a celestial object is the angle which the line drawn from some fixed point of reference to the object makes with the plane of the ecliptic.

Variability of Terrestrial Latitudes. — The latitude of a point on the earth's surface, as above defined, is measured from the equator. The latter is defined by the condition that its plane makes a right angle with the earth's axis of rotation. It follows that if the points in which this axis intersects the earth's surface, i.e. the poles of the earth,

change their positions on the earth's surface, the position of the equator will also change, and there- fore the latitudes of places will change also. About the end of the 19th century research showed that there actually was a very minute but measurable periodic change of this kind. The north and south poles, instead of being fixed points on the earth's surface, wander round within a circle about 50 ft. in diameter. The result is a variability of terrestrial latitudes generally.

To show the cause of this motion, let BQ represent a section of an oblate spheroid through its shortest axis, PP. We may consider this spheroid to be that of the earth, the ellipticity being greatly exagge- rated. If set in rotation around its axis of figure PP, it will con- tinue to rotate around that axis for an indefinite time. But if, instead of rotating around PP, it rotates around some other axis, RR, making a small angle, POR, with the axis of figure PP; then it has been known since the time of Euler that the axis of rotation RR, if referred to the spheroid regarded as fixed, will gradually rotate round the axis of figure PP in a period de- fined in the following way : — If we put C = the moment of momentum of the spheroid around the axis of figure, and A = the corresponding moment around an axis passing through the equator EQ, then, calling one day the period of rotation of the spheroid, the axis RR will make a revolution around PP in a number of days represented by the fraction C/(C — A). In the case of the earth, this ratio is 1/0-0032813 or 305. It follows that the period in question is 305 days.

Up to 1890 the most careful observations and researches failed to establish the periodicity of such a rotation, though there was strong evidence of a variation of latitude. Then S. C. Chandler, from an elaborate discussion of a great number of observations, showed that there was really a variation of the latitude of the points of observation; but, instead of the period being 305 days, it was about 428 days. At first sight this period seemed to be inconsistent with dynamical theory. But a defect was soon found in the latter, the correction of which reconciled the divergence. In deriving a period of 305 days the earth is regarded as an absolutely rigid body, and no account is taken either of its elasticity or of the mobility of the ocean. A study of the figure will show that the centrifugal force round the axis RR will act on the equatorial protuberance of the rotating earth so as to make it tend in the direction of the arrows. A slight deformation of the earth will thus result; and the axis of figure of the distorted spheroid will no longer be PP, but a line P'P' between PP and RR. As the latter moves round, P'P' will continually follow it through the incessant change of figure pro- duced by the change in the direction of the centrifugal force. Now the rate of motion of RR is determined by

the actual figure at the moment. It is therefore less than the motion in an absolutely rigid spheroid in the proportion RP': RP. It is found that, even though the earth were no more elastic than steel, its yielding combined with the mobility of the ocean would make this ratio about 2:3, resulting in an increase of the period by one-half, making it about 457 days. Thus this small flexibility is even

greater than that necessary to the reconciliation of observation with theory, and the earth is shown to be more rigid than steel — a conclusion long since announced by Kelvin for other reasons. Chandler afterwards made an important addition to the subject by showing that the motion was represented by the superposition of two harmonic terms, the first having a period of about 430 days, the other of one year. The result of this superposition is a seven-year period, which makes 6 periods of the 428-day term (428 d X6 = 2568 d = 7 years, nearly), and 7 periods of the annual term. Near one phase of this combined period the two com- ponent motions nearly annul each other, so that the variation is then small, while at the opposite phase, 3 to 4 years later, the two motions are in the same direction and the range of variation is at its maximum. The coefficient of the 428-day term seems to be between 0-12″ and 0-16"; that of the annual term between 006″ and o- 1 1 ". Recent observations give smaller values of both than those made between 1890 and 1900, and there is no reason to suppose either to be constant. The present state of the theory may be summed up as follows : — i. The fourteen-month term is an immediate result of the fact that the axes of rotation and figure of the earth do not strictly coincide, but make with each other a small angle of which the mean value is about 0-15". If the earth remained invariable, without any motion of matter on its surface, the result of this non-coincidence would be the revolution of the one pole round the other in a circle of radius 0-15", or about 15 ft., in a period of about 429 days. This revolution is called the Eulerian motion, after the mathematician who discovered it. But owing to meteorological causes the motion in question is subject to annual changes. These changes arise from two causes — the one statical, the other dynamical.

2. The statical causes are deposits of snow or ice slowly changing the position of the pole of figure of the earth. For example, a deposit of snow in Siberia would bring the equator of figure of the earth a little nearer to Siberia and throw the pole a little way from it, while a

deposit on the American continent would have the opposite effect. Owing to the approximate symmetry of the American and Asiatic continents it does not seem likely that the inequality of snowfall would produce an appreciable effect.

3. The dynamical causes are atmospheric and oceanic currents. Were these currents invariable their only effect would be that the Eulerian motion would not take place exactly round the mean pole of figure, but round a point slightly separated from it. But, as a matter of fact, they are subject to an annual variation. Hence the motion of the pole of rotation is also subject to a similar variation. The annual term in the latitude is thus accounted for.

Besides Chandler, Albrecht of Berlin has investigated the motion of the pole P. The methods of the two astronomers are in some points different. Chandler has constructed empirical formulae representing the motion, with the results already given, while Albrecht has determined the motion of the pole from observation simply, without trying to represent it either by a formula or by theory. It is noteworthy that the difference between Albrecht's numerical results and Chandler's formulae is generally less than 0-05".

When the fluctuation in the position of the pole was fully confirmed, its importance in astronomy and geodesy led the International Geodetic Association to establish a series of stations round the globe, as nearly as possible on the same parallel of latitude, for the purpose of observing the fluctuation with a greater degree of precision than could be attained by the miscellaneous observations before available. The same stars were to be observed from month to month at each station with zenith-telescopes of similar approved construction. This secures a double observation of each component of the polar motion, from which most of the systematic errors are eliminated. The principal stations are: Carloforte, Italy; Mizusawa, Japan; Gaithersburg, Maryland; and Ukiah, California, all nearly on the same parallel of latitude, 39 8'.

The fluctuations derived from this international work during

the last seven years deviate but slightly from Chandler's formulae though they show a markedly smaller value of the annual term. In consequence, the change in the amplitude of the fluctuation through the seven-year period is not so well marked as before 1 900. Chandler's investigations are found in a series of papers published in the Astronomical Journal, vols. xi. to xv. and xviii. , Newcomb's explanation of the lengthening of the Eulerian period is found in the

Monthly Notices of the Royal Astronomical Society for March 1892. Later volumes of the Astronomical Journal contain discussions of the causes which may produce the annual fluctuation. An elaborate mathematical discussion of the theory is by Vito Volterra: ” Sulla teoria dei movimenti del Polo terrestre ” in the A stronomische Nachrichten, vol. 1.38 ; also, more fully in his memoir ” Sur la theorie des variations des latitudes,” Acta Mathematica, vol. xxii. The results of the international observations are discussed from time to time by Albrecht in the publications of the International Geodetic Association, and in the Astronomische Nachrichten (see also Earth, Figure of). (S. N.)

LATIUM, 1 in ancient geography, the name given to the portion of central Italy which was bounded on the N.W. by Etruria, on the S.W. by the Tyrrhenian Sea, on the S.E. by Campania, on the E. by Samnium and on the N.E. by the mountainous district inhabited by the Sabini, Aequi and Marsi. The name was, however, applied very differently at different times. Latium originally means the land of the Latini, and in this sense, which alone is in use historically, it was a tract of limited extent; but after the overthrow of the Latin confederacy, when the neighbouring tribes of the Rutuli, Hernici, Volsci and Aurunci, as well as the Latini properly so called, were reduced to the condition of subjects and citizens of Rome, the name of Latium was extended to comprise them all. It thus denoted the whole country from the Tiber to the mouth of the Savo, and just included the Mons Massicus, though the boundary was not very precisely fixed (see below). The change thus introduced, though already manifest in the composition of the Latin league (see below) was not formally established till the reign of Augustus, who formed of this larger Latium and Campania taken together the first region of Italy; but it is already recognized by Strabo (v. 3. 2. p. 228), as well as by Pliny, who terms the additional territory thus incorporated Latium Adjectum, while he desig- nates the’original Latium, extending from the Tiber to Circeii, as Latium Antiquum.

1. Latium Antiquum consisted principally of an extensive plain, now known as the Campagna di Roma, bounded towards the interior by the Apennines, which rise very abruptly from the plains to a height of between 4000 and 5000 ft. Several of the Latin cities, including Tibur and Praeneste, were situated on the terrace-like underfalls of these mountains, 2 while Cora, Norba and Setia were placed in like manner on the slopes of the Volscian mountains (Monti Lepini), a rugged and lofty limestone range, which runs parallel to the main mass of the Apennines, being separated from them, however, by the valley of the Trerus (SacCo), and forms a continuous barrier from there to

Terracina. No volcanic eruptions are known to have taken place in these mountains within the historic period, though Livy sometimes speaks of it ” raining stones in the Alban hills ” (i. 31, xxxv. 9 — on the latter occasion it even did so on the Aventine). It is asserted, too, that some of the earliest tombs of the necropolis of Alba Longa (q.v.) were found beneath a stratum of peperino. Earthquakes (not of a violent character within recent centuries, though the ruin of the Colosseum is probably to be ascribed to this cause) are not unknown even at the present day in Rome and in the Alban Hills, and a seismograph has been established at Rocca di Papa. The surface is by no means a uniform plain, but is a broad undulating tract, furrowed throughout by numerous depressions, with precipitous banks, serving as water-courses, though rarely traversed by any considerable stream. As the general level of the plain rises gradually, though almost imperceptibly, to the foot of the Apennines, these channels by degrees assume the character of ravines of a formidable de- scription.

1 Latium, from the same root as latus, side ; later, brick ; TrKarbs, flat ; Sans, pratk : not connected with latus, wide.

2 In the time of Augustus the boundary of Latium extended as far E. as Treba (Trevi), 12 m. S.E. of Sublaqueum (Subiaco).

Four main periods may be distinguished in the geological history of Rome and the surrounding district. The hills on the right bank of the Tiber culminating in Monte Mario (455 ft.) belong Oeology. tQ ˆg £ rst f ([lese> being of the Pliocene formation; they consist of a lower bluish-grey clay and an upper group of yellow sands and gravels. This .clay since Roman times has supplied the material for brick-making, and the valleys which now separate the different summits (Janiculum, Vatican, Monte Mario) are in considerable measure artificial. On the left bank this clay has been reached at a lower level, at the foot of the Pincian Hill, while in the Campagna it has been found to extend below the later volcanic formations. The latter may be divided into two groups, corresponding to the second and third periods. In the second period volcanic activity occurred at the bottom of the Pliocene sea, and the tufa, which extends over the whole Campagna to a thickness of 300 ft. or more, was formed. At the same time, hot springs, containing abundant carbonate of lime in solution, produced deposits of travertine at various points. In the third, after the Campagna, by a great general uplift, had become a land surface, volcanic energy found

an outlet in com- paratively few large craters, which emitted streams of hard lava as well as fragmentary materials, the latter forming sperone {lapis Gabinus) and peperino (lapis Albanus), while upon one of the former, which runs from the Alban Hills to within 2 m. of Rome, the Via Appia was carried. The two main areas near Rome are formed by the group of craters on the north (Bracciano, Bolsena, &c.) and the Alban Hills on the south, the latter consisting of one great crater with a base about 12 m. in diameter, in the centre of which a smaller crater was later on built up (the basin is now known as the Campo di Annibale) with several lateral vents (the Lake of Albano, the Lake of Nemi, &c.). The Alban Mount (Monte Cavo) is almost the highest point on the rim of the inner crater, while Mount Algidus and Tusculum are on the outer ring wall of the larger (earlier) crater.

The fourth period is that in which the various subaerial agencies of abrasion, and especially the streams which drain the mountain chain of the Apennines, have produced the present features of the Campagna, a plain furrowed by gullies and ravines. The communities which inhabited the detached hills and projecting ridges which later on formed the city of Rome were in a specially favourable position. These hills (especially the Palatine, the site of the original settlement) with their naturally steep sides, partly surrounded at the base by marshes and situated not far from the confluence of the Anio with the Tiber, possessed natural advantages not shared by the other primitive settlements of the district; and their proximity to one another rendered it easy to bring them into a larger whole. The volcanic materials available in Rome and its neighbourhood were especially useful in building. The tufa, sperone and peperino were easy to quarry, and could be employed by those who possessed comparatively elementary tools, while travertine, which came into use later, was an excellent building stone, and the lava {selce) served for paving stones and as material for concrete. The strength of the renowned Roman concrete is largely due to the use of pozzolana (see Puteoli), which also is found in plenty in the Campagna.

Between the volcanic tract of the Campagna and the sea there is a broad strip of sandy plain, evidently formed merely by the accumulation of sand from the sea, and constituting a barren tract, still covered almost entirely with wood as it was in ancient times, except for the almost uninterrupted line of villas along the ancient coast- line, which is now marked by a line of sandhills, some i m. or more inland (see Lavinium, Tiber). This long belt of sandy shore extends without a break for a distance of above 30 m. from the mouth of the Tiber to the promontory of Antium (Porto d'Anzio); a low rocky headland, projecting out into the sea, and forming the only con- siderable angle

in this line of coast. Thence again a low sandy shore of similar character, but with extensive shore lagoons which served in Roman times and serve still for fish-breeding, extends for about 24 m. to the foot of the Monte Circeo (Circeius Mons, q.v.). The region of the Pomptine Marshes (q.v.) occupies almost the whole tract between the sandy belt on the sea-shore and the Volscian mountains, extend- ing from the southern foot of the Alban Hills below Velletri to the sea near Terracina.

The district sloping down from Velletri to the dead level of the Pontine (Pomptine) Marshes has not, like the western and northern slopes of the Alban Hills, drainage towards the Tiber. Drainage, -pˆ subsoil too is differently formed : the surface consists of very absorbent materials, then comes a stratum of less permeable tufa or peperino (sometimes clay is present), and below that again more permeable materials. In ancient, and probably pre-Roman, times this district was drained by an elaborate system of cuniculi, small drainage tunnels, about 5 ft. high and 2 ft. wide, which ran, not at the bottom of the valleys, where there were sometimes streams already, and where, in any case, erosion would have broken through their roofs, but along their slopes, through the less permeable tufa, their object being to drain the hills on each side of the valleys. They had probably much to do with the relative healthiness of this district in early times. Some of them have been observed to be earlier in date than the Via Appia (312 B.C.). They were studied in detail by R. de la Blanchere. When they fell into desuetude, malaria gained the upper hand, the lack of drainage providing breeding-places for the malarial mosquito. Remains of similar drainage channels exist in many parts of the Campagna Romana

and of southern Etruria at points where the natural drainage was not sufficient, and especially in cultivated or inhabited hills (though it was not necessary here, as in the neighbourhood of Velletri, to create a drainage system, as streams and rivers were already present as natural collectors) and streams very frequently pass through them at the present day. The drainage channels which were dug for the various crater lakes in the neighbourhood of Rome are also interest- ing in this regard. That of the Alban Lake is the most famous; but all the other crater lakes are similarly provided. As the drainage by cuniculi removed the moisture in the subsoil, so the drainage of the lakes by emissaria, outlet channels at a low level, prevented the permeable strata below the tufa from becoming impregnated with moisture which they would otherwise have derived from the lakes of the Alban Hills. The slopes below Velletri, on the other hand, derive much of their moisture from the space between the inner and outer ring of the

Alban volcano, which it was impossible to drain: and this in turn receives much moisture from the basin of the extinct inner crater. 1

Numerous isolated palaeolithic objects of the Mousterian type have been found in the neighbourhood of Rome in the quaternary gravels of the Tiber and Anio; but no certain traces of the neolithic period have come to light, as the many ˆ rc ” flint implements found sporadically round Rome pro- * /s ‘°™ c bably belong to the period which succeeded neolithic remains. (called by Italian archaeologists the eneolithic period) inasmuch as both stone and metal (not, however, bronze, but copper) were in use. 2 At Sgurgola, in the valley of the Sacco, a skeleton was found in a rock-cut tomb of this period which still bears traces of painting with cinnabar. A similar rock-cut tomb was found at Mandela, in the Anio valley. Both are outside the limits of the Campagna in the narrower sense; but similar tombs were found (though less accurately observed) in travertine quarries between Rome and Tivoli. Objects of the Bronze age too have only been found sporadically. The earliest cemeteries and hut foundations of the Alban Hills belong to the Iron age, and cemeteries and objects of a similar character have been found in Rome itself and in southern Etruria, especially the characteristic hut-urns. The objects found in these cemeteries show close affinity with those found in the terremare of Emilia, these last being of earlier date, and hence Pigorini and Helbig consider that the Latini were close descendants of the inhabitants of the terremare. On the other hand, the ossuaries of the Villanova type, while they occur as far south as Veil and Caere, have never so far been found on the left bank of the Tiber, in Latium proper (see L. Pigorini in Rendiconti dei Lincei, ser. v. vol. xvi., 1907, p. 676, and xviii., 1909). We thus have at the beginning of the Iron age two distinct currents of civilization in central Italy, the Latin and that of Villanova. As to the dates to which these are to be attributed, there is not as yet complete accord, e.g. some archae- ologists assign to the nth, others (and with far better reasons) to the 8th century B.C., the earliest tombs of the Alban necropolis and the coeval tombs of the necropolis recently discovered in the Forum at Rome. In this last necropolis cremation seems slightly to precede inhumation in date.

For the prehistoric period see Bullettino di paleontologia Italiana, passim, B. Modestov, Introduction a I’histoire romaine (Paris, 1907), and T. E. Peet, The Stone and Bronze Ages in Italy (Oxford,

1909).

It is uncertain to what extent reliance can be placed upon the traditional accounts of the gradual spread of the sup- remacy of Rome

in Latium, and the question cannot be discussed here. 3 The list of the thirty communities be- longing to the Latin league, given by Dionysius of Halicarnassus

1 See R. de la Blanchere in Daremberg and Saglio, Dictionnaire des antiquites, s.vv. Cuniculus, Emissarium, and the same author's Chapitre d'histoire pontine (Paris, 1889).

2 See G. A. Colini in Bullettino di palentologia Italiana, xxxi.

(1905).

3 The most important results will be found stated at the outset of the articles Rome : History (the chief being that the Plebeians of Rome probably consisted of Latins and the Patricians of Sabines), Liguria, Siculi and Aricia. For the Etruscan dominion in the Latin plain see Etruria. Special mention may here be made of one or two points of importance. The legends represent the Latins of the historical period as a fusion of different races, Ligures, Veneti and Siculi among them; the story of the alliance of the Trojan settler Aeneas with the daughter of Latinus, king of the aborigines, and the consequent enmity of the Rutulian prince Turnus, well known to readers of Virgil, is thoroughly typical of the reflection of these distant ethnical phenomena in the surviving traditions. In view of the historical significance of the NO- ethnicon (see Sabini) it is im- portant to observe that the original form of the ethnic adjective no doubt appears in the title of Juppiter Latiaris (not Latinus) ; and that Virgil's description of the descent of the noble Drances at Latinus's court (Aen. xi. 340) — genus huic materna superbum Nobilitas dabat, incertum de patre ferebat — indicates a very different system of family ties from the famous patria potestas and agnation of the Patrician and Sabine clans. (R. S. C.)

(v. 61), is, however, of great importance. It is considered by Th. Mommsen (Roman History, i. 448) that it dates from about the year 370 B.C., to which period belong the closing of the confederacy, no fresh communities being afterwards admitted to it, and the consequent fixing of the boundaries of Latium. The list is as follows: Ardeates, Aricini, Bovillani, 1 Bubentani, Cabani, Carventani, Circeiates, Coriolani, Corbintes, Corni (probably Corani), Fortinei (?), Gabini, Laurentini, Lavinates, Labicani, Lanuvini, Nomentani, Norbani,

Praenestini, Pedani, Querquetulani, Satricani, Scaptini, Setini, Tellenii, Tiburtini, Tolerini, Tusculani, Veliterni.

These communities may be briefly described according to their geographical arrangement. Laurentum and Lavinium, names so conspicuous in the legendary history of Aeneas, were situated in the sandy strip near the sea-coast — the former only 8 m. S.E. of Ostia, which was from the first merely the port of Rome, and never figured as an independent city. Farther S.E. again lay Ardea, the ancient capital of the Rutuli, and some distance beyond that Antium, situated on the sea-coast, which does not occur in the list of Dionysius, and is, in the early annals of Rome, called a Volscian town — even their chief city. On the southern underfalls of the Alban mountains, commanding the plain at the foot, stood Lanuvium and Velitrae; Aricia rose on a neighbouring hill, and Corioli was probably situated on the lower slopes. The village of the Cabani (probably identical with the Cabenses) is possibly to be sought on the site of the modern Rocca di Papa, N. of Monte Cavo. The more important city of Tusculum occupied one of the northern summits of the same group; while opposite to it, in a commanding situation on a lofty offshoot of the Apennines, rose Praeneste, now Palestrina. Bola and Pedum were probably in the same neighbourhood, Labici on an outlying summit (Monte Compatri) of the Alban Hills below Tusculum, and Corbio (probably at Rocca Priora) on a rocky summit east of the same city. Tibur (Tivoli) occupied a height commanding the outlet of the river Anio. Corniculum, farther west, stood on the summit of one of three conical hills that rise abruptly out of the plain at the distance of a few miles from Monte Gennaro, the nearest of the Apennines, and which were thence known as the Montes Corniculani. Nomentum was a few miles farther north, between the Apennines and the Tiber, and close to the Sabine frontier. The boundary between the two nations was indeed in this part very fluctuating. Nearly in the centre of the plain of the Campagna stood Gabii; Bovillae was also in the plain, but close to the Appian Way, where it begins to ascend the Alban Hills. Several other cities — Tellenae, Scaptia and Querquetulum — mentioned in the list of Dionysius were probably situated in the Campagna, but the site cannot be determined. Satricum, on the other hand, was certainly south of the Alban Hills, between Velitrae and Antium; while Cora, Norba and Setia (all of which retain their ancient names with little modification) crowned the rocky heights which form advanced posts from the Volscian mountains towards the Pontine Marshes. Carventum possibly occupied the site of Rocca Massima N. of Cori, and Tolerium was very likely at Valmontone in the valley of the Sacco (anc. Trerus or Tolerus) . The cities of the Bubentani and Fortinei are quite

unknown.

A considerable number of the Latin cities had before 370 B.C. either been utterly destroyed or reduced to subjection by Rome, and had thus lost their independent existence. Such were Antemnae and Caenina, both of them situated within a few miles of Rome to the N., the conquest of which was ascribed to Romulus; Fidenae, about 5 m. N. of the city, and close to the Tiber; and Crustumerium, in the hilly tract farther north towards the Sabine frontier. Suessa Pometia also, on the borders of the Pontine Marshes, to which it was said to have given name, was a city of importance, the destruction of which was ascribed to Tarquinius Superbus. In any case it had disappeared before 370 B.C., as it does not occur in the list of the Latin league attributable to that date. It is probably to be sought between Velletri and Cisterna. But by far the most important of these extinct cities was Alba, on the lake to which it gave its name, which was, according to universally received tradition, the parent of Rome, as well as of numerous other cities within the limits of Latium, including Gabii, Fidenae, Collatia, Nomentum and other well-known towns. Whether or not this tradition deserves to rank as historical, it appears certain that at a still earlier period there existed a confederacy of thirty towns, of which Alba was the supreme head. A list of those who were wont to participate in the sacrifices on the Alban Mount is given us by Pliny (N.H. ili. 5. 69) under the name of populi alhenses, which includes only 1 The MSS. read fa'iXKavwv or f}o'i\avS>v. the Latin translation has Bolanorum. It is difficult to say which is to be preferred. The list gives only twenty-nine names, and Mommsen proposes to insert Signini.

six or at most eight of those found in the list of Dionysius; and these for the most part among the more obscure and least known of the names given by him. Many of the rest are un- known; while the more powerful cities of Aricia, Lanuvium and Tusculum, though situated immediately on the Alban Hills, are not included, and appear to have maintained a wholly independent position. This earlier league was doubtless broken up by the fall of Alba; it was probably the increasing power of the Volsci and Aequi that led to the formation of the later league, including all the more powerful cities of Latium, as well as to the alliance concluded by them with the Romans in the consulship of Spurius Cassius (493 B.C.). Other cities of the Latin league had already (according to the traditional dates) received Latin colonies — Velitrae (494 B.C.), Norba (492), Ardea (442), Labici (418), Circei (393), Satricum (385), Setia (382).

The cities of the Latin league continued to hold general meetings or

assemblies from time to time at the grove of the Aqua Ferentina, a sanctuary at the foot of the Alban Hills, perhaps in a valley below Marino, while they had also a common place of worship on the summit of the Alban Mount (Monte Cavo), where stood the celebrated temple of Jupiter Latiaris. The participation in the annual sacrifices at this sanctuary was regarded as typical of a Latin city (hence the name ” prisci Latini ” given to the participating peoples) ; and they continued to be celebrated long after the Latins had lost their independence and been incorporated in the Roman state. 3

We are on firmer ground in dealing with the spread of the supremacy of Rome in Latium when we take account of the foundation of new colonies and of the formation of new tribes, processes which as a rule go together. The S a P ˆ macy . information thˆt we have as to the districts in which the sixteen earliest clans (tribus rusticae) 1 were settled shows us that, except along the Tiber, Rome’s dominion extended hardly more than 5 m. beyond the city gates (Mommsen, History of Rome, i. 58). Thus, towards the N. and E. we find the towns of Antemnae, Fidenae, Caenina and Gabii; 6 on the S.E., towards Alba, the boundary of Roman territory was at the Fossae Cluiliae, 5 m. from Rome, where Coriolanus encamped (Livy ii. 39), and, on the S., towards Laurentum at the 6th mile, where sacrifice to Terminus was made (Ovid, Fasti, ii. 681): the Ambarvalia too were celebrated even in Strabo’s day (v. 3. 3. p. 230) at a place called $ij<7Tot between the 5th and 6th mile. The identification (cf. Hiilsen in Pauly-Wissowa, Realencyclo- pddie, vi. 2223) of this locality with the grove of the Arval brothers at the 5th mile of the Via Portuensis, to the W. of Rome, and of the Ambarvalia with the festival celebrated by this brotherhood in May of each year, is now generally accepted. But Roman sway must either from the first, or very soon, have extended to Ostia, the port of Rome at the mouth of the Tiber: and it was as the emporium of Latium that Rome acquired her first importance. 6

2 Albani, Aesolani (probably E. of Tibur), Accienses, Abolani, Bubetani, Bolani, Cusuetani (Carventani ?), Coriolani, Fidenates, Foreti (Fortinei?), Hortenses (near Corbio), Latinienses (near Rome itself), Longani, Manates, Macrales, Munienses (Castrimoenienses?), Numinienses, Olliculani, Octulani, Pedani, Poletaurini, Querquetu- lani, Sicani, Sisolenses, Tolerienses, Tutienses (not, one would think, connected with the small stream called Tutia at the 6th mile of the Via Salaria; Liv. xxvi. 11), Vimitellari, Velienses, Venetulani, Vitellenses (not far from Corbio).

3 To an earlier stage of the Latin league, perhaps to about 430 B.C. (Mommsen, op. cit. 445 n. 2) belongs the dedication of the grove of

Diana by a dictator Latinus, in the name of the people of Tusculum, Aricia, Lanuvium, Laurentum, Cora, Tibur, Suessa Pometia and Ardea.

4 Of the gentes from which these tribes took their names, six entirely disappeared in later days, while the other ten can be traced as patrician — a proof that the patricians were not noble families in origin (Mommsen, Romische Forschungen, i. 106). For the tribes see W. Kubitschek, De Romanarum tribuum origine (Vienna, 1882). •

6 We have various traces of the early antagonism to Gabii, e.g. the opposition between ager Romanus and ager Gabinus in the augural law.

6 For the early extension of Roman territory towards the sea, cf. Festus, p. 213, Mull., s.v. ” Pectuscum :” Pectuscum Palati dicta est ea regio urbis, quam Romulus obversam posuit, ea parte, in qua plurimum erat agri Romani ad mare versus et qua mollissime adibatur Urbo, cum Etruscorum agrum a Romano Tiberis discluderet, ceterae vicinae civitates colles aliquos haberent oppositos.

The boundary of the Ager Romanus antiquus towards the north-west is similarly fixed by the festival of the Robigalia

at the 5th milestone of the Via Clodia. Within this primitive area ˆ a t ‘ le di str i cts inhabited by the earliest ‘tribes, tribes. so far as these are known to us. The tribus Romilia

was settled on the right bank of the Tiber near the sanctuary of the Arvales, the Galeria perhaps a little farther west on the lower course of the stream now known as Galera, and the Fabia perhaps on the Cremera towards Veii. We know that the pagus Lemonius was on the Via Latina, and that the tribus Pupinia dwelt between Tusculum and the city, while the territory of the Papiria possibly lay nearer Tusculum, as it was to this tribe that the Roman citizens in Tusculum belonged in later days. It is possible that the Camilla was situated in the direction of Tibur, inasmuch as this town was afterwards enrolled in this tribe. The tribus Claudia, probably the last of the 16 older tribus rusticae, was according to tradition founded in 504 B.C. Its territory lay beyond the Anio, between Fidenae and Ficulea (Liv. ii. 16; Dion. Hal. v. 40). The locality of the pagi round which the other tribes were grouped is not known to us.

With the earliest extensions of the Roman territory coincided the first beginnings of the Roman road system. The road to Ostia may

have existed from the first : but after the Latin com-

munities on the lower Anio had fallen under the dominion system. Q f R ome| we ma y well believe that the first portion of the Via Salaria, leading to Antemnae, Fidenae (the fall of which is placed by tradition in 428 B.C.) and Crustumerium, came into existence. The formation (according to the traditional dating in 495 or 471 B.C.) of the tribus Cluslumina (the only one of the earlier twenty-one tribes which bears a local name) is both a consequence of an extension of territory and of the establishment of the assembly of the plebs by tribes, for which an inequality of the total number of divisions was desirable (Mommsen, History of Rome, i. 360). The correlative of the Via Salaria was the Via Campana, so called because it led past the grove of the Arvales along the right bank of the Tiber to the Campus Salinarum Romanarum, 1 the salt marshes, from which the Via Salaria took its name, inasmuch as it was the route by which Sabine traders came from the interior to fetch the salt. To this period would also belong the Via Ficulensis, leading to Ficulea, and after- wards prolonged to Nomentum, and the Via Collatina, which led to Collatia. Gabii became Roman in fairly early times, though at what period is uncertain, and with its subjugation must have origin- ated the Via Gabina, afterwards prolonged to Praeneste. The Via Latina too must be of very early origin; and tradition places the foundation of the Latin colony at Signia (to which it led) as early as 495 B.C. Not long after the capture of Fidenae, the main outpost of Veii, the chief city itself fell (396 B.C.) and a road (still traceable) was probably made thither. There was also probably a road to Caere in early times, inasmuch as we hear of the flight of the Vestals thither in 389 B.C. The origin of the rest of the roads is no doubt to be connected with the gradual establishment of the Latin league. We find that while the later (long distance) roads bear as a rule the name of their constructor, ah the short distance roads on the left bank of the Tiber bear the names of towns which belonged to the league — Nomentum, Tibur, Praeneste, Labici, Ardea, Laurentum — while Ficulea and Collatia do not appear. The Via Pedana, leading to Pedum, is known to us only from an inscription (Bull. Soc. Antiquaires de France, 1905, p. 177) discovered in Tunisia in 1905, and may be of much later origin ; it was a branch of the Via Praenestina. There must too have been a road, along the line of the later Via Appia, to Bovillae, Aricia, Lanuvium and Velitrae, going thence to Cora, Norba and Setia along the foot of the Volscian Mountains; while nameless roads, which can still be traced, led direct from Rome to Satricum and to Lavinium.

We can trace the advance of the Roman supremacy with greater ease after 387 B.C., inasmuch as from this year (adopting the traditional dating for what it is worth) until 299 B.C. every accession of territory is marked by the foundation of a group of new tribes; the limit of 35 in all was reached in the latter year. In 387, after the departure of the' Gauls, southern Etruria was conquered, and four new tribes were formed: Amensis (probably derived from Aro, mod. Arrone — though the ancient name does not occur in literature — the stream which forms the outlet to the lake of Bracciano, anc. Lacus Sabalinus)? Sabatina (called after this lake), Stellatina (named from the Campus Stellatinus, near Capena; cf. Festus p. 343 Mull.) and Tromentina (which, Festus tells us, was so called from the

1 The ancient name is known from an inscription discovered in

1888.

2 So Kubitschek in Pauly-Wissowa, Rialencyclopadie, ii. 1204.

Campus Tromentus, the situation of which we do not know). Four years later were founded the Latin colonies of Sutrium and Nepet. In 358 B.C. Roman preponderance in the Pomptine territory was shown by the formation of the tribus Pomptina and Publilia, while in 338 and 329 respectively Antium and Tarracina became colonies of Roman citizens, the former having been founded as a Latin colony in 494 B.C.

After the dissolution of the Latin league which followed upon the defeat of the united forces of the Samnites and of those Latin and Volscian cities which had revolted against Rome, two new tribes, Maecia and Scaptia, 3 were created in 332 B.C. in connexion with the distribution of the newly acquired lands (Mommsen, History, i. 462). A further advance in the same direction ending in the capture of Privernum in 329 B.C. is marked by the establishment in 318 B.C. of the tribus Oufentina (from the river Ufens which runs below Setia, mod. Sezze, and Privernum, mod. Piperno, and the tribus Falerna (in the Ager Falernus), while the foundation of the colonies of Cales (334) and Fregellae (328) secured the newly won south Volscian and Campanian territories and led no doubt to a prolongation of the Via Latina. The moment had now come for the pushing forward of another line of communication, which had no doubt reached Tarracina in 329 B.C. but was now definitely constructed (munita) as a permanent military highway as far as Capua in 312 B.C. by Appius Claudius, after whom it was named. To him no doubt is due the direct line of road through the Pontine Marshes from Velitrae to Terracina. Its construction may fairly be taken to mark the period at which the

roads of which we have spoken, hitherto probably mere tracks, began to be transformed into real highways. In the same year (312) the colony of Interamna Lirenas was founded, while Luceria, Suessa (Aurunca) and Saticula had been established a year or two previously. Sora followed nine years later. In 299 B.C. further successes led to the establishment of two new tribes — the Teretina in the upper valley of the Trerus (Sacco) and the Aniensis, in the upper valley of the Anio — while to about the same time we must attribute the construction of two new military roads, both secured by fortresses. The southern road, the Via Valeria led to Carsioli and Alba Fucens (founded as Latin colonies respectively in 298 and 303 B.C.), and the northern (afterwards the Via Flaminia 4) to Narnia (founded as a Latin colony in 299 B.C.). There is little doubt that the formation of the tribus Quirina (deriving its name possibly from the town of Cures) and the tribus Velina (from the river Velinus, which forms the well-known waterfalls near Terni) is to be connected with the construction of the latter high road, though its date is not certainly known. The further history of Roman supremacy in Italy will be found in the article Rome : History. We notice, however, that the continual warfare in which the Roman state was engaged led to the decadence of the free population of Latium, and that the extension of the empire of Rome was fatal to the prosperity of the territory which immediately sur- rounded the city. 5

What had previously, it seems, been a well-peopled region, with peasant proprietors, kept healthy by careful drainage, became in the 4th and 3rd centuries B.C. a district consisting in large measure of huge estates (latifundia) d a ” SeS .f. owned by the Roman aristocracy, cultivated by gangs #„„, of slaves. This led to the disappearance of the agri- cultural population, to a decline in public safety, and to the spread of malaria in many parts ; indeed, it is quite possible that it was not introduced into Latium before the 4th century B.C. The evil increased in the later period of the Republic, and many of the old towns of Latium sank into a very decayed condition; with this the continual competition of the provinces as sources of food-supply no doubt had a good deal to do. Cicero

3 Festus tells us (p. 136 Mull.) that the Maecia derived its name ” a quodam castro.” Scaptia was the only member of the Latin league that gave its name to a tribe.

4 See Flaminia, Via and Valeria, Via.

5 L. Caetani indeed (Nineteenth Century and After, 1908) attributes the economic decadence of the Roman Campagna to the existence of

free trade throughout the Roman empire.

speaks of Gabii, Labici and Bovillae as places that had fallen into abject poverty, while Horace refers to Gabii and Fidenae as mere ” deserted villages,” and Strabo as ” once fortified towns, but now villages, belonging to private individuals.” Many of the smaller places mentioned in the list of Dionysius, or the early wars of the Romans, had altogether ceased to exist, but the statement of Pliny that fifty-three communities (populi) had thus perished within the boundaries of Old Latium is perhaps ex- aggerated. By the end of the Republic a good many parts cf Latium were infected, and Rome itself was highly malarious in the warm months (see W. H. S. Jones in Annals of Archaeology and Anthropology, ii. 97, Liverpool, 1909). The emperors Claudius, Nerva and Trajan turned their attention to the district, and under their example and exhortation the Roman aristocracy erected numerous villas within its boundaries, and used them at least for summer residences. During the 2nd century the Campagna seems to have entered on a new era of prosperity. The system of roads radiating in all directions from Rome (see Italy: History, § B) belonged to a much earlier period; but they were con- nected by a network of crossroads (now mostly abandoned, while the main lines are still almost all in use) leading to the very numerous villas with which the Campagna was strewn (even in districts which till recently were devastated by malaria), and which seem in large measure to belong to this period. Some of these are of enormous extent, e.g. the villa of the Quintilii on the Via Appia, that known as Setta Bassi on the Via Latina, and that of Hadrian near Tibur, the largest of all.

When the land tax was introduced into Italy in 292, the first region of Augustus obtained the name of prpvincia Campania. Later on the name Latium entirely disappeared, and the name Campania extended as far as Veii and the Via Aurelia, whence the medieval and modern name Campagna di Roma. The donation made by Constantine to various churches of Rome of numerous estates belonging to the palrimonium Caesaris in the neighbourhood of Rome was of great historical importance, as being the origin of the territorial dominion of the papacy. His example was followed by others, so that the church property in the Campagna soon became considerable; and, owing to the immunities and privileges which it enjoyed, a certain revival of prosperity ensued. The invasions of the barbarian hordes did great harm, but the formation of centres (domuscullae) in the 8th and 9th

centuries was a fact of great importance: the inhabitants, indeed, formed the medieval militia of the papacy. Smaller centres (the colonia — often formed in the remains of an ancient villa — the curtis or curia, the caslrum, the casale) grew up later. We may note that, owing to the growth of the temporal power of the popes, there was never a dux Romae dependent on the exarchate of Ravenna, similar to those estab- lished by Narses in the other districts of Italy.

The papal influence was also retained by means of the suburban bishoprics, which took their rise as early as the 4th and 5th centuries. The rise of the democratic commune of a er Rome l about 1143 and of the various trade corpora- commune. ti° n s which we already find in the early nth century led to struggles with the papacy; the commune of Rome made various attempts to exercise supremacy in the Campagna and levied various taxes from the 1 2th century until the 15th. The commune also tried to restrict the power of the barons, who, in the 13th century especially, though we find them feudatories of the holy see from the 10th century onwards, threatened to become ,masters of the whole territory, which is still dotted over with the baronial castles and lofty solitary towers of the rival families of Rome — Orsini, Colonna, Savelli, Conti, Caetani — who ruthlessly destroyed the remains of earlier edifices to obtain materials for their own, and whose castles, often placed upon the high roads, thus following a strategic line to a stronghold in the country, did not contribute to the undisturbed security of traffic upon them, but rather led to their abandonment. On a list of the inhabited centres of the Cam- pagna of the 14th century with the amount of salt (which was

1 The commune of Rome as such seems to have been in existence in 999 at least.

a monopoly of the commune of Rome) consumed by each, Tomassetti bases an estimate of the population: this was about equal to that of our own times, but differently distributed, some of the smaller centres having disappeared at the expense of the towns. Several of the popes, as Sixtus IV. and Julius III., made -unsuccessful attempts to improve the condition of the Campagna, the former making a serious attempt to revive agriculture as against pasture, while in the latter part of the 1 6th century a line of watch-towers was erected along the coast. In the Renaissance, it is true, falls the erection of many fine villas in the neighbourhood of Rome — not only in the hills round the Campagna, but even in certain places in the lower ground, e.g. those of Julius II. at La Magliana and of Cardinal Trivulzio at Salone, — and these continued to be frequented until the end of the 18th century, when the French Revolution dealt a fatal blow to the prosperity of the

Roman nobility. The 17th and 18th centuries, however, mark the worst period of depopulation in the more malarious parts of the Campagna, which seems to have begun in the 15th century, though we hear of malaria throughout the middle ages. The most healthy portions of the territory are in the north and east, embracing the slopes of the Apennines which are watered by the Teverone andSacco; and the most pestilential is the stretch between the Monti Lepini and the sea. The Pontine Marshes (q.v.) included in the latter division, were drained, according to the plan of Bolognini, by Pius VI., who restored the ancient Via Appia to traffic; but though they have returned to pasture and cultivation, their insalubrity is still notorious. con(f/. The soil in many parts is very fertile and springs are tlons. plentiful and abundant: the water is in some cases sulphureous or ferruginous. In summer, indeed, the vast expanse is little better than an arid steppe; but in the winter it furnishes abundant pasture to flocks of sheep from the Apennines and herds of silver-grey oxen and shaggy black horses, and sheep passing in the summer to the mountain pastures. A certain amount of horse-breeding is done, and the government has, as elsewhere in Italy, a certain number of stallions. Efforts have been made since 1882 to cure the waterlogged condition of the marshy grounds. The methods employed have been three — (i.) the cutting of drainage channels and clearing the marshes by pumping, the method principally employed; (ii.) the system of warping, i.e. directing a river so that it may deposit its sedimentary matter in the lower-lying parts, thus levelling them up and consolidating them, and then leading the water away again by drainage; (iii.) the planting of firs and eucalyptus trees, e.g. at Tre Fontane and elsewhere. These efforts have not been without success, though it cannot be affirmed that the malarial Campagna is anything like healthy yet. The regulation of the rivers, more especially of the Tiber, is probably the most efficient method for coping with the problem. Since 1884 the Italian Government have been systematically enclosing, pumping dry. and generally draining the marshes of the Agro Romano, that is, the tracts around Ostia; the Isola Sacra, at the mouth of the Tiber; and Maccarese. Of the whole of the Campagna less than one-tenth comes annually under the plough. In its picturesque desolation, contrasting so strongly with its prosperity in Roman times, immediately surrounding a city of over half a million inhabitants, and with lofty mountains in view from all parts, of it, it is one of the most interesting districts in the world, and has a peculiar and indefinable charm. The modern province of Rome (forming the compartimento of Lazio) includes also considerable mountain districts, extending as far N.W. as the Lake of Bolsena, and being divided on the N.E. from Umbria by the Tiber, while on the E. it includes a

considerable part of the Sabine mountains and Apennines. The ancient district of the Hernicans, of which Alatri is regarded as the centre, is known as the Ciociaria, from a kind of sandals (cioce) worn by the peasants. On the S.E. too a considerable proportion of the group of the Lepini belongs to the province. The land is for the most part let by the proprietors to mercanti di Campagna, who employ a subordinate class of factors (Jattori) to manage their affairs on the spot.

Produce.

The recent discovery that the malaria which has hitherto rendered parts of the Campagna almost uninhabitable during M . . the summer is propagated by the mosquito (Anopheles daviger) marks a new epoch; the most diverse theories as to its origin had hitherto been propounded, but it is now possible to combat it on a definite plan, by draining the marshes, protecting the houses by fine mosquito-proof wire netting (for Anopheles is not active by day), improving the water supply, &c, while for those who have fever, quinine (now sold cheaply by the state) is a great specific. A great improvement is already apparent; and a law carried in 1903 for the Bonifica dell' Agro Romano compels the proprietors within a radius of some 6 m. of Rome to cultivate their lands in a more productive way than has often hitherto been the case, exemption from taxes for ten years and loans at 25% from the government being granted to those who carry on improvements, and those who refuse being expropriated compulsorily. The government further resolved to open roads and schools and provide twelve additional doctors. Much is done in contending against malaria by the Italian Red Cross Society. In 1900 31% of the inhabitants of the Agro Romano had been fever-stricken; since then the figure has rapidly decreased (5-1% in 1905).

The wheat crop in 1906 in the Agro Romano was 8,108,500 bushels, the Indian corn 3,314,000 bushels, the wine 12,100,000 gallons and the olive oil 1,980,000 gallons, — these last two from the hill districts. The wine production had declined by one-half from the previous year, exportation having fallen off in the whole country. 1907, however, was a year of great overproduction all over Italy. The wine of the Alban hills is famous in modern as in ancient times, but will not as a rule bear exportation. The forests of the Alban hills and near the coast produce much charcoal and light timber, while the Sabine and Volscian hills have been largely deforested and are now bare

limestone rocks. Much of the labour in the winter and spring is furnished by peasants who come down from the Volscian and Hernican mountains, and from Abruzzi, and occupy sometimes caves, but more often the straw or wicker huts which are so characteristic a feature of the Campagna. The fixed population of the Campagna in the narrower sense (as distinct from the hills) is less than 1000. Emigration to America, especially from the Volscian and Hernican towns, is now considerable.

2. Latium Novum or Adjectum, as it is termed by Pliny, com- prised the territories occupied in earlier times by the Volsci and Hernici. It was for the most part a rugged and mountainous country, extending at the back of Latium proper, from the frontier of the Sabines to the sea-coast between Terracina and Sinuessa. But it was not separated from the adjacent territories by any natural frontier or physical boundaries, and it is only by the enumeration of the towns in Pliny according to the division of Italy by Augustus that we can determine its limits. It included the Hernican cities of Anagnia, Ferentinum, Alatrium and Verulae — a group of mountain strongholds on the north side of the valley of the Trerus (Sacco) ; together with the Volscian cities on the south of the same valley, and in that of the Liris, the whole of which, with the exception of its extreme upper end, was included in the Volscian territory. Here were situated Signia, Frusino, Fabrateria, Fregellae, Sora, Arpinum, Atina, Aquinum, Casinum and Interamna; Anxur (Terracina) was the only seaport that properly belonged to the Volscians, the coast from thence to the mouth of the Liris being included in the territory of the Aurunci, or Ausones as they were termed by Greek writers, who possessed the maritime towns of Fundi, Formiae, Caieta and Min- turnae, together with Suessa in the interior, which had replaced their more ancient capital of Aurunca. Sinuessa, on the sea-coast between the Liris (Garigliano) and the Vulturnus, at the foot of the Monte Massico, was the last town in Latium according to the official use of the term and was sometimes assigned to Campania, while Suessa was more assigned to Latium. On the other hand, as Nissen points out (Italische Landeskunde, ii. 554), the Pons Campanus, by which the Via Appia crossed the Savo some 9 m. S.E. of Sinuessa, indicates by its name the position of the old Campanian frontier. In the interior the boundary fell between Casinum and Teanum Sidicinum, at about the 100th milestone of the Via Latina — a fact which led later to the jurisdiction of the Roman courts being extended on every side to the 100th mile from the city, and to this being the limit beyond which banishment from Rome was considered to begin.

Though the Apennines comprised within the boundaries of Latium do

not rise to a height approaching that of the loftiest sum- mits of the central rjtnge, they attain to a considerable altitude, and

form steep and rugged mountain masses from 4000 to 5000 ft. high. They are traversed by three principal valleys: (1) that of the Anio, now called Teverone, which descends from above Subiaco to Tivoli, where it enters the plain of the Campagna; (2) that of the Trerus (Sacco), which has its source below Palestrina (Praeneste), and flows through a comparatively broad valley that separates the main mass of the Apennines from the Volscian mountains or Monti Lepini, till it joins the Liris below Ceprano; (3) that of the Liris (Garigliano), which enters the confines of New Latium about 20 m. from its source, flows past the town of Sora, and has a very tortuous course from thence to the sea at Minturnae; its lower valley is for the most part of considerable width, and forms a fertile tract of considerable extent, bordered on both sides by hills covered with vines, olives and fruit trees, and thickly studded with towns and villages.

It may be observed that, long after the Latins had ceased to exist as a separate people we meet in Roman writers with the phrase of nomen Latinum, used not in an ethnical but a purely political sense, to designate the inhabitants of all those cities on which the Romans had conferred ” Latin rights ” (jus Latinum) — an inferior form of the Roman franchise, which had been granted in the first instance to certain cities of the Latins, when they became subjects of Rome, and was afterwards bestowed upon many other cities of Italy, especially the so-called Latin colonies. At a later period the same privileges were extended to places in other countries also — as for instance to most of the cities in Sicily and Spain. All persons en- joying these rights were termed in legal phraseology Latini or Latinae conditionis .

Authorities. — For the topography of Latium, and the local history of its more important cities, the reader may consult Sir W. Cell’s Topography of Rome and its Vicinity (2nd ed., 1 vol., London, 1846) ; A. NibDy, Analisi storico-topografico-antiquaria delta carta dei dintorni di Roma (3 vols., 2nd ed., 1848); J. Westphal, Die romische Kampagne (Berlin, 1829); A. Bormann, Alt-lateinische Chorographie und Stddte-Geschichte (Halle, 1852) ; M. Zoeller, Latium und fiom (Leipzig, 1878); R. Burn’s Rome and the Campagna (London, 1871); H. Dessau, Corp. Inscr. Lat. v. xiv. (Berlin, 1887) (Latium); Th. Mommsen, Corp. Inscr. Lat. vol. x. pp. 498-675 (Berlin, 1883); G. Tomassetti, ” Delia Campagna Romana nel medio evo,” published in the Archivio delta Societa Romana di Storia Patria (Rome, 1874-1907), and separately (a work dealing with the medieval history and topography of the Campagna in great detail, containing also valuable

notices of the classical period) ; by the same author, La Campagna romana (Rome, 1910 foil.) ; R. A. Lanciani, ” I Comentari di Frontino intorno agli acquedotti,” Memorie dei Lincei (Rome, 1880), serie iii. vol. v. p. 215 sqq. (and separately), also many articles, and Wanderings in the Roman Campagna (London, 1909) ; E. Abbate, Guida della provincia di Roma (Rome, 1894, 2 vols.); H. Nissen, Italische Landeskunde, ii. (Berlin, 1902), 557 sqq.; T. Ashby, ” The Classical Topography of the Roman Campagna,” in Papers of the British School at Rome, i. iii.-v. (London, 1902 foil.). (T. As.)

LATONA (Lat. form of Gr. Ajjto), Leto), daughter of Coeus and Phoebe, mother of Apollo and Artemis. The chief seats of her legend are Delos and Delphi, and the generally accepted tradition is a union of the legends of these two places. Leto, pregnant by Zeus, seeks for a place of refuge to be delivered. After long wandering she reaches the barren isle of Delos, which, according to Pindar (Frag. 87, 88), was a wandering rock borne about by the waves till it was fixed to the bottom of the sea for the birth of Apollo and Artemis. In the oldest forms of the legend Hera is not mentioned; but afterwards the wanderings of Leto are ascribed to the jealousy of that goddess, enraged at her amour with Zeus. The foundation of Delphi follows immediately on the birth of the god; and on the sacred way between Tempe and Delphi the giant Tityus offers violence to Leto, and is immediately slain by the arrows of Apollo and Artemis (Odyssey, xi. 576-581; Apollodorus i. 4). Such are the main facts, of the Leto legend in its common literary form, which is due especially to the two Homeric hymns to Apollo. But Leto is a real goddess, not a mere mythological figure. The honour paid to her in Delphi and Delos might be explained as part of the cult of her son Apollo; but temples to her existed in Argos, in Mantineia and in Xanthus in Lycia; her sacred grove was on the coast of Crete. In Lycia graves are frequently placed under her protection, and she is also known as a goddess of fertility and as Kovporp64>os. It is to be observed that she appears far more conspicuously in the Apolline myths than in those which grew round the great centres of Artemis worship, the reason being that the idea of Apollo and Artemis as twins is one of later growth on Greek soil. Lycia, one of the chief seats of the cult of Apollo, where most frequent traces are found of the worship of Leto as the great goddess, was probably the earlier home of her religion.

In Greek art Leto usually appears carrying her children in her arms,

pursued by the dragon sent by the jealous Hera, which is slain by the infant Apollo; in vase paintings especially she is often repre- sented with Apollo and Artemis. The statue of Leto in the Letoon at Argos was the work of Praxiteles.

LATOUCHE, HYACINTHE JOSEPH ALEXANDRE THA- BAUD DE [known as Henri] (1785-1851), French poet and novelist, was born at La Chatre (Indre) on the 2nd of February 1785. Among his works may be distinguished his comedies: Projets de sagesse (181 1), and, in collaboration with Emile Deschamps, SeUnours de Florian (1818), which ran for a hundred nights; also La Reine d'Espagne (1831), which proved too indecent for the public taste; a novel, Fragolelta: Naples et Paris en 1799 (1829), which attained a success of notoriety; La Vallee aux coups (1833), a volume of prose essays and verse; and two volumes of poems, Les Adieux (1843) an d Les Agrestes (1844). Latouche's chief claim to remembrance is that he revealed to the world the genius of Andre Chenier, then only known to a limited few. The remains of the poet's work had passed from the hands of Daunou to Latouche, who had sufficient critical insight instantly to recognize their value. In editing the first selection of Chenier's poems (1819) he made some trifling emendations, but did not, as Beranger afterwards asserted, make radical and unnecessary changes. Latouche was guilty of more than one literary fraud. He caused a licentious story of his own to be attributed to the duchesse de Duras, the irreproachable author of Ourika. He made many enemies by malicious attacks on his contemporaries. The Constitutionnel was suppressed in 1 81 7 by the government for an obscure political allusion in an article by Latouche. He then undertook the management of the Mercure du XIX' siecle, and began a bitter warfare against the monarchy. After 1830 he edited the Figaro, and spared neither the liberal politicians nor the romanticists who triumphed under the monarchy of July. In his turn he was violently attacked by Gustave Planche in the Revue des deux mondes for November 1831. But it must be remembered to the credit of Latouche that he did much to encourage George Sand at the beginning of her career. The last twenty years of his life were spent in retirement at Aulnay, where he died on the 9th of March 1851.

Sainte-Beuve, in the Causeries du lundi, vol. 3, gives a not too sympathetic portrait of Latouche. See also George Sand in the Siecle for the 18th, 19th and 20th of July 1851.

LA TOUR, MAURICE QUENTIN DE (1704-1788), French pastellist, was born at St Quentin on the 5th of September 1704. After leaving Picardy for Paris in 1727 he entered the studio of Spoede — an upright man, but a poor master, rector of the academy of St Luke, who

still continued, in the teeth of the Royal Academy, the traditions of the old gild of the master painters of Paris. This possibly contributed to the adoption by La Tour of a line of work foreign to that imposed by an academical training; for pastels, though occasionally used, were not a principal and distinct branch of work until 1720, when Rosalba Carriera brought them into fashion with the Parisian world. In 1737 La Tour exhibited the first of that splendid series of a hundred and fifty portraits which formed the glory of the Salon for the succeeding thirty-seven years. In 1746 he was received into the academy; and in 1751, the following year to that in which he received the title of painter to the king, he was promoted by that body to the grade of councillor. His work had the rare merit of satisfying at once both the taste of his fashionable models and the judgment of his brother artists. His art, consummate of its kind, achieved the task of flattering his sitters, whilst hiding that flattery behind the just and striking likeness which, says Pierre Jean Mariette, he hardly ever missed. His portraits of Rousseau, of Voltaire, of Louis XV., of his queen, of the dauphin and dauphiness, are at once documents and masterpieces unsurpassed except by his life-size portrait of Madame de Pompadour, which, exhibited at the Salon of 1755, became the chief ornament of the cabinet of pastels in the Louvre. The museum of St Quentin also possesses a magnificent collection of works which at his death were in his own hands. La Tour retired to St Quentin at the age of 80, and there he died on the

1 8th of February 1788. The riches amassed during his long life were freely bestowed by him in great part before his death; he founded prizes at the school of fine arts in Paris and for the town of Amiens, and endowed St Quentin with a great number of useful and charitable institutions. He never married, but lived on terms of warm affection with his brother (who survived him, and left to the town the drawings now in the museum) ; and his relations to Mile Marie Fel (1713-1789), the celebrated singer, were distinguished by a strength and depth of feeling not common to the loves of the 18th century.

See, in addition to the general works on French art, C. Desmeze, M. Q. de La Tour, peintre du roi (1854) ; Champfleury, Les Peintres de Loon et de St Quentin (1855); and ” La Tour ” in the Collection des artistes celebres (1886); E. and J. de Goncourt, La Tour (1867); Guiffrey and M. Tourneux, Correspondance inedite de M. G. de la Tour (1885); Tourneux, La Tour, biographie critique (1904); and Patoux, L’CEuvre de M. Quentin de la Tour au musee de St Quentin (St Quentin, 1882).

LA TOUR D’AUVERGNE, THEOPHILE MALO (1743-1806), French soldier, was born at Carhaix in Brittany on the 23rd of December

1743, the son of an advocate named Corret. His desire for a military career being strongly marked, he was en- abled, by the not uncommon device of producing a certificate of nobility signed by his friends, first to be nominally enlisted in the Maison du Roi, and soon afterwards to receive a commission in the line, under the name of Corret de Kerbaufret. Four years after joining, in 1771, he assumed by leave of the duke of Bouillon the surname of La Tour d'Auvergne, being in fact descended from an illegitimate half-brother of the great Turenne. Many years of routine service with his regiment were broken only by his participation as a volunteer in the due de Crillon's Franco-Spanish expedition to Minorca in 1781. This led to an offer of promotion into the Spanish army, but he refused to change his allegiance. In 1748 he was promoted captain, and in 1 791 he received the cross of St Louis. In the early part of the Revolution his patriotism was still more conspicuously displayed in his resolute opposition to the proposals of many of his brother officers in the Angoumois regiment to emigrate rather than to swear to the constitution. In 1792 his lifelong interest in numismatics and questions of language was shown by a work which he published on the Bretons. At this time he was serving under Montesquiou in the Alps, and although there was only outpost fighting he distinguished himself by his courage and audacity, qualities which were displayed in more serious fighting in the Pyrenees the next year. He declined well-earned pro- motion to colonel, and, being broken in health and compelled, owing to the loss of his teeth, to live on milk, he left the army in 1795. On his return by sea to Brittany he was captured by the English and held prisoner for two years. When released, he settled at Passy and published Origines gauloises, but in 1797, on the appeal of an old friend whose son had been taken as a conscript, he volunteered as the youth's substitute, and served on the Rhine (1797) and in Switzerland (1 798-1 799) as a captain. In recognition of his singular bravery and modesty Carnot obtained a decree from the first consul naming LaTour d'Auvergne " first grenadier of France " (27th of April 1800). This led him to volunteer again, and he was killed in action at Oberhausen, near Donauworth, on the 27th of June 1800.

La Tour d'Auvergne 's almost legendary courage had captivated the imagination of the French soldier, and his memory was not suffered to die. It was customary for the French troops and their allies of the Rhine Confederation under Napoleon to march at attention when passing his burial-place on the battlefield. His heart was long carried by the grenadier company of his regiment, the 46th; after being in the possession of Garibaldi for many years, it was finally deposited in the keeping of the city of Paris in 1883. But the most striking tribute to

his memory is paid to-day as it was by order of the first consul in 1800. ” His name is to be kept on the pay list and roll of his company. It will be called at all parades and a non-commissioned officer will reply, Mort au champ d’honneur.” This custom, with little variation, is still observed in the 46th regiment on all occasions when the colour is taken on parade.

LATREILLE, PIERRE ANDRE (1762-1833), French natur- alist, was born in humble circumstances at Brives-la-Gaillarde (Correze), on the 20th of November 1762. In 1778 he entered the college Lemoine at Paris, and on his admission to priestly orders in 1786 he retired to Brives, where he devoted all the leisure which the discharge of his professional duties allowed to the study of entomology. In 1788 he returned to Paris and found means of making himself known to the leading naturalists there. His ” Memoire sur les mutilles decouvertes en France,” contributed to the Proceedings of the Society of Natural History in Paris, procured for him admission to that body. At the Re- volution he was compelled to quit Paris, and as a priest of conservative sympathies suffered considerable hardship, being imprisoned for some time at Bordeaux. His Precis dcs caractcres generiques des insectes, disposes dans un ordre naturel, appeared at Brives in 1796. In 1798 he became a corresponding member of the Institute, and at the same time was entrusted with the task of arranging the entomological collection at the recently organized Museum d’Histoire Naturelle (Jardin des Plantes); in 1814 he succeeded G. A. Olivier as member of the Academie des Sciences, and in 1821 he was made a chevalier of the Legion of Honour. For some time he acted as professor of zoology in the veterinary school at Alfort near Paris, and in 1830, when the chair of zoology of invertebrates at the Museum was divided after the death of Lamarck, Latreille was appointed professor of zoology of crustaceans, arachnids and insects, the chair of molluscs, worms and zoophytes being assigned to H. M. D. de Blainville. ” On me donne du pain quand je n’ai plus de dents,” said Latreille, who was then in his sixty-eighth year. He died in Paris on the 6th of February 1833.

In addition to the works already mentioned, the numerous works of Latreille include: Histoire naturelle generate et particuliere des crustaces el insectes (14 vols., 1802-1805), forming part of C. N. S. Sonnini’s edition of Buffon; Genera cruslaceorum et insectorum, secundum ordinem naturalem in fatnilias disposita (4 vols., 1806—

1807); Considerations generates sur I ordre naturel des animaux composant les classes des crustaces, des arachnides, et des insectes (1810); Families naturelles du regne animal, exposees succinctement et dans un ordre analytique (1825); Cours a" entomologie (of which only the first volume appeared, 1831); the whole of the section " Crustaces, Arachnides, Insectes," in G. Cuvier's Regne animal; besides many papers in the Annates du Museum, the Encyclopedie mcthodique, the Dictionnaire classique d'histoire naturelle and elsewhere.

LA TRˆMOILLE, an old French family which derives its name from a village (the modern La Trimouille) in the department of Vienne. The family has been known since the middle of the nth century, and since the 14th century its members have been conspicuous in French history. Guy, sire de la Tremoille, standard-bearer of France, was taken prisoner at the battle of Nicopolis (1396), and Georges, the favourite of King Charles VII., was captured at Agincourt (1415). Louis (2), called the chevalier sans reproche, defeated and captured the duke of Orleans at the battle of Saint»Aubin-du-Cormier (1488), distinguished himself in the wars in Italy, and was killed at Pavia (1525). In 1521 Francois (2) acquired a claim on the kingdom of Naples by his marriage with Anne de Laval, daughter of Charlotte of Aragon. Louis (3) became duke of Thouars in 1563, and his son Claude turned Protestant, was created a peer of France in 159S, and married a daughter of William the Silent in 1598. To this family belonged the lines of the counts of Joigny, the marquises of Royan and counts of Olonne, and the marquises and dukes of Noirmoutier.

LATROBE, CHARLES JOSEPH (1801-1875), Australian governor, was born in London on the 20th of March 1801. The Latrobes were of Huguenot extraction, and belonged to the Moravian community, of which the father and grandfather of C. J. Latrobe were ministers. His father, Christian Ignatius Latrobe (1758-1836), a musician of some note, did good service in the direction of popularizing classical music in England by his Selection of Sacred Music from the Works of the most Eminent Composers of Germany and Italy (6 vols., 1806-1825). C. J. Latrobe was an excellent mountaineer, and made some important ascents in Switzerland in 1824-1826. In 1832 he went to

America with Count Albert Pourtales, and in 1834 crossed the prairies from New Orleans to Mexico with Washington Irving. In 1837 he was invested with a government commission in the West Indies, and two years later was made superintendent of the Port Philip district of New South Wales. When Port Philip was erected into a separate colony as Victoria in 1851, Latrobe became lieutenant-governor. The discovery

of gold in that year attracted enormous numbers of immigrants annually. Latrobe discharged the difficult duties of government at this critical period with tact and success. He retired in 1854, became C. B. in 1858 and died in London on the 2nd of December 1875. Beside some volumes of travel he published a volume of poems, The Solace of Song (1837).

See Brief Notices of the Latrobe Family (1864), a privately printed translation of an article revised by members of the family in the Moravian Bruderbote (November 1864).

LATTEN (from O. Fr. laton, mod. Fr. laiton, possibly connected with Span, lata, Ital. latta, a lath), a mixed metal like brass, composed of copper and zinc, generally made in thin sheets, and used especially for monumental brasses and effigies. A fine example is in the screen of Henry VII. ‘s tomb in Westminster Abbey. There are three forms of latten, ” black latten,” un- polished and rolled, ” shaven latten,” of extreme thinness, and ” roll latten,” of the thickness either of black or shaven latten, but with both sides polished.

LATTICE LEAF PLANT, in botany, the common name for Ouvirandra fenestralis, an aquatic monocotyledonous plant belonging to the small natural order Aponogetonaceae and a native of Madagascar. It has a singular appearance from the structure of the leaves, which are oblong in shape, from 6 to 18 in. long and from 2 to 4 in. broad; they spread horizontally beneath the surface of the water, and are reduced to little more than a lattice-like network of veins. The tuberculate roots are edible. The plant is grown in cultivation as a stove-aquatic.

LATUDE, JEAN HENRI, often called Danry or Masers de Latude (1725-1805), prisoner of the Bastille, was born at Montagnac in Gascony on the 23rd of March 1725. He received a military education and went to Paris in 1748 to study mathe- matics. He led a dissipated life and endeavoured to curry favour with the marquise de Pompadour by secretly sending her a box of poison and then informing her of the supposed plot against her life. The ruse was discovered, and Mme de Pompadour, not appreciating the humour of the situation, had Latude put in the Bastille on the 1st of May 1749. He was later transferred to Vincennes, whence he escaped in 1750. Retaken and reim- prisoned in the Bastille, he made a second brief escape in 1756. He was transferred to Vincennes in 1764, and the next year made a third escape and was a third time recaptured. He was put in a madhouse by Malesherbes in 1775, and discharged in 1777 on condition that he should retire to his native town. He remained in Paris and was again imprisoned. A certain Mme Legros became interested in him through

chance reading of one of his memoirs, and, by a vigorous agitation in his behalf, secured his definite release in 1784. He exploited his long captivity with considerable ability, posing as a brave officer, a son of the marquis de la Tude, and a victim of Pompadour's intrigues. He was extolled and pensioned during the Revolution, and in 1793 the convention compelled the heirs of Mme de Pompadour to pay him 60,000 francs damages. He died in obscurity at Paris on the 1st of January 1805.

The principal work of Latude is the account of his imprisonment, written in collaboration with an advocate named Thiery, and en- titled Le Despotisme devoile, ou Memoires de Henri Masers de la Tude, detenu pendant trente-cinq ans dans les diverses prisons d'etat (Amster- dam, 1787, ed. Paris, 1889). An Eng. trans, of a portion was published in 1787. The work is full of lies and misrepresentations, but had great vogue at the time of the French Revolution. Latude also wrote essays on all sorts of subjects.

See J. F. Barriere, Memoires de Linguet et de Latude (1884); G. Bertin, Notice in edition of the Memoires (1889); F. Funck- Brentano, " Latude," in the Revue des deux mondes (1st October

1889).

LATUKA, a tribe of negroid stock inhabiting the mountainous country E. of Gondokoro on the upper Nile. They have received a tinge of Hamitic blood from the Galla people, and have high

foreheads, large eyes, straight noses and thick but not pouting lips. They are believed by Sir H. H. Johnston to be the original and purest type of the great Masai people, and are assimilated to the Nilotic negro races in customs. Like their neighbours the Bari and Shilluk tribes, they despise clothing, though the important chiefs have adopted Arab attire. Their country is fertile, and they cultivate tobacco, durra and other crops. Their villages are numerous, and some are of considerable size. Tar- angole, for instance, on the Khor Kohs, has upwards of three thousand huts, and sheds for many thousands of cattle. The Latuka are industrious and especially noted for skill as smiths. Emin Pasha stated that the lion was so little dreaded by the Latuka that on one being caught in a leopard trap they hastily set it free.

LAUBAN, a town of Germany in the Prussian province of Silesia, is situated in a picturesque valley, at the junction of the lines of railway from Gorlitz and Sorau, 16 m. E. of the former. Pop. (1905) 14,624. Lauban has a Roman Catholic and two Evan- gelical churches, a town hall, dating from 1541, a conventual house of the order of St Magdalene, dating from the 14th century, a municipal, library and museum, two hospitals, an orphanage and several schools. Its industrial establishments comprise tobacco, yarn, thread, linen and woollen cloth manufactories, bleaching and dyeing works, breweries and oil and flour mills.

Lauban was founded in the 10th and fortified in the 13 th century; in 1427 and 1431 it was devastated by the Hussites, and in 1640 by the Swedes. In 1761 it was the headquarters of Frederick the Great, and in 1815 it was the last Saxon town that made its submission to Prussia. See Berkel, Geschichte der Stadt Lauban (Lauban, 1896). LAUBE, HEINRICH (1806-1884), German dramatist, novelist and theatre-director, was born at Sprottau in Silesia on the 18th of September 1806. He studied theology at Halle and Breslau (1826-1829), and settled in Leipzig in 1832. Here he at once came into prominence with his political essays, collected under the title Das neue Jahrhundert, in two parts — Polen (1833) and Polilische Briefe (1833) — and with the novel Das junge Europa, in three parts — Die Poeten, Die Krieger, Die Burger — (1833-1837). These writings, in which, after the fashion of Heinrich Heine and Ludwig Borne, he severely criticized the political regime in Germany, together with the part he played in the literary movement known as Das junge Deutschland, led to his being subjected to police surveillance and his works con- fiscated. On his return, in 1834, from a journey to Italy, under- taken in the company of Karl Gutzkow, Laube was expelled from Saxony and imprisoned for nine months in Berlin. In 1836 he married the widow of Professor Hand of Leipzig; almost immediately afterwards he suffered a year's imprison- ment for his revolutionary sympathies. In 1839 he again settled in Leipzig and began a literary activity as a playwright. Chief among his earlier productions are the tragedies Monaldeschi (1845) and Struensee (1847); the comedies Rokoko, oder die alien Herren (1846); Gottsched und Gellert (1847); an d Die Karls- schuler (1847), of which the youthful Schiller is the hero. In 1848 Laube was elected to the national assembly at Frankfort- on-Main for the district of Elbogen, but resigned in the spring of 1849, when he was appointed artistic director of the Hofburg theatre in Vienna. This office he held until 1867, and in this period fall his finest dramatic productions, notably the tragedies Graf Essex (1856) and Montrose (1859), and his historical romance Der deutsche Krieg (1865-1866, 9 vols.), which

graphically pictures a period in the Thirty Years' War. In 1869 he became director of the Leipzig Stadttheater, but returned to Vienna in 1870, where in 1872 he was placed at the head of the new Stadttheater; with the exception of a short interval he managed this theatre with brilliant success until his retirement from public life in 1880. He has left a valuable record of his work in Vienna and Leipzig in the three volumes Das Burgtheater (1868), Das norddeutsche Theater (1872) and Das Wiener Stadt- theater (1875). His pen was still active after his retirement, and in the five years preceding his death, which took place at Vienna on the 1st of August 1884, he wrote the romances and

novels Die Bohminger (1880), Louison (1881), Der Schatten- Wilhelm (1883), and published an interesting volume of remi- niscences, Erinnerungen, 1841-1881 (1882). Laube's dramas are not remarkable for originality or for poetical beauty; their real and great merit lies in their stage-craft. As a theatre- manager he has had no equal in Germany, and his services in this capacity have assured him a more lasting name in German literary history than his writings.

His Gesammelte Schriften (excluding his dramas) were published in 16 vols. (1875-1882) ; his Dramatische Werke, in 13 vols. (1845-1875) ; a popular edition of the latter in 12 vols. (1880-1892). An edition of Laube's Ausgewdhlte Werke in 10 vols, appeared in 1906 with an introduction by H. H. Houben. See also J. Proelss, Das junge Deutschland (1892); and H. Bulthaupt, Dramaturgie des Schau- spiels (vol. iii., 6th ed., 1901).

L'AUBESPINE, a French family which sprang from Claude de l'Aubespine, a lawyer of Orleans and bailiff of the abbey of St Euverte in the beginning of the 16th century, and rapidly acquired distinction in offices connected with the law. Sebastien de l'Aubespine (d. 1582), abbot of Bassefontaine, bishop of Vannes and afterwards of Limoges, fulfilled important diplo- matic missions in Germany, Hungary, England, the Low Coun- tries and Switzerland under Francis I. and his successors. Claude (e. 1500-1567), baron of Chateauneuf-sur-Cher, Sebastien's brother, was a secretary of finance; he had charge of negotiations with England in 1555 and 1559, and Was several times commis- sioned to treat with the Huguenots in the king's name. His son Guillaume was a councillor of state and ambassador to England. Charles de l'Aubespine (1580-1653) was ambassador to Germany, the Low Countries, Venice and England, besides twice holding the office of keeper of the seals of France, from 1630 to 1633, and from 1650 to 1651. The family fell into poor circumstances and became extinct in the 19th century. (M.P.*)

LAUCHSTADT, a town of Germany in the province of Prussian Saxony, on the Laucha, 6 m. N.W. of Merseburg by the railway to Schafstadt. Pop. (1905) 2034. It contains an Evangelical church, a theatre, a hydropathic establishment and several educa- tional institutions, among which is an agricultural school affiliated to the university of Halle. Its industries include malting, vinegar-making and brewing. Lauchstadt was a popular watering-place in the 18th century, the dukes of Saxe-Merseburg often making it their summer residence. From 1789 to 1811 the Weimar court theatrical company gave performances here of the plays of Schiller and Goethe, an attraction which greatly contributed to the well-being of the town.

See Maak, Das Goethetheater in Lauchstadt (Lauchstadt, 1905) ; and Nasemann, Bad Lauchstadt (Halle, 1885).

LAUD, WILLIAM (1573-1645), English, archbishop, only son of William Laud, a clothier, was born at Reading on the 7th of October 1573. He was educated at Reading free school, matricul- ated at St John's college, Oxford, in 1589, gained a scholarship in 1590, a fellowship in 1593, and graduated B.A. in 1594, proceeding to D.D. in 1608. In 1601 he took ˆrders, in 1603 becoming chaplain to Charles Blount, earl of Devonshire. Laud early took up a position of antagonism to the Calvinistic party in the church, and in 1604 was reproved by the authorities for maintaining in his thesis for the degree of B.D. " that there could be no true church without bishops," and again in 1606 for advocating " popish " opinions in a sermon at St Mary's. If high-church doctrines, however, met with opposition at Oxford, they were relished elsewhere, and Laud obtained rapid advancement. In 1607 he was made vicar of Stanford in North- amptonshire, and in 1608 he became chaplain to Bishop Neile, who in 1 610 presented him to the living of Cuxton, when he resigned his fellowship. In 161 1, in spite of the influence of Archbishop Abbot and Lord Chancellor Ellesmere, Laud was made president of St John's, and in 1614 obtained in addition the prebend of Buckden, in 161 5 the archdeaconry of Hunting- don, and in 1616 the deanery of Gloucester. Here he repaired the fabric and changed the position of the communion table, a matter which aroused great religious controversy, from the centre of the choir to the east end, by a characteristic tactless exercise of power offending the bishop, who henceforth refused to enter the

cathedral. In 1617 he went with the king to Scotland, and aroused hostility by wearing the surplice. In 162 1 he became bishop of St David's, when he resigned the presidentship of St John's.

In April 1622 Laud, by the king's orders, took part in a con- troversy with Percy, a Jesuit, known as Fisher, the aim of which was to prevent the conversion of the countess of Bucking- ham, the favourite's mother, to Romanism, and his opinions expressed on that occasion show considerable breadth and comprehension. While refusing to acknowledge the Roman Church as the true church, he allowed it to be a true church and a branch of the Catholic body, at the same time emphasizing the perils of knowingly associating with error; and with regard to the English Church he denied that the acceptance of all its articles was necessary. The foundation of belief was the Bible, not any one branch of the Catholic church arrogating to itself infallibility, and when dispute, on matters of faith arose, " a lawful and free council, determining according to Scripture, is the best judge on earth." A close and somewhat strange intimacy, considering the difference in the characters and ideals of the two men, between Laud and Buckingham now began, and proved the chief instrument of Laud's advancement. The opportunity came with the old king's death in 1625, for James, with all his pedantry, was too wise and cautious to embark in Laud's rash undertakings, and had already shown a prudent moderation, after setting up bishops in Scotland, in going no further in opposition to the religious feelings of the people. On the ac- cession of Charles, Laud's ambitious activities were allowed free scope. A list of the clergy was immediately prepared by him for the king, in which each name was labelled with an O or a P, distinguishing the Orthodox to be promoted from the Puritans to be suppressed. Laud defended Richard Montague, who had aroused the wrath of the parliament by his pamphlet against Calvinism. His influence soon extended into the domain of the state. He supported the king's prerogative throughout the conflict with the parliament, preached in favour of it before Charles's second parliament in 1626, and assisted in Bucking- ham's defence. In 1626 he was nominated bishop of Bath and Wells, and in July 1628 bishop of London. On the 12th of April 1629 he was made chancellor of Oxford University.

In the patronage of learning and in the exercise of authority over the morals and education of youth Laud was in his proper sphere, many valuable reforms at Oxford being due to his activity, including the codification of the statutes, the statute by which public examinations were rendered obligatory for uni- versity degrees, and the ordinance for the election of proctors, the revival of the college system, of moral and religious discipline and order, and of academic dress. He founded

or endowed various professorships, including those of Hebrew and Arabic, and the office of public orator, encouraged English and foreign scholars, such as Voss, Selden and Jeremy Taylor, founded the university printing press, procuring in 1633 the royal patent for Oxford, and obtained for the Bodleian library over 1300 MSS., adding a new wing to the building to contain his gifts. His rule at Oxford was marked by a great increase in the number of students. In his own college he erected the new buildings, and was its second founder. Of his chancellorship he himself wrote a history, and the Laudian tradition long remained the great standard of order and good government in the university. Elsewhere he showed his liberality and his zeal for reform. He was an active visitor of Eton and Winchester, and endowed the grammar school at Reading, where he was himself educated. In London he procured funds for the restoration of the dilapidated cathedral of St Paul's.

He was far less great as a ruler in the state, showing as a judge a tyrannical spirit both in the star chamber and high- commission court, threatening Felton, the assassin of Bucking- ham, with the rack, and showing special activity in procuring a cruel sentence in the former court against Alexander Leighton in June 1630 and against Henry Sherfield in 1634. His power was greatly increased after his return from Scotland, whither he bad accompanied the king, by his promotion to the archbishopric

of Canterbury in August 1633. "As for the state indeed," he wrote to Wentworth on this occasion, " I am for Thorough." In 1636 the privy council decided in his favour his claim of jurisdiction as visitor over both universities. Soon afterwards he was placed on the commission of the treasury and on the committee of the privy council for foreign affairs. He was all- powerful both in church and state. He proceeded to impose by authority the religious ceremonies and usages to which he attached so much importance. His vicar-general, Sir Nathaniel Brent, went through the dioceses of his province, noting every dilapidation and every irregularity. The pulpit was no longer to be the chief feature in the church, but the communion table. The Puritan lecturers were suppressed. He showed great hostility to the Puritan sabbath and supported the reissue of the Book of Sports, especially odious to that party, and severely reprimanded Chief Justice Richardson for his interference with the Somerset wakes. He insisted on the use of the prayer-book among the English soldiers in the service of Holland, and forced strict conformity on the church of the merchant adventurers at Delft, endeavouring even to reach the colonists in New England. He tried to compel the Dutch and French refugees in England to unite with the Church of England, advising

double taxation and other forms of persecution. In 1634 the justices of the peace were ordered to enter houses to search for persons holding conventicles and bring them before the commissioners. He took pleasure in displaying his power over the great, and in punishing them in the spiritual courts for moral offences. In 1637 he took part in the sentence of the star chamber on Prynne, Bastwick and Burton, and in the same year in the prosecution of Bishop Williams. He urged Strafford in Ireland to carry out the same reforms and severities.

He was now to extend his ecclesiastical system to Scotland, where during his visits the appearance of the churches had greatly displeased him. The new prayer-book and canons were drawn up by the Scottish bishops with his assistance and enforced in the country, and, though not officially connected with the work, he was rightly regarded as its real author. The attack not only on the national religion, but on the national independ- ence of Scotland, proved to be the point at which the system, already strained, broke and collapsed. Laud continued to support Strafford's and the king's arbitrary measures to the last, and spoke in favour of the vigorous continuation of the war on Strafford's side in the memorable meeting of the committee of eight on the 5th of May 1640, and for the employment of any means for carrying it on. " Tried all ways," so ran the notes of his speech, " and refused all ways. By the law of God and man you should have subsistence and lawful to take it." Though at first opposed to the sitting of convocation, after the dissolution of parliament, as an independent body, on account of the opposi- tion it would arouse, he yet caused to be passed in it the new canons which both enforced his ecclesiastical system and assisted the king's divine right, resistance to his power entailing " damna- tion." Laud's infatuated policy could go no further, and the etcetera oath, according to which whole classes of men were to be forced to swear perpetual allegiance to the " government of this church by archbishops, bishops, deans and archdeacons, &c," was long remembered and derided. His power now quickly abandoned him. He was attacked and reviled as the chief author of the troubles on all sides. In October he was ordered by Charles to suspend the etcetera oath. The same month, when the high commission court was sacked by the mob, he was unable to persuade the star chamber to punish the offenders. On the 1 8th of December he was impeached by the Long Parlia- ment, and on the 1st of March imprisoned in the tower. On the 1 2th of May, at Strafford's request, the archbishop appeared at the window of his cell to give him his blessing on his way to execution, and fainted as he passed by. For some time he was left unnoticed in confinement. On the 31st of May 1643, how- ever, Prynne received orders from the parliament to search his papers, and published a

mutilated edition of his diary. The articles of impeachment were sent up to the Lords in October, the trial beginning on the 12th of March 1644, but the attempt

to bring his conduct under a charge of high treason proving hopeless, an attainder was substituted and sent up to the Lords on the 22nd of November. In these proceedings there was no semblance of respect for law or justice, the Lords yielding (4th of January 1645) to the menaces of the Commons, who arrogated to themselves the right to declare any crimes they pleased high treason. Laud now tendered the king's pardon, which had been granted to him in April 1643. This was rejected, and it was with some difficulty that his petition to be executed with the axe, instead of undergoing the ordinary bru.tal punishment for high treason, was granted. He suffered death on the 10th of January on Tower Hill, asserting his innocence of any offence known to the law, repudiating the charge of " popery," and declaring that he had always lived in the Protestant Church of England. He was buried in the chancel of All Hallows, Barking, whence his body was removed on the 24th of July 1663 to the chapel of St John's College, Oxford.

Laud never married. He is described by Fuller as " low of stature, little in bulk, cheerful in countenance (wherein gravity and quickness were all compounded), of a sharp and piercing eye, clear judgment and (abating the influence of age) firm memory." His personality, on account of the sharp religious antagonisms with which his name is inevitably associated, has rarely been judged with impartiality. His severities were the result of a narrow mind and not of a vindictive spirit, and their number has certainly been exaggerated. His career was distinguished by uprightness, by piety, by a devotion to duty, by courage and consistency. In particular it is clear that the charge of partiality for Rome is unfounded. At the same time the circumstances of the period, the fact that various schemes of union with Rome were abroad, that the missions of Panzani and later of Conn were gathering into the Church of Rome numbers of members of the Church of England who, like Laud himself, were dissatisfied with the Puritan bias which then characterized it, the incident men- tioned by Laud himself of his being twice offered the cardinalate, the movement carried on at the court in favour of Romanism, and the fact that Laud's changes in ritual, however clearly defined and restricted in his own intention, all tended towards Roman practice, fully warranted the

suspicions and fears of his contemporaries. Laud's complete neglect of the national senti- ment, in his belief that the exercise of mere power was sufficient to suppress it, is a principal proof of his total lack of true states- manship. The hostility to " innovations in religion," it is generally allowed, was a far stronger incentive to the rebellion against the arbitrary power of the crown, than even the violation of constitutional liberties; and to Laud, therefore, more than to Strafford, to Buckingham, or even perhaps to Charles himself, is especially due the responsibility for the catastrophe. He held fast to the great idea of the catholicity of the English Church, to that conception of it which regards it as a branch of the whole Christian church, and emphasizes its historical continuity and identity fiom the time of

Passing to the more indirect influence of Laud on his times, we can observe a narrowness of mind and aim which separates him from a man of such high imagination and idealism as Strafford, however closely identified their policies may have been for the moment. The chief feature of Laud's administration is attention to countless details, to the most trivial of which he attached excessive importance, and which are uninspired by any great underlying principle. His view was always essentially material. The one element in the church which to him was all essential was its visibility. This was the source of his intense dislike of the Puritan and Nonconformist conception of the church, which afforded no tangible or definite form. Hence the

necessity for outward conformity, and the importance attached to ritual and ceremony, unity in which must be established at all costs, in contrast to dogma and doctrine, in which he showed himself lenient and large-minded, winning over Hales by friendly discussion, and encouraging the publication of Chillingworth's Religion of Protestants. He was not a bigot, but a martinet. The external form was with him the essential feature of religion, preceding the spiritual conception, and in Laud's opinion being the real foundation of it. In his last words on the scaffold he alludes to the dangers and slanders he had endured labouring to keep an uniformity in the external service of God; and Bacon's conception of a spiritual union founded on variety and liberty was one completely beyond his comprehension.

This narrow materialism was the true cause of his fatal influence both in church and state. In his own character it produced the somewhat blunted moral sense which led to the few incidents in his career which need moral defence, his per- formance of the marriage ceremony between his first patron Lord Devonshire and the latter's mistress, the divorced wife of Lord Rich, an act completely at variance with his principles; his strange intimacy with Buckingham; his love of power

and place. Indistinguishable from his personal ambition was his passion for the aggrandisement of the church and its predominance in the state. He was greatly delighted at the foolish appointment of Bishop Juxon as lord treasurer in 1636. ” No churchman had it,” he cries exultingly, ” since Henry VII. ‘s time, . . . and now if the. church will not hold up themselves under God, I can do no more.” Spiritual influence, in Laud’s opinion, was not enough for the church. The church as the guide of the nation in duty and godliness, even extending its activity into state affairs as a mediator and a moderator, was not sufficient. Its power must be material and visible, embodied in great places of secular adminis- tration and enthroned in high offices of state. Thus the church, descending into the political arena, became identified with the doctrines of one political party in the state — doctrines odious to the majority of the nation — and at the same time became associated with acts of violence and injustice, losing at once its influence and its reputation. Equally disastrous to the state was the identification of the king’s administration with one party in the church, and that with the party in an immense minority not only in the nation but even among the clergy themselves.

Bibliography. — All Laud’s works are to be found in the Library of Anglo- Catholic Theology (7 vols.), including his sermons (of no great merit), letters, history of the chancellorship, history of his troubles and trial, and his remarkable diary, the MSS. of the last two works being the property of St John’s College. Various modern opinions of Laud’s career can be studied in T. Longueville’s Life of Laud, by a Romish Recusant (1 894) ; Congregational Union Jubilee Lectures, vol. i. (1882); J. B. Mozley’s Essay on Laud; Archbishop Laud, by A. C. Benson (1887); Wm. Laud, by W. H. Hutton (1895); Arch- bishop Laud Commemoration, ed. by W. F. Collins (lectures, biblio- graphy, catalogue of exhibits, 1895) ; Hook’s Lives of the Archbishops of Canterbury; and H. Bell, Archbishop Laud and Priestly Govern- ment (1907). (P. C. Y.)

LAUD (Lat. laus), a term meaning praise, now rarely found in this sense except in poetry or hymns. Lauds is the name for the second of the offices of the canonical hours in the Roman breviary, so called from the three laudes or psalms of praise, cxlviii.-cl. which form part of the service (see Breviary and Hours, Canonical).

LAUDANUM, originally the name given by Paracelsus to a famous medical preparation of his own composed of gold, pearls, &c. {Opera, 1658, i. 492/2), but containing opium as its chief ingredient. The term is now only used for the alcoholic tincture of opium (q.v.). The name was either invented by Paracelsus from Lat. laudare to praise, or was a

corrupted form of ” ladanum ” (Gr. \i]davov, from Pers. ladan), a resinous juice or gum obtained from various kinds of the Cistus shrub, formerly used medicinally in external applications and as a stomachic, but now only in perfumery and in making fumigating pastilles, &c.

LAUDER, SIR THOMAS DICK, Bart. (1 784-1848), Scottish author, only son of Sir Andrew Lauder, 6th baronet, was born at Edinburgh in 1784. He succeeded to the baronetcy in 1820. His first contribution to Blackwood’s Magazine in 1817, entitled

” Simon Roy, Gardener at Dunphail,” was by some ascribed to Sir Walter Scott. His paper (1818) on ” The Parallel Roads of Glenroy,” printed in vol. ix. of the Transactions of the Royal Society of Edinburgh, first drew attention to the phenomenon in question. In 1825 and 1827 he published two romances, Lochandhu and the Wolf of Badenoch. He became a frequent contributor to Blackwood and also to Tait’s Magazine, and in 1830 he published An Account of the Great Floods of August 1829 in the Province of Moray and adjoining Districts. Subsequent works were Highland Rambles, with Long Tales to Shorten the Way (2 vols. 8vo, 1837), Legendary Tales of the Highlands (3 vols. i2mo, 7841), Tour round the Coasts of Scotland (1842) and Memorial of the Royal Progress in Scotland (1843). Vol. i. of a Miscellany of Natural History, published in 1833, was also partly prepared by Lauder. He was a Liberal, and took an active interest in politics; he held the office of secretary to the Board of Scottish Manufactures. He died on the 29th of May 1848. An unfinished series of papers, written for Tait’s Magazine shortly before his death, was published under the title Scottish Rivers, with a preface by John Brown, M.D., in 1874.

LAUDER, WILLIAM (d. 1771), Scottish literary forger, was born in the latter part of the 17th century, and was educated at Edinburgh university, where he graduated in 1695. He applied unsuccessfully for the post of professor of humanity there, in succession to Adam Watt, whose assistant he had been for a time, and also for the keepership of the university library. He was a good scholar, and in 1 739, published Poetarum Scotorum Musae Sacrae, a collection of poems by various writers, mostly paraphrased from the Bible. In 1742 Lauder came to London. In 1747 he wrote an article for the Gentleman’s Magazine to prove that Milton’s Paradise Lost was largely a plagiarism from the Adamus Exul (1601) of Hugo Grotius, the Sarcotis (1654) of J. Masen

(Masenius, 1606-1681), and the Poemata Sacra (1633) of Andrew Ramsay (1574-1659). Lauder expounded his case in a series of articles, and in a book (1753) increased the list of plundered authors to nearly a hundred. But his success was short-lived. Several scholars, who had independently studied the alleged sources of Milton's inspiration, proved conclusively that Lauder had not only garbled most of his quotations, but had even inserted amongst them extracts from a Latin rendering of Paradise Lost. This led to his exposure, and he was obliged to write a complete confession at the dictation of his former friend Samuel Johnson. After several vain endeavours to clear his character he emigrated to Barbadoes, where he died in 1771.

LAUDER, a royal and police burgh of Berwickshire, Scotland. Pop. (1901) 719. It is situated on the Leader, 29 m. S.E. of Edinburgh by the North British railway's branch line from Fountainhall, of which it is the terminus. The burgh is said to date from the reign of William the Lion (1165-1214); its charter was granted in 1502. In 1482 James III. with his court and army rested here on the way to raise the siege of Berwick. While the nobles were in the church considering grievances, Robert Cochrane, recently created earl of Mar, one of the king's favourites, whose " removal " was at the very moment under discussion, demanded admittance. Archibald Douglas, earl of Angus, opened the door and seized Mar, who was forthwith dragged to Lauder Bridge and there, along with six other obnoxious favourites, hanged in sight of his royal master. It was in connexion with this exploit that Angus acquired the nickname of " Bell-the-cat." The public buildings include a town-hall and a library. The parish church was built in 1673 by the earl of Lauderdale, in exchange for the older edifice, the site of which was required for the enlargement of Thirlestane castle, which, originally a fortress, was then remodelled for a residence. The town is a favourite with anglers.

LAUDERDALE, JOHN MAITLAND, duke of (1616-1682), eldest surviving son of John Maitland, 2nd Lord Maitland of Thirlestane (d. 1645), who was created earl of Lauderdale in 1624, and of Lady Isabel Seton, daughter of Alexander, earl of Dunfermline, and great-grandson of Sir Richard Maitland (q.v.), the poet, a member of an ancient family of Berwickshire, was born on the 24th of May 1616, up Lethington. He began public

life as a zealous adherent of the Presbyterian cause, took the covenant, sat as an elder in the assembly at St Andrews in July 1643, and was sent to England as a commissioner for the covenant in August, and to attend the Westminster assembly in November. In February 1644 he was a member of the committee of both kingdoms, and on the 20th of

November was one' of the com- missioners appointed to treat with the king at Uxbridge, when he made efforts to persuade Charles to agree to the establishment of Presbyterianism. In 1645 he advised Charles to reject the proposals of the Independents, and in 1647 approved of the king's surrender to the Scots. At this period Lauderdale veered round completely to the king's cause, had several inter- views with him, and engaged in various projects for his restora- tion, offering the aid of the Scots, on the condition of Charles's consent to the establishment of Presbyterianism, and on the 26th of December he obtained from Charles at Carisbrooke " the engagement " by which Presbyterianism was to be estab- lished for three years, schismatics were to be suppressed, and the acts of the Scottish parliament ratified, the king in addition promising to admit the Scottish nobles into public employment in England and to reside frequently in Scotland. Returning to Scotland, in the spring of 1648, Lauderdale joined the party of Hamilton in alliance with the English royalists. Their defeat at Preston postponed the arrival of the prince of Wales, but Lauderdale had an interview with the prince in the Downs in August, and from this period obtained supreme influence over the future king. He persuaded him later to accept the invitation to Scotland from the Argyll faction, accompanied him thither in 1650 and in the expedition into England, and was taken prisoner at Worcester in 1651, remaining in confinement till March 1660. He joined Charles in May 1660 at Breda, and, in spite of the opposition of Clarendon and Monk, was appointed secretary of state. From this time onwards he kept his hold upon the king, was lodged at Whitehall, was " never from the king's ear nor council," 1 and maintained his position against his numerous adversaries by a crafty dexterity in dealing with men, a fearless unscrupulousness, and a robust strength of will, which overcame all opposition. Though a man of considerable learning and intellectual attainment, his character was exception- ally and grossly licentious, and his base and ignoble career was henceforward unrelieved by a single redeeming feature. He abandoned Argyll to his fate, permitted, if he did not assist in, the restoration of episcopacy in Scotland, and after triumphing over all his opponents in Scotland drew into his own hands the whole administration of that kingdom, and proceeded to impose upon it the absolute supremacy of the crown in church and state, restoring the nomination of the lords of the articles to the king and initiating severe measures against the Covenanters. In 1669 he was able to boast with truth that " the king is now master here in all causes and over all persons."

His own power was now at its height, and his position as the favourite of Charles, controlled by no considerations of patriotism or

statesmanship, and completely independent of the English parliament, recalled the worst scandals and abuses of the Stuart administration before the Civil War. He was a member of the cabal ministry, but took little part in English affairs, and was not entrusted with the first secret treaty of Dover, but gave personal support to Charles in his degrading demands for pen- sions from Louis XIV. On the 2nd of May 1672 he was created duke of Lauderdale and earl of March, and on the 3rd of June knight of the garter. In 1673, on the resignation of James in consequence of the Test Act, he was appointed a commissioner for the admiralty. In October he visited Scotland to suppress the dissenters and obtain money for the Dutch War, and the intrigues organized by Shaftesbury against his power in his absence, and the attacks made upon him in the House of Commons in January 1674 and April 1675, were alike rendered futile by the steady support of Charles and James. On the 25th of June 1674 he was created earl of Guilford and Baron Petersham in the peerage of England. His ferocious measures having failed to suppress the conventicles in Scotland, he summoned to his 1 Pepys's Diary, 2nd of March 1664.

aid in 1677 a band of Highlanders, who were sent into the western country. In consequence, a large party of Scottish nobles came to London, made common cause with the English country faction, and compelled Charles to order the disbandment of the marauders. In May 1678 another demand by the Commons for Lauderdale's removal was thrown out by court influence by one vote. He maintained his triumphs almost to the end. In Scotland, which he visited immediately after this victory in parliament, he overbore all opposition to the king's demands for money. Another address for his removal from the Commons in England was suppressed by the dissolution of parliament on the 26th of May 1679, and a renewed attack upon him, by the Scottish party and Shaftesbury's faction combined, also failed. On the 22nd of June 1679 the last attempt of the unfortunate Covenanters was suppressed at Bothwell Brig. In 1680, however, failing health obliged Lauderdale to resign the place and power for which he had so long successfully struggled. His vote given for the execution of Lord Stafford on the 29th of November is said also to have incurred the displeasure of James. In 1682 he was stripped of all his offices, and he died in August. Lauderdale married (1) Lady Anne Home, daughter of the 1st earl of Home, by whom he had one daughter; and (2) Lady Elizabeth Murray, daughter of the 1st earl of Dysart and widow of Sir Lionel Tolle- mache. He left no male issue, consequently his dukedom

and his English titles became extinct, but he was succeeded in the earldom by his brother Charles (see below).

See Lauderdale Papers Add. MSS. in Brit. Mus., 30 vols., a small selection of which, entitled The Lauderdale Papers, were edited by Osmond Airy for the Camden Society in 1 884-1 885; Hamilton Papers published by the same society; ” Lauderdale Correspondence with Archbishop Sharp,” Scottish Hist. Soc. Publications, vol. 15 (1893); Burnet’s Lives of the Hamiltons and History of his Own Time; R. Baillie’s Letters; S. R. Gardiner’s Hist, of the Civil War and of the Commonwealth; Clarendon’s Hist, of the Rebellion; and the Quarterly Review, clvii. 407. Several speeches of Lauder- dale are extant. (P. C. Y.) Earls of Lauderdale.

Charles Maitland, 3rd earl of Lauderdale (d. 1691), became an ordinary lord of session as Lord Halton in 1669, afterwards assisting his brother, the duke, in the management of public business in Scotland. His eldest son, Richard (1653-1695), became the 4th earl. As Lord Maitland he was lord-justice-general from 1681 to 1684; he was an adherent of James II. and after fighting at the battle of the Boyne he was an exile in France until his death. This earl made a verse translation of Virgil (published 1737). He left no sons, and his brother John (c. 1655-1710) became the 5th earl. John, a sup- porter of William III. and of the union of England and Scotland, was succeeded by his son Charles (c. 1688-1744), who was the grand- father of James, the 8th earl.

James Maitland, 8th earl of Lauderdale (1 759-1 839) , was a member of parliament from 1780 until August 1789 when he succeeded his father in the earldom. In the House of Commons he took an active part in debate, and in the House of Lords, where he was a repre- sentative peer for Scotland, he was prominent as an opponent of the policy of Pitt and the English government with regard to France, a country he had visited in 1792. In 1806 he was made a peer of the United Kingdom as Baron Lauderdale of Thirlestane and for a short time he was keeper of the great seal of Scotland. By this time the earl, who had helped to found the Society of the Friends of the People in 1792, had somewhat modified his political views; this process was continued, and after acting as the leader of the Whigs in Scotland, Lauderdale became a Tory and voted against the Reform Bill of 1832. He died on the 13th of September 1839. He wrote an Inquiry into the Nature and Origin of Public Wealth (1804 and 1819), a work which has been translated into French and Italiar and which produced a controversy between the author and Lord Brougham; The Depreciation of the Paper-currency of Great Britain Proved (1812) ; and other

writings of a similar nature. He was succeeded by his sons James (1784-1860) and Anthony (1785-1863) as 9th and 10th earls. Anthony, a naval officer, died unmarried in March 1863, when his barony of the United Kingdom became extinct, but his Scottish earldom devolved upon a cousin, Thomas Maitland (1803- 1878), a grandson of the 7th earl, who became nth earl of Lauder- dale. Thomas, who was an admiral of the fleet, died without sons, and the title passed to Charles Barclay-Maitland (1822-1884), a descendant of the 6th earl. When Charles died unmarried, another of the 6th earl's descendants, Frederick Henry Maitland (b. 1840), became 13th earl of Lauderdale.

The earls of Lauderdale are hereditary standard bearers for Scotland.

LAUENBURG, a duchy of Germany, formerly belonging with Holstein to Denmark, but from 1865 to Prussia, and now in-

cluded in the Prussian province of Schleswig-Holstein. . It lies on the right bank of the Elbe, is bounded by the territories of Hamburg, Liibeck, Mecklenburg-Strelitz and the province of Hanover, and comprises an area of 453 sq. m. The surface is a slightly undulating plain. The soil, chiefly alluvial, though in some places arenaceous, is generally fertile and well cultivated, but a great portion is covered with forests, interspersed with lakes. By means of the Stecknitz canal, the Elbe, the principal river, is connected with the Trave. The chief agricultural products are timber, fruit, grain, hemp, flax and vegetables. Cattle-breeding affords employment for many of the inhabitants. The railroad from Hamburg to Berlin traverses the country. The capital is Ratzeburg, and there are two other towns, Molln and Lauenburg.

The earliest inhabitants of Lauenburg were a Slav tribe, the Polabes, who were gradually replaced by colonists from Saxony. About the middle of the 12 th century the country was subdued by the duke of Saxony, Henry the Lion, who founded a bishopric at Ratzeburg, and after Henry's fall in 1180 it formed part of the smaller duchy of Saxony, which was governed by Duke Bernhard. In 1203 it was conquered by Waldemar II., king of Denmark, but in 1227 it reverted to Albert, a son of its former duke. When Albert died in 1260 Saxony was divided. Lauen- burg, or Saxe-Lauenburg, as it is generally called, became a separate duchy ruled by his son John, and had its own lines of dukes for over 400 years, one of them, Magnus I. (d. 1543), being responsible for the introduction of the reformed teaching into the land. The reigning family, however, became extinct when Duke Julius Francis died in September 1689, and there were at least eight claimants for his duchy, chief among them being John George III., elector of Saxony, and George William, duke of Brunswick-Liineburg-Celle, the ancestors of both these princes having made treaties of mutual succession with former dukes of Saxe-Lauenburg. Both entered the country, but George William proved himself the stronger and occupied Ratzeburg; having paid a substantial sum of money to the elector, he was recognized by the inhabitants as their duke. When he died three years later Lauenburg passed to his nephew, George Louis, elector of Hanover, afterwards king of Great Britain as George I., whose rights were recognized by the emperor Charles VI. in 1728. In 1803 the duchy was occupied by the French, and in 1810 it was

incorporated with France. It reverted to Hanover after the battle of Leipzig in 1813, and in 1816 was ceded to Prussia, the greater part of it being at once transferred by her to Denmark in exchange for Swedish Pomerania. In 1848, when Prussia made war on Denmark, Lauenburg was occupied at her own request by some Hanoverian troops, and was then administered for three years under the authority of the German confederation, being restored to Denmark in 1851. Definitely incorporated with this country in 1853, it experienced another change of fortune after the short war of 1864 between Denmark on the one side and Prussia and Austria on the other, as by the peace of Vienna (30th of October 1864) it was ceded with Schleswig and Holstein to the two German powers. By the convention of Gastein (14th of August 1865) Austria surrendered her claim to Prussia in return for the payment of nearly £300,000 and in September 1865 King William I. took formal possession of the duchy. Lauenburg entered the North German confederation in 1866 and the new German empire in 1870. It retained its constitution and its special privileges until the 1st of July 1876, when it was incorporated with the kingdom of Prussia. In 1890 Prince Bismarck received the title of duke of Lauenburg.

See P. von Kobbe, Geschichte und Landesbeschreibung des Herzogtums Lauenburg (Altona, 1 836-1 837); Duve, Mitteilungen zur Kunde der Staats geschichte Lauenburgs (Ratzeburg, 1852-1857), and the Archiv des Vereins fur die Geschichte des Herzogtums Lauenburg (Ratzeburg, 1884 seq.).

LAUFF, JOSEF (1855-), German poet and dramatist, was born at Cologne on the 16th of November 1855, the son of a jurist. He was educated at Miinster in Westphalia, and entering the army served as a lieutenant of artillery at Thorn and sub- sequently at Cologne, where he attained the rank of captain in I 1890. In 1898 he was summoned by the German emperor,

William II., to Wiesbaden, being at the same time promoted to major's rank, in order that he might devote his great dramatic talents to the royal theatre. His literary career began with the epic poems Jan van Calker, ein Malerlied vom Niederrhein (1887, 3rd ed., 1892) and Der Helfensteiner, ein Sang aus dem Bauern- kriege (3rd ed., 1896). These were followed by Die Overstolzin (5th ed., 1900), Herodias (2nd ed., 1898) and the Geislerin (4th ed., 1902). He also wrote the novels Die

Hexe (6th ed., 1900), Regina coeli (a story of the fall of the Dutch Republic) (7th ed., 1904), Die Hauptmannsfrau (8th ed., 1903) and Marie Verwahnen (1903). But he is best known as a dramatist. Beginning with the tragedy Ignez de Castro (1894), he proceeded to dramatize the great monarchs of his country, and, in a Hohenzollern tetralogy, issued Der Burggraf (1897, 6th ed. 1900) and Der Eisenzahn (1900), to be followed by Der grosse Kurfurst (The Great Elector) and Friedrich der Grosse (Frederick the Great).

See A. Schroeter, Josef Lauff, Ein Utterarisches Zeitbild (1899), and B. Sturm, Josef Lauff (1903).

LAUGHTER, the visible and audible expression of mirth, pleasure or the sense of the ridiculous by movements of the facial muscles and inarticulate sounds (see Comedy, Play and Humour). The O. Eng. hleahtor is formed from hleahhan, to laugh, a common Teutonic word; cf. Ger. lachen, Goth, hlahjan, Icel. hlaeja, &c. These are in origin echoic or imitative words, to be referred to a Teut. base hlah-, Indo-Eur. kark-, to make a noise; Skeat (Etym. Diet., 1898) connects ultimately Gr. Khjjoativ, to cluck like a hen, xpafetv, to croak, &c. A gentle and inaudible form of laughter expressed by a movement of the lips and by the eyes is a ” smile.” This is a comparatively late word in English, and is due to Scandinavian influence; cf. Swed. smila; it is ultimately connected with Lat. mirari, to wonder, and probably with Gr. neldos.

LAUMONT, FRANCOIS PIERRE NICHOLAS GILLET DE (1 747-1 834), French mineralogist, was born in Paris on the 28th of May 1747. He was educated at a military school and served in the army from 177 2-1 784, when he was appointed inspector of mines. His attention in his leisure time was wholly givefl to mineralogy, and he assisted in organizing the new Ecole des Mines in Paris. He was author of numerous mineralogical papers in the Journal and Annates des Mines. The mineral laumontite was named after him by Haiiy. He died in Paris on the 1st of June 1834.

LAUNCESTON, a market town and municipal borough in the Launceston parliamentary division of Cornwall, England, 3 Si m. N.W. of Plymouth, on branches of the Great Western and the London & South-Western railways. Pop. (1901) 4053. It lies in a hilly district by and above the river Kensey, an affluent of the Tamar, the houses standing picturesquely on the southern slope of the narrow valley, with the keep of the ancient castle crowning the summit. On the northern slope lies the parish of St Stephen. The castle, the ruins of which are in part of Norman date, was the seat of the earls of

Cornwall, and was frequently besieged during the civil wars of the 17 th century. In 1656 George Fox the Quaker was imprisoned in the north-east tower for disturbing the peace at St Ives by distribut- ing tracts. Fragments of the old town walls and the south gateway, of the Decorated period, are standing. The church of St Mary Magdalen, built of granite, and richly ornamented without, was erected early in the 16th century, but possesses a detached tower dated 1380. A fine Norman doorway, now appearing as the entrance to a hotel, is preserved from an Augustinian priory founded in the reign of Henry I. The parish church of St Stephen is Early English, and later, with a Perpendicular tower. The trade of Launceston is chiefly agricultural, but there are tanneries and iron foundries. The borough is under a mayor, 4 aldermen and 12 councillors. Area, 2189 acres.

A silver penny of ˆEthelred II. witnesses to the fact that the privilege of coining money was exercised by Launceston (Dun- he ved, Lanscaveton, Lanstone) more than half a century before the Norman conquest. At the time of the Domesday survey the canons of St Stephen held Launceston, and the count of

Mortain held Dunheved. The number of families settled on the former is not given, but attention is called to the market which had been removed thence by the count to the neighbour- ing castle of Dunheved, which had two mills, one villein and thirteen bordars. A spot more favoured by nature could not have been chosen either for settlement or for defence than the rich lands near the confluence of the Kensey and Tamar, out of which there rises abruptly the gigantic mound upon which the castle is built. It is not known when the canons settled here nor whether the count's castle, then newly erected, replaced some earlier fortification. Reginald, earl of Cornwall (1140-11 75); granted to the canons rights of jurisdiction in all their lands and exemption from suit of court in the shire and hundred courts. Richard (1 225-1 272), king of the Romans, constituted Dunheved a free borough, and granted to the burgesses freedom from pontage, stallage and suillage, liberty to elect their own reeves, exemption from all pleas outside the borough except pleas of the crown, and a site for a gild-hall. The farm of the borough was fixed at 100s. payable to the earl, 65s. to the prior and 100s. iod. to the lepers of St Leonard's. In 1205 the market which had been held on Sunday was changed to Thursday. An inquisition held in 1383 discloses two markets, a merchant gild, pillory and tumbrel. In 1555 Dunheved, otherwise Laun- ceston, received a charter of incorporation, the common council to consist of a mayor, 8 aldermen and a recorder. By its pro- visions the borough was governed until 1835. The parliamentary franchise which had been conferred in 1294 was confined to the corporation

and a number of free burgesses. In 1832 Launceston was shorn of one of its members, and in 1885 merged in the county. Separated from it by a small bridge over the Kensey lies the hamlet of Newport which, from 1547 until 1832, also returned two members. These were swept away when the Reform Bill became law. Launceston was the assize town until Earl Richard, having built a palace at Restormel, removed the assize to Lostwithiel. In 1386 Launceston regained the privilege by royal charter. From 1715 until 1837, eleven years only excepted, the assize was held alternately here and at Bod- min. Since that time Bodmin has enjoyed the distinction. Launceston has never had a staple industry. The manufacture of serge was considerable early in the 19th century. Its market on Saturdays is well attended, and an ancient fair on the Feast of St Thomas is among those which survive. See A. F. Robbins, Launceston Past and Present.

LAUNCESTON, the second city of Tasmania, in the county of Cornwall, on the river Tamar, 40 m. from the N. coast of the island, and 133 m. by rail N. by W. of Hobart. The city lies amid surroundings of great natural beauty in a valley en- closed by lofty hills. Cora Linn, about 6 m. distant, a deep gorge of the North Esk river, the Punch Bowl and Cataract Gorge, over which the South Esk falls in a magnificent cascade, joining the North Esk to form the Tamar, are spots famed throughout the Australian commonwealth for their romantic beauty. The city is the commercial capital of northern Tas- mania, the river Tamar being navigable up to the town for vessels of 4000 tons. The larger ships lie in midstream and discharge into lighters, while vessels of 2000 tons can berth alongside the wharves on to which the railway runs. Laun- ceston is a well-planned, pleasant town, lighted by electricity, with numerous parks and squares and many fine buildings. The post office, the custom house, the post office savings bank and the Launceston bank form an attractive group; the town hall is used exclusively for civic purposes, public meetings and social functions being held in an elegant building called the Albert hall. There are also a good art gallery, a theatre and a number of fine churches, one of which, the Anglican church of St John, dates from 1824. The city, which attained that rank in 1889, has two attractive suburbs, Invermay and Trevallyn; it has a racecourse at Mowbray 2 m. distant, and is the centre and port of an important fruit-growing district. Pop. of the city proper (1901) 18,022, of the city and suburbs 21,180.

LAUNCH. (1) A verb meaning originally to hurl, discharge a missile or other object, also to rush or shoot out suddenly

or rapidly. It is particularly used of the setting afloat a vessel from the stocks on which she has been built. The word is an adaptation of O. Fr. lancher, lander, to hurl, throw, Lat. lanceare, from lancea, a lance or spear. (2) The name of a particular type of boat, usually applied to one of the largest size of ships' boats, or to a large boat moved by electricity, steam or other power. The word is an adaptation of the Span, lancha, pinnace, which is usually connected with lanchara, the Portuguese name, common in 16th and 17th century histories, for a fast-moving small vessel. This word is of Malay origin and is derived from lanchdr, quick, speedy.

LAUNDRY, a place or establishment where soiled linen, &c, is washed. The word is a contraction of an earlier form lavendry, from Lat. lavanda, things to be washed, lavare, to wash. " Launder," a similar contraction of lavender, was one (of either sex) who washes linen; from its use as a verb came the form " launderer," employed as both masculine and feminine in America, and the feminine form " laundress," which is also applied to a female caretaker of chambers in the Inns of Court, London.

Laundry-work has become an important industry, organized on a scale which requires elaborate mechanical plant very different from the simple appliances that once sufficed for domestic needs. For the actual cleansing of the articles, instead of being rubbed by the hand or trodden by the foot of the washer- woman, or stirred and beaten with a " dolly " in the wash-tub, they are very commonly treated in rotary washing machines driven by power. These machines consist of an outer casing containing an inner horizontal cylindrical cage, in which the clothes are placed. By the rotation of this cage, which is reversed by automatic gearing every few turns, they are rubbed and tumbled on each other in the soap and water which is contained in the outer casing and enters the inner cylinder through perfora- tions. The outer casing is provided with inlet valves for hot and cold water, and with discharge valves; and often also arrange- ments are made for the admission of steam under pressure, so that the contents can be boiled. Thus the operations of washing, boiling, rinsing and blueing (this last being the addition of a blue colouring matter to mask the yellow tint and thus give the linen the appearance of whiteness) can be performed without removing the articles from the machine. For drying, the old methods of wringing by hand, or by machines in which the clothes were squeezed between rollers of wood or india-rubber, have been largely superseded by " hydro-extractors " or " centrifugals." In these the wet garments are placed in a perforated

cage or basket, supported on vertical bearings, which is rotated at a high speed (1000 to 1500 times a minute) and in a short time as much as 85% of the moisture may thus be removed. The drying is often completed in an apartment through which dry air is forced by fans. In the process of finishing linen the old- fashioned laundress made use of the mangle, about the only piece of mechanism at her disposal. In the box-mangle the articles were pressed on a flat surface by rollers which were weighted with a box full of stones, moved to and fro by a rack and pinion. In a later and less cumbrous form of the machine they were passed between wooden rollers or ” bowls ” held close together by weighted levers. An important advance was marked by the introduction of machines which not only smooth and press the linen like the mangle, but also give it the glazed finish obtained by hot ironing. Machines of this kind are essentially the same as the calenders used in paper and textile manufacture. They are made in a great variety of forms, to enable them to deal with articles of different shapes, but they may be described generally as consisting either of a polished metal roller, heated by steam or gas, which works against a blanketted or felted surface in the form of another roller or a flat table, or, as in the Decoudun type, of a felted metal roller rotating against a heated concave bed of polished metal. In cases where hand-ironing is resorted to, time is economized by the employment of irons which are continuously heated by gas or electricity.

LA UNION, a seaport and the capital of the department of La Union, Salvador, 144 m. E.S.E. of San Salvador. Pop. (1905)

about 4000. La Union is situated at the foot of a lofty volcano, variously known as Conchagua, Pinos and Meanguera, and on a broad indentation in the western shore of Fonseca Bay. Its harbour, the best in the republic, is secure in all weathers and affords good anchorage to large ships. La Union is the port of shipment for the exports of San Miguel and other centres of production in eastern Salvador.

LA UNION, a town of eastern Spain in the province of Murcia, 5 m. by rail E. of Cartagena and close to the Mediterranean Sea. Pop. (1900) 30,275, of whom little more than half inhabit the town itself. The rest are scattered among the numerous metal works and mines of iron, manganese, calamine, sulphur and lead, which are included within the municipal boundaries. La Union is quite a modern town, having sprung up in the second half of the 19th century. It has good modern municipal buildings, schools, hospital, town hall and large factories.

LAURAHUTTE, a village of Germany, in the Prussian province of Silesia, 5 m. S.E. of Beuthen, on the railway Tarnowitz- Emanuelsegen.

It has an Evangelical and a Roman Catholic church, but is especially noteworthy for its huge iron works, which employ about 6000 hands. Pop. (rgoo) 13,571.

LAUREATE (Lat. laureatus, from laurea, the laurel tree). The laurel, in ancient Greece, was sacred to Apollo, and as such was used to form a crown or wreath of honour for poets and heroes; and this usage has been widespread. The word ” laureate ” or ” laureated ” thus came in English to signify eminent, or associated with glory, literary or military. ” Laureate letters ” in old times meant the despatches announc- ing a victory; and the epithet was given, even officially (e.g. to John Skelton) by universities, to distinguished poets. The name of ” bacca-laureate ” for the university degree of bachelor shows a confusion with a supposed etymology from Lat. bacca lauri (the laurel berry), which though incorrect (see Bachelor) involves the same idea. From the more general use of the term ” poet laureate ” arose its restriction in England to the office of the poet attached to the royal household, first held by Ben Jonson, for whom the position was, in its essentials, created by Charles I. in 161 7. (Jonson’s appointment does not seem to have been formally made as poet-laureate, but his position was equivalent to that). The office was really a development of the practice of earlier times, when minstrels and versifiers were part of the retinue of the King; it is recorded that Richard Cceur de Lion had a versificator regis (Gulielmus Peregrinus), and Henry III. had a versificator (Master Henry); in the 15th century John Kay, also a ” versifier,” described himself as Edward IV. ‘s ” humble poet laureate.” Moreover, the crown had shown its patronage in various ways; Chaucer had been given a pension and a perquisite of wine by Edward III., and Spenser a pension by Queen Elizabeth. W. Hamilton classes Chaucer, Gower, Kay, Andrew Bernard, Skelton, Robert Whittington, Richard Edwards, Spenser and Samuel Daniel, as ” volunteer Laureates.” Sir William Davenant succeeded Jonson in 1638, and the title of poet laureate was conferred by letters patent on Dryden in 1670, two years after Davenant’s death, coupled with a pension of £300 and a butt of Canary wine. The post then became a regular institution, though the emoluments varied, DrydenV successors being T. Shad well (who originated annual birthday and New Year odes), Nahum Tate, Nicholas Rowe, Laurence Eusden, Colley Cibber, William Whitehead, Thomas Warton, H. J. Pye, Southey, Wordsworth, Tennyson and, four years after Tennyson’s death, Alfred Austin. The office took on a new lustre from the personal distinction of Southey, Wordsworth and Tennyson; it had fallen into contempt before Southey, and on Tennyson’s death there was a considerable feeling that no possible successor was acceptable

(William Morris and Swinburne being hardly court poets). Eventually, however, the undesirability of breaking with tradition for temporary reasons, and thus severing the one official link between literature and the state, prevailed over the protests against following Tennyson by any one of inferior genius. It may be noted that abolition was similarly advocated when Warton and Wordsworth died. The poet laureate, being a court official, was considered

responsible for producing formal and appropriate verses on birthdays and state occasions; but his activity in this respect has varied, according to circumstances, and the custom ceased to be obligatory after Pye's death. Wordsworth stipulated, before accepting the honour, that no formal effusions from him should be considered a necessity; but Tennyson was generally happy in his numerous poems of this class. The emoluments of the post have varied; Ben Jonson first received a pension of 100 marks, and later an annual " terse of Canary wine." To Pye an allowance of £27 was made instead of the wine. Tennyson drew £72 a year from the lord chamberlain's department, and £27 from the lord steward's in lieu of the " butt of sack."

See Walter Hamilton's Poets Laureate of England (1879), and his contributions to Notes and Queries (Feb. 4, 1893).

LAUREL. At least four shrubs or small trees are called by this name in Great Britain, viz. the common or cherry laurel (Prunus Laurocerasus) , the Portugal laurel (P. lusitanica), the bay or sweet laurel (Laurus nobilis) and the spurge laurel {Daphne Laureola). The first two belong to the rose family (Rosaceae), to the section Cerasus (to which also belongs the cherry) of the genus Prunus.

The common laurel is a native of the woody and sub-alpine regions of the Caucasus, of the mountains of northern Persia, of north-western Asia Minor and of the Crimea. It was received into Europe in 1376, and flowered for the first time in 1583. Ray in 1688 relates that it was first brought from Trebizonde to Constantinople, thence to Italy, France, Germany and England. Parkinson in his Paradisus records it as growing in a garden at Highgate in 1629; and in Johnson's edition of Gerard's Herbal (1633) it is recorded that the plant " is now got into many of our choice English gardens, where it is well respected for the beauty of the leaues and their lasting or continuall greennesse " (see Loudon's Arboretum, ii. 717). The leaves of this plant are rather large,

broadly lance-shaped and of a leathery con- sistence, the margin being somewhat serrated. They are re- markable for their poisonous properties, giving off the odour of bitter almonds when bruised; the vapour thus issuing is sufficient to kill small insects by the prussic acid which it contains. The leaves when cut up finely and distilled yield oil of bitter almonds and hydrocyanic (prussic) acid. Sweetmeats, custards, cream, &c, are often flavoured with laurel-leaf water, as it imparts the same flavour as bitter almonds; but it should be used sparingly, as it is a dangerous poison, having several times proved fatal. The first case occurred in 1731, which induced a careful investigation to be made of its nature; Schrader in 1802 discovered it to contain hydrocyanic acid. The effects of the distilled laurel-leaf water on living vegetables is to destroy them like ordinary prussic acid; while a few drops act on animals as a powerful poison. It was introduced into the British phar- macopoeia in 1839, but is generally superseded by the use of prussic acid. The aqua laurocerasi, or cherry laurel water, is now standardized to contain o-i% of hydrocyanic acid. It must not be given in doses larger than 2 drachms. It contains benzole hydrate, which is antiseptic, and is therefore suitable for hypodermic injection; but the drug is of inconsistent strength, owing to the volatility of prussic acid.

The following varieties of the common laurel are in cultivation: the Caucasian (Prunus Laurocerasus, var. caucasica), which is hardier and bears very rich dark-green glossy foliage; the Versailles laurel (var. latifolia), which has larger leaves; the Colchican (var. colchica), which is a dwarf -spreading bush with narrow sharply serrated pale-green leaves. There is also the variety rotundifolia with short broad leaves, the Grecian with narrow leaves and the Alexandrian with very small leaves.

The Portugal laurel is a native of Portugal and Madeira. It was introduced into England about the year 1648, when it was cultivated in the Oxford Botanic Gardens. During the first half of the 18th century this plant, the common laurel and the holly were almost the only hardy evergreen shrubs procurable in British nurseries. They are all three tender about Paris, and consequently much less seen in the neighbourhood of that city

than in England, where they stand the ordinary winters but not very severe ones. There is a variety (myrtifolia) of compact habit with smaller narrow leaves, also a variegated variety.

The evergreen glossy foliage of the common and Portugal laurels render them well adapted for shrubberies, while the racemes of white

flowers are not devoid of beauty. The former often ripens its insipid drupes, but the Portugal rarely does so. It appears to be less able to accommodate itself to the English climate, as the wood does not usually ” ripen ” so satisfactorily. Hence it is rather more liable to be cut by the frost. It is grown in the open air in the southern United States.

The bay or sweet laurel (Laurus nobilis) belongs to the family Lauraceae, which contains sassafras, benzoin, camphor and other trees remarkable for their aromatic properties. It is a large evergreen shrub, sometimes reaching the height of 60 ft., but rarely assuming a truly tree-like character. The leaves are smaller than those of the preceding laurels, possessing an aromatic and slightly bitter flavour, and are quite devoid of the poisonous properties of the cherry laurel. The small yellowish-green flowers are produced in axillary clusters, are male or female, and consist of a simple 4-leaved perianth which encloses nine stamens in the male, the anthers of which dehisce by valves which lift upwards as in the common barberry, and carry glandular processes at the base of the filament. The fruit con- sists of a succulent berry surrounded by the persistent base of the perianth. The bay laurel is a native of Italy, Greece and North Africa, and is abundantly grown in the British Isles as an evergreen shrub, as it stands most winters. The date of its introduction is unknown, but must have been previous to 1562, as it is mentioned in Turner’s Herbal published in that year. A full description also occurs in Gerard’s Herball (1597, p. 1222). It was used for strewing the floors of houses of distinguished persons in the reign of Elizabeth. Several varieties have been cultivated, differing in the character of their foliage, as the undulata or wave-leafed, salicifolia or willow-leafed, the varie- gated, the broad-leafed and the curled; there is also the double- flowered variety. The bay laurel was carried to North America by the early colonists.

This laurel is generally held to be the Daphne of the ancients, though Lindley, following Gerard (Herball, 1597, p. 761), asserted that the Greek Daphne was Ruscus racemosus. Among the Greeks the laurel was sacred to Apollo, especially in connexion with Tempe, in whose laurel groves the god himself obtained purification from the blood of the Python. This legend was dramatically represented at the Pythian festival once in eight years, a boy fleeing from Delphi to Tempe, and after a time being led back with song, crowned and adorned with laurel. Similar 8avr]opLai were known elsewhere in Greece. Apollo, himself purified, was the author of purification and atonement to other penitents, and the laurel was the symbol of this power, which came to be generally associated with his person and sanctuaries. The

relation of Apollo to the laurel was expressed in the legend of Daphne (q.v .) . The victors in the Pythian games were crowned with the laurels of Apollo, and thus the laurel became the symbol of triumph in Rome as well as in Greece. As Apollo was the god of poets, the Laurea Apollinaris “naturally belonged to poetic merit (see Laureate). The various prerogatives of the laurel among the ancients are collected by Pliny (Hist. Nat. xv. 30). It was a sign of truce, like the olive branch; letters announcing victory and the arms of the victorious soldiery were garnished with it; it was thought that lightning could not strike it, and the emperor Tiberius always wore a laurel wreath during thunder- storms. From its association with the divine power of purifica- tion and protection, it was often set before the door of Greek houses, and among the Romans it was the guardian of the gates of the Caesars (Ovid, Met. i. 562 sq.). The laurel worn by Augustus and his successors had a miraculous history: the laurel grove at the imperial villa by the ninth milestone on the Flaminian way sprang from a shoot sent from heaven to Livia Drusilla (Sueton. Galba,.). Like the olive, the laurel was forbidden to profane use. It was employed in divination; the crackling of its leaves in the sacred flame was a good omen (Tibull. ii. 5. 81),

and their silence unlucky (Propert. ii. 21); and the leaves when chewed excited a prophetic afflatus (8a.vri(t>ayoi, cf. Tibull. ii. 5. 63). There is a poem enumerating the ancient virtues of the laurel by J. Passeratius (1594).

The last of the plants mentioned above under the name of laurel is the so-called spurge laurel (Daphne Laureola). This and one other species (D. Mezereum), the mezereon, are the sole representatives of the family Thymelaeaceae in Great Britain. The spurge laurel is a small evergreen shrub, with alternate somewhat lanceolate leaves with entire margins. The green flowers are produced in early spring, and form drooping clusters at the base of the leaves. The calyx is four-cleft, and carries eight stamens in two circles of four each within the tube. The pistil forms a berry, green at first, but finally black. The mezereon differs in blossoming before the leaves are produced, while the flowers are lilac instead of green. The bark furnishes the drug Cortex Mezerei, for which that of the spurge laurel is often substituted. Both are powerfully acrid, but the latter is less so than the bark of mezereon. It is now only used as an ingredient of the liquor sarsae compositus concentratus. Of other species in cultivation there

are D. Fortunei from China, which has lilac flowers; D. pontica, a native of Asia Minor; D. alpina, from the Italian Alps; D. collina, south European; and D. Cneorum, the garland flower or trailing daphne, the handsomest of the hardy species.

See Hemsley's Handbook of Hardy Trees, &c.

LAURENS, HENRY (17 24-1 792), American statesman, was born in Charleston, South Carolina, on the 24th of February 1724, of Huguenot ancestry. When sixteen he became a clerk in a counting-house in London, and later engaged in commercial pursuits with great success at Charleston until 1771, when he retired from active business. He spent the next three years travelling in Europe and superintending the education of his sons in England. In spite of his strong attachment to England, and although he had defended the Stamp Act, in 1 774, in the hope of averting war, he united with thirty-seven other Americans in a petition to parliament against the passing of the Boston Port Bill. Becoming convinced that a peaceful settlement was impracticable, he returned to Charleston at the close of 1774, and there allied himself with the conservative element of the Whig party. He was soon made president of the South Carolina council of safety, and in 1776 vice-president of the state; in the same year he was sent as a delegate from South Carolina to the general continental congress at Philadelphia, of which body he was president from November 1777 until December 1778. In August 1780 he started on a mission to negotiate on behalf of congress a loan of ten million dollars in Holland; but he was captured on the 3rd of September off the Banks of Newfoundland by the British frigate " Vestal," taken to London and closely imprisoned in the Tower. His papers were found to contain a sketch of a treaty between the United States and Holland projected by William Lee, in the service of Congress, and Jan de Neufville, acting on behalf of Mynheer Van Berckel, pensionary of Amsterdam, and this discovery eventually led to war between Great Britain and the United Provinces. During his imprisonment his health became greatly impaired. On the 31st of December 1781 he was released on parole, and he was finally exchanged for Cornwallis. In June 1782 he was appointed one of the American commissioners for negotiating peace with Great Britain, but he did not reach Paris until the 28th of November 1782, only two days before the preliminaries of peace were signed by himself, John Adams, Franklin and Jay. On the day of signing, however, he procured the insertion of a clause prohibiting the British from " carrying away any negroes or other property of American inhabitants"; and this subse- quently led to considerable friction between the British and American governments. On account of failing health he did not remain for the signing of the definitive treaty,

but returned to Charleston, where he died on the 8th of December

1792.

His son, John Laurens (1754-1782), American revolutionary officer, was born at Charleston, South Carolina, on the 28th of

October 1754. He was educated in England, and on his return to America in 1777, in the height of the revolutionary struggle, he joined Washington's staff. He soon gained his commander's confidence, which he reciprocated with the most devoted attach- ment, and was entrusted with the delicate duties of a confidential secretary, which he performed with much tact and skill. He was present in all Washington's battles, from Brandywine to Yorktown, and his gallantry on every occasion has gained him the title of " the Bayard of the Revolution." Laurens displayed bravery even to rashness in the storming of the Chew mansion at Germantown; at Monmouth, where he saved Washington's life, and was himself severely wounded; and at Coosahatchie, where, with a handful of men, he defended a pass against a large English force under General Augustine Prevost, and was again wounded. He fought a duel against General Charles Lee, and wounded him, on account of that officer's disrespectful conduct towards Washington. Laurens distinguished himself further at Savannah, and at the siege of Charleston in 1780. After the capture of Charleston by the English, he rejoined Washington, and was selected by him as a special envoy to appeal to the king of France for supplies for the relief of the American armies, which had been brought by prolonged service and scanty pay to the verge of dissolution. The more active co-operation of the French fleets with the land forces in Virginia, which was one result of his mission, brought about the disaster of Cornwallis at Yorktown. Laurens lost no time in rejoining the army, and at Yorktown was at the head of an American storming party which captured an advanced redoubt. Laurens was designated with the vicomte de Noailles to arrange the terms of the surrender, which virtually ended the war, although desultory skirmishing, especially in the South, attended the months of delay before peace was formally concluded. In one of these trifling affairs on the 27th of August 1782, on the Combahee river, Laurens exposed himself needlessly and was killed. Washington lamented deeply the death of Laurens, saying of him, " He had not a fault that I could discover, unless it were intrepidity bordering upon rashness."

The most valuable of Henry Laurens's papers and pamphlets in- cluding the important " Narrative of the Capture of Henry Laurens, of his Confinement in the Tower of London, &c, 1780, 1781, 1782," in

vol. i. (Charleston, 1857) of the Society's Collections, have been published by the South Carolina Historical Society. John Laurens's military correspondence, with a brief memoir by W. G. Simms, was privately printed by the Bradford Club, New York, in 1867.

LAURENT, FRANCOIS (1810-1887), Belgian historian and jurisconsult, was born at Luxemburg on the 8th of July 1810. He held a high appointment in the ministry of justice for some time before he became professor of civil law in the university of Ghent in 1836. His advocacy of liberal and anti-clerical principles both from his chair and in the press made him bitter enemies, but he retained his position until his death on the nth of February 1887. He treated the relations of church and state in L'Eglise et I'itat (Brussels, 3 vols., 1858-1862; new and revised edition, 1865), and the same subject occupied a large proportion of the eighteen volumes of his chief historical work, Eludes sur I'histoire de Vhumanitt (Ghent and Brussels, 1855- 1870), which aroused considerable interest beyond the boundaries of Belgium. His fame as a lawyer rests on his authoritative exposition of the Code Napoleon in his Principes de droit civil (Brussels, 33 vols., 1869-1878), and his Droit civil international (Brussels, 8 vols., 1880-1881). He was charged in 1879 by the minister of justice with the preparation of a report on the proposed revision of the civil code. Besides his anti-clerical pamphlets his minor writings include much discussion of social questions, of the organization of savings banks, asylums, &c, and he founded the Sociele Collier for the encouragement of •thrift among the working classes. With Gustave Callier, whose funeral in 1863 was made the occasion of a display of clerical intolerance, Laurent had much in common, and the efforts of the society were directed to the continuation of Callier's philanthropic schemes.

For a complete list of his works, see G. Koninck, Bibliographie nationale (Brussels, vol. ii., 1892).

LAURENTINA, VIA, an ancient road of Italy, leading south- wards from Rome. The question of the nomenclature of the group of roads between the Via Ardeatina and the Via Ostiensis is somewhat difficult, and much depends on the view taken as to the site of Laurentum. It seems probable, however, that the Via Laurentina proper is that which led out of the Porta Ardea- tina of the Aurelian wall and went direct to Tor Paterno, while the road branching from the Via Ostiensis at the

third mile, and leading past Decimo to Lavinium (Pratica), which crosses the other road at right angles not far from its destination (the Laurentina there running S.W. and that to Lavinium S.E.) may for convenience be called Lavinatis, though this name does not occur in ancient times. On this latter road, beyond Decimo, two milestones, one of Tiberius, the other of Maxentius, each bearing the number 11, have been found; and farther on, at Capocotta, traces of ancient buildings, and an important sepulchral inscription of a Jewish ruler of a synagogue have come to light. That the Via Laurentina was near the Via Ardeatina is clear from the fact that the same contractor was responsible for both roads. Laurentum was also accessible by a branch from the Via Ostiensis at the eighth mile (at Malafede) leading past Castel Porziano, the royal hunting-lodge, which is identical with the ancient Ager Solonius (in which, Festus tells us, was situated the Pomonal or sacred grove of Pomona) and which later belonged to Marius.

See R. Lanciani in articles quoted under Lavinium. (T. As.)

LAURENTIUS, PAUL (1554-1624), Lutheran divine, was bom on the 30th of March 1554 at Ober Wierau, where his father, of the same names, was pastor. From a school at Zwickau he entered (1573) the university of Leipzig, graduating in 1577. In 1578 he became rector of the Martin school at Halberstadt; in 1583 he was appointed town's preacher at Plauen-im-Vogtland, and in 1586 superintendent at Oelnitz. On the 20th of October 1595 he took his doctorate in theology at Jena, his thesis on the Symbolum Athanasii (1597), gaining him similar honours at Wittenberg and Leipzig. He was promoted (1605) to be pastor and superintendent at Dresden, and transferred (1616) to the superintendence at Meissen, where he died on the 24th of February 1624. His works consist chiefly of commentaries and expository discourses on prophetic books of the Old Testament, parts of the Psalter, the Lord's Prayer and the history of the Passion. In two orations he compared Luther to Elijah. Besides theological works he was the author of a Spicilegium Gnomonologicum (161 2).

The main authority is C. Schlegel, the historian of the Dresden superintendents (1698), summarized by H. W. Roternund, in the additions (1810) to Jocher, Gelehrten-Lexicon (1750). (A. Go.*)

LAURIA (Lueia or Loeia) ROGER DE (d. 1305), admiral of Aragon and Sicily, was the most ' prominent figure in the naval war which arose directly from the Sicilian Vespers. Nothing is really known of his life before he was named admiral in 1283. His father was a supporter of

the Hohenstaufen, and his mother came to Spain with Costanza, the daughter of Man- fred of Beneventum, when she married Peter, the eldest son and heir of James the Conqueror of Aragon. According to one account Bella of Lauria, the admiral's mother, had been the foster mother of Costanza. Roger, who accompanied his mother, was bred at the court of Aragon and endowed with lands in the newly conquered kingdom of Valencia. When the misrule of Charles of Ahjou's French followers had produced the famous revolt known as the Sicilian Vespers in 1282, Roger de Lauria accompanied King Peter III. of Aragon on the expedition which under the cover of an attack on the Moorish kingdom of Tunis was designed to be an attempt to obtain possession of all or at least part of the Hohenstaufen dominions in Naples and Sicily which the king claimed by right of his wife as the heiress of Manfred. In 1283, when the island had put itself under the protection of Peter III. and had crowned him king, he gave the command of his fleet to Roger de Lauria. The commission speaks of him in the most laudatory terms, but makes no reference to previous military services.

From this time forward till the peace of Calatabellota in

1303, Roger de Lauria was the ever victorious leader of fleets in the service of Aragon, both in the waters of southern Italy and on the coast of Catalonia. In the year of his appointment he defeated a French naval force in the service of Charles of Anjou, off Malta. The main object before him was to repel the efforts of the Angevine party to reconquer Sicily and then to carry the war into their dominions in Naples. Although Roger de Lauria did incidental fighting on shore, he was as much a naval officer as any modern admiral, and his victories were won by good manoeuvring and by discipline. The Catalan squadron, on which the Sicilian was moulded, was in a state of high and intelligent efficiency. Its chiefs relied not on merely boarding, and the use of the sword, as the French forces of Charles of Anjou did, but on the use of the ram, and of the powerful cross-bows used by the Catalans either by hand or, in case of the larger ones, mounted on the bulwarks, with great skill. The conflict was in fact the equivalent on the water of the battles between the English bowmen and the disorderly chivalry of France in the Hundred Years' War. In 1284 Roger defeated the Angevine fleet in the Bay of Naples, taking prisoner the heir to the kingdom, Charles of Salerno, who remained a prisoner in the hands of the Aragonese in Sicily, and later in Spain, for years. In 1285 he fought on the coast of Catalonia one of the most brilliant campaigns in all naval history. The French king Philippe le Hardi had invaded Catalonia with a large army to which the pope gave the character of crusaders, in order to support his cousin of

Anjou in his conflict with the Aragonese. The king, Peter III., had offended his nobles by his vigorous exercise of the royal authority, and received little support from them, but the outrages perpetrated by the French invaders raised the towns and country against them. The in- vaders advanced slowly, taking the obstinately defended towns one by one, and relying on the co-operation of a large number of allies, who were stationed in squadrons along the coast, and who brought stores and provisions from Narbonne and Aigues Mortes. They relied in fact wholly on their fleet for their existence. A successful blow struck at that would force them to retreat. King Peter was compelled to risk Sicily for a time, and he recalled Roger de Lauria from Palermo to the coast of Catalonia. The admiral reached Barcelona on the 24th of August, and was informed of the disposition of the French. He saw that if he could break the centre of their line of squadrons, stretched as it was so far that its general superiority of numbers was lost in the attempt to occupy the whole of the coast, he could then dispose of the extremities in detail. On the night of the 9th of September he fell on the central squadron of the French fleet near the Hormigas. The Catalan and Sicilian squadrons doubled on the end of the enemies' line, and by a vigorous employment of the ram, as well as by the destructive shower of bolts from the cross-bows, which cleared the decks of the French, gained a complete victory. The defeat of the enemy was followed; as usually in medieval naval wars, by a wholesale massacre. Roger then made for Rosas, and tempted out the French squadron stationed there by approaching under French colours. In the open it was beaten in its turn. The result was the capture of the town, and of the stores collected there by King Philippe for the support of his army. Within a short time he was forced to retreat amid sufferings from hunger, and the incessant attacks of the Catalan mountaineers, by which his army was nearly annihilated. This campaign, which was followed up by destruc- tive attacks on the French coast, saved Catalonia from the invaders, and completely ruined the French naval power for the time being. No medieval admiral of any nation displayed an equal combination of intellect and energy, and none of modern times has surpassed it. The work had been so effectually done on the coast of Catalonia that Roger de Lauria was able to return to Sicily, and resume his command in the struggle of Aragonese and Angevine to gain, or to hold, the possession of Naples.

He maintained his reputation and was uniformly successful in his battles at sea, but they were not always fought for the defence of Sicily. The death of Peter III. in 1286 and of his

eldest son Alphonso in the following year caused a division among the members of the house of Aragon. The new king, James, would have given up Sicily to the Angevin e line with which he made peace and alliance, but his younger brother Fadrique accepted the crown offered him by the Sicilians, and fought for his own hand against both the Angevines and his senior. King James tried to force him to submission without success. Roger de Lauria adhered for a time to Fadrique, but his arrogant temper made him an intolerable supporter, and he appears, moreover, to have thought that he was bound to obey the king of Aragon. His large estates in Valencia gave him a strong reason for not offending that sovereign. He therefore left Fadrique, who confiscated his estates in Sicily and put one of his nephews to death as a traitor. For this Roger de Lauria took a ferocious revenge in two successive victories at sea over the Sicilians. When the war, which had become a ravening of wild beasts, was at last ended by the peace of Calatabellota, Roger de Lauria retired to Valencia, where he died on the 2nd of January 1305, and was buried, by his express orders, in the church of Santas Creus, a now deserted monastery of the Cister- cians, at the feet of his old master Peter III. In his ferocity, and his combination of loyalty to his feudal lord with utter want of scruple to all other men, Roger belonged to his age. As a captain he was far above his contemporaries and his successors for many generations.

Signor Amari's Guerra del Vespro Sicilidno gives a general picture of these wars, but the portrait of Roger de Lauria must be sought in the Chronicle of the Catalan Ramon de Muntaner who knew him and was formed in his school. There is a very fair and well " docu- mented" account of the masterly campaign of 1285 in Charles de la Ronciere's Histoire de la marine francaise, i. 189-217. (D. H.)

LAURIA, or Loria, a city of Basilicata, Italy, in the province of Potenza, situated near the borders of Calabria, 7§ m. by road S. of Lagonegro. Pop. (1901) 10,470. It is a walled town on the steep side of a hill with another portion in the plain below, 1 82 1 ft. above sea-level. The castle was the birthplace of Ruggiero di Loria, the great Italian admiral of the 13th century. It was destroyed by the French under Massena in 1806. |

LAURIER, SIR WILFRID (1841-), Canadian statesman, was born on the 20th of November 1841, at St Lin in the province of Quebec. The child of French Roman Catholic parents, he attended the elementary school of his native parish and for eight or nine months was a pupil of the Protestant elementary school at New Glasgow in order to learn

English; his association with the Presbyterian family with whom he lived during this period had a permanent influence on his mind. At twelve years of age he entered L'Assomption college, and was there for seven years. The college, like all the secondary schools in Quebec then avail- able for Roman Catholics, was under direct ecclesiastical control. On leaving it he entered a law office at Montreal and took the law course at McGill University. At graduation he delivered the valedictory address for his class. This, like so many of his later utterances, closed with an appeal for sympathy and union between the French and English races as the secret of the future of Canada. He began to practise law in Montreal, but owing to ill-health soon removed to Athabaska, where he opened a law office and undertook also to edit Le DSfricheur, a newspaper then on the eve of collapse. At Athabaska, the seat of one of the superior courts of Quebec, the population of the district was fairly divided between French- and English-speaking people, and Laurier's career was undoubtedly influenced by his constant association with English-speaking people and his intimate acquaintance with their views and aspirations.

While at Montreal he had joined the Institut Canadien, a literary and scientific society which, owing to its liberal dis- cussions and the fact that certain books upon its shelves were on the Index expurgatorius, was finally condemned by the Roman Catholic authorities. Le Defricheur was an organ of extreme French sentiment, opposed to confederation, and also under ecclesiastical censure. One of its few surviving copies contains an article by Laurier opposing confederation as a scheme designed in the interest of the English colonies in North America, and certain to prove the tomb of the French race and the ruin

of Lower Canada. The Liberals of Quebec under the leadership of Sir Antoine Dorion were hostile to confederation, or at least to the terms of union agreed upon at the Quebec conference, and Laurier in editorials and speeches maintained the position of Dorion and his allies. He was elected to the Quebec legislature in 1871, and his first speech in the provincial assembly excited great interest, on account of its literary qualities and the attrac- tive manner and logical method of the speaker. He was not less successful in the Dominion House of Commons, to which he was elected in 1874. During his first two years in the federal parlia- ment his chief speeches were made in defence of Riel and the French halfbreeds who were concerned in the Red River rebellion, and on fiscal questions. Sir John Macdonald, then in opposition, had committed his party to a protectionist policy, and Laurier, notwithstanding that the Liberal party stood for a low tariff, avowed himself to be " a moderate protectionist." He declared that if

he were in Great Britain he would be a free trader, but that free trade or protection must be applied according to the necessities of a country, and that which protection necessarily involved taxation it was the price a young and vigorous nation must pay for its development. But the Liberal government, to which Laurier was admitted as minister of inland revenue in 1877, made only a slight increase in duties, raising the general tariff from 15% to 175%; and against the political judgment of Alexander Mackenzie, Sir Richard Cartwright, George Brown, Laurier and other of the more influential leaders of the party, it adhered to a low tariff platform. In the bye-election which followed Laurier's admission to the cabinet he was defeated — the only personal defeat he ever sustained; but a few week." later he was returned for Quebec East, a constituency which he held thenceforth by enormous majorities. In 1878 his party went out of office and Sir John Macdonald entered upon a long term of power, with protection as the chief feature of his policy, to which was afterwards added the construction of the Canadian Pacific railway.

After the defeat of the Mackenzie government, Laurier sat in Parliament as the leader of the Quebec Liberals and first lieutenant to the Hon. Edward Blake, who succeeded Mackenzie in the leadership of the party. He was associated with Blake in his sustained opposition to high tariff, and to the Conservative plan for the construction of the Canadian Pacific railway, and was a conspicuous figure in the long struggle between Sir John Macdonald and the leaders of the Liberal party to settle the territorial limits of the province of Ontario and the legislative rights of the provinces under the constitution. He was forced also to maintain a long conflict with the ultramontane element of the Roman Catholic church in Quebec, which for many years had a close working alliance with the Conservative politicians of the province and even employed spiritual coercion in order to detach votes from the Liberal party. Notwithstanding that Quebec was almost solidly Roman Catholic the Rouges sternly resisted clerical pressure; they appealed to the courts and had certain elections voided on the ground of undue clerical influence, and at length persuaded the pope to send out a delegate to Canada, through whose inquiry into the circumstances the abuses were checked and the zeal of the ultramontanes restrained.

In 1887, upon the resignation of Blake on the ground of ill- health, Laurier became leader of the Liberal party, although he and many of the more influential men in the party doubted the wisdom of the proceeding. He was the first French Canadian to lead a federal party in Canada since confederation. Apart from the natural fear that he would arouse prejudice in the English-speaking provinces, the second

Riel rebellion was then still fresh in the public mind, and the fierce nationalist agitation which Riel's execution had excited in Quebec had hardly sub- sided. Laurier could hardly have come to the leadership at a more inopportune moment, and probably he would not have accepted the office at all if he had not believed that Blake could be persuaded to resume the leadership when his health was restored. But from the first he won great popularity even in the English-speaking provinces, and showed unusual capacity for leadership. His party was beaten in the first general election

held after he became leader (1891), but even with its policy of unrestricted reciprocity with the United States, and with Sir John Macdonald still at the head of the Conservative party, it was beaten by only a small majority. Five years later, with unrestricted reciprocity relegated to the background, and with a platform which demanded tariff revision so adjusted as not to endanger established interests, and which opposed the federal measure designed to restore in Manitoba the separate or Roman Catholic schools which the provincial government had abolished, Laurier carried the country, and in July 1896 he was called by Lord Aberdeen, then governor-general, to form a government.

He was the first French-Canadian to occupy the office of premier; and his personal supremacy was shown by his long continuance in power. During the years from 1896 to 1910, he came to hold a position within the British Empire which was in its way unique, and in this period he had seen Canadian prosperity advance progressively by leaps and bounds. The chief features of his administration were the fiscal preference of 33 1% in favour of goods imported into Canada from Great Britain, the despatch of Canadian contingents to South Africa during the Boer war, the contract with the Grand Trunk railway for the construction of a second transcontinental road from ocean to ocean, the assumption by Canada of the imperial fortresses at Halifax and Esquimault, the appointment of a federal railway commission with power to regulate freight charges, express rates and telephone rates, and the relations between competing companies, the reduction of the postal rate to Great Britain from 5 cents to 2 cents and of the domestic rate from 3 cents to 2 cents, a substantial contribution to the Pacific cable, a practical and courageous policy of settlement and development in the Western territories, the division of the North-West territories into the provinces of Alberta and Saskatchewan and the

enactment of the legislation necessary to give them provincial status, and finally (1910), a tariff arrangement with the United States, which, if not all that Canada might claim in the way of reciprocity, showed how entirely the course of events had changed the balance of commercial interests in North America.

Laurier made his first visit to Great Britain on the occasion of Queen Victoria's diamond jubilee (1897), when he received the grand cross of the Bath; he then secured the denunciation of the Belgian and German treaties and thus obtained for the colonies the right to make preferential trade arrangements with the mother country. His personality made a powerful impression in Great Britain and also in France, which he visited before his return to Canada. His strong facial resemblance both to Lord Beaconsfield and to Sir John Macdonald marked him out in the public eye, and he captured attention by his charm of manner, fine command of scholarly English and genuine eloquence. Some of his speeches in Great Britain, coming as they did from a French-Canadian, and revealing delicate appreciation of British sentiment and thorough comprehension of the genius of British institutions, excited great interest and enthusiasm, while one or two impassioned speeches in the Canadian parlia- ment during the Boer war profoundly influenced opinion in Canada and had a pronounced effect throughout the empire.

A skilful party-leader, Laurier kept from the first not only the affection of his political friends but the respect of his opponents; while enforcing the orderly conduct of public business, he was careful as first minister to maintain the dignity of parliament. In office he proved more of an opportunist than his career in opposition would have indicated, but his political courage and -personal integrity remained beyond suspicion. His jealousy for the political autonomy of Canada was noticeable in his attitude at the Colonial conference held at the time of King Edward's coronation, and marked all his diplomatic dealings with the mother country. But he strove for sympathetic relations between Canadian and imperial authorities, and favoured general legislative and fiscal co-operation between the two countries. He strove also for good relations between the two races in Canada, and between Canada and the United States. Although he was classed in Canada as a Liberal, his tendencies would in England have been considered strongly conservative;

an individualist rather than a collectivist, he opposed the intrusion of the state into the sphere of private enterprise, and showed no sympathy with the movement for state operation of railways, telegraphs and telephones, or with any kindred proposal looking to

the extension of the obligations of the central government.

Bibliography. — J. S. Willison, Sir Wilfrid Laurier and the Liberal Party; a Political History (Toronto, 1903) ; L. O. David, Laurier et son temps (Montreal, 1905); see also Henri Moreau, Sir Wilfrid Laurier, Premier Ministre du Canada (Paris, 1902) ; and the collection of Laurier's speeches from 1871 to 1890, compiled by Ulric Barthe (Quebec, 1890). (J. S. W.)

LAURISTON, JACQUES ALEXANDRE BERNARD LAW,

Marquis de (1768-1828), French soldier and diplomatist, was the son of Jacques Francois Law de Lauriston (1724-1785), a general officer in the French army, and was born at Pondicherry on the 1st of February 1768. He obtained his first commission about 1786, served with the artillery and on the staff in the' earlier Revolutionary campaigns, and became brigadier of artillery in 1795. Resigning in 1796, he was brought back into the service in 1800 as aide-de-camp to Napoleon, with whom as a cadet Lauriston had been on friendly terms. In the years immediately preceding the first empire Lauriston was successively director of the Le Fere artillery school and special envoy to Denmark, and he was selected to convey to England the rati- fication of the peace of Amiens (1802). In 1805, having risen to the rank of general of division, he took part in the war against Austria. He occupied Venice and Ragusa in 1806, was made governor-general of Venice in 1807, took part in the Erfurt negotiations of 1808, was made a count, served with the emperor in Spain in 1808-1809 and held commands under the viceroy Eugene Beauharnais in the Italian campaign and the advance to Vienna in the same year. At the battle of Wagram he com- manded the guard artillery in the famous " artillery preparation " which decided the battle. In 18 11 he was made ambassador to Russia; in 18 12 he held a command in the Grande Armie and won distinction by his firmness in covering the retreat from Moscow. He commanded the V. army corps at Liitzen and Bautzen and the V. and XI. in the autumn campaign, falling into the hands of the enemy in the disastrous retreat from Leipzig. He was held a prisoner of war until the fall of the empire, and then joined Louis XVIII. , to whom he remained faithful in the Hundred Days. His reward was a seat in the house of peers and a command in the royal guard. In 181 7 he was created marquis and in 1823 marshal of France. During the Spanish War he commanded the corps which besieged and took Pamplona. He died at Paris on the 12th of June 1828.

LAURIUM (Aavpiov, mod. Ergastiri), a mining town in Attica, Greece, famous for the silver mines which were one of the chief sources of

revenue of the Athenian state, and were employed for coinage. After the battle of Marathon, Themi- stocles persuaded the Athenians to, devote the revenue derived from the mines to shipbuilding, and thus laid the foundation of the Athenian naval power, and made possible the victory of Salamis. The mines, which were the property of the state, were usually farmed out for a certain fixed sum and a percentage on the working; slave labour was exclusively employed. To- wards the end of the 5th century the output was diminished, partly owing to the Spartan occupation of Decelea. But the mines continued to be worked, though Strabo records that in his time the tailings were being worked over, and Pausanias speaks of the mines as a thing of the past. The ancient workings, consisting of shafts and galleries for excavating the ore, and pans and other arrangements for extracting the metal, may still be seen. The mines are still worked at the present day by French and Greek companies, but mainly for lead, manganese and cadmium. The population of the modern town was 10,007 in 1907.

See E. Ardaillon, ” Les Mines du Laurion dans l’antiquite,” No. lxxvii. of the Bibliotheque des ecoles francaises d’Athenes et de Rome.

LAURIUM, a village of Houghton county, Michigan, U.S.A., near the centre of Keweenaw peninsula, the northern extremity of the state. Pop. (1890) 1159; (1900) 5643, of whom 2286 were foreign-born; (1904) 7653; (1910) 8537. It is served by

the Mineral Range and the Mohawk and Copper Range railways. It is in one of the most productive copper districts in the United States, and copper mining is its chief industry. Immediately W. of Laurium is the famous Calumet and Hecla mine. The village was formerly named Calumet, and was incorporated under that name in 1889, but in 1895 its name was changed by the legislature to Laurium, in allusion to the mineral wealth of Laurium in Greece. The name Calumet is now applied to the post office in the village of Red Jacket (incorporated 1875; pop. 1900, 4668; 1904, 3784; 1910, 421 1), W. of the Calumet and Hecla mine; and Laurium, the mining property and Red Jacket are all in the township of Calumet (pop. 1904, state census, 28,587).

LAURUSTINUS, in botany, the popular name of a common hardy evergreen garden shrub known botanically as Viburnum Tinus, with rather dark-green ovate leaves in pairs and flat- topped clusters (or

corymbs) of white flowers, which are rose- coloured before expansion, and appear very early in the year. It is a native of the Mediterranean region, and was in cultivation in Britain at the end of the 16th century. Viburnum belongs to the natural order Caprifoliaceae and includes the common wayfaring tree (V. Lantana) and the guelder rose (V. Opulus).

LAURVIK, Larvik or Laurvig, a seaport of Norway, in Jarlsberg and Laurvik amt (county), at the head of a short fjord near the mouth of the Laagen river, 98 m. S.S.W. of Chris- tiania by the Skien railway. Pop. (1900) 10,664. It has various industries, including saw and planing mills, shipbuilding, glass- works and factories for wood-pulp, barrels and potato flour; and an active trade in exporting timber, ice, wood-pulp and granite, chiefly to Great Britain, and in importing from the same country coal and salt. The port has a depth of 18 to 24 ft. beside the quays. Four miles south is Fredriksvaern, formerly a station of the Norwegian fleet and the seat of a naval academy. Laurviks Bad is a favourite spa, with mineral and sulphur springs and mud-baths.

LAUSANNE, the capital of the Swiss canton of Vaud. It is the junction of the railway lines from Geneva, from Brieg and the Simplon, from Fribourg and Bern, and from Vallorbe (for Paris). A funicular railway connects the upper town with the central railway station and with Ouchy, the port of Lausanne on the lake of Geneva. Lausanne takes its name from the Flon stream flowing through it, which was formerly called Laus (water). The older or upper portion of the town is built on the crest and slopes of five hillocks and in the hollows between them, all forming part of the Jorat range. It has a picturesque appear- ance from the surface of the lake, above which the cathedral rises some 500 ft., while from the town there is a fine view across the lake towards the mountains of Savoy and of the Valais. The quaint characteristics of the hilly site of the old town have largely been destroyed by modern improvements, which began in 1836 and were not quite completed in 1910. The Grand Pont, designed by the cantonal engineer, Adrien Pichard (1790-1841), was built 1839-1844, while the Barre tunnel was pierced 1851- 1855 and the bridge of Chauderon was built in 1905. The valleys and lower portions of the town were gradually filled up so as to form a series of squares, of which those of Riponne and of St Francois are the finest, the latter now being the real centre of the town. The railways were built between 1856 and 1862, while the opening of the Simplon tunnel (1906) greatly increased the commercial importance of Lausanne, which is now on the great international highway from Paris to Milan. From 1896 onwards a well-planned set of tramways within the town was constructed. The town is still rapidly extending, especially towards the south and west.

Since the days of Gibbon (resident here for three periods, 1753-1758, 1763-1764 and 1783-1793), whose praises of the town have been often repeated, Lausanne has become a favourite place of residence for foreigners (including many English), who are especially attracted by the excellent establishments for secondary and higher education. Hence in 1900 there were 9501 foreign residents (of whom 628 were British subjects) out of a total population of 46,732 inhabitants; in 1905 it was reckoned that these numbers had risen respectively

to 10,625, 818 and 53,577. In 1709 it is said that the inhabitants numbered but 7432 and 9965 in 1803, while the numbers were 20,515 in i860 and 33,340 in 1888. Of the population in 1900 the great majority was French-speaking (only 6627 German- speaking and 3146 Italian-speaking) and Protestant (9364 Romanists and 473 Jews).

The principal building is the cathedral church (now Protestant) of Notre Dame, which with the castle occupies the highest position. It is the finest medieval ecclesiastical building in Switzerland. Earlier buildings were more or less completely destroyed by fire, but the present edifice was consecrated in 1 2 7 5 by Pope Gregory X. in the presence of the emperor Rudolf of Habsburg. It was sacked after the Bernese conquest (1536) and the introduction of Protestantism, but many ancient tapestries and other precious objects are still preserved in the Historical Museum at Bern. The church was well restored at great cost from 1873 onwards, as it is the great pride of the citizens. Close by is the castle, built in the early 15th century by the bishops, later the residence of the Bernese bailiffs and now the seat of the various branches of the administration of the canton of Vaud. Near both is the splendid Palais de Rumine (on the Place de la Riponne), opened in 1906 and now housing the university as well as the cantonal library, the cantonal picture gallery (or Musee Arlaud, founded 1841) and the cantonal collections of archaeology, natural history, &c. The university was raised to that rank in 1890, but, as an academy, dates from 1537. Among its former teachers may be mentioned Theodore Beza, Conrad Gesner, J. P. de Crousaz, Charles Monnard, Alexandre Vinet, Eugene Rambert, Juste Olivier and several members of the Secretan family. On the Montbenon heights to the south- west of the cathedral group is the federal palace of justice, the seat (since 1886) of the federal court of justice, which, erected by the federal constitution of 29th May 1874, was fixed at Lausanne by a federal resolution of 26th June 1874. The house, La Grotte, which Gibbon inhabited 1 783-1 793, and on the terrace of which he completed (1787) his famous history, was demolished in 1896 to make room for the new post office that stands on the Place St

Francois. The asylum for the blind was mainly founded (1845) by the generosity of W. Haldimand, an Englishman of Swiss descent. The first book printed in Lausanne was the missal of the cathedral church (1493), while the Gazette de. Lausanne (founded 1798) took that name in 1804. Lausanne has been the birthplace of many distinguished men, such as Benjamin Con- stant, the Secretans, Vinet and Rambert. It is the seat of many benevolent, scientific and literary societies and establishments.

The original town (mentioned in the Antonine Itinerary) was on the shore of the lake, near Vidy, south-west of the present city. It was burnt in the 4th century by the Alamanni. Some of the inhabitants took refuge in the hills above and there founded a new town, which acquired more importance when Bishop Marius about 590 chose it as his see city (perhaps trans- ferring it from Avenches). Here rose the cathedral church, the bishop's palace, &c. Across the Flon was a Burgundian settle- ment, later known as the Bourg, while to the west was a third colony around the church of St Laurent. These three elements joined together to form the present city. The bishops obtained little by little great temporal powers (the diocese extended to the left bank of the Aar) and riches, becoming in n 25 princes of. the empire, while their chapter was recruited only from the noblest families. But in 1368 the bishop was forced to recognize various liberties and customs that had been gradually won by the citizens, the Plaid General of that year showing that there was already some kind of municipal government, save for the cite', which was not united with the ville injerieure or the other four quartiers (Bourg, St Laurent, La Palud and Le Pont) in 1481. In 1525 the city made an alliance with Bern and Fribourg. But in 1536 the territory of the bishop (as well as the Savoyard barony of Vaud) was forcibly conquered by the Bernese, who at once introduced Protestantism. The Bernese occupation lasted till 1798, though in 1723 an attempt was made to put an end to it by Major Davel, who lost his life in consequence. In 1798 Lausanne became a simple prefecture of the canton Leman

of the Helvetic republic. But in 1803, on the creation of the canton of Vaud by the Act of Mediation, it became its capital. The bishop of Lausanne resided after 1663 at Fribourg, while from 1821 onwards he added " and of Geneva "to his title.

Besides the general works dealing with the canton of Vaud (q.v.), the

following books refer specially to Lausanne: A. Bernus, U Imprimerie a Lausanne et d- Morges jusqu'a. la fin du i6 iime slide (Lausanne, 1904) ; M. Besson, Recherches sur les origines des eveches de Geneve, Lausanne, Sion (Fribourg, 1906) ; A. Bonnard, " Lausanne au i8 ilime siecle," in the work entitled Chez nos a'ieux (Lausanne, 1902); E. Dupraz, La Cathedrale de Lausanne . . . etude historique (Lausanne, 1906); E. Gibbon, Autobiography and Letters (3 vols., 1896); F. Gingins and F. Forel, Documents concernant Vancien Sveche de Lausanne, 2 parts (Lausanne, 1846-1847); J. H. Lewis and F. Gribble, Lausanne (1909); E. van Muyden and others, Lausanne a travers les ages (Lausanne, 1906); Meredith Read, Historic Studies in Vaud, Berne and Savoy (2 vols., 1897); M. Schmitt, Memoires hist, sur le diocese de Lausanne (2 vols., Fribourg, 1859) ; J. Stammler (afterwards bishop of Lausanne), Le Tresor de la cathedrale de Lausanne (Lausanne, 1902 ; trans, of a German book of 1894).

(W. A. B. C.)

LAUTREC, ODET DE FOIX, Vicomte de (1485-1528), French soldier. The branch of the viscounts of Lautrec origi- nated with Pierre, the grandson of Archambaud de Grailly, captal de Buch, who came into possession of the county of Foix in 1401. Odet de Foix and his two brothers, the seigneur de Lescun and the seigneur de l'Esparre or Asparros, served Francis I. as captains; and the influence of their sister, Francoise de Chateaubriant, who became the king' mistress, gained them high offices. In 151 5 Lautrec took part in the campaign of Marignano. In 1 5 1 6 he received the government of the Milanese, and by his severity made the French domination insupportable. In 1 52 1 he succeeded in defending the duchy against the Spanish army, but in 1522 he was completely defeated at the battle of the Bicocca, and was forced to evacuate the Milanese. The mutiny of his Swiss troops had compelled him, against his wish, to engage in the battle. Created marshal of France, he received again, in 1527, the command of the army of Italy, occupied the Milanese, and was then sent to undertake the conquest of the kingdom of Naples. The defection of Andrea Doria and the plague which broke out in the French camp brought on a fresh disaster. Lautrec himself caught the infection, and died on the 15th of August 1528. He had the reputation of a gallant and able soldier, but this reputation scarcely seems to be justified by the facts; though he was always badly used by fortune.

There is abundant MS. correspondence in the Bibliotheque Nationale, Paris. See the Works of Brant6me (Coll. Soci6t6d'Histoire de France, vol. iii., 1867); Memoirs of Martin du Bellay (Coll. Michaud and Poujoulat, vol. v., 1838).

LAUZUN, ANTONIN NOMPAR DE CAUMONT, Marquis de Puyguilhem, Due de (1632-1723), French courtier and soldier, was the son of Gabriel, comte de Lauzun, and his wife Charlotte, daughter of the due de La Force. He was brought up with the children of his kinsman, the marechal de Gramont, of whom the comte de Guiche became the lover of Henrietta of England, duchess of Orleans, while Catherine Charlotte, afterwards princess of Monaco, was the object of the one passion of Lauzun's life. He entered the army, and served under Turenne, also his kinsman, and in 1655 succeeded his father as commander of the cent gentilshommes de la maison du roi. Puy-guilhem (or Peguilin, as contemporaries simplified his name) rapidly rose in Louis XIV.'s favour, became colonel of the royal regiment of dragoons, and was gazetted mare'chal de camp. He and Mme de Monaco belonged to the coterie of the young duchess of Orleans. His rough wit and skill in practical jokes pleased Louis XIV., but his jealousy and violence were the causes of his undoing. He prevented a meeting between Louis XIV. and Mme de Monaco, and it was jealousy in this matter, rather than hostility to Louise de la Valliere, which led him to promote Mme de Montespan's intrigues with the king. He asked this lady to secure for him the post of grand-master of the artillery, and on Louis's refusal to give him the appointment he turned his back on the king, broke his sword, and swore that never again would he serve a monarch who had broken his word. The result was a short sojourn in the Bastille, but he soon returned to his functions of court buffoon. Meanwhile, xvi. 10

the duchess of Montpensier (La Grande Mademoiselle) had fallen in love with the little man, whose ugliness seems to have exercised a certain fascination over many women. He naturally encouraged one of the greatest heiresses in Europe, and the wedding was fixed for the 20th of December 1670, when on the 1 8th Louis sent for his cousin and forbade the marriage. Mme de Montespan had never forgiven his fury when she failed to procure the grand-mastership of the artillery, and now, with Louvois, secured his arrest. He was removed in November 1 67 1 from the Bastille to Pignerol, where excessive precautions were taken to ensure his safety. He was eventually allowed free intercourse with Fouquet, but before that time he managed to find a way through the chimney into Fouquet's room, and on another occasion succeeded in reaching the courtyard in safety. Another fellow-prisoner, from communication with whom he was supposed to be rigorously excluded, was Eustache Dauger (see Iron Mask).

It was now intimated to Mademoiselle that Lauzun's restora- tion to liberty depended on her immediate settlement of the principality of

Dombes, the county of Eu and the duchy of Aumale — three properties assigned by her to Lauzun — on the little due de Maine, eldest son of Louis XIV. and Mme de Monte- span. She gave way, but Lauzun, even after ten years of im- prisonment, refused to sign the documents, when he was brought to Bourbon for the purpose. A short term of imprisonment at Chalon-sur-Saone made him change his mind, but when he was set free Louis XIV. was still set against the marriage, which is supposed to have taken place secretly (see Montpensier). Married or not, Lauzun was openly courting Fouquet's daughter, whom he had seen at Pignerol. He was to be restored to his place at court, and to marry Mile Fouquet, who, however, became Mme d'Uzes in 1683. In 1685 Lauzun went to England to seek his fortune under James II., whom he had served as duke of York in Flanders. He rapidly gained great influence at the English court. In 1688 he was again in England, and arranged the flight of Mary of Modena and the infant prince, whom he accompanied to Calais, where he received strict in- structions from Louis to bring them " on any pretext " to Vincennes. In the late autumn of 1689 he was put in command of the expedition fitted out at Brest for service in Ireland, and he sailed in the following year. Lauzun was honest, a quality not too common in James II. 's officials in Ireland, but had no experience of the field, and he blindly followed Richard Talbot, earl of Tyrconnel. After the battle of the Boyne they fled to Limerick, and thence to the west, leaving Patrick Sarsfield to show a brave front. In September they sailed for France, and on their arrival at Versailles Lauzun found that his failure had destroyed any prospect of a return of Louis XIV.'s favour. Mademoiselle died in 1693, and two years later Lauzun married Genevieve de Durfort, a child of fourteen, daughter of the marechal de Lorges. Mary of Modena, through whose interest Lauzun secured his dukedom, retained her faith in him, and it was he who in 1715, more than a quarter of a century after the flight from Whitehall, brought her the news of the disaster of Sheriffmuir. Lauzun died on the 19th of November 1723. The duchy fell to his nephew, Armand de Gontaut, comte de Biron.

See the letters of Mme de Sevigne, the memoirs of Saint-Simon, who was Lauzun's wife's brother-in-law; also J. Lair, Nicolas Fouquet, vol. ii. (1890); Martin Hailes, Mary of Modena (1905), and M. F. Sandars, Lauzun, Courtier and Adventurer (1908).

LAVA, an Italian word (from Lat. lavare, to wash) applied to the liquid products of volcanic activity. Streams of rain- water, formed by condensation of exhaled steam often mingled with volcanic ashes so as to produce mud, are known as lava d'acqua, whilst the streams of molten matter are called lava di fuoco. The term lava is applied by

geologists to all matter of volcanic origin, which is, or has been, in a molten state. The magma, or molten lava in the interior of the earth, may be regarded as a mutual solution of various mineral silicates, charged with highly-heated vapour, sometimes to the extent of super-saturation. According to the proportion of silica, the lava is distinguished as ” acid ” or ” basic.” The basic lavas are

usually darker and denser than lavas of acid type, and when iHised they tend to flow to great distances, and may thus form far-spreading sheets, whilst the acid lavas, being more viscous, rapidly consolidate after extrusion. The lava is emitted from the volcanic vent at a high temperature, but on exposure to the air it rapidly consolidates superficially, forming a crust which in many cases is soon broken up by the continued flow of the subjacent liquid lava, so that the surface becomes rugged with clinkers. J. D. Dana introduced the term ” aa ” for this rough kind of lava-stream, whilst he applied the term ” pahoehoe ” to those flows which have a smooth surface, or are simply wrinkled and ropy; these terms being used in this sense in Hawaii, in relation to the local lavas. The different kinds of lava are more fully described in the article Volcano.

LAVABO (Lat. ” I will wash “; the Fr. equivalent is lavoir), in ecclesiastical usage, the term for the washing of the priests’ hands, at the celebration of the Mass, at the offertory. The words of Psalm xxvi. 6, Lavabo inter innocentes manus meas, are said during the rite. The word is also used for the basin employed in the ritual washing, and also for the lavatories, generally erected in the cloisters of monasteries. Those at Gloucester, Norwich and Lincoln are best known. A very curious example at Fontenay, surrounding a pillar, is given by Viollet-le-Duc. In general the lavabo is a sort of trough; in some places it has an almery for towels, &c.

LAVAGNA, a seaport of Liguria, Italy, in the province of Genoa, from which it is 25J m. S.E. by rail. Pop. (1901) 7005. It has a small shipbuilding trade, and exports great quantities of slate (lavagna, taking its name from the town). It also has a large cotton-mill. It was the seat of the Fieschi family, independent counts, who, at the end of the 12th century, were obliged to recognize the supremacy of Genoa. Sinibaldo Fieschi became Pope Innocent IV. (1243-1254), and Hadrian

V. (1276) was also a Fieschi.

LAVAL, ANDRES DE, SEIGNEUR DE LOHEAC (c. 1408-1485), French soldier. In 1423 he served in the French army against England, and in 1428 was taken prisoner by John Talbot, 1st earl of Shrewsbury, after the capitulation of Laval, which he was defending. After paying his ransom he was present with Joan of Arc at the siege of Orleans, at the battle of Patay, and at the coronation of Charles VII. He was made admiral of France in 1437 and marshal in 1439. He served Charles VII. faithfully in all his wars, even against the dauphin (1456), and when the latter became king as Louis XL, Laval was dismissed from the marshal's office. After the War of the Public Weal he was restored to favour, and recovered the marshal's baton, the king also granting him the offices of lieutenant-general to the government of Paris and governor of Picardy, and confer- ring upon him the collar of the order of St Michael. In 1472 Laval was successful in resisting the attacks of Charles the Bold, duke of Burgundy, on Beauvais.

LAVAL, a town of north-western France, capital of the department of Mayenne, on the Mayenne river, 188 m. W.S.W. of Paris by rail. Pop. (1906) 24,874. On the right bank of the river stands the old feudal city, with its ancient castle and its irregularly built houses whose slate roofs and pointed gables peep from the groves of trees which clothe the hill. On the left bank the regularly built new town extends far into the plain. The river, here 80 yds. broad, is crossed by the handsome railway viaduct, a beautiful stone bridge called Pont Neuf, and the Pont Vieux with three pointed arches, built in the 16th century. There is- communication by steamer as far as Angers. Laval may justly claim to be one of the loveliest of French towns. Its most curious and interesting monument is the sombre old castle of the counts (now a prison) with a donjon of the 12th century, the roof of which presents a fine example of the timber- work superseded afterwards by stone machicolation. The " new castle," dating partly from the Renaissance, serves as court-house. Laval possesses several churches of different periods: in that of the Trinity, which serves as the cathedral, the transept and nave are of the 12th century while the choir is of the 16th;

des Cordeliers, which dates from the end of the 14th century or the beginning of the 15th, has some fine marble altars. Half-a-mile below the Pont Vieux is the beautiful 12th- century church of Avenieres, with an ornamental spire of 1534. The finest remaining relic of the ancient fortifica- tions is the Beucheresse gate near the cathedral. The narrow streets around the castle are bordered by many old houses of the 15th and 16th century, chief among which is that known as the "

Maison du Grand Veneur.” There are an art-museum, a museum of natural history and archaeology and a library. The town is embellished by fine promenades, at the entrance of one of which, facing the mairie, stands the statue of the celebrated surgeon Ambroise Pare (151 7-1 590). Laval is the seat of a prefect, a bishopric created in 1855, and a court of assizes, and has tribunals of first instance and of commerce, a chamber of commerce, a board of trade-arbitrators, training colleges, an ecclesiastical seminary and a lycee for boys. The principal industry of the town is the cloth manufacture, intro- duced from Flanders in the 14th century. The production of fabrics of linen, of cotton or of mixtures of both, occupies some 10,000 hands in the town and suburbs. Among the numerous other industries are metal-founding, flour-milling, tanning, dyeing, the making of boots and shoes, and the sawing of the marble quarried in the vicinity. There is trade in grain.

Laval is not known to have existed before the 9th century. It was taken by John Talbot, earl of Shrewsbury, in 1428, changed hands several times during the wars of the League, and played an important part at the end of the 18th century in the war of La Vendee.

Seigneurs and Counts of Laval. The castle of Laval was founded at the beginning of the nth century by a lord of the name of Guy, and remained in the possession of his male descend- ants until the 13th century. In 1218 the lordship passed to the house of Montmorency by the marriage of Emma, daughter of Guy VI. of Laval, to Mathieu de Montmorency, the hero of the battle of Bouvines. Of this union was born Guy VII. seigneur of Laval, the ancestor of the second house of Laval. Anne of Laval (d. 1466), the heiress of the second family, married John de Montfort, who took the name of Guy (XIII.) of Laval. At Charles VII. ‘s coronation (1429) Guy XIV., who was after- wards son-in-law of John V., duke of Brittany, and father-in-law of King Rene of Anjou, was created count of Laval, and the countship remained in the possession of Guy’s male descendants until 1547. After the Montforts, the countship of Laval passed by inheritance to the families of Rieux and Sainte Maure, to the Colignys, and finally to the La Tremoilles, who held it until the Revolution.

See Bertrand de Broussillon, La Maison de Laval (3 vols., T895-

1900).

LA VALLIERE, LOUISE FRANgOISE DE (1644-1710), mistress of Louis XIV., was born at Tours on the 6th of August 1644, the daughter of an officer, Laurent de la Baume le Blanc, who took the name of La

Valliere from a small property near Amboise. Laurent de la Valliere died in 165 1; his widow, who soon married again, joined the court of Gaston d'Orleans at Blois. Louise was brought up with the younger princesses, the step-sisters of La Grande Mademoiselle. After Gaston's death his widow moved with her daughters to the palace of the Luxembourg in Paris, and with them went Louise, who was now a girl of sixteen. Through the influence of a distant kinswoman, Mine de Choisy, she was named maid of honour to Henrietta of England, who was about her own age and had just married Philip of Orleans, the king's brother. Henrietta joined the court at Fontainebleau, and was soon on the friendliest terms with her brother-in-law, so friendly indeed that there was some scandal, to avoid which it was determined that Louis should pay marked attentions elsewhere. The person selected was Madame's maid of honour, Louise. She had been only two months in Fontaine- bleau before she became the king's mistress. The affair, begun on Louis's part as a blind, immediately developed into real passion on both sides. It was Louis's first serious attachment,

St Venerand (15th century) has good stained glass; Notre-Dame I and Louise was an innocent, religious-minded girl, who brought

neither coquetry nor self-interest to their relation, which was sedulously concealed. Nicolas Fouquet's curiosity in the matter was one of the causes of his disgrace. In February 1662 there was a storm when Louise refused to tell her lover the relations between Madame (Henrietta) and the comte de Guiche. She fled to an obscure convent at Chaillot, where Louis rapidly followed her. Her enemies, chief of whom was Olympe Mancini, comtesse de Soissons, Mazarin's niece, sought her downfall by bringing her liaison to the ears of Queen Maria Theresa. She was presently removed from the service of Madame, and estab- lished in a small building in the Palais Royal, where in December 1663 she gave birth to a son Charles, who was given in charge to two faithful servants of Colbert. Concealment was practically abandoned after her return to court, and within a week of Anne of Austria's death in January 1666, La Valliere appeared at mass side by side with Maria Theresa. But her favour was already waning. She had given birth to a second child in January 1665, but both children were dead before the autumn of 1666. A daughter born at Vincennes in October 1666, who received the name of Marie Anne and was known as Mile de Blois, was publicly recognized by Louis as his daughter in letters-patent making the mother a duchess in May

1667 and conferring on her the estate of Vaujours. In October of that year she bore a son, but by this time her place in Louis's affections was definitely usurped by Athenais de Montespan {q.v.), who had long been plotting against her. She was compelled to remain at court as the king's official mistress, and even to share Mme de Montespan's apartments at the Tuileries. She made an attempt at escape in 1671, when she fled to the convent of Ste Marie de Chaillot, only to be compelled to return. In 1674 she was finally permitted to enter the Carmelite convent in the Rue d'Enfer. She took the final vows a year later, when Bossuet pronounced the allocution.

Her daughter married Armand de Bourbon, prince of Conti, in 1680. The count of Vermandois, her youngest born, died on his first campaign at Courtrai in 1683.

La Valli&re's Reflexions sur la misericorde de Dieu, written after her retreat, were printed by Lequeux in 1767, and in i860 US- flexions, lettres et sermons, by M. P. Clement (2 vols.). Some apocryphal Mimoires appeared in 1829, and the Lettres de Mme la duchesse de la Valliere (1767) are a corrupt version of her correspond- ence with the manfchal de Bellefonds. Of modern works on the subject see Arsene Houssaye, Mile de la Valliere et Mme de Monte- span (i860); Jules Lair, Louise de la Valliere (3rd ed., 1902, Eng. trans., 1908); and C. Bonnet, Documents inedits sur Mme de la Valliere (1904).

LAVATER, JOHANN KASPAR (1741-1801), German poet and physiognomist, was born at Ziirich on the 15th of November 1 74 1. He was educated at the gymnasium of his native town, where J. J. Bodmer and J. J. Breitinger were among his teachers. When barely one-and-twenty he greatly distinguished himself by denouncing, in conjunction with his friend, the painter H. Fuseli, an iniquitous magistrate, who was compelled to make restitution of his ill-gotten gains. In 1769 Lavater took orders, and officiated till his death as deacon or pastor in various churches in his native city. His oratorical fervour and genuine depth of conviction gave him great personal influence; he was exten- sively consulted as a casuist, and was welcomed with demon- strative enthusiasm in his numerous journeys through Germany. His mystical writings were also widely popular. Scarcely a trace of this influence has remained, and Lavater's name would be forgotten but for his work on physiognomy, Physiognomische Fragmente zur Beforderung der Menschenkenntnis und Menschen- liebe (1775-1778). The fame even of this book, which found enthusiastic admirers in France and England, as well as in Germany, rests to a great extent upon the handsome style of publi- cation and the accompanying illustrations. It left, however, the study of

physiognomy {q.v.), as desultory and unscientific as it found it. As a poet, Lavater published Christliche Lieder (1776- 1780) and two epics, Jesus Messias (1780) and Joseph von Arimaihia (1794), in the style of Klopstock. More important and characteristic of the religious temperament of Lavater's age are his introspective Aussichlen in die Ewigkeil (4 vols., 1 768-1 7 78); Geheimes Tagebuch von einem Beobachter seiner

selbst (2 vols., 1772-1773) and Pontius Pilalus, oder der Mensch in alien Gestalten (4 vols., 1782-1785). From 1774 on, Goethe was intimately acquainted with Lavater, but at a later period he became estranged from him, somewhat abruptly accusing him of superstition and hypocrisy. Lavater had a mystic's indifference to historical Christianity, and, although esteemed by himself and others a champion of orthodoxy, was in fact only an antagonist of rationalism. During the later years of his life his influence waned, and he incurred ridicule by some exhibitions of vanity. He redeemed himself by his patriotic conduct during the French occupation of Switzerland, which brought about his tragical death. On the taking of Zurich by the French in 1799, Lavater, while endeavouring to appease the soldiery, was shot through the body by an infuriated grenadier; he died after long sufferings borne with great fortitude, on the 2nd of January 1801. Lavater himself published two collections of his writings, Vermischte Schriften (2 vols., 1774-1781), and Kleinere prosaische Schriften (3 vols., 1784-1785). His Nachgelassene Schriften were edited by G. Gessner (5 vols., 1801-1802); Sdmtliche Werke (but only poems) (6 vols., 1836-1838); Ausgewdhlte Schriften (8 vols., 1841-1844). See G. Gessner, Lavaters Lebensbeschretbung (3 vols., 1802-1803); U. Hegner, Beitrdge zur Kenntnis Lavaters (1836); F. W. Bodemann, Lavater nach seinem Leben, Lehren und Wirken (1856; 2nd ed., 1877); F. Muncker, J. K. Lavater (1883); H. Waser, J. K. Lavater nach Hegners Aufzeichnungen (1894); J. K. Lavater, Denkschrift zum 100. Todestag (1902).

LAVAUR, a town of south-western France, capital of an arrondissement in the department of Tarn, 37 m. S.E. of Mont- auban by rail. Pop. (1906), town 4069; commune 6388. Lavaur stands on the left bank of the Agout, which is here crossed by a railway-bridge and a fine stone bridge of the late 18th century. From 1317 till the Revolution Lavaur was the seat of a bishopric, and there is a cathedral dating from the 13th, 14th and 15th centuries, with an octagonal bell-tower; a second smaller square tower contains a jaquemart (a statue which strikes the hours with a hammer) of the 16th century. In the bishop's garden is the statue of Emmanuel Augustin, marquis de Las Cases, one of the companions of Napoleon at St Helena. The town

carries on distilling and flour-milling and the manufacture of brushes, plaster and wooden shoes. There are a subprefecture and tribunal of .first instance. Lavaur was taken in 1211 by Simon de Montfort during the wars of the Albigenses, and several times during the religious wars of the 16th century.

LAVEDAN, HENRI LEON EMILE (1859-), French dramatist and man of letters, was born at Orleans, the son of Hubert Leon Lavedan, a well-known Catholic and liberal journalist. He contributed to various Parisian papers a series of witty tales and dialogues of Parisian life, many of which were collected in volume form. In 1891 he produced at the Theatre Francais Une Famille, followed at the Vaudeville in 1894 by Le Prince d'Aurec, a satire on the nobility, afterwards re-named Les Descendants. Later brilliant and witty pieces were Les Deux noblesses (1897), Catherine (1897), Le Nouveaujeu (1898), Le Vieux marcheur (1899), Le Marquis de Priola (1902), and Varennes (1904), written in collaboration with G. Lenotre. He had a great success with Le Duel (Comedie Francaise, 1905), a powerful psychological study of the relations of two brothers. Lavedan was admitted to the French Academy in

1898.

LAVELEYE, EMILE LOUIS VICTOR DE (1822-1892), Belgian economist, was born at Bruges on the 5th of April 1822, and educated there and at the College Stanislas in Paris, a celebrated establishment in the hands of the Oratorians. He continued his studies at the Catholic university of Louvain and afterwards at Ghent, where he came under the influence of Francois Huet, the philosopher and Christian Socialist. In 1844 he won a prize with an essay on the language and literature of Provence. In 1847 ne published L'Histoire des rois francs, and in 1861 a French version of the Nibelungen, but though he never lost his interest in literature and history, his most important work was in the domain of economics. He was one of a group of young lawyers, doctors and critics, all old pupils of Huet, who met once a week to discuss social and economic questions, and was thus led to

publish his views on these subjects. In 1859 some articles by hin in f he Revue des deux mondes laid the foundation of his reputation as an economist. In 1864 he was elected to the chair of political economy at

the state university of Liege. Here he wrote his most important works: La Russie et VAutriche depuis Sadoiva (187c), Essai sur les formes de gouvernement dans les societes r.iodemes (1872), Des Causes actuelles de guerre en Europe et de V arbitrage and De la propriete et de ses formes primitives (1874) , dedicated to the memory of John Stuart Mill and Francois Huet. He died at Doyon, near Liege, on the 3rd of January 1892. Laveleye's name is particularly connected with bi-metallism and primitive property, and he took a special interest in the revival and preservation of small nationalities. But his activity included the whole realm of political science, political economy, monetary questions, international law, foreign and Belgian politics, questions of education, religion and morality, travel and literature. He had the art of popularizing even the most technical subjects, owing to the clearness of his view and his firm grasp of the matter in hand. He was especially attracted to England, where he thought he saw many of his ideals of social, political and religious progress realized. He was a frequent contributor to the English newspapers and leading reviews. The most widely circulated of his works was a pamphlet on Le Parti clerical en Belgique, of which 2,000,000 copies were circulated in ten languages.

LAVENDER, botanically Lavandula, a genus of the natural order Labiatae distinguished by an ovate tubular calyx, a two- lipped corolla, of which the upper lip has two and the lower three lobes, and four stamens bent downwards.

The plant to which the name of lavender is commonly applied, Lavandula vera, is a native of the mountainous districts of the countries bordering on the western half of the Mediterranean, extending from the eastern coast of Spain to Calabria and northern Africa, growing in some places at a height of 4500 ft. above the sea-level, and preferring stony declivities in open sunny situations. It is cultivated in the open air as far north as Norway and Livonia. Lavender forms an evergreen under- shrub about 2 ft. high, with greyish-green hoary linear leaves, rolled under at the edges when young;, the branches are erect and give a bushy appearance to the plant. The flowers are borne on a terminal spike at the summit of a long naked stalk, the spike being composed of 6-10 dense clusters in the axils of small, brownish, rhomboidal, tapering, opposite bracts, the clusters being more widely separated towards the base of the spike. The calyx is tubular, contracted towards the mouth, marked with 13 ribs and 5-toothed, the posterior tooth being the largest. The corolla is of a pale violet colour, but darker on its inner surface, tubular, two-lipped, the upper lip with two and the lower with three lobes. Both corolla and calyx are covered with stellate hairs, amongst which are

imbedded shining oil glands to which the fragrance of the plant is due. The leaves and flowers of lavender are said to have been used by the ancients to perfume their baths; hence the Med. Lat. name Lavandula or Lavendula is supposed to have been derived from lavare, to wash. This derivation is considered doubtful and a connexion has been suggested with Lat. livere, to be of a bluish, pale or livid colour.

Although L. Stoechas was well known to the ancients, no allusion unquestionably referring to L. vera has been found in the writings of classical authors, the earliest mention of the latter plant being in the 12th century by the abbess Hildegard, who lived near Bingcn on the Rhine. Under the name of llafant or llafantly it was known to the Welsh physicians as a medicine in the 13th century. The dried flowers have long been used in England, the United States and other countries for perfuming linen, and the characteristic cry of “Lavender! sweet lavender!” was still to be heard in London streets at the beginning of the 20th century. In England lavender is cultivated chiefly for the distillation ot its essential oil, of which it yields on an average 15% when freed from the stalks, but in the south of Europe the flowers form an object of trade, being exported to the Barbary states, Turkey and America.

In Great Britain lavender is grown in the parishes of Mitcham, Carshalton and Beddington in Surrey, and in Hertfordshire in the parish of Hitchin. The most suitable soil seems to be a sandy loam with a calcareous substratum, and the most favourable position a sunny slope in localities elevated above the level of fogs, where the plant is not in danger of early frost and is freely exposed to air and light. At Hitchin lavender is said to have been grown as early as 1568, but as a commercial speculation its cultivation dates back only to 1823. The plants at present in cultivation do not produce seed, and the propagation is always made by slips or by dividing the roots. The latter plan has only been followed since i860, when a large number of lavender plants were killed by a severe frost. Since that date the plants have been subject to the attack of a fungus, in consequence of which the price of the oil has been considerably enhanced.

The flowers are collected in the beginning of August, and taken direct to the still. The yield of oil depends in great measure upon the weather. After a wet and dull June and July the yield is some- times only half as much as when the weather has been bright and sunshiny. From 12 to 30 lb of oil per acre is the average amount obtained. The oil contained in the stem has a more rank odour and is less volatile than that of the flowers; consequently the portion that distils over after the first hour and a half is collected separately.

The finest oil is obtained by the distillation of the flowers, without the stalks, but the labour spent upon this adds about 10s. per ft) to the expense of

the oil, and the

same end is prac- tically attained by

fractional distilla- tion. The oil mel- lows by keeping

three years, after

which it deterior- ates unless mixed

with alcohol ; it

is also improved

by redistillation.

Oil of lavender is

distilled from the

wild plants in

Piedmont and the

South of France,

especially in the

villages about

Mont Ventoux

near Avignon, and

in those some

leagues west of

Montpellier. The

best French oil

realizes scarcely

one-sixth, of the

price of the English

oil. Cheaper var- ieties are made by distilling the entire plant.

Oil of lavender is a mobile liquid having a specific gravity from 0-85 to 0-89. Its chief constituents are linalool acetate, which also occurs in oil of berga- mot, and linalool, C10H17OH, an al- cohol derived by oxidation from myrcene, C10H16, which is one of the terpenes. The dose is 5-3 minims. The British pharmacopeia contains a spiritus lavan- dulae, dose 5-20 minims: and a compound tincture, dose |-l drachm. This is contained in liquor arsenicalis, and its character- istic odour may thus be of great practical importance, medico-legally and otherwise. The pharmacology of oil of lavender is simply that of an exceptionally pleasant and mild volatile oil. It is largely used as a carminative and as a colouring and flavouring agent. _ Its adulteration with alcohol may be detected by chloride of calcium dissolving in it and forming a separate layer of liquid at the bottom of the vessel. Glycerine acts in the same way. If it contain turpen- tine it will not dissolve in three volumes of alcohol, in which quantity the pure oil is perfectly soluble.

Lavender flowers were formerly considered good for ” all dis- orders of the head and nerves”; a spirit prepared with them was known under the name of palsy drops.

Lavender water consists of a solution of the volatile oil in spirit

Lavender {Lavandula vera).

1. Flower, side view.

2. Flower, front view.

3. Calyx opened and spread flat.

4. Corolla opened and spread flat.

5. Pistil.

of wine with the addition of the essences of musk, rose, bergamot and ambergris, but is very rarely prepared by distillation of the flowers

with spirit.

In the climate of New York lavender is scarcely hardy, but in the vicinity of Philadelphia considerable quantities are grown for the market. In American gardens sweet basil (Ocitnum basilicum) is frequently called lavender.

Lavandula Spica, a species which differs from L. vera chiefly in its smaller size, more crowded leaves and linear bracts, is also used for the distillation of an essential oil, which is known in England as oil of spike and in France under the name of essence d'aspic. It is used in painting on porcelain and in veterinary medicine. The oil as met with in commerce is less fragrant than that of L. vera — probably because the whole plant is distilled, for the flowers of the two species are scarcely distinguishable in fragrance. L. Spica does not extend so far north, nor ascend the mountains beyond 2000 ft. It cannot be cultivated in Britain except in sheltered situations. A nearly allied species, L. lanata, a native of Spain, with broader leaves, is also very fragrant, but does not appear to be distilled for oil.

Lavandula Stoechas, a species extending from the Canaries to Asia Minor, is distinguished from the above plants by its blackish purple flowers, and shortly stalked spikes crowned by conspicuous purplish sterile bracts. The flowers were official in the London pharmacopoeia as late as 1746. They are still used by the Arabs as an expectorant and antispasmodic. The Stoechades (now called the isles of Hyeres near Toulon) owed their name to the abundance of the plant growing there.

Other species of lavender are known, some of which extend as far east as to India. A few which differ from the above in having divided leaves, as L. dentata, L. abrotanoides, L. mullifolia, L. pinnata and L. viridis, have been cultivated in greenhouses, &c, in England.

Sea lavender is a name applied in England to several species of Statice, a genus of littoral plants belonging to the order Plumba gineae. Lavender cotton is a species of the genus Santolina, small, yellow-flowered, evergreen undershrubs of the Composite order.

LAVERDY, CLEMENT CHARLES FRANQOIS DE (1723-1793), French statesman, was a member of the parlement of Paris when the case against the Jesuits came before that body in August 1 761. He demanded the suppression of the order and thus acquired popularity. Louis XV. named him controller- general of the finances in December 1763, but the burden was great and Laverdy knew nothing of finance. Three months after his nomination he forbade anything of any kind

whatever to be printed concerning his administration, thus refusing advice as well as censure. He used all sorts of expedients, sometimes dishonest, to replenish the treasury, and was even accused of having himself profited from the commerce in wheat. A court intrigue led to his sudden dismissal on the 1st of October 1768. Henceforward he lived in retirement until, during the Revolution, he was involved in the charges against the financiers of the old regime. The Revolutionary tribunal condemned him to death, and he was guillotined on the 24th of November

1793-

See A. Jobez, La France sous Louis X V (1869). ‘

LAVERNA, an old Italian divinity, originally one of the spirits of the underworld. A cup found in an Etruscan tomb bears the inscription ” Lavernai Pocolom,” and in a fragment of Septimius Serenus Laverna is expressly mentioned in con- nexion with the di inferi. By an easy transition, she came to be regarded as the protectress of thieves, whose operations were associated with darkness. She had an altar on the Aventine hill, near the gate called after her Lavernalis, and a grove on the Via Salaria. Her aid was invoked by thieves to enable them to carry out their plans successfully without forfeiting their reputation for piety and honesty (Horace, Ep.‘i. 16, 60). Many explanations have been given of the name : (1) from latere (Schol. on Horace, who gives laternio as another form of lavernio or robber); (2) from lavare (Acron on Horace, according to whom thieves were called lavatores, perhaps referring to bath thieves); (3) from levare (cf. shop-lifters). Modern etymologists connect it with lu-crum, and explain it as meaning the goddess of gain.

LAVERY, JOHN (1857-), British painter, was born in Belfast, and received his art training in Glasgow, London and Paris. He was elected associate of the Royal Scottish Academy in 1892 and academician in 1896, having won a considerable reputation as a painter of portraits and figure subjects, and as

a facile and vigorous executant. He became also vice-president of the International Society of sculptors, painters and gravers. Many of his paintings have been acquired for public collections, and he is represented in the National Galleries at Brussels, Berlin and Edinburgh, in the Carnegie Institute at Pittsburg, the Philadelphia Gallery, the New South Wales Gallery, the Modern Gallery, Venice, the Pinakothek, Munich, the Glasgow Corporation Gallery, and the Luxembourg.

LAVIGERIE, CHARLES MARTIAL ALLEMAND (1825- 1892), French divine, cardinal archbishop of Carthage and Algiers and primate of Africa, was born at Bayonne on the 31st of October 1825, and was educated at St Sulpice, Paris. He was ordained priest in 1849, and was professor of ecclesiastical history at the Sorbonne from 1854 to 1856. In 1856 he accepted the direction of the schools of the East, and was thus for the first time brought into contact with the Mahommedan world. ” C’est la,” he wrote, ” que j’ai connu enfin ma vocation.” Activity in missionary work, especially in alleviating the dis- tresses of the victims of the Druses, soon brought him prominently into notice; he was made a chevalier of the Legion of Honour, and in October 1861, shortly after his return to Europe, was appointed French auditor at Rome. Two years later he was raised to the see of Nancy, where he remained for four years, during which the diocese became one of the best administered in France. While bishop of Nancy he met Marshal MacMahon, then governor-general of Algeria, who in 1866 offered him the see of Algiers, just raised to an archbishopric. Lavigerie landed in Africa on the nth of May 1868, when the great famine was already making itself felt, and he began in November to collect the orphans into villages. This action, however, did not meet with the approval of MacMahon, who feared that the Arabs would resent it as an infraction of the religious peace, and thought that the Mahommedan church, being a state institution in Algeria, ought to be protected from proselytism; so it was intimated to the prelate that his sole duty was to minister to the colonists. Lavigerie, however, continued his self-imposed task, refused the archbishopric of Lyons, which was offered to him by the emperor, and won his point. Contact with the natives during the famine caused Lavigerie to entertain exaggerated hopes for their general conversion, and his enthusiasm was such that he offered to resign his archbishopric in order to devote himself entirely to the missions. Pius IX. refused this, but granted him a coadjutor, and placed the whole of equatorial Africa under his charge. In 1870 Lavigerie warmly supported papal infalli- bility. In 1871 he was twice a candidate for the National Assembly, but was defeated. In 1874 he founded the Sahara and Sudan mission, and sent missionaries to Tunis, Tripoli, East Africa and the Congo. The order of African missionaries thus founded, for which Lavigerie himself drew up the rule, has since become famous as the Peres Blancs. From 1881 to 1884 his activity in Tunisia so raised the prestige of France that it drew from Gambetta the celebrated declaration, L’Anti- clericalisme n’est pas nn article d’ exportation, and led to the exemption of Algeria from the application of the decrees concern- ing the religious orders. On the 27th of March 1882 the dignity of cardinal was conferred upon Lavigerie, but the great object of his ambition was to restore the see of

St Cyprian; and in that also he was successful, for by a bull of 10th November 1884 the metropolitan see of Carthage was re-erected, and Lavigerie received the pallium on the 25th of January 1885. The later years of his life were spent in ardent anti-slavery propaganda, and his eloquence moved large audiences in London, as well as in Paris, Brussels and other parts of the continent. He hoped, by organizing a fraternity of armed laymen as pioneers, to restore fertility to the Sahara; but this community did not succeed, and was dissolved before his death. In 1890 Lavigerie appeared in the new character of a politician, and arranged with Pope Leo XIII. to make an attempt to reconcile the church with the republic. He invited the officers of the Mediterranean squadron to lunch at Algiers, and, practically renouncing his monarchical sympathies, to which he clung as long as the comte de Chambord was alive, expressed his support of the republic.

and emphasized it by having the Marseillaise played by a band of his Peres Blancs. The further steps in this evolution emanated from the pope, and Lavigerie, whose health now began to fail, receded comparatively into the background. He died at Algiers on the 26th of November 1892. (G. F. B.)

LA VILLEMARQUE, THEODORE CLAUDE HENRI, Vicomte Hersart de (1815-1895), French philologist and man of letters, was born at Keransker, near Quimperle, on the 6th of July 181 5. He was descended from an old Breton family, which counted among its members a Hersart who had followed Saint Louis to the Crusade, and another who was a companion in arms of Du Guesclin. La Villemarque devoted himself to the elucidation of the monuments of Breton literature. Intro- duced in 1 85 1 by Jacob Grimm as correspondent to the Academy of Berlin, he became in 1858 a member of the Academy of Inscriptions. His works include: Contes populaires des anciens Bretons (1842), to which was prefixed an essay on the origin of the romances of the Round Table; Essai sur I'histoire de la langue bretonne (1837); Poemes des bardes bretons du sixieme siicle (1850); La Legende celtique en Irelande, en Cambrie et en Bretagne (1859). The popular Breton songs published by him in 1839 as Barzaz Breiz were considerably retouched. La Villemarque's work has been superseded by the work of later scholars, but he has the merit of having done much to arouse popular interest in his subject. He died at Keransker on the 8th of December 1895.

On the subject of the doubtful authenticity of Barzaz Breiz, see Luzel's Preface to his Chansons populaires de la Basse-Bretagne, and, for a list of works on the subject, the Revue Celtique (vol. v.).

LAVINIUM, an ancient town of Latium, on the so-called Via Lavinatis (see Laurentina, Via), 19 m. S. of Rome, the modern Pratica, situated 300 ft. above sea-level and 2\ m. N.E. from the sea-coast. Its foundation is attributed to Aeneas (whereas Laurentum was the primitive city of King Latinus), who named it after his wife Lavinia. It is rarely mentioned in Roman history and often confused with Lanuvium or Lanivium in the text both of authors and of inscriptions. The custom by which the consuls and praetors or dictators sacrificed on the Alban Mount and at Lavinium to the Penates and to Vesta, before they entered upcr. office or departed for their province, seems to have been one of great antiquity. There is no trace of its having continued into imperial times, but the cults of Lavinium were kept up, largely by the imperial appointment of honorary non-resident citizens to hold the priesthoods. The citizens of Lavinium were known under the empire as Laurentes Lavinates, and the place itself at a late period as Laurolavinium. It was deserted or forgotten not long after the time of Theodosius.

Lavinium was preceded by a more ancient town, Laurentum, the city of Latinus (Verg. Aen. viii.); of this the site is un- certain, but it is probably to besought at the modern TorPaterno, close to the sea-coast and 5 m. N. by W. of Lavinium. Here the name of Laurentum is preserved by the modern name Pantan di Lauro. Even in ancient times it was famous for its groves of bay-trees (lanrus) from which its name was perhaps derived, and which in imperial times gave the villas of its territory a name for salubrity, so that both Vitellius and Commodus resorted there. The exact date of the abandonment of the town itself and the incorporation of its territory with that of Lavinium is uncertain, but it may be placed in the latter part of the republic. Under the empire a portion of it must have been imperial domain and forest. We hear of an imperial, procurator in charge of the elephants at Laurentum; and the imperial villa may perhaps be identified with the extensive ruins at Tor Paterno itself. The remains of numerous other villas lie along the ancient coast-line (which was half a mile inland of the modern, being now marked by a row of sand-hills, and was followed by the Via Severiana), both north-west and south-east of Tor Paterno: they extended as a fact in an almost unbroken line along the low sandy coast — now entirely deserted and largely occupied by the low scrub which serves as cover for the wild boars of the king of Italy's preserves — from the mouth of the Tiber to Antium, and thence again to Astura; but there are no traces of any

buildings previous to the imperial period. In one of these villas, excavated by the king of Italy in 1906, was found a fine replica of the famous discobolus of Myron. The plan of the build- ing is interesting, as it diverges entirely from the normal type and adapts itself to the site. Some way to the N. W. was situated the village of Vicus Augustanus Laurentium, taking its name probably from Augustus himself, and probably identical with the village mentioned by Pliny the younger as separated by only one villa from his own. This village was brought to light by excavation in 1874, and its forum and curia are still visible. . The remains of the villa of Pliny, too, were excavated in 17 13 and in 1802-1819, and it is noteworthy that the place bears the name Villa di Pino (sic) on the staff map; how old the name is, is uncertain. It is impossible without further excavation to reconcile the remains — mainly of substructions — with the elaborate description of his villa given by Pliny (cf . H. Winnef eld in Jahrbuch des Instituts, 1891, 200 seq.).

The site of the ancient Lavinium, no less than 300 ft. above sea-level and 25 m. inland, is far healthier than the low-lying Laurentum, where, except in the immediate vicinity of the coast, malaria must have been a dreadful scourge. It possesses con- siderable natural strength, and consists of a small hill, the original acropolis, occupied by the modern castle and the village surrounding it, and a larger one, now given over to cultivation, where the city stood. On the former there are now no traces of antiquity, but on the latter are scanty remains of the city walls, in small blocks of the grey-green tufa (cappellaccio) which is used in the earliest buildings of Rome, and traces of the streets. The necropolis, too, has been discovered, but not sys- tematically excavated; but objects of the first Iron age, includ- ing a sword of Aegean type (thus confirming the tradition), have been found; also remains of a building with Doric columns of an archaistic type, remains of later buildings in brick, and inscriptions, some of them of considerable interest.

See R. Lanciani in Monumenti dei Lincei, xiii. (1903), 133 seq.; xvi. (1906), 241 seq. (T. As.)

LAVISSE, ERNEST (1842-), French historian, was born at Nouvion-en-Thierache, Aisne, on the 17th of December 1842. In 1865 he obtained a fellowship in history, and in 1875 became a doctor of letters; he was appointed maitre de conference (1876) at the ecole normale superieure, succeeding Fustel de Coulanges, and then professor of modern history at the Sorbonne (1888), in the place of Henri Wallon. He was an eloquent professor and very fond of young people, and played an important part in the revival of higher studies in France

after 1871. His know- ledge of pedagogy was displayed in his public lectures and his addresses, in his private lessons, where he taught a small number of pupils the. historical method, and in his books, where he wrote ad probandum at least as much as ad narrandum: class-books, collections of articles, intermingled with personal reminiscences (Questions d'enseignement national, 1885; Etudes et etudiants, 1890; A propos de nos ecoles, 1895), rough historical sketches (Vue generate de V histoire politique de V Europe, 1890), &c. Even his works of learning, written without a trace of pedantry, are remarkable for their lucidity and vividness.

After the Franco-Prussian War Lavisse studied the develop- ment of Prussia and wrote £tude sur I'une des origines de la monarchic prussienne, ou la Marche de Brandebourg sous la dynastie ascanienne, which was his thesis for his doctor's degree in 1875, and Etudes sur I'histoire de la Prusse (1879). In con- nexion with his study of the Holy Roman Empire, and the cause of its decline, he wrote a number of articles which were published in the Revue des Deux Mondes; and he wrote Trois empereurs d' Allemagne (1888), La Jeunesse du grand Frideric (1891) and Frederic II. avant son avenement (1893) when studying the modern German empire and the grounds for its strength. With his friend Alfred Rambaud he conceived the plan of L'Hisloire genSrale du IV siecle jusqu'd nos jours, to which, however, he contributed nothing. He edited the Histoire de France depuis les origines jusqu'd la Revolution (1901-), in which he care- fully revised the work of his numerous assistants, reserving the greatest part of the reign of Louis XIV. for himself. This

section occupies the whole of volume vii. It is a remarkable piece of work, and the sketch of absolute government in France during this period has never before been traced with an equal amount of insight and brilliance. Lavisse was admitted to the Academie Francaise on the death of Admiral Jurien de la Graviere in 1892, and after the death of James Darmesteter became editor of the Revue de Paris. He is, however, chiefly a master of pedagogy. When the ecole normale was joined to the university of Paris, Lavisse was appointed director of the new organization, which he had helped more than any one to bring about.

LAVOISIER, ANTOINE LAURENT (1 743-1 794), French chemist, was born in Paris on the 26th of August 1743. His father, an avocat an

parlement, gave him an excellent education at the college Mazarin, and encouraged his taste for natural science; and he studied mathematics and astronomy with N. L. de Lacaille, chemistry with the elder Rouelle and botany with Bernard de Jussieu. In 1766 he received a gold medal from the Academy of Sciences for an essay on the best means of lighting a large town; and among his early work were papers on the analysis of gypsum, on thunder, on the aurora and on conge- lation, and a refutation of the prevalent belief that water by repeated distillation is converted into earth. He also assisted J. E. Guettard (1715-1786) in preparing his mineralogical atlas of France. In 1768, recognized as a man who had both the ability and the means for a scientific career, he was nominated adjoint chimiste to the Academy, and in that capacity made numerous reports on the most diverse subjects, from the theory of colours to water-supply and from invalid chairs to mesmerism and the divining rod. The same year he obtained the position of adjoint to Baudon, one of the farmers-general of the revenue, subsequently becoming a full titular member of the body. This was the first of a series of posts in which his administrative abilities found full scope. Appointed regisseur des poudres in 1775, he not only abolished the vexatious search for saltpetre in the cellars of private houses, but increased the production of the salt and improved the manufacture of gunpowder. In 1785 he was nominated to the committee on agriculture, and as its secretary drew up reports and instructions on the cultivation of various crops, and promulgated schemes for the establishment of experimental agricultural stations, the distribution of agri- cultural implements and the adjustment of rights of pasturage. Seven years before he had started a model farm at Frechine, where he demonstrated the advantages of scientific methods of cultivation and of the introduction of good breeds of cattle and sheep. Chosen a member of the provincial assembly of Orleans in 1787, he busied himself with plans for the improvement of the social and economic conditions of the community by means of savings banks, insurance societies, canals, workhouses, &c.; and he showed the sincerity of his philanthropical work by advancing money out of' his own pocket, without interest, to the towns of Blois and Romorantin, for the purchase of barley during the famine of 1788. Attached in this same year to the caisse d'escomp/e, he presented the report of its operations to the national assembly in 1789, and as commissary of the treasury in 1 791 he established a system of accounts of unexampled punctuality. He was also asked by the national assembly to draw up a new scheme of taxation in connexion with which he produced a report De la richesse territoriale de la France, and he was further associated with committees on hygiene, coinage, the casting of cannon, &c, and was secretary and treasurer of

the commission appointed in 1790 to secure uniformity of weights and measures.

In 1 79 1, when Lavoisier was in the middle of all this official activity, the suppression of the farmers-general marked the beginning of troubles which brought about his death. His membership of that body was alone sufficient to make him an object of suspicion; his administration at the regie des poudres was attacked; and Marat accused him in the Ami du Peuple of putting Paris in prison and of stopping the circulation of air in the city by the mur d' octroi erected at his suggestion in 1787. The Academy, of which as treasurer at the time he was a con-

spicuous member, was regarded by the convention with no friendly eyes as being tainted with " incivism," and in the spring of 1792 A. F. Fourcroy endeavoured to persuade it to purge itself of suspected members. The attempt was unsuccess- ful, but in August of the same year Lavoisier had to leave his house and laboratory at the Arsenal, and in November the Academy was forbidden until further orders to fill up the vacancies in its numbers. Next year, on the 1st of August, the convention passed a decree for the uniformity of weights and measures, and requested the Academy to take measures for carrying it out, but a week later Fourcroy persuaded the same convention to suppress the Academy together with other literary societies patentees et dotees by the nation. In November it ordered the arrest of the ex-farmers-general, and on the advice of the com- mittee of public instruction, of which Guyton de Morveau and Fourcroy were members, the names of Lavoisier and others were struck off from the commission of weights and measures. The fate of the ex-farmers-general was sealed on the 2nd of May 1794, when, on the proposal of Antoine Dupin, one of their former officials, the convention sent them for trial by the Re- volutionary tribunal. Within a week Lavoisier and 27 others were condemned to death. A petition in his favour addressed to Coffinhal, the president of the tribunal, is said to have been met with the reply La Republique n'a pas besoin de savants, and on the 8th of the month Lavoisier and his companions were guillotined at the Place de la Revolution. He died fourth, and was preceded by his colleague Jacques Paulze, whose daughter he had married in i77r. " // ne leur afallu," Lagrange remarked, " qu'un moment pour /aire tomber cette tite y et cent annees peut-etre ne suffiront pas pour en reproduire une semblable."

Lavoisier's name is indissolubly associated with the overthrow of the phlogistic doctrine that had dominated the development of chemistry for over a century, and with the establishment of the foundations

upon which the modern science reposes. “He discovered,” says Justus von Liebig {Letters on Chemistry, No. 3), ” no new body, no new property, no natural phenomenon previously unknown ; but all the facts established by him were the necessary consequences of the labours of those who preceded him. His merit, his immortal glory, consists in this — that he infused into the body of the science a new spirit; but all the members of that body were already in existence, and rightly joined together.” Realizing that the total weight of all the products of a chemical reaction must be exactly equal to the total weight of the reacting substances, he made the balance the ultima ratio of the laboratory, and he was able to draw correct inferences from his weighings because, unlike many of the phlogistonists, he looked upon heat as imponderable. It was by weighing that in 1770 he proved that water is not converted into earth by distillation, for he showed that the total weight of a sealed glass vessel and the water it contained remained constant, however long the water was boiled, but that the glass vessel lost weight to an extent equal to the weight of earth produced, his inference being that the earth came from the glass, not from the water. On the 1st of November 1772 he deposited with the Academy a sealed note which stated that sulphur and phosphorus when burnt increased in weight because they absorbed ” air,” while the metallic lead formed from litharge by reduction with charcoal weighed less than the original litharge because it had lost ” air.” The exact nature of the airs concerned in the processes he did not explain until after the preparation of ” dephlogisticated air ” (oxygen) by Priestley in 1774. Then, perceiving that in combustion and the calcination of metals only a portion of a given volume of common air was used up, he concluded that Priestley’s new air, air eminemment pur, was what was absorbed by burning phosphorus, &c, “non-vital air,” azote, or nitrogen remaining behind. The gas given off in the reduction of metallic calces by charcoal he at first supposed to be merely that contained in the calx, but he soon came to under- stand that it was a product formed by the union of the charcoal with the ” dephlogisticated air ” in the calx. In a memoir presented to the Academy in 1777, but not published till 1782,

he assigned to dephlogisticated air the name oxygen, or ” acid-producer,” on the supposition that all acids w«re formed by its union with a simple, usually non-metallic, body; and having verified this notion for phosphorus, sulphur, charcoal, &c, and even extended it to the vegetable acids, he naturally asked himself what was formed by

the combustion of ” inflammable air ” (hydrogen). This problem he had attacked in 1774, and in subsequent years he made various attempts to discover the acid which, under the influence of his oxygen theory, he expected would be formed. It was not till the 25th of June 1783 that in conjunction with Laplace he announced to the Academy that water was the product formed by the combination of hydrogen and oxygen, but by that time he had been anticipated by Cavendish, to whose prior work, however, as to that of several other investigators in other matters, it is to be regretted that he did not render due acknowledgment. But a knowledge of the composition of water enabled him to storm the last defences of the phlogistonists. Hydrogen they held to be the phlogiston of metals, and they supported this view by pointing out that it was liberated when metals were dissolved in acids. Considerations of weight had long prevented Lavoisier from accepting this doctrine, but he was now able to explain the process fully, showing that the hydrogen evolved did not come from the metal itself, but was one product of the decomposition of the water of the dilute acid, the other product, oxygen, combining with the metal to form an oxide which in turn united with the acid. A little later this same knowledge led him to the beginnings of quantitative organic analysis. Knowing that the water produced by the combustion of alcohol was not pre-existent in that sub- stance but was formed by the combination of its hydrogen with the oxygen of the air, he burnt alcohol and other combustible organic substances, such as wax and oil, in a known volume of oxygen, and, from the weight of the water and carbon dioxide produced and his knowledge of their composition, was able to calculate the amounts of carbon, hydrogen and oxygen present in the substance.

Up to about this time Lavoisier’s work, mainly quantitative in character, had appealed most strongly to physicists, but it now began to win conviction from chemists also. C. L. Berthollet, L. B. Guy ton de Morveau and A. F. Fourcroy, his collaborators in the reformed system of chemical terminology set forth in 1787 in the Methode de momenclature chimique, were among the earliest French converts, and they were followed by M. H. Klaproth and the German Academy, and by most English chemists except Cavendish, who rather suspended his judgment, and Priestley, who stubbornly clung to the opposite view. Indeed, though the partisans of phlogiston did not surrender without a struggle, the history of science scarcely presents a second instance of a change so fundamental accomplished with such ease. The spread of Lavoisier’s doctrines was greatly facilitated by the defined and logical form in which he presented them in his Traite elementaire de chimie (presente dans un ordre nouveau et d’apres les

decouvertes modernes) (1789). The list of simple substances contained in the first volume of this work includes light and caloric with oxygen, azote and hydrogen. Under the head of ” oxidable or acidifiable ” substances, the combination of which with oxygen yielded acids, were placed sulphur, phos- phorus, carbon, and the muriatic, fluoric and boracic radicles. The metals, which by combination with oxygen became oxides, were antimony, silver, arsenic, bismuth, cobalt, copper, tin, iron, manganese, mercury, molybdenum, nickel, gold, platinum, lead, tungsten and zinc; and the ” simple earthy salifiable sub- stances ” were lime, baryta, magnesia, alumina and silica. The simple nature of the alkalies Lavoisier considered so doubtful that he did not class them as elements, which he conceived as substances which could not be further decomposed by any known process of analysis — les molecules simples et indivisibles qui composent les corps. The union of any two of the elements gave rise to binary compounds, such as oxides, acids, sulphides, &c. A substance containing three elements was a binary com- pound of the second order; thus salts, the most important compounds of this class, were formed by the union of acids and

oxides, iron sulphate, for instance, being a compound of iron oxide with sulphuric acid.

In addition to his purely chemical work, Lavoisier, mostly in conjunction with Laplace, devoted considerable attention to physical problems, especially those connected with heat. The two carried out some of the earliest thermochemical investiga- tions, devised apparatus for measuring linear and cubical expansions, and employed a modification of Joseph Black’s ice calorimeter in a series of determinations of specific heats. Regarding heat (matiere de feu or jluide igne) as a peculiar kind of imponderable matter, Lavoisier held that the three states of aggregation — solid, liquid and gas — were modes of matter, each depending on the amount of matiere de feu with which the pon- derable substances concerned were interpenetrated and com- bined; and this view enabled him correctly to anticipate that gases would be reduced to liquids and solids by the influence of cold and pressure. He also worked at fermentation, respiration and animal heat, looking upon the processes concerned as essentially chemical in nature. A paper discovered many years after his death showed that he had anticipated later thinkers in explaining the cyclical process of animal and vegetable life, for he pointed out that plants derive their food from the air, from water, and in general from the mineral kingdom, and animals in turn feed on plants or on other animals fed by plants, while the materials thus taken up by plants and animals are restored to the mineral kingdom by the

breaking-down processes of fermentation, putrefaction and combustion.

A complete edition of the writings of Lavoisier, CEuvres de Lavoisier, publiees par les soins du ministre de V instruction publique, was issued at Paris in six volumes from 1864-1893. This publication comprises his Opuscules physiques et chimiques (1774), many memoirs from the Academy volumes, and numerous letters, notes and reports relating to the various matters on which he was engaged. At the time of his death he was preparing an edition of his collected works, and the portions ready for the press were published in two volumes as Memoires de chimie in 1805 by his widow (in that year married to Count Rumford), -who had drawn and engraved the plates in his Traite elementaire de chimie (1789).

See E. Grimaux, Lavoisier 1743-1794, d'apres sa correspondance, ses manuscripts, &c. (1888), which gives a list of his works; P. E. M. Berthelot, La Revolution chimique: Lavoisier (1890), which contains an analysis of and extracts from his laboratory notebooks.

LA VOISIN. Catherine Monvoisin, known as "La Voisin " (d. 1680), French sorceress, whose maiden name was Catherine Deshayes, was one of the chief personages in the famous affaire des poisons, which disgraced the reign of Louis XIV. Her husband, Monvoisin, was an unsuccessful jeweller, and she practised chiromancy and face-reading to retrieve their fortunes. She gradually added the practice of witchcraft, in which she had the help of a renegade priest, Etienne Guibourg, whose part was the celebration of the " black mass," an abominable parody in which the host was compounded of the blood of a little child mixed with horrible ingredients. She practised medicine, especially midwifery, procured abortion and provided love powders and poisons. Her chief accomplice was one of her lovers, the magician Lesage, whose real name w : as Adam Cceuret. The great ladies of Paris flocked to La Voisin, who accumulated enormous wealth. Among her clients were Olympe Mancini, comtesse de Soissons, who sought the death of the king's mistress, Louise de la Valliere; Mme de Montespan, Mme de Gramont (la belle Hamilton) and others. The bones of toads, the teeth of moles, xantharides, iron filings, human blood and human dust were among the ingredients of the love powders concocted by La Voisin. Her knowledge of poisons was not apparently so thorough as that of less well-known sorcerers, or it would be difficult to account for La Valliere's immunity. The art of poisoning had become a regular science. The death of Henrietta, duchess of Orleans, was attributed, falsely it is true, to poison, and the crimes of Marie Madeleine de Brinvilliers (executed in 1676) and her

accomplices were still fresh in the public mind. In April 1679 a commission appointed to inquire into the subject and to prosecute the offenders met for the first time. Its pro- ceedings, including some suppressed in the official records, are preserved in the notes of one of the official rapporteurs, Gabriel Nicolas de la Reynie, The revelation of the treacherous intention

of Mme de Montesp^n to poison Louis XIV. and of other crimes, planned by personages who could not be attacked without scandal which touched the throne, caused Louis XIV. to close the chambre ardente, as the court was called, on the 1st of October 1680. It was reopened on the 19th of May 1681 and sat until the 21st of July 1682. Many of the culprits escaped through private influence. Among these were Marie Anne Mancini, duchesse de Bouillon, who had sought to get rid of her husband in order to marry the duke of Vendome, though Louis XIV. banished her to Nerac. Mme de Montespan was not openly disgraced, because the preservation of Louis's own dignity was essential, and some hundred prisoners, among them the infamous Guibourg and Lesage, escaped the scaffold through the suppres- sion of evidence insisted on by Louis XIV. and Louvois. Some of these were imprisoned in various fortresses, with instructions from Louvois to the respective commandants to flog them if they sought to impart what they knew. Some innocent persons were imprisoned for life because they had knowledge of the facts. La Voisin herself was executed at an early stage of the proceed- ings, on the 20th of February 1680, after a perfunctoiy applica- tion of torture. The authorities had every reason to avoid further revelations. Thirty-five other prisoners were executed; five were sent to the galleys and twenty-three were banished. Their crimes had furnished one of the most extraordinary trials known to history.

See F. Ravaisson, Archives de la Bastille, vols, iv.-vii. (1 870-1 874) ; the notes of La Reynie, preserved in the Bibliotheque Nationale; F. Funck-Brentano, Le Drame des poisons (1899); A. Masson, La Sorcelkrie et la science des poisons auX VII" siecle (1 904) . Sardou made the affair a background for his Affaire des poisons (1907). There is a portrait of La Voisin by Antoine Coypel, which has been often repro- duced.

LAW, JOHN (1671-1729), Scots economist, best known as the originator of the " Mississippi scheme," was born at Edinburgh in

April 1671. His father, a goldsmith and banker, bought shortly before his death, which took place in his son's youth, the lands of Lauriston near Edinburgh. John lived at home till he was twenty, and then went to London. He had already studied mathematics, and the theory of commerce and political economy, with much interest; but he was known rather as fop than scholar. In London he gambled, drank and flirted till in April 1694 a love intrigue resulted in a duel with Beau Wilson in Bloomsbury Square. Law killed his antagonist, and was condemned to death. His life was spared, but he was detained in prison. He found means to escape to Holland, then the greatest commercial country in Europe. Here he observed with close attention the practical working of banking and financial business, and conceived the first ideas of his celebrated " system." After a few years spent in foreign travel, he returned to Scotland, then exhausted and enraged by the failure of the Darien expedition (1695-1701). He propounded plans for the relief of his country in a work 1 entitled Money and Trade Considered, with a Proposal for supplying the Nation with Money (1705). This attracted some notice, but had no practical effect, and Law again betook himself to travel. He visited Brussels, Paris, Vienna, Genoa, Rome, making large sums by gambling and speculation, and spending them lavishly. He was in Paris in 1708, and made some pioposals to the government as to their financial difficulties, but Louis XIV. declined to treat with a "Huguenot," and d'Argenson, chief of the police, had Law expelled as a suspicious character. He had, however, become 1 A work entitled Proposals and Reasons for constituting a Council of Trade in Scotland was published anonymously at Edinburgh in 1701. It was republished at Glasgow in 1751 with Law's name attached; but several references in the state papers of the time mention William Paterson (1658-1719), founder of the Bank of England, as the author of the plan therein propounded. Even if Law had nothing to do with the composition of the work, he must have read it and been influenced by it. This may explain how it contains the germs of many of the developments of the " system." Certainly the suggestion of a central board, to manage great commercial undertakings, to furnish occupation for the poor, to encourage mining, fishing and manufactures, and to bring about a reduction in the rate of interest, was largely realized in the Mississippi scheme. See Bannister's Life of William Paterson (ed. 1858), and Writings of William Paterson (2nd ed., 3 vols., 1859).

intimately acquainted with the duke of Orleans, and when in 1715 that prince became regent, Law at once returned to Paris. The extravagant expenditure of the late monarch had plunged the kingdom into apparently inextricable financial confusion. The debt was 3000

million livres, the estimated annual expendi- ture, exclusive of interest payments, 148 million livres, and the income about the same. The advisability of declaring a national bankruptcy was seriously discussed, and though this plan was rejected, measures hardly less violent were carried. By a visa, or examination of the state liabilities by a committee with full powers of quashing claims, the debt was reduced nearly a half, the coin in circulation was ordered to be called in and reissued at the rate of 120 for 100 — a measure by which foreign coiners profited greatly, and a chamber of justice was established to punish speculators, to whom the difficulties of the state were ascribed. These measures had so little success that the billets d'etat which were issued as part security for the new debt at once sank 75% below their nominal value. At this crisis Law unfolded a vast scheme to the perplexed regent. A royal bank was to manage the trade and currency of the kingdom, to collect the taxes, and to free the country from debt. The council of finance, then under the due de Noailles, opposed the plan, but the regent allowed Law to take some tentative steps. By an edict of 2nd May 17 16, a private institution called La Banque ginirale, and managed by Law, was founded. The capital was 6 million livres, divided into 1200 shares of 5000 livres, payable in four instalments, one-fourth in cash, three-fourths in billets d'etat. It was to perform the ordinary functions of a bank, and had power to issue notes payable at sight in the weight and value of the money mentioned at day of issue. The bank was a great and immediate success. By providing for the absorption of part of the state paper it raised the credit of the government. The notes were a most desirable medium of exchange, for they had the element of fixity of value, which, owing to the arbitrary mint decrees of the government, was wanting in the coin of the realm. They proved the most convenient instruments of re- mittance between the capital and the provinces, and they thus developed the industries of the latter. The rate of interest, previously enormous and uncertain, fell first to 6 and then to 4%; and when another decree (10th April 1717) ordered collectors of taxes to receive notes as payments, and to change them for coin at request, the bank so rose in favour that it soon had a note-issue of 60 million livres. Law now gained the full confidence of the regent, and was allowed to proceed with the development of the " system."

The trade of the region about the Mississippi had been granted to a speculator named Crozat. He found the undertaking too large, and was glad to give it up. By a decree of August 17 17 Law was allowed to establish the Compagnie de la Louisiane ou d'Occidenl, and to endow it with privileges practically amounting to sovereignty over the most

fertile region of North America. The capital was 100 million livres divided into 200,000 shares of 500 livres. The payments were to be one-fourth in coin and three-fourths in billets d'etat. On these last the government was to pay 3 million livres interest yearly to the company. As the state paper was depreciated the shares fell much below par. The rapid rise of Law had made him many enemies, and they took advantage of this to attack the system. D'Argenson, now head of the council of finance, with the brothers Paris of Grenoble, famous tax farmers of the day, formed what was called the " anti-system." The farming of the taxes was let to them, under an assumed name, for 48 J million livres yearly. A company was formed, the exact counterpart of the Mississippi company. The capital was the same, divided in the same manner, but the payments were to be entirely in money. The returns from the public revenue were sure; those from the Mississippi scheme were not. Hence the shares of the latter were for some time out of favour. Law proceeded unmoved with the development of his plans. On the 4th of December 1718 the bank became a government institution under the name of La Banque royale. Law was director, and the king guaranteed the notes. The shareholders were repaid in coin, and, to widen the influence

of the new institution, the transport of money between towns where it had branches was forbidden. The paper-issue now reached no millions. Law had such confidence in the success of his plans that he agreed to take over shares in the Mississippi company at par at a near date. The shares began rapidly to rise. The next move was to unite the companies Des Indes Orientates and De Chine, founded in 1664 and 17 13 respectively, but now dwindled away to a shadow, to his company. The united associa- tion, La Compagnie des Indes, had a practical monopoly of the foreign trade of France. These proceedings necessitated the creation of new capital to the nominal amount of 25 million livres. The payment was spread over 20 months. Every holder of four original shares (meres) could purchase one of the new shares (filles) at a premium of 50 livres. All these 500-livre shares rapidly rose to 750, or 50% above par. Law now turned his attention to obtaining additional powers within France itself. On the 25th of July 1719 an edict was issued granting the company for nine years the management of the mint and the coin-issue. For this privilege the company paid 5 million livres, and the money was raised by a new issue of shares of the nominal value of 500 livres, but with a premium of other 500. The list was only open for twenty days, and it was

necessary to present four mires and one fille in order to obtain one of the new shares (petites filles). At the same time two dividends per annum of 6% each were promised. Again there was an attempt to ruin the bank by the commonplace expedient of making a run on it for coin; but the conspirators had to meet absolute power managed with fearlessness and skill. An edict appeared reducing, at a given date, the value of money, and those who had with- drawn coin from the bank hastened again to exchange it for the more stable notes. Public confidence in Law was increased, and he was enabled rapidly to proceed with the completion of the system. A decree of 27th August 1719 deprived the rival company of the farming of the revenue, and gave it to the Compagnie des Indes for nine years in' return for an annual payment of 52 million livres. Thus at one blow the " anti-system " was crushed. One thing yet remained; Law proposed to take over the national debt, and manage it on terms advan- tageous to the state. The mode of transfer was this. The debt was over 1500 million livres. Notes were to be issued to that amount, and with these the state creditors must be paid in a certain order. Shares were to be issued at intervals corresponding to the payments, and it was expected that the notes would be used in buying them. The government was to pay 3 % for the loan. It had formerly been bound to pay 80 millions, it would now pay under 50, a clear gain of over 30. As the shares of the company were almost the only medium for investment, the transfer would be surely effected. The creditors would now look to the government payments and the commercial gains of the company for their annual returns. Indeed the creditors were often not able to procure the shares, for each succeeding issue was immediately seized upon, though the 500- livre share was now issued at a premium of 4500 livres. After the third issue, on the 2nd of October, the shares immediately resold at 8000 livres in the Rue Quincampoix, then used as a bourse. They went on rapidly rising as new privileges were still granted to the company. Law had now more than regal power. The exiled Stuarts paid him court; the proudest aristocracy in Europe humbled themselves before him; and his liberality made him the idol of the populace. After, as a neces- sary preliminary, becoming a Catholic, he was made controller- general of the finances in place of d'Argenson. Finally, in February 1720, the bank was in name as well as in reality united to the company.

The system was now complete; but it had already begun to decay. In December 1719 it was at its height. The shares had then amounted to 20,000 livres, forty times their nominal price. A sort of madness possessed the nation. Men sold their all and hastened to Paris to speculate. The population of the capital was increased by an enormous

influx of provincials and foreigners. Trade received a vast though unnatural impulse. Everybody seemed to be getting richer, no one poorer. Those

who could still reflect saw that this prosperity was not real. The whole issue of shares at the extreme market-price valued 12,000 million livres. It would require 600 million annual revenue to give a 5 % dividend on this. Now, the whole income of the company as yet was hardly sufficient to pay 5% on the original capital of 1677 million livres. The receipts from the taxes, &c, could be precisely calculated, and it would be many years before the commercial undertakings of the company — with which only some trifling beginning had been made — would yield any considerable return. People began to sell their shares, and to. buy coin, houses, land — anything that had a stable element of value in.it. There was a rapid fall in the shares, a rapid rise in all kinds of property, and consequently a rapid depreciation of the paper money. Law met these new tendencies by a succession of the most violent edicts. The notes were to bear a premium over specie. Coin was only to be used in small payments, and only a small amount was to be kept in the posses- sion of private parties. The use of diamonds, the fabrication of gold and silver plate, was forbidden. A dividend of 40 % on the original capital was promised. By several ingenious but falla- ciously reasoned pamphlets Law endeavoured to restore public confidence. The shares still fell. At last, on the 5th of March 1720, an edict appeared fixing their piice at 0000 livres, and ordering the bank to buy and sell them at that price. The fall now was transferred to the notes, of which there were soon over 2500 million livres in circulation. A large proportion of the coined money was removed from the kingdom. Prices rose enormously. There was everywhere distress and complete financial confusion. Law became an object of popular hatred. He lost his court in- fluence, and was obliged to consent to a decree (21st May 1720) by which the notes and consequently the shares were reduced to half their nominal value. This created such a commotion that its promoters were forced to recall it, but the mischief was done. What confidence could there be in the depreciated paper after such a measure? Law was removed from his office, and his enemies proceeded to demolish the ” system.” A vast number of shares had been deposited in the bank. These were destroyed. The notes were reconverted into government debt, but there was first a visa which reduced that debt to the same size as before it was taken over by the company. The rate of interest was ‘ lowered, and the government now only pledged itself to pay 37 instead of 80 millions annually. Finally the bank was abolished, and the company reduced to a mere trading associa tion. By

November the ” system ” had disappeared. With these last measures Law, it may well be believed, had nothing to do. He left France secretly in December 1720, resumed his wandering life,’ and died at Venice, poor and forgotten, on the 21st of March 1729.

Of Law’s writings the most important for the comprehension of the ” system ” is his Money and Trade Considered. In this work he says that national power and wealth consist in numbers of people, and magazines of home and foreign goods. These depend on trade, and that on money, of which a greater quantity employs more people; but credit, if the credit have a circulation, has all the beneficial effects of money. To create and increase instruments of credit is the function of a bank. Let such be created then, and let its notes be only given in return for land sold or pledged. Such a currency would supply the nation with abundance of money ; and it would have many advantages, which Law points out in detail, over silver. The bank or commission was to be a government institu- tion, and its profits were to be spent in encouraging the export and manufacture of the nation. A very evident error lies at the root of the ” system.” Money is not the result but the cause of wealth, he thought. To increase it then must be beneficial, and the best way is by a properly secured paper currency. This is the motive force ; but it is to be applied in a particular way. Law had a profound belief in the omnipotence of government. He saw the evils of minor monopolies, and of private farming of taxes. He proposed to centre foreign trade and internal finance in one huge monopoly managed by the state for the people, and carrying on business through a plentiful supply of paper money. He did not see that trade and commerce are best left to private enterprise, and that such a scheme would simply result in the profits of speculators and favourites. The ” system ” was never so far developed as to exhibit its in- herent faults. The madness of speculators ruined the plan when only its foundations were laid. One part indeed might have been saved. The bank was not necessarily bound to the company, and had its note-issue been retrenched it might have become a permanent

institution. As Thiers points out, the edict of the 5th of March 1 730, which made the shares convertible into notes, ruined the bank without saving the company. The shares had risen to an unnatural height, and they should have been allowed to fall to their natural level. Perhaps Law felt this to be impossible. He had friends at court whose interests were involved in the shares, and he had enemies eager

for his overthrow. It was necessary to succeed completely or not at all ; so Law, a gambler to the core, risked and lost everything. Notwithstanding the faults of the ” system,” its author was a financial genius of the first order. He had the errors of his time; but he propounded many truths as to the nature of currency and banking then unknown to his contemporaries. The marvellous skill which he displayed in adapting the theory of the ” system ” to the actual condition of things in France, and in carrying out the various financial transactions rendered necessary by its development, is absolutely without parallel. His profound self-confidence and belief in the truth of his own theories were the reasons alike of his success and his ruin. He never hesitated to employ the whole force of a despotic government for the definite ends which he saw before him. He left France poorer than he entered it, yet he was not perceptibly changed by his sudden transitions of fortune. Montesquieu visited him at Venice after his fall, and has left a description of him touched with a certain pathos. Law, he tells us, was still the same in character, perpetually planning and scheming, and, though in poverty, revolving vast projects to restore himself to power, and France to commercial prosperity.

The fullest account of the Mississippi scheme isthatof Thiers, Law et son systeme des finances (1826, American trans. 1859). See also Heymann, Law und sein System (1853); Pierre Bonnassieux, Les Grandes Compagnies de commerce (1892) ; S. Alexi, John Law und sein System (1885); E. Levasseur, Recherches historiques sur le systeme de Law (1854); and Jobez, Vne Preface au socialisme, ou le systeme de Law etla chasse aux capitalistes (1848). Full biographical details are given in Wood’s Life of Law (Edinburgh, 1824). All Law’s later writings are to be found in Daire, Collection des principaux econo- mistes, vol. i. (1 843) . Other works on Law are : A. W. Wiston-Glynn, John Law of Lauriston (1908); P. A. Cachut, The Financier Law, his Scheme and Times (1856) ; A. Macf. Davis, An Historical Study of Law’s System (Boston, 1887); A. Beljame, La Pronunciation du nom de Jean Law le financier (1891). See also E. A. Benians in Camb. Mod. Hist. vi. 6 (1909). For minor notices see Poole’s Index to Periodicals. There is a portrait of Law by A. S. Belle in the National Portrait Gallery, London. (F. Wa.)

LAW, WILLIAM (1686-1761), English divine, was born at King’s Cliffe, Northamptonshire. In 1705 he entered as a sizar at Emmanuel College, Cambridge; in 171 1 he was elected fellow of his college and was ordained. He resided at Cambridge, teaching and taking occasional duty until the accession of George I., when his conscience forbade him to take the oaths of allegiance to the new government and of

abjuration of the Stuarts. His Jacobitism had already been betrayed in a tripos speech which brought him into trouble; and he was now deprived of his fellowship and became a non-juror. For the next few years he is said to have been a curate in London. By 1727 he was domiciled with Edward Gibbon (1666-1736) at Putney as tutor to his son Edward, father of the historian, who says that Law became ” the much honoured friend and spiritual director of the whole family.” In the same year he accompanied his pupil to Cambridge, and resided with him as governor, in term time, for the next four years. His pupil then went abroad, but Law was left at Putney, where he remained in Gibbon’s house for more than ten years, acting as a religious guide not only to the family but to a number of earnest-minded folk who came to consult him. The most eminent of these were the two brothers John and Charles Wesley, John Byrom the poet, George Cheyne the physician and Archibald Hutcheson, M.P. for Hastings. The household was dispersed in 1737. Law was parted from his friends, and in 1740 retired to King’s Cliffe, where he had inherited from his father a house and a small property. There he was presently joined by two ladies: Mrs Hutcheson, the rich widow of his old friend, who recommended her on his death-bed to place herself under Law’s spiritual guidance, and Miss Hester Gibbon, sister to his late pupil. This curious trio lived for twenty-one years a life wholly given to devotion, study and charity, until the death of Law on the 9th of April 1 761.

Law was a busy writer under three heads : —

1. Controversy. — In this field he had no contemporary peer save perhaps Richard Bentley. The first of his controversial works was Three Letters to the Bishop of Bangor (1717), which were considered by friend and foe alike as one of the most powerful contributions to the

Bangorian controversy on the high church side. Thomas Sherlock declared that ” Mr Law was a writer so considerable that he knew but one good reason why his lordship did not answer him.” Law’s next controversial work was Remarks on Mandeville’s Fable of the Bees (1723), in which he vindicates morality on the highest grounds; for pure style, caustic wit and lucid argument this work is re- markable; it was enthusiastically praised by John Sterling, and republished by F. D. Maurice. Law’s Case of Reason (1732), in answer to Tindal’s Christianity as old as the Creation is to a great extent an anticipation of Bishop Butler’s famous argument in the Analogy. In this work Law shows himself at least the equal of the ablest champion of Deism. His Letters to a Lady inclined to enter the Church of Rome are excellent specimens of the attitude of a high Anglican towards Romanism. His

controversial writings have not received due recognition, partly because they were opposed to the drift of his times, partly because of his success in other fields.

2. Practical Divinity. — The Serious Call to a Devout and Holy Life (1728), together with its predecessor, A Treatise of Christian Perfection (1726), deeply influenced the chief actors in the great Evangelical revival. The*Wesleys, George Whitefield, Henry Venn, Thomas Scott and Thomas Adam all express their deep obligation to the author. The Serious Call affected others quite as deeply. Samuel Johnson, Gibbon, Lord Lyttelton and Bishop Home all spoke enthusiastically of its merits; and it is still the only work by which its author is popularly known. It has high merits of style, being lucid and pointed to a degree. In a tract entitled The Absolute Unlawfulness of Stage Entertainments (1726) Law was tempted by the corruptions of the stage of the period to use unreasonable language, and incurred some effective criticism from John Dennis in The Stage Defended.

3. Mysticism. — Though the least popular, by far the most interesting, original and suggestive of all Law's works are those which he wrote in his later years, after he had become an enthusiastic admirer (not a disciple) of Jacob Boehme, the Teutonic theosophist. From his earliest years he had been deeply impressed with the piety, beauty and thoughtfulness of the writings of the Christian mystics, but it was not till after his accidental meeting with the works of Boehme, about 1734, that pronounced mysticism appeared in his works. Lav/'s mystic tendencies divorced him from the practical- minded Wesley, but in spite of occasional wild fancies the books are worth reading. They are A Demonstration of the Gross and Funda- mental Errors of a late Book called a " Plain Account, &c., of the Lord's Supper " (1737) ; The Grounds and Reasons of the Christian Regenera- tion (1739) ; An Appeal to all that Doubt and Disbelieve the Truths of Revelation (1740); An Earnest and Serious Answer to Dr Trapp's Sermon on being Righteous Overmuch (1740); The Spirit of Prayer (1749, 1752) ; The Way to Divine Knowledge (1752) ; The Spirit of Love (1752, 1754); A Short but Sufficient Confutation of Dr Warburton's Projected Defence (as he calls it) of Christianity in his " Divine Legation of Moses " (1757); A Series of Letters (1760); a Dialogue between a Methodist and a Churchman (1760); and An Humble, Earnest and Affectionate Address to the Clergy (1761).

Richard Tighe wrote a short account of Law's life in 1813. See also Christopher Walton, Notes and Materials for a Complete Biography of W. Law (1848); Sir Leslie Stephen, English Thought in the 1 8th century, and in the Diet. Nat. Biog. (xxxii. 236) ; W. H. Lecky, History

of England in the 18th Century; C. J. Abbey, The English Church in the 18th Century; and J. H. Overton, William Law, Non- juror and Mystic (1881).

LAW (0. Eng. lagu, M. Eng. lawe; from an old Teutonic root lag, ” lie,” what lies fixed or evenly; cf. Lat. lex, Fr. loi), a word used in English in two main senses — (1) as a rule prescribed by authority for human action, and (2) in scientific and philosophic phraseology, as a uniform order of sequence (e.g. ” laws ” of motion). In the first sense the word is used either in the abstract, for jurisprudence generally or for a state of things in which the laws of a country are duly observed (” law and order “), or in the concrete for some particular rule or body of rules. It is usual to distinguish further between ” law ” and ” equity ” (q.v.). The scientific and philosophic usage has grown out of an early conception of jurisprudence, and is really metaphorical, derived from the phrase ” natural law ” or ” law of nature,” which presumed that commands were laid on matter by God (see T. E. Holland, Elements of Jurisprudence, ch. ii.). The adjective ” legal ” is only used in the first sense, never in the second. In the case of the ” moral law ” (see Ethics) the term is employed somewhat ambiguously because of its connexion with both meanings. There is also an Old English use of the word ” law ” in> a more or less sporting sense (” to give law ” or ” allow so much law “) , meaning a start or fair allowance in time or distance. Presumably this originated simply in the liberty-loving Briton’s respect for proper legal procedure; instead of the brute exercise of tyrannous force he demanded ” law,” or a fair opportunity

and trial. But it may simply be an extension of the meaning of ” right,” or of the sense of ” leave ” which is found in early uses of the French loi.

In this work the laws or uniformities of the physical universe are dealt with in the articles on the various sciences. The general principles of law in the legal sense are discussed under Juris- prudence. What may be described as ” national systems ” of law are dealt with historically and generally under English Law, American Law, Roman Law, Greek Law, Mahommedan Law, Indian Law, &c. Certain broad divisions of law are treated under Constitution and Constitutional Law, Canon Law, Civil Law, Common Law, Criminal Law, Ecclesiastical Law, Equity, International Law, Military Law, &c. And the particular laws of different countries on special subjects are stated under the headings

for those subjects (Bankruptcy, &c.) . For courts (q.v.) of law, and procedure, see Jurisprudence, Appeal, Trial, King's Bench, &c.

Authorities. — The various legal articles have bibliographies attached, but it may be convenient here to mention such general works on law, apart from the science of jurisprudence, as (for English law) Lord Halsbury's Laws of England (vol. i., 1907), The Encyclo- paedia of the Laws of England, ed. Wood Renton (1907), Stephen's Commentaries on the Laws of England (1908), Brett's Commentaries on the present Laws of England (1896), Broom's Commentaries on the Common Law (1896) and Brodie-Innes's Comparative Principles of the Laws of England and Scotland (vol. i., 1903) ; and, for America, Bouvier's Law Dictionary, and Kent's Commentaries on American Law.

LAWES, HENRY (1595-1662), English musician, was born at Dinton in Wiltshire in December 1595, and received his musical education from John Cooper, better known under his Italian pseudonym Giovanni Coperario (d. 1627), a famous composer of the day. In 1626 he was received as one of the gentlemen of the chapel royal, which place he held till the Commonwealth put a stop to church music. But even during that songless time Lawes continued his work as a composer, and the famous collection of his vocal pieces, Ayres and Dialogues for One-, Two and Three Voyces, was published in 1653, being followed by two other books under the same title in 1655 and 1658 respectively. When in 1660 the king returned, Lawes once more entered the royal chapel, and composed an anthem for the coronation of Charles II. He died on the 21st of October 1662, and was buried in Westminster Abbey. Lawes's name has become known beyond musical circles by his friendship with Milton, whose Comus he supplied with incidental music for the performance of the masque in 1634. The poet in return im- mortalized his friend in the famous sonnet in which Milton, with a musical perception not common amongst poets, exactly indicates the great merit of Lawes. His careful attention to the words of the poet, the manner in which his music seems to grow from those words, the perfect coincidence of the musical with the metrical accent, all put Lawes's songs on a level with those of Schumann or Liszt or any modern composer. At the same time he is by no means wanting in genuine melodic invention, and his concerted music shows the learned contrapuntist.

LAWES, SIR JOHN BENNET, Bart. (1814-1900), English agriculturist, was born at Rothamsted on the 28th of December 1 814. Even before leaving Oxford, where he matriculated in 1832. he had begun to interest himself in growing various medicinal plants on the Rothamsted estates, which he inherited on his father's death in 1822.

About 1837 he began to experi- ment on the effects of various manures on plants growing in pots, and a year or two later the experiments were extended to crops in the field. One immediate consequence was that in 1842 he patented a manure formed by treating phosphates with sulphuric acid, and thus initiated the artificial manure industry. In the succeeding year he enlisted the services of Sir J. H. Gilbert, with whom he carried on for more than half a century those experiments in raising crops and feeding animals which have rendered Rothamsted famous in the eyes of scientific agriculturists all over the world (see Agriculture). In 1854 he was elected a Fellow of the Royal Society, which in 1867 bestowed a Royal medal on Lawes and Gilbert jointly, and in 1882 he was created a baronet. In the year before his death,

which happened on the 31st of August 1900, he took measures to ensure the continued existence of the Rothamsted experi- mental farm by setting aside £100,000 for that purpose and constituting the Lawes Agricultural Trust, composed of four members from the Royal Society, two from the Royal Agri- cultural Society, one each from the Chemical and Linnaean Societies, and the owner of Rothamsted mansion-house for the time being.

LAW MERCHANT or Lex mercatoria, originally a body of rules and principles relating to merchants and mercantile transactions, laid down by merchants themselves for the purpose of regulating their dealings. It was composed of such usages and customs as were common to merchants and traders in all parts of Europe, varied slightly in different localities by special peculiarities. The law merchant owed its origin to the fact that the civil law was not sufficiently responsive to the growing demands of commerce, as well as to the fact that trade in pre- medieval times was practically in the hands of those who might be termed cosmopolitan merchants, who wanted a prompt and effective jurisdiction. It was administered for the most part in special courts, such as those of the gilds in Italy, or the fair courts of Germany and France, or as in England, in courts of the staple or piepowder (see also Sea Laws). The history of the law merchant in England is divided into three stages: the first prior to the time of Coke, when it was a special kind of law — – as distinct from the common law — administered in special courts for a special class of the community (i.e. the mercantile); the second stage was one of transition, the law merchant being administered in the common law courts, but as a body of customs, to be proved as a fact in each individual case of doubt; the third stage, which has continued to the present day, dates from the presidency over the king’s bench of Lord Mansfield (q.v.), under whom it was moulded into the mercantile law

of to-day. To the law merchant modern English law owes the fundamental principles in the law of partnership, negotiable instruments and trade marks.

See G. Malynes, Consuetudo vel lex mercatoria (London, 1622) ; VV. Mitchell, The Early History of the Law Merchant (Cambridge, x 904); J. W. Smith, Mercantile Law (ed. Hart and Simey, 1905).

LAWN, a very thin fabric made from level linen or cotton yarns. It is used for light dresses and trimmings, also for handkerchiefs. The terms lawn and cambric (q.v.) are often intended to indicate the same fabric. The word ” lawn ” was formerly derived from the French name for the fabric linon, from lin, flax, linen, but Skeat (Etym. Diet., 1898, Addenda) and A. Thomas (Romania, xxix. 182, 1900) have shown that the real source of the word is to be found in the name of the French town Laon. Skeat quotes from Palsgrave, Les claircissement de la langue Franqoyse (1530), showing that the early name of the fabric was Laune lynen. An early form of the word was ” laund,” probably due to an adaptation to “laund,” lawn, glade or clearing in a forest, now used of a closely-mown expanse of grass in a garden, park, &c. (see Grass and Horticulture). This word comes from O. Fr. launde, mod. lande, wild, heathy or sandy ground, covered with scrub or brushwood, a word of Celtic origin; cf. Irish and Breton lann, heathy ground, also enclosure, land; Welsh llan, enclosure. It is cognate with ” land,” common to Teutonic languages. In the original sense of clearing in a forest, glade, Lat. saltus, ” lawn,” still survives in the New Forest, where it is used of the feeding-places of cattle.

LAWN-TENNIS, a game played with racquet and ball on a court traversed by a net, but without enclosing walls. It is a modern adaptation of the ancient game of tennis (q.v.), with which it is identical as regards the .scoring of the game and ” set.” Lawn-tennis is essentially a summer game, played in the open air, either on courts marked with whitewash on close-cut grass like a cricket pitch, or on asphalt, cinders, gravel, wood, earth or other substance which can be so prepared as to afford a firm, level and smooth surface. In winter, however, the game is often played on the floor of gymnasiums, drill sheds or other building*;, when it is called ” covered-court lawn-tennis”;

but there is no difference in the game itself corresponding to these

varieties of court.

The iawn-tennis court for the single-handed game, one player against one (“singles”), is shown in fig. 1, and that for the four-handed game (” doubles “) in fig. 2. The net stretched across the middle of the court is attached to the tops of two posts which stand 3 ft. outside the court on each side. The height of the net is 3 ft. 6 in. at the posts and 3 ft. at the centre.

♦ 37feet «.

SB feet-

1

i

-.-r

1

T

?

4.

<

„JL„.

feet

W5S/tat

I

Fig. 1.

Fig. 2.

The court is bisected longi- tudinally by the half- c o u r t-line, which, however, is marked only between the two service- lines and at the points of junc- tion with the base-lines. The divisions of the court on each side of the half- court-line are called respec- tively the right-hand and left-hand courts; and the portion of these divisions between the service-lines and the net are the right- hand service-court and left-

hand service-court respectively. The balls, which are made of hollow india-rubber, tightly covered with white flannel, are 2\ in. in diameter, and from ij to 2 oz. in weight. The racquets (fig. 3), for which there are no regula- tion dimensions, are broader and lighter than those used in tennis. Before play begins, a racquet is spun as in tennis, and the winner of the spin elects either to take first service or to take choice of courts. If he takes choice of courts, he and his partner (if the game be doubles) take their position on the selected side of the net, one stationing himself in the right- hand court and the other in the left, which positions are retained throughout the set. If the winner of the spin takes choice of courts, his opponent has first service; and vice versa. The players change sides of the net at the end of the first, third and every subsequent alter- nate game, and at the end of each set; but they may agree not to change during any set except the last. Service is de- livered by each player in turn, who retains it for one game irrespective of the win- ning or losing of points. In doubles the partner of the serVer in the first game serves in the third, and the partner of the server in the second game serves in the fourth; the same order being pre- served till the end of the set; but each pair of partners decide for themselves before their first turn of service which of the two shall serve first. The server delivers the service from the right- and left-hand courts alternately, begin- ning in each of his service games from the right-hand court, even though odds be given or owed; he must stand behind (i.e. farther from the net than) the base-line, and must serve the ball so that it drops in the opponent's service-court diagon- ally opposite to the court served from, or upon one of the lines enclosing that service-court. If in a serve, otherwise good, the ball touches the net, it is a " let " whether the serve be " taken " or not by striker-out; a " let " does not annul a previous " fault." (For the meaning of " let," " rest," " striker-out "

Fig. 3.

and other technical terms used in the game, see Tennis and Racquets.) The. serve is a fault (1) if it be not delivered by the server from the proper court, and from behind the base-line; (2) if the ball drops into the net or out-of-court, or into any part of the court other than the proper service-court. The striker- out cannot, as in racquets, " take," and thereby condone, a fault. When a fault has been served, the server must serve again from the same court, unless it was a fault because served from the wrong court, in which case the server crosses to the proper court before serving again. Two consecutive faults score a point against the side of the server. Lawn-tennis differs from tennis and racquets in that the service may not be taken on the volley by striker-out. After the serve has been returned the play proceeds until

the ” rest ” (or ” rally “) ends by one side or the other failing to make a ” good return “; a good return in lawn-tennis meaning a stroke by which the ball, having been hit with the racquet before its second bound, is sent over the net, even if it touches the net, so as to fall within the limits of the court on the opposite side. A point is scored by the player, or side, whose opponent fails to return the serve or to make a good return in the rest. A player also loses a point if the ball when in play touches him or his partner, or their clothes; or if he or his racquet touches the net or any of its supports while the ball is in play; or if he leaps over the net to avoid touching it; or if he volley the ball before it has passed the net.

For him who would excel in lawn-tennis a strong fast service is hardly less necessary than a heavily ” cut ” service to the tennis player and the racquet player. High overhand service, by which alone any great pace can be obtained, was first perfected by the brothers Renshaw between 1880 and 1890, and is now universal even among players far below the first rank. The service in vogue among the best players in America, and from this circumstance known as the “American service,” has less pace than the English but is ” cut ” in such a way that it swerves in the air and ” drags ” off the ground, the advantage being that it gives the server more time to ” run in ” after his serve, so as to volley his opponent’s return from a position within a yard or two of the net. Both in singles and” doubles the best players often make it their aim to get up comparatively near the net as soon as possible, whether they are serving or receiving the serve, the object being to volley the ball whenever possible before it begins to fall. The server’s partner, in doubles, stands about a yard and a half from the net, and rather nearer the side-line than the half-court-line; the receiver of the service, not being allowed to volley the serve, must take his stand according to the nature of the service, which, if very fast, will require him to stand outside the base-line; the receiver’s partner usually stands between the net and the service-line. All four players, if the rest lasts beyond a stroke or two, are generally found nearer to the net than the service-lines; and the game, assuming the players to be of the championship class, consists chiefly of rapid low volleying, varied by attempts on one side or the other to place the ball out of the opponents’ reach by ” lobbing ” it over their heads into the back part of the court. Good ” lobbing ” demands great skill, to avoid on the one hand sending the ball out of court beyond the base-line, and on the other allowing it to drop short enough for the adversary to kill it with a ” smashing ” volley. Of ” lobbing ” it has been laid down by the brothers Doherty that ” the higher it is the better, so long as the length is good “; and as regards returning lobs the same authorities say, ” you

must get them if you can before they drop, for it is usually fatal to let them drop when playing against a good pair.” The reason for this is that if thelob be allowed to drop before being returned, so much time is given to the striker of it to gain position that he is almost certain to be able to kill the return, unless the lob be returned by an equally good and very high lob, dropping within a foot or so of the base-line in the opposite court, a stroke that requires the utmost accuracy of strength to accomplish safely. The game in the hands of first-class players consists largely in manoeuvring for favourable position in the court while driving the opponent into a less favourable position on his side of the net; the player who gains the advantage of position in this way being gener- ally able to finish the rest by a smashing volley impossible to return. Ability to play this ” smash ” stroke is essential to strong lawn- tennis. ” To be good overhead,” say the Dohertys, ” is the sign of a first-class player, even if a few have managed to get on without it.” The smash stroke is played very much in the same way as the over- hand service, except that it is not from a defined position of known distance from the net ; and therefore when making jt_ the player must realize almost instinctively what his precise position is in re- lation to the net and the side-lines, for it is of the last importance that he should not take his eye off the ball ” even for the hundredth part of a second.” By drawing the racquet across the ball at the moment of impact spin may be imparted to it as in tennis, or as

” side ” is imparted to a billiard ball, and the direction of this spin

and the consequent behaviour of the ball after the stroke may be greatly varied by a skilful player. Perhaps the most generally useful form of spin, though by no means the only one commonly used, is that known as ” top ” or ” lift,” a vertical rotatory motion of the ball in the same direction as its flight, which is imparted to it by an upward draw of the racquet at the moment of making the stroke, and the effect of which is to make it drop more suddenly than it would ordinarily do, and in an unexpected curve. A drive made with plenty of ” top ” can be hit much harder than would otherwise be possible without sending the ball out of court, and it is therefore extensively employed by the best players. While the volleying game is almost universally the practice of first-class players — A. W. Gore, M. J. G. Ritchie and S. H. Smith being almost alone among those of championship rank in modern days to use the volley com- paratively little — its difficulty places it beyond the reach of the less skilful. In lawn-tennis as played

at the ordinary country house or local club the real ” smash ” of a Renshaw or a Doherty is seldom to be seen, and the high lob is almost equally rare. Players of moderate calibre are content to take the ball on the bound and to return it with some pace along the side-lines or across the court, with the aim of placing it as artfully as possible beyond the reach of the adversary ; and if now and again they venture to imitate a stroke employed with killing effect at Wimbledon, they ttttQk themselves fortunate if they occasionally succeed in making it witnout disaster to themselves. Before 1890 the method of handicapping at lawn- tennis was the same as in tennis so far as it was applicable to a game played in an open court. In 1890 bisques were abolished, and in 1894 an elaborate system was introduced by which fractional parts of ” fifteen ” could be conceded by way of handicap, in accordance with tables inserted in the laws of the game. The system is a development of the tennis handicapping by which a finer graduation of odds may be given. ” One-sixth of fifteen ” is one stroke given in every six games of a set; and similarly two-sixths, three-sixths, four-sixths and five- sixths of fifteen, are respectively two, three, four and five strokes given in every six games of a set; the particular game in the set in which the stroke in each case must be given being specified in the tables.

History. — Lawn-tennis cannot be said to have existed prior to the year 1874. It is, indeed, true that outdoor games based on tennis were from time to tine improvised by lovers of that game who found themselves out of reach of a tennis-court. Lord Arthur Hervey, sometime bishop of Bath and Wells, had thus devised a game which he and his friends played on the lawn of his rectory in Suffolk; and even’ so early as the end of the 18th century ” field tennis ” was mentioned by the Sporting Magazine as a game that rivalled the popularity of cricket. But, however much or little this game may have resembled lawn-tennis, it had long ceased to exist; and even to be remem- bered, when in 1874 Major Wingfield took out a patent for a game called Sphairistike, which the specification described as ” a new and improved portable court for playing the ancient game of tennis.” The court for this game was wider at the base- lines than at the net, giving the whole court the shape of an hour-glass; one side of the net only was divided into service- courts, service being always delivered from a fixed mark in the centre of the opposite court; and from the net-posts side-nets were fixed which tapered down to the ground at about the middle of the side-lines, thus enclosing nearly half the courts on each side of the net. The possibilities of Sphairistike were quickly perceived; and under the new name of lawn-tennis its popularity grew so quickly that in 1875 a meeting of those interested

in the game was held at Lord's cricket-ground, where a committee of the Marylebone Club (M.C.C.) was appointed to draw up a code of rules. The hour-glass shape of the court was retained by this code (issued in May 1875), and the scoring of the game followed in the main the racquets instead of the tennis model. It was at the suggestion of J. M. Heathcote, the amateur tennis champion, that balls covered with white flannel were sub- stituted for the uncovered balls used at first. In 1875, through the influence of Henry Jones (" Cavendish "), lawn-tennis was included in the programme of the All England Croquet Club, which in 1877 became the All England Croquet and Lawn- Tennis Club, on whose ground at Wimbledon the All England championships have been annually played since that date. In the same year, in anticipation of the first championship meeting, the club appointed a committee consisting of Henry Jones, Julian Marshall and C. G. Heathcote to revise the M.C.C. code of rules; the result of their labours being the introduction of the tennis in place of the racquets scoring, the substitution of a rectangular for the " hour-glass " court, and the enactment

of the modern rule as regards the " fault." The height of the net, which under the M.C.C. rules had been 4 ft. in the centre, was reduced to 3 ft. 3 in.; and regulations as to the size and weight of the ball were also made. Some controversy had already taken place in the columns of the Field as to whether volleying the ball, at all events within a certain distance of the net, should not be prohibited. Spencer Gore, the first to win the championship in 1877, used the volley with great skill and judgment, and in principle anticipated the tactics afterwards brought to perfection by the Renshaws, which aimed at forcing the adversary back to the base-line and killing his return with a volley from a position near the net. P. F. Hadow, champion in 1878, showed how the volley might be defeated by skilful use of the lob; but the question of placing some check on the volley continued to be agitated among lovers of the game. The rapidly growing popularity of lawn-tennis was proved in 1879 by the inauguration at Oxford of the four-handed championship, and at Dublin of the Irish championship, and by the fact that there were forty-five competitors for the All England single championship at Wimbledon, won by J. T. Hartley, a player who chiefly relied on the accuracy of his return without frequent resort to the volley. It was in the autumn of the same year, in a tournament at Cheltenham, that W. Renshaw made his first successful appearance in public. The year 1880 saw the foundation of the Northern Lawn-Tennis Association, whose tournaments have long been regarded as inferior in importance only to the championship meetings at Wimbledon and Dublin, and a revision of the rules which

substantially made them what they have ever since remained. This year is also memorable for the first championship doubles won by the twin brothers William and Ernest Renshaw, a success which the former followed up by winning the Irish championship, beating among others H. F. Lawford for the first time.

The Renshaws had already developed the volleying game at the net, and had shown what could be done with the ” smash ” stroke (which became known by their name as the ” Renshaw smash “), but their service had not as yet become very severe. In 1881 the distinctive features of their style were more marked, and the brothers first established firmly the supremacy which they maintained almost without interruption for the next eight years. In the doubles they discarded the older tactics of one partner standing back and the other near the net; the two Renshaws stood about the same level, just inside the service- line, and from there volleyed with relentless severity and with an accuracy never before equalled, and seldom if ever since; while their service also acquired an immense increase of pace. Their chief rival, and the leading exponent of the non-volleying game for several years, was H. F. Lawford. After a year or two it became evident that neither the volleying tactics of Renshaw nor the strong back play of Lawford would be adopted to the exclusion of the other, and both players began to combine the two styles. Thus the permanent features of lawn-tennis may be said to have been firmly established by about the year 1885; and the players who have since then come to the front have for the most part followed the principles laid down by the Renshaws and Lawford. One of the greatest performances at lawn-tennis was in the championship competition in 1886 when W. Renshaw beat Lawford a love set in q| minutes. The longest rest in first- class lawn-tennis occurred in a match between Lawford and E. Lubbock in 1880, when eighty-one strokes were played. Among players in the first class who were contemporaries of the Renshaws, mention should be made of E. de S. Browne, a powerful imitator of the Renshaw style: C. W. Grinstead, R. T. Richardson, V, Goold (who played under the nom de plume ” St Leger “), J. T. Hartley, E. W. Lewis, E L. Williams, H. Grove and W. J. Hamilton ; while among the most prominent lady players of the period were Miss M. Langrishe, Miss Bradley, Miss Maud Watson, Miss L. Dod, Miss Martin and Miss Bingley (afterwards Mrs Hillyard) . In 1 888 the Lawn-Tennis Association was established; and the All England Mixed Doubles Champion- ship (four-handed matches for ladies and gentlemen in partner- ship) was added to the existing annual competitions. Since 1881

lawn-tennis matches between Oxford and Cambridge universities have been played annually; and almost every county in England, besides Scotland, Wales and districts such as ” Midland Counties,” ” South of England,” &c, have their own champion- ship meetings. Tournaments are also played in winter at Nice, Monte Carlo and other Mediterranean resorts where most of the competitors are English visitors.

The results of the All England championships have been as follows : —

Year.

1877

1878

1879

1880

1881

1882

1883

1884

1885

1886

1887

1888

1889

1890

1891

1892

1893

Year.

1884 1885

1888 1889

1890 1891 1892

1893 1894

1895 1896

1897

Gentlemen's Singles. S. W. Gore P. F. Hadow J. T. Hartley J. T. Hartley W. Renshaw W. Renshaw W. Renshaw VV. Renshaw \V. Renshaw W. Renshaw H. F. Lawford E. Renshaw W. Renshaw W. J. Hamilton W. Baddeley W. Baddeley J. Pim

Year. Gentlemen's Singles.

1894 J. Pim

1895 W. Baddeley

1896 H. S. Mahony

1897 R. F. Doherty

1898 R. F. Doherty

1899 R. F. Doherty

1900 R. F. Doherty

1901 A. W. Gore

1902 H. L. Doherty

1903 H. L. Doherty

1904 H. L. Doherty

1905 H. L. Doherty

1906 H. L. Doherty

1907 N. E. Brookes

1908 A. W. Gore

1909 A. W. Gore

1910 A. F. Wilding

Year.

1879

1880

1881

1882

1883

1884

1885

1886

1887

1888

1889

1890

1891

1892

1893 1894

1895 1896 1897 1898 1899 1900 1901 1902 1903 1904

1905 1906 1907 1908

1909 1910

Ladies’ Singles. Miss M. Watson Miss M. Watson Miss Bingley Miss Dod Miss Dod Mrs Hillyard

(Miss Bingley) Miss Rice Miss Dod Miss Dod Miss Dod Mrs Hillyard

Miss C. Cooper Miss C. Cooper Mrs Hillyard

Gentlemen’s Doubles.

L. R. Erskine

W. Renshaw

W. Renshaw

J. T. Hartley

C. W. Grinstead

W. Renshaw

W. Renshaw

W. Renshaw

P. B. Lyon

W. Renshaw

W. Renshaw

J. Pim

W. Baddeley

H. S. Barlcw

J. Pim

W. Baddeley

W. Baddeley

W. Baddeley R. F. Doherty R. F. Doherty R. F. Doherty R. F. Doherty R. F. Dohert” S. H. Smith R. F. Doherty R. F. Doherty R. F. Doherty S. H. Smith N. E. Brookes M. J. G. Ritchie A. W. Gore M. J. G. Ritchie

and H. F. Lawford E. Renshaw E. Renshaw R. T. Richardson C. E. Welldon E. Renshaw E. Renshaw E. Renshaw H. W. W. Wilberforce E. Renshaw

E. Renshaw

F. 0. Stoker H. Baddeley

E. W. Lewis

F. O. Stoker H. Baddeley H. Baddeley H. Baddeley H. L. Doherty H. L. Doherty H. L. Doherty H. L. Doherty H. L. Doherty F! L. Riseiey H. L. Doherty H. L. Doherty H. L. Doherty F. L. Riseiey A. F. Wilding A. F. Wilding H. Roper Barrett A. F. Wilding

Year.

1888 1889 1890 1891 1892

1893 1894

Ladies' and

E. Renshaw J. C. Kay J. Baldwin J. C. Kay A. Dod W. Baddeley H. S. Mahony

Year. Ladies' Singles.

1898 Miss C. Cooper

1899 Mrs Hillyard

1900 Mrs Hillyard

1901 Mrs Sterry (Miss C.

Cooper)

1902 Miss M. E. Robb

1903 Miss D. K. Douglass

1904 Miss D. K. Douglass

1905 Miss M. Sutton

1906 Miss D. K. Douglass

1907 Miss M. Sutton

1908 Mrs Sterry

1909 Miss D. Boothby

1910 Mrs Lambert Chambers

(Miss Douglass)

Gentlemen’s Doubles.

and Mrs Hillyard Miss Dod Miss K. Hill Miss Jackson Miss Dod Mrs Hillyard. Miss C. Cooper

Year.

1895 1896 1897 1898 1899 1900 1901 1902 1903 1904 1905 1906 1907 1908

1909 1910

Ladies’ and Gentlemen’s Doubles.

H. S. H. S. H. S. H. S. C. H. H. L. S. H. S. H. F. L. S. H. S. H. F. L. N. E. A. F.

Mahony

Mahony

Mahony

Mahony

L. Cazelet

Doherty

Smith

Smith

Riseiey

Smith

Smith

Riseiey

Brookes

Wilding

H. Roper Barrett S. N. Doust

and Miss C. Cooper

,, Miss C. Cooper

„ Miss C. Cooper

,, Miss C. Cooper

,, Miss Robb

,, Miss C. Cooper

„ Miss Martin

• ,, Miss Martin

,, Miss D. K. Douglass

„ Miss E. W. Thompson

,, Miss E. W. Thompson

„ Miss D. K. Douglass

„ Mrs Hillyard

,, Mrs Lambert Chambers (Miss D. K. Douglass)

„ Miss Morton

,, Mrs Lambert Chambers

In the United States lawn-tennis was played at Nahant, near Boston, within a year of its invention in England, Dr James Dwight and the brothers F. R. and R. D. Sears being mainly instrumental in making it known to their countrymen. In 1881 at a meeting in New York of representatives of thirty- three clubs the United States National Lawn-Tennis Association was formed; and the adoption of the English rules put an end to the absence of uniformity in the size of the ball and height of the net which had hindered the progress of the game. The association decided to hold matches for championship of the United States at Newport, Rhode Island; and, by a curious coincidence, in the same year in which W. Renshaw first won the English championship, R. D. Sears won the first American championship by playing a volleying game at the net which entirely disconcerted his opponents, and he successfully defended his title for the next six years, winning the doubles throughout the same period in partnership with Dwight. In 1887, Sears being unable to play through ill-health, the championship went to H. W. Slocum. Other prominent players of the period were the brothers C. M. and J. S. Clark, who in 1883 came to England and were decisively beaten at Wimbledon by the two Renshaws. To a later generation belong the strongest single players, M. D. Whitman, Holcombe Ward, W. A. Larned and Karl Behr. Holcombe Ward and Dwight Davis, who have the credit of intro- ducing the peculiar ” American twist service,” were an ex- ceedingly strong pair in doubles; but after winning the American doubles championship for three years in succession, they were defeated in 1902 by the English brothers R. F. and H. L. Doherty. The championship singles in 1904 and 1905 was won by H. Ward and B. C. Wright, the latter being one of the finest players America has produced; and these two in partnership won the doubles for three years in succession, until they were displaced by F. B. Alexander and H. H. Hackett, who in their turn held the doubles championship for a like period. In 1909 two young Californians, Long and McLoughlin, un- expectedly came to the front, and, although beaten in the final round for the championship doubles, they represented the United States in the contest for the Davis cup (see below) in Australia in that year; McLoughlin having acquired a service of extraordinary power and a smashing stroke with a reverse spin which was sufficient by itself to place him in the highest rank of lawn-tennis players.

Winners of United States Championships.

Year. Gentlemen’s Singles.

1 88 1 R. D. Sears

1882 R. D. Sears

1883 R. D. Sears

1884 R. D. Sears

1885 R. D. Sears

1886 R. D. Sears

1887 R. D. Sears

1888 H. W. Slocum

1889 H. W. Slocum

1890 O. S. Campbell

1 89 1 O. S. Campbell

1892 O. S. Campbell

1893 R. D. Wrenn

1894 R. D. Wrenn

1895 F- H. Hovey

Year. Gentlemen's Singles.

1896 1897 1898 1899 1900 1901 1902 1903 1904 1905 1906 1907 1908 1909 1910

R. D. Wrenn R. D. Wrenn M. D. Whitman M. D. Whitman M. D. Whitman W. A. Larned W. A. Larned H. L. Doherty H. Ward B. C. Wright W. J. Clothier W. A. Larned W. A. Larned W. A. Larned W. A. Larned

3°4

LAWRENCE, ST— LAWRENCE, A.

Year.

Gentlemen's

Doubles.

1882

J. D wight

and R. D. Sears

1883

J. D wight

„ R. D. Sears

1884

J Dwight

„ R. D. Sears

1885′

J. S. Clark

„ R. D. Sears

1886

J. Dwight

„ R. D. Sears

1887

J. Dwight

„ R. D. Sears

1888

V. G. Hall

„ O. S. Campbell

1889

H. W. Slocum ‘

„ H. A. Taylor

1890

V. G. Hall

„ C. Hobart

1891

O. S. Campbell

„ R. P. Huntingdon

1892

O. S. Campbell

„ R. P. Huntingdon

1893

C. Hobart

„ F. H. Hovey

1894

C. Hobart

„ F. H. Hovey

1895

R. D. Wrenn

„ M. G. Chase

1896

C. B. Neel

„ S. R. Neel

1897

L. E. Ware

„ G. P. Sheldon

1898

L. E. Ware

„ G. P. Sheldon

1899

D. F. Davis

„ H. Ward

1900

D. F. Davis

„ H. Ward

1901

D. F. Davis

„ H. Ward

1902

R. F. Doherty

„ H. L. Doherty

1903

R. F. Doherty

„ H. L. Doherty

1904

H. Ward

„ B. C. Wright

1905

H. Ward

„ B. C. Wright

1906

H. Ward

„ B. C. Wright

1907

F. B. Alexander

„ H. H. Hackett

1908

F. B. Alexander

„ H. H. Hackett

1909

F. B. Alexander

„ H. H Hackett

1910

F. B. Alexander

„ H. H. Hackett

Year.

Lad

es’ Singles.

1900 Miss Myrtle McAteer

1890

MissE.

J. Roosevelt

1901 Miss Elizabeth H. Moore

1891

Miss Ma

bel E. Cahill

1902 Miss Marion Jones

1892

Miss Mabel E.Cahill

1903 Miss Elizabeth H. Moore

1893

Miss Aline M. Terry

1904 Miss May Sutton

1894

Miss He

en R. Helwig

1905 Miss Elizabeth H. Moore

1895

Miss J. P. Atkinson

1906 Miss Helen H. Homans

1896

Miss Elizabeth H. Moore

1907 Miss Evelyn Sears

1897

Miss J. P. Atkinson

1908 Mrs Bargcr Wallach

1898

Miss J. P. Atkinson

1909 Miss Hazel Hotchkiss

1899

Miss Marion Jones

1910 Miss Hazel Hotchkiss

Year.

Ladies’ and (

Gentlemen’s Doubles.

1894

E. P. Fischer

and Miss J. P. Atkinson

1895

E. P. Fischer

„ Miss J. P. Atkinson

1896

E. P. Fischer

,, Miss J. P, Atkinson

1897

D. L. Magruder

„ Miss Laura Henson

1898

E. P. Fischer

„ Miss Carrie Neely

1899

A. L. Hoskins

„ Miss Edith Rastall

1900

Alfred Codman

„ Miss M. Hunnewell

1901

R. D. Little

„ Miss Marion Jones

1902

W. C. Grant

„ Miss E. H. Moore

1903

Harry Allen

„ Miss Chapman

1904

W. C. Grant

„ Miss E. H. Moore

1905

Clarence Hobart

„ Mrs Clarence Hobart

1906

E. B. Dewhurst

„ Miss Coffin

1907

W. F. Johnson

„ Miss Say res

1908

N. W. Miles

„ Miss E. Rotch

1909

W. F. Johnson

,, Miss H. Hotchkiss

1910

J. R. Carpenter

,, Miss H. Hotchkiss

In 1900 an international challenge cup was presented by the American D. F. Davis, toTae competed for in the country of the holders. In the summer of that year a British team, consisting of A. W. Gore,E. D. Black and H. R. Barrett, challenged for the cup but were defeated by the Americans, Whitman, Larned, Davis and Ward. In 1902 a more representative British team, the two Dohertys and Pim, were again defeated by the same representatives of the United States; but in the following year the Dohertys brought the Davis cup to England by beating Larned and the brothers Wrenn at Longwood. In 1904 the cup was played for at Wimbledon, when representatives of Belgium, Austria and France entered, but failed to defeat the Dohertys and F. L. Riseley, who represented Great Britain. In 1905 the entries included France, Austria, Australasia, Belgium and the United States; in 1906 the same countries, except Belgium, competed; out in both years the British players withstood the attack. In 1907, however, when the contest' was confined to England, the United States and Australasia, the latter was suc- cessful in winning the cup, which was then for the first time taken to the colonies, where it was retained in the following year when the Australians N. E. Brookes and A. F.Wilding defeated the representatives of the United States, who had previously beaten the English challengers in America. In 1909 England

was not represented in the competition, and the Australians again retained the cup, beating the Americans McLoughlin and Long both in singles and doubles.

See ” The Badminton Library,” Tennis: Lawn-Tennis: Racquets: Fives, new and revised edition (1903) ; R. F. and H. L. Doherty, On Lawn-Tennis (1903); E. H. Miles, Lessons in Lawn-Tennis (1899); E. de Nanteuil, La Paume et le lawn-tennis (1898); J. Dwight, ” Form in Lawn-Tennis,” in Scribner’s Magazine, vol. vi. ; A. Wallis Myers, The Complete Lawn-Tennis Player (1908). (R. J. M.)

LAWRENCE (Laurentius, Lorenzo), ST, Christian martyr, whose name appears in the canon of the mass, and whose festival is on the 10th of August. The basilica reared over his tomb at Rome is still visited by pilgrims. His legend is very popular. Deacon of the pope (St) Sixtus (Xystus) II., he was called upon by the judge to bring forth the treasures of the church which had been committed to his keeping. He thereupon produced the church’s poor people. Seeing his bishop, Sixtus, being led to punishment, he cried: ” Father! whither goest thou without thy son? Holy priest! whither goest thou without thy deacon?” Sixtus prophesied that Lawrence would follow him in three days. The prophecy was fulfilled, and Lawrence was sentenced to be burnt alive on a gridiron. In the midst of his torments he addressed the judge ironically with the words: Assum est, versa et manduca (” I am roasted enough on this side; turn me round, and eat”). All these details of the well-known legend are already related by St Ambrose {De Offic. i. 41, ii. 28). The punishment of the gridiron and the speech of the martyr are probably a reminiscence of the Phrygian martyrs, as related by Socrates (iii. 15) and Sozomen (v. 11). But the fact of the martyrdom is unquestionable. The date is usually put at the persecution of Valerian in 258.

The cult of St Lawrence has spread throughout Christendom, and there are numerous churches dedicated to him, especially in England, where 228 have been counted. The Escurial was built in honour of St Lawrence by Philip II. of Spain, in memory of the battle of St Quentin, which was won in 1557 on the day of the martyr’s festival. The meteorites which appear annually on or about the 10th of August are popularly known as ” the tears of St Lawrence.”

See Acta sanctorum, Augusti ii. 485-532; P. Franchi de’ Cavalieri, S. Lorenzo e il supplicio delta graticola (Rome, 1900); Analecta Bollandiana, xix. 452 and 453; Fr. Arnold-Forster, Studies in Church Dedications or England’s Patron Saints, i. 508-515 iii 18 389-390 (1899). (H. DE.) ‘

LAWRENCE, AMOS (1786-1852), American merchant and philanthropist, was born in Groton, Massachusetts, U.S.A., on the 22nd of April 1786, a descendant of John Lawrence of Wisset, Suffolk,

England, who was one of the first settlers of Groton. Leaving Groton academy (founded by his father, Samuel Lawrence, and others) in 1799, he became a clerk in a country store in Groton, whence after his apprenticeship he went, with $20 in his pocket, to Boston and there set up in business for himself in December 1807. In the next year he took into his employ his brother, Abbott (see below), whom he made his partner in 1814, the firm name being at first A. &• A. Lawrence, and afterwards A. & A. Lawrence & Co. In 1831 when his health failed, Amos Lawrence retired from active business, and Abbott Lawrence was thereafter the head of the firm. The firm became the greatest American mercantile house of the day, was successful even in the hard times of 1812-1815, after- wards engaged particularly in selling woollen and cotton goods on commission, and did much for the establishment of the cotton textile industry in New England: in 1830 by coming to the aid of the financially distressed mills of Lowell, Massa- chusetts, where in that year the Suffolk, Tremont and Lawrence companies were established, and where Luther Lawrence, the eldest brother, represented the firm's interests; and in 1845- 1847 by establishing and building up Lawrence, Massachusetts, named in honour of Abbott Lawrence, who was a director of the Essex company, which controlled the water power of Lawrence, and afterwards was president of the Atlantic Cotton Mills and Pacific Mills there. In 1842 Amos Lawrence decided not to allow his property to increase any further, and in the last eleven years cf his life he spent in charity at least $525,000, a large sum

in those days. He gave to Williams college, to Bowdoin college, to the Bangor theological seminary, to Wabash college, to Kenyon college and to Groton academy, which was re-named Lawrence academy in honour of the family, and especially in recognition of the gifts of William Lawrence, Amos's brother; to the Boston children's infirmary, which he established, and ($10,000) to the Bunker Hill monument fund; and, besides, he gave to many good causes on a smaller scale, taking especial delight in giving books, occasionally from a bundle of books in his sleigh or carriage as he drove. He died in Boston on the 31st of December 1852.

See Extracts from the Diary and Correspondence of the late Amos Lawrence, with a Brief Account of Some Incidents in his Life (Boston, 1856), edited by his son William R. Lawrence.

His brother, Abbott Lawrence (1 792-1855), was born in Groton, Massachusetts, on the 16th of December 1792. Besides being a partner in the firm established by his brother, and long its head, he promoted various New England railways, notably the Boston & Albany. He was a Whig representative in Congress in 1835-1837 and in 1839-1840 (resigning in September 1840 because of ill-health); and in 1842 was one of the commissioners for Massachusetts, who with commissioners from Maine and with Daniel Webster, secretary of state and plenipotentiary of the United States, settled with Lord Ashburton, the British pleni- potentiary, the question of the north-eastern boundary. In 1842 he was presiding officer in the Massachusetts Whig con- vention; he broke with President Tyler, tacitly rebuked Daniel Webster for remaining in Tyler's cabinet after his colleagues had resigned, and recommended Henry Clay and John Davis as the nominees of the Whig party in 1844 — an action that aroused Webster to make his famous Faneuil Hall address. In 1848 Lawrence was a prominent candidate for the Whig nomination for the vice-presidency, but was defeated by Webster's followers. He refused the portfolios of the navy and of the interior in President Taylor's cabinet, and in 1849-1852 was United States minister to Great Britain, where he was greatly aided by his wealth and his generous hospitality. He was an ardent pro- tectionist, and represented Massachusetts at the Harrisburg convention in 1827. He died in Boston on the 18th of August 1855, leaving as his greatest memorial the Lawrence scientific school of Harvard university, which he had established by a gift of $50,000 in 1847 and to which he bequeathed another $50,000; in 1907-1908 this school was practically abolished as a distinct department of the university. He made large gifts to the Boston public library, and he left $50,000 for the erection of model lodging-houses, thus carrying on the work of an Associa- tion for building model lodging-houses for the poor, organized in Boston in 1857.

See Hamilton A. Hill, Memoir of Abbott Lawrence (Boston, 1884). Randolph Anders' Der Weg zum Gliick, oder die Kunst Milliondr zu werden (Berlin, 1856) is a pretended translation of moral maxims from a supposititious manuscript bequeathed to Abbott Lawrence by a rich uncle.

LAWRENCE, AMOS ADAMS (1814-1886), American philan- thropist, son of Amos Lawrence, was born in Groton, Massa- chusetts, U.S.A., on the 31st of July 1814. He graduated at Harvard in 1835, went into business in Lowell, and in 1837 established in Boston his own counting-house, which from 1843 to 1858 was the firm of Lawrence & Mason, and which was a selling agent for the Cocheco mills of Dover, New Hampshire, and for other textile factories. Lawrence established a

hosiery and knitting mill at Ipswich — the first of importance in the country — and was a director in many large corporations. He was greatly interested in the claims of Eleazer Williams of Green Bay, Wisconsin, and through loans to this ” lost dauphin ” came into possession of much land in Wisconsin; in 1849 he founded at Appleton, Wisconsin, a school named in his honour Lawrence university (now Lawrence college). He also contri- buted to funds for the colonization of free negroes in Liberia. In 1854 he became treasurer of the Massachusetts Emigrant Aid Company (reorganized in 1855 as the New England Emigrant Aid Company), which sent 1300 settlers to Kansas, where the city of Lawrence was named in his honour. He contributed

personally for the famous Sharp rifles, which, packed as ” books ” and ” primers,” were shipped to Kansas and afterwards came into the hands of John Brown, who had been a protege of Law- rence. During the contest in Kansas, Lawrence wrote frequently to President Pierce (his mother’s nephew) in behalf of the free- ‘ state settlers; and when John Brown was arrested he appealed to the governor of Virginia to secure for him a lawful trial. On Robinson and others in Kansas he repeatedly urged the necessity of offering no armed resistance to the Federal government; and he deplored Brown’s fanaticism. In 1858 and in i860 he was the Whig candidate for governor of Massachusetts. Till the very outbreak of the Civil War he was a “law and order” man, and he did his best to secure the adoption of the Crittenden compromise; but he took an active part in drilling troops, and in 1862 he raised a battalion of cavalry which became the 2nd Massachusetts Regiment of Cavalry, of which Charles Russell Lowell was colonel. Lawrence was a member of the Protestant Episcopal Church and built (1873-1880) Lawrence hall, Cam- bridge, for the Episcopal theological school, of which he was treasurer. In 1857-1862 he was treasurer of Harvard college, and in 1879-1885 was an overseer. He died in Nahant, Mass., on the 22nd of August 1886.

See William Lawrence, Life of Amos A. Lawrence, with Extracts from Ms Diary and Correspondence (Boston, 1888).

His son, William Lawrence (1850-), graduated in 1871 at Harvard, and in 1875 at the Episcopal theological school, where, after being rector of Grace Church, Lawrence, Mass., in 1876-1884, he was professor of homiletics and natural theology in 1884-1893 and dean in 1888-1893. In 1893 he succeeded Phillips Brooks as Protestant Episcopal bishop of Massachusetts. He wrote A Life of Roger Wolcott, Governor of Massachusetts (1902).

LAWRENCE, GEORGE ALFRED (1827-1876), English novel- ist, was born at Braxted, Essex, on the 25th of March 1827, and was educated at Rugby and at Balliol college, Oxford. He was called to the bar at the Inner Temple in 1852, but soon abandoned the law for literature. In 1857 he published, anony- mously, his first novel, Guy Livingstone, or Thorough. The book achieved a very large sale, and had nine or ten successors of a similar type, the best perhaps being Sword and Gown (.1859). Lawrence may be regarded as the originator in English fiction of the beau sabreur type of hero, great in sport and love and war. He died at Edinburgh on the 23rd of September 1876.

LAWRENCE, SIR HENRY MONTGOMERY (1806-1857), British soldier and statesman in India, brother of the 1st Lord Lawrence (

begun under the tripartite treaty signed at Lahore on the 20th of June 1838. But the Sikhs were slow to play their part after the calamities in Afghanistan. No one but Henry Lawrence could manage the disorderly contingent which they reluctantly supplied to Pollock's avenging army in 1842. He helped to force the Khyber Pass on the 5th of April, playing his guns from the heights, for 8 and 20 m. In recognition of his services Lord Ellenborough appointed him to the charge of the valley of Dehra Dun and its hill stations, Mussoorie and Landour, where he first formed the idea of asylums for the children of European soldiers. After a month's experience there it was discovered that the appointment, was the legal right of the civil service, and he was transferred, as assistant to the envoy at Lahore, to Umballa, where he reduced to order the lapsed territory of Kaithal. Soon he received the office of resident at the protected court of Nepal, where, assisted by his wife, he began a series of contributions to the Calcutta Review, a selected volume of which forms an Anglo-Indian classic. There, too, he elaborated his plans which resulted in the erection and endowment of the noblest philanthropic establishments in the East — the Lawrence military asylums at Sanawar (on the road to Simla), at Murree in the Punjab, at Mount Abu in Rajputana, and at Lovedale on the Madras Nilgiris. From 1844 to his death he devoted all his income, above a modest pittance for his children, to this and other forms of charity.

The Review articles led the new governor-general, Lord Hardinge, to summon Lawrence to his side during the first Sikh War; and not these articles only. He had published the results of his experience of Sikh rule and soldiering in a vivid work, the Adventures of an Officer in the

Service of Ranjit Singh (1845), in which he vainly attempted to disguise his own person- ality and exploits. After the doubtful triumphs of Moodkee and Ferozshah Lawrence was summoned from Nepal to take the place of Major George Broadfoot, who had fallen. Aliwal came; then the guns of Sobraon chased the demoralized Sikhs across the Sutlej. All through the smoke Lawrence was at the side of the governor-general. He gave his voice, not for the rescue of the people from anarchy by annexation, but for the reconstruction of the Sikh government, and was himself appointed resident at Lahore, with power " over every department and to any extent " as president of the council of regency till the maharaja Dhuleep Singh should come of age. Soon disgusted by the " venal and selfish durbar " who formed his Sikh colleagues, he summoned to his side assistants like Nicholson, James Abbott and Edwardes, till they all did too much for the people, as he regretfully confessed. But " my chief confidence was in my brother John, . . . who gave me always such help as only a brother could." Wearied out he went home with Lord Hardinge, and was made K.C.B., when the second Sikh War summoned him back at the end of 1848 to see the whole edifice of Sikh " recon- struction " collapse. It fell to Lord Dalhousie to proclaim the Punjab up to the Khyber British territory on the 29th of March 1849. But still another compromise was tried. As the best man to reconcile the Sikh chiefs to the inevitable, Henry Lawrence was made president of the new board of administration with charge of the political duties, and his brother John was entrusted with the finances. John could not find the revenue necessary for the rapid civilization of the new province so long as Henry would, for political reasons, insist on granting life pensions and alienating large estates to the needy remnants of Ranjit Singh's court. Lord Dalhousie delicately but firmly removed Sir Henry Lawrence to the charge of the great nobles of Rajputana, and installed John as chief commissioner. If resentment burned in Henry's heart, it was not against his younger brother, who would fain have retired. To him he said, " If you preserve the peace of the country and make the people high and low happy, I shall have no regrets that I vacated the field for you."

In the comparative rest of Rajputana he once more took up the pen as an army reformer. In March and September 1856 he published two articles, called forth by conversations with Lord Dalhousie at Calcutta, whither he had gone as the hero of a public banquet. The governor-general had vainly warned

the home authorities against reducing below 40,000 the British garrison of India even for the Crimean War, and had sought to improve the position of the sepoys. Lawrence pointed out the latent

causes of mutiny, and uttered warnings to be too soon justified. In March 1857 he yielded to Lord Canning's request that he should then take the helm at Lucknow, but it was too late. In ten days his magic rule put down administrative difficulties indeed, as he had done at Lahore. But what could even he effect with only 700 European soldiers, when the epidemic spread after the Meerut outbreak of mutiny on the 10th of May? In one week he had completed those preparations which made the defence of the Lucknow residency for ever memorable. Amid the deepening gloom Lord Canning ever wrote home of him as " a tower of strength," and he was appointed provisional governor-general. On the 30th of May mutiny burst forth in Oudh, and he was ready. On the 29th of June, pressed by fretful colleagues, and wasted by unceasing toil, he led 336 British soldiers with n guns and 220 natives out of Chinhat to reconnoitre the insurgents, when the natives joined the enemy and the residency was besieged. On the 2nd of July, as he lay exhausted by the day's work and the terrific heat in an exposed room, a shell struck him, and in forty-eight hours he was no more. A baronetcy was conferred on his son. A marble statue was placed in St Paul's as the national memorial of one who has been declared to be the noblest man that has lived and died for the good of India.

His biography was begun by Sir Herbert Edwardes, and"completed (2 vols. 1872) by Herman Merivale. See also J. J. McLeod Innes, Sir Henry Lawrence (" Rulers of India " series), 1898.

LAWRENCE, JOHN LAIRD MAIR LAWRENCE, ist Baron (1811-1879), viceroy and governor-general of India, was born at Richmond, Yorkshire, on the 24th of March 181 1. His father, Colonel Alexander Lawrence, volunteered for the forlorn hope at Seringapatam in presence of Baird and of Wellington, whose friend he became. His mother, Letitia Knox, was a collateral descendant of John Knox. To this couple were born twelve children, of whom three became famous in India, Sir George St Patrick, Sir Henry (q.v.) and Lord Lawrence. Irish Pro- testants, the boys were trained at Foyle college, Derry, and at Clifton, and received Indian appointments from their mother's cousin, John Hudleston, who had been the friend of Schwartz in Tanjore. In 1829, when only seventeen, John Lawrence landed at Calcutta as a civilian; he mastered the Persian language at the college of Fort William, and was sent to Delhi, on his own application, as assistant to the collector. The position was the most dangerous and difficult to which a Bengal civilian could be appointed at that time. The titular court of the pen- sioner who represented the Great Mogul was the centre of that disaffection and sensuality which found their opportunity in 1857. A Mussulman rabble filled the city. The district

around, stretching from the desert of Rajputana to the Jumna, was slowly recovering from the anarchy to which Lord Lake had given the first blow. When not administering justice in the city courts or under the village tree, John Lawrence was scouring the country after the marauding Meos and Mahommedan free- booters. His keen insight and sleepless energy at once detected the murderer of his official superior, William Fraser, in 1835, in the person of Shams-uddin Khan, the nawab of Loharu, whose father had been raised to the principality by Lake, and the assassin was executed. The first twenty years, from 1829 to 1849, during which John Lawrence acted as the magistrate and land revenue collector of the most turbulent and backward portion of the Indian empire as it then was, formed the period of the reforms of Lord William Bentinck. To what became the lieutenant-governorship of the North-Western (now part of the United) Provinces Lord Wellesley had promised the same permanent settlement of the land-tax which Lord Cornwallis had made with the large landholders or zemindars of Bengal. The court of directors, going to the opposite extreme, had sanctioned leases for only five years, so that agricultural progress was arrested. In 1833 Merttins Bird and James Thomason introduced the system of thirty years' leases based on a careful

survey ot every estate by trained civilians, and on the mapping of every village holding by native subordinates. These two revenue officers created a school of enthusiastic economists who rapidly registered and assessed an area as large as that of Great Britain, with a rural population of twenty-three millions. Of that school John Lawrence proved the most ardent and the most renowned. Intermitting his work at Delhi, he became land revenue settlement officer in the district of Etawah, and there began, by buying out or getting rid of the talukdars, to realize the ideal which he did much to create throughout the rest of his career — a country " thickly cultivated by a fat contented yeomanry, each man riding his own horse, sitting under his own fig-tree, and enjoying his rude family comforts." This and a quiet persistent hostility to the oppression of the people by their chiefs formed the two features of his administrative policy throughout life.

It was fortunate for the British power that, when the first Sikh War broke out, John Lawrence was still collector of Delhi. The critical engagements at Ferozeshah, following Moodkee, and hardly redeemed by Aliwal, left the British army somewhat exhausted at the gate of the

Punjab, in front of the Sikh en- trenchments on the Sutlej. For the first seven weeks of 1846 there poured into camp, day by day, the supplies and munitions of war which this one man raised and pushed forward, with all the influence acquired during fifteen years of an iron yet sympathetic rule in the land between the Jumna and the Sutlej. The crowning victory of Sobraon was the result, and at thirty- five Lawrence became commissioner of the Jullundur Doab, the fertile belt of hill and dale stretching from the Sutlej north to the Indus. The still youthful civilian did for the newly annexed territory what he had long before accomplished in and around Delhi. He restored it to order, without one regular soldier. By the fascination of his personal influence he organized levies of the Sikhs who had just been defeated, led them now against a chief in the upper hills and now to storm the fort of a raja in the lower, till he so welded the people into a loyal mass that he was ready to repeat the service of 1846 when, three years after, the second Sikh War ended in the conversion of the Punjab up to Peshawar into a British province.

Lord Dalhousie had to devise a government for a warlike population now numbering twenty-three millions, and covering an area little less than that of the United Kingdom. The first results were not hopeful; and it was not till John Lawrence became chief commissioner, and stood alone face to face with the chiefs and people and ring fence of still untamed border tribes, that there became possible the most successful experi- ment in the art of civilizing turbulent millions which history presents. The province was mapped out into districts, now numbering thirty-two, in addition to thirty-six tributary states, small and great. To each the thirty years' leases of the north- west settlement were applied, after a patient survey and assess- ment by skilled officials ever in the saddle or the tent. The revenue was raised on principles so fair to the peasantry that Ranjit Singh's exactions were reduced by a fourth, while agri- cultural improvements were encouraged. For the first time in its history since the earliest Aryan settlers had been over- whelmed by successive waves of invaders, the soil of the Punjab came to have a marketable value, which every year of British rule has increased. A stalwart police was organized; roads were cut through every district, and canals were constructed. Commerce followed on increasing cultivation and communica- tions, courts brought justice to every man's door, and crime hid its head. The adventurous and warlike spirits, Sikh and Mahom- medan, found a career in the new force of irregulars directed by the chief commissioner himself, while the Afghan, Dost Mahommed, kept within his own fastnesses, and the long extent of frontier at the foot of the passes was patrolled.

Seven years of such work prepared the lately hostile and always anarchic Punjab under such a pilot as John Lawrence not only to weather the storm of 1857 but to lead the older provinces into port. On the 12th of May the news of the tragedies at Meerut and Delhi reached him at Rawalpindi. The

position was critical in the last degree, for of 50,000 native soldiers 38,000 were Hindustanis of the very class that had mutinied elsewhere, and the British troops were few and scattered. For five days the fate of the Punjab hung upon a thread, for the question was, ” Could the 12,000 Punjabis be trusted and the 38,000 Hindustanis be disarmed?” Not an hour was lost in beginning the disarming at Lahore; and, as one by one the Hindustani corps succumbed to the epidemic of mutiny, the sepoys were deported or disappeared, or swelled the military rabble in and around the city of Delhi. The remembrance of the ten years’ war which had closed only in 1849, a bountiful harvest, the old love of battle, the offer of good pay, but, above all, the personality of Lawrence and his officers, raised the Punjabi force into a new army of 59,000 men, and induced the non-combatant classes to subscribe to a 6% loan. Delhi wa? invested, but for three months the rebel city did not fall. Under John Nicholson, Lawrence sent on still more men to the siege* till every available European and faithful native soldier was there, while a movable column swept the country, and the border was kept by an improvised militia. At length, when even in the Punjab confidence became doubt, and doubt distrust, and that was passing into disaffection, John Lawrence was ready to consider whether we should not give up the Peshawar valley to the Afghans as a last resource, and send its garrison to recruit the force around Delhi. Another week and that alternative must have been faced. But on the 20th of September the city and palace of Delhi were again in British hands, and the chief commissioner and his officers united in ascribing ” to the Lord our God all the praise due for nerving the hearts of our states- men and the arms of our soldiers.” As Sir John Lawrence, Bart., G.C.B., with the thanks of parliament, the gratitude of his country, and a life pension of £ 2000 a year in addition to his ordinary pension of £1000, the ” saviour of India ” re- turned home in 1859. After guarding the interests of India and its people as a member of the secretary of state’s council, he was sent out again in 1864 as viceroy and governor-general on the death of Lord Elgin. If no great crisis enabled Lawrence to increase his reputation, his five years’ administration of the whole Indian empire was worthy of the ruler of the Punjab. His foreign policy has become a subject of imperial interest, his name being associated with the ” close border ” as opposed to the ” forward ”

policy; while his internal administration was remarkable for financial prudence, a jealous regard for the good of the masses of the people and of the British soldiers, and a generous interest in education, especially in its Christian aspects.

When in 1854 Dost Mahommed, weakened by the antagonism of his brothers in Kandahar, and by the interference of Persia, sent his son to Peshawar to make a treaty, Sir John Lawrence was opposed to any entangling relation with the Afghans after the experience of 1838-1842, but he obeyed Lord Dalhousie so far as to sign a treaty of perpetual peace and friendship. His ruling idea, the fruit of long and sad experience, was that de facto powers only should be recognized beyond the frontier. When in 1863 Dost Mahommed's death let loose the factions of Afghanistan he acted on this policy to such an extent that he recognized both the sons, Afzul Khan and Shere AH, at different times, and the latter fully only when he had made himself master of all his father's kingdom. The steady advance of Russia from the north, notwithstanding the Gˆrtchakov circular of 1864, led to severe criticism of this cautious " buffer " policy which he justified under the term of " masterly inactivity." But he was ready to receive Shere Ali in conference, and to aid him in con- solidating his power after it had been established and maintained for a time, when his term of office came to an end and it fell to Lord Mayo, his successor, to hold the Umballa conference in 1869. When, nine years after, the second Afghan War was precipitated, the retired viceroy gave the last days of his life to an unsparing exposure, in the House of Lords and in the press, of a policy which he had striven to prevent in its inception, and which he did not cease to denounce in its course and consequences. On his final return to England early in 1869, after forty years'

service in and for India, " the great proconsul of our English Christian empire " was created Baron Lawrence of the Punjab, and of Grately, Hants. He assumed the same arms and crest as those of his brother Henry, with a Pathan and a Sikh trooper as supporters, and took as his motto " Be ready," his brother's being " Never give in." For ten years he gave himself to the work of the London school board, of which he was the first chairman, and of the Church missionary society. Towards the end his eyesight failed, and on the 27th of June 1879 he died at the age of sixty-eight. He was buried in the nave of Westminster Abbey, beside Clyde, Outram and Livingstone. He had married the

daughter of the Rev. Richard Hamilton, Harriette-Katherine, who survived him, and he was succeeded as 2nd baron by his eldest son, John Hamilton Lawrence (b. 1846).

See Bosworth Smith, Life of Lord Lawrence (1885); Sir Charles Aitchison, Lord Lawrence ("Rulers of India" series, 1892); L. J. Trotter, Lord Lawrence (1880); and F. M. Holmes, Four Heroes of India.

LAWRENCE, STRINGER (1697-1775), English soldier, was born at Hereford on the 6th of March 1697. He seems to have entered the army in 1727 and served in Gibraltar and Flanders, subsequently taking part in the battle of Culloden. In 1748, with the rank of major and the reputation of an experienced soldier, he went out to India to command the East India Com- pany's troops. Dupleix's schemes for the French conquest of southern India were on the point of taking effect, and not long after his arrival at Fort St David, Stringer Lawrence was actively engaged. He successfully foiled an attempted French surprise at Cuddalore, but subsequently was captured by a French cavalry patrol at Ariancopang near Pondicherry and kept prisoner till the peace of Aix-la-Chapelle. In 1749 he was in command at the capture of Devicota. On this occasion Clive served under him and a life-long friendship began. On one occasion, when Clive had become famous, he honoured the creator of the Indian army by refusing to accept a sword of honour unless one was voted to Lawrence also. In 1750 Lawrence returned to England, but in 1752 he was back in India. Here he found Clive in command of a force intended for the relief of Trichinopoly. As senior officer Lawrence took over the command, but was careful to allow Clive every credit for his share in the subsequent operations, which included the relief of Trichinopoly and the surrender of the entire French besieging force. In 1752 with an inferior force he defeated the French at Bahur (Behoor) and in 1753 again relieved Trichinopoly. For the next seventeen months he fought a series of actions in defence of this place, finally arranging a three months' armistice, which was afterwards converted into a conditional treaty. He had commanded in chief up to the arrival of the first detachment of regular forces of the crown. In 1757 he served in the operations against Wandiwash, and in 1 7 58-1 7 59 was in command of Fort St George during the siege by the French under Lally. In 1759 failing health compelled him to return to England. He resumed his command in 1761 as major-general and commander-in-chief. Clive supplemented his old friend's inconsiderable income by settling on him an annuity of £500 a year. In 1765 he presided over the board charged with arranging the reorganization of the Madras army, and he finally retired the following year. He died in London on the 10th of

January 1775. The East India Company erected a monument to his memory in Westminster Abbey. See Biddulph, Stringer Lawrence (1901).

LAWRENCE, SIR THOMAS (1 769-1830), English painter, was born at Bristol on the 4th of May 1769. His father was an innkeeper, first at Bristol and afterwards at Devizes, and at the age of six Thomas was already shown off to the guests of the Black Boar as an infant prodigy who could sketch their likenesses and declaim speeches from Milton. In 1779 the elder Lawrence had to leave Devizes, having failed in business, and the precocious talent of the son, who had gained a sort of reputation along the Bath road, became the support of the family. His debut as a crayon portrait painter was made at Oxford, where he was well patronized, and in 1782 the family settled in Bath, where the young artist soon found himself fully employed in taking crayon likenesses of the fashionables of the

place at a guinea or a guinea and a half a head. In 1784 he gained the prize and silver-gilt palette of the Society of Arts for a crayon drawing after Raphael's " Transfiguration," and presently beginning to paint in oil. Throwing aside the idea of going on the stage which he had for a short time entertained, he came to London in 1787, was kindly received by Reynolds, and entered as a student at the Royal Academy. He began to exhibit almost immediately, and his reputation increased so rapidly that he became an associate of the Academy in 1791. The death of Sir Joshua in 1792 opened the way to further successes. He was at once appointed painter to the Dilettanti society, and principal painter to the king in room of Reynolds. In 1794 he was a Royal Academician, and he became the fashionable portrait painter of the age, having as his sitters all the rank, fashion and talent of England, and ultimately most of the crowned heads of Europe. In 1815 he was knighted; in 1818 he went to Aix-la-Chapelle to paint the sovereigns and diplomatists gathered there, and visited Vienna and Rome, everywhere receiving flattering marks of distinction from princes, due as much to his courtly manners as to his merits as an artist. After eighteen months he returned to England, and on the very day of his arrival was chosen pres- ident of the Academy in room of West, who had died a few days before. This office he held from 1820 to his death on the 7th of January 1830. He was never married.

Sir Thomas Lawrence had all the qualities of personal manner and artistic style necessary to make a fashionable painter, and among English portrait painters he takes a high place, though not as high as

that given to him in his lifetime. His more ambitious works, in the classical style, such as his once celebrated ” Satan,” are practically forgotten.

The best display of Lawrence’s work is in the Waterloo Gallery of Windsor, a collection of much historical interest. ” Master Lambton,” painted for Lord Durham at the price of 600 guineas, is regarded as one of his best portraits, and a fine head in the National Gallery, London, shows his power to advantage. The Life and Correspondence of Sir T. Lawrence, by D. E. Williams, appeared in

1831.

LAWRENCE, a city and the county-seat of Douglas county, Kansas, U.S.A., situated on both banks of the Kansas river, about 40 m. W. of Kansas City. Pop. (1890) 9997, (190.0) 10,862, of whom 2032 were negroes, (1910 census) 12,374. It is served by the Atchison, Topeka & Santa Fe and the Union Pacific railways, both having tributary lines extending N. and S. Lawrence is surrounded by a good farming region, and is itself a thriving educational and commercial centre. Its site slopes up from the plateau that borders the river to the heights above, from which there is a view of rare beauty. Among the city’s principal public buildings are the court house and the Y.M.C.A. building. The university of Kansas, situated on Mount Oread, overlooking the city, was first opened in 1866, and in 190/-1908 had a faculty of 105 and 2063 students, including 702 women (see Kansas). Just S. of the city of Lawrence is Haskell institute (1884), one of the largest Indian schools in the country, main- tained for children of the tribal Indians by the national govern- ment. In 1907 the school had 813 students, of whom 313 were girls; it has an academic department, a business school and courses in domestic science, in farming, dairying and gardening, and in masonry, carpentry, painting, blacksmithing, waggon- making, shoemaking, steam-fitting, printing and other trades. Among the city’s manufactures are flour and grist mill products, pianos and cement plaster. Lawrence, named in honour of Amos A. Lawrence, was founded by agents of the Massachusetts Emigrant Aid Company in July 1854, and during the Territorial period was the political centre of the free-state cause and the principal point against which the assaults of the pro-slavery party were directed. It was first known as Wakarusa, from the creek by which it lies. A town association was organized in September 1854 before any Territorial government had been established. In the next month some pro-slavery men presented claims to a part of the land, projected a rival town to be called Excelsior on the same site, and threatened violence; but when Lawrence had organized its ” regulators ” the pro-slavery men

retired and later agreed to a compromise by which the town

site was limited to 640 acres. In December 1855 occurred the ” Wakarusa war.” A free-state man having been murdered for his opinions, a friend who threatened retaliation was arrested by the pro-slavery sheriff, S. J. Jones; he was rescued and taken to Lawrence; the city disclaimed complicity, but Jones persuaded Governor Wilson Shannon that there was rebellion, and Shannon authorized a posse; Missouri responded, and a pro-slavery force marched on Lawrence. The governor found that Lawrence had not resisted and would not resist the service of writs; by a written ” agreement ” with the free-state leaders he therefore withdrew his sanction from the Missourians and averted battle. The retreating Missourians committed some homicides. It was during this ” war ” that John Brown first took up arms with the free-state men. Preparations for another attack continued, particularly after Sheriff Jones, while serving writs in Lawrence, was wounded. On the 21st of May 1856, at the head of several hundred Missourians, he occupied the city without resistance, destroyed its printing offices and the free-state headquarters and pillaged private houses. In 1855 and again in 1857 the pro-slavery Territorial legislature passed an Act giving Lawrence a charter, but the people of Lawrence would not recognize that ” bogus ” government, and on the 13th of July r857, after an application to the Topeka free-state legislature for a charter had been denied, adopted a city charter of their own. Governor Walker proclaimed this rebellion against the United States, appeared before the town in command of 400 United States dragoons and declared it under martial law; as perfect order prevailed, and there was no overt resistance to Territorial law, the troops were withdrawn after a few weeks by order of President Buchanan, and in February 1858 the legislature passed an Act legalizing the city charter of July 1857. On the 21st of August 1863 W 7 illiam C. Quantrell and some 400 mounted Missouri bushrangers surprised the sleeping town and murdered 150 citizens. The city’s arms were in storage and no resistance was possible. This was the most distressing episode in all the turbulence of territorial days and border warfare in Kansas. A monument erected in 1895 commemorates the dead. After the free-state men gained control of the Territorial legislature in 1857 the legislature regularly adjourned from Lecompton, the legal capital, to Lawrence, which was practically the capital until the choice of Topeka under the Wyandotte constitution. The first railway to reach Lawrence was the Union

Pacific in

1864.

See F. W. Blackmar, ” The Annals of an Historic Town,” in the Annual Report of the American Historical Association for 1893 (Washington, 1894).

LAWRENCE, a city, and one of the three county-seats (Salem and Newburyport are the others) of Essex county, Massachusetts, U.S.A., on both sides of the Merrimac river, about 30 m. from its mouth and about 26 m. N.N.W. of Boston. Pop. (1890) 44.654, (1900) 62,559, of whom 28,577 were foreign-born (7058 being Irish, 6999 French Canadians, 513 1 English, 2465 German, 1683 English Canadian), and (1910 census) 85,892. It is served by the Boston & Maine railroad and by electric railways to Andover, Boston, Lowell, Haverhill and Salem, Massachusetts, and to Nashua and Salem, New Hamp- shire. The city’s area of 6-54 sq. m. is about equally divided by the Merrimac, which is here crossed by a great stone dam 900 ft. long, and, with a fall of 28ft., supplies about 12,000 horse- power. Water from the river is carried to factories by a canal on each side of the river and parallel to it; the first canal was built on the north side in 1845-1847 and is 1 m. long; the canal on the south side is about fm. long, and was built several years later. There are large and well-kept public parks, a common (17 acres) with a soldiers’ monument, a free public library, with more than 50,000 volumes in 1907, a city hall, county and municipal court-houses, a county gaol and house of correction, a county industrial school and a state armoury.

The value of the city’s factory product was $48,036,593 in 1905, $41,741,980 in 1900. The manufacture of textiles is the most important industry; in 1905 the city produced worsteds valued at $30,926,964 and cotton goods worth $5,745,611,

the worsted product being greater than that of any other American city. The Wood worsted mill here is said to be the largest single mill in the world. The history of Lawrence is largely the history of its textile mills. The town was formed in 1845 from parts of Andover (S. of the Merrimac) and of Methuen (N. of the river), and it was incorporated as a town in 1847, being named in honour of Abbott Lawrence, a director of the Essex company, organized in 1845 (on the same day as the formation of the town) for the control of the water power and for the construction of the great dam across the Merrimac. The Bay State woollen mills, which in 1858 became the Washington mills, and the Atlantic cotton mills were both chartered in 1846. The Pacific mills

(1853) introduced from Englandin 1854 Lister combs for worsted manufacture; and the Washington mills soon afterward began to make worsted dress goods. Worsted cloths for men's wear seem to have been made first about 1870 at nearly the same time in the Washington mills here, in the Hockanum mills of Rock- ville, Connecticut, and in Wanskuck mills, Providence, Rhode Island. The Pemberton mills, built in 1853, collapsed and after- wards took fire on the 10th of January i860; 90 were killed and hundreds severely injured. Lawrence was chartered as a city in 1853, and annexed a small part of Methuen in 1854 and parts of Andover and North Andover in 1879.

See H. A. Wadsworth, History of Lawrence, Massachusetts (Lawrence, 1880).

LAWRENCEBURG, a city and the county-seat of Dearborn county, Indiana, U.S.A., on the Ohio river, in the S.E. part of the state, 22 m. (by rail) W. of Cincinnati. Pop. (1890) 4284, (1900) 4326 (413 foreign-born); (1910) 3930. Lawrenceburg is served by the Baltimore & Ohio South- Western and the Cleveland, Cincinnati, Chicago & St Louis railways, by the Cincinnati, Lawrenceburg & Aurora electric street railroad, and by river packets to Louisville and Cincinnati. The city lies along the river and on higher land rising 100 ft. above river-level. It formerly had an important river trade with New Orleans, beginning about 1820 and growing in volume after the city became the terminus of the Whitewater canal, begun in 1836. The place was laid out in 1802. In 1846 an " old " and a " new " settlement were united, and Lawrenceburg was chartered as a city. Lawrence- burg was the birthplace of James B. Eads, the famous engineer, and of John Coit Spooner (b. 1843), a prominent Republican member of the United States Senate from Wisconsin in 1885- 1891 and in 1897-1907; and the Presbyterian Church of Law- renceburg was the first charge (1837-1839) of Henry Ward Beecher.

LAWSON, CECIL GORDON (1851-1882), English landscape painter, was the youngest son of William Lawson of Edinburgh, esteemed as a portrait painter. His mother also was known for her flower pieces. He was born near Shrewsbury on the 3rd of December 1851. Two of his brothers (one of them, Malcolm, a clever musician and song-writer) were trained as artists, and Cecil was from childhood devoted to art with the intensity of a serious nature. Soon after his birth the Lawsons moved to London. Lawson's first works were studies of fruit, flowers, &c, in the manner of W. Hunt; followed by riverside Chelsea subjects. His first exhibit at the Royal Academy (1870) was " Cheyne Walk," and in 1871 he sent two other Chelsea subjects. These gained full recognition from fellow- artists, if not from the public. Among his

friends were now numbered Fred Walker, G. J. Pinwell and their associates. Following them, he made a certain number of drawings for wood-engraving. Lawson's Chelsea pictures had been painted in somewhat low and sombre tones; in the " Hymn to Spring " of 1872 (rejected by the Academy) he turned to a more joyous play of colour, helped by work in more romantic scenes in North Wales and Ireland. Early in 1874 he made a short tour in Holland, Belgium and Paris; and in the summer he painted his large " Hop Gardens of England." This was much praised at the Academy of 1876. But Lawson's triumph was with the great luxuriant canvas " The Minister's Garden," exhibited in 1878 at the Grosvenor Gallery, and now in the Manchester Art Gallery. This was followed by several works conceived

in a new and tragic mood. His health began to fail, but he worked on. He married in 1879 the daughter of Birnie Philip, and settled at Haslemere. His later subjects are from this neighbourhood (the most famous being " The August Moon," now in the National Gallery of British Art) or from Yorkshire. Towards the end of 1881 he went to the Riviera, returned in the spring, and died at Haslemere on the 10th of June 1882. Lawson may be said to have restored to English landscape the tradition of Gainsborough, Crome and Constable, infused with an imagi- native intensity of his own. Among English landscape painters of the latter part of the 19th century his is in many respects the most interesting name.

See E. W. Gosse, Cecil Lawson, a Memoir (1883) ; Heseltihe Owen, " In Memoriam: Cecil Gordon Lawson," Magazine of Art (1894)- (L. B.)

LAWSON, SIR JOHN (d. 1665), British sailor, was born at Scarborough. Joining the parliamentary navy in 1642, he accompanied Penn to the Mediterranean in 1650, where he served for some time. In 1652 he served under Blake in the Dutch War and was present at the first action in the Downs and the battle of the Kentish Knock. At Portland, early in 1653, he was vice-admiral of the red, and his ship was severely handled. Lawson took part in the battles of June and July in the following summer. In 1654-1655 he commanded in the North Sea and) the Channel. Appointed in January 1655-1656 as Blake's second-in-command, Lawson was a few weeks later summarily dismissed from his command, probably for political reasons. He was a Republican and Anabaptist, and therefore an enemy to Cromwell. It is not improbable that like Penn and others he was detected in

correspondence with the exiled Charles II., who certainly hoped for his support. In 1657, along with Harrison and others, he was arrested and, for a short time, imprisoned for conspiring against Cromwell. Afterwards he lived at Scarborough until the fall of Richard Cromwell's govern- ment. During the troubled months which succeeded that event Lawson, flying his flag as admiral of the Channel fleet, played a marked political role. His ships escorted Charles to England, and he was soon afterwards knighted. Sent out in 1661 with Montagu, earl of Sandwich, to the Mediterranean, Lawson conducted a series of campaigns against the piratical states of the Algerian coast. Thence summoned to a command in the Dutch War, he was mortally wounded at Lowestoft. He died on the 29th of June 1665.

See Charnock, Biographia navalis, i. 20; Campbell, Lives of the Admirals, ii. 251; Penn, Life of Sir William Penn; Pepys, Diary.

LAWSON, SIR WILFRID, Bart. (1829-1906), English politician and temperance leader, son of the 1st baronet (d. 1867), was born on the 4th of September 1829. He was always an enthusiast in the cause of total abstinence, and in parliament, to which he was first elected in 1859 for Carlisle, he became its leading spokesman. In 1864 he first introduced his Permissive Bill, giving to a two-thirds majority in any district a veto upon the granting of licences for the sale of intoxicating liquors; and though this principle failed to be embodied in any act, he had the satisfaction of seeing a resolution on its lines accepted by a majority in the House of Commons in 1880, i88iand 1883. He lost his seat for Carlisle in 1865, but in 1868 was again returned as a supporter of Mr Gladstone, and was member till 1885; though defeated for the new Cockermouth division of Cumberland in 1885, he won that seat in 1886, and he held it till the election of 1900, when his violent opposition to the Boer War caused his defeat, but in 1903 he was returned for the Camborne division of Cornwall and at the general election of 1906 was once more elected for his old constituency in Cumberland. During all these years he was the champion of the United Kingdom Alliance (founded 1853), of which he became president. An extreme Radical, he also supported disestablishment, abolition of the House of Lords, and disarmament. Though violent in the expression of his opinions, Sir Wilfrid Lawson remained very popular for his own sake both in and out of the House of Commons; he became well known for his humorous vein, his faculty for composing topical doggerel being often exercised on questions of the day. He died on the 1st of July 1906.

LAY, a word of several meanings. Apart from obsolete and dialectical usages, such as the East Anglian word meaning " pond," possibly

cognate with Lat. lacus, pool or lake, or its use in weaving for the batten of a loom, where it is a variant form of ” lath,” the chief uses are as follows: (1) A song or, more accurately, a short poem, lyrical or narrative, which could be sung or accompanied by music; such were the romances sung by minstrels. Such an expression as the ” Lay of the Nibelungen ” is due to mistaken association of the word with Ger. Lied, song, which appears in Anglo-Saxon as leoft. ” Lay ” comes from O. Fr. lai, of which the derivation is doubtful. The New English Dictionary rejects Celtic origins sometimes put forward, such as Ir. laoidh, Welsh llais, and takes O. Mid. and High Ger. leich as the probable source. (2) ” Non-clerical ” or ” unlearned.” In this sense ” lay ” comes directly from Fr. lai (laique, the learned form nearer to the Latin, is now used) from Lat. laicus, Gr. Xgukos, of or belonging to the people (Xaos, Attic Xecos). The word is now specially applied to persons who are not in orders, and more widely to those who do not belong to other learned professions, particularly the law and medicine. The New English Dictionary quotes two examples from versions of the Bible. In the Douai version of 1 Sam. xxi. 4, Ahimelech tells David that he has ” no lay bread at hand but only holy bread “; here the Authorized Version has ” common bread,” the Vulgate laicos panes. In Coverdale’s version of Acts iv. 13, the high priest and his kindred marvel at Peter and John as being ” unlearned and lay people “; the Authorized Version has ” unlearned and ignorant men.” In a cathedral of the Church of England ” lay clerks ” and ” lay vicars ” sing such portions of the service as may be performed by laymen and clergy in minor orders. ” Lay readers ” are persons who are granted a commission by the bishop to perform certain religious duties in a particular parish. The commission remains in force until it is revoked by the bishop or his successors, or till there is a new incumbent in the parish, when it has to be renewed. In a religious order a ” lay brother ” is freed from duties at religious services performed by the other members, and from their studies, but is bound by vows of obedience and chastity and serves the order by manual labour. For ” lay impropriator ” see Appropriation, and for ” lay rector ” see Rector and Tithes; see further Laymen, Houses of. (3) “Lay” as a verb means ” to make to lie down,” ” to place upon the ground,” &c. The past tense is ” laid “; it is vulgarly confused with the verb ” to lie,” of which the past is ” lay.” The common root of both “lie” and “lay” is represented by O. Teut. leg; cf. Dutch leggen, Ger. legen, and Eng. “ledge.” 1 (4) “Lay- figure ” is the name commonly given to articulated figures of human beings or animals, made of wood, papier-mache or other materials; draped and posed, such figures serve as models for artists (see Models, Artists). The word has no connexion with .” to lay,” to place in position, but is an adaptation of the word ” layman,”

commonly used with this meaning in the 18th century. This was adapted from Dutch leeman (the older form is ledenman) and meant an ” articulated or jointed man ” from led, now lid, a joint ; cf . Ger. Gliedermann.

LAYA, JEAN LOUIS (1761-1833), French dramatist, -was born in Paris on the 4th of December 1761 and died in August 1833. He wrote his first comedy in collaboration with Gabriel M. J. B. Legouve in 1785, but the piece, though accepted by the Comedie Francaise, was never represented. In 1789 he produced a plea for religious toleration in the form of a five-act tragedy in verse, Jean Calas; the injustice of the disgrace cast on a family by the crime of one of its members formed the theme of Les Dangers de V opinion (1790); but it is by his Ami des lois (1793) that Laya is remembered. This energetic protest against mob-rule, with its scarcely veiled characterizations of Robespierre as Nomophage and of Marat as Duricrane, was an act of the highest courage, for the play was produced at the Theatre Francais (temporarily Theatre de la Nation) only

1 The verb ” to lie,” to speak falsely, to tell a falsehood, is in O. Eng. Uogan; it appears in most Teutonic languages, e.g. Dutch lugen, Ger. liigen.

nineteen days before the execution of Louis XVI. Ten days after its first production the piece was prohibited by the commune, but the public demanded its representation; the mayor of Paris was compelled to appeal to the convention, and the piece was played while some 30,000 Parisians guarded the hall. Laya went into hiding, and several persons convicted of having a copy of the obnoxious play in their possession were guillotined. At the end of the Terror Laya returned to Paris. In 1813 he re- placed Delille in the Paris chair of literary history and French poetry, he was admitted to the Academy in 181 7. Laya pro- duced in 1797 Les Deux Stuarts, and in 1799 Falkland, the title- role of which provided Talma with one of his finest oppor- tunities. Laya’s works, which chiefly owe their interest to the circumstances attending their production, were collected in

1836-1837.

See Notice biographique sur J. L. Laya (1833); Ch. Nodier, Discours de reception, 26th December 1833); Welschinger, Theatre de la

revolution (1880).

LAYAMON, early English poet, was the author of a chronicle of Britain entitled Brut, a paraphrase of the Brut a" Angleterre by Wace, a native of Jersey, who is also known as the author of the Roman de Ron. The excellent edition of Layamon by Sir F. Madden (Society of Antiquaries, London, 1847) should be consulted. All that is known concerning Layamon is derived from two extant MSS., which present texts that often vary considerably, and it is necessary to understand their comparative value before any conclusions can be drawn. The older text (here called the A-text) lies very near the original text, which is unfortunately lost, though it now and then omits lines which are absolutely necessary to the sense. The later text (here called the B-text) represents a later recension of the original version by another writer who frequently omits couplets, and alters the language by the substitution of better-known words for such as seemed to be obsolescent; e.g. harme (harm) in place of balewe (bale), and dead in place of feie (fated to die, or dead). Hence little reliance can be placed on the B-text, its chief merit being that it sometimes preserves couplets which seem to have been accidentally omitted in A; besides which, it affords a valuable commentary on the original version.

We learn from the brief prologue that Layamon was a priest among the people, and was the son of Leovenath (a late spelling of A.-S. Leofnoth); also, that he lived at Ernley, at a noble church on Severn bank, close by Radstone. This is certainly Areley Regis, or Areley Kings, close by Redstone rock and ferry, 1 m. to the S. of Stourport in Worcestershire. The B-text turns Layamon into the later form Laweman, i.e. Law-man, correctly answering to Chaucer's " Man of Lawe," though here apparently used as a mere name. It also turns Leovenath into Leuca, i.e. Leofeca, a diminutive of Leofa, which is itself a pet- name for Leofnoth; so that there is no real contradiction. But it absurdly substitutes " with the good knight, "which is practically meaningless, for " at a noble church."

We know no more about Layamon except that he was a great lover of books; and that he procured three books in particular which he prized above others, " turning over the leaves, and beholding them lovingly." These were: the English book that St Beda made; another in Latin that St Albin and St Austin made; whilst the third was made by a French clerk named Wace, who (in 1155) gave a copy to the noble Eleanor, who was queen of the high king Henry (i.e. Henry II.).

The first of these really means the Anglo-Saxon translation of Beda's Ecclesiastical History, which begins with the words: " Ic Beda, Cristes

theow," i.e. " I, Beda, Christ's servant." The second is a strange description of the original of the transla- tion, i.e. Albinus Beda's own Latin book, the second paragraph of which begins with the words: " Auctor ante omnes atque adiutor opusculi huius Albinus Abba reverentissimus vir per omnia doctissimus extitit "; which Layamon evidently mis- understood. As to the share of St Augustine in this work, see Book I., chapters 23-34, and Book II., chapters 1 and 2, which are practically all concerned with him and occupy more

than a tenth of the whole work. The third book was Wace's poem, Brut d' Angleterre. But we find that although Layamon had ready access to all three of these works, he soon settled down to the translation of the third, without troubling much about the others. His chief obligation to Beda is for the well- known story about Pope Gregory and the English captives at Rome; see Layamon, vol. iii. 180.

It is impossible to enter here upon a discussion of the numerous points of interest which a proper examination of this vast ˆnd important work would present to any careful inquirer. Only a few bare results can be here enumerated. The A-text may be dated about 1205, and the B-text (practically by another writer) about 1275. Both texts, the former especially, are remarkably free from admixture with words of French origin; the lists that have been given hitherto are inexact, but it may be said that the number of French words in the A-text can hardly exceed 100, or in the B-text 160. Layamon's work is largely original; Wace's Brut contains 15,300 lines, and Layamon's 32,240 lines of a similar length; and many of Layamon's additions to Wace are netable, such as his story " regarding the fairy elves at Arthur's birth, and his transportation by them after death in a boat to Avalon, the abode of Argante, their queen "; see Sir F. Madden's pref. p. xv. Wace's Brut is almost wholly a translation of the Latin chronicle concerning the early history of Britain by Geoffrey of Monmouth, who said that he obtained his materials from a manuscript written in Welsh. The name Brut is the French form of Brutus, who was the fabulous grand- son of Ascanius, and great-grandson of Aeneas of Troy, the hero of Virgil's Aeneid. After many adventures, this Brutus arrived in England, founded Troynovant or New Troy (better known as London), and was the progenitor of a long line of British kings, among whom were Locrine, Bladud, Leir, Gorboduc, Ferrex and Porrex, Lud, Cymbeline, Constantine, Vortigern, Uther and Arthur; and from this mythical Brutus the name Brut was transferred so as to denote the entire chronicle of this British history. Layamon gives the whole story, from the time of Brutus to that of Cadwalader, who may be identified with the Caedwalla of the Anglo-Saxon Chronicle, baptized by Pope Sergius in the year 688. Both texts of Layamon are in a south- western dialect;

the A-text in particular shows the Wessex dialect of earlier times (commonly called Anglo-Saxon) in a much later form, and we can hardly doubt that the author, as he intimates, could read the old version of Beda intelligently. The remarks upon the B-text in Sir F. Madden's preface are not to the point; the peculiar spellings to which he refers (such as same for shame) are by no means due to any confusion with the Northumbrian dialect, but rather to the usual vagaries of a scribe who knew French better than English, and had some difficulty in acquiring the English pronunciation and in representing it accurately. At the same time, he was not strong in English grammar, and was apt to confuse the plural form with the singular in the tenses of verbs; and this is the simple explanation of most of the examples of so-called " nunnation " in this poem (such as the use of wolden for wolde), which only existed in writing and must not be seriously considered as representing real spoken sounds. The full proof of this would occupy too much space; but it should be noticed that, in many instances, "this pleonastic n has been struck out or erased by a second hand." In other instances it has escaped notice, and that is all that need be said. The peculiar metre of the poem has been sufficiently treated by J. Schipper. An abstract of the poem has been given by Henry Morley; and good general criticisms of it by B. ten Brink and others.

See Layamon's Brut, or a Chronicle of Britain; a Poetical Semi-Saxon Paraphrase of the Brut of Wace; ... by Sir F. Madden (1847) ;B. ten Brink, Early English Literature, trans, by H.M.Kennedy (in Bonn's Standard Library, 1885); H Morley, English Writers, vol. iii. (1888); J. Schipper, Englische Metrik,'. (Bonn, 1882), E. Guest, A History of English Rhythms (new ed. by W. W. Skeat, 1882) , Article "Layamon," in the Diet. Nat. Biog.; Six Old English Chronicles, including Gildas, Nennius and Geoffrey of Monmouth (in Bohn's Antiquarian Library) ; Le Roux de Lincy, Le Roman de Brut, par Wace, avec un commentaire et des notes (Rouen, 1836—1838), E. Matzner, Altenglische Sprachproben (Berlin, 1867), (W. W. S.)

LAYARD, SIR AUSTEN HENRY (1817-1894), British author and diplomatist, the excavator of Nineveh, was born in Paris on the 5th of March 181 7. The Layards were of Huguenot descent. His father, Henry P. J. Layard, of the Ceylon Civil Service, was the son of Charles Peter Layard, dean of Bristol, and grandson of Daniel Peter Layard, the physician. Through his mother, a daughter of Nathaniel Austen,

banker, of Ramsgate, he inherited Spanish blood. This strain of cosmopolitanism must have been greatly strengthened by the circumstances of his education. Much of his boyhood was spent in Italy, where he received part of his schooling, and acquired a taste for the fine arts and a love of travel; but he was at school also in England, France and Switzerland. After spending nearly six years in the office of his uncle, Benjamin Austen, a solicitor, he was tempted to leave England for Ceylon by the prospect of obtaining an appointment in the civil service, and he started in 1839 with the intention of making an overland journey across Asia. After wandering for many months, chiefly in Persia, and having abandoned his intention of proceeding to Ceylon, he returned in 1842 to Constantinople, where he made the acquaintance of Sir Stratford Canning, the British ambassador, who employed him in various unofficial diplomatic missions in European Turkey. In 1845, encouraged and assisted by Canning, Layard left Con- stantinople to make those explorations among the ruins of Assyria with which his name is chiefly associated. This expedi- tion was in fulfilment of a design which he had formed, when, during his former travels in the East, his curiosity had been greatly excited by the ruins of Nimrud on the Tigris, and by the great mound of Kuyunjik, near Mosul, already partly excavated by Botta. Layard remained in the neighbourhood of Mosul, carrying on excavations at Kuyunjik and Nimrud, and in- vestigating the condition of various tribes, until 1847; and, returning to England in 1848, published Nineveh and its Remains: “xith an A ccount of a Visit to the Chaldaean Christians of Kurdistan, and the Yezidis, or Devil-worshippers; and an Inquiry into the Manners and Arts of the Ancient Assyrians (2 vols.,1848-1849). To illustrate the antiquities described in this work he published a large folio volume of Illustrations of the Monuments of Nineveh (1849). After spending a few months in England, and receiving the degree of D.C.L. from the university of Oxford, Layard returned to Constantinople as attache to the British embassy, and, in August 1849, started on a second expedition, in the course of which he extended his investigations tc the ruins of Babylon and the mounds of southern Mesopotamia. His record of this expedition, Discoveries in the Ruins of Nineveh and Babylon, which was illustrated by another folio volume, called A Second Series of the Monuments of Nineveh, was published in 1853. During these expeditions, often in circumstances of great difficulty, Layard despatched to England the splendid specimens which now form the greater part of the collection of Assyrian antiquities in the British Museum. Apart from the archaeo- logical value of his work in identifying Kuyunjik as the site of Nineveh, and in providing a great mass of materials for scholars to work upon, these two books of Layard’s are among the best- written books of travel in

the language.

Layard now turned to politics. Elected as a Liberal member for Aylesbury in 1852, he was for a few weeks under-secretary for foreign affairs, but afterwards freely criticized the govern- ment, especially in connexion with army administration. He was present in the Crimea during the war, and was a member of the committee appointed to inquire into the conduct of the expedition. In 1855 he refused from Lord Palmerston an office not connected with foreign affairs, was elected lord rector of Aberdeen university, and on 15th June moved a resolution in the House of Commons (defeated by a large majority) declaring that in public appointments merit had been sacrificed to private influence and an adherence to routine. After being defeated at Aylesbury in 1857, he visited India to investigate the causes of the Mutiny. He unsuccessfully contested York in 1859, but was elected for South wark in i860, and from 1861 to 1866 was under-secretary for foreign affairs in the successive administra- tions of Lord Palmerston and Lord John Russell. In 1866 he

was appointed a trustee of the British Museum, and in 1868 chief commissioner of works in W. E. Gladstone's government and a member of the Privy Council. He retired from parliament in 1869, on being sent as envoy extraordinary to Madrid. In 1877 he was appointed by Lord Beaconsfield ambassador at Constantinople, where he remained until Gladstone's return to power in 1880, when he finally retired from public life. In 1878, on the occasion of the Berlin conference, he received the grand cross of the Bath. Layard's political life was somewhat stormy. His manner was brusque, and his advocacy of the causes which he had at heart, though always perfectly sincere, was vehement to the point sometimes of recklessness. Layard retired to Venice, where he devoted much of his time to collecting pictures of the Venetian school, and to writing on Italian art. On this subject he was a disciple of his friend G. Morelli, whose views he embodied in his revision of F. Kugler's Handbook of Painting, Italian Schools (1887). He wrote also an introduction to Miss Ffoulkes's translation of Morelli's Italian Painters (1892-1893), and edited that part of Murray's Handbook of Rome (1894) which deals with pictures. In 1887 he published, from notes taken at the time, a record of his first journey to the East, entitled Early Adventures in Persia, Susiana and Babylonia. An abbreviation of this work, which as a book of travel is even more delightful than its predecessors, was published in 1894, shortly after the author's death, with a brief introductory notice by Lord Aberdare. Layard also from time to time contributed papers to various learned societies, including the Huguenot Society, of which he was first president. He died in London on the 5th of July 1894. (A.

Gl.)

■ LAYMEN, HOUSES OF, deliberative assemblies of the laity of the Church of England, one for the province of Canterbury, and the other for the province of York. That of Canterbury was formed in 1886, and that of York shortly afterwards. They are merely consultative bodies, and the primary intention of their foundation was to associate the laity in the deliberations of convocation. They have no legal status. The members are elected by the various diocesan conferences, which are in turn elected by the laity of their respective parishes or rural deaneries. Ten members are appointed for the diocese of London, six for each of the dioceses of Winchester, Rochester, Lichfield and Worcester; and four for each of the remaining dioceses. The president of each house has the discretionary power of appointing additional laymen, not exceeding ten in number.

LAYNEZ (or Lainez), DIEGO (1512-1565), the second general of the Society of Jesus, was born in Castile, and after studying at Alcala joined Ignatius of Loyola in Paris, being one of the six who with Loyola in August 1534 took the vow of missionary work m Palestine in the Montmartre church. This plan fell through, and Laynez became professor of scholastic theology at Sapienza. After the order had been definitely established (1540) Laynez was sent to Germany. He was one of the pope's theo- logians at the council of Trent (q.v.), where he played a weighty and decisive part. When Loyola died in 1556 Laynez acted as vicar of the society, and two years later became general. Before his death at Rome, on the 19th of January 1 565, he had immensely strengthened the despotic constitution of the order and developed its educational activities (see Jesuits).

His Disputationes Tridentinae were published in 2 volumes in 1886. Lives by Michel d'Esne (Douai, 1597) and Pet. Ribadeneira (Madrid, 1592; Lat. trans, by A. Schott, Antwerp, 1598). See also H. Miiller, Les Origines de la Compagnie de Jesus: Ignace et Lainez

(1898).

LAZAR, one afflicted with the disease of leprosy (q.v.). The term is an adaptation in medieval Latin of the name of Lazarus (q.v.), in Luke xvi. 20, who was supposed to be a leper. The word was not confined to persons suffering from leprosy; thus Caxton (The Life of Charles the Great, 37), " there atte laste were guarysshed and heled viij lazars of the palesey."

Lazaretto or Lazar-House is a hospital for the reception of poor

persons suffering from the plague, leprosy or other infectious or contagious diseases. A peculiar use of ” lazaretto ” is found in the application of the term, now obsolete, to a place in the after-part of a merchant vessel for the storage of provisions, &c.

Lazzarone, a name now often applied generally to beggars, is an Italian term, particularly used of the poorest class of Neapolitans, who, without any fixed abode, live by odd jobs and fishing, but chiefly by begging.

LAZARITES (Lazarists or Lazarians), the popular names of the ” Congregation of Priests of the Mission ” in the Roman Catholic Church. It had its origin in the successful mission to the common people conducted by St Vincent de Paul (q.v.) and five other priests on the estates of the Gondi family. More immediately it dates from 1624, when the little community acquired a permanent settlement in the college des Bons Enfans in Paris. Archiepiscopal recognition was obtained in 1626; by a papal bull of the 12th of January 1632, the society was constituted a congregation, with St Vincent de Paul at its head. About the same time the canons regular of St Victor handed over to the congregation the priory of St Lazarus (formerly a lazar-house) in Paris, whence the name of Lazarites or Lazarists. Within a few years they had acquired another house in Paris and set up other establishments throughout France; missions were also sent to Italy (1638), Tunis (1643), Algiers and Ireland (1646). Madagascar (1648) and Poland (1651). A fresh bull of Alexander VII. in April 1655 further confirmed the society; this was followed by a brief in September of the same year, regulating its constitution. The rules then adopted, which were framed on the model of those of the Jesuits, were published at Paris in 1668 under the title Regulae sen constitntiones com- munes congregationis missionis. The special objects contemplated were the religious instruction of the lower classes, the training of the clergy and foreign missions. During the French Revolution the congregation was suppressed and St Lazare plundered by the mob; it was restored by Napoleon in 1804 at the desire of Pius VII., abolished by him in 1809 in consequence of a quarrel with the pope, and again restored in 1816. The Lazarites were expelled from Italy in 1871 and from Germany in 1873. The Lazarite province of Poland was singularly prosperous; at the date of its suppression in 1796 it possessed thirty-five establish- ments. The order was permitted to return in 1816, but is now extinct there. In

Madagascar it had a mission from 1648 till 1674. In 1783 Lazarites were appointed to take the place of the Jesuits in the Levantine and Chinese missions; they still have some footing in China, and in 1874 their establishments through- out the Turkish empire numbered sixteen. In addition, they established branches in Persia, Abyssinia, Mexico, the South American republics, Portugal, Spain and Russia, some of which have been suppressed. In the same year they had fourteen establishments in the United States of America. The total number of Lazarites throughout the world is computed at about 3000. Amongst distinguished members of the congregation may be mentioned: P. Collet (1693-1 770), writer on theology and ethics; J. de la Grive (1689-1757), geographer; E. Bore (d. 1878), orientalist; P. Bertholon (1689-1757), physician; and Armand David, Chinese missionary and traveller.

See Regulae sen constitutiones communes congregationis missionis (Paris, 1668); Memoires de la congregation de la mission (1863); Congregation de la mission. Repertoire hislorique (1900); Notices bibliographiques sur les ecrivains de la congregation de la mission (Angouleme, 1878); P. Helyot, Diet, des ordres religieux, viii. 64-77; M. Heimbrecher, Die Orden und Kongregationen der kalholischen Kirche, ii. (1897); C. Stork in Wetzcr and VVelte's Kirchenlexikon (Catholic), vii. ; E. Bougaud, History of St Vincent de Paul (1908).

LAZARUS (a contracted form of the Heb. name Eleazar, " God has helped," Gr. Aafapos), a name which occurs in the New Testament in two connexions.

1. Lazarus of Bethany, brother of Martha and Mary. The story that he died and after four days was raised from the dead is told by John (xi., xii.) only, and is not mentioned by the Synoptists. By many this is regarded as the greatest of Christ's miracles. It produced a great effect upon many Jews; the Acta Pilati says that Pilate trembled when he heard of it, and, according to Bayle's Dictionary, Spinoza declared that if he were persuaded of its truth he would become a Christian. The story has been attacked more vigorously than any other portion of the Fourth Gospel, mainly on two grounds, (i.) the fact that,

in spite of its striking character, it is omitted by the Synoptists, and (ii.) its unique significance. The personality of Lazarus in John's account, his relation to Martha and Mary, and the possibility that John reconstructed the story by the aid of inferences from the story of the supper in Luke x. 40, and that of the anointing of Christ in Bethany given by Mark and Matthew, are among the chief problems. The controversy has given rise to a great mass of literature,

discussions of which will be found in the lives of Christ, the biblical encyclopaedias and the commentaries on St John.

2. Lazarus is also the name given by Luke (xvi. 20) to the beggar in the parable known as that of “La.zarus and Dives,” 1 illustrating the misuse of wealth. There is little doubt that the name is introduced simply as part of the parable, and not with any idea of identifying the beggar with Lazarus of Bethany. It is curious, not only that Luke’s story does not appear in the other gospels, but also that in no other of Christ’s parables is a name given to the central character. Hence it was in early times thought that the story was historical, not allegorical (see Lazar). LAZARUS, EMMA (1849-1887), American Jewish poetess, was born in New York. When the Civil War broke out she was soon inspired to lyric expression. Her first book (1867) included poems and translations which she wrote between the ages of fourteen and seventeen. As yet her models were classic and romantic. At the age of twenty-one she published Admetus and other Poems (1871). Admetus is inscribed to Emerson, who greatly influenced her, and with whom she maintained a regular correspondence for several years. She led a retired life, and had a modest conception of her own powers. Much of her next work appeared in Lippincott’s Magazine, but in 1874 she published a prose romance (Alide) based on Goethe’s autobiography, and received a generous letter of admiration from Turgeniev. Two years later she visited Concord and made the acquaintance of the Emerson circle, and while there read the proof-sheets of her tragedy The Spagnoletto. In 1881 she published her excellent translations of Heine’s poems. Meanwhile events were occurring which appealed to her Jewish sympathies and gave a new turn to her feeling. The Russian massacres of 1880-1881 were a trumpet-call to her. So far her Judaism had been latent. She belonged to the oldest Jewish congregation of New York, but she had not for some years taken a personal part in the observances of the synagogue. But from this time she took up the cause of her race, and ” her verse rang out as it had never rung before, a clarion note, calling a people to heroic action and unity; to the consciousness and fulfilment of a grand destiny.” Her poems, ” The Crowing of the Red Cock ” and ” The Banner of the Jew ” (1882) stirred the Jewish consciousness and helped to produce the new Zionism {q.v.). She now wrote another drama, the Dance to Death, the scene of which is laid in Nordhausen in the 14th century; it is based on the accusation brought against the Jews of poisoning the wells and thus causing the Black Death. The Dance to Death was included (with some translations of medieval Hebrew poems) in Songs of a Semite (r882), which she dedicated to George Eliot. In 1885 she visited Europe. She devoted much of the short remainder of her life to

the cause of Jewish nationalism. In 1887 appeared By the waters of Babylon, which consists of a series of ‘ prose poems,” full of prophetic fire. She died in New York on the rpth of November 1887. A sonnet by Emma Lazarus is engraved on a memorial tablet on the colossal Bartholdi statue of Liberty, New York.

See article in the Century Magazine, New Series, xiv. 875 (portrait p. 803), afterwards prefixed as a Memoir to the collected edition of The poems of Emma Lazarus (2 vols., 1889). (I. A.)

LAZARUS, HENRY (1815-1895), British clarinettist, was born in London on the 1st of January 18 15, and was a pupil of Blizard, bandmaster of the Royal Military Asylum, Chelsea, and subsequently of Charles Godfrey, senior, bandmaster of the Coldstream Guards. He made his first appearance as a soloist at a concert of Mme Dulcken’s, in April 1838, and in that year

1 The English Bible does not use Lat. Dives (rich) as a proper name, saying merely ” a certain rich man.” The idea that Dives was a proper name arose from the Vulgate quidam dives, whence it became a conventional name for a rich man.

he was appointed as second clarinet to the Sacred Harmonic Society. From Willman’s death in 1840 Lazarus was principal clarinet at the opera, and all the chief festivals and orchestral concerts. His beautiful tone, excellent phrasing and accurate execution were greatly admired. He was professor of the clarinet at the Royal Academy of Music from 1854 until within a short time of his death, and was appointed to teach his instrument at the Military School of Music, Kneller Hall, in 1858. His last public appearance was at a concert for his benefit in St James’s Hall, in June 1892, and he died on the 6th of March

1895.

LAZARUS, MORITZ (1824-1903), German philosopher, was born on the 15th of September 1824 at Filehne, Posen. The son of a rabbinical scholar, he was educated in Hebrew literature and history, and subsequently in law and philosophy at the university of Berlin. From i860 to 1866 he was professor in the university of Berne, and subsequently returned to Berlin as professor of philosophy in the kriegsakademie (1868) and later in the university of Berlin (1873). On the occasion of his seventieth birthday he was honoured with the title

of Geheimrath. The fundamental principle of his philosophy was that truth must be sought not in metaphysical or a priori abstractions but in psychological investigation, and further that this investigation cannot confine itself successfully to the individual consciousness, but must be devoted primarily to society as a whole. The psychologist must study mankind from the historical or compara- tive standpoint, analysing the elements which constitute the fabric of society, with its customs, its conventions and the main tendencies of its evolution. This V olkerpsychologie (folk- or comparative psychology) is one of the chief developments of the Herbartian theory of philosophy; it is a protest not only against the so-called scientific standpoint of natural philosophers, but also against the individualism of the positivists. In support of his theory he founded, in combination with H. Steinthal, the Zeitschrift fiir V olkerpsychologie und Sprachwissenschaft (1859). His own contributions to this periodical were numerous and important. His chief work was Das Leben der Seele (Berlin,

1855-1857; 3rd edition, 1

Other philosophical works

were: — Ueber den Ursprung der Sitten (i860 and 1867), Ueber die Idcen in der Geschichte (1865 and 1872); Zur Lehre von den Sinnestdnschungen (1867); Ideale Fragen (1875 and 1885), Erziehung und Geschichte (1881); Unser Standpunkt (1881); Ueber die Reizc des Spiels (1883). Apart from the great interest of his philosophical work, Lazarus was pre-eminent among the Jews of the so-called Semitic domination in Germany. Like Heine, Auerbach and Steinthal, he rose superior to the narrower ideals of the German Jews, and took a leading place in German literature and thought. Fie protested against the violent anti-Semitism of the time, and, in spite of the moderate tone of his publications, drew upon himself unqualified censure. He wrote in this connexion a number of articles collected in 1887 under the title Treu und Frci. Rcden und Vortrdge tibcr Juden u).l Judenthum. In 1869 and 1871 he was president of the first and second Jewish Synods at Leipzig and Augsburg.

See R. Flint, The Philosophy of History in Europe; M. Brasch, Gesammelte Essays und Characterkopfe zur neuen Philos. und Litera- tur; E. Berliner, Lazarus und die bffentliche Meinung; M. Brasch, ” Der Begriinder de Volkerpsychologie,” in Nord et Sud (September

1894)-

LAZARUS, ST, ORDER OF, a religious and military order

founded in Jerusalem about the middle of the 12th century. Its primary object was the tending of the sick, especially lepers, of whom Lazarus (see Lazar) was regarded as the patron. From the 13th century, the order made its way into various countries of Europe — Sicily, Lower Italy and Germany (Thuringia) ; but its chief centre of activity was France, where Louis IX. (1253) gave the members the lands of Boigny near Orleans and a building at the gates of Paris, which they turned into a lazar-house for the use of the lepers of the city. A papal confirmation was obtained from Alexander IV. in 1255. The knights were one hundred in number, and possessed the right of marrying and receiving pensions charged on ecclesiastical benefices. An eight-pointed cross was the insignia of both the French and Italian orders. The gradual disappearance of leprosy combined with other causes to secularize the order more and more. In Savoy in 1572 it was merged by Gregory XIII. (at the instance of Emanuel Philibert, duke of Savoy) in the order of St Maurice (see Knighthood and Chivalry: Orders of Knighthood, Italy). The chief task of this branch was the defence of the Catholic faith, especially against the Protestantism of Geneva. It continued to exist till the second half of the 19th century. In 1608 it was in France united by Henry IV. with the order of Notre-Dame du Mont-Carmel. It was treated with especial favour by Louis XIV., and the most brilliant period of its existence was from 1673 to 1691, under the marquis de Louvois. From that time it began to decay. It was abolished at the Revolution, reintroduced during the Restoration, and formally abolished by a state decree of 1830.

See L. Mainbourg, Hist, des croisades (1682; Eng. trans, by Nalson, 1686); P. Helyot, Hist, des ordres monastiques (1714), pp. 2 57i 386; J. G. Uhlhorn, Die christliche Liebesthatigheit im Mittelalter (Stuttgart, 1884); articles in Herzog-Hauck's Realencyklopadie fur protestantische Theologie, xi. (1902) and Wetzer and Welte's (Catholic) Kirchenlexikon, vii. (1891).

LEA, HENRY CHARLES (1825-1909), American historian, was born at Philadelphia on the 19th of September 1825. His father was a publisher, whom in 1843 he joined in business, and he retained his connexion with the firm till 1880. Weak, health, however, caused him from early days to devote himself to research, mainly on church history in the later middle ages, and his literary reputation rests on the important books he produced on this subject. These are: Superstition and Force (Philadelphia, 1866, new ed. 1892) ; Historical Sketch of Sacerdotal Celibacy (Philadelphia, 1867); History of the Inquisition of the Middle Ages (New York, 1888); Chapters from the religious history of Spain connected with the Inquisition (Philadelphia, 1890); History of auricular Confession and Indulgences in the Latin Church (3 vols., London, 1896); The Moriscos of Spain (Philadelphia, 1901), and History of the Inquisition of Spain (4 vols., New York and London, 1 906-1 907). He also edited a Formulary of the Papal Penitentiary in the 13th century (Phila- delphia, 1892), and in 1908 was published his Inquisition in the Spanish Dependencies. As an authority on the Inquisition he stood in the highest rank of modern historians, and distinctions were conferred on him by the universities of Harvard, Princeton, Pennsylvania, Giessen and Moscow. He died at Philadelphia on the 24th of October 1909.

LEAD (pronounced leed), a city of Lawrence county, South Dakota, U.S.A., situated in the Black Hills, at an altitude of about 5300 ft., 3m. S.W. of Deadwood. Pop. (1890) 2581,(1900) 6210, of whom 2145 were foreign-born, (1905) 8217, (1910) 8392. In 1905 it was second in population among the cities of the state. It is served by the Chicago, Burlington & Quincy, the Chicago & North-Western, and the Chicago, Milwaukee & St Paul railways. Lead has a hospital, the Hearst Free Library and the Hearst Free Kindergarten, and is the see of a Roman Catholic bishopric. It is the centre of the mining interests of the Black Hills, and the Homestake Gold Mine here contains perhaps the largest and most easily worked mass of low-grade ore and one of the largest mining plants (1000 stamps) in the world ; it has also three cyanide mills. From 1878 to 1906 the value of the gold taken from this mine amounted to about $58,000,000, and the net value of the product of 1906 alone was approximately $5,313,516. For two months in the spring of 1907 the mine was rendered idle by a fire (March 25), which was so severe that it was necessary to flood the entire mine. Mining tools and gold jewelry are manufactured. The first settlement was made here by mining prospectors in July 1876. Lead was chartered as a city in 1890 and became a city of the first class in 1904.

LEAD, a metallic chemical element; its symbol is Pb (from the Lat. plumbum), and atomic weight 207-10 (0=16). This metal was known

to the ancients, and is mentioned in the Old Testament. The Romans used it largely, as it is still used, for the making of water pipes, and soldered these with an alloy of lead and tin. Pliny treats of these two metals as plumbum nigrum and plumbum album respectively, which seems to show

that at his time they were looked upon as being only two varieties of the same species. In regard to the ancients' knowledge of lead compounds, we may state that the substance described by Dioscorides as iwhvfidaiva was undoubtedly litharge, that Pliny uses the word minium in its present sense of red lead, anu that white lead was well known to Geber in the 8th century. The alchemists designated it by the sign of Saturn .

Occurrence. — Metallic lead occurs in nature but very rarely and then only in minute amount. The chief lead ores are galena and cerussite; of minor importance are anglesite, pyromorphite and mimetesite (qq.v.). Galena (?.».), the principal lead ore, has a world-wide distribution, and is always contaminated with silver sulphide, the proportion of noble metal varying from about o-oi or less to 0-3%, and in rare cases coming up to | or 1%. Fine-grained galena is usually richer in silver than the coarse- grained. Galena occurs in veins in the Cambrian clay-slate, accompanied by copper and iron pyrites, zinc-blende, quartz, calc- spar, iron-spar, &c; also in beds or nests within sandstones and rudimentary limestones, and in a great many other geological formations. It is pretty widely diffused throughout the earth's crust. The principal English lead mines are in Derbyshire; but there are also mines at Allandale and other parts of western Northumberland, at Alston Moor and other parts of Cumberland, in the western parts of Durham, in Swaledale and Arkendale and other parts of Yorkshire, in Salop, in Cornwall, in the Mendip Hills in Somersetshire, and in the Isle of Man. The Welsh mines are chiefly in Flint, Cardigan and Montgomery shires; the Scottish in Dumfries, Lanark and Argyll; and the Irish in Wicklow, Waterford and Down. Of continental mines we may mention those in Saxony and in the Harz, Germany; those of Carinthia, Austria; and especially those of the southern provinces of Spain. It is widely distributed in the United States, and occurs in Mexico and Brazil; it is found in Tunisia and Algeria, in the Altai Mountains and India, and in New South Wales, Queensland, and in Tasmania.

The native carbonate or cerussite (q.v.) occasionally occurs in the pure form, but more frequently in a state of intimate intermixture with clay ("lead earth," Bleierde), limestone, iron oxides, &c. (as in the ores of Nevada and Colorado), and some times also with coal (" black lead ore "). All native carbonate of lead seems to be derived from what was originally galena, which is always present in it as an admixture. This ore, metallurgically, was not reckoned of much value, until immense quantities of it were discovered in Nevada and in Colorado (U.S.). The Nevada mines are mostly grouped around the city of Eureka, where the ore occurs in " pockets " disseminated at random through lime-stone. The crude ore contains about 30% lead and 0-2 to 0-3% silver. The Colorado lead district is in the Rocky Mountains, a few miles from the source of the Arkansas river. It forms gigantic deposits of almost constant thickness, embedded between a floor of limestone and a roof of porphyry. Stephens's discovery of the ore in 1877 was the making of the city of Leadville, which, in 1878, within a year of its foundation, had over 10,000 in- habitants. The Leadville ore contains from 24 to 42% lead and o- 1 to 2 % silver. In Nevada and Colorado the ore is worked chiefly for the sake of the silver. Deposits are also worked at Broken Hill, New South Wales.

Anglesite, or lead sulphate, $PbS0_4$, is poor in silver, and is only exceptionally mined by itself; it occurs in quantity in France, Spain, Sardinia and Australia. Of other lead minerals we may mention the basic sulphate lanarkite, $PbO\text{-}PbS0_4$; leadhillite, $PbS0_4\text{-}3PbC0_3$; the basic chlorides matlockite, $PbO\text{-}PbCl_2$, and mendipite, $PbCl_2\text{-}2PbO$; the chloro-phosphate pyro- morphite, $PbCl_2\text{-}3Pb_3(P0_4)$:>, the chloro-arsenate mimetesite, $PbCl_2\text{-}3Pb_3(As0_4)_2$; the molybdate wulfenite, $PbMo0_4$; the chromate crocoite or crocoisite, $PbCr0_4$; the tungstate stolzite, $PbW0_4$.

Production. —At the beginning of the 19th century the bulk of the world's supply of lead was obtained from England and Spain, the former contributing about 17,000 tons and the latter 10,000 tons annually. Germany, Austria, Hungary, France, Russia and the United States began to rank as producers during the second and third decades; Belgium entered in about 1840; Italy in the 'sixties;

Mexico, Canada, Japan and Greece in the 'eighties ; while Australia assumed importance in 1888 with a production of about 18,000 tons, although it had contributed small and varying amounts for many preceding decades. In 1850 England headed the list of producers with about 66,000 tons; this amount had declined in 1872 to 61,000 tons. Since this date, it has, on the whole, diminished, although large outputs occurred in isolated years, for instance, a production of

40,000 tons in 1893 was followed by 60,000 tons in 1896 and 40,000 in 1897. The output in 1900 was 35,000 tons, and in 1905, 25,000 tons. Spain ranked second in 1850 with about 47,000 tons; this was increased in 1863, 1876 and in 1888 to 84,000, 127,000 and 187,000 tons respectively; but the maximum outputs mentioned were preceded and succeeded by periods of depression. In 1900 the production was 176,000 tons, and in 1905, 179,000 tons. The United States, which ranked third with a production of 20,000 tons in 1850, maintained this annual yield, until 1870, when it began to increase; the United States now ranks as the chief producer; in 1900 the output was 253,000 tons, and in 1905, 319,744 tons. Ger- many has likewise made headway; an output of 12,000 tons in 1850 being increased to 120,000 tons in 1900 and to 152,590 in 1905. This country now ranks third, having passed England in 1873. Mexico increased its production from 18,000 tons in 1883 to 83,000 tons in 1900 and about 88,000 tons in 1905. The Australian pro- duction of 18,000 tons in 1888 was increased to 58,000 tons in 1891, a value maintained until 1893, when a depression set in, only 21,000 tons being produced in 1897; prosperity then returned, and in 1898 the yield was 68,000 tons, and in 1905, 120,000 tons. Canada became important in 1895 with a production of 10,000 tons; this increased to 28,654 tons in 1900; and in 1905 the yield was 25,391 tons. Italy has been a fairly steady producer; the output in 1896 was 20,000 tons, and in 1905, 25,000 tons.

Metallurgy.

The extraction of the metal from pure (or nearly pure) galena is the simplest of all metallurgical operations. The ore is roasted (i.e. heated in the presence of atmospheric oxygen) until all the sulphur is burned away and the lead left. This simple state- ment, however, correctly formulates only the final result. The first effect of the roasting is the elimination of sulphur as sulphur- dioxide, with formation of oxide and sulphate of lead. In practice this oxidation process is continued until the whole of the oxygen is as nearly as possible equal in weight to the sulphur present as sulphide or as sulphate, i.e. in the ratio S : O2. The heat is then raised in (relative) absence of air, when the two elements named unite into sulphur-dioxide, while a regulus of molten lead remains. Lead ores are smelted in the rever- beratory furnace, the ore-hearth, and the blast-furnace. The use of the first two is restricted, as they are suited only for galena ores or mixtures of galena and carbonate, which contain not less than 58% lead and not more than 4% silica; further, ores to be treated in the ore-hearth should run low in or be free from silver, as the* loss in the fumes is excessive. In the blast-furnace all lead ores are successfully smelted. Blast- furnace treatment has therefore become more general than any other.

Three types of reverberatory practice are in vogue — the English, Carinthian and Silesian. In Wales and the south of England the process is conducted in a reverberatory furnace, the sole of which is paved with slags from previous operations, and has a depression in the middle where the metal formed collects to be let off by a tap-hole. The dressed ore is introduced through a ” hopper ” at the top, and exposed to a moderate oxidizing flame until a certain proportion of ore is oxidized, openings at the side enabling the workmen to s-tir up the ore so as to constantly renew the surface exposed to the air. At this stage as a rule some rich slags of a former operation are added and a quantity of quicklime is incorporated, the chief object of which is to diminish the fluidity of the mass in the next stage, which consists in this, that, with closed air-holes, the heat is raised so as to cause the oxide and sulphate on the one hand and the sulphide on the other to reduce each other to metal. The lead produced runs into the hollow and is tapped off. The roasting process is then resumed, to be followed by another reduction, and so on.

A similar process is used in Carinthia; only the furnaces are smaller and of a somewhat different form. They are long and narrow; the sole is plane, but slopes from the fire-bridge towards the flue, so that the metal runs to the latter end to collect in pots placed outside the furnace. In Carinthia the oxidizing process from the first is pushed on so far that metallic lead begins fo show, and the oxygen introduced

predominates over the sulphur left. The mass is then stirred to liberate the lead, which is removed as Ruhrblei. Charcoal is now added, and the heat urged on to obtain Pressblei, an inferior metal formed partly by the action of the charcoal on the oxide of lead. The fuel used is fir-wood.

The Silesian furnace has an oblong hearth sloping from the fire- bridge to the flue-bridge. This causes the lead to collect at the coolest part of the hearth, whence it is tapped, &c, as in the English furnace. While by the English and Carinthian processes as much lead as possible is extracted in the furnace, with the Silesian method a very low temperature is used, thus taking out about one-half of the lead and leaving very rich slags (50% lead) to be smelted in the blast-furnace, the ultimate result being a very much higher yield than by either of the other processes. The loss in lead by the combined reverberatory and blast-furnace treatment is only 3-2 %. In Cumberland, Northumberland, Durham and latterly the United States, the reverberatory furnace is used only for roasting the ore, and the oxidized ore is then reduced by fusion in a low, square blast- furnace (a ” Scottish hearth furnace “) lined with cast iron, as is also the inclined sole-plate which is made to project beyond the furnace, the outside portion (the ” work-stone “) being provided with grooves guiding any molten metal that may be placed on the “stone” into a cast iron pot; the “tuyere” for the introduc- tion of the wind was, in the earlier types, about half way down the furnace.

As a preliminary to the melting process, the ” browse ” left in the preceding operation (half-fused and imperfectly reduced ore) is introduced with some peat and coal, and heated with the help of the blast. It is then raked out on the work-stone and divided into a very poor ” grey ” slag which is put aside, and a richer portion, which goes back into the furnace. Some of the roasted ore is strewed upon it, and, after a quarter of an hour’s working, the whole is taken out on the work-stone, where the lead produced runs off. The ” browse,” after removal of the ” grey ” slag, is reintroduced, ore added, and, after a quarter of an hour’s heating, the mass again placed on the work-stone, &c.

In the more recent form of the hearth process the blocks of cast iron forming the sides and back of the Scottish furnace are now generally replaced in the United States by water-cooled shells (water- jackets) of

cast iron. In this way continuous working has been rendered possible, whereas formerly operations had to be stopped every twelve or fifteen hours to allow the over-heated blocks and furnace to cool down. A later improvement (which somewhat changes the mode of working) is that by Moffett. While he also prevents interruption of the operation by means of water-jackets, he uses hot-blast, and produces, besides metallic lead, large volumes of lead fumes which are drawn off by fans through long cooling tubes, and then forced through suspended bags which filter off the dust, called ” blue powder.” Thus, a mixture of lead sulphate (45 °o) and oxide (44%) with some sulphide (8%), zinc and carbon- aceous matter, is agglomerated by a heap-roast and then smelted in a slag-eye furnace with grey slag from the ore-hearth. The furnace has, in addition to the usual tuyeres near the bottom, a second set near the throat in order to effect a complete oxidation of all combustible matter. Much fume is thus produced. This is drawn off, cooled and filtered, and forms a white paint of good body, consisting of about 65% lead sulphate, 26% lead oxide, 6% zinc oxide and 3% other substances. Thus in the Moffett method it is immaterial whether metal or fume is produced, as in either case it is saved and the price is about the same.

In smelting at once in the same blast-furnace ores of different character, the old use of separate processes-of precipitation, roasting and reduction, and general reduction prevailing in the Harz Mountains, Freiberg and other places, to suit local conditions, has been abandoned. Ores are smelted raw if the fall of matte (metallic sulphide) does not exceed 5%; otherwise they are subjected to a preliminary oxidizing roast to expel the sulphur, unless they run too high in silver, say 100 oz. to the ton, when they are smelted raw. The leading reverberatory furnace for roasting lead-bearing sulphide ores has a level hearth 14-16 ft. wide and 60-80 ft. long. It puts through 9-12 tons of ore in twenty-four hours, reducing the percent- age of sulphur to 2-4 ° , and requires four to six men and about 2 tons of coal. In many instances it has been replaced by mechanical furnaces, which are now common in roasting sulphide copper ores (see Sulphuric Acid). A modern blast-furnace is oblong in hori- zontal section and about 24 ft. high from furnace floor to feed floor. The shaft, resting upon arches supported by four cast irpn columns about 9 ft. high, is usually of brick, red brick on the outside, fire- brick on the inside ; sometimes it is made of wrought iron water- jackets. The smelting zone always has a bosh and a contracted tuyere section. It is enclosed by water-jackets, which are usually cast iron, sometimes mild steel. The hearth always has an Arents siphon tap. This is an inclined channel running through the side- wall, beginning near the bottom of

the crucible and ending at the top of the hearth, where it is enlarged into a basin. The crucible and the channel form the two limbs of an inverted siphon. While the furnace is running the crucible and channel remain filled with lead ; all the lead reduced to the metallic state in smelting collects in the crucible, and rising in the channel, overflows into the basin, whence it is removed. The slag and matte formed float upon the lead in the crucible and are tapped, usually together, at intervals into slag-pots, where the heavy matter settles on the bottom and the light slag on the top. When cold they are readily separated by a blow from a hammer. The following table gives the dimensions of some well-known American lead-furnaces.

Lead Blast- Furnace.

Locality.

Year.

Tuyere Section.

Height, Tuyere to Throat.

In.

Ft.

Leadville, Colorado

1880

33X84

H

Denver ,,

1880

36X100

17

Durango ,,

1882

36X96

12-6

Denver ,, . .

1892

42X100

16

Leadville, ,, . .

1892

42X120

18

Salt Lake City, Utah

1895

45X140

20

A furnace, 42 by 120 in. at the tuyeres, with a working height of 17-20 ft., will put through in twenty-four hours, with twelve men, 12% coke and 2 lb blast-pressure, 85-100 tons average charge, i.e. one that is a medium coarse, contains 12-15% lead, not over 5% zinc, and makes under 5 % matte. In making up a charge, the ores and fluxes, whose chemical compositions have been determined, are mixed so as to form out of the components not to be reduced to the metallic or sulphide state, typical slags (silicates of ferrous and calcium oxides, incidentally of aluminium oxide, which have been found to do successful work). Such slags contain Si0 2 = 30- 33%, Fe(Mn)0 = 27-50%, Ca(Mg, Ba)0 = 12-28%, and retain less than 1 % lead and I oz. silver to the ton. The leading products of the blast-furnace are argentiferous lead (base bullion), matte, slag and flue-dust (fine particles of charge and volatilized metal carried out of the furnace by the ascending gas current). The base bullion (assaying 300 = oz. per ton) is desilverized (see below); the matte (Pb = 8-I2%, Cu=3-4%, Ag = |-^ of the assay-value of the base bullion, rest Fe and S) is roasted and resmelted, when part of the argentiferous lead is recovered as base bullion, while the rest remains with the copper, which becomes concentrated in a copper-matte (60 % copper) to be worked up by

separate processes. The slag is a waste product, and the flue-dust, collected by special devices in dust-chambers, is briquetted by machinery, with lime as a bond, and then resmelted with the ore-charge. The yield in lead is over 90%, in silver over 97% and in gold 100%. The cost of smelting a ton of ore in Colorado in a single furnace, 42 by 120 in. at the tuyeres, is about $3.

The lead produced in the reverberatory furnace and the ore-hearth is of a higher grade than that produced in the blast-furnace, as the ores treated are purer and richer, and the reducing action is less powerful. The following analysis of blastrfurnace Ke ‘ Inla g- lead of Freiberg, Saxony, is from an exceptionally impure lead : Pb =95-088, Ag = 0-470, Bi = 0-019, Cu =0-225, As = l -826, Sb =0-958, Sn = i-354, Fe = o-oo7, Zn=o-oo2, S=-=o-05i. Of the impurities, most of the copper, nickel and copper, considerable arsenic, some antimony and small amounts of silver are removed by liquation. The lead is melted down slowly, when the impurities separate in the form of a scum (dross), which is easily removed. The purification by liquation is assisted by poling the lead when it is below redness. A stick of green wood is forced into it, and the vapours and gases set free expose new surfaces to the air, which at this temperature has only a mildly oxidizing effect. The pole, the use of which is awkward, has been replaced by dry stream, which has a similar effect. To remove tin, arsenic and antimony, the lead has to be brought up to a bright-red heat, when the air has a strongly oxidizing effect. Tin is removed mainly as a powdery mixture of stannate of lead and lead oxide, arsenic and antimony as a slagged mixture of arsenate and antimonate of lead and lead oxide. They are readily withdrawn from the surface of the lead, and are worked up into antimony (arsenic) — tin-lead and antimony-lead alloys. Liquation, if not followed by poling, is carried on as a rule in a reverberatory furnace with an oblong, slightly trough-shaped inclined hearth ; if the lead is to be poled it is usually melted down in a cast-iron kettle. If the lead is to be liquated and then brought to a bright-red heat, both operations are carried on in the same reverberatory furnace. This has an oblong, dish-shaped hearth of acid or basic fire-brick built into a wrought-iron pan, which rests on transverse rails sup- ported by longitudinal walls. The lead is melted down at a low temperature and drossed. The temperature is then raised, and the scum which forms on the surface is withdrawn until pure litharge forms, which only takes place after all the tin, arsenic and antimony have been eliminated.

Silver is extracted from lead by means of the process of cupellation. Formerly all argentiferous lead had to be cupelled, and the resulting litharge then reduced to metallic lead. In 1833 Pattinson invented his

process by means of which practically all the Oesaver' silver is concentrated in 13 % of the original lead to be ""£• cupelled, while the rest becomes market lead. In 1842 Karsten discovered that lead could be desilverized by means of zinc. His invention, however, only took practical form in 1850-1852 through the researches of Parkes, who showed how the zinc-silver-lead alloy formed could be worked and the desilverized lead freed from the zinc it had taken up. In the Parkes process only 5 % of the original lead need be cupelled. Thus, while cupellation still furnishes the only means for the final separation of lead and silver, it has become an auxiliary process to the two methods of concentration given. Of these the Pattinson process has become subordinate to the Parkes

process., as it is more expensive and leaves more silver and im- purities in the market lead. It holds its own, however, when base bullion contains bismuth in appreciable amounts, as in the Pattinson process bismuth follows the lead to be cupelled, while in the Parkes process it remains with the desilverized lead which goes to market, and lead of commerce should contain little bismuth. At Freiberg, Saxony, the two processes have been combined. The base bullion is imperfectly Pattinsonized, giving lead rich in silver and bismuth, which is cupelled, and lead low in silver, and especially so in bismuth, which is further desilverized by the Parkes process.

The effect of the two processes on the purity of the market lead is clearly shown by the two following analyses by Hampe, which represent lead from Lautenthal in the Harz Mountains, where the Parkes process replaced that of Pattinson, the ores and smelting process remaining practically the same : —

It is absolutely necessary for the success of the Parkes process that the zinc and lead should contain only a small amount of im- purity. The spelter used must therefore be of a good _ grade, and the lead is usually first refined in a rever- r es

beratory furnace (the softening furnace). The capacity Process. of the furnace must be 10 % greater than that of the kettle into which the softened lead is tapped, as the dross and skimmings formed amount to about 10 % of the weight of the lead charged. The kettle is spherical, and is suspended over a fire-place by a broad rim resting on a wall ; it is usually of cast iron. Most kettles at present hold 30 tons of lead ;

some, however, have double that capacity. When zinc is placed on the lead (heated to above the melting-point of zinc), liquefied and brought into intimate contact with the lead by stirring, gold, copper, silver and lead will combine with the zinc in the order given. By beginning with a small amount

Process.

Pb.

Cu.

Sb.

As.

Bi.

Ag-

Fe.

Zn.

Ni.

Pattinson Parkes

99-966200

99-983I39

0-015000 0-001413

I-OIOOOO

0-005698

none none

o- 000600

0-005487

O-O022O0

0-000460

0-004000 0-002289

o-ooiooo

0-000834

I-OOIOOO

0-000680

The reverberatory furnace commonly used for cupelling goes by

the name of the English cupelling furnace. It is oblong, and has a

c . fixed roof and a movable iron hearth (test). Formerly

ape ng. t ˆ e test was jj nct j w j t jj bone-ash ; at present the hearth

material is a mixture of crushed limestone and clay (3:1) or Portland cement, either alone or mixed with crushed fire-brick; in a few instances the lining has been made of burnt magnesite. In the beginning of the operation enough argentiferous lead is charged to fill the cavity of the test. After it has been melted down and brought to a red heat, the blast, admitted at the back, oxidizes the lead and drives the litharge formed towards the front, where it is run off. At the same time small bars of argentiferous lead, inserted at the back, are slowly pushed forward, so that in melting down they may replace the oxidized lead. Thus the level of the lead is kept approximately constant, and the silver becomes concentrated in the lead. In large works the silver-lead alloy is removed when it contains 60-80 % silver, and the cupellation of the rich bullion from several concentration furnaces is finished in a second furnace. At the same time the silver is brought to the required degree of fineness, usually by the use of nitre. In small works the cupellation is finished in one fur- nace, and the resulting low-grade silver fined in a plumbago crucible, either by overheating in the presence of air, or by the addition of silver sulphate to the melted silver, when air or sulphur trioxide and oxygen oxidize the impurities. The lead charged contains about 1-5 % lead if it comes from a Pattinson plant, from 5-10 % if from a Parkes plant. In a test 7 ft. by 4 ft. 10 in. and 4 in. deep, about 6 tons of lead are cupelled in twenty-four hours. A furnace is served by three men, working in eight-hour shifts, and requires about 2 tons of coal, which corresponds to about 1 10 gallons reduced oil, air being used as atomizer. The loss in lead is about 5 %. The latest cupelling furnaces have the general form of a reverberatory copper-smelting furnace. The working door through which the litharge is run off lies under the flue

which carries off the products of combustion and the lead fumes, the lead is charged and the blast is admitted near the fire-bridge.

In the Pattinson process the argentiferous lead is melted down in the central cast iron kettle of a series 8-15, placed one next to the „ . other, each having a capacity of 9-15 tons and a separate

a nson nre _pj ace _ The crystals of impoverished lead which fall p ‘ to the bottom, upon coaling the charge, are taken out

with a skimmer and discharged into the neighbouring kettle (say to the right) until about two-thirds of the original charge has been removed ; then the liquid enriched lead is ladled into the kettle on the opposite side. To the kettle, two-thirds full of crystals of lead, is now added lead of the same tenor in silver, the whole is liquefied, and the cooling, crystallizing, skimming and ladling are repeated. The same is done with the kettle one-third filled with liquid lead, and so on until the first kettle contains market lead, the last cupelling lead. The intervening kettles contain leads with silver contents ranging from above market to below cupelling lead. The original Pattinson process has been in many cases replaced by the Luce- Rozan process (1870), which does away with arduous labour and attains a more satisfactory crystallization. The plant consists of two tilting oval metal pans (capacity 7 tons), one cylindrical crystal- lizing pot (capacity 22 tons), with two discharging spouts and one steam inlet opening, two lead moulds (capacity 3 J tons), and a steam crane. Pans and pot are heated from separate fire-places. Supposing the pot to be filled with melted lead to be treated, the fire is with- drawn beneath and steam introduced. This cools and stirs the lead when crystals begin to form. As soon as two-thirds of the lead has separated in the form of crystals, the steam is shut off and the liquid lead drained off through the two spouts into the moulds. The fire underneath the pot is again started, the crystals are liquefied, and one of the two pans, filled with melted lead, is tilted by means of the crane and its contents poured into the pot. In the meantime the lead in the moulds, which has solidified, is removed with the crane and stacked to one side, until its turn comes to be raised and charged into one of the pans. The crystallization proper lasts one hour, the work- ing of a charge four hours, six charges being run in twenty-four hours.

of zinc, all the gold and copper and some silver and lead will be alloyed with the zinc to a so-called gold — or copper — crust, and the residual lead saturated with zinc. By removing from the surface of the lead this first crust and working it up separately (liquating, retorting and cupelling), dore silver is obtained. By the second addition of zinc

most of the silver will be collected in a saturated zinc-silver-lead crust, which, when worked up, gives fine silver. A third addition becomes necessaˆ' to remove the rest of the silver, when the lead will assay only o-i oz. silver per ton. As this com- plete desilverization is only possible by the use of an excess of zinc, the unsaturated zinc-silver-lead alloy is put aside to form part of the second zincking of the next following charge. In skimming the crust from the surface of the lead some unalloyed lead is also drawn off, and has to be separated by an additional operation (liquation), as, running lower in silver than the crust, it would other- wise reduce its silver content and increase the amount of lead to be cupelled. A zincking takes 5-6 hours;; 1-5-2-5 % zinc is required for desilverizing. The liquated zinc-silver-lead crust contains 5-10 % silver, 30-40 % zinc and 65-50 % lead.ˆ Before it can be cupelled it has to be freed from most of the zinc, which is accom- plished by distilling in a retort made of a mixture similar to that of the plumbago crucible. The retort is pear-shaped, and holds 1000-1500 lb of charge, consisting of liquated crust mixed with 1-3% of charcoal. The condenser commonly used is an old retort. The distillation of 1000 lb charge lasts 5-6 hours, requires 500-600 lb coke or 30=1= gallons reduced oil, and yields about 10% metallic zinc and 1 % blue powder — a mixture of finely-divided metallic zinc and zinc oxide. About 60 % of the zinc used in desilverizing is recovered in a form to be used again. One man serves 2-4 retorts. The desilverized lead, which retains 0-6-0-7 % zinc, has to be refined before it is suited for industrial use. The operation is carried on in a reverberatory furnace or in a kettle. In the reverberatory furnace, similar to the one used in softening, the lead is brought to a bright- red heat and air allowed to have free access. The zinc and some lead are oxidized ; part of the zinc passes off with the fumes, part is dis- solved by the litharge, forming a melted mixture which is skimmed off and reduced in a blast-furnace or a reverberatory smelting furnace. In the kettle covered with a hood the zinc is oxidized by means of dry steam, and incidentally some lead by the air which cannot be completely excluded. A yellowish powdery mixture of zinc and lead oxides collects on the lead; it is skimmed off and sold as paint. From the reverberatory furnace or the kettle the refined lead is siphoned off into a storage (market) kettle after it has cooled some- what, and from this it is siphoned off into moulds placed in a semi- circle on the floor. In the process the yield in metal, based upon the charge in the kettle, is lead 99%, silver 100+ , gold 98-100. The plus-silver is due to the fact that in assaying the base bullion by cupellation, the silver lost by volatilization and cupel-absorption is neglected. In the United States the cost of desilverizing a ton base bullion is about $6.

Properties of Lead. — Pure lead is'" a feebly lustrous bluish- white metal, endowed with a characteristically high degree of softness and plasticity, and almost entirely devoid of elasticity. Its breaking strain is very small: a wire iVth in. thick is ruptured by a charge of about 30 lb. The specific gravity is 11-352 for ingot, and from 11-354 to 11-365 for sheet lead (water of 4°C. = 1). The expansion of unit-length from o° C. to too C. is -002948 (Fizeau). The conductivity for heat (Wiedemann and Franz) or electricity is 8-5, that of silver being taken as 100. It melts at 327-7° C. (H. L. Callendar); at a bright-red heat it perceptibly vapourizes, and boils at a temperature between 1450° and 1600 . The specific heat is -0314 (Regnault).. Lead exposed to ordinary air is rapidly tarnished, but the thin dark film formed is very slow in increasing. When kept fused in the presence of air lead readily takes up oxygen, with the formation

at first of a dark-coloured scum, and then of monoxide PbO, the rate of oxidation increasing with the temperature.

Water when absolutely pure has no action on lead, but in the presence of air the lead is quickly attacked, with formation of the hydrate, Pb(OH) 2 , which is appreciably soluble in water forming an alkaline liquid. When carbonic acid is present the dissolved oxide is soon precipitated as basic carbonate, so that the corrosion of the lead becomes continuous. Since all soluble lead compounds are strong cumulative poisons, danger is involved in using lead cisterns or pipes in the distribution of pure waters. The word " pure " is emphasized because experience shows that the presence in a water of even small proportions of calcium bicarbonate or sulphate prevents its action on lead. All im- purities do not act in a similar way. Ammonium nitrate and nitrite, for instance, intensify the action of a water on lead. Even pure waters, however, such as that of Loch Katrine (which forms the Glasgow supply), act so slowly, at least on such lead pipes as have already been in use for some time, that there is no danger in using short lead service pipes even for them, if the taps are being constantly used. Lead cisterns must be unhesitatingly condemned.

The presence of carbonic acid in a water does not affect its action on lead. Aqueous non-oxidizing acids generally have little or no action on lead in the absence of air. Dilute sulphuric acid (say an acid of 20% H2SO4 or less) has no action on lead even when air is present, nor on boiling. Strong acid does act, the more so the greater its concentration

and the higher its tempera- ture. Pure lead is far more readily corroded than a metal con- taminated with 1 % or even less of antimony or copper. Boiling concentrated sulphuric acid converts lead into sulphate, with evolution of sulphur dioxide. Dilute nitric acid readily dissolves the metal, with formation of nitrate $Pb(N0_3)_2$.

Lead Alloys. — Lead unites readily with almost all other metals; hence, and on account of its being used for the extrac- tion of (for instance) silver, its alchemistic name of saturnus.

Of the alloys the following may be named: —

With Antimony. — Lead contaminated with small proportions of antimony is more highly proof against sulphuric acid than the pure metal. An alloy of 83 parts of lead and 17 of antimony is used as type metal; other proportions are used, however, and other metals added besides antimony (e.g. tin, bismuth) to give the alloy certain properties.

Arsenic renders lead harder. An alloy made by addition of about sath of arsenic has been used for making shot.

Bismuth and Antimony. — An alloy consisting of 9 parts of lead, 2 of antimony and 2 of bismuth is used for stereotype plates.

Bismuth and Tin. — These triple alloys are noted for their low fusing points. An alloy of 5 of lead, 8 of bismuth and 3 of tin fuses at 94-4° C, i.e. below the boiling-point of water (Rose's metal). An alloy of 15 parts of bismuth, 8 of lead, 4 of tin and 3 of cadmium (Wood's alloy) melts below 70° C.

Tin unites with lead in any proportion with slight expansion, the alloy fusing at a lower temperature than either component. It is used largely for soldering.

” Pewter ” (q.v.) may be said to be substantially an alloy of the same two metals, but small quantities of copper, antimony and zinc are frequently added.

Compounds of Lead.

Lead generally functions as a divalent element of distinctly metallic character, yielding a definite series of salts derived from the oxide PbO. At the same time, however, it forms a number of compounds in which it is most decidedly tetravalent; and thus it shows relations to carbon, silicon, germanium and tin.

Oxides. — Lead combines with oxygen to form five oxides, viz. Pb 2 0, PbO, Pb0 2 , Pb 2 3 and Pb 3 0i. The suboxide, Pb 2 0, is the first product of the oxidation of lead, and is also obtained as a black powder by heating lead oxalate to 300° out of contact with air. It ignites when heated in air with the formation of the monoxide; dilute acids convert it into metallic lead and lead monoxide, the latter dissolving in the acid. The monoxide, PbO, occurs in nature as the mineral lead ochre. This oxide is produced by heating lead in contact with air and removing the film of oxide as formed. It is manufactured in two forms, known as ” massicot ” and ” litharge.” The former is produced at temperatures below, the latter at tempera- tures above the fusing-point of the oxide. The liquid litharge when allowed to cool solidifies into a hard stone-like mass, which, however, when left to itself, soon crumbles up into a heap of resplendent dark yellow scales known as ” flake litharge.” ” Buff ” or ” levigated litharge ” is prepared by grinding the larger pieces under water. Litharge is much used for the preparation of lead salts, for the manufacture of oil varnishes, of certain cements, and of lead plaster, and for other purposes. Massicot is the raw material for the manufacture of ” red lead ” or ” minium.”

Lead monoxide is dimorphous, occurring as cubical dodecahedra and as rhombic octahedra. Its specific gravity is about 9 ; it is sparingly soluble in water, but readily dissolves in acids and molten alkalis. A yellow and red modification have been described (Zeit. anorg. Chem., 1906, 50, p. 265). The corresponding hydrate, Pb(OH) 2 , is obtained as a white crystalline precipitate by adding ammonia to a solution of lead nitrate or acetate. It dissolves in an excess of alkali to form plumbites of the general formula Pb(OM) 2 . It absorbs carbon dioxide from the air when moist. A hydrated oxide, 2PbO-H 2 0, is obtained

when a solution of the monoxide in potash is treated with carbon dioxide.

Lead dioxide, $Pb0_2$, also known as " puce oxide," occurs in nature as the mineral plattnerite, and may be most conveniently prepared by heating mixed solutions of lead acetate and bleaching powder until the original precipitate blackens. The solution is filtered, the precipitate well washed, and, generally, is put up in the form of a paste in well-closed vessels. It is also obtained by passing chlorine into a suspension of lead oxide or carbonate, or of magnesia and lead sulphate, in water; or by treating the sesquioxide or red oxide with nitric acid. The formation of lead dioxide by the electrolysis of a lead solution, the anode being a lead plate coated with lead oxide or sulphate and the cathode a lead plate, is the fundamental principle of the storage cell (see Accumulator). Heating or ex- posure to sunlight reduces it to the red oxide; it fires when ground with sulphur, and oxidizes ammonia to nitric acid, with the simul- taneous formation of ammonium nitrate. It oxidizes a manganese salt (free from chlorine) in the presence of nitric acid to a per- manganate; this is a very delicate test for manganese. It forms crystallizable salts with potassium and calcium hydrates, and functions as a weak acid forming salts named plumbates. The Kassner process for the manufacture of oxygen depends upon the formation of calcium plumbate, Ca_2Pb04, by heating a mixture of lime and litharge in a current of air ; decomposing this substance into calcium carbonate and lead dioxide by heating in a current of carbon dioxide, and then decomposing these compounds with the evolution of carbon dioxide and oxygen by raising the temperature. Plumbic acid, $PbO(OH)_2$, is obtained as a bluish-black, lustrous body of electrolysing an alkaline solution of lead sodium tartrate.

Tetravalent Lead. — If a suspension of lead dichloride in hydro- chloric acid be treated with chlorine gas, a solution of lead tetra- chloride is obtained ; by adding ammonium chloride ammonium plumbichloride, $(NH_4)_2PbCl_6$, is precipitated, which on treatment with strong sulphuric acid yields lead tetrachloride, PbCL, as a trans- lucent, yellow, highly refractive liquid. It freezes at — 15 to a yellowish crystalline mass; on heating it loses chlorine and forms lead dichloride. With water it forms a hydrate, and ultimately de- composes into lead dioxide and hydrochloric acid. It combines with alkaline chlorides — potassium, rubidium and caesium — to form crystalline plumbichlorides ; it also forms a crystalline compound with quinohne. By dissolving red lead, $Pb_3 4$, in glacial acetic acid and crystallizing the filtrate, colourless monoclinic prisms of lead tetracetate, $Pb(C_2H_3 2)4$, are obtained. This salt gives the corre-

sponding chloride and fluoride with hydrochloric and hydrofluoric acids, and the phosphate, Pb(HP04) 2 , with phosphoric acid.

These salts are like those of tin; and the resemblance to this metal is clearly enhanced by the study of the alkyl compounds. Here compounds of divalent lead have not yet been obtained; by acting with zinc ethide on lead chloride, lead tetraethide, Pb(C 2 H 3) 4 , is ob- tained, with the separation of metallic lead.

Lead sesquioxide, Pb 2 3 , is obtained as a reddish-yellow amorphous powder by carefully adding sodium hypochlorite to a cold potash solution of lead oxide, or by adding very dilute ammonia to a solution of red lead in acetic acid. It is decomposed by acids into a mixture of lead monoxide and dioxide, and may thus be regarded as lead metaplumbate, PbPb0 3 . Red lead or triplumbic tetroxide, Pb 3 04, is a scarlet crystalline powder of specific gravity 8-6-9- 1, obtained by roasting very finely divided pure massicot or lead car- bonate; the brightness of the colour depends in a great measure on the roasting. Pliny mentions it under the name of minium, but it was confused with cinnabar and the red arsenic sulphide; Dios- corides mentions its preparation from white lead or lead carbonate. On heating it assumes a finer colour, but then turns violet and finally black; regaining, however, its original colour on cooling. On ignition, it loses oxygen and forms litharge. Commercial red lead is frequently contaminated with this oxide, which may, however, be removed by repeated digestion with lead acetate. Its common adulterants are iron oxides, powdered barytes and brick dust. Acids decompose it into lead dioxide and monoxide, and the latter may or may not dissolve to form a salt; red lead may, therefore, be regarded as lead orthoplumbate, Pb 2 Pb0 4 . It is chiefly used as a pigment and in the manufacture of flint glass.

Lead chloride, PbCl 2 , occurs in nature as the mineral cotunnite, which crystallizes in the rhombic system, and is found in the neigh- bourhood of volcanic craters. It is artificially obtained by adding hydrochloric acid to a solution of lead salt, as a white precipitate,

little soluble in cold water, less so in dilute hydrochloric acid, more so in the strong acid, and readily soluble in hot water, from which on cooling, the excess of dissolved salt separates out in silky rhombic needles. It melts at 485° and solidifies on cooling to a translucent, horn-like mass; an early name for it was plumbum corneum, horn

lead. A basic chloride, Pb(OH)Cl, was introduced in 1849 by Pattinson as a substitute for white lead. Powdered galena is dis- solved in hot hydrochloric acid, the solution allowed to cool and the deposit of impure lead chloride washed with cold water to remove iron and copper. The residue is then dissolved in hot water, filtered, and the clear solution is mixed with very thin milk of lime so adjusted that it takes out one-half of the chlorine of the PbCl 2 . The oxy- chloride comes down as an amorphous white precipitate. Another oxychloride, PbCl 2 -7PbO, known as ” Cassel yellow,” was prepared by Vauquelin by fusing pure oxide, PbO, with one-tenth of its weight of sal ammoniac. ” Turner’s yellow ” or ” patent yellow ” is another artificially prepared oxychloride, used as a pigment. Mendipite and matlockite are mineral oxychlorides.

Lead fluoride, PbF2, is a white powder obtained by precipitating a lead salt with a soluble fluoride; it is sparingly soluble in water but readily dissolves in hydrochloric and nitric acids. A chloro- fluoride, PbCIF, is obtained by adding sodium fluoride to a solution of lead chloride. Lead bromide, PbBr 2 , a white solid, and lead iodide, Pbl 2 , a yellow solid, are prepared by precipitating a lead salt with a soluble bromide or iodide; they resemble the chloride in solubility.

Lead carbonate, PbCC>3, occurs in nature as the mineral cerussite (q.v.). It is produced by the addition of a solution of lead salt to an excess of ammonium carbonate, as an almost insoluble white pre- cipitate. Of greater practical importance is a basic carbonate, substantially 2PbCOyPb(OH)2, largely used as a white pigment under the name of “white lead.” This pigment is of great antiquity; Theophrastus called it ipinvdiov, and prepared it by acting on lead with vinegar, and Pliny, who called it cerussa, obtained it by dis- solving lead in vinegar and evaporating to dryness. It thus appears that white lead and sugar of lead were undifferentiated. Geber gave the preparation in a correct form, and T. O. Bergman proved its composition. This pigment is manufactured by several methods. In the old Dutch method, pieces of sheet lead are suspended in stoneware pots so as to occupy the upper two-thirds of the vessels. A little vinegar is poured into each pot ; they are then covered with plates of sheet lead, buried in horse-dung or spent tanner’s bark, and left to themselves for a considerable time. By the action of the acetic acid and atmospheric oxygen, the lead is converted super- ficially into a basic acetate, which is at once decomposed by the carbon dioxide, with formation of white lead and acetic acid, which latter then acts de novo. After a month or so the plates are converted to a more or less considerable depth into crusts of white lead. These are knocked off, ground up with water, freed from metal-particles by elutriation, and

the paste of white lead is allowed to set and dry in small conical forms. The German method differs from the Dutch inasmuch as the lead is suspended in a large chamber heated by ordinary means, and there exposed to the simultaneous action of vapour of aqueous acetic acid and of carbon dioxide. Another pro- cess depends upon the formation of lead chloride by grinding together litharge with salt and water, and then treating the alkaline fluid with carbon dioxide until it is neutral. White lead is an earthy, amorphous powder. The inferior varieties of commercial ” white lead ” are produced by mixing the genuine article with more or less of finely powdered heavy spar or occasionally zinc-white (ZnO). Venetian white, Hamburg white and Dutch white are mixtures of one part of white lead with one, two and three parts of barium sulphate respectively.

Lead sulphide, PbS, occurs in nature as the mineral galena (q.v.), and constitutes the most valuable ore of lead. It may be artificially prepared by leading sulphur vapour over lead, by fusing litharge with sulphur, or, as a black precipitate, by passing sulphuretted hydrogen into a solution of a lead salt. It dissolves in strong nitric acid with the formation of the nitrate and sulphate, and also in hot concentrated hydrochloric acid.

Lead sulphate, PbSGu, occurs in nature as the mineral anglesite (q.v.), and may be prepared by the addition of sulphuric acid to ■solutions of lead salts, as a white precipitate almost insoluble in water (3 in 21,739), ‘ ess soluble still in dilute sulphuric acid (1 in 36,504) r>,nd insoluble in alcohol. Ammonium sulphide blackens it, and it is coluble in solution of ammonium acetate, which distinguishes it from barium sulphate. Strong sulphuric acid dissolves it, forming an O.eid salt, Pb(HS0 4)2, which is hydrolysed by adding water, the normal sulphate being precipitated; hence the milkiness exhibited by samples of oil of vitriol on dilution.

Lead nitrate, Pb(NC>3) 2 , is obtained by dissolving the metal or oxide in aqueous nitric acid; it forms white crystals, difficultly soluble in cold water, readily in hot water and almost insoluble in strong nitric acid. It was mentioned by Libavius, who named it calx plumb dulcis. It is decomposed by heat into oxide, nitrogen peroxide and oxygen; and is used for the manufacture of fusees and other deflagrating compounds, and also for preparing mordants in the dyeing and calico-printing industries. Basic nitrates, e.g. Pb(NOs)OH, Pb 3 0(OH) 2 (N0 3) 2 , Pb,O s (OH)N0 3 , &c, have been described.

Lead Phosphates. — The normal ortho-phosphate, Pb 3 (P04) 2 , is

a white precipitate obtained by adding sodium phosphate to lead acetate; the acid phosphate, PbHP0 4 , is produced by precipitating a boiling solution of lead nitrate with phosphoric acid; the pyro-phosphate and meta-phosphate are similar white precipitates.

Lead Borates. — By fusing litharge with boron trioxide, glasses of a composition varying with the proportions of the mixture are obtained; some of these are used in the manufacture of glass. The borate, Pb2B 6 0n-4H 2 0,is obtained as a white precipitate by adding borax to a lead salt; this on heating with strong ammonia gives PbB 2 0vH 2 0, which, in turn, when boiled with a solution of boric acid, gives PbB 4 Gy4H 2 0.

Lead silicates are obtained as glasses by fusing litharge with silica ; they play a considerable part in the manufacture of the lead glasses (see Glass).

Lead chromate, PbCrCh, is prepared industrially as a yellow pigment, chrome yellow, by precipitating sugar of lead solution with potassium bichromate. The beautiful yellow precipitate is little soluble in dilute nitric acid, but soluble in caustic potash. The vermilion-like pigment which occurs in commerce as ” chrome- red ” is a basic chromate, Pb 2 CrC>5, prepared by treating recently precipitated normal chromate with a properly adjusted proportion of caustic soda, or by boiling it with normal (yellow) potassium chromate.

Lead acetate, Pb(C 2 H 3 2) 2 3H 2 (called ” sugar ” of lead, on account of its sweetish taste), is manufactured by dissolving massi cot in aqueous acetic acid. It forms colourless transparent crystals, soluble in one and a half parts of cold water and in eight parts of alcohol, which on exposure to ordinary air become opaque through absorption of carbonic acid, which forms a crust of basic carbonate. An aqueous solution readily dissolves lead oxide, with formation of a strongly alkaline solution containing basic acetates (Acetum Plumbi or Saturni). When carbon dioxide is passed into this solu- tion the whole of the added oxide, and even part of the oxide of the normal salt, is precipitated as a basic carbonate chemically similar, but not quite equivalent as a pigment, to white lead.

Analysis. — When mixed with sodium carbonate and heated on charcoal in the reducing flame lead salts yield malleable globules of metal and a yellow oxide-ring. Solutions of lead salts (colourless in the absence of coloured acids) are characterized by their behaviour to hydrochloric acid, sulphuric acid and potassium chromate. But the most delicate precipitant for lead is sulphuretted hydrogen, which

produces a black precipitate of lead sulphide, insoluble in cold dilute nitric acid, less so in cold hydrochloric, and easily decomposed by hot hydrochloric acid with formation of the characteristic chloride. The atomic weight, determined by G. P. Baxter and J. H. Wilson (/. Amer., Chem. Soc, 1908, 30, p. 187) by analysing the chloride, is 270-190 (0 = i6).

Pharmacology and Therapeutics. The metal itself is not used in medicine. The chief pharma- copoeial salts are: (1) Plumbi oxidum (lead oxide), litharge. It is not used internally, but from it is made Emplastrum Plumbi (diachylon plaster), which is an oleate of lead and is contained in emplastrum hydrargeri, emplastrum plumbi iodidi, emplastrum resinae, emplastrum saponis. (2) Plumbi Acetas (sugar of lead), dose 1 to s grains. From this salt are made the following prepara- tions: (a) Pilula Plumbi cum Opio, the strength of the opium in it being 1 in 8, dose 2 to 4 grains; (b) Suppositoria Plumbi composita, containing lead acetate, opium and oil of theobroma, there being one grain of opium in each suppository; (c) Un~ guentum Plumbi Acelatis; (d) Liquor Plumbi Subacetatis Fortior, Goulard's extract, strength 24% of the subacetate; this again has a sub-preparation, the Liquor Plumbi Subacetatis Dilutis, called Goulard's water or Goulard's lotion, containing 1 part in 80 of the strong extract; (e) Glycerinum Plumbi Subacetatis, from which is made the Unguentum Glycerini Plumbi Subacetatis. (3) Plumbi Carbonas, white lead, a mixture of the carbonate and the hydrate, a heavy white powder insoluble in water; it is not used internally, but from it is made Unguentum Plumbi Carbonatis, strength 1 in 10 parts of paraffin ointment. (4) Plumbi Iodidium, a heavy bright yellow powder not used in- ternally. From it are made (a) Emplastrum Plumbi Iodidi, and (6) Unguentum Plumbi Iodidi. The strength of each is 1 in 10.

Applied externally lead salts have practically no action upon the unbroken skin, but applied to sores, ulcers or any exposed mucous membranes they coagulate the albumen in the tissues themselves and contract the small vessels. They are very astringent, haemostatic and sedative; the strong solution of the

subacetate is powerfully caustic and is rarely used undiluted. Lead salts are applied as lotions in conditions where a sedative astringent effect is desired, as in weeping eczema; in many varieties of chronic ulceration; and as an injection for various inflammatory discharges

from the vagina, ear and urethra, the Liquor Plumbi Subacetatis Dilutum being the one employed. The sedative effect of lead lotion in pruritus is well known. Internally lead has an astringent action on the mucous mem- branes, causing a sensation of dryness; the dilute solution of the subacetate forms an effective gargle in tonsillitis. The chief use of the preparations of lead, however, is as an astringent in acute diarrhoea, particularly if ulceration be present, when it is usefully given in combination with opium in the form of the Pilula Plumbi cum Opio. It is useful in haemorrhage from a gastric ulcer or in haemorrhage from the intestine. Lead salts usually produce constipation, and lead is an active ecbolic. Lead is said to enter the blood as an albuminate in which form it is deposited in the tissues. As a rule the soluble salts if taken in sufficient quantities produce acute poisoning, and the in- soluble salts chronic plumbism. The symptoms of acute poison- ing are pain and diarrhoea, owing to the setting up of an active gastro-enteritis, the foeces being black (due to the formation of a sulphide of lead), thirst, cramps in the legs and muscular twitchings, with torpor, collapse, convulsions and coma. The treatment is the prompt use of emetics, or the stomach should be washed out, and'large doses of sodium or magnesium sulphate given in order to form an insoluble sulphate. Stimulants, warmth and opium may be required. For an account of chronic plumbism see Lead Poisoning.

Authorities. — For the history of lead see W. H. Pulsifer, Notes for a History of Lead (1888); B. Neumann, Die Metalle (1904); A. Rossing, Geschichte der Metalle (1901). For the chemistry see H. Roscoe and C. Schorlemmer, Treatise on Inorganic Chemistry, vol. ii. (1897); H. Moissan, Traite de chimie minerale; O. Dammer, Handbuch der anorganischen Chemie. For the metallurgy see J. Percy, The Metallurgy of Lead (London, 1870) ; H. F. Collins, The Metallurgy of Lead and Silver (London, 1899), part i. " Lead " ; H. 0. Hofmann, The Metallurgy of Lead (6th ed., New York, 1901); W. R. Ingalls, Lead Smelting and Refining (1906) ; A. G. Betts, Lead Refining by Electrolysis (1908) ; M. Eissler, The Metallurgy of Argentiferous Silver. The Mineral Industry, begun in 1892, annually records the progress made in lead smelting.

LEADER, BENJAMIN WILLIAMS (1831-), English painter, the son of E. Leader Williams, an engineer, received his art education first at the Worcester School of Design and later in the schools of the Royal Academy. He began to exhibit at the Academy in 1854, was elected A.R.A. in 1883 and R.A. in 1898, and became exceedingly popular as a painter of landscape. His subjects are attractive and skilfully composed. He was awarded a gold medal at the Paris Exhibition in

1889, and was made a knight of the Legion of Honour. One of his pictures, ” The Valley of the Llugwy,” is in the National Gallery of British Art.

See The Life and Work of B. W. Leader, R.A., by Lewis Lusk, Art Journal Office (1901).

LEADHILLITE, a rare mineral consisting of basic lead sulphato-carbonate, Pb 4 S0 4 (C0 3)2(OH) 2 . Crystals have usually the form of six-sided plates (fig. 1) or sometimes of acute rhombohedra (fig. 2) ; they have a perfect basal cleavage (parallel to P in fig. 1) on which the lustre is strongly pearly; they are usually white and translucent. The hardness is 2-5 and the sp. gr. 6-26-6-44. The crystallographic and optical characters point to the existence of three dis- tinct kinds of leadhillite, which are, however,

. ^^ identical in external ap-

i<^>^ . P J ^>\ pearance and may even ^ I occur intergrown to-gether in the same cry- stal: (a) monoclinic with an optic axial angle of 20 ; (b) rhombohedral (fig. 2) and optically uniaxial; (c) orthorhombic (fig. 1) with an optic axial angle of 72$°. The first of these is the more common kind, and the

Fig. 1.

Fig. 2.

second has long been known under the name susannite. Th3 fact that the published analyses of leadhillite vary somewhat from the formula given above suggests that these three kinds may also be chemically distinct.

Leadhillite is a mineral of secondary origin, occurring with cerussite, anglesite, &c, in the oxidized portions of lead-bearing lodes; it has also been found in weathered lead slags left by the Romans. It has been found most abundantly in the Susanna mine at Leadhills in Scotland (hence the names leadhillite and susannite). Good crystals have also been found at Red Gill in Cumberland and at Granby in Missouri. Crystals from Sardinia have been called maxite. (L. J. S.)

LEADHILLS, a village of Lanarkshire, Scotland, sf m. W.S.W. of Elvanfoot station on the Caledonian Railway Com- pany’s main line from Glasgow to the south. Pop. (1901) 835. It is the highest village in Scotland, lying 1301 ft. above sea-level, near the source of Glengonner Water, an affluent of the Clyde. It is served by a light railway. Lead

and silver have been mined here and at Wanlockhead, ij m. S.W., for many centuries — according to some authorities even in Roman days. Gold was discovered in the reign of James IV., but though it is said then to have provided employment for 300 persons, its mining has long ceased to be profitable. The village is neat and well built, and contains a masonic hall and library, the latter founded by the miners about the middle of the 18th century. Allan Ramsay, the poet, and William Symington (1763-1831), one of the earliest adaptors of the steam engine to the purposes of navigation, were born at Leadhills.

LEAD POISONING, or Plumbism, a ” disease of occupations,” which is itself the cause of organic disease, particularly of the nervous and urinary systems. The workpeople affected are principally those engaged in potteries where lead-glaze is used; but other industries in which health is similarly affected are file- making, house-painting and glazing, glass-making, copper- working, coach-making, plumbing and gasfitting, printing, cutlery, and generally those occupations in which lead is concerned.

The symptoms of chronic lead poisoning vary within very wide limits, from colic and constipation up to total blindness, paralysis, convulsions and death. They are thus described by Dr J. T. Arlidge (Diseases of Occupations) : —

The poison finds its way gradually into the whole mass of the circulating blood, and exerts its effects mainly on the nervous system, paralysing nerve-force and with it muscular power. Its victims become of a sallow- waxy hue; the functions of the stomach and bowels are deranged, appetite fails and painful colic with constipation supervenes. The loss of power is generally shown first in the fingers, hands and wrists, and the condition known as ” wrist-drop ” soon follows, rendering the victim useless for work. The palsy will extend to the shoulders, and after no long time to the legs also. Other organs frequently involved are the kidneys, the tissue of which becomes permanently damaged ; whilst the sight is weakened or even lost.

Dr M’Aldowie, senior physician to the North Staffordshire Infirmary, has stated that ” in the pottery trade lead is very slow in producing serious effects compared with certain other industries.” In his experience the average period of working in lead before serious lesions manifest themselves is 18 years for females and 22ˆ years for males. But some individuals fall victims to the worst forms of plumbism after a few months’ or even weeks’ exposure to the danger. Young persons are more readily affected than those of mature age, and women more than men. In addition, there seems to be an element

of personal susceptibility, the nature of which is not understood. Some persons ” work in the lead ” for twenty, forty or fifty years without the slightest ill effects; others have attacks whenever they are brought into contact with it. Possibly the difference is due to the general state of health; robust persons resist the poison successfully, those with impoverished blood and feeble constitution are mastered by it. Lead enters the body chiefly through the nose and mouth, being inspired in the form of dust or swallowed with food eaten with unwashed hands. It is very apt to get under the nails, and is possibly absorbed in this way through the skin. Personal care and cleanliness are therefore of the greatest importance. A factory surgeon of great experience in the English Potteries

has stated that seventeen out of twenty cases of lead-poisoning in the china and earthenware industry are due to carelessness (The Times, 8th October 1898).

The Home Office in England has from time to time made special rules for workshops and workpeople, with the object of minimizing or preventing the occurrence of lead-poisoning; and in 1895 notification of cases was made compulsory. The health of workpeople in the Potteries was the subject of a special inquiry by a scientific committee in 1893. The committee stated that ” the general truth that the potteries occupation is one fraught with injury to health and life is beyond dispute,” and that ” the ill effects of the trade are referable to two chief causes — namely, dust and the poison of lead.” Of these the inhalation of clay and flint dust was the more important. It led to bronchitis, pulmonary tuberculosis and pneumonia, which were the most prevalent disorders among potters, and responsible for 70% of the mortality. That from lead the committee did not attempt to estimate, but they found that plumbism was less prevalent than in past times, and expressed the opinion ” that a large part of the mortality from lead poisoning is avoidable; although it must always be borne in mind that no arrangements or rules, with regard to the work itself, can entirely obviate the effects of the poison to which workers are exposed, because so much depends upon the individual and the observance of personal care and cleanliness.” They recommended the adoption of certain special rules in the workshops, with the objects of protecting young persons from the lead, of minimizing the evils of dust, and of promoting cleanliness, particularly in regard to meals. Some of these recommendations were adopted and applied with good

results. With regard to the suggestion that ” only leadless glazes should be used on earthenware,” they did not ” see any immediate prospect of such glazes becoming universally applicable to pottery manufacture,” and therefore turned their attention to the question of ” fritting ” the lead.

It may be explained that lead is used in china and earthenware to give the external glaze which renders the naturally porous ware watertight. Both ” white ” and ” red ” lead are used. The lead is added to other ingredients, which have been ” fritted ” or fused together and then ground very fine in water, making a thick creamy liquid into which the articles are dipped. After dipping the glaze dries quickly, and on being ” fired ” in the kiln it becomes fused by the heat into the familiar glassy surface. In the manufacture of ware with enamelled colours, glaze is mixed with the pigment to form a flux, and such colours are used either moist or in the form of a dry powder. ” Fritting ” the lead means mixing it with the other ingredients of the glaze beforehand and fusing them all together under great heat into a kind of rough glass, which is then ground to make the glaze. Treated in this way the lead combines with the other ingredients and becomes less soluble, and therefore less dangerous, than when added afterwards in the raw state. The committee (1893) thought it ” reasonable to suppose that the fritting of lead might ultimately be found universally practicable,” but declared that though fritting ” no doubt diminishes the danger of lead-poisoning,” they ” could not regard all fritts as equally innocuous.”

In the annual report of the chief inspector of factories for 1897, it was stated that there had been ” material improvement in dust conditions ” in the potting industry, but ” of lead- poisoning unfortunately the same could not be said, the number of grave cases reported, and particularly cases of blindness, having ominously increased of late.” This appears to have been largely due to the erroneous inclusion among potting processes of ” litho-transfer making,” a colour industry in which girls are employed. New special rules were imposed in 1899 prohibiting the employment of persons under fifteen in the dangerous processes, ordering a monthly examination of all women and young persons working in lead by the certifying surgeon, with power to suspend those showing symptoms of poisoning, and providing for the more effectual removal of dust and the better enforcement of cleanliness. At the same time a scientific inquiry was ordered into the practicability of dispensing with lead in glazes or of substituting fritted compounds for the raw carbonate. The scientific experts reported in 1899, recommending that the use of raw lead should be absolutely prohibited, and expressing the, opinion that the greater

amount of earthenware could be successfully glazed without any lead. These views were in advance of the opinions held by practical potters, and met with

a good deal of opposition. By certain manufacturers consider- able progress had been made in diminishing the use of raw lead and towards the discovery of satisfactory leadless glazes; but it is a long step from individual experiments to the wholesale compulsory revolution of the processes of manufacture in so large and varied an industry, and in the face of foreign com- petitors hampered by no such regulations. The materials used by each manufacturer have been arrived at by a long process of experience, and they are such as to suit the particular goods he supplies for his particular market. It is therefore difficult to apply a uniform rule without jeopardizing the prosperity of the industry, which supports a population of 250,000 in the Potteries alone. However, the bulk of the manufacturers agreed to give up the use of raw lead, and to fritt all their glazes in future, time being allowed to effect the change of process; but they declined to be bound to any particular composition of glaze for the reasons indicated.

In 1901 the Home Office brought forward a new set of special rules. Most of these were framed to strengthen the provisions for securing cleanliness, removing dust, &c, and were accepted with a few modifications. But the question of making even more stringent regulations, even to the extent of making the use of lead-glaze illegal altogether, was still agitated; and in 1906 the Home Office again appointed an expert committee to reinvestigate the subject. They reported in 1910, and made various recommendations in detail for strengthening the existing regulations; but while encouraging the use of leadless glaze in certain sorts of common ceramic ware, they pointed out that, without the use of lead, certain other sorts could either not be made at all or only at a cost or sacrifice of quality which would entail the loss of important markets.

In 1908 Dr Collis made an inquiry into the increase of plumbism in connexion with the smelting of metals, and he considered the increase in the cases of poisoning reported to be due to the third schedule of the Workmen's Compensation Act, (i) by causing the prevalence of pre-existing plumbism to come to light, (2) by the tendency this fostered to replace men suspected of lead impregnation by new hands amongst whom the incidence is necessarily greater.

LEADVILLE, a city and the county seat of Lake county, Colorado, U.S.A., one of the highest (mean elevation c. 10,150 ft.) and most

celebrated mining ” camps ” of the world. Pop. (1900) 12,455, of whom 3802 were foreign-born; (1 910 census) 7508. It is served by the Denver & Rio Grande, the Colorado & Southern and the Colorado Midland railways. It lies amid towering mountains on a terrace of the western flank of the Mosquito Range at the head of the valley of the Arkansas river, where the river cuts the valley between the Mosquito and the Sawatch (Saguache) ranges. Among the peaks in the immediate environs are Mt. Massive (14,424 ft., the highest in the state) and Elbert Peak (14,421 ft.). There is a United States fish hatchery at the foot of Mt. Massive. In the spring of i860 placer gold was discovered in California Gulch, and by July i860 Oro City had probably 10,000 inhabitants. In five years the total yield was more than $5,000,000; then it diminished, and Oro City shrank to a few hundred inhabitants. This settle- ment was within the present limits of Leadville. In 1876 the output of the mines was about $20,000. During sixteen years ” heavy sands ” and great boulders that obstructed the placer fields had been moved thoughtlessly to one side. These boulders were from enormous lead carbonate deposits extremely rich in silver. The discovery of these deposits was made on the hills at the edge of Leadville. The first building was erected in June 1877; in December there were several hundred miners, in January the town was organized and named; at the end of 1879 there were, it is said, 35,000 inhabitants. Leadville was already a chartered city, with the usual organization and all public facilities. In 1880 it was reached by the Denver & Rio Grande railway. In early years Leadville was one of the most turbulent, picturesque and in all ways extraordinary, of the mining camps of the West. The value of the output from 1879 to 1889 totalled $147,834,186, including one-fifth of the silver production and a third of the lead consumption of the country. The decline in the price of silver, culminating with the closing of the India mints

and the repeal of the Sherman Law in 1893, threatened Lead- ville’s future. But the source of the gold of the old placers was found in 1892. From that year to 1899 the gold product rose from $262,692 to $2,183,332. From 1879 to 1900 the camp yielded $250,000,000 (as compared with $48,000,000 of gold and silver in five years from the Comstock, Nevada, lode; and $6o,oov.,ooo and 225,000 tons of lead, in fourteen years, from the Eureka, Nevada, mines). Before 1898 the production of zinc was unimportant, but in 1906 it was more valuable than that of silver and gold combined. This increased output is a result of the establishment of concentrating mills, in which the zinc content

is raised from 18 or 20% in the raw ores to 25 or 45% in the concentrates. In 1904, per ton of Lake county ore, zinc was valued at $6.93, silver at $4.16, lead at $3.85, gold at $1.77 and copper at $.66. The copper mined at Leadville amounted to about one-third the total mined in the state in 1906. Iron and manganese have been produced here, and in 1906 Leadville was the only place in the United States known to have produced bismuth. There were two famous labour strikes in the " diggings " in 1879 and 1896. The latter attracted national attention; it lasted from the 19th of June 1896 to the 9th of March 1897, when the miners, being practically starved out, declared the strike off. There had been a riot on the 21st of September 1896 and militia guarded the mines for months afterwards. In January 1897 the mines on Carbonate Hill were flooded after the removal of their pumps. This strike closed many mines, which were not opened for several years. Leadville stocks are never on the exchange, and " flotation " and " promotion " have been almost unknown.

The ores of the Leadville District occur in a blue limestone for- mation overlaid by porphyry, and are in the form of heavy sulphides, containing copper, gold, silver, lead and zinc; oxides containing iron, manganese and small amounts of silver and lead ; and siliceous ores, containing much silver and a little lead and gold. The best grade of ores usually consists of a mixture of sulphides, with some native gold. Nowhere have more wonderful advances in mining been apparent — in the size and character of furnaces and pumps; the development of local smelter supplies; the fall in the cost of coal, of explosives and other mine supplies; the development of railways and diminution of freight expenses; and the general im- provement of economic and scientific methods — than at Leadville since 1880. The increase of output more than doubled from 1890 to 1900, and many ores once far too low in grade for working now yield sure profits. The Leadville smelters in 1900 had a capacity of 35,000 tons monthly; about as much more local ore being treated at Denver, Pueblo and other places.

See S. F. Emmons, Geology and Mining Industry of Leadville, Colorado, monograph United States Geological Survey, vol. 12 (1886), and with J. D. Irving, The Downtown District of Leadville, Colorado, Bulletin 320, United States Geological Survey (1907), particularly for the discussion of the origin of the ores of the region.

LEAF (0. Eng. leaf, cf. Dutch loo}, Ger. Laub, Swed. Id}, &c; possibly to be referred to the root seen in Gr. Xknuv, to peel, strip), the name given in popular language to all the green expanded organs borne upon an axis, and so applied to similar objects, such as a thin sheet of metal, a hinged flap of a table, the page of a book, &c. Investigation

has shown that many other parts of a plant which externally appear very different from ordinary leaves are, in their essential particulars, very similar to them, and are in fact their morphological equivalents. Such are the scales of a bulb, and the various parts of the flower, and assuming that the structure ordinarily termed a leaf is the typical form, these other structures were designated changed or metamorphosed leaves, a somewhat misleading interpretation. All structures morphologically equivalent with the leaf are now included under the general term phyllome (leaf-structure).

Leaves are produced as lateral outgrowths of the stem in definite succession below the apex. This character, common to all leaves, distinguishes them from other organs. In the higher plants we can easily recognize the distinction between stem and leaf. Amongst the lower plants, however, it is found that a demarcation into stem and leaf is impossible, but that there is a structure which partakes of the characters of both — such is a thailus. The leaves always arise from the outer portion of the primary meristem of the plant, and the tissues of the leaf are continuous with those of the stem. Every leaf originates as

a simple cellular papilla (fig 1), which consists of a development from the cortical layers covered by epidermis; and as growth proceeds, the fibro-vascular bundles of the stem are continued outwards, and finally expand and terminate in the leaf. The increase in length of the leaf by growth at the apex is usually of a limited nature. In some ferns, however, there seems to be a provision for indefinite terminal growth, while in others this growth is periodically in- terrupted. It not unfre-quenlly happens, especially amongst Monocotyledons, that after growth at the apex has ceased, it is con- tinued at the base of the leaf, and in this way the length may be much in- creased. Amongst Dico-tyledons this is very rare. In all cases the dimensions of the leaf are enlarged by -fi interstitial growth of its parts.

The simplest leaf is found in some mosses, where it consists of a

single layer of Structure cells. The typical

From Strasburger's Lehrbuch der Botanik by permission of Gustav Fischer.

Fig. 1. — Apex of a shoot showing origin of leaves : /, leaf rudiment ; g, rudiment of an axillary bud.

foliage leaf consists of several layers, and amongst vascular plants is

distin- guishable into an outer layer (epidermis) and a central tissue (parenchyma) with fibro-vascular bundles distributed through it.

The epidermis (fig. 2, es, ei), composed of cells more or less compressed, has usually a different structure and aspect on the two surfaces of the leaf. The cells of the epidermis are very closely united laterally and contain no green colouring matter (chlorophyll) except in the pair of cellsˆguard-cells — which bound the stomata. The outer wall, especially of the upper epidermis, has a tough outer layer or cuticle which renders it impervious to water. The epidermis is continuous except where stomata or spaces bounded by specialized ;/» : cells communicate with intercellular spaces in “»” the interior of the leaf. It is chiefly on the epi- dermis of the lower sur- face (fig. 2, ei) thati/?ˆ- stomata, st, are pro- duced, and it is there ~ also that hairs, p, usually , occur. The lower epi dermis is often of a dull or pale-green colour, soft and easily detached. The upper epidermis is p 2 ._s e ction of a Melon leaf, perpen- frequently smooth and dicular to the surface _ v ˆ

shining, and sometimes y epidermis,

becomes very hard and , • L ˆ er e £ idermis . dense. Many tropical . jj a ; rs

plants present on the f/ Stomata .

iTvS Severn? &£*$ ■ ˆ <&*»

the mPr r p ld d er C l Sbe whˆ * Lowˆˆpongy) serve for storage of water matous cells ‘

layers of parenchjt layers of parenchy-

h

Air-spaces connected with stomata. Air-spaces between the loose cells in the spongy parenchyma. Bundles of fibro-vascular tissue.

and are known

aqueous tissue. In

leaves which float upon /■

the surface of the water, •< '

as those of the water-lily, the upper epidermis alone possesses”

stomata.

The parenchyma of the leaf is the cellular tissue enclosed within the epidermis and surrounding the vessels (fig. 2, ps, pi). It is known as mesophyll, and is formed of two distinct series of cells, each containing the green chlorophyll-granules, but differing in form and arrangement. Below the epidermis of the upper side of the leaf there are one or two layers of cells, elongated at right angles to the leaf surface (fig. 2, ps), and applied so closely to each other as to leave

only small intercellular spaces, except where stomata happen to be present (fig. 2, m); they form the palisade tissue. On the other side of the leaf the cells are irregular, often branched, and are arranged more or less horizontally (fig. 2, pi), leaving air-spaces between them, /, which communicate with stomata ; on this account the tissue has received the name of spongy. In leaves having a very firm texture, as those of Coniferae and Cycadaceae, the cells of the parenchyma immediately beneath the epidermis are very much thickened and elongated in a direction parallel to the surface of the leaf, so as to be fibre-like. These constitute a hypodermal layer, beneath which the chlorophyll cells of the parenchyma are densely packed together, and are elongated in a direction vertical to the surface of the leaf, forming the palisade tissue. The form and arrangement of the cells, however, depend much on the nature of the plant, and its exposure to light and air. Sometimes the arrange- ment of the cells on both sides of the leaf is similar, as occurs in leaves which have their edges presented to the sky. In very suc- culent plants the cells form a compact mass, and those in the centre are often colourless. In some cases the cellular tissue is deficient at certain points, giving rise to distinct holes in the leaf, as in Mon- stera Adansonii. The fibro-vascular system in the leaf constitutes the venation. The fibro-vascular bundles from the stem bend out into the leaf, and are there arranged in a definite manner. In skeleton leaves, or leaves in which the parenchyma is removed, this arrangement is well seen. In some leaves, as in the barberry, the veins are hardened, producing spines without any parenchyma. The hardening of the extremities of the fibro-vascular tissue is the cause of the spiny margin of many leaves, such as the holly, of the sharp-pointed leaves of madder, and of mucronate leaves, or those having a blunt end with a hard projection in the centre.

The form and arrangement of the parts of a typical foliage leaf are

intimately associated with the part played by _ the leaf in the life of the plant. The flat surface is spread to allow the maximum amount of sunlight to fall upon it, as it is by the absorption of energy from the sun's rays by means of the chloro- phyll contained in the cells of the leaf that the building up of plant food is rendered possible; this process is known as photo-synthesis; the first stage is the combination of carbon dioxide, absorbed from the air taken in through the stomata into the living cells of the leaf, with water which is brought into the leaf by the wood-vessels. The wood-vessels form part of the fibro-vascular bundles or veins of the leaf and are continuous throughout the leaf-stalk and stem with the root by which water is absorbed from the soil. The palisade layers of the mesophyll contain the larger number of chlorophyll grains (or corpuscles) while the absorption of carbon dioxide is carried on chiefly through the lower epidermis which is generally much richer in stomata. The water taken up by the root from the soil contains nitro- genous and mineral salts which combine with the first pro- duct of photo-synthesis — a carbohydrate — to form more complicated nitrogen-containing food substances of a proteid nature; these are then distributed by. other elements of the vascular bundles (the phloem) through the leaf to the stem and so throughout the plant to wherever growth or development is going on. A large proportion of the water which ascends to the leaf acts merely as a carrier for the other raw food materials and is got rid of from the leaf in the form of water vapour through the stomata — this process is known as transpiration. Hence the extended surface of the leaf exposing a large area to light and air is eminently adapted for the carrying out .of the process of photo-synthesis and transpiration. The arrangement of the leaves on the stem and branches (see Phyllotaxy, below) is such as to prevent the upper leaves shading the lower, and the shape of the leaf serves towards the same end — the disposition of leaves on a branch or stem is often seen to form a " mosaic," each leaf fitting into the space between neighbouring leaves and the branch on which they are borne without overlapping.

Submerged leaves, or leaves which are developed under water, differ in structure from aerial leaves. They have usually no fibro-vascular system, but consist of a congeries of cells, which sometimes become elongated and compressed so as to resemble veins. They have a layer of compact cells on their surface, but no true epidermis, and no stomata. Their internal structure consists of cells, disposed irregularly, and sometimes leaving spaces which are filled with air for the purpose of floating the leaf. When exposed to the air these leaves easily part with their moisture, and become shrivelled and dry. In some cases there

is only a network of filament-like cells, the spaces between which are not filled with parenchyma, giving a skeleton appear- ance to the leaf, as in Ouvirandra fenesiralis (Lattice plant). A leaf, whether aerial or submerged, generally consists of a flat expanded portion, called the blade, or lamina, of a narrower portion called the petiole or stalk, and sometimes of a portion at the base of the petiole, which forms a sheath or vagina (fig. 5, s), or is developed in the form of outgrowths, called stipules (fig. 24, s). All these portions are not always present. The sheathing or stipulary portion is frequently wanting. When a leaf has a distinct stalk it is petiolate; when it has none, it is sessile, and if in this case it embraces the stem it is said to be amplexicaul. The part of the leaf next the petiole or the axis is the base, while the opposite extremity is the apex. The leaf is usually flattened and expanded horizontally, i.e. at right angles to the longitudinal axis of the shoot, so that the upper face is directed towards the heavens, and the lower towards the earth. In some cases leaves, as in Iris, or leaf like petioles, as in Australian acacias and eucalypti, have their plane of expansion parallel to the axis of the shoot, there is then no distinction into an upper and a lower face, but the two sides are developed alike; or the leaf may have a cylindrical or polyhedral form, as in mesembry anthemum. The upper angle formed between the leaf and the stem is called its axil; it is there that leaf buds are normally developed. The leaf is sometimes articulated with the stem, and when it falls off a scar remains; at other times it is con tinuous with it, and then decays, while still attached to the axis. In their early state all leaves are continuous with the stem, and it is only in their after growth that articulations are formed. When leaves fall off annually they are called deciduous; when they remain for two or more years they are persistent, and the plant is evergreen. The laminar portion of a leaf is occasionally articulated with the petiole, as in the orange, and a joint at times exists between the vaginal or stipulary portion and the petiole. The arrangement of the fibro-vascular system in the lamina constitutes the venation or nervation. In an ordinary leaf, as that of the elm, there is observed a large central vein running aa ti OB from the base to the apex of the leaf, this is the midrib e _ ‘ (fig. 3) ; it gives off veins laterally {primary veins). A leaf with

Fig. 3. — Leaf of Elm (Ulmus) . Reticulated vena- tion; primary veins going to the margin, which is ser- rated. Leaf unequal at the base.

Fig. 4. — Multicostate leaf of Castor- oil plant (Ricinus communis). It is palmately-cleft, and exhibits seven lobes at the margin. The petiole is inserted a little above the base, and hence the leaf is called peltate or shield- like.

only a single midrib is said to be unicostate and the venation is described as pinnate or feather-veined. In some cases, as sycamore or castor oil (fig. 4), in place of there being only a single midrib there are several large veins (ribs) of nearly equal size (which diverge from the point where the blade joins the petiole or stem, giving off lateral veins. The leaf in this case is multicostate and the venation palmate. The primary veins give off secondary veins, and these in their turn give off tertiary veins, and so on until a complete network of vessels is produced, and those veins usually project on the under surface of the leaf. To a distribution of veins such as this the name of reticu- lated or netted venation has been applied. In the leaves of some plants there exists a midrib with large veins running nearly parallel to it from the base to the apex of the lamina, as in grasses (fig. 5) ; or with veins diverging from the base of the lamina in more or less

parallel lines, as in fan palms (fig. 6), or with veins coming off from it throughout its whole course, and running parallel to each other in a straight or curved direction towards the margin of the leaf, as in plantain and banana. In these cases the veins are often united by cross veinlets, which do not, however, form an angular network. Such leaves are said to be parallel-veined. The leaves of Mono- cotyledons have generally this kind of venation, while reticulated venation most usually occurs amongst Dicotyledons. Some plants,

which in most points of their struc- ture are monocotyledonous, yet have reticulated venation ; as in Smilax and Dioscorea. In vascular acotyle- donous plants there is frequently a ‘ tendency to fork exhibited by the

fibro- vascular bundles in the leaf; and when this is the case we have fork-veined leaves. This is well seen in many ferns. The distribution of the system of vessels in the leaf is

Fig. 5. — Stem of a Grass (Poa) with leaf. The sheaths ending in a process /, called a ligule; the blade of the leaf, /.

Fig. 6. — Leaf of a Fan Palm (Chamaerops), showing the veins running from the base to the mar- gin, and not forming an angular network.

usually easily traced, but in the case of succulent plants, as Hoya, agave, stonecrop and mesembryanthemum, the veins are obscure. The function of the veins which consist of vessels and fibres is to form a

rigid framework for the leaf and to conduct liquids.

In all plants, except Thallophytes, leaves are present at some period of their existence. In Cuscuta (Dodder) (q.v.), however, we have an exception. The forms assumed by leaves vary much, not only in different plants, but in the same plant. It is only amongst the lower classes of plants — Mosses, Characeae, &c. — that all the leaves on a plant are similar. As we pass up the scale of plant life we find them becoming more and more variable. The structures in ordinary language designated as leaves are considered so par excellence, and they are frequently spoken of as foliage leaves. In relation to their production on the stem we may observe that when they are small they are always produced in great number, and as they increase in size their number diminishes correspondingly. The cellular process from the axis which develops into a leaf is simple and undivided; it rarely remains so, but in progress of growth becomes segmented in various ways, either longitudinally or laterally, or in both ways. By longitudinal segmentation we have a leaf formed consisting of sheath, stalk and blade; or one or other of these may be absent, and thus stalked, sessile, sheathing, &c, leaves are produced. Lateral segmentation affects the lamina, pro- ducing indentations, lobings or Assuring of its margins. In this way two marked forms of leaf are produced — (1) Simple form, in which the segmentation, however deeply it extends into the lamina, does not separate portions of the lamina which become articulated with the midrib or petiole; and (2) Com- pound form, where portions of the lamina are separated as detached leaflets, which become articulated with the midrib or petiole. In both simple and compound leaves, according to the amount of segmentation and the mode of development of the parenchyma and direction of the fibro-vascular bundles, many forms are produced.

Simple Leaves. — When the parenchymals developed symmetrically on each side of the midrib or stalk, the leaf is equal; if otherwise, Simple tne * ea ˆ ‘ s une Q ua l or oblique (fig. 3). If the margins are leaves. even and present no divisions, the leaf is entire (fig. 7) ; if there are slight projections which are more or less pointed, the leaf is dentate or toothed; when the projections lie regularly over each other, like the teeth of a saw, the leaf is serrate (fig. 3) ; when they are rounded the leaf is crenate. If the divisions extend more deeply into the lamina than the margin, the leaf receives different names according to the nature of the segments; thus, when the divisions extend about half-way down (fig. 8), it is cleft; when the divisions extend nearly to the base or to the. midrib the leaf is partite.

If these divisions take place in a simple feather-veined leaf it becomes

either pinnatifid (fig. 9), when the segments extend to about the middle, or pinnatipartite, when the divisions extend nearly to the midrib. These primary divisions may be again subdivided in a similar manner, and thus a feather- veined leaf will become bi- pinnatifid or bipinnatipartite ; still further subdivisions give origin to tripinnatifid and laciniated leaves.. The same kinds of divisions

Fig. 7.

Fig. 9.

Fig. 8.

Fig. 7. — Ovate acute leaf of Coriara myrtifolia. Besides the mid- rib there are two intra-marginal ribs which converge to the apex. The leaf is therefore tricostate.

Fig. 8. — Runcinate leaf of Dandelion. It is a pinnatifid leaf, with the divisions pointing towards the petiole and a large triangular apex.

Fig. 9. — Pinnatifid leaf of Valeriana dioica. taking place in a simple leaf with palmate or radiating venation, give origin to lobed, cleft and partite forms. The name palmate or palmatifid (fig. 4) is the general term applied to leaves with radiating venation, in which there are several lobes united by a broad expansion of parenchyma, like the palm of the hand, as in the sycamore, castor- oil plant, &c. The divisions of leaves with radiating venation may extend to near the base of the leaf, and the names bipartite, tripartite, quinquepartite, &c, are given according as the partitions are two, three, five or more. The term dissected is applied to leaves with radiating venation, having numerous narrow divisions, as in Geranium dissectum.

When in a radiating leaf there are three primary partitions, and the two lateral lobes are again cleft, as in hellebore (fig. 11), the leaf is called pedate or pedatifid, from a fancied resem-

Fig. 10. — Five-partite leaf of Aconite.

Fig. 11. — Pedate leaf of Stinking Hellebore (Helleborus foetidus) . The venation is radiating. It is a palm- ately-partite leaf, in which the lateral lobes are deeply divided. When the leaf hangs down it resembles the foot of a bird, and hence the name.

blance to the claw of a bird. In all the instances already alluded to the leaves have been considered as flat expansions, in which the ribs or veins spread out on the same plane with the stalk. In some cases,

however, the veins spread at right angles to the stalk, form- ing a peltate leaf as in Indian cress (fig. 12).

The form of the leaf shows a very great variety ranging from the narrow linear form with parallel sides, as in grasses or the needle-like leaves of pines and firs to more or less rounded or orbicular — descrip- tions of these will be found in works on descriptive botany — a few

examples are illustrated here (figs. 7, 13, 14- 15)- The apex also vanes considerably being rounded, or obtuse, sharp or acute (fig. 7), notched (fig. 15) &c. Similarly the shape of the base may vary when rounded lobes are formed, as in dog-violet, the leaf is cordate or heart-shaped ; or kidney-shaped or reniform (fig. 16), when the apex is rounded as in ground ivy. When the lobes are prolonged down- wards and are acute, the leaf is sagittate (fig. 17) ; when they proceed at right angles, as in Rumex Acetosella, the leaf is hastate or halbert- snapcd. When a simple leaf is divided at the base into two leaf-like appendages, it 13 called auriculate. When the development of parenchyma is such that it more than fills up the spaces between the veins, the margins become wavy, crisp or undulated, as in Rumex crtspus and Rheum undulatum. By cultivation the cellular tissue is often much increased, giving rise to the curled leaves of greens savoys, cresses, lettuce, &c. B ‘

Compound leaves are those in which the divisions extend to the Compound m ‘ d ” b or .Petiole, and the sepa- leaves. rated Portions become each arti- culated with it, and receive the name of leaflets. The midrib, or petiole, has thus the appearance of a branch with

r rr T „ r > ti ~ , – T .. „ Fig. 13. — Lanceolate

l IG. 12.— Peltate leaves of Indian Cress leaf of a species of (Tropaeolum majus). Senna,

separate leaves attached to it, but it is considered properly as one leaf, because in its earliest state it arises from the axis as a single piece and its subsequent divisions in the form of leaflets are all in one plane. The leaflets are either sessile (fig. 18) or have stalks called peholules (fig. 19). Compound leaves are pinnate (fig. iq) or palmate (fig 18) according to the arrangement of leaflets; When a pinnate leaf ends in a pair of pinnae it is equally or abruptly pinnate (panpinnate) ; when there is a single terminal leaflet (fig. 19), the leaf is unequally pinnate

(imparipinnate) ; when the leaflets or pinnae are placed alternately on either side of the midrib, and not directly'opposlte to each other, the lea ,s alternately pinnate; and when the pinnae are of different sizes, the leaf is interruptedly pinnate. When the division

Fig. 17.

Fig. 14. Fig. 15. Fig. 16.

Fig. 14. — Oblong leaf of a species of Senna.

Fig. 15.— Emarginate leaf of a species of Senna. The leaf in its contour is somewhat obovate, or inversely egg-shaped, and its base is oblique.

Fig. H6.— Reniform leaf of Nepeta Glechoma, margin crenate

Fig.ˆ 17.— Sagittate leaf of Convolvulus, is carried into the second degree, and the pinnae of a compound leal are themselves pinnately compound, a bipinnatc leaf is formed

1 he petiole or leaf-stalk is the part which unites the limb or blade ot the leaf to the stem. It is absent in sessile leaves, and this is also Petiole. frequently the case when a sheath is present, as in grasses . . (°g- 5)- It consists of the fibro-vascular bundles with a varying amount of cellular tissue. When the vascular bundles reach the base of the lamina they separate and spread out in various ways as already described under venation. The lower part of the petiole is otten swollen (fig. 20, p), forming the pulvinus, formed of cellular tissue, the cells of which exhibit the phenomenon of irritability in Mimosa pudica (fig. 20) a sensitiveness is located in the pulvinus which upon irritation induces a depression of the whole bipinnate leaf, a similar property exists in the pulvini at the base of the leaflets which fold upwards. The petiole varies in length, being usually shorter than the lamina, but sometimes much longer. In some

palms it is 15 or 20 ft. long, and is so firm as to be used for poles or walking-sticks. In general, the petiole is more or less rounded in its form, the upper surface being flattened or grooved. Sometimes it is compressed laterally, as in the aspen, and to this peculiarity the trembling of the leaves of this tree is due. In aquatic plants the leaf-stalk is sometimes distended with air, as in Pontederia and Trapa, so as to float the leaf. At other times it is winged, and is either leafy, as in the orange (fig. 21, p), lemon and Dionaea, or pitcher- like, as in Sarracenia (fig. 22). In some Australian acacias, and in some species of Oxalis and Bupleurum, the petiole is flattened in a vertical direction,

the vascular bundles separating immediately after quitting the stem and running nearly parallel from base to apex. This kind of petiole (fig. 23, p) has been called a phyllode. In these plants the laminae or blades of the leaves are pin- nate or bipinnate, .and are produced at the/

Fig. 19. — Imparipinnate (unequally pinnate) leaf of Robinia. There are nine pairs of shortly-stalked leaflets Frr- tH i?t ., , (f oliola, pinnae), and an odd

f ig. is.— Falmately compound one at the extremity. At the

leaf of the Horse-chestnut (Aes- base of the leaf the spiny

cuius Hippocastanum). stipules are seen. ‘

extremities of the phyllodes in a horizontal direction; but in many instances they are not developed, and the phyllode serves Sn 117T- ° f a r eaf > Th °? e Pˆodes, by their vertical posi- tion and their peculiar form, give a remarkable aspect to vegetation.

™!!-fˆ S \T aC u Cla – thc [e occur leaves with the P etiole a “d lamina perfect pothers having the petiole slightly expanded or winged, and the lamina imperfectly developed; and others in which there is no lamina, and the petiole becomes large and broad. Some petioles are long, slender and sensitive to contact, and function as tendrils

which the plant climbs; as in the n a s t u rtiums (Tropaeolum), clematis and others; and in compound leaves the midrib and some of the leaf lets may similarly be transformed into tendrils, as in the pea and vetch. The leaf base is often de- veloped as a sheath (vagina), which embraces the whole or part of the circumfer- ence of the stem (fig. 5)- This sheath is com- paratively rare in dicotyledons

/ £ IG ‘ 20 ~ Branch and ‘eaves of the Sensitive plant (Mimosa pudica), showing the petiole in its erect state, a, and in its depressed state, b; also the leaflets closed, c, and the leaflets expanded, d. Irritability resides in the pulvinus, p.

but is seen in umbelliferous plants.

V . ‘, ”” > -jˆuviw, UUL IO SCC11 111 UlllUt

C ‘\w more common amongst monocotyledons. In sedg’es the sheath forms a complete investment of the stem, whilst in grasses it is split on one side. In the latter plants there is ieaf6a * ! – also a membranous

outgrowth, the ligule, at right angles to the median plane of the leaf from the point where the sheath passes into the lamina, there being no petiole (fig. 5, I).

In leaves m which no sheath is produced we not infrequently hnd small foliar organs, stipules, at the base of the petiole (fig. 24, si the stipules are generally two in number, and they are important as supplying characters in certain natural orders. Thus they occur

Fig. 21. — Leaf of Orange (Citrus Auran- tium), showing a winged leafy petiole p, which is articulated to the lamina /.

Fig. 22. — Pitcher (ascidium) of a species of Side-saddle plant (Sarracenia purpurea). The pitcher is formed from the petiole, which is prolonged.

in the i > ea and bean family, in rosaceous plants and the family Rubiaceae. They are not common in dicotyledons with opposite leaves. Plants having stipules are called stipulate; those having none are exstipulate. Stipules may be large or small, entire or divided, deciduous or persistent. They are not usually of the same form as the ordinary foliage leaves of the plant, from which they are distinguished by their lateral position at the base of the petiole. In the pansy

(fig. 24) the true leaves are stalked and crenate, while the stipules s are large, sessile and pin- natifid. InLathyrus Aphaca and some other plants the true pinnate leaves are abortive, the petiole forms a tendril, and the stipules alone are developed, perform- ing the office of leaves. When sti- pulate leaves are op- posite to each other, at the same height on the stem, it occa- sionally happens that the stipules on the two sides unite wholly or partially, so as to form an in- terpetiolary or inter- foliar stipule, as in members of the family Rubiaceae. In the case of alternate leaves, the stipules at the base of each leaf are sometimes united to the petiole and to each other, so as to form an adnate, adherent or petiolary stipule, as in the rose, or an axillary stipule, as in Houttuynia cordata. In other in- stances the stipules unite together on the side of the stem opposite the leaf forming an ocrea, as in the dock family (fig. 25).

In the development of the leaf the stipules frequently play a most

important part. They begin to be formed after the origin of the leaves,

but grow much more rapidly than the leaves, and in this way they arch over the young leaves and form protective chambers wherein the parts of the leaf may de- velop. In the figs, magnolia and pondweeds they are very large and completely envelop the young leaf-bud. The sti- pules are sometimes so minute as to be scarcely distinguish- able without the aid of a lens, and so fugacious as to be visible only in the very young state of the leaf. They may assume a hard and spiny char- acter, as in Robinia Pseud- acacia (fig. 19), or may be cir- rose, as in Smilax, where each stipule is represented by a tendril. At the base of the leaflets of a compound leaf, small stipules (stipels) are occasionally produced.

Variations in the structure and forms of leaves and leaf- stalks are produced by the increased development of cel- lular tissue, by the abortion or degeneration of parts, by the multiplication or repetition of parts and by adhesion. When cellular tissue is developed to a great extent, leaves become succulent and occasionally assume a crisp or curled ap- pearance. Such changes take place naturally, but they are the art of the gardener, and the object of operations is to increase the bulk and suc- It is in this way that cabbages and savoys delicate and nutritious. By a deficiency in development of parenchyma and an increase in the mechanical tissue, leaves are liable to become hardened and spinescent. The leaves of barberry and of some species of Astragalus, and the

stipules of the false acacia (Robinia) are spiny. To the same cause is due the spiny margin of the holly-leaf. When two lobes at the base of a leaf are prolonged beyond the stem and unite (fig. 26), the leaf is perfoliate, the stem appearing to pass through it, as in Bupleurum perfoliatum and Chlora perfoliata; when two leaves unite by their bases they become connate (fig. 27), as in Lonicera Capri- folium; and when leaves adhere to the stem, forming a sort of winged or leafy ap- pendage, they are decurrent, as in thistles. The for- mation of peltate leaves has been traced to the union of the lobes of a cleft leaf. In the leaf of the Victoria regia the transformation may be traced during germination. The first leaves produced by the young plant are linear, the second are sagittate and hastate, the third are rounded-cordate and the next are orbicular. The cleft indicating the union of the lobes remains in the large leaves.

Modifica- tions.

Fig. 23. — Leaf of an Acacia (Acacia heterophylla), showing a flattened leaf-like petiole p, called a phyllode, with straight venation, and a bipin- nate lamina.

often increased by many horticultural culence of leaves, are rendered more

Fig. 25. — Leaf of Poly- gonum, with part of stem. 0, Ocrea.

Fig. 24. — Leaf of Pansy, s, Sti- pules. The parts of the leaf are frequently transformed into tendrils, with the view of enabling the plants to twine round others for support. In Leguminous plants (the pea tribe) the pinnae are frequently modified to form tendrils, as in Lathyrus Aphaca, in which the stipules perform the function of true leaves. In Flagellaria indica, Gloriosa superba

Fig. 26. — Perfoliate leaf of a species of Hare's-ear (Bupleurum rotundifolium). The two lobes at the base Fig. 27.— Connate leaves of

of the leaf are united, so a species of Honeysuckle

that the stalk appears to (Lonicera Caprifolium). Two

come through the leaf. leaves are united by their bases.

and others, the midrib of the leaf ends in a tendril. In Smilax there

are two stipulary tendrils.

The vascular bundles and cellular tissue are sometimes developed

in such a way as to form a circle, with a hollow in the centre, and thus

give rise to what are called fistular or hollow leaves, as in the onion,

and to ascidia or pitchers. Pitchers are

formed either by petioles or by laminae, and

they are composed of one or more leaves.

In Sarracenia (fig. 22) and Heliamphora the

pitcher is composed of the petiole of the leaf.

In the pitcher plant, Nepenthes, the pitcher

is a modification of the lamina, the petiole

often plays the part of a tendril, while the

leaf base is flat and leaf-like (fig. 28).

In Utricularia bladder-like sacs are formed

by a modification of leaflets on the sub- merged leaves.

In some cases the leaves are reduced to

mere scales — cataphyllary leaves; they are

produced abundantly upon underground

shoots. In parasites (Lathraea, Orobanche)

and in plants growing on decaying vegetable

matter (saprophytes), in which no chloro- phyll is formed, these scales are the only

leaves produced. In Pinus the only leaves

Fig.

28. — Pitcher

produced on the main stem and the lateral °f a , spec ‘ es , Ar ° shoots are scales, the acicular leaves of the pitcher-plant (Aep- tree growing from axillary shoots. In Cycas entries distillatoria) . whorls of scales alternate with large pinnate

leaves. In many plants, as already noticed, phyllodia or stipules I perform the function of leaves. The production of leaf-buds from

Phyllo taxis.

leaves sometimes occurs as in Bryophyllum, and many plants of the order Gesneraceae. The leaf of Venus’s fly-trap (Dionaea muscipula) when cut off and placed in damp moss, with a pan of water under- neath and a bell-glass for a cover, has produced buds from which young plants were obtained. Some species of saxifrage and of ferns also produce buds on their leaves and fronds. In Nymphaea micrantha buds appear at the upper part of the petiole.

Leaves occupy various positions on the stem and branches, and have received different names according to their situation. Thus leaves

arising from the crown of the root, as in the primrose, are called radical; those on the stem are cauline; on flower-stalks, floral leaves (see Flower). The first leaves developed are known as seed leaves or cotyledons. The arrangement of the leaves on the axis and its appendages is called phyllotaxis.

In their arrangement leaves follow a definite order. The points on the stem at which leaves appear are called nodes; the part of the stem between the nodes is the internode. When two leaves are produced at the same node, one on each side of the stem or axis, and at the same level, they are opposite (fig. 29) ; when more than two are produced they are verticillate, and the circle of leaves is then

called a verticil or whorl. When leaves are opposite, each successive pair may be placed at right angles to the pair immediately preceding. They are then said to decus- sate, following thus a law of alternation (fig. 29). The same occurs in the verticillate arrangement, the leaves of each whorl rarely being super- posed on those of the whorl next it, but usually alterna- ting so that each leaf in a whorl occupies the space be- tween two leaves of the whorl next to it. There are con- siderable irregularities, how- ever, in this respect, and the number of leaves in different whorls is not always uniform, as may be seen in Lysimachia vulgaris. When a single leaf is produced at a node, and the nodes are separated so that each leaf is placed at a tastichous or different height on the stem, quincuncial man- the leaves are alternate (fig. ner. The sixth 30). A plane passing through leaf is directly the point of insertion of the above the first, leaf in the node, dividing and commences the leaf into similar halves, the second cycle, is the median plane of the The fraction of leaf ; and when the leaves are the circumference arranged alternately on an of the stem ex- axis so that their median pressing the di- planes coincide they form a vergence of the straight row or ortkostichy. leaves is two- On every axis there are usually fifths. two or moreorthostichies. In

fig. 31, leaf 1 arises from a node n ; leaf 2 is separated from it by an internode m, and is placed to the right or left; while leaf 3 is situated directly above leaf I. In this case, then, there are two orthostichies, and the arrangement is said to be distichous. When the fourth leaf is directly above the first, the arrangement is tristichous. The same arrangement continues throughout the branch, so that in the latter case the 7th leaf is above the 4th, the 10th above the 7th ; also the 5th above the 2nd, the 6th above the 3rd and so on. The size of the angle between the median planes of two consecutive leaves in an alternate arrangement is their divergence; and it is expressed in fractions of the circum- ference of the axis which is supposed to be a circle. In a

regularly- formed straight branch covered with leaves, if a thread is passed from one to the other, turning always in the same direction, a spiral is described, and a certain number of leaves and of complete turns occur before reaching the leaf directly above that from which the enumeration commenced. If this arrangement is expressed by a fraction, the numerator of which indicates the number of turns, and the denominator the number of internodes in the spiral cycle, the fraction will be found to represent the angle of divergence of the consecutive leaves on the axis. Thus, in fig. 32, a, b, the cycle consists of five leaves, the 6|h leaf being placed vertically over the 1st, the 7th over the 2nd and so on; while the number of turns between the 1st and 6th leaf is two; hence this arrangement is indicated by the fraction |. In other words, the distance or divergence between the first and second leaf, expressed in parts of a circle, is f of a circle or 36o°Xl = 144°. In fig- 3i> a, b, the spiral is J, i.e. one turn and

Fig. 29. — A stem with opposite leaves. The pairs are placed at right angles alternately, or in what is called a decussate man- ner. In the lowest pair one leaf is in front and the other at the back ; in the second pair the leaves are placed laterally, and so on.

Fig. 30. — A stem with alter- nate leaves, ar- ranged in a pen-

two leaves; the third leaf being placed vertically over the first, and the divergence between the first and second leaf being one-half the circumference of a circle, 36o°Xi = 180 °. Again, in a tristichous arrangement the number is J, or one turn and three leaves, the angular divergence being 120 .

By this means we have a convenient mode of expressing on paper the exact position of the leaves upon an axis. And in many cases such a mode of expression is of excellent service in enabling us readily to understand the relations of the leaves. The divergences may also be represented diagrammatically on a horizontal projection of the vertical axis, as in fig. 33. Here the outer- most circle represents a section of that portion of the axis bearing the lowest leaf, the inner- most representˆ the highest. The bro'ad dark lines represent the leaves, and they are numbered according to their age and position. It will be seen at once that the leaves are ar- „ “.

ranged in orthostichies b IG : 3 1 ■— Portion of a branch of a Lime marked I.V., and that tree.with four leaves arranged in a distichous these divide the circum manner, or in two rows, o, The branch with ference into five equal tne ‘ eaves numbered in their order, n being portions. But the t ‘? e n °de and m the internode; b is a mag-

divergence between leaf nme ˆ representation of the branch, show- I and leaf 2 is equal to ing.the points of insertion of the leaves and |ths of the circumfer- their spiral arrangement, which is expressed ence, and the same by tne fraction -|, or one turn of the spiral is the case between 2 for two internodes.

and 3, 3 and 4, &c. The divergence, then, is |, and from this we learn that, starting from any leaf on the axis, we must pass twice round the stem in a spiral through five leaves before reaching one directly over that with which we started. The line which, wind- ing round an axis either to the right or to the left, passes through the points of insertion of all the leaves on the axis is termed the genetic or generating spiral; and that margin of each leaf which is towards the direction from which the spiral proceeds is the kathodic side, the other margin facing the point whither the spiral passes being the anodic side.

In cases where the internodes are very short and the leaves are closely applied to each other, as in the house-leek, it is difficult to trace the generating spiral. Thus, in fig. 34 there are thirteen leaves which are numbered in their order, and five turns of the spiral marked by circles in the centre (ˆ3 indicating the arrange- ment) ; but this could not be detected at once. So also in fir cones (fig. 35), which are com- posed of scales or modified leaves, the generating spiral cannot be determined easily. But in such cases a series of secondary spirals or parastichies are seen running parallel with each other .both right and left, which to a certain Fig. 32.— Part of a branch of a extent conceal the genetic spiral. Cherry with six leaves, the sixth

The spiral is not always con- being placed vertically over the stant throughout the whole first, after two turns of the spiral, length of an axis. The angle of This is expressed by two- fifths, divergence may alter either a, The branch, with the leaves abruptly or gradually, and the numbered in order; b, a magnified phyllotaxis thus becomes very representation of the branch, complicated. This change may showing the points of insertion of be brought about by arrest of the leaves and their spiral arrange- development, by increased de- ment. velopment of parts or by a tor- sion of the axis. The former are exemplified in many Crassulaceae and aloes. The latter is seen well in the screw-pine (Pandanus). In the bud of the screw-pine the leaves are arranged in three orthostichies with the phyllotaxis J, but by torsion the developed leaves become arranged in three strong spiral rows running round the stem. These causes of change in phyllotaxis are also well exemplified in the altera- tion of an opposite or verticillate arrangement to an alternate, and vice versa ; thus the effect of interruption of growth, in causing alternate leaves to become opposite

and verticillate, can be distinctly shown in Rhododendron ponticum. The primitive or generating spiral may

pass either from right to left or from left to right. It sometimes follows a different direction in the branches from that pursued in the stem. When it follows the same course in the stem and branches, they are homodromous; when the direction differs, they are hetero- dromous. In different species of the same genus the phyllotaxis frequently varies.'

All modifications of leaves follow the same laws of arrangement as true leaves — a fact which is of importance in a morphological point of view. In dicotyledonous plants the first leaves produced (the cotyledons) are opposite. This arrangement often continues during the life of the plant, but at other times it changes, passing into distichous and spiral forms. Some tribes of plants are distinguished

by their opposite or ver- ticillate, others by their alternate, leaves. Labiate plants have decussate leaves, while Boragin- aceae have alternate leaves, and Tiliaceae usu- ally have distichous leaves ; Rubiaceae have opposite leaves. Such arrangements as |, f , f^ and 2 s j are common in Dicotyledons. The first of these, called a quin- cunx, is met with in the apple, pear and cherry (fig. 32); the second, in the bay, holly, Plantago media; the third, in the cones of Picea alba (fig. Fig. 33. — Diagram of a phyllotaxis repre- 35) ; and the fourth in sented by the fraction f. those of the silver fir.

In monocotyledonous plants there is only one seed-leaf or cotyledon, and hence the arrangement is at first alternate; and it generally continues so more or less, rarely being verticillate. Such arrangements as \, 3 and I are common in Monocotyledons, as in grasses, sedges and lilies. It has been found in general that, while the number 5 occurs in the phyllotaxis of Dicotyledons, 3 is common in that of Mono- cotyledons.

In the axil of previously formed leaves leaf-buds arise. These leaf-buds contain the rudiments of a shoot, and consist of leaves covering a growing point. The buds of trees of temperate climates, which lie dormant during the winter, are protected by scale leaves. These scales or protective appendages of the bud consist either of

*Fig. 35. — Cone of Picea alba with the scales or modified leaves

numbered in the order of their arrangement on the axis of the cone. The lines indicate a rectilinear series of scales and two lateral secondary spirals, one turning from left to right, the other from right to left.

Fig. 34. — Cycle of thirteen leaves placed closely together so as to form a rosette, as in Sempervivum. A is the very short axis to which the leaves are attached. The leaves are numbered in their order, from below upwards. The circles in the centre indicate the five turns of the spiral, and show the insertion of each of the leaves. The divergence is expressed by the fraction Aths.

the altered laminae or of the enlarged petiolary sheath, or of stipules, as in the fig and magnolia, or of one or two of these parts combined. These are often of a coarse nature, serving a temporary purpose, and then falling off when the leaf is expanded. They are frequently covered with a resinous matter, as in balsam-poplar and horse-chestnut, or by a thick downy covering as in the willow. In plants of warm climates the buds have often no protective appendages, and are then said to be naked.

The arrangement of the leaves in the bud is termed vernation or prefoliation. In considering vernation we must take into account both the manner in which each individual leaf is folded and also the arrangement of the leaves in relation to each other. These vary in

different plants, but in each species they follow a regular law. The leaves in the bud are either placed simply in apposition, as in the mistletoe, or they are folded or rolled up longitudinally or laterally, giving rise to different kinds of vernation, as delineated in figs. 36 to 45, where the folded or curved lines represent the leaves, the thickened part being the midrib. The leaf taken individually is either folded longitudinally from apex to base, as in the tulip-tree, and called reclinate or replicate ; or rolled up in a circular manner from apex to base, as in ferns (fig. 36), and called circinate; or folded laterally, conduplicate (fig. 37), as in oak; or it has several folds like a fan, plicate or plaited (fig. 38), as in vine and sycamore, and in leaves with radiating vernation, where the ribs mark the foldings; or it is rolled upon itself, convolute (fig. 39), as in banana and apricot; or its edges are rolled inwards, involute (fig. 40), as in violet; or

Fig. 36.

/

Fig. 37.

Fig. 38.

Fig. 39.

Fig.

36.

Fig.

37-

Fig.

38.

Fig.

39-

Fig.

40.

Fig.

4i-

Fig. 40. Fig. 41.

-Circinate vernation.

-Transverse section of a conduplicate leaf.

-Transverse section of a plicate or plaited leaf.

-Transverse section of a convolute leaf. — Transverse section of an involute leaf. , — Transverse section of a revolute leaf.

outwards, revolute (fig. 41), as in rosemary. The different divisions of a cut leaf may be folded or rolled up separately, as in ferns, while the entire leaf may have either the same or a different kind of vernation. The leaves have a definite relation to each other in the bud, being either opposite, alternate or verticillate ; and thus different kinds of vernation are produced. Sometimes they are nearly in a circle at the same level, remaining flat or only slightly convex externally, and placed so as to touch each other by their edges, thus giving rise to

valvate vernation. At other times they are at different levels, and are applied over each other, so as to be imbricated, as in lilac, and in the outer scales of sycamore; and occasionally the margin of one leaf overlaps that of another, while it in its turn is overlapped by a third, so as to be twisted, spiral or contortive. When leaves are applied to each other face to face, without being folded or

Fig. 42. Fig. 43. Fig. 44. Fig. 45.

Fig. 42. — Transverse section of a bud, in which the leaves are arranged in an accumbent manner.

Fig. 43. — Transverse section of a bud, in which the leaves are arranged in an equitant manner.

Fig. 44. — Transverse section of a bud, showing two leaves folded in an obvolute manner. Each is conduplicate, and one embraces the edge of the other.

Fig. 45. — Transverse section of a bud, showing two leaves arranged in a supervolute manner.

rolled together, they are appressed. When the leaves are more completely folded they cither touch at their extremities and are accumbent or opposite (fig. 42), or are folded inwards by their margin and become induplicate ; or a conduplicate leaf covers another similarly folded, which in turn covers a third, and thus the vernation is equitant (fig. 43), as in privet; or conduplicate leaves are placed so that the half of the one covers the half of another, and thus they become half-equitant or obvolute (fig. 44), as in sage. When in the case of convolute leaves one leaf is rolled up within the other, it is supervolute (fig. 45). The scales of a bud sometimes exhibit one kind of vernation and the leaves another. The same modes of arrangement occur in the flower-buds.

Leaves, after performing their functions for a certain time, wither and die. In doing so they frequently change colour, and hence arise the beautiful and varied tints of the autumnal foliage. This change

of colour is chiefly occasioned by the diminished circulation in the leaves, and the higher degree of oxidation to which their chlorophyll has been submitted.

Leaves which are articulated with the stem, as in the walnut and horse-chestnut, fall and leave a scar, while those which are continuous with.it remain attached for some time after they have lost their vitality. Most of the trees of Great Britain have deciduous leaves, their duration not extending over more than a few months, while in trees of warm climates the leaves often remain for two or more years. In tropical countries, however, many trees lose their leaves in the dry season. The period of defoliation varies in different countries according to the nature of their climate. Trees which are called evergreen, as pines and evergreen-oak, are always deprived of a certain number of leaves at intervals, sufficient being left, how- ever, to preserve their green appearance. The cause of the fall of the leaf in cold climates seems to be deficiency of light and heat in winter, which causes a cessation in the functions of the cells of the leaf. The fall is directly caused by the formation of a layer of tissue across the base of the leaf-stalk; the cells of this layer separate from one another and the leaf remains attached only by the fibres of the veins until it becomes finally detached by the wind or frost. Before its fall the leaf has become dry owing to loss of water and the removal of the protoplasm and food substances to the stem for use next season ; the red and yellow colouring matters are products of decomposition of the chlorophyll. Inorganic and other waste matters are stored in the leaf-tissue and thus got rid of by the plant. The leaf scar is protected by a corky change (suberization) in the walls of the exposed cells. (A. B. R.)

LEAF-INSECT, the name given to orthopterous insects of the family Phasmidae, referred to the single genus Phyllium and characterized by the presence of lateral laminae upon the legs and abdomen, which, in association with an abundance of green colouring-matter, impart a broad and leaf-like appearance to the whole insect. In the female this deceptive resemblance is enhanced by the large size and foliaceous form of the front wings which, when at rest edge to edge on the abdomen, forcibly suggest in their neuration the midrib and costae of an ordinary leaf. In this sex the posterior wings are reduced and functionless so far as flight is concerned; in the male they are ample, membranous and functional, while the anterior wings are small and not leaf-like. The freshly hatched young are reddish in colour; but turn green after feeding for a short time upon leaves. Before death a specimen has been observed to pass through the various hues of a decaying leaf, and the spectrum of the green colouring matter does not differ from that of the chlorophyll of living leaves. Since leaf-insects are purely vegetable feeders and not predaceous like mantids, it is probable that their re- semblance to leaves is solely for purposes of concealment from enemies. Their egg capsules are similarly

protected by their like- ness to various seeds. Leaf-insects range from India to the Seychelles on the one side, and to the Fiji Islands on the other. (R. I. P.)

LEAGUE. 1. (Through Fr. ligue, Ital. liga, from Lat. ligare, to bind), an agreement entered into by two or more parties for mutual protection or joint attack, or for the furtherance of some common object, also the body thus joined or ” leagued ” to- gether. The name has been given to numerous confederations, such as the Achaean League (q.v.), the confederation of the ancient cities of Achaia, and especially to the various holy leagues (ligues saintes), of which the better known are those formed by Pope Julius II. against Venice in 1508, often known as the League of Cambrai, and against France in 1511. “The League,” in French history, is that of the Catholics headed by the Guises to preserve the Catholic religion against the Huguenots and prevent the accession of Henry of Navarre to the throne (see France: History). ” The Solemn League and Covenant ” was the agreement for the establishment of Presbyterianism in both countries entered into by England and Scotland in 1643 (see Covenanters). Of commercial leagues the most famous is that of the Hanse towns, known as the Hanseatic League (q.v.). The word has been adopted by political associations, such as the Anti-Corn Law League, the Irish Land League, the Primrose League and the United Irish League, and by numerous social organizations. ” League ” has also been applied to a special form of competition in athletics, especially in Association football. In this system clubs ” league ” together in a com- petition, each playing every other member of the association

twice, and the order of merit is decided by the points gained during the season, a win counting two and a draw one.

2. (From the late Lat. leuga, or leuca, said to be a Gallic word; the mod. Fr. lieue comes from the O. Fr. Hue; the Gaelic leac, meaning a flat stone posted as a mark of distance on a road, has been suggested as the origin), a measure of distance, prob- ably never in regular use in England, and now only in poetical or rhetorical language. It was the Celtic as opposed to the Teutonic unit, and was used in France, Spain, Portugal and Italy. In all the countries it varies with different localities, and the ancient distance has never been fixed. The kilometric league of France is fixed at four kilometres. The nautical league is equal to three nautical miles.

LEAKE, WILLIAM MARTIN (1777-1860), British anti- quarian and topographer, was born in London on the 14th of January 1777. After completing his education at the Royal Military Academy, Woolwich,

and spending four years in the West Indies as lieutenant of marine artillery, he was sent by the government to Constantinople to instruct the Turks in this branch of the service. A journey through Asia Minor in 1800 to join the British fleet at Cyprus inspired him with an interest in anti- quarian topography. In 1801, after travelling across the desert with the Turkish army to Egypt, he was, on the expulsion of the French, employed in surveying the valley of the Nile as far as the cataracts; but having sailed with the ship engaged to convey the Elgin marbles from Athens to England, he lost all his maps and observations when the vessel foundered off Cerigo. Shortly after his arrival in England he was sent out to survey the coast of Albania and the Morea, with the view of assisting the Turks against attacks of the French from Italy, and of this he took advantage to form a valuable collection of coins and inscriptions and to explore ancient sites. In 1807, war having broken out between Turkey and England, he was made prisoner at Salonica; but, obtaining his release the same year, he was sent on a diplomatic mission to Ali Pasha of lannina, whose confidence he completely won, and with whom he remained for more than a year as British representative. In 1810 he was granted a yearly sum of £600 for his services in Turkey. In 1815 he retired from the army, in which he held the rank of colonel, devoting the remainder of his life to topographical and anti- quarian studies, the results of which were given to the world in the following volumes: Topography of Athens (182 1); Journal of a Tour in Asia Minor (1824); Travels in the Morea (1830), and a supplement, Peloponnesiaca (1846); Travels in Northern Greece (1835); and Numismata Hellenica (1854), followed by a supplement in 1859. A characteristic of the researches of Leake was their comprehensive minuteness, which was greatly aided by his mastery of technical details. His Topography of Athens, the first attempt at a scientific treatment of the subject, is still authoritative in regard to many important points (see Athens). He died at .Brighton on the 6th of January i860. The marbles collected by him in Greece were presented to the British Museum; his bronzes, vases, gems and coins were purchased by the uni- versity of Cambridge after his death, and are now in the Fitz- william Museum. He was elected F.R.S. and F.R.G.S., received the honorary D.C.L. at Oxford (1816), and was a member of the Berlin Academy of Sciences and correspondent of the Institute of France.

See Memoir by J, H. Marsden (1864) ; the Architect for the 7th of October 1876 ; E. Curtius in the Preussische Jahrbucher (Sept., 1876) ; J. E. Sandys, Hist, of Classical Scholarship, iii. (1908), p. 442.

LEAMINGTON, a municipal borough and health resort of Warwickshire, England, on the river Learn near its junction with the

Avon, 98 m. N.W. from London, served by the Great Western and London & North Western railways. Pop. (1001) 26,888. The parliamentary boroughs of Leamington and Warwick were joined into one constituency in 1885, re- turning one member. The centres of the towns are 2 m. apart, Warwick lying to the west, but they are united by the intermediate parish of New Milverton. There are three saline springs, and the principal pump-rooms, baths and pleasant gardens lie on the right bank of the river. The chief public

buildings are the town hall (1884), containing a free library and school of art; and the Theatre Royal and assembly room. The parish church of All Saints is modernized, and the other churches are entirely modern. The S. Warwickshire hospital and Midland Counties Home for incurables are here. Leamington High School is an important school for girls. There is a municipal technical school. Industries include iron foundries and brick- works. The town lies in a well-wooded and picturesque country, within a few miles of such interesting towns as Warwick, Kenil- worth, Coventry and Stratford-on-Avon. It is a favourite hunt- ing centre, and, as a health resort, attracts not only visitors but residents. The town is governed by a mayor, 8 aldermen, and 24 councillors. Area, 2817 acres.

Leamington was a village of no importance until about 1786, when baths were first erected, though the springs were noticed by Camden, writing about 1586. The population in 181 1 was only 543, The town was incorporated in 1875. The name in former use was Leamington Priors, in distinction from Leamington Hastings, a village on the upper Leam. By royal licence granted in 1838 it was called Royal Leamington Spa.

LEANDRE, CHARLES LUCIEN (1862-), French carica- turist and painter, was born at Champsecret (Orne), and studied painting under Bin and Cabanel. From 1887 he figured among the exhibitors of the Salon, where he showed numerous portraits and genre pictures, but his popular fame is due to his comic drawings and caricatures. The series of the ” Gotha des souverains,” published in Le Rire, placed him in the front rank of modern caricaturists. Besides his contributions to Le Rire, Le Figaro and other comic journals, he published a series of albums: Nocturnes, Le MusSe des souverains, and Paris et la province. Leandre produced admirable work in lithography, and designed many memorable posters, such as the “Yvette Guilbert.” ” Les nouveaux

maries," " Joseph Prudhomme," " Les Lutteurs," and " La Femme au chien." He was created a knight of the Legion of Honour.

LEAP-YEAR (more properly known as bissextile), the name given to the year containing 366 days. The astronomers of Julius Caesar, 46 B.C., settled the solar year at 365 days 6 hours. These hours were set aside and at the end of four years made a day which was added to the fourth year. The English name for the bissextile year is an allusion to the result of the inter- position of the extra day; for after the 29th of February a date " leaps over " the day of the week on which it would fall in ordinary years. Thus a birthday on the 10th of June, a Monday, will in the next year, if a leap-year, be on the 10th of June, 1 a Wednesday. Of the origin of the custom for women to woo, not be wooed, during leap-year no satisfactory explanation has ever been offered. In 1288 a law was enacted in Scotland that " it is statut and ordaint that during the rein of hir maist blissit Megeste, for ilk yeare knowne as lepe yeare, ilk mayden ladye of bothe highe and lowe estait shall hae liberte to bespeke ye man she likes, albeit he refuses to taik hir to be his lawful wyfe, he shall be mulcted in ye sum ane pundis or less, as his estait may be; except and awis gif he can make it appeare that he is betrothit ane ither woman he then shall be free." A few years later a like law was passed in France, and in the 15th century the custom was legalized in Genoa and Florence.

LEAR, EDWARD (1812-1888), English artist and humorist, was born in London on the 12th of May 1812. His earliest drawings were ornithological. When he was twenty years old he published a brilliantly coloured selection of the rarer Psittacidae. Its power attracted the attention of the 13th earl of Derby, who employed Lear to draw his Knowsley menagerie. He became a permanent favourite with the Stanley family; and Edward, 15th earl, was the child for whose amusement the first Book of Nonsense was composed. From birds Lear turned to landscape, his earlier efforts in which recall the manner of J. D. Harding; but he quickly acquired a more individual style. About 1837 he set up a studio at Rome, where he lived for ten years, with summer tours in Italy and Sicily, and occasional visits to England. During this period he began to publish his Illustrated Journals of a Landscape Painter: charmingly written reminiscences of wandering, which ultimately embraced Calabria, the Abruzzi,

Albania, Corsica, &c. From 1848- 1849 he explored Greece, Constantinople, the Ionian Islands, Lower Egypt, the wildest recesses of Albania, and the desert of Sinai. He returned to London, but the climate did not suit him. In 1854-1855 he wintered on the Nile, and migrated successively to Corfu, Malta and Rome, finally building

himself a villa at San Remo. From Corfu Lear visited Mount Athos, Syria, Palestine, and Petra; and when over sixty, by the assistance of Lord Northbrock, then Govenor-General, he saw the cities and scenery of greatest interest within a large area of India. From first to last he was, in whatever circumstances of difficulty or ill-health, an indomitable traveller. Before visiting new lands he studied their geography and literature, and then went straight for the mark; and wherever he went he drew most indefatigably and most accurately. His sketches are not only the basis of more finished works, but an exhaustive record in themselves. Some defect of technique or eyesight occasionally left his larger oil painting, though nobly conceived, crude or deficient in harmony; but his smaller pictures and more elaborate sketches abound in beauty, delicacy, and truth. Lear modestly called himself a topographical artist; but he included in the term the perfect rendering of all characteristic graces of form, colour, and atmosphere. The last task he set himself was to prepare for popular circulation a set of some 200 drawings, illustrating from his travels the scenic touches of Tennyson's poetry; but he did not live to complete the scheme, dying at San Remo on the 30th of January 1888. Until sobered by age, his conversation was brimful of humorous fun. The paradoxical originality and ostentatiously uneducated draughtsmanship of his numerous nonsense books won him a more universal fame than his serious work. He had a true artist's sympathy with art under all forms, and might have become a skilled musician had he not been a painter. Swainson, the naturalist, praised young Lear's great red and yellow macaw as " equalling any figure ever painted by Audubon in grace of design, perspective, and anatomical accuracy." Murchison, examining his sketches, complimented them as rigorously embodying geological truth. Tennyson's lines " To E.L. on his Travels in Greece," mark the poet's genuine admiration of a cognate spirit in classical art. Ruskin placed the Book of Nonsense first in the list of a hundred delectable volumes of contemporary literature, a judgment endorsed by English-speaking children all over the world.

See Letters of Edward Lear to Chichester Fortescue, Lord Carlingford, and Frances, Countess Waldegrave (1907), edited by Lady Strachey, with an introduction by Henry Strachey. (F. L.*)

LEASE (derived through the Fr. from the Lat. laxare, to loosen), a certain form of tenure, or the contract embodying it, of land, houses, &c. ; see Landlord and Tenant.

LEATHER (a word which appears in all Teutonic languages; cf. Ger. Leder, Dutch leer or leder, Swed. Ictder, and in such Celtic forms as Welsh llader), an imputrescible substance prepared from the hides or

skins of living creatures, both cold and warm blooded, by chemical and mechanical treatment. Skins in the raw and natural moist state are readily putrescible, and are easily disintegrated by bacterial or chemical action, and if dried in this condition become harsh, horny and intractable. The art of the leather manufacturer is principally directed to overcoming the tendency to putrefaction, securing suppleness in the material, rendering it impervious to and unalterable by water, and increas- ing the strength of the skin and its power to resist wear and tear. Leather is made by three processes or with three classes of substances. Thus we have (1) tanned leather, in which the hides and skins are combined with tannin or tannic acid; (2) tawed leather, in which the skins are prepared with mineral salts; (3) chamoised (shamoyed) leather, in which the skins are rendered imputrescible by treatment with oils and fats, the decomposition products of which are the actual tanning agents.

Sources and Qualities of Hides and Skins. — The hides used in heavy leather manufacture may be divided into three classes: (1) ox and heifer, (2) cow, (3) bull. Oxen feathers. I and heifer hides produce the best results, forming a I tough, tight, solid leather. Cow hides are thin, the hide itself

being fibrous, but still compact, and by reason of its spread or area is used chiefly for dressing purposes in the bag and port- manteau manufacture and work of a similar description. Bull hides are fibrous; they are largely used for heel lifts, and for cheap belting, the thicker hides being used in the iron and steel industry.

A second classification now presents itself, viz. the British home supply, continental (Europe), British colonial, South American, East Indian, Chinese, Sic.

In the British home supply there are three chief breeds: (1) Shorthorns (Scotch breed), (2) Herefords (Midland breed), (3) Lowland, or Dutch class. From a tanner's standpoint, the shorthorns are the best hides procurable. The cattle are exposed to a variable climate in the mountainous districts of Scotland, and nature, adapting herself to circumstances, provides them with a thicker and more compact hide; they are well grown, have short necks and small heads. The Hereford class are probably the best English hide; they likewise have small heads and horns, and produce good solid sole leather. The Lowland

hides come chiefly from Suffolk, Kent and Surrey; the animals have long legs, long necks and big heads. The hides are usually thin and spready. The hides of the animals killed for the Christmas season are poor. The animals being stall-fed for the beef, the hides become distended, thin and surcharged with fat, which renders them unsuitable for first-class work.

The continental supply may be divided into two classes: (1) Hides from hilly regions, (2) hides from lowlands. All animals subject to strong winds and a wide range of temperatures have a very strong hide, and for this reason those bred in hilly and mountainous districts are best. The hides coming under heading No. 1 are of this class, and include those from the Swiss and Italian Alps, Bavarian Highlands and Pyrenees, also Florence, Oporto and Lisbon hides. They are magnificent hides, thick, tightly-built, and of smooth grain. The butt is long and the legs short. A serious defect in some of these hides is a thick place on the neck caused by the yoke; this part of the hide is absolute waste. Another defect, specially noticeable in Lisbon and Oporto hides, is goad marks on the rump, barbed wire scratches and warbles, caused by the gadfly. Those hides coming under heading No. 2 are Dutch, Rhine valley, Danish, Swedish, Norwegian, Hungarian, &c. The first three hides are very similar; they are spready, poorly grown, and are best used for bag and portmanteau work. Hungarian oxen are immense animals, and supply a very heavy bend. Swedish and Norwegian hides are evenly grown and of good texture; they are well flayed, and used a great deal for manufacturing picker bands, which require an even leather.

New Zealand, Australian and Queensland hides resemble good English. A small quantity of Canadian steers are imported; these are generally branded.

Chinese hides are exported dry, and they have generally suffered more or less from peptonization in the storing and drying; this cannot be detected until they are in the pits, when they fall to pieces.

Anglos are imported as live-stock, and are killed within forty- eight hours. They come to Hull, Birkenhead, Avonmouth and Deptford from various American ports, and usually give a flatter result than English, the general quality depending largely on whether the ship has had a good voyage or not.

Among South American hides, Liebig's slaughter supply the best; they are thoroughly clean and carefully trimmed and flayed. They come to London, Antwerp and Havre, and except .for being branded are of first-class quality. Second to the Liebig slaughter come the Uruguay hides.

East Indian hides are known as kips, and are supposed to be, and should be, the hides of yearling cattle. They are now dressed to a large extent in imitation of box calf, being much cheaper. They come from a small breed of ox, and have an extremely tight grain; the leather is not so soft as calf.

Calf-skins are largely supplied by the continent. They are soft and pliant, and have a characteristically fine grain, are tight in texture and quite apart from any other kind of skin.

The most valuable part of a sheep-skin is the wool, and the value of the pelt is inversely as the value of the wool. Pure Leicester and Norfolk wools are very valuable, and next is the North and South Downs, but the skins, i.e. the leathers. pelts, of these animals are extremely poor. Devon and Cheviot cross-bred sheep supply a fair pelt, and sometimes these sheep are so many times crossed that it is quite impossible to tell what the skin is. Welsh skins also supply a good tough pelt, though small. Indian and Persian sheep-skins are very goaty, the herds being allowed to roam about together so much. The sheep-skin is the most porous and open-textured skin in existence, as also the most greasy one; it is flabby and soft, with a tight, compact grain, but an extremely loose flesh. Still- born lambs and lambs not over a month old are worth much more than when they have lived for three months; they are used for the manufacture of best kid gloves, and must be milk skins. Once the lambs have taken to grass the skins supply a harsher leather.

The best goat-skins come from the Saxon and Bavarian Highlands, Swiss Alps, Pyrenees, Turkey, Bosnia, Southern Hungary and the Urals. The goats being exposed to all winds yield fine skins. A good number come from Argentina and from Abyssinia, the Cape and other parts of Africa. Of all light leathers the goat has the toughest and tightest grain; it is, there- fore, especially liked for fancy work. The grain is rather too bold for glace work, for which the sheep is largely used.

The seal-skin, used largely for levant work, is the skin of the yellow-hair seal, found in the Northern seas, the Baltic, Norway and Sweden,

&c. The skin has a large, bold, brilliant grain, and being a large skin is much used for upholstery and coach work, like the Cape goat. It is quite distinct from the fur seal.

Porpoise hide is really the hide of the white whale; it is dressed for shooting, fishing and hunting boots. Horse hide is dressed for light split and upper work; being so much stall-fed it supplies only a thin, spready leather. The skins of other Equidae, such as the ass, zebra, quagga, &c. are also dressed to some small extent, but are not important sources.

Structure of Skin. — Upon superficial inspection, the hides and skins of all mammalia appear to be unlike each other in general structure, yet, upon closer examination, it is found that the anatomi- cal structure of most skins is so similar that for all practical purposes we may assume that there is no distinction (see Skin and Exo- skeleton). But from the practical point of view, as opposed to the anatomical, there are great and very important differences, such as those of texture, thickness, area, &c. ; and these differences cause a great divergence in the methods of tanning used, almost necessitating a distinct tannage for nearly every class of hide or skin.

The skins of the lower animals, such as alligators, lizards, fish and snakes, differ to a large extent from those of the mammalia, chiefly in the epidermis, which is much more horny in structure and forms scales.

The skin is divided into two distinct layers: (1) the epidermis or epithelium, i.e. the cuticle, (2) the corium derma, or cutis, i.e. the true skin. These two layers are not only different in structure, but are also of entirely distinct origin. The epidermis again divides itself into two parts, viz. the ” horny layer ” or surface skin, and the rete Malpighi, named after the Italian anatomist who first drew attention to its existence. The rete Malpighi is composed of living, soft, nucleated cells, which multiply by division, and, as they increase, are gradually pushed to the surface of the skin, becoming flatter and drier as they near it, until they reach the surface as dried scales. The epidermis is thus of cellular structure, and more or less horny or waterproof. It must consequently be removed together with the hair, wool or bristles before tannage begins, but as it is very thin compared with the corium, this matters little.

The hair itself does not enter the corium, but is embedded in a sheath of epidermic structure, which is part of and continuous with the epidermis. It is of cellular structure, and the fibrous part is composed

of long needle-shaped cells which contain the pigment with which the hair is coloured. Upon removal of the hair some of these cells remain behind and colour the skin, and this colour does not disappear until these cells are removed by scudding. Each hair is supplied with at least two fat or sebaceous glands, which dis- charge into the orifice of the hair sheath ; these glands impart to the hair that natural glossy appearance which is characteristic of good health. The hair bulb (&, fig. 1) consists of living nucleated cells, which multiply rapidly, and, like the rete Malpighi, cause an upward pressure, getting harder at the same time, thereby lengthen- ing the hair.

The hair papilla (a, fig. i) consists of a globule of the corium or true skin embedded in the hair bulb, which by means of blood- vessels feeds and nourishes the hair. Connected with the lower part of each hair is an oblique muscle known as the arrector or erector pili, seen at k, fig. I ; this is an involuntary muscle, and is contracted by sudden cold, heat or shock, with an accompanying tightening of the skin, producing the phenomenon commonly known as ” goose flesh.” This is the outcome of the contracted muscle pulling on the base of the hair, thereby giving it a tendency to approach the vertical, and producing the simultaneous effect of making the ” hair stand on end.”

The sudoriferous or sweat glands (R, fig. i) consist of long spiral- like capillaries, formed from the fibres of the connective tissue of the corium. These glands discharge sometimes directly through the epidermis, but more often into the orifice of the hair-sheath.

The epidermis is separated from the corium by a very important and very fine membrane, termed the ” hyaline ” or ” glassy layer/’ which constitutes the actual grain surface of a hide or skin. This layer is chemically different from the corium, as if it is torn or scratched during the process of tanning the colour of the underlying parts is much lighter than that of the grain surface.

The corium, unlike the epidermis, is of fibrous, not cellular struc- ture; moreover, the fibres do not multiply among themselves, but are gradually developed as needed from the interfibrillar substance, a semi-soluble gelatinous modification of the true fibre. This

interfibrillar sub- stance consequently has no structure, and is prepared at _ any time on corn-

g|- — m ing into contact with ~ tannin to form amor-

phous leather, which fills what would in the absence of this substance be inter- fibrillar spaces. The more of this matter there is present the more completely will the spaces be filled, and the more water- proof will be the leather. An old bull, as is well known, supplies a very poor, soft and spongy leather, simply be- cause the hide lacks interfibrillar sub- stance, which has been sapped up by the body. The fibres are, therefore, separ- ated by interfibrillar spaces, which on contact with water absorb it with avidity by capiflary attraction. But a heifer hide or young

This loosely-woven part is full of fatty nodules, and the skin is generally split at this part, the flesh going for chamois leather and the grain for skivers. The other notable exception is the horse hide, which has a third skin over the loins just above the kidneys, known as the crup; it is very greasy and tight in structure, and is used for making a very waterproof leather for seamen's and fishermen's boots. Pig-skin, perhaps, is rather peculiar, in the fact that the bristles penetrate almost right through the skin.

Tanning Materials. — Tannin or tannic acid is abundantly formed in a very large number of plants, and secreted in such diverse organs and members as the bark, wood, roots, leaves, seed-pods, fruit, &c. The number of tannins which exists has not been determined, nor has the constitution of those which do exist been satisfactorily settled. As used in the tanyard tannin is present both in the free state and combined with colouring matter and accompanied by decomposition products, such as gallic acid or phlobaphenes (an- hydrides of the tannins), respectively depending upon the series to which the tannin belongs. In whatever other points they differ, they all have the common property of being powerfully astringent, of forming insoluble compounds with gelatine or gelatinous tissue, of being soluble in water to a greater or lesser extent, and of form- ing blacks (greenish or bluish) with iron. Pyrogallol tannins give a blue-black coloration or precipitate with ferric salts, and catechol tannins a green-black; and whereas bromine water gives a pre- cipitate with catechol tannins, it does not with pyrogallol tannins There are two distinctive classes of tannins, viz. catechol and pyrogallol tannins. The materials belonging to the former series are generally much darker in colour than those classified with the latter, and moreover they yield reds, phlobaphenes or tannin an- hydrides, which deposit on or in the leather. Pyrogallol tannins include some of the lightest coloured and best materials known, and, speaking generally, the leather produced by them is not so harsh or hard as that produced with catechol tannins. They decom- pose,

yielding ellagic acid (known technically as ” bloom “) and gallic acid; the former has waterproofing qualities, because it fills the leather, at the same time giving weight.

It has been stated, and perhaps with some truth, that leather cannot be successfully made with catechol tannins alone ; pyrogallol tannins, however, yield an excellent leather; but the finest results are obtained by blending the two.

The classification of the chief tanning materials is as follows: — ■ Pyrogallols. Myrobalans {Terminalia Chebula). Chestnut wood {Caslanea vesca). Divi-divi {Caesalpinia Cotiaria). Algarobilla {Caesalpinia brevijolia). Sumach {Rhus Coriaria). Oakwood {Quercus family). Chestnut oak {Quercus Prinus). Galls {Quercus Inlecloria). Willow {Salix arenaria).

Fig. i.

d,

Hair papilla. J, Sebaceous glands.

Hair bulb. k, Erector pili.

Hair sheath show- m, Sweat ducts.

ing epidermic n and p, Epidermis.

structure. n, Rete Malpighi.

Dermic coat of hair p, Horny layer.

sheath. R, Sweat or sudori-

Outer root sheath. ferous gland. _ .

Inner root sheath. S, Opening at sweat calf supplies the Hair cuticle. duct.

Hair.

most tight and waterproof leather known, because the animals are young, and having plenty of nourishment do not require to draw upon and sap the interfibrillar substance with which the skin is full to overflowing.

The corium obtains its food from the body by means of lymph ducts,

with which it is well supplied. It is also provided with nodules of lymph to nourish the hair, and nodules of grease, which increase in number as they near the flesh side, until the net skin, panniculus adiposus, or that which separates the corium from meat proper, is quite full with them.

The corium is coarse in the centre of the skin where the fibres, which are of the kind known as white connective tissue, and which exist in bundles bound together with yellow elastic fibres, are loosely woven, but towards the flesh side they become more com- pact, and as the hyaline layer is neared the bundles of fibres get finer and finer, and are much more tightly interwoven, until finally, next the grain itself, the fibres no longer exist in bundles, but as individual fibrils lying parallel with the grain. This layer is known as the pars papillaris. The bundles of fibre interweave one another in every conceivable direction. The fibrils are extremely minute, and are cemented together with a medium rather more soluble than themselves.

There are only two exceptions to this general structure which need be taken into account. Sheep-skin is especially loosely woven in the centre, so much so that any carelessness in the wet work or sweating process enables one to split the skin in two by tearing.

Catechols. Gambier {Uncaria Gambir). Hemlock {Abies canadensis). Quebracho {Quebracho Colorado). Mangrove or Cutch {Rhizophora Mangle). Mimosa or Golden Wattle {Acacia Pycnantha). Larch {Larix Europaea). Canaigre (Rumex llymenosepalum). Birch {Betula alba). Cutch Catechu {Acacia Catechu). Subsidiary. Oakbark (Quercus Robur). Valonia {Quercus Aegilops). Myrobalans are the fruit of an Indian tree. There are several different qualities, the order of which is as follows, the best being placed first: Bhimley, Jubbalpore, Rajpore, Fair Coast Madras and Vingorlas. They are a very light-coloured material, containing from 27% to 38% of tannin; they deposit much ” bloom,” ferment fairly rapidly, supplying acidity, and yield a mellow leather.

Chestnut comes on the market in the form of crude and decolorized liquid extracts, containing about 27% to 31% of tannin, and yields a good leather of a light-brown colour.

Oakwood reaches the market in the same form ; it is a very similar material, but only contains 24% to 27% of tannin, and yields a slightly heavier and darker leather.

Divi-divi is the dried seed pods of an Indian tree containing 40% to

45% of tannin, and yielding a white leather; it might be valuable but for the tendency to dangerous fermentation and de- velopment of a dark-red colouring matter.

Algarobilla consists of the seeds of an Indian tree, containing about 45% of tannin, and in general properties is similar to divi- divi, but does not discolour so much upon fermentation.

Sumach is perhaps the best and most useful material known. It is the ground leaves of a Sicilian plant, containing about 28 % of tannin, and yielding a nearly white and very beautiful leather. It is used alone for tanning the best moroccos and finer leather, and being so valuable is much adulterated, the chief adulterant being Pistacia lentiscus (Stinko or Lentisco), an inferior and light-coloured catechol tannin. Other but inferior sumachs are also used. There is Venetian sumach {Rhus cotinus) and Spanish sumach (Colpoon compressa) ; these are used to some extent in the countries bordering on the Mediterranean. R. Glabra and R. Copallina are also used in considerable quantities in America, where they are cultivated.

Galls are abnormal growths found upon oaks, and caused by the gall wasp laying eggs in the plant. They are best harvested just before the insect escapes. They contain from 50% to 00% of tannin, and are generally used for the commercial supply of tannic acid, and not for tanning purposes.

Gambier, terra japomca or catechu, is the product of a shrub

1 cultivated in Singapore and the Malay Archipelago. It is made by

boiling the shrub and allowing the extract to solidify. It is a

peculiar material, and may be completely washed out of a leather tanned with it. It mellows exceedingly, and keeps the leather fibre open; it may be said that it only goes in the leather to prepare and make easy the way for other tannins. Block gambier contains from 35 % to 40 % and cube gambier from 50 % to 65 % of tannin. Hemlock generally reaches the market as extract, prepared from the bark of the American tree. It contains about 22 % of tannin, has a pine-like odour, but yields a rather dark-coloured red leather. Quebracho is imported mainly as solid extract, containing 63 % to 70% of tannin; it is a harsh, light-red tannage, but darkens rapidly on exposure to light. It is

used for freshening up very mellow liquors, but is rather wasteful, as it deposits an enormous amount of its tannin as phlobaphenes.

Mangrove or cutch is a solid extract prepared from the mangrove tree found in the swamps of Borneo and the Straits Settlements; it contains upwards of 60 % of a red tannin.

Mimosa is the bark of the Australian golden wattle (Acacia pycnantha), and contains from 36% to 50% of tannin. It is a rather harsh tannage, yielding a flesh-coloured leather, and is useful for sharpening liquors. This bark is now successfully cultivated in Natal. The tannin content of this Natal bark is somewhat inferior, but the colour is superior to the Australian product.

Larch bark contains 9% to 10% of light-coloured tannin, and is used especially for tanning Scotch basils.

Canaigre is the air-dried tuberous roots of a Mexican plant, containing .25% to 30% of tannin and about 8 % of starch. It yields an orange-coloured leather of considerable weight and firm- ness. Its cultivation did not pay well enough, so that it is little used.

Cutch, catechu or " dark catechu," is obtained from the wood of Indian acacias, and is not to be confounded with mangrove cutch. It contains 60 % of tanning matter and a large proportion of catechin similar to that contained in gambier, but much redder. It is used for dyeing browns and blacks with chrome and iron mordants.

The willow and the white birch barks contain, respectively, 12% to 14% and 2% to 5% of ta.nnin. In combination they are used to produce the, famous Russia leather, whose insect-resisting odour is due to the birch bark. In America this leather is imitated with the American black birch bark (Betula lento), and also with the oil obtained from its dry distillation.

In the list of materials two have been placed in a subsidiary class because they are a mixture of catechol and pyrogallol tannin. Oak bark produces the best leather known, proving that a blend of the two classes of tannins gives the best results. It is the bark of the coppice oak, and contains 12% to 14% of a reddish-yellow tannage. Valonia is the acorn cup of the Turkish and Greek oak. The Smyrna or Turkish valonia is best, and contains 32% to 36% of an almost white tannin. Greek valonia is greyer in colour, and contains 26 % to 30% of tannin. It yields a tough, firm leather of great weight, due to the rapid deposition of a large amount of bloom.

Grinding and Leaching 1 Tanning Materials. — At first sight it would not seem possible that science could direct such a clumsy process as the grinding of tanning materials, and yet even here, the ” scientific smashing ” of tanning materials may mean the difference between profit and loss to the tanner. In most materials the tannin exists imprisoned in cells, and is also to some extent free, but with this latter condition the science of grinding has nothing to do. If tanning materials are simply broken by a series of clean cuts, only those cells directly on the surfaces of the cuts will be ready to yield their tannin ; therefore, if materials are ground by cutting, a proportion of t”he total tannin is thrown away. Hence it is necessary to bruise, break and otherwise sever the walls of all the cells containing the tannin; so that the machine wanted is one which crushes, twists and cuts the material at the same time, turning it out of uniform size and with little dust.

The apparatus in most common use is built on the same principle as the coffee mill, which consists of a series of segmental cutters; as the bark works down into the smaller cutters of the mill it is twisted and cut in every direction. This is a very good form of mill, but it requires a considerable amount of power and works slowly. The teeth require constant renewal, and should, therefore, be replaceable in rows, not, as in some forms, cast on the bell. The disintegrator is another form of mill, which produces its effect by violent concussion, obtained by the revolution in opposite directions of from four to six large metal arms fitted with projecting spikes inside a drum, the faces of which are also fitted with protruding pieces of metal. The arms make from 2000 to 4000 revolutions per minute. The chief objection to this apparatus is that it forms much dust, which is caught in silken bags fitted to gratings in the drum. The myrobalans crusher, a very useful machine for such materials as myrobalans and valonia, consists of a pair of toothed rollers above and a pair of fluted rollers beneath. The material is dropped upon the toothed rollers first, where it is broken and crushed ; then the crushing is finished and any sharp corners rounded off in the fluted rollers.

It must not be thought that now the material is ground it is necessarily ready for leaching. This may or may not be so, de- pending upon whether the tanner is making light or heavy leathers.

If light leathers are being considered, it is ready for immediate leaching, i.e. to be infused with water in preparation of a liquor. If heavy leathers are in process of manufacture, he would be a very wasteful tanner who would extract his material raw. It must be borne in mind that when an infusion is made with fresh tanning material, the liquor begins to deposit decomposition products after standing a

day or two, and the object of the heavy-leather tanner is to get this material deposited in the leather, to fill the pores, produce weight and make a firm, tough product. With this end in view he dusts his hides with this fresh material in the layers, i.e. he spreads a layer between each hide as it is laid down, so that the strong liquors penetrate and deposit in the hides. When most of this power to deposit has been usefully utilized in the layers, then the material (which is now, perhaps, half spent) is leached. The light-leather maker does not want a hard, firm leather, but a soft and pliable product; hence he leaches his material fresh, and does not trouble as to whether the tannin deposits in the pits or not.

Whether fresh or partially spent material is leached, the process is carried out in the same way. There are several methods in vogue ; the best method only will be described, viz. the ” press leach ” system.

The leaching is carried out in a series of six square pits, each holding about 3 to 4 tons of material. The method depends upon the fact that when a weak liquor is forced over a stronger one they do not mix, by reason of the higher specific gravity of the stronger one; the weaker liquor, therefore, by its weight forces the stronger liquor downwards, and as the pit in which it is contained is fitted with a false bottom and side duct running over- into the next pit, the stronger liquor is forced upwards through this duct on to the next stronger pit. There the process is repeated, until finally the weak liquor or water, as the case may be, is run off the last vat as a very strong infusion. As a concrete example let us take the six pits shown in the figure.

4 5 6

3 2 1

1 See Lye.

No. 6 is the last vat, and the liquor, which is very strong, is about to be run off. No. I is spent material, over which all six liquors have passed, the present liquor having been pumped on as fresh water. The liquor from No. 6 is run off into the pump well, and liquor No. 1 is pumped over No. 2, thus forcing all liquors one forward and leaving pit No. 1 empty; this pit is now cast and filled with clean fishings and perhaps a little new material, clean water is then pumped on No. 2, which is now the weakest pit, and all liquors are thus forced forward one pit more, making No. 1 the strongest pit. After infusing for some time this is run off to the pump well, and the process repeated. It may be noted that the hotter the water is pumped on the weakest pit, the

better will the material be spent, and the nearer the water is to boiling-point the better; in fact, a well-managed tanyard should have the spent tan down to between 1 % and 2 % of tannin, although this material is fre- quently thrown away containing up to 10% and sometimes even more. There is a great saving of time and labour in this method, since the liquors are self-adjusting.

Testing Tan Liquors. — The methods by which the tanning value of any substance may be determined are many, but few are at once capable of simple application and minute accuracy. An old method of ascertaining the strength of a tan liquor is by means of a hydro- meter standardized against water, and called a barkometer. It consists of a long graduated stem fixed to a hollow bulb, the opposite end of which is weighted. It is placed in the liquor, the weighted end sinks to a certain depth, and the reading is taken on the stem at that point which touches ” water mark.” The graduations are such that if the specific gravity is multiplied by 1000 and then 1000 is subtracted from the result, the barkometer strength of the liquor is obtained. Thus 1029 specific gravity equals 29° barkometer. This method affords no indication of the amount of tannin present, but is useful to the man who knows his liquors by frequent analysis. A factor which governs the quality of the leather quite as much as the tannin itself is the acidity of the liquors. It is known that gallic and tannic acids form insoluble calcium salts, and all the other acids present as acetic, propionic, butyric, lactic, formic, &c, form comparatively soluble salts, so that an easy method of deter- mining this important factor is as follows : —

Take a quantity, say 100 ex., of tan liquor, filter till clear through paper, then pipette 10 c.c. into a small beaker (about \ in. dia- meter), place it on some printed paper and note how clear the print appears through the liquor; now gradually add from a burette a clear solution of saturated lime water until the liquor becomes just cloudy, that is until it just loses its brilliancy. Now read off the number of cubic centimetres required in the graduated stem of the burette, and either read as degrees (counting each c.c. as one degree), to which practice at once gives a useful signification, or calculate out in terms of acetic acid per 100 c.c. of liquor, reckoning saturated lime water as -fa normal.

The methods which deal with the actual testing for tannin itself

depend mostly upon one or other of two processes; either the precipitation of the tannin by means of gelatin, or its absorption by means of prepared hide. Sir Humphry Davy was the first to propose a method for analysing tanning materials, and he pre- cipitated the tannin by means of gelatin in the presence of alum, then dried and weighed the precipitate, after washing free from excess of reagents. This method was improved by Stoddart, but cannot lay claim to much accuracy. Warington and Mtiller again modified the method, but their procedure being tedious and difficult to work could not be regarded as a great advance. Wagner then proposed precipitation by means of the alkaloids, with special regard to cinchonine sulphate in the presence of rosaniline acetate as indicator, but this method also proved useless. After this many metallic precipitants were tried, used gravi- metrically and volumetrically, but without success. The weighing of precipitated tannates will never succeed, because the tannins are such a diverse class of substances that each tannin precipitates different quantities of, the orecipitants, and some materials contain two or three different tannins. Then there are also the difficulties of incomplete precipitation and the precipitation of colouring matter, &c. Among this class of methods may be mentioned Garland's, in which tartar emetic and sal ammoniac were employed. It was improved by Richards and Palmer.

Another class of methods depends upon the destruction of the tannin by some oxidizing agent, and the estimation of the amount required. Terreil rendered the tannin alkaline, and after agitating it with a known quantity of air, estimated the volume of oxygen absorbed. The method was slow and subject to many sources of error. Commaille oxidized with a known quantity of iodic acid and estimated the excess of iodate. This process also was troublesome, besides oxidizing the gallic acid (as do all the oxidation processes), and entailing a separate estimation of them after the removal of the tannin. Ferdinand Jean (1877) titrated alkaline tannin solution with standard iodine, but the mixture was so dark that the end reaction with starch could not be seen; in addition the gallic acid had again to be estimated. Monier proposed permanganate as an oxidizing agent, and Lowenthal made a very valuable improvement by adding indigo solution to the tannin solution, which controlled the oxidation and acted as indicator. This method also required double titration because of the gallic acid present, the tanning matters being removed from solution by means of gelatin and acidified salt.

The indirect gravimetric hide-powder method first took form about 1886. It was published in Der Gerber by Simand and Weiss, other workers being Eitner and Meerkatz. Hammer, Muntz and Ramspacher did some earlier work on similar lines, depending upon the specific

gravity of solutions. Professor H. R. Procter perfected this method by packing a bell, similar in shape to a bottomless bottle of about 2 oz. (liq.) capacity, with the hide- powder, and siphon- ing the tan liquor up through the powder and over into a receiver. This deprives the tan liquor of tannin, and a portion of this non- tannin solution is evaporated to dryness and weighed till constant; similarly a portion of the original solution containing non-tannins and tannins is evaporated and weighed till constant; then the weight of the non-tannins subtracted from the weight of the non- tannins and tannins gives the weight of tannin, which is calculated to percentage on original solutions. This method was adopted as official by the International Association of Leather Trades Chemists until September 1906, when its faults were vividly brought before them by Gordon Parker of London and Bennett of Leeds, working in collaboration, although other but not so complete work had been previously done to the same end. The main faults of the method were that the hide-powder absorbed non-tannins, and therefore registered them as tannins, and the hide-powder was partially soluble. This difficulty has now been overcome to a large extent in the present official method of the I.A.L.T.C.

Meanwhile, Parker and Munro Payne proposed a new method of analysis, the essence of which is as follows: — A definite excess of lime solution is added to a definite quantity of tannin solution and the excess of lime estimated; the tan solution is now deprived of tannin by means of a soluble modification of gelatin, called ” collin,” and the process is repeated. Thus we get two sets of figures, viz. total absorption and acid absorption (i.e. acids other than tan) ; the latter subtracted from the former gives tannin absorption, and this is calculated out in percentage of original liquor. The method failed theoretically, because a definite mole- cular weight had to be assumed for tannins which are all different. There are also several other objections, but though, like the hide- powder method, it is quite empirical, it gives exceedingly useful results if the rules for working are strictly adhered to.

The present official method of the I.A.L.T.C. is a modification of the American official method, which is in turn a modification of a method proposed by W. Eitner, of the Vienna Leather Research Station. The hide-powder is very slightly chrome-tanned with a basic solution of chromium chloride, 2 grammes of the latter being used per 100 grammes of hide-powder, and is then washed free from soluble salts and squeezed to contain 70% of moisture, and is ready for use. This preliminary chroming does away with the difficulty of the powder being soluble, by rendering it quite in- soluble; it also lessens the

tendency to absorb non-tannins. Such

a quantity of this wet powder as contains 6-5 grammes of dry hide is now taken, and water is added until this quantity contains exactly 20 grammes of moisture, i.e. 26-5 grammes in all; it is then agitated for 15 minutes with 100 c.c. of the prepared tannin solution, which is made up to contain tannin within certain definite limits, in a mechanical rotator, and filtered. Of this non-tannin solution 50 c.c. is then evaporated to dryness. The same thing is done with 50 c.c. of original solution containing non-tannins and tannins, and both residues are weighed. The tannin is thus determined by difference. The method does all that science can do at present. The rules for carrying out the analysis are necessarily very strict. The object in view is that all chemists should get exactly concordant results, and in this the I.A.L.T.C. has succeeded.

The work done by Wood, Trotman, Procter, Parker and others on the alkaloidal precipitation of tannin deserves mention.

Heavy Leathers. — The hides of oxen are received in the tanyard in four different conditions: (1) market or slaughter hides, which, coming direct from the local abattoirs, are soft, moist and covered with dirt and blood; (2) wet salted hides; (3) dry salted hides; (4) sun-dried or ” flint ” hides — the last three forms being the condition in which the imports of foreign hides are made. The first operation in the tannery is to clean the hides and bring them back as nearly as possible to the flaccid condition in which they left the animal’s back. The blood and other matter on market hides must be removed as quickly as possible, the blood being of itself a cause of dark stains and bad grain, and with the other refuse a source of putrefaction. When the hides are sound they are given perhaps two changes of water. Salted hides need a longer soaking than market hides, as it is not only essential to remove the salt from the hide, but also necessary to plump and soften the fibre which has been partially dehydrated and contracted by the salt. It must also be borne in mind that a 10% solution of salt dissolves hide substance, thereby causing an undesirable loss of weight, and a weak solution prevents plumping, especially when taken into the limes, and may also cause ” buckling,” which cannot easily be removed in after processes. Dried and dry salted hides require a much longer soaking than any other variety. Dried hides are always uncertain, as they may have putrefied before drying, and also may have been dried at too high a temperature; in the former case they fall to pieces in the limes, and in the latter case it is practically impossible to soak them back, unless putrefactive processes are used, and such are always dangerous and difficult to work because of the Rivers Pollution Acts. Prolonged

soaking in cold water dissolves a serious amount of hide substance. Soaking in brine may be advantageous, as it prevents putrefaction to some extent. Caustic soda, sodium sulphide and sulphurous acid may also be advantageously employed on account of their softening and antiseptic action. In treating salted goods, the first wash water should always be rapidly changed, because, as mentioned, strong salt solutions dissolve hide; four changes of water should always be given to these goods.

There are other and mechanical means of softening obstinate material, viz. by stocking. The American hide mill, or double- acting stocks, shown diagrammatically in fig. 2, is a popular piece of apparatus, but the goods should never be sub- jected to violent me- chanical treatment until soft enough to stand it, else severe grain crack- ing may result. Perhaps the use of sodium sul- phide or caustic soda in conjunction with the American wash wheel is the safest method.

Whatever means are used the ultimate object is first to swell and open up the fibres as much as possible, and secondly to remove putrefactive refuse and dirt, which

if left in is fixed by the lime in the process of depilation, and causes a dirty buff.

After being thus brought as nearly as possible into a uniform condition, all hides are treated alike. The first operation to which they are subjected is depilation, which removes not only the hair but also the scarf skin or epidermis. When the goods are sent to the limes for depilation they are, first of all, placed in an old lime, highly charged with organic matter and bacteria. It is the common belief that the lime causes the hair to loosen and fall out, but this is not so; in fact, pure lime has the opposite

Fig. 2. — Double-acting Stocks.

effec* of tightening the hair. The real cause of the loosening of the hair is that the bacteria in the old lime creep down the hair, enter the rete Malpighi and hair sheath, and attack and decompose the soft cellular structure of the sheath and bulb, also altering the composition of the rete Malpighi by means of which the scarf skin adheres to the true skin. These products of the bacterial action are soluble in lime, and immediately dissolve, leaving the scarf skin and hair unbound and

in a con- dition to leave the skin upon scraping. In this first ” green ” lime the action is mainly this destructive one, but the goods have yet to be made ready to receive the tan liquor, which they must enter in a plump, open and porous condition. Consequently, the ” green ” lime is followed with two more, the second being less charged with bacteria, and the third being, if not actually a new one, a very near approach to it; in these two limes the bundles of fibre are gradually softened, split up and distended, causing the hide to swell, the interfibrillar substance is rendered soluble and the whole generally made suitable for transference to the tan liquors. The hide itself is only very slightly soluble; if care is taken, the grease is transformed into an insoluble calcium soap, and the hair is hardly acted upon at all.

The time the goods are in the limes and the method of making new limes depends upon the quality of the leather to be turned out. The harder and tougher the leather required the shorter and fresher the liming. For instance, for sole leather where a hard result is required, the time in the limes would be from 8 to 10 days, and a perfectly fresh top lime would be used, with the addition of sodium sulphide to hasten the process. Every tanner uses a different quantity of lime and sulphide, but a good average quantity is 7 lb lime per hide and 10-15 1° sodium sulphide per pit of 100 hides. The lime is slaked with water and the sulphide mixed in during the slaking; if it is added to the pit when the slaking is finished the greater part of its effect is lost, as it does not then enter into the same chemical combinations with the lime, forming polysulphides, as when it is added during the process of slaking.

For softer and more pliable leathers, such as are required for harness and belting, a “lower” or mellower liming is given, and the time in the limes is increased from 9 to 1 2 days. Some of the old mellow liquor is added to the fresh lime in the making, so as just to take off the sharpness. It would be made up as for sole leather, but with less sulphide or none at all, and then a dozen buckets of an old lime would be added. For lighter leathers from 3 to 6 weeks’ liming is given, and a fresh lime is never used.

” Sweating ” as a method of depilation is obsolete in England so far as heavy leathers are concerned. It consists of hanging the goods in a moist warm room until incipient putrefaction sets in. This first attacks the more mucous oortions, as the rete Malpighi, hair bulb and sheath, and so allows the hair to be removed as before. The method pulls down the hide, and the putrefaction may go too far, with disastrous results, but there is much to recommend it for sheepskins where the wool is the main consideration, the main point being that while lime

entirely destroys wool, this process leaves it intact, only loosening the roots. It is consequently still much used.

Another method of fellmongering (dewooling) sheepskins is to paint the flesh side with a cream of lime made with a 10% solution of sodium sulphide and lay the goods in pile flesh to flesh, taking care that none of the solution comes in contact with the wool, which is ready for pulling in from 4 to 8 hours. Although this process may be used for any kind of skin, it is practically only used for sheep, as if any other skin is depilated in this manner all plumping effect is lost. Since this must be obtained in some way, it is an economy of time and material to place the goods in lime in the first instance. Sometimes, in the commoner classes of sole leather, the hair is removed by painting the hair side with cream of lime and sulphide, or the same effect is produced by drawing the hides through a strong solution of sulphide; this completely destroys the hair, actually taking it into solution. But the hair roots remain embedded in the skin, and for this reason such leather always shows a dirty buff.

Arsenic sulphide (realgar) is slaked with the lime for the pro- duction of the finer light leathers, such as glace kid and glove kid. This method produces a very smooth grain (the tendency of sodium sulphide being to make the grain harsh and bold), and is therefore very suitable for the purpose, but it is very expensive.

Sufficient proof of the fact that it is not the lime which causes skins to unhair is found in the process of chemical liming patented by Payne and Pullman. In this process the goods are first treated

with caustic soda and then with calcium chloride; in this manner lime is formed in the skin by the reaction of the two salts, but still the hair remains as tight as ever. If this process is to be used for unhairing and liming effect, the goods must be first subjected to a putrid soak to loosen the hair, and afterwards limed. Experi- ments made by the present writer also prove this theory. A piece of calf skin was subjected to sterilized lime for several months, at the end of which time the hair was as tight as ever; then bacterial influence was introduced, and the skin unhaired in as many days.

After liming it is necessary to unhair the goods. This is done by stretching a hide over a tanner's beam (fig. 3), when with an unhairing knife (a, fig. 4) the beamsman partially scrapes and partially shaves off the hair and epidermis. Another workman, a " flesher," removes the flesh or " net skin " (panniculus adiposus) , a fatty matter from the flesh side of the skin, with the

fleshing knife (two- edged), seen in b, fig.

4. For these opera-

tions several

machines have been

adapted, working

mostly with revolv- ing spiral blades or

vibrating cutters,

under which the

hides pass in a fully

extended state.

Among these may

be mentioned the

Leidgen unhairer,

which works on a

rubber bed, which

” gives ” with the

irregularities of the

hide, and the Wilson flesher.

Fig. 3. — Tanner’s Beam.

consisting of a series of knives attached to a revolving belt, and which also ” give ” in contact with irregularities.

At this stage the hide is divided into several parts, the process being known as ” rounding.” The object of the division is this: certain parts of the hide termed the ” offal ” are of less value than the ” butt,” which consists of the prjme part. The grain of the butt is fine and close in texture, whereas the offal grain is loose, coarse and open, and if the offal is placed in the same superior liquors as the butt, being open and porous, it will absorb the best of the tannin first; consequently the

offal goes to a set of inferior liquors, often consisting of those through which the butts have passed. The hides are ” rounded ” with a sharp curved butcher’s knife; the divisions are seen in fig. 5_ The bellies, cheeks and shoulders constitute the offal, and are tanned separately al- though the shoulder is not often detached from the butt until the end of the ” suspenders,” being of slightly better quality than the bellies. The butt is divided into two ” bends.” This separation is not made until the tanning of the butt p IG .. is finished, when it is cut in two, and the components sold as ” bends,” although as often as not the butt is not divided. In America the hides are only split down the ridge of the back, from head to tail, and tanned as hides. Dressing hides are more frequently rounded after tanning, the mode depending on the purpose for which the leather is required.

The next step is to remove as much ” scud ” and lime as possible, the degree of removal of the latter depending upon the kind of leather to be turned out. ” Scudding ” consists of working the already unhaired hide over the beam with an unhairing knife with increased pressure, squeezing out the dirt, which is composed of pigment cells, semi-soluble compounds of lime, and hide, hair sacks and soluble hide substance, &c. This exudes as a dirty, milky, viscisl liquid, and mechanically brings the

-Tanner’s Knives and Pin.

Fig. 5-

lime out with it, but involves a great and undesirable loss of hide substance, heavy leather being sold by weight. This difficulty is now got over by giving the goods an acid bath first, to delime the surface; the acid fixes this soluble hide substance (which is only soluble in alkalies) and hardens it, thus preventing its loss, and the goods may then be scudded clean with safety. The surface of all heavy leathers must be delimed to obtain a good coloured leather, the demand of the present day boot manufacturer; it is also necessary to carry this further with

milder leathers than sole, such as harness and belly, &c, as excess of lime causes the leather to crack when finished. Per- haps the best material for this purpose is boracic acid, using about 10 lb per ioo butts, and suspending the goods. This acid yields a character- istic fine

grain, and because of its limited solubility cannot be usedinexcess. Other acids are also used, such as acetic, lac- tic, formic, hydro-chloric,with varying success. Where the water used is very soft, it is only necessary to wash in water for a few hours, when the butts are ready for tanning, but if the water is hard, the lime is fixed in the hide by the bicarbonates it contains, in the form of carbonate, and the result is somewhat disastrous.

After deliming, the butts are scudded, rinsed through water or weak acid, and go off to the tan pits for tanning proper. Any lime which remains is sufficiently removed by the acidity of the early tan liquors.

The actual tanning now begins, and the operations involved may be divided into a series of three: (i) colouring, (2) handling, (3) laying away.

The colouring pits or ” suspenders,” perhaps a series of eight pits, consist of liquors ranging from 16 to 40 barkometer, which tvere once the strongest liquors in the yard, but have gradually tvorked down, having had some hundreds of hides through them; they now contain very little tannin, and consist mainly of developed acids which neutralize the lime, plump the hide, colour it off, and generally prepare it to receive stronger liquors. The goods are suspended in these pits on poles, which are lifted up and down several times a day to ensure the goods taking an even colour; they are moved one pit forward each day into slightly stronger liquors, and take about from 7 to 18 days to get through the suspender stage.

The reason why the goods are suspended at this stage instead of being laid flat is that if the latter course were adopted, the hides would sink and touch one another, and the touch-marks, not being accessible to the tan liquor, would not colour, and uneven colouring would thus result; in addition the weight of the top hides would flatten the lower ones and prevent their plumping, and this con- dition would be exceedingly difficult to remedy in the after liquors. Another question which might occur to the non-technical reader is, why should not the process be hastened by placing the goods in strong liquors ? The reason is simple. Strong tanning solutions have the effect of ” drawing the grain ” of pelt, i.e. contracting the fibres, and causing the leather to assume a very wrinkled appearance which cannot afterwards be remedied; at the same time “case tanning ” results , i.e. the outside only gets tanned, leaving the centre still raw hide, and once the outside is case-hardened it is impossible for the liquor to penetrate and finish the tanning. This condition being almost irremediable, the leather would thus be rendered useless.

After the ” suspenders ” the goods are transferred to a series

Fig. 6. — Tanner’s Hook (without handle).

of ” handlers ” or ” floaters,” consisting of, perhaps, a dozen pits containing liquors ranging from 30 to 55° barkometer. These liquors contain an appreciable quantity of both tannin and acid, once formed the ” lay-aways,” and are destined to constitute the ” suspenders.” In these pits the goods, having been evenly coloured off, are laid flat, handled every day in the ” hinder ” (weaker) liquors and shifted forward, perhaps every two days, at the tanner’s convenience. The ” handling ” consists of lifting the butts out of the pit by means of a tanner’s hook (fig. 6) , piling them on the side of the pit to drain, and return- ing them to the pit, the top butt in the one handler being returned as the bottom in the next. This operation is continued throughout the process, only, as the hides advance, the neces- sity for frequent handling decreases. The top two handler pits are sometimes converted into ” dusters,” i.e. when the hides have advanced to these pits, as each butt is lowered, a small quantity of tanning material is sprinkled on it.

Some tanners, now that the hides are set flat, put them in suspension again before laying away; the method has its advantages, but is not general. The goods are generally laid away immediately. The layer liquors consist of leached liquors from the fishings, strengthened with either chestnut or oakwood extract, or a mixture of the two. The first layer is made up to, say, 60° barkometer in this way, and as the hides are laid down they are sprinkled with fresh tanning material, and remain undisturbed for about one week. The second layer is a 70 barkometer liquor, the hides are again sprinkled and allowed to lie for perhaps two weeks. The third may be 8o° barkometer and the fourth oo°, the goods being ” dusted ” as before, and lying undisturbed for perhaps three or four weeks respectively. Some tanners give more layers, and some give less, some more or less time, or greater or lesser strengths of liquor, but this tannage is a typical modern one.

As regards ” dusting ” material, for mellow leather, mellow materials are required, such as myrobalans being the mellowest and mimosa bark the most astringent of those used in this connexion. For harder leather, as sole leather, a much smaller quantity of myrobalans is used, if any at all, a fair quantity of mimosa bark as a medium, and much valonia, which deposits a large amount of bloom, and is of great astringency. About 3 to 4 cwt. of a judicious mixture is used for each pit, the mellower material predominating in the earlier liquors and the most astringent in the later liquors.

The tanning is now finished, and the goods are handled out of the pits, brushed free from dusting material, washed up in weak liquor, piled and allowed to drip for 2 or 3 days so that the tan may become set.

Finishing. — From this stage the treatment of sole leather differs from that of harness, belting and mellower leathers. As regards the first, it will be found on looking at the dripping pile of leather that each butt is covered with a fawn-coloured deposit, known technically as “bloom “; this disguises the under colour of the leather, just like a coat of paint. The theory of the formation of this bloom is this. Strong solutions of tannin, such as are formed between the hides from dusting materials, are not able to exist for long without decomposition, and consequently the tannin begins to condense, and forms other acids and in- soluble anhydrides; this insoluble matter separates in and on the leather, giving weight, firmness, and rendering the leather water- proof. It is known technically as bloom and chemically as ellagic acid.

After dripping, the goods are scoured free from surface bloom in a Wilson scouring machine, and are then ready for bleaching. There are several methods by which this is effected, or, more correctly several materials or mixtures are used, the method of application being the same, viz. the goods are ” vatted ” (steeped) for some hours in the bleaching mixture at a temperature of no c F. The mixture may consist of either sumach and a light-coloured chestnut extract made to no° barkometer, and no” F., or some bleaching extract made for the purpose, consisting of bisulphited liquid ‘ quebracho, which bleaches by reason of the free sulphurous acid it

contains. The former method is best (though more expensive), as it removes less weight, and the light shade of colour is more per- manent than that obtained by using bisulphited extracts.

After the first vatting the goods are laid up in pile to drip; meanwhile the liquor is again heated, and they are then returned for another twenty-four hours, again removed and allowed to drip for 2 to 3 days, after which they are oiled with cod oil on the grain and hung up in the sheds to dry in the dark. When they have dried to an indiarubber-like condition, they are piled and allowed to heat slightly until a greyish ” bloom ” rises to the surface, they are then set out and stretched in a Wilson scouring machine; using brass slickers instead of

the stone ones used for scouring, ” pinned ” over by hand (with the three-edged instrument seen in c, fig. 4, and known as a ” pin “) to remove any bloom not removed by the machine, oiled and dried. When of a damp even colour they are ” rolled on ” between two heavy rollers like a wringing machine, the pressure being applied from above, hung up in the dark sheds again until the uneven colour so produced has dried in, and then ” rolled off” through the same machine, the pressure being applied from below. They are now dried right out, brushed on the grain to produce a slight gloss, and are finished.

As regards the finishing of harness leather, &c, the goods, after thorough dripping for a day or two, are brushed, lightly scoured, washed up in hot sumach and extract to improve the colour, and are again laid up in pile for two days; they are then given a good coat of cod oil, sent to the sheds, and dried right out. Only sufficient scouring is given to clean the goods, the object of the tanner being to leave as much weight in as possible, although all this superfluous tan has to be washed out by the currier before he can proceed.

Currying. — When the goods are dried from the sheds they are purchased by the currier. If, as is often the case, the tanner is his own currier, he does not tan the goods so heavily, or trouble about adding superfluous weight, but otherwise the after pro- cesses, the art of the currier, are the same.

Currying consists of working oil and grease into the leather ko render it pliable and increase its strength. It was once thought that this was a mere physical effect produced by the oil, but such is not the case. Currying with animal oils is a second tannage in itself; the oils oxidize in the fibres and produce aldehydes, which are well-known tanning agents; and this double tannage renders the leather very strong. Then there is the lubricating effect, a very important physical action so far as the strength of the leather is concerned. Mineral oils are much used, but they do not oxidize to aldehydes, or, for the matter of that, to anything else, as they are not subject to decomposition. They, therefore, produce no second tannage, and their action is merely the physical one of lubrication, and this is only more or less temporary, as, except in the case of the heavier greases, they slowly evaporate. Where animal fats and oils are used, the longer the goods are left in contact with the grease the better and stronger will be the leather.

In the ” Einbrennen ” process (German for ” burning in “), the hides are thoroughly scoured, and when dry are dipped into hot grease, which is then allowed to cool; when it is nearly set the goods are

removed and set out. This process is not much used in Great Britain.

In hand-stuffing belting butts the goods are first thoroughly soaked in water to which has been added some soda, and then scoured and stretched by machine. They are then lightly shaved, to take off the loose flesh and thin the neck. The whole of the mechanically deposited tannin is removed by scouring, to make room for the grease, and they are then put into a sumach vat of 40° barkometer to brighten the colour, horsed up to drip, and set out. If any loading, to produce fictitious weight, is to be done, it is done now, by brushing the solution of either epsom salts, barium chloride or glucose, or a mixture, into the flesh, and laying away in pile for some days to allow of absorption, when, perhaps, another coat is given. Whether this is done or not, the goods are hung up until ” tempered ” (denoting a certain degree of dryness), and then treated with dubbin. This is manufactured by melting down tallow in a steam-jacketed pan, and adding cod oil, the mixture being stirred continually; when quite clear, k is cooled as rapidly as possible by running cold water through the steam pan, the stirring being continued until it has set. The tempered leather having been set out on a glass

table, to which the flesh side adheres, is given a thin coat of the dubbin on the grain, turned, set out on the flesh, and given a thick coat of dubbin. Then it is hung up in a wind shed, and as the moisture dries out the grease goes in. After two or three days the goods are ” set out in grease ” with a brass slicker, given a coat of dubbin on the grain slightly thicker than the first coat, then flesh dubbined, a slightly thinner coat being applied than at first, and stoved at 70 F. The grease which is slicked off when ” setting out in grease ” is collected and sold. After hanging in the warm stove for 2 or 3 days the butts are laid away in grease for a month; they are then slicked out tight, flesh and grain, and buck tallowed. Hard tallow is first rubbed on the grain, when a slight polish is induced by rubbing with the smoothed rounded edge of a thick slab of glass; they are then hung up in the stove or stretched in frames to dry. A great deal of stuffing is now carried out by drumming the goods in hot hard fats in previously heated drums; and in modern times the tedious process of laying away in grease for a month is either left undone altogether or very considerably shortened.

In the tanning and dressing of the commoner varieties of kips and dried hides, the materials used are of a poorer quality, and the time taken for all processes is cut down, so that whereas the time taken to dress the better class of leather is from 7 to 10 months, and in a few cases more, these cheaper goods are turned_ out in from 35 to 5 months.

A considerable quantity of the leather which reaches England, such as East India tanned kips, Australian sides, &c, is bought up and retanned, being sold then as a much better-class leather. The first operation with such goods is to ” strip ” them of any grease they may contain, and part of their original tannage. This is effectually carried out by first soaking them thoroughly, laying them up to drip, and drumming for half an hour in a weak solution of soda; they are then washed by drumming in plenty of water, the water is run off and replaced by very weak sulphuric acid to neutralize any remaining soda; this is in turn run off and replaced by weak tan liquor, and the goods are so tanned by drumming for some days in a liquor of gradually increasing strength. The liquor is made up as cheaply as possible with plenty of solid quebracho and other cheap extract, which is dried in with, perhaps, glucose, epsom salts, &c. to produce weight. Sometimes a better tannage is given to goods of. fair quality, in which they are, perhaps, started in the drum and finished in layers, slightly better materials being used all through, and a longer time taken to complete the tannage.

The tannage of dressing hides for bag and portmanteau work is rather different from the other varieties described, in that the goods, after having had a rather longer liming, are ” bated ” or ” pucred.”

Bating consists of placing the goods in a wheel or paddle with hen or pigeon excrement, and paddling for from a few hours to 2 or 3 days. In puering, dog manure is used, and this bting rather more active, the process does not take so long. This bat ing or puering is carried out in warm liquors, and the actions involved are several. From a practical point of view the action is the removal of the lime and the solution of the hair sacs and a certain amount of inter- fibrillar substance. In this way the goods are pulled down to a soft flaccid condition, which allows of the removal of short hair, hair sacs and other filth by scudding with an unhairing knife upon the beam. The lime is partially taken into solution and partially removed mechanically during the scudding. A large quantity of hide substance, semi-soluble and soluble, is lost by being pressed out, but this matters little, as for dressing work, area, and not weight, is the main consideration. Theoretically the action k due to bacteria and bacterial products (organized ferments and enzymes), unorganized ferments or vegetable ferments like the yeast ferment, such as pancreadiae, pepsin, &c. and chemicals, such as ammonium and calcium salts and phosphates, . all of which are present in the manure. The evolved gases also play their part in the action.

There are several bates upon the market as substitutes for dung bate.

A most popular one was the American ” Tiffany ” bate, made by keeping a weak glue solution warm for some hours and then introducing a piece of blue cheese to start fermentation ; when fermenting, glucose was added, and the bate was then ready for work. This and all other bates have been more or less supplanted by ” erodin,” discovered after years of research by Mr Wood (Nottingham) and Drs Popp and Becker (Vienna). This is an artificial bate, containing the main constituents of the dung bate. It is supplied

in the form of a bag of nutrient material for bacteria to thrive on and a bottle of bacterial culture. The nutrient material is dissolved in water and the bacterial culture added, and after allowing the mixture to get working it is ready for use. Many tons of this bate are now being used per annum. Its advantages are: (l) that it is clean, (2) that it is under perfect control, and (3) that stains and bate burns, which so often accompany the dung bate, are absolutely absent. Bate burns are caused by not filtering the dung bate through coarse sacking before use. The accumulation of useless solid matter settles on the skins if they are not kept well in motion, causing excessive action in these places.

After pulling down the goods to a soft, silky condition by bating or puering, it is necessary, after scudding, to plump them up again and bring them into a clean and fit condition for re- ceiving the tan. This is done by ” drenching ” in a bran drench. A quantity of bran is scalded and allowed to ferment. When the fermentation has reached the proper stage the goods are placed, together with the bran liquor, in a suitable pit or vat, and are allowed to remain until they have risen three times; this rising to the surface is caused by the gaseous products of the fermenta- tion being caught by the skin. The plumping action of the bran is due to the acids produced during fermentation and also in part to the gases, and the cleansing action is due to the mechanical action of the particles of bran rubbing against the grain of the skins. After drenching, the goods are washed free from bran, and are ready for the tanning process.

Drenching, now that all kinds of acids are available, is not so much used for heavy hides as for light skins, it being found much more convenient and cheaper to use acids. In fact, bating and puering are being gradually replaced by acid baths in the case of heavy leathers, the process being carried out as deliming for sole leather, only much

more thoroughly in the case of dressing leather.

The tanning of dressing hides, which are not rounded into butts and offal, is briefly as follows. They first enter a series of colour- ing pits or suspenders, and then a series of handlers, by which time they should be plump and coloured through; in this con- dition they are split either by means of a union or band-knife splitting machine (fig. 7).

Fig. 7. — Band Knife Splitting Machine.

This latter is the most popular machine, and consists essentially of an endless band knife a, which revolves at considerable speed with its cutting edges close to the sides of a pair of rollers through which the leather is fed and pressed against the knife. The lower of these rollers is made of short segments or rings, each separately capable of yielding so as to accommodate itself to the unequal thicknesses of various parts of a hide. The thickness of the leather to be cut is gauged to the utmost minuteness by means of the hand screws 6 b which raise or lower the upper roller. The knife edge of the cutter is kept keen by rubbing against revolving emery wheels c as it passes round. So delicately can this machine effect its work that slices of leather uniform throughout and as thin as paper can be easily prepared by it, and by its aid it is quite common to split hides into as many as three useful splits.

The dressing hides are usually split in two. Here we will leave the split (flesh) for a time and continue with the treatment of the grain. After splitting, they enter another series of handlers, are then piled up for a day or two, and thrown into a large drum with sumach mixed to a paste with hot water and a light-coloured extract. They are drummed in this for one hour to brighten and mellow the grain, washed up in tepid liquor, piled for two days, and drummed with cod oil or some other suitable oil or mixture;

they are now piled for a day or two to absorb, dried out, flattened on the grain, and flesh folded.

The splits are rinsed up in old sumach liquor and drummed with cheap extracts and adulterants, such as size, glucose, barium chloride, epsom salts, &c. after which they are piled up to drain, dried to a ” sammied ” condition, rolled to make firm, and dried right out.

In the dressing hide tannage very mellow materials are used. Gambier and . myrobalans form the main body of the tannage, together with a

little quebracho extract, mimosa bark, sumach and extracts.

Upper Leather. — Under the head of upper leather are included the thin, soft and pliable leathers, which find their principal, but by no means exclusive, application in making the uppers of boots and shoes, which may be taken as a type of a class of leathers. They are made from such skins as East Indian kips, light cow and horse hides, thin split hides, such as those described under dressing leather, but split rather thinner, and calf. The preparatory dressing of such skins and the tanning operations do not differ essentially from those already described. In pro- portion to the thinness of the skin treated, the processes are more rapidly finished and less complex, the tannage is a little lighter, heavy materials such as valonia being used sparsely if at all. Generally speaking, the goods have a longer and mellower liming and bating, the lime being more thoroughly removed than for the leathers previously described, to produce greater pliability, and everything must tend in this direction. The heavier hides and kips are split as described under dressing leather, and then tanned right out.

Currying of the Lighter Leathers. — The duty of the currier is not solely directed towards heavier leathers; he is also entrusted with the dressing and fitting of the lighter leathers for the shoemaker, coachbuilder, saddler, &c. He has to pare the leather down and reduce inequalities in thickness, to impregnate it with fatty matter in order to render it soft and pliable, and to give it such a surface dressing, colour and finish as will please the eye and suit the purposes of its consumers. The fact that machinery is used by some curriers for nearly every mechanical operation, while others adhere to the manual system, renders it almost impossible to give in brief an outline of operations which will be consistent with any considerable number of curriers.

The following may be taken as a typical modern dressing of waxed calf or waxed kips. The goods are first of all soaked down and brought to a ” sammied ” condition for shaving. In the better- class leathers hand-shaving is still adhered to, as it is maintained that the drag of the shaving machine on the leather causes the ” nap ” finish to be coarser. Hand-shaving is carried out on a beam or strong frame of wood, supporting a stout plank faced with lignum vitae, and set vertically, or nearly so. The knife (fig. 8) is a double-edged rectangular blade about 12 in. by 5 in., girded on either side along its whole length and down the centre with two bars 3 in. wide, leaving each blade protruding I in. be- yond them; it has a straight handle at one end and a cross handle at the other in the plane of the blade. The edges of this knife are first made very keen, and are then turned over

so as to form a wire edge, by means of the thicker of the two straight steel tools shown in fig. 9. The wire edge is preserved by drawing the thinner of the two steel tools along the interior angle of the wire edge and then along the outside of the turnover edge. The skin being thrown flesh uppermost over the vertical beam, the shaver presses his body against it, and leaning over the top holds the knife by its two handles almost at right angles to the leather, and proceeds to shave it by a scraping stroke downwards which the wire edge, being set at right angles to the knife and almost parallel with the skin, turns into a cut. The skin is shifted so as to bring all parts under the action of the knife, the shaver frequently passing a fold between his finger to test the progress of his work. After shaving, the goods are thoroughly soaked, allowed to drip, and are ready for ” scouring.” This operation has for its object the removal of bloom (ellagic acid) and any other superfluous adherent matter. The scouring solution consists of a weak solution of soft soap and borax. This is first well brushed into the flesh of the leather, which is then ” sleeked ” (slicked) out with a steel slicker shown at S fig. 9. The upper part

Fig. 8.— Currying Knife.

Fig 9-

-Currying Apparatus. C, pommel ; R, raising board ; S, slicker.

of the ” slicker ” is wooden, and into it a steel, stone, brass or vulcanite blade is forced and fastened. The wooden part is grasped in both hands, and the blade is half rubbed and half scraped over the surface of the leather in successive strokes, the angle of the slicker being a continuation of the angle which the thrust out arms of the worker. form with the body, perhaps 30 to 45 , with the leather, depending upon the pressure to be applied, The soap and borax solution is continually dashed on the leather to supply a body for the removal of the bloom with the steel slicker. The hide is now turned, and the grain is scoured with a stone slicker and brush, with soap and borax solution, it is then rinsed up, and sent to dry ; when sammied, it is ” set ” i.e. the grain is laid smooth with a brass or steel slicker and dried right out. It is now ready for ” stuffing,” which is invariably done in the drum with a mixture of stearine and ” sod ” oil, to which is sometimes added cod oil and wool fat; it is then set out on the grain and ” canked ” on the flesh, the grain side

is glassed, and the leather dried right out. The goods are now ” rounded,” i.e. the lighter coloured parts of the grain are damped with a mix- ture of dubbin and water to bring them to even colour, and are then laid in pile for a few days to mel- low, when they are ready for whitening. The goods are damped down and got to the right temper with a weak soap and water solution, and are then ” whitened,” an operation similar to shaving, carried out with a turned edge slicker. By this means a fine flesh surface is obtained upon which to finish by waxing; after this they are “boarded” with an arm board (R, fig. 9) to bring up the grain, or give a granular appearance to the leather and make it supple, when they may be turned flesh inwards and bruised, a similar operation to graining, essentially to soften and make them pliant. At this stage the goods are known as ” finished russet,” and are stored until ready for waxing.

For waxing, the first operation is to black the goods. In England this is generally done by hand, but machinery is much more used in the United States. The process consists of well brushing into the flesh side of the skins a black preparation made in one of two ways. The older recipe is a mixture of lampblack, oil and perhaps a little tallow; the newer recipe consists of soap, lampblack, logwood extract and water. Either of these is brushed well into the flesh side, which is then glassed up by means of a thick slab of glass, the smooth rounded edges being used with a slicking motion, and the goods are hung up to dry. When dry they are oiled with cod oil, and are ready for sizing. Goods blacked with soap blacking are sized once, those prepared with oil blacking are sized twice. The size used for soap black skins may consist of a mixture of beeswax, pitch, linseed oil, tallow, soap, glue and logwood extract. For oil blacked skins the ” bottom sizing ” may be glue, soap, logwood extract and water, after the application of which the goods are dried and the ” top sizing ” applied; this consists of glue, cod oil, beeswax, tallow, Venice turps, black dye and water. The sizings having been applied with a sponge or soft brush, thoroughly rubbed in with a glass slicker, crush marks are removed by padding with a 20ft leather pad, and the goods, after being dried out, are ready for the market.

In the dressing of waxed grain leathers, such as French calf, satin leather, &c, the preparatory processes are much the same as for waxed leathers described above as far as stuffing, after which the grain is prepared to take the colour by light hand scouring with weak soap and borax solution. The dye is now applied, and so that it may take well on the grain of the greasy leather, a quantity of either soap, turkey red oil or methylated spirit is added to the solution. Acid colours are preferably used, and three coats are given to the dry

leather, which is then grained with an arm board, and finished by the application of hard buck tallow to the grain and brushing. The dye or stain may consist of aniline colours for coloured leathers, or, in the case of blacks, consecutive applications of logwood and iron solutions are given.

Finishing dressing Hides for Bag and Portmanteau Work. — The hides as received from the tanner are soaked down, piled to sammy, and shaved, generally by machine, after which they are scoured, as under waxed leather; sumached and hung up to dry; when just damp they are set out with a brass slicker and dried right out. The grain is now filled by applying a solu- tion of either Irish moss, linseed mucilage or any other mucilagin- ous filling material, and the flesh is sized with a mixture of mucilage and French chalk, after which the goods are brush- stained with an aniline dye, to which has been added linseed mucilage tp give it body; two coats are applied to the sammied

leather. When the goods have sammied, after the last coat of stain, they are ” printed ” with a brass roller in a ” jigger,” or by means of a machine embosser. This process consists of im- printing the grain by pressure from a brass roller, on which the pattern is deeply etched. After printing, the flesh side is sponged with a weak milk solution, lightly glassed and dried, when the grain is sponged with weak linseed mucilage, almost dried, and brushed by machine. The hides are now finished, by the application either of pure buck tallow or of a mixture of carnauba wax and soap; this is rubbed up into a slight gloss with a flannel.

Light Leathers. — So far only the heavier leathers have been dealt with; we will now proceed to discuss lighter calf, goat, sheep, seal, &c.

In tanning light leathers everything must tend towards suppleness and pliability in the finished leather, in contrast to the firmness and solidity required in heavy leathers. Consequently, the liming is longer and mellower; puering, bating or some bacterial substitute always follows; the tannage is much shorter; and mellow materials are used. A deposition of bloom in the goods is not often required, so that very soon after they are struck through they are removed as tanned. The materials largely used are sumach, oak bark, gambier, myrobalans, mimosa bark, willow, birch and larch barks.

As with heavy leathers, so also with light leathers, there are various ways of tanning; and quality has much to do with the elaboration or modification of the methods employed. The tan- ning of all leathers will be dealt with first, dyeing and finishing operations being treated

later.

The vegetable-tanned leather de luxe is a bottle-tanned skin. It is superior to every other class of vegetable-tanned leather in every way, but owing to competition not a great deal is now produced, as it is perhaps the most expensive leather ever put on the market. The method of preparation is as follows.

The skins are usually hard and dry when received, so they are at once soaked down, and when sufficiently soft are either milled in the stocks, drummed in a lattice drum (American dash wheel, fig. 10), or " broken down " over the beam by working on the flesh with a blunt unhairing knife. They are next mellow limed (about 3 weeks), sulphide being used if convenient, unhaired and fleshed as described under heavy leathers, and are then ready for puering. This process is carried through at about 8o° F., when the goods are worked on the beam, rinsed, drenched in a bran drench, scudded, and are ready for tanning. The skins are now folded down the centre of the back from neck to butt (tail end), flesh outwards, and the edges are tightly stitched all round to form bags, leav- ing an aperture at one of the shanks for filling; they are now turned grain out- wards and filled with strong sumach liquor and some quantity of solid sumach to fill up the interstices and prevent leakage, after which the open shank is tied up, and they are thrown into warm sumach liquor, where they float about like so many pigs, being continually pushed under the surface with a dole. When struck through they are piled on a shelf above the vat, and by their own weight the liquor is forced through the skins. The tannage takes about 24 hours, and when finished the stitching is ripped up, the skins are slicked out, " strained " on frames and dried. " Straining " consists of nailing the skins out on boards in a stretched condition, or the stretching in frames by means of strings laced in the edge of the frame and attached to the edge of the skin.

The commoner sumach-tanned skins (but still of very good quality) are tanned in paddle wheels, a series of three being most

Fig. 10. — Dash Wheel.

conveniently used in the same manner as the three-pit system of liming, each wheel having three packs of skins through it before being thrown away. This paddling tends to make a bolder grain, as the skins

are kept in continual motion, and work over one another. Some manufacturers finish the tannage with a mixture of sumach and oak bark; this treatment yields a less porous product. Others, when the skins are strained and in a semi-dry condition, apply neatsfoot or other oil, or a mixture of glycerine and oil, to the grain to lubricate it and make it more supple; the glycerine mixture is generally used for " chrome " leather, and will be discussed later under that head.

The skins tanned as above are largely dressed as morocco. Originally " morocco " was produced by the Moors in southern Spain and Morocco, whence the industry spread to the Levant, Turkey and the Mediterranean coast of Africa generally, where the leather was made from a species of sumach. Peculiarly enough, the dyeing was carried out before the tanning, with Roman alum as " mordant " and kermes, which with the alum produced a fine red colour. Such leather was peculiarly clear in colour, elastic and soft, yet firm and fine in grain and texture, and has long been much prized for bindings, being the material in which most of the artistic work of the 16th-century binders was executed. Now, in addition to the genuine morocco made from goat skins, we have imitation or French moroccos, for which split calf and especially sheep skins are employed, and as the appearance of morocco is the result of the style of graining and finish, which can now be imitated by printing or embossing machines, morocco can be made from all varieties of thin leather.

Great quantities of " Persian " (East India tanned) sheep and goat are now dressed as moroccos and for innumerable other purposes, the method being as follows: The goods are tanned with turwar bark and cassia bark, besides being impregnated with sesame oil, even to the extent of 30%. The first operation is to “strip” them of the oil and original tannage as far as possible, by drumming in a solution of soda; the soap thus formed is got rid of by thoroughly washing the goods, when they are " soured " in a weak bath of sulphuric acid to brighten the colour and remove iron stains, after which they are washed up and re-tanned by drumming in warm sumach, allowing about 4 oz. per skin. They are then slicked out, dried and are ready for dyeing.

The tanning of sheep and lamb skins differs very essentially from the tanning of goat and other leathers, mainly in the preparatory processes. As the wool is completely destroyed by lime, other methods have to be resorted to. The process usually practised is known as " sweating “; this consists of hanging the moist skins up in a warm, badly-ventilated chamber and allowing incipient putre- faction to set in. The chamber is always kept warm and saturated with moisture, either by means of a steam jet or water sprinklers. During the process

large quantities of ammoniacal vapours are given off, and after two or three days the skins become slimy to the touch, and the wool slips easily ; at this stage the goods are removed, for if the putrefaction goes too far the grain of the skin is irretriev- ably ruined. The wool is now ” pulled ” by pullers, who throw it into bins arranged to receive the different qualities; for one pelt may have three different grades of wool on it.

Other methods of dewooling are to paint the flesh with a solution of sodium sulphide, or cream of lime made with a solution of sodium sulphide; in either case the goods are piled flesh to flesh for an hour or so, and care is taken that the dewooling agent does not touch the wool. The pelt is then pulled and rapidly swilled in a stream of running water. The goods are now, in some yards, lightly limed to plump them superficially, by paddling in a milk of lime, and at this stage, or when the goods have been ” struck through ” with tan liquor, they are ” degreased ” either by hydraulic pressure or by benzene decreasing. This is to expel the oleaginous or fatty matter with which sheep skins are richly impregnated; the average yield is about 4 oz. per skin. The tannage is carried out in much the same way as for goat skins, the goods being started in old acid bark liquors ; the general tannage consists of sumach and bark.

Basils are sheep skins tanned in various ways. English basils are tanned with oak bark, although, as in all other leathers, inferior tannages are now common; Scotch basils are tanned with larch bark, Australian and New Zealand basils with mimosa bark and Turkish basils with galls. The last are the commonest kind of skins imported into Great Britain, and are usually only semi-tanned. Roans are sumach-tanned sheep skins.

Skivers are the grain splits of sheep skins, the fleshes of which are finished for chamois leather. The goods are split in the limed state, just as the grains are ready for tanning, and are sub- sequently treated much as sumach-tanned goat skins, or in any

other convenient way; the fleshes, on the other hand, go back into the limes, as it is necessary to get a large quantity of lime into leather which is to be finished. as chamois.

Russia Leather was originally a speciality of Russia, where it was made from the hides of young cattle, and dressed either a brownish red or black colour for upper leather, bookbinding, dressing-cases, purses, &c. It is now made throughout Europe and America, the best qualities being obtained from Austria. The empyreumatic odour of the

old genuine ” Russia ” leather was derived from a long-continued contact with willow and the bark of the white birch, which contains the odorous betulin oil. Horse hides, calf, goat, sheep skins and even splits are now dressed as ” Russia leather,” but most of these are of a decidedly inferior quality, and as they are merely treated with birch bark oil to give them something of the odour by which Russia leather is ordinarily recognized, they scarcely deserve the name under which they pass. The present-day genuine Russia leather is tanned like other light leathers, but properly in willow bark, although poplar and spruce fir barks are used. After tanning and setting out the goods are treated with the empyreumatic oil obtained by the dry distillation of birch bark. The red colour commonly seen in Russia leather is now produced by aniline colours, but was originally gained by the application of an in- fusion of Brazil wood, which was rubbed over the grain with a brush or sponge. Some time ago Russia leather got into disrepute because of its rapid decay; this was owing to its being dyed with a very acid solution of tin salts and cochineal, the acid completely destroying the leather in a year or two. The black leather is obtained by staining with logwood infusion and iron acetate. The leather, if genuine quality, is very watertight and strong, and owing to its impregnation with the empyreumatic oil, it wards off the attacks of insects.

Seal Leathers, eVc. — The tannage of seal skins is now an important department of the leather industry of the United Kingdom. The skins form one of the items of the whaling industry which principally centres in Dundee, and at that port, as well as at Hull and Peterhead, they are received in large quantities from the Arctic regions. This skin is that of the white hair seal, and must not be confused with the expensive seal fur obtained from Russian and Japanese waters. These white hair seal skins are light but exceedingly close in texture, yielding a very strong tough leather of large area and fine bold grain, known as Levant morocco. The area of the skins renders them suitable for upholstery work, and the flesh splits are dressed in considerable quantity for ” japanned ” (” patent “) leather and ” bolsters,” which are used to grain other skins on, the raised buff affording a grip on the skin being grained and thus prevent- ing slipping. When the skins arrive in the tanyard (generally lightly salted) they are drummed in old drench liquors until soft, dipped into warm water and ” blubbered ” with a sharp knife; they are then alternately dipped in warm water and drummed several times to remove fat, after which they are heavily limed, as they are still very greasy, and after unhairing and fleshing they are heavily puered for the same reason. The tannage takes about a month, and is much the same as for other leathers, the

skins being split when ” struck through.”

Alligator leather is now produced to some extent both in the United States and India. The belly and flanks alone are useful. There are no special tanneries or processes for dressing the skins. Layers are not given. The leather is used mostly for small fancy goods, and is much imitated on sheepskin by embossing.

Snake and frog skins are also dressed to some extent, the latter having formed a considerable item in the exports of Japan; they are dressed mostly for cigar cases and pocket books. The general procedure is first to lime the goods and then to remove any scales (in the case of snake skins) by scraping with an unhairing knife on a small beam, after which the skins are bated and tanned in sumach by paddling.

A considerable amount of leather is now produced in Australia from the skins of kangaroo, wallaby and other marsupials. These skins are both tanned and ” tawed,” the principal tanning agents being mimosa bark, mallet bark and sugar bush, which abound in Australia. The leather produced is of excellent quality, strong and pliable, and rivals in texture and appearance the kid of Europe; but the circumstance that the animals exist only in the wild state renders them a limited and insecure source of leather.

Japan and Enamel Leathers.- — Japanning is usually done on flesh splits, whereas enamelling is done on the grain, and if splits are used they are printed and boarded. The leather should be mellow, soft, free from grease, with a firm grain and no inclination to stretch. It is first shaved very smooth, thoroughly scoured with a stone, sumached, washed, slicked out tight and dried; when ” sammied,” the grain is buffed to remove scratches and oiled, the goods are then whitened or fluffed, and if too hard, bruised by boarding; enamel goods are now grained. The skins are now tightly nailed on boards and any holes patched up with brown paper, so that the japan shall not touch the flesh when the first thick coat of japan or the ” daub ” is put on. This is applied so thickly that it cannot soak in, with fine-toothed slicker, and then placed in a hot stove for twenty- four hours until quite dry; the coating is then pumiced smooth and the second thinner coat, termed ” blanback,” is applied. This is dried and pumiced, and a fine coating of japan or copal varnish is finally given. This is dried and cooled, and if the goods are for enamel they are boarded.

English japans sometimes contain light petroleum, but no turps. The secret of successful japanning lies in the age of the oil used; the older the linseed oil is, the better the result. To prepare the ground coat, boil 10 gallons linseed oil for one hour with 2 lb litharge at 600° F. to jellify the oil, and then add 2 lb prussian blue and boil the whole for half an hour longer. Before application the mixture is thinned with 10 gallons light petroleum. For the second coat, boil 10 gallons linseed oil for 2 hours with 2 lb prussian blue and 2 lb lampblack; when of a thin jelly consistency thin with 5 gallons of benzine or light petroleum. For the finishing coat, boil 5 gallons of linseed oil for I hour, then add 1 lb prussian blue, and boil for another hour; thin with 10 gallons petroleum and apply with a brush in a warm room. After drying, the goods are mellowed by exposure to the sun for at least three days.

Tawing. — Wool rugs are, after the preliminary processes, sometimes tanned in oak bark liquors by paddling, but are generally " tawed," that is, dressed with alum and salt, and are therefore more suitably dealt with under that head. Tawing implies that the conversion of skins into leather is carried out by means of a mixture of which the more important constituents are mineral salts, such as alum, chrome and iron, which mayor may not be supplemented with fatty and albuminous matter, both animal and vegetable.

As an example of alum tawing, calf kid may be taken as characteristic of the process; glove kid is also treated on similar lines. The goods are prepared for tawing in a manner similar to the preparation of tanned leathers, arsenical limes being used to ensure a fine grain. After being well drenched and washed the goods are ready for the tawing process. On the continent of Europe it is usual for the goods to be thrown into a tub with the tawing paste and trodden with the bare feet, although this old- fashioned method is gradually being driven out, and the drum or tumbler is being used.

The tawing paste consists of a mixture of alum, salt, flour, egg yolk and water; the quantities of each constituent diverge widely, every dresser having his own recipe. The following has been used, but cannot well be classed as typical: For 100 lb skin take 9 lb alum, 5 lb salt, dissolve in water, and mix to a thin paste with from 5 to 13 lb flour, using 4 to 6 egg yolks for every pound of flour used. Olive oil is also mixed in sometimes. The skins are drummed or trodden, at intervals, in the warm paste for some hours, removed, allowed to drain, and dried rapidly, damped down or " sammied " and " staked " by drawing them to and fro over a blunt knife fixed in the top of a post, and known as a knee stake; this process softens them very

considerably. After staking, the goods are wet back and shaved smooth, either with a moon knife, i.e. a circular concave convex knife, the centre of which has been cut out, a piece of wood bridging the cavity forming the grip, or with an ordinary currier's shaving knife ; the skins are now ready for dyeing and finishing.

Wool Rug Dressing. — Wool rugs are first thoroughly soaked, well washed and clean-fleshed, scoured well by rubbing into the wool a solution of soft soap and soda, and then leathered by rubbing into the flesh of the wet skins a mixture consisting of three parts of alum and two parts of salt until they are practically dry; they are now piled up over-night, and the mixture is again applied. After the second or third application the goods should be quite leathered. Other methods consist of stretching the skins in frames and painting the flesh with a solution of alum and salt, or, better, with a solution of basic alum and salt, the

alum being made basic by the gradual addition of soda until a permanent precipitate is produced.

The goods are now bleached, for even the most vigorous scouring will not remove the yellow tint of the wool, especially at the tips. There are several methods of bleaching, viz. by hydrogen peroxide, following up with a weak vitriol bath; by potassium permanganate, following up with a bath of sulphurous acid; or by fumigating in an air-tight chamber with burning sulphur. The last-named method is the more general ; the wet skins are hung in the chamber, an iron pot containing burning sulphur is introduced, and the exposure is continued for several hours.

If the goods are to be finished white, they are now given a vitriol sour, scoured, washed, retanned, dried, and when dry softened by working with a moon knife. If they are to be dyed, they must be prepared for the dye solution by " chloring," which consists of immersion in a cold solution of bleaching powder for some hours, and then souring in vitriol.

The next step is dyeing. If basic dyes are to be used, it is neces- sary to neutralize the acidity of the skins by careful addition of soda, and to prevent the tips from being dyed a darker colour than the roots. Glauber salts and acetic acid are added to the dye-bath. The tendency of basic colours to rub off may be overcome by passing the goods through a solution of tannin in the form of cutch, sumach, quebracho, &c. ; in fact, some of the darker-coloured materials may be used as a ground colour, thus economizing dyestuff and serving two purposes. If

acid colours are used, it is necessary to add sulphuric acid to the dye bath, and in either case colours which will strike below 50 C. must be used, as at that temperature alum leather perishes.

After being dyed, the goods arc washed up, drained, and if neces- sary retanned, the glossing finish is then produced by passing them through a weak emulsion or ” fat liquor ” of oil, soap and water, after which they are dried, softened by working with a moon knife and beating, when they are combed out, and are ready for the market.

Blacks are dyed by immersing the goods alternately in solutions of logwood and iron, or a one-solution method is used, consisting of a mixture of these two, with, in cither case, varying additions of lactic acid and sumach, copper salts, potassium bichromate, &c; the time of immersion varies from hours to days. After striking, the goods are exposed to the air for some hours in order to oxidize to a good black; they are then well scoured, washed, drained, retanned, dried, softened and combed.

Chrome Tanning. — The first chrome tanning process was described by Professor Knapp in 1858 in a paper on “Die Natur und Wesen der Gerbcrie,” but was first brought into commercial prominence by Dr Heinzerling about 1878, and was worked in a most persevering way by the Eglinton Chemical Company, who owned the English patents, though all their efforts failed to produce any lasting effects. Now chrome tanning is almost the most important method of light leather dressing, and has also taken a prominent place in the heavy department, more especially in curried leathers and cases where greater tensile strength is needed. The leather produced is much stronger than any other leather, and will also stand boiling water, whereas vegetable-tanned leather is completely destroyed at 70° C. and alum leather at 50° C.

The theory of chrome tanning is not perfectly understood, but in general terms it consists of a partial chemical combination between thehide fibre and the chrome salts, and a partial mechanical de- position of chromium oxide in and on the fibre. The wet work, or preparation for tanning, may be taken as much the same as ‘for any other leather.

There are two distinct methods of chrome tanning, and several different methods of making the solutions. The ” two bath process ” consists of treating the skins with a bichromate in which the chromium is in the acidic state, and afterwards reducing it to the basic state by some reducing agent. The exact process is as follows: To

prevent wrinkled or “drawn” grain the goods are first paddled for half an hour in a solution of vitriol and salt, when they are piled or ” horsed ” up over night, and then, without washing, placed in a solution consisting of 7 lb of potassium bichromate, 32 lb of hydrochloric acid to each 100 lb of pelts, with sufficient water to conveniently paddle in; it is recommended that 5% of salt be added to this mixture. The goods are run in this for about 3 hours, or until struck through, when they are horsed up. for some hours, care being taken to cover them up, and are then ready for the reducing bath. This consists of a 14% solution of plain ” hypo,” or hyposulphite of soda, to which, during the process of reduction, frequent additions of hydrochloric acid are made to free the sul- phurous and thiosulphuric acids, which are the active reducing agents. After about 3 hours’ immersion, during which time the goods will have changed in colour from bright yellow to bright green, one or two skins are cut in the thickest part, and if the green has struck right through, the pack is removed as tanned, washed up, and allowed to drain.

The ” single-bath process ” consists of paddling, drumming, or otherwise introducing into the skins a solution of a chrome salt, usually chrome alum, which is already in the basic condition, and therefore does not require reducing. The basic solutions are made as follows: For ioo lb of pelts 9 lb of chrome alum are dissolved in 9 gallons of water, and 2\ lb of washing soda already dissolved in I gallon of water are gradually added, with constant stirring. One- third of the solution is added to 80 gallons of water, to which is added 7 lb of salt, and the skins are introduced; the other two- thirds are introduced at intervals in two successive portions. Another liquor, used in the same way, is made by dissolving 3 lb of potassium bichromate in hot water, adding \ gallon strong hydrochloric acid and then, gradually, about 1 \ lb of glucose or grape sugar; this reduces the acidic chrome salt, vigorous effervescence ensuing. The whole is made up to 2 gallons and 5% to 15% of salt is added. In yet another method a chrome alum solution is rendered basic by boiling with ” hypo,” and after the reaction has ceased the solution is allowed to settle and the clear portion used.

After tanning, which takes from 8 hours to as many, and even more, days, depending upon the method used and the class of skin being dressed, the skins tanned by both methods are treated in a similar manner, and are neutralized by drumming in borax solution, when

they are washed free from borax by drumming in warm water, and are ready for dyeing, a process which will be dealt with further on. The goods are sometimes tanned by suspension, but this method is generally reserved for the tanning of the heavier leathers, which are treated in much the same way, the several processes taking longer.

Iron Tannage. — Before leaving mineral tanning, mention may be made of iron tannage, although this has gained no prominent position in commerce. Ferric salts possess powerful tanning pro- perties, and were thoroughly investigated by Professor Knapp, who took out several patents, but the tendency to produce a brittle leather has never been entirely overcome, although it has been greatly modified by the incorporation of organic matter, such as blood, rosin, paraffin, urine, &c. Knapp's basic tanning liquor is made as follows: A strong solution of ferrous sulphate is boiled and then oxidized to the ferric state by the careful addition of nitric acid. Next, to destroy excess of nitric acid, ferrous sulphate is added until effervescence ceases and the resulting clear orange- coloured solution is concentrated to a varnish-like consistency. It does not crystallize or decompose on concentration. The hides or skins are prepared for tanning in the usual way, and then handled or otherwise worked in solutions of the above iron salt, the solutions, which are at first weak, being gradually strengthened.

The tannage occupies from 2 to 8 days, and the goods are then stuffed in a ventilated drum with greases or soap. If the latter is used, an insoluble iron soap is precipitated on the fibres of the leather, which may then be finally impregnated with stearin and paraffin, and finished in the usual manner as described under Curried Leathers. A very fair leather may also be manufactured by using iron alum and salt in the same manner as described under ordinary alum and salt.

Combination Tannages. — Leathers tanned by mixtures or separate baths of both mineral and vegetable tanning agents have now taken an important position in commerce. Such leathers are the Swedish and Danish glove leathers, the United States " dongola leather," and French glazed kid. The useful- ness of such a combination will be evident, for while vegetable tanning produces fullness, plumpness and resistance to water, the mineral dressing produces a softness unnatural to vegetable tannages without the use of large quantities of oils and fats. It may also be noted that once a leather has been thoroughly tanned with either mineral or vegetable materials, although it will absorb large quantities of the material which has not been first used, it will retain in the main the characteristics of the tannage first applied. The principle had long been used in the manufacture of such tough

and flexible leathers as ” green leather,” ” combing leather ” and ” picker bands,” but was first applied to the manufacture of imitation glazed kid by Kent in America, who, about 1878; discovered the principle of ” fatliquor- ing,” and named his product ” dongola leather.” The discovery of this process revolutionized the manufacture of combination leathers.

The Swedish and Danish glove leathers were first given a dressing of alum and salt, with or without the addition of flour and egg, and were then finished and coloured with vegetable materials, generally with willow bark, although, in cases of scarcity, sumach, oak bark, madder and larch were resorted to. The ” green leathers ” manu- factured in England generally receive about a week’s tannage in gambier liquors, and are finished off in hot alum and salt liquors, after which they are dried, have the crystallized salts slicked off, are damped back, and heavily stuffed with moellon, degras or sod oil. Kent, in the manufacture of his dongola leather, used mixed

liquors of gambier alum and salt, and when tanned, washed the goods in warm water to remove excess of tanning agent, piled up to samm, and fatliquored. In making alum combinations it must be borne in mind that alum leather will not glaze, and if a glazed finish is required, a fairly heavy vegetable tannage should be first applied. For dull finishes the mineral tannage may advantageously precede the vegetable.

Very excellent chrome combination leather is also manufactured by the application of the above principles, gambier always being in great favour as the vegetable agent. The use of other materials deprives the leather of its stretch, although they may be advantage- ously used where the latter property is objectionable.

Oil Tanning. — Under the head of oil tanning is included ” buff leather,” ” buck leather,” ” piano leather,” ” chamois leather,” and to a greater or lesser extent, ” Preller’s crown or helve tia leather.” The process of oil tanning dates back to antiquity, and was known as ” shamoying,” now spelt ” chamois- ing.” Chamoising yields an exceedingly tough, strong and durable leather, and forms an important branch of the leather industry. The theory of the process is the same as the theory of currying, which is nothing more or less than chamoising, viz. the lubrica- tion of the fibres by the oil itself and the aldehyde tanning which takes place, due to the oxidation and decomposition of the esters of the fatty acids contained in the oil. The fact that an aldehyde tannage takes place seems to have been first discovered by Payne and Pullman, who took out a patent in 1898,

covering formalde- hyde and other aldehydes used in alkaline solutions. Their product, ” Kaspine ” leather, found considerable application in the way of military accoutrements. Chamois, buff, buck and piano leathers are all manufactured by the same process slightly modified to suit the class of hide used, the last three being heavy leathers, the first light.

As regards the process used for chamois leather, the reader will remember, from the account of the vegetable tannage of sheep skins, that after splitting from the limes, the fleshes were thrown back into the pits for another three weeks' liming (six weeks in all) preparatory to being dressed as chamois leather. It is necessary to lime the goods for oil dressing very thoroughly, and if the grain has not been removed by splitting, as in the case of sheep skins, it is ” frized ” off with a sharp knife over the beam. The goods are now rinsed, scudded and drenched, dried out until stiff, and stocked in the faller stocks with plenty of cod oil for 2 to 3 hours until they show signs of heating, when they are hung up in a cool shed. This process is repeated several times during a period of from 4 to 6 days, the heat driving the water out of the skins and the oil replacing it. At the end of this time the goods, which will have changed to a brown colour, are hung up and allowed to become as dry as possible, when they are hung in a warm stove for some hours, after which they are piled to heat off, thrown into tepid water and put through a wringing machine. The grease which is recovered from the wringing machine is known.commercially as ” degras ” or ” moellon," and fetches a good price, as it is unrivalled for fatliquoring and related processes, such as stuffing, producing a very soft product. They next receive a warm soda lye bath, and are again wrung; this removes more grease, which forms soap with the lye, and is re- covered by treatment with vitriol, which decomposes the soap. The grease which floats on top of the liquor is sold under the name of ” sod oil." This also is a valuable material for fatliquoring, &c, but not so good as degras.

After being wrung out, the goods are bleached by one of the processes mentioned in the section on wool rug dressing, the per- manganate method being in general use in England. In countries where a fine climate prevails the soap bleach or ” sun bleach ” is adopted; this consists of dipping the goods in soap solution and exposing them to the sun's rays, the process being repeated three or more times as necessary.

The next step is fatliquoring to induce softness, after which they are dried out slowly, staked or ” perched ” with a moon knife, fluffed on a revolving wheel covered with fine emery to produce the fine ” nap ”

or surface, brushed over with french chalk, fuller's earth or china clay, and finally finished on a very fine emery wheel.

Preller's Helvetia or Crown Leather. — This process of leather manufacture was discovered in 1850 by Theodor Klemm, a cabinetmaker of Wurttemberg, who being then in poor circumstances, sold his patent to an Englishman named Preller, who manufactured it in Southwark, and adopted a crown as his trade mark. Hence the name " crown " leather. The manufacture then spread through Switzerland and Germany, the product being used in the main for picker straps, belting and purposes where waterproof goods were required, such as hose pipes and military water bags. No taste is imparted to the water by this leather.

The process of manufacture is as follows : The hides are unhaired by short liming, painting with lime and sulphide, or sweating, and cleansed by scudding and washing, after which they are coloured in bark liquors, washed up through clean water, and hung up to dry partially, When in a sammied condition the goods are placed on a table and a thick layer of the tanning paste spread on the flesh side. The tanning paste varies with each manufacturer, but the following is the mixture originally used by Preller: ioo parts flour, ioo parts soft fat or horse tallow, 35 parts butter, 88 parts ox brains, 50 parts milk, 15 parts salt or saltpetre.

The hides are now rolled in bundles, placed in a warm drum and worked for 8 to 10 hours, after which they are removed and hung up until half dry, when the process is repeated. Thus they are tumbled 3 to 4 times, set out flesh and grain, rinsed through tepid water, set out, sammied, and curried by coating with glycerin, oil, tallow and degras. The table grease is now slicked off, and the goods are set out in grease, grained and dried.

Transparent Leather. — Transparent leather is a rather horny product, somewhat like raw hide, and has been used for stitching belts and picker bands. The goods to be dressed are limed, un- haired, very thoroughly delimed with acids, washed in wtier, scudded and clean-fleshed right to the veins; they are now stretched in frames, clean-fleshed with a moon knife, and brushed with warm water, when several coats of glycerin, to which has been added some antiseptic such as salicylic or picric acid, are applied; the goods are then dried

out, and another coat is applied, and when semi-dry they are drummed in a mixture of glycerin, boracic acid, alum and salt, with the addition of a little bichromate of potash to stain them a yellow colour. After drumming for 2 to 3 hours they are removed, washed up, lightly set out, and stretched in frames to dry, when they are ready for cutting into convenient lengths for use.

Parchment. — A certain class of sheep skin known as Hampshires is generally used in the manufacture of this speciality. The skins as received are first very carefully washed to remove all dirt, de- wooled, limed for 3 to 4 weeks ; they are then cleanly fleshed, un- haired, rinsed up in water, and thickly rplit, the poorer hides being ultilized for chamois; they are now re-split at the fatty strata so that all fat may be easily removed, and while the grains are dressed as skivers, the fleshes are tied in frames, watered with hot water, scraped and coated on both sides with a cream consisting of whiting, soda and water, after which they are dried out in a hot stove. In the drying the whiting mixture absorbs the grease from the skins; in fact, this method of degreasing is often employed in the manufac- ture of wool rugs. When dry, both sides of the skins are flooded to remove the whiting, and are then well rubbed over with a flat piece of pumice-stone, swilled, dried, re-pumiced, again swilled, and when sammied are rolled off with a wooden roller and dried out.

Tar and Peat Tanning. — Tar tanning was discovered by a French chemist named Philippi, who started with the idea that, if coal was a decomposition product of forests, it must still necessarily possess the tanning properties originally present in the trees. However far-fetched such an argument may seem, Philippi succeeded in pro- ducing a leather from wood and coal tar at a fairly cheap rate, the product being of excellent texture and strength, but rather below the average in the finish, which was inclined to be patchy, showing oily spots. His method consisted of impregnating the goods with refined tar and some organic acid, but the product does not seem to have taken any hold upon the market, and is not much heard of now. Peat tanning was discovered by Payne, an English chemist, who was also the co-discoverer of the Payne-Pullman formaldehyde tan- ning process. His peat or humic acid tannage was patented by him about 1905, and is now worked on a commercial scale. The humic acid is first extracted from the peat by means of alkalis, and the hides are treated with this solution, the humic acid being after- wards precipitated in the hides by treatment with some stronger organic or mineral acid.

Dyeing, Staining and Finishing. — These operations are practised almost exclusively on the lighter leathers. Heavy leathers, except

coloured and black harness and split hides for bag work, are not often dyed, and their finishing is generally considered to be part of the tannage. In light leathers a great business is done in buying up ” crust ” stock, i.e. rough tanned stock, and then dyeing and finishing to suit the needs and demands of the various markets. The carrying out of these operations is a distinct and separate business from tanning, although where possible fhe two businesses are carried on in the same works.

Whatever the goods are and whatever their ultimate finish, the first operation, upon receipt by the dyer of the crust stock, is sorting, an operation requiring much skill. The sorter must be familiar with the why and wherefore of all subsequent processes through which the leather must go, so as to judge of the suitability of the various qualities of leather for these processes, and to know where any flaws that may exist will be sufficiently sup-

pressed or hidden to produce a saleable product, or will be rendered entirely unnoticeable. The points to be considered in the sorting are coarseness or fineness of texture, boldness or fineness of grain, colour, flaws including stains and scratches, substance, &c. Light-coloured and flawless goods are parcelled out for fine and delicate shades, those of darker hue and few flaws are parcelled out for the darker shades, such as maroons, greens (sage and olive), dark blues, &c, and those which are so badly stained as to be unsuitable for colours go for blacks. After sorting, the goods are soaked back to a limp condition by immersion in warm water, and are then horsed up to drip, having been given, perhaps, a preliminary slicking out.

Up to this point all goods are treated alike, but the subsequent processes now diverge according to the class of leather being treated and the finish required.

Persian goods for glaces, moroccos, &c, require special pre- paration for dyeing, being first re-tanned. As received, they are sorted and soaked as above, piled to samm, and shaved. Shaving consists of rendering the flesh side of the skins smooth by shaving off irregularities, the skin, which is supported on a rubber roller actuated by a foot lever, being pressed against a series of spiral blades set on a steel roller, which is caused to revolve rapidly. When shaved, the goods are stripped, washed up, soured, sweetened and re-tanned in sumach, washed up, and slicked out, and are then ready for dyeing.

There are three distinct methods of dyeing, with several minor modifications. Tray dyeing consists of immersing the goods, from 2 to

4 dozen at a time, in two separate piles, in the dye solution at 60° C, contained in a flat wooden tray about 5 ft.X4 ft.Xi ft., and keeping them constantly moving by continually turning them from one pile to the other. The disadvantages of this method are that the bath rapidly cools, thus dyeing rapidly at the beginning and slowly at the termination of the operation; hence a large excess of dye is wasted, much labour is required, and the shades obtained are not so level as those obtained by the other methods. But the goods are under observation the whole time, a very distinct advantage when matching shades, and a white flesh may be preserved. The paddle method of dyeing consists of paddling the goods in a large volume of liquor contained in a semi-circular wooden paddle for from half to three-quarters of an hour. The disadvantages are that the liquor cools fairly rapidly, more dye is wasted than in the tray method, and a white flesh cannot be preserved. But larger packs can be dyed at the one operation, the goods are under observation the whole time, and little labour is required. The drum method of dyeing is perhaps best, a drum somewhat similar to that used by curriers being preferable. The goods are placed on the shelves inside the dry drum, the lid of which is then fastened on, and the machinery is started; when the drum is revolving at full speed, which should be about 12 to 1 5 revolutions per minute, the dye solution is added through the hollow axle, and the dyeing continued for half an hour, when, without stopping the drum, if desired, the goods may be fatliquored by running in the fatliquor through the hollow axle. The disadvantages are that the flesh is dyed and the goods cannot be seen. The advantages are that little labour is required, a large pack of skins may be treated, level shades are produced, heat is retained, almost complete exhaustion of the dye-bath is effected, and subsequent processes, such as fatliquoring, may be carried out without stopping the drum.

Of the great number of coal-tar dyes on the market comparatively few can be used in leather manufacture. The four chief classes are : (1) acid dyes; (2) basic or tannin dyes; (3) direct or cotton dyes; (4) mordant (alizarine) dyes.

Acid dyes are not so termed because they have acid characteristics; the name simply denotes that for the development of the full shade of colour it is necessary to add acid to the dye-bath. These dyes are generally sodium salts of sulphonic acids, and need the addition of an acid to free the dye, which is the sulphonic acid _ Although theoretically any acid (stronger than the sulphonic acid present) will do for this purpose, it is found in practice that only sulphuric and formic acids may be employed, because others, suchas acetic, lactic, &c, do not develop the full shade of colour. Acid sodium sulphate may

also be successfully used.

Acid colours produce a full level shade without bronzing, and do not accentuate any defects in the leather, such as bad grain, &c. They are also moderately fast to light and rubbing. They are generally applied to leather at a temperature between 50 and 6o° C, with an equal weight of sulphuric acid. The quantity of dye used varies, but generally, for goat, persians, &c, from 25 to 30 oz. are used per ten dozen skins, and for calf half as much again, dissolved in such an amount of water as is most convenient according to the method being used. If sodium bisulphate is substituted for] sulphuric acid twice as much must be used, and if formic acid three times as much (by weight).

Basic dyes are salts of organic colour bases with hydrochloric or some other suitable acid. Basic colours precipitate the tannins, and thus, because of their affinity for them, dye very rapidly, tending to produce uneven shades, especially if the tannin on the skin is un- evenly distributed. They are much more intense in colour than the acid dyes, have a strong tendency to bronze, and accentuate weak and defective grain. They are also precipitated by hard waters, so that the hardness should be first neutralized by the addition of acetic acid, else the precipitated colour lake may produce streakily dyed leather. To prevent rapid dyeing, acetic acid or sodium bisulphate should always be added in small quantity to the dye-bath, preferably the latter, as it prevents bronzing. The most important point about the application of basic dyes to leather is the previous fixation of the tannin on the surface of the leather to prevent its bleeding into the dye-bath and precipitating the dye. All soluble salts of the heavy metals will fix the tannin, but few are applicable, as they form colour lakes, which are generally un- desirable. Antimony and titanium salts are generally used, the forms being tartar emetic (antimony potassium tartrate), antimonine (antimony lactate), potassium titanium oxalate, and titanium lactate. The titanium salts are economically used when dyeing browns, as they produce a yellowish-brown shade; it is therefore not necessary to use so much dye. About 2 oz. of tartar emetic and 8 oz. of salt is a convenient quantity for I dozen goat skins. The bath is used at 30 to 40 C, and the goods are immersed for about 15 minutes, having been thoroughly washed before being dyed. Iron salts are sometimes used by leather-stainers for saddening (dulling) the shade of colour produced, iron tannate, a black salt, being formed.

It is often found economical to ” bottom ” goods with acid, direct, or other colours, and then finish with basic colours; this procedure forms a colour lake, and colour lakes are always faster to light and rubbing than the colours themselves.

Direct cotton dyes produce shades of great delicacy, and are used for the dyeing of pale and ” art ” shades. They are applied in neutral or very slightly acid baths, formic and acetic acids being most suitable with the addition of a quantity of sodium chloride or sulphate. After dyeing, the goods are well washed to free from excess of salt. The eosine colours, including erythrosine, phloxine, rose Bengal, &c, are applied in a similar manner, and are specially used for the beautiful fluorescent pink shades they produce; acid and basic colours and mineral acids precipitate them.

The mordant colours, which include the alizarine and anthracene colours, are extremely fast to light, and require a mordant to develop the colour. They are specially applicable to chamois leather, although a few may be used for chrome and alum leathers, and one or two are successfully applied to vegetable-tanned leather without a mordant.

Sulphur or sulphide colours, the first of which to appear were the famous Vidal colours, are applied in sodium sulphide solution, and are most successfully used on chrome leather, as they produce a colour lake with chrome salts, the resulting colour being very fast to light and rubbing. A very serious disadvantage in connexion with them is that they must necessarily be applied in alkaline solution, and the alkali has a disintegrating effect upon the fibre of the leather, which cannot be satisfactorily overcome, although formaldehyde and glycerin mixtures have been patented for the purpose.

The Janus colours are perhaps worth mentioning as possessing both acid and basic characteristics; they precipitate tannin, and are best regarded as basic dyes from a leather-dyer’s standpoint.

The goods after dyeing are washed up, slicked out on an inclined glass table, nailed on boards, or hung up by the hind shanks to dry out.

Coal-tar dyes are not much used for the production of blacks, as they do not give such a satisfactory result as logwood with an iron mordant. In the dyeing of blacks the preliminary operation of souring is always omitted and that of sumaching sometimes, but if much tan has been removed it will be found necessary to use sumach, although cutch may be advantageously and cheaply substituted. After shaving,

the goods, if to be dressed for ” blue backs ” (blue-coloured flesh), are dyed as already described, with methyl violet or some other suitable dye; they are then folded down the back and drawn through a hot solution of logwood and fustic extracts, and then rapidly through a weak, cold iron sulphate and copper acetate solution.

Immediately afterwards they are rinsed up and either drummed in a little neatsfoot oil or oiled over with a pad, flesh and grain, and dried. When dry the goods are damped back and staked, dried out and re-staked.

After dry-staking, the goods are ” seasoned,” i.e. some suitable mixture is applied to the grain to enable it to take the glaze. The following is typical: 3 quarts logwood liquor, § pint bullock’s blood, § pint milk, J gill ammonia, 5 gill orchil and 3 quarts water. This season is brushed well into the grain, and the goods are dried in a warm stove and glazed by machine. The skins are glazed under considerable pressure, a polished glass slab or roller being forced over the surface of the leather in a series of rapid strokes, after which the goods are re-seasoned, re-staked, fluffed, re-glazed, oiled over with a pad, dipped in linseed oil and dried. They are now ready for market. If the goods are to be finished dull they are seasoned with linseed mucilage, casein or milk (many other materials are also used), and rolled, glassed with a polished slab by hand, or ironed with a warm iron.

Coloured glaces are finished in a similar manner to black glaces, dye (instead of logwood and iron) being added to the season, which usually consists of a simple mixture of dye, albumen and milk.

Moroccos and grain leathers are boarded on the flesh side before and after glazing, often being ” tooth rolled ” between the several operations. Tooth rolling consists of forcing, under pressure, a toothed roller over the grain ; this cuts into the leather and helps to produce many grains, which could not be produced naturally by boarding, besides fixing them.

Many artificial grains and patterns are also given to leather by printing and embossing, these processes being carried out by passing the leather between two rollers, the top one upon which the pattern is engraved being generally steam heated. This impresses the pattern upon the grain of the leather.

The above methods will give a very general idea of the processes in vogue for the dressing of goods for fancy work. The dressing of chrome leathers for uppers is different in important particulars.

Chrome Box and Willow Calf. — Willow calf is coloured calf, box calf is dressed black and grained with a ” box ” grain. A large quantity of kips is now dressed as box calf; these goods are the hides of yearling Indian cattle, and are dressed in an exactly similar manner as calf. After tanning and boraxing to neutralize the acidity of the chrome liquor, the goods are washed up, sammied, shaved, and are ready for mordanting previous to dyeing. Very few dyes will dye chrome leather direct, i.e. without mordanting. Sulphide colours are not yet in great demand, nor are the alizarines used as much as they might be. The ordinary acid and basic dyes are more generally employed, and the goods consequently require to be first mordanted. The mordanting is carried out by drumming the goods in a solution containing tannin, and, except for pale shades, some dyewood extract is used ; for reds peachwood extract, for browns fustic or gambier, and for dark browns a little logwood is added. For all pale shades sumach is exclusively used. After drumming in the warm tannin infusion for half an hour, if the goods are to be dyed with basic colours the tannin is first fixed by drumming in tartar emetic and salt, or titanium, as previously described; the dyeing is also carried out as described for persians, except that a slightly higher temperature may be maintained, if the goods are to be dyed black they are passed through logwood and iron solutions.

After dyeing and washing up, &c, the goods are fatliquored by placing them in a previously heated drum and drumming’ them with a mixture known as a ” fatliquor,” of which the following recipe is typical: Dissolve 3 lb of soft soap by boiling with 3 gallons of water, then add 9 lb of neatsfoot oil and boil for some minutes; now place the mixture in an emulsifier and emulsify until cooled to 35° C, then add the yolks of 5 fresh eggs and emulsify for a further half hour. The fatliquor is added to the drum at 55° C, and the goods are drummed for half an hour, when all the fatliquor should be absorbed ; they are then slicked out and dried. After drying, they are damped back, staked, dried, re-staked and seasoned with materials similar to those used for persians; when dry they are glazed, boarded on the flesh (” grained “) from neck to butt and belly to belly to give them the box grain, fluffed, reseasoned, reglazed and regrained.

Finishing of Bag Hides. — The goods are first soaked back, piled to samm, split or shaved, scoured by machine, finished off by hand, washed up and retanned by drumming in warm sumach and ex- tract, after which they are washed up, struck out, hung up to samm, and ” set.” ” Setting ” consists of laying the grain flat and smooth by striking out with a steel or sharp brass slicker. They are then dried out, topped with linseed mucilage, and again dried.

This brushing over with linseed mucilage prevents the dye from sinking too far into the leather; gelatine, Irish moss, starch and gums are also used for the same purpose. These materials are also added to the staining solution to thicken it and further prevent its sinking in.

When dry, the goods are stained by applying a \ % (usually) solution of a suitable basic dye, thickened with linseed, with a brush. Two men are usually employed on this work; one starts at the right-hand flank and the other at the left-hand shank, and they work towards each other, staining in sections; much skill is needed to obviate markings where the sections overlap. The goods may advantageously be bottomed with an acid dye or a dye-wood extract, and then finished with basic dyes. Whichever method is used, two to three coats are given, drying between each. After the last coat of stain, and while the goods are still in a sammied condition, a mixture of linseed mucilage and French chalk is applied to the flesh and glassed off wet, to give it a white appearance, and then the goods are printed with any of the usual bag grains by machine or hand, and dried out. For a bright finish the season may consist of a solution of 15 parts carnauba wax, 10 parts curd soap and 100 parts water boiled together; this is sponged into the grain, dried and the hides are finished by either glassing or brushing. For a duller finish the grain is simply rubbed over with buck tallow and brushed. Hide bellies for small work are treated in much the same manner.

Glove Leather';. — As these goods were tanned in alum, salt, flour and egg, any undue immersion in water removes the tannage; for this reason they are generally stained like bag hides, one man only being employed on the same skin. The skins are first thoroughly soaked in warm water and then drummed for some minutes in a fresh supply, when they are re-egged to replace that which has been lost. This is best done by drumming them for about ij hours in 40 to 50 egg yolks and 5 lb of salt for every hundred skins; they are then allowed to be in pile for 24 hours, and are set out on the table ready for mordanting. The mordants universally used are ammonia or alkaline soft soap; I in 1000 of the former or a I % solution of the latter. When the goods have partially dried in, bottoming follows, and usually the natural wood dyestuffs are used for this operation, such as fustic, Brazil wood, peachwood, logwood and turmeric. After application of these colours the goods are sammied and topped with a 1 % solution of an acid dye, to which has been added 20 % of methylated spirit to prevent frothing

with the egg yolk; they are then dried out slowly, staked, pulled in shape, fluffed and brushed by machine. The season, which is sponged on, may consist of 1 part dye, I part albumen, 2 parts dextrine and i part glycerine, made up to 100 parts with water; when it has been applied, the goods are sammied, brushed and ironed with a warm flat iron such as is used in laundry work.

Bookbinding Leathers. — A committee of the Society of Arts (London) has investigated the question of leather for bookbinding, attention having been drawn to this subject by the rotten and decayed condition often observed in bindings less than fifty years old. This committee engaged in research work extending over several years, and the report in which its results were given was edited for the Society of Arts and the Leathcrsellers' Company (which also did much important work in connexion with it) by Lord Cobham, chairman of the committee, and Sir Henry Trueman Wood, secretary of the society. The essence of the report, so far as leather manufacture is concerned, is as follows: The goods should be soaked and limed in fresh liquors, and bating and puering should be avoided, weak organic acids or erodine being used; they should also be tanned with pyrogallol tanning materials, and preferably with sumach. In shaving, they should only be necked and backed, i.e. only irregularities should be removed, as further shaving has a considerable weakening effect on the fibre. The striking out should not be heavy enough to lay the fibre. In dyeing, acid dyes and a few direct colours only arc permissible, and in connexion with the former the use of sulphuric acid is strongly condemned, as it absolutely disintegrates the fibre; the use of formic, acetic and lactic acids is permitted. The use of salts of mineral acids is to be avoided, and in finishing, tight setting out and damp glazing is not to be recommended; oil may be advantageously used.

Bibliography. — H. G. Bennett, The Manufacture of Leather (1909); S. R. Trotman, Leather Trades Chemistry (1908); M. C. Lamb, Leather Dressing (1907); A. Watt, Leather Manufacture (1906); H. R. Procter, Principles of Leather Manufacture (1903), and Leather Industries Laboratory Book (1908); L. A. Flemming, Practical Tanning (1910); A. M. Villon, Practical Treatise on the Leather Industry (1901) ; C. T. Davis, Manufacture of Leather (1897). German works include J. Borgman, Die Rotlederfabrikation (Berlin, 1904-1905), and ■ Feinlederfabrikation (1901); J. Jettmar, Handbuch der Chromgerbung (Leipzig, 1900) ; J. von Schroeder, Gerberei- chemie (Berlin, 1898). (J. G. P.*)

LEATHER, ARTIFICIAL. Under the name of artificial leather, or of American leather cloth, large quantities of a material having, more or

less, a leather-like surface are used, principally for upholstery purposes, such as the covering of chairs, lining the tops of writing desks and tables, &c. There

is considerable diversity in the preparation of such materials. A common variety consists of a web of calico coated with boiled linseed oil mixed with dryers and lamp-black or other pigment. Several coats of this mixture are uniformly spread, smoothed and compressed on the cotton surface by passing it between metal rollers, and when the surface is required to possess a glossy enamel-like appearance, it receives a finishing coat of copal varnish. A grained morocco surface is given to the material by passing it between suitably embossed rollers. Preparations of this kind have a close affinity to cloth waterproofed with indiarubber, and to such manufactures as ordinary waxcloth. An artificial leather which has been patented and proposed for use as soles for boots, &c, is composed of powdered scraps and cuttings of leather mixed with solution of guttapercha dried and compressed. In place of the guttapercha solution, oxidized linseed oil or dissolved resin may be used as the binding medium for the leather powder.

LEATHERHEAD, an urban district in the Epsom parliamentary division of Surrey, England, 18 m. S.S.W. of London, on the London, Brighton & South Coast and the London & South- western railways. Pop. (1901) 4694. It lies at the foot of the North Downs in the pleasant valley of the river Mole. The church of St Mary and St Nicholas dates from the 14th century. St John's Foundation School, opened in London in 1852, is devoted to the education of sons of poor clergymen. Leatherhead has brick-making and brewing industries, and the district is largely residential.

LEATHES, STANLEY (1830-1900), English divine and Orientalist, was born at Ellesborough, Bucks, on the 21st of March 1830, and was educated at Jesus College, Cambridge, where he graduated B.A. in 1852, M.A. 1853. In 1853 he was the first Tyrwhitt's Hebrew scholar. He was ordained priest in 1857, and after serving several curacies was appointed professor of Hebrew at King's College, London, in 1863. In 1 868-1 870 he was Boyle lecturer (The Witness of the Old Testament to Christ), in 1873 Hulsean lecturer (The Gospel its Own Witness), in 1874 Bampton Lecturer (The Religion of the Christ) and from 1876 to 1880 Warburtonian lecturer. He was a member of the Old Testament revision committee from 1870 to 1885. In 1876 he was elected prebendary of St Paul's Cathedral, and he was rector of Cliffe-at-Hoo near Gravesend (1880-1889) and of Much Hadham, Hertfordshire (1889-1900). The university of Edin- burgh gave him the honorary

degree of D.D. in 1878, and his own college made him an honorary fellow in 1885. Besides the lectures noted he published Studies in Genesis (1880), The Foundations of Morality (1882) and some volumes of sermons. He died in May 1900.

His son, Stanley Mordaunt Leathes (b. 1861), became a fellow of Trinity, Cambridge, and lecturer on history, and was one of the editors of the Cambridge Modern History; he was secretary to the Civil Service Commission from 1903 to 1907, when he was appointed a Civil Service Commissioner.

LEAVEN (in Mid. Eng. levain, adapted from Fr. levain, in same sense, from Lat. levamen, which is only found in the sense of alleviation, comfort, levare, to lift up), a substance which produces fermentation, particularly in the making of bread, properly a portion of already fermented dough added to other dough for this purpose (see Bread). The word is used figura- tively of any element, influence or agency which effects a subtle or secret change. These figurative usages are mainly due to the comparison of the kingdom of Heaven to leaven in Matt. xiii. ˆ3, and to the warning against the leaven of the Pharisees in Matt. xvi. 6. In the first example the word is used of a good influence, but the more usual significance is that of an evil agency. There was among the Hebrews an association of the idea of fermentation and corruption, which may have been one source of the prohibition of the use of leavened bread in sacrificial offerings. For the usage of unleavened bread at the feasts of the Passover and of Massoth, and the connexion of the two, see Passover.

LEAVENWORTH, a city and the county-seat of Leavenworth county, Kansas, U.S.A., on the W. bank of the Missouri river.

Pop. (1900) 20,735, of whom 3402 were foreign-born and 2925 were negroes; (iqio census) 19,363. It is one of the most important railway centres west of the Missouri river, being served by the Atchison, Topeka & Santa Fe, the Chicago, Bur- lington & Quincy, the Chicago, Rock Island & Pacific, the Chicago Great Western, the Missouri Pacific, the Union Pacific and the Leavenworth & Topeka railways. The city is laid out regularly in the bottom-lands of the river, and its streets are named after Indian tribes. Rolling hills surround it on three sides. The city has many handsome public buildings, and contains the Cathedral of the Immaculate Conception, Leavenworth being the see of a Roman

Catholic bishop. The public institutions include the Kansas State Protective Home (1889) for negroes, an Old Ladies' Rest (1892), St Vincent's Orphans' Asylum (1886, open to all sects) and a Guardian Angels' Home (1889), for negroes — all private charities aided by the state; also St John's Hospital (1879), Cushing Hospital (1893) and Leavenworth Hospital (1900), which are training schools for nurses. There is also a branch of the National Home for Disabled Volunteer Soldiers. In the suburbs there are state and United States penitentiaries. Leavenworth is a trading centre and has various manufactures, the most important being foundry and machine shop and flouring and grist-mill products, and furniture. The city's factory products increased in value from $3,251,460 in 1900 to $4,151,767 in 1905, or 27-7%. There are valuable coal mines in Leavenworth and the immediate vicinity. About 3 m. N. of the city, on a reservation of about 6000 acres, is Fort Leavenworth, an important United States military post, associated with which are a National Cemetery and Service Schools of the U.S. Army (founded in 1881 as the U.S. Infantry and Cavalry School and in 1901 developed into a General Service and Staff College). In 1907 there were three general divisions of these schools: the Army School of the Line, for officers (not below the grade of captain) of the regular army and for militia officers recommended by the governors of their respective states or territories, offering courses in military art, engineering, law and languages; the Army Signal School, also open to regular and militia officers, and having departments of field signalling, signal engineering, topography and languages; and the Army Staff College, in which the students are the highest graduates from the Army School of the Line, and the courses of instruction are included in the departments of military art, engineering, law, languages and care of troops. The course is one year in each school. At Fort Leavenworth there is a colossal bronze statue of General U. S. Grant erected in 1889. A military prison was established at Fort Leavenworth in 1875; it was used as a civil prison from 1895 to 1906, when it was re-established as a military prison. Its inmates were formerly taught various trades, but owing to the opposition of labour organizations this system was discontinued, and the prisoners are now employed in work on the military reservation.

The fort, from which the city took its name, was built in 1827, in the Indian country, by Colonel Henry Leavenworth (1 783-1834) of the 3rd Infantry, for the protection of traders plying between the Missouri river and Sante Fe. The town site was claimed by Missourians from Weston in June 1854, Leavenworth thus being the oldest permanent settlement in Kansas; and during the contest in Kansas between the anti-slavery and pro-slavery settlers, it was known as a pro-slavery

town. It was first incorporated by the Territorial legislature in 1855; a new charter was obtained in 1881 ; and in 1908 the city adopted the commission plan of government. On the 3rd of April 1858 a free-state convention adopted the Leaven- worth Constitution here; this constitution, which was as radically anti-slavery as the Lecompton Constitution was pro-slavery, was nominally approved by popular vote in May 1858, and was later submitted to Congress, but never came into effect. During the Civil War Leavenworth enjoyed great prosperity, at the expense of more inland towns, partly owing to the proximity of the fort, which gave it immunity from border raids from Missouri and was an important dep6t of supplies and a place for mustering troops into and out of the service. Leavenworth was, in Territorial days and until after 1880, the largest and most thriving commercial city of the state, and rivalled Kansas City, Missouri, which, however, finally got the better of it in the struggle for railway facilities.

LEBANON (from Semitic laban, ” to be white,” or ” whitish,” probably referring not to snow, but to the bare white walls of

chalk or limestone which form the characteristic feature of the whole range) , in its widest sense is the central mountain mas*j of Syria, extending for about 100 m. from N.N.E. to S.S.W. It is bounded W. by the sea, N. by the plain Jun Akkar, beyond which rise the mountains of the Ansarieh, and E. by the inland plateau of Syria, mainly steppe-land. To the south Lebanon ends about the point where the river Litany bends westward, and at Banias. A valley narrowing towards its southern ˆnd, and now called the Buka’a, divides the mountainous mass into two great parts. That lying to the west is still called Jebel Libnan; the greater part of the eastern mass now bears the name of the Eastern Mountain (Jebel el-Sharki) . In Greek the western range was called Libanos, the eastern Antilibanos. The southern extension of the latter, Mount Hermon (q.v.), may in many respects be treated as a separate mountain.

Lebanon and Anti-Lebanon have many features in common; in both the southern portion is less arid and barren than the northern, the western valleys better wooded and more fertile than the eastern. In general the main elevations of the two ranges form pairs lying opposite one another; the forms of both ranges are monotonous, but the colouring is splendid, especially when viewed from a distance; when seen close at hand only a few valleys with perennial streams offer pictures of landscape beauty, their rich green contrasting pleasantly with the bare brown and yellow mountain sides. The finest scenery is found in N. Lebanon, in the Maronite districts of Kesrawan

and Bsherreh, where the gorges are veritable canyons, and the villages are often very picturesquely situated. The south of the chain is more open and undulating. Anti-Lebanon is the barest and most inhospitable part of the system.

The district west of Lebanon, averaging about 20 m. in breadth, slopes in an intricate series of plateaus and terraces to the Medi- terranean. The coast is for the most part abrupt and rocky, often leaving room for only a narrow path along the shore, and when viewed from the sea it does not suggest the extent of country lying between its cliffs and the lofty summits behind. Most of the moun- tain spurs run from east to west, but in northern Lebanon the pre- vailing direction of the valleys is north-westerly, and in the south some ridges run parallel with the principal chain. The valleys have for the most part been deeply excavated by mountain streams; the apparently inaccessible heights are crowned by numerous villages, castles or cloisters embosomed among trees. The chief perennial streams, beginning from the north, are the Nahr Akkar, N. Arka, N. el-Barid, N. Kadisha, “the holy river” (the valley of which begins in the immediate neighbourhood of the highest summits, and rapidly descends in a series of great bends till the river reaches the sea at Tripoli), Wadi el-Joz (falling into the sea at Batrun), Wadi Fidar, Nahr Ibrahim (the ancient Adonis, having its source in a recess of the great mountain amphitheatre where the famous sanctuary Apheca, the modern Afka, lay), Nahr el-Kelb (the ancient Lycus), Nahr Beirut (the ancient Magoras, entering_ the sea at Beirut), Nahr Damur (ancient Tamyras), Nahrel-Auwali (theancient Bostrenus, which in the upper part of its course is joined by the Nahr el-Baruk). The ‘Auwali and the Nahr el-Zaherani, the only other considerable streams before we reach the Litany, flow north- east to south-west, in consequence of the interposition of a ridge subordinate and parallel to the central chain. On the north, where the mountain bears the special name of Jebel Akkar, the main ridge of Lebanon rises gradually from the plain. A number of valleys run to the north and north-east, among them that of the Nahr el-Kebir, the Eleutherus of the ancients, which rises in the Jebel el-Abiad on the eastern slope of Lebanon, and afterwards, skirting the district, flows westward to the sea. South of Jebel el-Abiad, beneath the main ridge, which as a rule falls away suddenly towards the east, occur several small elevated terraces having a southward slope; among these are the Wadi en-Nusur (” vale of eagles “), and the basin of the lake Yammuna, with its intermittent spring Neb ‘a el-Arba’in. Of the streams which descend into the Buka’a, the Berdani rises in Jebel Sunnin, and enters the plain by a deep and picturesque moun- tain cleft at Zahleh.

The most elevated summits occur in the north, but even these are of

very gentle gradient. The ” Cedar block ” consists of a double line of four and three summits respectively, ranged from north to south, with a deviation of about 35 . Those to the east are ‘Uyun Urghush, Makmal, Muskiyya (or Naba’ esh-Shemaila) and Ras Zahr el-Kazib; fronting the sea are Karn Sauda or Timarun, Furam el-Mizab and Zahr el-Kandil. The height of Zahr el-Kazib, by barometric measurement, is 10,018 ft.; that of the others dees not reach 10,000 ft. South from them is the pass (8351 ft.) which leads from Baalbek to Tripoli; the great mountain amphitheatre on the west side of its summit is remarkable. Farther south is a second group of lofty summits — the snow-capped Sunnin. visible

from Beirut; its height is 8482 ft. Between this group and the more southerly Jebel Keniseh (about 6700 ft.) lies the pass (4700 ft.) traversed by the French post road between Beirut and Damascus. Among the bare summits still farther south are the long ridge of Jebel el-Baruk (about 7000 ft.), the Jebel Niha, with the Tau’amat Niha (about 6100 ft.), near which is a pass to Sidon, and the Jebel Rihan (about 5400 ft.).

The Buka’a, the broad valley which separates Lebanon from Anti-Lebanon, is watered by two rivers having their watershed near Baalbek, at an elevation of about 3600 ft., and separated only by a short mile at their sources. That flowing northwards, El-‘Asi, is the ancient Orontes (q.v.) ; the other is the Litany. In the lower part of its course the latter has scooped out a deep and narrow rocky bed; at Burghuz it is spanned by a great natural bridge. Not. far from the point where it suddenly trends to the west lie, immediately above the romantic valley, at an elevation of 1500 ft., the imposing ruins of the old castle Kal’at esh-Shakif, near one of the passes to Sidon. In its lower part the Litany bears the name of Nahr el- Kasimiya. Neither the Orontes nor the Litany has any important a’ffluent.

The Buka’a used to be known as Coelesyria (Strabo. xvi. 2, 21); but that word as employed by the ancients had a much more ex- tensive application. At present its full name is Buka’a el- Aziz (the dear Buka’a), and its northern portion is known as Sahlet Ba’albek (the plain of Baalbek). The valley is from 4 to 6 m. broad, with an undulating surface.

The Anti-Lebanon chain has been less fully explored than that of

Lebanon. Apart from its southern offshoots it is 67 m. long, while its width varies from 16 to 13J m. It rises from the plain of Hasya-Homs, and in its northern portion is very arid. The range has not so many offshoots as occur on the west side of Lebanon; under its precipitous slopes stretch table-lands and broad plateaus, which, especially on the east side looking towards the steppe, steadily increase in width. Along the western side of northern Anti-Lebanon stretches the Khasha'a, a rough red region lined with juniper trees, a succession of the hardest limestone crests and ridges, bristling with bare rock and crag that shelter tufts of vegetation, and are divided by a succession of grassy ravines. On the eastern side the parallel valley of 'Asal el-Ward deserves special mention; the descent towards the plain eastwards, as seen for example at Ma'lula, is singular — first a spacious amphitheatre and then two deep very narrow gorges. Few perennial streams take their rise in Anti-Lebanon; one of the finest and best watered valleys is that of Helbun, the ancient Chalybon, the Helbon of Ezek. xxvii. 18. The highest points of the range, reckoning from the north, are Halimat el-Kabu (8257 ft.), which has a splendid view; the Fatli block, including Tal'at Musa (8721 ft.) and the adjoining Jebel Nebi Baruh (7900 ft.) ; and a third group near Bludan, in which the most promi- nent names are Shakif, Akhyar and Abu'1-Hin (8330 ft.). Of the valleys descending westward the first to claim mention is the Wadi Yafufa; a little farther south, lying north and south, is the rich upland valley of Zebedani, where the Barada has its highest sources. Pursuing an easterly course, this stream receives the waters of the romantic 'Ain Fije (which doubles its volume), and bursts out by a rocky gateway upon the plain of Damascus, in the irrigation of which it is the chief agent. It is the Abana of 2 Kings v. 12; the portion of Anti-Lebanon traversed by it was also called by the same name (Canticles iv. 8). From the point where the southerly continuation of Anti-Lebanon begins to take a more westerly direction, a low ridge shoots out towards the south-west, trending farther and farther away from the eastern chain and narrowing the Buka'a; upon the eastern side of this ridge lies the elevated valley or hilly stretch known as Wadi et-Teim. In the north, beside 'Ain Faluj, it is connected by a low watershed with the Buka'a; from the gorge of the Litany it is separated by the ridge of Jebel ed-Dahr. At its southern end it contracts and merges into the plain of Banias, thus enclosing Mount Hermon on its north-west and west sides; eastward from the Hasbany branch of the Jordan lies the meadow-land Merj 'Iyun, the ancient Ijon (1 Kings xv. 20).

Vegetation. — The western slope of Lebanon has the common characteristics of the flora of the Mediterranean coast, but the Anti-

Lebanon belongs to the poorer region of the steppes, and the Mediterranean species are met with only sporadically along the water-courses. Forest and pasture land do not properly exist: the place of the first is for the most part taken by a low brushwood ; grass is not plentiful, and the higher ridges maintain alpine plants only so long as patches of snow continue to lie. The rock walls harbour some rock plants, but many absolutely barren wildernesses of stone occur. (1) On the western slope, to a height of 1600 ft., is the coast region, similar to that oi Syria in general and of the south of Asia Minor. Characteristic trees are the locust tree and the stone pine; in Melia Azedarach and Ficus Sycomorus (Beirut) is an admixture of foreign and partially subtropical elements. The great mass of the vegetation, however is of the low-growing type (maquis or garrigue of the western Mediterranean), with small and stiff leaves, and frequently thorny and aromatic, as for example the ilex (Quercus coccifera), Smilax, Cistus, Lentiscus, Calycotome, &c. (2) Next comes, from 1600 to 6500 ft., the mountain region, which may also be called the forest region, still exhibiting sparse woods

and isolated trees wherever shelter, moisture and the inhabitants have permitted their growth. From 1600 to 3200 ft. is a zone of dwarf hard-leaved oaks, amongst which occur the Oriental forms Fontanesia phillyraeoides, Acer syriacum and the beautiful red- stemmed Arbutus Andrachne. Higher up, between 3700 and 4200 ft., a tall pine, Pinus Brutia, is characteristic. Between 4200 and 6200 ft. is the region of the two most interesting forest trees of Lebanon, the cypress and the cedar. The former still grows thickly, especially in the valley of the Kadisha; the horizontal is the prevailing variety. In the upper Kadisha valley there is a cedar grove of about three hundred trees, amongst which five are of gigantic size. (See also Cedar.) The cypress and cedar zone exhibits a variety of other leaf -bearing and coniferous trees; of the first may be mentioned several oaks — Quercus subalpina (Kotschy), Q. Cerris and the hop-hornbeam (Ostrya) ; of the second class the rare Cilician silver fir (Abies cilicica) may be noticed. Next come the junipers, sometimes attaining the size of trees {Juniperus excelsa, J. rufescens and, with fruit as large as plums, J", drupacea). But the chief orna- ment of Lebanon is the Rhododendron ponticum, with its brilliant purple flower clusters; a peculiar evergreen, Vinca libanotica, also adds beauty to this zone. (3) Into the alpine region (6200 to 10,400 ft.) penetrate a few very stunted oaks (Quercus subalpina), the junipers already mentioned and a barberry (Berberis cretica), which sometimes spreads into close thickets. Then follow the low, dense, prone, pillow-like dwarf bushes, thorny and grey, common to the Oriental highlands — Astragalus and the peculiar

Acantholimon. They are found to within 300 ft. of the highest summits.

Upon the exposed mountain slopes a species of rhubarb (Rheum Ribes) is noticeable, and also a vetch (Vicia canescens) excellent for sheep. The spring vegetation, which lasts until July, appears to be rich, especially as regards showy plants, such as Corydalis, Gagea, Colchicum, Puschkinia, Geranium, Ornithogalum, &c. The flora of the highest ridges, along the edges of the snow patches, exhibits no forms related to the northern alpine flora, but suggestions of it are found in a Draba, an Androsace, an Alsine and a violet, occurring, however, only in local species. Upon the highest summits are found Saponaria Pumilio (resembling our Silene acaulis) and varieties of Galium, Euphorbia, Astragalus, Veronica, Jurinea, Festuca, Scrophularia, Geranium, Asphodeline, Allium, Asperula; and, on the margins of the snow fields, a Taraxacum and Ranunculus demissus. The alpine flora of Lebanon thus connects itself directly with the Oriental flora of lower altitudes, and is unrelated to the glacial flora of Europe and northern Asia.

Zoology. — There is nothing of special interest about the fauna of Lebanon. Bears are no longer numerous; the panther and the ounce are met with; the wild hog, hyaena, wolf and fox are by no means rare; jackals and gazelles are very common. The polecat and hedgehog also occur. As a rule there are not many birds, but the eagle and the vulture may occasionally be seen; of eatable kinds partridges and wild pigeons are the most abundant.

Population. — In the following sections the Lebanon proper will alone be considered, without reference to Anti-Lebanon, because the peculiar political status of the former range since 1 064 has effectually differentiated it; whereas the Anti-Lebanon still forms an integral part of the Ottoman province of Syria (q.v.), and neither its population nor its history is readily dis- tinguishable from those of the surrounding districts. .

The total population in the Lebanon proper is about 400,000, and is increasing faster than the development of the province will admit. There is consequently much emigration, the Christian surplus going mainly to Egypt, and to America, the Druses to the latter country and to the Hauran. The emigrants to America, however, usually return after making money, build new houses and settle down. The singularly complex population is com- posed of Christians, Maronites, and Orthodox Eastern and Uniate; of Moslems, both Sunni and Shiah (Metawali); and of Druses.

(a) Maronites (q.v.) form about three-fifths of the whole and have the north of the Mountain almost to themselves, while even in the south, the old Druse stronghold, they are now numerous. Feudalism is practically extinct among them and with the decline of the Druses, and the great stake they have acquired in agriculture, they have laid aside much of their warlike habit together with their arms. Even their instinct of nationality is being sensibly impaired by their gradual assimilation to the Papal Church, whose agents exercise from Beirut an increasing influence on their ecclesiastical elections and church government. They are strong also in the Buka'a, and have colonies in most of the Syrian cities.

(b) Orthodox Eastern form a little more than one-eighth of the whole, and are strongest in S. Lebanon (Metn and Kurah districts). Syrians by race and Arab-speaking, they are descendants of those " Melkites " who took the side of the Byzantine church in the time of Justinian II. against the Moslems and eventually the Maronites. They are among the most progressive of the Lebanon elements.

(c) Greek Uniate are less numerous, forming little more than

one-twelfth, but are equally progressive. Their headquarters is Zahleh; but they are found also in strength in Metn and Jezzin, where they help to counterbalance Druses. They sympathize with the Maronites against the Orthodox Eastern, and, like both, are of Syrian race, and Arab speech.

(d) Sunnite Moslems are a weak element, strongest in Shuf and Kurah, and composed largely of Druse renegades and " Druse " families, which, like the Shehab, were of Arab extraction and never conformed to the creed of Hamza.

(e) Shiite Moslems outnumber the Sunni, and make about one t wenty-fif th of the whole. They are called Metawali and are strongest in North Lebanon (Kesrawan and Batrun), but found also in the south, in Buka'a and in the coast-towns from Beirut to Acre. They are said to be descendants of Persian tribes; but the fact is very doubtful, and they may be at least as aboriginal as the Maronites, and a remnant of an old Incarnationist population which did not accept Christianity, and kept its heretical Islam free from those influences which modified Druse creed. They own a chief sheikh, resident at Jeba'a, and have the

reputation, like most heretical communities in the Sunni part of the Moslem world, of being ex- ceedingly fanatical and inhospitable. It is undoubtedly the case that they are suspicious of strangers and defiant of interference. Another small body of Shiites, the Ismailites (Assassins (q.v.) of the crusading chronicles), also said to be of Persian origin, live about Kadmus at the extreme N. of Lebanon, but outside the limits of the privileged province. They are about 9000 strong.

(/) Druses (q.v.), now barely an eighth of the whole and confined to Shuf and Metn in S. Lebanon, are tending to emigrate or conform to Sunni Islam. Since the establishment of the privileged province they have lost the Ottoman support which used to compensate for their numerical inferiority as compared with the Christians; and they are fast losing also their old habits and distinctiveness. No longer armed or wearing their former singular dress, the remnant of them in Lebanon seems likely ere long to be assimilated to the ” Osmanli ” Moslems. Their feud with the Maronites, whose accentuation in the middle of the 19th century was largely due to the tergiversations of the ruling Shehab family, now reduced to low estate, is dying away, but they retain something of their old clan feeling and feudal organization, especially in Shuf.

The mixed population, as a whole, displays the usual charac- teristics of mountaineers, fine physique and vigorous independent spirit; but its ancient truculence has given way before strong government action since the middle 19th century, and the great increase of agricultural pursuits, to which the purely pastoral are now quite secondary. The culture of the mulberry and silk, of tobacco, of the olive and vine, of many kinds of fruits and cereals, has expanded enormously, and the Lebanon is now probably the most productive region in Asiatic Turkey in proportion to its area. It exports largely through Beirut and Saida, using both the French railway which crosses S. Lebanon on its way to Damascus, and the excellent roads and mule-paths made since 1883. Lebanon has thick deposits of lignite coal, but of inferior quality owing to the presence of iron pyrites. The abundant iron is little worked. Manufactures are of small account, the raw material going mostly to the coast ; but olive-oil is made, together with various wines, of which the most famous is the vino d’oro, a sweet liqueur-like beverage. This wine is not exported in any quantity, as it will not bear a voyage well and is not made to keep. Bee-keeping is general, and there is an export of eggs to Egypt.

History. — The inhabitants of Lebanon have at no time played a conspicuous part in history. There are remains of prehistoric occupation, but we do not even know what races dwelt there in the

historical period of antiquity. Probably they belonged chiefly to the Aramaean group of nationalities ; the Bible mentions Hivites (Judges iii. 3) and Giblites (Joshua xiii. 5); Lebanon was included within the ideal boundaries of the land of Israel, and the whole region was well known to the Hebrews, by whose poets its many excellences are often praised. How far the Phoenicians had any effective control over it is unknown; the absence of their monuments does not argue much real jurisdiction. Nor apparently did the Greek Seleucid kingdom have much to do with the Mountain. In the Roman period the district of Phoenice extended to Lebanon. In the 2nd century, with the inland districts, it constituted a subdivision of the province of Syria, having Emesa (Horns) for its capital. From the time of Diocletian there was a Phoenice ad Libanum, with Emesa as capital, as well as a Phoenice Maritima of which Tyre was the chief city. Remains of the Roman period occur through- out Lebanon. By the 6th century it was evidently virtually

independent again; its Christianization had begun with the immigration of Monothelite sectaries, flying from persecution in the Antioch district and Orontes valley. At all tim es Lebanon has been a place of refuge for unpopular creeds. Large part of the mountaineers took up Monothelism and initiated the national distinction of the Maronites, which begins to emerge in the history of the 7th century. The sectaries, after helping Justinian II. against the caliph Abdalmalik, turned on the emperor and his Orthodox allies, and were named Mardaites (rebels). Islam now began to penetrate S. Lebanon, chiefly by the immigration of various more or less heretical elements, Kurd, Turkoman, Persian and especially Arab, the latter largely after the break-up of the kingdom of Hira; and early in the nth century these coalesced into a nationality (see Druses) under the congenial influence of the Incarnationist creed brought from Cairo by Ismael Darazi and other emissaries of the caliph Hakim and his vizier Hamza. The subsequent history of Lebanon to the middle of the 19th century will be found under Druses and Maronites, and it need only be stated here that Latin influence began to be felt in N. Lebanon during the Frank period of Antioch and Palestine, the Maronites being inclined to take the part of the crusading princes against the Druses and Moslems; but they were still regarded as heretic Monothelites by Abulfaragius (Bar-Hebraeus) at the end of the 13th century; nor is their effectual reconciliation to Rome much older than 1736, the date of the mission sent by the pope Clement XII., which fixed the actual status of their church. An informal French protection had, however, been exercised over them for some time previously, and with it began the feud of Maronites and Druses, the latter incited and spasmodically supported

by Ottoman pashas. The feudal organization of both, the one under the house of Khazin, the other under those of Maan and Shehab successively, was in full force during the 17th and 18th centuries; and it was the break-up of this in the first part of the 19th century which produced the anarchy that culminated after 1840 in the civil war. The Druses renounced their Shehab amirs when Beshir al-Kassim openly joined the Maronites in 1841, and the Maronites definitely revolted from the Khazin in 1858. The events of i860 led to the formation of the privileged Lebanon province, finally constituted in 1864. It should be added, however, that among the Druses of Shuf, feudalism has tended to re-establish itself, and the power is now divided between the Jumblat and Yezbeki families, a leading member of one of which is almost always Ottoman kaimakam of the Druses, and locally called amir.

The Lebanon has now been constituted a sanjak or mutessariflik, dependent directly on the Porte, which acts in this case in consultation with the six great powers. This province extends about 93 m. from N. to S. (from the boundary of the sanjak of Tripoli to that of the caza of Saida), and has a mean breadth of about 28 m. from one foot of the chain to the other, beginning at the edge of the httoral plain behind Beirut and ending at the W. edge of the Buka'a: but the boundaries are ill-defined, especially on the E. where the original line drawn along the crest of the ridge has not been adhered to, and the mountaineers have encroached on the Buka'a. The Lebanon is under a military governor (mushir)who must be a Christian in the service of the sultan, approved by the powers, and has, so far, been chosen from the Roman Catholics owing to the great preponderance of Latin Christians in the province. He resides at Deir al-Kamar, an old seat of the Druse amirs. At first appointed for three years, then for ten, his term has been fixed since 1892 at five years, the longer term having aroused the fear of the Porte, lest a personal domination should become established. Under the governor are seven kaimakams, all Christians except a Druse in Shuf, and forty-seven mudirs, who all depend on the kaimakams except one in the home district of Deir al-Kamar. A central mejliss or Council of twelve members is composed of four Maronites, three Druses, one Turk, two Greeks (Orthodox), one Greek Uniate and one Metawali. This was the original proportion, and it has not been altered in spite of the decline of the Druses and increase of the Maronites. The members are elected by the seven cazas. In each mudirieh there is also a local mejliss. The old feudal and mukataji (see Druses) jurisdictions are abolished, i.e. they often persist under Ottoman forms, and three courts of First Instance, under the mejliss, and superior to the petty courts of the mudirs and the

village sheikhs, administer justice. Judges are appointed by the governor ,_ but sheikhs by the villages. Commercial cases, and litigation in which strangers are concerned, are carried to Beirut. The police is recruited locally, and no regular troops appear in the

province except on special requisition. The taxes are collected directly, and must meet the needs of the province, before any sum is remitted to the Imperial Treasury. The latter has to make deficits good. Ecclesiastical jurisdiction is exercised only over the clergy, and all rights of asylum are abolished.

This constitution has worked well on the whole, the onlyserious hitches having been due to the tendency of governors-general and kaimakams to attempt to supersede the mcjliss by autocratic action, and to impair the freedom of elections. The attention of the porte was called to these tendencies in 1892 and again in 1902, on the appointments of new governors. Since the last date there has been no complaint. Nothing now remains of the former French pre- dominance in the Lebanon, except a certain influence exerted by the fact that the railway is French, and by the precedence in ecclesi- astical functions still accorded by the Maronites to official repre- sentatives of France. In the Lebanon, as in N. Albania, the tradi- tional claim of France to protect Roman Catholics in the Ottoman Empire has been greatly impaired by the non-religious character of the Republic. Like Italy, she is now regarded by Eastern Catholics with distrust as an enemy of the Holy Father.

See Druses. Also V. Cuinet, Syrie, Liban et Palestine (1896); N. V'erney ami G. Dambmann, Puissances etrangeres en Syrie, &c. (1900); G. Young, Corps de droit ottoman, vol. i. (1905); G. E. Post, Flora of Syria, eke. (1896); M. von Oppenheim, Vom Mittel- meer, &c. (1899). (A. So. ; D. G. H.)

LEBANON, a city of Saint Clair county, Illinois, U.S.A., on Silver Creek, about 24 m. E. of Saint Louis, Missouri. Pop. (1910) 1907. It is served by the Baltimore & Ohio South- Western railroad and by the East Saint Louis & Suburban Electric line. It is situated on a high tableland. Lebanon is the seat of McKendree College, founded by Methodists in 1828 and one of the oldest colleges in the Mississippi valley. It was called Lebanon Seminary until 1830, when the present name was adopted in honour of William McKendree (1757-1835),

known as the ” Father of Western Methodism,” a great preacher, and a bishop of the Methodist Church in 1808-1835, who had en- dowed the college with 480 acres of land. In 1835 the college was chartered as the ” McKendreean College,” but in 1839 the present name was again adopted. There are coal mines and excellent farming lands in the vicinity of Lebanon. Among the city’s manufactures are flour, planing-mill products, malt liquors, soda and farming implements. The municipality owns and operates its electric-lighting plant. Lebanon was chartered as a city in 1874.

LEBANON, a city and the county-seat of Lebanon county, Pennsylvania, U.S.A., in the fertile Lebanon Valley, about 25 m. E. by N. of Harrisburg. Pop. (1900) 17,628, of whom 618 were foreign-born, (1910 census) 19,240. It is served by the Philadelphia & Reading, the Cornwall and the Cornwall & Lebanon railways. About 5 m. S. of the city are the Cornwall (magnetite) iron mines, from which about 18,000,000 tons of iron ore were taken between 1740 and 1902, and 804,848 tons in 1906. The ore yields about 46% of iron, and contains about 2 ‘ 5% °f sulphur, the roasting of the ores being necessary — ore-roasting kilns are more extensively used here than in any other place in the country. The area of ore exposed is about 4000 ft. long and 400 to 800 ft. wide, and includes three hills; it has been one of the most productive magnetite deposits in the world. Limestone, brownstone and brick-clay also abound in the vicinity; and besides mines and quarries, the city has extensive manufactories of iron, steel, chains, and nuts and bolts. In 1905 its factory products were valued at $6,978,458. The municipality owns and operates its water-works.

The first settlement in the locality was made about 1730, and twenty years later a town was laid out by one of the landowners, George Steitz, and named Steitztown in his honour. About 1760 the town became known as Lebanon, and under this name it was incorporated as a borough in 1821 and chartered as a city in 1885.

LE BARGY, CHARLES GUSTAVE AUGUSTE (1858-), French actor, was born at La Chapelle (Seine). His talent both as a comedian and a serious actor was soon made evident, and he became a member of the Comedie Francaise, his chief successes being in such plays as Le Duel, L’Enigme, Le Marquis de Priola, U Autre Danger and Le Dedale. His wife, Simone le Bargy nee Benda, an accomplished actress, made her debut at the Gymnase in 1902, and in later years had a great success in La Rafale and ofher plays. In 1910 he had differences with the authorities of the Comedie Francaise and ceased to be a societaire.

LE BEAU, CHARLES (1701-1778), French historical writer, was born at Paris on the 1 5th of October 1 701 , and was educated at the College de Sainte-Barbe and the College du Plessis; at the latter he remained as a teacher until he obtained the chair of rhetoric in the College des Grassins. In 1748 he was admitted a member of the Academy of Inscriptions, and in 1752 he was nominated professor of eloquence in the College de France. From 1755 he held the office of perpetual secretary to the Academy of Inscriptions, in which capacity he edited fifteen volumes (from the 25th to the 39th inclusive) of the Histoire of that institution. He died at Paris on the 13th of March 1778. The only work with which the name of Le Beau continues to be associated is his Histoire du Bas-Empire, en commencant a Constantin le Grand, in 22 vols. i2mo (Paris, 1756-1779), being a continuation of C. Rollin's Histoire Romaine and J. B. L. Crevier's Histoire des empereurs. Its usefulness arises entirely from the fact of its being a faithful resume of the Byzantine historians, for Le Beau had no originality or artistic power of his own. Five volumes were added by H. P. Ameilhon (1781-1811), which brought the work down to the fall of Constantinople. A later edition, under the care of M. de Saint-Martin and afterwards of Brosset, has had the benefit of careful revision throughout, and has received considerable additions from Oriental sources.

See his " Eloge " in vol. xlii. of the Histoire de I'Academie des Inscriptions (1786), pp. 190-207.

LEBEAU, JOSEPH (1794-1865), Belgian statesman, was born at Huy on the 3rd of January 1794. He received his early education from an uncle who was parish priest of Hannut, and became a clerk. By dint of economy he raised money to study law at Liege, and was called to the bar in 1819. At Liege he formed a fast friendship with Charles Rogier and Paul Devaux, in conjunction with whom he founded at Liege in 1824 the Mathieu Laensbergh, afterwards Le politique, "a journal which helped to unite the Catholic party with the Liberals in their opposition to the ministry, without manifesting any open disaffection to the Dutch government. Lebeau had not con- templated the separation of Holland and Belgium, but his hand was forced by the revolution. He was sent by his native district to the National Congress, and became minister of foreign affairs in March 1831 during the interim regency of Surlet de Chokier. By proposing the election of Leopold of Saxe-Coburg as king of the Belgians he secured a benevolent attitude on the part of Great Britain, but the restoration to Holland of part of the duchies of Limburg and Luxemburg provoked a heated opposition to the treaty of London, and Lebeau was accused of treachery to Belgian interests. He resigned the direction of foreign

affairs on the accession of King Leopold, but in the next year became minister of justice. He was elected deputy for Brussels in 1833, and retained his seat until 1848. Differences with the king led to his retirement in 1834. He was subsequently governor of the province of Namur (1838), ambassador to the Frankfort diet (1839), and in 1840 he formed a short-lived Liberal ministry. From this time he held no office of state, though he continued his energetic support of liberal and anti-clerical measures. He died at Huy on the 19th of March 1865.

Lebeau published La Belgique depuis 1847 (Brussels, 4 vols., 1852), Lettres aux Uecteurs beiges (8 vols., Brussels, 1853-1856). His Souvenirs personnels et correspondance diplomatique 1824-1841 (Brussels, 1883). were edited by A. Freson. See an article by A. Freson in the Biographie nationale de Belgique; and T. Juste, Joseph Lebeau (Brussels, 1865).

LEBEL, JEAN (d. 1370), Belgian chronicler, was born near the end of the 13th century. His father, Gilles le Beal des Changes, was an alderman of Liege. Jean entered the church and became a canon of the cathedral church, but he and his brother Henri followed Jean de Beaumont to England in 1327, and took part in the border warfare against the Scots. His will is dated 1369, and his epitaph gives the date of his death as 1370. Nothing more is known of his life, but Jacques de Hemricourt, author of the Miroir des nobles de Hesbaye, has left a eulogy of his character, and a description of the magnificence of his attire, his retinue and his hospitality. Hemricourt asserts that he was eighty years old or more when he died. For a long time Jean Lebel (or le Bel) was only known as a chronicler through a reference by Froissart, who quotes him in the prologue of his first book as one of his authorities. A fragment of his work.

in the MS. of Jean d'Outremeuse's Mireur des istores, was dis- covered in 1847; and the whole of his chronicle, preserved in the library of Chalons-sur-Marne, was edited in 1863 by L. Polain. Jean, Lebel gives as his reason for writing a desire to replace a certain misleading rhymed chronicle of the wars of Edward III. by a true relation of his enterprises down to the beginning of the Hundred Years' War. In the matter of style Lebel has been placed by some critics on the level of Froissart. His chief merit is his refusal to narrate events unless either he himself or his informant had witnessed them. This scrupulous- ness in the acceptance of evidence must be set against his limita- tions. He

takes on the whole a similar point of view to Froissart's ; he has no concern with national movements or politics; and, writing for the public of chivalry, he preserves no general notion of a campaign, which resolves itself in his narrative into a series of exploits on the part of his heroes. Froissart was considerably indebted to him, and seems to have borrowed from him some of his best-known episodes, such as the death of Robert the Bruce, Edward III. and the countess of Salisbury, and the devotion of the burghers of Calais. The songs and virelais, in the art of writing which he was, according to Hemricourt, an expert, have not come to light.

See L. Polain, Les Vraies Chroniqu.es de messire Jehan le Bel (1863) ; Kervyn de Lettenhove, Bulletin de la societi d' emulation de Bruges, series' ii. vols. vii. and ix. ; and H. Pirenne in Biographie nationale de Belgique.

LEBER, JEAN MICHEL CONSTANT (1780-1859), French historian and bibliophile, was born at Orleans on the 8th of May 1780. His first work was a poem on Joan of Arc (1804); but he wrote at the same time a Grammaire general synthitique, which attracted the attention of J. M. de Gerando, then secretary-general to the ministry of the interior. The latter found him a minor post in his department, which left him leisure for his historical work. He even took him to Italy when Napoleon was trying to organize, after French models, the Roman states which he had taken from the pope in 1809. Leber however did not stay there long, for he considered the attacks on the temporal property of the Holy See to be sacrilegious. On his return to Paris he resumed his administrative work, literary recreations and historical researches. While spending a part of his time writing vaudevilles and comic operas, he began to collect old essays and rare pamphlets by old French historians. His office was preserved to him by the Restoration, and Leber put his literary gifts at the service of the government. When the question of the coronation of Louis XVIII. arose, he wrote, as an answer to Volney, a minute treatise on the Ceremonies du sacre, which was published at the time of the coronation of Charles X. Towards the end of Villele's ministry, when there was a movement of public opinion in favour of extending municipal liberties, he undertook the defence of the threatened system of centraliza- tion, and composed, in answer to Raynouard, an Histoire critique da pouvoir municipal depuis Vorigine de la monarchie jusqu'd nos jours (1828). He also wrote a treatise entitled De Vital reel de la presse el des pamphlets depuis Francois I er jusqu'd Louis XIV (1834), in which he refuted an empty paradox of Charles Nodier, who had tried to prove that the press had never been, and could never be, so free as under the Grand Monarch. A few years later, Leber retired (1839), and

sold to the library of Rouen the rich collection of books which he had amassed during thirty years of research. The catalogue he made himself (4 vols., 1839 to 1852). In 1840 he read at the Academie des Inscriptions et Belles-Lettres two dissertations, an ” Essai sur l’appreciation de la fortune privee au moyen age,” followed by an ” Examen critique des tables de prix du marc d’argent depuis l’epoque de Saint Louis “; these essays were included by the Academy in its Recueil de memoires prisentes par divers savants (vol. i., 1844), and were also revised and published by Leber (1847). They form his most considerable work, and assure him a position of eminence in the economic history of France. He also rendered good service to historians by the publication of his Collection des meilleures dissertations, notices et traites relalifs d V histoire de France (20 vols., 1826-1840); in the absence of an index, since Leber did not give one, an analytical table of

contents is to be found in Alfred Franklin’s Sources de Vhistoirt de France (1876, pp. 342 sqq.). In consequence of the revolution of 1848, Leber decided to leave Paris. He retired to his native town, and spent his last years in collecting old engravings. He died at Orleans on the 22nd of December 1859.

In 1832 he had been elected as a member of the SociUe des Anti-quaires de France, and in the Bulletin of this society (vol. i., i860) is to be found the most correct and detailed account of his life’s works.

LEBEUF, JEAN (1687-1760), French historian, was born on the 7th of March 1687 at Auxerre, where his father, a councillor in the parlement, was receveur des consignations. He began his studies in his native town, and continued them in Paris at the College Ste Barbe. He soon became known as one of the most cultivated minds of his time. He made himself master of practically every branch of medieval learning, and had a thorough knowledge of the sources and the bibliography of his subject. His learning was not drawn from books only; he was also an archaeologist, and frequently went on expeditions in France, always on foot, in the course of which he examined the monuments of architecture and sculpture, as well as the libraries, and collected a number of notes and sketches. He was in correspondence with all the most learned men of the day. His correspondence with President Bouhier was published in 1885 by Ernest Petit; his other letters have been edited by the Societe des sciences historiques et naturelles de I’Yonne (2 vols., 1866-1867). He also wrote numerous articles, and, after his election as a member of the Academie des Inscriptions et Belles- Lettres (1740), a number of Memoires which appeared in the Recueil of this society. He died at Paris on the 10th of

April 1760. His most important researches had Paris as their subject.

He published first a collection of Dissertations sur I'histoire civile et ecclesiastique de Paris (3 vols., 1739-1743), then an Histoire de la ville et de tout le diocese de Paris (15 vols., 1745-1760), which is a mine of information, mostly taken from the original sources. In view of the advance made by scholarship in the 19th century, it was found necessary to publish a second edition. The work of reprinting it was undertaken by H. Cocheris, but was interrupted (1863) before the completion of vol. iv. Adrien Augier resumed the work, giving Lebeuf's text, though correcting the numerous typographical errors of the original edition (5 vols., 1883), and added a sixth volume containing an analytical table of contents. Finally, Fernand Bournon completed the work by a volume of Rectifications et additions (1890), worthy to appear side by side with the original work.

The bibliography of Lebeuf's writings is, partly, in various numbers of the Bibliotheque des ecrivains de Bourgogne (1716-1741). His biography is given by Lebeau in the Histoire de V Academie royale des Inscriptions (xxix., 372, published 1764), and by H. Cocheris, in the preface to his edition.

LE BLANC, NICOLAS (1742-1806), French chemist, was born at Issoudun, Indre, in 1742. He made medicine his profes- sion and in 1780 became surgeon to the duke of Orleans, but he also paid much attention to chemistry. About 1787 he was attracted to the urgent problem of manufacturing carbonate of soda from ordinary sea-salt. The suggestion made in 1789 by Jean Claude de la Metherie (1743-1817), the editor of the Journal de physique, that this might be done by calcining with charcoal the sulphate of soda formed from salt by the action of oil of vitriol, did not succeed in practice because the product was almost entirely sulphide of soda, but it gave Le Blanc, as he himself acknowledged, a basis upon which to work. He soon made the crucial discovery — which proved the foundation of the huge industry of artificial alkali manufacture — that the desired end was to be attained by adding a proportion of chalk to the mixture of charcoal and sulphate, of soda. Having had the soundness of this method tested by Jean Darcet (1725-1801), the professor of chemistry at the College de France, the duke of Orleans in June 1791 agreed to furnish a sum of 200,000 francs for the purpose of exploiting it. In the following September Le Blanc was granted a patent for fifteen years, and shortly afterwards a factory was started at Saint-Denis, near Paris. But it had not long been in operation when the Revolution led to the confiscation of the duke's property, including the factory, and about the same time the Committee of Public Safety called upon all citizens who possessed

soda-factories to disclose their situation and capacity and the nature of the methods employed. Le Blanc

had no choice but to reveal the secrets of his process, and he had the misfortune to see his factory dismantled and his stocks of raw and finished materials sold. By way of compensation for the loss of his rights, the works were handed back to him in 1800, but all his efforts to obtain money enough to restore them and resume manufacturing on a profitable scale were vain, and, worn out with disappointment, he died by his own hand at Saint-Denis on the 16th of January 1806.

Four years after his death, Michel Jean Jacques Diz§ (1764-1852), who had been preparateur to Darcet at the time he examined the process and who was subsequently associated with Le Blanc in its exploitation, published in the Journal de physique a paper claiming that it was he himself who had first suggested the addition of chalk ; but a committee of the French Academy, which reported fully on the question in 1856, came to the conclusion that the merit was entirely Le Blanc's (Com. rend., 1856, p. 553).

LE BLANC, a town of central France, capital of an arrondisse- ment, in the department of Indre, 44 m. W.S.W. of Chateauroux on the Orleans railway between Argenton and Poitiers. Pop. (igo6) 4719. The Creuse divides it into a lower and an upper town. The church of St Genitour dates from the 12th, 13th and 15th centuries, and there is an old castle restored in modern times. It is the seat of a subprefect, and has a tribunal of first instance and a communal college. Wool-spinning, and the manufacture of linen goods and edge-tools are among the industries. There is trade in horses and in the agricultural and other products of the surrounding region.

Le Blanc, which is identified with the Roman Oblincum, was in the middle ages a lordship belonging to the house of Naillac and a frontier fortress of the province of Berry.

EUF, EDMOND (1809-1888”>LEB, marshal of France, was born at Paris on the 5th of November 1809, passed through the Ecole Polytechnique and the school of Metz, and distinguished himself as an artillery officer in Algerian warfare, becoming colonel in 1852. He commanded the artillery of the 1st French corps at the siege of Sebastopol, and was promoted in 1854 to the rank of general of

brigade, and in 1857 to that of general of division. In the Italian War of 1859 he commanded the artillery, and by his action at Solferino materially assisted in achieving the victory. In September 1866, having in the meantime become aide-de-camp to Napoleon III., he was despatched to Venetia to hand over that province to Victor Emmanuel. In 1869, on the death of Marshal Niel, General Lebceuf became minister of war, and earned public approbation by his vigorous reorganization of the War Office and the civil departments of the service. In the spring of 1870 he received the marshal's baton. On the declaration of war with Germany Marshal Lebceuf delivered himself in the Corps Legislatif of the historic saying,

So ready are we, that if the war lasts two years, not a gaiter button would be found wanting." It may be that he intended this to mean that, given time, the reorganization of the War Office would be perfected through experience, but the result inevitably caused it to be regarded as a mere boast, though it is now known that the administrative confusion on the frontier in July 1870 was far less serious than was supposed at the time. Lebceuf took part in the Lorraine campaign, at first as chief of staff (major-general) of the Army of the Rhine, and afterwards, when Bazaine became commander-in-chief, as chief of the III. corps, which he led in the battles around Metz. He distinguished himself, whenever engaged, by personal bravery and good leadership. Shut up with Bazaine in Metz, on its fall he was confined as a prisoner in Germany. On the conclusion of peace he returned to France and gave evidence before the commission of inquiry into the surrender of that stronghold, when he strongly denounced Bazaine. After this he retired into private life to the Chateau du Moncel near Argentan, where he died on the 7th of June 1888.

LE BON, JOSEPH (1765-1795), French politician, was born at Arras on the 29th of September 1765. He became a priest in the order of the Oratory, and professor of rhetoric at Beaune. He adopted revolutionary ideas, and became a cure of the Constitutional Church in the department of Pas-de-Calais, where he was later elected as a deputi suppliant to the Convention. He became maire of Arras and administrateur of Pas-de-Calais,

and on the 2nd of July 1793 took his seat in the Convention. He was sent as a representative on missions into.the departments of the Somme and Pas-de-Calais, where he showed great severity in dealing with offences against revolutionaries (8th Brumaire, year II. to 22nd Messidor, year II.; i.e. 29th October 1793 to 10th July 1794). In consequence, during the reaction which followed the 9th Thermidor

(27th July 1794) he was arrested on the 22nd Messidor, year III. (10th July 1795). He was tried before the criminal tribunal of the Somme, condemned to death for abuse of his power during his mission, and executed at Amiens on the 24th Vendemiaire in the year IV. (10th October 1795). Whatever Le Bon's offences, his condemnation was to a great extent due to the violent attacks of one of his political enemies, Armand Guffroy; and it is only just to remember that it was owing to his courage that Cambrai was saved from falling into the hands of the Austrians.

His son, Emile le Bon, published a Histoire de Joseph le Bon et des tribunaux revolutionnaires d' Arras et de Cambrai (2nd ed., 2 vols., Arras, 1864).

LEBRIJA, or Lebrixa, a town of southern Spain, in the province of Seville, near the left bank of the Guadalquivir, and on the eastern edge of the marshes known as Las Marismas. Pop. (1900) 10,997. Lebrija is 44 m. S. by W. of Seville, on the Seville-Cadiz railway. Its chief buildings are a ruined Moorish castle and the parish church, an imposing structure in a variety of styles — Moorish, Gothic, Romanesque — dating from the 14th century to the 16th, and containing some early specimens of the carving of Alonso Cano (1601-1667). There are manufactures of bricks, tiles and earthenware, for which clay is found in the neighbourhood; and some trade in grain, wine and oil.

Lebrija is the Nabrissa or Nebrissa, surnamed Veneria, of the Romans; by Silius Italicus (iii. 393), who connects it with the worship of Dionysus, the name is derived from the Greek vefipis (a "fawn-skin," associated with Dionysiac ritual). Nebrishah was a strong and populous place during the period of Moorish domination (from 711); it was taken by St Ferdinand in 1249, but again lost, and became finally subject to the Castilian crown only under Alphonso the Wise in 1264. It was the birthplace of Elio Antonio de Lebrija or Nebrija (1444-1522), better known as Nebrissensis, one of the most important leaders in the revival of learning in Spain, the tutor of Queen Isabella, and a colla- borator with Cardinal Jimenes in the preparation of the Com- plutensian Polyglot (see Alcala de Henares).

LE BRUN, CHARLES (1619-1690), French painter, was born at Paris on the 24th of February 1619, and attracted the notice of Chancellor Seguier, who placed him at the age of eleven in the studio of Vouet. At fifteen he received commissions from Cardinal Richelieu, in the execution of which he displayed an ability which obtained the generous commendations of Poussin, in whose company Le Brun

started for Rome in 1642. In Rome he remained four years in the receipt of a pension due to the liberality of the chancellor. On his return to Paris Le Brun found numerous patrons, of whom Superintendent Fouquet was the most important. Employed at Vaux le Vicomte, Le Brun ingratiated himself with Mazarin, then secretly pitting Colbert against Fouquet. Colbert also promptly recognized Le Brun's powers of organization, and attached him to his interests. Together they founded the Academy of Painting and Sculpture (1648), and the Academy of France at Rome (1666), and gave a new development to the industrial arts. In 1660 they established the Gobelins, which at first was a great school for the manufacture, not of tapestries only, but of every class of furniture required in the royal palaces. Commanding the industrial arts through the Gobelins — of which he was director — and the whole artist world through the Academy — in which he successively held every post — Le Brun imprinted his own character on all that was produced in France during his lifetime, and gave a direction to the national tendencies which endured after his death. The nature of his emphatic and pompous talent was in harmony with the taste of the king, who, full of admiration at the decorations designed by Le Brun for his triumphal entry into Paris (1660), commissioned him to execute

a series of subjects from the history of Alexander. The first of these, " Alexander and the Family of Darius," so delighted Louis XIV. that he at once ennobled Le Brun (December, 1662), who was also created first painter to his majesty with a pension of 12,000 livres, the same amount as he had yearly received in the service of the magnificent Fouquet. From this date all that was done in the royal palaces was directed by Le Brun. The works of the gallery of Apollo in the Louvre were interrupted in 1677 when he accompanied the king to Flanders (on his return from Lille he painted several compositions in the Chateau of St Germains), and finally — for they remained unfinished at his death — by the vast labours of Versailles, where he reserved for himself the Halls of War and Peace, the Ambassadors' Staircase, and the Great Gallery, other artists being forced to accept the position of his assistants. At the death of Colbert, Louvois, who succeeded him in the department of public works, showed no favour to Le Brun, and in spite of the king's con- tinued support he felt a bitter change in his position. This contributed to the illness which on the 22nd of February 1690 ended in his death in the Gobelins. Besides his gigantic labours at Versailles and the Louvre, the number of his works for religious

corporations and private patrons is enormous. He modelled and engraved with much facility, and, in spite of the heaviness and poverty of drawing and colour, his extraordinary activity and the vigour of his conceptions justify his claim to fame. Nearly all his compositions have been reproduced by celebrated engravers.

LEBRUN, CHARLES FRANCOIS, due de Plaisance (1739- 1824), French statesman, was born at St-Sauveur-Lendelin (Manche) on the 19th of March 1739, and in 1762 made his first appearance as a lawyer at Paris. He filled the posts successively of censeur royale (1766) and of inspector general of the domains of the crown (r768); he was also one of the chief advisers of the chancellor Maupeou, took part in his struggle against the parlements, and shared in his downfall in 1774. He then devoted himself to literature, translating Tasso's Gerusalemme liberata (1774), and the Iliad (1776). At the outset of the Revolution he foresaw its importance, and in the Voix du citoyen, which he published in 1789, predicted the course which events would take. In the Constituent Assembly, where he sat as deputy for Dourdan, he professed liberal views, and was the proposer of various financial laws. He then became president of the directory of Seine-et-Oise, and in 1795 was elected as a deputy to the Council of Ancients. After the coup d'etat of the 18th Brumaire in the year VIII. (9th November 1799), Lebrun was made third consul. In this capacity he took an active part in the reorganization of finance and of the administration of the departments of France. In 1804 he was appointed arch- treasurer of the empire, and in 805-1806 as governor-general of Liguria effected its annexation to France. He opposed Napoleon's restoration of the noblesse, and in 1808 only re- luctantly accepted the title of due de Plaisance (Piacenza). He was next employed in organizing the departments which were formed in Holland, of which he was governor-general from 1811 to 1813. Although to a certain extent opposed to the despotism of the emperor, he was not in favour of his deposition, though he accepted the fait accompli of the Restoration in April 1814. Louis XVIII. made him a peer of France; but during the Hundred Days he accepted from Napoleon the post of Grand Master of the university. On the return of the Bourbons in 181 5 he was consequently suspended from the House of Peers, but was recalled in 1819. He died at St Mesmes (Seine-et-Oise) on the 16th of June 1824. He had been made a member of the Academie des Inscriptions et Belles-Lettres in 1803.

See M. dc Caumont la Force, L'Architrcsorier Lebrun (Paris, 1907) ; M. Marie du Mesnil, Mcmoire sur le prince Le Brun, due de Plaisance (Paris, 1828) ; Opinions, rapports et choix d'icrits poliliques de C. F. Lebrun (1829), edited, with a biographical notice, by his son Anne-

Charles Lebrun.

LEBRUN, PIERRE ANTOINE (1785-1873), French poet, was born in Paris on the 29th of November 1785. An Ode a la grande armee, mistaken at the time for the work of Ecouchard Lebrun, attracted Napoleon's attention, and secured for the

author a pension of 1200 francs. Lebrun's plays, once famous, are now forgotten. They are: Ulysse (1814), Marie Stuart (1820), which obtained a great success, and Le Cid d' Andalousie (1825). Lebrun visited Greece in 1820, and on his return to Paris he published in 1822 an ode on the death of Napoleon which cost him his pension. In 1825 he was the guest of Sir Walter Scott at Abbotsford. The coronation of Charles X. in that year inspired the verses entitled La Vallee de Champrosay, which have, perhaps, done more to secure his fame than his more ambitious attempts. In 1828 appeared his most important poem, La Grece, and in the same year he was elected to the Academy. The revolution of 1830 opened up for him a public career; in 1 83 1 he was made director of the Imprimerie Royale, and sub- sequently filled with distinction other public offices, becoming senator in 1853. He died on the 27th of May 1873. See Sainte-Beuve, Portraits contemporains, vol. ii. LEBRUN, PONCE DENIS fiCOUCHARD (1729-1807), French lyric poet, was born in Paris on the rrth of August 1729, in the house of the prince de Conti, to whom his father was valet. Young Lebrun had among his schoolfellows a son of Louis Racine whose disciple he became. In 1755 he published an Ode sur les desastres de Lispon. In r759 he married Marie Anne de Surcourt, addressed in his Elegies as Fanny. To the early years of his marriage belongs his poem Nature. His wife suffered much from his violent temper, and when in 1774 she brought an action against him to obtain a separation, she was supported by Lebrun's own mother and sister. He had been secretaire des commandements to the prince de Conti, and on his patron's death was deprived of his occupation. He suffered a further misfortune in the loss of his capital by the bankruptcy of the prince de Guemene. To this period belongs a long poem, the Veillces des Muses, which remained unfinished, and his ode to Buffon, which ranks among his best works. Dependent on government pensions he changed his politics with the times. Calonne he compared to the great Sully, and Louis XVI. to Henry IV., but the Terror nevertheless found in him its official poet. He occupied rooms in the Louvre, and fulfilled his obliga- tions by shameless attacks on the unfortunate king and queen. His excellent ode on the Vengeur and the Ode nationale conlre Angleterre on the occasion of the projected invasion of England are in honour of the power of Napoleon. This " versatility " has so much injured Lebrun's reputation that it is difficult to appreciate his real

merit. He had a genius for epigram, and the quatrains and dizaines directed against his many enemies have a verve generally lacking in his odes. The one directed against La Harpe is called by Sainte-Beuve the ” queen of epigrams.” La Harpe has said that the poet, called by his friends, perhaps with a spice of irony, Lebrun-Pindare, had written many fine strophes but not one good ode. The critic exposed mercilessly the obscurities and unlucky images which occur even in the ode to Buffon, and advised the author to imitate the simplicity and energy that adorned Buffon’s prose. Lebrun died in Paris on the 31st of August 1807.

His works were published by his friend P. L. Ginguene in 181 1. The best of them are included in Prosper Poitevin’s ” Petits poetes francais,” which forms part of the ” Pantheon litteraire.”

LE CARON, HENRI (whose real name was Thomas Miller Beach) (1841-1894), British secret service agent, was born at Colchester, on the 26th of September i84r. He was of an adventurous character, and when nineteen years old went to Paris, where he found employment in business connected with America. Infected with the excitement of the American Civil War, he crossed the Atlantic in i86r and enlisted in the Northern army, taking the name of Henri Le Caron. In 1864 he married a young lady who had helped him to escape from some Confederate marauders; and by the end of the war he rose to be major. In 1865, through a companion in arms named O’Neill, he was brought into contact with Fenianism, and having learnt of the Fenian plot against Canada, he mentioned the designs when writing home to his father. Mr Beach told his local M.P., who in turn told the Home Secretary, and the latter asked Mr Beach to arrange for further information. Le Caron, inspired (as al! I the evidence shows) by genuinely patriotic feeling, from that

time till 1889 acted for the British government as a paid military | spy. He was a proficient in medicine, among other qualifica- tions for this post, and he remained for years on intimate terms with the most extreme men in the Fenian organization under ill its forms. His services enabled the British government to take measures which led to the fiasco of the Canadian invasion of 1870 and Riel’s surrender in 1871, and he supplied full details concerning the various Irish-American associations, in which he himself was a prominent member. He was in the secrets of the ” new departure ” in 1870-1881, and in

the latter year had an interview with Parnell at the House of Commons, when the Irish leader spoke sympathetically of an armed revolution in Ireland. For twenty-five years he lived at Detroit and other places in America, paying occasional visits to Europe, and all the time carrying his life in his hand. The Parnell Commission of 1889 put an end to this. Le Caron was subpoenaed by The Times, and in the witness-box the whole story came out, all the efforts of Sir Charles Russell in cross-examination failing to shake his testimony, or to impair the impression of iron tenacity and absolute truthfulness which his bearing conveyed. His career, however, for good or evil, was at an end. He published the story of his life, Twenty-five Years in the Secret Service, and it had an immense circulation. But he had to be constantly guarded, his acquaintances were hampered from seeing him, and he was the victim of a painful disease, of which he died on the 1 st of April 1894. The report of the Parnell Commission is his monument.

LE CATEAU, or Cateau-Cambresis, a town of northern France, in the department of Nord, on the Selle, 15 m. E.S.E. of Cambrai by road. Pop. (1906) 10,400. A church of the early 17th century and a town-hall in the Renaissance style are its chief buildings. Its institutions include a board of trade- arbitration and a communal college, and its most important industries are wool-spinning and weaving. Formed by the union of the two villages of Peronne and Vendelgies, under the pro- tection of a castle built by the bishop of Cambrai, Le Cateau became the seat of an abbey in the nth century. In the 15th it was frequently taken and retaken, and in 1556 it was burned by the French, who in 1559 signed a celebrated treaty with Spain in the town. It was finally ceded to France by the peace of Nijmwegen in 1678.

LECCE (anc. Lupiae), a town and archiepiscopal see of Apulia, Italy, capital of the province of Lecce, 24 m. S.E. of Brindisi by rail. Pop. (1906) 35,179. The town is remarkable for the number of buildings of the 17th century, in the rococo style, which it contains; among these are the cathedral of S. Oronzo, and the churches of S. Chiara, S. Croce, S. Domenico, &c, the Seminario, and the Prefettura (the latter contains a museum, with a collection of Greek vases, &c). Buildings of an earlier period are not numerous, but the fine portal of the Romanesque church of SS. Nicola e Cataldo, built by Tancred in 1180, may be noted. Another old church is S. Maria di Cerrate, near the town. Lecce contains a large government tobacco factory, and is the centre of a fertile agricultural district. To the E. 7j m. is the small harbour of S. Cataldo, reached by electric tramway. Lecce is quite close to the site of the ancient Lupiae, equidistant (25 m.) from

Brundusium and Hydruntum, remains of which are mentioned as existing up to the 15th century. A colony was founded there in Roman times, and Hadrian made a harbour — no doubt at S. Cataldo. Hardly a mile' west was Rudiae, the birthplace of the poet Ennius, spoken of by Silius Italicus as worthy of mention for that reason alone. Its site was marked by the now deserted village of Rugge. The name Lycea, or Lycia, begins to appear in the 6th century. The city was for some time held by counts of Norman blood, among whom the most noteworthy is Bohemond, son of Robert Guiscard. It afterwards passed to the Orsini. The rank of provincial capital was bestowed by Ferdinand of Aragon in acknowledgment of the fidelity of Lecce to his cause. (T. As.)

See M. S. Briggs, In the Heel of Italy (1910).

LECCO, a town of Lombardy, in the province of Como, 32 m. by rail N. by E. of Milan, and reached by steamer from Como, xvi. 12

673 ft. above sea-level. Pop. (1901) 10,352. It is situated near the southern extremity of the eastern branch of the Lake of Como, which is frequently distinguished as the Lake of Lecco. At Lecco begins the line (run by electricity) to Colico, whence there are branches to Chiavenna and Sondrio; and another line runs to Bergamo. To the south the Adda is crossed by a fine bridge originally constructed in 1335, and rebuilt in 1609 by Fuentes. Lecco, in spite of its antiquity, presents a modern appearance, almost the only old building being its castle, of which a part remains. Its schools are particularly good. Besides iron-works, there are copper-works, brass-foundries, olive-oil mills and a manufacture of wax candles; and silk-spinning, cotton-spinning and wood-carving. In the neighbourhood is the villa of Caleotto, the residence of Alessandro Manzoni, who in his Promcssi Sposi has left a full description of the district. A statue has been erected to him.

In the nth century Lecco, previously the seat of a marquisate, was presented to the bishops of Como by Otto II.; but in the 1 2th century it passed to the archbishops of Milan, and in n 27 it assisted the Milanese in the destruction of Como. During the 13th century it was struggling for its existence with the metro- politan city; and its fate seemed to be sealed when the Visconti drove its inhabitants across the lake to Valmadrera, and forbade them to raise their town from its ashes. But in a few years the people returned; Azzone Visconti made Lecco a strong fortress, and in 1335 united it with the Milanese territory by a bridge across the Adda. During the 15th and 16th centuries the citadel of Lecco was an object of endless contention. In 1 647 the town with its territory was made a countship. Morone,

Charles V.‘s Italian chancellor, was born in Lecco.

See A. L. Apostolo, Lecco ed it suo territorio (Lecco, 1855).

LECH (Licus), a river of Germany in the kingdom of Bavaria, 177 m. long, with a drainage basin of 2550 sq. m. It rises in the Vorarlberg Alps, at an altitude of 6120 ft. It winds out of the gloomy limestone mountains, flows in a north-north-easterly direction, and enters the plains at Fiissen (2580 ft.), where it forms rapids and a fall, then pursues a northerly course past Augsburg, where it receives the Wertach, and joins the Danube from the right just below Donauworth (1330 ft.). It is not navigable, owing to its torrential character and the gravel beds which choke its channel. More than once great historic events have been decided upon its banks. On the Lechfeld, a stony waste some miles long, between the Lech and the Wertach, the emperor Otto I. defeated the Hungarians in August 955. Tilly, in attempting to defend the passage of the stream at Rain against the forces of Gustavus Adolphus, was fatally wounded, on the 5th of April 1632. The river was formerly the boundary between Bavaria and Swabia.

LE CHAMBON, or Le Chambon-Feugerolles, a town of east-central France in the department of Loire, 7J m. S.W. of St Etienne by rail, on the Ondaine, a tributary of the Loire. Pop. (1906) town, 7525; commune, 12,011. Coal is mined in the neighbourhood, and there are forges, steel works, manu- factures of tools and other iron goods, and silk mills. The feudal castle of Feugerolles on a hill to the south-east dates in part from the nth century.

Between Le Chambon and St Etienne is La Ricamarie (pop. of town 5289) also of importance for its coal-mines. Many of the galleries of a number of these mines are on fire, probably from spontaneous combustion. According to popular tradition these fires date from the time of the Saracens; more authenti- cally from the 1 5th century.

LE CHAPELIER, ISAAC RENlJ GUY (17 54-1 794), French politician, was born at Rennes on the 12th of June 1754, his father being bdtonnier of the corporation of lawyers in that town. He entered his father’s profession, and had some success as an orator. In 1789 he was elected as a deputy to the States General by the Tiers-Etat of the senechaussee of Rennes. He adopted advanced opinions, and was one of the founders of the Breton Club (see Jacobin Club); his influence in the Constituent Assembly was considerable, and on the 3rd of August 1789 he was elected its president. Thus he presided over the Assembly

during the important period following the 4th of August; he took an active part in the debates, and was a leading member of the committee which drew up the new constitution; he further presented a report on the liberty of theatres and on literary copyright. He was also conspicuous as opposing Robes- pierre when he proposed that members of the Constituent Assembly should not be eligible for election to the proposed new Assembly. After the flight of the king to Varennes (20th of June 1792), his opinions became more moderate, and on the 29th of September he brought forward a motion to restrict the action of the clubs. This, together with a visit which he paid to England in 1792 made him suspect, and he was denounced on his return for conspiring with foreign nations. He went into hiding, but was discovered in consequence of a pamphlet which he published to defend himself, arrested and condemned to death by the Revolutionary Tribunal. He was executed at Paris on the 22nd of April 1794.

See A. Aulard, Les Oraleurs de la constituante (2nd ed., Paris, 1905) ; R. Kerviler, Recherches et notices sur les deputes de la Bretagne aux etats generaux (2 vols., Rennes, 1888-1889) ; P. J. Levot, Biographie bretonne (2 vols., 1853-1857).

LECHLER, GOTTHARD VICTOR (1811-1888), German Lutheran theologian, was born on the 18th of April 181 1 at Kloster Reichenbach in Wiirttemberg. He studied at Tubingen under F. C. Baur, and became in 1858 pastor of the church of St Thomas, professor ordinarius of historical theology and superintendent of the Lutheran church of Leipzig. He died on the 26th of December 1888. A disciple of Neander, he belonged to the extreme right of the school of mediating theo- logians. He is important as the historian of early Christianity and of the pre-Reformation period. Although F. C. Baur was his teacher, he did not attach himself to the Tubingen school; in reply to the contention that there are traces of a sharp con- flict between two parties, Paulinists and Petrinists, he says that ” we find variety coupled with agreement, and unity with differ- ence, between Paul and the earlier apostles; we recognize the one spirit in the many gifts.” His Das apostolische und das nachapostolische Zeitalter (1851), which developed out of a prize essay (1849), passed through three editions in Germany (3rd ed., 1885), and was translated into English (2 vols., 1886). The work which in his own opinion was his greatest, Johann von Wiclif und die Vorgeschichie der Reformation (2 vols.,

1873), appeared in English with the title John Wiclif and his English Precursors (1878, new ed., 1884). An earlier work, Geschichte des engl. Deismus (1841), is still regarded as a valuable con- tribution to the study of religious thought in England.

Lechler's other works include Geschichte der Presbyterial- und Synodal-verfassung (1854), Urkundenfunde zur Geschichte des christl. Altertums (1886), and biographies of Thomas Bradwardine (1862) and Robert Grosseteste (1867). He wrote part of the commentary on the Acts of the Apostles in J. P. Lange's Bibelwerk. From 1882 he edited with F. W. Dibelius the Beitrdge zur sdchsischen Kirchen- geschichte. Johannes Hus (1890) was published after his death.

LECKY, WILLIAM EDWARD HARTPOLE (1838-1903), Irish historian and publicist, was born at Newtown Park, near Dublin, on the 26th of March 1838, being the eldest son of John Hartpole Lecky, whose family had for many generations been landowners in Ireland. He was educated at Kingstown, Armagh, and Cheltenham College, and at Trinity College, Dublin, where he graduated B.A. in 1859 and M.A. in 1863, and where, with a view to becoming a clergyman in the Irish Protestant Church, he went through a course of divinity. In i860 he published anonymously a small book entitled The Religious Tendencies of the Age, but on leaving college he abandoned his first intention and turned to historical work. In 1861 he pub- lished Leaders of Public Opinion in Ireland, a brief sketch of the lives and work of Swift, Flood, Grattan and O'Connell, which gave decided promise of his later admirable work in the same field. This book, originally published anonymously, was repub- lished in 187 1 ; and the essay on Swift, rewritten and amplified, appeared again in 1897 as an introduction to a new edition of Swift's works. Two learned surveys of certain aspects of history followed: A History of the Rise and Influence of Rationalism in Europe (2 vols., 1865), and A History of European Morals

from Augustus to Charlemagne (2 vols., 1869). Some criticism was aroused by these books, especially by the last named, with its opening dissertation on " the natural history of morals," but both have been generally accepted as acute and suggestive commentaries upon a wide range of facts. Lecky then devoted himself to the chief work of his life, A History of England during the Eighteenth Century, vols. i. and ii. of which appeared in 1878, and vols. vii. and viii. (completing the work) in 1890. His object was " to disengage from the great mass of facts those which relate to the permanent forces of the nation, or which indicate some of the more enduring features of national life," and in the carrying out of this task Lecky displays many of the qualities of a

great historian. The work is distinguished by the lucidity of its style, but the fulness and extent of the authorities referred to, and, above all, by the judicial impartiality maintained by the author throughout. These qualities are perhaps most conspicuous and most valuable in the chapters which deal with the history of Ireland, and in the cabinet edition of 1892, in 1 2 vols, (frequently reprinted) this part of the work is separated from the rest, and occupies five volumes under the title of A History of Ireland in the Eighteenth Century. A volume of Poems, published in 1891, was characterized by a certain frigidity and by occasional lapses into commonplace, objections which may also be fairly urged against much of Lecky's prose-writing. In 1896 he published two volumes entitled Democracy and Liberty, in which he considered, with special reference to Great Britain, France and America, some of the tendencies of modern democracies. The somewhat gloomy conclusions at which he arrived provoked much criticism both in Great Britain and America, which was renewed when he published in a new edition (1899) an elaborate and very depreciatory estimate of Gladstone, then recently dead. This work, though essentially different from the author's purely historical writings, has many of their merits, though it was inevitable that other minds should take a different view of the evidence. In The Map of Life (1900) he discussed in a popular style some of the ethical problems which arise in everyday life. In 1903 he published a revised and greatly enlarged edition of Leaders of Public Opinion in Ireland, in two volumes, from which the essay on Swift was omitted and that on O'Connell was expanded into a complete biography of the great advocate of repeal of the Union. Though always a keen sympathizer with the Irish people in their mis- fortunes and aspirations, and though he had criticized severely the methods by which the Act of Union was passed, Lecky, who grew up as a moderate Liberal, was from the first strenuously opposed to Gladstone's policy of Home Rule, and in 1895 he was returned to parliament as Unionist member for Dublin University. In 1897 he was made a privy councillor, and among the coronation honours in 1902 he was nominated an original member of the new Order of Merit. His university honours included the degree of LL.D. from Dublin, St Andrews and Glasgow, the degree of D.C.L. from Oxford and the degree of Litt.D. from Cambridge. In 1894 he was elected corresponding member of the Institute of France. He contributed occasionally to periodical literature, and two of his addresses, The Political Value of History (1892) and The Empire, its Value and its Growth (1893), were published. He died in London on the 22nd of October 1903. He married in 1871 Elizabeth, baroness de Dedem, daughter of baron de Dedem, a general in the Dutch service, but had no children. Mrs Lecky contributed to various reviews a

number of articles, chiefly on historical and political subjects. A volume of Lecky's Historical and Political Essays was published posthumously (London, 1908).

LE CLERC [Clericus], JEAN (1657-1736), French Protestant theologian, was born on the 19th of March 1657 at Geneva, where his father, Stephen Le Clerc, was professor of Greek. The family originally belonged to the neighbourhood of Beauvais in France, and several of its members acquired some name in literature. Jean Le Clerc applied himself to the study of phil- osophy under J. R. Chouet (1642-1731) the Cartesian, and attended the theological lectures of P. Mestrezat, Franz Turretin and Louis Tronchin (1629-1705). In 1678-1679 he spent some

time at Grenoble as tutor in a private family; on his return to Geneva he passed his examinations and received ordination. Soon afterwards he went to Saumur, where in 1679 were pub- lished Liberii de Sancto Amove Epistolac Theologicae (Irenopoli: Typis Fhilalethianis), usually attributed to him; they deal with the doctrine of the Trinity, the hypostatic union of the two natures in Jesus Christ, original sin, and the like, in a manner sufficiently far removed from that of the conventional orthodoxy of the period. In 1682 he went to London, where he remained six months, preaching on alternate Sundays in the Walloon church and in the Savoy chapel. Passing to Amsterdam he was introduced to John Locke and to Philip v. Limborch, professor at the Remonstrant college; the acquaintance with Limborch soon ripened into a close friendship, which strengthened his preference for the Remonstrant theology, already favourably known to him by the writings of his grand-uncle, Stephan Curcel- laeus (d. 1645) and by those of Simon Episcopius. A last attempt to live at Geneva, made at the request of relatives there, satisfied him that the theological atmosphere was uncongenial, and in 16S4 he finally settled at Amsterdam, first as a moderately successful preacher, until ecclesiastical jealousy shut him out from that career, and afterwards as professor of philosophy, belles-lettres and Hebrew in the Remonstrant seminary. This appointment, which he owed to Limborch, he held from 1684, and in 171 2 on the death of his friend he was called to occupy the chair of church history also. His suspected Socinianism was the cause, it is said, of his exclusion from the chair of dog- matic theology. Apart from his literary labours, Le Clerc's life at Amsterdam was uneventful. In 1691 he married a daughter of

Gregorio Leti. From 1728 onward he was subject to repeated strokes of paralysis, and he died on the 8th of January

I730-

A full catalogue of the publications of Le Clerc will be found, with biographical material, in E. and E. Haag's France Protestante (where seventy-three works are enumerated), or in J. G. de Chauffe- pie's Dictionnaire. Only the most important of these can be men- tioned here. In 1685 he published Sentimens de quelques theologiens de Hollande sur I'histoire critique du Vieux Testament composce par le P. Richard Simon, in which, while pointing out what he believed to be the faults of that author, he undertook to make some positive contributions towards a right understanding of the Bible. Among these last may be noted his argument against the Mosaic author- ship of the Pentateuch, his views as to the manner in which the five books were composed, his opinions (singularly free for the time in which he lived) on the subject of inspiration in general, and particularly as to the inspiration of Job, Proverbs, Ecclesiastes, Canticles. Richard Simon's Reponse (1686) elicited from Le Clerc a Defense des sentimens in the same year, which was followed by a new Reponse (1687). In 1692 appeared his Logica sive Ars Ratiocinandi , and alsj Ontologia el Pneumatologia; these, with the Physica (1695), are incorporated with the Opera Philosophica, which have passed through several editions. In 1693 his series of Biblical commentaries began with that on Genesis; the series was not com- pleted until 1 73 1. The portion relating to the New Testament books included the paraphrase and notes of Henry Hammond (1605-1660). Le Clerc's commentary had a great influence in breaking up traditional prejudices and showing the necessity for a more scientific inquiry into the origin and meaning of the biblical books. It was on all sides hotly attacked. His Ars Critica appeared in 1696, and, in continuation, Epistolae Criiicae et Ecclesiasticae in 1700. Le Clerc's new edition of the Apostolic Fathers of Johann Cotelerius (1627-1C86), published in 1698, marked an advance in the critical study of these documents. But the greatest literary influence of Le Clerc was probably that which he exercised over his contemporaries by means of the serials, or, if one may so call them, reviews, of which he was editor. These were the Bibliotheque universelle et historique (Amsterdam, 25 vols. 12 mo., 1686— 1693), begun with J. C. de la Croze; the Bibliotheque choisie (Amsterdam, 28 vols., 1703-1713); and the Bibliotheque ancienne et moderne, (29 vols., 1714-1726).

See Le Clerc's Parrhasiana ou pensees sur des matieres de critique, d'histoire, de morale, et de politique: avec la defense de divers ouvrages de M. L. C. par Theodore Parrhase (Amsterdam, 1699) ! an d Vita et opera ad annum MDCCXL, amid ejus opusculum, philosophicis Clerici operibus subjiciendum, also attributed to himself. The supplement to Hammond's notes was translated into English in 1699,

Parrhasiana, or Thoughts on Several Subjects, in 1700, the Harmony of the Gospels in 1701, and Twelve Dissertations out of M. Le Clerc's Genesis in 1696.

LECOCq, ALEXANDRE CHARLES (1832-), French

musical composer, was born in Paris, on the 3rd of June 1832.

He \yas admitted into the Conservatoire in 1849, being already an accomplished pianist. He studied under Bazin, Halevy and Benoist, winning the first prize for harmony in 1850, and the second prize for fugue in 1852. He first gained notice by dividing with Bizet the first prize for an operetta in a competition in- stituted by Offenbach. His operetta, Le Docteur miracle, was performed at the Bouffes Parisiens in 1857. After that he wrote constantly for theatres, but produced nothing worthy of mention until Fleur de the (1868), which ran for more than a hundred nights. Les Cent vierges (1872) was favourably received also, but all his previous successes were cast into the shade by La Fille de Madame Angot (Paris, 1873; London, 1873), which was performed for 400 nights consecutively, and has since gained and retained enormous popularity. After 1873 Lecocq produced a large number of comic operas, though he never equalled his early triumph in La Fille de Madame Angot. Among the best of his pieces are Girofle-Girofla (Paris and London, 1874); Les Pres Saint-Gervais (Paris and London, 1874); La Petite Mariee (Paris, 1875; London, 1876, revived as The Scarlet Feather, 1897); Le Petit Due (Paris, 1878; London, as The Little Duke, 1878); La Petite Mademoiselle (Paris, 1879; London, 1880); Le Jour et la Nuit (Paris, 1881; London, as Manola, 1882); LeCceur et la mam (Paris, 1882; London, as Incognita, 1893); La Princesse des Canaries (Paris, 1883; London, as Pepita, 1888). In 1899 a ballet by Lecocq, entitled Le Cygne, was staged at the Opera Comique, Paris; and in 1903 Yetla was produced at Brussels.

LECOINTE-PUYRAVEAU, MICHEL MATHIEU (1764-1827), French politician, was born at Saint-Maixent (Deux-Sevres) on the 13th of December 1764. Deputy for his department to the Legislative Assembly in 1792, and to the Convention in the same year, he voted for " the death of the tyrant." His associa- tion with the Girondins nearly involved him in their fall, in spite of his vigorous republicanism. He took part in the revolu- tion of Thermidor, but protested against the establishment of the Directory, and continually pressed for severer measures against the emigres, and even their relations who had remained in France. He was secretary and then president of the Council of Five Hundred, and under the Consulate a member of the Tribunate. He took no part in public affairs under the

Empire, but was lieutenant-general of police for south-east France during the Hundred Days. After Waterloo he took ship from Toulon, but the ship was driven back by a storm and he narrowly escaped massacre at Marseilles. After six weeks' imprisonment in the Chateau dTf he returned to Paris, escaping, after the proscription of the regicides, to Brussels, where he died on the r5th of January 1827.

LE CONTE, JOSEPH (1823-1901), American geologist, of Huguenot descent, was born in Liberty county, Georgia, on the 26th of February 1823. He was educated at Franklin College, Georgia, where he graduated (i84r); he afterwards studied medicine and received his degree at the New York College of Physicians and Surgeons in r845- After practising for three or four years at Macon, Georgia, he entered Harvard, and studied natural history under L. Agassiz. An excursion made wdth Professors J. Hall and Agassiz to the Helderberg mountains of New York developed a keen interest in geology. After graduating at Harvard, Le Conte in 1851 accompanied Agassiz on an expedition to study the Florida reefs. On his return he became professor of natural science in Oglethorpe University, Georgia; and from 1852 to 1856 professor of natural history and geology in Franklin College. From 1857 to 1869 he was professor of chemistry and geology in South Carolina College, and he was then appointed professor of geology and natural history in the university of California, a post which he held until his death. He published a series of papers on monocular and binocular vision, and also on psychology. His chief contributions, how- ever, related to geology, and in all he wrote he was lucid and philosophical. He described the fissure-eruptions in western America, discoursed on earth-crust movements and their causes and on the great features of the earth's surface. As separate works he published Elements of Geology (1878, 5th ed. 1889); Religion and Science (1874); and Evolution: its History, its

Evidences, and its Relation to Religious Thought (1888). He was president of the American Association for the Advancement of Science in 1892, and of the Geological Society of America in 1896. He died in the Yosemite Valley, California, on the 6th of June 1901.

Sec Obituary by J. J. Stevenson, Annals of New York Acad, of Sciences, vol. xiv. (1902), p. 150.

LECONTE DE LISLE, CHARLES MARIE RENfi (1818-1894), French

poet, was born in the island of Reunion on the 22nd of October 1818. His father, an army surgeon, who brought him up with great severity, sent him to travel in the East Indies with a view to preparing him for a commercial life. After this voyage he went to Rennes to complete his education, studying especially Greek, Italian and history. He returned once or twice to Reunion, but in 1846 settled definitely in Paris. His first volume, La V&nus de Milo, attracted to him a number of friends many of whom were passionately devoted to classical literature. In 1873 he was made assistant librarian at the Luxembourg; in 1886 he was elected to the Academy in succes- sion to Victor Hugo. His Poemes antiques appeared in 1852; Poemes et poesies in 1854; Le Chemin de la croix in 1859; the Poemes barbares, in their first form, in 1862; Les Erinnyes, a tragedy after the Greek model, in 1872; for which occasional music was provided by Jules Massenet; the Poemes tragiques in 1S84; L' Apollonide, another classical tragedy, in 1888; and two posthumous volumes, Derniers poemes in 1899, and Premieres poesies et lettres intimes in 1902. In addition to his original work in verse, he published a series of admirable prose translations of Theocritus, Homer, Hesiod, Aeschylus, Sophocles, Euripides, Horace. He died at Voisins, near Louveciennes (Seine-et-Oise), on the i8thof July 1894.

In Leconte de Lisle the Parnassian movement seems to crystallize. His verse is clear, sonorous, dignified, deliberate in movement, classically correct in rhythm, full of exotic local colour, of savage names, of realistic rhetoric. It has its own kind of romance, in its " legend of the ages," so different from Hugo's, so much fuller of scholarship and the historic sense, yet with far less of human pity. Coldness cultivated as a kind of artistic distinction seems to turn all his poetry to marble, in spite of the fire at its heart. Most of Leconte de Lisle's poems are little chill epics, in which legend is fossilized. They have the lofty monotony of a single conception of life and of the universe. He sees the world as what Byron called it, " a glorious blunder," and desires only to stand a little apart from the throng, meditating scornfully. Hope, with him, becomes no more than this desperate certainty: —

" Tu te tairas, 6 voix sinistre des vivants! " His only prayer is to Death, " divine Death," that it may gather its children to its breast: —

" Affranchis-nou? du temps, du nombre et de l'espace, Et rends-nous le repos que la vie a trouble!"

The interval which is his he accepts with something of the defiance of his own Cain, refusing to fill it with the triviality cf happiness, waiting even upon beauty with a certain inflexible austerity. He listens and

watches, throughout the world, for echoes and glimpses of great tragic passions, languid with fire in the East, a tumultuous conflagration in the middle ages, a sombre darkness in the heroic ages of the North. The burning emptiness of the desert attracts him, the inexplicable melancholy of the dogs that bark at the moon; he would interpret the jaguar's dreams, the sleep of the condor. He sees nature with the same wrathful impatience as man, praising it for its destruc- tive energies, its haste to crush out human life before the stars fall into chaos, and the world with them, as one of the least of stars. He sings the " Dies Irae " exultingly; only seeming to desire an end of God as well as of man, universal nothingness. He conceives that he does well to be' angry, and this anger is indeed the personal note of his pessimism; but it leaves him somewhat apart from the philosophical poets, too fierce for wisdom and not rapturous enough for poetry. (A. Sy.)

See J. Dornis, Leconte de Lisle intime (1895); F. Calmette, Un Demi siecle litteraire, Leconte de Lisle et ses amis (1902) ; Paul Bourget,

Nouveaux essais de psychologie contemporaine (1885) ; F. Brunetiere, L'Evolution de la poesie lyrique en France au XIX" siecle (1894); Maurice Spronck, Les Artistes litteraires (1889); J. Lemaltre, Les Contemporains (2nd series, 1886); F. Brunetiere, Nouveaux essais sur la litt. contemp. (1895).

LE COQ, ROBERT (d. 1373), French bishop, was born at Montdidier, although he belonged to a bourgeois family of Orleans, where he first attended school before coming to Paris. In Paris he became advocate to the parlement (1347) ; then King John appointed him master of requests, and in 1351, a year during which he received many other honours, he became bishop of Laon. At the opening of 1354 he was sent with the cardinal of Boulogne, Pierre I., duke of Bourbon, and Jean VI., count of Vendome, to Mantes to treat with Charles the Bad, king of Navarre, who had caused the constable, Charles of Spain, to be assassinated, and from this time dates his connexion with this king. At the meeting of the estates which opened in Paris in October 1356 Le Coq played a leading role and was one of the most outspoken of the orators, especially when petitions were presented to the dauphin Charles, denouncing the bad government of the realm and demanding the banishment of the royal councillors. Soon, however, the credit of the estates having gone down, he withdrew to his diocese, but at the request of the bourgeois of Paris he speedily returned. The king of Navarre had succeeded in escaping from prison and had entered Paris, where his party was in the ascendant; and Robert le Coq became the most powerful person in his council. No. one dared to contradict him, and he brought into it whom he pleased. He did not scruple to reveal

to the king of Navarre secret delibera- tions, but his fortune soon turned. He ran great danger at the estates of Compiegne in May 1358, where his dismissal was demanded, and he had to flee to St Denis, where Charles the Bad and Etienne Marcel came to find him. After the death of Marcel, he tried, unsuccessfully, to deliver Laon, his episcopal town, to the king of Navarre, and he was excluded from the amnesty promised in the treaty of Calais (1360) by King John to the partisans of Charles the Bad. His temporalities had been seized, and he was obliged to flee from France. In 1363, thanks to the support of the king of Navarre, he was given the bishopric of Calahorra in the kingdom of Aragon, which he administered until his death in 1373.

See L. C. Douet d'Arcq, " Acte d'accusation contre Robert le Coq, evSque de Laon " in Bibliotheque de I'Ecole des Charles, 1st series, t. ii., pp. 350-387; and R. Delachenal, " La Bibliotheque d'un avocat du XIV" siecle, inventaire estimatif des livres de Robert le Coq," in Nouvelle revue historique de droit francais et etranger (1 887) , pp. 524-537. LECOUVREUR, ADRIENNE (1692-1730), French actress, was born on the 5th of April 1692, at Damery, Marne, the daughter of a hatter, Robert Couvreur. She had an unhappy childhood in Paris. She showed a natural talent for declamation and was instructed by La Grand, societaire of the Comfidie Francaise, and with his help she obtained a provincial engage- ment. It was not until 1717, after a long apprenticeship, that she made her Paris debut as Electre, in Crebillon's tragedy of that name, and Angelique in Moliere's George Dandin. Her success was so great that she was immediately received into the Comedie Francaise, and for thirteen years she was the queen of tragedy there, attaining a popularity never before accorded an actress. She is said to have played no fewer than 1 184 times in a hundred roles, of which she created twenty-two. She owed her success largely to her courage in abandoning the stilted style of elocution of her predecessors for a naturalness of delivery and a touching simplicity of pathos that delighted and moved her public. In Baron, who returned to the stage at the age of sixty-seven, she had an able and powerful coadjutor in changing the stage traditions of generations. The jealousy she aroused was partly due to her social successes, which were many, in spite of the notorious freedom of her manner of life. She was on visiting and dining terms with half the court, and her salon was frequented by Voltaire and all the other notables and men of letters. She was the mistress of Maurice de Saxe from 1 721, and sold her plate and jewels to supply him with funds for his ill-starred adventures as duke of Courland. By him she had a daughter, her third, who was grandmother of

the father of George Sand. Adrienne Lecouvreur died on the 20th of March 1730. She was denied the last rites of the Church, and her remains were refused burial in consecrated ground. Voltaire, in a fine poem on her death, expressed his indignation at the barbarous treatment accorded to the woman whose ” friend, admirer, lover ” he was.

Her life formed the subject of the well-known tragedy (1849), by Eugene Scribe and Ernest Legouve.

LE CREUSOT, a town of east-central France in the department of Saone-et-Loire, 55 m. S.W. of Dijon on the Paris-Lyon railway. Pop. (1906), town, 22,535; commune, 33,437. Situated at the foot of lofty hills in a district rich in coal and iron, it has the most extensive iron works in France. The coal bed of Le Creusot was discovered in the 13th century; but it was not till 1774 that the first workshops were founded there. The royal crystal works were transferred from Sevres to Le Creusot in 17S7, but this industry came to an end in 1831. Meanwhile two or three enterprises for the manufacture of metal had ended in failure, and it was only in 1836 that the foundation of iron works by Adolphe and Eugene Schneider definitely inaugurated the industrial prosperity of the place. The works supplied large quantities of war material to the French armies during the Crimean and Franco-German wars. Since that time they have continuously enlarged the scope of their operations, which now embrace the manufacture of steel, armour-plate, guns, ordnance- stores, locomotives, electrical machinery and engineering material of every description. A net-work of railways about 37 m. in length connects the various branches of the works with each other and with the neighbouring Canal du Centre. Special attention is paid to the welfare of the workers who, not including the miners, number about 12,000, and good schools have been established. In 1897 the ordnance-manufacture of the Societe des Forges et Chantiers de la Mediterranee at Havre was acquired by the Company, which also has important branches at Chalon- sur-Saone, where ship-building and bridge-construction is carried on. and at Cette (Herault).

LECTERN (through 0. Fr. leitrun, from Late Lat. leclrum, or lectrinum, legere, to read; the French equivalent is lutrin; Ital. leggio; Ger. Lcsepult), in the furniture of certain Christian churches, a reading-desk, used more especially for the reading of the lessons and in the Anglican Church practically confined to that purpose. In the early Christian Church this was done from the ambo (q.v.), but in the 15th

century, when the books were often of great size, it became necessary to provide a lectern to hold them. These were either in wood or metal, and many fine examples still exist; one at Detling in wood, in which there are shelves on all four sides to hold books, is perhaps the most elaborate. Brass lecterns, as in the colleges of Oxford and Cambridge, are common; in the usual type the book is supported on the outspread wings of an eagle or pelican, which is raised on a moulded stem, carried on three projecting ledges or feet with lions on them. In the example in Norwich cathedral, the pelican supporting the book stands on a rock enclosed with a rich cresting of Gothic tabernacle work; the central stem or pillar, on which this rests, is supported by miniature projecting buttresses, standing on a moulded base with lions on it.

LECTION, LECTIONARY. The custom of reading the books of Moses in the synagogues on the Sabbath day was a very ancient one in the Jewish Church. The addition of lections (i.e. readings) from the prophetic books had been made afterwards and was in existence in our Lord's time, as may be gathered from such passages as St Luke iv. 16-20, xvi. 2g. This element in synagogue worship was taken over with others into the Christian divine service, additions being made to it from the writings of the apostles and evangelists. We find traces of such additions within the New Testament itself in such directions as are con- tained in Col. iv. 16; 1 Thess. v. 27.

From the 2nd century onwards references multiply, though the earlier references do not prove the existence, of a fixed lectionary or order of lessons, but rather point the other way. Justin Martyr, describing divine worship in the middle of the 2nd century says: " On the day called Sunday all who live in

cities or in the country gather together to one place, and the memoirs of the Apostles, or the writings of the Prophets are read as long as time permits " (Apol. i. cap. 67). Tertullian about half a century later makes frequent reference to the reading of Holy Scripture in public worship (Apol. 39; De praescript. 36; De amina, 9).

In the canons of Hippolytus in the first half of the 3rd century we find this direction: " Let presbyters, subdeacons and readers, and all the people assemble daily in the church at time of cock- crow, and betake themselves to prayers, to psalms and to the reading of the Scriptures, according to the command of the Apostles, until I come attend to reading " (canon xxi.).

But there are traces of fixed lessons coming into existence in the course of this century; Origen refers to the book of Job being read in

Holy Week (Commentaries on Job, lib. i.). Allusions of a similar kind in the 4th century are frequent. John Cassian (c. 380) tells us that throughout Egypt the Psalms were divided into groups of twelve, and that after each group there followed two lessons, one from the Old, one from the New Testament (De caenob. inst. ii. 4), implying but not absolutely stating that there was a fixed order of such lessons just as there was of the Psalms. St Basil the Great mentions fixed lessons on certain occasions taken from Isaiah, Proverbs, St Matthew and Acts (Horn. xiii. De bapt.). From Chrysostom (Horn, lxiii. in Act. &c), and Augustine (Tract, vi. in Joann. &c.) we learn that Genesis was read in Lent, Job and Jonah in Passion Week, the Acts of the Apostles in Eastertide, lessons on the Passion on Good Friday and on the Resurrection on Easter Day. In the Apostolical Constitutions (ii. 57) the following service is described and enjoined. First come two lessons from the Old Testament by a reader, the whole of the Old Testament being made use of except the books of the Apocrypha. The Psalms of David are then to be sung. Next the Acts of the Apostles and the Epistles of Paul are to be read, and finally the four Gospels by a deacon or a priest. Whether the selections were ad libitum or according to a fixed table of lessons we are not informed. Nothing in the shape of a lectionary is extant older than the 8th century, though there is evidence that Claudianus Mamercus made one for the church at Vienne in 450, and that Musaeus made one for the church at Marseilles c. 458. The Liber comilis formerly attributed to St Jerome must be three, or nearly three, centuries later than that saint, and the Luxeuil lectionary, or Lectionarium Gallicanum, which Mabillon attributed to the 7th, cannot be earlier than the 8th century; yet the oldest MSS. of the Gospels have marginal marks, and sometimes actual interpolations, which can only be accounted for as indicating the beginnings and endings of liturgical lessons. The third council of Carthage in 397 forbade anything but Holy Scripture to be read in church; this rule has been adhered to so far as the liturgical epistle and gospel, and occasional additional lessons in the Roman missal are concerned, but in the divine office, on feasts when nine lessons are read at matins, only the first three lessons are taken from Holy Scripture, the next three being taken from the sermons of ecclesiastical writers, and the last three from expositions of the day's gospel; but sometimes the lives or Passions of the saints, or of some particular saints, were substituted for any or all of these breviary lessons. (F. E. W.)

LECTISTERNIUM (from Lat. ledum sternere, "to spread a couch "; arpfj}fivai in Dion. Halic. xii. 9), in ancient Rome, a propitiatory ceremony, consisting of a meal offered to gods and goddesses,

represented by their busts or statues, or by portable figures of wood, with heads of bronze, wax or marble, and covered with drapery. Another suggestion is that the symbols of the gods consisted of bundles of sacred herbs, tied together in the form of a head, covered by a waxen mask so aS to resemble a kind of bust (cf. the straw puppets called Argei). These symbols were laid upon a couch (lectus), the left arm resting on a cushion (pulvinus, whence the couch itself was often called pulvinar) in the attitude of reclining. In front of the couch, which was placed in the open street, a meal was set out on a table. It is definitely stated by Livy (v. 13) that the ceremony took place ” for the first time ” in Rome in the year

399 B.C., after the Sibylline books had been consulted by their keepers and interpreters (duumviri sacris faciendis), on the occasion of a pestilence. Three couches were prepared for three pairs of gods — Apollo and Latona, Hercules and Diana, Mercury and Neptune. The feast, which on that occasion lasted for eight (or seven) days, was also celebrated by private in- dividuals; the citizens kept open house, quarrels were forgotten, debtors and prisoners were released, and everything done to banish sorrow. Similar honours were paid to other divinities in subsequent times — Fortuna, Saturnus, Juno Regina of the Aventine, the three Capitoline deities (Jupiter, Juno, Minerva), and in 217, after the defeat of lake Trasimenus, a lectisternium was held for three days to six pairs of gods, corresponding to the twelve great gods of Olympus — Jupiter, Juno, Neptune, Minerva, Mars, Venus, Apollo, Diana, Vulcan, Vesta, Mercury, Ceres. In 205, alarmed by unfavourable prodigies, the Romans were ordered to fetch the Great Mother of the gods from Pessinus in Phrygia; in the following year the image was brought to Rome, and a lectisternium held. In later times, the lectisternium became of constant (even daily) occurrence, and was celebrated in the different temples. Such celebrations must be distinguished from those which were ordered, like the earlier lectisternia, by the Sibylline books in special emergencies. Although un- doubtedly offerings of food were made to the gods in very early Roman times on such occasions as the ceremony of confarreatio, and the epulum Jovis (often confounded with the lectisternium), it is generally agreed that the lectisternia were of Greek origin. In favour of this may be mentioned: the similarity of the Greek 6eo£fjaa, in which, however, the gods played the part of hosts; the gods associated with it were either previously unknown to Roman religion, though often concealed under Roman names, or were

provided with a new cult (thus Hercules was not wor- shipped as at the Ara Maxima, where, according to Servius on Aeneid, viii. 176 and Cornelius Balbus, ap. Macrobius, Sal. iii. 6, a lectisternium was forbidden); the Sibylline books, which decided whether a lectisternium was to be held or not, were of Greek origin; the custom of reclining at meals was Greek. Some, however, assign an Etruscan origin to the ceremony, the Sibylline books themselves being looked upon as old Italian ” black books.” A probable explanation of the confusion between the lectisternia and genuine old Italian ceremonies is that, as the lectisternia became an almost everyday occurrence in Rome, people forgot their foreign origin and the circumstances in which they were first introduced, and then the word pulvinar with its associations was transferred to times in which it had no existence. In imperial times, according to Tacitus (Annals, xv. 44), chairs were substituted for couches in the case of goddesses, and the lectisternium in their case became a sellisternium (the reading, however, is not certain). This was in accordance with Roman custom, since in the earliest times all the members of a family sat at meals, and in later times at least the women and children. This is a point of distinction between the original practice at the lectisternium and the epulum Jovis, the goddesses at the latter being provided with chairs, whereas in the lecti- sternium they reclined. In Christian times the word was used for a feast in memory of the dead (Sidonius Apollinaris, Epistulae, iv. 15).

See article by A. Bouche-Leclercq in Daremberg and Saglio, Dictionnaire des antiquites; Marquardt, Romische Staatsverwaltung, iii. 45, 187 (1885); G. Wissowa, Religion und Kultus der Romer, p. 355 seq. ; monograph by Wackcrmann (Hanau, 1888); C. Pascal, Studii di anlichila e mitologia (1896).

LECTOR, or Reader, a minor office-bearer in the Christian Church. From an early period men have been set apart, under the title of anagnostae, lectorcs, or readers, for the purpose of reading Holy Scripture in church. We do not know what the custom of the Church was in the first two centuries, the earliest reference to readers, as an order, occurring in the writings of Tertullian (De praescript. haeret. cap. 41); there are frequent allusions to them in the writings of St Cyprian and afterwards. Cornelius, bishop of Rome in a.d. 251-252, in a well-known letter mentions readers among the various church orders then existing at Rome. In the Apostolic Church Order (canon 19), mention

is made of the qualifications and duties of a reader, but no reference is made to their method of ordination. In the Apostolic Didascalia there

is recognition of three minor orders of men, subdeacons, readers and singers, in addition to two orders of women, deaconesses and widows. A century later, in the Apos- tolic Constitutions, we find not only a recognition of readers, but also a form of admission provided for them, consisting of the imposition of hands and prayer (lib. viii. cap. 22). In Africa the imposition of hands was not in use, but a Bible was handed to the newly appointed reader with words of commission to read it, followed by a prayer and a beiiediction (Fourth Council of Carthage, can. 8). This is the ritual of the Roman Church of to-day. With regard to age, the novels of Justinian (No. 123) forbade any one to be admitted to the office of reader under the age of eighteen. (F. E. W.)

LECTOURE, a town of south-western France, capital of an arrondissement in the department of Gers, 21 m. N. of Auch on the Southern railway between that city and Agen. Pop. (1906), town, 2426; commune, 4310. It stands on the right bank of the Gers, overlooking the river from the summit of a steep plateau. The church of St Gervais and St Protais was once a cathedral. The massive tower which flanks it on the north belongs to the 15th century; the rest of the church dates from the 13th, 15th, r6th and 17th centuries. The hotel de ville, the sous-prefecture and the museum occupy the palace of the former bishops, which was once the property of Marshal Jean Lannes, a native of the town. A recess in the wall of an old house contains the Fontaine de Houndelie, a spring sheltered by a double archway of the 13th century. At the bottom of the hill a church of the 16th century marks the site of the monastery of St Geny. Lectoure has a tribunal of first instance and a communal college. Its industries include distilling, the manufacture of wooden shoes and biscuits, and market gardening; it has trade in grain, cattle, wine and brandy.

Lectoure, capital of the Iberian tribe of the Lactorates and for a short time of Novempopulania, became the seat of a bishopric in the 4th century. In the nth century the counts of Lomagne made it their capital, and on the union of Lomagne with Armagnac, in !3 2 5> it became the capital of the counts of Armagnac. In 1473 Cardinal Jean de Jouffroy besieged the town on behalf of Louis XI. and after its fall put the whole pupulation to the sword. In 1562 it again suffered severely at the hands of the Catholics under Blaise de Montluc.

LEDA, in Greek mythology, daughter of Thestius, king of Aetolia, and Eurythemis (her parentage is variously given). She was the wife of Tyndareus and mother of Castor and Pollux, Clytaemnestra and Helen (see Castor and Pollux). In another account Nemesis was the mother of Helen (q.v.) whom Leda adopted as her daughter. This led to the

identification of Leda and Nemesis. In the usual later form of the story, Leda herself, having been visited by Zeus in the form of a swan, produced two eggs, from one of which came Helen, from the other Castor and Pollux.

See Apollodorus iii. 10; Hyginus, Fab. 77; Homer, Iliad, iii. 426, Od. xi. 298; Euripides, Helena, 17; Isocrates, Helena, 59; Ovid, Heroides, xvii. 55; Horace, Ars poetica, 147; Stasinus in Athenaeus viii. 334 c. ; for the representations of Leda and the swan in art, J. A. Overbeck, Kunstmythologie, i., and Atlas to the same; also article in Roscher's Lexikon der Mythologie.

LE DAIM (or Le Dain), OLIVIER (d. 1484), favourite of Louis XI. of France, was born of humble parentage at Thielt near Courtrai in Flanders. Seeking his fortune at Paris, he became court barber and valet to Louis XL, and so ingratiated himself with the king that in 1474 he was ennobled under the title Le Daim and in 1477 made comte de Meulant. In the latter year he was sent to Burgundy to influence the young heiress of Charles the Bold, but he was ridiculed and compelled to leave Ghent. He thereupon seized and held Tournai for the French. Le Daim had considerable talent for intrigue, and, according to his enemies, could always be depended upon to execute the baser designs of the king. He amassed a large fortune, largely by oppression and violence, and was named gentleman-in-waiting, captain of Loches, and governor of Saint-Quentin. He remained in favour until the death of Louis XL, when the rebellious lords were able to avenge the slights and insults they had suffered 'at

the hands of the royal barber. He was arrested on charges, the nature of which is uncertain, tried before the parlement of Paris, and on the 21st of May 1484 hanged at Montfaucon without the knowledge of Charles VIII., who might have heeded his father's request and spared the favourite. Le Daim's property was given to the duke of Orleans.

See the memoirs of the time, especially those of Ph. de Commines (ed. Mandrot, 1901-1903, Eng. trans, in Bohn Library); Robt. Gaguin, Compendium de origine el gestis Francorum (Paris, 1586) — it was Gaguin who made the celebrated epigram concerning Le Daim: " Eras judex, lector, et exitium "; De Reiffenberg, Olivier le Dain (Brussels, 1829); Delanone, Le Barbier de Louis XL (Paris, 1832): G. Picot, " Proces d'Olivier le Dain," in the Comptes rendus de I' Academic des

sciences morales et politiques, viii. (1877), 485-537. The memoirs of the time are uniformly hostile to Le Daim.

LEDBURY, a market town in the Ross parliamentary division of Herefordshire, England, 145 m. E. of Hereford by the Great Western railway, pleasantly situated on the south-western slope of the Malvern Hills. Pop. of urban district (1901) 3259. Cider and agricultural produce are the chief articles of trade, and there are limestone quarries in the neighbouring hills. The town contains many picturesque examples of timbered houses, characteristic of the district, the principal being the Market House (1633) elevated on massive pillars of oak. The fine church of St Michael exhibits all the Gothic styles, the most noteworthy features being the Norman chancel and west door, and the remarkable series of ornate Decorated windows on the north side. Among several charities is the hospital of St Catherine, founded by Foliot, bishop of Hereford, in 1232. Hope End, 2 m. N.E. of Ledbury, was the residence of Elizabeth Barrett Browning during her early life. A clock-tower in the town commemorates her.

Wall Hills Camp, supposed to be of British origin, is the earliest evidence of a settlement near Ledbury (Liedeburge, Lidebury). The manor was given to the see of Hereford in the nth century; but in 1561-1562 became crown property. As early as 1170-1171 an episcopal castle existed in Ledbury. The town was not incor- porated, but was early called a borough; and in 1295 and 1304- 1305 returned two members to parliament. A fair on the day of the decollation of John the Baptist was granted to the bishop in 1249. Of fairs which survived in 1792 those of the days of St Philip and St James and St Barnabas were granted in 1584-1585; those held on the Monday before Easter and St Thomas's day were reputed ancient, but not those of the 12th of May, the 22nd of June, the 2nd of October and the 21st of December. Existing fairs are on the second Tuesday in every month and in October. A weekly market, granted to the bishop by Stephen, John and Henry III., was obsolete in 1584-1585, when the present market of Tuesday was authorized. The wool trade was considerable in the 14th century; later Ledbury was inhabited by glovers and clothiers. The town was deeply involved in the operations of the Civil Wars, being occupied both by the royalist leader Prince Rupert and by the Parliamentarian Colonel Birch.

LEDGER (from the English dialect forms Kggen or leggcn, to lie or lay; in sense adapted from the Dutch substantive legger), properly a book remaining regularly in one place, and so used of the copies of the Scriptures and service books kept in a church. The New English Dictionary quotes from Charles Wriothcsley's Chronicle, 1538 (ed.

Camden Soc, 1875, by W. D. Hamilton), ” the curates should provide a booke of the bible in Englishe, of the largest volume, to be a lidger in the same church for the parishioners to read on.” It is an application of this original meaning that is found in the commercial usage of the term for the principal book of account in a business house (see Book-Keeping). Apart from these applications to various forms of books, the word is used of the horizontal timbers in a scaffold (q.v.) lying parallel to the face of a building, which support the “put logs”; of a flat stone to cover a grave; and of. a stationary form of tackle and bait in angling. In the form ” lieger ” the term was formerly frequently applied to a ” resi- dent,” as distinguished from an “extraordinary” ambassador.

LEDOCHOWSKI, MIECISLAUS JOHANN, Count (1822-1902), Polish cardinal, was born on the 29th of October 1822 in Gorki (Russian Poland), and received his early education at the gymnasium and seminary of Warsaw. After finishing his studies at the Jesuit Accademia dei Nobili Ecclesiastici in Rome, which strongly influenced his religious development and his attitude towards church affairs, he was ordained in 1845. From 1856 to

1858 he represented the Roman See in Columbia, but on the outbreak of the Columbian revolution had to return to Rome. In 1861 Pope Pius IX. made him his nuncio at Brussels, and in 1865 he was made archbishop of Gnesen-Posen. His preconiza- tion followed on the 8th of January 1866. This date marks the beginning of the second period in Ledochowski’s life; for during the Prussian and German Kulturkampf he was one of the most declared enemies of the state. It was only during the earliest years of his appointment as archbishop that he entertained a different view, invoking, for instance, an intervention of Prussia in favour of the Roman Church, when it was oppressed by the house of Savoy. On the 12th of December 1870 he presented an effective memorandum on the subject at the headquarters at Versailles. In 1872 the archbishop protested against the demand of the government that religious teaching should be given only in the German language, and in 1873 he addressed a circular letter on this subject to the clergy of his diocese. The govern- ment thereupon demanded a statement from the teachers of religion as to whether they intended to obey it or the archbishop, and on their declaring for the archbishop, dismissed them. The count himself was called upon at the end of 1873 to lay aside his office. On his refusing to do so, he was arrested between 3 and 4 o’clock in the morning on the 3rd of February 1874 by Stafidi, the director of police, and taken to the military prison of Ostrowo. The pope made him a cardinal on the 13th of March, but it was not till the 3rd of February 1876 that he

was released from prison. Having been expelled from the eastern provinces of Prussia, he betook himself to Cracow, where his presence was made the pretext for anti-Prussian demonstrations. Upon this he was also expelled from Austria, and went to Rome, whence, in spite of his removal from office, which was decreed on the 15th of April 1874, he continued to direct the affairs of his diocese, for which he was on several occasions from 1877 to 1879 con- demned in absentia by the Prussian government for " usurpation of episcopal rights." It was not till 1885 that Ledochowski re- solved to resign his archbishopric, in which he was succeeded by Dinder at the end of the year. Ledochowski's return in 1884 was forbidden by the Prussian government (although the Kulturkampf had now abated) , on account of his having stirred up anew the Polish nationalist agitation. He passed the closing years of his life in Rome. In 1892 he became prefect of the Congregation of the Propaganda, and he died in Rome on the 22nd of July 1902.

See Ograbiszewski, Deulschlands Episkopat in Lebensbildern (1876 and following years) ; Holtzmann-Zoppfel, Lexikon fur Theologie und Kirchenwesen (2nd ed., 1888); Vapereau, Dictionnaire universel des contemporains (6th ed., 1893); Briick, Geschichte der katholischen Kirche in Deutschland im neunzehnten Jahrhundert vol. 4 (1901 and 1908) ; Lauchert, Biegraphisch.es Jahrbuch, vol. 7 (1905)- (J- Hn.)

LEDRU-ROLLIN, ALEXANDRE AUGUSTE (1807-1874), French politician, was the grandson of Nicolas Philippe Ledru, the celebrated quack doctor known as " Comus " under Louis XIV., and was born in a house that was once Scarron's, at Fontenay-aux-Roses (Seine), on the 2nd of February 1807. He had just begun to practise at the Parisian bar before the revolu- tion of July, and was retained for the Republican defence in most of the great political trials of the next ten years. In 1838 he bought for 330,000 francs Desire Dalloz's place in the Court of Cassation. He was elected deputy for Le Mans in 1841 with hardly a dissentient voice; but for the violence of his electoral speeches he was tried at Angers and sentenced to four months' imprisonment and a fine, against which he appealed successfully on a technical point. He made a rich and romantic marriage in 1843, an d in 1846 disposed of his charge at the Court of Cassation to give his lime entirely to politics. He was now the recognized leader of the working-men of France. He had more authority in the country than in the Chamber, where the violence of his oratory diminished its effect. He asserted that the fortifications of Paris were directed against liberty, not against foreign invasion, and he stigmatized the law of regency (1842) as an audacious usurpation. Neither from official Liberalism nor from the press did he receive support; even the

Republican National was

opposed to him because of his championship of labour. He therefore founded La Reforme in which to advance his propa- ganda. Between Ledru-Rollin and Odilon Barrot with the other chiefs of the ” dynastic Left ” there were acute differences, hardly dissimulated even during the temporary alliance which produced the campaign of the banquets. It was the speeches of Ledru-Rollin and Louis Blanc at working-men’s banquets in Lille, Dijon and Chalons that really heralded the revolution. Ledru-Rollin prevented the appointment of the duchess of Orleans as regent in 1848. He and Lamartine held the tribune in the Chamber of Deputies until the Parisian populace stopped serious discussion by invading the Chamber. He was minister of the interior in the provisional government, and was also a member of the executive committee 1 appointed by the Con- stituent Assembly, from which Louis Blanc and the extremists were excluded. At the crisis of the 15th of May he definitely sided with Lamartine and the party of order against the pro- letariat. Henceforward his position was a difficult one. He never regained his influence with the working classes, who considered they had been betrayed; but to his short ministry belongs the credit of the establishment of a working system of universal suffrage. At the presidential election in December he was put forward as the Socialist candidate, but secured only 370,000 votes. His opposition to the policy of President Louis Napoleon, especially his Roman policy, led to his moving the impeachment of the president and his ministers. The motion was defeated, and next day (June 13, 1849) he headed what he called a peaceful demonstration, and his enemies armed insurrec- tion. He himself escaped to London where he joined the execu- tive of the revolutionary committee of Europe, with Kossuth and Mazzini among his colleagues. He was accused of complicity in an obscure attempt (1857) against the life of Napoleon III., and condemned in his absence to deportation. Emile Ollivier removed the exceptions from the general amnesty in 1870, and Ledru-Rollin returned to France after twenty years of exile. Though elected in 187 1 in three departments he refused to sit in the National Assembly, and took no serious part in politics until 1874 when he was returned to the Assembly as member for Vaucluse. He died on the 31st of December of that year.

Under Louis Philippe he made large contributions to French jurisprudence, editing the Journal du palais, 1791-183/ (27 vols.,

1837), and 1 837-18 47 (17 vols.), with a commentary Repertoire general de la jurisprudence francaise (8 vols., 1843-1848), the introduction to which was written by himself. His later writings were political in character. See Ledru-Rollin, ses discours et ses ecrits politiques (2 vols., Paris, 1879), edited by his widow.

LEDYARD, JOHN (1751-1789), American traveller, was born in Groton, Connecticut, U.S.A. After vainly trying law and theology, Ledyard adopted a seaman's life, and, coming to London, was engaged as corporal of marines by Captain Cook for his third voyage (1776). On his return (1778) Ledyard had to give up to the Admiralty his copious journals, but afterwards published, from memory, a meagre narrative of his experiences — herein giving the only account of Cook's death by an eye-witness (Hartford, U.S.A., 1783). He continued in the British service till 1782, when he escaped, off Long Island. In 1784 he revisited Europe, to organize an expedition to the American North-West. Having failed in his attempts, he decided to reach his goal by travelling across Europe and Asia. Baffled in his hopes of crossing the Baltic on the ice (Stockholm to Abo), he walked right round from Stockholm to St Petersburg, where he arrived barefoot and penniless (March 1787). Here he made friends with Pallas and others, and accompanied Dr Brown, a Scotch physician in the Russian service, to Siberia. Ledyard left Dr Brown at Barnaul, went on to Tomsk and Irkutsk, visited Lake Baikal, and descended the Lena to Yakutsk (18th of September 1787). With Captain Joseph Billings, whom he had known on Cook's " Resolution," he returned to Irkutsk, where he was arrested, deported to the Polish frontier, and banished from Russia for ever. Reaching London, he was engaged by Sir Joseph Banks and the African Association to explore overland routes from Alexandria to the Niger, but in Cairo he succumbed to a dose

1 Arago, Garnier-Pages, Marie, Lamartine, and Ledru-Rollin.

of vitriol (17th of January 1789). Though a born explorer, little 'resulted from his immense but ill-directed activities.

See Memoirs of the Life and Travels of John Ledyard, by Jared Sparks (1828).

LEE, ANN (1 736-1 784), English religious visionary, was born in Manchester, where she was first a factory hand and afterwards a cook. She is remembered by her connexion with the sect known as Shakers (q.v.). She died at Watervliet, near Albany, New York. LEE, ARTHUR (1740-1792), American diplomatist, brother of Richard Henry Lee, was born at Stratford, Westmoreland county, Virginia, on the 20th of

December 1740. He was educated at Eton, studied medicine at Edinburgh, practised as a physician in Williamsburg, Virginia, read law at the Temple, London, in 1766-1770, and practised law in London in 1770-1776. He was an intimate of John Wilkes, whom he aided in one of his London campaigns. In 17 70-1 77 5 he served as London agent for Massachusetts, second to Benjamin Franklin, whom he succeeded in 1775. At that time he had shown great ability as a pamphleteer, having published in London The Monitor (r768), seven essays previously printed in Virginia; The Political Detection: or the Treachery and Tyranny of Administration, both at Home and Abroad (1770), signed ” Junius Americanus “; and An Appeal to the Justice and Interests of the People of Great Britain in the Present Disputes with America (1774), signed “An Old Member of Parliament.” In December 1775 the Committee of Secret Correspondence of Congress chose him its European agent principally for the purpose of ascertaining the views of France, Spain, and other European countries regarding the war between the colonies and Great Britain. In October 1776 he was appointed, upon the refusal of Jefferson, on the commission with Franklin and Silas Deane to negotiate a treaty of alliance, amity and commerce with France, and also to negotiate with other European governments. His letters to Congress, in which he expressed his suspicion of Deane’s business integrity and criticized his accounts, resulted in Deane’s recall; and other letters impaired the confidence of Congress in Franklin, of whom he was especially jealous. Early in 1777 he went to Spain as American commissioner, but received no official recognition, was not permitted to proceed farther than Burgos, and accomplished nothing; until the appointment of Jay, however, he continued to act as commissioner to Spain, held various conferences with the Spanish minister in Paris, and in January 1778 secured a promise of a loan of 3,000,000 livres, only a small part of which (some 170,000 livres) was paid. In June 1777 he went to Berlin, where, as in Spain, he was not officially recognized. Although he had little to do with the negotiations, he signed with Franklin and Deane in February 1778 the treaties between the United States and France. Having become unpopular at the courts of France and Spain, Lee was recalled in 1779, and returned to the United States in September 1780. He was a member of the Virginia House of Delegates in 1781 and a delegate to the Continental Congress in 1782-1785. With Oliver Wolcott and Richard Butler he negotiated a treaty with the Six Nations, signed at Fort Stanwix on the 22nd of October 1784, and with George Clark and Richard Butler a treaty with the Wyandot, Delaware, Chippewa and Ottawa Indians, signed at Ft. Mcintosh on the 21st of January 1785. He was a member of the treasury board in 1 784-1 789. He strongly opposed the constitution, and after its

adoption retired to his estate at Urbana, Virginia, where he died on the 12th of December 1792.

See R. H. Lee, Life of Arthur Lee (2 vols., Boston, 1829), and C. H. Lee, A Vindication of Arthur Lee (Richmond, Virginia, 1894), both partisan. Much of Lee's correspondence is to be found in Wharton's Revolutionary Diplomatic Correspondence (Washington, 1889). Eight volumes of Lee's MSS. in the Harvard University Library are described and listed in Library of Harvard University, Bibliographical Contributions, No. 8 (Cambridge, 1882).

LEE, FITZHUGH (1835-1905), American cavalry general, was born at Clermont, in Fairfax county, Virginia, on the 19th of November 1835. He was the grandson of " Light Horse Harry " Lee, and the nephew of Robert E. Lee. His father, Sydney Smith Lee, was a fleet captain under Commodore Perry in Japanese waters and rose to the rank of commodore; his

mother was a daughter of George Mason. Graduating from West Point in 1856, he was appointed to the 2nd Cavalry, which was commanded by Colonel Albert Sidney Johnston, .and in which his uncle, Robert E. Lee, was lieutenant-colonel. As a cavalry subaltern he distinguished himself by his gallant conduct in actions with the Comanches in Texas, and was severely wounded in 1859. I n May i860 he was appointed instructor of cavalry at West Point, but resigned on the secession of Virginia. Lee was at once employed in the organization of the forces of the South, and served at first as a staff officer to General R. S. Ewell, and afterwards, from September 1861, as lieutenant-colonel, and from April 1862 as colonel of the First Virginia Cavalry in the Army of Northern Virginia. He became brigadier- general on General J. E. B. Stuart's recommendation on the 25th of July 1862, and served under that general throughout the Virginian campaigns of 1862 and 1863, becoming major- general on the 3rd of September 1863. He conducted the cavalry action of Beverly Ford (17th March 1863) with skill and success. In the Wilderness and Petersburg campaigns he was constantly employed as a divisional commander under Stuart, and, after Stuart's death, under General Wade Hampton. He took part in Early's campaign against Sheridan in the Shenandoah Valley, and at Winchester (19th Sept. 1864) three horses were shot under him and he was severely wounded. On General Hampton's being sent to assist General Joseph E. Johnston in North Carolina, the

command of the whole of General Lee's cavalry devolved upon Fitzhugh Lee early in 1865, but the surrender of Appomattox followed quickly upon the opening of the campaign. Fitzhugh Lee himself led the last charge of the Confederates on the 9th of April that year at Farmville.

After the war he devoted himself to farming in Stafford county, Virginia, and was conspicuous in his efforts to reconcile the Southern people to the issue of the war, which he regarded as a final settlement of the questions at issue. In 1875 he attended the Bunker Hill centenary at Boston, Mass., and delivered a remarkable address. In 1885 he was a member of the board of visitors of West Point, and from 1886 to 1890 was governor of Virginia. In April 1896 he was appointed by President Cleveland consul-general at Havana, with duties of a diplomatic and military character added to the usual consular business. In this post (in which he was retained by President McKinley) he was from the first called upon to deal with a situation of great diffi- culty, which culminated with the destruction of the " Maine " (see Spanish- American War). Upon the declaration of war between Spain and the United States he re-entered the army. He was one of the three ex-Confederate general officers who were made major-generals of United States Volunteers. Fitzhugh Lee commanded the VII. army corps, but took no part in the actual operations in Cuba. He was military governor of Havana and Pinar del Rio in 1899, subsequently commanded the department of the Missouri, and retired as a brigadier-general U.S. Army in 1901. He died in Washington on the 28th of April 1905. He wrote Robert E. Lee (1894) in the " Great Commanders " series, and Cuba's Struggle Against Spain (1899).

LEE, GEORGE ALEXANDER (1802-1851), English musician, was born in London, the son of Henry Lee, a pugilist and inn- keeper. He became " tiger " to Lord Barrymore, and his singing led to his being educated for the musical profession. After appearing as a tenor at the theatres in Dublin and London, he joined in producing opera at the Tottenham Street theatre in 1829, and afterwards was connected with musical productions at Drury Lane and Covent Garden. He married Mrs Waylett, a popular singer. Lee composed music for a number of plays, and also many songs, including the popular " Come where the Aspens quiver," and for a short time had a music-selling business in the Quadrant. He died on the 8th of October 1851.

LEE, HENRY (1756-18 18), American general, called "Light Horse Harry," was born near Dumfries, Virginia, on the 29th of January 1756. His father was first cousin to Richard Henry Lee. With a view to a legal career he graduated (1773) at Princeton, but soon afterwards,

on the outbreak of the War of Independence, he became an officer in the patriot forces. He

served with great distinction under Washington, and in 1778 was promoted major and given the command of a small irregular corps, with which he won a great reputation as a leader of light troops. His services on the outpost line of the army earned for him the soubriquet of ” Light Horse Harry.” His greatest exploit was the brilliant surprise of Paulus Hook, N.J., on the 19th of August 1779; for this feat he received a gold medal, a reward given to no other officer below general’s rank in the whole war. He was promoted lieutenant-colonel 1780, and sent with a picked corps of dragoons to the southern theatre of war. Here he rendered invaluable services in victory and defeat, notably at Guilford Court House, Camden and Eutaw Springs. He was present at Cornwallis’s surrender at Yorktown, and afterwards left the army owing to ill-health. From 1786 to 1788 he was a delegate to the Confederation Congress, and in the last- named year in the Virginia convention he favoured the adoption of the Federal constitution. From 1789 to 1791 he served in the General Assembly, and from 1791 to 1794 was governor of Virginia. In 1794 Washington sent him to help in the suppres- sion of the ” Whisky Insurrection ” in western Pennsylvania. A new county of Virginia was named after him during his governorship. He was a major-general in 1798-1800. From 1799 to 1801 he served in Congress. He delivered the address on the death of Washington which contained the famous phrase, ” first in war, first in peace, and first in the hearts of his countrymen.” Soon after the War of 1812 broke out, Lee, while helping to resist the attack of a mob on his friend, A. C. Hanson, editor of the Baltimore Federal Republican, which had opposed the war, received grave injuries, from which he never recovered. He died at the house of General Nathanael Greene on Cumberland Island, Georgia, on the 25th of March 1818.

Lee wrote valuable. Memoirs of the War in the Southern Department (1812; 3rd ed., with memoir by Robert E. Lee, 1869).

LEE, JAMES PRINCE (1804-1869), English divine, was born in London on the 28th of July 1804, and was educated at St Paul’s school and at Trinity College, Cambridge, where he dis- played exceptional ability as a classical scholar. After taking orders in 1830 he served under Thomas Arnold at Rugby school, and in 1838 was appointed head-master of King Edward’s school, Birmingham, where he had among his pupils E. W. Benson, J. B. Lightfoot and B. F. Westcott. In 1848 Lord John Russell nominated him as first bishop of the newly-con- stituted see of Manchester. His pedagogic manner bore some- what irksomely on his clergy. He is best remembered for his splendid work in church

extension; during his twenty-one years' tenure of the see he consecrated 130 churches. He took a foremost part in founding the Manchester free library, and bequeathed his own valuable collection of books to Owens College. He died on the 24th of December 1869.

A memorial sermon was preached by Archbishop E. W. Benson, and was published with biographical details by J. F. Wickenden and others.

LEE, NATHANIEL (c. 1653-1692), English dramatist, son of Dr Richard Lee, a Presbyterian divine, was born probably in 1653. His father was rector of Hatfield, and held many prefer- ments under the Commonwealth. He was chaplain to General Monk, afterwards duke of Albemarle, and after the Restoration he conformed to the Church of England, abjuring his former opinions, especially his approval of Charles I.'s execution. Nathaniel Lee was educated at Westminster school, and at Trinity College, Cambridge, taking his B.A. degree in 1668. Coming to London under the patronage, it is said, of the duke of Buckingham, he tried to earn his living as an actor, but though he was an admirable reader, his acute stage fright made actiiig impossible. His earliest play, Nero, Emperor of Rome, was acted in 1675 at Drury Lane. Two tragedies written in rhymed heroic couplets, in imitation of Dryden, followed in 1676 — Sophonisba, or Hannibal's Overthrow and Gloriana, or the Court of Augustus Caesar. Both are extravagant in design and treat- ment. Lee made his reputation in 1677 with a blank verse tragedy, The Rival Queens, or the Death of Alexander the Great. The play, which treats of the jealousy of Alexander's first wife, Roxana, for his second wife, Statira, was, in spite of ntu£h

bombast, a favourite on the English stage down to the days of Edmund Kean. Mithridates, King of Pontus (acted 1678), Theodosius, or the Force of Love (acted 1680), Caesar Borgia (acted 1680) — an imitation of the worst blood and thunder Elizabethan tragedies — Lucius Junius Brutus, Father of His Country (acted 1681), and Constantine the Great (acted 1684) followed. The Princess of Cleve (1681) is a gross adaptation of Madame de La Fayette's exquisite novel of that name. The Massacre of Paris (published 1690) was written about this time. Lee had given offence at court by his Lucius Junius Brutus, which had been suppressed after its third representation for some lines on Tarquin's character that were taken to be a reflection on Charles II. He therefore joined with Dryden, who

had already admitted him as a collaborator in an adaptation of Oedipus, in The Duke of Guise (1683), a play which directly advocated the Tory point of view. In it part of the Massacre of Paris was incorporated. Lee was now thirty years of age, and had already achieved a considerable reputation. But he had lived in the dissipated society of the earl of Rochester and his associates, and imitated their excesses. As he grew more disreputable, his patrons neglected him, and in 1684 his mind was completely unhinged. He spent five years in Bethlehem Hospital, and recovered his health. He died in a drunken fit in 1692, and was buried in St Clement Danes, Strand, on the 6th of May.

Lee's Dramatic Works were published in 1784. In spite of their extravagance, they contain many passages of great beauty.

LEE, RICHARD HENRY (1732-1794), American statesman and orator, was born at Stratford, in Westmoreland county, Virginia, on the 20th of January 1732, and was one of six dis- tinguished sons of Thomas Lee (d. 1750), a descendant of an old Cavalier family, the first representative of which in America was Richard Lee, who was a member of the privy council, and early in the reign of Charles I. emigrated to Virginia. Richard Henry Lee received an academic education in England, then spent a little time in travel, returned to Virginia in 1752, having come into possession of a fine property left him by his father, and for several years applied himself to varied studies. When twenty-five he was appointed justice of the peace of Westmore- land county, and in the same year was chosen a member of the Virginia House of Burgesses, in which he served from 17ˆ8 to 1775. He kept a diffident silence during two sessions, his first speech being in strong opposition to slavery, which he proposed to discourage and eventually to abolish, by imposing a heavy tax on all further importations. He early allied himself with the Patriot or Whig element in Virginia, and in the years immedi- ately preceding the War of Independence was conspicuous as an opponent of the arbitrary measures of the British ministry. In 1768, in a letter to John Dickinson of Pennsylvania, he sug- gested a private correspondence among the friends of liberty in the different colonies, and in 1773 he became a member of the Virginia Committee of Correspondence.

Lee was one of the delegates from Virginia to the first Con- tinental Congress at Philadelphia in 1774, and prepared the address to the people of British America, and the second address to the people of Great Britain, which are among the most effective papers of the time. In accordance with instructions given by the Virginia House of Burgesses, Lee introduced in Congress, on the 7th of June 1776, the

following famous resolu- tions: (1) ” that these united colonies are, and of right ought to be, free and independent states, that they are absolved from all allegiance to the British crown, and that all political con- nexion between them and the state of Great Britain is, and ought to be, totally dissolved “; (2) ” that it is expedient to take the most effectual measures for forming foreign alliances “; and (3) ” that a plan of confederation be prepared and transmitted to the respective colonies for their consideration and approba- tion.” After debating the first of these resolutions for three days, Congress resolved that the further consideration of it should be postponed until the 1st of July, but that a committee should be appointed to prepare a declaration of independence. The illness of Lee’s wife prevented him from being a member of that committee, but his first resolution was adopted on the 2nd

of July, and the Declaration of Independence, prepared princi- pally by Thomas Jefferson, was adopted two days later. Lee was in Congress from 1774 to 1780, and was especially prominent in connexion with foreign affairs. He was a member of the Virginia House of Delegates in 1777, 1780-1784 and 1786-1787; was in Congress again from 1784 to 1787, being president in 1784- 1786; and was one of the first United States senators chosen from Virginia after the adoption of the Federal constitution. Though strongly opposed to the adoption of that constitution, owing to what he regarded as its dangerous infringements upon the independent power of the states, he accepted the place of senator in hope of bringing about amendments, and proposed the Tenth Amendment in substantially the form in which it was adopted. He became a warm supporter of Washington’s administration, and his prejudices against the constitution were largely removed by its working in practice. He retired from public life in 1792, and died at Chantilly, in Westmoreland county, on the 19th of June 1794.

See the Life (Philadelphia, 1825), by his grandson, R. H. Lee; and Letters (New York, 19 10), edited by J. C. Ballagh.

His brother, William Lee (i 739-1795), was a diplomatist during the War of Independence. He accompanied his brother, Arthur Lee (

See Letters of William Lee, edited by W. C. Ford (Brooklyn, 1 891). Another brother, Francis Lightfoot Lee (1734-1797), was a member of the Virginia House of Burgesses in 1770-1775. In 1775-1779 he was a delegate to the Continental Congress, and as such signed the Declaration of Independence. He served on the committee which drafted the Articles of Confederation, and contended that there should

be no treaty of peace with Great Britain which did not grant to the United States both the right to the Newfoundland fisheries and the free navigation of the Mississippi. After retiring from Congress he served in 1780-1782 in the Virginia Senate.

LEE, ROBERT EDWARD (1807-1870), American soldier, general in the Confederate States army, was the youngest son of major-general Henry Lee, called ” Light Horse Harry.” He was born at Stratford, Westmoreland county, Virginia, on the 19th of January 1807, and entered West Point in 1825. Graduat- ing four years later second in his class, he was given a commission in the U.S. Engineer Corps. In 1831 he married Mary, daughter of G. W. P. Custis, the adopted son of Washington and the grand- son of Mrs Washington. In 1836 he became first lieutenant, and in 1838 captain. In this rank he took part in the Mexican War, repeatedly winning distinction for conduct and bravery. He received the brevets of major for Cerro Gordo, lieut.- colonel for Contreras-Churubusco and colonel for Chapultepec. After the war he was employed in engineer work at Washington and Baltimore, during which time, as before the war, he resided on the great Arlington estate, near Washington, which had come to him through his wife. In 1852 he was appointed super- intendent of West Point, and during his three years here he carried out many important changes in the academy. Under him

as cadets were his son G. W. Custis Lee, his nephew, Fitzhugh | Lee and J. E. B. Stuart, all of whom became general officers in the Civil War. In 1855 he was appointed as lieut. colonel to the 2nd Cavalry, commanded by Colonel Sidney Johnston, with whom he served against the Indians of the Texas border. In 1859, while at Arlington on leave, he was summoned to com mand the United States troops sent to deal with the John Brown raid on Harper’s Ferry. In March 1861 he was made colonel of the 1st U.S. Cavalry; but his career in the old army ended with the secession of Virginia in the following month. Lee was strongly averse to secession, but felt obliged to conform to the action of his own state. The Federal authorities offered Lee the command of the field army about to invade the South, which he refused. Resigning his commission, he made his way to Richmond and was at once made a major-general in the Virginian forces. A few weeks later he became a brigadier- general (then the highest rank) in the Confederate service.

The military operations with which the great Civil War opened in 1861 were directed by President Davis and General Lee. Lee was personally in charge of the unsuccessful West Virginian operations in the autumn, and, having been made a full general on the 31st of August, during the winter he devoted his ex- perience as an engineer to the fortification and general defence of the Atlantic coast. Thence, when the well-drilled Army of the Potomac was about to descend upon Richmond, he was hurriedly recalled to Richmond. General Johnston was wounded at the battle of Fair Oaks (Seven Pines) on the 31st of May 1862, and General Robert E. Lee was assigned to the command of the famous Army of Northern Virginia which for the next three years " carried the rebellion on its bayonets." Little can be said of Lee's career as a commander-in-chief that is not an integral part of the history of the Civil War. His first success was the " Seven Days' Battle " (q.v.) in which he stopped McClellan's advance; this was quickly followed up by the crushing defeat of the Federal army under Pope, the invasion of Maryland and the sanguinary and indecisive battle of the Antietam (q.v.). The year ended with another great victory at Fredericksburg (qv.) Chancellorsville (see Wilderness), won against odds of two to one, and the great three days' battle of Gettysburg (q.v.), where for the first time fortune turned decisively against the Confederates, were the chief events of 1863. In the autumn Lee fought a war of manoeuvre against General Meade. The tremendous struggle of 1864 between Lee and Grant included the battles of the Wilderness (q.v.), Spottsylvania, North Anna, Cold Harbor and the long siege of Petersburg (q.v.), in which, almost invariably, Lee was locally successful. But the steady pressure of his unrelenting opponent slowly wore down his strength. At last with not more than one man to oppose to Grant's three he was compelled to break out of his Petersburg lines (April 1865). A series of heavy combats revealed his purpose, and Grant pursued the dwindling remnants of. Lee's army to the westward. Headed off by the Federal cavalry, and pressed closely in rear by Grant's main body, General Lee had no alternative but to surrender. At Appomattox Court House, on the gth of April, the career of the Army of Northern Virginia came to an end. Lee's farewell order was issued on the following day, and within a few weeks the Confederacy was at an end. For a few months Lee lived quietly in Powhatan county, making his formal submission to the Federal authorities and urging on his own people acceptance of the new conditions. In August he was offered, and accepted, the presidency of Washing- ton College, Lexington (now Washington and Lee University), a post which he occupied until his death on the 12th of October 1870 He was buried in the college grounds.

Fur the events of Lee's military career briefly indicated in this notice the reader is referred to the articles American Civil War, &c. By his achievements he won a high place amongst the great generals of history. Though hampered by lack of materials and by political necessities, his strategy was daring always, and he never hesitated to take the gravest risks. On the field of battle he was as energetic in attack as he was constant in defence, and his personal influence over the men

whom he led was extraordinary. No student of the American Civil War can fail to notice how the influence of Lee dominated the course of the struggle, and his surpassing ability was never more conspicuously shown than in the last hopeless stages of the contest. The personal history of Lee is lost in the history of the great crisis of America's national life; friends and foes alike acknowledged the purity of his motives, the virtues of his private life, his earnest Christianity and the unrepining loyalty with which he accepted the ruin of his party.

See A. L. Long, Memoirs of Robert E. Lee (New York, 1 886) ; Fitzhugh Lee, General Lee (New York, 1894, " Great Commanders " series); R. A. Brock, General Robert E. Lee (Washington, 1904) ; R. E. Lee, Recollections and Letters of General R. E. Lee (London, 1904) ; H. A. White, Lee (" Heroes of the Nations") (1897) ; P. A. Bruce, Robert E. Lee (1907) ; T. N. Page, Lee (1909) ; W.H.Taylor, Four Years with Gen- eral Lee; J. W. Jones, Personal Reminiscences of Robert E. Lee (1874). LEE (or Legh) ROWLAND (d. 1543), English bishop, belonged to a Northumberland family and was educated at Cambridge. Having entered the Church he obtained several livings owing to the favour of Cardinal Wolsey; after Wolsey's fall he rose high in the esteem of Henry VIII. and of Thomas Cromwell, serving both king and minister in the business of suppressing the monasteries, and he is said to have celebrated Henry's secret marriage with Anne Boleyn in January 1533. Whether this be so or not, Lee took part in preparing for the divorce pro- ceedings against Catherine of Aragon, and in January 1534 he was elected bishop of Coventry and Lichfield, or Chester as the see was often called, taking at his consecration the new oath to the king as head of the English Church and not seeking confirmation from the pope. As bishop he remained in Henry's personal service, endeavouring to establish the legality of his marriage with Anne, until May 1534, when he was appointed lord president of the council in the marches of Wales. At this time the Welsh marches were in a very disorderly condition. Lee acted in a stern and energetic fashion, holding courts, sentencing many offenders to death and overcoming the hostility of the English border lords. After some years of hard and successful work in this capacity, " the last survivor of the old martial

prelates, fitter for harness than for bishops' robes, for a court of justice than a court of theology," died at Shrewsbury in June 1543. Many letters from Lee to Cromwell are preserved in the Record Office, London; these throw much light on the bishop's career and on the lawless condition of the Welsh marches in his time.

One of his contemporaries was Edward Lee (c. 1482-1544) archbishop of York, famous for his attack on Erasmus, who replied to him in his Epistolae aliquot eruditorum virorum. Like Rowland, Edward was useful to Henry VIII. in the matter of the divorce of Catherine of Aragon, and was sent by the king on embassies to the emperor Charles V. and to Pope Clement VII. In 1531 he became archbishop pi York, but he came under suspicion as one who dis- liked the king's new position as head of the English Church. At Pontefract in 1536, during the Pilgrimage of Grace, the archbishop was compelled to join the rebels, but he did not sympathize with the rising and in 1539 he spoke in parliament in favour of the six articles of religion. Lee, who was the last archbishop of York to coin money, died on the 13th of September 1544.

LEE, SIDNEY (1859-), English man of letters, was born in London on the 5th of December 1859. He was educated at the City of London school, and at Balliol College, Oxford, where he graduated in modern history in 1882. In the next year he became assistant-editor of the Dictionary of National Biography. In 1890 he was made joint-editor, and on the retirement of Sir Leslie Stephen in 1891 succeeded him as editor. He was himself a voluminous contributor to the work, writing some 800 articles, mainly on Elizabethan authors or statesmen. While he was still at Balliol he wrote two articles on Shake- spearian questions, which were printed in the Gentleman's Magazine, and in 1884 he published a book on Stratford-on-Avon. His article on Shakespeare in the fifty-first volume (1897) of the Dictionary of National Biography formed the basis of his Life of William Shakespeare (1898), which reached its fifth edition in 1905. Mr Lee edited in 1902 the Oxford facsimile edition of the first folio of Shakespeare's Comedies, Histories and Tragedies, followed in 1902 and 1904 by supplementary volumes giving details of extant copies, and in 1906 by a complete edition of

Shakespeare's Works. Besides editions of English classics his works include a Life of Queen Victoria (1902), Great Englishmen of the

Sixteenth Century (1904), based on his Lowell Institute lectures at Boston, Mass., in 1903, and Shakespeare and the Modern Stage (1906).

LEE, SOPHIA (1 750-1824), English novelist and dramatist, daughter of John Lee (d. 1781), actor and theatrical manager, was born in London. Her first piece, The Chapter of Accidents, a one-act-opera based on Diderot's Pere de famille, was produced by George Colman at the Haymarket Theatre on the 5th of August 1780. The proceeds were spent in establishing a school at Bath, where Miss Lee made a home for her sisters. Her subsequent productions included The Recess, or a Tale of other Times (1785), a historical romance; and Almeyda, Queen of Grenada (1796), a tragedy in blank verse; she also contributed to her sister's Canterbury Tales (1797). She died at her house near Clifton on the 13th of March 1824.

Her sister, Harriet Lee (1757-1851), published in 1786 a novel written in letters, The Errors of Innocence. Clara Lennox followed in 1797. Her chief work is the Canterbury Tales (1797- 1805), a series of twelve stories which became very popular. Lord Byron dramatized one of the tales, " Kruitzner," as Werner, or the Inheritance. She died at Clifton on the 1st of August 1851. LEE, STEPHEN DILL (1833-1908), Confederate general in the American Civil War, came of a family distinguished in the history of South Carolina, and was born at Charleston, S.C., on the 22nd of September 1833. Graduating from West Point in 1854, he served for seven years in the United States army and resigned in 1861 on the secession of South Carolina. He was aide de camp to General Beauregard in the attack on Fort Sumter, and captain commanding a light battery in General Johnston's army later in the year 1861. Thereafter, by succes- sive steps, each gained by distinguished conduct on the field of battle, he rose to the rank of brigadier-general in November 1862, being ordered to take command of defences at Vicks- burg. He served at this place with great credit until its surrender to General Grant in July 1863, and on becoming a prisoner of war, he was immediately exchanged and promoted major-general. His regimental service had been chiefly with artillery, but he had generally worked with and at times commanded cavalry, and he was now assigned to command the troops of that arm in the south-western theatre of war. After harassing, as far as his limited numbers permitted, the advance of Sherman's column on Meridian, he took General Polk's place as commander of the department of Mississippi. In June 1864, on Hood's promotion to command the Army of Tennessee, S. D. Lee was made a lieutenant-general and assigned to command Hood's old corps in that army. He fought at Atlanta and Jonesboro and in the skirmishing and manoeuvring along middle

Tennessee which ended in the great crisis of Nashville and the " March to the Sea." Lee's corps accompanied Hood in the bold advance to Nashville, and fought in the battles of Franklin and Nashville, after which, in the rout of the Confederate army Lee kept his troops closed up and well in hand, and for three consecutive days formed the fighting rearguard of the otherwise disintegrated army. Lee was himself wounded, but did not give up the command until an organized rearguard took over the post of danger. On recovery he joined General J. E. Johnston in North Carolina, and he surrendered with Johnston in April 1865. After the war he settled in Mississippi, which was his wife's state and during the greater part of the war his own territorial command, and devoted himself to planting. He was president of the Agricultural and Mechanical College of Mississippi from 1880 to 1899, took some part in state politics and was an active member — at the time of his death commander- in-chief — of the " United Confederate Veterans " society. He died at Vicksburg on the 28th of May 1908.

LEE, a township of Berkshire county, in western Massa- chusetts, U.S.A. Pop. (1900) 3596; (1905) 3972; (iqio) 4106. The township is traversed by the New York, New Haven & Hartford railway, covers an area of 225 sq. m., and includes the village of Lee, 10 m. S. of Pittsfield, East Lee, adjoining it on

the S.E., and South Lee, about 3 m. to the S'.W. Lee and South Lee are on, and East Lee is near, the Housatonic river. The eastern part of the township is generally hilly, reaching a maxi- mum altitude of about 2200 ft., and there are two considerable bodies of water — Laurel Lake in the N.W. (partly in Lenox) and Goose Pond, in the S.E. (partly in Tyringham). The region is healthy as well as beautiful, and is much frequented as a summer resort. Memorial Hall was built in memory of the soldiers from Lee who died during the Civil War. The chief manufactures are paper and wire, and from the quarries near the village of Lee is obtained an excellent quality of marble; these quarries furnished the marble for the extension of the Capitol at Washington, for St Patrick's cathedral in New York City and for the Lee High School and the Lee Public Library (1908). Lime is quarried in the township. Lee was formerly a paper- manufacturing place of great importance. The first paper mill in the township was built in South Lee in 1806, and for a time more paper was made in Lee than in any other place in the United States; the Housatonic Mill in Lee was probably the first (1867) in the United States to manufacture paper from wood pulp. The first settlement within the present township of Lee was made in 1760. The township was formed from parts of Great Barrington and Washington, was incorporated in 1777 and was named in honour of General Charles Lee (1731-1782). In the autumn of 1786

there was an encounter near the village of East Lee between about 250 adherents of Daniel Shays (many of them from Lee township) and a body of state troops under General John Paterson, wherein the Shaiys contingent paraded a bogus cannon (made of a yarn beam) with such effect that the state troops fled.

See Amory Gale, History of the Town of Lee (Lee, 1854), and Lee, The Centennial Celebration and Centennial History of the Town of Lee (Springfield, Mass., 1878), compiled by Charles M. Hyde and Alexander Hyde.

LEE. (1) (In O. Eng. hleo; cf. the pronunciation lew-ward of ” leeward “; the word appears in several Teutonic languages; cf. Dutch lij, Dan. lae), properly a shelter or protection, chiefly used as a nautical term for that side of a ship, land, &c, which is farthest from the wind, hence a ” lee shore,” land under the lee of a ship, i.e. one on which the wind blows directly and which is unsheltered. A ship is said to make ” leeway ” when she drifts laterally away from her course. (2) A word now always used in the plural ” lees,” meaning dregs, sediment, particularly of wine. It comes through the O. Fr. lie from a Gaulish Lat. lia, and is probably of Celtic origin.

LEECH, JOHN (1817-1864), English caricaturist, was born in London on the 29th of August 1817. His father, a native of Ireland, was the landlord of the London Coffee House on Ludgate Hill, ” a man,” on the testimony of those who knew him, “of fine culture, a profound Shakespearian, and a thorough gentle- man.” His mother was descended from the family of the famous Richard Bentley. It was from his father that Leech inherited his skill with the pencil, which he began to use at a very early age. When he was only three, he was discovered by Flaxman, who had called on his parents, seated on his mother’s knee, drawing with much gravity. The sculptor pronounced his sketch to be wonderful, adding, ” Do not let him be cramped with lessons in drawing; let his genius follow its own bent; he will astonish the world ” — an advice which was strictly followed. A mail-coach, done when he was six years old, is already full of surprising vigour and variety in its galloping horses. Leech was educated at Charterhouse, where Thackeray, his lifelong friend, was his schoolfellow, and at sixteen he began to study for the medical profession at St Bartholomew’s Hospital, where he won praise for the accuracy and beauty of his anatomical draw- ings. He was then placed under a Mr Whittle, an eccentric practitioner, the original of ” Rawkins ” in Albert Smith’s Adventures of Mr Ledbury, and afterwards under Dr John Cockle; but gradually the true bent of the youth’s mind asserted itself, and he drifted into the artistic profession. He was

eighteen when his first designs were published, a quarto of four pages, entitled Etchings and Sketchings by A. Pen, Esq., comic character

studies from the London streets. Then he drew some political lithographs, did rough sketches for Bell's Life, produced an exceedingly popular parody on Mulready's postal envelope, and, on the death of Seymour, applied unsuccessfully to illustrate the Pickwick Papers. In 1840 Leech began his contributions to the magazines with a series of etchings in Bentley's Miscellany, where Cruikshank had published his splendid plates to Jack Sheppard and Oliver Twist, and was illustrating Guy Fawkes in sadly feebler fashion. In company with the elder master Leech designed for the Ingoldsby Legends and Stanley Thorn, and till 1847 produced many independent series of etchings. These cannot be ranked with his best work; their technique is exceedingly imperfect; they are rudely bitten, with the light and shade out of relation; and we never feel that they express the artist's individuality, the Richard Savage plates, for instance, being strongly reminiscent of Cruikshank, and " The Dance at Stamford Hall " of Hablot Browne. In 1845 Leech illustrated St Giles and St James in Douglas Jerrold's newly started Shilling Magazine, with plates more vigorous and accomplished than those in Bentley, but it is in subjects of a somewhat later date, and especially in those lightly etched and meant to be printed with colour, that we see the artist's best powers with the needle and the acid. Among such of his designs are four charming plates to Dickens's Christmas Carol (1844), the broadly humorous etchings in the Comic History of England (1847-1848), and the still finer illustra- tions to the Comic History of Rome (1852) — which last, particu- larly in its minor woodcuts, shows some exquisitely graceful touches, as witness the fair faces that rise from the surging water in " Cloelia and her Companions Escaping from the Etruscan Camp." Among the other etchings which deserve very special reference are those in Young Master Troublesome or Master Jacky's Holidays, and the frontispiece to Hints on Life, or How to Rise in Society (1845) — a series of minute subjects linked gracefully together by coils of smoke, illustrating the various ranks and conditions of men, one of them — the doctor by his patient's bedside — almost equalling in vivacity and precision the best of Cruikshank's similar scenes. Then in the 'fifties we have the numerous etchings of sporting scenes, contributed, together with woodcuts, to the Handley Cross novels.

Turning to Leech's lithographic work, we have, in 1841, the Portraits

of the Children of the Mobility, an important series dealing with the humorous and pathetic aspects of London street Arabs, which were afterwards so often and so effectively to employ the artist's pencil. Amid all the squalor which they depict, they are full of individual beauties in the delicate or touching expression of a face, in the graceful turn of a limb. The book is scarce in its original form, but in 1875 two reproductions of the outline sketches for the designs were published — a lithographic issue of the whole series, and a finer photographic transcript of six of the subjects, which is more valuable than even the finished illustrations of 1841, in which the added light and shade is frequently spotty and ineffective, and the lining itself has not the freedom which we find in some of Leech's other lithographs, notably in the Fly Leaves, published at the Punch office, and in the inimitable subject of the nuptial couch of the Caudles, which also appeared, in woodcut form, as a political cartoon, with Mrs Caudle, personated by Brougham, disturbing by untimely loquacity the slumbers of the lord chancellor, whose haggard cheek rests on the woolsack for pillow.

But it was in work for the wood-engravers that Leech was most prolific and individual. Among the earlier of such designs are the illustrations to the Comic English and Latin Grammars (1840), to Written Caricatures (1841), to Hood's Comic Annual, (1842), and to Albert Smith's Wassail Bowl (1843), subjects mainly of a small vignette size, transcribed with the best skill of such woodcutters as Orrin Smith, and not, like the larger and later Punch illustrations, cut at speed by several engravers working at once on the subdivided block. It was in 1841 that Leech's connexion with Punch began, a connexion which sub- sisted till his death on the 29th of October 1864, and resulted in the production of the best-known and most admirable of his designs. His first contribution appeared in the issue of the 7th

of August, a full-page illustration — entitled " Foreign Affairs ' ' — of character studies from the neighbourhood of Leicester Square. His cartoons deal at first mainly with social subjects, and are rough and imperfect in execution, but gradually their method gains in power and their subjects become more distinctly political, and by 1849 the artist is strong enough to produce the splendidly humorous national personification which appears in " Disraeli Measuring the British Lion." About 1845 we have the first of that long series of half-page and quarter-page pictures of life and manners, executed with a hand as gentle as it was skilful, containing, as Ruskin has said, " admittedly the finest definition and natural history of the classes of oiu society, the kindest and subtlest analysis of its foibles, the tenderest flattery of

its pretty and well-bred ways," which has yet appeared. In addition to his work for the weekly issue of Punch, Leech contributed largely to the Punch almanacks and pocket-books, to Once a Week from 1859 till 1862, to the Illustrated London News, where some of his largest and best sporting scenes appeared, and to innumerable novels and miscellaneous volumes besides, of which it is only necessary to specify A Little Tour in Ireland (1859), which is noticeable as showing the artist's treatment of pure landscape, though it also contains some of his daintiest figure- pieces, like that of the wind-blown girl, standing on the summit of a pedestal, with the swifts darting around her and the breadth of sea beyond.

In 1862 Leech appealed to the public with a very successful exhibition of some of the most remarkable of his Punch drawings. These were enlarged by a mechanical process, and coloured in oils by the artist himself, with the assistance and under the direction of his friend J. E. Millais.

Leech was a singularly rapid and indefatigable worker. Dean Hole tells us, when he was his guest, " I have known htm send off from my house three finished drawings on the wood, designed, traced, and rectified, without much effort as it seemed, between breakfast and dinner." The best technical qualities of Leech's art, his unerring precision, his unfailing vivacity in the use of the line, are seen most clearly in the first sketches for his woodcuts, and in the more finished drawings made on tracing-paper from these first outlines, before the chiaroscuro was added and the designs were transcribed by the engraver. Turning to the mental qualities of his art, it would be a mistaken criticism which ranked him as a comic draughtsman. Like Hogarth he was a true humorist, a student of human life, though he observed humanity mainly in its whimsical aspects,

" Hitting all he saw with shafts With gentle satire, kin to charity, That harmed not." The earnestness and gravity of moral purpose which is so constant a note in the work of Hogarth is indeed far less characteristic of Leech, but there are touches of pathos and of tragedy in such of the Punch designs as the " Poor Man's Friend " (1845), and " General Fevrier turned Traitor " (1855), and in " The Queen of the Arena " in the first volume of Once a Week, which are sufficient to prove that more solemn powers, for which his daily work afforded no scope, lay dormant in their artist. The purity and manliness of Leech's own character are impressed on his art. We find in it little of the exaggeration and grotesqueness, and none of the fierce political enthusiasm, of which the designs of Gillray are so full. Compared with that of his great contemporary George Cruikshank, his work is

restricted both in compass of subject and in artistic dexterity.

Biographies of Leech have been written by John Brown (1882), and Frith (1891); see also “John Leech’s Pictures of Life and Character,” by Thackeray, Quarterly Review (December 1854) ; letter by John Ruskin, Arrows of the Chace, vol. i. p. 161 ; ” Un Humoriste Anglais,” by Ernest Chesneau, Gazette des Beaux Arts (1875)- (J. M. G.)

LEECH, the common name of members of the Hirudinea, a division of Chaetopod worms. It is doubtful whether the medicinal leech, Hirudo medicinalis, which is rarer in England than on the continent of Europe, or the horse leech, Aulasloma gulo, often confused with it, has the best right to the original pos- session of this name. But at present the word ” leech ” is applied to every member of the group Hirudinea, for the general structure and classification of which see Chaetopoda. There are many genera and species of leeches, the exact definitions of which are still in need of a more complete survey. They occur in all parts of the world and are mostly aquatic, though sometimes terrestrial, in habit. The aquatic forms frequent streams, ponds and marshes, and the sea. The members of this group are always

carnivorous or parasitic, and prey upon both vertebrates and invertebrates. In relation to their parasitic habit one or two suckers are always developed, the one at the anterior and the other at the posterior end of the body. In one subdivision of the leeches, the Gnathobdellidae, the mouth has three chitinous jaws which produce a triangular bite, though the action has been described as like that of a circular saw. Leeches without biting jaws possess a protrusible proboscis, and generally engulf their prey, as does the horse leech when it attacks earthworms. But some of them are also ectoparasites. The leech has been used in medicine from remote antiquity as a moderate blood-letter; and it is still so used, though more rarely than formerly. As unlicensed blood-lette r s, certain land-leeches are among the most unpleasant of parasites that can be encountered in a tropical jungle. A species of Haemadipsa of Ceylon attaches itself to the passer-by and draws blood with so little irritation that the sufferer is said to be aware of its presence only by the trickling from the wounds produced. Small leeches taken into the mouth with drinking-water may give rise to serious symptoms by attach- ing themselves to the fauces and neighbouring parts and thence sucking blood. The effects of these parasites have been mistaken for those of disease All leeches

are very extensile and can contract the body to a plump, pear-shaped form, or extend it to a long and worm-like shape. They frequently progress after the fashion of a ” looper ” caterpillar, attaching themselves alternately by the anterior and the posterior sucker. Others swim with eel-like curves through the water, while one land-leech, at any rate, moves in a gliding way like a land Planarian, and leaves, also like the Planarian, a slimy trail behind it. Leeches are usually olive green to brown in colour, darker patches and spots being scattered over a paler ground. The marine parasitic leech Pontobdella is of a bright green, as is also the land-leech Trocheta.

The term ” leech,” as an old English synonym for physician, is from a Teutonic root meaning ” heal,” and is etymologically distinct from the name (O. Eng. lyce) of the Hirudo, though the use of the one by the other has helped to assimilate the two words. (F. E. B.)

LEEDS, THOMAS OSBORNE, ist Duke of (1631-1712), English statesman, commonly known also by his earlier title of earl of Danby, son of Sir Edward Osborne, Bart., of Kiveton, Yorkshire, was born in 1631. He was great-grandson of Sir Edward Osborne (d. 1591), lord mayor of London, who, according to the accepted account, while apprentice to Sir William Hewett, clothworker and lord mayor in 1550, made the fortunes of the family by leaping from London Bridge into the river and rescuing Anne (d. 1585), the daughter of hisemployer, whom he afterwards married. 1 Thomas Osborne, the future lord treasurer, succeeded to the baronetcy and estates in Yorkshire on his father’s death in 1647, and after unsuccessfully courting his cousin Dorothy Osborne, married Lady Bridget Bertie, daughter of the earl of Lindsey. He was introduced to public life and to court by his neighbour in Yorkshire, George, 2nd duke of Buckingham, was elected M.P. for York in 1665, and gained the ” first step in his future rise ” by joining Buckingham in his attack on Clarendon in 1667. In 1668 he was appointed joint treasurer of the navy with Sir Thomas Lyttelton, and subsequently sole treasurer. He succeeded Sir William Coventry as com- missioner for the state treasury in 1669, and in 1673 was appointed a commissioner for the admiralty. He was created Viscount Osborne in the Scottish peerage on the 2nd of February 1673, and a privy councillor on the 3rd of May. On the 19th of June, on the resignation of Lord Clifford, he was appointed lord treasurer and made Baron Osborne of Kiveton and Viscount Latimer in the peerage of England, while on the 27th of June 1674 he was created earl of Danby, when he surrendered his Scottish peerage of Osborne to his second son Peregrine Osborne. He was appointed the same year lord-lieutenant of the West Riding of Yorkshire, and in 1677 received the Garter.

Danby was a statesman of very different calibre from the

1 Chronicles of London Bridge, by R. Thomson (1827), 313, quoting Stow.

leaders of the Cabal ministry, Buckingham and Arlington. His principal aim was no doubt the maintenance and increase of his own influence and party, but his ambition corresponded with definite political views. A member of the old cavalier party, a confidential friend and correspondent of the despotic Lauder- dale, he desired to strengthen the executive and the royal authority. At the same time he was a keen partisan of the established church, an enemy of both Roman Catholics and div senters, and an opponent of all toleration. In 1673 he opposed the Indulgence, supported the Test Act, and spoke against the proposal for giving relief to the dissenters. In June 1675 he signed the paper of advice drawn up by the bishops for the king, urging the rigid enforcement of the laws against the Roman Catholics, their complete banishment from the court, and the suppression of conventicles, 2 and a bill introduced by him impos- ing special taxes on recusants and subjecting Roman Catholic priests to imprisonment for life was only thrown out as too lenient because it secured offenders from the charge of treason. The same year he introduced a Test Oath by which all holding office or seats in either House of Parliament were to declare resistance to the royal power a crime, and promise to abstain from all attempts to alter the government of either church or state; but this extreme measure of retrograde toryism was successfully opposed by wiser statesmen. The king himself as a Roman Catholic secretly opposed and also doubted the wisdom and practicability of this ” thorough “policy of repression. Danby therefore ordered a return from every diocese of the numbers of dissenters, both Romanist and Protestant, in order by a proof of their insignificance to remove the royal scruples. 3 In December 1676 he issued a proclamation for the suppression of coffee-houses because of the ” defamation of His Majesty’s Government ” which took place in them, but this was soon withdrawn. In 1677, to secure Protestantism in case of a Roman Catholic succession, he introduced a bill by which ecclesiastical patronage and the care of the royal children were entrusted to the bishops; but this measure, like the other, was thrown out. In foreign affairs Danby showed a stronger grasp of essentials. He desired to increase English trade, credit and power abroad. He was a determined enemy both to Roman influence and to French ascendancy. He terminated the war with Holland in 1674, and from that time maintained a friendly correspondence with William; while in 1677, after two years of tedious negotia- tions, he overcame all obstacles, and in spite of James’s opposi- tion, and without the knowledge of

Louis XIV., effected the marriage between William and Mary that was the germ of the Revolution and the Act of Settlement. This national policy, however, could only be pursued, and the minister could only maintain himself in power, by acquiescence in the king's personal relations with the king of France settled by the disgraceful Treaty of Dover in 1670, which included Charles's acceptance of a pension, and bound him to a policy exactly opposite to Danby's, one furthering French and Roman ascendancy. Though not a number of the Cabal ministry, and in spite of his own denial, Danby must, it would seem, have known of these relations after becoming lord treasurer. In any case, in 1676, together with Lauderdale alone, he consented to a treaty between Charles and Louis according to which the foreign policy of both kings was to be conducted in union, and Charles received an annual subsidy of £100,000. In 1678 Charles, taking advantage of the growing hostility to France in the nation and parliament, raised his price, and Danby by his directions demanded through Ralph Montagu (afterwards duke of Montagu) six million livres a year (£300,000) for three years. Simultaneously Danby guided through parliament a bili for raising money for a war against France; a league was concluded with Holland, and troops were actually sent there. That Danby, in spite of these compromising transactions, remained in intention faithful to the national interests, appears clearly from the hostility with which he was still regarded by France. In 1676 he is described

2 Cal. of St Pap. Dom. (1673-1675), p. 449.

3 Letter of Morley, Bishop of Winchester, to Danby (June 10, 1676). (Hist. MSS. Com. xi. Rep. pt. vii. 14.)

by Ruvigny to Louis XIV. as intensely antagonistic to France and French interests, and as doing his utmost to prevent the treaty of that year. 1 In 1678, on the rupture of relations between Charles and Louis, a splendid opportunity was afforded Louis of paying off old scores by disclosing Danby's participation in the king's demands for French gold.

Every circumstance now conspired to effect his fall. Although both abroad and at home his policy had generally embodied the wishes of the ascendant party in the state, Danby had never obtained the confidence of the nation. His character inspired no respect, and he

could not reckon during the whole of his long career on the support of a single individual. Charles is said to have told him when he made him treasurer that he had only two friends in the world, himself and his own merit. 2 He was described to Pepys on his acquiring office as ” one of a broken sort of people that have not much to lose and therefore will venture all,” and as ” a beggar having £1100 or £1200 a year, but owes above £10,000.” His office brought him in £20,000 a year, 3 and he was known to be making large profits by the sale of offices; he maintained his power by corruption and by jealously excluding from office men of high standing and ability. Burnet described him as ” the most hated minister that had ever been about the king.” Worse men had been less detested, but Danby had none of the amiable virtues which often counter- act the odium incurred by serious faults. Evelyn, who knew him intimately from his youth, describes him as ” a man of excellent natural parts but nothing of generous or grateful.” Shaftesbury, doubtless no friendly witness, speaks of him as an inveterate liar, “proud, ambitious, revengeful, false, prodigal and covetous to the highest degree,” 4 and Burnet supports his unfavourable judgment to a great extent. His corruption, his mean submission to a tyrant wife, his greed, his pale face and lean person, which had succeeded to the handsome features and comeliness of earlier days, 6 were the subject of ridicule, from the witty sneers of Halifax to the coarse jests of the anony- mous writers of innumerable lampoons. By his championship of the national policy he had raised up formidable foes abroad without securing a single friend or supporter at home, 6 and his fidelity to the national interests was now, through a very mean and ignoble act of personal spite, to be the occasion of his downfall.

Danby in appointing a new secretary of state had preferred Sir W. Temple, a strong adherent of the anti-French policy, to Montagu. The latter, after a quarrel with the duchess of Cleveland, was dismissed from the king’s employment. He immediately went over to the opposition, and in concert with Louis XIV. and Barillon, the French ambassador, by whom he was supplied with a large sum of money, arranged a plan for effecting Danby’s ruin. He obtained a seat in parliament; and in spite of Danby’s endeavour to seize his papers by an order in council, on the 20th of December 1678 caused two of the incriminating letters written by Danby to him to be read aloud to the House of Commons by the Speaker. The House im- mediately resolved on Danby’s impeachment. At the foot of each of the letters appeared the king’s postscripts, ” I approve of this letter. C.R.,” in his own handwriting; but they were not read by the Speaker, and were entirely neglected in the proceedings against the minister, thus emphasizing

the con- stitutional principle that obedience to the orders of the sovereign can be no bar to an impeachment. He was charged with having encroached to himself royal powers by treating matters of peace and war without the knowledge of the council, with having promoted the raising of a standing army on pretence of a war with France, with having obstructed the assembling of parlia-

1 Memoirs of Great Britain and Ireland, by Sir J. Dalrymple 1773). i- app. 104. '-' Letters to Sir Joseph Williamson (Camden Soc., 1874), '• 64.

3 Halifax note-book in Devonshire House collection, quoted in Foxcrolt's Life of Halifax, ii. 63, note.

4 Life of Shaftesbury, by W. D. Christie (1871), ii. 312. 6 Macky's Memoirs, 46; Pepys's Diary, viii. 143.

6 See the description of his position at this time by Sir W. Temple in Lives of Illustrious Persons (1714), 40.

ment, with corruption and embezzlement in the treasury. Danby, while communicating the "Popish Plot" to the parlia- ment, had from the first expressed his disbelief in the so-called revelations of Titus Oates, and his backwardness in the matter now furnished an additional charge of having "traitorously concealed the plot." He was voted guilty by the Commons; but while the Lords were disputing whether the accused peer should have bail, and whether the charges amounted to more than a misdemeanour, parliament was prorogued on the 30th of December and dissolved three weeks later. In March 1679 a new parliament hostile to Danby was returned, and he was forced to resign the treasurership; but he received a pardon from the king under the Great Seal, and a warrant for a mar- quessate. 7 His proposed advancement in rank was severely reflected upon in the Lords, Halifax declaring it in the king's presence the recompense of treason, " not to be borne "; and in the Commons his retirement from office by no means appeased his antagonists. The proceedings against him were revived, a committee of privileges deciding on the 19th of March 1679 that the dissolution of parliament was no abatement of an im- peachment. A motion was passed for his committal by the Lords, who, as in Clarendon's case, voted his banishment. This was, however, rejected by the Commons, who now passed an act of attainder. Danby had removed to the country, but returned on the 21st of April to avoid the threatened passing by the Lords of the attainder, and was sent to the Tower. In his written defence he now pleaded the king's pardon, but on the 5th of May 1679 it was pronounced illegal by the

Commons. This declaration was again repeated by the Commons in 1689 on the occasion of another attack made upon Danby in that year, and was finally embodied in the Act of Settlement in 1701. The Commons now demanded judgment against the prisoner from the Lords. Further proceedings, however, were stopped by the dissolution of parliament again in July; but for nearly five years Danby remained a prisoner in the Tower. A number of pamphlets asserting the complicity of the fallen minister in the Popish Plot, and even accusing him of the murder of Sir Edmund Berry Godfrey, were published in 1679 and 1680; they were answered by Danby's secretary, Edward Christian, in Reflections; and in May 1681 Danby was actually indicted by the Grand Jury of Middlesex for Godfrey's murder on the • accusation of Edward FitzHarris. His petition to the king for a trial by his peers on this indictment was refused, and an attempt to prosecute the publishers of the false evidence in the king's bench was unsuccessful. For some time all appeals to the king, to parliament, and to the courts of justice were unavailing; but on the 12th of February 1684 his application to Chief Justice Jeffreys was at last successful, and he was set at liberty on finding bail to the amount of £40,000, tc appear in the House of Lords in the following session. He visited the king at court the same day; but took no part in public affairs for the rest of the reign.

After James's accession Danby was discharged from his bail by the Lords on the 19th of May 1685, and the order declaring a dissolution of parliament to be no abatement of an impeach- ment was reversed. He again took his seat in the Lords as a leader of the moderate Tory party. Though a strong Tory and supporter of the hereditary principle, James's attacks on Protestantism soon drove him into opposition. He was visited by Dykvelt, William of Orange's agent; and in June 1687 he wrote to William assuring him of his support. On the 30th of June 1688 he was one of the seven leaders of the Revolution who signed the invitation to William. In November he occupied York in the prince's interest, returning to London to meet William on the 26th of December. He appears to have thought that William would not claim the crown, 8 and at first supported the theory that the throne having been vacated by James's flight the succession fell as of right to Mary; but as this met with little support, and was rejected both by William and by Mary herself, he voted against the regency and joined with

7 Add. MSS. 28094, f- 47-

8 Boyer's Annals (1722), 433.

Halifax and the Commons in declaring the prince and princess joint sovereigns.

Danby had rendered extremely important services to William's cause. On the 20th of April 1689 he was created marquess of Carmarthen and was made lord-lieutenant of the three ridings of Yorkshire. He was, however, still greatly disliked by the Whigs, and William, instead of reinstating him in the lord treasurership, only appointed him president of the council in February 1689. He did not conceal his vexation and disappointment, which were increased by the appointment of Halifax to the office of lord privy seal. The antagonism between the " black " and the " white marquess " (the latter being the nickname given to Carmarthen in allusion to his sickly appearance), which had been forgotten in their common hatred to the French policy and to Rome, revived in all its bitterness. He retired to the country and was seldom present at the council. In June and July new motions were made in parliament for his removal; but notwithstanding his great unpopularity, on the retirement of Halifax in 1690 he again acquired the chief power in the state, which he retained till 1695 by bribery in parliament and by the support of the king and queen. In 1690, during. William's absence in Ireland, he was appointed Mary's chief adviser. In 1 69 1, desiring to compromise Halifax, he discredited himself by the patronage of an informer named Fuller, soon proved an impostor. He was absent in 1692 when the Place Bill was thrown out. In 1693 he presided in great state as lord high steward at the trial of Lord Mohun; and on the 4th of May 1694 he was created duke of Leeds. 1 The same year he supported the Triennial Bill, but opposed the new treason bill as weakening the hands of the executive. Meanwhile fresh attacks had been made upon him. He was accused unjustly of Jacobitism. In April 1695 he was impeached once more by the Commons for having received a bribe of 5000 guineas to procure the new charter for the East India Company. In his defence, whilst denying that he had received the money and appealing to his past services, he did not attempt to conceal the fact that according to his experience bribery was an acknowledged and universal custom in public business, and that he himself had been instru- mental in obtaining money for others. Meanwhile his servant, who was said to have been the intermediary between the duke and the Company in the transaction, fled the country; and no evidence being obtainable to convict, the proceedings fell to the ground. In May 1695 he had been ordered to discontinue his attendance at the council. He returned in October, but was not included among the lords justices appointed regents during William's absence in this year. In November

he was created D.C.L. by the university of Oxford; in December he became a commissioner of trade, and in December 1696 governor of the Royal Fishery Company. He opposed the prosecution of Sir John Fenwick, but supported the action taken by members of both Houses in defence of William's rights in the same year. On the 23rd of April 1698 he entertained the tsar, Peter the Great, at Wimbledon. He had for some time lost the real direction of affairs, and in May 1699 he was compelled to retire from office and from the lord-lieutenancy of Yorkshire.

In Queen Anne's reign, in his old age, he is described as " a gentleman of admirable natural parts, great knowledge and experience in the affairs of his own country, but of no reputation with any party. He hath not been regarded, although he took his place at the council board." a The veteran statesman, how- ever, by no means acquiesced in his enforced retirement, and continued to take an active part in politics. As a zealous churchman and Protestant he still possessed a following. In 1705 he supported a motion that the church was in danger, and in 1 7 10 in Sacheverell's case spoke in defence of hereditary right. 3 In November of this year he obtained a renewal of his pension of £3500 a year from the post office which he was holding in

1 The title was taken, not from Leeds in Yorkshire, but from Leeds in Kent, 4! m. from Maidstone, which in the 17th century was a more important place than its Yorkshire namesake.

2 Memoirs of Sir John Macky (Roxburghe Club, 1895), 46.

3 Boyer's Annals, 219, 433.

1 694,* and in 17 n at the age of eighty was a competitor for the office of lord privy seal. 6 His long and eventful career, however, terminated soon afterwards by his death on the 26th of July 1712.

In 1 7 10 the duke had published Copies and Extracts of some letters written to and from the Earl of Danby . . . in the years 1676, 1677 and 1678, in defence of his conduct, and this was accompanied by Memoirs relating to the Impeachment of Thomas, Earl of Danby. The original letters, however, of Danby to Montagu have now been published (by the Historical MSS. Commission from the MSS. of J. Eliot Hodgkin), and are seen to have been considerably garbled by Danby for the purposes of publication, several passages being obliterated and others altered by his own hand.

See the lives, by Sidney Lee in the Diet. Nat. Biography (1895); by T. P. Courtenay in Lardner's Encyclopaedia, " Eminent British Statesmen," vol. v. (1850); in Lodge's Portraits, vii. ; and Lives and Characters of . . . Illustrious Persons, by J. le Neve (1714). Further material for his biography exists in Add. MSS., 26040- 95 (56 vols., containing his papers); in the Duke of Leeds MSS. at Hornby Castle, calendered in Hist. MSS. Comm. nth Rep. pt. vii. pp. I-43; MSS. of Earl of Lindsay and J. Eliot Hodgkin; and Calendars of State Papers Dom. See also Add. MSS. 18Q4-189Q, Index and Calendar; Hist. MSS. Comm. nth Rep. pt. ii., House of Lords MSS. ; Gen. Cat. British Museum for various pamphlets.

(P. C. Y.)

Later Dukes of Leeds.

The duke's only surviving son, Peregrine (1659-1729), who became 2nd duke of Leeds on his father's death, had been a member of the House of Lords as Baron Osborne since 1690, but he'is better known as a naval officer; in this service he attained the rank of a vice-admiral. He died on the 25th of June 1729, when his son Peregrine Hyde (1691-1731) became 3rd duke. The 4th duke was the latter's son Thomas (1713-1789), who was succeeded by his son Francis.

Francis Osborne, 5th duke of Leeds (1751-1799), was born on the 29th of January 17 51 and was educated at Westminster school and at Christ Church, Oxford. He was a member of parlia- ment in 1774 and 1775; in 1776 he became a peer as Baron Osborne, and in 1777 lord chamberlain of the queen's household. In the House of Lords he was prominent as a determined foe of the prime minister, Lord North, who, after he had resigned his position as chamberlain, deprived him of the office of lord- lieutenant of the East Riding of Yorkshire in 1780. He regained this, however, two years later. Early in 1783 the marquess of Carmarthen, as he was called, was selected as ambassador to France, but he did not take up this appointment, becoming instead secretary for foreign affairs under William Pitt in December of the same year. As secretary he was little more than a cipher, and he left office in April 1791. Subsequently he took some slight part in politics, and he died in London on the 31st of January 1799. His Political Memoranda were edited by Oscar Browning for the Camden Society in 1884, and there are eight volumes of his official correspondence in the British Museum. His first wife was Amelia (1 754-1 784), daughter of Robert Darcy, 4th earl of Holdernesse, who became Baroness Conyers in her own right in 1778. Their elder son, George William Frederick (1775-1838), succeeded his father as duke of Leeds and his mother as

Baron Conyers. These titles were, however, separated when his son, Francis Godolphin Darcy, the 7th Duke (1798- 1859), died without sons in May 1859. The barony passed to his nephew, Sackville George Lane-Fox (1827-1888), failing into abeyance on his death in August 1888, and the dukedom passed to his cousin, George Godolphin Osborne (1802-1872), a son of Francis Godolphin Osborne (1777-1850), who was created Baron Godolphin in 1832. In 1895 George's grandson George Godolphin Osborne (b. 1862) became 10th duke of Leeds. The name of Godolphin, which is borne by many of the Osbornes, was intro- duced into the family through the marriage of the 4th duke with Mary (d. 1764), daughter and co-heiress of Francis Godolphin, 2nd earl of Godolphin, and grand-daughter of the great duke of Marlborough.

LEEDS, a city and municipal county and parliamentary borough in the West Riding of Yorkshire, England, 185 m. 4 Harleian MSS. 2264, No. 239. 6 Boyer's Annals, 515.

N.N.W. from London. Pop. (1891) 367,505; (1901) 428,968. It is served by the Great Northern railway (Central station), the Midland (Wellington station), North-Eastern and London & North- Western (New station), and Great Central and Lanca- shire & Yorkshire railways (Central station). It lies nearly in the centre of the Riding, in the valley of the river Aire.

The plan of the city is in no way regular, and the numerous handsome public buildings are distributed among several streets, principally on the north side of the narrow river. The town hall is a fine building in Grecian style, well placed in a square between Park Lane and Great George Street. It is of oblong shape, with a handsome facade over which rises a domed clock- tower. The principal apartment is the Victoria Hall, a richly ornamented chamber measuring 161 ft. in length, 72 in breadth and 75 in height. It was opened in 1858 by Queen Victoria. Immediately adjacent to it are the municipal offices (1884) in Italian style. The Royal Exchange (1872) in Boar Lane is an excellent Perpendicular building. In ecclesiastical architecture Leeds is not rich. The church of St John, however, is an interest- ing example of the junction of Gothic traditions with Renaissance tendencies in architecture. It dates from 1634 and contains some fine contemporary woodwork. St Peter's parish church occupies an ancient site, and preserves a very early cross from the former building. The church was

rebuilt in 1840 at the instance of the vicar, Dr Walter Farquhar Hook (1798-1875), afterwards dean of Chichester, whose work here in a poor and ill-educated parish brought him fame. The church of All Souls (1880) commemorates him. It may be noted that the vicarage of Leeds has in modern times commonly formed a step to the episcopal bench. There are numerous other modern churches and chapels, of which the Unitarian chapel in Park Row is note- worthy. Leeds is the seat of a Roman Catholic bishop, with a pro-cathedral dedicated to St Anne. There is a large free library in the municipal offices, and numerous branch libraries are maintained. The Leeds old library is a private institution founded in 1768 by Dr Priestley, who was then minister of the Unitarian chapel. It occupies a building in Commercial Street. The Philosophical and Literary Society, established in 1820, possesses a handsome building in Park Row, known as the Philosophical Hall, containing a laboratory, scientific library, lecture room, and museum, with excellent natural history, geological and archaeological collections. The City Art Gallery was completed in 1888, and contains a fine permanent collection, while exhibitions are also held. The University, incorporated in 1904, grew out of Yorkshire College, established in 1875 for the purpose of supplying instruction in the arts and sciences which are applicable to the manufactures, engineering, mining and agriculture of the county. In 1887 it became one of the con- stituent colleges of Victoria University, Manchester, and so remained until its separate incorporation. The existing building was completed in 1885, and contains a hall of residence, a central hall and library, and complete equipments in all departments of instruction. New departments have been opened in extension of the original scheme, such as the medical department (1894). A day training college is a branch of the institution. The Mechanics' Institute (1865) occupies a handsome Italian building in Cookridge Street near the town hall. It comprises a lecture room, library, reading and class rooms; and day and evening classes and an art school are maintained. The grammar school, occupying a Gothic building (1858) at Woodhouse Moor, dates its foundation from 1552. It is largely endowed, and possesses exhibitions tenable at Oxford, Cambridge and Durham uni- versities. There is a large training college for the Wesleyan Methodist ministry in the suburb of Headingley. The Yorkshire Ladies' Council of Education has as its object the promotion of female education, and the instruction of girls and women of the artisan class in domestic economy, &c. The general infirmary in Great George Street is a Gothic building of brick with stone dressings with a highly ornamental exterior by Sir Gilbert Scott, of whose work this is by no means the only good example in Leeds. The city possesses further notable buildings in its market- halls, theatres, clubs, &c.

Among open spaces devoted by the corporation to public use that of Woodhouse Moor is the principal one within the city, but 3 m. N.E. of the centre is Roundhay Park, a tract of 700 acres, beautifully laid out and containing a picturesque lake. In 1889 there came into the possession of the corporation the ground, lying 3 m. up the river from the centre of the city, containing the celebrated ruins of Kirkstall Abbey. The remains of this great foundation, of the middle of the 12 th century, are extensive, and so far typical of the usual arrangement of Cistercian houses as to be described under the heading Abbey. The ruins are carefully preserved, and form a remarkable contrast with the surrounding industrial district. Apart from Kirkstall there are few antiquarian remains in the locality. In Guildford Street, near the town hall, is the Red Hall, where Charles I. lay during his enforced journey under the charge of the army in 1647.

For manufacturing and commercial purposes the situation of Leeds is highly advantageous. It occupies a central position in the railway system of England. It has communication with Liverpool by the Leeds and Liverpool Canal, and with Goole and the Humber by the Aire and Calder Navigation. It is moreover the centre of an important coal and iron district. Though regarded as the capital of the great manufacturing district of the West Riding, Leeds is not in its centre but on its border. Eastward and northward the country is agricultural, but westward and southward lies a mass of manufacturing towns. The characteristic industry is the woollen manufacture. The industry is carried on in a great number of neighbouring town- ships, but the cloth is commonly finished or dressed in the city itself, this procedure differing from that of the wool manufacturers in Gloucestershire and the west of England, who carry out the entire process in one factory. Formerly much of the business between manufacturer and merchant was transacted in the cloth halls, which formed a kind of market, but merchants now order goods directly from the manufacturers. Artificial silk is import- ant among the textile products. Subsidiary to these leading industries is the production of machine-made clothing, hats and caps. The leather trade of Leeds is the largest in England, though no sole leather is tanned. The supply comes chiefly from British India. Boots and shoes are extensively manufactured. The iron trade in its different branches rivals the woollen trade in wealth, including the casting of metal, and the manufacture of steam engines, steam wagons, steam ploughs, machinery, tools, nails, &c. Leeds was formerly famed for the production of artistic pottery, and specimens of old Leeds ware are highly prized. The industry lapsed about the end of the 1 8th century, but has been revived in modern times. Minor and less specialized industries are numerous.

The parliamentary borough is divided into five divisions (North, Central, South, East and West), each returning one member. The county borough was created in 1888. Leeds was raised to the rank of a city in 1893. The municipal borough is under a lord mayor (the title was conferred in 1897 on the occasion of Queen Victoria's Diamond Jubilee), 16 aldermen and 48 councillors. Area, 21,572 acres.

Leeds (Loidis, Ledes) is mentioned by Bede as the district where the Northumbrian kings had a royal vill in 627, and where Oswy, king of Northumbria, defeated Penda, king of the Mercians, in 665. Before the Norman Conquest seven thanes held it of Edward the Confessor as seven manors, but William the Conqueror granted the whole to Ilbert de Lacy, and at the time of the Domesday Survey it was held of him by Ralph Paganel, who is said to have raised Leeds castle, possibly on the site of an earlier fortification. In 1207 Maurice Paganel constituted the inhabitants of Leeds free burgesses, granting them the same liberties as Robert de Lacy had granted to Pontefract, including the right of selling burgher land to whom they pleased except to religious houses, and freedom from toll. He also appointed as the chief officer of the town a reeve who was to be chosen by the lord of the manor, the burgesses being " more eligible if only they would pay as much as others for the office." The town was incorporated by Charles I. in 1626 under the title of an alderman, 7 principal burgesses and 24 assistants. A second charter granted by Charles It. in 1661 appointed a mayor, 12 alder- men and 24 assistants, and is still the governing charter of the borough. The woollen manufacture is said to have been introduced into Leeds in the 14th century, and owing to the facilities for trade afforded by its position on the river Aire soon became an important

industry. Camden, writing about 1590, says, " Leeds is rendered wealthy by its woollen manufactures," and the incorporation charter of 1626 recites that " the inhabitants have for a long time exercised the art of making cloth." The cloth was then, as it is now, made in the neighbouring villages and only finished and sold in the town. A successful attempt was made in the beginning of the 19th century by Mr William Hirst to introduce goods of a superior quality which were made and finished in his own factory. Other manufacturers followed his example, but- their factories are now only used for the finishing process. The worsted trade which was formerly carried on to some extent has now almost disappeared. The spinning of flax by machinery

was introduced early in the 19th century by Mr John Marshall, a Holbeck manufacturer, who was one of the first to apply Sir Richard Arkwright's water frame, invented for cotton manufacture, to the spinning of linen yarn. The burgesses were represented in parliament by one member during the Commonwealth, but not again until by the Reform Act of 1832 they were allowed to return two members. In 1867 they were granted an additional member.

See James Wardell, The Municipal History of the Borough of Leeds (1846); J. D. Whitaker, Loidis and Elmete: or an Attempt to illus- trate the Districts described in these words by Bede (1816); D. H. Atkinson, Ralph Thoresby, the Topographer; his Town {Leeds) and Times (1885-1887).

LEEK, a market town in the Leek parliamentary division of Staffordshire, England, 157 m. N.W. from London, on the Churnet Valley branch of the North Staffordshire railway. Pop. of urban district (1901) 15,484. The town lies high in a picturesque situation near the head of the river Churnet. The church of St Edward the Confessor is mainly Decorated, and stands in a churchyard commanding a beautiful view from an elevation of some 640 ft. There is here a curious pillar of Danish work ornately carved. An institute contains a free library, lecture hall, art gallery and school of art. A grammar school was established in 1723. In the vicinity are ruins of the Cis- tercian abbey De la Croix, or Dieulacresse, erected in 12 14 by Ralph de Blundevill, earl of Chester. The slight remains are principally embodied in a farm-house. The silk manufacture includes sewing silk, braids, silk buttons, &c. Cloud Hill, rising to 1 190 ft. \V. of the town, causes a curious phenomenon in the height of summer, the sun sinking behind one flank to reappear beyond the other, and thus appearing to set twice.

Leek (Lee, Leike, Leeke) formed part of the great estates of .Elf gar, earl of Mercia; it escheated to William the Conqueror who held it at the time of the Domesday Survey. Later it passed to the earls Palatine of Chester, remaining in their hands until Ralph de Blundevill, earl of Chester, gave it to the abbey of Dieulacresse, which continued to hold it until its dissolution. The same earl in a charter which he gave to the town {temp. John) calls it a borough and grants to his free burgesses various privileges, including freedom from toll throughout Cheshire. These privileges were confirmed by Richard, abbot of Dieulacresse, but the town received no royal charter and failed to establish its burghal position. The Wednesday market which is still held dates from a grant of John to the earl of Chester: in the 17th century it was very considerable. A fair, also granted by John, beginning on the third day

before the Translation of Edward the Confessor is still held. The silk manufacture which can be traced to the latter part of the 17th century is thought to have been aided by the settlement in Leek of some Huguenots after the revocation of the Edict of Nantes. In the 17th and 18th centuries the town was famous for its ale. Prince Charles Edward passed through Leek on his march to Derby (174.5) and again on his return journey to Scotland. A story in con- nexion with the Civil Wars is told to explain the expression “Now thus” occurring on the tombstone of a citizen, who by this meaningless answer to all questions sought escape on the plea of insanity.

LEEK, the Allium Porrum of botanists, a plant now con- sidered as a mere variety of Allium Ampeloprasum, wild leek, produced by cultivation. The plant is probably of Eastern origin, since it was commonly cultivated in Egypt in the time of the Pharaohs, and is so to the present day; while as regards its first appearance in England both Tusser and Gerard — two of the earliest writers on this class of subjects, the former of whom flourished in the early part and the latter in the later part of the 1 6th century — speak of it as being then commonly culti-

vated and used. 1 The Romans, it would appear, made great use of the leek for savouring their dishes, as seems proved by the number of recipes for its use referred to by Celsius. Hence it is more than probable that it was brought to England by the Romans. Italy was celebrated for leeks in the time of Pliny {H.N. xix. c. 6), according to whom they were brought into great esteem through the emperor Nero, derisively surnamed “Porrophagus,” who used to eat them for several days in every month to clear his voice. The leek is very generally cultivated in Great Britain as an esculent, but more especially in Scotland and in Wales, being esteemed as an excellent and wholesome vegetable, with properties very similar to those of the onion, but of a milder character. In America it is not much cultivated except by market gardeners in the neighbourhood of large cities. The whole plant, with the exception of the fibrous roots, is used in soups and stews. The sheathing stalks of the leaves lap over each other, and form a thickish stem-like base, which is blanched, and is the part chiefly preferred. These blanched stems are much employed in French cookery. They form an important ingredient in Scotch winter broth, and particularly in the national dish cock-a-leekie, and are also largely used boiled, and served with toasted bread and white sauce, as in the case of asparagus. Leeks are sown in the spring, earlier or later according to the soil and the season, and are planted out for the summer, being dropped into holes made with a stout dibble and left unfilled in order to allow the stems space to swell. When they are thus

planted deeply the holes gradually fill up, and the base of the stem becomes blanched and prepared for use, a process aided by drawing up the earth round about the stems as they elongate. The leek is one of the most useful vegetables the cottager can grow, as it will supply him with a large amount of produce during the winter and spring. It is extremely hardy, and presents no difficulty in its cultivation, the chief point, as with all succulent esculents, being that it should be grown quickly upon well-enriched soil. The plant is of biennial dura- tion, flowering the second year, and perishing after perfecting its seeds. The leek is the national symbol or badge of the Welsh, who wear it in their hats on St David's Day. The origin of this custom has received various explanations, all of which are more or less speculative.

LEER, a town and river port in the Prussian province of Hanover, lying in a fertile plain on the right bank of the Leda near its confluence with the Ems, and at the junction of railways to Bremen, Emden and Miinster. Pop. (1905) 12,347; The streets are broad, well paved, and adorned with many elegant buildings, among which are Roman Catholic, Lutheran and Calvinist churches, and a new town hall with a tower 165 ft. high. Among its educational establishments are a classical school and a school of navigation. Linen and woollen fabrics, hosiery, paper, cigars, soap, vinegar and earthenware are manu- factured, and there are iron-foundries, distilleries, tanneries and shipbuilding yards. Many markets for horses and cattle are held. The transit trade from the regions traversed by the Westphalian and Oldenburg railways is considerable. The principal exports are cattle, horses, cheese, butter, honey, wax, flour, paper, hardware and Westphalian coal. Leer is one of the principal ports for steamboat communication with the North Sea watering-places of Borkum and Norderney. Leer is a very old place, although it only obtained municipal privileges in 1823. Near the town is the Plitenberg, formerly a heathen place of sacrifice.

LEEUWARDEN, the capital of the province of Friesland, Holland, on the canal between Harlingen and Groningen, 3$ m. by rail W. of Groningen. Pop (1901) 32,203. It is one of the most prosperous towns in the country. To the name of the Frisian Hague, it is entitled as well by similarity of history as by similarity of appearance. As the Hague grew up round the court 01 the counts of Holland, so Leeuwarden round the

1 Tusser, in his verse for the month of March, writes: — " Now leckes are in season, for pottage ful good,

And spareth the milck cow, and purgeth the blood, These hauving

with peason, for pottage in Lent, Thou spareth both otemel and bread to be spent.”

court of the Frisian stadtholders; and, like the Hague, it is an exceptionally clean and attractive town, with parks, pleasure grounds, and drives. The old gates have been somewhat ruth- lessly cleared away, and the site of the town walls on the north and west competes with the park called the Prince’s Garden as a public pleasure ground. The Prince’s Garden was originally laid out by William Frederick of Nassau in 1648, and was presented to the town by King William I. in 1819. The royal palace, which was the seat of the Frisian court from r6o3 to 1 747, is now the residence of the royal commissioner for Friesland. It was restored in 1816 and contains a portrait gallery of the Frisian stadtholders. The fine mansion called the Kanselary was begun in 1502 as a residence for the chancellor of George of Saxony (1539), governor of Friesland, but*was only completed in 1571 and served asa court house until 1811. It was restored at the end of the 19th century to contain the important pro- vincial library and national archives. Other noteworthy build- ings are the picturesque weigh-house (1595), the town hall (1715), the provincial courts (1850), and the great church of St Jacob, once the church of the Jacobins, and the largest monastic church in the Netherlands. The splendid tombs of the Frisian stadt- holders buried here (Louis of Nassau, Anne of Orange, and others) were destroyed in the revolution 1795. The unfinished tower of Oldehove dates from 1529-1532. The museum of the Frisian Society is of modern foundation and contains a collection of provincial antiquities, including two rooms from Hindeloopen, an ancient village of Friesland, some i6th-and 17th-century portraits, some Frisian works in silver of the 17th and 18th centuries, and a collection of porcelain and faience.

Leeuwarden is the centre of a flourishing trade, being easily accessible from all parts of the province by road, rail and canal. The chief business is in stock of every kind, dairy and agri- cultural produce and fresh-water fish, a large quantity of which is exported to France. The industries include boat-building and timber yards, iron-foundries, copper and lead works, furniture, organ, tobacco and other factories, and the manufacture of gold and silver wares. The town is first mentioned in documents of the 13th century.

LEEUWENHOEK, or Leuwenhoek, ANTHONY VAN (1632- 1723),

Dutch microscopist, was born at Delft on the 24th of October 1632. For a short time he was in a merchant's office in Amsterdam, but early devoted himself to the manufacture of microscopes and to the study of the minute structure of organized bodies by their aid. He appears soon to have found that single lenses of very short focus were preferable to the compound microscopes then in use; and it is clear from the discoveries he made with these that they must have been of very excellent quality. His discoveries were for the most part made public in the Philosophical Transactions of the Royal Society, to the notice of which body he was introduced by R. de Graaf in 1673, and of which he was elected a fellow in 1680. He was chosen a corresponding member of the Paris Academy of Sciences in 1697. He died at his native place on the 26th of August 1723. Though his researches were not conducted on any definite scientific plan, his powers of careful observation enabled him to make many interesting discoveries in the minute anatomy of man, the higher animals and insects. He confirmed and extended M. Malpighi's demonstration of the blood capillaries in 1668, and six years later he gave the first accurate description of the red blood corpuscles, which he found to be circular in man but oval in frogs and fishes. In 1677 he described and illustrated the spermatozoa in dogs and other animals, though in this discovery Stephen Hamm had anticipated him by a few months; and he investigated the structure of the teeth, crystalline lens, muscle, &c. In 1680 he noticed that yeast consists of minute globular particles, and he described the different structure of the stem in monocotyledonous and dicotyledonous plants.

His researches in the life-history of various of the lower forms of animal life were in opposition to the doctrine that they could be " produced spontaneously, or bred from corruption." Thus he showed that the weevils of granaries, in his time commonly sup- posed to be bred from wheat, as well as in it, are grubs hatched from eggs deposited by winged insects. His chapter on the flea,

in which he not only describes its structure, but traces out the whole history of its metamorphoses from its first emergence from the egg, is full of interest — not so much for the exactness of his observations, as for its incidental revelation of the extraordinary ignorance then prevalent in regard to the origin and propagation of " this minute and despised creature," which some asserted to be produced from sand, others from dust, others from the dung of pigeons, and others from urine, but which he showed to be "en- dowed with as great perfection in its kind as any large animal," and proved to breed in the regular way of winged insects. He even noted the fact that the pupa of the flea is sometimes attacked and fed upon by a mite — an observation which

suggested the well, known lines of Swift. His attention having been drawn to the blighting of the young shoots of fruit-trees, which was commonly attributed to the ants found upon them, he was the first to find the Aphides that really do the mischief; and, upon searching into the history of their generation, he observed the young within the bodies of their parents. He carefully studied also the history of the ant and was the first to show that what had been commonly reputed to be ” ants' eggs ” are really their pupae, containing the perfect insect nearly ready for emersion, whilst the true eggs are far smaller, and give origin to ” maggots ” or larvae. Of the sea-mussel, again, and other shell-fish, he argued (in reply to a then recent defence of Aristotle's doctrine by F. Buonanni, a learned Jesuit of Rome) that they are not generated out of the mud or sand found on the seashore or the beds of rivers at low water, but from spawn, by the regular course of generation; and he maintained the same to be true of the fresh-water mussel (Unio), whose ova he examined so carefully that he saw in them the rotation of the embryo, a pheno- menon supposed to have been first discovered long afterwards. In the same spirit he investigated the generation of eels, which were at that time supposed, not only by the ignorant vulgar, but by ” re- spectable and learned men,” to be produced from dew without the ordinary process of generation. Not only was he the first discoverer of the rotifers, but he showed ” how wonderfully nature has provided for the preservation of their species,” by their tolerance of the drying-up of the water they inhabit, and the resistance afforded to the evaporation of the fluids of their bodies by the impermeability of the casing in which they then become enclosed. ” We can now easily conceive,” he says, ” that in all rain-water which is collected from gutters in cisterns, and in all waters exposed to the air, animal- cules may be found ; for they may be carried thither by the particles of dust blown about by the winds.”

Leeuwenhoek's contributions to the Philosophical Transactions amounted to one hundred and twelve; he also published twenty-six papers in the Memoirs of the Paris Academy of Sciences. Two collections of his works appeared during his life, one in Dutch (Leiden and Delft, 1685-1718), and the other in Latin (Opera omnia s. Arcana naturae ope exactissitnorum microscopiorutn selecta, Leiden, I 7 I 5 -I 7 22); and a selection from them was translated by S. Hoole and published in English (London, 1798-1781).

LEEWARD ISLANDS, a group in the West Indies. They derive their name from being less exposed to the prevailing N.E. trade wind than the adjacent Windward Islands. They are the most northerly of the Lesser Antilles, and form a curved chain stretching S.W. from Puerto Rico to meet St Lucia, the most northerly of the Windward Islands.

They consist of the Virgin Islands, with St Kitts, Antigua, Montserrat, Guadeloupe, Dominica, Martinique and their various dependencies. The Virgin Islands are owned by Great Britain and Denmark, Holland having St Eustatius, with J5aba, and part of St Martin. France possesses Guadeloupe, Martinique, St Bartholomew and the remainder of St Martin. The rest of the islands are British, and (with the exception of Sombrero, a small island used only as a lighthouse-station) form, under one governor, a colony divided into five presidencies, namely: Antigua (with Barbuda and Redonda), St Kitts (with Nevis and Anguilla), Dominica, Montserrat and the Virgin Islands. Total pop. (1901) 127,536. There is one federal executive council nominated by the crown, and one federal legislative council — ten nominated and ten elected members. Of the latter, four are chosen by the unofficial members of the local legislative council of Antigua, two by those of Dominica, and four by the non-official members of the local legislative council of St Kitts-Nevis. The federal legis- lative council meets once annually, usually at St John, Antigua. LE FANU, JOSEPH SHERIDAN (1814-1873), Irish journalist and author, was born of an old Huguenot family at Dublin on the 28th of August 1814. He entered Trinity College, Dublin, in 1833. At an early age he had given proof of literary talent, and in 183 7 he joined the staff of the Dublin University Magazine, of which he became later editor and proprietor. In 1837 he produced the Irish ballad Phaudhrig Croohore, which was

shortly afterwards followed by a second, Shamus O'Brien, successfully recited in the United States by Samuel Lover. In 1839 he became proprietor of the Warder, a Dublin newspaper, and, after purchasing the Evening Packet and a large interest in the Dublin Evening Mail, he combined the three papers under the title the Evening Mail, a weekly reprint from which was ■ issued as the Warder. After the death of his wife in 1858 he lived in retirement, and his best work was produced at this period of his life. He wrote some clever novels, of a sensational order, in which his vigorous imagination and his Irish love of the supernatural have full play. He died in Dublin on the 7th of February 1873. His best-known novels are The House by the Churchyard (1863) and Uncle Silas, a Tale of Bartram Haugh (1864). The Purcell Papers, Irish stories dating from his college days, were edited with a memoir of the author by A. P. Graves in 1880.

LEFEBVRE, PIERRE FRANCOIS JOSEPH, duke of Danzig (1755-1820),

marshal of France, was born at Rouffach in Alsace on the 20th of October 1755. At the outbreak of the Revolution he was a sergeant in the Gardes francaises, and with many of his comrades of this regiment took the popular side. He dis- tinguished himself by bravery and humanity in many of the street fights in Paris, and becoming an officer and again distinguishing himself — this time against foreign invaders — he was made a general of division in 1794. He took part in the Revolutionary Wars from Fleurus to Stokach, always resolute, strictly obedient and calm. At Stokach (1799) he received a severe wound and had to return to France, where he assisted Napoleon during the coup d'etat of 18 Brumaire. He was one of the first generals of division to be made marshal at the beginning of the First Empire. He commanded the guard infantry at Jena, conducted the siege of Danzig 1806- 1807 (from which town he received his title in 1808), commanded a corps in the emperor's campaign of 1808-1809 in Spain, and in 1809 was given the difficult task of commanding the Bavarian contingent, which he led in the containing engagements of Abensberg and Rohr and at the battle of Eckmiihl. He commanded the Imperial Guard in Russia, 181 2, fought through the last campaign of the Empire, and won fresh glory at Montmirail, Areis-sur-Aube and Champau- bert. Fie was made a peer of France by Louis XVIII. but joined Napoleon during the Hundred Days, and was only amnestied and permitted to resume his seat in the upper chamber in 1819. He died at Paris on the 14th of September 1820. Marshal Lefebvre was a simple soldier, whose qualifications for high rank, great as they were, came from experience and not from native genius. He was incapable of exercising a supreme com- mand, even of leading an important detachment, but he was absolutely trustworthy as a subordinate, as brave as he was experienced, and intensely loyal to his chief. He maintained to the end of his life a rustic simplicity of speech and demeanour. Of his wife (formerly a blanchisseuse to the Gardes Francaises) many stories have been told, but in so far as they are to her discredit they seem to be false, she being, like the marshal, a plain " child of the people."

LEFEBVRE, TANNEGUY (Tanaquillus Faber) (1615- 1672), French classical scholar, was born at Caen. After complet- ing his studies in Paris, he was appointed by Cardinal Richelieu inspector of the printing-press at the Louvre. After Richelieu's death he left Paris, joined the Reformed Church, and in 1651 obtained a professorship at the academy of Saumur, which he filled with great success for nearly twenty years. His increasing ill-health and a certain moral laxity (as shown in his judgment on Sappho) led to a quarrel with the consistory, as a result of which he resigned his professorship. Several

universities were eager to obtain his services, and he had accepted a post offered him by the elector palatine at Heidelberg, when he died suddenly on the 12th of September, 1672. One of his children was the famous Madame Dacier. Lefebvre, who was by no means a typical student in dress or manners, was a highly cultivated man and a thorough classical scholar. He brought out editions of various Greek and Latin authors— Longinus, Anacreon and Sappho, Virgil, Horace, Lucretius and many others. His

most important original works are: Les Vies des poetes Grecs (1665); Methode pour commencer les humanites Grecques et Latines (2nd ed., 1731), of which several English adaptations have appeared; Epistolae Criticae (1659).

In addition to the Memoires pour . . . la vie de Tanneguy Lefebvre, by F. Graverol (1686), see the article in the Nouvelle biographie generate, based partly on the MS. registers of the Saumur Academie.

LEFEBVRE-DESNOETTES, CHARLES, Comte (1773-1822), French cavalry general, joined the army in 1792 and served with the armies of the North, of the Sambre-and-Meuse and Rhine- and-Moselle in the various campaigns of the Revolution. Six years later he had become captain and aide-de-camp to General Bonaparte. At Marengo he won further promotion, and at Austerlitz became colonel, serving also in the Prussian campaigns of 1806-1807. In 1808 he was made general of brigade and created a count of the Empire. Sent with the army into Spain, he conducted the first and unsuccessful siege of Saragossa. The battlefield of Tudela showed his talents to better advantage, but towards the end of 1808 he was taken prisoner in the action of Benavente by the British cavalry under Paget (later Lord Uxbridge, and subsequently Marquis of Anglesey). For over two years he remained a prisoner in England, living on parole at Cheltenham. In 181 1 he escaped, and in the invasion of Russia in 181 2 was again at the head of his cavalry. In 18 13 and 18 14 his men distinguished themselves in most of the great battles, especially La Rothiere and Montmirail. He joined Napoleon in the Hundred Days and was wounded at Waterloo. For his part in these events he was condemned to death, but he escaped to the United States, and spent the next few years farming in Louisiana. His frequent appeals to Louis XVIII. eventually obtained his permission to return, but the ” Albion,” the vessel on which he was returning to France, went down off the coast of Ireland with all on board on the 22nd of May 1822.

LE FEVRE, JEAN (c. 1395-1468), Burgundian chronicler and seigneur of Saint Remy, is also known as Toison d’or from his long connexion

with the order of the Golden Fleece. Of noble birth, he adopted the profession of arms and with other Bur- gundians fought in the English ranks at Agincourt. In 1430, on the foundation of the order of the Golden Fleece by Philip III. the Good, duke of Burgundy, Le Fevre was appointed its king of arms and he soon became a very influential person at the Burgundian court. He frequently assisted Philip in conducting negotiations with foreign powers, and he was an arbiter in tournaments and on all questions of chivalry, where his wide knowledge of heraldry was highly useful. He died at Bruges on the 16th of June 1468.

Le Fevre wrote a Chronique, or Histoire de Charles VI., roy de France. The greater part of this chronicle is merely a copy of the work of Enguerrand de Monstrelet, but Le Fevre is an original authority for the years between 1428 and 1436 and makes some valuable additions to our knowledge, especially about the chivalry of the Burgundian court. He is more concise than Monstrelet, but is equally partial to the dukes of Burgundy. The Chronique has been edited by F. Morand for the Soci6t6 de l'histoire de France (Paris, 1876). Le Fevre is usually regarded as the author of the Livre des faites 'de Jacques de Lalaing.

LEG (a word of Scandinavian origin, from the Old Norwegian leggr, cf. Swed. lagg, Dan. lae~g; the O. Eng. word was sceanca, shank), the general name for those limbs in animals which support and move the body, and in man for the lower limbs of the body (see Anatomy, Superficial and Artistic; Skeleton, Appendicular; Muscular System). The word is in common use for many objects which resemble the leg in shape or function. As a slang term, " leg," a shortened form of " blackleg," has been in use since the end of the 18th century for a swindler, especially in connexion with racing or gambling. The term " blackleg " is now also applied by trade-unionists to a workman who, during a strike or lockout, continues working or is brought to take the place of the withdrawn workers.

LEGACY (Lat. legatum), in English law, some particular thing or things given or left by a testator in his will, to be paid or performed by his executor or administrator. The word is primarily applicable to gifts of personalty or gifts charged

upon real estate; but if there is nothing else to which it can refer it may refer to realty; the proper word, however, for gifts of realty is devise.

Legacies may be either specific, general or demonstrative. A specific legacy is ” something which a testator, identifying it by a sufficient description and manifesting an intention that it should be enjoyed in the state and condition indicated by that description, separates in favour of a particular legatee from the general mass of his personal estate,” e.g. a gift of ” my portrait by X,” naming the artist. A general legacy is a gift not so distinguished from the general mass of the personal estate, e.g. a gift of £100 or of a gold ring. A demonstrative legacy partakes of the nature of both the preceding kinds of legacies, e.g. a gift of £100 payable out of a named fund is a specific legacy so far as the fund named is available to pay the legacy; after the fund is exhausted the balance of the legacy is a general legacy and recourse must be had to the general estate to satisfy such balance. Sometimes a testator bequeaths two or more legacies to the same person; in such a case it is a question whether the later legacies are in substitution for, or in addition to, the earlier ones. In the latter case they are known as cumulative. In each case the intention of the testator is the rule of construction; this can often be gathered from the terms of the will or codicil, but in the absence of such evidence the following rules are followed by the courts. Where the same specific thing is be- queathed twice to the same legatee or where two legacies of equal amount are bequeathed by the same instrument the second bequest is mere repetition; but where legacies of equal amounts are bequeathed by different instruments or of unequal amounts by the same instruments they are considered to be cumulative.

If the estate of the testator is insufficient to satisfy all the legacies these must abate, i.e. be reduced rateably; as to this it should be noticed that specific and demonstrative legacies have a prior claim to be paid in full out of the specific fund before general legacies, and that general legacies abate rateably inter se in the absence of any provision

to the contrary by the testator. Specific legacies are liable to ademption where the specific thing perishes or ceases to belong to the testator, e.g. in the instance given above if the testator sells the portrait the legatee will get nothing by virtue of the legacy. As a general rule, legacies given to persons who predecease the testator do not take effect; they are said to lapse. This is so even if the gift be to A and his executors, administrators and assigns, but this is not so if the testator has shown a contrary intention, thus, a gift to A or his personal representative will be effective even though A predecease the testator; further, by the Wills Act 1837, devises of estates tail and gifts to a child or other issue of the testator will not lapse if anj' issue of the legatee survive the testator. Lapsed legacies fall into and form part of the residuary' estate. In the absence of any indication to the contrary a legacy becomes due on the day of the death of the testator, though for the convenience of the executor it is not payable till a year after that date; this delay does not prevent the legacy vesting on the testator's death. It frequently happens, however, that a legacy is given payable at a future date; in such a case, if the legatee dies after the testator but prior to the date when the legacy is payable it is necessary to discover whether the legacy was vested or contingent, as in the former case it becomes payable to the legatee's representative; in the latter, it lapses. In this, as in other cases, the test is the intention of the testator as expressed in the will; generally it may be said that a gift " payable " or " to be paid " at a certain fixed time confers a vested interest on the legatee, while a gift to A " at " a fixed time, e.g. twenty-one years of age, only confers on A an interest contingent on his attaining the age of twenty-one.

Legacy Duty is a duty charged by the state upon personal pro- perty devolving upon the legatees or next of kin of a dead person, either by virtue of his will or upon his intestacy. The duty was first imposed in England in 1 780. but the principal act dealing with the subject is the Legacy Duty Act 1796. The principal points as to the duty are these. The duty is charged on personalty only. It is payable only where the person on whose death the property

passes was domiciled in the United Kingdom. The rate of duty varies from 1 to 10% according to the relationship between the testator and legatee. As between husband and wife no duty is payable. The duty is payable by the executors and deducted from the legacy unless the testator directs otherwise. Special provisions as to valuation are in force where the gift is of an annuity or is settled on various persons in succession, or the legacy is given in joint tenancy and other cases. In sr me cases the duty is payable by instalments which carry interest at 3%. In various cases legacies are exempt from duty — the more im-

portant are gifts to a member of the royal family, specific legacies under £20 (pecuniary legacies under £20 pay duty), legacies of books, prints, &c, given to a body corporate for preservation, not for sale, and legacies given out of an estate the principal value of which is less than £100. Further, by the Finance Act 1894, payment of the estate duty thereby created absorbs the 1 % duty paid by lineal ancestors or descendants of the deceased 1 and the duty on a settled legacy, and, lastly, in the event of estate duty being paid on an estate the total value of which is under £1000, no legacy duty is payable. The legacy duty payable in Ireland is now for all practical purposes assimi- lated to that in Great Britain. The principal statute in that country is an act of 1814.

LE GALLIENNE, RICHARD (1866-), English poet and critic, was born in Liverpool on the 20th of January 1866. He started life in a business office in Liverpool, but abandoned this to turn author. My Lady's Sonnets appeared at Liverpool in 1887, and in 1889 he became for a short time literary secretary to Wilson Barrett. In the same year he published Volumes in Folio, The Book Bills of Narcissus and George Meredith: some Characteristics (new ed., 1900). He joined the staff of the Star in 1891, and wrote for various papers over the signature of " Logroller." English Poems (1892), R. L. Stevenson and other Poems (1895), a paraphrase (1897) of the Rubaiyat of Omar Khayyam, and Odes from the Divan of Hafiz (1903), contained some light, graceful verse, but he is best known by the fantastic prose essays and sketches of Prose Fancies (2 series, 1894-1896), Sleeping Beauty and other Prose Fancies (1900), The Religion of a Literary Man (1893), The Quest of the Golden Girl (1897), The Life Romantic (1901), &c. His first wife, Mildred Lee, died in 1894, and in 1897 he married Julie Norregard, subsequently taking up his residence in the United States. In 1906 he trans- lated, from the Danish, Peter Nansen's Love's Trilogy.

LEGAREˆ HUGH SWINTON (1797-1843), American lawyer and statesman, was born in Charleston, South Carolina, on the 2nd of January 1797, of Huguenot and Scotch stock. Partly on account of his inability to share in the amusements of his fellows by reason of a deformity due to vaccine poisoning before he was five (the poison permanently arresting the growth and development of his legs), he was an eager student, and in 1814 he graduated at the College of South Carolina with the highest rank in his class and with a reputation throughout the state for scholarship and eloquence. He studied law for three years in South Carolina, and then spent two years abroad, studying French and Italian in Paris and jurisprudence at Edinburgh. In 1 8 20-1 82 2 and in 18 24-1 830 he was a member of the South

Carolina legislature. In 1827, with Stephen Elliott (1771-1830), the naturalist, he founded the Southern Review, of which he was the sole editor after Elliott's death until 1834, when it was discontinued, and to which he contributed articles on law, travel, and modern and classical literature. In 1830-1832 he was attorney-general of South Carolina, and, although a State's Rights man, he strongly opposed nullification. During his term of office he appeared in a case before the United States Supreme Court, where his knowledge of civil law so strongly impressed Edward Livingston, the secretary of state, who was himself an admirer of Roman Law, that he urged Legare to devote himself to the study of this subject with the hope that he might influence American law toward the spirit and philosophy and even the forms and processes of Roman jurisprudence.

1 The Finance Bill 1909-1910 re-imposed this duty, and extended it to husbands and wives as well as descendants and ancestors.

Through Livingston, Legare was appointed American chargi d'affaires at Brussels, where from 1833 to 1836 he perfected himself in civil law and in the German commentaries on civil law. In 1837-1830, as a Union Democrat, he was a member of the national House of Representatives, and there ably opposed Van Buren's financial policy in spite of the enthusiasm in South Carolina for the sub-treasury project. He supported Harrison in the presidential campaign of 1840, and when the cabinet was reconstructed by Tyler in 1841, Legare was appointed attorney- general of the United States. On the 9th of May 1843 he was appointed secretary of state ad interim, after the resignation of Daniel Webster. On the 20th of June 1843 he died suddenly at Boston. His great work, the forcing into common law of the principles of civil law, was unaccomplished; but Story says " he seemed about to accomplish [it]; for his arguments before the Supreme Court were crowded with the principles of the Roman Law, wrought into the texture of the Common Law with great success." As attorney-general he argued the famous cases, the United States v. Miranda, Wood v. the United Stales, and Jewell v. Jewell.

See The Writings of Hugh Swinton Legare (2 vols., Charleston, S.C., 1846), edited by his sister, Mrs Mary Bullen, who contributed a biographical sketch; and two articles by B. J. Ramage in The Sewanee Review, vol. x. (New York, 1902).

LEGAS, one of the Shangalla group of tribes, regarded as among the purest types of the Galla race. They occupy the upper Yabus valley, S.W. Abyssinia, near the Sudan frontier. The Legas are physically distinct from the Negro Shangalla. They are of very light complexion, tall and thin, with narrow hollow- cheeked faces, small heads and high foreheads. The chiefs' families are of more mixed blood, with perceptible Negro strain. The Legas are estimated to number upwards of a hundred thousand, of whom some 20,000 are warriors. They are, however, a peaceful race, kind to their women and slaves, and energetic agriculturists. Formerly independent, they came about 1900 under the sway of Abyssinia. The Legas are pagans, but Mahom- medanism has gained many converts among them.

LEGATE, BARTHOLOMEW (c. 1575-1612), English fanatic, was born in Essex and became a dealer in cloth. About the beginning of the 17th century he became a preacher among a sect called the " Seekers," and appears to have held unorthodox opinions about the divinity of Jesus Christ. Together with his brother Thomas he was put in prison for heresy in i6r 1. Thomas died in Newgate gaol, London, but Bartholomew's imprisonment was not a rigorous one. James I. argued with him, and on several occasions he was brought before the Consistory Court of London, but without any definite result. Eventually, after having threatened to bring an action for wrongful imprisonment, Legate was tried before a full Consistory Court in February 161 2, was found guilty of heresy, and was delivered to the secular authorities for punishment. Refusing to retract his opinions he was burned to death at Smithfield on the 18th of March 1612. Legate was the last person burned in London for his religious opinions, and Edward Wightman, who was burned at Lichfield in April 1612, was the last to suffer in this way in England.

See T. Fuller, Church History of Britain (1655) ; and S. R. Gardiner, History of England, vol. ii. (London, 1904).

LEGATE (Lat. legatus, past part, of legare, to send as deputy), a title now generally confined to the highest class of diplomatic representatives of the pope, though still occasionally used, in its original Latin sense, of any ambassador or diplomatic agent. According to the Nova Compilatio Decretalium of Gregory IX., under the title " De officio legati " the canon law recognizes two sorts of legate, the legatus natus and the legatus datus or missus. The legatus datus (missus) may be either .(1) delegatus, or (2) nuncius apostolicus, or (3) legatus a latere {lateralis, collateralis) . The rights of the legatus natus, which included concurrent juris- diction with that of all the bishops within his province, have been much curtailed since the 16th

century; they were alto- gether suspended in presence of the higher claims of a legatus a latere, and the title is now almost quite honorary. It was attached to the see of Canterbury till the Reformation and it still attaches to the sees of Seville, Toledo, Aries, Reims, Lyons,

Gran, Prague, Gnesen-Posen, Cologne, Salzburg, among others. The commission of the legatus delegatus (generally a member of the local clergy) is of a limited nature, and relates only to some definite piece of work. The nuncius apostolicus (who has the privilege of red apparel, a white horse and golden spurs) possesses ordinary jurisdiction within the province to which he has been sent, but his powers otherwise are restricted by the terms of his mandate. The legatus a latere (almost invariably a cardinal, though the power can be conferred on other prelates) is in the fullest sense the plenipotentiary representative of the pope, and possesses the high prerogative implied in the words of Gregory VII., ” nostra vice quae corrigenda sunt corrigat, quae statuend constituat.” He has the power of suspending all the bishops in his province, and no judicial cases are reserved from his judg- ment. Without special mandate, however, he cannot depose bishops or unite or separate bishoprics. At present legati a latere are not sent by the holy see, but diplomatic relations, where they exist, are maintained by means of nuncios, inter- nuncios and other agents.

The history of the office of papal legate is closely involved with that of the papacy itself. If it were proved that papal legates exercised the prerogatives of the primacy in the early councils, it would be one of the strongest points for the Roman Catholic view of the papal history. Thus it is claimed that Hosius of Cordova presided over the council of Nicaea (325) in the name of the pope. But the claim rests on slender evidence, since the first source in which Hosius is referred to as representative of the pope is Gelasius of Cyzicus in the Propontis, who wrote toward the end of the 5th century. It is even open to dispute whether Hosius was president at Nicaea, and though he certainly pre- sided over the council of Sardica in 343, it was probably as representative of the emperors Constans and Constantius, who had summoned the council. Pope Julius I. was represented at Sardica by two presbyters. Yet the fifth canon, which provides for appeal by a bishop to Rome, sanctions the use of embassies a latere. If the appellant wishes the pope to send priests from his own household, the pope shall be free to do so, and to furnish them with full authority from himself (” ut de latere suo presby- teros mittat . . . habentes ejus auctoritatem a quo destinati sunt “). The decrees of Sardica, an obscure council, were later confused with those of Nicaea and thus gained weight. In the synod of Ephesus in 431, Pope Celestine I.

instructed his repre- sentatives to conduct themselves not as disputants but as judges, and Cyril of Alexandria presided not only in his own name but in that of the pope (and of the bishop of Jerusalem). Instances of delegation of the papal authority in various degrees become numerous in the 5th century, especially during the pontificate of Leo I. Thus Leo writes in 444 {Ep. 6) to Anastasius of Thessalonica, appointing him his vicar for the province of Illyria; the same arrangement, he informs us, had been made by Pope Siricius in favour of Anysius, the predecessor of Anas- tasius. Similar vicarial or legatine powers had been conferred in 418 by Zosimus upon Patroclus, bishop of Aries. In 449 Leo was represented at the " Robber Synod," from which his legates hardly escaped with life; at Chalcedon, in 451, they were treated with singular honour, though the imperial commissioners presided. Again, in 453 the same pope writes to the empress Pulcheria, naming Julianus of Cos as his representative in the defence of the interests of orthodoxy and ecclesiastical discipline at Constantinople (Ep. 112); the instructions to Julianus are given in Ep. 113 (" hanc specialem curam vice mea functus assumas "). The designation of Anastasius as vicar apostolic over Illyria may be said to mark the beginning of the custom of conferring, ex officio, the title of legatus upon the holders of important sees, who ultimately came to be known as legati nali, with the rank of primate; the appointment of Julianus at Constantinople gradually developed into the long permanent office of apocrisiarius or responsalis. Another sort of delegation is exemplified in Leo's letter to the African bishops (Ep. 12), in which he sends Potentius, with instructions to inquire in his name, and to report (" vicem curae nostrae fratri et consacerdoti nostro Potentio delegantes qui de episcopis, quorum culpabilis

ferebatur electio, quid Veritas haberet inquireret, nobisque omnia fideliter indicaret "). Passing on to the time of Gregory the Great, we find him sending two representatives to Gaul in 599, to suppress simony, and one to Spain in 603. Augustine of Canterbury is sometimes spoken of as legate, but it does not appear that in his case this title was used in any strictly technical sense, although the archbishop of Canterbury afterwards attained the permanent dignity of a legatus natus. Boniface, the apostle of Germany, was in like manner constituted, according to Hinc- mar (Ep. 30), a legate of the apostolic see by Popes Gregory II. and Gregory III. According to Hefele (Cone. iv. 239), Rodoald of Porto and Zecharias of Anagni, who were sent by Pope Nicolas to Constantinople in 860, were the first actually

called legati a latere. The policy of Gregory VII. naturally led to a great development of the legatine as distinguished from the ordinary episcopal function. From the creation of the medieval papal monarchy until the close of the middle ages, the papal legate played a most important role in national as well as church history. The further definition of his powers proceeded through- out the 1 2th and 13th centuries. From the 16th century legates a latere give way almost entirely to nuncios (q.v.).

See P. Hinschius, Kirchenrecht, i. 498 ff . ; G. Phillips, Kirchen- recht, vol. vi. 680 ff.

LEGATION (Lat. legatio, a sending or mission), a diplomatic mission of the second rank. The term is also applied to the build- ing in which the minister resides and to the area round it covered by his diplomatic immunities. See Diplomacy.

LEGEND (through the French from the med. Lat. legenda, things to be read, from legere, to read), in its primary meaning the history or life-story of a saint, and so applied to portions of Scripture and selections from the lives of the saints as read at divine service. The statute of 3 and 4 Edward VI. dealing with the abolition of certain books and images (1549), cap. 10, sect. 1, says that ” all bookes . . . called processionalles, manuelles, legends . . . shall be . . . abolished.” The ” Golden Legend,” or A urea Legenda, was the name given to a book containing lives of the saints and descriptions of festivals, written by Jacobus de Voragine, archbishop of Genoa, in the 13th century. From the original application of the word to stories of the saints con- taining wonders and miracles, the word came to be applied to a story handed down without any foundation in history, but popularly believed to be true. ” Legend ” is also used of a writing, inscription, or motto on coins or medals, and in connexion with coats of arms, shields, monuments, &c.

LEGENDRE, ADRIEN MARIE (1752-1833), French mathe- matician, was born at Paris (or, according to some accounts, at Toulouse) in 1752. He was brought up at Paris, where he completed his studies at the College Mazarin. His first published writings consist of articles forming part of the Traite de mecanique (1774) of the Abbe Marie, who was his professor; Legendre’s name, however, is not mentioned. Soon afterwards he was appointed professor of mathematics in the Eeole Mililaire at Paris, and he was afterwards professor in the Eeole Normale. In 1782 he received the prize from the Berlin Academy for his ” Dissertation sur la question de balistique,” a memoir relating to the paths of projectiles in resisting media. He also, about this time,

wrote his ” Recherches sur la figure des planetes,” published in the Memoires of the French Academy, of which he was elected a member in succession to J. le Rond d’Alembert in 1783. He was also appointed a commissioner for connecting geodetically Paris and Greenwich, his colleagues being P. F. A. Mechain and C. F. Cassini de Thury; General William Roy conducted the operations on behalf of England. The French observations were published in 1792 (Expose des operations faitcs en France in 1787 pour la jonetion des observatoires de Paris et de Greenwich) . During the Revolution, he was one of the three members of the council established to introduce the decimal system, and he was also a member of the commission appointed to determine the length of the metre, for which purpose the calculations, &c, connected with the arc of the meridian from Barcelona to Dunkirk were revised. He was also associated with G. C. F. M. Prony (1755-1839) in the formation of the great

French tables of logarithms of numbers, sines, and tangents, and natural sines, called the Tables du Cadastre, in which the quadrant was divided centesimally; these tables have never been published (see Logarithms). He was examiner in the Eeole Poly technique, but held few important state offices. He died at Paris en the 10th of January r833, and the discourse at his grave was pronounced by S. D. Poisson. The last of the three supplements to his Traite des fonclions elliptiques was published in 1832, and Poisson in his funeral oration remarked: ” M. Legendre a eu cela de commun avec la plupart des geometres qui l’ont precede, que ses travaux n’ont fini qu’avec sa vie. Le dernier volume de nos memoires renferme encore un memoire de lui, sur une question difficile de la theorie des nombres; et peu de temps avant la maladie qui l’a conduit au tombeau, il se procura les observations les plus recentes des cometes a, courtes periodes, dont il allait se servir pour appliquer et perfectionner ses methodes.”

It will be convenient, in giving an account of his writings, to consider them under the different subjects which are especially associated with his name.

Elliptic Functions. — This is the subject with which Legendre’s name will always be most closely connected, and his researches upon it extend over a period of more than forty years. His first published writings upon the subject consist of two papers in the Memoires de V Academie Frangaise for 1786 upon elliptic arcs. In 1792 he presented to the Academy a memoir on elliptic transcendents. The contents of these memoirs are included in the first volume of his Exercices de calcul integral (1811). The third volume (1816) contains the very elaborate and now well-known tables of the elliptic

integrals which were calculated by Legendre himself, with an account of the mode of their construction. In 1827 appeared the Traite des fonclions elliptiques (2 vols., the first dated 1825, the second 1826), a great part of the first volume agrees very closely with the contents of the Exercices; the tables, &c, are given in the second volume. Three supplements, relating to the researches of N. H. Abel and C. G. J. Jacobi, were published in 1828-1832, and form a third volume. Legendre had pursued the subject which would now be called elliptic integrals alone from 1786 to 1827, the results of his labours having been almost entirely neglected by his contemporaries, but his work had scarcely appeared in 1827 when the discoveries which were independently made by the two young and as yet unknown mathematicians Abel and Jacobi placed the subject on a new basis, and revolutionized it completely. The readiness with which Legendre, who was then seventy-six years of age, welcomed these important researches, that quite overshadowed his own, and included them in successive supplements to his work, does the highest honour to him (see Function).

Eulerian Integrals and Integral Calculus. — The Exercices de calcul integral consist of three volumes, a great portion of the first and the whole of the third being devoted to elliptic functions. The remainder of the first volume relates to the Eulerian integrals and to quadratures. The second volume (18 17) relates to the Eulerian integrals, and to various integrals and series, developments, mechani- cal problems, &c, connected with the integral calculus; this volume contains also a numerical table of the values of the gamma function. The latter portion of the second volume of the Traite des fonclions elliptiques (1826) is also devoted to the Eulerian integrals, the table being reproduced. Legendre's researches connected with the "gamma function" are of importance, and are well known; the subject was also treated by K. F. Gauss in his memoir Disquisitiones generates circa series infinitas (1816), but in a very different manner. The results given in the second volume of the Exercices are of too miscellaneous a character to admit of being briefly described. In 1788 Legendre published a memoir on double integrals, and in 1809 one on definite integrals.

Theory of Numbers. — Legendre's Theorie des nombres and Gauss's Disquisitiones arithmeticac (1801) are still standard works upon this subject. The first edition of the former appeared in 1798 under the title Essai sur la theorie des nombres; there was a second edition in 1808; a first supplement was published in 1816, and a second in 1825. The third edition, under the title Theorie des nombres, appeared in 1830 in two volumes. The fourth edition appeared in 1900. To

Legendre is due the theorem known as the law of quadratic reciprocity, the most important general result in the science of numbers which has been discovered since the time of P. de Fermat, and which was called by Gauss the ” gem of arith- metic.” It was first given by Legendre in the Memoires of the Academy for 1785, but the demonstration that accompanied it was incomplete. The symbol (a/p) which is known as Legendre’s sym- bol, and denotes the positive or negative unit which is the remainder when ai^~ l > is divided by a prime number p, does not appear in this memoir, but was first used in the Essai sur la theorie des nombres. Legendre’s formula x; (log x-i -08366) for the approximate number of forms inferior to a given number x was first given by him also in this work (2nd ed., p. 394) (see Number).

37&

LEGENDRE, L.— LEGGE, H.

Attractions of Ellipsoids. — Legendre was the author of four im- portant memoirs on this subject. In the first of these, entitled ” Recnerches sur l’attraction des spheroides homogenes,” published in the Memoires of the Academy for 1785, but communicated to it at an earlier period, Legendre introduces the celebrated expressions which, though frequently called Laplace’s coefficients, are more correctly named after Legendre. The definition of the coefficients is that if (1-2/ z cos <£+/j 2)~J be expanded in ascending powers of h, and if the general term be denoted by PJi", then P n is of the Legen- drian coefficient of the Kth order. In this memoir also the function which is now called the potential was, at the suggestion of Laplace, first introduced. Legendre shows that Maclaurin's theorem with respect to confocal ellipsoids is true for any position of the external point when the ellipsoids are solids of revolution. Of this memoir Isaac Todhunter writes: " We may affirm that no single memoir in the history of our subject can rival this in interest and importance. During forty years the resources of analysis, even in the hands of d'Alembert, Lagrange and Laplace, had not carried the theory of the attraction of ellipsoids beyond the point which the geometry of Maclaurin had reached. The introduction of the coefficients now called Laplace's, and their application, commence a new era in mathematical physics." Legendre's second memoir was com- municated to the Academic in 1784, and relates to the conditions of equilibrium of a mass of rotating fluid in the form of a figure of revolution which does not deviate much from a sphere. The third memoir relates to Laplace's theorem respecting confocal ellipsoids. Of che fourth memoir Todhunter writes: " It occupies an important position. in the history of our subject. The most

striking addition which is here made to previous researches consists in the treatment of a planet supposed entirely fluid; the general equation for the form of a stratum is given for the first time and discussed. For the first time we have a correct and convenient expression for Laplace's «th coefficient." (See Todhunter's History of the Mathematical Theories of Attraction and the Figure of the Earth (1873), the twentieth, twenty-second, twenty-fourth, and twenty-fifth chapters of which' contain a full and complete account of Legendre's four memoirs. See also Spherical Harmonics.)

Geodesy. — Besides the work upon the geodetical operations connecting Paris and Greenwich, of which Legendre was one of the authors, he published in the Memoires de V Academic for 1787 two papers on trigonometrical operations depending upon the figure of the earth, containing many theorems relating to this subject. The best known of these, which is called Legendre's theorem, is usually given in treatises on spherical trigonometry; by means of it a small spherical triangle may be treated as a plane triangle, certain correc- tions being applied to the angles. Legendre was also the author of a memoir upon triangles drawn upon a spheroid. Legendre's theorem is a fundamental one in geodesy, and his contributions to the subject are of the greatest importance.

Method of Least Squares. — In 1806 appeared Legendre's Nouvelles Methodes pour la determination des orbites des cometes, which is memorable as containing the first published suggestion of the method of least squares (see Probability). In the preface Legendre re- marks: " La methode qui me paroit la plus simple et la plus generate consiste a rendre minimum la somme des quarres des erreurs, . . . et que j'appelle methode des moindres quarres " ; and in an appendix in which the application of the method is explained his words are : " De tous les principes qu'on peut proposer pour cet objet, je pense qu'il n'en est pas de plus general, de plus exact, ni d'une application plus facile que celui dont nous avons fait usage dans les recherches precedentes, et qui consiste a rendre minimum la somme des quarres des erreurs." The method was proposed by Legendre only as a convenient process for treating observations, without reference to the theory of probability. It had, however, been applied by Gauss as early as 1795, and the method was fully explained, and the law of facility for the first time given by him in 1809. Laplace also justified the method by means of the principles of the theory of probability; and this led Legendre to republish the part of his Nouvelles Methodes which related to it in the Memoires de V Academic for 1810. Thus, although the method of least squares was first formally proposed by Legendre, the theory and algorithm and mathematical foundation of

the process are due to Gauss and Laplace. Legendre published two supplements to his Nouvelles Methodes in 1806 and 1820.

The Elements of Geometry. — Legendre's name is most widely known on account of his Elements de gcomctrie, the most successful of the numerous attempts that have been made to supersede Euclid as a text-book on geometry. It first appeared in 1794, and went through very many editions, and has been translated into almost all languages. An English translation, by Sir David Brewster, from the eleventh French edition, was published in 1823, and is well known in England. The earlier editions did not contain the trigonometry. In one of the notes Legendre gives a proof of the irrationality, of v. This had been first proved by J. H. Lambert in the Berlin Memoirs for 1768. Legendre's proof is similar in prin- ciple to Lambert's, but much simpler. On account of the objections urged against the treatment of parallels in this work, Legendre was induced to publish in 1803 his Nouvelle Thcorie des paralleles. His Gcomctrie gave rise in England also to a lengthened discussion on the difficult question of the treatment of the theory of parallels.

It will thus be seen that Legendre's works have placed him in the very foremost rank in the widely distinct subjects of elliptic func- tions, theory of numbers, attractions, and geodesy, and have given him a conspicuous position in connexion with the integral calculus and other branches of mathematics. He published a memoir on the integration of partial differential equations and a few others which have not been noticed above, but they relate to subjects with which his name is not especially associated. A good account of the principal works of Legendre is given in the Bibliotheque universelle de Geneve for 1833, pp. 45-82.

See Elie de Beaumont, " Memoir de Legendre," translated by C. A. Alexander, Smithsonian Report (1874). (J. W. L. G.)

LEGENDRE, LOUIS (1752-1797), French revolutionist, was born at Versailles on the 22nd of May 1752. When the Revolu- tion broke out, he kept a butcher's shop in Paris, in the rue des Boucheries St Germain. He was an ardent supporter of the ideas of the Revolution, a member of the Jacobin Club, and one of the founders of the club of the Cordeliers. In spite of the incorrectness of his diction, he was gifted with a genuine eloquence, and well knew how to carry the populace with him. He was a prominent actor in the taking of the Bastille (14th of July 1789), in the massacre of the Champ de Mars (July 1791), and in the attack on the Tuileries (10th of August 1792). Deputy from Paris to the Convention, he voted for the death of Louis

XVI., and was sent on mission to Lyons (27th of February 1793) before the revolt of that town, and was on mission from August to October 1793 in Seine-Inferieure. He was a member of the Comile de Surete Generale, and contributed to the downfall of the Girondists. When Danton was arrested, Legendre at first defended him, but was soon cowed and withdrew his defence. After the fall of Robespierre, Legendre took part in the reactionary movement, undertook the closing of the Jacobin Club, was elected president of the Convention, and helped to bring about the impeachment of J. B. Carrier, the perpetrator of the noyades of Nantes. He was subsequently elected a member of the Council of Ancients, and died on the 13th of December 1797.

See F. A. Aulard, Les Orateurs de la Legislative et de la Convention (2nd ed., Paris, 1906, 2 vols.) ; " Correspondance de Legendre " in the Revolution francaise (vol. xl., 1901).

LEGERDEMAIN (Fr. leger-de-main, i.e. light or sleight of hand), the name given specifically to that form of conjuring in which the performer relies on dexterity of manipulation rather than on mechanical apparatus. See Conjuring.

LEGGE, afterwards Bilson-Legge, HENRY (1708-1764), English statesman, fourth son of William Legge, 1st earl of Dartmouth (1672-1750), was born on the 29th of May 1708. Educated at Christ Church, Oxford, he became private secretary to Sir Robert Walpole, and in 1739 was appointed secretary of Ireland by the lord-lieutenant, the 3rd duke of Devonshire; being chosen member of parliament for the borough of East. Looe in 1740, and for Orford, Suffolk, at the general election in the succeeding year. Legge only shared temporarily in the downfall of Walpole, and became in quick succession surveyor-general of woods and forests, a lord of the admiralty, and a lord of the treasury. In 1748 he was sent as envoy extraordinary to Frederick the Great, and although his conduct in Berlin was sharply censured by George II., he became treasurer of the navy soon after his return to England. In April 1754 he joined the ministry of the duke of Newcastle as chancellor of the exchequer, the king consenting to this appointment although refusing to hold any intercourse with the minister; but Legge shared the elder Pitt's dislike of the policy of paying subsidies to the land- grave of Hesse, and was dismissed from office in November 1755. Twleve months later he returned to his post at the exchequer in the administration of Pitt and the 4th duke of Devonshire, retaining office until April 1757 when he shared both the dismissal and the ensuing popularity of Pitt. When in conjunction with the duke of Newcastle Pitt returned to power in the following July,

Legge became chancellor of the exchequer for the third time. He imposed new taxes upon houses and windows, and he appears to have lost to some extent the friendship of Pitt, while the king refused to make him a peer. In 1759 he obtained the sinecure position of surveyor of the petty customs and subsidies in the port of London, and having in consequence to resign his seat in parliament he was chosen one of the members for

Hampshire, a proceeding which greatly incensed the earl of Bute, who desired this seat for one of his friends. Having thus incurred Bute's displeasure Legge was again dismissed from the exchequer in March 1761, but he continued to take part in parliamentary debates until his death at Tunbridge Wells on the 23rd of August 1764. Legge appears to have been a capable financier, but the position of chancellor of the exchequer was not at that time a cabinet office. He took the additional name of Bilson on succeed- ing to the estates of a relative, Thomas Bettersworth Bilson, in 1754. Pitt called Legge, " the child, and deservedly the favourite child, of the Whigs." Horace Walpole said he was "of a creeping, underhand nature, and aspired to the lion's place by the manoeuvre of the mole," but afterwards he spoke in high terms of his talents. Legge married Mary, daughter and heiress of Edward, 4th and last Baron Stawel (d. 1755). This lady, who in 1760 was created Baroness Stawel of Somerton, bore him an only child, Henry Stawel Bilson-Legge (1757-1820), who became Baron Stawel on his mother's death in 1780. When Stawel died without sons his title became extinct. His only daughter, Mary (d. 1864), married John Dutton, 2nd Baron Sherborne.

See John Butier, bishop of Hereford, Some Account of the Character of the late Rt. Hon. H. Bilson-Legge (1765) ; Horace Walpole, Memoirs of the Reign of George II. (London, 1847) ; and Memoirs of the Reign of George III., edited by G. F. R. Barker (London, 1894); W. E. H. Lecky, History of England, vol. ii. (London, 1892) ; and the memoirs and collections of correspondence of the time.

LEGGE, JAMES (1815-1897), British Chinese scholar, was

born at Huntly, Aberdeenshire, in 181 5, and educated at King's

College, Aberdeen. After studying at the Highbury Theological

College, London, he went in 1839 as a missionary to the Chinese,

but, as China was not yet open to Europeans, he remained at Malacca three years, in charge of the Anglo-Chinese College there. The College was subsequently moved to Hong-Kong, where Legge lived for thirty years. Impressed of missionaries being able to comprehend the ideas and culture of ihe Chinese, he began in 1841 a translation in many volumes of the Chinese classics, a monumental task admirably executed and completed a few years before his death. In 1870 he was made an LL.D. of- Aberdeen and in 1884 of Edinburgh University. In 1875 several gentlemen connected with the China trade suggested to the university of Oxford a Chair of Chinese Language and Literature to be occupied by Dr Legge. The university responded liberally, Corpus Christi College contributed the emoluments of a fellowship, and the chair was constituted in 1876. In addition to his other work Legge wrote The Life and Teaching of Confucius (1867); The Life and Teaching of Mencius (1S75); The Religions of China (1880); and other books on Chinese literature and religion. He died at Oxford on the 29th of November 1897.

LEGHORN (Ital. Livorno, Fr. Livourne), a city of Tuscany, Italy, chief town of the province of the same name, which con- sists of the commune of Leghorn and the islands of Elba and Gorgona. The town is the seat of a bishopric and of a large naval academy — the only one in Italy — and the third largest commercial port in the kingdom, situated on the west coast, 12 m. S.W. of Pisa by rail, 10 ft. above sea-level. Pop. (1901) 78,308 (town), 96,528 (commune). It is built along the sea- shore upon a healthy and fertile tract of land, which forms, as it were, an oasis in a zone of Maremma. Behind is a range of hills, the

most conspicuous of which, the Monte Nero, is crowned by a frequented pilgrimage church and also by villas and hotels, to which a funicular railway runs. The town itself is almost entirely modern. The 16th-century Fortezza Vecchia, guarding the harbour, is picturesque, and there is a good bronze statue of the grand duke Ferdinand I. by Pietro Tacca (1577— 1640), a pupil of Giovanni da Bologna. The lofty Torre del Marzocco, erected in J423 by the Florentines, is fine. The facade of the cathedral was designed by Inigo Jones. The old Protestant cemetery contains the tombs of Tobias Smollett (d. 1771) and Francis Horner (d. 1817). There is also a large synagogue founded in 1581. The exchange, the chamber of commerce and the clearing-house (one of the oldest in the

world, dating from 1764) are united under one roof in the Palazzo del Commercio, opened in 1907. Several improvements have been carried out in the city and port, and the place is developing rapidly as an industrial centre. The naval academy, formerly established partly at Naples and partly at Genoa, has been transferred to Leghorn. Some cf the navigable canals which connected the harbour with the interior of the city have been either modified or filled up. Several streets have been widened, and a road along the shore has been transformed into a fine and shady promenade. Leghorn is the principal sea-bathing resort in this part of Italy, the season lasting from the end of June to the end of August. A spa for the use of the Acque della Salute has been constructed. Leghorn is on the main line from Pisa to Rome; another line runs to Colle Salvetti. A con- siderable number of important steamship lines call here. The new rectilinear mole, sanctioned in 1881, has been built out into the sea for a distance of 600 yds. from the old Vegliaia lighthouse, and the docking basin has been lengthened to 490 ft. Inside the breakwater the depth varies from 10 to 26 ft. The total trade of the port increased from £3,853,593 in 1897 to £S,67S, 2 85 in 1905 and £7,009,758 in 1906 (the large increase being mainly due to a rise of over £1,000,000 in imports — mainly of coal, building materials and machinery), the average ratio of imports to exports being as three to two. The imports consist principally of machinery, coal, grain, dried fish, tobacco and hides, and the exports of hemp, hides, olive oil, soap, coral, candied fruit, wine, straw hats, boracic acid, mercury, and marble and alabaster. In 1885 the total number of vessels that entered the port was 4281 of 1,434,000 tons; of these, 1251 of 750,000 tons were foreign; 688,000 tons of merchandise were loaded and unloaded. In 1906, after considerable fluctua- tions during the interval, the total number that entered was 4623 vessels of 2,372,551 tons; of these, 935 of 1,002,119 tons were foreign; British ships representing about half this tonnage. In 1906 the

total imports and exports amounted to 1,470,000 tons including coasting trade. A great obstacle to the develop- ment of the port is the absence of modern mechanical appliances for loading and unloading vessels, and of quay space and dock accommodation. The older shipyards have been considerably extended, and shipbuilding is actively carried on, especially by the Orlando yard which builds large ships for the Italian navy, while new industries — namely, glass-making and copper and brass-founding, electric power works, a cement factory, porcelain factories, flour-mills, oil-mills, a cotton yarn spinning factory, electric plant works, a ship-breaking yard, a motor-boat yard, &c. — have been established. Other important firms, Tuscan wine-growers, oil-growers, timber traders, colour manu-facturers, &c, have their head offices and stores at Leghorn, with a view to export. The former British ” factory ” here was of great importance for the trade with the Levant, but was closed in 1825. The two villages of Ardenza and Antignano, which form part of the commune, have acquired considerable im- portance, the former in part for sea-bathing.

The earliest mention of Leghorn occurs in a document of 891, relating to the first church here; in 1017 it is called a castle. In the 13th century the Pisans tried to attract a population to the. spot, but it was not till the 14th that Leghorn became a rival of Porto Pisano at the mouth of the Arno, which it was destined ultimately to supplant. It was at Leghorn that Urban V. and Gregory XL landed on their return from Avignon. When in 1405 the king of France sold Pisa to the Florentines he kept possession of Leghorn; but he afterwards (1407) sold it for 26,000 ducats to the Genoese, and from the Genoese the Floren- tines purchased it in 142 1. In 1496 the city showed its devotion to its new masters by a successful defence against Maximilian and his allies, but it was still a small place; in 1551 there were only 749 inhabitants. With the rise of the Medici came a rapid increase of prosperity; Cosmo, Francis and Ferdinand erected fortifications and harbour works, warehouses and churches, with equal liberality, and the last especially gave a stimulus to trade by inviting ” men of the East and the West, Spanish and Portuguese, Greeks, Germans, Italians, Hebrews, Turks,

Moors, Armenians, Persians and others,” to settle and traffic in the

city, as it became in 1606. Declared free and neutral in 160 1, Leghorn was permanently invested with these privileges by the Quadruple Alliance in 1718; but in 1796 Napoleon seized all the hostile vessels in its port. It ceased to be a free city by the law of 1867. (T. As.)

LEGION (Lat. legio), in early Rome, the levy of citizens marching out en masse to war, like the citizen-army of any other primitive state. As Rome came to need more than one army at once and warfare grew more complex, legio came to denote a unit of 4000-6000 heavy infantry (including, however, at first some light infantry and at various times a handful of cavalry) who were by political status Roman citizens and were distinct from the ” allies,” auxilia, and other troops of the second class. The legionaries were regarded as the best and most characteristic Roman soldiers, the most trustworthy and truly Roman; they enjoyed better pay and conditions of service than the ‘• auxiliaries.” In a.d. 14 (death of Augustus) there were 25 such legions: later, the number was slightly increased; finally about a.d. 290 Diocletian reduced the size and greatly increased the number of the legions. Throughout, the dominant features of the legions were heavy infantry and Roman citizenship. They lost their importance when the Barbarian invasions altered the character of ancient warfare and made cavalry a more important arm than infantry, in the late 3rd and 4th centuries a.d. In the middle ages the word ” legion ” seems not to have been used as a technical term. In modern times it has been employed for organizations of an unusual or exceptional character, such as a corps of foreign volunteers or mercenaries. See further Roman Army. (F. J. H.)

The term legion has been used to designate regiments or corps of all arms in modern times, perhaps the earliest example of this being the Provincial Legions formed in France by Francis I. (see Infantry). Napoleon, in accordance with this precedent, employed the word to designate the second-line formations which he main- tained in France and which supplied the Grande Armee with drafts. The term ” Foreign Legion ” is often used for irregular volunteer corps of foreign sympathizers raised by states at war, often by smaller states righting for independence. Unlike most foreign legions the ” British Legion ” which, raised in Great Britain and commanded by Sir de Lacy Evans (q.v.), fought in the Carlist wars, was a regularly enlisted and paid force. The term ” foreign legion ” is colloquially but incorrectly applied to-day to the Regiments Hrangers in the French service, which are composed of adventurous spirits of all nationalities and have been employed in many arduous colonial campaigns.

The most famous of the corps that have borne the name of legion in modern times was the King's German Legion (see Beamish's history of the corps). The electorate of Hanover being in 1805 threatened by the French, and no effective resistance being con- sidered possible, the British government wished to take the greater part of the Hanoverian army into its service. But the acceptance by the Hanoverian government of this offer was delayed until too late, and it was only after the French had entered the country and the army as a unit had been disbanded that the formation ot the " King's German Regiment," as it was at first called, was begun in England. This enlisted not only ex-Hanoverian soldiers, but other Germans as well, as individuals. Lieut. -Colonel von dcr Decken and Major Colin Halkett were the officers entrusted with the formation of the new corps, which in January 1805 had become a corps of all arms with the title of King's German Legion. It then consisted of a dragoon and a hussar regiment, five batteries, two light and four line battalions and an engineer section, all these being afterwards increased. Its services included the abortive German expedition of November 1805, the expedition to Copenhagen in 1807, the minor sieges and combats in Sicily 1808-14, the Walchcren expedition of 1809, the expedition to Sweden under Sir John Moore in 1808, and the campaign of 1813 in north Germany. But its title to fame is its part in the Peninsular War, in which from first to last it was an acknowledged corps d'elite — its cavalry especially, whose services both on reconnaissance and in battle were of the highest value. The exploit of the two dragoon regiments of the Legion at Garcia Hernandez after the battle of Salamanca, where they charged and broke up two French infantry squares and captured some 1400 prisoners, is one of the most notable incidents in the history of the cavalry arm (see Sir E. Wood's Achievements of Cavalry). A general officer of the Legion, Charles Alten (q.v.), commanded the British Light Division in the latter part of the war. It should be said that the Legion was rarely engaged as a unit. It was considered rather as a small army of the British type, most of which served abroad by regiments and battalions while a small portion and depot units were at home, the total numbers under

arms being about 25,000. In 1815 the period of service of the corps had almost expired when Napoleon returned from Elba, but its members voluntarily offered to prolong their service. It lost heavily at Waterloo, in which Baring's battalion of the light infantry distinguished itself by its gallant defence of La Haye Sainte. The strength of the Legion at the time of its disbandment was 1 100 officers and 23,500 men. A short-lived " King's German Legion " was raised by the British government for service in the Crimean War.

Certain Hanoverian regiments of the German army to-day represent the units of the Legion and carry Peninsular battle- honours on their standards and colours.

LEGITIM, or Bairn's Part, in Scots law, the legal share of the movable property of a father due on his death to his children. If a father dies leaving a widow and children, the movable property is divided into three equal parts; one-third part is divided equally among all the children who survive, although they may be of different marriages (the issue of predeceased children do not share); another third goes to the widow as her jus rclictae, and the remaining third, called " dead's part," may be disposed of by the father by will as he pleases. If the father die intestate the dead's part goes to the children as next of kin. Should the father leave no widow, one-half of the movable estate is legitim and one-half dead's part. In claiming legitim, however, credit must be given for any advance made by the father out of his movable estate during his lifetime.

LEGITIMACY, and LEGITIMATION, the status derived by individuals in consequence of being born in legal wedlock, and the means by which the same status is given to persons not so born. Under the Roman or civil law a child born before the marriage of the parents was made legitimate by their subsequent marriage. This method of legitimation was accepted by the canon law, by the legal systems of the continent of Europe, of Scotland and of some of the states of the United States. The early Germanic codes, however, did not recognize such legiti- mation, nor among the Anglo-Saxons had the natural-born child any rights of inheritance, or possibly any right other than that of protection, even when acknowledged by its father. The principle of the civil and canon law was at one time advocated by the clergy of England, but was summarily rejected by the barons at the parliament of Merton in 1236, when they replied Nolumus leges Angliae mutare.

English law takes account solely of the fact that marriage precedes the birth of the child; at whatever period the birth happens after the marriage, the offspring is prima facie legitimate. The presumption of law is always in favour of the legitimacy of the child of a married woman, and at one time it was so strong that Sir Edward Coke held that " if the husband be within the four seas, i.e. within the jurisdiction of the king of England, and the wife hath issue, no proof shall be admitted to prove the child a bastard unless the husband hath an apparent im- possibility of procreation." It is now settled, however, that the presumption of legitimacy may be rebutted by evidence showing non-access on the part of the husband, or any other circumstance showing that the husband could not in the course of

nature have been the father of his wife's child. If the husband had access, or the access be not clearly negatived, even though others at the same time were carrying on an illicit intercourse with the wife, a child born under such circumstances is legitimate. If the husband had access intercourse must be presumed, unless there is irresistible evidence to the contrary. Neither husband or wife will be permitted to prove the non-access directly or indirectly. Children born after a divorce a mensa et thoro will, however, be presumed to be bastards unless access be proved. A child born so long after the death of a husband that he could not in the ordinary course of nature have been the father is illegitimate. The period of gestation is presumed to be about nine calendar months; and if there were any circumstances from which an unusually long or short period of gestation could be inferred, special medical testimony would be required.

A marriage between persons within the prohibited degrees of affinity was before 1835 not void, but only voidable, and the ecclesiastical courts were restrained from bastardizing the issue after the death of either of the parents. Lord

Lyndhurst's act (1835) declared all such existing marriages valid, but all subsequent marriages between persons within the prohibited degrees of consanguinity or affinity were made null and void and the issue illegitimate (see Marriage). By the- Legitimacy Declaration Act 1858, application may be made to the Probate, Divorce and Admiralty Court (in Scotland, to the Court of Session by action of declarator) for a declaration of legitimacy and of the validity of a marriage. The status of legitimacy in any country depending upon the fact of the child having been born in wedlock, it may be concluded that any question as to the legitimacy of a child turns either on the validity of the marriage or on whether the child has been born in wedlock.

Legitimation effected by the subsequent marriage of the parents of the illegitimate child is technically known as legitimation per subsequent matrimonium. This adoption of the Roman law principle is followed by most of the states of the continent of Europe (with distinctions, of course, as to certain illegitimate children, or as to the forms of acknowledgment by the parent or parents), in the Isle of Man, Guernsey, Jersey, Lower Canada, St Lucia, Trinidad, Demerara, Berbice, Cape Colony, Ceylon, Mauritius; it has been adopted in New Zealand (Legitimation Act 1894), South Australia (Legitimation Act

1898, amended 1902), Queensland (Legitimation Act 1899), New South Wales (Legitimation Act ‘1902), and Victoria (Registration of Births, Deaths and Marriages Act 1903). It is to be noted, however, that in these states the mere fact of the parents marrying does not legitimate the child; indeed, the parents may marry, yet the child remain illegitimate. In order to legitimate the child it is necessary for the father to make application for its registra tion; in South Australia, the application must be made by both parents; so also in Victoria, if the mother is living, if not, application by the father will suffice. In New Zealand, Queens- land and New South Wales, registration may be made at any time after the marriage; in Victoria, within six months from the date of the marriage; in South Australia, by the act of 1898, registra- tion was permissible only within thirty days before or after the marriage, but by the amending act of 1902 it is allowed at any time more than thirty days after the marriage, provided the applicants prove before a magistrate that they are the parents of the child. In all cases the legitimation is retrospective, taking effect from the birth of the child. Legitimation by subsequent marriage exists also in the following states of the American Union: Maine, Pennsylvania, Illinois, Michigan, Iowa, Minnesota, California, Oregon. Nevada, Washington, N. and S. Dakota, Idaho, Montana and New Mexico. In Massachusetts, Vermont, Illinois, Indiana, Wisconsin, Nebraska, Maryland, Virginia, West Virginia, Kentucky, Missouri, Arkansas, Texas, Colorado, Idaho, Wyoming, Georgia, Alabama, Mississippi and Arizona, in addition to the marriage the father must recognize or acknow- ledge the illegitimate child as his. In New Hampshire, Con- necticut and Louisiana both parents must acknowledge the child, either by an authentic act before marriage or by the contract of marriage. In some states (California, Nevada, N. and S. Dakota and Idaho) if the father of an illegitimate child receives it into his house (with the consent of his wife, if married), and treats it as if it were legitimate, it becomes legitimate for all purposes. In other states (N. Carolina, Tennessee, Georgia and New Mexico) the putative father can legitimize the child by process in court. Those states of the United States which have not been mentioned follow the English common law, which also prevails in Ireland, some of the West Indies and part of Canada. In Scotland, on the other hand, the principle of the civil law is followed. In Scotland, bastards could be legitimized in two ways: either by the subsequent intermarriage of the mother of the child with the father, or by letters of legitimation from the sovereign. With respect to the last, however, it is to be observed that letters of legitimation, be their clauses ever so strong, could not enable the bastard to succeed to his natural father; for the sovereign could not, by any prerogative, cut off the private right of third parties. But by a special clause in the letters of

legitimation, the sovereign could renounce his right to the

bastard's succession, failing legitimate descendants, in favour of him who would have been the bastard's heir had he been born in lawful wedlock, such renunciation encroaching upon no right competent to any third person.

The question remains, how far, if at all, English law recognizes the legitimacy of a person born out of wedlock. Strictly speak- ing, English law does not recognize any such person as legiti- mate (though the supreme power of an act of parliament can, of course, confer the rights of legitimacy), but under certain circumstances it will recognize, for purposes of succession to property, a legitimated person as legitimate. The general maxim of law is that the status of legitimacy must be tried by the law of the country where it originates, and where the law of the father's domicile at the time of the child's birth, and of the father's domicile at the time of the subsequent marriage, taken together, legitimize the child, English law will recognize the legitimacy. For purposes of succession to real property, however, legitimacy must be determined by the lex loci rei sitae; so that, for example, a legitimized Scotsman would be recognized as legitimate in England, but not legitimate so far as to take lands as heir {Birlwhistle v. Vardill, 1840). The con- flict of laws on the subject yields some curious results. Thus, a domiciled Scotsman had a son born in Scotland and then married the mother in Scotland. The son died possessed of land in England, and it was held that the father could not inherit from the son. On the other hand, where an unmarried woman, domi- ciled in England died intestate there, it was held that her brother's daughter, born before marriage, but whilst the father was domiciled in Holland, and legitimized by the parents' marriage while they were still domiciled in Holland, was entitled to succeed to the personal property of her aunt {In re Goodman's Trusts, 1880). In re Grey's Trusts (1892) decided that, where real estate was bequeathed to the children of a person domi- ciled in a foreign country and these children were legitimized by the subsequent marriage in that country of their father with their mother, that they were entitled to share as legiti- mate children in a devise of English realty. It is to be noted that this decision does not clash with that of Birtwhistle v. Vardill.

See J. A. Foote, Private International Law, A. V. Dicey, Conflict of Laws; L. von Bar, Private International Law; Story, Conflict of Laws; J. Westlake, International Law.

LEGITIMISTS (Fr. legitimistes, from Ugitime, lawful, legiti- mate), the

name of the party in France which after the revolution of 1830 continued to support the claims of the elder line of the house of Bourbon as the legitimate sovereigns " by divine right." The death of the comte de Chambord in 1883 dissolved the parti legitimiste, only an insignificant remnant, known as the Blancs d'Espagne, repudiating the act of renunciation of Philip V. of Spain and upholding the rights of the Bourbons of the line of Anjou. The word legitimiste was not admitted by the French Academy until 1878; but meanwhile it had spread beyond France, and the English word legitimist is now applied to any supporter of monarchy by hereditary right as against a parliamentary or other title.

LEGNAGO, a fortified town of Venetia, Italy, in the province of Verona, on the Adige, 29 m. by rail E. of Mantua, 52 ft. above sea-level. Pop. (1906) 2731 (town), 17,000 (commune). Legnago is one of the famous Quadrilateral fortresses. The present fortifications were planned and made in 1815, the older defences having been destroyed by Napoleon I. in 1801. The situation is low and unhealthy, but the territory is fertile, rice, cereals and sugar being grown. Legnago is the birthplace of G. B. Cavalcaselle, the art historian (1827-1897). A branch line runs hence to Rovigo.

LEGNANO, a town of Lombardy, Italy, in the province of Milan, 17 m. N.W. of that city by rail, 682 ft. above sea-level. Pop. (1881) 7153, (1901) 18,285. The church of S. Magno, built in the style of Bramante by G. Lampugnano (1504-1529), contains an altar-piece considered one of Luini's best works. There are also remains of a castle of the Visconti. Legnano is the seat of important cotton and silk industries, with

machine-shops, boiler-works, and dyeing and printing of woven goods, and thread. Close by, the Lombard League defeated Frederick Barbarossa in 1176; a monument in com- memoration of the battle was erected on the field in 1876, while there is another by Butti erected in 1900 in the Piazza Federico Barbarossa.

LEGOUVE\ GABRIEL JEAN BAPTISTE ERNEST WILFRID (1807-1903), French dramatist, son of the poet Gabriel Legouve (1764-1812), who wrote a pastoral La Mort d' Abel (1793) and a tragedy of Epicharis et Neron, was born in Paris on the 5th of February 1807. His mother died in 1810, and almost im- mediately afterwards his father was

removed to a lunatic asylum. The child, however, inherited a considerable fortune, and was carefully educated. Jean Nicolas Bouilly (1 763-1842) was his tutor, and early instilled into the young Legouve a passion for literature, to which the example of his father and of his grandfather, J. B. Legouve (1 729-1 783), predisposed him. As early as 1829 he carried away a prize of the French Academy for a poem on the discovery of printing; and in 1832 he published a curious little volume of verses, entitled Les Morts Bizarres. In those early days Legouve brought out a succession of novels, of which Edith de Falsen enjoyed a considerable success. In 1847 he began the work by which he is best remembered, his contributions to the development and education of the female mind, by lecturing at the College of France on the moral history of women: these discourses were collected into a volume in 1848, and enjoyed a great success. Legouve wrote considerably for the stage, and in 1849 he collaborated with A. E. Scribe in Adrienne Leconvreur. In 1855 he brought out his tragedy of Medee, the success of which had much to do with his election to the French Academy. He succeeded to the fauteuil of J. A. Ancelot, and was received by Flourens, who dwelt on the plays of Legouve as his principal claim to consideration. As time passed on, however, he became less prominent as a playwright, and more so as a lecturer and propagandist on woman's rights and the advanced education of children, in both of which direc- tions he was a pioneer in French society. His La Femme en France an XIX me Steele (1864), reissued, much enlarged, in 1878; his Messieurs les enfants (1868), his Conferences Parisiennes (1872), his Nos fdhs ct nos fils (1877), and his Une Education de jeune jille (1884) were works of wide-reaching influence in the moral order. In 1886-188 7 he published, in two volumes, his Soixante ans de souvenirs, an excellent specimen of autobiography. He was raised in 1887 to the highest grade of the Legion of Honour, and held for many years the post of inspector-general of female education in the national schools. Legouve was always an advocate of physical training. He was long accounted one of the best shots in France, and although, from a conscientious objection, he never fought a duel, he made the art of fencing his lifelong hobby. After the death of Desire Nisard in 1888, Legouve became the " father " of the French Academy. He died on the 14th of March 1903.

LEGROS, ALPHONSE (1837-), painter and etcher, was born at Dijon on the 8th of May 1837. His father was an accountant, and came from the neighbouring village of Veronnes. Young Lcgros frequently visited the farms of his relatives, and the peasants and landscapes of that part of France are the subjects of many of his pictures and etchings. He was sent to the art school at Dijon with a view to qualifying for a trade,

and was apprenticed to Maitre Nicolardo, house decorator and painter of images. In 1851 Legros left for Paris to take another situation; but passing through Lyons he worked for six months as journeyman wall-painter under the decorator Beuchot, who was painting the chapel of Cardinal Bonald in the cathedral. In Paris he studied with Cambon, scene-painter and decorator of theatres, an experience which developed a breadth of touch such as Stanficld and Cox picked up in similar circumstances. At this time he attended the drawing-school of Lecoq de Bois- baudran. In 1855 Legros attended the evening classes of the Ecole des Beaux Arts, and perhaps gained there his love of drawing from the antique, some of the results of which may be seen in the Print Room of the British Museum. He sent two

portraits to the Salon of 1857: one was rejected, and formed part of the exhibition of protest organized by Bonvin in his studio; the other, which was accepted, was a profile portrait of his father. This work was presented to the museum at Tours by the artist when his friend Cazin was curator. Champfleury saw the work in the Salon, and sought out the artist to enlist him in the small army of so-called ” Realists,” comprising (round the noisy glory of Courbet) all those who raised protest against the academical trifles of the degenerate Romantics. In 1859 Legros’s ” Angelus ” was exhibited, the first of those quiet church interiors, with kneeling figures of patient women, by which he is best known as a painter. ” Ex Voto,” a work of great power and insight, painted in 1861, now in the museum at Dijon, was received by his friends with enthusiasm, but it only obtained a mention at the Salon. Legros came to England in 1863, and in 1864 married Miss Frances Rosetta Hodgson. At first he lived by his etching and teaching. He then became teacher of etching at the South Kensington School of Art, and in 1876 Slade Professor at University College, London. He was naturalized as an Englishman in 1881, and remained at University College seventeen years. His influence there was exerted to encourage a certain distinction, severity and truth of character in the work of his pupils, with a simple technique and a respect for the traditions of the old masters, until then some- what foreign to English art. He would draw or paint a torso or a head before the students in an hour or even less, so that the attention of the pupils might not be dulled. As students had been known to take weeks and even months over a single drawing, Legros ordered the positions of the casts in the Antique School to be changed once every week. In the painting school he insisted upon a good outline, preserved by a thin rub in of umber, and then the work was to be finished in a single painting, ” premier coup.” Experiments in all varieties of art work were practised; whenever the professor saw a fine example in the museum, or when a process

interested him in a workshop, he never rested until he had mastered the technique and his students were trying their 'prentice hands at it. As he had casually picked up the art of etching by watching a comrade in Paris working at a commercial engraving, so he began the making of medals after a walk in the British Museum, studying the masterpieces of Pisanello, and a visit to the Cabinet des Medailles in Paris. Legros . considered the traditional journey to Italy a very important part of artistic training, and in order that his students should have the benefit of such study he devoted a part of his salary to augment the income available for a travel- ling studentship. His later works, after he resigned his pro- fessorship in 1892, were more in the free and ardent manner of his early days — imaginative landscapes, castles in Spain, and farms in Burgundy, etchings like the series of " The Triumph of Death," and the sculptured fountains for the gardens of the duke of Portland at Welbeck.

Pictures and drawings by Legros, besides those already mentioned, may be seen in the following galleries and museums: " Amende Honorable," " Dead Christ," bronzes, medals and twenty-two drawings, in the Luxembourg, Paris; "Landscape," " Study of a Head," and portraits of Browning, Burne-Jones, Cassel, Huxley and Marshall, at the Victoria and Albert Museum, Kensington; " Femmes en priere," National Gallery of British Art ; " The Tinker," and six other works from the Ionides Collection, bequeathed to South Kensington; "Christening," "Barricade," " The Poor at Meat," two portraits and several drawings and etchings, collection of Lord Carlisle; " Two Priests at the Organ," " Landscape " and etchings, collection of Rev. Stopford Brooke; "Head of a Priest," collection of Mr Vereker Hamilton; "The Weed-burner," some sculpture and a large collection of etchings and drawings, Mr Guy Knowles; " Psyche," collection of Mr L. W. Hodson; "Snow Scene," collection of Mr G. F. Watts, R.A. ; thirty-five drawings and etchings, the Print Room, British Museum; " Jacob's Dream " and twelve drawings of the antique, Cambridge; " Saint Jerome," two studies of heads and some drawings, Man- chester; " The Pilgrimage " and " Study made before the Class," Liverpool Walker Art Gallery; " Study of Heads," Peel Park Museum, Salford.

See Dr Hans W. Singer, " Alphonse Legros," Die graphischen Kilnste (1898); Leonce Benedite, "Alphonse Legros," Revue de I'art (Paris, 1900); Cosmo Monkhouse, "Professor Legros," Magazine of Art (1882). (C. H.*)

LEGUMINOSAE

LEGUMINOSAE, the second largest family of seed-plants, containing about 430 genera with 7000 species. It belongs to the series Rosales of the Dicotyledons, and contains three well- marked suborders, Papilionatae, Mimosoideae and Caesalpini- oideae. The plants are trees, shrubs or herbs of very various habit. The British representatives, all of which belong to the suborder Papilionatae, include a few shrubs, such as Ulex (gorse, furze), Cytisus (broom) and Genista, but the majority, and this applies to the suborder as a whole, are herbs, such as the clovers, Medicago, Meli- lotus, &c, sometimes climbing by aid of tendrils which are modified leaf-structures, as in Laihyrus and the vetches (Vicia). Scarlet runner (Phascolus multiflorus) h?s a herbaceous twining stem. Woody climbers (lianes) are represented by species of Bauhinia (Caesal- pinioideae), which with their curiously flattened twisted stems are characteristic features of tropical forests, and Entada scandcns (Mimosoideae) also common in the tropics; these two suborders, which are confined to the warmer parts of the earth, consist chiefly of trees and shrubs such as Acacia and Mimosa belonging to the Mimosoideae, and the Judas tree of southern Europe (Cercis) and tamarind belonging to the Caesalpinioideae. The so-called acacia of European gardens {Robinia

Pseudacacia) and laburnum are examples of the tree thorns in which the ants live ; F, food F. habit in the Papilionatae. Water plants are rare, bodiesatthcapicesofthelower pinnules; but are represented by Aeschynomene and Neptunia. N < nectar Y »" the petiole. (Reduced.)

are tendrils; in Robinia the stipules are spiny and persist after leaf-fall. In some acacias {q.v.) the thorns are hollow, and inhabited by ants as in A. sphaerocephala, a central American plant (fig. 2) and others. In some species of Astragalus, Ono- brychis and others, the leaf-stalk persists after the fall of the leaf and becomes hard and spiny.

From Strasburger's Lehrbuch der Botanik, by permission of Gustav Fischer.

Fig. 2. — Acacia sphaerocephala. I, Leaf and part of stem; D, hollow II, Single pinnule with food-body,

(Somewhat enlarged.)

tropical genera. The roots of many species bear nodular swellings (tubercles), the cells of which contain bacterium-like bodies which have the power of fixing the nitrogen of the atmosphere in such a form as to make it available for plant food. Hence the value of these plants as a crop on poor soil or as a member of a series of rotation of

crops, since they enrich the soil by the nitrogen liberated by the decay of their roots or of the whole plant if ploughed in as green manure.

The leaves are alternate in arrangement and generally com- pound and stipulate. A common – form is illustrated by the

trefoil or clovers, which have three leaflets springing from a common point (digi- tately trifoliate) ; pinnate leaves are also frequent as in laburnum and Robinia. In Mimosoideae the leaves are generally bipinnate (figs. 1, 2, 3). Rarely are the leaves simple as in Bauhinia. Various depart- ures from the usual leaf- type occur in association with adaptations to different functions or environments. In leaf-climbers, such as pea or vetch, the end of the rachis and one or more pairs of leaflets are changed into tendrils. In gorse the leaf is reduced to a slender spine- like structure, though the leaves of the seedling have one to three leaflets. In many Australian acacias the leaf surface in the adult plant is much reduced, the petiole being at the same time flat-

.„. .. Leaf of an Acacia {A. ˆ al J d f 1 ˆ (fig. 1), heterophylla) showing flattened leaf- frequently the leaf is reduced like petiole (phyllode), p, and bipin- to a petiole flattened in the nate blade. vertical plane; by this

means a minimum surface is exposed to the intense sunlight. In the garden pea the stipules are large and foliaceous, replacing the leaflets, which

Leaf-movements occur in many of the genera. Such are the sleep-movement in the clovers, runner bean (Phaseolus), Robinia and acacia, where the leaflets assume a vertical position at nightfall. Spontaneous movements are exemplified in the telegraph-plant (Desmodium gyrans), native of tropical Asia, where the small lateral leaflets move up and down every few minutes. The sensitive plant {Mimosa pudica) is an example of movement in response to contact, the leaves assuming a sleep-position if touched. The seat of the movement is the swollen base of the leaf-stalk, the so-called pulvinus

(fig. 3)-

The stem of the lianes shows some remarkable deviations from the normal in form and structure. In Papilionatae anomalous secondary thickening arises from the production of new cambium zones outside the original ring {Mucuna, Wistaria) forming concentric rings or transverse or broader strands; where, as in Rhyncosia the successive

cam- biums are active only at two op- posite points, a flat ribbon – like , stem is produced.' The climbing Bauhinias (Caes- al pi n ioideae) have a flattened stem with basin- like undulations; in some growth in thickness is normal, in others new cambium- zones are found

while n fn ' 'others ˆ IG- 3′ — Branch with two leaves of the Sensitive new and distinct ?} ant {Mimosa pudica), showing the petiole in srrowth -centres erect state, a, and in its depressed state, 0;

each with its a ' so *ˆ e leaflets closed, c, and the leaflets ex- cambium zone P a nded, d; p, pulvinus, the seat of the movement arise outside the of the P edole –

primary zone. The climbing Mimosoideae show no anomalous growth in thickness, but in some cases the stem becomes strongly winged. Gum passages in the pith and medullary rays occur, especi- ally in species of acacia and Astragalus; gum-arabic is an exuda- tion from the branches of Acacia Senegal, gum-tragacanth from Astragalus gummifer and other species. Logwood is the coloured hˆartwood of Haematoxylon campechianum ; red sandalwood of Pterocarpus santalinus.

The flowers are arranged in racemose inflorescences, such as the simple raceme {Laburnum, Robinia), which is condensed to a head in Trifolium; in Acacia and Mimosa the flowers are densely crowded (fig. 4). The flower is characterized by a hypogynous or slightly perigynous arrangement of parts, the anterior position of the odd sepal, the free petals, and the single median carpel with a terminal style, simple stigma and two

alternating rows of ovules on the vential suture of the ovary which faces the back of the flower.

The arrangement of the petals and the number and cohesion of the stamens vary in the three suborders. In Mimosoideae, the smallest of the three, the flower is regular (fig. 4 [3]), and the sepals and petals have a valvate aestivation, and are generally pentamerous, but 3-6-merous flowers also occur. The sepals are more or less united into a cup (fig. 4 [2]), and the petals sometimes cohere at the base. The stamens vary widely in number and cohesion; in A cacia (fig. 4) they are indefinite and free, in the tribe Ingeae, inde- finite and monadelphous, in other tribes as many or twice as many as the petals.

Frequently, as in Mimosa, the long yellow stamens are the most conspicuous feature of the flower. In Caesalpinioideae (fig. 5) the flowers are zygomorphic in a median plane and generally pentamerous. The sepals are free, or the two upper ones united as in tamarind, and imbricate in aestivation, rarely as in the Judas- tree (fig. 5 [2]), valvate. The corolla shows great variety in form; it is imbricate in aestivation, the posterior petal being innermost. In Cercis (fig. 5) it clearly resembles the papilionaceous type; the odd petal stands erect, the median pair are reflexed and wing-like, and the lower pair enclose the essential organs. In Cassia all five petals are subequal and spreading; in Amherstia the anterior pair are small or absent while the three upper ones are large ; in Krameria,

Fig. 4. — Acacia obscura, flowering branch about 5 natural size.

, Part of stem with leaf and it subtended inflorescence about natural size.

2, Flower, much enlarged.

3, Floral diagram of Acacia lati- folia. (After Eichler.)

is often explosive, the valves separating elastically and twisting spirally, thus shooting out the seeds, as in gorse, broom and others. In Desmodium, Entada and others the pod is constricted between each seed, and breaks up into indehiscent one-seeded parts; it is then called a lomentum (fig. 11); in Astragalus it is divided by a longitudinal septum.

The pods show a very great variety in form and size. Thus in the

the anterior pair are represented by glandular scales, and in Tamarin- dus are suppressed. Apetalous flowers occur in Copaifera and Ceratonia. The stamens, generally ten in number, are free, as in Cercis (fig. 5) or more or less united as in Amherstia, where the posterior one is free and the rest are united. In tamarind only three stamens are fertile. The largest suborder, Papilionatae, has a flower zygomorphic in the median plane (figs. 6, 7). The five sepals are generally united (figs. 7, 9), and have an ascending imbricate arrangement (fig. 6); the calyx is often two-lipped (fig. 9 [1]). The corolla has five unequal petals with a descending imbricate arrange- ment; the upper and largest, the standard (vexillum), stands erect, the lateral pair, the wings or alae, are long-clawed, while the anterior pair cohere to form the keel or carina, in which are enclosed the stamens and pistil. The ten stamens are monadelphous as in gorse or broom (fig. 9), or

diadelphous as in sweet pea (fig. 8) (the posterior one being free), or almost or quite free; these differences are associ- ated with differences in the methods of pollination. The ten stamens here, as in the last suborder, though arranged in a single whorl, arise in two series, the five opposite the sepals arising first.

The carpel is sometimes stalked and often surrounded at the base by a honey-secreting disk; the style is terminal and in the zygomor- phic flowers is often curved and somewhat flattened with a definite back and front. Sometimes as in species of Trifolium and Medicago the ovules are reduced to one. The pod or legume splits along both sutures (fig. 10) into a pair of membranous, leathery or sometimes fleshy valves, bearing the seeds on the ventral suture. Dehiscence

Fig. 5. — Flowering branch of Judas-tree (Cercis siliquastrum) reduced. I, Flower, natural size. 2, Floral diagram.

clovers they are a small fraction of an irich, while in the common tropical climber Entada scandens they are woody structures more than a yard long and several inches wide. They are generally more or less flattened, but sometimes round and rod-like, as in species of Cassia, or are spirally coiled as in Medicago. Indehiscent one- seeded pods occur in species of clover and in Medicago, also in Dalbergia and allied genera, where they are winged. In Colutea, the bladder-senna of gardens, the pod forms an inflated bladder which bursts under pressure; it often becomes detached and is blown some distance before bursting. An arillar outgrowth is often developed on the funicle, and is sometimes brightly coloured, rendering the seed conspicuous and favouring dissemination by birds; in such _

cases the seed- coat is hard. In other cases the hard seed-coat it- self is bright- coloured as in the scarlet seeds of Abrus precatorius,

the so-called Fig. 6. — Diagram of weather-plant. Flower of Sweet Pea Fig. 7. — Flower of Animals also act (Lathyrus), showing Pea (Pisum sativum), as the agents of five sepals, s, two are showing a papiliona- distribution in the superior, one inferior, ceous corolla, with one case of fleshy and two lateral; five petal superior, st, the edible pods con- petals, p, one superior, standard (vexillum), taining seeds with two inferior, and two two inferior, car, the a hard smooth lateral; ten stamens in keel (carina), and two testa, which will two rows, a, and one lateral, a, wings (alae). pass uninjured carpel, c. The calyx is marked c.

through the body,

as in tamarind and the fruit of the carob-tree (Ceratonia). In the ground-nut (Arachis kypogaea), Trifolium subterraneum and others, the flower-stalks grow downwards after fertilization of the ovules and bury the fruit in the earth. In the suborders Mimosoideae and Papilionatae the embryo fills the seed or a small quantity of endosperm occurs, chiefly round the radicle. In Caesalpinioideae endosperm is absent, or present forming a thin layer round the embryo as in the tribe Bauhinieae, or copious and cartilaginous as in the Cassieae. The embryo has generally flat leaf-like or fleshy cotyledons with a short radicle.

Insects play an important part in the pollination of the flowers. In the two smaller suborders the stamens and stigma

are freely exposed and the conspicuous coloured stamens serve as well as the petals to attract insects; in Mimosa and Acacia the flowers are crowded in conspicuous heads or spikes. The relation of insects to the flower has been carefully studied in the Papilionatae, chiefly in European species. Where honey is present it is secreted on the inside of the base of the stamens and

accumulated in the base of the tube formed by the united fila- ments round the ovary. It is accessible only to insects with long probosces, such as bees. In these cases the posterior stamen is free, allowing access to the

_ , _. .. honey. The flowers stand more

I*ig. 8. — Stamens and Pistil , 1. „• „ 4. 11.,. 4.1. „ i„

of Sweet Pea (Lathyrus). The or less horizontally; the large

stamens are diadelphous, nine of erect white or coloured standard

them being united by their fila- renders them conspicuous, the

ments/, while the uppermost wmgs f orm a platform on which

one (e) is free; st, stigma, c, thf , insect ˆ and ˆ ˆ

encloses the stamens and pistil, protecting them from rain and the attacks of unbidden pollen- eating insects. In his book on the

fertilization of flowers, Hermann MUller distinguishes four types of papilionaceous flowers accord- ing to the way in which the pollen is applied to the bee:

(1) Those in which the stamens and stigma return within the carina and thus admit of repeated visits, such are the clovers, Melilotus and laburnum. (2) Explosive flowers where stamens

Fig. 9. — Broom (Cyiisus scoparius) . (2-7 slightly reduced.)

1, Calyx. 3, Wing. 5, Monadelphous stamens 6, Pistil.

2, Standard. 4, Keel. and style. 7, Pod.

and style are confined within the keel under tension and the pressure of the insect causes their sudden release and the scattering of the pollen, as in broom and Genista; these contain no honey but are visited for the sake of the pollen. (3) The piston-mechanism as in bird's-foot trefoil {Lotus corniculatus) , Anlhyllis, Ononis and Lupinus, where the pressure of the bee upon the carina while probing for honey squeezes a narrow ribbon of pollen through the opening at the tip. The pollen has been shed into the cone-like tip of the carina, and the heads of the five outer stamens form a piston beneath

by but Papi-

From Vines's Students' Text- Book of Botany, by permis- sion 01 Swan, Sonnenschein &Co.

Fig. 10. — Drydehis- cent Fruit. The pod (legume) of the Pea. r.The dorsal suture ; b, the ventral ; c, calyx ; s, seeds.

Fig. 1 1 . — Lomentum or lomentaceous le- gume of a species of Desmodium. Each

seed is contained in a separate cavity by the folding inwards of the walls of the legume at equal intervals ; the legume, when ripe.separates transversely into single-seeded portions or mericarps.

it, pushing it out at the tip when pressure is exerted on the keel; a further pressure causes the protrusion of the stigma, which is thus brought in contact with the insect's belly. (4) The style bears a brush of hairs which sweeps small quantities of pollen out of the tip cf the carina, as in Lathyrus, Pisum, Vicia and Phaseolus.

Leguminosae is a cosmopolitan order, and often affords a

characteristic feature of the vegetation. Mimosoideae and Caesalpinioideae are richly developed in the tropical rain forests, where Papilion- atae are less con- spicuous and mostly herb- aceous; in sub- tropical forests arborescent forms of all three sub- orders occur. In the temperate regions, tree- forms are rare — thus Mimosoideae are unrepresented in Europe; Caes- alpinioideae are represented by species of Cercis, Gymnocladus and Gleditschia ; Papi – lio n at a e Robinia; herbaceous lionatae abound and penetrate to the limit of growth of seed-plants in arctic and high alpine regions. Shrubs and under- shrubs, such as Ulex, Genista, Cylisus are a characteristic feature in Europe and the Mediterranean area. Acacias are an important component of the evergreen bush-vegetation of Australia, together with genera of the tribe Podalyrieae of Papilionatae (Chorizema, Oxylobium, &c). Astragalus, Oxytropis, Hedysarum, Onobrychis, and others are characteristic of the steppe-formations of eastern Europe and western Asia.

The order is a most important one economically. The seeds, which are rich in starch and proteids, form valuable foods, as in pea, the various beans, vetch, lentil, ground-nut (Arachis) and others; seeds of Arachis and others yield oils; those of Physostigma veneno- sum, the Calabar ordeal bean, contain a strong poison. Many are useful fodder-plants, as the clovers (Trifolium) (q.v.), Medicago (e.g. M. sativa, lucerne (q.v.), or alfalfa); Melilotus, Vicia, Onobrychis {0. sativa is sainfoin, q.v.) ; species of Trifolium, lupine and others are used as green manure. Many of the tropical trees afford useful timber; Crotalaria, Sesbania, Aeschynomene and others yield fibre; species of Acacia and Astragalus yield gum; Copaifera, Hymenaea and others balsams and resins; dyes are obtained from Genista (yellow), Indigofera (blue) and others; TIaematoxylon campechianum is logwood; of medicinal value are species of Cassia (senna leaves) and Astragalus; Tamarindus indica is tamarind, Glycyrrhiza glabra yields liquorice root. Well-known ornamental trees and shrubs are Cercis (C. siliquastrum is the Judas-tree), Gleditschia, Genista, Cylisus (broom), Colutea (C. arborescens is bladder-senna), Robinia and Acacia; Wistaria sinensis, a native of China, is a well-known climbing shrub; Phaseolus multiflorus is the scarlet runner; Lathy- rus (sweet and everlasting peas), Lupinus, Galega (goat's-rue) and others are herbaceous garden plants. Ceratonia Siliqua is the carob- tree of the Mediterranean, the pods of which (algaroba or St John's bread) contain a sweet juicy pulp and are largely used for feeding stock.

The order is well represented in Britain. Thus Genista tinctoria is dyers' greenweed, yielding a yellow dye; G. anglica is needle furze; other shrubs are Ulex (U. europaeus, gorse, furze or whin, U. nanus, a

dwarf species) and Cylisus scoparius, broom. Herbaceous plants are Ononis spinosa (rest-harrow), Medicago (medick), Melilotus (melilot) , Trifolium (the clovers) ,A nthyllis Vulneraria (kidney- vetch), Lotus corniculatus (bird's-foot trefoil), Astragalus (milk-vetch), Vicia (vetch, tare) and Lathyrus.

LlSGYA, called by the Shans Lai-hka, a state in the central division of the southern Shan States of Burma, lying approxi- mately between 20 15′ and 21° 30′ N. and 97 50′ and 98 30′ E., with an area of 1433 sq. m. The population was estimated at 30,000 in 1881. On the downfall of King Thibaw civil war

broke out, and reduced the population to a few hundreds. In 1901 it had risen again to 25,811. About seven-ninths of the land under cultivation consists of wet rice cultivation. A certain amount of upland rice is also cultivated, and cotton, sugar-cane and garden produce make up the rest; recently large orange groves have been planted in the west of the state. Laihka, the capital, is noted for its iron-work, both the iron and the implements made being produced at Pang Long in the west of the state. This and lacquer-ware are the chief exports, as also a considerable amount of pottery. The imports are chiefly cotton piece-goods and salt. The general character of the state is that of an undulating plateau, with a broad plain near the capital and along the Nam Teng, which is the chief river, with a general altitude of a little under 3000 ft.

LEH, the capital of Ladakh, India, situated 4 m. from the right bank of the upper Indus 11,500 ft. above the sea, 243 m. from Srinagar and 48 2 m. from Yarkand. It is the great emporium of the trade which passes between India, Chinese Turkestan and Tibet. Here meet the routes leading from the central Asian khanates, Kashgar, Yarkand, Khotan and Lhasa. The two chief roads from Leh to India pass via Srinagar and through the Kulu valley respectively. Under a commercial treaty with the maharaja of Kashmir, a British officer is deputed to Leh to regulate and control the traders and the traffic, conjointly with the governor appointed by the Kashmir state. Lying upon the western border of Tibet, Leh has formed the starting- point of many an adventurous journey into that country, the best-known route being that called the Janglam, the great trade route to Lhasa and China, passing by the Manasarowar lakes and the Mariam La pass into the valley of the Tsanpo. Pop. (1901) 2079. A Moravian mission has long

been established here, with an efficient little hospital. There is also a meteoro- logical observatory, the most elevated in Asia, where the average mean temperature ranges from 19-3° in January to 64-4° in July. The annual rainfall is only 3 in.

LEHMANN, JOHANN GOTTLOB (?i767), German miner alogist and geologist, was educated at Berlin where he took his degree of doctor of medicine. He became a teacher of mineralogy and mining in that city, and was afterwards (1761) appointed professor of chemistry and director of the imperial museum at St Petersburg. While distinguished for his chemical and miner- alogical researches, he may also be regarded as one of the pioneers in geological investigation. Although he accepted the view of a universal deluge, he gave in 1756 careful descriptions of the rocks and stratified formations in Prussia, and introduced the now familiar terms Zechstein and Rothes Todtliegendes (Roth- liegende) for subdivisions of the strata since grouped as Permian. His chief observations were published in Versuch einer Geschichle von Flotz-Geburgen, betrejfend deren Entstehung, Lage, darinne befindliche Metallen, Mineralien und Fossilien (1756). He died at St Petersburg on the 22nd of January 1767.

LEHMANN, PETER MARTIN ORLA (1810-1870), Danish statesman, was born at Copenhagen on the 15th of May 18 10. Although of German extraction his sympathies were with the Danish national party and he contributed to the liberal journal the Kjobenhavnsposten while he was a student of law at the university of Copenhagen, and from 1839 to 1842 edited, with Christian N. David, the Fddrelandet. In 1842 he was condemned to three months' imprisonment for a radical speech. He took a considerable part in the demonstrations of 1848, and was regarded as the leader of the " Eiderdanen," that is, of the party which regarded the Eider as the boundary of Denmark, and the duchy of Schleswig as an integral part of the kingdom. He entered the cabinet of Count A. W. Moltke in March 1848, and was employed on diplomatic missions to London and Berlin in connexion with the Schleswig-Holstein question. He was for some months in 1849 a prisoner of the Schleswig-Holsteiners at Gottorp. A member of the Folkething from 185 1 to 1853, of the Landsthing from 1854 to 1870, and from 1856 to 1866 of the Reichsrat, he became minister of the interior in 1861 in the cabinet of K. C. Hall, retiring with him in 1863. He died at Copenhagen on the 13th of September 1870. His book On the

Causes of the Misfortunes of Denmark (1864) went through many editions, and his posthumous works were published in 4 vols.,

1872-1874.

See Reinhardt, Orla Lehmann og hans samtid (Copenhagen, 1871); J. Clausen, Af O. Lehmanns Papirer (Copenhagen, 1903).

LEHNIN, a village and health resort of Germany, in the Prussian province of Brandenburg, situated between two lakes, which are connected by the navigable Emster with the Havel, 12 m. S.W. from Potsdam, and with a station on the main line Berlin-Magdeburg, and a branch line to Grosskreuz. Pop. (1900) 2379. It contains the ruins of a Cistercian monastery called Himmelpfort am See, founded in n 80 and dissolved in 1542; a handsome parish church, formerly the monasterial chapel, restored in 1872-1877; and a fine statue of the emperor Frederick III. Boat-building and saw-milling are the chief industries.

See Heffter, Geschichle des Klosters Lehnin (Brandenburg, 1851); and Sello, Lehnin, Beitrdge zur Geschichle von Kloster und Ami (Berlin, 1881).

The Lehnin Prophecy (Lehninsche Weissagung, Vaticinium Lehninense), a poem in 100 Leonine verses, reputed to be from the pen of a monk, Hermann of Lehnin, who lived about the year 1300, made its appearance about 1690 and caused much controversy. This so-called prophecy bewails the extinction of the Ascanian rulers of Brandenburg and the rise of the Hohen- zollern dynasty to power; each successive ruler of the latter house down to the eleventh generation is described, the date of the extinction of the race fixed, and the restoration of the Roman Catholic Church foretold. But as the narrative is only exact in details down to the death of Frederick William, the great elector, in 1688, and as all prophecies of the period subsequent to that time were falsified by events, the poem came to be regarded as a compilation and the date of its authorship placed about the year 1684. Andreas Fromm (d. 1685), rector of St Peter's church in Berlin, an ardent Lutheran, is commonly believed to have been the forger. This cleric, resisting certain measures taken by the great elector against the Lutheran pastors, fled the country in 1668 to avoid prosecution, and having been received at Prague into the Roman Catholic Church was appointed canon of Leitmeritz in Bohemia, where he died. During the earlier part of the 19th century the poem was eagerly scanned by the enemies of the Hohenzollerns, some of whom believed that the race would end with King Frederick William III., the repre- sentative of the eleventh generation of the family.

The " Vaticinium " was first published in Lilienthal's Gelehrtes

Preussen (Konigsberg, 1723), and has been many times reprinted. See Boost, Vie Weissagungen des Monchs Hermann zu Lehnin (Augsburg, 1848); Hilgenfeld, Die Lehninische Weissagung (Leipzig, !875); Sabell, Literatur der sogenannten Lehninschen Weissagung (Heilbronn, 1879) and Kampers, Die Lehninsche Weissagung uber das Haus Hohenzollern (Milnster, 1897).

LEHRS, KARL (1802-1878), German classical scholar, was born at Konigsberg on the 2nd of June 1802. He was of Jewish extraction, but in 1822 he embraced Christianity. In 1845 he was appointed professor of ancient Greek philology in Konigsberg University, which post he held till his death on the 9th of June 1878. His most important works are: De Aristarchi Studiis Homericis (1833, 2nd ed. by A. Ludwich, 1882), which laid a new foundation for Homeric exegesis (on the Aristarchean lines of explaining Homer from the text itself) and textual criticism; Quaestiones Epicae (1837); De Asclepiade Myrleano (1845); Herodiani Scripta Tria emendatiora (1848); Popular e Aufsatze aus dem Altertum (1856, 2nd much enlarged ed., 1875), his best- known work; Horatius Flaccus (1869), in which, on aesthetic grounds, he rejected many of the odes as spurious; Die Pindar-scholien (1873). Lehrs was a man of very decided opinions, ” one of the most masculine of German scholars “; his enthusiasm for everything Greek led him to adhere firmly to the undivided authorship of the Iliad; comparative mythology and the sym- bolical interpretation of myths he regarded as a species of sacrilege. See the exhaustive article by L. Friedlander in Allgemeine Deutsche Biographie, xviii. ; E. Kammer in C. Bursian’s Jahresberichi (1879); A. Jung, Zur Erinnerung an Karl Lehrs (progr. Meseritz, 1880); A. Ludwich edited Lehrs’ select correspondence (1894) and bis Kleine Schriften (1902).

LEIBNITZ (Leibniz), GOTTFRIED WILHELM (1646-17 16)’, German philosopher, mathematician and man of affairs, was born on the 1st of July 1646 at Leipzig, where his father was professor of moral philosophy. Though the name Leibniz, Leibnitz or Lubeniecz was originally Slavonic, his ancestors were German, and for three generations had been in the employ- ment of the Saxon government. Young Leibnitz was sent to the Nicolai school at Leipzig, but, from 1652 when his father died, seems to have been for the most part his own teacher. From his father he had acquired a love of historical study. The German books at his command were soon read through,

and with the help of two Latin books — the Thesaurus Chronologicus of Calvisius and an illustrated edition of Livy — he learned Latin at the age of eight. His father's library was now thrown open to him, to his great joy, with the permission, " Tolle, lege." Before he was twelve he could read Latin easily and had begun Greek; he had also remarkable facility in writing Latin verse. He next turned to the study of logic, attempting already to reform its doctrines, and zealously reading the scholastics and some of the Protestant theologians.

At the age of fifteen, he entered the university of Leipzig as a law student. His first two years were devoted to philosophy under Jakob Thomasius, a Neo-Aristotelian, who is looked upon as having founded the scientific study of the history of philosophy in Germany. It was at this time probably that he first made acquaintance with the modern thinkers who had already revolu- tionized science and philosophy, Francis Bacon, Cardan and Campanella, Kepler, Galileo and Descartes; and he began to consider the difference between the old and new ways of regarding nature. He resolved to study mathematics. It was not, how- ever, till the summer of 1663, which he spent at Jena under E. Weigel, that he obtained the instructions of a mathematician of repute; nor was the deeper study of mathematics entered upon till his visit to Paris and acquaintance with Huygens many years later.

The next three years he devoted to legal studies, and in r666 applied for the degree of doctor of law, with a view to obtaining the post of assessor. Being refused on the ground of his youth he left his native town for ever. The doctor's degree refused him there was at once (November 5, 1666) conferred on him at Altdorf — the university town of the free city of Nuremberg — where his brilliant dissertation procured him the immediate offer of a professor's chair. This, however, he declined, having, as he said, " very different things in view."

Leibnitz, not yet twenty-one years of age, was already the author of several remarkable essays. In his bachelor's disserta- tion De principio individui (1663), he defended the nominalistic doctrine that individuality is constituted by the whole entity or essence of a thing; his arithmetical tract De complexionibus, published in an extended form under the title De arte combinaloria (1666), is an essay towards his life-long project of a reformed symbolism and method of thought; and besides these there are our juridical essays, including the Nova methodus docendi discendique juris, written in the intervals of his journey from Leipzig to Altdorf. This last essay is remarkable, not only for the reconstruction it attempted of the Corpus Juris, but as containing the first clear recognition of the importance of the

historical method in law. Nuremberg was a centre of the Rosicrucians, and Leibnitz, busying himself with writings of the alchemists, soon gained such a knowledge of their tenets that he was supposed to be one of the secret brotherhood, and was even elected their secretary. A more important result of his visit to Nuremberg was his acquaintance with Johann Christian von Boyneburg (1622-1672), formerly first minister to the elector of Mainz, and one of the most distinguished German statesmen of the day. By his advice Leibnitz printed his Nova methodus in 1667, dedicated it to the elector, and, going to Mainz, presented it to him in person. It was thus that Leibnitz entered the service of the elector of Mainz, at first as an assistant in the revision of the statute-book, afterwards on more important work.

The policy of the elector, which the pen of Leibnitz was now xvi. 13

called upon to promote, was to maintain the security of the German empire, threatened on the west by the aggressive power of France, on the east by Turkey and Russia. Thus when in 1669 the crown of Poland became vacant, it fell to Leibnitz to support the claims of the German candidate, which he did in his first political writing, Specimen demonstrationum politicarum pro rege Polonorum eligendo, attempting, under the guise of a Catholic Polish nobleman, to show by mathematical demonstration that it was necessary in the interest of Poland that it should have the count palatine of Neuburg as its king. But neither the diplo- matic skill of Boyneburg, who had been sent as plenipotentiary to the election at Warsaw, nor the arguments of Leibnitz were successful, and a Polish prince was elected to fill the vacant throne.

A greater danger threatened Germany in the aggressions of Louis XIV. (see France: History). Though Holland was in most immediate danger, the seizure of Lorraine in 1670 showed that Germany too was threatened. It was in this year that Leibnitz wrote his Thoughts on Public Safety, 1 in which he urged the formation of a new " Rheinbund " for the protection of Germany, and contended that the states of Europe should employ their power, not against one another, but in the conquest of the non-Christian world, in which Egypt, " one of the best situated lands in the world," would fall to France. The plan thus proposed of averting the threatened attack on Germany by a French expedition to Egypt was discussed with Boyneburg, and obtained the approval of the elector. French relations with Turkey were at the time so strained as to make a breach im- minent, and at the close of 1671, about the time when the war with Holland broke out, Louis himself was approached by a letter from Boyneburg and a short memorial from the pen of Leibnitz, who attempted to show that

Holland itself, as a mercantile power trading with the East, might be best attacked through Egypt, while nothing would be easier for France or would more largely increase her power than the conquest of Egypt. On February 12, 1672, a request came from the French secretary of state, Simon Arnauld de Pomponne (i6r8-i6oc;), that Leibnitz should go to Paris. Louis seems still to have kept the matter in view, but never granted Leibnitz the personal inter- view he desired, while Pomponne wrote, " I have nothing against the plan of a holy war, but such plans, you know, since the days of St Louis, have ceased to be the fashion." Not yet discouraged, Leibnitz wrote a full account of his project for the king, 2 and a summary of the same 3 evidently intended for Boyneburg. But Boyneburg died in December 1672, before the latter could be sent to him. Nor did the former ever reach its destination. The French quarrel with the Porte was made up, and the plan of a French expedition to Egypt disappeared from practical politics till the time of Napoleon. The history of this scheme, and the reason of Leibnitz's journey to Paris, long remained hidden in the archives of the Hanoverian library. It was on his taking possession of Hanover in 1803 that Napoleon learned, through the Consilium Aegyptiacum, that the idea of a French conquest of Egypt had been first put forward by a German philosopher. In the same year there was published in London an account of the Justa dissertation of which the British Government had procured a copy in 1799. But it was only with the appearance of the edition of Leibnitz's works begun by Onno Klopp in 1864 that the full history of the scheme was made known. Leibnitz had other than political ends in view in his visit to France. It was as the centre of literature and science that Paris chiefly attracted him. Political duties never made him lose sight of his philosophical and scientific interests. At Mainz he was still busied with the question of the relation between the old and new methods in philosophy. In a letter to Jakob

1 Bedenken, welchergestalt securitas publica interna et externa und status praesens jetzigen Umstiinden nach im Reich auf festen Fuss zu stellen.

2 De expeditione Aegyptiaca regi Franciae proponenda justa dissertatio.

3 Consilium Aegyptiacum.

4 A Summary Account of Leibnitz's Memoir addressed to Lewis the Fourteenth, &c. [edited by Granville Penn], (London, 1803).

Thomasius (1669) he contends that the mechanical explanation of nature by magnitude, figure and motion alone is not incon- sistent with the doctrines of Aristotle's Physics, in which he finds more truth than in the Meditations of Descartes. Yet these qualities of bodies, he argues in 1668 (in an essay published without his knowledge under the title Confessio naturae contra atheistas), require an incorporeal principle, or God, for their ultimate explanation. He also wrote at this time a defence of the doctrine of the Trinity against Wissowatius (1669), and an essay on philosophic style, introductory to an edition of the Anti- barbarus of Nizolius (1670). Clearness and distinctness alone, he says, are what makes a philosophic style, and no language is better suited for this popular exposition than the German. In 1671 he issued a Hypothesis physica nova, in which, agreeing with Descartes that corporeal phenomena should be explained from motion, he carried out the mechanical explanation of nature by contending that the original of this motion is a fine aether, similar to light, or rather constituting it, which, penetrating all bodies in the direction of the earth's axis, produces the pheno- mena of gravity, elasticity, &c. The first part of the essay, on concrete motion, was dedicated to the Royal Society of London, the second, on abstract motion, to the French Academy.

At Paris Leibnitz met with Arnauld, Malebranche and, more important still, with Christian Huygens. This was pre-eminently the period of his mathematical and physical activity. Before leaving Mainz he was able to announce 1 an imposing list of dis- coveries, and plans for discoveries, arrived at by means of his new logical art, in natural philosophy, mathematics, mechanics, optics, hydrostatics, pneumatics and nautical science, not to speak of new ideas in law, theology and politics. Chief among these discoveries was that of a calculating machine for performing more complicated operations than that of Pascal — multiplying, dividing and extracting roots, as well as adding

and subtracting. This machine was exhibited to the Academy of Paris and to the Royal Society of London, and Leibnitz was elected a fellow of the latter society in April 1673. 2 In January of this year he had gone to London as an attache on a political mission from the elector of Mainz, returning in March to Paris, and while in London had become personally acquainted with Oldenburg, the secretary of the Royal Society, with whom he had already corresponded, with Boyle the chemist and Pell the mathematician. It is from this period that we must date -the impulse that directed him anew to mathematics. By Pell he had been referred to Mercator's Logarithmotechnica as already containing some numerical observations which Leibnitz had thought original on his own part ; and, on his return to Paris, he devoted himself to the study of higher geometry under Huygens, entering almost at once upon the series of investigations which culminated in his discovery of the differential and integral calculus (see Infinitesimal Calculus).

Shortly after his return to Paris in 1673, Leibnitz ceased to be in the Mainz service any more than in name, but in the same year entered the employment of Duke John Frederick of Bruns- wick-Liineburg, with whom he had corresponded for some time. In 1676 he removed at the duke's request to Hanover, travelling thither by way of London and Amsterdam. At Amsterdam he saw and conversed with Spinoza, and carried away with him extracts from the latter's unpublished Ethica.

For the next forty years, and under three successive princes, Leibnitz was in the service of the Brunswick family, and his headquarters were at Hanover, where he had charge of the ducal library. Leibnitz thus passed into a political atmosphere formed by the dynastic aims of the typical German state (see Hanover; Brunswick). He supported the claim of Hanover to appoint an ambassador at the congress of Nimeguen (1676) 3 to defend the establishment of primogeniture in the Luneburg branch of the Brunswick family; and, when the proposal was

1 In a letter to the duke of Brunswick-Liineburg (autumn 1671), Werke, ed. Klopp, iii. 2^3 sq.

- He was made a foreign member of the French Academy in 1700.

3 Caesarini Furstenerii Iractattts de jure suprematus ac legationis princdpum Germaniae (Amsterdam, 1677); Entreliens de Philar'ete et a' Engine sur le droit d'ambassade CDuisb., 1677).

made to raise the duke of Hanover to the electorate, he had to show that this did not interfere with the rights of the duke of Wiirttemberg. In 1692 the duke of Hanover was made elector. Before, and with a view to this, Leibnitz had been employed by him to write the history of the Brunswick-Liineburg family, and, to collect material for his history, had undertaken a journey through Germany and Italy in 1687-1690, visiting and examining the records in Marburg, Frankfort-on-the-Main, Munich, Vienna (where he remained nine months), Venice, Modena and Rome. At Rome he was offered the custodianship of the Vatican library on condition of his joining the Catholic Church.

About this time, too, his thoughts and energies were partly taken up with the scheme for the reunion of the Catholic and Protestant Churches. At Mainz he had joined in an attempt made by the elector and Boyneburg to bring about a reconcilia- tion, and now, chiefly through the energy and skill of the Catholic Royas de Spinola, and from the spirit of moderation which prevailed among the theologians he met with at Hanover in 1683, it almost seemed as if some agreement might be arrived at. In 1686 Leibnitz wrote his Systema theologicum, 4 in which he strove to find common ground for Protestants and Catholics in the details of their creeds. But the English revolution of 1688 interfered with the scheme in Hanover, and it was soon found that the religious difficulties were greater than had at one time appeared. In the letters to Leibnitz from Bossuet, the landgrave of Hessen-Rheinfels, and Madame de Brinon, the aim is obviously to make converts to Catholicism, not to arrive at a compromise with Protestantism, and when it was found that Leibnitz refused to be converted the correspondence ceased. A further scheme of church union in which Leibnitz was engaged, that between the Reformed and Lutheran Churches, met with no better success.

Returning from Italy in 1690, Leibnitz was appointed librarian at Wolfenbuttel by Duke Anton of Brunswick-Wolfenbuttel. Some years afterwards began his connexion with Berlin through his friendship with the electress Sophie Charlotte of Brandenburg and her mother the princess Sophie of Hanover. He was invited to Berlin in 1700, and on the nth July of that year the academy (Akademie der Wissenschaften) he had planned was founded, with himself as its president for life. In the same year he was made a privy councillor of justice by the elector of Brandenburg. Four years before he had received a like honour from the elector of Hanover, and twelve years afterwards the same distinction was conferred upon him by Peter the Great, to whom he gave a plan for an academy at St Petersburg, carried out after the czar’s death. After the death of his royal pupil in 1705 his visits to Berlin became less frequent and less welcome, and in

1711 he was there for the last time. In the following year he undertook his fifth and last journey to Vienna, where he stayed till 17 14. An attempt to found an academy of science there was defeated by the opposition of the Jesuits, but he now attained the ho.nour he had coveted of an imperial privy councillorship (1712), and, either at this time or on a previous occasion (1709), was made a baron of the empire (Reichsfreiherr). Leibnitz returned to Hanover in September 17 14, but found the elector George Louis had already gone to assume the crown of England. Leibnitz would gladly have followed him to London, but was bidden to remain at Hanover and finish his history of Brunswick.

During the last thirty years Leibnitz had been busy with many matters. Mathematics, natural science, 5 philosophy, theology, history jurisprudence, politics (particularly the French wars with Germany, and the question of the Spanish succession), economics and philology, all gained a share of his attention; almost all of them he enriched with original observations.

His genealogical researches in Italy — through which he established the common origin of the families of Brunswick and

4 Not published till 1819. It is on this work that the assertion lias been founded that Leibnitz was at heart a Catholic — a supposition clearly disproved by his correspondence.

5 In his Protogaea (1691) he developed the notion of the historical genesis of the present condition of the earth's surface. Cf. O. Peschel, Gesch. d. Erdkunde (Munich, 1865), pp. 615 sq.

Este — were not only preceded by an immense collection of historical sources, but enabled him to publish materials for a code of international law. 1 The history of Brunswick itself was the last work of his life, and had covered the period from 768 to 1005 when death ended his labours. But the government, in whose service and at whose order the work had been carried out, left it in the archives of the Hanover library till it was published by Pertz in 1843.

It was in the years between 1690 and 1716 that Leibnitz's chief philosophical works were composed, and during the first ten of these years the accounts of his system were, for the most part, preliminary sketches. Indeed, he never gave a full and systematic account of his

doctrines. His views have to be gathered from letters to friends, from occasional articles in the Acta Eruditorum, the Journal des Savants, and other journals, and from one or two more extensive works. It is evident, however, that philosophy had not been entirely neglected in the years in which his pen was almost solely occupied with other matters. A letter to the duke of Brunswick, and another to Arnauld, in 1671, show that he had already reached his new notion of substance; but it is in the correspondence with Antoine Arnauld, between 1686 and 1690, that his fundamental ideas and the reasons for them are for the first time made clear. The appearance of Locke's Essay in 1690 induced him (1696) to note down his objections to it, and his own ideas on the same subjects. In 1 703-1 704 these were worked out in detail and ready for publication, when the death of the author whom they criticized prevented their appearance (first published by Raspe, 1765). In 1 7 10 appeared the only complete and systematic philosophical work of his life-time, Essais de Theodicee sur la bonte de Dicu, la liberie de Phommc, et V origins du mal, originally undertaken at the request of the late queen of Prussia, who had wished a reply to Bayle's opposition of faith and reason. In 17 14 he wrote, for Prince Eugene of Savoy, a sketch of his system under the title of La Monadologie, and in the same year appeared his Principes de la nature' et de la grace. The last few years of his life were perhaps more occupied with correspondence than any others, and, in a philosophical regard, were chiefly notable for the letters, which, through the desire of the new queen of England, he interchanged with Clarke, sur Dieu, I'dme, I'espace, la durte,

Leibnitz died on the 14th of November 1716, his closing years enfeebled by disease, harassed by controversy, embittered by neglect; but to the last he preserved the indomitable energy and power of work to which is largely due the position he holds as, more perhaps than any one in modern times, a man of almost universal attainments and almost universal genius. Neither at Berlin, in the academy which he had founded, nor in London, whither his sovereign had gone to rule, was any notice taken of his death. At Hanover, Eckhart, his secretary, was his only mourner; " he was buried," says an eyewitness, " more like a robber than what he really was, the ornament of his country." 2 Only in the French Academy was the loss recognized, and a worthy eulogium devoted to his memory (November 13, 1717). The 200th anniversary of his birth was celebrated in 1846, and in the same year were opened the Koniglichsachsische Gesell- schaft der Wissenschaften and the Kaiserliche Akademie der Wissenschaften in Leipzig and Vienna respectively. In 1883, a statue was erected to him at Leipzig.

Leibnitz possessed a wonderful power of rapid and continuous work.

Even in travelling his time was employed in solving mathematical problems. He is described as moderate in his habits, quick of temper but easily appeased, charitable in his judgments of others, and tolerant of differences of opinion, though impatient of contradiction on small matters. He is also said to have been fond of money to the point of covetousness; he was certainly desirous of honour, and felt keenly the neglect in which his last years were passed.

Philosophy. — The central point in the philosophy of Leibnitz was only arrived at after many advances and corrections in his

1 Codex juris gentium diplomaticus (1693); Mantissa codicis juri gentium diplomatics (1700).

2 Memoirs of John Ker of Ker stand, by himself (1726), i. 118.

opinions. This point is his new doctrine of substance (p. 702), 3 and it is through it that unity is given to the succession of occasional writings, scattered over fifty years, in which he explained his views. More inclined to agree than to differ with what he read (p. 425), and borrowing from almost every philosophical system, his own standpoint is yet most closely related to that of Descartes, partly as consequence, partly by way of opposition. Cartesianism, Leibnitz often asserted, is the ante-room of truth, but the ante-room only. Descartes's separation of things into two heterogeneous substances only connected by the omnipotence of God, and the more logical absorption of both by Spinoza into the one divine substance, followed from an erroneous conception of what the true nature of substance is. Substance, the ultimate reality, can only be conceived as force. Hence Leibnitz's metaphysical view of the monads as simple, per- cipient, self-active beings, the constituent elements of all things, his physical doctrines of the reality and constancy of force at the same time that space, matter and motion arc merely phenomenal, and his psychological conception of the continuity and development of consciousness. In the closest connexion with the same stand his logical principles of consistency and sufficient reason, and the method he developed from them, his ethical end of perfection, and his crowning theological conception of the universe as the best possible world, and of God both as its efficient cause and its final harmony.

The ultimate elements of the universe are, according to Leibnitz, individual centres of force or monads. Why they should be in- dividual, and not manifestations of one world-force, he never clearly proves. 4 His doctrine of individuality seems to have been arrived at, not by strict deduction from the nature of force, but rather from the

empirical observation that it is by the manifesta- tion of its activity that the separate existence of the individual becomes evident; for his system individuality is as fundamental as activity. ” The monads,” he says, ” are the very atoms of nature — in a word, the elements of things,” but, as centres of force, they have neither parts, extension nor figure (p. 705). Hence their distinction from the atoms of Democritus and the materialists. They are metaphysical points or rather spiritual beings whose very nature it is to act. As the bent bow springs back of itself, so the monads naturally pass and are always passing into action without any aid but the absence of opposition (p. 122). Nor do they, like the atoms, act upon one another (p. 680) ; the action of each ex- cludes that of every other. The activity of each is the result of its own past state, the determinator of its own future (pp. 706, 722). ” The monads have no windows by which anything may go in or out ” (p. 705).

Further, since all substances are of the nature of force, it follows that — ” in imitation of the notion which we have of souls ” — they must contain something analogous to feeling and appetite. It is the nature of the monad to represent the many in one, and this is per- ception, by which external events are mirrored internally (p. 438). Through their own activity the monads mirror the universe (p. 725), but each in its own way and from its own point of view, that is, with a more or less perfect perception (p. 127); for the Cartesians were wrong in ignoring the infinite grades of perception, and identi- fying it with the reflex cognizance of it which may be called apper- ception. Every monad is thus a microcosm, the universe in little, 5 and according to the degree of its activity is the distinctness of its iepresentation of the universe (p. 709). Thus Leibnitz, borrowing the Aristotelian term, calls the monads entelechies, because they have a certain perfection (rd hvrehks) and sufficiency (aiTaputLa) which make them sources of their internal actions and, so to speak, incorporeal automata (p. 7˚6). That the monads are not pure entelechies is shown by the differences amongst them. Excluding all external limitation, they are yet limited by their own nature. All created monads contain a passive element or materia prima (pp. 440, 687, 725), in virtue of which their perceptions are more or bss confused. As the activity of the monad consists in perception, this is inhibited by the passive principle, so that there arises in the monad an appetite or tendency to overcome the inhibition and become more perceptive, whence follows the change from one perception to another (pp. 706, 714). By the proportion of activity to passivity in it one monad is differentiated from another. The greater the amount of activity or of distinct perceptions the more perfect is the monad; the stronger the clement of passivity, the more

confused its perceptions, the less perfect is it (p. 709). The soul would be a divinity had it nothing but distinct perceptions

(P- 520). . , , . ,

The monad is never without a perception; but, when it has a number of little perceptions with no means of distinction, a state similar to that of being stunned ensues, the monade nue being per- petually in this state (p. 707). Between this and the most distinct perception there is room for an infinite diversity of nature among the monads themselves. Thus no one monad is exactly the same as another; for, were it possible that there should be two identical, there would be no sufficient re ason why God, who brings them into

3 When not otherwise stated, the references are to Erdmann's edition of the Opera philosophica.

4 See Considerations sur la doctrine d'un esprit universe! (1702).

5 Cf. Opera, ed. Dutens, II. ii. 20.

actual existence, should put one of them at one definite time and place, the other at a different time and place. This is Leibnitz's principle of the identity of indiscernibles (pp. 277, 755) ; by it his early problem as to the principle of individuation is solved by the distinction between genus and individual being abolished, and every individual made sui generis. The principle thus established is formulated in Leibnitz's law of continuity, founded, he says, on the doctrine of the mathematical infinite, essential to geometry, and of importance in physics (pp. 104, 105), in accordance with which there is neither vacuum nor break in nature, but " everything takes place by degrees " (p. 392), the different species of creatures rising by insensible steps from the lowest to the most perfect form (p- 312)'. _

As in every monad each succeeding state is the consequence of the preceding, and as it is of the nature of every monad to mirror or represent the universe, it follows (p. 774) that the perceptive con- tent of each monad is in " accord " or correspondence with that of every other (cf. p. 127), though this content is represented with infinitely varying degrees of perfection. This is Leibnitz's famous doctrine of pre-established harmony, in virtue of which the infinitely numerous independent substances of which the world is composed are related to

each other and form one universe. It is essential to notice that it proceeds from the very nature of the monads as per- cipient, self-acting beings, and not from an arbitrary determination of the Deity.

From this harmony of self-determining percipient units Leibnitz has to explain the world of nature and mind. As everything that really exists is of the nature of spiritual or metaphysical points (p. 126), it follows that space and matter in the ordinary sense can only have a phenomenal existence (p. 745), being dependent not on the nature of the monads themselves but on the way in which they are perceived. Considering that ‘ several things exist at the same time and in a certain order of coexistence, and mistaking this con- stant relation for something that exists outside of them, the mind forms the confused perception of space (p. 768). But space and time are merely relative, the former an order of coexistences, the latter of successions (pp. 682, 752). Hence not only the secondary qualities of Descartes and Locke, but their so-called primary qualities as well, are merely phenomenal (p. 445). The monads are really without position or distance from each other; but, as we perceive several simple substances, there is for us an aggregate or extended mass. Body is thus active extension (pp. no, III). The unity of the aggregate depends entirely on our perceiving the monads com- posing it together. There is no such thing as an absolute vacuum or empty space, any more than there are indivisible material units or atoms from which all things are built up (pp. 126, 186, 277). Body, corporeal mass, or, as Leibnitz calls it, to distinguish it from the materia prima of which every monad partakes (p. 440), materia secunda, is thus only a ” phenomenon bene fundatum ” (p. 436). It is not a substantia but substantias or substantiatum (p. 745). While this, however, is the only view consistent with Leibnitz’s fundamental principles, and is often clearly stated by himself, he also speaks at other times of the materia secunda as itself a composite substance, and of a real metaphysical bond between soul and body. But these expressions occur chiefly in the letters to des Bosses, in which Leibnitz is trying to reconcile his views with the’ doctrines of the Roman Catholic Church, especially with that of the real presence in the Eucharist, and are usually referred to by him as doctrines of faith or as hypothetical (see especially p. 680). The true vinculum substantiate is not the materia secunda, which a consistent develop- ment of Leibnitz’s principles can only regard as phenomenal, but the materia prima, through which the monads are individualized and distinguished and their connexion rendered possible. And Leibnitz seems to recognize that the opposite assumption is inconsistent with his cardinal metaphysical view of the monads as the only realities.

From Leibnitz’s doctrine of force as the ultimate reality it follows that

his view of nature must be throughout dynamical. And though his project of a dynamic, or theory of natural philosophy, was never carried out, the outlines of his own theory and his criticism of the mechanical physics of Descartes are known to us. The whole distinction between the two lies in the difference between the mechanical and the dynamical views of nature. Descartes started from the reality of extension as constituting the nature of material substance, and found in magnitude, figure and motion the explanation of the material universe. Leibnitz, too, admitted the mechanical view of nature as giving the laws of corporeal phenomena (p. 438), applying also to even thing that takes place in animal organisms, 1 even the human body (p. 777). But, as phenomenal, these laws must find their explanation in metaphysics, and thus in final causes (p. 155). All things, he says (in his Specimen Dynamicum), can be explained either by efficient or by final causes. ‘ But the latter method is not appropriate to individual occurrences, 2 though it must be applied when the laws of mechanism themselves need explanation (p. 678). For Descartcs’s doctrine of the constancy of the quantity of motion

1 The difference between an organic and an inorganic body con- sists, he says, in this, that the former is a machine even in its smallest parts.

2 Opera, ed. Dutens, iii. 321.

(i.e. momentum) in the world Leibnitz substitutes the principle of the conservation of vis viva, and contends that the Cartesian position that motion is measured by velocity should be superseded by the law that moving force (vis matrix) is measured by the square of the velocity (pp. 192, 193). The long controversy raised by this criticism was really caused by the ambiguity of the terms employed. The principles held by Descartes and Leibnitz were both correct, though different, and their conflict only apparent. Descartes’s principle is now enunciated as the conservation of momentum, that of Leibnitz as the conservation of energy. Leibnitz further criticizes the Cartesian view that the mind can alter the direction of motion though it cannot initiate it, and contends that the quantity of ” vis directiva,” estimated between the same parts, is constant (p. 108) — a position developed in his statical theorem for determining geome- trically the resultant of any number of forces acting at a point.

Like the monad, body, which is its analogue, has a passive and an active element. The former is the capacity of resistance, and includes impenetrability and inertia; the latter is active force (pp. 250, 687). Bodies, too, like the monads, are self-contained activities, receiving no

impulse from without — it is only by an accommodation to ordinary language that we speak of them as doing so — but moving themselves in harmony with each other (p. 250).

The psychology of Leibnitz is chiefly developed in the Nouveaux essais sur I'entendement humain, written in answer to Locke's famous Essay, and criticizing it chapter by chapter. In these essays he worked out a theory of the origin and development of knowledge in harmony with his metaphysical views, and thus without Locke's implied assumption of the mutual influence of soul and body. When one monad in an aggregate perceives the others so clearly that they are in comparison with it bare monads (monades nues), it is said to be the ruling monad of the aggregate, not because it actu- ally does exert an influence over the rest, but because, being in close correspondence with them, and yet having so much clearer percep- tion, it seems to do so (p. 683). This monad is called the entelechy or soul of the aggregate or body, and as such mirrors the aggregate in the first place and the universe through it (p. 710). Each soul or entelechy is surrounded by an infinite number of monads forming its body (p. 714) ; soul and body together make a living being, and, as their laws are in perfect harmony — a harmony established be- tween the whole realm of final causes and that of efficient causes (p. 714) — we have the same result as if one influenced the other. This is further explained by Leibnitz in his well-known illustration of the different ways in which two clocks may keep exactly the same time. The machinery of the one may actually move that of the other, or whenever one moves the mechanician may make a similar alteration in the other, or they may have been so perfectly con- structed at first as to continue to correspond at every instant with- out any further influence (pp. 133, 134). The first way represents the common (Locke's) theory of mutual influence, the second the method of the occasionalists, the third that of pre-established harmony. Thus the body does not act on the soul in the production of cognition, nor the soul on the body in the production of motion. The body acts just as if it had no soul, the soul as if it had no body (p. 711). Instead, therefore, of all knowledge coming to us directly or indirectly through the bodily senses, it is all developed by the soul's own activity, and sensuous perception is itself but a confused kind of cognition. Not a certain select class of our ideas only (as Descartes held), but all our ideas, are innate, though only worked up into actual cognition in the development of knowledge (p. 212). To the aphorism made use of by Locke, " Nihil est in intellectu quod non prius fuerit in sensu," must be added the clause, " nisi intellectus ipse " (p. 223). The soul at birth is not comparable to a tabula rasa, but rather to an unworked block of marble, the hidden

veins of which already determine the form it is to assume in the hands of the sculptor (p. 196). Nor, again, can the soul ever be without perception; for it has no other nature than that of a percipient active being (p. 246). Apparently dreamless sleep is to be accounted for by unconscious perception (p. 223) ; and it is by such insensible perceptions that Leibnitz explains his doctrine of pre-established harmony (p. 197).

In the human soul perception is developed into thought, and there is thus an infinite though gradual difference between it and the mere monad (p. 464). As all knowledge is implicit in the soul, it follows that its perfection depends on the efficiency of the instrument by which it is developed. Hence the importance, in Leibnitz's system, of the logical principles and method, the consideration of which occupied him at intervals throughout his whole career.

There are two kinds of truths — (1) truths of reasoning, and (2) truths of fact (pp. 83, 99, 707). The former rest on the principle of identity (or contradiction) or of possibility, in virtue of which that is false which contains a contradiction, and that true which is contradictory to the false. The latter rest on the principle of sufficient reason or of reality (compossibilite), according to which no fact is true unless there be a sufficient reason why it should be so and not otherwise (agreeing thus with the principium melioris or final cause). God alone, the purely active monad, has an a priori know- ledge of the latter class of truths; they have their source in the human mind only in so far as it mirrors the outer world, i.e. in its passivity, whereas the truths of reason have their source in our mind in itself or in its activity.

Both kinds of truths fall into two classes, primitive and deriva- tive. The primitive truths of fact are, as Descartes held, those of internal experience, and the derivative truths are inferred from them in accordance with the principle of sufficient reason, by their agree- ment with our perception of the world as a whole. They are thus reached by probable arguments — a department of logic which Leib- nitz was the first to bring into prominence (pp. 84, 164, 168, 169, 343). The primitive truths of reasoning are identical (in later terminology, analytical) propositions, the derivative truths being deduced from them by the principle of contradiction. The part of his logic on which Leibnitz laid the greatest stress was the separation of these rational cognitions into their simplest elements — -for he held

that the root-notions (cogitationes primae) would be found to be few in number (pp. 92, 93) — and the designation of them by universal characters or symbols, 1 composite notions being denoted by the formulae formed by the union of several definite characters, and judgments by the relation of aequipollence among these formulae, so as to reduce the syllogism to a calculus. This is the main idea of Leibnitz's " universal characteristic," never fully worked out by him, which he regarded as one of the greatest discoveries of the age. An incidental result of its adoption would be the intro- duction of a universal symbolism of thought comparable to the symbolism of mathematics and intelligible in all languages (cf. p. 356). But the great revolution it would effect would chiefly consist in this, that truth and falsehood would be no longer matters of opinion but of correctness or error in calculation, 2 (pp. 83, 84, 89, 93). The old Aristotelian analytic is not to be superseded; but it is to be supplemented by this new method, for of itself it is but the ABC of logic.

But the logic of Leibnitz is an art of discovery (p. 85) as well as of proof, and, as such, applies both to the sphere of reasoning and to that of fact. In the former it has by attention to render explicit what is otherwise only implicit, and by the intellect to introduce order into the a priori truths of reason, so that one may follow from another and they may constitute together a monde intellectuel. To this art of orderly combination Leibnitz attached the greatest im- portance, and to it one of his earliest writings was devoted. Similarly, in the sphere of experience, it is the business of the art of discovery to find out and classify the primitive facts or data, referring every other fact to them as its sufficient reason, so that new truths of experience may be brought to light.

As the perception of the monad when clarified becomes thought, so the appetite of which all monads partake is raised to will, their spontaneity to freedom, in man (p. 669). The will is an effort or tendency to that which one finds good (p. 251), and is free only in the sense of being exempt from external control 3 (pp. 262, 513, 521), for it must always have a sufficient reason for its action determined by what seems good to it. The end determining the will is pleasure (p: 269), and pleasure is the sense of an increase of perfection (p. 670). A will guided by reason will sacrifice transitory and pursue constant pleasures or happiness, and in this weighing of pleasures consists true wisdom. Leibnitz, like Spinoza, says that freedom consists in following reason, servitude in following the passions (p. 669), and that the passions proceed from confused perceptions (pp. 188, 269). In love one finds joy in the happiness of another; and from love follow justice and law. " Our reason," says Leibnitz, 4 " illumined by the spirit of

God, reveals the law of nature," and with it positive law must not conflict. Natural law rises from the strict command to avoid offence, through the maxim of equity which gives to each his due, to that of probity or piety (honeste vivere), — the highest ethical perfection, — which presupposes a belief in God, providence and a future life. 5 Moral immortality — not merely the simple continuity which belongs to every monad — comes from God having provided that the changes of matter will not make man lose his individuality (pp. 126, 466).

Leibnitz thus makes the existence of God a postulate of morality as well as necessary for the realization of the monads. It is in the Theodicee that his theology is worked out and his view of the universe as the best possible world defended. In it he contends that faith and reason are essentially harmonious (pp. 402, 479), and that nothing can be received as an article of faith which contradicts an eternal truth, though the ordinary physical order may be superseded by a higher. 6

The ordinary arguments for the being of God are retained by Leibnitz in a modified form (p. 375). Descartes's ontological proof is supplemented by the clause that God as the ens a se must either

1 Different symbolic systems were proposed by Leibnitz at different periods; cf. Kvet, Leibnitzens Logik (1857), p. 37.

2 The places at which Leibnitz anticipated the modern theory of logic mainly due to Boole are pointed out in Mr Venn's Symbolic Logic (1881).

3 Hence the difference of his determinism from that of Spinoza, though Leibnitz too says in one place that "it is difficult enough to distinguish the actions of God from those of the creatures " [Werke, ed. Pertz, 2nd ser. vol. i. p. 160).

1 Opera omnia, ed. Dutens, IV. iii. 282.

5 Ibid. IV. iii. 295. Cf. Bluntschli, Gesch. d. attg. Staatsrechts u. Politik (1864), pp. 143 sqq.

6 P. 480; cf. Werke. ed. Pertz, 2nd ser. vol. i. pp. 158,159.

exist or be impossible (pp. 80, 177, 708); in the cosmological proof he passes from the infinite series of finite causes to their sufficient reason which contains all changes in the series necessarily in itself (pp. 147, 708) ; and he argues teleologically from the existence of harmony among the monads without any mutual influence to God as the author

of this harmony (p. 430).

In these proofs Leibnitz seems to have in view an extramundane power to whom the monads owe their reality, though such a conception evidently breaks the continuity and harmony of his system, and can only be externally connected with it. But he also speaks in one place at any rate 7 of God as the ” universal harmony ” ; and the historians Erdmann and Zeller are of opinion that this is the only sense in which his system can be consistently theistic. Yet it would seem that to assume a purely active and therefore perfect monad as the source of all things is in accordance with the principle of continuity and with Leibnitz’s conception of the gradation of existences. In this sense he sometimes speaks of God as the first or highest of the monads (p. 678), and of created substances proceeding from Him continually by ” figurations ” (p. 708) or by ” a sort of emanation as we produce our thoughts.” s

The positive properties or perfections of the monads, Leibnitz holds, exist eminenter, i.e. without the limitation that attaches to created monads (p. 716), in God — their perception as His wisdom or intellect, and their appetite as His absolute will or goodness (p. 654) ; while the absence of all limitation is the divine independence or power, which again consists in this, that the possibility of things depends on His intellect, their reality on His will (p. 506). The universe in its harmonious order is thus the realization of the divine end, and as such must be the best possible (p. 506). The teleology of Leibnitz becomes necessarily a Theodicee. God created a world to manifest and communicate His perfection (p. 524), and, in choos- ing this world out of the infinite number that exist in the region of ideas (p. 515), was guided by the principium melioris (p. 506). With this thoroughgoing optimism Leibnitz has to reconcile the existence of evil in the best of all possible worlds. 9 With this end in view he distinguishes (p. 655) between (1) metaphysical evil or imperfection, which is unconditionally willed by God as essential to created beings; (2) physical evil, such as pain, which is con- ditionally willed by God as punishment or as a means to greater good (cf. p. 510) ; and (3) moral evil, in which the great difficulty lies, and which Leibnitz makes various attempts to explain. He says that it was merely permitted not willed by God (p. 655), and, that being obviously no explanation, adds that it was permitted because it was foreseen that the world with evil would nevertheless be better than any other possible world (p. 350). He also speaks of the evil as a mere set-off to the good in the world, which it increases by con- trast (p. 149), and at other times reduces moral to metaphysical evil by giving it a merely negative existence, or says that their evil actions are to be referred to men alone, while it is

only the power of action that comes from God, and the power of action is good (p. 658).

The great problem of Leibnitz's Theodicee thus remains unsolved. The suggestion that evil consists in a mere imperfection, like his idea of the monads proceeding from God by a continual emanation, was too bold and too inconsistent with his immediate apologetic aim to be carried out by him. Had he done so his theory would have transcended the independence of the monads with which it started, and found a deeper unity in the world than that resulting from the somewhat arbitrary assertion that the monads reflect the universe.

The philosophy of Leibnitz, in the more systematic and abstract form it received at the hands of Wolf, ruled the schools of Germany for nearly a century, and largely determined the character of the critical philosophy by which it was superseded. On it Baumgarten laid the foundations of a science of aesthetic. Its treatment of theological questions heralded the German Aufkldrung. And on many special points — in its physical doctrine of the conservation of force, its psychological hypothesis of unconscious perception, its attempt at a logical symbolism — it has suggested ideas fruitful for the progress of science.

Bibliography. — (1) Editions: Up to 1900 no attempt had been made to publish the complete works. Several editions existed, but a vast mass of MSS. (letters, &c.) remained only roughly classified in the Hanover library. The chief editions were: (1) L. Dutens (Geneva, 1768), called Opera Omnia, but far from complete; (2) G. H. Pertz, Leibnizens gesammelte Werke (Berlin, 1843-1863) (1st ser. History, 4 vols.; 2nd ser. Philosophy, vol. i. correspondence with Arnauld, &c, ed. C. L. Grotefend; 3rd ser. Mathematics, 7 vols., ed. C. J. Gerhardt) ; (3) Foucher de Careil (planned in 20 vols., 7 published, Paris, 1859-1875), the same editor having previously published Lettres et opuscules inedits de Leibniz (Paris, 1854-1857); (4) Onno Klopp, Die Werke von Leibniz gemass seinem Handschriftlichen Nachlasse in der Koniglichen Bibliothek zu Hannover (1st series, Historico-Political and Political, 10 vols., 1864-1877). The QLuvres de Leibnitz, by A. Jacques (2 vols., Paris, 1846) also

7 Werke, ed. Klopp, iii. 259; cf. Op. phil., p. 716. s Werke, ed. Pertz, 2nd ser. vol. i. p. 167.

9 " Si e'est ici le meilleur des mondes possibles, que sont done les autres? " — Voltaire, Candide, ch. vi.

deserves mention. The philosophical writings had been published by Raspe (Amsterdam and Leipzig, 1765), by J. E. Erdmann, Leibnitii opera philos. quae extant Latina, Gallica, Germanica, omnia (Berlin, 1840), by P. Janet (2 vols., Paris, 1866, 2nd ed. 1900), and the fullest by C. J. Gerhardt, Die Philosophischen Schriften von G. W. Leibniz (7 vols., 1875-1890); cf. also Die kleineren philos. wichtigeren Schriften (trans, with commentary, J. H. von.Kirchmann, 1879). The German works had also been partly published separately; G. E. Guhrauer (Berlin, 1838-1840). Of the letters various collec- tions had been published up to 1900, e.g.: C. J. Gerhardt (Halle, i860) and Der Briefwechsel von G. W. Leibnitz mit Mathematikern (1899); Corrispondenza tra L. A. Muratori e G. Leibnitz (1899); and cf. Neue Beitrdge zum Briefwechsel zwischen D. E. Jablonsky und G. W. Leibnitz (1899).

In 1900 it was decided by scholars in Berlin and Paris that a really complete edition should be published, and with this object four German and four French critics were entrusted with the pre- liminary task of correlating the MSS. in the royal library at Hanover. This process resulted in the preparation of the Kritischer Katalog der Leibnitz-Handschriften zur Vorbereitung der inter akademischen Leibnitz- Ausgabe unternommen (1908), and also in certain other preliminary publications, e.g. L. Couturat, Opuscules et fragments inedits (1903); E. Gerland, Leibnizens nachgelassene Schriften physikalischen, mechanischen und technischen Inhalts (1906); Jean Baruzi, Leibniz (1909), containing unedited MSS. and a sketch-biography; cf. the same author's Leibniz et V organisation religieuse de la terre (1907).

Translations. — Of the Systema Theologicum (1850, C. W. Russell), of the correspondence with Clarke (1717); Works, by G. M. Duncan (New Haven, 1890); of the Nouveaux Essais, by A. G. Langley (London, 1894); the Monadology and other Writings, by R. Latta (Oxford, 1898).

Biographical. — The materials for the life of Leibnitz, in addition to his own works, are the notes of Eckhart (not published till 1779), the £loge by Fontenclle (read to the French Academy in 1717), the " Eulogium," by Wolf, in the Acta Eruditorium for July 1717, and the " Supplementum " to the same by Feller, published in his Otium Hannover anum (Leipzig, 1 7 18). The best biography is that of G. E.

Guhrauer, G. W. Freiherr von Leibnitz (2 vols., Brcslau, 1842; Nachlrdge, Breslau, 1846). A shorter Life of G. W. von Leibnitz, on the Basis of the German Work of Guhrauer , has been published by J. M. Mackie (Boston, 1845). More recent works are those of L. Grote, Leibniz und seine Zeit (Hanover, 1869); E. Pfleiderer, Leibniz als Patriot, Staatsmann, und Bildungstrdger (Leipzig, 1870); the slighter volume of F. Kirchner, G. W. Leibniz: sein Leben und Denken (Kothen, 1876); Kuno Fischer, vol. iii. in Gesch. der neuern Philosophic (4th ed., 1902).

Critical. — The monographs and essays on Leibnitz are too numer- ous to mention, but reference may be made to Feuerbach, Darstellung, Entwicklung, und Kritik der Leibnitz schen Phil. (2nded., Leipzig, 1844); Nourrisson, La Philosophic de Leibniz (Paris, i860); R. Zimmermann, Leibnitz und Herbart: eine Vergleichung ihrer Mona- dologieen (Vienna, 1849); O. Caspari, Leibniz' Philosophic beleuchtet vom Gesichtspunkt der physikalischen Grundbegriffe von Kraft und Stoff (Leipzig, 1870); G. Hartenstein, "Locke's Lehre von der menschl. t.rk. in Vergl. mit Leibniz's Kritik derselben dargestcllt," in the Abhandl. d. philol.hist. CI. d. K. Sachs. Gesells. d. Wis:., vol. iv. (Leipzig, 1865); G. Class, Die metaph. Voraussetzungen des Leibnitzischen Determinismus (Tubingen, 1874); F. B. Kvet, Leib nitzens Logik (Prague, 1857); the essays on Leibnitz in Trendelen- burg's Beitrdge, vols. ii. and iii. (Berlin, 1855, 1867); L. Neff, Leibniz als Sprachforscher (Heidelberg, 1870-1871); J. Schmidt, Leibniz und Baumgarten (Halle, 1875); D. Nolcn, La Critique de Kant et la Mvtaphysique de Leibniz (Paris, 1875); and the exhaustive work of A. Pichler, Die Theologie des Leibniz (Munich, 1869-1870). Among the more recent works are: C. Braig, Leibniz: sein Leben und die Bedeutung seiner Lehre (1907) ; E. Cassirer, Leibniz' System in seinem wissenschaftlichen Grundlagen (1902); L. Couturat, La Logique de Leibniz d'apres des documents inedits (1901); L. Daville, Leibniz historien (1909); Kuno Fischer, G. W. Leibniz (1889); R. B. Frenzel, Der Associationsbegriff bei Leibniz (1898); R. Herbertz, Die Lehre vom Unbe-wussten im System des Leibniz (1905) ; H. Hoff- mann, Die Leibniz' sche Religions-philosophie in ihrer geschichtlichen Stellung (1903); \V. Kabitz, Die Philosophic des jungen Leibniz (1909), a study of the development of the Leibnitzian system; H. L. Koch, Materie und Organismus bei Leibniz (1908); G. Nicl, L'Optimisme de Leibniz (1888); Bertrand A. W. Russell, A Critical Exposition of the Philosophy of Leibniz (1900) ; F. Schmoger, Leibniz in seiner Stellung zur tellurischen Physik (1901); A. Silberstein, Leibnizens Apriorismus in Verhaltnis zu seiner Metaphysik (1904); Stein, Leibniz und Spinoza (1890); F. Thilly, Leibnizens Streit gegen Locke in Ansehung der

angeborenen Ideen (1891); R. Urbach, Leibnizens Rechtfertigung des Uebels in der besten Welt (1901); W. Werckmeister, Der Leibnizsche Substanzbegriff (1899); F. G. F. Wernicke, Leibniz' Lehre von der Freiheit des menschlichen Willens (1890). (W. R. So.)

LEICESTER, EARLS OF. The first holder of this English earldom belonged to the family of Beaumont, although a certain Saxon named Edgar has been described as the 1st earl of Leicester.

Robert de Beaumont (d. 11 18) is frequently but erroneously considered to have received the earldom from Henry I., about 1 107; he had, however, some authority in the county of Leicester and his son Robert was undoubtedly earl of Leicester in 1131. The 3rd Beaumont earl, another Robert, was also steward of England, a dignity which was attached to the earldom of Leicester from this time until 1399. The earldom reverted to the crown when Robert de Beaumont, the 4th earl, died in January 1204.

In 1207 Simon IV., count of Montfort (q.v.), nephew and heir of Earl Robert, was confirmed in the possession of the earldom by King John, but it was forfeited when his son, the famous Simon de Montfort, was attainted and was killed at Evesham in August 1265. Henry III.'s son Edmund, earl of Lancaster, was also earl of Leicester and steward of England, obtaining these offices a few months after Earl Simon's death. Edmund's sons, Thomas and Henry, both earls of Lancaster, and his grandson Henry, duke of Lancaster, in turn held the earldom, which then passed to a son-in-law of Duke Henry, William V., count of Holland (c. 1327-1389), and then to another and more celebrated son-in-law, John of Gaunt, duke of Lancaster. When in 1399 Gaunt's son became king as Henry IV. the earldom was merged in the crown.

In 1564 Queen Elizabeth created her favourite, Lord Robert Dudley, earl of Leicester. The new earl was a son of John Dudley, duke of Northumberland; he left no children, or rather none of undoubted legitimacy, and when he died in September 1588 the title became extinct.

In 1618 the earldom of Leicester was revived in favour of Robert Sidney, Viscount Lisle, a nephew of the late earl and a brother of Sir Philip Sidney; it remained in this family until the death of Jocelyn (1682-1743), the 7th earl of this line, in July 1743. Jocelyn left no legitimate children, but a certain John Sidney claimed to be his son and consequently to be 8th earl of Leicester.

In 1744, the year after Jocelyn's death, Thomas Coke, Baron Lovel (c.

1695-1759), was made earl of Leicester, but the title became extinct on his death in April 1759. The next family to hold the earldom was that of Townshend, George Townshend (1755-1811) being created earl of Leicester in 1784. In 1807 George succeeded his father as 2nd marquess Townshend, and when his son George Ferrars Townshend, the 3rd marquess (1778-1855), died in December 1855 the earldom again became extinct. Before this date, however, another earldom of Leicester was in existence. This was created in 1837 in favour of Thomas William Coke, who had inherited the estates of his relative Thomas Coke, earl of Leicester. To distinguish his earldom from that held by the Townshends Coke was ennobled as earl of Leicester of Holkham; his son Thomas William Coke (1822- 1909) became 2nd earl of Leicester in 1842, and the latter's son Thomas William (b. 1848) became 3rd earl.

See G. E. C(okayne), Complete Peerage, vol. v. (1893). LEICESTER, ROBERT DUDLEY, Earl of (c. 1 531-1588). This favourite of Queen Elizabeth came of an ambitious family. They were not, indeed, such mere upstarts as their enemies loved to represent them; for Leicester's grandfather — the notorious Edmund Dudley who was one of the chief instruments of Henry VII. 's extortions — was descended from a younger branch of the barons of Dudley. But the love of power was a passion which seems to have increased in them with each succeed- ing generation, and though the grandfather was beheaded by Henry VIII. for his too devoted services in the preceding reign, the father grew powerful enough in the days of Edward VI. to trouble the succession to the crown. This was that John Dudley, duke of Northumberland, who contrived the marriage of Lady Jane Grey with his own son Guildford Dudley, and involved both her and her husband in a common ruin with himself. Robert Dudley, the subject of this article, was an elder brother of Guildford, and shared at that time in the misfortunes of the whole family. Having taken up arms with them against Queen Mary, he was sent to the Tower, and was sentenced to I death; but the queen not only pardoned and restored him to

liberty, but appointed him master of the ordnance. On the accession of Elizabeth he was also made master of the horse. He was then, perhaps, about seven-and-twenty, and was evidently rising rapidly in the queen's favour. At an early age he had been married to Amy, daughter of Sir John Robsart. The match had been arranged by his father, who was very studious to provide in this way for the future fortunes of his

children, and the wedding was graced by the presence of King Edward. But if it was not a love match, there seems to have been no positive estrangement between the couple. Amy visited her husband in the Tower during his imprisonment; but afterwards when, under the new queen, he was much at court, she lived a good deal apart from him. He visited her, however, at times, in different parts of the country, and his expenses show that he treated her liberally. In September 1560 she was staying at Cumnor Hall in Berkshire, the house of one Anthony Forster, when she met her death under circumstances which certainly aroused suspicions of foul play. It is quite clear that her death had been surmised some time before as a thing that would remove an obstacle to Dudley's marriage with the queen, with whom he stood in so high favour. We may take it, perhaps, from Venetian sources, that she was then in delicate health, while Spanish state papers show further that there were scandalous rumours of a design to, poison her; which were all the more propagated by malice after the event. The occurrence, however, was explained as owing to a fall down stairs in which she broke her neck; and the explanation seems perfectly adequate to account for all we know about it. Certain it is that Dudley continued to rise in the queen's favour. She made him a Knight of the Garter, and bestowed on him the castle of Kenilworth, the lordship of Denbigh and other lands of very great value in Warwickshire and in Wales. In September 1564 she created him baron of Denbigh, and immediately afterwards earl of Leicester. In the preceding month, when she visited Cambridge, she at his request addressed the university in Latin. The honours shown him excited jealousy, especially as it was well known that he entertained still more ambitious hopes, which the queen apparently did not altogether discourage. The earl of Sussex, in opposition to him, strongly favoured a match with the archduke Charles of Austria. The court was divided, and, while arguments were set forth on the one side against the queen's marrying a subject, the other party insisted strongly on the disadvantages of a foreign alliance. The queen, however, was so far from being foolishly in love with him that in 1564 she recommended him as a husband for Mary Queen of Scots. But this, it was believed, was only a blind, and it may be doubted how far the proposal was serious. After his creation as earl of Leicester great attention was paid to him both at home and abroad. The university of Oxford made him their chancellor, and Charles IX. of France sent him the order of St Michael. A few years later he formed an ambiguous connexion with the baroness dowager of Sheffield, which was maintained by the lady, if not with truth at least with great plausibility, to have been a valid marriage, though it was concealed from the queen. Her own subsequent conduct, however, went far to

discredit her statements; for she married again during Leicester's life, when he, too, had found a new conjugal partner. Long afterwards, in the days of James I., her son, Sir Robert Dudley, a man of extraordinary talents, sought to establish his legitimacy; but his suit was suddenly brought to a stop, the witnesses discredited and the documents connected with it sealed up by an order of the Star Chamber.

In 1575 Queen Elizabeth visited the earl at Kenilworth, where she was entertained for some days with great magnificence. The picturesque account of the event given by Sir Walter Scott has made every one familiar with the general character of the scene. Next year Walter, earl of Essex, died in Ireland, and Leicester's subsequent marriage with his widow again gave rise to very serious imputations against him. For report said that he had had two children by her during her husband's absence in Ireland, and, as the feud between the two earls was notorious, Leicester's many enemies easily suggested that he had poisoned his rival. This marriage, at all events, tended

to Leicester's discredit and was kept secret at first; but it was revealed to the queen in 1579 by Simier, an emissary of the duke of Alencon, to whose projected match with Elizabeth the earl seemed to be the principal obstacle. The queen showed great displeasure at the news, and had some thought, it is said, of committing Leicester to the Tower, but was dissuaded from doing so by his rival the earl of Sussex. He had not, indeed, favoured the Alencon marriage, but otherwise he had sought to promote a league with France against Spain. He and Bur- leigh had listened to proposals from France for the conquest and division of Flanders, and they were in the secret about the capture of Brill. When Alencon actually arrived, indeed, in August 1579, Dudley being in disgrace, showed himself for a time anti-French; but he soon returned to his former policy. He encouraged Drake's piratical expeditions against the Spaniards and had a share in the booty brought home. In February 1582 he, with a number of other noblemen and gentlemen, escorted the duke of Alencon on his return to Antwerp to be invested with the government of the Low Countries. In 1584 he in- augurated an association for the protection of Queen Elizabeth against conspirators. About this time there issued from the press the famous pamphlet, supposed to have been the work of Parsons the Jesuit, entitled Leicester's Commonwealth, which was intended to suggest that the English constitution was subverted and the government handed over to one who was at heart an atheist and a traitor, besides being a man of in- famous life and morals. The book was ordered to be suppressed by letters from the privy council, in which it was declared that the charges against the earl were to the

queen's certain knowledge untrue; nevertheless they produced a very strong impression, and were believed in by some who had no sympathy with Jesuits long after Leicester's death. In 1585 he "was ap- pointed commander of an expedition to the Low Countries in aid of the revolted provinces, and sailed with a fleet of fifty ships to Flushing, where he was received with great enthusiasm. In January following he was invested with the government of the provinces, but immediately received a strong reprimand from the queen for taking upon himself a function which she had not authorized. Both he and the states general were obliged to apologize; but the latter protested that they had no intention of giving him absolute control of their affairs, and that it would be extremely dangerous to them to revoke the appointment. Leicester accordingly was allowed to retain his dignity; but the incident was inauspicious, nor did affairs prosper greatly under his management. The most brilliant achievement of the war was the action at Zutphen, in which his nephew Sir Philip Sidney was slain. But complaints were made by the states general of the conduct of the whole campaign. He returned to England for a time, and went back in 1587, when he made an abortive effort to raise the siege of Sluys. Disagreements increasing between him and the states, he was recalled by the queen, from whom he met with a very good reception; and he continued in such favour that in the following summer (the year being that of the Armada, 1 588) he was appointed lieutenant- general of the army mustered at Tilbury to resist Spanish in- vasion. After the crisis was past he was returning homewards from the court to Kenilworth, when he was attacked by a sudden illness and died at his house at Cornbury in Oxfordshire, on the 4th September.

Such are the main facts of Leicester's life. Of his character it is more difficult to speak with confidence, but some features of it are indisputable. Being in person tall and remarkably handsome, he improved these advantages by a very ingratiating manner. A man of no small ability and still more ambition, he was nevertheless vain, and presumed at times upon his influence with the queen to a degree that brought upon him a sharp rebuff. Yet Elizabeth stood by him. That she was ever really in love with him, as modern writers have supposed, is extremely questionable; but she saw in him some valuable qualities which marked him as the fitting recipient of high favours. He was a man of princely tastes, especially in architec- ture. At court he became latterly the leader of the Puritan party.

and his letters were pervaded by expressions of religious feeling which it is hard to believe were insincere. Of the darker sus- picions against him it is enough to say that much was cer- tainly reported beyond the truth; but there remain some facts sufficiently disagreeable, and others, perhaps, sufficiently mys- terious, to make a just estimate of the man a rather perplexing problem.

No special biography of Leicester has yet been written except in biographical dictionaries and encyclopaedias. A general account of him will be found in the Memoirs of the Sidneys prefixed to Collins's Letters and Memorials of State; but the fullest yet published is Mr Sidney Lee's article in the Dictionary of National Biography (London, 1888) where the sources are given. Leicester's career has to be made out from documents and state papers, especially from the Hatfield MSS. and Major Hume's Calendar of documents from the Spanish archives bearing on the history of Queen Elizabeth. This last is the most recent source. Of others the principal are Digges's Compleat Ambassador (1655), John Nichols's Progresses of Queen Elizabeth and the Leycester Correspondence edited by J. Bruce for the Camden Society. The death of Dudley's first wife has been a fruitful source of literary controversy. The most recent addition to the evidences, which considerably alters their com- plexion, will be found in the English Historical Review, xiii. 83, giving the full text (in English) of De Quadra's letter of Sept. 11, 1560, on which so much has been built. (J. Ga.)

LEICESTER, ROBERT SIDNEY, Earl of (1563-1626), second son of Sir Henry Sidney (q.v.), was born on the 19th of November 1563, and was educated at Christ Church, Oxford, afterwards travelling on the Continent for some years between 1578 and 1583. In 1585 he was elected member of parliament for Glamorganshire; and in the same year he went with his elder brother Sir Philip Sidney (q.v.) to the Netherlands, where he served in the war against Spain under his uncle Robert Dudley, earl of Leicester.. He was present at the engagement where Sir Philip Sidney was mortally wounded, and remained with his brother till the latter's death in October 1586. After visiting Scotland on a diplomatic mission in 1588, and France on a similar errand in 1593, he returned to the Netherlands in 1 506, where he rendered distinguished service in the war for the next two years. He had been appointed governor of Flushing in 1588, and he spent much time there till 1603, when, on the accession of James I., he returned to England. James raised him at once to the peerage as Baron Sidney of Penshurst, and he was appointed chamberlain to the queen consort. In 1605 he was created Viscount Lisle, and in 1618 earl of Leicester, the latter title having become extinct in 1588 on the death of his uncle,

whose property he had inherited (see Leicester, Earls of). Leicester was a man of taste and a patron of literature, whose cultured mode of life at his country seat, Penshurst, was celebrated in verse by Ben Jonson. The earl died at Pens- hurst on the 13th of July 1626. He was twice married; first to Barbara, daughter of John Gamage, a Glamorganshire gentle- man; and secondly to Sarah, daughter of William Blount, and widow of Sir Thomas Smythe. By his first wife he had a large family. His eldest son having died unmarried in 1613, Robert, the second son (see below), succeeded to the earldom; one of his daughters married Sir John Hobart, ancestor of the earls of Buckinghamshire.

Robert Sidxey, 2nd earl of Leicester of the 1618 creation (1595-1677), was born on the 1st of December 1595, and was educated at Christ Church, Oxford; he was called to the bar in 16 1 8, having already served in the army in the Netherlands during his father's governorship of Flushing, and having entered parliament as member for Wilton in 1614. In 1616 he was given command of an English regiment in the Dutch service; and having succeeded his father as earl of Leicester in 1626, he was employed on diplomatic business in Denmark in 1632, and in France from 1636 to 1641. He was then appointed lord-lieuten- ant of Ireland in place of the earl of Strafford, but he waited in vain for instructions from the king, and in 1643 he was com- pelled to resign the office without having set foot in Ireland. He shared the literary and cultivated tastes of his family, without possessing the statesmanship of his uncle Sir Philip Sidney; his character was lacking in decision, and, as commonly befalls men of moderate views in times of acute party strife, he failed

to win the confidence of either of the opposing parties. His sincere protestantism offended Laud, without being sufficiently extreme to please the puritans of the parliamentary faction; his fidelity to the king restrained him from any act tainted with rebellion, while his dislike for arbitrary government pre- vented him giving whole-hearted support to Charles I. When, therefore, the king summoned him to Oxford in November 1642, Leicester's conduct bore the appearance of vacillation, and his loyalty of uncertainty. Accordingly, after his resignation of the lord-lieutenancy of Ireland at the end of 1643, he retired into private life. In 1649 the younger children of the king were for a time committed tc his care at Penshurst. He took no part in public affairs during the Commonwealth; and although at the Restoration he took his seat in the House of Lords and was sworn of the privy council, he continued to live for the most part in retirement at Penshurst, where he died on the 2nd of November 1677. Leicester married, in 1616, Dorothy, daughter of Henry Percy, 9th earl of

Northumberland, by whom he had fifteen children. Of his nine daughters, the eldest, Dorothy, the ” Sacharissa ” of the poet Waller, married Robert Spencer, 2nd earl of Sunderland; and Lucy married John Pelham, by whom she was the ancestress of the 18th-century statesmen, Henry Pelham, and Thomas Pelham, duke of Newcastle. Alger- non Sidney (q.v.), and Henry Sidney, earl of Romney (q.v.), were younger sons of the earl.

Leicester’s eldest son, Philip, 3rd earl (1619-1698), known for most of his life as Lord Lisle, took a somewhat prominent part during the civil war. Being sent to Ireland in 1642 in command of a regiment of horse, he became lieutenant-general under Ormonde; he strongly favoured the parliamentary cause, and in 1647 he was appointed lord-lieutenant of Ireland by the parliament. Named one of Charles I.‘s judges, he refused to take part in the trial; but he afterwards served in Cromwell’s Council of State, and sat in the Protector’s House of Lords. Lisle stood high in Cromwell’s favour, but nevertheless obtained a pardon at the Restoration. He carried on the Sidney family tradition by his patronage of men of letters; and, having suc- ceeded to the earldom on his father’s death in 1677, he died in 1698, and was succeeded in the peerage by his son Robert, 4th earl of Leicester (1649-1702), whose mother was Catherine, daughter of William Cecil, 2nd earl of Salisbury.

See Sydney Papers, edited by A. Collins (2 vols., London, 1746); Sydney Papers, edited by R. W. Blencowe (London, 1825) con- taining the 2nd earl of Leicester’s journal; Lord Clarendon History of the Rebellion and Civil Wars in England (8 vols, Oxford, 1826); S. R. Gardiner, History of the Great Civil War (3 vols., London, 1 886-1891). (R. J. M.)

LEICESTER, THOMAS WILLIAM COKE, Earl or (1754- 1842), English agriculturist, known as Coke of Norfolk, was the eldest son of Wenman Roberts, who assumed the name of Coke in 1750. In 1759 Wenman Coke’s maternal uncle Thomas Coke, earl of Leicester, died leaving him his estates, subject, however, to the life-interest of his widow, Margaret, Baroness de Clifford in her own right. This lady’s death in 1775 was followed by that of Wenman Coke in 1776, when the latter’s son, Thomas William, born on the 6th of May 1754, succeeded to his father’s estates at Holkham and elsewhere. From 1776 to 1784, from 1790 to 1806, and again from 1807 to 1832 Coke was member of parliament for Norfolk; he was a friend and supporter of Charles James Fox and a sturdy and aggressive Whig, acting upon the maxim taught him by his father ” never to trust a Tory.” Coke’s chief interests, however, were in the country, and his fame is that of

an agriculturist. His land around Holkham in Norfolk was poor and neglected, but he introduced many improvements, obtained the best expert advice, and in a few years wheat was grown upon his farms, and the breed of cattle, sheep and pigs greatly improved. It has been said that ” his practice is really the basis of every treatise on modern agriculture.” Under his direction the rental of the Holkham estate is said to have increased from £2200 to over £20,000 a year. In 1837 Coke was created earl of Leicester of Holkham. Leicester, who was a strong and handsome man and a fine sportsman, died at Longford Hall in Derbyshire on

the 30th of June 1842. He was twice married, and Thomas William, his son by his second marriage, succeeded to his earldom.

See A. M. W. Stirling, Coke of Norfolk and his Friends (1907).

LEICESTER, a municipal county and parliamentary borough, and the county town of Leicestershire, England; on the river Soar, a southern tributary of the Trent. Pop. (1891) 174,624, (1901) 211,579. It is 99 m. N.N.W. from London by the Midland railway, and is served by the Great Central and branches of the Great Northern and London and North-Western railways, and by the Leicester canal.

This was the Roman Ratae {Ratae Coritanorum), and Roman remains of high interest are preserved. They include a portion of Roman masonry known as the Jewry Wall; several pavements have been unearthed; and in the museum, among other remains, is a milestone from the Fosse Way, marking a distance of 2 m. from Ratae. St Nicholas church is a good example of early Norman work, in the building of which Roman bricks are used. St Mary de Castro church, with Norman remains, including sedilia, shows rich Early English work in the tower and elsewhere, and has a Decorated spire and later additions. All Saints church has Norman remains. St Martin’s is mainly Early English, a fine cruciform structure. St Margaret’s, with Early English nave, has extensive additions of beautiful Perpendicular workmanship. North of the town are slight remains of an abbey of Black Canons founded in 1143. There are a number of modern churches. Of the Castle there are parts of the Norman hall, modernized, two gateways and other remains, together with the artificial Mount on which the keep stood. The following public buildings and institutions may be mentioned — municipal buildings (1876), old town hall,

formerly the gild-hall of Corpus Christi; market house, free library, opera house and other theatres and museum. The free library has several branches; there are also a valuable old library founded in the 17th century, a permanent library and a literary and philosophical society. Among several hospitals are Trinity hospital, founded in 133 1 by Henry Plantagenet,earl of Lancaster and of Leicester, and Wyggeston's hospital (1513). The Wyggeston schools and Queen Elizabeth's grammar school are amalgamated, and include high schools for boys and girls; there are also Newton's greencoat school for boys, and municipal technical and art schools. A memorial clock tower was erected in 1868 to Simon de Montfort and other historical figures connected with the town. The Abbey Park is a beautiful pleasure ground; there are also Victoria Park, St Margaret's Pasture and other grounds. The staple trade is hosiery, an old-established industry; there are also manufactures of elastic webbing, cotton and lace, iron-works, maltings and brick-works. Leicester became a county borough in 1888. and the bounds were extended and constituted one civil parish in 1892. It is a suffragan bishopric in the diocese of Peterborough. The parliamentary borough returns two members. Area, 8586 acres.

The Romano-British town of Ratae Coritanorum, on the Fosse Way, was a municipality in a.d. 120-121. Its importance, both commercial and military, was considerable, as is attested by the many remains found here. Leicester (Ledecestre, Lege- cestria, Leyrcestria) was called a " burh " in 918, and a city in Domesday. Until 874 it was the seat of a bishopric. In 1086 both the king and 'Hugh de Grantmesnil had much land in Leicester; by 1101 the latter's share had passed to Robert of Meulan, to whom the rest of the town belonged before his death. Leicester thus became the largest mesne borough. Between 1103 and 11 18 Robert granted his first charter to the burgesses, confirming their merchant gild. The portmanmote was confirmed by his son. In the 13th century the town developed its own form of government by a mayor and 24 jurats. In 1464 Edward IV. made the mayor and 4 of the council justices of the peace. In 1489 Henry VII. added 48 burgesses to the council for certain purposes, and made it a close body; he granted another charter in 1505. In 1589 Elizabeth incorporated the town, and gave another charter in 1599. James I. granted charters in 1605 and 1610; and Charles I. in 1630. In 1684 the charters

were surrendered; a new one granted by James II. was rescinded by proclamation in 1688.

Leicester has been represented in parliament by two members since

1295. It has had a prescriptive market since the 13th century, now held on Wednesday and Saturday. Before 1228- 1229 the burgesses had a fair from July 31 to August 14; changes were made in its date, which was fixed in 1360 at September 26 to October 2. It is now held on the second Thursday in October and three following days. In 1473 another fair was granted on April 27 to May 4. It is now held on the second Thursday in May and the three following days. Henry VIII. granted two three-day fairs beginning on December 8 and June 26; the first is now held on the second Friday in December; the second was held in 1888 on the last Tuesday in June. In 1307 Edward III. granted a fair for seventeen days after the feast of the Holy Trinity. This would fall in May or June, and may have merged in other fairs. In 1794 the corporation sanctioned fairs on January 4, June 1, August 1, September 13 and November 2. Other fairs are now held on the second Fridays in March and July and the Saturdays next before Easter and in Easter week. Leicester has been a centre for brewing and the manufacture of woollen goods since the 13th century. Knitting frames for hosiery were introduced about 1680. Boot manufacture became important in the 19th century.

See Victoria County History, Leicester; M. Bateson, Records of Borough of Leicester (Cambridge, 1899).

LEICESTERSHIRE, a midland county of England, bounded N. by Nottinghamshire, E. by Lincolnshire and Rutland, S.E. by Northamptonshire, S.W. by Warwickshire, and N.W. by Derby- shire, also touching Staffordshire on the W. The area is 823-6 sq. m. The surface of the county is an undulating tableland, the highest eminences being the rugged hills of Charnwood Forest (q.v.) in the north-west, one of which, Bardon Hill, has an elevation of 912 ft. The county belongs chiefly to the basin of the Trent, which forms for a short distance its boundary with Derbyshire. The principal tributary of the Trent in Leicester- shire is the Soar, from whose old designation the Leire the county is said to derive its name, and which rises, near Hinckley in the S.E., and forms the boundary with Nottinghamshire for some distance above its junction with the Trent. The Wreak, which, under the name of the Eye, rises on the borders of Rutland, flows S.W. to the Soar. Besides the Soar the other tributaries of the Trent are the Anker, touching the boundary with Warwickshire, the Devon and the Mease. A portion of the county in the S. drains to the Avon, which forms part of the boundary with Northamptonshire, and receives the Swift. The Welland forms for some distance the boundary with Northamptonshire.

Geology. — The oldest rocks in the county belong to the Charnian

System, a Pre-Cambrian series of volcanic ashes, grits and slates, into which porphyroid and syenite were afterwards intruded. These rocks emerge from the plain formed by the Keuper Marls of the Triassic System as a group of isolated hills and peaks (known as Charnwood Forest) ; these are the tops of an old mountain-range, the lower slopes of which are still buried under the surrounding Keuper Marls. West of this district lies the Leicestershire coalfield, where the poor state of development of the Carboniferous Limestone shows that the Charnian rocks formed shoals or islands in the Car- boniferous Limestone sea. The Millstone Grit just enters the county to the north of the same region, while the Coal Measures occupy a considerable area round Ashby-de-la-Zouch and contain valuable coal-seams. The rest of the county is almost equally divided between the red Keuper Marls of the Trias on the west and the grey limestones and shales of the Lias on the east. The former were deposited in lagoons into which the land was gradually lowered after a prolonged period of desert conditions. The Rhaetic beds which follow the Keuper mark the incoming of the sea and introduce the fossiliferous Liassic deposits. On the eastern margin of the county a few small outliers of the Inferior Oolite sands and limestones are present. The Glacial Period has left boulder-clay, gravel and erratic blocks scattered over the surface, while later gravels, with remains of mammoth, reindeer, &c, border some of the present streams.

Slates, honestones, setts and roadstone from the Charnian rocks, limestone and cement from the Carboniferous and Lias, and coal from the Coal Measures are the chief mineral products.

Agriculture. — The climate is mild, and, on account of the inland position of the county, and the absence of any very high elevations, + he rainfall is very moderate. The soil is of a loamy character, the

richest district being that east of the Soar, which is occupied by pasture, while the corn crops are grown chiefly on a lighter soil resting above the Red Sandstone formation. About nine-tenths of the total area is under cultivation. The proportion of pasture land is large and increasing. It is especially rich along the river- banks. Dairy-farming is extensively carried on, the famous Stilton cheese being produced near Melton Mowbray. Cattle are reared in large numbers, while of sheep the New Leicester breed is well known. It was introduced by Robert Bakewell the agriculturist, who was born near

Loughborough in 1725. He also improved the breed of horses by the importation of mares from Flanders.

The county is especially famed for fox-hunting, Leicester and Melton Mowbray being favourite centres, while the kennels of the Quorn hunt are located at Quorndon near Mount Sorrel. For this reason Leicestershire is rich in good riding horses.

Other Industries. — Coal is worked in the districts about Moira, Colcorton and Coalville. Limestone is worked in various parts, freestone is plentiful, gypsum is found, and a kind of granite, extensively used for paving, is obtained in the Charnwood district, as at Bardon and Mount Sorrelˆ and at Sapcote and Stoney Stanton in the south-west. Apart from the mining industries, the staple manufacture of Leicestershire is hosiery, for which the wool is obtained principally from home-bred sheep. Its principal seats are Leicester, Loughborough, Hinckley and Castle Donington. Cotton hose are likewise made, and other industries include the manufacture of boots and shoes, as at Market Harborough, elastic webbing, and bricks, also iron founding. Melton Mowbray gives name to a well- known manufacture of pork pies.

Communications. — The main line of the Midland railway serves Market Harborough, Leicester, and Loughborough, having, an important junction at Trent (on that river) for Derby and Nottingham. Branches radiate from Leicester to Melton Mowbray, to Coalville, Ashby-de-la-Zouch, Moira and Burton-upon-Trent, with others through the mining district of the N.W., which is also served by the branch of the London & North- Western railway from Nuneaton to Market Bosworth, Coalville and Loughborough. This company serves Market Harborough from Rugby, and branches of the Great Northern serve Market Harborough, Leicester and Melton Mowbray. The main line of the Great Central railway passes through Lutterworth, Leicester and Loughborough. The principal canals are the Union and Grand Union, with which various branches are connected with the Grand Junction, and the Ashby-de-la-Zouch canal, which joins the Coventry canal at Nuneaton. The Lough- borough canal serves that town, connecting with the river Soar.

Population and Administration. — The area of the ancient county is 527,123 acres; pop. (1891) 373,584, (i9°G 434,019. The area of the administrative county is 532,788 acres. The county con- tains six hundreds. The municipal boroughs are: Leicester, the county town and a county borough (pop. 211,579), Loughborough (21,508). The urban districts are: Ashby-de-la-Zouch (4726),Ashby Woulds (2799),

Coalville (15,281), Hinckley (11,304), Market Har- borough (7735), Melton Mowbray (7454), Quorndon (2173), Shepshed (5293), Thurmaston (1732), YVigston Magna (8404). The county is in the Midland circuit, has one court of quarter sessions, and is divided into 9 petty sessional divisions. The county borough of Leicester has a separate court of quarter sessions and a separate commission of the peace. There are 327 civil parishes. The county is divided into four parliamentary divisions (Eastern or Melton, Mid or Loughborough, Western or Bosworth, Southern or Har- borough), each returning one member; and the parliamentary borough of Leicester returns 2 members. The county is in the diocese of Peterborough, with the exception of small parts in those of Southwell and Worcester; and contains 255 ecclesiastical parishes or districts, wholly or in part.

History. — The district which is now Leicestershire was reached in the 6th century by Anglian invaders who, making their way across the Trent, penetrated Charnwood Forest as far as Leicester, the fall of which may be dated at about 556. In 679 the district formed the kingdom of the Middle Angles within the kingdom of Mercia, and on the subdivision of the Mercian see in that year was formed into a separate bishopric having its see at Leicester. In the qth century the district was subjugated by the Danes, and Leicester became one of the five Danish boroughs. It was re- covered by /Ethelflaed in 918, but the Northmen regained their supremacy shortly after, and the prevalence of Scandinavian place-names in the county bears evidence of the extent of their settlement.

Leicestershire probably originated as a shire in the 10th century, and at the time of the Domesday Survey was divided into the four wapentakes of Guthlaxton, Framland, Goscote and Gartree. The Leicestershire Survey of the 12th century shows an additional grouping of the vills into small local hundreds, manorial rather than administrative divisions, which have completely disappeared. In the reign of Edward I. the divisions appear as hundreds, and

in the reign of Edward III. the additional hundred of Sparkenhoe was formed out of Guthlaxton. Before the 17th century Goscote was divided into East and West Goscote, and since then the hundreds have undergone little change. Until 1566 Leicester- shire and Warwickshire had a common sheriff, the shire-court for the former being held at Leicester.

Leicestershire constituted an archdeaconry within the diocese of Lincoln from 1092 until its transference to Peterborough in 1837. In 1 29 1 it comprised the deaneries of Akeley, Leicester (now

Christianity), Framland, Gartree, Goscote, Guthlaxton and Sparkenhoe. The deaneries remained unaltered until 1865, Since 1894 they have been as follows: East, South and W r est Akeley, Christianity, Framland (3 portions), Sparkenhoe (2 portions), Gartree (3 portions), Goscote (2 portions), Guthlaxton (3 portions).

Among the earliest historical events connected with the county were the siege and capture of Leicester by Henry II. in 1 1 73 on the rebellion of the earl of Leicester; the surrender of Leicester to Prince Edward in 1264; and the parliament held at Leicester in 1414. During the Wars of the Roses Leicester was a great Lancastrian stronghold. In 1485 the battle of Bosworth was fought in the county. In the Civil War of the 17 th century the greater part of the county favoured the parliament, though the mayor and some members of the corporation of Leicester sided with the king, and in 1642 the citizens of Leicester on a summons from Prince Rupert lent Charles £500. In 1645 Leicester was twice captured by the Royalist forces.

Before the Conquest large estates in Leicestershire were held by Earls Ralf, Morcar, Waltheof and Harold, but the Domesday Survey of 1086 reveals an almost total displacement of English by Norman landholders, only a few estates being retained by Englishmen as under-tenants. The first lay-tenant mentioned in the survey is Robert, count of Meulan, ancestor of the Beau- mont family and afterwards earl of Leicester, to whose fief was afterwards annexed the vast holding of Hugh de Grantmesnil, lord high steward of England. Robert de Toeni, another Domes- day tenant, founded Belvoir Castle and Priory. The fief of Robert de Buci was bestowed on Richard Basset, founder of Laund Abbey, in the reign of Henry I. Loughborough was an ancient seat of the Despenser family, and Brookesby was the seat of the Villiers and the birthplace of George Villiers, the famous duke of Buckingham. Melton Mowbray was named from its former lords, the Mowbrays, descendants of Nigel de Albini, the founder of Axholme Priory. Lady Jane Grey was born at Bradgate near- Leicester, and Bishop Latimer was born at Thurcaston.

The woollen industry flourished in Leicestershire in Norman times, and in 1343 Leicestershire wool was rated at a higher value than that of most other counties. Coal was worked at Coleorton in the early 15th century and at Measham in the 17th century. The famous blue slate of Swithland has been quarried from time immemorial, and the limestone quarry at Barrow-on- Soar is also of very ancient repute, the monks of the abbey of St Mary de Pre formerly enjoying the tithe of its produce. The staple manufacture of the county, that of hosiery, originated in the 17th century, the chief centres being Leicester,

Hinckley and Loughborough, and before the development of steam-driven frames in the 19th century hand framework knitting of hose and gloves was carried on in about a hundred villages. Wool- carding was also an extensive industry before 1840.

In 1290 Leicestershire returned two members to parliament, and in 1295 Leicester was also represented by two members. Under the Reform Act of 1832 the county returned four members in two divisions until the Redistribution of Seats Act of 1885, under which it returned four members in four divisions.

Antiquities. — Remains of monastic foundations are slight, though there were a considerable number of these. There are traces of Leicester Abbey and of Gracedieu near Coalville, while at Ulvers- croft in Charnwood, where there was an Augustinian priory of the 1 2th century, there are fine Decorated remains, including a tower. The most noteworthy churches are found in the towns, as at Ashby- de-la-Zouch, Hinckley, Leicester, Loughborough, Lutterworth, I Market Bosworth, Market Harborough, and Melton Mowbray

(qq.v.). The principal old castle “is that of Ashby-de-la-Zouch, while at Kirby Muxloe there is a picturesque fortified mansion of Tudor date. There are several good Elizabethan mansions, as that at Laund in the E. of the county. Among modern mansions that of the dukes of Rutland, Belvoir Castle in the extreme N.E., is a massive mansion of the early 19th century, finely placed on the summit of a hill.

See Victoria County History, Leicestershire; W. Burton, Descrip- tion of Leicestershire (London, 1622; 2nd ed., Lynn, 1777); John Nicholls, History and Antiquities 0} tlie County of Leicester (4 vols., London, 1 795—181 5) ; John Curtis, A Topographical History of the County of Leicester (Ashby-de-la-Zouch, 1831).

LEIDEN or Leyden, a city in the province of South Holland, the kingdom of the Netherlands, on the Old Rhine, and a junction station 18 m. by rail S.S.W. of Haarlem. It is connected by steam tramway with Haarlem and The Hague respectively, and with the seaside resorts of Katwyk and Noordwyk. There is also regular steamboat connexion with Katwyk, Noordwyk, Amster- dam and Gouda. The population of Leiden which, it is estimated, reached 100,000 in 1640, had sunk to 30,000 between 1796 and 181 1, and in 1904 was

56,044. The two branches of the Rhine which enter Leiden on the east unite in the centre of the town, which is further intersected by numerous small and sombre canals, with tree-bordered quays and old houses. On the south side of the town pleasant gardens extend along the old Singel, or outer canal, and there is a large open space, the Van der Werf Park, named after the burgomaster, Pieter Andriaanszoon van der Werf, who defended the town against the Spaniards in 1574. This open space was formed by the accidental explosion of a powdershipin 1807, hundreds of houses being demolished, includ- ing that of the Elzevir family of printers. At the junction of the two arms of the Rhine stands the old castle (De Burcht), a circular tower built on an earthen mound. Its origin is unknown, but some connect it with Roman days and others with the Saxon Hengist. Of Leiden's old gateways only two — both dating from the end of the 17th century — are standing. Of the numerous churches the chief are the Hooglandsche Kerk, or the church of St Pancras, built in the 15th century and restored in 1885- 1902, containing the monument of Pieter Andriaanszoon van der Werf, and the Pieterskerk (1315) with monuments to Scaliger, Boerhaave and other famous scholars. The most interesting buildings are the town hall (Stadhuis), a fine example of 16th- century Dutch building; the Gemeenlandshuis van Rynland (1596, restored 1878); the weight-house built by Pieter Post (1658); the former court-house, now a military storehouse; and the ancient gymnasium (1599) and the so-called city timber- house (Stads Timmerhuis) (161 2), both built by Lieven de Key (c. 1560-1627).

In spite of a certain industrial activity and the periodical bustle of its cattle and dairy markets, Leiden remains essentially an academic city. The university is a flourishing institution. It was founded by William of Orange in 1575 as a reward for the heroic defence of the previous year, the tradition being that the citizens were offered the choice between a university and a certain exemption from taxes. Originally located in the convent of St Barbara, the university was removed in 1581 to the convent of the White Nuns, the site of which it still occupies, though that building was destroyed in 1616. The presence within half a century of the date of its foundation of such scholars as Justus Lipsius, Joseph Scaliger, Francis Gomarus, Hugo Grotius, Jacobus Arminius, Daniel Heinsius and Guardas Johannes Yossius, at once raised Leiden university to the highest European fame, a position which the learning and reputation of Jacobus Gronovius, Hermann Boerhaave, Tiberius Hemsterhuis and David Ruhnken, among others, enabled it to maintain down to the end of the 18th century. The portraits of many famous professors since the, earliest days hang in the university aula, one of the most memorable places, as Niebuhr

called it, in the history of science. The university library contains upwards of 190,000 volumes and 6000 MSS. and pamphlet portfolios, and is very rich in Oriental and Greek MSS. and old Dutch travels. Among the institutions connected with the university are the national institution for East Indian languages, ethnology and geography; the fine botanical gardens, founded in 1587; the observatory

(i860); the natural history museum, with a very complete anatomical cabinet; the museum of antiquities (Museum van Oudheden), with specially valuable Egyptian and Indian depart- ments; a museum of Dutch antiquities from the earliest times; and three ethnographical museums, of which the nucleus was P. F. von Siebold's Japanese collections. The anatomical and pathological laboratories of the university are modern, and the museums of geology and mineralogy have been restored. The university has now five faculties, of which those of law and medicine are the most celebrated, and is attended by about 1200 students.

The municipal museum, founded in 1869 and located in the old cloth-hall (Laeckenhalle) (1640), contains a varied collection of antiquities connected with Leiden, as well as some paintings including works by the elder van Swanenburgh, Cornelius Engel- brechtszoon, Lucas van Leiden and Jan Steen, who were all natives of Leiden. Jan van Goyen, Gabriel Metsu, Gerard Dou and Rembrandt were also natives of this town. There is also a small collection of paintings in the Meermansburg. The Thysian library occupies an old Renaissance building of the year 1655, and is especially rich in legal works and native chronicles. Noteworthy also are the collection of the Society of Dutch Literature (1766); the collections of casts and of engravings; the seamen's training school; the Remonstrant seminary, transferred hither from Amsterdam in "1873; the two hospitals (one of which is private); the house of correction; and the court-house.

Leiden is an ancient town, although it is not the Lugdunum Batavorum of the Romans. Its early name was Leithen, and it was governed until 1420 by burgraves, the representatives of the courts of Holland. The most celebrated event in its history is its siege by the Spaniards in 1574. Besieged from May until October, it was at length relieved by the cutting of the dikes, thus enabling ships to carry provisions to the inhabitants of the flooded town. The weaving establishments (mainly broadcloth) of Leiden at the close of the 15th century were very important, and after the expulsion of the Spaniards Leiden cloth, Leiden baize and Leiden camlet were familiar terms. These industries afterwards declined, and in the beginning of the 19th century the baize manufacture was altogether given up. Linen and woollen

manufactures are now the most important industries, while there is a considerable transit trade in butter and cheese.

Katwyk, or Katwijk, 6 m. N.W. of Leiden, is a popular seaside resort and fishing village. Close by are the great locks constructed in 1807 by the engineer, F. W. Conrad (d. 1808), through which the Rhine (here called the Katwyk canal) is admitted into the sea at low tide. The shore and the entrance to the canal are strengthened by huge dikes. In 1520 an ancient Roman camp known as the Britten- burg was discovered here. It was square in shape, each side measur- ing 82 yds., and the remains stood about 10 ft. high. By the middle of the 1 8th century it had been destroyed and covered by the sea.

See P. J. Blok, Eine hollandsche stad in de middeleeuwen (T"he Hague, 1883); and for the siege see J. L. Motley, The Rise of the Dutch Republic (1896).

LEIDY, JOSEPH (1823-1891), American naturalist and palaeontologist, was born in Philadelphia on the 9th of September 1823. He studied mineralogy and botany without an instructor, and graduated in medicine at the university of Pennsylvania in 1844. Continuing his work in anatomy and physiology, he visited Europe in 1848, but both before and after this period of foreign study lectured and taught in American medical colleges. In 1853 he was appointed professor of anatomy in the university of Pennsylvania, paying special attention to comparative anatomy. In 1884 he promoted the establishment in the same institution of the department of biology, of which he became director, and meanwhile taught natural history in Swarthmore College, near Philadelphia. His papers on biology and palae- ontology were very numerous, covering both fauna and flora, and ranging from microscopic forms of animal life to the higher vertebrates. He wrote also occasional papers on minerals. He was an active member of the Boston Society of Natural History and of the American Philosophical Society; and was the recipient of various American and foreign degrees and honours. His Cretaceous Reptiles of the United States (1865) and Contributions to the Extinct Vertebrate Fauna of the Western Territories (1873) were the most important of his larger works; the best known and most widely circulated was an Elementary Treatise on Human

Anatomy (i860, afterwards revised in new editions). He died in

Philadelphia on the 30th of April 1891.

See Memoir and portrait in Amer. Geologist, vol. ix. (Jan. 1892) and Bibliography in vol. viii. (Nov. 1891) and Memoir by H. C. Chapman in Proc. Acad. Nat. Sc. (Philadelphia, 1891), p. 342.

LEIF ERICSSON [Leifr Eiriksson] (fl. 999-1000), Scandi- navian explorer, of Icelandic family, the first known European discoverer of ” Vinland,” ” Vineland ” or ” Wineland, the Good,” in North America. He was a son of Eric the Red (Eirikr hinn raudi Thorvaldsson), the founder of the earliest Scandinavian settlements — from Iceland — in Greenland (985). In 999 he went from Greenland to the court of King Olaf Tryggvason in Norway, stopping in the Hebrides on the way. On his departure from Norway in 1000, the king commissioned him to proclaim Christianity in Greenland. As on his outward voyage, Leif was again driven far out of his course by contrary weather — this time to lands (in America) ” of which he had previously had no knowledge,” where ” self-sown ” wheat grew, and vines, and ” mosur ” (maple?) wood. Leif took specimens of all these, and sailing away came home safely to his father’s home in Brattahlid on Ericsfiord in Greenland. On his voyage from this Vineland to Greenland, Leif rescued some shipwrecked men, and from this, and his discoveries, gained his name of ” The Lucky ” (hinn heppni). On the subsequent expedition of Thorfinn Karlsefni for the further exploration and settlement of the Far Western vine-country, it is recorded that certain Gaels, incredibly fleet of foot, who had been given to Leif by Olaf Tryggvason, and whom Leif had offered to Thorfinn, were put on shore to scout.

Such is the account of the Saga of Eric the Red, supported by a number of briefer references in early Icelandic and other literature. The less trustworthy history of the Flatey Book makes Biarni Heriulfsson in 985 discover Helluland (Labrador?) as well as other western lands which he does not explore, not even permitting his’ men to land; while Leif Ericsson follows up Biarni’s discoveries, begins the exploration of Helluland, Markland and Vinland, and realizes some of the charms of the last named, where he winters. But this secondary authority (the Flatey Book narrative), which till lately formed the basis of all general knowledge as to Vinland, abounds in contradictions and difficulties from which Eric the Red Saga is comparatively free. Thus (in Flatey) the grapes of Vinland are found in winter and gathered in spring; the man who first finds them, Leif’s foster-father Tyrkerthe German, gets drunk from eating the fruit; and the vines themselves are spoken of as big trees afford- ing timber. Looking at the record in Eric the Red Saga, it would seem probable

that Leif's Vinland answers to some part of southern Nova Scotia. See Vinland. (As to Helluland and Markland see Thorfinn Karlsefni.)

The MSS. of Eric the Red's Saga are Nos. 544 and 557 of the Arne-Magnaean collection in Copenhagen; the MS. of the Flatey Book, so called because it was long the property of a family living on Flat Island in Broad Firth (Flatey in BreiSafjord [B-eidafj-d]), on the north-west coast of Iceland, was presented in 1662 to the Royal Lib- rary of Denmark, of which it is still one of the chief treasures. These leading narratives are supplemented by Adam of Bremen, Gesta Hammaburgensis ecclesiae pontificum, chap. 38 (247 Lappenberg) of book iv. (often separately entitled Descriptio Insularum Aquilonis; Adam's is the earliest extant reference to Vinland, c. 1070): we have also notices of Vinland in the Libellus Islandorum of Ari Frodi (r. 1 120), the oldest Icelandic historian; in the Kristni Saga (re- peated in Snorri Sturlason's Heimskringla) ; in Eyrbyggia Saga (c. 1250); in Gretti Saga (c. 1290); and in an Icelandic chorography of the 14th century, or earlier, partly derived from the famous traveller Abbot Xicolas of Thing-eyrar (t 1 1 59)-

See Gustav Storm, " Studies on the Vineland Voyages," in the Memoires de la Societe royale des Antiquaires du Nord (Copenhagen, 1888); and Eiriks Saga Raudha (Copenhagen, 1891); A. M. Reeves, Finding of Wineland the Good: the History of the Icelandic Discovery of America (London, 1890); in this work the original authorities are given in full, with photographic facsimiles, English translations and adequate commentary; Rafn's Antiquitates Americanae (Copenhagen, 1837) contains all the sources, but the editor's personal views have in many cases failed to satisfy criticism; the Flatey text is printed also by Vigfusson and Unger in Flateyjar-hok, vol. i. (Christiania, i860). There are also translations of Flatey and Red Eric Saga in Beamish, Discovery of North America.by the Northmen (Lond., 1841); E. F. Slafter, Voyages of the Northmen (Boston, 1877);

B. F. de Costa, Pre-Columbian Discovery of America by the Northmen (Albany, 1901); and Original Narratives of Early American History; The Northmen, Columbus and Cabot, pp. 1-66 (New York, 1906). See also C. Raymond Beazley, Dawn of Modern Geography ii. 48-83 (London, 1901); Josef Fischer, Die Entdeckungen der Norˆ mannen in Amerika (Freiburg i. B., 1902); John Fiske, Discovery of America, vol. i. ; Juul Dieserud, " Norse Discoveries in America," in the Bulletin of the American Geographical Society (February, 1901) ; G. Vigfusson, Origines Islandicae (1905), which strangely expresses a preference for the Flatey Book " account of the first sighting of the American continent " by the Norsemen. (C. R. B.)

LEIGH, EDWARD (1602-1671), English Puritan and theo- logian, was born at Shawell, Leicestershire. He was educated at Magdalen Hall, Oxford, from 1616, and subsequently became a member of the Middle Temple. In 1636 he entered parliament as member for Stafford, and during the Civil War held a colonelcy in the parliamentary army. He has sometimes been confounded with John Ley (1583-1662), and so represented as having sat in the Westminster Assembly. The public career of Leigh ter- minated with his expulsion from parliament with the rest of the Presbyterian party in 1648. From an early age he had studied theology and produced numerous compilations, the most important being the Critica Sacra, containing Observations on all the Radices of the Hebrew Words of the Old and the Greek of the New Testament (1639-1644; new ed., with supplement, 1662), for which the author received the thanks of the Westminster Assembly, to whom it was dedicated. His other works include Select and Choice Observations concerning the First Twelve Caesars (I0 35)j A Treatise of Divinity (1646-165 1); Annotations upon the New Testament (1650), of which a Latin translation by Arnold was published at Leipzig in 1732; A Body of Divinity (1654); A Treatise of Religion and Learning (1656); Annotations of the Five Poetical Books of the Old Testament (1657). Leigh died in Staffordshire in June 1671.

LEIGH, a market town and municipal borough in the Leigh parliamentary division of Lancashire, England, 11 m. W. by N. from Manchester by the London & North-Western railway. Pop. (1891) 30,882, (1901) 40,001. The ancient parish church of St Mary the Virgin was, with the exception of the tower, rebuilt in 1873 in the Perpendicular style. The grammar school, the date of whose foundation is unknown, received its principal endowments in 1655, 1662 and 1681. The staple manufactures are silk and cotton; there are also glass works, foundries, breweries, and flour mills, with extensive collieries. Though the neighbourhood is principally an industrial district, several fine old houses are left near Leigh. The town was incorporated in 1899, and the corporation consists of a mayor, 8 aldermen and 24 councillors. Area, 6358 acres.

LEIGHTON, FREDERICK LEIGHTON, Baron (1830-1896), English painter and sculptor, the son of a physician, was born at Scarborough on the 3rd of December 1830. His grandfather, Sir James Leighton, also a physician, was long resident at the court of St Petersburg. Frederick Leighton was taken abroad at a very early age. In 1840 he learnt drawing at Rome under Signor Meli. The family moved to Dresden and Berlin, where he attended classes at the Academy. In 1843 he was sent to school at Frankfor', and in the winter of 1844 accompanied his family to Florence, where his future career as an

artist was decided. There he studied under Bezzuoli and Segnolini at the Accademia delle Belle Arti, and attended anatomy classes under Zanetti; but he soon returned to complete his general education at Frank- fort, receiving no further direct instruction in art for five years. He went t«> Brussels in 1848, where he met Wiertz and Gallait, and painted some pictures, including ” Cimabue finding Giotto,” and a portrait of himself. In 1849 he studied for a few months in Paris, where he copied Titian and Correggiq in the Louvre, and then returned to Frankfort, where he settled down to serious art work under Edward Steinle, whose pupil he declared he was ” in the fullest sense of the term.” Though his artistic training was mainly German, and his master belonged to the same school as Cornelius and Overbeck, he loved Italian art and Italy and the first picture by which he became known to the British public was ” C imabue’s Madonna carried in Procession through the

Streets of Florence,” which appeared at the Royal Academy in 1855. At this time the works of the Pre-Raphaelites almost absorbed public interest in art — it was the year of Holman Hunt’s ” Light of the World,” and the ” Rescue,” by Millais. Yet Leighton’s picture, painted in quite a different style, created a sensation, and was purchased by Queen Victoria. Although, since his infancy, he had only visited England once(in 1851, when he came to see the Great Exhibition), he was not quite unknown in the cultured and artistic world of London, as he had made many friends during a residence in Rome of some two years or more after he left Frankfort in 1852. Amongst these were Giovanni Costa, Robert Browning, James Knowles, George Mason and Sir Edward Poynter, then a youth, whom he allowed to work in his studio. He also met Thackeray, who wrote from Rome to the young Millais: ” Here is a versatile young dog, who will run you close for the presidentship one of these days.” During these years he painted several Florentine subjects — “Tybalt and Romeo,” ” The Death of Brunelleschi,” a cartoon of ” The Pest in Florence according to Boccaccio,” and ” The Reconciliation of the Montagues and the Capulets.” He now turned his attention to themes of classic legend, which at first he treated in a ” Romantic spirit.” His next picture, exhibited in 1856, was ” The Triumph of Music: Orpheus by the Power of his Art redeems his Wife from Hades.” It was not a success, and he did not again exhibit till 1858, when he sent a little picture of ” The Fisherman and the Syren ” to the Royal Academy, and ” Samson and Delilah ” to the Society of British Artists in Suffolk Street. In 1 858 he

visited London and made the acquaint- ance of the leading Pre-Raphaelites — Rossetti, Holman Hunt and Millais. In the spring of 1859 he was at Capri, always a favourite resort of his, and made many studies from nature, including a very famous drawing of a lemon tree. It was not till i860 that he settled in London, when he took up his quarters at 2 Orme Square, Bayswater, where he stayed till, in 1866, he moved to his celebrated house in Holland Park Road, with its Arab hall decorated with Damascus tiles. There he lived till his death. He now began to fulfil the promise of his " Cimabue," and by such pictures as " Paolo e Francesca," " The Star of Bethlehem," " Jezebel and Ahab taking Possession of Naboth's Vineyard," " Michael Angelo musing over his Dying Servant," " A Girl feeding Peacocks," and " The Odalisque," all exhibited in 1861- 1863, rose rapidly to the head of his profession. The two latter pictures were marked by the rhythm of line and luxury of colour which are among the most constant attributes of his art, and may be regarded as his first dreams of Oriental beauty, with which he afterwards showed so great a sympathy. In 1864 he exhibited "Dante in Exile" (the greatest of his Italian pictures), "Orpheus and Eurydice " and " Golden Hours." In the winter of the same year he was elected an Associate of the Royal Academy. After this the main effort of his life .was to realize visions of beauty suggested by classic myth and history. If we add to pictures of this class a few Scriptural subjects, a few Oriental dreams, one or two of tender sentiment like " Wedded " (one of the most popular of his pictures, and well known by not only an engraving, but a statuette modelled by an Italian sculptor), a number of studies of very various types of female beauty, " Teresina," " Biondina," " Bianca," " Moretta," &c, and an occasional portrait, we shall nearly exhaust the two classes into which Lord Leighton's work (as a painter) can be divided.

Amongst the finest of his classical pictures were — " Syracusan Bride leading Wild Beasts in Procession to the Temple of Diana " (1S66), " Venus disrobing for the Bath " (1867), " Electra at the Tomb of Agamemnon," and " Helios and Rhodos " (1869), " Hercules wrestling with Death for the Body of Alcestis " (1871), " Clytemnestra " (1874), " The Daphnephoria " (1876), '• Nausicaa " (1878), " An Idyll " (1881), two lovers under a spreading oak listening to the piping of a shepherd and gazing on the rich plain below; " Phryne " (1882), a nude figure stand- ing in the sun; " Cymon and Iphigenia " (1884), "Captive Andromache " (1888), now in the Manchester Art Gallery; with the " Last Watch of Hero " (1887), " The Bath of Psyche " (1890), now in the Chantrey Bequest collection; " The Garden

of the Hesperides " (1892), " Perseus and Andromeda " and " The

Return of Persephone," now in the Leeds Gallery (1891); and " Clytie," his last work (1896). All these pictures are char- acterized by nobility of conception, by almost perfect draughts- manship, by colour which, if not of the highest quality, is always original, choice and effective. They often reach distinction and dignity of attitude and gesture, and occasionally, as in the " Hercules and Death, " the " Electra " and the " Clytemnestra," a noble intensity of feeling. Perhaps, amidst the great variety of qualities which they possess, none is more universal and more characteristic than a rich elegance, combined with an almost fastidious selection of beautiful forms. It is the super-eminence of these qualities, associated with great decorative skill, that make the splendid pageant of the " Daphnephoria " the most perfect expression of his individual genius. Here we have his com- position, his colour, his sense of the joy and movement of life, his love of art and nature at their purest and most spontaneous, and the result is a work without a rival of its kind in the British School.

Leighton was one of the most thorough draughtsmen of his day. His sketches and studies for his pictures are numerous and very highly esteemed. They contain the essence of his conceptions, and much of their spiritual beauty and subtlety of expression was often lost in the elaboration of the finished picture. He seldom succeeded in retaining the freshness of his first idea more completely than in his last picture — " Clytie " — which was left unfinished on his easel. He rarely painted sacred subjects. The most beautiful of his few pictures of this kind was the " David musing on the Housetop" (1865). Others were " Elijah in the Wilderness " (1879), " Elisha raising the Son of the Shunammite " (1881) and a design intended for the decoration of the dome of St Paul's Cathedral, " And the Sea gave up the Dead which were in it " (1892), now in the Tate Gallery, and the terrible " Rizpah " of 1893. His diploma picture was " St Jerome," exhibited in 1869. Besides these pictures of sacred subjects, he made some designs for Dalziel's Bible, which for force of imagination excel the paintings. The finest of these are " Cain and Abel," and " Samson with the Gates of Gaza."

Not so easily to be classed, but among the most individual and beautiful of his pictures, are a few of which the motive was purely aesthetic. Amongst these may specially be noted " The Summer Moon," two Greek girls sleeping on a marble bench, and "The Music Lesson," in which a lovely litlle girl is seated on her lovely young mother's lap learning to play the lute. With these, as a work produced without any literary suggestion, though very different in feeling, may be associated the "Eastern Slinger scaring Birds in the Harvest-time: Moon-rise " (1875), a nude figure standing on a raised platform in a

field of wheat.

Leighton also painted a few portraits, including .those of Signor Costa, the Italian landscape painter, Mr F. P. Cockerell, Mrs Sutherland Orr (his sister), Amy, Lady Coleridge, Mrs Stephen Ralli and (the finest of all) Sir Richard Burton, the traveller and Eastern scholar, which was exhibited in 1876 and is now in the National Portrait Gallery.

Like other painters of the day, notably G. F. Watts, Lord Leighton executed a few pieces of sculpture. His ” Athlete struggling with a Python ” was exhibited at the Royal Academy in 1877, and was purchased for the Chantrey Bequest collection. Another statue, ” The Sluggard,” of equal merit, was exhibited in 1886; and a charming statuette of a nude figure of a girl looking over her shoulder at a frog, called “Needless Alarms,” was completed in the same year, and presented by the artist to Sir John Millais in acknowledgment of the gift by the latter of his picture, ” Shelling Peas.” He made the beautiful design for the reverse of the Jubilee Medal of 1887. It was also his habit to make sketch models in wax for the figures in his pictures, many of which are in the possession of the Royal Academy. As an illustrator in black and white he also deserves to be remem- bered, especially for the cuts to Dalziel’s Bible, already mentioned, and his illustrations to George Eliot’s Romola, which appeared in the Cornhill Magazine. The latter are full of the spirit of

Florence and the Florentines, and show a keen sense of humour, elsewhere excluded from his work. Of his decorative paintings, the best known are the elegant compositions (in spirit fresco) on the walls of the Victoria and Albert Museum, representing ” The Industrial Arts of War and Peace.” There, also, is the refined and spirited figure of ” Cimabue ” in mosaic. In Lynd- hurst church are mural decorations to the memory of Mr Pepys Cockerell, illustrating ” The Parable of the Wise and Foolish Virgins.”

Leighton’s life was throughout marked by distinction, artistic and social. Though not tall, he had a fine presence and manners, at once genial and courtly. He was welcomed in all societies, from the palace to the studio. He spoke German, Italian and French, as well as English. He had much taste and love for music, and considerable gifts as an orator of a florid type. His Presidential Discourses (published, London, 1896) were full of elegance and culture. For seven years (1876-1883)

he com- manded the 20th Middlesex (Artists) Rifle Volunteers, retiring with the rank of honorary colonel, and subsequently receiving the Volunteer Decoration. Yet no social attractions or successes diverted him from his devotion to his profession, the welfare of his brethren in art or of the Royal Academy. As president he was punctilious in the discharge of his duties, ready to give help and encouragement to artists young and old, and his tenure of the office was marked by some wise and liberal reforms. He frequently went abroad, generally to Italy, where he was well known and appreciated. He visited Spain in 1866, Egypt in 1868, when he went up the Nile with Ferdinand de Lesseps in a steamer lent by the Khedive. He was at Damascus for a short time in 1873. It was his custom on all these trips to make little lively sketches of landscape and buildings. These fresh little flowers of his leisure used to decorate the walls of his studio, and at the sale of its contents after his death realized considerable prices. It was when he was in the full tide of his popularity and success, and apparently in the full tide of his personal vigour also, that he was struck with angina pectoris. For a long time he struggled bravely with this cruel disease, never omitting except from absolute necessity any of his official duties except during a brief period of rest abroad, which failed to produce the desired effect. His death occurred on the 25th of January

1896.

Leighton was elected an Academician in 1868, and succeeded Sir Francis Grant as President in 1878, when he was knighted. He was created a baronet in 1886, and was raised to the peerage in 1896, a few days before his death. He held honorary degrees at the universities of Oxford, Cambridge, Dublin, Edinburgh and Durham, was an Associate of the Institute of France; a Commander of the Legion of Honour, and of the Order of Leopold. He was a Knight of the Coburg Order, ” Dem Ver- dienste,” and of the Prussian Order, ” Pour le Merite,” and a member of at least ten foreign Academies. In 1859 he won a medal of the second class at the Paris Salon, and at the Exposi- tion Universelle of 1889 a gold medal. As a sculptor he was awarded a medal of the first class in 1878 and the Grand Prix in 1889.

See Art Annual (Mrs A. Lang), 1884; Royal Academy Cata- logue, Winter Exhibition, 1897; National Gallery of British Art Catalogue; C. Monkhouse, British Contemporary Artists (London, 1899); Ernest Rhys, Frederick, Lord Leighton (London, 1898, 1900). (C. Mo.)

LEIGHTON, ROBERT (1611-1684), archbishop of Glasgow, was born, probably in London (others say at Ulishaven, Forfar- shire), in 1611, the eldest son of Dr Alexander Leighton, the author of Zion’s Plea

against the Prelacie, whose terrible sufferings for having dared to question the divine right of Episcopacy, under the persecution of Laud, form one of the most disgraceful incidents of the reign of Charles I. Dr Leighton is said to have been of the old family of Ulishaven in Forfarshire. From his earliest childhood, according to Burnet, Robert Leighton was distinguished for his saintly disposition. In his sixteenth year (1627) he was sent to the university of Edinburgh, where, after studying with distinguished success for four years, he took the degree of M.A. in 1631. His father then sent him to travel

abroad, and he is understood to have spent several years ic. France, where he acquired a complete mastery of the French language. While there he passed a good deal of time with relatives at Douai who had become Roman Catholics, and with whom he kept up a correspondence for many years afterwards. Either at this time or on some subsequent visit he had also a good deal of intercourse with members of the Jansenist party. This intercourse contributed to the charity towards those who differed from him in religious opinion, which ever afterwards formed a feature in his character. The exact period of his return to Scotland has not been ascertained; but in 1641 he was ordained Presbyterian minister of Newbattle in Midlothian. In 1652 he resigned his charge and went to reside in Edinburgh. What led him to take this step does not distinctly appear. The account given is that he had little sympathy with the fiery zeal of his brother clergymen on certain political questions, and that this led to severe censures on their part.

Early in 1653 he was appointed principal of the university of Edinburgh, and primarius professor of divinity. In this post he continued for seven or eight years. A considerable number of his Latin prelections and other addresses (published after his death) are remarkable for the purity and elegance of their Latinity, and their subdued and meditative eloquence. They are valuable instructions in the art of living a holy life rather than a body of scientific divinity. Throughout, however, they bear the marks of a deeply learned and accomplished mind, saturated with both classical and patristic reading, and like all his works they breathe the spirit of one who lived very much above the world. His mental temper was too unlike the temper of his time to secure success as a teacher.

In 1661, when Charles II. had resolved to force Episcopacy once more upon Scotland, he fixed upon Leighton for one of his bishops (see Scotland, Church of). Leighton, living very much out of the world, and being somewhat deficient in what may be called the political sense,

was too open to the persuasions used to induce him to enter a sphere for which he instinctively felt he was ill qualified. The Episcopacy which he contemplated was that modified form which had been suggested by Archbishop Ussher, and to which Baxter and many “of the best of the English Nonconformists would have readily given their adherence. It is significant that, he always refused to be addressed as ” my lord,” and it is stated that when dining with his clergy on one occasion he wished to seat himself at the foot of the table.

Leighton soon began to discover the sort of men with whom he was to be associated in the episcopate. He travelled with them in the same coach from London towards Scotland, but having become, as he told Burnet, very weary of their company (as he doubted not they were of his), and having found that they intended to make a kind of triumphal entrance into Edinburgh, he left them at Morpeth and retired to the earl of Lothian’s at Newbattle. He very soon lost all hope of being able to build up the church by the means which the government had set on foot, and his work, as he confessed to Burnet, ” seemed to him a fighting against God.” He did, however, what he could, governing his diocese (that of Dunblane) with the utmost mildness, as far as he could, preventing the persecuting measures in active operation elsewhere, and endeavouring to persuade the Presbyterian clergy to come to an accommodation with their Episcopal brethren. After a hopeless struggle of three or four years to induce the government to put a stop to their fierce persecution of the Covenanters, he determined to resign his bishopric, and went up to London in 1665 for this purpose. He so far worked upon the mind of Charles that he promised to enforce the adoption of milder measures, but it does not appear that any material improvement took place. In 1669 Leighton again went to London and made fresh representations on the subject, but little result followed. The slight disposition, however, shown by the government to accommodate matters appears to have inspired Leighton with so much hope that in the following year he agreed, though with a good deal of hesitation, to accept the archbishopric of Glasgow. In this higher sphere he redoubled his efforts with the Presbyterians to bring about

some degree of conciliation with Episcopacy, but the only result was to embroil himself with the hot-headed Episcopal party as well as with the Presbyterians. In utter despair, therefore, of being able to be of any further service to the cause of religion, he resigned the

archbishopric in 1674 and retired to the house of his widowed sister, Mrs Lightmaker, at Broadhurst in Sussex. Here he spent the remaining ten years, probably the happiest of his life, and died suddenly on a visit to London in 1684.

It is difficult to form a just or at least a full estimate of Leighton's character. He stands almost alone in his age. In some respects he was immeasurably superior both in intellect and in piety to most of the Scottish ecclesiastics of his time; and yet he seems to have had almost no influence in moulding the characters or conduct of his contemporaries. So intense was his absorption in the love of God that little room seems to have been left in his heart for human sympathy or affection. Can it be that there was after all something to repel in his outward manner? Burnet tells us that he had never seen him laugh, and very seldom even smile. In other respects, too, he gives the impression of standing aloof from human interests and ties. It may go for little that he never married, but : t was surely a curious idiosyncrasy that he habitually cherished the wish (which was granted him) that he might die in an inn. In fact, holy meditation seems to have been the one absorbing interest of his life. At Dunblane tradition preserved the memory of " the good bishop," silent and companionless, pacing up and down the sloping walk by the river's bank under the beautiful west window of his cathedral. And from a letter of the earl of Lothian to his countess it appears that, whatever other reasons Leighton might have had for resigning his charge at Newbattle, the main object which he had in view was to be left to his own thoughts. It is therefore not very wonderful that he was completely misjudged and even disliked both by the Presbyterian and by the Episcopal party.

It was characteristic of him that he could never be made to understand that anything which he wrote possessed the smallest value. None of his works were published by himself, and it is stated that he left orders that all his MSS. should be destroyed after his death. But fortunately for the world this charge was disregarded. Like all the best writing, it seems to flow without effort; it is the easy unaffected outcome of his saintly nature. Throughout, how- ever, it is the language of a scholar and a man of perfect literary taste ; and with all its spirituality of thought there are no mystical raptures, such as are often found mingled with the Scottish practical theology of the 17th century. It was a common reproach against Leighton that he had leanings towards Roman Catholicism, and perhaps this is so far true that he had formed himself in some degree upon the model of some of the saintly persons of that faith, such as Pascal and Thomas a Kempis.

The best account of Leighton's character is that of Bishop Burnet in Hist, of his Own Times (1723-1734). No perfectly satisfactory edition of Leighton's works exists. After his death his Commentary on Peter and several of his other works were published under the editorship of his friend Dr Fall, and those early editions may be said to be, with some drawbacks, by far the best. His later editors have been possessed by the mania of reducing his good archaic and nervous language to the bald feebleness of modern phraseology. It is unfortunately impossible to exempt from this criticism even the edition, in other respects very valuable and meritorious, published under the superintendence of the Rev. W. West (7 vols., London, 1869-1875); see also volume of selections (with biography) by Dr Blair of Dunblane (1883), who also contributed " Bibliography of Archbishop Leighton " to the British and Foreign Evangelical Review duly 188O; Andrew Lang, History of Scotland (1902).

(J.T. Br.; D. Mn.) LEIGHTON BUZZARD, a market town in the southern parlia- mentary division of Bedfordshire, England, 40 m. N.W. of London by the London & North- Western railway. Pop. of urban district (1901) 6331. It lies in the flat valley of the Ouzel, a tributary of the Ouse, sheltered to east and west by low hills. The river here forms the county boundary with Buckinghamshire. The Grand Junction canal follows its course, and gives the town extensive water-communications. The church of All Saints is cruciform, with central tower and spire. It is mainly Early English, and a fine example of the style; but some of the windows including the nave clerestory, and the beautiful carved wooden roof, are Perpendicular. The west door has good early iron- work; and on one of the tower-arch pillars are some remarkable early carvings of jocular character, one of which represents a man assaulted by a woman with a ladle. The market cross is of the 14th century, much restored, having an open arcade supporting a pinnacle, with flying buttresses. The statues in its niches are modern, but the. originals are placed on the exterior of the town hall. Leighton has a considerable agricultural trade, and some industry in straw-plaiting. Across the Ouzel in

Buckinghamshire, where Leighton railway station is situated, is the urban district of Linslade (pop. 2157).

LEININGEN, the name of an old German family, whose lands lay principally in Alsace and Lorraine. The first count of Leiningen about whom anything certain is known was a certain Emicho (d. 1117), whose family became extinct in the male line when Count Frederick, a Minnesinger, died about 1220. Frederick's sister, Liutgarde, married Simon, count of Saar- briicken, and Frederick, one of their sons,

inheriting the lands of the counts of Leiningen, took their arms and their name. Having increased its possessions the Leiningen family was divided about 13 17 into two branches; the elder of these, whose head was a landgrave, died out in 1467. On this event its lands fell to a female, the last landgrave's sister Margaret, wife of Reinhard, lord of Westerburg, and their descendants were known as the family of Leiningen-Westerburg. Later this family was divided into two branches, those of Alt-Leiningen-Westerburg and Neu-Leiningen-Westerburg, both of which are represented to-day.

Meanwhile the younger branch of the Leiningens, known as the family of Leiningen-Dagsburg, was flourishing, and in 1560 this was divided into the lines of Leiningen-Dagsburg- Hartenburg, founded by Count John Philip (d. 1562), and Leiningen-Dagsburg-Heidesheim or Falkenburg, founded by Count Emicho (d. 1593). In 1779 the head of the former line was raised to the rank of a prince of the Empire. In 1801 this family was deprived of its lands on the left bank of the Rhine by France, but in 1803 it received ample compensation for these losses. A few years later its possessions were mediatized, and they are now included mainly in Baden, but partly in Bavaria and in Hesse. A former head of this family, Prince Emich Charles, married Maria Louisa Victoria, princess of Saxe-Coburg; after his death in 1814 the princess married George III.'s son, the duke of Kent, by whom she became the mother of Queen Victoria. In 1910 the head of the family was Prince Emich (b. 1866).

The family of Leiningen-Dagsburg-Heidesheim was divided into three branches, the two senior of which became extinct during the 18th century. At present it is represented by the counts of Leiningen-Guntersblum and Leiningen-Heidcsheim, called also Leiningen-Billigheim and Leiningen-Neidenau.

See Brinckmeier, Genealogische Geschichte des Hauses Leiningen (Brunswick, 1890-1891).

LEINSTER, a province of Ireland, occupying the middle and south-eastern portion of the island, and extending to the left bank of the Shannon. It includes counties Longford, West- meath, Meath, Louth, King's County, Kildare, Dublin, Queen's County, Carlow, Wicklow, Kilkenny and Wexford (q.v. for topography, &c). Leinster (Laighen) was one of the early Milesian provinces of Ireland. Meath, the modern county of which is included in Leinster, was the name of a separate province created in the 2nd century a.d. The kings of Leinster retained their position until 11 71, and their descendants maintained independence within a circumscribed territory as late as the 16th

century. In n 70 Richard Strongbow married Aoife, daughter of the last king Diarmid, and thus acquired the nominal right to the kingdom of Leinster. Henry II. confirmed'him in powers of jurisdiction equivalent to those of a palatinate. His daughter Isabel married William Marshal, earl of Pembroke. Their five daughters shared the territory of Leinster, which was now divided into five liberties carrying the same extensive privileges as the undivided territory, namely, Carlow, Kilkenny, Wexford, Kildare and Leix. The history of Leinster thereafter passes to the several divisions which were gradually organized into the present counties.

LEIPZIG, a city of Germany, the second town of the kingdom of Saxony in size and the first in commercial importance, 70 m. N.W. of Dresden and mm. S.W. of Berlin by rail, and 6 m. from the Prussian frontier. Tt. lies 3

under the name of the Elster, discharge themselves into the Saale. The climate, though not generally unhealthy, may be inclement in winter and hot in summer.

Leipzig is one of the most enterprising and prosperous of German towns, and in point of trade and industries ranks among German cities immediately after Berlin and Hamburg. It possesses the third largest German university, is the seat of the supreme tribunal of the German empire and the headquarters of the XIX. (Saxon) army corps, and forms one of the most prominent literary and musical centres in Europe. Its general aspect is imposing, owing to the number of new public buildings erected during the last 20 years of the 19th century. It consists of the old, or inner city, surrounded by a wide and pleasant promenade laid out on the site of the old fortifications, and of the very much more extensive inner and outer suburbs. Many thriving suburban villages, such as Reudnitz, Volkmarsdorf, Gohlis, Eutritzsch, Plagwitz and Lindenau, have been incorpor- ated with the city, and with these accretions the population in 1905 amounted to 502,570. On the north-west the town is bordered by the fine public park and woods of the Rosenthal, and on the west by the Johanna Park and by pleasant groves leading along the banks of the Pleisse.

The old town, with its narrow streets and numerous houses of the 16th and 17th centuries, with their high-pitched roofs, preserves much of its quaint medieval aspect. The market square, lying almost in its

centre, is of great interest. Upon it the four main business streets, the Grimmaische-, the Peters-, the Hain- and the Katharinen-strassen, converge, and its north side is occupied by the beautiful old Rathaus, a Gothic edifice built by the burgomaster Hieronymus Lotter in 1556, and containing life-size portraits of the Saxon rulers. Superseded by the new Rathaus, it has been restored and accommodates a municipal museum. Behind the market square and the main street lie a labyrinth of narrow streets interconnected by covered courtyards and alleys, with extensive warehouses and cellars. The whole, in the time of the great fairs, when every available place is packed with merchandise and thronged with a motley crowd, presents the semblance of an oriental bazaar. Close to the old Rathaus is Auerbach's Hof, built about 1 530 and interesting as being immor- talized in Goethe's Faust. It has a curious old wine vault (Keller) which contains a series of mural paintings Of the 16th century, representing the legend on which the play is based. Near by is the picturesque Konigshaus, for several centuries the palace of the Saxon monarchs in Leipzig and in which King Frederick Augustus I. was made prisoner by the Allies after the battle of Leipzig in October 1813. At the end of the Petersstrasse, in the south-west corner of the inner town and on the promenade, lay the Pleissenburg, or citadel, modelled, according to tradition, on that of Milan, and built early in the 13th century. Here Luther in 15 19 held his momentous disputation. The round tower was long used as an observatory and the building as a barrack. With the exception of the tower, which has been encased and raised to double its former height — to 300 ft. — the citadel has been removed and its site is occupied by the majestic pile of the new Rathaus in Renaissance style, with the tower as its central feature. The business of Leipzig is chiefly concen- trated in the inner city, but the headquarters of the book trade lie in the eastern suburb. Between the inner town and the latter lies the magnificent Augustusplatz, one of the most spacious squares in Europe. Upon it, on the side of the inner town and included within it, is the Augusteum, or main building of the university, a handsome edifice containing a splendid hall (1900), lecture rooms and archaeological collections; adjoining it is the Paulinerkirche, the university church. The other sides of the square are occupied by the new theatre, an imposing Renaissance structure, designed by C. F. Langhans, the post office and the museum of sculpture and painting, the latter faced by the Mende fountain. The churches of Leipzig are compara- tively uninteresting. The oldest, in its present form, is the Paul- inerkirche, built in 1 2 29-1 240, and restored in 1900, with a curiously grooved cloister; the largest in the inner town is the Thomaskirche, with a high-pitched roof dating from 1496, and

memorable for its association with J. Sebastian Bach, who was organist here. Among others may be mentioned the new Gothic Petrikirche, with a lofty spire, in the south suburb. On the east is the Johanniskirche, round which raged the last conflict in the battle of 1813, when it suffered severely from cannon shot. In it is the tomb of Bach, and outside that of the poet Gellert. Opposite its main entrance is the Reformation monument, with bronze statues of Luther and Melanchthon, by Johann Schilling, unveiled in 1883. In the Johanna Park is the Lutherkirche (1886), and close at hand the Roman Catholic and English churches. To the south-west of the new Rathaus, lying beyond the Pleisse and between it and the Johanna Park, is the new academic quarter. Along the fine thoroughfares, noticeable among which is the Karl Tauchnitz Strasse, are closely grouped many striking buildings. Here is the new Gewandhaus, or Konzerthaus, built in 1880-1884, in which the famous concerts called after its name are given, the old Gewandhaus, or Drapers' Hall, in the inner town having again been devoted to commercial use as a market hall during the fairs. Immediately opposite to it is the new university library, built in 1891, removed hither from the old monasterial buildings behind the Augusteum, and containing some 500,000 volumes and 5000 MSS. Behind that again is the academy of art, one wing of which accommodates the industrial art school; and close beside it are the school of technical arts and the conservatoire of music. Between the university library and the new Gewandhaus stands a monument of Mendelssohn (1892). Immediately to the east of the school of a.rts rises the grand pile of the supreme tribunal of the German empire, the Reichsgericht, which compares with the Reichstag building in Berlin. It was built in 1888-1895 from plans by Ludwig Hoffmann, and is distinguished for the symmetry and harmony of its proportions. It bears an imposing dome, 225 ft. high, crowned by a bronze figure of Truth by O. Lessing, 18 ft. high. Opposite, on the outer side of the Pleisse, are the district law-courts, large and substantial, though not specially imposing edifices. In the same quarter stands the Grassi Museum (1893- 1896) for industrial art and ethnology, and a short distance away are the palatial buildings of the Reichs and Deutsche Banks. Farther east and lying in the centre of the book-trade quarter stand close together the Buchhandlerhaus (booksellers' exchange), the great hall decorated with allegorical pictures by Sascha Schneider, and the Buchgewerbehaus, a museum of the book trade, both handsome red brick edifices in the German Renais- sance style, erected in 1886-1890. South-west of these buildings, on the other side of the Johannisthal Park, are clustered the medical institutes and hospitals of the university — the infirmary, clinical and other hospitals, the physico-chemical institute, pathological institute, physiological

institute, ophthalmic hospital, pharmacological institute, the schools of anatomy, the chemical laboratory, the zoological institute, the physico- mineralogical institute, the botanical garden and also the veterinary schools, deaf and dumb asylum, agricultural college and astronomical observatory. Among other noteworthy buildings in this quarter must be noted the Johannisstift, an asylum for the relief of the aged poor, with a handsome front and slender spire. On the north side of the inner town and on the promenade are the handsome exchange with library, and the reformed church, a pleasing edifice in late Gothic.

Leipzig has some interesting monuments; the Siegesdenkmal, commemorative of the wars of 1866 and 1870, on the market square, statues of Goethe, Leibnitz, Gellert, J. Sebastian Bach, Robert Schumann, Hahnemann, the homeopathist, and Bismarck. There are also many memorials of the battle of Leipzig, including an obelisk on the Randstadter-Steinweg, on the site of the bridge which was prematurely blown up, when Prince Poniatowski was drowned; a monument of cannon balls collected after the battle; a ” relief ” to Major Friccius, who stormed the outer Grimma gate; while on the battle plain itself and, close to ” Napoleonstein,” which commemorates Napoleon’s position on the last day of the battle, a gigantic obelisk sur- rounded by a garden has been planned for dedication on the hundredth anniversary of the battle (October 19, 1913).

The University and Education— Tht university of Leipzig, founded in 1400 by a secession of four hundred German students from Prague, is one of the most influential universities in the world. It was a few years since the most numerously attended of any university in Germany, but it has since been outstripped by those of Berlin and of Munich. Its large revenues, derived to a great extent from house property in Leipzig and estates in Saxony, enable it, in conjunction with a handsome state sub- vention, to provide rich endowments for the professorial chairs. To the several faculties also belong various collegiate buildings, notably, to the legal, that of the Collegium beatae Virginis in the Petersstrasse, and to the philosophical the Rothe Haus on the promenade facing the theatre. The other educational institutions of Leipzig include the Nicolai and Thomas gymnasia, several ” Realschulen,” a commercial academy (Handelssckule), high schools for girls, and a large number of public and private schools of all grades.

Art and Literature. — The city has a large number of literary, scientific and artistic institutions. One of the most important is the museum, which contains about four hundred modern paintings, a large number of casts, a few pieces of original sculp- ture and a well-arranged collection of drawings and engravings. The collection of the historical society and the ethnographical and art-industrial collections in the Grassi Museum are also of considerable interest. The museum was erected with part of the munificent bequest made to the city by Dominic Grassi in 1 88 1. As a musical centre Leipzig is known all over the world for its excellent conservatorium, founded in 1843 by Mendelssohn. The series of concerts given annually in the Gewandhaus is also of world-wide reputation, and the operatic stage of Leipzig is deservedly ranked among the finest in Germany. There are numerous vocal and orchestral societies, some of which have brought their art to a very high pitch of perfection. The promin- ence of the publishing interest has attracted to Leipzig a large number of gifted authors, and made it a literary centre of con- siderable importance. Over five hundred newspapers and periodicals are published here, including several of the most widely circulated in Germany. Intellectual interests of a high order have always characterized, Leipzig, and what Karl von Holtei once said of it is true to-day: ” There is only one city in Germany that represents Germany; only a single city where one can forget that he is a Hessian, a

Bavarian, a Swabian, a Prussian or a Saxon; only one city where, amid the opulence of the commercial world with which science is so gloriously allied, even the man who possesses nothing but his personality is honoured and esteemed; only one city, in which, despite a few narrownesses, all the advantages of a great, I may say a world-metropolis, are conspicuous! This city is, in my opinion, and in my experience, Leipzig."

Commerce, Fairs. — The outstanding importance of Leipzig as a commercial town is mainly derived from its three great fairs, which annually attract an enormous concourse of merchants from all parts of Europe, and from Persia, Armenia and other Asiatic countries. The most important fairs are held at Easter and Michaelmas, and are said to have been founded as markets about 1 1 70. The smaller New Year's fair was established in T458. Under the fostering care of the margraves of Meissen, and then of the electors of Saxony they attained great popularity. In 1 268 the margrave of Meissen granted a safe-conduct to all frequenters of the fairs, and in 1407 and 1507 the emperor Maximilian I. greatly increased their importance by prohibiting the holding of annual markets at any town within a wide radius of Leipzig. During the Thirty Years' War, the Seven Years' War and the troubles consequent upon the French Revolution, the trade of the Leipzig fairs considerably decreased, but it re- covered after the accession of Saxony to the German Customs Union (Zollverein) in 1834, and for the next twenty years rapidly and steadily increased. Since then, owing to the greater facilities of communication, the transactions at the fairs have diminished in relative, though they have increased in actual, value. Wares that can be safely purchased by sample appear at the fairs in steadily diminishing quantities, while others, such as hides,

furs and leather, which require to be actually examined, show as marked an increase. The value of the sales considerably exceeds £10,000,000 sterling per annum. The principal com- modity is furs (chiefly American and Russian), of which about one and a quarter million pounds worth are sold annually; other articles disposed of are leather, hides, wool, cloth, linen and glass. The Leipzig wool-market, held for two days in June, is also important.

In the trades of bookselling and publishing Leipzig occupies a unique position, not only taking the first place in Germany, but even surpassing London and Paris in the number and total value of its sales. There are upwards of nint hundred pub- lishers and booksellers in the town, and about eleven thousand firms in other parts of Europe are represented here. Several hundred booksellers assemble in Leipzig

every year, and settle their accounts at their own exchange (Buchhandler-Bbrse). Leipzig also contains about two hundred printing-works, some of great extent, and a corresponding number of type-foundries, binding-shops and other kindred industries.

The book trades give employment to over 15,000 persons, and since 1878 Leipzig has grown into an industrial town of the first rank. The iron and machinery trades employ 4500 persons; the textile industries, cotton and yarn spinning and hosiery, 6000; and the making of scientific and musical instruments, including pianos, 2650. Other industries include the manufac- ture of artificial flowers, wax-cloth, chemicals, ethereal oils and essences, beer, mineral waters, tobacco and cigars, lace, india- rubber wares, rush-work and paper, the preparation of furs and numerous other branches. These industries are mostly carried on in the suburbs of Plagwitz, Reudnitz, Lindenau, Gohlis, Eutritzsch, Konnewitz and the neighbouring town of Markranstadt.

Communications. — Leipzig lies at the centre of a network of railways giving it direct communication with all the more important cities of Germany. There are six main line railway stations, of which the Dresden and the Magdeburg lie side by side in the north-east corner of the promenade, the Thur- ingian and Berlin stations further away in the northern suburb; in the eastern is the Eilenburg station (for Breslau and the east) and in the south the Bavarian station. The whole traffic of these stations is to be directed into a vast central station (the largest in the world), lying on the sites of the Dresden, Magde- burg and Thuringian stations. The estimated cost, borne by Prussia, Saxony and the city of Leipzig, is estimated at 6 million pounds sterling. The city has an extensive electric tramway system, bringing all the outlying suburbs into close connexion with the business quarters of the town.

Population.— The population of Leipzig was quintupled within' the 19th century, rising from 31,887 in 1801 to 153,988 in 1881, to 455,089 in 1900 and to 502,570 in 1905.

History. — Leipzig owes its origin to a Slav settlement between the Elster and the Pleisse, which was in existence- before the year 1000, and its name to the Slav word lipa, a lime tree. There was also a German settlement near this spot, probably round a castle erected early in the 10th century by the German king, Henry the Fowler. The district was part of the mark of Merseburg, and the bishops of Merseburg were the lords of extensive areas around the settlements. In the nth century Leipzig is mentioned as a fortified place and in the

12th it came into the possession of the margrave of Meissen, being granted some municipal privileges by the mar- grave, Otto the Rich, before 1 190. Its favourable situation in the midst of a plain intersected by the principal highways of central Europe, together with the fostering care of its rulers, now began the work of raising Leipzig to the position of a very important commercial town. Its earliest trade was in the salt produced at Halle, and its enterprising inhabitants constructed roads and bridges to lighten the journey of the traders and travellers whose way led to the town. Soon Leipzig was largely used as a depot by the merchants of Nuremberg, who carried on a considerable trade with Poland. Powers of self-government were acquired by the council (Rat) of the town, the importance of which was enhanced during the 15th century by several grants of privileges from the emperors. When Saxony was divided in 1485 Leipzig fell to the Albertine, or ducal branch of the family, whose head Duke George gave new rights to the burghers. This duke, however, at whose instigation the famous discussion between Luther and Johann von Eck took place in the Pleissenburg of Leipzig, inflicted some injury upon the

town's trade and also upon its university by the harsh treatment which he meted out to the adherents of the new doctrines; but under the rule of his successor, Henry, Leipzig accepted the teaching of the reformers. In 1547 during the war of the league of Schmal- kalden the town was besieged by the elector of Saxony, John Frederick I. It was not captured, although its suburbs were de- stroyed. These and the Pleissenburg were rebuilt by the elector Maurice, who also strengthened the fortifications. Under the elector Augustus I. emigrants from the Netherlands were encouraged to settle in Leipzig and its trade with Hamburg and with England was greatly extended.

During the Thirty Years' War Leipzig suffered six sieges and on four occasions was occupied by hostile troops, being retained by the Swedes as security for the payment of an indemnity from 1648 to 1650. After 1650 its fortifications were strengthened; its finances were put on a better footing; and its trade, especially with England, began again to prosper; important steps being taken with regard to its organization. Towards the end of the 17th century the publishing trade began to increase very rapidly, partly because the severity of the censorship at Frankfort-on-the-Main caused many booksellers to remove to Leipzig. During the Seven Years' War Frederick the Great

exacted a heavy contribution from Leipzig, but this did not seriously interfere with its prosperity. In 1784 the fortifications were pulled down. The wars in the first decade of the 19th century were not on the whole unfavourable to the commerce of Leipzig, but in 1813 and 1814, owing to the presence of enormous armies in the neighbourhood, it suffered greatly. Another revival, however, set in after the peace of 1815, and this was aided by the accession of Saxony to the German Zoilverein in 1834, and by the opening of the first railway a little later. In 1831 the town was provided with a new constitution, and in 1837 a scheme for the reform of the university was completed. A riot in 1845, the revolutionary movement of 1848 and the Prussian occupation of 1866 were merely passing shadows. In 1879 Leipzig acquired a new importance by becoming the seat of the supreme court of the German empire.

The immediate neighbourhood of Leipzig has been the scene of several battles, tw-o of which are of more than ordinary importance. These are the battles of Breitenfeld, fought on the 17th of September 1631, between the Swedes under Gustavus Adolphus and the im- perialists, and the great battle of Leipzig, known in Germany as the Volkerschlacht, fought in October 1813 between Napoleon and the allied forces of Russia, Prussia and Austria.

Towards the middle of the 18th century Leipzig was the seat of the most influential body of literary men in Germany, over whom Johann Christoph Gottsched, like his contemporary, Samuel Johnson, in England, exercised a kind of literary dictatorship. Then, if ever, Leipzig deserved the epithet of a ” Paris in miniature ” (Klein Paris) assigned to it by Goethe in his Faust. The young Lessing produced his first play in the Leipzig theatre, and the university counts Goethe, Klopstock, Jean Paul Richter, Fichte and Schelling among its alumni. Schiller and Gellert also resided for a time in Leipzig, and Sebastian Bach and Mendelssohn filled musical posts here. Among the celebrated natives of the town are the philosopher Leibnitz and the composer Wagner.

Authorities. — For the history of Leipzig see E. Hasse, Die Stadt Leipzig und ihre Umgebung, geographisch und statistisch be- ichrieben (Leipzig, 1878); K. Grosse, Geschichte der Stadt Leipzig (Leipzig, 1897-1898); Rachel, Verwaltungsorganisation und Amter- wesen der Stadt Leipzig bis 1627 (Leipzig, 1902); G. Wustmann, Aus Leipzigs Vergangenheit (Leipzig, 1898); Bilderbuch aus der Geschichte der Stadt Leipzig (Leipzig, 1897); Leipzig durch drei Jahrhunderte, Atlas zur Geschichte des Leipziger Stadtbildes (Leipzig, 1891); Quellen zur Geschichte Leipzigs (Leipzig, 1889-1895); and Geschichte der

Stadt Leipzig (Leipzig, 1905) ; F. Seifert, Die Re- formation in Leipzig (Leipzig, 1883); G. Buchwald, Reformations- geschichte der Stadt Leipzig (Leipzig, 1900) ; Geffcken and Tyko- cinski, Stifiitngsbuch der Stadt Leipzig (Leipzig, 1905); the Urkun- denbuch der Stadt Leipzig, edited by C. F. Posern-Klett and Forste- mann (Leipzig, 1870-1895); and the Schriften des Vereins fur die Geschichte Leipzigs (Leipzig, 1872-1904). For other aspects of the town's life see Hirschfeld, Leipzigs Grossindustrie und Grosshandel (Leipzig, 1887); Hassert, Die geographische Lage und Entwickelung Leipzigs (Leipzig, 1899); Helm, Heimatkunde von Leipzig (Leipzig, 1903); E. Friedberg, Die Universitdt Leipzig in Vergangenheit und Gegenwart (Leipzig, 1897); F. Zarncke, Die Statutenbucher der Universitdt Leipzig (Leipzig, 1861); E. Hasse, Geschichte der Leip- ziger Messen (Leipzig, 1885); Tille, Die Anfdnge der hohen Land- strasse (Gotha, 1906) ; Biedermann, Geschichte der Leipziger Kramerin- nitng (Leipzig, 1881); and Moltke, Die Leipziger Kramerinnung im 75 und 16 Jahrhundert (Leipzig, 1901).

LEIRIA, an episcopal city and the capital of the district of Leiria, formerly included in Estremadura, Portugal; on the river Liz and on the Lisbon-Figueria da Foz railway. Pop. (1900) 4459. The principal buildings of Leiria are the ruined citadel, which dates from 1135, and the cathedral, a small Renaissance building erected in 1571 but modernized in the

1 8th century. The main square of the city is named after the poet Francisco Rodrigues Lobo, who was born here about 1 500. Between Leiria and the Atlantic there are extensive pine woods known as the Pinhal de Leiria, which were planted by King Diniz (1279-1325) with trees imported from the Landes in France, in order to give firmness to the sandy soil. In the neighbourhood there are glass and iron foundries, oil wells and mineral springs. Leiria, the Roman Calippo, was taken from the Moors in 1135 by Alphonso I. (Affonso Henriques). King Diniz made it his capital. In 1466 the first Portuguese printing- press was established here; in 1545 the city was made an episcopal see. The administrative district of Leiria coincides with the north and north-west of the ancient province of Estremadura (q.v.); pop. (1900) 238,755; area 1317 sq. m.

LEISLER, JACOB (c. 1635-1691), American political agitator, was born probably at Frankfort-on-Main, Germany, about 1635. He went to New Netherland (New York) in 1660, married a wealthy widow, engaged in trade, and soon accumulated a fortune. The English Revolution of 1688 divided the people of New York into two well-defined factions. In general the small shop-keepers, small farmers,

sailors, poor traders and artisans were arrayed against the patroons, rich fur-traders, merchants, lawyers and crown officers. The former were led by Leisler, the latter by Peter Schuyler (1657-1724), Nicholas Bayard (c. 1644- 1 707) , Stephen van Cortlandt (1 643-1 700) , William Nicolls (1657- 1723) and other representatives of the aristocratic Hudson Valley families. The ” Leislerians ” pretended greater loyalty to the Protestant succession. When news of the imprisonment of Gov. Andros in Massachusetts was received, they took possession on the 31st of May 1689 of Fort James (at the southern end of Manhattan Island) , renamed it Fort William and announced their determination to hold it until the arrival of a governor commis- sioned by the new sovereigns. The aristocrats also favoured the Revolution, but preferred to continue the government under authority from James II. rather than risk the danger of an inter-regnum. Lieutenant- Governor Francis Nicholson sailed for Eng- land on the 24th of June, a committee of safety was organized by the popular party, and Leisler was appointed commander-in-chief. Under authority of a letter from the home government addressed to Nicholson, “or in his absence, to such as for the time being takes care for preserving the peace and administering the laws in His Majesty’s province of New York,” he assumed the title of lieutenant-governor in December 1689, appointed a council and took charge of the government of the entire province. He summoned the first Intercolonial Congress in America, which met in New York on the 1st of May 1690 to plan concerted action against the French and Indians. Colonel Henry Sloughter was commissioned governor of the province on the 2nd of September 1689 but did not reach New York until the 19th of March 1691. In the meantime Major Richard Ingoldsby and two companies of soldiers had landed (January 28, 1691) and demanded possession of the fort. Leisler refused to surrender it, and after some con- troversy an attack was made on the 17 th of March in which two soldiers were killed and several wounded. When Sloughter arrived two days later Leisler hastened to give over to him the fort and other evidences of authority. He and his son-in-law, Jacob Milborne, were charged with treason for refusing to sub- mit to Ingoldsby, were convicted, and on the 16th of May 1691 were executed. There has been much controversy among historians with regard both to the facts and to the significance of Leisler’s brief career as ruler in New York.

See J. R. Brodhead, History of the State of New York (vol. 2, New York, 1871). For the documents connected with the controversy see E. B. O’Callaghan, Documentary History of the State of New York (vol. 2, Albany, 1850).

LEISNIG, a town in the kingdom of Saxony, prettily situated on the

Freiberger Mulde, 7 m. S. of Grimma by the railway from Leipzig to Dresden via Dobeln. Pop. (1905) 8147. On a high rock above the town lies the old castle of Mildenstein, now utilized as administrative offices. The industries include the manufacture of cloth, furniture, boots, buttons, cigars, beer, machinery and chemicals. Leisnig is a place of considerabl

antiquity. About 1080 it passed into the possession of the counts of Groitzsch, but was purchased in 11 57 by the emperor Frederick I., who committed it to the charge of counts. It fell to Meissen in 1365, and later to Saxony.

LEITH, a municipal and police burgh, and seaport, county of Midlothian, Scotland. Pop. (1901) 77,439- It is situated on the south shore of the Firth of Forth, if m. N.N.E. of Edinburgh, of which it is the port and with which it is connected by Leith Walk, practically a continuous street. It has stations on the North British and Caicdonian railways, and a branch line (N.B.R.) to Portobello. Lying at the mouth of the Water of Leith, which is crossed by several bridges and divides it into the parishes of North and South Leith, it stretches for 31 m. along the shore of the Firth from Seafield in the east to near Granton in the west. There is tramway communication with Edinburgh and Newhaven.

The town is a thriving centre of trade and commerce. St Mary's in Kirkgate, the parish church of South Leith, was founded in 1483, and was originally cruciform but, as restored in 1852, consists of an aisled nave and north-western tower. Here David Lindsay (1531-1613), its minister, James VI. 's chaplain and afterwards bishop of Ross, preached before the king the thanksgiving sermon on the Gowrie conspiracy (1600). John Logan, the hymn-writer and reputed author of " The Ode to the Cuckoo," was minister for thirteen years; and in its graveyard lies the Rev. John Home, author of Douglas, a native of Leith. Near it in Constitution Street is St James's Episcopal church (1862-1869), in the Early English style by Sir Gilbert Scott, with an apsidal chancel and a spire 160 ft. high. The parish church of North Leith, in Madeira Street, with a spire 158 ft. high, is one of the best livings in the Established Church of Scotland. St Thomas's, at the head of Shirra Brae, in the Gothic style, was built in 1843 by Sir John Gladstone of Fasque, who — prior to his removal to Liverpool, where his son, W. E. Gladstone, was born — had been a merchant in Leith.

The public buildings are wholly modern, the principal being of classic design. They include the custom house (181 2) in the Grecian style; Trinity House (1817), also Grecian, containing Sir Henry Raeburn's portrait of Admiral Lord Duncan, David Scott's " Vasco da Gama Rounding the Cape " and other paintings; the markets (1818); the town hall (1828), with an Ionic facade on Constitution Street and a Doric porch on Charlotte Street; the corn exchange (1862) in the Roman style; the assembly rooms; exchange buildings; the public institute (1867) and Victoria public baths (1899). Trinity House was founded in 1555 as a home for old and disabled sailors, but on the decline of its revenues it became the licensing authority for pilots, its humane office being partly fulfilled by the sailors' home, established about 1840 in a building adjoining the Signal Tower, and re- housed in a handsome structure in the Scottish Baronial style in 1883-1S84. Other charitable institutions include the hospital, John Watt's hospital and the smallpox hospital. The high school, built in 1806, for many years a familiar object on the west margin of the Links, gave way to the academy, a hand- some and commodious structure, to which are drafted senior pupils from the numerous board schools for free education in the higher branches. Here also is accommodated the technical college. Secondary instruction is given also in Craighall Road, school. A bronze statue of Robert Burns was unveiled in 1898. Leith Links, one of the homes of golf in Scotland, is a popular resort, on Lochcnd Road are situated Hawkhill recreation grounds, and Lochend Loch is used for skating and curling. There are small links at Newhaven, and in Trinity are Starbank Park and Cargilfield playing ground. The east pier (1177 yds. long) and the west pier (1041 yds.) are favourite promenades. The waterway between them is the entrance to the harbour. Leith cemetery is situated at Seafield and the Eastern cemetery in Easter Road.

The oldest industry is shipbuilding, which dates from 1313. Here in 1511 James IV. built the " St Michael," " ane verrie monstruous great ship, whilk tuik sae meikle timber that schee wnisted all the woodis in Fyfe, except Falkland wood, besides

the timber that cam out of Norroway." Other important industries are engineering, sugar-refining (established 1757), meat-preserving, flour-milling, sailcloth-making, soap-boiling, rope and twine-making, tanning, chemical manures-making, wood-sawing, hosiery, biscuit-baking, brewing, distilling and lime-juice making. Of the old trade of glass-making, which began in 1682, scarcely a trace survives. As a distributing centre, Leith occupies a prominent place. It is the headquarters of the whisky business in Great Britain, and stores also large quantities of wine from Spain, Portugal and France. This pre-

eminence is due to its excellent dock and harbour accom- modation and capacious warehouses. The two old docks (1801-1807) cover 1 of acres; Victoria Dock (1852) 5 acres; Albert Dock (1863-1869) iof acres; Edinburgh Dock (1874- 1881) 165 acres; and the New Dock (1892-1901) 60 acres. There are several dry docks, of which the Prince of Wales Graving Dock (1858), the laigest, measures 370 ft. by 60 ft. Space can always be had for more dock room by reclaiming the east sands, where in the 17th and 18th centuries Leith Races were held, the theme of a humorous descriptive poem by Robert Fergusson. Apart from coasting trade there are constant sailings to the leading European ports, the United States and the British colonies. In 1908 the tonnage of ships entering the harbour was (including coastwise trade) 1,975,457; that of ships clearing the harbour 1,993,227. The number of vessels registered at the port was 213 (net tonnage 146,799). The value of imports was £12,883,890, of exports £5,377,188. In summer there are frequent excursions to the Bass Rock and the Isle of May, North Berwick, Elie, Aberdour, Alloa and Stirling. Leith Fort, built in North Leith in 1779 for the defence of the harbour, is now the headquarters of the Royal Artillery in Scotland. Leith is the head of a fishery district. The town, which is governed by a provost, bailies and council, unites with Musselburgh and Portobello to send one member to parliament.

Leith figures as Inverleith in the foundation charter of Holyrood Abbey (1128). In 1329 Robert I. granted the harbour to the magistrates of Edinburgh, who did not always use their power wisely. They forbade, for example, the building of streets wide enough to admit a cart, a regulation that accounted for the number of narrow wynds and alleys in the town. Had the overlords been more considerate incorporation with Edinburgh would not have been so bitterly resisted. Several of the quaint bits of ancient Leith yet remain, and the appearance of the shore as it was in the 17th and 18th centuries, and even at a later date, was picturesque in the extreme. During the centuries of strife between Scotland and England its situation exposed the port to attack both by sea and land. At least twice (in 1313 and 1410) its shipping was burned by the English, who also sacked the town in 1544 — when the 1st earl of Hertford destroyed the first wooden pier — and 1547. In the troublous times that followed the death of James V., Leith became the stronghold of the Roman Catholic and French party from 1548 to 1560, Mary of Guise, queen regent, not deeming herself secure in Edinburgh. In 1 549 the town was walled and fortified by Montalembcrt, sicur d'Essc, the commander of the French troops, and endured an ineffectual siege in 1560 by the Scots and their English allies. A house in Coalhill is

thought to be the ” handsome and spacious edifice ” erected for her privy council by Mary of Guise. D’Esse’s wall, pierced by six gates, was partly dismantled on the death of the queen regent, but although rebuilt in 1571, not a trace of it exists. The old tolbooth, in which William Maitiand of Lethington, Queen Mary’s secretary, poisoned himself in 1573, to avoid execution for adhering to Mary’s cause, was demolished in 1819. Charles I. is said to have received the first tidings of the Irish rebellion while playing golf on the links in 1641. Cromwell in his Scottish campaign built the Citadel in 1650 and the mounds on the links, known as” Giant’s Brae ” and ” Lady Fife’s Brae,” were thrown up by the Protector as batteries. In 1698 the sailing of the first Darien expedition created great excitement. In 171.5 William Mackintosh of Borlum (1662-1743) and his force of Jacobite Highlanders captured the Citadel, of which only the name of Citadel Street and the archway in Couper Street have preserved the memory.

A mile S.E. of the links lies the ancient village of Restalrig, the home of the Logans, from whom the superiority of Leith was purchased in 1553 by the queen regent. Sir Robert Logan (d. 1606) was alleged to have been one of the Gowrie conspirators and to have arranged to imprison the king in Fast Castle. This charge, how- ever, was not made until three years after his death, when his bones were exhumed for trial. He was then found guilty of high treason and sentence of forfeiture pronounced ; but there is reason to suspect that the whole case was trumped up. The old church escaped demolition at the Reformation and even the fine east

window was saved. In the vaults repose Sir Robert and other Logans, besides several of the lords Balmerino, and Lord Brougham’s father lies in the kirkyard. The well of St Triduana, which was reputed to possess wonderful curative powers, vanished when the North British railway was constructed.

LEITMERITZ (Czech, Litomefice) , a town and episcopal see of Bohemia, 45 m. N. of Prague by rail. Pop. (1900) 13,075, mostly German. It lies on the right bank of the Elbe, which becomes here navigable for steamers and is spanned by an iron bridge 1700 ft. in length. The fine cathedral, founded in 1057, was built in 1671 and contains some valuable paintings. The library of the episcopal palace, built between 1694 and 1701, possesses the oldest maps of Bohemia made in 15 18 by Nicolaus Claudianus of Jung-Bunzlau. Of the other

churches that of All Saints dates from the 13th century. The town-hall, with its remarkable bell tower, dates from the 1 5th century. Leitmeritz is situated in the midst of a very fertile country, called the ” Bohemian Paradise,” which produces great quantities of corn, fruit, hops and wines. The beer brewed here enjoys a high reputation. On the opposite bank of the river, where the Eger discharges itself into the Elbe, lies Theresienstadt (pop. 7046), an important garrison town. It was formerly an important fortress, erected in 1780 by the emperor Joseph II. and named after his mother Maria Theresa, but the fortress was dismantled in 1882.

Leitmeritz was originally the castle of a royal count and is first mentioned, in 993, in the foundation charter of the convent of St Margaret near Prague. In 1248 it received a town charter, and was governed by the laws of Magdeburg until the time of Ferdinand I., having a special court of jurisdiction over all the royal towns where this law obtained. The town reached its highest degree of prosperity under Charles IV., who bestowed upon it large tracts of forest, agricultural land and vineyards. In the Hussite wars, after its capture by the utraquist, Leitmeritz remained true to ” the Chalice,” shared also in the revolt against Ferdinand I., and suffered in con- sequence. It was still more unfortunate during the Thirty Years’ War, in the course of which most of the Protestant inhabitants left it ; the property of the Bohemian refugees being given to German immigrants. The present bishopric was established in 1655.

LEITNER, GOTTLIEB WILHELM (1840-1899), Anglo-Hun- garian orientalist, was born at Budapest in 1840. He was the son of a physician, and was educated at Malta Protestant college. At the age of fifteen he acted as an interpreter in the Crimean War. He entered King’s College, London, in 1858, and in

This varied county has in general a floor of Carboniferous Limestone, which forms finely scarped hills as it reaches the sea in Donegal Bay. The underlying sandstone appears at Lough Melvin, and again on the margin of a Silurian area in the extreme south. The Upper Carboniferous series, dipping gently south- ward, form mountainous country round Lough Allen, where the name of Slieve Anierin records the abundance of clay-ironstone beneath the coal seams. The sandstones and shales of this series scarp boldly towards the valley of the Bonnet, across which rises, in picturesque contrast, the heather-clad ridge of ancient gneiss which forms, in Benbo, the north-east end of the Ox Mountains. The ironstone was smelted in the upland at Creevelea down to 1859, and the coal is worked in a few thin seams.

The climate is moist and unsuitable for grain crops. On the higher districts the soil is stiff and cold, and, though abounding in stones, retentive of moisture, but in the valleys there are some fertile districts. Lime, marl and similar manures are abundant, and on the coast seaweed is plentiful. The proportion of tillage to pasture is roughly as 1 to 3. Potatoes are grown, but oats, the principal grain crop, are scanty. The live stock consists chiefly of cattle, pigs and poultry. Coarse linens for domestic purposes are manufactured and coarse pottery is also made. The Sligo, Leitrim and Northern Counties railway, connecting Sligo with Enniskillen, crosses the northern part of the county, by way of Manor Hamilton; the Mullingar and Sligo line of the Midland Great Western touches the south- western boundary of the county, with a station at Carrick-on- Shannon; while connecting with this line at Dromod is the Cavan and Leitrim railway to Ballinamore and Arigna, and to Belturbet in county Cavan.

The population (78,618 in 1891; 69,343 in 1901) decreases owing to emigration, the decrease being one of the mosc serious shown by any Irish county. It includes nearly 90% of Roman Catholics. The only towns are Carrick-on-Shannon (pop. 11 18) and Manor Hamilton (993). The county is divided into five baronies. It is within the Connaught circuit, and assizes are held at Carrick-on-Shannon, and quarter sessions at Ballinamore, Carrick-on-Shannon and Manor Hamilton. It is in the Protestant diocese of Kilmore, and the Roman Catholic dioceses of Ardagh and Kilmore. In the Irish House of Commons two members

1 86 1 was appointed professor of Arabic and Mahommedan law. | were returned for the county and two for the boroughs of Carrick-

He became principal of the government college at Lahore in 1864, and there originated the term ” Dardistan ” for a portion of the mountains on the north-west frontier, which was subse- quently recognized to be a purely artificial distinction. He collected much valuable information on Graeco-Buddhist art and the origins of Indian art. He spoke, read and wrote twenty- five languages. He founded an oriental institute at Woking, and for some years edited the Asiatic Quarterly Review. He died at Bonn in 1899.

See J. H. Stocqueler, Life and Labours of Dr Leitner (1875).

LEITRIM, a county of Ireland in the province of Connaught, bounded N.W. by Donegal Bay, N.E. by Fermanagh, E. by Cavan, S.E. by Longford, S.W. by Roscommon and W. by Sligo. The area is 392,381 acres, or about 613 sq. m. The northern portion of the county consists

of an elevated table-land, of which the highest summits belong to the Truskmore Hills, reaching 1712 ft.; with Benbo, 1365 ft. and Lackagh, 1446 ft. In the southern part the country is comparatively level, and is generally richly wooded. The county touches the south coast of Donegal Bay, but the coast-line is only about 3 m. The principal river is the Shannon, which, issuing from Lough Allen, forms the south-western boundary of the county with Ros- common. The Bonnet rises in the north-west and flows to Lough Gill, and the streams of Drones and Duff separate Leitrim from Donegal and Sligo. Besides Lough Allen, which has an area of 8900 acres, the other principal lakes in the county are Lough Macnean, Lough Scur, Lough Garadice and Lough Melvin. The scenery of the north is wild and attractive, while in the neighbourhood of the Shannon it is of great beauty. Lough Melvin and the coast rivers afford rod fishing, the lough being noted for its gillaroo trout.

on-Shannon and Jamestown, but at the Union the boroughs were disfranchised. The county divisions are termed the North and South, each returning one member.

With the territory which afterwards became the county Cavan, Leitrim formed part of Brenny or Breffny, which was divided into two principalities, of which Leitrim, under the name of Hy Bruin-Brenny, formed the western. Being for a long time in the possession of the O'Rourkes, descendants of Roderick, king of Ireland, it was also called Brenny O'Rourke. This family long maintained its independence; even in 1579, when the other existing counties of Connaught were created, the creation of Leitrim was deferred, and did not take place until 1583. Large confiscations were made in the reigns of Elizabeth and James I., in the Cromwellian period, and after the Revolu- tion of 1688.

There are " druidical " remains near Fenagh and at Letter- fyan, and important monastic ruins at Creevelea near the Bonnet, with several antique monuments, and in the parish of Fenagh. There was a flourishing Franciscan friary at James- town. The abbeys of Mohill, Annaduff and Drumlease are converted into parish churches. Among the more notable old castles are Manor Hamilton Castle, originally very extensive, but now in ruins, and Castle John on an island in Lough Scur. There is a small village named Leitrim about 4 m. N. of Carrick- on-Shannon, which was once of enough importance to give its name to a barony and to the county, and is said to have been the seatjof an early bishopric.

LEIXOES, a seaport and harbour of refuge of northern Portugal; in 41

9′ 10″ N., 8° 40′ 35″ W., 3 m. N. of the mouth of the Douro. Leixoes is included in the parish of Matozinhos (pop. 1900, 7690) and constitutes the main port of the city of

Oporto (q.v.), with which it is connected by an electric tramway. The harbour, of artificial construction, has an area of over 220 acres, and admits vessels of any size, the depth at the entrance being nearly 50 ft. The transference of cargo to and from ships lying in the Leixoes basin is effected entirely by means of lighters from Oporto. In addition to wine, &c, from Oporto, large numbers of emigrants to South America are taken on board here. The trade of the port is mainly in British hands, and large numbers of British ships call at Leixoes on the voyage between Lisbon and Liverpool, London or Southampton.

LEJEUNE, LOUIS FRANCOIS, Baron (1776-1848), French general, painter, and lithographer, was born at Versailles. As aide-de-camp to General Berthier he took an active part in many of the Napoleonic campaigns, which he made the subjects of an important series of battle-pictures. The vogue he enjoyed is due to the truth and vigour of his work, which was generally executed from sketches and studies made on the battlefield. When his battle-pictures were shown at the Egyptian Hall in London, a rail had to be put up to protect them from the eager crowds of sightseers. Among his chief works are ” The Entry of Charles X. into Paris, 6 June 1825 ” at Versailles; ” Episode of the Prussian War, October 1807 ” at Douai Museum; ” Marengo ” (1801) ; “Lodi,” ” Thabor,” ” Aboukir ” (1804) ; ” The Pyramids ” (1806); ” Passage of the Rhine in 1795 ” (1824), and ” Moskawa ” (1812). The German campaign of 1806 brought him to Munich, where he visited the workshop of Senefelder, the inventor of lithography. Lejeune was so fascinated by the possibilities of the new method that he then and there made the drawing on stone of his famous ” Cossack ” (printed by C. and T. Senefelder, 1806). Whilst he was taking his dinner, and with his horses harnessed and waiting to take him back to Paris, one hundred proofs were printed, one of which he subse- quently submitted to Napoleon. The introduction of litho- graphy into France was greatly due to the efforts of Lejeune. Many of his battle-pictures were engraved by Coiny and Bovinet.

See Fournier-Sarloveze, Le General Lejeune (Paris, Libraire de fart).

LEKAIN, the stage name of Henri Louis Cain (1728-1778), French

actor, who was born in Paris on the 14th of April 1728, the son of a silversmith. He was educated at the College Mazarin, and joined an amateur company of players against which the Comedie Francaise obtained an injunction. Voltaire supported him for a time and enabled him to act in his private theatre and also before the duchess of Maine. Owing to the hostility of the actors it was only after a struggle of seventeen months that, by the command of Louis XV., he was received at the Comedie Francaise. His success was immediate. Among his best parts were Herod in Mariamne, Nero in Britannicus and similar tragic roles, in spite of the fact that he was short and stout, with irregular and rather common features. His name is connected with a number of important scenic reforms. It was he who had the benches removed on which privileged spectators formerly sat encumbering the stage, Count Lauragais paying for him an excessive indemnity demanded. Lekain also protested against the method of sing-song declamation prevalent, and endeavoured to correct the costuming of the plays, although unable to obtain the historic accuracy at which Talma aimed. He died in Paris on the 8th of February 1778.

His eldest son published his Mimoire* (1801) with his correspondence with Vi.haire, Garrirk and others. They were reprinted with a preface liy Talma in Memo ires sur I' art dramatique (1825).

LELAND, CHARLES GODFREY (1824-1903), American author, son of a merchant, was born at Philadelphia on the 15th of August 1824. and graduated at Princeton in rS45. He after- wards studied at Heidelberg, Munich and Paris. He_ was in Paris during the revolution of 1848, and took an active part in it. He then returned to Philadelphia, and after being admitted to the bar in 1851, devoted himself to contributing to periodicals, editing various magazines and writing books. At the opening of the Civil War he started at Boston the Continental Magazine, which advocated emancipation. In 1868 he became known as

the humorous author of Hans Breitmann's Party and Ballads, which was followed by other volumes of the same kind, collected in 1871 with the title'of Hans Breitmann's Ballads. These dialect poems, burlesquing the German American, at once became popular. In 1869 he went to Europe, and till 1880 was occupied, chiefly in London, with literary work; after returning to Phila- delphia for six years, he again made his home in Europe, generally at Florence, where he died on the 20th of March 1903. Though his humorous verses were most attractive to the public, Leland was a serious student of folk-lore, particularly of the gipsies, his writings on the latter {The English Gypsies and their Language, 1872; The Gypsies, 1882; Gypsy Sorcery

and Fortune- telling . . . , 1891, &c.) being recognized as valuable contribu- tions to the literature of the subject. He was president of the first European folk-lore congress, held in Paris in 1889.

His other publications include Poetry and Mystery of Dreams (1855), Mcister Karl's Sketch-book (1855), Pictures of Travel (18 56), Sunshine in Thought (1862), Heine's Book of Songs (1862), The Music Lesson of Confucius (1870), Egyptian Sketch-book (1873), Abraham Lincoln (1879), The Minor Arts (1880), Algonquin Legends of New England (1884), Songs of the Sea and Lays of the Land (1895), Hans Breitmann in Tyrol (1895), One Hundred Profitable Acts (1897), Unpublished Legends of Vergil (1899), Kuloskap the Master, and other Algonquin Poems (1903, with J. Dyneley Prince).

See his Memoirs (2 vols., 1893), and E. R. Pennell, C. G. Leland

(1906).

LELAND (Leyland or Laylonde), JOHN {c. 1506-1552), English antiquary, was born in London on the 13th of September, probably in 1506. He owed his education at St Paul's school under William Lilly, and at Christ's College, Cambridge, to the kindness of a patron, Thomas Myles. He graduated at Cambridge in 1 52 1, and subsequently studied at All Souls College, Oxford, and in Paris under Francois Dubois (Sylvius). On his return to England he took holy orders. He had been tutor to Lord Thomas Howard, son of the 3rd duke of Norfolk, and to Francis Hastings, afterwards earl of Huntingdon. Meanwhile his learning had recommended him to Henry VIIL, who presented him to the rectory of Peuplingues in the marches of Calais in 1530. He was already librarian and chaplain to the king, and in 1533 he received a novel commission under the great seal as king's antiquary, with power to search for records, manuscripts and relics of antiquity in all the cathedrals, colleges and religious houses of England. Probably from 1534, and definitely from 1536 onwards to 1542, he was engaged on an antiquarian tour through England and Wales. He sought to preserve the MSS. scattered at the dissolution of the monasteries, but his powers did not extend to the actual collection of MSS. Some valuable additions, however, he did procure for the king's library, chiefly from the abbey of St Augustine at Canterbury. He had received a special dispensation permitting him to absent himself from his rectory of Peuplingues in 1536, and on his return from his itinerary he received the rectory of Haseley in Oxfordshire; his support of the church policy of Henry and Cranmer being further rewarded by a canonry and prebend of King's College (now Christ Church), Oxford, and a prebend of Salisbury. In a Slrena Henrico 1

(pr. 1546), addressed to Henry VIII. in 1545, he proposed to execute from the materials which he had collected in his journeys a topography of England, an account of the adjacent islands, an account of the British nobility, and a great history of the antiquities of the British Isles. He toiled over his papers at his house in the parish of St Michael le Querne, Cheapside, London, but he was not destined to complete these great undertakings, for he w"as certified insane in March 1550, and died on the 18th of April 1552.

Leland was an exact observer, and a diligent student of local chronicles. The bulk of his work remained in MS. at the time of his death, and various copies were made, one by John Stowe in 1576. After passing through various hands the greater part of

1 Re-edited in 1549 by John Bale as The laboryeuse Journey and Serche cf J. Leylande for Englandes Antiquitees geven of him for a Neu Yeares Gifte, &c., modern edition by W. A. Copinger (Manchester, 1895).

Leland's MSS. were deposited by William Burton, the historian of Leicestershire, in the Bodleian at Oxford. They had in the mean- time been freely used by other antiquaries, notably by John Bale, William Camden and Sir William Dugdale. The account of his journey in England and Wales in eight MS. quarto volumes received its name The Itinerary of John Leland from Thomas Burton and was edited by Thomas Hearne (9 vols., Oxford, 1710-1712; other editions in 1745 and 1770). The scattered portions dealing with Wales were re-edited by Miss L. Toulmin Smith in 1907. His other most important work, the Collectanea, in four folio MS. volumes, was also published by Hearne (6 vols., Oxford, 1715). His Com- mentarii de scriptoribus Britannicis, which had been used and dis- torted by his friend John Bale, was edited by Anthony Hall (2 vols., Oxford, 1709). Some of Leland's MSS., which formerly belonged to Sir Robert Cotton, passed into the possession of the British Museum. He was a Latin poet of some merit, his most famous piece being the Cygnea Canlio (1545) in honour of Henry VIII. Many of his minor works are included in Hearne's editions of the Itinerary and the Collectanea.

For accounts of Leland see John Bale, Catalogus (1557); Anthony a. Wood, Athenae Oxonienses; W. Huddesford, Lives of those eminent Antiquaries John Leland, Thomas Hearne and Anthony a Wood

(Oxford, 1772). A life of Leland, attributed to Edward Burton (c. 1750), from the library of Sir Thomas Phillipps, printed in 1896 contains a bibliography. See also the biography by Sidney Lee, in the Diet. Nat. Biog.

LELAND, JOHN (1 691-1766), English Nonconformist divine, was born at Wigan, Lancashire, and educated in Dublin, where he made such progress that in 17 16, without having attended any college or hall, he was appointed first assistant and afterwards sole pastor of a congregation of Presbyterians in New Row. This office he continued to fill until his death on the 16th of January 1766. He received the degree of D.D. from Aberdeen in 1739. His first publication was A Defence of Christianity (1733), in reply to Matthew Tindal's Christianity as old as the Creation; it was succeeded by his Divine Authority of the Old and New Testaments asserted (1738), in answer to The Moral Philoso- pher of Thomas Morgan; in 1741 he published two volumes, in the form of two letters, being Remarks on [H. DodwelPs] Christianity not founded on Argument; and in 1753 Reflexions on the late Lord Bolingbroke's Letters on the Study and Use of History. His View of the Principal Deistical Writers that have appeared in England was published in 17 54-1 7 56. This is the chief work of Leland — " most worthy, painstaking and common- place of divines," as Sir Leslie Stephen called him — and in spite of many defects and inconsistencies is indispensable to every student of the deistic movement of the 18th century.

His Discourses on various Subjects, with a Life prefixed, was published posthumously (4 vols., 1768-1789).

LELAND STANFORD JR. UNIVERSITY, near Palo Alto, California, U.S.A., in the beautiful Santa Clara valley, was founded in 1885 by Leland Stanford 1 (1824-1893), and by his wife Jane Lathrop Stanford (1825-1905), as a memorial to their only child, Leland Stanford, Jr., who died in 1884 in his seven- teenth year. The doors were opened in 1891 to 559 students. The university campus consists of Stanford's former Palo Alto farm, which comprises about 9000 acres. From the campus there are charming views of San Francisco Bay, of the Coast Range, particularly of Mount Hamilton some 30 m. E. with the Lick Observatory on its summit, of mountain foothills, and of the magnificent redwood forests toward Santa Cruz.

The buildings, designed originally by H. H. Richardson and completed by his successors, Shepley, Rutan and Coolidge, are of soft buff sandstone in a style adapted from the old Cali- fornia mission (Moorish-Romanesque) architecture, being long and low with wide

colonnades, open arches and red tiled roofs. An outer surrounds an inner quadrangle of buildings. The

‘Stanford was born in Watervlipt, New York; studied law in Albany; removed to California in 1852 and went into business at Michigan Bluff, Placer county, whence he removed to Sacramento in 1856; was made president in 1861 of the Central Pacific railroad company, which built the first trans-continental railway line over the Sierra Nevada; was governor of California in 1862-1863, and United States senator in 1885-1893; and was owner of the great Vina farm (55,000 acres) in Tehama county, containing the largest vineyard in the world (13,400 acres), the Gridley tract (22,000 acres) in Butte county, and the Palo Alto breeding farm, which was the home of his famous thoroughbred racers, Electioneer, Arion, Sunol, Palo Alto and Advertiser.

inner quadrangle, about a court which is 586 by 246 ft. and is faced by a continuous open arcade and adorned with large circular beds of tropical plants and flowers, consists of twelve one-storey buildings and a beautiful memorial church. Of the fourteen buildings of the outer quadrangle some are two storeys high. A magnificent memorial arch (100 ft. high), adorned with a frieze designed by John Evans, representing the ” Progress of Civilization in America,” and forming the main gateway, was destroyed by the earthquake of 1906. Outside the quad- rangles are other buildings — a museum of art and archaeology, based on collections made by Leland Stanford, Jr., chemical laboratories, engineering work-shops, dormitories, a mausoleum of the founders, &c. There is a fine arboretum (300 acres) and a cactus garden. The charming views, the grace and harmonious colours of the buildings, and the tropic vegetation make a campus of wonderful beauty. The students in 1907-1908 numbered 1738, of whom 126 were graduates, 99 special students, and 500 women. 2 The university library (with the library of the law department) contained in 1908 about 107,000 volumes. A marine biological laboratory, founded by Timothy Hopkins, is maintained at Pacific Grove on the Bay of Monterey. The university has an endowment from its founders estimated at $30,000,000, including three great estates with 85,000 acres of farm and vineyard lands, and several smaller tracts; but the endowment was very largely in interest-bearing securities, income from which was temporarily cut off in the early years of the university’s life by litigation. The founders wished the university ” to qualify students for personal success and direct usefulness in life; to promote the public welfare by exercising an influence in behalf of humanity and civilization, teaching the blessings of liberty regulated by law, and inculcating love and reverence for the

great principles of government as derived from the inalienable rights of man to life, liberty and the pursuit of happiness." There are no inflexible entrance requirements as to particular studies except English composition to ensure a degree of mental maturity, the minimum amount of preparation is fixed as that which should be given by four years in a secondary school, leaving to the applicants a wide choice of subjects (35 in 1906) ranging from ancient history to woodworking and machine shop. In the curriculum, liberty perhaps even greater than at Harvard is allowed as to " electives." Work on some one major subject occupies about one-third of the undergraduate course; the remaining two-thirds (or more) is purely elective. The influence of sectarianism and politics is barred from the university by its charter, and by its private origin and private support. At the same time in its policy it is practically a state university of the most liberal type. Instruction is entirely free. The president of the university has the initiative in all appoint- ments and in all matters of general policy. Within the university faculty power lies in an academic council, and, more particularly, in an advisory board of nine professors, elected by the academic council, to which all propositions of the president are submitted. The growth of the university has been steady, and its conduct careful. David Starr Jordan 3 was its first president.

See O. H. Elliot and O. V. Eaton, Stanford University and there- abouts (San Francisco, 1896), and the official publications of the university.

LELEGES, the name applied by Greek writers to an early people or peoples of which traces were believed to remain in Greek lands.

1. In Asia Minor. — In Homer the Leleges are allies of the Trojans, but they do not occur in the formal catalogue in Iliad,

1 The number of women attending the university as students in any semester is limited by the founding grant to 500.

3 President Jordan was born in 1851 at Gainesville, New York; was educated at Cornell, where he taught botany for a time; be- came an- assistant to the United States fish commission in 1872; in 1885-1891 was president of the university of Indiana, where from 1879 he had been professor of zoology; and in 1891 was elected president of Leland Stanford Jr. University. An eminent ichthyologist, he wrote, with Barton Warren Evermann (b. 1853), of the United States Bureau of Fisheries, Fishes of North and Middle America (4 vols., 1896-1900), and Food and Game Fishes of North America (1902); and prepared A Guide to the Study of Fishes (1905).

bk. ii., and their habitat is not specified. They are distinguished from the Carians, with whom some later writers confused them; they have a king, Altes, and a town Pedasus which was sacked by Achilles. The name Pedasus occurs (i.) near Cyzicus, (ii.) in the Troad on the Satnioeis river, (iii.) in Caria, as well as (iv.) in Messenia. Alcaeus (7th-6th centuries B.C.) calls An- tandrus in the Troad Lelegian, but Herodotus (5th century) substitutes Pelasgian (q.v.). Gargara in the Troad also counted as Lelegian. Pherecydes (5th century) attributed to Leleges the coast land of Caria from Ephesus to Phocaea, with the islands of Samos and Chios, placing the ” true Carians ” farther south from Ephesus to Miletus. If this statement be from Pherecydes of Leros (c. 480) it has great weight. In the 4th century, how- ever, Philippus of Theangela in south Caria describes Leleges still surviving as serfs of the true Carians, and Strabo, in the 1st century B.C., attributes to the Leleges a well-marked group of deserted forts, tombs and dwellings which ranged (and can still be traced) from the neighbourhood of Theangela and Halicarnassus as far north as Miletus, the southern limit of the ” true Carians ” of Pherecydes. Plutarch also implies the historic existence of Lelegian serfs at Tralles in the interior.

2. In Greece and the Aegean. — A single passage in the Hesiodic catalogue (fr. 136 Kinkel) places Leleges ” in Deucalion’s time,” i.e. as a primitive people, in Locris in central Greece. Not until the 4th century B.C. does any other writer place them anywhere west of the Aegean. But the confusion of the Leleges with the Carians (immigrant conquerors akin to Lydians and Mysians, and probably to Phrygians) which first appears in a Cretan legend (quoted by Herodotus, but repudiated, as he says, by the Carians themselves) and is repeated by Callisthenes, Apollo- dorus and other later writers, led easily to the suggestion of Callisthenes, that Leleges joined the Carians in their (half legendary) raids on the coasts of Greece. Meanwhile other writers from the 4th century onwards claimed to discover them in Boeotia. west Acarnania (Leucas), and later again in Thessaly, Euboea, Megara, Lacedaemon and Messenia. In Messenia they were reputed immigrant founders of Pylos, and were connected with the seafaring Taphians and Teleboans of Homer, and distinguished from the Pelasgians; in Lacedaemon and in Leucas they were believed to be aboriginal. These European Leleges must be interpreted in connexion with the recurrence of place names like Pedasus, Physcus, Larymna and Abae, (a) in. Caria, and (b) in the ” Lelegian ” parts of Greece; perhaps this is the result of some early migration; perhaps it is also the

cause of these Lelegian theories.

Modern speculations (mainly corollaries of Indo-Germanic theory) add,. little of value to the Greek accounts quoted above. H. Kiepert (" fjber den Volksstamm der Leleges," in Monatsber. Berl. Akad., 1861, p. 114) makes the Leleges an aboriginal people akin to Al- banians and Illyrians; K. W. Deimling, Die Leleger (Leipzig, 1862), starts them in south-west Asia Minor, and brings them thence to (jreece (practically the Greek view) ; G. F. Unger, " Hellas in Th.es- salien," in Philologus, Suppl. ii. (1863), makes them Phoenician, and derives their name from XaXafeu- (cf. the names flapl3apos,Walsche). E. Curtius {History 0} Greece, i.) distinguished a " Lelegian " phase of nascent Aegean culture. Most later writers follow Deimling. For Strabo's " Lelegian " monuments, cf. Paton and Myrcs, Journal 0} Hellenic Studies, xvi. 188-270. (J. L. M.)

LELEWEL, JOACHIM (1786-1861), Polish historian, geo- grapher and numismatist, was born at Warsaw on the 22nd of March 1786. His family came from Prussia in the early part of the 1 8th century; his grandfather was appointed physician to the reigning king of Poland, and his father caused himself to be naturalized as a Polish citizen. The original form of the name appears to have been Lolhoffel. Joachim was educated at the university of Vilna, and became in 1807 a teacher in a school at Krzcmieniec in Volhynia, in 18 14 teacher of history at Vilna, and in 1818 professor and librarian at the university of Warsaw. He returned to Vilna in 1821. His lectures enjoyed great popularity, and enthusiasm felt for him by the students is shown in the beautiful lines addressed to him by Mickiewicz. But this very circumstance made him obnoxious to the Russian government, and at Vilna Novosiltsev was then all-powerful. Lelewel was removed from his professorship in 1824, and returned

to Warsaw, where he was elected a deputy to the diet in 1829. He joined the revolutionary movement with more enthusiasm than energy, and though the emperor Nicholas I. distinguished him as one of the most dangerous rebels, did not appear to advantage as a man of action. On the suppression of the rebellion he made his way in disguise to Germany, and sub- sequently reached Paris in 1831. The government of Louis Philippe ordered him to quit French territory in 1833 at the request of the Russian ambassador. The cause of this expulsion is said to have been his activity in writing revolutionary pro- clamations. He went to Brussels, where for nearly thirty years he earned a scanty livelihood by his writings. He died on the 29th of May 1 86 1 in Paris, whither he had removed a few days previously.

Lelewel, a man of austere character, simple tastes and the loftiest conception of honour, was a lover of learning for its own sake. His literary activity was enormous, extending from his Edda Skandinawska (1807) to his Geographic des Arabes (2 vols., Paris, 1851). One of his most important publications was La Geographic du moyen age (5 vols., Brussels, 1852-1857), with an atlas (1849) of fifty plates entirely engraved by himself, for he rightly attached such importance to the accuracy of his maps that he would not allow them to be executed by any one else. His works on Polish history are based on minute and critical study of the documents; they were collected under the title Polska, dzieje i rzeczy jej rozpatrzywane {Poland, her History and Affairs surveyed), in 20 vols. (Posen, 1853-1876). He intended to write a complete history of Poland on an extensive scale, but never accomplished the task. His method is shown in the little history of Poland, first published at Warsaw in Polish in 1823, under the title Dzieje Polski, and afterwards almost rewritten in the Histoire de Pologne (2 vols., Paris, 1844). Other works on Polish history which may be especially mentioned are La Pologne au moyen age (3 vols., Posen, 1846-1851), an edition of the Chronicle of Matthew Cholewa l (181 1) and Ancient Memorials of Polish Legislation {Ksiegi ustaw polskich i mazo- wieckich). He also wrote on the trade of Carthage, on Pytheas of Marseilles, the geographer, and two important works on numismatics {La Numismatique du moyen age, Paris, 2 vols., 1835; Etudes numismatiques, Brussels, 1840). While employed in the university library of Warsaw he studied bibliography, and the fruits of his labours may be seen in his Bibliograficznych Ksiag dwoje {A Couple of Books on Bibliography) { 2 vols., Vilna, 1823-1826). The characteristics of Lelewel as an historian are great research and power to draw inferences from his facts; his style is too often careless, and his narrative is not picturesque, but his expressions are frequently terse and incisive.

He left valuable materials for a just comprehension of his career in the autobiography {Adventures while Prosecuting Researches and Inquiries on Polish Matters) printed in his Polska.

LELONG, JACQUES (1665-1721), French bibliographer, was born at Paris on the 19th of April 1665. He was a priest of the Oratory, and was librarian to the establishment of the Order in Paris, where he spent his life in seclusion. He died at Paris on the 13th of August 1721. He first published a Bibliotheca sacra (1709), an index of all the editions of the Bible, then a Biblio- theque historique de la France (1719), a volume of considerable size, containing 17,487 items to which Lelong sometimes appends useful notes. His work is far from complete. He vainly hoped that his friend and successor Father

Desmolets, would continue it; but it was resumed by Charles-Marie Fevret de Fontette, a councillor of the parlement of Dijon, who spent fifteen years of his life and a great deal of money in rewriting the Bibliotheque historique. The first two volumes (1768 and 1769) contained as many as 29,143 items. Fevret de Fontette died on the 1 6th of February 1772, leaving the third volume almost finished. It appeared in 1772, thanks to Barbaudde La Bruyere, who later brought out the 4th and 5th volumes (1775 and 1778).

1 I.e. the three first books of the Historia Polonica of Vincentius (Kadlbek), bishop of Cracow (d. 1223), wrongly ascribed by Lelewel to Matthaeus Cholewa, bishop of Cracow. See Potthast, Bibliotheca hist. med. aev., s.v. ” Vincentius.”

In this new edition the Bibliotheque historique is a work of reference of the highest order; it is still of great value.

LELY, SIR PETER (1617-1680) English painter, was born at Soest, Westphalia, in 161 7. His father, a military captain and a native of Holland, was originally called van der Vaes; the nickname of Le Lys’ or Lely, by which he was generally known, was adopted by his son as a surname. After studying for two years under Peter de Grebber, an artist of some note at Haarlem, Lely, induced by the patronage of Charles I. for the fine arts, removed to England in 1641. There he at first painted historical subjects and landscape; he soon became so eminent in his profession as to be employed by Charles to paint his portrait shortly after the death of Vandyck. He afterwards portrayed Cromwell. At the Restoration his genius and agreeable manners won the favour of Charles II., who made him his state- painter, and afterwards knighted him. He formed a famous collection, the best of his time, containing drawings, prints and paintings by the best masters; it sold by auction for no less than £26,000. His great example, however, was Vandyck, whom, in some of his most successful pieces, he almost rivals. Lely’s paintings are carefully finished, warm and clear in colour- ing, and animated in design. The graceful posture of the heads, the delicate rounding of the hands, and the broad folds of the draperies are admired in many of his portraits. The eyes of the ladies are drowsy with languid sentiment, and allegory of a commonplace sort is too freely introduced. His most famous work is a collection of portraits of the ladies of the court of Charles II., known as ” the Beauties,” formerly at Windsor Castle, and now

preserved at Hampton Court Palace. Of his few historical pictures, the best is ” Susannah and the Elders,” at Burleigh House. His ” Jupiter and Europa,” in the duke of Devonshire’s collection, is also worthy of note. Lely was nearly as famous for crayon work as for oil-painting. Towards the close of his life he often retired to an estate which he had bought at Kew. He died of apoplexy in the Piazza, Covent Garden, London, and was buried in Covent Garden church, where a monument was afterwards erected to his memory. Pepys characterized Lely as “a mighty proud man and full of state.” The painter married an English lady of family, and left a son and daughter, who died young. His only disciples were J. Greenhill and J. Buckshorn; he did not, however, allow them to obtain an insight into his special modes of work. (W. M. R.)

LE MAQON (or Le Masson), ROBERT (c. 1365-1443), chan- cellor of France, was born at Chateau du Loir, Sarthe. He was ennobled in March 1401 , and became six years later a councillor of Louis II., duke of Anjou and king of Sicily. A partisan of the house of Orleans, he was appointed chancellor to Isabella of Bavaria on the 29th of January 1414, on the 20th of July commissary of the mint, and in June 1416 chancellor to the count of Ponthieu, afterwards Charles VII. On the 16th of August he bought the barony of Treves in Anjou, and henceforward bore the title of seigneur of Treves. When Paris was surprised by the Burgundians on the night of the 29th of May 141 8 he assisted Tanguy Duchatel in saving the dauphin. His devotion to the cause of the latter having brought down on him the wrath of John the Fearless, duke of Burgundy, he was excluded from the political amnesty known as the peace of Saint Maur des Fosses, though he retained his seat on the king’s council. He was by the dauphin’s side when John the Fearless was murdered at the bridge of Montereau on the 10th of September 1419. He resigned the seals at the beginning of 1422; but he continued to exercise great influence, and in 1426 he effected a reconciliation between the king and the duke of Brittany. Having been captured by Jean de Langeac, seneschal of Auvergne, in August of the same year, he was shut up for three months in the chateau of Usson. When set at liberty he returned to court, where he staunchly supported Joan of Arc against all the cabals that menaced her. It was he who signed the patent of nobility for the Arc family in December 1429. In u.30 he was once more entrusted with an embassy to Brittany.. Having retired from political life in 1436, he died on the 28th of January 1443, and was interred at Treves, where his epitaph may still be seen.

See C. Bourcier, ” Robert le Masson,” in the Revue historique de I’ Anjou (1873); and the Nouvelle biographic generate, vol. xxx.

(J.V.*)

LE MAIRE DE BELGES, JEAN (1473-e. 1525), French poet and historiographer, was born at Bavai in Hainault. He was a nephew of Jean Molinet, and spent some time with him at Valenciennes, where the elder writer held a kind of academy of poetry. Le Maire in his first poems calls himself a disciple of Molinet. In certain aspects he does belong to the school of the grands rhUoriqueurs, but his great merit as a poet is that he emancipated himself from the affectations and puerilities of his masters. This independence of the Flemish school he owed in part perhaps to his studies at the university of Paris and to the study of the Italian poets at Lyons, a centre of the French renascence. In 1503 he was attached to the court of Margaret of Austria, duchess of Savoy, afterwards regent of the Netherlands. For this princess he undertook more than one mission to Rome; he became her librarian and a canon of Valenciennes. To her were addressed his most original poems, Epistres de Vamand verd, the amant vert being a green parrot belonging to his patroness. Le Maire gradually became more French in his sympathies, eventually entering the service of Anne of Brittany. His prose Illustrations des Gaules et singularitez de Troye (1510-1512), largely adapted from Benoit de Sainte More, connects the Bur- gundian royal house with Hector. Le Maire probably died before 1525. fitienne Pasquier, Ronsard and Du Bellay all acknow- ledged their indebtedness to him. In his love for antiquity, his sense Of rhythm, and even the peculiarities of his vocabulary he anticipated the PUiade.

His works were edited in 1882-1885 by J. Stecher, who wrote the article on him in the Biographie nationale de Belgique.

LEMAITRE, FRANCOIS ELIE JULES (1853-), French critic and dramatist, was born at Vennecy (Loiret) on the 27th of April 1853. He became a professor at the university of Grenoble, but he had already become known by his literary criticisms, and in 1884 he resigned his position to devote himself entirely to literature. He succeeded J. J. Weiss as dramatic critic of the Journal des Dibats, and subsequently filled the same office on the Revue des Deux Mondes. His literary studies were collected under the title of Les Contemporains (7 series, 1886- 1899), and his dramatic jeuilletons as Impressions de tkedtre (10 series, 1888-1898). His sketches of modern authors are interesting for the insight displayed in them, the unexpectedness of the judgments and the gaiety and originality of their expression. He published two volumes of poetry: Les Medaillons (1880) and Petites orientates (1883) ; also some volumes of contes, among them En marge des vieux livres (1905). His plays are: Rivoltee (1889), Le depute Leveau,

and Le Manage blanc (1891), Les Rots (1893), Le Pardon and V Age difficile (1895), La Massiere (1905) and Bertrade (1906). He was admitted to the French Academy on the 16th of January 1896. His political views were defined in La Campagne nationaliste (1902), lectures delivered in the provinces by him and by G. Cavaignac. He conducted a nationalist campaign in the Echo de Paris, and was for some time president of the Ligue de la Patrie Francaise, but resigned in 1904, and again devoted himself to literature.

LE MANS, a town of north-western France, capital of the department of Sarthe, 77 m. S.W. of Chartres on the railway from Paris to Brest. Pop. (1906) town, 54,907, commune, 65,467. It is situated just above the confluence of the Sarthe and the Huisne, on an elevation rising from the left bank of the Sarthe. Several bridges connect the old town and the new quarters which have sprung up round it with the more extensive quarter of Pre on the right bank. Modern thoroughfares are gradually superseding the winding and narrow streets of old houses; a tunnel connects the Place des Jacobins with the river side. The cathedral, built in the highest part of the town, was originally founded by St Julian, to whom it is dedicated. The nave dates from the nth and 1 2th centuries. In the 13th century the choir was enlarged in the grandest and boldest style of that period. The transepts, which are higher than the nave, were rebuilt in the 15th century, and the bell-tower of the south

transept, the lower part of which is Romanesque, was rebuilt in the 15th and 16th centuries. Some of the stained glass in the nave, dating from the first half of the 12th century, is the oldest in France; the west window, representing the legend of St Julian, is especially interesting. The south lateral portal (12th century) is richly decorated, and its statuettes exhibit many costumes of the period. The austere simplicity of the older part of the building is in striking contrast with the lavish richness of the ornamentation in the choir, where the stained glass is especially fine. The rose- window (15th century) of the north transept, representing the Last Judgment, contains many historical figures. The cathedral also has curious tapestries and some remarkable tombs, including that of Berengaria, queen of Richard Cceur de Lion. Close to the western wall is a megalithic monument nearly 15 ft. in height. The church of La Couture, which belonged to an old abbey founded in the 7th century by St Bertrand, has a porch of the 13th century with fine statuary; the rest of the building is older. The church of Notre-Dame

du Pre, on the right bank of the Sarthe, is Romanesque in style. The hotel de ville was built in 1756 on the site of the former castle of the counts of Maine; the prefecture (1760) occupies the site of the monastery of La Couture, and contains the library, the communal archives, and natural history and art collections; there is also an archaeological museum. Among the old houses may be mentioned the Hotel du Grabatoire of the Renaissance, once a hospital for the canons and the so-called house of Queen Berengaria (16th century), meeting place of the historical and archaeological society of Maine. A monument to General Chanzy commemorates the battle of Le Mans (1871). Le Mans is the seat of a bishopric dating from the 3rd century, of a prefect, and of a court of assizes, and headquarters of the IV. army corps. It has also tribunals of first instance and of commerce, a council of trade-arbitrators, a chamber of commerce, a branch of the Bank of France, an exchange, a lycee for boys, training colleges, a higher ecclesiastical seminary and a school of music. The town has a great variety of industries, carried on chiefly in the southern suburb of Pontlieue. The more important are the state manufacture of tobacco, the preparation of preserved vegetables, fish. &c, tanning, hemp-spinning, bell-founding, flour-milling, the founding of copper and other metals, and the manufacture of railway wagons, machinery and engineering material, agri- cultural implements, rope, cloth and stained glass. The fatten- ing of poultry is an important local industry, and there is trade in cattle, wine, cloth, farm-produce, &c. The town is an important railway centre.

As the capital of the Aulerci Cenomanni, Le Mans was called Suindinum or Vindinum. The Romans built walls round it in the 3rd century, and traces of them are still to be seen close to the left bank of the river near the cathedral. In the same century the town was evangelized by St Julian, who became its first bishop. Ruled at first by his successors— notably St Aldric — Le Mans passed in the middle ages to the counts of Maine (q.v.), whose capital and residence it became. About the middle of the nth century the citizens secured a communal charter, but in 1063 the town was seized by William the Conqueror, who deprived them of their liberties, which were recovered when the countship of Maine had passed to the Plantagenet kings of England. Le Mans was taken by Philip Augustus in 1189, recaptured by John, subsequently confiscated and later ceded to Queen Beren- garia, who did much for its prosperity. It was several times besieged in the 15th and 16th centuries. In 1703 it was seized by the Vendeans, who were expelled by the Republican generals Marceau and Westermann after a stubborn battle in the streets. Jn 1 709 it was again occupied by the Chouans.

The battle of Le Mans (ioth-i2th January 1871) was the culminating point of General Chanzy's fighting retreat into western France after the winter campaign in Beauce and Perche (see Franco-German War). The numerous, but ill-trained and ill-equipped, levies of (he French were followed up by Prince Frederick Charles with the German II. Army, now very much weakened but consisting of soldiers who had in six months' active warfare acquired the self-confidence of veterans. The

Germans advanced with three army corps in first line and one in reserve. On the 9th of January the centre corps (III.) drove an advanced division of the French from Ardenay (13 m. E. of Le Mans). On the 10th of January Chanzy's main defensive position was approached. Its right wing was east of the Sarthe and 3-5 m. from Le Mans, its centre on the heights of Anvours with the river Huisne behind it, and its left scattered along the western bank of the same river as far as Montfort (12 m. E.N.E. of Le Mans) and thence northward for some miles. On the 10th there was a severe struggle for the villages along the front of the French centre. On the nth Chanzy attempted a counter- offensive from many points, but owing to the misbehaviour of certain of his rawest levies, the Germans were able to drive him back, and as their cavalry now began to appear beyond his extreme left flank, he retreated in the night of the nth on Laval, the Germans occupying Le Mans after a brief rearguard fight on the 1 2th.

LE MARCHANT, JOHN GASPARD (1766-1812), English major-general, was the son of an officer of dragoons, John Le Marchant, a member of an old Guernsey family. After a some- what wild youth, Le Marchant, who entered the army in 1781, attained the rank of lieutenant-colonel in 1797. Two years before this he had designed a new cavalry sword; and in 1801 his scheme for establishing at High Wycombe and Great Marlow schools for the military instruction of officers was sanctioned by Parliament, and a grant of £30,000 was voted for the " royal military college," the two original departments being afterwards combined and removed to Sandhurst. Le Marchant was the first lieutenant-governor, and during the nine years that he held this appointment he trained many officers who served with distinction under Wellington in the Peninsula. Le Marchant himself was given, the command of a cavalry brigade in 1810, and greatly distinguished himself in several actions, being killed at the battle of Salamanca on the 22nd of July 1812, after the charge of his brigade had had an important share in the English victory. He wrote several treatises on cavalry tactics and other military subjects, but few of them were published. By his wife, Mary, daughter of John Carey of Guernsey, Le Marchant had four sons and six daughters.

His second son, Sir Denis le Marchant, Bart. (1795-1874), was educated at Eton and Trinity College, Cambridge, and was called to the bar in 1823. In 1830 he became secretary to Lord Chancellor Brougham, and in the Reform Bill debates made himself exceedingly useful to the ministers. Having been secretary to the board of trade from 1836 to 1841, he was created a baronet in 1841. He entered the House of Commons in 1846, and was under secretary for the home department in the govern- ment of Lord John Russell. He was chief clerk of the House of Commons from 1850 to 1871. He published a Life of his f ather in 1841, and began a Life of Lord Althorpe which was completed after his death by his son; he also edited Horace Walpole's Memoirs of the Reign of George III. (1845). Sir Denis Le Marchant died in London on the 30th of October 1874.

The third son of General Le Marchant, Sir John Gaspard Le Marchant (1803-1874), entered the English army, and saw service in Spain in the Carlist War of 1835-37. He was after- wards lieutenant-governor of Newfoundland (1847-1852) and of Nova Scotia (1852-1857); governor of Malta (1859-1864); commander-in-chief at Madras (186 5-1 868). Fie was made K.C.B. in 1865, and died on the 6th of February 1874.

See Sir Denis Le Marchant, Memoirs of General Le Marchant (1841); Sir William Napier, History of the War in the Peninsula (6 vols., 1 82 8- 1 84.0).

LEMBERG (Pol. Lwow, Lat. Leopolds), the capital of the crownland of Galicia, Austria, 468 m. N.W. of Vienna by rail. Pop. (1900) 159,618, of whom over 80% were Poles, 10% Germans, and 8% Ruthenians; nearly 30% of the population were Jews. According to population Lemberg is the fourth city in the Austrian empire, coming after Vienna, Prague and Trieste. Lemberg is situated on the small river Peltew, an affluent of the Bug, in a valley in the Sarmatian plateau, and is surrounded by hills. It is composed of the inner town and of four suburbs.

The inner town was formerly fortified, but the fortifications were transformed into pleasure grounds in 1811. Lemberg is the residence of Roman Catholic, Greek Catholic and Armenian archbishops, and contains three cathedrals. The Roman Catholic cathedral was finished by Casimir IV. in 1480 in Gothic style; near it is a chapel (1609)

remarkable for its architecture and sculpture. The Greek cathedral, built in 1740-1779 in the Basilica style, is situated on a height which dominates the town. The Armenian cathedral was built in 1437 in the Armenian- Byzantine style. The Dominican church, built in 1749 after the model of St Peter's at Rome, contains a monument by Thorvaldsen to the Countess Dunin-Borkowska; the Greek St Nicholas church was built in 1292; and the Roman Catholic St Mary church was built in 1363 by the first German settlers. The town hall (1828-1837) with a tower 250 ft. high is situated in the middle of a square.- Also notable are the hall of the estates (1 877-1881), the industrial museum, the theatre, the palace of the Roman Catholic archbishop and several educational establishments. There are many beautiful private buildings, broad and well-paved streets, numerous squares and public gardens. At the head of the educational institutions stands the university, founded in 1784 by Joseph II., transformed into a lycee in 1S03, and restored and reorganized in 1817. Since 1871 (he language of instruction has been Polish, and in 1901 the university had 1 10 lecturers, and was attended by 2060 students. There are also a polytechnic, gymnasia — for Poles, Ruthenians and Germans respectively — seminaries for priests, training colleges for teachers, and other special and technical schools. In Lemberg is the National Institute founded by Count Ossolinski, which contains a library of books and manuscripts relating chiefly to the history and literature of Poland, valuable anti- quarian and scientific collections, and a printing establishment; also the Dzieduszycki museum with collections of natural history and ethnography relating chiefly to Galicia. Industrially and commercially Lemberg is the most important city in Galicia, its industries including the manufacture of machinery and iron wares, matches, stearin candles and naphtha, arrack and liqueurs, chocolate, chicory, leather and plaster of Paris, as well as brewing, corn-milling and brick and tile making. It has important commerce in linen, flax, hemp, wool and seeds, and a considerable transit trade. Of the well-wooded hills which surround Lemberg, the most important is the Franz- Josef-Berg to the N.E., with an altitude of 13 10 ft. Several beautiful parks have been laid out on this hill.

Leopolis was founded about 1259 by the Ruthenian prince Leo Danilowicz, who moved here his residence from Halicz in 1270. From Casimir the Great, who captured it in 1340, it received the Magdeburg rights, and for almost two hundred years the public records were kept in German. In 141 2 it became the see of a Roman Catholic archbishopric, and from 1432 until 1772 it was the capital of the Polish province of Reussen (Terra Russia). During the whole period of Polish supremacy it was a most important city, and after the fall of

Constantinople it greatly developed its trade with the East. In 1648 and 1655 it was besieged by the Cossacks, and in 1672 by the Turks. Charles XII. of Sweden captured it in 1704. In 1848 it was bombarded.
LEMERCIER, LOUIS JEAN NEPOMUCENE (1771-1840), French poet and dramatist, was born in Paris on the 21st of April 1 77 1. His father had been intendant successively to the due dc Penthievre, the comte de Toulouse and the unfortunate princesse de Lamballe, who was the boy's godmother. Lemercier showed great precocity; before he was sixteen his tragedy of Mel-eagre was produced at the Thedtre Franqais. Clarissa Harlowe (1792) provoked the criticism that the author was not assez roue pour peindre les roueries. Le Tartufe revolutionnaire, a parody full of the most audacious political allusions, was suppressed after the fifth representation. In 1795 appeared Letnercier's masterpiece Agamemnon, called by Charles Labitte the last great antique tragedy in French literature. It was a great success, but was violently attacked later by Geoffroy, who stigmatized it as a bad caricature of Crebillon. Quatre metamorphoses (1799) was written to prove that the most indecent

subjects might be treated without offence. The Pinto (1800) was the result of a wager that no further dramatic innovations were possible after the comedies of Beaumarchais. It is a historical comedy on the subject of the Portuguese revolution of 1640. This play was construed as casting reflections on the first consul, who had hitherto been a firm friend of Lemercier. His extreme freedom of speech finally offended Napoleon, and the quarrel proved disastrous to Lemercier's fortune for the time. None of his subsequent work fulfilled the expectations raised by Agamemnon, with the exception perhaps of Fredegonde et Brunehaut (1821). In 1810 he was elected to the Academy, where he consistently opposed the romanticists, refusing to give his vote to Victor Hugo. In spite of this, he has some pretensions to be considered the earliest of the romantic school. His Ckristophe Colomb (1809), advertised on the playbill as a comedie shakes pirienne (sic), represented the interior of a ship, and showed no respect for the unities. Its numerous innovations provoked such violent disturbances in the audience that one person was killed and future representations had to be guarded by the police. Lemercier wrote four long and ambitious epic poems: Homere, Alexandre (1801), L'Atlantiade, ou la theogonie newlonienne (181 2) and Moise (1823), as well as an extraordinary Panhypocrisiade (1819-1832), a distinctly romantic production in twenty cantos, which has the sub-title Spectacle infernal du XVI" si'ccle. In it 16th-century history, with Charles V. and Francis I. as principal personages, is played out on an imaginary stage by demons in the intervals of their sufferings. Lemercier died on the 7th

of June 1840 in Paris.

LEMERY, NICOLAS (1645-17 15), French chemist, was born at Rouen on the 17th of November 1645. After learning pharmacy in his native town he became a pupil of C. Glaser's in Paris, and then went to Montpellier, where he began to lecture on chemistry. He next established a pharmacy in Paris, still continuing his lectures, but in 1683, being a Calvinist, he was obliged to retire to England. In the following year he returned to France, and turning Catholic in 1686 was able to reopen his shop and resume his lectures. He died in Paris on the 19th of June 1 715. Lemery did not concern himself much with theoretical speculations, but holding chemistry to be a demonstrative science, confined himself to the straightforward exposition of facts and experiments. In consequence, his lecture-room was thronged with people of all sorts, anxious to hear a man who shunned the barren obscurities of the alchemists, and did not regard the quest of the philosopher's stone and the elixir of life as the sole end of his science. Of his Cours de chymie (1675) he lived to see 13 editions, and for a century it maintained its reputation as a standard work. His other publications included Pharmacopee universelle (1697), Traite universel des drogues simples (1698), Traite de I'antimoine (1707), together with a number of papers contributed to the French Academy, one of which offered a chemical and physical explanation of underground fires, earthquakes, lightning and thunder. He discovered that heat is evolved when iron filings and sulphur are rubbed together to a paste with water, and the artificial volcan de Lemery was produced by burying underground a considerable quantity of this mixture, which he regarded as a potent agent in the causation of volcanic action.

His son Louis (1677-1743) was appointed physician at the Hotel Dieu in 1710, and became demonstrator of chemistry at the Jardin du Roi in 1731. He was the author of a Traite des aliments (1702), and of a Dissertation sur la nature des os (1704), as well as of a number of papers on chemical topics.

LEMERY, a town of the province of Batangas, Luzon, Philip- pine Islands, on the Gulf of Balayan and the Pansipit river, opposite Taal (with which it is connected by a bridge), and about 50 m. S. of Manila. Pop. of the municipality (1903) 11,150. It has a fine church and convent. Lemery is situated on a plain in a rich agricultural district, which produces rice, Indian corn, sugar and cotton, and in which horses and cattle are bred. It is also a port for coasting vessels, and has an important trade with various parts of the archipelago. The language is Tagalog.

LEMGO, a town of Germany, in the principality of Lippe, in a broad and fertile plain, 9 m. N. from Detmold and on the railway Hameln-Lage. Pop. (1900) 8840. Its somewhat gloomy aspect, enhanced by the tortuous narrow lanes Hanked by gabled houses of the 15th century, has gained for it among countryfolk the sobriquet of the ” Witches' nest ” (Hcxen-Nest). It is replete with interest for the antiquarian. It has four Evangelical churches, two with curiously leaning, lead-covered spires; an old town-hall; a gymnasium; and several philanthropic and religious institutions. Among the latter is the Jungfrauenstift, of which a princess of the reigning house of Lippe-Detmold has always been lady superior since 1306. The chief industry of Lemgo is the manufacture of meerschaum pipes, which has attained here a high pitch of excellence; other industries are weaving, brewing and the manufacture of leather and cigars. The town was a member of the Hanseatic league.

LEMIERRE, ANTOINE MARIN (1733-1793), French drama- tist and poet, was born in Paris on the 12th of January 1733. His parents were poor, but Lemierre found a patron in the collector-general of taxes, Dupin, whose secretary he became. Lemierre gained his first success on the stage with Hypermnestre (175S); Teree (1761) and Idomenee (1764) failed on account of the subjects. Artaxcrce, modelled on Metastasio, and Guillaume Tell were produced in 1766; other successful tragedies were La Veuve de Malabar (1770) and Bamavelt (1784). Lemierre revived Guillaume Tell in 1786 with enormous success. After the Revolution he professed great remorse for the production of a play inculcating revolutionary principles, and there is no doubt that the horror of the excesses he witnessed hastened his death, which took place on the 4th of July 1793. He had been admitted to the Academy in 1781. Lemierre published La Peinturc (1769), based on a Latin poem by the abbe de Marsy, and a poem in six cantos, Les Fastes, ou les usages de I'annee (1779), an unsatisfactory imitation of Ovid's Fasti.

His CEuvres (1810) contain a notice of Lemierre by R. Perrin. and his CEuvres choisies (181 1) one by F. Fayolle.

LEMIRE, JULES AUGUSTE (1853-), French priest and social reformer, was born at Vieux-Berquin (Nord) on the 23rd of April 1853. He was educated at the college of St Francis of Assisi, Hazebrouck, where he subsequently taught philosophy and rhetoric. In 1897 he was elected

deputy for Hazebrouck and was returned unopposed at the elections of 1898, 1902 and 1906. He organized a society called La Ligue du coin de terre et du foyer, the object of which was to secure, at the expense of the state, a piece of land for every French family desirous of possess- ing one. The abbe Lemire sat in the chamber of deputies as a conservative republican and Christian Socialist. He protested in 1893 against the action of the Dupuy cabinet in closing the Bourse du Travail, characterizing it as the expression of ” a policy of disdain of the workers.” In December 1893 he was seriously injured by the bomb thrown by the anarchist Vaillant from the gallery of the chamber.

LEMMING, the native name of a small Scandinavian rodent mammal Lemmus norvegicus (or L. lemmus), belonging to the mouse tribe, or Muridae, and nearly related, especially in the structure of its cheek-teeth, to the voles. Specimens vary considerably in size and colour, but the usual length is about 5 in., and the soft fur yellowish-brown, marked with spots of dark brown and black. It has a short, rounded head, obtuse muzzle, small bead-like eyes, and short rounded ears, nearly concealed by the fur. The tail is very short. The feet are small, each with five claws, those of the fore feet strongest, and fitted for scratching and digging. The usual habitat of lemmings is the high lands or fells of the great central mountain chain of Norway and Sweden, from the southern branches of the Langfjeldene in Christiansand stiff to the North Cape and the Varangerfjord. South of the Arctic circle they are, under ordinary circumstances, confined to the plateaus covered with dwarf birch and juniper above the conifer-region, though in Tromso amt and in Finmarken they occur in all suitable localities down to the level of the sea. The nest, under a tussock of grass or a stone, is constructed of short dry straws, and usually lined with hair. The number of

young in each nest is generally five, sometimes only three occasionally seven or eight, and at least two broods are produced annually. Their food is entirely vegetable, especially grass roots and stalks, shoots of dwarf birch, reindeer lichens and mosses, in search of which they form, in winter, long galleries through the turf or under the snow. They are restless, courageous and pugnacious little animals. When suddenly disturbed, instead of trying to escape they sit upright, with their back against a stone, hissing and showing fight in a determined manner.

The circumstance which has given popular interest to the lemming is that certain districts of the cultivated lands of Norway and Sweden, where in ordinary circumstances they are unknown, are, at uncertain intervals varying from five to twenty or more years, overrun by an

army of these little creatures, which steadily and slowly advance, always in the same direction, and regardless of all obstacles, swimming streams and even lakes of several miles in breadth, and committing considerable devasta- tion on their line of march by the quantity of food they consume. In their turn they are pursued and harassed by crowds of beasts

The Norwegian Lemming {Lemmus Norvegicus).

and birds of prey, as bears, wolves, foxes, dogs, wild cats, stoats, weasels, eagles, hawks and owls, and never spared by man; even domestic animals, as cattle, goats and reindeer, join in the destruction, stamping them to the ground with their feet, and even eating their bodies. Numbers also die from diseases produced apparently from overcrowding. None returns, and the onward march of the survivors never ceases until they reach the sea, into which they plunge, and swimming onwards in the same direction perish in the waves. These sudden appearances of vast bodies of lemmings, and their singular habit of persistently pursuing the same onward course of migration, have given rise to various speculations, from the ancient belief of the Norwegian peasants, shared by Olaus Magnus, that they fall down from the clouds, to the hypothesis that they are acting in obedience to an instinct inherited from ancient times, and still seeking the congenial home in the submerged Atlantis, to which their ancestors of the Miocene period were wont to resort when driven from their ordinary dwelling-places by crowding or scarcity of food. The principal facts regarding these migrations seem to be as follows. When any combination of circumstances has occa- sioned an increase of the numbers of the lemmings in their ordinary dwelling-places, impelled by the restless or migratory instinct possessed in a less developed degree by so many of their congeners, a movement takes place at the edge of the elevated plateau, and a migration towards the lower-lying land begins. The whole body moves forward slowly, always advancing in the

same general direction in which they originally started, but following more or less the course of the great valleys. They only travel by night; and, staying in congenial places for considerable periods, with unaccustomed abundance of provender, notwith- standing the destructive influences to which they are exposed, they multiply excessively during their journey, having families more numerous and

frequent than in their usual homes. The progress may last from one to three years, according to the route taken, and the distance to be traversed until the sea-coast is reached, which in a country so surrounded by water as the Scandinavian peninsula must be the ultimate goal of such a journey. This may be either the Atlantic or the Gulf of Bothnia, according as the migration has commenced from the west or the east side of the central elevated plateau. Those that finally perish in the sea, committing what appears to be a voluntary suicide, are only acting under the same blind impulse which has led them previously to cross shallower pieces of water with safety. In Eastern Europe, Northern Asia and North America the group is represented by the allied L. obensis, and in Alaska, by L. nigripcs; while the circumpolar banded lemming, Dicrostonyx torquatns, which turns white in winter, represents a second genus taking its name from the double claws on one of the toes of the forefeet.

For habits of lemmings, see R. Collett, Myodes lemmus, its habits and migrations in Norway (Christiania Videnskabs-Selskabs For-handlinger, 1895). (W. H. F. ; R. L.*)

LEMNISCATE (from Gr. XrifivLaKos, ribbon), a quartic curve invented by Jacques Bernoulli (Acta Eruditorum, 1694) and afterwards investigated by Giulio Carlo Fagnano, who gave its principal properties and applied it to effect the division of a quadrant into 2-2 m , 3”2 m and 5-2 m equal parts. Following Archimedes, Fagnano desired the curve to be engraved on his tombstone. The complete analytical treatment was first given by Leonhard Euler. The lemniscate of Bernoulli may be defined as the locus of a point which moves so that the product of its distances from two fixed points is constant and is equal to the square of half the distance between these points. It is therefore a particular form of Cassini’s oval (see Oval). Its cartesian equation, when the line joining the two fixed points is the axis of x and the middle point of this line is the origin, is (x 2 + y 2) 2 = 2(7-(x 2 – > > 2) and the polar equation is r 2 —2a? cos 20. The curve (tig. 1) consists of two loops symmetrically placed about the coordinate axes. The pedal equation is r 3 = a?p, which shows

Fig. 1.

Fig. 2.

Fig. 3.

that it is the first positive pedal of a rectangular hyperbola with regard to the centre. It is also the inverse of the same curve for the same

point. It is the envelope of circles described on the central radii of an ellipse as diameters. The area of the complete curve is 2a 2 , and the length of any arc may be expressed in the form /(i-ar'J^y.x, an elliptic integral sometimes termed the lemniscalic integral.

The name lemniscate is sometimes given to any crunodal quartic curve having only one real finite branch which is symmetric about the axis. Such curves are given by the equation y? — y* = ax iJ - bx'-y i +cy\ If a be greater than b the curve resembles fig. 2 and is sometimes termed the fishtail-lemniscate ; if a be less than b, the curve resembles fig. 3. The same name is also given to the first positive pedal of any centra! conic. When the conic is a rectangular hyper- bola, the curve is the lemniscate of Bernoulli previously described. The elliptic lemniscate has for its equation (x—-y 2) i = a' i x 2 --b 2 y i or r 2 = a? cos 2 0+i 2 sin 2 9 (a>b). The centre is a conjugate point (or acnode) and the curve resembles fig. 4. The hyperbolic lemniscate has for its equation (x 2J cy 2) 2 = a 2 × 2 — b"y or r 2 = a"- cos 2 9 — b 2 sin 2 0. In this case the centre is a crunode

Fig. 4.

Fig. 5.

and the curve resembles fig. 5. inicursal bicircular quartics.

These curves are instances of

LEMNOS (mod. Limnos), an island in the northern part of the Aegean Sea. The Italian form of the name, Stalimene, i.e. is rf/v Arj/xvov, is not used in the island itself, but is commonly employed in geographical works. The island, which belongs to Turkey, is of considerable size: Pliny says that the coast -line measured 112 J Roman miles, and the area has been estimated at 150 sq. m. Great part is mountainous, but some very fertile valleys exist, to cultivate which 2000 yoke of oxen are employed. The hill-sides afford pasture for 20,000 sheep. No forests exist on the island; all wood is brought from the coast of Rumelia or from Thasos. A few mulberry and fruit trees grow, but no olives. The population is estimated by some as high as 27,000, of whom 2000 are Turks and the rest Greeks, but other authorities doubt whether it reaches more than half this number. The chief towns are Kastro on the western coast, with a population of 4000 Greeks and 800 Turks, and Mudros on the southern coast. Kastro possesses an excellent harbour, and is the seat of all the trade carried on with the island. Greek, English and Dutch consuls or consular

agents were formerly stationed there; but the whole trade is now in Greek hands. The archbishops of Lemnos and Ai Strati, a small neighbouring island with 2000 inhabitants, resides in Kastro. In ancient times the island was sacred to Hephaestus, who as the legend tells fell on Lemnos when his father Zeus hurled him headlong out of Olympus. This tale, as well as the name Aethaleia, sometimes applied to it, points to its volcanic character. It is said that fire occasionally blazed forth from Mosychlos, one of its mountains; and Pausanias (viii. 33) relates that a small island called Chryse, off the Lemnian coast, was swallowed up by the sea. All volcanic action is now extinct.

The most famous product of Lemnos is the medicinal earth, which is still used by the natives. At one time it was popular over western Europe under the name terra sigillata. This name, like the Gr. A-qfivia acfrpayls, is derived from the stamp impressed on each piece of the earth ; in ancient times the stamp was the head of Artemis. The Turks now believe that a vase of this earth destroys the effect of any poison drunk from it — -a belief which the ancients attached rather to the earth from Cape Kolias in Attica. Galen went to see the digging up of this earth (see Kuhn, Medic. Gr. Opera, xii. 172 sq.) ; on one day in each year a priestess performed the due ceremonies, and a waggon-load of earth was dug out. At the present time the day selected is the 6th of August, the feast of Christ the Saviour. Both the Turkish hodja and the Greek priest are present to perform the necessary ceremonies; the whole process takes place before daybreak. The earth is sold by apothecaries in stamped cubical blocks. The hill from which the earth is dug is a dry mound, void of vegetation, beside the village of Kotschinos, and about two hours from the site of Hephaestia. The earth was considered in ancient times a cure for old festering wounds, and for the bite of poisonous snakes.

The name Lemnos is said by Hecataeus (ap. Steph. Byz.) to have been a title of Cybele among the Thracians, and the earliest inhabitants are said to have been a Thracian tribe, called by the Greeks Sinties, i.e. ” the robbers.” According to a famous legend the women were all deserted by their husbands, and in revenge murdered every man on the island. From this barbarous act, the expression Lemnian deeds, Arjixvia efrya, became pro- verbial. The Argonauts landing soon after found only women in the island, ruled over by Flypsipyle, daughter of the old king Thoas. From the Argonauts and the Lemnian women were descended the race called Minyae, whose king Euneus, son of Jason and Hypsipyle, sent wine and provisions to the Greeks at Troy. The Minyae were expelled by a Pelasgian tribe who came from Attica. The historical element underlying these traditions is probably that the original Thracian people were gradually brought into communication

with the Greeks as navigation began to unite the scattered islands of the Aegean (see Jason); the Thracian inhabitants were barbarians in comparison with the Greek mariners. The worship of Cybele was characteristic of Thrace, whither it spread from Asia Minor at a very early period, and it deserves notice that Hypsipyle and Myrina (the name of one of the chief towns) are Amazon names, which are always connected with Asiatic Cybele- worship. Coming down to a better authenticated period, we find that I Lemnos was conquered by Otanes, one of the generals of Darius

Hystaspis; but was soon reconquered by Miltiades, the tyrant | of the Thracian Chersonese. Miltiades afterwards returned to Athens, and Lemnos continued an Athenian possession till the Macedonian empire absorbed it. On the vicissitudes of its history in the 3rd century B.C. see Kohler in Mittheil. Inst. Athen. i. 261 The Romans declared it free in 197 B.C., but gave it over in 166 to Athens, which retained nominal possession of it till the whole of Greece was made a Roman province. A colony of Attic cleruchs was established by Pericles, and many inscriptions on the island relate to Athenians After the division of the empire, Lemnos passed under the Byzantine emperors; it shared in the vicissitudes of the eastern provinces, being alternately in the power of Greeks, Italians and Turks, till finally the Turkish sultans became supreme in the Aegean. In 1476 the Venetians successfully defended Kotschinos against a Turkish siege; but in 1657 Kastro was captured by the Turks from the Venetians after a siege of sixty-three days. Kastro was again besieged by the Russians in 1770.

Homer speaks as if there were one town in the island called Lemnos, but in historical times there was no such place. There were two towns, Myrina, now Kastro, and Hephaestia. The latter was the chief town; its coins are found in considerable number, the types being sometimes the Athenian goddess and her owl, sometimes native religious symbols, the caps of the Dioscuri, Apollo, &c. Few coins of Myrina are known. They belong to the period of Attic occupation, and bear Athenian types. A few coins are also known which bear the name, not of either city, but of the whole island. Conze was the first to discover the site of Hephaestia, at a deserted place named Palaeokastro on the east coast. It had once a splendid harbour, which is now filled up. Its situation on the east explains why Miltiades attacked it first when he came from the Chersonese. It surrendered at once, whereas Myrina, with its very strong citadel built on a perpendicular rock, sustained a

siege. It is said that the shadow of Mount Athos fell at sunset on a bronze cow in the agora of Myrina. Pliny says that Athos was 87 m. to the north-west; but the real distance is about 40 English miles. One legend localized in Lemnos still requires notice. Philoctetes was left there by the Greeks on their way to Troy; and there he suffered ten years' agony from his wounded foot, until Ulysses and Xeoptolemus induced him to accompany them to Troy. He is said by Sophocles to have lived beside Mount Hermaeus, which Aeschylus (Agam. 262) makes one of the beacon points to flash the news of Troy's downfall home to Argos.

See Rhode, Res Lemnicae; Conze, Reise auf den Inseln des Thrakischen Meeres (from which the above-mentioned facts about the present state of the island are taken) ; also Hunt in Walpcle's Travels ; Belon du Mans, Observations de plusieurs singularites, &c. ; Finlay, Greece under the Romans; von Hammer, Gesch. des ihman. Reich.es; Gott. Gel. Anz. (1837). The chief references in ancient writers are Iliad i. 593, v. 138, xiv. 229, &c. ; Herod, iv^. 145; Str. pp. 124, 330; Plin. iv. 23, xxxvi. 13.

LEMOINNE, JOHN EMILE (1815-1892), French journalist, was born of French parents, in London, on the 17th of October 1815. He was educated first at an English school and then in France. In 1840 he began writing for the Journal des debats, on English and other foreign questions, and under the empire he held up to admiration the free institutions of England by contrast with imperial methods. After 187 1 he supported Thiers, but his sympathies rather tended towards a liberalized monarchy, until the comte de Chambord's policy made such a development an impossibility, and he then ranged himself with the moderate Republicans. In 1875 Lemoinne was elected to the French Academy, and in 1880 he was nominated a life senator. Distinguished though he was for a real knowledge of England among the French journalists who wrote on foreign affairs, his tone towards English policy greatly changed in later days, and though he never shared the extreme French bitterness against England as regards Egypt, he maintained a critical attitude which served to stimulate French Anglophobia. He was a frequent contributor to the Revue des deux mondes, and published several books, the best known of which is his

Etudes critiques et biographiques (1862). He died in Paris on the 14th of December 1892.

LEMON, MARK (1809-1870), editor of Punch, was born in London on the 30th of November 1809. He had a natural talent for journalism

and the stage, and, at twenty-six, retired from less congenial business to devote himself to the writing of plays. More than sixty of his melodramas, operettas and comedies were produced in London. At the same time he contributed to a variety of magazines and newspapers, and founded and edited the Field. In 1841 Lemon and Henry Mayhew conceived the idea of a humorous weekly paper to be called Punch, and when the first number was issued, in July 1841, were joint-editors and, with the printer and engraver, equal owners. The paper was for some time unsuccessful, Lemon keeping it alive out of the profits of his plays. On the sale of Punch Lemon became sole editor for the new proprietors, and it remained under his control until his death, achieving remarkable popularity and influence. Lemon was an actor of ability, a pleasing lecturer and a success- ful impersonator of Shakespearian characters. He also wrote a host of novelettes and lyrics, over a hundred songs, a few three-volume novels, several Christmas fairy tales and a volume of jests. He died at Crawley, Sussex, on the 23rd of May 1870.

LEMON, the fruit of Citrus Limonum, which is regarded by some botanists as a variety of Citrus medica. The wild stock of the lemon tree is said to be a native of the valleys of Kumaon and Sikkim in the North-West provinces of India, ascending to a height of 4000 ft., and occurring under several forms. Sir George Watt (Dictionary of Economic Products of India, ii. 352) regards the wild plants as wild forms of the lime or citron and considers it highly probable that the wild form of the lemon has not yet been discovered.

The lemon seems to have been unknown to the ancient Greeks and Romans, and to have been introduced by the Arabs

Citrus Limonum.

3, Fruit.

4, Same cut across.

5, Seed.

6, Same cut lengthwise.

1, Flowering shoot.

2, Flower with two petals and

two bundles of stamens re- moved ; slightly enlarged.

into Spain between the 12th and 13th centuries. In 1494 the fruit was cultivated in the Azores, and largely shipped to England, but since 1838 the exportation has ceased. As a cultivated plant the lemon is now met with throughout the Mediterranean region, in Spain and Portugal, in California and Florida, and in almost all tropical and subtropical countries. Like the apple and pear, it varies exceedingly under cultivation. Risso and Poiteau enumerate forty-seven varieties of this fruit, although they maintain as distinct the sweet lime, C. Limetta, with eight varieties, and the sweet lemon, C. Lumia, with twelve varieties, which differ only in the fruit possessing an insipid instead of an acid juice.

The lemon is more delicate than the orange, although, according to Humboldt, both require an annual mean temperature of 62 Fahr.

4H

LEMON

Unlike the orange, which presents a fine close head of deep green foliage, it forms a straggling bush, or small tree, 10 to 12 ft. high, with paler, more scattered leaves, and short angular branches with sharp spines in the axils. The flowers, which possess a sweet odour quite distinct from that of the orange, are in part hermaphrodite and in part unisexual, the outside of the corolla having a purplish hue. The fruit, which is usually crowned with a nipple, consists of an outer rind or peel, the surface of which is more or less rough from the convex oil receptacles imbedded in it, and of a white inner rind, which is spongy and nearly tasteless, the whole of the interior of the fruit being filled with soft parenchymatous tissue, divided into about ten to twelve compartments, each generally containing two or three seeds. The white inner rind varies much in thickness in different kinds, but is never so thick as in the citron. As lemons are much more profitable to grow than oranges, on account of their keeping properties, and from their being less liable to injury during voyages, the cultivation of the lemon is preferred in Italy wherever it will succeed. In damp valleys it is liable like the orange (q.v.) to be attacked by a fungus sooty mould, the stem, leaves, and fruit becoming covered with a blackish dust. This is coincident with or subsequent to the attacks of a small oval brown insect, Chermes hesperidum. Trees not properly exposed to sunlight and air suffer most severely from these pests. Syringing with resin-wash or milk of lime when the young insects are hatched, and before they have fixed themselves to the plant, is a preventive. Since 1875 this fungoid disease has made great ravages in Sicily among the lemon and citron trees, especially around Catania and Messina. Heritte

attributes the prevalence of the disease to the fact that the growers have induced an unnatural degree of fertility in the trees, permitting them to bear enormous crops year after year. This loss of vitality is in some measure met by grafting healthy scions of the lemon on the bitter orange, but trees so grafted do not bear fruit until they are eight or ten years old.

The lemon tree is exceedingly fruitful, a large one in Spain or Sicily ripening as many as three thousand fruits in favourable seasons. In the south of Europe lemons are collected more or less during every month of the year, but in Sicily the chief harvest takes place from the end of October to the end of December, those gathered during the last two months of the year being considered the best for keeping purposes. The fruit is gathered while still green. After collection the finest specimens are picked out and packed in cases, each containing about four hundred and twenty fruits, and also in boxes, three of which are equal to two cases, each lemon being separately packed in paper. The remainder, consisting of ill-shaped or unsound fruits, are reserved for the manufacture of essential oil and juice. The whole of the sound lemons are usually packed in boxes, but those which are not exported immediately are carefully picked over and the unsound ones removed before shipment. The exporta- tion is continued as required until April and May. The large lemons with a rougher rind, which appear in the London market in July and August, are grown at Sorrento near Naples, and are allowed to remain on the trees until ripe.

Candied lemon peel is usually made in England from a larger variety of the lemon cultivated in Sicily on higher ground than the common kind, from which it is distinguished by its thicker rind and larger size. This kind, known as the Spadaforese lemon, is also allowed to remain on the trees until ripe, and when gathered the fruit is cut in half longitudinally and pickled in brine, before being exported in casks. Before candying the lemons are soaked in fresh water to remove the salt. Citrons are also exported from Sicily in the same way, but these are about six times as expensive as lemons, and a comparatively small quantity is shipped. Besides those exported from Messina and Palermo, lemons are also imported into England to a less extent from the Riviera of Genoa, and from Malaga in Spain, the latter being the most esteemed. Of the numerous varieties the wax lemon, the imperial lemon and the Gaeta lemon are considered to be the best. Lemons are also extensively grown in California and Florida.

Lemons of ordinary size contain about 2 oz. of juice, of specific gravity 1-039-1-046, yielding on an average 32-5 to 42-53 grains of citric acid per oz. The amount of this acid, according to Stoddart,

varies in different seasons, decreasing in lemons kept from February to July, at first slowly and afterwards rapidly, until at the end of that period it is all split up into glucose and carbonic acid — the specific gravity of the juice being in February 1-046, in May 1-041 and in July 1-027, while the fruit is hardly altered in appearance. It has been stated that lemons may be kept for some months with scarcely perceptible deterioration by varnishing them with an

alcoholic solution of shellac — the coating thus formed being easily removed when the fruit is required for household use by gently kneading it in the hands. Besides citric acid, lemon juice contains 3 to 4% of gum and sugar, albuminoid matters, malic acid and 2-28% of inorganic salts. Cossa has determined that the ash of dried lemon juice contains 54 % of potash, besides 15 % of phosphoric acid. In the white portion of the peel (in common with other fruits of the genus) a bitter principle called hesperidin has been found. It is very slightly soluble in boiling water, but is soluble in dilute alcohol and in alkaline solutions, which it soon turns of a yellow or reddish colour. It is also darkened by tincture of perchloride of iron. Another substance named lemonin, crystallizing in lustrous plates, was discovered in 1879 by Palerno and Aglialoro in the seeds, in which it is present in very small quantity, 15,000 grains of seed yielding only 80 grains of it. It differs from hesperidin in dissolving in potash without alteration. It melts at 275° F.

The simplest method of preserving lemon juice in small quantities for medicinal or domestic use is to keep it covered with a layer of olive or almond oil in a closed vessel furnished with a glass tap, by which the clear liquid may be drawn off as required. Lemon juice is largely used on shipboard as a preventive of scurvy. By the Merchant Shipping Act 1867 every British ship going to other countries where lemon or lime juice cannot be obtained was required to take sufficient to give 1 oz. to every member of the crew daily. Of this juice it requires about 13,000 lemons to yield I pipe (108 gallons). Sicilian juice in November yields about 9 oz. of crude citric acid per gallon, but only 6 oz. if the fruit is collected in April. The crude juice was formerly exported to England, and was often adulterated with sea-water, but is now almost entirely replaced by lime juice. A concentrated lemon juice for the manufacture of citric acid is prepared in considerable quantities, chiefly at Messina and Palermo, by boiling down the crude juice in copper vessels over an open fire until its specific gravity is about 1-239, seven to ten pipes of raw making only one of concentrated lemon juice. ” Lemon juice ” for use on shipboard is prepared also from the fruits of limes and Bergamot oranges. It is said to be sometimes adulterated with sulphuric acid on arrival in England.

The lemon used in medicine is described in the British pharmacopoeia as being the fruit of Citrus medica, var. Limonum. The preparations of lemon peel are of small importance. From the fresh peel is obtained the oleum limonis (dose j-3 minims), w ; hich has the characters of its class. It contains a terpene known as citrene or limonene, which also occurs in orange peel: and citral, the aldehyde of geraniol, which is the chief constituent of oil of roses. Of much importance is the succus limonis or lemon juice, 1 oz. of which contains about 40 grains of free citric acid, besides the citrate of potassium (-25 %) and malic acid, free and combined. Ten per cent, of alcohol must be added to lemon juice if it is to be kept. From it are prepared the syrupus limonis (dose -2 drachms), which consists of sugar, lemon juice and an alcoholic extract of lemon peel, and also citric acid itself. Lemon juice is practically impure citric acid (q.v.).

Essence or Essential Oil of Lemon. — The essential oil contained in the rind of the lemon occurs in commerce as a distinct article. It is manufactured chiefly in Sicily, at Reggio in Calabria, and at Mentone and Nice in France. The small and irregularly shaped fruits are employed while still green, in which state the yield of oil is greater than when they are quite ripe. In Sicily and Calabria the oil is extracted in November and December as follows. A workman cuts three longitudinal slices off each lemon, leaving a three-cornered central core having a small portion of rind at the apex and base. These pieces are then divided transversely and cast on one side, and the strips of peel are thrown in another place. Next day the pieces of peel are deprived of their oil by pressing four or five times successively the outer surface of the peel (zest or flavedo) bent into a convex shape, against a flat sponge held in the palm of the left hand and wrapped round the forefinger. The oil vesicles in the rind, which are ruptured more easily in the fresh fruit than in the state in which lemons are imported, yield up their oil to the sponge, which when saturated is squeezed into an earthen vessel furnished with a spout and capable of holding about three pints. After a time the oil separates from the watery liquid which accom- panies it, and is then decanted. By this process four hundred fruits yield 9 to 14 oz. of essence. The prisms of pulp are afterwards expressed to obtairt lemon juice, and then distilled to obtain the small quantity of volatile oil they contain. At Mentone and Nice a different process is adopted. The lemons are placed in an ecuelle a piquer, a shallow basin of pewter about 8| in. in diameter, having a lip for pouring on one side and a closed tube at the bottom about 5 in. long and 1 in. in diameter. A number of stout brass pins stand up about half an inch from the bottom of the vessel. The workman rubs a lemon over these pins, which rupture the oil vesicles,

and the oil collects in the tube, which when it becomes full is emptied into another vessel that it may separate from the aqueous liquid mixed with it. When filtered it is known as Essence de citron au zeste, or, in the English market, as perfumers' essence of lemon, inferior qualities being distinguished as druggists' essence of lemon. An additional product is obtained by immersing the scarified lemons in warm water and separating the oil which floats off. Essence de citron distillee is obtained by rubbing the surface of fresh lemons

(or of those which have been submitted to the action of the ecuelle a piquer) on a coarse grater of tinned iron, and distilling the grated peel. The oil so obtained is colourless, and of inferior fragrance, and is sold at a lower price, while that obtained by the cold processes has a yellow colour and powerful odour.

Essence of lemon is chiefly brought from Messina and Palermo packed in copper bottles holding 25 to 50 kilogrammes or more, and sometimes in tinned bottles of smaller size. It is said to be rarely found in a state of purity in commerce, almost all that comes into the market being diluted with the cheaper distilled oil. This fact may be considered as proved by the price at which the essence of lemon is sold in England, this being less than it costs the manu- facturer to make it. When long kept the essence deposits a white greasv stearoptene, apparently identical with the bergaptene obtained from the essential oil of the Bergamot orange. The chief constituent of oil of lemon is the terpene, Ci Hi 6 , boiling at 348°-8 Fahr., which, like oil of turpentine, readily yields crystals of terpin, C10H163OH2, but diffe r s in yielding the crystalline compound, CinHie+2Cl, oil of turpentine forming one having the formula CinHie + HCl- Oil of lemons also contains, according to Tilden, another hydrocarbon, G0H16, boiling at 3-20° Fahr., a small amount of cymene, and a compound acetic ether, CjHaO-CioHnO. The natural essence of lemon not being wholly soluble in rectified spirit ot wine, an essence for culinary purposes is sometimes prepared by digesting 6 oz of lemon peel in one pint of pure alcohol of 95 %, and, when the rind has become brittle, which takes place in about two and a half hours, powdering it and percolating the alcohol through it This article is known as " lemon flavour."

The name lemon is also applied to some other fruits. The Java lemon is the fruit of Citrus javanica, the pear lemon of a variety of C.

Limetta, and the pearl lemon of C. margarita. The fruit of a passion-flower, Passiflora laurifolia, is sometimes known as the water-lemon, and that of a Berberidaceous plant, Podophyllum pcltalum, as the wild lemon. In France and Germany the lemon is known as the citron, and hence much confusion arises concern- ing the fruits referred to in different works. The essential oil known as oil of cedrat is usually a factitious article instead of being prepared, as its name implies, from the citron (Fr. cedratier) . An essential oil is also prepared from C. Lumia, at Squillace in Calabria, and has an odour like that of Bergamot but less powerful.

The sour lime is Citrus acida, generally regarded as a var. {acida) of C. medica. It is a native of India, ascending to about 4000 ft. in the mountains, and occurring as a small, much-branched thorny bush. The small flowers are white or tinged with pink

Fig. 2. — Lime

Flowering shoot.

Fruit.

Same cut transversel

Seed.

4 5

Citrus medica, var. acida.

5, Seed cut lengthwise.

6, Seed cut transversely.

7, Superficial view of portion of

rind showing oil glands.

on the outside; the fruit is small and generally round, with a thin, light green or lemon-yellow bitter rind, and a very sour, somewhat bitter juicy pulp. It is extensively cultivated throughout the West Indies, especially in Dominica, Montserrat and Jamaica, the approximate annual value of the exports from these islands being respectively £45,000, £6000 and £6000. The plants are grown from seed in nurseries and planted out about 200 to the

acre. They begin to bear from about the third year, but full crops are not produced until the trees are six or seven years old. The ripe yellow fruit is gathered as it falls. The fruit is bruised by hand in a funnel-shaped vessel known as an ecuelle, with a hollow stem; by rolling the fruit on a number of points on the side of the funnel the oil cells in the rind are broken and the oil collects in the hollow stem — this is the essential oil or essence of limes. The fruits are then taken to the mill, sorted, washed and passed through rollers and exposed to two squeezings. Two-thirds of the juice is expressed by the first squeezing, is strained at once, done up in puncheons and exported as raw juice. The pro- duct of the second squeezing, together with the juice extracted by a subsequent squeezing in a press, is strained and evaporated down to make concentrated juice; ten gallons of the raw juice yield one gallon of the concentrated juice. The raw juice is used for preparations of lime juice cordial, the concentrated for manufactures of citric acid.

On some estates citrate of lime is now manufactured in place of concentrated acid. Distilled oil of limes is prepared by distilling the juice, but its value is low in comparison with the expressed oil obtained by hand as described above. Green limes and pickled limes preserved in brine are largely exported to the United States, and more recently green limes have been exported to the United Kingdom. Limalade or preserved limes is an excellent substitute for marmalade. A spineless form of the lime appeared as a sport in Dominica in 1 892, and is now grown there and elsewhere on a commercial scale. A form with seedless fruits has also recently been obtained in Dominica and Trinidad independently. The young leaves of the lime are used for perfuming the water in finger-glasses, a few being placed in the water and bruised before use.

LEMONNIER, ANTOINE LOUIS CAMILLE (1844-), Belgian poet, was born at Ixelles, Brussels, on the 24th of March 1844. He studied law, and then took a clerkship in a government office, which he resigned after three years. Lemonnier inherited Flemish blood from both parents, and with it the animal force and pictorial energy of the

Flemish temperament. He published a Salon de Bruxelles in 1863, and again in 1866. His early friend- ships were chiefly with artists; and he wrote art criticisms with recognized discernment. Taking a house in the hills near Namur, he devoted himself to sport, and developed the intimate sympathy with nature which informs his best work. Nos Flamands (1869) and Croquis d'automne (1870) date from this time. Paris-Berlin (1870), a pamphlet pleading the cause of France, and full of the author's horror of war, had a great Success. His capacity as a novelist, in the fresh, humorous description of peasant life, was revealed in Un Coin de village (1879). In Un Male (1881) he achieved a different kind of success. It deals with the amours of a poacher and a farmer's daughter, with the forest as a background. Cachapres, the poacher, seems the very embodiment of the wild life around him. The rejection of Un Mdle by the judges for the quinquennial prize of literature in 1883 made Lemonnier the centre of a school, inaugurated at a banquet given in his honour on the 27th of May 1883. Le Mori (1882), which describes the remorse of two peasants for a murder they have committed, is a masterpiece in its vivid representation of terror. It was remodelled as a tragedy in five acts (Paris, 1899) by its author. Ceux de la glebe (1889), dedicated to the " children of the soil," was written in 1885. He turned aside from local subjects for some time to produce a series of psychological novels, books of art criticism, &c., of considerable value, but assimilating more closely to French contemporary literature. The most striking of his later novels are: L'Hysterique (1885); Happe-chair (1886), often compared with Zola's Germinal; Le Possede (1890); La Fin des bourgeois (1892); L'Arcke, journal d'une maman (1894), a quiet book, quite different from his usual work; La Faule de Mme Charvet (1895); L' Homme en amour (1897); and, with a return to Flemish subjects, Le Vent dans les moulins (1901); Petit Homme de Dieu (1902), and Comme va le ruisseau (1903). In 1888 Lemonnier was prosecuted in Paris foroffending against public morals by a story in Gil Bias, and was condemned to a fine. In a later prosecution at Brussels he was defended by Edmond Picard, and acquitted; and he was arraigned for a third time, at Bruges, for his Homme en amour, but again

acquitted. He represents his own case in Les Deux consciences (1902). L'lle vierge (1897) was the first of a trilogy to be called La Legende de la vie, which was to trace, under the fortunes of the hero, the pilgrimage of man through sorrow and sacrifice to the conception of the divinity within him. In Adam et Eve (1899), and Au Cceur frais de

la foret (1900), he preached the return to nature as the salvation not only of the individual but of the community. Among his other more important works are G. Courbet, et ses ceuvres (1878); L'Histoire des Beaux-Arts en Belgique 1830-1887 (1887); En Allemagne (1888), dealing especially with the Pinakothek at Munich; La Belgique (1888), an elaborate descriptive work with many illustrations; La Vie beige (1905) ; and Alfred Stevens et son ceuvre (1906).

Lemonnier spent much time in Paris, and was one of the early contributors to the Mercure de France. He began to write at a time when Belgian letters lacked style; and with much toil, and some initial extravagances, he created a medium for the expression of his ideas. He explained something of the process in a preface contributed to Gustave Abel's Labeur de la prose (1902). His prose is magnificent and sonorous, but abounds in neologisms and strange metaphors.

See the Revue de Belgique (15th February 1903), which contains the syllabus of a series of lectures on Lemonnier by Edmond Picard, a bibliography of his works, and appreciations by various writers.

LEMONNIER, PIERRE CHARLES (17 15-1799), French astronomer, was born on the 23rd of November 1715 in Paris, where his father was professor of philosophy at the college d'Harcourt. His first recorded observation was made before he was sixteen, and the presentation of an elaborate lunar map procured for him admission to the Academy, on the 21st of April 1736, at the early age of twenty. He was chosen in the same year to accompany P. L. Maupertuis and Alexis Clairault on their geodetical expedition to Lapland. In 1738, shortly after his return, he explained, in a memoir read before the Academy, the advantages of J. Flamsteed's mode of determining right ascensions. His persistent recommendation, in fact, of English methods and instruments contributed effectively to the reform of French practical astronomy, and constituted the most eminent of his services to science. He corresponded with J. Bradley, was the first to represent the effects of nutation ii\ the solar tables, and introduced, in 1741, the use of the transit- instrument at the Paris observatory. He visited England in 1748, and, in company with the earl of Morton and James Short the optician, continued his journey to Scotland, where he observed tne annular eclipse of July 25. The liberality of Louis XV., in whose favour he stood high, furnished him with the means of procuring the best instruments, many of them by English makers. Amongst the fruits of his industry may be mentioned a laborious investigation of the disturbances of Jupiter by Saturn, the results of which were employed and confirmed by L. Euler in his prize essay of 1748; a series of lunar observations extending over fifty years; some

interesting researches in terrestrial magnetism and atmospheric electricity, in the latter of which he detected a regular diurnal period; and the determina- tion of the places of a great number of stars, including twelve separate observations of Uranus, between 1765 and its discovery as a planet. In his lectures at the college de France he first publicly expounded the analytical theory of gravitation, and his timely patronage secured the services of J. J. Lalande for astronomy. His temper was irritable, and his hasty utterances exposed him to retorts which he did not readily forgive. Against Lalande, owing to some trifling pique, he closed his doors " during an entire revolution of the moon's nodes." His career was arrested by paralysis late in 1791, and a repetition of the stroke terminated his life. He died at Heril near Bayeux on the 31st of May 1799. By his marriage with Mademoiselle de Cussy he left three daughters, one of whom became the wife of J. L. Lagrange. He was admitted in 1739 to the Royal Society, and was one of the one hundred and forty-four original members of the Institute.

He wrote Histoire celeste (1741); Theorie des cometes (1743), a translation, with additions of Halley's Synopsis; Institutions astronomiques (1746), an improved translation of J. Keill's text-

book; Nouveau zodiaque (1755); Observations de la lune, du soleil, et des etoiles fixes (1751— 1775) ; Lois du magnetisme (1776-1778), &c, See J. J. Lalande, Bibl. astr., p. 819 (also in the Journal des savants for 1801); F. X. von Zach, Allgemeine geog. Ephemeriden iii. 625; J. S. Bailly, Hist, de t'astr. moderne, iii. ; J. B. J. Delambre. Hist, de I'astr. au XV III", siecle, p. 179; J. Madler, Geschichte der Himmelskunde, ii. 6; R. Wolf, Geschichte der Astronomie, p. 480.

LEMOYNE, JEAN BAPTISTE (1704-1778), French sculptor, was the pupil of his father, Jean Louis Lemoyne, and of Robert le Lorrain. He was a great figure in his day, around whose modest and kindly personality there waged opposing storms of denunciation and applause. Although his disregard of the classic tradition and of the essentials of dignified sculpture, as well as his lack of firmness and of intellectual grasp of the larger principles of his art, lay him open to stringent criticism, de Clarac's charge that he had delivered a mortal blow at sculpture is altogether exaggerated. Lemoyne's more important works have for the most part been destroyed or have disappeared. The equestrian statue of " Louis XV." for the military school, and the composition of " Mignard's daughter, Mme Feuquieres, kneeling before her father's bust " (which bust was from the hand of Coysevox) were subjected to the violence by which Bouchardon's equestrian monument of Louis XIV. (?.».) was destroyed. The panels

only have been preserved. In his busts evidence of his riotous and florid imagination to a great extent disappears, and we have a remarkable series of important portraits, of which those of women are perhaps the best. Among Lemoyne's leading achievements in this class are " Fontenelle " (at Versailles), "Voltaire," " Latour " (all of 1748), "Due de la Valiere " (Versailles), " Comte de St Florentin," and "Crebillon" (Dijon Museum); "Mile Chiron" and "Mile Dangeville," both produced in 1761 and both at the Theatre Francais in Paris, and " Mme de Pompadour," the work of the same year. Of the Pompadour he also executed a statue in the costume of a nymph, very delicate and playful in its air of grace. Lemoyne was perhaps most successful in his training of pupils, one of the leaders of whom was Falconnet.

LEMPRIERE, JOHN (c. 1765-1824), English classical scholar, was born in Jersey, and educated at Winchester and Pembroke College, Oxford. He is chiefly known for his Bibliotheca Classica or Classical Dictionary (1788), which, edited by various later scholars, long remained a readable if not very trustworthy reference book in mythology and classical history. In 1792, after holding other scholastic posts, he was appointed to the head- mastership of Abingdon grammar school, and later became the vicar of that parish. While occupying this living, he published a Universal Biography of Eminent Persons in all Ages and Countries (1808). In 1809 he succeeded to the head-mastership of Exeter free grammar school. On retiring from this, in consequence of a disagreement with the trustees, he was given the living of Meeth in Devonshire, which, together with that of Newton Petrock, he held till his death in London on the 1st of February 1824.

LEMUR (from Lat. lemures, " ghosts "), the name applied by Linnaeus to certain peculiar Malagasy representatives of the order Primates (q.v.) which do not come under the designation of either monkeys or apes, and, with allied animals from the same island and tropical Asia and Africa, constitute the sub-order Prosimiae, or Lemuroidea, the characteristics of which are given in the article just mentioned. The typical lemurs include species like Lemur mongoz and L. catta, but the English name " lemur " is often taken to include all the members of the sub-order, although the aberrant forms are often conveniently termed " lemuroids." All the Malagasy lemurs, which agree in the structure of the internal ear, are now included in the family Lemuridae, confined to Madagascar and the Comoro Islands, which comprises the great majority of the group. The other families are the Nycticebidae, common to tropical Asia and Africa, and the Tarsiidae, restricted to the Malay countries. In the more typical Lemuridae there are two pairs of upper incisor teeth, separated by a gap in the middle line; the premolars may be either two or three, but the molars, as in

the lower jaw, are always three on each side. In the lower jaw the incisors and canines are directed straight forwards, and are of small size

and nearly similar form; the function of the canine being discharged by the first premolar, which is larger than the other teeth of the same series. With the exception of the second toe of the hind-foot, the digits have well-formed, flattened nails as in the majority of monkeys. In the members of the typical genus Lemur, as well as in the allied Hapalemur and Lepidolemur, none of the toes or fingers are connected by webs, and all have the hind-limbs of moderate length, and the tail long. The maximum number of teeth is 36, there being typically two pairs of incisors and three of premolars in each jaw. In habits some of the species are nocturnal and others diurnal; but all subsist on a mixed diet, which includes birds, reptiles, eggs, insects and fruits. Most are arboreal, but the ring-tailed lemur (L. catta) often dwells among rocks. The species of the genus Lemur are diurnal, and may be recognized by the length of the muzzle, and the large tufted ears. In some cases, as in the black lemur (L. macaco) the two sexes are differ- ently coloured; but in others, especially the ruffed lemur (L. varius), there is much individual variation in this respect, scarcely any two being alike. The gentle lemurs (Hapalemur) have a rounder head, with smaller ears and a shorter muzzle, and also a bare patch covered with spines on the fore-arm. The sportive lemurs (Lepidolemur) are smaller than the typical species of Lemur, and the adults generally lose their upper incisors. The head is short and conical, the ears large, round and mostly bare, and the tail shorter than the body. Like the gentle lemurs they are nocturnal. (See Avahi, Aye-Aye, Gai.ago. Ixdri, Loris, Potto, Sifaka and Tarsif.r.) (R. L.*)

LENA, a river of Siberia, rising in the Baikal Mountains, on the W. side of Lake Baikal, in 54° 10′ N. and 107 55′ E. Wheeling round by the S., it describes a semicircle, then flows N.N.E. and N.E., being joined by the Kirenga and the Vitim, both from the right; from 113° E. it flows E.N.E as far as Yakutsk (62° N., 127 40′ E.), where it enters the lowlands, after being joined by the Olekma, also from the right. From Yakutsk it goes X. until joined by its right-hand affluent the Aldan.which deflects it to the north-west; then, after receiving its most important left-hand tributary, the Vilyui, it makes its way nearly due X. to the Nordenskjold Sea, a division of the Arctic, disemboguing S.W. of the New Siberian Islands by a delta 10.800 sq. m. in area, and

traversed by seven principal branches, the most important being Bylov, farthest east. The total length of the river is estimated at 2860 m. The delta arms sometimes remain blocked with ice the whole year round. At Yakutsk navigation is generally practicable from the middle of May to the end of October, and at Kirensk, at the confluence of the Lena and the Kirenga, from the beginning of May to about the same time. Between these two towns there is during the season regular steamboat communication. The area of the river basin is calculated at 895,500 sq. m. Gold is washed out of the sands of the Vitim and the Olekma, and tusks of the mammoth are dug out of the delta.

See G. W. Melville, In the Lena Delta (1885). LE NAIN, the name of three brothers, Louis, Antoine and Mathieu, who occupy a peculiar position in the history of French art. Although they figure amongst the original members of the French Academy, their works show no trace of the influences which prevailed when that body was founded. Their sober execution and choice of colour recall characteristics of the Spanish school, and when the world of Paris was busy with mythological allegories, and the ” heroic deeds ” of the king, the three Le Nain devoted themselves chiefly to subjects of humble life such as ” Boys Playing Cards,” ” The Forge,” or ” The Peasants’ Meal.” These three paintings are now in the Louvre; various others may be found in local collections, and some fine drawings may be seen in the British Museum; but the Le Xain signature is rare, and is never accompanied by initials which might enable us to distinguish the work of the brothers. Their lives are lost in obscurity; all that can be affirmed is that they were born at Laon in Picardy towards the close of the 16th century. About 1629 they went to Paris; in 1648 the three brothers ww received into the Academy, and in the same year

m. 14

both Antoine and Louis died. Mathieu lived on till August 1677; he bore the title of chevalier, and painted many portraits. Mary of Medici and Mazarin were amongst his sitters, but these works seem to have disappeared.

See Champfleury, Essai sur la vie et Voeuvre des Le Nain (1850), and Catalogue des tableaux des Le Nain (1861).

LENAU, NIKOLAUS, the pseudonym of Nikolaus Franz Niembsch von Strehlenau (1802-1850), Austrian poet, who was born at Csatad near Temesvar in Hungary, on the 15th of August 1802. His father, a government official, died at Budapest in 1807, leaving his children to the care of an affectionate, but jealous and somewhat hysterical,

mother, who in 1811 married again. In 1819 the boy went to the university of Vienna; he subsequently studied Hungarian law at Pressburg and then spent the best part of four years in qualifying himself in medicine. But he was unable to settle down to any profession. He had early begun to write verses ; and the disposition to sentimental melancholy acquired from his mother, stimulated by love dis- appointments and by the prevailing fashion of the romantic school of poetry, settled into gloom after his mother's death in 1829. Soon afterwards a legacy from his grandmother enabled him to devote himself wholly to poetry. His first published poems appeared in 1827, in J. G. Seidl's Aurora. In 1831 he went to Stuttgart, where he published a volume of Gedichte- (1832) dedicated to the Swabian poet Gustav Schwab. Here he also made the acquaintance of Uhland, Justinus Kerner, Karl Mayer 1 and others; but his restless spirit longed for change, and he determined to seek for peace and freedom in America. In October 1832 he landed at Baltimore and settled on a home- stead in Ohio. But the reality of life in " the primeval forest " fell lamentably short of the ideal he had pictured; he disliked the Americans with their eternal " English lisping of dollars " (englischcs Talergelispel); and in 1833 he returned to Germany, where the appreciation of his first volume of poems revived his spirits. From now on he lived partly in Stuttgart and partly in Vienna. In 1836 appeared his Faust, in which he laid bare his own soul to the world; in 1837, Savonarola, an epic in which freedom from political and intellectual tyranny is insisted upon as essential to Christianity. In 1838 appeared his Neuere Gedichte, which prove that Savonarola had been but the result of a passing exaltation. Of these new poems, some of the finest were inspired by his hopeless passion for Sophie von Lowenthal, the wife of a friend, whose acquaintance he had made in 1833 and who " understood him as no other." In 1842 appeared Die Albigenser, and in 1844 he began writing his Don Juan, a fragment of which was published after his death. Soon after- wards his never well-balanced mind began to show signs of aberration, and in October 1844 he was placed under restraint. He died in the asylum at Oberdobling near Vienna on the 22nd of August 1850. Lenau's fame rests mainly upon his shorter poems; even his epics are essentially lyric in quality. He is the greatest modern lyric poet of Austria, and the typical repre- sentative in German literature of that pessimistic Weltschmerz which, beginning with Byron, reached its culmination in the poetry of Leopardi.

Lenau's Sdmtliche Werke were published in 4 vols, by A. Grim (1855); but there are several more modern editions, as those by M.ˆochinKiivschncr' sDeutscheNationalliteratiir,vo\s.i$ ± -i$5 (1888),

and by E. Castle (2 vols., 1900). See A. Schurz, Lenaus Leben, grosstenteils aus des Dichters eigenen Brief en (1855); L. A. Frankl, Zu Lenaus Biographie (1854, 2nd ed., 1885); A. Marchand, Les Poetes lyriques de V Autriche (1881) ; L. A. Frankl, Lenaus Tagebuck und Brief e an Sophie Lowenthal (1891); A. Schlossar, Lenaus Briefe an die Familie Reinbeck (1896); L. Roustan, Lenau et son temps (1898); E. Castle, Lenau und die Familie Lowenthal (1906).

LENBACH, FRANZ VON (1836-1904), German painter, was born at Schrobenhausen, in Bavaria, on the 13th of December 1836. His father was a mason, and the boy was intended to follow his father's trade or be a builder. With this view he was sent to school at Landsberg, and then to the polytechnic at Augsburg. But after seeing Hofner, the animal painter, execut-

1 Karl Friedrich Hartmann Mayer (1786-1870), poet, and bio- grapher of Uhland, was by profession a lawyer and government official in Wiirttemberg.

ing some studies, he made various attempts at painting, which his father's orders interrupted. However, when he had seen the galleries of Augsburg and Munich, he finally obtained his father's permission to become an artist, and worked for a short time in the studio of Grafle, the painter; after this he devoted much time to copying. Thus he was already accomplished in technique when he became the pupil of Piloty, with whom he set out for Italy in 1858. A few interesting works remain as the outcome of this first journey — " A Peasant seeking Shelter from Bad Weather" (1855), "The Goatherd" (i860, in the Schack Gallery, Munich), and "The Arch of Titus" (in the Palfy collection, Budapest). On returning to Munich, he was at once called to Weimar to take the appointment of professor at the Academy. But he did not hold it long, having made the acquaintance of Count Schack, who commissioned a great number of copies for his collection. Lenbach returned to Italy the same year, and there copied many famous pictures. He set out in 1867 for Spain, where he copied not only the famous pictures by Velasquez in the Prado, but also some landscapes in the museums of Granada and the Alhambra (1868). In the previous year he had exhibited at the great exhibition at Paris several portraits, one of which took a third-class medal. There- after

he exhibited frequently both at Munich and at Vienna, and in 1900 at the Paris exhibition was awarded a Grand Prix for painting. Lenbach, who died in 1904, painted many of the most remarkable personages of his time.

See Berlepsch, ” Lenbach,” Velhagen und Klasings Monatshefte (1891); Begouen, Les Portraits de Lenbach a I’exposition de Munich (1899); K. Knackfuss, Lenbach, and Franz von Lenbach Bildnisse

(1900).

LENCLOS, NINON DE (1615-1705), the daughter of a gentle- man of good position in Touraine, was born in Paris in November 161 5. Her long and eventful life divides into two periods, during the former of which she was the typical Frenchwoman of the gayest and most licentious society of the 17th century, during the latter the recognized leader of the fashion in Paris, and the friend of wits and poets. All that can be pleaded in defence of her earlier life is that she had been educated by her father in epicurean and sensual beliefs, and that she retained throughout the frank demeanour, and disregard of money, which won from Saint Evremond the remark that she was an honnite homme. She had a succession of distinguished lovers, among them being Gaspard de Coligny, the marquis d’Estrees, La Rochefoucauld, Conde and Saint Evremond. Queen Christina of Sweden visited her, and Anne of Austria was powerless against her. After she had continued her career for a pre- posterous length of time, she settled down to the social leadership of Paris. Among her friends she counted Mme de la Sabliere, Mme de la Fayette and Mme de Maintenon. It became the fashion for young men as well as old to throng round her, and the best of all introductions for a young man who wished to make a figure in society was an introduction to Mile de Lenclos. Her long friendship with Saint Evremond must be briefly noticed. They were of the same age, and had been lovers in their youth, and throughout his long exile the wit seems to have kept a kind remembrance of her. The few really authentic letters of Ninon are those addressed to her old friend, and the letters of both in the last few years of their equally long lives are exceptionally touching, and unique in the polite compliments with which they try to keep off old age. If Ninon owes part of her posthumous fame to Saint Evremond, she owes at least as much to Voltaire, who was presented to her as a promising boy poet by the abbe de Chateauneuf. To him she left 2000 francs to buy books, and his letter on her was the chief authority of many subsequent biographers. Her personal appearance is, according to Sainte-Beuve, best described in Clelie, a novel by Mile de Scudery, in which she figures as Clarisse. Her distin- guishing characteristic was neither

beauty nor wit, but high spirits and perfect evenness of temperament.

The letters of Ninon published after her death were, according to Voltaire, all spurious, and the only authentic ones are those to Saint Evremondi which can be best studied in Dauxmesnil's edition of Saint Evremond, and his notice on her. Sainte-Beuve has an

interesting notice of these letters in the Causeries du Lundi, vol. iv. The Correspondance authentique was edited by E. Colombey in 1886. See also Helen K. Hayes, The Real Ninon de I'Enclos (1908) ; and Mary C. Rowsell, Ninon de I'Enclos and her century (1910).

LENFANT, JACQUES (1661-1728), French Protestant divine, was born at Bazoche in La Beauce on the 13th of April 1661, son of Paul Lenfant, Protestant pastor at Bazoche and after- wards at Chatillon-sur-Loing until the revocation of the edict of Nantes, when he removed to Cassel. After studying at Saumur and Geneva, Lenfant completed his theological course at Heidel- berg, where in 1684 he was ordained minister of the French Protestant church, and appointed chaplain to the dowager electress palatine. When the French invaded the Palatinate in 1688 Lenfant withdrew to Berlin, as in a recent book he had vigorously attacked the Jesuits. Here in 1689 he was again appointed one of the ministers of the French Protestant church; this office he continued to hold until his death, ultimately adding to it that of chaplain to the king, with the dignity of Consistorialrath. He visited Holland and England in 1707, preached before Queen Anne, and, it is said, was invited to become one of her chaplains. He was the author of many works, chiefly on church history. In search of materials he visited Helmstadt in 1712, and Leipzig in 1715 and 1725. He died at Berlin on the 7th of August 1728.

An exhaustive catalogue of his publications, thirty-two in all, will be found in J. G. de Chauffepie's Dictionnaire. See also E. and S. Haag's France Protestante. He is now best known by his Histoire du concile de Constance (Amsterdam, 1714; 2nd ed., 1728; English trans., 1730). It is of course largely dependent upon the laborious work of Hermann von der Hardt (1660-1746), but has literary merits peculiar to itself, and has been praised on all sides for its fairness. It was followed by Histoire du concile de Pise (1724), and (posthumously) by Histoire de la guerre des Hussites et du concile de Basle (Amsterdam, 1731; German translation, Vienna, 1 783-1 784). Lenfant was one of the chief promoters of the Biblio- theque Germanique, begun in 1720; and he was associated with Isaac Beausobre (1659-1738) in the preparation of the new French translation of the New Testament with original notes, published at Amsterdam in 1718.

LENKORAN, a town in Russian Transcaucasia, in the govern- ment of Baku, stands on the Caspian Sea, at the mouth of a small stream of its own name, and close to a large lagoon. The lighthouse stands in 38 45′ 38″ N. and 48 50′ 18″ E. Taken by storm on New Year's day 18 13 by the Russians, Lenkoran was in the same year formally surrendered by Persia to Russia by the treaty of Gulistan, along with the khanate of Talysh, of which it was the capital. Pop. (1867) 15,933, (1897) 8768. The fort has been dismantled; and in trade the town is outstripped by Astara, the customs station on the Persian frontier.

The District of Lenkoran (2117 sq. m.) is a thickly wooded mountainous region, shut off from the Persian plateau by the Talysh range (7000-8000 ft. high), and with a narrow marshy strip along the coast. The climate is exceptionally moist and warm (annual rainfall 52-79 in.; mean temperature in summer 75° F., in winter 40°), and fosters the growth of even Indian species of vegetation. The iron tree (Parrotia persica), the silk acacia, Carpinus betulus, Quercus iberica, the box tree and the walnut flourish freely, as well as the sumach, the pomegranate, and the Gleditschia caspica. The Bengal tiger is not unfre- quently met with, and wild boars are abundant. Of the 131,361 inhabitants in 1897 the Talyshes (35,000) form the aboriginal element, belonging to the Iranian family, and speaking an independently developed language closely related to Persian. They are of middle height and dark complexion, with generally straight nose, small round skull, small sharp chin and large full eyes, which are expressive, however, rather of cunning than intelligence. They Hve exclusively on rice. In the northern half of the district the Tatar element predominates (40,000) and there are a number of villages occupied by Russian Raskolniks (Nonconformists). Agriculture, bee-keeping, silkworm-rearing and fishing are the principal occupations.

LENNEP, JACOB VAN (1 802-1 868), Dutch poet and novelist, was born on the 24th of March 1802 at Amsterdam, where his father, David Jacob van Lennep (1774-1853), a scholar and

poet, was professor of eloquence and the classical languages in the Athenaeum. Lennep took the degree of doctor of laws at Leiden, and then settled as an advocate in Amsterdam. His first poetical efforts had been translations from Byron, of whom he was an ardent admirer, and in 1826 he published a collection of original Academische Idyllen, which had some success. He first attained genuine popularity by the N

ederlandsche Legenden (2 vols., 1828) which reproduced, after the manner of Sir Walter Scott, some of the more stirring incidents in the early history of his fatherland. His fame was further raised by his patriotic songs at the time of the Belgian revolt, and by his comedies Het Dorp aan de Grenzen (1830) and Het Dorp over de Grenzen (1831), which also had reference to the political events of 1830. In 1833 he broke new ground with the publication of De Pleegzoon {The Adopted Son), the first of a series of historical romances in prose, which have acquired for him in Holland a position somewhat analogous to that of Sir Walter Scott in Great Britain. The series included De Roos van Dekama (2 vols., 1836), Onze Voorouders (5 vols., 1838), De Lotgcvallen van Ferdinand Huyck (2 vols., 1840), Elizabeth Musch (3 vols., 1850), and De Lotgevallen van Klaasje Zevenster (5 vols., 1865), several of which have been translated into German and French, and two — The Rose of Dekama (1847) and The Adopted Son (New York, 1847) — into English. His Dutch history for young people {Voornaamsle Geschiedenissen van N oord-N ederland aan mijne Kindern verhaald, 4 vols., 1845) is attractively written. Apart from the two comedies already mentioned, Lennep was an indefatigable journalist and literary critic, the author of numerous dramatic pieces, and of an excellent edition of Vondel's works. For some years Lennep held a judicial appointment, and from 1853 to 1856 he was a member of the second chamber, in which he voted with the conservative party. He died at Oosterbeek near Arnheim on the 25th of August 1868.

There is a collective edition of his Poetische Werken (13 vols., 1859-1872), and also of his Romantische Werken (23 vols., 1855-1872). See also a bibliography by P. Knoll (1869); and Jan ten Brink, Geschiedenis der Noord- Nederlandsche Letteren in de XIX° Eeu~u> (No. iii.).

LENNEP, a town of Germany, in the Prussian Rhine province, 18 m. E. of Dusseldorf, and 9 m. S. of Barmen by rail, at a height of 1000 ft. above the level of the sea. Pop. (1905) 10,323. It lies in the heart of one of the busiest industrial districts in Germany, and carries on important manufactures of the finer kinds of cloth, wool, yarn and felt, and also of iron and steel goods. It has an Evangelical and a Protestant church, a modern school and a well-equipped hospital. Lennep, which was the residence of the counts of Berg from 1226 to 1300, owes the foundation of its prosperity to an influx of Cologne weavers during the 14th century.

LENNOX, a name given to a large district in Dumbartonshire and Stirlingshire, which was erected into an earldom in the latter half of

the 12th century. It embraced the ancient sheriffdom of Dumbarton and nineteen parishes with the whole of the lands round Loch Lomond, formerly Loch Leven, and the river of that name which glides into the estuary of the Clyde at the ancient castle of Dumbarton.

On this river Leven, at Balloch, was the seat of Alwin, first earl of Lennox. It is probable that he was of Celtic descent, but the records are silent as to his part in history; that he was earl at all is only proved from the charters of his son, another Alwin, and he died some time before 121 7. The second Alwin was father of ten sons, one of whom founded the clan Macfarlane, famous in the annals of the district, while another was ancestor of Walter of Farlane, who married the heiress of the 6th earl of Lennox. Maldouen, the 3rd earl, eldest of the sons of Alwin the younger, is an historical personage; he was a witness to the treaty between Alexander II., king of Scotland, and his brother-in-law the English king Henry III., at Newcastle in 1237, concerning the much disputed northern counties of England. His grandson, Malcolm, successor to the title, swore fealty to Edward I. in 1296; it was apparently his son, another Malcolm, the 5th earl, who was summoned by Edward to parliament

and entrusted with the important post of guarding the fords of the river Forth. But the 5th earl soon after gave his services to the party of Bruce, the cause of that family having been embraced by his father as early as 1292. As a result the English king bestowed the earldom on Sir John Menteith, who was holding it in 1307 while the real earl was with King Robert Bruce in his wanderings in the Lennox country. For his services he was rewarded with a renewal of the earldom and the keeping of Dumbarton Castle; he fell fighting for his country at Halidon Hill in 1333. His son Donald, the 6th earl, an adherent of King David II., left a daughter, Margaret, countess of Lennox, who was married to her kinsman the above-mentioned Walter of Farlane, nearest heir male of the Lennox family.

In 1392, on the marriage of their grand-daughter Isabella, eldest daughter of Duncan, 8th earl, with Sir Murdoch Stewart, afterwards duke of Albany, the earldom was resigned into the hands of the king, who re-granted it to Earl Duncan, with remainder to the heirs male of his body, with remainder to Murdoch and Isabella and the heirs of their bodies begotten between them, with eventual remainder to Earl Duncan’s nearest and lawful heirs. In 1424, when Murdoch, then duke of Albany, succeeded in ransoming the poet king James I. from his long English captivity, the aged Earl Duncan went with the Scottish party to Durham. The next year, however, he suffered the fate of Albany, being executed perhaps for no other reason than that he was

his father-in-law. The earldom was not forfeited, and the widowed duchess of Albany, now also countess of Lennox, lived secure in her island castle of Inchmurrin on Loch Lomond until her death. Of her four sons, none of whom left legitimate issue, the eldest died in 142 1, the two next suffered their father's fate at Stirling, while the youngest had to flee for his life to Ireland. Her daughter Isobel appears to have been the wife of Sir Walter Buchanan of that ilk.

It was from Elizabeth, sister of the countess, that the next holders of the title descended. She was married to Sir John Stewart of Darnley (distinguished in the military history of France as seigneur d'Aubigny), whose immediate ancestor was brother of James, 5th high steward of Scotland. Their grandson, another Sir John Stewart, created a lord of parliament as Lord Darnley, was served heir to his great-grandfather Duncan, earl of Lennox, in i473» an d was designated as earl of Lennox in a charter under the great seal in the same year. Thereafter followed disputes with John of Haldane, whose wife's great-grand-mother had been another of the three daughters of Duncan, 8th earl of Lennox, and in her right he contested the succession. Lord Darnley, however, appears to have silenced all opposition and for the last seven years of his life maintained his right to the earldom undisputed. Three of his younger sons were greatly distinguished in the French service, one being captain of Scotsmen- at-arms, another premier homme d'armes, and a third marechal de France. Their elder brother Matthew, 2nd earl of this line, fell on Flodden Field, leaving by his wife Elizabeth, daughter of James, earl of Arran, and niece of James III., a son and successor John, who became one of the guardians of James V. and was murdered in 1526. His son Matthew, the 4th earl, played a great part in the intrigues of his time, and by his marriage with Margaret Douglas allied himself to the royal house of England as well as strengthening the ties which bound his family to that of Scotland ; because Margaret was the daughter and heir of the 6th earl of Angus by his wife, Margaret Tudor, sister of King Henry VIII. and widow of King James IV. Though his estates were forfeited in 1 545, Earl Matthew in 1564 not only had them restored but had the satisfaction of getting his eldest son Henry married to Mary, queen of Scots. The murder of Lord Darnley, now created earl of Rosse, lord of Ardmanoch and duke of Albany, took place in February 1567, and in July his only son James, by Mary's abdication, became king of Scotland. The old earl of Lennox, now grandfather of his sovereign, obtained the regency in 1570, but in the next year was killed. in the attack made on the parliament at Stirling, being the third earl in succession to meet with a violent death.

The title was now merged in the crown in the person of

James VI. the next heir, but was soon after granted to the king's uncle Charles, who died in 1576, leaving an only child, the unfortunate Lady Arabella Stewart.

Two years later the title was granted to Robert Stewart, the king's grand-uncle, second son of John, the 3rd earl, but he in 1580 exchanged it for that of earl of March. On the same day the earldom of Lennox was given to Esme Stewart, first cousin of the king and grandson of the 3rd earl , he being son of John Stewart (adopted heir of the marechal d'Aubigny) and his French wife, Annede la Queulle. In the following year Esme was created duke of Lennox, earl of Darnley, Lord Aubigny, Tar- boulton and Dalkeith, and other favours were heaped upon him, but the earl of Ruthven sent him back to France where he died soon after. His elder son, Ludovic, was thereupon summoned to Scotland by James, who invested him with all his father's honours and estates, and after his accession to the English throne created him Lord Settrington and earl of Richmond (1613), and earl of Newcastle-upon-Tyne and duke of Richmond (1623), all these titles being in the peerage of England. After holding many appointments the 2nd duke died without issue in 1624, being succeeded in his Scottish titles by his brother Esme, who had already been created earl of March and Lord Clifton of Leighton Bromswold in the peerage of England (1619) and was seigneur d'Aubigny in France. Of his sons, Henry succeeded to Aubigny and died young at Venice; Ludovic, seigneur d'Aubigny, entered the Roman Catholic Church and received a cardinal's hat just before his death; while the three other younger sons, George, seigneur d'Aubigny, John and Bernard, were: all distinguished as royalists in the Civil War. Each met a soldier's death, George at Edgehill, John at Alresford and Bernard at Rowton Heath. James, the eldest son and 4th duke of Lennox, was created duke of Richmond in 1641, being like his brother a devoted adherent of Charles I.

With the death of his little son Esme, the 5th duke, in 1660, the titles, including that of Richmond, passed to his first cousin Charles, who had already been created Lord Stuart of Newbury and earl of Lichfield, being likewise now seigneur d'Aubigny* Disliked by Charles II., principally because of his marriage with "la belle Stuart "—" the noblest romance and example of a brave lady that ever I read in my life," writes Pepys — he was sent into exile as ambassador to Denmark, where he was drowned in 1672. His wife had had the

Lennox estates granted to her for life, but his only sister Katharine, wife of Henry O'Brien, heir apparent of the 7th earl of Thomond, was served heir to him. Her only daughter, the countess of Clarendon, was mother of Theodosia Hyde, ancestress of the present earls of Darnley.

The Lennox dukedom, being to heirs male, now devolved upon Charles II., who bestowed it with the titles of earl of Darnley and Lord Tarbolton upon one of his bastards, Charles Lennox, son of the celebrated duchess of Portsmouth, he having previously been created duke of Richmond, earl of March and Lord Settring- ton in the peerage of England. The ancient lands of the Lennox title were also granted to him, but these he sold to the duke of Montrose.

His son Charles, who inherited his grandmother's French dukedom of Aubigny, was a soldier of distinction, as were the 3rd and 4th dukes. The wife of the last, Lady Charlotte Gordon, as heir of her brother brought the ancient estates of her family to the Lennoxes; the additional name of Gordon being taken by the 5th duke of Richmond and of Lennox on the death of his uncle, the 5th duke of Gordon. In the next generation further honours were granted to the family in the person of the 6th duke, who was rewarded for his great public services with the titles of duke of Gordon and earl of Kinrara in the peerage of the United Kingdom (1876).

See Scots Peerage, vol. v., for excellent accounts of these peerages by the Rev. John Anderson, curator Historical Dept. H.M. Register House; A. Francis Steuart and Francis J. Grant, Rothesay Herald. See also The Lennox by William Fraser.

LENNOX, CHARLOTTE (1720-1804),- British writer, daughter :jf Colonel James Ramsay, lieutenant-governor of New York,

was born in 1720. She went to London in 1735, and, being left unprovided for at her father's death, she began to earn her living by writing. She made some unsuccessful appearances on the stage and married in 1748. Samuel Johnson had an exaggerated admiration for her. " Three such women," he said, speaking of Elizabeth Carter, Hannah More and Fanny Burney, "are not to be found; I know not where to find a fourth, except Mrs Lennox, who is superior to them all." Her chief works are: The Female Quixote; or the Adventures of Arabella (1752), a novel; Shakespear illustrated; or the novels and histories on which the plays . . . are founded (1753-1754), in which she argued that Shakespeare had spoiled the stories he borrowed for his plots by interpolating unnecessary intrigues and incidents; The Life of Harriot Stuart (1751), a novel; and The Sister, a comedy produced

at Covent Garden (18th February 1769). This last was withdrawn after the first night, after a stormy reception, due, said Goldsmith, to the fact that its author had abused Shakespeare.

LENNOX, MARGARET, Countess of (1515-1578), daughter of Archibald Douglas, 6th earl of Angus, and Margaret Tudor, daughter of Henry VII. of England and widow of James IV. of Scotland, was born at Harbottle Castle, Northumberland, on the 8th of October 151 5. On account of her nearness to the English crown, Lady Margaret Douglas was brought up chiefly at the English court in close association with the Princess Mary, who remained her fast friend throughout life. She was high in Henry VIII. ‘s favour, but was twice disgraced; first for an attachment to Lord Thomas Howard, who died in the Tower m 1537, and again in 1541 for a similar affair with Sir Charles Howard, brother of Queen Catherine Howard. In 1 544 she married a Scottish exile, Matthew Stewart, 4th earl of Lennox (1516-1571), who was regent of Scotland in 1570-1571. During Mary’s reign the countess of Lennox had rooms in Westminster Palace; but on Elizabeth’s accession she removed to Yorkshire, where her home at Temple Newsam became a centre for Catholic intrigue. By a series of successful manoeuvres she married her son Henry Stewart, Lord Darnley, to Mary, queen of Scots. In 1566 she was sent to the Tower, but after the murder of Darnley in 1567 she was released. She was at first loud in her denunciations of Mary, but was eventually reconciled with her daughter-in-law. In 1574 she again aroused Elizabeth’s anger by the marriage of her son Charles, earl of Lennox, with Elizabeth Cavendish, daughter of the earl of Shrewsbury. She was sent to the Tower with Lady Shrewsbury, and was only pardoned after her son’s death in 1577. Her diplomacy largely contributed to the future succession of her grandson James to the English throne. She died on the 7th of March 1578.

The famous Lennox jewel, made for Lady Lennox as a memento of her husband, was bought by Queen Victoria in 1842.

LENO, DAN, the stage-name of George Galvin (1861-1004), English comedian, who was born at Somers Town, London, in February 1861. His parents were actors, known as Mr and Mrs Johnny Wilde. Dan Leno was trained to be an acrobat, but soon became a dancer, travelling with his brother as ” the brothers Leno,” and winning the world’s championship in clog- dancing at Leeds in 1880. Shortly afterwards he appeared in London at the Oxford, and in 1886-1887 at the Surrey Theatre. In 1 888-1 889 he was engaged by Sir Augustus Harris to play the Baroness in the Babes in the Wood, and from that time he was a principal figure in the Drury Lane pantomimes. He was

the wittiest and most popular comedian of his day, and delighted London music-hall audiences by his shop-walker, stores-proprietor, waiter, doctor, beef-eater, bathing attendant, ” Mrs Kelly,” and other impersonations. In 1900 he engaged to give his entire services to the Pavilion Music Hall, where he received £100 per week. In November 1901 he was summoned to Sand- ringham to do a ” turn ” before the king, and was proud from that time to call himself the ” king’s jester.” Dan Leno’s generosity endeared him to his profession, and he was the object of much sympathy during the brain failure which recurred during the last eighteen months of his life. He died on the 31st of October 1904.

LENORMANT, FRANCOIS (1837-1883), French Assyriologist and archaeologist, was born in Paris on the 17th of January 1837. His father, Charles Lenormant, distinguished as an archaeologist, numismatist and Egyptologist, was anxious that his son should follow in his steps. He made him begin Greek at the age of six, and the child responded so well to this precocious scheme of instruction, that when he was only fourteen 1 an essay of his, on the Greek tablets found at Memphis, appeared in the Revue archeologique. In 1856 he won the numismatic prize of the Academie des Inscriptions with an essay entitled Classification des monnaies des Lagides. In 1862 he became sub-librarian of the Institute. In 1859 he accompanied his father on a journey of exploration to Greece, during which Charles Lenormant succumbed to fever at Athens (24th November). Lenormant returned to Greece three times during the next six years, and gave up all the time he could spare from his official work to archaeological research. These peaceful labours were rudely interrupted by the war of 1870, when Lenormant served with the army and was wounded in the siege of Paris. In 1874 he was appointed professor of archaeology at the National Library, and in the following year he collaborated with Baron de Witte in founding the Gazette archeologique. As early as 1867 he had turned his attention to Assyrian studies; he was among the first to recognize in the cuneiform inscriptions the existence of a non-Semitic language, now known as Accadian. Lenormant’s knowledge was of encyclopaedic extent, ranging over an immense number of subjects, and at the same time thorough, though somewhat lacking perhaps in the, strict accuracy of the modern school. Most of his varied studies were directed towards tracing the origins of the two great civilizations of the ancient world, which were to be sought in Mesopotamia and on the shores of the Mediterranean. He, had a perfect passion for

exploration. Besides his early expedi- tions to Greece, he visited the south of Italy three times with this object, and it was while exploring in Calabria that he met with an accident which ended fatally in Paris on the oth of December 1883, after a long illness. The amount and variety of Lenormant's work is truly amazing when it is remembered that he died at the early age of forty-six. Probably the best known of his books are Les Origines de I'hisloire d'apres la Bible, and his ancient history of the East and account of Chaldean magic. For breadth of view, combined with extraordinary subtlety of intuition, he was probably unrivalled.

LENOX, a township of Berkshire county, Massachusetts, U.S.A. Pop. (1900) 2942, (1905) 3058; (1910) 3060. Area, 19-2 sq. m. The principal village, also named Lenox (or Lenox – on-the-Heights), lies about 2 m. W. of the Housatonic river, at an altitude of about 1000 ft., and about it are high hills— Yokun Seat (2080 ft.), South Mountain (1200 ft.), Bald Head (1583 ft.), and Rattlesnake Hill (1540 ft.). New Lenox and Lenoxdale are other villages in the township. Lenox is a fashionˆ able summer and autumn resort, much frequented by wealthy people from Washington, Newport and New York. There are innumerable lovely walks and drives in the surrounding region, which contains some of the most beautiful country of the Berk- shires — hills, lakes, charming intervales and woods. As early as 1835 Lenox began to attract summer residents. In the next decade began the creation of large estates, although the great holdings of the present day, and the villas scattered over the hills, are comparatively recent features. The height of the season is in the autumn, when there are horse-shows, golf, tennis, hunts and other outdoor amusements. The Lenox library (1855) contained about 20,000 volumes in 1908. Lenox was settled about 1750, was included in Richmond township in 1765, and became an independent township in 1767. The names were those of Sir Charles Lennox, third duke of Richmond and of Lennox (1735-1806), one of the staunch friends of the American colonies during the War of Independence. Lenox was the county- seat from 1787 to 1868. It has literary associations with Catherine M. Sedgwick (1789-1867), who passed here the second half of her life; with Nathaniel Hawthorne, whose brief residence here (1850-1851) was marked by the production of the House

of the Seven Gables and the Wonder Book ; with Fanny Kemble, a summer resident; from ; 1 836-1 853; and with Henry Ward Beecher (see his Star Papers). Elizabeth (Mrs Charles) Sedgwick, the sister-in-law of Catherine Sedgwick, maintained here from 1828 to 1864 a school for girls, in which Harriet Hosmer, the sculptor, and Maria S. Cummins (1827-1866), the novelist, were educated; and in Lenox

academy (1803), a famous classical school (now a public high school) were educated W. L. Yancey, A. H. Stephens, Mark Hopkins and David Davis (1815-1886), a circuit judge of Illinois from 1848X0 1862, a justice (1862-1877) of the United States Supreme Court, a Republican member of the United States Senate from Illinois in 1877-1883, and president of the Senate from the 31st of October 1881, when he succeeded Chester A. Arthur, until the 3rd of March 1883. There is a statue commemorating General John Patersort (1744- 1808) a soldier from Lenox in the War of Independence.

See R. de W. Mallary, Lenox and the Berkshire Highlands (1902); J. C. Adams, Nature Studies in Berkshire; C. F. Warner, Picturesque Berkshire (1896); and Katherine M. Abbott, Old Paths and Legends of the New England Border ‘(1907).

LENS, a town of Northern France, in the department of Pas- de-Calais, 13 m. N.N.E. of Arras by rail on the Deule and on the Lens canal. Pop. (1906) 27,692. Lens has’ important iron and steel foundries, and engineering works and: manufactories of steel cables, and occupies a central position ‘in the coalfields of the department. Two and a half miles W.S.W.lies LieVIn (pop. 22,070); likewise a centre of the coalfield’. In 1648 the neighbourhood of Lens was the scene of a celebrated victory gained by Louis II. of Bourbon, prince of Conde, over the Spaniards.

LENS (from Lat. lens, lentil, on account of the similarity of the form of a lens to that of a lentil seed), in optics, an instrument which refracts the luminous rays proceeding from an object in such a manner as to produce an image of the object. It may be regarded as having four principal functions: (1) to produce an image larger than the object, as in the magnifying glass, microscope, &c; (2) to produce an image smaller than the object, as in the ordinary photographic camera; (3) to con- vert rays proceeding from a point or other luminous source into a definite pencil, as in light-house lenses, the engraver’s globe, &c; (4) to collect luminous and heating rays into a smaller area, as in the burning glass. A lens made up of two or more lenses cemented together or very close to eg.ch other is termed ” composite ” or ” compound “; several lenses arranged in succession at a distance from each other form a “system of lenses,” and if the axes be collinear ‘ a “centred system.” This article is concerned with the general theory of lenses, and more particularly with spherical lenses. For a special part of the theory of lenses see Aberration; the instruments in which the lenses occur are treated under their own headings.

The most important type of lens is the spherical lens, which is a piece

of transparent material bounded by two spherical surfaces, the boundary at the edge being usually cylindrical or conical. The line joining the centres, Ci, C 2 (fig. 1), of the bounding surfaces is termed the axis; the points Si, S2, at

c, c,

Fig. 1.

which the axis intersects the surfaces, are termed the ” vertices ” of the lens; and the distance between the vertices is termed the ” thickness.” If the edge be everywhere equidistant from the vertex, the lens is ” centred.”

Although light is really a wave motion in the aether, it is only necessary, in the investigation of the optical properties of systems of lenses, to trace the rectilinear path of the waves, i.e. the direction. of the normal to the wave front, and this can be done

by purely geometrical methods. It will be assumed that light, so long as it traverses the same medium, always travels in a straight line; and in following out the geometrical theory it will always be assumed that the light travels from left to right; accordingly all distances measured in this direction are positive, while those measured in the opposite direction are negative.

Theory of Optical Representation. — If a pencil of rays, i.e: the totality of the rays proceeding from a luminous point, falls on a lens or lens system, a section of the pencil, determined by the dimensions of the system, will be transmitted. The emergent rays will have directions differing from those of the incident rays, the alteration, however, being such that the transmitted rays are con- vergent in the “image-point,” just as the incident rays diverge from the ” object-point. With each incident ray is associated an emergent ray; such pairs are termed ” conjugate ray pairs.” Similarly we define an object-point and its image-point as ” con- jugate points ” ; all object-points lie in the ” object-space,” and all image-points lie in the ” image-space.”

The laws of optical representations were first deduced in their most general form by E. Abbe, who assumed (i) that an optical representation always exists, and (2) that to every point in the

FIG. 2. object-space there corresponds a point in the image-space, these points being mutually convertible by straight rays; in other words, with each object-point is associated one, and only one, image-point, and if the object-point be placed at the image-point, the conjugate point is the original object-point. Such a transformation is termed a ” collineation,” since it transforms points into points and straight lines into straight lines. Prior to Abbe, however, James Clerk Maxwell published, in 1856, a geometrical theory of optical representation, but his methods were unknown to Abbe and to his pupils until O. Eppenstein drew attention to them. Although Maxwell’s theory is not so general as Abbe’s, it is used here since its methods permit a simple and convenient deduction of the laws.

Maxwell assumed that two obiect-planes perpendicular to the axis are represented sharply and similarly in two image-planes also perpendicular to the axis (by ” sharply ” is meant that the assumed ideal instrument unites all the rays proceeding from an object-point in one of the two planes in its image-point, the rays being generally transmitted by the system). The symmetry of the axis being premised, it is sufficient to deduce laws for a plane containing the axis. . In fig. 2 let Oi, O2 be the two points in which the perpendicular object-planes meet the axis; and since the axis corresponds to itself, the two conjugate points 0’i, O’z, are at the intersections of the two image-planes with the axis. We denote the four planes by the letters Oi, 2 , and O’i, O 2. If two points A, C be taken in the plane Oi, their images are A’, C in the plane Oi, and since the

the two rays CDi, and EFr, the conjugate point P’i will be deter- mined by the intersection of the conjugate rays C’D’i and E’F’i, the points D’i, F’i, being readily found from the magnifications ft, ft. Since PPi is parallel to CE and also to DF, then DF = D1F1. Since the plane O2 is similarly represented in 0‘2, D’F’ = D’iF’i; this is impossible unless P’P’i be parallel to C’E’. Therefore every per- pendicular object-plane is represented by a perpendicular image- plane.

Let O be the intersection of the line PPi with the axis, and let 0′ be its conjugate; then it may be shown that a fixed magnification ft exists for the planes O and 0’. For PP,/FFi = 00,/0i02, P’P’i/F’F’ 1 = 0‘070 r i0′ 2 , and F’F’i=ftFFi. Eliminating FF, and F’F’i between these ratios, we have P’P’i/PPjft = 0‘0′ r 0i0 2 /00i. 0’i0′ 2 , or /3 3 = ft.O‘0’i.Oi02/ OOi.O’iO’ 2 ‘, i.e. ft = ftXa product of the axial distances.

The determination of the image-point of a given object-point is facilitated by means of the so-called ” cardinal points ” of the optical system. To determine the image-point O’i (fig. 3) correspond- ing to

the object-point Oi, we begin by choosing from the ray pencil proceeding from Oi, the ray parallel with the axis, i.e. inter- secting the axis at infinity. Since the axis is its own conjugate, the parallel ray through Oi must intersect the axis after refraction (say at F'). Then F' is the image-point of an object-point situated at infinity on the axis, and is termed the "second principal focus " (German der bildseitige Brennpunkt, the image-side focus). Similarly if O't be on the parallel through Oi but in the image-space, then the conjugate ray must intersect the axis at a point (say ¥), which is conjugate with the point at infinity; on the axis in the image-space. This point is termed the "first principal focus " (German der objekt- seitige Brennpunkt, the object-side. focus).

Let Hi, H'i be the intersections of the focal rays through F and F' with the line OiO'* These two points are in the position of object and image, since they are each determined by two pairs of conjugate rays (O1H1 being conjugate with H'iF', and 0′ 4 H'i_with HiF). It has already been shown that object-planes perpendicular to the axis are represented by image-planes also perpendicular to the axis. Two vertical planes through Hi and H'i, are related as object- and image-planes; and if these planes intersect the axis in two points H and H', these points are named the " principal," or " Gauss points " of the system, H being the " object-side " and H' the " image-side principal point." The vertical planes containing H and H' are the " principal planes." It is obvious that conjugate points in these planes are equidistant from the axis; in other words, the magnification j3 of the pair of planes is unity. An ad- ditional characteristic of the principal planes is that the object and image are direct and not inverted. The distances between F and H, and between F' and H' are termed the focal lengths; the former may be called the " object-side focal length " and the latter the " image-side focal length." The two focal points and the two principal points constitute the so-called four cardinal points of the system, and with their aid the image of any object can be readily determined.

Equations relating to the Focal Points. — We know that the ray proceeding from the object point Oi, parallel to the axis and inter- secting the principal plane H in Hi, passes through H'i and F'.

plane ˆ t -..« — -„— _ , – ,. –

0'2B':02B = 0'2D':0 2 D = |82 (say), ft being the linear magnification of the plane-pair Oj, 0′ 2 . The joins of A and B and of C and D intersect in a point P, and the joins of the conjugate points simi- larly determine the point P'. ,

If P’ is the only possible image-point of the object-point P, then the conjugate of every ray passing through P must pass through P\ To prove this, take a third line through P intersecting the planes Oi, Oj in the points E, F, and by means of the magnifications ft, ft determine the conjugate points E’, F’ in L theˆ planes ˆ1, O 2;

Since the planes Oi, Oj are parallel, then AC/AE ~= BD/BF ; and

conjugate point! since tne pianes ui, O2 are parallel, men 2.›.— — 17- • -;~, since these planes are represented similarly in O 1, 2 , then AL/Ah = B’D’/B’F’. This proportion is only possible when the straight line E’F’ contains the point P’. Since P was any point whatever, it follows that every point of the object-space is represented in one and only one point in the image-space. .

Take a second object-point Pi, vertically under P and defined by

Fig. 3-

Choose from the pencil a second ray which contains F and inter- sects the principal plane H in H 2 ; then the conjugate ray must contain points corresponding to F and H 2 . The conjugate of F is the point at infinity on the axis, i.e. on the ray parallel to the axis. The image of H2 must be in the plane H’ at the same distance from, and on the same side of, the axis, as in H’ 2 . The straight line passing through H‘2 parallel to the axis intersects the ray H’iF’ in the point O 1, which must be the image of Oi. If O be the foct of the perpendicular from Oi to the axis, then OOi is represented by the line O’O’i also perpendicular to the axis.

This conetruction is not applicable if the object or image be infinitely distant. For example, if the object OOi be at infinity (0 being assumed to be on the axis for the sake of simplicity), so that the object appears under a constant angle w, we know that the second principal focus is conjugate with the infinitely distant axis-point. If the object is at infinity in a plane perpendicular to the axis, the image must be in the perpendicular plane through the focal point F’ (fig. 4).

The size y’ of the image is readily deduced. Of the parallel rays from the object subtending the angle w, there is one which passes

through the first principal focus F, and intersects the principal plane H

in Hi. Its conjugate ray passes through H' parallel to, and at the same distance from the axis, and intersects the image-side focal plane in O'i ; this point is the image of Oi, and y' is its magni- tude. From the figure we have tan w- HHi/FH = ///, or/=y'/tan w\ this equation was used by Gauss to define the focal length.

Referring to fig. 3, we have from the similarity of the triangles 00,F and HH 2 F, HH 2 /OO t = FH/FO, or 0'0',/OOi = FH/FO. Let y be the magnitude of the object OOi, y' that of the image O'O'i, x the focal distance FO of the object, and / the object-side focal distance FH; then the above equation may be written

y'h~fl x – From the similar triangles H'lH'F'andO'iO'F', we obtain O'O'i/OOi = F'07F'H'. Letx' be the focal distance of the image F'O', and /' the image- side focal length F'H'; then y'/y = x'/f. The ratio of Fig. 4. the size of the image

to the size of the object is termed the lateral magnification. Denoting this by /3, we have

0=y'/y=f/x=x'/f, (1)

and also

**'=//'. . (2)

By differentiating equation (2) we obtain

dx'=- (J'/x*)dx or dx 'jdx = -ff'/x 2 . (3)

The ratio of the displacement of the image dx' to the displacement of the object dx is the axial magnification, and is denoted by a. Equation (3) gives important information on the displacement of the image when the object is moved. Since / and /' always have contrary signs (as is proved below), the product —ff' is invariably positive, and since x 2 is positive for all values of x, it follows that dx and dx' have the same sign, i.e. the object and image always move in the same direction, either both in the direction of the light, or both in the opposite direction. This is shown in fig. 3 by the object 3 2 and the image O'jO^.

If two conjugate rays be drawn from two conjugate points on the axis, making angles u and u' with the axis, as for example the rays OHi, O'H'i, in fig. 3, u is termed the " angular aperture for the object," and u' the " angular aperture for the image." The ratio of the tangents of these angles is termed the " convergence " and is denoted by 7, thus 7

= tan tt'/tan u. Now tan «' = H'H'i/0'H' = H'H' 1 /(0'F'+F'H') = H'H' 1 /(F'H'-F'0'). Also tan m = HHi/OH = HH,/(OF+FH) = HHi/ (FH-FO). Consequently 7=(FH-F0) /(F'H' — F'O'), or, in our previous notation, y = (f—x)/(f'—x').

From equation (1) f/x = x'/f, we obtain by subtracting unity from both sides (f—x)/x*=(x'—f')/f, and consequently

X f

(4).

corresponding image subtend the same angle at the principal points. Equations Relating to the Principal Points. — It is sometimes desirable to determine the distances of an object and its image, not from the focal points, but from the principal points. Let A (see fig- 3) De the principal point distance of the object and A' that of the image, we then have

A = HO = HF+FO = FO-FH = x-/, A' = H'0′ = H'F'+F'0′ = F'0'F'H' = *'/', whence * = A4-/and x' = A'+f.

Using xx'=ff, we have (A+/) (A'f/') =//', which leads to AA' + A/'+A'/ = 0, or

i +A ;+£ = 0; this becomes in the special case when/= — /',

1 2.— I

A' A" – / To express the linear magnification in terms of the principal point distances, we start with equation (4) (f—x)/(f'—x') — ~x/f. From this we obtain A/A' = —x/f, or x = —/A/A' ; and by using equation (1) we have 0= -/A'//' A.

In the special case of /= — /', this becomes p = A'/ A = y'ly, from which it follows that the ratio of the dimensions of the object and image is equal to the ratio of the distances of the object and image from the principal points.

The convergence can be determined in terms of A and A' by substituting x= —f'A/A' in equation (4), when we obtain 7 = A/A'.

Compound Systems. — In discussing the laws relating to compound systems, we assume that the cardinal points of the component systems are known, and also that the combinations are centred, i.e. that the axes of the component lenses coincide. If some object be represented

by two systems arranged one behind the other, we can regard the systems as co-operating in the formation of the final image.

Let such a system be represented in fig. 6. The two single systems are denoted by the suffixes I and 2; for example, Fi is the first

hJ

h;

- K K^^-v^ O'

O F^v^H

rf ^ i

H,

h; c

>,

Fig. 5.

From equations (1), (3) and (4), it is seen that a simple relation exists between the lateral magnification, the axial magnification and the convergence, viz. a7 = /3.

In addition to the four cardinal points F, H, F', H', J. B. Listing, " Beitrage aus physiologischen Optik," Gottinger Studien (1845) introduced the so-called "nodal points" (Knotenpunkte) ot the

system, which are the two conjugate points from which the object and image appear under the same angle. In fig. 5 let K be the nodal point from which the object y appears under the same angle as the image y' from the other nodal point K'. Then 00,/KO = 0'0'i/K'0', or OOi/(KF + FO) = 0'0'i/(K'F' + F'0'), or 00,/(FO-FK) = 0'0'i/(F'0'-F'K'). Calling the focal distances FK and F'K', X and X', we have y/(x — X) = y'/(x' — X'), and since V/v = /3, it follows that i/(x-X) = 0/(x'-X'). Replace x' and X' by the values given in equation (2), and we obtain

rhr«(?-S)— – *§■

Since = f,'x = x'/f, we have /' = -X, / = -X'.

These equations show that to determine the nodal points, it is only necessary to measure the focal distance of the second principal focus

from the first principal focus, and vice versa. In the special case when the initial and final medium is the same, as for example, a lens in air, we have /= — /', and the nodal points coincide with the principal points of the system; we then speak of the " nodal point property of the principal points," meaning that the object and

A

f ™^»

F

F,

H,

Hi

K

-

F»

H,

Hi

k

F'

Fig. 6.

principal focus of the first, and F' 2 the second principal focus of the second system. A ray parallel to the axis at a distance y passes through the second principal focus F'i of the first system, inter- secting the axis at an angle w. The point F'i will be represented in the second system by the point F', which is therefore conjugate to the point at infinity for the entire system, i.e. it is the second principal focus of the compound system. The representation of F'i in F' by the second system leads to the relations F 2 F'i = #4, and F' 2 F' = «:' 2 , whence x^x'% =/ 2 /' 2 . Denoting the distance between the adjacent focal planes F'i, F 2 by A, we have A = F'iF 2 = — F 2 F'i, so that x' 2 = — / 2 /' 2 /A. A similar ray parallel to the axis at a distance y proceeding from the image-side will intersect the axis at the f ocal point F 2 ; and by finding the image of this point in the first system, we determine the

first principal focus of the compound system. Equation (2) gives Xix \=fif' lt and since *' 1 = F'iF 2 =A, we have 3Ci=/i/'i/A as the distance of the first principal focus F of the compound system from the first principal focus Fi of the first system.

To determine the focal lengths / and /' of the compound system and the principal points H and H', we employ the equations de- fining the focal lengths, viz. / = y'/tan w, and/' = y/tan w'. From the construction (fig. 6) tan w'\=ylj. The variation of the angle w\ by the second system is deduced from the equation to the con- vergence, viz. 7 = tan o>' 2 /tan ro 2 = ~x 2 //' 2 = A//' 2 , and since tty=t»'i, we have tan o>' 2 = (A//' 2) tan w. Since w' = w\ in our system of notation, we have

f- y _ yf'2 _/vr, . ;

J tan w' A tan w\ A ' Kt >'

By taking a ray proceeding from the image-side we obtain for the first principal focal distance of the combination

/=-/,/ 2 /A. In the particular case in which A = U, the two focal planes F'i, F2 coincide, and the focal lengths /, /' are infinite. Such a system is called a telescopic system, and this condition is realized in a telescope focused for a normal eye.

So far we have assumed that all the rays proceeding from an object 1 – point are exactly united in an image-point after transmission through the ideal system. The question now arises so to how far this assumption is justified for spherical lenses. To investigate this it is simplest to trace the path of a ray through one spherical

refracting surface. Let such a surface divide media of refractive indices re and re', the former being to the left. The point where the axis intersects the surface is the vertex S (fig. 7). Denote the distance of the axial object-point O from Sby 5; the distance from

/» having the opposite sign to /1. Denoting the distance F'i F 2 by A, we have A.-F'iF 2 = F' 1 S 1 +S,S 2 -fS 2 F 2 = F' 1 Si+S 1 S 2 F 2 S 2 =/'i+d./ 2 . Substituting for/'i and/ 2 we obtain

Fig. 7.

O to the point of incidence P by p ; the radius of the spherical surface by r; and the distance OC by e, C being the centre of the sphere. Let u be the angle made by the ray with the axis, and i the angle of incidence, i.e. the angle between the ray and the norrnal to the sphere at the point of incidence. The corresponding quantities in the image-space are denoted by the same letters with a dash. From the triangle O'PC we have sin u = {r/c) sin i, and from the triangle O'PC we have sin w' = (r/c') sin t'. By Snell's law we have re'/» = sin t/sin i', and also 4> — u'--i'. Consequently c' and the position of the image may be found.

To determine whether all the rays proceeding from O are re- fracted through O', we investigate the triangle OPO'. We have pip' = sin it'/ sin u. Substituting for sin u and sin u' the values found above, we obtain p'/p = c' sin ilc sin i' — n'c'/nc. Also c = OC = CS + SO = -SC-f SO = s-r, and similarly c' = s'-r. Substituting these values we obtain

A=-

■ -H+;

re — 1 ‘ ‘ re — 1 Writing R = A (re – 1), this relation becomes

R = n(n-n)+d(,n-i). We have already shown that f (the first principal focal length of a compound system) = -fif 2 /A. Substituting for fi, f 2 , and A the values found above, we obtain

r t r 2 n nr 2 n

(re-i)R (»-l)ire(r 2 -ri)+d(»-i)}' which is equivalent to

f-

(10)

! = («-,)) I-

+

{n-i) 2 d

ri $ ”’”” Win if d be zero, we have for the first

If the lens be infinitely thin, principal focal length,

/ ‘in r 2

By the same method we obtain for the second principal focal length

/’

_ f)f’- . _ _ gfl _f

. n(s—r)

(6)

n’(s’—r)

P ‘ F

we use the triangles OPC and O’PC; we

•) 2 +r 2 +2r(i-r)cos 4,, p’ i = {s’-r)’ l +r 1 +2r(s’-r) cos 4.

, re and re’ be constant, s’ must vary as 4> varies. The

p’_ n’{s’-r) p n{s — r) ‘ and p’

To obtain p have f? = (s- Hence if s, r

refracted rays therefore do not reunite in a point, and the deflection is termed the spherical aberration (see Aberration). Developing cos 4> in powers of , we obtain

and therefore for such values of 4, for which the second and higher powers may be neglected, we have p 2 = (s-rY+r*-{-2r(s-r), i.e. p = s, and similarly p’ = s’. Equation (6) then becomes n{s-r)js = n’(s’-r)/ s’ or

p?~(s-r) 2 +r i +2r(s-r) 1-

-$+•■•}•

A (re-i)R

The reciprocal of the focal length is termed the power of the lens and is denoted by 4>. In formulae involving 4, it is customary to

n _n , n —

(7)

This relation shows that in a very small central aperture in which the equation p = s holds, all rays proceeding from an object-point are

exactly united in an image-point, and therefore the equations previously deduced are valid for this aperture. K. F. Gauss derived the equations for thin pencils in his Dioptrische Unter- suchungen (1840) by very elegant methods. More recently the laws relating to systems with finite aperture have been approximately realized, as for example, in well-corrected photographic objectives. Position of the Cardinal Points of a Lens. — Taking the case of a single spherical refracting surface, and limiting ourselves to the small central aperture, it is seen that the second principal focus F' is obtained when s is infinitely great. Consequently «'=-/'; the difference of sign is obvious, since s' is measured from S, while /' is measured from F'. The focal lengths are directly deducible from equation (7) :—

f'=-n'rl(n'-n) (8)

f=nr/(n'-n). (9)

By joining this simple refracting system with a similar one, so that the second spherical surface limits the medium of refractive index re', we derive the spherical lens. Generally the two spherical surfaces enclose a glass lens, and are bounded on the outside by air of refractive index I.

The deduction of the cardinal points of a spherical glass lens in air from the relations already proved is readily effected if we regard the lens as a combination of two systems each having one refracting surface, the light passing in the first system from air to glass, and in the second from glass to air. If we know the refractive index of the glass re, the radii n, r 2 of the spherical surfaces, and the distances of the two lens-vertices (or the thickness of the lens d) we can deter- mine all the properties of the lens. A biconvex lens is shown in fig. 8. Let Fi be the first principal focus of the first system of radius n, and F/ the second principal focus; and let Si be its vertex. Denote the distance Fi Si (the first principal focal length) by /1, and the corresponding distance F'i Si by f. Let the corre- sponding quantities in the second system be denoted by the same letters with the suffix 2.

By equations (8) and (9) we have

4 – r i f ■ nr> t nr * f r *

Fig

denote the reciprocal of the radii by the symbol p; we thus have = l//, p = l/r. Equation (10) thus becomes

4> = (re-i)(pi-p>)H •

The unit of power employed by spectacle-makers is termed the diopter or dioptric (see Spectacles).

We proceed to determine the distances of the focal points from the vertices of the lens, i.e. the distances FSi and F'S 2 . Since F is represented by the first system in F 2 , we have by equation (2)

fi.fi f./V- , nr? x\ A (re-i)R'

where *i=FiF, and x'i = F'iF 2 = A. The distance of the first principal focus from the vertex S, i.e. SiF, which we denote by ir is given by s F = S 1 F = S 1 F,+F 1 F= F1S1+F1F. Now F,Si is the dis tance from the vertex of the first principal focus of the first system, i.e. f u and FiF = *i. Substituting these values, we obtain

_ _n ran 2 _ " n(wri+R)

Sf ~ re-l (re-i)R (re-

The distance F' 2 F' or x\

X. –

(re-i)R (re-i)R

is similarly determined by considering F'i to be represented by the second system in F'. We have

, f.fi Af. nrj X2 ~T" A (re-l)R'

so that

, , ,, _ r 2 (nr,R) s " =^2/ 2 — („_ I)R '

where s r ' denotes the distance of the second principal focus from the vertex S 2 .

The two focal lengths and the distances of the foci from the vertices being known, the positions of the remaining cardinal points, i.e. the principal points H and H', are readily determined. Let j„=SiH, i.e. the distance of the object-side principal point from the vertex of the first surface, and %' = S 2 H', i.e. the distance of the image-side principal point from the vertex of the second surface, then / = FH=FS 1 -r-S 1 H = -S I F+SiH = -s F +s H ; hence s H = s ¥ +f = -dn/R. Similarly s H , = s F ,+f = -dr 2 jK. It is readily seen that the

distances s H and s„/ are in the ratio of the radii n and r 2 .

The distance between the two principal planes (the inter stitium) is deduced very simply. We have SiS 2 = SiH + HH' + H'S 2 , or HH' = SiS2-SiH + S2H'. Substituting, we have

HH' = d-s a + s H , = d(.n-i)(r2-r 1 + d)/R. The interstitium becomes zero, or the two principal planes coincide, if d = n — r 2 .

We have now derived all the properties of the lens in terms of its elements, viz. the refractive index, the radii of the surfaces, and the thickness.

Forms of Lenses. — By varying the signs and relative magnitude of the radii, lenses may be divided into two groups according to their action, and into four groups according to their form.

According to their action, lenses are either collecting, convergent

and condensing, or divergent and dispersing; the term positive is sometimes applied to the former, and the term negative to the latter. Convergent lenses transform a parallel pencil into a con- verging one, and increase the convergence, and diminish the diverg- ence of any pencil. Divergent lenses, on the other hand, transform a parallel pencil into a diverging one, and diminish the convergence, and increase the divergence of any pencil. In convergent lenses the first principal focal distance is positive and the second principal focal distance negative ; in divergent lenses the converse holds.

The four forms of lenses are interpretable by means of equation

(10).

■/-7

TiTitl

' (n-l) {nf/r-ri) + d{n-l)\ (1) If ri be positive and r 2 negative. This type is called biconvex (fig. 9, 1). The first principal focus is in front of the lens, and the second principal focus behind the lens, and the two principal points

f]

Fig. 9.

are inside the lens. The order of the cardinal points is therefore FSiHH'SsF'. The lens is convergent so long as the thickness is less than n{ri-n)/{n-l). The special case when one of the radii is infinite, in other words, when one of the bounding surfaces is plane is shown in fig. 9, 2. Such a collective lens is termed plano-convex. As d increases, F and H move to the right and F' and H' to the left. If d = n(ri-rt)l(.n-i), the focal length is infinite, i.e. the lens is telescopic. If the thickness be greater than »(fi-r 2)/(«-i), the lens is dispersive, and the order of the cardinal points is HFS,S 2 F'H'.

(2) If ri is negative and r 2 positive. This type is called biconcave (fig. 9, 4). Such lenses are dispersive for all thicknesses. If d increases, the radii remaining constant, the focal lengths diminish. It is seen from the equations giving the distances of the cardinal points from the vertices that the first principal focus F is always behind Si, and the second principal focus F' always in front of S 2 , and that the principal points are within the lens, H' always follow- ing H. If one of the radii becomes infinite, the lens is plano-concave

(fig- 9. 5)- .

(3) If the radii are both positive. These lenses are called convexo-concave. Two cases occur according asr 2 >ri, or ri, "we obtain the mensicus (fig. 9, 3). Such lenses are always collective; and the order of the cardinal points is FHH'F'. Since sf and Sh are always negative, the object-side cardinal points are always in front of the lens. H' can take up different positions. Since s»' = – <2r 2 /R = -dr 2 /|«(r 2 -fi) +d{n-i) j, sh' is greater or less than d, i.e. H' is either in front of or inside the lens, according as d\r i -n(rr-r\) }/(»- i)- (b) If r 2 n{rr-r i) [{n-\), f is positive and the lens is collective. The cardinal points are in the same order as in the mensicus, viz. FHH'F'; and the relation of the principal points to the vertices is also the same as in the mensicus.

(4) If d and r 2 are both negative. This case is reduced to (3) above, by assuming a change in the direction of the light, or, in other words, by interchanging the object- and image-spaces.

The six forms shown in fig. 9 are all used in optical constructions.

It may be stated fairly generally that lenses which are thicker at

the middle are collective, while those which are thinnest at the

middle are dispersive.

Different Positions of Object and Image. — -The principal points are

always near the surfaces limiting the lens, and consequently the lens

divides the direct pencil containing the axis into two parts. The object can be either in front of or behind the lens as in fig. 10. Fig. 10. If the object point

be in front of the

lens, and if it be realized by rays passing from it, it is called real.

If, on the other hand, the object be behind the lens, it is called

virtual; it does not actually exist, and can only be realized as an

image.

When we speak of ” object-points,” it is always understood that the rays from the object traverse the first surface of the lens before meeting the second. In the same way, images may be either real or virtual. If the image be behind the second surface, it is real, and can be intercepted on a screen. If, however, it be in front of the lens, it is visible to an eye placed behind the lens, although the rays do not actually inter- sect, but only appear to do so, but the image cannot be in- tercepted on a screen behind the lens. Such an image is said to hi. virtual. fig. 11.

By referring to the equations given above, it is seen that a thin convergent lens produces both real and virtual images of real objects, but only a real image of a virtual object, whilst a divergent lens produces a virtual image of a real object and both real and virtual images of a virtual object. The construction of a real image of a

Fig. 11. These relations are shown in

real object by a convergent lens is shown in fig. 3; and that of a virtual image of a real object by a divergent lens in fig. 12.

The optical centre of a lens is a point such that, for any ray which passes through it, the incident and emergent rays are parallel. The idea of the optical centre was originally due to J; Harris {Treatise on Optics, 1775) ; it is not properly a cardinal point, although it has several interesting properties. In fig. 13, let C1P1 and C 2 P 2 be two

parallel radii of a biconvex lens. Join PiP 2 and let O1P1 and 2 Pj

Fig. 13.

be incident and emergent rays which have P1P2 for the path through the lens. Then if M be the intersection of P1P2 with the axis, we have angle CiPiM= angle C2P2M; these two angles areˆfor a ray travelling in the direction O1P1P2O2 — the angles of emergence and of incidence respectively. From the similar triangles C 2 P 2 M and C1P1M we have

CiM-CjM = CiPi:C 2 P2=nˆ2. (11)

Such rays as P1P2 therefore divide the distance C1C2 in the ratio of the radii, i.e. at the fixed point M, the optical centre. Calling SiM=ii, S 2 M=s 2 , then C,Si = C,M+MSi =GM-S,M, i.e. since GS, = ri, GM =(-1+ˆ, and similarly C 2 M =r 2 +s 2 . Also SˆˆSiM+MSj = SiM-S2M, i.e. d=S-Si. Then by using equation (11) we have Si=ridj{r-rz) and S2 = r 2 dl(ri-r 2), and hence ii/i 2 = ri/?‘2. The vertex distances of the optical centre are therefore in the ratio of the radii.

The values of S\ and s 2 show that the optical centre of a biconvex or biconcave lens is in the interior of the lens, that in a plano-convex or plano-concave lens it is at the vertex of the curved surface, arid in a concavo-convex lens outside the lens.

The Wave-theory Derivation of the Focal Length.— -The formulae above have been derived by means of geometrical rays. We here give an account of Lord Rayleigh’s wave-theory derivation of the focal length of a convex lens in terms of the aperture, thickness and refractive index {Phil. Mag. 1879 (5) 8, p. 480;. 1885, 20„

.26

LENS

P- 354); the argument is based on the principle that the optical distance from object to image is constant.

” Taking the case of a convex lens of glass, let us suppose that parallel rays DA, EC, GB (fig. 14) fall upon the lens ACB, and are collected by it to a focus at F. The points D, E, G, equally distant from ACB, lie upon a front of the wave before it impinges upon the lens. The focus is a point at which the different parts of the wave arrive at the same time, and that such a point can exist depends upon the fact that the propagation is slower in glass than in air.

The ray ECF is re- -ˆ tarded from having

to pass through the thickness (d) of glass by the amount (n — i)d. The ray DAF, which tra- verses only the ex- treme edge of the lens, is retarded merely on account p of the crookedness

: ˆ’ of its path, and the

amount of the retardation is measured by AF-CF. If F is a focus these retardations must be equal, or AF-CF = (n — i)d. Now if y be the semi-aperture AC of the lens, and / be the focal length CF, AF — CF = V (f 2 +y 2) — / = h’flf approximately, whence

I = iyV(.n-i)d. (12)

In the case of plate-glass (« — 1) = J (nearly), and then the rule (12) may be thus stated: the semi-aperture is a mean proportional between the focal length and the thickness. The form (12) is in general the more significant, as well as the more practically useful, but we may, of eourse, express the thickness in terms of the curvatures and semi-aperture by means of d = %y ? (r i – 1 ri 1). In the preceding statement it has been supposed for simplicity that the lens comes to a sharp edge. If this be not the case we must take as the thickness of the lens the difference of the thicknesses at the centre and at the circum- ference. In this form the statement is applicable to concave lenses, and we see that the focal length is positive when the lens is thickest at the centre, but negative when the lens is thickest at the edge.”

Regulation of the Rays.

The geometrical theory of optical instruments can be con- veniently divided into four parts: (1) The relations of the positions and sizes of objects and their images (see above) ; (2) the different aberrations from an ideal image (see Aberra- tion) ; (3) the intensity of radiation in the object- and image- spaces, in other words, the alteration of brightness caused by physical or geometrical influences; and (4) the regulation of the rays (Slrahlenbegrenzung) .

The regulation of rays will here be treated only in systems free from aberration. E. Abbe first gave a connected theory; and M von Rohr has done a great deal towards the elaboration. The Gauss cardinal points make it simple to construct the image of a given object. No account is taken of the size of the system, or whether the rays used for the construction really assist in the reproduction of the image or not. The diverging cones of rays coming from the object-points can only take a certain small part in the production of the image in consequence of

the apertures of the lenses, or of diaphragms. It often happens that the rays used for the construction of the “image do not pass through the system ; the image being formed by quite different rays. If we take a luminous point of the object lying on the axis of the system then an eye introduced at the image-point sees in the instrument several concentric rings, which are either the fittings of the lenses or their images, or the real diaphragms or their images. The innermost

Fig. 15.

and smallest ring is completely lighted, and forms the origin of the cone of rays entering the image-space. Abbe called it the exit pupil. Similarly there is a corresponding smallest ring in the object- space which limits the entering cone of rays. This is called the entrance pupil. The real diaphragm acting as a limit at any part of the system is called the aperture-diaphragm. These diaphragms remain for all practical purposes the same for all points lying on the axis. It sometimes happens that one and the same diaphragm

fulfils the functions of the entrance pupil and the aperture-diaphragm or the exit pupil and the aperture-diaphragm.

Fig. 15 shows the general but simplified case of the different diaphragms which are of importance for the regulation of the rays. Si, S2 are two centred systems. A’ is a real diaphragm lying between them. Bi and B’ 2 are the fittings of the systems. Then Si produces the virtual image A of the diaphragm A’ and the image B 2 of the fitting B’ 2 , whilst the system Sjj makes the virtual image A” of the diaphragm A’ and the virtual image B’i of the fitting Bi. The object-point O is reproduced really through the whole system in the point O’. From the object-point O three diaphragms can be seen in the object-space, viz. the fitting Bi, the image of the fitting B 2 and the image A of the diaphragm A’ formed by the system Si. The cone of rays nearest to B 2 is not received to its total extent by the fitting Bi, and the cone which has entered through Bi is again diminished in its further course, when passing through the diaphragm A’, so that the cone of rays really used for producing the image is limited by A, the diaphragm which seen from O appears to be the smallest. A is therefore the entrance pupil. The real diaphragm A’ which limits the rays in the centre of the system is the aperture diaphragm. Similarly three diaphragms lying in the image-space are to be seen from the image-point O’ — namely B’, A”, and B’ 2 . A” limits the rays in the image-space, and is therefore the exit pupil. As A is conjugate to the diaphragm A’ in the system Si, and A” to the same diaphragm A’ in the system S», the entrance pupil A is conjugate to the exit pupil A” throughout the instrument. This

relation between entrance and exit pupils is general.

The apices of the cones of rays producing the image of points near the axis thuslie in the object-points, and their common base is the entrance pupil. The axis of such a cone, which connects the object point with the centre of the entrance pupil, is called the principal ray. Similarly, the principal rays in the image-space join the centre of the exit pupil with the image-points. The centres of the entrance and exit pupils are thus the intersections of the principal rays.

For points lying farther from the axis, the entrance pupil no longer alone limits the rays, the other diaphragms taking part. In fig. 16 only one diaphragm L is present besides the entrance pupil A, and the object- space is divided to a certain extent into four parts. The section M contains all points rendered by a system with a complete aperture; N con- tains all points rendered by a system with a gradually diminishing aperture ; but this diminution does not attain the principal ray passing through the centre C. In the section O are those points rendered by a system with an aperture which gradually decreases to zero. No rays pass from the points of the section P

through the system and no „ ,

image can arise from them. rlG. 10.

The second diaphragm L therefore limits the three-dimensional object-space containing the points which can be rendered by the optical system. From C through this diaphragm L this three- dimensional object-space can be seen as through a window. L is called by M von Rohr the entrance luke. If several diaphragms can be seen from C, then the entrance luke is the diaphragm which seen from C appears the smallest. In the sections N and O the entrance luke also takes part in limiting the cones of rays. This restriction is known as the ” vignetting ” action of the entrance luke. The base of the cone of rays for the points of this section of the object-space is no longer a’ circle but a two-cornered curve which arises from the object point by the projection of the entrance luke on the entrance pupil. Fig. iya shows the base of such a cone of rays. It often hap pens that besides the entrance luke, another diaphragm acts in a vignetting manner, then

the operating aperture of the cone of rays is a curve made up of circular arcs formed out of the entrance pupil and the two projections of the two acting diaphragms (fig. 176).

If the entrance pupil is narrow, then the section NO, in which the

vignetting is increasing, is diminished, and there is > really only one division of the section M which can be reproduced, and of the section P which cannot be reproduced. The angle w + w = 2w, comprising the section which can be reproduced, is called the angle of the field of view on the object-side. The field of view 2w retains its importance

Fig. 17a.

Fig. 176.

if the entrance pupil is increased. It then comprises all points reached by principal rays. The same relations apply to the image- space, in which there is an exit luke, which, seen from the middle of the exit pupil, appears under the smallest angle. It is the image of the entrance luke produced by the whole system. The image- side field of view 2w' is the angle comprised by the principal rays reaching the edge of the exit luke.

Mos > t optical instruments are used to observe object- reliefs (three-dimensional objects), and generally an image-relief (a three-dimensional image) is conjugate to this object-relief. It is sometimes required, however, to represent by means of an optical instrument the object-relief on a plane or on a ground-glass as in the photo- graphic camera. For simplicity we shall assume the intercepting plane as perpendicular to the axis and shall call it, after von Rohr, the " ground glass plane." All points of the image not lying in this plane produce circular spots (corresponding to the form of the pupils) on it, which are called " circles of confusion." The ground- glass plane (fig. 18) is conjugate to the object-plane E in the object-space, perpendicular to the axis, and called the " plane focused for." All points lying in this plane are reproduced exactly on the ground-glass plane as the points 00. The circle of confusion

Z on the plane focused for corresponds to the circle of confusion Z' on the ground-glass plane. The figure formed on the plane focused for by the cones of rays from all of the object-points of the total object-space directed to the entrance pupil, was called " object- side representation " {imago) by M von Rohr. This representation is a central projection. If, for instance, the entrance pupil is imagined so small that only the principal rays pass through, then they project directly, and the intersections of the principal rays represent the projections of the

points of the object lying off the plane focused for. The centre of the projection or the per- spective centre is the middle point of the entrance pupil C. If the entrance pupil is opened, in place of points, circles of confusion ap- pear, whose size depends upon the size of the entrance pupil and the position of the object-points and the plane focused for. The inter- section of the principal ray is the centre of the circle of confusion. The clearness of the representation on the plane focused for is of course diminished by the circles of confusion. This central pro- jection does not at all depend upon the instrument, but is entirely geometrical, arising when the position and the size of the entrance pupil, and the position of the plane focused for have been fixed. The instrument then produces an image on the ground-glass plane of this perspective representation on the plane focused for, and on account of the exact likeness which this image has to the object-side representation it is called the ” representation copy.” By moving it round an angle of 180 , this representation can be brought into a perspective position to the objects, so that all rays coming from the middle of the entrance pupil and aiming at the object-points, would always meet the corresponding image- points. This representation is accessible to the observer in different ways in different instruments. If the observer desires a perfectly correct perspective impression of the object-relief the distance of the pivot of the eye from the representation copy must be equal to the nth part of the distance of the plane focused for from the entrance pupil, if the instrument has produced a «th diminution of the object-side representation. The pivot of the eye must coincide with the centre of the perspective, because all images are observed in direct vision. It is known that the pivot of the eye is the point of intersection of all the directions in which one can look. Thus all these points represented by circles of confusion which are less than the angular sharpness of vision appear clear to the eye; the space containing all these object-points, which appear clear to the eye, is called the depth. The depth of definition, therefore, is not a special property of the instrument, but depends on the size of the entrance pupil, the position of the plane focused for and on the conditions under which the representation can be observed.

If the distance of the representation from the pivot of the eye be altered from the correct distance already mentioned, the angles of vision under which various objects appear are changed; perspective errors arise, causing an incorrect idea to be given of the depth. A simple case is shown in fig. 19. A cube is the object, and if it is observed as in fig. 190 with the representation copy at the correct distance, a correct idea of a cube will be obtained. If, as in figs. 196 and 19c, the distance is too great, there can be

two results. If it is known that the farthest section is just as high as the nearer one then the cube appears exceptionally deepened, like a long parallelepipedon. But if it is known to be as deep as it is high then the eye will see it low at the back and high at the front. The reverse occurs when the distance of observation is too short, the body then appears either too flat, or the nearer sections seem too low in relation to those farther off. These perspective errors can be seen in any telescope. In the

After von Rohr.

Fig. 19.

telescope ocular the representation copy has to be observed under too large an angle or at too short a distance: all objects therefore appear flattened, or the more distant objects appear too large in comparison with those nearer at hand.

From the above the importance of experience will be inferred. But it is not only necessary that the objects themselves be known to the observer but also that they are presented to his eye in the customary manner. This depends upon the way in which the principal rays pass through the system — in other words, upon the special kind of ” transmission ” of the principal’ rays. In ordinary vision the pivot of the eye is the centre of the perspective representa- tion which arises on the very distant plane standing perpendicular to the mean direction of sight. In this kind of central projection all objects lying in front of the plane focused for are diminished when projected on this plane, and those lying behind it are magnified. (The distances are always given in the direction of light.) Thus the objects near to the eye appear large and those farther from it appear small. This perspective has been called by M von Rohr 1 “ento- centric transmission ” (fig. 20). If the entrance pupil of the instru- ment lies at infinity, then all the principal rays are parallel and the

After von Rohr. After von Rohr.

Fig. 20. Fig. 21.

projections of all objects on the plane focused for are exactly as large as the objects themselves. After E. Abbe, this course of rays is called ” telecentric transmission ” (fig. 21). The exit pupil then lies in the image-side focus of the 5+

system. If the perspective

centre lies in front of the plane

focused for, then the objects

lying in front of this plane are

magnified and those behind it „ ,

are diminished. This is just the After von Rohr

reverse of perspective repre- Fig. 22 –

sentation in ordinary sight, so that the relations of size and the

arrangements for space must be quite incorrectly indicated (fig. 22) ;

this representation is called by M von Rohr a ” hypercentric

transmission.” (0. Hr.)

LENT (O. Eng. lencten, ” spring,” M. Eng. lenten, lente, lent; cf. Dut. lente, Ger. Lenz, ” spring,” O. H. Ger. lenzin, lengizin, lenzo, probably from the same root as ” long ” and referring to ” the lengthening days “), in the Christian Church, the period of fasting preparatory to the festival of Easter. As this fast falls in the early part of the year, it became confused with the season, and gradually the word Lent, which originally meant spring, was confined to this use. The Latin name for the fast, Quadragesima (whence Ital. quaresima. Span, cuaresma and Fr. cartme) , and its Gr. equivalent reaaapaKoarfi (now superseded by the term fj vrjareia ” the fast “), are derived from the Sunday which was the fortieth day before Easter, as Quinquagesima and Sexagesima are the fiftieth and sixtieth, Quadragesima being until the 7th century the captti jejunii or first day of the fast.

The length of this fast and the rigour with which it has been observed have varied greatly at different times and in different countries (see Fasting). In the time of Irenaeus the fast before Easter was very short, but very severe; thus some ate nothing for forty hours between the afternoon of Good Friday and the morning of Easter. This was the only authoritatively prescribed fast known to Tertullian (De jejunio, 2, 13, 14; De oratione, 18). In Alexandria about the middle of the 3rd century it was already

1 M von Rohr, Zeitschr. ftir Sinnesphysielogie (1907), xli. 408-429.

customary to fast during Holy Week; and earlier still the Montanists boasted that they observed a two weeks' fast instead of one. Of the Lenten fast or Quadragesima, the first mention is in the fifth canon of the council of Nicaea (325), and from this time it is frequently referred to, but chiefly as a season of prepara- tion for baptism, of absolution of penitents or of retreat and recollection. In this season fasting played a part, but it was not universally nor rigorously enforced. At Rome, for instance, the whole period of fasting was but three weeks, according to the historian Socrates (Hist. eccl. v. 22), these three weeks, in Mgr. Duchesne's opinion, being not continuous but, following the primitive Roman custom, broken by intervals. Gradually, however, the fast as observed in East and West became more rigorously defined. In the East, where after the example of the Church of Antioch the Quadragesima fast had been kept distinct from that of Holy Week, the whole fast came to last for seven weeks, both Saturdays and Sundays (except Holy Saturday) being, however, excluded. In Rome and Alexandria, and even in Jerusalem, Holy Week was included in Lent and the whole fast lasted but six weeks, Saturdays, however, not being exempt. Both at Rome and Constantinople, therefore, the actual fast was but thirty-six days. Some Churches still continued the three weeks' fast, but by the middle of the 5th century most of these divergences had ceased and the usages of Antioch-Con- stantinople and Rome-Alexandria had become stereotyped in their respective spheres of influence.

The thirty-six days, as forming a tenth part of the year and therefore a perfect number, at first found a wide acceptance (so Cassianus, Coll. xxi. 30) ; but the inconsistency of this period with the name Quadragesima, and with the forty days' fast of Christ, came to be noted, and early in the 7th century four days were added, by what pope is unknown, Lent in the West begin- ning henceforth on Ash Wednesday (g.v.). About the same time the cycle of paschal solemnities was extended to the ninth week before Easter by the institution of stational masses for Septua- gesima, Sexagesima and Quinquagesima Sundays. At Constanti- nople, too, three Sundays were added and associated with the Easter festival in the same way as the Sundays in Lent proper. These three Sundays were added in the Greek Church also, and the present custom of keeping an eight weeks' fast (i.e. exactly 8X5 days), now universal in the Eastern Church, originated in the 7th century. The Greek Lent begins on the Monday of Sexagesima, with a week of preparatory fasting, known as rvpo4>a.yi.a, or the " butter- week "; the actual fast, however, starts on the Monday of Quinquagesima (Estomihi), this week being known

as ” the first week of the fast” (eˆSo/uos toiv vtjoreuoJ’) . The period of Lent is still described as ” the six weeks of the fast ” (e£ e/35ojud5es tuv vqareuiiv), Holy Week (17 0.71a KaX jU*7III. The chief Lenten food from the earliest days was fish, and entries in the royal household accounts of Edward III. show the amount of fish supplied to the king. Herring-pies were a great delicacy. Charters granted to seaports often stipulated that the town should send so many herrings or other fish to the king annually during Lent. How severely strict medieval abstinence was may be gauged from the fact that armies and garrisons were sometimes, in default of dispensations, as in the case of the siege of Orleans in 1429, reduced to starvation for want of Lenten food, though in full possession of meat and other supplies. The battle of the Herrings (February 1429) was fought in order to cover the march of a convoy of Lenten food to the English army besieging Orleans. Dispensations from fasting were, however, given in case of illness.

During the religious confusion of the Reformation, the practice of fasting was generally relaxed and it was found necessary to reassert the obligation of keeping Lent and the other periods and

days of abstinence by a series of proclamations and statutes. In these, however, the religious was avowedly subordinate to a political motive, viz. to prevent the ruin of the fisheries, which were the great nursery of English seamen. Thus the statute of 2 and 3 Edward VI., cap. 9 (1549), while inculcating that ” due and godly abstinence from flesh is a means to virtue,” adds that ” by the eating of fish much flesh is saved to the country,” and that thereby, too, the fishing trade is encouraged. The statute, however, would not seem to have had much effect; for in spite of a proclamation of Queen Elizabeth in 1560 imposing a fine of £20 for each offence on butchers slaughtering animals during Lent, in 1563 Sir William Cecil, in Notes upon an Act for the Increase of the Navy, says that ” in old times no flesh at all was eaten on fish days; even the king himself could not have license; which was occasion of eating so much fish as now is eaten in flesh upon fish days.” The revolt against fish had ruined the fisheries and driven the fishermen to turn pirates, to the great scandal and detriment of the realm. Accordingly, in the session of 1562- 1563, Cecil forced upon an unwilling parliament “a politic ordinance on fish eating,” by which the eating of flesh on fast days was made punishable by a fine of three pounds or three months’ imprisonment, one meat dish being allowed on Wednesdays on condition that three fish dishes were present on the table. The kind of argument by which Cecil overcame the Protestant temper of the parliament is illustrated by a clause which he had meditated adding to the statute, a draft of

which in his own handwriting is preserved: ” Because no person should misjudge the intent of the statute,” it runs, ” which is politicly meant only for the increase of fishermen and mariners, and not for any superstition for choice of meats; whoever shall preach or teach that eating of fish or forbearing of flesh is for the saving of the soul of man, or for the service of God, shall be punished as the spreader of false news ” (Dom. MSS., Elizabeth, vol. xxvii.). But in spite of statutes and proclamations, of occasional severities and of the patriotic example of Queen Elizabeth, the practice of fasting fell more and more into disuse. Ostentatious avoidance of a fish-diet became, indeed, one of the outward symbols of militant Protestantism among the Puritans. ” I have often noted,” writes John Taylor, the water-poet, in his Jack a Lent (1620), “that if any superfluous feasting or gormandizing, paunch-cramming assembly do meet, it is so ordered that it must be either in Lent, upon a Friday, or a fasting: for the meat does not relish well except it be sauced with disobedience and comtempt of authority.” The government continued to struggle against this spirit of defiance; proclamations of James I. in 1619 and 1625, and of Charles I. in 1627 and 1631, again com- manded abstinence from all flesh during Lent, and the High Church movement of the 17th century lent a fresh religious sanction to the official attitude. So late as 1687, James II. issued a proclamation ordering abstention from meat; but, after the Revolution, the Lenten laws fell obsolete, though they remained on the statute-book till repealed by the Statute Law Revision Act 1863. But during the 18th century, though the strict observance of the Lenten fast was generally abandoned, it was still observed and inculcated by the more earnest of the clergy, such as William Law and John Wesley; and the custom of women wearing mourning in Lent, which had been followed by Queen Elizabeth and her court, survived until well into the 19th century. With the growth of the Oxford Movement in the English Church, the practice of observing Lent was revived; and, though no rules for fasting are authoritatively laid down, the duty of abstinence is now very generally inculcated by bishops and clergy, either as a discipline or as an exercise in self-denial. For the more ” advanced ” Churches, Lenten practice tends to conform to that of the pre-Reformation Church.

Mid-Lent, or the fourth Sunday in Lent, was long known as Mothering Sunday, in allusion to the custom for girls in service to be allowed a holiday on that day to visit their parents. They usually took as a present for their mother a small cake known as a simnel. In shape it resembled a pork- pie but in materials it was a rich plum-pudding. The word is derived through M. Lat. simenellus, simella, from Lit. simila,

wheat flour. In Gloucestershire simnel cakes are still common; and at Usk, Monmouth, the custom of mothering is still scrupulously observed.

LENTHALL, WILLIAM (1591-1662), English parliamentarian, speaker of the House of Commons, second son of William Lenthall, of Lachford, Oxfordshire, a descendent of an old Herefordshire family, was born at Henley-on-Thames in June 1501. He left Oxford without taking a degree in 1609, and- was called to the bar at Lincoln's Inn in 1616, becoming a bencher in 1633. He represented Woodstock in the Short Parliament (April 1640), and was chosen by King Charles I. to be speaker of the Long Parliament, which met on the 3rd of November 1640. According to Clarendon, a worse choice could not have been made, for Lenthall was of a " very timorous nature." He was treated with scanty respect in the chair, and seems to have had little control over the proceedings. On the 4th of January 1642, however, when the king entered the House of Commons to seize the five members, Lenthall behaved with great prudence and dignity. Having taken the speaker's chair and looked round in vain to discover the offending members, Charles turned to Lenthall standing below, and demanded of him " whether any of those persons were in the House, whether he saw any of them and where they were." Lenthall fell on his knees and replied: " May it please your Majesty, I have neither eyes to see nor tongue to speak in this place but as the House is pleased to direct me, whose servant I am here." On the outbreak of the great rebellion, Lenthall threw in his lot with the parliament. He had already called attention to the inadequacy of his salary and been granted a sum of £6000 (9th of April 1642); and he was now appointed master of the rolls (22nd of November 1643), and one of the commissioners of the great seal (Oct. 1646- March 1648).

He carried on his duties as speaker without interruption till 1647, when the power of the parliament had been transferred to the army. On the 26th of July a mob invaded the House of Commons and obliged it to rescind the ordinance re-establishing the old parliamentary committee of militia; Lenthall was held in the chair by main force and compelled to put to the vote a resolution inviting the king to London. Threats of worse things came subsequently to LenthalTs ears, and, taking the mace with him, he left London on the 29th to join the army and Fairfax. Lenthall and Manchester, the speaker of the Lords, headed the fugitive members at the review on Hounslow Heath on the 3rd of August, being received by the soldiers " as so many angels sent from heaven for their good." Returning to

London with the army, he was installed again by Fairfax in the chair (6th August), and all votes passed during his absence were annulled. He adhered henceforth to the army party, but with a constant bias in favour of the king.

At the Restoration he claimed to have sent money to the king at Oxford, to have provided the queen with comforts and necessaries and to have taken care of the royal children. But he put the question for the king's trial from the chair, and continued to act as speaker after the king's execution. He still continued to use his influence in favour of the royalists, whenever this was possible without imperilling his own interests, and he saved the lives of both the earl of Norwich (8th March 1649) and Sir W. D'Avenant (3rd July 1650) by his casting vote. The, removal of the king had left the parliament supreme; and Lenthall as its representative, though holding little real power, was the first man in the state.

His speakership continued till the 20th of April 1653, when the Long Parliament was summarily expelled. Cromwell directed Colonel Harrison, on the refusal of Lenthall to quit the chair, to pull him out — and Lenthall submitted to the show of force. He took no part in politics till the assembling of the first pro- tectorate parliament, on the 3rd of September 1654, in which he sat as member for Oxfordshire. He was again chosen speaker, his former experience and his pliability of character being his chief recommendations. In the second protectorate parliament, summoned by Cromwell on the 17th of September 1656, Lenthall Was again chosen member for Oxfordshire, but had some difficulty

in obtaining admission, and was not re-elected speaker. He supported Cromwell's administration, and was active in urging the protector to take the title of king. In spite of his services, Lenthall was not included by Cromwell in his new House of Lords, and was much disappointed and crestfallen at his omission. The protector, hearing of his " grievous complaint," sent him a writ, and Lenthall was elated at believing he had secured a peerage. After Cromwell's death, the officers, having determined to recall the " Rump " Parliament, assembled at LenthalPs house at the Rolls (6th May 1659), to desire Kim to send out the writs. Lenthall, however, had no wish to resume his duties as speaker, preferring the House of Lords, and made various excuses for not complying. Nevertheless, upon the officers threatening to: summon the parliament without his aid, and hearing the next morning that several members had assembled, he led the procession to the parliament house. Lenthall was now restored to the position of dignity which he had filled before. He was temporarily made keeper

of the new great seal (14th of May). On the 6th of June it was voted that all commissions should be signed by Lenthall and not by the commander-in-chief. His exalted position, however, was not left long unassailed. On the 13th of October Lambert placed soldiers round the House and prevented the members from assembling. Lenthall's coach was stopped as he was entering Palace Yard, the mace was seized and he was obliged to return. The army, however, soon returned to their allegiance to the parliament. On the 24th of December they marched to Lenthall's house, and expressed their sorrow. On the 29th the speaker received the thanks of the reassembled parliament.

Lenthall now turned his attention to bring about the Restora- tion. He " very violently " opposed the oath abjuring the house of Stuart, now sought to be imposed by the republican faction on the parliament, and absented himself from the House for ten days, to avoid, it was said, any responsibility for the bill. He had been in communication with Monk for some time, and on Monk entering London with his army (3rd February 1660) Lenthall met him in front of Somerset House. On the 6th of February Monk visited the House of Commons, when Lenthall pronounced a speech of thanks. On the 28th of March Lenthall forwarded to the king a paper containing " Heads of Advice." According to Monk, he " was very active for the restoring of His Majesty and performed many services . . . which could not have been soe well effected without his helpe." Lenthall notwithstanding found himself in disgrace at the Restoration. In spite of Monk's recommendation, he was not elected by Oxford University for the Convention Parliament, nor was he allowed by the king, though he had sent him a present of £3000, to remain master of the rolls. On the nth of June he was included by the House of Commons, in spite of a recommendatory letter from Monk, among the twenty persons excepted from the act of indemnity and subject to penalties not extending to life. In the House of Lords, however, Monk's testimony and intercession were effectual, and Lenthall was only declared incapable of holding for the future any public office. His last public act was a disgraceful one. Unmindful now of the privileges of parliament, he consented to appear as a witness against the regicide Thomas Scot, for words spoken in the House of Commons while Lenthall was in the chair. It was probably after this that he was allowed to present himself at court, and his contemporaries took a malicious glee in telling how " when, with some difficulty, he obtained leave to kiss the king's hand he, out of guilt, fell backward, as he was kneeling."

Lenthall died on the 3rd of September 1662. In his will he desired to be buried without any state and without a monument, " but at the

utmost a plain stone with this superscription only, Vermis sum, acknowledging myself to be unworthy of the least outward regard in this world and unworthy of any remembrance that hath been so great a sinner." He was held in little honour by his contemporaries, and was universally regarded as a time- server. He was, however, a man of good intentions, strong family affections and considerable ability. Unfortunately he was called by the irony of fate to fill a great office, in which.

governed constantly by fears for his person and estate, he was seduced into a series of unworthy actions. He left one son, Sir John Lentiall, who had descendants. His brother, Sir John Lenthall, who, it was said, had too much influence with him, was notorious for his extortions as keeper of the King's Bench prison.

See C. H. Firth in the Diet. Nat. Biog.; Wood (ed. Bliss), Ath. Oxon. iii. 603, who gives a list of his printed speeches and letters; Foss, Lives of tlie Judges, vi. 447; and J. A. Manning, Lives of the Speakers of the House of Commons. There are numerous references to Lenthall in his official capacity, and letters written by and to him, in the Calendar of State Papers, Domestic Series, and in various MSS. calendared in the Hist. MSS. Commission Series. See also D'Ewes's Diary, in the Harleian Collection, British Museum, some extracts from which have been given by J. Forster, Case of the Five Members, 233 sq. ; and Notes and Queries, ser. iii., vii. 45 (" Lenthall's Lamenta- tion "), viii., i. 165, 338, 2, ix., xi. 57.

LENTIL, the seed of Lens esculenta (also known as Ervum Lens), a small annual of the vetch tribe. The plant varies from 6 to 18 in. in height, and has many long ascending branches. The leaves are alternate, with six pairs of oblong-linear, obtuse, mucronate leaflets. The flowers, two to four in number, are of a pale blue colour, and are borne in the axils of the leaves, on a slender footstalk nearly equalling the leaves in length; they are produced in June or early in July. The pods are about \ in. long, broadly oblong, slightly inflated, and contain two seeds, which are of the shape of a doubly convex lens, and about J in. in diameter. There are several cultivated varieties of the plant, differing in size, hairiness and colour of the leaves, flowers and seeds. The last may be more or less compressed in shape, and in colour may vary from yellow or grey to dark brown; they are also sometimes mottled or speckled. In English commerce two kinds of

lentils are principally met with, French and Egyptian. The former are usually sold entire, and are of an ash-grey colour externally and of a yellow tint within; the latter are usually sold like split peas, without the seed coat, and consist of the reddish-yellow cotyledons, which are smaller and rounder than those of the French lentil; the seed coat when present is of a dark brown colour. Considerable quantities of lentils are also imported into the United States.

The native country of the lentil is not known. It was probably one of the first plants brought under cultivation by mankind; lentils have been found in the lake dwellings of St Peter's Island, Lake of Bienne, which are of the Bronze age. The name 'adas (Heb. e>"iv) appears to be an original Semitic word, and the red pottage of lentils for which Esau sold his birthright (Gen. xxv. 34) was apparently made from the red Egyptian lentil. This lentil is cultivated in one or other variety in India, Persia, Syria, Egypt, Nubia and North Africa, and in Europe, along the coast of the Mediterranean, and as far north as Germany, Holland and France. In Egypt, Syria and other Eastern countries the parched seeds are exposed for sale in shops, and esteemed the best food to carry on long journeys. Lentils form a chief ingredient in the Spanish puchero, and are used in a similar way in France and other countries. For this purpose they are usually sold in the shelled state.

The reddish variety of the lentil {lentillon d'hiver) is the kind most esteemed in Paris on account of the superior flavour of its smaller seeds. It is sown in autumn either with a cereal crop or alone, and is cultivated chiefly in the north and east of France. The large or common variety, Untitle large blonde, cultivated in Lorraine and at Gallardon (Eure-et-Loir), and largely in Germany, is the most productive, but is less esteemed. This kind has very small whitish flowers, two or rarely three on a footstalk, and the pods are generally one-seeded, the seeds being of a whitish or cream colour, about J of an inch broad and \ in. thick. A single plant produces from 100 to 150 pods, which are flattened, about | in. long and i in. broad. Another variety, with seeds similar in form and colour to the last, but of much smaller size, is known as the lentillon de Mars. It is sown in spring. This variety and the lentille large are both sometimes called the lentille a la reine. A small variety, lentille verte du Puy, cultivated chiefly in the departments of Haute Loire and Cantal, is also grown as a vegetable and for forage. The Egyptian lentil was introduced into Britain in 1820. It has blue flowers. Another species of lentil, Ervum monanthos, is grown in France about Orleans and elsewhere under the name of jarosse and jarande. It is, according to Vilmorin, one of the best kinds of green food to grow on a poor dry sandy soil; on calcareous soil it does not succeed so

well. It is usually sown in autumn with a little rye or winter oats, at the rate of a hectolitre to a hectare.

The lentil prefers a light warm sandy soil; on rich land it runs to leaf and produces but few pods. The seeds are sown in March or April or early in May, according to the climate of the country, as they cannot endure night frosts. If for fodder they are sown broad- cast, but in drills if the ripe seeds are required. The pods are gathered in August or September, as soon as they begin to turn brown — the plants being pulled up like flax while the foliage is still green, and on a dry day lest the pods split in drying and loss of seed takes place. Lentils keep best in the husk so far as flavour is concerned, and will keep good in this way for two years either for sowing or for food. An acre of ground yields on an average about 11 cwt. of seed and 30 cwt. of straw. The amount and character of the mineral matter requisite in the soil may be judged from the analysis of the ash, which in the seeds has as its chief ingredients — potash 34-6% soda 9-5, lime 6-3, phosphoric acid 36-2, chloride of sodium 7-6, while in the straw the percentages are — potash io-8, lime 52-3, silica 17-6, phosphoric acid 12-3, chloride of sodium 2-1.

Lentils have attracted considerable notice among vegetarians as a food material, especially for soup. A Hindu proverb says, ” Rice is good, but lentils are my life.” The husk of the seed is indigestible, and to cook lentils properly requires at least two and a half hours, but they are richer in nutritious matter than almost any other kind of pulse, containing, according to Payen’s analysis, 25-2 % of nitrogenous matter (legumin), 56% of starch and 2-6% of fatty matter. Fresenius’s analysis differs in giving only 35 % of starch; Einhoff gives 32-81 of starch and 37-82% of nitrogenous matter. Lentils are more properly the food of the poor in all countries where they are grown, and have often been spurned when better food could be obtained, hence the proverb Dives foetus jam desiit gaudere lente. The seeds are said to be good for pigeons, or mixed in a ground state with potatoes or barley for fattening pigs. The herbage is highly esteemed as green food for suckling ewes and all kinds of cattle (being said to increase the yield of milk), also for calves and lambs. Haller says that lentils are so flatulent as to kill horses. They were also believed to be the cause of severe scrofulous disorders common in Egypt. This bad reputation may possibly be due to the substitution of the seeds of the bitter vetch or tare lentil, Ervum Ervilia, a plant which closely resembles the true lentil in height, habit, flower and pod, but whose seeds are without doubt possessed of deleterious properties — producing weakness or even paralysis of the extremities in horses which have partaken of them. The poisonous principle seems to reside chiefly in the bitter

seed coat, and" can apparently be removed by steeping in water, since Gerard, speaking of the " bitter vetch " (E. Ervilia), says " kine in Asia and in most other countries do eat thereof, being made sweet by steeping in water." The seed of E. Ervilia is about the same size and almost exactly of the same reddish-brown colour as that of the Egyptian lentil, and when the seed coat is removed they are both of the same orange red hue, but the former is not so bright as the latter. The shape is the best means of distinguishing the two seeds, that of E. Ervilia being obtusely triangular.

Sea-lentil is a name sometimes applied to the gulfweed Sargassum vulgare.

LENTULUS, the name of a Roman patrician family of the Cornelian gens, derived from lentes (" lentils "), which its oldest members were fond of cultivating (according to Pliny, Nat. Hist. xviii. 3, 10). The word Lentulitas (" Lentulism "; cf. Appietas) is coined by Cicero (Ad Fatn. iii. 7, 5) to express the attributes of a pronounced aristocrat. The three first of the name were L. Cornelius Lentulus (consul 327 B.C.), Servius Cornelius Lqntulus (consul 303) and L. Cornelius Lentulus Caudinus (consul 275). Their connexion with the later Lentuli (especially those of the Ciceronian period) is very obscure and difficult to establish. The following members of the family deserve mention.

Ptjblius Cornelius Lentulus, nicknamed Sura, one of the chief figures in the Catilinarian conspiracy. When accused by Sulla (to whom he had been quaestor in 81 B.C.) of having squandered the public money, he refused to render any account, but insolently held out the calf of his leg (sura), on which part of the person boys were punished when they made mistakes in playing ball. He was praetor in 75, governor of Sicily 74, consul 71. In 70, being expelled from the senate with a number of others for immorality, he joined Catiline. Relying upon a Sibylline oracle that three Cornelii should be rulers of Rome, Lentulus regarded himself as the destined successor of Cornelius Sulla and Cornelius Cinna. When Catiline left Rome after Cicero's first speech In Catilinam, Lentulus took his place as chief of the conspirators in the city. In conjunction with C. Cornelius Cethegus, he undertook to murder Cicero and set fire to Rome, but the plot failed owing to his timidity and

indiscretion. Ambassadors from the Allobroges being at the time in Rome, the bearers of a complaint against the oppressions ot provincial governors, Lentulus made overtures to them, with the object of obtaining armed assistance. Pretending to fall in with his views, the ambassadors obtained a written agree- ment signed by the chief conspirators, and informed Q. Fabius Sanga, their ” patron ” in Rome, who in his turn acquainted Cicero. The conspirators were arrested and forced to admit their guilt. Lentulus was compelled to abdicate his praetorship, and, as it was feared that there might be an attempt to rescue him, he was put to death in the Tullianum on the 5th of December 63.

See Dio Cassius xxxvii. 30, xlvi. 20; Plutarch, Cicero, 17; Sallust, Catilina; Cicero, In Catilinam, iii., iv.; Pro Sulla, 25; also Catiline.

Pubuus Cornelius Lentulus, called Spinther from his likeness to an actor of that name, one of the chief adherents of the Pompeian party. In 63 B.C. he was curule aedile, assisted Cicero in the suppression of the Catilinarian conspiracy, and distinguished himself by the splendour of the games he provided. Praetor in 60, he obtained the governorship of Hispania Citerior (59) through the support of Caesar, to whom he was also indebted for his election to the consulship (57). Lentulus played a prominent part in the recall of Cicero from exile, and although a temporary coolness seems to have arisen between them, Cicero speaks of him in most grateful terms. From 56-53 Lentulus was governor of the province of Cilicia (with Cyprus) and during that time was commissioned by the senate to restore Ptolemy XL Auletes to his kingdom (see Ptolemies). The Sibylline books, however, declared that the king must not be restored by force of arms, at the risk of peril to Rome. As a provincial governor, Lentulus appears to have looked after the interests of his subjects, and did not enrich himself at their expense. In spite of his indebtedness to Caesar, Lentulus joined the Pompeians on the outbreak of civil war (49). The generosity with which he was treated by Caesar after the capitulation of Corfinium made him hesitate, but he finally decided in favour of Pompey. After the battle of Pharsalus, Lentulus escaped to Rhodes, where he was at first refused admission, although he subsequently found an asylum there (Cicero, Ad Alt. xi. 13. 1). According to Aurelius Victor (De vir. ill. lxxviii., 9, if the reading be correct), hs subsequently fell into Caesar’s hands and was put to death. See Caesar, Bell. Civ. i. 15-23, iii. 102; Plutarch, Pomp. 49; Valerius Maximus ix. 14, 4; many letters of Cicero, especially Ad Fam. i. 1-9.

Lucius Cornelius Lentulus, surnamed Crus or Cruscello (for what reason is unknown), member of the anti-Caesarian party. In 61 B.C. he

was the chief accuser of P. Clodius (q.v.) in the affair of the festival of Bona Dea. When consul (49) he advised the rejection of all peace terms offered by Caesar, and declared that, if the senate did not at once decide upon opposing him by force of arms, he would act upon his own responsibility. There seems no reason to doubt that Lentulus was mainly inspired by selfish motives, and hoped to find in civil war an opportunity for his own aggrandizement But in spite of his brave words he fled in haste from Rome as soon as he heard of Caesar's advance, and crossed over to Greece. After Pharsalus, he made his way to Rhodes (but was refused admission), thence, by way of Cyprus, to Egypt. He landed at Pelusium the day after the murder of Pompey, was immediately seized by Ptolemy, imprisoned, and put to death.

See Caesar, Bell. Civ. i. 4, iii. 104; Plutarch, Pompey, 80. A lull account of the different CorneHi Lentuli, with genealogical table, will be found in Pauly-Wissowa's Re.alencyclopadie, iv. pt. I, P- 1355 ('9°o) (s – v – " Cornelius ") ; see also V. de Vit, Onomasticon, "• 433-

LENZ, JAKOB MICHAEL REINHOLD (1751-1792), German poet, was born at Sesswegen in Livonia, the son of the village pastor, on the 12th of January 1751. He removed with his parents to Dorpat in 1759, and soon began to compose sacred odes, in the manner of Klopstock. In 1768 he entered the university of Konigsberg as a student of theology, and in 1771 accompanied, as tutor, two young German nobles, named von Kleist, to Strassburg, where they were to enter the French

army. In Strassburg Lenz was received into the literary circle that gathered round Friedrich Rudolf Salzmann (1749-1821) and became acquainted with Goethe, at that time a student at the university. In order to be close to his young pupils, Lenz had to remove to Fort Louis in the neighbourhood, and while here became deeply enamoured of Goethe's friend, Friederike Elisabeth Brion (1752-1813), daughter of the pastor of Sesenheim. Lenz endeavoured, after Goethe's departure from Strassburg, to replace the great poet in her affections, and to her he poured out songs and poems {Die Liebe auf dem Lande) which were long attributed to Goethe himself, as was also Lenz's first drama, the comedy, Der Hofmeister, oder Vorteile der Privaterziehung (1774). In 1776 he visited Weimar and was most kindly received by the duke; but his rude, overbearing manner and vicious habits led to his expulsion. In 1777 he became insane, and in 1779 was removed from Emmendingen, where J. G. Schlosser (1739- 1799), Goethe's brother-in-law, had given him a home, to his native village. Here he lived in great poverty for several years, and then was given, more out of charity than on account of his merits, the appointment of tutor in a

pension school near Moscow, where he died on the 24th of May 1792. Lenz, though one of the most talented poets of the Sturm und Drang period, presented a strange medley of genius and childishness. His great, though neglected and distorted, abilities found vent in ill-conceived imitations of Shakespeare. His comedies, Der Hofmeister; Der neue Menoza (1774); Die Soldaten (1776); Die Freunde machen den Philosophen (1776), though accounted the best of his works, are characterized by unnatural situations and an incongruous mixture of tragedy and comedy.

Lenz's Gesammelte Schriften were published by L. Tieck in three volumes (1828); supplementary to these volumes are E. Dorer- Egloff, /. M. R. Lenz und seine Schriften (1857) and K. Weinhold, Dramatischer Nachlass von J. M. R. Lenz (1884); a selection of Lenz's writings will be found in A. Sauer, Stiirmer und Dr anger, it.; Kiirschner's Deutsche Nationalliteratur, vol. lxxx., (1883). See further E. Schmidt, Lenz und Klinger (1878); J. Froitzheim, Lenz und Goethe (1891); H. Rauch, Lenz und Shakespeare (1892); F. Waldmann, Lenz in Briefen (1894).

LEO, the name of thirteen popes.

Leo I., who alone of Roman pontiffs shares with Gregory I. the surname of the Great, pope from 440 to 461, was a native of Rome, or, according to a less probable account, of Volterra in Tuscany. Of his family or early life nothing is known; that he was highly cultivated according to the standards of his time is obvious, but it does not appear that he could write Greek, or even that he understood that language. In one of the letters (Ep. 104) of Augustine, an acolyte named Leo is mentioned as having been in 418 the bearer of a communication from Sixtus of Rome (afterwards pope) to Aurelius of Carthage against the Pelagians. In 429, when the first unmistakable reference to Pope Leo occurs, he was still only a deacon, but already a man of commanding influence; it was at his suggestion that the De incarnalione of the aged Cassianus, having reference to the Nestorian heresy, was composed in that year, and about 431 we find Cyril of Alexandria writing to him that he might prevent the Roman Church from lending its support in any way to the ambitious schemes of Juvenal of Jerusalem. In 440, while Leo was in Gaul, whither he had been sent to compose some differences between Aetius and another general named Albinus, Pope Sixtus III. died. The absent deacon, or rather archdeacon, was unanimously chosen to succeed him, and received consecration on his return six weeks afterwards (September 29). In 443 he began to take measures against the Manichaeans (who since the capture of Carthage by Genseric in 439 had become very

numerous at Rome), and in the following year he was able to report to the Italian bishops that some of the heretics had returned to Catholicism, while a large number had been sentenced to perpetual banishment ” in accordance with the constitutions of the Christian emperors,” and others had fled ; in seeking these out the help of the provincial clergy was sought. It was during the earlier years of Leo’s pontificate that the events in Gaul occurred which resulted in this triumph over Hilarius of Aries, signalized by the edict of Valentinian ILL

(445), denouncing the contumacy of the Gallic bishop, and enacting “that nothing should be done in Gaul, contrary to ancient usage, without the authority of the bishop of Rome, and that the decree of the apostolic see should henceforth be kaw.” In 447 Leo held the correspondence with Turribus of Astorga which led to the condemnation of the Priscillianists by the Spanish national church. In 448 he received with commendation a letter from Eutyches, the Constantinopolitan monk, com- plaining of the revival of the Nestorian heresy there; and in the following year Eutyches wrote his circular, appealing against the sentence which at the instance of Eusebius of Dorylaeum had been passed against him at a synod held in Constantinople under the presidency of the patriarch Flavian, and asking papal support at the oecumenical council at that time under summons to meet at Ephesus. The result of a correspondence was that Leo by his legates sent to Flavian that famous epistle in which he sets forth with great fulness of detail the doctrine ever since recognized as orthodox regarding the union of the two natures in the one person of Jesus Christ. The events at the ” robber ” synod at Ephesus belong to general church history rather than to the biography of Leo; his letter, though submitted, was not read by the assembled fathers, and the papal legates had some difficulty in escaping with their lives from the violence of the theologians who, not content with deposing Flavian and Eusebius, shouted for the dividing of those who divided Christ. When the news of the result of this oecumenical council (oecumenical in every circumstance except that it was not presided over by the pope) reached Rome, Leo wrote to Theodosius ” with groanings and tears,” requesting the emperor to sanction another council, to be held this time, however, in Italy. In this petition he was supported by Valentinian III., by the empress-mother Galla Placidia and by the empress Eudoxia, but the appeal was made in vain. A change, however, was brought about by the accession in the following year of

Marcian, who three days after coming to' the throne published an edict bringing within the scope of the penal laws against heretics the supporters of the dogmas of Apollinaris and Eutyches. To convoke a synod in which greater orthodoxy might reasonably be expectied was in these circumstances no longer difficult, but all Leo's efforts to secure that the meeting should take place on Italian soil were unavailing. When the synod of Chalcedon assembled in 451, the papal legates were treated with great respect, and Leo's former letter to Flavian was adopted by acclamation as formulating the creed of the universal church on the subject of the person of Christ. Among the reasons urged by Leo for holding this council in Italy had been the threatening attitude of the Huns; the dreaded irruption took place in the following year (452). After Aquileia had succumbed to Attila's long siege, the conqueror set out for Rome. Near the confluence of the Mincio and the Po he was met by Leo, whose eloquence persuaded him to turn back. Legend has sought to enhance the impressiveness of the occurrence by an unnecessarily imagined miracle. The pope was less successful with Genseric when the Vandal chief arrived under the walls of Rome in 455, but he secured a promise that there should be no incendiarism or murder, and that three of the oldest basilicas should be exempt from plunder— a promise which seems to have been faithfully observed. Leo died on the 10th of November 461, the liturgical anniversary being the 1 ith of April. His successor was Hilarius or. Hilarus, who had been one of the papal legates at the " robber " synod in 449.

The title of doctor ecclesiae was given to Leo by Benedict XIV. As bishop of the diocese of Rome, Leo distinguished himself above all his predecessors by his preaching, to which he devoted himself with great zeal and success. From his short and pithy Sermones many of the lessons now to be found in the Roman breviary have been taken. Viewed in conjunction with his voluminous correspondence, the sermons sufficiently explain the secret of his greatness, which chiefly lay in the extraordinary strength and purity of his convictions as to the primacy of the successors of St Peter at a time when the civil atid ecclesiastical troubles of tne civilized world made men

willing enough to submit themselves to any authority whatsoever that could establish its right to exist by courage, honesty and knowledge of affairs.

The works of Leo I. were first collectively edited by Quesnel (Lyons, 1700), and again, on the basis of this, in what is now the standard edition by Ballerini (Venice, 1753-1756). Ninety-three Sermones and one hundred and seventy-three Epistolae occupy the firstˆ volume ; the

second contains the Liber Sacramentorum, usually attributed to Leo, and the De Vocatione Omnium Gentium, also ascribed, by Quesnel and others, to him, but more probably the production of a certain Prosper, of whom nothing further is known. The works of Hilary of Aries are appended.

Leo II., pope from August 682 to July 683, was a Sicilian by birth, and succeeded Agatho I. Agatho had been represented at the sixth oecumenical council (that of Constantinople in 681), where Pope Honorius I. was anathematized for his views in the Monothelite controversy as a favourer of heresy, and the only fact of permanent historical interest with regard to Leo is that he wrote once and again in approbation of the decision of the council and in condemnation of Honorius, whom he regarded as one who profana proditione immaculatam fidem subvertere conatus est. In their bearing upon the question of papal infallibility these words have excited considerable attention and controversy, and prominence is given to the circumstance that in the Greek text of the letter to the emperor in which the phrase occurs the milder expression irapexuprjcrev {subverti permisit) is used for subvertere conatus est. This Hefele in his Conciliengeschichte (iii. 294) regards as alone expressing the true meaning of Leo. It was during Leo's pontificate that the dependence of the see of Ravenna upon that of Rome was finally settled by imperial edict. Benedict II. succeeded him.

Leo III., whose pontificate (795-816) covered the last eighteen years of the reign of Charlemagne, was a native of Rome, and having been chosen successor of Adrian I. on the 26th of December 795, was consecrated to the office on the following day. His first act was to send to Charles as patrician the standard of Rome along with the keys of the sepulchre of St Peter and of the city; a gracious and condescending letter in reply made it still more clear where all real power at that moment lay. For more than three years his term of office was uneventful; but at the end of that period the feelings of disappointment which had secretly been rankling in the breasts of Paschalis and Campulus, nephews of Adrian I., who had received from him the offices of primicerius and sacellarius respectively, suddenly manifested themselves in an organized attack upon Leo as he was riding in procession through the city on the day of the Greater Litany (25th April 799); the object of his assailants was, by depriving him of his eyes and tongue, to disqualify him for the papal office, and, although they were unsuccessful in this attempt, he found it necessary to accept the protection of Winegis, the Frankish duke of Spoleto, who came to the rescue. Having vainly requested the presence of Charles in Rome, Leo went beyond the Alps to meet the king at Paderborn; he

was received with much ceremony and respect, but his enemies having sent in serious written charges, of which the character is not now known, Charles decided to appoint both the pope and his accusers to appear as parties before him when he should have arrived in Rome. Leo returned in great state to his diocese, and was received wiiu honour; Charles, who did not arrive until November in the following year, lost no time in assuming the office of a judge, and the result of his investigation was the acquittal of the pope, who at the same time, however, was per- mitted or rather required to clear himself by the oath of com- purgation. The coronation of the emperor followed two days afterwards; its effect was to bring out with increased clearness the personally subordinate position of Leo. The decision of the emperor, however, secured for Leo's pontificate an external peace which was only broken after the accession of Louis the Pious. His enemies began to renew their attacks; the violent repression of a conspiracy led to an open rebellion at Rome; serious charges were once more brought against him, when he was overtaken by death in 816. It was under this pontificate that Felix of Urgel, the adoptianist, was anathematized (798) by a

Roman synod. Leo at another synod held in Rome in 810 admitted the dogmatic correctness of the filoque, but deprecated its introduction into the creed. On this point, however, the Frankish Church persevered in the course it had already initiated. Leo's successor was Stephen IV.

Leo IV., pope from 847 to 855, was a Roman by birth, and succeeded Sergius II. His pontificate was chiefly distinguished by his efforts to repair the damage done by the Saracens during the reign of his predecessor tq various churches of the city, especially those of St Peter and St Paul. It was he who built and fortified the suburb on the right bank of the Tiber still known as the Civitas Leonina. A frightful conflagration, which he is said to have extinguished by his prayers, is the subject of Raphael's great work in the Sala dell' Incendio of the Vatican. He held three synods, one of them (in 850) distinguished by the presence of Louis II., who was crowned emperor on the occasion, but none of them otherwise of importance. The history of the papal struggle with Hincmar of Reims, which began during Leo's pontificate, belongs rather to that of Nicholas I. Benedict III. was Leo's immediate successor.

Leo V., a native of Ardea, was pope for two months in 903 after thedeathof BenedictlV. He was overthrown and cast into prison by the priest Christopher, who installed himself in his place.

Leo VI. succeeded John X. in 928, and reigned seven months and a few days. He was succeeded by Stephen VIII.

Leo VII., pope from 936 to 939, was preceded by John XL, and followed by Stephen IX.

Leo VIII., pope from 963 to 965, a Roman by birth, held the lay office of protoscrinius when he was elected to the papal chair at the instance of Otto the Great by the Roman synod which deposed John XII. in December 963. Having been hurried with unseemly haste through all the intermediate orders, he received consecration two days after his election, which was unacceptable to the people. In February 964, the emperor having withdrawn from the city, Leo found it necessary to seek safety in flight, whereupon he was deposed by a synod held under the presidency of John XII. On the sudden death of the latter, the populace chose Benedict V. as his successor; but Otto, returning and laying siege to the city, compelled their acceptance of Leo. It is usually said that, at the synod which deposed Benedict, Leo conceded to the emperor and his successors as sovereign of Italy full rights of investiture, but the genuineness of the document on which this allegation rests is more than doubtful. Leo VIII. was succeeded by John- XIII.

Leo IX., pope from 1049 to 1054, was a native of Upper Alsace, where he was born on the 21st of June 1002. His proper name was Bruno; the family to which he belonged was of noble rank, and through his father he was related to the emperor Conrad II. He was educated at Toul, where he successively became canon and (1026) bishop; in the latter capacity he rendered important political services to his relative Conrad II., and afterwards to Henry III., and at the same time he became widely known as an earnest and reforming ecclesiastic by the zeal he showed in spreading the rule of the order of Cluny. On the death of Damasus II., Bruno was in December 1048, with the concurrence both of the emperor and of the Roman delegates, selected his successor by an assembly at Worms; he stipulated, however, as a condition of his acceptance that he should first proceed to Rome and be canonically elected by the voice of clergy and people. Setting out shortly after Christmas, he had a meet- ing with abbot Hugo of Cluny at Besancon, where he was joined by the young monk Hildebrand, who afterwards became Pope Gregory VII.; arriving in pilgrim garb at Rome in the following February, he was received with much

cordiality, and at his consecration assumed the name of Leo IX. One of his first public acts was to hold the well-known Easter synod of 1049, at which celibacy of the clergy (down to the rank of subdeacon) was anew enjoined, and where he at least succeeded in making clear his own convictions against every kind of simony. The greater part of the year that followed was occupied in one of those progresses through Italy, Germany and France which form a marked feature in Leo's pontificate. After presiding

bver a synod at Pavia, he joined the emperor Henry III. in Saxony, and accompanied him to Cologne and Aix-la-Chapelle; to Reims he also summoned a meeting of the higher clergy, by which several important reforming decrees were passed. At Mainz also he held a council, at which the Italian and French as well as the German clergy were represented, and ambassadors of the Greek emperor were present; here too simony and the marriage of the clergy were the principal matters dealt with. After his return to Rome he held (29th April 1050) another Easter synod, which was occupied largely with the controversy about the teachings of Berengarius of Tours; in the same year he presided over provincial synods at Salerno, Siponto and Vercelli, and in September revisited Germany, returning to Rome in time for a third Easter synod, at which the question of the reordination of those who had been ordained by simonists was considered. In 1052 he joined the emperor at Pressburg, and vainly sought to secure the submission of the Hungarians; and at Regensburg, Bamberg and Worms the papal presence was marked by various ecclesiastical solemnities. After a fourth Easter synod in 1053 Leo set out against the Normans in the south with an army of Italians and German volunteers, but his forces sustained a total defeat at Astagnum pear Civitella (18th June 1053); on going out, however, from the city to meet the enemy he was received with every token of submission, relief from the pressure of his ban was implored and fidelity and homage were sworn. From June 1053 to March 1054 he was nevertheless detained at Benevento in honourable captivity; he did not long survive his return to Rome, where he died on the 19th of April 1054. He was succeeded by Victor II.

Leo X. [Giovanni de' Medici] (1475-1521), pope from the nth of March 15 13 to the 1st of December 1521, was the second son of Lorenzo de' Medici, called the Magnificent, and was born at Florence on the 1 ith of December 1475. Destined from his birth for the church, he received the tonsure at the age of seven and was soon loaded with rich benefices and preferments. His father prevailed on Innocent VIII. to name him cardinal -deacon of Sta Maria in Dominica in March 1489, although he was not allowed to wear the insignia or share in

the deliberations of the college until three years later. Meanwhile he received a careful education at Lorenzo's brilliant humanistic court under such men as Angelo Poliziano, the classical scholar, Pico della Mirandola, the philosopher and theologian, the pious Matsilio Ficino who endeavoured to unite the Platonic cult with Christianity and the poet Bernardo Dbvizio Bibbiena. From 1489 to 1491 he studied theology and canon law at Pisa under Filippo Decio and Bartolomeo Sozzini. On the 23rd of March 1492 he was formally admitted into the sacred college and took up his residence at Rome, receiving a letter of advice from his father which ranks among the wisest of its kind. The death of Lorenzo on the 8th of April, however, called the seventeen-year-old cardinal to Florence. He participated in the conclave which followed the death of Innocent VIII. in July 1492 and opposed the election of Cardinal Borgia. He made his home with his elder brother Piero at Florence throughout the agitation of Savonarola and the invasion of Charles VIII. of France, until the uprising of the Florentines and the expulsion of the Medici in November 1494. While Piero found refuge at Venice and Urbino, Cardinal Giovanni travelled in Germany, in the Netherlands and in France. In May 1560 he returned to Rome, where he was received with outward cordiality by Alexander VI., and where he lived for several years immersed in art and litera- ture. In 1503 he welcomed the accession of Julius II. to the pontificate; the death of Piero de' Medici in the same year made Giovanni head of his family. On the 1st of October 1511 he was appointed papal legate of Bologna and the Romagna, and when the Florentine republic declared in favour of the schismatic Pisans Julius II. sent him against his native city at the head of the papal army. This and other attempts to regain political control of Florence were frustrated, until a bloodless revolution permitted the return of the Medici on the 14th of September 151 2. Giovanni's younger brother Giuliano was placed at the head of the republic, but the cardinal actually

managed the government. Julius II. died in February 1513, and the conclave, after a stormy seven day's session, united on Cardinal de' Medici as the candidate of the younger cardinals. He was ordained to the priesthood on the 15th of March, consecrated bishop on the 17th, and enthroned with the name of Leo X. on the 19th. There is no evidence of simonv in the conclave, and Leo's election was hailed with delight by the Romans on account of his reputation for liberality, kindliness and love of peace. Following the example of many of his predecessors, he promptly repudiated his election " capitulation " as

an infringement on the divinely bestowed prerogatives of the Holy See.

Many problems confronted Leo X. on his accession. He must preserve the papal conquests which he had inherited from Alexander VI. and Julius II. He must minimize foreign influence, whether French, Spanish or German, in Italy. He must put an end to the Pisan schism and settle the other troubles incident to the French invasion. He must restore the French Church to Catholic unity, abolish the pragmatic sanction of Bourges, and bring to a successful close the Lateran council convoked by his predecessor. He must stay the victorious advance of the Turks. He must quiet the disagreeable wranglings of the German humanists. Other problems connected with his family interests served to complicate the situation and eventually to prevent the successful consummation of many of his plans. At the very time of Leo's accession Louis XII. of France, in alliance with Venice, was making a determined effort to regain the duchy of Milan, and the pope, after fruitless endeavours to maintain peace, joined the league of Mechlin on the 5th of April 15 13 with the emperor Maximilian I., Ferdinandl. of Spain and Henry VIII. of England. The French and Venetians were at first successful, but on the 6th of June met overwhelming defeat at Novara. The Venetians continued the struggle until October. On the 19th of December the fifth Lateran council, which had been reopened by Leo in April, ratified the peace with Louis XII. and registered the conclusion of the Pisan schism. While the council was engaged in planning a crusade and in considering the reform of the clergy, a new crisis occurred between the pope and the king of France. Francis I., who succeeded Louis XII. on the 1st of January 1515, was an enthusiastic young prince, dominated by the ambition of recovering Milan and Naples. Leo at once formed a new league with the emperor and the king of Spain, and to ensure English support made Wolsey a cardinal. Francis entered Italy in August and on the 14th of September won the battle of Marignano. The pope in October signed an agreement binding him to with- draw his troops from Parma and Piacenza, which had been previously gained at the expense of the duchy of Milan, on con- dition of French protection at Rome and Florence. The king of Spain wrote to his ambassador at Rome " that His Holiness hau hitherto played a double game and that all his zeal to drive the French from Italy had been only a mask "; this reproach seemed to receive some confirmation when Leo X. held a secret conference with Francis at Bologna in December 1515. The ostensible sub- jects under consideration were the establishment of peace between France, Venice and the Empire, with a view to an expedition against the Turks, and the ecclesiastical affairs of France.

Precisely what was arranged is unknown. During these two or three years of incessant political intrigue and warfare it was not to be expected that the Lateran council should accomplish much. Its three main objects, the peace of Christendom, the crusade and the reform of the church, could be secured only by general agreement among the powers, and Leo or the council failed to secure such agreement. Tts most import- ant achievements were the registration at its eleventh sitting (19th December 1516) of the abolition of the pragmatic sanction, which the popes since Pius II. had unanimously' condemned, and the confirmation of the concordat between Leo X. and Francis I., which was destined to regulate the relations between the French Church and the Holy See until the Revolution. Leo closed the council on the 16th of March 151 7. It had ended the schism, ratified the censorship of books introduced by Alexander VI. and imposed tithes for a war against the Turks. It raised no voice against the primacy of the pope.

The year which marked the close of the Lateran council was also signalized by Leo's unholy war against the duke of Urbino. The pope was naturally proud of his family and had practised nepotism from the outset. His cousin Giulio, who subsequently became Clement VII., he had made the most influential man in the curia, naming him archbishop of Florence, cardinal and vice-chancellor of the Holy See. Leo had intended his younger brother Giuliano and his nephew Lorenzo for brilliant secular careers. He had named them Roman patricians; the latter he had placed in charge of Florence; the former, for whom he planned to carve out a kingdom in central Italy of Parma, Piacenza, Ferrara and Urbino, he had taken with himself to Rome and married to Filiberta of Savoy. The death of Giuliano in March 1516, however, caused the pope to transfer his ambitions to Lorenzo. At the very time (December 1516) that peace between France, Spain, Venice and the Empire seemed to give some promise of a Christendom united against the Turk, Leo was preparing an enterprise as unscrupulous as any of the similar exploits of Cesare Borgia. He obtained 150,000 ducats towards the expenses of the expedition from Henry VIII. of England, in return for which he entered the imperial league of Spain and England against France. The war lasted from February to September 1517 and ended with the expulsion of the duke and the triumph of Lorenzo; but it revived the nefarious policy of Alexander VI., increased brigandage and anarchy in the States of the. Church, hindered the preparations for a crusade and wrecked the papal finances. Guicciardini reckoned the cost of the war to Leo at the prodigious sum of 800,000 ducats. The new duke of Urbino was the Lorenzo de' Medici to whom Machiavelli addressed The Prince. His marriage in March 1518 was arranged by the pope with Madeleine la Tour d'Auvergne, a royal princess of France, whose daughter was the Catherine de' Medici celebrated in French history. The war of Urbino was further marked by a crisis in the relations between pope and cardinals. The sacred college had grown especially worldly and troublesome since the time of Sixtus IV., and Leo took advantage of a plot of several of its members to poison him, not only to inflict exemplary punishments by executing one and imprisoning several others, but also to make a radical change in the college. On the 3rd of July 151 7 he published the names of thirty-one new cardinals, a number almost unprecedented in the history of the papacy. Some of the nominations were ex- cellent, such as Lorenzo Campeggio, Giambattista Pallavicini, Adrian of Utrecht, Cajetan, Cristoforo Numai and Egidio Canisio, The naming of seven members of prominent Roman families, however, reversed the wise policy of his predecessor which had kept Lhe dangdous factions of the city out of the curia.

Other promotions were for political or family considerations or to secure money for the war against Urbino. The pope was accused of having exaggerated the conspiracy of the cardinals for purposes of financial gain, but most of such accusations appear to be unsubstantiated.

Leo, meanwhile, felt the need of staying the advance of the warlike sultan, Selim L, who was threatening western Europe, and made elaborate plans for a crusade. A truce was to be proclaimed throughout Christendom; the pope was to be the arbiter of disputes; the emperor and the king of France were to lead the army; England, Spain and Portugal were to furnish the fleet; and the combined forces were to be directed against Constantinople. Papal diplomacy in the interests of peace failed, however; Cardinal Wolsey made England, not the pope, the arbiter between France and the Empire; and much of the money collected for the crusade from tithes and indulgences was spent in other ways. In 1519 Hungary concluded a three years' truce with Selim I., but the succeeding sultan, Suliman the Magnificent, renewed the war in June 1521 and on the 28th of August captured the citadel of Belgrade. The pope was greatly alarmed, and although he was then involved in war with France he sent about 30,000 ducats to the Hungarians. Leo treated the Uniate Greeks with great loyalty, and by bull of the 1 8th of May 1521 forbade Latin clergy to celebrate mass in Greek churches and Latin bishops to ordain Greek clergy.

These provisions were later strengthened by Clement VII. and Paul III. and went far to settle the chronic disputes between the Latins and Uniate Greeks.

Leo was disturbed throughout his pontificate by heresy and schism. The dispute between Reuchlin and Pfefferkorn relative to the Talmud and other Jewish books was referred to the pope in September 1513. He in turn referred it to the bishops of Spires and Worms, who gave decision in March 1514 in favour of Reuchlin. After the appeal of the inquisitor-general, Hoch- straten, and the appearance of the Epistolae obscurorum virorum, however, Leo annulled the decision (June 1520) and imposed silence on Reuchlin. The pope had already authorized the extensive grant of indulgences in order to secure funds for the crusade and more particularly for the rebuilding of St Peter's at Rome. Against the attendant abuses the Augustinian monk Martin Luther (q.v.) posted (31st October 151 7) on the church door at Wittenberg

his famous ninety-five theses, which were the signal for widespread revolt against the church. Although Leo did not fully comprehend the import of the movement, he directed (3rd February 15 18) the vicar-general of the Augustinians to impose silence on the monks. On the 30th of May Luther sent an explanation of his theses to the pope; on the 7th of August he was cited to appear at Rome. An- arrangement was effected, however, whereby that citation was cancelled, and Luther betook himself in October 1518 to Augsburg to meet the papal legate, Cardinal Cajetan, who was attending the imperial diet convened by the emperor Maximilian to impose the tithes for the Turkish war and to elect a king of the Romans; but neither the arguments of the learned cardinal, nor the dogmatic papal bull of the oth of November to the effect that all Christians must believe in the pope's power to grant indulgences, moved Luther to retract. A year of fruitless negotiation followed, during which the pamphlets of the reformer set all Germany on fire. A papal bull of the 15th of June 1520, which condemned forty-one propositions extracted from Luther's teachings, was taken to Germany by Eck in his capacity of apostolic nuncio, published by him and the legates Alexander and Caracciola, and burned by Luther on the 10th of December at Wittenberg. Leo then formally excommunicated Luther by bull of the 3rd of January 1521; and in a brief directed the emperor to take energetic measures against heresy. On the 26th of May 1521 the emperor signed the edict of the diet of Worms, which placed Luther under the ban of the Empire; on the 21st of the same month Henry VIII. of England sent to Leo his book against Luther on the seven sacraments. The pope, after careful consideration, conferred on the king of England the title " Defender of the Faith " by bull of the nth of October 1521. Neither the imperial edict nor the work of Henry VIII. stayed the Lutheran movement, and Luther himself, safe in the solitude of the Wartburg, survived Leo X. It was under Leo X. also that the Protestant movement had its beginning in Scandinavia. The pope had repeatedly used the rich northern benefices to reward members of the Roman curia, and towards the close of the year 15 16 he sent the grasping and impolitic Arcimboldi as papal nuncio to Denmark to collect money for St Peter's. King Christian II. took advantage of the growing dissatisfaction on the part of the native clergy toward the papal government, and of Arcimboldi's interference in the Swedish revolt, in order to expel the nuncio and summon (1520) Lutheran theologians to Copenhagen. Christian approved a plan, by which a formal state church should be established in Denmark, all appeals to Rome should be abolished, and the king and diet should have final jurisdiction in ecclesiastical causes. Leo sent a new nuncio to Copenhagen (1521) in the person of the Minorite Francesco de

Potentia, who readily absolved the king and received the rich bishopric of Skara. The pope or his legate, however, took no steps to remove abuses or otherwise reform the Scandinavian churches.

That Leo did not do more to check the tendency toward heresy and schism in Germany and Scandinavia is to be partially explained by the political complications of the time, and by his own preoccupation with schemes of papal and Medicean

aggrandizement in Italy. The death of the emperor Maximilian on the 12th of January 1519 had seriously affected the situation. Leo vacillated between the powerful candidates for the succession, allowing it to appear at first that he favoured Francis I. while really working for the election of some minor German prince. He finally accepted Charles I. of Spain as inevitable, and the election of Charles (28th of June 1519) revealed Leo's desertion of his French alliance, a step facilitated by the death at about the same time of Lorenzo de' Medici and his French wife. Leo was now anxious to unite Ferrara, Parma and Piacenza to the States of the Church. An attempt late in 1 510 to seize Ferrara failed, and the pope recognized the need of foreign aid. In May 1 52 1 a treaty of alliance was signed at Rome between him and the emperor. Milan and Genoa were to be taken from France and restored to the Empire, and Parma and Piacenza were to be given to the Church on the expulsion of the French. The expense of enlisting 10,000 Swiss was to be borne equally by pope and emperor. Charles took Florence and the Medici family under his protection and promised to punish all enemies of the Catholic faith. Leo agreed to invest Charles with Naples, to crown him emperor, and to aid in a war against Venice. It was provided that England and the Swiss might join the league. Henry VIII. announced his adherence in August. Francis I. had already begun war with Charles in Navarre, and in Italy, too, the French made the first hostile movement (23rd June 1521). Leo at once announced that he would excommunicate the king of France and release his subjects from their allegiance unless Francis laid down his arms and surrendered Parma and Piacenza. The pope lived to hear the joyful news of the capture of Milan from the French and of the occupation by papal troops of the long-coveted provinces (November 1521). Leo X. died on the 1st of December 1521, so suddenly that the last sacraments could not be administered; but the contemporary suspicions of poison were unfounded. His successor was Adrian VI.

Several minor events of Leo's pontificate are worthy of mention. He was particularly friendly with King Emmanuel of Portugal on account of the latter's missionary enterprises in Asia and Africa. His concordat

with Florence (1516) guaranteed the free election of the clergy in that city. His constitution of the 1 st of March 15 19 condemned the king of Spain's claim to refuse the publication of papal bulls. He maintained close relations with Poland because of the Turkish advance and the Polish contest with the Teutonic Knights. His bull of the 1st of July 1519, which regulated the discipline of the Polish Church, was later transformed into a concordat by Clement VII. Leo showed special favours to the Jews and permitted them to erect a Hebrew printing-press at Rome. He approved the formation of the Oratory of Divine Love, a group of pious men at Rome which later became the Theatine Order, and he canonized Francesco di Paola.

As patron of learning Leo X. deserves a prominent place among the popes. He raised the church to a high rank as the friend of whatever seemed to extend knowledge or to refine and embellish life. He made the capital of Christendom the centre of culture. Every Italian artist and man of letters in an age of singular intellectual brilliancy tasted or hoped to taste of his bounty. While yet a cardinal, he had restored the church of Sta Maria in Domnica after Raphael's designs; and as pope he built S. Giovanni on the Via Giulia after designs by Jacopo Sansovino and pressed forward the work on St Peter's and the Vatican under Raphael and Chigi. His constitution of the 5th of November 15 13 reformed the Roman university, which had been neglected by Julius II. He restored all its faculties, gave larger salaries to the professors, and summoned distinguished teachers from afar; and, although it never attained to the importance of Padua or Bologna, it nevertheless possessed in 1 514 an excellent faculty of eighty-eight professors. Leo called Theodore Lascaris to Rome to give instruction in Greek, and established a Greek printing-press from which the first Greek book printed at Rome appeared in 1515. He made Raphael custodian of the classical antiquities of Rome and the vicinity. The distinguished Latinists Pietro Bembo (1470-1547) and

Jacopo Sadoleto (147 7-1 547) were papal secretaries, as well as the famous poet Bernardo Accolti (d.1534). Writers of poetry like Vida (1400-1566), Trissino (1478-1550), and Bibbiena (1470- 1520), writers of novelle like Bandello, and a hundred other literati of the time were bishops, or papal scriptors or abbreviators, or in other papal employ. Leo's lively interest in art and literature, to say nothing of his natural liberality, his nepotism, his political ambitions and necessities, and his immoderate personal luxury, exhausted within two years the

hard savings of Julius II., and precipitated a financial crisis from which he never emerged and which was a direct cause of most of the calamities of his pontificate. He created many new offices and shamelessly sold them. He sold cardinals' hats. He sold membership in the " Knights of Peter." He borrowed large sums from bankers, curials, princes and Jews. The Venetian ambassador Gradenigo estimated the paying number of offices on Leo's death at 2150, with a capital value of nearly 3,000,000 ducats and a yearly income of 328,000 ducats. Marino Giorgi reckoned the ordinary income of the pope for the year 1517 at about 580,000 ducats, of which 420,000 came from the States of the Church, 100,000 from annates, and 60,000 from the composition tax instituted by Sixtus IV. These sums, together with the considerable amounts accruing from indulgences, jubilees, and special fees, vanished as quickly as they were received. Then the pope resorted to pawning palace furniture, table plate, jewels, even statues of the apostles. Several banking firms and many individual creditors were ruined by the death of the pope.

In the past many conflicting estimates were made of the character and achievements of the pope during whose pontificate Protestantism first took form. More recent studies have served to produce a fairer and more honest opinion of Leo X. A report of the Venetian ambassador Marino Giorgi bearing date of March 1517 indicates some of his predominant characteristics: — " The pope is a good-natured and extremely free-hearted man, who avoids every difficult situation and above all wants peace; he would not undertake a war himself unless his own personal interests were involved; he loves learning; of canon law and literature he possesses remarkable knowledge; he is, moreover, a very excellent musician." Leo was dignified in appearance and elegant in speech, manners and writing. He enjoyed music and the theatre, art and poetry, the masterpieces of the ancients and the wonderful creations of his contemporaries, the spiritual and the witty — life in every form. It is by no means certain that he made the remark often attributed to him, " Let us enjoy the papacy since God has given it to us," but there is little doubt that he was by nature devoid of moral earnestness or deep religious feeling. On the other hand, in spite of his worldliness, Leo was not an unbeliever; he prayed, fasted, and participated in the services of the church with conscientiousness. To the virtues of liberality, charity and clemency he added the Machia- vellian qualities of falsehood and shrewdness, so highly esteemed by the princes of his time. Leo was deemed fortunate by his contemporaries, but an incurable malady, wars, enemies, a conspiracy of cardinals, and the loss of all his nearest relations darkened his days; and he failed entirely in his general policy of

expelling foreigners from Italy, of restoring peace throughout Europe, and of prosecuting war against the Turks. He failed to recognize the pressing need of reform within the church and the tremendous dangers which threatened the papal monarchy; and he unpardonably neglected the spiritual needs of the time. He was, however, zealous in firmly establishing the political power of the Holy See; he made it unquestionably supreme in Italy; he successfully restored the papal power in France; and he secured a prominent place in the history of culture.

Authorities. — The life of Leo X. was written shortly after his death by Paolo Giovio, bishop of Nocera, who had known him intimately. Other important contemporary sources are the Italian History of the Florentine writer Guicciardini, covering the period 1492-1530 (4 vols., Milan, 1884); the reports of the Venetian ambassadors, Marino Giorgi (1517), Marco Minio (1520) and Luigi Gradenigo (1523), in vol. iii. of the 2nd series of Le Relazioni degli ambasciatori Veneti, edited by Alberi (Florence, 1846) ; and the Diarii of the Venetian Marino Sanuto (58 vols., 1879-1903). Other materials for the biography are to be found in the incomplete Regesta

edited by Joseph Cardinal Hergenrother (Freiburg-i-B., 1884 fL); in the Turin collection of papal bulls (1859, &c.) ; in II Diario di Leone X. dai volumi manoscritti degli archivi Vaticani delta S. Sede connote di M. Armellini (Rome, 1884); and in ” Documenti ris- gua’rdanti Giovanni de’ Medici e il pontifice Leone X.,” appendix to vol. 1 of the Archivio storico Italiano (Florence, 1842).

See L. Pastor, Geschichte der Pdpste im Zeitalter der Renaissance u. der Glaubensspaltung von der Wahl Leos X. bis zum Tode Klemens VII. part I (Freiburg-i.-B., 1906); M. Creighton, History of the Papacy, vol. 6 (1901); F. Gregorovius, Rome in the Middle Ages, trans, by Mrs 6. W. Hamilton, vol. viii., part I (1902); L. von Ranke, History of the Popes, vol. i., trans, by E. Foster in the Bohn Library; Histoire de France, ed. by E. Lavisse, vol. 5, part I (1903) ; Walter Friedensburg, ” Ein rotulus familiae Papst Leos X.,” in Quellen u. Forschungen aus italienischen Archiven u. Bibliotheken, vol. vi. (1904) ; W. Roscoe, Life and Pontificate of Leo X. (6th ed., 2 vols., 1853), a celebrated biography but considerably out of date in spite of the valuable notes of the German and Italian translators, Henke and Bossi; F. S. Nitti, Leone X. e la sua politica secondo documenti e carteggi inediti (Florence, 1892) ; A. Schulte, Die Fugger in Rom 140ˆ-1ˆ23 (2 vols., Leipzig, 1906); and H. M. Vaughan, The Medici Popes (1908). (C. H. Ha.)

Leo XL (Alessandro de' Medici) was elected pope on the 1st of April 1605, at the age of seventy. He had long been archbishop of Florence and nuncio to Tuscany; and was entirely pro-French in his sympathies. He died on the 27th day of his pontificate, and was succeeded by Paul V. ■

See the contemporary life by Vitorelli, continuator of Ciaconius, Vitae et res gestae summorum Pontiff. Rom.; Ranke, Popes (Eng. trans., .Austin), ii. 330; v. Reumont, Gesch. der Stadt Rom. iii. 2, 604; Brosch, Gesch. des Kirchenstaates (1880), i. 350.

Leo XII. (Annibale della Genga), pope from 1823 to 1829, was born of a noble family, near Spoleto, on the 22nd of August 1760. Educated at the Accademia dei Nobili ecclesiastici at Rome, he was ordained priest in 1783, and in 1790 attracted favourable attention by a tactful sermon commemorative of the emperor Joseph II. In 1792 Pius VI. made him his private secretary, in 1793 creating him titular archbishop of Tyre and despatching' him to Lucerne as nuncio. In 1794 he was trans- ferred to the nunciature at Cologne, but owing to the war had to make his residence in Augsburg. During the dozen or more years he spent in Germany he was entrusted with several honourable and difficult missions, which brought him into contact with the courts of Dresden,Vienna, Munich and Wiirttemberg, as well as with Napoleon. It is, however, charged at one time during this period that his finances were disordered, and his private life not above suspicion. After the abolition of the States of the Church, he was treated by the French as a state prisoner, and lived for some years at the abbey of Monticelli, solacing himself with music and with bird-shooting, pastimes which he did not eschew even after his election as pope. In 1814 he was chosen to carry the pope's congratulations to Louis XVIII.; in 1816 he was created cardinal-priest of Santa Maria Maggiore, and appointed to the see of Sinigaglia, which he resigned in 1818. In 1820 Pius VII. gave him the distinguished post of cardinal vicar. In the conclave of 1823, in spite of the active opposition of France, he was elected pope by the zelanti on the 28th of September. His election had been facilitated because he was thought to be on the edge of the grave; but he unexpectedly rallied. His foreign policy, entrusted at first to Della Somaglia and then to the more able Bernetti, moved in general along lines laid down by Consalvi; and he negotiated certain concordats very advantageous to the papacy. Personally most frugal, Leo reduced taxes, made justice less costly, and was able to find money for certain public improvements; yet he left the finances more confused than he had found them, and even the elaborate jubilee of 1825 did not really mend matters. His domestic policy was one of extreme reaction. He condemned the Bible societies,

and under Jesuit influence reorganized the educational system. Severe ghetto laws led many of the Jews to emigrate. He hunted down the Carbonari and the Freemasons; he took the strongest measures against political agitation in theatres. A well-nigh ubiquitous system of espionage, perhaps most fruitful when directed against official corruption, sapped the foundations of public confidence. Leo, temperamentally stern, hard-working in spite of bodily infirmity, died at Rome on the 10th of February

1829. The news was received by the populace with unconcealed joy. He was succeeded by Pius VIII.

Authorities.— Artaud de Montor, Histoire du Pape Leon XII. (2 vols., 1843; by the secretary of the French embassy in Rome); Bruck, ” Leo XII.,” in Wetzer and Welte’s Kirchenlexikon, vol. vii. (Freiburg, 1891); F. Nippold, The Papacy in the 19th Century (New York, 1900), chap. 5; Benrath, ” Leo XII.,” in Herzog-Hauck, Realencyklopadie, vol. xi.- (Leipzig, 1902), 300-393, with bibliography; F. Nielsen, The History of the Papacy in the 19th century (1906), vol. ii. 1-30; Lady Blennerhassett, in the Cambridge Modern History, vol. x. (1907), I5I-I54. (w – W – R -*)

Leo XIII. (Gioacchino Pecci) (1810-1903), pope from 1878 to 1903, reckoned the 257th successor of St Peter, was born at Carpineto on the 2nd of March 1810. His family was Sienese in origin, and his father, Colonel Domenico Pecci, had served in the army of Napoleon. His mother, Anna Prosperi, is said to have been a descendant of Rienzi, and was a member of the third order of St Francis. He and his elder brother Giuseppe (known as Cardinal Pecci) received their earliest education from the Jesuits at Viterbo, and completed their education in Rome. In the jubilee year 1825 he was selected by his fellow-students at the Collegium Romanum to head a deputation to Pope Leo XII. , whose memory he subsequently cherished and whose name he assumed in 1878. Weak health, consequent on over-study, prevented him from obtaining the highest academical honours, but he graduated as doctor in theology at the age of twenty-two, and then entered the Accademia dei Nobili ecclesiastici, a college in which clergy of aristocratic birth are trained for the diplomatic service of the Roman Church. Two years later Gregory XVI. appointed him a domestic prelate, and bestowed on him, by way of apprenticeship, various minor administrative offices. He was ordained priest on the 31st of

December 1837, and a few weeks later was made apostolic delegate of the small papal territory of Benevento, where he had to deal with brigands and smugglers, who enjoyed the protection of some of the noble families of the district. His success here led to his appointment in 1841 as delegate of Perugia, which was at that time a centre of anti-papal secret societies. This post he held for eighteen months only, but in that brief period he obtained a reputation as a social and municipal reformer. In 1843 he was sent as nuncio to Brussels, being first consecrated a bishop (19th February), with the title of archbishop of Damietta. During his three years' residence at the Belgian capital he found ample scope for his gifts as a diplomatist in the education controversy then raging, and as mediator between the Jesuits and the Catholic university of Louvain. He gained the esteem of Leopold I., and was presented to Queen Victoria of England and the Prince Consort. He also made the acquaintance of many Englishmen, Archbishop Whately among them. In January 1846, at the request of the magistrates and people of Perugia, he was appointed bishop of that city with the rank of archbishop ; but before returning to Italy he spent February in London, and March and April in Paris. On his arrival in Rome he would, at the request of King Leopold, have been created cardinal but for the death of Gregory XVI. Seven years later, 19th December 1853, he received the red hat from Pius IX. Meanwhile, and throughout his long episcopate of thirty-two years, he foreshadowed the zeal and the enlightened policy later to be displayed in the prolonged period of his pontificate, ■ building and restoring many churches, striving to elevate the intellectual as well as the spiritual tone of his clergy, and showing in his pastoral letters an unusual regard for learning and for social reform. His position in Italy was similar to that of Bishop Dupanloup in France; and, as but a moderate supporter of the policy enunciated in the Syllabus, he was not altogether persona grata to Pius IX. But he protested energetically against the loss of the pope's temporal power in 1870, against the confiscation of the property of the religious orders, and against the law of civil marriage established by the Italian government, and he refused to welcome Victor Emmanuel in his diocese. Nevertheless, he remained in the comparative obscurity of his episcopal see until thcj death of Cardinal Antonelli; but in 1877, when the important papal office of camerlengo became vacant,

Pius IX. appointed to it Cardinal Pecci, who thus returned to reside in Rome, with the prospect of having shortly responsible functions to perform during the vacancy of the Holy See, though the camerlengo was traditionally regarded as disqualified by his office from succeeding to the papal throne.

When Pius IX. died (7th February 1878) Cardinal Pecci was elected pope at the subsequent conclave with comparative unanimity, obtaining at the third scrutiny (20th February) forty-four out of sixty-one votes, or more than the requisite two-thirds majority. The conclave was remarkably free from political influences, the attention of Europe being at the time engrossed by the presence of a Russian army at the gates of Constantinople. It was said that the long pontificate of Pius IX. led some of the cardinals to vote for Pecci, since his age (within a few days of sixty-eight) and health warranted the expectation that his reign would be comparatively brief; but he had for years been known as one of the few ” papable ” cardinals; and although his long seclusion at Perugia had caused his name to be little known outside Italy, there was a general belief that the conclave had selected a man who was a prudent statesman as well as a devout churchman; and Newman (whom he created a cardinal in the year following) is reported to have said, “In the successor of Pius I recognize a depth of thought, a tenderness of heart, a winning simplicity, and a power answering to the name of Leo, which prevent me from lamenting that Pius is no longer here.”

The second day after his election Pope Leo XIII. crossed the Tiber incognito to his former residence in the Falconieri Palace to collect his papers, returning at once to the Vatican, where he continued to regard himself as ” imprisoned ” so long as the Italian government occupied the city of Rome. He was crowned in the Sistine Chapel 3rd March 1878, and at once began a reform of the papal household on austere and economic lines which found little favour with the entourage of the former pope. To fill posts near his own person he sum- moned certain of the Perugian clergy who had been trained under his own eye, and from the first he was less accessible than his predecessor had been, either in public or private audience. Externally uneventful as his life henceforth necessarily was, it was marked chiefly by the reception of distinguished personages and of numerous pilgrimages, often on a large scale, from all parts of the world, and by the issue of encyclical letters. The stricter Jtheological training of the Roman Catholic clergy throughout the world on the lines laid down by St Thomas Aquinas was his first care, and to this end he founded in Rome and endowed an academy bearing the great schoolman’s name, further devoting about £12,000 to the publication of a new and splendid edition of his works, the idea being that on this basis the later teaching of Catholic theologians and many of the speculations of modern thinkers could best be harmonized and brought into line. The study of Church history was next en- couraged, and in August 1883 the pope addressed a letter to Cardinals de Luca, Pitra and Hergenrother, in which he made the

remarkable concession that the Vatican archives and library might be placed at the disposal of persons qualified to compile manuals of history. His belief was that the Church would not suffer by the publication of documents. A man of literary taste and culture, familiar with the classics, a facile writer of Latin verses 1 as well as of Ciceronian prose, he was as anxious that the Roman clergy should unite human science and literature with their theological studies as that the laity should be educated in the principles of religion; and to this end he established in Rome a kind of voluntary school board, with members both lay and clerical; and the rivalry of the schools thus founded ultimately obliged the state to include religious teaching in its curriculum. The numerous encyclicals by which the pontificate of Leo XIII. will always be distinguished were prepared and written by himself, but were submitted to the customary re- vision. The encyclical Aeterni Patris (4th August 1879) was

1 Leonis XIII. Pont. Maximi carmina, ed. Brunelli (Udine, 1883); Leonis XIII. carmina, inscriptiones, numismata, ed. J. Bach (Cologne, 1903).

written in the defence of the philosophy of St Thomas Aquinas. In later ones, working on the principle that the Christian Church should superintend and direct every form of civil life, he dealt with the Christian constitution of states (Immortale Dei, ist November 1885), with human liberty (Libertas, 20th June 1888), and with the condition of the working classes (Rerum novarum, 15th May 1801). This last was slightly tinged with modern socialism; it was described as ” the social Magna Carta of Catholicism,” and it won for Leo the name of ” the working- man’s pope.” Translated into the chief modern languages, many thousands of copies were circulated among the working classes in Catholic countries. Other encyclicals, such as those on Christian marriage {Arcanum divinae sapientiae, 10th February 1880), on the Rosary {Supremi apostolatus officii, ist September 1883, and Superior e anno, 5th September 1898), and on Free- masonry (Humanum genus, 20th April 1884), dealt with subjects on which his predecessor had been accustomed to pronounce allocutions, and were on similar lines. It was the knowledge that in all points of religious faith and practice Leo XIII. stood precisely where Pius IX. had stood that served to render in- effectual others of his encyclicals, in which he dealt earnestly and effectively with matters in which orthodox Protestants had a sympathetic interest with him and might otherwise

have lent an ear to his counsels. Such were the letters on the study of Holy Scripture (18th November 1893); and on the reunion of Christendom (20th June 1894). He showed special anxiety for the return of England to the Roman Catholic fold, and addressed a letter ad Anglos, dated 14th April 1895. This he followed up by an encyclical on. the unity of the Church (Satis cognitum, 29th June 1896); and the question of the validity of Anglican ordinations from the Roman Catholic point of view having been raised in Rome by Viscount Halifax, with whom the abb6 Louis Duchesne and one or two other French priests were in sympathy, a commission was appointed to consider the subject, and on the 15th of September 1896 a condemnation of the Anglican form as theologically insufficient was issued, and was directed to be taken as final.

The establishment of a diocesan hierarchy in Scotland had been decided upon before the death of Pius IX., but the actual announcement of it was made by Leo XIII. On the 25th of July 1898 he addressed to the Scottish Catholic bishops a letter, in the course of which he said that ” many of the Scottish people who do not agree with us in faith sincerely love the name of Christ and strive to ascertain His doctrine and to imitate His most holy example.” The Irish and American bishops he summoned to Rome to confer with him on the subjects of Home Rule and of ” Americanism ” respectively. In India he established a diocesan hierarchy, with seven archbishoprics, the archbishop of Goa taking precedence with the rank of patriarch.

With the government of Italy his general policy was to be as conciliatory as was consistent with his oath as pope never to surrender the ” patrimony of St Peter “; but a moderate attitude was rendered difficult by partisans on either side in the press, each of whom claimed to represent his views. In 1879, addressing a congress of Catholic journalists in Rome, he exhorted them to uphold the necessity of the temporal power, and to proclaim to the world that the affairs of Italy would never prosper until it was restored; in 1887 he found it necessary to deprecate the violence with which this doctrine was advocated in certain journals. A similar counsel of moderation was given to the Canadian press in connexion with the Manitoba school question in December 1897. The less conciliatory attitude towards the Italian government was resumed in an encyclical addressed to the Italian clergy (5th August 1898), in which he insisted on the duty of Italian Catholics to abstain from political life while the papacy remained in its ” painful, precarious and intolerable position.” And in January 1902, reversing the policy which had its inception in the encyclical, Rerum novarum, of 1891, and had further been developed ten years later in a letter to the Italian bishops entitled Graves de

communi, the ” Sacred Congregation of Extraordinary Ecclesiastical Affairs”

issued instructions concerning ” Christian Democracy in Italy,” directing that the popular Christian movement, which embraced in its programme a number of social reforms, such as factory laws for children, old-age pensions, a minimum wage in agricul- tural industries, an eight-hours’ day, the revival of trade gilds, and the encouragement of Sunday rest, should divert its attention from all such things as savoured of sovelty and devote its energies to the restoration of the temporal power. The re- actionary policy thus indicated gave the impression that a similar aim underlay the appointment about the same date of a commission to inquire into Biblical studies; and in other minor matters Leo XIII. disappointed those who had looked to him for certain reforms in the devotional system of the Church. ! A revision of the breviary, which would have involved the omission of some of the less credible legends, came to nothing, while the recitation of the office in honour of the Santa Casa at Loreto was imposed on all the clergy. The worship of Mary, largely developed during the reign of Pius IX., received further stimulus from Leo; nor did he do anything during his pontificate to correct the superstitions connected with popular beliefs concern- ing relics and indulgences.

His policy towards all governments outside Italy was to support them wherever they represented social order; and it was with difficulty that he persuaded French Catholics to be united in defence of the republic. The German’ Kulturkampj was ended by his exertions. In 1885 he successfully arbitrated between Germany and Spain in a dispute concerning the Caroline Islands! In Ireland he condemned the ” Plan of Campaign ” in 1888, but he conciliated the Nationalists by appointing Dr Walsh archbishop of Dublin. His hope that his support of the British government in Ireland would be followed by the establishment of formal diplomatic relations between the court of St James’s and the Vatican was disappointed. But the jubilee of Queen Victoria in 1887 and the pope’s priestly jubilee a few months later were the occasion of friendly intercourse between Rome and Windsor, Mgr. Ruffo Scilla coming to London as special papal envoy, and the duke of Norfolk being received at the Vatican as the bearer of the congratulations of the queen of England. Similar courtesies were exchanged during the jubilee of 1897, and again in March 1902, when Edward VII. sent the earl of Denbigh to Rome to congratulate Leo XIII. on reaching his ninety-third year and the twenty-fifth year of his pontificate. The visit of Edward VII. to Leo XIII. in April 1903 was a further proof of the friendliness between the English court and the

Vatican.

The elevation of Newman to the college of Cardinals in 1879 was regarded with approval throughout the English-speaking world, both on Newman's account and also as evidence that Leo XIII. had a wider horizon than his predecessor; and his similar recognition of two of the most distinguished " inoppor- tunist " members of the Vatican council, Haynald, archbishop of Kalocsa, and Prince Furstenberg, archbishop of Olmtitz, was even more noteworthy. Dupanloup would doubtless have received the same honour had he not died shortly after Leo's accession. Dollinger the pope attempted to reconcile, but failed. He laboured much to bring about the reunion of the Oriental Churches with the see of Rome, establishing Catholic educational centres in Athens and in Constantinople with that end in view. He used his influence with the emperor of Russia, as also with the emperors of China and Japan and with the shah of Persia, to secure the free practice of their religion for Roman Catholics within their respective dominions. Among the canonizations and beatifications of his pontificate that of Sir Thomas More, author of Utopia, is memorable. His encyclical issued at Easter 1902, and described by himself as a kind of will, was mainly a reiteration of earlier condemnations of the Reformation, and of modern philosophical systems, which for their atheism and materialism he makes responsible for all existing moral and political disorders. Society, he earnestly pleaded, can only find salvation by a return to Christianity and tp the fold of the Roman Catholic Church.

Grave and serious in manner, speaking slowly, but with

energetic gestures, simple and abstemious in his life — his daily bill of fare being reckoned as hardly costing a couple of francs — Leo XIII. distributed large sums in charity, and at his own charges placed costly astronomical instruments in the Vatican observatory, providing also accommodation and endowment for a staff of officials. He always showed the greatest interest in science and in literature, and he would have taken a position as a statesman of the first rank had he held office in any secular government. He may be reckoned the most illustrious pope since Benedict XIV., and under him the papacy acquired a prestige unknown since the middle ages. On the 3rd of March 1903 he celebrated his jubilee in St Peter's with more than usual pomp and splendour; he died on the 20th of July following. His

successor was Pius X.

See Scelta di atti episcopate del cardinale G. Pecci . . . (Rome, 1879); Leonis XIII. Pont. Max. acta (17 vols., Rome, 1881-1898); Sanctissimi Domini N. Leonis XIII. allocutiones , epistolae, &c. (Bruges and Lille, 1887, &c.) ; the encyclicals (Sdmtliche Rund- schreiben) with a German translation (6 vols., Freiburg, 1878-1904) ; Discorsi del Sommo Pontefi.ce Leone XIII. 1878-1882 (Rome, 1882). There are lives of Leo XIII. by B. O'Reilly (new ed., Chicago, 1903), H. des Houx (pseudonym of Durand Morimbeau) (Paris, 1900), by W. Meynell (1887), by J. McCarthy (1896), by Boyer d'Agen, (Jeunesse de Lion XIII. (1896); La Prelature, 1900), by M. Spahn (Munich, 1005), by L. K. Goetz (Gotha, 1899), &c. Alifeof LeoXIII. (4 vols.) was undertaken by F. Marion Crawford, Count Edoardo Soderini and Professor Giuseppe Clementi. (A. W. Hu. ; M. Br.)

LEO, the name of six emperors of the East.

Leo I., variously surnamed Thrax, Magnus and Makelles, emperor of the East, 457-474, was born in Thrace about 400. From his position as military tribune he was raised to the throne by the soldiery and recognized both by senate and clergy; his coronation by the patriarch of Constantinople is said to have been the earliest instance of such a ceremony. Leo owed his elevation mainly to Aspar, the commander of the guards, who was debarred by his Arianism from becoming emperor in his own person, but hoped to exercise a virtual autocracy through his former steward and dependant. But Leo, following the traditions of his predecessor Marcian, set himself to curtail the domination of the great nobles and repeatedly acted in defiance of Aspar. Thus he vigorously suppressed the Eutychian heresy in Egypt, and by exchanging his Germanic bodyguard for Isaurians removed the chief basis of Aspar's power. With the help of his generals Anthemius and Anagastus, he repelled invasions of the Huns into Dacia (466 and 468). In 467 Leo had Anthemius elected emperor of the West, and in concert with him equipped an armament of more than 1100 ships and 100,000 men against the pirate empire of the Vandals in Africa. Through the remiss- ness of Leo's brother-in-law Basiliscus, who commanded the expedition, the fleet was surprised by the Vandal king, Genseric, and half of its vessels sunk or burnt (468). This failure was made a pretext by Leo for killing Aspar as a. traitor (471), and Aspar's murder served the Goths in turn as an excuse for ravaging Thrace up to the walls of the capital. In 473 the emperor associated with himself his infant grandson, Leo II., who, how- ever, survived him by only a few months. His surnames Magnus (Great) and Makelles (butcher) respectively reflect the attitude of the Orthodox and the

Arians towards his religious policy.

See E. Gibbon, The Decline and Fall of the Ror.ian Empire (ed. Bury, 1896), iv. 29-37; J- B. Bury, The Later Roman Empire (1889), i. 227-233.

Leo III. (c. 680-740), surnamed The Isaurian, emperor of the East, 717-740. Born about 680 in the Syrian province of Commagene, he rose to distinction in the military service, and under Anastasius II. was invested with the command of the eastern army. In 717 he revolted against the usurper Theodosius III. and, marching upon Constantinople, was elected emperor in his stead. The first year of Leo's reign saw a memorable siege of his capital by the Saracens, who had taken advantage of the civil discord in the Roman empire to bring up a force of 80,000 men to the Bosporus. By his stubborn defence the new ruler wore out the invadere who, after a twelve months' investment, withdrew their forces. An important factor in the victory of the Romans was their use of Greek fire. Having thus preserved the empire from extinction, Leo proceeded to consolidate its adminis-

tration, which in the previous years of anarchy had become completely disorganized. He secured its frontiers by inviting Slavonic settlers into the depopulated districts and by restoring the army to efficiency; when the Arabs renewed their invasions in 726 and 739 they were decisively beaten. His civil reforms include the abolition of the system of prepaying taxes which had weighed heavily upon the wealthier proprietors, the elevation of the serfs into a class of free tenants, the remodelling of family and of maritime law. These measures, which were embodied in a new code published in 740, met with some opposition on the part of the nobles and higher clergy. But Leo's most striking legislative reforms dealt with religious matters. After an apparently successful attempt to enforce the baptism of all Jews and Montanists in his realm (722), he issued a series of edicts against the worship of images (726-729). This prohibition of a custom which had undoubtedly given rise to grave abuses seems to have been inspired by a genuine desire to improve public morality, and received the support of the official aristocracy and a section of the clergy. But a majority of the theologians and all the monks opposed these measures with uncompromising hostility, and in the western parts of the empire the people refused to obey the edict. A revolt which broke out in Greece, mainly on re- ligious grounds, was crushed by the imperial fleet (727), and two years later, by deposing the patriarch of Constantinople, Leo suppressed the overt opposition of the capital. In Italy the defiant attitude of Popes Gregory II. and III. on behalf of image- worship led to a fierce quarrel with the emperor. The former

summoned councils in Rome to anathematize and excom- municate the image-breakers (730, 732); Leo retaliated by transferring southern Italy and Greece from the papal diocese to that of the patriarch. The struggle was accompanied by an armed outbreak in the exarchate of Ravenna (727), which Leo finally endeavoured to subdue by means of a large fleet. But the destruction of the armament by a storm decided the issue against him; his south Italian subjects successfully defied his religious edicts, and the province of Ravenna became detached from the empire. In spite of this partial failure Leo must be reckoned as one of the greatest of the later Roman emperors. By his re- solute stand against the Saracens he delivered all eastern Europe from a great danger, and by his thorough-going reforms he not only saved the empire from collapse, but invested it with a stability which enabled it to survive all further shocks for a space of five centuries.

See E. Gibbon, The Decline and Fall of the Roman Empire (ed. Bury, 1896), v. 185 seq., 251 seq. and appendices, vi. 6-12, J. B. Bury, The Later Roman Empire (1889), ii. 401-449; K. Scnenk, Kaiser Leo III. (Halle, 1880), and in Byzantinische Zeitschrift (1896), v. 257-301; T. Hodgkin, Italy and her Invaders (1892, &c), bk. vii., chs. 11, 12. See also Iconoclasts.

Leo IV., called Chozar, succeeded his father, Constantine V., as emperor of the East in 775. In 776 he associated his young son, Constantine, with himself in the empire, and suppressed a rising led by his five step-brothers which broke out as a result of this proceeding. Leo was largely under the influence of his wife Irene (q-v.), and when he died in 780 he left her as the guardian of his successor, Constantine VI.

Leo V., surnamed The Armenian, emperor of the East, 813- 820, was a distinguished general of Nicephorus I. and Michael I. After rendering good service on behalf of the latter in a war with the Arabs (812), he was summoned in 813 to co-operate in a campaign against the Bulgarians. Taking advantage of the dis- affection prevalent among the troops, he left Michael in the lurch at the battle of Adrianople and subsequently led a successful revolution against him. Leo justified his usurpation by re- peatedly defeating the Bulgarians who had been contemplating the siege of Constantinople (814-817). By his vigorous measures of repression against the Paulicians and image- worshippers he roused considerable opposition, and after a conspiracy under his friend Michael Psellus had been foiled by the imprison- ment of its leader, he was assassinated in the palace chapel on Christmas Eve, 820.

See E. Gibbon, The Decline and Fall of the Roman Empire (ed. Bury, 1896), v. 193-195. (M. O. B..C.)

Leo VI., surnamed The Wise and The Philosopher, Byzan- tine emperor, 886-911. He was a weak*-minded ruler, chiefly occupied with unimportant wars with barbarians and struggles with churchmen. The chief event of his reign was the capture of Thessalonica (904) by Mahommedan pirates (described in The Capture of Thessalonica by John Cameniata) under the renegade Leo of Tripolis. In Sicily and Lower Italy the imperial arms were unsuccessful, and the Bulgarian Symeon, who assumed the title of ” Czar of the Bulgarians and autocrat of the Romaei ” secured the independence of his church by the establishment of a patriarchate. Leo’s somewhat absurd surname may be explained by the facts that he ” was less ignorant than the greater part of his contemporaries in church and state, that his education had been directed by the learned Photius, and that several books of profane and ecclesiastical science were composed by the pen, or in the name, of the imperial philosopher ” (Gibbon). His works include seventeen Oracula, in iambic verse, on the destinies of future emperors and patriarchs of Constantinople; thirty-three Orations, chiefly on theological subjects (such as church festivals) ; Basilica, the completion of the digest of the laws of Justinian, begun by Basil I., the father of Leo; some epigrams in the Greek Anthology; an iambic lament on the melancholy condition of the empire; and some palindromic verses, curiously called Kapdvoi (crabs). The treatise on military tactics, attributed to him, is probably by Leo III., the Isaurian.

Complete edition in Migne, Patrologia Graeca, cvii. ; for the, literature of individual works see C. Krumbacher, Geschichte der byzantinischen Lilteratur (1897). (J. H. F.)

LEO, Brother (d. c. 1270), the favourite disciple, secretary and confessor of St Francis of Assisi. The dates of his birth and of his becoming a Franciscan are not known; but he was one of the small group of most trusted companions of the saint during his last years. After Francis’s death Leo took a leading part in the opposition to Elias: he it was who broke in pieces the marble box which Elias had set up for offertories for the completion of the basilica at Assisi. For this Elias had him scourged, and this outrage on St Francis’s dearest disciple consolidated the opposi- tion to Elias and brought about his deposition. Leo was the leader in the early stages of the struggle in the

order for the' maintenance of St Francis's ideason strict poverty, and the chief inspirer of the tradition of the Spirituals on St Francis's life and teaching. The claim that he wrote the so-called Speculum perfectionis cannot be allowed, but portions of it no doubt go back to him. A little volume of his writings has been published by Lemmeus {Scripta Iratris Leonis, 1901). Leo assisted at St Clara's deathbed, 1253; after suffering many persecutions from the dominant party in the order he died at the Portiuncula in extreme old age.

All that is known concerning him is collected by Paul Sabatier in the " Introduction " to the Speculum perfectionis (1898). See St Francis and Franciscans. (E. C. B.)

LEO, HEINRICH (1799-1878), German historian, was born at Rudolstadt on the 19th of March 1799, his father being chaplain to the garrison there. His family, not of Italian origin — as he himself was inclined to believe on the strength of family tradition — but established in Lower Saxony so early as the 1 6th century, was typical of the German upper middle classes, and this fact, together with the strongly religious atmosphere in which he was brought up and his early enthusiasm for nature, largely determined the bent of his mind. The taste for historical study was, moreover, early instilled into him by the eminent philologist Karl Wilhelm Gottling (1793-1869), who in 1816 became a master at the Rudolstadt gymnasium. From 1816 to 1819 Leo studied at the universities of Breslau, Jena and Gottingen, devoting himself more especially to history, philology and theology. At this time the universities were still agitated by the Liberal and patriotic aspirations aroused by the War of Liberation; at Breslau Leo fell under the influence of Jahn, and joined the political gymnastic association (Tumverein); at Jena he attached himself to the radical wing of the German Bursche)i- schaft, the so-called " Black Band," under the leadership of Karl Follen. The murder of Kotzebue by Karl Sand, however, shocked him out of his extreme revolutionary views, and from

this time he tended, under the influence of the writings of Hamann and Herder, more and more in the direction of conservatism and romanticism, until at last he ended, in a mood almost of pessimism, by attaching himself to the extreme right wing of the forces of reaction. So early as April 1819, at Gottingen, he had fallen under the influence of; Karl Ludwig von Haller's Handbuch der allgemeinen Slaatenkunde (1808), a text-book of the counter- Revolution. On the nth of May 1820 he took his doctor's degree ; in the same year he qualified as Priwtdozent at the university of Erlangen. For this latter purpose he had chosen as his thesis the constitution of the free Lombard cities in

the middle ages, the province in which he was destined to do most for the scientific study of history. His interest in it was greatly stimulated by a journey to Italy in 1823; in 1824 he returned to the subject, and, as the result, published in five volumes a history of the Italian states (1829-1832). Meanwhile he had been established (1822-1827) as Dozent at Berlin, where he came in contact with the leaders of German thought and was somewhat spoilt by the flattering attentions of the highest Prussian society. Here, too, it was that Hegel's philosophy of history made a deep impression upon him. It was at Halle, however, where he remained for forty years (1528-1868), that he acquired his fame as an academical teacher. His wonderful power of exposition, aided by a remarkable memory, is attested by the most various witnesses. In 1830 he became ordinary professor.

In addition to his lecturing, Leo found time for much literary and political work. He collaborated in the Jdhrbucher filr Wissenschaftliche Kriti'k from its foundation in 1827 until the publication was stopped in 1846. As a critic of independent views he won the approval of Goethe; on the other hand, he fell into violent controversy with Ranke about questions con- nected with Italian history. Up to the revolutionary year 1830 his religious views had remained strongly tinged with rational- ism, Hegel remaining his guide in religion as in practical politics and the treatment of history. It was not till 1838 that Leo's 1 polemical work Die Hegelingen proclaimed his breach with the radical developments of the philosopher's later disciples; a breach which developed into opposition to the philosopher him- self. Under the impression of the July revolution in Paris and of the orthodox and pietistic influences at Halle, Leo's political convictions were henceforth dominated by reactionary principles. As a friend of the Prussian " Camarilla " and of King Frederick William IV. he collaborated especially in the high conservative Politisches Wochenblatt, which first appeared in 1831, as well as in the Evangelische Kirchenzeitung, the Kreuzzeitung and the Volksblatt fur Stadt und Land. In all this his critics scented an inclination towards Catholicism; and Leo did actually glorify the counter-Reformation, e.g. in his History of the Netherlands (2 vols. 1832-1835). His other historical works also, notably his Universalgeschichte (6 vols., 1835-1844), display a very one- sided point of view. When, however, in connexion with the quarrel about the archbishopric of Cologne (1837), political Catholicism raised its head menacingly, Leo turned against it with extreme violence in his open letter (1838) to Goerres, its foremost champion. On the other hand, he took a lively part in the politico-religious controversies within the fold of Prussian Protestantism.

Leo was by nature highly excitable and almost insanely passionate, though at the same time strictly honourable, unselfish, and in private intercourse even gentle. During the last year of his life his mind suffered rapid decay, of which signs had been apparent so early as 1868. He died at Halle on the 24th of April 1878. In addition to the works already mentioned, he left behind an account of his early life (Meine Jugendseit, Gotha, 1880) which is of interest.

See Lord Acton, English Historical Review, i. (1886); H. Haupt, Karl Follen und die Giessener Schwarzen (Giessen, 1907) ; W. Herbst, Deutsch-Evangelische Blatter, Bd. 3; P. Kragelin, H. Leo, vol. i. (1779-1844) (Leipzig, 1908); P. Kraus, Allgemeine Konservative Monatsschrift, Bd. 50 u. 51; R. M. Meyer, Gestalten und Probleme (1904); W. Schrader, Geschichte der Friedrichs-Universitat in Halle (Berlin, 1894); C. Varrentrapp, Historische Zeitschrift, Bdi 92; F. X. Wegele, Allgemeine Deutsche Biographie, Bd. 18 (1883);

Geschichie der deutschen Historiographie (1885); G. Wolf, Einfiih-rung in das Studium der neueren Geschichte (1910). Leo's Rectitudines singularum personarum nebst einer einleitenden Abhandlung iiber Landsiedelung, Landbau, gutsherrliche und bduerliche Vethiiltnisse der Angelsachsen, was translated into English by Lord Acton (1852).

U- Hn.)

LEO, JOHANNES (c. 1494-1552), in Italian Giovanni Leo or Leone, usually called Leo Africanus, sometimes Eliberi- tanus (i.e. of Granada), and properly known among the Moors as Al Hassan Ibn Mahommed Al Wezaz Al Fasi, was the author of a Descrizione dell' Ajfrica, or Africae description which long ranked as the best authority on Mahommedan Africa. Born probably at Granada of a noble Moorish stock (his father was a landowner; an uncle of his appears as an envoy from Fez to Timbuktu), he received a great part of his education at Fez, and while still very young began to travel widely in the Barbary States. In 1512 we trace him at Morocco, Tunis, Bugia and Constantine; in 15 13 we find him returning from Tunis to Morocco; and before the close of the latter year he. seems to have started on his famous Sudan and Sahara journeys (1513-1515) which brought him to Timbuktu, to many other regions of the Great Desert and the Niger basin (Guinea, Melli, Gago, Walata, Aghadez, Wangara, Katsena, &c), and apparently to Bornu and Lake Chad. In 1516-1517 he travelled to Constantinople, probably visiting Egypt on the way; it is more

uncertain when he visited the three Arabias (Deserta, Felix and Petraea), Armenia and “Tartary” (the last term is perhaps satisfied by his stay at Tabriz). His three Egyptian journeys, immediately after the Turkish conquest, all probably fell between 151 7 and 1520; on one of these he ascended the Nile from Cairo to Assuan. As he was returning from Egypt about 1520 he was captured by pirates near the island of Gerba, and was ultimately presented as a slave to Leo X. The pope discovered his merit, assigned him a pension, and having persuaded him to profess the Christian faith, stood sponsor at his baptism, and bestowed on him (as Ramusio says) his own names, Johannes and Leo. The new convert, having made himself acquainted with Latin and Italian, taught Arabic (among his pupils was Cardinal Egidio Antonini, bishop of Viterbo) ; he also wrote books in both the Christian tongues he had acquired. His Description of Africa was first, apparently, written in Arabic, but the primary text now remain- ing is that of the Italian version, issued by the author at Rome, on the 10th of March 1526, three years after Pope Leo’s death, though originally undertaken at the latter’s suggestion. The Moor seems to have lived on Rome for some time longer, but he returned to Africa some time before his death at Tunis in 1552; according to some, he renounced his Christianity and returned to Islam; but the later part of his career is obscure.

The Descrizione dell’ Affrica in its original Arabic MS. is said to have existed for some time in the library of Vincenzo Pinelli (1535- 1601); the Italian text, though issued in 1526, was first printed by Giovanni Battista Ramusio in his Navigationi et Viaggi (vol. i.) of 1550. This was reprinted in 1554, 1563, 1588, &c. In 1556 Jean Temporal executed at Lyons an admirable French version from the Italian (Historiale description de I’Afrique); and in the same year appeared at Antwerp both Christopher Plantin’s and Jean Bellerc’s pirated issues of Temporal’s translation, and a new (very inaccurate) Latin version by Joannes Florianus, Joannis Leonis Africani de tutius Africae descriptione libri i.-ix. The latter was reprinted in 1 55S, 1559 (Zurich), and 1632 (Leiden), and served as the basis of John Pory’s Elizabethan English translation, made at the suggestion of Richard Hakluyt (.4 Geographical Historic of Africa, London, 1600). Pory’s version was reissued, with notes, maps, &c, by Robert Brown, E. G. Ravenstein, &c. (3 vols., Hakluyt Society, London, 1896). An excellent German translation was made by Lorsbach, from the Italian, in 1805 (Johann Leos des Afrikaners Beschreibung von Afrika, Herborn). See also Francis Moore’s Travels into the inland parts of Africa (1738), containing a translation of Leo’s account of negro kingdoms. Heinrich Barth intended to have made a fresh version, with a commentary,, but

was prevented by death; as it is, his own great works on the Sudan are the best elucidation of the Descrizione dell' Affrica.

Leo also wrote lives of the Arab physicians and philosophers (De viris quibusdam illnstribus apud Arabes; see J. A. Fabricius, Bibliotheca Graeca, Hamburg, 1726, xiii. 259-298); a Spanish- Arabic vocabulary, now lost, but noticed by Ramusio as having been consulted by the famous Hebrew physician, Jacob Mantino; a collection of Arabic epitaphs in and near Fez (the MS. of this Leo presented, it is said, to the brother of the king) ; and poems, also

lost. It is stated, moreover, that Leo intended writing a history of the Mahommedan religion, an epitome of Mahommedan chronicles, and an account of his travels in Asia and Egypt.

(C. R. B.)

LEO, LEONARDO (1694-1744), more correctly Lionardo Oronzo Salvatore de Leo, Italian musical composer, was born on the 5th of August 1694 at S. Vito dei Normanni, near Brindisi. He became a student at the Conservatorio della Pieta. dei Turchihi at Naples in 1703, and was a pupil first of Provenzale and later of Nicola Fago. It has been supposed that he was a pupil of Pitoni and Alessandro Scarlatti, but he could not possibly have studied with either of these composers, although he was un- doubtedly influenced by their compositions. His earliest known work was a sacred drama, L'Infedeltd abbattuta, performed by his fellow-students in 1 712. In 17 14 he produced, at the court theatre, an opera, Pisistrato, which was much admired. He held various posts at the royal chapel, and continued to write for the stage, besides teaching at the conservatorio. After adding comic scenes to Gasparini's Bajazette in 1722 for performance at Naples, he composed a comic opera, La Mpeca scoperta, in Neapolitan dialect, in 1723. His most famous comic opera was Amor vuol sojferenze (1739), better known as La Finta FraScatana, highly praised by Des Brosses. He was equally distinguished as a composer of serious opera, Demofoonte (1735), Parnace (1737) and L'Olimpiade (1737) being his most famous works in this branch, and is still better known as a composer of sacred music. He died of apoplexy on the 31st of October 1744 while engaged in the composition of new airs for a revival of La Finta Frascatana.

Leo was the first of the Neapolitan school to obtain a complete mastery over modern harmonic counterpoint. His sacred music is

masterly and dignified, logical rather than passionate, and free from the sentimentality which disfigures the work of F. Durante and G. B. Pergolesi. His serious operas suffer from a coldness and severity of style, but in his comic operas he shows a keen sense of humour. His ensemble movements are spirited, but never worked up to a strong climax.

A fine and characteristic example of his sacred music is the Dixit Dominus in C, edited by C. V. Stanford and published; by Novella. A number of songs from operas are accessible in modern editions. (E.J. D.)

LEO (The Lion), in astronomy, the fifth sign of the zodiac (q.v.), denoted by the symbol Q. It is also a constellation, mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.). According to Greek mythology this constellation is the Nemean lion,, which, after being killed by Hercules, was raised to the heavens by Jupiter in honour of Hercules. A part of Ptolemy's Leo is now known as Coma Berenices (q.v.). a Leonis, also known as Cor Leonis or the Lion's Heart, Regulus, Basilicus, &c, is a very bright star of magnitude 1-23, and parallax 0-02", and proper motion C27″ per annum. 7 Leonis is a very fine orange-yellow binary star, of magnitudes 2 and 4, and period 400 years, t Leonis is a binary, composed of a 4th magni- tude pale yellow star, and a 7th magnitude blue star. The Leonids are a meteoric swarm, appearing in November and radiating from this constellation (see Meteor).

LEOBEN, a town in Styria, Austria, 44 m. N.W. of Graz by rail. Pop. (1900) 10,204. It is situated on the Mur, and part of its old walls and towers still remain. It has a well-known academy of mining and a number of technical schools. Its extensive iron-works and trade in iron are a consequence of its position on the verge of the important lignite deposits of Upper Styria and in the neighbourhood of the iron mines and furnaces of Vordernberg and Eisenerz. On the 18th of April 1797 a preliminary peace was concluded here between Austria and France, which led to the treaty of Campo-Formio.

LEOBSCHUTZ (Bohemian Lubczyce), a town of Germany, in the Prussian province of Silesia, on the Zinna, about 20 m, to the N.W. of Ratibor by rail. Pop. (1905) 12,700. It has a large trade in wool, flax and grain, its markets for these commodities being very numerously attended. The; principal industries are malting, carriage-building, wool-spinning and glass-making. The town contains three Roman Catholic

churches, a Protestant church, a synagogue, a new town-hall and a gymnasium. Leobschiitz existed in the ioth century, and from 1524 to 1623 was the capital of the principality of Jagerndorf.

See F. Troska, Geschichte der Stadt Leobschiitz (Leobschiitz, 1892).

LEOCHARES, a Greek sculptor who worked with Scopas on the Mausoleum about 350 B.C. He executed statues of the family of Philip of Macedon, in gold and ivory, which were set up by that king in the Philippeum at Olympia. He also with Lysippus made a group in bronze at Delphi representing a lion-hunt of Alexander. Of this the base with an inscription was recently found. We hear of other statues by Leochares of Zeus, Apollo and Ares. The statuette in the Vatican, repre- senting Ganymede being carried away by an eagle, though considerably restored and poor in execution, so closely corre- sponds with Pliny's description of a group by Leochares that we are justified in considering it a copy of that group, especially as the Vatican statue shows all the characteristics of Attic 4th-century art. Pliny {N.H. 34. 79) writes: "Leochares made a group of an eagle aware whom it is carrying off in Gany- mede and to whom it is bearing him; holding the boy delicately in its claws, with his garment between." (For engraving see Greek Art, Plate I. fig. 53.) The tree stem is skilfully used as a support; and the upward strain of the group is ably rendered. The close likeness both in head and pose between the Ganymede and the well-known Apollo Belvidere has caused some modern archaeologists to assign the latter also to Leochares. With somewhat more confidence we may regard the fine statue of Alexander the Great at Munich as a copy of his gold and ivory portrait at Olympia. (P. G.)

LEOFRIC (d. 1057), earl of Mercia, was a son of Leofwine, earl of Mercia, and became earl at some date previous to 1032. Henceforth, being one of the three great earls of the realm, he took a leading part in public affairs. On the death of King Canute in 1035 he supported the claim of his son Harold to the throne against that of Hardicanute; and during the quarrel between Edward the Confessor and Earl Godwine in 105 1 he played the part of a mediator. Through his efforts civil war was averted, and in accordance with his advice the settlement of the dispute was referred to the Witan. When he became earl of Mercia his direct rule seems to have been confined to Cheshire, Staffordshire, Shropshire and the borders of north Wales, but afterwards he extended the area of his earldom. As Chester was his

principal residence and the seat of his government, he is sometimes called earl of Chester. Leofric died at Bromley in Staffordshire on the 31st of August 1057. His wife was Godgifu, famous in legend as Lady Godiva. Both husband and wife were noted as liberal benefactors to the church, among their foundations being the famous Benedictine monastery at Coventry. Leofric's son, ˆlfgar, succeeded him as earl of Mercia.

See E. A. Freeman, The Norman Conquest, vols. i. and ii. (1877).

LEOMINSTER, a market-town and municipal borough in the Leominster parliamentary division of Herefordshire, England, in a rich agricultural country on the Lugg, 157 m. W.N.W. of London and 12ˆ N. of Hereford on the Great Western and London & North-Western railways. Pop. (1901) 5826. Area, 8728 acres. Some fine old timber houses lend picturesqueness to the wide streets. The parish church, of mixed architecture, including the Norman nave of the old priory church, and con- taining some of the most beautiful examples of window tracery in England, was restored in 1866, and enlarged by the addition of a south nave in 1879. The Butter Cross, a beautiful example of timber work of the date 1633, was removed when the town- hall was building, and re-erected in the pleasure ground of the Grange. Trade is chiefly in agricultural produce, wool and cider, as the district is rich in orchards. Brewing (from the produce of local hop-gardens) and the manufacture of agricultural implements are also carried on. The town is under a mayor, four aldermen and twelve councillors.

Merewald, king of Mercia, is said to have founded a religious house in Leominster (Llanlieni, Leofminstre, Lempster) in 660,

and a nunnery existed here until the Conquest, when the place became a royal demesne. It was granted by Henry I. to the monks of Reading, who built in it a cell of their abbey, and under whose protection the town grew up and was exempted from the sphere of the county and hundred courts. In 1539 it reverted to the crown; and in 1554 was incorporated, by a charter renewed in 1562, 1563, 1605, 1666, 1685 and 1786. The borough returned two members to the parliament of 1295 and to other parliaments, until by the Representation Act 1867 it lost one representative, and by the Redistribution of Seats Act 1885 separate representation. A fair was granted in the time of Henry II., and fairs in the seasons of Michaelmas and the feasts of St Philip and St James and of Edward the Confessor, in 1265, 1281 and 1290 respectively. Charters to the burghers authorized fairs on the days of St Peter and of St Simon and St Jude in 1554, on St Bartholomew's

day in 1605, in Mid-lent week in 1665, and on the feast of the Purification and on the 2nd of May in 1685; these fairs have modern representatives. A market was held by the abbey by a grant of Henry I. ; Friday is now market day. Leominster was famous for wool from the 13th to the 18th century. There were gilds of mercers, tailors, drapers, dyers and glovers in the 16th century. In 1835 the wool trade was said to be dead; and that of glove-making, which had been important, was diminishing. Hops and apples were grown in 1715.

See G- Townsend, The Town and Borough of Leominster (1863), and John Price, An Historical and Topographical Account of Leominster and its Vicinity (Ludlow, 1715).

LEOMINSTER, a township of Worcester county, Massa- chusetts, U.S.A., about 45 m. N.W. of Boston and about 20 m. N. by E. of Worcester. Pop. (1890) 7269; (1900) 12,392, of whom 2827 were foreign-born; (1910 census) 17,580. It is a broken, hilly district, 26-48 sq. m. in area, traversed by the Nashua river, crossed by the Northern Division of the New York, New Haven & Hartford railroad, and by the Fitchburg Division of the Boston & Maine, and connected with Boston, Worcester and other cities by interurban electric lines. Along the N.E. border and mostly in the township of Lunenburg are Whalom Lake and Whalom Park, popular pleasure resorts. The principal villages are Leominster, 5 m. S.E. of Fitchburg, and North Leominster; the two adjoin and are virtually one. According to the Special U.S. Census of Manufactures of 1905 the township had in that year a greater diversity of important manufacturing industries than any place of its size in the state, or, probably, in the United States; its 65 manufactories, with a capital of $4,572,726 and with a product for the year valued at $7,501,720 (39% more than in 1900), produced celluloid and horn work (the manufacture of which is a more important industry here than elsewhere in the United States), celluloid combs, furniture, paper, buttons, pianos and piano-cases, children's carriages and sleds, stationery, leatherboard, worsted, woollen and cotton goods, shirts, paper boxes, &c. Leominster owns and operates its water-works. The township was formed from a part of Lancaster township in 1740.

LE6N, LUIS PONCE DE (1527-1591), Spanish poet and mystic, was born at Belmonte de Cuenca, entered the university of Salamanca at the age of fourteen, and in 1544 joined the Augustinian order. In 1561 he obtained a theological chair at Salamanca, to which in 1 571 was added that of sacred literature. He was denounced to the Inquisition for translating the book of Canticles, and for criticizing the text of the Vulgate. He was consequently imprisoned at Valladolid from March

1572 till December 1576; the charges against him were then abandoned, and he was released with an admonition. He returned to Salamanca as professor of Biblical exegesis, and was again reported to the Inquisition in 1582, but without result. In 1 583-1 585 he published the three books of a celebrated mystic treatise, Los N ombres de Cristo, which he had written in prison. In 1583 also appeared the most popular of his prose works, a treatise entitled La Perfecta Casada, for trie use of a lady newly married. Ten days before his death, which occurred at Madrigal on the 23rd of August 1591, he was elected vicar

general of the Augustinian order. Luis de Leon is not only the I greatest of Spanish mystics; he is among the greatest of Spanish lyrical poets. His translations of Euripides, Pindar, Virgil and Horace are singularly happy; his original pieces, whether devout like the ode De la vida del cielo, or secular like the ode A Salinas, are instinct with a serene sublimity unsurpassed in any literature, and their form is impeccable. Absorbed by less worldly interests, Fray Luis de Leon refrained from printing his poems, which were not issued till 1631, when Quevedo published them as a counterblast to culteranismo.

The best edition of Luis de Leon's works is that of Merino (6 vols., Madrid, 1816); the reprint (Madrid, 1885) by C. Munoz Saenz is incorrect. The text of La Perfecta Casada has been well edited by Miss Elizabeth Wallace (Chicago, 1903). See Coleccion de documentos ineditos para la historia de Espana, vols, x.-xi. ; F. H. Reusch, Luis de Leon und die spanische Inquisition (Bonn, 1873); M. Gutierrez, Fray Luis de Leon y lafilosofia espanola (Madrid, 1885) ; M. Menendez y Pelayo, Estudios de critica literaria (Madrid, 1893), Primera seVie, pp. 1-72.

LEON, MOSES [Ben Shem-tob] DE (d. 1305), Jewish scholar, was born in Leon (Spain) in .the middle of the 13th century and died at Arevalo. His fame is due to his authorship of the most influential Kabbalist work, the Zohar (see Kabbala), which was attributed to Simon b. Yohai, a Rabbi of the 2nd century. In modern times the discovery of the modernity of the Zohar has led to injustice to the author. Moses de Leon undoubtedly used old materials and out of them constructed a work of genius. The discredit into which he fell was due partly to the unedifying incidents of his personal career. He led a wandering life, and was more or less of an adventurer. But as to the greatness of his

work, the profundity of his philosophy and the brilliance of his religious idealism, there can be no question.

See Graetz, History of the Jews, vol. iv. ch. i. ; Geiger, Leon de Modena. (I. A.)

LEON OF MODENA (1571-1648), Jewish scholar, was born in Venice, of a notable French family which had migrated to Italy after the expulsion of the Jews from France. He was a precocious child, but, as Graetz points out, his lack of stable character prevented his gifts from maturing. ” He pursued all sorts of occupations to support himself, viz. those of preacher, teacher of Jews and Christians, reader of prayers, interpreter, writer, proof-reader, bookseller, broker, merchant, rabbi, musician, matchmaker and manufacturer of amulets.” Though he failed to rise to real distinction he earned a place by his criticism of the Talmud among those who prepared the way for the new learning in Judaism. One of Leon’s most effective works was his attack on the Kabbala (‘Art Nohem, first published in 1840), for in it he demonstrated that the ” Bible of the Kabbalists” (the Zohar) was a modern composition. He became best known, however, as the interpreter of Judaism to the Christian world. At the instance of an English nobleman he . prepared an account of the religious customs of the Synagogue, Rili Ebraici (1637). This book was widely read by Christians; it was rendered into various languages, and in 1650 was translated into English by Edward Chilmead. At the time the Jewish question was coming to the fore in London, and Leon of Modena’s book did much to stimulate popular interest. He died at Venice.

See Graetz, History of the Jews (Eng. trans.), vol. v. ch. iii.; Jewish Encyclopedia, viii. 6; Geiger, Leon de Modena. (I. A.)

LE6N, or Leon de las Aldamas, a city of the state of Guana- juato, Mexico, 209 m. N.W. of the federal capital and 30 m. W. by N. of the city of Guanajuato. Pop. (1895) 9°>978; (1900) 62,623, Leon ranking fourth in the latter year among the cities of Mexico. The Mexican Central gives it railway connexion with the national capital and other prominent cities of the Republic. Leon stands in a fertile plain on the banks of the Turbio, a tributary of the Rio Grande de Lerma, at an elevation of 5862 ft. above sea-level and in the midst of very attractive surroundings. The country about Leon is considered to be one of the richest cereal-producing districts of Mexico. The city itself is subject to disastrous floods, sometimes leading to loss of life as well as damage to property, as in the great flood of 1889. Leon is essentially a manufacturing and commercial city; it has a

cathedral and a theatre, the latter one of the largest and finest in the republic. The city is regularly built, with wide streets and numerous shady parks and gardens. It manufactures saddlery and other leather work, gold and silver embroideries, cotton and woollen goods, especially rebozos (long shawls), soap and cutlery. There are also tanneries and flour mills. The city has a considerable trade in wheat and flour. The first settlement of Leon occurred in 1552, but its formal foundation was in 1576, and it did not reach the dignity of a city until 1836.

LEON, the capital of the department of Leon, Nicaragua, an episcopal see, and the largest city in the republic, situated midway between Lake Managua and the Pacific Ocean, 50 m. N.W. of Managua, on the railway from that city to the Pacific port of Corinto. Pop. (1905) about 45,000, including the Indian town of Subtiaba. Leon covers a very wide area, owing to its gardens and plantations. Its houses are usually one-storeyed, built of adobe and roofed with red tiles; its public buildings are among the finest in Central America. The massive and elaborately ornamented cathedral was built in the Renaissance style between 1746 and 1774; a Dominican church in Subtiaba is little less striking. The old (1678) and new (1873) episcopal palaces, the hospital, the university and the barracks (formerly a Franciscan monastery) are noteworthy examples of Spanish colonial architecture. Leon has a large general trade, and manufactures cotton and woollen fabrics, ice, cigars, boots, shoes and saddlery; its tanneries supply large quantities of cheap leather for export. But its population (about 60,000 in 1850) tends to decrease.

At the time of the Spanish conquest Subtiaba was the residence of the great cacique of Nagrando, and contained an important Indian temple. The city of Leon, founded by Francisco Hernan- dez de Cordova in 1523, was originally situated at the head of the western bay of Lake Managua, and was not removed to its present position till 1610. Thomas Gage, who visited it in 1665, describes it as a splendid city; and in 1685 it yielded rich booty to William Dampier (q.v.). Until 1855 Leon was the capital of Nicaragua, although its great commercial rival Granada contested its claim to that position, and the jealousy between the two cities often resulted in bloodshed. Leon was identified with the interests of the democracy of Nicaragua, Granada with the clerical and aristocratic parties.

See Nicaragua; E. G. Squier, Central America, vol. i. (1856); and T. Gage, Through Mexico, &c. (1665).

LEON, the name of a modern province and of an ancient kingdom,

captaincy-general and province in north-western Spain. The modern province, founded in 1833, is bounded on the N. by Oviedo, N.E. by Santander, E. by Palencia, S. by Valladolid and Zamora and W. by Orense and Lugo. Pop. (1900) 386,083. Area, 5986 sq. m. The boundaries of the province on the north and west, formed respectively by the central ridge and southerly offshoots of the Cantabrian Mountains (q.v.), are strongly marked; towards the south-east the surface merges imper- ceptibly into the Castilian plateau, the line of demarcation being for the most part merely conventional. Leon belongs partly to the river system of the Mifio (see Spain), partly to that of the Duero or Douro (q.v.), these being separated by the Montafias de Leon, which extend in a continuous wall (with passes at Manzanal and Poncebadon) from north to south-west. To the north-west of the Montafias de Leon is the richly wooded pastoral and highland district known as the Vierzo, which in its lower valleys produces grain, fruit, and wine in abundance. The Tierra del Campo in the west of the province is fairly productive, but in need of irrigation. The whole province is sparsely peopled. Apart from agriculture, stock-raising and mining, its commerce and industries are unimportant. Cattle, mules, butter, leather, coal and iron are exported. The hills of Leon were worked for gold in the time of the Romans; iron is still obtained, and coal- mining developed considerably towards the close of the 19th century. The only towns with more than 5000 inhabitants in 1900 were Leon (15,580) and Astorga (5573) (q.v.). The main railway from Madrid to Corunna passes through the province, and there are branches from the city of Leon to Vierzo, Oviedo, and the Biscayan port of Gijon,

At the time of the-Roman conquest, the province was inhabited by the Vettones and Callaici; it afterwards formed part of Hispania Tarraconensis. Among the Christian kingdoms which arose in Spain as the Moorish invasion of the 8th century receded, Leon was one of the oldest. The title of king of Leon was first assumed by Ordofio in 913. Ferdinand I. (the Great) of Castile united the crowns of Castile and Leon in the nth century; the two were again separated in the 12th, until a final union took place (1230) in the person of St Ferdinand. The limits of the kingdom varied with the vicissitudes of war, but roughly speaking it may be said to have embraced what are now the provinces of Leon, Palencia, Valladolid, Zamora and Salamanca. For a detailed account of this kingdom, see Spain: History. The captaincy-general of the province of Leon before 1833 included Leon, Zamora

and Salamanca. The Leonese, or inhabitants of these three provinces, have less individuality, in character and physique, than the people of Galicia, Catalonia or Andalusia, who are quite distinct from what is usually regarded as the central or national Spanish type, i.e. the Castilian. The Leonese belong partly to the Castilian section of the Spaniards, partly to the north-western section which includes the Galicians and Asturians. They have comparatively few of the Moorish traits which arc so marked in the south and east of Spain. Near Astorga there dwells a curious tribe, the Maragatos, sometimes considered to be a remnant of the original Celtiberian inhabitants. As a rule the Maragatos earn their living as muleteers or carriers; they wear a distinctive costume, mix as little as possible with their neighbours and do not marry outside their own tribe.

LEON, an episcopal see and the capital of the Spanish province of Leon, situated on a hill 2631 ft. above sea-level, in the angle made by the Torio and Bernesga, streams which unite on the south, and form the river Leon, a tributary of the Esla. Pop. (1900) 15,580. Leon is on the main railway from Madrid to Oviedo, and is connected with Astorga by a branch line. The older quarters of the city, which contain the cathedral and other medieval buildings, are surrounded by walls, and have lost little of their beauty and interest from the restoration carried out in the second half of the 19th century. During the same period new suburbs grew up outside the walls to house the industrial popula- tion which was attracted by the development of iron-founding and the manufacture of machinery, railway-plant, chemicals and leather. Leon thus comprises two towns — the old, which is mainly ecclesiastical in its character, and the new, which is industrial. The cathedral, founded in n 99 and only finished at the close of the 14th century, is built of a warm cream-coloured stone, and is remarkable for simplicity, lightness and strength. It is one of the finest examples of Spanish Gothic, smaller, indeed, than the cathedrals of Burgos and Toledo, but exquisite in design and workmanship. The chapter library contains some valuable manuscripts. The collegiate church of San Isidoro was founded by Ferdinand I. of Castile in 1063 and consecrated in 1149. Its architecture is Romanesque. The church contains some fine plate, including the silver reliquary in which the bones of St Isidore of Seville are preserved, and a silver processional cross dating from the 16th century, which is one of the most beautiful in the country. The convent and church of San Marcos, planned in 1514 by Ferdinand the Catholic, founded by Charles V. in 1537, and consecrated in 1541, are Renaissance in style. They are built on the site of a hostel used by pilgrims on their way to Santiago de Compostela. The provincial museum occupies the chapterhouse and

contains some interesting Roman monuments. The lower part of the city walls consists of Roman masonry dating from the 3rd century. Other buildings are the high school, ecclesiastical seminaries, hospital, episcopal palace and municipal and provincial halls.

Leon (Arab. Liyun) owes its name to the Legio Septima Gemina of Galba, which, under the later emperors, had its head- quarters here. About 540 Leon fell into the hands of the Gothic king Leovigild, and in 717 it capitulated to the Moors. Retaken about 742, it ultimately, in the beginning of the 10th century, became the capital of the kingdom of Leon (see Spain: History). About 996 it was taken by Almansur, but on his death soon

afterwards it reverted to the Spaniards. It was the seat of several ecclesiastical councils, the first of which was held under Alphonso V. in 1012 and the last in 1288.

LEONARDO DA VINCI (1452-1519), the great Italian painter, sculptor, architect, musician, mechanician, engineer and natural philosopher, was the son of a Florentine lawyer, born out of wedlock by a mother in a humble station, variously described as a peasant and as of gentle birth. The place of his birth was Vinci, a castello or fortified hill village in the Florentine territory near Empoli, from which his father's family derived its name. The Christian name of the father was Piero (the son of Antonio the son of Piero the son of Guido, all of whom had been men of law like their descendant). Leonardo's mother was called Catarina. Her relations with Ser Piero da Vinci seem to have come to an end almost immediately upon the birth of their son. She was soon afterwards married to one Accatta- briga di Piero del Vacca, of Vinci. Ser Piero on his part was four times married, and had by his last two wives nine sons and two daughters; but he had from the first acknowledged the boy Leonardo and brought him up in his own house, principally, no doubt, at Florence. In that city Ser Piero followed his profession with success, as notary to many of the chief families in the city, including the Medici, and afterwards to the signory or governing council of the state. The son born to him before marriage grew up into a youth of shining promise. To splendid beauty and activity of person he joined a winning charm of temper and manners, a tact for all societies, and an aptitude for all accomplishments. An inexhaustible intellectual energy and curiosity lay beneath this amiable surface. Among the multir f arious pursuits to which the young Leonardo set his hand, the favourites at first were music, drawing and modelling. His father showed some of his drawings to an acquaintance, Andrea del Verrocchio, who at once recognized the boy's artistic vocation, and was selected by Ser Piero to

be his master.

Verrocchio, although hardly one of the great creative or in- ventive forces in the art of his age at Florence, was a first-rate craftsman alike as goldsmith, sculptor and painter, and particu- larly distinguished as a teacher. In his studio Leonardo worked for several years (about 1470-147 7) in the company of Lorenzo di Credi and other less celebrated pupils. Among his contenv poraries he formed special ties of friendship with the painters Sandro Botticelli and Pietro Perugino. He had soon learnt all that Verrocchio had to teach — more than all, if we are to believe the oft-told tale of the figure, or figures, executed by the pupil in the picture of Christ's Baptism designed by the master for the monks of Vallombrosa. The work in question is now in the Apademy at Florence. According to Vasari the angel kneeling on the left, with a drapery over the right arm, was put in by Leonardo, and when Verrocchio saw it his sense of its superiority to his own work caused him to forswear painting for ever after. The latter part, of the story is certainly false. The picture, originally painted in tempera, has suffered much from later repaints in oil, rendering exact judgment difficult. The most competent opinion inclines to acknowledge the hand of Leonardo, not only in the face of the angel, but also in parts of the drapery and of the landscape background. The work was probably done in or about 1470, when Leonardo was eighteen years old. By 1472 we find him enrolled in the lists of the painters' gild at Florence. Here he continued to live and work for ten or eleven years longer. Up till 1477 he is still spoken of as a pupil or apprentice of Verrocchio; but in that year he seems to have been taken into special favour by Lorenzo the Magnificent, and to have worked as an independent artist under his patronage until 1482-1483. In 1478 we find him receiving an important com- mission from the signory, and in 1480 another from the monks of San Donato in Scopeto.

Leonardo was not one of those artists of the Renaissance who sought the means of reviving the ancient glories of art mainly in the imitation of ancient models. The antiques of the Medici gardens seem to have had little influence on him beyond that of generally stimulating his passion for perfection. By his own instincts he was an exclusive student of nature.

From his earliest days he had flung himself upon that study with an unprecedented ardour of delight and curiosity. In drawing from life he

had early found the way to unite precision with freedom and fire — the subtlest accuracy of expressive definition with vital movement and rhythm of line— ˆ as no draughtsman had been able to unite them before. He was the first painter to recognize the play of light and shade as among the most significant and attractive of the world's appearances, the earlier schools having with one consent subordinated light and shade to colour and outline. Nor was he a student of the broad, usual, patent appearances only of the world; its fugitive, fantastic, unaccustomed appearances attracted him most of all. Strange shapes of hills and rocks, rare plants and animals, unusual faces and figures of men, questionable smiles and ex- pressions, whether beautiful or grotesque, far-fetched objects and curiosities, were things he loved to pore upon and keep in memory. Neither did he stop at mere appearances of any kind, but, having stamped the image of things upon his brain, went on indefatigably to probe their hidden laws and causes; He soon satisfied himself that the artist who was content to repro- duce the external aspects of things without searching into the hidden workings of nature behind them, was one but half equipped for his calling. Every fresh artistic problem immedi 1 – ately became for him a far-reaching scientific problem as well. The laws of light and shade, the laws of " perspective," including optics and the physiology of the eye, the laws of human and animal anatomy and muscular movement, those of the growth and structure of plants and of the powers and properties of water, all these and much more furnished food almost from the beginning to his insatiable spirit of inquiry.

The evidence of the young man's predilections and curiosities is contained in the legends which tell of lost works produced by him in youth. One of these was a cartoon or monochrome painting of Adam and Eve in tempera, and in this, besides the beauty of the figures, the infinite truth and elaboration of the. foliage and animals in the background are celebrated in terms which bring to mind the treatment of the subject by Albrecht Durer in his famous engraving done thirty years later. Again, a peasant of Vinci having in his simplicity asked Ser Piero to get a picture painted for him on a wooden shield, the father is said to have laughingly handed on the commission to his son, who thereupon shut himself up with all the noxious insects and grotesque reptiles he could find, observed and drew and dissected them assiduously, and produced at last a picture of a dragon compounded of their various shapes and aspects, which was so fierce and so life-like as to terrify all who saw it. With equal research and no less effect he painted on another occasion the head of a snaky-haired Medusa. (A picture of this subject which long did duty at the Uffizi for Leonardo's

work is in all likelihood merely the production of some later artist to whom the descrip- tions of that work have given the cue.) Lastly, Leonardo is related to have begun work in sculpture about this time by modelling several heads of smiling women and children.

Of certified and accepted paintings produced by the young genius, whether during his apprentice or his independent years at Florence (about 1470-1482), very few are extant, and the two most important are incomplete. A small and charming strip of an oblong ” Annunciation ” at the Louvre is generally accepted as his work, done soon after 1470; a very highly wrought drawing at the Uffizi, corresponding on a larger scale to the head of the Virgin in the same picture, seems rather to be a copy by a later hand. This little Louvre ” Annunciation ” is not very compatible in style with another and larger, much- debated ” Annunciation ” at the Uffizi, which manifestly came from the workshop of Verrocchio about 1473-1474, and which many critics claim confidently for the young Leonardo. It may have been joint studio-work of Verrocchio and his pupils including Leonardo, who certainly was concerned in it, since a study for the sleeve of the angel, preserved at Christ Church, Oxford, is un-questionably by his hand. The landscape, with its mysterious spiry mountains and winding waters, is very Leonardesque both in this picture and in another contemporary product of the

workshop, or as some think of Leonardo’s hand, namely a very highly and coldly finished small “Madonna with a Pink ” at Munich. The likeness he is recorded to have painted of Ginevra de’ Benci used to be traditionally identified with the fine portrait of a matron at the Pitti absurdly known as La Monaco: more lately it has been recognized in a rather dull, expressionless Verrocchiesque portrait of a young woman with a fanciful background of pine-sprays in the Liechtenstein gallery at Vienna. Neither attribution can be counted convincing. Several works of sculpture, including a bas-relief at Pistoia and a small terra-cotta. model of a St John at the Victoria and Albert Museum, have also been claimed, but without general consent, as the young master’s handiwork. Of many brilliant early drawings by him, the first that can be dated is a study of landscape done in 1473. A magnificent silver-point head of a Roman warrior at the British Museum was clearly done, from or for a bas- relief, under the immediate influence of Verrocchio. A number of studies of heads in pen or silver point, with some sketches for Madonnas, including a charming series in the British Museum for a ” Madonna with the Cat,” may belong to the same years or the first years of his independence. A sheet with two studies of heads bears a MS. note of 1478, saying that in one of the last months of that year he began painting the ” Two Maries!” One of

the two may have been a picture of the Virgin appearing to St Bernard, which we know he was commissioned to paint in that year for a chapel in the Palace of the Signory, but never finished: the commission was afterwards transferred to Filippino Lippi, whose performance is now in the Badia. One of the two heads on this dated sheet may probably have been a study for the same St Bernard; it was used afterwards by some follower for a St Leonard in a stiff and vapid " Ascension of Christ," wrongly attributed to the master himself in the Berlin Museum. A pen-drawing representing a ringleader of the Pazzi conspiracy, Bernardo Baroncelli, hung out of a window of the Bargello after his surrender by the sultan at Constantinople to the emissaries of Florence, can be dated from its subject as done in December 1479. A number of his best drawings of the next following years are preparatory pen-studies for an altarpiece of the " Adoration of the Magi," undertaken early in 1481 on the com- mission of the monks of S. Donato at Scopeto. The preparation in monochrome for this picture, a work of extraordinary power both of design and physiognomical expression, is preserved at the Uffizi, but the painting itself was never carried out, and after Leonardo's failure to fulfil his contract Filippino Lippi had once more to be employed in his place. Of equal or even more intense power, though of narrower scope, is an unfinished monochrome preparation for a St Jerome, found accidentally at Rome by Cardinal Fesch and now in the Vatican gallery; this also seems to belong to the first Florentine period, but is not mentioned in documents.

The tale of completed work for these twelve or fourteen years (1470-1483 or thereabouts) is thus very scanty. But it must be remembered that Leonardo was already full of projects in mechanics, hydraulics, architecture, and military and civil engineering, ardently feeling his way in the work of experimental study and observation in every branch of theoretical or applied science in which any beginning had been made in his age, as well as in some in which he was himself the first pioneer. He was full of new ideas concerning both the laws and the applications of mechanical forces. His architectural and engineering projects were of a daring which amazed even the fellow-citizens of Alberti and Brunelleschi. History presents few figures more attractive to the mind's eye than that of Leonardo during this period of his all-capable and dazzling youth. He did not indeed escape calumny, and was even denounced on a charge of immoral practices, but fully and honourably acquitted. There was nothing about him, as there was afterwards about Michelangelo, dark-tempered, secret or morose; he was open and genial with all men. He has indeed praised "the self-sufficing power of solitude " in almost the same phrase as

Wordsworth, and from time to time would even in youth seclude himself for a season in complete intellectual absorption, as when he toiled among his

bats and wasps and lizards, forgetful of reit and food, and in- sensible to the noisomeness of their corruption. But we have to picture him as anon coming out and gathering about him a tatterdemalion company, and jesting with them until they were in fits of laughter, for the sake of observing their burlesque physiognomies; anon as eagerly frequenting the society of men of science and learning of an older generation like the mathe- matician Benedetto Aritmetico, the physician, geographer and astronomer Paolo Toscanelli, the famous Greek Aristotelian Giovanni Argiropoulo; or as out-rivalling all the youth of the city now by charm of recitation, now by skill in music and now by feats of strength and horsemanship; or as stopping to buy caged birds in the market that he might set them free and watch them rejoicing in their flight; or again as standing radiant in his rose-coloured cloak and his rich gold hair among the throng of young and old on the piazza, and holding them spell- bound while he expatiated on the great projects in art and mechanics that were teeming in his mind. Unluckily it is to written records and to imagination that we have to trust ex- clusively for our picture. No portrait of Leonardo as he appeared during this period of his life has come down to us.

But his far-reaching schemes and studies brought him no immediate gain, and diverted him from the tasks by which he should have supported himself. For all his shining power and promise he remained poor. Probably also his exclusive belief in experimental methods, and slight regard for mere authority whether in science or art made the intellectual atmosphere of the Medicean circle, with its passionate mixed cult of the classic past and of a Christianity mystically blended and recon- ciled with Platonism, uncongenial to him. At any rate he was ready to leave Florence when the chance was offered him of fixed service at the court of Ludovico Sforza (il Moro) at Milan. Soon after that prince had firmly established his power as nominal guardian and protector of his nephew Gian Galeazzo but really as usurping ruler of the state, he revived a project previously mooted for the erection of an equestrian monument in honour of the founder of his house's greatness, Francesco Sforza, and consulted Lorenzo dei Medici on the choice of an artist. Lorenzo recommended the young Leonardo, who went to Milan accord- ingly (at some uncertain date in or about 1483),

taking as a gift from Lorenzo and a token of his own skill a silver lute of wondrous sweetness fashioned in the likeness of a horse's head. Hostilities were at the moment imminent between Milan and Venice; it was doubtless on that account that in the letter commending himself to the duke, and setting forth his own capacities, Leonardo rests his title to patronage chiefly on his attainments and in- ventions in military engineering. After asserting these in detail under nine different heads, he speaks under a tenth of his pro- ficiency as a civil engineer and architect, and adds lastly a brief paragraph with reference to what he can do in painting and sculpture, undertaking in particular to carry out in a fitting manner the monument to Francesco Sforza.

The first definite documentary evidence of Leonardo's em- ployments at Milan dates from 1487. Some biographers have supposed that the interval, or part of it, between 1483 and that date was occupied by travels in the East. The grounds of the supposition are some drafts occurring among his MSS. of a letter addressed to the diodario or diwddar of Syria, lieutenant of the sultan of Babylon (Babylon meaning according to a usage of that time Cairo). In these drafts Leonardo describes in the first person, with sketches, a traveller's strange experiences in Egypt, Cyprus, Constantinople, the Cilician coasts about Mount Taurus and Armenia. He relates the rise and persecution of a prophet and preacher, the catastrophe of a falling mountain and submergence of a great city, followed by a general inunda- tion, and the claim of the prophet to have foretold these disasters; adding physical descriptions of the Euphrates river and the marvellous effects of sunset light on the Taurus range. No contemporary gives the least hint of Leonardo's having travelled in the East; to the places he mentions he gives their classical and not their current Oriental names; the catastrophes he describes are unattested from any other source; he confuses

the Taurus and the Caucasus; some of the phenomena he mentions are repeated from Aristotle and Ptolemy; and there seems little reason to doubt that these passages in his MSS. are merely his drafts of a projected geographical treatise or perhaps romance. He had a passion for geography and travellers' tales, for descriptions of natural wonders and ruined cities, and was himself a practised fictitious narrator and fabulist, as other passages in his MSS. prove. Neither is the gap in the account of his doings after he first went to the court of Milan really so complete as has been represented. Ludovico was vehemently denounced and attacked during the earlier years of his usurpa- tion, especially by the partisans of his sister-in-law Bona of Savoy, the mother of the rightful duke, young Gian Galeazzo. To repel these

attacks he employed the talents of a number of court poets and artists, who in public recitation and pageant, in emblematic picture and banner and device, proclaimed the wisdom and kindness of his guardianship and the wickedness of his assailants. That Leonardo was among the artists thus employed is proved both by notes and projects among his MSS. and by allegoric sketches still extant. Several such sketches are at Christ Church, Oxford: one shows a horned hag or she-fiend urging her hounds to an attack on the state of Milan, and baffled by the Prudence and Justice of Il Moro (all this made clear by easily recognizable emblems). The allusion must almost certainly be to the attempted assassination of Ludovico by agents of the duchess Bona in 1484. Again, it must have been the pestilence decimating Milan in 1484-1485 which gave occasion to the projects submitted by Leonardo to Ludovico for breaking up the city and reconstructing it on improved sanitary prin- ciples. To 1485-1486 also appears to belong the inception of his elaborate though unfulfilled architectural plans for beautifying and strengthening the Castello, the great stronghold of the ruling power in the state. Very soon afterwards he must have begun work upon his plans and models, undertaken during an acute phase of the competition which the task had called forth be- tween German and Italian architects, for another momentous enterprise, the completion of Milan cathedral. Extant records of payments made to him in connexion with these architectural plans extend from August 1487 to May 1490: in the upshot none of them was carried out. From the beginning of his residence with Ludovico his combination of unprecedented mechanical ingenuity with apt allegoric invention and courtly charm and eloquence had made him the directing spirit in all court ceremonies and festivities. On the occasion of the marriage of the young duke Gian Galeazzo with Isabella of Aragon in 1487, we find Leonardo devising all the mechanical and spectacular part of a masque of Paradise; and presently afterwards designing a bathing pavilion of unheard-of beauty and ingenuity for the young duchess. Meanwhile he was filling his note-books as busily as ever with the results of his studies in statics and dynamics, in human anatomy, geometry and the phenomena of light and shade. It is probable that from the first he had not forgotten his great task of the Sforza monu- ment, with its attendant researches in equine movement and anatomy, and in the science and art of bronze casting on a great scale. The many existing sketches for the work (of which the chief collection is at Windsor) cannot be distinctly dated. In 1490, the seventh year of his residence at Milan, after some expressions of impatience on the part of his patron, he had all but got his model ready for display on the occasion of the marriage of Ludovico with Beatrice d'Este, but at the last moment was dissatisfied with what he had done and determined

to begin all over again.

In the same year, 1490, Leonardo enjoyed some months of uninterrupted mathematical and physical research in the libraries and among the learned men of Pavia, whither he had been called to advise on some architectural difficulties concerning the cathedral. Here also the study of an ancient equestrian monu- ment (the so-called Regisole, destroyed in 1796) gave him fresh ideas for his Francesco Sforza. In January 1491 a double Sforza-Este marriage (Ludovico Siorza himself with Beatrice d'Este, Alfonso d'Este with Anna Sforza the sister of Gian

Galeazzo) again called forth his powers as a masque and pageant-master. For the next following years the ever-increasing gaiety and splendour of the Milanese court gave him continual employment in similar kinds, including the composition and recitation of jests, tales, fables and "prophecies" {i.e. moral and social satires and allegories cast in the future tense); among his MSS. occur the drafts of many such, some of them both profound and pungent. Meanwhile he was again at work upon the monument to Francesco Sforza, and this time to practical purpose. When ambassadors from Austria came to Milan towards the close of 1493 t0 escort the betrothed bride of their emperor Maximilian, Bianca Maria Sforza, away on her nuptial journey, the finished colossal model, 26 ft. high, was at last in its place for all to see in the courtyard of the Castello. Con- temporary accounts attest the magnificence of the work and the enthusiasm it excited, but are not precise enough to enable us to judge to which of the two main groups of extant sketches its design corresponded. One of these groups shows the horse and rider in relatively tranquil march, in the manner of the Gattemalata monument put up fifty years before by Donatello at Padua and the Colleoni monument on which Verocchio was now engaged at Venice. Another group of sketches shows the horse galloping or rearing in violent action, in some instances in the act of trampling a fallen enemy. Neither is it possible to discriminate with certainty the sketches intended for the Sforza monument from others which Leonardo may have done in view of another and later commission for an equestrian statue, namely, that in honour of Ludovico's great enemy, Gian Giacomo Trivulzio.

The year 1494 is a momentous one in the history of Italian politics. In that year the long ousted and secluded prince, Gian Galeazzo, died under circumstances more than suspicious. In that year Ludovico, now

duke of Milan in his own right, for the strengthening of his power against Naples, first entered into those intrigues with Charles VIII. of France which later brought upon Italy successive floods of invasion, revolution and calamity. The same year was one of special importance in the prodigiously versatile activities of Leonardo da Vinci. Documents show him, among other things, planning during an absence of several months from the city vast new engineering works for improving the irrigation and water-ways of the Lomellina and adjacent regions of the Lombard plain; ardently studying phenomena of storm and lightning, of river action and of mountain struc- ture; co-operating with his friend, Donato Bramante, the great architect, in fresh designs for the improvement and embellish- ment of the Castello at Milan; and petitioning the duke to secure him proper payment for a Madonna lately executed with the help of his pupil, Ambrogio de Predis, for the brotherhood of the Conception of St Francis at Milan. (This is almost certainly the fine, slightly altered second version of the ” Virgin of the Rocks,” now in the National Gallery, London. The original and earlier version is one of the glories of the Louvre, and shows far more of a Florentine and less of a Milanese character than the London picture.) In the same year, 1494, or early in the next, Leonardo, if Vasari is to be trusted, paid a visit to Florence to take part in deliberations concerning the projected new council-hall to be constructed in the palace of the Signory. Lastly, recent research has proved that it was in 1494 that Leonardo got to work in earnest on what was to prove not only by far his greatest but by far his most expeditiously and steadily executed work in painting. This was the ” Last Supper ” undertaken for the refectory of the convent church of Sta Maria delle Grazie at Milan on the joint commission (as it would appear) of Ludovico and of the monks themselves.

This picture, the world-famous ” Cenacolo ” of Leonardo, has been the subject of much erroneous legend and much misdirected experiment. Having through centuries undergone cruel injury, from technical imperfections at the outset, from disastrous atmospheric conditions, from vandalism and neglect, and most of all from unskilled repair, its remains have at last (1904-1908) been treated with a mastery of scientific resource and a tenderness of conscientious skill that have revived for ourselves and for

posterity a great part of its power. At the same time its true history has been investigated and re-established. The intensity of intellectual and manual application which Leonardo jthrew into the work is proved by the fact that he finished it within four years, in spite of all his other avocations and of those prolonged pauses of concentrated imaginative effort and intense self-critical brooding to which we have

direct contemporary witness. He painted the picture on the wall in tempera, not, according to the legend which sprung up within twenty years of its completion, in oil. The tempera vehicle, perhaps including new experimental ingredients, did not long hold firmly to its plaster ground, nor that to the wall. Flaking and scaling set in; hard crusts of mildew formed, dissolved and re-formed with changes of weather over both the loosened parts and those that remained firm. Decade after decade these processes went on, a rain of minute scales and grains falling, according to one witness, continually from the surface, till the picture seemed to be perishing altogether. In the 18th century attempts were first made at restoration. They all proceeded on the false assump- tion, dating from the early years of the 16th century, that the work had been executed in oil. With oil it was accordingly at one time saturated in hopes of reviving the colours. Other experimenters tried various " secrets," which for the most part meant deleterious glues and varnishes. Fortunately not very much of actual repainting was accomplished except on some parts of the garments. The chief operations were carried on by Bellotti in 1726, by Mazza in 1770, and by Barezzi in 1819 and the following years. None of them arrested, some actually accelerated, the natural agencies of damp and disintegration, decay and mildew. Yet this mere ghost of a picture, this evocation, half vanished as it was, by a great world-genius of a mighty spiritual world-event, remained a thing indescribably impressive. The ghost has now been brought back to much of true life again by the skill of the most scrupulous of all restorers, Cavaliere Cavenaghi, who, acting under the authority of a competent commission, and after long and patient experiment, found it possible to secure to the wall the innumerable blistered, mildewed and half-detached flakes and scales of the original work that yet remained, to clear the surface thus obtained of much of the obliterating accretions due to decay and mishandling, and to bring the whole to unity by touching tenderly in with tempera the spots and spaces actually left bare. A further gain obtained through these operations has been the uncovering, immediately above the main subject, of a beautiful scheme of painted lunettes and vaultings, the lunettes filled by Leonardo's hand with inscribed scutcheons and interlaced plait or knot ornaments (intrecciamenti), the vaultings with stars on a blue ground. The total result, if adequate steps can be taken to counteract the effects of atmospheric change in future, will remain a splendid gain for posterity and a happy refutation of D'Annunzio's despairing poem, the Death of a Masterpiece.

Leonardo's " Last Supper," for all its injuries, became from the first, and has ever since remained, for all Christendom the typical

representation of the scene. Goethe in his famous criticism has said all that needs to be said of it. The painter has departed from precedent in grouping the disciples, with their Master in the midst, along the far side and the two ends of a long, narrow table, and in leaving the near or service side of the table towards the spectator free. The chamber is seen in a perfectly symmetrical perspective, its rear wall pierced by three plain openings which admit the sense of quiet distance and mystery from the open landscape beyond; by the central of these openings, which is the widest of the three, the head and shoulders of the Saviour are framed in. On His right and left are ranged the disciples in equal numbers. The furniture and accessories of the chamber, very simply conceived, have been rendered with scrupulous exactness and distinctness; yet they leave to the human and dramatic elements the absolute mastery of the scene. The serenity of the holy company has within a moment been broken by the words of their Master, ” One of you shall betray Me.” In the agitation of their consciences and affections, the disciples have started into groups

or clusters along the table, some standing, some still remaining seated. There are four of these groups, of three disciples each, and each group is harmoniously interlinked by some natural connecting action with the next. Leonardo, though no special student of the Greeks, has perfectly carried out the Greek principle of expressive variety in particulars subordinated to general symmetry. He has used all his acquired science of linear and aerial perspective to create an almost complete illusion to the eye, but an illusion that has in it nothing trivial, and in heightening our sense of the material reality of the scene only heightens its profound spiritual impressiveness and gravity. The results of his intensest meditations on the psychology and the human and divine significance of the event (on which he has left some pregnant hints in written words of his own) are perfectly fused with those of his subtlest technical calculations on the rhythmical balancing of groups and arrangement of figures in space.

Of authentic preparatory studies for this work there remain but few. There is a sheet at the Louvre of much earlier date than the first idea or commission for this particular picture, containing some nude sketches for the arrangement of the subject ; another later and farther advanced, but still probably anterior to the practical commission, at Venice, and a MS. sheet of great interest at the Victoria and Albert Museum, on which the painter has noted in writing the dramatic

motives appropriate to the several disciples. At Windsor and Milan are a few finished studies in red chalk for the heads. A highly- reputed series of life-sized chalk drawings of the same heads, of which the greater portion is at Weimar, consists of early copies, and is interesting though having no just claim to origin- ality. Scarcely less doubtful is the celebrated unfinished and injured study of the head of Christ at the Brera, Milan.

Leonardo's triumph with his " Last Supper " encouraged him in the hope of proceeding now to the casting of the Sforza monument or " Great Horse," the model of which had stood for the last three years the admiration of all beholders, in the Corte Vecchio of the Castello. He had formed a new and close friend- ship with Luca Pacioli of Borgo San Sepolcro, the great mathe- matician, whose Summa de aritmetica, geometrica, &c, he had eagerly bought at Pavia on its first appearance, and who arrived at the Court of Milan about the moment of the completion of the " Cenacolo." Pacioli was equally amazed and delighted at Leonardo's two great achievements in sculpture and painting, and still more at the genius for mathematical, physical and anatomical research shown in the collections of MS. notes which the master laid before him. The two began working together on the materials for Pacioli's next book, De divina proportione. Leonardo obtained Pacioli's help in calculations and measure- ments for the great task of casting the bronze horse and man. But he was soon called away by Ludovico to a different under- taking, the completion of the interior decorations, already begun by another hand and interrupted, of certain chambers of the Castello called the Saletia Negro, and the Sala Grande dell' Asse, or Sala della Torre. When, in the last decade of the 19th century, works of thorough architectural investigation and repair were undertaken in that building under the superintend- ence of Professor Luca Beltrami, a devoted foreign student, Dr Paul Muller-Walde, obtained leave to scrape for traces of Leonardo's handiwork beneath the replastered and white- washed walls and ceilings of chambers that might be identified with these. In one small chamber there was cleared a frieze of cupids intermingled with foliage; but in this; after the first moments of illusion, it was only possible to acknowledge the hand of some unknown late and lax decorator of the school, influenced as much by Raphael as by Leonardo. In another room (Sala del Tesoro) was recovered a gigantic headless figure, in all probability of Mercury, also wrongly claimed at first for Leonardo, and afterwards, to all appearance rightly, for IJramante. But in the great Sala dell' Asse (or della Torre) abundant traces of Leonardo's own hand were found, in the shape of a decoration of intricate geometrical knot or plait work combined with natural leafage; the

abstract puzzle-pattern, of

a kind in which Leonardo took peculiar pleasure, intermingling in cunning play and contrast with a pattern of living boughs and leaves exquisitely drawn in free and vital growth. Sufficient portions of this design were found in good preservation to enable the whole to be accurately restored — a process as legitimate in such a case as censurable in the case of a figure-painting. For these and other artistic labours Leonardo Was rewarded in 1498 (ready money being with difficulty forthcoming and bis salary being long in arrears) by the gift of a suburban garden outside the Porta Vercelli.

But again he could not get leave to complete the task in hand. He was called away on duty as chief military engineer (ingegnere camerale) with the special charge of inspecting and maintaining all the canals and waterways of the duchy. Dangers were accumu- lating upon Ludovico and the state of Milan. France had become Ludovico's enemy; and Louis XII., the pope and Venice had formed a league to divide his principality among them. He counted on baffling them by forming a counter league of the principalities of northern Italy, and by raising the Turks against Venice, and the Germans and Swiss against France. Germans and Swiss, however, inopportunely fell to war against each other. Ludovico travelled to Innsbruck, the better to push his interests (September 1499). In his absence Louis XII. invaded the Milanese, and the officers left in charge of the city surrendered it without striking a blow. The invading sovereign,- going to Sta Maria delle Grazie with his retinue to admire the renowned painting of the " Last Supper," asked if it could not be detached from the wall &nd transported to France. The French lieutenant in Milan, Gian Giacomo Trivulzio, the embittered enemy of Ludovico, began exercising a vindictive tyranny over the city which had so long accepted the sway of the usurper. Great artists were usually exempt from the consequences of political revolutions, and Trivulzio, now or later, commissioned Leonardo to design an equestrian monument to himself. Leonardo, having remained unmolested at Milan for two months under the new regime, but knowing that Ludovico was preparing a great stroke for the re-establishment of his power, and that fresh convulsions must ensue, thought it best to provide for his own security. In December he left Milan with his friend Luca Pacioli, having first sent some of his modest savings to Florence for investment. His intention was to watch events. They took a turn which made him a stranger to Milan for the next seven years. Ludovico, at the head of an army of Swiss mercenaries, returned victoriously in February 1500, and was welcomed by a population disgusted with the oppression of the invaders. But in April he was once more overthrown

by the French in a battle fought at Novara, his Swiss clamouring at the last moment for their overdue pay, and treacherously refusing to fight against a force of their own countrymen led by La Tremouille. Ludovico was taken prisoner and carried to France; the city, which had been strictly spared on the first entry of Louis XII., was entered and sacked; and the model of Leonardo's great statue made a butt (as eye witnesses tell) for Gascon archers. Two years later we find the duke Ercole of Ferrara begging the French king's lieutenant in Milan to let him have the model, injured as it was, for the adornment of his own city; but nothing came of the petition, and within a short time it seems to have been totally broken up.

Thus, of Leonardo's sixteen years' work at Milan (1483-1409) the results actually remaining are as follows: The Louvre "Virgin of the Rocks " possibly, i.e. as to its execution; the conception and style are essentially Florentine, carried out by Leonardo to a point of intense and almost glittering finish, of quintessential, almost overstrained, refinement in design and expression, and invested with a new element of romance by the landscape in which the scene is set— a strange watered country of basaltic caves and arches, with the lights and shadows striking sharply and yet mysteriously among rocks, some upright, some jutting, some pendent, all tufted here and there with exquisite growths of shrub and flower. The National Gallery " Virgin of the Rocks " certainly, with help from Ambrogio de Predis; in this the Florentine character of the original is modified by an admixture of Milanese elements, the tendency to harshness and

over-elaboration of detail softened, the strained action of the angel's pointing hand altogether dropped, while in many places pupils' work seems recognizable beside that of the master. The " Last Supper" of Sta Maria delle Grazie, his masterpiece; as to its history and present condition enough has been said. The decorations of the ceiling of the Sala della Torre in the Castello. Other paintings done by him at Milan are mentioned, and attempts have been made to identify them with works still existing. He is known to have painted portraits of two of the king's mistresses, Cecilia Gallerani and LucreziaCrivelli. Cecilia Gallerani used to be identified as a lady with ringlets and a lute, depicted in a portrait at Milan, now rightly assigned to Barto- lommeo Veneto. More lately she has by some been conjecturally recognized in a doubtful, though Leonardesque, portrait of a lady with a weasel in the Czartoryski collection at Prague. Lucrezia Crivelli has, with no

better reason, been identified with the famous ” Belle Ferronniere ” (a mere misnomer, caught from the true name of another portrait which used to hang near it) at the Louvre; this last is either a genuine Milanese portrait by Leonardo himself or an extraordinarily fine work of his pupil Boltraffio. Strong claims have also been made on behalf of a fine profile portrait resembling Beatrice d’Este in the Ambrosiana; but this the best judges are agreed in regarding as a work, done in a lucky hour, of Ambrogio de Predis. A portrait of a musician in the same gallery is in like manner contested between the master and the pupil. Mention is made of a ” Nativity ” painted for and sent to the emperor Maximilian, and also apparently of some picture painted for Matthias Corvinus, king of Hungary; both are lost or at least unidentified. The painters especially recorded as Leonardo’s immediate pupils during this part of his life at Milan are the two before mentioned, Giovanni Antonio Boltraffio and Ambrogio Preda or de Predis, with Marco d’Oggionno and Andrea Salai, the last apparently less a fully-trained painter than a studio assistant and personal attendant, devotedly attached and faithful in both capacities. Leonardo’s own native Florentine manner had at first been not a little modified by that of the Milanese school as he found it represented in the works of such men as Bramantino, Borgognone and Zenale; but his genius had in its turn reacted far more strongly upon the younger members of the school, and exercised, now or later, a transforming and dominating influence not only upon his immediate pupils, but upon men like Luini, Giam- petrino, Bazzi, Cesare da Sesto and indeed the whole Lombard school in the early 1 5th century. Of sculpture done by him during this period we have no remains, only the tragically tantalizing history of the Sforza monument. Of drawings there are very many, including few only for the ” Last Supper,” many for the Sforza monument, as well as the multitude of sketches, scientific and other, which we find intermingled among the vast body of his miscellaneousMSS., notes and records. In mechanical, scientific and theoretical studies of all kinds it was a period, as these MSS. attest, of extraordinary activity and self-develop- ment. At Pavia in 1494 we find him taking up literary and grammatical studies, both in Latin and the vernacular; the former, no doubt, in order the more easily to read those among the ancients who had laboured in the fields that were his own, as Euclid, Galen, Celsus, Ptolemy, Pliny, Vitruvius and, above all, Archimedes; the latter with a growing hope of some day getting into proper form and order the mass of materials he was daily accumulating for treatises on all his manifold subjects of enquiry. He had been much helped by his opportunities of intercourse with the great architects, engineers and mathematicians who frequented the court of Milan — Bramante, Alberghetti, Andrea di

Ferrara, Pietro Monti, Fazio Cardano and, above all, Luca Pacioli. The knowledge of Leonardo's position among and familiarity with such men early helped to spread the idea that he had been at the head of a regularly constituted academy of arts and sciences at Milan. The occurrence of thewords "Acha- demia Leonardi Vinci " on certain engravings, done after his drawings, of geometric " knots " or puzzle-patterns (things for which we have already learned his partiality), helped to give currency to this impression not only in Italy but in the North, xvi. 15

where the same engravings were copied by Albrecht Dtirer. The whole notion has been proved mistaken. There existed no such academy at Milan, with Leonardo as president. The academies of the day represented the prevailing intellectual tendency of Renaissance humanism, namely, an absorbing enthusiasm for classic letters and for the transcendental specula- tions of Platonic and neo-Platonic mysticism, not unmixed with the traditions and practice of medieval alchemy, astrology and necromantics. For these last pursuits Leonardo had nothing but contempt. His many-sided and far-reaching studies in experimental science were mainly his own, conceived and carried out long in advance of his time, and in communion with only such more or less isolated spirits as were advancing along one or another of the same paths of knowledge. He learnt indeed on these lines eagerly wherever he could, and in learning imparted knowledge to others. But he had no school in any proper sense except his studio, and his only scholars were those who painted there. Of these one or two, as we have evidence, tried their hands at engraving; among their engravings were these " knots," which, being things of use for decorative craftsmen to copy, were inscribed for identification, and perhaps for protection, as coming from the Achademia Leonardi Vinci; a trifling matter altogether, and quite unfit to sustain the elaborate structure of conjecture which has been built on it.

To return to the master: when he and Luca Pacioli left Milan in December 1499, their destination was Venice. They made a brief stay at Mantua, where Leonardo was graciously received by the duchess Isabella Gonzaga, the most cultured of the many cultured great ladies of her time, whose portrait he promised to paint on a future day; meantime he made the fine chalk drawing of her now at the Louvre. Arrived at Venice, he seems to have occupied himself chiefly with studies in mathe- matics and cosmography. In April the friends heard of the second and final overthrow of Ludovico il Moro, and at that news, giving up all idea of a return to Milan, moved on to Florence, which they found depressed both by internal troubles and by the protraction of the indecisive and inglorious war with Pisa. Here-

Leonardo undertook to paint an altar-piece for the Church of the Annunziata, Filippino Lippi, who had already received the commission, courteously retiring from it in his favour. A year passed by, and no progress had been made with the painting. Questions of physical geography and engineering engrossed him as much as ever. He writes to correspondents making enquiries about the tides in the Euxine and Caspian Seas. He reports for the information of the Arte de' Mercanli on the precautions to be taken against a threatening landslip on the hill of S. Salvatore dell' Osservanza. He submits drawings and models for the canalization and control of the waters of the Arno, and propounds, with compulsive eloquence and conviction, a scheme for transporting the Baptistery of St John, the " bel San Giovanni " of Dante, to another part of the city, and elevat- ing it on a stately basement of marble. Meantime the Servite brothers of the Annunziata were growing impatient for the completion of their altar-piece. In April 1 501 Leonardo had only finished the cartoon, and this all Florence flocked to see and admire. Isabella Gonzaga, who cherished the hope that he might be induced permanently to attach himself to the court of Mantua, wrote about this time to ask news of him, and to beg for a paint- ing from him for her study, already adorned with masterpieces by the first hands of Italy, or at least for a " small Madonna, devout and sweet as is natural to him." In reply her corre- spondent says that the master is wholly taken up with geometry and very impatient of the brush, but at the same time tells her all about his just completed cartoon for the Annunziata. The subject was the Virgin seated in the lap of St Anne, bending forward to hold her child who had half escaped from her embrace to play with a lamb upon the ground. The description answers exactly to the composition of the celebrated picture of the Virgin and St Anne at the Louvre. A cartoon of this composition in the Esterhazy collection at Vienna is held to be only a copy, and the original cartoon must be regarded as lost. But another of kindred though not identical motive has come down to us

and is preserved in the Diploma Gallery at the Royal Academy. In this incomparable work St Anne, pointing upward with her left hand, smiles with an intense look of wondering, questioning, inward sweetness into the face of the Virgin, who in her turn smiles down upon her child as He leans from her lap to give the blessing to the little St John standing beside her. Evidently two different though nearly related designs had been maturing in Leonardo's mind. A rough

first sketch for the motive of the Academy cartoon is in the British Museum; one for the motive of the lost cartoon and of the Louvre picture is at Venice. Nc painting by Leonardo from the Academy cartoon exists, but in the Ambrosiana at Milan there is one by Luini, with the figure of St Joseph added. It remains a matter of debate whether the Academy cartoon or that shown by Leonardo at the Annun- ziata in 1501 was the earlier. The probabilities seem in favour of the Academy cartoon. This, whether done at Milan or at Florence, is in any case a typically perfect and harmonious example of the master's Milanese manner; while in the other composition with the lamb the action and attitude of the Virgin are somewhat strained, and the original relation between her head and her mother's, lovely both in design and expression, is lost.

In spite of the universal praise of his cartoon, Leonardo did not persevere with the picture, and the monks of the Annunziata had to give back the commission to Filippino Lippi, at whose death the task was completed by Perugino. It remains un- certain whether a small Madonna with distaff and spindle, which the correspondent of Isabella Gonzaga reports Leonardo as having begun for one Robertet, a favourite of the king of France, was ever finished. He painted one portrait, it is said, at this time, that of Ginevra Benci, a kinswoman, perhaps sister, of a youth Giovanni di Amerigo Benci, who shared his passion for cosmographical studies; and probably began another, the famous " La Gioconda," which was only finished four years afterwards. The gonfalionere Soderini offered him in vain, to do with it what he would, the huge half spoiled block of marble out of which Michelangelo three years later wrought his " David." Isabella Gonzaga again begged, in an autograph letter, that she might have a painting by his hand, but her request was put off; he did her, however, one small service by examining and reporting on some jewelled vases, formerly the property of Lorenzo de' Medici, which had been offered her. The impor tunate expectations of a masterpiece or masterpieces in painting or sculpture, which beset him on all hands in Florence, inclined him to take service again with some princely patron, if possible of a genius commensurate with his own, who would give him scope to carry out engineering schemes on a vast scale. Ac- cordingly he suddenly took service, in the spring of 1502, with Cesare Borgia, duke of Valentinois, then almost within sight of the realization of his huge ambitions, and meanwhile occupied in consolidating his recent conquests in the Romagna. Between May 1502 and March 1503 Leonardo travelled as chief engineer to Duke Caesar over a great part of central Italy. Starting with a visit to Piombino, on the coast opposite Elba, he went by way of Siena to Urbino, where he made

drawings and began works; was thence hastily summoned by way of Pesaro and Rimini to Cesena; spent two months between there and Cesenatico, projecting and directing canal and harbour works, and planning the restoration of the palace of Frederic II. ; thence hurriedly joined his master, momentarily besieged by enemies at Imola; followed him probably to Sinigaglia and Perugia, through the whirl of storms and surprises, vengeances and treasons, which marked his course that winter, and finally, by way of Chiusiand Acquapendente, as far as Orvieto and probably to Rome, where Caesar arrived on the 14th of February 1503. The pope's death and Caesar's own downfall were not destined to be long delayed. But Leonardo apparently had already had enough of that service, and was back at Florence in March. He has left dated notes and drawings made at most of the stations we have named, besides a set of six large-scale maps drawn minutely with his own hand, and including nearly the whole territory of the Maremma, Tuscany and Umbria between the Apennines and the Tyrrhene Sea.

At Florence he was at last persuaded, on the initiative of Piero Soderini, to undertake for his native city a work of painting as great as that with which he had adorned Milan. This was a battle-piece to decorate one of the walls of the new council- hall in the palace of the signory. He chose an episode in the victory won by the generals of the republic in 1440 over Niccolo Piccinino near a bridge at Anghiari, in the upper valley of the Tiber. To the young Michelangelo was presently entrusted a rival battle-piece to be painted on another wall of the same apartment; he chose, as is well known, a surprise of the Floren- tine forces in the act of bathing near Pisa. About the same time Leonardo took part in the debate on the proper site for Michelangelo's newly finished colossal " David," and voted in favour of the Loggia dei Lanzi, against a majority which included Michelangelo himself. Neither Leonardo's genius nor his noble manners could soften the rude and taunting temper of the younger man, whose style as an artist, nevertheless, in subjects both of tenderness and terror, underwent at this time a profound modification from Leonardo's example.

In one of the sections of his projected Treatise on Painting, Leonardo has detailed at length, and obviously from his own observation, the pictorial aspects of a battle. His choice of subject in this instance was certainly not made from any love of warfare or indifference to its horrors. In his MSS. there occur almost as many trenchant sayings on life and human affairs as on art arid natural law; and of war he has disposed in two words as a " bestial frenzy " (pazzia bestialissima) . In his design for the Hall of Council he set himself to depict this frenzy at its fiercest. He chose the moment of a terrific struggle for the colours

between the opposing sides; hence the work became commonly known as the “Battle of the Standard.” Judging by the accounts of those who saw it, and the fragmentary evidences which remain, the tumultuous medley of men arid horses, and the expressions of martial fury and despair, must have been conceived and rendered with a mastery not less commanding than had been the looks and gestures of bodeful sorrow and soul’s perplexity among the quiet company on the convent wall at Milan. The place assigned to Leonardo for the preparation of his cartoon was the Sala del Papa at Santa Maria Novella. He for once worked steadily and unremittingly at his task. His accounts with the signory enable us to follow its progress step by step. He had finished the cartoon in less than two years (1504-1505), and when it was exhibited along with that of Michelangelo, the two rival works seemed to all men a new revelation of the powers of art, and served as a model and example of the students of that generation, as the frescoes of Masaccio in the Carmine had served to those of two generations earlier. The young Raphael, whose incomparable instinct for rhythmical design had been trained hitherto on subjects of holy quietude and rapt contemplation according to the traditions of Umbrian art, learnt from Leonardo’s example to apply the same instinct to themes of violent action and strife. From the same example Fra Bartolommeo and a crowd of other Florentine painters of the rising or risen generation took in like manner a new impulse. The master lost no time in proceeding to the execution of his design upon the mural surface; this time he had devised a technical method of which, after a pre- liminary trial in the Sala del Papa, he regarded the success as certain; the colours, whether tempera or other remains in doubt, were to be laid on a specially prepared ground, and then both colours and ground made secure upon the wall by the application of heat. When the central group was done the heat was applied, but it was found to take effect, unequally; the colours in the upper part ran or scaled from the wall, and the result was a failure more or less complete. The unfinished and decayed painting remained for some fifty years on the wall, but after 1560 was covered over with new frescoes by Vasari. The cartoon did not last so long. After doing its work as the most inspiring of all examples for students it seems to have been cut up. When Leonardo left Italy for good in 1516 he is recorded to have left ” the greater part of it ” in deposit at the hospital of S. Maria Nuova, where he was accustomed also to deposit his

moneys, and whence it seems before long to have disappeared. Our

only existing memorials of the great work are a number of small pen-studies of fighting men and horses, three splendid studies in red chalk at Budapest for heads in the principal group, one head at Oxford copied by a contemporary of the size of the original cartoon (above life); a tiny sketch, also at Oxford, by Raphael after the principal group; an engraving done by Zacchia of Lucca in 1558 not after the original but after a copy; a 16th-century Flemish drawing of the principal group, and another, splendidly spirited, by Rubens, both copies of copies; with Edelinck's fine engraving after the Rubens drawing.

During these years, 1 503-1 506, Leonardo also resumed (if it is true that he had already begun it before his travels with Cesare Borgia) the portrait of Madonna Lisa, the Neapolitan wife of Zanobi del Giocondo, and finished it to the last pitch of his powers. In this lady he had found a sitter whose face and smile possessed in a singular degree the haunting, enigmatic charm in which he delighted. He worked, it is said, at her portrait during some portion of four successive years, causing music to be played during the sittings that the rapt expression might not fade from off her countenance. The picture was bought afterwards by Francis I. for four thousand gold florins, and is now one of the glories of the Louvre. The richness of colouring on which Vasari expatiates has indeed flown, partly from injury, partly because in striving for effects of light and shade the painter was accustomed to model his figures on a dark ground, and in this as in his other oil-pictures the ground has to a large extent come through. Nevertheless, in its dimmed and blackened state, the portrait casts an irresistible spell alike by subtlety of expression, by refinement and precision of drawing, and by the romantic invention of its background. It has been the theme of endless critical rhapsodies, among which that of Pater is perhaps the most imaginative as it is the best known.

In the spring of 1506 Leonardo, moved perhaps by chagrin at the failure of his work in the Hall of Council, accepted a pressing invitation to Milan, from Charles d'Amboise, Marechal de Chaumont, the lieutenant of the French king in Lombardy. The leave of absence granted to him by the signory on the request of the French viceroy was for three months only. The period was several times extended, at first grudgingly, Soderini complaining that Leonardo had treated the republic ill in the matter of the battle picture; whereupon the painter honourably offered to refund the money paid, an offer which the signory as honourably refused. Louis XII. sent messages urgently desiring that Leonardo should await his own arrival in Milan, having seen a small Madonna by him in France (probably that painted for Robertet) and hoping to obtain from him works of the same class and

perhaps a portrait. The king arrived in May 1507, and soon afterwards Leonardo's services were formally and amicably transferred from the signory of Florence to Louis, who gave him the title of painter and engineer in ordinary. In September of the same year troublesome private affairs called him to Florence. His father had died in 1504, apparently intestate. After his death Leonardo experienced unkindness from his seven half-brothers, Ser Piero's legitimate sons. They were all much younger than himself. One of them, who followed his father's profession, made himself the champion of the others in disputing Leonardo's claim to his share, first in the paternal inheritance, and then in that which had been left to be divided between the brothers and sisters by an uncle. The litigation that ensued dragged on for several years, and forced upon Leonardo frequent visits to Florence and interrup- tions of his work at Milan, in spite of pressing letters to the authorities of the republic from Charles d'Amboise, from the French king himself, and from others of his powerful friends and patrons, begging that the proceedings might be accelerated. There are traces of work done during these intervals of com- pulsory residence at Florence. A sheet of sketches drawn there in 1 508 shows the beginning of a Madonna now lost except in the form of copies, one of which (known as the " Madonna Litta ") is at St Petersburg, another in the Poldi-Pezzoli Museum

at Milan. A letter from Leonardo to Charles d'Amboise in 1511, announcing the end of his law troubles, speaks of two Madonnas of different sizes that he means to bring with him to Milan. One was no doubt that just mentioned; can the other have been the Louvre " Virgin with St Anne and St John," now at last completed from the cartoon exhibited in 1501? Meantime the master's main home and business were at Milan. Few works of painting and none of sculpture (unless the unfulfilled commis' sion for the Trivulzio monument belongs to this time) are recorded as occupying him during the seven years of his second residence in that city (1506-1513). He had attached to himself a new and devoted young friend and pupil of noble birth, Francesco Melzi. At the villa of the Melzi family at Vaprio, where Leonardo was a frequent visitor, a colossal Madonna on one of the walls is traditionally ascribed to him, but is rather the work of Sodoma or of Melzi himself working under the master's eye. Another painter in the service of the French king, Jehan Perreal or Jehan de Paris, visited Milan, and consultations on technical points were held between him and Leonardo. But Leonardo's chief practical employments were evidently on the continuation of his great hydraulic and irrigation works in Lombardy. His old trivial office of pageant-master and inventor of scientific toys was revived on the

occasion of Louis XII. ‘s triumphal entry after the victory of Agnadello in 1 509, and gave intense delight to the French retinue of the king. He was consulted on the construction of new choir-stalls for the cathedral. He laboured in the natural sciences as ardently as ever, especially at anatomy in company with the famous professor of Pavia, Marcantonio della Torre. To about this time, when he was approaching his sixtieth year, may belong the noble portrait- drawing of himself in red chalk at Turin. He looks too old for his years, but quite unbroken; the character of a veteran sage has fully imprinted itself on his countenance; the features are grand, clear and deeply lined, the mouth firmly set and almost stern, the eyes strong and intent beneath their bushy eyebrows, the hair flows untrimmed over his shoulders and commingles with a majestic beard.

Returning to Milan with his law-suits ended in 1511, Leonardo might have looked forward to an old age of contented labour, the chief task of which, had he had his will, would undoubtedly have been to put in order the vast mass of observations and speculations accumulated in his note-books, and to prepare some of them for publication. But as his star seemed rising that of his royal protector declined. The hold of the French on Lombardy was rudely shaken by hostile political powers, then confirmed again for a while by the victories of Gaston de Foix, and finally destroyed by the battle in which that hero fell under the walls of Ravenna. In June 151 2 a coalition between Spain, Venice and the pope re-established the Sforza dynasty in power at Milan in the person of Ludovico’s son Massimiliano. This prince must have been familiar with Leonardo as a child, but perhaps resented the ready transfer of his allegiance to the French, and at any rate gave him no employment. Within a few months the ageing master uprooted himself from Milan, and moved with his chattels and retinue of pupils to Rome, into the service of the house that first befriended him, the Medici. The vast enterprises of Pope Julius II. had already made Rome the chief seat and centre of Italian art. The acces- sion of Giulio de’ Medici in 1513 under the title of Leo X. raised on all hands hopes of still ampler and more sympathetic patron- age. Leonardo’s special friend at the papal court was the pope’s youngest brother, Giuliano de’ Medici, a youth who combined dissipated habits with thoughtful culture and a genuine interest in arts and sciences. By his influence Leonardo and his train were accommodated with apartments in the Belvedere of the Vatican. But the conditions of the time and place proved adverse. The young generation held the field. Michelangelo and Raphael, who had both, as we have seen, risen to greatness partly on Leonardo’s shoulders, were fresh from the glory of their great achievements in the Sistine Chapel and the Stanze. Their rival factions

hated each other, but both, especially the faction of Michelangelo, turned bitterly against the veteran

newcomer. The pope, indeed, is said to have been delighted with Leonardo's minor experiments and ingenuities in science, and' especially by a kind of zoological toys which he had invented by way of pastime, as well as mechanical tricks played upon living animals. But for the master's graver researches and projects he cared little, and was far more interested in the dreams of astrologers and alchemists. When Leonardo, having received a commission for a picture, was found distilling for himself a new medium of oils and herbs before he had begun the design, the pope was convinced, not quite unreasonably, that nothing serious would come of it. The only paintings positively recorded as done by him at Rome are two small panels for an official of the papal court, one of a child, the other of a Madonna, both now lost or unrecognized. To this time may also belong a lost Leda, standing upright with the god in swan's guise at her side and the four children near their feet. This picture was at Fontainebleau in the 1 6th century and is known from several copies, the finest of them at the Borghese gallery, as well as from one or two preliminary sketches by the master himself and a small sketch copy by Raphael. A portrait of a Florentine lady, said to have been painted for Giuliano de' Medici and seen afterwards in France, may also have been done at Rome; or may what we learn of this be only a confused account of the Monna Lisa? Tradition ascribes to Leonardo an attractive fresco of a Madonna with a donor in the convent of St Onofrio, but this seems to be clearly the work of Boltraffio. The only engineering works we hear of at this time are some on the harbour and defences of Civita Vecchia. On the whole the master in these Roman days found himself slighted for the first and only time in his life. He was, moreover, plagued by insubordination and malignity on the part of two German assistant craftsmen lodged in his apartments. Charges of impiety and body-snatching laid by these men in connexion with his anatomical studies caused the favour of the pope to be for a time withdrawn. After a stay of less than two years, Leonardo left Rome under the follow- ing circumstances. Louis XII. of France had died in the last days of 1514. His young and brilliant successor, Francis I., surprised Europe by making a sudden dash at the head of an army across the Alps to vindicate his rights in Italy. After much hesitation Leo X. in the summer of 1515 ordered Giuliano de' Medici, as gonfalonier of the Church, to lead a papal force into the

Emilia and watch the movements of the invader. Leonardo accompanied his protector on the march, and remained with the headquarters of the papal army at Piacenza when Giuliano fell ill and retired to Florence. After the battle of Marignano it was arranged that Francis and the pope should meet in December at Bologna. The pope, travelling by way of Florence and discussing there the great new scheme of the Laurentian library, entertained the idea of giving the com- mission to Leonardo; but Michelangelo came in hot haste from Rome and succeeded in securing it for himself. As the time for the meetingof the potentatesatBolognadrewnear, Leonardo proceeded thither from Piacenza, and in due course was pre- sented to the king. Between the brilliant young sovereign and the grand old sage an immediate and strong sympathy sprang up; Leonardo accompanied Francis on his homeward march as far as Milan, and there determined to accept the royal invitation to France, where a new home was offered him with every assurance of honour and regard.

The remaining two and a half years of Leonardo's life were spent at the Castle of Cloux near Amboise, which was assigned, with a handsome pension, to his use. The court came often to Amboise, and the king delighted in his company, declaring his knowledge both of the fine arts and of philosophy to be beyond those of all mortal men. In the springof 151 8 Leonardo had occasion to exercise his old talents as a festival-master when the dauphin was christened and a Medici-Bourbon marriage celebrated. He drew the designs for a new palace at Amboise, and was much engaged with the project of a great canal to connect the Loire and Sa6ne. An ingenious attempt has been made to prove, in the absence of records, that the famous spiral staircase at Blois was also of his designing.

Among his visitors was a fellow-countryman, Cardinal Louis of Aragon, whose secretary has left an account of the day. Leonardo, it seems, was suffering from some form of slight paralysis which impaired his power of hand. But he showed the cardinal three pictures, the portrait of a Florentine lady done for Giuliano de' Medici (the Gioconda ?), the Virgin in the lap of St Anne (the Louvre picture; finished at Florence or Milan 1507-1513?), and a youthful John the Baptist. The last, which may have been done since he settled in France, is the darkened and partly repainted, but still powerful and haunting half-length figure in the Louvre, with the smile of inward ravishment and the prophetic finger beckoning skyward like that of St Anne in the Academy cartoon. Of the " Pomona " mentioned by Lomazzo as a work of the Amboise time his visitor says nothing, nor yet of the Louvre ■" Bacchus," which tradition ascribes to Leonardo but which is clearly pupil's work. Besides pictures, the master seems

also to have shown and explained to his visitors some of his vast store of notes and observations on anatomy and physics. He kept hoping to get some order among his papers, the accumulation of more than forty years, and perhaps to give the world some portion of the studies they contained. But his strength was nearly exhausted. On Easter Eve 1519, feeling that the “end was near, he made his will. It made provision, as became a great servant of the most Christian king, for masses to be said and candles to be offered in three different churches of Amboise, first among them that of St Florentin, where he desired to be buried, as well as for sixty poor men to serve as torch-bearers at his funeral. Vasari babbles of a death-bed conversion and repentance. But Leonardo had never been either a friend or an enemy of the Church. Sometimes, indeed, he denounces fiercely enough the arts and pretensions of priests; but no one has embodied with such profound spiritual insight some of the most vital moments of the Christian story. His insatiable researches into natural fact brought upon him among the vulgar some suspicion of practising those magic arts which of all things he scouted and despised. The bent of his mind was all towards the teachings of experience and against those of authority, and laws of nature certainly occupied far more of his thoughts than dogmas of religion; but when he mentions these it is with respect as throwing light on the truth of things from a side which was not his own. His conformity at the end had in it nothing contradictory of his past. He received the sacraments of the Church and died on the 2nd of May 1519- King Francis, then at his court of St Germain-en-Laye, is said to have wept for the loss of such a servant; that he was present beside the death-bed and held the dying painter in his arms is a familiar but an untrue tale. After a temporary sepulture elsewhere his remains were trans- ported on the 1 2th of August to the cloister of St Florentin according to his wish. He left all his MSS. and apparently all the contents of his studio, with other gifts, to the devoted Melzi, whom he named executor; to Salai and to his servant Battista Villanis a half each of his vineyard outside Milan; gifts of money and clothes to his maid Maturina; one of money to the poor of the hospital in Amboise; and to his unbrotherly half- brothers a siim of four hundred ducats lying to his credit at Florence.

History tells of no man gifted in the same degree as Leonardo was at once for art and science. In art he was an inheritor and perfecter, born in a day of great and many-sided endeavours on which he put the crown, surpassing both predecessors and” contemporaries. In science, on the other hand, he was a pioneer, working wholly for the future, and in great part alone. That the two stupendous gifts should in some degree neutralize each other was inevitable. No imaginable strength of

any single man would have sufficed to carry out a hundredth part of what Leonardo essayed. The mere attempt to conquer the kingdom of light and shade for the art of painting was destined to tax the skill of generations, and is perhaps not wholly and finally accomplished yet. Leonardo sought to achieve that conquest and at the same time to carry the old Florentine excellences of linear drawing and psychological expression to a perfection of which, other mei

had not dreamed. The result, though marvellous in quality, is in quantity lamentably meagre. Knowing and doing allured him equally, and in art, which consists in doing, his efforts were often paralysed by his strained desire to know. The thirst for know- ledge had first been aroused in him by the desire of perfecting the images of beauty and power which it was his business to create.

Thence there grew upon him the passion of knowledge for its own sake. In the splendid balance of his nature the Virgilian longing, rerum cognoscere causas, could never indeed wholly silence the call to exercise his active powers. But the powers he cared most to exercise ceased by degree to be those of imaginative creation, and came to be those of turning to practical human use the mastery which his studies had taught him over the forces of nature. In science he was the first among modern men to set himself most of those problems which unnumbered searchers of later' generations have laboured severally or in concert to solve. Florence had had other sons of comprehensive genius,, .artistic and mechanical, Leon Battista Alberti perhaps the chief. But the more the range and character of Leonardo's studies becomes ascertained the more his greatness dwarfs them all. A hundred years before Bacon, say those who can judge best, he showed a firmer grasp of the principles of experimental science than Bacon showed, fortified by a far wider range of actual experiment and observation. Not in his actual conclusions, though many of these point with surprising accuracy in the direction of truths established by later generations, but in the soundness, the wisdom, the tenacity of his methods lies, his great title to glory. Had the Catholic reaction not fatally discouraged the pursuit of the natural sciences in Italy, had Leonardo even left behind him any one with zeal and knowledge enough to extract from the mass of his MSS. some portion of his labours in those sciences and give them to the world, an incalculable impulse would have been given to all those enquiries by which mankind has since been striving to understand the laws of its being

and control the conditions of its environment, — to mathematics and astronomy, to mechanics, hydraulics, and physics generally, to geology, geography, and cosmology, to anatomy and the sciences of life. As it was, these studies of Leonardo — ” studies intense of strong and stern delight ” — seemed to his trivial followers and biographers merely his whims and fancies, ghiribizzi, things to be spoken of slightingly and with apology. The MSS., with the single exception of some of those relating to painting, lay unheeded and undivulged until the present generation ; and it is only now that the true range of Leonardo’s powers is beginning to be fully discerned.

So much for the intellectual side of Leonardo’s character and career. As a moral being we are less able to discern what he was like. The man who carried in his brain so many images of subtle beauty, as well as so much of the hidden science of the future, must have lived spiritually, in the main, alone. Of things communicable he was at the same time, as we have said, communicative — a genial companion, a generous and loyal friend, ready and eloquent of discourse, impressing all with whom he was brought in contact by the power and the charm of genius, and inspiring fervent devotion and attachment in friends and pupils. We see him living on terms of constant affection with his father, and in disputes with his brothers not the aggressor but the sufferer from aggression. We see him full of tenderness to animals, a virtue not common in Italy in spite of the example of St Francis; open-handed in giving, not eager in getting — ” poor,” he says, ” is the man of many wants “; not prone to resentmentˆ-” the best shield against injustice is to double the cloak of long-suffering “; zealous in labour above all men — ” as a day well spent gives joyful, sleep, so does a life well spent give joyful death.” With these instincts and maxims, and with his strength, granting it almost more than human, spent ever tunnel- ling in abstruse mines of knowledge, his moral experience is not likely to have been deeply troubled. In religion, he regarded the faith of his age and country at least with imaginative sym- pathy and intellectual acquiescence, if no more. On the political storms which shook his country and drove him from one employ- ment to another, he seems to have looked not with the passionate

participation of a Dante or a Michelangelo but rather with the serene detachment of a Goethe. In matters of the heart, if any consoling or any disturbing passion played a great part in his life, we do not know it; we know only (apart from a few passing shadows cast by calumny and envy) of affectionate and dignified relations with friends, patrons and pupils, Of public and private regard mixed in the days of his youth with dazzled admiration, and in those of his age with something of reverential awe.

The Drawings of Leonardo.— These are among the greatest treasures ever given to the world by the human spirit expressing itself in pen and pencil. Apart from the many hundreds of illustrative pen- sketches scattered through his autobiographic and scientific MSS., the principal collection is at Windsor Castle (partly derived from' the Arundel collection) ; others of importance are in the British Museum; at Christ Church, Oxford; in the Louvre, at Chantilly, in the Uffizi, the Venice Academy, the Royal Library at Turin, the Museum of Budapest, and in the collections of M. Bonnat., Mrs Mohd, and Captain Holford. Leonardo's chief implements were pen, silver- point, and red and black chalk (red chalk especially). In silver- point there are many beautiful drawings of his earlier time, and some of his later;. but of the charming heads of women and yoUng men in this material attributed to him in various collections, compara- tively few are his own work, the majority being drawings in his spirit by his pupils Ambrogio Preda or Boltraffib. Leonardo appears to have been left-handed. There is some doubt on the point ; but a contemporary and intimate friend, Luca Pacioli, speaks of his "ineffable left hand"; all the best of his drawings are shaded downward from left to right, which would be the readiest waj/ for a left-handed man ; and his habitual- eccentric practice of writing from right to left is much more likely to have been due to natural left-handedness than to any desire of mystery or concealment. A full critical discussion and catalogue of the extant drawings of Leonardo are to be found in Berenson's Drawings of the Florentine Painters.

The Writings of Leonardo. — 'The, only printed book bearing Leonardo's name until the recent issues of transcripts from his MSS. was the celebrated Treatise on Painting (Trattato delta pittura, TraitS de la peinture). This consists of brief didactic chapters, or more properly paragraphs, of practical direction or critical remark on all the branches and conditions of a painter's practice. The original MS. draft of Leonardo has been lost, though a great number of notes for it are scattered through the various extant volumes of bis MSS. The work has been printed in two different forms; one of these is an abridged version consisting of 365 sections ; the first edition of it was published in Paris in 1551, t>y Raphael Diifresne, from a MS. which he found in the Barberini library ; the last, translated into English by J. F. Rigaud, in London, 1877, The other is a more extended version, in 912 sections, divided into eight books; this was printed in 1817 by Guglielmo Manzi at Rome, from two MSS. which he had discovered in the Vatican library;. a German transla- tion from the same MS. has been edited by G. H. Ludwig in Eitel- berger's series of Quellenschriften fur Kunstgeschichte (Vienna, r882 ; Stuttgart, 1885).

On the history of the book in general see Max Jordan, Das Malerbuch des Leonardo da Vinci (Leipzig, 1873). The unknown compilers of the Vatican MSS. must have had before them much more of Leonardo's original text than is now extant. Only about a quarter of the total number of paragraphs are identical with passages to be found in the master's existing autograph note- books. It is indeed doubtful whether Leonardo himself ever com- pleted the MS. treatise (or treatises) oh painting and kindred subjects mentioned by Fra Luca Pacioli and by Vasari, and probable that the form and order, and perhaps some of the substance, of the Trattato as we have it was due to compilers and not to the master himself.

In recent years a whole body of scholars and editors have been engaged in giving to the world the texts of Leonardo's existing MSS. The history of these is too complicated to be told here in any detail. Francesco Melzi (d. 1570) kept the greater part of his master's bequest together as a sacred trust as long as he lived, though even in his time some MSS. on the art of painting, seem to have passed into other hands. But his descendants suffered the , treasure to be recklessly dispersed. The chief agents in their dispersal were the Doctor Orazio Melzi who possessed them in the last quarter of the 16th century; the members of a Milanese family called Mazzenta, into whose hands they passed in Orazio Melzi's lifetime ; and the sculptor Pompeo Leoni, who at one time entertained the design of procuring their presentation to Philip II. of Spain, and who cut up a number of the note-books to form the great miscellane- ous single volume called the Codice Atlantico, now at Milan. This volume, with a large proportion of the total number of other Leonardo MSS. then existing, passed into the hands of a Count Arconati, who presented them to the Ambrosian library at Milan in 1636. In the meantime the earl of Arundel had made a vain attempt to purchase one of these volumes (the Codice Atlantico?)' at a great price for the king of England. Some stray parts of the collection, including the MSS. now at Windsor, did evidently come irito Lord Arundel's possession, and the history of some other parts can be

followed; while much, it is evident, was lost for good. In 1796 Napoleon swept away to Paris, along with the other art treasures of Italy, the whole of the Leonardo MSS. at the Ambrosiana: only the Codice AUantico was afterwards restored, the other volumes remaining the property of the Institut de France. These also have had

their adventures, two of them having been stolen by Count Libri and passed temporarily into the collection of Lord Ashburnham, whence they were in recent years made over again to the Institute. The first important step towards a better knowledge of the MSS. was made by the beginning, in 1880, of the great series of publications from the MSS. of the Institut de France undertaken by C. Ravaisson- Mollien; the next by the publication in 1883 of Dr J. P. Richter's Literary Works of Leonardo da Vinci (see Bibliography) : this work included, besides a history and analytical index of the MSS., fac- similes of a number of selected pages containing matter of auto- biographical, artistic, or literary interest, with transcripts and translations of their MS. contexts. Since then much progress has been made in the publication of the complete MSS., scientific and other, whether with adequate critical apparatus or in the form of mere facsimile without transliteration or comment.

A brief statement follows of the present distribution of the several MSS. and of the form in which they are severally published : —

England. — Windsor: Nine MSS., chiefly on anatomy, published entire in simple facsimile by Rouveyre (Paris, 1901); partially, with transliterations and introduction by Piumati and Sabachni- koff (Paris, 1898, foil.); British Museum: one MS., miscellaneous, unpublished; Victoria and Albert Museum: ten note-books bound in 3 vols. ; facsimile by Rouveyre, Holkham (collection of Lord Leicester), I vol., on hydraulics and the action of water; published in facsimile with transliteration and notes by Gerolamo Calvi. France. — Institut de France:, seventeen MSS., all published with transliteration and notes by C. Ravaisson-Mollien (6 vols., Paris, 1880-1891). Italy. — Milan, Ambrosiana: the Codice Atlantico, the huge miscellany, of vital importance for the study of the master,

f>ut together by Pompeo Leoni; published in facsimile, with trans- iteration, by the Accademia dei Lincei (1894, foil.) ; Milan: collection of Count Trivulzio; 1 vol., miscellaneous; published and edited by L. Beltrami (1892); Rome: collection of Count Marszolini; Treatise on the Flight of Birds, published and edited by Piumati and Sabach- nikoff (Paris, 1492).

Bibliography. — The principal authorities are: — " II libro di Antonio Billi," edited from MS. by G. de Fabriazy in Archivio Storico Ital. ser. v. vol. 7; " Breve vita di Leonardo da Vinci, scritto da un adnonimo del 1500 " (known as the AnonimoGaddiano), printed by G. Milanesi in Archivio Storico Ital. t. xvi. (1872), trans- lated with notes by H. P. Home in series published by the Unicorn Library (1903) ; Paolo

Giovio, ” Leonardi Vincii vita,” in his Elogia, printed in Tiraboschi, Storia della Lett. Ital. t. vii. pt. 4, and in Classici Ilaliani, vol. 314; Vasari, in his celebrated Lives of the Painters (1st ed., Florence, 1550; 2nd ed. ibid. 1568; ed. Milanesi, with notes and supplements, 1878-1885); Sabba da Castiglione, Ricordi (Venice, 1565); G. P. Lomazzo, Trattato dell’ arte della pittura, &c. (Milan, 1584-1585); Id., Idea del tempio della pittura (Milan, 1591); Le Pere Dan, Le Tresor . . . de Fontaine- bleau (1642); J. B. Venturi, Essai sur les ouvrages physico-mathe- matiques de L. da V. (Paris, 1797); C. Amoretti, Memorie storiche sulla vita, &c. di L. da V. (Milan, 1804), a work which laid the foundation of all future researches; Giuseppe Bossi, Del Cenacolo dx L. da V. (Milan, 1810); C. Fumagalli, Scuola di Leonardo da Vinci (181 1); Gaye, Carteggio d’artisti (1839-1841); G. Uzielli, Ricerche intorno a L. da V., series 1,2 (Florence, 1872; Rome, 1884; series I revised, Turin, 1896), documentary researches of the first importance for the study ; C. L. Calvi, Notizie dei principali professori di belle arli (Milan, 1869); Arsene Houssaye, Histoire de L. de V. (Paris, 1869 and 1876, an agreeable literary biography of the pre-critical kind) ; Mrs Heaton, Life of L. da V. (London, 1872), a work also made obsolete by recent research; Hermann Grothe, L. da V. als Ingenieur und Philosoph (Berlin, 1874); A. Marks, the 5. Anne of L. da V. (London, 1882); J. P. Richter, The Literary Works of L. da V. (2 vols., London, 1883), this is the very important and valuable history of and selection from the. texts mentioned above under MSS. ; Ch. Ravaisson-Mollien, Les Perils de L. da V. (Paris, 1881); Paul M tiller Walde, L. da V., Lebensskizze und Forschungen (Munich, 1889-1890) ; Id., ” Beitrage zur Kenntniss des L. da V.,” in Jahrbuch der k. Preussischen Kunstsammlungen (1897-1899), the first immature and incomplete, the second of high value: the whole life of this writer has been devoted to the study of L. da V., but it is uncertain whether the vast mass of material collected by him will ever take shape or see the light; G. Gronau, L. da V. (London, 1902) ; Bernhard Berenson, The Drawings of the Florentine Painters (London, 1903) ; Edmondo Solmi, Studi sulla filosofia naturale di L. da V. (Modena, 1898); Id., Leonardo (Florence, 1st ed. 1900, 2nd ed. 1907; this last edition of Solmi’s work is by far the most complete and satisfactory critical biography of the master which yet exists) ; A. Rosenberg, L. da V., in Knackfuss’s series of art biographies (Leipzig, 1898); Gabriel Seailles, L. da V., Vartiste et le savant (ist ed. 1892, 2nd ed. 1906), a lucid and careful general estimate of great value, especially in reference to Leonardo’s relations to modern science; Edward McCurdy, L. da V., in Bell’s “Great Masters ” series (1904 and 1907), a very sound and trustworthy

summary of the master’s career as an artist; Id., L. da V.‘s Note’ Books

(1908), a selection from the passages of chief general interest in the master's MSS., very well chosen, arranged, and translated; with a useful history of the MSS. prefixed; Le Vicende del Cenacolo di L. da V. nel secolo XIX. (Milan, 1906), an official account of the later history and vicissitudes of the " Last Supper " previous to its final repair; Luca Beltrami, II Castello di Milano (1894); Id., L. da V. et la Sala dell' Asse (1902) ; Id., " II Cenacolo di Leonardo," in Raccolta Vinciana (Milan, 1908), the official account of the suc- cessful work of repair carried out by Signor Cavenaghi in the pre- ceding years; Woldemar von Seidlitz, Leonardo da Vinci, der Wendepunkt der Renaissance (2 vols., 1909), a comprehensive and careful work by an accomplished and veteran critic, inclined to give perhaps an excessive share in the reputed works of Leonardo to a single pupil, Ambrogio Preda. It seems needless to give references to the voluminous discussion in newspapers and periodicals con- cerning the authenticity of a wax bust of Flora acquired in 1909 for the Berlin Museum and unfortunately ascribed to Leonardo da Vinci, its real author having been proved by external and internal evidence to be the Englishman Richard Cockle Lucas, and its date 1846- (S.C.)

LEONARDO OF PISA (Leonardus Pisanus or Fibonacci), Italian mathematician of the 13th century. Of his personal history few particulars are known. His father was called Bonaccio, most probably a nickname with the ironical meaning of " a good, stupid fellow," while to Leonardo himself another nickname, Bigollone (dunce, blockhead), seems to have been given. The father was secretary in one of the numerous factories erected on the southern and eastern coasts of the Mediterranean by the warlike and enterprising merchants of Pisa. Leonardo was educated at Bugia, and afterwards toured the Mediterranean. In 1202 he was again in Italy and published his great work, Liber abaci, which probably procured him access to the learned and refined court of the emperor Frederick II. Leonardo certainly was in relation with some persons belonging to that circle when he published in 1220 another more extensive work, De practica geometriae, which he dedicated to the imperial astronomer Dominicus Hiapanus. Some years afterwards (perhaps in 1228) Leonardo dedicated to the well-known astro- loger Michael Scott the second edition of his Liber abaci, which was printed with Leonardo's other works by Prince Bald. Boncompagni (Rome, 1857-1862, 2 vols.). The other works consist of the Practica geometriae and some most striking papers of the greatest scientific importance, amongst which the Liber quadratorum may be specially signalized. It bears the notice that the author wrote it in 1225, and in the introduction Leonardo tells us the occasion of its being written. Dominicus had presented Leonardo to

Frederick II. The presentation was accompanied by a kind of mathematical performance, in which Leonardo solved several hard problems proposed to him by John of Palermo, an imperial notary, whose name is met with in several documents dated between 1221 and 1240. The methods which Leonardo made use of in solving those problems fill the Liber quadratorum, the Flos, and a Letter to Magister Theodore. All these treatises seem to have been written nearly at the same period, and certainly before the publication of the second edition of the Liber abaci, in which the Liber quadratorum is expressly mentioned. We know nothing of Leonardo's fate after he issued that second edition.

Leonardo's works are mainly developments of the results obtained by his predecessors; the influences of Greek, Arabian, and Indian mathematicians may be clearly discerned in his methods. In his Practica geometriae plain traces of the use of the Roman agrimensores are met with ; in his Liber abaci old Egyptian problems reveal their origin by the reappearance of the very numbers in which the problem is given, though one cannot guess through what channel they came to Leonardo's knowledge. Leonardo cannot be regarded as the inventor of that very great variety of truths for which he mentions no earlier source.

The Liber abaci, which fills 459 printed pages, contains the most perfect methods of calculating with whole numbers and with fractions, practice, extraction of the square and cube roots, proportion, chain rule, finding of proportional parts, averages, progressions, even compound interest, just as in the completest mercantile arithmetics of our days. They teach further the solution of problems leading to equations of the first and second degree, to determinate and indeterminate equations, not by single and double position only, but by real algebra, proved by means of geometric constructions, and including the use of letters as symbols for known numbers, the unknown quantity being called res and its square census.

The second work of Leonardo, his Praclica geometriae (1220) requires readers already acquainted with Euclid's planimetry, who are able to follow rigorous demonstrations and feel the necessity for them. Among the contents of this book we simply mention a trigonometrical chapter, in which the words sinus versus arcus occur, the approximate extraction of cube roots shown more at large than in the

Liber abaci, and a very curious problem, which nobody would search for in a geometrical work, viz. — To find a square number remaining so after the addition of 5. This problem evidently suggested the first question, viz. — To find a square number which remains a square after the addition and subtraction of 5, put to our mathematician in presence of the emperor by John of Palermo, who, perhaps, was quite enough Leonardo's friend to set him such problems only as he had himself asked for. Leonardo gave as solu- tion the numbers 1 1 ,Yj, 16ˆ/j and 6,Vi. — the squares of 3, 5 », 4 1 * 3 and 2jV, and the method of finding them is given in the Liber quadra- torum. We observe, however, that this kind of problem was not new. Arabian authors already had found three square numbers of equal difference, but the difference itself had not been assigned in proposing the question. Leonardo's method, therefore, when the difference was a fixed condition of the problem, was necessarily very different from the Arabian, and, in all probability, was his own discovery. The Flos of Leonardo turns on the second question set by John of Palermo, which required the solution of the cubic equation x'+2× 2 + i0:k = 2O. Leonardo, making use of fractions of the sexagesimal scale, gives x — l" 22* 7″ 42*" 33*' 4″ 40*', after having demonstrated, by a discussion founded on the 10th book of Euclid, that a solution by square roots is impossible. It is much to be deplored that Leonardo does not give the least intimation how he found his approximative value, outrunning by this result more than three centuries. Genocchi believes Leonardo to have been in pos- session of a certain method called regula aurea by H. Cardan in the 16th century, but this is a mere hypothesis without solid foundation. In the Flos equations with negative values of the unknown quantity ire also to be met with, and Leonardo perfectly understands the meaning of these negative solutions. In the Letter to Magister Theodore indeterminate problems are chiefly worked, and Leonardo hints at his being able to solve by a general method any problem of this kind not exceeding the first degree.

As for the influence he exercised on posterity, it is enough to say that Luca Pacioli, about 1500, in his celebrated Summa, leans so exclusively to Leonardo's works (at that time known in manuscript only) that he frankly acknowledges his dependence on them, and states that wherever no other author is quoted all belongs to Leonardus Pisanus.

Fibonacci' s series is a sequence of numbers such that any term is the sum of the two preceding terms; also known as Lame's series.

(M. Ca.)

LEONCAVALLO, RUGGIERO (1858-), Italian operatic composer, was born at Naples and educated for music at the conservatoire. After some years spent in teaching and in ineffectual attempts to obtain the production of more than one opera, his Pagliacci was performed at Milan in 1892 with im- mediate success; and next year his Medici was also produced there. But neither the latter nor Chatterton (1896) — both early works — obtained any favour; and it was not till La Boheme was performed in 1897 at Venice that his talent obtained public confirmation. Subsequent operas by Leoncavallo were Zaza (1900), and Der Roland (1904). In all these operas he was his own librettist.

LEONIDAS, king of Sparta, the seventeenth of the Agiad line. He succeeded, probably in 489 or 488 B.C., his half-brother Cleomenes, whose daughter Gorgo he married. In 480 he was sent with about 7000 men to hold the pass of Thermopylae against the army of Xerxes. The smallness of the force was, according to a current story, due to the fact that he was deliber- ately going to his doom, an oracle having foretold that Sparta could be saved only by the death of one of its kings: in reality it seems rather that the ephors supported the scheme half- heartedly, their policy being to concentrate the Greek forces at the Isthmus. Leonidas repulsed the frontal attacks of the Persians, but when the Malian Ephialtes led the Persian general Hydarnes by a mountain track to the rear of the Greeks he divided his army, himself remaining in the pass with 300 Spartiates, 700 Thespians and 400 Thebans. Perhaps he hoped to surround Hydarnes' force: if so, the movement failed, and the little Greek army, attacked from both sides, was cut down to a man save the Thebans, who are said to have surrendered. Leonidas fell in the thickest of the fight ; his head was afterwards cut off by Xerxes' order and his body crucified. Our knowledge of the circumstances \t too slight to enable us to judge of Leonidas's

strategy, but his heroism and devotion secured him an almost unique place in the imagination not only of his own but also of succeeding times.

See Herodotus v. 39-41, vii. 202-225, 2 3 8 . ix – I0 ; Diodorus xi. 4-1 1 ; Plutarch, Apophthegm. Lacon.; de malignitate Herodoti, 28-33; Pausanias i. 13, iii. 3, 4; Isocrates, Paneg. 92; Lycurgus, c. Leocr. no, in; Strabo i. 10, ix. 429; Aelian, Var hist. iii. 25; Cicero, Tusc. disput. i. 42, 49; de Finibus, ii. 30; Cornelius Nepos, Themistocles, 3; Valerius Maximus iii. 2; Justin ii. 11. For modern criticism on the battle of Thermopylae see G. B. Grundy, The Great Persian War (1901); G. Grote, History of Greece, part ii., c. 40; E. Meyer, Geschichte des A'tertums, iii., §§ 219, 220; G. Busolt, Griechische Geschichte, 2nd ed., ii. 666-688; J. B. Bury, " The Cam- paign of Artemisium and Thermopylae," in British School Annual, ii. 83 seq. ; J. A. R. Munro, " Some Observations on the Persian Wars, II.," in Journal of Hellenic Studies, xxii. 294-332. (M. N. T.)

LEONTIASIS OSSEA, a rare disease characterized by an overgrowth of the facial and cranial bones. The common form is that in which one or other maxilla is affected, its size progres- sively increasing both regularly and irregularly, and thus en- croaching on the cavities of the orbit, the mouth, the nose and its accessory sinuses. Exophthalmos gradually develops, going on later to a complete loss of sight due to compression of the optic nerve by the overgrowth of bone. There may also be interference with the nasal respiration and with the taking of food. In the somewhat less common form of this rare disease the overgrowth of bone affects all the cranial bones as well as those of the face, the senses being lost one by one and death finally resulting from cerebral pressure. There is no treatment other than exposing the overgrown bone, and chipping away pieces, or excising entirely where possible.

LEONTINI (mod. Lentini), an ancient town in the south-east of Sicily, 22 m. N.N.W. of Syracuse direct, founded by Chalcidians from Naxos in 729 B.C. It is almost the only Greek settlement not on the coast, from which it is 6 m. distant. The site, origin- ally held by the Sicels, was seized by the Greeks owing to its command of the fertile plain on the north. It was reduced to subjection in 498 B.C. by Hippocrates of Gela, and in 476 Hieron of Syracuse established here the inhabitants of Catana and Naxos. Later on Leontini regained its independence, but in its efforts to retain it, the intervention of Athens was more than once invoked. It was mainly the eloquence of Gorgias (q.v.) of Leontini which led to the abortive Athenian expedition of 427. In 422 Syracuse supported the oligarchs against the people and received them as citizens, Leontini itself being forsaken. This led to renewed Athenian intervention, at first mainly diplomatic; but the exiles of Leontini joined the envoys of Segesta in per- suading Athens to

undertake the great expedition of 415. After its failure, Leontini became subject to Syracuse once more (see Strabo vi. 272). Its independence was guaranteed by the treaty of 405 between Dionysius and the Carthaginians, but it very soon lost it again. It was finally stormed by M. Claudius Marcellus in 214 B.C. In Roman times it seems to have been of small importance. It was destroyed by the Saracens a.d. 848, and almost totally ruined by the earthquake of 1698. The ancient city is described by Polybius (vii. 6) as lying in a bottom between two hills, and facing north. On the western side of this bottom ran a river with a row of houses on its western bank under the hill. At each end was a gate, the northern leading to the plain, the southern, at the upper end, to Syracuse. There was an acropolis on each side of the valley, which lies between precipitous hills with fiat tops, over which buildings had extended. The eastern hill 1 still has considerable remains of a strongly fortified medieval castle, in which some writers are inclined(though wrongly) to recognize portions of Greek masonry. See G. M. Columba, in Archeologia di Leontinoi (Palermo, 1891), reprinted from Archivio Storico Siciliano, xi.; P. Orsi in Romische Milteilungen (1900), 61 seq. Excavations were made in 1899 in one of the ravines in a Sicel necropolis of the third period; explorations in the various Greek cemeteries resulted in the discovery of some fine bronzes, notably a fine bronze lebes, now in the Berlin museum. (T. As.)

1 As a fact there are two flat valleys, up both of which the modern Lentini extends ; and hence there is difficulty in fitting Polybius's account to the site.

LEONTIUS, theological writer, born at Byzantium, flourished during the 6th century. He is variously styled Byzantinus, Hierosolymitanus (as an inmate of the monastery of St Saba near Jerusalem) and Scholasticus (the first " schoolman," as the introducer of the Aristotelian definitions into theology; according to others, he had been an advocate, a special meaning of the word scholasticus). He himself states that in his early years he belonged to a Nestorian community. Nothing else is known of his life; he is frequently confused with others of the same name, and it is uncertain which of the works bearing the name Leontius are really by him. Most scholars regard as genuine the polemical treatises Contra Nestorianos et Eutychianos, Contra Nestorianos, Contra Monophysitas, Contra Severum (patriarch of Antioch); and the 2 ×6Xw , generally called De Sectis. An essay

Adversus fraudes Apollinaristarum and two homilies are referred to other hands, the homilies to a Leontius, presbyter of Constantinople.

Collected works in J. P. Migne, Patrologia Graeca, lxxxvi.; for the various questions connected with Leontius see F. Loops, Das Leben und die polemischen Werke des Leontios von Byzanz (Leipzig, 1887); W. Riigamer, Leontius von Byzanz (1894); V. Ermoni, De Leontio Byzantino (Paris, 1895); C. Krumbacher, Geschichte der byzantinischen Litteratur (1897); J. P. Junglas, Leontius von Byzanz (1908). For other persons of the name see Fabricius, Biblio- theca Graeca (ed. Harles), viii. 323.

LEOPARD, 1 Pard or Panther (Felis pardus), the largest spotted true cat of the Old World, with the exception of the snow- leopard, which is, however, inferior in point of size to the largest leopard. (See CARNivbRA and Snow-LeoPard.) Leopards, known in India as cheeta (chita), are characterized by the rosette- like form of the black spots on the greater part of the body, and the absence of a central spot from each rosette. Towards the head and on the limbs the spots tend to become solid, but there is great local variation in regard to their form and arrangement. In the Indian leopard, the true Felis pardus, the spots are large and rosette-like, and the same is the case with the long-haired Persian leopard (F. pardus lulliana). On the other hand the heavily built and thick-haired Manchurian F. p. villosa has more consolidated spots. African leopards, again, to one of which the name F. p. leopardus is applicable, show a decided tendency to a breaking-up of the spots; West African animals being much darker-coloured than those from the east side of the con- tinent.

Both as regards structure and habits, the leopard may be reckoned as one of the more typical representatives of the genus Felis, belonging to that section in which the hyoid bone is loosely connected with the skull, owing to imperfect ossification of its anterior arch, and the pupil of the eye when contracted under the influence of light is circular, not linear as in the smaller cats.

The size of leopards varies greatly, the head and body usually measuring from 3J to 4J ft. in length, and the tail from 25 to 3 ft., but some specimens exceed these limits, while the Somali leopard (F. p. nanopardus) falls considerably short of them. The ground- colour of the fur varies from a pale fawn to a rufous buff, graduat- ing in the Indian race into pure white on the under-parts and inside of the limbs. Generally speaking, the spots on the under parts and limbs are simple and blacker than those on the other parts of the body. The bases of the ears behind are black, the tips buff. The upper side of the tail is buff,

spotted with broken rings like the back, its under surface white with simple spots. The hair of the cubs is longer than that of the adults, its ground- colour less bright, and its spots less distinct. Perfectly black leopards, which in certain lights show the characteristic markings on the fur, are not uncommon, and are examples of melanism, occurring as individual variations, sometimes in one cub out of a litter of which the rest are normally coloured, and therefore not indicating a distinct race, much less a species. These are met with chiefly in southern Asia; melanism among African leopards

1 The name (Late Lat. leopardus. Late Gr. \eoirap5os) was given by the ancients to an animal supposed to have been a cross between a lion (Lat. leo, Gr. Aeojp) and a pard (Gr. xdpSos, Pers. pars) or panther. Medieval heralds made no distinction in shape between a lion and a leopard, but marked the difference by drawing the leopard showing the full face (see Heraldry : § Beasts and Birds).

taking the form of an excessive breaking-up of the spots, which finally show a tendency to coalesce.

In habits the leopard resembles the other large cat-like animals, yielding to none in the ferocity of its disposition. It is exceed- ingly quick in its movements, but seizes its prey by waiting in ambush or stealthily approaching to within springing distance, when it suddenly rushes upon it and tears it to ground with its

The Leopard {Felis pardus).

powerful claws and teeth. It preys upon almost any animal it can overcome, such as antelopes, deer, sheep, goats, monkeys, peafowl, and has a special liking for dogs. It not unfrequently attacks human beings in India, chiefly children and old women, but instances have been known of a leopard becoming a regular ” man-eater.” When favourable opportunities occur, it often kills many more victims than it can devour at once, either to gratify its propensity for killing or for the sake of their fresh blood. It generally inhabits woody districts, and can climb trees with facility when hunted, but usually lives on or near the ground, among rocks, bushes and roots and low branches of large trees,

The geographical range of the leopard embraces practically all Africa, and Asia from Palestine to China and Manchuria, inclusive of Ceylon and the great Malay Islands as far as Java. Fossil bones and teeth, indistinguishable from those of existing leopards, have been found in cave-deposits of Pleistocene age in Spain, France, Germany and

England. (R. L.*; W. H. F.)

LEOPARDI, GIACOMO, Count (1798-1837), Italian poet, was born at Recanati in the March of Ancona, on the 2gth of June 1798. AH the circumstances of his parentage and education conspired to foster his precocious and sensitive genius at the expense of his physical and mental health. His family was ancient and patrician, but so deeply embarrassed as to be only rescued from ruin by the energy of his mother, who had taken the control of business matters entirely into her own hands, and whose engrossing devotion to her undertaking seems to have almost dried up the springs of maternal tenderness. Count Monaldo Leopardi, the father, a mere nullity in his own household, secluded himself in his extensive library, to which his nervous, sickly and deformed son had free access, and which absorbed him exclusively in the absence of any intelligent sympathy from his parents, any companionship except that of his brothers and sister, or any recreation in the dullest of Italian towns. The lad spent his days over grammars and dictionaries, learning Latin with little assistance, and Greek and the principal modern languages with none at all. Any ordinarily clever boy would have emerged from this discipline a mere pedant and

bookworm. Leopardi came forth a Hellene, not merely a con- summate Greek scholar, but penetrated with the classical con- ception of life, and a master of antique form and style. At sixteen he composed a Latin treatise on the Roman rhetoricians of the 2nd century, a commentary on Porphyry's life of Plotinus and a history of astronomy; at seventeen he wrote on the popular errors of the ancients, citing more than four hundred authors. A little later he imposed upon the first scholars of Italy by two odes in the manner of Anacreon. At eighteen he produced a poem of considerable length, the Appressamento alia Morte, which, after being lost for many years, was discovered and published by Zanino Volta. It is a vision of the omnipotence of death, modelled upon Petrarch, but more truly inspired by Dante, and in its conception, machinery and general tone offering a remarkable resemblance to Shelley's Triumph of Life (1822), of which Leopardi probably never heard. This juvenile work was succeeded (1819) by two lyrical compositions which at once placed the author upon the height which he maintained ever afterwards. The ode to Italy, and that on the monument to Dante erected at Florence, gave voice to the dismay and affliction with

which ‘Italy, aroused by the French Revolution from the torpor of the 17th and 18th centuries, contemplated her forlorn and degraded condition, her political impotence, her degeneracy in arts and arms and the frivolity or stagnation of her intellectual life. They were the outcry of a student who had found an ideal of national existence in his books, and to whose disappointment everything in his own circumstances lent additional poignancy. But there is nothing unmanly or morbid in the expression of these sentiments, and the odes are surprisingly exempt from the ‘ailings characteristic of young poets. They are remarkably chaste in diction, close and nervous in style, sparing in fancy and almost destitute of simile and metaphor, antique in spirit, yet pervaded by modern ideas, combining Landor’s dignity with a considerable infusion of the passion of Byron. These qualities continued to characterize Leopardi’s poetical writings throughout his life. A third ode, on Cardinal Mai’s discoveries of ancient MSS., lamented in the same spirit of indignant sorrow the decadence of Italian literature. The publication of these pieces widened the breach between Leopardi and his father, a well-mean- ing but apparently dull and apathetic man, who had lived into the 19th century without imbibing any of its spirit, and who provoked his son’s contempt by a superstition unpardonable in a scholar of real learning. Very probably from a mistaken idea of duty to his son, very probably, too, from his own entire dependence in pecuniary matters upon his wife, he for a long time obstinately refused Leopardi funds, recreation, change of scene, everything that could have contributed to combat the growing pessimism which eventually became nothing less than monomaniacal. The affection of his brothers and sister afforded him some con- solation, and he found intellectual sympathy in the eminent scholar and patriot Pietro Giordani, with whom he assiduously corresponded- at this period, partly on the ways and means of escaping from ” this hermitage, or rather seraglio, where the delights of civil society and the advantages of solitary life are alike wanting.” This forms the keynote of numerous letters of complaint and lamentation, as touching- but as effeminate in their pathos as those of the banished Ovid. It must be remem- bered in fairness that the weakness of Leopardi’s eyesight frequently deprived him for months together of the resource of study. At length (1822) his father allowed him to repair to Rome, where, though cheered by the encouragement of C. C. J. Bunsen and Niebuhr, he found little satisfaction in the trifling pedantry that passed for philology and archaeology, while his sceptical opinions prevented his taking orders, the indispensable condition of public employment in the Papal States. Dispirited and with exhausted means, he returned to Recanati, where he spent three miserable years, brightened only by the production of several lyrical

masterpieces, which appeared in 1824. The most remarkable is perhaps the Bruto Minore, the condensation of his philosophy of despair. In 1825 he accepted an engagement to edit Cicero and Petrarch for the publisher Stella at Milan, and took up his residence at Bologna, where his life was for a

time made almost cheerful by the friendship of the countess Malvezzi. In 1827 appeared the Operette Morali, consisting principally of dialogues and his imaginary biography of Filippo Ottonieri, which have given Leopardi a fame as a prose writer hardly inferior to his celebrity as a poet. Modern literature has few productions so eminently classical in form and spirit, so symmetrical in construction and faultless in style. Lucian is evidently the model; but the wit and irony which were play- things to Lucian are terribly earnest with Leopardi. Leopardi's invention is equal to Lucian's and his only drawback in com- parison with his exemplar is that, while the latter's campaign against pretence and imposture commands hearty sympathy, Leopardi's philosophical creed is a repulsive hedonism in the disguise of austere stoicism. The chief interlocutors in his dialogues all profess the same unmitigated pessimism, claim emancipation from every illusion that renders life tolerable to the vulgar, and assert or imply a vast moral and intellectual superiority over unenlightened mankind. When, however, we come to inquire what renders them miserable, we find it is nothing but the privation of pleasurable sensation, fame, fortune or some other external thing which a lofty code of ethics would deny to be either indefeasibly due to man or essential to his felicity. A page of Sartor Resartus scatters Leopardi's sophistry to the winds, and leaves nothing of his dialogues but the con- summate literary skill that would render the least fragment precious. As works of art they are a possession for ever, as contributions to moral philosophy they are worthless, and apart from their literary qualities can only escape condemnation if regarded as lyrical expressions of emotion, the wail extorted from a diseased mind by a diseased body. Filippo Ottonieri is a portrait of an imaginary philosopher, imitated from the biography of a real sage in Lucian's Demonax. Lucian has shown us the philosopher he wished to copy, Leopardi has truly depicted the philosopher he was. Nothing can be more striking or more tragical than the picture of the man superior to his fellows in every quality of head and heart, and yet condemned to sterility and impotence because he has, as he imagines, gone a step too far on the road to truth, and illusions exist for him no more. The little tract is full of remarks on life and character of surprising depth and justice, manifesting what powers of observation as well as reflection were possessed by the sickly youth who had seen so little of

the world.

Want of means soon drove Leopardi back to Recanati, where, deaf, half-blind, sleepless, tortured by incessant pain, at war with himself and every one around him except his sister, he spent the two most unhappy years of his unhappy life. In May 1831 he escaped to Florence, where he formed the acquaintance of a young Swiss philologist, M. de Sinner. To him he confided his unpublished philological writings, with a view to their appearance in Germany. A selection appeared under the title Excerpta ex schedis criticis J. Leopardi (Bonn, 1834). The remaining MSS. were purchased after Sinner's death by the Italian government, and, together with Leopardi's correspond- ence with the Swiss philologist, were partially edited by Aulard. In 1 83 1 appeared a new edition of Leopardi's poems, comprising several new pieces of the highest merit. These are in general less austerely classical than his earlier compositions, and evince a greater tendency to description, and a keener interest in the works and ways of ordinary mankind. The Resurrection, com- posed on occasion of his unexpected recovery, is a model of concentrated energy of diction, and The Song of the Wandering Shepherd in Asia is one of the highest flights of modern lyric poetry. The range of the author's ideas is still restricted, but his style -and melody are unsurpassable. Shortly after the publication of these pieces (October 1831) Leopardi was driven from Florence to Rome by an unhappy attachment. His feelings are powerfully expressed in two poems, To Himself and Aspasia, which seem to breathe wounded pride at least as much as wounded love. In 1832 Leopardi returned to Florence, and there formed acquaintance with a young Neapolitan, Antonio Ranieri, himself an author of merit, and destined to enact towards him the part performed by Severn towards Keats, an enviable title to renown

if Ranieri had not in his old age tarnished it by assuming the relation of Trelawny to the dead Byron. Leopardi accompanied Ranieri and his sister to Naples, and under their care enjoyed four years of comparative tranquillity. He made the acquaint- ance of the German poet Platen, his sole modern rival in the classical perfection of form, and composed La Ginestra, the most consummate of all his lyrical masterpieces, strongly resembling Shelley's Mont Blanc, but more perfect in expression. He also wrote at Naples The Sequel to the Battle of the Frogs and Mice, a satire in ottava rima on the abortive Neapolitan revolution of 1820, clever and humorous, but obscure

from the local character of the allusions. The more painful details of his Neapolitan residence may be found by those who care to seek for them in the deplorable publication of Ranieri's peevish old age (Sette anni di sodalizio). The decay of Leopardi's constitution con- tinued; he became dropsical; and a sudden crisis of his malady, unanticipated by himself alone, put an end to his life-long sufferings on the 15th of June 1837.

The poems which constitute Leopardi's principal title to immor- tality are only forty-one in number, and some of these are merely fragmentary. They may for the most part be described as odes, meditative soliloquies, or impassioned addresses, generally couched in a lyrical form, although a few are in magnificent blank verse. Some idea of the style and spirit of the former might be obtained by imagining the thoughts of the last book of Spenser's Faerie Queene in the metre of his Epithalamium. They were first edited complete by Ranieri at Florence in 1845, forming, along with the Operette Morali, the first volume of an edition of Leopardi's works, which does not, however, include The Sequel to the Battle of the Frogs and Mice, first printed at Paris in 1842, nor the afterwards discovered writings. Vols, ii.iv. contain the philological essays and translations, with some letters, and vols. v. and vi. the remainder of the corre spondence. Later editions are those of G. Chiarini and G. Mestica. The juvenile essays preserved in his father's library at Recanati were edited by Cugnoni (Opere inedite) in 1879, with the consent of the family. See Cappelleti, Bibliografia Leopardiana (Parma, 1882). Leopardi's biography is mainly in his letters (Epistolario. 1st ed., 1849, 5th ed., 1892), to which his later biographers (Brandes, Bouche-Leclercq, Rosa) have merely added criticisms, excellent in their way, more particularly Brandes's, but generally over-rating Leopardi's significance in the history of human thought. W. E. Gladstone's essay (Quart. Rro., 1850), reprinted in vol. ii. of the author's Gleanings, is too much pervaded by the theological spirit, but is in the main a pattern of generous and discriminating eulogy. There are excellent German translations of the poems by Heyse and Brandes. An English translation of the essays and dialogues by C. Edwards appeared in 1882, and most of the dialogues were trans- lated with extraordinary felicity by James Thomson, author of The City of Dreadful Night, and originally published in the National Reformer. (R. G.)

LEOPARDO, ALESSANDRO (d. c. 1512), Italian sculptor, was born and died at Venice. His first known work is the imposing mausoleum of the doge Andrea Vendramini, now in the church of San Giovanni e Paolo; in this he had the co- operation of Tullio Lombardo, but the finest parts are Leopardo's. Some of the figures have been taken away,

and two in the Berlin museum are considered to be certainly his work. He was exiled on a charge of fraud in 1487, and recalled in 1490 by the senate to finish Verrocchio's colossal statue of Bartolommeo Colleoni. He worked between 1503 and 1505 on the tomb of Cardinal Zeno at St Mark's, which was finished in 1515 by Pietro Lombardo; and in 1 505 he designed and cast the bronze sockets for the three flagstaffs in the square of St Mark's, the antique character of the decorations suggesting some Greek model. (See Venice.)

LEOPOLD (M.H. Ger. Liupolt; O.H. Ger. Liupald, from Hut, Mod. Ger. Leute, " people," and paid, " bold," i.e. " bold for the people "), the name which has been that of several European sovereigns.

LEOPOLD I. (1640-1705), Roman emperor, the second son of the emperor Ferdinand III. and his first wife Maria Anna, daughter of Philip III. of Spain, was born on the gth of June 1640. Intended for the Church, he received a good education, but his prospects were changed by the death of his elder brother, the German king Ferdinand IV., in July 1654, when he became his father's heir. In 1655 he was chosen king of Hungary and in 1656 king of Bohemia, and in July 1658, more than a year after his father's death, he was elected emperor at Frankfort, in spite of the intrigues of Cardinal Mazarin, who wished to place

on the impeiial throne Ferdinand, elector of Bavaria, or some other prince whose elevation would break the Habsburg succes- sion. Mazarin, however, obtained a promise from the new emperor that he would not send assistance to Spain, then at war with France, and, by joining a confederation of German princes, called the league of the Rhine, France secured a certain influence in the internal affairs of Germany. Leopold's long reign covers one of the most important periods of European history; for nearly the whole of its forty-seven years he was pitted against Louis XIV. of France, whose dominant personality completely overshadowed Leopold. The emperor was a man of peace and never led his troops in person; yet the greater part of his public life was spent in arranging and directing wars. The first was with Sweden, whose king Charles X. found a useful ally in the prince of Transylvania, George II. Rakocky, a re- bellious vassal of the Hungarian crown. This war, a legacy of the last reign, was waged by Leopold as the ally of Poland until peace was made at Oliva in 1660. A more dangerous foe next entered the lists. The Turks interfered in the affairs of Tran- sylvania, always an unruly district, and this interference brought on a war with the Empire, which after some desultory operations really began in 1663. By a personal appeal to the diet at Regens- burg Leopold induced the princes to send assistance for

the campaign; troops were also sent by France, and in August 1664 the great imperialist general, Montecucculi, gained a notable victory at St Gotthard. By the peace of Vasvar the emperor made a twenty years' truce with the sultan, granting more generous terms than his recent victory seemed to render necessary.

After a few years of peace began the first of three wars between France and the Empire. The aggressive policy pursued by Louis XIV. towards Holland had aroused the serious attention of Europe, and steps had been taken to check it. Although the French king had sought the alliance of several German princes and encouraged the Turks in their attacks on Austria the emperor at first took no part in this movement. He was on friendly terms with Louis, to whom he was closely related and with whom he had already discussed the partition of the lands of the Spanish monarchy; moreover, in 1671 he arranged with him a treaty of neutrality. In 1672, however, he was forced to take action. He entered into an alliance for the defence of Holland and war broke out; then, after this league had collapsed owing to the defection of the elector of Brandenburg, another and more durable alliance was formed for the same purpose, including, besides the emperor, the king of Spain and several German princes, and the war was renewed. At this time, twenty-five years after the peace of Westphalia, the Empire was virtually a confederation of independent princes, and it was very difficult for its head to conduct any war with vigour and success, some of its members being in alliance with the enemy and others being only lukewarm in their support of the imperial interests. Thus this struggle, which lasted until the end of 1678, was on the whole unfavourable to Germany, and the advantages of the treaty of Nijmwegen (February 1679) were with France.

Almost immediately after the conclusion of peace Louis renewed his aggressions on the German frontier. Engaged in a serious struggle with Turkey, the emperor was again slow to move, and although he joined a league against France in 1682 he was glad to make a truce at Regensburg two years later. In 1686 the league of Augsburg was formed by the emperor and the imperial princes, to preserve the terms of the treaties of Westphalia and of Nijmwegen. The whole European position was now bound up with events in England, and the tension lasted until 1688, when William of Orange won the English crown and Louis invaded Germany. In May 1689 the grand alliance was formed, including the emperor, the kings of England, Spain and Denmark, the elector of Brandenburg and others, and a fierce struggle against France was waged throughout almost the whole of western Europe. In general the several campaigns were favourable to the allies, and in September 1697 England and Holland made peace with Louis at

Ryswick.

To this treaty Leopold refused to assent, as he considered that his allies had somewhat neglected his interests, but in the follow- ing month he came to terms and a number of places were trans- ferred from France to Germany. The peace with France lasted for about four years and then Europe was involved in the War of the Spanish Succession. The king of Spain, Charles II., was a Habsburg by descent and was related by marriage to the Austrian branch, while a similar tie bound him to the royal house of France. He was feeble and childless, and attempts had been made by the European powers to arrange for a peaceable division of his extensive kingdom. Leopold refused to consent to any partition, and when in November 1700 Charles died, leaving his crown to Philip, duke of Anjou, a grandson of Louis XIV., all hopes of a peaceable settlement vanished. Under the guidance of William III. a powerful league, the grand alliance, was formed against France; of this the emperor was a prominent member, and in 1703 he transferred his claim on the Spanish monarchy to his second son, the archduke Charles. The early course of the war was not favourable to the imperialists, but the tide of defeat had been rolled back by the great victory of Blenheim before Leopold died on the 5th of May 1705.

In governing his own lands Leopold found his chief difficulties in Hungary, where unrest was caused partly by his desire to crush Protestantism. A rising was suppressed in 167 1 and for some years Hungary was treated with great severity. In 168 1, after another rising, some grievances were removed and a less repressive policy was adopted, but this did not deter the Hun- garians from revolting again. Espousing the cause of the rebels the sultan sent an enormous army into Austria early in 1683; this advanced almost unchecked to Vienna, which was besieged from July to September, while Leopold took refuge at Passau. Realizing the gravity of the situation somewhat tardily, some of the German princes, among them the electors of Saxony and Bavaria, led their contingents to the imperial army which was commanded by the emperor’s brother-in-law, Charles, duke of Lorraine, but the most redoubtable of Leopold’s allies was the king of Poland, John Sobieski, who was already dreaded by the Turks. On the 12th of September 1683 the allied army fell upon the enemy, who was completely routed, and Vienna was saved. The imperialists, among whom Prince Eugene of Savoy was rapidly becoming prominent,

followed up the victory with others, notably one near Mohacz in 1687 and another at Zenta in 1697, and in January 1699 the sultan signed the treaty of Karlowitz by which he admitted the sovereign rights of the house of Habsburg over nearly the whole of Hungary. Before the conclusion of the war, however, Leopold had taken measures to strengthen his hold upon this country. In 1687 at the diet of Pressburg the constitution was changed, the right of the Habsburgs to succeed to the throne without election was admitted and the emperor's elder son Joseph was crowned hereditary king of Hungary.

During this reign some important changes were made in the constitution of the Empire. In 1663 the imperial diet entered upon the last stage of its existence, and became a body perman- ently in session at Regensburg; in 1692 the duke of Hanover was raised to the rank of an elector, becoming the ninth member of the electoral college; and in 1700 Leopold, greatly in need of help for the impending war with France, granted the title of king of Prussia to the elector of Brandenburg. The net result of these and similar changes was to weaken the authority of the emperor over the members of the Empire, and to compel him to rely more and more upon his position as ruler of the Austrian archduchies and of Hungary and Bohemia, and Leopold was the first who really appears to have realized this altered state of affairs and to have acted in accordance therewith.

The emperor was married three times. His first wife was Margaret Theresa (d. 1673), daughter of Philip IV. of Spain; his second Claudia Felicitas (d. 1676), the heiress of Tirol; and his third Eleanora, a princess of the Palatinate. By his first two wives he had no sons, but his third wife bore him two, Joseph and Charles, both of whom became emperors. He had also four daughters.

Leopold was a man of industry and education, and during his later years he showed some political ability. Extremely tenacious of his rights, and regarding himself as an absolute sovereign, he was also very intolerant and was greatly influenced by the Jesuits. In person he was short, but strong and healthy. Although he had no inclination for a military life he loved exercises in the open air, such as hunting and riding; he had also a taste for music.

Leopold's letters to Marco d'Aviano from 1680 to 1699 were edited by O. Klopp and published at Graz in 1888. Other letters are found in the Fontes rerum Austriacarum, Bande 56 and 57 (Vienna, 1903-1904). See also F. Krones, Handbuch der Geschichte Osterreichs (Berlin, 1876-1879); R. Baumstark, Kaiser Leopold I. (1873) ; and A. F. Pribram, Zur Wahl Leopolds I. (Vienna, 1888).

(A.W.H.*)

LEOPOLD II. (1747-1792), Roman emperor, and grand-duke of Tuscany, son of the empress Maria Theresa and her husband, Francis I., was born in Vienna on the 5th of May 1747. He was a third son, and was at first educated for the priesthood, but the theological studies to which he was forced to apply himself are believed to have influenced his mind in a way unfavourable to the Church. On the death of his elder brother Charles in 1 761 it was decided that he should succeed to his father's grand duchy of Tuscany, which was erected into a " secundogeniture " or apanage for a second son. This settlement was the condition of his marriage on the 5th of August 1764 with Maria Louisa, daughter of Charles III. of Spain, and on the death of his father Francis I. (13th August 1765) he succeeded to the grand duchy. For five years he exercised little more than nominal authority under the supervision of counsellors appointed by his mother. In 1770 he made a journey to Vienna to secure the removal of this vexatious guardianship, and returned to Florence with a free hand. During the twenty years which elapsed between his return to Florence and the death of his eldest brother Joseph II. in 1790 he was employed in reforming the administra- tion of his small state. The reformation was carried out by the removal of the ruinous restrictions on industry and personal freedom imposed by his predecessors of the house of Medici, and left untouched during his father's life; by the introduction of a rational system of taxation; and by the execution of profitable public works, such as the drainage of the Val di Chiana. As he had no army to maintain, and as he suppressed the small naval force kept up by the Medici, the whole of his revenue was left free for the improvement of his state. Leopold was never popular with his Italian subjects. His disposition was cold and retiring. His habits were simple to the verge of sordidness, though he could display splendour on occasion, and he could not help offending those of his subjects who had profited by the abuses of the Medicean regime. But his steady, consistent and intelligent administration, which advanced step by step, making the second only when the first had been justified by results, brought the grand duchy to a high level of material prosperity. His ecclesiastical policy, which disturbed the deeply rooted convictions of his, people, and brought him into collision with the pope, was not successful. He was unable to secularize the property of the religious houses, or to put the clergy entirely under the control of the lay power.

During the last few years of his rule in Tuscany Leopold had begun to be frightened by the increasing disorders in the German and Hungarian dominions of his family, which were the direct • result of

his brother's headlong methods. He and Joseph II. were tenderly attached to one another, and met frequently both before and after the death of their mother, while the portrait by Pompeo Baltoni in which they appear together shows that they bore a strong personal resemblance to one another. But it may be said of Leopold, as of Fontenelle, that his heart was made of brains. He knew that he must succeed his childless eldest brother in Austria, and he was unwilling to inherit his unpopularity. When, therefore, in 1789 Joseph, who knew himself to be dying, asked him to come to Vienna, and become co-regent, Leopold coldly evaded the request. He was still in Florence when Joseph II. died at Vienna on the 20th of February 1790, and he did not leave his Italian capital till the

3rd of March. Leopold, during his government in Tuscany, had shown a speculative tendency to grant his subjects a con- stitution. When he succeeded to the Austrian lands he began by making large concessions to the interests offended by his brother's innovations. He recognized the Estates of his different dominions as " the pillars of the monarchy," pacified 'the Hungarians and divided the Belgian insurgents by concessions. When these failed to restore order, he marched troops into the country, and re-established at the same time his own authority, and the historic franchises of the Flemings. Yet he did not surrender any part that could be retained of what Maria Theresa and Joseph had done to strengthen the hands of the state. He continued, for instance, to insist that no papal bull could be published in his dominions without his consent (placetum regium). If Leopold's reign as emperor, and king of Hungary and Bohemia, had been prolonged during years of peace, it is probable that he would have repeated his successes as a reforming ruler in Tuscany on a far larger scale. But he lived for barely two years, and during that period he was hard pressed by peril from west and east alike. The growing revolutionary disorders in France endangered the life of his sister Marie Antoinette, the queen of Louis XVI., and also threatened his own dominions with the spread of a subversive agitation. His sister sent him passionate appeals for help, and he was pestered by the royalist emigrants, who were intriguing both to bring about an armed intervention in France, and against Louis XVI. From the east he was threatened by the aggressive ambition of Catherine II. of Russia, and by the unscrupulous policy of Prussia. Catherine would have been delighted to see Austria and Prussia embark on a crusade in the cause of kings against the Revolution. While they were busy beyond the

Rhine, she would have annexed what remained of Poland, and would have made conquests in Turkey. Leopold II. had no difficulty in seeing through the rather trans- parent cunning of the Russian empress, and he refused to be misled. To his sister he gave good advice and promises of help if she and her husband could escape from Paris. The emigrants who followed him pertinaciously were refused audience, or when they forced themselves on him were peremptorily denied all help. Leopold was too purely a politician not to be secretly pleased at the destruction of the power of France and of her influence in Europe by her internal disorders. Within six weeks of his accession he displayed his contempt for her weakness by practically tearing up the treaty of alliance made by Maria Theresa in 1756 and opening negotiations with England to impose a check on Russia and Prussia. He was able to put pressure on England by threatening to cede his part of the Low Countries to France, and then, when secure of English support, he was in a position to baffle the intrigues of Prussia. A personal appeal to Frederick William II. led to a conference between them at Reichenbach in July 1 790, and to an arrangement which was in fact a defeat for Prussia Leopold's coronation as king of Hungary on the 1 5th of November 1 790, was preceded by a settlement with the diet in which he recognized the dominant position of the Magyars. He had already made an eight months' truce with the Turks in September, which prepared the way for the termination of the war begun by Joseph II. the peace of Sistova being signed in August 1 791. The pacification of his eastern dominions left Leopold free to re-establish order in Belgium and to confirm • friendly relations with England and Holland.

During 1791 the emperor continued to be increasingly pre- occupied with the affairs of France. In January he had to dismiss the count of Artois, afterwards Charles X., king of France, in a very peremptory way. His good sense was revolted by the folly of the French emigrants, and he did his utmost to avoid being entangled in the affairs of that country. The insults inflicted on Louis XVI. and Marie Antoinette, however, at the time of their attempted flight to Varennes in June, stirred his indignation, and he made a general appeal to the sovereigns of Europe to take common measures in view of events which " immediately compromised the honour of all sovereigns, and the security of all governments." Yet he was most directly interested in the conference at Sistova, which in June led to a

final peace with Turkey. On the 25th of August he met the king of Prussia at Pillnitz, near Dresden, and they drew up a declaration of their readiness to intervene in France if and when their assistance was called for by the other powers. The declara- tion was a mere formality,

for; as Leopold knew, neither Russia nor England was prepared to act, and he endeavoured to guard against the use which he foresaw the emigrants would endeavour to make of it. In face of the agitation caused by the Pillnitz declaration in France, the intrigues of the emigrants, and the attacks made by the French revolutionists on the rights of the German princes in Alsace, Leopold continued to hope that intervention might not be required. When Louis XVI. swore to observe the constitution of September 1791, the emperor professed to think that a settlement had been reached in France. The attacks on the rights of the German princes on the left bank of the Rhine, and the increasing violence of the parties in Paris which were agitating to bring about war, soon showed, however, that this hope was vain. Leopold met the threatening language of the revolutionists with dignity and temper. His sudden death on the 1st of March 1792 was an irreparable loss to Austria.

Leopold had sixteen children, the eldest of his eight sons being his successor, the emperor Francis II. Some of his Other sons were prominent personages in their day. Among them were: Ferdinand HI., grand duke of Tuscany; the archduke Charles, a celebrated soldier; the archduke John, also a soldier; the archduke Joseph, palatine of Hungary; and the archduke Rainer, viceroy of Lombardy-Venetia.

Several volumes containing the emperor's correspondence have been published. Among these are: Joseph II. und Leopold von Toskana. Ihr Briefwechsel 1781-17QO (Vienna, 1872), and Marie Antoinette, Joseph II. und Leopold II. Ihr Briefwechsel (Vienna, 1866), both edited by A. Ritter vonArneth; Joseph II., Leopold II. und Kaunitz. Ihr Briefwechsel (Vienna, 1873); and Leopold II., Franz II. und Catharina. Ihre Correspondenz nebsteiner Einleitung: Zur Geschichte der Politih Leopolds II. (Leipzig, 1874), both edited by A. Beer ; and Leopold II. und Marie Christine, Ihr Briefwechsel 1781-1792, edited by A. Wolf (Vienna, 1867). See also H. von Sybel, fiber die Regierung Kaiser Leopolds II. (Munich, i860) ; A. Schultze, Kaiser Leopold II. und die franzosische Revolution (Leipzig, 1899); and A. Wolf and H. von Zwiedeneck-Stidenhorst, Osterreich unter Maria Theresa, Joseph II. und Leopold II. (Berlin,

1882-1884).

LEOPOLD I. (1790-1865), king of the Belgians, fourth son of Francis, duke of Saxe-Coburg-Saalfeld, and uncle of Queen Victoria of England, was born at Coburg on the 18th of December 1790. At the age of eighteen he entered the military service of Russia, and accompanied the emperor Alexander to Erfurt as a member of his staff. He was

required by Napoleon to quit the Russian army, and spent some years in travelling. In 18 13 he accepted from the emperor Alexander the post of a cavalry general in the army of invasion, and he took part in the whole of the campaign of that and the following year, distinguishing himself in the battles of Leipzig, Liitzen and Bautzen. He entered Paris with the allied sovereigns, and accompanied them to England. He married in May 1816 Charlotte, only child of George, prince regent, afterwards George IV., heiress-pre- sumptive to the British throne, and was created duke of Kendal in the British peerage and given an annuity of £50,000. The death of the princess in the following year was a heavy blow to his hopes, but he continued to reside in England. In 1830 he declined the offer of the crown of Greece, owing to the refusal of the powers to grant conditions which he considered essential to the welfare of the new kingdom, but was in the following year elected king of the Belgians (4th June 1831). After some hesitation he accepted the crown, having previously ascertained that he would have the support of the great powers on entering upon his difficult task, and on the 12th of July he made his entry into Brussels and took the oath to observe the constitution. During the first eight years of his reign he was confronted with the resolute hostility of King William I. of Holland, and it was not until 1839 that the differences between the two states, which until 1830 had formed the kingdom of the Netherlands, were finally settled at the conference of London by the treaty

of the 24 Articles (see Belgium). From this date until his death, King Leopold spent all his energies in the wise administra- tion of the affairs of the newly formed kingdom, which may be said to owe in a large measure its first consolidation and constant prosperity to the care and skill of his discreet and fatherly government. In 1848 the throne of Belgium stood unshaken amidst the revolutions which marked that year in almost every European country. On the 8th of August 1832 Leopold married, as his second wife, Louise of Orleans, daughter of Louis Philippe, king of the French. Queen Louise endeared herself to the Belgian people, and her death in 1850 was felt as a national loss; This union produced two sons and one daughter — (1) Leopold, afterwards king of the Belgians; (2) Philip, count of Flanders; (3) Marie Charlotte, who married Maximilian of Austria, the unfortunate emperor of Mexico. Leopold I. died at Laeken on the 10th of December 1865. He was a most cultured man and a great reader, and did his utmost during his reign to encourage art, science and

education. His judgment was universally respected by contemporary sovereigns and statesmen, and he was frequently spoken of as ” the Nestor of Europe ” (see also Victoria, Queen).

See Th. Juste, Leopold I”, roi des Beiges d’aprhs des doc. ined. 1703-1865 (2 vols., Brussels, J868), and Les Fondateurs de la monarchic Beige (22 vols., Brussels,” 1878-1880) ; J. J. Thonissen, La Belgique sous le regne de Leopold I* (L6uvain, 1862).

LEOPOLD II. [Leopold Louis Philippe Marie Victor] (1835-1909), king of the Belgians, son. of the preceding, was born at Brussels on the 9th of April 1835. In 1846 he was created duke of Brabant and appointed a sub-lieutenant in the army, in which he served until his accession, by which time he had reached the rank of lieutenant-general. On attaining his majority he was made a member of the senate, in whose proceed- ings he took a lively interest, especially in matters concerning the development of Belgium and its trade. On the 22nd of August 1853 Leopold married Marie Henriette (1836-1902), daughter of the archduke Joseph of Austria,, palatine of Hungary, by his wife Marie Dorothea, duchess of Wurttemberg. This princess, who was a great-granddaughter of the empress Maria Theresa, and a great-niece of Marie Antoinette, endeared herself to the people by her elevated character and indefatigable benevolence, while her beauty gained for her the sobriquet of ” The Rose of Brabant “; she was also an accomplished artist and musician, and a fine horsewoman. Between the years 1854 and 1865 Leopold travelled much abroad, visiting India and China as well as Egypt and the countries on the Mediter- ranean coast of Africa. On the 10th of December 1865 he succeeded his father. On the 28th of January 1869 he lost his only son. Leopold (b. 1859), duke of Hainaut. The king’s brother Philip, count of Flanders (1837-1905), then became heir to the throne; and on his death his son Albert (b. 1875) became heir-presumptive. During the Franco-Prussian War (1870-1871) the king of the Belgians preserved neutrality in a period of unusual difficulty and danger. But the most notable event in Leopold’s career was the foundation of the Congo Free State (q.v.). While still duke of Brabant he had been the first to call the attention of the Belgians to the need of enlarging their horizon beyond sea, and after his accession to the throne he gave the first impulse towards the development of this idea by founding in 1876 the Association Internationale Africaine. He enlisted the services of H. M. Stanley, who visited Brussels in 1878 after exploring the Congo river, and returned in 1879 to the Congo as agent of the Comiti d’ Etudes du Haut Congo, soon afterwards reorganized as the ” International Association of the Congo.” This association was, in 1884-1885, recognized by the powers as a sovereign state under the name of the

Etat Indipendant du Congo. Leopold's exploitation of this vast territory, which he administered autocratically, and in which he associated himself personally with various financial schemes, was understood to bring him an enormous fortune; it was the subject of acutely hostile criticism, to a large extent sub- stantiated by the report of a commission of inquiry instituted by the king himself in 1904, and followed in 1908 by the annexa-

tion of the state to Belgium (see Congo Free State: History). In 1880 Leopold sought an interview with General C. G. Gordon and obtained his promise, subject to the approval of the British government, to enter the Belgian service on the Congo. Three years later Leopold claimed fulfilment of the promise, and Gordon was about to proceed to the Congo when the British government required his services for the Sudan. On the 15th of November 1902 King Leopold's life was attempted in Brussels by an Italian anarchist named Rubino. Queen Marie Henriette died at Spa on the 19th of September of the same year. Besides the son already mentioned she had borne to Leopold three daughters — Louise Marie Amelie (b. 1858), who in 1875 married Philip of Saxe-Coburg and Gotha, and was divorced in 1906; Stephanie (b. 1864), who married Rudolph, crown prince of Austria, in 1881, and after his death in 1889 married, against her father's wishes, Elemer, Count Lonyay, in 1900; and Clementine (b. 1872). At the time of the queen's death an unseemly incident was occasioned by Leopold's refusal to see his daughter Stephanie, who in consequence was not present at her mother's funeral. The disagreeable impression on the public mind thus created was deepened by an unfortunate litigation, lasting for two years (1904-1906), over the deceased queen's will, in which the creditors of the princess Louise, together with princess Stephanie (Ccuntess Lonyay), claimed that under the Belgian law the queen'j estate was entitled to half of her husband's property. This claim was disallowed by the Belgian courts. The king died at Laeken, near Brussels, on the 17th of December 1909. On the 23rd of that month his nephew took the oath to observe the constitution, assuming the title of Albert I. King Leopold was personally a man of considerable attainments and much strength of character, but he was a notoriously dissolute monarch, who even to the last offended decent opinion by his indulgences at Paris and on the Riviera. The wealth he amassed from the Congo he spent, no doubt, royally not only in this way but also on public improvements in Belgium; but he had a hard heart towards the natives of his distant possession.

LEOPOLD II. (1797-1870), of Habsburg-Lorraine, grand-duke of Tuscany, was born on the 3rd of October 1797, the son of the grand-

duke Ferdinand III., whom he succeeded in 1824. During the first twenty years of his reign he devoted himself to the internal development of the state. His was the mildest and least reactionary of all the Italian despotisms of the day, and although always subject to Austrian influence he refused to adopt the Austrian methods of government, allowed a fair measure of liberty to the press, and permitted many political exiles from other states to dwell in Tuscany undisturbed. But when in the early 'forties a feeling of unrest spread throughout Italy, even in Tuscany demands for a constitution and other political reforms were advanced; in 1845-1846 riots broke out in various parts of the country, and Leopold granted a number of administrative reforms. But Austrian influence prevented him from going further, even had he wished to do so. The election of Pope Pius IX. gave fresh impulse to the Liberal movement, and on the 4th of September 1847 Leopold instituted the National Guard— a first step towards the constitution; shortly after the marchese Cosimo Ridolfi was appointed prime minister. The granting of the Neapolitan and Piedmontese constitutions Was followed (17th February 1848) by that of Tuscany, drawn up by Gino Capponi. The revolution in Milan and Vienna aroused a fever of patriotic enthusiasm in Tuscany, where war against Austria was demanded; Leopold, giving way to popular pressure, sent a force of regulars and volunteers to co-operate with Piedmont in the Lombard campaign. His speech on their departure was uncompromisingly Italian and Liberal. "Soldiers," he said, " the holy cause of Italian freedom is being decided to-day on the fields of Lombardy. Already thecitizens of Milan have purchased their liberty with their blood and with a heroism of which history offers few examples. . . . Honour to the arms of Italy! Long live Italian independence!" The Tuscan contingent fought bravely, if unsuccessfully, at Curtatone and Montanara. On the 26th of June the first Tuscan parliament assembled; but the

disturbances consequent on the failure of the campaign in Lombardy led to the resignation of the Ridolfi ministry, which was succeeded by that of Gino Capponi. The riots continued, especially at Leghorn, which was a prey to actual civil war, and the democratic party of which F. D. Guerrazzi and G. Montanelli were leading lights became every day more influential. Capponi resigned, and Leopold reluctantly agreed to a Montanelli- Guerrazzi ministry, which in its turn had to fight against the extreme republican party. New elections in the autumn of 1848 returned a constitutional majority, but it ended by

voting in favour of a constituent assembly. There was talk of instituting a central Italian kingdom with Leopold as king, to form part of a larger Italian federation, but in the meanwhile the grand-duke, alarmed at the revolutionary and republican agitations in Tuscany and encouraged by the success of the Austrian arms, was, according to Montanelli, negotiating with Field-Marshal Radetzky and with Pius IX., who had now abandoned his Liberal tendencies, and fled to Gaeta. Leopold had left Florence for Siena, and eventually for Porto S. Stefano, leaving a letter to Guerrazzi in which, on account of a protest from the pope, he declared that he could not agree to the proposed constituent assembly. The utmost confusion prevailed in Florence and other parts of Tuscany. On the 9th of February 1849 the republic was proclaimed, largely as a result of Mazzini's exhortations, and on the 18th Leopold sailed for Gaeta. A third parliament was elected and Guerrazzi appointed dictator. But there was great discontent, and the defeat of Charles Albert at Novara caused consternation among the Liberals. The majority, while fearing an Austrian invasion, desired the return of the grand-duke who had never been unpopular, and in April 1849 the municipal council usurped the powers of the assembly and invited him to return, " to save us by means of the restoration of the constitu- tional monarchy surrounded by popular institutions, from the shame and ruin of a foreign invasion." Leopold accepted, although he said nothing about the foreign invasion, and on the 1st of May sent. Count Luigi Serristori to Tuscany with full powers. But at the same time the Austrians occupied Lucca and Leghorn, and although Leopold simulated surprise at their action it has since been proved, as the Austrian general d'Aspre declared at the time, that Austrian intervention was due to the request of the grand-duke. On the 24th of May the latter appointed G. Baldasseroni prime minister, on the 25th the Austrians entered Florence and on the 28th of July Leopold himself returned. In April 1850 he concluded a treaty with Austria sanctioning the continuation for an indefinite period of the Austrian occupation with 10,000 men; in September he dismissed parliament, and the following year established a concordat with the Church of a very clerical character. He feebly asked Austria if he might maintain the constitution, and the Austrian premier, Prince Schwarzenberg, advised him to consult the pope, the king of Naples and the dukes of Parma and Modena. On their advice he formally revoked the constitution (1852). Political trials were held, Guerrazzi and many others being condemned to long terms of imprisonment, and although in 1855 the Austrian troops left Tuscany, Leopold's popularity was gone. A part of the Liberals, however, still believed in the possibility of a constitutional grand-duke who could be induced for a second time to join Piedmont in a war

against Austria, whereas the popular party headed by F. Bartolommei and G. Dolfi realized that only by the expulsion of Leopold could the national aspirations be realized. When in 1859 France and Piedmont made war on Austria, Leopold's government failed to prevent numbers of young Tuscan volunteers from joining the Franco-Piedmontese forces. Finally an agreement was arrived at between the aristocratic constitutionalists and the popular party, as a result of which the grand-duke's participation in the war was formally demanded. Leopold at first gave way, and entrusted Don Neri Corsini with the formation of a ministry. The popular demands presented by Corsini were for the abdica- tion of Leopold in favour of his son, an alliance with Piedmont and the reorganization of Tuscany in accordance with the eventual and definite reorganization of Italy. Leopold hesitated

and finally rejected the proposals as derogatory to his dignity. On the 27th of April there was great excitement in Florence, Italian colours appeared everywhere, but order was maintained, and the grand-duke and his family departed for Bologna un- disturbed. Thus the revolution was accomplished without a drop of blood being shed, and after a period of provisional govern- ment Tuscany was incorporated in the kingdom of Italy. On the 21st of July Leopold abdicated in favour of his son Ferdinand IV., who never reigned, but issued a protest from Dresden (26th March i860). He spent his last years in Austria, and died in Rome on the 29th of January 1870.

Leopold of Tuscany was a well-meaning, not unkindly man, and fonder of his subjects than were the other Italian despots, but he was weak, and too closely bound by family ties and Habsburg traditions ever to become a real Liberal. Had he not joined the conclave of autocrats at Gaeta, and, above all, had he not summoned Austrian assistance while denying that he had done so, in 1849, he might yet have preserved his throne, and even changed the whole course of Italian history. At the same time his rule, if not harsh, was enervating and demoralizing.

See G. Baldasseroni, Leopoldo II (Florence, 1871), useful but reactionary in tendency, the author having been Leopold's minister, G. Montanelli, Memorie sulV Italia (Turin, 1853); F. D. Guerrazzi, Memorie (Leghorn, 1848) ; Zobi, Storia civile delta Toscana, vols. iv.-v. (Florence, 1850-1852); A. von Reumont, Geschichte Toscanas (2 vols., Gotha, 1876-1877); M. Bartolommei-Gioli, II Rivolgimento Toscano e I'azione popolare (Florence, 1905); C. Tivaroni, L Italia durante il dominio Austriaco, vol. i. (Turin, 1892), and IS Italia degli Italiani, vol. i. (Turin, 1895). See also Ricasoli; Bartolommei; Capponi, Gino; &c. (L. V.*)

LEOPOLD II., a lake of Central Africa in the basin of the Kasai affluent of the Congo, cut by 2° S.” and 18° 10′ E. It has a length N. to S. of about 75 m., is 30 m. across at its northern end, tapering towards its southern end. Numerous bays and gulfs render its outline highly irregular. Its shores are flat and marshy, the lake being (in all probability) simply the lowest part of a vast lake which existed here before the Kasai system breached the barrier — at Kwa mouth — separating it from the Congo. The lake is fed by the Lokoro (about 300 m. long) and smaller streams from the east. Its northern and western affluents are com- paratively unimportant. It discharges its waters (at its southern end) into the Mfini, which is in reality the lower course of the Lukenye. The lake is gradually diminishing in area; in the rainy season it overflows its banks. The surrounding country is very flat and densely wooded.

See Kasai ; and articles and maps in Le Mouvement geog., speci- ally vol. xiv., No. 29 (1897) and vol. xxiv., No. 38 (1907).

LEOTYCHIDES, Spartan king, of the Eurypontid family, was descended from Theopompus through his younger son Anaxandridas (Herod, viii. 131), and in 491 B.C. succeeded Demaratus (q.v.), whose title to the throne he had with Cleomenes’ aid successfully challenged. He took part in Cleomenes’ second expedition to Aegina, on which ten hostages were seized and handed over to the Athenians for safe custody: for this he narrowly escaped being surrendered to the Aeginetans after Cleomenes’ death. In the spring of 479 we find him in command of the Greek fleet of no ships, first at Aegina and afterwards at Delos. In August he attacked the Persian position at Mycale on the coast of Asia Minor opposite Samos, inflicted a crushing defeat on the land-army, and annihilated the fleet which was drawn up on the shore. Soon afterwards he sailed home with the Peloponnesians, leaving the Athenians to prosecute the siege of Sestos. In 476 he led an army to Thessaly to punish the Aleuadae of Larisa for the aid they had rendered to the Persians and to strengthen Spartan influence in northern Greece. After a series of successful engagements he accepted a bribe from the enemy to withdraw. For this he was brought to trial at Sparta, and to save his life fled to the temple of Athena Alea at Tegea. Sentence of exile was passed, his house was razed and his grand- son Archidamus II. ascended the throne (Herod, vi. 65-87, ix. 90-114; Thucydides i. 89; Pausanias iii. 4. 3. 7. 9-10; Plutarch, De malignitate Herodoti, 21, p. 859 d; Diodorus xi,

34-37)-

According to Diodorus (xi. 48) Leotychides reigned twenty-two, his successor Archidamus forty-two years. The total duration of the two reigns, sixty-four years, we know to be correct, for Leoty- chides came to the throne in 491 and Archidamus (q.v.) died in 427. On this basis, then, Leotychides's exile would fall in 469 and the Thessalian expedition in that or the preceding year (so E. Meyer, Geschichte des Altertums, iii. § 287). But Diodorus is not consistent with himself ; he attributes (xi. 48) Leotychides's death to the year 476-475 and he records (xii. 35) Archidamus's death in 434-433, though he introduces him in the following years at the head of the Peloponnesian army (xii. 42, 47, 52). Further, he says expressly that Leotychides irt\ii>rr)otv fipfas «ttj tUoai kclI Siio, i.e. he lived twenty-two years after his accession. The twenty-two years, then, may include the time which elapsed between his exile and his death. In that case Leotychides died in 469, and 476-475 may be the year in which his reign, though not his life, ended. This date seems, from what we know of the political situation in general, to be more probable than the later one for the Thessalian campaign.

G. Busolt, Griech. Geschichte, iii. 83, note; J. B. Bury, History of Greece, p. 326; G. Grote, History of Greece, new edition 1888, iv. 349, note; also abridged edition 1907, p. 273, note 3. Beloch's view (Griech. Geschichte, i. 455, note 2) that the expedition took place in 476, the trial and flight in 469, is not generally accepted. (M. N. T.)

LEOVIGILD, or Lowenheld (d. 586), king of the Visigoths, became king in 568 after the short period of anarchy which followed the death of King Athanagild, whose widow, Goisvintha, he married. At first he ruled that part of the Visigothic kingdom which lay to the south of the Pyrenees, his brother Liuva or Leova governing the small part to the north of these mountains; but in 572 Liuva died and Leovigild became sole king. At this time the Visigoths who settled in Spain early in the 5th century were menaced by two powerful enemies, the Suevi who had a small kingdom in the north-west of the peninsula, and the Byzantines who had answered Athanagild 's appeal for help by taking possession of a stretch of country in the south-east. Their kingdom, too, was divided and weakened by the fierce hostility between the orthodox Christians and those who pro- fessed Arianism. Internal and external dangers alike, however, failed to daunt Leovigild, who may fairly be called the restorer of the Visigothic kingdom. He turned first against the Byzantines, who were defeated several times; he took Cordova and chastised the Suevi; and then by stern measures he destroyed the power of those unruly and rebellious chieftains who had

reduced former kings to the position of ciphers. The chronicler tells how, having given peace to his people, he, first of the Visi- gothic sovereigns, assumed the attire of a king and made Toledo his capital. He strengthened the position of his family and provided for the security of his kingdom by associating his two sons, Recared and Hermenegild, with himself in the kingly office and placing parts of the land under their rule. Leovigild him- self was an Arian, being the last of the Visigothic kings to hold that creed ; but he was not a bitter foe of the orthodox Christians, although he was obliged to punish them when they conspired against him with his external enemies. His son Hermenegild, however, was converted to the orthodox faith through the influence of his Frankish wife, Ingundis, daughter of King Sigebert L, and of Leander, metropolitan of Seville. Allying himself with the Byzantines and other enemies of the Visigoths, and supported by most of the orthodox Christians he headed a formidable insurrection. The struggle was fierce; but at length, employing persuasion as well as force, the old king triumphed. Hermenegild was captured; he refused to give up his faith and in March or April 585 he was executed. He was canonized at the request of Philip II., king of Spain, by Pope Sixtus V. About this time Leovigild put an end to the kingdom of the Suevi. During his last years he was engaged in a war with the Franks. He died at Toledo on the 21st of April 586 and was succeeded by his son Recared.

LEPANTO, 1 BATTLE OF, fought on the 7th of October 1571. The conquest of Cyprus by the Turks, and their aggressions on the Christian powers, frightened the states of the Mediterranean into forming a holy league for their common defence. The main promoter of the league was Pope Pius V., but the bulk of the forces was supplied by the republic of Venice and Philip II. of Spain, who was peculiarly interested in checking the Turks r For Lepanto see Naupactus.

both because of the Moorish element in the population of Spain, and because he was also sovereign of Naples and Sicily. In compliment to King Philip, the general command of the league's fleet was given to his natural brother, Don John of Austria. It included, however, only twenty-four Spanish ships. The great majority of the two hundred galleys and eight galeasses, of which the fleet was composed, came from Venice, under the command of the proveditore Barbarigo; from Genoa, which was in close alliance with Spain, under Gianandrea Doria; and from the Pope whose squadron was commanded by Marc Antonio Colonna. The Sicilian and Neapolitan contingents were commanded by the marquess of Santa Cruz, and Cardona, Spanish officers. Eight thousand Spanish soldiers were em- barked. The allied fleet was collected slowly at Messina, from whence it advanced by the

passage between Ithaca and Cephalonia to Cape Marathia near Dragonera. The Turkish fleet which had come up from Cyprus and Crete anchored in the Gulf of Patras. It consisted in all of 273 galleys which were of lighter build than the Christians', and less well supplied with cannon or small arms. The Turks still relied mainly on the bow and arrow. Ali, the capitan pasha, was commander-in-chief, and he had with him Chulouk Bey of Alexandria, commonly called Scirocco, and Uluch Ali, dey of Algiers. On the 7th of October the Christian fleet advanced to the neighbourhood of Cape Scropha. It was formed in the traditional order of the galleys — a long line abreast, subdivided into the centre or " battle " commanded by Don John in person, the left wing under the proveditore Barbarigo, and the right under Gianandrea Doria. But a reserve squadron was placed behind the centre under the marquess of Santa Cruz, and the eight lumbering galeasses were stationed at intervals in front of the line to break the formation of the Turks. The capitan pasha left his anchorage in the Gulf of Patras with his fleet in a single line, without reserve or advance-guard. He was himself in the centre, with Scirocco on his right and Uluch Ali on his left. The two fleets met south of Cape Scropha, both drawn up from north to south, the land being close to the left flank of the Christians, and the right of the Turks. To the left of the Turks and the right of the Christians, there was open sea. Ali Pasha's greater numbers enabled him to outflank his enemy. The Turks charged through the intervals between the galeasses, which proved to be of no value. On their right Scirocco out- flanked the Venetians of Barbarigo, but the better build of the galleys of Saint Mark and the admirable discipline of their crews gave them the victory. The Turks were almost all sunk or driven on shore. Scirocco and Barbarigo both lost their lives. On the centre Don John and the capitan pasha met prow to prow — the Christians reserving the fire of their bow guns (called di cursia) till the moment of impact, and then boarding. Ali Pasha was slain and his galley taken. Everywhere on the centre the Christians gained the upper hand, but their victory was almost turned into a defeat by the mistaken manoeuvres of Doria. In fear lest he should be outflanked by Uluch Ali, he stood out to sea, leaving a gap between himself and the centre. The dey of Algiers, who saw the opening, reversed the order of his squadron, and fell on the right of the centre. The galleys of the Order of Malta, which were stationed at this point, suffered severely, and their flagship was taken with great slaughter. A disaster was averted by the marquess of Santa Cruz, who brought up the reserve. Uluch Ali then retreated with sail and oar, bringing most of his division off in good order.

The loss of life in the battle was enormous, being put at 20,000 for the

Turks and 8000 for the Christians. The battle of Lepanto was of immense political importance. It gave the naval power of the Turks a blow from which it never recovered, and put a stop to their aggression in the Eastern Mediterranean. Historically the battle is interesting because it was the last example of an encounter on a great scale between fleets of galleys and also because it was the last crusade. The Christian powers of the Mediterranean did really combine to avert the ruin of Christendom. Hardly a noble house of Spain or Italy was not represented in the fleet, and the princes headed the boarders. Volunteers came from all parts of Europe, and it is said that

among them was Sir Richard Grenville, afterwards famous for his fight in the ” Revenge ” off Flores in the Azores. , Cervantes was undoubtedly present, and had his left hand shattered by a Turkish bullet.

For full accounts of the battle, with copious references to author- ities and to ancient controversies, mostly arising out of the conduct of Doria, see Sir W. Stirling Maxwell, Don John of Austria (1883); and Jurien de la Graviere, La Guerre de Chypre et la bataille de Lepanto (1888). (D. H.)

LE PAUTRE, JEAN (1618-1682), French designer and en- graver. He was apprenticed to a carpenter and builder and in addition to learning mechanical and constructive work developed considerable facility with the pencil. His designs, which were innumerable in quantity and exuberant in fancy, consisted mainly of ceilings, friezes, chimney-pieces, doorways and mural decorations; he also devised fire-dogs, sideboards, cabinets, console tables, mirrors and other pieces of furniture; he was long employed at the Gobelins. His work is often ex- cessively flamboyant and over-elaborate; he revelled in amorini and swags, arabesques and cartouches. His chimney-pieces, however, were frequently simple and elegant. His engraved plates, almost entirely original, are something like 1 500 in number and include a portrait of himself. He became a member of the academy of Paris in 1677.

LEPCHA, the name of the aboriginal inhabitants of Sikkim (q.v.). A peace-loving people, the Lepchas have been repeatedly conquered by surrounding hill-tribes, and their ancient patri- archal customs are dying out. The total number of speakers of Lepeha, or Rong, in all India in 1901, was only 19,291. Their rich and beautiful language has

been preserved from extinction by the efforts of General Mainwaring and others; but their literature was almost entirely destroyed by the Tibetans, and their traditions are being rapidly forgotten. Once free and independent, they are now the poorest people in Sikkim, and it is from them that the coolie class is drawn. They are above all things woodmen, knowing the ways of beasts and birds, and possessing an extensive zoological and botanical nomenclature of their own.

See Florence Donaldson, Lepclia Land (1900). LE PELETIER (or Lepelletier), DE SAINT-FARGEAU, LOUIS MICHEL (1760-1793), French politician, was born on the 29th of May 1 760 at Paris. He belonged to a well-known family, his great-grandfather, Michel Robert Le Peletier des Forts, count of Saint-Fargeau, having been controller-general of finance. He inherited a great fortune, and soon became president of the parlement of Paris and in 1789 he was a deputy of the noblesse to the States-General. At this time he shared the conservative views of the majority of his class; but by slow degrees his ideas changed and became very advanced. On the 13th of July 1789 he demanded the recall of Necker, whose dismissal by the king had aroused great excitement in Paris; and in the Con- stituent Assembly he had moved the abolition of the penalty of death, of the galleys and of branding, and the substitution of beheading for hanging. This attitude won him great popularity, and on the 21st of June 1790 he was made president of the Constituent Assembly. During the existence of the Legislative Assembly, he was president of the general council for the department of the Yonne, and was afterwards elected by this department as a deputy to the Convention. Here he was in favour of the trial of Louis XVI. by the assembly and voted for the death of the king. This vote, together with his ideas in general, won him the hatred of the royalists, and on the 20th of January 1793, the eve of the execution of the king, he was assassinated in the Palais Royal at Paris by a member of the king's body-guard. The Convention honoured Le Peietier by a magnificent funeral, and the painter J. L. David represented his death in a famous picture, which was later destroyed by his daughter. Towards the end of his life, Le Peletier had interested himself in the question of public education; he left fragments of a plan, the ideas contained in which were borrowed in later schemes. His assassin fled to Normandy, where, on the point of being discovered, he blew out his brains. Le Peletier had a brother, Felix (1769-1837), well known for his advanced

ideas. His daughter, Suzanne Louise, was " adopted " by the French nation.

See (Euvres de M. le Peletier de Saint-Fargeau (Brussels, 1826) with a

life by his brother F61ix; E. Le Blant, ” Le Peletier de St- Fargeau,. et son meurtrier,” in the Correspondant review (1874); F. Clerembray, Episodes de la Revolution (Rouen, 1891); Brette, ” La RtSforme de la legislation universelle, et le plan de Lepelletier Saint-Fargeau,” in La Revolution franqaise, xlii. (1902); and M. Tourneux, Bibliog. de I’ hist, de Paris . . . (vol. i., 1890, Nos. 3896*- 3910, and vol. iv., 1906, s.v. Lepeletier).

LEPIDOLITE, or Lithia-Mica, a mineral of the mica group (see Mica). It is a basic alummium, potassium and lithium fluo-silicate, with the approximate formula RLi [Al(OH,F)2J Al(Si0 3)3. Lithia and fluorine are each present to the extent of about 5%; rubidium and caesium are sometimes present in small amounts. Distinctly developed monoclinic crystals or cleavage sheets of large size are of rare occurrence, the mineral being usually found as scaly aggregates, and on this account was named lepidolite (from Gr. Xerls, scale) by M. H. Klaproth in 1792. It is usually of a lilac or peach-blossom colour, but is sometimes greyish-white, and has a pearly lustre on the cleavage surfaces. The hardness is 2J-4 and the sp. gr. 2-8-2-9, the optic axial angle measures so°-7o°. It is found in pegmatite-veins, often in association with pink tourmaline (rubellite) and some- times intergrown in parallel position with muscovite. Scaly masses of considerable extent are found at Rozena near Bystrzitz in Moravia and at Pala in San Diego county, California. The material from Rozena has been known since 1791, and has some- times been cut and polished for ornamental purposes: it has a pretty colour and spangled appearance and takes a good polish, but is rather soft. At Pala it has been extensively mined for the preparation of lithium and rubidium salts. Other localities for the mineral are the island of Uto in Sweden, and Auburn and Paris in Maine, U.S.A.; at Alabashka near Mursinka in the Urals large isolated crystals have been found, and from Central Australia transparent cleavage sheets of a fine lilac colour are known.

The lithium-iron mica zinnwaldite or lithionite is closely allied to lepidolite, differing from it in containing some ferrous iron in addition to the constituents mentioned above. It occurs as greyish silvery scales with hexagonal outlines in the tin- bearing granites of Zinnwald in the Erzgebirge, Bohemia and of Cornwall. (L. J. S.)

LEPIDOPTERA (Gr. Xe7r«, a scale or husk, and irrepov, a wing), a term used in zoological classification for one of the largest and best-known orders of the class Hexapoda (q.v.), in order that comprises the insects popularly called butterflies and moths. The term was first used by Linnaeus (1735) in the sense still accepted by modern zoologists, and there are few

After Edwards, Riley and Howard's Insect Life, vol. 3 (U.S. Dept. Agr.).

Fig. 1. — e, Crytophasa unipuctata, Donov., Australia, a, Larva;

c, pupa, natural size; b, 2nd and 3rd abdominal segments of larva;

d, cremaster of pupa, magnified.

groups of animals as to whose limits and distinguishing characters less controversy has arisen.

Characters.— The name of the order indicates the fact that the wings (and other parts of the body) are clothed with flattened

cuticular structures— the scales (fig. 7)— that may be regarded as modified arthropodan " hairs." Such scales are not peculiar to the Lepidoptera — they are found also on many of the Aptera, on the Psocidae, a family of Corrodentia, on some Coleoptera (beetles) and on the gnats (Culicidae), a family of Diptera. The most distinctive structural features of the Lepidoptera are to be found in the jaws. The mandibles are mere vestiges or entirely absent; the second maxillae are usually reduced to a narrow transverse mentum which bears the scale-covered labial palps, between which project the elongate first maxillae, grooved on their inner faces, so as to form when apposed a tubular proboscis adapted for sucking liquid food.

All Lepidoptera are hatched as the eruciform soft-bodied type of larva (fig. 1, a) known as the caterpillar, with biting mandibles, three pairs of thoracic legs and with a variable number (usually five pairs) of abdominal prolegs, which carry complete or incomplete circles of hooklets. The pupa in a single family only is free (i.e. with the appendages free from the body), and mandibulate. In the vast majority of the order it is more or less obtect (i.e. with the appendages fixed to the cuticle of the body) and without mandibles (fig. 1, c).

Structure. — The head in the Lepidoptera is sub-globular in shape with the compound eyes exceedingly well developed, and with a pair of ocelli or " simple eyes " often present on the vertex. It is connected to the thorax by a relatively broad and membranous " neck." The feelers are many-jointed, often they are complex,

the segments bearing processes arranged in a comb-like manner and

furnished with numerous sensory hairs (fig. 2). The complexity of the feelers is carried to its highest develop- ment in certain male moths chat have a wonderful power of discovering their females by smell or From Riley and Howard, Insect Life, vol. 7 (U.S. Dept. some analogous sense. Agr). Often the feelers are

FiG. 2. — a, Feeler of Saturniid Moth (Telea excessively complex polyphemus). b, c. Tips of branches, highly in male moths whose magnified. maxillae are so re-

duced that they take no food in the imaginal state. The nature of the jaws has already been briefly described. Functional mandibles of peculiar form (fig. 3, A) are present in the remarkable small moths of the genus Micropteryx (or Eriocephala) , and there are vestiges of these jaws in other moths of low type, but the minute structures in the higher Lepidoptera that were formerly described as mandibles are now believed to belong to the labrum, the true mandibles being perhaps

represented by rounded prominences, not articulated with the head-capsule. Throughout the order, as a whole, the jaws are adapted for sucking liquid food, and the suctorial pro- boscis (often erroneously called a ” tongue “) is formed as was shown by J. C. Savigny in 1816 by two elongated and flexible outgrowths of the first maxillae, usually regarded as representing the outer lobes or galeae (fig. 4, A, B, g). These struc- tures are grooved along their inner faces and by means of a series of interlocking hair-like bristles can be joined together so as to form a After A. Walter (Jen. Zeits. f. tubular sucker (fig. 4, C). At their Naiuns. vol. 18). extremities they are beset with club-

Fig. 3.— A, Mandible, and like sense-organs, whose apparent B, 1st maxilla of Micropteryx function is that of taste. The pro- (Eriocephala). Magnified. boscis when in use is stretched out

, o.- in front of the head and inserted

a, stipes. into the cot . iia of a flower or else-

e,. <~arao or w i iere> i 0T the absorption of liquid maxilla. nourishment. When at rest, the proboscis is rolled up into a close spiral beneath the head and between the labial palps (fig. 4, A, p). Only in the genus Micropteryx mentioned above is the lacinia of the maxilla (as A. Walter has shown) developed (fig. 3, B, c). The maxillary palp is usually a mere vestige (fig. 4, B, p) though it is conspicuous in a few families of small moths. A consider-

able- number of Lepidoptera take no food in the imaginal state; in these the maxillae are reduced or altogether atrophied. The second maxillae are intimately fused together to form the labiumˆ which consists only of a reduced men- turn, bearing some- times vestigial lobes and always a pair of palps. These have two or three seg- ments and are clothed with scales. The form and direc- tion of the terminal segment of the labial palp afford valuable characters in classi- fication.

In the thorax of the Lepidoptera the foremost segment or prothorax is very small, and not mov- able on the meso- thorax. In many families it carries a pair of small erectile plates — the patagia — which have been

regarded as serially p 4 ._ Arrangement f the jaws in a wiZ g °The me» typical Moth. Somewhat diagrammatic and ZTax is T ex < ten"fve'; »V «** * Burgess and V. L. Kellogg its scutum forming (Amer – NaL xlv " m ' most of the dorsal A, Front view of head, thoracic area and c, Clypeus.

Compound eye.

Vestigial mandible.

Labrum.

Galeae of 1st maxillae.

Labial palp. Magnified, B. [head.

Base of first maxilla dissected out of the

Vestigial palp.

Galea. Further magnified.

Part transverse section showing how the channel (a) of the proboscis is formed by the interlocking of the grooved inner faces of the flexible maxillae.

Air-tube.

Nerve.

Muscle-fibres. Highly magnified.

o, Palp. b, Galea, f, Lacinia.

small plates — teg- u 1 a e — a re o f t e n m, present at the base h of the forewings, as g, in Hymenoptera. P, The tegulae which b, are beset with long P, hair-like scales are g, often conspicuous.' C, The metathorax is smaller than the mesothorax. The legs are of the typical t, hexapodan form «, with five-segmented m,

feet ; the shins often

bear terminal and median spurs articulated at their bases and' the

entirelimbs are clothed with scales.

The wings of the Lepidoptera may be said to dominate thestructure of the insect ; only exceptionally, in certain female moths, are they vestigial or absent (fig. 17). The forewing, withits prominent apex, is longer than the / " 1

hindwing, and the < ' "" '"" " a

neuration in both (see figs. 5 and 6) is for the most part longitudinal, only a few transverse ner- vures, which are, in fact, branches of the median trunk,

marking off a dis- coidal areolet or

" cell " (fig. 5, a).

The five branches of

the radial nervure

(figs. 5. 6, 3) (see

Hexapoda) are

usually present in

the forewing, but

the hindwing, in

most families, has

only a single radial

nervure ; its anal

area is, however,

often more strongly

developed than that

of the forewing. The

two wings of a side

are usually kept together during flight by a few stout bristles — the

frenulum— ‘(fig. 5, /) projecting from the base of the costaof the

hindwing and fitting beneath a membranous fold or a few thickened

scales— the retinaculum — on the under surface of the forewing.

In butterflies there is no frenulum, but a costal outgrowth of the

Sr ii

After A. S. Packard, Mem. Nat, Acad. Set. vol. vii.

Fig. 5. — Wing-neuration of a Notodont Moth. 2, Subcostal; 3, radial; 4, median; 5, cubital; 7, 8, anal nervures. a, Discoidal areolet or “cell”; /, frenulum. Note that the forewing has five branches (1- — 5) of the radial nervure, the hindwing one only. The first anal nervure (No. 6) is absent.

After Packard, Mem. Nat. Acad. Sci. vol. vii.

Fig. 6. — Wing neuration of a Swift Moth (Hepialid). j, Jugum. Ner vures numbered as in fig. 5. Note that there are five branches to the radial nervure (No. 3) in both fore- and hindwing, and that the median trunk nervures (No. 4) traverse the discoidal areolet.

hindwing subserves the same function. In the most primitive moths a small lobate outgrowth — the jugum (fig. 6, j.) — from the dorsum of the forewing is present, but it can be of little service in keeping the two wings tfogether. A jugum may be also present on the hindwing. The legs, which are generally used for clinging rather than for walking, have five-segmented feet and are covered with scales. In

some families the front pair are reduced and without tarsal segments.

Ten abdominal segments are recognizable in many Lepidoptera, but the terminal segments are reduced or modified to form external

organs of reproduction. In 2 the male, according to the

interpretation of C. Pey- toureau, the lateral plates belonging to the ninth seg- ment form paired claspers beset with harpes, or series of ridges or teeth, while the tergum of the tenth seg- ment forms a dorsal hook — the uncus — and its ster- num a ventral process or scaphium. In the female the terminal segments form, in some cases, a protrusible ovipositor, but the typical hexapodan ovi- positor with its three pairs of processes is undeveloped in the Lepidoptera.

As already mentioned, the characteristic scales on the wings, legs and body of the Lepidoptera are cuticular structures. A complete series of transi- tional forms can be traced between the most elaborate flattened scales (fig. 7, B) with numerous longitudinal striae and a simple arthropod ” hair.” Either a ” hair ” or a scale owes its origin to a special cell of the ectoderm (hypodermis), a process from which grows through the general cuticle and forms around itself the substance of the cuticular appendage. The scales on the wings are arranged in regular rows (fig. 7, A), and the general cuticle is drawn out into a narrow neck or collar around the base of each scale. The scales can be easily rubbed from the surface of the wing, and the series of collars in which the scales rest are then evident (fig. 7, A, c) on the wing-membrane. On the wings of many male butterflies there are specially modified scales — the androconia (fig. 7, C) — which are formed by glandular cells and diffuse a scented secretion. In some cases, the androconia are mixed among the ordinary scales; in others they are associated into conspicuous ” brands ” (see fig. 66). The admirable colours of the wings of the Lepidoptera are due partly to pigment in the scales — as in the case of yellows, browns, reds and blacks — partly to ” interference ” effects from the fine striae on the scales — as with the blues, purples and greens.

A few points of interest in the in- ternal structure of the Lepidoptera deserve mention. The mouth opens into a sub-globular, muscular pharynx which is believed to suck the liquid food through the proboscis, and force it along the slender gullet into a crop- like enlargement or diverticulum of the fore-gut known as a ” food-reservoir ” or sucking-stomach.” The true ot scales in rows on wing stomach is tubular, and beyond it lies of Butterfly n Nervure- tne lntest ine lnto which open the three collar-like outgrowths P airs of

excretory (Malpighian) tubes. — – - The terminal part of the intestine is of wide diameter, and in some cases The brain ganglia are closely approximated; there are two or three thoracic and four (rarely five) abdominal ganglia. In the female each ovary has four ovarian tubes, in which the large egg-cells are enclosed in follicles and associated with nutritive cells. There is a special bursa which in the Hepialidae opens with the vagina on the eighth abdominal sternum. In the Micropterygidae, Enocraniidae and the lower Tineides, the duct of the bursa leads into the vagina, which still opens on the eighth sternum. But in most Lepidoptera, the bursa opens by a vestibule on the eighth sternum, distinct from the vagina, whose opening shifts back to the ninth, the duct of the bursa being connected with the vagina by a canal which opens opposite to the spermatheca. In the male, the two testes are usually fused into a single mass, and a pair of tubular accessory glands open into the vasa deferentia or into the ejaculatory duct. In a few families — the Hepialidae and Saturniidae

for example — the testes retain the primitive paired arrangement. These details have been worked out by various students, among whom W. H. Jackson and W. Petersen deserve special mention. Summing up the developmental history of the genital ducts, Jackson remarks that there is ” an Ephemeridal stage, which ends towards the close of larval life, an Orthopteran stage, indicated during the quiescent period preceding pupation, and a Lepidopteran stage which begins with the commencement of pupal life.”

Development — Many observations have been made on the embryology of the Lepidoptera; for some of the more important

Fig. 7. — A, Arrangement of scales

of cuticle. Magnified, single scale, and C,

B,

an

androconium more highly % W ? S ° ff a * hort ca ecum. m o„ˆ;fi nr i and the sub-oesophageal

magnified.

Fig. 8 a. — Cossus macmurtrei. (MacMurtrie’s Goat Moth.) N. America.

results of these see Hexapoda. The post-embryonic develop- ment of

Lepidoptera is more familiar, perhaps, than that of any other group of animals. The egg shows great variation in its outward form, the outer envelope or chorion being in some families globular, in others flattened, in others again erect and sub-conical or cylindrical; while its surface often exhibits a beautifully regular series of ribs and furrows. Throughout the order the larva is of the form known as the caterpillar (fig. 1, a, b, fig. 8 b)

Fig. 8 b. — Larva of Cossus cossus. (Goat Moth.) Europe.

characterized by the presence of three pairs of jointed and clawed legs on the thorax and a variable number of pairs of abdominal ” prolegs “—sub-cylindrical outgrowths of the abdominal seg- ments, provided with a complete or incomplete circle of hooklets at the extremity.

There are ten abdominal segments — the ninth often small and concealed ; prolegs are usually present on the third, fourth, fifth, sixth and tenth of these segments. The head of the caterpillar (fig. 9) is large with firmly chitinized cuticle ; it carries usually twelve simple eyes or ocelli, a pair of short feelers (fig. 9 At) and a pair of strong mandibles (fig. 9, Mri), for the caterpillar feeds by biting leaves or other plant- tissues. The first maxillae, so highly developed in the imago, are in the larva small and inconspicuous ap- pendages, each bearing two short jointed processes, — the galea and the palp (fig. 9, Mx). The second maxillae form a plate-like labium on whose surface projects the • ■ j_i,

spinneret which is usually regarded _ T . , r „ ,, ,

as a modified hypopharynx (fig. 9, „ FlG -.?-— Head of Goat Moth Lm). The silk-glands whose ducts Caterpillar [Cossus) from be- open on this spinneret are paired hln . d ˆ Magnified.ˆ (From Miall convoluted tubes lying alongside the elongate cylindrical stomach. In the common ” silkworm ” these glands are five times as long as the boay of the caterpillar. They are re- garded as modified salivary glands, though the correspondence has been doubted by some students. The body of the caterpillar is usually cylindrical and wormlike, with the

Mx

and Denny after Lyonnet.) At, Feeler. Mn, Mandible. Mx, First maxilla. Lm, Second maxillae (Lab- ium) with spinneret.

segmentation well marked and the cuticle feebly chitinized and flexible. Firm chitinous plates are, however, not seldom present on the prothorax and on the hindmost abdominal segment. The seg- ments are mostly provided with bristle or spine-bearing tubercles, whose arrangement has lately been shown by H. G. Dyar to give partially trustworthy indications of relationship. On either side of the median line we find two dorsal or trapezoidal tubercles (Nos. 1 and 2), while around the spiracle are grouped (Nos. 3, 4 and 5) supra-, post-, and pre-spiracular tubercles; below are the sub- spiraculars, of which there may be two (Nos. 6, 7). The last-named is situated on the base of the abdominal proleg, and yet another tubercle (No. 8) may be present on the inner aspect of the proleg. The spiracles are very conspicuous on the body of a caterpillar, occurring on the prothorax and on the first eight abdominal seg- ments. Various tubercles may become coalesced or aborted (fig. 10, B) ; often, in conjunction with the spines that they bear, the tubercles serve as a valuable protective armature for the caterpillar. Much discussion has taken place as to whether the abdominal prolegs are or are not developed directly from the embryonic abdominal appendages. In the more lowly families of Lepidoptera, these organs are provided at the extremity with a complete circle of hooklets, but in the more highly organized families, only the inner half of this circle is retained.

The typical Lepidopteran pupa, or ” chrysalis,” as shown in the higher families, is an obtect pupa (fig. 1 1) with no trace of mandibles, the appendages being glued to the body by an exudation, and

B, after Grote, Mitt, aus dem Roemer Museum, No. 6.

Fig. 10. — Abdominal segments of Caterpillars, to show arrangement of tubercles; the arrows point anteriorly. A, Generalized condition; B, special- ized condition in the Saturniidae. s, Spiracle ; the numbering of the tubercles is explained in the text. Note that in Fig. ii. — Pupa

B No. 2 is much reduced and disappears of a Butterfly

after the first moult. 4 and 5 are (Amathusia phi-

coalesced, and 6 is absent. dippus).

motion being possible only at three of the abdominal intersegmental regions, the fifth and f ixth abdominal segments at most being ” free.” A flattened or pointed process — the cremaster — often prominent at the tail-end, may carry one or several hooks (fig. 1, d) which serve to

anchor the pupa to its cocoon or to suspend butterfly-pupae from their pad of silk (fig. 11). In the lower families the pupa (fig. 1, c) is only incompletely obtect, and a greater number of abdominal segments can move on one another. The seventh ab- dominal segment is, in all female lepidopterous pupae, fused with those behind it; in the male “incomplete” pupa this becomes ” free ” and so may the segments anterior to it, in both sexes, for- ward to and including the third. The presence of circles of spines on the abdominal segments enables the ” incomplete ” pupa as a whole to work its way partly out of the cocoon when the time for the emergence of the imago draws near. In the family of the Eriocraniidae (often called the Micropterygidae) the pupa resembles that of a caddis-fly {Trichopteron) being active before the emergence of the imago and provided with strong mandibles by means of which it bites its way out of the cocoon. The importance of the pupa in the phylogeny and classification of the Lepidoptera has lately been demonstrated by T. A. Chapman in a valuable series of papers. Sometimes organs are present in the pupa which are undeveloped in the imago, such as the maxillary palps of the Sesiidae (clearwing moths) and the pectination on the feelers of female Saturniids. E. B. Poulton has drawn attention to the ancestral value of such characters.

Habits and Life- Relations. — The attractiveness of the Lepidop- tera and the conspicuous appearance of many of them have led to numerous observations on their habits. The method of feeding of the imago by the suction of liquids has already been mentioned in connexion with the structure of the maxillae and the food- canal. Nectar from flowers is the usual food of moths and butterflies, most of which alight on a blossom before thrusting the proboscis into the corolla of the flower, while others —the hawk moths (Sphingidae) for example — remain poised in the

air in front of the flower by means of excessively rapid vibration of the wings, and quickly unrolling the proboscis sip the nectar. Certain flowers with remarkably long tubular corollas seem to be specially adapted for the visits of hawk moths. Some Lepidoptera have other sources of food-supply. The juices of fruit are often sought for, and certain moths can pierce the envelope of a succulent fruit with the rough cuticular outgrowths at the tips of the maxillae, so as to reach the soft tissue within. Animal juices attract other Lepidoptera, which have been observed to suck blood from a wounded mammal; while putrid meat is a familiar ” lure ” for the gorgeous ” purple emperor ” butterfly (A patura iris) . The water of streams or the dew on leaves may be frequently sought by Lepidoptera desirous of quenching their thirst, possibly with fatal results, the insects being sometimes drowned in rivers in large numbers. Members of several families of the Lepidoptera — the Hepialidae, Lasiocampidae and Saturniidae, for example — have the maxillae vestigial or aborted, and take no food at all after attaining the winged condition. In such insects there is a complete ” division of labour ” between the larval and the imaginal instars, the former being entirely devoted to nutritive, the latter to reproductive functions.

Of much interest is the variety displayed among the Lepidop- tera in the season and the duration of the various instars. The brightly coloured vanessid butterflies, for example, emerge from the pupa in the late summer and live through the winter in sheltered situations, reappearing to lay their eggs in the succeed- ing spring. Many species, such as the vapourer moths (Orgyia), lay eggs in the autumn, which remain unhatched through the winter. The eggs of the well-known magpie moths (Abraxas) hatch in autumn and the caterpillar hibernates while still quite small, awaiting for its growth the abundant food-supply to be afforded by the next year’s foliage. The codlin moths (Carpo- capsa) pass the winter as resting full-grown larvae, which seek shelter and spin cocoons in autumn, but do not pupate until the succeeding spring. Lastly, many of the Lepidoptera hibernate in the pupal stage; the death’s head moth (Acherontia) and the cabbage-white butterflies (Pieris) are familiar examples of such. The last-named insects afford instances of the ” double-brooded ” condition, two complete life-cycles being passed through in the year. The flour moth (Ephestia kiihnidla) is said to have five successive generations in a twelvemonth. On the other hand, certain species whose larvae feed in wood or on roots take two or three years to reach the adult stage.

The rate of growth of the larva depends to a great extent on the nature of its food, and the feeding-habits of caterpillars afford much of

interest and variety to the student. The contrast among the Lepidoptera between the suctorial mouth of the imago and the biting jaws of the caterpillar is very striking (cf. figs. 4 and 9), and the profound transformation in structure which takes place is necessarily accompanied by the change from solid to liquid food. The first meal of a young caterpillar is well known to be often its empty egg-shell; from this it turns to feed upon the leaves whereon its provident parent has laid her eggs. But in a few cases hatching takes place in winter or early spring, and the young larvae have then to find a temporary food until their own special plant is available. For example, the caterpillars of some species of Xanthia and other noctuid moths feed at first upon willow-catkins. On the other hand, the caterpillars of the pith moth (Blastodacna) hatched at midsummer, feed on leaves when young, and burrow into woody shoots in autumn. All who have tried to rear caterpillars know that, while those of some species will feed only on one particular species of plant, others will eat several species of the same genus or family, while others again are still less particular, some being able to feed on almost any green herb. It is curious to note how certain species change their food in different localities, a caterpillar confined to one plant in some localities being less particular elsewhere. Individual aberrations in food are of special interest in suggesting the starting-point for a change in the race. When we consider the vast numbers of the Lepidoptera and the structural modifica- 1 lions which they have undergone, their generally faithful I adherence to a vegetable diet is remarkable. The vast majority

of caterpillars eat leaves, usually devouring them openly, and, if of large size, quickly reducing the amount of foliage on the plant. But many small caterpillars keep, apparently for the sake of concealment, to the under surface of the leaf, while others burrow into the green tissue, forming a characteristic sinuous ” mine ” between the two leaf-skins. In several families we find the habit of burrowing in woody stems, — the ” goat ” (Cossus, fig. 8) and the clearwings (Sesiidae), for example, while others, like the larvae of the swift moths (Hepialidae) live underground devouring roots (fig 12). The richer nutrition in the green food is usually shown by the quicker growth of the numerous cater- pillars that feed on it, as compared with the slower development of the wood and root-feeding species. Aquatic larvae are very rare among the Lepidoptera The caterpillars of the pyralid ” china-mark ” moths (Hydrocampa, fig. 13), however, live under water, feeding on duckweed (Lemna) and breathing atmospheric air, a film of

which is enclosed in a spun-up shelter beneath the leaves, while the larvae of Paraponyx, which feed on Stratioks, have closed spiracles and breathe dissolved air by means of branchial filaments along the sides of the body.

the smut-covered bark of the tree, it roams about during its later stages, devouring several coccids every day. So nutritious is the food, that four or five successive broods follow each other through the summer.

The habit just mentioned of forming some kind of protective covering out of foreign substances spun together by silk is practised by caterpillars of different families. The clothes moth larvae (Tinea, fig. 14), for example, make a tubular dwelling out

Fig. 12.— Larva of Hepialus humuli (ghost moth).

Fig. 13. — Hydro- campa aquatilis (water moth).

We may now turn to instances of more anomalous modes of feeding. The clothes moths (Tineids) have invaded our dwellings and found a congenial food-stuff for their larvae in our garments. A few small species of the same group are reared in meal and other human food-stores; so are the caterpillars of some pyralid moths (Ephestia), while others (Asopia, Aglossa) feed upon kitchen refuse. Two species of crambid moths (Aphomia sociella and Galleria melonella) find a home in bee-hives, where their caterpillars feed upon the wax, while the waxy secretion from the body of the great American lantern-fly (Fulgora candelaria) serves both as shelter and food for the caterpillar of the moth Epipyrops anomala. Very few caterpillars have developed a thoroughly carnivorous habit. That of Cosmia trapezina feeds on oak and other leaves, but devours smaller caterpillars which happen to get in its way, and if shaken from the tree, eats other larvae while climbing the trunk. Xylina omilhopus and a few other species are said to be always carni- vorous when opportunity offers; the small looping caterpillar of a ” pug ” moth (Eupithecia coronata) has been observed to eat a larva three times as big as itself. The caterpillars of Orthosia pislacina live together in peace while their food is moist, but devour each other when it dries up; this is true cannibalism — a term which should not be applied to the habit of preying on another species. A few carnivorous caterpillars do not attack other caterpillars, but prey upon insects of another order; among these Fenescia larquinius, which eats aphides, and Erastria scitula, which feeds upon scale insects, must be reckoned as bene- factors to mankind. The life-history of the latter moth has been worked out by H. Rouzaud. It inhabits the shores of the

Medi- terranean, and its caterpillar devours the coccids upon various fruit-trees, especially the black-scale (Lecanium oleae) of the olive. The moth, which is a small noctuid, the white markings on whose wings give it the appearance of a bird-dropping when at rest in the daytime, appears in May, and lays her eggs, singly and far apart, upon the trees infested by the coccids. When hatched, the young caterpillar selects a large female coccid, eats its way through the scale, and devours the insect beneath; having done this it makes its way to a fresh victim. As it increases in size it forms a case for itself made of the scales of its victims, excrement, &c, bound together by silk which it spins, and, protected by this covering, which closely resembles

After Marlatt (after Riley), Bull. 4, Din. Ent. U.S. Deft. Agr.

Fig. 14. — Clothes Moth (Tinea pellionella) , with larva in and out of. its case. Magnified.

of the pellets of wool passed from their own intestines, while the allied Tortricid caterpillars roll up leaves and spin for themselves cylindrical shelters. The habit of spinning over the food plant a protective mass of web, whereon the caterpillars of a family can live together socially is not uncommon. In the case of the small ermine moths (Hyponomeuta) the caterpillars remain associated throughout their lives and pupate in cocoons on the mass of web produced by their common labour. But the larger, spiny caterpillars of the vanessid butterflies usually scatter away from the nest of their infancy when they have attained a certain size.

Spines and hairs seem to be often effective protections for caterpillars; the experiments of E. B. Poulton and others tend to. show that hairy caterpillars (fig. 15) are distasteful to birds. Many caterpillars are protected by the harmony of their general green coloration with their surroundings. When the insect attains a large size — as in the case of the hawk moth (Sphingid) cater- pillars — the extensive green surface becomes broken up by diagonal dark markings (fig. 466), thus simulating the effect of light and shade among the foli- age. A remarkable result of Poulton ‘s experiments has been the establishment of a reflex effect through the skin on the colour of a caterpillar. Some species of ” loopers ” (Geometridae, fig. 43) for example, if placed when young among surroundings of a certain colour, become closely assimilated thereto — dark brown among dark twigs, green among green leaves. These colour-reflexes in conjunction with the elongate twig-like shape of the caterpillars and their habit of stretching themselves straight out from a branch, afford some of the best and most familiar examples of ” protective resemblance.” The ”

terrifying attitude ” of caterpillars, and the supposed resemblance borne by some of them to serpents and ‘other formidable vertebrates or arthropods, are discussed in the article Mimicry.

The silk produced by a caterpillar is, as we have seen, often advantageous in its own life-relations, but its great use is in connexion with the pupal stage. In the life-history of many Lepidoptera, the last act of the caterpillar is to spin a cocoon which may afford protection to the pupa. In some cases this is formed entirely of the silk produced by the spinning-glands, and may vary from the loose meshwork that clothes the pupa of the

Fig. 15. — Larva of Orgyia gonostigma. Europe.

After Ratzeburg, Insect Life, vol. 2 (U.S. Dept. Agr.).

Fig. 16. — Pupa of Gypsy Moth {Porthelria dispar) sheltered in leaves joined by silken threads. Below is the cast larval cuticle.

diamond-back moth (Plutella cruciferarum) to the densely woven cocoon of the silkworms (Bombycidae and Saturniidae) or the hard shell-like covering of the eggars (Lasiocampidae). Fre- quently foreign substances are worked up with the silk and serve to strengthen the cocoon, such as hairs from the body of the caterpillar itself, as among the ” tigers ” (Arctiidae) or chips of wood, as with the timber-burrowing larva of the ” goat ” {Cossus). In many families of Lepidoptera we can trace a degenera- tion of the cocoon. Thus, the pupae of most owl moths (Noctuidae) and hawk moths (Sphingidae) lie buried in an earthen cell. Among the butterflies we find that the cocoon is reduced to a pad of silk which gives attachment to the cremaster; in the Pieridae there is in addition a girdle of silk around the waist-region of the pupa, but the pupae of the Nymphalidae (figs, n, 65) simply hang from the supporting pad by the tail-end. Poulton has shown that the colours of some exposed pupae vary with the nature of the surroundings of the larva during the final stage.

When the pupal stage is complete the insect has to make its way out of the cocoon. In the lower families of moths it is the pupa which comes out at least partially, working itself onwards by the spines on its abdominal segments; the pupa of the primitive Micropteryx has functional mandibles with which it bites through the cocoon. In the higher Lepidoptera the pupa is immovable, and the imago, after the

ecdysis of the pupal cuticle, must emerge. This emergence is in some cases facilitated by the secretion of an acid or alkaline solvent discharged from the mouth or from the hind-gut, which weakens the cocoon — so that the delicate moth can break through without injury.

As might be expected, the conditions to which larva and pupa are subjected have often a marked influence on the nature of the imago. An indifferent food-supply for the larva leads to a dwarfing of the moth or butterfly. Many converging lines of experiment and observation tend to show that cool conditions during the pupal stage frequently induce darkening of pigment in the imago, while a warm temperature brightens the colours of the perfect insect. For example, in many species of butterfly that are double-brooded, the spring brood emerging from the wintering pupae are more darkly coloured than the summer brood, but if the pupae producing the latter be subjected artifici- ally to cold conditions, the winter form of imago results. It is usually impossible, however, to produce the summer form of the species from wintering pupae by artificial heat. From this A. Weismann argued that the more stable winter form must be regarded as representing the ancestral race of the species. Further examples of this ” seasonal dimorphism ” are afforded by many tropical butterflies which possess a darker ” wet-season ” and a brighter ” dry-season ” generation. So different in appearance are often these two seasonal forms that before their true relationship was worked out they had been naturally regarded as independent species. The darkening of wing- patterns in many species of Lepidoptera has been carefully studied in our own British fauna. Melanic or melanochroic varieties are specially characteristic of western and hilly regions, and some remarkable dark races (fig. 43) of certain geometrid moths have arisen and become perpetuated in the manufacturing districts of the north of England. The production of these melanic forms is explained by J. W. Tutt and others as largely due to the action of natural selection, the damp and sooty conditions of the districts where they occur rendering unusually dark the surfaces— such as rocks, tree-trunks and palings — on which moths habitually rest and so favouring the survival of dark, and the elimination of pale varieties, as tie latter

would be conspicuous to their enemies. Breeding experiments have shown that these melanic races are sometimes ” dominant ” to their parent-stock. An evidently adaptive connexion can be frequently traced between the resting situation and attitude of the insect and the colour and pattern of its wings. Moths that rest with the hindwings concealed beneath the forewings (fig. 34, /) often have the latter dull and mottled, while the former are sometimes highly coloured. Butterflies whose normal resting attitude is with the wings closed

vertically over the back (fig. 63) so that the under surface is exposed to view, often have this under surface mottled and inconspicuous although the upper surface may be bright with flashing colours. Various degrees of such ” protective resemblance ” can be traced, culminating in the wonderful ” imitation ” of its surroundings shown by the tropical ” leaf -butterflies ” (Kallima), the under surfaces of whose wings, though varying greatly, yet form in every case a perfect representation of a leaf in some stage or other of decay, the butterfly at the same time disposing of the rest of its body so as to bear out the deception. How this is effected is best told by A. R. Wallace, who was the first to observe it, in his work The Malay Archipelago: —

” The habit of the species is always to rest on a twig and among dead or dried leaves, and in this position, witfi the wings closely pressed together, their outline is exactly that of a moderately sized leaf slightly curved or shrivelled. The tail of the hindwings forms a perfect stalk and touches the stick, while the insect is supported by the middle pair of legs, which are not noticed among the twigs and fibres that surround it. The head and antennae are drawn back between the wings so as to be quite concealed, and there is a little notch hollowed out at the very base of the wings, which allows the head to be retracted sufficiently.”

But the British Vanessids often rest on a bare patch of ground with the brightly coloured upper surface of their wings fully exposed to view, and even make themselves still more conspicuous by fanning their wings up and down. Some genera and families of Lepidoptera, believed to secrete noxious juices that render them distasteful, are adorned with the staring contrasts of colour usually regarded as ” warning,” while other genera, belonging to harmless families sought for as food by birds and lizards, are believed to obtain complete or partial immunity by their likeness to the conspicuous noxious groups. (See Mimicry.)

Sexual dimorphism is frequent’ among the Lepidoptera. In many families this takes the form of more elaborate feelers in the male than in the female moth. Such complex feelers (fig. 2) bear numerous sensory (olfactory) nerve-endings and give to the males that possess them a wonderful power of dis- covering their mates. A single captive female of the Endromidae or Lasiocampidae often causes hundreds of males of her; species to ” assemble ” around her prison, and this character is made use of by collectors who want to secure specimens. In many butterflies — notably the ” blues ” (Lycaenidae)- — the male is brilliant while the female is dull, and in other groups (the Danainae for example) he is provided with scent-producing glands believed to

be ” alluring ” in function. The apparent evidence given by the sexual differences among the Lepidoptera in favour of C. Darwin’s theory of sexual selection finds no support from a study of their habits. The male indeed usually seeks the female, but she appears to exercise no choice in pairing. In some cases the female is attracted by the male, and here a modified form of sexual selection appears to be opera- tive. The ghost swift A B moth (H epialus humuli) FlG – ! 7-— Vnpourer Moth(Ocneriadetrita). affords a curious and S ” Euro P e – A – Male ˆ B ‘ Female ‘ interesting example of this condition, the female showing the usual brown and buff coloration of her genus, while the wings of the male are pure white, rendering him conspicuous in the dusky evening when pairing takes place. But in the northernmost

haunts of the species, where there is no midsummer night, the male closely resembles the female in wing patterns, the development of the conspicuous white being needless. A very interesting sexual dimorphism is seen in the wingless condition of several female moths — the winter moths (Hybernia and Cheimatobia) among the Geometridae and the vapourers {Orgyia and Ocneria) among the Lymantriidae for example (fig. 17). It might be thought that the loss of power of flight by the female would seriously restrict the range of the species. In such insects, however, the caterpillars are often active and travel far. Distribution and Migration. — The range of the Lepidoptera is practically world-wide; they are absent from the most remote and inhospitable of the arctic and antarctic lands, but even Kerguelen possesses a few small indigenous moths. Many of the large and dominant families have a range wide as that of the order, and certain species that have attached themselves to man — like the meal moths and the clothes moths — have become almost cosmopolitan. Interesting and suggestive restrictions of range can, however, be often traced. Although butterflies have been found in 82 N. latitude in Greenland, they are unknown in Iceland, and only a few species of the group reach New Zealand. Three large sections — the Ithomiinae, Heliconiinae and Brassolinae — of the great butterfly family Nymphalidae are peculiar to the Neotropical region, while the Morphinae, a characteristically South American group, have a few Oriental genera in India and Indo-Malaya. The Acraeinae, another section of the same family, have the vast majority of their species in Ethiopian Africa, but are represented eastwards in the Oriental and Australian regions and westwards in South America. A comparison of the lepidopterous faunas of Ireland, Great Britain and the European

continent is very instructive, and suggests strongly that, despite their power of flight the Lepidoptera are mostly dependent on land-connexions for the extension of their range. For example, Ireland has only forty of the seventy species of British butterflies. The range of many Lepidoptera is of course determined by the distribution of the plants on which their larvae feed.

Nevertheless certain species of powerful flight, and some that might be thought feeble on the wing, often cross sea-channels and establish or reinforce distant colonies. Caterpillars of the great death's head moth (Acherontia atropos) are found every summer feeding in British arid Irish potato fields, but it is doubt- ful if any of the pupae resulting from them survive the winter in our climate. It is believed by Tutt that the species is only maintained by a fresh immigration of moths from the South each summer. Hosts of white butterflies (Pieris) have been frequently observed crossing the English Channel from France to Kent. Migrating swarms of Lepidoptera have often been met by sailors in mid-ocean; thus, Tutt records the presence around a sailing ship in the Atlantic of such a swarm of the rather feeble moth Deiopeia pulchella, nearly 1000 m. from its nearest known habitat. This migratory instinct is connected with the gregarious habits of many Lepidoptera. For example, H. W. Bates states that at one place in South America he noticed eighty different species flying about in enormous numbers in the sunshine, and these, with few exceptions, were males, the females remaining within the forest shades. Darwin describes a "butterfly shower," which he observed 10 m. off the South American coast, extending as far as the eye could reach; " even by the aid of the telescope," he adds, "it was not possible to see a space free from butterflies." Sir J. Emerson Tennent, witnessed in Ceylon a mighty host of butterflies of white or pale yellow hue, " apparently miles in breadth and of such prodigious extension as to occupy hours and even days uninterruptedly in their passage." Observations at Heligoland by H. Gatke have shown that migrating moths " travel under the same conditions as migrating birds, and for the most part in their company, in an east to west direction; they fly in swarms, the numbers of which defy all attempts at computation and can only be expressed by millions." The painted lady butterfly (Pyrameis cardui) comes in repeated swarms from the Mediter- ranean region into northern and western Europe, while in North

America companies of the monarch (Anosia archippus) invade Canada every summer from the United States, and are believed to return southwards in autumn. This latter species has, during the last half-century, extended its range south-westwards across the Pacific and reached the Austro-Malayan islands, while several specimens have

occurred in southern and western England, though it has not established itself on this side of the Atlantic. It is noteworthy that the introduction of its food-plant — Asclepias — into the Sandwich Islands in 1850 apparently enabled it to spread across the Pacific.

Fossil History. — Our knowledge of the geological history of the Lepidoptera is but scanty. Certain Oolitic fossil insects from the lithographic stone of Solenhofen, Bavaria, have been described as moths, but it is only in Tertiary deposits that undoubted Lepidoptera occur, and these, all referable to existing families, are very scarce. Most of them come from the Oligocene beds of Florissant, Colorado, and have been described by S. H. Scudder. The paucity of Lepidoptera among the fossils is not surprising when we consider the delicacy of their structure, and though their past history cannot be traced back beyond early Cainozoic times, we can have little doubt from the geographical distribution of some of the families that the order originated with the other higher Endopterygota in the Mesozoic epoch.

Classification. — The order Lepidoptera' contains more than fifty families, the discussion of whose mutual relationships has given rise to much difference of opinion. The generally received distinction is between butterflies or Rhopalocera (Lepidoptera with clubbed feelers, whose habit is to fly by day) and moths or Heterocera (Lepidoptera with variously shaped feelers, mostly crepuscular or nocturnal in habit). This distinction is quite untenable as a zoological conception, for the relationship of butterflies to some moths is closer than that of many families of Heterocera to each other. Still more objectionable is the division of the order into Macrolepidoptera (including the butterflies and large moths) and the Microlepidoptera (comprising the smaller moths). Most of the recent suggestions for the division of the Lepidoptera into sub-orders depend upon some single character. Thus J. H. Comstock has proposed to separate the three lowest families, which have — like caddis-flies (Trichoptera) — a jugum on each forewing, as a sub-order Jugatae, distinct from all the rest of the Lepidoptera — the Frenatae, mostly posses- sing a frenulum on the hind wing. A. S. Packard places one family (Micropterygidae) with functional mandibles and a lacinia in the first maxilla alone in a sub-order Laciniata, all the rest of the order forming the sub-order Haustellata. T. A. Chapman divides the families- with free or incompletely obtect and mobile pupae (Incompletae) from those with obtect pupae which never leave the cocoon (Obtectae) , and this is probably the most natural primary division of the Lepidoptera that has as yet been suggested. Dyar puts forward a classification founded entirely on the structure of the larva, while Tutt divides the

Lepidoptera into three great stirps characterized by the shape of the chorion of the egg. The primitive form of the egg is oval, globular, or flattened with the micropyle at one end; from this has apparently been derived the upright form of egg with the micropyle on top which characterizes the butterflies and the higher moths. These schemes, though helpful in pointing out important differences, are unnatural in that they lay stress on single, often adaptive, characters to the exclusion of others equally important. Although it is perhaps best to establish no division among the Lepidoptera between the order and the family, an attempt has been made in the classification adopted in this article to group the families into tribes or super-families which may indicate their probable affinities. The systematic work of G. F. Hampson, A. R. Grote and E. Meyrick has done much to place the classification of the Lepidoptera on a sound basis, so far as the characters of the imago are concerned, but attention must also be paid to the preparatory stages if a truly natural system is to be reached.

Jugatae. Three families are included in this group having in common certain primitive characters of the wings and neuration (see fig. 6),

as well as of the larva and pupa. There is a membranous lobe or jugum near the base of the wing, and the neuration of the hindwing is closely like that of the forewing, the radial nervure being five-branched in both. The pupa has four or five movable segments, and the larval prolegs have complete circles of hooklets.

The three families of the Jugatae are not very closely related to each other. The Micropterygidae (often known as Eriocephalidae) , comprising a few small moths with metallic wings, are the most primitive of all Lepidoptera. They are provided with functional mandibles, while the maxillae have distinct laciniae, well-developed palps and galeae not modified for suction (see fig. 3). The larva is remarkable on account of its long feelers, the presence of pairs of jointed prolegs on the first eight abdominal segments, an anal sucker beneath the last segment and bladder-like outgrowths on the cuticle. These curious larvae feed on wet moss. The family has only a few genera scattered widely over the earth’s surface (Europe, America, Australia, New Zealand).

The Eriocraniidae resemble the Micropterygidae in appearance, but the imago has no mandibles, and the maxillae, though short and

provided with conspicuous palps, have no laciniae and form a proboscis as in Lepidoptera generally. The abdomen of the female carries a serrate piercing process, and the eggs are laid in the leaves of deciduous trees, the white larvae, with aborted legs, mining in the leaf tissue. The fully-fed larva winters in an underground cocoon and then changes into the most remarkable of all known lepidopter- ous pupae, with relatively enormous toothed mandibles which bite a way out of the cocoon in preparation for the final change. These pupal mandibles of the Eriocraniidae, together with the nature of the rmaginal maxillae in the Micropterygidae (Eriocephalidae) and the wing-neuration in both families, point strongly to a relationship between the Lepidoptera and the Trichoptera.

The Hepialidae or swift moths — the third family of the Jugatae — are in some respects specialized. The moths are of large or moderate size with the maxillae in a vestigial condition, no food being taken after the attainment of the perfect state. The larvae (fig. 12) feed either on roots or in the wood of trees and shrubs, not attaining their growth in less than a year and some large exotic species living for two or three. The family is world-wide in range, and Australia possesses some almost gigantic and strangely coloured genera.

Tineides.

A large assemblage of moths, mostly of small size, are included in this group. The wings have no jugum, but there is a frenulum on the hindwing, which has, as in all the groups above the Jugatae, only a single radial nervure. Three anal nervures are present in the hindwing in those families whose wings are well developed, but in several families of small moths the wings of both pairs are very narrow and pointed, and the neuration is consequently reduced. The sub-costal nervure of the hindwing is usually present and distinct from the radial nervure. The egg is flat except in the Cossidae and Castniidae in which it is upright. The larval prolegs, with few exceptions, have a complete circle of hooklets, and the larvae usually feed in some concealed situation. The pupa is incom- pletely obtect, with three (in some females only two) to five free abdominal segments, and emerges partly from the cocoon before the moth appears. The cremaster serves to anchor the pupa to its cocoon at the correct degree of emergence, and thus facilitates the eclosion of the imago.

The Cossidae are a small family of large moths (figs. 8, 18, 19) belonging to this section, characterized by their heads with erect rough scales or hairs, the pectinate feelers of the males, their reduced maxillae so that no food is taken in the perfect state, and their

Fig. 18. — Stygia a U s Ir a lis . S. Europe. Fig. 19. — Zeuzera scalaris. India.

wings with the fifth radial nervure arising from the third, and the main median nervure forking in the discoidal areolet. The larvae feed in plant stems, often in the wood of trees, forming tunnels and galleries, and usually taking a year or more to reach maturity. The pupa which has three or four free segments in the male and four or five in the female, rests in a cocoon within the food plant, often strengthened by chips of wood, or in a subterranean cocoon. The family is fairly well represented in the tropics; the British fauna possesses only three species, of which the ” goat ” (Cossus cossus) and the ” leopard ” (Zeuzera pyrina) are well known, the cater- pillars of both being often injurious to timber and fruit trees.

The Tortricidae are a large family of small moths (see fig, 1), nearly allied to the Cossidae. The fifth radial nervure does not

arise from the third, the maxillae are well developed, but their palps are obsolete; the head is densely clothed with erect scales; the terminal segment of the labial palp is short and obtuse. The female pupa has three, the male four, free segments. All the larvae of these moths have some method of concealing themselves while feeding. A frequent plan is to roll up a leaf of the food-plant, fastening the twisted portion with silken threads so as to make a tubular retreat; this is the habit of the caterpillar of the green bell moth (Tortrix viridana) which often ravages the foliage of oak plantations. The larvae of the pine-shoot moths (Retinia) shelter in solidified resinous exudations from their coniferous food-plants, while the codlin-moth caterpillar {Carpocapsa pomonella) feeds in apples and pears, growing with the growth of the fruit which affords them both provender and home. The antics of ” jumping-beans ” are due to the movements of tortricid caterpillars within the substance of the seed.

The Psychidae are a small but widely-distributed family of moths whose males have the head, densely clothed with rough hairs, bearing complex, bipectinated feelers, but with the maxillae reduced and useless. The larvae live in portable cases made of grass, pieces of leaf or stick, with a silken lining, and these cases serve as cocoons for the pupae which agree in structure with those of the Tortricidae. But the most remarkable feature of the family is the extreme degradation of the female, which, wingless, legless and without jaws or feelers, never emerges from the cocoon.

The Castniidae are a small family of large, conspicuous, day-flying

exotic moths (fig. 20) whose clubbed feelers and bright colours give them a resemblance to butterflies, al- though their wing- neuration is of the primitive t i n e o i d type; the smooth larvae feed on the stems or roots of plants and the pupal structure agrees with that of .

the Tortricidae and rIG. 20. — Castma acraeoides. Brazil.

Psychidae. The distribution of the family is confined to Tropical America and the Indo-Malayan and Australian regions.

The Zygaenidae (burner, moths) are a large family of day-flying moths (fig. 21) adorned with brilliant metallic colours. The feelers are long, stout in the middle and tapering, bearing numerous long or short pectinations. The well-developed maxillae have vestigial palps. The larvae — often very conspicuously coloured — are remark- able among the Tineides in having incomplete circles of hooks on the prolegs, and they feed exposed on the leaves of various plants. The pupa, enclosed in a silken cocoon, has four or five free segments. The Limacodidae are a small family of brownish nocturnal moths, allied to

Fig. 21. — Neuro-

the Zygaenidae and agreeing with them in the g , “$j? 6a concinna – structure of the pupa. The larva in this family ” also is an exposed feeder, but it is remarkable in form, being flattened and slug-like, without prolegs and adorned with curious spinous processes.

The Sesiidae are a large family of small, narrow-winged moths, the sub-costal nervure of the hindwing being absent and the wings being for the most part destitute of scales (fig. 22). The maxillae are developed but their palps are vestigial, while the

terminal segment of the “\ J Of

labial palp is short and pointed. Many of these insects have their bodies banded with black and yellow; this in conjunc- tion with the transparent wings makes some of them like wasps or hornets in appearance. The larvae feed in the woody stems of various j ± B

feVST&‘ffi *%■ ^^”^ (Ckd-fly dominal segments, re- Hawk Moth). Europe. B, Larva, mains within its cocoon, formed with chips of wood, until the time for its final change draws near; then it works itself partly out of the tree by means of the spines on its abdominal segments.

The Nepticulidae are the smallest of all the Lepidoptera, measur- ing

only 3-8 mm. across the outspread wings, which are all lanceolate and pointed at the tip. The sucking portions of the maxillae are vestigial, but the palps are long and jointed. The larvae, without

thoracic limbs or prolegs, but sometimes with paired rudimentary processes on some of the segments, mine in the leaves of plants, The pupa, with four free abdominal segments in the female and five in the male, rests in a cocoon usually outside the mine.

The Adelidae are a family of delicate, but larger, moths with very long feelers (fig. 23) especially in the males. The larvae feed, when young, in flowers, later, protected by a flat case, they devour leaves, the pupa resembles that of the Nepticulidae in structure. The female has an ovipositor adapted for piercing plant tissues.

The Tineidae are a large and important family of small moths (figs. 14, 24, 25) with rough-haired heads, and with the maxillae

Fig. 23. — Adela degeerella. Europe.

Fig. 26. — Cero- stoma asperella. Europe.

Fig. 27. — Psecadia pusiella.

mention. The Pterophoridae (plume moths, fig. 28) usually have the wings deeply cleft — a single cleft in the forewing and two in the hindwing. The hairy larvae feed openly on leaves, while the soft and hairy pupa remains attached to its cocoon by the cremaster, although it is incompletely obtect and has three or four free ab- dominal segments. The Orneodidae (multiplumc moths) have all the wings six-cleft. Our British species, Orneodes hexadactyla (fig. 29), is an exquisite little insect, whose larva feeds on the blossoms of honeysuckle. The pupa is completely obtect, with only two free abdominal segments. The Pyralidae (figs. 13, 30), a large family with numerous divisions, have entire wings, and their pupae are

Fig. 28. — Ptero- phorus spilodactylus. Europe.

Fig. 29. — Orneodes hexadactylus (24-plumed Moth). Europe.

isˆ

Fig. 24. — Euplocampus Fig. 25. — Tinea anthracinus. Europe. tapetzella (Clothes Moth). Europe.

and their palps usually well developed. Many of the genera have narrow pointed wings with degraded neuration. The larvae differ in their habits, some — Gracilaria for example — mine in leaves, while others, like the well-known caterpillars of the clothes moth {Tinea) surround themselves with portable cases (fig. 14) formed by spinning together their own excrement. The female pupa has three, the male four free abdominal segments.

Plutellides. This group includes a few large families of small moths that are linked by their imaginal and larval structure to the Tineidae (in which they have often been included) and by their pupal structure to the higher groups that have yet to be considered. The moths have labial palps with slender pointed terminal segments, and narrow pointed wings, but the neuration (except in the Elachistidae) is less degenerate than in most Tineidae. The hairy covering of the head is smooth, and the maxillary palps are usually vestigial. The egg is flat, and the larval prolegs have complete circles of hooklets. The pupa is obtect with only two free abdominal segments (fifth and sixth) in both sexes and does not move out of the cocoon.

Four families are included in this group. The Plutellidae (fig. 26) have the maxillary palps developed, in some genera, as slender threadlike appendages directed straight forward. The larvae do not usually mine in leaves, but feed openly, keeping to the underside for

protection (Plutella), or spinning by their united labour a mass of web over the food- plant (Hyponomeuta) . In the other three families the maxillary palps are vestigial or obsolete. The Elachi- stidae have remarkably narrow, pointed wings and their larvae mine in leaves or form portable cases and feed among seeds. In the Oecophoridae (fig. 27) the sub-costal nervure of the hindwing is free and distinct throughout its length, and the larvae usually feed among spun leaves or seeds, or in decayed wood. The Gelechiidae are a large family with similar larval habits; the moths are distinguished by the sinuate termen of the hindwing and the connexion of its sub-costal nervure with the discoidal areolet.

Pyralides. This group includes a number of moths of delicate build with elongate legs, the maxillae and their palps being usually well

developed, , The forewings have two anal nerv- ures, the hind- wings three (fig. 30, h, i) ; in the hindwing the sub- costal nervure bends

towards and often con- nects with the radial, and the frenulum is usually present. The _ egg is flat. The larva has complete circles of hooklets on its five pairs of prolegs, and the pupa (usually completely obtect) dees not move at all from its cocoon. This group includes the only Lepidoptera that have aquatic larvae. ,

Of the families comprised in this division three deserve special

After Riley and Howard, Insect Life, vol. 2 (U.S. Dept. Agr.).

Fig. 30. — Flour Moth (Ephestia kiihniella). c, With wings spread. d, Head and front body-seg-

/, At rest. [wings. ments of larva.

g, h, i, Marking and neuration of e, 2nd and 3rd abdominal seg-

a. Larva. ments.

b, Pupa.

obtect. The caterpillars feed in some kind of shelter, some spinning a loose case among the leaves of their food-plant, others burrowing into dry vegetable substances or eating the waxen cells of bees. Several species of this group, such as the Mediterranean flour moth, Ephestia kiihniella (fig. 30), become serious pests in storehouses and granaries, their larvae devouring flour and similar food-stuffs.

Noctuides. In this group may be included a number of families of moths with the second median nervure of the forewing arising close to the third. This feature of neuration characterizes also the Jugatae (see fig. 6), Tineides, Plutellides and Pyralides. But the Noctuides differ from these groups in having only two anal nervures in the hindwing. The maxillary palps are absent or vestigial, and a frenu- lum is usually present on the hindwing. The larva has usually ten prolegs, whose hooklets are arranged only along the inner edge, while the immobile pupa is always obtect with only two free ab- dominal segments (the fifth and sixth). The Lasiocampidae and their allies have flat eggs, but in the Noctuidae, Arctiidae and their allies the egg is upright.

The Lasiocampidae, together with a few small families, differ from the majority of this group in wanting a frenulum. The maxillae of the Lasiocampidae are so reduced that no food is taken in the imaginal state, and in correlation with this condition the feelers of the male are strongly (those of the female more feebly) bipectinated. The. moths are stout, hairy insects, usually brown or yellow in the pattern of their

wings. The caterpillars are densely hairy and many species hibernate in the larval stage. The pupa is enclosed in a hard, dense cocoon, whence the name ” eggars ” is often applied to the family, which has a wide distribution, but is absent from New Zealand. The Drepanulidae are an allied family, in which the frenulum is usually present, while the hindmost pair of larval pro- legs are absent, their segment being prolonged into a pointed process which is raised up when the caterpillar is at rest. The hook-tip moths represent this family in the British fauna.

The Lymantriidae resemble the Lasiocampidae in their hairy bodies and vestigial maxillae, but the, frenulum is usually present on. the hindwing and the feelers are bipectinate only in the males. Fl(J 3 ,._ ctoerfia cydonia _ India . Some females of this family — the J 7

vapourer moths (Orgyia and allies,

fig- 17). for example — are degenerate creatures with vestigial wings. The larvae (fig. 15) are very hairy, and often carry dense tufts on some of their segments; hence the name of ” tussocks ” frequently applied to them. The pupae are also often hairy (fig. 16) — an

exceptional condition — and are protected by a cocoon of silk mixed with some of the larval hairs, while the female sheds some hairs from her own abdomen to cover the eggs. The family is widely distributed, its headquarters being the eastern tropics. To that part of the world is restricted the allied family of the Hypsidae,

and the caterpillars are often densely covered with long smooth hairs. The pupae are enclosed in silken cocoons (fig. 38). The highest specialization of structure in this group of the Lepidoptera is reached by the Syntomidae, a family nearly allied to the Arctiidae, but with the sub-costal nervure in the hindwing absent. The Syntomidae have elongate narrow forewings and short hindwings, usually s’ark in colour with clear spots and dashes destitute of

Fig. 32. — Ophideres imperator. Madagascar.

distinguished from the ” tussocks ” by the slender upturned terminal segment of the labial palps and by the development of the maxillae. The Noctuidae are the largest and most dominant family of the Lepidoptera, comprising some 10,000 known species. They are mostly

moths of dull coloration, flying at dusk or by. night. The maxillae are well developed, the hindwing has a frenulum, and its

sub – costal nervure touches the radial near the base. The larvae of the Noc- tuidae (fig. 34, c) are rarely hairy and the pupa (fig. 34, d) usually rests in an earthen cell, being often the wintering stage for the species ; sometimes the pupa is enclosed in a loose cocoon of silk and leaves. In some Noctuidae (fig. 32) the hindwings are brightly coloured, but these are concealed berteath the dull, in- conspicuous forewings when the insect rests (fig. 34, /). Nearly allied to the Noctuidae, but very different in appearance, are the gaily-coloured Agaristidae, a family of day-flying moths (figs.. 35, 36), confined to the warmer regions of the globe and distinguished by

Fig. 33. — Cyligramma fiuctuosa.

Africa.

From Mally, Bull. 24, Div. Ent. U.S. Dept. Agr.

Fig. 34. — e, f, Heliothis armigera. Europe, c, Larva; d, pupa in cell. Natural size, a, 6, Egg, highly magnified.

their thickened feelers, those of the Noctuids being thread-like or slightly pectinate.

The Arctiidae (tiger moths,. footmen, &c.) are allied to the Noc- tuidae, but their wing-neuration is more specialized, the sub-costal nervure of the hindwing being confluent with the radial for the basal part of its course. These moths (fig. 37) have gaily coloured wings,

-Rothia pales. Madagascar.

scales (fig. 40). The body, on the other hand, is often brilliantly adorned. The family, abundant in the tropics of the Old World, has only two European species.

Sphingides. This group includes a series of families which agree with the Noctuides in most points, but are distinguished by the origin of the

Fig. 37. — Haploa Lecontei. N. America.

Fig. 36. — Aegocera rectilinea.

Tropical Africa.

second median nervure of the forewing close to the first, or from the discocellular nervure midway between the first and third medians (see fig. 5). These neurational characters may appear somewhat insignificant, but such slight though constant distinctions in structures of no adaptational value may be safely regarded as truly significant of relationship. Several of the families in this

After Lugger, Riley and Howard, Insect Life, vol. 2 (U.S. Dept. Agr.). Fig. 38.— c, Tiger Moth (Phragmatobia fuliginosa, Linn.). Europe. o, Caterpillar; 6, cocoon with pupa. Slightly enlarged.

group have lost the frenulum. In larval and pupal characters the Sphingides generally resemble the Noctuides, but in some families there is a reduction in the number of the larval pro legs. The egg is spherical or flat, upright only in the Notodontidae.

The Notodontidae are stout, hairy moths (figs. 5, 41, 42 a) with maxillae and frenulum developed. In the larva the prolegs on the

Fig. 39 prasinana.

-Halias Europe.

Fig. 40. — Euchromia formosa. S. Africa. ,

hindmost segment are sometimes modified into pointed outgrowths which are carried erect when the caterpillar moves about. From these structures whip-like, coloured processes are protruded by the caterpillar (fig. 42 ft) of the puss moth (Cerura) when alarmed; these processes are believed to help in ” terrifying ” the caterpillar’s enemies. Allied to the Notodontidae are the Cymakiphoridaeˆ-a. family of moths agreeing with the Noctuidae in appearance and habits — and the large and important family of the Geometridoe.

The moths (fig. 43) of this family are distinguished from the Notodontidae by their delicate build and elongate feet, the caterpillars (fig. 43, c) by the absence or vestigial condition of the three anterior pairs of prolegs. The two hinder pairs of prolegs are therefore alone

Fig. 41. — Notodonta ziczac (Pebble Prominent Moth). Europe.

The Sphingidae (hawk moths) are insects often of large size (figs. 46a,

47), with spindle-shaped feelers, elongate and powerful fore- wings and the maxillae very well developed. The hindwing carries a frenulum and has its sub-costal nerv- ure connected with the radial by a short bar. The cater- pillars have the full number of prolegs, and, in many genera, carry a prominent dorsal horn on the eighth abdominal segment (fig. 46 b). The pupa lies in an earthen cell. On account of their powerful flight the moths of this family

ceTteinspedes— lfki FlG – AS-— Urania boisduvalnat rest, showing Aclieronlia atropos _ under surface of wings,

and Protoparce convolvuli — migrate into the British Islands in numbers almost every summer.

Fig. 420. — Cerura borealis. N. America.

Fig. 426. — Larva of Cerura (Puss Moth).

functional and the larva progresses by ” looping,” i.e. bending the body so as to bring these prolegs close up to the thoracic legs, and then, taking a fresh grip on the twig whereon it walks, stretching the body straight out again. Many of these larvae have a striking

After Grote, Natural Science (J. M. Dent & Co.),

Fig. 43. — Geometrid Moth (Amphidasys betularia, Linn.). Europe. a, Large grey type; b, dark variety; c, caterpillar in looping attitude.

resemblance both in form and colour to the twigs of their food- plant. In some of the species the female has the wings reduced to useless vestiges. The family is world-wide in its range. The tropical Uraniidae are large handsome moths (figs. 44, 45), often with ex-

quisite wing-patterns, allied to the Geometridae, but distinguished by the absence of a frenulum in the moth and the presence of the normal ten prolegs in the larva.

Fig. 46a. — Chlaenogramma jasminearum (Jessamine Sphinx). N. America.

A group of families in which the first maxillae are vestigial, the feelers bipectinate and the pupa enclosed in a dense silken cocoon, have been regarded as the most highly special- ized of all the moths, though according to other views the whole series of the Lepidoptera culminates in the Synto- midae. Of these cocoon- spinning families may be specially mentioned the Eupterotidae, large brown or yellow

moths inhabiting tropical Asia and Africa, and repre- sented in Europe only by the ” processionary moth” (Cnethocampa processionea). In this family the frenulum is with tufts of long hair.

Fig. 46J. — Larva.

and the larvae are protected The Bombycidae have no frenulum, and

present,

Fig. 47. — Smerinthus ocellatus (Eyed Hawk moth). Europe.

the larvae are smooth, with some of the segments humped and the eighth abdominal often carrying a dorsal spine. The family

is tropical in its distribution, but the common silkworm (Bombyx mori, fig. 48) has become acclimatized in southern Europe and is the source of most of the silk used in manufacture and art. Of

After C. V. Riley, Bull. 14, Div. Enl. U.S. Dept. Agr.

FlG. 48. — Bombyx mori. China, a, Caterpillar (the common silk-worm) ; b, cocoon ; c, male moth.

commercial value also is the silk spun by the great moths of the family Saturniidae, well represented in warm countries and con- tributing a single species {Saturnia pavonia-minor) to the British fauna. These moths (fig. 49) have but a single anal nervure in the hindwing and only three radial nervures in the forewing. The wing-patterns are handsome and striking; usually an unsealed ” eyespot ” is conspicuous at the end of each discoidal areolet. The

- — usually brown or grey wings (fig. 50) and a peculiar jerky flight.

The family has an extensive range but is unknown in Greenland,

New Zealand, and in many oceanic

islands.

Rhopalocera. This group comprises the typical

butterflies which are much more

highly specialized than the Gry-

pocera, and may be readily distin- guished by the knobbed or clubbed

feelers and by the absence of a

frenulum. Two or more of the

radial nervures in the forewing arise

from a common stalk or are sup- pressed. The egg is ” upright.” The

larvae have hooklets only on the

inner edges of the prolegs. The pupa

is very highly modified, only two free

abdominal segments are ever recog- nizable, and in some genera even

theseˆhave become consolidated. The

cocoon is reduced to a pad of silk, to which the pupa is attached, suspended by the cremastral hooks; in some families there is also a silken girdle around the waist-region. In correlation with the exposed condition of the” pupa, we find the presence of a specially developed Fig. 51.— Chrysalis and “head-piece” or “nose-horn” to Larva of Nison iadestages protect the head-region of the con- (dingy skipper). Europe, tained imago. Their bright colours

and conspicuous flight in the sunshine has made the Rhopa- locera the most admired of all insects by the casual observer.

A modification that has taken place in several families of butterflies is the re- duction of the first pair of legs. H. W. Bates arranged the families in a series depending on this character, but neura- tional and pupal features must be taken

Fig. 49. — Epiphora bouhiniae. W. Africa.

caterpillars are protected by remarkable spine-bearing tubercles t (fig. 10, B). I

Grypocera.

This group stands at the base of the series of families that are usually distinguished as ” butterflies.” The feelers are recurved at the tip, and

thickened just before the extremity. The forewing

has the full number of radial nervures, distinct and evenly spaced, and two anal nervures; the frenu- lum is usually absent. The larvae (fig. 51) have prolegs with complete circles of hooklets, and often feed in concealed situations, while the pupa is protected by a light cocoon. The affinities of this group are clearly not with the higner groups of moths just described, but with some of the lower families. Accord- ing to Meyrick they are most closely related to the Pyralidae, but Hampson and most other students would derive them (through the Castniidae) from a primitive Tineoid stock allied to the Cossidae and Zygaenidae.

Three families are included in the section. The North American Megalhymidae and the Australian Euschemonidae have a frenulum and are usually reckoned among the ” moths.” The Hesperiidae in which the frenulum is wanting form the large family of the skipper butterflies, represented in our own fauna by several species. They are insects with broad head — the feelers being widely separated

Fig.: 52. — Chrysophanus thoe. N. America.

into account as well, and the sequence followed here is modified from that pro- posed by A. R. Grote and J. W. Tutt.

The Lycaenidae are a large family in- cluding the small butterflies (figs. 52, 53, 54) popularly known as blues, coppers and hairstreaks. The forelegs in the female are normal, but in the male the tarsal segments are shortened and the claws sometimes are absent. The forewing has only three or four radial nervures (fig-55),the last two of which arise from a common stalk; the feelers are inserted close together on the head. The larva is short and hairy, somewhat like a woodlouse in shape, the broad sides concealing the legs and prolegs, while the pupa, which is also hairy or bristly, is attached by the cremaster to a silken pad and cinctured with a silken thread. The upper surfaces of the wings of these insects are usually of a bright metallic hue — blue_ or coppery — while beneath there are often

Fig. 50.-

-Tagiades sabadius. S. Africa.

Fig. 53. — Rathinda amor. India.

Fig. 54. — Cheritra freja. India.

numerous dark centred ” eye-spots.” The family is widely dis- tributed. Nearly related are the Lemoniidae, a family abundantly represented in the Neotropical Region, but scarce in the Old World and having only a single European species (Nemeobius lucinia) which occurs also in England. In the Lemoniidae (figs. 56, 57) the forelegs of the male are reduced and useless for walking. The Libytheidae may be recognized by the elongate snout-like palps,

the five-branched radial nervur? of the forewing, the cylindrical hairy larva, and the pupa attached only by the creraaster.

The Papilionidae are large butterflies with ample wings, and all six legs fully developed in both sexes. The forewing has five radial

After Grote, Natural Scunce, vol. 12 (J. M. Deat& Co.). Fig. 55. — Neura- tion of Wings in Lycaena.

2, Sub-costal.

3, Radial.

4, Median. Cubital

Fig. 56. — Eurybia Carolina. Brazil

7, 8, Anal nerv-

Fig. 57. — -Calephelis caenius. N. America.

and two anal nervures, the second of the latter being free from the first and running to the dorsum of the wing, while the hindwing has but a single anal, and is frequently prolonged into a ” tail ” at the

Fig. 58. — Papilio machaon (Swallow-tail). Europe.

third median nervure (fig. 58). The larva is cylindrical, never hairy but often tuberculate and provided with a dorsal retractile tentacle (osmaterium) on the prothorax. The pupa, which has a

Parnassius apollo (Apollo). European Alps.

double ” nose-horn,” is attached by the cremaster and a waist- girdle to the food-plant in the Papilioninae (fig. 58), but lies in a web on the

ground among the Parnasiinae (figs. 59, 60). The latter sub- family includes the well-known Apollo butterflies of the Alps.

Fig. 60. — Thais medesicaste.

The former is represented in the British fauna by the East Anglian swallow-tail (Papilio machaon), and is very abundant in the warmer regions of the world, in- cluding some of the most magnificent and brilliant of insects.

Agreeing with the Papilionidae in the six perfect legs of both sexes and the cincture-support of the pupa we find the Pieridae — the family of the white and yellow butterflies (figs. 61, 62) — represented by ten species in the British fauna and very widely spread over the earth's surface. In the Pieridae there are two anal nervures in the hindwing, while the second anal nervure in the forewing runs into the first; the larva is cylindrical and hairy without an osmaterium. The pupa has a single " nose-horn," and in the more highly organ- ized genera there is no mobility whatever be- tween its abdominal seg- ments. The wintering pupae of the common cabbage butterflies (Pieris brassicae and P. rapae) are common objects attached to walls and fences and theircolourharmonizes.to a great extent, with that of their surroundings.

The Nymphalidae are by far the largest and most dominant family of butterflies. In both sexes the forelegs are useless for walk- ing (fig. 63), the tarsal segments being absent and the short shins clothed with long hairs, whence the name of brush-footed butterflies is often applied to the family. The neuration of the wings resembles

Fig.

61. — Colias hyale (Pale clouded Yellow Butterfly). Europe.

Fig. 62. — Appias nero (male). Malaya

that found among the Pieridae, but in the Nymphalidae the pupa, which has a double nose-horn (fig. 65) — as in Papilio — is suspended from the cremaster only, no girdling thread being present, or it lies simply on the ground. The egg is elongate and sub-conical in form

Fig. 63. — Dionemoneta. Brazil.

Fig. 64. — Larva of Argynnis paphia (Silver-washed Fritil- lary). Europe.

and ornamented with numerous ribs, while the larva is usually protected by numerous spines (fig. 64) arising from the segmental tubercles. To this family belong our common gaily-coloured butterflies — the tortoiseshells, peacock (fig. 65), admirals, fritillaries

and emperors. In most cases the bright colouring is confined to the upper surface of the wings, the under-side being mottled and often inconspicuous. Most members of the group Vanessidi — the peacock and tortoiseshells (Vanessa) and the red admiral (Pyrameis) for

Fig. 65. — Vanessa io (Peacock) and its pupa.

example — hibernate in the imaginal state. This large family is divided into several sub-families whose characters may be briefly given, as they are considered to be distinct families by many entomologists. The Danainae (or Euploeinae, fig. 66) have the anal nervures of the forewing arising from a common stalk, the discoidal areolets in both wings closed, and the front feet of the female thickened; their

distinguished from the Danainae by the slender feet of the females;

the narrow winged, tawny Acraeinae, with simple anal nervures, thick

hairy palps and spiny larvae; and the Heliconiinae whose palps are compressed, scaly at the sides and hairy in front. This last named sub-family is con- fined to the Neotropical Region, while the Acraeinae are most numerous in the Ethiopian. The Nymphalinae include the British vanessids (fig. 65), and a vast assemblage of exotic genera (figs. 68, 70), characterized by

After A. R. Grote, Natural Science, vol. 12 (J. M. Dent & Co.).

Fig. 67. — Neuration of Wings in a Nymphaline Butterfly.

2, Sub-costal.

3, Radial.

4, Median.

5, Cubital.

6, 7, 8, Anal nervures.

the ” open ” discoidal areolets (fig. 67) owing to the absence of the

transverse ” disco-cellular ” nervules. In the Morphinae — including

•some magnificent South American insects with deep or -azure

Fig. 69. — Larva and Pupa of

Apatura ilia.

Fig. 66. — Euploea leucostictos (male). Malaya.

larvae are smooth with fleshy processes. The danaine butterflies range over all the warmer parts of the world, becoming most numer- ous in the eastern tropics, where flourish the handsome purple Euploeae whose males often have “brands” on the wings; these insects are conspicuously marked and are believed to be distaste- ful to birds and lizards. So are the South American Ithomiinae,

Fig. lo.—Calliiliea sapphira. Brazil.

blue wings, and a few rather ‘ dull-coloured” Oriental genera- the areolets are closed in the forewings and often in the hind- wings. The larvae of the Morphinae (fig. 71) are smooth

Fig. 68. — Nymphalis jason. W. Africa. Upper and under surface.

or hairy with a curiously forked tail-segment. A similar larva characterizes the South American Brassolinae or owl-butterflies —

Fig. 71. — Larva of Amathusia phidippus.

After A. R. Grote, Natural Science, vol. 12 Q. M. Dent& Co.).

Fig. 74— Neur- ation of wings in Pararge, a satyrid butterfly.

2, Sub-costal.

3, Radial.

4, Median.

5, Cubital. 7, 8, Anal nervures.

Fig. 76 — Bia actorion. Brazil.

robust insects (figs. 72, 73) with the areolets closed in both wings, which are adorned with large ” eye-spots ” beneath. The Satyrinae,

including our native browns and the Alpine Erebiae, resemble the foregoing group in many respects of structure, but the sub-costal nervure is greatly thickened at the base (fig. 74). This sub-family is world-wide in its distribution. One genus (Oeneis, fig. 75) is found in high northern latitudes, but reappears in South America. The dark, spotted species of Erebia are familiar insects to travellers among the Alps; yet butterflies nearly related to these Alpine insects occur in Patagonia, in South Africa and in New Zealand. Such facts of distribution clearly show that though the Nymphalidae have attained a high degree of specialization among the Lepidoptera, some of their genera have a history which goes back to a time when the distribution of land and water on the earthls surface must have been very different from what it is to-day.

Bibliography. — The handsome Lepidoptera, with their interest- ing and easily observed life-histories, have naturally attracted many students, and the literature of the order is enormous. M. Malpighi’s treatise on the anatomy of the silkworm (De Bombycibus, London, 1669) and P. Lyonnet’s memoir on the Goat-caterpillar, are among the earliest and most famous of entomological writings. W. F. Kirby’s Handbook to the Order Lepidoptera (5 vols., London, 1894-1897) should be consulted for references to the older systematic writers such as Linnaeus, J. C. Fabricius, J. Hiibner, P. Cramer,

E. Doubleday and W. C. Hewitson. Kirby’s Catalogues are also invaluable for the systematise For the jaws of the Lepidoptera see

F. Darwin, Quart. Journ. Mic. Sci. xv. (1875); E. Burgess, Amer. Nat. xiv. (1880); A. Walter, Jen. Zeits. f. Nature, xviii. (1885); W. Breitenbach, lb. xv. (1882); V. L. Kellogg, Amer. Nat. xxix. (1895). The last-named deals also with wing structure, which is further described by A. Spuler, Zeits. wiss. Zool. liii. (1892) and Zool. Jahrb. Anat. viii. (1895); A. R. Grote, Mitt, aus dem Roemer- Museum _ (Hildesheim, 1896-1897); G. Enderlein, Zool. Jahrb. Anat. xvi. (1903), and many others. For scales see A. G. Mayer, Bull. Mus. Comp. Zool. Harvard, xxix. (1896). For internal anatomy W. H. Jackson, Trans. Linn. Soc. Zool. (2) v. (1891), and W. Petersen, Mem. Acad. Imp. Sci. St Petersburg (8) ix. (1900). The early stages and transformations of Lepidoptera are described by J. Gonin, Bull. Soc. Vaud. Sci. Nat. xxx. (1894); E. B. Poulton, Trans. Linn. Soc. Zool. (2) v. (1891); H. G. Dyar,

Ann. New York Acad. Sci. viii. (1894); T. A. Chapman, Trans. Entom. Soc. Lond. (1893), &c. For habits and life- relations see A. Seitz, Zool. Jahrb. Syst. v., vii. (1890, 1894) ; A. Weismann, Studies in the Theory of Descent (London, 1882) and Entomologist, xxix. (1896); F. Merrifield, Trans. Entom. Soc. Lond. (1890, 1893, 1905); M. Standfuss, Handbuch der paldark- hschen Gross-schmetterlinge (Jena, 1896); R. Trimen, Proc. Ent. Soc. Lond. (1898) ; E. B. Poulton, Colours of Animals (London, 1890) ; Trans. Entom. Soc. (1892 and 1903), and Journ. Linn. Soc. Zool. xxvi. (1898); F. E. Beddard, Animal Coloration (London, 1892). For distribution see H. J. Elwes, Proc. Entom. Soc. Lond. (1894); J. W. Tutt, Migration and Dispersal of Insects (London, 1902); Fossil Lepidoptera, S. H. Scudder, 8th Rep. U.S. Geol. Survey (1889). Among recent general works on the Lepidoptera, most of which contain numerous references to the older literature, may be mentioned A. S. Packard's unfinished work on the Bombycine Moths of N. America, Mem. Nat. Acad. Sci. Philadelphia, vii. (1895), and Mem. Acad. Sci. Washington, lx. (1905) ; D. Sharp's chapter in Cambridge Nat. Hist. vi. (London, 1898); G. F. Hampson, Moths of India (4 vols., London, 1892-1896), and Catalogue of the Lepidoptera Phalaenae (1895) and onwards; S. H. Scudder, Butterflies of New England (3 vols., Cambridge, Mass., 1888-1889); W. J. Holland, Butterfly Book (New York, 1899). Works on the British Lepidoptera are numerous, for example, those of H. T. Stainton (185O, C. G. Barrett (1893-1907), E. Meyrick (1895), and J. W. Tutt (1899 and onwards). For recent general systematic works, the student should consult the catalogues mentioned above and the Zoological Record. The writings of O. Staudinger, E. Schatz, C. Oberthtir, K. Jordan, C. Aurivillius and P. Mabille may be specially mentioned.

(G. H. C.) LEPIDUS, the name of a Roman patrician family in the Aemilian gens.

1. Marcus Aemilius Lepidus, one of the three ambassadors sent to Egypt in 201 b. c. as guardians of the infant king Ptolemy V. He was consul in 187 and 175, censor 179, pontifex maximus from 180 onwards, and was six times chosen by the censors princeps senatus. He died in 152. He distinguished himself in the war with Antiochus III. of Syria, and against the Ligurians. He made the Via Aemilia from Ariminum to Placentia, and led colonies to Mutina and Parma.

Livy xl. 42-46, epit. 48; Polybius xvi. 34.

2. Marcus Aemilius Lepidus, surnamed Porcina (probably from his personal appearance), consul 137 b.c. Being sent to Spain to conduct the Numantine war, he began against the will of the senate to attack

the Vaccaei. This enterprise was so unsuccessful that he was deprived of his command in 136 and condemned to pay a fine. He was among the greatest of the earlier Roman orators, and Cicero praises him for having

introduced the well-constructed sentence and even flow of language from Greek into Roman oratory.

Cicero, Brutus, 25, 27, 86, 97; Veil. Pat. ii. 10; Appian, Hisp. 80-83; Livy, epit.56.

3. Marcus Aemilius Lepidus, father of the triumvir. In 81 B.C. he was praetor of Sicily, where he made himself detested by oppression and extortion. In the civil wars he sided with Sulla and bought much of the confiscated property of the Marian partisans. Afterwards he became leader of the popular party, and with the help of Pompey was elected consul for 78, in spite of the opposition of Sulla. When the dictator died, Lepidus tried in vain to prevent the burial of his body in the Campus Martius, and to alter the constitution established by him. His colleague Lutatius Catulus found a tribune to place his veto on Lepidus's proposals; and the quarrel between the two parties in the state became so acute that the senate made the consuls swear not to take up arms. Lepidus was then ordered by the senate to go to his province, Transalpine Gaul; but he stopped in Etruria on his way from the city and began to levy an army. He was declared a public enemy early in 77, and forthwith marched against Rome. A battle took place in the Campus Martius, Pompey and Catulus commanding the senatorial army, and Lepidus was defeated. He sailed to Sardinia, in order to put himself into connexion with Sertorius in Spain, but here also suffered a repulse, and died shortly afterwards.

Plutarch, Sulla, 34, 38, Pompey, 15; Appian, B.C. i. 105, 107; Livy, epit. go ; Florus iii. 23 ; Cicero, Balbus, 15.

4. Marcus Aemilius Lepidus, the triumvir. He joined the party of Julius Caesar in the civil wars, and was by the dictator thrice nominated magister equitum and raised to the consulship in 46 B.C. He was a man of great wealth and influence, and it was probably more on this ground than on account of his ability that Caesar raised him to such honours. In the beginning of 44 b.c he was sent to Gallia Narbonensis, but before he had left- the city with his army Caesar was murdered.

Lepidus, as commander of the only army near Rome, became a man of great importance in the troubles which followed. Taking part with Marcus Antonius (Mark Antony), he joined in the reconciliation which the latter effected with the senatorial party, and afterwards sided with him when open war broke out. Antony, after his defeat at Mutina, joined Lepidus in Gaul, and in August 43 Octavian (afterwards the emperor Augustus), who had forced the senate to make him consul, effected an arrangement with Antony and Lepidus, and their triumvirate was organized at Bononia. Antony and Octavian soon reduced Lepidus to an inferior position. His province of Gaul and Spain was taken from him; and, though he was included in the triumvirate when it was renewed in 37, his power was only nominal. He made an effort in the following year to regain some reality of power, conquered part of Sicily, and claimed the whole island as his province, but Octavian found means to sap the fidelity of his soldiers, and he was obliged to supplicate for his life. He was allowed to retain his fortune and the office of pontifex maximus to which he had been appointed in 44, but had to retire into private life. According to Suetonius (Augustus, 16) he died at Circeii in the year 13.

See Rome: History ii., “The Republic,” Period C, ad fin.; Appian, Bell. Civ. ii.-v. ; Dio Cassius xli.-xlix. ; Veil. Pat. ii. 64, 80 ; Orelli’s Onomasticon to Cicero.

LE PLAY, PIERRE GUILLAUME FREDERIC (1806-1882), French engineer and economist, was born at La Riviere-Saint- Sauveur (Calvados) on the nth of April 1806, the son of a custom-house official. He was educated at the Ecole Poly- technique, and from there passed into the State Department of Mines. In 1834 he was appointed head of the permanent committee of mining statistics, and in 1840 engineer-in-chief and professor of metallurgy at the school of mines, where he became inspector in 1848. For nearly a quarter of a century Le Play spent his vacations travelling in the various countries of Europe, and collected a vast quantity of material bearing upon the social condition of the working classes. In 1855 he published Les Ouvriers europeens, which comprised a series of thirty -six monographs on the budgets of typical families selected

from the most diverse industries. The Academie des Sciences conferred on him the Montyon prize. Napoleon III., who held him in high esteem, entrusted him with the organization of the Exhibition of 1855, and appointed him counsellor of state, commissioner general of the Exhibition of 1867, senator of the empire and grand officer of the Legion of Honour. He died in Paris on the 5th of April 1882.

In 1856 Le Play founded the Societe Internationale des etudes pratiques d'Economie sociale, which has devoted its energies principally to forwarding social studies on the lines laid down by its founder. The journal of the society, La Riforme sociale, founded in 1881, is published fortnightly. Other works of Le Play are La Reforme sociale (2 vols., 1864; 7th ed., 3 vols., 1887); V Organisation de la fatnille (1871); La Constitution de VAngleterre (in collaboration with M. Delaire, 1875). See article in Harvard Quarterly Journal of Economics (June 1890), by H. Higgs.

LEPROSY (Lepra Arabum, Elephantiasis Graecorum, Aussatz, Spedalskhed), the greatest disease of medieval Christendom, identified, on the one hand, with a disease endemic from the earliest historical times (1500 B.C.) in the delta and valley of the Nile, and, on the other hand, with a disease now common in Asia, Africa, South America, the West Indies, and certain isolated localities of Europe. An authentic representation of the leprosy of the middle ages exists in a picture at Munich by Holbein, painted at Augsburg in 1516; St Elizabeth gives bread and wine to a prostrate group of lepers, including a bearded man whose face is covered with large round reddish knobs, an old woman whose arm is covered with brown blotches, the leg swathed in bandages through which matter oozes, the bare knee also marked with discoloured spots, and on the head a white rag or plaster, and, thirdly, a young man whose neck and face (especially round the somewhat hairless eyebrows) are spotted with brown patches of various size. It is conjectured by Virchow that the painter had made studies of lepers from the leper-houses then existing at Augsburg. These external characters of medieval leprosy agree with the descriptions of it by the ancients, and with the pictures of modern leprosy given by Danielssen and Boeck for Norway, by various authors for sporadic European cases, by Anderson for Malacca, by Carter for India, by Wolff for Madeira and by Hillis for British Guiana. There has been some confusion in the technical naming of the disease; it is called Elephantiasis (Leontiasis, Satyriasis) by the Greek writers, and Lepra by the Arabians.

Leprosy is now included among the parasitic diseases (see Parasitic Diseases). The cause is believed to be infection by the bacillus leprae, a specific microbe discovered by Armauer Hansen in 187 1. It is worthy of note that tuberculosis is very common among lepers, and especially attacks the serous mem- branes. The essential character of leprosy is a great multiplica- tion of cells, resembling the " granulation cells " of lupus and syphilis, in the tissues affected, which become infiltrated and thickened, with degeneration and destruction of their normal elements. The new cells vary in size from ordinary leucocytes

to giant cells three or four times larger. The bacilli are found in these cells, sometimes in small numbers, sometimes in masses. The structures most affected are the skin, nerves, mucous mem- branes and lymphatic glands.

The symptoms arise from the anatomical changes indicated, and they vary according to the parts attacked. Three types of disease are usually described — (1) nodular, (2) smooth or anaes- thetic, (3) mixed. In the first the skin is chiefly affected, in the second the nerves; the third combines the features of both. It should be understood that this classification is purely a matter of convenience, and is based on the relative prominence of symptoms, which may be combined in all degrees. The incuba- tion period of leprosy — assuming it to be due to infection — is unknown, but cases are on record which can only be explained on the hypothesis that it may be many years. The invasion is usually slow and intermittent. There are occasional feverish attacks, with the usual constitutional disturbance and other slight premonitory signs, such as changes in the colour of the skin and in its sensibility. Sometimes, but rarely, the onset is acute and the characteristic symptoms develop rapidly. These begin with

an eruption which differs markedly according to the type of disease. In the nodular form dark red or coppery patches appear on the face, backs of the hands, and feet or on the body; they are generally symmetrical, and vary from the size of a shilling upwards. They come with one of the feverish attacks and fade away when it has gone, but only to return. After a time in- filtration and thickening of the skin become noticeable, and the nodules appear. They are lumpy excrescences, at first pink but changing to brown. Thickening of the skin of the face produces a highly characteristic appearance, recalling the aspect of a lion. The tissues of the eye undergo degenerative changes; the mucous membrane of the nose and throat is thickened, impairing the breathing and the voice; the eyebrows fall off; the ears and nose become thickened and enlarged. As the disease progresses the nodules tend to break down and ulcerate, leaving open sores. The patient, whose condition is extremely wretched, gradually becomes weaker, and eventually succumbs to exhaustion or is carried off by some intercurrent disease, usually inflammation of the kidneys or tuberculosis. A severe case may end fatally in two years; but, as a rule, when patients are well cared for the illness lasts several years. There is often temporary improve- ment, but complete recovery from this form

of leprosy rarely or never occurs. The smooth type is less severe and more chronic. The eruption consists of patches of dry, slightly dis- coloured skin, not elevated above the surface. These patches are the result of morbid changes affecting the cutaneous nerves, and are accompanied by diminished sensibility over the areas of skin affected. At the same time certain nerve trunks in the arm and leg, and particularly the ulnar nerve, are found to be thickened. In the further stages the symptoms are those of increasing degeneration of the nerves. Bullae form on the skin, and the discoloured patches become enlarged; sensation is lost, muscular power diminished, with wasting, contraction of tendons, and all the signs of impaired nutrition. The nails become hard and clawed; perforating ulcers of the feet are common; portions of the extremities, including whole fingers and toes, die and drop off. Later, paralysis becomes more marked, affecting the muscles of the face and limbs. The disease runs a very chronic course, and may last twenty or thirty years. Recovery occasion- ally occurs. In the mixed form, which is probably the most common, the symptoms described are combined in varying degrees. Leprosy may be mistaken for syphilis, tuberculosis, ainhum (an obscure disease affecting negroes, in which the little toe drops off), and several affections of the skin. Diagnosis is established by the presence of the bacillus leprae in the nodules or bullae, and by the signs of nerve degeneration exhibited in the anaesthetic patches of skin and the thickened nerve trunks. In former times leprosy was often confounded with other skin diseases, especially psoriasis and leucoderma; the white leprosy of the Old Testament was probably a form of the latter. But there is no doubt that true leprosy has existed from time immemorial. Prescriptions for treating it have been found in Egypt, to which a date of about 4600 B.C. is assigned. The disease is described by Aristotle and by later Greek writers, but not by Hippocrates, though leprosy derives its name from his ” lepra ” or ” scaly ” disease, which was no doubt psoriasis. In ancient times it was widely prevalent throughout Asia as well as in Egypt, and among the Greeks and Romans. In the middle ages it became extensively diffused in Europe, and in some countries— France, England, Germany and Spain— every con- siderable town had its leper-house, in which the patients were segregated. The total number of such houses has been reckoned at 19,000. The earliest one in England was established at Canterbury in 1096, and the latest at Highgate in 1472. At one time there were at least 95 religious hospitals for lepers in Great Britain and 14 in Ireland (Sir James Simpson). During the 15th century the disease underwent a remarkable diminution. It practically disappeared in the civilized parts of Europe, and the leper-houses were given up. It is a singular fact that this diminution was coincident with the great extension of

syphilis (see Prostitution). The general disappearance of leprosy at this time is the more unintelligible because it did not take

effect everywhere. In Scotland the disease lingered until the 19th century, and in some other parts it has never died out at all. At the present time it still exists in Norway, Iceland, along the shores of the Baltic, in South Russia, Greece, Turkey, several Mediterranean islands, the Riviera, Spain and Portugal. Isolated cases occasionally occur elsewhere, but they are usually imported. The Teutonic races seem to be especially free from the taint. Leper asylums are maintained in Norway and at two or three places in the Baltic, San Remo, Cyprus, Constantinople, Alicante and Lisbon. Except in Spain, where some increase has taken place, the disease is dying out. The number of lepers in Norway was 3000 in 1856, but has now dwindled to a few hundreds. They are no longer numerous in any part of Europe. On the other hand, leprosy prevails extensively throughout Asia, from the Mediterranean to Japan, and from Arabia to Siberia. It is also found in nearly all parts of Africa, particularly on the east and west coasts near the equator. In South Africa it has greatly increased, and attacks the Dutch as well as natives. Leper asylums have been established at Robben Island near Cape Town, and in Tembuland. Inˆ Australia, where it was introduced by Chinese, it has also spread to Europeans. In New Zealand the Maoris are affected; but the amount of leprosy is not large in either country. A much more remarkable case is that of the Hawaiian Islands, where the disease is believed to have been imported by Chinese. It was unknown before 1848, but in 1866 the number of lepers had risen to 230 and in 1882 to 4000 (Liveing), All attempts to stop it by segregating lepers in the settlement of Molokai appear to have been fruit- less. In the West Indies and on the American continent, again, leprosy has a wide distribution. It is found in nearly all parts of South and Central America, and in certain parts of North America — namely, Louisiana, California (among Chinese), Minnesota, Wisconsin and North and South Dakota (Norwegians) , “New Brunswick (French Canadians).

It is difficult to find any explanation of the geographical distribution and behaviour of leprosy. It seems to affect islands and the sea-coast more than the interior, and to some extent this gives colour to the old belief that it is caused or fostered by a fish diet, which has been revived by Mr Jonathan Hutchin- son, but is not generally accepted. Leprosy is found in interiors where fish is not an article of diet. Climate, again, has obviously little, if any, influence. The theory of heredity is equally at fault, whether it be applied to account for the spread of the disease by transmission or for its disappearance by the elimination of susceptible persons. The latter is the manner in which

heredity might be expected to act, if at all, for lepers are re- markably sterile. But we see the disease persisting among the Eastern races, who have been continuously exposed to its selective influence from the earliest times, while it has disappeared among the Europeans, who were affected very much later. The opposite theory of hereditary transmission from parents to offspring is also at variance with many observed facts. Leprosy is very rarely congenital, and no cases have occurred among the descendants to the third generation of 160 Norwegian lepers settled in the United States. Again, if hereditary transmission were an effective influence, the disease could hardly have died down so rapidly as it did in Europe in the 15th century. Then we have the theory of contagion. There is no doubt that human beings are inoculable with leprosy, and that the disease may be communicated by close contact. Cases have been recorded which prove it conclusively; for instance, that of a man who had never been out of the British islands, but developed leprosy after sharing for a time the bed and clothes of his brother, who had contracted the disease in the West Indies. Some of the facts noted, such as the extensive dissemination of the disease in Europe during the middle ages, and its subsequent rapid decline, suggest the existence of some unknown epidemic factor. Poverty and insanitation are said to go with the prevalence of leprosy, but they go with every malady, and there is nothing to show that they have any special influence. Vaccination has been blamed for spreading it, and a few cases of communication by arm-to-arm inoculation are recorded. The influence of this

factor, however, can only be trifling. Vaccination is a new thing, leprosy a very old one; where there is most vaccination there is no leprosy, and where there is most leprosy there is little or no vaccination. In India 78% of the lepers are unvaccinatcd, and in Canton since vaccination was introduced leprosy has declined (Cantlie). On the whole we must conclude that there is still much to be learnt about the conditions which govern the prevalence of leprosy.

With regard to prevention, the isolation of patients is obviously desirable, especially in the later stages, when open sores may disseminate the bacilli; but complete segregation, which has been urged, is regarded as impracticable by those who have had most experience in leprous districts. Scrupulous cleanliness should be exercised by persons attending on lepers or brought into close contact with them. In treatment the most essential thing is general care of the

health, with good food and clothing. The tendency of modern therapeutics to attach increasing importance to nutrition in various morbid states, and notably in diseases of degeneration, such as tuberculosis and affections of the nervous system, is borne out by experience in leprosy, which has affinities to both; and this suggests the application to it of modern methods for improving local as well as general nutrition by physical means. A large number of internal remedies have been tried with varying results; those most recommended are chaulmoogra oil, arsenic, salicylate of soda, salol and chlorate of potash. Vergueira uses Collargol intravenously and sub- cutaneously, and states that in all the cases treated there was marked improvement, and hair that had been lost grew again. Calmette's Anterenene injected subcutaneously has been followed by good results. Deycke together with R. Bey isolated from a non-ulcerated leprous nodule a streptothrix which they call S. leproides. Its relation to the bacillus is uncertain. They found that injections of this organism had marked curative effects, due to a neutral fat which they named " Nastin." Injections of Nastin together with Benzoyl Chloride directly act on the lepra bacilli. Some cases were unaffected by this treatment, but with others the effect was marvellous. Dr W. A. Pusey of Chicago uses applications of carbon dioxide snow with good effect. In the later stages of the disease there is a wide field for surgery, which is able to give much relief to sufferers.

Literature. — For history and geographical distribution, see Hirsch, Handbuch der historisch-geographischen Pathologie (1st ed., Erlangen, 1860, with exhaustive literature). For pathology, Virchow, Die krankhajten Geschwulste (Berlin, 1863-1867), vol. ii. For clinical histories, R. Livcing, Elephantiasis Graecorum or True Leprosy (London, 1873), ch. iv. For medieval leprosy — in Germany, Virchow, in Virchow' s Archiv, five articles, vols, xviii.xx. (1860 1861); in the Netherlands, Israels, in Nederl. Tijdschr. voor Genees- kunde, vol. i. (1857) ; in Britain, J. Y. Simpson, Edin. Med. and Surg. Joum., three articles, vols. lxvi. and lxvii. (1846-1847). Treatises on modern leprosy in particular localities: Danielssen and Boeck (Norway), Traite de la Spedalskhed, with atlas of twenty-four coloured plates (Paris, 1848) ; A. F. Anderson, Leprosy as met with in the Straits Settlements, coloured photographs with explanatory notes (London, 1872); H. Vandyke Carter (Bombay), On Leprosy and Elephantiasis, with coloured plates (London, 1874); Hillis, Leprosy in British Guiana, an account of West Indian leprosy, with twenty- two coloured plates (London, 1882). See also the dcrmatological works of Hebra, Erasmus Wilson, Bazin and Jonathan Hutchinson (also the latter's letters to The Times of the nth of April and the 25th of May 1903); British Medical

Journal (April 1, 1908); American Journal of Dermatology (Dec. 1907); The Practitioner (February 1910). An important early work is that of P. G. Hensler, Vom abendlandischen Aussatze im Mittelalter (Hamburg, 1790).

LEPSIUS, KARL RICHARD (1810-1884), German Egypto- logist, was born at Naumburg-am-Saale on the 23rd of December 1810, and in 1823 was sent to the ” Schulpforta ” school near Naumburg, where he came under the influence of Professor Lange. In 1829 he entered the university of Leipzig, and one year later that of Gbttingen, where, under the influence of Otfried Muller, he finally decided to devote himself to the archaeological side of philology. From Gottingen he proceeded to Berlin, where he graduated in 1833 as doctor with the thesis De tabulis Eugtibinis. In the same year he proceeded to study in Paris, and was commissioned by the due de Luynes to collect material from the Greek and Latin writers for his work on the

weapons of the ancients. In 1834 he took the Volney prize with his Palaographie als Mittel der Sprachforschumg. Befriended by Bunsen and Humboldt, Lepsius threw himself with great ardour into Egyptological studies, which, since the death of Champollion in 1832, had attracted no scholar of eminence and weight. Here Lepsius found an ample field for his powers. After four years spent in visiting the Egyptian collections of Italy, Holland and England, he returned to Germany, where Humboldt and Bunsen united their influence to make his projected visit to Egypt a scientific expedition with royal support. For three years Lepsius and his party explored the whole of the region in which monuments of ancient Egyptian and Ethiopian occupation are found, from the Sudan above Khartum to the Syrian coast. At the end of 1845 they returned home, and the results of the expedition, consisting of casts, drawings and squeezes of in- scriptions and scenes, maps and plans collected with the utmost thoroughness, as well as antiquities and papyri, far surpassed expectations. In 1846 he married Elisabeth Klein, and his appointment to a professorship in Berlin University in the following August afforded him the leisure necessary for the completion of his work. In 1859 the twelve volumes of his vast Denkmiiler aus Agyplen und Athiopien were finished, supplemented later by a text prepared from the note-books of the expedition; they comprise its entire archaeological, palaeo- graphical and historical results. In 1866 Lepsius again went to Egypt, and discovered the famous Decree of Tanis or Table of Canopus, an inscription of the same character as the Rosetta Stone, in hieroglyphic, demotic and Greek. In 1873 he was appointed keeper of the Royal Library, Berlin,

which, like the Berlin Museum, owes much to his care. About ten yearslater he was appointed Geheimer Oberregierungsrath. He died at Berlin on the 10th of July 1884. Besides the colossal Denkmiiler and other publications of texts such as the Todtenbuch der Agypter {Book of the Dead, 1842) his other works, amongst which may be specially named his Konigsbuch der Agypter (1858) and Chronologie der Agypter (1849), are characterized by a quality of permanence that is very remarkable in a subject of such rapid development as Egyptology. In spite of his scientific training in philology Lepsius left behind few transla- tions of inscriptions or discussions of the meanings of words: by preference he attacked historical and archaeological problems connected with the ancient texts, the alphabet, the metrology, the names of metals and minerals, the chronology, the royal names. On the other hand one of his latest works, the Nubische Grammatik (1880), is an elaborate grammar of the then little- known Nubian language, preceded by a linguistic sketch of the African continent. Throughout his life he profited by the gift of attaching to himself the right men, whether as patrons or, like Weidenbach and Stern, as assistants. Lepsius was a fine specimen of the best type of German scholar.

See Richard Lepsius, by Georg Ebers (New York, 1887), and art. Egypt, section Exploration and Research.

LEPTINES, an Athenian orator, known as the proposer of a law that no Athenian, whether citizen or resident alien (with the sole exception of the descendants of Harmodius and Aristo- geiton), should be exempt from the public charges (\ti.TOVfrylai) for the state festivals. The object was to provide funds for the festivals and public spectacles at a time when both the treasury and the citizens generally were short of money. It was further asserted that many of the recipients of immunity were really unworthy of it. Against this law Demosthenes delivered (354 B.C.) his well-known speech Against Leptines in support of the proposal of Ctesippus that all the cases of immunity should be carefully investigated. Great stress is laid on the reputation for ingratitude and breach of faith which the abolition of in> munities would bring upon the state. Besides, the law itself had been passed unconstitutionally, for an existing law confirmed these privileges, and by the constitution of Solon no law could be enacted until any existing law which it contravened had been repealed. The law was probably condemned. Nothing further is known of Leptines.

See the edition of the speech by J. E. Sandys (1890).

LEPTIS, the name of two towns in ancient Africa. The first, Leptis Magna (Aenrinayva.) , the modern Lebda, was in Tripolitana between Tripolis and Mesrata at the mouth of the Cinyps; the second, Leptis Parva (Aeims 17 fuKpa), known also as Leptiminus or Leptis minor, the modern Lamta, was a small harbour of Byzacena between Ruspina (Monastir) and Thapsus (Dimas).

1 . Leptis Magna was one of the oldest and most flourishing of the Phoenician emporia established on the coasts of the greater Syrtis, the chief commercial entrepot for the interior of the African continent. It was founded by the Sidonians (Sallust, Jug. 78) who were joined later by people of Tyre (Pliny, Hist. Nat. v. 17). Herodotus enlarges on the fertility of its territory (iv. 175, v. 42). It was tributary to Carthage to which it paid a contribution of a talent a day (Livy xxxiv. 62). After the Second Punic War Massinissa made himself master of it (Sallust, Jug. 78; Livy xxxiv. 62; Appian viii. 106). During the Jugurthine War it appealed for protection to Rome (Sallust, Jug. 78). Though captured and plundered by Juba, it maintained its allegiance to Rome, supported the senatorial cause, received Cato the younger with the remains of the Pompeian forces after Pharsalus 48 B.C. After his victory Julius Caesar imposed upon it an annual contribution of 300,000 measures of oil. Neverthe- less, it preserved its position as a free city governed by its own magistrates (C.I.L. viii. 7). It received the title of muni- cipium {C.I.L. viii. 8), and was subsequently made a colcnia by Trajan (C.I.L. viii. 10). Septimius Severus, who was born there, beautified the place and conferred upon it the Ius Italicum. Leptis Magna was the limit of the Roman state, the last station of the limes Tripolitanus; hence, especially during the last centuries of the Empire, it suffered much from the Nomads of the desert, the Garamantes, the Austuriani and the Levathae (Ammian. Marc, xxviii. 6; Procop. De Aedif. vi. 4). Its commerce declined and its harbour silted up. Justinian made a vain attempt to rebuild it (Procop. ibid. ; Ch. Diehl, L'Afrique byzantine, p. 388). It was the seat of a bishopric, but no mention is made of its bishops after 462.

Leptis Magna had a citadel which protected the commercial city which was generally called Neapolis, the situation of which may be compared with that of Carthage at the foot of Byrsa. Its ruins are still imposing; remains of ramparts and docks, a theatre, a circus and various buildings of the Roman period still exist. Inscriptions show that the current pronunciation of the name was Lepcis, Lepcitana,

instead of Leptis, Leptitana (Tissot, Giogr. comp. de la prov. d'Afrique, ii. 219; Clermont- Ganneau, Recueil d'archiologie orientate, vi. 41; Comptes rendus de I' Acad, des Inscr. et B.-Lettres, 1903, p. S33; Cagnat, C.R. Acad., 1905, p. 531). The coins of Leptis Magna, like the majority of the emporia in the neighbourhood, present a series from the Punic period. They are of bronze with the legend "PB 1 ? (Lepqi). They have on one side the head of Bacchus, Hercules or Cybele, and on the other various emblems of these deities. From the Roman period we have also coins bearing the heads of Augustus, Livia and Tiberius, which still have the name of the town in Neo-Punic script (Lud. Miiller, Numism. de I'anc. Afrique, ii. 3).

The ruins of Leptis Magna have been visited by numerous travellers since the time of Frederick William and Henry William Beechey (Travels, pp. 51 and 74) and Heinrich Barth (Wanderungen, pp. 306, 360); they are described by Ch. Tissot (Giogr. comp. ii. 219 et seq.); CI. Perroud, De Syrticis emporiis, p. 33 (Paris, 1881, in 8°); see also a description in the New York journal, The Nation (1877), vol. xxvii. No. 683. M. M6hier de Mathuisieulx explored the site afresh in 1 90 1 ; his account is inserted in the Nouvelles Archives des missions, x. 245-277; cf. vol. xii. See also J. Toutain, " Le Limes Tripolitanus en Tripolitaine," in the Bulletin archeologique du cotniti des travaux historiques (1905).

2. Leptis Parva (Lamta), 7J m. from Monastir, which is often confused by modern writers with Leptis Magna in their interpretations of ancient texts (Tissot, Geogr. comp. ii. 169), was, according to the Tabula Peutingeriana, 18 m. south of Hadrumetum. Evidently Phoenician in origin like Leptis Magna, it was in the Punic period of comparatively slight importance. Nevertheless, it had fortifications, and the French

engineer, A. Daux, has discovered a probable line of ramparts Like its neighbour Hadrumetum, Leptis Parva declared for Rome after the last Punic War. Also after the fall of Carthage in 146 it preserved its autonomy and was declared a civitas libera et immunis (Appian, Punica, 94; C.I.L. i. 200; De bell. Afric. c. xii.). Julius Caesar made it the base of his opera- tions before the battle of Thapsus in 46 (Ch. Tissot, Geogr. comp. ii. 728). Under the Empire Leptis Parva became extremely prosperous; its bishops appeared in the African councils from 258 onwards. In Justinian's reorganization of Africa we find that Leptis Parva was with Capsa one of the two residences of the Dux Byzacenae (Tissot, op. cit. p. 171). The town had coins under Augustus and Tiberius. On the obverse is the imperial effigy with a Latin legend, and on the reverse the Greek legend AEnTIC with the

bust of Mercury (Lud. Miiller, Numism. de I'anc. Afrique, ii. 49). The ruins extend along the sea-coast to the north-west of Lemta; the remains of docks, the amphitheatre and the acropolis can be distinguished; a Christian cemetery has furnished tombs adorned with curious mosaics.

See Comptes rendus de V Acad, des Inscrip. et B.-Lettres (1883), p. 189; Cagnat and Saladin, "Notes d'archeol. tunisiennes," in the Bulletin monumental of 1884; Archives des missions, xii. m; Cagnat, Explorations archeol. en Tunisie, 3 me fasc. pp. 9-16, and Tour du monde (1881), i. 292; Saladin, Rapport sur une mission en Tunisie (1886), pip. 9-20; Bulletin archeol. du comite de travaux, historiques (1895), pp. 69-71 (inscriptions of Lamta); Bulletin de la Soc. archeol. de Sousse (1905 ; plan of the ruins of Lamta). (E. B.*)

LE PUY, or Le Puy en Velay, a town of south-eastern France, capital of the department of Haute-Loire, 90 m. S.W. of Lyons on the Paris-Lyon railway. Pop. (1906) town, 17,291; commune, 21, 420. Le Puy rises in the form of an amphitheatre from a height of 2050 ft. above sea-level upon Mont Anis, a hill that divides the left bank of the Dolezon from the right bank of the Borne (a rapid stream joining the Loire 3 m. below). From the new town, which lies east and west in the valley of the Dolezon, the traveller ascends the old feudal and ecclesiastical town through narrow steep streets, paved with pebbles of lava, to the cathedral commanded by the fantastic pinnacle of Mont Corneille. Mont Corneille, which is 433 ft. above the Place de Breuil (in the lower town), is a steep rock of volcanic breccia, surmounted by an iron statue of the Virgin (53 ft. high) cast, after a model by Bonassieux, out of guns taken at Sebastopol. Another statue, that of Msgr de Morlhon, bishop of Le Puy, also sculptured by Bonassieux, faces that of the Virgin. From the platform of Mont Corneille a magnificent panoramic view is obtained of the town and of the volcanic mountains, which make this region one of the most interesting parts of France.

The Romanesque cathedral (Notre-Dame), dating chiefly from the first half of the 12th century, has a particoloured facade of white sandstone and black volcanic breccia, which is reached by a flight of sixty steps, and consists of three tiers, the lowest composed of three high arcades opening into the porch, which extends beneath the first bays of the nave; above are three windows lighting the nave; and these in turn are surmounted by three gables, two of which, those to the right and the left, are of open work. The staircase continues within the porch, where it divides, leading on the left to the cloister, on the right into the church. The doorway of the south transept is sheltered by a fine

Romanesque porch. The isolated bell-tower (184 ft.), which rises behind the choir in seven storeys, is one qf the most beautiful examples of the Romanesque transition period. The bays of the nave are covered in by octagonal cupolas, the central cupola forming a lantern. The choir and transepts are barrel-vaulted. Much veneration is paid to a small image of the Virgin on the high altar, a modern copy of the medieval image destroyed at the Revolution. The cloister, to the north of the choir, is striking, owing to its variously- coloured materials and elegant shafts. Viollet-le-Duc considered one of its galleries to belong to the oldest known type of cathedral cloister (8th or 9th century). Connected with the cloister are remains of fortifications of the 13 th century, by which it was separated from the rest of the city. Near the cathedral the

baptistery of St John (nth century), built on the foundations of a Roman building, is surrounded by walls and numerous remains of the period, partly uncovered by excavations. The church of St Lawrence (14th century) contains the tomb and statue of Bertrand du Guesclin, whose ashes were afterwards carried to St Denis.

Le Puy possesses fragmentary remains of its old line of fortifica- tions, among them a machicolated tower, which has been restored, and a few curious old houses dating from the 12th to the 17th century. In front of the hospital there is a fine medieval porch under which a street passes. Of the modern monuments the statue of Marie Joseph Paul, marquis of La Fayette, and a fountain in the Place de Breuil, executed in marble, bronze and syenite, may be specially mentioned. The museum, named after Charles Crozatier, a native sculptor and metal-worker to whose munificence it principally owes its existence, contains antiquities, engravings a collection of lace, and ethnographical and natural history collections. Among the curiosities of Le Puy should be noted the church of St Michel d'Aiguilhe, beside the gate of the town, perched on an isolated rock like Mont Corneille, the top of which is reached by a staircase of 271 steps. The church dates from the end of the 10th century and its chancel is still older. The steeple is of the same type as that of the cathedral. Three miles from Le Puy are the ruins of the Chateau de Polignac, one of the most important feudal strongholds of France.

Le Puy is the seat of a bishopric, a prefect and a court of assizes, and has tribunals of first instance and of commerce, a board of trade

arbitration, a chamber of commerce, and a branch of the Bank of France. Its educational institutions include ecclesiastical seminaries, lycees and training colleges for both sexes and municipal industrial schools of drawing, architecture and mathematics applied to arts and industries. The principal manufacture is that of lace and guipure (in woollen, linen, cotton, silk and gold and silver threads), and distilling, leather-dressing, malting and the manufacture of chocolate and cloth are carried on. Cattle, woollens, grain and vegetables are the chief articles of trade.

It is not known whether Le Puy existed previously to the Roman invasion. Towards the end of the 4th or beginning of the 5th century it became the capital of the country of the Vellavi, at which period the bishopric, originally at Revesskm, now St Paulien, was transferred hither. Gregory of Tours speaks of it by the name of Anicium, because a chapel ” ad Deum ” had been built on the mountain, whence the name of Mont Adidon or Anis, which it still retains. In the 10th century it was called Podium Sanctae Mariae, whence Le Puy. In the middle ages there was a double enclosure, one for the cloister, the other for the town. The sanctuary of N6tre Dame was much frequented by pilgrims, and the city grew famous and populous. Rivalries between the bishops who held directly of the see of Rome and had the right of coining money, and the lords of Polignac, revolts of the town against the royal authority, and the encroachments of the feudal superiors on municipal pre- rogatives often disturbed the quiet of the town. The Saracens in the 8th century, the Routiers in the 12th, the English in the 14th, the Burgundians in the 15th, successively ravaged the neighbourhood. Le Puy sent the flower of its chivalry to the Crusades in 1096, and Raymond d’Aiguille, called d’Agiles, one of its sons, was their historian. Many councils and various assemblies of the states of Languedoc met within its walls; popes and sovereigns, among the latter Charlemagne and Francis I., visited its sanctuary. Pestilence and the religious wars put an end to its prosperity. Long occupied by the Leaguers, it did not submit to Henry IV. until many years after his accession.

LERDO DE TEJADA, SEBASTIAN (1825-1880), president of Mexico, was born at Jalapa on the 25th of April 1825. He was educated as a lawyer and became a member of the supreme court. He became known as a liberal leader and a supporter of President Juarez. He was minister of foreign affairs for three months in 1857, and became president of the Chamber of Deputies in 1861. During the French intervention and the reign of the emperor Maximilian he continued loyal to the patriotic party, and had an active share in conducting the national resistance. He was minister of foreign affairs to President

Juarez, and he showed an implacable resolution in carrying out the execution of Maximilian at Queretaro. When Juarez died in 1872 Lerdo succeeded him in office in the midst

of a confused civil war. He achieved some success in pacifying the country and began the construction of railways. He was re-elected on the 24th of July 1876, but was expelled in January of the following year by Porfirio Diaz. He had made himself unpopular by the means he took to secure his re-election and by his disposition to limit state rights in favour of a strongly centralized government. He fled to the United States and died in obscurity at New York in 1889.

See H. H. Bancroft, Pacific States, vol. 9 (San Francisco, 1882-

1890).

LERICI, a village of Liguria, Italy, situated on the N.E. side of the Gulf of Spezia, about 12 m. E.S.E. of Spezia, and 4 m. W.S.W. of Sarzana by road, 17 ft. above sea-level. Pop. (1901) 9326. Its small harbour is guarded by an old castle, said to have been built by Tancred; in the middle ages it was the chief place on the gulf. S. Terenzo, a hamlet belonging to Lerici, was the residence of Shelley during his last days. Farther north-west is the Bay of Pertusola, with its large lead-smelting works.

LERIDA, a province of northern Spain, formed in 1833 of districts previously included in the ancient province of Catalonia, and bounded on the N. by France and Andorra, E. by Gerona and Barcelona, S. by Tarragona and W. by Saragossa and Huesca. Pop. (1900) 274,590; area 4690 sq. m. The northern half of Lerida belongs entirely to the Mediterranean or eastern section of the Pyrenees, and comprises some of the finest scenery in the whole chain, including the valleys of Aran and La Cerdana, and large tracts of forest. It is watered by many rivers, the largest of which is the Segre, a left-hand tributary of the Ebro. South of the point at which the Segre is joined on the right by the Noguera Pallaresa, the character of the country completely alters. The Llanos de Urgel, which comprise the greater part of southern Lerida, are extensive plains forming part of the Ebro valley, but redeemed by an elaborate system of canals from the sterility which characterizes so much of that region in Aragon. Lerida is traversed by the main railway from Barcelona to Saragossa, and by a line from Tarragona to the city of Lerida. In 1904 the Spanish government agreed with France to carry another line to the mouth of an international tunnel through the Pyrenees. Industries are in a more backward condition than in any other province of Catalonia, despite

the abundance of water- power. There are, however, many saw-mills, Hour-mills, and distilleries of alcohol and liqueurs, besides a smaller number of cotton and linen factories, paper-mills, soap-works, and oil and leather factories. Zinc, lignite and common salt are mined, but the output is small and of slight value. There is a thriving trade in wine, oil, wool, timber, cattle, mules, horses and sheep, but agriculture is far less prosperous than in the maritime provinces of Catalonia. Lerida {q.v.) is the capital (pop. 21,432), and the only town with more than 5000 inhabitants. Seo de Urgel, near the headwaters of the Segre, is a fortified city which has been an episcopal see since 840, and has had a close historical connexion with Andorra (q.v.). Solsona, on a small tributary of the Cardoner, which flows through Barcelona to the Mediterranean, is the Setelix of the Romans, and contains in its parish church an image of the Virgin said to possess miraculous powers, and visited every year by many hundreds of pilgrims. Cervera, on a small river of the same name, contains the buildings of a university which Philip V. established here in 1717. This university had originally been founded at Barcelona in the 15th century, and was reopened there in 1842. In character, and especially in their industry, intelligence and keen local patriotism, the inhabitants of Lerida are typical Catalans. (See Catalonia.)

LERIDA, the capital of the Spanish province of Lerida, on the river Segre and the Barcelona-Saragossa and Lerida-Tarragona railways. Pop. (1900) 21,432. The older parts of the city, on the right bank of the river, are a maze of narrow and crooked streets, surrounded by ruined walls and a moat, and commanded by the ancient citadel, which stands on a height overlooking the plains of Noguera on the north and of Urgel on the south. On the left bank, connected with the older quarters by a fine

stone bridge and an iron railway bridge, are the suburbs, laid out after 1880 in broad and regular avenues of modern houses. The old cathedral, last used for public worship in 1707, is a very interesting late Romanesque building, with Gothic and Mauresque additions; but the interior was much defaced by its conversion into barracks after 1717. It was founded in 1203 by Pedro II. of Aragon, and consecrated in 1278. The fine octagonal belfry was built early in the 15th century. A second cathedral, with a Corinthian facade, was completed in 1781. The church of San Lorenzo (1 270-1300) is noteworthy for the beautiful tracery of its Gothic windows; its nave is said to have been a

Roman temple, converted by the Moors into a mosque and by Ramon Berenguer IV., last count of Barcelona, into a church. Other interesting buildings are the Romanesque town hall, founded in the 13th century but several times restored, the bishop's palace and the military hospital, formerly a convent. The museum contains a good collection of Roman and Romanesque antiquities; and there are a school for teachers, a theological seminary and academies of literature and science. Leather, paper, glass, silk, linen and cloth are manufactured in the city, which has also some trade in agricultural produce.

Lerida is the Ilerda of the Romans, and was the capital of the people whom they called Ilerdenses (Pliny) or Ilergetes (Ptolemy). By situation the key of Catalonia and Aragon, it was from a very early period an important military station. In the Punic Wars it sided with the Carthaginians and suffered much from the Roman arms. In its immediate neighbourhood Hanno was defeated by Scipio in 216 B.C., and it afterwards became famous as the scene of Caesar's arduous struggle with Pompey's generals Afranius and Petreius in the first year of the civil war (49 B.C.). It was already a municipium in the time of Augustus, and enjoyed great prosperity under later emperors. Under the Visigoths it became an episcopal see, and at least one ecclesiastical council is recorded to have met here (in 546) . Under the Moors Lareda became one of the principal cities of the province of Saragossa; it became tributary to the Franks in 793, but was reconquered in 797. In 1 149 it fell into the hands of Ramon Berenguer IV. In modern times it has come through numerous sieges, having been taken by the French in November 1707 during the War of Succession, and again in 1810. In 1300 James II. of Aragon founded a university at Lerida, which achieved some repute in its day, but was suppressed in 1717, when the university of Cervera was founded.

LERMA, FRANCISCO DE SANDOVAL Y ROJAS, Duke or (1552-1625), Spanish minister, was born in 1552. At the age of thirteen he entered the royal palace as a page. The family of Sandoval was ancient and powerful, but under Philip II. (1556-1598) the nobles, with the exception of a few who held viceroyalties or commanded armies abroad, had little share in the government. The future duke of Lerma, who was by descent marquis of Denia, passed his life as a courtier, and possessed no political power till the accession of Philip III. in 1598. He had already made himself a favourite with the prince, and was in fact one of the incapable men who, as the dying king Philip II. fore- saw, were likely to mislead the new sovereign. The old king's fears were fully justified. No sooner was Philip III. king than he entrusted all authority to his favourite, whom he created duke of Lerma in 1599 and on whom he lavished an immense list of offices

and grants. The favour of Lerma lasted for twenty years, till it was destroyed by a palace intrigue carried out by his own son. Philip III. not only entrusted the entire direction of his government to Lerma, but authorized him to affix the royal signature to documents, and to take whatever presents were made to him. No royal favourite was ever more amply trusted, or made a worse use of power. At a time when the state was practically bankrupt, he encouraged the king in extravagance, and accumulated for himself a fortune estimated by contem- poraries at forty-four millions of ducats. Lerma was pious withal, spending largely on religious houses, and he carried out the ruinous measures for the expulsion of the Moriscoes in 1610 — a policy which secured him the admiration of the clergy and was popular with the mass of the nation. He persisted in' costly and

useless hostilities with England till, in 1604, Spain was forced by exhaustion to make peace, and he used all his influence against a recognition of the independence of the Low Countries. The fleet was neglected, the army reduced to a remnant, and the finances ruined beyond recovery. His only resources as a finance minister were the debasing of the coinage, and foolish edicts against luxury and the making of silver plate. Yet it is probable that he would never have lost the confidence of Philip III., who divided his life between festivals and prayers, but for the domestic treachery of his son, the duke of Uceda, who combined with the king's confessor, Aliaga, whom Lerma had introduced to the place, to turn him out. After a long intrigue in which the king was all but entirely dumb and passive, Lerma was at last com- pelled to leave the court, on the 4th of October 1618. As a protection, and as a means of retaining some measure of power in case he fell from favour, he had persuaded Pope Paul V, to create him cardinal, in the year of his fall. He retired to the town of Lerma in Old Castile, where he had built himself a splendid palace, and then to Valladolid. Under the reign of Philip IV., which began in 162 1 he was despoiled of part of his wealth, and he died in 1625.

The history of Lerma's tenure of office is in vol. xv. of the Historia General de Espana of Modesto Lafuente (Madrid, 1855) — with references to contemporary authorities.

LERMONTOV, MIKHAIL YUREVICH (1814-1841), Russian poet and novelist, often styled the poet of the Caucasus, was born in Moscow, of Scottish descent, but belonged to a respectable family of the Tula government, and was brought up in the village of Tarkhanui (in the Penzensk government), which now preserves his dust. By his grandmother — on whom the whole care of his childhood was devolved by his mother's early death and his father's military service

— no cost nor pains was spared to give him the best education she could think of. The intellectual atmo- sphere which he breathed in his youth differed little from that in which Pushkin had grown up, though the domination of French had begun to give way before the fancy for English, and Lamartine shared his popularity with Byron. From the academic gymnasium in Moscow Lermontov passed in 1830 to the university, but there his career came to an untimely close through the part he took in some acts of insubordination to an obnoxious teacher. From 1830 to 1834- he attended the school of cadets at St Peters- burg, and in due course he became an officer in the guards. To his own and the nation's anger at the loss of Pushkin (1837) the young soldier gave vent in a passionate poem addressed to the tsar, and the very voice which proclaimed that, if Russia took no vengeance on the assassin of her poet, no second poet would be given her, was itself an intimation that a poet had come already. The tsar, however, seems to have found more im- pertinence than inspiration in the address, for Lermontov was forthwith sent off to the Caucasus as an officer of dragoonˆ. He had been in the Caucasus with his grandmother as a boy of ten, and he found himself at home by yet deeper sympathies than those of childish recollection. The stern and rocky virtues of the mountaineers against whom he had to fight, no less than the scenery of the rocks 'and mountains themselves, proved akin to his heart; the emperor had exiled him to his native land. He was in St Petersburg in 1838 and 1839, and in the latter year wrote the novel, A Hero of Our Time, which is said to have been the occasion of the duel in which he lost his life in July 1841. In this contest he had purposely selected the edge of a precipice, so that if either combatant was wounded so as to fall his fate should be sealed.

Lermontov published only one small collection of poems in 1840. Three volumes, much mutilated by the censorship, were issued in 1842 by Glazounov; and there have been full editions of his works in i860 and 1863. To Bodenstedt's German translation of his poems (Michail Lermontov's poetischer Nachlass, Berlin, 1842, 2 vols.), which indeed was the first satisfactory collection, he is indebted for a wide reputation outside of Russia. His novel has found several translators (August Boltz, Berlin, 1852, &c). Among his best-known pieces are " Ismail-Bey," " HadjiAbrek," " Walerik," " The Novice," and, remarkable as an imitation of the old Russian ballad, " The song of the tsar Ivan Vasilivitch, his young body- guard, and the bold merchant Kalashnikov."

See Taillandier, " Le Poete du Caucase," in Revue des deux mondes

(February 1855), reprinted in Allemagne el Russie (Paris, 1856); Duduishkin's " Materials for the Biography of Lermontov," prefixed to the 1863 edition of his works. The Demon, translated by Sir Alexander Condie Stephen (1875), is an English version of one of his longer poems. (W. R. S.-R.) .

LEROUX, PIERRE (1798-1871), French philosopher and economist, was born at Bercy near Paris on the 7th of April 1798, the son of an artisan. His education was interrupted by the death of his father, which compelled him to support his mother and family. Having worked first as a mason and then as a compositor, he joined P. Dubois in the foundation of Le Globe which became in 1831 the official organ of the Saint-Simonian community, of which he became a prominent member. In November of the same year, when Enfantin preached the en- franchisement of women and the functions of the couple-pretrc, Leroux separated himself from the sect. In 1838, with J. Regnaud, who had seceded with him, he founded the Ency- clopedic nonvelle (eds. 1838-1841). Amongst the articles which he inserted in it were Dc Vegalite and Refutation de I'eclcctisme, which afterwards appeared as separate works. In 1840 he published his treatise De I'humanile (2nd ed. 1845), which contains the fullest exposition of his system, and was regarded as (he philosophical manifesto of the Humanitarians. In 1841 he established the Revue independante, with the aid of George Sand, over whom he had great influence. Her Spiridion, which was dedicated to him, Sept cordes de la lyre, Consuelo, and La Comtcsse de Rudohladt, were written under the Humanitarian inspiration. In 1843 he established at Boussac (Creuse) a print- ing association organized according to his systematic ideas, and founded the Revue sociale. After the outbreak of the revolution of 1848 he was elected to the Constituent Assembly, and in 1849 to the Legislative Assembly, but his speeches on behalf of the extreme socialist wing were of so abstract and mystical a character that they had no effect. After the coup d'etat of 1851 he settled with his family in Jersey, where he pursued agricultural experiments and wrote his socialist poem La Greve dc Samarez. On the definitive amnesty of 1869 he returned to Paris, where he died in April 1871, during the Commune.

The writings of Leroux have no permanent significance in the history of thought. He was the propagandist of sentiments and aspirations rather than the expounder of a systematic theory. He has, indeed, a system, but it is a singular medley of doctrines borrowed, not only from Saint-Simonian, but from Pythagorean and Buddhistic sources. In philosophy his fundamental principle is that of what he calls the "

triad ” — a triplicity which he finds to pervade all things, which in God is ” power, intelligence and love,” in man ” sensation, sentiment and knowledge.” His religious doc- trine is Pantheistic; and, rejecting the belief in a future life as commonly conceived, he substitutes for it a theory of metempsy- chosis. In social economy his views are very vague; he preserves the family, country and property, but finds in all three, as they now are, a despotism which must be eliminated. He imagines certain combinations by which this triple tyranny can be abolished, but his solution seems to require the creation of families without heads, countries without governments and property without rights of possession. In politics he advocates absolute equality — a democracy pushed to anarchy.

See Raillard, Pierre Leroux et ses ceuvres (Paris, 1899); Thomas, Pierre Leroux: sa vie, son ceuvre, sa doctrine (Paris, 1904) ;’ L. Rey- baud, Etudes sur les reformateurs et socialistes modernes; article in R. H. Inglis Palgrave’s Dictionary of Pol. Econ.

LEROY-BEAULIEU, HENRI JEAN BAPTISTE ANATOLE (1S42-), French publicist, was born at Lisieux, on the 12th of February 1842. In 1866 he published Une troupe dc comediens, and afterwards Essai sur la restauration dc nos monuments his- loriqucs devant Part el devant lebudget, which deals particularly with the restoration of the cathedral of Evreux. He visited Russia in order to collect documents on the political and economic organiza- tion of the Slav nations, and on his return published in the Revue des deux mondes (1882-1889) a series of articles, which appeared shortly afterwards in book form under the title L’ Empire des tsars el les Russcs (4th ed., revised in 3 vols., 1897-1898). The work entitled Un empercur, mi rot, un pape, une restaura- tion. published in 1879, was an analysis and criticism of the politics of the Second Empire. Un homme d’etat russe (1884) gave the history of the emancipation of the serfs by Alexander II.

Other works are Les Catholiques liberaux, I’eglise et le liberalisme (1890), La Papaute, le socialisme et la democracie (1892), Les Juifs et Tanlisemitisme; Israel chez les nations (1893), Les Arm&niens et la question armenienne (1896), U Antisemitisme (1897), Etudes russes el europiennes (1897). These writings, mainly collections of articles and lectures intended for the general public, display enlightened views and wide information. In 1881 Leroy-Beaulieu was elected professor of contemporary history and eastern affairs at the Ecole Libre des Sciences Politiques, becoming director of this institution on the death of Albert Sorel in 1906, and in 1887 he became a member of the Academie des Sciences Morales et Politiques.

Two of Leroy-Bcaulieu's works have been translated into English : one as the Empire of the Tsars and the Russians, by Z. A. Regozin (New York, 1893-1896), and another as Papacy, Socialism, Demo- cracy, by B. L. O'Donnell (1892). See W. E. H. Lecky, Historical and Political Essays (1908).

LEROY-BEAULIEU, PIERRE PAUL (1843-), French economist, brother of the preceding, was born at Saumur on the 9th of December 1843, and educated in Paris at the Lycee Bonaparte and the Ecole de Droit. He afterwards studied at Bonn and Berlin, and on his return to Paris began to write for Le Temps, Revue nationale and Revue contemporaine. In 1867 he won a prize offered by the Academy of Moral Science with an essay entitled " LTnfluence de l'etat moral et intellectuel des populations ouvrieres sur le taux des salaires." In 1870 he gained three prizes for essays on "La Colonization chez les peuples modernes," " L'Administration en France et en Angle- terre," and " LTmpot fonder et ses consequences economiques." In 1872 Leroy-Beaulieu became professor of finance at the newly-founded Ecole Libre des Sciences Politiques, and in 1880 he succeeded his father-in-law, Michel Chevalier, in the chair of political economy in the College de France. Several of his works have made their mark beyond the borders of his own country; Among these may be mentioned his Recherches (conomiques, historiques et statistiques sur les guerres contemporaines, a series of studies published between 1863 and 1869, in which he calculated the loss of men and capital caused by the great European conflicts. Other works by him are — La Question monnaie au dix-neuvieme Steele (1861), Le Travail des femmes au dix-neuvieme Steele (1873), TrailS de la science des finances (1877), Essai sur la repartition des richesses (1882), L' Algtrie et la Tunisie (1888), Precis d'economie politique (1888), and L'Etat moderne et ses fonctions (1889). He also founded in 1873 the Economiste jrancais, oh the model of the English Economist. Leroy-Beaulieu may be regarded as the leading representative in France of orthodox political economy, and the most pronounced opponent of pro- tectionist and collectivist doctrines.

LERWICK, a municipal and police burgh of Shetland, Scot- land, the most northerly town in the British Isles. Pop. (1901) 4281. It is situated on Brassay Sound, a fine natural harbour, on the east coast of the island called Mainland, 115 m. N.E. of Kirkwall, in Orkney, and 340 m. from Leith by steamer. The town dates from the beginning of the 17th century, and the older part consists of a flagged causeway called Commercial Street, running for 1 m. parallel with the sea (in which the gable ends of several of the quaint-looking houses stand), and so narrow in places as not to allow of two vehicles passing each

other. At right angles to this street lanes ascend the hill-side to Hillhead, where the more modern structures and villas have been builti At the north end stands Fort Charlotte, erected by Cromwell; repaired in 1665 by Charles II. and altered in 1 781 by George III., after whose queen it was named. It is now used as a depot for the Naval Reserve, for whom a large drill hall was added. The Anderson Institute, at the south end, was constructed as a secondary school in 1862 by Arthur Anderson, a native, who also presented the Widows' Asylum in the same quarter, an institution intended by preference for widows of Shetland sailors. The town-hall, built in 1881, contains several stained- glass windows, two of which were the gift of citizens of Amster- dam and Hamburg, in gratitude for services rendered by the islanders to fishermen and seamen of those ports. Lerwick's main industries are connected with the fisheries, of which it is an

important centre. Docks, wharves, piers, curing stations and warehouses have been provided or enlarged to cope with the growth of the trade, and an esplanade has been constructed along the front. The town is also the chief distributing agency for the islands, and carries on some business in knitted woollen goods. One mile west of Lerwick is Clickimin Loch, separated from the sea by a narrow strip of land. On an islet in the lake stands a ruined " broch " or round tower.

LE SAGE, ALAIN RENE (i 668-1 747), French novelist and dramatist, was born at Sarzeau in the peninsula of Rhuys, between the Morbihan and the sea, on the 13th of December 1668. Rhuys was a legal district, and Claude le Sage, the father of the novelist, held the united positions of advocate, notary and registrar of its royal court. His wife's name was Jeanne Brenugat. Both father and mother died when Le Sage was very young, and his property was wasted or embezzled by his guardians. Little is known of his youth except that he went to school with the Jesuits at Vannes until he was eighteen. Conjecture has it that he continued his studies at Paris, and it is certain that he was called to the bar at the capital in 1692. In August 1694 he married the daughter of a joiner, Marie Elizabeth Huyard. She was beautiful but had no fortune, and Le Sage had little practice. About this time he met his old schoolfellow, the dramatist Danchet, and is said to have been advised by him to betake himself to literature. He began modestly as a trans- lator, and published in 1695 a French version of the Epistles of Aristaenetus, which was not successful. Shortly afterwards he found a valuable patron and adviser in the abbe

de Lyonne, who bestowed on him an annuity of 600 livres, and recommended him to exchange the classics for Spanish literature, of which he was himself a student and collector.

Le Sage began by translating plays chiefly from Rojas and Lope de Vega. Le Traitre puni and Le Point d'honneur from the former, Don FSlix de Mendoce from the latter, were acted or published in the first two or three years of the 18th century. In 1704 he translated the continuation of Don Quixote by Avellaneda, and soon afterwards adapted a play from Calderon, Don Cesar Ursin, which had a divided fate, being successful at court and damned in the city. He was, however, nearly forty before he obtained anything like decided success. But in 1707 his admirable farce of Crispin rival de son maitre was acted with great applause, and Le Diable boiteux was published. This latter went through several editions in the same year, and was frequently reprinted till 1725, when Le Sage altered and improved it considerably, giving it its present form. Notwith- standing the success of Crispin, the actors did not like Le Sage, and refused a small piece of his called Les Etrennes (1707). He thereupon altered it into Turcaret, his theatrical masterpiece, and one of the best comedies in French literature. This appeared in 1 709. Some years passed before he again attempted romance writing, and then the first two parts of Gil Bias de Santillane appeared in 1715. Strange to say, it was not so popular as Le Diable boiteux. Le Sage worked at it for a long time, and did not bring out the third part till 1724, nor the fourth till 1735. For this last he had been part paid to the extent of a hundred pistoles some years before its appearance. During these twenty years he was, however, continually busy. Notwithstanding the great merit and success of Turcaret and Crispin, the Theatre Francais did not welcome him, and in the year of the publication of Gil Bias he began to write for the Th6atre de la Foire — the comic opera held in booths at festival time. This, though not a very dignified occupation, was followed by many writers of dis- tinction at this date, and by none more assiduously than by Le Sage. According to one computation he produced, either alone or with others, about a hundred pieces, varying from strings of songs with no regular dialogues, to comediettas only distinguished from regular plays by the introduction of music. He was also industrious in prose fiction. Besides finishing Gil Bias he translated the Orlando innamorato (1721), rearranged Guzman d'Alfarache (1732), published two more or less original novels, Le Bachelier de Salamanque and Estevanille Gonzales, and in 1733 produced the Vie el aventures de M. de Beauchesne,

which is curiously like certain works of Defoe. Besides all this, Le Sage was also the author of La Valise trouvie, a collection of imaginary

letters, and of some minor pieces, of which Une journee des parques is the most remarkable. This laborious life he continued until 1740, when he was more than seventy years of age. His eldest son had become an actor, and Le Sage had disowned him, but the second was a canon at Boulogne in comfortable circumstances. In the year just mentioned his father and mother went to live with him. At Boulogne Le Sage spent the last seven years of his life, dying on the 17th of November 1747. His last work, Melange amusant de saillies d 'esprit el de traits historiques les plus frap pants, had appeared in 1743.

Not much is known of Le Sage's life and personality, and the foregoing paragraph contains not only the most important but almost the only facts available for it. The few anecdotes which we have of him represent him as a man of very independent temper, declining to accept the condescending patronage which in the earlier part of the century was still the portion of men of letters. Thus it is said that, on being remonstrated with, as he thought impolitely, for an unavoidable delay in appearing at the duchess of Bouillon's house to read Turcaret, he at once put the play in his pocket and retired, refusing absolutely to return. It may, however, be said that as in time so in position he occupies a place apart from most of the great writers of the 17th and 18th centuries respectively. He was not the object of royal patronage like the first, nor the pet of salons and coteries like the second. Indeed, he seems all his life to have been purely domestic in his habits, and purely literary in his interests.

The importance of Le Sage in French and in European literature is not entirely the same, and he has the rare distinction of being more important in the latter than in the former. His literary work may be divided into three parts. The first contains his Theatre de la Foire and his few miscellaneous writings, the second his two remarkable plays Crispin and Turcaret, the third his prose fictions. In the' first two he swims within the general literary current in France; he can be and must be compared with others of his own nation. But in the third he emerges altogether from merely national comparison. It is not with Frenchmen that he is to be measured. He formed no school in France; he followed no French models. His work, admirable as it is from the mere point of view of style and form, is a paren- thesis in the general development of the French novel. That product works its way from Madame de la Fayette through Marivaux and Prevost, not through Le Sage. His literary ancestors are Spaniards, his literary contemporaries and suc- cessors are Englishmen. The position is almost unique; it is certainly interesting and remarkable in the highest degree.

Of Le Sage's miscellaneous work, including his numerous farce-

operettas, there is not much to be said except that they are the very best kind of literary hack-work. The pure and original style of the author, his abundant wit, his cool, humoristic attitude towards human life, which wanted only greater earnest- ness and a wider conception of that life to turn it into true humour, are discernible throughout. But this portion of his work is practically forgotten, and its examination is incumbent only on the critic. Crispin and Turcaret show a stronger and more deeply marked genius, which, but for the ill-will of the actors, might have gone far in this direction. But Le Sage's peculiar unwillingness to attempt anything absolutely new discovered itself here. Even when he had devoted himself to the Foire theatre, it seems that he was unwilling to attempt, when occasion called for it, the absolute innovation of a piece with only one actor, a crux which Alexis Piron, a lesser but a bolder genius, accepted and carried through. Crispin and Turcaret are unquestionably Molieresque, though they are perhaps more original in their following of Moliere than any other plays that can be named. For this also was part of Le Sage's idiosyncrasy that, while he was apparently unable or unwilling to strike out an entirely novel line for himself, he had no sooner entered upon the beaten path than he left it to follow his own devices. Crispin rival de son maitre is a farce in one act and many scenes, after the earlier manner of motion. Its

plot is somewhat extravagant, inasmuch as it lies in the effort of a knavish valet, not as usual to further his master's interests, but to supplant that master in love and gain. But the charm of the piece consists first in the lively bustling action of the short scenes which take each other up so promptly and smartly that the spectator has not time to cavil at the improbability of the action, and secondly in the abundant wit of the dialogue. Turcaret is a far more important piece of work and ranks high among comedies dealing with the actual society of their time. The only thing which prevents it from holding the very highest place is a certain want of unity in the plot. This want, however, is compensated in Turcaret by the most masterly profusion of character-drawing in the separate parts. Turcaret, the ruthless, dishonest and dissolute financier, his vulgar wife as dissolute as himself, the harebrained marquis, the knavish chevalier, the baroness (a coquette with the finer edge taken off her fine- ladyhood, yet by no means unlovable), are each and all finished portraits of the best comic type, while almost as much may be said of the minor characters. The style and dialogue are also worthy of the highest praise; the wit never

degenerates into mere ” wit-combats.”

It is, however, as a novelist that the world has agreed to remember Le Sage. A great deal of unnecessary labour has been spent on the discussion of his claims to originality. What has been already said will give a sufficient clue through this thorny ground. In mere form Le Sage is not original. He does little more than adopt that of the Spanish picaroon romance of the 1 6th and 17th century. Often, too, he prefers merely to rearrange and adapt existing work, and still oftener to give himself a kind of start by adopting the work of a preceding writer as a basis. But it may be laid down as a positive truth that he never, in any work that pretends to originality at all, is guilty of anything that can fairly be called plagiarism. Indeed we may go further, and say that he is very fond of asserting or suggesting his indebtedness when he is really dealing with his own funds. Thus the Diable boiteux borrows the title, and for a chapter or two the plan and almost the words, of the Diablo Cojuclo of Luis Velez de Guevara. But after a few pages Le Sage leaves his predecessor alone. Even the plan of the Spanish original is entirely discarded, and the incidents, the episodes, the style, are as independent as if such a book as the Diablo Cojuelo had never existed. The case of Gil Bias is still more remarkable. It was at first alleged that Le Sage had borrowed it from the Marcos de Obregon of Vincent Espinel, a curiously rash assertion, inasmuch as that work exists and is easily accessible, and as the slightest consultation of it proves that, though it furnished Le Sage with separate incidents and hints for more than one of his books, Gil Bias as a whole is not in the least indebted to it. Afterwards Father Isla asserted that Gil Bias was a mere translation from an actual Spanish book — an assertion at once incapable of proof and disproof, inasmuch as there is no trace whatever of any such book. A third hypothesis is that there was some manuscript original which Le Sage may have worked up in his usual way, in the same way, for instance, as he professes himself to have worked up the Bachelor of Salamanca. This also is in the nature of it incapable of refutation, though the argument from the Bachelor is strong against it, for there could be no reason why Le Sage should be more reticent of his obligations in the one case than in the other. Except, however, for historical reasons, the controversy is one which may be safely neglected, nor is there very much importance in the more impartial indication of sources — chiefly works on the history of Olivares — which has sometimes been attempted. That Le Sage knew Spanish literature well is of course obvious; but there is as little doubt (with the limitations already laid down) of his real originality as of that of any great writer in the world . Gil Bias then remains his property, and it is admittedly the capital example of its own style. For

Le Sage has not only the characteristic, which Homer and Shakespeare have, of absolute truth to human nature as distinguished from truth to this or that national character, but he has what has been called the quality of detachment,

which they also have. He never takes sides with his characters as Fielding (whose master, with Cervantes, he certainly was) sometimes does. Asmodeus and Don Cleofas, Gil Bias and the Archbishop and Doctor Sangrado, are produced by him with exactly the same impartiality of attitude. Except that he brought into novel writing this highest quality of artistic truth, it perhaps cannot be said that he did much to advance prose fiction in itself. He invented, as has been said, no new genre; he did not, as Marivaux and Prevost did, help on the novel as distinguished from the romance. In form his books arc un-distinguishable, not merely from the Spanish romances which are, as has been said, their direct originals, but from the medieval romans d'aventures and the Greek prose romances. But in individual excellence they have few rivals. Nor should it be forgotten, as it sometimes is, that Le Sage was a great master of French style, the greatest unquestionably between the classics of the 17th century and the classics of the 18th. He is perhaps the last great writer before the decadence (for since the time of Paul Louis Courier it has not been denied that the philosophe period is in point of style a period of decadence). His style is perfectly easy at the same time that it is often admirably epi- grammatic. It has plenty of colour, plenty of flexibility, and may be said to be exceptionally well fitted for general literary work. The dates of the original editions of Le Sage's most important works have already been given. He published during his life a collection of his regular dramatic works, and also one of his pieces for the Foire, but the latter is far from exhaustive; nor is there any edition which can be called so, though the (Euvres choisies of 1782 and 1818 are useful, and there are so-called (Euvres completes of 1 82 1 and 1840. Besides critical articles by the chief literary critics and historians, the work of Eugene Lintilhac, in the Grands ecrivains francais (1893), should be consulted. The Diable boiteux and Gil Bias have been reprinted and translated numberless times. Both will be found conveniently printed, together with Estevanille Gonzales and Guzman d'Alfarache, the best of the minor novels, in four volumes of Garnier's Bibliotheque amusante (Paris, 1865). Turcaret and Crispin are to be found in all collected editions of the French drama. There is a useful edition of them, with ample specimens of Le Sage's work for the Foire, in two volumes (Paris, 1821). (G. Sa.)

LES ANDELYS, a town of northern France, capital of an arrondissement in the department of Eure about 30 m. S.E. of Rouen

by rail. Pop. (1906) 3955. Les Andelys is formed by the union of Le Grand Andely and Le Petit Andely, the latter situated on the right bank of the Seine, the former about half a mile from the river. Grand Andely, founded, according to tradition, in the 6th century, has a church (13th, 14th and 15th centuries) parts of which are of fine late Gothic and Renaissance architec- ture. The works of art in the interior include beautiful stained glass of the latter period. Other interesting buildings are the hotel du Grand Cerf dating from the first half of the 16th century, and the chapel of Sainte-Clotilde, close by a spring which, owing to its supposed healing powers, is the object of a pilgrimage. Grand Andely has a statue of Nicolas Poussin a native of the place. Petit Andely sprang up at the foot of the eminence on which stands the chateau Gaillard, now in ruins, but formerly one of the strongest fortresses in France (see Fortification and Siegecraft and Castle). It was built by Richard Cceur de Lion at the end of the 12th century to protect the Norman frontier, was captured by the French in 1204 and passed finally into their possession in 1449. The church of St Sauveur at Petit Andely also dates from the end of the 12th century. Les Andelys is the seat of a sub-prefect and of a tribunal of first instance, has a preparatory infantry school; it carries on silk milling, and the manufacture of leather, organs and sugar. It has trade in cattle, grain, flour, &c.

LES BAUX, a village of south-eastern France, in the depart- ment of Bouches-du-Rh&ne, 1 1 m. N.E. of Aries by road. Pop. (1906) in. Les Baux, which in the middle ages was a flourishing town, is now almost deserted. Apart from a few inhabited dwellings, it consists of an assemblage of ruined towers, fallen walls and other debris, which cover the slope of a hill crowned by the remains of a huge chateau, once the seat of a celebrated “court of love.” The ramparts, a medieval church, the chateau, parts of which date to the nth century, and many of the dwellings are,

in great part, hollowed out of the white friable limestone on which they stand. Here and there may be found houses preserv- ing carved facades of Renaissance workmanship. Les Baux has given its name to the reddish rock (bauxite) which is plentiful in the neighbourhood and from which aluminium is obtained. In the middle ages Les Baux was the seat of a powerful family which owned the Terre Baussenques, extensive domains in Provence and Dauphine. The influence of the seigneurs de Baux in Provence declined before the power of the house

of Anjou, to which they abandoned many of their possessions. In 1632 the chateau and the ramparts were dismantled.

LESBONAX, of Mytilene, Greek sophist and rhetorician, flourished in the time of Augustus. According to Photius {cod. 74) he was the author of sixteen political speeches, of which two are extant, a hortatory speech after the style of Thucydides, and a speech on the Corinthian War. In the first he exhorts the Athenians against the Spartans, in the second (the title of which is misleading) against the Thebans (edition by F. Kiehr, Les- bonactis quae supcrsunt, Leipzig, 1907). Some erotic letters are also attributed to him.

The Lesbonax described in Suidas as the author of a large number of philosophical works is probably of much earlier date; on the other hand, the author of a small treatise Ilepi Xxvua-Tuv on grammatical figures (ed. Rudolf Muller, Leipzig, 1900), is probably later.

LESBOS (Mytilene, Turk. Midullu), an island in theAegean sea, off the coast of Mysia, N. of the entrance of the Gulf of Smyrna, forming the main part of a sanjak in the archipelago vilayet of European Turkey. It is divided into three districts, Mytilene or Kastro in the E., Molyvo in the N., and Calloni in the W. Since the middle ages it has been known as Mytilene, from the name of its principal town. Strabo estimated the circum- ference of the island at 1100 stadia, or about 138 m., and Scylax reckoned it seventh in size of the islands of the Mediterranean. The width of the channel between it and the mainland varies from 7 to 10 m. The island is roughly triangular in shape; the three points are Argennum on the N.E., Sigrium (Sigri) on the W., and Malea (Maria) on the S.E. The Euripus Pyrrhaeus (Calloni) is a deep gulf on the west between Sigrium and Malea. The country though mountainous is very fertile, Lesbos being celebrated in ancient times for its wine, oil and grain. Homer refers to its wealth. Its chief produce now is olives, which also form its principal export. Soap, skins and valonea are also exported, and mules and cattle are extensively bred. The sardine fishery is an important trade, and antimony, marble and coal are found on the island. The surface is rugged and mountainous, the highest point, Mount Olympus (Hagios Elias) being 3080 ft. The island has suffered from periodical earthquakes. The roads were remade in 1889, and there is telegraphic communication on the island, and to the mainland by cable. The ports are Sigri and Mytilene. The Gulf of Calloni and Hiera or Olivieri can only be entered by vessels of small draught.

The chief town, called Mytilene, is built in amphitheatre shape round a small hill crowned by remains of an ancient fortress. There are now

14 mosques and 7 churches, including a cathedral. It was originally built on an island close to the eastern coast of Lesbos, and afterwards when the town became too large for the island, it was joined to Lesbos by a causeway, and the city spread along the coast. There was a harbour on each side of the small island. Maloeis, by some surmised to be the northern of these, was not far away. Besides the five cities which gave the island the name of Pentapolis (Mytilene, Methymna, Antissa, Eresus, Pyrrha), there was a town called Arisba, destroyed by an earth- quake in the time of Herodotus. Professor Conze thinks that this is the site now called Palaikastro, N.E. of Calloni. Pyrrha lay S.E. of Calloni, and is now also called Palaikastro. Antissa was on the N. coast near Sigri. It was destroyed by the Romans in 168 B.C. Eresus was also near Sigri on the S. coast. Methymna was on the N. coast, on the site of Molyvo, still the second city of the island. The name Methymna is derived from the wine (Gr. (ikQv) for which it was famous. Considerable remains of town walls and other buildings are to be seen on all these sites. (E. Gr.)

History. — Although the position of Lesbos near the old- established trade-route to the Hellespont marks it out as an important site even in pre-historic days, no evidence on the early condition of the island is as yet obtainable, beyond the Greek tradition which represented it at the time of the Trojan War as inhabited by an original stock of Pelasgi and an immigrant population of lonians. In historic times it was peopled by an ” Aeolian ” race who reckoned Boeotia as their motherland and claimed to have migrated about 1050 B.C.; its principal nobles traced their pedigree to Orestes, son of Agamemnon. Lesbos was the most prominent of Aeolian settlements, and indeed played a large part in the early development of Greek life. Its commercial activity is attested by several colonies in Thrace and the Troad, and by the participation of its traders in the settlement of Naucratis in Egypt; hence also the town of Mytilene, by virtue of its good harbour, became the political capital of the island. The climax of its prosperity was reached about 600 B.C., when a citizen named Pittacus was appointed as aesymnetes (dictator) to adjust the balance between the governing nobility and the insurgent commons and by his wise administra- tion and legislation won a place among the Seven Sages of Greece. These years also constitute the golden age of Lesbian culture. The lyric poetry of Greece, which owed much to two Lesbians of the 7th century, the musician Terpander and the dithyrambist Arion, attained the standard of classical excellence under Pittacus’ contemporaries Alcaeus and Sappho. In the 6th century the importance of the island declined, partly through a protracted and unsuccessful struggle with Athens for the possession of Sigeum near the Hellespont, partly through a

crushing naval defeat inflicted by Polycrates of Samos (about 550). The Lesbians readily submitted to Persia after the fall of Croesus of Lydia, and although hatred of their tyrant Coes, a Persian protege, drove them to take part in the Ionic revolt (499- 493), they made little use of their large navy and displayed poor spirit at the decisive battle of Lade. In the 5th century Lesbos for a long time remained a privileged member of the Delian League (q.v.), with full rights of self-administration, and under the sole obligation of assisting Athens with naval contingents. Nevertheless at the beginning of the Peloponnesian War the ruling oligarchy of Mytilene forced on a revolt, which was ended after a two years' siege of that town (429-427). The Athenians, who had intended to punish the rebels by a wholesale execution, contented themselves with killing the ringleaders, confiscating the land and establishing a garrison. In the later years of the war Lesbos was repeatedly attacked by the Peloponnesians, and in 403 the harbour of Mytilene was the scene of a battle between the admirals Callicratidas and Conon. In 389 most of the island was recovered for the Athenians by Thrasybulus; in 377 it joined the Second Delian League, and remained through- out a loyal member, although in the second. half of the century the dominant democracy was for a while supplanted by a tyranny. In 334 Lesbos served as a base for the Persian admiral Memnon against Alexander the Great. During the Third Macedonian War the Lesbians sided with Perseus against Rome; similarly in 88 they became eager allies of Mithradates VI. of Pontus, and Mytilene stood a protracted siege on his behalf. This town, nevertheless, was raised by Pompey to the status of a free com-munity, thanks no doubt to his confidant Theophanes, a native of Mytilene.

Of the other towns on the island, Antissa, Eresus and Pyrrha possess no separate history. Methymna in the 5th and 4th centuries sometimes figures as a rival of Mytilene, with an independent policy. Amohg the distinguished Lesbians, in addition to those cited, may be mentioned the cyclic poet Lesches, the historian Hellanicus and the philosophers Theo- phrastus and Cratippus.

During the Byzantine age the island, which now assumes the name of Mytilene, continued to flourish. In 109 1 it fell for a while into the hands of the Seljuks, and in the following century was repeatedly occupied by the Venetians. In 1224 it was recovered by the Byzantine emperors, who in 1354 gave it as a dowry to the Genoese family Gattilusio. After prospering under

their administration Mytilene passed in 1462 under Turkish control, and has since had an uneventful history. The present population is about 130,000 of whom 13,000 are Turks and Moslems and 117,000 Greeks.

See Strabo xiii. pp. 617-619; Herodotus ii. 178, iii. 39, vi. 8, 14; Thucydides iii. 2-50; Xenophon, Hellenica, i., ii. ; S. Plehn, Lesbiacorum Liber (Berlin, 1828); C. T. Newton, Travels and Discoveries in the Levant (London, 1865) ; B. V. Head, Historia Numorum (Oxford, 1887), pp. 487-488; E. L. Hicks and G. F. Hill, Greek Historical Inscriptions (Oxford, 1901), Nos. 61, 94,-101, 139, 164; Conze, Reise auf der Inset Lesbos (1865) ; Koldewey, Antike Baureste auf Lesbos (Berlin, 1890). (M. O. B. C.)

LESCHES (Lescheos in Pausanias x. 25. 5), the reputed author of the Little Iliad (‘IXias y-wpa.), one of the “cyclic” poems. According to the usually accepted tradition, he was a native of Pyrrha in Lesbos, and flourished about 660 B.C. (others place him about 30 years earlier). The Little Iliad took up the story of the Homeric Iliad, and, beginning with the contest between Ajax and Odysseus for the arms of Achilles, carried it down to the fall of Troy (Aristotle, Poetics, 23). Accord- ing to the epitome in the Chrestomathy of Proclus, it ended with the admission of the wooden horse within the walls of the city. Some ancient authorities ascribe the work to a Lacedaemonian named Cinaethon, and even to Homer.

See F. G. Welcker, Der epische Cyclus (1865-1882) ; Muller and Donaldson, Hist, of Greek Literature, i. ch. 6; G. H. Bode, Geschichte der hellenischen Dichtkunst, i.

LESCURE, LOUIS MARIE JOSEPH, Marquis de (1766-1793), French soldier and anti-revolutionary, was born near Bressuire. He was educated at the Ecole Militaire, which he left at the age of sixteen. He was in command of a company of cavalry in the Regiment de Royal-Piemont, but being opposed to the ideas of the Revolution he emigrated in 1791; he soon, however, returned to France, and on the 10th of August 1792 took part in the defence of the Tuileries against the mob of Paris. The day after, he was forced to leave Paris, and took refuge in the chateau of Clisson near Bressuire. On the outbreak of the revolt of Vendee against the Republic, he was arrested and imprisoned with all his family, as one of the promoters of the rising. He was set at liberty by the Royalists, and became one of their leaders, fighting at Thouars, taking Fontenay and Saumur (May-June 1793), and, after an

unsuccessful attack on Nantes, joining H. du Verger de la Rochejaquelein, another famous Vendean leader. Their peasant troops, opposed to the republican general F. J. Westermann, sustained various defeats, but finally gained a victory between Tiffauges and Cholet on the 19th of September 1793. The struggle was then concentrated round Chatillon, which was time after time taken and lost by the Republicans. Lescure was killed on the 15th of October 1793 near the chateau of La Tremblaye between Sinee and Fougeres.

See Marquise de la Rochejaquelein (Lescure's widow, who after- wards married La Rochejaquelein), Memoires (Paris, 1817); Jullien de Courcelles, Dictionnaire des generaux franqais, tome vii. (1823); T. Muret, Histoire des guerres de Vouest (Paris, 1848); and J. A. M. Cretineau-Joly, Guerres de Vendee (1834).

LESDIGUIERES, FRANCOIS DE BONNE, Due de (1 543-1626), constable of France, was born at Saint-Bonnet de Champsaur on the 1st of April 1543, of a family of notaries with pretensions to nobility. He was educated at Avignon under a Protestant tutor, and had begun the study of law in Paris when he enlisted as an archer. He served under the lieutenant-general of his native province of Dauphine, Bertrand de Simiane, baron de Gordes, but when the Huguenots raised troops in Dauphine Lesdiguieres threw in his lot with them, and under his kinsman Antoine Rambaud.de Furmeyer, whom he succeeded in 1570, distinguished himself in the mountain warfare that followed by his bold yet prudent handling of troops. He fought at Jarnac and Moncontour, and was a guest at the wedding of Henry IV. of Navarre. Warned of the impending massacre he retired hastily to Dauphine, where he secretly equipped and drilled a determined body of Huguenots, and in 1575, after the execution of Montbrun, became the acknowledged leader of the Huguenot resistance in the district with the title of commandant general, confirmed in 1577 by Marshal Damville, by Conde in 1580,

and by Henry of Navarre in 1582. He seized Gap by a lucky night attack on the 3rd of January 1577, re-established the reformed religion there, and fortified the town. He refused to acquiesce in the treaty of Poitiers (1578) which involved the surrender of Gap, and after two years of fighting secured better terms for the province. Nevertheless in 1580 he was compelled to hand the place over to Mayenne and to see the fortifications dismantled. He took up arms for Henry IV. in 1585, capturing Chorges, Embrun, Chateauroux and other places, and after the truce of 1 588-1 589 secured the complete submission of Dauphine. In 1590 he beat down the resistance of Grenoble, and was now able to threaten the leaguers and to support

the governor of Provence against the raids of Charles Emmanuel I. of Savoy. He defeated the Savoyards at Esparron in April 1591, and in 1592 began the reconquest of the marquessate of Saluzzo which had been seized by Charles Emmanuel. After his defeat of the Spanish allies of Savoy at Salebertrano in June 1593 there was a truce, during which Lesdiguieres was occupied in maintaining the royal authority against Eperon in Provence. The war with Savoy proceeded intermittently until 1601, when Henry IV. concluded peace, much to the dissatisfaction of Lesdiguieres. The king regarded his lieutenant's domination in Dauphine with some distrust, although he was counted among the best of his captains. Nevertheless he made him a marshal of France in 1609, and ensured the succession to the lieutenant-generalship of Dauphine, vested in Lesdiguieres since 1597, to his son-in-law Charles de Crequy. Sincerely devoted to the throne, Lesdiguieres took no part in the intrigues which disturbed the minority of Louis XIII., and he moderated the political claims made by his co-religionists under the terms of the Edict of Nantes. After the death of his first wife, Claudine de Berenger, he married the widow of Ennemond Matel, a Grenoble shopkeeper, who was murdered in 1617. Lesdiguieres was then 73, and this lady, Marie Vignon, had long been his mistress. He had two daughters, one of whom, Francoise, married Charles de Crequy. In 1622 he formally abjured the Protestant faith, his conversion being partly due to the influence of Marie Vignon. He was already a duke and peer of France; he now became constable of France, and received the order of the Saint Esprit. He had long since lost the confidence of the Huguenots, but he nevertheless helped the Vaudois against the duke of Savoy. Lesdiguieres had the qualities of a great general, but circumstances limited him to the mountain warfare of Dauphine, Provence and Savoy. He had almost unvarying success through sixty years of fighting. His last campaign, fought in alliance with Savoy to drive the Spaniards from the Valtellinc, was the least successful of his enterprises. He died of fever at Valence on the 21st of September 1626.

The life of the Huguenot captain has been written in detail by Ch. Dufuyard, Le Connelable de Lesdiguieres (Paris, 1892). His first biographer was his secretary Louis Videl, Histoire de la vie du connestable de Lesdiguieres (Paris, 1638). Much of his official correspondence, with an admirable sketch of his life, is contained in Actes et correspondance du connetable de Lesdiguieres, edited by Comte Douglas and J. Roman in Documents historiques inedits pour servii ct I' histoire de Dauphine (Grenoble, 1878). Other letters are in the Lettres et memoires (Paris, 1647) of Duplessis-Mornay.

LESGHIANS, or Lesghis (from the Persian Leksi, called Leki by the

Grusians or Georgians, Armenians and Ossetes), the collective name for a number of tribes of the eastern Caucasus, who, with their kinsfolk the Chechenzes, have inhabited Daghestan from time immemorial. They spread southward into the Transcaucasian circles Kuba, Shemakha, Nukha and Sakataly. They are mentioned as Arjxca by Strabo and Plutarch along with the TifKat (perhaps the modern Galgai, a Chechenzian tribe), and their name occurs frequently in the chronicles of the Georgians, whose territory was exposed to their raids for centuries, until, on the surrender (1859) to Russia of the Chechenzian chieftain Shamyl, they became Russian subjects. Moses of Chorene mentions a battle in the reign of the Armenian king Baba (a.d. 370-377), in which Shagir, king of the Lekians, was slain. The most important of the Lesghian tribes are the Avars (g.v.), the Kasimukhians or Lakians, the Darghis and the

Kurins or Lesghians proper. Komarov * gives the total number of the tribes as twenty-seven, all speaking distinct dialects. Despite this, the Lesghian peoples, with the exception of the Udi and Kubatschi, are held to be ethnically identical. The Lesghians are not usually so good-looking as the Circassians or the Chechenzes. They are tall, powerfully built, and their hybrid descent is suggested by the range of colouring, some of the tribes exhibiting quite fair, others quite dark, individuals. Among some there is an obvious mongoloid strain. In disposi- tion they are intelligent, bold and persistent, and capable of reckless bravery, as was proved in their struggle to maintain their independence. They are capable of enduring great physical fatigue. They live a semi-savage life on their mountain slopes, for the most part living by hunting and stock-breeding. Little agriculture is possible. Their industries are mainly restricted to smith-work and cutlery and the making of felt cloaks, and the women weave excellent shawls. They are for the most part fanatical Mahommedans.

See Moritz Wagner, Schamyl (Leipzig, 1854); von Seidlitz, ” Ethnographie des Kaukasus,” in Petermann’s Milleilungen (1880); Ernest Chantre, Recherches anthropologiques dans le Caucase (Lyon, 1885-1887) ; J. de Morgan, Recherches sur les origines des peuples du Caucase (Paris, 1889).

LESINA (Serbo-Croatian, Hvar), an island in the Adriatic Sea, forming part of Dalmatia, Austria. Lesina lies between the islands of Brazza on the north and Curzola on the south; and is divided from the peninsula

of Sabbioncello by the Narenta channel. Its length is 41 m.; its greatest breadth less than 4 m. It has a steep rocky coast with a chain of thinly wooded limestone hills. The climate is mild, and not only the grape and olive, but dates, figs and the carob or locust-bean flourish. The cultivation of these fruits, boat-building, fishing and the preparation of rosemary essence and liqueurs are the principal resources of the islanders. Lesina {Hvar) and Cittavecchia (Starigrad) are the principal towns and seaports, having respec- tively 2138 and 3120 inhabitants. Lesina, the capital, contains an arsenal, an observatory and some interesting old buildings of the 16th century. It is a Roman Catholic bishopric, and the centre of an administrative district, which includes Cittavecchia, Lissa, and some small neighbouring islands. Pop. (1900) of island 18.091, of district 27,928.

To the primitive ” Illyrian ” race, whose stone cists and bronze implements have been disinterred from barrows near the capital, may perhaps be attributed the ” Cyclopean ” walls at Citta- vecchia. About 385 B.C., a Greek colony from Paros built a city on the site of the present Lesina, naming it Paros or Pharos. The forms Phara, Pharia (common among Latin writers), and Pilyeia, also occur. In 229 B.C. the island was betrayed to the Romans by Demetrius, lieutenant of the Illyrian queen Teuta; but in 219, as Demetrius proved false to Rome also, his capital was razed by Lucius Aemilius Paullus. Neos Pharos, now Cittavecchia, took its place, and flourished until the 6th century, when the island was laid waste by barbarian invaders. Con- stantine Porphyrogenitus mentions Lesina as a colony of pagan Slavs, in the 10th century. Throughout the middle ages it remained a purely Slavonic community; and its name, which appears in old documents as Lisna, Lesna or Lyesena, ” wooded ” is almost certainly derived from the Slavonic lyes, ” forest,” not from the Italian lesina, ” an awl.” But the old form Pharia persisted, as Far or Hvar, with the curious result that the modern Serbo-Croatian name is Greek, and the modern Italian name Slavonic in origin. Lesina became a bishopric in 1145, and received a charter from Venice in 133 1. It was sacked by the enemies of Venice in 1354 and 1358; ceded to Hungary in the same year; held by Ragusa from 1413 to 1416; and incorporated in the Venetian dominions in 1420. During the 16th century Lesina city had a considerable maritime trade, and, though sacked and partly burned by the Turks in 1571, it remained the chief naval station of Venice, in these waters, until 1776, when it was superseded by Curzola. Passing to Austria in 1797, and to France in 1805, it withstood a Russian attack in 1807, 1 Ethnological Map of Daghestan.

but was surrendered by the French in 18 13, and finally annexed to Austria in 1815.

LESION (through Fr. from Lat. laesio i injury, laedere, to hurt), an injury, hurt, damage. In Scots law the term is used of damage suffered by a party in a contract sufficient to enable him to bring an action for setting it aside. In pathology, the chief use, the word is applied to any morbid change in the structure of an organ, whether shown by visible changes or by disturbance of function.

LESKOVATS (Leskovatz or Leskovac), a town in Servia, between Nish and Vranya, on the railway line from Nish to Salonica. Pop. (1901) 13,707. It is the headquarters of the Servian hemp industry, the extensive plain in which the town lies growing the best flax and hemp in all the Balkan peninsula. The plain is not only the most fertile portion of Servia, but also the best cultivated. Besides flax and hemp, excellent tobacco is grown. Five valleys converge on the plain from different directions, and the inhabitants of the villages in these valleys are all occupied in growing flax and hemp, which they send to Leskovats to be stored or manufactured into ropes. After Belgrade and Nish, Leskovats is the most prosperous town in Servia.

LESLEY, JOHN (1527-1596), Scottish bishop and historian, was born in 1527. His father was Gavin Lesley, rector of Kingussie. He was educated at the university of Aberdeen, where he took the degree of M.A. In 1538 he obtained a dis- pensation permitting him to hold a benefice, notwithstanding his being a natural son, and in June 1546 he was made an acolyte in the cathedral church of Aberdeen, of which he was afterwards appointed a canon and prebendary. He also studied at Poitiers, at Toulouse and at Paris, where he was made doctor of laws in 1 553- In 1558 he took orders and was appointed Official of Aberdeen, and inducted into the parsonage and prebend of Oyne. At the Reformation Lesley became a champion of Catholicism. He was present at the disputation held in Edin- burgh in 1561, when Knox and Willox were his antagonists. He was one of the commissioners sent the same year to bring over the young Queen Mary to take the government of Scotland. He returned in her train, and was appointed a privy councillor and professor of canon law in King's College, Aberdeen, and in 1565 one of the senators of the college of justice. Shortly afterwards he was made abbot of Lindores, and in 1565 bishop of Ross, the election to the see being confirmed in the following year. He was one of the sixteen commissioners appointed to revise the laws of Scotland, and the volume of the Actis and Constitutionis of the Realme of Scotland known as the Black Acts was, chiefly owing to his care, printed in 1566.

The bishop was one of the most steadfast friends of Queen Mary. After the failure of the royal cause, and whilst Mary was a captive in

England, Lesley (who had gone to her at Bolton) continued to exert himself on her behalf. He was one of the commissioners at the conference at York in 1568. He appeared as her ambassador at the court of Elizabeth to complain of the injustice done to her, and when he found he was not listened to he laid plans for her escape. He also projected a marriage for her with the duke of Norfolk, which ended in the execution of that noble- man. For this he was put under the charge of the bishop of London, and then of the bishop of Ely (in Holborn), and after- wards imprisoned in the Tower of London. During his confine- ment he collected materials for his history of Scotland, by which his name is now chiefly known. In 1571 he presented the latter portion of this work, written in Scots, to Queen Mary to amuse her in her captivity. He also wrote for her use his Piae Consola- liones, and the queen devoted some of the hours of her captivity to translating a portion of it into French verse.

In 1573 he was liberated from prison, but was banished from England. For two years he attempted unsuccessfully to obtain the assistance of Continental princes in favour of Queen Mary. While at Rome in 1578 he published his Latin history De Origine, Moribus, et Rebus Gestis Scotorum. In 1579 he went to France, and was made suffragan and vicar-general of the archbishopric

of Rouen. Whilst visiting his diocese, however, he was thrown into prison, and had to pay 3000 pistoles to prevent his being given up to Elizabeth. During the remainder of the reign of Henry III. he lived unmolested, but on the accession of the Protestant Henry IV. he again fell into trouble. In 1590 he was thrown into prison, and had to purchase his freedom at the same expense as before. In 1593 he was made bishop of Cout- ances in Normandy, and had licence to hold the bishopric of Ross till he should obtain peaceable possession of the former see. He retired to an Augustinian monastery near Brussels, where he died on the 31st of May 1596.

The chief works of Lesley are as follows: A Defence of the Honour of . . . Marie, Queene of Scotland, by Eusebius Dicaeophile (London, ‘569), reprinted, with alterations, at Liege in 1571, under the title, A Treatise r oncerning the Defence of the Honour of Marie, Queene of Scotland, made by Morgan Philippes, Bachelor of Divinitie, Piae afflict’ animi consolationes , ad Mariam Scot. Reg. (Paris, 1574); De or-‘ˆne, moribus et rebus gestis Scotorum libri decern (Rome, 1578; fˆissued

1675); De illustrium feminarum in republica administranda (jMthoritate libellus (Reims, 1580; a Latin version of a tract on ” The Lawfulness of the Regiment of Women ” : cf. Knox’s pamphlet); De titulo et jure Mariae Scot. Reg., quo regni Angliae successionem sibi juste vindicat (Reims, 1580; translated in 1584). The history of Scotland from 1436 to 1561 owes much, in its earlier chapters, to the accounts of Hector Boece (q.v.)a.nd John Major (q.v.), though no small portion of the topographical matter is first-hand. In the later sections he gives an independent account (from the Catholic point of view) which is a valuable supplement and a correc- tive in many details, to the works of Buchanan and Knox. A Scots version of the history was written in 1596 by James Dalrymple of the Scottish Cloister at Regensburg. It has been printed for the Scottish Text Society (2 vols., 1 888-1 895) under the editorship of the Rev. E. G. Cody, O.S.B. A slight sketch by Lesley of Scottish history from 1562 to 1 57 1 has been translated by Forbes- Leith in his Narrative of Scottish Catholics (1885), from the original MS. now in the Vatican.

LESLEY, J. PETER (1819-1903), American geologist, was born in Philadelphia on the 17th of September 1819. It is recorded by Sir A. Geikie that ” He was christened Peter after his father and grandfather, and at first wrote his name ‘ Peter Lesley, Jr.,’ but disliking the Christian appellation that had been given to him, he eventually transformed his signature by putting the J. of ‘ Junior ‘ at the beginning.” He was educated for the ministry at the university of Pennsylvania, where he graduated in 1838; but the effects of close study having told upon his health, he served for a time as sub-assistant on the first geological survey of Pennsylvania under Professor H.. D. Rogers, and was after- wards engaged in a special examination of the coal regions. On the termination of the survey in 1841 he entered Princeton seminary and renewed his theological studies, at the same time giving his leisure time to assist Professor Rogers in preparing the final report and map of Pennsylvania. He was licensed to preach in 1844; he then paid a visit to Europe and entered on a short course of study at the university of Halle. Returning to America he worked during two years for the American Tract Society, and at the close of 1847 he joined Professor Rogers again in preparing geological maps and sections at Boston. He then accepted the pastorate of the Congregational church at Milton, a suburb of Boston, where he remained until 1851, when, his views having become Unitarian, he abandoned the ministry and entered into practice as a consulting geologist. In the course of his work he made elaborate surveys of the Cape Breton coal- field, and of other coal and iron regions. From 1855 to 1859 he was secretary of the American Iron Association; for twenty-

seven years (1858-1885) he was secretary and librarian of the American Philosophical Society; from 1872 to 1878 he was professor of geology and dean of the faculty of science in the university of Pennsylvania, and from 1874-1893 he was in charge of the second geological survey of the state. He then retired to Milton, Mass., where he died on the 1st of June 1903. He published Manual of Coal and Us Topography (1856); The Iron Manufacturer's Guide to the Furnaces, Forges and Rolling Mills of the United States (1859).

See Memoir by Sir A. Geikie in Quart. Journ. Geol. Soc. (May 1904) ; and Memoir (with portrait) by B. S. Lyman, printed in advance with portrait, and afterwards in abstract only in Trans. Amer. Inst. Mining Engineers, xxxiv. (1904) p. 726.

LESLIE, CHARLES (1650-1722), Anglican rKnjuring divine, son of John Leslie (1571-1671), bishop of Rapˆoe and afterwards of Clogher, was born in July 1650 in Dublin, and was educated at Enniskillen school and Trinity College, Dublin. Going to England he read law for a time, but soon turned his attention to theology, and took orders in 1680. In 1687 he became chancellor of the cathedral of Connor and a justice of the peace, and began a long career of public controversy by responding in public disputation at Monaghan to the challenge of the Roman Catholic bishop of Clogher. Although a vigorous opponent of Roman Catholicism, Leslie was a firm supporter of the Stuart dynasty, and, having declined at the Revolution to take the oath to William and Mary, he was on this account deprived of his benefice. In 1689 the growing troubles in Ireland induced him to withdraw to England, where he employed himself for the next twenty years in writing various controversial pamphlets in favour of the nonjuring cause, and in numerous polemics against the Quakers, Jews, Socinians and Roman Catholics, and especi- ally in that against the Deists with which his name is now most commonly associated. He had the keenest scent for every form of heresy and was especially zealous in his defence of the sacra- ments. A warrant having been issued against him in 1710 for his pamphlet The Good Old Cause, or Lying in Truth, he resolved to quit England and to accept an offer made by the Pretender (with whom he had previously been in frequent correspondence) that he should reside with him at Bar-le-Duc. After the failure of the Stuart cause in 1715, Leslie accompanied his patron into Italy, where he remained until 17 21, in which year, having found his sojourn amongst Roman Catholics extremely unpleasant, he sought and obtained permission to return to his native country. He died at Glaslough, Monaghan, on the 13th of April 1722.

The Theological Works of Leslie were collected and published by

himself in 2 vols, folio in 1721; a later edition, slightly enlarged, appeared at Oxford in 1832 (7 vols. 8vo). Though marred by persistent arguing in a circle they are written in lively style and show considerable erudition. He had the somewhat rare distinction of making several converts by his reasonings, and Johnson declared that ” Leslie was a reasoner, and a reasoner who was not to be reasoned against.” An historical interest in all that now attaches to his subjects and his methods, as may be seen when the promise given in the title of his best-known work is contrasted with the actual performance. The book professes to be A Short and Easy Method with the Deists, wherein the certainty of the Christian Religion is Demonstrated by Infallible Proof from Four Rules, which are incom- patible to any imposture that ever yet has been, or that can possibly be (1697). The four rules which, according to Leslie, have only to be rigorously applied in order to establish not the probability merely but the absolute certainty of the truth of Christianity are simply these : (I) that the matter of fact be such as that men’s outward senses, their eyes and ears, may be judges of it ; (2) that it be done publicly, in the face of the world; (3) that not only public monuments be kept up in memory of it, but some outward actions be performed; (4) that such monuments and such actions or observances be in- stituted and do commence from the time that the matter of fact was done. Other publications of Leslie are The Snake in the Grass (1696), against the Quakers; A Short Method with the Jews (1689) ; Gallienus Redivivus (an attack on William III., 1695); The Socinian Con- troversy Discussed (1697); The True Notion of the Catholic Church (1703); and The Case Stated between the Church of Rome and the Church of England (1713).

LESLIE, CHARLES ROBERT (1794-1859), English genre- painter, was born in London on the 19th of October 1794. His parents were American, and when he was five years of age he returned with them to their native country. They settled in Philadelphia, where their son was educated and afterwards apprenticed to a bookseller. He was, however, mainly interested in painting and the drama, and when George Frederick Cooke visited the city he executed a portrait of the actor, from re- collection of him on the stage, which was considered a work of such promise that a fund was raised to enable the young artist to study in Europe. He left for London in 181 1, bearing introductions which procured for him the friendship of West, Beechey, Allston, Coleridge and Washington Irving, and was admitted as a student of the Royal Academy, where he carried off two silver medals. At first, influenced by West and Fuseli, he essayed ” high art,” and his earliest important subject depicted Saul and the Witch of Endor; but he soon

discovered his true

aptitude and became a painter of cabinet-pictures, dealing, not like those of Wilkie, with the contemporary life that sur- rounded him, but with scenes from the great masters of fiction, from Shakespeare and Cervantes, Addison and Moliere, Swift, Sterne, Fielding and Smollett. Of individual paintings we may specify “Sir Roger de Coverley going to Church” (1819); ” May-day in the Time of Queen Elizabeth ” (1821); ” Sancho Panza and the Duchess ” (1824); ” Uncle Toby and the Widow Wadman ” (1831); La Malade Imaginaire, act iii. sc. 6 (1843); and the ” Duke’s Chaplain Enraged leaving the Table,” from Don Quixote (1849). Many of his more important subjects exist in varying replicas. He possessed a sympathetic imagina- tion, which enabled him to enter freely into the spirit of the author whom he illustrated, a delicate perception for female beauty, an unfailing eye for character and its outward manifestation in face and figure, and a genial and sunny sense of humour, guided by an instinctive refinement which prevented it from overstepping the bounds of good taste. In 182 1 Leslie was elected A.R.A., and five years later full academician. In 1833 he left for America to become teacher of drawing in the military academy at West Point, but the post proved an irksome one, and in some six months he returned to England. He died on the 5th of May 1859.

In addition to his skill as an artist, Leslie was a ready and pleasant writer. His Life of his friend Constable, the landscape painter, appeared in 1843, and his Handbook for Young Painters, a volume, embodying the substance of his lectures as professor of painting to the Royal Academy, in 1855. In i860 Tom Taylor edited his Autobiography and Letters, which contain interesting reminiscences of his distinguished friends and contemporaries.

LESLIE, FRED [Frederick Hobson] (1855-1892), English actor, was born at Woolwich on the 1st of April 1855. He made his first stage appearance in London as Colonel Hardy in Paul Pry in 1878. He had a good voice, and in 1882 made a great hit as Rip Van Winkle in Planquette's opera of that name at the Comedy. In 1885 he appeared at the Gaiety as Jonathan Wild in H. P. Stephens and W. Yardley's burlesque Little Jack Sheppard. His extraordinary success in this part determined his subsequent career, and for some years he and Nelly Farren, with whom he played in perfect association, were the pillars of Gaiety burlesque. Leslie's " Don Caesar de Bazan " in Ruy Bias, or the Blase Roue, was perhaps the most popular of his later parts. In all of them it was his own versatility and entertaining personality which formed the attraction; whether he sang, danced, whistled or " gagged," his performance was an unending flow of high spirits and ludicrous charm. Under the pseudonym of " A. C. Torr " he was acknowledged on the programmes as part-author of these burlesques, and while on occasion he acted in more serious comedy, for which he had undoubted capacity, his fame rests on his connexion with them. In 1881 and 1883 he played in America. He died on the 7th of December 1892. See W. T. Vincent, Recollections of Fred Leslie (1894).

LESLIE, SIR JOHN (1766-1832), Scottish mathematician and physicist, was born of humble parentage at Largo, Fifeshire, on the 16th of April 1766, and received his early education there and at Leven. In his thirteenth year, encouraged by friends who had even then remarked his aptitude for mathematical and physical science, he entered the university of St Andrews. On the completion of his arts course, he nominally studied divinity at Edinburgh until 1787; in 1788-1789 he spent rather more than a year as private tutor in a Virginian family, and from 1790 till the close of 1792 he held a similar appointment at Etruria in Staffordshire, with the family of Josiah Wedgwood, employing his spare time in experimental research and in preparing a translation of Buffon's Natural History of Birds, which was published in nine 8vo vols, in 1793, and brought him some money. For the next twelve years (passed chiefly in London or at Largo, with an occasional visit to the continent of Europe) he continued his physical studies,

which resulted in numerous papers contri- buted by him to Nicholson's Philosophical Journal, and in the publication (1804) of the Experimental Inquiry into the Nature end Properties of Heat, a work which gained him the Rumford Medal of the Royal Society of London. In 1805 he was elected

to Succeed John Playfair in the chair of mathematics at Edin- burgh, not, however, without violent though unsuccessful opposi- tion on the part of a narrow-minded clerical party who accused him of heresy in something he had said as to the " unsophisti- cated notions of mankind " about the relation of cause and effect. During his tenure of this chair he published two volumes of a Course of Mathematics — the first, entitled Elements of Geo- metry, Geometrical Analysis and Plane Trigonometry, in 1809, and the second, Geometry of Curve Lines, in 1813; the third volume, on Descriptive Geometry and the Theory of Solids was never completed. With reference to his invention (in 1810) of a process of artificial congelation, he published in 1813 A Short Account of Experiments and Instruments depending on the relations of Air to Heat and Moisture; and in 1818 a paper by him " On certain impressions of cold transmitted from the higher atmosphere, with an instrument (the aethrioscope) adapted to measure them," appeared in the Transactions of the Royal Society of Edinburgh. In 1819, on the death of Playfair, he was promoted to the more congenial chair of natural philosophy, which he continued to hold until his death, and in 1823 he pub- lished, chiefly for the use of his class, the first volume of his never-completed Elements of Natural Philosophy. Leslie's main contributions to physics were made by the help of the " differential thermometer," an instrument whose invention was contested with him by Count Rumford. By adapting to this instrument various ingenious devices he was enabled to employ it in a great variety of investigations, connected especially with photometry, hygroscopy and the temperature of space. In 1820 he was elected a corresponding member of the Institute of France, the only distinction of the kind which he valued, and early in 1832 he was created a knight. He died at Coates, a small property which he had acquired near Largo, on the 3rd of November 1832.

LESLIE, THOMAS EDWARD CLIFFE (1827-1882), English economist, was born in the county of Wexford in (as is believed) the year 1827. He was the second son of the Rev. Edward Leslie, prebendary of Dromore, and rector of Annahilt, in the county of Down. His family was of Scottish descent, but had been connected with Ireland since the reign of Charles , I. Amongst his ancestors were that accomplished prelate, John Leslie (1571-1671), bishop first of Raphoe and afterwards of Clogher, who, when holding the former see, offered so

stubborn a resistance to the Cromwellian forces, and the bishop's son Charles (see above), the nonjuror. Cliff e Leslie received his elementary education from his father, who resided in England, though holding church preferment as well as possessing some landed property in Ireland; by him he was taught Latin, Greek and Hebrew, at an unusually early age; he was afterwards for a short time under the care of a clergyman at Clapham, and was then sent to King William's College, in the Isle of Man, where he remained until, in 1842, being then only fifteen years of age, he entered Trinity College, Dublin. He was a distinguished student there, obtaining, besides other honours, a classical scholarship in 1845, a- n d a senior moderatorship (gold rnedal) in mental and moral philosophy at his degree examination in 1846. He became a law student at Lincoln's Inn, was for two years a pupil in a conveyancer's chambers in London, and was called to the English bar. But his attention was soon turned from the pursuit of legal practice, for which he seems never to have had much inclination, by his appointment, in 1853, to the professorship of jurisprudence and political economy in Queen's College, Belfast. The duties of this chair requiring only short visits to Ireland in certain terms of each year, he continued to reside and prosecute his studies in London, and became a frequent writer on economic and social questions in the principal reviews and other periodicals. In 1870 he collected a number of his essays, adding several new ones, into a volume entitled Land Systems and Industrial Economy of Ireland, England and Con- tinental Countries. J. S. Mill gave a full account of the contents of this work in a paper in the Fortnightly Review, in which he pronounced Leslie to be " one of the best living writers on applied political economy." Mill had sought his acquaintance on reading

his first article in Macmillan's Magazine; he admired his talents and took pleasure in his society, and treated him with a respect and kindness which Leslie always gratefully acknowledged.

In the frequent visits which Leslie made to the continent, especially to Belgium and some of the less-known districts of France and Germany, he occupied himself much in economic and social observation, studying the effects of the institutions and system of life which prevailed in each region, on the material and moral condition of its inhabitants. In this way he gained an extensive and accurate acquaintance with continental rural economy, of which he made excellent use in studying parallel phenomena at home. The accounts

he gave of the results of his observations were among his happiest efforts; ” no one,” said Mill, ” was able to write narratives of foreign visits at once so instructive and so interesting.” In these excursions he made the acquaintance of several distinguished persons, amongst others of M. Leonce de Lavergne and M. Emile de Laveleye. To the memory of the former of these he afterwards paid a graceful tribute in a biographical sketch (Fortnightly Review, February 1881) ; and to the close of his life there existed between him and M. de Laveleye relations of mutual esteem and cordial intimacy.

Two essays of Leslie’s appeared in volumes published under the auspices of the Cobden Club, one on the ” Land System of France” (2nd ed., 1870), containing an earnest defence of la petite culture and still more oi la petite proprUte; the other on ” Financial Reform ” (1871), in which he exhibited in detail the impediments to production and commerce arising from indirect taxation. Many other articles were contributed by him to reviews between 1875 and 1879, including several discussions of the history of prices and the movements of wages in Europe, and a sketch of life in Auvergne in his best manner; the most important of them, however, related to the philosophical method of political economy, notably a memorable one which appeared in the Dublin University periodical, Hermathena. In 1879 the provost and senior fellows of Trinity College published for him a volume in which a number of these articles were collected under the title of Essays in Political and Moral Philosophy. These and some later essays, together with the earlier volume on Land Systems, form the essential contribution of Leslie to economic literature. He had long contemplated, and had in part written, a work on English economic and legal history, which would have been his magnum opus — a more substantial fruit of his genius and his labours than anything he has left. But the MS. of this treatise, after much pains had already been spent on it, was unaccountably lost at Nancy in 1872; and, though he hoped to be able speedily to reproduce the missing portion and finish the work, no material was left in a state fit for publication. What the nature of it would have been may be gathered from an essay on the ” History and Future of Profit ” in the Fortnightly Review for November 1881, which is believed to have been in substance an extract from it.

That he was able to do so much may well be a subject of wonder when it is known that his labours had long been impeded by a painful and depressing malady, from which he suffered severely at intervals, whilst he never felt secure from its recurring attacks. To this disease he in the end succumbed at Belfast, on the 27th of January 1882.

Leslie’s work may be distributed under two heads, that of applied

political economy and that of discussion on the philosophical method of the science. The Land Systems belonged principally to the former division. The author perceived the great and growing importance for the social welfare of both Ireland and England of what is called ” the land question,” and treated it in this volume at once with breadth of view and with a rich variety of illustrative detail. His general purpose was to show that the territorial systems, of both countries were so encumbered with elements of feudal origin as to be altogether unfitted to serve the purposes of a modern industrial society. The policy he recommended is summed up in the following list of requirements, ” a simple jurisprudence relating to land, a law of equal intestate succession, a prohibition of entail, a legal security for tenants' improvements, an open registration of title and transfer and a considerable number of peasant properties.” The volume is full of practical good sense, and exhibits a thorough knowledge of home and foreign agricultural economy ; and in the handling of the

subject is everywhere shown the special power which its author possessed of making what he wrote interesting as well as instructive. The way in which sagacious observation and shrewd comment are constantly intermingled in the discussion not seldom reminds us of Adam Smith, whose manner was more congenial to Leslie than the abstract and arid style of Ricardo.

But what, more than anything else, marks him as an original thinker and gives him a place apart among contemporary econo- mists, is his exposition and defence of the historical method in political economy. Both at home and abroad there has for some time existed a profound and growing dissatisfaction with the method and many of the doctrines of the hitherto dominant school, which, it is alleged, under a ” fictitious completeness, symmetry and exact- ness ” disguises a real hollowness and discordance with fact. It is urged that the attempt, to deduce the economic phenomena of a society from the so-called universal principle of ” the desire of wealth ” is illusory, and that they cannot be fruitfully studied apart from the general social conditions and historic development of which they are the outcome. Of this movement of thought Leslie was the principal representative, if not the originator, in England. There is no doubt, for he has himself placed it on record, that the first influence which impelled him in the direction of the historical method was that of Sir Henry Maine, by whose personal teaching of jurisprudence, as well as by the example of his writings, he was led ” to look at the present economic structure and state of society as the result of a long evolution.” The study of those German economists who represent similar tendencies doubtless confirmed him in the new line of thought on which he had entered,

though he does not seem to have been further indebted to any of them except, perhaps, in some small degree to Roscher. And the writings of Comte, whose ” prodigious genius,” as exhibited in the Philosophie Positive, he admired and proclaimed, though he did not accept his system as a whole, must have powerfully co-operated to form in him the habit of regarding economic science as only a single branch of sociology, which should always be kept in close relation to the others. The earliest writing in which Leslie’s revolt against the so-called ” orthodox school ” distinctly appears is his Essay on Wages, which was first published in 1868 and was reproduced as an appendix to the volume on Land Tenures. In this, after exposing the inanity of the theory of the wage-fund, and showing the utter want of agree- ment between its results and the observed phenomena, he concludes by declaring that ” political economy must be content to take rank as an inductive, instead of a purely deductive science,” and that, by this change of character, ” it will gain in utility, interest and real truth far more than a full compensation for the forfeiture of a fictitious title to mathematical exactness and certainty.” But it is in the essays collected in the volume of 1879 that his attitude in relation to the question of method is most decisively marked. In one of these, on ‘ the political economy of Adam Smith,” he exhibits in a very interesting way the co-existence in the Wealth of Nations of historical-inductive investigation in the manner of Montesquieu with a priori speculation founded on theologico-metaphysical bases, and points out the error of ignoring the former element, which is the really characteristic feature of Smith’s social philosophy, and places him in strong contrast with his soi-disant followers of the school of Ricardo. The essay, however, which contains the most brilliant polemic against the ” orthodox school,” as well as the most luminous account and the most powerful vindication of the new direction, was that of which we have above spoken as having first appeared in Hermathena. It may be recommended as supplying the best extant presentation of one of the two contending views of economic method. On this essay mainly rests the claim of Leslie to be regarded as the founder and first head of the English historical school of political economy. Those who share his views on the philosophical constitu- tion of the science regard the work he did, notwithstanding its un- systematic character, as in reality the most important done by any English economists in the latter half of the 19th century. But even the warmest partisans of the older school acknowledge that he did excellent service by insisting on a kind of inquiry, previously too much neglected, which was of the highest interest and value, in whatever relation it might be supposed to stand to the establishment of economic truth. The members of both groups alike recognized his great learning, his patient and conscientious habits of investiga- tion

and the large social spirit in which he treated the problems of his science. (J. K. I.)

LESLIE, a police burgh of Fifeshire, Scotland. Pop. (1901) 3587. It lies on the Leven, the vale of which is overlooked by the town, 4 m. W. of Markinch by the North British railway. The industries include paper-making, flax-spinning, bleaching and linen-weaving. The old church claims to be the ” Christ’s Kirk on the Green ” of the ancient ballads of that name. A stone on the Green, called the Bull Stone, is said to have been used when bull-baiting was a popular pastime. Leslie House, the seat of the earl of Rothes, designed by Sir William Bruce, rivalled Holyrood in magnificence. It was noted for its tapestry and its gallery oi family portraits and other pictures, including a

portrait of Rembrandt by himself. Daniel Defoe considered its park the glory of the kingdom. The mansion sustained serious damage from fire in 1763. Norman Leslie, master of Rothes, was concerned in the killing of Cardinal Beaton (1546), and the dagger with which John Leslie, Norman’s uncle, struck the fatal blow is preserved in Leslie House.

Markinch (pop. 1499), a police burgh situated between Conland Burn and the Leven, 7J m. N. by E. of Kirkcaldy by the North British railway, is a place of great antiquity. A cell of the Culdees was established here by one of the last of the Celtic bishops, the site of which may possibly be marked by the ancient cross of Balgonie. Markinch is also believed to have been a residence of the earlier kings, where prior to the nth century they occasionally administered justice; and in the reign of William the Lion (d. 1 2 14) the warrantors of goods alleged to have been stolen were required to appear here. Its industries com- prise bleaching, flax-spinning, paper-making, distilling and coal- mining. Balgonie Castle, close by, the keep of which is 80 ft. high, was a residence of Alexander Leslie, the first earl of Leven, and at Balfour Castle were born Cardinal Beaton and his uncle and nephew the archbishops of Glasgow.

LESPINASSE, JEANNE JULIE ELEONORE DE (1732-1776), French author, was born at Lyons on the 9th of November 1732. A natural child of the comtesse d’Albon, she was brought up as the daughter of Claude Lespinasse of Lyons. On leaving her convent school she became governess in the house of her mother’s legitimate daughter, Mme de Vichy, who had married the brother of the marquise du

Deffand. Here Mme du Deffand made her acquaintance, and, recognizing her extraordinary gifts, per- suaded her to come to Paris as her companion. The alliance lasted ten years (1754-1764) until Mme du Deffand became jealous of the younger woman's increasing influence, when a violent quarrel ensued. Mile de Lespinasse set up a salon of her own which was joined by many of the most brilliant members of Mme du Deffand's circle. D'Alembert was one of the most assiduous of her friends and eventually came to live under the same roof. There was no scandal attached to this arrangement, which ensured d'Alembert's comfort and lent influence to Mile de Lespinasse's salon. Although she had neither beauty nor rank, her ability as a hostess made her reunions the most popular in Paris. She owes her distinction, however, not to her social success, but to circumstances which remained a secret during her lifetime from her closest friends. Two volumes of Lettres pub- lished in 1809 displayed her as the victim of a passion of a rare intensity. In virtue of this ardent, intense quality Sainte Beuve and other of her critics place her letters in the limited category to which belong the Latin letters of Helo'ise and those of the Portuguese Nun. Her first passion, a reasonable and serious one, was for the marquis de Mora, son of the Spanish ambassador in Paris. De Mora had come to Paris in 1765, and with some intervals remained there until 1772 when he was ordered to Spain for his health. On the way to Paris in 1774 to fulfil promises exchanged with Mile de Lespinasse, he died at Bordeaux. But her letters to the comte de Guibert, the worthless object of her fatal infatuation, begin from 1773. From the struggle between her affection for de Mora and her blind passion for her new lover they go on to describe her partial disenchantment on Guibert 's marriage and her final despair. Mile de Lespinasse died on the 23rd of May 1776, her death being apparently hastened by the agitation and misery to which she had been for the last three years of her life a prey. In addition to the Lettres she was the author of two chapters intended as a kind of sequel to Sterne's Sentimental Journey.

Her Lettres . . . were published by Mme de Guibert in 1809 and a spurious additional collection appeared in 1820. Among modern editions may be mentioned that of Eugene Asse (1876-1877). Lettres inedites de Mademoiselle de Lespinasse a Condorcet, & D'Alem- bert, d Guibert, au comte de Crillon, edited by M. Charles Henry (1887), contains copies of the documents available for her biography. Mrs Humphry Ward's novel, Lady Rose's Daughter, owes something to the character of Mile de Lespinasse.

LES SABLES D'OLONNE, a seaport of western France, capital of an arrondissement of the department of Vend6e, on an inlet of

the Atlantic seaboard, 23 m. S.W. of La Roche-sur-Yon by rail. Pop. (1906) 11,847. The town stands between the sea on the south and the port on the north, while on the west it is separated by a channel from the suburb of La Chaume, built at the foot of a range of dunes 65 ft. high, which terminates southwards in the rocky peninsula of L'Aiguille. The beautiful smoothly sloping beach, 1 m. in length, is much frequented by bathers. To the north of Sables extend salt-marshes and oyster-parks, yielding 6,000,000 to 8,000,000 oysters per annum. Sables has a church built in the Late Gothic style towards the middle of the 17th century. The port, consisting of a tidal basin and a wet-dock, is accessible to vessels of 2000 tons, but is dangerous when the winds are from the south-west. The lighthouse of Barges, a mile out at sea to the west, is visible for 17 to 18 nautical miles. The inhabitants are employed largely in sardine and tunny fishing; there are imports of coal, wood, petroleum and phosphates. Boat-building and sardine-preserving are carried on. The town has a sub-prefecture and a tribunal of first instance.

Founded by Basque or Spanish sailors, Sables was the first place in Poitou invaded by the Normans in 817. Louis XL, who went there in 1472, granted the inhabitants various privileges, improved the harbour, and fortified the entrance. Captured and recaptured during the Wars of Religion, the town afterwards became a nursery of hardy sailors and privateers, who harassed the Spaniards and afterwards the English. In 1696 Sables was bombarded by the combined fleets of England and Holland. In the middle of the 18th century hurricanes caused grievous damage to town and harbour.

LES SAINTES-MARIES, a coast village of south-eastern France in the department of Bouches-du-Rh6ne, 24 m. S.S.W. of Aries by rail. Pop. (1906) 544. Saintes-Maries is situated in the plain of the Oamargue, if m. E. of the mouth of the Petit-Rhone. It is the object of an ancient and famous pilgrimage due to the tradition that Mary, sister of the Virgin, and Mary, mother of James and John, together with their black servant Sara, Lazarus, Martha, Mary Magdalen and St Maximin fled thither to escape persecution in Judaea. The relics of the two Maries, who are said to have been buried at Saintes-Maries, are bestowed in the upper storey of the apse of the fortress-church, a remarkable building of the 12th century with crenelated and machicolated walls. Two festivals are held in the town, a less important one in October, the other, on the 24th and 25th of May, unique for its gathering of gipsies who come in large numbers to do honour to the tomb of their patroness Sara, contained in the crypt below the apse.

LESSE, one of the most romantic of the smaller rivers of Belgium. It rises at Ochamps in the Ardennes, and flowing in a north-westerly course reaches the Meuse at Anseremme, a few miles above Dinant. The river is only 49 m. long, but its meander- ing course may be judged by the fact that it is no more than 29 m. from Ochamps to Anseremme in a straight line. There is a good deal of pretty scenery along this river, as, for instance, atCiergnon, but the most striking part of the valley is contained in the last 12 m. from Houyet to Anseremme. In this section the river is confined between opposing walls of cliff ranging from 300 to 500 ft. above the river. Here were discovered in the caves near Walzin the bones of prehistoric men, and other evidence of the primitive occupants of this globe at a period practically beyond computa- tion. Another curious natural feature of the Lesse is that on reaching the hill of Han it disappears underground, reappearing about 1 m. farther on at the village of that name. Here are the curious and interesting Han grottoes. The Lesse receives altogether in its short course the water of thirteen tributaries.

LESSEPS, FERDINAND DE (1805-1894). French diplomatist and maker of the Suez Canal, was born at Versailles on the 19th of November 1805. The origin of his family has been traced back as far as the end of the 14th century. His ancestors, it is believed, came from Scotland, and settled at Bayonne when that region was occupied by the English. One of his great-grandfathers was town clerk and at the same time secretary to Queen Anne of Neuberg, widow of Charles II. of Spain, exiled to Bayonne after the accession of Philip V. From the middle of the 18th century

the ancestors of Ferdinand de Lesseps followed the diplomatic career, and he himself occupied with real distinction several posts in the same calling from 1825 to 1849. His uncle was ennobled by King Louis XVI., and his father was made a count by Napoleon I. His father, Mathieu de Lesseps (1774-1832), was in the consular service; his mother, Catherine de Grivegnee, was Spanish, and aunt of the countess of Montijo, mother of the empress Eugenie. His first years were spent in Italy, where his father was occupied with his consular duties. He was educated at the College of Henry IV. in Paris. From the age of 18 years to 20 he was employed in the commissary department of the army. From 1825 to 1827 he acted as assistant vice- consul at Lisbon, where his uncle, Bartheilemy de Lesseps, was the French charge d’affaires. This uncle was an old companion of La Perouse and

a survivor of the expedition in which that navigator perished. In 1828 Ferdinand was sent as an assist- ant vice-consul to Tunis, where his father was consul-general. He courageously aided the escape of Youssouff, pursued by the soldiers of the bey, of whom he was one of the officers, for viola- tion of the seraglio law. Youssouff acknowledged this protection given by a Frenchman by distinguishing himself in the ranks of the French army at the time of the conquest of Algeria. Ferdinand de Lesseps was also entrusted by his father with missions to Marshal Count Clausel, general-in-chief of the army of occupation in Algeria. The marshal wrote to Mathieu de Lesseps on the 18th of December 1830: ” I have had the pleasure of meeting your son, who gives promise of sustaining with great credit the name he bears.” In 1832 Ferdinand de Lesseps was appointed vice-consul at Alexandria. To the placing in quaran- tine of the vessel which took him to Egypt is due the origin of his great conception of a canal across the isthmus of Suez. In order to help him to while away the time at the lazaretto, M. Mimaut, consul-general of France at Alexandria, sent him several books, among which was the memoir written upon the Suez Canal, according to Bonaparte’s instructions, by the civil engineer Lapere, one of the scientific members of the French expedition. This work struck de Lesseps’s imagination, and gave him the idea of piercing the African isthmus. This idea, moreover, was conceived in circumstances that were to prepare the way for its realization. Mehemet Ali, who was the viceroy of Egypt, owed his position, to a certain extent, to the recommendations made in his behalf to the French government by Mathieu de Lesseps, who was consul-general in Egypt when Mehemet Ali was a simple colonel. The viceroy therefore wel- comed Ferdinand affectionately, while Said Pacha, Mehemet’s son, began those friendly relations that he did not forget later, when he gave him the concession for making the Suez Canal. In 1833 Ferdinand de Lesseps was sent as consul to Cairo, and soon afterwards given the management of the consulate- general at Alexandria, a post that he held until 1837. While he was there a terrible epidemic of the plague broke out and lasted for two years, carrying off more than a third of the inhabitants of Cairo and Alexandria. During this time he went from one city to the other, according as the danger was more pressing, and constantly displayed an admirable zeal and an imperturbable energy. Towards the close of the year 1837 he returned to France, and on the 21st of December married Mile Agathe Delamalle, daughter of the government prosecuting attorney at the court of Angers. By this marriage M. de Lesseps became the father of five sons. In 1839 he was appointed consul at Rotterdam, and in the following year transferred to Malaga, the place of origin of his mother’s family. In 1842 he was sent to

Barcelona, and soon afterwards promoted to the grade of consul-general. In the course of a bloody insurrection in Catalonia, which ended in the bombardment of Barcelona, Ferdinand de Lesseps showed the most persistent bravery, rescuing from death, without distinction, the men belonging to the rival factions, and protecting and sending away not only the Frenchmen who were in danger, but foreigners of all nationalities. From 1848 to 1849 he was minister of France at Madrid. In the latter year the government of the French Republic confided to him a mission to Rome at the moment when it was a question whether

the expelled pope would return to the Vatican with or without bloodshed. Following his interpretation of the instructions he had received, de Lesseps began negotiations with the existing government at Rome, according to which Pius IX. should peace- fully re-enter the Vatican and the independence of the Romans be assured at the same time. But while he was negotiating, the elections in France had caused a change in the foreign policy of the government. His course was disapproved; he was re- called and brought before the council of state, which blamed his conduct without giving him a chance to justify himself. Rome, attacked by the French army, was taken by assault after a month's sanguinary siege. M. de Lesseps then retired from the diplomatic service, and never afterwards occupied any public office. In 1853 he lost his wife and daughter at a few days' interval. Perhaps his energy would not have been sufficient to sustain him against these repeated blows of destiny if, in 1854, the accession to the viceroyalty of Egypt of his old friend, Said Pacha, had not given a new impulse to the ideas that had haunted him for the last twenty-two years concerning the Suez Canal. Said Pacha invited M. de Lesseps to pay him a visit, and on the 7th of November 1854 he landed at Alexandria; on the 30th of the same month Said Pacha signed the concession authoriz- ing M. de Lesseps to pierce the isthmus of Suez.

A first scheme, indicated by him, was immediately drawn out by two French engineers who were in the Egyptian service, MM. Linant Bey and Mougel Bey. This project, differing from others that had been previously presented or that were in opposi- tion to it, provided for a direct communication between the Mediterranean and the Red Sea. After being slightly modified, the plan was adopted in 1856 by an international commission of civil engineers to which it had been submitted. Encouraged by this approval, de Lesseps no longer allowed anything to stop him. He listened to no adverse criticism and receded before no obstacle. Neither the opposition of Lord Palmerston, who considered the projected disturbance as too radical not to endanger the commercial position of Great Britain, nor the opinions entertained,

in France as well as in England, that the sea in front of Port Said was full of mud which would obstruct the entrance to the canal, that the sands from the desert would fill the trenches — no adverse argument, in a word, could dishearten Ferdinand de Lesseps. His faith made him believe that his adversaries were in the wrong; but how great must have been this faith, which permitted him to undertake the work at a time when mechanical appliances for the execution of such an undertaking did not exist, and when for the utilization of the proposed canal there was as yet no steam mercantile marine ! Impelled by his convictions and talent, supported by the emperor Napoleon III. and the empress Eugenie, he succeeded in rousing the patriotism of the French and obtaining by their subscriptions more than half of the capital of two hundred millions of francs which he needed in order to form a company. The Egyptian government subscribed for eighty millions' worth of shares. The company was organized at the end of 1858. On the 25th of April 1859 the first blow of the pickaxe was given by Lesseps at Port Said, and on the 17th of November 1869 the canal was officially opened by the Khedive, Ismail Pacha (see Suez Canal). While in the interests of his canal Lesseps had resisted the opposition of British diplomacy to an enterprise which threatened to give to France control of the shortest route to India, he acted loyally towards Great Britain after Lord Beaconsfield had acquired the Suez shares belonging to the Khedive, by frankly admitting to the board of directors of the company three representatives of the British government. The consolidation of interests which resulted, and which has been developed by the addition in 1884 of seven other British directors, chosen from among shipping merchants and business men, has augmented, for the benefit of all concerned, the commercial character of the enterprise.

Ferdinand de Lesseps steadily endeavoured to keep out of politics. If in 1869 he appeared to deviate from this principle by being a candidate at Marseilles for the Corps Legislatif, it was because he yielded to the entreaties of the Imperial

government in order to strengthen its goodwill for the Suez Canal. Once this goodwill had been shown, he bore no malice towards those who rendered him his liberty by preferring Gam- betta. He afterwards declined the other candidatures that were offered him: for the Senate in 1876, and for the Chamber in 1877. In 1873 he became interested in a project for uniting Europe and Asia by a railway to Bombay, with

a branch to Peking. He subsequently encouraged Major Roudaire, who wished to transform the Sahara desert into an inland sea. The king of the Belgians having formed an International African Society, de Lesseps accepted the presidency of the French committee, facilitated M. de Brazza's explorations, and acquired stations that he subsequently abandoned to the French government. These stations were the starting-point of French Congo. In 1879 a congress assembled in the rooms of the Geographical Society at Paris, under the presidency of Admiral de la Ronciere le Noury, and voted in favour of the making of the Panama Canal. Public opinion, it may be declared, designated Ferdinand de Lesseps as the head of the enterprise. It was upon that occasion that Gambetta bestowed upon him the title of Le Grand Franqais. He was not a man to shirk responsibility, and notwithstanding that he had reached the age of 74, he undertook to carry out the Panama Canal project (see Panama Canal and France: History). Politics, which de Lesseps had always avoided, was his greatest enemy in this matter. The winding-up of the Panama Company having been declared in the month of December 1888, the adversaries of the French Republic, seeking for a scandal that would imperil the govern- ment, hoped to bring about the prosecution of the directors of the Panama Company. Their attacks were so vigorously made that the government was obliged, in self-defence, to have judicial proceedings taken against Ferdinand de Lesseps, his son Charles (b. 1849) and his co-workers Fontane and Cottu. Charles de Lesseps, a victim offered to the fury of the politicians, tried to divert the storm upon his head and prevent it from reaching his father. He managed to draw down upon himself alone the burden of the condemnations pronounced. One of the consequences of the persecutions of which he was the object was to oblige him to spend three years, from 1896 to 1899, in England, where his participation in the management of the Suez Canal had won for him some strong friendships, and where he was able to see the great respect in which the memory and name of his father were held by Englishmen. ■ Ferdinand de Lesseps died at La Chenaie on the 7th of December 1894. He had contracted a second marriage in 1869 with Mile Autard de Bragard, daughter of a former magistrate of Mauritius; and eleven out of twelve children of this marriage survived him. M. de Lesseps was a member of the French Academy, of the Academy of Sciences, of numerous scientific societies, Grand Cross of the Legion of Honour and of the Star of India, and had received the freedom of the City of London. According to some accounts he was unconscious of the disastrous events that took place during the closing months of his life. Others report that, feeling himself powerless to scatter the gathered clouds, and aware of his physical feebleness, he had had the moral

courage to pass in the eyes' of his family, which he did not wish to afflict, as the dupe of the efforts they employed to conceal the truth from him. This last version would not be surprising if we relied upon the following portrait, sketched by a person who knew him intimately: — " Simple in his tastes, never thinking of himself, constantly preoccupied about others, supremely kind, he did not and would not recognize such a thing as evil. Of a confiding nature, he was inclined to judge«others by himself. This naturally affectionate abandonment that every one felt in him had procured him profound attachments and rare devotions. He showed, while making the Suez Canal, what a gift he possessed for levying the pacific armies he con- ducted. He set duty above everything, had in the highest degree a reverence for honour, and placed his indomitable courage at the service of everything that was beneficial with an abnegation that nothing could tire. His marvellous physical and moral equilibrium gave him an evenness of temper which always

rendered his society charming. Whatever 'his cares, his work or his troubles, I have never noticed in him aught but generous impulses and a love of humanity carried even to those heroic imprudences of which they alone are capable who devote them- selves to the amelioration of humanity." No doubt this eulogy requires some reservations. The striking and universal success which crowned his work on the Suez Canal gave him an absolute- ness of thought which brooked no contradiction, a despotic temper before which every one must bow, and against which, when he had once taken a resolution, nothing could prevail, not even the most authoritative opposition or the most legiti- mate entreaties. He had resolved to construct the Panama Canal without locks, to make it an uninterrupted navigable way. All attempts to dissuade him from this resolution failed before his tenacious will. At his advanced age he went with his youngest child to Panama to see with his own eyes the field of his new enterprise. He there beheld the Culebra and the Chagres; he saw the mountain and the stream, those two greatest obstacles of nature that sought to bar his route. He paid no heed to them, but began the struggle against the Culebra and the Chagres. It was against them that was broken his invincible will, sweeping away in the defeat the work of Panama, his own fortune, his fame and almost an atom of his honour. But this atom, only grazed by calumny, has already been restored to him by posterity, for he died poor, having been the first to suffer by the disaster to his illusions. Political agitators, in order to sap the power of the Opportunist party, did not hesitate to drag in the mud one of the greatest citizens of France. But when the Panama " scandal " has been forgotten, for centuries to come the traveller in saluting the statue of

Ferdinand de Lesseps at the entrance of the Suez Canal will pay homage to one of the most powerful embodiments of the creative genius of the 19th century.

See G. Barnett Smith, The Life and Enterprises of Ferdinand de Lesseps (London, 1893); and Souvenirs de guarante ans, by Ferdi- nand de Lesseps (trans, by C. B. Pitman). (de B.)

LESSING, GOTTHOLD EPHRAIM (1729-1781), German critic and dramatist, was born at Kamenz in Upper Lusatia (Oberlausitz), Saxony, on the 22nd of January 1729. His father, Johann Gottfried Lessing, was a clergyman, and, a few years after his son's birth, became pastor primarius or chief pastor of Kamenz. After attending the Latin school of his native town, Gotthold was sent in 1741 to the famous school of St Afra at Meissen, where he made such rapid progress, especially in classics and mathematics, that, towards the end of his school career, he was described by the rector as " a steed that needed double fodder." In 1746 he entered the university of Leipzig as a theological student. The philological lectures of Johann Fried- rich Christ (1700-1756) and Johann August Ernesti (1707-1781) proved, however, more attractive than those on theology, and he attended the philosophical disputations presided over by his friend A. G. Kastner, professor of mathematics and also an epigrammatist of repute. Among Lessing's chief friends in Leipzig were C. F. Weisse (1726-1804) the dramatist, and Christ- lob Mylius (1722-1754), who had made some name for himself as a journalist. He was particularly attracted by the theatre then directed by the talented actress Karoline Neuber (1697-1760), who had assisted Gottsched in his efforts to bring the German stage into touch with literature. Frau Neuber even accepted for performance Lessing's first comedy, Der junge Gelehrte (1748), which he had begun at school. His father naturally did not approve of these new interests and acquaint- ances, and summoned him home. He was only allowed to return to Leipzig on the condition that he would devote himself to the study of medicine. Some medical lectures he did attend, but as long as Frau Neuber's company kept together the theatre had an irresistible fascination for him.

In 1748, however, the company broke up, and Lessing, who had allowed himself to become surety for some of the actors' debts, was obliged to leave Leipzig too, in order to escape their creditors. He went to Wittenberg, and afterwards, towards the end of the year, to Berlin, where his friend Mylius had

established himself as a journalist. In Berlin Lessing now spent three years, maintaining himself chiefly by literary work. He translated three volumes of Charles Rollin's Hisloire ancicnne, wrote several plays — Der Misogyn, Der Frcigeist, Die Juden — and in association with Mylius, began the Beilrdgc zur Historie und Aufnahme des Theaters (1750), a periodical — which soon came to an end — for the discussion of matters connected with the drama. Early in 1751 he became literary critic to the Vossischc Zeitung, and in this position laid the foundation for his reputation as a reviewer of learning, judgment and wit. At the end of 1751 he was in Wittenberg again, where he spent about a year engaged in unremitting study and research. He then returned to Berlin with a view to making literature his pro- fession; and the next three years were among the busiest of his life. Besides translating for the booksellers, he issued several numbers of the Theatralische Bibliothek, a periodical similar to that which he had begun with Mylius; he also continued his work as critic to the Vossische Zeitung. In 1 7 54 he gave a particu- larly brilliant proof of his critical powers in his V ademecum jiir Hcrrn S. G. Lange; as a retort to that writer's overbearing criticism, Lessing exposed with scathing satire Lange's errors in his popular translation of Horace.

By 1753 Lessing felt that his position was sufficiently assured to allow of him issuing an edition of his collected writings (Schriften, 6 vols., 1753-1755)- They included his lyrics and epigrams, most of which had already appeared during his first residence in Berlin in a volume of Kleinigkeiten, published anonymously. Much more important were the papers entitled Rettungen, in which he undertook to vindicate the character of various writers — Horace and writers of the Reformation period, such as Cochlaeus and Cardanus — who had been mis- understood or faisely judged by preceding generations. The Schrijten also contained Lessing's early plays, and one new one, Miss Sara Sampson (1755). Hitherto Lessing had, as a drama- tist, followed the methods of contemporary French comedy as cultivated in Leipzig; Miss Sara Sampson, however, marks the beginning of a new period in the history of the German drama. This play, based more or less on Lille's Merchant of London, and influenced in its character-drawing by the novels of Richard- son, is the first biirgerliches Traucrspiel, or " tragedy of common life " in German. It was performed for the first time at Frank- fort-on-Oder in the summer of 1755, and received with great favour. Among Lessing's chief friends during his second residence in Berlin were the philosopher Moses Mendelssohn (17 29-1786), in association with whom he wrote in 1755 an admirable treatise, Pope ein Metaphysiker! tracing sharply the lines which

separate the poet from the philosopher. He was also on intimate terms with C. F. Nicolai (1733-1811), a Berlin bookseller and rationalistic writer, and with the ” German Horace ” K. W. Ramler (1725-1798); he had also made the acquaintance of J. W. L. Gleim (1719-1803), the Halberstadt poet, and E. C. von Kleist (1715-1759), a Prussian officer, whose fine poem, Der Frilhling, had won for him Lessing’s warm esteem.

In October 1755 Lessing settled in Leipzig with a view to devoting himself more exclusively to the drama. In 1756 he accepted the invitation of Gottfried Winkler, a wealthy young * merchant, to accompany him on a foreign tour for three years. They did not, however, get beyond Amsterdam, for the out- break of the Seven Years’ War made it necessary for Winkler to return home without loss of time. A disagreement with his patron shortly after resulted in Lessing’s sudden dismissal; he demanded compensation and, although in the end the court decided in his favour, it was not until the case had dragged on for about six years. At this time Lessing began the study of medieval literature to which attention had been drawn by the Swiss critics, Bodmer and Breitinger, and wrote occasional criticisms for Nicolai’s Bibliothek der schonen Wisscnschajlen. In Leipzig Lessing had also an opportunity of developing his friendship with Kleist who happened to be stationed there. The two men were mutually attracted, and a warm affection sprang up betweem them. In 1758 Kleist’s regiment being

ordered to new quarters, Lessing decided not to remain behind him and returned again to Berlin. Kleist was mortally wounded in the following year at the battle of Kunersdorf.

Lessing’s third residence in Berlin was made memorable by the Brieje, die neneste Literatur betrejfend (1759-1765), a series of critical essays — written in the form of letters to a wounded officer — on the principal books that had appeared since the beginning of the Seven Years’ War. The scheme was sug* gested by Nicolai, by whom the Letters were published. In Lessing’s share in this publication, his critical powers and methods are to be seen at their best. He insisted especially on the necessity of truth to nature in the imaginative presentation of the facts of life, and in one letter he boldly proclaimed the superiority of Shakespeare to Corneille, Racine and Voltaire. At the same time he marked the immutable conditions to which even genius must submit if it is to succeed in its appeal to our sympathies. While in Berlin at this time, he edited with Ramler a selection from the writings of F. von Logau, an epigrammatist of the 17th century, and introduced to the German public the Lieder eines preussischen

Grenadiers, by J. W. L. Gleim. In 1759 he published Philotas, a prose tragedy in one act, and also a complete collection of his fables, preceded by an essay on the nature of the fable. The latter is one of his best essays on criticism, defining with perfect lucidity what is meant by “action” in works of the imagination, and distinguishing the action of the fable from that of the epic and the drama.

In 1760, feeling the need of some change of scene and work, Lessing went to Breslau, where he obtained the post of secretary to General Tauentzien, to whom Kleist had introduced him in Leipzig. Tauentzien was not only a general in the Prussian army, but governor of Breslau, and director of the mint. During the four years which Lessing spent in Breslau, he associated chiefly with Prussian officers, went much into society, and developed a dangerous fondness for the gaming table. He did not, however, lose sight of his true goal; he collected a large library, and, after the conclusion of the Seven Years’ War, in 1763, he resumed more enthusiastically than ever the studies which had been partially interrupted. He investigated the early history of Christianity and penetrated more deeply than any contemporary thinker into the significance of Spinoza’s philosophy. He also found time for the studies which were ultimately to appear in the volume entitled Laokoon, and in fresh spring mornings he sketched in a garden the plan of Minna von Barnhelm.

After resigning his Breslau appointment in 1765, he hoped for a time to obtain a congenial appointment in Dresden, but nothing came of this and he was again compelled, much against his will, to return to Berlin. His friends there exerted themselves to obtain for him the office of keeper of the royal library, but Frederick had not forgotten Lessing’s quarrel with Voltaire, and declined to consider his claims. During the two years which Lessing now spent in the Prussian capital, he was restless and unhappy, yet it was during this period that he published two of his greatest works, Laokoon, oder uber die Grenzen der Malerei und Poesie (1766) and Minna von Barnhelm (1767). The aim of Laokoon, which ranks as a classic, not only in German but in European literature, is to define by analysis the limitations of poetry and the plastic arts. Many of his conclusions have been corrected and extended by later criticism; but he indicated more decisively than any of his predecessors the fruitful principle that each art is subject to definite conditions, and that it can accomplish great results only by limiting itself to its special function. The most valuable parts of the work are those which relate to poetry, of which he had a much more intimate knowledge than of sculpture and painting. His exposition of the methods of Homer and Sophocles is especially suggestive, and he may be said to have marked an epoch in the appreciation of these

writers,, and of Greek literature generally. The power of Minna von Barnhelm, Lessing's greatest drama, was also immediately recognized. Tellheim, the hero of the comedy, is an admirable study of a manly and sensitive soldier, with somewhat exagger- ated ideas of conventional honour; and Minna, the heroine, is one of the brightest and most attractive figures in German

comedy. The subordinate characters are conceived with even more force and vividness; and the plot, which reflects precisely the struggles and aspirations of the period that immediately followed the Seven Years' War, is simply and naturally unfolded. In 1767 Lessing settled in Hamburg, where he had been invited to take part in the establishment of a national theatre. The scheme Dromised well, and, as he associated himself with Johann Joachim Christoph Bode (1730-1793), a literary man whom he respected, in starting a printing establishment, he hoped that he might at last look forward to a peaceful and prosperous career. The theatre, however, was soon closed, and the printing estab- lishment failed, leaving behind it a heavy burden of debt. In despair, Lessing determined towards the end of his residence in Hamburg to quit Germany, believing that in Italy he might find congenial labour that would suffice for his wants. The Hatnburgische Dramaturgic (1 767-1768), Lessing's commentary on the performances of the National Theatre, is the first modern handbook of the dramatist's art. By his original interpretation of Aristotle's theory of tragedy, he delivered German dramatists from the yoke of the classic tragedy of France, and directed them to the Greek dramatists and to Shakespeare. Another result of Lessing's labours in Hamburg was the Antiquarische Briej e (1768), a series of masterly letters in answer to Christian Adolf Klotz (1738-1771), a professor of the university of Halle, who, after flattering Lessing, had attacked him, and sought to establish a kind of intellectual despotism by means of critical journals which he directly or indirectly controlled. In connexion with this controversy Lessing wrote his brilliant little treatise, Wie die Alien den Tod gebildet (1769), contrasting the medieval representation of death as a skeleton with the Greek conception of death as the twin-brother of sleep.

Instead of settling in Italy, as he intended, Lessing accepted in 1770 the office of librarian at Wolfenbuttel, a post which was offered to him by the hereditary prince of Brunswick. In this position he passed his remaining years. For a time he was not unhappy, but the debts which

he had contracted in Hamburg weighed heavily on him, and he missed the society of his friends; his health, too, which had hitherto been excellent, gradually gave way. In 1775 he travelled for nine months in Italy with Prince Leopold of Brunswick, and in the following year he married Eva Konig, the widow of a Hamburg merchant, with whom he had been on terms of intimate friendship. But their happiness lasted only for a brief period; in 1778 she died in childbed.

Soon after settling in Wolfenbuttel, Lessing found in the library the manuscript of a treatise by Berengarius of Tours on transubstantiation in reply to Lanfranc. This was the occasion of Lessing's powerful essay on Berengarius, in which he vindicated the latter's character as a serious and consistent thinker. In 1 7 7 1 he published his Zerstreule A nmerkungen ilber das Epigramm, und einige der vornehmsten Epigrammatisten — a work which Herder described as " itself an epigram." Lessing's theory of the origin of the epigram is somewhat fanciful, but no other critic has offered so many pregnant hints as to the laws of epigrammatic verse, or defended with so much force and in- genuity the character of Martial. In 1772 he published Emilia Galolti, a tragedy which he had begun many years before in Leipzig. The subject was suggested by the Roman legend of Virginia, but the scene is laid in an Italian court, and the whole play is conceived in the spirit of the "tragedy of common life." Its defect is that its tragic conclusion does not seem absolutely inevitable, but the characters — especially those of the Grafin Orsina and Marinelli, the prince of Guastalla's chamberlain who weaves the intrigue from which Emilia escapes by death, are powerfully drawn. Having completed Emilia Galotti, which the younger generation of playwrights at once accepted as a model, Lessing occupied himself for some years almost exclusively with the treasures of the Wolfenbuttel library. The results of these researches he embodied in a series of volumes, Zur Geschichle und Literatur, the first being issued in 1773, the last in the year of his death.

The last period of Lessing's life was devoted chiefly to theo-

logical controversy. H. S. Reimarus (1694-1768), professor of oriental languages in Hamburg, who commanded general respect as a scholar and thinker, wrote a book entitled Apologie oder Schutzschrift fur die vemunftigen Verehrer Gottes. His standpoint was that of the English deists, and he investigated, without hesitation, the evidence for the miracles recorded in the Bible. The manuscript of this work was, after the author's death, entrusted by his daughter to Lessing, who published extracts from it in his Zur Geschichle und Literatur in 17 74-1 7 78. These extracts, the authorship of which was not publicly

avowed, were known as the Wolfenbiitteler Fragmente. They created profound excitement among orthodox theologians, and evoked many replies, in which Lessing was bitterly condemned for having published writings of so dangerous a tendency. His most for- midable assailant was Johann Melchior Goeze (1717-1786), the chief pastor of Hamburg, a sincere and earnest theologian, but utterly unscrupulous in his choice of weapons against an opponent. To him, therefore, Lessing addressed in 1778 his most elaborate answers — Eine Parabel, Axiomata, eleven letters with the title Anti-Goeze, and two pamphlets in reply to an inquiry by Goeze as to what Lessing meant by Christianity. These papers are not only full of thought and learning; they are written with a grace, vivacity and energy that make them hardly less interesting to-day than they were to Lessing's con- temporaries. He does not undertake to defend the conclusions of Reimarus; his immediate object is to claim the right of free criticism in regard even to the highest subjects of human thought. The argument on which he chiefly relies is that the Bible cannot be considered necessary to a belief in Christianity, since Chris- tianity was a living and conquering power before the New Testament in its present form was recognized by the church. The true evidence for what is essential in Christianity, he contends, is its adaptation to the wants of human nature; hence the religious spirit is undisturbed by the speculations of the boldest thinkers. The effect of this controversy was to secure wider freedom for writers on theology, and to suggest new problems regarding the growth of Christianity, the formation of the canon and the essence of religion. The Brunswick government having, in deference to the consistory, confiscated the Fragments and ordered Lessing to discontinue the controversy, he resolved, as he wrote to Elise Reimarus, to try " whether they would let him preach undisturbed from his old pulpit, the stage." In Nathan der Weise, written in the winter of 1778-1779, he gave poetic form to the ideas which he had already developed in prose. Its governing conception is that noble character may be associated with the most diverse creeds, and that there can, therefore, be no good reason why the holders of one sect of religious principles should not tolerate those who maintain wholly different doctrines. The play, which is written in blank verse, is too obviously a continuation of Lessing's theological con- troversy to rank high as poetry, but the representatives of the three religions — the Mahommedan Saladin, the Jew Nathan and the Christian Knight Templar — are finely conceived, and show that Lessing's dramatic instinct had, in spite of other interests, not deserted him. In 1 780 appeared Die Erziehung des Menschen- geschlechls, the first half of which he had published in 1777 with one of the Fragments. This work, composed a hundred brief paragraphs, was the last, and is one

of the most suggestive of Lessing's writings. The doctrine on which its argument is based is that no dogmatic creed can be regarded as final, but that every historical religion had its share in the development of the spiritual life of mankind. Lessing also maintains that history reveals a definite law of progress, and that occasional retrogression may be necessary for the advance of the world towards its ultimate goal. These ideas formed a striking contrast to the principles both of orthodox and of sceptical writers in Lessing's day, and gave a wholly new direction to religious philosophy. Another work of Lessing's last years, Ernst und Folk (a series of five dialogues, of which the first three were published in 1777, the last two in 1780), also set forth many new points of view. Its nominal subject is freemasonry, but its real aim is to plead for a humane and charitable spirit in opposition to a narrow

patriotism, an extravagant respect for rank, and exclusive devotion to any particular church.

Lessing's theological opinions exposed him to much petty persecution, and he was in almost constant straits for money. Nothing, however, broke his manly and generous spirit. To the end he was always ready to help those who appealed to him for aid, and he devoted himself with growing ardour to the search for truth. He formed many new plans of work, but in the course of 1780 it became evident to his friends that he would not be able much longer to continue his labours. His health had been undermined by excessive work and anxiety, and after a short illness he died at Brunswick on the 15th of February 1781. " We lose much in him," wrote Goethe after Lessing's death. " more than we think." It may be questioned whether there is any other writer to whom the Germans owe a deeper debt of gratitude. He was succeeded by poets and philosophers who gave Germany for a time the first place in the intellectual life of the world, and it was Lessing, as they themselves acknowledged, who prepared the way for their achievements. Without attaching himself to any particular system of philosophical doctrine, he fought error incessantly, and in regard to art, poetry and the drama and religion, suggested ideas which kindled the en- thusiasm of aspiring minds, and stimulated their highest energies. Bibliography. — The first edition of Lessing's collected works, edited by his brother Karl Gotthelf Lessing (1740-1812), J. J. Eschenburg and F. Nicolai, appeared in 26 vols, between 1791 and 1794, as a continuation of the Vermischte Schriften, edited by Lessing

himself in 4 vols. (1771-1785); the Sdmtliche Schriften, edited by Karl Lachmann, were published in 13 vols. (1825-1828), this edition being subsequently re-edited by W. von Maltzahn (1853-1857) and by F. Muncker (21 vols., 1886 ff.), the last mentioned being the standard edition of Lessing's works. Other editions are Lessings Werke, published by Hempel, under the editorship of various scholars (23 vols., 1868-1877); an illustrated edition published by Grote in 8 vols. (1875, new ed., 1882); Lessings Werke, edited by R. Box- berger and H. Bliimner, in Kiirschner"s Deutsche Nationalliteratur, vols. 58-71 (1883-1890). There are also many popular editions. Lessing's correspondence is included in the Lachmann editions and in that of Hempe! (edited by C. C. Redlich, 1879; Nachtrdge und Berichtigungen, 1886); his correspondence with his wife was pub- lished as early as 1789 (2 vols., new edition by A. Schone, 1885). The chief biographies of Lessing are by K. G. Lessing (his brother), ('793 _ i795. a reprint in Reclam's Universalbibliothek) ; by J. F. Schink (1825); T. W. Danzel and G. E. Guhrauer (1850-1853, 2nd ed. by W. von Maltzahn and R. Boxberger, 2 vols.. 1880- 1881); A. Stahr (2 vols., 1859, 9th ed., 1887); J. Sime, Lessing, his Life and Works (2 vols., 1877); H. Zimmcrn, Lessing's Life and Works (1878); H. Diintzer, Lessings Leben (1882); E. Schmidt, Lessing, Geschichte seines Lebens und seiner Schriften (2 vols., 1884- 1892, 3rd ed., 1910) — this is the most complete biography; T. W. Rolleston, Lessing (in " Great Writers," 1889); K. Borinski, Lessing (2 vols., 1900). Cf. also C. Heblcr, Lessing-Studicn (1862); A. Leh- mann, Forschungen iiber Lessings Sprache (1875); W. Cosack, Materialien zu Lessings Hamburgischer Dramaturgic (1876, 2nd ed., 1 89 1) ; H. Bliimner, Lessings Laokoon (1876, 2nd ed., 1880); H. Bliimner, Laokoon-Studien (2 vols., 1881-1882); K. Fischer, Lessing als Reformator der deutschen Literatur dargestellt (2 vols., 1881, 2nd ed., 1888); B. A. Wagner, Lessing- Forschungen (1881); J. W. Braun, Lessing im Urteile seiner Zeitgenossen (2 vols., 1884); P. Albrecht, Lessings Plagiate (6 vols., 1890 ff.) ; K. Werder, Vorles- ungen iiber Lessings Nathan (1892); G. Kettner, Lessings Dramen im Lichte ihrer und unsrer Zeit (1904). Translations of Lessing's Dramatic Works (2 vols., 1878), edited by E. Bell, and of Laokoon, Dramatic Notes and the Representation of Death by the Ancients, by E. C. Beasley and H. Zimmern (1 vol., 1879), will be found in Bohn's " Standard Library." (J. Si.; J. G. R.)

LESSON (through Fr. leqon from Lat. lectio, reading; legere, to read), properly a certain portion of a book appointed to be read aloud, or learnt for repetition, hence anything learnt or studied, a course of instruction or study. A specific meaning of the word is that of a portion of Scripture or other religious writings appointed to be read at

divine service, in accordance with a table known as a ” lectionary.” In the Church of England the lectionary is so ordered that most of the Old Testament is read through during the year as the First Lesson at Morning and Evening Prayer, and as the Second Lesson the whole of the New Testament, except Revelation, of which only portions are read. (See Lection and Lectionary.)

LESTE, a desert wind, similar to the Leveche (q.v.), observed in Madeira. It blows from an easterly direction in autumn,

winter and spring, rarely in summer, and is of intense dryness, sometimes reducing the relative humidity at Funchal to below 20%. The Leste is commonly accompanied by clouds of fine red sand.

L’ESTRANGE, SIR ROGER (1616-1704), English pamphleteer on the royalist and court side during the Restoration epoch, but principally remarkable as the first English man of letters of any distinction who made journalism a profession, was born at Hunstanton in Norfolk on the 17th of December 1616. In 1644, during the civil war, he headed a conspiracy to seize the town of Lynn for the king, under circumstances which led to his being condemned to death as a spy. The sentence, however, was not executed, and after four years’ imprisonment in Newgate he escaped to the Continent. He was excluded from the Act of Indemnity, but in 1653 was pardoned by Cromwell upon his personal solicitation, and lived quietly until the Restoration, when after some delay his services and sufferings were acknow- ledged by his appointment as licenser of the press. This office was administered by him in the spirit which might be expected from a zealous cavalier. He made himself notorious, not merely by the severity of his literary censorship, but by his vigilance in the suppression of clandestine printing. In 1663 (see News- papers) he commenced the publication of the Public Intelli- gencer and the News, from which eventually developed the famous official paper the London Gazelle in 1665. In 1679 he again became prominent with the Observator, a journal specially designed to vindicate the court from the charge of a secret inclination to popery. He discredited the Popish Plot, and the suspicion he thus incurred was increased by the conversion of his daughter to Roman Catholicism, but there seems no reason to question the sincerity of his own attachment to the Church of England. In 1687 he gave a further proof of independence by discontinuing the Observator from his unwillingness to advocate James II. ‘s Edict of Toleration, although he had previously gone all lengths in support of the measures of the court. The Revolution cost him his office as licenser, and the remainder of his life was spent in obscurity. He died in 1704. It is to L’Estrange’s credit that among the

agitations of a busy political life he should have found time for much purely literary work as a translator of Josephus, Cicero, Seneca, Quevedo and other standard authors.

LESUEUR, DANIEL, the pseudonym of Jeanne Lapanze, nee Loiseau (i860-), French poet and novelist, who was born in Paris in i860. She published a volume of poems, Fleurs d'avril (1882), which was crowned by the Academy. She also wrote some powerful novels dealing with contemporary life: Le Mariage de Gabrielle (1882); Un Mysterieux Amour (1892), with a series of philosophical sonnets; L \Amant de Genevieve (1883); Marcelle (1885); Une Vie tragique (1890); Justice de femme (1893); Comedienne Haine d' amour (1894); Honneur d' une femme (1901); La Force du passS (1905). Hei poems were collected in 1895. She published in 1905 a book on the economic status of women, L' Evolution feminine; and in 1891-1893 a translation (2 vols.) of the works of Lord Byron, which was awarded a prize by the Academy. Her Masque d' amour, a five-act play based on her novel (1904) of the same name, was produced at the Theatre Sarah Bernhardt in 1905. She received the ribbon of the Legion of Honour in 1900, and the prix Yitet from the French Academy in 1905. She married in 1904 Henry Lapanze (b. 1867), a well-known writer on art.

LE SUEUR, EUSTACHE (1617-1655), one of the founders of the French Academy of painting, was born on the 19th of November 161 7 at Paris, where he passed his whole life, and where he died on the 30th of April 1655. His early death and retired habits have combined to give an air of romance to his simple history, which has been decorated with as many fables as that of Claude. We are told that, persecuted by Le Brun, who was jealous of his ability, he became the intimate friend and correspondent of Poussin, and it is added that, broken-hearted at the death of his wife, Le Sueur retired to the monastery of the Chartreux and died in the arms of the prior. All this, however, is pure fiction. The facts of Le Sueur's life are these. He was

the son of Cathelin Le Sueur, a turner and sculptor in wood, who placed his son with Vouet, in whose studio he rapidly dis- tinguished himself. Admitted at an early age into the guild of master-painters, he left them to take part in establishing the academy of painting and sculpture, and was one of the first twelve professors of that body. Some paintings, illustrative of the Hypnerotomachia Polyphili, which

were reproduced in tapestry, brought him into notice, and his reputation was further enhanced by a series of decorations (Louvre) in the mansion of Lambert de Thorigny, which he left uncompleted, for their execution was frequently interrupted by other commissions. Amongst these were several pictures for the apartments of the king and queen in the Louvre, which are now missing, although they were entered in Bailly's inventory (1710); but several works produced for minor patrons have come down to us. In the gallery of the Louvre are the " Angel and Hagar," from the mansion of De Tonnay Charente; " Tobias and Tobit," from the Fieubet collection; several pictures executed for the church of Saint Gervais; the " Martyrdom of St Lawrence," from Saint Germain de l'Auxerrois; two very fine works from the destroyed abbey of Marmou tiers; " St Paul preaching at Ephesus," one of Le Sueur's most complete and thorough performances, painted for the goldsmith's corporation in 1649; and his famous series of the " Life of St Bruno," executed in the cloister of the Chartreux. These last have more personal character than anything else which Le Sueur produced, and much of their original beauty survives in spite of injuries and restorations and removal from the wall to canvas. The Louvre also possesses many fine draw- ings (reproduced by Braun), of which Le Sueur left an incredible quantity, chiefly executed in black and white chalk His pupils, who aided him much in his work, were his wife's brother, Th. Gousse, and three brothers of his own, as well as Claude Lefebvre and Patel the landscape painter.

Most of his works have been engraved, chiefly by Picart, B. Audran, Seb. Leclerc, Drevet, Chauveau, Poilly and Desplaces. Le Sueur's work lent itself readily to the engraver's art, for he was a charming draughtsman; he had a truly delicate perception of varied shades of grave and elevated sentiment, and possessed the power to render them. His graceful facility in composition was always restrained by a very fine taste, but his works often fail to please completely, because, producing so much, he had too frequent recourse to conventional types, and partly because he rarely saw colour except with the cold and clayey quality proper to the school of Vouet ; yet his " St Paul at Ephesus " and one or two other works show that he was not naturally deficient in this sense, and whenever we get direct reference to nature — as in the monks of the St Bruno series — we recognize his admirable power to read and render physiog- nomv of varied and serious type. '

See Guillet de St Georges, Mem. ined. ; C. Blanc, Histoire des peintres; Vitet, Catalogue des tableaux du Louvre; dArgenville, Vies des peintres. ,

LESUEUR, JEAN FRANCOIS (1760 or 1763-1837), French musical composer, was born on the 15th of January 1760 (or 1763) at Drucat-Plessiel, near Abbeville. He was a choir boy in the cathedral of Amiens, and then became musical director at various churches. In 1786 he obtained by open competition the musical directorship of the cathedral of Notre-Dame in Paris, where he gave successful performances of sacred music with a full orchestra. This place he resigned in 1787; and, after a retirement of five years in a friend's country house, he produced La Caverne and two other operas at the Theatre Feydeau in Paris. At the foundation of the Paris Conservatoire (1795) Lesueur was appointed one of its inspectors of studies, but was dismissed in 1802, owing to his disagreements with Mehul. Lesueur succeeded G. Paisiello as Maestro di cappella to Napoleon, and produced (1804) his Ossian at the Opera. He also composed for the emperor's coronation a mass and a Te Deum. Louis XVIII., who had retained Lesueur in his court, appointed him (1818) professor of composition at the Con- servatoire; and at this institution he had, among many other pupils, Hector Berlioz, Ambroise Thomas, Louis Desire, Besozzi and Charles Gounod. He died on the 6th of October 1837. Lesueur composed eight operas and several masses, and other sacred music. All his works are written in a style of rigorous simplicity.

See Raoul Rochette, Les Outrages de M. Lesueur (Paris, J839,).

LE TELLIER, MICHEL (1603-1685), French statesman, was born in Paris on the 19th of April 1603. Having entered the public service he became maitre des requetes and in 1640 intendant of Piedmont; in 1643, owing to his friendship with Mazarin, he became secretary of state for military affairs, being an efficient administrator. In 1677 he was made chancellor of France and he was one of those who influenced Louis XIV. to revoke the Edict of Nantes. He died on the 30th of October 1685, a few days after the revocation had been signed. Le Tellier, who amassed great wealth, left two sons, one the famous statesman Louvois and another who became archbishop of Reims. His correspondence is in the Bibliotheque nationale in Paris.

See L. Caron, Michel Le Tellier, intendant d'armee au Piemont (Paris, 1881).

Another Michel le Tellier (1643-17 19) was confessor of the French king Louis XIV. Born at Vire on the 16th of December ,1643 he entered the Society of Jesus and later became prominent in consequence of his violent attacks on the Jansenists. He was appointed provincial of his order in France, but it was not until 1709 that he

became the king ‘s confessor. In this capacity all his influence was directed towards urging Louis to further persecutions of the Protestants. He was exiled by the regent Orleans, but he had returned to France when he died at La Fleche on the 2nd of September 17 19.

LETHAL (Lat. lethalis, for letalis, deadly, from letum, death; the spelling is due to a confusion with Gr. X17&17, forgetfulness), an adjective meaning ” deadly,” ” fatal,” especially as applied to weapons, drugs, &c. A ” lethal chamber ” is a room or recep- tacle in which animals may be put to death painlessly, by the admission of poisonous gases.

LETHARGY (Gr. \rjdapyia, from \r)d-n, forgetfulness), drowsi- ness, torpor. In pathology the term is used of a morbid condition of deep and lasting sleep from which the sufferer can be with difficulty and only temporarily aroused. The term Negro or African lethargy was formerly applied to the disease now gener- ally known as ” sleeping sickness ” (q.v.).

LETHE (” Oblivion “), in Greek mythology, the daughter of Eris (Hesiod, Theog. 227) and the personification of forgetfulness. It is also the name of a river in the infernal regions. Those initiated in the mysteries were taught to distinguish two streams in the lower world, one of memory and one of oblivion. Direc- tions for this purpose, written on a gold plate, have been found in a tomb at Petilia, and near Lebadeia, at the oracle of Tro- phonius, which was counted an entrance to the lower world, the two springs Mnemosyne and Lethe were shown (Pausanias ix. 39. 8). This thought begins to appear in literature in the end of the 5th century B.C., when Aristophanes (Frogs, 186) speaks of the plain of Lethe. Plato (Rep. x.) embodies the idea in one of his finest myths.

LE TREPORT, a maritime town of northern France in the department of Seine-Inferieure, on the English Channel, at the mouth of the Bresle, 114 m. N.N.W. of Paris on the Northern railway. Pop. (1906) 4619. Owing to its nearness to the capital, Le Treport is a favourite watering-place of the Parisians. A good view is obtained from Mont Huon, which rises to the south- west of the town. The mouth of the Bresle forms a small port, comprising an outer tidal harbour and an inner dock accessible to vessels drawing from 13 to 16 ft. The fisheries and oyster parks with their dependent industries, shipbuilding and glass manufacture, furnish the chief occupations of the inhabitants. Coal, timber, ice and jute are imported ; articles de Paris, sugar, &c, are exported. The chief buildings are the church of St Jacques (16th century), which has finely carved vaulting and good modern stained

glass, and the casino erected 1896-1897. About 1 m. north-east of Le Treport is the small bathing resort of Mers. The Eu-Treport canal, uniting the two towns, has a length of about 3m., and is navigable by vessels drawing 14 ft. Le Treport (the ancient Ulterior Portus) was a port of some note in the middle ages and suffered from the English invasions. Louis Philippe twice received Queen Victoria here.

LETRONNE, JEAN ANTOINE (1787-1848), French archaeo- logist, was born at Paris on the 25th of January 1787. His

father, a poor engraver, sent him to study art under the painter t>avid, but his own tastes were literary, and he became a student in the College de France, where it is said he used to exercise his already strongly developed critical faculty by correcting for his own amusement old and bad texts of Greek authors, afterwards comparing the results with the latest and most approved editions. From 1810 to 1812 he travelled in France, Switzerland and Italy, and on his return to Paris published an Essai critique sur la topographie de Syracuse (181 2), designed to elucidate Thucy- dides. Two years later appeared his Rechefches geographiques et critiques on the De Mensura Orbis Terras of Dicuil. In 181 5 he was commissioned by government to complete the translation of Strabo which had been begun by Laporte-Dutheil, and in March 1 816 he was one of those who were admitted to the Academy of Inscriptions by royal ordinance, having previously contributed a Memoire, ” On the Metrical System of the Egyptians,” which had been crowned. Further promotion came rapidly; in 1817 he was appointed director of the Ecole des Chartes, in 1819 inspector-general of the university, and in 1831 professor of history in the College de France. This chair he exchanged in 1838′ for that of archaeology, and in 1840 he succeeded Pierre C. Francois Daunou (1 761-1840) as keeper of the national archives. Meanwhile he had published, among other works, Considerations generates sur V evaluation des monnaies grecques et romaines et sur la valeur de For et de I’ argent avant la decouverte de V ‘ Amerique (181 7), Recherches pour servir a I’hisloire d’Egypte pendant la domination des Grecs el des Romains (1823), and Sur I’origine grecque des zodiaques pretendus egyptiens (1837). By the last- named he finally exploded a fallacy which had up to that time vitiated the chronology of contemporary Egyptologists. His Diplomes et chartres de I’epoque Merovingienne sur papyrus et sur velin were published in 1844. The most important work of Letronne is the Recueil des inscriptions

grecques el latines de VEgypte, of which the first volume appeared in 1842, and the second in 1848. He died at Paris on the 14th of December 1848.

LETTER (through Fr. lettre from Lat. littera or litera, letter of the alphabet; the origin of the Latin word is obscure; it has probably no connexion with the root of linere, to smear, i.e. with wax, for an inscription with a stilus), a character or symbol expressing any one of the elementary sounds into which a spoken word may be analysed, one of the members of an alphabet. As applied to things written, the word follows mainly the meanings, of the Latin plural litterae, the most common meaning attaching to the word being that of a written communication from one person to another, an epistle (q.v.). For the means adopted to secure the transmission of letters see Post and Postal Service. The word is also, particularly in the plural, applied to many legal and formal written documents, as in letters patent, letters rogatory and dismissory, &c. The Latin use of the plural is also followed in the employment of ” letters ” in the sense of literature (q.v.) or learning.

LETTERKENNY, a market town of Co. Donegal, Ireland, 23 m. W. by S. of Londonderry by the Londonderry and Lough Swilly and Letterkenny railway. Pop. (1901) 2370. It has a harbour at Port Ballyrane, 1 m. distant on Lough Swilly. In the market square a considerable trade in grain, flax and pro- visions is prosecuted. Rope-making and shirt-making are industries. The handsome Roman Catholic cathedral for the diocese of Raphoe occupies a commanding site, and cost a large sum, as it contains carving from Rome, glass from Munich and a pulpit of Irish and Carrara marble. It was consecrated in igoi. There is a Catholic college dedicated to St Ewnan. The town, which is governed by an urban district council, is a centre for visitors to the county. Its name signifies the ” hill of the O’Cannanans,” a family who lorded over Tyrconnell before the rise of the O’Donnells.

LETTER OF CREDIT, a letter, open or sealed, from a banker or merchant, containing a request to some other person or firm to advance the bearer of the letter, or some other person named therein, upon the credit of the writer a particular or an unlimited sum of money. A letter of credit is either general or special. It is general when addressed to merchants or other persons in

general, requesting an advance to a third person, and special when addressed to a particular person by name requesting him to make such an advance. A letter of credit is not a negotiable instrument. When a

letter of credit is given for the purchase of goods, the letter of credit usually states the particulars of the merchandise against which bills are to be drawn, and shipping documents (bills of lading, invoices, insurance policies) are usually attached to the draft for acceptance.

LETTERS PATENT. It is a rule alike of common law and sound policy that grants of freehold interests, franchises, liberties, &c, by the sovereign to a subject should be made only after due consideration, and in a form readily accessible to the public. These ends are attained in England through the agency of that piece of constitutional machinery known as ” letters patent.” It is here proposed to consider only the charac- teristics of letters patent generally. The law relating to letters patent for inventions is dealt with under the heading Patents.

Letters patent (litterae patentes) are letters addressed by the sovereign ” to all to whom these presents shall come,” reciting the ‘grant of some dignity, office, monopoly, franchise or other privilege to the patentee. They are not sealed up, but are left open (hence the term “patent”), and are recorded in the Patent Rolls in the Record Office, or in the case of very recent grants, in the Chancery Enrolment Office, sp that all subjects of the realm may read and be bound by their contents. In this respect they differ from certain other letters of the sovereign directed to particular persons and for particular purposes, which, riot being proper for public inspection, are closed up and sealed on the outside, and are thereupon called writs close (litterae ciausae) and are recorded in the Close Rolls. Letters patent are used to put into commission various powers inherent in the crown — legislative powers, as when the sovereign entrusts to others the duty of opening parliament or assenting to bills; judicial powers, e.g. of gaol delivery; executive powers, as when the duties of Treasurer and Lord High Admiral are assigned to commissioners of the Treasury and Admiralty (Anson, Const, ii. 47). Letters patent are also used to incorporate bodies by charter — in the British colonies, this mode of legislation is frequently applied to joint stock companies (cf. Rev. Stats. Ontario, c. 191, s. 9)— to grant a conge d’elire to a dean and chapter to elect a bishop, or licence to convocation to amend canons; to grant pardon, and to confer certain offices and dignities. Among grants of offices, &c, made by letters patent the following may be enumer- ated: offices in the Heralds’ College; the dignities of a peer, baronet and knight bachelor; the appointments of lord-lieuten- ant, custos rotulorum of counties, judge of the High Court: and Indian and Colonial judgeships, king’s counsel, crown livings; the offices of attorney- and solicitor-general, commander-in- chief, master of the horse, keeper of the privy seal, postmaster- general, king’s printer; grants of separate courts of quarter- sessions. The fees payable in

respect of the grant of various forms of letters patent are fixed by orders of the lord chancellor, dated 20th of June 1871, 18th of July 1871 and nth of Aug. 1 88 1. (These orders are set out at length in the Statutory Rules and Orders Revised (ed. ˆ04), vol. ii. tit. ” Clerk of the Crown in Chancery,” pp. i. et seq.) Formerly each colonial governor was appointed and commissioned by letters patent under the great seal of the United Kingdom. But since 1875, the practice has been to create the office of governor in each colony by letters patent, and then to make each appointment to the office by commission under the Royal Sign Manual and to give to the governor so appointed instructions in a uniform shape under the Royal Sign Manual. The letters patent, commission and instructions, are commonly described as the Governor’s Com- mission (see Jenkyns, British Rule and Jurisdiction beyond the Seas, p. 100; the forms now in use are printed in Appx. iv. Also the Statutory Rules and Codes Revised, ed. 1904, under the title of the colony to which they relate). The Colonial Letters Patent Act 1863 provides that letters patent shall not take effect in the colonies or possessions beyond the seas until their publication there by proclamation or otherwise (s. 2), and shall

be void unless so published within nine months in the case of colonies east of Bengal or west of Cape Horn, and within six months in any other case. Colonial officers and judges holding offices by patent for life or for a term certain, are removable by a special procedure — ” amotion ” — by the Governor and Council, subject to a right of appeal to the king in Council (Leave of Absence Act, formerly cited as “Burke’s Act” 1782; see Montagu v. Governor of Van Diemen’s Land, 1849, 6 Moo. P.C. 491; Willis v. Gipps, 1846, 6 St. Trials [N.S., 311]). The law of conquered or ceded colonies may be altered by the crown by letters patent under the Great Seal as well as by Proclamation or Order in Council (Jephson v. Riera, 1835, 3 Knapp, 130; 3 St. Trials [N.S.] 591).

Procedure. — Formerly letters patent were always granted under the Great Seal. But now, under the Crown Office Act 1877, and the Orders in Council made under it, many letters patent are sealed with the wafer great seal. Letters patent for inven- tions are issued under the seal of the Patent Office. The pro- cedure by which letters patent are obtained is as follows: A warrant for the issue of letters patent is drawn up ; and is signed by the lord chancellor; this is submitted to the law officers of the crown, who countersign it; finally, the warrant

thus signed and countersigned is submitted to His Majesty, who affixes his signature. The warrant is then sent to the Crown Office and is filed, after it has been acted upon by the issue of letters patent under the great or under the wafer seal as the case may be. The letters patent are then delivered into the custody of those in whose favour they are granted.

Construction. — The construction of letters patent differs from that of other grants in certain particulars: (i.) Letters patent, contrary to the ordinary rule, are construed in a sense favourable to the grantor (viz. the crown) rather than to the grantee; although this rule is said not to apply so strictly where the grant is made for consideration, or where it purports to be made ex certa scientid ct mero motu. (ii.) When it appears from the face of the grant that the sovereign has been mistaken or deceived, either in matter of fact or in matter of law, as, e.g. by false suggestion on the part of the patentee, or by misrecital of former grants, or if the grant is contrary to law or uncertain, the letters patent are absolutely void, and may still, it would seem, be cancelled (except as regards letters patent for inventions, which are revoked by a special procedure, regulated by § 26 of the Patents Act 1883), by the procedure known as scire facias, an action brought against the patentee in the name of the crown with the fiat of the attorney-general.

As to letters patent generally, see Bacon's Abridgment (" Prerogative," F.); Chitty's Prerogative; Hindmarsh on Patents (1846); Anson, Law and Custom of the Const, ii. (3rd ed., Oxford and London, 1907-1908). (A. W. R.)

LETTRES DE CACHET. Considered solely as French docu- ments, lettres de cachet may be defined as letters signed by the king of France, countersigned by one of his ministers, and closed with the royal seal {cachet). They contained an order — in principle, any order whatsoever — emanating directly from the king, and executory by himself. In the case of organized bodies lettres de cachet were issued for the purpose of enjoining members to assemble or to accomplish some definite act; the provincial estates were convoked in this manner, and it was by a lettre de cachet (called lettre de jussipn) that the king ordered a parlement to register a law in the teeth of its own remonstrances. The best-known lettres de cachet, however, were those which may be called penal, by which the king sentenced a subject without trial and without an opportunity of defence to imprisonment in a state prison or an ordinary gaol, confinement in a convent or a hospital, transportation to the colonies, or relegation to a given place within the realm.

The power which the king exercised on these various occasions was a royal privilege recognized by old French law, and can be traced to a maxim which furnished a text of the Digest of Jus- tinian: ” Rex solutus est a legibus.” This signified particularly that when the king intervened directly in the administration proper, or in the administration of justice, by a special act of

his will, he could decide without heeding the laws, and even in a sense contrary to the laws. This was an early conception, an3 in early times the order in question was simply verbal; thus some letters patent of Henry III. of France in 1576 (Isambert, Anciennes lois francaises, xiv. 278) state that Francois de Mont- morency was ” prisoner in our castle of the Bastille in Paris by verbal command” of the late king Charles IX. But in the 14th century the principle was introduced that the order should be written, and hence arose the lettre, de cachet. The lettre de cachet belonged to the class of lettres closes, as opposed to lettres patentes, which contained the expression of the legal and permanent will of the king, and had to be furnished with the seal of state affixed by the chancellor. The lettres de cachet, on the contrary, were signed simply by a secretary of state (formerly known as secre- taire des commandements) for the king; they bore merely the imprint of the king’s privy seal, from which circumstance they were often called, in the 14th and 15th centuries, lettres de petit signet or lettres de petit cachet, and were entirely exempt from the control of the chancellor.

While serving the government as a silent weapon against political adversaries or dangerous writers and as a means of punishing culprits of high birth without the scandal of a suit at law, the lettres de cachet had many other uses. They were employed by the police in dealing with prostitutes, and on their authority lunatics were shut up in hospitals and sometimes in prisons. They were also often used by heads of families as a means of correction, e.g. for protecting the family honour from the disorderly or criminal conduct of sons; wives, too, took advantage of them to curb the profligacy of husbands and vice versa. They were issued by the intermediary on the advice of the attendants in the provinces and of the lieutenant of police in Paris. In reality, the secretary of state issued them in a completely arbitrary fashion, and in most cases the king was unaware of their issue. In the 18th century it is certain that the letters were often issued blank, i.e. without containing the name of the person against whom they were directed; the recipient, or mandatary, filled in the name in order to make the letter effective.

Protests against the lettres de cachet were made continually by the

parlement of Paris and by the provincial parlements, and often also by the States-General. In 1648 the sovereign courts of Paris procured their momentary suppression in a kind of charter of liberties which they imposed upon the crown, but which was ephemeral. It was not until the reign of Louis XVI. that a reaction against this abuse became clearly perceptible. At the beginning of that reign Malesherbes during his short ministry endeavoured to infuse some measure of justice into the system, and in March 1784 the baron de Breteuil, a minister of the king's household, addressed a circular to the intendants and the lieutenant of police with a view to preventing the crying abuses connected with the issue of lettres de cachet. In Paris, in 1779, the Cour des Aides demanded their suppression, and in March 1788 the parlement of Paris made some exceedingly energetic remonstrances, which are important for the light they throw upon old French public law. The crown, however, did not decide to lay aside this weapon, and in a declaration to the States-General in the royal session of the 23rd of June 1789 (art. 15) it did not renounce it absolutely. Lettres de cachet were abolished by the Constituent Assembly, but Napoleon re-established their equivalent by a political measure in the decree of the 9th of March 1801 on the state prisons. This was one of the acts brought up against him by the senatus-consulte of the 3rd of April 1 8 14, which pronounced his fall "considering that he has violated the constitutional laws by the decrees on the state prisons."

See Honore Mirabeau, Les Lettres de cachet et des prisons d'etat (Hamburg, 1782), written in the dungeon at Vincennes into which his father had thrown him by a lettre de cachet, one of the ablest and most eloquent of his works, which had an immense circulation and was translated into English with a dedication to the duke of Norfolk in 1788; Frantz Funck-Brentano, Les Lettres de cachet & Paris (Paris, 1904) ; and Andre Chassaigne, Les Lettres de cachet sous t'ancien regime (Paris, 1903). (J. P. E.)

LETTUCE, known botanically as Lactuca sativa (nat. ord. Compositae), a hardy annual, highly esteemed as a salad plant. The London market-gardeners make preparation for the first main crop of Cos lettuces in the open ground early in August, a frame being set on a shallow hotbed, and, the stimulus of heat not being required, this is allowed to subside till the first week in October, when the soil, consisting of leaf-mould mixed with a little sand, is put on 6 or 7 in. thick, so that the surface is within 4.5 in. of the sashes. The best time for sowing is

found to be about the 1 ith of October, one of the best varieties being Lobjoits Green Cos. When the seeds begin to germinate the sashes are drawn quite off in favourable weather during the day, and put on, but tilted, at night in wet weather. Very little watering is required, and the aim should be to keep the plants gently moving till the days begin to lengthen. In January a more active growth is encouraged, and in mild winters a considerable extent of the planting out is done, but in private gardens the preferable time would be February. The ground should be light and rich, and well manured below, and the plants put out at 1 ft. apart each way with the dibble. Frequent stirring of the ground with the hoe greatly encourages the growth of the plants. A second sowing should be made about the 5th of November, and a third in frames about the end of January or beginning of February. In March a sowing may be made in some warm situation out of doors; successional sowings may be made in the open border about every third or fourth week till August, about the middle of which month a crop of Brown Cos, Hardy Hammersmith or Hardy White Cos should be sown, the latter being the most reliable in a severe winter. These plants may be put out early in October on the sides of ridges facing the south or at the front of a south wall, beyond the reach of drops from the copings, being planted 6 or 8 in. apart. Young lettuce plants should be thinned out in the seed-beds before they crowd or draw each other, and transplanted as soon as possible after two or three leaves are formed. Some cultivators prefer that the summer crops should not be transplanted, but sown where they are to stand, the plants being merely thinned out; but transplanting checks the running to seed, and makes the most of the ground.

For a winter supply by gentle forcing, the Hardy Hammer- smith and Brown Dutch Cabbage lettuces, and the Brown Cos and Green Paris Cos lettuces, should be sown about the middle of August and in the beginning of September, in rich light soil, the plants being pricked out 3 in. apart in a prepared bed, as soon as the first two leaves are fully formed. About the middle of October the plants should be taken up carefully with balls attached to the roots, and should be placed in a mild hotbed of well-prepared dung (about 55°) covered about 1 ft. deep with a compost of sandy peat, leaf-mould and a little well-decomposed manure. The Cos and Brown Dutch varieties should be planted about 9 in. apart. Give plenty of air when the weather permits, and protect from frost. For winter work Stanstead Park Cabbage Lettuce is greatly favoured now by London market-gardeners, as it stands the winter well. Lee's Immense is another good variety, while All the Year Round may be sown for almost any season, but is better perhaps for summer crops.

There are two races of the lettuce, the Cos lettuce, with erect oblong heads, and the Cabbage lettuce, with round or spreading heads, — the former generally crisp, the latter soft and flabby in texture. Some of the best lettuces for general purposes of the two classes are the following: — ■

Cos: White Paris Cos, best for summer; Green Paris Cos, hardier than the white; Brown Cos, Lobjoits Green Cos, one of the hardiest and best for winter; Hardy White Cos.

Cabbage: Hammersmith Hardy Green: Stanstead Park, very hardy, good for winter; Tom Thumb; Brown Dutch; Neapolitan, best for summer; All the Year Round; Golden 3all, good for forcing in private establishments.

Lactuca virosa, the strong-scented lettuce, contains an alkaloid which has the power of dilating the pupil and may possibly be identical with hyoscyamine, though this point is as yet not determined. No variety of lettuce is now used for any medicinal

purpose, though there is probably some slight foundation for the belief that the lettuce has faint narcotic properties.

LEUCADIA, the ancient name of one of the Ionian Islands, now Santa Maura (q.v.), and of its chief town (Hamaxichi).

LEUCIPPUS, Greek philosopher, born at Miletus (or Elea), founder of the Atomistic theory, contemporary of Zeno, Empedocles and Anaxagoras. His fame was so completely over- shadowed by that of Democritus, who subsequently developed the theory into a system, that his very existence was denied by Epicurus (Diog. Laert. x. 7), followed in modern times by E. Rohde. Epicurus, however, distinguishes Leucippus from Democritus, and Aristotle and Theophrastus expressly credit him with the invention of Atomism. There seems, therefore, no reason to doubt his existence, although nothing is known of his life, and even his birthplace is uncertain. Between Leucippus and Democritus there is an interval of at least forty years; accordingly, while the beginnings of Atomism are closely con- nected with the doctrines of the Eleatics, the system as developed by Democritus is conditioned by the sophistical views of his time, especially those of Protagoras. While Leucippus's notion of Being agreed generally with that of the Eleatics, he postulated its plurality (atoms) and motion, and the reality of not -Being (the void) in which his atoms moved.

See Democritus. On the Rohde-Diels controversy as to the exist- ence of Leucippus, see F. Lortzing in Bursian's Jahresbericht, vol. cxvi. (1904); also J. Burnet, Early Greek Philosophy (1892).

LEUCITE, a rock-forming mineral composed of potassium and aluminium metasilicate KAl(SiO a) 2 . Crystals have the form of cubic icositetrahedra { 2 1 1 } , but, as first observed by Sir David Brewster in 1821, they are not optically isotropic, and are there- fore pseudo-cubic. Goniomfttric measurements made by G. vom Rath in 1873 led him to refer the crystals to the tetragonal system, the faces being distinct from those lettered i in the adjoining figure. Optical investigations have since proved the crystals to be still more complex in character, and to consist of several orthorhombic or monoclinic indi- viduals, which are optically biaxial and repeatedly twinned, giving rise

to twin-lamellae and to striations on I'M WSˆ' ''/'/7///////X Z*rf/([the faces. When the crystals are raised to a temperature of about 500° C. they become optically iso- tropic, the twin-lamellae and stria- tions disappearing, reappearing, however, when the crystals are again cooled. This pseudo-cubic character of leucite is exactly the same as that of the mineral boracite (q.v.).

The crystals are white (hence the name suggested by A. G. Werner in 1791, from Xeuxos) or ash-grey in colour, and are usually dull and opaque, but sometimes transparent and glassy; they are brittle and break with a conchoidal fracture. The hardness is 5 • 5 , and the specific gravity 2-5. Enclosures of other minerals, arranged in concentric zones, are frequently present in the crystals. On account of the colour and form of the crystals the mineral was early known as " white garnet." French authors employ R. J. Haiiy's name " amphigene." (L. J. S.)

Leucite Rocks. — Although rocks containing leucite are numerically scarce, many countries such as England being entirely without them, yet they are of wide distribution, occurring in every quarter of the globe. Taken collectively, they exhibit a considerable variety of types and are of great interest petrographically. For the presence of this mineral it is necessary that the silica percentage of the rock should not be high, for leucite never occurs in presence of free quartz. It is most common in lavas of recent and Tertiary age, which have a fair amount of potash, or at any rate have potash equal to or greater than soda; if soda preponderates nepheline occurs rather than leucite. In pre-Tertiary rocks leucite is uncommon, since it readily decomposes and changes to zeolites, analcite and other secondary minerals. Leucite

also is rare in plutonic rocks and dike rocks, but leucite-syenite and leucite-tinguaite bear witness to the possibility that it may occur in this manner. The rounded shape of its crystals, their white or grey colour, and rough cleavage, make the presence of leucite easily determinable in many of these rocks by simple inspection, especially when the crystals are large. ” Pseudo-leu- cites ” are rounded areas consisting of felspar, nepheline, analcite,

&c, which have the shape, composition and sometimes even the crystalline forms. of leucite; they are probably pseudomorphs or paramorphs, which have developed from leucite because this mineral, in its isometric crystals, is not stable at ordinary temperatures and mav be expected under favourable conditions to undergospontaneous change into an aggregate of other minerals. Leucite is very often accompanied by nepheline, sodalite or nosean; other minerals which make their appearance with some frequency are melanite, garnet and melilite.

The plutonic leucite-bearing rocks are leucite-syenite and mis- sourite. Of these the former consists of orthoclase, nepheline, sodalite, diopside and aegirine, biotite and sphene. Two occur- rences are known, one in Arkansas, the other in Sutherlandshire, Scotland. The Scottish rock has been called borolanite. Both examples show large rounded spots in the hand specimens; they are pscudo-leucites and under the microscope prove to consist of ortho- clase, nepheline, sodalite and decomposition products. These have a radiate arrangement externally, but are of irregular structure at their centres; it is interesting to note that in both rocks melanite is an important accessory. The missourites are more basic and consist of leucite, olivine, augite and biotite; the leucite is partly fresh, partly altered to analcite, and the rock has a spotted character recalling that of the leucite-syenites. It has been found only in the Highwood Mountains of Montana.

The leucite-bearing dike-rocks are members of the tinguaite and monchiquite groups. The leucite-tinguaites are usually pale grey or greenish in colour and consist principally of nepheline, alkali- felspar and aegirine. The latter forms bright green moss-like patches and growths of indefinite shape, or in other cases scattered acicular prisms, among the felspars and nephclines of the ground mass. .Where leucite occurs, it is always eumorphic in small, rounded, many-sided

crystals in the ground mass, or in larger masses which have the same characters as the pseudo-leucites. Biotite occurs in some of these rocks, and melanite also is present. . Nepheline appears to decrease in amount as leucite increases. Rpcks_ of this group are known from Rio de Janeiro, Arkansas, Kola (in Finland), Montana and a few other places. In Greenland there are leucite- tinguaites with much arfvedsonite (hornblende) and eudyalite. Wherever they occur they accompany leucite- and nephehne- syenites. Leucite-monchiquites are fine-grained dark rocks con- sisting of olivine, titaniferous augite and iron oxides, with a glassy ground mass in which small rounded crystals of leucite are scattered. They have been described from Bohemia.

By far the greater number of the rocks which contain leucite are lavas of Tertiary or recent geological age. They are never acid rocks which contain quartz, but felspar is usually present, though there are certain groups of leucite lavas which are non-felspathic. Many of them also contain nepheline, sodalite, hauyne and nosean; the much rarer mineral melilite appears also in some examples. The commonest ferromagnesian mineral is augite (sometimes rich in soda), with olivine in the more basic varieties.ˆ Hornblende and biotite occur also, but are less common. Melanite is found in some of the lavas, as in the leucite-syenites.

The rocks in which orthoclase (or sanidine) is present in con- siderable amount are leucite-trachytes, leucite-phonohtes and leucito- phvres. Of these groups the two former, which are not sharply distinguished from one another by most authors, are common in the neighbourhood of Rome (L. Bracciano, L. Bolsena). They are of trachytic appearance, containing phenocysts of sanidine, leucite, augite and biotite. Sodalite or hauyne may also be present, but nepheline is tvpically absent. Rocks of this class occur also in the tuffs of the Phlegraean Fields, near Naples. The leucitophyres are rare rocks which have been described from various parts of the volcanic district of the Rhine (Olbruck, Laacher See, &c.) and from Monte Vulture in Italy. They are rich in leucite, but contain also some sanidine and often much nepheline with hauyne or nosean. Their pyroxene is principally aegirine or aegirine augite; some of them are rich in melanite. Microscopic sections of some of these rocks are of great interest on account of their beauty and the variety of felspathoid minerals which they contain. In Brazil leucitophyres have been found which belong to the Carboniferous period.

Those leucite rocks which contain abundant essential plagioclase felspar are known as leucite-tephrites and ieucite-basanites._ The

former consist mainly of plagioclase, leucite and augite, while the latter contain olivine in addition. The leucite is often present in two sets of crystals, both porphyritic and as an ingredient of the ground mass. It is always idiomorphic with rounded outlines. The felspar ranges from bytownite to oligoclase, being usually a variety of labradorite; orthoclase is scarce. The augite varies a good deal in character, being green, brown or violet, but aegirine (the dark green pleochroic soda-iron-augite) is seldom present. Among the accessory minerals biotite, brown hornblende, hauyne, iron oxides and apatite are the commonest; melanite and nepheline may also occur. The ground mass of these rocks is only occasionally rich in glass. The leucite-tephrites and leucite-basanites of Vesuvius and Somma are familiar examples of this class of rocks. They are black or ashy-grey in colour, often vesicular, and may contain many large grey phenoevsts of leucite. Their black augite and yellow green olivine are also easily detected in hand specimens. From Volcan- ello, Sardinia and Roccamonfina similar rocks are obtained; they

occur also in Bohemia, in Java, Celebes, Kilimanjaro (Africa) and near Trebizond in Asia Minor.

Leucite lavas from which felspar is absent are divided into the leucitites and leucite basalts. The latter contain olivine, the former do not. Pyroxene is the usual ferromagnesian mineral, and resembles that of the tephrites and basanites. Sanidine, melanite, hauyne and perofskite are frequent accessory minerals in these rocks, and many of them contain melilite in some quantity. The well-known leucitite of the Capo di Bove, near Rome, is rich in this mineral, which forms irregular plates, yellow in the hand specimen, enclosing many small rounded crystals of leucite. Bracciano and Roccamon- fina are other Italian localities for leucitite, and in Java, Montana, Celebes and New South Wales similar rocks occur. The leucitc- basalts belong to more basic types and are rich in olivine and augite. They occur in great numbers in the Rhenish volcanic district (Eifel, Laacher See) and in Bohemia, and accompany tephrites or leucitites in Java, Montana, Celebes and Sardinia. The ” peperino ” of the neighbourhood of Rome is a leucitite tuff. (J. S. F.)

LEUCTRA, a village of Boeotia in the territory of Thespiae, chiefly noticeable for the battle fought in its neighbourhood in 371 B.C. between the Thebans and the Spartans and their allies. A Peloponnesian army, about 10,000 strong, which had invaded Boeotia from Phocis, was here confronted by a Boeotian levy of perhaps 6000 soldiers under Epaminondas (g.v.). In spite of inferior numbers and the doubtful loyalty of his Boeotian allies, Epaminondas offered battle

on the plain before the town. Mass- ing his cavalry and the so-deep column of Theban infantry on his left wing, he sent forward this body in advance of his centre and right wing. After a cavalry engagement in which the Thebans drove their enemies off the field, the decisive issue was fought out between the Theban and Spartan foot. The latter, though fighting well, could not sustain in their 12 -deep formation the heavy impact of their opponents' column, and were hurled back with a loss of about 2000 men, of whom 700 were Spartan citizens, including the king Cleombrotus. Seeing their right wing beaten, the rest of the Peloponnesians retired and left the enemy in possession of the field. Owing to the arrival of a Thessalian army under Jason of Pherae, whose friendship they did not trust, the Thebans were unable to exploit their victory. But the battle is none the less of great significance in Greek history. It marks a revolution in military tactics, affording the first known instance of a deliberate concentration of attack upon the vital point of the enemy's line. Its political effects were equally far-reaching, for the loss in material strength and prestige which the Spartans here sustained deprived them for ever of their supremacy in Greece.

Authorities. — Xenophon, Hellenica, vi. 4. 3-15; Diodorus xi. 53-56; Plutarch, Pelopidas, chs. 20-23; Pausanias ix. 13. 210; G. B. Grundy, The Topography of the Battle of Plataea (London, 1894), pp. 73-76; H. Delbruck, Geschichte der Kriegskunst (Berlin v 1900), i. 130 ff. (M. O. B. C.)

LEUK (Fr. Loeche Vitte), an ancient and very picturesque little town in the Swiss canton of the Valais. It is built above the right bank of the Rhone, and is about 1 m. from the Leuk- Susten station (155 m. east of Sion and 17 Jm. west of Brieg) on the Simplon railway. In 1900 it had 1592 inhabitants, all but wholly German-speaking and Romanists. About 105 m. by a winding carriage road N. of Leuk, and near the head of the Dala valley, at a height of 4629 ft. above the sea-level, and over- shadowed by the cliffs of the Gemmi Pass (7641 ft.; g.v.) leading over to the Bernese Oberland, are the Baths of Leuk (Leukerbad, or Loeche les Bains) . They have only 613 permanent inhabitants, but are much frequented in summer by visitors (largely French and Swiss) attracted by the hot mineral springs. These are 22 in number, and are very abundant. The principal is that of St Laurence, the water of which has a temperature of 124 F. The season lasts from June to September. The village in winter is long deprived of sunshine, and is much exposed to avalanches, by which it was destroyed in 1518, 1719 and 1756, but it is now protected by a strong embankment from a similar catastrophe.

(W. A. B. C.)

LEUTHEN, a village of Prussian Silesia, 10 m. W. of Breslau, memorable as the scene of Frederick the Great's victory over the Austrians on December 5, 1757. The high road from Breslau to Ltiben crosses the marshy Schweidnitz Water at Lissa, and immediately enters the rolling country about Neumarkt.

Leuthen itself stands some 4000 paces south of the road, and a similar distance south again lies Sagschiitz, while Nypern, on the northern edge of the hill country, is 5000 paces from the road. On Frederick's approach the Austrians took up a line of battle resting on the two last-named villages. Their whole position was strongly garrisoned and protected by obstacles, and their artillery was numerous though of light calibre. A strong outpost of Saxon cavalry was in Borne to the westward. Frederick had the previous day surprised the Austrian bakeries at Neumarkt, and his Prussians, 33,000 to the enemy's 82,000, moved towards Borne and Leuthen early on the 5th. The Saxon outpost was rushed at in the morning mist, and, covered by their advanced guard on the heights beyond, the Prussians wheeled to their right. Prince Charles of Lorraine, the Austrian commander- in-chief, on Leuthen Church tower, could make nothing of Frederick's movements, and the commander of his right wing (Lucchesi) sent him message after message from Nypem and Gocklerwitz asking for help, which was eventually despatched. But the real blow was to fall on the left under Nadasdy. While the Austrian commander was thus wasting time, the Prussians were marching against Nadasdy in two columns, which preserved their distances with an exactitude which has excited the wonder of modern generations of soldiers; at the due place they wheeled into line of battle obliquely to the Austrian front, and in one great echelon, — the cavalry of the right wing foremost, and that of the left " refused," — Frederick advanced on Sagschiitz. Nadasdy, surprised, put a bold face on the matter and made a good defence, but he was speedily routed, and, as the Prussians advanced, battalion after battalion was rolled up towards Leuthen until the Austrians faced almost due south. The fighting in Leuthen itself was furious; the Austrians stood, in places, 100 deep, but the disciplined valour of the Prussians carried the village. For a moment the victory was endangered when Lucchesi came down upon the Prussian left wing from the north, but Driesen's cavalry, till then refused, charged him in flank and scattered his troopers in wild rout. This stroke ended the

battle. The retreat on Breslau became a rout almost comparable to that of Waterloo, and Prince Charles rallied, in Bohemia, barely 37,000 out of his 82,000. Ten thousand Austrians were left on the field, 21,000 taken prisoners (besides 17,000 in Breslau a little later), with 51 colours and 116 cannon. The Prussian loss in all was under 5500. It was not until 1854 that a memorial of this astonishing victory was erected on the battlefield.

See Carlyle, Frederick, bk. xviii. cap. x. ; V. Ollech, Friedrich der Grosse von Kolin bis Leuthen (Berlin, 1858); Kutzen, Schlacht bei Leuthen (Breslau, 1851); and bibliography under Seven Years' War.

LEUTZE, EMANUEL (1816-1868), American artist, was born at Gmiind, Wiirttemberg, on the 24th of May 1816, and as a child was taken by his parents to Philadelphia, where he early displayed talent as an artist. At the age of twenty-five he had earned enough to take him to Diisseldorf for a course of art study at the royal academy. Almost immediately he began the painting of historical subjects, his first work, " Columbus before the Council of Salamanca," being purchased by the Diisseldorf Art Union. In i860 he was commissioned by the United States Congress to decorate a stairway in the Capitol at Washington, for which he painted a large composition, " Westward the Star of Empire takes its Way." His best-known work, popular through engraving, is " Washington crossing the Delaware," a large canvas containing a score of life-sized figures; it is now owned by the Metropolitan Museum of Art, New York. He became a member of the National Academy of Design in i860, and died at Washington, D.C., on the 18th of July 1868.

LEVALLOIS-PERRET, a north-western suburb of Paris, on the right bank of the Seine, 2! m. from the centre of the city. Pop. (1906) 61,410. It carries on the manufacture of motor-cars and accessories, carriages, groceries, liqueurs, perfumery, soap, &rc. and has a port on the Seine.

LEVANT (from the French use of the participle of lever, to rise, for the east, the orient), the name applied widely to the

coastlands of the eastern Mediterranean Sea from Greece to Egypt, or, in a more restricted and commoner sense, to the Mediterranean coastlands of Asia Minor and Syria. In the 16th and 17th centuries the term " High Levant" was used of the Far East. The phrase " to levant," meaning to abscond, especi- ally of one who runs away leaving debts unpaid, particularly of a betting man or gambler, is taken from the Span, levantar, to lift or break up, in such phrases as levantar la casa,

to break up a household, or el campo, to break camp.

LEVASSEUR, PIERRE EMILE (1828-), French econo- mist, was born in Paris on the 8th of December 1828. Educated in Paris, he began to teach in the lycee at Alencon in 1852, and in 1857 was chosen professor of rhetoric at Besancon. He re- turned to Paris to become professor at the lycee Saint Louis, and in 1868 he was chosen a member of the academy of moral and political sciences. In 1872 he was appointed professor of geography, history and statistics in the College dc France, and subsequently became also professor at the Conservatoire des arts et metiers and at the Ecole libre des sciences poliliques. Levasseur was one of the founders of the study of commercial geography, and became a member of the Council of Public Instruction, president of the French society of political economy and honorary president of the French geographical society.

His numerous writings include : Histoire des classes inwrieres en France depuis la conquete de Jules Cesar jusqu'd la Revolution (1859) ; Histoire des classes ouvrieres en France depuis la Revolution jusqu'a nos jours (1867); L'&tude et I ' er.seignement de la geographic. (1871); La Population francaise (1889-1892); U Agriculture aux Etats-Unis (1894); V Enseignement primaire dans les pays civilises (1897); L'Ouvrier amiricain (1898); Questions ouvrieres et industrielles sous la troisieme Republique (1907); and Histoire des classes ouvrieres et de I'industrie en France de 178Q a 1870 (1903-1904). He also pub- lished a Grand Alias de geographic physique et politique (1890-1892).

LEVECHE, the name given to the dry hot sirocco wind! in Spain; often incorrectly called the " solano." The direction of the Leveche is mostly from S.E., S. or S.W., and it occurs along the coast from Cabo de Gata to Cabo de Nao, and even beyond Malaga for a distance of some 10 m. inland.

LEVˆE (from Fr. lever, to raise), an embankment which keeps a river in its channel. A river such as the Mississippi (q.v.), draining a large area, carries a great amount of sediment from its swifter head-streams to the lower ground. As soon as a stream's velocity is checked, it drops a portion of its load of sediment and spreads an alluvial fan in the lower part of its course. This deposition of material takes place particularly at the sides of the stream where the velocity is least, and the banks are in consequence raised above the main channel, so that the river becomes lifted bodily upwards in its bed, and flows above the level of the surrounding country. In flood-time the muddy water flows over the river's banks, where its velocity is at once checked as it flows gently down the outer side, causing more material to be

deposited there, and a long alluvial ridge, called a natural levee, to be built up on either side of the stream. These ridges may be wide or narrow, but they slope from the stream's outer banks to the plain below, and in consequence require careful watching, for if the levee is broken by a " crevasse," the whole body of the river may pour through and flood the country below. In 1890 the Mississippi near New Orleans broke through the Nita crevasse and flowed eastward with a current of 15 m. an hour, spreading destruction in its path. The Hwang-ho river in China is peculiarly liable to these inundations. The word levee is also sometimes used to denote a riverside quay or landing-place.

LEVEE (from the French substantival use of lever, to rise; there is no French substantival use of levee in the English sense), a reception or assembly held by the • British sovereign or his representative, in Ireland by the lord-lieutenant, in India. by the viceroy, in the forenoon or early afternoon, at which men only are present in distinction from a " drawing-room," at which ladies also are presented or received. Under the ancien regime in France the lever of the king was regulated, especially under Louis XIV., by elaborate etiquette, and the various divisions of the ceremonial followed the stages of the king's rising from bed, frum wiiicb it gained its name. The petit lever began when the

king had washed and said his daily offices; to this were ad- mitted the princes of the blood, certain high officers of the house- hold and those to whom a special permit had been granted; then followed the premiere entree, to which came the secretaries and other officials and those having the entree; these were received by the king in his dressing-gown. Finally, at the grand lever, the remainder of the household, the nobles and gentlemen of the court were received; the king by that time was shaved, had changed his linen and was in his wig. In the United States the term " levee" was formerly used of the public receptions held by the president.

LEVELLERS, the name given to an important political party in England during the period of the Civil War and the Common- wealth. The germ of the Levelling movement must be sought for among the Agitators (q.v.), men of strong republican views, and the name Leveller first appears in a letter of the ist of November 1647, although it was undoubtedly in existence as a nickname before this date (Gardiner,

Great Civil War, iii. 380). This letter refers to these extremists thus: ” They have given themselves a new name, viz. Levellers, for they intend to sett all things straight, and rayse a parity and community in the kingdom.”

The Levellers first became prominent in 1647 during the pro- tracted and unsatisfactory negotiations between the king and the parliament, and while the relations between the latter and the army were very strained. Like the Agitators they were mainly found among the soldiers; they were opposed to the existence of kingship, and they feared that Cromwell and the other parliamentary leaders were too complaisant in their deal- ings with Charles; in fact they doubted their sincerity in this matter. Led by John Lilburne (q.v.) they presented a manifesto, The Case of the Army truly stated, to the commander-in-chief, Lord Fairfax, in October 1647. In this they demanded a dissolution of parliament within a year and substantial changes in the con- stitution of future parliaments, which were to be regulated by an unalterable ” law paramount.” In a second document, The Agreement of the People, they expanded these ideas, which were discussed by Cromwell, Ireton and other officers on the one side, and by John Wildman, Thomas Rainsborough and Edward Sexby for the Levellers on the other. But no settlement was made; some of the Levellers clamoured for the king’s death, and in November 1647, just after his flight from Hampton Court to Carisbrooke, they were responsible for a mutiny which broke out in two regiments at Corkbush Field, near Ware. This, however, was promptly suppressed by Cromwell. During the twelve months which immediately preceded the execution of the king the Levellers conducted a lively agitation in favour of the ideas expressed in the Agreement of the people, and in January 1648 Lilburne was arrested for using seditious language at a meeting in London. But no success attended these and similar efforts, and their only result was that the Levellers regarded Cromwell with still greater suspicion.

Early in 1649, just after the death of the king, the Levellers renewed their activity. They were both numerous and danger- ous, and they stood up, says Gardiner, ” for an exaggeration of the doctrine of parliamentary supremacy.” In a pamphlet, England’s New Chains, Lilburne asked for the dissolution of the council of state and for a new and reformed parliament. He followed this up with the Second Part of England’s New Chains; his writings were declared treasonable by parliament, and in March 1649 he and three other leading Levellers, Richard Over- ton, William Walwyn and Prince were arrested. The discontent which was spreading in the army was fanned when certain regiments were ordered to proceed to Ireland, and in April 1649 there

was a meeting in London; but this was quickly put down by Fairfax and Cromwell, and its leader, Robert Lockyer, was shot. Risings at Burford and at Banbury were also suppressed without any serious difficulty, and the trouble with the Levellers was practically over. Gradually they became less prominent, but under the Commonwealth they made frequent advances to the exiled king Charles II., and there was some danger from them early in 1655 when Wildman was arrested and Sexby escaped

from England. The distinguishing mark of the Leveller was a sea-green ribbon.

Another but more harmless form of the same movement was the assembling of about fifty men on St George's Hill near Oatlands in Surrey. In April 1649 these "True Levellers" or " Diggers," as they were called, took possession of some unoccupied ground which they began to cultivate. They were, however, soon dispersed, and their leaders were arrested and brought before Fairfax, when they took the opportunity of denouncing landowners. It is interesting to note that Lilburne and his colleagues objected to being designated Levellers, as they had no desire to take away " the proper right and title that every man has to what is his own."

Cromwell attacked the Levellers in his speech to parliament in September 1654 (Carlyle, Cromwell's Letters and Speeches, Speech II.). He said: " A nobleman, a gentleman, a yeoman; the distinction of these; that is a good interest of the nation, and a great one. The ' natural ' magistracy of the nation, was it not almost trampled under foot, under despite and contempt, by men of Levelling principles ? I beseech you, for the orders of men and ranks of men, did not that Levelling principle tend to the reducing of all to an equality ? Did it ' consciously ' think to do so; or did it 'only unconsciously' practise towards that for property and interest ? ' At all events,' what was the pur- port of it but to make the tenant as liberal a fortune as the landlord ? Which, I think, if obtained, would not have lasted long."

In 1724 there was a rising against enclosures in Galloway, and a number of men who took part therein were called Levellers or Dyke-breakers (A. Lang, History of Scotland, vol. iv.). The word was also used in Ireland during the 18th century to describe a secret revolutionary society similar to the Whiteboys. (A. W. H.*)

LEVEN, ALEXANDER LESLIE, ist Earl of (c. 1580-1661), Scottish general, was the son of George Leslie, captain of Blair-in- Athol, and a member of the family of Leslie of Balquhain. After a scanty education

he sought his fortune abroad, and became a soldier, first under Sir Horace Vere in the Low Countries, and afterwards (1605) under Charles IX. and Gustavus Adolphus of Sweden, in wnose. service he remained for many years and fought in many campaigns with honour. In 1626 Leslie had risen by merit to the rank of lieutenant-general, and had been knighted by Gustavus. In 1628 he distinguished himself by his constancy and energy in the defence of Stralsund against Wallen- stein, and in 1630 seized the island of Rugen in the name of the king of Sweden. In the same year he returned to Scotland to assist in recruiting and organizing the corps of Scottish volunteers which James, 3rd marquis of Hamilton, brought over to Gustavus in 163 1. Leslie received a severe wound in the following winter, but was able nevertheless to be present at Gustavus's last battle at Lutzen. Like many others of the soldiers of fortune who served under Gustavus, Leslie cherished his old commander's memory to the day of his death, and he kept with particular care a jewel and miniature presented to him by the king. He continued as a general officer in the Swedish army for some years, was promoted in 1636 to the rank of field marshal, and continued in the field until 1638, when events recalled him to his own country. He had married long before this — in 1637 his eldest son was made a colonel in the Swedish army — and he had managed to keep in touch with Scottish affairs.

As the foremost Scottish soldier of his day he was naturally nominated to command the Scottish army in the impending war with England, a post which, resigning his Swedish command, he accepted with a glad heart, for he was an ardent Covenanter and had caused " a great number of our commanders in Germany subscryve our covenant" (Baillie's Letters). On leaving Sweden he brought back his arrears of pay in the form of cannon and muskets for his new army. For some months he busied himself with the organization and training of the new levies, and with inducing Scottish officers abroad to do their duty to their country by returning to lead them. Diminutive in size and somewhat deformed in person as he was, his reputation and his shrewdness

and simple tact, combined with the respect for his office of lord general that he enforced on all ranks, brought even the unruly nobles to subordination. He had by now amassed a considerable fortune and was able to live in a manner befitting a commander- in-chief, even when in the field. One of his first exploits was to take the castle of

Edinburgh by surprise, without the loss of a man. He commanded the Scottish army at Dunse Law in May of that year, and in 1640 he invaded England, and defeated the king's troops at Newburn on the Tyne, which gave him possession of Newcastle and of the open country as far as the Tees. At the treaty with the king at Ripon, Leslie was one of the commissioners of the Scottish parliament, and when Charles visited Edinburgh Leslie entertained him magnificently and accompanied him when he drove through the streets. His affirmations of loyalty to the crown, which later events caused to be remembered against him, were sincere enough, but the complicated politics of the time made it difficult for Leslie, the lord general of the Scottish army, to maintain a perfectly consistent attitude. However, his influence was exercised chiefly to put an end to, even to hush up, the troubles, and he is found, now giving a private warning to plotters against the king to enable them to escape, now guarding the Scottish parliament against a royalist coup d'etat, and now securing for an old comrade of the German wars, Patrick Ruthven, Lord Ettrick, indemnity for having held Edinburgh Castle for the king against the parliament. Charles created him, by patent dated Holyrood, October n, 1641, earl of Leven and Lord Balgonie, and made him captain of Edinburgh Castle and a privy councillor. The parliament recognized his services by a grant, and, on his resigning the lord generalship, appointed him commander of the permanent forces. A little later, Leven, who was a member of the committee of the estates which exercised executive powers during the recess of parliament, used his great influence in support of a proposal to raise a Scottish army to help the elector palatine in Germany, but the Ulster massacres gave this force, when raised, a fresh direction and Leven himself accompanied it to Ireland as lord general. He did not remain there long, for the Great Rebellion (q.v.) had begun in England, and negotiations were opened between the English and the Scottish parliaments for mutual armed assistance. Leven accepted the command of the new forces raised for the invasion of England, and was in consequence freely accused of having broken his personal oath to Charles, but he could hardly have acted otherwise than he did, and at that time, and so far as the Scots were concerned, to the end of the struggle, the parliaments were in arms, professedly and to some extent actually, to rescue his majesty from the influence of evil counsellors.

The military operations preceding Marston Moor are described under Great Rebellion, and the battle itself under its own heading. Leven's great reputation, wisdom and tact made him an ideal commander for the allied army formed by the junction of Leven's, Fairfax's and Manchester's in Yorkshire. After the battle the allied forces separated,

Leven bringing the siege of Newcastle to an end by storming it. In 1645 the Scots were less successful, though their operations ranged from Westmorland to Hereford, and Leven himself had many administrative and political difficulties to contend with. These difficulties became more pronounced when in 1646 Charles took refuge with the Scottish army. The king remained with Leven until he was handed over to the English parliament in 1647, and Leven constantly urged him to take the covenant and to make peace. Presbyterians and Independents had now parted, and with no more concession than the guarantee of the covenant the Scottish and English Presbyterians were ready to lay down their arms, or to turn them against the ” sectaries.” Leven was now old and infirm, and though retained as nominal commander-in- chief saw no further active service. He acted with Argyll and the ” godly ” party in the discussions preceding the second in- vasion of England, and remained at his post as long as possible in the hope of preventing the Scots becoming merely a royalist instrument for the conquest of the English Independents. But he was induced iu *.he end to resign, though he was appointed

lord general of all new forces that might be raised for the defence of Scotland. The occasion soon came, for Cromwell annihilated the Scottish invaders at Preston and Uttoxeter, and thereupon Argyll assumed political and Leven military control at Edinburgh. But he was now over seventy years of age, and willingly resigned the effective command to his subordinate David Leslie (see Newark, Lord), in whom he had entire confidence. After the execution of Charles I. the war broke out afresh, and this time the ” godly ” party acted with the royalists. In the new war, and in the disastrous campaign of Dunbar, Leven took but a nominal part, though attempts were afterwards made to hold him responsible. But once more the parliament refused to accept his resignation. Leven at last fell into the hands of a party of English dragoons in August 1651, and with some others was sent to London. He remained incarcerated in the Tower for some time, till released on finding securities for £20,000, upon which he retired to his residence in Northumberland. While on a visit to London he was again arrested, for a technical breach of his engagement, but by the intercession of the queen of Sweden he obtained his liberty. He was freed from his engagements in 1654, and retired to his seat at Balgonie in Fifeshire, where he died at an advanced age in 1661. He acquired considerable landed property, particularly Inchmartin in the Carse of Gowrie, which he called Inchleslie. See Leven and Melville, Earls of, below.

LEVEN, a police burgh of Fifeshire, Scotland. Pop. (1901) 5577. It is

situated on the Firth of Forth, at the mouth of the Leven, 5fm. E. by N. of Thornton Junction by the North British railway. The public buildings include the town hall, public hall and people's institute, in the grounds of which the old town cross has been erected. The industries are numerous, comprising flax-spinning, brewing, linen-weaving, paper-making, seed-crushing and rope-making, besides salt-works, a foundry, saw-mill and brick-works. The wet dock is not much used, owing to the constant accumulation of sand. The golf-links extending for 2 m. to Lundin are among the best in Scotland. Two miles N.E. is Lundin Mill and Drumochie, usually called Lundin (pop. 570), at the mouth of Kiel Burn, with a station on the Links. The three famous standing stones are supposed to be either of " Druidical " origin or to mark the site of a battle with the Danes. In the vicinity are the remains of an old house of the Lundins, dating from the reign of David II. To the N.W. of Leven lies the parish of Kennoway (pop. 870). In Captain Seton's house, which still stands in the village of Kennoway, Archbishop Sharp spent the night before his assassination (1679). One mile east of Lundin lies Largo (pop. of parish 2046), consisting of Upper Largo, or Kirkton of Largo, and Lower Largo. The public buildings include Simpson institute, with a public hall, library, reading-room, bowling-green and lawn- tennis court, and John Wood's hospital, founded in 1659 for poor persons bearing his name. A statue of Alexander Selkirk, or Selcraig (1676-1721), the prototype of " Robinson Crusoe," who was born here, was erected in 1886. Sir John Leslie (1766- 1832), the natural philosopher, was also a native. Largo claims two famous sailors, Admiral Sir Philip Durham (1 763-1845), commander-in-chief at Portsmouth from 1836 to 1839, and Sir Andrew Wood (d. 1515), the trusted servant of James III. and James IV., who sailed the " Great Michael," the largest ship of its time. When he was past active service he had a canal cut from his house to the parish church, to which he was rowed every Sunday in an eight-oared barge. Largo House was granted to him by James III., and the tower of the original structure still exists. About 1 1 m. from the coast rises the height of Largo Law (948 ft.). Kellie Law lies some 5 J m. to the east.

LEVEN, LOCH, a lake of Kinross-shire, Scotland. It has an oval shape, the longer axis running from N.W. to S.E., has a length of 3! m., and a breadth of 2§ m. and is situated near the south and east boundaries of the shire. It lies at a height of 350 ft. above the sea. The mean depth is less than 15 ft., with a maximum of 83 ft., the lake being thus one of the shallowest in Scotland. Reclamation works carried on from 1826 to 1836 reduced its area by one quarter, but it still possesses a surface

area of si sq. m. It drains the county and is itself drained by the Lcven. It is famous for the Loch Leven trout (Salmo levcnciisis, considered by some j. variety of S. trutta), which are remarkable for size and quality. The fishings are controlled by the Loch Leven Angling Association, which organizes com- petitions attracting anglers from far and near. Theloch contains seven islands. Upon St Serf's, the largest, which commemorates the patron saint of Fifeshire, are the ruins of the Priory of Port- moak — so named from St Moak, the first abbot — the oldest Culdee establishment in Scotland. Some time before 961 it was made over to the bishop of St Andrews, and shortly after 1 1 44 a body of canons regular was established on it in connexion with the priory of canons regular founded in that year at St Andrews. The second largest island, Castle Island, possesses remains of even greater interest. The first stronghold is supposed to have been erected by Congal, son of Dongart, king of the Ticts. The present castle dates from the 13th century and was occasionally used as a royal residence. It is said to have been in the hands of the English for a time, from whom it was delivered by Wallace. It successfully withstood Edward Baliol's siege in 1335, and was granted by Robert II. to Sir William Douglas of Lugton. It became the prison at various periods of Robert II. ; of Alexander Stuart, earl of Buchan, " the Wolf of Badenoch "; Archibald, earl of Douglas (1429); Patrick Graham, archbishop of St Andrews (who died, still in bondage, on St Serf's Island in 1478). arid of Mary, queen of Scots. The queen had visited it more than once before her detention, and had had a presence chamber built in it. Conveyed hither in June 1567 after her surrender at Carberry, she signed her abdication within its walls on the 4th of July and effected her escape on the 2nd of May 1 568. The keys of the castle, which were thrown into the loch during her flight, were found and are preserved at Dalmahoy in Mid- lothian. Support of Mary's cause had involved Thomas Percy, 7th carl of Northumberland (b. 1528). He too was lodged in the castle in 1569, and after three years' imprisonment was handed over to the English, by whom he was beheaded at York in 1572. The proverb that "Those never got luck who came to Loch Leven " sums up the history of the castle. The causeway connecting the isle with the mainland was long sub- merged too deeply for use, but the reclamation operations already referred to almost brought it into view again.

LEVEN AND MELVILLE, EARLS OF. The family of Melville which now holds these two earldoms is descended' from Sir John Melville of Raith in Fifeshire. Sir John, who was a member of the reforming party in Scotland, was put to death for high treason on the 13th of

December 1548; he left with other children a son Robert (1527-1621), who in i6r6 was created a lord of parliament as Lord Melville of Monymaill. Before his eleva- tion to the Scottish peerage Melville had been a stout partisan of Mary, queen of Scots, whom he represented at the English court, and he had filled several important offices in Scotland under her son James VI. The fourth holder of the lordship of Melville was George (c 1634-1707), a son of John, the 3rd lord (d. 1643), an(l a descendant of Sir John Melville. Implicated in the Rye House plot against Charles II., George took refuge in the Netherlands in 1683, but he returned to England after the revolution of 1688 and was appointed secretary for Scotland by William III. in 1689, being created earl of Melville in the following year. He was made president of the Scottish privy council in 1696, but he was deprived of his office when Anne became queen in 1702, and he died on the 20th of May 1707. His son David, 2nd earl of Melville (1660-1728), fled to Holland with his father in 1683; after serving in the army of the elector of Brandenburg he accompanied William of Orange to England in 168S. At the head of a regiment raised by himself he fought for William at Killiecrankie and elsewhere, and as commander- in-chief of the troops in Scotland he dealt promptly and effectively with the attempted Jacobite rising of T708. In 1712, however, his office was taken from him and he died on the 6th of June 172.S.

Alexander Leslie, 1st earl of Leven (q.v.), was succeeded in his earldom by his grandson Alexander, who died without sons

in July 1664. The younger Alexander's two daughters were then in turn countesses of Leven in their own right ; and after the death of the second of these two ladies in 1676 a dispute arose over the succession to the earldom between John Leslie, earl (afterwards duke) of Rothes, and David Melville, 2nd earl of Melville, mentioned above. In 1681, however, Rothes died, and Melville, who was a great-grandson of the 1st earl of Lcven, assumed the title, calling himself earl of Leven and Melville after he succeeded his father as earl of Melville in May 1707. Since 1805 the family has borne the name of Leslie-Melville. In 1906 John David Leslie-Melville (b. 1886) became 12th earl of Leven and nth earl of Melville.

See Sir W. Fraser, The Melvilles, Earls of Melville, and the Leslies, Earls of Leven (1890); and the Leven and Melville Papers, edited by the Hon. W. H. Leslie-Melville for the Bannatyne Club (1843).

LEVER, CHARLES JAMES (1806-1872), Irish novelist, second son of James Lever, a Dublin architect and builder, was born in the Irish capital on the 31st of August 1806. His descent was purely English. He

was educated in private schools, where he wore a ring, smoked, read novels, was a ringleader in every breach of discipline, and behaved generally like a boy destined for the navy in one of Captain Marryat's novels. His escapades at Trinity College, Dublin (1823-1828), whence he took the degree of M.B. in 1831, form the basis of that vast cellarage of anecdote from which all the best vintages in his novels are derived. The inimitable Frank Webber in Charles O'Mallcy (spiritual ancestor of Foker and Mr Bouncer) was a college friend, Robert Boyle, later on an Irish parson. Lever and Boyle sang ballads of their own composing in the streets of Dublin, after the manner of Fergusson or Goldsmith, filled their caps with coppers and played many other pranks embellished in the pages of O'Malley, Con Cregan and Lord Kilgobbin. Before seriously embarking upon the medical studies for which he was designed, Lever visited Canada as an unqualified surgeon on an emigrant ship, and has drawn upon some of his experiences in Con Cregan, Arthur O'Leary and Roland Cashel. Arrived in Canada he plunged into the backwoods, was affiliated to a tribe of Indians and had to escape at the risk of his life, like his own Bagenal Daly.

Back in Europe, he travelled in the guise of a student from Gottingen to Weimar (where he saw Goethe), thence to Vienna; he loved the German student life with its beer, its fighting and its fun, and several of his merry songs, such as " The Pope he loved a merry life " (greatly envied by Titmarsh), are on Student-lied models. His medical degree admitted him to an appointment from the Board of Health in Co. Clare and then as dispensary doctor at Port Stewart, but the liveliness of his diversions as a country doctor seems to have prejudiced the authorities against, him. In 1833 he married his first love, Catherine Baker, and in February 1837, after varied experiences, he began running The Confessions of Harry Lorrequer through the pages of the recently established Dublin University Magazine. During the previous seven years the popular taste had declared strongly in favour of the service novel as exemplified by Frank Mildmay, Tom Cringle, The Subaltern, Cyril Thornton, Stories of Waterloo, Ben Brace and The Bivouac; and Lever himself had met William Hamilton Maxwell, the titular founder of the genre. Before Harry Lorrequer appeared in volume form (1839), Lever had settled on the strength of a slight diplomatic connexion as a fashionable physician in Brussels (16, Rue Ducale). Lorrequer was merely a string of Irish and other stories good, bad and indifferent, but mostly rollicking, and Lever, who strung together his anecdotes late at night after the serious business of the day was done, was astonished at its success. " If this sort of thing amuses them, I can go on for ever." Brussels was indeed a superb

place for the observation of half-pay officers, such as Major Monsoon (Commissioner Meade), Captain Bubbleton and the like, who terrorized the tavernes of the place with their endless peninsular stories, and of English society a little damaged, which it became the specialty of Lever to depict. He sketched with a free hand, wrote, as he lived, from hand to mouth, and the chief difficulty he experienced was that of getting rid of his

characters who ” hung about him like those tiresome people who never can make up their minds to bid you good night.” Lever had never taken part in a battle himself, but his next three books, Charles O’Malley (1841), Jack Hint on and Tom Burke of Ours (1843), written under the spur of the writer’s chronic extravagance, contain some splendid military writing and some of the most animated battle-pieces on record. In pages of O’M alley and Tom Burke Lever anticipates not a few of the best effects of Marbot, Thiebaut, Lejeune, Griois, Seruzier, Burgoyne and the like. His account of the Douro need hardly fear compari- son, it has been said, with Napier’s. Condemned by the critics, Lever had completely won the general reader from the Iron Duke himself downwards.

In 1842 he returned to Dublin to edit the Dublin University Magazine, and gathered round him a typical coterie of Irish wits (including one or two hornets) such as the O’Sullivans, Archer Butler, W. Carleton, Sir William Wilde, Canon Hayman, D. F. McCarthy, McGlashan, Dr Kenealy and many others. In June 1842 he welcomed at Templeogue, 4 m. south-west of Dublin, the author of the Snob Papers on his Irish tour (the Sketch Book was, later, dedicated to Lever). Thackeray recognized the fund of Irish sadness beneath the surface merriment. “The author’s character is not humour but sentiment. The spirits are mostly artificial, the fond is sadness, as appears to me to be that of most Irish writing and people.” The Waterloo episode in Vanity Fair was in part an outcome of the talk between the two novelists. But the ” Galway pace,” the display he found it necessary to maintain at Templeogue, the stable full of horses, the cards, the friends to entertain, the quarrels to compose and the enormous rapidity with Which he had to complete Tom Burke, The O’Donoghue and Arthur O’Leary (1845), made his native land an impossible place for Lever to continue in. Templeogue would soon have proved another Abbotsford. Thackeray suggested London. But Lever required a new field of literary observation and anecdote. His she originel was exhausted and

he decided to renew it on the continent. In 1S45 he resigned his editorship and went back to Brussels, whence he started upon an unlimited tour of central Europe in a family coach. Now and again he halted for a few months, and entertained to the limit of his resources in some ducal castle or other which he hired for an off season. Thus at Rieden- burg, near Bregenz, in August 1846, he entertained Charles Dickens and his wife and other well-known people. Like his own Daltons or Dodd Family Abroad he travelled continentally, from Carlsruhe to Como, from Como to Florence, from Florence to the Baths of Lucca and so on, and his letters home are the litany of the literary remittance man, his ambition now limited to driving a pair of novels abreast without a diminution of his standard price for serial work (" twenty pounds a sheet "), In the Knight of Gwynne, a story of the Union(i847), ConCregan (1840), Roland Cashel (1850) and Maurice Tiernay (1852) we still have traces of his old manner; but he was beginning to lose his original joy in composition. His fond of sadness began to cloud the animal joyousness of his temperament. Formerly he had written for the happy world which is young and curly and merry; now he grew fat and bald and grave. " After 38 or so what has life to offer but one universal declension. Let the crew pump as hard as they like, the leak gains every hour." But, depressed in spirit as he was, his wit was unextinguished; he was still the delight of the salons with his stories, and in 1867, after a few years' experience of a similar kind at Spezia, he was cheered by a letter from Lord Derby offering him the more lucrative consulship of Trieste. " Here is six hundred a year for doing nothing, and you are just the man to do it." The six hundred could not atone to Lever for the lassitude of prolonged exile. Trieste, at first " all that I could desire," became with characteristic abruptness "detestable and damnable." " Nothing to eat, nothing to drink, no one to speak to." " Of all the dreary places it has been my lot to sojourn in this is the worst " (some references to Trieste will be found in That Boy of Norcott'.s, i86q). He could never be alone and was almost morbidly dependent upon literary encouragement. Fortunately, like

Scott, he had unscrupulous friends who assured him that his last efforts were his best. They include The Fortunes of Glencore (1857), Tony Butler (1865), Lutlrell of Arran (1865), Sir Brooke Fosbrooke (1866), Lord Kilgobbin (1872) and the table-talk of Cornelius O'Dowd, originally contributed to Blackwood. His depression, partly due to incipient heart disease, partly to the growing conviction that he was the victim of literary and critical conspiracy, was confirmed by the death of his wife (23rd April 1870), to whom he was tenderly attached. He visited Ireland in the following year and seemed

alternately in very high and very low spirits. Death had already given him one or two runaway knocks, and, after his return to Trieste, he failed gradually, dying suddenly, however, and almost painlessly, from failure of the heart's action on the 1st of June 1872. His daughters, one of whom, Sydney, is believed to have been the real author of The Rent in a Cloud (1869), were well provided for.

Trollope praised Lever's novels highly when he said that they were just like his conversation. He was a born raconteur, and had in perfection that easy flow of light description which -without tedium or hurry leads up to the point of the good stories of which in earlier days his supply seemed inexhaustible. With little respect for unity of action or conventional novel structure, his brightest books, such as Lorrequer, O'Malley and Tom Burke, are in fact little more than recitals of scenes in the life of a particular " hero," unconnected by any continuous intrigue. The type of character he depicted is for the most part elementary. His women are mostly rouees, romps or Xanthippes; his heroes have too much of the Pickle temper about them and fall an easy prey to the serious attacks of Poe or to the more playful gibes of Thackeray in Phil Fogarty or Bret Harte in Terence Deuville. This last is a perfect bit of burlesque. Terence exchanges nineteen shots with the Hon. Captain Henry Somerset in the glen. " At each fire I shot away a button from his uniform. As my last bullet shot off the last button from his sleeve, I remarked quietly, ' You seem now, my lord, to be almost as ragged as the gentry you sneered at,' and rode haughtily away." And yet these careless sketches contain such haunting creations as Frank Webber, Major Monsoon and Micky Free, " the Sam Weller of Ireland." Falstaff is alone in the literature of the world; but if ever there came a later Falstaff, Monsoon was the man. As for Baby Blake, is she not an Irish Di Vernon ? The critics may praise Lever's thoughtful and careful later novels as they will, but Charles O'Malley will always be the pattern of a. military romance.

Superior, it is sometimes claimed, in construction and style, the later books approximate it may be thought to the good ordinary novel of commerce, but they lack the extraordinary qualities, the incommunicable " go " of the early books — the elan of Lever's untamed youth. Artless and almost formless these productions may be, but they represent to us, as very few other books can, that pathetic ejaculation of Lever's own — " Give us back the wild freshness of the morning! " We know the novelist's teachers, Maxwell, Napier, the old-fashioned com- pilation known as Victoires, conquetes et desastres des Franqais (1835), and the old buffers at Brussels who emptied the room by uttering the word " Badajos." .But where else shall we find the equals of the military scenes in O'Malley and Tom Burke, or the

military episodes in Jack Hinton, Arthur O'Leary (the story of Aubuisson) or Maurice Tiernay (nothing he ever did is finer than the chapter introducing " A remnant of Fontenoy ").? It is here that his true genius lies, even more than in his talent for conviviality and fun, which makes an early copy of an early Lever (with Phiz's illustrations) seem literally to exhale an atmosphere of past and present entertainment. It is here that he is a true romancist, not for boys only, but also for men.

Lever's lack of artistry and of sympathy with the deeper traits of the Irish character have been stumbling-blocks to his reputation among the critics. Except to some extent in The Martins of Cro' Martin (1856) it may be admitted that his por- traits of Irish are drawn loo exclusively from the type. depicted in Sir Jonah Barrington's Memoirs and already well known- ,on

the English stage. He certainly had no deliberate intention of " lowering the national character." Quite the reverse. Yet his posthumous reputation seems to have suffered in consequence, in spite of all his Gallic sympathies and not unsuccessful endeavours to apotheosize the " Irish Brigade."

The chief authorities are the Life, by W. J. Fitzpatrick (1879), and the Letters, ed. in 2 vols, by Edmund Downey (1906), neither of which, however, enables the reader to penetrate below the surface. See also Dr Garnett in Diet. Nat. Biog.\ Dublin Univ. Mag. (1880), 465 and 570; Anthony Trollope's Autobiography; Blackwood (August 1862); Fortnightly Review, vol. xxxii. ; Andrew Lang's Essays in Little (1892) ; Henley's Views and Reviews; Hugh Walker's Literature of the Victorian Era (1 9 1 o) ; The Bookman Hist, of English Literature (1906), p. 467; Bookman (June 1906; portraits). A library edition of the novels in 37 vols, appeared 1897-1899 under the superintendence of Lever's daughter, Julie Kate Neville. (T. Se.)

LEVER (through 0. Fr. leveour, levere, mod. levier, from Lat. levare, to lift, raise), a mechanical device for raising bodies; the " simple " lever consists of a rigid bar free to move about a fixed point, termed the fulcrum; one point of the rod is connected to the piece to be moved, and power is applied at another point (see Mechanics).

LEVERRIER, URBAIN JEAN JOSEPH (1811-1877), French astronomer,

was born at St L6 in Normandy on the 1 ith of March 181 1. His father, who held a small post under government, made great efforts to send him to Paris, where a brilliant examina- tion gained him, in 1831, admittance to the ficole Polytechnique. The distinction of his career there was rewarded with a free choice amongst the departments of the public service open to pupils of the school. He selected the administration of tobaccos, addressing himself especially to chemical researches under the guidance of Gay-Lussac, and gave striking proof of ability in two papers on the combinations of phosphorus with hydrogen and oxygen, published in Annates de Chimie et de Physique (1835 and 1837). His astronomical vocation, like that of Kepler, came from without. The place of teacher of that science at the Ecole Polytechnique falling vacant in 1837, it was offered to and accepted by Leverrier, who, " docile to circumstance," instantly abandoned chemistry, and directed the whole of his powers to celestial mechanics. The first fruits of his labours were contained in two memoirs presented to the Academy, September 16 and October 14, 1839. Pursuing the investigations of Laplace, he demonstrated with greater rigour the stability of the solar system, and calculated the limits within which the eccentricities and inclinations of the planetary orbits vary. This remarkable debut excited much attention, and, on the recom- mendation of Francois Arago, he took in hand the theory of Mercury, producing, in 1843, vastly improved tables of that planet. The perturbations of the comets discovered, the one by H. A. E. A. Faye in November 1843, the other by Francesco de Vico a year later, were minutely investigated by Leverrier, with the result of disproving the supposed identity of the first with Lexell's lost comet of 1770, and of the other with Tycho's of 1585. On the other hand, he made it appear all but certain that Vico's comet was the same with one seen by Philippe de Lahire in 1678. Recalled once more, by the summons of Arago, to planetary studies, he was this time invited to turn his attention to Uranus. Step by step, with sagacious and patient accuracy, he advanced to the great discovery which has immortalized his name. Carefully sifting all the known causes of disturbance, he showed that one previously unknown had to be reckoned with, and on the 23rd of September 1846 the planet Neptune was discerned by J. G. Galle (d. 1910) at Berlin, within one degree of the spot Leverrier had indicated (see Neptune).

This memorable achievement was greeted with an outburst of public enthusiasm. Academies vied with each other in en- rolling Leverrier among their members; the Royal Society awarded him the Copley medal; the king of Denmark sent him the order of the Dannebrog; he was named officer in the Legion of Honour, and preceptor to the

comte de Paris; a chair of astronomy was created for his benefit at the Faculty of Sciences; he was appointed adjunct astronomer to the Bureau of Longi- tudes. Returned to the Legislative Assembly in 1849 by his native department of Manche, he voted with the anti-republican

party, but devoted his principal attention to subjects connected with science and education. After the coup d'etat of 1851 he became a senator and inspector-general of superior instruction, sat upon the commission for the reform of the Ecole Poly- technique (1854), and, on the 30th of January 1854, succeeded Arago as director of the Paris observatory. His official work in the latter capacity would alone have strained the energies of an ordinary man. The institution had fallen into a state of lament- able inefficiency. Leverrier placed it on a totally new footing, freed it from the control of the Bureau of Longitudes, and raised it to its due rank among the observatories of Europe. He did not escape the common lot of reformers. His uncompromising measures and unconciliatory manner of enforcing them raised a storm only appeased by his removal on the 5th of February 1870. On the death of his successor Charles Eugene Delaunay (1816- 1872), he was reinstated by Thiers, but with authority restricted by the supervision of a council. In the midst of these dis- quietudes, he executed a task of gigantic proportions. This was nothing less than the complete revision cf the planetary theories, followed by a laborious comparison of results with the most authentic observations, and the construction of tables represent- ing the movements thus corrected. It required all his indomit- able perseverance to carry through a purpose which failing health continually menaced with frustration. He had, however, the happiness of living long enough to perfect his work. Three weeks after he had affixed his signature to the printed sheets of the theory of Neptune he died at Paris on the 23rd of September 1877. By his marriage with Mademoiselle Choquet, who sur- vived him little more than a month, he left a son and daughter. The discovery with which Leverrier's name is popularly identified was only an incident in his career. The elaboration of the scheme of the heavens traced out by P. S. Laplace in the Mecanique celeste was its larger aim, for the accomplishment of which forty years of unremitting industry barely sufficed. He nevertheless found time to organize the meteorological service in France and to promote the present system of international weather- warnings. He founded the Association Scientifique, and was active in introducing a practical scientific element into public education. His inference of the exist- ence, between Mercury and the sun, of an appreciable quantity of circulating matter (Comptes rendus, 1859, ii. 379), has not yet been verified. He was twice, in 1868 and 1876, the recipient of the gold medal of the Royal Astronomical

Society, London, and the university of Cambridge conferred upon him, in 1875, the honorary degree of LL.D. His planetary and solar tables were adopted by the Nautical Almanac, as well as by the Connaissance des temps.

The Annates de I ‘ Observatoire de Paris, the publication of which was set on foot by Leverrier, contain, in vols, i.-vi. (Memoires) (1855-1861) and x.-xiv. (1874-1877), his theories and tables of the several planets. In vol. i. will be found, besides his masterly report on the observatory, a general theory of secular inequalities, in which the development of the disturbing function was carried further than had previously been attempted.

The memoirs and papers communicated by him to the Academy were summarized in Comptes rendus (1839-1876), and the more im- portant published in full either separately or in the Conn, des temps and the Journal des mathematiques. That entitled Developpemens sur dijferents points de la theorie des perturbations (1841), was trans- lated in part xviii. of Taylor’s Scientific Memoirs. For his scientific work see Professor Adams’s address, Monthly Notices, xxxvi. 232, and F. Tisserand’s review in Ann. de I’Obs. torn. xv. (1880); for a notice of his life, J. Bertrand’s ” Eloge historique,” Mem. de VAc. des Sciences, torn, xli., 2 me serie (A. M. C.)

LEVERTIN, OSCAR IVAN (1862-1906), Swedish poet and man of letters, was born of Jewish parents at Norrkoping on the 17th of July 1862. He received his doctorate in letters at TJpsala in 1887, and was subsequently docent at Upsala, and later pro- fessor of literature at Stockholm. Enforced sojourns in southern Europe on account of health familiarized him with foreign languages. He began by being an extreme follower of the natural- ist school, but on his return in 1890 from a two years’ residence in Davos he wrote, in collaboration with the poet C. G. Verner von Heidenstam (b. 1859), a novel, Pepitas brollop (1890), which was a direct attack on naturalism. His later volumes of short stories, Rococonoveller and Sista noveller, are fine examples of modern Swedish fiction. The lyrical beauty of his poems, Legender och visor (1891), placed him at the head of the romantic reaction in Sweden. In his poems entitled Nya Diktcr (1894) he drew his material partly from medieval sources, and a third

volume of poetry in 1902 sustained his reputation. His last poetical

work (1905) was Kung Salomo och Morolf, poems founded on an eastern legend. As a critic he first attracted attention by his books on the Gustavian age of Swedish letters: T eater och drama under Gustaf III. (1889), &c. He was an active colla- borator in the review Ord och Bild. He died in 1906, at a time when he was engaged on his Linne, posthumously published, a fragment of a great work on Linnaeus.

LEVI, HERMANN (1839-1900), German orchestral conductor, was born at Giessen on the 7th of November 1839, and was the son of a Jewish rabbi. He was educated at Giessen and Mann- heim, and came under Vincenz Lachner's notice. From 1855 to 1858 Levi studied at the Leipzig conservatorium, and after a series of travels which took him to Paris, he obtained his first post as music director at Saarbriicken, which post he exchanged for that at Mannheim in 1861. From 1862 to 1864 he was chief conductor of the German opera in Rotterdam, then till 1872 at Carlsruhe, when he went to Munich, a post he held until 1896, when ill-health compelled him to resign. Levi's name is in- dissolubly connected with the increased public appreciation of Wagners music. He conducted the first performance of Parsifal at Bayreuth in 1882, and was connected with the musical life of that place during the remainder of his career. He visited London in 1895.

LEVI, LEONE (1821-1888), English jurist and statistician, was born of Jewish parents on the 6th of June 1821, at Ancona, Italy. After receiving an early training in a business house in his native town, he went to Liverpool in 1844, became naturalized, and changing his faith, joined the Presbyterian church. Per- ceiving the necessity, in view of the unsystematic condition of the English law on the subject, for the establishment of chambers and tribunals of commerce in England, he warmly advocated their institution in numerous pamphlets; and as a result of his labours the Liverpool Chamber of Commerce, of which Levi was made secretary, was founded in 1849. In 1850 Levi published his Commercial Law of the World, being an exhaustive and com- parative treatise upon the laws and codes of mercantile countries. Appointed in 1852 to the chair of commercial law in King's College, London, he proved himself a highly competent and popular instructor, and his evening classes were a most successful innovation. He was called to the bar at Lincoln's Inn in 1859, and received from the university of Tubingen the degree of doctor of political science. His chief work — History of British Commerce and of the Economic Progress of the British Nation, 176J-1870, is perhaps a rather too partisan account of British economic development, being a eulogy upon the blessings of Free Trade, but its value as a work of reference cannot be gainsaid. Among his other works are: Work and Pay; Wages and Earnings of the Working Classes; International Law, with Materials for a Code. He died on the 7th of May 1888.

LEVIATHAN, the Hebrew name (livydthdn), occurring in the poetical books of the Bible, of a gigantic animal, apparently the sea or water equivalent of behemoth (q.v.), the king of the animals of the dry land.

In Job xli. 15 it would seem to repre- sent the crocodile, in Isaiah xxvii. 1 it is a crooked and piercing serpent, the dragon of the sea;cf. Psalms civ. 26. The etymology of the word is uncertain, but it has been taken to be connected with a root meaning ” to twist.” Apart from its scriptural usage, the word is applied to any gigantic marine animal such as the whale, and hence, figuratively, of very large ships, and also of persons of outstanding strength, power, wealth or influence. Hobbes adopted the name as the title of his principal work, applying it to ” the multitude so united in one person . . . called a commonwealth. . . . This is the generation of that Leviathan, or rather … of that mortal God, to which we owe under the immortal God, our peace and defence.”

LEVIRATE (Lat. levir, a husband’s brother), a custom, sometimes even a law, compelling a dead man’s brother to marry his widow. It seems to have been widespread in primitive times, and is common to-day. Of the origin and primitive purpose of the levirate marriage various explanations have been put forward: —

1. It has been urged that the custom was primarily based on the law of inheritance; a wife, regarded as a chattel, being inherited like other possessions. The social advantage of pro- viding one who should maintain the widow doubtless aided the spread of the custom. The abandonment of a woman and her children in the nomadic stage of civilization would be equiva- lent to death for them; hence with some peoples the levirate became a duty rather than a right. Among the Thlinkets, for example, when a man dies, his brother or his sister’s son must marry the widow, a failure in this duty occasioning feuds. The obligation on a man to provide for his sister-in-law is analogous to other duties devolving on kinsfolk, such as the vendetta.

2. J. F. McLennan, however, would assume the levirate to be a relic of polyandry, and in his argument lays much stress on the fact that it is the dead man’s brother who inherits the widow. But among many races who follow the custom, such as the Fijians, Samoans, Papuans of New Guinea, the Caroline Islanders, and some tribes in the interior of Western Equatorial Africa, the rule of inheritance is to the brother first. Thus among the Santals, ” when the elder brother dies, the next younger inherits the widow, children and all the property.” Further, there is no known race where it is permitted to a son to marry his own mother. Inheriting a woman in primitive societies would be always tantamount to marrying her, and, apart from any special laws of inheritance, it would be natural for the brother to take over the widow. In polygamous countries where a man leaves many widows the son would have a right of ownership over these, and could dispose

of them or keep them as he pleased, his own mother alone excepted. Thus among the Bakalai, an African tribe, widows may marry the son of their dead husband, or in default of a son, can live with the brother. The Negroes of Benin and the Gabun and the Kaffirs of Natal have similar customs. In New Caledonia every man, married or single, must immediately marry his brother's widow. In Polynesia the levirate has the force of law, and it is common throughout America and Asia.

3. Another explanation of the custom has been sought in a semi-religious motive which has had extraordinary influence in countries where to die without issue is regarded as a terrible calamity. The fear of this catastrophe would readily arise among people who did not believe in personal immortality, and to whom the extinction of their line would be tantamount to annihilation. Or it is easily conceivable as a natural result of ancestor-worship, under which failure of offspring entailed deprivation of cherished rites and service. 1 Thus it is only when the dead man has no offspring that the Jewish, Hindu and Malagasy laws prescribe that the brother shall " raise up seed " to him. In this sense the levirate forms part of the Deuteronomic Code, under which, however, the obligation is restricted to the brother who " dwelleth together " {i.e. on the family estate) with the dead man, and the first child only of the levirate marriage is regarded as that of the dead man. That the custom was obsolescent seems proved by the enjoining of ceremony on any brother who wished to evade the duty, though he had to submit to an insult from his sister-in-law, who draws off his sandal and spits in his face. The biblical story of Ruth ex-emplifies the custom, though with further modifications (see RtJTH, Book of). Finally the custom is forbidden in Leviticus, though in New Testament times the levirate law was still observed by some Jews. The ceremony ordained by Deuteronomy is still observed among the orthodox. Among the Hindus the levir did not take his brother's widow as wife, but he had intercourse with her. This practice was called niyoga.

4. Yet another suggested origin of the levirate is agrarian, the motive being to keep together under the levirate husband the

1 An expression of this idea is quoted from the Mahabharata (Muir's trans.), by Max Mtiller (Gifford Lectures) , Anthropological Religion, p. 31 —

" That stage completed, seek a wife And gain the fruit of wedded life, A race of sons, by rites to seal, When thou art gone, thy spirit's weal."

property which would otherwise have been divided among all the brothers or next of kin.

See J. F. McLennan, Studies in Ancient History (London, 1886) and ” The Levirate and Polyandry,” in The Fortnightly Review, n.s. vol. xxi. (1877); C. N. Starcke, The Primitive Family in its Origin and Development (London, 1889) ; Edward Westermarck, History of Human Marriage (London, 1894), pp. 510-514, where are valuable notes containing references to numerous books of travel; H. Spencer, Principles of Sociology, ii. 649; A. H. Post, Einleitung in das Stud. d. Ethnolog. Jurisprud. (1886).

LˆViS (formerly Pointe Levi), the chief town of Levis county, Quebec, Canada, situated on the precipitous south bank of the St Lawrence, opposite Quebec city. Pop. (1901) 7783. It is on the Intercolonial railway, and is the eastern terminus of the Grand Trunk and Quebec Central railways. It contains the Lome dock, a Dominion government graving dock, 445 ft. long, 100 ft. wide, with a depth on the sill of 26I and 205 ft. at high water, spring and neap tides respectively. It is an important centre of the river trade, and is connected by steam ferries with the city of Quebec. It is named after the marechal due de Levis, the last commander of the French troops in Canada.

LEVITES, or sons of Levi (son of Jacob by Leah), a sacred caste in ancient Israel, the guardians of the temple service at Jerusalem. 1

1. Place in Ritual. — In the developed hierarchical system the ministers of the sanctuary are divided into distinct grades. All are ” Levites ” by descent, and are thus correlated in the genealogical and other lists, but the true priesthood is confined to the sons of Aaron, while the mass of the Levites are subordinate servants who are not entitled to approach the altar or to perform any strictly priestly function. All access to the Deity is restricted to the one priesthood and to the one sanctuary at Jerusalem; the worshipping subject is the nation of Israel as a unity, and the function of worship is discharged on its behalf by divinely chosen priests. The ordinary individual may not intrude under penalty of death; only those of Levitical origin may perform service, and they are essentially the servants and hereditary serfs of the Aaronite priests (see Num. xviii.). But such a scheme finds no place in the monarchy; it presupposes ahierocracy under which the priesthood increased its rights by claiming the privileges which past kings had enjoyed; it is the outcome of a complicated development in Old Testament religion in the light of which it is to be followed (see

Hebrew Religion).

First (a) , in the earlier biblical writings which describe the state of affairs under the Hebrew monarchy there is not this funda- mental distinction among the Levites, and, although a list of Aaronite high-priests is preserved in a late source, internal details and the evidence of the historical books render its value extremely doubtful (1 Chron. vi. 3-15, 49-53)- In Jerusalem itself the subordinate officers of the temple were not members of a holy gild, but of the royal body-guard, or bond-slaves who had access to the sacred courts, and might even be uncircumcised foreigners (Josh. ix. 27; 1 Kings xiv. 28; 2 Kings xi.; cf. Zeph. i. 8 seq. ; Zech. xiv. 21). Moreover, ordinary individuals might serve as priests (1 Sam. ii. 11, 18, vii. 1; see 2 Sam. viii. 18, deliberately altered in 1 Chron. xviii. 17); however, every Levite was a priest, or at least qualified to become one (Deut. x. 8, xviii. 7 ; Judges xvii. 5-13), and when the author of 1 Kings xii. 31, wishes to represent Jeroboam's priests as illegitimate, he does not say that they were not Aaronites, but that they were not of the sons of Levi.

The next stage (b) is connected with the suppression of the local high-places or minor shrines in favour of a central sanctuary. This involved the suppression of the Levitical priests in the country (cf . perhaps the allusion in Deut. xxi. 5) ; and the present book of Deuteronomy, in promulgating the reform, represents the Levites as poor scattered " sojourners " and recommends them to the charity of the people (Deut. xii. 12, 18 seq., xiv. 27, 29, xvi. n, 14, xxvi. 11 sqq.). However, they are permitted to congregate at " the place which Yahweh shall choose," where they may perform the usual priestly duties together with their brethren who " stand there before Yahweh," and they are 1 For the derivation of " Levi " see below § 4 end.

allowed their share of the offerings (Deut. xviii. 6-8) ? The Deuteronomic history of the monarchy actually ascribes to the Judaeanking Josiah (621 B.C.) the suppression of the high-places, and states that the local priests were brought to Jerusalem and received support, but did not minister at the altar (2 Kings xxiii. 9). Finally, a scheme of ritual for the second temple raises this exclusion to the rank of a principle. The Levites who had been idolatrous are punished by exclusion from the proper priestly work, and take the subordinate offices which the un- circumcised and polluted foreigners had formerly filled, while the sons of Zadok, who had remained faithful, are henceforth the legitimate priests, the only descendants of Levi who are allowed to minister unto Yahweh (Ezek. xliv. 6-15, cf. xl. 46, xliii. iq, xlviii. n). " A threefold cord is not quickly broken," and these three independent witnesses agree in describing a significant innovation

which ends with the supremacy of the Zadokites of Jerusalem over their brethren.

In the last stage © the exclusion of the ordinary Levites from all share in the priesthood of the sons of Aaron is looked upon as a matter of course, dating from the institution of priestly worship by Moses. The two classes are supposed to have been founded separately (Exod. xxviii., cf. xxix. 9; Num. iii. 6-10), and so far from any degradation being attached to the rank and file of the Levites, their position is naturally an honourable one compared with that of the mass of non-Levitical worshippers (see Num. i. 50-53), and they are taken by Yahweh as a surrogate for the male first-born of Israel (iii. 11-13). They are inferior only to the Aaronites to whom they are ” joined ” (xviii. 2, a play on the name Levi) as assistants. Various adjustments and modifications still continue, and a number of scattered details may indicate that internal rivalries made themselves felt. But the different steps can hardly be recovered clearly, although the fact that the priesthood was extended beyond the Zadokites to families of the dispossessed priests points to some compromise (1 Chron. xxiv.). Further, it is subsequently found that certain classes of temple servants, the singers and porters, who had once been outside the Levitical gilds, became absorbed as the term ” Levite ” was widened, and this change is formally expressed by the genealogies which ascribe to Levi, the common ” ancestor ” of them all, the singers and even certain families whose heathenish and foreign names show that they were once merely servants of the temple. 3

2. Significance of the Development. — Although the legal basis for the final stage is found in the legislation of the time of Moses (latter part of the second millennium B.C.), it is in reality scarcely earlier than the 5th century B.C., and the Jewish theory finds analogies when developments of the Levitical service are referred to David (1 Chron. xv. seq., xxiii. sqq.), Hezekiah (2 Chron. xxix.) and Josiah (xxxv.) — contrast the history in the earlier books of Samuel and Kings — or when the still later book of Jubilees (xxxii.) places the rise of the Levitical priesthood in the patriarchal period. The traditional theory of the Mosaic origin of the elaborate Levitical legislation cannot be maintained save by the most arbitrary and inconsequential treatment of the evidence and by an entire indifference to the historical spirit; and, although numerous points of detail still remain very obscure, the three leading stages in the Levitical institutions are now recog nized by nearly all independent scholars. These stages with a number of concomitant features confirm the literary hypothesis that biblical history is in the main due to two leading recensions, the Deuteronomic and the Priestly (cf. [b] and © above), which have

incorporated older sources. 4 If the hierarchical system as

2 The words ” beside that which cometh of the sale of his patri- mony ” (lit. ” his sellings according to the fathers “) are obscure; they seem to imply some additional source of income which the Levite enjoys at the central sanctuary.

3 For the nethlnlm (“given”) and “children of the slaves of Solomon ” (whose hereditary service would give them a pre-eminence over the temple slaves), see art. Nethinim, and Benzinger, Ency. Bib. cols. 3397 sqq.

4 In defence of the traditional view, see S. I. Curtiss, The Levitical Priests (1877), with which his later attitude should be contrasted (see Primitive Semitic Religion To-day, pp. 14, 50, 133 seq., 171, 238 sqq., 241 sqq.); W. L. Baxter, Sanctuary and Sacrifice (1895)-;

it existed in the post-exilic age was really the work of Moses, it is inexplicable that all trace of it was so completely lost that the degradation of the non-Zadokites in Ezekiel was a new feature and a punishment, whereas in the Mosaic law the ordinary Levites, on the traditional view, was already forbidden priestly rights under penalty of death. There is in fact no clear evidence of the existence of a distinction between priests and Levites in any Hebrew writing demonstrably earlier than the Deuteronomic stage, although, even as the Pentateuch contains ordinances which have been carried back by means of a ” legal convention ” to the days of Moses, writers have occasionally altered earlier records of the history to agree with later standpoints. 1

No argument in support of the traditional theory can be drawn from the account of Korah’s revolt (Num. xvi. sqq., see § 3) or from the Levitical cities (Num. xxxv. ; Josh. xxi.). Some of the latter were either not conquered by the Israelites until long after the in- vasion, or, if conquered, were not held by Levites; and names are wanting of places in which priests are actually known to have lived. Certainly the names are largely identical with ancient holy cities, which, however, arc holy because they possessed noted shrines, not because the inhabitants were members of a holy tribe. Gezer and Taanach, for example, are said to have remained in the hands of Canaanites (Judges i. 27, 29 ; cf. 1 Kings ix. 16), and recent excavation has shown how far the cultus

of these cities was removed from Mosaic religion and ritual and how long the grosser elements persisted. 2 On the other hand, the sanctuaries obviously had always their local ministers, all of whom in time could be called Levitical, and it is only in this sense, not in that of the late priestly legislation, that a place like Shechem could ever have been included. Further, instead of holding cities and pasture-grounds, the Levites are sometimes described as scattered and divided (Gen. xlix. 7; Deut. xviii. 6), and though they may naturally possess property as private indi- viduals, they alone of all the tribes of Israel possess no tribal in- heritance (Num. xviii. 23, xxvi. 62; Deut. x. 9; Josh. xiv. 3). This fluctuation finds a parallel in the age at which the Levites were to serve; for neither has any reasonable explanation been found on the traditional view. Num. iv. 3 fixes the age at thirty, although in i. 3 it has been reduced to twenty; but in 1 Chron. xxiii. 3, David is said to have numbered them from the higher limit, whereas in vv. 24, 27 the lower figure is given on the authority of " the last words (or acts) of David." In Num. viii. 23-26, the age is given as twenty-five, but twenty became usual and recurs in Ezra iii. 8 and 2 Chron. xxxi. 17. There are, however, independent grounds for believing that 1 Chron. xxiii. 24, 27, 2 Chron. xxxi. 17 belong to later insertions and that Ezr. iii. 8 is relatively late.

When, in accordance with the usual methods of Hebrew genealogical history, the Levites are defined as the descendants of Levi, the third son of Jacob by Leah (Gen. xxix. 34), a literal interpretation is unnecessary, and the only narrative wherein Levi appears as a person evidently delineates under the form of personification events in the history of the Levites (Gen. xxxiv.). 3 They take their place in Israel as the tribe set apart for sacred duties, and without entering into the large question how far the tribal schemes can be used for the earlier history

A. van Hoonacker, Le Sacerdoce levitique (1899); and J. Orr, Problem of the O.T. (1905). These and other apologetic writings have so far failed to produce any adequate alternative hypothesis, and while they argue for the traditional theory, later revision not being excluded, the modern critical view accepts late dates for the literary sources in their present form, and explicitly recognizes the presence of much that is ancient. Note the curious old tradition that Ezra wrote out the law which had been burnt (2 Esdr. xiv. 21 sqq.).

1 For example, in I Kings viii. 4, there are many indications that the context has undergone considerable editing at a fairly late date. The Septuagint translators did not read the clause which speaks of " priests and Levites," and 2 Chron. v. 5 reads " the Levite priests," the phrase

characteristic of the Deuteronomic identification of priestly and Levitical ministry. 1 Sam. vi. 15, too, brings in the Levites, but the verse breaks the connexion between 14 and 16. For the present disorder in the text of 2 Sam. xv. 24, see the com- mentaries.

- See Father H. Vincent, O.P., Canaan d'aprhs I 'exploration recenie (1907), pp. 151, 200 sqq., 463 sq.

3 So Gen. Kxxiv. 7, Hamor has wrought folly " in Israel " (cf. Judges xx. 6 and often), and in v. 30 " Jacob " is not a personal but a collec- tive idea, for he says, " I am a few men," and the capture and destruction of a considerable city is in the nature of things the work of more than two individuals. In the allusion to Levi and Simeon in (len. xlix. the two are spoken of as " brothers " with a communal assembly. See, for other examples of personification, Genealogy: Biblical.

of Israel, it may be observed that no adequate interpretation has yet been found of the ethnological traditions of Levi and other sons of Leah in their historical relation to one another or to the other tribes. However intelligible may be the notion of a tribe reserved for priestly service, the fact that it does not apply to early biblical history is apparent from the heterogeneous details of the Levitical divisions. The incorporation of singers and porters is indeed a late process, but it is typical of the tendency to co-ordinate all the religious classes (see Genealogy: Biblical). The genealogies in their complete form pay little heed to Moses, although Aaron and Moses could typify the priesthood and other Levites generally (1 Chron. xxiii. 14). Certain priesthoods iii the first stage (§ 1 [a]) claimed descent from these prototypes, and it is interesting to observe (1) the growing importance of Aaron in the later sources of " the

Exodus," and (2) the relation between Mosheh (Moses) and his two sons Gershom and Eliezer, on the one side, and the Levitical names Mushi (i.e. the Mosaite), Gershon and the Aaronite priest Eleazar, on the other. There are links, also, which unite Moses with Kenite, Rechabite, Calebite and Edomite families, and the Levitical names themselves are equally connected with the southern tribes of Judah and Simeon and with the Edomites. 4 It is to be inferred, therefore, that some relationship subsisted, or was thought to subsist, among (1) the Levites, (2) clans actually located in the south of Palestine, and (3) families whose names and traditions point to a southern origin. The exact meaning of these features is not clear, but if it be remembered (a) that the Levites of post-exilic literature represent only the result of a long and intricate development, (b) that the name "Levite," in the later stages at least, was extended to include all priestly servants, and © that the priesthoods, in tending to become hereditary, included priests who were Levites by adoption and not by descent, it will be recognized that the examination of the evidence for the earlier stages cannot confine itself to those narratives where the specific term alone occurs.

3. The Traditions of the Levites. — In the " Blessing of Moses " (Deut. xxxiii. 8-1 1), Levi is a collective name for the priesthood, probably that of (north) Israel. He is the guardian of the sacred oracles, knowing no kin, and enjoying his privileges for proofs of fidelity at Massah and Meribah. That these places (in the district of Kadesh) were traditionally associated with the origin of the Levites is suggested by various Levitical stories, although: it is in a narrative now in a context pointing to Horeb or Sinai that the Levites are

Israelites who for some cause (now lost) severed themselves from their people and took up a stand on behalf of Yahweh (Exod. xxxii.). Other evidence allows us to link together the Kenites, Calebites and Danites in a tradition of some movement into Palestine, evidently quite distinct from the great invasion of Israelite tribes which pre-dominates in the existing records. The priesthood of Dan certainly traced its origin to Moses (Judges xvii. 9, xviii. 30) ; that of Shiloh claimed an equally high ancestry (1 Sam. ii. 27 seq.). 6 Some tradition of a widespread movement appears to be ascribed to the age of Jehu, whose accession, promoted by the prophet Elisha, marks the end of the conflict between Yahweh and Baal. To a Rechabite (the clan is allied to the Kenites) is definitely ascribed a hand in Jehu's sanguinary measures, and, though little is told of the obviously momentous events, one writer clearly alludes to a bloody period when reforms were to be effected by the sword (1 Kings xix. 17). Similarly the story of the original selection of the Levites in the wilderness men- tions an uncompromising massacre of idolaters. Consequently, it is very noteworthy that popular tradition preserves the recollection of some attack by the " brothers " Levi and Simeon

4 See E. Meyer, Israeliten u. ihre Nachbarstamme, pp. 299 sqq. (passim); S. A. Cook, Ency. Bib. col. 1665 seq.; Crit. Notes on O.T. History, pp. 84 sqq., 122-125.

6 The second element of the name Abiathar is connected with Jcther or Jethro, the father-in-law of Moses, and even Ichabod (1 Sam. iv. 21) seems to be an intentional reshaping of Jochebed, which is elsewhere the name of the mother of Moses. Phinehas, Eli's son, becomes in later writings the name of a prominent Aaronite priest in the days of the exodus from Egypt.

upon the famous holy city of Shechem to avenge their " sister " Dinah (Gen. xxxiv.), and that a detailed narrative tells of the bloodthirsty though pious Danites who sacked an Ephraimite shrine on their journey to a new home (Judges xvii. sq.).

The older records utilized by the Deuteronomic and later compilers indicate some common tradition which has found expression in these varying forms. Different religious standpoints are represented in the biblical writings, and it is now important to observe that the prophecies of Hosea unmistakably show another attitude to the

Israelite priesthood. The condemnation of Jehu's bloodshed (Hos. i. 4) gives another view of events in which both Elijah and Elisha were concerned, and the change is more vividly realized when it is found that even to Moses and Aaron, the traditional founders of Israelite religion and ritual, is ascribed an offence whereby they incurred Yahweh's wrath (Num. xx. 12, 24, xxvii. 14; Deut. ix. 20, xxxii. 51). The sanctuaries of Shiloh and Dan lasted until the deportation of Israel (Judges xviii. 30 seq.), and some of their history is still preserved in the account of the late premonarchical age (i2th-l ith centuries B.C.). Shiloh's priestly gild is condemned for its iniquity (1 Sam. iii. U-14), the sanctuary mysteriously disappears, and the priests are subsequently found at Nob outside Jerusalem (1 Sam. xxi. seq.). All idea of historical perspective has been lost, since the fall of Shiloh was apparently a recent event at the close of the 7th century (Jer. vii. 12-15, xxvi. 6-9). But the tendency to ascribe the disasters of northern Israel to the priesthood (see esp. Hosea) takes another form when an inserted prophecy revokes the privileges of the ancient and honourable family, foretells its over- throw, and announces the rise of a new faithful and everlasting priesthood, at whose hands the dispossessed survivors, reduced to poverty, would beg some priestly office to secure a livelihood (1 Sam. ii. 27-36). The sequel to this phase is placed in the reign of Solomon, when David's old priest Abiathar, sole survivor of the priests of Shiloh, is expelled to Anathoth (near Jerusalem), and Zadok becomes the first chief priest contemporary with the foundation of the first temple (1 Kings ii. 27, 35). These situations cannot be severed from what is known elsewhere of the Deuteronomic teaching, of the reform ascribed to Josiah, or of the principle inculcated by Ezekiel (see § I [b]). The late specific tendency in favour of Jerusalem agrees with the Deuteronomic editor of Kings who condemns the sanctuaries of Dan and Bethel for calf-worship (1 Kings xii. 28-31), and does not acknowledge the northern priesthood to be Levitical (1 Kings xii. 31, note the interpretation in 2 Chron. xi. 14, xiii. 9). It is from a similar standpoint that Aaron is condemned for the manufacture of the golden calf, and a compiler (not the original writer) finds its sequel in the election of the faithful Levites. 1

In the third great stage there is another change in the tone. The present (priestly) recension of Gen. xxxiv. has practically justified Levi and Simeon from its standpoint of opposition to intermarriage, and in spite of Jacob's curse (Gen. xlix. 5-7) later traditions continue to extol the slaughter of the Shechemites as a pious duty. Post-exilic revision has also hopelessly obscured the offence of Moses and Aaron, although there was already a tendency to place the blame upon the people

(Deut. i. 37, iii. 26, iv. 21). When two-thirds of the priestly families are said to be Zadokites and one-third are of the families of Abiathar, some reconciliation, some adjustment of rivalries, is to be recognized (1 Chron. xxiv.). Again, in the composite story of Korah's revolt, one version reflects a contest between Aaronites and the other Levites who claimed the priesthood (Num. xvi. 8-11,36-40), while another shows the supremacy of the Levites as a caste either over the rest of the people (? cf. the prayer, Deut. xxxiii. 11), or, since the latter are under the leadership of Korah, later the eponym of a gild of singers, perhaps over the more subordinate ministers who once formed a separate class. 2 In the composite work Chronicles-Ezra-Nehemiah (dating after the post-exilic Levitical legislation) a peculiar interest is taken in the Levites, more particularly in the singers, and certain passages even reveal

1 With this development in Israelite religion, observe that Judaean cult included the worship of a brazen serpent, the institution of which was ascribed to Moses, and that, according to the compiler of Kings, Hezekiah was the first to destroy it when he suppressed idolatrous worship in Judah (2 Kings xviii. 4). It may be added that the faithful Kenites (found in N. Palestine, Judges iv. 11) appear in another light when threatened with captivity by Asshur (Num. xxiv. 22; cf. fall of Dan and Shiloh), and if their eponym is Cain (?.».), the story of Cain and Abel serves, amid a variety of purposes, to condemn the murder of the settled agriculturist by the nomad, but curiously allows that any retaliation upon Cain shall be avenged (see below, note 5).

- The name Korah itself is elsewhere Edomite (Gen. xxxvi. 5, 14, 18) and Calebite (1 Chron. ii. 43). See Ency. Bib., s.v.

some animus against the Aaronites (2 Chron. xxix. 34, xxx. 3), A Levite probably had a hand in the work, and this, with the evidence for the Levitical Psalms (see Psalms), gives the caste an interesting place in the study of the transmission of the biblical records. 3 But the history of the Levites in the early post-exilic stage and onwards is a separate problem, and the work of criticism has not advanced sufficiently for a proper estimate of the various vicissitudes. However, the feeling which was aroused among the priests when some centuries later the singers obtained from Agrippa the privilege of wearing the priestly linen dress (Josephus, Ant. xx. 9. 6), at least enables one to appreciate more vividly the scantier hints of internal jealousies during the preceding years. 4

4. Summary. — From the inevitable conclusion that there are three stages in the written sources for the Levitical institutions, the next step

is the correlation of allied traditions or* the basis of the genealogical evidence. But the problem of fitting these into the history of Israel still remains The assumption that the earlier sources for the pre-monarchical history, as incorporated by late compilers, are necessarily trustworthy confuses the inquiry (on Gen. xxxiv., see Simeon), and even the probability of a reforming spirit in Jehu's age depends upon the internal criticism of the related records (see Jews, §§ u-14). The view that the Levites came from the south may be combined with the con- viction that there Yahweh had his seat (cf. Deut. xxxiii. 2; Judges v. 4; Hab. iii. 3), but the latter is only one view, and the traditions of the patriarchs point to another belief (cf. also Gen. iv. 26). The two are reconciled when the God of the patriarchs reveals His name for the first time unto Moses (Exod. iii. 15, vi. 3). With these variations is involved the problem oi the early history of the Israelites. 5 Moreover, the real Judaean tendency which associates the fall of Eli's priesthood at Shiloh with the rise of the Zadokites involves the literary problems of Deuteronomy, a composite work whose age is not certainly known, and of the twofold Deuteronomic redaction elsewhere, one phase of which is more distinctly Judaean and anti-Samaritan. There are vicissitudes and varying standpoints which point to a complicated literary history and require some historical back- ground, and, apart from actual changes in the history of the Levites, some allowance must be made for the real character of the circles where the diverse records originated or through which they passed. The key must be sought in the exilic and post-exilic age where, unfortunately, direct and decisive evidence is lacking. It is clear that the Zadokite priests were rendered legitimate by finding a place for their ancestor in the Levitical genealogies — through Phinehas (cf. Num. xxv. 12 seq.), and Aaron — there was a feeling that a legitimate priest must be an Aaronite, but the historical reason for this is uncertain (see R. H. Kennett, Journ. Theolog. Stud., 1905, pp. 161 sqq.). Hence, it is impossible at present to trace the earlier steps which led to the grand hierarchy of post-exilic Judaism. Even the name Levite itself is of uncertain origin. Though popularly connected with lavah, " be joined, attached," an ethnic from Leah has found some favour; the Assyrian IV u "powerful, wise," has also been suggested. The term has been more plausibly identified with l-v- (fern, l-v-'t), the name given in old Arabian inscriptions (e.g. at al'Ola, south-east of Elath) to the priests and priestesses of the Arabian god Vadd (so especially Hommel, Anc. Heb. Trad., pp. 278seq.). The date of the evidence, however, has not been fixed with unanimity, and this very

3 The musical service of the temple has no place in the Pentateuch, but was considerably developed under the second temple and

attracted the special attention of Greek observers (Theophrastus, apud Porphyry, de Abstin. ii. 26); see on this subject, R. Kittel's Handkommentar on Chronicles, pp. 90 sqq.

4 Even the tithes enjoyed by the Levites (Num. xviii. 21 seq.) were finally transferred to the priests (so in the Talmud: see Yeba- moth, fol. 86a, Carpzov, App. ad Godw. p. 624; Hottinger, De Dec. vi. 8, ix. 17).

6 For some suggestive remarks on the relation between nomadism and the Levites, and their influence upon Israelite religion and literary tradition, see E. Meyer, Die Israeliten u. ihre Nachbarstamme (1906), pp. 82-89, 138; on the problems of early Israelite history, see Simeon (end), Jews, §§ 5, 8, and Palestine, History.

attractive and suggestive view requires confirmation and independent support.

Authorities. — For the argument in § 1, see Wellhausen, Prolego- mena, pp. 121-151 ; W. R. Smith, Old Tesi. in Jew. Church (2nd ed., Index, s.v. " Levites "); A. Kuenen, Hexaieuch, §§ 3 n. 16; 11, pp. 203 sqq.; 15 n. 15 (more technical); also the larger commentaries on Exodus-Joshua and the ordinary critical works on Old Testa- ment literature. In § 1 and part of § 2 use has been freely made of W. R. Smith's article " Levites " in the 9th edition of the Ency. Brit, (see the revision by A. Bertholet, Ency. Bib. col. 2770 sqq.). For the history of the Levites in the post-exilic and later ages, see the commentaries on Numbers (by G. B. Gray) and Chronicles (E. L. Curtis), and especially H. Vogelstein, Der Kampf zwischen Priestern u. Leviten seit den Tagen Ezechiels, with Kuenen's review in his Gesammelte Abhandlungen (cd. K. Budde, 1894). See further Priest. (S. A. C.)

LEVITICUS, in the Bible, the third book of the Pentateuch. The name is derived from that of the Septuagint version (to) ~Kev[e]LTLKov (sc. /3i/3\toj'), though the English form is due to the Latin rendering, Leviticus (sc. liber). By the Jews the book is called Wayyikra. (n-jjh) from the first word of the Hebrew text, but it is also referred to (in the Talmud and Massorah) as Torath koh&nim (n':rp m'w, law of the priests), Sepher kohanlm ("219?, book of the priests), and Sepher korbantm (&w® ijp, book of offerings). As a descriptive title Leviticus, "the Levitical book," is not inappropriate to the contents of the book,

which exhibits an elaborate system of sacrificial worship. In this connexion, however, the term ” Levitical ” is used in a perfectly general sense, since there is no reference in the book itself to the Levites themselves.

The book of Leviticus presents a marked contrast to the two preceding books of the Hexateuch in that it is derived from one document only, viz. the Priestly Code (P), and contains no trace of the other documents from which the Hexateuch has been compiled. Hence the dominant interest is a priestly one, while the contents are almost entirely legislative as opposed to histori- cal. But though the book as a whole is assigned to a single document, its contents are by no means homogeneous: in fact the critical problem presented by the legislative portions of Leviticus, though more limited in scope, >s very similar to that of the other books of the Hexateuch. Here, too, the occurrence of repetitions and divergencies, the variations of standpoint and practice, and, at times, the linguistic peculiarities point no less clearly to diversity of origin.

The historical narrative with which P connects his account of the sacred institutions of Israel is reduced in Leviticus to a minimum, and presents no special features. The consecration of Aaron and his sons (viii. ix.) resumes the narrative of Exod. xl., and this is followed by a brief notice of the death of Nadab and Abihu (x. 1-5), and later by an account of the death of the blasphemer (xxiv. 10 f.). Apart from these incidents, which, in accordance with the practice of P, are utilized for the purpose of introducing fresh legislation, the book consists of three main groups or collections of ritual laws: (1) chaps, i.-vii., laws of sacrifice; (2) chaps, xi.xv., laws of purification, with an ap pendix (xvi.) on the Day of Atonement; (3) chaps, xvii.-xxvi., the Law of Holiness, with an appendix (xxvii.) on vows and tithes. In part these laws appear to be older than P, but when examined in detail the various collections show unmistakably that they have undergone more than one process of redaction before they assumed the form in which they are now presented. The scope of the present article does not permit of an elaborate analysis of the different sections, but the evidence adduced will, it is hoped, afford sufficient proof of the truth of this statement.

I. The Laws of Sacrifice. — Chaps, i.-vii. This group of laws clearly formed no part of the original narrative of P since it interrupts the connexion of chap. viii. with Exod. xl. For chap, viii. describes how Moses carried out the command of Exod. xl. 12-15 in accordance with the instructions given in Exod. xxix. 1-35, and bears the same relation to the latter passage that Exod. xxxv. ff. bears to E.xod. xxv. ff. Hence

we can only con- clude that Lev. i.vii. were added by a later editor. This con clusion does not necessarily involve a late date for the laws them- selves, many of which have the appearance of great antiquity,

though their original form has been considerably modified. But though these chapters form an independent collection of laws, and were incorporated as such in P, a critical analysis of their con- tents shows that they were not all derived from the same source. The collection falls into two divisions, (a) i.-vi. 7 (Heb. v. 26), and (b) vi. 8 (Heb. vi. i)-vii., the former being addressed to the people and the latter to the priests. The laws contained in (a) refer to (1) burnt-offerings, i. ; (2) meal-offerings, ii.; (3) peace-offerings, iii.; (4) sin-offerings, iv. (on v. 1-13 see below); (5) trespass-offerings, v. 14-vi. 7 (Heb. v. 14-26). The laws in (b) cover practically the same ground — (1) burnt-offerings, vi. 8-13 (Heb. vv. 1-6); (2) meal- offerings, vi. 14-18 (Heb. vv. 7-1 1) ; (3) the meal-offering of the priest, vi. 19-23 (Heb. vv. 12-16); (4) sin-offerings, vi. 24-30 (Heb. vv. 17- 23); (5) trespass-offerings, vii. 1-7, together with certain regulations for the priest's share of the burnt- and meal-offerings (vv. 8-10); (6) peace-offerings, vii. 1 1 -2 1. Then follow the prohibition of eating the fat or blood (vv. 22-28), the priest's share of the peace-offerings (vv. 29-34), the priest's anointing-portion (vv. 35, 36), and the sub- scription (vv. 37, 38). The second group of laws is thus to a certain extent supplementary to the first, and was, doubtless, intended as such by the editor of chaps, i.-vii. Originally it can hardly have formed part of the same collection; for (a) the order is different, that of the second group being supported by its subscription, and (b) the laws in vi. 8-vii. are regularly introduced by the formula " This is the law (torah) of. . . ." Most probably the second group was excerpted by the editor of chaps, i.-vii. from another collection for the purpose of supplementing the laws of i.-v., more especially on points connected with the functions and dues of the officiating priests.

Closer investigation, however, shows that both groups of laws contain heterogeneous elements and that their present form is the result of a long process of development. Thus i. and iii. seem to contain genuinely old enactments, though i. 14-17 is probably a later addition, since there is no reference to birds in the general heading v. 2. Chap. ii. 1-3, on the other hand, though it corresponds in form to i. and iii., interrupts the close connexion between those chapters, and should in any case stand after iii. : the use of the second for the third person in the remaining verses points to a different source. As might be expected from the nature of the sacrifice with which it deals, iv. (sin-offerings) seems to belong to a relatively later period of the sacrificial system. Several features confirm this view: (1) the blood of the sin-

offering of the ” anointed priest ” and of the whole con- gregation is brought within the veil and sprinkled on the altar of incense, (2) the sin-offering of the congregation is a bullock, and not, as elsewhere, a goat (ix. 15; Num. xv. 24), (3) the altar of incense is distinguished from the altar of burnt-offering (as opposed to Exod. xxix.; Lev. viii. ix.). Chap. v. 1-13 have usually been regarded as an appendix to iv., setting forth (a) a number of typical cases for which a sin-offering is required (vv. 1-6), and (b) certain con- cessions for those who could not afford the ordinary sin-offering (vv. 7-13). But vv. 1-6, which are not homogeneous (vv. 2 and 3 treating of another question and interrupting vv. 1, 4, 5 f.), cannot be ascribed to the same author as iv. : for (1) it presents a different theory of the sin-offering (contrast v. 1 f. with iv. 2), (2) it ignores the fourfold division of offerings corresponding to the rank of the offender, (3) it fails to observe the distinction between sin- and trespass-offering (in vv. 6, 7, “his guilt-offering” (tops) appears to have the sense of a ” penalty ” or ” forfeit,” unless with Baentsch we read u?”;i3 “his oblation” in each case; cf. v. II, iv. 23 ff. Verses 7-13, on the other hand, form a suitable continuation of iv., though probably they are secondary in character. Chap. v. 14 (Heb. v. 26)-vi. 7 contain regulations for the trespass-offering, in which the distinctive character of that offering is clearly brought out. The cases cited in vi. 1-7 (Heb. v. 20-26) are clearly analogous to those in v. 14-16, from which they are at present separated by vv. 17-19. These latter prescribe a trespass-offering for the same case for which in iv. 22 f. a sin-offering is required: it is noticeable also that no restitution, the characteristic feature of the asham, is prescribed. It is hardly doubtful that the verses are derived from a different source to that of their immediate context, possibly the same as v. 1-6.

The subscription (vii. 37, 38) is our chief guide to determining the original extent of the second group of laws (vi. 8 [Heb. vi. i]-vii. 36). From it we infer that originally the collection only dealt with the five chief sacrifices (vi. 8-13; 14-18; 24, 25, 27-30; vii. 1-6; 11-21) already discussed in i.v., since only these are referred to in the colophon where they are given in the same order (the consecration offering [v. 37] is probably due to the same redactor who introduced the gloss ” in the day when he is anointed ” in vi. 20). Of the remaining sections vi. 19-23 (Heb. 12-16), the daily meal-offering of the (high-) priest, betrays its secondary origin by its absence from the subscription, cf. also the different introduction. Chaps, vi. 26 (Heb. 19) and vii. 7 assign the offering to the officiating priest in contrast to vi. 18 (Heb. 11), 29 (Heb. 22), vii. 6 (” every male among the priests “), and possibly belong, together with vii. 8-10, to a separate collection which

dealt especially with priestly dues. Chap. vii. 22-27, which prohibit the eating of fat and blood, are addressed to the community at large, and were, doubtless, inserted here in connexion with the sacrificial meal which formed

the usual accompaniment of the peace-offering. Chap. vii. 28-34. are also addressed to the people, and cannot therefore have formed part of the original priestly manual; v. 33 betrays the same hand as vi. 26 (Heb. 19) and vii. 7, and with 350 may be assigned to the same collection as those verses; to the redactor must be assigned w. 32 (a doublet of v. 33), 34, 356 and 36.

Chaps, viii.-x. As stated, these chapters form the original sequel to Exod. xl. They describe (a) the consecration of Aaron and his sons, a ceremony which lasted seven days (viii.), and (6) the public worship on the eighth day, at which Aaron and his sons officiated for the first time as priests (ix.) ; then follow © an account of the death of Nadab and Abihu for offering strange fire (x. 1-5) ; (d) various regulations affecting the priests (yv. 12-15), an d (e) an explanation, in narrative form, of the departure in ix. 15 from the rules for the sin-offering given in vi. 30 (w. 16-20).

According to Exod. xl. 1-15 Moses was commanded to set up the Tabernacle and to consecrate the priests, and the succeeding verses (16-38) describe how the former command was carried out. The execution of the second command, however, is first described in Lev. viii., and since the intervening chapters exhibit obvious traces of belonging to another source, we may conclude with some certainty that Lev. viii. formed the immediate continuation of Exod. xl. in the original narrative of P. But it has already been pointed out (see Exodus) that Exod. xxxv.-xl. belong to a later stratum of P than Exod. xxv.-xxix , hence it is by no means improbable that Exod. xxxv -xl. have superseded an earlier and shorter account of the fulfilment of the commands in Exod. xxv.-xxix. If this be the case, we should naturally expect to find that Lev. viii., which bears the same relation to Exod. xxix. 1-35 as Exod. xxxv. ff. to Exod. xxv. ft. also belonged to a later stratum. But Lev. viii., unlike Exod xxxv. ff., only mentions one altar, and though in its present form the chapter exhibits marks of later authorship, these marks form no part of the original account, but are clearly the work of a later editor. These additions, the secondary character of which is obvious both from the way in which they

interrupt the context and also from their contents, are (1), v. 10, the anointing of the Tabernacle in accordance with Exod. xxx. 26 ff. : it is not enjoined in Exod. xxix.; (2) v. 11, the anointing of the altar and the laver (cf. Exod. xxx. 17 ff.) as in Exod. xxix. 366, xxx. 26 ff.) ; (3) v. 30, the sprinkling of blood and oil on Aaron and his sons. Apart from these secondary elements, which readily admit of excision, the chapter is in complete accord with P as regards point of view and language, and is therefore to be assigned to that source.

The consecration of Aaron and his sons was, according to P, a necessary preliminary to the offering of sacrifice, and chap. ix. accordingly describes the first solemn act of worship. The ceremony consists of (a) the offerings for Aaron, and (b) those for the congregation; then follows the priestly blessing (v. 22), after which Moses and Aaron enter the sanctuary, and on reappearing once more bless the people. The ceremony terminates with the appearance of the glory of Yahweh, accompanied by a fire which consumes the sacri- fices on the altar. Apart from a few redactional glosses the chapter as a whole belongs to P. The punishment of Nadab and Abihu by death for offering ” strange fire ” (x. 1-5) forms a natural sequel to chap. ix. To this incident a number of disconnected regulations affecting the priests have been attached, of which the first, viz. the prohibition of mourning to Aaron and his sons (w. 6, 7), alone has any connexion with the immediate context; as it stands, the passage is late in form (cf. xxi. 10 ff.). The second passage, w. 8, 9, which prohibits the use of wine and strong drink to the priest when on duty, is clearly a later addition. The connexion between these verses and the following is extremely harsh, and since w. 10, 11 relate to an entirely different subject (cf. xi. 47), the latter verses must be re- garded as a misplaced fragment. Verses 12-15 relate to the portions of the meal- and peace-offerings which fell to the lot of the priests, and connect, therefore, with chap. ix. ; possibly they have been wrongly transferred from that chapter. In the remaining para- graph, x. 16-20, we have an interesting example of the latest type of additions to the Hexateuch. According to ix. 15 (cf. v. 11) the priests had burnt the flesh of the sin-offering which had been offered on behalf of the congregation, although its blood had not been taken into the inner sanctuary (cf. iv. 1-2 1, vi. 26). Such treatment, though perfectly legitimate according to the older legislation (Exod. xxix. 14; cf. Lev. viii. 17), was in direct contradiction to the ritual of vi. 24 ff., which prescribed that the flesh of ordinary sin-offerings should be eaten by the priests. Such a breach of ritual on the part of Aaron and his sons seemed to a later redactor to demand an explanation, and this is furnished in the present, section.

II. The Laws of Purification. — Chaps, xi.-xv. This collection of laws comprises four main sections relating to (1) clean and unclean beasts (xi.), (2) childbirth (xii.), (3) leprosy (xiii. xiv.), and (4) certain natural secretions (xv.). These laws, or toroth, are so closely allied to each other by the nature of their contents and their literary form (cf. especially the recurring formula ” This is the law of . . . ” xi. 46, xii. 7, xiii. 59, xiv. 32, 54, 57, xv. 3 2) that they must originally have formed a single collection. The collection however, has clearly undergone more than one

redaction before reaching its final form. This is made evident not only by the present position of chap. xii. which in v. 2 pre- supposes chap. xv. (cf. xv. 19), and must originally have followed after that chapter, but also by the contents of the different sections, which exhibit clear traces of repeated revision. At the same time it seems, like chaps, i.—vii., xvii.xxvi., to have been formed independently of P and to have been added to that document by a later editor; for in its present position it in terrupts the main thread of P’s narrative, chap. xvi. forming the natural continuation of chap, x.; and, further, the inclusion of Aaron as well as Moses in the formula of address (xi. 1, xiii. 1, xiv. ss> xv. 1) is contrary to the usage of P.

1. Chap. xi. consists of two main sections, of which the first (w. 1-23, 41-47) contains directions as to the clean and unclean animals which may or may not be used for food, while the second (yv: 24-40) treats of the defilement caused by contact with the carcases of unclean animals (in. v. 39 f. contact with clean animals after death is also forbidden), and prescribes certain rites of purifi- cation. The main interest of the chapter, from the point of view of literary criticism, centres in the relation of the first section to the Law of Holiness (xvii.-xxvi.) and to the similar laws in Deut. xiv. 3-20. From xx. 25 it has been inferred with considerable probability that H, or the Law of Holiness, originally contained legislation of a similar character with reference to clean and unclean animals; and many scholars have held that the first section (vo. 1 [or 2]-23 and 41-47) really belongs to that code. But while w. 43-45 may unhesitatingly be assigned to H, the remaining verses fail to exhibit any of the characteristic features of that code. We must assign them, therefore, to another source, though, in view of xx. 25 and xi- .43-45. it is highly probable that they have superseded similar legislation belonging to H.

The relation of Lev. xi. 2-23 to Deut. xiv. 4-20 is less easy to determine, since the phenomena presented by the. two texts are somewhat inconsistent. The two passages are to a large extent verbally identical, but while Deut. xiv. 46, 5 both defines and exemplifies the

clean animals (as opposed to Lev. xi. 3 ; which only defines them), the rest of the Deuteronornic version is much shorter than that of Leviticus. Thus, except for w. 46, 5, the Deuteronornic version, which in its general style, and to a certain extent in its phrase- ology {d.ˆakind, w. 13, 15, 18, and Yl¥ swarm, v. 19), shows traces of a priestly origin, might be regarded as an abridgment of Lev. xi. But the Deuteronornic version uses ndb unclean, throughout (yv. 7, 10. 19), while Lev xi. from v. 1 1 onwards employs the technical term pgp detestable thing, and it is at least equally possible to treat the longer version of Leviticus as an expansion of Deut. xiv. 4-20. The fact that Deut. xiv: 21 permits the stranger (-ill) to eat the flesh of any animal that die3 a natural death, while Lev. xvii. 25 places him on an equal footing with the Israelite, cannot be cited in favour of the priority of Deuteronomy since v. 21 is clearly supplementary; cf. also Lev. xi. 39. On the whole it seems best to accept the view that both passages are derived separately from an earlier source.

2. Chap. xii. prescribes regulations for the purification of a woman after the birth of (a) a male and (b) a female child. It has been already pointed out that this chapter would follow more suitably after chap, xv., with which it is closely allied in regard to subject- matter. The closing formula (v. 7) shows clearly that; as in the case of v. 7-13 (cf. i. 14-17), the concessions in favour of the poorer worshipper are a later addition.

3. Chaps, xiii., xiv. The regulations concerning leprosy fall readily into four main divisions: (a) xiii. 1-460, an elaborate descrip- tion of the symptoms common to the earlier stages of leprosy and other skin diseases to guide the priest in deciding as to the cleanness or uncleanness of the patient; (b) xiii. 47-59, a further description of different kinds of mould or fungus growth affecting stuffs and leather; (c) xiv. 1-32, the rites of purification to be employed after the healing of leprosy; and (d) xiv. 33-53, regulations dealing with the appearance of patches of mould or mildew on the walls of a house. Like other collections the group of laws on leprosy easily betrays its composite character and exhibits unmistakable evidence of its gradual growth. There is, however, no reason to doubt that a large portion of the laws is genuinely old since the subject is one that would naturally call for early legislation; moreover, Deut. xxiv. 8 pre- supposes the existence of regulations concerning leprosy, presumably oral, which were in the possession of the priests. The earliest sections are admittedly xiii. 1-460 and xiv. 2-8a, the ritual of the latter being obviously of a very archaic type. The secondary character of xiii. 47-59 “'s evident: it interrupts the close connexion between xiii. 1 -460 and xiv. _2-8a, and further it is provided with its own colophon in v. 59. A similar

character must be assigned to the remaining verses of chap, xiv., with the exception of the colophon in v. 576; the latter has been successively expanded in vo. 54-570 so as to include the later additions. Thus xiv. 9-20 prescribes a second and more elaborate ritual of purification after the healing of leprosy, though the leper, according to v. 8a, is already clean; its secondary character is further shown by the heightening of the ceremonial which seems to be modelled on that of the consecration of the priest

(viii. 23 ff.), the multiplication of sacrifices and the minute regulations with regard to the blood and oil. The succeeding section (vv. 21-32) enjoins special modifications for those who cannot afford the more costly offerings of vv. 9-20, and like v. 7-13, xii. 8 is clearly a later addition; cf. the separate colophon, v. 32. The closing section xiv. 33-53 is closely allied to xiii. 47-59, though probably later in date : probably the concluding verses (48-53), in which the same rites are prescribed for the purification of a house as are ordained for a person in vv. 3-80, were added at a still later period.

4. Chap. xv. deals with the rites of purification rendered necessary by various natural secretions, and is therefore closely related to chap. xii. On the analogy of the other laws it is probable that the old loruk, which forms the basis of the chapter, has been subsequently expanded, but except in the colophon (vv. 32-34), which displays marks of later redaction, there is nothing to guide us in separating the additional matter.

Chap. xvi. It may be regarded as certain that this chapter consists of three main elements, only one of which was originally connected with the ceremonial of the Day of Atonement, and that it has passed through more than one stage of revision. Since the appearance of Benzinger's analysis ZA TV/ (1889), critics in the main have accepted the division of the chapter into three independent sections: (1) vv. 1-4, 6, 12, 13, 34J (probably vv. 23, 24 also form part of this section), regulations to be observed by Aaron whenever he might enter " the holy place within the veil." These regulations are the natural outcome of the death of Nadab and Abihu (x. 1-5), and their object is to guard Aaron from a similar fate; the section thus forms the direct continuation of chap. x. ; (2) vv. 29-340, rules for the observance of a yearly fast day, having for their object the purification of the sanctuary and of the people; {3) w. 5, 7-10, 14-22, 26-28, a later

expansion of the blood-ritual to be performed by the high-priest when he enters the Holy of Holies, with which is combined the strange ceremony of the goat which is sent away into the wilderness to Azazel. The matter common to the first two sections, viz. the entrance of the high priest into the Holy of Holies, was doubtless the cause of their subsequent fusion; beyond this, however, the sections have no connexion with one another, and must originally have been quite independent. Doubtless, as Benzinger suggests, the rites to be performed by the officiating high priest on the annual Day of Atonement, which are not prescribed in vv. 29-340, were identical with those laid down in chap. ix. That the third section belongs to a later stage of development and was added at a later date is shown by (a) the incongruity of vv. 14 ff. with v. 6— ac- cording to the latter the purification of Aaron is a preliminary condi- tion of his entrance within the veil — and (b) the elaborate ceremonial in connexion with the sprinkling of the blood. The first section, doubtless, belongs to the main narrative of P; it connects directly with chap. x. and presupposes only one altar (cf. ». 12, Exod. xxviii. 35)- The second and third sections, however, must be assigned to a later stratum of P, if only because they appear to have been unknown to Ezra (Neh. ix. 1) ; the fact that Ezra's fast day took place on the twenty-fourth day of the seventh month (as opposed to Lev. xvi. 29, xxiii. 26 f.) acquires an additional importance in view of the agreement between Neh. viii. 23 f . and Lev. xxiii. 33 f. as to the date of the Feast of Tabernacles. No mention is made of the Day of Atone- ment in the pre-exilic period, and it is a plausible conjecture that the present law arose from the desire to turn the spontaneous fasting of Neh. ix. 1 into an annual ceremony; in any case directions as to the annual performance of the rite must originally have preceded vv. 29 ff. Possibly the omission of this introduction is due to the re- dactor who combined (1) and (2) by transferring the regulations of (1) to the ritual of the annual Day of Atonement. At a later period the ritual was further developed by the inclusion of the additional ceremonial contained in (3).

III. The Law of Holiness.— Chaps, xvii.xxvi. The group of laws' contained in these chapters has long been recognized as standing apart from the rest of the legislation set forth in Leviticus. For, though they display undeniable affinity with P, they also exhibit certain features which closely distinguish them from that document. The most noticeable of these is the promin ence assigned to certain leading ideas and motives, especially to that of holiness. The idea of holiness, indeed, is so characteristic of the entire group that the title " Law of Holiness," first given to it by Klestermann (1877), has been generally adopted. The term "holiness" in this connexion consists positively in

the fulfilment of ceremonial obligations and negatively in abstaining from the defilement caused by heathen customs and superstitions, but it also includes obedience to the moral requirements of the religion of Yahweh.

On the literary side also the chapters are distinguished by the paraenetic setting in which the laws are embedded and by the use of a special terminology, many of the words and phrases occurring rarely, if ever, in P (for a list of characteristic phrases cf. Driver, L.O. T. e , p. 40). Further, the structure of these chapters, which closely resembles that of the other two Hexateuchal codes (Exod. xx. 22- xxiii. and Deut. xii.-xxviii.), may reasonably be adduced in support of

their independent origin. All three codes contain a somewhat miscellaneous collection of laws; all alike commence with regulations as to the place of sacrifice and close with an exhortation. Lastly, some of the laws treat of subjects which have been already dealt with in P (cf. xvii. 10-14 ar) d vii. 26 f., xix. 6-8 and vii. 15-18). It is hardly doubtful also that the group of laws, which form the basis of chaps, xvii.xxvi., besides being independent of P, represent an older stage of legislation than that code. For the sacrificial system of H (= Law of Holiness) is less developed than that of P, and in particular shows no knowledge of the sin and trespass-offerings; the high priest is only primus inter pares among his brethren, xxi. 10 (cf. Lev. x. 6, 7, where the same prohibition is extended to all the priests); the distinction between ” holy ” and ” most holy ” things (Num. xviii. 8) is unknown to Lev. xxii. (Lev. xxi. 22 is a later addition). It cannot be denied, however, that chaps, xvii.-xxvi. present many points of resemblance with P, both in language and subject-matter, but on closer examination these points of contact are seen to be easily separable from the main body of the legislation. It is highly probable, therefore, that these marks of P are to be assigned to the compiler who combined H with P. But though it may be regarded as certain that H existed as an independent code, it cannot be maintained that the laws which it contains are all of the same origin or belong to the same age. The evidence rather shows that they were first collected by an editor before they were incorporated in P. Thus there is a marked difference in style between the laws themselves and the paraenetic setting in which they are embedded; and it is not unnatural to conjecture that this setting is the work of the first editor.

Two other points in connexion with H are of considerable importance : (a) the possibility of other remains of H, and (b) its relation to Deuteronomy and Ezekiel.

(a) It is generally recognized that H, in its present form, is in- complete. The original code must, it is felt, have included many other subjects now passed over in silence. These, possibly, were omitted by the compiler of P, because they had already been dealt with elsewhere, or they may have been transferred to other con- nexions. This latter possibility is one that has appealed to many scholars, who have accordingly claimed many other passages of P as parts of H. We have already accepted xi. 43 ff. as an undoubted excerpt from H, but, with the exception of Num. xv. 37-41 (on fringes), the other passages of the Hexateuch which have been attri- buted to H do not furnish sufficient evidence to justify us in assigning them to that collection. Moore (Ency. Bibl. col. 2787) rightly points out that " resemblance in the subject or formulation of laws to toroih incorporated in H may point to a relation to the sources of H, but is not evidence that these laws were ever included in that collection."

(b) The exact relation of H to Deuteronomy and Ezekiel is hard to determine. That chaps, xvii.-xxvi. display a marked affinity to Deuteronomy cannot be denied. Like D, they lay great stress on the duties of humanity and charity both to the Israelite and to the stranger (Deut. xxiv. ; Lev. xix.; compare also laws affecting the poor in Deut. xv. ; Lev. xxv.), but in some respects the legislation of H appears to reflect a more advanced stage than that of D, e.g. the rules for the priesthood (chap, xxi.), the feasts (xxiii. 9-20, 39-43), the Sabbatical year (xxv. 1-7, 18-22), weights and measures (xix. 35 f.). It must be remembered, however, that these laws have passed through more than one stage of revision and that the original regulations have been much obscured by later glosses and additions; it is therefore somewhat hazardous to base any argument on their present form. " The mutual independence of the two (codes) is rather to be argued from the absence of laws identically formulated, the lack of agreement in order either in the whole or in smaller portions, and the fact that of the peculiar motives and phrases of Rd there is no trace in H (Lev. xxiii. 40 is almost solitary). It is an unwarranted assumption that all the fragments of Israelite legis- lation which have been preserved lie in one serial development " (Moore, Ency. Bibl. col. 2790).

The relation of H to Ezekiel is remarkably close, the resemblances between the two being so striking that many writers have regarded Ezekiel as the author of H. Such a theory, however, is excluded by the existence of even greater differences of style and matter, so that the main problem to be decided is whether Ezekiel is prior to H or vice versa. The main arguments brought forward by those who maintain the priority of Ezekiel are (1) the fact that H makes mention of a high priest, whereas Ezekiel betrays no knowledge of such an official, and

(2) that the author of Lev. xxvi. presupposes a condition of exile and looks forward to a restoration from it. Too much weight, however, must not be attached to these points; for (1) the phrase used in Lev. xxi. 10 (literally, ” he who is greater than his brethren “) cannot be regarded as the equivalent of the definitive ” chief priest ” of P, and is rather comparable with the usage of 2 Kings xxii. 4 ff., xxv. 18 (” the chief priest “), cf. ” the priest ” in xi. 9 ff., xvi. 10 ff. ; and (2) the passages in Lev. xxvi. (vv. 34 f., 39-45), which are especially cited in support of the exilic standpoint of the writer, are just those which, on other grounds, show signs of later interpolation. The following considerations un- doubtedly suggest the priority of H : (1) there is no trace in H of the distinction between priests and Levites first introduced by Ezekiel; (2) Ezekiel xviii., xx., xxii., xxiii. appear to presuppose the laws of

Lev. xviu.xx. ; (3) the calendar of Lev. xxiii. represents an earlier stage of development than the fixed days and months of Ezek. xlv. ; (4) the sin and trespass-offerings are not mentioned in H (cf. Ezek. xl. 39, xlii. 13, xliv. 29, xlvi. 20) ; (5) the parallels to H, which are found especially in Ezek. xviii., xx., xxii. f., include both the parae- netic setting and the laws; and lastly, (6) a comparison of Lev. xxvi. with Ezekiel points to the greater originality of the former. Baentsch, however, who is followed by Bertholet, adopts the view that Lev. xxvi. is rather an independent hortatory discourse modelled on Ezekiel. The same writer further maintains that H consists of three separate elements, viz. chaps, xvii. ; xviii.-xx. , with various ordinances in chaps, xxiii.-xxv. ; and xxii., xxiii., of which the last is certainly later than Ezekiel, while the second is in the main prior to that author. But the arguments which he adduces in favour of the threefold origin of H are not sufficient to outweigh the general impression of unity which the code presents.

Chap. xvii. comprises four main sections which are clearly marked off by similar introductory and closing formulae: (1) pp. 3-7, prohibition of the slaughter of domestic animals, unless they are presented to Yahweh ; (2) pp. 8, 9, sacrifices to be offered to Yahweh alone; (3) pp. 10-12, prohibition of the eating of blood; (4) op. 13, 14, the blood of animals not used in sacrifice to be poured on the ground. The chapter as a whole is to be assigned to H. At the same time it exhibits many marks of affinity with P, a phenomenon most easily explained by the supposition that older laws of H have been expanded and modified by

later hands in the spirit of P, Clear instances of such revision may be seen in the references to ” the door of the tent of meeting ” (w. 4, 5, 6, 9) and ” the camp ” (0. 3), as well as in to. 6, 11, 12-14; vv. 15, 16 (prohibiting the eating of animals that die a natural death or are torn by beasts) differ formally from the preceding paragraphs, and are to be assigned to P. What remains after the excision of later additions, however, is not entirely uniform, and points to earlier editorial work on the part of the compiler of H. Thus vv. 3-7 reflect two points of view, vv. 3, 4 drawing a contrast between profane slaughter and sacrifice, while vv. 5-7 distinguish between sacrifices offered to Yahweh and those offered to demons.

Chap, xviii. contains laws on prohibited marriages (pp. 6-18) and various acts of unchastity (op. 19-23) embedded in a paraenetic setting (to. 1-5 and 24-30), the laws being given in the 2nd pers. sing., while the framework employs the 2nd pers. plural. With the exception of p. 21 (on Molech worship), which is here out of place, and has possibly been introduced from xx. 2-5, the chapter displays all the characteristics of H.

Chap. xix. is a collection of miscellaneous laws, partly moral, partly religious, of which the fundamental principle is stated in v. 2 (” Ye shall be holy “). The various laws are clearly defined by the formula ” I am Yahweh,” or ” I am Yahweh your God,” phrases which are especially characteristic of chaps, xviii.-xx. The first group of laws {vv. 3 f .) corresponds to the first table of the decalogue, while pp. 11-18 are analogous to the second table; pp. 5-8 (on peace-offerings) are obviously out of place here, and are possibly to be restored to the cognate passage xxii. 29 f., while the humani- tarian provisions of pp. 9 and 10 (cf. xxiii. 22) have no connexion with the immediate context; similarly p. 20 (to which a later redactor has added pp. 21, 22, in accordance with vi. 6 f.) appears to be a fragment from a penal code; the passage resembles Exod. xxi. 7 ff . , and the offence is clearly one against property, the omission of the punishment being possibly due to the redactor who added pp. 21, 22.

Chap. xx. Prohibitions against Molech worship, pp. 2-5, witch- craft, pp. 6 and 27, unlawful marriages and acts of unchastity, pp. 10-21. Like chap, xviii., the main body of laws is provided with a paraenetic setting, pp. 7, 8 and 22-24; it differs from that chapter, however, in prescribing the death penalty in each case for disobedi- ence. Owing to the close resemblance between the two chapters, many critics have assumed that they are derived from the same source and that the latter chapter was added for the purpose of supplying the penalties. This view, however, is not borne out by a comparison of the two

chapters, for four of the cases mentioned in chap, xviii. (pp. 7, 10, 176, 18) are ignored in chap, xx., while the order and in part the terminology are also different ; further, it is difficult on this view to explain why the two chapters are separated by chap. xix. A more probable explanation is that the compiler of H has drawn from two parallel, but independent, sources. Signs of revision are not lacking, especially in pp. 2-5, where pp. 4 f. are a later addition intended to reconcile the inconsistency of p. 2 with v- 3 (Rh); p. 6, which is closely connected with xix. 31, appears to be less original than p. 27, and may be ascribed to the same hand as p. 3 ; p. 9 can hardly be in its original context — it would be more suitable after xxiv. 15. The paraenetic setting (pp. 7, 8 and 22-24) is to be assigned to the compiler of H, who doubtless prefaced the parallel version with the additional laws of pp. 2-6. Verses 25, 26 apparently formed the conclusion of a law on clean and unclean animals similar to that of chap, xi., and very probably mark the place where H's regulations on that subject originally stood.

Chaps, xxi., xxii. A series of laws affecting the priests and offer- ings, viz. (1) regulations ensuring the holiness of (a) ordinary priests, xxi. 1-9, and (6) the chief priest, pp. 10-15; (2) a list of physical defects which exclude a priest from exercising his office,

pp. 16-24; (3) the enjoyment of sacred offerings limited to (a) priests, if they are ceremonially clean, xxi. 1-9, and {b) members of a priestly family, pp. 10-16; (4) animals offered in sacrifice must be without blemish, pp. 17-25; (5) further regulations with regard to sacrifices, pp. 26-30, with a paraenetic conclusion, pp. 31-33.

These chapters present considerable difficulty to the literary critic; for while they clearly illustrate the application of the principle of " holiness," and in the main exhibit the characteristic phraseology of 1 1, they also display many striking points of contact with P and the later strata of P, which have been closely interwoven into the original laws. These phenomena can be best explained by the supposition that we have here a body of old laws which have been subjected to more than one revision. The nature of the subjects with which they deal is one that naturally appealed to the priestly schools, and owing to this fact the laws were especially liable to modification and expansion at the hands of later legislators who wished to bring them into conformity with later usage. Signs of such revision may be traced back to the compiler of H, but the evidence shows that the process must have been continued down to the latest period of editorial activity i n connexion with P . To redactors of the school of P belong such phrases as " the sons of Aaron " (xxi. I, 24, xxii. 2, 18), " the seed of Aaron "

(xxi. 21, xxii. 4 and ” thy seed,” p. 17; cf. xxii. 3), ” the offerings of the Lord made by fire ” (xxi. (6, 21, xxii. 22, 27), ” the most holy things ” (xxi. 22; cf. xxii. 3ff._” holy things ” only), ” throughout their (or your) generations ” (xxi. 7, xxii. 3), the references to the anointing of Aaron (xxi. 10, 12) and the Veil (xxi. 23), the introductory formulae (xxi. 1, 16 f., xxii. 1 f., 17 f., 26) and the subscription (xxi. 24). Apart from these redactional additions, chap. xxi. is to be ascribed to H, pp. 6 and 8 being possibly the work of R H . Most critics detect a stronger influence of P in chap, xxii., more especially in pp. 3-7 and 17-25,’ 29, 30; most probably these verses have been largely recast and expanded by later editors, but it is noticeable that they contain no mention of either sin- or trespass-offerings.

Chap, xxiii. A calendar of sacred seasons. The chapter consists of two main elements which can easily be distinguished from one another, the one being derived from P and the other from H. To the former belongs the fuller and more elaborate description of pp. 4-8, 21, 23-38; to the latter, pp. 9-20, 22, 39-44. Characteristic of the priestly calendar are (1) the enumeration of ” holy convocations,” (2) the prohibition of all work, (3) the careful determination of the date by the day and month, (4) the mention of ” the offerings made by fire to Yahweh,” and (5) the stereotyped form of the regulations. The older calendar, on the other hand, knows nothing of ” holy convocations,” nor of abstinence from work; the time of the feasts, which are clearly connected with agriculture, is only roughly defined with reference to the harvest (cf, Exod. xxiii, 14 ff., xxxiv. 22 ; Deut. xvi. 9 ff.).

The calendar of P comprises (a) the Feast of Passover and the Unleavened Cakes, op. 4-8; (6) a fragment of Pentecost, p. 21; (c) the Feast of Trumpets, vv. 23-25; (d) the Day of Atonement, op. 26-32; and (e) the Feast of Tabernacles, pp. 33-36, with a sub- scription in pp. 37, 38. With these have been incorporated the older regulations of H on the Feast of Weeks, or Pentecost, pp. 9-20, which have been retained in place of P’s account (cf. p. 21), and on the Feast of Tabernacles, pp. 39-44, the latter being clearly intended to supplement 00. 33-36. The hand of the redactor who combined the two elements may be seen partly in additions designed to accom- modate the regulations of H to P (e.g. p. 39a, ” on the fifteenth day of the seventh month,” and 396, ” and on the eighth day shall be a solemn rest “), partly in the later expansions corresponding to later usage, pp. 12 f., 18, 190, 216, 41. Further, pp. 26-32 (on the Day of Atonement, cf . xvi.) are a later addition to the P sections.

Chap. xxiv. affords an interesting illustration of the manner in which the redactor of P has added later elements to the original code of H.

For the first part of the chapter, with its regulations as to (a) the lamps in the Tabernacle, pp. 1-4, and {b) the Shewbread, pp. 5-9, is admittedly derived from P, 00. 1-4, forming a supplement to Exod. xxv. 31-40 (cf. xxvii. 20 f.) and Num. viii. 1-4, and pp. 5-9 to Exod. xxv. 30. The rest of the chapter contains old laws (pp. 156-22) derived from H on blasphemy, manslaughter and injuries to the person, to which the redactor has added an historical setting (pp. 10-14, 23) as well as a few glosses.

Chap. xxv. lays down regulations for the observance of (a) the Sabbatical year, pp. 1-7, 19-22, and (b) the year of Jubilees, pp. 8-18, 23, and then applies the principle of redemption to (1) land and house property, pp. 24-34, and (2) persons, op. 35-55. The rules for the Sabbatical year (pp. 1-7) are admittedly derived from H, and pp. 19-22 are also from the same source. Their present position after pp. 8-18 is due to the redactor who wished to apply the same rules to the year of Jubilee. But though the former of the two sections on the year of Jubilee (pp. 8-18, 23) exhibits undoubted signs of P, the traces of H are also sufficiently marked to warrant the conclusion that the latter code included laws relating to the year of Jubilee, and that these have been modified by R P and then connected with the regulations for the Sabbatical year. Signs of the redactor's handiwork may be seen in vv. 9, 11-13 (the year of Jubilee treated as a fallow year) and 15, 16 (cf. the repetition of " ye shall not wrong one another," pp. 14 and 17). Both on historical and on critical grounds, however, it is improbable that the principle of restitution

underlying the regulations for the year of Jubilee was originally extended to persons in the earlier code. For it is difficult to harmonize the laws as to the release of Hebrew slaves with the other legislation on the same subject (Exod. xxi. 2-6; Deut. xv.), while both the secondary position which they occupy in this chapter and their more elaborate and formal character point to a later origin for vv. 35-55. Hence these verses in the main must be assigned to R P . In this connexion it is noticeable that vv. 35-38, 39-400, 43, 47, 53, 55, which show the characteristic marks of H, bear no special relation to the year of Jubilee, but merely inculcate a more humane treat- ment of those Israelites who are compelled by circumstances to sell themselves either to their brethren or to strangers. It is probable, therefore, that they form no part of the original legislation of the year of Jubilee, but were incorporated at a later period. The present form

of vv. 24-34 is largely due to R P , who has certainly added vv. 32-34 (cities of the Levites) and probably vv. 29-31.

Chap. xxvi. The concluding exhortation. After reiterating commands to abstain from idolatry and to observe the Sabbath, vv. 1, 2, the chapter sets forth (a) the rewards of obedience, vv. 3-13, and (6) the penalties incurred by disobedience to the preceding laws, vv. 14-46. The discourse, which is spoken throughout in the name of Yahweh, is similar in character to Exod. xxiii. 20-33 and Deut. xxviii., more especially to the latter. That it forms an integral part of H is shown both by the recurrence of the same distinctive phraseology and by the emphasis laid on the same motives. At the same time it is hardly doubtful that the original discourse has been modified and expanded by later hands, especially in the con- cluding paragraphs. Thus vv. 34, 35, which refer back to xxv. 2 ff., interrupt the connexion and must be assigned to the priestly redactor, while vv. 40-45 display obvious signs of interpolation. With regard to the literary relation of this chapter with Ezekiel, it must be admitted that Ezekiel presents many striking parallels, and in par- ticular makes use, in common with chap, xxvi., of several expressions which do not occur elsewhere in the Old Testament. But there are also points of difference both as regards phraseology and subject- matter, and in view of these latter it is impossible to hold that Ezekiel was either the author or compiler of this chapter.

Chap, xxvii; On the commutation of vows and tithes. The chapter as a whole must be assigned to a later stratum of P, for while vv. 2-25 (on vows) presuppose the year of Jubilee, the section on tithes, vv. 30-33, marks a later stage of development than Num. xviii. 21 ff. (P) ; vv. 26-29 (on firstlings and devoted things) are supplementary restrictions to vv. 2-25.

Literature. — Commentaries: Dillmann-Ryssel, Die Biicher Exodus und Leviticus (1897); Driver and White, SBOT. Leviticus (English, 1898); B. Baentsch, Exod. Zct. u. Num. (HK, 1900); Bertholet, Leviticus (KHC, 1901). Criticism: The Introductions to the Old Testament by Kuenen, Holzinger, Driver, Cornill, Konig and the archaeological works of Benzinger and Nowack. Well- hausen, Die Composition des Hexateuchs, &c. (1899); Kayser, Das vorexilische Buck der Urgeschichte Isr. (1874); Klostermann, Zeitschrift fur Luth. Theologie (1877); Horst, Lev. xvii.xxvi. und Hezekiel (1881); Wurster, ZATW (1884); Baentsch, Das Heilig keitsgesetz (1893); L. P. Paton, ” The Relation of Lev. 20 to Lev. 17-19,” Hebraica (1894); “The Original Form of Leviticus,” JBL (1897, 1898); “The Holiness Code and Ezekiel,” Pres. and Ref. Review (1896); Carpenter, Composition of the

Hexateuch (1902). Articles on Leviticus by G. F. Moore, Hastings's Diet. Bib., and G. Harford Battersby, Ency. Bib. (J. F. St.)

LEVY, AMY (1861-1889), English poetess and novelist, second daughter of Lewis Levy, was born at Clapham on the 10th of November 1861, and was educated at Newnham College, Cambridge. She showed a precocious aptitude for writing verse of exceptional merit, and in 1884 she published a volume of poems, A Minor Poet and Other Verse, some of the pieces in which had already been printed at Cambridge with the title Xantippe and Other Poems. The high level of this first publication was main- tained in A London Plane Tree and Other Poems, a collection of lyrics published in 1889, in which the prevailing pessimism of the writer's temperament was conspicuous. She had already in 1888 tried her hand at prose fiction in The Romance of a Shop, which was followed by Reuben Sachs, a powerful novel. She committed suicide on the 10th of September 1889.

LEVY, AUGUSTE MICHEL (1844-), French geologist, was born in Paris on the 7th of August 1844. He became inspector-general of mines, and director of the Geological Survey of France. He was distinguished for his researches on eruptive rocks, their microscopic structure and origin; and he early employed the polarizing microscope for the determination of minerals. In his many contributions to scientific journals he described the granulite group, and dealt with pegmatites, vario- lites, eurites, the ophites of the Pyrenees, the extinct volcanoes of Central France, gneisses, and the origin of crystalline schists.

He wrote Structures et classification des roches cruptives (1889). but his more elaborate studies were carried on with F. Fouque. Together they wrote on the artificial production of felspar, nepheline and other minerals, and also of meteorites, and pro- duced MiMralogie micro graphique. (1879) and Synthese des mineraux et des roches (1882). Levy also collaborated with A. Lacroix in Les Mineraux des roches (1888) and Tableau des minlraux des roches (1889).

LEVY (Fr. lev&e, from lever, Lat. levare, to lift, raise), the raising of money by the collection of an assessment, &c, a tax or compulsory contribution; also the collection of a body of men for military or other purposes. When all the able-bodied men of a nation are enrolled for service, the French term levee en masse, levy in mass, is frequently used.

LEWALD, FANNY (1811-1889), German author, was born at

Konigsberg in East Prussia on the 24th of March 181 1, of Jewish parentage. When seventeen years of age she embraced Chris- tianity, and after travelling in Germany, France and Italy, settled in 1845 at Berlin. Here, in 1854, she married the author, Adolf Wilhelm Theodor Stahr (1805-1876), and removed after his death in 1876 to Dresden, where she resided, engaged in literary work, until her death on the 5th of August 1889. Fanny Lewald is less remarkable for her writings, which are mostly sober, matter-of-fact works, though displaying considerable talent and culture, than for her championship of " women's rights," a question which she was practically the first German woman to take up, and for her scathing satire on the sentimentalism of the Grafin Hahn Hahn. This authoress she ruthlessly attacked in the exquisite parody {Diogena, Roman von Iduna Grafin H . . . . H. . . . (2nd ed., 1847). Among the best known of her novels are Klementine (1842) ; Prinz Louis Ferdinand (1849; 2nd ed., 1859); Das Mddchen von Hela (i860); Von Geschlecht zu Geschlecht (8 vols., 1863-1865); Benvenuto (1875), and Stella (1883; English by B. Marshall, 1884). Of her writings in defence of the emancipation of women Osterbriefe fur die Frauen (1863) and Fur und wider die Frauen (1870) are con- spicuous. Her autobiography, Meine Lebensgeschichte (6 vols., 1 861-1862), is brightly written and affords interesting glimpses of the literary life of her time.

A selection of her works was published under the title Gesammelte Schriften in 12 vols. (1870-1874). Cf. K. Frenzel, Erinnerungen und Stromungen (1890).

LEWANIKA (c. i860-), paramount chief of the Barotse and subject tribes occupying the greater part of the upper Zambezi basin, was the twenty-second of a long line of rulers, whose founder invaded the Barotse valley about the beginning of the 17th century, and according to tradition was the son of a woman named Buya Mamboa by a god. The graves of successive ruling chiefs are to this day respected and objects of pilgrimage for purposes of ancestor worship. Lewanika was born on the upper Kabompo in troublous times, where his father — Letia, a son of a former ruler — lived in exile during the interregnum of a foreign dynasty (Makololo), which remained in possession from about 1830 to 1865, when the Makololo were practically exterminated in a night by a well-organized revolt. Once more masters of their own country, the Barotse invited Sepopa, an uncle of Lewanika, to rule over them. Eleven years of brutality and licence resulted in the tyrant's expulsion and subsequent assassination, his place being taken by Ngwana-Wina, a nephew. Within a year abuse of power brought about this chief's downfall (1877), and he was succeeded by Lobosi, who assumed the name of Lewanika in 1885. The early years of his

reign were also stained by many acts of blood, unˆil in 1884 the torture and murder of his own brother led to open rebellion, and it was only through extreme presence of mind that the chief escaped with his life into exile. His cousin, Akufuna or Tatela, was then proclaimed chief. It was during his brief reign that Francois Coillard, the eminent missionary, arrived at Lialui, the capital. The following year Lewanika, having collected his partisans, deposed the usurper and re-established his power. Ruthless revenge not unmixed with treachery characterized his return to power, but gradually the strong

personality of the high-minded Francois Coillard so far influenced him for good that from about 1887 onward he ruled tolerantly and showed a consistent desire to better the condition of his people. In 1890 Lewanika, who two years previously had proposed to place himself under the protection of Great Britain, concluded a treaty with the British South Africa Company, acknowledging its supremacy and conceding to it certain mineral rights. In 1897 Mr R. T. Coryndon took up his position at Lialui as British agent, and the country to the east of 25 E. was thrown open to settlers, that to the west being reserved to the Barotse chief. In 1905 the king of Italy's award in the Barotse boundary dispute with Portugal deprived Lewanika of half of his dominions, much of which had been ruled by his ancestors for many generations. In 1902 Lewanika attended the coronation of Edward VII. as a guest of the nation. His recognized heir was his eldest son Letia.

See Barotse, and the works there cited, especially On the Threshold of Central Africa (London, 1897), by Francois Coillard.

(A. St. H. G.)

LEWES, CHARLES LEE (1740-1803), English actor, was the son of a hosier in London. After attending a school at Ambleside he returned to London, where he found employment as a postman; but about 1760 he went on the stage in the provinces, and some three years later began to appear in minor parts at Covent Garden Theatre. His first role of importance was that of " Young Marlow " in She Stoops to Conquer, at its production of that comedy in 1773, when he delivered an epilogue specially written for him by Goldsmith. He remained a member of the Covent Garden company till 1783, appearing in many parts, among which were " Fag " in The Rivals, which he " created," and " Sir Anthony Absolute " in the same comedy. In 1783 he

removed to Drury Lane, where he assumed the Shakespearian roles of "Touchstone," " Lucio " and " Falstaff." In 1787 he left London for Edinburgh, where he gave recitations, includ- ing Cowper's " John Gilpin." For a short time in 1792 Lewes assisted Stephen Kemble in the management of the Dundee Theatre; in the following year he went to Dublin, but he was financially unsuccessful and suffered imprisonment for debt. He employed his time in compiling his Memoirs, a worthless production published after his death by his son. He was also the author of some poor dramatic sketches. Lewes died on the 23rd of July 1803. He was three times married; the philosopher, George Henry Lewes, was his grandson.

See John Genest, Some Account of the English Stage (Bath, 1832).

LEWES, GEORGE HENRY (181 7-1878), British philosopher and literary critic, was born in London in 1817. He was a grandson of Charles Lee Lewes, the actor. He was educated in London. Jersey, Brittany, and finally at Dr Burney's school in Greenwich. Having abandoned successively a commercial and a medical career, he seriously thought of becoming an actor, and between 1841 and 1850 appeared several times on the stage. Finally he devoted himself to literature, science and philosophy. As early as 1836 he belonged to a club formed for the study of philosophy, and had sketched out a physiological treatment of the philosophy of the Scottish school. Two years later he went to Germany, probably with the intention of studying philosophy. In 184.0 he married a daughter of Swynfen Stevens Jervis (1798-1867), and during the next ten years supported himself by contributing to the quarterly and other reviews. These articles discuss a wide variety of subject, and, though often characterized by hasty impulse and imperfect study, betray

a singularly acute critical judgment, enlightened by philosophic study. The most valuable are those on the drama, afterwards republished under the title Actors and Acting (1875). With this may be taken the volume on The Spanish Drama (1846). The combination of wide scholarship, philosophic culture and practical acquaintance with the theatre gives these essays a high place among the best efforts in English dramatic criticism. In 184 5-1846 he published The Biographical History of Philosophy , an attempt to depict the life of philosophers as an ever-renewed fruitless labour to attain the unattainable. In 1847-1848 he made two attempts in the field of fiction — Ranthrope, and Rose, Blanche and Violet — which, though displaying considerable skill both in plot, construction and in characterization, have taken no permanent place in literature. The same is to be said of an ingenious attempt to rehabilitate Robespierre (1849). In 1850 he collaborated with Thornton Leigh Hunt in the foundation of the Leader, of which he was the literary editor. In 1853 he republished under the title of Comte's Philosophy of the Sciences a series of papers which had appeared in that journal. In 1851 he became acquainted with Miss Evans (George Eliot) and in 1854 left his wife. Subsequently he lived with Miss Evans as her husband (see Eliot, George).

The culmination of Lewes's work in prose literature is the Life of Goethe (1855), probably the best known of his writings. Lewes's many-sidedness of mind, and his combination of scientific with literary tastes, eminently fitted him to appreciate the large nature and the wide-ranging activity of the German poet. The high position this work has taken in Germany itself, notwithstanding the boldness of its criticism and the unpopu- larity of some of its views (e.g. on the relation of the second to the first part of Faust), is a sufficient testimony to its general excellence. From about 1853 Lewes's writings show that he was occupying himself with scientific and more particularly biological work. He may be said to have always manifested a distinctly scientific bent in his writings, and his closer devotion to science was but the following out of early impulses.

Considering that he had not had the usual course of technical training, these studies are a remarkable testimony to the penetration of his intellect. The most important of these essays are collected in the volumes Seaside Studies (1858), Physiology of Common Life (1859), Studies in Animal Life (1862), and Aristotle, a Chapter from the History of Science (1864). They are much more than popular expositions of accepted scientific truths. They contain able criticisms of authorized ideas, and embody the results of in- dividual research and individual reflection. He made a number of impressive suggestions, some of which have since been accepted by physiologists. Of these the most valuable is that now known as the doctrine of the functional indifference of the nerves — that what are known as the specific energies of the optic, auditory and other nerves are simply differences in their mode of action due to the differences of the peripheral structures or sense-organs with which they are connected. This idea was subsequently arrived at independently by Wundt (Physiologische Psychologie, 2nd ed., p. 321). In 1865, on the starting of the Fortnightly Review, Lewes became its editor, but he retained the post for less than two years, when he was succeeded by John Morley. This date marks the transition from more strictly scientific to philosophic work. He had from early youth cherished a strong liking for philosophic studies; one of his earliest essays was an appreciative account of Hegel's Aesthetics. Coming under the influence of positivism as unfolded both in Comte's own works and in J. S. Mill's System of Logic, he abandoned all faith in the possibility of metaphysic, and recorded this abandonment in the above-mentioned History of Philosophy. Yet he did not at any time give an unqualified adhesion to Comte's teachings, and with wider reading and reflection his mind moved away further from the positivist standpoint. In the preface to the third edition of his History of Philosophy he avowed a change in this direction, and this movement is still more plainly dis- cernible in subsequent editions of the work. The final outcome of this intellectual progress is given to us in The Problems of Life and Mind, which may be regarded as the crowning work of his life. His sudden death on the 28th of November 1878 cut short the work, yet it is complete enough to, allow us to judge of the author's matured conceptions on biological, psychological and metaphysical problems. Of his three sons only one, Charles (1843-1891), survived him; in the first London County Council Election (1888) he was elected for St Pancras; he was also much interested in the Hampstead Heath extension.

Philosophy. — The first two volumes on The Foundations of a Creed lay down what Lewes regarded as the true principles of

philosophizing. He here seeks to effect a rapprochement between metaphysic and science. He is still so far a positivist as to pronounce all inquiry into the ultimate nature of things fruitless. What matter, form, spirit are

in themselves is a futile question that belongs to the sterile region of ” metempirics.” But philosophical questions may be so stated as to be susceptible of a precise solution by scientific method. Thus, since the relation of subject to object falls within our experience, it is a proper matter for philosophic investigation. It may be questioned whether Lewes is right in thus identifying the methods of science and philosophy. Philosophy is not a mere extension of scientific knowledge ; it is an investigation of the nature and validity of the knowing process itself. In any case Lewes cannot be said to have done much to aid in the settlement of properly philosophical questions. His whole treatment of the question of the relation of subject to object is vitiated by a confusion between the scientific truth that mind and body coexist in the living organism and the philosophic truth that all knowledge of objects implies a knowing subject. In other words, to use Shadworth Hodgson’s phrase, he mixes up the question of the genesis of mental forms with the question of their nature (see Philosophy of Reflexion, ii. 40-58). Thus he reaches the ” monistic ” doctrine that mind and matter are two aspects of the same existence by attending simply to the parallelism between psychical and physical processes given as a fact (or a prob- able fact) of our experience, and by leaving out of account their relation as subject and object in the cognitive act. His identification of the two as phases of one existence is open to criticism, not only from the point of view of philosophy, but from that of science. In his treatment of such ideas as ” sensibility,” ” sentience ” and the like, he does not always show whether he is speaking of physical or of psychical phenomena. Among the other properly philosophic questions discussed in these two volumes the nature of the casual relation is perhaps the one which is handled with most freshness and suggestivencss. The third volume, The Physical Basis of Mind, further develops the writer’s views on organic activities as a whole, lie insists strongly on the radical distinction between organic and inorganic processes, and on the impossibility of ever explaining the former by purely mechanical principles. With respect to the nervous system, he holds that all its parts have one and the same elementary property, namely, sensibility. Thus sensibility belongs as much to the lower centres of the spinal cord as to the brain,

contributing in this more elementary form elements to the ” subconscious ” region of mental life. The higher functions of the nervous system, which make up our conscious mental life, are merely more complex modifi- cations of this fundamental property of nerve substance. Closely related to this doctrine is the view that the nervous organism acts as a whole, that particular mental operations cannot be referred to definitely circumscribed regions of the brain, and that the hypothesis of nervous activity passing in the centre by an isolated pathway from one nerve-cell to another is altogether illusory. By insisting on the complete coincidence between the regions of nerve-action and sentience, and by holding that these arc but different aspects of one thing, he is able to attack the doctrine of animal and human auto- matism, which affirms that feeling or consciousness is merely an incidental concomitant of nerve-action and in no way essential to the chain of physical events. Lewes’s views in psychology, partly opened up in the earlier volumes of the Problems, are more fully worked out in the last two volumes (3rd series). He discusses the method of psychology with much insight. He claims against Comte and his followers a place for introspection in psychological research. In addition to this subjective method there must be an objective, which consists partly in a reference to nervous conditions and partly in the employment of sociological and historical data. Biological know- ledge, or a consideration of the organic conditions, would only help us to explain mental functions, as feeling and thinking; it would not assist us to understand differences of mental faculty as mani- fested in different races and stages of human development. The organic conditions of these differences will probably for ever escape detection. Hence they can be explained only as the products of the social environment. This idea of dealing with mental phenomena in their relation to social and historical conditions is probably Lewes’s most important contribution to psychology. Among other points which he emphasizes is the complexity of mental phenomena. Every mental state is regarded as compounded of three factors in different proportions — namely, a process of sensible affection, of logical grouping and of motor impulse. But Lewes’s work in psychology consists less in any definite discoveries than in the inculcation of a sound and just method. His biological training prepared him to view mind as a complex unity, in which the various functions interact one on the other, and of which the highest processes are identical with and evolved out of the lower. Thus the operations of thought, ” or the logic of signs,” are merely a more complicated form of the elementary operations of sensation and instinct or ” the logic of feeling.” The whole of the last volume of the Problems may be said to be an illustration of this position. It is a valuable repository of psychological

facts, many of them drawn from the more obscure regions of mental life and from abnormal experience, and is throughout suggestive and stimulating. To suggest and to stimulate the mind, rather than to supply it with any complete svstem of knowledge, may be said to be Lewes's service in philosophy. The exceptional rapidity and versatility of his intelligence seems to account at once for the freshness in his way of envisaging the subject- matter of philosophy and psychology, and for the want of satisfac- tory elaboration and of systematic co-ordination. (J. S. ; X.)

LEWES, a market-town and municipal borough and the county town of Sussex, England, in the Lewes parliamentary division, 50 m. S. from London by the London; Brighton & South Coast railway. Pop. (1901) 11,249. It is picturesquely situated on the slope of a chalk down falling to the river Ouse. Ruins of the old castle, supposed to have been founded by King Alfred and rebuilt by William de Warenne shortly after the Conquest, rise from the height. There are two mounds which bore keeps, an uncommon feature. The castle guarded the pass through the downs formed by the valley of the Ouse. In one of the towers is the' collection of the Sussex Archaeological Society. St Michael's church is without architectural merit, but contains old brasses and monuments; St Anne's church is a transitional Norman structure; St Thomas-at-Cliffe is Perpendicular; St John's, Southover, of mixed architecture, preserves some early Norman portions, and has some relics of the Warenne family. In the grounds of the Cluniac priory of St Pancras, founded in 1078, the leaden coffins of William de Warenne and Gundrada his wife were dug up during an excavation for the railway in 1845. There is a free grammar school dating from 151 2, and among the other public buildings are the town hall and corn exchange, county hall, prison, and the Fitzroy memorial library. The industries include the manufacture of agricultural implements, brewing, tanning, and iron and brass founding. The municipal borough is under a mayor, 6 aldermen and 18 councillors. Area, 1042 acres.

The many neolithic and bronze implements that have been discovered, and the numerous tumuli and earthworks which surround Lewes, indicate its remote origin. The town Lewes (Loewas, Loewen, Leswa, Laquis, Latisaquensis) was in the royal demesne of the Saxon kings, from whom it received the privilege of a market. ˆEthelstan established two royal mints there, and by the reign of Edward the Confessor, and probably before, Lewes was certainly a borough. William I. granted the whole barony of Lewes, including the revenue arising from the town, to William de Warenne, who converted an already existing fortifica- tion into a place of residence. His

descendants continued to hold the barony until the beginning of the 14th century. In default of male issue, it then passed to the earl of Arundel, with whose descendants it remained until 1439, when it was divided between the Norfolks, Dorsets and Abergavennys. By 1086 the borough had increased 30% in value since the beginning of the reign, and its importance as a port and market-town is evident from Domesday. A gild merchant seems to have existed at an early date. The first mention of it is in a charter of Reginald de Warenne, about 1148, by which he restored to the burgesses the privileges they had enjoyed in the time of his grandfather and father, but of which they had been deprived. In 1 595 a ” Fellow- ship ” took the place of the old gild and in conjunction with two constables governed the town until the beginning of the 18th century. The borough seal probably dates from the 14th century. Lewes was incorporated by royal charter in 1881. The town returned two representatives to parliament from 1295 until deprived of one member in 1867. It was disfranchised in 1885. Earl Warenne and his descendants held the fairs and markets from 1066. In 1792 the fair-days were the 6th of May, Whit-Tuesday, the 26th of July (for wool), and the 2nd of October. The market-day was Saturday. Fairs are now held on the 6th of May for horses and cattle, the 20th of July for wool, and the 21st and 28th of September for Southdown sheep. A corn-market is held every Tuesday, and a stock-market every alternate Monday. The trade in wool has been important since the 14th century.

Lewes was the scene of the battle fought on the 14th of May 1 264 between Henry III. and Simon de Montfort, earl of Leicester. Led by the king and by his son, the future king Edward I., the royalists left Oxford, took Northampton and drove Montfort from Rochester into London. Then, harassed on the route by their foes, they marched through Kent into Sussex and took up their quarters at Lewes, a stronghold of the royalist Earl Warenne. Meanwhile, reinforced by a number of Londoners, Earl Simon left London and reached Fletching, about 9 m. north of Lewes,

on the 13th of May. Efforts at reconciliation having failed he led his army against the town, which he hoped to surprise, early on the following day. His plan was to direct his main attack against the priory of St Pancras, which sheltered the king and his brother Richard, earl of Cornwall, king of the Romans, while causing the enemy to believe that his principal objective was the castle, where Prince

Edward was. But the surprise was not complete and the royalists rushed from the town to meet the enemy in the open field. Edward led his followers against the Londoners, who were gathered around the standard of Montfort, put them to flight, pursued them for several miles, and killed a great number of them. Montfort's ruse, however, had been successful. He was not with his standard as his foes thought, but with the pick of his men he attacked Henry's followers and took prisoner both the king and his brother. Before Edward returned from his chase the earl was in possession of the town. In its streets the prince strove to retrieve his fortunes, but in vain. Many of his men perished in the river, but others escaped, one band, consisting of Earl Warenne and others, taking refuge in Pevensey Castle. Edward himself took sanctuary and on the following day peace was made between the king and the earl.

LEWES, a town in Sussex county, Delaware, U.S.A., in the S.E. part of the state, on Delaware Bay. Pop. (1910), 2158. Lewes is served by the Philadelphia, Baltimore & Washington (Pennsylvania System), and the Maryland, Delaware & Virginia railways. Its harbour is formed by the Delaware Breakwater, built by the national government and completed in 1869, and 2j m. above it another breakwater was completed in December 1901 by the government. The cove between them forms a harbour of refuge of about 550 acres. At the mouth of Delaware Bay, about 2 m. below Lewes, is the Henlopen Light, one of the oldest lighthouses in America. The Delaware Bay pilots make their headquarters at Lewes. Lewes has a large trade with northern cities in fruits and vegetables, and is a subport of entry of the Wilmington Customs District. The first settlement on Delaware soil by Europeans was made near here in 1631 by Dutch colonists, sent by a company organized in Holland in the previous year by Samuel Blommaert, Killian van Rensselaer, David Pieterszen de Vries and others. The settlers called the place Zwaanendael, valley of swans. The settlement was soon entirely destroyed by the Indians, and a second body of settlers whom de Vries, who had been made director of the colony, brought in 1632 remained for only two years. The fact of the settlement is important ; because of it the English did not unite the Delaware country with Maryland, for the Maryland Charter of 1632 restricted colonization to land within the prescribed boundaries, uncultivated and either uninhabited or inhabited only by Indians. In 1658 the Dutch established an Indian trading post, and in 1659 erected a fort at Zwaanendael. After the annexation of the Delaware counties to Pennsylvania in 1682, its name was changed to Lewes, after the town of that name in Sussex, England. It was pillaged by French pirates in 1698. One of the last naval battles of the War of

Independence was fought in the bay near Lewes on the 8th of April 1782, when the American privateer ” Hyder Ally ” (16), commanded by Captain Joshua Barnes (1739-1818), defeated and captured the British sloop “General Monk” (20), which had been an American privateer, the ” General Washington,” had been captured by Admiral Arbuthnot’s squadron in 1780, and was now pur- chased by the United States government and, as the ” General Washington,” was commanded by Captain Barnes in 1782- 1784. In March 1813 the town was bombarded by a British frigate.

See the ” History of Lewes ” in the Papers of the Historical Society of Delaware, No. xxxviii. (Wilmington, 1903); and J. T. Scharf, History of Delaware (2 vols., Philadelphia, 1888).

LEWIS, SIR GEORGE CORNEWALL, Bart. (1806-1863), English statesman and man of letters, was born in London on the 21st of April 1806. His father, Thomas F. Lewis, of Harpton Court, Radnorshire, after holding subordinate office in various administrations, became a poor-law commissioner, and was made

a baronet in 1846. Young Lewis was educated at Eton and at Christ Church, Oxford, where in 1828 he took a first-class in classics and a second-class in mathematics. He then entered the Middle Temple, and was called to the bar in 1831. In 1833 he undertook his first public work as one of the commissioners to inquire into the condition of the poor Irish residents in the United Kingdom. 1 In 1834 Lord Althorp included him in the commission to inquire into the state of church property and church affairs generally in Ireland. To this fact we owe his work on Local Disturbances in Ireland, and the Irish Church Question (London, 1836), in which he condemned the existing connexion between church and state, proposed a state provision for the Catholic clergy, and maintained the necessity of an efficient workhouse organization. During this period Lewis's mind was much occupied with the study of language. Before leaving college he had published some observations on Whately's doctrine of the predicables, and soon afterwards he assisted Thirlwall and Hare in starting the Philological Museum. Its successor, the Classical Museum, he also supported lay occasional contribu- tions. In 1835 he published an Essay on the Origin and Forma- tion of the Romance Languages (re-edited in 1862), the first effective criticism in England of Raynouard's theory of a uniform romance tongue, represented by the poetry of the troubadours. He also compiled a glossary of provincial words used in Hereford- shire and the adjoining counties. But the most important work of this earlier period was one to which his logical and philological tastes contributed. The Remarks on the Use and Abuse of some Political Terms (London, 1832) may have been suggested by Bentham's Book of Parliamentary Fallacies, but it shows all that power of clear sober original thinking which marks his larger and later political works. Moreover, he translated Boeckh's Public Economy of Athens and Muller's History of Greek Literature, and he assisted Tufnell in the translation of Muller's Dorians. Some time afterwards he edited a text of the Fables of Babrius. While his friend Hay ward conducted the Law Magazine, he wrote in it frequently on such subjects as secondary punishments and the penitentiary system. In 1836, at the request of Lord Glenelg, he accompanied John Austin to Malta, where they spent nearly two years reporting on the condition of the island and framing a new code of laws. One leading object of both commissioners was to associate the Maltese in the responsible

government of the island. On his return to England Lewis succeeded his father as one of the principal poor-law commissioners. In 1841 appeared the Essay on the Government of Dependencies, a systematic statement and dis- cussion of the various relations in which colonies may stand towards the mother country. In 1844 Lewis married Lady Maria Theresa Lister, sister of Lord Clarendon, and a lady of literary tastes. Much of their married life was spent in Kent House, Knightsbridge. They had no children. In 1847 Lewis resigned his office. He was then returned for the county of Hereford, and Lord John Russell appointed him secretary to the Board of Control, but a few months afterwards he became under-secretary to the Home Office. In this capacity he introduced two importan t bills,one for the abolition of turnpike trusts and the management of highways by a mixed county board, the other for the purpose of defining and regulating the law of parochial assessment. In 1850 he succeeded Hayter as financial secretary to the treasury. About this time, also, appeared his Essay on the Influence of A uthority in Matters of Opinion. On the dissolution of parlia- ment which followed the resignation of Lord John Russell's ministry in 1852, Lewis was defeated for Herefordshire and then for Peterborough. Excluded from parliament he accepted the editorship of the Edinburgh Review, and remained editor until 1855. During this period he served on the Oxford commission, and on the commission to inquire into the government of London. But its chief fruits were the Treatise on the Methods of Observation and Reasoning in Politics, and the Enquiry into the Credibility of the Early Roman History, 2 in which he vigorously attacked

1 See the Abstract of Final Report of Commissioners of Irish Poor Enquiry, &c, by G. C. Lewis and N. Senior (1837).

2 Translated into German by Liebrecht (Hanover, 1858).

the theory of epic lays and other theories on which Niebuhr's reconstruction of that history had proceeded. In 1855 Lewis succeeded his father in the baronetcy. He was at once elected member for the Radnor boroughs, and Lord Palmerston made him chancellor of the exchequer. He had a war loan to contract and heavy additional taxation to impose, but his industry, method and clear vision carried him safely through. After the change of ministry in 1859 Sir George became home secretary under Lord Palmerston, and in 1861, much

against his wish, he succeeded Sidney Herbert (Lord Herbert of Lea) at the War Office. The closing years of his life were marked by increasing intellectual vigour. In 1859 he published an able Essay on Foreign Jurisdiction and the Extradition of Criminals, a subject to which the attempt on Napoleon's life, the discussions on the Conspiracy Bill, and the trial of Bernard, had drawn general attention. He advocated the extension of extradition treaties, and condemned the principal idea of Welirechtsordnung which Mohl of Heidelberg had proposed. His two latest works were the Survey of the Astronomy of the Ancients, in which, without professing any knowledge of Oriental languages, he applied a sceptical analysis to the ambitious Egyptology of Bunsen; and the Dialogue on the Best Form of Government, in which, under the name of Crito, the author points out to the supporters of the various systems that there is no one abstract government which is the best possible for all times and places. An essay on the Characteristics of Federal, National, Provincial and Municipal Government does not seem to have been published. Sir George died in April 1863. A marble bust by Weekes stands, in Westminster Abbey.

Lewis was a man of mild and affectionate disposition, much beloved by a large circle of friends, among whom were Sir E. Head, the Grotes, the Austins, Lord Stanhope, J. S. Mill, Dean Milman, the Duff Gordons. In public life he was distinguished, as Lord Aberdeen said, " for candour, moderation, love of truth." He had a passion for the systematic acquirement of knowledge, and a keen and sound critical faculty. His name has gone down to history as that of a many-sided man, sound in judgment, unselfish in political life, and abounding in practical good sense.

A reprint from the Edinburgh Review of his long series of papers on the Administration of Great Britain appeared in 1864, and his Letters to various Friends (1870) were edited by his brother Gilbert, who succeeded him in the baronetcy.

LEWIS, HENRY CARVILL ˆ1853-1888), American geologist, was born in Philadelphia on the 16th of November 1853. Educated in the university of Pennsylvania he took the degree of M.A. in 1876. He became attached to the Geological Survey of Pennsylvania in 1879, serving for three years as a volunteer member, and during this term he became greatly interested in the study of glacial phenomena. In 1880 he was chosen professor of mineralogy in the Philadelphia academy of natural sciences, and in 1883 he was appointed to the chair of geology in Haverford College, Pennsylvania. During the winters of 1885 to 1887 he studied petrology under H. F. Rosenbusch at Heidelberg, and

during the summers he investigated the glacial geology of northern Europe and the British Islands. His observations in North America, where he had studied under Professor G. F. Wright, Professor T. C. Chamberlin and Warren Upham, had demonstrated the former extension of land-ice, and the existence of great terminal moraines. In 1884 his Report on the Terminal Moraine in Pennsylvania and New York was published: a work containing much information on the limits of the North American ice-sheet. In Britain he sought to trace in like manner the southern extent of the terminal moraines formed by British ice-sheets, but before his conclusions were matured he died at Manchester on the 21st of July 1888. The results of his observations were published in 1894 entitled Papers and Notes on the Glacial Geology of Great Britain and Ireland, edited by Dr H. W. Crosskey.

See “Prof. Henry Carvill Lewis and his Work in Glacial Geology,” by Warren Upham, Amer. Geol. vol. ii. (Dec. 1888) p. 371, with portrait.

LEWIS, JOHN FREDERICK (1805-1876), British painter, son of F. C. Lewis, engraver, was born in London. He was

elected in 1827 associate of the Society of Painters in Water Colours, of which he became full member in 1829 and president in 1855; he resigned in 1858, and was made associate of the Royal Academy in 1859 and academician in 1865. Much of his earlier life was spent in Spain, Italy and the East, but he re- turned to England in 185 1 and for the remainder of his career devoted himself almost exclusively to Eastern subjects, which he treated with extraordinary care and minuteness of finish, and with much beauty of technical method. He is represented by a picture, ” Edfou: Upper Egypt,” in the National Gallery of British Art. He achieved equal eminence in both oil and water-colour painting.

LEWIS, MATTHEW GREGORY (1775-1818), English romance-writer and dramatist, often referred to as ” Monk ” Lewis, was born in London on the 9th of July 1775. He was educated for a diplomatic career at Westminster school and at Christ Church, Oxford, spending most of his vacations abroad in the study of modern languages; and in 1794 he proceeded to the Hague as attache to the British embassy. His stay there lasted only a few months, but was marked by the composition, in ten weeks, of his romance Ambrosio, or the Monk, which was published in the summer of the following year. It immediately achieved celebrity; but some passages it contained were of such a nature that about a year after its appearance an injunction to restrain its sale was moved for and a rule nisi obtained. Lewis published a second edition from which he had expunged, as he

thought, all the objectionable passages, but the work still remains of such a character as almost to justify the severe language in which Byron in English Bards and Scotch Reviewers addresses —

” Wonder-working Lewis, Monk or Bard,

Who fain would’st make Parnassus a churchyard;

Even Satan’s self with thee might dread to dwell,

And in thy skull discern a deeper hell.” .

Whatever its demerits, ethical or aesthetic, may have been, The Monk did not interfere with the reception of Lewis into the best English society; he was favourably noticed at court, and almost as soon as he came of age he obtained a seat in the House of Commons as member for Hindon, Wilts. After some years, however, during which he never addressed the House, he finally withdrew from a parliamentary career. His tastes \&y wholly in the direction of literature, and The Castle Spectre (1796, a musical drama of no great literary merit, but which enjoyed a long popularity on the stage), The Minister (a translation from Schiller’s Kabale u. Liebe), Rolla (1797, a translation from Kotzebue), with numerous other operatic and tragic pieces, appeared in rapid succession. The Bravo of Venice, a romance translated from the German, was published in 1804; next to The Monk it is the best known work of Lewis. By the death of his father he succeeded to a large fortune, and in 1815 embarked for the W T est Indies to visit his estates; in the course of this tour, which lasted four months, the Journal of a West Indian Proprietor, published posthumously in 1833, was written. A second visit to Jamaica was undertaken in 181 7, in order that he might become further acquainted with, and able to amelio- rate, the condition of the slave population; the fatigues to which he exposed himself in the tropical climate brought on a fever which terminated fatally on the homeward voyage on the 14th of May 1818.

The Life and Correspondence of M. G. Lewis, in two volumes, was published in 1839.

LEWIS, MERIWETHER (1774-1809), American explorer, was born near Charlottesville, Virginia, on the 18th of August 1774. In 1794 he volunteered with the Virginia troops called out to suppress the ” Whisky Insurrection,” was commissioned as ensign in the regular United States army in 1795, served with distinction under General Anthony Wayne in the campaigns against the Indians, and attained the

rank of captain in 1797. From 1801 to 1803 he was the private secretary of President Jefferson. On the 18th of January 1803 Jefferson sent a. con- fidential message to Congress urging the development of trade with the Indians of the Missouri Valley and recommending that an exploring party be sent into this region, notwithstanding

the fact that it was then held by Spain and owned by France. Congress appropriated funds for the expedition, and the president instructed Lewis to proceed to the head-waters of the Missouri river and thence across the mountains to the Pacific Ocean. With Jefferson's consent Lewis chose .as a companion Lieut. William Clark, an old friend and army comrade. The prepara- tions were made under the orders of the War Department, and, until the news arrived that France had sold Louisiana to the United States, they were conducted in secrecy. Lewis spent some time in Philadelphia, gaining additional knowledge of the natural sciences and learning the use of instruments for deter- mining positions; and late in 1803 he and Clark, with twenty- nine men from the army, went into winter quarters near St Louis, where the men were subjected to rigid training. On the 14th of May 1804 the party, with sixteen additional members, who, however, were to go only a part of the way, started up the Missouri river in three boats, and by the 2nd of November had made the difficult ascent of the stream as far as 47 21′ N. lat., near the site of the present Bismarck, North Dakota, where, among the Mandan Indians, they passed the second winter. Early in April 1805 the ascent of the Missouri was continued as far as the three forks of the river, which were named the Jeffer- son, the Gallatin and the Madison. The Jefferson was then followed to its source in the south-western part of what is now the state of Montana. Procuring a guide and horses from the Shoshone Indians, the party pushed westward through the Rocky Mountains in September, and on the 7th of October embarked in canoes on a tributary of the Columbia river, the mouth of which they reached on the 15th of November. They had travelled upwards of 4000 m. from their starting-point, had encountered various Indian tribes never before seen by whites, had made valuable scientific collections and observations, and were the first explorers to reach the Pacific by crossing the continent north of Mexico. After spending the winter on the Pacific coast they started on the 23rd of March 1806 on their return journey, and, after crossing the divide, Lewis with one party explored Maria's river, and Clark with another the Yellowstone. On

the 12th of August the two explorers reunited near the junction of the Yellowstone and the Missouri, and on the 23rd qf September reached St Louis. In spite of exposure, hardship and peril only one member of the party died, and only one deserted. No later feat of exploration, perhaps, in any quarter of the globe has exceeded this in romantic interest. The expedition was commemorated by the Lewis and Clark Centennial Exposition at Portland, Oregon, in 1905. The leaders and men of the exploring party were rewarded with liberal grants of land from the public domain, Lewis receiving 1500 acres; and in March 1807 Lewis was made governor of the northern part of the territory obtained from France in 1803, which had been organized as the Louisiana Territory. He performed the duties of this office with great efficiency, but it is said that in the un- wonted quiet of his new duties, his mind, always subject to melancholy, became unbalanced, and that while on his way to Washington he committed suicide about 60 m. south-west of Nashville, Tennessee, on the nth of October 1809. It is not definitely known, however, whether he actually committed suicide or was murdered.

Bibliography. — Jefferson's Message from the President of the United States, Communicating Discoveries made in Exploring the Missouri, Red River and Washita by Captains Lewis and Clark, Dr Sibley and Mr Dunbar (Washington, 1806, and subsequent editions) is the earliest account, containing the reports sent back by the ex- plorers in the winter of 1804-1805. Patrick Gass's Journal of the Voyages and Travels of a Corps of Discovery under the Command of Capt. Lewis and Capt. Clark (Pittsburg, 1807) is the account of a sergeant in the party. Biddle and Allen's History of the Expedition under [he Command of Captains Lewis and Clark (2 vols., Philadelphia, 1814) is a condensation of the original journals. There are numerous reprints of this work, the best being that of Elliott Coues (4 vols., New York, 1893), which contains additions from the original manu- scripts and a new chapter, in the style of Biddle, inserted as though a part of the original text. As a final authority consult R. G. Thwaites (ed.), The Original Journals of the Lewis and Clark Ex- pedition (8 vols., New York, 1904-1905), containing all the known literary records of the expedition. For popular accounts see W. R.

Lighton, Lewis and Clark (Boston, 1901); O. D. Wheeler, The Trail of Lewis and Clark (2 vols., New York, 1904); and Noah Brooks (ed.), First across the Continent: Expedition of Lewis and Clark (New York, 1901).

LEWISBURG, a borough and the county-seat of Union county, Pennsylvania, U.S.A., on the W. bank of W T est Branch of the

Susquehanna river, about 50 m. N. of Harrisburg. Pop. (1900) 3457 (60 foreign-born); (1910) 3081. It is served by the Pennsylvania and the Philadelphia & Reading railways. It is the seat of Bucknell University (coeducational), opened in 1846 as the university of Lewisburg and renamed in 1886 in honour of William Bucknell (1809-1890), a liberal benefactor. The university comprises a College of Liberal Arts, an Academy for Young Men, an Institute for Young Women, and a School of Music, and in 1908-1909 had 50 instructors and 775 students, of whom 547 were in the College of Liberal Arts. The city is situated in a farming region, and has various manufactures, including flour, lumber, furniture, woollens, nails, foundry products and carriages. Lewisburg (until about 1805 called Derrstown) was founded and laid out in 1785 by Ludwig Derr, a German, and was chartered as a borough in 181 2.

LEWISHAM, a south-eastern metropolitan borough of London, England, bounded N.W. by Deptford, N-.E. by Greenwich, E. by Woolwich, and W. by Camberwell, and extending S. to the boundary of the county of London. Pop. (1901) 127,495. Its area is for the most part occupied by villas. It includes the districts of Blackheath and Lee in the north, Hither Green, Catford and Brockley in the central parts, and Forest Hill and part of Sydenham in the south-west. In the districts last named well-wooded hills rise above 300 ft., and this is an especially favoured residential quarter, its popularity being formerly increased by the presence of medicinal springs, discovered in 1640, on Sydenham Common. Towards the south, in spite of the constant extension of building, there are considerable tracts of ground uncovered, apart from public grounds. In the north the borough includes the greater part of Blackheath (q.v.), an open common of considerable historical interest. The other principal pleasure grounds are Hilly Fields (46 acres) and Ladywell Recrea- tion Grounds (46 acres) in the north-west part of the borough; and at Sydenham (but outside the boundary of the county of London) is the Crystal Palace. Among institutions are the Horniman Museum, Forest Hill (1901); Morden's College, on the south of Blackheath, founded at trie close of the 17th century by Sir John Morden for Turkey merchants who were received as pensioners, and subsequently extended in scope; numerous schools in the same locality; and the Park Fever Hospital, Hither Green. The parliamentary borough of Lewisham returns one member. The borough council consists of a mayor, 7 aldermen and 42 councillors. Area, 7014-4 acres.

LEWISTON, a city of Androscoggin county, Maine, U.S.A., on the Androscoggin river, opposite Auburn, with which it is connected by four steel bridges, and about 36m.N.E. of Portland. Pop. (1900)

23,761, of whom 9316 were foreign-born; (1910 census) 26,247. It is served by the Maine Central, the Grand Trunk, the Portland & Rumford Falls and the Lewiston, Augusta & Waterville (electric) railways. The surrounding country is hilly and the river is picturesque; in the vicinity there are many lakes and ponds abounding in salmon and trout. The Maine fish hatchery is on Lake Auburn, 3 m. above the city. Lewiston is the seat of Bates College, a non-sectarian institution, which grew out of the Maine State Seminary (chartered in 1855), and was chartered in 1864 under its present name, adopted in honour of Benjamin E. Bates (d. 1877), a liberal benefactor. In 1908-1909 the college had 25 instructors and 440 students, and its library contained 34,000 volumes. The campus of the college is about 1 m. from the business portion of Lewiston and covers 50 acres; among the college buildings are an auditorium (1909) given by W. Scott Libbey of Lewiston, and the Libbey Forum for the use of the three literary societies and the two Christian associations of the college. The literary societies give excellent training in forensics. The matriculation pledge requires from male students total abstinence from intoxicants

as a condition of membership. There are no secret fraternities. From the beginning women have been admitted on the same terms as men. The Cobb Divinity School (Free Baptist), which was founded at Parsonfield, Maine, in 1840 as a department of Parsonneld Seminary, and was situated in 1842-1844 .at Dracut, Massachusetts, in 1844-1854 at Whitestown, New York, and in 1854-1870 at New Hampton, New Hampshire, was removed to Lewiston in 1870 and became a department (known as Bates Theological Seminary until 1888) of Bates College, with which it was merged in 1908. Lewiston has a fine city hall, a Carnegie library and a public park of io§ acres, with a bronze soldiers' monument by Franklin Simmons, who was born in 1839 at Webster near Lewiston, and is known for his statues of Roger Williams, William King, Francis H. Pierpont and U. S. Grant in the national Capitol, and for " Grief " and " History " on the Peace Monument at Washington. In Lewiston are the Central Maine General Hospital (1888), the Sisters' Hospital (1S88). under the charge of the French Catholic Sistersof Charity, a home for aged women, a young women's home and the Hesley Asylum for boys. The Shrine Building (Kora Temple), dedicated in 1909, is the headquarters of the Shriners of the state. The river at Lewiston breaks over a ledge of mica-schist and gneiss, the natural fall of 40 ft. having been increased to more than 50 ft. by a strong granite dam; and 3 m. above the city at Deer

Rips a cement dam furnishes 10,000 horse-power. The water-power thus obtained is distributed by canals from the nearer dam and transmitted by wire from the upper dam. The manufacture of cotton goods is the principal industry, and in 1 905 the product of the city's cotton mills was valued at about one-third of that of the mills of the whole state. Among other industries are the manufacture of woollen goods, shirts, dry- plates, carriages, spools and bobbins, and boots and shoes, and the dyeing and finishing of textiles. The total factory product in 1905 was valued at' $8,527,649. The municipality owns its water works and electric lighting plant. Lewiston was settled in 1770, incorporated as a township in 1795 and chartered as a city in 1861. It was the home of Nelson Dingley (1832-1899), who from 1856 until his death controlled the Lewiston Journal. He was governor of the state in 1874-1876, Republican repre- sentative in Congress in 1 881-1899, and the drafter of the Dingley Tariff Bill (1897).

LEWIS-WITH-HAKRIS, the most northerly island of the Outer Hebrides, Scotland. It is sometimes called the Long Island and is 24 m. from the nearest point of the mainland, from which it is separated by the strait called The Minch. It is 60 m. long and has an extreme breadth of 30 m., its average breadth being 15 m. It is divided into two portions by a line roughly drawn between Loch Resort on the west and Loch Seaforth on the east, of which the larger or more northerly portion, known as Lewis (pron. Lents), belongs to the county of Ross and Cromarty and the lesser, known as Harris, to Inverness-shire. The area of the whole island is 492,800 acres, or 770 sq. m., of which 368,000 acres belong to Lewis. In 1891 the population of Lewis was 27,045, of Harris 3681; in 1901 the popula- tion of Lewis was 28,357, of Harris 3803, or 32,160 for the island, of whom 17,175 were females, 11,209 spoke Gaelic only, and 17,685 both Gaelic and English. There is communication with certain ports of the Western Highlands by steamer via Stornoway every week — oftener during the tourist and special seasons — the steamers frequently calling at Loch Erisort, Loch Sealg, Ardvourlie, Tarbert, Ardvey, Rodel and The Obe. The coast is indented to a remarkable degree, the principal sea-lochs in Harris being East and West Loch Tarbert; and in Lewis, Loch Seaforth. Loch Erisort and Broad Bay (or Loch a Tuath) on the east coast and Loch Roag and Loch Resort on the west. The mainland is dotted with innumerable fresh-water lakes. The island is composed of gneiss rocks, excepting a patch of granite near Carloway, small bands of intrusive basalt at Gress and in Eye Peninsula and some Torridonian sandstone at Stornoway, Tong, Vatskir and Carloway. Most of Harris is mountainous, there being more than thirty peaks above 1000 ft. high. Lewis is comparatively flat, save in the south-east, where Ben More

reaches 1874 ft., and in the south-west, where Mealasbhal (1885) is the highest point; but in this division there are only eleven peaks exceeding 1000 ft. in height. The rivers are small and unimportant. The principal capes are the Butt of Lewis, in the extreme north, where the cliffs are nearly 150 ft. high and crowned with a lighthouse, the light of which is visible for 19 m.; Tolsta Head, Tiumpan Head and Cabag Head, on the east; Renish Point, in the extreme south; and, on the west, Toe Head and Gallon Head. The following inhabited islands in the lnverness-shire division belong to the parish of Harris: off the S.W. coast, Bernera (pop. 524), Ensay, Killigray and Pabbay; off the W. coast, Scarp (160), Soay and Tarrensay (72); off the E. coast, Scalpa (587) and Scotasay. Belonging to the county of Ross and Cromarty are Great Bernera (580) to the W*. of Lewis, in the parish of Uig, and the Shiant Isles, about 21 m. S. of Stornoway, in the parish of Lochs, so named from the nimber of its sea lochs and fresh- water lakes. The south-easten base of Broad Bay is furnished by the peninsula of Eye, attached to the main mass by so slender a neck as seemingly to be on the point of becoming itself an island. Much of the surface of both Lewis and Harris is composed of peat and swamp; there are scanty fragments of an ancient forest. The rainfall for the year averages 41-7 in., autumn and winter being very wet. Owing to the influence of the Gulf Stream, however, the temperature is fairly high, averaging for the year 46>6° F., for January 39-5° F. and for August 56-5° F.

The economic conditions of the island correspond with its physical conditions. The amount of cultivable land is small and poor. Sir James Matheson (1796-1878), who purchased the island in 1844, is said to have spent nearly £350,000 in reclamation and improvements. Barley and potatoes are the chief crops. A large number of black cattle are reared “and some sheep-farming is carried on in Harris. Kelp-making, once important, has been extinct for many years. Harris has obtained great reputation for tweeds. The cloth has an aroma of heather and peat, and is made in the dwellings of the cotters, who use dyes of long-established excellence. The fisheries are the principal mainstay of the people. In spite of the very consider- able reductions in rent effected by the Crofters’ Commission (appointed in 1886) and the sums expended by government, most of the crofters still live in poor huts amid dismal surround- ings. The island affords good sporting facilities. Many of the streams abound with salmon and trout; otters and seals are plentiful, and deer and hares common; while bird life includes grouse, ptarmigan, woodcock, snipe, heron, widgeon, teal, eider duck, swan and varieties of geese and gulls. There are many antiquarian remains, including duns, megaliths, ruined towers and

chapels and the like. At Rodel, in the extreme south of Harris, is a church, all that is left of an Augustinian monastery. The foundation is Norman and the superstructure Early English. On the towers are curious carved figures and in the interior several tombs of the Macleods, the most remarkable being that of Alastair (Alexander), son of William Macleod of Dunvegan, dated 1528. The monument, a full-length recumbent' effigy of a knight in armour, lies at the base of a tablet in the shape of an arch divided into compartments, in which are carved in bas-relief, besides the armorial bearings of the deceased and a rendering of Dunvegan castle, several symbolical scenes, one of which exhibits Satan weighing in the balance the good and evil deeds of Alastair Macleod, the good obviously preponderating. Stornoway, the chief town (pop. 3852) is treated under a separate heading. At Callernish, 13 m. due W. of Stornoway, are several stone circles, one of which is probably the most perfect example of so-called " Druidical " structures in the British Isles. In this specimen the stones are huge, moss-covered, undressed blocks of gneiss. Twelve of such monoliths constitute the circle, in the centre of which stands a pillar 17 ft. high. From the circle there runs northwards an avenue of stones, comprising on the right-hand side nine blocks and on the left-hand ten. There also branch off from the circle, on the east and west, a single line of four stones and, on the south, a single line of five stones. From the extreme point of the south file to the farther

end of the avenue on the north is a distance of 127 yds. and the width from tip to tip of the east and west arms is 41 yds. Viewed from the north end of the avenue, the design is that of a cross. The most important fishery centre on the west coast is Carloway, where there is the best example of a broch, or fort, in the Hebrides. Rory, the blind harper who translated the Psalms into Gaelic, was born in the village. Tarbert, at the head of East Loch Tarbert, is a neat, clean village, in communication by mail-car with Stornoway. At Coll, a few miles N. by E. of Stornoway, is a mussel cave; and at Gress, 2 m. or so beyond in the same direction, there is a famous seals' cave, adorned with fine stal- actites. Port of Ness, where there is a harbour, is the head-quarters of the ling fishery. Loch Seaforth gave the title of earl to a branch of the Mackenzies, but in 17 16 the 5th earl was attainted for Jacobitism and the title forfeited. In 1797 Francis Humberston Mackenzie (1754-1815), chief of the Clan Mackenzie, was created Lord Seaforth and Baron Mackenzie of Kintail, and made colonel of the 2nd battalion of the North British Militia, afterwards the 3rd

battalion of the Seaforth Highlanders. The 2nd battalion of the Seaforth Highlanders was formerly the Ross-shire Buffs, which was raised in 1771.

LEXICON, a dictionary (q.v.). The word is the Latinized form of Gr. Xc £ik6c, sc. 0ifl\lov, a word-book (Xe£«, word, Xkyuv, to speak). Lexicon, rather than dictionary, is used of word-books of the Greek language, and sometimes of Arabic and Hebrew.

LEXINGTON, BARON, a title borne in the English family of Sutton from 1645 to 1723. Robert Sutton (1594-1668), son of Sir William Sutton of Averham, Nottinghamshire, was a member of parliament for his native county in 162c and again in 1640. He served Charles I. during the Civil War, making great monetary sacrifices for the royal cause, and in 1645 the king created him Baron Lexington, this being a variant of the name of the Nottinghamshire village of Laxton. His estate suffered during the time of the Commonwealth, but some money was returned to him by Charles II. He died on the 13th of October 1668. His only son, Robert, the 2nd baron (1661-1723), supported in the House of Lords the elevation of William of Orange to the throne, and was employed by that king at court and on diplomatic business. He also served as a. soldier, but he is chiefly known as the British envoy at Vienna during the conclusion of the treaty of Ryswick, and at Madrid during the negotiations which led to the treaty of Utrecht. He died on the 10th of September 1723. His letters from Vienna, selected and edited by the Hon. H. M. Sutton, were published as the Lexington Papers (1851). Lexington's barony became extinct on his death, but his estates descended to the younger sons of his daughter Bridget (d. 1734), the wife of John Manners, 3rd duke of Rutland. Lord George Manners, who inherited these Estates in 1762, is the ancestor of the family of Manners-Sutton. An earlier member of this family is Oliver Sutton, bishop of Lincoln from 1280 to 1299.

LEXINGTON, a city and the county-seat of Fayette county Kentucky, U.S.A., about 75 m. S. of Cincinnati. Pop. (1900) 26,369, of whom 10,130 were negroes and 924 were foreign-born; (1010 census), 35,099. It is served by the Louisville & Nash- ville, the Southern, the Chesapeake & Ohio, the Cincinnati, New Orleans & Texas Pacific, the Lexington & Eastern, and electric railways. The. city, which lies at an altitude of about 950 ft., is situated near the centre of the celebrated " blue grass " region, into which extend a number of turnpike roads. Its public buildings include the court house and the Federal building, both built of Bowling Green oolitic limestone. Among the public institutions are two general hospitals— St Joseph's (Roman Catholic) and Good Samaritan (controlled by the Protestant churches of the

city)— the Eastern Lunatic Asylum (1815, a state institution since 1824), with 250 acres of grounds- a state House of Reform for Girls and a state House of Reform for Boys (both at Greendale, a suburb); an orphan industrial school (for negroes); and two Widows' and Orphans' Homes one established by the Odd Fellows of Kentucky and the other by the Knights of Pythias of the state. Lexington is the seat of Transylvania University (non-sectarian; coeducational),

formerly Kentucky University (Disciples of Christ), which grew out of Bacon College (opened at Georgetown, Ky., in 1836), was chartered in 1858 as Kentucky University, and was opened at Harrodsburg, Ky., in 1859, whence after a fire in 1864 it removed to Lexington in 1865. At Lexington it was consolidated with the old Transylvania University, a well-known institution which had been chartered as Transylvania Seminary in 1783, was opened near Danville, Ky., in 1785, was removed to Lexing- ton in 1789, was re-chartered as Transylvania University in 1798, and virtually ceased to exist in 1859. 1 In 1908 Kentucky University resumed the old name, Transylvania University. It has a college of Liberal Arts, a College of Law, a Preparatory School, a Junior College for Women, and Hamilton College for women (founded in 1869 as Hocker Female College), over which the university assumed control in 1903, and a College of the Bible, organized in 1865 as one of the colleges of the university, but now under independent control. In 1907-1908 Transylvania University, including the College of the Bible, had 1129 students. At Lexington are the State University, two colleges for girls— the Campbell-Hagerman College and Sayre College— and St Catherine's Academy (Roman Catholic) . The city is the meeting- place of a Chatauqua Assembly, and has a public library. The State University was founded (under the Federal Land Grant Act of 1862) in 1865 as the State Agricultural and Mechanical College, was opened in 1866, and was a college of Kentucky University until 1878. In 1890 the college received a second Federal appropriation, and it received various grants from the state legislature, which in 1880 imposed a state tax of one-half of 1% for its support. In connexion with it an Agricultural Experiment Station was established in 1885. In 1908 its title became, by act of Legislature, the State University. The university has a College of Agriculture, a College of Arts and Science, a College of Law, a School of Civil Engineering, a School of Mechanical and Electrical Engineering,' and a School of mining Engineering. The university campus is the former City Park, in the southern part of the city. In 1907-1908 the university had 1064 students. The city is the see of a Protestant Episcopal bishopric.

Lexington was the home of Henry Clay from 1797 until his death in

1852, and in his memory a monument has been erected, consisting of a magnesian-limestone column (about 120 ft.) in the Corinthian style and surmounted by a statue of Clay, the head of which was torn off in 1902 by a thunderbolt. Clay's estate, " Ashland," is now one of the best known of the stock- farms in the vicinity; the present house is a replica of Clay's home. The finest and most extensive of these stock-farms, and probably the finest in the world, is " Elmendorf," 6 m. from the city. On these farms many famous trotting and running horses have been raised. There are two race-tracks in Lexington, and annual running and trotting race meetings attract large crowds. The city's industries consist chiefly in a large trade in tobacco, hemp, grain and live stock— there are large semi-annual horse sales— and in the manufacture of " Bourbon " whisky, tobacco, flour, dressed flax and hemp, carriages, harness and saddles.' The total value of the city's factory products in 1905 was $2,774>3 2 9 (46-9% more than in 1900).

Lexington was named from Lexington, Massachusetts, in 1775 by a party of hunters who were encamped here when they received the news of the battle of Lexington; the permanent settlement dates from 1779. It was laid out in 1781, incor- porated as a town in 1782, and chartered as a city in 1832. The first newspaper published west of the Alleghany Mountains, the Kentucky Gazette, was established here in 1787, to promote the separation of Kentucky from Virginia. ' The first state legislature met here in 1792, but later in the same year Frankfort became the state capital. Until 1907, when the city was enlarged by annexation, its limits remained as they were first laid out, a circle with a radius of 1 m., the court house being its centre.

See G.W. Ranck, History of Lexington, Kentucky (Cincinnati, 1872).

' See Robert Peter, Transylvania University: Its Origin, Rise Decline and Fall (Louisville, 1896), and his History of the Medical Department of Transylvania University (Louisville, 1905).

LEXINGTON

527

LEXINGTON, a township of Middlesex county, Massachusetts, U.S.A., about 11 m. N.W of Boston. Pop. (1900) 3831, (1910 U.S. census) 4918. It is traversed by the Boston & Maine railroad and by the Lowell & Boston electric railway. Its area is about 17 sq. m., and it contains three villages — Lexington, East Lexington and North Lexington. Agriculture is virtually the only industry. Owing to its historic interest

the village of Lexington is visited by thousands of persons annually, for it was on the green or common of this village that the first armed conflict of the American War of Independence occurred. On the green stand a monument erected by the sta*.e in 1799 to the memory of the minute-men who fell in that engagement, a drinking fountain surmounted by a bronze statue (1900, by Henry Hudson Kitson) of Captain John Parker, who was in command of the minute-men, and a large boulder, which marks the position of the minute-men when they were fired upon by the British. Near the green, in the old burying-ground, are the graves of Captain Parker and other American patriots — the oldest gravestone is dated 1690. The Hancock-Clarke House (built in part in 1698) is now owned by the Lexington Historical Society and contains a museum of revolutionary and other relics, which were formerly exhibited in the Town Hall. The Buckman Tavern (built about 1690), the rendezvous of the minute-men, and the Munroe Tavern (1695), tne headquarters of the British, are still standing, and two other houses, on the common, antedate the War of Independence. The Cary Library in this village, with 25,000 volumes (1908), was founded in 1868, and was housed in the Town Hall from 1871 until 1906, when it was removed to the Cary Memorial Library building. In the library are portraits of Paul Revere, William Dawes and Lord Percy. The Town Hall (1871) contains statues of John Hancock (by Thomas R. Gould) and Samuel Adams (by Martin Millmore), of the ” Minute- Man of 1775 ” and the ” Soldier of 1861,” and a painting by Henry Sandham, ” The Battle of Lexington.”

Lexington was settled as a part of Cambridge as early as 1642. It was organized as a parish in 1691 and was made a township (probably named in honour of Lord Lexington) in 17 13. In the evening of the 18th of April 1775 a British force of about 800 men under Lieut. Colonel Francis Smith and Major John Pit cairn was sent by General Thomas Gage from Boston to destroy military stores collected by the colonists at Concord, and to seize John Hancock and Samuel Adams, then at Parson Clarke’s house (now known as the Hancock- Clarke House) in Lexington. Although the British had tried to keep this movement a secret, Dr Joseph Warren discovered their plans and sent out Paul Revere and William Dawes to give warning of their approach. The expedition had not proceeded far when Smith, discovering that the country was aroused, despatched an express to Boston for reinforcements and ordered Pitcairn to hasten forward with a detachment of light infantry. Early in the morning of the 19th Pitcairn arrived at the green in the village of Lexington, and there found between sixty and seventy minute-men under Captain John Parker drawn up in line of battle. Pitcairn ordered them to disperse, and on

their refusal to do so his men fired a volley. Whether a stray shot preceded the first volley, and from which side it came, are questions which have never been determined. After a second volley from the British, Parker ordered his men to withdraw. The engagement lasted only a few minutes, but eight Americans were killed and nine were wounded; not more than two or three of the British were wounded. Hancock and Adams had escaped before the British troops reached Lexington. The British proceeded from Lexing- ton to Concord (q. v.). On their return they were continually fired upon by Americans from behind trees, rocks, buildings and other defences, and were threatened with complete destruction until they were rescued at Lexington by a force of 1000 men under Lord Hugh Percy (later, 1786, duke of Northumberland). Percy received the fugitives within a hollow square, checked the onslaught for a time with two field-pieces, used the Munroe Tavern for a hospital, and later in the day carried his command with little further injury back to Boston. The British losses for the entire day were 73 killed, 174 wounded and 26

missing; the American losses were 49 killed, 39 wounded and S missing.

In 1839 a state normal school for women (the first in Massa- chusetts and the first public training school for teachers in the United States) was opened at Lexington; it was transferred to West Newton in 1844 and to Framingham in 1853.

See Charles Hudson, History of the Town of Lexington (Boston, 1868), and the publications of the Lexington Historical Society, (1890 seq.).

LEXINGTON, a city and the county-seat of Lafayette county, Missouri, U.S.A., situated on the S. bank of the Missouri river, about 40m. E. of Kansas City. Pop. (1900) 4190, including 1170 negroes and 283 foreign-born; (1910) 5242. It is served by the Atchison, Topeka & Santa Fe, the Wabash (at Lexington Junction, 4 m. N.W.), and the Missouri Pacific railway systems. The city lies for the most part on high broken ground at the summit of the river bluffs, but in part upon their face. Lexington is the seat of the Lexington College for Young Women (Baptist, established 1855), the Central College for Women (Methodist Episcopal, South; opened 1869), and the Wentworth Military Academy (1880). There are steam flour mills, furniture factories and various other small manufactories; but the main economic interest of the city is in brickyards and coal-mines in its immedi- ate vicinity. It is one of the principal coal centres of the state, Higginsville (pop. in 1910, 2628), about 12 m. S.E., in the same county, also being important. Lexington was founded in 1819, was

laid out in 1832, and, with various additions, was chartered as a city in 1845. A new charter was received in 1870. Lexing- ton succeeded Sibley as the eastern terminus of the Santa Fe trade, and was in turn displaced by Independence; it long owed its prosperity to the freighting trade up the Missouri, and at the opening of the Civil War it was the most important river town between St Louis and St Joseph and commanded the approach by water to Fort Leavenworth. After the Confederate success at Wilson's Creek (Aug. 10, 1 861), General Sterling Price advanced northward, and with about 15,000 men arrived in the vicinity of Lexington on the 1 2th of September. Here he found a Federal force of about 2800 men under Colonel James A. Mulligan (1830-1864) throwing up intrenchments on Masonic College Hill, an eminence adjoining Lexington on the N.E. An attack was made on the same day and the Federals were driven within their defences, but at night General Price withdrew to the Fair-grounds not far away and remained there five days waiting for his wagon train and for reinforcements. On the 18 th the assault was renewed, and on the 20th the Confederates, advancing behind movable breastworks of water-soaked bales of hemp, forced the besieged, now long without water, to surrender. The losses were: Confederate, 25 killed and 75 wounded; Federal, 39 killed and 120 wounded. At the end of September General Price withdrew, leaving a guard of only a few hundred in the town, and on the 16th of the next month a party of 220 Federal scouts under Major Frank J. White (1842-1875) surprised this guard, released about 15 prisoners, and captured 60 or more Confederates. Another Federal raid on the town was made in December of the same year by General John Pope's cavalry. Again, during General Price's Missouri expedition in 1864, a Federal force entered Lexington on the 16th of October, and three days later there was some fighting about 4 m. S. of the town.

LEXINGTON, a town and the county-seat of Rockbridge county, Virginia, U.S.A., on the North river (a branch of the James), about 30 m. N.N.W. of Lynchburg. Pop. (1900) 3203 (1252 negroes); (1910) 2931. It is served by the Chesapeake & Ohio and the Baltimore & Ohio railways. The famous Natural Bridge is about 16 m. S.W., and there are mineral springs in the vicinity — at Rockbridge Baths, 10 m. N, at Wilson's Springs, 12 m. N, and at Rockbridge Alum Springs, 17 m. N.W. Lexington is best known as the seat of Washington and Lee University, and of the Virginia Military Institute. The former grew out of Augusta Academy, which was established in 1749 in Augusta county, about 15 m. S.W. of what is now the city of Staunton, was renamed Liberty Hall and was established near

Lexington in 1780, and was chartered as Liberty Hall Academy in 1782. In 1798 its name was changed to Washington Academy, in recognition of a gift from George Washington of some shares of canal stock, which he refused to receive from the Virginia legislature. In 1802 the Virginia branch of the Society of the Cincinnati disbanded and turned over to the academy its funds, about $25,000; in 1813 the academy took the name Washington College; and in 187 1 its corporate name was changed to Washington and Lee University, the addition to the name being made in honour of General Robert E. Lee, who was the president of the college from August 1865 until his death in 1870. He was succeeded by his son, General George Washington Custis Lee (b. 1832), president fromi87i to 1897, and Dr William Lyne Wilson (1 843-1 900), the eminent political leader and educator, was president from 1897 to 1900. In 1908-1909 the university comprised a college, a school of commerce, a school of engineering and a school of law, and had a library of 47,000 volumes, 23 instructors and 565 students. In the Lee Memorial chapel, on the campus, General Robert E. Lee is buried, and over his grave is a notable recumbent statue of him by Edward Virginius Valentine (b. 1838). The Virginia Military Institute was established in March 1839, when its cadet corps supplanted the company of soldiers maintained by the state to garrison the Western Arsenal at Lexington. The first superintendent (1839-1890) was General Francis Henney Smith (1812-1890), a graduate (1833) of the United States Military Academy; and from 1851 until the outbreak of the Civil War ” Stonewall ” Jackson was a professor in the Institute- — he is buried in the Lexington cemetery and his grave is marked by a monument. On the campus of the institute is a fine statue, ” Virginia Mourning Her Dead,” by Moses Ezekiel (b. 1844), which com- memorates the gallantry of a battalion of 250 cadets from the institute, more than 50 of whom were killed or wounded during the engagement at New Market on the 15th of May 1864. In 1908-1909 the institute had 21 instructors and 330 cadets. Flour is manufactured in Lexington and lime in the vicinity. The town owns and operates its water-works. The first settlers of Rockbridge county established themselves in 1737 near the North river, a short distance below Lexington. The first permanent settlement on the present site was made about 1778. On the nth of June 1864, during the occupation of the town by Federal troops under General David Hunter, most of the buildings in the town and those of the university were damaged and all those of the institute, except the superintendent’s headquarters, were burned.

LEYDEN, JOHN (1775-1811), British orientalist and man of letters,

was born on the 8th of September 1775 at Denholm on the Teviot, not far from Hawick. Leyden's father was a shepherd, but contrived to send his son to Edinburgh University to study for the ministry. Leyden was a diligent but somewhat miscel- laneous student, reading everything apparently, except theology, for which he seems to have had no taste. Though he completed his divinity course, and in 1798 received licence to preach from (he presbytery of St Andrews, it soon became clear that the pulpit was not his vocation. In 1794 Leyden had formed the acquaintance of Dr Robert Anderson, editor of The British Poets, and of The Literary Magazine. It was Anderson who introduced him to Dr Alexander Murray, and Murray, probably, who led him to the study of Eastern languages. They became warm friends and generous rivals, though Leyden excelled, perhaps, in the rapid acquisition of new tongues and acquaintance with their literature, while Murray was the more scientific philologist. Through Anderson also he came to know Richard Heber, by whom he was brought under the notice of Sir Walter Scott, who was then collecting materials for his Minstrelsy of the Scottish Border. Leyden was admirably fitted for helping in this kind of work, for he was a borderer himself, and an enthusiastic lover of old ballads and folk-lore. Scott tells how, on one occasion, Leyden walked 40 m. to get the last two verses of a ballad, and returned at midnight, singing it all the way with his loud, harsh voice, to the wonder and consternation of the poet and his household.

Early history.

Leyden meanwhile compiled a work on the Discoveries and Settlements of Europeans in Northern and Western Africa, sug- gested by Mungo Park's travels, edited The Complaint of Scotland, printed a volume of Scottish descriptive poems, and nearly finished his Scenes of Infancy, a diffuse poem based on border scenes and traditions. He also made some translations from Eastern poetry, Persian and Arabic. At last his friends got him an appointment in India on the medical staff, for which he qualified by a year's hard work. In 1803 he sailed for Madras, and took his place in the general hospital there. He was pro- moted to be naturalist to the commissioners going to survey Mysore, and in 1807 his knowledge of the languages of India procured him an appointment as professor of Hindustani at Calcutta; this he soon after resigned for a judgeship, and that again to be a commissioner in the court of requests in 1809, a post which required a familiarity with several Eastern tongues. In 181 1 he joined Lord Minto in the expedition to Java. Having entered a library which was said to contain many Eastern MSS., without having the place ■aired, he was seized with Batavian fever, and died, after three days' illness, on the 28th of August

LEYDEN JAR, or Condenser, an electrical appliance con- sisting in one form of a thin glass jar partly coated inside and outside with tin foil, or in another of a number of glass plates similarly coated. When the two metal surfaces are connected for a short time with the terminals of some source of electro- motive force, such as an electric machine, an induction coil or a voltaic battery, electric energy is stored up in the condenser in the form of electric strain in the glass, and can be recovered again in the form of an electric discharge.

The earliest form of Leyden jar consisted of a glass vial or thin Florence flask, partly full of water, having a metallic nail in- serted through the cork which touched the water. The bottle was held in the hand, and the nail presented to the prime conductor of an electrical machine. If the person holding the bottle subsequently touched the nail, he experienced an electric shock. This experiment was first made by E. G. von Kleist of Kammin in Pomerania in 1745, 1 and it was repeated in another form in 1746 by Cunaeus and P. van Musschenbroek, of the university of Leyden (Leiden), whence the term Leyden jar. 2 J. H. Winkler discovered that an iron chain wound round the bottle could be substituted for the hand, and Sir William Watson in England shortly afterward showed that iron filings or mercury could replace the water within the jar. Dr John Bevis of London suggested, in 1746, the use of sheet lead coatings within and without the jar, and subsequently the use of tin foil or silver leaf made closely adherent to the glass. Benjamin Franklin and Bevis devised independently the form of condenser known as a Franklin or Leyden pane, which consists of a sheet of glass, partly coated on both sides with tin foil or silver leaf, a margin of glass all round being left to insulate the two tin foils from each other. Franklin in 1747 and 1748 made numerous investigations on the Leyden jar, and devised a method of charging jars in series as well as in parallel. In the former method, now commonly known as charging in cascade, the jars are insulated and the outside coating of one jar is connected to the inside coating of the next and so on for a whole series, the inside coating of the first jar and the outside coating of the last jar being the terminals of the condenser. For charging in parallel a number of jars are collected in a box, and all the out- side coatings are connected together metallically and all the inside coatings brought to one common terminal. This arrange- ment is commonly called a battery of Leyden jars. To Franklin also we owe the important knowledge that the electric charge resides really in the glass and not in the metal coatings, and that when a condenser has been charged the metallic coatings can be exchanged for fresh ones and yet the electric charge of

the condenser remains.

In its modern form the Leyden jar consists of a wide- mouthed bottle of thin English flint glass of uniform thickness,

1 Park Benjamin, The Intellectual Rise in Electricity, p. 512.

2 Ibid. p. 519.

free frorn flaws. About half the outside and half the inside surface is coated smoothly with tin foil, and the remainder of

the glazed surface is painted with shellac varnish. A Modern ˆ wooden stopper closes the mouth of the jar, and through tloa it a brass rod passes which terminates in a chain, or

better still, three elastic brass springs, which make good contact with the inner coating. The rod terminates externally in a knob or screw terminal. The jar has a certain capacity C which is best expressed in microfarads or electrostatic units (see Electrostatics), and is determined by the surface of the tin foil and thickness and quality of the glass. The jar can be charged so that a certain potential difference V, reckoned in volts, exists between the two coatings. If a certain critical potential is exceeded, the glass gives way under the electric strain and is pierced. The safe voltage for most glass jars is about 20,000 volts for glass iVih in. in thickness; this corre- sponds with an electric spark of about 7 millimetres in length. When the jar is charged, it is usually discharged through a metallic arc called the discharging tongs, and this discharge is in the form of an oscillatory current (see Electrokinetics). The energy stored up in the jar in joules is expressed by the value of 5 C" 2 , where C is the capacity measured in farads and V the potential difference of the coatings in volts. If the capacity C is reckoned in microfarads then the energy storage is equal to CV 2 /2Xio 6 joules or 0-737 CV 2 /2Xio 6 foot-pounds. The size of jar commonly known as a quart size may have a capacity from ToT tri to -g-oTth of a microfarad, and if charged to 20,000 volts stores up energy from a quarter to half a joule or from ! 8 aths to fths of a foot-pound.

Leyden jars are now much employed for the production of the high frequency electric currents used in wireless telegraphy (see Telegraphy, Wireless). For this purpose they are made by Moscicki in

the form of glass tubes partly coated by silver chemically deposited on the glass on the inner and outer surfaces. The tubes have walls thicker at the ends than in the middle, as the tendency to puncture the glass is greatest at the edges of the coatings. In other cases, Leyden jars or condensers take the form of sheets of mica or micanite or ebonite partly coated with tin foil or silver leaf on both sides; or a pile of sheets of alternate tin foil and mica may be built up, the tin foil sheets having lugs projecting out first on one side and then on the other. All the lugs on one side are connected together, and so also are all the lugs on the other side, and the two sets of tin foils separ- ated by sheets of mica constitute the two metallic surfaces of the Leyden jar condenser. For the purposes of wireless tele- graphy, when large condensers are required, the ordinary Leyden Hlsth i ar occu P' es t°o much space in comparison with its

tension electrical capacity, and hence the best form of con- condea- denser consists of a number of sheets of crown glass, sers " each partly coated on both sides with tin foil. The

tin foil sheets have lugs attached which project beyond the glass. The plates are placed in a vessel full of insulating oil which pre- vents the glow or brush discharge taking place over their edges. All the tin foils on one side of the glass plates are connected together and all the tin foils on the opposite sides, so as to con- struct a condenser of any required capacity. The box should be of glass or stoneware or other non-conducting material. When glass tubes are used it is better to employ tubes thicker at the ends than in the middle, as it has been found that when the safe voltage is exceeded and the glass gives way under electric strain, the piercing of the glass nearly always takes place at the edges of the tin foil.

Glass is still commonly used as a dielectric because of its cheapness, high dielectric strength or resistance to electric Com- puncture, and its high dielectric constant (see Electro-

pressed statics). It has been found, however, that very aircoa- efficient condensers can be made with compressed air easers. a s dielectric. If a number of metal plates separated by small distance pieces are enclosed in an iron box which is pumped full of air to a pressure, say, of 100 lb. to 1 sq. in., the dielectric strength of the air is greatly increased, and the plates may there- fore be brought very near to one another without causing a spark

to pass under such voltage as would cause discharge in air at normal pressure. Condensers of this kind have been employed by R. A.

Fessenden in wireless telegraphy, and they form a very excellent arrangement for standard condensers with which to compare the capacity of other Leyden jars. Owing to the Variation in the value of the dielectric constant of glass with the temperature and with the frequency of the applied electromotive force, and also owing to electric glow discharge from the edges of the tin foil coatings, the capacity of an ordinary Leyden jar is not an absolutely fixed quantity, but its numerical value varies somewhat with the method by which it is measured, and with the other circumstances above mentioned. For the purpose of a standard condenser a number of concentric metal tubes may be arranged on an insulating stand, alternate tubes being con- nected together. One coating of the condenser is formed by one set of tubes and the other by the other set, the air between being the dielectric. Paraffin oil or any liquid dielectric of constant inductivity may replace the air.

See T. A. Fleming, Electric Wave Telegraphy (London, 1906); R. A. Fessenden, ” Compressed Air for Condensers,” Electrician, I 9°5. 55 > P’ 7.95; Moscicki, ” Construction of High Tension Con- densers,” L’Eclairage electrique, 1904, 41, p. 14, or Engineering, 1904, p. 865. (J. A. F.)

LEYS, HENDRIK, Baron (1815-1869), Belgian painter, was born at Antwerp on the 18th of February 181 5. He studied under Wappers at the Antwerp Academy. In 1833 he painted ” Combat d’un grenadier et d’un cosaque,” and in the following year ” Combat de Bourguignons et Flamands.” In 1835 he went to Paris where he was influenced by the Romantic move- ment. Examples of this period of his painting are ” Massacre des echevins de Louvain,” ” Mariage flamand,” ” Le Roi des arbalfitriers ” and other works. Leys was an imitative painter in whose works may rapidly be detected the schools which he had been studying before he painted them. Thus after his visit to Holland in 1839 he reproduced many of the characteristics of the Dutch genre painters in such works as ” Franz Floris se rendant a une fete ” (1845) and ” Service divin en Hollande ” (1850). So too the methods of Quentin Matsys impressed themselves upon him after he had travelled in Germany in 1852. In 1862 Leys was created a baron. At the time of his death, which occurred in August 1869, he was engaged in decorating with fresco the large hall of the Antwerp Hotel de Ville.

LEYTON, an urban district forming one of the north-eastern suburbs of London. England, in the Walthamstow (S.W.) parliamentary division of Essex. Pop. (1891) 63,106; (1901) 98,912. It lies on the east (left) bank of the Lea, along the flat open valley of which runs the boundary between Essex and the county of London. The church of St Mary,

mainly a brick reconstruction, contains several interesting memorials; including one to William Bowyer the printer (d. 1737), erected by his son and namesake, more famous in the same trade. Here is also buried John Strype the historian and biographer (d. 1737), who held the position of curate and lecturer at this church. Leyton is in the main a residential as distinct from a manufactur- ing locality. Its name is properly Low Leyton, and the parish includes the district of Leytonstone to the east. Roman remains have been discovered here, but no identification with a Roman station by name has been made with certainty. The ground of the Essex County Cricket Club is at Leyton.

LHASA (Lhassa, Lassa, ” God’s ground “), the capital of Tibet. It lies in 29° 39′ N., 91 5′ E., 11,830 ft. above sea-level. Owing to the inaccessibility of Tibet and the political and religious exclusiveness of the lamas, Lhasa was long closed to European travellers, all of whom during the latter half of the 19th century were stopped in their attempts to reach it. It was popularly known as the ” Forbidden City.” But its chief features were known by the accounts of the earlier Romish missionaries who visited it and by the investigations, in modern times, of native Indian secret explorers, and others, and the British armed mission of 1904 (see Tibet).

Site and General Aspect. — The city stands in a tolerably level plain, which is surrounded on all sides by hills. Along its

southern side, about 5 m. south of Lhasa, runs a considerable river called the Kyichu (Ki-chu) or Kyi, flowing here from E.N.E., and joining the great Tsangpo (or upper course of the Brahma- putra) some 38 m. to the south-west. The hills round the city are barren. The plain, however, is fertile, though in parts marshy. There are gardens scattered over it round the city, and these are planted with fine trees. The city is screened from view from the west by a rocky ridge, lofty and narrow, with summits at the north and south, the one flanked and crowned by the majestic buildings of Potala, the chief residence of the Dalai lama, the other by the temple of medicine. Groves, gardens and open ground intervene between this ridge and the city itself for a distance of about 1 m. A gate through the centre of the ridge gives access from the west ; the road thence to the north part of the city throws off a branch to the Yutok sampa or turquoise-tiled covered bridge, one of the noted features of Lhasa, which crosses a former

channel of the Kyi, and carries the road to the centre of the town.

The city is nearly circular in form, and less than 1 m. in dia- meter. It was walled in the latter part of the 17th century, but the walls were destroyed during the Chinese occupation in 1722. The chief streets are fairly straight, but generally of no great width. There is no paving or metal, nor any drainage system, so that the streets are dirty and in parts often flooded. The inferior quarters are unspeakably filthy, and are rife with evil smells and large mangy dogs and pigs. Many of the houses are of clay and sun-dried brick, but those of the richer people are of stone and brick. All are frequently white-washed, the doors and windows being framed in bands of red and yellow. In the suburbs there are houses entirely built of the horns of sheep and oxen set in clay mortar. This construction is in some cases very roughly carried out, but in others it is solid and highly picturesque. Some of the inferior huts of this type are inhabited by the Ragyaba or scavengers, whose chief occupation is that of disposing of corpses according to the practice of cutting and exposing them to the dogs and birds of prey. The houses gener- ally are of tW'o or three storeys. Externally the lower part generally presents dead walls (the ground floor being occupied by stables and similar apartments); above these rise tiers of large windows with or without projecting balconies, and over all flat broad-eaved roofs at varying levels. In the better houses there are often spacious and well-finished apartments, and the principal halls, the verandahs and terraces are often highly ornamented in brilliant colours. In every house there is a kind of chapel or shrine, carved and gilt, on which are set images and sacred books.

Temples and Monasteries. — In the centre of the city is an open square which forms the chief market-place. Here is the great temple _. of the " Jo " or Lord Buddha, called the Jokhang, 1

, * regarded as the centre of all Tibet, from which all the main

" g ' roads are considered to radiate. This is the great metro- politan sanctuary and church-centre of Tibet, the St Peter's or Lateran of Lamaism. It is believed to have been founded by the Tibetan Constantine, Srong-tsan-gampo, in 652, as the shrine of one of those two very sacred Buddhist images which were associated with his conversion and with the foundation of the civilized monarchy in Tibet. The exterior of the building is not impressive; it rises little above the level of other buildings which closely surround it, and the effect of its characteristic gilt roof, though conspicuous and striking from afar, is lost close at hand.

The main building of the Jokhang is three storeys high. The entrance consists of a portico supported on timber columns, carved and gilt, while the walls are engraved with Chinese, Mongolian and Tibetan characters, and a great prayer-wheel stands on one side. Massive folding doors, ornamented with scrollwork in iron, lead to an antehall, and from this a second gate opens into a courtyard surrounded by a verandah with many p illars and chapels, and frescoes on its walls. On the left is the throne of the grand lama, laid with cushions, together with the seats of other ecclesiastical dignitaries, variously elevated according to the rank of their occupants. An inner door with enclosed vestibule gives access to the quadrangular choir or chancel, as it may be called, though its centre is open to the sky. On either side of it are three chapels, and at the extremity is the rectangular "holy of holies," flanked by two gilded images of the coming Buddha, and screened by lattice-work. In it is the shrine on which sits the great image of Sakya, set about with small

1 The name given by Koppen (Die lamaische Kirche, Berlin, 1859, p. 74) is " La Brang," by which it is sometimes known.

figures, lamps and a variety of offerings, and richly jewelled, though the workmanship of the whole is crude. In the second and third storeys of the temple are shrines and representations of a number of gods and goddesses. The temple contains a vast accumulation of images, gold and silver vessels, lamps, reliquaries and precious bric-a-brac of every kind. The daily offices are attended by crowds of worshippers, and a sacred way which leads round the main build- ing is constantly traversed by devotees who perform the circuit as a work of merit, always in a particular direction. The temple was found by the members of the British mission who visited it to be exceedingly dirty, and the atmosphere was foul with the fumes of butter-lamps.

Besides the convent-cells, halls of study and magazines of precious lumber, buildings grouped about the Jokhang are occupied by the civil administration, e.g. as treasuries, customs office, courts of justice, &c, and there are also private apartments for the grand lama and other high functionaries. No woman is permitted to pass the night within the precinct.

In front of the main entrance to the Jokhang, in the shadow of a sacred willow tree, stands a famous monument, the Doring monolith, which bears the inscribed record of a treaty of peace concluded in 822 (or, according to another view, in 783) between the king of Tibet and the emperor of China. Before this monument the apostate from Lamaism, Langdharma, brother and successor of the last-named king,

is said to have been standing when a fanatic recluse, who had been stirred by a vision to avenge his persecuted faith, assassinated him.

The famous Potala hill, covered by the palace of the Dalai lama, forms a majestic mountain of building; with its vast inward-sloping walls broken only in the upper parts by straight rows of p (a/a many windows, and its flat roofs at various levels, it is not unlike a fortress in appearance. At the south base of the rock is a large space enclosed by walls and gates, with great porticoes on the inner side. This swarms with lamas and with beggars. A series of tolerably easy staircases, broken by intervals of gentle ascent, leads to the summit of the rock. The whole width of this is occupied by the palace. The central part of this group of buildings (for the component parts of Potala are of different dates) rises in a vast quadrangular mass above its satellites to a great height, terminat- ing in gilt canopies similar to those on the Jokhang. Here on the lofty terrace is the grand lama's promenade, and from this great height he looks down upon the crowds of his votaries far below. This central member of Potala is called the red palace from its crimson colour, which distinguishes it from the rest. It contains the principal halls and chapels and shrines of past Dalai lamas. There is in these much rich decorative painting, with jewelled work, carving and other ornament, but the interior of Potala as a whole cannot compare in magnificence with the exterior. Among the numerous other buildings of note on or near Potala hill, one is distinguished by the Chinese as one of the principal beauties of Lhasa. This is a temple not far from the base of the hill, in the middle of a lake which is surrounded by trees and shrubberies. This temple, called Lu-kang, is circular in form, with a loggia or portico running all round and adorned with paintings. Its name, " the serpent house," comes from the tradition of a serpent or dragon, which dwelt here and must be propitiated lest it should cause the waters to rise and flood Lhasa.

Another great and famous temple is Ramo-che, at the north side of the city. This is also regarded as a foundation of "Srong-tsan- gampo, and is said to contain the body of his Chinese wife and the second of the primeval palladia, the image that she brought with her to the Snow-land; whence it is known as the " small Jokhang." This temple is noted for the practice of magical arts. Its buildings are in a neglected condition.

Another monastery within the city is that of Moru, also on the north side, remarkable for its external order and cleanliness. Though famous as a school of orthodox magic, it is noted also for the printing- house in the convent garden. This convent was the temporary residence of the regent during the visit of the British mission in 1904. Other

monasteries in or near the city are the Tsamo Ling or Chomoling at the north-west corner; the Tangyii Ling or Tengyeiing at the west of the city; the Kunda Ling or Kundcling about I m. west of the city, at the foot of a low isolated hill called Chapochi. Three miles south, beyond the river, is the Tsemchog Ling or Tsecho- ling. These four convents are known as ” The Four Ling.” From their inmates the Dalai lama’s regent, during his minority, was formerly chosen. The temple of medicine, as already stated, crowns the summit (Chagpa) at the end of the ridge west of the city, opposite to that on which stands the Potala. It is natural that in a country possessing a religious system like that of Tibet the medical profession should form a branch of the priesthood. ” The treatment of disease, though based in some measure upon a judicious use of the commoner simple drugs of the country, is, as was inevitable amongst so super- stitious a people, saturated with absurdity ” (Waddell, Lhasa and its Mysteries).

The three great monasteries in the vicinity of Lhasa, all claiming to be foundations of Tsongkhapa (1356-1418), the medieval reformer and organizer of the modern orthodox Lama Church, ” the yellow caps,” are the following: —

1. Debung (written ‘Bras spungs) is 6 m. west of Lhasa at the foot

of the hills which flank the plain on the north. It is one of the largest monasteries in the world, having some 8000 monks. In the middle of the convent buildings rises a kind of pavilion, brilliant with colour and gilding, which is occupied by the Dalai Lama when he visits Debung once a year and expounds to the inmates. The place is frequented by the Mongol students who come to Lhasa to graduate, and is known in the country as the Mongol convent ; it has also been notorious as a centre of political intrigue. Near it is the seat of the chief magician of Tibet, the Nachung Chos-kyong, a building picturesque in itself and in situation.

2. Sera is 3 m. north of the city on the acclivity of the hills and close to the road by which pilgrims enter from Mongolia. From a distance the crowd of buildings and temples, rising in amphitheatre against a background of rocky mountains, forms a pleasing picture. In the recesses of the hill, high above the convent, are scattered cells of lamas adopting the solitary life. The chief temple of Sera, a highly ornate building, has a special reputation as the resting- place of a

famous Dorje, i.e. the Vajra or Thunderbolt of Jupiter, the symbol of the strong and indestructible, which the priest grasps and manipulates in various ways during prayer. The emblem is a bronze instrument, shaped much like a dumbbell with pointed ends, and it is carried solemnly in procession to the Jokhang during the New Year's festival.

The hill adjoining Sera is believed to be rich in silver ore, but it is not allowed to be worked. On the summit is a spring and a holy place of the Lhasa Mahommedans, who resort thither. Near the monastery there is said to be gold, which is worked by the monks. " Should they . . . discover a nugget of large size, it is immediately replaced in the earth, under the impression that the large nuggets . . . germinate in time, producing the small lumps which they are privileged to search for " (Nain Singh).

3. Galdan. — This great convent is some 25 m. east of Lhasa, on the other side of the Kyichu. It is the oldest monastery of the

' Yellow " sect, having been founded by Tsongkhapa and having had him for its first superior. Here his body is said to be preserved with miraculous circumstances; here is his tomb, of marble and malachite, with a great shrine said to be of gold, and here are other relics of him, such as the impression of his hands and feet.

Samye is another famous convent intimately connected with Lhasa, being said to be used as a treasury by the government, but it lies some 36 m. south-east on the left bank of the great Tsangpo. It was founded in 770, and is the oldest extant monastery in Tibet. It is surrounded by a' very high circular stone wall, l| m. in circum- ference, with gates facing the four points of the compass. On this wall Nain Singh, who was here on his journey in 1874, counted 1030 votive piles of brick. One very large temple occupies the centre, and round it are four smaller but still large temples. Many of the idols are said to be of pure gold, and the wealth is very great. The interiors of the temples are covered with beautiful writing in enormous characters, which the vulgar believe to be the writing of Sakya himself.

Population and Trade. — The total population of Lhasa, including the lamas in the city and vicinity, is probably about 30,000; a census in 1854 made the figure 42,000, but it is known to have greatly decreased since. There are only some 1500 resident Tibetan laymen and about 5500 Tibetan women. The permanent population embraces, besides Tibetans, settled families of Chinese (about 2000 persons), as well as people from Nepal, from Ladak, and a few from Bhotan and Mongolia. The Ladakis and some of the other foreigners are

Mahommedans, and much of the trade is in their hands. Desideri (1716) speaks also of Armenians and even ” Muscovites.” The Chinese have a crowded burial-ground at Lhasa, tended carefully after their manner. The Nepalese (about 800) supply the mechanics and metal-workers. There are among them excellent gold- and silversmiths; and they make the elaborate gilded canopies crowning the temples. The chief industries are the weaving of a great variety of stuffs from the fine Tibetan wool; the making of earthenware and of the wooden porringers (varying immensely in elaboration and price) of which every Tibetan carries one about with him; also the making of certain fragrant sticks of incense much valued in China and elsewhere.

As Lhasa is not only the nucleus of a cluster of vast monastic establishments, which attract students and aspirants to the religious life from all parts of Tibet and Mongolia, but is also a great place of pilgrimage, the streets and public places swarm with visitors from every part of the Himalayan plateau, 1 and from all the steppes of Asia between Manchuria and the Balkhash Lake. Naturally a great traffic arises quite apart from the

1 Among articles sold in the Lhasa bazaars are fossil bones, called by the people ” lightning bones,” and believed to have healing virtues.

pilgrimage. The.

During December especially traders arrive from western China by way of Tachienlu bringing every variety of silk-stuffs, carpets, china-ware and tea; from Siningfu come silk, gold lace, Russian goods, carpets of a superior kind, semi-precious stones, horse furniture, horses arid a very large breed of fat-tailed sheep; from eastern Tibet, musk in large quantities, which eventually finds its way to Europe through Nepal; from Bhotan and Sikkim, rice; from Sikkim also tobacco; besides a variety of Indian and European goods from Nepal and Darjeeling, and charas (resinous exudation of hemp) and saffron from Ladakh and Kashmir. The merchants leave Lhasa in March, before the setting in of the rains renders the rivers impassable.

The tea importation from China is considerable, for tea is an absolute necessary to the Tibetan. The tea is of various qualities, from the coarsest, used only for ” buttered ” tea (a sort of broth), to the fine quality drunk by the wealthy. This is pressed into bricks or cakes weighing about 55 lb, and often passes as currency. The quantity that pays duty at Tachienlu is about 10,000,000 lb, besides some amount smuggled. No doubt a large part of this comes to Lhasa.

Lhasa Festivities. — The greatest of these is at the new year. This lasts fifteen days, and is a kind of lamaic carnival, in which masks and mummings, wherein the Tibetans take especial delight, play a great part. The celebration commences at midnight, with shouts and clangour of bells, gongs, chank-shells, drums and all the noisy repertory of Tibetan music; whilst friends exchange early visits and administer coarse sweetmeats and buttered tea. On the second day the Dalai Lama gives a grand banquet, at which the Chinese and native authorities are present, whilst in the public spaces and in front of the great convents all sorts of shows and jugglers' perform- ances go on. Next day a regular Tibetan exhibition takes place. A long cable, twisted of leather thongs, is stretched from a high point in the battlements of Potala slanting down to the plain, where it is strongly moored. Two men slide from top to bottom of this huge hypothenuse, sometimes lying on the chest (which is protected by a breast-plate of strong leather), spreading their arms as if to swim, and descending with the rapidity of an arrow-flight. Occasionally fatal accidents occur in this performance, which is called " the dance of the gods "; but the survivors are rewarded by the court, and the Grand Lama himself is always a witness of it. This practice occurs more or less over the Himalayan plateau, and is known in the neigh- bourhood of the Ganges as Barat. It is employed as a kind of expiatory rite in cases of pestilence and the like. Exactly the same performance is described as having been exhibited in St Paul's Church- yard before King Edward VI., and again before Philip of Spain, as well as, about 1750, at Hertford and other places in England (see Strutt's Sports, &c, 2nd ed., p. 198).

The most remarkable celebration of the new year's festivities is the great jubilee of the Monlam {sMon-lam, " prayer "), instituted by Tsongkhapa himself in 1408. Lamas from all parts of Tibet, but chiefly from the great convents in the neighbourhood, flock to Lhasa, and every road leading thither is thronged with troops of monks on foot or horseback, on yaks or donkeys, carrying with them their breviaries and their cooking-pots. Those who cannot find lodging bivouac in the streets and squares, or pitch their little black tents in the plain. The festival lasts six days, during which there reigns a kind of saturnalia. Unspeakable confusion and disorder reign, while gangs of lamas parade the streets, shouting, singing and coming to blows. The object of this gathering is, however, supposed to be devotional. Vast processions take place, with mystic offerings and lama-music, to the Jokhang and Moru convents; the Grand Lama himself assists at the festival, and from an elevated throne beside the Jokhang receives the offerings of the multitude and bestows his benediction.

On the 15th of the first month multitudes of torches are kept ablaze, which lighten up the city to a great distance, whilst the interior of the Jokhang is illuminated throughout the night by in- numerable lanterns shedding light on coloured figures in bas-relief, framed in arabesques of animals, birds and flowers, and representing the history of Buddha and other subjects, all modelled in butter. The figures are executed on a large scale, and, as described by Hue, who witnessed the festival at Kunbum on the frontier of China, with extraordinary truth and skill. These singular works of art occupy some months in preparation, and on the morrow are thrown

away. On other days horse-races take place from Sera to Potala, and foot-races from Potala to the city. On the 27th of the month the holy Dorje is carried in solemn procession from .Sera to the Jokhang, and to the presence of the lama at Potala.

Of other great annual feasts, one, in the fourth month, is assigned to the conception of Sakya, but appears to connect itself with the old nature-feast of the entering of spring, and to be more or less identical with the Hull of India. A second, the consecration of the waters, in September-October, appears, on the confines of India, to be associated with the Dasehra.

On the 30th day of the second month there takes place a strange ceremony, akin to that of the scapegoat (which is not unknown in India). It is called the driving out of the demon. A man is hired to perform the part of demon (or victim rather), a part which sometimes ends fatally. He is fantastically dressed, his face mottled with white and black, and is then brought forth from the Jokhang to engage in quasi-theological controversy with one who represents the Grand Lama. This ends in their throwing dice against each other (as it were for the weal or woe of Lhasa). If the demon were to win the omen would be appalling; so this is effectually barred by false dice. The victim is then marched outside the city, followed by the troops and by the whole populace, hooting, shouting and firing volleys after him. Once he is driven off, the people return, and he is carried off to the Samye convent. Should he die shortly after, this is auspicious ; if not, he is kept in ward at Samye for a twelvemonth.

Nain Singh, whose habitual accuracy is attested by many facts, mentions a strange practice of comparatively recent origin, according

to which the civil power in the city is put up to auction for the first twenty-three days of the new year. The purchaser, who must be a member of the Debung monastery, and is termed the Jalno, is a kind of lord of misrule, who exercises arbitrary authority during that time for his own benefit, levying taxes and capricious fines upon the citizens.

History. — The seat of the princes whose family raised Tibet to a position among the powers of Asia was originally on the Yarlung river, in the extreme east of the region now occupied by Tibetan tribes. It was transplanted to Lhasa in the 7th century by the king Srong-tsan-gampo, conqueror, civilizer and proselytizer, the founder of Buddhism in Tibet, the intro- ducer of the Indian alphabet. On the three-peaked crag now occupied by the palace-monastery of the Grand Lama this king is said to have established his fortress, while he' founded in the plain below temples to receive the sacred images, brought respectively from Nepal and from China by the brides to whom his own conversion is attributed.

Tibet endured as a conquering power some two centuries, and the more famous among the descendants of the founder added to the city. This-rong-de-tsan (who reigned 740-786) is said to have erected a great temple-palace of which the basement followed the Tibetan style, the middle storey the Chinese, and the upper storey the Indian — a combination which would aptly symbolize the elements that have moulded the culture of Lhasa. His son, the last of the great orthodox kings, in the next century, is said to have summoned artists from Nepal and India, and among many splendid foundations to have erected ! a sanctuary (at Samye) of vast height, which had nine storeys, the three lower of stone, the three middle of brick, the three uppermost of timber. With this king the glory of Tibet and of ancient Lhasa reached its zenith, and in 822, a monument recording his treaty on equal terms with the Great T'ang emperor of China was erected in the city. There followed dark days for Lhasa and the Buddhist church in the accession of this king's brother Lang- dharma, who has been called the Julian of the lamas. This king rejected the doctrine, persecuted and scattered its ministers, and threw down its temples, convents and images. It was more than a century before Buddhism recovered its hold and its convents were rehabilitated over Tibet. The country was then split into an infinity of petty states, many of them ruled from the convents by warlike ecclesiastics; but, though the old monarchy never recovered, Lhasa seems to have maintained some supremacy, and probably never lost its claim to be the chief city of that congeries of principalities, with a common faith and a common language, which was called Tibet.

The Arab geographers of the 10th century speak of Tibet, but without real knowledge, and none speaks of any city that we can identify with Lhasa. The first passage in any Western author in which such identification can be probably traced occurs in the narrative of Friar Odoric of Pordenone (c. 1330).

This remarkable traveller's route from Europe to India, and thence by sea to China, can be traced satisfactorily, but of his journey homeward through Asia the indications are very frag- mentary. He speaks, however, on this return journey of the realm of Tibet, which lay on the confines of India proper: " The folk of that country dwell in tents made of black felt. But the chief and royal city is all built with walls of black and white, and all its streets are very well paved. In this city no one shall dare to shed the blood of any, whether man or beast, for the reverence they bear a certain idol that is there worshipped. In that city dwelleth the Abassi, i.e. in their tongue the pope, who is the head of all the idolaters, and has the disposal of all their benefices such as they are after their manner."

We know that Kublai Khan had constituted a young prince of the Lama Church, Mati Dhwaja, as head of that body, and tributary ruler of Tibet, but besides this all is obscure for a century. This passage of Odoric shows that such authority continued under Kublai's descendants, and that some foreshadow of the position since occupied by the Dalai Lama already existed. But it was not till a century after Odoric that the strange heredity of the dynasty of the Dalai Lamas of Lhasa actually began. In the first two centuries of its existence the residence of these pontiffs was rather at Debung or Sera than at Lhasa itself, though the latter was the centre of devout resort. A great event for Lhasa was the conversion, or reconversion, of the Mongols to Lamaism (c. 1577), which made the city the focus'of sanctity and pilgrimage to so vast a tract of Asia. It was in the middle of the 17th century that Lhasa became the residence of the Dalai Lama. A native prince, known as the Tsangpo, with his seat at Shigatse, had made himself master of southern Tibet, and threatened to absorb the whole. The fifth Dalai Lama, Nagwang Lobzang, called in the aid of a Kalmuck prince, Gushi Khan, from the neighbourhood of the Koko-nor, who defeated and slew the Tsangpo and made over full dominion in Tibet to the lama (1641). The latter now first established his court and built his palace on the rock-site of the fortress of the ancient monarchy, which apparently had fallen into ruin, and to this he gave the name of Potala.

The founder of Potala died in 1681. He had appointed as " regent " or civil administrator (Deisri, or Deba) one supposed to be his own

natural son. This remarkable personage, Sangye Gyamtso, of great ambition and accomplishment, still renowned in Tibet as the author of some of the most valued works of the native literature, concealed the death of his master, asserting that the latter had retired, in mystic meditation or trance, to the upper chambers of the palace. The government continued to be carried on in the lama's name by the regent, who leagued with Galdan Khan of Dzungaria against the Chinese (Manchu) power. It was not till the great emperor Kang-hi was marching on Tibet that, the death of the lama, sixteen years before, was admitted. A solemn funeral was then performed, at which 108,000 lamas assisted, and a new incarnation was set up in the person of a youth of fifteen, Tsangs-yang Gyamtso. This young man was the scandal of the Lamaist Church in every kind of evil living and debauchery, so that he was deposed and assassin- ated in 1 701. But it was under him and the regent Sangye Gyamtso that the Potala palace attained, its present scale of grandeur, and that most of the other great buildings of Lhasa were extended and embellished.

For further history and bibliography, see Tibet. Consult also Lamaism. (H. Y.; L. A. W.)

L'HOPITAL (or L'Hospital), MICHEL DE (c. 1505-1573), French statesman, was born near Aigueperse in Auvergne (now Puy -de-Dome). His father, who was physician to the constable Charles of Bourbon, sent him to study at Toulouse, whence at the age of eighteen he was driven, a consequence of the evil fortunes of the family patron, to Padua, where he studied law and letters for about six years. On the completion of his studies he joined his father at Bologna, and afterwards, the constable having died, went to Rome in the suite of Charles V. For some time he held a position in the papal court at Rome, but about 1534 he returned to France, and becoming an advocate, bis

marriage, in 153 7, procured for him' the post of counsellor to trie parlement of Paris. This office he held until 1547, when he was sent by Henry II. on a mission to Bologna, where the council of Trent was at that time sitting; after sixteen months of wearisome inactivity there, he was by his own desire ! recalled at the close of 1548. L'Hopital now for some time held the position of chancellor to the king's sister, Margaret, duchess of Berry. In 1553, on the recommendation of the Cardinal of Lorraine, he was named master of the requests, and

afterwards president of the chambre des comptes. In 1559 he accompanied the princess Margaret, now duchess of Savoy, to Nice, where, in the following year, tidings reached him that he had been chosen to succeed Francois Olivier (1487-1560) in the chancellor- ship of France.

One of his first acts after entering on the duties of his office was to cause the parlement of Paris to register the edict of Romorantin, of which he is sometimes, but erroneously, said to have been the author. Designed to protect heretics from the secret and summary methods of the Inquisition, it certainly had his sympathy and approval. In accordance with the cpnsistent policy of inclusion and toleration by which the whole of his official life was characterized, he induced the council to call the assembly of notables, which met at Fontainebleau in August 1560 and agreed that the States General should be summoned, all proceedings against heretics being meanwhile suppressed, pending the reformation of the church by a general or national council. The States General met in December; the edict of Orleans (January 1561) followed, and finally, after the colloquy of Poissy, the edict of January. 1562, the most liberal, except that of Nantes, ever obtained by the Protestants of France. Its terms, however, were not carried out, and during the war which was the inevitable result of the massacre of Vassy in March, L'H6pital, whose dismissal had been for some time urged by the papal legate Hippolytus of Este, found it necessary to retire to his estate at Vignay, near Etampes, whence he did not return until after the pacification of Amboise (March 19, 1563). Tt was by his advice that Charles IX. was declared of age at Rouen in August 1363, a measure which really increased the power Of Catherine de' Medici; and it was under his influence also that the' royal council in 1564 refused to authorize the publication of the acts of the council of Trent, on account of their inconsistency with the Gallican liberties. In 1564-1566 he accompanied the young king on an extended tour through France; and in 1566 he was instrumental in the promulgation of an important edict for the reform of abuses in the administration of justice. The renewal of the religious war in September 1567, however, was at once a symptom and a cause of diminished influence to L'Hopital, and in February 1568 he obtained his letters of discharge, which were registered by the parlement on the nth of May, his titles, honours and emoluments being reserved to him during the re- mainder of his life. Henceforward he lived a life of unbroken seclusion at Vignay, his only subsequent public appearance being by means of a memoir e which he addressed to the king in 1570 under the title Le But de la guerre et de la paix, ou discours du chancel ier I' Hospital pour exhort 'er Charles IX. a. donn'er la paix a

ses sujets. Though not exempt from considerable danger, he passed in safety through the troubles of StBartholomew's eve. His death took place either at Vignay orat Bellebat on the 13th of March 1573.

After his death Pibrac, assisted by De Thou and Scevole de Sainte-Marthe, collected a volume of the Poemata of L'H&pitaf, and in 1585 his grandson published Epistolarum seu SermonUm libri sex. The complete CEuvres de I'Hopital were published fpr the first time by P. J..S. Dufey (5 vols., Paris, 1824-1825). They include his " Harangues " and "Remonstrances," the Epistles, the Memoire to Charles IX., a Traite de la reformation de la justice, 'and hts'will. See also A. F. Villemain, Vie du Chdncelier de Vlldpital (Paris* 1874) ; R. G. E. T; St-Rene Taillandier, Le Chancelier. de I'Hospitglflifˆtis, 1861); Dupre-Lasalle, Michel de I' Hospital avant son elevation au pbstc de chancelier de France (Paris, 1875-1899); Amphoux, Mictiel de I' Hospital et la liberie de conscience au'XVl' siecle (Paris, i960); C. T. Atkinson, Michel de I' Hospital (London, I900), containing; an appendix on bibliography and sources; A. ,E. . Shaw, Michpl . de V Hospital and his Policy (London, .1905) ; and Eugene and Emile Haag, La France protestante (and ed., 1877 seq.).

LIAO-YANG, a city of China, formerly the chief town of the province of Liao-tung or Sh6ng-king (southern Manchuria), 35 m. S of Mukden. It is situated in' a rich cotton district in the fertile valley of the Liao, on the road between Niuchwang and Mukden, and carries on a considerable trade. The walls include an area about 25 m. long by 2 m. broad, and there are fairly extensive suburbs; but a good deal even of the enclosed area is under cultivation. The population is estimated at 100,000. Liao-yang was one of the first objectives of the Japanese during the Russo-Japanese War, and its capture by them resulted in some of the fiercest fighting during the campaign, from the 24th of August to the 4th of September 1904.

LIAS, in geology, the lowermost group of Jurassic strata. Originally the name seems to have been written " Lyas "; it is most probably a provincial form of ." layers," strata, employed by quarrymen in the west of England; it has been suggested, however, that the Fr. liais, Breton leach = a stone, Gaelic leac = a flat stone, may have given rise to the English " Lias." Liassic strata occupy an important position in England, where they crop out at Lyme Regis on the Dorsetshire coast and extend thence by Bath, along the western flank of the Cotswold Hills, forming Edge Hill and appearing at Banbury, Rugby, Melton, Grantham, Lincoln, to Redcar on the coast of Yorkshire. They occur also in Glamorganshire, Shropshire, near Carlisle, ■. in Skye, Raasay (Pabba, Scalpa and Broadfoot beds), and elsewhere in the

north of Scotland, and in the north-east of Ireland. East of the belt of outcrop indicated, the Lias is known to occur beneath the younger rocks for some distance farther east, but it is absent from beneath London, Reading, Ware, Harwich, Dover, and in the southern portion of the area in which these towns lie; the Liassic rocks are probably thinned out against a concealed ridge of more ancient rocks. The table on following page will serve to illustrate the general characters of the English Lias and the subdivisions adopted by the Geological Survey. By the side are shown the principal zonal ammonites, and, for comparison, the subdivisions preferred by Messrs Tate and Blake arid by A. de Lapparent.

The important fact is clearly demonstrated in the table, that where the Lias is seen in contact with the Trias below or the Inferior Oolite above, there is, as a tule, a gradual passage from the Liassic formation, both downwards and upwards; hence Professor de Lapparent includes in his Liassique System the zone of Ammonites opalinus at the top, and the Rhaetic beds at the bottom (see Oolite; Rhaetic).. Owing to the trans- gression of the Liassic sea the strata rest in places upon older Palaeozoic rocks. The thickness of the Lias varies considerably; in Dorsetshire if is 900 ft., near Bath it has thinned to 280 ft., and beneath Oxford it is further reduced. In north Gloucester- shire it is 1360 ft., Northampton 760 ft., Rutland 800 ft., Lincoln- shire 950 ft., and in Yorkshire about 500 ft.

The Lias of England was laid down in conditions very similar to those which obtained at the same time in north France and north Germany, that is. to say, on the floor of a shallow sea; but in the Alpine region limestones are developed upon a much greater scale. Many of the limestones are red and crystalline marbles such as the ” ammonitico-rosso-inferiore ” of the Apennines; a grey, laminated limestone is known as the ” Fleckenmergel.” The whitish ” Hierlatzkalke,” the Adnet beds and the ” Grestener beds” in the eastern Alps and Balkan Mountains are important phases of Alpine Lias. The Grestener -beds contain a considerable amount of coal. The Lias of Spain and the Pyrenees contains much dolomitic limestone. This formation is widely spread in western Europe; besides the localities already cited it occurs in Swabia, the Rhenish provinces, Alsace-Lorraine, Luxemburg, Ardennes, Normandy, Austria-Hungary, the Balkan States, Greece ‘and Scania. It has not been found north of Kharkov in Russia, but it is present in the south and in the Caucasus, in Anatolia, Persia and the Himalayas. It appears on the eastern side .of’ Japan, in Borneo, Timor, New Caledonia and New Zealand (Bastion beds); in Algeria, Tunisia and elsewhere in North Africa, and on the west coast of Madagascar. In South America it is found in the Bolivian Andes, in Chile and

Argentina; it appears also on the Pacific coast of North America.

The economic products of the Lias are of considerable importance. In the Lower Lias of Lincolnshire and the Middle Lias of Oxfordshire, Northamptonshire, Lincolnshire, Leicestershire and Yorkshire the beds of ironstone are of great value. Most of these ores are limestones that have been converted into iron carbonate with some admixture of silicates; they weather near the surface into hydrated peroxide.

He removed his school to Nicomedia, where he remained five years. After another attempt to settle in Constantinople , he finally retired to Antioch (354). Though a pagan, he enjoyed the favour of the Christian emperors. When Julian, his special patron, restored paganism as the state religion, Libanius showed

S.W. England and Midlands.

Yorkshire.

Ammonite Zones. 1

Divisions according to A. de Lapparent. 2

Midford Sands (passage beds)

Clays with Cement-stones Limestones and Clays

Alum shale

Jet Rock Grey Shale

Am. jurensis

„ communis ,, serpentinus . „ annulatus -,

-U.

(Including the opalinus zone

of the Inferior Oolite.) Toarcien.

S- 1

Marlstone and Sands

(Rock Bed and Ironstones) Micaceous Clays and Sands

Ironstone Series Sandy Series

Am. spinatus ,, margaritatus

-M.

Charmouthien.

u

O

Clays with occasional bands of Limestone

Limestones and Clays

Upper Series with Ironstone nodules

Lower Series with Sandy and Marly Beds

Am. capricornus ,, Jamesoni

and „ armatus

„ oxynotus “ > ,, Bucklandi L „ angulatus i”— ,, planorbis J

Sinfimourien.

Hettangien including “White Lias.”

Rherien.

1 The brackets indicate the divisions made by R. Tate and J. F. Blake.
2 Traite de geologie (5th ed., Paris, 1906).

At Frodingham in Lincolnshire the oolitic iron ore reaches 30 ft. in thickness, of which 12 ft. are workable. In Gloucestershire the top beds of the Lower Lias and lower beds of the Middle division are the most ferruginous; the best ores near Woodstock and Banbury and between Market Harborough and Leicester are at the summit of the Middle Lias in the Marlstone or Rock bed. The ironstone of Fawler is sometimes known as Blenheim ore. The ores of the Cleve- land district in Yorkshire have a great reputation ; the main seam is 1 1 ft. thick at

Eston, where it rests directly upon the Pecten Seam, the two together aggregating 15 ft. 6 in. Similar iron ores of this age are worked at Meurthe-et-Moselle, Villerupt, Marbache, Longuy, Champagneulles, &c. Some of the Liassic limestones are used as building stones, the more important ones being the Lower Lias Sutton stone of Glamorganshire and Middle Lias Hornton stone, the best of the Lias building stones, from Edge Hill. The limestones are often used for paving. The limestones of the Lower Lias are much used for the production of hydraulic cement and " Blue Lias " lime at Rugby, Barrow-on-Soar, Barnstone, Lyme Regis, Abertham and many other places. Roman cement has been made from the nodules in the Upper Lias of Yorkshire ; alum is obtained from the same horizon. A considerable trade was formerly done in jet, the best quality being obtained from the " Serpentinus " beds, but " bastard " or soft jet is found in many of the other strata in the Yorkshire Lias. Both Lower and Upper Lias clays have been used in making bricks and tiles.

Fossils are abundant in the Lias; Lyme Regis, Shepton Mallet, Rugby, Robin Hood's Bay, Ilminster, Whitby and Golden Cap near Charmouth are well-known localities. The saurian reptiles, Ichthyo- saurus and Plesiosaurus, are found in excellent preservation along with the Pterodactyl. Among the fishes are Hybodus, Dapedius, Pholidophorus, Acrodus. The crinoids, Pentacrinus and Extracrinus are locally abundant. Insect remains are very abundant in certain beds. Many ammonites occur in this formation in addition to the forms used as zonal indexes mentioned in the table. Lima gigantea, Posidonomya Bronni, Inoceramus dubius, Gryphaea cymbium and G. arcuata are common pelecypods. Amberleya capitanea, Pleuroto- maria anglica are Lias gasteropods. Leptaena, Spiriferina, Terebra- tella and Rhynchonella tetrahedra and R. variabilis are among the brachiopods.

Certain dark limestones with regular bedding which occur in the Carboniferous System are sometimes called " Black Lias " by quarrymen.

See " The Lias of England and Wales " (Yorkshire excepted), by H. B. Woodward, Geol. Survey Memoir (London, 1893); and, for Yorkshire, " The Jurassic Rocks of Britain," vol. i., " Yorkshire," by C. Fox-Strangways, Geol. Survey Memoir. See also Jurassic.

(J. A. H.)

LIBANIUS (a.d. 314-303), Greek sophist and rhetorician, was born at Antioch, the capital of Syria. He studied at Athens, and spent most of his earlier manhood in Constantinople and Nicomedia. His private

classes at Constantinople were much more popular than those of the public professors, who had him expelled in 346 (or earlier) on the charge of studying magic.

no intolerance. Among his pupils he numbered John Chryso- stom, Basil (bishop of Caesarea) and Ammianus Marcellinus. His works, consisting chiefly of.orations (including his autobio- graphy), declamations on set topics, letters, life of Demosthenes, and arguments to all his orations are voluminous. He devoted much time to the classical Greek writers, and had a thorough contempt for Rome and all things Roman. His speeches and letters throw considerable light on the political and literary history of the age. The letters number 1607 in the Greek original; with these were formerly included some 400 in Latin, purporting to be a translation, but now proved to be a forgery by the Italian humanist F. Zambeccari (15th century).

Editions: Orations and declamations, J. J. Reiske (1791- 1797); letters, J. C. Wolf (1738); two additional declamations, R. Forster {Hermes, ix. 22, xii. 217), who in 1903 began the publica- tion of a complete edition; Apologia Socratis, Y. H. Rogge (1891). See also E. Monnier, Histoire de Libanius (1866); L. Petit, Essai sur la vie et la correspondance du sophiste Libanius (1866); G. R. Sievers, Das Leben des Libanius (1868); R. Forster, F. Zambeccari und die Brief e des Libanius (1878). Some letters from the emperor Julian to Libanius will be found in R. Hercher, Epistolographi Graeci (1873). Sixteen letters to Julian have been translated by J. Duncombe (The Works of the Emperor Julian, i. 303-332, 3rd ed., London, 1798). The oration on the emperor Julian is translated by C. W. King (in Bohn's " Classical Library," London, 1888), and that in Defence of the Temples of the Heathen by Dr Lardner (in a volume of translations by Thomas Taylor, from Celsus and others, 1830). See further J. E. Sandys, Hist, of Classical Scholarship, i. (1906), and A. Harrent, Les ILcoles d' Antioche (1898).

LIBATION (Lat. libatio, from libare, to take a portion of something, to taste, hence to pour out as an offering to a deity, &c; cf. Gr. \ti(3ti.v), a drink offering, the pouring out of a small quantity of wine, milk or other liquid as a ceremonial act. Such an act was performed in honour of the dead (Gr. x°&L, Lat. prof usiones), in making of treaties (Gr. o-irovSrj, crirkvb'tivˆlibare, whence <7irov8al, treaty), and particularly in honour of the gods (Gr. Xoi/317, Lat. libatio, libamentum, libamen). Such libations to the gods were made as part of the daily ritual of domestic worship, or at banquets or feasts to the Lares, or to special deities, as by the Greeks to Hermes, the god of sleep, when going to rest.

LIBAU (Lettish, Leepaya), a seaport of Russia, in the govern- ment of Courland, 145 m. by rail S.W. of Riga, at the northern extremity of a narrow sandy peninsula which separates Lake Libau (12 m. long and 2 m. wide) from the Baltic Sea. Its population has more than doubled since 1881 (30,000), being 64,505 in 1897. The town is well built of stone, with good gardens, and has a naval cathedral (1903). The harbour was

2 m. S. of the town until a canal was dug through the peninsula in 1697; it is now deepened to 23 ft., and is mostly free from ice throughout the year. Since being brought, in 1872, into railway connexion with Moscow, Orel and Kharkov, Libau has become an important port. New Libau possesses large factories for colours, explosives, machinery belts, sails and ropes, tobacco, furniture, matches, as well as iron works, agricultural machinery works, tin-plate works, soap works, saw-mills, breweries, oil- mills, cork and linoleum factories and flour-mills. The exports reach the annual value of £3,250,000 to £5,500,000, oats being the chief export, with flour, wheat, rye, butter, eggs, spirits, flax, linseed, oilcake, pork, timber, horses and petroleum. The imports average £1,500,000 to £2,000,000 annually. Shipbuilding, including steamers for open-sea navigation, is on the increase. North of the commercial harbour and enclosing it the Russian government made (1893- 1906) a very extensive fortified naval port, protected by moles and breakwaters. Libau is visited for sea-bathing in summer.

The port of Libau, Lyra porlus, is mentioned as early as 1 263 ; it then belonged to the Livonian Order or Brothers of the Sword. In 1418 it was burnt by the Lithuanians, and in 1560 it was mortgaged by the grandmaster of the Teutonic Order, to which it had passed, to the Prussian duke Albert. In 1701 it was captured by Charles XII. of Sweden, and was annexed to Russia in 1795.

See Wegner, Geschichle der Stadt Libau (Libau, 1898).

LIBEL and SLANDER, the terms employed in English law to denote injurious attacks upon a man’s reputation or character by words written or spoken, or by equivalent signs. In most early systems of law verbal injuries are treated as a criminal or quasi-criminal offence, the essence of the injury lying not in pecuniary loss, which may be compensated by damages, but in the personal insult which must be

atoned for — a vindictive penalty coming in the place of personal revenge. By the law of the XII. Tables, the composition of scurrilous songs and gross noisy public affronts were punished by death. Minor offences of the same class seem to have found their place under the general conception of injuria, which included ultimately every form of direct personal aggression which involved con- tumely or insult. In the later Roman jurisprudence, which has, on this point, exercised considerable influence over modern systems of law, verbal injuries are dealt with in the edict under two heads. The first comprehended defamatory and injurious statements made in a public manner (convicium contra bonos mores). In this case the essence of the offence lay in the un- warrantable public proclamation. In such a case the truth of the statements was no justification for the unnecessarily public and insulting manner in which they had been made. The second head included defamatory statements made in private, and in this case the offence lay in the imputation itself, not in the manner of its publication. The truth was therefore a sufficient defence, for no man had a right to demand legal protection for a false reputation. Even belief in the truth was enough, because it took away the intention which was essential to the notion of injuria. The law thus aimed at giving sufficient scope for the discussion of a man's character, while it protected him from needless insult and pain. The remedy for verbal injuries was long confined to a civil action for a money penalty, which was estimated according to the gravity of the case, and which, although vindictive in its character, doubtless included practi- cally the element of compensation. But a new remedy was introduced with the extension of the criminal law, under which many kinds of defamation were punished with great severity. At the same time increased importance attached to the publica- tion of defamatory books and writings, the libri or libelli famosi, from which we derive our modern use of the word libel; and under the later emperors the latter term came to be specially applied to anonymous accusations or pasquils, the dissemination of which was regarded as peculiarly dangerous, and visited with very severe punishment, whether the matter contained in them were true or false.

The earlier history of the English law of defamation is some-

what obscure. Civil actions for damages seem to have been tolerably frequent so far back as the reign of Edward I. There was no distinction drawn between words written and spoken. When no pecuniary penalty was involved such cases fell within the old jurisdiction of the ecclesiastical courts, which was only finally abolished in the 19th century. It seems, to say the least, uncertain whether any generally applicable criminal process was in use. The crime of scandalum

magnatum, spreading false reports about the magnates of the realm, was established by statutes, but the first fully reported case in which libel is affirmed generally to be punishable at common law is one tried in the star chamber in the reign of James I. In that case no English authorities are cited except a previous case of the same nature before the same tribunal; the law and terminology appear to be taken directly from Roman sources, with the insertion that libels tended to a breach of the peace; and it seems probable that that not very scrupulous tribunal had simply found it convenient to adopt the very stringent Roman provisions regard- ing the libelli famosi without paying any regard to the Roman limitations. From that time we find both the criminal and civil remedies' in full operation, and the law with regard to each at the present time may now be considered.

Civil Law. — The first important distinction encountered is that between slander and libel, between the oral and written promulgation of defamatory statements. In the former case the remedy is limited. The law will not take notice of every kind of abusive or defamatory language. It must be shown either that the plaintiff has suffered actual damage as a direct conse- quence of the slander, or that the imputation is of such a nature that we are entitled to infer damage as a necessary consequence. The special damage on which an action is founded for slanderous words must be of the nature of pecuniary loss. Loss of reputa- tion or of position in society, or even illness, however clearly it may be traced to the slander, is insufficient. When we cannot prove special damage, the action for slander is only allowed upon certain strictly defined grounds. These are the imputation of a crime or misdemeanour which is punishable corporeally, e.g. by imprisonment; the imputation of a contagious or infectious disease; statements which tend to the disherison of an apparent heir (other cases of slander of title when the party is in possession requiring the allegation of special damage); the accusing a woman of unchastity (Slander of Women Act 1891); and, lastly, slanders directed against a man's professional or business character, which tend directly to prejudice him in his trade, profession, or means of livelihood. In the latter case the words must either be directly aimed at a man in his business or official character, or they must be such as necessarily to imply unfitness for his particular office or occupation. Thus words which merely reflect generally upon the moral character of a tradesman or professional man are not actionable, but they are actionable if directed against his dealings in the course of his trade or profession. But, in the case of a merchant or trader, an allega- tion which affects his credit generally is enough, and it has been held that statements are actionable which affect the ability or moral characters

of persons who hold offices, or exercise occupation which require a high degree of ability, or infer peculiar confidence. In every case the plaintiff must have been at the time of the slander in the actual exercise of the occupation or enjoy- ment of the office with reference to which the slander is supposed to have affected him.

The action for libel is not restricted in the sarne way as that for slander. Originally there appears to have been no essential distinction between them, but the establishment of libel as a criminal offence had probably considerable influence, and it soon became settled that written defamatory statements, or pictures and other signs which bore a defamatory meaning, implied greater malice and deliberation, and were generally fraught with greater injury than those made by word of mouth. The result has been that the action for libel is not limited to special grounds, or by the necessity of proving special damage. It may be founded on any statement which disparages a man's private or professional character, or which tends to hold him up to hatred,

contempt or ridicule. In one of the leading cases, for example, the plaintiff obtained damages because it was said of him that he was a hypocrite, and had used the cloak of religion for un- worthy purposes. In another case a charge of ingratitude was held sufficient. In civil cases the libel must be published by being brought by the defendant under the notice of a third party; it has been held that it is sufficient if this has been done by gross carelessness, without deliberate intention to publish. Every person is liable to an action who is concerned in the publication of a libel, whether he be the author, printer or publisher; and the extent and manner of the publication, although not affecting the ground of the action, is a material element in estimating the damages.

It is not necessary that the defamatory character of the words or writing complained of should be apparent on their face. They may be couched in the form of an insinuation, or may derive their sting from a reference to circumstances understood by the persons to whom they are addressed. In such a case the plaintiff must make the injurious sense clear by an averment called an innuendo, and it is for the jury to say whether the words bore the meaning thus ascribed to them.

In all civil actions for slander and libel the falsity of the injurious statements is an essential element, so that the defendant is always entitled to justify his statements by their truth; but when the statements are in themselves defamatory, their falsity is presumed, and the burden of proving their truth is laid upon the defendant. There are however a large class of false defamatory statements, commonly called privileged, which are not actionable on account of

the particular circumstances in which they are made. The general theory of law with regard to these cases is this. It is assumed that in every case of defamation intention is a necessary element; but in the ordinary case, when a statement is false and defamatory, the law presumes that it has been made or published with an evil intent, and will not allow this presumption to be rebutted by evidence or submitted as matter of fact to a jury. But there are certain circum- stances in which the natural presumption is quite the other way. There are certain natural and proper occasions on which statements may be made which are in themselves defamatory, and which may be false, but which naturally suggest that the statements may have been made from a perfectly proper motive and with entire belief in their truth. In the cases of this kind which are recognized by law, the presumption is reversed. It lies with the plaintiff to show that the defendant was actuated by what is called express malice, by an intention to do harm, and in this case the question is not one of legal inference for the court, but a matter of fact to be decided by the jury. Although, however, the theory of the law seems to rest entirely upon natural presumption of intention, it is pretty clear that in determining the limits of privilege the courts have been almost wholly guided by considerations of public or general expediency.

In some cases the privilege is absolute, so that we cannot have an action for defamation even although we prove express malice. Thus no action of this kind can be maintained for statements made in judicial proceedings if they are in any sense relevant to the matter in hand. In the same way no statements or publications are actionable which are made in the ordinary course of parliamentary proceedings. Papers published under the authority of parliament are protected by a special act, 3 & 4 Vict. c. 9, 1840, which was passed after a decree of the law courts adverse to the prfvilege claimed. The reports of judicial and parliamentary proceedings stand in a somewhat different position, which has only been attained after a long and interesting conflict . The general rule now is that all reports of parliamentary or judicial proceedings are privileged in so far as they are honest and impartial. Even ex parte proceedings, in so far as they take place in public, now fall within the same rule. But if the report is garbled, or if part of it. only is published, the party who is injured in consequence is entitled to maintain an action, and to have the question of malice submitted to a jury.

Both absolute and qualified privilege are given to newspaper reports under certain conditions by the Law of Libel Amendment

Act 1888. The reports must, however, be published in a news- paper

as defined in the Newspaper Libel and Registration • Act 1881. Under this act a newspaper must be published ” at intervals not exceeding twenty-six days.”

By s. 3 of the act of 1888 fair and accurate reports of judicial proceedings are absolutely privileged provided that the report is published contemporaneously with the proceedings and no blasphemous or indecent matter is contained therein. By s. 4 a limited privilege is given to fair and accurate reports (1) of the proceedings of a. bona fide public meeting lawfully held for a lawful purpose and for the furtherance and discussion of any matter of public concern, even when the admission thereto is restricted ; (2) of any meeting, open either to the public or to a reporter, of a vestry, town council, school board, board of guardians, board of local authority, formed or constituted under the provisions of any act of parliament, or of any committee appointed by any of these bodies ; or of any meeting of any commissioners authorized to act by letters patent, act of parlia- ment, warrant under royal sign manual, or other lawful warrant or authority, select committees of either House of parliament, justices of the peace in quarter sessions assembled for administrative or deliberative purposes; (3) of the publication of any notice or report issued for the information of the public by any government office or department, officer of state, commissioner of police or chief constable, and published at their request. But the privilege given in s. 4 does not authorize the publication of any blasphemous or indecent matter; nor is the protection available as a defence if it be proved that the reports or notices were published maliciously, in the legal sense of the word, or the defendant has been requested to insert in the newspaper in which the report was issued a reasonable letter or statement by way of contradiction or explanation, and has refused or neglected to do so. Moreover, nothing in s. 4 is to interfere with any privilege then existing, or to protect the publication of any matter not of public concern, or in cases where publication is not for the public benefit. Consequently no criminal prosecution should be commenced where the interests of the public are not affected. By the Law of Libel Amendment Act 1888, s. 8, no criminal prose- cution for libel is to be commenced against any newspaper proprietor, publisher or editor unless the order of a judge at chambers has been first obtained. This protection does not cover the actual writer of the alleged libel.

In private life a large number of statements are privileged so long as they remain matters of strictly private communication. It is difficult to define the limits of private privilege without extensive reference to concrete cases; but generally it may be said that it includes all communications made in performance of a duty not merely legal but

moral or social, answers to bona fide inquiries, communications made by persons in confidential relations regarding matters in which one or both are interested, and even statements made within proper limits by persons in the bona fide prosecution of their own interest. Common ex- amples of this kind of privilege are to be found in answer to inquiries as to the character of servants or the solvency of a trader, warnings to a friend, communications between persons who are jointly interested in some matters of business. But in every case care must be taken not to exceed the limits of publication required by the occasion, or otherwise the privilege is lost. Thus defamatory statements may be privileged when made to a meeting of shareholders, but not when published to others who have no immediate concern in the business.

In a few instances in which an action cannot be maintained even by the averment of malice, the plaintiff may maintain an action by averring not only malice but also want of reasonable and probable cause. The most common instances of this kind are malicious charges made in the ordinary course of justice and malicious prosecutions. In such cases it would be contrary to public policy to punish or prevent every charge which was made from a purely malicious motive, but there is no reason for pro- tecting accusations which are not only malicious, but destitute of all reasonable probability.

Criminal Law. — Publications which are blasphemous, immoral or seditious are frequently termed libels, and are punishable both at common law and by various statutes. The matter, however, which constitutes the offence in these publications lies beyond our present scope. Libels upon individuals may be prosecuted by criminal information or indictment, but there can be no criminal prosecution for slander. So far as concerns the definition of libel, and its limitation by the necessity of proving in certain cases express malice, there is no substantial difference between the rules which apply to criminal prosecutions and to

civil actions, with the one important exception (now considerably modified) that the falsity of a- libel is not in criminal law an essential element of the offence. If the matter alleged were in itself defamatory, the court would not permit inquiry into its truth. The sweeping application of this rule seems chiefly due to the indiscriminate use, in earlier cases, of a rule in Roman law which was only applicable to

certain modes of publication, but has been supported by various reasons of general policy, and especially by the view that one main reason for punishing a libel was its tendency to provoke a breach of the peace.

An important dispute about the powers of the jury in cases of libel arose during the 19th century in connexion with some well-known trials for seditious libels. The point is familiar to readers of Macaulay in connexion with the trial of the seven bishops, but the cases in which it was brought most prominently forward, and which led to its final settlement, were those against Woodfall (the printer of Junius), Wilkes and others, and especi- ally the case against Shipley, the dean of St Asaph (21 St. Tr. 925), in which the question was fought by Lord Erskine with extraordinary energy and ability. The controversy turned upon the question whether the jury were to be strictly confined to matters of fact which required to be proved by evidence, or whether in every case they were entitled to form their own opinion upon the libellous character of the publication and the intention of the author. The jury, if they pleased, had it in their power to return a general verdict of guilty or not guilty, but both in theory and practice they were subject in law to the directions of the court, and had to be informed by it as to what they were to take into consideration in determining upon their verdict. There is no difficulty about the general application of this principle in criminal trials. If the crime is one which is inferred by law from certain facts, the jury are only concerned with these facts, and must accept the construction put upon them by law. Applying these principles to the case of libel, juries were directed that it was for the court to determine whether the publication fell within the definition of libel, and whether the case was one in which malice was to be inferred by construction of law. If the case were one in which malice was inferred by law, the only facts left to the jury were the fact of publication and the meaning averred by innuendoes; they could not go into the question of intention, unless the case were one of privilege, in which express malice had to be proved. In general principle, therefore, the decisions of the court were in accordance with the ordinary principles of criminal law. But there were undoubtedly some peculiarities in the case of libel. The sense of words, the inferences to be drawn from them, and the effect which they produce are not so easily defined as gross matters of fact. They seem to belong to those cases in which the impression made upon a jury is more to be trusted than the decision of a judge. Further, owing to the mode of procedure, the defendant was often punished before the question of law was determined. But, nevertheless, the question would scarcely have been raised had the libels related merely to

private matters. The real ground of dispute was the liberty to be accorded to political discussion. Had the judges taken as wide a view of privilege in discussing matters of public interest as they do now, the question could scarcely have arisen; for Erskine's whole contention really amounted to this, that the jury were entitled to take into consideration the good or bad intent of the authors, which is precisely the question which would now be put before them in any matter which concerned the public. But at that time the notion of a special privilege attaching to political discus- sion had scarcely arisen, or was confined within very narrow limits, and the cause of free political discussion seemed to be more safely entrusted to juries than to courts. The question was finally settled by the Libel Act 1792, by which the jury were entitled to give a general verdict on the whole matter put in issue. .Scots Law. — In Scots law there were originally three remedies for delamation. It might lie prosecuted by or with the concurrence of the lord advocate before the court of justiciary; or, secondly, a criminal remedy might be obtained in the commissary (ecclesiastical) courts, which originally dealt with the defender by public retractation or penance, but subsequently made use of fines payable to their own

procurator or to the party injured, these latter being regarded as solatium to his feelings; or, lastly, an action of damages was com- petent before the court of session, which was strictly civil in its character and aimed at the reparation of patrimonial loss. The first remedy has fallen into disuse ; the second and third (the commissary courts being now abolished) are represented by the present action for damages or solatium. Originally the action before the court of session was strictly for damages — founded, not upon the animus injuriandi, but upon culpa, and could be defended by proving the truth of the statements. But in time the court of session began to assume the original jurisdiction of the commissary courts, and enter- tained actions for solatium in which the animus injuriandi was a necessary clement, and to which, as in Roman law, the truth was not necessarily a defence. Ultimately the two actions got very much confused. We find continual disputes as to the necessity for the animus injuriandi and the applicability of the plea of Veritas convicii, which arose from the fact that the courts were not always conscious that they were dealing with two actions, to one of which these notions were applicable, and to the other not. On the introduction of the jury court, presided over by an English lawyer, it was quite natural that he, finding no very clear distinction maintained between damage and solatium, applied the English plea of truth as a justification to every case, and retained the animus injuriandi both in ordinary cases and cases of privilege in the same shape as the English concep- tion of

malice. The leading and almost only differences between the English and Scots law now are that the latter makes no essential distinction between oral and written defamation, that it practically gives an action for every case of defamation, oral or written, upon which in England a civil action might be maintained for libel, and that it possesses no criminal remedy. In consequence of the latter defect and the indiscriminate application of the plea of Veritas to every case both of damages and solatium, there appears to be no remedy in Scotland even for the widest and most needless publication of offensive statements if only they are true.

American Law. — American law scarcely if at all differs from that of England. In so far indeed as the common law is concerned, they may be said to be substantially identical. The principal statutes which have altered the English criminal law are represented by equivalent legislation in most American states.

See generally W. B. Odgers, Libel and Slander; Fraser, Law of Libel and Slander.

LIBELLATICI, the name given to a class of persons who, during the persecution of Decius, a.d. 250, evaded the con- sequences of their Christian belief by procuring documents (libelli) which certified that they had satisfied the authorities of their submission to the edict requiring them to offer incense or sacrifice to the imperial gods. As thirty-eight years had elapsed since the last period of persecution, the churches had become in many ways lax, and the number of those who failed to hold out under the persecution was very great. The procedure of the courts which had cognizance of the matter was, however, by no means strict, and the judges and subordinate officials were often not ill-disposed towards Christians, so that evasion was fairly easy. Many of those who could not hold out were able to secure certificates which gave them immunity from punishment without actually renouncing the faith, just as ” parliamentary certificates ” of conformity used to be given in England without any pretext of fact. It is to the persons who received such certificates that the name libellalici belonged (those who actually fulfilled the edict being called tkurificati or sacrificati) . To calculate their number would be impossible, but we know from the writings of Cyprian, Dionysius of Alex- andria and other contemporaries, that they were a numerous class, and that they were to be found in Italy, in Egypt and in Africa, and among both clergy and laity. Archbishop Benson is probably right in thinking that ” there was no systematic and regular procedure in the matter,” and that the libelli may have been of very different kinds. They must, however, as a general rule, have consisted of a certificate from the authorities to

the effect that the accused person had satisfied them. [The name libellus has also been applied to another kind of document — to the letters given by confessors, or by those who were about to suffer martyrdom, to persons who had fallen, to be used to secure forgiveness for them from the authorities of the Church. With such libelli we are not here concerned.] The subject has acquired a fresh interest from the fact that two of these actual libelli have been recovered, in 1893 and 1894 respectively, both from Egypt; one is now in the Brugsch Pasha collection in the Berlin Museum ; the other is in the collection of papyri belonging to the Archduke Rainer. The former is on a papyrus leaf about

8 by 3 in., the latter on mere fragments of papyrus which have been pieced together. The former was first deciphered and described by Dr Fritz Krebs, the latter by Dr K. Wessely: both are given and commented upon by Dr Benson. There is a remarkable similarity between them: in each the form is that N. ” was ever constant in sacrificing to the gods”; and that he now, in the presence of the commissioners of the sacrifices (ol ■qfnuxhi’oiT&v dva&v), has both sacrificed and drunk [or has poured libations], and has tasted of the victims, in witness whereof he begs them to sign this certificate. Then follows the signature, with attesta- tions. The former of the two is dated, and the date must fall in the year 250. It is impossible to prove that either of the documents actually refers to Christians: they may have been given to pagans who had been accused and had cleared them- selves, or to former Christians who had apostatized. But no doubt libdli’m this same form were delivered, in Egypt at least, to Christians who secured immunity without actual apostasy; and the form in Italy and Africa probably did not differ widely from this. The practice gave rise to complicated problems of ecclesiastical discipline, which are reflected in the correspondence of Cyprian and especially in the Novatian controversy.

See E. W. Benson, Cyprian (London, 1897); Theol. Literatur- zeitung, 20th of January and 17th of March 1894. (W. E. Co.)

LIBER and LIBERA, in Roman mythology, deities, male and female, identified with the Greek Dionysus and Persephone. In honour of Liber (also called Liber Pater and Bacchus) two festivals were celebrated. In the country feast of the vintage, held at the time of the gathering of the grapes, and the city festival of March 17th called Liberalia (Ovid, Fasti, iii. 711) we find purely Italian ceremonial unaffected by Greek religion. The country festival was a great merry-making, where the

first- fruits of the new must were offered to the gods. It was characterized by the grossest symbolism, in honour of the fertility of nature. In the city festival, growing civilization had impressed a new character on the primitive religion, and connected it with the framework of society. At this time the youths laid aside the boy's toga praetexla and assumed the man's toga libera or virilis (Fasti, iii. 771). Cakes of meal, honey and oil were offered to the two deities at this festival. Liber was originally an old Italian god of the productivity of nature, especially of the vine. His name indicated the free, unrestrained character of his worship. When, at an early period, the Hellenic religion of Demeter spread to Rome, Liber and Libera were identified with Dionysus and Persephone, and associated with another Italian goddess Ceres, who was identified with Demeter. By order of the Sibylline books, a temple was built to these three deities near the Circus Flaminius; the whole cultus was borrowed from the Greeks, down even to. the terminology, and priestesses were brought from the Greek cities.

LIBERAL PARTY, in Great Britain, the name given to and accepted by the successors of the old Whig party (see Whig and Tory), representing the political party opposed to Toryism or Conservatism, and claiming to be the originators and champions of political reform and progressive legislation. The term came into general use definitely as the name of one of the two great parties in the state when Mr Gladstone became its leader, but before this it had already become current coin, as a political appellation, through a natural association with the use of such phrases as " liberal ideas," in the sense of " favourable to change," or " in support of political freedom and democracy." In this respect it was the outcome of the French Revolution, and in the early years of the 19th century the term was used in a French form; thus Southey in i8r6 wrote about the " British Liberates." But the Reform Act and the work of Bentham and Mill resulted in the crystallization of the term. In Leigh Hunt's autobiography (1850) we read of " newer and more thorough- going Whigs . . . known by the name of Radicals . . . since called Liberals" ; and J. S. Mill in 1865 wrote (from his own Liberal point of view), " A Liberal is he who looks forward for his principles of government; a Tory looks backward." The gradual adoption of the term for one of the great parties, super- seding " Whig," was helped by the transition period of " Liberal

Conservatism," describing the position of the later Peelites; and Mr Gladstone's own career is the best instance of its changing signification; moreover the adjective " liberal " came meanwhile into common use in other spheres than that of parliamentary politics, e.g.

in religion, as meaning ” intellectually advanced ” and free from the trammels of tradition. Broadly speaking, the Liberal party stands for progressive legislation in accordance with freedom of social development and advanced ethical ideas. It claims to represent government by the people, by means of trust in the people, in a sense which denies genuine popular sympathy to its opponents. Being largely composed of dis- senters, it has identified itself with opposition to the vested interests of the Church of England; and, being apt to be thwarted by the House of Lords, with attempts to override the veto of that house. Its old watchword, ” Peace, retrenchment and reform,” indicated its tendency to avoidance of a ” spirited ” foreign policy, and to parsimony in expenditure. But throughout its career the Liberal party has always been pushed forward by its extreme Radical wing, and economy in the spending of public money is no longer cherished by those who chiefly represent the non-taxpaying classes. The party organization lends itself to the influence of new forces. In 1861 a central organization was started in the ” Liberal Registration Association,” composed ” of gentlemen of known Liberal opinions “; and a number of ” Liberal Associations ” soon rose throughout the country. Of these, that at Birmingham became, under Mr J. Chamberlain and his active supporter Mr Schnadhorst, particularly active in the ‘seventies; and it was due to Mr Schnadhorst that in 1877 a conference was held at Birmingham which resulted in the formation of the ” National Federation of Liberal Associations,” or ” National Liberal Federation,” representing a system of organization which was dubbed by Lord Beaconsfield ” the Caucus.” The Birmingham Caucus and the Central Liberal Association thus coexisted, the first as an independent democratic institution, the second as the official body representing the whips of the party, the first more advanced and ” Radical,” the second inclined to Whiggishness. Friction naturally resulted, but the 1880 elections confirmed the success of the Caucus and con- solidated its power. And in spite of the Home Rule crisis in 1886, resulting in the splitting off of the Liberal Unionists — ” dis- sentient Liberals,” as Mr Gladstone called them — from the Liberal party, the organization of the National Liberal Federation remained, in the dark days of the party, its main support. Its headquarters were, however, removed to London, and under Mr Schnadhorst it was practically amalgamated with the old Central Association. »

It is impossible here to write in detail the later history of the Liberal party, but the salient facts will be found in such articles as those on Mr Gladstone, Mr J. Chamberlain, Lord Rosebery, Sir Henry Campbell-Bannerman, Mr H. H. Asquith and Mr David Lloyd George.

See, apart from general histories of the period, M. Ostrogorski’s

Democracy and the Organization of Political Parlies (Eng. trans. 1902).

LIBER DIURNUS ROMANORUM PONTIFICUM, or ” Journal of the Roman Pontiffs,” the name given to a collection of formulae used in the papal chancellery in preparing official documents, such as the installation of a pope, the bestowal of the pallium and the grant of papal privileges. It was compiled between 685 and 751, and was constantly employed until the nth century, when, owing to the changed circumstances of the Church, it fell into disuse, and was soon forgotten and lost. During the 17th century a manuscript of the Liber was dis- covered in Rome by the humanist, Lucas Holstenius, who prepared an edition for publication; for politic reasons, however, the papal authorities would not allow this to appear, as the book asserted the superiority of a general council over the pope. It was, however, published in France by the Jesuit, Jean Gamier, in 1680, and other editions quickly followed.

The best modern editions are one bv Eugene de Roziere (Paris, 1869) and another by T. E. von Sichel (Vienna, 1889), both of which contain critical introductions. The two existing manuscripts of the Liber are in the Vatican library, Rome, and in the library of St Ambrose at Milan.

LIBERIA, a negro republic in West Africa, extending along the coast of northern Guinea about 300 m., between the British colony of Sierra Leone on the N.W. and the French colony of the Ivory Coast on the S.E. The westernmost point of Liberia (at the mouth of the river Mano) lies in about 6° 55′ N. and 11° 32′ W. The southernmost point of Liberia, and at the same time almost its most eastern extension, is at the mouth of the Cavalla, beyond Cape Palmas, only 4 22′ N. of the equator, and in about 7° 33′ W. The width of Liberia inland varies very considerably; it is greatest, about 200 m., from N.E. to S.W. The Liberia-Sierra Leone boundary was determined by a frontier commission in 1903. Commencing at the mouth of the river Mano, it follows the Mano up stream till that river cuts io° 40′ W. It then followed this line of longitude to its intersection with N. latitude 9° 6’, but by the Franco-Liberian understanding of 1907 the frontier on this side was withdrawn to 8° 25′ N., where the river Makona crosses 10° 40′ W. The Liberian frontier with the adjacent French possessions was defined by the Franco-Liberian treaty of 1892, but as the definition therein given was found to be very difficult of reconciliation with

geographical features (for in 1892 the whole of the Liberian interior was unmapped) further negotiations were set on foot. In 1905 Liberia proposed to France that the boundary line should follow the river Moa from the British frontier of Sierra Leone up stream to near the source of the Moa (or Makona), and that from this point the boundary should run eastwards along the line of water-parting between the system of the Niger on the north and that of the coast rivers (Moa, Lofa, St Paul's) on the south, until the 8th degree of N. latitude was reached, thence following this 8th degree eastwards to where it cuts the head stream of the Cavalla river. From this point the boundary between France and Liberia would be the course of the Cavalla river from near its source to the sea. Within the limits above described Liberia would possess a total area of about 43,000 to 45,000 sq. m. But after deliberation and as the result of certain " frontier incidents " France modified her counter-proposals in 1907, and the actual definition of the northern and eastern frontiers of Liberia is as follows: —

Starting from the point on the frontier of the British colony of Sierra Leone where the river Moa or Makona crosses that frontier, the Franco-Liberian frontier shall follow the left bank of the river Makona up stream to a point 5 kilometres to the south of the town of Bofosso. From this point the frontier shall leave the line of the Makona and be carried in a south-easterly direction to the source of the most northwesterly affluent of the Nuon river or Western Cavalla. This line shall be so drawn as to leave on the French side of the boundary the following towns: Kutumai, Kisi Kurumai, Sundibu, Zuapa, Nzibila, Koiama, Bangwedu and Lola. From the north-westernmost source of the Nuon the boundary shall follow the right bank of the said Nuon river down stream to its presumed confluence with the Cavalla, and thenceforward the right bank of the river Cavalla down to the sea. If the ultimate destination of the Nuon is not the Cavalla river, then the boundary shall follow the right bank of the Nuon down stream as far as the town of Tuleplan. A line shall then be drawn from the southern outskirts of the town of Tuleplan due E. to the Cavalla river, and thence shall follow the right bank of the Cavalla river to the sea.

(The delimitation commission proved that the Nuon does not flow into the Cavalla, but about 6° 30′ N. it flows very near the north-westernmost bend of that river. Tuleplan is in about lat. 6° 50′ N. The river Makona takes a much more northerly course than had been estimated. The river Nuon also is situated 20 or 30 m. farther to the east than had been supposed. Consequently the territory of Liberia as thus demarcated is rather larger than it would appear on the uncorrected English maps of 1907 — about 41,000 sq. m.)

It is at the southern extremity of Liberia, Cape Palmas, that the West African coast from Morocco to the southernmost extremity of Guinea turns somewhat abruptly eastwards and northwards and faces the Gulf of Guinea. As the whole coastline of Liberia thus fronts the sea route from Europe to South Africa it is always likely to possess a certain degree of strategical importance. The coast, however, is unprovided with a single good harbour. The anchorage at Monrovia is safe, and with some expenditure of money a smooth harbour could be made in front of Grand Basa.

Coast Features. — The coast is a good deal indented, almost all the headlands projecting from north-east to south-west. A good deal

of the seaboard is dangerous by reason of the sharp rocks which lie near the surface. As most of the rivers have rapids or falls actually at the sea coast or close to it, they are, with the exception of the Cavalla, useless for penetrating far inland, and the whole of this part of Africa from Cape Palmas north-west to the Senegal suggests a sunken land. In all probability the western projection of Africa was connected by a land bridge with the opposite land of Brazil as late as the Eocene period of the Tertiary epoch. The Liberian coast has few lagoons compared with the adjoining littoral of Sierra Leone or that of the Ivory Coast. The coast, in fact, rises in some places rather abruptly from the sea. Cape Mount (on the northern side of which is a large lagoon — Fisherman Lake) at its highest point is 1050 ft. above sea level. Cape Mesurado is about 350 ft., Cape Palmas about 200 ft. above the sea. There is a salt lake or lagoon between the Cape Palmas river and the vicinity of the Cavalla. Although very little of the coast belt is actually swampy, a kind of natural canalization connects many of the rivers at their mouths with each other, though some of these connecting creeks are as yet unmarked on maps.

Mountains. — Although there are patches of marsh — generally the swampy bottoms of valleys — the whole surface of Liberia inclines to be hilly or even mountainous at a short distance inland from the coast. In the north-east, French explorers have computed the alti- tudes of some mountains at figures which would make them the highest land surfaces of the western projection of Africa — from 6000 to 9000 ft. But these altitudes are largely matters of conjecture. The same mountains have been sighted by English explorers coming up from the south and are pronounced to be ” very high.” It is possible that they may reach to 6000 ft. in some places. Between the western bend of the Cavalla river and the coast there is a somewhat broken mountain range with altitudes of from 2000 to 5000 ft. (approximate). The Po range to the west of the St Paul’s river may reach in places to 3000 ft.

Rivers. — The work of the Franco-Liberian delimitation commission in 1908-1909 cleared up many points connected with the hydro- graphy of the country. Notably it traced the upper Cavalla, proving that that river was not connected either with the Nuon on the west or the Ko or Zo on the east. The upper river and the left bank of the lower river of the Cavalla are in French territory. It rises in about 7° 50′ N., 8° 30′ W. in the Nimba mountains, where also rise the Nuon, St John's and Dukwia rivers. After flowing S.E. the Cavalla, between 7 and 6° N., under the name of Dugu, makes a very considerable elbow to the west, thereafter resuming its south- easterly course. It is navigable from the sea for some 80 m. from its mouth and after a long series of rapids is again navigable. Un- fortunately the Cavalla does not afford a means of easy penetration into the rich hinterland of Liberia on account of the bad bar at its mouth. The Nuon (or Nipwe), which up to 1908 was described some- times as the western Cavalla and sometimes as the upper course of the St John's river, has been shown to be the upper course of the Cestos. About 6° 30′ N. it approaches within 16 m. of the Cavalla. It rises in the Nimba mountains some 10 m. S. of the source of the Cavalla, and like all the Liberian rivers (except the Cavalla) it has a general S.W. flow. The St Paul, though inferior to the Cavalla in length, is a large river with a considerable volume of water. The main branch rises in the Beila country nearly as far north as 9 N. under the name of Diani. Between 8° and 7° N. it is joined by the We from the west and the Wale from the east. The important river Lofa flows nearly parallel with the St Paul's river and enters the sea about 40 m. to the west, under the name of Little Cape Mount river. The Mano or Bewa river rises in the dense Gora forest, but is of no great importance until it becomes the frontier between Liberia and Sierra Leone. The Dukwia and Farmington are tortuous rivers entering the sea under the name of the river Junk (Portuguese, J unco). The Farmington is a short stream, but the Dukwia is believed to be the lower course of the Mani, which rises as the Tigney (Tige), north of the source of the Cavalla, just south of 8° N. The St John's river of the Basa country appears to be of considerable importance and volume. The Sino river rises in the Niete mountains and brings down a great volume of water to the sea, though it is not a river of considerable length. The Duobe rises at the back of the Satro Mountains and flows nearly parallel with the Cavalla, which it joins. The Moa or Makona river is a fine stream of con- siderable volume, but its course is perpetually interrupted by rocks and rapids. Its lower course is through the territory of Sierra Leone, and it enters the sea as the Sulima.

Climate and Rainfall. — Liberia is almost everywhere well watered.

The climate and rainfall over the whole of the coast region for about 120 m. inland are equatorial, the rainfall in the western half of the country being about 150 in. per annum and in the eastern half about 100 in. North of a distance of about 120 m. inland the climate is not quite so rainy, and the weather is much cooler during the dry season. This region beyond the hundred-miles coast belt is far more agreeable and healthy to Europeans.

Forests. — Outside a coast belt of about 20 m. and south of 8° N. the country is one vast forest, except where the natives have cleared the land for cultivation. In many districts the land has been cleared and cultivated and then abandoned, and has relapsed into scrub and jungle which is gradually returning to the condition of forest. The densest forest of all would seem to be that known as Gora,

which is almost entirely uninhabited and occupies an area of about 6000 sq. m. between the Po hills and the British frontier. There is another very dense forest stretching with little interruption from the eastern side of the St Paul's river nearly to the Cavalla. The Nidi forest is noteworthy for its magnificent growth of Funtumia rubber trees. It extends between the Duobe and the Cavalla rivers. The extreme north of Liberia is still for the most part a very well-watered country, covered with a rich vegetation, but there are said to be a few breaks that are rather stony and that have a very well-marked dry season in which the vegetation is a good deal burnt up. In the main Liberia is the forest country par excellence of West Africa, and although this region of dense forests overlaps the political frontiers of both Sierra Leone and the Ivory Coast, it is a feature of physical geography so nearly coincident with the actual frontiers of Liberia as to give this country special characteristics clearly marked in its existing fauna.

Fauna. — The fauna of Liberia is sufficiently peculiar, at any rate as regards vertebrates, to make it very nearly identical with a " district " or sub-province of the West African province, though in this case the Liberian " district " would not include the northern- most portions of the country and would overlap on the east and west into Sierra Leone and the French Ivory Coast. It is probable that the Liberian chimpanzee may offer one or more distinct varieties; there is an interesting local development of the Diana monkey, sometimes called the bay-thighed monkey (Cercopithecus diana ignita) on account of its brilliant orange-red thighs. One or more species of bats are peculiar to

the country — Vespertilio stampflii, and perhaps Roussettus buttikojeri; two species of shrew (Crocidura) , one dormouse (Graphiurus nagtglasii) ; the pygmy hippopotamus (H. liberiensis) — differing from the common hippopotamus by its much smaller size and by the reduction of the incisor teeth to a single pair in either jaw, or occasionally t > the odd number of three ; and two remarkable Cephalophus antelopes peculiar to this region so far as is known — these are the white-shouldered duiker, Cephalo- phus jentinki, and the zebra antelope, C. doriae, a creature the size of a small goat, of a bright bay brown, with broad black zebra-like stripes. Amongst other interesting mammals are four species of the long-haired Colobus monkeys (black, black and white, greenish- grey and reddish-brown) ; the Potto lemur, fruit bats of large size with monstrous heads (Hypsignathus monstrosus) ; the brush- tailed African porcupine; several very brightly coloured squirrels; the scaly-tailed flying Anomalurus; the common porcupine; the leopard, serval, golden cat (Felis celidogaster) in two varieties, the copper-coloured and the grey, possibly the same animal at different ages ; the striped and spotted hyenas (beyond the forest region) ; two large otters; the tree hyrax, elephant and manati; the red bush pig (Potamochoerus porcus) ; the West African chevrotain (Dorcatherium) ; the Senegalese buffalo ; Bongo antelope (Boocercus) ; large yellow-backed duiker {Cephalophus sylvicultrix), black duiker, West African hartebeest (beyond the forest), pygmy antelope (Neotragus); and three species of Manis or pangolin (M. gigantea, M. longicaudata and M. tricuspis).

The birds of Liberia are not quite so peculiar as the mammals. There is the interesting white-necked guineafowl, Agelastes (which is found on the Gold Coast and elsewhere west of the lower Niger) ; there is one peculiar species of eagle owl (Bubo lettii) and a very handsome sparrow-hawk (Accipiter bilttikoferi) ; a few sun-birds, warblers and shrikes are peculiar to the region. The other birds are mainly those of Senegambia and of the West African forest region generally. A common and handsome bird is the blue plantain-eater (Corythaeola) . The fishing vulture (Gypohierax) is found in all the coast districts, but true vultures are almost entirely absent except from the north, where the small brown Percnopterus makes its appearance. A flamingo (Phoeniconaias) visits Fisherman Lake, and there are a good many species of herons. Cuckoos are abundant, some of them of lovely plumage, also rollers, kingfishers and horn- bills. The last family is well represented, especially by the three forest forms — the elate hornbill and black hornbill (Ceratogymna), and the long-tailed, white-crested hornbill (Ortholophus leucolophus) . There is one trogon — green and crimson, a brightly coloured ground thrush (Pitta),

numerous woodpeckers and barbets; gloss.y starlings, the black and white African crow and a great variety of brilliantly coloured weaver birds, waxbills, shrikes and sun-birds.

As regards reptiles, there are at least seven poisonous snakes — two cobras, two puff-adders and three vipers. The brilliantly coloured red and blue lizard (Agama colonorum) is found in the coast region of eastern Liberia. There are three species of crocodile, at least two chameleons (probably more when the forest is further explored), the large West African python (P. sebae) and a rare Boine snake (Cala-baria). On the sea coast there is the leathery turtle (Dermochelis) and also the green turtle (Chelone).. In the rivers and swamps there are soft-shelled turtle (Trionyx and Sternothaerus) . The land tor- toises chieily belong to the genus Cynyxis. The fresh-water fish seem in their affinities to be nearly allied to those of the Niger and the Nile. There is a species of Polypterus, and it is probable that the Prolopterus or lung fish is also found there, though its existence has not as yet been established by a specimen. As regards' invertebrates, very few species or genera are peculiar to Liberia so far as is yet known, though there are probably one or two butterflies of local range. The gigantic scorpions (Pandinus imperator) — more than 6 in.

long — are a common feature in the forest. One noteworthy feature in Liberia, however, is the relative absence of mosquitoes, and the white ants and some other insect pests are not so troublesome here as in other parts of West Africa. The absence or extreme paucity of mosquitoes no doubt accounts for the infrequency ,of malarial fever in the interior.

Flora. — Nowhere, perhaps, does the flora of West Africa attain a more wonderful development than in the republic of Liberia and in the adjoining regions of Sierra Leone and the Ivory Coast. This is partly due to the equatorial position and the heavy rainfall. The region of dense forest, however, does not cover the whole of Liberia ; the Makona river and the northern tributaries of the Lofa and St Paul's flow through a mountainous country covered with grass and thinly scattered trees, while the ravines and watercourses are still richly forested. A good deal of this absence of forest is directly due to the action of man. Year by year the influence of the Mahommedan tribes on the north leads to the cutting down of the forest, the ex- tension of both planting and pasture and the introduction of cattle and even horses. In the regions bordering the coast also a good deal of the forest has disappeared, its place being taken (where the land is not actually cultivated) by very dense scrub. The most striking trees in the forest region are, in the basin of the Cavalla, the giant Funtumia elastica,

which grows to an altitude of 200 ft. ; various kinds of Parinarium, Oldfieldia and Khaya; the bombax or cotton tree, giant dracaenas, many kinds of fig ; Borassus palms, oil palms, the climbing Calamus palms, and on the coast the coco- nut. The most important palm of the country perhaps is the Raphia vinifera, which produces the piassava fibre of commerce. There are about twenty-two different trees, shrubs and vines pro- ducing rubber of more or less good quality. These belong chiefly to the Apocynaceous order. In this order is the genus Strophanthus, which is represented . in Liberia by several species, amongst others S. gratus. This Strophanthus is not remarkable for its rubber — which is mere bird lime — but for the powerful poison of its seeds, often used for poisoning arrows, but of late much in use as a drug for treating diseases of the heart. Coffee of several species is in- digenous and grows wild. The best known is the celebrated Cojfea liberica. The kola tree is also indigenous. Large edible nuts are derived from Coula edulis of the order Olacineae. The country is exceedingly rich in Aroids, many of which are epiphytic, festooning the trunks of tall trees with a magnificent drapery of abundant foliage. A genus much represented is Culcasia, and, swampy localities are thickly set with the giant Cyrtosperma arum, with flower spathes that are blotched with deep purple. Ground orchids and tree orchids are well represented; Polystachya liberica, an epiphytic orchid with sprays of exquisite small flowers of purple and gold, might well be introduced into horticulture for its beauty. The same might be said of the magnificent Lissochilus roseus, a terrestrial orchid, growing to 7 ft. in height, with rose-coloured flowers nearly 1 in. long; there are other orchids of fantastic design in their green and white flowers, some of which have spurs (nectaries) nearly 7 in. long.

Many trees offer magnificent displays of flowers at certain seasons of the year; perhaps the loveliest effect is derived from the bushes and trailing creepers of the Combretum genus, which, during the ” winter ” months from December to March, cover the scrub and the forest with mantles of rose colour. Smaethmannia trees are thickly set at this season with large blossoms of waxen white. Very beautiful also are the red velvet or white velvet sepals of the Mussaenda genus. Bamboos of the genus Oxytenanihera are indigenous, Tree ferns are found on the mountains above 4000 ft. The bracken grows in low sandy tracts near the coast. The country in general is a fern paradise, and the iridescent creeping Selaginella (akin to Lycopodium) festoons the undergrowth by the wayside. The cultivated trees and plants of importance are, besides rubber, the manioc or cassada, the orange tree, lime, cacao, coffee, pineapple (which now runs wild over the whole of Liberia), sour sop, ginger, papaw, alligator apple, avocado pear, okro, cotton

(Gossypium peruvianum — the kidney cotton), indigo, sweet potato, capsicum (chillie), bread-fruit, arrow- root (Maranta) , banana, yam, ” coco “yam (Colocasia antiquorum, var. escidenta), maize, sorghum, sugar cane, rice and eleusine (Eleu sine), besides gourds, pumpkins, cabbages and onions.

Minerals. — The hinterland of Liberia has been but slightly ex- plored for mineral wealth. In a general way it is supposed that the lands lying between the lower St Paul’s river and the Sierra Leone frontier are not much mineralized, except that in the vicinity of river mouths there are indications of bitumen. The sand of nearly all the rivers contains a varying proportion of gold. Garnets and mica are everywhere found. There have been repeated stories of diamonds obtained from the Finley Mountains (which are volcanic) in the central province, but all specimens sent home, except one, have hitherto proved to be quartz crystals. There are indications of sapphires and other forms of corundum. Corundum indeed is abundantly met with in the eastern half of Liberia. The sand of the rivers contains monazite. Graphite has been discovered in the Po Hills. Lead has been reported from the Nidi or Niete Mountains. Gold is present in some abundance in the river sand of central Liberia, and native reports speak of the far interior as being rich in gold. Iron — haematite — is present almost everywhere. There are other indications of bitumen, besides those mentioned, in the coast region of eastern Liberia.

LIBERIA

54*

History and Population. — Tradition asserts that the Liberian coast was first visited by Europeans when it was reached by the Dieppois merchant-adventurers in the 14th century. The French in the 17th century claimed that but for the loss of the archives of Dieppe they would be able to prove that vessels from this Norman port had established settlements at Grand Basa, Cape Mount, and other points on the coast of Liberia. No proof lias yet been forthcoming, however, that the Portuguese were not the first white men to reach this coast. The first Portuguese pioneer was Pedro de Sintra, who discovered and noted in 1461 the remarkable promontory of Cape Mount, Cape Mesurado (where the capital, Monrovia, is now situated) and the mouth of the Junk river. In 1462 de Sintra returned with another Portuguese captain, Sueiro da Costa, and penetrated as far as Cape Palmas and the Cavalla river. Subsequently the Portu- guese mapped the whole coast of Liberia, and nearly all the prominent features — capes, rivers, islets — off that coast still bear Portuguese names. From

the 16th century onwards, English, Dutch, German, French and other European traders contested the commerce of this coast with the Portuguese, and finally drove them away. In the 18th century France once or twice thought of establishing colonies here. At the end of the 1 8th century, when the tide was rising in favour of the abolition of slavery and the repatriation of slaves, the Grain Coast [so called from the old trade in the" Grains of Paradise "or Amomum pepper] was suggested once or twice as a suitable home for repatriated negroes. Sierra Leone, however, was chosen first on account of its possessing an admirable harbour. But in 182 1 Cape Mesurado was selected by the American Colonization Society as an appropriate site for the first detachment of American freed negroes, whom difficulties in regard to extending the suffrage in the United States were driving away from a still slave-holding America. From that date, 1821, onwards to the present day, negroes and mulattos — freed slaves or the descend- ants of such — have been crossing the Atlantic in small numbers to settle on the Liberian coast. The great migrations took place during the first half of the 19th century. Only two or three thousand American emigrants— at most — have come to Liberia since i860.

The colony was really founded by Jehudi Ashmun, a white American, between 1822 and 1828. The name "Liberia" was invented by the Rev. R. R. Gurley in 1824. In 1847 the American colonists declared their country to be an independent republic, and its status in this capacity was recognized in 1848-1849 by most of the great powers with the exception of the United States. Until 1857 Liberia consisted of two republics — Liberia and Maryland. These American settlements were dotted at intervals along the coast from the mouth of the Sewa river on the west to the San Pedro river on the east (some 60 m. beyond Cape Palmas) . Some tracts of territory, such as the greater part of the Kru coast, still, however, remain without foreign— American- settlers, and in a state of quasi-independence. The uncertainty of Liberian occupation led to frontier troubles with Great Britain and disputes with France. Finally, by the English and French treaties of 1885 and 1892 Liberian territory on the coast was made continuous, but was limited to the strip of about 300 m. between the Mano river on the west and the Cavalla river on the east. The Sierra Leone-Liberia frontier was demarcated in 1903; then followed the negotiations with France for the exact delimitation of the Ivory Coast-Liberia frontier, with the result that Liberia lost part of the hinterland she had claimed. Reports of territorial encroachments aroused much sympathy with Liberia in America and led in February 1909 to the appoint- ment by President Roosevelt of a commission which visited Liberia in the summer of that year to investigate the condition of the country. As a

result of the commissioners' report negotia- tions were set on foot for the adjustment of the Liberian debt and the placing of United States officials in charge of the Liberian customs. In July 1910 it was announced that the American government, acting in general agreement with Great Britain, France and Germany, would take charge of the finances, military organization, agriculture and boundary questions of the re-

public. A loan for £400,000 was also arranged. Meantime the attempts of the Liberian government to control the Kru coast led to various troubles, such as the fining or firing upon foreign steamships for alleged contraventions of regulations. During 1910 the natives in the Cape Palmas district were at open warfare with the Liberian authorities.

One of the most notable of the Liberian presidents was J. J. Roberts, who was nearly white, with only a small proportion of negro blood in his veins. But perhaps the ablest statesman that this American-Negro republic has as yet produced is a pure- blooded negro — President Arthur Barclay, a native of Barbados in the West Indies, who came to Liberia with his parents in the middle of the 19th century, and received all his education there. President Barclay was of unmixed negro descent, but came of a Dahomey stock of superior type. 1 Until the accession to power of President Barclay in 1904 (he was re-elected in 1907), the Americo- Liberian government on the coast had very uncertain relations with the indigenous population, which is well armed and tenacious of local independence. But of late Liberian influence has been extending, more especially in the counties of Maryland and Montserrado.

The president is now elected for a term of four years. There is a legislature of eight senators and thirteen representatives. The type of the constitution is very like that of the United States. Increasing attention is being given to education, to deal with which there are several colleges and a number of schools. The judicial functions are discharged by four grades of officials — the local magistrates, the courts of common pleas, the quarterly courts (five in number) and the supreme court. The customs service includes British customs officers lent to the Liberian service. A gunboat for preventive service purchased from the British government and commanded by an Englishman, with native petty officers and crew, is employed by the Liberian government. The language of government and trade is English, which is understood far and wide throughout Liberia. As the origin of the Sierra Leonis and the Americo-Liberian settlers was very much the same, an increasing intimacy is growing up between the

English-speaking populations of these adjoining countries. Order is maintained in Liberia to some extent by a militia.

The population of Americo-Liberian origin in the coast regions is estimated at from 12,000 to 15,000. To these must be added about 40,000 civilized and Christianized negroes who make common cause with the Liberians in most matters, and have gradually been filling the position of Liberian citizens.

For administrative purposes the country is divided into four counties, Montserrado, Basa, Sino and Maryland, but Cape Mount in the far west and the district round it has almost the status of a fifth county. The approximate revenue for 1906 was £65,000, and the expenditure about £60,000, but some of the revenue was still collected in paper of uncertain value. There are three custom-houses, or ports of entry on the Sierra Leone land frontier between the Moa river on the north and the Mano on the south, and nine ports of entry along the coast. At all of these Europeans are allowed to settle and trade, and with very slight restrictions they may now trade almost anywhere in Liberia. The rubber trade is controlled by the Liberian Rubber Corporation, which holds a special concession from the Liberian government for a number of years, and is charged with the pre- servation of the forests. Another English company has con- structed motor roads in the Liberian hinterland to connect centres of trade with the St Paul's river. The trade is done almost entirely with Great Britain, Germany and Holland, but friendly relations are maintained with Spain, as the Spanish plantations in Fernando Po are to a great extent worked by Liberian labour.

The indigenous population must be considered one of the assets of Liberia. The native population — apart from the American element — is estimated at as much as 2,000,000; for

1 Amongst other remarkable negroes that Liberian education produced was Dr E. W. Blyden (b. 1832), the author of many works dealing with negro questions.

although large areas appear to be uninhabited forest, other parts are most densely populated, owing to the wonderful fertility of the soil. The native tribes belong more or less to the following divisions, commencing on the west, and proceeding eastwards: (i) Vai, Gbandi,

Kpwesi, Mende, Buzi and Mandingo (the Vai, Mende and Mandingo are Mahommedans) ; all these tribes speak languages derived from a common stock. (2) In the densest forest region between the Mano and the St Paul's river is the powerful Gora tribe of unknown linguistic affinities. (3) In the coast region between the St Paul's river and the Cavalla (and beyond) are the different tribes of Kru stock and language family — DS, Basa, Gibi, Kru, Grebo, Putu, Sikon, &c. &c. The actual Kru tribe inhabits the coast between the river Cestos on the west and Grand Sesters on the east. It is known all over the Atlantic coasts of Africa, as it furnishes such a large proportion of the seamen employed on men-of-war and merchant ships in these tropical waters. Many of the indigenous races of Liberia in the forest belt beyond 40 m. from the coast still practise cannibalism. In some of these forest tribes the women still go quite naked, but clothes of a Mahommedan type are fast spreading over the whole country. Some of the indigenous races are of very fine physique. In the Nidi country the women are generally taller than the men. No traces of a Pygmy race have as yet been discovered, nor any negroes of low physiognomy. Some of the Krumen are coarse and ugly, and this is the case with the Mende people; but as a rule the indigenes of Liberia are handsome, well-proportioned negroes, and some of the Mandingos have an almost European cast of feature.

Authorities. — Col. VVauwerman, Liberia; Histoire de lafondation d'un etal negre (Brussels, 1885); J. Bilttikofer, Reisebilder aus Liberia (Leiden, 1890) ; Sir Harry Johnston, Liberia (2 vols., London, 1906), with full bibliography; Maurice Delafosse, Vocabulaires comparatifs de plus de 60 langues et dialectes paries d la Cdte d'lvoire et dans la region limitrophe (1904), a work which, though it professes to deal mainly with philology, throws a wonderful light on the relationships and history of the native tribes of Liberia.

(H. H. J.) LIBERIUS, pope from 352 to 366, the successor of Julius I., was consecrated according to the Catalogus Liberianus on the 22nd of May. His first recorded act was, after a synod had been held at Rome, to write to Constantius, then in quarters at Aries (353-354), asking that a council might be called at Aquileia with reference to the affairs of Athanasius; but his messenger Vincentius of Capua was compelled by the emperor at a con- ciliabulum held in Aries to subscribe against his will a con- demnation of the orthodox patriarch of Alexandria'. In 355 Liberius was one of the few who, along with Eusebius of Vercelli, Dionysius of Milan and Lucifer of Cagliari, refused to sign the condemnation of Athanasius, which had anew been imposed at Milan by imperial command upon all the Western bishops; the consequence was his relegation to Beroea in Thrace, Felix II. (antipope) being

consecrated his successor by three ” catascopi haud episcopi,” as Athanasius called them. At the end of an exile of more than two years he yielded so far as to subscribe a formula giving up the ” homoousios,” to abandon Athanasius, and to accept the communion of his adversaries — a serious mistake, with which he has justly been reproached. This sub- mission led the emperor to recall him from exile; but, as the Roman see was officially occupied by Felix, a year passed before Liberius was sent to Rome. It was the emperor’s intention that Liberius should govern the Church jointly with Felix, but on the arrival of Liberius, Felix was expelled by the Roman people. Neither Liberius nor Felix took part in the council of Rimini (359). After the death of the emperor Constantius in 361, Liberius annulled the decrees of that assembly, but, with the concurrence of SS. Athanasius and Hilarius, retained the bishops who had signed and then withdrawn their adherence. In 366 Liberius gave a favourable reception to a deputation of the Eastern episcopate, and admitted into his communion the more moderate of the old Arian party. He died on the 24th of September 366.

His biographers used to be perplexed by a letter purporting to be from Liberius, in the works of Hilary, in which he seems to” write, in 352, that he had excommunicated Athanasius at the instance of

the Oriental bishops; but the document is now held to be spurious See Hefele, Conciliengesch. i. 648 seq. Three other letters, though contested by Hefele, seem to have been written by Liberius at the time of his submission to the emperor. (L. D.*)

LIBER PONTIFICALIS, or Gesta Pontificum Romanorum (i.e. book of the popes), consists of the lives of the bishops of Rome from the time of St Peter to the death of Nicholas I. in 867. A supplement continues the series of lives almost to the close of the 9th century, and several other continuations were written later. During the 16th century there was some dis- cussion about the authorship of the Liber, and for some time it was thought to be the work of an Italian monk, Anastasius Bibliothecarius (d. 886). It is now, however, practically certain that it was of composite authorship and that the earlier part of it was compiled about 530, three centuries before the time of Anastasius. This is the view taken by Louis Duchesne and substantially by G. Waitz and T. Mommsen, although these scholars think that it was written about a century later. The Liber contains much information about papal affairs in general, and about endowments, martyrdoms and the like, but a con- siderable part of it is obviously legendary. It assumes that the bishops of Rome exercised authority over the Christian Church from its earliest days.

The Liber, which was used by Bede for his Hisloria Ecclesiastica, was first printed at Mainz in 1602. Among other editions is the one edited by T. Mommsen for the Monumenta Germaniae historica. Gesta Romanorum pontificum, Band i., but the best is the one by L. Duchesne, Le Liber pontificalis: texte, introduction, commentaire (Paris, 1884-1892). See also the same writer's Ittude sur le Liber pontificalis (Paris, 1877); and the article by A. Brackmann in Herzog-Hauck's Realencyklopa'die, Band xi. (Leipzig, 1902).

LIBERTAD, or La Libertad, a coast department of Peru, bounded N. by Lambayeque and Cajamarca, E. by San Martin, S. by Ancachs, S.W. and W. by the Pacific. Pop. (1906 esti- mate) 188,200; area 10,209 s q- m – Libertad formerly included the present department of Lambayeque. The Western Cordillera divides it into two nearly equal parts; the western consisting of a narrow, arid, sandy coast zone and the western slopes of the Cordillera broken into valleys by short mountain spurs, and the eastern a high inter- Andine valley lying between the Western and Central Cordilleras and traversed by the upper Marafion or Amazon, which at one point is less than 90 m. in a straight line from the Pacific coast. The coast region is traversed by several short streams, which are fed by the melting snows of the Cordillera and are extensively used for irrigation. These are (the names also applying to their valleys) the Jequete- peque or Pacasmayo, in whose valley rice is an important product, the Chicama, in whose valley the sugar plantations are among the largest and best in Peru, the Moche, Viru, Chao and Santa; the last, with its northern tributary, the Tablachaca, forming the southern boundary line of the department. The Santa Valley is also noted for its sugar plantations. Cotton is produced in several of these valleys, coffee in the Pacasmayo district, and coca on the mountain slopes about Huamachuco and Otuzco, at elevations of 3000 to 6000 ft. above sea-level. The upland regions, which have a moderate rainfall and a cool, healthy climate, are partly devoted to agriculture on a small scale (producing wheat, Indian corn, barley, potatoes, quinua, alfalfa, fruit and vegetables), partly to grazing and partly to mining. Cattle and sheep have been raised on the upland pastures of Libertad and Ancachs since early colonial times, and the llama and alpaca were reared throughout this " sierra " country long before the Spanish conquest. Gold and silver mines are worked in the districts of Huamachuco, Otuzco and Pataz, and coal has been found in the first two. The department had 169 m. of rail- way in 1906, viz.: from Pacasmayo to Yonan (in Cajamarca) with a branch to Guadalupe, 60 m. ; from Salaverry to Trujillo with its extension to Ascope, 47 m.; from Trujillo to Laredo, Galindo and Menocucho, 185 m.; from

Huanchaco to Roma, 25 m.; and from Chicama to Pampas, 185 m. The principal ports are Pacasmayo and Salaverry, which have long iron piers built by the national government; Malabrigo, Huanchuco, Guanape and Chao are open roadsteads. The capital of the department is Trujillo. The other principal towns are San

Pedro, Otuzco, Huamachuco, Santiago de Chuco and Tuyabamba —all provincial capitals and important only through their mining interests, except San Pedro, which stands in the fertile district of the Jequetepeque. The population of Otuzco (35 m. N.E. of Trujillo) was estimated to be about 4000 in 1896, that of Huamachuco (65 m. N.E. of Trujillo) being perhaps slightly less.

LIBERTARIANISM (from Lat. libertas, freedom), in ethics, the doctrine which maintains the freedom of the will, as opposed to necessitarianism or determinism. It has been held in various forms. In its extreme form it maintains that the individual is absolutely free to chose this or that action indifferently (the liberum arbitrium indijjerentiae) , but most libertarians admit that acquired tendencies, environment and the like, exercise control in a greater or less degree.

LIBERTINES, the nickname, rather than the name, given to various political and social parties. It is futile to deduce the name from the Libertines of Acts vi. 9; these were ” sons of freedmen,” for it is vain to make them citizens of an imaginary Libertum, or to substitute (with Beza) Libustines, in the sense of inhabitants of Libya. In a sense akin to the modern use of the term ” libertine,” i.e a person who sets the rules of morality, &c, at defiance, the word seems first to have been applied, as a stigma, to Anabaptists in the Low Countries (Mark Pattison, Essays, ii. 38). It has become especially attached to the liberal party in Geneva, opposed to Calvin and carrying on the tradition of the Liberators in that city; but the term was never applied to them till after Calvin’s death (F. W. Kamp- schulte, Johann Calvin). Calvin, who wrote against the ” Libertins qui se nomment Spirituelz ” (1545), never confused them with his political antagonists in Geneva, called Perrinistes from their leader Amadeo Perrin. The objects of Calvin’s polemic were the Anabaptists above mentioned, whose first obscure leader was Coppin of Lisle, followed by Quintin of Hennegau, by whom and his disciples, Bertram des Moulins and Claude Perseval, the principles of the sect were disseminated in France. Quintin was put to death as a heretic at Tournai in 1546. His most notable follower

was Antoine Pocquet, a native of Enghien, Belgium, priest and almoner (1540-1549), afterwards pensioner of the queen of Navarre, who was a guest of Bucer at Strassburg (1 543-1 544) and died some time after 1 560. Calvin (who had met Quintin in Paris) describes the doctrines he impugns as pantheistic and antinomian.

See Choisy in Herzog-Hauck's Realencyklopddie (1902).

(A. Go.*)

LIBERTINES, SYNAGOGUE OF THE, a section of the Hellen- istic Jews who attacked Stephen (Acts vi. 9). The passage reads, t'uhs twv tn ri;s avvaf(jrfr\% ttJs \eyoixevrjs Aifieprivuv, Kai Kvpqvaiwv Kai 'A \(ˆav8piu>u, Kai twv avb KtXtKias koX 'Adas, and opinion is divided as to the number of synagogues here named. The probability is that there are three, corresponding to the geographical regions involved, (1) Rome and Italy, (2) N.E. Africa, (3) Asia Minor. In this case " the Synagogue of the Libertines " is the assembly of " the Freedmen " from Rome, descendants of the Jews enslaved by Pompey after his conquest of Judaea 63 B.C. If, however, we take AifiepHvuv Kai Kvprtvaicav Kai 'A\e£av5peoov closely together, the first name must denote the people of some city or district. The obscure town Libertum (inferred from the title Episcopus Libertinensis in connexion with the synod of Carthage, a.d. 411) is less likely than the reading (Aif} {xi>i> or) Aˆvarlvuiv underlying certain Armenian versions and Syriac commentaries. The Greek towns lying west from Cyrene would naturally be called Libyan. In any case the interesting point is that these returned Jews, instead of being liberalized by their residence abroad, were more tenacious of Judaism and more bitter against Stephen than those who had never left Judaea.

LIBERTY (Lat. libertas, from liber, free), generally the state of freedom, especially opposed to subjection, imprisonment or slavery, or with such restricted or figurative meaning as the circumstances imply. The history of political liberty is in modern days identified practically with the progress of civiliza-

tion. In a more particular sense, " a liberty " is the term for a franchise, a privilege or branch of the crown's prerogative granted to a subject, as, for example, that of executing legal process; hence the district over which the privilege extends. Such liberties are exempt from the jurisdiction of the sheriff and have separate commissions of the peace, but for purposes of local government form part of the county in which they are situated. The exemption from the jurisdiction of the sheriff was recognized in England by the Sheriffs

Act 1887, which provides that the sheriff of a county shall appoint a deputy at the expense of the lord of the liberty, such deputy to reside in or near the liberty. The deputy receives and opens in the sheriff's name all writs, the return or execution of which belongs to the bailiff of the liberty, and issues to the bailiff the warrant re- quired for the due execution of such writs. The bailiff then becomes liable for non-execution, mis-execution or insufficient return of any writs, and in the case of non-return of any writ, if the sheriff returns that he has delivered the writ to a bailiff of a liberty, the sheriff will be ordered to execute the writ not- withstanding the liberty, and must cause the bailiff to attend before the high court of justice and answer why he did not execute the writ.

In nautical phraseology various usages of the term are derived from its association with a sailor's leave on shore, e.g. liberty-man, liberty-day, liberty-ticket.

A History of Modern Liberty, in eight volumes, of which the third appeared in 1906, has been written by James Mackinnon; see also Lord Acton's lectures, and such works as J. S. Mill's On Liberty and Sir John Seeley's Introduction to Political Science.

LIBERTY PARTY, the first political party organized in the United States to oppose the spread and restrict the political power of slavery, and the lineal precursor of the Free Soil and Republican parties. It originated in the Old North-west. Its organization was preceded there by a long anti-slavery religious movement. James G. Birney (q.v.), to whom more than to any other man belongs the honour of founding and leading the party, began to define the political duties of so-called " abolitionists " about 1836; but for several years thereafter he, in common with other leaders, continued to disclaim all idea of forming a political party. In state and local campaigns, however, non-partisan political action was attempted through the questioning of Whig and Democratic candidates. The utter futility of seeking to obtain in this way any satisfactory concessions to anti-slavery sentiment was speedily and abundantly proved. There arose, consequently, a division in the American Anti-slavery Society between those who were led by W. L. Garrison (q.v.), and advo- cated political non-resistance — and, besides, had loaded down their anti-slavery views with a variety of religious and social vagaries, unpalatable to all but a small number — and those who were led by Birney, and advocated independent political action. The sentiment of the great majority of " abolitionists " was, by 1838, strongly for such action; and it was clearly sanctioned and implied in the constitution and declared principles of the Anti-slavery Society; but the capture of that organization by the

Garrisonians, in a ” packed ” convention in 1830, made it unavailable as a party nucleus — even if it had not been already outgrown — and hastened a separate party organization. A convention of abolitionists at Warsaw, New York, in November 1839 had resolved that abolitionists were bound by every consideration of duty and expediency to organize an independent political party. Accordingly, the political abolitionists, in another convention at Albany, in April 1840, containing delegates from six states but not one from the North-west, launched the ” Liberty Party,” and nominated Birney for the presidency. In the November election he received 7069 votes. 1

The political ” abolitionists ” were abolitionists only as they were restrictionists: they wished to use the federal government to exclude (or abolish) slavery from the federal Territories and the District of Columbia, but they saw no opportunity to attack slavery in the states — i.e. to attack the institution per se; also

1 Mr T. C. Smith estimates that probably not one in ten of even professed abolitionists supported Birney; only in Massachusetts did he receive as much as 1 % of the total vote cast.

they declared there should be ” absolute and unqualified division of the General Government from slavery ” — which implied an amendment of the constitution. They proposed to use ordinary moral and political means to attain their ends — not, like the Garrisonians, to abstain from voting, or favour the dissolution of the Union: ,

After 1840 the attempt began in earnest to organize the Liberty Party thoroughly, and unite all anti-slavery men. The North-west, where ” there was, after 1840, very little known of Garrison and his methods “(T. C. Smith) , was the most promis- ing field, but though the contest of state and local campaigns gave morale to the party, it made scant political gains (in 1843 it cast hardly 10% of the total vote); it could Uot convince the people that slavery should be made the paramount question in politics. In 1844, however, the Texas question gave slavery precisely this pre-eminence in the presidential campaign. Until then, neither Whigs nor Democrats had regarded the Liberty Party seriously; now, however, each party charged that the Liberty movement was corruptly auxiliary to the other. As the campaign progressed, the Whigs’ alternately abused the Liberty men and made frantic appeals for their support. But the Liberty men were strongly opposed to Clay

personally; and even if his equivocal campaign letters (see Clay, Henry) had not left exceedingly small ground for belief that he would resist the annexation of Texas, still the Liberty men were not such as to admit that an end justifies the means; therefore they again nominated Birney. He received 62,263 votes 1 — m&ny more than enough in New York to have carried that state and the presidency for Clay, had they been thrown to- his, support. . The Whigs, therefore, blamed the Liberty Party , for Democratic success and the annexation of Texas; but— quite apart from the issue of political ethics — it is almost certain that though Clay's chances were injured by the Liberty ticket, they were injured much more outside the Liberty ranks;, by his own quibbles. 2 After 1844 the Liberty Party made little progress. Its leaders were never very strong as politicians, and its ablest organizer, Birney, was about this time compelled, by an accident to abandon public life. Moreover, the election of 1844 was in a way fatal to the party; for it seemed to prove that though " abolition " was not the party programme, still its antecedents and personnel were too radical to unite the North; and above all it could not, after 1844, draw the disaffected Whigs, for though their party was steadily moving toward anti-slavery their dislike of the Liberty Party effectually prevented union. Indeed, no party of one idea could hope to satisfy men. who had been Whigs or Democrats. At the same time, anti-slavery Whigs and Democrats were segregating in state politics, and the issue of excluding slavery from the new territory acquired from Mexico afforded a golden opportunity to unite all anti-slavery men on the principle of the Wilmot Proviso (1846). The Liberty Party reached its greatest strength (casting 74,017 votes) in the state elections of 1846. Thereafter, though growing somewhat in New England, it rapidly became ineffective in the rest of the North. Many, including Birney, thought it should cease to be an isolated party of one idea — striving for mere balance of power between Whigs and Democrats, welcoming small conces- sions from them, almost dependent upon them. Some wished to revivify it by making it a party of general reform. One result was the secession and formation of the Liberty League, which in 1847 nominated Gerrit Smith for the presidency. No adequate effort was made to take advantage of the disintegration of other parties. In October 1847, at Buffalo, was held the third and last national convention. John P. Hale— whose election to the United States Senate had justified the first successful Union of

1 Birney's vote was reduced by a disgraceful election, trick by the Whigs (the circulation of a forged letter on the eve of the election) ; a trick to which he had exposed himself by an ingenuously honest reception of Democratic advances in a matter of local good-govern-

ment in Michigan.

2 E.g. Horace Greeley made the Whig charge; but in later life he repeatedly attributed Clay's defeat simply to Clay's own letters ; and for Millard Fillmore's important opinion see footnote to Know Nothing Party.

Liberty men with other anti-slavery men in state politics-ˆwas nominated for the presidency. But the nomination by the Democrats of Lewis Cass shattered the Democratic organization in New Yorkand the North-west; and when the Whigs nominated General Taylor, adopted a non-committal platform, and showed hostility to the, Wilmot Proviso, the way was cleared for a union of all anti-slavery men. The Liberty Party, abandoning there- fore its independent nominations, joined in the first convention and nominations of the Free Soil Party (q.v.), thereby practically losing its identity, although it continued until after the organiza- tion of the Republican Party to maintain something of a semi- independent organization. The Liberty Party has the unique honour among third-parties in the United States of seeing its principles rapidly adopted and realized.

See T. C. Smith, History of the Liberty and Free Soil Parties in- the Northwest (Harvard University Historical Studies, New York, 1897), and lives, and writings of all the public men mentioned above ; also of G. W. Julian, J. R. Giddings and S. P. Chase.

LIBITINA, an old Roman goddess of funerals. She had a sanctuary in a sacred grove (perhaps on the Esquiline), where, by an ordinance of Servius Tullius, a piece of money (lucar Libitinae) was deposited whenever a death took place. Here the undertakers (libitinarii) , who carried out all funeral arrange- ments by contract, had their offices, and everything necessary was >kept for sale or hire; here all deaths were registered for statistical purposes. The word Libitina then came to be used for the busifless of an undertaker, funeral requisites, and (in the poets) " for' death itself. By later antiquarians Libitina was sometimes-identified with Persephone, but more commonly (partly or completely) with Venus Lubentia or Lubentina, an Italian goddess of gardens. The similarity of name and the fact that VehUs Lubentia had a sanctuary in the grove of Libitina favoured this idea. . Further, Plutarch {Quaest. Rom. 2,3) mentions a small statue at Delphi of Aphrodite Epitymbia (A. of tombs = Venus. Libitina); to which the spirits of the dead were- summoned; The inconsistency of selling funeral requisites in the temple of Libitina, seeing that she is identified with Venus, is explained by him as indicating that one and the same goddess presides over birth and death ; or the association of such

things with the goddess of love and pleasure is intended to show that death is not a calamity, but rather a consummation to be desired. Libitina may, however, have been originally an earth goddess* connected with luxuriant nature and the enjoyments of life (cf . lub-el, lib-ido) ; then, all such deities being connected with the underworld, she also became the goddess of death, and that side of her character predominated in the later conception's* .

See Plutarch, Numa, 12; Dion. Halic. iv. 15; Festus xvi., s.v. " Rustica Vinalia "; Juvenal xii. 121, with Mayor's note; G. Wis- sowa in Roscher's Lexicon der Mythologie, s.v.

LIBMANAN, a town of the province of Anibos Camarines, Luzon, Philippine Islands, on the Libmanan river, n m. N.W.of Nueva Caceres, the capital. Pop. (1903) 17,416. It is about 4! m. N.E- of the Bay of San Miguel. Rice, coco-nuts, hemp, Indian corn, sugarcane, bejuco, arica nuts and camotes, are grown in the vicinity, and the manufactures include hempgoodst, alcohol (from' coco-nut-palm sap), copra, and baskets, chairs, hammocks and hats of bejuco and bamboo. The Libmanan river?, a tributary of theBicol, into which it empties 2 m. below the town, is famous for its clear cold water and for its sulphur springs. The language is Bicol.

: LIBO, in ancient Rome, the name of a family belonging to the Scrfbonian gens. It is chiefly interesting for its connexion with the Puteal Scribonianum or Puteal Libonis in the forum at Rome, 3 dedicated or restored by one of its members, perhaps the praetor of 204 B.c.jor the tribune of the people in 149. In its vicinity the praetor's tribunal, removed from the comitium in the 2nd century B.C., held its sittings, which led to the place becoming the haunt of litigants, money-lenders and business people. According to ancient authorities, the Puteal Libonis

s Puteal was the name given to an erection (or enclosure) on a spot which had been struck by lightning; it was so called from its resemblance to the stone kerb or low enclosure round a well {pulsus).

was between the temples of Castor and Vesta, near the Porticus Julia and the Arcus Fabiorum, but no remains have been dis- covered. The idea that an irregular circle of travertine blocks, found near the temple of Castor, formed part of the puteal is now abandoned.

See Horace, Sat. ii. 6. 35, Epp. i. 19. 8; Cicero, Pro Sestio, 8; for the well-known coin of L. Scribonius Libo, representing the puteal of Libo, which rather resembles a cippus (sepulchral monument) or an altar, with laurel wreaths, two lyres and a pair of pincers or tongs below the wreaths (perhaps symbolical of Vulcanus as forger of lightning), see C. Hulsen, The, Roman Forum (Eng. trans, by J. 15. Carter, 1906), p. 150, where a marble imitation found at Veii is also given.

LIBON, a Greek architect, born at Elis, who was employed to build the great temple of Zeus at Olympia (q.v.) about 460 B.C. (Pausanias v. 10. 3).

LI BOURNE, a town of south-western France, capital of : an arrondissement of the department of Gironde, situated at the confluence of the Isle with the Dordogne, 22 m. E.N.E. of Bor- deaux on the railway to Angouleme. Pop. (1906) town, 15,280; commune, 19,323. The sea is 56 m. distant, but the tide affects the river so as to admit of vessels drawing 14 ft. reaching the town at the highest tides. The Dordogne is here crossed by a stone bridge 492 ft. long, and a suspension bridge across the Isle connects Libourne with Fronsac, built on a hill on which in feudal times stood a powerful fortress. Libourne is regularly built. The Gothic church, restored in the 19th century, has a stone spire 232 ft. high. On the quay there is a machicolated clock-tower which is a survival of the ramparts of the 14th century; and the town-house, containing a small museum and a library, is a quaint relic- of the. 16th century. There is a statue of the Due Decazes, who was born in the neighbourhood. The sub-prefecture, tribunals of first instance and of commerce, and a communal college are among the public institutions. The principal articles of commerce are the wines and brandies of the district. Printing and cooperage are among the industries.

Like other sites at the confluence of important rivers, that of Libourne was appropriated at an early period. Under the Romans Condate stood rather more than a mile to the south of the present Libourne; it was destroyed during the troubles of the 5th century. Resuscitated by Charlemagne, it was rebuilt in 1269, under its present name and on the site and plan it still retains, by Roger de Leybourne (of Leybourne in Kent), seneschal of Guienne. acting under the authority of King Edward I. of England. It suffered considerably in the struggles of the French and English for the possession of Guienne in the 14th century.

See R. Guinodie, Hist, de Libourne (2nd ed., 2 vols., Libourne,

1876-1877).

LIBRA (" The Balance "), in astronomy, the 7th sign of the zodiac (q.v.), denoted by the symbol =ˆ, resembling a pair of scales, probably in allusion to the fact that when the sun enters this part of the ecliptic, at the autumnal equinox, the days and nights are equal. It is also a constellation, not mentioned by Eudoxus or Aratus, but by Manetho (3rd century B.C.) and Geminus (1st century B.C.), and included by Ptolemy in his 48 asterisms; Ptolemy catalogued 17 stars, Tycho Brahe 10, and Hevelius 20. 8 Librae is an Algol (q.v.) variable, the range of magnitude being 5-0 to 6-2, and the period 2 days 7 hrs. 51 min.; and the cluster M . 5 Librae is a faint globular cluster of which only about one star in eleven is variable.

LIBRARIES. A library (from Lat. liber, book), in the modern sense, is a collection of printed or written literature. As such, it implies an advanced and elaborate civilization. If the term be extended to any considerable collection of written documents, it must be nearly as old as civilization itself. The earliest use to which the invention of inscribed or written signs was put was probably to record important religious and political trans- actions. These records would naturally be preserved in sacred places, and accordingly the earliest libraries of the world were probably temples, and the earliest librarians priests. And indeed before the extension of the arts of writing and reading the priests were the only persons who could perform such work as, xvi. 18

Assyria.

e.g. the compilation of the Annates Maximi, which was the duty of the pontifices in ancient Rome. The beginnings of literature proper in the shape of ballads and songs may have continued to be conveyed orally only from one generation to another, long after the record of important religious or civil events was regularly committed to writing. The earliest collections of which we know anything, therefore, were collections of archives. Of this character appear to have been such famous collections as that of the Medians at Ecbatana, the Persians at Susa or the hiero- glyphic archives of Knossos discovered by A. J. Evans (Scripta Minoa, 1909) of a date synchronizing with the Xllth Egyptian dynasty. It is not until the development of arts and sciences, and the growth of a considerable written literature, and even of a distinct literary class, that we find collections of books which can be called libraries in our modern sense. It is of libraries in the: modern sense, and not, except incidentally, of archives that we are to speak.

Ancient Libraries

The researches which have followed the discoveries of P. E. Botta and

Sir H. Layard have thrown unexpected light not only upon the history but upon the arts, the sciences and the literatures of the ancient civilizations of Babylonia and Assyria. In all these wondrous revelations no facts are more interesting than those which show the existence of extensive libraries so many ages ago, and none are more eloquent of the elaborateness of these forgotten civilizations. In the course of his excavations at Nineveh in 1850, Layard came upon some chambers in the south-west palace, the floor of which, as well as the adjoining rooms, was covered to the depth of a foot with tablets of clay, covered with cuneiform characters, in many cases so small as to require a magnifying glass. These varied in size from 1 to 1 2 in. square. A great number of them were broken, as Layard supposed by the falling in of the roof, but as George Smith thought by having fallen from the upper storey, upon which he believed the collection to have been placed. These tablets formed the library of the great monarch Assur- bani-pal — the Sardanapalus of the Greeks — the greatest patron of literature amongst the Assyrians. It is estimated that this library consisted of some ten thousand distinct works and documents, some of the works extending over several tablets. The tablets appear to have been methodically arranged and cata- logued, and the library seems to have been thrown open for the general use of the king's subjects. 1 A great portion of this library has already been brought to England and deposited in the British museum, but it is calculated that there still remain some 20,000 fragments to be gathered up. For further details as to Assyrian libraries, and the still earlier Babylonian libraries at Tello, the ancient Lagash, and at Niffer, the ancient Nippur, from which the Assyrians drew their science and literature, see Babylonia and Nippur.

Of the libraries of ancient Egypt our knowledge is scattered and imperfect, but at a time extending to more than 6000 years ago we find numerous scribes of many classes who re- corded official events in the life of their royal masters / t" cle ". t or details of their domestic affairs and business trans- Libraries. actions. Besides this official literature we possess examples of many commentaries on the sacerdotal books, as well as historical treatises, works on moral philosophy and proverbial wisdom, science, collections of medical receipts as well as a great variety of popular novels and humoristic pieces. At an early date Heliopolis was a literary centre of great importance with culture akin to the Babylonian. Attached to every temple were professional scribes whose function was partly religious and partly scientific. The sacred books of Thoth constituted as it were a. complete encyclopaedia of religion and science, and on these books was gradually accumulated an immense mass of exposition and

commentary. We possess a record relating to ” the land of the collected works [library] of Khufu,” a monarch of the IVth dynasty, and a similar inscription relating to the library of Khafra, the builder of the second pyramid. At Edfu 1 See Menant, Bibliothique du palais de Ninive (Paris, 1880).

rr

5+ 6

LIBRARIES

[ANCIENT

Greece.

the library was a small chamber in the temple, on the wall of which is a list of books, among them a manual of Egyptian geography (Brugsch, History of Egypt, 1881, i. 240). The exact position of Akhenaten’s library (or archives) of clay tablets is known and the name of the room has been read on the books of which it has been built. A library of charred books has been found at Mendes (Egypt Expl. Fund, Two Hieroglyphic Papyri), and we have references to temple libraries in the Silsileh ” Nile ” stelae and perhaps in the great Harris papyri. The most famous of the Egyptian libraries is that of King Osymandyas, described by Diodorus Siculus, who relates that it bore an inscription which he renders by the Greek words ˆTXHS IATPEION ” the Dispensary of the Soul.” Osymandyas has been identified with the great king Rameses II. (1300-1236 B.C.) and the seat of the library is supposed to have been the Ramessaeum at Western Thebes. Amen-em-hant was the name of one of the directors of the Theban libraries. Papyri from the palace, of a later date, have been discovered by Professor W. F. Flinders Petrie. At Thebes the scribes of the ” Foreign Office ” are depicted at work in a room which was perhaps rather an office than a library. The famous Tel-el-Amarna tablets (1383-1365 B.C.) were stored in ” the place of the records of the King.” There were record offices attached to the granary and treasury departments and we know of a school or college for the reproduction of books, which were kept in boxes and in jars. According to Eustathius there was a great collection at Memphis. A heavy blow was dealt to the old Egyptian literature by the Persian invasion, and many books were carried away by the conquerors. The Egyptians were only delivered from the yoke of Persia to suc- cumb to that of Greece and Rome and henceforward their civiliza- tion was dominated by foreign influences. Of the Greek libraries under the

Ptolemies we shall speak a little further on.

Of the libraries of ancient Greece we have very little know- ledge, and such knowledge as we possess comes to us for the most part from late compilers. Amongst those who are known to have collected books are Pisistratus, Polycrates of Samos, Euclid the Athenian, Nicocrates of Cyprus, Euripides and Aristotle (Athenaeus i. 4). At Cnidus there is said to have been a special collection of works upon medicine. Pisistratus is reported to have been the first of the Greeks who collected books on a large scale. Aulus Gellius, indeed, tells us, in language perhaps " not well suited to the 6th century B.C.," 1 that he was the first to establish a public library. The authority of Aulus Gellius is hardly sufficient to secure credit for the story that this library was carried away into Persia by Xerxes and subsequently restored to the Athenians by Seleucus Nicator. Plato is known to have been a collector; and Xenophon tells us of the library of Euthydemus. The library of Aristotle was bequeathed by him to his disciple Theophrastus, and by Theo- phrastus to Neleus, who carried it to Scepsis, where it is said to have been concealed underground to avoid the literary cupidity of the kings of Pergamum. Its subsequent fate has given rise to much controversy, but, according to Strabo (xiii. pp. 608, 609), it was sold to Apellicon of Teos, who carried it to Athens, where after Apellicon's death it fell a prey to the conqueror Sulla, and was transported by him to Rome. The story told by Athenaeus (i. 4) is that the library of Neleus was purchased by Ptolemy Philadelphus. The names of a few other libraries in Greece are barely known to us from inscriptions; of their character and contents we know nothing. If, indeed, we are to trust Strabo entirely, we must believe that Aristotle was the first person who collected a library, and that he communicated the taste for collecting to the sovereigns of Egypt. It is at all events certain that the libraries of Alexandria were the most important as they were the most celebrated of the ancient world. Under the enlightened rule of the Ptolemies a society of scholars and men of science was attracted to their capital. It seems pretty certain that Ptolemy Soter had already begun to collect books, but it was in the reign of Ptolemy Phila- delphus that ihe libraries were properly organized and established in separate buildings. Ptolemy Philadelphus sent into every 1 Grote, History of Greece, iv. 37, following Becker.

Alex- andria.

part of Greece and Asia to secure the most valuable works, and no exertions or expense were spared in enriching the collections. Ptolemy Euergetes, his successor, is said to have caused all books brought into Egypt by foreigners to be seized for the benefit of the library, while

the owners had to be content with receiving copies of them in exchange. Nor did the Alexandrian scholars exhibit the usual Hellenic exclusiveness, and many of the treasures of Egyptian and even of' Hebrew literature were by their means translated into Greek. There were two libraries at Alexandria; the larger, in the Brucheum quarter, was in connexion with the Museum, a sort of academy, while the smaller was placed in the Serapeum. The number of volumes in these libraries was very large, although it is difficult to attain any certainty as to the real numbers amongst the widely varying accounts. According to a scholium of Tzetzes, who appears to draw his information from the authority of Callimachus and Eratosthenes, who had been librarians at Alexandria, there were 42,800 vols, or rolls in the Serapeum and 490,000 in the Brucheum. 2 This enumeration seems to refer to the librarianship of Callimachus himself under Ptolemy Euergetes. In any case the figures agree tolerably well with those given by Aulus Gellius 3 (700,000) and Seneca 4 (400,000). It should be observed that, as the ancient roll or volume usually contained a much smaller quantity of matter than a modern book — so that, e.g. the history of Herodotus might form nine " books " or volumes, and the Iliad of Homer twenty-four — these numbers must be discounted for the purposes of comparison with modern collections. The series of the first five librarians at Alexandria appears to be pretty well established as follows: Zenodotus, Callimachus, Eratosthenes, Apollonius and Aristophanes; and their activity covers a period of about a century. The first experiments in bibliography appear to have been made in producing catalogues of the Alexandrian libraries. Amongst other lists, two cata- logues were prepared by order of Ptolemy Philadelphus, one of the tragedies, the other of the comedies contained in the collec- tions. The HivaKes of Callimachus formed a catalogue of all the principal books arranged in 1 20 classes. When Caesar set fire to the fleet in the harbour of Alexandria, the flames accidentally extended to the larger library of the Brucheum, and it was destroyed. 6 Antony endeavoured to repair the loss by presenting to Cleopatra the library from Pergamum. This was very probably placed in the Brucheum, as this continued to be the literary quarter of Alexandria until the time of Aurelian. Thenceforward the Serapeum became the principal library. The usual statement that from the date of the restoration of the Brucheum under Cleopatra the libraries continued in a flourishing condition until they were destroyed after the conquest of Alexandria by the Saracens in a.d. 640 can hardly be supported. It is very possible that one of the libraries perished when the Brucheum quarter was destroyed by Aurelian, a.d. 273. In 389 or 391 an edict of Theodosius ordered the destruction of the Serapeum, and its books were pillaged by the Christians. When we

take into account the disordered condition of the times, and the neglect into which literature and science had fallen, there can be little difficulty in believing that there were but few books left to be destroyed by the soldiers of Amru. The familiar anecdote of the caliph's message to his general rests mainly upon the evidence of Abulfaraj, so that we may be tempted to agree with Gibbon that the report of a stranger who wrote at the end of six hundred years is overbalanced by the silence of earlier and native annalists. It is, however, so far from easy to settle the question that a cloud of names could easily be cited upon either side, while some of the most careful inquirers confess the difficulty of a decision 6 (see Alexandria, III.).

The magnificence and renown of the libraries of the Ptolemies excited the rivalry of the kings of Pergamum, who vied with the Egyptian rulers in their encouragement of literature. The

2 Ritschl, Die alexandrinischen Bibliotheken, p. 22; Opusc. phil. i. § 123.

3 N.A. vi. 17. 4 De tranq. an. 9. 5 Parthey (Alexandrinisch.es Museum) assigns topographical reasons

for doubting this story. 8 Some of the authorities have been collected by Parthey, op. cit,

Per- gamum,

Rome.

German researches in the acropolis of Pergamum between 1878 and 1886 revealed four rooms which had originally been appro- priated to the library (Alex. Conze, Die pergamen. Bibliothek, 1884). Despite the obstacles presented by the embargo placed by the Ptolemies upon the export of papyrus, the library of the Attali attained considerable importance, and, as we have seen, when it was transported to Egypt numbered 200,000 vols. We learn from a notice in Suidas that in 221 b.c. Antiochus the Great summoned the poet and grammarian Euphorion of Chalcis to be his librarian-

The early Romans were far too warlike and practical a people to

devote much attention to literature, arid it is not until the last century of the republic that we hear of libraries in Rome. The collections of Carthage, which fell into their hands when Scipio sacked that city (146 B.C.), had no attractions for them; and with the exception of the writings of Mago upon agriculture, which the senate reserved for translation into Latin, they bestowed all the books upon the kinglets of Africa (Pliny, H.N. xviii. 5). It is in accordance with the military character of the Romans that the first considerable collections of which we hear in Rome were brought there as the spoils of war. The first of these was that brought by Aemilius Paulus from Macedonia after the conquest of Perseus (167 B.C.). The library of the conquered monarch was all that he reserved from the prizes of victory for himself and his sons, who were fond of letters. Next came the library of Apellicon the Teian, brought from Athens by Sulla (86 B.C.). This passed at his death into the hands of his son, but of its later history nothing is known. The rich stores of literature brought home by Lucullus from his eastern conquests (about 67 B.C.) were freely thrown open to his friends and to men of letters. Accordingly his library and the neighbouring walks were much resorted to, especially by Greeks. It was now becoming fashionable for rich men to furnish their libraries well, and the fashion prevailed until it became the subject of Seneca's scorn and Lucian's wit. The zeal of Cicero and Atticus in adding to their collections is well known to every reader of the classics. Tyrannion is said to have had 30,000 vols, of his own; and that M. Terentius Varro had large collections we may infer from Cicero's writing to him: " Si hortum in bibliotheca habes, nihil deerit." Not to prolong the list of private collectors, Serenus Sammonicus is said to have left to his pupil the young Gordian no less than 62,000 vols. Amongst the numerous projects entertained by Caesar was that of pre- senting Rome with public libraries, though it is doubtful whether any steps were actually taken towards its execution. The task of collecting and arranging the books was entrusted to Varro. This commission, as well as his own fondness for books, may have led Varro to write the book upon libraries of which a few words only have come down to us, preserved by a grammarian. The honour of being the first actually to dedicate a library to the public is said by Pliny and Ovid to have fallen to G. Asinius Pollio, who erected a library in the Atrium Libertatis on Mount Aventine, defraying the cost from the spoils of his Ulyfian campaign. The library of Pollio was followed by the public libraries established by Augustus. That emperor, who did so much for the embellishment of the city, erected two libraries, the Octavian and the Palatine. The former was founded (33 B.C.) in honour of his sister, and was placed in the Porticus Octaviae, a magnificent structure, the lower part of which served as a promenade,

while the upper part contained the library. The charge of the books was committed to C. Melissus. The other library formed by Augustus was attached to the temple of Apollo on the Palatine hill, and appears from inscriptions to have consisted of two departments, a Greek and a Latin one, which seem to have been separately administered. The charge of the Palatine collections was given to Pompeius Macer, who was succeeded by Julius Hyginus, the grammarian and friend of Ovid. The Octavian library perished in the fire which raged at Rome for three days in the reign of Titus. The Palatine was, at all events in great part, destroyed by fire in the reign of Commodus. The story that its collections were destroyed by order of Pope Gregory the Great in the 6th century is now

generally rejected. The successors of Augustus, though they did not equal him in their patronage of learning, maintained the tradition of forming libraries. Tiberius, his immediate suc- cessor, established one in his splendid house on the Palatine, to which Gellius refers as the ” Tiberian library,” and Suetonius relates that he caused the writings and images of his favourite Greek poets to be placed in the public libraries. Vespasian established a library in the Temple of Peace erected after the burning of the city Under Nero. Domitian restored the libraries which had been destroyed in the same conflagration, procuring books from every quarter, and even sending to Alexandria to have copies made. He is also said to have founded the Capitoline library, though others give the credit to Hadrian. The most famous and important of the imperial libraries, however, was that created by Ulpius Trajanus, known as the Ulpian library, which was first established in the Forum of Trajan, but was afterwards removed to the baths of Diocletian. In this library were deposited by Trajan the ” libri lintei ” and ” libri ele- phantini,” upon which the senatus consulta and other trans- actions relating to the emperors were written. The library of Domitian, which had been destroyed- by fire in the reign of Commodus, was restored by Gordian, who added to it the books bequeathed to him by Serenus Sammonicus. Altogether in the 4th century there are Said to have been twenty-eight public libraries in Rome.

Nor were public libraries confined to Rome. We possess records of at least 24 places in Italy, the Grecian provinces, Asia Minor, Cyprus and Africa in which libraries had been established, most of them attached to temples, #«”””» usually through the liberality of generous individuals. //^Wes! The library which the younger Pliny dedicated to his townsmen at Comum cost a million sesterces and he contributed a large sum to the support of a library at Milan. Hadrian established one at Athens, described by Pausanias, and recently identified with a

building called the Stoa of Hadrian, which shows a striking similarity with the precinct of Athena at Pergamum. Strabo mentions a library at Smyrna; Aulus Gellius one at Patrae and another at Tibur from which books could be borrowed. Recent discoveries at Ephesus in Asia Minor and Timegad in Algeria have furnished precise information as to the structural plan of these buildings. The library at Ephesus was founded by T. Julius Aquila Polemaeanus in memory of his father, pro-consul of Asia in the time of Trajan, about a. D. 106-107. The library at Timegad was established at a cost of 400,000 sesterces by M. Julius Quintianus Flavius Rogatianus, who probably lived in the 3rd century (R. Cagnat, " Les Bibliotheques municipales dans l'Empire Romain," 1906, Mem. de I' Acad, des Insc, torn, xxxviii. pt. 1). At Ephesus the light came through a circular opening in the roof; the library at Timegad greatly resembles that discovered at Pompeii and possesses a system of book stores. All these buildings followed the same general plan, consisting of a reading-room and more or less ample book stores; the former was either rect- angular or semi-circular in shape and was approached under a stately portico and colonnade. In a niche facing the entrance a statue was always erected; that formerly at Pergamum — a figure of Minerva — is now preserved at Berlin. From a well-known line of Juvenal {Sat. iii. 219) we may assume that a statue of the goddess was usually placed in libraries. The reading? room was also ornamented with busts or life-sized images of celebrated writers. The portraits or authors were also painted on medallions on the presses {armaria) in which the books or rolls were preserved as in the library of Isidore of Seville; some- times these medallions decorated the walls, as in a private library discovered by Lanciani in 1883 at Rome {Ancient Rome, 1888, p. 193). Movable seats, known to us by pictorial representations, were iri use. The books were classified, and the presses (framed of precious woods and highly ornamented) were numbered to facilitate reference from the catalogues. A private library discovered at Herculaneum contained 1756 MSS. placed on shelves round the room to a height of about 6 ft: with a central press. In the public rooms some of the books were arranged

Constan- tinople.

in the reading-room and some in the adjacent book stores. The Christian libraries of later foundation closely followed the classical

prototypes not only in their structure but also in smaller details. The general appearance of a Roman library is preserved in the library of the Vatican fitted up by Sextus V. in 1 587 with painted presses, busts and antique vases.

As the number of libraries in Rome increased, the librarian, who was generally a slave or freedman, became a recognized public functionary. The names of several librarians are pre- served to us in inscriptions, including that of C. Hymenaeus, who appears to have fulfilled the double function of physician and librarian to Augustus. The general superintendence of the public libraries was committed to a special official. Thus from Nero to Trajan, Dionysius, an Alexandrian rhetorician, dis- charged this function. Under Hadrian it was entrusted to his former tutor C. Julius Vestinus, who afterwards became ad- ministrator of the Museum at Alexandria.

When the seat of empire was removed by Constantine to his new capital upon the Bosporus, the emperor established a collection there, in which Christian literature was probably admitted for the first time into an imperial library. Diligent search was made after the Christian books which had been doomed to destruction by Diocletian. Even at the death of Constantine, however, the number of books which had been brought together amounted only to 6900. The smallness of the number, it has been suggested, seems to show that Constantine's library was mainly intended as a repository of Christian literature. However this may be, the collection was greatly enlarged by some of Constantine's successors, especially by Julian and Theodosius, at whose death it is said to have increased to 100,000 vols. Julian, himself a close student and voluminous writer, though he did his best to discourage learning among the Christians, and to destroy their libraries, not only augmented the library at Constantinople, but founded others, including one at Nisibis, which was soon afterwards de- stroyed by fire. From the Theodosian code we learn that in the time of that emperor a staff of seven copyists was attached to the library at Constantinople under the direction of the librarian. The library was burnt under the emperor Zeno in 477, but was again restored.

Meanwhile, as Christianity made its way and a distinctively Christian literature grew up, the institution of libraries became part of the ecclesiastical organization. Bishop Alexander (d. a.d. 250) established a church library at Jerusalem, and it became the rule to attach to every church a collection necessary for the inculcation of Christian doctrine. There were libraries at Cirta, at Constantinople and at Rome. The basilica of St Lawrence at Rome contained a library or arckivum

founded by Pope Damasus at the end of the 4th century. Most of these collections were housed in the sacred edifices and consisted largely of copies of the Holy Scriptures, liturgical volumes and works of devotion. They also included the Gesta Martyrum and Matricidae Pauperum and official correspondence. Many of the basilicas had the apse subdivided into three smaller hemicycles, one of which contained the library (Lanciani, op. cit. p. 187). The largest of these libraries, that founded by Pamphilus (d. a.d. 309) at Caesarea, and said to have been increased by Eusebius, the historian of the church, to 30,000 vols., is frequently mentioned by St Jerome. St Augustine bequeathed his collection to the library of the church at Hippo, which was fortunate enough to escape destruction at the hands of the Vandals. The hermit com- munities of the Egyptian deserts formed organizations which developed into the later monastic orders of Western Europe and the accumulation of books for the brethren was one of their cares.

The removal of the capital to Byzantium was in its result a serious blow to literature. Henceforward the science and learning of the East and West were divorced. The libraries of Rome ceased to collect the writings of the Greeks, while the Greek libraries had never cared much to collect Latin literature. The influence of the church became increasingly hostile to the study of pagan letters. The repeated irruptions of the barbarians

Qaul.

soon swept the old learning and libraries alike from the soil of Italy. With the close of the Western empire in 476 the ancient history of libraries may be said to cease.

Medieval Period

During the first few centuries after the fall of the Western empire, literary activity at Constantinople had fallen to its lowest ebb. In the West, amidst the general neglect of learning and literature, the collecting of books, though not wholly forgotten, was cared for by few. Sidonius Apollinaris tells us of the libraries of several private collectors in Gaul. Publius Consentius possessed a library at his villa near Narbonne which was due to the labour of three generations. The most notable of these appears to have been the prefect Tonantius Ferreolus, who had formed in his villa of Prusiana, near Nimes, a collection which his friend playfully compares to that of Alexandria. The Goths, who had been introduced to the Scriptures in their own language by Ulfilas in the 4th century, began to pay some attention to

Latin literature. Cassiodorus, the favourite minister of Theodoric, was a collector as well as an author, and on giving up the cares of government retired to a monastery which he founded in Calabria, where he employed his monks in the transcription of books.

Henceforward the charge of books as well as of education fell more and more exclusively into the hands of the church. While the old schools of the rhetoricians died out new monasteries arose everywhere. Knowledge was no longer pursued for its own sake, but became subsidiary to religious and theological teaching. The proscription of the old classical literature, which is symbolized in the fable of the destruction of the Palatine library by Gregory the Great, was only too effectual. The Gregorian tradition of opposition to pagan learning long con- tinued to dominate the literary pursuits of the monastic orders and the labours of the scriptorium.

During the 6th and 7th centuries the learning which had been driven from the Continent took refuge in the British Islands, where it was removed from the political disturbances of the mainland. In the Irish monasteries during this period there appear to have been many books, and the Venerable Bede was superior to any scholar of his age. Theodore of Tarsus brought a considerable number of books to Canterbury from Rome in the 7th century, including several Greek authors. The library of York, which was founded by Archbishop Egbert, was almost more famous than that of Canterbury. The verses are well known in which Alcuin describes the extensive library under his charge, and the long list of authors whom he enumerates is superior to that of any other library possessed by either England or France in the 12th century, when it was unhappily burnt. The inroads of the Northmen in the 9th and 10th centuries had been fatal to the monastic libraries on both sides of the channel. It was from York that Alcuin came to Charle- magne to superintend the school attached to his palace; and it was doubtless inspired by Alcuin that Charles issued the memor- able document which enjoined that in the bishoprics and monasteries within his realm care should be taken that there shall be not only a regular manner of life, but also the study of letters. When Alcuin finally retired from the court to the abbacy of Tours, there to carry out his own theory of monastic discipline and instruction, he wrote to Charles for leave to send to York for copies of the books of which they had so much need at Tours. While Alcuin thus increased the library at Tours- Charlemagne enlarged that at Fulda, which had been founded in 774, and which all through the middle ages magoe. stood in great respect. Lupus Servatus, a pupil of Hrabanus Maurus at Fulda, and afterwards abbot of Ferrieres, was a devoted student of the classics and a great collector of books. His correspondence illustrates

the difficulties which then attended the study of literature through the paucity and dearness of books, the declining care for learning, and the in- creasing troubles of the time. Nor were private collections of books altogether wanting during the period in which Charlemagne and his successors laboured to restore the lost traditions of

Alcula.

MEDIEVAL]

LIBRARIES

549

Benedict.

liberal education and literature. Pepin le Bref had indeed met with scanty response to the request for books which he addressed to the pontiff Paul I. Charlemagne, however, collected a con- siderable number of choice books for his private use in two places. Although these collections were dispersed at his death, his son Louis formed a library which continued to exist under Charles the Bald. About the same time Everard, count of Friuli, formed a considerable collection which he bequeathed to a monastery. But the greatest private collector of the middle ages was doubtless Gerbert, Pope Sylvester II., who showed the utmost zeal and spent large sums in collecting books, not only in Rome and Italy, but from Germany, Belgium and even from Spain.

The hopes of a revival of secular literature fell with the decline of the schools established by Charles and his successors. The knowledge of letters remained the prerogative of the church, and for the next four or five centuries the collecting and multiplication of books were almost entirely confined to the monasteries. Several of the greater orders made these an express duty; this was especially the case with the Benedictines. It was the first care of St Benedict, we are told, that in each newly founded monastery there should be a library, ” et velut curia quaedam illustrium auctorum. ” Monte Cassino became the starting-point of a long line of in- stitutions which were destined to be the centres of religion and of literature. It must indeed be remembered that literature in the sense of St Benedict meant Biblical and theological works, the lives of the saints and martyrs, and the lives and writings of the fathers. Of the reformed Benedictine orders the Carthusians and the Cistercians were those most devoted to literary pursuits. The abbeys of Fleury, of Melk and of St Gall were remarkable

for the splendour of their libraries. In a later age the labours of the congregation of St Maur form one of the most striking chapters in the history of learning. The Augustinians and the Dominicans rank next to the Benedictines in their care for literature. The libraries of St Genevieve and St Victor, belong- ing to the former, were amongst the largest of the monastic collections. Although their poverty might seem to put them at a disadvantage as collectors, the mendicant orders cultivated literature with much assiduity, and were closely connected with the intellectual movement to which the universities owed their rise. In England Richard of Bury praises them for their extra- ordinary diligence in collecting books. Sir Richard Whittington built a large library for the Grey Friars in London, and they possessed considerable libraries at Oxford.

It would be impossible to attempt here an account of all the libraries established by the monastic orders. We must be content to enumerate a few of the most eminent.

In Italy Monte Cassino is a striking example of the dangers and vicissitudes to which monastic collections were exposed. Ruined by the Lombards in the 6th century, the libraries, monastery was rebuilt and a library established, to fall a prey to Saracens and to fire in the cjth. The collection then reformed survived many other chances and changes, and still exists. Boccaccio gives a melancholy de- scription of its condition in his day. It affords a conspicuous example of monastic industry in the transcription not only of theological but also of classical works. The library of Bobbio, which owed its existence to Irish monks, was famous for its palimpsests. The collection, of which a catalogue of the ioth century is given by Muratori (Antiq. Hal. Med. Aev. iii. 817-824), was mainly transferred to the Ambrosian library at Milan. Of the library of Pomposia, near Ravenna, Montfaucon has printed a catalogue dating from the nth century (Diarium Italicum, chap. xxii.).

Of the monastic libraries of France the principal were those of Fleury, of Cluny, of St Riquier and of Corbie. At Fleury Abbot Macharius in 1146 imposed a contribution for library purposes upon the officers of the community and its dependencies, an example which was followed elsewhere. After many vicissi tudes, its MSS., numbering 238, were deposited in 1793 in the town library of Orleans. The library of St Riquier in the time

of Louis the Pious contained 256 MSS., with over 500 works. Of the collection at Corbie in Picardy we have also catalogues dating from the 12th and from the 17th centuries. Corbie was famous for the

industry of its transcribers, and appears to have stood in active literary intercourse with other monasteries. In 1638, 400 of its choicest manuscripts were removed to St Germain- des-Pres. The remainder were removed after 1794, partly to the national library at Paris, partly to the town library of Amiens.

The chief monastic libraries of Germany were at Fulda, Corvey, Reichenau and Sponheim. The library at Fulda owed much to Charlemagne and to its abbot Hrabanus Maurus. Under Abbot Sturmius four hundred monks were hired as copyists. In 1561 the collection numbered 774 volumes. The library of Corvey on the Weser, after being despoiled of some of its treasures in the Reformation age, was presented to the university of Marburg in 181 1. It then contained 109 vols., with 400 or 500 titles. The library of Reichenau, of which several catalogues are extant, fell a prey to fire and neglect, and its ruin was consummated by the Thirty Years' War. The library of Sponheim owes its great renown to John Tritheim, who was abbot at the close of the 15th century. He found it reduced to 10 vols., and left it with upwards of 2000 at his retirement. The library at St Gall, formed as early as 816 by Gozbert, its second abbot, still exists.

In England the principal collections were those of Canter- bury, York, Wearmouth, Jarrow, Whitby, Glastonbury, Croy- land, Peterborough and Durham. Of the library of BaglamL the monastery of ChristChurch, Canterbury, originally founded by Augustine and Theodore, and restored by Lanfranc and Anselm, a catalogue has been preserved dating from the 13th or 14th century, and containing 698 volumes, with about 3000 works. Bennet Biscop, the first abbot of Wearmouth, made five journeys to Rome, and on each occasion returned with a store of books for the library. It was destroyed by the Danes about 867. Of the library at Whitby there is a catalogue dating from the 1 2th century. The catalogue of Glastonbury has been printed by Hearne in his edition of John of Glastonbury. When the library of Croyland perished by fire in 1091 it contained about 700 vols. The library at Peterborough was also rich; from a catalogue of about the end of the 14th century it had 344 vols., with nearly 1700 titles. The catalogues of the library at the monastery of Durham have been printed by the Surtees Society, and form an interesting series. These catalogues with many others 1 afford abundant evidence of the limited character of the monkish collections, whether we look at the number of their volumes or at the nature of their contents. The scriptoria were manufactories of books and not centres of learning. That in spite of the labours of so many transcribers the costliness and scarcity of books remained so great may have been partly, but cannot

have been wholly, due to the scarcity of writing materials. It may be suspected that indojence and carelessness were the rule in most monasteries, and that but few of the monks keenly realized the whole force of the sentiment expressed by one of their number in the 12th century — ” Claustrum sine armario quasi castrum sine armamentario.” Nevertheless it must be

1 The oldest catalogue of a western library is that of the monastery of Fontanelle in Normandy compiled in the 8th century. Many catalogues may be found in the collections of D’Achery, Martene and Durand, and Pez, in the bibliographical periodicals of Naumann and Petzholdt and the Centralblatt f. Bibliotkekswissenschaft. The Rev. Joseph Hunter has collected some particulars as to the contents of the English monastic libraries, and Ed. Edwards has printed a list of the catalogues (Libraries and Founders of Libraries, 1865, pp. 448-454). See also G. Becker, Catalogi Bibliothecarum Antiqui (1885). There are said to be over six hundred such catalogues in the Royal Library at Munich. In the 14th century the Franciscans compiled a general catalogue of the MSS. in 160 English libraries and about the year 1400 John Boston, a Benedictine monk of Bury, travelled over England and a part of Scotland and examined the libraries of 195 religious houses (Tanner, Bibliotheca Brit. Hibern. 1748). Leland’s list of the books he found during his visitation of the houses in 1539-1545 is printed in his Collectanea (ed. Hearne, 1715, 6 vols.). T. W. Williams has treated Gloucestershire and Bristol medieval libraries and their catalogues in a paper in the Bristol and Gloucestershire Arch. Soc. vol. xxxi.

admitted that to the labours of the monastic transcribers we are indebted for the preservation of Latin literature.

The subject of the evolution of the arrangement of library rooms and fittings as gradually developed throughout medieval Europe should not be passed over. 1 The rear origin . ‘ of library organization in the Christian world, one may

mental almost say the origin of modern library methods, library , began with the rule of St Benedict early in the 6th arrange- cen tury. In the 48th chapter the monks were ordered to borrow a book apiece and to read it straight through. There was no special apartment for the

books in the primitive Benedictine house. After the books became too numerous to be kept in the church they were preserved in armaria, or chests, in the cloister; hence the word armarius, the Benedictine librarian, who at first joined with it the office of precentor. The Benedictine regulations were developed in the stricter obser- vances of the Cluniacs, which provided for a kind of annual report and stocktaking. The Carthusians were perhaps the first to lend books away from the convent; and the Cistercians to possess a separate library official as well as a: room specially devoted to books. The observances of the Augustinians contained rules for the binding, repairing, cataloguing and arranging the books by the librarian, as well as a prescription of the exact kind. of- chest to be used. Among the Premonstratensians or Reformed Augustinians, it was one of the duties of the librarian to provide for the borrowing of books elsewhere for the use of the monks. The Mendicant Friars found books so necessary that at: last Richard de Bury tells us with some exaggeration that their libraries exceeded all others. Many volumes still exist which belonged to the library at Assisi, the parent house of the Francisˆ cans, of which a catalogue was drawn up in 1381. No authentic monastic bookcase can now be found; the doubtful example shown at Bayeux probably contained ecclesiastical utensils. At the Augustinian priory at Barnwell the presses were lined with wood to keep out the damp and were partitioned off both vertically and horizontally. Sometimes there were recesses in the walls of the cloisters fitted with shelves and closed with a door. These recesses developed into a small windowless room in the Cistercian houses. At Clairvaux, Kirkstall, Fountains, Tintern, Netley and elsewhere this small chamber was placed between the chapter-house and the transept of the church. At Meaux in Holderness the books were lodged on shelves against the walls and even over the door of such a chamber. In many houses the treasury or spendiment contained two classes of books — one for the monks generally, others more closely guarded. A press near the infirmary contained books used by the reader in the refectory. By the end of the 15th century the larger monasteries became possessed of many volumes and found themselves obliged to store the books, hitherto placed in various parts of the building, in a separate apartment. We now find libraries being specially built at Canterbury, Durham, Citeaux, Clairvaux and elsewhere, and with this specialization there grew up increased liberality in the use of books and learned strangers were admitted. Even at an early date students were permitted to borrow from the Benedictines at St Germain-des-Pres at Paris, of which a later foundation owned in 1513 a noble library erected over the south wall of the cloister, and enlarged and made very accessible to the outer world in the 17th and 18th centuries. The methods and

fittings of college libraries of early foundation closely resembled those of the monastic libraries. There was in both the annual giving out and inspection of what we would now call the lending department for students; while the books, fastened by chains — a kind of reference department kept in the library chamber for the common use of the fellows — followed a similar system in monastic institutions. By the 15th century collegiate and monastic libraries were on the same plan, with the separate room containing books placed on their sides on desks or lecterns, to which they were attached by chains to a

1 This subject has been specially treated by J. Willis Clark in several works, of which the chief is a masterly volume, The Care of Books (1901). See also Dom Gasquet, “On Medieval Monastic Libraries,” in his Old English Bible (1897).

horizontal bar. As the books increased the accommodation was augmented by one or two shelves erected above the desks. The library at Cesena in North Italy may still be seen in its original condition. The Laurentian library at Florence was designed by Michelangelo on the monastic model. Another good example of the old form may be seen, in the library of Merton College at Oxford, a long narrow room with bookcases standing between the windows at right angles to the walls. In the chaining system one end was attached to the wooden cover of the book while the other ran freely on a bar fixed by a method of double locks to the front of the shelf or desk on which the book rested. The fore edges of the volumes faced the reader. The seat and shelf were sometimes combined. Low cases were subsequently introduced between the higher cases, and the seat replaced by a step. Shelf lists were placed at the end of each case. There were no chains in the library of the Escorial, erected in 1584, which showed for the first time . bookcases placed against the walls. Although chains were no longer part of the appliances in the newly erected libraries they continued to be used and were ordered in bequests in England down to the early part of the 1 8th century. Triple desks and revolving lecterns, raised by a wooden screw,, formed part of the library furniture. The English cathedral libraries were fashioned after the same principle. The old methods were fully reproduced in the fittings at West- minster, erected at a late date. Here we may see books on shelves against the walls as well as in cases at right angles to the walls; the desk-like shelves for the chained volumes (no longer in existence) have a slot in which the chains could be suspended, and are hinged to allow access to shelves below. An ornamental wooden tablet at the end of each case is a survival of the old shelf list. By the end of the 17th century the type of the public library developed from collegiate and monastic prototypes, became fixed as it were

throughout Europe (H. R. Tedder, ” Evolution of the Public Library,” in Trans, of 2nd Int. Library Conference, 1897, 1898).

The first conquests of the Arabians, as we have already seen, threatened hostility to literature. But, as soon as their con- quests were secured, the caliphs became the patrons of learning and science. Greek manuscripts were eagerly sought for and translated into Arabic, and colleges and libraries everywhere arose. Baghdad in the east and Cor- dova in the west became the seats of a rich development of letters and science during the age when the civilization of Europe was most obscured. Cairo and Tripoli were also distinguished for their libraries. The royal library of the Fatimites in Africa is said to have numbered 100,000 manuscripts, while that col- lected by the Omayyads of Spain is reported to have contained six times as many. It is said that there were no less than seventy libraries opened in the cities of Andalusia. Whether these figures be exaggerated or not — and they are much below those given by some Arabian writers, which are undoubtedly so — it is certain that the libraries of the Arabians and the Moors of Spain offer a very remarkable contrast to those of the Christian nations during the same period. 2

The literary and scientific activity of the Arabians appears to have been the cause of a revival of letters amongst the Greeks of the Byzantine empire in the 9th century. Under Leo the Philosopher and Constantine Porphyrogenitus the libraries of Constantinople awoke into renewed life. The compilations of such writers as Stobaeus, Photius and Suidas, as well as the labours of innumerable critics and com- mentators; bear witness to the activity, if not to the lofty character of the pursuits, of the Byzantine scholars. The labours of transcription were industriously pursued in the libraries and in the monasteries of Mount Athos and the Aegean, and it was from these quarters that the restorers of learning brought into Italy so many Greek manuscripts. In this way many of the treasures of ancient literature had been already

2 Among the Arabs, however, as among the Christians, theological bigotry did not always approve of non-theological literature, and the great library of Cordova was sacrificed by Almanzor to his reputation for orthodoxy, 97& A. D.

Arabians.

Renais- sance.

MODERN]

conveyed to the West before the fate which overtook the libraries of Constantinople on the fall of the city in 1453.

Meanwhile in the West, with the reviving interest in literature which already marks the 14th century, we find arising outside the monasteries a taste for collecting books. St Louis of France and his successors had formed small collections, none of which survived its possessor. It was reserved for Charles V. to form a considerable library which he intended to be permanent. In 1373 he had amassed 910 volumes, and had a catalogue of them prepared, from which we see that it included a good deal of the new sort of literature. In England Guy, earl of Warwick, formed, a curious collection of. French romances, which he bequeathed to Bordesley Abbey on his death in 1315. Richard d'Aungervyle of Bury, the author of the PhUdbiblon, amassed a noble collection of books, and had special opportunities of doing so as Edward III.'s chancellor and ambassador. He founded Durham College at Oxford, and equipped it with a library a hundred years before Humphrey, duke of Gloucester, made his benefaction of books to the university. The taste for secular literature, and the enthusiasm for the ancient classics, gave a fresh direction to the researches of collectors. A dis- position to encourage literature began to show itself amongst the great. This was most notable amongst the Italian princes. Cosimo de' Medici formed a library at Venice while living there in exile in 1433, and on his return to Florence laid the foundation of the great Medicean library. The honour of establishing the first modern public library in Italy had been already secured by Niccolo Niccoli, who left his library of over 800 volumes for the use of the public on his death in 1436. Frederick, duke of Urbino, collected all the writings in Greek and Latin which he could procure, and we have an interesting account of his collection written by his first librarian, Vespasiano. The ardour for classical studies led to those active researches for the Latin writers who were buried in the monastic libraries which are especially identified with the name of Poggio. For some time before the fall of Constantinople, the perilous state of the Eastern empire had driven many Greek scholars from that capital into western Europe, where they had diiected the studies and formed the taste of the zealous students of the Greek language and literature. The enthusiasm of the Italian princes extended itself beyond the Alps. Matthias Corvinus, king of Hungary, amassed a collection of splendidly executed and magnificently bound manuscripts, which at his death are said, to have reached the almost incredible number of

50,000 vols. The library was not destined long to survive its founder. There is reason to believe that it had been very seriously despoiled even before it perished at the hands of the Turks on the fall of Buda in 1527. A few of its treasures are still preserved in some of the libraries of Europe. While these munificent patrons of learning were thus taking pains to recover and multiply the treasures of ancient literature by the patient labour of transcribers and caliigraphers, an art was being elaborated which was destined to revolutionize the whole condition of literature and libraries. With the invention of printing, so happily coinciding with the revival of true learning and sound science, the modern history of libraries may be said to begin.

Modern Libraries

In most of the European countries and in the United States libraries of all kinds have during the last twenty years been undergoing a process of development and improvement which has greatly altered their policy and methods. At one time libraries were regarded almost entirely as repositories for the storage of books to be used by the learned alone, but now they are coming to be regarded more and more as workshops or as places for intellectual recreation adapted for every depart- ment of life. This is particularly to be found as the ideal in the public libraries of the Anglo-Saxon races throughout the world.

The following details comprise the chief points in the history, equipment and methods of the various libraries and systems noticed.

The United Kingdont.

Slate Libraries. — The British Museum ranks in importance before all the great libraries of the world, and excels in the arrangement and accessibility of its contents. The library consists of over 2,000,000 printed volumes museum and 56,000 manuscripts, but this large total does not include pamphlets and other small publications which are usually counted in other libraries. Adding these together it is probable that over 5,000,000 items are comprised in the collec- tions. This extraordinary opulence is principally due to the enlightened energy of Sir Anthony Panizzi {q.v.). The number of volumes in the printed book department, when he took the keepership in 1837, was only 240,000; and during the nineteen years he held that office about 400,000 were added, mostly by purchase, under his advice and direction. It was Panizzi like- wise who first seriously set to work to see that the national library reaped all the benefits bestowed upon it by the Copyright Act.

Tie foundation of the British Museum' dates from T753, when effect was given to the bequest (in exchange for £20,000 to be paid to his executors) by Sir Hans Sloahe, of his books, manu- scripts; curiosities, &c, to be held by trustees for the use of the nation. A bill was passed through parliament for the purchase of the Sloane collections and of the Harleian MSS., costing £10,000. To these, with the Cottonian MSS., acquired by the country in 1700, was added by George II., in 1757,, the royal library of the former kings of England, coupled with the privilege, which that library had for many years enjoyed, of obtaining a copy of every publication entered at Stationers' Hall. This addition was of the highest importance, as it enriched the museum with the old collections of Archbishop Cranmer, Henry prince of Wales, and other patrons of literature, while the transfer of the privilege with regard to the acquisition of new books, a right which has been maintained by successive Copyright Acts, secured a large and continuous augmentation. • A lottery having been authorized to defray the expenses of purchases, as well as for providing suitable accommodation, the museum and library were established in Montague House, and opened to the public 15th January 1759. In J 7 3 George III. presented the well- known Thomason collection (in 2220 volumes) of books and pamphlets issued in England between 1640 and 1662, embracing all the controversial literature which appeared during that period. The Rev. C. M. Cracherode, one of the trustees, bequeathed his collection of choice books in 1799; and in 1820 Sir Joseph Banks left to the nation his important library of 16,000 vols. Many other libraries have since then been incorporated in the museum, the most valuable being George III.'s royal collection (15,000 vols, of tracts, and 65,259 vols, of printed books, including many of the utmost rarity, which had cost the king about £130,000), which was presented (for a pecuniary consideration; it has been said) by George IV. in 1823, and that of the Right Honourable Thomas Grenville (20,240 vols, of rare books, all in fine condition and binding), which was acquired under bequest in 1846. The Cracherode, Banksian, King's and Grenville libraries are still preserved as separate collections. Other libraries of minor note have also been absorbed in a similar way, while, at least since the time of Panizzi, no opportunity has been neglected of making useful purchases at all the British and Continental book auctions.

The collection of English books is far from approaching completeness, but, apart from the enormous number of volumes, the library contains an extraordinary quantity of rarities. Few libraries in the United States equal either in number or value the American books in the museum. The collection of Slavonic literature, due to the initiative of Thomas

Watts, is also a re- markable feature. Indeed, in cosmopolitan interest the museum is without a rival in the world, possessing as it does the best library in any European language out of the territory in which the language is vernacular. The Hebrew, the Chinese, and printed books in other Oriental languages are important and represented in large numbers. Periodical literature has not been

forgotten, and the series of newspapers is of great extent and interest. Great pains are taken by the authorities to obtain the copies of the newspapers published in the United Kingdom to which they are entitled by the provisions of the Copyright Act, and upwards of 3400 are annually collected, filed and bound.

The department of MSS. is almost equal in importance to that of the printed books. The collection of MSS. in European languages ranges from the 3rd century before Christ down to our own times, and includes the Codex Alexandrinus of the Bible. The odd historical chronicles of England, the charters of the Anglo-Saxon kings, and the celebrated series of Arthurian romances are well represented; and care has been taken to acquire on every available opportunity the imprinted works of English writers. The famous collections of MSS. made by Sir Robert Cotton and Robert Harley, earl of Oxford, have already been mentioned, and from these and other sources the museum has become rich in early Anglo-Saxon and Latin codices, some of them being marvels of skill in calligraphy and ornamentation, such as the charters of King Edgar and Henry I. to Hyde Abbey, which are written in gold letters; or the Lindisfarne gospels (a.d. 700) containing the earliest extant Anglo-Saxon version of the Latin gospels. The Burney collection of classical MSS. furnished important additions, so that from this source and from the collection of Arundel MSS. (transferred from the Royal Society in 183 1), the museum can boast of an early copy of the Iliad, and one of the earliest known codices of the Odyssey. Among the unrivalled collection of Greek papyri are the unique MSS. of several works of ancient literature. Irish, French and Italian MSS. are well represented. Special reference may be made to the celebrated Bedford Hours, illuminated for the duke of Bedford, regent of France, to the Sforza Book of Hours and to Queen Mary's Psalter. The Oriental collection is also extremely valuable, including the library formed by Mr Rich (consul at Baghdad in the early part of the 19th century), and a vast quantity of Arabic, Persian and Turkish MSS. ; the Chambers collection of Sanskrit MSS.; several other collections of Indian MSS. ; and a copious library of Hebrew MSS. (including that of the great scholar Michaelis, and codices of great age, recently brought from Yemen). The collection of Syriac MSS., embrac- ing the relics of the famous library of the convent of St Mary Deipara in the Nitrian desert, formed by the abbot Moses of Nisibis, in the 10th century, is the most important in

existence; of the large store of Abyssinian volumes many were amassed after the campaign against King Theodore. The number of genealogical rolls and documents relating to the local and family history of Great Britain is very large. Altogether there are now more than 56,000 MSS. (of which over 0000 are Oriental), besides more than 75,000 charters and rolls. There is a very large and valuable collection of printed and manuscript music of all kinds, and it is probable that of separate pieces there are nearly 200,000. The catalogue of music is partly in manuscript and partly printed, and a separate printed catalogue of the MS. music has been published. The number of maps is also very large, and a printed catalogue has been issued.

The general catalogue of the printed books was at one time kept in MS. in large volumes, but since 1880 the entries have gradu- ally been superseded by tie printed titles forming part of the large alphabetical catalogue which was completed in 1900. This im- portant work is arranged in the order of authors' names, with occasional special entries at words like Bible, periodicals and bio- graphical names. It is being constantly supplemented and forms an invaluable bibliographical work of reference.

Theother printed catalogues of books commence with one published in 2 vols, folio (1787), followed by that of 1813-1810 in 7 vols. 8vo; the next is that of the library of George III. (1820-1829, 5 vols, folio, with 2 vols. 8vo, 1834)., describing the geographical'and topographical collections; and then the Bibliotheea Grenvilliana (1842-1872, 4 vols. 8vo). The first vol. (letteivA) of a general catalogue appeared in 1841 in a folio volume which has' never been added to. The octavo catalogue of the Hebrew books came out in 1867; that of the Sanskrit and Pali literature is in 4to (1876); and the Chinese cata- logue is also in 4to (1877). There is a printed list of the books of reference (1910) in the reading-room.

The printed catalogues of the MSS. are — that of the old Royal Library (1734, 4to), which in 1910 was shortly to be superseded by a new one; the Sloane and others hitherto undescribed (1782, 2 vols. 4to); the Cottonian (1802, folio); the Harlelan (1808, 4 vols, folio); the Hargrave (1818, 4to); the Lansdowne (1819, folio); the Arundel (1840, folio); the Burney (1840, folio); the Stowe (1895-1896, 4to); the Additional, in periodical volumes since 1836; the Greek Papyri (1893-1910); the Oriental (Arabic and Ethiopic), 5 pts., folio (1838-1871); the Syriac (1870-1873, 3 pts., 4to); the Ethiopic (1877, 4to); the Persian (1870-1896, 4 vols. 4to); and the Spanish (1875-1893, 4 vols. 8vo); Turkish (1888); Hebrew and Samaritan (1900-1909, 3

vols.); Sanskrit (1903); Hindi, &c. (1899); Sinhalese (1900). There are also catalogues of the Greek and Egyptian papyri (1839- 1846, 5 pts., folio). Many other special catalogues have been issued, including one of the Thomason Collection of Civil War pamphlets, Incunabula (vol. i.), Romances (MSS.), Music, Seals and Arabic, Hebrew and other Oriental books, maps, prints and drawings. Perhaps the most useful catalogue of all is the Subject-index to Modern Works issued in 1881-1905 (4 vols.) and compiled by Mr G. K. Fortescue.

The Rules for compiling catalogues in the department of printed books were revised and published in 1906.

The building in which the library is housed forms part of the fine group situated in Great Russell Street in central London, and is distinguished by a stately circular reading-room designed by Sydney Smirke from suggestions and sketches supplied by Sir A. Panizzi. This was begun in 1855 and opened in 1857. The room is surrounded by book stores placed in galleries with iron floors, in which, owing to congestion of stock, various devices have been introduced, particularly a hanging and rolling form of auxiliary bookcase. The presses inside the reading-room, arranged in three tiers, contain upwards of 60,000 vols., those on the ground floor (26,000) being books of reference to which readers have unlimited access. The accommodation for readers is comfortable and roomy, each person having a portion of table fitted with various conveniences. Perhaps not the least convenient arrangement here is the presence of the staff in the centre of the room, at the service of readers who require aid.

In order to enjoy the privilege of reading at the British Museum, the applicant (who must be over twenty-one years of age) must obtain a renewable ticket of admission through a recommendation from a householder addressed to the principallibrarian.

The pressure upon the space at the command of the library has been so great that additional land at the rear and sides of the existing buildings was purchased by the government for the further extension of the Museum. One very important wing facing Torrington Square was nearly completed in 1910. The Natural History Museum, South Kensington, a department of the British Museum under separate management, has a library of books on the natural sciences numbering nearly 100,000 vols.

Next in importance to the British Museum, and superior to it in accessibility, is the Library of the Patent Office in South- ampton Buildings, London. This is a department of _ the Board of Trade, and

though primarily intended office. for office use and patentees, it is really a public library freely open to anyone. The only formality required from readers is a signature in a book kept in the entrance hall. After this readers have complete access to the shelves. The library contains considerably over 110,000 vols., and possesses complete sets of the patents specifications of all countries, and a remark- able collection of the technical and scientific periodicals of all countries. The library was first opened in 1855, in somewhat unsuitable premises, and in 1897 it was transferred to a handsome new building.

The reading-room is provided with two galleries and the majority of the books are open to public inspection without the need for application forms. A printed catalogue in author-alphabetical form has been published with supplement, and in addition, separate subject catalogues are issued. This is one of the most complete libraries of technology in existence, and its collection of scientific transactions and periodicals is celebrated.

Another excellent special library is the National Art Library, founded in 1841 and transferred to South Kensington in 1856. It contains about half a million books, prints, drawings ■ ,

and photographs, and is used mostly by the students state attending the art schools, though the general public libraries. can obtain admission on payment of sixpence per week.

A somewhat similar library on the science side is the

Science Library of the Victoria and Albert Museum, South Kensington, which was founded in 1857. It is a general science collection and incorporates most of the books which at one time were in the Museum of Practical Geology.

The only other state library which is open to the public is that of the Board of Education in Whitehall, which was opened in a new building in 1908. It contains a large collection of works on educational subjects for which a special classification has been devised and printed.

The other state libraries in London may be briefly noted as follows:

Admiralty (1700), 40,000 vols.; College of Arms, or Heralds College, 15,000 vols.; Colonial Office, c. 15,000 vols.; Foreign Office, c. 80,000 vols.; Home Office (1800) c. 10,000 vols.; House of Commons (1818), c. 50,000 vols.; House of Lords (1834), 50,000 vols.; India Office (1800), c. 86,000 vols.; Kew, Royal Botanic Gardens (1853), 22,000 vols.; and Royal Observatory (Greenwich), c. 20,000 vols.

Outside London the most important state library is the National Library of Ireland, Dublin, founded in 1877 and incorporating the library of the Royal Dublin Society. It is housed in a handsome building (1890) and contains about 200,000 vols., classified on the Decimal system, and catalogued in various forms. The library of the Museum of Science and Art at Edinburgh, containing over 20,000 vols., was opened to the public in 1890. Practically every department of the state has a reference library of some kind for the use of the staff, and provision is also made for lending libraries and reading-rooms in connexion with garrisons, naval depots and other services of the army and navy.

No professional qualifications are required for positions in British state libraries, most of the assistants being merely second-division clerks who have passed the Civil Service ex- aminations. It would be an advantage from an administrative point of view if the professional certificates of the Library Association were adopted by the Civil Service Commissioners as compulsory requirements in addition to their own examination. The official recognition of a grade of properly trained librarians would tend to improve the methods and efficiency of the state libraries, which are generally behind the municipal libraries in organization and administration.

University and Collegiate Libraries.— The Bodleian Library, Oxford, though it had been preceded by various efforts towards Oxford. a university library, owed its origin to Sir Thomas Bodley (q.v.). Contributing largely himself, and pro- curing contributions from others, he opened the library with upwards of 2000 vols, in 1602. In 1610 he obtained a grant from the Stationers' Company of a copy of every work printed in the country, a privilege still enjoyed under the provisions of the various copyright acts. The additions made to the library soon surpassed the capacity of the room, and the founder pro- ceeded to enlarge it. By his will he left considerable property to the university for the maintenance and increase of the library. The example set by Bodley found many noble imitators. Amongst the chief benefactors have been Archbishop Laud, the executors of Sir Kenelm Digby, John Selden, Sir Thomas (Lord) Fairfax, Richard Gough, Francis Douce, Richard Raw- linson, and the Rev. Robert Mason. The

library now contains almost 800,000 printed vols., and about 41,000 manuscripts. But the number of volumes, as bound up, conveys a very in- adequate idea of the size or value of the collection. In the department of Oriental manuscripts it is perhaps superior to any other European library; and it is exceedingly rich in other manuscript treasures. It possesses a splendid series of Greek and Latin editiones principes and of the earliest productions of English presses. Its historical manuscripts contain most valu- able materials for the general and literary history of the country.

The last general catalogue of the printed books was printed in 4 vols, folio (1843-1851). In 1859 it was decided to prepare a new manuscript catalogue on the plan of that then in use at the British Museum, and this has been completed in duplicate. In 1910 it was being amended with a view to printing. It is an alphabetical author-catalogue; and the Bodleian, like the British Museum, has no complete subject-index. A slip-catalogue on subjects was, how- ever, in course of preparation in 1910, and there are classified hand-lists of accessions since 1883. There are also printed catalogues of the books belonging to several of the separate collections. The MSS. are in general catalogued according to the collections to which they belong, and they are all indexed. A number of the catalogues of manuscripts have been printed.

In i860 the beautiful Oxford building known as the ” Radcliffe Library,” now called the ” Radcliffe Camera,” was offered to the curators of the Bodleian by the Radcliffe trustees. The Radcliffe Library was founded by the famous physician Dr John Radcliffe, who died in 17 14, and bequeathed, besides a permanent endowment of £350 a year, the sum of £40,000 for a building. The library was opened in 1749. Many years ago the trustees resolved to confine their purchases of books to works on medicine and natural science. When the university museum and laboratories were built in i860, the trustees’ allowed the books to be transferred to the museum. It is used as a storehouse for the more modern books, and it also serves as a reading-room. It is the only room open after the hour when the older building is closed owing to the rule as to the exclusion of artificial light. In 1889 the gallery of the Radcliffe Camera was opened as an addition to the reading-room.

A Staff Kalendar has been issued since 1902, which with a Supple- ment contains a complete list of cataloguing rules, routine work of the libraries and staff, and useful information of many kinds concerning the library methods.

The Bodleian Library is open by right to all graduate members of the university, and to others upon producing a satisfactory recommendation. No books are allowed to be sent out of the library except by special leave of the curators and convocation of the university. The administration and control of the library are committed to a librarian and board of thirteen curators. The permanent t.‘dowment is comparatively small; the ordinary expenditure, ch > fly defrayed from the university chest, is about £10,000. Within recent years the use of wheeling metal bookcases has been greatly extended, and a large repository has been arranged for economical book storage under ground.

The Taylor Institution is due to the benefaction of Sir Robert Taylor, an architect, who died in 1788, leaving his property to found an establishment for the teaching of modern languages. The library was established in 1848, and is devoted to the literature of the modern European languages. It contains a fair collection of works on European philology, with a special Dante collection, about 1000 Mazarinades and 400 Luther pamphlets. The Finch collection, left to the university in 1830, is also kept with the Ta,/io\ Library. Books are lent out to members of the university and to others on a proper introduction. The endowment affords an income of £800 to £1000 for library purposes.

The libraries of the several colleges vary considerably in extent and character, although, owing chiefly to limited funds, the changes and growth of all are insignificant. That of All Souls was established in ‘443 by Archbishop Chichele (and enlarged in 1710 by the munificent bequest of Christopher Codnngton. It devotes special attention to jurisprudence, of which it has a large collection. It possesses 40,000 printed volumes and 300 MSS., and fills a splendid hall 200 ft. long. The library of Brasenose College has a special endowment fund, so that it has, for a college library, the unusually large income of £200. The library of Christ Church is rich in divinity and topography. It embraces the valuable library bequeathed by Charles Boyle, 4th earl of Orrery, amounting to 10,000 volumes, the books and MSS. of Archbishop Wake, and the Morris collection of Oriental books. The building was finished in 1761, and closely resembles the basilica of Antoninus at Rome, now the Dogana. Corpus possesses a fine collection of Aldines, many of them presented by its founder, Bishop Fox, and a collection of 17th-century tracts catalogued by Mr Edwards, with about 400 MSS. Exeter College Library has 25,000 volumes, with special collections of classical dissertations and English theological and political tracts. The library of Jesus College has few books of later date than the early part of the last century. Many of them are from the bequest of Sir Leoline Jenkins, who built the

existing library. There are also some valuable Welsh MSS. The library of Keble College consists largely of theology, including ths MSS. of many of Keble's works. The library of Magdalen College has about 22,500 volumes (including many volumes of pamphlets) and 250 MSS. It has scientific and topographical collections. The library of Merton College has of late devoted itself to foreign modern history. New College Library has about 17,000 printed volumes and about 350 MSS., several of which were presented by its founder, William of Wykeham. Oriel College Library, besides its other possessions, has a special collection of books on comparative philology and mythology, with a printed catalogue. The fine library of Queen $ College is strong in theology, in English and modern European history, and in English county histories. St John's College Library is largely composed of the literature of theology and jurisprudence before 1750, and possesses a collection'of medical books of the 1 6th and 17th centuries. The newer half of the library building was

erected by Inigo Jones at the expense of Laud, who also gave many printed and manuscript books. The room used as a library at Trinity College formed part of Durham College, the library of which was established by Richard of Bury. Wadham College Library includes a collection of botanical books bequeathed by Richard Warner in 1775 and a collection of books, relating chiefly to the Spanish Reformers, presented by the executors of Benjamin Wiffen. Worcester College Library has of late specially devoted itself , to classical archaeology. It is also rich in old plays.

The college libraries as a rule have not been used to the extent they deserve, and a good deal must be done before they can be said to be as useful and efficient as they might be.

The history of the University Library at Cambridge dates from the earlier part of the 15th century. Two early lists of its contents are preserved, the first embracing 52 vols. bridge. dating from about 1425, the second a shelf-list, ap- parently of 330 vols., drawn up by the outgoing proctors in 1473. Its first great benefactor was Thomas Scott of Rother- ham, archbishop of York, who erected in 1475 the building in which the library continued until 1755. He also gave more than 200 books and manuscripts to the library, some of which still

remain. The library received other benefactions, but neverthe- less appeared “but mean ” to John Evelyn when he visited Cambridge in 1654. In 1666 Tobias Rustat presented a sum of money to be invested to buy the choicest and most useful books. In 1715 George I. presented the library of Bishop Moore, which was very rich in early English printed books, forming over 30,000 vols, of printed books and manuscripts. The funds bequeathed by William Worts and John Manistre. .ogether with that of Rustat, produce at present about £150 a year. The share of university dues appropriated tc library purposes amounts to £3006 a year. In addition the library is entitled to new books under the Copyright Acts. The number of printed volumes in the library cannot be exactly stated, as no recent calculation on the subject exists. It has been estimated at half a million. It includes a fine series of editiones principes of the classics and of the early productions of the English press. The MSS. number over 6000, in which are included a considerable, number of adversaria or printed books with MS. notes, which form a leading feature in the collection. The most famous of the MSS. is the celebrated copy of the four gospels and the Acts of the Apostles, which is known as Codex Bezae, and which was presented to the university by that Reformer.

A catalogue of the MSS. has been published in 4 vols. (1856-1861), and this has been followed up by the publication of a number of separate catalogues of Persian, Syriac, Hebrew, Chinese, &c , MSS. There is no published catalogue of the books, although the catalogue is in print, the accessions being printed and cut up and arranged in volumes. A catalogue of English books before 1640 is in course of publication. The regulations of the library with regard to the lending of books are very liberal, as many as ten volumes being allowed out to one borrower at the same time. The annual income is about £7000.

There is a library attached to the Fitzwilliam Museum, be- queathed to the university in 1816. It consists of the entire library of Lord Fitzwilliam, with the addition of an archaeological library bought from the executors of Colonel Leake, and a small number of works, chiefly on the history of art, since added by purchase or bequest. It contains a collection of engravings of old masters, a collection of music, printed and MS., and a collection of illuminated MSS., chiefly French and Flemish, of the 14th to 1 6th centuries. The books are not allowed to be taken out. Catalogues and reprints of some of the music and other collections have been published.

The library of Trinity College, which is contained in a magnificent hall built by Sir Christopher Wren, has about 90,000 printed and 1918 MS. vols., and is especially strong in theology, classics and bibliography. It

owes to numerous gifts and bequests the possession of a great number of rare books and manuscripts. Amongst these special collections are the Capell collection of early dramatic and especially Shakespearian literature, the collection of German theology and philosophy bequeathed by Archdeacon Hare, and the Grylls bequest in 1863 of 960O vols., including many early printed books. There are printed catalogues of the Sanskrit and other Oriental MSS. by Dr Aufrecht and Professor Palmer, and of the incunabula by the late librarian, Mr Sinker. The library is open to all members of the college, and the privilege of using it is liberally extended to properly accredited students. One of the most interesting libraries

is that of Trinity Hall, in which the original bookcases and benches are preserved, and many books are seen chained to the cases, as used formerly to be the practice.

None of the other college libraries rivals Trinity in the number of books. The, library of Christ's College received its first books from the foundress. Clare College Library includes a number of Italian and Spanish plays of the end of the 16th century left by George Ruggle. The library of Corpus Christi College first became notable through the bequest of books and MSS. made by Archbishop Parker > n 1575- The printed books are less than 5000 in number, and the additions now made are chiefly in such branches as throw light on the extremely valuable collection of ancient MSS., which attracts scholars from all parts of Europe. There is a printed catalogue of these MSS. Gonville and Caius College Library is of early foundation. A catalogue of the MSS. was printed in 1849, with pictorial illustra- tions, and a list of the incunabula in 1850. The printed books of King's College includes the fine collection bequeathed by Jacob Bryant in 1804. The MSS. are almost wholly Oriental, chiefly Persian and Arabic, and a catalogue of them has been printed. Magdalene College possesses the curious library formed by Pepys and bequeathed by him to the college, together with his collections of prints and drawings and of rare British portraits. It is remarkable for its treasures of popular literature and English ballads, as well as for the Scottish manuscript poetry collected by Sir Richard Maitland. The books are kept in Pepys's own cases, and remain just as he arranged them himself. The library of Peterhouse is the oldest library in Cambridge, and possesses a catalogue of some 600 or 700 books dating from 1418, in which year it was completed. It is chiefly theological, though it possesses a valuable collection of modern works on geology and natural science, and a unique collection of MS. music. Queen's College Library contains about 30,000 vols, mainly in theology, classics and Semitic literature, and has a printed class- catalogue". The library of St John's College is rich in early

printed books, and possesses a large collection of English historical tracts. Of the MSS. and rare books there is a printed catalogue.

The library of the university of London, founded in 1837, has over 60,000 vols, and includes the Goldsmith Library of economic literature, numbering 30,000 vols. Other collections are De Morgan's collection of mathematical books, Grote's classical library, &c. There is a printed catalogue of 1897, with supplements. Since its removal to South Kensing- ton, this library has been greatly improved and extended. University College Library, Gower Street, established in 1829, has close upon 1 20,000 vols, made up chiefly of separate collec- tions which have been acquired from time to time. Many of these collections overlap, and much duplicating results, leading to congestion. These collections include Jeremy Bentham's library, Morrison's Chinese library, Barlow's Dante library, collections of law, mathematical, Icelandic, theological, art, oriental and other books, some of them of great value.

King's College Library, founded in 1828, has over 30,000 vols, chiefly of a scientific character. In close association with the university of London is the London School of Economics and Political Science in Clare Market, in which is housed the British Library of Political Science with 50,060 vols, and a large number of official reports and pamphlets.

The collegiate library at Dulwich dates from 1619, and a list of its earliest accessions, in the handwriting of the founder, may still be seen. There are now about 17,000 vols, of mis- cellaneous works of the 17th and 18th centuries, with a few rare books. A catalogue of them was printed in 1880; and one describing the MSS. (567) and the muniments (606) was issued during the succeeding year. The last two classes are very im- portant, and include the well-known " Alleyn Papers " and the theatrical diary of Philip Henslow. Sion College is a gild of the parochial clergy of the city and suburbs of London, and the library was founded in 1629 for their use; laymen may also read (but not borrow) the books when recommended by some beneficed metropolitan clergyman. The library is especially rich in liturgies, Port-Royal authors, pamphlets, &c, and contains about 100,000 vols, classified on a modification of the Decimal system. The copyright privilege was commuted in 1835 for an annual sum of £363, 15s. 2d. The present building was opened in 1886 and is one of the striking buildings of the Victoria Embankment.

Most of the London collegiate or teaching institutions have libraries attached to them, and it will only be necessary to mention a few of the

more important to get an idea of their variety : Baptist College (1810), 13,000 vols.; Bedford College (for women), 17,000

Scotland.

vols.; Birkbeck College (1823), 12,000 vols.; Congregational Library (1832-1893), 14,000 vols.; t_he Royal College of Music, con- taining the library of the defunct Sacred Harmonic Society; Royal Naval College (Greenwich, 1873), 7000 vols. ; St Bartholomew's Hospital (1422), 15,000 vols.; St Paul's School (1509), 10,000 vols.; the Working Men's College (1854), 5000 vols. ; and all. the Poly- technic schools in the Metropolitan area.

The university library of Durham (1832) contains about 35,000 vols., and all the modern English universities— Birmingham, Mason University College (1880), 27,000 vols.; Leeds, provinces. Liverpool (1882), 56,000 vols.; Manchester, Victoria University, which absorbed Owens College (1851), 115,000 vols.; Newcastle-upon-Tyne; Sheffield (1907), &c. — have collections of books. The libraries in connexion with theological colleges and public schools throughout England are often quite extensive, and reference may be made to Eton College (1441), 25,000 vols.; Haileybury (1862), 12,000 vols.; Harrow (Vaughan Library), 12,000 vols.; Mill Hill'; Oscott College. Erdington (1838), 36,000 vols.; Rugby (1878), 8000 vols.; Stonyhurst College (1794), c. 40,000 vols., &c. The new building for the university of Wales at Bangor has ample accommodation for an adequate library, and the University College at Aberystwith is also equipped with a library.

The origin of the University Library of Edinburgh is to be found in a bequest of his books of theology and law made to the town in 1580 by Clement Little, advocate. This was two years before the foundation of the university, and in 1 584 the town council caused the collection to be removed to the college, of which they were the patrons. As it was the only library in the town, it continued to grow and received many benefactions, so that in 161 5 it became necessary to erect a library building. Stimulated perhaps by the example of Bodley at Oxford, Drummond of Hawthornden made a large donation of books, of which he printed a catalogue in 1627, and circulated an appeal for assistance

from others. In 1678 the library received a bequest of 2000 vols, from the Rev. James Nairne. In 1709 the library became entitled to the copy privilege, which has since been commuted for a payment of £575 per annum. In 1 83 1 the books were removed to the present library buildings, for which a parliamentary grant had been obtained. The main library hall (190 ft. in length) is one of the most splendid apart r ments in Scotland. One of the rooms is set apart as a memorial to General Reid, by whose benefaction the library has greatly benefited. Amongst the more recent accessions have, been the H illiwcll Phillips Shakespeare collection, the Laing collection of Scottish MSS., the Baillie collection of Oriental MSS. (some of which are of great value), and the Hodgson collection of works on political economy. The library now consists of about 210,000 vols, of printed books with over 2000 MSS. Recently it has been found necessary to make considerable additions to the shelving. The library of the university of Glasgow dates from the 15th century, and numbers George Buchanan and many other distinguished men amongst its early benefactors. A classified subject-catalogue has been printed, and there is also a printed dictionary catalogue. The annual accessions are about 1500, and the commutation-grant £707. Connected with the uni- versity, which is trustee for the public, is the library of the Hunterian Museum, formed by the eminent anatomist Dr William Hunter. It is a collection of great bibliographical interest, as it is rich in MSS. and in fine specimens of early printing, especially in Greek and Latin classics. There are about 200,000 vols, in the library.

The first mention of a library at St Andrews is as early as 1456. The three colleges were provided with libraries of their own about the time of their foundation — St Salvator's 1455, St Leonard's 1512, St Mark's 1537- The University Library was established about 1610 by King James VI.. and in the course of the 1 8th century the college libraries were merged in it. The copyright privilege was commuted in 1837. The collection numbers 120,000 vols, exclusive of pamphlets, with about 200 MSS., chiefly of local interest. A library is supposed to have existed at Aberdeen since the foundation of King's College by Bishop Elphinstone in 1494. The present collection combines the libraries of King's College and Marischal College, now incorporated in the university. The latter had its origin in a collection of books formed by the town authorities at the time of the Reformation, and for some time kept in one of the churches. The library has benefited

by the Melvin bequest, chiefly of classical books, and those of Hender- son and Wilson, and contains some very valuable books. The general

library is located in Old Aberdeen in a room of imposing design, while the medical and law books are in the New Town in Marischal College. The library has a grant, in lieu of the copyright privilege, of £320. The annual income of the library is £2500, and it contains over 180,000 vols. The books are classified on a modification of the decimal system, and there are printed author and MS. subject-cata- logues. By arrangement with the municipal library authority, books are lent to non-students. All the technical schools, public schools, and theological and other colleges in Scotland are well equipped with libraries as the following list will show : — Aberdeen : Free Church College, 17,000 vols. Edinburgh: Fettes College, c. 5000 vols.; Heriot's Hospital (1762), c. 5000 vols. ; New College (1843), 50,000 vols. Glasgow: Anderson's College (containing the valuable Euing music library), 16,000 vols.; United Free Church Theological College, 33,000 vols. Trinity College, Glenalmond, 5000 vols.

The establishment of the library of Trinity College, Dublin, is contemporaneous with that of the Bodleian at Oxford, and it is an interesting circumstance that, when ChaJloner and Ussher (afterwards the archbishop) were in London purchasing books to form the library, they met Bodley there, and entered into friendly intercourse and co-operation with him to procure the choicest and best books.' The commission was g'ven to Ussher and Challoner as trustees of the singular donation which laid the foundation of the library. In the year 1601 the English army determined to commemorate their victory over the Spanish troops at Kinsale by some permanent monu- ment. Accordingly they subscribed the sum of £1800 to establish a library in the university of Dublin. For Ussher's own collection, consisting of 10,000 vols, and many valuable MSS., the college was also indebted to military generosity. On his death in 1655 the officers and soldiers of the English army then in Ireland purchased the whole collection for £22,000 with the design of presenting it to the college. Cromwell, however, interfered, alleging that he proposed to found a new college, where the books might more conveniently be preserved. They were deposited therefore in Dublin Castle, and the college only obtained them after the Restoration. In 1674 Sir Jerome Alexander left his law books with some valuable MSS. \p the college. In 1726 Dr Palliser, archbishop of Cashel, bequeathed over 4000 vols, to the library; and ten years later Dr Gilbert gave the library nearly 13,000 vols, which he had himself col- lected and arranged. In 1745 the library received a valuable collection of MSS. as a bequest, from Dr Stearne. In 1802 the collection formed by the,; pensionary Fagel, which had been removed to England on tf$e French invasion of Holland, was acquired for £16,000. It Consisted of over 20,000 vols. In 1805 Mr Quin

bequeathed a choice collection of classical and Italian books. There have been many other smaller donations, in addition to which the library is continually increased by the books received under the Copyright Act. The library now contains 300,000 vols, and over 2000 MSS. There is no per- manent endowment, and purchases are made by grants from the board. The whole collections are contained in one building, erected in 1732, consisting of eight rooms. The great library hall is a magnificent apartment over 200 ft. long. A new reading-room was opened in 1848. A catalogue of the books acquired before 1872 has been printed (1887). There is a printed catalogue of the MSS. and Incunabula (1890). Graduates of Dublin, Oxford, and Cambridge are admitted to read permanently, and temporary admission is granted by the board to any fit person who makes application.

The library of Queen's College, Belfast (1849), contains about 60,000 vols., while Queen's College, Cork (1849), has over 32,000 vols. St Patrick's College, Maynooth (1795), has about 60,000, and other collegiate libraries are well supplied with books.

With one or two exceptions, libraries are attached to the cathedrals of England and Wales. Though they are of course intended for the use of the cathedral or diocesan cathedral clergy, they are in most cases open to any respectable and person who may be properly introduced. They seldom church contain very much modern literature, chiefly consisting r e *' of older theology, with more or less addition of classical and historical literature. They vary in extent from a few volumes, as at Llandaff or St David's, to 20,000 vols., as at

Durham. Together they possess nearly 150,000 printed and manuscript vols. As a. rule, very little is spent upon them, and they are very little used. The chamber in the old cloisters, in which the library of the dean and chapter of Westminster is preserved, is well known from the charming description by Washington Irving in his Sketch Book. There are about 14,000 vols., mostly of old theology and history, including many rare Bibles and other valuable books. The library of the dean and chapter of St Paul's Cathedral was founded in very early times, and now numbers some 22,000 vols, and pamphlets, mainly theological, with a good collection of early Bibles and Testa-

ments, Paul's Cross Sermons, and works connected with the cathedral.

Perhaps the best library of Catholic theology in London is that of the Oratory at South Kensington, established in 1849, and now containing nearly 35,000 vols. The Catholic Cathedral of Westminster, of recent foundation, contains about 22,000 vols. The archiepiscopal library at Lambeth was founded in 1610 by Archbishop Bancroft, and has been enriched by the gifts of Laud, Tenison, Manners Sutton, and others of his successors; it is now lodged in the noble hall built by Juxon. The treasures consist of the illuminated MSS., and a rich store of early printed books; of the latter two catalogues have been issued by Samuel Roffey Maitland (1792-1866). The MSS. are described in H. J. Todd's catalogue, 1812. The total number of printed books and manuscripts is nearly 45,000.

The library of Christ Church, Oxford, belongs alike to the college and the cathedral, but will be more properly described as a college library. The cathedral library of Durham dates from monastic times, and possesses many of the books which belonged to the monastery. These were added to by Dean Sudbury, the second founder of the library, and Bishop Cosin. The collection has been considerably increased in more modern times, and now contains 15,000 vols. It is especially rich in MSS., some of which are of great beauty and value ; a catalogue of them was printed in 1825. The library has good topographical and entomological collections. The chapter spend £370 per annum in salaries and in books. The library at York numbers about 11,000 vols., and has been very liberally thrown open to the public. It is kept in the former chapel of the archbishop's palace, and has many valuable TVISS. and early printed books. The foundation of the library at Canterbury dates probably from the Roman mission to England, A.D. 596, although the library does not retain any of the books then brought over, or even of the books said to have been sent by Pope Gregory to the first archbishop in 6or. It is recorded that among Lanfranc's buildings was a new library, and Becket is said to have collected books abroad to present to the library. The collection now numbers about 9900 printed books, with about no MS. vols., and between 6000 and 7000 documents. A catalogue was printed in 1802. The present building was erected in 1 867 on part of the site of the monastic dormitory. The library at Lincoln contains 7400 vols., of which a catalogue was printed in 1859. It possesses a fine collection of political tracts of the age of Elizabeth, James and Charles I. The present collection at Chichester dates from the Restoration only; that at Ely is rich in books and tracts relating to the non-jurors. The library at Exeter possesses many Saxon MSS. of extreme interest, one of them being the gift of Leofric, the first bishop. The treasures of Lichfield

were destroyed by the Puritans during the civil war, and the existing library is of later formation. Frances, duchess of Somerset, bequeathed to it nearly 1000 vols., including the famous Evangeliary of St Chad. The collection at Norwich is chiefly modern, and was presented by Dr Sayers. The earlier library at Peterborough having almost wholly perished in the civil war, Bishop White Kennett became the virtual founder of the present collection. Salisbury is rich in incunabula, and a catalogue has recently been printed. Winchester Cathedral Library is mainly the bequest of Bishop Morley in the 17th century. The library at Bristol, then numbering 6000. or 7000 vols., was burnt and pillaged by the mob in the riots of 1831. Only about 1000 vols, were saved, many of which were recovered, but few additions have been made" to them. .At Chester in 1 69 1 Dean Arderne be- queathed his books and part of his estate " as the beginning of a public library for the clergy and city." The library of Hereford is a good specimen of an old monastic library; the books are placed in the Lady Chapel, and about 230 choice MSS. are chained to oaken desks. The books are ranged with the edges outwards upon open shelves, to which they^are attached by chains and bars. Another most interesting " chained " library is that at Wimborne Minster, Dorset, which contains about 280 books in their original condition. The four Welsh cathedrals were supplied with libraries by a deed of settlement in 1709. The largest of them, that of St Asaph, has about 1750 vols. The Bibliotheca Leightoniana, or Leightonian Library, founded by Archbishop Leighton in 1684 in Dunblane Cathedral, Scotland, contains about 2000 vols., and is the only cathedral library

in Scotland of any historic interest. The library of St Benedict's Abbey, Fort Augustus (1878) with 20,000 vols, is an example of a recent foundation. The public library in St Patrick's Cathedral, Dublin, sometimes called Marsh's Library after its founder, was established about 1694 by Archbishop Marsh, was incorporated by act of parliament in 1707, and endowed by its founder at his death in 1713. The building was erected by the founder, and the original oak fittings still remain. There is no room for additions, and a large collection of modern books was refused a few years ago on that ac- count. The endowment is too small to allow of purchases from the funds of the library, so that it still retains the character of a 17th- century library. The books are chiefly theological, and in the learned languages; they include the libraries of Bishop Stillingfleet and of EliasrBouhereau, a French refugee, who was the first librarian.

Endowed libraries may be defined as those which have been directly established by the bequests of individuals or corporate bodies, excluding those which have been assisted by donors or are merely

named after them. As com- ˆfrfe? pared with the United States, the endowed libraries of Britain are few in number, although several are of great import- ance. London possesses very few libraries which have been endowed by individual donors. The principal are the Bishopsgate Institute (1891), which was founded out of sundry City of London charities, and now contains about 44,000 vols., and is celebrated for a fine collection of local prints, drawings and maps. It is open free to persons in the east part of the City. The Cripplegate Institute (1896) in Golden Lane, also founded out of charity moneys, has three branches — St Bride's Foundation Institute (18,000 vols.), jointly; Queen Street, Cheapside, Branch (8000 vols.); and St Luke's Institute (5000 vols.) — and contains 28,000 vols. Lectures and other entertainments are features of both these libraries. Dr Williams' library was founded by the will of an eminent Presbyterian divine of that name; it was opened in 1729. The books (50,000) are housed in a new building in Gordon Square, completed in 1873. Theology of all schools of opinion is represented, and there are special collections of theosophical books and MSS., the works of Boehme, Law, and other mystical writers. The MSS. include the original minutes of the Westminster Assembly, letters and treatises of Richard Baxter, &c. The St Bride Foundation Technical Reference Library (1895) is a very complete collection of books and specimens of printing and the allied arts, including the libraries of William Blades and Talbot Baines Reed, and a number of more modern books presented by Mr Passmore Edwards. It contains about 18,000 vols., and is open to all persons interested in printing, lithography, &c, and also to the general public.

. The most notable of the English provincial endowed libraries are those established in Manchester. The fine old library established by Humphrey Chetham in 1653 is still housed in the old collegiate buildings where Sir Walter Raleigh was once entertained by Dr Dee. The collection consists largely of older literature, and numbers about 60,000 volumes and MSS. It is freely open to the public, and may be said to have been the first free library in England. Catalogues in broad classified form were issued in 1791-1863, and there have been supplements since. A remarkable instance of a great library established by private munificence is that of the John Rylands Library at Manchester, which was founded, erected and endowed by Mrs E. A. Rylands in memory of her husband, and is contained in a magnificent building designed by Basil Champneys and opened in 1899. The collection was formed largely on the famous Althorp Library, made by Earl Spencer (40,000 vols.), one of the most re- markable collections of early printed books and rare Bibles ever brought together. The present number of volumes is about 1 15,000, of which over 2500 are

incunabula. A short-title catalogue, 3 vols. 4to., and one of English books, have been published, and a manu- script dictionary catalogue has been provided. Several valuable special catalogues and descriptive lists have been issued, one of the latest being a special catalogue of the architectural works contained in all the Manchester libraries.

The William Salt Library, a special Staffordshire library with numerous MSS. and other collections, formed to bring together materials for a history of Staffordshire, was opened to the public in 1874 ‘ n the town of Stafford. It contains nearly 20,000 books, prints and other items.

Other endowed libraries in the English provinces which deserve mention are the Bingham Public Library (1905) at Cirencester; the Guille-Alles Library (1856), Guernsey; St Deiniol’s Library (1894), Hawarden, founded by William Ewart Gladstone, the great statesman; and the Shakespeare Memorial Library and theatre (1879) at Stratford-upon-Avon.

learned bodies.

The most important endowed library in Scotland is the Mitchell Library in Glasgow, founded by Stephen Mitchell, tobacco-manu- facturer (1874), who left £70,000 for the purpose. It was opened in 1877 in temporary premises, and after various changes will soon be transferred to a very fine new building specially erected. It con- tains some very valuable special collections, among which may be mentioned Scottish poetry, Burns’ works, Glasgow books and print- ing, and a choice collection of fine books on art and other subjects given by Robert Jeffrey. It contains nearly 200,000 vols, and is the reference library for the Glasgow public library system. Another older Glasgow public library, also founded by a tobacco merchant, is Stirling’s and Glasgow Public Library (1791), which was endowed by Walter Stirling, and amalgamated with an existing subscription library. It contains 60,000 vols, and is free to reference readers, but a subscription is charged for borrowing privileges. Still another Glasgow institution is Baillie’s Institution Free Reference Library, established under the bequest of George Baillie (1863), but not opened till 1887. It contains over 24,000 vols. Other Scottish endowed libraries are the

Anderson Library, Woodside, Aberdeen (1883); the Taylor Free Library, Crieff (1890); the Elder Free Library, Govan (1900); and the Chambers Institution, Peebles (1859), founded by William Chambers, the well-known publisher. The public library of Armagh, Ireland, was founded by Lord Primate Robinson in 1 770, who gave a considerable number of books and an endowment. The books are freely available, either on the spot, or by loan on deposit of double the value of the work applied for.

Libraries There are many libraries belonging to societies otaocie- devoted to the study of every kind of subject, and ties and it is only necessary to mention a few of the principal. Full particulars of most of them will be found in Reginald A. Rye's Libraries of London: a Guide jot Students (1910), a work of accuracy and value.

Of the law libraries, that at Lincoln's Inn, London, is the oldest and the largest. It dates from 1497, when John Nethersale, a member of the society, made a bequest of forty marks, part of which was to be devoted to the building of a library for the benefit of the students of the laws of England. A catalogue of the printed books was published in 1859 and since supplemented, and the MSS. were cata- logued by the Rev. Joseph Hunter in 1837. There are about 72,000 vols. The library of the Inner Temple is known to have existed in 1540. In the middle pf the 17th century it received a considerable benefaction from William Petyt, the well-known keeper of the Tower records. There are now about 60,000 vols., including the pamphlets collected by John Adolphus for his History of England, books on crime and prisons brought together by Mr Crawford, and a selection of works on jurisprudence made by John Austin. A library in con- nexion with the Middle Temple was in existence during the reign of Henry VIII., but the date usually assigned to its foundation is 1641, when Robert Ashley left his books to the inn of which he had been a member. There are now about 50,000 vols. Gray's Inn Library (21,000 vols.) was perhaps established before 1555. In 1669 was made the first catalogue of the books, and the next, still extant, in 1689. The Law Society (1828) has a good law and general library (50,000 vols.), including the-best collection of private acts of parlia- ment in England. The library of the Royal Society (1667), now housed in Burlington House, contains over 80,000 vols., of which many are the transactions and other publications of scientific bodies. The Royal Institution of Great Britain (1803) possesses a reference library of 60,000 vols. Some of its early catalogues were in classified form. The London Institution (1805), in the City, is a general library of reference and lending books open to members only. There are about 150,000 vols., and lectures are given in connexion with the institution. The Royal Society of Arts has

a library numbering about 11,000 vols., chiefly the publications of other learned bodies.

The best library of archaeology and kindred subjects is that of the Society of Antiquaries, Burlington House, consisting of nearly 40,000 printed vols, and many MSS. It is rich in early printed books, topography, heraldry and numismatics, and includes a curious collection of books on pageants presented by Mr Fairholt, and the remarkable assemblage of lexicographical works formerly belonging to Albert Way.

Of libraries devoted to the natural sciences may be mentioned those of the Geological Society of London (1807), with over 30,000 vols, and maps; the Linnean Society (1788), 35,000 vols.; the Zoological Society (1829), about 31,000 vols. Of libraries associated with medicine there are those of the Royal Society of Medicine (1907), incorporating a number of medical societies, over 95,000 vols., about to be housed in a new building; the Royal College of Physicians (1525), 26,000 vols.; the British Medical Association, 20,000 vols.; the Royal College of Surgeons of England (1800), 60,000 vols., with a MS. catalogue on cards; the Chemical Society (1841), oyer 25,000 vols.; and the Pharmaceutical Society of Great Britain (1841), about 15,000 vols. Other important London society libraries are — the Royal Geographical Society (1830), 50,000 vols., and numerous maps in a special room, open to the public for reference; the Royal Colonial Institute (1868), 70,000 vols, of British colonial literature; the Royal United Service Institution, Whitehall (1831), has 32,000

works on military and naval subjects and a museum. Large and interesting collections of books are owned by the British and Foreign Bible Society, the Institution of Civil Engineers, the Institution of Electrical Engineers (containing the Ronalds Library), the Royal Academy, the Royal Institute of British Architects, and practic- ally every other working society in London.

The English provincial libraries connected with societies or learned bodies are mostly attached to those concerned with law, medicine, and various antiquarian, literary and scientific subjects. The head-quarters of most national societies being in London to some extent accounts for the comparatively small number of these special, libraries in the provinces.

The most important libraries of this description outside London are situated in Scotland and Ireland, and one at least is practically a national collection.

The principal library in Scotland is that of the Faculty of Advo- cates at Edinburgh, who in 168,0 appointed a committee of their number, which reported that " it was fitt that, seeing if the recusants could be made pay their entire money, there wold be betwixt three thousand and four thousand pounds in cash; that the same be im- ployed on the best and fynest lawers and other law bookes, conforme to a catalogue to be condescended upon by the Facultie, that the samen may be a fonde for ane Bibliothecque whereto many lawers and others may leave their books." In 1682 the-active carrying out of the scheme was committed to the Dean of Faculty, Sir George Mackenzie of Rosehaugh, who may be regarded as the founder of the library. In 1684 the first librarian was appointed, and the library appears to have made rapid progress, since it appears from the treasurer's accounts that in 1686 the books and furniture were valued at upwards of £11,000 Scots, exclusive of donations. In the year 1700, the rooms in the Exchange Stairs, Parliament Close, in which the library was kept, being nearly destroyed by fire the collection was removed to the ground floor of the Parliament House, where it has ever since remained. The library retains the copyright privilege conferred upon it in 1709. Of the special collections the most important are the Astorga collection of old Spanish books, purchased by the faculty in 1824 for £4000; theThorkelin collection, consisting of about 1200 vols., relating chiefly to jthe history and antiquities of the northern nations, and including some rare books on old Scottish poetry; the Dietrich collection of over 100,000 German

Eamphlets and dissertations, including many of the writings of uther and Melanchthon, purchased for the small sum of £80; and the Combe collection.

The faculty appear early to have turned their attention to the collection of MSS., and this department of the library now numbers about 3000 vols. Many of them are of great interest and value, especially for the civil and ecclesiastical history of Scotland before and after the Reformation. There are thirteen monastic chartularies which escaped the destruction of the religi6us houses to which they belonged. The MSS. relating to Scottish church history include the collections of Spottiswoode, Wodrow and Calderwood. , The Wodrow collection consists of 154 vols., and includes his correspond- ence, extending from 1694 to 1726. Sir James Balfour's collection and the Balcarres papers consist largely of original state papers, and include many interesting royal letters of the times of James V., Queen Mary and James VI. The Sibbald papers, numbering over 30 vols., are largely topographical. The Riddel notebooks, number- ing 156 vols., contain collections to illustrate the genealogy of Scottish families.

There are about one hundred volumes of Icelandic MSS., purchased in 1825 from Professor Finn Magnusspn, and some Persian and Sanskrit, with a few classical, manuscripts. The de- partment has some interesting treasures of old poetry, extending to 73 vols. The most important are the Bannatyne MS., in 2 vols, folio, written by George Bannatyne in 1568, and the Auchinleck MS., a collection of ancient English poetry, named after Alexander Boswell of Auchinleck, who presented it in 1774.

The first catalogue of the printed books was compiled in 1692, and contains a preface by Sir George Mackenzie. Another was prepared under the care of Ruddiman in 1742. In 1853 the late Mr Halkett commenced a catalogue, which has been printed in 6 vols. 4to, with a supplement, and includes all the printed books in the library at the end of 1871, containing about 260,000 entries. The library, managed by a keeper and staff, under a board of six curators, is easily accessible to all persons engaged in literary work, and now contains about 500,000 vols.

The library of the Writers to the Signet was established by the Society at Edinburgh in 1755. At first it consisted oi law books exclusively, but in 1 788 they began to collect the best editions of works in other departments of literature. During the librarianship of Macvey Napier (1805-1837) the number of volumes was more than sextupled, and in 1812 the library was removed to the new hall adjoining the Parliament House. In 1834 the upper hall was de- voted to the collection. This is a magnificent apartment 142 ft. long, with a beautiful cupola painted by Stothard. The library now contains over 1 10,000 vols, and includes some fine specimens of early printing, as well as many other rare and costly works. It is especially rich in county histories and British topography and antiquities- A catalogue of the law books was printed in 1856. The late David Laing, who became librarian in 1837, published the first volume of a I new catalogue in 187 1, and in 1 891 this was completed with a subject

index. The books are lent out to the writers' and even to strangers recommended by them.

The library of the Royal Irish Academy at Dublin was established on

the formation of the Academy in 1785 for the purpose of promot- ing the study of science, literature and antiquities in Ireland. The library possesses about 80,000 printed vols, and MSS: There is a large collection of MSS. and books relating to the history, ancient language, and antiquities of Ireland. They include the Betham collection, acquired partly by public subscription in 1 851. The library is partly supported by a government grant and is freely open on a proper introduction. The publication of Irish MSS. in the library was begun in 1870, and has since continued; the general catalogue is in manuscript form.

The library of King's Inns was founded, pursuant to a bequest of books and legal MSS. under the will of Mr Justice Robinson in 1787; to form the nucleus of a library for law students. It is partly sup ported from the funds Of the benchers, but partly also by a treasury grant in lieu of the copyright privilege.

It is needless to describe the other society libraries, as most of them are described in annuals like the Literary Year-book and similar publications, with statistics of stock, issues, &c, brought up to date.

Proprietary and subscription libraries were at one time more common than now, as, owing to the steady advance of the municipal library, the minor subscription libraries have been gradually extinguished. A striking example of this is furnished by the mechanics' institutes which used to flourish all over the country. In most cases these have been handed over to the local authorities by the owners to form the nucleus of the public rate-supported library, and in this way the older libraries have been preserved and valuable aid has been given to the popular library move- ment. Somewhat akin to the mechanics' institutes are the libraries established' in connexion with various co-operative societies in the north of England. Together with working men's club libraries, there must be nearly 100 libraries of the class just mentioned, ranging in size from a few hundred vols, to 30,000 or 40,000 vols. The affiliated clubs of the Working Men's Club and Institute Union possess among them over 100,600 vols.

Among subscription libraries, the London Library : stands first in order of importance. It was founded in 1841 as a lending library for the use of scholars, and Dean Milman, Sir G. C. Lewis, W. E. Gladstone, Thomas Carlyle, Henry Hallam and other eminent men took part in its formation. By means of a moderate subscription, funds were raised for the purchase of books on general subjects, which now amount to about 250,000 vols. Of these elaborate and excellent author and subject catalogues The last is valuable as. a classified guide to

Proprie- tary and subscrip- tion libraries.

have been printed.

the contents of the library.

Some mention should be made also of the more important subscrip- tion or proprietary libraries, which were formed for the most part in the latter half of the 18th century. The earliest circulating library, in the metropolis was established about the middle of the 1 8th century. The first in Birmingham was opened by Huttoh in 1757. The idea of a proprietary library appears to have been first carried out at Liverpool in 1758. The library then formed still flourishes at the Lyceum, and possesses a collection of 55,000 vols, and an income of £1000 a year. In 1760 a library was formed at Warrington which has been merged in the Warrington Museum. The Leeds library was established in 1 768, and now has 64,000 vols. In 1 772 the Bristol museum and library was formed, and numbered Coleridge, Southey and Landor among its earlier members. It has now been merged in the reference collection of the Bristol public libraries. The Birming- ham (old) library was formed in 1779, and its rules were drawn up by Dr Priestley. The library has now about 80,000 vols.

Other English proprietary libraries have been established -at Leicester, Liverpool (Athenaeum, 1798), Manchester, Nottingham and elsewhere. In Scotland the first subscription library was started by Allan Ram.say, the poet, at Edinburgh in 1725, and since that time commercial subscription libraries have increased greatly in number *nd size, Mudie's and The Times Book Club being typical modern examples.

Many of the principal clubs possess libraries; that of the Athenaeum (London) is by far the most important. It now numbers about 75,000 vols, of books in all departments of literature, and is especially rich in well-bound and fine copies of works on the fine arts, archaeology, topography and history. The pamphlets, of which there is a complete printed catalogue, as well as of the books, form a remarkable series, jncluding those collected by Gibbon and Mackintosh. Next comes the Reform Club, with, about 60,000

CJtrft libraries.

vols., chiefly in belles-lettres, with a fair proportion of parlia- mentary and historical works. The National Liberal Club, containing the Gladstone Library, has about 45 > °°° vols,, and may be used

occasionally by non-members. The Oxford and Cambridge Club has 30,000 vols, in general and classical literature. At the Garrick there is a small dramatic collection; and the (Senior) United Service Club, besides a number of books on professional subjects, possesses the fine library which formerly belonged to Dugald Stewart.

Other London clubs which possess libraries are the Carlton with 25,006 vols. ; the Constitutional with 12,000 vols. ; Grand Lodge of Freemasons, 10,000 vols.; Alpine, 5000 vols.; Travellers, 8000 vols.; and Junior Carlton, 6000 vols. In the provinces and in Scotland and Ireland every club of a social character has a reading- room, and in most cases a library is attached.

The first act of parliament authorizing the establishment of

public libraries in England was obtained by William Ewart,

M.P. for the Dumfries Burghs, in 1850. This arose out „ .. ,

, , ■’ f ■?!•..• -^ Municipal

of the report of a special parliamentary committee u orar i es .

appointed to enquire into the management of the

British Museum in 1835, arid a more general report on

libraries in 1849, at which much evidence was submitted to

prove the necessity for providing public libraries. Ewart

obtained both committees and also, in 1845, procured an act

for ” encouraging the establishment of museums in large towns.”

Neither the 1845 nor 1850 acts proved effective, owing chiefly

to the limitation of the library rate to |d. in the £ of rental,

which produced in most cases an insufficient revenue. In 1853

the Library Act of 1850 was extended to Ireland and Scotland,

and in 1854 Scotland obtained a,n act increasing the rate limit

from j^ to id. in the £. In 1855 Ireland also obtained a penny

rate, and later in the same year England obtained the same power by an act which remained the principal library act, with some intermediate amendments, till 1892, when a Public Library Consolidation Act was passed. In the following year, 1893, the power of adopting the acts, or putting them in operation, was transferred from the ratepayers to the local authority, save in the case of rural parishes and the metropolitan vestries. By the London Government Act of 1899, however, the metropolitan boroughs were given the power of adopting the acts of 1892-1893 without consulting the ratepayers, so that as the law at present stands, any urban district can put the public libraries acts in force without reference to the voters. Rural parishes are still required by the provisions of the Local Government Act 1894 to adopt the 1892 Libraries Act by. means of a parish meeting, or if a poll is demanded, by means of a poll of the voters.

■ The main points in British library legislation are as follows: —

(a) The acts are permissive in character and not compulsory, and can only be put in force by a vote of a. majority of members in an urban district or city, or of a majority of voters in rural districts.

Q>) The amount of rate which can be collected is limited to one penny in the pound of the rateable value of the district, though in some towns power has been obtained by special legislation for local purposes to increase the amount to 2d. In a few cases, as at Birmingham, no limit is fixed. The incomes produced by the penny in the pound range from less than £10 in a rural district to over £25,000 in a large city.

(c) Municipal libraries are managed by committees appointed by the local authorities, who may, if so disposed, delegate to them all their powers and duties under section 15 of the act of 1892. The local

authorities in England have also power to appoint persons on such committees who are not members of the council. By the Scottish principal act of 1887 committees are to consist of one-half councillors and one-half non-councillors, not to exceed a total of 20, and these committees become independent bodies not subject to the councils. Glasgow has contracted out of this arrangement by means of a special act. In Ireland, committees are appointed much on the same system as in England.

(d) Power is given to provide libraries, museums, schools for science, art galleries, and schools for art. Needless to say it is im- possible, to carry on so many departments with the. strictly limited means provided by the acts, although some towns have attempted to do so. The Museums and Gymnasiums Act of 1891 enables an additional rate of Jd. to be raised for either purpose, and many places which have established museums or art galleries under the pro- visions of the Libraries Acts have also adopted the Museums Act in order to increase their revenues.

(e) The regulation and management of public libraries are en- trusted to the library authority, which may either be the locail

authority, or a committee with a full or partial delegation of powers. The library authority can buy books, periodicals, specimens of art and science, and make all necessary rules for the proper working of the libraries A staff can be appointed, and arrangements may be made with adjoining local authorities for the joint use of one or more libraries. Buildings may also be erected, and money borrowed for the purpose on the security of the local rates. These are the main provisions of the library legislation of the United Kingdom as at present existing. Revision and amendment are wanted as regards the abolition or raising of the rate limitation, and some clearer definitions as to powers which can be exercised, as, for example, the right to spend money on lectures. The rate limitation is the most serious obstacle to progress, and it affects the smaller towns to a much greater degree than large cities or areas.

Between 1850 and 1910 about 630 local government areas of all kinds adopted the Public Libraries Acts. Of these a consider- able number

had in 19 10 not yet put the acts in operation, whilst the London Government Act 1899, by joining various previously independent vestries or boards, extinguished about 23 library areas. The Metropolitan County of London in 19 10 comprised 2 5 library areas, or counting also the City, 26, and only Maryle- bone, Bethnal Green and parts of Finsbury and Paddington remained unprovided. Practically every large city or district council has adopted the Public Libraries Acts or obtained special legislation, and the only important places, in addition to Maryle- bone and Bethnal Green, unprovided in 1910 were Bacup, 'Crewe, Dover, Jarrow, Scarborough, Swindon, Weymouth, Llandudno, Govan, Leith, Pollokshaws and Wishaw. In all, 556 places had library systems in operation, and among them they possessed about 925 buildings.

The progress of the public library movement was very slow up to 1887, the year of Queen Victoria's jubilee. From 1887, however, when many districts established libraries as memorials to Queen Victoria, the progress has been much more rapid. An immense stimulus to the movement was given from about 1900, when Mr Andrew Carnegie (g.o.) began to present library buildings to towns in England as well as to Scotland and the United States. The result of this action was to increase the number of municipal libraries from 146 in 1886 to 556 in 1910; and in the 10 years up to 1910 during which Mr Carnegie's gifts had been offered, no fewer than 163 places had put the acts in operation, a yearly average of over 16 adoptions.

There is one municipal library whose importance demands special mention, although it is not rate-supported under the provisions of the Public Libraries Acts. This is the Guildhall library of the Corporation of the City of London, which is a free public reference library with a periodicals reading-room, and a lending department for officials and members of the corporation. A library was established for London by Sir Richard Whittington between 1421-1426, and several notices in the civic records show how well in those times the citizens cared for their books. But it did not remain without accident; in 1522 the Lord Protector Somerset carried off three cart-loads of books, and during the great fire of 1666 the remainder was destroyed together with the library buildings. Nothing was done to repair the loss until 1824, when a committee was appointed, and rooms set apart for library purposes. In 1840 a catalogue of 10,000 vols, was printed, and in 1859 a second was prepared of 40,000 vols. In consequence of the large and increasing number of the readers, the present fine building was commenced about ten years later, and, after having cost £90,000, was opened in 1873 as a free public library.

There are now upwards of 136,000 printed vols, and 5900 MSS. in the Guildhall library. The contents are of a general character, and include a special collection of books about London, the Solomons Hebrew and rabbinical library, and the libraries of the Clockmakers Company and the old Dutch church in Austin Friars. Recently the fine collection of books by and about Charles Dickens, called the National Dickens Library, was added, and other special libraries of a valuable nature, as well as an extensive and well-carcd-for collection of London prints, and drawings.

BrMsh There is such a variety of library buildings in the

library United Kingdom that it is not possible to single out admlnH-examples for special description, but a brief statement of their work and methods will help to give some idea of the extent of their activities.

The total number of borrower? enrolled in 1910 was. 1 about 2,200,000, 59% males and 41% females, 48% under 20 years 1 Guide to Librarianship by J. D. Brown (1909).

of age and 52 % over 20. Industrial and commercial occupations were followed by 49%of the borrowers, the balance of 51% being domestic, professional, unstated, and including 20% of students and scholars. To these borrowers 60,000,000 vols, are circulated every year for home-reading, and of this large number 54% represented fiction, including juvenile literature. The Reference libraries issued over 11,000,000 vols., exclusive of books consulted at open shelves, and to the Reading-rooms, Magazines, Newspapers, Directories, Time-tables, &c, allowing only one consultation for each visit, 85,000,000 visits are made per annum. Allowing 5% for the reading of fiction in current magazines, it appears that the percentage of fiction read in British municipal libraries, taking into account the work of every issuing or consulting department, is only about 24%. This fact should be carefully recorded, as in the past municipal libraries have suffered in the esteem of all sections of the public, by being erroneously described as mere centres for the distribu- tion of common novels. The quality of the fiction selected is the best obtainable, and, as shown above, it is not read to an unreasonable or unnecessary extent.

The changes in character, policy and methods which have marked library administration in the United Kingdom, have affected libraries of all kinds, but on the whole the municipal libraries have been most active in the promotion of improve- ments. It is evident, moreover, even to the most casual observer, that a complete revolution in library

practice has been effected since 1882, not only in the details of administration, but in the initiation of ideas and experiments. One of the most notable changes has been the gradual disappearance of the unclassified library. Previous to 1882 very little had been accomplished in the way of scientific classification schemes equipped with suitable notations, although the Decimal method of Mr Melvil Dewey had been applied in the United States. After that date this system began to be adopted for reference departments in British municipal libraries, till in 1910 at least 120 places had been classified by means of the scheme. An English scheme, called the ” Adjustable,” with a notation, but not fully expanded, has been adopted in 53 places, and a very complete and minute scheme called the ” Subject,” also English, has been used in nearly 40 libraries, although it only dates from 1906. That much remains to be accomplished in this direction is indicated by the fact that over 340 municipal libraries were in 1910 not closely classified, but only arranged in broad numerical or alphabetical divisions. The adoption of exact schemes of classification for books in libraries may be said to double their utility almost mechanically, and in course of time an unclassified municipal library will be unknown. The other kinds of library- state, subscription, university, &c. — are. very often not classified, but some use the Decimal system, while others, like the Patent Office, have systems peculiar to themselves.

The catalogue, as a means of making known the contents of books, has also undergone a succession of changes, both in policy and mechanical construction. At one period, before access to the shelves and other methods of making known the contents of libraries had become general, the printed catalogue was relied upon as practically the sole guide to the books. Many excellent examples of such catalogues exist, in author, subject and classified form, and some of them are admirable contributions to bibliography. Within recent years, however, doubts have arisen in many quarters, both in Europe and America, as to the wisdom of printing the catalogues of general popular libraries which possess comparatively few rare or extraordinary books. A complete catalogue of such a library is out of date the moment it is printed, and in many cases the cost is Very great, while only a small number is sold. For these and other reasons, modern libraries have begun to compile complete catalogues only in MS. form, and to issue comparatively cheap class-lists at intervals, supplemented by monthly or quarterly bulletins or lists of recent accessions, which in combination will answer most of the questions likely to be put to a catalogue. Various improvements in the mechanical construction of manuscript catalogues have contributed to popularize them, and many

libraries use the card, sheaf and other systems which allow constant and infinite intercalation coupled with economy and ease in making additions.

The idea of using separate slips or cards for cataloguing books, in order to obtain complete powers of arrangement and revision is not new, having been applied during the French revolutionary period to the cataloguing of libraries. More recently the system has been applied to various commercial purposes, such as book- keeping by what is known as the ” loose-leaf ledger,” and in this way greater public attention has been directed to the possibilities of adjustable methods both in libraries and for business. The card system is perhaps the most generally used at present, but many improvements in the adjustable binders, called by librarians the ” sheaf system,” will probably result in this latter form becoming a serious rival. The card method consists of a series of cards in alphabetical or other order kept on edge in trays or drawers, to which projecting guides are added in order to facilitate reference. Entries are usually made on one side of the card, and one card serves for a single entry. The sheaf method provides for slips of an uniform size being kept in book form in volumes capable of being opened by means of a screw or other fastening, for the purpose of adding or withdrawing slips. In addition to the advantage of being in book-form the sheaf system allows both sides of a slip to be used, while in many cases from two to twelve entries may be made on one slip. This is a great economy and leads to considerable saving of space. A great advantage resulting from the use of an adjustable manuscript catalogue, in whatever form adopted, is the simplicity with which it can be kept up-to-date. This is an advantage which in the view of many librarians outweighs the undoubted valuable qualities of comparative safety and multiplication of copies possessed by the printed form. There are many different forms of both card and sheaf systems, and practically every library now uses one or other of them for cataloguing or indexing purposes.

One other modification in connexion with the complete printed catalogue has been tried with success, and seems worthy of brief mention. After a complete manuscript catalogue has been provided in sheaf form, a select or eclectic catalogue is printed, comprising all the most important books in the library and those that represent special

subjects. This, when supple- mented by a printed list or bulletin of additions, seems to supply every need.

The most striking tendency of the modern library movement is the great increase in the freedom allowed to readers both in reference and lending departments. Although access to the shelves was quite a common feature in the older subscription libraries, and in state libraries like the British Museum and Patent Office, it is only within comparatively recent years that lending library borrowers were granted a similar privilege. Most municipal reference libraries grant access to a large or small collection of books, and at Cambridge, Birmingham and elsewhere in the United Kingdom, the practice is of long standing. So also in the United States, practically every library has its open shelf collection. On the continent of Europe, however, this method is not at all general, and books are guarded with a jealousy which in many cases must militate against their utility. The first ” safe-guarded ” open access municipal lending library was opened at Clerkenwell (now Finsbury), London, in 1893, and since then over one hundred cities and districts of all sizes in Britain have adopted the system. The British municipal libraries differ considerably from those of the United States in the safeguards against abuse which are employed, and the result is that their losses are insignificant, whilst in America they are sometimes enormous. Pawtucket and Cleveland in America were pioneers to some extent of the open shelf system for lending libraries, but the methods employed had little resemblance to the safe-guarded system of British libraries. The main features of the British plan are: exact classification; class, shelf and book guiding; the provision of automatic locking wickets to regulate the entrance and exit of borrowers, and the- rule that borrowers must be registered before they can

obtain admission. This last rule is not always current in America, and in consequence abuses are liable to take place. The great majority of British and American libraries, whether allowing open access or not, use cards for charging or registering books loaned to borrowers. In the United Kingdom a consider- able number of places still use indicators for this purpose, although this mechanical method is gradually being restricted to fiction, save in very small places.

Other activities of modern libraries which are common to both Britain and America are courses of lectures, book exhibitions, work with children, provision of books for the blind and for foreign residents, travelling libraries and the education of library assistants. In many of the recent buildings, especially in those erected from the gifts of Mr Andrew Carnegie, special rooms for lectures and exhibi- tions and

children are provided. Courses of lectures in connexion with the Liverpool and Manchester public libraries date from i860, but during the years 1900-1910 there was a very great extension of this work. As a rule these courses are intended to direct attention to the literature of the subjects treated, as represented in the libraries, and in this way a certain amount of mutual advantage is secured. In some districts the libraries work in association with the education authorities, and thus it is rendered possible to keep schools supplied with books, over which the teachers are able to exercise supervision. This connexion between libraries and schools is much less common in the United Kingdom than in the British colonies and the United States, where the libraries are regarded as part of the national system of education. Excellent work has been accom- plished within recent years by the Library Association in the training' of librarians, and it is usual for about 300 candidates to come forward annually for examination in literary history, bibliography, classifica- tion, cataloguing, library history and library routine for which subjects certificates and diplomas are awarded. The profession of municipal librarian is not by any means remunerative as compared with employment in teaching or in the Civil Service, and until the library rate is increased there is little hope of improvement.

The usefulness of public libraries has been greatly increased by the work of the Library Association, founded in 1877, during the first International Library Conference held in London in October 1877. A charter of incorporation was granted to the association in 1898. It holds monthly and annual meetings, publishes a journal, conducts examinations, issues certificates, holds classes for instruction, and has greatly helped to improve the public library law. The Library Assistants Association (1895) publishes a journal. A second International Library Conference was held at London in 1897, and a third at Brussels in 1910. Library associations have been started in most of the countries of Europe, and the American Library Association, the largest and most important in existence, was established in 1876. These associations are giving substantial aid in the development and improvement of library methods and the status of librarians, and it is certain that their influence will in time produce a more scientific and valuable type of library than at present generally exists.

British Colonies and India.

The majority of the British Colonies and Dependencies have permissive library laws on lines very similar to those in force in the mother country. There are, however, several points of difference which are worth mention. The rate limit is not so strict in every case,

and an effort is made to bring the libraries into closer relations with the educational machinery of each colony. There is, for example, no rate limit in Tasmania; and South Australia may raise a library rate equivalent to 3d. in the £, although, in both cases, owing to the absence of large towns, the legislation existing has not been adopted. In Africa, Australia and Canada the governments make grants to public libraries up to a certain amount, on condition that the reading-rooms are open to the public, and some of the legislatures are even in closer touch with the libraries. The Canadian and Australian libraries are administered more or less on American lines, whilst those of South Africa, India, &c, are managed on the plan followed in England.

Africa. There are several important libraries in South Africa, and many small town libraries which used to receive a government grant equal to the subscriptions of the members, but in no case did such grants exceed £150 for any one library in one year. These grants fluctuate considerably owing to the changes and temper of successive governments, and since the last war they have been considerably reduced everywhere. One of the oldest libraries is the South African Public Library at Cape Town established in 1818, which enjoys the copyright-privilege of

receiving a free copy of every publication issued in Cape Colony. This library contains the great collection of colonial books bequeathed by Sir George Grey. The libraries of the various legislatures are perhaps the best supported and most important, but mention should be made of the public libraries of Port Elizabeth, Cape Colony, which published an excellent catalogue, ; and the public libraries at Kimberley; Durban, Natal; Bloemfon- tein, Orange River Colony; Bulawayo, Rhodesia; Johannesburg, Transvaal; and the public and university libraries at Pretoria. None of the libraries of North Africa are specially notable, although there are considerable collections at Cairo and Algiers. Australasia.

All the public libraries, mechanics' institutes, schools of arts and similar institutes receive aid from the government, either in the form of grants of money or boxes of books sent from some centre. The public library of New South Wales, Sydney (1869), which includes the Mitchell Library of over 50,060 vols., now possesses a total of nearly

250,000 vols., and circulates books to country libraries, lighthouses and teachers' associations to the number of about 20,000 vols, per annum. The public library of Victoria, Melbourne (1853), with about 220,000 vols., also sends books to 443 country libraries of various kinds, which among them possess 750,000 vols., and circulate annually con- siderably over 2\ million vols. The university library at Mel- bourne (1855) has over 20,000 vols., and the libraries connected with the parliament and various learned societies are important. The public library of South Australia, Adelaide, has about 75,000 vols., and is the centre for the distribution of books to the institutes throughout the colony. These institutes possess over 325,000 vols. There is a good public library at Brisbane, Queensland, and there are a number of state-aided schools of arts with libraries attached. The Library of Parliament in Brisbane possesses over 40,000, and the Rockhampton School of Arts has 10,000 vols. Western Australia has a public library at Perth, which was established in 1887, and the small town institutes are assisted as in the other colonies.

Tasmania has several good libraries in the larger towns, but none of them had in 1910 taken advantage of the act passed in 1S67 which gives municipalities practically unlimited powers and means as far as the establishment and maintenance of public libraries are concerned. At Hobart the Tasmanian Public Library (1849) is one of the most important, with 25,000 vols.

New Zealand is well equipped with public libraries established under acts dating from 1869 to 1877, as well as subscription, college and government libraries. At Auckland the Free Public Library (1880) has 50,000 vols., including Sir George Grey's Australasian collection; ' the Canterbury Public Library, Christchurch (1874), has 40,000 vols.; the University of Otago Library, Dunedin (1872), 10,000 vols.; and the public library at Wellington (1893) contains 20,000 vols.

India and the East.

Apart from government and royal libraries, there are many college, society, subscription and others, both English and oriental. It is impossible to do more than name a few of the most notable. Lists of many of the libraries in private hands including descriptions of their MS. contents have been issued by the Indian government. At Calcutta the Sanskrit college has 1652 printed Sanskrit volumes and 2769 Sanskrit MSS., some as old as the 14th century; there is also a large collection of Jain MSS. The Arabic library attached to the Arabic department of the Madrasa was founded about 1781, and now includes 731 printed volumes, 143 original MSS. and 151 copies; the

English library of the Anglo-Persian department dates from 1854, and extends to 3254 vols. The library of the Asiatic Society of Bengal was founded in 1784, and now contains r 5,000 printed vols., chiefly on eastern and philological subjects, with a valuable collection of 9500 Arabic and Persian MSS.

At Bombay the library of the Bombay branch of the Royal Asiatic Society, established in 1804 as the Literary Society of Bengal, is now an excellent general and oriental collection of

75,000 printed vols, and MSS., described in printed catalogues. The Moolla Feroze Library was bequeathed for public use by Moolla Feroze, head priest of the Parsis of the Kudmi sect in 1831, and consisted chiefly of MSS., in Arabic and Persian on history, philosophy and astronomy; some additions of English and Gujarati works have been made, as well as of European books on Zoroastrianism. The Native General Library (1845) has 11,000 vols., and there are libraries attached to Elphinstone College and the university of Bombay.

The library of Tippoo Sahib, consisting of 2000 MSS., fell into the hands of the British, and a descriptive catalogue of them by Charles Stewart was published at Cambridge in 1809, 4to. A few were presented to public libraries in England, but the majority were placed in the college of Fort William, then recently established. The first volume, containing Persian and Hindustani poetry, of the Catalogue of the Libraries of the King of Oudh, by A. Sprenger, was published at Calcutta in 1854. The compiler shortly afterwards left the Indian service, and no measures were taken to complete the work. On the annexation of the kingdom in 1856 the ex-king is believed to have taken some of the most valuable MSS. to Calcutta, but the largest portion was left behind at Lucknow. During the siege the books were used to block up windows, &c, and those which were not destroyed were abandoned and plundered by the soldiers. Many were burnt for fuel; a few, however, were rescued and sold by auction, and of these some were purchased for the Asiatic Society of Bengal.

Perhaps the most remarkable library in India is that of the raja of Tanjore, which dates from the end of the 16th or beginning of the 17th century, when Tanjore was under the rule of the Telugu Naiks, who collected Sanskrit MSS. written in the Telugu character. In the 18th century the Mahrattas conquered the country, and since that date the library increased but slowly. By far the greater portion of the store was acquired by Sharabhojl Raja during a visit to Benares in 1820-1830; his successor Sivaji added a few, but of inferior value. There are now about 18,000 MSS. written in Devanagari, Nandinagari,

Telugu, Kannada, Granthi, Malayalam, Bengali, Panjabl or Kashmiri, and Uriya; 8000 are on palm leaves. Dr BurnelPs printed catalogue describes 12,375 articles.

The Royal Asiatic Society has branches with libraries attached in many of the large cities of India, the Straits Settlements, Ceylon, China, Japan, &c. At Rangoon in Burma there are several good libraries. The Raffles Library at Singapore was established as a proprietary institution in 1844, taken over by the government in 1874, and given legal status by an ordinance passed in 1878. It now contains about 35,000 vols, in general literature, but books relating to the Malayan peninsula and archipelago have been made a special feature, and since the acquisition of the collection of J. R. Logan in 1879 the library has become remarkably rich in this department. In Ceylon there is the Museum Library at Colombo (1877), which is main- tained by the government, and there are many subscription and a few oriental libraries.

Canada.

The public libraries of the various provinces of Canada have grown rapidly in importance and activity, and, assisted as they are by government and municipal grants, they promise to rival those of the United States in generous equipment. Most of the library work in Canada is on the same lines as that of the United States, and there are no special points of difference worth mention. The library laws of the Dominion are embodied in a series of acts dating from 1854, by which much the same powers are conferred on local authorities as by the legislation of Britain and the United States. An important feature of the Canadian library law is the close association maintained between schools and libraries, and in some provinces the school libraries are established by the school and not the library laws. There is also an important extension of libraries to the rural districts, so that in every direction lull provision is being made for the I after-school education and recreation of the people.

The province of Ontario has a very large and widespread library system of which full particulars are given in the annual reports of the minister of education. The library portion has been printed separ-

ately, and with its illustrations and special articles form's quite a handbook of Canadian library practice. There are now 413 public libraries described as free and not free, and of these 131 free and 234 not free reported in 1909. The free libraries possessed 775,976 vols, and issued 2,421,049 vols. The not free libraries, most of which receive legislative or municipal grants, possessed 502,879 vols, and issued 650,826 vols. This makes a grand total of 1,278,855 vols, in municipal and assisted subscription libraries without counting the university and other libraries in the province. The most important other libraries in Ontario are — Queen's University, Kingston (1841), 40.000 vols. ; Library of Parliament, Ottawa, about 250,006 vols. ; university of Ottawa, 35,000 vols.; Legislative Library of Ontario, Toronto, about 100,000 vols.; university of Toronto (1856), 50,000 vols. The Public (municipal) Library of Toronto has now over 152,000 vols.

In the province of Quebec, in addition to the state-aided libraries there are several large and important libraries, among which may be mentioned the Fraser Institute, Montreal, 40,000 vols. ; McGill University, Montreal (1855), 125,000 vols., comprising many important collections; the Seminary of St Sulpicc, Montreal, about 80,000 vols.; Laval University, Quebec, 125,000 vols.; and the library of the Legislature (1792), about 100,000 vols. In the western provinces several large public, government and college libraries have been formed, but none of them are as old and important as those in the eastern provinces.

In Nova Scotia there are now 279 cases of books circulating among the school libraries, containing about 40,000 vols., and in addition 2800 vols, were stocked for the use of rural school libraries. The rural school libraries of Nova Scotia are regulated by a special law, and a little handbook has been printed, somewhat similar to that published bv the French educational authorities for the communale libraries. The Legislative Library at Halifax contains nearly 35,000 vols., and the Dalhousie University (1868), in the same town, contains about 20,000 vols. The Legislative Library of Prince Edward Island, Charlottetovvn, containing the Dodd Library, issues books for home use. The school law of New Brunswick provides for grants being made in aid of school libraries by the Board of Education equal to one half the amount raised by a district, and a series of rules has been published. The only other British libraries in America of much consequence are those in the West Indian Islands. The Institute of Jamaica, Kingston (1879) has about 15,000 vols.; the Trinidad Public Library (1841), recently revised and catalogued, 23,000 vols.; and there are a few small legislative and college libraries in addition.

Authorities. — For the history of British libraries see H. B. Adams, Public Libraries and Popular Education (Albany, N.Y., 1900) ; I. D. Brown, Guide to Librarianship (1909); G. F. Chambers and H. \V. Fovargue, The Law relating to Public Libraries (4th ed., 1899) ; J. W. Clark, The Care of Books (1909); E. Edwards, Memoirs of Libraries (1859); T. Greenwood, Edward Edwards (1901) and Public Libraries (4th ed., revised, 1891); J. J. Ogle, The Free Library (1897) ; Maurice Pellisson, Les Biblioth'eques populaires d, 1'etranger et en France (Paris, 1906); R. A. Rye, The Libraries of London (1910); E. A. Savage, The Story of Libraries and Book-Collectors (1909).

For library economy consult J. D. Brown, Manual of Library Economy (1907); F. J. Burgoyne, Library Construction, &c. (1897); A. L. Champneys, Public Libraries: a Treatise on their Design (1907) ; J. C. Dana, A Library Primer (Chicago, 1910); Arnim Graesel, Handbuch der Biblioihekslehre (Leipzig, 1902); Albert Maire, Manuel pratique du bibliothicaire (Paris, 1896). On the subject of classifica- tion consult J. D. Brown, Manual of Library Classification (1898) and Subject Classification (1906); C. A. Cutter, Expansive Classification (1891-1893) (not yet completed); M. Dewey, Decimal Classification (6th ed., 1899), and Inslitut International de Bibliographie : Classifica- tion bibliographique decimate (Brussels, 1905); E. C. Richardson, Classification: Theoretical and Practical (1901).

Various methods of cataloguing books are treated in Cataloguing Rules, author and title entries, compiled by the Committees of the American Library Association and the Library Association (1908); C. A. Cutter, Rules for a Printed Dictionary Catalogue (Washington, 1904); M. Dewey, Rules for Author and Classed Catalogues (1892); T. Hitchler, Cataloguing for Small Libraries (Boston, 1905); K. A. Linderfelt, Eclectic Card Catalog Rules (Boston, 1890); J. H. Quinn, Manual of Library Cataloguing (1899); E. A. Savage, Manual of Descriptive Annotation (1906); J. D. Stewart, The. Sheaf Catalogue (1909); H. B. Wheatley, How to Catalogue a Library (1889).

United States of America.

The libraries of the United States are remarkable Tor their number, size, variety, liberal endowment and good administra- tion. The total number of libraries with over 1000 vols, was 5383 in 1900, including those attached to schools and institutions, and in 1910 there were probably at least 10,000 libraries having 1000 vols, and over. It is impossible to do more than glance at the principal libraries and activities, where the field is so

immense, and a brief sketch of some of the chief federal, state, university, endowed and municipal libraries will therefore be presented.

The Library of Congress was first established in 1800 at Washington, and was burned together with the Capitol by the British army in 1814. President Jefferson's books were purchased to form the foundation of a new libraries. library, which continued to increase slowly until 1851, when all but 20,000 vols, were destroyed by fire. From this time the collection has grown rapidly, and now consists of about 1,800,000 vols. In 1866 the library of the Smithsonian Institution, consisting of 40,000 vols., chiefly in natural science, was transferred to the Library of Congress. The library is specially well provided in history, jurisprudence, the political sciences and Americana. Since 1832 the law collections have been constituted into a special department. This is the national library. In 1870 the registry of copyrights was transferred to it under the charge of the librarian of Congress, and two copies of every publication which claims copyright are required to be deposited. Cards for these are now printed and copies are sold to other libraries for an annual subscription fixed according to the number taken. The building in which the library is now housed was opened in 1897. It covers 35 acres of ground, contains 10,000,000 cub. ft. of space, and has possible accom- modation for over 4 million vols. Its cost was $6,500,000, or including the land, $7,000,000. It is the largest, most ornate and most costly building in the world yet erected for library purposes. Within recent years the appropriation has been largely increased, and the bibliographical department has been able to publish many valuable books on special subjects. The A.L.A. Catalog (1904) and A.L.A. Portrait Index (1906), may be mentioned as of especial value. The classification of the library is being gradually completed, and in every respect this is the most active government library in existence.

Other important federal libraries are those attached to the following departments at Washington: Bureau of Education (1868); Geological Survey (1882); House of Representatives; Patent Office (1836); Senate (1868); Surgeon General's Office (1870), with an elaborate analytical printed catalogue of world- wide fame.

Although the state libraries of Pennsylvania and New Hamp- shire are known to have been established as early as 1777, it was not until some time after the revolution that any

State

general tendency was shown to form official libraries libraries. in connexion with the state system. It is especially within the last thirty years that the number of these libraries has so increased that now every state and territory possesses a collection of books and documents for official and public pur- poses. These collections depend for their increase upon annual appropriations by the several states, and upon a systematic exchange of the official publications of the general government and of the several states and territories. The largest is that of the state of New York at Albany, which contains nearly 500,000 vols., and is composed of a general and a law library. Printed and MS. card catalogues have been issued. The state libraries are libraries of reference, and only members of the official classes are allowed to borrow books, although any well-behaved person is admitted to read in the libraries.

The earliest libraries formed were in connexion with educa- tional institutions, and the oldest is that of Harvard (1638). It was destroyed by fire in 1764, but active steps were at once taken for its restoration. From that time to the present, private donations have been the great nbraries. y resource of the library. In 1840 the collection was removed to Gore Hall, erected for the purpose with a noble be- quest from Christopher Gore (1758-1829), formerly governor of Massachusetts. There are also ten special libraries connected with the different departments of the university. The total numbers of vols, in all these collections is over 800,000. There is a MS. card-catalogue in two parts, by authors and subjects, which is accessible to the readers. The only condition of ad- mission to use the books in Gore Hall is respectability; but only

members of the university and privileged persons may borrow books. The library of Yale College, New Haven, was founded in 1701, but grew so slowly that, even with the 1000 vols, received from Bishop Berkeley in 1733, it had only increased to 4000 vols, in 1766, and some of these were lost in the revolutionary war. During the 19th-century the collection grew more speedily, and now the library numbers over 550,000 vols.

Other important university and college libraries are Amherst College, Mass. (1821), 93,000 vols.; Brown University, R.I. (1767), 156,000

vols.; Columbia University, N.Y. (1763), 430,000 vols.; Cornell University, N.Y. (1868), 355,000 vols. ; Dartmouth College, N.H. (1769), 106,000 vols.; Johns Hopkins University, Baltimore (1876), 220,000 vols.; Lehigh University, Pa. (1877), 150,000 vols.; Leland Stanford University, Cal. (1891), 113,000 vols.; Princeton University, N.J. (1746), 260,000 vols.; University of California (1868), 240,000 vols.; University of Chicago, 111. (1892), 480,000 vols.; University of Michigan (1837), 252,000 vols.; University of Pennsylvania (1749), 285,000 vols. There are numerous other college libraries, several of them even larger than some of those named above.

The establishment of proprietary or subscription libraries runs back into the first half of the 18th century, and is connected Subscrip- with the name of Benjamin Franklin. It was at thta and Philadelphia, in the year 1731, that he set on foot Endowed w hat he called ” his first project of a public nature, that Libraries. ˆ QJ . a subscription library. . . . The institution soon manifested its ability, was imitated by other towns and in other provinces.” The Library Company of Philadelphia was soon regularly incorporated, and gradually drew to itself other collections of books, including the Loganian Library, which was vested in the company by the state legislature in 1792 in trust for public use. Hence the collection combines the character of a public and of a proprietary library, being freely open for reference purposes, while the books circulate only among the subscribing members. It numbers at present 226,000 vols., of which 11,000 belong to the Loganian Library, and may be freely lent. In 1869 Dr James Rush left a bequest of over one million dollars for the purpose of erecting a building to be called the Ridgeway branch of the library. The building is very handsome, and has been very highly spoken of as a library structure. Philadelphia has another large proprietary library — that of the Mercantile Library Company, which was established in 1821. It possesses 200,000 vols., and its members have always enjoyed direct access to the shelves. The library of the Boston Athenaeum was established in 1807, and numbers 235,000 vols. It has published an admirable dictionary-cata- logue. The collection is especially rich in art and in history, and possesses a part of the library of George Washington. The Mercantile Library Association of New York, which was founded in 1820, has over 240,000 vols. New York possesses two other large proprietary libraries, one of which claims to have been formed as early as 1700 as the ” public ” library of New York. It was organized as the New York Society Library in 1754, and has been especially the library of the old Knickerbocker families and their descendants, its contents bearing witness to its history. It contains about 100,000 vols. The Apprentices’ Library (1820) has about

100,000 vols., and makes a special feature of works on trades and useful arts.

The Astor Library in New York was founded by a bequest of John Jacob Astor, whose example was followed successively by his son and grandson. The library was opened to the public in 1854, and consists of a careful selection of the most valuable books upon all subjects. It is a library of reference, for which purpose it is freely open, and books are not lent out. It is ” a working library for studious persons.” The Lenox Library was established by James Lenox in 1870, when a body of trustees was incorporated by an act of the legislature. In addition to the funds intended for the library building and endowment, amounting to $1,247,000, the private collection of books which Mr Lenox had long been accumulating is extremely valuable. Though it does not rank high in point of mere numbers, it is exceedingly rich in early books on America, in Bibles, in Shake- speriana and in Elizabethan poetry. Both those libraries are now merged in the New York Public Library. The Peabody

Institute at Baltimore was established by George Peabody in 1857, and contains a reference library open to all comers. The institute has an endowment of $1,000,000, which, however, has to support, besides the library, a conservatoire of music, an art gallery, and courses of popular lectures. It has a very fine printed dictionary catalogue and now contains nearly 200,000 vols. In the same city is the Enoch Pratt Free Library (1882) with 257,000 vols. In the city of Chicago are two very im- portant endowed libraries, the Newberry Library (1887) with over 200,000 vols., and the John Crerar Library (1894), with 235,000 vols. Both of these are reference libraries of great value, and the John Crerar Library specializes in science, for which purpose its founder left $3,000,000.

It will be sufficient to name a few of the other endowed libraries to give an idea of the large number of donors who have given money to libraries. Silas Brohson (Waterbury), Annie T. Howard (New Orleans), Joshua Bates (Boston), Charles E. Forbes (Northampton, Mass.), Mortimer F. Reynolds (Rochester, N.Y.), Leonard Case (Cleveland), I. Osterhout (Wilkes- Barrij, Pa.), and above all Andrew Carnegie, whose library benefactions exceed $53,000,000.

It remains to mention another group of proprietary and society libraries.

Since the organization Of the government in 1789, no less than one hundred and sixty historical societies have been formed in the United

States, most of which still continue to exist. Many of them have formed considerable libraries, and possess extensive and valuable manuscript collections. The oldest of them is the Massachusetts Historical Society, which dates from 1791.

The earliest of the scientific societies, the American Philosophical Society (1743), has 73,000 vols. The most extensive collection is that of the Academy of Natural Sciences of Philadelphia, which consists of 80,000 vols, and pamphlets, For information as to the numerous professional libraries of the United States — theological, legal and medical—the reader may be referred to the authorities quoted below.

In no country has the movement for the development of municipal libraries made such progress as in the United States; these institutions called free or public as the case may be are distinguished for their work, enterprise and the Libraries. liberality with which they are supported. They are established under laws passed by the different states, the first to pass such an enactment being Massachusetts, which in 1848- empowered the city of Boston to establish a free public library. This was subsequently extended to the whole state in 185 1. Other states followed, all with more or less variation in the provisions, till practically every state in the Union now has a body of library laws. In general the American library law is much on the same lines as the English. In most states the acts are permissive. In New Hampshire aid is granted by the state to any library for which a town- ship contracts to make a definite annual appropriation. A limit is imposed in most states on the library tax which may be levied, although there are some, like Massachusetts and New Hampshire, which fix no limit. In every American town the amount derived from the library tax' usually exceeds by double or more the same rate raised in Britain in towns of similar size. For example, East Orange, N.J., with a population of 35,000, expends £2400, while Dumfries in Scotland, with 23,000 pop. expends £500. Cincinnati, 345,000 pop., expenditure £26,000; Islington (London), 350,000 pop., expenditure £8200, is another example. In the smaller towns the difference is not so marked, but generally the average American municipal library income is considerably in excess of the British one. Many American municipal libraries have also endowments which add to their incomes.

In one respect the American libraries differ from those of the United Kingdom. They are usually managed by a small com- mittee or body of trustees, about five or more in American number, who administer the library independent of Library the city council. This is akin to the practice in ■***»'■*• Scotland, although there, the committees are larger. s ra oa ' In addition to' the legislation authorizing town

libraries to be established, thirty-two states have formed state library com- missions. These are small bodies of three or five trained persons appointed by the different states which, acting on behalf of the state, encourage iheformation of local libraries, particularly in towns and villages, and in many cases have authority to aid

their establishment by the grant out of the state funds of a certain sum (usually $100) towards the purchase of books,. upon the appropriation of a similar sum by the local authorities. These commissions are prepared to aid further with select lists of desirable books, and with suggestions or advice in the problems of construction and maintenance. Such, commissions are in existence in Alabama, California, Colorado, Connecticut, Delaware, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, Tennessee, Texas, Utah, Vermont, Washington and Wisconsin.

The reports and other documents issued by some of these commissioners axe very interesting and valuable, especially as regards the light they throw on the working' of the travelling libraries in country districts. These to .some extent are a revival of the " itinerating " library idea of Samuel Brown of Haddington in Scotland, who from 1 817 to 1836 carried on a system of travelling subscription libraries in that country. At the time of his death there were 3850 vols, in 47 libraries. The American travelling libraries, often under state supervision, are well organized and numerous, arid the books are circu- lated free. New York was the pioneer in this movement which now extends to most of the states which have established library commissions. There are also -town travelling libraries and deposit stations in addition to : branches, so that every effort is made to, bring people in outlying districts into touch with books. ■]:."

The municipal libraries of the United States work in con- junction with the schools, and it 19 generally considered that they are part of the educational machinery of the country. In the case of New York the state libraries have been put under the control of the university of the state of New York, which also inaugurated the travelling' libraries. Work with the schools and children generally is more cultivated in the

libraries of the United States than elsewhere. In some cases. the libraries send collections of books to the schools; in others provision is made for children's reading-rooms and lending departments at the library buildings. At Cleveland (Ohio), Pittsburg (Pa.), New York and many other places, elaborate arrangements are in force for the convenience and amusement of children.. ..There is a special school, the Carnegie Library training school for children's librarians, at Pittsburg, and within recent years the instruction has included the art of telling stories to children at the libraries. This " storyrhour " idea, has been the cause of considerable discussion in the United States, librarians and teachers being divided in opinion as to the value of. the service, The chief factors in children's work in American libraries, often overlooked by critics, are the number of non-English reading adults and the large number of childfenof foreign, origin. The adults do not use the libraries to any large extent, but the children, who learn English at the schools, are brought into close touch with the juvenile departments of the libraries. In this way many libraries are obliged to undertake '; special work for children, and as a rule it is performed in a sane, practical and economical manner. The preponderance of womenlibrarians and their natural sentimental regard for children has tended to make this work loom rather largely in some quarters, but with these exceptions the activity on behalf of children is justified on many grounds. But above all, it- is manifest that a rapidly growing nation, finding homes for thousands of foreigners and their children annually, must use every means. Of rapidly educating their new citizens, and the public library is one of the most efficient and ready ways of accomplishing this great national object.

With regard to methods, the American libraries are working on much the same plan as those of the United Kingdom. They allow access to the shelves more universally, and there is much more standardization in- classification and other internal matters. The provision of books is more profuse, although: there; is, on the whole, more reading, done in. the United Kingdom. The largest municipal library system in America, and also in the world, is

that .of New York City, which, after struggling with. a series of Free Circulating Libraries, blossomed out in 1895: into the series of combinations, which resulted in the present great establishment. In that year, the Astor and Lenox libraries (see above) were taken over by the city, and in addition, $2,000,000 was given by one of the heirs of Mr S. J. Tilden, who had be- queathed about $4,000,000 for library purposes in New York but whose will had been upset in the law courts. In 1,901 Mr Andrew Carnegie gave about £1,500,000 for the

purpose of providing 65 branches, and these are now nearly all erected. A very fine central library building has been erected, and when the organization is completed there will be no system of municipal libraries to equal that of New York. It possesses about 1,400,000 vols, in the consolidated libraries. Brooklyn, although forming part of Greater New York, has an inde- pendent library system,, and possesses about 560,0010. vols. distributed among 26 branches and including the old Brooklyn Library which has been absorbed in the municipal library system. At Boston (Mass.) is one of the. most renowned public libraries in the United States,, and also the oldest established by act of legislature. It was first opened to the public, in 1854, and is now housed in a very magnificently decorated building which was completed in 1895. The centrabdib*a*y contains many fine special collections, and there are 28 branch and numerous , school libraries in connexion. It; possesses about 1, 000,000′ vols, altogetherˆ its annual circulation js about 1,500,000 yoIs., and its ainn.ua! expenditure is nearly £70,000. ‘ Other notable municipal libraries are those of Philadelphia (1&91), Chicago (1872); Los Angeles (Cal.), 187.2; Indianapolis (186,8), Detroit (1865), Minneapolis (1885), St Louis (1865), Newark, N.J. (1889), Cincinnati (1856), Cleveland (1869), Allegheny (1890), Pittsburg (1895), Providence’, R.I. (r878), Milwaukeeˆ ‘(1875), Washington, D.C. (1898), Worcester, Mass. (1859), Buffalo (1837,). Authorities. — The Annual Library Index (New York, 1908) — contains a select list of libraries in the United States; Arthur E. Bostwick, The American Public Library, illust. (New York, igiojˆ — the most comprehensive general book; Bureau of Education, Statistics of Public Libraries in the United States and Canada (1893) — this has been succeeded by a list of ” Public, Society and School Libraries,” reprinted at irregular intervals from the Report of the Commissioner of Education and giving a list of libraries containing over 5000 vols, with various other particulars; Clegg, International Directory of Booksellers (1910) and earlier issues — contains a list of American libraries with brief particulars; John C. Dana, A. Library Primer (Chicago, 1910) — the standard manual of American library practice; Directory of Libraries in the United States and Canada (6th ed.; Minneapolis, 1908)ˆ-ˆ brief list of 4500 libraries-, with indica- tion of the annual income of each ; Wm. I. Fletcher, Public Libraries in America (2nd ed., Boston, 1899), illust.; T. W. Koch, Portfolio of Carnegie Libraries (1908) ; Cornelia Marvin, Small Library Buildings (Boston, 1908); A. R. Spofford, A Book for all Readers. . . the Formation of Public and Private Libraries’iicjos).

France.

French libraries (other than those in private hands) belong either to

the state, to the. departments, to the communes or to learned societies, educational establishments and other pub.h? institutions; the libraries of judicial or administrative bodies are not considered to be owned by them, but to be state property. Besides the unrivalled library accommodation of the capital, France possesses a remarkable assemblage of provincial libraries. The comniunal and school libraries also form striking features of the French free library system. Taking as a basis for compari- son the Tableau statistique des bibliotheques publiques (1857), there were at that date 340 departmental libraries with a total of 3,734,260 vols., and 44,436 MSS. In 1908 the number of volumes in all the public libraries; communal, university, learned societies, educational and departmental, was more than 20,060,148 vols., 93,986 MSS. and 15,530 incunabula, j Paris alone now possesses over 10,570,000 printed vols., 147,543 MSS,, 5000 incunabula, 609,439 maps and plans, 2,000,000 prints (designs and reproductions).

The Bibliotheque Nationale (one of the most extensive libraries in the world) has had an advantage over others in the : length of time during which its contents have been accumu-: ˆ

Iflting, and in the great zeal shown for it by several ; kings and other eminent ; mep. Enthusiastic writers find the

original of this library in the MS. collections of Charlemagne and Charles the Bald, but these were dispersed in course of time, and the few precious relics of them which the national library now possesses have been acquired at a much later date. Of the library which St Louis formed in the 13th. century (in imitation of what he had seen in the East) nothing has fallen into the possession of the Bibliotheque Nationale, but much has remained of the royal collections made by kings of the later dynasties. The real foundation of the institution (formerly known as the Bibliotheque du Roi) may be said to date from the reign of King John, the Black Prince’s captive, who had a considerable taste for books, and bequeathed his ” royal library ” of MSS. to his successor Charles V. Charles V. organized his library in a very effective manner, removing it from the Palais de la Cite to the Louvre, where it was arranged on desks in a large hall of three storeys, and placed under the management of the first librarian and

cataloguer, Claude Mallet, the king's valet-de-chambre. His catalogue was a mere shelf-list, entitled Inventaire des Litres du Roy nostre Seigneur estans au chastel du Louvre; it is still extant, as well as the further inventories made by Jean Blanchet in 1380, and by Jean le Begue in 1411 and 1424. Charles V. was very liberal in his patronage of literature, and many of the early monuments of the French language are due to his having employed Nicholas Oresme, Raoul de Presle and other' scholars to make translations from ancient texts. Charles VI. added some hundreds of MSS. to the royal library, which, however, was sold to the regent, duke of Bedford, after a valuation had been established by the inventory of 1424. "The regent transferred it to England, and it was finally dispersed at his death in 1435. Charles VII. and Louis XI, did little to repair the loss of the precious Louvre library, but the news of the invention of printing served as a stimulus to the creation of another one, of which the first librarian was Laurent Paulmier. The famous miniaturist, Jean Foucquet of Tours, wa,s named the king's enlumineur, and although Louis XI. neglected to avail himgeˆf of many. precious opportunities that occurred in his reign, still the new library developed gradually with the help of confiscation. , Charles VIII. enriched it with many fine MSS. executed by his order, and also with most of the books that had formed the library of the kings of Aragon, seized by him at Naples. Louis XII., oh coming to the throne, incorporated the Bibliotheque du Roi with the fine Orleans library at Blois, which he had inherited. The Blois. library, thus augmented, and farther enriched by plunder from the palaces of Pavia, and by the purchase of the famous Gruthiiyse collection, was described at the time as one of the four marvels of France. Francis I. removed it to Fontaine- bleau in 1534, enlarged by the addition of his private library. He was the first to set the fashion of fine artistic bindings, which was still more cultivated by Henry II., and which has never died out in France. During the librarianship of Amyot (the translator of Plutarch) the library was transferred from Fontaine- bleau to Paris, not without the loss of several books coveted by powerful thieves. Henry IV. removed it to the College de Clermont, but in 1604 another change was made, and in 1622 it was Installed in the Rue de la Harpe. Under the librarianship of J. A. de Thou it acquired the library of Catherine de' Medici, and the glorious Bible of Charles the Bald. In 1617 a decree was passed that two copies of every new publication should be deposited in the library, but this was not rigidly enforced till Louis XIV. 's time. The first catalogue worthy of the name was finished in 1622, and contains a description of some 6000 vols., chiefly MSS. Many additions were made during LoUis XIII. 's reign, notably that of the Dupuy collection, but a new era dawned for the Bibliotheque du

Roi under the patronage of Louis XIV. The enlightened activity of Colbert, one of the greatest of, collectors, so enriched the library that it became necessary for want of space to make another removal. It was therefore in 1666 installed in the Rue Vivien (now Vivienne) not far from its present habitat. The departments of engravings and medals were now created, and before long rose to nearly equal importance with that of books. Marolles's prints, Fouc- quet's books, and many from the Mazarin library were added to

the collection, and, in short, the Bibliotheque du Roi had its future pre-eminence undoubtedly secured. Nic, Clement made a catalogue in 1684 according to an arrangement which has been followed ever since (that is, in twenty-three classes, each one designated by a letter of the alphabet), with an alphabetical index to it. After Colbert's death Louvois emulated his predecessor's labours, and employed Mabillon, Thevenot and others to procure fresh accessions from all parts of the world. A new catalogue was compiled in 1688 in 8. vols, by several distinguished scholars. The Abbe Louvois, the minister's son, became head of the library in 1691, and opened it to all students — a privilege which although soon withdrawn was afterwards restored. Towards the end of Louis XIV.'s reign it contained over 70,000 vols. Under the management of the Abbe" Bignon numerous additions were made in all departments, and the library was removed to its present home in the Rue. Richelieu. Among the more important ac- quisitions were 6000 MSS. from the private library of the Colbert family, Bishop Huet's forfeited collection, and a large number of Oriental books imported by missionaries from the farther East, and by special agents from the Levant. Between 1739 and 1753 a catalogue in n vols, was printed, which enabled the adminis- tration to. discover and to sell' its duplicates,. In Louis XVL's reign the saje of the La/ Valliere library furnished a valuable increase both iri MSS. and printed books. A few years before the Revolution broke out the latter department contained over 300,000 vols, and opuscules. The Revolution was serviceable to the library, now called the Bibliotheque , Nationale, by in- creasing it with the forfeited collections of the Smigr'Ss, as well as of the suppressed religious communities. In the midst of the difficulties of placing and cataloguing these numerous acquisitions, the name of Van Praet appears as an administrator of the first order. Napoleon increased the amount of the government grant ; and by the strict enforcement of the law concerning new publica- tions, ;ˆs well as by the acquisition of severalspecial collections, the Bibliotheque made considerable progress during hjs reign towards realizing his idea ˆhat it should be universal in character. At the beginning of last century the recorded numbers were 250,000 printed vols., 83,000 _MSS., and

1,500,000 engravings. After Napoleon's downfall the MSS. which he had transferred from Berlin; Hanover, Florence, Venice, Rome, the Hague and other places had to be returned to their proper owners. The MacCarthy sale in 1817 brought a rich store of MSS. and incunabula. From that time onwards to the present, under the enlightened administration of MM. Taschereau and Delisle and Marcel, the accessions have been very extensive.

According to the statistics for 1908 the riches of the Bibliotheque Nationale may be enumerated as follows: (1) Departement des Imprimes: more' than 3,000,000 vols.; Maps and plans, 500,000 in 28,000 vols. (2) Departement des Manuscrits: 110,000 MSS. thus divided: Greek496o, Latin 21,544, French 44,913, Oriental and miscellaneous 38,583; (3) Departement des Estampes: 1,000,000 pieces. (4) Departement des Medailles: 207,096 pieces.

Admittance to the " salte'de travail " is obtained through a card procured from the secretarial office; the "salle publique "contains 344 places for readers, who are able to' consult more than 50,000 vols, of books of reference. Great improvements have lately been intro- duced into the service. A " salle de lecture publique is free to all readers and is much used. 1 New buildings are in process of con- struction. The slip catalogue bound in Volumes dates from 1882 and gives a list of all accessions since that date; it is divided into two parts, one for the names of authors and the other for subjects. There is'not yet, as at the British Museum, an alphabetical catalogue of all the printed works and kept/up by periodical supplements, but since 1897 a Catalogue gknerai des livres imprimes has been begun. In 1909 the 38th vol. containing letters A to Delp had appeared. Some volumes are published each year, but the earlier volumes only contain a selection of the' books; this inconvenience has now been remedied. Among the other catalogues published by the Printed Book Department, the following may be mentioned: Repertoire alphabitique des livres mis a la disposition des lecteurs dans la salle de travail (1896, 8vo), Lisle des piriodiques frdncais et Strangers mis i la disposition des lecteurs (1907, 4to, autogr.), Lisle des piriodiques elrangers (new ed., 1896, 8vo) and Supplement (1902, 8vo), Bulletin des rScentes publications franchises (from 1882, 8vo),, Catalogue des dissertations el ecriis, academiques provenant des echanges avec Us universitis itrangires (from 1882, 8 vo). The other extensive cata- logues apart from those of the 1 8th cehtury are: Catalogue de I'hisloire de France (1885-1889, 4to, 11 vols.); Table des auteurs,

par P. Marchal (1895, 4to), with the following autographed supplements: Hisloire locale (1880); Histoire genialogique et biographies (1884); Mceurs et coutumes, archeologie (1885); Histoire maritime et militaire (1894); Histoire constitutionnelle (1895); Sciences mMicales (1857-1889, 3 vols., 4to); Histoire de la Grande-Bretagne (1875- 1878, autogr.); Histoire de VEspagne et du Portugal (1883, autogr.); Histoire de I'Asie (1894); Histoire de VAfrique (1895, autogr.); Histoire de VAmirique, par G. Barringer (1903-1908, autogr.); Factums et autres documents judiciaires antirieurs a 1790, par Corda et A. Trudon des Ormes (1890-1907, 8 vols., 8vo); Catalogue

finiral des incunables des bibliotheques publiques de France, par M. •ellechet et L. Polain, t. i.-iii. (1897-1909, 8vo); Livres d'heures imprimis au XV' siecle conservis dans les bibliotheques publiques de Paris, par P. Lacombe (1907, 8vo), &c. In the Geographical section there is L. Valine's Catalogue des cartes et plans relatifs & Paris et aux environs de Paris (1908, 8vo). The following should be mentioned: Bibliographie ginerale des travaux historiques et archio- logiques public's par les societis savantes de la France, par R. de Lasteyrie avec la collaboration d'E. Lefevre-Pontalis, S. Bougenot, A. Vidier, t. i.-vi. (1885-1908, 4to). The scientific division of this work (in two parts) is by Deniker. The printed catalogues and the autographed and manuscript lists of the Departement des Manu- scrits are very numerous and greatly facilitate research. For the French there are: H. Omont, Catalogue giniral des manuscrits francais (1895-1897, 9 vols. 8vo); H. Omont, Nouvelles acquisitions (continuation of the same catalogue, 1899-1900, 3 vols. 8vo) ; H. Omont, Anciens Inventaires de la Bibliotheque Nationale (1908-1909, 2 vols. 8vo) ; E. Coyecque, Inventaire de la Collection Anisson sur Vhistoire de Vimprimerieel de la librairie (1900, 2 vols. 8vo). Without repeating the catalogues mentioned in the tenth edition of the Encyclopaedia Britannica, it is yet necessary to mention the follow- ing: Catalogue de la collection Baluze; Inventaire des sceaux de la collection Clairambault; Catalogue de la collection des cinq-cents et des mttanges Colbert; Catalogue des collections Duchesne et de Briquigny; those of the Dupuy, Joly de Fleury, and Moreau collec- tions, and that of provincial history, &c. For the Greek collection the most important catalogues have been made by H. Omont, the present Keeper of the Manuscripts, and these are: Inventaire som- maire des MSS. grecs (1886-1898, 4 vols. 8vo); Catalogus codicum hagiographicorum graecorum (1896, 8vo); Facsimiles des plus anciens MSS. grecs en onciale et en minuscule du IX' au XIV' siecle (1891, fol.); as well as Description des peintures et autres ornements contenus dans les MSS. latins, par H. Bordier (1883,

4to). The lists of the Latin MSS. are: Inventaire des manuscrits latins el nouvelles acquisitions jusqu'en 1874 (1863-1874, 7 pts. 8vo) and Manuscrits latins et francais ajoulis ouxfonds des nouvelles acquisitions 1875-1881 (1891, 2 vols. 8vo), by M. Delisle; M. Omont published Nouvelles Acquisitions du departement des manuscrits (1892-1907, 8 pts. 8vo), and B. Haureau, Notices et extrails de quelques manuscrits latins (1 890-1 893, 6 vols. 8vo). The principal modern catalogues of the oriental collection are: B. de Slane, Catalogue des MSS. arabes, avec supplement (1883-1895, 4to); E. Blochet, Catalogue des MSS. arabes, persons, et lures de la collection Schefer (1900) ; E. Blochet, Inventaire des MSS. arabes de la collection Decourtemanche (1906); F. Macler, Catalogue des MSS. armeniens et giorgiens (1908). For other oriental languages the following catalogues have been compiled: MSS. birmans et cambodgiens (1879); MSS. chinois, coreens et japonais (1900-1907); MSS. copies (1906); MSS. ithiopiens(i85g— 1877); MSS. hebreux et samaritdins (1867-1ˆ03); MSS. indo- chinois (in the press) ; MSS. malayo-polynesiens (in the press) ; MSS. mazdeens (1900); MSS. mexicains (1899); MSS. persons, t. i. (1905); MSS. sanserifs et palis (1899,1907-1908); MSS. siamois (1887); MSS. syriaques et sabeens (1874-1896); MSS. thibetains (in the press) , &c. The catalogues of manuscripts in modern languages are nearly all completed. The Departements des Medailles et des Estampes possess excellent catalogues, and the following should be mentioned: E. Babelon, Catalogue des monnaies grecques (1890- 1893); E. Babelon, Inventaire sommaire de la collection Waddington (1898); Medailles fausses recueillies, par Hoffmann (1902); Muret et Chabouillet, Catalogue des monnaies gauloises (1889-1892); Prou, Catalogue des monnaies francaises (1892-1896); H. de la Tour, Catalogue de la collection Rouyer, 1″ partie (1899); Catalogues des monnaies et medailles d' Alsace (1902); Cat. des monnaies de I'Amerique du Nord (1861); Cat. des monnaies musulmanes (1887- 1891); Cat. des plombs (1900); Cat. des bronzes antiques (1889); Cat. des camies antiques et modernes (1897-1899); Cat. des vases peinls (1902-1904, 2 vols.). In the Departement des Estampes the following should be mentioned: F. Courboin, Catalogue sommaire des gravures el lithographies de la Reserve (1900-1901) ; Duplessis, Cat. des portraits francais et etrangers (1896-1907, 6 vols.); H. Bouchot, Les Portraits au crayon des XVI' el XV IP siecles (1884); Cat. des dessins relatifs & Vhistoire du thi&tre (1896); F. Courboin, Inventaire des dessins, photographies et gravures relatives a Vhistoire ginerale de Vart (1895, 2 vols.), &c.

The Bibliotheque de l'Arsenal was founded by the marquis de Paulmy (Antoine-Rene d'Argenson), in the 18th century; it received in 1 786

80,000 vols, from the due de La Valliere. Before its confiscation as national property it had belonged to the

[MODERN

comte d'Artois, who had bought it from the marquis de Paulmy in his lifetime. It contains at the present time about 600,000 vols., 10,000 manuscripts, 120,000 prints and the Bastille collection (2500 portfolios) of which the inventory is complete; it is the richest library for the literary history of France and has more than 30,000 theatrical pieces.

V Inventaire des manuscrits was made by H. Martin (1 885-1899, t. i.viii.); the other catalogues and lists are: Extrait du catalogue des journaux conserves & la Bibliotheque de l'Arsenal (" Bulletin des biblioth. et des archives " t. i.) ; Archives de la Bastille, par F. Funck Brentano (1892-1894, 3 vols. 8vo) ; Notice sur les dipdts litteraires par J. B. Labiche (1880, 8vo); Catalogue des estampes, dessins et cartes composanl le cabinet des estampes de la bibliotheque de l'Arsenal, par G. Schefer (1894-1905, 8 pts. 8vo).

The Bibliotheque Mazarine owes its origin to the great cardinal, who confided the direction to Gabriel Naude; it was open to the public in 1642, and was transferred to Rue de Richelieu in 1648. Dispersed during the Fronde in the lifetime of Mazarin, it was reconstituted after the death of the cardinal in 1661, when it contained 40,000 vols, which were left to the College des Quatre-Nations, which in 1691 made it again public. It now has 250,000 vols.; with excellent manuscript catalogues.

The catalogues of incunabula and manuscripts are printed: P. Marais et A. Dufresne de Saint-Leon, Catalogue des incunables de la bibliotheque Mazarine (1893, 8vo); Supplement, additions el corrections (1898, 4 vols. 8vo) y Catalogue des MSS., par A- Molinier (1885-1892, 4 vols. 8vo); Inventaire sommaire des MSS. grecs, par H. Omont.

The first library of the Genovefains had nearly disappeared owing to bad administration when Cardinal Francois de la Rochefoucauld, who had charge of the reformation of that re- ligious order, constituted in 1642 a new library with his own books. The Bibliotheque Ste-Genevieve in 1716 possessed 45,000 vols. ; important gifts were made by Letellier in 1791, and the due d'Or!6ans increased it still more. It became national property in 1791, and was called the Bibliotheque du Pantheon and added to the Lycee Henri IV. under the empire. In 1908

the library contained 3 50,000 printed vols., 1225 incuna- bula, 3510 manuscripts, 10,000 prints (including 7357 portraits and 3000 maps and plans).

The printed catalogues at present comprise: Poiree et Lamoureux, Catalogue abrege de la bibliotheque Ste-Genevieve (1891, 8vo); 3 supplements (1890-1896, 1897-1899, 1900-1902); Catalogue des incunables de la bibliotheque Ste-Genevieve, ridige par Daunou, public par M. Pellechet (1892, 8vo); Catalogue general des MSS., par Ch. Kohler (1894-1896, 2 vols. 8vb); Inventaire sommaire des MSS. grecs, par H. Omont; Notices sur quelques MSS. normands, par E. Deville (1904-1906, 10 pts. 8vo), &c.

The Bibliotheque des Archives Rationales, founded in 1808 by Daunou, contains 30,000 vols, on sciences auxiliary to history. It is only accessible to the officials.

It would be impossible to describe all the official, municipal and academic libraries of Paris more or less open to the public, which are about 200 in number, and in the following survey we deal only with those having 10,000 vols, and over.

The Bibliotheque du Ministere des affaires etrangeres was founded by the marquis de Torcy, minister for foreign affairs under Louis XIV.; it contains 80,000 vols, and is for official use only. The Bibliotheque du Ministere de l'Agriculture dates from 1882 and has only 4000 vols. At the Ministry for the Colonies the library (of 10,000 vols.) dates from 1897; the catalogue was published in 1005; the library of the Colonial office is attached to this ministry; sup- pressed in 1896, it was re-established in 1899, and now contains 6000 vols., 7400 periodicals and 5000 photographs; it is open to the public. There are 30,000 vols, in the Bibliotheque du Ministere du commerce et de 1'industrie; the Bibliotheque du Ministere des finances was burnt at the Commune, but has been reconstituted and now contains 35,000 vols. ; connected with it are the libraries of the following offices: Contributions directes, Contributions indirectes, Enregistrement et inspection des finances; the contents of these four libraries make a total of 13,500 vols. The Bibliotheque du Ministere de la Guerre was formed by Louvois and possesses 130,000 vols, and 800 MSS. and an income of 20,000 francs; the catalogues are Bibliotheque du depot de la guerre: Catalogue (1883-1890); Supplements (1893-1896); Catalogue des MSS., par J. Lemoine (1910). The' following libraries are connected with this department: Comit6 de sant6 (10,000 vols.), Iicole superieure de guerre (70,000 vols.), Comite technique de l'artillerie (24,000 vols.). The Biblio- theque du Ministere del'Interieur was founded in 1793 and

has 80,006 vols. The Bibjiotheque du Ministere de la Justice possesses 10,000 vols., and L'lmprimerie Nationale which is connected with it has a further 19,000 vols. There are also the following law libraries:

Cour d'appel (12,000 vols.); Ordre des avocats, dating from 1871 (56,000 vols., with a catalogue printed in 1880-1882); the Bibliotheque des avocats de la cour de Cassation (20,000 vols.) ; that of the Cour de Cassation (40,000 vols.). The Bibliotheque du Ministere de la Marine is of old formation (catalogue 1 838-1 843); it contains 1 00,000 vols, and 356 MSS.; the catalogue of manuscripts was compiled in 1907. The Bibliotheque du service hydrographique de la Marine has 65,000 vols, and 250 MSS. The Ministere des Travaux publics possesses 12,000 vols., and the Sous-Secretariat des postes et tclegraphes a further 30,000 vols. The Bibliotheque de la Chambre des deputes (1796) possesses 250,000 printed books and 1546 MSS. (Catalogue des manuscrits, by E. Coyecque et H. Debray, 1907; Catalogue des livres de jurisprudence, d'exonomie politique, de finances, et d' administration, 1883). The Bibliotheque du Senat (1818) contains 150,000 vols, and 1343 MSS. The Bibliotheque du Conseil d'Etat has 30,000 vols. All these libraries are only accessible to officials except by special permission.

The Bibliotheque Historique de la ville de Paris was destroyed in 1871, but Jules Cousin reconstituted it in 1872; it possesses 400,000 vols., 3500 MSS. and 14,000 prints; the principal printed catalogues are Catalogue des imprimis de la Reserve by M. Poete (1910), Catalogue des manuscrits, by F. Bournon (1893); a Bulletin has been issued periodically since 1906. The Bibliotheque administrative de la prefecture de la Seine is divided into two sections: French (40,000 vols.) and foreign (22,000 vols.) ; it is only accessible to officials and to persons having a card of introduction; the catalogues are printed. The other libraries connected with the city of Paris are that of the Conseil municipal (20,000 vols.), the Bibliotheques Municipales Populaires, 82 in number with a total of 590,000 books; those of the 22 Hospitals (92,887 vols.), the Pr6fecture de police (10,000 vols.), the Bibliotheque Forney (10,000 vols, and 80,000 prints), the five Ecoles municipales superieures (19,700 vols.), the six professional schools (14,200 vols.).

The libraries of the university and the institutions dealing with higher education in Paris are well organized and their catalogues generally printed.

The Bibliotheque de l'Universite, although at present grouped as a system in four sections in different places, historically considered is the library of the Sorbonne. This was founded in 1 762 by Montem- puis and only included the faculties of Arts and Theology. It changed its name several times; in 1800 it was the Bibliotheque du Prytanee, in 1808 Bibliotheque des Quatre Lycees and in 1812 Bibliotheque de l'Universite de France. The sections into which the Bibliotheque de l'Universite is now divided are: (1) Facult6s de Sciences et des Lettres,a la Sorbonne, (2) Faculty de M6decine, (3) Faculty de droit, (4) Ecole superieure de pharmacie. Before the separation of Church and State there was a fifth section, that of Protestant theology. After the Bibliotheque nationale it is the richest in special collections, and above all as regards classical philo- logy, archaeology, French and foreign literature and literary criticism, just as the library of the Faculty des Sciences et des Lettres is notable for philosophy, mathematics and chemico-physical sciences. The great development which has taken place during the last thirty years, especially under the administration of M. J. de Chantepie du Dezert, its installation since 1897 in the buildings of the New Sorbonne, have made it a library of the very first rank. The reading-room only seats about 300 persons. The average attend- ance per day is 1200, the number of books consulted varies from 1500 to 3000 vols, a day, and the loans amount to 14,000 vols, per year. The store-rooms, although they contain more than 1200 metres of shelves and comprise two buildings of five storeys each, are insufficient for the annual accessions, which reach nearly 10,000 vols, by purchase and presentation. Amongst the latter the most im- portant are the bequests of Leclerc, Peccot, Lavisse, Derenbourg and Beljame; the last-named bequeathed more than 3000 vols., including an important Shakespearean library. The first section contains more than 550,000 vols., 2800 periodicals which include over 70,000 vols., 320 incunabula, 2106 MSS., more than 2000 maps and plans and some prints. The alphabetical catalogues are kept up day by day on slips. The classified catalogues were in 1910 almost ready for printing, and some had already been published: Periodiques (1905); Cartulaires (1907); Melanges jubilaircs et publications commemora- tives (1908); Inventaires des MSS., by E. Chatelain (1892); Incun- ables, by E. Chatelain (1902"); and Supplement, Reserve de la biblio- theque 1401-1540, by Ch. Beaulieux (1909); Nouvelles acquisitions (1905-1908); Catalogue des livres de G. Duplessis donnes a l'Uni- versite de Paris (1907), Catalogue collectif

des bibliotheques universi- taires by Fecamp (1898-1901). For French theses, of which the library possesses a rich collection, the catalogues are as follows: Mourier et Deltour, Catalogue des theses de lettres (1809, &c.);A. Maire, Repertoire des theses de lettres (1809-1900); A. Maire, Cata- logue des theses de sciences (1809-1890) with Supplement to 1900 by Estanave ; Catalogue des theses publie par le Ministere de I' Instruction publique (1882, &c).

At the Sorbonne are also to be found the libraries of A. Dumont and V-Cousin (15,000 vols.), and those of the laboratories, of which the richest is the geological (30,000 specimens and books). The section relating to medicine, housed since 1891 in the new buildings of the Faculte de MeVlecine, includes 180,000 vols, and 88 MSS. (catalogue ipio). The Bibliotheque de la faculte de droit dates from 1772

and contains 80,000 vols., 239 MSS. The fourth section, l'Ecole superieure de pharmacie, greatly developed since 1882, now contains 50,000 vols.

The other libraries connected with higher education include that of the Ecole des Beaux-Arts (40,000 vols., 100,000 reproductions, 14,000 drawings). The library of the Ecole normale superieure (1794), established in the Rue d'Ulm in 1846, has received legacies from Verdet (1867), Caboche (1887), Lerambert-Whitcomb_(i89o), and a portion of Cuvier's library; the system of classification in use is practically the same as that of the Sorbonne, being devised by Philippe Lebas (librarian of the Sorbonne) about 1845; there are 200,000 vols. The library of the Museum d'histoire naturelle dates from the 1 8th century, and contains 220,000 vols., 2000 MSS., 8000 original drawings on vellum beginning in 1 631. The Bibliotheque de l'Office et Musee de l'lnstruction publique (formerly Musee pedagogique), founded only in 1880, has 75,000 vols. In 1760 was founded the Bibliotheque de l'lnstitut de France, which is very rich; its acquisitions come particularly from gifts and exchanges (400,000 vols., numerous and scarce; valuable MSS., especially modern ones).

The following may be briefly mentioned: Conservatoire national de musique (1775), which receives everything published in France relating to music (200,000 vols.) ; the Bibliotheque du thdatre de l'Opera (25,000 vols., 5000 songs, 20,000 romances, and a dramatic library of 12,000 vols, and 20,000 prints) ; the Th6atre francais (40,000 vols.) ; the Acad6mie de medecine (15,000 vols., 10,000 vols, of periodicals, 5000 portraits), l'Observatoire ' (18,400 vols.); the Bureau des Longitudes (15,000 vols, and 850 MSS.). The scholastic libraries are : L'Ecole centrale des arts et manufactures (16,000 vols.) ;

l'Ecole coloniale (11,000 vols.); l,'£cole d'application du service de sant6 militaire (23,000 vols.); l'Ecole d'application du g6nie maritime (14,000 vols.) ; l'Ecole libre des sciences; politiques (25,000 vols., 250 periodicals); l'Ecole normale d'instituteiirs de la Seine (10,000 vols.); l'Ecole normale israelite (30,000 vols., 250 MSS.); l'Ecole nationale des ponts-et-chausees (9000 vols., 5000 MSS., 5000 photographs); Biblioth&que de l'lnstitut catholique (160,000 vols.); l'lnstitut national agronomique (25,000 vols.) ; Faculte libre de theologie protestante (36,000 vols.); Conservatoire des arts et metiers (46,000 vols., 2500 maps and plans) ; Bibliotheque polonaise, administered by the Academie des Sciences de Cracovie (80,000 vols., 30,000 prints); Serninaire des Missions etrangeres (25,000 vols.); l'Association Valentin Haiiy, established 1885 (2000 vols, printed in relief) which lends out 40,000 books per annum; l'Association generate des Etudiants (22,000 vols.), which lends and allows reference on the premises to books by students; Bibliotheque de la Chambre de Commerce (40,000 vols.), the catalogues of which were printed in 1879, 1889 and 1902; the Societ6 nationale d'agriculture (20,000 vols.); the Soci6t6 d'anthropologie (23,000 vols.); the Societe asiatique (12,000 vols., 200 MSS.); the Societ6 chimique de France (10,000 vols.), the catalogue of which was published in 1907; the Societe de chirurgie, dating from 1843 (20,000 vols.) ; the Society entomologique (30,000 vols.); the Societe de geographie founded 1821 (60,000 vols., 6000 maps, 22,000 photographs, 2200 portraits, 80 MSS. of which the catalogue was printed in 1901); the Society geologiquede France (15,000 vols., 30,000 specimens, 800 periodicals) ; the Societd de l'histoire du protestantisme francais, founded in 1852 (50,000 vols., 1000 MSS. ; income 25,000 frs.) ; the Societe d'encourage- ment pour l'industrie nationale (50,000 vols., income 8000 frs.); the Societe des Ingenieurs civils (47,000 vols.; catalogue made in 1894) ; the Societe de legislation comparee (15,000 vols., 4500 pamphlets); and lastly the Bibliotheque de la Societe de Statistique de Paris, founded in i860 (60,000 vols., with a printed catalogue).

Before the Revolution there were in Paris alone 1100 libraries containing altogether 2,000,000 vols. After the suppression of the religious orders the libraries were confiscated, and in 1791 more than 800,000 vols, were seized in 162 religious houses and transferred to eight literary foundations in accordance with a decree of November 14, 1789. In the provinces 6,000,000 vols, were seized and transferred to local depositories. The organiza- tion of the central libraries under the decree of 3 Brumaire An IV. (October 25, 179s) came to nothing, but the consular edict of January 28, 1803 gave definitive

organization to the books in the local depositories. From that time the library system was reconstituted, alike in Paris and the provinces. Unfortunately many precious books and MSS. were burnt, since by the decree of 4 Brumaire An II. (October 25, 1793) the Committee of Instruction ordered, on the proposition of its president the deputy Romme, the destruction or modification of books and objects of art, under the pretext that they recalled the outward signs of feudalism.

The books in the provincial libraries, not including those in private hands or belonging to societies, number over 9,200,000 vols., 15,540 incunabula and 93,986 MSS. The number in the colonies and protected states outside France is uncertain, but it extends to more than 200,000 vols.; to this number must be

of the

Depart-

meats.

added the 2,428,954 vols, contained in the university libraries. There are over 300 departmental libraries, and as many Libraries belong to learned societies. The increase in the provincial libraries is slower than that of the Parisian collections. With the exception of 26 libraries con- nected specially with the state, the others are municipal and are administered under state control by municipal librarians. The original foundation of most of the libraries dates but a short time before the Revolution, but there are a few exceptions. Thus the Bibliotheque d' Angers owes its first collection to Alain de la Rue about 1376; it now contains 72,485 vols., 134 incuna- bula and 2039 MSS. That of Bourges dates from 1466 (36,856 vols., 325 incunabula, 741 MSS.). The library of Carpentras was established by Michel Anglici between 1452 and 1474 (50,000 vols., 21 54 MSS.). Mathieu de la Porte is said to be the founder of the library at Clermont-Ferrand at the end of the 15th century; it contained rather more than 49,000 vols, at the time of its

union with the Bibliotheque Universitaire.

Amongst the libraries which date from the 1 6th century must be

mentioned that at Lyons founded by Francois I. in 1527; it possesses 1 1 3, 1 68 vols. , 870 incunabula and 5243 MSS. That of the Palais des Arts has 82,079 vols., 64 incunabula and 311 MSS.

In the 17th century were established the following libraries: Abbeville, by Charles Sanson in 1685 (46,929 vols., 42 incunabula, 342 MSS.); Besancon by Abbe Boisot in 1696 (93,580 vols., 1000 incunabula, 2247 MSS.). In 1604 the Consistoire reforme" de la Rochelle established a library which possesses to-day 58,900 vols., 14 incunabula, 1715 MSS. St Etienne, founded by Cardinal de Villeroi, has 50,000 vols., 8 incunabula, 343 MSS.

The principal libraries founded during the 1 8th century are the following: Aix-en- Provence, established by Tournon and M6jane in 1705 (160,000 vols., 300 incunabula, 1351 MSS.); Bordeaux, 1738 (200,000 vols., 3491 MSS.); ChambeVy, 1736 (64,200 vols., 47 incunabula, 155 MSS.); Dijon, 1701, founded by P. Fevret (125,000 vols., 211 incunabula, 1669 MSS.); Grenoble, 1772 (260,772 vols., 635 incunabula, 2485 MSS.); Marseilles, 1799 (111,672 vols., 143 incunabula, 1691 MSS.); Nancy, founded in 1750 by Stanislas (126,149 vols., 205 incunabula, 1695 MSS.); Nantes, 1753 (103,328 vols., 140 incunabula, 2750 MSS.); Nice, founded in 1786 by Abbe Massa (55,000 vols., 300 incunabula, 150 MSS.) ; Nimes, founded by J. T. de Seguier in 1778 (80,000 vols., 6r incunabula, 675 MSS.); Niort, by Jean de Dieu and R. Bion in 1771 (49,413 vols., 67 incunabula, 189 MSS.); Perpignan, by Marechal de Mailly in 1759 (27,200 vols., 80 incunabula, 127 MSS.); Rennes, 1733 (110,000 vols., 116 incunabula, 602 MSS., income 8950 frs.) ; Toulouse, by archbishop of Bnenne in 1782 (213,000 vols., 859 incunabula, 1020 MSS.).

Nearly all the other municipal libraries date from the Revolution, or rather trom the period of the redistribution of the books in 1803. The following municipal libraries possess more than 100,000 vols. : Avignon (135,000 vols., 698 incunabula, 4152 MSS.), of which the first collection was the legacy of Calvet in 1810; Caen (122,000 vols., 109 incunabula, 665 MSS.); Montpellier (130,300 vols., 40 incunabula, 251 MSS.); Rouen (140,000 vols., 400 incunabula, 4000 MSS.); Tours (123,000 vols., 451 incunabula, 1999 MSS.) ; Versailles (161,000 vols., 436 incunabula, 12 13 MSS.).

The following towns have libraries with more than 50,000 volumes : Amiens, Auxerre, Beaune, Brest, Douai, le Havre, Lille, le Mans, Orleans, Pau, Poitiers, Toulon and Verdun.

The catalogues of the., greater part of the municipal libraries are

printed. Especially valuable is the Catalogues des MSS. des bibliotheques de Paris et des Departments, which began to appear in 1885; the MSS. of Paris fill 18 octavo volumes, and those of the provinces' 5°- . .

The libraries of the provincial universities, thanks to their reorganization in 1882 and to the care exhibited by the general inspectors, are greatly augmented. Aix has 74,658 vols.; Alger 160,489; Besangon 24,275; Bordeaux 216,278; Caen 127,542; Clermont 173,000; Dijon 117,524; Grenoble 127,400; Lille 215,427; Lyons 425,624; Marseilles 53.763; Montpellier 210,938; Nancy 139,036; Poitiers 180,000; Rennes 166,427 ; Toulouse 232,000.

Since 1882 the educational libraries have largely developed; in 1877 they were 17,764 in number; in 1907 they were 44,021, con- taining 7.757.917 vols. The purely scholastic libraries have de- creased; in 1902 there were 2674 libraries with 1,034,132 vols., whilst after the reorganization (Circulaire of March 14,1904) there were only 1131 with 573,279 vols. The Societ6 Franklin pour la propagation des bibliotheques populaires et militaires distributed among the libraries which it controls 55,185 vols. , between the years 1900 and 1909.

Authorities. — Information has been given for this account by M. Albert Maire, librarian at the Sorbonne. See also the following works: — Bibliotheque Nationale: I. Bdliments, collections, organisation, departement des estampes, departement des medailles et antiques, par Henri Marcel, Henri Bouchot et Ernest Babelon. II. Le Departe- ment des imprimes et la section de geographic Le Departement des

manuscrits, par Paul Marchal et Camille Couderc (Paris, 1907, 2 vols.); F61ix Chambon, Notes sur la bibliotheque de I'Universite de Paris de 1763 a 1905 (Ganat, 1905); Fosseyeux, La Bibliotheque des hdpilaux ds Paris (Revue des bibliotheques, t. 18, 1908) ; Alfred Franklin, Guide des savants, des litterateurs et des artistes dans les bibliotheques de Paris (Paris, 1908); Instruction du 7 Mars 1899 sur V organisation des bibliotheques militaires (Paris, 1899); Henri Jadart, Les Anciennes bibliotheques de Reims, leur sort en 1790-1791 et la formation de la bibliotheque publique (Reims, 1 891); Henry Marcel, Rapport adressk au Mtnistre de V Instruction Publique, sur I'ensemble des services de la bibliotheque nationale en 1905 (Journal Officiel, 1906) ; Henry Martin, Histoire de la bibliotheque del' Arsenal (Paris, 1899) ; E. Morel, Le Developpement des bibliotheques publiques (Paris, 1909); Theod. Mortreuil, La Bibliotheque nationale, son origine et sesaccroissements; notice historique (Paris, 1878); Abbe L. V. Pecheur, Histoire des bibliotheques publiques du departement de

VAisne existant a Soissons, Laon et Saint-Quentin (Soissons, 1884); M. Po£te, E. Beaurepaire and E. Clouzot, Une visite d. la bibliotheque

Germany {with Austria-Hungary and Switzerland).

Germany is emphatically the home of large libraries; her former want of political unity and consequent multiplicity of capitals have had the effect of giving her many large Qerman state libraries, and the number of her universities has erma “y- tended to multiply considerable collections; 161 7 libraries were registered by P. Schwenke in 189 1. As to the conditions, hours of opening, &c, of 200 of the most important of them, there is a yearly statement in the Jahrbuch der deutschen Bibliotheken, published by the Verein deutscher Bibliothekare.

The public libraries of the German empire are of four distinct types: state libraries, university libraries, town libraries and popular libraries. The administration and financial affairs of the state and university libraries are under state control. The earlier distinction between these two classes has become less and less marked. Thus the university libraries are no longer re- stricted to professors and students, but they are widely used by scientific workers, and books are borrowed extensively, especially in Prussia. In Prussia, as a link between the state and the libraries, there has been since 1907 a special office which deals with library matters at the Ministry of Public Instruction. Generally the state does not concern itself with the town libraries and the popular libraries, but there is much in common between these two classes. Sometimes popular libraries are under, the supervision of a scientifically administered town library as in Berlin, Dantzig, &c; elsewhere, as at Magdeburg, we see an ancient foundation take up the obligations of a public library. Only in Prussia and Bavaria are regulations in force as to the professional education of librarians. Since 1904 the librarians of the Prussian state libraries have been obliged to complete their university courses and take up their doctorate, after which they have to work two years in a library as volunteers and then under- go a technical examination. The secretarial officials since 1909 have to reach a certain educational standard and must pass an examination. This regulation has been in force as regards librarians in Bavaria from 1905.

Berlin is well supplied with libraries, 268 being registered by P. Schwenke and A. Hortzschansky in 1906, with about 5,000,000 printed vols. The largest of them is the Royal Library, which was founded by the ” Great Elector ” Frederick »< > ”””»• William, and opened as a public library in a wing of the electoral palace in 1661.

From 1699 the library became entitled to a copy of every book published within the royal territories, and it has received many valuable accessions by purchase and otherwise. It now in- cludes 1,230,000 printed vols, and over 30,000 MSS. The amount yearly expended upon binding and the acquisition of books, &c, is £11,326. The catalogues are in manuscript, and include two general alphabetical catalogues, the one in volumes, the other on slips, as well as a systematic catalogue in volumes. The following annual printed catalogues are issued : Verzeichnis der aus der neu erschienenen Literatur von der K. Bibliothek und den Preussischen Universitats-Bibliotheken erworbenen Druckschriften (since 1892) ; Jahresverzeichnis der an den Deutschen Universitdten erschienenen Schriften (since 1887); Jahresverzeichnis der an den Deutschen Schulanstalten erschienenen Abhandlungen (since 1889). There is besides a printed Verzeichnis der im grossen Lesesaal aufgestellten Handbibliothek (4th ed. 1909), the alphabetical Verzeichnis der laufenden Zeitschriften (last ed., 1908), and the classified Verzeichnis der laufenden Zeitschriften

(1908). The catalogue of MSS. are mostly in print, vols. 1-13, 16-23 (1853-1905). The library is specially rich in oriental MSS., chiefly due to purchases of private collections. The musical MSS. are very remarkable and form the richest collection in the world as re- gards autographs. The building, erected about 1780 by Frederick the Great, has long been too small, and a new one was completed in 1909. The building occupies the whole space between the four streets: Unter den Linden, Dorotheenstrasse, Universitatsstrasse and Charlottenstrasse, and besides the Royal Library, houses the University Library and the Academy of Sciences. The conditions as to the use of the collections are, as in most German libraries, very liberal. Any adult person is allowed to have books in the reading- room. Books are lent out to all higher officials, including those holding educational offices in the university, &c, and by guarantee to almost any one recommended by persons of standing ; borrowing under pecuniary security is also permitted. By special leave of the librarian, books and MSS. may be sent to a scholar at a distance, or, if especially valuable, may be deposited in some public library where he can conveniently use them. In 1908-1909 264,000 vols, were used in the reading-rooms, 312,000 were lent inside Berlin, and 32,000 outside. There is a regular system

of exchange between the Royal Library and a great number of Prussian libraries. It is the same in Bavaria, Wurttemberg and Baden; the oldest system is that between Darmstadt and Giessen (dating from 1837). There is either no charge for carriage to the borrower or the cost is very small. The reading-room and magazine hall are, with the exception of Sundays and holidays, open daily from 9 to 9, the borrowing counter from 9 to 6.

Associated with the Royal Library are the following undertakings: the Gesamlkatalog der Preussischen wissenschaftlichen Bibiiotheken (describing the printed books in the Royal Library and the Prussian University Libraries in one general catalogue upon slips), the Auskunftsbureau der Deutschen Bibiiotheken (bureau to give information where any particular book may be consulted), and the Kommission fur den Gesamtkatalog der Wiegendrucke (to draw up a complete catalogue of books printed before 1500).

The University Library (1831) numbers 220,000 vols, together with 250,000 academical and school dissertations. The number of volumes lent out in 1908-1909 was 104,000. The library possesses trie right to receive a copy of every work published in the province of Brandenburg.

Some of the governmental libraries are important, especially those of the Statistisches Landesamt (184,000 vols.); Reichstag (181,000 vols.) ; Patent-Amt (1 18,000 vols.) ; Haus der Abgeordneten (100,000 vols.) ; Auswartiges-Amt (118,000 vols.).

The public library of Berlin contains 102,000 vols.; connected therewith 28 municipal Volksbibliotheken and 14 municipal reading-rooms. The 28 Volksbibliotheken contain (1908) 194,000 vols.

The Prussian university libraries outside Berlin include Bonn (332,000 printed vols., 1500 MSS.); Breslau (330,000 printed vols., 3700 MSS.); Gottingen, from its foundation in 1736/7 the best administered library of the 18th century (552,000 printed vols., 6800 MSS.); Greifswald (200,000 printed vols., 800 MSS.); Halle (261,000 printed vols., 2000 MSS.); Kiel (278,000 printed vols., 2400 MSS.); Konigsberg (287,000 printed vols., 1500 MSS.); Marburg (231,000 printed vols, and about 800 MSS.); Milnster (191,000 printed vols., 800 MSS.). Under provincial administration are the Konigliche and Provinzialbibliothek at Hanover (203,000 printed vols., 4000 MSS.); the Landesbibliothek at Cassel (230,000 printed vols., 4400 MSS.); and the Kaiser- Wilhelm-Bibliothek at Posen (163,000 printed vols.). A number of the larger towns possess excellent municipal libraries; Aix-la-Chapelle (112,000

vols.); Breslau (164,000 vols., 4000 MSS.); Dantzig (145,600 vols., 2900 MSS.); Frankfort a/M (342,000 vols, besides MSS.); Cassel Murhardsche Bibliothek (141,000 vols., 6300 MSS.); Cologne (235,000 vols.); Treves (100,000 vols., 2260 MSS.); Wiesbaden (158,000 vols.).

The libraries of Munich, though not so numerous as those of Berlin, include two of great importance. The Royal Library, for a long time Munich tne ‘ ar S est collection of books in Germany, was founded by Duke Albrecht V. of Bavaria (1550-1579), who made numerous purchases from Italy, and incorporated the libraries of the Nuremberg physician and historian Schedel, of Widmannstadt, and of J. J. Fugger. The number of printed vols, is estimated at about 1,100,000 and about 50,000 MSS. The library is especially rich in incunabula, many of them being derived from the libraries of over 1 50 monasteries closed in 1803. The oriental MSS. are numerous and valuable, and include the library of Martin Haug. The amount annually spent upon books and binding is £5000. The catalogues of the printed books are in manuscript, and include (1) a general alphabetical catalogue, (2) an alphabetical repertorium of each of the 195 subdivisions of the library, (3) biographical and other subject catalogues. A printed catalogue of MSS. in 8 vols, was in 1910 nearly complete; the first was published in 1 858. The library is open on weekdays from 8 to 1 (November to March 8.30 to 1), and on Monday to Friday (except from August 1 to September 15) also from 3 to 8. The regulations for the use of the library are very similar to those of the Royal Library at Berlin. The building was erected for this collection under King Louis I. in 1 832-1 843. The archives are bestowed on the ground floor, and the two upper floors are devoted

to the library, which occupies seventy-seven apartments. The University Library was originally founded at Ingolstadt in 1472, and removed with the university to Munich in 1826. At present the number of vols, amounts to 550,000; the MSS. number 2000. Forty-six Munich libraries are described in Schwenke’s Adressbuch, 15 of which possessed in 1909 about 2,000,000 printed vols, and about 60,000 MSS. After the two mentioned above the most note- worthy is the Koniglich Bayrische Armee-Bibliothek (100,000 printed vols., 1000 MSS.).

The chief Bavarian libraries outside Munich are the Royal Library at Bamberg (350,000 vols., 4300 MSS.) and the University Library at Wiirzburg (390,600 vols., 1500 MSS.); both include rich monastic libraries. The University Library at Erlangen has 237,000 vols. The Staats-Kreis and Stadtbibliothek at Augsburg owns 200,000 vols., and

2000 MSS. ; Nuremberg has two great collections, the Bibliothek des Germanischen National-museums (250,000 vols., 3550 MSS.) and the Stadtbibliothek (104,000 vols., 2500 MSS.).

In 1906 there were in Dresden 78 public libraries with about 1,495,000 vols. The Royal Public Library in the Japanese Palace was founded in the 16th century. Among its numerous n nsd „ acquisitions have been the library of Count Btinau in e ”

1764, and the MSS. of Ebert. Special attention is devoted to history and literature. The library possesses more than 520,000 vols. (1909) ; the MSS. number 6000. Admission to the reading-room is granted to any respectable adult on giving his name, and books are lent out to persons qualified by their position or by a suitable guarantee. Here, as at other large libraries in Germany, works of belles-lettres are only supplied for a literary purpose. The number of persons using the reading-room in a year is about 14,000, and about 23,000 vols, are lent. The second largest library in Dresden, the Bibliothek des Statistischen Landes-Amtes, has 120,000 vols.

Leipzig is well equipped with libraries; that of the University has 550,000 vols, and 6500 MSS. The Bibliothek des Reichsgerichts has 151,000 vols., the Padagogische Central-Bibliothek der Comenius-Stiftung 150,000 vols., and the Stadtbibliothek 125,000 vols., with 1500 MSS.

The Royal Public Library of Stuttgart, although only established in 1765, has grown so rapidly that it now possesses about 374,000 vols, of printed works and 5300 MSS. There is a famous stuttmi collection of Bibles, containing over 7200 vols. The * ‘

annual expenditure devoted to books and binding is £2475. The library also enjoys the copy-privilege in Wurttemberg. The annual number of borrowers is over 2600, who use nearly 29,000 vols. The number issued in the reading-room is 41,000. The number of parcels despatched from Stuttgart is nearly 23,000. Admission is also gladly granted to the Royal Private Library, founded in 1810, which contains about 137,000 vols.

Of the other libraries of Wurttemberg the University Library of Tubingen (500,000 vols, and 4100 MSS.) need only be noted.

The Grand-ducal Library of Darmstadt was established by the grand-duke Louis I. in 1819, on the basis of the still older _ library formed in the 17th century, and includes 510,000 stadt’ vols.andabout36ooMSS.

(i909). Thenumberof vols. used in the course of the year is about 90,000, of which 14,000 are lent out. Among the other libraries of the Grand Duchy of Hesse the most remarkable are the University Library at Giessen (230,000 vols., 1500 MSS.), and the Stadtbibliothek at Mainz (220,000 vols., 1200 MSS.) to which is attached the Gutenberg Museum.

In the Grand Duchy of Baden are the Hof- und Landes-bibliothek at Carlsruhe (202,000 vols., 3800 MSS.), the University Library at Freiburg i/B (300,000 vols., 700 MSS.), and the University Library at Heidelberg. This, the oldest of the German University libraries, was founded in 1386. In 1623 the whole collection, described by Joseph Scaliger in 1608 as " locupletior et meliorum librorum quam Vaticana," was carried as a gift to the pope and only the German MSS. were afterwards returned. The library was re-established in 1703, and after 1800 enriched with monastic spoils; it now contains about 400,000 vols, and 3500 MSS. for the most part of great value.

Among the State or University libraries of other German states should be mentioned Detmold (110,000 vols.)'; Jena (264,000 vols.); Neustrelitz (130,000 vols.) ; Oldenburg (126,000 vols.) ; Rostock (275,000 vols.); Schweriri (225,000 vols.); and Weimar (270,000), all possessing rich collections of MSS.

The Ducal Library of Gotha was established by Duke Ernest the Pious in the 17th century, and contains many valuable books and MSS. from monastic collections. It numbers about Qotha 192,000 vols., with 7400 MSS. The catalogue of the oriental MSS., chiefly collected by Seetzen, and forming one-half of the collection, is one of the best in existence.

The Ducal Library at Wolfenbiittel, founded in the second half of the 16th century by Duke Julius, was made over to the university of Helmstedt in 1614, whence the most important treasures were returned to Wolfenbiittel in the 19th century; it now numbers 300,000 vols., 7400 MSS.

The chief libraries of the Hanse towns are: Bremen (Stadt- bibliothek, 141,000 vols.), and Lubeck (Stadtbibliothek, 121,000 vols.); the most important being the Stadtbibliothek at Hamburg, made public since 1648 (383,000 vols., 7300 MSS., among them many Mexican). Hamburg has also in the Kommerzbibliothek (£20,000 vols.) a valuable trade collection, and the largest Volksbibliothek

(about 100,000 vols.) after that at Berlin. Alsace-Lorraine has the most recently formed of the great German collections — the Uni- versities-und Landesbibliothek at Strassburg, which, though founded only in 1871 to replace that which had been destroyed in the siege, already ranks amongst the largest libraries of the empire. Its books amount to 922,000 vols., the number of MSS. is 5900.

The Adressbuch der Bibliothekeil der Oesterreich-ungarischen Monarchic by Bohatta and Holzmann (1900) describes 1014 libraries in Austria, 656 in Hungary, and 23 in Bosnia and Herzegovina. Included in this list, however, are private lending libraries.

The largest library in Austria, and one of the most important collections in Europe, is the Imperial Public Library at Vienna, apparently founded by the emperor Frederick III. in 1440, although its illustrious librarian Lambecius, in the well-known inscription over the entrance to the library which summarizes its history attributes this honour to Frederick's son Maximilian. However this may be, the munificence of succeeding emperors greatly added to the wealth of the collection, including a not inconsiderable portion of the dispersed library of Corvinus. Since 1808 the library has also been entitled to the copy-privilege in respect of all books published in the empire. The sum devoted to the purchase and binding of books is £6068 annually. The number of printed vols, is 1,000,000; 8000 incunabula. The MSS. amount to 27,000, with 100,000 papyri of the collection of Archduke Rainer. The main library apartment is one of the most splendid halls in Europe. Admission to the reading-room is free to everybody, and books are also lent out under stricter limitations. The University Library of Vienna was established by Maria Theresa. The reading-room is open to all comers, and the library is open from 1st Oct. to 30th June from 9 a.m. to 8 p.m.; in the other months for shorter hours. In 1909 447,391 vols, were used in the library, 45,000 vols, lent out in Vienna, and 6519 vols, sent carriage free to borrowers outside Vienna. The number of printed vols, is 757,000. For the pur-chase of books and binding the Vienna University Library has annually 60,000 crowns from the state as well as 44,000 crowns from matriculation fees and contributions from the students.

The total number of libraries in Vienna enumerated by Bohatta and

Holzmann is 165, and many of them are of considerable extent. One of the oldest and most important libraries of the monarchy is the University Library at Cracow, with 380,000 vols, and 8169 MSS.

The number of monastic libraries in Austria is very considerable. They possess altogether more than 2,500,000 printed vols., 25,000 incunabula and 25,000 MSS. The oldest of them, and the oldest in Austria, is that of the monastery of St Peter at Salzburg, which was established by Archbishop Arno (785-821). It includes 70,000 vols., nearly 1 500 incunabula. The three next in point of antiquity are Kremsmunster (100,000), Admont (86,000) and Melk (70,000), all of them dating from the nth century. Many of the librarians of these monastic libraries are trained in the great Vienna libraries. There is no official training as in Prussia and Bavaria.

Information about income, administration, accessions, &c, of the chief libraries in the Hungarian kingdom, are given in the Hungarian Statistical Year Book annually. The largest library in Hungary is the Szechenyi-Nationalbibliothek at Budapest, founded in 1802 by the gift of the library of Count Franz Szechenyi. It contains 400,000 printed vols., 16,000 MSS., and has a remarkable collection of Hungarica. The University Library of Budapest includes 273,000 printed books and more than 2000 MSS. Since 1897 there has been in Hungary a Chief Inspector of Museums and Libraries whose duty is to watch all public museums and libraries which are administered by committees, municipalities, religious bodies and societies. He also has undertaken the task of organizing a general catalogue of all the MSS. and early printed books in Hungary.

The libraries of the monasteries and other institutions of the Catholic Church are many in number but not so numerous as in Austria. The chief among them, the library of the Benedictines at St Martinsberg, is the central library of the order in Hungary and contains nearly 170,000 vols. It was reconstituted in 1802 after the re-establishment of the order. The principal treasures of this abbey (nth century) were, on the secularization of the monasteries under Joseph II., distributed among the state libraries in Budapest.

Among the Swiss libraries, which numbered 2096″ in 1868, there is none of the first rank. Only three possess over 200,000 vols. — the University Library at Basle founded in 1460, the

Hungary.

Cantonal Library at Lausanne, and the Stadtbibliothek at Berne, which

since 1905 is united to the University Library of that city. One great advantage of the laadi Swiss libraries is that they nearly all possess printed catalogues, which greatly further the plan of compiling a great general catalogue of all the libraries of the republic. A valuable co-operative work is their treatment of Helvetiana. All the literature since 1848 is collected by the Landes-Bibliothek at Berne, established in 1895 for this special object. The older literature is brought together in the Biirgerbibliothek at Lucerne, for which it has a government grant. The monastic libraries of St Gall and Einsiedeln date respectively from the years 830 and 946, and are of great historical and literary interest.

Authorities.— Information has been supplied for this account by Professor Dr A. Hortzschansky, librarian of the Royal Library, Berlin. See also Adressbuch der deulschen Bibliolheken by Paul Schwenke (Leipzig, 1893); Jahrbuch der deulschen Bibliotheken (Leipzig, 1902-1910); Berliner Bibliothekenfuhrer, by P. Schwenke and A. Hortzschansky (Berlin, 1906) ; A. Hortzschansky, Die K. Bibliothek zu Berlin (Berlin, 1908) ; Ed. Zarncke, Leipziger Biblio- thekenfuhrer (Leipzig, 1909) ; J. Bohatta and M. Holzmann, Adressbuch der Bibliolheken der osterreich-ungarischen Monarchic (Vienna, 1900) ; Ri. Kukula, Die osterreichischen Studienbibliotheken (1905) ; A. fliibl, Die osterreichischen Klosterbibliotheken in den Jahren 1 848-1 008 (1 908) ; P. Gulyas, Das ungarische Oberinspektorat der Museen und Bibliotheken (1909); Die iiber 10,000 Bdnde zdhlenden off entlichen-Bibliotheken Ungarns, im Jahre iqo8 (Budapest, 1910); H. Escher, ” Bibliotheks- wesen ” in Handbuch der Schweizer Volkswirtschaft, vol. i. (1903).

Italy. As the former centre of civilization, Italy is, of course, the country in which the oldest existing libraries must be looked for, and in which the rarest and most valuable MSS. are preserved. The Vatican at Rome and the Laurentian Library at Florence are sufficient in themselves to entitle Italy to rank before most other states in that respect, and the venerable relics at Vercelli, Monte Cassino and La Cava bear witness to the enlightenment of the peninsula while other nations were slowly taking their places in the circle of Christian polity. The local rights and interests which so long helped to impede the unification of Italy were useful in creating and preserving at numerous minor centres many libraries which otherwise would probably have been lost during the progress of absorption that results from such centralization as exists in England. In spite of long centuries of suffering and of the aggression of foreign swords and foreign gold, Italy is still rich in books and MSS. The latest official statistics (1896) give particulars of 1831 libraries, of which 419 are provincial and communal. In 1893 there were 542 libraries of a popular character

and including circulating libraries. The governmental libraries (biblioteche governative) number 36 and are under the authority of the minister of public instruction. The Regolamento controlling them was issued in the Bol- letino Ufficiale, 5 Dec. 1907. They consist of the national Qovera- central libraries of Rome (Vittorio Emanuele) and libraries.' Florence, of the national libraries of Milan (Braidense), Naples, Palermo, Turin and Venice (Marciana); the Biblioteca governativa at Cremona; the Marucelliana, the Mediceo-Lau- renziana and the Riccardiana at Florence; the governativa at Lucca; the Estense at Modena; the Brancacciana and that of San Giacomo at Naples; the Palatina at Parma; the Angelica, the Casanatense, and the Lancisiana at Rome; the university libraries of Bologna, Cagliari, Catania, Genoa, Messina, Modena, Naples, Padua, Pa via, Pisa, Rome and Sassari; the Ventimiliana at Catania (joined to the university library for administrative purposes) ; the Vallicelliana and the musical library of the R. Accad. of St Cecilia at Rome; the musical section of the Palatine at Parma; and the Lucchesi-Palli (added to the national library at Naples). There are provisions whereby small collections can be united to larger libraries in the same place and where there are several government libraries in one city a kind of corporate administration can be arranged. The libraries belonging to bodies concerned with higher education, to the royal scientific and literary academies, fine art galleries, museums and scholastic institutions are ruled by special regulations. The minister of public instruction is assisted by a technical board.

LIBRARIES

57i

The librarians and subordinates are divided into (1) librarians, or keepers of MSS.; (2) sub-librarians, or sub-keepers of MSS.; (3) attendants, or book distributors; (4) ushers, &c. Those of class 1 constitute the " board of direction," which is presided over by the librarian, and meets from time to time to consider important measures connected with the administration of the library. Each library is to possess, alike for books and MSS., a general inventory, an accessions register, an alphabetical author-catalogue and a subject-catalogue. When they are ready, catalogues of the special collections are to be compiled, and these the government intends to print. A general catalogue of the MSS. was in 1910 being issued together with catalogues of oriental codices and incunabula. Various other small registers are provided for. The sums granted by the state for library purposes must be applied to (1) salaries and the catalogues of the MSS.; (2) maintenance and other expenses; (3) purchase of books,

binding and repairs, &c. Books are chosen by the librarians. In the university libraries part of the expenditure is decided by the librarians, and part by a council formed by the professors of the different faculties. The rules {Boll. Ufficiale, Sept. 17, 1908) for lending books and MSS. allow them to be sent to other countries under special circumstances.

The 36 biblioteche governative annually spend about 300,000 lire in books. From the three sources of gifts, copyright and purchases, their accessions in 1908 were 142,930, being 21,122 more than the previous year. The number of readers is in- creasing. In 1908 there were 1,176,934, who made use of 1,650,542 vols., showing an increase of 30,456 readers and 67,579 books as contrasted with the statistics of the previous year. Two monthly publications catalogue the accessions of these libraries, one dealing with copyright additions of Italian literature, the other with all foreign books.

The minister of public instruction has kept a watchful eye upon the literary treasures of the suppressed monastic bodies. In 1875 there were 1700 of these confiscated libraries, containing two millions and a half of volumes. About 650 of the collections were added to the contents of the public libraries already in existence; the remaining 1050 were handed over to the different local authorities, and served to form 371 new communal libraries, and in 1876 the number of new libraries so composed was 415.

The Biblioteca Vaticana stands in the very first rank among European libraries as regards antiquity and wealth of MSS. We can trace back the history of the Biblioteca Vaticana to the earliest records of the Scrinium Sedis Apostolicae, which was enshrined in safe custody at the Lateran, and later on partly in the Turris Chartularia; but of all the things that used to be stored there, the only survival, and that is a dubious example, is the celebrated Codex Amiatinus now in the Laurentian Library at Florence. Of the new period inaugurated by Innocent III. there but remains to us the inventory made under Boniface ‘VIII. The library shared in the removal of the Papal court to Avignon, where the collection was renewed and increased, but the Pontifical Library at Avignon has only in part, and in later times, been taken into the Library of the Vatican. This latter is a new creation of the great humanist popes of the 15th century. Eugenius IV. planted the first seed, but Nicholas V. must be looked upon as the real founder of the library, to which Sixtus IV. consecrated a definite abode, ornate and splendid, in the Court of the Pappagallo. Sixtus V. erected the present magnificent building in 1588, and greatly augmented the collection. The library increased under various popes and librarians,

among the most noteworthy of whom were Marcello Cervini, the first Cardinale Bibliotecario, later Pone Marcel II., Sirleto and A. Carafa. In 1600 it was further enriched by the acquisition of the valuable library of Fulvio Orsini, which contained the pick of the most precious libraries. Pope Paul V. (1605-1621) separated the library from the archives, fixed the progressive numeration of the Greek and Latin MSS.. and added two great halls, called the Pauline, for the new codices. Under him and under Urban VIII. a number of MSS. were purchased from the Convento of Assisi, of the Minerva at Rome, of the Capranica College, &c. Especially

Vatican,

noteworthy are the ancient and beautiful MSS. of the monastery of Bobbio, and those which were acquired in various ways from the monastery of Rossano. Gregory XV. (1622) received from Maximilian I., duke of Bavaria, by way of com- pensation for the money supplied by him for the war, the valuable library of the Elector Palatine, which was seized by Count Tilly at the capture of Heidelberg. Alexander VII. (1658), having purchased the large and beautiful collection formerly belonging to the dukes of Urbino, added the MSS. of it to the Vatican library. The Libreria della Regina, i.e. of Christina, queen of Sweden, composed of very precious manuscripts from ancient French monasteries, from St Gall in Switzerland, and others — also of the MSS. of Alexandre Petau, of great importance for their history and French literature, was purchased and in great part presented to the Vatican library by Pope Alexander VIII. (Ottoboni) in 1689, while other MSS. came in later with the Ottoboni library. Under Clement XL there was the noteworthy purchase of the 54 Greek MSS. which had belonged to Pius II., and also the increase of the collection of Oriental MSS. Under Benedict XIV. there came into the Vatican library, as a legacy, the library of the Marchese Capponi, very rich in rare and valuable Italian editions, besides 285 MSS.; and by a purchase, the Biblioteca Ottoboniana, which, from its wealth in Greek, Latin, and even Hebrew MSS., was, after that of the Vatican, the richest in all Rome. Clement XIII. in 1758, Clement XIV. in 1769, and Pius VI. in 1775 were also bene- factors. During three centuries the vast and monumental library grew with uninterrupted prosperity, but it was to undergo a severe blow at the end of the 18th century. In 1798, as a sequel to the Treaty of Tolentino, 500 MSS. picked from the most valuable of the different collections were sent to Paris by the victorious French to enrich the Bibliotheque Nationale and other libraries. These, however, were chiefly restored in 1815. Most of the Palatine MSS., which formed part of the plunder, found their way back to the university of Heidelberg. Pius VII. acquired for the Vatican

the library of Cardinal Zelada in r8oo, and among other purchases of the 19th century must be especially noted the splendid Cicognara collection of archaeo- logy and art (1823); as well as the library in 40,000 vols, of Cardinal Angelo Mai (1856). Recent more important purchases, during the Pontificate of Leo XIII., have been the Borghese MSS., about 300 in number, representing part of the ancient library of the popes at Avignon; the entire precious library of the Barberini; the Borgia collection De Propaganda Fide, containing Latin and Oriental MSS., and 500 incunabula.

Few libraries are so magnificently housed as the Biblioteca Vaticana. The famous Codici Vaticani are placed in the salone or great double hall, which is decorated with frescoes depicting ancient libraries and councils of the church. At the end of the great hall an immense gallery, also richly decorated, and ex- tending to 1200 ft., opens out from right to left. Here are preserved in different rooms the codici Palatini, Regin., Otto- boniani, Capponiani, &c. The printed books only are on open shelves, the MSS. being preserved in closed cases. The printed books that were at first stored in the Borgia Apartment, now with the library of Cardinal Mai, constitute in great part the Nuova Sala di Consultazione, which was opened to students under the Pontificate of Leo XIII. Other books, on the other hand, are still divided into i a and 2 da raccolta, according to the ancient denomination, and are stored in adjacent halls.

Well-reasoned calculations place the total number of printed books at 400,000 vols.; of incunabula about 4000, with many vellum copies; 500 Aldines and a great number of bibliographical rarities. The Latin manuscripts number 31,373; the Greek amount to 4148; the Oriental MSS., of which the computation is not complete, amount to about 4000. Among the Greek and Latin MSS. are some of the most valuable in the world, alike for antiquity and intrinsic importance. It is sufficient to mention the famous biblical Codex Vaticanus of the 4th century, the two Virgils of the 4th and 5th centuries, the Bembo Terence, the palimpsest De Republica of Cicero, conjectured to be of the 4th century, discovered by Cardinal Mai, and an extraordinary

number of richly ornamented codices of great beauty and costli- ness. The archives are apart from the library, and are accessible in part to the public under conditions. Leo XIII. appointed a committee to consider what documents of general interest might expediently be

published.

The Biblioteca Vaticana is now open from October ist to Easter every morning between 9 and 1 o'clock, and from Easter to June 29 from 8 o'clock to 12, with the exception of Sundays, Thursdays and the principal feast days.

Catalogues of special classes of MSS. have been published. The Oriental MSS. have been described by J. S. Assemani, Biblio- theca orientalis Clementino-Vaticana (Rome, 17 19-17 28, 4 vols, folio), and Bibl. Vat. codd. MSS. catalogus ah S. E. et J. S. Assemano redactus (ib., 1756-1759, 3 vols, folio), and by Cardinal Mai in Script. Vet. nova collectio. The Coptic MSS. have, been specially treated by G. Zoega (Rome, 1810, folio) and by F. G. Bonjour (Rome, 1699, 4to). There are printed catalogues of the Capponi (1747) and the Cicognara (1820) libraries. Thefollowing catalogues have lately been printed: E. Stevenson, Codd. Palatini Graeci (1885), Codd. Gr. Reg. Sueciae et Pii II. (1888); Feron-Battaglini, Codd. Oltobon. Graeci (1893); C. Stornaiolo, Codd. Urbinates Gr. (1895); E. Stevenson, Codd. Palatini Lat. torn. 1 (1886); G. Salvo-Cozzo, Codici Capponiani (1897); M. Vattasso and P. Franchi de' Cavalieri, Codd. Lat. Vaticani, torn. 1 (1902); C. Stornaiolo, Codices Urbinates Latini, torn. 1 (1902); E. Stevenson, Inventario dei libri stampali Palatino- Vaticani (1886-1891); and several volumes relating to Egyptian papyri by O. Marucchi. Some of the greatest treasures have been reproduced in facsimile.

The most important library in Italy for modern requirements is the Nazionale Centrale Vittorio Emanuele. From its foundation in 1875, incorporating the biblioteca maior secrela of the Orfier Jesuits in the Collegio Romano, and all the cloister

lib ""h" libraries of the Provincia Romana which had devolved to ra es. ˆ e sta ˆ e through the suppression of the Religious Orders, it has now, by purchases, by donations, through the operation of the law of the press increased to about 850,000 printed vols., and is continually being ameliorated. It possesses about 1600 incunabula and 6200 MSS. Noteworthy among these are the Farfensi and the Sessoriani MSS. of Santa Croce in Jerusalem, and some of these last of the 6th to the 8th centuries are real treasures. The library has been recently reorganized. It is rich in the history of the renaissance, Italian and foreign reviews, and Roman topography. A monthly Bollettino is issued of modern foreign literature received by the libraries of Italy.

The Biblioteca Casanatense, founded by Cardinal Casanate in 1698,

contains about 200,000 printed vols., over 2000 incunabula, with many Roman and Venetian editions, and more than 5000 MSS., among which are examples of the 8th, 9th and 10th centuries. They are arranged in eleven large rooms, the large central hall being one of the finest in Rome. It is rich in theology, the history of the middle ages, jurisprudence and the economic, social and political sciences. An incomplete catalogue of the printed books by A. Audiffredi still remains a model of its kind (Roma, 1 761-1788, 4 vols, folio, and part of vol. v.).

The Biblioteca Angelica was founded in 1605 by Monsignor Angelo Rocca, an Augustinian, and was the first library in Rome to throw open its doors to the public. It contains about 90,000 vols., of which about 1000 are incunabula; 2570 MSS., of which 120 are Greek, and 91 Oriental. It includes all the authentic acts of the Congre- gatio de Auxiliis and the collections of Cardinal Passionei and Lucas Holstenius.

The Biblioteca Universitaria Alessandrina was founded by Pope Alexander VII., with the greater part of the printed books belonging to the dukes of Urbino, and was opened in 1676. In 1815 Pius VII. granted to it the right to receive a copy of every printed book in the States of the Church, which grant at the present time, by virtue of the laws of Italy, is continued, but limited to the province of Rome. The library possesses 130,000 printed books, 600 incunabula, 376 MSS.

The library of the Senate was established at Turin in 1848. It contains nearly 87,000 vols, and is rich in municipal history and the statutes of Italian cities, the last collection extending to 2639 statutes or vols, for 679 municipalities. The library of the Chamber of Deputies contains 120,000 vols, and pamphlets. It is rich in modern works, and especially in jurisprudence, native and foreign history, economics and administration.

The Biblioteca Vallicelliana was founded by Achille Stazio (1581), and contains some valuable manuscripts, including a Latin Bible of the 8th century attributed to Alcuin, and some inedited writings of Baronius. It now contains 28,000 vols, and 2315 MSS. Since 1884 it has been in the custody of the R. Societa Romana di Storia Patria.

The Biblioteca Lancisiana, founded in. 1711 by G. M. Lancisi, is valuable for its medical collections.

In 1877 Professor A. Sarti presented to the city of Rome his collection of fine-art books, 10,000 vols., which was placed in charge of the

Accademia di San Luca, Which already possessed a good artistic library. The Biblioteca Centrale Militare (1893) includes 66,000 printed vols, and 72,000 maps and plans relating to military affairs; and the Biblioteca della R. Accad. di S. Cecilia (1875), a valuable musical collection of 40,000 volumes and 2300 MSS.

Among the private libraries accessible by permission, the Chigiana (1660) contains 25,000 vols, and 2877 MSS. The Corsiniana, founded by Clement XII. (Lorenzo Corsini) is rich in incunabula, and includes one of the most remarkable collections of prints, the series of Marc-Antonios being especially complete. It was added to the Accademia dei Lincei in 1884 and now extends to 43,000 vols. The library of the Collegium de Propaganda Fide was established by Urban VIII. in 1626. It owes its present richness almost entirely to testamentary gifts, among which may be mentioned those of Cardinals Borgia, Caleppi and Di Pietro. It is a private collection for the use of the congregation and of those who belong to it, but permission may be obtained from the superiors. There are at least thirty libraries in Rome which are more or less accessible to the public. At s hi en Subiaco, about 40 m. from Rome, the library of the Bene- ” a ‘ dictine monastery of Santa Scolastica is not a very large one, com- prising only 6000 printed vols, and 400 MSS., but the place is re- markable as having been the first seat of typography in Italy. It was in this celebrated Protocoenobium that Schweynheim and Pannartz, fresh from the dispersion of Fust and Schoeffer’s workmen in 1462, established their press and produced a series of very rare and important works which are highly prized throughout Europe. The Subiaco library, although open daily to readers, is only visited by students who are curious to behold the cradle of the press in Italy, and to inspect the series of original editions preserved in their first home.

The Biblioteca Nazionale Centrale of Florence, formed from the union of Magliabechi’s library with the Palatina, is the largest after the Vittorio Emanuele at Rome. The Magliabechi col- „. lection became public property in 1714, and with accessions orence. from time to time, held an independent place until 1862, when the Palatina (formed by Ferdinand III., Grand Duke of Tuscany), was incorporated with it. An old statute by which a copy of every work printed in Tuscany was to be presented to the Magliabechi library was formerly much neglected, but has been maintained more rigorously in force since i860. Since 1870 it receives by law a copy of every book published in the kingdom. A Bollettino is issued describ- ing these accessions. There are many valuable autograph originals of famous works in this library, and the MSS. include the most im- portant extant codici of Dante and later poets, as well as of the historians from

Villani to Machiavelli and Guicciardini. Amongst the printed books is a very large assemblage of rare early impressions, a great number of the Rappresentazioni of the 16th century, at least 200 books printed on vellum, and a copious collection of municipal histories and statutes, of testi di lingua and of maps. The Galileo collection numbers 308 MSS. The MS. portolani, 25 in number, are for the most part of great importance; the oldest is dated 1417, and several seem to be the original charts executed for Sir Robert Dudley (duke of Northumberland) in the preparation of his Arcano del Mare. The library contains (1909) 571,698 printed vols., 20,222 MSS., 9037 engravings, 21,000 portraits, 3847 maps, and 3575 incunabula. In 1902 the Italian parliament votedthe funds for a new building which is being erected on the Corso dei Tintori close to the Santa Croce Church.

The Biblioteca Nazionale of Milan, better known as the Braidense, founded in 1770 by Maria Theresa, consists of 243,000 printed vols. 1787 MSS. and over 3000 autographs." It comprises nearly Milan 2300 books printed in the 15th century (including the rare Monte Santo di Dio of Bettini, 1477), 913 Aldine impressions, and a xylographic Biblia Pauperum. Amongst the MSS. are an early Dante and autograph letters of Galileo, some poems in Tasso's autograph, and a fine series of illustrated service-books, with minia- tures representing the advance of Italian art from the 12th to the 1 6th century. One room is devoted to the works of Manzoni.

The Biblioteca Nazionale at Naples, though only opened to the public in 1804, is the largest library of that city. The nucleus from which it developed was the collection of Cardinal Seri- fj aD i es pando, which comprised many MSS. and printed books of great value. Acquisitions came in from other sources, especially when in the year 1848 many private and conventual libraries were thrown on the Neapolitan market, and still more so in i860. The Biblical section is rich in rarities, commencing with the Mainz Bible of 1462, printed on vellum. Other special features are the collection of testi di lingua, that of books on volcanoes, the best collection in existence of the publications of Italian literary and scientific societies and a nearly complete set of the works issued by the Bodoni press. The MSS. include a palimpsest containing writings of the 3rd, 5th and 6th centuries under a grammatical treatise of the 8th, 2 Latin papyri of the 6th century, over 50 Latin Bibles, many illuminated books with miniatures, and the autographs of G. Leopardi. There are more than 40 books printed on vellum in the 15th and 16th

centuries, including a fine first Homer; and several MS. maps and portolani, one dating from the end of the 14th century. The library contains about 389, 100 printed vols., 7990 MSS. and 4217 incunabula. The Biblioteca Nazionale of Palermo, founded from the Collegio Massimo of the Jesuits, with additions from other libraries of that Palermo suppressed order, is rich in 15th-century books, which have been elaborately described in a catalogue printed in 1875, and in Aldines and bibliographical curiosities of the 16th and following centuries, and a very complete series of the Sicilian publica- tions of the 16th century, many being unique. The library contains 167,898 printed vols., 2550 incunabula, 1537 MSS.

The Biblioteca Nazionale Universitatia of Turin took its origin in the donation of the private library of the House of Savoy, which in 1720 was made to the University by Vittorio Amedeo II. Turin. -pjjg disastrous fi re f January 1904 destroyed about 24,000

out of the 300,000 vols, which the library possessed, and of the MSS., the number of which was 4138, there survive now but 1500 in a more or less deteriorated condition. Among those that perished were the palimpsests of Cicero, Cassidorus, the Codex Theodosianus and the famous Livre d'Heures. What escaped the fire entirely was the valuable collection of 1095 incunabula, the most ancient of which is the Rationale Divinorum Officiorum of 1459. Since the fire the library has been enriched by new gifts, the most conspicuous of which is the collection of 30,000 vols, presented by Baron Alberto Lumbroso, principally relating to the French Revolution and empire. The library was in 19 10 about to be transferred to the premises of the Palazzo of the Debito Publico. The Biblioteca Marciana, or library of St Mark at Venice, was traditionally founded . in 1362 by a donation of MSS. from the famous Petrarch

' (all of them now lost) and instituted as a library by Cardinal Bessarione in 1468. The printed vols, number 417,314. The precious contents include 12,106 MSS. of great value, of which more than 1000 Greek codices were given by Cardinal Bessarione, important MS. collections of works on Venetian history, music and theatre, rare incunabula, and a great number of volumes, unique or exceedingly rare, on the subject of early geographical research. Amongst the MSS. is a Latin Homer, an invaluable codex of the laws of the Lombards, and the autograph MS. of Sarpi's History of the Council of Trent. Since the fall of the republic and the suppression of the monasteries a great many private and conventual libraries have been incorporated with

the Marciana, which had its first abode in the Libreria del Sansovino, from which in turn it was transferred in 1812 to the Palazzo Ducale, and from this again in 1904 to the Palazzo della Zecca (The Mint).

Among the university libraries under government control some deserve special notice. First in historical importance comes the .. , .. Biblioteca della University at Bologna, founded by the llbrarTs * naturalist U. Aldrovandi, who bequeathed by his will in e ‘ 1605 to the senate of Bologna his collection of 3800 printed books and 360 MSS. Count Luigi F. Marsili increased the library by a splendid gift in 1 7 12 and established an Istituto delle Scienze, reconstituted as a public library by Benedict XIV. in 1756. The printed books number 255,000 vols., and the MSS. 5000. The last comprise a rich Oriental collection of 547 M SS. in Arabic, 173 in Turkish, and several in Persian, Armenian and Hebrew. Amongst the Latin codices is a Lactantius of the 6th or • 7th century. The other noteworthy articles include a copy of the Armenian gospels (12th century), the Avicenna, with miniatures dated 1 194, described in Montfaucon’s Diarium Italicum, and some unpublished Greek texts. Amongst the Italian MSS. is a rich assem- blage of municipal histories. Mezzofanti was for a long time the custodian here, and his own collection of books has been incorporated in the library, which is remarkable likewise for the number of early editions and Aldines which it contains. A collection of drawings by Agostino Caracci is another special feature of worth. The grand hall with its fine furniture in walnut wood merits particular attention. The Biblioteca della Universita at Naples was established by Joachim Murat in 1812 in the buildings of Monte Oliveto, and has thence been sometimes called the ” Biblioteca Gioacchino.” Later it was trans- ferred to the Royal University of studies, and was opened to the public in 1827. It was increased by the libraries of several monastic bodies. The most copious collections relate to the study of medicine and natural science. It possesses about 300,000 printed books, 404 incunabula, 203 Aldines, and 196 Bodoni editions, but the more important incunabula and MSS. about the middle of _ the 19th century went to enrich the Biblioteca Nazionale. Other important university libraries are those of Catania (1755), 130,000 vols. ; Genoa (1773). 132,000 vols., 1588 MSS.; Pavia (1763), 250,000 vols., 1100 MSS.; Padua (200,000 vols., 2356 MSS.), which in 1910 was housed in a new building; Cagliari (90,000 vols.); Sassari (74,000 vols.). Messina, destroyed in the earthquake of 1908, preserved, however, beneath its ruins the more important part of its furniture and fittings, and in 1910 was already restored to active work, as regards the portion serving for the reawakened Faculty of Law in the University.

Chief among the remaining government libraries comes the world-

famed Biblioteca Mediceo-Laurenziana at Florence, formed from the collections of Cosimo the Elder, Pietro de' Medici, and Lorenzo the Magnificent (which, however, passed away from the family after

the expulsion of the Medici from Florence, and were repurchased in 1508 by Cardinal Giovanni, afterwards Leo X.). It was first constituted as a public library in Florence by Clement M ,. VII., who charged Michelangelo to construct a suitable ˆ *" edifice for its reception. It was opened to the public by .itna" 1 " Cosimo I. in 157 1, and has ever since gone on increasing in value, the accessions in the 1 8th century alone being enough to double its former importance. The printed books it contains are

Erobably no more than 11,000 in number, but are almost all of the ighest rarity and interest, including 242 incunabula of which 151 editiones principes. It is, however, the precious collection of MSS., amounting to 9693 articles, which gives its chief importance to this library. They comprise more than 700 of dates earlier than the nth century. Some of them are the most valuable codices in the world—the famous Virgil of the 4th or 5th century, Justinian's Pandects of the 6th, a Homer of the loth, and several other very early Greek and Latin classical and Biblical texts, as well as copies in the handwriting of Petrarch, about 100 codices of Dante, a Decameron copied by a contemporary from Boccaccio's own MS., and Cellini's MS. of his autobiography. Bandini's catalogue of the MSS. occupies 13 vols, folio, printed in 1764-1778. Administratively united to the Laurentian is the Riccardiana rich in MSS. of Italian literature, especially the Florentine (33,000 vols., 3905 MSS.). At Florence the Biblioteca Marucelliana, founded in 1 703 , remarkable for its artistic wealth of early woodcuts and metal engravings, was opened to the public in 1753. The number of these and of original drawings by the old masters amounts to 80,000 pieces; the printed volumes number 200,000, the incunabula 620, and the MSS. 1500. At Modena is the famous Biblioteca Estense, so called from ««-ju having been founded by the Este family at Ferrara in / " oaena ' T 393i it was transferred to Modena by Cesare D'Este in 1598. Muratori, Zaccaria and Tiraboschi were librarians here, and made good use of the treasures of the library. It is particularly rich in early printed literature and valuable codices. Between 1 859 and 1867 it was known as the Biblioteca Palatina. The printed vols, number 150,570, the incunabula 1600, the MSS. 3336J besides the 4958 MSS. and the 100,000 autographs of the Campori collection.

The oldest library at Naples is the Biblioteca Brancacciafta, with many valuable MSS. relating to the history of Naples. Two plani- spheres by Coronelli are preserved here. It was founded Parma. in 1673 by

Cardinal F. M. Brancaccio, and opened by his heirs in 1675; 150,000 vols, and 3000 MSS. The Regia Biblioteca di Parma, founded definitively in 1779, owes its origin to the grand-duke Philip, who employed the famous scholar Paciaudi to organize it. It is now a public library containing 308,770 vols, and 4890 MSS. Amongst its treasures is De Rossi's magnificent collection of Biblical and rabbinical MSS. Also worthy of note are the Bibl. Pubblica or governation of Lucca (1600) with 214,000 vols., 725 incunabula and 309T MSS. and that of Cremona (1774), united to that of the Museo Civico.

Among the great libraries not under government control, the most important is the famous Biblioteca Ambrosiana at Milan, founded in 1609 by Cardinal Fed. Borromeo. It contains 230,000 -ˆ

printed vols, and 8400 MSS. Amongst the MSS. are a ˆa Greek Pentateuch of the 5th century, the famous Peshito and Syro-Hexaplar from the Nitrian convent of St Maria Deipara, a Josephus written on papyrus, supposed to be of the 5th century, several palimpsest texts, including an early Plautus, and St Jerome's commentary on the Psalms in a volume of 7th-century execution, full of contemporary glosses in Irish, Gothic fragments of Ulfilas, and a Virgil with notes in Petrarch's handwriting. Cardinal Mat Was formerly custodian here. In 1879 Professor C. Mensinger presented his " Biblioteca Europea," consisting of 2500 vols., 300 maps and 5000 pieces, all relating to the literature and linguistics of European countries. The Melzi and Trivulzio libraries should not pass with- out mention here, although they are private and inaccessible without special permission. The former is remarkable for its collection of early editions with engravings, including the Dante of 1481, with twenty designs by Baccio Bandinelli. The latter is rich in MSS. with miniatures of the finest and rarest kind, and in printed books of which many are unique or nearly so. It consists of 70,000 printed vols. At Genoa the Biblioteca Franzoniana, founded about 1770 for the instruction of the poorer classes, is noteworthy as being the first European library lighted up at night for the use of readers.

The foundation of the monastery of Monte Cassino is due to St Benedict, who arrived there in the year 529, and established the prototype of all similar institutions in western Europe. Mnnte The library of printed books now extends to about 20,000 casslao vols., chiefly relating to the theological sciences, but in- cluding some rare editions. A collection of the books belonging to the monks contains about the same number of volumes. But the chief glory of Monte Cassino consists of the arcMvio, which is quite apart ; and this includes more than 30,000 bulls, diplomas, charters and other

documents, besides 1000 MSS. dating from the 6th century downwards. The latter comprehend some very early Bibles and important codices of patristic and other medieval writings. There are good written catalogues, and descriptions with extracts are published in the Bibliotheca Casinensis: The monastery was declared a national monument in 1866. At Ravenna the Biblioteca Classense

has a 10th-century codex of Aristophanes and two 14th-century codices of Dante. At Vercelli the Biblioteca dell' Archivio Capitolare,

the foundation of which can be assigned to no certain date, VerceW. ˆ ut must jˆ, re f erre(j t the early days when the barbarous conquerors of Italy had become christianized, comprises nothing but MSS.. all of great antiquity and value. Amongst them is an Evangel- iarium S. Eusebii in Latin, supposed to be of the 4th century; also the famous codex containing the Anglo-Saxon homilies which have been published by the /Elfric Society.

The Biblioteca del Monastero della S. Trinita, at La Cava dei Tirreni in the province of Salerno, is said to date from the foundation

of the abbey itself (beginning of the nth century). It La Cava, contains only some 10,000 vols., but these include a number of MSS. of very great rarity and value, ranging from the 8th to the 14th century. Amongst these is the celebrated Codex Legum Longobardorum, dated 1004, besides a well-known geographi- cal chart of the 12th century, over 100 Greek MSS., and about 1000 charters beginning with the year 840, more than 200 of which belong to the Lombard and Norman periods. The library is now national property, the abbot holding the office of Keeper of the Archives.

Not a few of the communal and municipal libraries are of great extent and interest: Bologna (1801), 191,000 vols., 5060 MSS.; Brescia, Civica Quiriniana, 125,000 vols., 1500 MSS. ; Ferrara (1753), 91,000 vols., 1698 MSS., many Ferrarese rarities; Macerata, the Mozzi-Borgetti (1783-1835, united 1855), 50,000 vols.; Mantua, 70,000 vols., 1300 MSS.; Novara, Negroni e Civica (1847 and 1890), 75,000 vols.; Padua, 90,000 vols., 1600 MSS.; Palermo (1760), 216,000 vols., 3263 MSS., coins and Sicilian collection; Perugia (1852), founded by P. Podiani, 70,000 vols., 915 MSS.; Siena (1758), founded by S. Bandini, fine art collection, 83,250 vols., 5070 MSS.; Venice, Museo

Civico Correr, 50,000 vols., 1 1,000 MSS. ; Verona (1792, public since 1802), 180,000 vols., 2650 MSS.; Vicenza, Bertoliana (1708), local literature, archives of religious corporations, 175,000 vols., 6000 MSS.

Popular libraries have now been largely developed in Italy, chiefly through private or municipal enterprise; they enjoy a small state subvention of £1000. The government report for 1908 stated that 319 communes possessed biblioteche popolari numbering altogether 415. Of these, 313 were established by municipalities, 113 by individuals, 8 by business houses, 80 by working men's societies and 15 by ministers of religion; 225 are open to the public, 358 lend books, 221 gratuitously, and 127 on payment of a small fee. In order to establish these institutions throughout the kingdom, a Bollettino has been published at Milan since 1907, and a National Congress was held at Rome in December 1908.

Information has been given for this account by Dr G. Staderini of the Biblioteca Casanatense, Rome. See also F. Bluhme, Iter Italicum (Berlin, 1 824-1 836); Notizie sulle biblioteche governative del regno d' Italia (Roma, 1893); Le biblioteche governative Italiane nel 1898 (Roma, 1900); Statislica delle biblioteche (Roma, 1893- 1896, 2 pts.); Le biblioteche popolari in Italia, relazione al Ministro della Pubb. Istruzione (Roma, 1898); Bollettino delle biblioteche popolari (Milano, 1907, in progress) ; E. Fabietti, Manuale per le biblioteche popolari (2 da ediz., Milano); Le biblioteche pop. al 1° Congresso Naz. 1908 (Milano, 1910).

Latin America.

Much interest in libraries has not been shown in south, central and other parts of Latin America. Most of the libraries which exist are national or legislative libraries.

As the libraries of the republic of Cuba are more Spanish than American in character, it will be convenient to consider them here.

The chief libraries are in Havana, and the best are the Cuba. Biblioteca Publica and the University Library. The

Biblioteca Publica has within recent years been completely over-hauled, and is now one of the most actively-managed libraries in Latin America.

Out of the twenty-nine states and territories of the Mexican republic about half have public libraries, and only a small proportion

of the contents consists of modern literature. Many Mexico. possess rare and valuable books, of interest to the biblio- grapher and historian, which have come from the libraries of the sup- pressed religious bodies. There is a large number of scientific and literary associations in the republic, each possessing-books. The Society of Geography and Statistics, founded in 1 851 in Mexico City, is the most important of them, and owns a fine museum and excellent library. After the triumph of the Liberal party the cathedral, uni- versity and conventual libraries of the city of Mexico came into the possession of the government, and steps were taken to form them into one national collection. No definite system was organized, however, until 1867, when the church of San Augustin was taken and fitted up for the purpose. In 1884 it was opened as the Biblioteca Nacional, and now possesses over 200,000 vols. Two copies of every book printed in Mexico must be presented to this library. Most of the libraries of Mexico, city or provincial, are subscription, and belong to societies and schools of various kinds.

The importance of public libraries has been fully recognized in Argentina, and more than two hundred of them are in the country. They are due to benefactions, but the government in every case adds an equal sum to any endowment. A central Argeatlna. commission exists for the purpose of facilitating the acquisition of books and to promote a uniform excellence of administra- tion. The most considerable is the Biblioteca Nacional at Buenos Aires, which is passably rich in MSS., some of great interest, con- cerning the early history of the Spanish colonies. There is also the Biblioteca Municipal with about 25,000 vols. There are libraries attached to colleges, churches and clubs, and most of the larger towns possess public libraries.

The chief library in Brazil is the Bibliotheca Publica Nacional at Rio de Janeiro (1807) now comprising over 250,000 printed vols, with many MSS. National literature and works _ connected with South America are special features of this Brazil. collection. A handsome new building has been erected which has been fitted up in the most modern manner. Among other libraries of the capital may be mentioned those of the Faculty of Medicine, Marine Library, National Museum, Portuguese Literary Club, Bibliotheca Fluminense, Benedictine Monastery, and the Bibliotheca Municipal. There are various provincial and public libraries through- out Brazil, doing good work, and a typical example is the public library of Maranhao.

The Biblioteca Nacional at Santiago is the chief library in Chile. The catalogue is printed, and is kept up by annual supple- ments. It

possesses about 100,000 vols. There is also a Chile.

University Library at Santiago, and a fairly good Biblioteca Publica at Valparaiso.

The Biblioteca Nacional at Lima was founded by a decree of the liberator San Martin on the 28th of August 1 821, and placed in the house of the old convent of San Pedro. The nucleus of the library consisted of those of the university of San Marcos Peru.

and of several monasteries, and a large present of books was also made by San Martin. The library is. chiefly interesting from containing so many MSS. and rare books relating to the history of Peru in vice-regal times.

Spain and Portugal.

Most of the royal, state and university libraries of Spain and Portugal have government control and support. In Portugal the work of the universities is to a certain extent connected up, and an official bulletin is published in which the laws and acces- sions of the libraries are contained.

The chief library in Spain is the Biblioteca Nacional (formerly the Biblioteca Real) at Madrid. The printed volumes number 600,000 with 200,000 pamphlets. Spanish literature is of course l well represented, and, in consequence of the numerous accessions' from the libraries of the suppressed convents, the classes of theology, canon law, history, &c, are particularly complete. There are 30,000 MSS., including some finely illuminated codices, historical documents, and many valuable autographs. The collection of prints extends to 120,000 pieces, and was principally formed from the important series bought from Don Valentin Carderera in 1865. The printed books have one catalogue arranged under authors' names, and one under titles; the departments of music, maps and charts, and prints have • subject ˆcatalogues as well. There is a general index of the MSS., with special catalogues of the Greek and Latin codices and genea- logical documents. The cabinet of medals is most valuable and well arranged. Of the other Madrid libraries it is enough to mention the Biblioteca de la Real Academia de la Historia, 1758 (20,000 vols, and 1500 MSS.), which contains some printed and MS. Spanish books of great value, including the well-known Salazar collection. The history of the library of the Escorial (q.v.) has been given elsewhere. In 1808, before the invasion, the Escorial is estimated to have contained 30,000 printed vols, and 3400 MSS. ; Joseph removed the collection to Madrid, but when it was returned by Ferdinand 10,000 vols, were missing. There are now about 40,000 printed vols. The Arabic MSS. have been described by M. Casiri, 1 760-1 770; and a catalogue of the Greek codices by Miiller was issued at the expense of the French government in 1848. There is a MS. catalogue of the printed books. Permission to study at the Escorial, which is one of the royal private libraries, must be obtained by special application. The Biblioteca Provincial y Universitaria of Barcelona (1841) contains about 155,000 vols., and that of Seville (1767) has 82,000 vols. Other cities in Spain possess provincial or university libraries open to students under various restrictions, among them may be mentioned the Biblioteca Universitaria of Salamanca (1254) with over 80,000 vols.

Among the libraries of Portugal the Bibliotheca Nacional at Lisbon (1796) naturally takes the first place. In 1 841 it was largely increased from the monastic collections, which, however, seem to have been

little cared for according to a report prepared Portugal. by the principal librarian three years later. There are now said to be 400,000 vols, of printed books, among which theology, canon law, history and Portuguese and Spanish literature largely predominate. The MSS. number 16,000 including many of great value. There is also a cabinet of 40,000 coins and medals. The Bibliotheca da Academia, founded in 1780, is preserved in the suppressed convent

of the Ordera Terceira da Penitencia. In 1836 the Academy acquired the library of that convent, numbering 30,000 vols., which have since been kept apart. The Archivo Nacional, in the earne building, contains the archives of the kingdom, brought here after the de- struction of the Torre do Castello during the great earthquake.

The Biblioteca Publica Municipal at Oporto is the second largest in Portugal, although only dating from the 9th of July 1833, the anniversary of the debarcation of D. Pedro, and when the memorable siege was;still in progress; from that date to 1874 it was styled the Real Biblioteca do Porto. The regent (ex-emperor of Brazil) gave to the town the libraries of the suppressed convents in the northern provinces, the municipality undertaking to defray the expense of keeping up the collection. Recent accessions consist mainly of Portuguese and French books. The important Camoeris collection is described in a printed catalogue (Oporto, 1880). A notice of the MSS. may be found in Catalogo dos MSS. da B. Publica Eborense, by H. da Cunha Rivara (Lisbon, 1850-1870), 3 vols, folio, and the first part of an Indice preparatorio do Catalogo dos Manuscriptos was produced in 1880. The University Library of Coimbra (1 591) contains about 100,000 vols., and other colleges possess libraries.

Netherlands. Since 1900 there has been considerable progress made in both Belgium and Holland in the development of public libraries, and several towns in the latter country have established popular libraries after the fashion of the municipal libraries of the United Kingdom and America.

The national library of Belgium is the Bibliotheque Royale at Brussels, of which the basis may be said to consist of the famous _ . Bibliotheque des dues de Bourgogne, the library of the

ae * n ” B ” Austrian sovereigns of the Low Countries, which had

gradually accumulated during three centuries. After suffering many losses from thieves and fire, in 1772 the Bibliotheque de Bourgogne received considerable augmentations from the libraries of the suppressed order of Jesuits, and was thrown open to the public. On the occupation of Brussels by the French in J 794 a number of books and MSS. were confiscated and transferred to Paris (whence the majority were returned in 1815) ; in 1795 the remainder were formed into a public library under the care of La Serna Santander, who was also town librarian, and who was followed by van Hulthem. At the end of the administration of van Hulthem a large part of the precious collections of the Bollandists was acquired. In 1830 the Bibliotheque de Bourgogne was added to the state archives, and the whole made available for students. Van Hulthem died in 1832, leaving one of the most important private libraries in Europe, described by Voisin in Bibliotheca Hulthemiana (Brussels, 1836), 5 vols., and extending to 60,000 printed vols, and 1016 MSS., mostly relating to Belgian history. The collection was purchased by the government in 1837, and, having been added to the Bibliotheque de Bourgogne (open since 1772) and the Bibliotheque de la Ville (open, since 1794), formed what has since been known as the Bibliotheque Royale de Belgique. The printed volumes now number over 600,000 with 30,000 MSS., 105,600 prints and 80,000 coins and medals. The special collections, each with a printed catalogue, consist of the Fonds van Hulthem, for national history; the Fonds Fetis, for music; the Fonds Goethals, for genealogy; and the Fonds Miiller, for physiology. The catalogue of the MSS. has been partly printed, and catalogues of accessions and other departments are also in course of publication. There are libraries attached to most of the depart- ments of the government, the ministry of war having 120,000 vols, and the ministry of the interior, 15,000 vols. An, interesting library is the Bibliotheque Collective des Societes Savantes founded in 1906 to assemble in one place the libraries of all the learned societies of Brussels. It contains about 40,000 vols, which have been catalogued on cards. The Bibliotheque du Conservatoire royal de Musique (1832) contains 12,000 vols, and 6000 dramatic works. The popular or communal libraries of Brussels contain about 30,000 vols, and those of the adjoining suburbs about 50,000 vols., most of which are distributed through the primary and secondary schools. At Antwerp the Stadt Bibliothek (1805) has now 70,000 vols., and is partly supi- ported by subscriptions and endowments. The valuable collection of books in the Musee Plantin-Moretus (1640) should also be mentioned. It contains 11,000 MSS. and 15,000 printed books, comprising the works issued by the Plantin family and many 15th- century books.

The University Library of Ghent, known successively as the Bibliotheque de l'Ecole Centrale and Bibliotheque Publique de la Ville, was founded upon the old libraries of the Conseil de Flandres, of the College des fichevins, and of many suppressed religious communities. It was declared public in 1797, and formally opened in 1 708. On the foundation of the university in 1 8 1 7 the town placed the collection at its disposal, and the library has since remained under state control. The printed volumes now amount to 353,000. There are important special collections on archaeology, Netherlands litera- ture, national history, books prifttedin Flanders, and 23,000 historical pamphlets of the 16th Jind 17th centuries.. The main catalogue is in MS. on cards. There are printed catalogues of the works on jurisprudence (1 839), and of the MSS. (1852). The Bibliotheque de

1'Universite Catholique of Louvain is based upon the collection of "Beyerlinck, who bequeathed it to his alma mater in 1627; this example was followed by Jacques Romain, professor of medicine, but the proper organization of the library began in 1636. There are now said to be 211,000 vols. The Bibliotheque de 1'Universite of Liege dates from 1817, when on the foundation of the university the old Bibliotheque de la Ville was added to it. There are now 350,000 printed vols., pamphlets, MSS., &c. The Liege collection (of which a printed catalogue appeared in 3 vols. 8vb., 1872), be- queathed by M. Ulysse Capitaine, extends to 12,061 vols, and pamphlets. There are Various printed catalogues. The Bibliotheques Populaires of Liege established in 1862, now number five, and contain among them 50,000 vols, which are circulated to the extent of 130,000 per annum among the school children. The Bibliotheque publique of Bruges (1 798)' contains 145,600 printed books and MSS., housed in a very artistic building, once the Tonlieu or douane, 1477. There are communal libraries at Alost, Arlon (1842), Ath (1842), Courtrai, Malines (1864), Mons (1797), Namur (1800), Ostend (1861), Tournai (1794, housed in the H6tel des Anciens Pretres, 1755), Ypres (1839) and elsewhere, all conducted on the same system as the French communal libraries. Most of them range in size from 5000 to 40,000 vols, and they are open as a rule only part of the day. Every small town has a similar library, and a complete list of them, together with much other information, will be found in the Annuaire de la Belgique, scientifique, artistique et littiraire (Brussels 1908 and later issues).

The national library of Holland is the Koninklijke Bibliotheek at Hague, which was established in 1798, when it was decided to join the library of the princes of Orange with those of the defunct government bodies in order to form a library for tlouana. the States-General, to be called the National Bibliotheek. In 1805 the present

name was adopted; and since 18 15 it has become the national library. In 1848 the Baron W. Y. H. van Westreenen van Tiellandt bequeathed his valuable books, MSS., coins and antiquities to the country, and directed that they should be preserved in his former residence as a branch of the royal library. There are now upwards of 500,000 vols, of printed books, and the MSS. number 6000, chiefly historical, but including many fine books of hours with miniatures. Books are lent all over the country. The library boasts of the richest collection in the world of books on chess, Dutch incunabula, Elzevirs and Spinozana. There is one general written catalogue arranged in classes, with alphabetical indexes. In 1800 a printed catalogue was issued, with four supplements down to 181 1 ; and since 1866 a yearly list of additions has been published. Special mention should be made of the excellent catalogue of the incunabula published in 1856.

The next library in numerical importance is the famous Bibliotheca Academiae Lugduno-Batavae, which dates from the foundation of the university of Leiden by William I., prince of Orange, on the 8th of February 1575. It has acquired many valuable additions from the books and MSS. of the distinguished scholars, Golius, Joseph Scaliger, Isaac Voss, Ruhnken and Hemsterhuis. The MSS. compre- hend many of great intrinsic importance. The library of the Society of Netherland Literature has been placed here since 1877; this is rich in the national history and literature. The Arabic and Oriental MSS. known as the Legatum Warnerianum are of great value and interest; and the collection of maps bequeathed in 1870 by J. J. Bodel Nyenhuis is also noteworthy. The library is contained in a building which was formerly a church of the Beguines, adapted in i860 somewhat after the style of fhe British Museum. The catalogues (one alphabetical and one classified) are on slips, the titles being printed. A catalogue of books and MSS. was printed in 1716, one of books added between 1814 and 1847 and a supplementary part of MSS. only in 1850. A catalogue of the Oriental MSS. was published in 6 vols. (1851-1877). The Bibliotheek der Rijks Universiteit (1575) at Leiden contains over 190,000 vols.

The University Library at Utrecht dates from 1582, when certain conventual collections were brought together in order to form a public library, which was shortly afterwards enriched by the books bequeathed by Hub. Buchelius and Ev. Pollio. Upon the founda- tion of the university in 1636, the town library passed into its charge. Among the MSS. are some interesting cloister MSS. and the famous “Utrecht Psalter,” which contains the oldest text of the Athanasian creed. The last edition of the catalogue was in 2 vols, folio, 1834, with supplement in 1845, index from 1845-1855 in 8vo., and additions

1856-1870, 2 vols. 8vo. A catalogue of the MSS. was issued in 1887. The titles of accessions are now printed in sheets and pasted down for insertion. There are now about 250,000 vols, in the library.

The basis of the University Library at Amsterdam consists of a collection of books brought together in the 15th century and preserved in the Nieuwe Kerk. At the time of the Reformation in 1578 they became the property of the city, but remained in the Nieuwe Kerk for the use of the public till 1632, when they were transferred to the Athenaeum. Since 1877 the collection has been known as the University Library, and in 1881 it was removed to a building designed upon the plan of the new library and reading-room of the British Museum. The library includes the best collection of medical works in Holland, and the Bibliotheca Rosenthaliana of Hebrew and Talmudic literature is of great fame and value ; a catalogue of the last was printed in 1875. The libraries of the Dutch Geographical

and other societies are preserved here. A general, printed catalogue was issued in 6 vols. 8vo Amsterdam (1856-1877); one describing the bequests of J. de Bosch Kemper, E. I. Potgieter and F. W Rive in 3 vols., 8vo. (1878-1879); a catalogue of. the MSS. of Professor Moll was published in 1880, and one of those of P. Camper in 1881 .uwcc T?u kve been published up to 1002, including one of the Mbb. 1 he library contains about half a million volumes There are popular subscription libraries with reading-rooms in all parts of Holland, and in Rotterdam there is a society lor the encouragement of social culture which has a large library as part of its equipment. At Hague, Leiden, Haarlem, Dordrecht and other towns popular libraries have, been established, and there is a movement of recent 8 r ™ th ;’ n favour of training librarians on advanced English lines. 1 ne library of the Genootschap van Kunsten en Wetenschappen at Batavia contains books printed in Netherlandish India, works re- lating to the Indian Archipelago and adjacent countries, and the

ˆ t0r Lcc the , Du u? 1 l in the East – There are 20 – 00 ° P rin t«d vols, and 1630 MSS of which 243 are Arabic, 445 Malay, 303 Javanese, 60 Batak and 517 on lontar leaves, in the ancient’ Kawi, Javanese and Bah languages, &c. Printed catalogues of the Arabic, Malay, Javanese and Kawi MSS. have been issued,

Scandinavia.

Owing largely to so many Scandinavian librarians having been trained and employed in American libraries, a greater approach has been made to Anglo-American library ideals in Norway, Sweden and Denmark than anywhere else on the continent of Europe.

The beginning of the admirably managed national library of Denmark the great Royal Library at Copenhagen (Det Store Denmark ˆongelige Bibhothek) may be said to have taken place

° . durln g the rel g» «> f Christian III. (1533-1550), who took

pride in importing foreign books and choice MSS. ; but the true founder was Frederick III (1648-1670); to him is mainly due the famous collection of Icelandic literature and the acquisition of Tycho Brahe s MSS. The present building (in the Christiansborg castle) was begun in 1667. Among notable accessions may be mentioned InH C ˆY ££ S v° f 9 u Reltze T' £l e count °f Danneskjold (Socio Vols, and 500 MSS.) and Count de Thott; the jast bequeathed 6039 Vols printed before 153I, and the remainder of his books, over 100,000 vols., was eventually purchased. In 1703 the library was opened to the public, and it has since remained under state control. Two copies ot every book published within the kingdom must be deposited here 1 ne incunabula and block books form an important series. There is a general classified catalogue in writing for the use of readers: and an alphabetical one on slips arranged in boxes for the, officials. A good catalogue of the de Thott. collection was printed in 12 vols 8vo (1780-1795); a catalogue of the French MSS. appeared in 1844 i of Oriental MSS., 1846; of the Danish collection, 1875, 8vo. Annual reports and accounts of notable MSS. have been published since 1864 i he library now contains over 750,000 vols.

_ The University Library, founded in 1482, was destroyed by fire in 1728, and re-established shortly afterwards. A copy of everv Danish publication must be deposited here. The MSS. include the famous Arne-Magnean collection. There are now about 400,000 vols, in this library The Statsbiblioteket of Aarhus (1902) possesses about 200000 vols, and the Landsb6kasafn Islands (National ffL Reykjavik, Iceland.has about 50,000 printed books and 5500 Mbb. In Copenhagen there are u popular libraries supported in part by the city, and there are at least 50 towns in the provinces with public libraries and in some cases reading-rooms. An associa- tion for promoting public libraries was formed in 1905, and in 1909 the minister of public instruction appointed a special adviser in library matters. About 800 towns arid villages are aided by the above named association, the state and local authorities, and it is estimated that

they possess among them 500,000 vols., and circulate over 1 ,000,000 vols, annually.

The chief library in Norway is the University Library at Christiania, established at the same time as the university, September 2nd, 181 1 Norway b . y Fre denck II., with a donation from the king of many ‘ thousands of duplicates from the Royal Library at Copenhagen, and since augmented by important bequests. Annual catalogues are issued and there are now over 420,000 vols, in the collection. The Deichmanske Bibliothek in Christiania was founded by Carl Deichmann in 1780 as a free library. In 1898 it was reorgan- ized and in. 1903 the open shelf method was installed by Haakon M-huiis, the librarian, who had been trained in the United States. 1 he library ispartly supported by endowment, partly by grants from the municipality. It now contains about 85,000 vols., and is a typical example of a progressive library. The Free Library at Bergen (1872) has about 90,000 vols, and has recently been re-housed in a new building. A free library, with open shelves, has also been opened at Irondhjem. The library connected with the Kongellige Videps- kabers belskab at Trondhiem now contains about 120,000 vols. Uwing to the absence of. small towns and villages in Norway, most of th e library work is concentrated in the coast towns.

the Royal Library at Stockholm was first established in 1585. ; ine original collection , was given to the university of Upsala by

Gustavus II thatlormed by Christina is at the Vatican, and the library brought together by Charles X. was destroyed by fire f„ I6q7 The present hbrary was organized shortly afterwards” 97 ‘

Ine Benzelstjerna-Engestrom Library (14,500 printed Sweden. vols, and !2O0 MSS.) rich in materials for SwedishhisTory is now a „ n ntf d ft*— Nat 4 Ural hist °ry, medicine and mathemariS ‘are left toother libraries Among the MSS. the Codex Aureus of theoth or 7th century, with itsmteresting Anglo-Saxon inscription, is par4u- IIˆ w- eW i° rth J- , T ˆ e «”*! < *««* are in writing, and are both Stfonfof theˆsT 6 ˆ P rint ed catalogues' havˆe bee* issled of portions ot the MSS. The present building was opened in 1882

7i 000 M& n T W h. C T ai r S lˆf ‘3?o,ooo. printed books and’ovfr 11,000 MSS The Karohnska Institute! in Stockholm, contains a hbrary of medical books numbering over 40,000 , , – contains a 4 j ˆUniversity Library at Upsala was founded by Gustavus Adolphus in 1620, from the remains of several convent abrades te a so provided an endowment. The MSS. chiefly relate to the hist’o™

ˆS e i C0U f n iT 1 Ki bUt ˆ Ude the *? 0deX A ˆenteus, containing the Gothk gospels of U lfilas The general catalogue is in writing. A catalogue n, a K1 P, h m H ed ln ‘ 8l 4; apecia.1 lists of the foreign accessions have bfen

MSS ˆ d H eaCh K y Ti, fr ? m Tˆ 50 V the Arabic ‘ p e™an and Turkish MSS. are described by C. J Tornberg,.i8 4 6. It now contains about 340,000 printed books and MSS. The library at Lund dates From the foundation of the university in 1668, ihd was basetl upon the old Sfflft T T h h e MSS. include thede la Gardˆ archives, acquired in 1848. There are about 200,000 vols, in the librarv The Stadsbibhotek of Gothenburg contains about “00,000 vX’ and has a printed catalogue. «”,wu vyis.,

Russia. The imperial Public Library at St Petersburg is one of, the largest libraries in the world, and now possesses about 1,800,000 printed vols, and 34,000 MSS., as well as large collection of maps autographs, photographs,. &c. The beginning of this magnificent collection may be said to have been the books seized by the Czar Peter during his invasion of Courland in 1714- he hbrary dtd not Receive’ any notable augmentation, howevej til the year 1795, when, by the acquisition of the famous Zaluskj collection, the Imperial Library suddenly attained a place in the first rank among great European libraries. The Zaluski Librarv was formed by the Polish count Joseph. Zaluski, who collected at his own expense during forty-three years no less than 200,000 vols., which were added to; by his brother Andrew, bishop of Cracow, by whom in 1 747 the library was thrown open to the public. At his death it was left under the control of the Jesuit College at Warsaw; on the suppression of the order it was taken care of by the Commission of Education; and finally in 1 795 it was transferred by Suwaroff to St Petersburg as a trophy tˆ\ – then extend(id to 260,000 printed vols, and 1G ,o6o MSS. but in consequence of the withdrawal of many medical and illustrated works to enrich other institutions, hardly 2,8 000 vols, remained in 1810. Literature, historyand’ theology formed the main features of the Zaluski Library; the last .class alone amounted to one-fourth of the whole number. Since the beginning of the 10th century, through the liberality of the sovereigns, the gifts of individuals, careful purchases, and the application of the law of 1810, whereby two copies of every Russian publication must be deposited here, the Imperial Library has attained its present extensive dimensions. Nearly one hundred different collections, some of them very valuable and extensive have been added from time to time. They include

MSS T£ % the J ˆ t ° i Sclav °™ collection (1830), Tischendorf’s MSS.

(1858), ˆhe Dolgorousky Oriental MSS. (1859), and the Firkowitsch Hebrew (Karaite) collection

hbranes of Adelung (l8 58) and Tobler (1877), that of the Slavonic scholar Tungmann d8 5 6), and the national MSS. of Karamzin US07). This system of acquiring books, while it has made some departments exceedingly rich, has left others comparatively meagre The library was not regularly opened t6 =the public until 1814; it is under the control of the minister of public instruction. There are fine collections of Aldines and Elzevirs, and the numerous incunabula are instructively arranged

The manuscripts include 26,600 codices, 41,346′ autographs’, 4689 charters and S7 6 maP s, The glory of this, department is the celebrated Codex Sinaiticus of the Greek Bible, brought from the convent of St Catherineon Mount Sinai by Tischendorf in 1859- Other important Biblical and patristic codices are to be found among the Greek, and .Latin MSS.; the Hebrew’ MS$

include some of the most ancient that exist, and the Samaritan collection is one of the largest in Europe; the Oriental MSS. comprehend many valuable texts, and among the French are some of great historical value. The general Catalogues are in writing, but many special catalogues of the MSS. and printed books have been published.

The nucleus of the library at the Hermitage Palace was formed by the empress Catherine II., who purchased the books and MSS. of, Voltaire and Diderot., In the year 1861 the collection amounted to 150,000 yoIs., of which nearly all not relating to the history of “art were then transferred to the Imperial Library. There are many large and valuable libraries attached to the government departments in St Petersburg, and most of the academies and colleges and learned societies are provided with libraries.

The second largest library in Russia is contained in the Public Museum at Moscow. The class of history is particularly rich, arid Russian early printed books are Well represented. The MSS. number 5000, including many ancient Sclavonic codices and historical docu- ments of value. One room is devoted to a collection of Masqnip M SS., which comprehend the archives of the lodges in Russia between 1 8 16 and 182 1. There is a general alphabetical catalogue in writing; the

catalogue of the MSS. has been printed, as well as those of some of the special collections. This large and valuable library now contains close upon 1 ,000,000 printed books and MSS. The Imperial University at Moscow (1755) has a library of over 310,000 vols,, and the Duchovnaja Academy has 126,000 vols. The Imperial Russian Historical Museum- (1875-1883) in Moscow contains nearly 200,000 vols, and most of the state institutions and schools are supplied with libraries. All the Russian universities have libraries, some of them being both large and valuable— ˆDorpat (1802) 400ˆ000 vols.; Charkov (1804) 180,000 volsl ; Hefsipgfors (1640- 1827) 193,000 vols. ; : Kasan (1804) 242,060 vols.; Kiev (1832) 125,000 vols. ; Odessa (1865) 250ˆ000 vols,; and Warsaw (1817) 550,000 vols. There ve ako communal or public libraries at Charkov (1886) 110,000 vols.; Odessa (1830) 130,000 vols.; Reval (1825) ,40,000 vols.; Riga, 90,000 vols. ; Vilna (1856) 210,000 vols, and many other towns. A text-book on library ecbnomy, based on Graesel and Brown, was issued at St Petersburg in 1904.

Eastern Europe. At Athens the National Library (1842) possesses about 260,000 vols., and there is also a considerable library at the university. The Public Library at Corfu has about 40,000 vols. Belgrade University Library has 60,000 vols, and the University Library of Sofia has 30,060 vols.' Constantinople University in 1910 had a library in. process of ' formation,, and there are libraries at the Greek Literary Society (20,000 vols.) and Theological School (n,ooo vols;).

Chvna.

Chinese books were first- written op. thin slips el bamboo, which were replaced by silk or cloth scrolls in the 3rd century b.c:, paper coming into use in the beginning of the 2nd century. These methods were customary down to the 10th or nth century. There were no public libraries in the western sense.

The practice of forming national collections of the native literature originated in the attempts to recover the works destroyed in the " burning of the books ' by the " First Emperor " (220 B.C.). In 190 b.c. the law for the suppression Of literary works was repealed, but towards the close of the 1st century B.C. many works were still missing. Hsiao Wu (139-86 b.c.) formed the plan of Repositories, in which books might be stored, with officers to transcribe them. Liu Hsiang (80-9 B.C.) was specialty appointed to classify the literature and form a library ˆ His task was completed by his son, and the resume of their labours is a detailed catalogue with valuable notes

describing 11,332 (‘ sections ” (volumes) by 625 authors. Similar national collections were formed by nearly evEry succeeding dynasty. The high estimation in which literature has always been held has led to the formation of very large imperial, official and private collections of books. Large numbers of works, Chiefly re- lating to Buddhism and Taoism, are also stored in many of the temples. Chinese books are usually in several, and frequently in many volumes. The histories and encyclopaedias are mostly of vast dimensions. Collections of books are kept in wooden cupboards or on open shelves, placed on their sides, each set (t’ao) of volumes (pen) being protected and held together by two thin wooden or card boards, one forming the front cover (in a European book) and the other the back cover, joined by two cords or tapes, running round the whole. By untying and tying these tapes the fdo is opened and’ closed. The titles of the whole work and of each section are written am the edge (either the top or bottom in a European book) and so face outwards as it lies on the shelf. Catalogues are simple lists with comments on the books, not the systematic and scientific productions used in Western countries. There are circulating libraries m large numbers in Peking, Canton and other cities. xvi. 19

See E. T. C. Werner, “Chinese Civilisation ” (in H. Spencer’s Descriptive Sociology, pt. ix.).

Japan.

The ancient history of libraries in Japan is analogous to that of China, with whose civilization and literature it had cIosg relations. Since about 1870, however, the great cities and institutions have established libraries on the European model.

Perhaps the most extensive library of the empire is that of th« Imperial Cabinet (1885) at Tokio with over 500,600 vols., consisting of the collections of the various government departments, and is for official use alone. The University Library (1872) is the largest open to students and the public; it contains over 400,000 vols, of which 230,000 are Chinese and Japanese. The Public Library and reading-room (Tosho-Kwan) at Ueno Park (1872) was formed in 1872 and contains over 250,000 vols., of which about one-fifth are European books. At Tokio are also to be found the Ohashi Library (1902) with 60,000 vols, and the Hibaya Library (1908) with 130,000 vols, and the Nanki Library (1899) with 86,006 vols. The library of the Imperial University of Kyoto contains nearly 260,000 vols., of which over 90,600 are in European languages. To this is attached tha library of the Fukuoka Medical College with 113,000 vols. Tha Municipal

Library of Kyoto (1898) contains 46,000 vols.? Other im- portant municipal libraries in Japan are those at Akita in the province Of Ugo (1899), 47,000 vols., at Mito, province of Hitachi (1908), 25,006 vois., Narita, province of Shimosa (1901), 36,000 vols., chiefly Buddhistic, Yamaguchi, province of Su6 (1907), 23,000 vols. The libraries of the large temples often contain books oi, value, to the, philologist. Lending libraries of native and Chinese literature have existed in Japan from very early times.

Library Associations and Training The first and largest association established for the study of librarianship was the American Library Association (1876) . The Library Association of the United Kingdom was formed in 1877 as an outcome of the first International Librajy Conference, held at London, and in 1898 it received a royal charter. It publishes a Year Book, the monthly Library Association Record, and a number of professional handbooks. It also holds examina- tions in Literary History, Bibliography and Library Economy, and issues certificates and diplomasˆ There are also English and Scottish district library associations. The Library Assistants Association was formed in 1895 and has branches in different parts of England, Wales and Ireland. It issues a monthly magazine entitled The Library Assistant: There is an important Library Association in Germany which issues a year-book giving information concerning the libraries of the country, and a similar organisation in Austria-Hungary which issues a magazine at irregular intervals. An Association of Archivists and Lib- rarians was formed at Brussels in 1907, and there are similar societies in France, Italy, Holland and elsewhere. In every country there is now some kind of association for the study of librarianship, archives or bibliography. International conferences have been held at London, 1877; London, 1897; Paris (at Exhibition), 1903; St Louis, 1904; Brussels (preliminary), 1908; and Brussels, 1910.

Library Periodicals. — The following is a list of the current periodicals which deal with library matters, with the dates of their establishment and place of publication: The Library Journal ‘ (New York, 1876); The Library (London, 1889); Public. Libraries (Chicago, 1896); The Library World (London, l8g8);The Library Assistant (1898); The Library Association Record (1899); Library Work (Minneapolis, U.S., 1906); Bulletin of the American Library Association {Boston, I 9°7); Revue des bibliotheques (Paris, 1891); Bulletin des bibliotheques populaires (Paris, 1906); Courrier des Bibliotheques (Paris) ; Bulletin de Tinstitut international de biblio graphie (Brussels, 1 895); Revue des bibliotheques- el archives de Belgique (Brussels, 1903); Tijdschrift voor boekund bibliothekwezm (Hague, 1903) ;■ De Boekzaal (Hague, 1907) ; Bogsamlingsbladet i (Copenhagen, 1906) ; For Folke-og

Barnboksamlinger (Christiania, ■ 1906) ; Folkebibliolheksbladet (Stockholm,. 1903) ; Zentrdlblatt fur Bibliothekswesen (Leipzig, 1884); Blatter fur Vol&sbibliolheken und Lesehallen (1899; occasional supplement to the above); Biblio- graphic des Bibliotheks- und Buchwesens (ed. by ; Adalbert Hortz- schansky, 1904; issued in the Zentralblatt) ; Jahrbuch der Deutschen Biblidtheken (Leipzig, 1902); Minerva. Jahrbuch der gelehrten Welt (Strassburg, 1890); Milteilungen des osterreichischen Vereins fiir Bibliothekswesen (Vienna, 1896); Ceskd Osv6ta (Noyy Bydzov, Bohemia, 1905) ; Revista delle biblietecke e. degli archivi- (Florence, 1890); Bollettino delle biblioteche popolari (Milan, 1907); Revista de Archivos, Bibliotecas y Museos Madrid (1907); The Gakuto (Tokio, Japan, 1897). (B. R. T; J. D. Bk.)

LIB RATION (Lat. libra, a balance), a slow oscillation, as of a balance; in astronomy especially the seeming oscillation of the moon around her axis, by which portions of her surface near the edge of the disk are alternately brought into sight and swung out of sight.

LIBYA, the Greek name for the northern part of Africa, ,with which alone Greek and Roman history are concerned. It is mentioned as a land of great fertility in Homer (Odyssey, iv. 85), but no indication of its extent is given. It did not originally include Egypt, which was considered part of Asia, and first assigned to Africa by Ptolemy, who made the isthmus of Suez and the Red Sea the boundary between the two continents.' The name Africa came into general use through the Romans. In the early empire, North Africa (excluding Egypt) was divided into Mauretania, Numidia, Africa Propria and Cyrenaica. The old name was reintroduced by Diocletian, by whom Cyrenaica (detached from Crete) was divided into Marmarica (Libya inferior) in the east, and Cyrenaica (Libya superior) in the west. A further distinction into Libya interior and exterior is also known. The former (1ˆ ivros) included th* interior (known and unknown) of the continent, as contrasted with the N. and N.E. portion; the latter (17 <■£&>, called also simply Libya, or Libyae nomas), between Egypt and Marmarica, was so called as having once formed an Egyptian " nome." See Africa, Roman. ;

LICATA, a seaport of Sicily, in the province of Girgenti, 24 m. S.E. of Girgenti direct and 54 m. by rail. Pop. (1901) 22,931. It occupies the site of the town which Phintias of Acragas (Agrigentum) erected after

the destruction of Gela, about 281 B.C., by the Mamertines, and named after himself. The river Salso, which flows into the sea on the east of the town, is the ancient Himera Meridionalis. The promontory at the foot of which the town is situated, the Poggio di Sant' Angelo, is the Ecnomus (Eknomon) of the Greeks, and upon Its slopes are scanty traces of ancient structures and rock tombs. It was off this promontory that the Romans gained the famous naval victory over the Carthaginians in the spring of 256 B.C., while the plain to the north was this scene of the defeat of Agathocles by Hamflcar in 310 B.C. The modern town is mainly important as' a shipping port for sulphur.

LICENCE (through the French from Lat. licentia, licere, to be lawful), permission, leave, liberty, hence an abuse of liberty, licentiousness; in particular, a formal authority to do some lawful act. Such authority may be either verbal or written; when written, the document containing. the authority is called a " licence." Many acts, lawful in themselves, are regulated by statutory authority, and licences must be obtained. For the sale of alcoholic liquor see Liquor Laws.

LICHEN (lichen ruber), in medical terminology, a papu- lar disease of the skin, consisting of an eruption in small thickly set, slightly elevated red points, more or less widely distributed over the body, and accompanied by slight febrile symptoms.

LICHENS, in botany, compound or dual organisms each consisting of an association of a higher fungus, with a usually unicellular, sometimes filamentous, alga. The fungal part of the organism nearly always consists of a number of the Disco- mycetes or Pyrenomyceies, while the algal portion is a member of the Schizophyceae (Cyanophyceae or Blue-green Algae) or of the Green Algae; only in a very few cases is the fungus a member of the Basidiomycetes. The special fungi which take part in the association are, with rare exceptions, not found growing separately, while the algal forms are constantly found free. The reproductive organs of the lichen are of a typically fungal character, i.e. are apothecia or perithecia (see Fungi) and spermogonia. The algal cells are never known to form spores while part of the lichen-thatlus, but they may do so when separated from it and growing free. The fungus thus clearly takes the upper hand in the association.

Owing to their peculiar dual nature, lichens are able to live

in situations where neither the alga nor fungus could exist alone. The enclosed alga is protected by the threads (hyphae) of the fungus, and supplied with water and salts and, possibly, organic nitrogenous

substances; in its turn the alga by means of its green or blue-green colouring matter and the sun's energy manufactures carbohydrates which are used in part by the fungus. An association of two organisms to their mutual advantage is known as symbiosis, and the lichen in botanical language is described as a symbiotic union of an alga and a fungus. This form of relationship is now known in other groups of plants (see Bacteriology and Fungi), but it was first discovered in the lichens. The lichens are charac- terized by their excessively slow growth and their great length of life.

•. Until comparatively recent times the lichens were considered as a group of simple organisms on a level with algae and fungi. The green (or blue-green) cells were termed gonidia by Wallroth, who looked upon them as asexual reproductive cells, but when it was later realized that they were not reproductive elements they were considered as mere outgrowths of the hyphae of the thallus which had developed chlorophyll. In 1865 De Bary suggested the possibility that such lichens as Collema, Ephebe, &c, arose as a result of the attack of parasitic Ascomycetes upon the algae, Nostoc, Chroococcus, &c. In 1S67 the observations of Famintzih and Baranetzky showed that the gonidia, in certain caSes,ˆwere able to live outside the lichen-thallus, and in the case of Physcia, Evernia and Cladonia were able to form zoospores. Baranetzky therefore concluded that a certain number, if not all of the so-called algae were nothing more than free living lichenrgonidia. In 1869 Schwendener put forward the really illuminating view — exactly opposite to that of Baranetzky — ■ that the gonidia in all cases were algae which had been attacked by parasitic fungi. Although Schwendener supported this view of the " dual " nature of lichens by very strong evidence and identified the more common lichen-gonidia with known free-living algae, yet the theory was received with a storm of opposition by nearly all lichenologists. These workers were unable to consider with equanimity the loss of the autonomy of their group, and its reduction to the level of a special division of the fungi. The, observations of Schwendener, however, received ample support from Bornet's (1873) exami- nation of 60 genera. He investigated the exact relation of fungus and alga and showed that the same alga is able to combine with a number of different fungi to form lichens; thus Chroolepns umbrinus is found as the gonidia of 13 different lichen genera.

The view of the dual nature of lichens had hitherto been based on analysis; the final proof of this view was now supplied by the actual synthesis of a lichen from fungal and algal con- stituents. Rees in 187 1 produced the sterile thallus of a Collema from its constituents; later Stahl did the same for three species. Later Bonnier (1886) succeeded

in producing fertile thalli by sowing lichen spores and the appropriate algae upon sterile glass plates or portions of bark, and growing them in sterilized air (fig. i). Moller also in 1887 succeeded in growing small lichen-thalli without their algal constituent (gonidia) on nutritive solutions; in the case of Calicium pycnidia were actually produced under these conditions.

The thallus or body of the lichen is of very different form in different genera. In the simplest filamentous lichens (e.g. Ephebe pubescens) the form of thallus is the form of the filamentous alga which is merely surrounded by the fungal hyphae (fig. 2). The next simplest forms are gelatinous lichens (e.g. Collemaceae) ; in these the algae are Chroococcaceae and Nostocaceae, and the fungus makes its way into the gelatinous membranes of the algal cells and ramifies there (fig. 3). We can distinguish this class of forms as lichens with a homoiomerous thallus, i.e. one in which the alga and fungus are equally distributed. The majority of the lichens, however, possess a stratified thallus in which the gonidia are found as a definite layer or layers embedded in a pseudo- parenchymatous mass of fungal hyphae, i.e. they are heteromerous (figs. 8 and 9). Obviously these two conditions may merge

into one another, and the distinction is not of classificatory

value.

In external form the heteromerous thallus presents the following modifications, (a) The foliaceous (leaf-like)_ thallus, which may be either peltate, i.e. rounded and entire, as in Umbilicdria, &c, or variously lobed and laciniated, as in Sticta, Parmelia, Cetraria (fig. 4), &c. This is the highest type of its development , and is sometimes very considerably expanded. (6) The fruticose thallus may be either erect, becoming pendulous, as in Usnea (fig. 5), Ramalina, &c, or prostrate, as in Alectoria jubata, var. chalybeiformis. It is usually divided into branches and branchlets, bearing some resemblance to a miniature shrub. An erect cylindrical thallus terminated by the fruit is termed a podetium, as in Cladonia (fig. 7). (c) The crustaceous thallus, which is the most common of all, forms a mere crust on the substratum, varying in thickness, and may be squamose (in Squamaria), radiate (in Placodium), areolate, granulose or pulverulent (in various Lecanorae and Lecideae). (d) The hypophloeodal thallus is often concealed beneath the bark of trees (as in some Verrucariae and Arthoniae), or

enters into the fibres of wood (as in Xylographa and

Gonidia. — It has been made clear above that the gonidia are nothing more than algal cells, which have been ensnared

by fungal hyphae and made to develop in captivity (fig. 1). Funfstuck gives ten free living algae which have been identified as the gonidia of lichens. Pleuro- coccus {Cystococcus) humicola in the majority of lichens, e.g. Usnea, Cladonia, Physcia, Parmelia, Cali- cium, many species of Lecidea, &c, Trentepohlia (Chroolepus) umbrina in many species of Verrucaria, Graphidieae and Lecidea; Palmella botryoides in Epigloea; Pleurococcus vulgaris in Acarospora, Dermato- carpon, Catillaria; Dactylococcus infusionum in Solorina, Ntphromia;

Thallus in process of forma- tion. Two ascospores. Cystococcus cells.

After Bonnier, from v. Tavel. From Strasburger's Lehrbuch der Bolanik, by

permission of Guslav Fischer.

Fig. I. — Xanthoria parietina. By the fusion of the hyphae in the middle of the mycelium a pseudo-parenchymatous cortical layer has begun to form. 1 , Germinating ascospore (sp) 2 with branching germ-tube applied to the Cystococcus sp, cells (a). p,

Agyrium), being indicated externally only by a very thin film (figs. 3, 4, 5, 6, 7 and 8). In colour also the thallus externally is very variable. In the dry and more typical state it is most fre- quently white or whitish, and almost as often greyish or greyish glaucous. Less commonly it is of different shades of brown, red, yellow and black. In the moist state of the thallus these colours are much less apparent, as the textures then become more or less trans- lucent, and the thallus usually prevents the greenish colour of the gonidia (e.g. Parmelia Borreri, Peltidea cphthosa, Vmbilicaria pustulata and pulverulent Lecideae).

The thallus may be free upon the surface of the substratum (e.g. Collema) or may be fixed more or less closely to it by special hyphae or rhizoids. These may penetrate but slightly into the substratum, but the connexion established may be so close that it is impossible to remove the thallus from the substratum without injury (e.g. Physcia, Placodium). In some cases the rhizoids are united together into larger strands, the rhizines.

The typical heteromerous thallus shows on section a peripheral, thin

and therefore transparent, layer, the cortical layer, and centrally a mass of denser tissue the so-called medullary layer, between these two layers is the algal zone or gonidial layer (figs. 8 and 9).

The term epithallus is sometimes applied to the superficial dense portion of the cortical layer and the term hypothallus to the layer, when specially modified, in immediate contact with the substratum; the hypothallus is usually dark or blackish. The cylindrical branches of the fruticose forms are usually radially symmetrical, but the flattened branches of these forms and also the thalli of the foliaceous form show a difference in the cortex of the upper and lower side. The cortical layer is usually more developed on the side towards the light, while in many lichens this is the only side provided with a cortical layer. The podetia of some species of Cladonia possess no cortical layer at all. The surface of the thallus often exhibits out- growths in the form of warts, hairs, &c. The medullary layer, which usually forms the main part of the thallus, is distinguished from the cortical layer by its looser consistence and the presence in it of numerous, large, air-containing spaces.

After Sachs, from De Bary's Vergleichende Morplwlogie und Biohgie der Pike, Mycetozoen und Badericn, by permission of Wilhelm Engelmann.

Fig. 2. — Ephebe pubes- cens, Fr. A branched fili- form thallus of Stigonema with the hyphae of the fungus growing through its gelatinous membranes. Extremity of a branch of the thallus with a young lateral branch a; h, hy- phae; g, cells of the alga; gs, the apex of the thal- lus.

Fig. 3. — Section of Homoiomerous Thallus of Collema conglomeratum, with Nostoc threads scattered among the hyphae.

Nostoc lichenoides in most of the Collemaceae; Rivularia rutida in Omphalaria; Lichina, &c, Polycoccus punctiformis in Peltigera, Pan- naria and Stictina; Glbeocapsa polyder- matica in Baeomyccs and Omphalaria; Sirosiphon pulvina- tus in Ephebe pu- bescens. The ma- jority of lichens are confined to one particular kind of gonidium (i.e. species of alga) but a few forms are known (Lecanora granatina, Solorina crocea) which make use of more than one kind ,,,,,. „ . – t u

,, • , , From Strasburger's Lehrbuch der Botamk, by permis-

in their develop- sion of Gustav Fjscher .

ment. In the case Fig. 4.— Cetraria islandica. (Nat. size.)

of Solorina, for ex- ap, Apothecium.

ample, the principal

alga is a green alga, one of the Palmellaceae, but Nostoc (a

blue-green alga) is also found playing a subsidiary part as

gonidia. In L. granalina the primary alga is Pleurococcus, the

secondary, Gleococapsa.

Cephalodia.— In about ioo species of lichens peculiar growths

are developed in the interior of the thallus which cause a slight

projection of the upper or lower surface. These structures are known as cephalodia and they usually occupy a definite position in the thallus. They are distinguished by possessing as gonidia algae foreign to the ordinary part of the thallus. The foreign algae are always members of the Cyano- phyceae and on the same individual and even in the same cephalodium more than one type of gonidium may be found. The func- tion of these peculiar structures is unknown. Zukal has suggested that they may play the part of water-absorbing organs. From Strasburger's Lekrbuch der Botanik, by tu q „■»„,.* ,„i„n«„ „f

permisston ol Gustav Fischer. The exact relation of

Fig. S .—Usnea barbata. (Nat. size.) f nidia and hyphae has ap, Apothecium. been investigated es-

pecially by Bornet and also by Hedliind, and very considerable differences have been shown to exist in different genera. In Physma, Arnoldia, Phylliscum and other genera the gonidia are killed sooner or later by special hyphal branches, haustoria, which pierce the membrane of the algal cell, penetrate the proto- plasm and absorb the contents (fig. u, C). In other cases, e.g. Synalissa, Micarea, the haustoria pierce the membrane, but do not penetrate the protoplasm (fig. n, D). In many other cases, especially those algae possessing Pleurococcus as their gonidia, there are no penetrating hyphae, but merely

From Strasburger's Lehrbuck der Botanik, by permission of Gustav

Fischer.

Fig. 6. — Cladonia rangiferina. (Nat. size.)

A, Sterile.

B, With ascus-fruit at the ends of

the branches.

From Strasburger's Lehr- buchˆ der Botanik, by per- mission of Gustav Fischer;.

Fig. 7. — Cladonia coccifera . Podetia be a r i n g apothecia. (Nat. size.)

/, Scales of primary thallus.

special short hyphal branches which are in close contact with the membrane of the algal cell (fig. 3).

Reproduction.

There are three methods of reproduction of the lichen: by fragmentation, by soredia, by the formation of fungal spores. In the first process, portions of thallus containing gonidia may be accidentally separated and so may start new plants. The second method is only a special process of fragmentation. The soredia are found in a large number of lichens, and consist of a single gonidium or groups of gonidia, surrounded by a sheath and hyphae. They arise usually in the gonidial layer of the thallus by division of the gonidia and the development

around them of the hyphal investment ; their increase in number leads to the rupture of the enclosing cortical layer and the soredia escape from the thallus as a powdery mass (fig. 12). Since they are provided with both fungal and algal elements, they are able to develop directly, under suitable conditions, into a new thallus. The soredia are the most successful method of reproduction in lichens, for not only are some forms nearly always without spore-formation and in others the spores laregly abortive, but in all cases the spore represents only the fungal component of the thallus, and its success in the development of a new lichen-thallus depends on the chance meeting, at the time of germination, with the appropriate algal component.

Conidia. — Contrary to the behaviour of the non-lichen forming

Ascomycetes the lichen-fungi show very few cases of ordinary conidial formation. Bornet describes free conidia in Arnoldia minitula, and Placodium decipiens and Conidia-formntion has been described by Neubner in the Caliciae.

Spermatia. — In the majority of genera of lichens small flask-shaped structures are found embedded in the thallus (fig. 13). These were investigated by Tulasne in 1853, who gave them x

the name spermogonia The lower, ventral por- tion of the spermo- gonium is lined by delicate hyphae, the sterigmala, which give origin to minute colour- less cells, the spermatid* The sterigmata are either simple (fig. 13, C) or septate — the so- called arthrosterigmata (fig. 13, B). The spermo- gonia open by a small pore at the apex, to- wards which the sterig- mata converge and through which the sper- matia escape (fig. 13). There are two views as to the nature of the spermatia. In one view they are mere asexual conidia, and the term pycnoconidia is accord- ingly applied since they are borne in structures like the

ffTthe other view the FlG – %—Usnea barbata. (Mag. nearly 100 spermatia are the male times.)

sexual cells and thus A, Optical longitudinal section of the ex- are rightly named ; it tremity of a thin branch of the thallus should, however, be which has become transparent in pointed out that this solution of potash, was not the view of B, Transverse section through a stronger Tulasne, though we owe branch with the point of origin of an to him the designation adventitious branch (sa). which carries with it r, Cortical layer, the sexual significance, m, Medullary layer. The question is one x, Stout axile strand, very difficult to settle g, The algal zone (Cystococcus). owing to the fact that 5, Apex of the branch, the majority of sper- matia appear to be functionless. In favour of the conidial view is the fact that in the case of Collema and a few other forms the sper- matia have been made to germinate in artificial cultures, and in the case of Caliciu'm parietinum Moller succeeded in producing a sper- mogonia bearing thallus from a spermatium. For the germination of the spermatia in nature there is only the observation of Hedlund, that in Catillaria denigrata and C. prasena a thallus may be derived from the spermatia under natural conditions. In relation to the view that the spermatia are sexual cells, or at least were primitively so, it must be pointed out that although the actual fusion of the spermatial nucleus with a female nucleus has not been observed, yet in a few cases the spermatia have been seen to fuse with a projecting portion (trichogyne) of the ascogonium, as in Collema and Physcia, and there is very strong circumstantial evidence that fertilization takes

place (see later in section on development of ascocarp). The resemblance of the spermatia and spermogonia to those of Uredineae should be pointed out, where also there is consider- able evidence for their original sexual nature, though they appear in that group to be functionless in all cases. The observations of Moller, &c, on the germination cannot be assumed to negative the sexual hypothesis for the sexual' cells of Ulothrix and Ectocarpus, for example

. w „ After Sachs, from De Bai

««n CO v,, <,l pkologie und Biologie der Pilze, Mycetozqen

iry's Vergleichende Mor- Filze, Mycetozofin und Bacterien, by permission of Wilhelm Engehnann. '

LICHENS

•re able to develop with or without fusion. The most satisfactory view in the present state of our knowledge seems to be that the sper- •' matia are male cells which,

while retaining their fertiliz- ing action in a few cases are now mainly f unctionless. The female sexual organs, the ascogonia, would thus in the majority of cases develop by the aid of some reduced sexual process or the asco- carps be developed without relation to sexual organs. A further argument in sup- port of this view is that it is in complete agreement with what we know of the sexuality of the ordinary, free-living ascomycetes, where we find both normal and reduced forms (see Fungi).

Fruit Bodies. — We find two chief types of fruit bodies in the lichens, the 'perithecium and apothecium ; the first when the fungal element is a member of the Pyrenomycetes division of the Ascomycetes, the second when the fungus belongs to

FnmBeitrcgtzur WissenjchafUichen Botonik. the Discomycetes division.

Fig. 9. — Section of Heteromerous I n the two genera of lichens Lichen Thallus. —the Basidiolichens— in

I fer coS layer! \ ˆ ˆ W* * »»• c. Medullary layer. ber of the Basidiomycetes,

b, Gonidiaf layer. we have the fructification

characteristic of that class of fungi: these are dealt with separately. The perithecium is very constant in form and since the gonidia take no part

SSI

variations are of value in classification some more details mav be added.

They present various shapes, of which the following are “the principal : (a) peltate which are large, rounded, without any distinct thalhne margin 1 (eg. Usnea, Peltigera); (b) lecanorine, or scutelliform, which are orbicular and surrounded by a distinct more or less prominent, thalline margin (e.g. Parmelia, Lecanora), having sometimes also in addition a proper one 1 (e.g. Thelotrema, Urceolaria) ; (c) lecidetne, or patelliform, which are typically orbicular! with only a proper margin (e.g. Lecidea), sometimes obsolete, and which are occar sionally irregular in shape, angular or flexuose (e.g. Lecidea jut ana, L. myrmecma), or complicated and gyrose (e.g. Gyro-

phora), and even After Schwendener, from De Bary’s Vagleichcnde Mor stipitate (e.g. Wogie und Bwlogio dtr Piize Mytelozom und Bacterim, Baeomyces) ; (d) y P*™ 11 * 51011 ° f Wilhelm Engetmann. hrelliform, which Fig. 12. — Usnea barbata. (Mag. more than are of very irregu- . 5°o times.)

lar figure, elon- c > An isolated mature soredium, with an algal gated, branched or cel1 (Pleurococcus) in the envelope orfiyphae flexuose, with only d > Another with several algal cells in optical a proper margin longitudinal section.

(e.g. Xylographa, e < {• Two soredia in the act of germinating; the Graphis, &c.) or hyphal envelope has grown out below into none (e.g. some rjuzoid branches, and above shows already Arthoniae), and ' he structure of the apex of the thallus (see often very variable %• 9)- even in the same species. In colour the apothecia are extremely

Tu “fu ,1′ an , d n r\ s but rare, y that the y are the same colour’ as the thallus (e.g. Usnea, Ramalina). Usually they are of a different colour, and may be black, brown, yellowish, or also less frequently rose-coloured, rusty-red, orange-reddish, saffron, or of various intermediate shades. Occasionally in the same species their colour is very variable (e.g. Lecanora metaboloides, Lecidea decolorans) while sometimes they are white or glaucous, rarely greenish, pruinose Lecideine apothecia which are not black, but otherwise variously coloured, are

termed bmtorine. . ....

The two principal parts of which an apothecium consists are the hypothectum and the hymenium, or thecium The hypothecium is the basal part of the apothecium on which the hymenium is borne; the latter consists of asci (thecae) with ascospores, and paraphyses The paraphyses (which may be absent entirely in the Fyrenohchens) are erect, colourless filaments which are

j.f'?.™™.'™ De Gary's Vergikckende Morthologit und Engelmann ' MyCeU "° m uni ˆolerim, by permbsion of tfilhelm

Fig. 13. — A, B, Gyrophora cylindrica. (A mag. 90 B 390 times, C highly magnified.)

After Bornet. *on» De Bary's Vergleichende Morphologic und Biologic da Ptiu, Mycelozoai und Bacterim, by permission of y/iˆfai Engelmiˆn. * ' "*"""*»"• "»

Fig. j l— Lichen-forming Algae." (A, Q, D, E mag. 950, B 650 times.) The al(?a is in all cases indicated by the letter g, the assailing hyphae by h.

A, Phurococcus, Ag. (Cystococcus, Nag.) C, Nostoc from the thallus of Physma

attacked by the germ-tube from a chalazanum.

spore of Physiea parittina. . ,; ' D, Gloeocapsa from the thallus of

B, ˆcytonema from the thallus of Synalissa Symphorea.

ixtereocaulim tatnutosum, E, Pleurococcus Sp. (Cystococcus) from

,,..,. the thallus of Cladoniafurcata.

m the formation of this organ or that of the apothecium it lias the general' structure characteristic of that division of fungi. The alpotheciai, though of the normal fungal type and ufcually disk-shˆ»d,

0,

m, B,

A vertical median sec- tion through a sper- mogonium imbedded in the thallus.

Upper rind.

Under rind. [thallus.

Medullary layer of the

Portion of a very thin section from the base of the spermogonium.

w, Its wall from which

proceed sterigmata

with rod-like sper-

matia (s).

TO, Medullary hyphae of

the thallus. C, Cladonia novae A ngliae, Delise ; sterigmata with spermatia from the spermogohium. usually dilated and coloured at the apex; the apices are usually cemented together into a definite layer, the epithecium (fig. 14). The spores themselves may be unicellular without a septum or multicellular with one or more septa. Sometimes the two cavities are restricted to the two ends of the spore, the polari-tnlocular type and the two loculi may be united

The thalhne margin (margo thallinus) is the projecting edge of a special layer of thallus, the amphithecium, round the actual apothecium; the proper margin (margo proprius) is the proiectine edge of the apothecium itself. *

by a narrow channel (fig. 15). At other times the spores are divided by both transverse and longitudinal septa producing the munform (murali-divided) spore so called from the resemblance of the individual chambers to the stones in a wall. The very large single spores of Pertusaria have been shown to contain numerous nuclei and when they germinate develop a large number of germ tubes.

Development of the Ascocarps. — As the remarks on the nature of the spermatia show, the question of the sexuality of the lichens has been hotly disputed in common with that of the rest of the Ascomycetes. As indicated above, the weight of evidence seems to favour what has been put forward in the case of the non-lichen- forming fungi (see

Fungi), that in some cases the ascogonia develop as a result of a previous fertilization by spermatia, in other cases the ascogonia develop without such a union, while in still other

Epitheclum Ascl

Proper margin iThecium (Hymenium) A Paraphyse3

»i .’ / I ‘ ˆ

,— .«.„ ,„ / 1 £ ‘ 1 / Paratheclurn

TMifine marinn i I ibiiiiiiiiii i I \vm I IIMB limilmmin ‘

— — – MMMinn 1 – - Cortex

After Darbishire, from Berkhte der deutschen botanischen Gesellschaft by permission o» liomtraeger & Co.

Fig. 14. — Diagram showing Apothecium in Section and sur- rounding Portion of Thallus, and special terms used to designate these parts.

cases the reduction goes still farther and the ascogenous hyphae instead of developing from the ascogonia are derived directly from the vegetative hyphae.

The first exact knowledge as to the origin of the ascocarp was the work of Stahl on Collema in 1877. He showed that the archicarp consisted of two parts, a lower coiled portion, the ascogonium, and an upper portion, the trichogyne, which projected from the thallus. Only when a spermatium was found attached to the trichogyne did the further development of the ascogo.niura take place. From these observations he drew the natural conclusion that the spermatium was a male, sexual cell. This view was hotly contested by many workers and it was sought to explain the trichogyne — without much success — as a respiratory organ, or as a boring organ which made

a way for the developing

WBmm maˆmˆmmˆˆˆˆˆˆm • a P Qtnec ‘ um – It was not till

fe TWnilWn [fffnlii HnWW l898, however, that Stahl’s

\ \uUUj|| I [lˆlil lUIIIU W0I “k received confirmation

W Xa\ mJL|p” /WmII and addition at the hands

\ /**k>.\ ! l/TMEYIII.'.Sfc \1 f Baur (fig. 16). Thelatter

showed that in Collema crispum there are two kinds of thalli, one with numerous apothecia, the other quite sterile or bearing only a few. The sterile thalli possessed no spermogonia, but were found to show sometimes as many as 1000 archicarps with trichogynes; yet none orveryfew came to maturity. The fertile thalli were shown to bear either spermogonia " " or to be in immediate con-

FlG. 15. — Vertical Section of Apothe- nexion with spermogonia- cium of Xanthoria parietina. bearing thalli. Furthermore

a, Paraphyses. Baur showed that after the

4, Asci (thecae) with bilocular spores. fu . si ° n ? f the . spermatium c, Hyppthecium. wlth the trichogyne the

transverse walls of that organ became perforated. There was thus very strong circumstantial evidence in favour of fertilization, although the male nucleus was not traced. The further work of Baur, and that of Darbishire, Funfstuck and Lindau, have shown that in a number of other cases trichogynes are present. Thus ascogonia with trichogynes have been observed in Endocarpon, Collema, Pertusaria, Lecanora, Gyrophora, Parmelia, Ramaltna, Physcia, Anaptychia and Cladonia. In Nephroma, Peltigera, Peltidea and Solorina a cogonia without trichogynes have been observed. In Collema and a form like Xanthoria parietina it is probable that actual fertilization takes place, and possibly also in some of the other forms. It is probable, however, that in the majority of cases the ascogonia develop without normal fertilization,

After E, Baur, from Strasburger's Lekrbyck der Boianik, by permission of Gustav Fischer. Fig. 16.— Collema crispum.

A, Carppgonium, c, with its trichogyne I.

B, Apex of the trichogyne with the spermatium, i, attached.

as is necessarily the case where the jascogonia have no trichogyne* or the spermatia are absent. In these cases we should expect to find some reduced process of fertilization similar to that of Humaria granulata among the ordinary Ascomycetes, where in the absence of the antheridia the female nuclei fuse in pairs. In other lichens we should expect to find the ascogenous hyphae arising directly from the vegetative hyphae as in Humaria rulilans among the ordinary fungi, where the process is associated with' the fusion of vege- tative nuclei.

It is possible that So- lorina saccata belongs to this cjass. Cyfological details of nuclear behaviour among the lichens are, however, difficult to obtain owing to the slow growth of these forms and the often refractory nature of the material in the matter of preparation for microscopical ex- amination.

Ejection of Spores.- — The spores are ejected from the aDothecia and peri- thelia as in the fungi by forcible ejacu- lation from the asci. In the majority of forms it is clear that the soredia rather than the ascospore must play the more important part in lichen dis- tribution as the development of the ordinary spores is dependent on their finding the proper alga on the sub- stratum on which they happen to fall. In a number of forms (Endocarpon pusillum, Sligmaatonima cataleptum, various species 6f StaurOtheU), however, there is a special arrangement by which the spores are, on ejection, associated with gonidia. In these forms gonidia are found in connexion with the young fruit ; such algal cells undergo numerous divisions becoming very small in size and penetrating intp the hymenium among the asci and paraphyses. When the spores are thrown but some of these hymenial gonidia, as they are called, are carried with them. When the spores

germinate the germ-tubes surround the algal cells, whjch now in- crease in size and become the normal gonidia of the thallus.

Basidiolichens.

As is clear from the above, nearly all the lichens are, pro- duced by the association of ‘ an ascomycetous fungus with algae. For some obscure reason the Basidiomycetes do not readily form lichens, so that only a few forms are known in which the fungal element is a member of this family. The two best- known genera are Cora and Dictyonema; Coretfa, whose hymenium is un- ‘ known, is also placed here by Wainio. The so-called Gasterolichens, Trichocoma and Emeri- ■ cella, have been shown to be merely ascomy- cetous fungi. Clavaria mucida, however, . has apparently some claims to be considered as a Basidiolichen, since the base of the fruit body

and the thallus from From Strasburger’s Uhrbuch da Boianik, by which it arises, according P e ™ is s i °< > > °* Gustav Fischer.

to Coker, always shows , FlG – £ 7 ˆ C Z a t tfw ”” \ , A – Viewed • t f , ‘, , from above; B, From below: hym,

a mixture of hyphae and hymenium. (Nat. size.) algae.

The best-known species is Cora pavonia, which is found in tropical

regions growing on the bare earth and on trees; the gonidia belong to the genus Chroococcus while the fungus belongs, apparently, to the Thelephoreae (see Fungi), This lichen seems unique in the fact that the fungal element is also found growing and fruiting entirely devoid of algae* while ia the

ascolichens the fungus portion seems to have become so special- ized to its symbiotic mode of life that it is never found growing independently.

The genus Didyonema has gonidia belonging to the blue- green alga, Scytonema. When the fungus predominates in the thallus it has a bracket-like mode of growth and is found projecting from the branches of trees with the hymenium on the under side. When the alga is predominant it forms felted patches on the bark of trees, the Laudatea form. It is said that the fungus of Cora pavonia and of Didyonema is identical, the difference being in the nature of the alga.

Mode of Life. Lichens are found growing in various situations such as bare earth, the bark of trees, dead wood, the surface of stones and rocks, where they have little competition to fear from ordinary plants. As is well known, the lichens are often found in the most exposed and arid situations; in the extreme polar regions these plants are practically the only vegetable forms of life. They owe their capacity to live under the most in- hospitable conditions to the dual nature of the organism, and to their capacity to withstand extremes of heat, cold and drought without destruction. On a bare rocky surface a fungus would die from want of organic substance and an alga from drought and want of mineral substances. The lichen, however, is able to grow as the alga supplies organic food material and the fungus has developed a battery of acids (see below) which enable it actually to dissolve the most resistant rocks. It is owing to the power of disintegrating by both mechanical and chemical means the rocks on which they are growing that lichens play such an important part in soil-production. The resistance of lichens is extraordinary; they may be cooled to very low temperatures and heated to high temperatures without being killed. They may be dried so thoroughly that they can easily be reduced to powder yet their vitality is not destroyed but only suspended; on being supplied with water they absorb it rapidly by their general surface and renew their activity. The life of many lichens thus consists of alternating periods of activity when moisture is

plentiful, and completely suspended animation under conditions of dryness. Though so little sensitive to drought and extremes of temperature lichens appear to be very easily affected by the presence in the air of noxious sub- stances such as are found in large cities or manufacturing towns. In such districts lichen vegetation is entirely or almost entirely absent. The growth of lichens is extremely slow and many of them take years before they arrive at a spore-bearing stage. Xanthoria parietina has been known to grow for forty- five years before bearing apothecia. This slowness of growth is associated with great length of life and it is probable that individuals found growing on hard mountain rocks or on the trunks of aged trees are many hundreds of years old. It is possible that specimens of such long-lived species as Lecidea geographica actually outrival in longevity the oldest trees.

Relation of Fungus and Alga. The relation of the two constituents of the lichen have been briefly stated in the beginning of this article. The relation of the fungus to the alga, though it may be described in general terms as one of symbiosis, partakes also somewhat of the nature of parasitism. The algal cells are usually controlled in their growth by the hyphae and are prevented from forming zoospores, and in some cases, as already described, the algal cells are killed sooner or later by the fungus. The fungus seems, on the other hand, to stimulate the algal cells to special development, for those in the lichen are larger than those in the free state, but this is not necessarily adverse to the idea of parasitism, for it is well known that an increase in the size of the cells of the host is often the result of the attacks of parasitic fungi. It must be borne in mind that the exact nutritive relations of the two constituents of the lichen have not been completely elucidated, and that it is very difficult to draw the line between symbiosis and parasitism. The lichen algae are not alone in their specializa-

tion to the symbiotic (or parasitic) mode of life, for, as stated earlier, the fungus appear in the majority of cases to have com- pletely lost the power of independent development since with very rare exceptions they are not found alone. They also differ very markedly from free living fungi in their chemical reactions.

Chemistry of Lichens.

The chemistry of lichens is very complex, not yet fully investi- gated and can only be very briefly dealt with here. The wall of the hyphae of the fungus give in the young state the ordinary reactions of cellulose but older material shows somewhat different reactions, similar to those of the so-called fungus-cellulose. In many lichen- fungi the wall

shows various chemical modifications. In numerous lichens, e.g. Cetraria islandica, the wall contains Lichenin (CeHioOj), a gummy substance which swells in cold water and dissolves in hot. Besides this substance, a very similar one, Isolichenin, is also found which is distinguished from lichenin by the fact that it dissolves in cold water and turns blue under the reaction of Iodine. Calcium oxalate is a very common substance, especially in crustaceous lichens; fatty oil in the form of drops or as an infiltration in the membrane is also common; it sometimes occurs in special cells and in extreme cases may represent 90% of the dry substance as in Verrucaria caiciseda, Bialora immersa.

Colouring Matters. — Many lichens, as is well known, exhibit a vivid colouring which is usually due to the incrustation of the hyphae with crystalline excretory products. These excretory products have usually an acid nature and hence are generally known as lichen-acids. A large number of these acids, which are mostly benzene derivatives, have been isolated and more or less closely investigated. They are characterized by their insolubility or very slight solubility in water ; as examples may be mentioned erythrinic acid in Roccella and Lecanora; evernic acid in species of Evernia, Ramalina and Cladonia ; lecanoric acid in Lecanora,. Gyrophora. The so-called chrysophanic acid found in Xanthoria (Physcia) parietina is not an acid but a quinone and is better termed physcion. Colour Reactions of Lichens. — The classification of lichens is unique in the fact that chemical colour reactions are used by many lichen- ologists in the discrimination of species, and these reactions are included in the specific diagnoses. The substances used as tests in these reactions are caustic potash and calcium hypochlorite; the former being the substance dissolved in an equal weight of water and the latter a saturated extract of bleaching powder in water. These substances are represented by lichenologists by the signs K and CaCl respectively, and the presence or absence of the colour reactions are represented thus, K+, CaCl-K or K —, CaCl —. If the cortical layer should exhibit positive reaction and the medulla of the same species a negative reaction with both reagents, the result is represented thus, K^CaCl^. If a reaction is only produced after the consecutive addition of the two reagents, this is symbolized by K(CaCl)+. A solution of iodine is also used as a test owing to the blue or wine-red colour which the thallus, hymenium or spores may give with this reagen,t. The objection to the case of these colour reactions is due to the indefinite nature of the reaction and the doubt as to the constant presence of a definite chemical compound in a given species. A yellow colour with causticpotash solution is produced not only by atranoric acid but also by evernic acid, thamnolic acid, &c. Again in the case of Xanthoria parietina vulpinic acid is only to be

found in young thalli growing on sand- stone; in older forms or in those growing on another substratum it is not to be detected. A similar relation between oil formation and the nature of the substratum has been observed in many lichens. Considerations such as these should make one very wary in placing reliance on these colour reactions for the purposes of classification.

Economic Uses of Lichens.

In the arts, as food and as medicine, many lichens have been highly esteemed, though others are not now employed for the same purposes as formerly.

1. Lichens Used in the Arts. — Of these the most important are such as yield, by maceration in ammonia, the dyes known in commerce as archil, cudbear and litmus. These, however, may with propriety be regarded as but different names for the same pigmentary substance, the variations in the character of which are attributable to the different modes in which the pigments are manufactured. Archil proper is derived from several species of Roccella (e.g. R. Montaguei, R. tindoria), which yield a rich purple dye; it once fetched a high price in the market. Of considerable value is the ” perelle ” prepared from Lecanora parella, and used in the preparation of a red or crimson dye. Inferior to this is ” cudbear,” derived from Lecanora tartarea, which was formerly very extensively employed by the peasantry of north Europe for giving a scarlet or purple colour to woollen cloths. By adding certain alkalies to the other ingredients used

in the preparation of these pigments, the colour becomes indigo- blue, in which case it is the litmus of the Dutch manufacturers. Amongst other lichens affording red, purple or brown dyes may be mentioned Ramaiina •scopulorum, Parmelia., saxatilis and _P. amphalodes, Umbilicaria pustulata and several species of Gyrophora, Urceolaria scruposa, all of which are more or less employed as domestic dyes. Yellow dyes, again, are derived from Chlorea vulpina, Platysma juniperinum, Parmelia taper ala and P. cons per sa, Physcia flavicans, Ph. parietina and Ph. lychnea, . though like the preceding they do not form articles of commerce, being merely used locally by the natives of the regions in which they occur most plentifully. In addition to these, many exotic lichens, belonging especially to Parmelia and Sticta (e.g. Parmelia tinctorum, Sticta argyracea), are rich in colouring matter,

and, if obtained in sufficient quantity, would yield a dye in every way equal to archil. These pigments primarily depend upon special acids contained in the thalli of lichens, and their presence may readily be detected by means of the reagents already noticed. In the process of manufacture, however, they undergo various changes, of which the chemistry is still but little understood. At one time also some species were used in the arts for supplying a gum as a substitute for gum-arabic. These were chiefly Ramaiina fraxinea, Evernia prunastri and Parmelia physodes, all of which contain a consider- able proportion of gummy matter (of a much inferior quality, however, to gum-arabicˆ), and were employed in the process of calico-printing and in the making of parchment and cardboard. In the 17 th century some filamentose andfruticulose lichens ; viz. species of Usnea and Ramaiina, also Evernia furfuracea and Cladonia rangiferina, were used in the art of perfumery. From their supposed aptitude to imbibe and retain odours, their powder was the basis of various perfumes, such as the celebrated ” Poudre de Cypre ” of the hairdressers, but their employment in this respect has long since been abandoned.

2. Nutritive Lichens.—ˆOi still greater importance is the capacity of many species for supplying food for man and beast. This results from their containing starchy substances, and in some cases a small quantity of saccharine matter of the nature of mannite. One of the most useful nutritious species is Cetraria islandica, “■ Iceland moss,” which, after being deprived of its bitterness by boiling in water, is reduced to a powder and made into cakes, or is boiled and eaten with milk by the poor Icelander, whose sole food it often constitutes. Similarly Cladonia rangi- ferina and CI. sylvatica, the familiar ” reindeer moss,” are frequently eaten by man in times of scarcity, after being powdered and mixed with flour. Their chief importance, however, is that in Lapland and other northern countries they supply the winter food of the reindeer and other animals, who scrape away the snow and eagerly feed upon them. Another nutritious lichen is the “Tripe de Roche” of the arctic regions, consisting of several species of the Gyrophorei,> which when boiled is often eaten by the Canadian hunters and Red Indians when pressed by hunger. But the most singular esculent lichen of all is the ” manna lichen,” which in times of drought and famine has served as food for large numbers of men and cattle in the arid steppes of various countries stretching from Algiers to Tartary. This is derived chiefly from Lecanora esculenta, which grows unattached on the ground in layers from 3 to 6 in. thick over large tracts of country in the form of small irregular lumps of a greyish or white colour. In connexion with their use as food we may observe that of recent years in Scandinavia and Russia an alcoholic

spirit has been distilled ! from Cladonia rangiferina and extensively con- sumed, especially* in seasons when potatoes were scarce and dear. Formerly also Sticta pulmonaria was much employed in brewing instead of hops, and it is said that a Siberian monastery was much celebrated for its beer which was flavoured with the bitter principle of this species.

3. Medicinal Lichens. — During the middle ages, and even in some quarters to a much later period, lichens were extensively used in medicine in various European countries. Many species had a great repute as demulcents, febrifuges, astringents, tonics, purgative* and anthelmintics. The chief of those employed

for one or other, and in some cases for several, of these purposes were Cladonia pyxidata, Usnea barbata, Ramaiina farinacea, Evernia prunastri, Cetraria islandica, Sticta pulmonaria, Parmelia saxatilis, Xanthoria parietina and Pertusaria amara. Others again were believed to be endowed with specific virtues, e.g. Peltigera canina, which formed the basis of the celebrated ■" pulvis antilyssus " of Dr Mead, long regarded as a sovereign cure for hydrophobia; Platysma juniperinum, lauded as a specific in jaundice, no doubt on the similia similibus principle from a resemblance between its yellow colour and that of the jaundiced skin; Peltidea aphthosa, which on the same principle was regarded by the Swedes, when boiled in milk, as an effectual remedy for the aphthae or rash on their children. Almost all of these virtues, general or specific, were imaginary; and at the present day, except perhaps in some remoter districts of northern Europe, only one of them is employed as a remedial agent. This is the "Iceland moss" of the druggists' shops, which is undoubtedly an excellent demulcent in various dyspeptic and chest complaints. No lichen is known to be possessed of any poisonous properties to man, although Chlorea vulpina is believed by the Swedes to be so. Zukal has considered that the lichen acids protect the lichen from the attacks of animals; the experiments of Zopf, however, have cast doubt on this; certainly lichens containing very bitter acids are eaten by mites though some of the acids appear to be poisonous to frogs.

Classification.

The dual nature of the lichen thallus introduces at the outset a classificatory difficulty. Theoretically the lichens may be classified on the basis of their algal constituent, on the basis of their fungal constituent, or they may be classified as if they were homogeneous organisms. The first of these systems is impractic- able owing to the absence of algal reproductive organs and the similarity of the algal

cells (gonidia) in a large number of different forms. The second system is the most obvious one, since the fungus is the dominant partner and produces reproductive organs. The third system was that of Nylander and his followers, who did not accept the Schwenderian doctrine of duality. In actual practice the difference between the second and third methods is not very great since the fungus is the producer of the reproductive organs and generally the main constituent. Most systems agree in deriving the major divisions from the characters of the reproductive organs (perithecia, apothecia, or basidiospore bearing fructification), while the characters of the algal cells and those of the thallus generally are used for the minor divisions. The difference between the various systems lies in the relative importance given to the reproductive characters on the one hand and the vegetative characters on the other. In the system (1854-1855) of Nylander the greater weight is given to the latter, while in more modern systems the former characters receive the more attention.

A brief outline of a system of classification, mainly that of Zahlbruckner as given in Engler and Prantl's Pfianzenfamttien, is outlined below.

There are two main divisions of lichens, Ascolichenes and Basidiolichenes, according to the nature of the fungal element, whether an ascomycete or basidiomycete. The Ascolichenes are again divided into Pyrenocarpeae or Pyrenolichenes and Gymnocarpeae or Discolichenes; the first having an ascocarp of the nature of aperithecium, the second bearing their ascospores in an open apothecium.

Pyrenolichenes

Series I. Perithecium simple not divided.

a. With Pleurococcus or Palmetta gonidia.

Moriolaceae, Verrucariaceae, Pyrenothamnaceae.

b. With Chroolepus gonidia.

Pyrenulaceae, Paratheliaceae.

c. With Phyllactidium or Cephaleurus gonidia.

Strigulaceae.

d. With Nostoc or Scytonema gonidia.

Pyrenidiaceae.

Series II. Perithecia divided or imperfectly divided by cross-waits.' Mycoporaceae with Palmetta or Chroolepus gonidia.

LICHENS

585

DlSCOLICHENES

Scries I. Coniocarpineae. The paraphyses branch and form a net- work (capillitium) over the asci, the capillitium and ejected spores forming a long persistent powdery mass (mazaedium). Caliciaceae, Cypheliaceae, Sphaerophoraceae. Series II. Graphidineae. Apothecia seldom round, usually elongated- ellipsoidal, no capillitium. Arthoniaceae, Graphidiaceae, Roccellaceae. Series III. Cyclocarpineae, Apothecium usually circular, no capil- litium.

A. Spores usually two-celled, either with a strongly thickened

cross-wall often perforated by a narrow canal or with cross- wall only slightly thickened. In the first case the spores are usually colourless, the second case always brown. Buelliaceae, Physciaceae.

B. Spores unicellular, parallel-multicellular or muriform, usually

colourless, cross-walls usually thin.

a Thallus in moist state more or less gelatinous.

Gonidia always belonging to the Cyanophyceae, Lichinaceae, Ephebaceae, Collemaceae, Pyrenopsi- daceae. (3 Thallus not gelatinous.

Coenogoniaceae, Lecideaceae, Cladoniaceae, Leca- noraceae, Pertusariaceae, Peltigeraceae, Stictaceae, Pannariaceae, Gyrophoraceae, Parmeliaceae, Clado- niaceae, Usneaceae.

Basidiolichenes (Hymenolichenes) Cora, Diclyonema (incl. Laudatea), Corella (doubtfully placed here as the hymenium is unknown).

Habitats and Distribution of Lichens. 1. Habitats. — These are extremely varied, and

comprise a great number of very different substrata. Chiefly, however, they are the bark of trees, rocks, the ground, mosses and, rarely,

perennial leaves, (a) With respect to corticolous lichens, some prefer the rugged bark of old trees (e.g. Ramalina, Parmelia, Stictei) and others the smooth bark of young trees and shrubs (e.g. Graphidei and some Lecideae). Many are found principally in large forests (e.g. Usnea, Alectoria jubata) ; while a few occur more especially on trees by roadsides (e.g. Physcia parielina and Ph. pulverulcnta). In connexion with corticolous lichens may be mentioned those lignicole species which grow on decayed, or decaying wood of trees and on old pales (e.g. Caliciei, various Lecideae, Xylographa), (b) As to saxicolous lichens, which occur on rocks and stones, they may be divided into two sections, viz. cakkolous and calcijugous. To the former belong such as are found on calcareous and cretaceous rocks, and the mortar of walls (e.g. Lecanora calcarea, Lecidea calcivora and several Vcrrucariae), while all other saxicolous lichens may be regarded as belonging to the latter, whatever may be the mineralogical character of the substratum. It is here worthy of notice that the apothecia of several calcicolous lichens (e.g. Lecanora Prevostii, Lecidea calcivora) have the power of forming minute cavities in the rock, in which they are partially buried, (c) With respect to terrestrial species, some prefer peaty soil (e.g. Cladonia, Lecidea decolor ans), others calcareous soil (e.g. Lecanora crassa, Lecidea decipiens), others sandy soil or hardened mud (e.g. Collema limosum, Peltidea venosa); while many may be found growing on all kinds of soil, from the sands of the sea-shore to the granitic detritus of lofty mountains, with the exception of course of cultivated ground, there being no agrarian lichens. (d) Muscicolous lichens again are such as are most frequently met with on decayed mosses and Jungermannia, whether on the ground, trees or rocks (e.g. Leptogium muscicola, Gomphittus calicioides). (e) The epiphyllous species are very peculiar as occurring upon perennial leaves of certain trees and shrubs, whose vitality is not at all affected by their presence as it is by that of fungi. In so far, however, as is known, they are very limited in number (e.g. Lecidea, Bouleillei, Singula).

Sometimes various lichens occur abnormally in such un- expected habitats as dried dung of sheep, bleached bones of reindeer and whales, old leather, iron and glass, in districts where the species are abundant. It is apparent that in many cases lichens are quite indifferent to the substrata on which they occur, whence we infer that the preference of several for certain substrata depends upon the temperature of the locality

or that of the special habitat. Thus in the case of saxicolous lichens the mineralogical character of the rock has of itself little or no influence upon lkhen growth, which is influenced more especially and directly

by their physical properties, such as their capacity for retaining heat and moisture. As a rule lichens grow commonly in open exposed habitats, though some are found only or chiefly in shady situations", while, as* alf eady observed, scarcely any occur where the atmosphere is impreg- nated with smoke. Many species also prefer growing in moist places by streams, lakes and the sea, though very f ew'are normally and probably none entirely, aquatic, being always at' certain seasons exposed for a longer or shorter period to the atmosphere (e.g. Lichina, Leptogiumrivulare, Endocarponfl-uviatUe, Verrucaria maura). Some species are entirely parasitical on other lichens (e.g. various Lecideae and Pyrenocarpei), and may be peculiar to one (e.g. Lecidea vitellinaria) or common to several species (e.g. Habrothallus parmeliarum) . "A few, generally known as erratic species, have been met with growing unattached to' any substratum (e.g. Parmelia revoluta, var. concentrica, Lecanora esculenta); but it can hardly be that these are really free ab initio (vide Crombie in J own. Bot., 1872, p. 306). It is to the different characters of the stations they occupy with respect to exposure, moisture, &c, that the variability observed in many types of lichens is to be attributed.

2. Distribution. — From what has now been said it will readily be inferred that the distribution of lichens over the" surface of the glolle is regulated, not only by the presence of suitable substrata, but more especially by climatic conditions. At the same time it may safely be affirmed that their geographical range is more extended than that of any other class of plants, occurring as they do in the coldest and warmest regions — on the dreary shores of arctic and antarctic seas and in the torrid valleys of tropical climes, as well as on the greatest mountain elevations yet attained by man, on projecting rocks even far above the snow- line (e.g. Lecidea geographica) . In arctic regions lichens form by far the largest portion of the vegetation, occurring everywhere on the ground and on rocks, and fruiting freely; while terrestrial species of Cladonia and Stereocaulon are seen in the greatest luxuriance and abundance spreading over extensive tracts almost to the entire exclusion of other vegetation. The lichen flora of temperate regions again is essentially distinguished from the preceding by the frequency of corticolous species belonging to Lecanora, Lecidea and Graphidei. In intertropical regions lichens attain their maximum development (and beauty) in the foliaceous Stictei and Parmeliei, while they are especially characterized by epiphyllous species, as Strigula, and by many peculiar corticole Thelotremei, Graphidei and Pyrenocarpei. Some lichens, especially saxicolous ones, seem to be cosmopolitan (e.g. Lecanora subfusca, Cladonia pyxidata); and others, not strictly cosmopolitan, have been

observed in regions widely apart. A considerable number of species, European and exotic, seem to be endemic, but further research will no doubt show that most of them occur in other climatic regions similar to those in which they have hitherto alone been detected. To give any detailed account, however, of the distribution of the different genera (not to speak of that of individual species) of lichens would necessarily far exceed available limits.

Bibliography. — General: Engler and Prantl, Die naturlichen Pflanzenfamilien, Teil 1, Abt. I * where full literature will be found up to 1898. M. Funfstuck, ” Der gegenwartige Stand der Flechten-kunde,” Refer. Generalvers. d. dent. bot. Ges. (1902). Dual Nature: J. Baranetzky, ” Beitrage zur Kenntnis des selbststandigen Lebens der Flechtengonidien,” Prings. Jahrb. f. wiss. Bot. vii. (1869); E ; Bornet, ” Recherches sur les gonidies des lichens,” Ann: de sci. not. bot., 5 ser. n. 17 (1873); G. Bonnier, ““Recherches sur la synthase des lichens,” Ann. de sci. not. bot., 7 ser. n. 9 (1889); A. Famintzin and J. Baranetzky, ” Zur Entwickelungsgeschichte der Gonidien u. Zoosporenbildung der Lichenen,” Bot. Zeit. (1867, p. 189, 1868, p. 169); S. Schwendener, Die Algentypen der Flechten- gonidien (Basel, 1869); A. Moller, Uber die Kultur flechtenbildender Ascomyceten ohne Algen. (Minister, 1887). Sexuality: E. Stahl, Beitrage zur ˆEntwickelungsgeschichte der Flechten (Leipzig, 1877).; G. Lindau, fiber Anlage una” Entwickelung einiger Flechtenapothecun (Flora, 1888); E. Baur, “Zur Frage nach der Sexualitat der Collemaceae,” Ber. d. deut. bot. Ges. (1898) ; ” Uber Anlage trad

Entwickelung einiger Flechtenapothecien ” (Flora, Bd. 88, 1901); ” Untersuchungen iiber die Entwickelungsgeschichte der Flechtena-pothecien,” Bol. Zeit. (1904); O. V. Darbishire, ” Cber die Apothe-cium-entwickelung der Flechte, Physcia pulverulenta,” Nyl. Prings. Jahrb. (Bd. 34, 1900). Chemistry. — W. Zopf, ” Vergleichende Pro-dukte,” Beitr. z. bot. Centralbl. (Bd. 14, 1903) ; Die Flechtenstoffe (Jena, 1907). (J. M. C; V. H. B.)

LICHFIELD, a city, county of a city, and municipal borough in the Lichfield parliamentary division of Staffordshire, England, 118 m. N.W. from London. Pop. (1901) 7902. The London and North-Western railway has stations at Trent Valley Junction on the main line, and in the city on a branch westward. The town lies in a pleasant country, on a small stream draining eastward to the Trent, with low

hills to the E. and S. The cathedral is small (the full internal length is only 370 ft., and the breadth of the nave 68 ft.), but beautiful in both situation and style. It stands near a picturesque sheet of water named Minster Pool. The present building dates from various periods in the 13th and early 14th centuries, but the various portions cannot be allocated to fixed years, as the old archives were destroyed during the Civil Wars of the 1 7th century. The earlier records of the church are equally doubtful. A Saxon church founded by St Chad, who was subsequently enshrined here, occupied the site from the close of the 7th century; of its Norman successor portions of the foundations have been excavated, but no record exists either of its date or of its builders. The fine exterior of the cathedral exhibits the feature, unique in England, of a lofty central and two lesser western spires, of which the* central, 252 ft. high, is a restoration attributed to Sir Christopher Wren after its destruction during the Civil Wars. The west front is composed of three stages of ornate arcading, with niches contain- ing statues, of which most are modern. Within, the south transept shows simple Early English work, the north transept and chapter house more ornate work of a later period in that style, the nave, with its geometrical ornament, marks the transition to the Decorated style, while the Lady chapel is a beautiful specimen of fully developed Decorated work with an apsidal east end. The west front probably falls in date between the nave and the Lady chapel. Among numerous monuments are — memorials to Samuel Johnson, a native of Lichfield, and to David Garrick, who spent his early life and was educated here; a monument to Major Hodson, who fell in the Indian mutiny, and whose father was canon of Lichfield; the tomb of Bishop Hacket, who restored the cathedral after the Civil Wars; and a remarkable effigy of Perpendicular date displaying Sir John Stanley stripped to the waist and awaiting chastisement. Here is also the" Sleeping Children," a masterpiece by Chantrey (1817). A picturesque bishop's palace (1687) and a theological college (1857) are adjacent to the cathedral. The diocese covers the greater part of Staffordshire and about half the parishes in Shropshire, with small portions of Cheshire and Derbyshire. The church of St Chad is ancient though extensively restored; on its site St Chad is said to have occupied a hermit's cell. The principal schools are those of King Edward and St Chad. There are many picturesque half-timbered and other old houses, among which is that in which Johnson was born, which stands in the market-place, and is the property of the corporation and opened to the public. There is also in the market place a statue to Johnson. A fair is held annually on Whit-Monday, accompanied by a pageant of ancient origin. Brewing is the principal industry, and in the neighbourhood are large market gardens. The city is governed by a mayor, 6

aldermen and 18 councillors. Area, 3475 acres.

There is a tradition that ” Christianfield ” near Lichfield was the site of the martyrdom of a thousand Christians during the persecutions of Maximian about 286, but there is no evidence in support of the tradition. At Wall, 3 m. from the present city, there was a Romano-British village called Letocetum (” grey wood “), from which the first half of the name Lichfield is derived. The first authentic notice of Lichfield {Lyecidfelth, Lychfeld, Litchfield) occurs in Bede’s history where it is mentioned as the place where St Chad fixed the episcopal see of the Mercians. After the foundation of the see by St Chad in 669, it was raised in

786 by Pope Adrian through the influence of Offa, King of Mercia, to the dignity of an archbishopric, but in 803 the primacy was restored to Canterbury. In 1075 the see of Lichfield was removed to Chester, and thence a few years later to Coventry, but it was restored in 1148. At the time of the Domesday Survey Lichfield was held by the bishop of Chester: it is not called a borough, and it was a small village, whence, on account of its insignificance, the see had been moved. The lordship and manor of the town were held by the bishop until the reign of Edward VI., when they were leased to the corporation. There is evidence that a castle existed here in the time of Bishop Roger Clinton {temp. Henry I.), and a footpath near the grammar- school retains the name of Castle-ditch. Richard II. gave a charter (1387) for the foundation of the gild of St Mary and St John the Baptist; this gild obtained the whole local government, which it exercised until its dissolution by Edward VI., who incorporated the town (1548), vesting the government in two bailiffs and twenty-four burgesses; further charters were given by Mary, James I. and Charles II. (1664), the last, incorporating it under the title of the ” bailiffs and citizens of the city of Lich- field,” was the governing charter until 1835; under this charter the governing body consisted of two bailiffs and twenty-four brethren. Lichfield sent two members to the parliament of 1304 and to a few succeeding parliaments, but the representation did not become regular until 1552; in 1867 it lost one member, and in 1885 its representation was merged in that of the county. By the charter of James I. the market day was changed from Wednesday to Tuesday and Friday; the Tuesday market disappeared during the 19th century; the only existing fair is a small pleasure fair of ancient origin held on Ash-Wednesday; the annual fete on Whit-Monday claims to date from the time of Alfred. In the Civil Wars Lichfield was divided. The cathedral authorities with a certain following were for the king, but the townsfolk generally sided with the parliament, and this led to the fortification of the close in 1 6 43 . Lord B rooke, notorious for his

hostility to the church, came against it, but was killed by a deflected bullet on St Chad's day, an accident welcomed as a miracle by the Royalists. The close yielded and was retaken by Prince Rupert in this year; but on the break- down of the king's cause in 1646 it again surrendered. The cathedral suffered terrible damage in these years.

See Rev. T. Harwood, Hist, and Antiquities of Church and City of Lichfield (1806), Victoria County History, Stafford. .

LICH-GATE, or Lych-Gate (from O. Eng. lie " a body, a corpse ";cf. Ger. Leiche), the roofed-in gateway or porch-entrance to churchyards. Lich-gates existed in England certainly thirteen centuries ago, but comparatively few early ones survive, as they were almost always of wood. One at Bray, Berkshire, is dated 1448. Here the clergy meet the corpse and some portion of the service is read. The gateway was really part of the church; it also served to shelter the pall-bearers while the bier was brought from the church. In some lich-gates there stood large flat stones called lich-stones upon which the corpse, usually uncoffined, was laid. The most common form of lich-gate is a simple shed composed of a roof with two gabled ends, covered with tiles or thatch. At Berrynarbor, Devon, there is a lich-gate in the form of a cross, while at Troutbeck, Westmorland, there are three lich-gates to one churchyard. Some elaborate gates have chambers over them. The word lich entered into com- position constantly in old English, thus, lich-bell, the hand-bell rung before a corpse; lich- way, the path along which a corpse was carried to burial (this in some districts was supposed to establish a right-of-way); lich-owl, the screech-owl, because its cry was a portent of death; and lyke-wake, a night watch over a corpse.

LICHTENBERG, GEORG CHRISTOPH (1742-1799), German physicist and satirical writer, was born at Oberramstadt, near Darmstadt, on the 1st of July 1742. In 1763 he entered Gottingen university, where in 1769 he became extraordinary professor of physics, and six years later ordinary professor. This post he held till his death on the 24th of February 1799. As a physicist

he is best known for his investigations in electricity, more especially as to the so-called Lichtenberg figures, which are fully described in two memoirs Super nova methodo motum ac naturam fluidi electrici investigandi (Gottingen, 1777-1778). These figures, originally studied

on account of the light they were supposed to throw on the nature of the electric fluid or fluids, have reference to the distribution of electricity over the surface of non-conductors. They are produced as follows: A sharp-pointed needle is placed perpendicular to a non-conducting plate, such as of resin, ebonite or glass, with its point very near to or in contact with the plate, and a Leyden jar is discharged into the needle. The electrification of the plate is now tested by sifting over it a mixture of flowers of sulphur and red lead. The negatively electrified sulphur is seen to attach itself to the positively electrified parts of the plate, and the positively electrified red lead to the negatively electrified parts. In addition to the distribution of colour thereby produced, there is a marked difference in the form of the figure, according to the nature of the electricity originally communicated to the plate. If it be positive, a widely extending patch is seen on the plate, consisting of a dense nucleus, from which branches radiate in all directions; if negative the patch is much smaller and has a sharp circular boundary entirely devoid of branches. If the plate receives a mixed charge, as, for example, from an induction coil, a ” mixed ” figure results, consisting of a large red central nucleus, corresponding to the negative charge, surrounded by yellow rays, corresponding to the positive charge. The difference between the positive and negative figures seems to depend on the presence of the air; for the difference tends to disappear when the experiment is conducted in vacuo. Riess explains it by the negative electrification of the plate caused by the friction of the water vapour, &c, driven along the surface by the explosion which accompanies the disruptive discharge at the point. This electrification would favour the spread of a positive, but hinder that of a negative discharge. There is, in all probability, a connexion between this phenomenon and the peculiarities of positive and negative brush and other discharge in air.

As a satirist and humorist Lichtenberg takes high rank among the German writers of the 18th century. His biting wit involved him in many controversies with well-known contemporaries, such as Lavater, whose science of physiognomy he ridiculed, and Voss, whose views on Greek pronunciation called forth a powerful satire, Vber die Pronunciation der Schopse des alien Gricchenlandes (1782). In 1769 and again in 1774 he resided for some time in England and his Briefe aus England (1776-1778), with admirable descriptions of Garrick’s acting, are the most attractive of his writings. He contributed to the Gbttinger Taschenkalender from 1778 onwards, and to the Gottingisches Magazin dcr Literatur und Wissenschaft, which he edited for three years (1780-1782) with J. G. A. Forster. He also published in 1794-1799 an Ausfiihrliche Erkl&rung der Hogarthschen

Kupfersliche.

Lichtenberg's Vermischte Schriften were published by F. Kries in 9 vols. (1800-1805) ; new editions in 8 vols. (1844-1846 and 1867). Selections by E. Grisebach, Lichtenbergs Gedanken und Maximen (1871); by F. Robertag (in Kiirschner's Deutsche Nationalliteratur (vol. 141, 1886); and by A. Wilbrandt (1893). Lichtenberg's Briefe have been published in 3 vols, by C. Scntiddekopf and A. Leitzmann (1900-1902); his Aphorismen by A. Leitzmann (3 vols., 1902-1906). | See also R. M. Meyer, Swift und Lichtenberg (1886); F. Lauchert, Lichtenbergs schriftstellerische Tdtigkeit (1893) ; and A. Leitzmann, Aus Lichtenbergs Nachlass (1899).

LICHTENBERG, formerly a small German principality on the west bank of the Rhine, enclosed by the Nahe, the Blies and the Glan, now belonging to the government district of Trier, Prussian Rhine province. The principality was constructed of parts of the electorate of Trier, of Nassau-Saarbrucken and other districts, and lay between Rhenish Bavaria and the old Prussian province of the Rhine. Originally called the lordship of Baum- holder, it owed the name of Lichtenberg and its elevation in 18 1 9 to a principality to Ernest, duke of Saxe-Coburg, to whom it was ceded by Prussia, in 1816, in accordance with terms agreed upon at the congress of Vienna. The duke, however,

restored it to Prussia in 1834, in return for an annual pension of £12,000 sterling. The area is about 210 sq. m.

LICINIANUS, GRANIUS, Roman annalist, probably lived in the age of the Antonines (2nd century a.d.). He was the author of a brief epitome of Roman history based upon Livy, which he utilized as a means of displaying his antiquarian lore. Accounts of omens, portents, prodigies and other remarkable things apparently took up a considerable portion of the work. Some fragments of the books relating to the years 163-178 B.C. are preserved in a British Museum MS.

Editions. — C. A. Pertz (1857); seven Bonn students (1858); M. Flemisch (1904); see also J. N. Madvig, Kleine philologische Schriften (1875), and the list of articles in periodicals in Flemisch's edition (p. iv.).

LICINIUS [Flavius Galerius Valerius Licinianus], Roman emperor, a.d. 307-324, of Illyrian peasant origin, was born probably about 250. After the death of Flavius Valerius Severus he was elevated to the rank of Augustus by Galerius, his former friend and companion in arms, on the 1 ith of November 307, receiving as his immediate command the

provinces of Illyricum. On the death of Galerius, in May 311, he shared the entire empire with Maximinus, the Hellespont and the Thracian Bosporus being the dividing line. In March 313 he married Constantia, half-sister of Constantine, at Mediolanum (Milan), in the following month inflicted a decisive defeat on Maximinus at Heraclea Pontica, and established himself master of the East, while his brother-in-law, Constantine, was supreme in the West. In 314 his jealousy led him to encourage a treasonable enterprise on the part of Bassianus against Constantine. When his perfidy became known a civil war ensued, in which he was twice severely defeated — first near Cibalae in Pannonia (October 8th, 314), and next in the plain of Mardia in Thrace; the out- ward reconciliation, which was effected in the following December, left Licinius in possession of Thrace, Asia Minor, Syria and Egypt, but added numerous provinces to the Western empire. In 323 Constantine, tempted by the ” advanced age and un-popular vices ” of his colleague, again declared war against him, and, having defeated his army at Adrianople (3rd of July 323), succeeded in shutting him up within the walls of Byzantium. The defeat of the superior fleet of Licinius by Flavius Julius Crispus, Constantine’s eldest son, compelled his withdrawal to Bithynia, where a last stand was made; the battle of Chrysopolis, near Chalcedon (18th of September), finally resulted in his submission. He was interned at Thessalonica and executed in the following year on a charge of treasonable correspondence with the barbarians.

See Zosimus ii. 7-28 ; Zonaras xiii. I ; Victor, Caes. 40, 41 ; Eutropius x. 3 ; Orosius vii. 28.

LICINIUS CALVUS STOLO, GAIUS, Roman statesman, the chief representative of the plebeian Licinian gens, was tribune in 377 B.C., consul in 361. His name is associated with the Licinian or Licinio-Sextian laws (proposed 377, passed 367), which practically ended the struggle between patricians and plebeians. He was himself fined for possessing a larger share of the public land than his own law allowed.

See Rome: History, II. ” The Republic.”

LICINIUS MACER CALVUS, GAIUS (82-47 B.C.), Roman poet and orator, was the son of the annalist Licinius Macer. As a poet he is associated with his friend Catullus, whom he followed in style and choice of subjects. As an orator he was the leader of the opponents of the florid Asiatic school, who took the simplest Attic orators as their model and attacked even Cicero as wordy and artificial. Calvus held a correspondence on questions connected with rhetoric, perhaps (if the reading be correct) the commentarii alluded to by Tacitus (Dialogus,

23; compare also Cicero, Ad Fam. xv. 21). Twenty-one speeches by him are mentioned, amongst which the most famous were those delivered against Publius Vatinius. Calvus was very short of stature, and is alluded to by Catullus (Ode 53) as Sala- putium disertum (eloquent Lilliputian).

For Cicero's opinion see Brutus, 82; Quintilian x. I. 115; Tacitus, Dialogus, 18. 21; the monograph by F. Plessis (Paris, 1896) contains a collection of the fragments (verse and prosej.

LICODIA EUBEA, a town of Sicily in the province of Catania, 4 m. W. of Vizzini, which is 39 m. S.W. of Catania by rail. Pop. (1001) 7033. The name Eubea was given t<) the place in 1872 owing to a false identification with the Greek city of Euboea, a colony of Leontini, founded probably early in the 6th century B.C. and taken by Gelon. The town occupies the site of an unknown Sicel city, the cemeteries of which have been explored. A few vases of the first period were found, but practically all the tombs explored in 1898 belonged to the fourth period (700- 500 B.C.) and show the gradual process of Hellenization among the Sicels.

See Romische Milleilungen, 1898, 305 seq.; Notizie degli scavi, 1902, 219. (T. As.)

LICTORS (liclores), in Roman antiquities, a class of the attendants (apparitores) upon certain Roman and provincial magistrates. 1 As an institution (supposed by some to have been borrowed from Etruria) they went back to the regal period and continued to exist till imperial time's. The majority of the city lictors were freedmen; they formed a corporation divided into decuries, from which the lictors of the magistrates in office were drawn; provincial officials had the nomination of their own. In Rome they wore the toga, perhaps girded up; on a campaign and at the celebration of a triumph, the red military cloak (sagulum); at funerals, black. As representatives of magis- trates who possessed the imperium, they carried the fasces and axes in front of them (see Fasces). They were exempt from military service; received a fixed salary; theoretically they were nominated for a year, but really for life. They were the constant attendants, both in and out of the house, of the magistrate to whom they were attached. They walked before him in Indian file, cleared a passage for him (summovere) through the crowd, and saw that he was received with

the’ marks of respect due to his rank. They stood by him when he took his seat on the tribunal; mounted guard before his house, against the wall of which they stood the fasces; summoned offenders before him, seized, bound and scourged them, and (in earlier times) carried out the death sentence. It should be noted that directly a magistrate entered an allied, independent state, he was obliged to dispense with nis lictors. The king had twelve lictors; each of the consuls (immediately kiter their institution) twelve, subsequently limited to the monthly officiating consul, although Caesar appears to have restored the original arrangement; the dictator, as representing both consuls, twenty-four; the emperors twelve, until the time of Domitian, who had’ twenty-four. The Flamen Dialis, each of the Vestals, the magister vicorum (over seer of the sections into which the city was divided) were also accompanied by lictors. These lictors were probably supplied from the lictores curiatii, thirty in number, whose functions were specially religious, one of them being in attendance on the pontifex maximus. They originally summoned the comitia curiata, and when its meetings became merely a formality, acted as the representatives of that assembly. Lictors were also assigned to private individuals at the celebration of funeral games, and ‘to the aediles at the games provided by them and the theatrical representations under their Supervision.

For the fullest account of the lictors, see ‘ Mommsen, Romisches Staatsrecht, i. 355, 374 (3rd Cd.yi887); ■ ■-■

LIDDELL, HENRY GEORGE (181 1-1898), English scholar and divine, eldest son of the Rev. Henry George Liddell, younger brother of the first Baron Ravensworth, was born at Binchester, near Bishop Auckland, on the 6th of February 181 1. He was educated at Charterhouse and Christ Church, Oxford. Gaining a double first in 1833, Liddell became a college tutor, and was ordained in 1838. In the’ same’ year Dean Gaisford appointed him Greek reader in Christ Church, and in 1846 he was appointed

1 The Greek equivalents of lictor axe pa/SSovˆos, t>a0&o6pos, fia&Sovoiios (rod-bearer) ; the Latin word is variously derived from: (a) ligare, to bind or arrest a criminal; (b) licere, to summon, as convoking assemblies or haling offenders before the magistrate; (c) licium, the girdle with which (according to some) their toga was held up; (fi) Plutarch (Quaestiones Romanae, 67), assuming an older form Xirwp, suggests an identification with \tirovpy6s, one who performs a public office.

to the headmastership of Westminster School. Meanwhile his life

work, the great Lexicon (based on the German work of F. Passow), which he and Robert Scott began as early as 1834, had made good progress, and the first edition appeared in 1843. It immediately became the standard Greek-English dictionary and still maintains this rank, although, notwithstanding the great additions made of late to our Greek vocabulary from inscriptions, papyri and other sources, scarcely any enlargement has been made since about 1880. The 8th edition was published in 1897. As headmaster of Westminster Liddell enjoyed a period of great success, followed by trouble due to the outbreak of fever and cholera in the school. In 1855 he accepted the deanery of Christ Church, then vacant by the death of Gaisford. In the same year he brought out a History of Ancient Rome (much used in an abridged form as the Student's History of Rome) and took a very active part in the first Oxford University Com- mission. His tall figure, fine presence and aristocratic mien were for many years associated with all that was characteristic of Oxford life. Coming just at the transition period when the " old Christ Church," which Pusey strove so hard to preserve, was inevitably becoming broader and more liberal, it was chiefly due to Liddell that necessary changes were effected with the minimum of friction. In 1859 Liddell welcomed the then prince of Wales when he matriculated at Christ Church, being the first holder of that title who had matriculated since Henry V. In conjunction with Sir Henry Acland, Liddell did much to en- courage the. study of art at Oxford, and his taste and judgment gained him the admiration and friendship of Ruskin. In 1891, owing to advancing years, he resigned the deanery. The last years of his life were spent at Ascot, where he died on the 18th of January 1898. Dean Liddell married in July 1846 Miss Lorina Reeve (d. 1910), by whom he had a numerous family. See memoir by H. L. Thompson, Henry George Liddell (1899). LIDDESDALE, the valley of Liddel Water, Roxburghshire, Scotland, extending in a south-westerly direction from the vicinity of Peel Fell to the Esk, a distance of 2 1 m. The Waverley route of the North British railway runs down the dale, and the Catrail, or Picts' Dyke, crosses its head. At one period the points of vantage on the river and its affluents were occupied with freebooters' peel-towers, but many of them have disappeared and the remainder are in decay. Larriston Tower belonged to the Elliots, Mangerton to the Armstrongs and Park to "little Jock Elliot," the outlaw who nearly killed Bothwell in an encounter in 1566. The chief point of interest in the valley, however, is Hermitage Castle, a vast, massive H -shaped fortress of enormous strength, one of the oldest baronial buildings in Scotland. It stands on a hill overlooking Hermitage Water, a tributary of the Liddel. It was built in 1244 by Nicholas de Soulis and was captured by the English in David II. 's reign. It was retaken by Sir William Douglas,

who received a grant of it from the king. In 1492 Archibald Douglas, 5th earl of Angus, exchanged it for Bothwell Castle on the Clyde with Patrick Hepburn, 1st earl of Bothwell. It finally passed to the duke of Buccleuch, under whose care further ruin has been arrested. It was here that Sir Alexander Ramsay of Dalhousie was starved to death by Sir William Douglas in 1342, and that James Hepburn, 4th earl of Bothwell, was visited by Mary, queen of Scots, after the assault referred to.

To the east of the castle is Ninestane Rig, a hill 943 ft. high, 4 m. long and I m. broad, where it is said that William de Soulis, hated for oppression and cruelty, was (in 1320) boiled by his own vassals in a copper cauldron, which was supported on two of the nine stones which composed the ” Druidical ” circle that gave the ridge its- name. Only five of the stones remain. James Telfer (1802- 1862), the writer of ballads, who was born in the parish of Southdean (pronounced Soudan), was for several years schoolmaster of Saugh- tree, near the head of the valley. The castle of the lairds of Liddes- dale stood near the junction of Hermitage Water and the Liddel and around it grew up the village of Castleton.

LIDDON, HENRY PARRY (1829-1890), English divine, was the son of a naval captain and was born at North Stoneham, Hampshire, on the 20th of August 1829. He was educated at King’s College School, London, and at Christ Church, Oxford,

where he graduated, taking a second class, in 1850. As vice- principal of the theological college at Cuddesdon (1854-1859) he wielded considerable influence, and, on returning to Oxford as vice-principal of St Edmund’s Hall, became a growing force among the undergraduates, exercising his influence in strong opposition to the liberal reaction against Tractarianism, which had set in after Newman’s secession in 1845. In 1864 the bishop of Salisbury (W. K. Hamilton), whose examining chaplain he had been, appointed him prebendary of Salisbury cathedral. In 1866 he delivered his Bampton Lectures on the doctrine of the divinity of Christ. From that time his fame as a preacher, which had been steadily growing, may be considered established. In 1870 he was made canon of St Paul’s Cathedral, London. He had before this published Some Words for God, in which, with great power and eloquence, he combated the scepticism of the day. His preaching at St Paul’s soon attracted vast

crowds. The afternoon sermon, which fell to the lot of the canon in residence, had usually been delivered in the choir, but soon after Liddon's appointment it became necessary to preach the sermon under the dome, where from 3000 to 4000 persons used to gather to hear the preacher. Few orators belonging to the Church of England have acquired so great a reputation as Liddon. Others may have surpassed him in originality, learning or reasoning power, but for grasp of his subject, clearness of language, lucidity of arrangement, felicity of illustration, vivid- ness of imagination, elegance of diction, and above all,- for sympathy with the intellectual position of those whom he addressed, he has hardly been rivalled. In the elaborate arrange- ment of his matter he is thought to have imitated the great French preachers of the age of Louis XIV. In 1870 he had also been made Ireland professor of exegesis at Oxford. The combination of the two appointments gave him extensive influence over the Church of England. With Dean Church he may be said to have restored the waning influence Of the Trac- tarian school, and he succeeded in popularizing the opinions which, in the hands of Pusey and Keble, had appealed to thinkers and scholars. His forceful spirit was equally conspicuous in his opposition to the Church Discipline Act of 1874, and in his denunciation of the Bulgarian atrocities of 1876. In 1882 he resigned his professorship and utilized his thus increased leisure by travelling in Palestine and Egypt, and showed his interest in the Old Catholic movement by visiting Dollinger at Munich. In 1886 he became chancellor of St Paul's, and it is said that he declined more than one offer of a bishopric. He died on the oth of September 1890, in the full vigour of his intellect and at the zenith of his reputation. He had undertaken and nearly completed an elaborate life of Dr Pusey, for whom his admiration was unbounded; and this work was completed after his death by Messrs Johnston and Wilson. Liddon's great influence during his life was due to his personal fascination and the beauty of his pulpit oratory rather than to any high qualities of intellect. As a theologian his outlook was that of the 16th rather than the iqth century; and, reading his Bampton Lectures now, it is difficult to realize how they can ever have been hailed as a great cont ribution to Christian apologetics. To the last he maintained the narrow standpoint of Pusey and Keble, in defiance of all the developments of modern thought and modern scholarship; and his latter years were embittered by the consciousness that the younger generation of the disciples of his school were beginning to make friends of the Mammon of scientific unrighteousness. The publication in 1889 of Lux Mundi, a series of essays attempt- ing to harmonize Anglican Catholic doctrine with modern thought, was a severe blow to him, for it showed that even at the Pusey House, established as the citadel of Puseyism at

Oxford, the principles of Pusey were being departed from. Liddon's importance is now mainly historical. He was the last of the classical pulpit orators of the English Church, the last great popular exponent of the traditional Anglican orthodoxy. Besides the works mentioned, Liddon published several volumes of Sermons, a volume of Lent lectures entitled Some Elements of Religion (1870), and a collection of Essays and Addresses on such themes as Buddhism, Dante, &c.

See Life and Letters, by J. O. Johnston (1904);. G.W. E. Russell, H. P. Liddon. (1903); A. B. Donaldson, Five Great Oxford Leaders (1900), from which the life of Liddon was reprinted separately in

1905.

LIE, JONAS LAURITZ EDEMIL (1833-1908), Norwegian novelist, was born on the 6th of November 1833 close to Hougsund (Eker), near Drammen. In 1838, his father being appointed sheriff pf Tromso, the family removed to that Arctic town. Here the future novelist enjoyed an untrammelled childhood among the shipping of the little Nbrdland capital, and gained acquaintance with the wild seafaring- life which he was after- wards to describe. In 1846 he was sent to the naval school at Frederiksvaern* but his extreme near-sight unfitted him for the service, and he was transferred to the Latin school at Bergen. In 1851 he went to the university of Christiania, where Ibsen and Bjornson were among his fellow-students. Jonas Lie, however, showed at this time no inclination to literature. He pursued his studies as a lawyer, took his degrees in law in 1858, and settled down to practice as a solicitor in the little town of Kongsvinger. In i860 he married his cousin, Thomasine Lie, whose collaboration in his work he acknowledged in 1893 in a graceful article in : the Samtiden entitled " Min hustru." In 1866 he published hisˆ first book, a volume of poems. He made unlucky speculations in wood, and the consequent financial embarrassment induced him to return to Christiania to try his luck as a man of letters, As a journalist he had no success, but.in 1870 he published a melancholy little romance, Den Frem- synte (Eng. trans., The Visionary, 1894), which made him famous. Lie proceeded to Rome,' and published Tales in 1871 and Tre- masteren " Fremtiden" (Eng. trans., The Barque "Future," Chicago, 1879), a novel,in 187*. His first great book, however, was Lodsen og hans Huslru {The Pilot and his Wife, 1874), which placed him at the head of Norwegian novelists; it was written in the little town of Rocca di Papa in the Albano moun- tains. From that time Lie enjoyed, with BjSrnson and Ibsen, a stipend as poet from" the Norwegian government. Lie spent the next few years partly in Dresden, partly in Stuttgart, with frequent summer excursions to Berchtesgaden in the Bavarian highlands.

During his exile he produced the drama in verse called Faustina Strozzi (1876). Returning to Norway, Lie began a series of romances of modern life in Christiania, of which Thomas Ross (1878) and Adam Schroder (1879) were the earliest. He returned to Germany, and settled first in Dresden again, then in Hamburg, until 1882, when he took up his abode in Paris, where he lived in close retirement in the society of Scandinavian friends. His summers were spent at Berchtesgaden in Tirol. The novels of his German period are Rutland (1881) and GW paa ("Go Ahead!" 1882), tales of life- in the Norwegian merchant navy. His subsequent works, produced with great regularity, enjoyed an immense reputation in Norway. Among the best of them are: Livsslaven (1883, Eng. trans., " One of Life's Slaves," 1895); Familjen paa Gilje (" The Family of Gilje," 1883) r; Malstroem (1885), describing the gradual ruin of a Norwegian family; Et Samliv (" Life in C&mmon," 1887), describing a marriage of convenience. Two of trie most successful of his novels were The Commodore's Daughters (188&) and Niobe (1894), both of which were presented to English readers in the International library, edited by Mr Gosse. In 189I-1892 he wrote, under the influence of the new romantic impulse, twenty-four folk-tales, printed in two volumes entitled Trold. Some of these were translated by R. N. Bain in Weird Tales (1893), illustrated by L. Housman. Among his later works were the romance Naar Sol gaar ned (" When the Sun goes down," 1895), the powerful novel of Dyre Rein (1806), the fairy drama of Lindeltn (1897), Paste Forland (1899), a romance which con- tains much which is autobiographical, When the Iron Curtain falls (1001), and The Consul (1904). His Samlede Vaerker were published at Copenhagen in 14 vols. (1902-1904). Joriks Lie left Paris in 1891, and, after spending a' year in Rome, returned to Norway, establishing himself at Holskbgen, near Christiansand. He died at Christiania on the 5th df July 1908. As a novelist he stands with those minute and unobtrusive

painters of contemporary manners who defy arrangement in this or that school. He is with Mrs Gaskell or Ferdinand Fabre ; he is not entirely without relation with that old-fashioned favourite of the public, Fredrika Bremer.

His son, Erik Lie (b. 1868), published a successful volume of stories, Med Blyanten, in 1890; and is also the author of various works on literary history. An elder son, Mons Lie (b. 1864), studied the violin in Paris, but turned to literature in 1894. Among his works are the plays

Tj-agedier om Kjaerlighed (1897); Lombardo and Agrippina (1898); Don Juan (1900); and the novels, Sjofareren (1901); Adam,Ravn (1903) and /. Kvindensnet (1904). (E. G.)

LIE, MARIUS SOPHUS (1842-1899), Norwegian mathemati- cian, was born at Nordfjordeif, near Bergen, on the 17th of December 1842, and was educated at the university of Christi- ania, where he took his doctor's degree in 1868 and became extraordinary professor of mathematics (a chair created specially for him) four years later. In 1886 he was chosen to succeed Felix Klein in the chair of geometry at Leipzig, but as his fame grew a special post was arranged for him in Christiania. But his health was broken down by too assiduous study, and he died at Christiania on the 18th of February 1899, six months after iris return. Lie's work exercised a great influence on the progress of' mathematical science during the later decades of the 19th century. His primary aim has been declared to be the advance- ment and elaboration of the theory of differential equations, and it was with this end in view that he developed his theory of transformation groups, set forth in his Theorie der Trans- formations gruppen (3 vols., Leipzig, 1888-1893), a work of wide range and great originality, by which probably his name is best known. A special application of his theory of continuous groups was to the general problem of non-Euclidean geometry. The latter part of the book above mentioned was devoted to a study of the foundations of geometry, considered from the standpoint of B. Riemann and H. von Helmholtz; and he intended to publish a systematic exposition of his geometrical investigations, in Conjunction with Dr G. Scheffers, but only one volume made its appearance (Geometrie der Beriihrungs- transformationen, Leipzig, 1896). Lie was a foreign member of the Royal Society, as well as an honorary member of the Cambridge Philosophical Society and the London Mathematical Society, and his geometrical inquiries gained him the much- coveted honour of the Lobatchewsky prize.

An analysis of Lie's works is given in the Bibliotheca Mathematica (Leipzig, 1900).

LIEBER, FRANCIS (1800-1872), German-American publicist, was born at Berlin on the 18th of March 1800. He served with his two brothers under Blucher in the campaign of 181.5, fighting at Ligny, Waterloo and Namur, where he was twice dangerously wounded. Shortly afterwards he was arrested for his political sentiments, the chief evidence against him being several songs of liberty which he had written. After several months he was discharged without a trial, but was forbidden to pursue his studies at the Prussian universities. He accordingly went to Jena, where he took his degrees in 1820,

continuing his studies at Halle and Dresden. He subsequently took part in the Greek War of Independence, publishing his experiences in his Journal in Greece (Leipzig, 1823, and under the title The German Anacharsis, Amsterdam, 1823). For a year he was in Rome as tutor to the son of the historian Niebuhr, then Prussian ambassador. Returning to Berlin in 1823, he was imprisoned at Koepenik, but was released after some months through the influence of Niebuhr. In 1827 he went to the United States and as soon as possible was naturalized as a citizen. He settled at Boston, and for five years edited The Encyclopaedia Americana (13 vols.). From 1835 to 1856 he was professor of history and political economy in South Carolina College at Columbia, S.C., and during this period wrote his three chief works, Manual of Political Ethics (1838), Legal and Political Hermeneutics (1839), and Civil Liberty and Self Govern- ment (1853). In 1856 he resigned and next year was elected to a similar post in Columbia College, New York, and in 1865 became professor of constitutional history and public law in the same institution. During the Civil War Lieber rendered services

of great value to the government. He was one of the first to point out the madness of secession, and was active in upholding the Union. He prepared, upon the requisition of the president, the important Code of War for the Government of the Armies of the United States in the Field, which was promulgated by the Government in General Orders No. 100 of the war depart- ment. This code suggested to Bluntschli his codification of the law of nations, as may be seen in the preface to his Droit International CodifiS. During this period also Lieber wrote his Guerilla Parties with Reference to the Laws and Usages of War. At the time of his death he was the umpire of the commission for the adjudication of Mexican claims. He died on the 2nd of October 1872. His books were acquired by the University of California, and his papers were placed in the Johns Hopkins University.

His Miscellaneous Writings were published by D. C. Gilman (Philadelphia, 1881). See T. S. Perry, Life and Letters (1882), and biography by Harby (1899).

LIEBERMANN, MAX (1849-), German painter and

etcher, was born in Berlin. After studying under Steffeck, he entered the school of art at Weimar in 1869. Though the straightforward simplicity of his first exhibited picture, ” Women plucking Geese,” in 1872, presented already a striking contrast to the conventional art then in vogue, it was heavy and bituminous in colour, like all the artist’s paintings before his visit to Paris at the end of 1872. A summer

spent at Barbizon in 1873, where he became personally acquainted with Millet and had occasion to study the works of Corot, Troyon, and Daubigny, resulted in the clearing and brightening of his palette, and taught him to forget the example of Munkacsy, under whose influence he had produced his first pictures in Paris. He sub- sequently went to Holland, where the example of Israels con- firmed him in the method he had adopted at Barbizon; but on his return to Munich in 1878 he caused much unfavourable criticism by his realistic painting of " Christ in the Temple," which was condemned by the clergy as irreverent and remained his only attempt at a scriptural subject. Henceforth he devoted himself exclusively to the study of free-light and to the painting of the life of humble folk. He found his best subjects in the orphanages and asylums for the old in Amsterdam, among the peasants in the fields and village streets of Holland, and in the beer-gardens, factories, and workrooms of his own country. Germany was reluctant, however, in admitting- the merit of an artist whose style and method were so markedly at variance with the time-honoured academic tradition. Only when his fame was echoed back from France, Belgium, and Holland did his compatriots realize the eminent position which is his due in the history of German art. It is hardly too much to say that Liebermann has done for his country what Millet did for France. His pictures hold the fragrance of the soil and the breezes of the heavens. His people move in their proper atmosphere, and their life is stated in all its monotonous simplicity, without artificial pathos or melodramatic exaggeration. His first success was a medal awarded him for " An Asylum for Old Men " at the 1 88 1 Salon. In 1884 he settled again in Berlin, where he became professor of the Academy in 1898. He became a member of the Societe nationale des Beaux Arts, of the Societe royale beige des Aquarellistes, and of the Cercle des Aquarellistes at the Hague. Liebermann is represented in most of the Ger- man and other continental galleries. The Berlin National Gallery owns " The Flax-Spinners "; the Munich Pinakothek, "The Woman with Goats"; the Hamburg Gallery, "The Net-Menders "; the Hanover Gallery, the " Village Street in Holland." . " The Seamstress " is at the Dresden Gallery; the " Man on the Dunes " at Leipzig; " Dutch Orphan Girls " at Strassburg; " Beer-cellar at Brandenburg " at the Luxem- bourg Museum in Paris, and the " Knopflerinnen " in Venice. His etchings are to be found in the leading print cabinets of Europe.

LIEBIG, JUSTUS VON, Baron (1803-1873), German chemist, was born at Darmstadt, according to his baptismal certificate, on the 12th of May 1803 (4th of May, according to his mother). His father, a drysalter and dealer in colours, used sometimes to

make experiments in the hope of finding improved processes for the production of his wares, and thus his son early acquired familiarity with practical chemistry. For the theoretical side he read all the text-books which he could find, somewhat to the detriment of his ordinary school studies. Having determined to make chemistry his profession, at the age of fifteen he entered the shop of an apothecary at Appenheim, near Darmstadt; but he soon found how great is the difference between practical pharmacy and scientific chemistry, and the explosions and other incidents that accompanied his private efforts to increase his chemical knowledge disposed his master to view without regret his departure at the end of ten months. He next entered the university of Bonn, but migrated to Erlangen when the professor of chemistry, K. W. G. Kastner (1783-1857), was appointed in 1821 to the chair of physics and chemistry at the latter university. He followed this professor to learn how to analyse certain minerals, but in the end be found that the teacher himself was ignorant of the process. Indeed, as he himself said afterwards, it was a wretched time for chemistry in Germany. No labora- tories were accessible to ordinary students, who had to content themselves with what the universities could give in the lecture- room and the library, and though both at Bonn and Erlangen Liebig endeavoured to make up for the deficiencies of the official instruction by founding a students' physical and chemical society for the discussion of new discoveries and speculations, he felt that he could never become a chemist in his own country. Therefore, having graduated as Ph.D. in 1822, he left Erlangen-ˆ where he subsequently complained that the contagion of the " greatest philosopher . and metaphysician of the century " (Schelling), in a period " rich in words and ideas, but poor in true knowledge and genuine studies," had cost him two precious years of his life — and by the liberality of Louis I.,, grand-duke of Hesse-Darmstadt, was enabled to go to Paris. By the help of L. J. Thenard he gained admission to the private laboratory of H. F. Gaultier de Claubry (1792-1873), professor of chemistry at the Ecole de Pharmacie, and soon afterwards, by the influence of A. von Humboldt, to that of Gay-Lussac, where in 1824 he concluded his investigations on the composition of the fulminates. It was on Humboldt's advice, that he determined to become a teacher of chemistry, but difficulties stood in his way. As a native of Hesse-Darmstadt he ought, according to the academical rules of the time, to have studied and graduated at the university of Giessen, and it was only through the influence of Humboldt that the authorities forgave him for straying to the foreign university of Erlangen. After

examination his Erlangen degree was recognized, and in 1824 he was appointed extraordinary professor of chemistry at Giessen, becoming ordinary professor two years later. In this small town his most important work was accomplished. His first care w,as to persuade the Darmstadt government to provide a chemical laboratory in which the students might obtain a proper practical training. This labora- tory, unique of its kind at the time, in conjunction with Liebig's unrivalled gifts as a teacher, soon rendered Giessen the most famous chemical school in the world; men flocked from every country to enjoy its advantages, and many of the most accom- plished chemists of the 19th century had to thank it for their early training. Further, it gave a great impetus to the progress of chemical education throughout Germany, for the continued admonitions of Liebig combined with the influence of his pupils induced many other universities to build laboratories modelled on the same plan. He remained at Giessen for twenty-eight years, until in 1832 he accepted the invitation of the Bavarian govern- ment to the ordinary chair of chemistry at Munich university, and this office he held, although he was offered the chair at Berlin in 1865, until his death, which occurred at Munich on the 10th of April 1873.

Apart from Liebig's labours for the improvement of chemical teaching, the influence of his experimental researches and of his contributions to chemical thought was felt in every branch of the science. In regard to methods and apparatus, mention should be made of his improvements in the technique of organic analysis, his plan for determining the natural alkaloids and for ascertaining the molecular weights of organic bases bv means of their chloro- platinates, his process for determining the quantity of urea in a

solution— the first step towards the introduction of precise chemical methods into practical medicine — and his invention of the simple form of condenser known in every laboratory. His contributions to inorganic chemistry were numerous, including investigations on the compounds of antimony, aluminium, silicon, &c, on the separa- tion of nickel and cobalt, and on the analysis of mineral waters, but they are outweighed in importance by his work on organic sub- stances. In this domain his first research was on the fulminates of mercury and silver, and his study of these bodies led him to the discovery of the isomerism of cyanic and fulminic acids, for the composition of fulminic acid as found by him was the same as that of cyanic acid, as found by F. Wohler, and it became necessary to admit them to be two bodies which differed in properties, though of the same percentage composition. Further work on cyanogen and connected substances yielded a great number of interesting derivatives, and he described an improved method for the manu- facture of potassium cyanide, an

agent which has since proved of enormous value in metallurgy and the arts. In 1832 he published, jointly with Wohler, one of the most famous papers in the history of chemistry, that on the oil of bitter almonds (benzaldehyde), wherein it was shown that the radicle benzoyl might be regarded as forming an unchanging constituent of a long series of compounds obtained from oil of bitter almonds, throughout which it behaved like an element. Berzelius hailed this discovery as marking the dawn of a new era in organic chemistry, and proposed for benzoyl the names ” Pro'in ” or ” Orthrin ” (from irpwl and opflpus). A continuation of their work on bitter almond oil by Liebig and Wohler, who remained firm friends for the rest of their lives, resulted in the elucidation of the mode of formation of that substance and in the discovery of the ferment emulsin as well as the recognition of the first glucoside, amygdalin, while another and not less important and far-reaching inquiry in which they collaborated was that on uric acid, published in 1837. About 1832 he began his investigations into the constitution of ether and alcohol and their derivatives. These on the one hand resulted in the enunciation of his ethyl theory, by the light of which he looked upon those substances as compounds of the radicle ethyl (C_2H_6), in opposition to the view of J. B; A. Dumas, who regarded them as hydrates of olefiant gas (ethylene); on the other they yielded chloroform, chloral and aldehyde, as well as other compounds of less general interest, and also the method of forming mirrors by depositing silver from a slightly ammoniacal solution by acet aldehyde. In 1837 with Dumas he published a note on the constitution of organic acids, and in the following year an elaborate paper on the same subject appeared under his own name alone; by this work T. Graham s doctrine of polybasicity was extended to the organic acids. Liebig also did much to further the hydrogen theory of acids.

These and other studies in pure chemistry mainly occupied his attention until about 1838, but the last thirty-five years of his life were devoted more particularly to the chemistry of the processes of life, both aiiimal and vegetable. In animal physiology he set himself to trace out the operation of determinate chemical and physical laws in the maintenance of life and health. To this end he examined such immediate vital products as blood, bile and urine; he analysed the juices of flesh, establishing the composition of creatin and investigating . its decomposition products, creatinin and sarcosin ; he classified the various articles of food in accordance with the special function performed by each in the animal economy, and expounded the philosophy of cooking; and in opposition to many of the medical opinions of his time taught that the heat of the body is the result of

the processes of combustion and oxidation performed within the organism. A secondary result of this line of study was the preparation of his food for infants and of his extract of meat. Vegetable physiology he pursued with special reference to agriculture, which he held to be the foundation of all trade and industry, but which could not be rationally practised without the guidance of chemical principles. His first publication on this subject was Die Chemie in ihrer Anwendung auf Agricultur und Physiolo-gie in 1840, which was at once translated into English by Lyon Playfair. Rejecting the old notion that plants derive their nourishment from humus, he taught that they get Carbon and nitrogen from the carbon dioxide and ammonia present in the atmosphere, these compounds being returned by them to the atmosphere by the processes ot putrefaction and fermentation — which latter he regarded as essentially chemical in nature— while their potash, soda, lime, sulphur, phosphorus, &c, come from the soil. Of the carbon dioxide and ammonia no exhaustion can take place, but of the mineral constitutents the supply is limited because the soil cannot afford an indefinite amount of them ; hence the chief care of the farmer, and the function of manures, is to restore to the soil those minerals which each crop is found, by the analysis of its ashes, to take up in its growth. On this theory he prepared artificial manures containing the essential mineral substances together with a small quantity of ammoniacal salts, because he held that the air does not supply ammonia fast enough in certain cases, and carried out systematic experiments on ten acres of poor sandy land which he obtained from the town of Giessen in 1845. But in practice the results were not wholly satisfactory, and it was a long time before he recognized one important reason for the failure in the fact that

to prevent the alkalis from being washed away by the rain he had taken pains to add them in an insoluble form, whereas, as was ultimately suggested to him by experiments performed by J. T. Way about 1850, this precaution was not only superfluous but harmful, because the soil possesses a power of absorbing the soluble saline matters required by plants and of retaining them, in spite of rain, for assimilation by the roots.

Liebig’s literary activity was very great. The Royal Society’s Catalogue of Scientific Papers enumerates 318 memoirs under his name, exclusive of many others published in collaboration with other investigators. A certain impetuousness of character which disposed

him to rush into controversy whenever doubt was cast upon the views he supported accounted for a great deal of writing, and he also carried on an extensive correspondence with W6hler and other scientific men. In 1832 he founded the Annalen der Pharmazie, which became the Annalen der Chemie und Pharmazie in 1840 when Wohler became joint-editor with himself , and in 1837 with Wohler and Poggendorff he established the Handwdrterbuch der reinen und angewandten Chemie. After the death of Berzelius he continued the Jahresbericht with H. F. M. Kopp. The following are his most important separate publications, many of which were translated into English and French almost as soon as they ap- peared: Anleitung zur Analyse der organischen Korper (1837); Die Chemie in ihrer Anwendung auf Agrikultur und Physiologie (1840) ; Die Thier-Chemie oder die organische Chemie in ihrer Anwen- dung auf Physiologie und Pathologie (1842); Handbuch der organi- schen Chemie mil Riicksicht auf Pharmazie (1843); Chemische Brief e (1844); Chemische Untersuchungen uber das Fleisch und seine Zubereitung zum Nahrungsmittel (1847); Die Grundsatze der Agri- kultur-Chemie (1853); Vber Theorie und Praxis in der Landwirth- schaft (1856); Naturwissenschaftliche Brief e uber die moderne Land- wirthschaft (1859). A posthumous collection of his miscellaneous addresses and publications appeared in 1874 as Reden und Abhand- lungen, edited by his son George (b. 1827). His criticism of Bacon, Vber Francis von Verulam, was first published in 1863 in the Augs- burger allgemeine Zeitung, where also most of his letters on chemistry made their first appearance.

See The Life Work of Liebig (London, 1876), by his pupil A. W. von Hofmann, which is the Faraday lecture delivered before the London Chemical Society in March 1875, and is reprinted in Hof- mann's Zur Erinnerung an vorangegangene Freunde; also W. A. Shenstone, Justus von Liebig, his Life and Work (1895).

LIEBKNECHT, WILHELM (1826-1900), German socialist, was born at Giessen on the 29th of March 1826. Left an orphan at an early age, he was educated at the gymnasium in his native town, and attended the universities of Giessen, Bonn and Marburg. Before he left school he had become affected by the political discontent then general in Germany; he had already studied the writings of St Simon, from which he gained his first interest in communism, and had been converted to the extreme republican theories of which Giessen was a centre. He soon came into conflict with the authorities, and was expelled from Berlin apparently in consequence of the strong sympathy he displayed for some Poles, who were being tried for high treason. He proposed in 1846 to migrate to America, but went instead to Switzerland, where

he earned his living as a teacher. As soon as the revolution of 1848 broke out he hastened to Paris, but the attempt to organize a republican corps for the invasion of Germany was prevented by the government. In September, however, in concert with Gustav von Struve, he crossed the Rhine from Switzerland at the head of a band of volunteers, and proclaimed a republic in Baden. The attempt collapsed; he was captured, and, after suffering eight months' imprisonment, was brought to trial. Fortunately for him, a new rising had just broken out; the mob burst into the court, and he was acquitted. During the short duration of the revolutionary government he was an active member of the most extreme party, but on the arrival of the Prussian troops he succeeded in escaping to France. Thence he went to Geneva, where he came into intercourse with Mazzini; but, unlike most of the German exiles, he was already an adherent of the socialist creed, which at that time was more strongly held in France. Expelled from Switzerland he went to London, where he lived for thirteen years in close association with Karl Marx. He endured great hardships, but secured a livelihood by teaching and writing; he was a correspondent of the Augsburger Allgemeine Zeitung. The amnesty of 1861 opened for him the way back to Germany, and in 1862 he accepted the post of editor of the Norddeutsche Allgemeine Zeitung, the founder of which was an old revolutionist. Only a few months elapsed before the paper, passed under

Bismarck's influence. There' is rib more curious episode in German history than the success with which – Bismarck acquired the services of many of the men of 1848,' but Liebkriechtremained faithful to his principles and resigned his editorshipˆ He became a member of the Arbeit erverein, arid after the death of Ferdinand Lassalle he was the chief mouthpiece in Germany of Karl Marx, and was instrumental 'in spreading the influence of the newly- founded International. Expelled from Prussia in 1865, he settled at Leipzig, and it is primarily to his activity in Saxony among the newly-formed unions of workers that the modern social democrat party owes its origin. Here he conducted the Demokratisches Wochenbldtt. In 1867 he was elected a member of the North German Reichstag, but in opposition to Lassalle's followers he refused all compromise ' with the- " capitalists," and avowedly used his position merely for purposes of agitation whilst taking every opportunity for making the parliament ridiculous. He was strongly influenced by the " great German " traditions of the democrats of 1848, and, violently anti-Prussian, he distinguished himself by his attacks on the policy of 1866 and the " revolution from above," and by his opposition to every form of militarism. His adherence to the traditions of 1848 are also seen in his dread of Russia, which he 1

maintained to his death. His opposition to the war of 1870 exposed him t6 insults and violence, and in 1872 he was condemned to two years' imprisonment in a fortress for treasonable intentions. The Union of the German Socialists in 1874 at the congress of Gotha was really a triumph of his influence, and from that time he was regarded as founder and leader of the party. From 1874 till his death he was a fnembef of the German Reichstag, and for many years also of the Saxon diet. He was one of the chief spokesmen of the party, and he took a very important part in directing its policy. In 1881 he was expelled from Leipzig, but took up his residence in a neighbouring village. After the lapse of the Socialist law (1890) he became chief editoriof the Vorwttrts, and settled in Berlin. If he did not always find it easy in his later years to follow the new developments, he preserved to his death the idealism of his youth; the hatred both of Liberalism and of State Socialism; and though he was to some extent overshadowed by Bebel's greater oratorical power, he was the chief support of the orthodox Marxian tradition. Liebknecht was the author of numerous pamphlets and books, of which the most important were:' Robert Blum und seine Zeit (Nuremberg, 1892); Geschichte der FranzSsischen Revolution (Dresden, 1890); Die Emser Depesche (Nuremberg; 1899) and Robert Owen (Nuremberg, 1892). He died at Gharlottenburg on the 6th of August 1900.

See Kurt Eisner, Wilhelm Liebknecht, sein Leben und Wirken (Berlin, 1900). ■..,..,

LIECHTENSTEIN, the smallest independent state in Europe, save San Merino and Monaco. It lies some way S. of the Lake of Constance, and extends along the right bank of the Rhine, opposite Swiss territory, between Sargans arid Sennwald, while on the E. it also comprises the upper portion of the Samina glen that joins the 111 valley at Frastanz, above Feldkireh. It is about 12 m. in length, and covers an area of 61-4 or 68-8 sq. m. (according to different estimates). Its loftiest point rises at the S.E. angle of the state, in the Rhatikon range, and is named to Naafkopf or the Rothe Wand (8445 ft.); on its summit the Swiss, Vorarlberg, and Liechtenstein frontiers join. In 1 90 1 the population was 9477 (of whom 4890 were women and 4587 men). The capital is Vaduz (1523 ft.), with about 1 100 inhabitants, and 2 m. S. of the Schaan railway station, which is 2 m. from Buchs (Switz.). Even in the 17th century the Romonsch language was not extinguished in the state, and many Romonsch place-names still linger, e.g. Vaduz, Samina, Gavadura, &c. Now the population is German-speaking and Romanist. The constitution of 1862 was amended in 1878, 1895 * n d 1901- All males of 24 years of age are primary electors, while the diet consists of 12 members, holding, their seals for 4 years and elected

indirectly, together with 3 members nomir nated by the prince. The prince has a lieutenant resident at Vaduz, whence there is an appeal to the prince's court at Vlerina,

wit ha final appeal (since 1884) to-the supreme district court at Innsbruck. Compulsory military service was abolished in 1868, the army having till then been 91 strong. The principality forms ecclesiastically part of the diocese of Coire, while as regards customs duties it is joined with the Vorarlberg, and as regards postal and coinage arrangements with Austria, which (according to the agreement of 1852, renewed in 1876, by which the princi- pality entered the Austrian customs union) must pay it at least 40,000 crowns annually. In 1904 the revenues of the principality amounted to 888,931 crowns, arid its expenditure to 802,163 crowns. There is no public debt.

The county of Vaduz and the lordship of Schellenberg passed through many hands before they were bought in 16 13 by the Count of Hohenems {to the N. of Feldkirch). In consequence of financial embarrassments, i that family had to sell both (the lordship in 1699, the county in 1713) to the Liechtenstein family, which had since the 12th century owned two castles of that name (both now ruined), one in Styria and the other a little S.W. of Vienna. In 1719 these, new acquisitions were raised by the emperor into a principality under the name of Liechten- stein, which formed part successively of the Holy Roman Empire (till 1806) and of the German Confederation (1815-1866), having been sovereign 1806-1815 as well as since 1866.

See J; Falke's Geschichte d. furstlichen Houses Liechtenstein (3 vols., Vienna, 1868-1883); J. C. Heer, Vorarlberg und Liechtenstein (Feldkirch, 1906) ; P. Kaiser, Geschichte d. Fiirstenthums Liechten- stein (Coire, 1847) ; F. Umlauft, Das Furstenthum Liechtenstein (Vienna, 1891); E. Walder, Aus den Bergen (Zurich, 1896); A. Waltenberger, Algau, Vorarlberg, und Westtirol (Rtes. 25 and 26) (.10th ed., Innsbruck, 1906), (W. A. B. C.)

LllJGE, one of the nine provinces of Belgium, touching on the east the Dutch province of Limburg and the German district of Rhenish Prussia, To a certain extent it may be assumed to represent the old prince-bishopric. Besides the city of Liege it contains the towns of Verviers, Dolhain, Seraing, Huy, &c. The Meuse flows through the

centre of the province, and its valley from Huy down to Herstal is one of the most productive mineral districts in Belgium. Much has been done of late years to develop the agricultural resources of the Condroz district south of the Meuse. The area of the province is 723,470 acres, or 1 130 sq. m. The population in 1904 was 863,254, showing an average of 763 per sq. m.

LIEGE (Walloon, Lige, Flemish, Luik, Ger. Lilttich) , the capital of the Belgian province that bears its name. It is finely situated

Liege is a fortified position of far greater strength than is generally appreciated. In the wars of the 18th century Liege played but a small part. It was then defended only by the citadel and a detached fort on the right side of the Meuse, but at- a short distance from the river, called the Chartreuse. Marl- borough captured these forts in 1 703 in preparation for his advance

in the following year into Germany which resulted in the victory of Blenheim. The citadel and the Chartreuse were still the only defences of Liege in 1888 when, after long discussions, the Belgian authorities decided on adequately fortifying the two important passages of the Meuse at Liege and Namur. A similar plan was adopted at each place, viz. the construction of a number of detached forts along a perimeter drawn at a distance varying from 4 to 6 m. of the town, so as to shelter it so far as possible from; bombardment. At Liege twelve forts were constructed, six on the right bank and six on the left. Those on the right bank beginning at the north and following an eastern curve are Barchon, Evegnee, Fleron, Chaudfontaine, Embourg and Boncelles. The average distance between each fort is 4 m., but Fleron and Chaudfontaine are separated by little over 1 m. in a direct line as they defend the main line of railway from Germany. The six forts on the left bank also commencing at the north, but following a western curve, are Pontisse, Liers, Lantin, Loncin, Hollogne and Flemalle. These forts were constructed under the personal direction of General Brialmont, and are on exactly the same principle as those he designed for the formidable defences of Bucarest. All the forts are con- structed in concrete with casemates, and the heavy guns are raised and lowered automatically. Communication is main- tained between the different forts by military roads in all cases, and by steam tramways in some. It is estimated that 25,000 troops would be required for the defence of the twelve forts, but the number is inadequate for the defence of so important and extensive a position. The population of Liege, which in 1875 was only 117,600, had risen by 1900 to 157,760, and in 1905 it was 168,532.

History. — Liege first appears in history about the year 558, at which date St Monulph, bishop of Tongres, built a chapel near the confluence of the Meuse and the Legia. A century later the town, which had grown up round this chapel, became the favourite abode of St Lambert, bishop of Tongres, and here he was assassinated. His successor St Hubert raised a splendid church over the tomb of the martyred bishop about 720 and made Liege his residence. It was not, however, until about 930 that the title bishop of Tongres was abandoned for that of bishop of Liege. The episcopate of Notger (972-ioo8)was marked by large territorial acquisitions, and the see obtained recognition as an independent principality of the Empire. The popular saying was ” Liege owes Notger to God, and everything else to Notger.” By the munificent encouragement of successive bishops Liege became famous during the nth century as a centre of learning, but the history of the town for centuries records little else than the continuous struggles of the citizens to free themselves from the exactions of their episcopal sovereigns; the aid of the emperor and of the dukes of Brabant being fre- quently called in to repress the popular risings. In 1316 the citizens compelled Bishop Adolph de la Marck to sign a charter, which made large concessions to the popular demands. It was, however, a triumph of short duration, and the troubles continued, the insurgent subjects now and again obtaining a fleeting success, only to be crushed by the armies of the powerful relatives of the bishops, the houses of Brabant or of Burgundy. During the episcopate of Louis de Bourbon (1456-1484) the Liegeois, having expelled the bishop, had the temerity to declare war ori Philip V., duke of Burgundy. Philip’s son, Charles the Bold, utterly defeated them in 1467, and razed the walls of the town to the ground. In the following year the citizens again revolted, and Charles being once more successful delivered up the city to sack and pillage for three days, and deprived the remnant of the citizens o’f all their privileges. This incident is narrated in Quentin Durward. The long episcopate of Eberhard de la Marck (1 505-1 538) was a time of good administration and of quiet, during which the town regained something of its former pros- perity. The outbreak of civil war between two factions, named the Cluroux and the Grignoux, marked the opening of the 17th century. Bishop Maximilian Henry of Bavaria (1650-1688) at last put an end to the internal strife and imposed a regulation (reglement) which abolished all the free institutions of the citizens

and the power of the gilds. Between this date and the outbreak of the

French Revolution the chief efforts of the prince-bishops were directed to maintaining neutrality in the various wars, and preserving their territory from being ravaged by invading armies. They were only in part successful. Liege was taken by Marl- borough in 1702, and the fortress was garrisoned by the Dutch until 1 7 18. The French revolutionary armies overran the principality in 1792, and from 1794 to the fall of Napoleon it was annexed to France, and was known as the department of the Ourthe. The Congress of Vienna in 18 15 decreed that Liege with the other provinces of the southern Netherlands should form part of the new kingdom of the Netherlands under the rule of William I., of the house of Orange. The town of Liege took an active part in the Belgian revolt of 1830, and since that date the ancient principality has been incorporated in the kingdom of Belgium.

The see, which at first bore the name of the bishopric of Tongres, was under the metropolitan jurisdiction of the arch- bishops of Cologne. The principality comprised besides the town of Liege and its district, the counties of Looz and Hoorn, the marquessate of Franchimont, and the duchy of Bouillon.

Authorities. — Theodore Bouille, Histoire de la ville et du pays de Liege (3 vols., Liege, 1725-1732); A. Borgnet, Histoire de la revolution liegeoise (2 vols., Liege, 1865); Baron B. C. de Gerlache, Histoire de Liege (Brussels, 1843); J. Daris, Histoire du diocese et de la principaute de Liege (10 vols., Li£ge, 1868-1885); Ferdinand Henaux, Histoire du pays de Liege (2 vols., Liege, 1857) ; L. Polain, Histoire de I'ancien pays de Liege (2 vols., Liege, 1844-1847). For full bibliography see Ulysse Chevalier, Repertoire des sources histo- riques. Topo-bibliographie, s.v. (Montbeliard, 1900).

LIEGE, an adjective implying the mutual relationship of a feudal superior and his vassal; the word is used as a sub- stantive of the feudal superior, more usually in this sense, however, in the form " liege lord, " and also of the vassals, his "lieges." Hence the word is often used of the loyal subjects of a sovereign, with no reference to feudal ties. It appears that ligeitas or ligentia, the medieval Latin term for this relation- ship, was restricted to a particular form of homage. According to N. Broussel (Nouvel examen de I'usage general des fiefs en France, 1727) the homage of a "liege" was a stronger form of the ordinary homage, the especial distinction being that while the ordinary vassal only undertook forty days' military service, the liege promised to serve as long as the war might last, in which his superior was engaged (cf . Ducange, Glossarium, s.v. " Ligius ").

The etymology of the word has been much discussed. It comes into English through the O. Fr. lige or liege, Med. Lat. ligius. This was early connected with the Lat. ligatus, bound, ligare, to bind, from the sense of the obligation of the vassal to his lord, but this has been generally abandoned. Broussel takes the Med. Lat. liga, i.e., foedus, confederate, the English " league," as the origin. Ducange connects it with the word lilies, which appears in a gloss of .the Salic law, and is defined as a scriptitius, servus glebae. The more usually. accepted derivation is now from the Old High Ger. ledic, or led ig, meaning " free " (Mod. Ger. ledig means unoccupied, vacuus). This is confirmed by the occurrence in a charter of Otto of Benthem, 1253, of a word " ledigh-man " (quoted in Ducange, Glossarium, s.v.), Proinde ajfecti sumus ligius homo, quod Teutonice dictur Ledighman. Skeat, in explaining the application of " free " to such a relationship as that subsisting between a feudal superior and his vassal, says " 'a liege lord' seems to have been the lord of a free band; and his lieges, though serving under him, were privileged men, free from all other obligations; their name being due to their freedom, not to their service " (Etym. Did., ed. 1898). A. Luchaire (Manuel des institutions franqaises, 1892, p. 189, n. 1) considers it difficult to call a man " free " who is under a strict obligation to another; further that the " liege " was not free from all obligation to a third party, for the charters prove without doubt that the " liege men " owed duty to more than one lord.

LIEONITZ, a town in Germany, in the Prussian province of Silesia, picturesquely situated on the Katzbach, just above

its junction with the Schwarzwasser, and 40 m. W.N.W. of Breslau, on the main line of railway to Berlin via Sommerfeld. Pop. (1885) 43,347, (1905) 59,710. It consists of an old town, surrounded by pleasant, shady promenades, and several well- built suburbs. The most prominent building is the palace, formerly the residence of the dukes of Liegnitz, rebuilt after a fire in 1835 and now used as the administrative offices of the district. The Ritter Akademie, founded by the emperor Joseph I. in 1708 for the education of the young Silesian nobles, was reconstructed as a gymnasium in 1810. The Roman Catholic church of St John, with two fine towers, contains the burial vault of the dukes. The principal Lutheran church, that of SS. Peter and Paul (restored in 1892-1894), dates from the 14th century. The manufactures are considerable, the chief articles made being cloth, wool, leather, tobacco, pianos and machinery. Its trade in grain and its cattle-markets are like- wise important. The large market gardens in the suburbs grow vegetables of considerable annual value.

Liegnitz is first mentioned in an historical document in the year 1004.

In 1163 it became the seat of the dukes of Liegnitz, who greatly improved and enlarged it. The dukes were members of the illustrious Piast family, which gave many kings to Poland. During the Thirty Years' War Liegnitz was taken by the Swedes, but was soon recaptured by the Imperialists. The Saxon army also defeated the imperial troops near Liegnitz in 1634. On the death of the last duke of Liegnitz in 1675, the duchy came into the possession of the Empire, which retained it until the Prussian conquest of Silesia in 1742. On the 15th of August 1760 Frederick the Great gained a decisive victory near Liegnitz over the Austrians, and in August 1813 Blucher defeated the French in the neighbourhood at the battle of the Katzbach. During the 19th century Liegnitz rapidly increased in population and prosperity. In 1906 the German autumn manoeuvres were held over the terrain formerly the scene of the great battles already mentioned.

See Schuchard, Die Stadt Liegnitz (Berlin, 1868) ; Sammter and Kraffert, Chronik von Liegnitz (Liegnitz, 1861-1873); Jander, Liegnitz in seinem Entwickelungseange (Liegnitz, 1905) ; and FUhr'er fur Liegnitz und seine Umgebung (Liegnitz, 1897) ; and the Urkunden-buch der Stadt Liegnitz bis 1455, edited by Schirrmacher (Liegnitz,

1866).

LIEN, in law. The word lien is literally the French for a band, cord or chain, and keeping in mind that meaning we see in what respect it differs from a pledge on the one hand and a mortgage on the other. It is the bond which attaches- a creditor's right to a debtor's property, but which gives no right ad rem, i.e. to property in the thing; if the property is in the possession of the creditor he may retain it, but in the absence of statute he cannot sell to recover what is due to him without the ordinary legal process against the debtor; and if it is not in possession, the law would indeed assist him to seize the property, and will hold it for him, and enable him to sell it in due course and pay himself out of the proceeds, but does not give him the property itself. It is difficult to say at what period the term lien made its appearance in English law; it probably came from more than one source. In fact, it was used as a convenient phrase for any right against the owner of property in regard to the property not specially defined by other better recognized species of title.

The possessory lien of a tradesman for work done on the thing, of a carrier for his hire, and of an innkeeper for his bill, would seem to be an inherent right which must have been in existence from the dawn, or before the dawn, of civilization. Probably the man who made or repaired weapons in the Stone Age was careful not to deliver them

until he received what was stipulated for, but it is also probable that the term itself resulted from the infusion of the civil law of Rome into the common law of England which the Norman Conquest brought about, and that it represents the ” tacit pledge ” of the civil law. As might be expected, so far as the possessory lien is concerned the common law and civil law, and probably the laws of all countries, whether civilized or not, coincide; but there are many differences with respect to other species of lien. For instance, by the common

law — in this respect a legacy of the feudal system— a landlord has a lien over his tenant’s furniture and effects for rent due, which can be enforced without the assistance of the law simply by the landlord taking possession, personally or by his agent, and selling enough to satisfy his claim; whereas the maritime lien is more distinctly the product of the civil law, and is only found and used in admiralty proceedings, the high court of admiralty having been founded upon the civil law, and still (except so far as restrained by the common-law courts prior to the amalgamation and co-ordination of the various courts by the Judicature Acts, and as affected by statute law) acting upon it. The peculiar effects of this maritime lien are discussed below. There is also a class of liens, usually called equitable liens (e.g. that of an unpaid vendor of real property over the property sold), which are akin to the nature of the civil law rather than of the common law. The word lien does not frequently occur in statute law, but it is found in the extension of the common-law ” carriers’ or shipowners’ lien ” in the Merchant Shipping Act 1894; in the definition, extension and limitation of the vendor’s lien; in the Factors Act 1877, and the Sale of Goods Act 1893; in granting a maritime lien to a shipmaster for his wages and disbursements, and in regulating that of the seamen in the Merchant Shipping Act 1894; and in the equity jurisdiction of the county courts 1888.

Common-Law Liens. — These may be either particular, i.e. a right over one or more specified articles for a particular debt, or general, i.e. for all debts owing to the creditor by the debtor. The requisites for a particular lien are, firstly, that the creditor should be in possession of the article; secondly, that the debt should be incurred with reference to the article; and thirdly, that the amount of the debt should be certain. It may be created by express contract, by implied contract (such as the usage of a particular trade or business), or as a consequence of the legal relation existing between the parties. As an

example of the first, a shipowner at common law has a lien on the cargo for the freight; but though the shipper agrees to pay dead freight in addition, i.e. to pay freight on any space in the ship which he fails to occupy with his cargo, the shipowner has no lien on the cargo for such dead freight except by express agreement. The most usual form of the second is that which is termed a possessory lien — the right a ship-repairer has to retain a ship in his yard till he is paid for the repairs executed upon her, 1 and the right a cobbler has to retain a pair of shoes till he is paid for the repairs done to them. But this lien is only in respect of the work done on, and consequent benefit received by, the subject of the lien. Hence an agistor of cattle has no lien at common law upon them for the value of the pasturage consumed, though he may have one by agreement; nor a conveyancer upon deeds which he has not drawn, but which are in his possession for reference, The most common example of the third is that of a carrier, who is bound by law to carry for all persons, and has, therefore, a lien for the price of the carriage on the goods carried. It has been held that even if. the goods are stolen, and entrusted to the carrier by the thief, the carrier can hold them for the price of the carriage against the rightful owner. Of the same nature is the common-law lien of an innkeeper on the baggage of his customer for the amount of his account, he being under a legal obligation to entertain travellers generally. Another instance of the same class is where a person has obtained possession of certain things over which he claims to hold a lien in the exercise of a legal right. For example, when a lord of a manor has seized cattle as estrays, he has a lien upon them for the expense of their keep as against the real owner; but the holder's claim must be specific, otherwise a general tender of compensation releases the lien.

A general lien is a right of a creditor to retain property, not merely for charges relating to it specifically, but for debts due on a general account. This not being a common-law right, is viewed by the English courts with the greatest jealousy, and to be enforced must be strictly proved. This can be done by proof either of an express or implied contract or of a general usage of

1 This right, however, is not absolute, but depends on the custom of the port (Raitt v. Mitchell, 1815,4 Camp. 146).

trade. The first of these is established by the ordinary methods or by previous dealings between the parties on such terms; the second is recognized in certain businesses; it would probably be exceedingly difficult, if not impossible, to extend it at the present time to any other trades. When, however, a lien by general usage has once been

judicially established, it becomes part of the Law Merchant, and the courts are bound to recognize and enforce it. The best known and most important instance is the right of a solicitor to retain papers in his hands belonging to his client until his account is settled. The solicitor's lien, though probably more commonly enforced than any other, is of no great antiquity in English law, the earliest reported case of it being in the reign of James II. ; but it is now of a twofold nature. In the first place there is the retaining lien. This is similar in kind to other possessory liens, but of a general nature attaching to all papers of the client, and even to his money, up to the amount of the solicitor's bill, in the hands of the solicitor in the ordinary course of business. There are certain exceptions which seem to have crept in for the same reason as the solicitor's lien itself, i.e. general convenience of litigation; such exceptions are the will of the client after his decease, and proceedings in bankruptcy. In this latter case the actual possessory lien is given up, the solicitor's interests and priorities being protected by the courts, and it may be said that the giving up the papers is really only a means of enforcing the lien they give in the bankruptcy proceedings. In the second place there is what is called a charging lien — more correctly classed under the head of equitable lien, since it does not require posses- sion, but is a lien the solicitor holds over property recovered or preserved for his client. He had the lien on an order by the court upon a fund in court by the common law, but as to property generally it was only given by 23 & 24 Vict. c. 127, § 28; and it has been held to attach to property recovered in a probate action (ex parte Tweed, C.A. 1899, 2 Q.B. 167). A banker's lien is the right of a banker to retain securities belonging to his customer for money due on a general balance. Other general liens, judicially established, are those of wharfingers, brokers and factors (which are in their nature akin to those of solicitors and bankers), and of calico printers, packers of goods, fullers (at all events at Exeter), dyers and millers; but in all these special trades it is probable that the true reason is that the account due was for one continuous transaction. The calico would come to be printed, the goods to be packed, the cloth to be bleached, the silk to be dyed, and the corn to be ground, in separate parcels, and at different times, but all as one under- taking; and they are therefore, though spoken of as instances of general lien, only adaptations by the courts of the doctrine of particular lien to special peculiarities of business. In none of these cases would the lien exist, in the absence of special agree- ment, for other matters of account, such as money lent or goods sold.

Equitable Liens. — " Where equity has jurisdiction to enforce rights and obligations growing out of an executory contract," e.g. in a suit

for specific performance, ” this equitable theory of remedies cannot be carried out unless the notion is admitted that the contract creates some right or interest in or over specific property, which the decree of the court can lay hold of, and by means of which the equitable relief can be made efficient. The doctrine of equitable liens supplies this necessary element; and it was introduced for the sole purpose of furnishing a ground for these specific remedies which equity confers, operating upon particular identified property instead of the general pecuniary recoveries granted by courts of common law. It follows, therefore, that in a large class of executory contracts express and implied, which the common law regards as creating no property, right nor interest analogous to property, but only a mere personal right to obligation, equity recognizes in addition to the personal obligation a particular right over the thing with which the con- tract deals, which it calls a lien, and which though not property is analogous to property, and by means of which the plaintiff is enabled to follow the identical thing and to enforce the defendant’s I obligation by a remedy which operates directly on the thing.

The theory of equitable liens has its ultimate foundation, therefore, in contracts express or implied which either deal or in some manner relate to specific property, such as a tract of land, particular chattels or securities, a certain fund and the like. It is necessary to divest oneself of the purely legal notion concerning the effects of such contracts, and to recognize the fact that equity regards them as creating a charge upon, or hypothecation of, the specific thing, by means of which the personal obligation arising from the agreement may be more effectively enforced than by a mere pecuniary recovery at law ” (Pomeroy, 2 Eq. Jur. 232).

This description from an American text-book seems to give at once the fullest and most concise definition and description of an equitable lien. It differs essentially from a common-law lien, inasmuch as in the latter possession or occupation is as a rule necessary, whereas in the equitable lien the person claiming the lien is seldom in possession or occupation of the property, its object being to obtain the possession wholly or partially. A special instance of such a lien is that claimed by a publisher over the copyright of a book which he has agreed to publish on terms which are not complied with — for example, the author attempting to get the book published elsewhere. It cannot perhaps be said that this has been absolutely decided to exist, but a

strong opinion of the English court of exchequer towards the close of the 18th century was expressed in its favour (Brook v. Wentworth, 3 Anstruther 881). Other instances are the charging lien of a solicitor, and the lien of a person on improve- ments effected by him on the property of another who ” lies by ” and allows the work to be done before claiming the property. So also of a trustee for expenses lawfully incurred about the trust property. The power of a limited liability company to create a lien upon its own shares was in 1901 established (Allen v. Gold Reefs, &“c, C.A. 1900, 1 Ch. 656).

Maritime Liens, — Maritime lien differs from all the others yet considered, in its more elastic nature. Where a maritime lien has once attached to property — and it may and generally does attach without possession — it will continue to attach, unless lost by laches, so long as the thing to which it attaches exists, notwithstanding changes in the possession of and pro- perty in the thing, and notwithstanding that the new possessor or owner may be entirely ignorant of its existence; and even if enforced it leaves the owner’s personal liability for any balance unrealized intact (the”Gemma,” 1899, P. 285). So far as England is concerned, it must be borne in mind that the courts of admiralty were conducted in accordance with the principles of civil law, and in that law both the pledge with possession and the hypothe- cation without possession were well recognized. The extreme convenience of such a right as the latter with regard to such essentially movable chattels as ships is apparent. Strictly speaking, a maritime lien is confined to cases arising in those matters over which the courts of admiralty had original juris- diction, viz. collisions at sea, seamen’s wages, salvage and bottomry, in all of which cases the appropriate remedy is a proceeding in rem in the admiralty court. In the first of these — collisions at sea— if there were no maritime lien there would frequently be no remedy at all. When two ships have collided at sea it may well be that the innocent ship knows neither the name nor the nationality of the wrongdoer, and the vessel may escape with slight damage and not have to make a port of refuge in the neighbourhood. Months afterwards it is ascer- tained that she was’ a foreign ship, and in the interval she has changed owners. Then, were it not a fact that a maritime lien invisible to the wrongdoer nevertheless attaches itself to his ship at the moment of collision, and continues to attach, the unfortunate owner of the innocent ship would have no remedy, except the doubtful one of pursuing the former owner of the wrong-doing vessel in his own country in a personal action where such proceedings are allowed — which is by no means the case in all foreign countries. The same reasons apply, though not possibly with quite the same force, to the other classes of cases mentioned.

Between 1840 and 1873 the jurisdiction of the admiralty

court was largely extended. At the latter date it was merged in the probate, divorce and admiralty division of the High Court of Justice. Since the merger questions have arisen as to how far the enlargement of jurisdiction has extended the principle of maritime lien. An interesting article on this subject by J. Mansfield, barrister-at-law, will be found in the Law Quarterly Review, vol. iv., October 1888. It must be sufficient to state here that where legislation has extended the already existing jurisdiction to which a maritime lien pertained, the maritime lien is extended to the subject matter, but that where a new jurisdiction is given, or where a jurisdiction formerly existing without a maritime lien is extended, no maritime lien is given, though even then the extended jurisdiction can be enforced by proceedings in rem. Of the first class of extended jurisdictions are collisions, salvage and seamen's wages. Prior to 1840 the court of admiralty only had jurisdiction over these when occurring or earned on the high seas. The jurisdiction, and with it the maritime lien, is extended to places within the body of a county in collision or salvage; and as to seamen's wages, whereas they were dependent on the earning of freight, they are now free from any such limitation; and also, whereas the remedy in rem was limited to seamen's wages not earned under a special con- tract, it is now extended to all seamen's wages, and also to a master's wages and disbursements, and the maritime lien covers all these. The new jurisdiction given over claims for damage to cargo carried into any port in England or Wales, and on appeal from the county courts over all claims for damage to cargo under £300, though it may be prosecuted by proceedings in rem, i.e. by arrest of the ship, yet confers no maritime lien; and so also in the case of claims by material men (builders and fitters-out of ships) and for necessaries. Even though in the latter case the admiralty court had jurisdiction previously to 1840 where the necessaries were supplied on the high seas, yet as it could not be shown that such jurisdiction had ever been held to confer a maritime lien, no such lien is given. Even now there is much doubt as to whether towage confers a maritime lien or not, the services rendered being pursuant to contract, and frequently to a contract made verbally or in writing on the high seas, and being rendered also to a great extent on the high seas. In these cases and to that extent the high court of admiralty would have had original jurisdiction. But prior to 1840 towage, as now rendered by steam tugs expressly employed for the service, was practically unknown, and therefore there was no established catena of precedent to show the exercise of a maritime lien. It may be argued on the one hand that towage is only a modified form of salvage, and therefore entitled to a

maritime lien, and on the other that it is only a form of necessary power supplied like a new sail or mast to a ship to enable her to complete her voyage expeditiously, and therefore of the nature of necessaries, and as such not entitled to a maritime lien. The matter is not of academical interest only, for though in the case of an inward-bound ship the tug owner can make use of his statutory Tight of proceeding in rem, and so obtain much of the benefit of a maritime lien, yet in the case of an outward- boUnd ship, if she once gets away without payment, and the agent or other authorized person refuses or is unable to pay, the tug owner's claim may, on the return of the ship to a British port, be met by an allegation of a change of ownership, which defeats his right of proceeding at all if he has no maritime lien; whereas if he has a maritime lien he can still proceed against the ship and recover his claim, if he has not been guilty of laches.

A convenient division of the special liens other than possessory on ships may be made by classifying them as maritime, statutory-maritime or quasi-maritime, and statutory. The first attach only in the case of damage done by collision between ships on the high seas, salvage on the high seas, bottomry and seamen's wages so far as freight has been earned ; the second attach in cases of damage by collision within the body of a county, salvage within the body of a county, life salvage everywhere, seamen's wages even if no freight has been earned, master's wages and disbursements. These two classes continue to attach notwithstanding a change of ownership without notice of the lien, if there have been no laches in enforcing it (the " Bold Bucdeuch," 1852, 7 Moo. P.C.267; the "Kong Magnus," 1 89 1, P. 223). The third class, which only give a right to proceed

in rem, i.e. against the ship itself, attach, so long as there is no bona fide change of ownership, without citing the owners, in all cases of claims for damage to ship and of claims for damage to cargo where no owner is domiciled in England or Wales. Irrespective of this limitation, they attach in all cases not only of damage to cargo, but also of breaches of contract to carry where the damage does not exceed £300, when the suit must be commenced in a county court having admiralty jurisdiction; and in cases of claims for necessaries supplied elsewhere than in the ship's home port, for wages earned even under a special contract by masters and mariners, and of claims for towage. In all three classes the lien also exists over cargo where the suit from its nature extends to it, as in salvage and in some cases of bottomry or

respondentia, and in cases where proceedings are taken against cargo by the shipowner for a breach of contract (cargo ex ” Argos ” and the ” Hewsons,” 1873, L.R. 5 P.C. 134; the ” Alina,” 1880, 5 Ex. D. 227).

Elsewhere than in England, and those countries such as the United States which have adopted her jurisprudence in maritime matters generally, the doctrine of maritime lien, or that which is substituted for it, is very differently treated. Speaking generally, those states which have adopted the Napoleonic code* or modifica- tions of them — France, Italy, Spain, Holland, Portugal, Belgium, Greece, Turkey, and to some extent Russia — have instead of a maritime lien the civil-law principle of privileged debts. Amongst these in all cases are found claims for salvage, wages, bottomry under certain restrictions, and necessaries. Each of these has a privileged claim against the ship, and in some cases against freight and cargo as well, but it is a matter of very great importance that, except in Belgium, a claim for collision damage (which as we have seen confers a maritime lien, and one of a very high order, in Great Britain) confers no privilege against the wrong-doing ship, whilst in all these countries an owner can get rid of his personal liability by abandoning the ship and freight to his creditor, and so, if the ship is sunk, escape all liability whilst retaining any insurance there may be. This, indeed, was at one time the law of Great Britain; the measure of damage was limited by the value of the res; and in the United States at the present time a shipowner can get rid of his liability for damage by abandoning the ship and freight. A different rule prevails in Germany and the Scandinavian states. There claims relating to the ship, unless the owner has specially rendered himself liable, confer no personal claim at all against him. The claim is limited ab initio to ship and freight, except in the case of seamen’s wages, which do confer a personal claim so far as they have been earned on a voyage or passage completed prior to the loss of the ship. In all maritime states, however, except Spain, a pro- visional arrest of the ship is allowed, and thus between the privilege accorded to the debt and the power to arrest till bail is given or the ship abandoned to creditors, a condition of things analogous to the maritime lien is established ; especially as these claims when the proper legal steps have been taken to render them valid — usually by endorsement on the ship’s papers on board, or by registration at her port of registry— attach to the ship and follow her into the hands of a purchaser. They are in fact notice to him of the incum- brance.

Duration of Lien. — So long as the party claiming the lien at common law retains the property, the lien continues, not- withstanding the debt in respect of which it is claimed becoming barred by the Statute of Limitations (Higgins v. Scott, 1831, 2 B. & Aid. 413). But if he takes

proceedings at law to recover the debt, and on a sale of the goods to satisfy the judgment purchases them himself, he so alters the nature of the possession that he loses his lien {Jacobs v. Latour, 5 Bing. 130). An equit- able lien probably in all cases continues, provided the purchaser of the subject matter has notice of the lien at the time of his purchase. A maritime lien is in no respect subject to the Statute of Limitations, and continues in force notwithstanding a change in the ownership of the property without notice, and is only terminated when it has once attached, by laches on the part of the person claiming it (the " Kong Magnus," 1801, P. 223). There is an exception in the case of seamen's wages, where by 4 Anne c. 16 {Stat. Rev. 4 & 5 Anne c. 3) all suits for seamen's wages in the Admiralty must be brought within six years.

Ranking of Maritime Liens. — There may be several claimants holding maritime and other liens on the same vessel. For example, a foreign vessel comes into collision by her own fault and is damaged and her cargo also; she is assisted into port by salvors and ultimately under a towage agreement, and put into the hands of a shipwright who does necessary repairs. The innocent party to the collision has a maritime lien for his damage, and the seamen for their wages; the cargo owner has a suit in rem or a statutory lien for damage, and the ship- wright a possessory lien for the value of his repairs, while the

tugs certainly have a right in rem and possibly a maritime lien also in the nature of salvage. The value of the property may be insufficient to pay all claims, and it becomes a matter of great consequence to settle whether any, and if so which, have priority over the others, or whether all rank alike and have to divide the proceeds of the property pro raid amongst them. The following general rules apply: liens for benefits conferred rank against the fund in the inverse, and those for the reparation of damage sustained in the direct order of their attaching to the res; as between the two classes those last mentioned rank before those first mentioned of earlier date; as between liens of the same class and the same date, the first claimant has priority over others who have not taken action. The courts of admiralty, however, allow equitable considerations, and enter into the question of marshalling assets. For example, if one claimant has a lien on two funds, or an effective right of action in addition to his lien, and another claimant has only a lien upon one fund, the first claimant will be obliged to exhaust his second remedy before coming into competition with the second. As regards possessory liens, the shipwright takes the ship as she stands, i.e. with her incumbrances, and it appears that the lien for seaman's wages takes precedence of a solicitor's lien for costs, under a charging order made in pursuance of

the Solicitors Act i860, § 28.

Subject to equitable considerations, the true principle appears to be that services rendered under an actual or implied contract, which confer a maritime lien, make the holder of the lien in some sort a proprietor of the vessel, and therefore liable for damage done by her — hence the priority of the damage lien — but, directly it has attached, benefits conferred on the property by enabling it to reach port in safety benefit the holder of the damage lien in common with all other prior holders of maritime liens. It is less easy to see why of two damage liens the earlier should take precedence of the later, except on the principle that the res which came into collision the second time is depreciated in value by the amount of the existing lien upon her for the first collision, and where there was more than one damage lien, and also liens for benefits conferred prior to the first collision between the two collisions and subsequent to the second, the court would have to make a special order to meet the peculiar circumstances. The claim of a mortgagee naturally is deferred to all maritime liens, whether they are for benefits conferred on the property in which he is interested or for damage done by it, and also for the same reason to the possessory lien of the shipwright, but both the possessory lien of the shipwright and the claim of the mortgagee take precedence over a claim for necessaries, which only confers a statutory lien or a right to proceed in rem in certain cases. In other maritime states possessing codes of commercial law, the privileged debts are all set out in order of priority in these codes, though, as has been already pointed out, the lien for damage by collision— the most important in English law — has no counterpart in' most of the foreign codes.

Stoppage in Transitu. — This is a lien held by an unpaid vendor in certain cases over goods sold after they have passed out of his actual possession. It has been much discussed whether it is an equitable or common-law right or lien. The fact appears to be that it has always been a part of the Law Merchant, which, properly speaking, is itself a part of the common law of England unless inconsistent with it. This particular right was, in the first instance, held by a court of equity to be equitable and not contrary to English law, and by that decision this particular part of the Law Merchant was approved and became part of the common law of England (see per Lord Abinger in Gibson v. Carruthers, 8 M. & W., p. 336 et seq.). It may be described as a hen by the Law Merchant, decided by equity to be part of the common law, but in its nature partaking rather of the character of an equitable lien than one at common law. " It is a right which arises solely upon the insolvency of the buyer, and is based on the plain reason of justice

and equity that one man's goods shall not be applied to the payment of another man's debts. If, therefore, after the vendor has delivered the goods out of his own possession and put them in the hands of a carrier for delivery to the buyer, he discovers that the buyer is insolvent, he may re-take the goods if he can before they reach the buyer's possession, and thus avoid having his property applied to paying debts due by the buyer to other people " {Benjamin on Sales, 2nd ed., 289). This right, though I only recognized by English law in 1690, is highly favoured by

the courts on account of its intrinsic justice, and extends to quasi-vendors, or persons in the same position, such as consignors who have bought on behalf of a principal and forwarded the goods. It is, however, defeated by a lawful transfer of the docu- ment of title to the goods by the vendor to a third person, who takes it bond fide and for valuable consideration (Factors Act 1889; Sale of Goods Act 1893).

Assignment or Transfer of Lien. — A lien being a personal right acquired in respect of personal services, it cannot, as a rule, be assigned or transferred; but here again there are exceptions. The personal representative of the holder of a possessory lien on his decease would probably in all cases be held entitled to it ; and it has been held that the lien over a client's papers remains with the firm of solicitors notwithstanding changes in the constitution of the firm {Gregory v. Cresswell, 14 L.J. Ch. 300). So also where a solicitor, having a lien on documents for his costs, assigned the debt to his bankers with the benefit of the lien, it was held that the bankers might enforce such lien in equity. But though a tradesman hds a lien on the property of his customer for his charges for work done upon it, where the property is delivered to him by a servant acting within the scope of his employment, such lien cannot be transferred to the servant, even if he has paid the money himself; and the lien does not exist at all if the servant was acting without authority in delivering the goods, except where (as in the case of a common carrier) he is bound to receive the goods, in which case he retains his lien for the carriage against the rightful owner. Where, however, there is a lien on property of any sort not in possession, a person acquiring the property with knowledge of the lien takes it subject to such lien. This applies to equitable liens, and cannot apply to those common-law hens in which possession is necessary. It is, however, true that by statute certain common-law liens can be transferred, e.g. under the Merchant

Shipping Act a master of a ship having a lien upon cargo for his freight can transfer the possession of the cargo to a wharfinger, and with it the lien (Merchant Shipping Act 1894, § 494). In this case, however, though the matter is simplified by the statute, if the wharfinger was constituted the agent or servant of the ship- master, his possession would be the possession of the shipmaster, and there would be no real transfer of the lien; therefore the common-law doctrine is not altered, only greater facilities for the furtherance of trade are given by the statute, enabling the wharfinger to act in his own name without reference to his principal, who may be at the other side of the world. So also a lien may be retained, notwithstanding that the property passes out of possession, where it has to be deposited in some special place (such as the Custom-House) to comply with the law. Seamen cannot sell or assign or in any way part with their maritime lien for wages (Merchant Shipping Act 1894, § 156), but, nevertheless, with the sanction of the court, a. person who pays seamen their wages is entitled to stand in their place and exercise their rights (the Cornelia Henrietta, 1866, L.R. 1 Ad. & Ec. 51).

Waiver. — Any parting with the possession of goods is in general a waiver of the lien upon them; for example, when a factor having a lien on the goods of his principal gives them to a carrier to be carried at the expense of his principal, even if undisclosed, he waives his lien, and has no right to stop the goods in transitu to recover it; so also where a coach-builder who has a lien on a carriage for repairs allows the owner from time to time to take it out for use without expressly reserving his lien, he has waived it, nor has he a lien for the standage of the carriage except by express agreement, as mere standage does not give a possessory lien. It has even been held that where a portion of goods sold as a whole for a lump sum has been taken away and paid for proportionately, the conversion has taken place and the lien for the residue of the unpaid purchase-money has gone {Gurr v. Cuthbert, 1843, 12 L.J. Ex. 309). Again, an acceptance of security for a debt is inconsistent with the existence of a lien, as it substitutes the credit of the owner for the material guarantee of the thing itself, aad so acts as a waiver of the lien. For the

same reason even an agreement to take security is a waiver of the lien, though the security is not, in fact, given {Alliance Bank v. Broon, 11 L.T. 332).

Sale of Goods under Lien. — At common law the lien only gives a right to retain the goods, and ultimately to sell by legal process, against the owner; but in certain cases a right has been given by statute to sell without the intervention of legal process, such as the

right of an innkeeper to sell the goods of his customer for his unpaid account (Innkeepers Act 1878, § 1), the right of a wharfinger to sell goods entrusted to him by a shipowner with a lien upon them for freight, and also for their own charges (Merchant Shipping Act 1894, §§ 497, 498), and of a railway company to sell goods for their charges (Railway Clauses Act I 84S, § 97). Property affected by an equitable lien or a maritime lien cannot be sold by the holder of the lien without the inter- position of the court to enforce an order, or judgment of the court. In Admiralty cases, where a sale is necessary, no bail having been given and the property being under arrest, the sale is usually made by the marshal in London, but may be elsewhere on the parties concerned showing that a better price is likely to be obtained.

American Law. — In the United States, speaking very gener- ally, the law relating to liens is that of England, but there are some considerable differences occasioned by three principal causes. (1) Some of the Southern States, notably Louisiana, have never adopted the common law of England. When that state became one of the United States of North America it had (and still preserves) its own system of law. In this respect the law is practically identical with the Code Napoleon, which, again speaking generally, substitutes privileges for liens, i.e. gives certain claims a prior right to others against particular property. These privileges being strictissimae interpretations, cannot be extended by any principle analogous to the English doctrine of equitable liens. (2) Probably in consequence of the United States and the several states composing it having had a more democratic government than Great Britain, in their earlier years at all events, certain liens have been created by statute in several states in the interest of the working classes which have no parallel in Great Britain, e.g. in some states workmen employed in building a house or a ship have a lien upon the building or structure itself for their unpaid wages. This statutory lien partakes rather of the nature of an equitable than of a common-law lien, as the property is not in the possession of the workman, and it may be doubted whether the right thus conferred is more beneficial to the workman than the priority his wages have in bankruptcy proceedings in England. Some of the states have also practically extended the maritime lien to matters over which it was never contended for in England. (3) By the constitution of the United States the admiralty and inter-state jurisdiction is vested in the federal as distinguished from the state courts, and these federal courts have not been liable to have their jurisdiction curtailed by prohibition from courts of common law, as the court of admiralty had in England up to the time of the Judicature Acts; consequently the maritime lien in the

United States extends further than it does in England, even after recent enlargements; it covers claims for necessaries and by material men (see Maritime Lien), as, well as collision ; salvage, wages, bottomry and damage to cargo.

Difficulties connected with lien occasionally arise in the federal courts in admiralty cases, from a conflict on the subject between the municipal law of the state where the court happens to sit and the admiralty law; but as there is no power to prohibit the federal court, its view of the admiralty law based on the civil law prevails. More serious difficulties arise where a federal court has to try inter-state questions, where the two states have different laws on the subject of lien; one for example, like Louisiana, following the civil law, and the other the common law and equitable practice of Great Britain. The question as to which law is to govern in such a case can hardly be said to be decided. " The question whether equitable liens can exist to be enforced in Louisiana by the federal courts, notwithstanding its restrictive law of privileges, is still an open one " (Derris,

Contracts of Pledge, 517; and see Burdon Sugar Refining Co. v. Payne, 167 U.S. 127).

British Colonies.— In those colonies which before the Canadian federation were known as Upper Canada and the Maritime Provinces of British North America, and in the several Australasian states where the English common law is enforced except as modified by colonial statute, the principles of lien, whether by common law or equitable or maritime, discussed above with reference to England, will prevail; but questions not dissimilar to those treated of in reference to the United States may arise where colonies have come to the crown of Great Britain by cession, and where different systems of municipal law are enforced. For example, in Lower Canada the law of France prior to the Revolution occupies the place of the common law in England, but is generally regulated by a code very similar to the Code Napoleon; in Mauritius and its dependencies the Code Napoleon itself is in force except so far as modified by subsequent ordinances. In South Africa, and to some extent in Ceylon and Guiana, Roman-Dutch law is in force; in the island of Trinidad old Spanish law, prior to the introduction of the present civil code of Spain, is the basis of jurisprudence. Each several system of law requires to be studied on the point; but, speaking generally, apart from the possessory lien of

work- men and the maritime lien of the vice-admiralty courts, it may be assumed that the rules of the civil law, giving a privilege or priority in certain specified cases rather than a lien as understood in English law, prevail in those colonies where the English law is not in force. (F. W. Ra.)

LIERRE (Flemish, Lief), a town in the province of Antwerp, Belgium; 9 m. S.E. of Antwerp. Pop. (1904) 24,229. It carries on a brisk industry in silk fabrics. Its church of St Gommaire was finished in 1557 and contains three fine glass windows, the gift of the archduke Maximilian, to celebrate his wedding with Mary of Burgundy.

LIESTAL, the capital (since 1833) of the half canton of Basel- Stadt in Switzerland. It is a well-built but uninteresting industrial town, situated on the left bank of the Ergolz stream, and is the most populous town in the entire canton of Basel, after Basel itself. By rail it is 9 J m. S.E. of Basel, and 15J m. N.W. of Olten. In the 15th-century town hall (Rathaus) is preserved the golden drinking cup of Charles the Bold, duke of Burgundy, which was taken at the battle of Nancy in 1477- In 1900 the population was 5403, all German-speaking and mainly Protestants. The town was sold in 1302 by its lord to the bishop of Basel who, in 1400, sold it to the city of Basel, at whose hands it suffered much in the Peasants' War -of 1653, and so consented gladly to the separation of 1833.

LIEUTENANT, one who takes the place, office and duty of and acts on behalf of a superior or other person. The word in English preserves the form of the French original (from lieu, place, tenant, holding), which is the equivalent of the Lat. locum tenens, one holding the place of another. The usual English pronunciation appears early, the word being frequently spelled lieftenant, lyeftenant or luf tenant in the 14th and 15th centuries. The modern American pronunciation is lewtenant, while the German is represented by the present form of the word Leutnatit. In French history, lieutenant du roi {locum tenens regis) was a title borne by the officer sent with military powers to represent the king in certain provinces. With wider powers and functions, both civil as well as military, and holding authority throughout an entire province, such a representative of the king was called lieutenant general du roi. The first appoint- ment of these officials dates from the reign of Philip IV. the Fair (see Constable). In the 16th century the administration of the provinces was in the hands of gouverneurs, to whom the lieutenants du roi became subordinates. The titles lieutenant civil or criminel and lieutenant gSnSral de police have been borne by certain judicial officers in France (see Chatelet and Bailiff: Bailli). As the title of the representative of the sovereign, " lieutenant

” in English usage appears in the title of the lord lieutenant of Ireland, and of the lords lieutenant of the counties of the United Kingdom (see below).

The most general use of the word is as the name of a grade of naval and military officer. It is common in this application to nearly every navy and army of the present day. In Italy and Spain the first part of the word is omitted, and an Italian and Spanish officer bearing this rank are called tenente or tenienle respectively. In the British and most other navies the lieu- tenants are the commissioned officers next in rank to com- manders, or second class of captains. Originally the lieutenant was a soldier who aided, and in case of need replaced, the captain, who, until the latter half of the 17th century, was not necessarily a seaman in any navy. At first one lieutenant was carried, and only in the largest ships. The nuiriber was gradually increased, and the lieutenants formed a numerous corps. At the close of the Napoleonic War in 1813 there were 3 211 lieutenants in the British navy. Lieutenants now often qualify for special duties such as navigation, or gunnery, or the management of torpedoes. In the British army a lieutenant is a subaltern officer rank- ing next below a captain and above a second lieutenant. In the United States of America subalterns are classified as first lieutenants and second lieutenants. In France the two grades are lieutenant and sous-lieutenant, while in Germany the Leutnant is the lower of the two ranks, the higher being Ober-leuinant (formerly Premier-leutnant). A “captain lieutenant” in the British army was formerly the senior subaltern who virtually commanded the colonel’s company or troop, and ranked as junior captain, or ” puny captain,” as he was called by Cromwell’s soldiers.

The lord lieutenant of a county, in England and Wales and in Ireland, is the principal officer of a county. His creation dates from the reign of Henry VIII. (or, according to some, Edward VI.), when the military functions of the sheriff were handed over to him. He was responsible for the efficiency of the militia of the county, and afterwards of the yeomanry and volunteers. He was commander of these forces, whose officers he appointed. By the Regulation of the Forces Act 1871, the jurisdiction, duties and command exercised by the lord lieutenant were revested in the crown, but the power of recommending for first appointments was reserved to the lord lieutenant. By the Territorial and Reserve Forces Act 1907, the lord lieutenant of a county was constituted president of the county association. The office of lord lieutenant is honorary, and is held during the royal pleasure, but virtually for life. Appointment to the office is by letters patent under the great seal. Usually, though not necessarily, the person appointed

lord lieutenant is also appointed custos rotulorum (q.v.). Appointments to the county bench of magistrates are usually made on the recommendation of the lord lieutenant (see Justice of the Peace).

A deputy lieutenant (denoted frequently by the addition of the letters D.L. after a person's name) is a deputy of a lord lieutenant of a county. His appointment and qualifications previous to 1908 were regulated by the Militia Act 1882. By s. 30 of that act the lieutenant of each county was required from time to time to appoint such properly qualified persons as he thought fit, living within the county, to be deputy lieutenants. At least twenty had to be ap- pointed for each county, if there were so many qualified ; if less than that number were qualified, then all the duly qualified persons in the county were to be appointed. The appointments were subject to the sovereign's approval, and a return of all appointments to, and removals from, the office had to be laid before parliament annually. To qualify for the appointment of deputy lieutenant a person had to be (a) a peer of the realm, or the heir-apparent of such a peer, having a place of residence within the county; or (b) have in possession an estate in land in the United Kingdom of the yearly value of not less than £200; or © be the heir-apparent of such a person; or (d) have a clear yearly income from personalty within the United Kingdom of not less than £200 (s. 33). If the lieutenant were absent from the United Kingdom, or through illness or other cause were unable to act, the sovereign might authorize any three deputy lieutenants to act as lieutenant (s. 31), or might appoint a deputy lieutenant to act as vice-lieutenant. Otherwise, the duties of the office were practically nominal, except that a deputy lieu- tenant might attest militia recruits and administer the oath of allegiance to them. The reorganization in 1907 of the forces of the British crown, and the formation of county associations to ad- minister the territorial army, placed increased duties on deputy lieutenants, and it was publicly announced that the king's approval of appointments to that position would only be given in the case of gentlemen who had served for ten years in some force of the crown, or had rendered eminent service in connexion with a county association.

The lord lieutenant of Ireland is the head of the executive in that country. He represents his sovereign and maintains the formalities of government, the business of government being entrusted to the

department of his chief secretary, who represents the Irish government in the House of Commons, and may have a seat in the cabinet. The chief secretary occupies an important position, and in every cabinet either the lord lieutenant or he has a seat.

Lieutenant-governor is the title of the governor of an Indian province, in direct subordination to the governor-general in council. The lieutenant-governor comes midway in dignity between the governors of Madras and Bombay, who are appointed from England, and the chief commissioners of smaller provinces. In the Dominion of Canada the governors of provinces also have the title of lieutenant-governor. The representatives of the sovereign in the Isle of Man and the Channel Islands are likewise styled lieutenant- governors.

LIFE, the popular name for the activity peculiar to proto- plasm (?.!).). This conception has been extended by analogy to phenomena different in kind, such as the activities of masses of water or of air, or of machinery, or by another analogy, to the duration of a composite structure, and by imagination to real or supposed phenomena such as the manifestations of incorporeal entities. From the point of view of exact science life is associated with matter, is displayed only by living bodies, by all living bodies, and is what distinguishes living bodies from bodies that are not alive. Herbert Spencer's formula that life is " the continuous adjustment of internal relations to external relations " was the result of a profound and subtle analysis, but omits the fundamental consideration that we know life only as a quality of and in association with living matter.

In developing our conception we must discard from considera- tion the complexities that arise from the organization of the higher living bodies, the differences between one living animal and another, or between plant and animal. Such differentiations and integrations of living bodies are the subject-matter of discussions on evolution; some will see in the play of circum- ambient media, natural or supernatural, on the simplest forms of living matter, sufficient explanation of the development of such matter into the highest forms of living organisms; others will regard the potency of such living matter so to develop as a mysterious and peculiar quality that must be added to the conception of life. Choice amongst these alternatives need not complicate investigation of the nature of life. The explanation that serves for the evolution of living matter, the vehicle of life, will serve for the evolution of life. What we have to deal with here is life in its simplest form.

The definition of life must really be a description of the essential characters of life, and we must set out with an investiga- tion of the characters of living substance with the special object of detecting the differences between organisms and unorganized matter, and the differences between dead and living organized matter.

Living substance (see Protoplasm), as it now exists in all animals and plants, is particulate, consisting of elementary organisms living independently, or grouped in communities, the communities forming the bodies of the higher animals and plants. These small particles or larger communities are subject to accidents, internal or external, which destroy them, immedi- ately or slowly, and thus life ceases; or they may wear out, or become clogged by the products of their own activity. There is no reason to regard the mortality of protoplasm and the consequent limited duration of life as more than the necessary consequence of particulate character of living matter (see Longevity).

Protoplasm, the living material, contains only a few elements, all of which are extremely common and none of which is peculiar to it. These elements, however, form compounds characteristic of living substance and for the most part peculiar to it. Proteid, which consists of carbon, hydrogen, nitrogen, oxygen and sulphur, is present in all protoplasm, is the most complex of all organic bodies, and, so far, is known only from organic bodies. A multitude of minor and simpler organic compounds, of which carbohydrates and fats are the best known, occur in different protoplasm in varying forms and proportions, and are much less isolated from the inorganic world. They may be stages in the elaboration or disintegration of protoplasm, and although they were at one time believed to occur only as products of living

matter, are gradually being conquered by the synthetic chemist. Finally, protoplasm contains various inorganic substances, such as salts and water, the latter giving it its varying degrees of liquid consistency.

We attain, therefore, our first generalized description of life as the property or peculiar quality of a substance composed of none but the more Common elements, but of these elements grouped in various ways to form compounds ranging from proteid, the most complex of known substances to the simplest salts. The living substance, moreover, has its mixture of elaborate and simple compounds associated in a fashion that is peculiar. The older writers have spoken of protoplasm or the cell as being in a sense ” manufactured articles “; in the more modern view such a conception is replaced by the

statement that protoplasm and the cell have behind them a long historical architecture. Both ideas, or both modes of expressing what is fundamentally the same idea, have this in common, that life is not a sum of the qualities of the chemical elements con- tained in protoplasm, but a function first of the peculiar architecture of the mixture, and then of the high complexity of the compounds contained in the mixture. The qualities of water are no sum of the qualities of oxygen and hydrogen, and still less can we expect to explain the qualities of life without regard to the immense complexity of the living substance.

We must now examine in more detail the differences which exist or have been alleged to exist between living organisms and inorganic bodies. There is no essential difference in structure. Confusion has arisen in regard to this point from attempts to compare organized bodies with crystals, the comparison having been . suggested by the view that as crystals present the highest type of inorganic structure, it was reasonable to compare them with organic matter. Differences between crystals and organized bodies have no bearing on the problem of life, for organic substance must be compared with a liquid rather than with a crystal, and differs in structure no more from inorganic liquids than these do amongst themselves, and less than they differ from crystals. Living matter is a mixture of substances chiefly dissolved in water; the comparison with the crystals has led to a supposed distinction in the mode of growth, crystals growing by the superficial apposition of new particles and living substance by intussusception. But inorganic liquids also grow in the latter mode, as when a soluble substance is added to them.

The phenomena of movement do not supply any absolute distinction. Although these are the most obvious characters of life, they cannot be detected in quiescent seeds, which we know to be alive, and they are displayed in a fashion very like life by inorganic foams brought in contact with liquids of different composition. Irritability, again, although a notable quality of living substance, is not peculiar to it, for many in- organic substances respond to external stimulation by definite changes. Instability, again, which lies at the root of Spencer's definition " continuous adjustment of internal relations to external relations " is displayed by living matter in very varying degrees from the apparent absolute quiescence of frozen seeds to the activity of the central nervous system, whilst there is a similar range amongst inorganic substances.

The phenomena of reproduction present no fundamental distinction. Most living bodies, it is true, are capable of reproduc- tion, but there

are many without this capacity, whilst, on the other hand, it would be difficult to draw an effective distinction between that reproduction of simple organisms which consists of a sub-division of their substance with consequent resumption of symmetry by the separate pieces, and the breaking up of a drop of mercury into a number of droplets.

Consideration of the mode of origin reveals a more real if not an absolute distinction. All living substance so far as is known at present (see Biogenesis) arises only from already existing living substance. It is to be noticed, however, that green plants have the power of building up living substance from I inorganic material, and there is a certain analogy between the

building up of new living material only in association with pre-existing living material, and the greater readiness with which certain inorganic reactions take place if there already be present some trace of the result of the reaction.

The real distinction between living matter and inorganic matter is chemical. Living substance always contains proteid, and although we know that proteid contains only common inorganic elements, we know neither how these are combined to form proteid, nor any way in which proteid can be brought into existence except in the presence of previously existing proteid. The central position of the problem of life lies in the chemistry of proteid, and until that has been fully explored, we are unable to say that there is any problem of life behind the problem of proteid.

Comparison of living and lifeless organic matter presents the initial difficulty that we cannot draw an exact line between a living and a dead organism. The higher ” warm-blooded ” creatures appear to present the simplest case and in their life- history there seems to be a point at which we can say ” that which was alive is now dead.” We judge from some major arrest of activity, as when the heart ceases to beat. Long after this, however, various tissues remain alive and active, and the event to which we give the name of death is no more than a super- ficially visible stage in a series of changes. In less highly integrated organisms, such as ” cold-blooded ” vertebrates, the point of death is less conspicuous, and when we carry our observations further down the scale of animal life, there ceases to be any salient phase in the slow transition from life to death.

The distinction between life and death is made more difficult by a consideration of cases of so-called ” arrested vitality.” If credit can be given to the stories of Indian fakirs, it appears that human beings can pass voluntarily into a state of suspended animation that may last for weeks. The state of involuntary trance, sometimes mistaken for death, is a similar occurrence. A. Leeuwenhoek, in 1710, made the remarkable discovery, since abundantly confirmed, that many animalculae, notably tardigrades and rotifers, may be completely desiccated and remain in that condition for long periods without losing the power of awaking to active life when moistened with water. W. Preyer has more recently investigated the matter and has given it the name ” anabiosis.” Later observers have found similar occurrences in the cases of small nematodes, rotifers and bacteria. The capacity of plant seeds to remain dry and inactive for very long periods is still better known. It has been supposed that in the case of the plant seeds and still more in that of the animals, the condition of anabiosis was merely one in which the metabolism was too faint to be perceptible by ordinary methods of observa- tion, but the elaborate experiments of W. Kochs would seem to show that a complete arrest of vital activity is com- patible with viability. The categories, ” alive ” and ” dead,” are not sufficiently distinct for us to add to our conception of life by comparing them. A living organism usually displays active metabolism of proteid, but the metabolism may slow down, actually cease and yet reawaken; a dead organism is one in which the metabolism has ceased and does not reawaken.

Origin of Life. — It is plain that we cannot discuss adequately the origin of life or the possibility of the artificial construction of living matter (see Abiogenesis and Biogenesis) until the chemistry of protoplasm and specially of proteid is more advanced. The investigations of O. Biitschli have shown how a model of protoplasm can be manufactured. Very finely triturated soluble particles are rubbed into a smooth paste with an oil of the requisite consistency. A fragment of such a paste brought into a liquid in which the solid particles are soluble, slowly expands into a honeycomb like foam, the walls of the minute vesicles being films of oil, and the contents being the soluble particles dissolved in droplets of the circumambient liquid. Such a model, properly constructed, that is to say, with the vesicles of the foam microscopic in size, is a marvellous imitation of the appearance of protoplasm, being distinguishable from it

ohly by a greater symmetry. The nicely balanced conditions of solution produce a state of unstable equilibrium, with the result that internal streaming movements and changes of shape and changes of position in the model simulate closely the corre- sponding

manifestations in real protoplasm. The model has no power of recuperation ;_m a comparatively short time equilibrium is restored and the resemblance with protoplasm disappears. But it suggests a method by which, when the chemistry of proto- plasm and proteid is better known, the proper substances which compose protoplasm may be brought ˆgether to form a simple kind of protoplasm.

It has been suggested from time to time that conditions very unlike those now existing Were necessary for the first appearance of life, and must be repeated if living matter is to be constructed artificially. No support for such a view can be derived from observations of the existing conditions of life. The chemical elements involved are abundant; the physical conditions of temperature pressure and so forth at which living matter is most active, and within the limits of which it is confined, are familiar and almost constant in the world around us. On the other hand, it may be that the initial conditions for the synthesis of proteid are different from those under which proteid and living matter display their activities. E. Pfliiger has argued that the analogies between living proteid and the compounds of cyanogen are so numerous that they suggest cyanogen as the starting- point of protoplasm. Cyanogen and its compounds, so far as we know, arise only in a state of incandescent heat. Pfliiger suggests that such compounds arose when the surface of the earth was incandescent, and that in the long process of cooling, compounds of cyanogen and hydrocarbons passed into living protoplasm by such processes of transformation and polymerization as are familiar in the chemical groups in question, and by the acquisition of water and oxygen. His theory is in consonance with the inter- pretation of the structure of protoplasm as having behind it a long historical architecture and leads to the obvious conclusion that if protoplasm be constructed artificially it will be by a series of stages and that the product will be simpler than any of the existing animals or plants.

Until greater knowledge of protoplasm and particularly of proteid has been acquired, there is no scientific room for the suggestion that there is a mysterious factor differentiating living matter from other matter and life from other activities. We have to scale the walls, open the windows, and explore the castle before crying out that it is so marvellous that it must contain ghosts.

As may be supposed, theories of the origin of life apart from doctrines of special creation or of a primitive and slow spontaneous generation are mere fantastic speculations. The most striking of these suggests an extra-terrestrial origin. H. E. Richter appears to have been the first to propound the idea that life came to this planet as cosmic dust or in

meteorites thrown off from stars and planets. Towards the end of the 10th century Lord Kelvin (then Sir W. Thomson) and H. von Helmholtz independently raised and discussed the possibility of such an origin of terrestrial life, laying stress on the presence of hydrocarbons in meteoric stones and on the indications of their presence revealed by the spectra of the tails of comets. W. Preyer has criticized such views, grouping them under the phrase ” theory of cosmozoa,* and has suggested that living matter preceded inorganic matter. Preyer’s view, however, enlarges the conception of life until it can be applied to the phenomena of incandescent gases and has no relation to ideas of life derived from observation of the living matter we know.

References. — O. Btitschli, Investigations on Microscopic Foams and Protoplasm (Eng. trans, by E. A. Minchin, 1894), with a useful list of references; H. von Helmholtz, Vortrdge und Reden, ii. (1884); W. Kochs, Allgemeine Naturkunde, x. 673 (1890); A. Leeuwenhoek, Epistolae ad Societatem regiam Anglicam (17 19); E. Pfliiger, ” fiber einige Gesetze des Eiweissstoffwechsels,” in Archiv. Ges. Physiol, liv. 333 (l 8 93); W. Preyer, Die Hypothesen iiber den Ur sprung des Lebens (1880); H. E. Richter, Zur Darwin- ischen Lehre (1865); Herbert Spencer, Principles of Biolog-y; Max Verworm, General Physiology (English trans, by F. S. Lee, 1899), I with a very full literature. (P. C. M.)

LIFE-BOAT, and LIFE-SAVING SERVICE. The article on Drowning and Life-Saving (g,v.) deals generally with the means of saving life at sea, but under this heading it is convenient to include the appliances connected specially with the life-boat service. The ordinary open boat is unsuited for life-saving in a stormy sea, and numerous contrivances, in regard to which the lead came from England, have been’ made for securing the best type of life-boat.

The first life-boat was conceived and designed by Lionel Lukin, a London coachbuilder, in 1785. Encouraged by the prince of Wales (George IV.), Lukin fitted up a Norway yawl as a life-boat, took out a patent for it, and wrote a pamphlet descriptive of his ” Insubmergible Boat.” Buoyancy he obtained by means of a projecting gunwale of cork and air-chambers inside — one of these being at the bow, another at the stern. Stability he secured by a false iron keel. The self-righting and self-empty- ing principles he seems not to have thought

of; at all events he did not compass them. Despite the patronage of the prince, Lukin went to his grave a neglected and disappointed man. But he was not altogether unsuccessful, for, at the request of the Rev Dr Shairp, Lukin fitted up a coble as an ” unimmergible ” life-boat, which was launched at Bamborough, saved several lives the first year and afterwards saved many lives and much property.

Public apathy in regard to shipwreck was temporally swept away by the wreck of the ” Adventure ” of Newcastle in 1789. This vessel was stranded only 300 yds. from the shore, and her crew dropped, one by one, into the raging breakers in presence of thousands of spectators, none of whom dared to put off in an ordinary boat to the rescue. An excited meeting among the people of South Shields followed; a committee was formed, and premiums were offered for the best models of a life-boat. This called forth many plans, of which those of William Would- have, a painter, and Henry Greathead, a boatbuilder, of South Shields, were selected. The committee awarded the prize to the latter, and, adopting the good points of both models, gave the order for the construction of their boat to Greathead. This boat was rendered buoyant by nearly 7 cwts. of cork, and had very raking stem and stern-posts, with great curvature of keel. It did good service, and Greathead was well rewarded; neverthe- less no other life-boat was launched till 1798, when the duke of Northumberland ordered Greathead to build him a life-boat which he endowed. This boat also did good service, and its owner ordered another in 1800 for Oporto. In the same year Mr Cath- cart Dempster ordered one for St Andrews, where, two years later, it saved twelve lives. Thus the value of life-boats began to be recognized, and before the end of 1803 Greathead had built thirty-one boats — eighteen for England, five for Scotland and eight for foreign lands. Nevertheless, public interest in life-boats was not thoroughly aroused till 1823.

In that year Sir William Hillary, Bart., stood forth to champion the life-boat cause. Sir William dwelt in the Isle of Man, and had assisted with his own hand in the saving of three hundred and five lives. In conjunction with two members of parliament — Mr Thomas Wilson and Mr George Hibbert — Hillary founded the ” Royal National Institution for the Preservation of Life from Shipwreck.” This, perhaps the grandest of England’s charitable societies, and now named the ” Royal National Life-boat Institution,” was founded on the 4th of March 1824. The king patronized it; the archbishop of Canterbury presided at its birth; the most eloquent men in the land — among them Wilberforce — pleaded the cause; nevertheless, the institution began its career with a sum of only £9826. In the first year twelve new life-boats were built and placed at different stations, besides

which thirty-nine life-boats had been stationed on the British shores by benevolent individuals and by independent associations over which the institution exercised no control though it often assisted them. In its early years the institution placed the mortar apparatus of Captain Manby at many stations, and provided for the wants of sailors and others saved from shipwreck, — a duty subsequently discharged by the " Ship- wrecked Fishermen and Mariners' Royal Benevolent Society."

At the date of the institution's second report it had contributed to the saving of three hundred and forty-two lives, either by its own life-saving apparatus or by other means for which it had granted rewards. With fluctuating success, both as regards means and results, the institution continued its good work — saving many lives, and occasionally losing a few brave men in its tremendous battles with the sea. Since the adoption of the self-righting boats, loss of life in the service has been com- paratively small and infrequent.

Towards the middle of the 19th century the life-boat cause appeared to lose interest with the British public, though the life- saving work was prosecuted with unremitting zeal, but the increasing loss of life by shipwreck, and a few unusually severe disasters to life-boats, brought about the reorganization of the society in 1850. The Prince Consort became vice-patron of the institution in conjunction with the king of the Belgians, and Queen Victoria, who had been its patron since her accession, became an annual contributor to its funds. In 1851 the duke of Northumberland became president, and from that time forward a tide of prosperity set in, unprecedented in the history of benevolent institutions, both in regard to the great work accom- plished and the pecuniary aid received. In 1850 its committee , undertook the immediate superintendence of all the life-boat work on the coasts, with the aid of local committees. Periodical inspections, quarterly exercise of crews, fixed rates of payments to coxswains and men, and quarterly reports, were instituted, at the time when the self-righting self-emptying boat came into being. This boat was the result of a hundred-guinea prize, offered by the president, for the best model of a life-boat, with another hundred to defray the cost of a boat built on the model chosen. In reply to the offer no fewer than two hundred and eighty models were sent in, not only from all parts of the United Kingdom, but from France, Germany, Holland and the United States of America. The prize was gained by Mr James Beeching of Great Yarmouth, whose model, slightly modified by Mr James Peake, one of the committee of inspection, was still further improved as time and experience suggested (see below).

The necessity of maintaining a thoroughly efficient life-boat service is now generally recognized by the people not only of Great Britain, but also of those other countries on the European Continent and America which have a sea-board, and of the British colonies, and numerous life-boat services have been founded more or less on the lines of the Royal National Life- boat Institution. The British Institution was again reorganized in 1883; it has since greatly developed both in its life-saving efficiency and financially, and has been spoken of in the highest terms as regards its management by successive governments — a Select Committee of the House of Commons in 1897 reporting to the House that the thanks of the whole community were due to the Institution for its energy and good management. On the death of Queen Victoria in January 1901 she was succeeded as patron of the Institution by Edward VII., who as prince of Wales had been its president for several years. At the close of 1908 the Institution's fleet consisted of 280 life-boats, and the total number of lives for the saving of which the committee of management had granted rewards since the establishment of the Institution in 1824 was 47,983. At this time there were only seventeen life-boats on the coast of the United Kingdom which did not belong to the Institution. In 18*82 the total amount of money received by the Institution from all sources was £57,797, whereas in 1901 the total amount received had increased to £107,293. In 1908 the receipts were £115,303, the expenditure £90,335.

In 1882 the Institution undertook, with the view of diminishing the loss of life among the coast fishermen, to provide the masters and owners of fishing-vessels with trustworthy aneroid barometers, at about a third of the retail price, and in 1883 the privilege was extended to the masters and owners of coasters under 100 tons burden. At the end of 1901 as many as 4417 of these valuable instruments had been supplied. In 1889 the committee of management secured the passing of the Removal of Wrecks Act 1877 Amendment Act, which provides for the removal of wrecks in non-navigable waters whictfi might prove dangerous to life-boat crews

and others. Under its provisions numerous highly dangerous wrecks have been removed.

In 1893 the chairman of the Institution moved a resolution in the House of Commons that, in order to decrease the serious loss of life from shipwreck on the coast, the British Government should provide

either telephonic or telegraphic communication between all the coast-guard stations and signal stations on the coast of the United Kingdom; and that where there are no coast-guard stations the post offices nearest to the life-boat stations should be electrically connected, the object being to give the earliest possible information to the life-boat authorities at all times, by day and night, when the life-boats are required for service; and further, that a Royal Com- mission should be appointed to consider the desirability of electrically connecting the rock lighthouses, light-ships, &c, with the shore. The resolution was agreed to without a division, and its intention has been practically carried out, the results obtained having proved most valuable in the saving of life.

On the 1st of January. 1898 a pension and gratuity scheme was introduced by the committee of management, under which life-boat coxswains, bowmen and signalmen of long and meritorious service, retiring on account of old age, accident, ill-health or abolition of office, receive special allowances as a reward for their good services. While these payments act as an incentive to the men to discharge their duties satisfactorily, they at the same time assist the committee of management in their effort to obtain the best men for the work. For many years the Institution has given compensation to any who may have received injury while employed in the service, besides granting liberal help to the widows and dependent relatives of any in the service who lose their own lives when endeavouring to rescue others.

A very marked advance in improvement in design and suit- ability for service has been made in the life-boat since the re- organization of the Institution in 1883, but principally since

Fig. I.— The 33-ft., Double-banked, Ten-oared, Self-righting and Self-emptying Life-boat (188 1) of the Institution on its Transporting Carriage, ready for launching.

1887, when, as the result of an accident in December 1886 to two self-righting life-boats in Lancashire, twenty-seven out of twenty-nine of the men who manned them were drowned. At this time a permanent technical sub-committee was ap- pointed by the Institution, whose object was, with the assistance of an eminent consulting naval architect — a new post created — and the Institution's official experts, to give its careful attention to the designing of improvements in the life-boat and its equip- ment, and to the scientific consideration of any inventions or proposals submitted by the public, with a view to adopting them if of practical utility. Whereas in 1881 the self-righting life-boat of that time was looked upon as the Institution's special life-

boat, and there were very few life-boats in the Institution's fleet not of that type, at the close of 1901 the life-boats of the Institution included 60 non-self-righting boats of various types, known by the following designations: Steam life-boats 4, Cromer 3, Lamb and White 1, Liverpool 14, Norfolk and Suffolk 19, tubular 1, Watson 18. In 1901 a steam-tug was placed at Padstow for use solely in conjunction with the life-boats on the north coast of Cornwall. The self-righting life-boat of 1901 was a very different boat from that of 1881. The Institution's present policy is to allow the men who man the life-boats, after having seen and tried by deputation, the various types, to select that in which they have the most con- fidence.

The present life-boat of the self-righting type (fig. 2) differs materially from its predecessor, the stability being increased and the righting power greatly improved. The test of efficiency in this last quality was formerly considered sufficient if the boat would quickly right herself in smooth water without her crew and gear, but every self-righting life-boat now built by

the Institution will right with her full crew and gear on board, with her sails set and the anchor down. Most of the larger self-righting boats are furnished with " centre-boards " or

DECK. PLAN .

vhisSt 5 ˆ

00Y PLAN .

MIOSHIP SECTION

Fig. 2. — Plans, Profile and Section of Modern English Self-

E, Wale, or fender.

F, Iron keel ballast, import-

ant in general stability and self-righting.

G, Water-ballast tanks. H, Drop-keel.

righting Life-boat.

A, Deck.

B, Relieving valves for automatic dis-

charge of water off deck.

C, Side air-cases above deck.

D, End air compartments, usually

called ” end-boxes,” an important factor in self-righting.

” drop-keels ” of varying size and weight, which can be used at pleasure; and materially add to their weather qualities. The drop-keel was for the first time placed in a life-boat in

1885.

Steam was first introduced into a life-boat in 1890, when the Institution, after very full inquiry and consideration,

PICK PLAN.

PDV PLAH

MtDSHIP SECTION

Fig. 3. — Plans, Profile and Section of English Steam Life-boat.

A, Cockpit.

a, Deck.

b, Propeller hatch.

c, Relief valves.

B, Engine-room.

C, Boiler-room.

D, Water-tight compartments.

E, Coal-bunkers.

F, Capstan.

G, Hatches to engine-and boiler

rooms. H, Cable reel. I, Anchor davit.

stationed on the coast a steel life-boat, 50 ft. long and 12 ft beam, and

a depth of 3 ft. 6 in., propelled by a turbine whee, driven by engines developing 170 horse-power. It had been

previously held by all competent judges that a mechanically-propelled life-boat, suitable for service in heavy weather, was a problem surrounded by so many and great difficulties that even the most sanguine experts dared not hope for an early solution of it. This type of boat (fig. 3) has proved very useful. It is, however, fully recognized that boats of this description can necessarily be used at only a very limited number of stations, and where there is a harbour which never dries out. The highest speed attained by the first hydraulic steam life-boat was rather more than 9 knots, and that secured in the latest 9% knots. In 1909 the fleet of the Institution included 4 steam life-boats and 8 motor life-boats. The experiments with motor life-boats in previous years had proved successful.

The other types of pulling and sailing life-boats are all non- self-righting, and are specially suitable for the requirements of the different parts of the coast on which they are placed. Their various qualities will be understood by a glance at the illustrations (figs. 4, 5, 6, 7 and 8).

The Institution continues to build life-boats of different sizes according to the requirements of the various points of the coast at which they are placed, but of late years the tendency has been generally to increase the dimensions of the boats. This change of policy is mainly due to the fact that the small

of an endless plateway or jointed wheel tyre fitted to the main wheels of the carriage, thereby enabling the boat to be trans- ferred with rapidity and with greatly decreased labour over beach and soft sand. Further efficiency in launching has also been attained at many stations by the introduction in 1890 of pushing-poles, attached to the transporting-carriages, and

BOOT PIAN. MIDSHIP SCCTIOW,

Fig. 4.— Plans, Profile and Section of Cromer Type of Life-boat.

A, Deck. C, Side air-cases above deck.

B, Relieving valves for auto- E, Wale, or fender.

matic discharge of water off G, Water-ballast tanks, deck.

coasters and fishing-boats have in great measure disappeared, their places being taken by steamers and steam trawlers. The cost of the building and equipping of pulling and sailing life- boats has materially increased, more especially since 1898, the increase being mainly due to improvements and the seriously augmented charges for materials and labour. In 1881 the average cost of a fully-equipped life-boat and carriage was £650, whereas at the end of 1901 it amounted to £1000, the average annual cost of maintaining a station having risen to about £125.

The transporting-carriage continues to be a most important part of the equipment of life-boats, generally of the self-righting type, and is indispensable where it is necessary to launch the boats at any point not in the immediate vicinity of the boat- house. It is not, however, usual to supply carriages to boats of larger dimensions than 37 ft. in length by 9 ft. beam, those in excess as regards length and beam being either launched by means of special slipways or kept afloat. The transporting- carriage of to-day has been rendered particularly useful at places where the beach is soft, sandy or shingly, by the introduction in 1888 of Tipping's sand-plates. They are composed

• ODV PLAN.

MIDSHIP SECTION.

Fig. 5. — Plans, Profile and Section of Liverpool Type of Life-boat. A, B, C, E, G, as in fig. 3; D, end air-compartments; F, iron keel; H, drop-keels.

of horse launching-poles, first used in 1892. Fig. 9 gives a view of the modern transporting-carriage fitted with Tipping's sand- or wheel-plates.

The life-belt has since 1898 been considerably improved, being now less cumbersome than formerly, and more comfortable. The feature of the principal improvement is the reduction in length of the corks under the arms of the wearer and the rounding- off of the upper portions, the result being that considerably more freedom is provided for the arms. The maximum extra buoyancy has thereby been reduced from 25 lb to 22 lb, which is more than sufficient to support a man heavily clothed with his head and shoulders above the water, or to enable him to

•bor plan.

MIDSHIP SECTION,

Fig. 6.— Plans, Profile and Section of Norfolk and Suffolk Type of Life-boat. A, B, E, F, G, H, as in fig. 4; A, side deck; I, cable- well.

support another person besides himself. Numerous life-belts of very varied descriptions, and made of all sorts of materials, have been patented, but it is generally agreed that for life-boat work the cork life-belt of the Institution has not yet been equalled. Life-savins rafts, seats for ships' decks, dresses, buoys, bells, brc,

have been produced in all shapes and sizes, but apparently nothing indispensable has as yet been brought out. Those interested in life-saving appliances were hopeful that the Paris

_u Ll Ui

25SSSE2

s:

rnoFiu. \ h

MIDSHIP SECTION.

Fig. 7. — Plan, Profile and Section of Tubular Type of Life-boat. A, deck; E, wale, or fender; H, drop-keel.

Exhibition of 1900 would have produced some life-saving invention which might prove a benefit to the civilized world, but so lacking in real merit were the life-saving exhibits that the jury of experts were unable to award to any of the 435 competitors the Andrew Pollok prize of £4000 for the best method or device for saving life from shipwreck.

The rocket apparatus, which in the United Kingdom is under the management of the coast-guard, renders excellent service in life-saving. This, next to the life-boat, is the most important and successful means by which shipwrecked persons are rescued

to tackle fixed to an anchor on shore, the life-buoy is run dut by the rescuers, and the shipwrecked persons, getting into it one at a time, are hauled ashore. Sometimes, in cases of urgency, the life-buoy is

worked by means of the whip alone, without the hawser. Captain G. W. Manby, F.R.S., in 1807 invented, or at least introduced, the mortar apparatus, on which the system of the rocket apparatus, which superseded it in England, is founded. Previously, however, in 1 79 1, the idea of throwing a rope from a wreck to the shore by means of a shell from a mortar had occurred to Serjeant Bell of the Royal Artillery, and about the same time, to a Frenchman named La F£re, both of whom made successful experiments with their apparatus. In the same year (1807) a rocket was proposed by Mr Trengrouse of Helston in Cornwall, also a hand and lead line as means of communicating with vessels in distress. The heaving- cane was a fruit of the latter suggestion. In 1814 forty-five mortar stations were established, and Manby received £2000, in addition to previous grants, in acknowledgment of the good service rendered by his invention. Mr John Dennett of Newport, Isle of Wight, introduced the rocket, which was afterwards extensively used. In 1826 four places in the Isle of Wight were supplied with Dennett's rockets, but it was not till after government had taken the apparatus

TRANSPORTING-CARRIAGE WITH WHEEL-PLATES.

BOPV PLAN MIDSHIP SECTION.

Fig. 8. — Plans, Profile and Section of Watson Type of Life-boat. Lettering as in fig. 5, but C, side air-cases above deck and thwarts.

on the British shores. Many vessels are cast every year on the rocky parts of the coasts, under cliffs, where no life-boat could be of service. In such places the rocket alone is available.

The rocket apparatus consists of five principal parts, viz. the rocket, the rocket-line, the whip, the hawser and the sling life-buoy. The mode of working it is as follows. A rocket, having a: light line attached to it, is fired over the wreck. By means of this line the wrecked crew haul out the whip, which is a double or endless line, rove through a block with a tail attached to it. The tail-block, having been detached from the rocket-line, is fastened to a mast, or other portion of the wreck, high above the water. By means of the whip the rescuers haul off the hawser, to which is hung the travel- ling or sling life-buoy. When one end of the hawser has been made fast to the mast, about 18 in. above the whip, and its other end

[RsgsS 3 ” ft = *

a

MAIN BCD. FORE BCD.

TIPPING'S WHEEL-PLATES.

L-A

END-VIEW.

"H"

ELEVATION.

Fig. 9. — Life-boat Transporting-Carriage with Tipping's Wheel-Plates.

under its own control, in 1855, that the rocket invented by Colonel Boxer was adopted. Its peculiar characteristic lies in the com- bination of two rockets in one case, one being a continuation of the other, so that, after the first compartment has carried the machine to its full elevation, the second gives it an additional impetus whereby a great increase of range is obtained. (R. M. B. ; C. Di.)

United States. — In the extent of coast line covered, magni- tude of operations and the extraordinary success which has crowned its efforts, the life-saving service of the United States is not surpassed by any other institution of its kind in the world. Notwithstanding the exposed and dangerous nature of the coasts flanking and stretching between the approaches to the principal seaports, and the immense amount of shipping concentrating upon them, the loss of life among a total of 121,459 persons imperilled by marine casualty within the scope of the operations of the service from its organization in 187 1 to the 30th of June 1907, was less than 1%, and even this small proportion is made up largely of persons washed overboard immediately upon the striking of vessels and before any assistance could reach them, or lost in attempts to land in their own boats, and people thrown into the sea by the capsizing of small craft. In the scheme of the service, next in importance to the saving of life is the saving of property from marine disaster, for which no salvage or reward is allowed. During the period named vessels and cargoes to the value of nearly two hundred million dollars were saved, while only about a quarter as much was lost.

The first government life-saving stations were plain boat-houses

erected on the coast of New Jersey in 1848, each equipped with a fisherman's surf-boat and a mortar and life-car with accessories. Prior to this time, as early as 1789, a benevolent organization known as the Massachusetts Humane Society had erected rude huts along the coast of that state, followed by a station at Cohasset in 1807 equipped with a boat for use by volunteer crews. Others were subsequently added. Between 1849 and 1870 this society secured appropriations from Congress aggregating $40,000. It still maintains sixty-nine stations on the Massa- chusetts coast. The government service was extended in 1849 to the coast of Long Island, and in 1850 one station was placed on the Rhode.Island coast. In 1854 the appointment of keepers for the New Jersey and Long Island stations, and a superintendent for each of these coasts, was authorized by law. Volunteer crews were depended upon until 1870, when Congress authorized crews at each alternate station for the three winter months.

The present system was inaugurated in 1871 by Sumner I. Kimball, who in that year was appointed chief of the Revenue Cutter Service, which had charge of the few existing stations. He recommended an appropriation of $200,000 and authority for the employment of crews for all stations for such periods as were deemed necessary, which were granted. The existing stations were thoroughly overhauled and put in condition for the housing of crews; necessary boats and equipment were furnished; incapable keepers, who had been appointed largely for political reasons, were supplanted by experienced men; additional stations were established; all were manned by capable surfmen; the merit system for appointments and promotions was inaugurated; a beach patrol system was introduced, together with a system of signals; and regulations for the government of the service were promulgated. The result of the transformation was immediate and striking. At the end of the year it was found that not a life had been lost within the domain of the service; and at the end of the second year the record was almost identical, but one life having been lost, although the service had been extended to embrace the dangerous coast of Cape Cod. Legislation was subsequently secured, totally eliminating politics in the choice of officers and men, and making other provisions necessary for the completion of the system. The service continued to grow in extent and importance until, in 1878, it was separated from the Revenue Cutter Service and organized into a separate bureau of the Treasury, its administration being placed in the hands of a general superintendent appointed by the president and con- firmed by the senate, his term of office being limited only by the will of the president. Mr Kimball was appointed to the position, which he still held in 1909.

The service embraces thirteen districts, with 280 stations located at selected points upon the sea and lake coasts. Nine districts on the Atlantic and Gulf coasts contain 201 stations, including nine houses of refuge on the Florida coast, each in charge of a keeper only, without crews; three districts on the Great Lakes contain 61 stations, including one at the falls of the Ohio river, Louisville, Kentucky; and one district on the Pacific coast contains 18 stations, including one at Nome, Alaska.

The general administration of the service is conducted by a general superintendent; an inspector of life-saving stations and two superintendents of construction of life-saving stations detailed from the Revenue Cutter Service; a district superintendent for each district; and assistant inspectors of stations, also detailed from the Revenue Cutter Service " to perform such duties in con- nexion with the conduct of the service as the general superintendent may require." There is also an advisory board on life-saving appliances consisting of experts, to consider devices and inventions submitted by the general superintendent.

Station crews are composed of a keeper and from six to eight surfmen, with an additional man during the winter months at most of the stations on the Atlantic coast. The surfmen are re- enlisted from year to year during good behaviour, subject to a thorough physical examination. The keepers are also subject to annual physical examinations after attaining the age of fifty-five. Stations on the Atlantic and Gulf coasts are manned from August 1st to May 31st. On the lakes the active season covers the period of navigation, from about April 1st to early in December. The falls station at Louisville, and all stations on the Pacific coast, are in commission continuously. One station, located in Dorchester Bay, an expanse of water within Boston harbour, where numerous

yachts rendezvous and many accidents occur, which, with the on? at Louisville are. believed to be the only floating life-saving stations in the world, is manned from May 1st to November 15th. Its equipment includes a steam tug and two gasoline launches, the latter being harboured in a slip cut into the after-part of the station and extending from the stern to nearly amidships. The Louisville stations guard the falls of the Ohio river, where life is much en- dangered from accidents to vessels passing over the falls and small craft which are liable to be drawn into the chutes while attempting to cross the river. Its equipment includes two river skiffs which can be instantly launched directly from the ways at one end of the station. These skiffs are small boats modelled much like surf-boats, designed to be rowed by one or

two men. Other equipments are provided for the salvage of property. The stations, located as near as practicable to a launching place, contain as a rule convenient quarters for the residence of the keeper and crew and a boat and apparatus room. In some instances the dwelling- and boat-house are built separately. Each station has a look-out tower for the day watch.

The principal apparatus consists of surf- and life-boats, Lyle gun and breeches-buoy apparatus and life-car. The Hunt gun and Cunningham line-carrying rocket are available at selected stations on account of their greater range, but their use is rarely necessary. The crews are drilled daily in some portion of rescue work, as practice in manceuvring, upsetting and righting boats, with the breeches- buoy, in the resuscitation of the apparently drowned and in sig- nalling. The district officers upon their quarterly visits examine the crews orally and by drill, recording the proficiency of each member, including the keeper, which record accompanies their report to the general superintendent. For watch and patrol the day of twenty-four hours is divided into periods of four or five hours each. Day watches are stood by one man in the look-out tower or at some other point of vantage, while two men are assigned to each night watch between sunset and sunrise. One of the men remains on watch at the station, dividing his time between the beach look-out and visits to the telephone at specified intervals to receive messages, the service telephone system being extended from station to station nearly throughout the service, with watch tele- phones at half-way points. The other man patrols the beach to the end of his beat and returns, when he takes the look-out and his watchmate patrols in the opposite direction. A like patrol and watch is maintained in thick or stormy weather in the daytime. Between adjacent stations a record of the patrol is made by the exchange of brass checks; elsewhere the patrolman carries a watch-man's clock, on the dial of which he records the time of his arrival at the keypost which marks the end of his beat. On discovering a vessel standing into danger the patrolman burns a Coston signal, which emits a brilliant red flare, to warn the vessel of her danger. The number of vessels thus warned averages about two hundred in each year, whereby great losses are averted, the extent of which can never be known. When a stranded vessel is discovered, the patrolman's Coston signal apprises the crew that they are seen and assistance is at hand. He then notifies his station, by telephone if possible. When such notice is received at the station, the keeper determines the means with which to attempt a rescue, whether by boat or beach-apparatus. If the beach-apparatus is chosen, the apparatus cart is hauled to a point directly opposite the wreck by horses, kept at most of the stations during the

inclement months, or by the members of the crew. The gear is unloaded, and while being set up — the members of the crew performing their several allotted parts simultaneously — the keeper fires a line over the wreck with the Lyle gun, a small bronze cannon weighing, with its i81h elongated iron projectile to which the line is attached, slightly more than 200 lb, and having an extreme range of about 700 yds., though seldom available at wrecks for more than 400 yds. This gun was the invention of Lieutenant (afterwards Colonel) David A. Lyle, U.S. Army. Shotline? are of three sizes, s 4 2 , A and f% of an inch diameter, designated respectively Nos. 4, 7 and 9. The two larger are ordinarily used, the No. 4 for extreme range. A line having been fired within reach of the persons on the wreck, an endless rope rove through a tail-block is sent out by it with instructions, printed in English and French on a tally-board, to make the tail fast to a mast or other elevated portion of the wreck. This done, a 3-in. hawser is bent on to the whip and hauled off to the wreck, to be made fast a little above the tail-block, after which the shore end is hauled taut over a crotch by means of tackle attached to a sand anchor. From this hawser the breeches-buoy or life-car is suspended and drawn between the ship and shore of the endless whip-line. The life-car can also be drawn like a boat between ship and shore without the use of a hawser. The breeches-buoy is a cork life-buoy to which is attached a pair of short canvas breeches, the whole suspended from a traveller block by suitable lanyards. It usually carries one person at a time, although two have frequently been brought ashore together. The life-car, first introduced in 1848, is a boat of corrugated iron with a convex iron cover, having a hatch in the top for the admission of passengers, which can be fastened either from within or without, and a few perforations to admit air, with raised edges to exclude water. At wreck operations during the night the shore is illuminated by powerful acetylene (calcium carbide) lights. If any of the rescued persons are frozen,

as often happens, or are injured or sick, first aid and simple remedies are furnished them. Dry clothing, supplied by the Women’s National Relief Association, is also furnished to survivors, which the destitute are allowed to keep.

„ Scale of Feet

12 o 1 2 \ 4 c

however, have now been transformed into power boats without the sacrifice of any of their essential qualities. The installation of power is effected by introducing a 25 H. P. four-cycle gasoline motor, weighing with its fittings, tanks, &c, about 800 lb. The engine is

Fig. 10.— American Power Life-boat.

Several types of light open surf-boats are used, adapted to the special requirements of the different localities and occasions They are built of cedar, from 23 to 27 ft. long, and are provided with end air chambers and longitudinal air cases on each side under the thwarts

installed in the after air chamber, with the starting crank, reversing clutches, &c, recessed into the bulkhead to protect them from accidents. These boats attain a speed of from 7 to 9 m. an hour, and have proved extremely efficient. A new power life-boat (fig. 10) on somewhat improved lines, 36 ft. in length, and equipped with

Fig. 11. — Beebe-McLellan Self -bailing Boat.

Self-righting and self-bailing life-boats, patterned after those used in England and other countries, have heretofore been used at most of the Lake stations and at points on the ocean coast where they can be readily launched from ways. Most of these boats,

a 35-40 H.P. gasoline engine, promises to prove still more efficient. A number of surf-boats have also been equipped with gasoline engines of from 5 to 7 H.P., for light and quick work, with very satisfactorv results.

6o&

LI FFORD— LIGHT

A distinctively American life-boat extensively used is the Beebe-McLellan self-bailing boat (fig. il), which for all round life-saving work is held in the highest esteem. It possesses all the qualities of the self-righting and self-bailing life-boats in use in all life-saving institutions, except that of self-righting; and the sacrifice of this quality is largely counteracted by the ease with which it can be righted by its crew when capsized. For accomplishing this the crews are thoroughly drilled. In drill a trained crew can upset and

numerous branches with local committees. The Imperial govern- ment contributes an annual subsidy of 20,000 yen (£2000). The members of the Institution consist of three classes — honorary, ordinary and sub-

ordinary, the amount contributed by the member determining the class in which he is placed. The chairman and council are not, as in Great Britain, appointed by the subscribers, but by the president, who must always be a member of the imperial family. The Institution bestows three medals: (a) the medaJ of

Scale of Feet

4 5

‘ion at after bulkhead bout i’aft of Section IS

etflund&n fsn

u

_j

&’ •

1

!

i, .„

^^Jni |

1 1 M s/jP

§ Midship Section

Section at forward bulkhead about bˆforward of Section 4

Fig. 12. — Details of boat shown in Fig. 10.

right the boat and resume their places at the oars in twenty seconds. | The boat is built of cedar, weighs about 1200 lb, and can be used at all stations and launched by the crew directly off the beach from the boat-wagon especially made for it. The self-bailing quality is secured by a water-tight deck at a level a little above the load water line with relieving tubes fitted with valves through which any water shipped runs back into the sea by gravity. Air cases along the sides under the thwarts, inclining towards the middle of the boat, minimize the quantity of water taken in, and the water-ballast tank in the bottom increases the stability by the weight of the water which can be admitted by opening the valve. When transported along the land it is

empty. The Beebe-McLellan boat is 25 ft. long, 7 ft. beam, and will carry 12 to 15 persons in addition to its crew. Some of these boats, intended for use in localities where the temperature of the water will not permit of frequent upsetting and righting drills, are built with end air cases which render them self-righting.

In addition to the principal appliances described, a number of minor importance are included in the equipment of every life-saving station, such as launching carriages for life-boats, roller boat-skids, heaving sticks and all necessary tools. Members of all life-saving crews are required on all occasions of boat practice or duty at wrecks to wear life-belts of the prescribed pattern. (A. T. T.)

Life-boat Service in other Countries. — Good work is done by the life-boat service in other countries, most of these institutions having been formed on the lines of the Royal National Life-boat Institution of Great Britain. The services are operating in the following countries: —

Belgium. — Established in 1838. Supported entirely by govern- ment.

Denmark. — Established in 1848. Government service.

Sweden. — Established in 1856. Government service.

France. — Established in 1865. Voluntary association, but assisted by the government.

Germany. — Established in 1885. Supported entirely by voluntary contributions.

Turkey (Black Sea) .—Established in 1868. Supported by dues.

Russia. — Established in 1872. Voluntary association, but re- ceiving an annual grant from the government.

Italy. — Established in 1879. Voluntary association.

Spain. — Established in 1880. Voluntary association, but receiving annually a grant of £1440 from government.

Canada. — Established in 1880. Government service.

Holland.— Established in 1884. Voluntary association, but assisted by a government subsidy.

Norway. — Established in 189 1. Voluntary association, but re- ceiving a small annual grant from government.

Portugal. — Established in 1898. Voluntary society.

India {East Coast). — Voluntary association.

Australia (South). — Voluntary association.

New Zealand. — Voluntary association.

Japan. — The National Life-boat Institution of Japan was founded in 1889. It is a voluntary society, assisted by government. Its attairs are managed by a president and a vice-president, supported by a very influential council. The head office is at T6kyo ; there are

merit, to be awarded to persons rendering distinguished service to the Institution; (b) the medal of membership, to be held by honorary and ordinary members or subscribers; and © the medal of praise, which is bestowed on those distinguishing themselves by special service in the work of rescue.

LIFFORD, the county town of Co. Donegal, Ireland, on the left bank of the Foyle. Pop. (1901) 446. The county gaol, court house and infirmary are here, but the town is practically a suburb of Strabane, across the river, in Co. Londonderry. Lifford, formerly called Ballyduff, was a chief stronghold of the O'Donnells of Tyrconnell. It was incorporated as a borough (under the name of Liffer) in the reign of James I. It returned two members to the Irish parliament until the union in 1800.

LIGAMENT (Lat. ligamentum, from ligare, to bind), anything which binds or connects two or more parts; in anatomy a piece of tissue connecting different parts of an organism (see Con- nective Tissues and Joints).

LI6A0, a town near the centre of the province of Albay, Luzon, Philippine Islands, close to the left bank of a tributary of the Bicol river, and on the main road through the valley. Pop. (1903) 17,687. East of the town rises Mayon, an active volcano, and the rich volcanic soil in this region produces Jiemp, rice and coco-nuts. Agriculture is the sole occupation of the inhabitants. Their language is Bicol.

LIGHT. Introduction. — § 1. " Light " may be defined sub- jectively as the sense-impression formed by the eye. This is the most familiar connotation of the term, and suffices for the discussion of optical subjects which do not require an objective definition, and, in particular, for the treatment of physiological optics and vision. The objective definition, or the " nature of light," is the ultima Thule of

optical research. ” Emission theories,” based on the supposition that light was a stream of corpuscles, were at first accepted. These gave place during the opening decades of the 19th century to the ” undulatory or wave theory,” which may be regarded as culminating in the ” elastic solid theory ” — so named from the lines along which the mathe- matical investigation proceeded — and according to which light is a transverse vibratory motion propagated longitudinally though the aether. The mathematical researches of James Clerk Maxwell have led to the rejection of this theory, and it is now held that light is identical with electromagnetic disturbances, such as are generated by oscillating electric currents or moving magnets. Beyond this point we cannot go at present. To quote Arthur Schuster {Theory of Optics, 1904), “So long as the char- acter of the displacements which constitute the waves remains undefined we cannot pretend to have established a theory of

light.” It will thus be seen that optical and electrical phenomena are co-ordinated as a phase of the physics of the ” aether,” and that the investigation of these sciences culminates in the deriva- tion of the properties of this conceptual medium, the existence of which was called into being as an instrument of research. 1 The methods of the elastic-solid theory can still be used with advantage in treating many optical phenomena, more especially so long as we remain ignorant of fundamental matters concerning the origin of electric and magnetic strains and stresses; in addition, the treatment is more intelligible, the researches on the electromagnetic theory leading in many cases to the deriva- tion of differential equations which express quantitative relations between diverse phenomena, although no precise meaning can be attached to the symbols employed. The school following Clerk Maxwell and Heinrich Hertz has certainly laid the founda- tions of a complete theory of light and electricity, but the methods must be adopted with caution, lest one be constrained to say with Ludwig Boltzmann as in the introduction to his Vorlesungen tiber Maxwell’s Theorie der Elektricitdt und des Lichtes: — ” So soil ich denn mit saurem Schweiss Euch lehren, was ich selbst nicht weiss.”

Goethe, Faust.

The essential distinctions between optical and electromagnetic phenomena may be traced to differences in the lengths of light- waves and of electromagnetic waves. The aether can probably transmit

waves of any wave-length, the velocity of longitudinal propagation being about yid L0 cms. per second. The shortest waves, discovered by Schumann and accurately measured by Lyman, have a wave-length of o-oooi mm.; the ultra-violet, recognized by their action on the photographic plate or by their promoting fluorescence, have a wave-length of 0-0002 mm.; the eye recognizes vibrations of a wave-length ranging from about 0-0004 mm. (violet) to about 0-0007 (red); the infra-red rays, recognized by their heating power or by their action on phosphorescent bodies, have a wave-length of o-ooi mm.; and the longest waves present in the radiations of a luminous source are the residual rays (" Rest-strahlen ") obtained by repeated reflections from quartz (-0085 mm.), from flucrite (0-056 mm.), and from sylvite (0-06 mm.). The research-field of optics includes the investigation of the rays which we have just enumerated. A delimitation may then be made, inasmuch as luminous sources yield no other radiations, and also since the next series of waves, the electromagnetic waves, have a minimum wave-length of 6 mm.

§ 2. The commonest subjective phenomena of light are colour and visibility, i.e. why are some bodies visible and others not, or, in other words, what is the physical significance of the words " transparency," " colour " and " visibility." What is ordinarily understood by a transparent substance is one which transmits all the rays of white light without appreciable absorption — that some absorption does occur is perceived when the substance is viewed through a sufficient thickness. Colour is due to the absorption of certain rays of the spectrum, the unabsorbed rays being transmitted to the eye, where they occasion the sensation of colour (see Colour; Absorption of Light). Transparent bodies are seen partly by reflected and partly by transmitted light, and opaque bodies by absorption. Refraction also influences visibility. Objects immersed in a liquid of the same refractive index and dispersion would be invisible; for example, a glass rod can hardly be seen when immersed in Canada balsam; other instances occur in the petrological examination of rock-sections under the microscope. In a complex rock-section the boldness with which the constituents stand out are measures of the difference between their refractive in- dices and the refractive index of the mounting medium, and the

1 The invention of " aethers " is to be carried back, at least, to the Greek philosophers, and with the growth of knowledge they were empirically postulated to explain many diverse phenomena. Only one " aether " has survived in modern science — that associated with light and electricity, and of which Lord Salisbury, in his pre- sidential address to the British Association in 1894, said, " For more than two generations the main, if not the only, function of the word ' aether '

has been to furnish a nominative case to the verb ‘ to undulate.’ ” (See Aether.)

more nearly the indices coincide the less defined become tLp boundaries, while the interior of the mineral may be most advantageously explored. Lord Rayleigh has shown that transparent objects can only be seen when non-uniformly illuminated, the differences in the refractive indices of the substance and the surrounding medium becoming inoperative when the illumination is uniform on all sides. R. W. Wood has performed experiments which confirm this view.

The analysis of white light into the spectrum colours, and the reformation of the original light by transmitting the spectrum through a reversed prism, proved, to the satisfaction of Newton and subsequent physicists until late in the 19th century, that the various coloured rays were present in white light, and that the action of the prism was merely to sort out the rays. This view, which suffices for the explanation of most phenomena, has now been given up, and the modern view is that the prism or grating really does manufacture the colours, as was held previously to Newton. It appears that white light is a sequence of irregular wave trains which are analysed into series of more regular trains by the prism or grating in a manner comparable with the analytical resolution presented by Fourier’s theorem. The modern view points to the mathematical existence of waves of all wave-lengths in white light, the Newtonian view to the physical existence. Strictly, the term ” monochromatic ” light, is only applicable to light of a single wave-length (which can have no actual existence), but it is commonly used to denote light which cannot be analysed by the instruments at our disposal ; for example, with low-power instruments the light emitted by sodium vapour would be regarded as homogeneous or mono- chromatic, but higher power instruments resolve this light into two components of different wave-lengths, each of which is of a higher degree of homogeneity, and it is not impossible that these rays may be capable of further analysis.

§ 3. Divisions of the Subject. — In the early history of the science of light or optics a twofold division was adopted: Cat- optrics (from Or. kLtotttpov, a mirror), embracing the phenomena of reflection, i.e. the formation of images by mirrors; and Dioptrics (Gr. 81a, through), embracing the phenomena of refraction, i.e. the bending of a ray of light when passing ob- liquely through the surface dividing two media. 2 A third element, Chromatics (Gr. xP&na, colour), was subsequently introduced to include phenomena involving colour

transforma- tions, such as the iridescence of mother-of-pearl, feathers, soap- bubbles, oil floating on water, &c. This classification has been discarded (although the terms, particularly ” dioptric ” and ” chromatic,” have survived as adjectives) in favour of a twofold division: geometrical optics and physical optics. Geometrical optics is a mathematical development (mainly effected by geometrical methods) of three laws assumed to be rigorously true: (1) the law of rectilinear propagation, viz. that light travels in straight lines or rays in any homogeneous medium ; (2) the law of reflection, viz. that the incident and reflected rays at any point of a surface are equally inclined to, and coplanar with, the normal to the surface at the point of incidence; and (3) the law of refraction, viz. that the incident and refracted rays at a surface dividing two media make angles with the normal to the surface at the point of incidence whose sines are in a ratio (termed the ” refractive index “) which is constant for every particular pair of media, and that the incident and refracted rays are coplanar with the normal. Physical optics, on the other hand, has for its ultimate object the elucida- tion of the question: what is light? It investigates the nature of the rays themselves, and, in addition to determining the validity of the axioms of geometrical optics, embraces phenomena for the explanation of which an expansion of these assumptions is necessary.

Of the subordinate phases of the science, ” physiological optics” is concerned with the phenomena of vision, with the eye as an optical instrument, with colour-perception, and

2 With the Greeks the word ” Optics ” or ‘Oifrutd (from ottohm., the obsolete present of 6pCo, I see) was restricted to questions concerning vision, &c., and the nature of light.

with such allied subjects as the appearance of the eyes of a cat and the luminosity of the glow-worm and firefly; ” meteoro- logical optics ” includes phenomena occasioned by the atmo- sphere, such as the rainbow, halo, corona, mirage, twinkling of stars and colour of the sky, and also the effects of atmospheric dust in promoting such brilliant sunsets as were seen after the eruption of Krakatoa; ” magneto-optics ” investigates the effects of electricity and magnetism on optical properties; ” photo-chemistry,” with its more practical

development photography, is concerned with the influence of light in effect- ing ehemical action; and the term ” applied optics ” may be used to denote, on the one hand, the experimental investiga- tion of material for forming optical systems, e.g. the study of glasses with a view to the formation of a glass of specified optical properties (with which may be included such matters as the transparency of rock-salt for the infra-red and of quartz for the ultra-violet rays), and, on the other hand, the application of geometrical and physical investigations to the construction of optical instruments.

§ 4. Arrangement of the Subject. — The following three divisions of this article deal with: (I.) the history of the science of light; (II.) the nature of light; (III.) the velocity of light; but a summary (which does not aim at scientific precision) may here be given to indicate to the reader the inter-relation of the various optical phenomena, those phenomena which are treated in separate articles being shown in larger type.

The simplest subjective phenomena of light are Colour and intensity, the measurement of the latter being named Photometry. When light falls on a medium, it may be re- turned by Reflection or it may suffer Absorption; or it may be transmitted and undergo Refraction, and, if the light be composite, Dispersion; or, as in the case of oil films on water, brilliant colours are seen, an effect which is due to Inter- ference. Again, if the rays be transmitted in two directions, as with certain crystals, ” double refraction ” (see Refraction, Double) takes place, and the emergent rays have undergone Polarization. A Shadow is cast by light falling on an opaque object, the complete theory of which involves the phenomenon of Diffraction. Some substances have the property of trans- forming luminous radiations, presenting the phenomena of Calorescence, Fluorescence and Phosphorescence. An optical system is composed of any number of Mirrors or Lenses, or of both. If light falling on a system be not brought to a focus, i.e. if all the emergent rays be not concurrent, we are presented with a Caustic and an Aberration. An optical instrument is simply the setting up of an optical system, the Telescope, Microscope, Objective, optical Lantern, Camera lucida, Camera obscura and the Kaleidoscope are examples; instruments serviceable for simultaneous vision with both eyes are termed Binocular instruments; the Stereoscope may be placed in this category; the optical action of the Zoetrope, with its modern development the Cinematograph, depends upon the physiological persistence of Vision. Meteorological optical phenomena comprise the Corona, Halo, Mirage, Rainbow, colour of Sky and Twilight, and also astronomical refraction (see Refraction, Astro- nomical) ; the complete theory of the corona involves Diffrac- tion, and atmospheric Dust also

plays a part in this group of phenomena.

I. History

§ 1. There is reason to believe that the ancients were more familiar with optics than with any other branch of physics; and this may be due to the fact that for a knowledge of external things man is indebted to the sense of vision in a far greater degree than to other senses. That light travels in straight lines — or, in other words, that an object is seen in the direction in which it really lies — must have been realized in very remote times. The antiquity of mirrors points to some acquaintance with the phenomena of reflection, and Layard's discovery of a convex lens of rock-crystal among the ruins of the palace of Nimrud implies a knowledge of the burning and magnifying

powers of this instrument. The Greeks were acquainted with the fundamental law of reflection, viz. the equality of the angles of incidence and reflection; and it was Hero of Alexandria who proved that the path of the ray is the least possible. The lens, as an instrument for magnifying objects or for concentrating rays to effect combustion, was also known. Aristophanes, in the Clouds (c. 424 B.C.), mentions the use of the burning-glass to destroy the writing on a waxed tablet; much later, Pliny describes such glasses as solid balls of rock-crystal or glass, or hollow glass balls filled with water, and Seneca mentions their use by engravers. A treatise on optics (KaroirrpiKa) , assigned to Euclid by Proclus and Marinus, shows that the Greeks were acquainted with the production of images by plane, cylindrical and concave and convex spherical mirrors, but it is doubtful whether Euclid was the author, since neither this work not the 'Oirrink, a work treating of vision and also assigned to him by Proclus and Marinus, is mentioned by Pappus, and more particularly since the demonstrations do not exhibit the pre- cision of his other writings.

Reflection, or catoptrics, was the key-note of their explana- tions of optical phenomena; it is to the reflection of solar rays by the air that Aristotle ascribed twilight, and from his observation of the colours formed by light falling on spray, he attributes the rainbow to reflection from drops of rain. Although certain elementary phenomena of refraction had also been noted — such as the apparent bending of an oar at the point where it met the water, and the apparent elevation of a coin in a basin by filling the basin with water — the quantita- tive law of refraction was unknown; in fact, it was not formu- lated until the beginning of the 17th century. The analysis of white light into the continuous spectrum of rainbow colours by transmission through a prism was observed by Seneca, who regarded the colours as fictitious,

placing them in the same category as the iridescent appearance of the feathers on a pigeon's neck.

§ 2. The aversion of the Greek thinkers to detailed experi- mental inquiry stultified the progress of the science; instead of acquiring facts necessary for formulating scientific laws and correcting hypotheses, the Greeks devoted their intellectual energies to philosophizing on the nature of light itself. In their search for a theory the Greeks were mainly concerned with vision — in other words, they sought to determine how an object was seen, and to what its colour was due. Emission theories, involving the conception that light was a stream of concrete particles, were formulated. The Pythagoreans assumed that vision and colour were caused by the bombardment of the eye by minute particles projected from the surface of the object seen. The Platonists subsequently introduced three elements— a stream of particles emitted by the eye (their " divine fire "), which united with the solar rays, and, after the combination had met a stream from the object, returned to the eye and excited vision.

In some form or other the emission theory — that light was a longitudinal propulsion of material particles — dominated optical thought until the beginning of the 19th century. The authority of the Platonists was strong enough to overcome Aristotle's theory that light was an activity (ivkpyeia.) of a medium which he termed the pellucid (oia.av&) ; about two thousand years later Newton's exposition of his corpuscular theory overcame the undulatory hypotheses of Descartes and Huygens; and it was only after the acquisition of new experimental facts that the labours of Thomas Young and Augustin Fresnel indubitably established the wave-theory.

§ 3. The experimental study of refraction, which had been almost entirely neglected by the early Greeks, received more attention during the opening centuries of the Christian era. Cleomedes, in his Cyclical Theory of Meteors, c. a.d. 50, alludes to the apparent bending of a stick partially immersed in water, and to the rendering visible of coins in basins by filling up with water; and also remarks that the air may refract the sun's rays so as to render that luminary visible, although actually it may be below the horizon. The most celebrated of the early

writers on optics is the Alexandrian Ptolemy (2nd century). \ His writings on light are believed to be preserved in two imperfect Latin manuscripts, themselves translations from the Arabic. The subjects discussed include the nature of light and colour; the formation of images by various types of mirrors, refractions at the surface of glass and of water, with tables of the angle of refraction corresponding to given angles of incidence for rays passing from air to glass and from air to water; and also astro- nomical refractions, i.e. the apparent displacement of a heavenly body due to the refraction of light in its passage through the atmosphere. The authenticity of these manuscripts has been contested: the Almagest contains no mention of the Optics, nor is the subject of astronomical refractions noticed, but the strongest objection, according to A. de Morgan, is the fact that their author was a poor geometer.

§ 4. One of the results of the decadence of the Roman empire was the suppression of the academies, and few additions were made to scientific knowledge on European soil until the 13th century. Extinguished in the West, the spirit of research was kindled in the East. The accession of the Arabs to power and territory in the 7th century was followed by the acquisition of the literary stores of Greece, and during the following five centuries the Arabs, both by their preservation of existing works and by their original discoveries (which, however, were but few), took a permanent place in the history of science. Pre-eminent among Arabian scientists is Alhazen, who flourished in the 1 1 th century. Primarily a mathematician and astronomer, he also investigated a wide range of optical phenomena. He examined the anatomy of the eye, and the functions of its several parts in promoting vision; and explained how it is that we see one object with two eyes, and then not by a single ray or beam as had been previously held, but by two cones of rays proceeding from the object, one to each eye. He attributed vision to emanations from the body seen; and on his authority the Platonic theory fell into disrepute. He also discussed the magnifying powers of lenses; and it may be that his writings on this subject inspired the subsequent invention of spectacles. Astronomical observations led to the investigation of refraction by the atmosphere, in particular, astronomical refraction; he explained the phenomenon of twilight, and showed a connexion between its duration and the height of the atmosphere. He also treated optical deceptions, both in direct vision and in vision by reflected and refracted light, including the phenomenon known as the horizontal moon, i.e. the apparent increase in the diameter of the sun or moon when near the horizon. This appearance had been explained by Ptolemy on the supposition that the diameter was actually increased

by refraction, and his com- mentator Theon endeavoured to explain why an object appears larger when viewed under water. But actual experiment showed that the diameter did not increase. Alhazen gave the correct explanation, which, however, Friar Bacon attributes to Ptolemy. We judge of distance by comparing the angle under which an object is seen with its supposed distance, so that if two objects be seen under nearly equal angles and one be supposed to be more distant than the other, then the former will be supposed to be the larger. When near the horizon the sun or moon, conceived as very distant, are intuitively compared with terres- trial objects, and therefore they appear larger than when viewed at elevations.

§ 5. While the Arabs were acting as the custodians of scientific knowledge, the institutions and civilizations of Europe were gradually crystallizing. Attacked by the Mongols and by the Crusaders, the Bagdad caliphate disappeared in the 13th century. At that period the Arabic commentaries, which had already been . brought to Europe, were beginning to exert great influence on scientific thought; and it is probable that their rarity and the increasing demand for the originals and translations led to those forgeries which are of frequent occurrence in the literature of the middle ages. The first treatise on optics written in Europe was admitted by its author Vitello or Vitellio, a native of Poland, to be based on the works of Ptolemy and Alhazen. It was written in about 1270, and first published in 1572, with a Latin transla-

tion of Alhazen's treatise, by F. Risner, under the title Thesaurus opticae. Its tables of refraction are more accurate than Ptolemy's; the author follows Alhazen in his investigation of lenses, but his determinations of the foci and magnifying powers of spheres are inaccurate. He attributed the twinkling of stars to refraction by moving air, and observed that the scintillation was increased by viewing through water in gentle motion; he also recognized that both reflection and refraction were instrumental in producing the rainbow, but he gave no explanation of the colours.

The Perspectiva Communis of John Peckham, archbishop of Canterbury, being no more than a collection of elementary propositions containing nothing new, we have next to consider the voluminous works of Vitellio's illustrious contemporary, Roger Bacon. His writings on light, Perspectiva and Specula mathematica, are included in his Opus majus. It is conceivable that he was acquainted with the nature of the images formed by light traversing a small orifice — a phenomenon noticed by Aristotle, and applied at a later date to the construction of the camera obscura. The invention of the

magic lantern has been ascribed to Bacon, and his statements concerning spectacles, the telescope, and the microscope, if not based on an experimental realization of these instruments, must be regarded as masterly conceptions of the applications of lenses. As to the nature of light, Bacon adhered to the theory that objects are rendered visible by emanations from the eye.

The history of science, and more particularly the history of inventions, constantly confronts us with the problem presented by such writings as Friar Bacon's. Rarely has it been given to one man to promote an entirely new theory or to devise an original instrument; it is more generally the case that, in the evolution of a single idea, there comes some stage which arrests our attention, and to which we assign the dignity of an " inven- tion." Furthermore, the obscurity that surrounds the early history of spectacles, the magic lantern, the telescope and the microscope, may find a partial solution in the spirit of the middle ages. The natural philosopher who was bold enough to present to a prince a pair of spectacles or a telescope would be in imminent danger of being regarded in the eyes of the church as a powerful and dangerous magician; and it is conceivable that the maker of such an instrument would jealously guard the secret of its actual construction, however much he might advertise its potentialities. 1

§ 6. The awakening of Europe, which first manifested itself in Italy, England and France, was followed in the 16th century by a period of increasing intellectual activity. The need for experimental inquiry was realized, and a tendency to dispute the dogmatism of the church and to question the theories of the established schools of philosophy became apparent. In the science of optics, Italy led the van, the foremost pioneers being Franciscus Maurolycus (1404-ˆ75) of Messina, and Giambattista della Porta (1538-1615) of Naples. A treatise by Maurolycus entitled Photismi de Lumine et Umbra prospectivum radiorum incidentium facientes (1575), contains a discussion of the measure- ment of the intensity of light — an early essay in photometry; the formation of circular patches of light by small holes of any shape, with a correct explanation of the phenomenon; and the optical relations of the parts of the eye, maintaining that the crystalline humour acts as a lens which focuses images on the retina, explaining short- and long-sight (myopia and hyper- metropia), with the suggestion that the former may be corrected by concave, and the latter by convex, lenses. He observed the spherical aberration due to elements beyond the axis of a lens, and also the caustics of refraction (diacaustics) by a sphere (seen as the bright boundaries of the luminous patches formed by receiving the transmitted light on a screen), which he correctly

1 It seems probable that spectacles were in use towards the end of the 13th century. The Italian dictionary of the Accademici della Crusca (1612) mentions a sermon of Jordan de Rivalto, published in I3°5 > which refers to the invention as ” not twenty years since “; and Muschenbroek states that the tomb of Salvinus Armatus, a Florentine nobleman who died in 1317, bears an inscription assigning the invention to him. (See the articles Telescope and Camera I Obscura for the history of these instruments.)

regarded as determined by the intersections of the refracted rays. His researches on refraction were less fruitful; he assumed the angles of incidence and refraction to be in the constant ratio of 8 to 5, and the rainbow, in which he recognized four colours, orange, green, blue and purple, to be formed by rays reflected in the drops along the sides of an octagon. Porta’s fame rests chiefly on his Magia naturalis sive de miraculis rerum naturalium, of which four books were published in 1558, the complete work of twenty books appearing in 1 589. It attained great popularity, perhaps by reason of its astonishing medley of subjects — pyrotechnics and perfumery, animal reproduction and hunting, alchemy and optics, — and it was several times reprinted, and translated into English (with the title Natural Magick, 1658), German, French, Spanish, Hebrew and Arabic. The work contains an account of the camera obscura, with the invention of which the author has sometimes been credited; but, whoever the inventor, Porta was undoubtedly responsible for improving and popularizing that instrument, and also the magic lantern. In the same work practical applications of lenses are suggested, combinations comparable with telescopes are vaguely treated and spectacles are discussed. His De Refractione, optices parte (1593) contains an account of binocular vision, in which are found indications of the principle of the stereoscope.

§ 7. The empirical study of lenses led, in the opening decade of the 17th century, to the emergence of the telescope from its former obscurity. The first form, known as the Dutch or Galileo telescope, consisted of a convex and a concave lens, a combination which gave erect images; the later form, now known as the ” Keplerian ” or ” astronomical ” telescope (in contrast with the earlier or ” terrestrial ” telescope) consisted of two convex lenses, which gave inverted

images. With the microscope, too, advances were made, and it seems probable that the compound type came into common use about this time. These single instruments were followed by the invention of binoculars, i.e. instruments which permitted simultaneous vision with both eyes. There is little doubt that the experimental realization of the telescope, opening up as it did such immense fields for astronomi- cal research, stimulated the study of lenses and optical systems. The investigations of Maurolycus were insufficient to explain the theory of the telescope, and it was Kepler who first determined the principle of the Galilean telescope in his Dioptrice (16 11), which also contains the first description of the astronomical or Keplerian telescope, and the demonstration that rays parallel to the axis of a plano-convex lens come to a focus at a point on the axis distant twice the radius of the curved surface of the lens, and, in the case of an equally convex lens, at an axial point distant only once the radius. He failed, however, to determine accurately the case for unequally convex lenses, a problem which was solved by Bonaventura Cavalieri, a pupil of Galileo.

Early in the 17th century great efforts were made to determine the law of refraction. Kepler, in his Prolegomena ad Vitellionem (1604), assiduously, but unsuccessfully, searched for the law, and can only be credited with twenty-seven empirical rules, really of the nature of approximations, which he employed in his theory of lenses. The true law — that the ratio of the sines of the angles of incidence and refraction is constant — was discovered in 1621 by Willebrord Snell (1591-1626); but was published for the first time after his death, and with no mention of his name, by Descartes. Whereas in Snell's manuscript the law was stated in the form of the ratio of certain lines, trigonometrically inter- pretable as a ratio of cosecants, Descartes expressed the law in its modern trigonometrical form, viz. as the ratio of the sines. It may be observed that the modern form was independently obtained by James Gregory and published in his Optica promota (1663). Armed with the law of refraction, Descartes determined the geometrical theory of the primary and secondary rainbows, but did not mention how far he was indebted to the explana- tion of the primary bow by Antonio de Dominis in 1611; and, similarly, in his additions to the knowledge of the telescope the influence of Galileo is not recorded.

§ 8. In his metaphysical speculations on the system of nature, Descartes formulated a theory of light at variance with the gener-

ally accepted emission theory and showing some resemblance to the earlier views of Aristotle, and," in a smaller measure, to the modern undulatory theory. He imagined light to be a pressure transmitted by

an infinitely elastic medium which pervades space, and colour to be due to rotatory motions of the particles of this medium. He attempted a mechanical explanation of the law of refraction, and came to the conclusion that light passed more readily through a more highly refractive medium. This view was combated by Pierre de Fermat (1601-1665), who, from the principle known as the ” law of least time,” deduced the converse to be the case, i.e. that the velocity varied inversely with the refractive index. In brief, Fermat’s argument was as follows: Since nature performs her operations by the most direct routes or shortest paths, then the path of a ray of light between any two points must be such that the time occupied in the passage is a minimum. The rectilinear propagation and the law of reflection obviously agree with this principle, and it remained to be proved whether the law of refraction tallied.

Although Fermat’s premiss is useless, his inference is invaluable, and the most notable application of it was made in about 1824 by Sir William Rowan Hamilton, who merged it into his con- ception of the ” characteristic function,” by the help of which all optical problems, whether on the corpuscular or on the undulator theory, are solved by one common process. Hamilton was in possession of the germs of this grand theory some years before 1824, but it was first communicated to the Royal Irish Academy in that year, and published in imperfect instalments some years later. The following is his own description of it. It is of interest as exhibiting the origin of Fermat’s deduction, its relation to contemporary and subsequent knowledge, and its connexion with other analytical principles. Moreover, it is important as showing Hamilton’s views on a very singular part of the more modern history of the science to which he contributed so much.

” Those who have meditated on the beauty and utility, in theoreti- cal mechanics, of the general method of Lagrange, who have felt the power and dignity of that central dynamical theorem which he deduced, in the Mecanique analytique . . ., must feel that mathe- matical optics can only then attain a coordinate rank with mathe- matical mechanics . . ., when it shall possess an appropriate method, and become the unfolding of a central idea. ... It ap- pears that if a general method in deductive optics can be attained at all, it must flow from some law or principle, itself of the highest generality, and among the highest results of induction. . . . [This] must be the principle, or law, called usually the Law of Least Action; suggested by questionable views, but established on the widest induction, and embracing every known combination of media, and every straight, or bent, or curved line, ordinary or extraordinary, along which light (whatever light may be) extends its influence suc- cessively in space and time: namely, that

this linear path of light, from one point to another, is always found to be such that, if it be compared with the other infinitely various lines by which in thought and in geometry the same two points might be connected, a certain integral or sum, called often Action, and depending by fixed rules on the length, and shape, and position of the path, and on the media which are traversed by it, is less than all the similar integrals for the other neighbouring lines, or, at least, possesses, with respect to them, a certain stationary property. From this Law, then, which may, perhaps, be named the Law of Stationary Action, it seems that we may most fitly and with best hope set out, in the synthetic or deductive process and in the search of a mathematical method.

" Accordingly, from this known law of least or stationary action I deduced (long since) another connected and coextensive principle, which may be called by analogy the Law of Varying Action, and which seems to offer naturally a method such as we are seeking : the one law being as it were the last step in the ascending scale of induction, respecting linear paths of light, while the other law may usefully be made the first in the descending and deductive way.

" The former of these two laws was discovered in the following manner. The elementary principle of straight rays showed that light, under the most simple and usual circumstances, employs the direct, and therefore the shortest, course to pass from one point to another. Again, it was a very early discovery (attributed by Laplace to Ptolemy), that, in the case of a plane mirror, the bent line formed by the incident and reflected rays is shorter than any other bent line having the same extremities, and having its point of bending on the mirror. These facts were thought by some to be instances and results of the simplicity and economy of nature; and Fermat, whose researches on maxima and minima are claimed by the Continental mathematicians as the germ of the differential calculus, sought anxiously to trace some similar economy in the

more complex case of refraction. He believed that by a metaphy- sical or cosmological necessity, arising from the simplicity of the universe, light always takes "he course which it can traverse in the shortest time. To reconcile this metaphysical opinion with the law of

refraction, discovered experimentally by Snellius, Fermat was led to suppose that the two lengths, or indices, which Snellius had measured on the incident ray prolonged and on the refracted ray, and had observed to have one common projection on a refracting plane, are inversely proportional to the two successive velocities of the light before and after refraction, and therefore that the velocity of light is diminished on entering those denser media in which it is observed to approach the perpendicular; for Fermat believed that the time of propagation of light along a line bent by refraction was represented by the sum of the two products, of the incident portion multiplied by the index of the first medium and of the refracted portion multiplied by the index of the second medium; because he found, by his mathematical method, that this sum was less, in the case of a plane refractor, than if light went by any other than its actual path from one given point to another, and because he per- ceived that the supposition of a velocity inversely as the index reconciled his mathematical discovery of the minimum of the fore- going sum with his cosmological principle of least time. Descartes attacked Fermat's opinions respecting light, but Leibnitz zealously defended them; and Huygens was led, by reasonings of a very different kind, to adopt Fermat's conclusions of a velocity inversely as the index, and of a minimum time of propagation of light, in passing from one given point to another through an ordinary re- fracting plane. Newton, however, by his theory of emission and attraction, was led to conclude that the velocity of light was directly, not inversely, as the index, and that it was increased instead of being diminished on entering a denser medium; a result incom- patible with the theorem of the shortest time in refraction. This theorem of shortest time was accordingly abandoned by many, and among the rest by Maupertuis, who, however, proposed in its stead, as a new cosmological principle, that celebrated law of least action which has since acquired so high a rank in mathematical physics, by the improvements of Euler and Lagrange."

§ 9. The second half of the 17th century witnessed develop- ments in the practice and theory of optics which equal in import- ance the mathematical, chemical and astronomical acquisitions of the period. Original observations were made which led to the discovery, in an embryonic form, of new properties of light, and the development of mathematical analysis facilitated the quantitative and theoretical investigation of these properties. Indeed, mathematical and physical optics may justly be dated from this time. The phenomenon of diffraction, so named by Grimaldi, and by Newton inflection, which may be described briefly as the spreading out, or deviation, from the

strictly rectilinear path of light passing through a small aperture or beyond the edge of an opaque object, was discovered by the Italian Jesuit, Francis Maria Grimaldi (1619-1663), and pub- lished in his Physico-Mathesis de Lumine (1665); at about the same time Newton made his classical investigation of the spectrum or the band of colours formed when light is transmitted through a prism, 1 and studied interference phenomena in the form of the colours of thin and thick plates, and in the form now termed Newton's rings; double refraction, in the form of the dual images of a single object formed by a rhomb of Iceland spar, was dis- covered by Bartholinus in 1670; Huygens's examination of the transmitted beams led to the discovery of an absence of symmetry now called polarization; and the finite velocity of light was deduced in 1676 by Ole Roemer from the comparison of the observed and computed times of the eclipses of the moons of Jupiter.

These discoveries had a far-reaching influence upon the theoretical views which had been previously held: for instance, Newton's recombination of the spectrum by means of a second (inverted) prism caused the rejection of the earlier view that the prism actually manufactured the colours, and led to the accept- ance of the theory that the colours were physically present in the white light, the function of the prism being merely to separate the physical mixture; and Roemer's discovery of the finite

1 Newton's observation that a second refraction did not change the colours had been anticipated in 1648 by Marci de Kronland U595 – '667), professor of medicine at the university of Prague, in his Thaumantias, who studied the spectrum under the name of Iris trigonia. There is no evidence that Newton knew of this, although he mentions de Dominic's experiment with the glass globe containing water.

velocity of light introduced the necessity of considering the momentum of the particles which, on the accepted emission theory, composed the light. Of greater moment was the con- troversy concerning the emission or corpuscular theory championed by Newton and the undulatory theory presented by Huygens (see section II. of this article). In order to explain the colours of thin plates Newton was forced to abandon some of the original simplicity of his theory; and we may observe that by postulat- ing certain motionsfor theNewtonian corpuscles all thephenomena of light can be explained, these motions aggregating to a trans- verse displacement translated longitudinally, and the corpuscles, at the same time, becoming otiose and being replaced by a medium in which the vibration is transmitted. In this

way the Newtonian theory may be merged into the undulatory theory. Newton's results are collected in his Opticks, the first edition of which appeared in 1704. Huygens published his theory in his Traite de lumibre (1690), where he explained reflection, refraction and double refraction, but did not elucidate the formation of shadows (which was readily explicable on the Newtonian hypothesis) or polarization; and it was this inability to explain polarization which led to Newton's rejection of the wave theory. The authority of Newton and his masterly exposition of the corpuscular theory sustained that theory until the beginning of the 19th century, when it succumbed to the assiduous skill of Young and Fresnel.

§ 10. Simultaneously with this remarkable development of theoretical and experimental optics, notable progress was made in the construction of optical instruments. The increased demand for telescopes, occasioned by the interest in observational astronomy, led to improvements in the grinding of lenses (the primary aim being to obtain forms in which spherical aberration was a minimum), and also to the study of achromatism, the principles of which followed from Newton's analysis and snythesis of white light. Kepler's supposition that lenses having the form of surfaces of revolution of the conic sections would bring rays to a focus without spherical aberration was investigated by Descartes, and the success of the latter's demonstration led to the grinding of ellipsoidal and hyperboloidal lenses, but with dis- appointing results. 2 The grinding of spherical lenses was greatly improved by Huygens, who also attempted to reduce chromatic aberration in the refracting telescope by introducing a stop {i.e. by restricting the aperture of the rays) ; to the same experi- menter are due compound eye-pieces, the invention of which had been previously suggested by Eustachio Divini. The so- called Huygenian eye-piece is composed of two plano-convex lenses with their plane faces towards the eye; the field-glass has a focal length three times that of the eye-glass, and the distance between them is twice the focal length of the eye-glass. Huygens observed that spherical aberration was diminished by making the deviations of the rays at the two lenses equal, and Ruggiero Giuseppe Boscovich subsequently pointed out that the combination was achromatic. The true development, however, of the achromatic refracting telescope, which followed from the introduction of compound object-glasses giving no dispersion, dates from about the middle of the 18th century.

2 The geometrical determination of the form of the surface which will reflect, or of the surface dividing two media which will refract, rays from one point to another, is very easily effected by using the "characteristic function" of Hamilton, which for the problems under

consideration may be stated in the form that “the optical paths of all rays must be the same.” In the case of reflection, if A and B be the diverging and converging points, and P a point on the reflecting surface, then the locus of P is such that AP + PB is constant. Therefore the surface is an ellipsoid of revolution having A and B as foci. If the rays be parallel, i.e. if A be at infinity, the surface is a paraboloid of revolution having B as focus and the axis parallel to the direction of the rays. In refraction if A be in the medium of index /i, and B in the medium of index /*’, the char- acteristic function shows that mAP + m’PB, where P is a point on the surface, must be constant. Plane sections through A and B of such surfaces were originally investigated by Descartes, and- are named Cartesian ovals. If the rays be parallel, i.e. A be at infinity, the surface becomes an ellipsoid of revolution having B for one focus, n’ In for eccentricity, and the axis parallel to the direction of the rays.

[HISTORY

The difficulty of obtaining lens systems in which aberrations were minimized, and the theory of Newton that colour production invariably attended refraction, led to the manufacture of im- proved specula which permitted the introduction of reflecting telescopes. The idea of this type of instrument had apparently occurred to Marin Mersenne in about 1640, but the first reflector of note was described in 1663 by James Gregory in his Optica promota; a second type was invented by Newton, and a third in 1672 by Cassegrain. Slight improvements were made in the microscope, although the achromatic type did not appear until about 1820, some sixty years after John Dollond had determined the principle of the achromatic telescope (see Aberration, Telescope, Microscope, Bino- cular Instrument) .

§ 11. Passing over the discovery by Ehrenfried Walther Tschirnhausen (1651-1708) of the caustics produced by reflection (” catacaustics “) and his experiments with large reflectors and refractors (for the manufacture of which he established glass- works in Italy); James Bradley’s discovery in 1728 of the ” aberration of light,” with the subsequent derivation of the velocity of light, the value agreeing fairly well with Roemer’s estimate; the foundation of scientific photometry by Pierre Bouguer in an essay published in 1729 and expanded in 1760 into his Traite d’optique sur la graduation de la lumiire: the publication of John Henry Lambert’s treatise’on the same subject,

entitled Photometria, sive de Mensura et Gradibus Luminis, Colorum et Umbrae (1760); and the development of the telescope and other optical instruments, we arrive at the closing decades of the 18th century. During the forty years 1780 to 1820 the history of optics is especially marked by the names of Thomas Young and Augustin Fresnel, and in a lesser degree by Arago, Malus, Sir William Herschel, Fraunhofer, Wollaston, Biot and Brewster. .

Although the corpuscular theory had been disputed by Benjamin Franklin, Leonhard Euler and others, the authority of Newton retained for it an almost general acceptance until the beginning of the 19th century, when Young and Fresnel instituted their destructive criticism. Basing his views on the earlier undulatory theories and diffraction phenomena of Grimaldi and Hooke, Young accepted the Huygenian theory, assuming, from a false analogy with sound waves, that the wave- disturbance was longitudinal, and ignoring the suggestion made by Hooke in 1672 that the direction of the vibration might be transverse, i.e. at right angles to the direction of the rays. As with Huygens, Young was unable to explain diffraction correctly, or polarization. But the assumption enabled him to establish the principle of interference, 1 one of the most fertile in the science of physical optics. The undulatory theory was also accepted by Fresnel who, perceiving the inadequacy of the researches of Huygens and Young, showed in 181 8 by an analysis which, however, is not quite free from objection, that, by assuming that every element of a wave-surface could act as a source of secondary waves or wavelets, the diffraction bands were due to the interference of the secondary waves formed by each element of a primary wave falling upon the edge of an obstacle or aperture. One consequence of Fresnel's theory was that the bands were independent of the nature of the diffracting edge — a fact confirmed by experiment and therefore invalidating Young's theory that the bands were produced by the interference between the primary wave and the wave reflected from the edge of the obstacle. Another consequence, which was first mathematically deduced by Poisson and subsequently confirmed by experi- ment, is the paradoxical phenomenon that a small circular disk illuminated by a point source casts a shadow having a bright centre.

§ 12. The undulatory theory reached its zenith when Fresnel explained the complex phenomena of polarization, by adopting the conception of Hooke that the vibrations were transverse,

1 Young's views of the nature of light, which he formulated as Propositions and Hypotheses, are given in extenso in the article Interference. See also his article " Chromatics " in the supple- mentary

volumes to the 3rd edition of the Encyclopaedia Britannica.

and not longitudinal. 2 Polarization by double refraction had been investigated by Huygens, and the researches of Wollaston and, more especially, of Young, gave such an impetus to the study that the Institute of France made double refraction the subject of a prize essay in 1812. E. L. Malus (1775-1812) discovered the phenomenon of polarization by reflection about 1808 and investigated metallic reflection; Arago discovered circular polarization in quartz in 181 1, and, with Fresnel, made many experimental investigations, which aided the establishment of the Fresnel- Arago laws of the interference of polarized beams; Biot introduced a reflecting polariscope, investigated the colours of crystalline plates and made many careful researches on the rotation of the plane of polarization; Sir David Brewster made investigations over a wide range, and formulated the law con- necting the angle of polarization with the refractive index of the reflecting medium. Fresnel's theory was developed in a strikingly original manner by Sir William Rowan Hamilton, who interpreted from Fresnel's analytical determination of the geometrical form of the wave-surface in biaxal crystals the existence of two hitherto unrecorded phenomena. At Hamilton's instigation Humphrey Lloyd undertook the experimental search, and brought to light the phenomena of external and internal conical refraction.

The undulatory vibration postulated by Fresnel having been generally accepted as explaining most optical phenomena, it became necessary to determine the mechanical properties of the aether which transmits this motion. Fresnel, Neumann, Cauchy, MacCullagh, and, especially, Green and Stokes, developed the " elastic-solid theory." By applying the theory of elasticity they endeavoured to determine the constants of a medium which could transmit waves of the nature of light. Many different allocations were suggested (of which one of the most recent is Lord Kelvin's " contractile aether," which, however, was afterwards discarded by its author), and the theory as left by Green and Stokes has merits other than purely historical. At a later date theories involving an action between the aether and material atoms were proposed, the first of any moment being J. Boussinesq's (1867). C. Christiansen's investigation of anomalous dispersion in 1870, and the failure of Cauchy's formula (founded on the elastic-solid theory) to explain this phenomenon, led to the theories of W. Sellmeier (1872), H. von Helmholtz (1875), E. Ketteler (1878), E. Lommel (1878) and W. Voigt (1883). A third class of theory, to which the present-day theory belongs, followed from Clerk Maxwell's analytical investigations in electromagnetics. Of the greatest exponents of this theory we may mention H. A. Lorentz, P. Drude and J. Larmor, while

Lord Rayleigh has, with conspicuous brilliancy, explained several phenomena (e.g. the colour of the sky) on this hypothesis.

For a critical examination of these theories see section II. of this article; reference may also be made to the British Association Reports: ” On Physical Optics,” by Humphrey Lloyd (1834), p. 35; ” On Double Refraction,” by Sir G. G. Stokes (1862), p. 233; ” On Optical Theories,” by R. T. Glazebrook (1885), p. 157.

§ 13. Recent Developments. — The determination of the velocity of light (see section III. of this article) may be regarded as definitely settled, a result contributed to by A. H. L. Fizeau (1849), J. B. L. Foucault (1850, 1862), A. Cornu (1874), A. A. Michelson (1880), James Young and George Forbes (1882), Simon Newcomb (1880-1882) and Cornu (1900). The velocity in moving media was investigated theoretically by Fresnel; and Fizeau (1859), and Michelson and Morley (1886) showed experimentally that the velocity was increased in running water by an amount agreeing with Fresnel’s formula, which was based on the hypothesis of a stationary aether. The optics of moving media have also been investigated by Lord Rayleigh, and more especially by H. A. Lorentz,- who also assumed a stationary aether. The relative motion of the earth and the aether has an

2 A crucial test of the emission and undulatory theories, which was realized by Descartes, Newton, Fermat and others, consisted in determining the velocity of light in two differently refracting media. This experiment was conducted in 1850 by Foucault, who showed that the velocity was less in water than in air, thereby confirming the undulatory and invalidating the emission theory.

important connexion with the phenomenon of the aberration of light, and has been treated with masterly skill by Joseph Larmor and others (see Aether). The relation of the earth’s motion to the intensities of terrestrial sources of light was investigated theoretically by Fizeau, but no experimental inquiry was made until 1903, when Nordmeyer obtained negative results, which were confirmed by the theoretical investigations of A. A. Bucherer and H. A. Lorentz.

Experimental photometry has been greatly developed since the

pioneer work of Bouguer and Lambert and the subsequent introduction of the photometers of Ritchie, Rumford, Bunsen and Wheatstone, followed by Swan's in 1859, and 0. R. Lummer and E. Brodhun's instrument (essentially the same as Swan's) in 1889. This expansion may largely be attributed to the increase in the number of artificial illuminants — especially the many types of filament- and arc-electric lights, and the incan- descent gas light. Colour photometry has also been notably developed, especially since the enunciation of the " Purkinje phenomenon " in 1825. Sir William Abney has contributed much to this subject, and A. M. Meyer has designed a photo- meter in which advantage is taken of the phenomenon of contrast colours. " Flicker photometry " may be dated from O. N. Rood's investigations in 1893, and the same principle has been applied by Haycraft and Whitman. These questions — colour and flicker photometry — have important affinities to colour percep- tion and the persistence of vision (see Vision) . The spectrophoto- meter, devised by De Witt Bristol Brace in 1899, which permits the comparison of similarly coloured portions of the spectra from two different sources, has done much valuable work in the determination of absorptive powers and extinction coefficients. Much attention has also been given to the preparation of a standard of intensity, and many different sources have been introduced (see Photometry). Stellar photometry, which was first investigated instrumentally with success by Sir John Herschel, was greatly improved by the introduction of Zollner's photometer, E. C. Pickering's meridian photometer and C. Pritchard's wedge photometer. Other methods of research in this field are by photography — photographic photometry — and radiometric method (see Photometry, Celestial).

The earlier methods for the experimental determination of refractive indices by measuring the deviation through a solid prism of the substance in question or, in the case of liquids, through a hollow prism containing the liquid, have been re- placed in most accurate work by other methods. The method of total reflection, due originally to Wollaston, has been put into a very convenient form, applicable to both solids and liquids, in the Pulfrich refractometer (see Refraction). Still more accurate methods, based on interference phenomena, have been devised. Jamin's interference refractometer is one of the earlier forms of such apparatus; and Michelson's interferometer is one of the best of later types (see Interference). The variation of re- fractive index with density has been the subject of much experi- mental and theoretical inquiry. The empirical rule of Gladstone and Dale was often at variance with experiment, and the mathe- matical investigations of H. A. Lorentz of Leiden and L. Lorenz of Copenhagen

on the electromagnetic theory led to a more consistent formula. The experimental work has been chiefly associated with the names of H. H. Landolt and J. W. Briihl, whose results, in addition to verifying the Lorenz-Lorentz formula, have established that this function of the refractive index and density is a colligative property of the molecule, i.e. it is calculable additively from the values of this function for the component atoms, allowance being made for the mode in which they are mutually combined (see Chemistry, Physical) . The preparation of lenses, in which the refractive index decreases with riˆJjstance from the axis, by K. F. J. Exner, H. F. L. Mattmessen and Schott, and the curious results of refraction by non-homogeneous media, as realized by R. Wood may be mentioned (see Mirage).

The spectrum of white light produced by prismatic refraction has engaged many investigators. The infra-red or heat waves were discovered by Sir William Herschel, and experiments on

the actinic effects of the different parts of the spectrum on silver salts by Scheele, Senebier, Ritter, Seebeck and others, proved the increased activity as one passed from the red to the violet and the ultra-violet. Wollaston also made many investiga- tions in this field, noticing the dark lines — the ” Fraunhofer lines ” — which cross the solar spectrum, which were further discussed by Brewster and Fraunhofer, who thereby laid the foundations of modern spectroscopy. Mention may also be, made of the investigations of Lord Rayleigh and Arthur Schuster on the resolving power of prisms (see Diffraction), and also of the modern view of the function of the prism in analysing white light. The infra-red and ultra-violet rays are of especial interest since, although not affecting vision after the manner of ordinary light, they possess very remarkable properties. Theoretical investigation on the undulatory theory of the law of reflection shows that a surface, too rough to give any trace of regular reflection with ordinary light, may regularly reflect the long waves, a phenomenon experimentally realized by Lord Rayleigh. Long waves — the so-called ” residual rays ” or ” Rest-strahlen “■ — have also been isolated by repeated reflec- tions from quartz surfaces of the light from zirconia raised to incandescence by the oxyhydrogen flame (E. F. Nichols and H. Rubens) ; far longer waves were isolated by similar reflections from fluorite (56 /*) and sylvite (61 /x) surfaces in 1899 by Rubens and E. Aschkinass. The short waves — ultra-violet rays — have also been studied, the researches of E. F. Nichols on the trans- parency of quartz to these rays, which are especially present in the radiations of the mercury arc, having led to the introduc- tion of lamps made of fused quartz, thus permitting the convenient study of these rays, which, it is to be noted, are absorbed by ordinary clear glass. Recent researches at

the works of Schott and Genossen, Jena, however, have resulted in the production of a glass transparent to the ultra-violet.

Dispersion, i.e. that property of a substance which consists in having a different refractive index for rays of different wave- lengths, was first studied in the form known as ” ordinary dispersion ” in which the refrangibility of the ray increased with the wave-length. Cases had been observed by Fox Talbot, Le Roux, and especially by Christiansen (1870) and A. Kundt (1871-1872) where this normal rule did not hold; to such phenomena the name ” anomalous dispersion ” was given, but really there is nothing anomalous about it at all, ordinary dispersion being merely a particular case of the general pheno- menon. The Cauchy formula, which was founded on the elastic- solid theory, did not agree with the experimental facts, and the germs of the modern theory, as was pointed out by Lord Rayleigh in 1900, were embodied in a question proposed by Clerk Maxwell for the Mathematical Tripos examination for 1869. The principle, which occurred simultaneously to W. Sellmeier (who is regarded as the founder of the modern theory) and had been employed about 1850 by Sir G. G. Stokes to explain absorption lines, involves an action between the aether and the molecules of the dispersing substance. The mathematical investigation is associ- ated with the names of Sellmeier, Hermann Helmholtz, Eduard Render, P. Drude, H. A. Lorentz and Lord Rayleigh, and the experimental side with many observers — F. Paschen, Rubens and others; absorbing media have been investigated by A. W. Pfluger, a great many aniline dyes by K. Stockl, and sodium vapour by R. W. Wood. Mention may also be made of the beautiful experiments of Christiansen (1884) and Lord Rayleigh on the colours transmitted by white powders suspended in liquids of the same refractive index. If, fjor instance, benzol be gradually added to finely powdered quartz, a succession of beautiful colours — red, yellow, green and finally blue — is trans- mitted, or, under certain conditions, the colours may appear at once, causing the mixture to flash like a fiery opal. Absorption, too, has received much attention; the theory has been especially elaborated by M. Planck, and the experimental investigation has been prosecuted from the purely physical standpoint, and also from the standpoint of the physical chemist, with a view to correlating absorption with constitution.

Interference phenomena have been assiduously studied. The

experiments of Young, Fresnel, Lloyd, Fizeau and Foucault, of Fresnel and Arago on the measurement of refractive indices by the shift of the interference bands, of H. F. Talbot on the ” Talbot bands ” (which he insufficiently explained on the principle of interference, it being shown by Sir G. B. Airy that diffraction phenomena supervene), of Baden-Powell on the ” Powell bands,” of David Brewster on ” Brewster’s bands,” have been developed, together with many other phenomena — Newton’s rings, the colours of thin, thick and mixed plates, &c. — in a striking manner, one of the most important results being the construction of interferometers applicable to the determination of refractive indices and wave-lengths, with which the names of Jamin, Michelson, Fabry and Perot, and of Lummer and E. Gehrcke are chiefly associated. The mathematical investigations of Fresnel may be regarded as being completed by the analysis chiefly due to Airy, Stokes and Lord Rayleigh. Mention may be made of Sir G. G. Stokes’ attribution of the colours of iridescent crystals to periodic twinning; this view has been confirmed by Lord Rayleigh {Phil. Mag., 1888) who, from the purity of the reflected light, concluded that the laminae were equidistant by the order of a wave-length. Prior to 1891 only interference between waves proceeding in the same direction had been studied. In that year Otto H. Wiener obtained, on a film -jˆth of a wave-length in thickness, photographic impressions of the stationary waves formed by the interference of waves proceeding in opposite directions, and in 1892 Drude and Nernst employed a fluorescent film to record the same phenomenon. This principle is applied in the Lippmann colour photography, which was suggested by W. Zenker, realized by Gabriel Lippmann, and further investigated by R. G. Neuhauss, O. H. Wiener, H. Lehmann and others.

Great progress has been made in the study of diffraction, and ” this department of optics is precisely the one in which the wave theory has secured its greatest triumphs ” (Lord Rayleigh). The mathematical investigations of Fresnel and Poisson were placed on a dynamical basis by Sir G. G. Stokes; and the results gained more ready interpretation by the introduc- tion of ” Babinet’s principle ” in 1837, and Cornu’s graphic methods in 1874. The theory also gained by the researches of Fraunhofer, Airy, Schwerd, E. Lommel and others. The theory of the concave grating, which resulted from H. A. Row- land’s classical methods of ruling lines of the necessary nature and number on curved surfaces, was worked out by Rowland, E. Mascart, C. Runge and others. The resolving power and the intensity of the spectra have been treated by Lord Rayleigh and Arthur Schuster, and more recently (1905), the distribution of light has been treated by A. B. Porter. The

theory of diffrac- tion is of great importance in designing optical instruments, the theory of which has been more especially treated by Ernst Abbe (whose theory of microscopic vision dates from about 1870) by the scientific staff at the Zeiss works, Jena, by Rayleigh and others. The theory of coronae (as diffraction phenomena) was originally due to Young, who, from the principle involved, devised the eriometer for measuring the diameters of very small objects; and Sir G. G. Stokes subsequently explained the appearances presented by minute opaque particles borne on a transparent plate. The polarization of the light diffracted at a slit was noted in 1861 by Fizeau, whose researches were extended in 1892 by H. Du Bois, and, for the case of gratings, by Du Bois and Rubens in 1904. The diffraction of light by small particles was studied in the form of very fine chemical precipitates by John Tyndall, who noticed the polarization of the beautiful cerulean blue which was transmitted. This subject- — one form of which is presented in the blue colour of the sky — has been most auspiciously treated by Lord Rayleigh on both the elastic- solid and electromagnetic theories. Mention may be made of R. W. Wood's experiments on thin metal films which, under certain conditions, originate colour phenomena inexplicable by interference and diffraction. These colours have been assigned to the principle of optical resonance, and have been treated by Kossonogov (Phys. Zeit., 1903). J. C. Maxwell Garnett {Phil. Trans, vol. 203) has shown that the colours of coloured glasses

are due to ultra-microscopic particles, which have been directly studied by H. Siedentopf and R. Zsigmondy under limiting oblique illumination.

Polarization phenomena may, with great justification, be regarded as the most engrossing subject of optical research during the 19th century; the assiduity with which it was cultivated in the opening decades of that century received a great stimulus when James Nicol devised in 1828 the famous " Nicol prism," which greatly facilitated the determination of the plane of vibration of polarized light, and the facts that light is polarized by reflection, repeated refractions, double refraction and by diffraction also contributed to the interest which the subject excited. The rotation of the plane of polariza- tion by quartz was discovered in 181 1 by Arago; if white light be used the colours change as the Nicol rotates — a phenomenon termed by Biot " rotatory dispersion." Fresnel regarded rotatory polarization as compounded from right- and left-handed (dextro- and laevo-) circular polarizations; and Fresnel, Cornu, Dove and Cotton effected their experimental separation. Legrand des Cloizeaux discovered the enormously enhanced rotatory polarization of cinnabar, a property

also possessed — but in a lesser degree — by the sulphates of strychnine and ethylene diamine. The rotatory power of certain liquids was discovered by Biot in 1815; and at a later date it was found that many solutions behaved similarly. A. Schuster distinguishes substances with regard to their action on polarized light as follows: substances which act in the isotropic state are termed photogyric; if the rotation be associated with crystal structure, crystallogyric; if the rotation be due to a magnetic field, magneto gyric; for cases not hitherto included the term allogyric is employed, while optically inactive substances are called isogyric. The theory of photogyric and crystallogyric rotation has been worked out on the elastic-solid (MacCullagh and others) and on the electromagnetic hypotheses (P. Drude, Cotton, &c). Allogyrism is due to a symmetry of the molecule, and is a subject of the greatest importance in modern (and, more especially, organic) chemistry (see Stereoisomerism).

The optical properties of metals have been the subject of much experimental and theoretical inquiry. The explanations of MacCullagh and Cauchy were followed by those of Beer, Eisenlohr, Lundquist, Ketteler and others; the refractive indices were determined both directly (by Kundt) and indirectly by means of Brewster's law; and the reflecting powers from X=25i i uju to \=iˆoo ix/j. were determined in 1900-1902 by Rubens and Hagen. The correlation of the optical and electrical constants of many metals has been especially studied by P. Drude (1900) and by Rubens and Hagen (1903).

The transformations of luminous radiations have also been studied. John Tyndall discovered calorescence. Fluorescence was treated by John Herschel in 1845, and by David Brewster in 1846, the theory being due to Sir G. G. Stokes (1852). More recent studies have been made by Lommel, E. L. Nichols and Merritt {Phys. Rev., 1904), and by Millikan who discovered polarized fluorescence in 1895. Our knowledge of phosphor- escence was greatly improved by Becquerel, and Sir James Dewar obtained interesting results in the course of his low temperature researches (see Liquid Gases). In the theoretical and experimental study of radiation enormous progress has been recorded. The pressure of radiation, the necessity of which was demonstrated by Clerk Maxwell on the electromagnetic theory, and, in a simpler manner, by Joseph Larmor in his article Radiation in these volumes, has been experimentally determined by E. F. Nichols and Hull, and the tangential component by J. H. Poynting. With the theoretical and practical investigation the names of Balfour Stewart, Kirchhoff, Stefan, Bartoli, Boltzmann, W. Wien and Larmor are chiefly associated. Magneto-optics, too, has been greatly developed since Faraday's discovery of the rotation of the plane of polariza- tion by the magnetic

field. The rotation for many substances was measured by Sir William H. Perkin, who attempted a correlation between rotation and composition. Brace effected the analysis of the beam into its two circularly polarized

components, and in 1904 Mills measured their velocities. The Kerr effect, discovered in 1877, and the Zeeman effect (1896) widened the field of research, which, from its intimate connexion with the nature of light and electromagnetics, has resulted in discoveries of the greatest importance.

§ 14. Optical Instruments. — Important developments have been made in the construction and applications of optical instruments. To these three factors have contributed. The mathematician has quantitatively analysed the phenomena observed by the physicist, and has inductively shown what results are to be expected from certain optical systems. A consequence of this was the detailed study, and also the prepara- tion, of glasses of diverse properties; to this the chemist largely contributed, and the manufacture of the so-called optical glass (see Glass) is possibly the most scientific department of glass manufacture. The mathematical investigations of lenses owe much to Gauss, Helmholtz and others, but far more to Abbe, who introduced the method of studying the aberrations separ- ately, and applied his results with conspicuous skill to the construction of optical systems. The development of Abbe's methods constitutes the main subject of research of the present- day optician, and has brought about the production of tele- scopes, microscopes, photographic lenses and other optical apparatus to an unprecedented pitch of excellence. Great improvements have been effected in the stereoscope. Binocular instruments with enhanced stereoscopic vision, an effect achieved by increasing the distance between the object glasses, have been introduced. In the study of diffraction phenomena, which led to the technical preparation of gratings, the early attempts of Fraunhofer, Nobert and Lewis Morris Rutherfurd, were followed by H. A. Rowland's ruling of plane and concave gratings which revolutionized spectroscopic research, and, in 1898, by Michelson's invention of the echelon grating. Of great import- ance are interferometers, which permit extremely accurate determinations of refractive indices and wave-lengths, and Michelson, from his classical evaluation of the

standard metre in terms of the wave-lengths of certain of the cadmium rays, has suggested the adoption of the wave-length of one such ray as a standard with which national standards of length should be compared. Polarization phenomena, and particularly the rotation of the plane of polarization by such substances as sugar solutions, have led to the invention and improvements of polarimeters. The polarized light employed in such instru- ments is invariably obtained by transmission through a fixed Xicol prism — the polarizer — and the deviation is measured by the rotation of a second Nicol — the analyser. The early forms, which were termed ” light and shade ” polarimeters, have been generally replaced by ” half-shade ” instruments. Mention may also be made of the microscopic examination of objects in polarized light, the importance of which as a method of crystallographic and petrological research was suggested by Nicol, developed by Sorby and greatly expanded by Zirkel, Rosenbusch and others.

Bibliography. — There are numerous text-books which give elementary expositions of light and optical phenomena. More advanced works, which deal with the subject experimentally and mathematically, are A. B. Bassett, Treatise on Physical Optics (1892); Thomas Preston, Theory of Light, 2nd ed. by C. F. Joly (1901); R. VV. Wood, Physical Optics (1905), which contains ex- positions on the electromagnetic theory, and treats ” dispersion ” in great detail. Treatises more particularly theoretical are James Walker, Analytical Theory of Light (1904); A. Schuster, Theory of Optics (1904); P. Drude, Theory of Optics, Eng. trans, by C. R. Mann and R. A. Millikan (1902). General treatises of exceptional merit are A. Winkelmann, Handbuch der Physik, vol. vi. ” Optik ” (1904) ; and E. Mascart, Traile d’optique (1889-1893) ; M. E. Verdet, Lemons d’optique physique (1869, 1872) is also a valuable work. Geometrical optics is treated in R. S. Heath, Geometrical Optics (2nd ed., 1898); H. A. Herman, Treatise on Geometrical Optics (1900). Applied optics, particularly with regard to the theory of optical instruments, is treated in H. D. Taylor, A System of Applied Optics (1906); E. T. Whittaker, The Theory of Optical Instruments (1907); in the publications of the scientific staff of the Zeiss works at Jena: Die Theorie der optischen Instrumente, vol. i. ” Die Bilder- zeugung in optischen Instrumenten ” (1904); in S. Czapski, Theorie der optischen Instrumente, 2nd ed. by O. Eppenstein (1904); and in

A. Steinheil and E. Voit, Handbuch der angewandten Optik (1901). The mathematical theory of general optics receives historical and modern treatment in the Encyklopddie der mathematischen Wissen- schaften (Leipzig). Meteorological optics is fully treated in J. Pernter,

Meleorologische Optik; and physiological optics in H. v Helmholtz, Handbuch der physiologischen Optik (1896) and in A. Koenig, Gesammelte Abhandlungen zur physiologischen Optik (1903).

The history of the subject may be studied in J. C. Poggendorff, Geschichte der Physik (1879); F. Rosenberger, Die Geschichte der Physik (1882-1890); E. Gerland and F. Traumiiller, Geschichte der physikalischen Experimentierkunst (1899); reference may also be made to J oseph Priestley, History and Present State of Discoveries relating to Vision, Light and Colours (1772), German translation by G. S. Kliigel (Leipzig, 1775). Original memoirs are available in many cases in their author's " collected works," e.g. Huygens, Young, Fresnel, Hamilton, Cauchy, Rowland, Clerk Maxwell, Stokes (and also his Burnett Lectures on Light), Kelvin (and also his Baltimore Lectures, 1904) and Lord Rayleigh. Newton's Opticks forms volumes 96 and 97 of Ostwald' s Klassiker ; Huygens' Uber d. Licht (1678), vol. 20, and Kepler's Dioptrice (1611), vol. 144 of the same series.

Contemporary progress is reported in current scientific journals, e.g. the Transactions and Proceedings of the Royal Society, and of the Physical Society (London), the Philosophical Magazine (London), the Physical Review (New York, 1893 seq.) and in the British Association Reports; in the Annates de chimie et de physique and Journal de physique (Paris) ; and in the Physikalische Zeitschrift (Leipzig) and the Annalen der Physik und Chemie (since 1900: Annalen der Physik) (Leipzig). (C. E.*)

II. Nature of Light

1. Newton's Corpuscular Theory. — Until the beginning of the 19th century physicists were divided between two different views concerning the nature of optical phenomena. According to the one, luminous bodies emit extremely small corpuscles which can freely pass through transparent substances and produce the sensation of light by their impact against the retina. This emission or corpuscular theory of light was supported by the authority of Isaac Newton, 1 and, though it has been entirely superseded by its rival, the wave-theory, it remains of considerable historical interest.

2. Explanation of Reflection and Refraction. — Newton supposed the light-corpuscles to be subjected to attractive and repulsive forces exerted at very small distances by the particles of matter. In the interior of a homogeneous body a corpuscle moves in a straight line as it is equally acted on from all sides, but it changes its course at the boundary of two bodies, because, in a thin layer near the surface there

is a resultant force in the direction of the normal. In modern language we may say that a corpuscle has at every point a definite potential energy, the value of which is constant throughout the interior of a homogeneous body, and is even equal in all bodies of the same kind, but changes from one substance to another. If, originally, while moving in air, the corpuscles had a definite velocity v , their velocity v in the interior of any other substance is quite determinate. It is given by the equation \m$ — ˆmvo i = A, in which m denotes the mass of a corpuscle, and A the excess of its potential energy in air over that in the substance considered.

A ray of light falling on the surface of separation of two bodies is reflected according to the well-known simple law, if the corpuscles are acted on by a sufficiently large force directed towards the first medium. On the contrary, whenever the field of force near the surface is such that the corpuscles can penetrate into the interior of the second body, the ray is refracted. In this case the law of Snellius can be deduced from the consideration that the projection w of the velocity on the surface of separation is not altered, either in direction or in magnitude. This obviously requires that the plane passing through the incident and the refracted rays be normal to the surface, and that, if ai and 02 are the angles of incidence and of refraction, Vi and v 2 the velocities of light in the two media,

sin ajsm a2 = w/vi : wjvt=vilvi. (1)

The ratio is constant, because, as has already been observed, v x and v % have definite values.

As to the unequal refrangibility of differently coloured light, Newton accounted for it by imagining different kinds of corpuscles. He further carefully examined the phenomenon of total reflection, and described an interesting experiment connected with it. _ If one of the faces of a glass prism receives on the inside a beam of light of such obliquity that it is totally reflected under ordinary circumstances,

1 Newton, Opticks (London, 1704).

a marked change is observed when a second piece of glass is made to approach the reflecting face, so as to be separated from it only by a

very thin layer of air. The reflection is then found no longer to be total, part of the light finding its way into the second piece of glass. Newton concluded from this that the corpuscles are attracted by the glass even at a certain small measurable distance.

3. New Hypotheses in the Corpuscular Theory. — The preceding explanation of reflection and refraction is open to a very serious objection. If the particles in a beam of light all moved with the same velocity and were acted on by the same forces, they all ought to follow exactly the same path. In order to understand that part of the incident light is reflected and part of it trans- mitted, Newton imagined that each corpuscle undergoes certain alternating changes; he assumed that in some of its different ” phases ” it is more apt to be reflected, and in others more apt to be transmitted. The same idea was applied by him to the phenomena presented by very thin layers. He had observed that a gradual increase of the thickness of a layer produces periodic changes in the intensity of the reflected light, and he very ingeniously explained these by his theory. It is clear that the intensity of the transmitted light will be a minimum if the corpuscles that have traversed the front surface of the layer, having reached that surface while in their phase of easy trans- mission, have passed to the opposite phase the moment they arrive at the back surface. As to the nature of the alternating phases, Newton (Opticks, 3rd ed., 1721, p. 347) expresses himself as follows: — ” Nothing more is requisite for putting the Rays of Light into Fits of easy Reflexion and easy Transmission than that they be small Bodies which by their attractive Powers, or some other Force, stir up Vibrations in what they act upon, which Vibrations being swifter than the Rays, overtake them successively, and agitate them so as by turns to increase and decrease their Velocities, and thereby put them into those Fits.”

4. The Corpuscular Theory and the Wave-Theory compared. — Though Newton introduced the notion of periodic changes, which was to play so prominent a part in the later development of the wave-theory, he rejected this theory in the form in which it had been set forth shortly before by Christiaan Huygens in his Traiti de la lumiire (1690), his chief objections being: (1) that the rectilinear propagation had not been satisfactorily accounted for; (2) that the motions of heavenly bodies show no sign of a resistance due to a medium filling all space; and (3) that Huygens had not sufficiently explained the peculiar properties of the rays produced by the double refraction in Iceland spar. In Newton’s days these objections were of much weight.

Yet his own theory had many weaknesses. It explained the propagation in straight lines, but it could assign no cause for the

equality of the speed of propagation of all rays. It adapted itself to a large variety of phenomena, even to that of double refraction (Newton says [ibid.]: — “. . . the unusual Refraction of Iceland Crystal looks very much as if it were perform’d by some kind of attractive virtue lodged in certain Sides both of the Rays, and of the Particles of the Crystal.”), but it could do so only at the price of losing much of its original simplicity.

In the earlier part of the 19th century, the corpuscular theory broke down under the weight of experimental evidence, and it received the final blow when J. B. L. Foucault proved by direct experiment that the velocity of light in water is not greater than that in air, as it should be according to the formula (1), but less than it, as is required by the wave-theory.

5. General Theorems on Rays of Light. — With the aid of suitable assumptions the Newtonian theory can accurately trace the course of a ray of light in any system of isotropic bodies, whether homogeneous or otherwise; the problem being equivalent to that of determining the motion of a material point in a space in which its potential energy is given as a function of the coordinates. The application of the dynamical principles of ” least and of varying action ” to this latter problem leads to the following important theorems which William Rowan ‘Hamilton made the basis of his exhaustive treatment of systems of rays. 1 The total energy of a corpuscle is supposed to have

1 Trans. Irish Acad. 15, p. 69 (1824); 16, part i. ” Science,” p. 4 (•830), part ii., ibid. p. 93 (1830); 17, part i., p. I (1832).

a given value, so that, since the potential energy is considered as known at every point, the velocity v is so likewise.

(a) The path along which light travels from a point A to a point B is determined by the condition that for this line the integral fvds, in which ds is an element of the line, be a minimum (provided A and B be not too near each other). Therefore, since w = m!‘o, if fo is the velocity of light in vacuo and n the index of refraction, we have for every variation of the path the points A and B remaining fixed,

Sfnds = o. (2)

(b) Let the point A be kept fixed, but let B undergo an infinitely small displacement BB’ (=

bjiids = iiaq cos 6, (3)

where /i B is the value of y. at the point B.

6. General Considerations on the Propagation of Waves. — ” Waves,” i.e. local disturbances of equilibrium travelling onward with a certain speed, can exist in a large variety of systems. In a theory of these phenomena, the state of things at a definite point may in general be defined by a certain directed or vector quantity P, 2 which is zero in the state of equilibrium, and may be called the disturbance (for example, the velocity of the air in the case of sound vibrations, or the displacement of the particles of an elastic body from their positions of equi- librium). The components P x , P„, P* of the disturbance in the directions of the axes of coordinates are to be considered as functions of the coordinates x, y, z and the time t, determined by a set of partial differential equations, whose form depends on the nature of the problem considered. If the equations are homogeneous and linear, as they always are for sufficiently small disturbances, the following theorems hold.

(a) Values of Pi, P„, P« (expressed in terms of x, y, 2, f) which satisfy the equations will do so still after multiplication by a common arbitrary constant.

(b) Two or more solutions of the equations may be combined into a new solution by addition of the values of Pi, those of P„, &c, i.e. by compounding the vectors P, such as they are in each of the particular solutions.

In the application to light, the first proposition means that the phenomena of propagation, reflection, refraction, &c, can be pro- duced in the same way with strong as with weak light. The second proposition contains the principle of the ” superposition ” of different states, on which the explanation of all phenomena of interference is made to depend.

_ In the simplest cases (monochromatic or homogeneous light) the

disturbance is a simple harmonic function of the time (” simple

harmonic vibrations “), so that its components can be represented by

Pi = ai cos (nt +/0 , V y = a 2 cos {nt +f 2) , P 2 = a 3 cos (nt +f 3) .

The ” phases ” of these vibrations are determined by the angles nt+fi, &c, or by the times t+fi/n, &c. The ” frequency ” n is con- stant throughout the system, while the quantities / 1? f 2 , f 3 , and perhaps

the ” amplitudes ” Ci, a 2 , a s change from point to point. It may be shown that the end of a straight line representing the vector P, and drawn from the point considered, in general describes a certain ellipse, which becomes a straight line, if /i=/2=/ 3 . In this latter case, to which the larger part of this article will be confined, we can write in vector notation

P = Acos (nt+f), (4)

where A itself is to be regarded as a vector.

We have next to consider the way in which the disturbance changes from point to point. The most important case is that of plane waves with constant amplitude A. Here / is the same at all points of a plane (” wave-front “) of a definite direction, but changes as a linear function as we pass from one such wave-front to the next. The axis of x being drawn at right angles to the wave-fronts, we may write f=fo-kx, where / and k are constants, so that (4) becomes

P = A cos (nt — kx--f). (5)

This expression has the period 2ir[n with respect to the time and the perion 2ir/k with respect to x, so that the ” time of vibration ” and the ” wave-length ” are given by T = 2ir/«, \ = 2ir/k. Further, it is easily seen that the phase belonging to certain values of x and t is equal to that which corresponds to x + Ax and t + At provided Ax = (n/k)At. Therefore the phase, or the disturbance itself, may be said to be propagated in the direction normal to the wave-fronts with a velocity (velocity of the waves) -v = n/k, which is connected with the time of vibration and the wave-length by the relation X = vT. (6)

2 This kind of type will always be used in this article to denote vectors.

In isotropic bodies the propagation can go on in all directions with the same velocity. In anisotropic bodies (crystals), with which the theory of light is largely concerned, the problem is more complicated. As a general rule we can say that, for a given direction of the wave- fronts, the vibrations must have a determinate direction, if the propagation is to take place according to the simple formula given above. It is to be

understood that for a given direction of the waves there may be two or even more directions of vibration of the kind, and that in such a case there are as many different velocities, each belonging to one particular direction of vibration.

7. Wave-surface. — After having found the values of v for a particular frequency and different directions of the wave- normal, a very instructive graphical representation can be employed.

Let ON be a line in any direction, drawn from a fixed point O, OA a length along this line equal to the velocity v of waves having ON for their normal, or, more generally, OA, OA', &c, lengths equal to the velocities v, v', &o, which such waves have according to their direction of vibration, Q, Q', &c, planes perpendicular to ON through A, A 1 , &c. Let this construction be repeated for all directions of ON, and let W be the surface that is touched by all the planes Q, Q', &c. It is clear that if this surface, which is called the " wave-surface," is known, the velocity of propagation of plane waves of any chosen direction is given by the length of the perpendicular from the centre O on a tangent plane in the given direction. It must be kept in mind that, in general, each tangent plane corresponds to one definite direction of vibration. If this direction is assigned in each point of the wave-surface, the diagram contains all the information which we can desire concerning the propagation of plane waves of the frequency that has been chosen.

The plane Q employed in the above construction is the position after unit of time of a wave-front perpendicular to ON and originally passing through the point 0. The surface W itself is often considered as the locus of all points that are reached in unit of time by a disturbance starting from and spreading towards all sides. Admitting the validity of this view, we can determine in a similar way the locus of the points reached in some infinitely short time dt, the wave- surface, as we may say, or the " elementary wave," corresponding to this time. It is similar to W, all dimensions of the latter surface being multiplied by dt. It may be noticed that in a heterogeneous medium a wave of this kind has the same form as if the properties of matter existing at its centre extended over a finite space.

8. Theory of Huygens. — Huygens was the first to show that the explanation of optical phenomena may be made to depend on the wave-surface, not only in isotropic bodies, in which it has a spherical form, but also in crystals, for one of which (Iceland spar) he deduced the form of the surface from the observed double refraction. In his argument Huygens availed himself of the following principle that is

justly named after him: Any point that is reached by a wave of light becomes a new centre of radiation from which the disturbance is propa- gated towards all sides. On this basis he determined the progress of light- waves by a construction which, under a restriction to be mentioned in §13, applied to waves of any form and to all kinds of transparent media. Let cr be the surface (wave-front) to which a definite phase of vibration has advanced at a certain time /, dt an infinitely small increment of time, and let an elementary wave corresponding to this interval be described around each point P of 0. Then the envelope a of all these elementary waves is the surface reached by the phase in question at the time t + dt, and by repeating the construction all successive positions of the wave-front can be found.

Huygens also considered the propagation of waves that are laterally limited, by having passed, for example, through an opening in an opaque screen. If, in the first wave-front a, the disturbance exists only in a certain part bounded by the contour s, we can confine ourselves to the elementary waves around the points of that part, and to a portion of the new wave-front a' whose boundary passes through the points where a' touches the elementary waves having their centres on 5. Taking for granted Huygens's assumption that a sensible disturbance is only found in those places where the ele- mentary waves are touched by the new wave-front, it may be inferred that the lateral limits of the beam of light are determined by lines, each element of which joins the centre P of an elementary wave with its point of contact P' with the next wave-front. To lines of this kind, whose course can be made visible by using narrow pencils of light, the name of " rays " is to be given in the wave-theory. The disturbance may be conceived to travel along them with a velocity u = PP'/dt, which is therefore called the " ray-velocity."

The construction shows that, corresponding to each direction of the wave-front (with a determinate direction of vibration), there is a definite direction and a definite velocity of the ray. Both are given

by a line drawn from the centre of the wave-surface to its point of contact with a tangent plane of the given direction. It will be con- venient to say that this line and the plane are conjugate with each other. The rays of light, curved in non-homogeneous bodies, are always straight lines in homogeneous substances. In an isotropic medium, whether homogeneous or otherwise, they are normal to the wave-fronts, and their velocity is equal to that of the waves.

By applying his construction to the reflection and refraction of light,

Huygens accounted for these phenomena in isotropic bodies as well as in Iceland spar. It was afterwards shown by Augustin Fresnel that the double refraction in biaxal crystals can be explained in the same way, provided the proper form be assigned to the wave- surface.

In any point of a bounding surface the normals to the reflected and refracted waves, whatever be their number, always lie in the plane passing through the normal to the incident waves and that to the surface itself. Moreover, if ai is the angle between these two latter normals, and a 2 the angle between the normal to the boundary and that to any one of the reflected and refracted waves, and Vi, v 2 the corresponding wave-velocities, the relation

sin ai/sin a 2 = »i/i> 2 (7)

is found to hold in all cases. These important theorems may be proved independently of Huygens's construction by simply observing that, at each point of the surface of separation, there must be a certain connexion between the disturbances existing in the incident, the reflected, and the refracted waves, and that, therefore, the lines of intersection of the surface with the positions of an incident wave-front, succeeding each other at equal intervals of time dt, must coincide with the lines in which the surface is intersected by a similar series of reflected or refracted wave-fronts.

In the case of isotropic media, the ratio (7) is constant, so that we are led to the law of Snellius, the index of refraction being given by

H = v 1 /v 2 (8)

(cf. equation 1).

9. General Theorems on Rays, deduced from Huygens's Construction. — (a) Let A and B be two points arbitrarily chosen in a system of transparent bodies, ds an element of a line drawn from A to B, u the velocity of a ray of light coinciding with ds. Then the integral fu *ds, which represents the time required for a motion along the line with the velocity u, is a minimum for the course actually taken by a ray of light (unless A and B be too far apart). This is the " principle of least time " first formulated by Pierre de Fermat for the case of two isotropic substances. It shows that the course of a ray of light can always be inverted.

(b) Rays of light starting in all directions from a point A and travelling onward for a definite length of time, reach a surface

(c) If all rays issuing from A are concentrated at a point B, the integral fuˆds has the same value for each of them.

(d) In case (b) the variation of the integral caused by an infinitely small displacement q of B, the point A remaining fixed, is given by ifu~ l ds = q cos 8/v B . Here 8 is the angle between the displacement q and the normal to the surface a, in the direction of propagation, i > b the velocity of a plane wave tangent to this surface.

In the case of isotropic bodies, for which the relation (8) holds, we recover the theorems concerning the integral ffids which we have deduced from the emission theory (§ 5).

10. Further General Theorems. — (a) Let Vi and V2 be two planes in a system of isotropic bodies, let rectangular axes of coordinates be chosen in each of these planes, and let x\, yi be the coordinates of a point A in Vi, and x 2 , y 2 those of a point B in V 2 . The integral // ids, taken for the ray between A and B, is a function of x\, y u x 2 , y 2 and, if £1 denotes either xi or y u and | 2 either x 2 or y 2 , we shall have

On both sides of this equation the first differentiation may be performed by means of the formula (3). The second differentiation admits of a geometrical interpretation, and the formula may finally be employed for proving the following theorem :

Let o > i be the solid angle of an infinitely thin pencil of rays issuing from A and intersecting the plane V 2 in an element

m 1 <7i COi cos 81 = ju 2 2 cr 2 0 > 2 cos 8 2 .

(b) There is a second theorem that is expressed by exactly the same formula, if we understand by ai and a 2 elements of surface that are related to each other as an object and its optical image — by ui, w 2 the infinitely small openings, at the beginning and the end of its course, of a pencil of rays issuing from a point A of

consider the section

(c) If in the last theorem the system of bodies is symmetrical around

the straight line AB, we can take for whether the ray R on leaving A and on reaching B lies on opposite sides of the axis or on the same side.

The above theorems are of much service in the theory of optical instruments and in the general theory of radiation.

ii. Phenomena of Interference and Diffraction. — The impulses or motions which a luminous body sends forth through the universal medium or aether, -were considered by Huygens as being without any regular succession; he neither speaks of vibrations, nor of the physical cause of the colours. The idea that monochromatic light consists of a succession of simple harmonic vibrations like those represented by the equation (5), and that the sensation of colour depends on the frequency, is due to Thomas Young 1 and Fresnel, 2 who explained the phenomena of interference on this assumption combined with the principle of super-position. In doing so they were also enabled to determine the wave-length, ranging from 0-000076 cm. at the red end of the spectrum to 0-000039 cm. for the extreme violet and, by means of the formula (6), the number of vibrations per second. Later investigations have shown that the infra-red rays as well as the ultra-violet ones are of the same physical nature as the luminous rays, differing from these only by the greater or smaller length of their waves. The wave-length amounts to 0-006 cm. for the least refrangible infra-red, and is as small as o-ooooi cm. for the extreme ultra- violet.

Another important part of Fresnel's work is his treatment of diffraction on the basis of Huygens's principle. If, for example, light falls on a screen with a narrow slit, each point of the slit is regarded as a new centre of vibration, and the intensity at any point behind the screen is found by compounding with each other the disturbances coming from all these points, due account being taken of the phases with which they come together (see Diffraction; Interference).

12. Results of Later Mathematical Theory. — Though the theory of diffraction developed by Fresnel, and by other physicists who worked on the same lines, shows a most beautiful agreement with observed facts, yet its foundation; Huygens's principle, cannot, in its original elementary form, be deemed quite satis- factory. The general validity of the results has, however, been confirmed by the researches of those mathematicians (Simeon Denis Poisson, Augustin Louis Cauchy, Sir G. G. Stokes, Gustav Robert Kirchhoff) who investigated the propagation of vibrations in a more rigorous manner. Kirchhoff 3 showed that the dis- turbance at any point of the aether inside a closed surface which contains no ponderable matter can be represented as made up of a

large number of parts, each of which depends upon the state of things at one point of the surface. This result, the modern form of Huygens's principle, can be extended to a system of bodies of any kind, the only restriction being that the source of light be not surrounded by the surface. Certain causes capable of producing vibrations can be imagined to be distributed all over this latter, in such a way that the disturbances to which they give rise in the enclosed space are exactly those which are brought about by the real source of light. 4 Another interesting result that has been verified by experiment is that, whenever rays of light pass through a focus, the phase undergoes a change of half a period. It must be added that the results alluded to in

1 Phil. Trans. (1802), part i. p. 12.

2 CEuvres completes de Fresnel (Paris, 1866). (The researches were published between 1815 and 1827.)

'Ann. Phys. Chem. (1883), 18, p. 663.

1 H. A. Lorentz, Zittingsversl. Akad. v. Wet. Amsterdam, 4 (1896), p. 176.

the above, though generally presented in the terms of some particular form of the wave theory, often apply to other forms as well.

13. Rays of Light. — In working out the theory of diffraction it is possible to state exactly in what sense light may be said to travel in straight lines. Behind an opening whose width is very large in comparison with the wave-length the limits between the illuminated and the dark parts of space are approximately determined by rays passing along the borders.

This conclusion can also be arrived at by a mode of reasoning that is independent of the theory of diffraction. 6 If linear differential equations admit a solution of the form (5) with A constant, they can also be satisfied by making A a function of the coordinates, such that, in a wave-front, it changes very little over a distance equal to the wave-length X, and that it is constant along each line conjugate with the wave-fronts. In cases of this kind the disturbance may truly be said to travel along lines of the said direction, and an observer who is unable to discern lengths of the order of X, and who uses an opening of much larger dimensions, may very well have the impression of a cylindrical beam with a sharp boundary.

A similar result is found for curved waves. If the additional restriction is made that their radii of curvature be very much larger than the

wave-length, Huygens's construction may con- fidently be employed. The amplitudes all along a ray are determined by, and proportional to, the amplitude at one of its points.

14. Polarized Light. — As the theorems used in the explanation of interference and diffraction are true for all kinds of vibratory motions, these phenomena can give us no clue to the special kind of vibrations in light-waves. Further information, however, may be drawn from experiments on plane polarized light. The properties of a beam of this kind are completely known when the position of a certain plane passing through the direction • of the rays, and in which the beam is said to be polarized, is given. " This plane of polarization," as it is called, coincides with the plane of incidence in those cases where the light has been polarized by reflection on a glass surface under an angle of incidence whose tangent is equal to the index of refraction (Brewster's law). '

The researches of Fresnel and Arago left no doubt as to the direction of the vibrations in polarized light with respect to that of the rays themselves. In isotropic bodies at least, the vibra- tions are exactly transverse, i.e. perpendicular to the rays, either in the plane of polarization or at right angles to it. The first part of this statement also applies to unpolarized light, as this can always be dissolved into polarized components.

Much experimental work has been done on the production of polarized rays by double refraction and on the reflection of polarized light, either by isotropic or by anisotropic transparent bodies, the object of inquiry being in the latter case to determine the position of the plane of polarization of the reflected rays and their intensity.

In this way a large amount of evidence has been gathered by which it has been possible to test different theories concerning the nature of light and that of the medium through which it is propagated. A common feature of nearly all these theories is that the aether is supposed to exist not only in spaces void of matter, but also in the interior of ponderable bodies.

15. Fresnel's Theory. — Fresnel and his immediate successors assimilated the aether to an elastic solid, so that the velocity of propagation of transverse vibrations could be determined by the formula »=V(K/p), where K denotes the modulus of rigidity and p the density. According to this equation the different properties of various isotropic transparent bodies may arise from different values of K, of p, or of both. It has, however, been found that if both K and p are

supposed to change from one substance to another, it is impossible to obtain the right reflection formulae. Assuming the constancy of K Fresnel was led to equations which agreed with the observed properties of the reflected light, if he made the further assumption (to be mentioned in what follows as ” Fresnel’s assumption “) that the vibrations of plane polarized light are perpendicular to the plane of polarization.

5 H. A. Lorentz, Abhandlungen iiber theoretische Physik, 1 (1907), L P- 415-

Let the indices p and n relate to the two principal cases in which the incident (and, consequently, the reflected) light is polarized in the plane of incidence, or normally to it, and let positive directions h and h’ be chosen for the disturbance (at the surface itself) in the incident and for that in the reflected beam, in such a manner that, by a common rotation, h and the incident ray prolonged may be made to coincide with h’ and the reflected ray. Then, if 01 and a 2 are the angles of incidence and refraction, Fresnel shows that, in order to get the reflected disturbance, the incident one must be multiplied by

0ˆ= — sin (ol — a 2)/ sin (ai + a 2) (9)

in the first, and by

a„ = tan (ai — a 2) / tan (

in the second principal case.

As to double refraction, Fresnel made it depend on the unequal elasticity of the aether in different directions. He came to the conclusion that, for a given direction of the waves, there are two possible directions of vibration (§6), lying in the wave-front, at right angles to each other, and he determined the form of the wave-surface, both in uniaxal and in biaxal crystals.

Though objections may be urged against the dynamic part of Fresnel's theory, he admirably succeeded in adapting it to the facts.

16. Electromagnetic Theory. — We here leave the historical order and pass on to Maxwell's theory of light.

James Clerk Maxwell, who had set himself the task of mathematically working out Michael Faraday's views, and who, both by doing so and by introducing many new ideas of his own, became the founder of the modern science of electricity, 1 recognized that, at every point of an electromagnetic field, the state of things can be defined by twt) vector quantities, the " electric force " E and the " magnetic force " H, the former of which is the force acting on unit of electricity and the latter that which acts on a magnetic pole of unit strength. In a non-conductor (dielectric) the force E produces a state that may be described as a displacement of electricity from its position of equilibrium. This state is represented by a vector D (" dielectric displacement ") whose magnitude is measured by the quantity of electricity reckoned per unit area which has traversed an element of surface perpendicular to D itself. Similarly, there is a vector quantity B (the " magnetic induction ") intimately connected with the magnetic force H. Changes of the dielectric displacement constitute an electric current measured by the rate of change of D, and represented in vector notation by

C = D (11)

Periodic changes of D and B may be called " electric " and " magnetic vibrations " Properly choosing the units, the axes of coordinates (in the first proposition also the positive direction of ˆ and n), and denoting components of vectors by suitable indices, we can express in the following way the fundamental propositions of the theory.

(a) Let sbea closed line,

/&& = i/c&r, jnds = -I £Jbm,

where the constant c means the ratio between the electro-magnet and the electrostatic unit of electricity.

From these equations we can deduce:

(a) For the interior of a body, the equations

aH i _aH ! ,_i r aHj_aH £ _i aHj, 3H x _i r . .

dy dz ~~c^ x ‘ dz dx “c” 1 ” dx dy ~ c^” {12) aEj_6E j;=: _l aB_j aE £ _3E J= _i_aB 2 , 3JW_dE*_i^c>B_ 2 , .

dz ~ c tit ‘ as dx ~ c tit ‘ dx f>^ ~ r.’ M ‘ (T 3J

c dt

dy dz C tit ‘ <3s dx c dt ' dx 3y

(0) For a surface of separation, the continuity of the tangential components of E and H;

(7) The solenoidal distribution of C and B, and in a dielectric that of D. A solenoidal distribution of a vector is one corresponding to that of the velocity in an incompressible fluid. It involves the continuity, at a surface, of the normal component of the vector.

(b) The relation between the electric force and the dielectric displacement is expressed by

D* = «!E„ D 1/ = e 2 E !(> D Z = £ 3 E,, (14)

the constants «i, (2, c 3 (dielectric constants) depending on the properties of the body considered. In an isotropic medium they have a common value e, which is equal to unity for the free aether, so that for this medium D = E.

(<") There is a relation similar to (14) between the magnetic force and the magnetic induction. For the aether, however, and for all ponderable bodies with which this article is concerned, we may write B=H.

1 Clerk Maxwell, A Treatise on Electricity and Magnetism (Oxford, 1st ed., 1873).

It follows from these principles that, in an isotropic dialectric,

transverse electric vibrations can be propagated with a velocity

» = c/Vf. (15)

Indeed, all conditions are satisfied if we put D, = o, Dj, = tfcos»(< — xv~ l -\-l), D* = o,) , , >

Hx = o, H„ = o , B. l = avc- i cos n{t-xv~ l +l) \ {lb)

For the free aether the velocity has the value c. Now it had been found that the ratio c between the two units of electricity agrees within the limits of experimental errors with the numerical value of the velocity of light in aether. (The mean result of the most exact determinations 2 of c is 3,001 -io^cm. /sec, the largest deviations being about o,oo8-io 10 ; and Cornu 3 gives 3,ooi-io 10 ±o,oo3-io 10 as the most probable value of the velocity of light.) By this Maxwell was led to suppose that light consists of transverse electromagnetic disturbances. On this assumption, the equations (16) represent a beam of plane polarized light. They show that, in such a beam, there are at the same time electric and magnetic vibrations, both transverse, and at right angles to each other.

It must be added that the electromagnetic field is the seat of two kinds of energy distinguished by the names of electric and magnetic energy, and that, according to a beautiful theorem due to J. H. Poynting, 4 the energy may be conceived to flow in a direction perpendicular both to the electric and to the magnetic force. The amounts per unit of volume of the electric and the magnetic energy are given by the expressions

KExD* + E,D y + EJ),), (17)

and

J(H*B Ji + H 1 ,B 1 , + H,B») = iH ! , (18)

whose mean values for a full period are equal in every beam of light. The formula (15) shows that the index of refraction of a body is given by V e, a result that has been verified by Ludwig Boltzmann's measurements 6 of the dielectric constants of gases. Thus Maxwell's theory can assign the true cause of the different optical properties of various transparent bodies. It also leads to the reflection formulae (9) and (10), provided the electric vibrations of polarized light be supposed to be perpendicular to the plane of polarization, which implies that the magnetic vibrations are parallel to that plane.

Following the same assumption Maxwell deduced the laws of double

refraction, which he ascribes to the unequality of ei, e 2 , «. His results agree with those of Fresnel and the theory has been confirmed by Boltzmann, 6 who measured the three coefficients in the case of crystallized sulphur, and compared them with the principal indices of refraction. Subsequently the problem of crystalline reflection has been completely solved and it has been shown that, in a crystal, Poynting's flow of energy has the direction of the rays as determined by Huygens's construction.

Two further verifications must here be mentioned. In the first place, though we shall speak almost exclusively of the propagation of light in transparent dielectrics, a few words may be said about the optical properties of conductors. The simplest assumption con- cerning the electric current C in a metallic body is expressed by the equation C = o\E, where tr is the coefficient of conductivity. Com- bining this with his other formulae (we may say with (12) and (13)), Maxwell found that there must be an absorption of light, a result that can be readily understood since the motion of electricity in a conductor gives rise to a development of heat. But, though Maxwell accounted in this way for the fundamental fact that metals are opaque bodies, there remained a wide divergence between the values of the coefficient of absorption as directly measured and as cal- culated from the electrical conductivity; but in 1903 it was shown by E. Hagen and H. Rubens' that the agreement is very satis- factory in the case of the extreme infra-red rays.

In the second place, the electromagnetic theory requires that a surface struck by a beam of light shall experience a certain pressure. If the beam falls normally on a plane disk, the pressure is normal too; its total amount is given by cKA + *»—*») 1 if i\, H and i 3 are the quantities of energy that are carried forward per unit of time by the incident, the reflected, and the transmitted light. This result has been quantitatively verified by E. F. Nicholls and G. F. Hull.'

Maxwell's predictions have been splendidly confirmed by the experiments of Heinrich Hertz 9 and others on electromagnetic waves; by diminishing the length of these to the utmost, some physicists have been able to reproduce with them all phenomena of reflection, refraction (single and double), interference, and polariza- tion. 10 A table of the wave-lengths observed in the aether now has

2 H. Abraham, Rapports presenters au congres de physique de igoo (Paris), 2, p. 247. z Ibid., p. 225.

4 Phil. Trans., 175 (1884), p. 343. 6 Ann. d. Phys. u. Chem. 155

(1875), p. 403. 6 Ibid. 153 (1874), p. 525. ‘ Ann. d. Phys. 11 (1903), p. 873.

8 Phys. Review, 13 (1901), p. 293.

9 Hertz, Untersuchungen ilber die Ausbreitung der elektrischen Kraft (Leipzig, 1892).

10 A. Righi, L’uttica delle oscillazioni elettriche (Bologna, 1897); P. Lebedew, Ann. d. Phys. u. Chem., 56 (1895), p. I.

to contain, besides the numbers given in § u, the lengths of the waves produced by electromagnetic apparatus and extending from the long waves used in wireless telegraphy down to about 0-6 cm.

17. Mechanical Models of the Electromagnetic Medium. — From the results already enumerated, a clear idea can be formed of the difficulties which were encountered in the older form of the wave-theory. Whereas, in Maxwell’s theory, longitudinal vibrations are excluded ab initio by the solenoidal distribution of the electric current, the elastic-solid theory had to take them into account, unless, as was often done, one made them disappear by supposing them to have a very great velocity of propagation, so that the aether was considered to be practically incompressible. Even on this assumption, however, much in Fresnel’s theory remained questionable. Thus George Green, 1 who was the first to apply the theory of elasticity in an unobjectionable manner, arrived on Fresnel’s assumption at a formula for the reflection coefficient A n sensibly differing from (10).

In the theory of double refraction the difficulties are no less serious. As a general rule there are in an anisotropic elastic solid three possible directions of vibration (§ 6), at right angles to each other, for a given direction of the waves, but none of these lies in the wave-front. In order to make two of them do so and to find Fresnel’s form for the wave-surface, new hypotheses are required. On Fresnel’s assumption it is even necessary, as was observed by Green, to suppose that in the absence of all vibra- tions there is already a certain state of pressure in the medium.

If we adhere to Fresnel’s assumption, it is indeed scarcely possible to

construct an elastic model of the electromagnetic medium. It may be done, however, if the velocities of the particles in the model are taken to represent the magnetic force H, which, of course, implies that the vibrations of the particles are parallel to the plane of polarization, and that the magnetic energy is representee! by the kinetic energy in the model. Considering further that, in the case of two bodies connected with each other, there is continuity of H in the electromagnetic system, and continuity of the velocity of the particles in the model, it becomes clear that the representation of H by that velocity must be on the same scale in all substances, so that, if £, tj, f are the displacements of a particle and g a universal constant, we may write

By this the magnetic energy per unit of volume becomes

(19)

wKsr + ar + GO'i-

and since this must be the kinetic energy of the elastic medium, the density of the latter must be taken equal to g 2 , so that it must be the same in all substances.

It may further be asked what value we have to assign to the potential energy in the model, which must correspond to the electric energy in the electromagnetic field. Now, on account of (11) and

(19), we can satisfy the equations (12) by .putting D x = gc (ˆ • — ~) ,

&c, so that the electric energy (17) per unit of volume becomes

lgc \ti\dy dz] ˆeiKdz dx) + n\dx dy))' This, therefore, must be the potential energy in the model.

It may be shown, indeed, that, if the aether has a uniform constant density, and is so constituted that in any system, whether homogeneous or not, its potential energy per unit of volume can be represented by an expression of the form

» I > ■(£-»■ + »•«-©' + » «-©'!■ (-)

where L, M, N are coefficients depending on the physical properties of the substance considered, the equations of motion will exactly correspond to the equations of the electromagnetic field.

18. Theories of Neumann, Green, and MacCullagh. — A theory of light in which the elastic aether has a uniform density, and in which the

vibrations are supposed to be parallel to the plane of polarization, was developed by Franz Ernst Neumann, 2 who gave the first deduction of the formulas for crystalline reflection. Like Fresnel, he was, however, obliged to introduce some illegitimate assumptions and simplifications. Here again Green indicated a more rigorous treatment.

1 ” Reflection and Refraction,” Trans. Cambr. Phil. Soc. 7, p. 1 (1837); ” Double Refraction,” ibid. p. 121 (1839).

2 ” Double Refraction,” Ann. d. Phys. u. Chem. 25 (1832), p. 418; ” Crystalline Reflection,” Abhandl. Akad. Berlin (1835), p. 1.

By specializing the formula for the potential energy of an aniso- tropic body he arrives at an expression which, if some of his co- efficients are made to vanish and if the medium is supposed to be incompressible, differs from (20) only by the additional terms

2 J L fa *!-&&) +M 3 2f-tf 2ft +N (% 2!-« S3) I ., 2l) I \dy da . dy dzj ˆ m \dz dx dz dx) ˆ™ \dx dy dx dy) J ˆ L)

If £, v< f vanish at infinite distance the integral of this expression over all space is zero, when L, M, N are constants, and the same will be true when these coefficients change from point to point, provided we add to (21) certain terms containing the differential coefficients of L, M, N, the physical meaning of these terms being that, besides the ordinary elastic forces, there is some extraneous force (called into play by the displacement) acting on all those elements of volume where L, M, N are not constant. We may conclude from this that all phenomena can be explained if we admit the existence of this latter force, which, in the case of two contingent bodies, reduces to a surface-action on their common boundary.

James MacCullagh 3 avoided this complication by simply assuming an expression of the form (20) for the potential energy. He thus established a theory that is perfectly consistent in itself, and may be said to have foreshadowed the electromagnetic theory as regards the form of the equations for transparent bodies. Lord Kelvin afterwards interpreted MacCullagh’s assumption by supposing the only action which is called forth by a displacement to consist in certain couples acting on the elements of volume and proportional to the components i{(,d£/dy) — (di;/dz)), &c, of their rotation from the natural position. He also showed 4 that this ” rotational elasticity ” can be produced by certain hidden rotations going on in the medium.

We cannot dwell here upon other models that have been pro- posed,

and most of which are of rather limited applicability. A mechanism of a more general kind ought, of course, to be adapted to what is known of the molecular constitution of bodies, and to the highly probable assumption of the perfect rTerme- ability for the aether of all ponderable matter, an assumption by which it has been possible to escape from one of the objections raised by Newton (§4) (see Aether).

The possibility of a truly satisfactory model certainly cannot be denied. But it would, in all probability, be extremely com- plicated. For this reason many physicists rest content, as regards the free aether, with some such general form of the electromagnetic theory as has been sketched in § 16.

19. Optical Properties of Ponderable Bodies. Theory of Elec- trons. — If we want to form an adequate representation of optical phenomena in ponderable bodies, the conceptions of the molecular and atomistic theories naturally suggest themselves. Already, in the elastic theory, it had been imagined that certain material particles are set vibrating by incident waves of light. These particles had been supposed to be acted on by an elastic force by which they are drawn back towards their positions of equilibrium, so that they can perform free vibrations of their own, and by a resistance that can be represented by terms proportional to the velocity in the equations of motion, and may be physically understood if the vibrations are supposed to be converted in one way or another into a disorderly heat-motion. In this way it had been found possible to explain the phenomena of dis- persion and (selective) absorption, and the connexion between them (anomalous dispersion). 5 These ideas have been also embodied into the electromagnetic theory. In its more recent development the extremely small, electrically charged particles, to which the name of ” electrons ” has been given, and which are supposed to exist in the interior of all bodies, are considered as forming the connecting links between aether and matter, and as determining by their arrangement and their motion all optical phenomena that are not confined to the free aether. 6

It has thus become clear why the relations that had been estab- lished between optical and electrical properties have been found to hold only in some simple cases (§16). In fact it cannot be doubted that, for rapidly alternating electric fields, the formulae expressing the connexion between the motion of electricity and the electric force take a form that is less simple than the one previously admitted, and is to be determined in each case by

3 Trans. Irish Acad. 21, ” Science,” p. 17 (1839).

4 Math, and Phys. Papers (London, 1890), 3, p. 466.

6 Helmholtz, Ann. d. Phys. u. Chem., 154 (1875), p. 582.

6 H. A. Lorentz, Versuch einer Theorie der elektrischen u. optischen Erscheinungen in bewegten Korpern (1895) (Leipzig, 1906); J. Larmor, Aether and Matter (Cambridge, 1900).

elaborate investigation. However, the general boundary con- ditions given in § 16 seem to require no alteration. For this reason it has been possible, for example, to establish a satisfactory- theory of metallic reflection, though the propagation of light in the interior of a metal is only imperfectly understood.

One of the fundamental propositions of the theory of electrons is that an electron becomes a centre of radiation whenever its velocity changes either in direction or in magnitude. Thus the production of Rbntgen rays, regarded as consisting of very short and irregular electromagnetic impulses, is traced to the impacts of the electrons of the cathode-rays against the anti- cathode, and the lines of an emission spectrum indicate the existence in the radiating body of as many kinds of regular vibrations, the knowledge of which is the ultimate object of our investigations about the structure of the spectra. The shifting of the lines caused, according to Doppler's law, by a motion of the source of light, may easily be accounted for, as only general principles are involved in the explanation. To a certain extent we can also elucidate the changes in the emission that are observed when the radiating source is exposed to external magnetic forces (" Zeeman-effect " ; see Magneto- Optics).

20. Various Kinds of Light-motion. — (a) If the disturbance is represented by

Pi = o, Pj, = a cos (nt-kx +f) , P 2 = o'cos (nt-kx +/') , so that the end of the vector P describes an ellipse in a plane per- pendicular to the direction of propagation, the light is said to be elliptically, or in special cases circularly, polarized. Light of this kind can be dissolved in many different ways into plane polarized components.

There are cases in which plane waves must be elliptically or circularly

polarized in order to show the simple propagation of phase that is expressed by formulae like (5). Instances of this kind occur in bodies having the property of rotating the plane of polarization, either on account of their constitution, or under the influence of a magnetic field. For a given direction of the wave-front there are in general two kinds of elliptic vibrations, each having a definite form, orientation, and direction of motion, and a determinate velocity of propagation. All that has been said about Huygens's construction applies to these cases.

(b) In a perfect spectroscope a sharp line would only be observed if an endless regular succession of simple harmonic vibrations were admitted into the instrument. In any other case the light will occupy a certain extent in the spectrum, and in order to determine its distribution we have to decompose into simple harmonic functions of the time the components of the disturbance, at a point of the slit for instance. This may be done by means of Fourier's theorem.

An extreme case is that of the unpolarized light emitted by incandescent solid bodies, consisting of disturbances whose variations are highly irregular, and giving a continuous spectrum- But even with what is commonly called homogeneous light, no perfectly sharp line will be seen. There is no source of light in which the vibrations of the particles remain for ever undisturbed, and a particle will never emit an endless succession of uninterrupted vibrations, but at best a series of vibrations whose form, phase and intensity are changed at irregular intervals. The result must be a broadening of the spectral line.

In cases of this kind one must distinguish between the velocity of propagation of the phase of regular vibrations and the velocity with which the said changes travel onward (see below, iii. Velocity of Light).

(c) In a train of plane waves of definite frequency the disturbance ip represented by means of goniometric functions of the time and the coordinates. Since the fundamental equations are linear, there are also solutions in which one or more of the coordinates occur in an exponential function. These solutions are of interest because the motions corresponding to them are widely different from those of which we have thus far spoken. If, for example, the formulae contain the factor

e-^cos (nl-sy+l) »

with the positive constant r, the disturbance is no longer periodic with

respect to x, but steadily diminishes as x increases. A state of things of this kind, in which the vibrations rapidly die away as we leave the surface, exists in the air adjacent to the face of a glass prism by which a beam of light is totally reflected. It furnishes us an explanation of Newton's experiment mentioned in § 2.

(H. A. L.)

III. Velocity of Light The fact that light is propagated with a definite speed was first brought out by Ole Roemer at Paris, in 1676, through observations of the eclipses of Jupiter's satellites, made in

different relative positions of the Earth and Jupiter in their respective orbits. It is possible in this way to determine the time required for light to pass across the orbit of the earth. The dimensions of this orbit, or the distance of the sun, being taken as known, the actual speed of light could be computed. Since this computation requires a knowledge of the sun's distance, which has not yet been acquired with certainty, the actual speed is now determined by experiments made on the earth's surface. Were it possible by any system of signals to compare with absolute precision the times at two different stations, the speed could be determined by finding how long was required for light to pass from one station to another at the greatest visible distance. But this is impracticable, because no natural agent is under our control by which a signal could be com- municated with a greater velocity than that of light. It is therefore necessary to reflect a ray back to the point of observation and to determine the time which the light requires to go and come. Two systems have been devised for this purpose. One is that of Fizeau, in which the vital appliance is a rapidly re- volving toothed wheel; the other is that of Foucault, in which the corresponding appliance is a mirror revolving on an axis in, or parallel to, its own plane.

The principle underlying Fizeau's method is shown in the accom- panying figs. 1 and 2. Fig. 1 shows the course of a ray of light which, emanating from a luminous point L, strikes the p . plane surface of a plate of glass M at an angle of about zeaa.

45°. A fraction of the light is reflected from the two surfaces of the glass to a distant reflector R, the plane of which is at right angles to the course of the ray. The latter is thus reflected back on its own course and, passing through the glass M on its return, reaches a point E behind the glass. An observer with his eye at E looking through the glass sees the return ray as a distant luminous point in the reflector R, after the light has passed over the course in both directions. In actual

practice it is necessary to interpose the object glass of a telescope at a point O, at a dis-

N* = = t

Fig. 1.

tance from M nearly equal to its focal length. The function of this appliance is to render the diverging rays, shown by the dotted lines, nearly parallel, in order that more light may reach R and be thrown back again. But the principle may be conceived without respect to the telescope, all the rays being ignored except the central one, which passes over the course we have described.

Conceiving the apparatus arranged in such a way that the ob- server sees the light reflected from the distant mirror R, a fine toothed wheel WX is placed immediately in front of the glass M, with its plane perpendicular to the course of the ray, in such a way that the ray goes out and returns through an opening between two adjacent teeth. This wheel is represented in section by WX in fig. I, and a part of its circumference, with the teeth as viewed by the observer, is shown in fig. 2. We conceive that the latter sees the luminous point between two of the teeth at K. Now, conceive that the wheel is set in revolution. The ray is then interrupted as every tooth passes, so that what is sent out is a succession of flashes. Conceive that the speed of the mirror is such that while the flash is going to the distant mirror and returning again, each tooth of the wheel takes the place of an opening between the teeth. Then each flash sent out will, on its return, be intercepted by the adjacent tooth, and will therefore become invisible. If the speed be now doubled, so that the teeth pass at intervals equal to the time required for the light to go and come, each flash sent through an opening will return through the adjacent opening, and will therefore be seen with full brightness. If the speed be continuously increased the result will be successive disappearances and reappear- ances of the light, according as a tooth is or is not interposed when the ray reaches the apparatus on its return. The computation of the time of passage and return is then very simple. The speed of the wheel being known, the number of teeth passing in one second can be computed. The order of the disappearance, or the number of teeth which have passed while the light is going and coming, being also determined in each case, the interval of time is computed by a simple formula.

Fig. 2.

and Forbes.

The most elaborate determination yet “made by Fizeau’s method was that of Cornu. The station of observation was at the Paris Observatory. The distant reflector, a telescope with a Coma. reflector at its focus, was at Montlhery, distant 22,910 metres from the toothed wheel. Of the wheels most used one had 150 teeth, and was 35 millimetres in diameter; the other had 200 teeth, with a diameter of 45 mm. The highest speed attained was about 900 revolutions per second. At this speed, 135,000 (or 180,000) teeth would pass per second, and about 20 (or 28) would pass while the light was going and coming. But the actual speed attained was generally less than this. The definitive result derived by Cornu from the entire series of experiments was 300,400 kilo- metres per second. Further details of this work need not be set forth because the method is in several ways deficient in precision. The eclipses and subsequent reappearances of the light taking place gradually, it is impossible to fix with entire precision upon the moment of complete eclipse. The speed of the wheel is continually varying, and it is impossible to determine with precision what it was at the instant of an eclipse.

The defect would be lessened were the speed of the toothed wheel placed under control of the observer who, by action in one direction or the other, could continually check or accelerate it, so as to keep the return point of light at the required phase of brightness. If the phase of complete extinction is chosen for this purpose a definite result cannot be reached; but by choosing the moment when the light is of a certain definite brightness, before or after an eclipse, the observer will know at each instant whether the speed should be accelerated or retarded, and can act accordingly. The nearly constant speed through as long a period as is deemed necessary would then be found by dividing the entire number of revolutions of the wheel by the time through which the light was kept constant. But even with these improvements, which were not actually tried by Cornu, the estimate of the brightness on which the whole result depends would necessarily be uncertain. The outcome is that, although Cornu’s discussion of his experiments is a model in the care taken to determine so far as practicable every source of error, his definitive result is shown by other determinations to have been too great by about Ythz part of its

whole amount.

An important improvement on the Fizeau method was made in 1880 by James Young and George Forbes at Glasgow. This con- Vo nit sisted in using two distant reflectors which were placed nearly in the same straight line, and at unequal distances. The ratio of the distances was nearly 12 : 13. The phase observed was not that of complete extinction of either light, but that when the two lights appeared equal in intensity. But it does not appear that the very necessary device of placing the speed of the toothed wheel under control of the observer was adopted. The accordance between the different measures was far from satisfactory, and it will suffice to mention the result which was

Velocity in vacuo = 301 ,382 km. per second. These experimenters also found a difference of 2 % between the speed of red and blue light, a result which can only be attributed to some unexplained source of error.

The Foucault system is much more precise, because it rests upon the measurement of an angle, which can be made with great precision.

The vital appliance is a rapidly revolving mirror. Let AB (fig. 3) be a section of this mirror, which we shall first suppose at rest. A ray of light LM emanating from a source at L, is re- Foucauli. fl ecte(} ; n t h e direction MQR to a distant mirror R, from which it is perpendicularly reflected back upon its original course. This mirror R should be slightly concave, with the centre of curvature

near M, so that the ray shall »A .- – E always be reflected back to

‘ L « 1 M on whatever point of R it

\2_ R| may fall. Conceiving the re-

1 volving mirror M as at rest, the » return ray will after three reflec- BV* tions, at M, R and M again,

p IG , be returned along its original

course to the point L from which it emanated. An important point is that the return ray will always follow the fixed line ML no matter what the position of the movable mirror M, provided there is a distant reflector to send the ray back. Now, suppose that, while the ray is going and coming, the mirror M, being set in revolution, has turned from the position in which the ray was reflected to that shown by the dotted line. If a be the angle through which the surface has turned, the

course of the return ray, after reflection, will then deviate from ML by the angle 20, and so be thrown to a point E, such that the angle LME = = 20. If the mirror is in rapid rotation the ray reflected from it will strike the distant mirror as a series of flashes,_ each formed by the light reflected when the mirror was in the position AB. If the speed of rotation is uniform, the reflected rays from the successive flashes while the mirror is in the dotted position will thus all follow the same direction ME after their second reflection from the mirror. If the motion is sufficiently rapid an eye observing the reflected ray will see the flashes as an invariable point of light so long as the

speed of revolution remains constant. The time required for the light to go and come is then equal to that required by the mirror to turn through half the angle LME.which is therefore to be measured. In practice it is necessary on this system, as well as on that of Fizeau, to condense the light by means of a lens, Q, so placed that L and R shall be at conjugate foci. The position of the lens may be either between the luminous point L and the mirror M, or between M and R, the latter being the only one shown in the figure. This position has the advantage that more light can be concentrated, but it has the disadvantage that, with a given magnifying power, the effect of atmospheric undulation, when the concave reflector is situated at a great distance, is increased in the ratio of the focal length of the lens to the distance LM from the light to the mirror. To state the fact in another form, the amplitude of the disturbances produced by the air in linear measure are proportional to the focal distance of the lens, while the magnification required increases in the inverse ratio of the distance LM. Another difficulty associated with the Foucault system in the form in which its originator used it is that if the axis of the mirror is at right angles to the course of the ray, the light from the source L will be flashed directly into the eye of the observer, on every passage of the revolving mirror through the position in which its normal bisects the two courses of the ray. This may be avoided by_ inclining the axis of the mirror.

In Foucault's determination the measures were not made upon a luminous point, but upon a reticule, the image of which could not be seen unless the reflector was quite near the revolving mirror. In- deed the whole apparatus was contained in his laboratory. The effec- tive distance was increased by using several reflectors ; but the entire course of the ray measured only 20 metres. The result reached by Foucault for the velocity of light was 298,000 kilometres per second. The first marked advance on Foucault's determination was made by Albert A. Michelson, then a young officer on duty at the U.S. Naval Academy, Annapolis. The improvement consisted in using the image

of a slit through which the ” llcfle ‘ son > rays of the sun passed after reflection from a heliostat. In this way it was found possible to see the image of the slit reflected from the distant mirror when the latter was nearly 600 metres from the station of observation. The essentials of the arrangement are those we have used in fig. 3, L being the slit. It will be seen that the revolving mirror is here interposed between the lens and its focus. It was driven by an air turbine, the blast of which was under the control of the observer, so that it could be kept at any required speed. The speed was determined by the vibrations of two tuning forks. One of these was an electric fork, making about 120 vibrations per second, with which the mirror was kept in unison by a system of rays reflected from it and the fork. The speed of this fork was determined by comparison with a freely vibrating fork from time to time. The speed of the revolving mirror was generally about 275 turns per second, and the deflection of the image of the slit about 1 12-5 mm. The mean result of nearly 100 fairly accordant determinations was : —

Velocity of light in air . . . 299,828 km. per sec. Reduction to a vacuum . . +82 Velocity of light in a vacuum . 299,910ˆ50 While this work was in progress Simon Newcomb obtained the official support necessary to make a determination on a yet larger scale. The most important modifications made in the Foucault-Michelson system were the following: — _ Newcomb.

1. Placing the reflector at the much greater distance of several kilometres.

2. In order that the disturbances of the return image due to the passage of the ray through more than 7 km. of air might be re- duced to a minimum, an ordinary telescope of the ” broken back ” form was used to send the ray to the revolving mirror.

3. The speed of the mirror was, as in Michelson’s experiments, completely under control of the observer, so that by drawing one or the other of two cords held in the hand the return image could be kept in any required position. In making each measure the receiving telescope hereafter described was placed in a fixed position and during the ” run ” the image was kept as nearly as practicable upon a vertical thread passing through its focus. A ” run ” generally lasted about two minutes, during which time the mirror commonly made between 25,000 and 30,000 revolutions. The speed per second was found by dividing the entire number of revolutions by the number of seconds in the ” run.” The extreme deviations between the times of transmission of the light, as derived from any two runs, never ap-

proached to the thousandth part of its entire amount. The aver- age deviation from the mean was indeed less than 5-5*5 r> part of the whole.

To avoid the injurious effect of the directly reflected flash, as well as to render unnecessary a comparison between the directions of the outgoing and the return ray. a second telescope, turning hori- zontally on an axis coincident with that of the revolving mirror, was used to receive the return ray after reflection. This required the use of an elongated mirror of which the upper half of the surface reflected the outgoing ray, and the lower other half received and reflected the ray on its return. On this system it was not necessary to incline the mirror in order to avoid the direct reflection of the return ray. The greatest advantage of this system was that the revolving mirror could be turned in either direction without break

Fig. 4.

of continuity, so that the angular measures were made between the directions of the return ray after reflection when the mirror moved in opposite directions. In this way the speed of the mirror was as good as doubled, and the possible constant errors inherent in the reference to a fixed direction for the sending telescope were eliminated. The essentials of the apparatus are shown in fig. 4. The revolving mirror was a rectangular prism M of steel, 3 in. high

and 1 J in. on a side in cross section, which was driven by a blast of air acting on two fan- wheels, not shown in the fig., one at the top, the other at the bottom of the mirror. NPO is the object-end of the fixed sending telescope the rays passing through it being reflected to the mirror by a prism P. The receiving telescope ABO is straight, and has its objective under O. It was attached to a frame which could turn around the same axis as the mirror. The angle through which it moved was measured by a divided arc immediately below its eye-piece, which is not shown in the figure. The position AB is that for receiving the ray during a rotation of the mirror in the anti-clockwise direction; the position A’B’ that for a clockwise rotation.

In these measures the observing station was at Fort Myer, on a hill above the west bank of the Potomac river. The distant re- flector was

first placed in the grounds of the Naval Observatory, at a distance of 2551 metres. But the definitive measures were made with the reflector at the base of the Washington monument, 3721 metres distant. The revolving mirror was of nickel-plated steel, polished on all four vertical sides. Thus four reflections of the ray were received during each turn of the mirror, which would be coincident were the form of the mirror invariable. During the preliminary series of measures it was found that two images of the return ray were sometimes formed, which would result in two different conclusions as to the velocity of light, according as one or the other was observed. The only explanation of this defect which presented itself was a tortional vibration of the revolving mirror, coinciding in period with that of revolution, but it was first thought that the effect was only occasional.

In the summer of 1881 the distant reflector was removed from the Observatory to the Monument station. Six measures made in August and September showed a systematic deviation of +67 km. per second from the result of the Observatory series. This difference led to measures for eliminating the defect from which it was sup- posed to arise. The pivots of the mirror were reground, and a change made in the arrangement, which would permit of the effect of the vibration being determined and eliminated. This consisted in making the relative position of the sending and receiving tele- scopes interchangeable. In this way, if the measured deflection was too great in one position of the telescopes, it would be too small by an equal amount in the reverse position. As a matter of fact, when the definitive measures were made, it was found that with the improved pivots the mean result was the same in the two positions. But the new result differed systematically from both the former ones. Thirteen measures were made from the Monument in the summer of 1882, the results of which will first be stated in the form of the time required by the ray to go and come. Ex- pressed in millionths of a second this was : —

Least result of the 13 measures . . 24-819 Greatest result 24-831

Double distance between mirrors . 7-44242 km. Applying a correction of +12 km. for a slight convexity in the face of the revolving mirror, this gives as the mean result for the speed of light in air, 299,778 km. per second. The mean results for the three series were : —

Observatory, 1880-1881 . V in air = 299,627 Monument, 1881 . . . V ,, =299,694 Monument, 1882 . . . V ,, =299,778 The last result being the only one from which the effect of distortion was completely eliminated, has been adopted as definitive. For reduction to a vacuum

it requires a correction of +82 km. Thus the final result was concluded to be

Velocity 0} light in vacuo = 299,860 km. per second. This result being less by 50 km. than that of Michelson, the latter made another determination with improved apparatus and arrange- ments at the Case School of Applied Science in Cleveland. The result was

Velocity in vacuo = 299,853 km. per second.

So far as could be determined from the discordance of the separate measures, the mean error of Newcomb's result would be less than ±10 km. But making allowance for the various sources of syste- matic error the actual probable error was estimated at =30 km.

It seems remarkable that since these determinations were made, a period during which great improvements have become possible in every part of the apparatus, no complete redetermina- tion of this fundamental physical constant has been carried out.

The experimental measures thus far cited have been primarily those of the velocity of light in air, the reduction to a vacuum being derived from theory alone. The fundamental constant at the basis of the whole theory is the speed of light in a vacuum, such as the celestial spaces. The question of the relation between the velocity in vacuo, and in a transparent medium of any sort," belongs to the domain of physical optics. Referring to the pre- ceding section for the principles at play we shall in the present part of the article confine ourselves to the experimental results. With the theory of the effect of a transparent medium is associated that of the possible differences in the speed of light of different colours.

The question whether the speed of light in vacuo varies with

its wave-length seems to be settled with entire certainty by

observations of variable stars. These are situated at

different distances, some being so far that light must e ? c ˆ

. . . ,. -, ... ana wave'

be several centuries in reaching us from them. Were length.

there any difference in the speed of light of various colours it would be shown by a change in the colour of the star as its light waxed and

waned. The light of greatest speed preceding that of lesser speed would, when emanated during the rising phase, impress its own colour on that which it overtook. The slower light would predominate during the falling phase. If there were a difference of 10 minutes in the time at which light from the two ends of the visible spectrum arrived, it would be shown by this test. As not the slightest effect of the kind has ever been seen, it seems certain that the difference, if any, cannot approximate to T-mro-riro part of the entire speed. The case is different when light passes through a refracting medium. It is a theoretical result of the undulatory theory of light that its velocity in such a medium is inversely proportional to the refractive index of the medium. This being different for different colours, we must expect a corresponding difference in the velocity.

Foucault and Michelson have tested these results of the undulatory theory by comparing the time required for a ray of light to pass through a tube filled with a refracting medium, and through air. Foucault thus found, in a general way, that there actually was a retardation; but his observations took account only of the mean retardation of light of all the wave- lengths, which he found to correspond with the undulatory theory. Michelson went further by determining the retarda- tion of light of various wave-lengths in carbon bisulphide. He made two series of experiments, one with light near the brightest part of the spectrum; the other with red and blue light. Putting V for the speed in a vacuum and Vi for that in the medium, his result was

Yellow light V : Vi = 1-758

Refractive index for yellow . . 1 -64

Difference from theory . . +0-12

The estimated uncertainty was only 0-02, or \ of the difference between observation and theory.

The comparison of red and blue light was made differentially. The colours selected were of wave-length about 0-62 for red and 0-49 for blue. Putting V r and V& for the speeds of red and blue light respectively in bisulphide of carbon, the mean result compares with theory as follows : —

Observed value of the ratio V r , Vb . 1 -0245 Theoretical value (Verdet) . . 1-025

This agreement may be regarded as perfect. It shows that the

divergence of the speed of yellow light in the medium from theory, as found above, holds through the entire spectrum.

The excess of the retardation above that resulting from theory is probably due to a difference between ” wave-speed ” and ” group-speed ” pointed out by Rayleigh. Let fig. 5 repre- sent a short series of progressive undulations of constant period and wave-length. The wave-speed is that required to carry a wave crest A to the position of the crest B in the wave time.

But when a flash of light like that measured passes through a refracting medium, the front waves of the flash are continually dying away, as shown at the end of the figure, and the place of each is taken by the wave following. A familiar case of this sort is seen when a stone is thrown into a pond. The front waves die out one at a time, to be followed by others, each of which goes further than its predecessor, while new waves are formed in the rear. Hence the group, as represented in the figure by the A B

Fig. 5.

larger waves in the middle, moves as a whole more slowly than do the individual waves. When the speed of light is measured the result is not the wave-speed as above defined, but something less, because the result depends on the time of the group passing through the medium. This lower speed is called the group- velocity of light. In a vacuum there is no dying out of the waves, so that the group-speed and the wave-speed are identical. From Michelson’s experiments it would follow that the retarda- tion was about 1/14 of the whole speed. This would indicate that in carbon bisulphide each individual light wave forming the front of a moving ray dies out in a space of about 15 wave- lengths.

Authorities. — For Foucault’s descriptions of his experiments see Comples Rendus (September 22 and November 24, 1862), and Recueil de Travaux Scientifiques de Leon Foucault (2 vols., 4to, Paris, 1878). Cornu’s determination is found in Annates de I’Ob- servatoire de Paris, Memoires, vol. xiii. The works of Michelson and Newcomb are published in extenso in the Astronomical Papers of the American Ephemeris, vols. i. and ii. (S. N.)

LIGHTFOOT, JOHN (1602-1675), English divine and rab- binical

scholar, was the son of Thomas Lightfoot, vicar of Uttoxeter, Staffordshire, and was born at Stoke-upon-Trent on the 29th of March 1602. His education was received at Morton Green near Congleton, Cheshire, and at Christ's College, Cambridge, where he was reckoned the best orator among the undergraduates. After taking his degree he became assistant master at Repton in Derbyshire; after taking orders he was appointed curate of Norton-under-Hales in Shropshire. There he attracted the notice of Sir Rowland Cotton, an amateur Hebraist of some distinction, who made him his domestic chaplain at Bellaport. Shortly after the removal of Sir Rowland to London, Lightfoot, abandoning an intention to go abroad, accepted a charge at Stone in Staffordshire, where he continued for about two years. From Stone he removed to Hornsey, near London, for the sake of reading in the library of Sion College. His first published work, entitled Erubhin, or Miscellanies, Christian and Judaical, penned for recreation at vacant hours, and dedicated to Sir R. Cotton, appeared at London in 1629. In September 1630 he was presented by Sir R. Cotton to the rectory of Ashley in Staffordshire, where he remained until June, 1642, when he went to London, probably to superintend the publication of his next work, A Few and New Observations upon the Book of Genesis: the most of them certain; the rest, probable; all, harmless, strange and rarely heard of before, which appeared at London in that year. Soon after his arrival in London he became minister of St Bartholomew's church, near the Exchange; and in 1643 he was appointed to preach the sermon before the House of Commons on occasion of the public fast of the 29th of March. It was published under the title of Elias Redivivus, the text being Luke i. 17; in it a parallel is drawn between the Baptist's ministry and the work of reforma- tion which in the preacher's judgment was incumbent on the parliament of his own day.

Lightfoot was also one of the original members of the West- minster Assembly; his " Journal of the Proceedings of the Assembly of Divines from January 1, 1643 to December 31, 1644," now printed in the thirteenth volume of the 8vo edition of his Works, is a valuable historical source for the brief period to which it relates. He was assiduous in his attendance, and, though frequently standing almost or quite alone, especially

in the Erastian controversy, he exercised a material influence on the result of the discussions of the Assembly. In 1643 Light- foot published A Handful of Gleanings out of the Book of Exodus, and in the same year he was made master of Catharine Hall by the parliamentary visitors of Cambridge, and also, on the recommendation of the Assembly, was promoted to the rectory of Much Munden in Hertfordshire; both appointments he re- tained until his death. In

1644 was published in London the first instalment of the laborious but never completed work of which the full title runs The Harmony of the Four Evangelists among themselves, and with the Old Testament, with an explanation of the chiefest difficulties both in Language and Sense: Part I. From the beginning of the Gospels to the Baptism of our Saviour. The second part From the Baptism of our Saviour to the first Passover after followed in 1647, and the third From the first Passover after our Saviour's Baptism to the second in 1650. On the 26th of August 1645 he again preached before the House of Commons on the day of their monthly fast. His text was Rev. xx. 1, 2. After controverting the doctrine of the Millen- aries, he urged various practical suggestions for the repression with a strong hand of current blasphemies, for a thorough revision of the authorized version of the Scriptures, for the encouragement of a learned ministry, and for a # speedy settle- ment of the church. In the same year appeared A Commentary upon the Acts of the Apostles, chronical and critical; the Diffi- culties of the text explained, and the times of the Story cast into annals. From the beginning of the Book to the end of the Twelfth Chapter. With a brief survey of the contemporary Story of the Jews and Romans (down to the third year of Claudius). In 1647 he published The Harmony, Chronicle, and Order of the Old Testament, which was followed in 1655 by The Harmony, Chronicle, and Order of the New Testament, inscribed to Crom- well. In 1654 Lightfoot had been chosen vice-chancellor of the university of Cambridge, but continued to reside by preference at Munden, in the rectory of which, as well as in the mastership of Catharine Hall, he was confirmed at the Restoration. The remainder of his life was devoted to helping Brian Walton with the Polyglot Bible (1657) and to his own best-known work, the Horae Hebraicae et Talmudicae, in which the volume relating to Matthew appeared in 1658, that relating to Mark in 1663, and those relating to 1 Corinthians, John and Luke, in 1664, 1671 and 1674 respectively. While travelling from Cambridge to Ely where he had been collated in 1668 by Sir Orlando Bridgman to a prebendal stall), he caught a severe cold, and died at Ely on the 6th of December 1675. The Horae Hebraicae et Talmudicae impensae in Acta Apostolorum et in Ep. S. Pauli ad Romanos were published posthumously.

The Works of Lightfoot were first edited, in 2 vols, fol., by G. Bright and Strype in 1684; the Opera Omnia, cura Joh. Texelii, appeared at Rotterdam in 1686 (2 vols, fol.), and again, edited by J. Leusden, at Franeker in 1699 (3 vols. fol.). A volume of Remains was published at London in 1700. The Hor. Hebr. et Taint, were also edited in Latin by Carpzov (Leipzig, 1675-1679), and again, in English, by Gandell

(Oxford, 1859). The most complete edition is that of the Whole Works, in 13 vols. 8vo, edited, with a life, by R. Pitman (London, 1822-1825). It includes, besides the works already noticed, numerous sermons, letters and miscellaneous writings; and also The Temple, especially as it stood in the Days of our Saviour (London, 1650).

See D. M. Welton, John Lightfoot, the Hebraist (Leipzig, 1878).

LIGHTFOOT, JOSEPH BARBER (1828-1889), English theologian and bishop of Durham, was born at Liverpool on the 13th of April 1828. His father was a Liverpool accountant. He was educated at King Edward's school, Birmingham, under James Prince Lee, afterwards bishop of Manchester, and had as contemporaries B. F. Westcott and E. W. Benson. In 1847 Lightfoot went up to Trinity College, Cambridge, and there read for his degree with Westcott. He graduated senior classic and 30th wrangler, and was elected a fellow of his college. From 1854 to 1859 he edited the Journal of Classical and Sacred Philology. In 1857 he became tutor and his fame as a scholar grew rapidly. He was made Hulsean professor in 1861, and shortly afterwards chaplain to the Prince Consort and honorary chaplain in ordinary to the queen. In 1866 he was Whitehall

preacher, and in 1871 he became canon of St Paul's. His sermons were not remarkable for eloquence, but a certain solidity and balance of judgment, an absence of partisanship, a sobriety of expression combined with clearness and force of diction, attracted hearers and inspired them with confidence. As was written of him in The Times after his death, " his personal character carried immense weight, but his great position depended still more on the universally recognized fact that his belief in Christian truth and his defence of it were supported by learning as solid and comprehensive as could be found anywhere in Europe, and by a temper not only of the utmost candour but of the highest scientific capacity. The days in which his university influence was asserted were a time of much shaking of old beliefs. The disintegrating speculations of an influential school of criticism in Germany were making their way among English men of culture just about the time, as is usually the case, when the tide was turning against them in their own country. The peculiar service which was rendered at this juncture by the ' Cambridge School ' was that, instead of opposing a mere dogmatic opposition to the Tubingen critics, they met them frankly on their own ground; and instead of arguing that

their conclusions ought not to be and could not be true, they simply proved that their facts and their premisses were wrong. It was a characteristic of equal importance that Dr Lightfoot, like Dr Westcott, never discussed these subjects in the mere spirit of controversy. It was always patent that what he was chiefly concerned with was the substance and the life of Christian truth, and that his whole energies were employed in this inquiry because his whole heart was engaged in the truths and facts which were at stake. He was not diverted by controversy to side-issues; and his labour was devoted to the positive elucida- tion of the sacred documents in which the Christian truth is enshrined."

In 1872 the anonymous publication of Supernatural Religion created considerable sensation. In a series of masterly papers in the Contemporary Review, between December 1874 and May 1877, Lightfoot successfully undertook the defence of the New Testament canon. The articles were published in collected form in 1889. About the same time he was engaged in contribu- tions to W. Smith's Dictionary of Christian Biography and Dictionary of the Bible, and he also joined the committee for revising the translation of the New Testament. In 1875 he became Lady Margaret professor of divinity in succession to William Selwyn. He had previously written his commentaries on the epistles to the Galatians (1865), Philippians (1868) and Colossians (1875), the notes to which were distinguished by sound judgment and enriched from his large store of patristic and classical learning. These commentaries may be described as to a certain extent a new departure in New Testament exegesis. Before Lightfoot's time commentaries, especially on the epistles, had not infrequently consisted either of short homilies on particular portions of the text, or of endeavours to enforce foregone conclusions, or of attempts to decide with infinite industry and ingenuity between the interpretations of former commentators. Lightfoot, on the contrary, endeavoured to make his author interpret himself, and by considering the general drift of his argument to discover his meaning where it appeared doubtful. Thus he was able often to recover the meaning of a passage which had long been buried under a heap of contradictory glosses, and he founded a school in which sobriety and common sense were added to the industry and ingenuity of former com- mentators. In 1879 Lightfoot was consecrated bishop of Durham in succession to C. Baring. His moderation, good sense, wisdom, temper, firmness and erudition made him as successful in this position as he had been when professor of theology, and he speedily surrounded himself with a band of scholarly young men. He endeavoured to combine his habits of theological study with the practical work of administration. He

exercised a large liberality and did much to further the work of temperance and purity organizations. He continued to work at his editions of the Apostolic Fathers, and in 1885 pub- lished an edition of the Epistles of Ignatius and Polycarp,

collecting also a large store of valuable materials for a second edition of Clement of Rome, which was published after his death (1st ed., 1869). His defence of the authenticity of the Epistles of Ignatius is one of the most important contributions to that very difficult controversy. His unremitting labours impaired his health and shortened his splendid career at Durham. He was never married. He died at Bournemouth on the 21st of December 1889, and was succeeded in the episcopate by Westcott, his schoolfellow and lifelong friend.

Four volumes of his Sermons were published in 1890.

LIGHTHOUSE, a form of building erected to carry a light for the purpose of warning or guidance, especially at sea.

1. Early History. — The earliest lighthouses, of which records, exist, were the towers built by the Libyans and Cushites in Lower Egypt, beacon fires being maintained in some of them by the priests. Lesches, a Greek poet (c. 660 B.C.) mentions a lighthouse at Sigeum (now Cape Incihisari) in the Troad. This appears to have been the first light regularly maintained for the guidance of mariners. The famous Pharos 1 of Alexandria, built by Sostratus of Cnidus in the reign of Ptolemy II. (283-247 B.C.) was regarded as one of the wonders of the world. The tower, which took its name from that of the small island on which it was built, is said to have been 600 ft. in height, but the evidence in support of this statement is doubtful. It was destroyed by an earthquake in the 13th century, but remains are said to have been visible as late as 1350. The name Pharos became the general term for all lighthouses, and the term ” pharology ” has been used for the science of lighthouse construction.

The tower at Ostia was built by the emperor Claudius (a.d. 50). Other famous Roman lighthouses were those at Ravenna, Pozzuoli and Messina. The ancient Pharos at Dover and that at Boulogne, later known as la Tour d’Ordre, were built by the Romans and were probably the earliest lighthouses erected in western Europe. Both are now demolished.

The light of Cordouan, on a rock in the sea at the mouth of the Gironde, is the earliest example now existing of a wave- swept tower. Earlier towers on the same rock are attributed the first to Louis le

Debonnaire (c. a.d. 805) and the second to Edward the Black Prince. The existing structure was begun in 1584 during the reign of Henri II. of France and completed in 1611. The upper part of the beautiful Renaissance building was removed towards the end of the 18th century and replaced by a loftier cylindrical structure rising to a height of 207 ft. above the rock and with the focal plane of the light 196 ft. above high water (fig. 1). Until the 18th century the light exhibited from the tower was from an oak log fire, and subsequently a coal fire was in use for many years. The ancient tower at Corunna, known as the Pillar of Hercules, is supposed to have been a Roman Pharos. The Torre del Capo at Genoa originally stood on the promontory of San Berrique. It was built in n 39 and first used as a lighthouse in 1326. It was rebuilt on its present site in 1643. This beautiful tower rises 236 ft. above the cliff, the light being elevated 384 ft. above sea-level. A lens light was first installed in 1841. The Pharos of Meloria was constructed by the Pisans in 1154 and was several times rebuilt until finally destroyed in 1290. On the abandonment of Meloria by the Pisans, they erected the still existing tower at Leghorn in 1304.

In the 17th and 18th centuries numerous towers, on which were erected braziers or grates containing wood or coal fires, were established in various positions on the coasts of Europe. Among such stations in the United Kingdom were Tynemouth (c. 1608), the Isle of May (1636), .St Agnes (1680), St Bees (1718) and the Lizard (17 51). The oldest lighthouse in the United States is believed to be the Boston light situated on Little Brewster Island on the south side of the main entrance to Boston Harbour, Mass. It was established in 1716, the present structure dating from 1859. During the American War of Independence the lighthouse suffered many vicissitudes and was successively destroyed and rebuilt three times by the American or British

1 A full account is given in Hermann Thiersch, Pharos Antike, Islam und Occident (1909). See also Minaret.

/‘orces. At the third rebuilding in 1783 a stone tower 68 ft. in height was erected, the illuminant consisting of four oil lamps. Other early lighthouse structures on the New England coast were those at Beaver

Tail, near the entrance to Newport Harbour (1740), and the Brant at the entrance to Nantucket Harbour (1 7 54) . A watch-house and beacon appear to have been erected on Beacon or Lighthouse Island as well as on Point Allerton Hill near Boston, prior to 1673, but these structures would seem to have been in the nature of look-out stations in time of war rather than lighthouses for the guidance of mariners.

2. Lighthouse Structures. — The structures of lighthouses may be divided into two classes, (a) those on rocks, shoals or in other situations exposed to the force of the sea, and (b) the more numerous class of land structures.

Wave-swept Towers. — In determining the design of a lighthouse tower to be erected in a wave-swept position consideration must

“■7

Fig. 1. — Cordouan Lighthouse.

be given to the physical features of the site and its surroundings. Towers of this description are classified as follows: (1) Masonry and concrete structures; (2) Openwork steel and iron-framed erections on pile or other foundations; (3) Cast iron plated towers; (4) Structures erected’ on cylinder foundations.

(1) Masonry Towers. — Masonry or concrete towers are generally preferred for erection on wave-swept rocks affording good foundation, and have also been constructed in other situations where adequate foundations have been made by sinking caissons into a soft sea bed. Smeaton’s tower on the Eddystone Rock is the model upon which most later designs of masonry towers have been based, although many improvements in detail have since been made. In situations of great exposure the following requirements in design should be observed: (a) The centre of gravity of the tower structure should be as low as possible. (b) The mass of the structure superimposed at any horizontal section must be sufficient to prevent its displacement by the combined forces of wind and waves without dependence on the adhesion at horizontal joint faces or on the dovetailing of stones introduced as an additional safeguard, (c) The structure should be circular in plan throughout, this form affording the least resistance to wave stroke and wind pressure in any direction.

(d) The lower portion of the tower exposed to the direct horizontal stroke of the waves should, for preference, be constructed with vertical face. The upper portion to be either straight with uniform

batter or continuously curved in the vertical plane. External projections from the face of the tower, except in the case of a gallery under the lantern, should be avoided, the surface throughout being smooth, (e) The height from sea-level to the top of the tower should be sufficient to avoid the obscuration of the light by broken water or dense spray driving over the lantern. (/) The foundation of the tower should be carried well into the solid rock, (g) The materials of which the tower is built should be of high density and of resistant nature, (h) The stones used in the construction of the tower, at any rate those on the outer face, should be dovetailed or joggled one to the other in order to prevent their being dislodged by the sea during the process of construction and as an additional safe- guard of stability. Of late years, cement concrete has been used to a considerable extent for maritime structures, including lighthouses, either alone or faced with masonry.

(2) Openwork Structures. — Many examples of openwork steel and iron lighthouses exist. Some typical examples are described hereafter. This form of design is suitable for situations where the tower has to be carried on a foundation of iron or steel piles driven or screwed into an insecure or sandy bottom, such as on shoals, coral reefs and sand banks or in places where other materials of construction are exceptionally costly and where facility of erection is a desideratum.

(3) Cast iron Towers. — Cast iron plated towers have been erected in many situations where the cost of stone or scarcity of labour would have made the erection of a masonry tower excessively expensive.

(4) Caisson Foundations. — Cylinder or caisson foundations have been used for lighthouse towers in numerous cases where such structures have been erected on sand banks or shoals. A remarkable instance is the Rothersand Tower. Two attempts have been made to sink a caisson in the outer Diamond Shoal off Cape Hatteras on the Atlantic coast of the United States, but these have proved futile.

The following are brief descriptions of the more important wave-swept towers in various parts of the world.

Eddystone {Winstanley' s Tower). — The Eddystone rocks, which lie about 14 m. off Plymouth, are fully exposed to south-west seas. The reef is submerged at high water of spring tides. Four towers have been constructed on the reef. The first lighthouse (fig. 2 was polygonal in plan and highly ornamented with galleries and pro- jections which offered considerable resistance to the sea stroke. The work was begun by Henry Winstanley, a gentleman of Essex, in 1695. In 1698 it was finished to a height of 80 ft. to the wind vane and the light exhibited,

but in the following year, in con- sequence of damage by storms, the tower was increased in diameter from 16 ft. to 24 ft. by the addition of an outer ring of masonry and made solid to a height of 20 ft. above the rock, the tower being raised to nearly 120 ft. The work was completed in the year 1700. The lower part of the structure appears to have been of stone, the upper part and lantern of timber. During the great storm of the 20th of November 1703 the tower was swept away, those in it at the time, including the builder, being drowned.

Eddystone (Rudyerd's Tower, fig. 3). — This structure was begun in 1706 and completed in 1709. It was a frustum of a cone 22 ft. 8 in. in diameter at the base and 14 ft. 3 in. at the top. The tower was 92 ft. in height to the top of the lantern. The work consisted principally of oak timbers securely bolted and cramped together, the lower part being filled in solid with stone to add weight to the structure. The simplicity of the design and the absence of pro- jections from the outer face rendered the tower very suitable to withstand the onslaught of the waves. The lighthouse was de- stroyed by fire in 1755.

Eddystone (Smeaton's Tower, fig. 4). — This famous work, which consisted entirely of stone, was begun in 1756, the light being first exhibited in 1759. John Smeaton was the first engineer to use dovetailed joints for the stones in a lighthouse structure. The stones, which averaged 1 ton in weight, were fastened to each other by means of dovetailed vertical joint faces, oak key wedges, and by oak tree-nails wedged top and bottom, extending vertically from every course into the stones beneath it. During the 19th century the tower was strengthened on two occasions by the addition of heavy wrought iron ties, and the overhanging cornice was reduced in diameter to prevent the waves from lifting the stones from their beds. In 1877, owing partly to the undermining of the rock on which the tower was built and the insufficient height of the structure,

the Corporation of Trinity House determined on the erection of a new lighthouse in place of Smeaton's tower

Eddystone, New Lighthouse (J. N. Douglass).- The site selected for the new tower is 120 ft. S.S.E. from Smeaton's lighthouse, where a suitable foundation was found, although a considerable section of the lower courses had to be laid below the level of low water 1 he vertical base is 44 ft. in diameter and 22 ft. in height The tower (figs. 5 and 6)

is a concave elliptic frustum, and is solid, with the exception of a fresh-water tank, to a height of 25 ft. 6 in above high-water level. The walls above this level va?y in thickness trom 8 ft. 6 in. to 2 ft. 3 in. under the gallery. All the stones are

Fig. 3. Fig. 4.

Lighthouses on the Eddystone.

dovetailed, both horizontally and vertically, on all joint faces, the stones of the foundation course being secured to the rock by Muntz metal bolts. The tower contains 62,133 cub. ft. of granite, weighing 4668 tons. The height of the structure from low water ordinary spring tides to the mean focal plane is 149 ft. and it stands 133 ft above high water. The lantern is a cylindrical helically framed structure with domed roof. The astragals are of gunmetal and the pedestal of cast iron. The optical apparatus consists of two super- posed tiers of refracting lens panels, 12 in each tier of 920 mm. focal distance. The lenses subtend an angle of 92 ° vertically. The 12 lens panels are arranged in groups of two, thus producing a group

Fig. 6. — Plan of Entrance Floor, Eddystone Lighthouse.

flashing light showing 2 flashes of i| seconds' duration every half minute the apparatus revolving once in 3 minutes. The burners originally fitted in the apparatus were of 6-wick pattern, but these were replaced in 1904 by incandescent oil vapour burners. The intensity of the combined beam of light from the two apparatus is 292,000 candles. At the time of the completion of the lighthouse two bells, weighing 2 tons each and struck by mechanical power, were installed for fog-signalling purposes. Since that date an

explosive gun-cotton fog signal has been erected, the bells being removed. At a lower level in the tower are installed 2 21-in. para- bolic silvered reflectors with 2-wick burners, throwing a fixed light of 8000 candle-power over a danger known as the Hand Deeps. The work of pre- paring the foundation was begun on the 17th of July 1878, the foundation stone /ocomon. being laid by the late duke of Edinburgh ' on the 19th of August 1879. The last stone was laid on the 1st of June 1881, and the light was exhibited for the first time on the 18th of May 1882. The upper portion of Smeaton's tower, which was removed on completion of the new light- house, was re-erected on Plymouth Hoe, where it replaced the old Trinity House sea mark. One

of the principal features in the design of the new Eddystone lighthouse tower is the solid vertical base. This construction was much criticized at the time, but experience has proved that heavy seas striking the massive cylindrical structure are immedi- ately broken up and rush round to the opposite side, spray alone ascending to the height of the lantern gallery. On the other hand, the waves striking the old tower at its foundation ran up the surface, which presented a curved face to the waves, and, unimpeded by any projection until arriving at the lantern gallery, were partially broken up by the cornice and My-_, then spent themselves in heavy spray ˆ ” over the_ lantern. The shock to which the cornice of the gallery was exposed was so great that stones were sometimes lifted from their beds. The new Eddy stone tower presents another point of . ., ˆ A , , dissimilarity from Smeaton’s structure,

in that the stones forming the floors consist of single corbels built into the wall and constituting solid portions thereof. In Smeaton’s tower the floors consisted of stone arches, the thrust being taken by the walls of the tower itself, which were strengthened for the

JSO,

Sir J.N. Douglass t88a

Fig. 5.

rp.

m

1

ifr

Fig. 7. — Floor, Smeaton’s Eddystone Lighthouse.’

purpose by building in chains in the form of hoops (fig. 7) The system of constructing corbelled stone floors was first adopted by R. Stevenson in the Bell Rock lighthouse (fig 8)

Bell Rock Lighthouse (fig. 9).— The Bell Rock, which lies 12 m. off the coast of Forfarshire, is exposed to a considerable extent at low water. The tower is submerged to a depth of about 16 ft at high water of spring tides. The rock is of hard sandstone The lighthouse was constructed by Robert Stevenson and is 100 ft in height, the solid portion being carried to a height of 21 ft. above highwater The work

of construction was begun in 1807, and finished in 1810, the light being first exhibited in 181 1. The total weight of the tower is 2076 tons. A new lantern and dioptric apparatus were erected on the tower in 1902. The focal plane of the light is elevated 93 ft. above high water

Skerryvore Lighthouse (fig. 10).— The Skerryvore Rocks, 12 m. off the island of 1 yree in Argyllshire, are wholly open to the Atlantic I he work, designed by Alan Stevenson, was begun in 1838 and finished in 1844 The tower, the pro file of which is a hyperbolic curve, is 138 ft. high to the lantern base, 42 ft

Fig. 8.

-Floor, Stevenson's Bell Rock Lighthouse.

diameter at the base, and 16 ft. at the top. Its weight is 4308 tons. The structure contains 9 rooms in addition to the lantern chamber It is solid to a height of 26 ft. above the base.

Heaux de Brehat Lighthouse. — The reef on which this tower is constructed lies off the coast of Brittany, and is submerged at high tide. The work was carried out in 1 836-1 839. The tower is circular in plan with a gallery at a height of about 70 ft. above the base. The tower is 1 56 ft ; in height from base to lantern floor.

Haut Banc du Nord Lighthouse. — This tower is placed on a reef at the north-west extremity of the lie de Re, and was constructed in 1849-1853. It is 86 ft. in height to the lantern floor.

Bishop Rock Lighthouse— The lighthouse on the Bishop Rock, which is the westernmost landfall rock of the Scilly Islands, occupies perhaps a more exposed situation than any other in the world

The first lighthouse erected there was begun in 1847 under the direction of N. Douglass. The tower consisted of a cast and wrought iron openwork structure having the columns deeply sunk into the rock. On the 5th of February 1850, when the tower was ready for the erection of the lantern and illuminating apparatus, a heavy storm swept away the whole of the structure. This tower was de- signed for

an elevation of 94 ft. to the focal plane. In 1851 the

UStevenson i8o6

1 ■ — 1 1 1 1 1 1

Fig. 9.— Bell Rock. Fig. 10— Skerryvore. Fig. 11.— Bishop Rock

erection of a granite tower, from the designs of James Walker, was begun; the light was first exhibited in 1858. The tower (fig. 11) had an elevation to the focal plane of no ft., the lower 14 courses being arranged in steps, or offsets, to break up the force of the waves. This structure also proved insufficient to withstand the very heavy seas to which it was exposed. Soon after its completion the 5-cwt. fog bell, fixed to the lantern gallery 100 ft. above high-water mark was washed away, together with the flagstaff and ladder. The tower vibrated considerably during storms, and it was found that some of the external blocks of granite had been split by the excessive stress to which they had been exposed. In 1874 the tower was strengthened by bolting continuous iron ties to the internal surfaces of the walls. In 1881, when further signs of damage appeared, it was determined to remove the upper storey or service room of the lighthouse, and to case the structure from its base upwards with granite blocks securely dovetailed to each other and to the existing work. At the same time it was considered advisable to increase the elevation of the light, and place the mean focal plane of the new apparatus at an elevation of 146 ft. above high-water mark. The work was begun in 1883, and the new apparatus was first illuminated on the 25th of October 1887. During the operation of heightening the tower it was necessary to install a temporary light, consisting of a cylindrical lightship lantern with catoptric apparatus; this was raised from time to time in advance of the structure as the work proceeded. The additional masonry built into the tower amounts approximately to 3220 tons. Profiting by the experience gained after the construction of the new Eddystone tower, Sir J. N. Douglass decided to build the lower portion of the improved Bishop Rock tower in the form of a cylinder, but with considerably increased elevation (figs. 12 and 13). The cylindrical base is 40 ft. in diameter and rises to 25 ft. above high-water mark. The lantern is cylindrical and helically framed, 14 ft. in diameter, the glazing being 15 ft. in height. The optical apparatus consists of two superposed tiers of lenses of 1330 mm. focal distance, the lenses subtending a horizontal angle of 36 and a vertical angle of 80°. The apparatus consists of 5 groups of lenses each group producing a double flashing light of one minute period, the whole apparatus revolving once in five minutes The maximum aggregate candle-power of the flash is 622,000

candles A gu n-cotton explosive fog signal is attached to the lantern. The cost of the various lighthouses on the Bishop Rock has been as follows:

1. Cast iron lighthouse £12,500 o o

2. Granite lighthouse ….'. 34,559 18 9

3. Improved granite lighthouse . . . 64,889 o o

The Smalls Lighthouse.— -A lighthouse has existed on the Smalls rock, 18 J m. off Milford Haven, since 1776, when an oak pile structure was erected by Henry Whiteside. The existing structure, after the model of the second lighthouse on the Bishop Rock, was erected in

1856-1861 by the Trinity House and is 114 ft. in height from the foundation to the lantern floor. A new optical apparatus was in- stalled in 1907.

Minot's Ledge Lighthouse. — The tower, which is 89 ft. in height, is built of granite upon a reef off Boston Harbor, Mass., and occupied five years in construction, being completed in i860 at a cost of £62,500 The rock just bares at low water. The stones are dovetailed verti- cally but not on their horizontal beds in the case of the lower 40 ft. or solid portion of the tower, bonding bolts being substituted for the horizontal dovetailed joints used in the case of the Wolf and other English towers. The shape of the tower is a conical frustum.

Wolf Rock Lighthouse. — This much exposed rock lies midway between the Scilly Isles and the Lizard Point, and is submerged to the depth of about 6 ft. at high water. The tower was erected in 1862-1869 (fig. 14). It is 1 16 ft. 6 in. high 41 ft. 8 in. diameter at the base, decreas- ing to 17 ft. at the top. The walls are 7 ft. 9i in. thick, decreasing to 2 ft. 3 in. The shaft is a concave elliptic frustum, and contains 3296 tons. The lower part of the tower has projecting scarcements in order to break up the sea.

Dhu Heartach Rock Lighthouse. — The Dhu Heartach Rock, 35 ft. above high water, is 14 m. from the island of Mull, which is the nearest shore. The maxi- mum diameter of the tower (fig. 15), which is of parabolic outline, is 36 ft., decreas- ing to 16 ft.; the shaft is solid for 32 ft. above the rock; the masonry weighs 31 15 tons, of which 1810 are contained in the solid part. This tower occupied six years in erection, and was completed ?? in 1872.

Great Basses Lighthouse, Ceylon. — The . Fig. 12. — Bishop Rock.

Great Basses lighthouse lies 6 m. from the nearest land. The cylindrical base is 32 ft. in diameter, above which is a tower 67 ft. 5 in. high and 23 ft. in diameter. The walls vary in thickness from 5 ft. to 2 ft. The tower, including the base, contains about 2768 tons. The work was finished in three years, 1870-1873.

Spectacle Reef Lighthouse, Lake Huron. — This is a structure similar to that on Minot's ledge, standing on a limestone reef at the northern end of the lake. The tower (fig. 16) was constructed with a view to withstanding the effects of ice massing in solid fields thousands of acres in extent and travelling at considerable velocity. The tower is in shape the frustum of a cone, 32 ft. in diameter at the base and 93 ft. in height to the coping of the gallery. The focal plane is at a level of 97 ft. above the base. The lower 34 ft. of the tower is solid. The work was completed in 1874, having occupied four years. The cost amounted to approximately £78,000.

Chicken Rock Lighthouse. — The Chicken Rock lies 1 m. off the Calf of Man. The curve of the tower, which is 123 ft. 4 in. high, is hyperbolic, the diameter varying from 42 ft. to 16 ft. The tower is submerged 5 ft. at high-water springs. The solid part is 32 ft. 6 in. in height, weighing 2050 tons, the whole weight of the tower being 3557 tons. The walls decrease from 9 ft. 3 in. to 2 ft. 3 in. in thickness. The work was begun in 1869 and completed in 1874.

Ar'men Lighthouse. — The masonry tower, erected by the French Lighthouse Service, on the Ar'men Rock off the western extremity of the lie de Sein, Finistere, occupied fifteen years in construction (1867-1881). The rock is of small area, barely uncovered at low water, and it was therefore found impossible to construct a tower having a base diameter greater than 24 ft. The focal plane of the light is 94 ft. above high water (fig. 17).

St George's Reef Lighthouse, California. — This structure consists of a square pyramidal stone tower rising from the easterly end of an oval masonry pier, built on a rock to a height of 60 ft. above the water. The focal plane is at an elevation of 146 ft. above high water. The site is an exceedingly dangerous one, and ,the work, which was completed in 1891, cost approximately £144,000.

Rattray Head Lighthouse. — This lighthouse was constructed between the years 1892 and 1895 by the Northern Lighthouse Com- missioners upon the Ron Rock, lying about one-fifth of a mile off Rattray Head, Aberdeenshire. The focal plane is 91 ft. above high water, the building being approximately 113 ft. in height. In the tower there is a fog-horn

worked by compressed air.

Fastnet Lighthouse. — In the year 1895 it was reported to the Irish Lights Commissioners that the then existing lighthouse on the Fastnet Rock off the south-west coast of Ireland, which was completed in 1854 and consisted of a circular cast iron tower 86 ft. in height on the summit of the rock, was considerably undermined. It was subsequently determined to proceed with the erection of a granite structure of increased height and founded upon a sound ledge of rock on one side of the higher, but now considerably undermined.

siftviec room

Fig. 13. — Bishop Rock Lighthouse.

portion of the reef. This lighthouse tower has its foundation laid near high-water level. The focal plane is at a level of 158 ft. above high-water mark. The cost of the structure, which was commenced in 1899 and completed in 1904, was £79,000.

Beachy Head Lighthouse. — A lighthouse has been erected upon the foreshore at the foot of Beachy Head, near Eastbourne, to replace the old structure on the cliff having an elevation of 284 ft. above high-water mark. Experience proved that the light of the latter was frequently obscured by banks of mist or fog, while at the lower level the transparency of the atmosphere was considerably less impaired. The Trinity House therefore decided in the year 1899 to proceed with the construction of a granite tower upon the foreshore at a distance of some 570 ft. from the base of the cliff (fig. 18). The foreshore at this point consists of chalk, and the selected site just bares at low water ordinary spring tides. The foundation course was laid at a depth of 10 ft. below the surface, the area being excavated within a coffer-dam. The tower, which is 47 ft. in diameter at the base, has an elevation to the focal plane above high water of 103 ft., or a total height from foundation course to gallery coping of 123 ft. 6 in. The lower or solid portion of the tower has its Face stones constructed in vertical offsets or steps in a similar manner to that adopted at the Wolf Rock and elsewhere. The tower is constructed with a facing of granite, all the stones being dovetailed in the usual manner. The hearting of the base is largely composed of concrete. The work was completed in 1902 and

cost £56,000.

Maplin Lighthouse. — The screw pile lighthouse erected on the Maplin Sand in the estuary of the river Thames in 1 838 is the earliest of its kind and served as a model for numerous similar structures in various parts of the world. The piles are nine in number, 5 in. diameter of solid wrought iron with screws 4 ft. diameter (fig. 19).

Fowey Rocks Lighthouse, Florida. — This iron structure, which was begun in 1875 and completed in 1878, stands on the extreme northern point of the Florida reefs. The height of the tower, which is founded on wrought iron piles driven 10 ft. into the coral rock, is no ft. from high water to focal plane. The iron openwork pyramidal structure encloses a plated iron dwelling for the accommodation of the keepers. The cost of construction amounted to £32,600

Alligator Reef Lighthouse, Florida. — This tower is one of the finest iron sea-swept lighthouse structures in the world. It consists of a pyramidal iron framework 135 ft. 6 in. in height, standing on the Florida Reef in 5 ft. of water. The cost of the structure, which is similar to the Fowey Rocks tower, was £37,000.

American Shoal Lighthouse, Florida. — This tower (fig. 20) is typical of the openwork pile structures on the Florida reefs, and was completed in 1880. The focal plane of the light is at an elevation of 109 ft. above high water.

Wolf Trap Lighthouse. — This building was erected during the years 1893 and 1894 on Wolf Trap Spit in Chesapeake Bay, near the site of the old openwork structure which was swept away by ice early in 1893. The new tower is formed upon a cast iron caisson 30 ft. in diameter sunk 18 ft. into the sandy bottom. The depth of water on the shoal is 16 ft. at low water. The caisson was filled with concrete, and is surmounted by a brick superstructure 52 ft. in height from low water to the focal plane of the light. A somewhat similar structure was erected in 1885-1887 on the Fourteen Foot Bank in Delaware Bay, at a cost of £24,700. The foundation in this case was, however, shifting sand, and the caisson was carried to a greater depth.

Rothersand Lighthouse. — This lighthouse, off the entrance to the river Weser (Germany), is a structure of great interest on account of the difficulties met with in its construction. The tower had to be founded on a bottom of shifting sand 20 ft. below low water and in a very exposed situation. Work was begun in May 1881, when attempts were made to sink an iron caisson under pneumatic pressure. Owing

to the enormous scour removing the sand from one side of the caisson it tilted to an alarming angle, but eventually it was sunk to a level of 70 ft. below low-water mark. In October of the same year the whole structure collapsed. Another attempt, made in May 1883, to sink a caisson of bi-convex shape in plan 47 ft. long, 37 ft. wide and 62 ft. in height, met with success, and after many difficulties the structure was sunk to a depth of 73 ft. below low water, the sides being raised by the addition of iron plating as the caisson sank. The sand was removed from the interior by suction. Around the caisson foundation were placed 74,000 cub. yds. of mattress work and stones, the interior being filled with concrete. Towards the end of 1885 the lighthouse was completed, at a total cost, including the first attempt, of over £65,000. The tower is an iron structure in the shape of a concave elliptic frustum, its base being founded upon the caisson foundation at about half-tide level (fig. 21). The light is electric, the current being supplied by cable from the shore. The focal plane is 78 ft. above high water or 109 ft. from the sand level. The total height from the foundation of the caisson to the top of the vane is” 185 ft.

Other famous wave-swept towers are those at Haulbowline Rock (Carlingford Lough, Ireland, 1823); Horsburgh (Singapore, 1851); Bayes d’Olonne (Bay of Biscay, 1861); Hanois (Alderney, 1862); Daedalus Reef, iron tower (Red Sea, 1863); Alguada Reef (Bay of Bengal, 1865) ; Longships (Land’s End, 1872) ; the Prongs (Bombay, 1874); Little Basses (Ceylon, 1878); the Graves (Boston, U.S.A.,

James Walker 186a J. N.Douglass

Fig. 14. — Wolf Rock.

O.-M.Poe 1874

Fig. 15.—

50* 60 70

90 100 Feet

Dhu Heartach. Fig. 16. — Spectacle Reef. Fig. 17. — Ar’men.

Fig. 18. — Beachy Head.

‘9°5); Jument d’Ouessant (France, 1907); and Roche Bonne (France, building 1910).

Jointing of Stones in Rock Towers. — Various methods of jointing the stones in rock towers are shown in figs. 6 and 22. The great distinction between the towers built by successive engineers to the Trinity House and other rock lighthouses is that, in the former the stones of each course are dovetailed together both laterally and vertically and are not connected by metal or wooden pins and wedges and dowled as in most other cases. This dove- tail method was first adopted at the Hanois Rock at the sugges- tion of Nicholas Douglass. On the upper face, one side and at one end of each block is a dovetailed projection. On the under face and the other side and end, corresponding dovetailed

effect of waves on the Bishop Rock and Eddystone towers has been noted above.

Land Structures for Lighthouses. — The erection of lighthouse towers and other buildings on land presents no difficulties of construction, and such buildings are of ordinary architectural character. It will therefore be unnecessary to refer to them in detail. Attention is directed to the Phare d’Eckmuhl at Penmarc’h (Finistere), completed in 1897. The cost of this magnificent structure, 207 ft. in height from the ground, was largely defrayed by a bequest of £12,000 left by the marquis de Blocqueville. It is constructed entirely of granite, and is octagonal in plan. The total cost of the tower and other light- house buildings amounted to £16,000.

Table I. — Comparative Cost of Exposed Rock Towers.

Cost per

Name of Structure.

Total Cost.

Cub. ft.

cub. ft, of

Masonry.

Eddvstone, Smeaton (1759)

£40,000

13,343

£2 19 n|

Bell Rock, Firth of Forth (181 1)

55.619

12

I

28,530

1 19

Skerrvvore, west coast of Scotland (1844) . . . .

72,200

11

6

58,58o

1 4 7l

Bishop Rock, first granite tower (1858) ....

34,559

18

9

35,209

19 7s

Smalls, Bristol Channel (1861)

50,124

11

8

46,386

1 1 7i

Hanois, Aldernev (1862)

25,296

24,542

1 7i

Wolf Rock, Land’s End (1869)

62,726

59,070

1 1 3

Dhu Heartach, west coast of Scotland (1872)

72,584

9

7

42,050

1 14 6

Longships, Land’s End (1872)

43.869

8

11

47,610

18 5

Eddystone, Douglass (1882)

59.255

65,198

18 2

Bishop Rock, strengthening and part reconstruction (1887)

64,889

45,080

1 8 9

Great Basses, Ceylon (1873)

63,560

47,8i9

1 6 7

Minot’s Ledge, Boston, Mass. (i860)

62,500

36,322

1 17 2

Spectacle Reef, Lake Huron (1874)

78,125

42,742

1 16 2

Ar’men, France (1881)

37,692

32,400

1 3 3

Fastnet, Ireland (1904)

79,000

62,600

1 5 5i

recesses are formed with just sufficient clearance for the raised bands to enter in setting (fig. 23). The cement mortar in the joint formed between the faces so locks the dovetails that the stones cannot be separated without breaking (fig. 24).

Effect of Waves. — The wave stroke to which rock lighthouse towers are exposed is often considerable. At the Dhu Heartach, during the erection of the tower, 14 joggled stones, each of 2 tons weight, were washed away after having been set in cement at a height of 37 ft. above high water, and similar damage was done during the construction of the Bell Rock tower. The

Fig. 19. — Maplin Pile Lighthouse.

The tower at lie Vierge (Finistere), completed in 1902, has an elevation of 247 ft. from the ground level to the focal plane, and is probably the highest structure of its kind in the world.

The brick tower, constructed at Spurn Point, at the entrance to the Humber and completed in 1895, replaced an earlier structure erected by Smeaton at the end of the 18th century. The existing tower is constructed on a foundation consisting of concrete cylinders sunk in the shingle beach. The focal plane of the light is elevated 120 ft. above high water.

Besides being built of stone or brick, land towers are frequently

constructed of cast iron plates or open steel-work with a view | to economy. Fine examples of the former are to be found in many British colonies and elsewhere, that on Dassen Island (Cape of Good Hope), 105 ft. in height to the focal plane, being typical (fig. 25). Many openwork structures up to 200 ft. in height have been built. Recent examples are the towers erected at Cape San Thome (Brazil) in 1882, 148 ft. in height (fig. 26), Mocha (Red Sea) in 1903, 180 ft. and

Sanganeb Reef (Red Sea) 1906, 165 ft. in height to the focal plane.

3. Optical Apparatus. — Optical apparatus in lighthouses is required for one or other of three distinct purposes: (1) the concentration of the rays derived from the light source into a belt of light distributed evenly around the horizon, condensation in the vertical plane only being employed; (2) the concentration of the rays both vertically and horizontally into a pencil or cone

of small angle directed towards the horizon and caused to revolve about the light source as a centre, thus producing a flashing light; and (3) the condensation of the light in the vertical plane and also in the horizontal plane in such a manner as to concen- trate the rays over a limited azimuth only.

Apparatus falling under the first category produce a fixed light, and further distinction can be provided in this class by mechanical means of occultation, resulting in the pro- duction of an occulting or intermittent light. Apparatus included in the second class are usually employed to produce flashing lights, ■' but sometimes the dual condensation is taken advantage of to produce a fixed pencil of rays thrown towards the horizon for the purpose of marking an isolated danger or the limits of a narrow channel. Such lights are best described by the French term feux de direction. Catoptric apparatus, by which dual con- densation is produced, are moreover sometimes used for fixed lights, the light pencils overlapping each other in azimuth. Apparatus of the third class are employed for sector lights or those throwing a beam of light over a wider azimuth than can be conveniently covered by an apparatus of the second class, and for reinforcing the beam of light emergent from a fixed apparatus in any required direction.

The above classification of apparatus depends on the resultant effect of the optical elements. Another classification divides the instruments themselves into three classes: (a) catoptric, (b) dioptric and © catadioptric.

Catoptric apparatus are those by which the light rays are reflected only from the faces of incidence, such as silvered mirrors of plane, spherical, parabolic or other profile. Dioptric elements are those in which the light rays pass through the optical glass, suffering refraction at the incident and emergent faces (fig. 27). Catadioptric elements are combined of the two foregoing and consist of optical prisms in which the light rays suffer refraction at the incident face, total internal reflexion at a second face and again refraction on emergence at the

third face (fig. 28). The object of these several forms of optical apparatus is not

Fig. 20.-

-American Shoal Lighthouse, Florida.

30 5 m.

Room

only to produce characteristics or distinctions in lights to enable them to be readily recognized by mariners, but to utilize the light rays in directions above and below the horizontal plane, and also, in the case of revolving or flashing lights, in azimuths not requiring to be illuminated for strengthening the beam in the direction of the mariner. It will be seen that the effective condensation in flashing lights is very much greater than in fixed belts, thus enabling higher in- tensities to be ob- tained by the use of flashing lights than with fixed ap- paratus.

Catoptric System. — Parabolic reflectors, consisting of small facets of silvered glass set in plaster of Paris, were first used about the year 1763 in some of the Mersey lights by Mr Hut- chinson, then dock master at Liverpool (fig. 29). Spherical metallic reflectors were introduced in France in 1781, followed by parabolic reflectors on silvered copper in 1790 in England and France, and in Scotland in 1803. The earlier lights were of fixed type, a number of re- flectors being ar- ranged on a frame or stand in such a manner that the pencils of emergent rays overlapped and thus illuminated the whole horizon con- tinuously. In 1783 the first revolving light was erected at Marstrand inSweden. Similar apparatus were installed at Cor- douan (1790), Flam- borough Head (1806) and at the Bell Rock (181 1). To produce arevolving or flashing light the reflectors were fixed on a re- volving carriage hav- ing several faces. Three or more re- flectors in a face were set with their axes parallel.

ranee Koom

jSljj|p5€=Pr! +2-om. * ‘ l_Djtum,..o om.

to

Red

•-l0-0m>

$ S*n4’l

[fc

it

:’-“T

220m.

Fig. 21. — Rothersand Lighthouse.

A type of parabolic reflector now in use is shown in fig. 30. The sizes in general use vary from 21 in. to 24 in. diameter. These instruments are still largely used for light-vessel illumination, and a few important land lights are at the present time of catoptric type, including those at St Agnes (Scilly Islands), Cromer and St Anthony (Falmouth).

Dioptric System. — The first adaptation of dioptric lenses to lighthouses is probably due to T. Rogers, who used lenses at one of the Portland lighthouses between 1786 and 1790. Subsequently lenses by the same maker were used at Howth, VVaterford and the North Foreland. Count Buffon had in 1748 proposed to grind out of a solid piece of glass a lens in steps or concentric zones in order to reduce the thickness to a minimum (fig. 31). Condorcet in 1773 and Sir D. Brewster in 181 1 designed built-up lenses consisting of stepped annular rings. Neither of these proposals, however, was intended to apply to lighthouse purposes. In 1822 Augustin Fresnel constructed a built-up annular lens in which the centres of curvature of the different rings receded from the axis according to their distances from the centre, so as practically to eliminate spherical aberration; the only spherical surface being the small central part or ” bull’s eye ” (fig. 32). These lenses were intended for revolving lights only. Fresnel next produced his cylindric refractor or lens belt, consisting

of a zone of glass generated by the revolution round a vertical axis of a medial section of the annular lens (fig. 33). The lens belt condensed and parallelized the light rays in the vertical plane only, while the annular lens does so in every plane. The first revolving light constructed from Fresnel’s designs was erected at the Cordouan

lighthouse in 1823. It consisted of 8 panels of annular lenses placed round the lamp at a focal distance of 920 mm. To utilize the light,

Wolf, 12th Course.

Eddystone, 12th Course, Smeaton's Tower.

Eddystone, 48th Course, Douglass Tower.

Chickens, 6th Course.

'L

SC*lC O' THE COURSES. t

I I II I I I! [

t

•efur

=1

Fig. 22. — Courses of various Lighthouse Towers.

which would otherwise escape above the lenses, Fresnel introduced a series of 8 plain silvered mirrors, on which the light was thrown by a system of lenses. At a subsequent period mirrors were also placed in the lower part of the optic. The apparatus was revolved by clock-work. This optic embodied the first combination of dioptric and catoptric elements in one design (fig. 34). In the following year Fresnel designed a dioptric lens with catoptric mirrors for fixed light, which was the first of its kind installed in a lighthouse. It was erected at the Chassiron lighthouse in 1827 (fig. 35). This combination is geometrically perfect, but not so practically on account of the great

Fig. 23.-

- Perspective drawing of Dovetailed Stone (Wolf Rock).

Fig. 24. — Section of Dovetail.

the place of the silvered reflectors previously used above and below the

lens elements (fig. 28). The ray Fi falling on the prismoidal ring ABC

is refracted in the direction i r and meeting the face AB at an angle

of incidence greater than the »

critical, is totally reflected in —

the direction r e emerging

after second refraction in a

horizontal direction. Fresnel

devised these prisms for use

in fixed light apparatus, but

the principle was, at a later

_Fp£al Plant _

loss of light entailed by metallic reflection which is at least 25% greater than the system described under. Before his death in 1827 Fresnel devised his totally reflecting or catadioptric prisms to take

Fig. 25. — Dassen Island Lighthouse (cast iron).

X *:

Fig. 26. — Cape San Thom6 Lighthouse.

date, also applied to flashing lights, in the first instance by T. Stevenson. Both the dioptric lens and catadioptric prism invented by Fresnel are still in general use, the mathematical calculations of the great French designer still forming the basis upon which lighthouse opticians work.

Fresnel also designed a form of fixed and flashing light in which the distinction of a fixed light, varied by flashes, was produced by placing panels of straight refracting prisms in a vertical position on a revolving carriage outside the fixed light apparatus. The revolu- tion of the upright prisms periodically in- creased the power of the beam, by condensa- tion of the rays emergent from the •,’£*’*

fixed apparatus, in the i..**’ horizontal plane. /’

The lens segments in Fresnel’s early appara- F J G- 27.— Dioptric Prism.

tus were of polygonal form instead of cylindrical, but subsequently manufacturers succeeded in grinding glass in cylindrical rings of the form now used. The first apparatus of this description was made by Messrs Cookson of Newcastle in 1836 at the suggestion of Alan Stevenson and erected at Inchkeith.

In 1825 the French Commission des Phares decided upon the exclusive use of lenticular apparatus in its service. The Scottish Lighthouse ”” Board followed with the Inchkeith revolving ap- paratus in 1835 and the Isle of May fixed optic in 1836. In the latter instru- ment Alan Stevenson in- troduced helical frames for holding the glass prisms in place, thus avoiding com- plete obstruction of the light rays in any azimuth. The first dioptric light erected by the Trinity House was that formerly at Start Point in Devon- shire, constructed in 1836. Catadioptric or reflecting prisms for revolving lights were not used until 1850, when Alan Stevenson designed them for the North Ronaldshay lighthouse.

Fig. 28.-

_ Focal \ Plane _ – - – p –

-Catadioptric or Reflecting Prism.

Fig. 29.— Early Reflector and Lamp (1763).

Dioptric Mirror. — The next important improvement in lighthouse optical work was the invention of the dioptric spherical mirror by Mr (afterwards Sir) J. T. Chance in 1862. The zones or prisms are generated round a vertical axis and divided into segments. This Form of mirror is still in general use (figs. 36 and 37).

Azimuthal Condensing Prisms. — Previous to 1850 all apparatus were designed to emit light of equal power in every azimuth either

constantly or periodic- ally. The only excep- tion was where a light was situated on a stretch of coast where a mirror could be placed behind the flame to utilize the rays, which would otherwise pass land- ward, and reflect them back, passing through the flame and lens in a seaward direction. In order to increase the intensity of lights in certain

azimuths T. Stevenson devised his azimuthal condensing prisms which, in various forms and methods of applica- tion, have been largely used for the purpose of strengthening the light rays in required directions as, for instance, where coloured sectors are provided. Applications of this system will be referred to subsequently.

Optical Glass for Lighthouses. — In the early days of lens lights the only glass used for the prisms was made in France at the St Gobain and Premontre works, which have long been celebrated for the high quality of optical glass produced. The early diop- tric lights erected in the United Kingdom, some 13 in all, were made by Messrs Cook- son of South Shields, who were instructed by Leonor Fresnel, the brother of Augustin. At first they tried to mould the lens and then to grind it out of one thick sheet of glass. The successors of the Cookson firm abandoned the manufacture of lenses in 1845, and the firm of Letourneau & Lepaute of Paris again became the mono- polists. In 1850 Messrs Chance Bros. & Co. of Birmingham began the manufacture of optical glass, assisted by M. Tabouret, a French expert who had been a colleague of Augustin Fresnel himself. The first light made by the firm was shown at the Great Exhibition of 1851, since when numerous dioptric apparatus have been constructed by Messrs Chance, who are, at this time, the only manufacturers of lighthouse glass in the United Kingdom. Most of the glass used for apparatus constructed in France is manufactured at St Gobain. Some of the glass used by German constructors is made at Rathenow in Prussia and Goslar in the Harz.

The glass generally employed for lighthouse optics has for its refractive index a mean value of n = 1-51, the corresponding critical angle being 41 ° 30’. Messrs Chance have used dense flint glass for the upper and lower refracting rings of high angle lenses and for dioptric mirrors in certain cases. This glass has a value of 11 = 1-62 with critical angle 38 5’.

Occulting Lights. — During the last 25 years of the 19th century the disadvantages of fixed lights became more and more apparent. At the present day the practice of installing such, except occasionally in the case of the smaller and less important of harbour or river lights, has practically ceased. The necessity for providing a dis- tinctive characteristic for every light when possible has led to the

Fig. 30. — Modern Parabolic Reflector.

^^j)»J//J»»WW»t ‘

Section

Fig. 31. Buffon's Lens.

Fig. 32. Fresnel's Annular Lens.

conversion of many of the fixed-light apparatus of earlier years into occulting lights, and often to their supersession by more modern and powerful flashing apparatus. An occulting apparatus in general use consists of a cylindrical screen, fitting over the burner, rapidly lowered and raised by means of a cam-wheel at stated

intervals. The cam-wheel is actuated by means of a weight or spring clock. Varying characteristics may be procured by means of such a contrivance — single, double, triple or other systems of occultation. The eclipses or periods of darkness bear much the same relation to the times of illumination as do the flashes to the eclipses in a revolving or flashing light. In the case of a first- order fixed light the cost of conversion to an occulting characteristic does not exceed £250 to £300. With ap- paratus illuminated by gas the occultations may be pro- duced by successively raising and lowering the gas at stated intervals. Another form of occulting mechanism em- ployed consists of a series of vertical screens mounted on a carriage and revolving round the burner. The car- riage is rotated on rollers or ball bearings or carried upon a small mercury float. The usual driving mechanism employed is a spring clock. " Otter " screens are used in cases when it is desired to produce different periods of occultations in two or more positions in azimuth in order to differentiate sectors mark- ing shoals, &c. The screens are of sheet metal blacked and arranged vertically, some what in the manner of the laths of a Venetian blind, and operated by mechanical means.

Leading Lights. — In the case of lights designed to act as a lead through a narrow channel or as direction lights, it is undesirable to employ a flashing apparatus. Fixed- light optics are employed to meet such cases, and are generally fitted with occulting mechanism A typical ap- paratus of this description is that at Gage Roads, Fremantle, West Australia (fig. 38). The occulting bright light covers the fair- way, and is flanked by sectors of occulting red and green light marking dangers and Plan

intensified by vertical con- „

densing prisms. A good . * IG – 34-— Fresnel s Revolving example of a holophotal Apparatus at Cordouan Lighthouse, direction light was

exhibited at the 1900 Paris Exhibition, and afterwards erected at Suzac lighthouse (France). The light con- sists of an annular lens 500 mm. focal distance, of 180 horizontal angle and 157° vertical, with a mirror of 180° at the back. The lens thrown a red beam of about 4f° amplitude in azimuth, and 50,000 candle-power over a narrow channel. The illuminant is an incandesce it petroleum vapour burner. Holophotal direction lenses

of this type can only be applied where the

3 iˆ. sector t0 .be marked is of comparatively small

~j |r angle. Silvered metallic mirrors of parabolic

, IP form are also used for the purpose. The use of

single direction lights frequently renders the

construction of separate towers for leading

lights unnecessary.

_ If two distinct lights are employed to in- dicate the line of navigation through a channel or between dangers they must be sufficiently far apart to afford a good lead, the front or seaward light being situated at a lower eleva- tion than the rear or landward one.

Coloured Lights. — Colour is used as seldom as possible as a distinction, entailing as it does a considerable reduction in the power of the light. It is necessary in some instances for differentiating sectors over dangers and for harbour lighting purposes. The use of coloured lights as alternating flashes for lighthouse lights is not to be com mended, on account of the unequal absorption of the coloured

Fig. 33. Fresnel's Lens Belt.

and bright rays by the atmosphere. When such distinction has been employed, as in the Wolf Rock apparatus, the red and white beams can be approximately equalized in initial intensity by constructing the lens and prism panels for the red light of larger angle than those for the white beams. Owing to the absorption by

at Pendeen in Cornwall is shown in fig. 39; and fig. 55 (Plate I.) illustrates a double flashing first order light at Pachena Point in British Columbia. Hopkinson's system has been very extensively used, most of the group-flashing lights shown in the accompanying tables, being designed upon the general lines he introduced. A modification of the system consists in grouping two or more lenses

Section. Fig. 35. — Fixed Apparatus at Chassiron Lighthouse (1827).

the red colouring, the power of a red beam is only 40% of the intensity of the corresponding white light. The corresponding intensity of green light is 25 %. When red or green sectors are employed they should invariably be reinforced by mirrors, azimuthal condensing prisms, or other means to raise the coloured beam to approximately the same intensity as the white light. With the introduction of group-flashing characteristics the necessity for using colour as a means of distinction disappeared.

High-Angle Vertical Lenses. — Messrs Chance of Birmingham have manufactured lense* having 97° of vertical amplitude, but this

result was only attained by using dense flint glass of high refractive •f index for the upper and lower elements. It is doubtful, how- ever, whether the use of refracting elements for a by any material

Fig. 36.-

- Vertical Section. Prism of Dioptric Spherical Mirror.

greater angle "than 8o° vertically is attended corresponding advantage.

Group Flashing Lights. — One of the most useful distinctions consists in the grouping of two or more flashes separated by short intervals of darkness, the group being succeeded by a longer eclipse. Thus two, three or more flashes of, say, half second duration or less follow each other at intervals of about 2 seconds and are succeeded by an eclipse of, say, 10 seconds, the sequence being completed in a period of, say, 15 seconds. In 1874 Dr John Hopkinson introduced the very valuable improvement of dividing the lenses of a dioptric

J'eclicm, on/U/te' AB

Slerafiojt

Fig. 37. — Chance's Dioptric Spherical Mirror.

revolving light with the panels of reflecting prisms above and below them, setting them at an angle to produce the group-flashing characteristic. The first apparatus of this type constructed were those now in use at Tampico, Mexico and the Little Basses light- house, Ceylon (double flashing). The Casquets apparatus (triple flashing) was installed in 1S77. A group-flashing catoptric light had, however, been exhibited from the ” Royal Sovereign light-vessel in 1875. A sectional plan of the quadruple-flashing first order apparatus

\

I

I

\\/ \ A fey

Fig.

^

-Gage Roads Direction Light.

together separated by equal angles, and filling the remaining angle in azimuth by a reinforcing mirror or screen. A group-flashing distinction was proposed for gas lights by J. R. Wigham of Dublin, who obtained it in the case of a revolving apparatus by alternately raising and lowering the flame. The first apparatus in which this method was employed was erected at Galley Head, Co. Cork (1878). At this lighthouse 4 of Wigham’s large gas burners with four tiers of first-order revolving lenses, eight in each tier, were adopted. By successive lowering and raising of the gas flame at the focus of each tier of lenses he produced the group-flashing distinction. The light showed, instead of one prolonged flash at intervals of one minute, as would be produced by the apparatus in the absence of a gas occulter, a group of short flashes varying in number between six and seven. The uncertainty, however, in the number of flashes contained in each group is found to be an objection to the arrange- ment. This device was adopted at other gas-illuminated stations in Ireland at subsequent dates. The quadriform apparatus and gas installation at Galley Head were superseded in 1907 by a first order biform apparatus with incandescent oil vapour burner showing five flashes every 20 seconds.

Flashing Lights indicating Numbers. — Captain F. A. Mahan, late engineer secretary to the United States Lighthouse Board, devised for that service a system of flashing lights to indicate certain numbers.

The apparatus in- stalled at Minot's Ledge lighthouse near Boston Harbour, Massa- chusetts, has a flash indicating the number 143,

thus: -,

the dashes in- dicating short flashes. Each group is separ- ated by a longer period of dark- ness than that between succes- sive members of a group. The flashes in a group indicating a figure are about ij seconds apart, the groups being 3 seconds apart, an interval of 16 seconds' dark- ness occurring between each repetition. Thus the number is repeated every half minute. Two examples of this system were exhibited by the United States Lighthouse Board at the Chicago Exhibition in 1893, viz. the second-order apparatus just men- tioned and a similar light of the first order for Cape Charles on the Virginian coast. The lenses are arranged in a somewhat

Fig. 39. — Pendeen Apparatus. Plan at Focal Plane.

LIGHTHOUSE

Plate I.

Fig. 55.— PACHENA POINT LIGHTHOUSE, B.C.— FIRST ORDER DOUBLE-FLASHING APPARATUS.

Fig. 54.— FASTNET LIGHTHOUSE— FIRST ORDER S'NGLE-FLASHING BIFORM APPARATUS.

Plate II.

LIGHTHOUSE

Fig. 58.— ILE VIERGE LIGHTHOUSE.

Fig. 59.— MINOT'S LEDGE LIGHTHOUSE..

OPTICAL APPARATUS]

LIGHTHOUSE

6 37

similar manner to an ordinary group-flashing light, the groups of lenses being placed on one side of the optic, while the other is pro- vided with a catadioptric mirror. This system of numerical flashing for lighthouses has been frequently proposed in various forms, notably by Lord Kelvin. The installation of the lights described is, however, the

first practical application of the system to large and important coast lights. The great cost involved in the alteration of the lights of any country to comply with the requirements of a numerical system is one of the objections to its general adoption.

Hyper-radial Apparatus. — In 1885 Messrs Barbier of Paris constructed the first hyper- radial apparatus (1330 mm. focal distance) to the design of Messrs D. and C. Stevenson. This had a height of 1 81 2 mm. It was tested during the South Foreland experiments in comparison with other lenses, and found to give excellent results with burners of large focal diameter. Apparatus of similar focal distance (1330 mm.) were subsequently established at Round Island, Bishop Rock, and Spurn Point in England, Fair Isle and Sule Skerry (fig. 40) in Scotland, Bull Rock and Tory Island in

ˆ_ r ˆ Ireland, Cape d'Antifer

•

Reflect/sup Prisma

1.

EqivUxnjgular Prisma

Spheric*ˆ

J*ervs

EqwcaTujvdLaj- Prisms 1

fieflectiiig Prism*

WM 'Obi. C<*ol .dutaiwc

in France, Pei Yu-shan in China and a light- house in Brazil.

The light erected in 1907 at Cape Race, Newfoundland, is a fine example of a four-sided hyper-radial apparatus mounted on a mercury float. The total weight of the revolving part of '. the light amounts to 7

\ tons, while the motive

', clock weight required to '< rotate this large mass at > v a speed of two complete \ revolutions a minute is »ˆ\ only 8 cwt. and the \zWi

weight of mercury re ‘J’”/’ quired for flotation 950 lb. A similar apparatus was placed at Manora Point, Karachi, India, in 1908 (fig. 41).

The introduction of incandescent and other burners of focal compactness and high intensity has rendered the use of optics of such large dimensions as the above, intended for burners of

Fig. 40. — Sule Skerry Apparatus.

great focal diameter, unnecessary. It is now possible to obtain with a second-order optic (or one of 700 mm. focal distance), having a powerful incandescent petroleum burner in focus, a beam of equal intensity to that which would be obtained from the apparatus having a 10-wick oil burner or 108-jet gas burner at its focus.

Stephenson’s Spherical Lenses and Equiangular Prisms. — Mr C. A. Stephenson in 1888 designed a form of lens spherical in the horizontal and vertical sections. This admitted of the construction of lenses of long focal distance without the otherwise corresponding necessity of increased diameter of lantern. A lens of this type and 011330 mm. focal distance was constructed in 1890 for Fair Isle lighthouse. The spherical form loses in efficiency if carried beyond an angle subtending 20 at the focus, and to obviate this loss Mr Stephenson designed his equiangular prisms, which have an inclination outwards. It is claimed by the designer that the use of equiangular prisms results in less loss of light and less divergence than is the

(1895)-

Fixed and Flashing Lights. — The use of these, lights, which show & fixed beam varied at intervals by more powerful flashes, is not to oe recommended, though a large number were constructed in the .earlier years of dioptric illumination and many are still in existence fhe distinction can be produced in one or other of three ways: (a) by the revolution of detached panels of straight condensing lens prisms placed vertically around a fixed light optic, (6) by utilizing revolving lens panels in the middle portion of the optic to produce the flashing light, the upper and lower sections of the apparatus being fixed zones of catadioptric or reflecting elements emitting a fixed belt of light, and © by interposing panels of fixed light section between the flashing light panels of a revolving apparatus. In certain conditions of the atmosphere it is possible for the fixed light of low power to be entirely obscured while the flashes are visible, thus vitiating the true characteristic of the light. Cases have frequently occurred of such lights being mistaken for, and even described in lists of light as,

revolving or flashing lights.

” Cute ” and Screens. — Screens of coloured glass, intended to distinguish the light in particular azimuths, and of sheet iron, when it is desired to ” cut off ” the light sharply on any angle, should be

fixed as far from the centre of the light as possible in order to reduce the escape of light rays due to divergence. These screens are usually attached to the lantern framing.

Divergence. — A dioptric apparatus designed to bend all incident rays of light from the light source in a horizontal direction would, if the flame could be a point, have the effect of projecting a horizontal band or zone of light, in the case of a fixed apparatus, and a cylinder of light rays, in the case of a flashing light, towards the horizon. Thus the mariner in the near distance would receive no light, the rays, visible only at or near the horizon, passing above the level of his eye. In practice this does not occur, sufficient natural divergence being produced ordinarily owing to the magnitude of the flame. Where the electric arc is employed it is often necessary to design the prisms so as to produce artificial divergence. The measure of the natural divergence for any point of the lens is the angle whose sine is the ratio of the diameter of the flame to the distance of the point from centre of flame.

In the case of vertical divergence the mean height of the flame must be substituted for the diameter. The angle thus obtained is the total divergence, that is, the sum of the angles above and beiow the horizontal plane or to right and left of the medial section. In fixed dioptric lights there is, of course, no divergence in the horizontal plane. In flashing lights the horizontal divergence is a matter of considerable importance, determining as it does the duration or length of time the flash is visible to the mariner.

Feux-lZclairs or Quick Flashing Lights. — One of the most im- portant developments in the character of lighthouse illuminating apparatus that has occurred in recent years has been in the direction of reducing the length of flash. The initiative in this matter was taken by the French lighthouse authorities, and in France alone forty lights of this type were established between 1892 and 1 901. The use of short flash lights rapidly spread to other parts of the world. In England the lighthouse at Pendeen (1900) exhibits a quadruple flash every 15 seconds, the flashes being about J second duration (fig. 39), while the bivalve apparatus erected on Lundy Island (i897)shows2 flashes of § second duration in quick succession every 20 seconds. Since 1900

many quick flashing lights have been erected on the coasts of the United Kingdom and in other countries. The early feux-eclairs , designed by the French engineers and others, had usually a flash of rVth to Jrd of a second duration. As a result of experiments carried out in France in 1903-1904, ˆsecond has been adopted by the French authorities as the minimum duration for white flashing lights. If shorter flashes are used it is found that the reduction in duration is attended by a corresponding, but not pro- portionate, diminution in effective intensity. In the case of many electric flashing lights the duration is of necessity reduced, but the greater initial intensity of the flash permits this loss without serious detriment to efficiency. Red or green requires a considerably greater duration than do white flashes. The intervals between the flashes in lights of this character are also small, 2! seconds to 7 seconds. In group-flashing lights the intervals between the flashes are about 2 seconds or even less, with periods of 7 to 10 or 15 seconds between the groups. The flashes are arranged in single, double, triple or even quadruple groups, as in the older forms of apparatus. The feu-eclair type of apparatus enables a far higher intensity of flash to be obtained than was previously possible without any corresponding increase in the luminous power of the burner or other source of light. This result depends entirely upon the greater ratio of condensation of light employed, panels of greater angular breadth than was customary in the older forms of apparatus being used with a higher rotatory velocity. It has been urged that short flashes are insufficient for taking bearings, but the utility of a light in this respect does not seem to depend so much upon the actual length of the flash as upon its frequent recurrence at short intervals. At the Paris Exhibition of 1900 was exhibited a fifth-order flashing light giving short flashes at 1 second intervals; this represents the extreme to which the movement towards ‘,he reduction of the period of flashing lights has yet been carried.

Mercury Floats. — It has naturally been found impracticable to revolve the optical apparatus of a light with its mountings, sometimes weighing over 7 tons, at the high rate of speed required for feux-Sclairs by means of the old system of roller carriages, though for some small quick-revolving lights ball bearings have been successfully adopted. It has therefore become almost the universal practice to carry the rotating portions of the apparatus upon a mercury float. This beautiful application of mercury rotation was the invention of Bourdelles, and is now utilized not only for the high-speed apparatus, but also generally for the few examples of the older type still being constructed. The arrangement consists of an annular cast iron bath or trough of such dimensions that a similar but slightly smaller annular

float immersed in the bath and surrounded by mercury displaces a volume of the liquid metal whose weight is equal to that of the apparatus supported. Thus a comparatively insignificant quantity of mercury, say 2 cwt., serves to ensure the flotation of a mass of over 3 tons. Certain differences exist between the type of float usually constructed in France and those generally designed by English engineers. In all cases pro- vision is made for lowering the mercury bath or raising the float and apparatus for examination. Examples of mercury floats are shown in figs. 41, 42, 43 and Plate I., figs. 54 an 55.

Multiform Apparatus. — In order to double the power to be obtained from a single apparatus at stations where lights of exceptionally high inten- sity are desired, the ex- pedient of placing one complete lens apparatus above another has some- times been adopted, as at the Bishop Rock (fig. 13), and at the Fastnet light- house in Ireland (Plate I., fig. 54). Triform and quad- riform apparatus have also been erected in Ireland; particulars of the Tory Island triform apparatus will be found in table VII. The adoption of the multi- form system involves the use of lanterns of in- creased height.

Twin A p par atu s. — Another method of doub- ling the power of a light is by mounting two complete and distinct optics side by side on the same revolving table, as I shown in fig. 43 of the lie Vierge appar- atus. Several such lights have been installed by the French Lighthouse Service.

Port Lights. — Small self- contained lanterns and lights are in common use for marking the entrances to harbours and in other similar positions where neither high power nor long range is requisite. Many such lights are un- attended in the sense that they do not require the attention of a keeper for days and even weeks together. These are de- scribed in more detail in section 6 of this article. A typical port light con- sists of a copper or brass lantern containing a lens of the fourth order (250 mm. focal distance) or smaller, and a single wick or 2-wick Argand capillary burner. Duplex burners are also used. The appar- atus may exhibit a fixed light or, more usually, an occulting characteristic is produced by the revolu- tion of screens actuated by spring clockwork around the burner. The lantern may be placed at the

top of a column, or suspended from the head of a mast. Coal gas and electricity are also used as illuminants for port lights when local supplies are available. The optical apparatus used in connexion with electric light is described below.

“Orders” of Apparatus. — Augustin Fresnel divided the dioptric lenses, de- signed by him, into “orders” or sizes depending on their local distance. This divi- sion is still used, although (two additional ” orders,’ known as ” small third order “and “hyper-radial”

recopctivelv

dinary use

are in or- The following

FlG. 41. — Manora Point Apparatus and Lantern.

OPTICAL APPARATUS]

LIGHTHOUSE

639

table gives the principal dimensions of the several sizes in use :- Table II.

Order.

Focal

Distance,

mm.

Vertical Angles of Optics. (Ordinary Dimensions.)

Dioptric Belt only.

Holophotal Optics.

Lower Prisms.

Lens.

Upper Prisms.

Hyper- Radial 1st order . 2nd ,,

3rd ,, . . Small 3rd

order 4th order . 5th „ . . 6th ,, . .

1330 920 700 500

375 250

187-5 150

8o°

92°,8o°, 5 8°

8o°

8o°

80° 80° 80°

80 °

21° 21° 21° 21°

21° 21° 21° 21°

57 o

57l 57°

57 o

57°

4 s :

48 o 48 o

48°

4 s : 48 »

48 1

48°

Lenses of small focal distance are also made for buoy and beacon lights.

Light Intensities.— The powers of lighthouse lights in the British Empire are expressed in terms of standard candles or in ” light- house units” (one lighthouse unit = 1000 standard candles). In France the unit is the ” Carcel ” = 952 standard candle. The powers of burners and optical apparatus, then in use in the United Kingdom, were carefully determined by actual photometric measure ment in 1892 by a committee consisting of the engineers of the three general lighthouse boards, and the values so obtained are used as the basis for calculating the intensities of all British lights. It was

Fig. 42. — Cape Naturaliste Apparatus.

Half Stchon \ˆP j| K Half ElevaNon

Fig. 43. — lie Vierge Apparatus.

found that the intensities determined by photometric measurement were considerably less than the values given by the theoretical calculations formerly employed. A deduction of 20% was made from the mean experimental results obtained to compensate for loss by absorption in the lantern glass, variations in effects obtained by different men in working the burners and in the illuminating quality of oils, &c. The resulting reduced values are termed ” ser- vice ” intensities.

As has been explained above, the effect of a dioptric apparatus is to condense the light rays, and the measure of this condensation is the ratio between the vertical divergence and the vertical angle of the optic in the case of fixed lights. In flashing lights the ratio of vertical condensation must be multiplied by the ratio between the horizontal divergence and the horizontal angle of the panel. The loss of light by absorption in passing through the glass and by refraction varies from 10% to 15%. For apparatus containing catadioptric elements a larger deduction must be made.

The intensity of the flash emitted from a dioptric apparatus, showing a white light, may be found approximately by the empirical formula I=PCVH/!/ft, where I = intensity of resultant beam,’ P = service intensity of flame, V = vertical angle of optic, »=angle of mean vertical divergence, H= horizontal angle of panel, ft = angle

of mean horizontal divergence, and C= constant varying between ■9 and ‘75 according to the description of apparatus. The factor H/h must be eliminated in the case of fixed lights. Deduction must also be made in the case of coloured lights. It should, however, be pointed out that photometric measurements alone can be relied upon to give accurate values for lighthouse intensities. The values

Fig. 43A. — He Vierge Apparatus and Lantern. Plan at focal plane,

obtained by the use of Allard’s formulae, which were largely used before the necessity for actual photometric measurements came to be appreciated, are considerably in excess of the true intensities.

Optical Calculations. — The mathematical theory of optical apparatus for lighthouses and formulae for the calculations of profiles will be found in the works of the Stevensons, Chance, Allard, Reynaud, Ribiere and others. Particulars of typical lighthouse apparatus will be found in tables VI. and VII.

4. Illuminaxts. — The earliest form of illuminant used for lighthouses was a fire of coal or wood set in a brazier or grate erected on top of the lighthouse tower. Until the end of the 18th and even into the 1 9th century this primitive illuminant continued to be almost the only one in use. The coal fire at the Isle of May light continued until 1810 and that at St Bees lighthouse ; n Cumberland till 1823. Fires are stated to have been used on the two towers of Nidingen, in the Kattegat, until 1846. Smeaton was the first to use any form of illuminant other than coal fires; he placed within the lantern of his Eddystone light- house a chandelier holding 24 tallow candles each of which weighed £ of a lb and emitted a light of 2-8 candle power. The aggregate illuminating power was 67-2 candles and the consumption at the rate of 3-4 lb per hour.

Oil. — Oil lamps with flat wicks were used in the Liverpool light-houses as early as 1763. Argand, between 1780 and 1783, perfected his cylindrical wick lamp which provides a central current of air through the burner, thus allowing the more perfect combustion of the gas issuing from the wick. The contraction in the diameter of the glass chimney used with wick lamps is due to Lange, and the principle of the multiple wick burner was devised by Count Rumford. Fresnel produced burners having two, three and four concentric wicks. Sperm oil, costing 5s. to 8s. per gallon, was used in English lighthouses until 1846, but about that year colza oil was employed generally at a cost

of 2s. 9d. per gallon. Olive oil, lard oil and coconut oil have also been used for lighthouse purposes in various parts of the world.

■ Mineral Oil Burners. — The introduction of mineral oil, costing a mere fraction of the expensive animal and vegetable ails, revolutionized the illumination of lighthouses. It was not until 1868 that a burner was devised which successfully consumed hydro-carbon oils. This was a multiple wick burner invented by Captain Doty.

The invention was quickly taken advantage of by lighthouse authorities, and the ” Doty ” burner, and other patterns involving the same principle, remained practically the only oil burners in lighthouse use until the last few years of the 19th century.

The lamps used for supplying oil to the burner are of two general types, viz. those in which the oil is maintained under pressure by mechanical action and constant level lamps. In the case of single wick, and some 2-wick burners, oil is supplied to the burner by the capillary action of the wick alone.

The mineral oils ordinarily in use are petroleum, which for lighthouse purposes should have a specific gravity of from -820 to •830 at 6o° F. and flashing point of not less than 230 F. (Abel close test), and Scottish shale oil or paraffin with a specific gravity of about -8io at 6o ° F. and flash point of 140° to 165 F. Both these varieties may be obtained in England at a cost of about 6jd. per gallon in bulk.

Coal Gas had been introduced in 1837 at the inner pier light of Troon (Ayrshire) and in 1847 it was in use at the Heugh lighthouse (West Hartlepool). In 1878 cannel coal gas was adopted for the Galley Head lighthouse, with 108-jet Wigham burners. Sir James Douglass introduced gas burners consisting of concentric rings, two to ten in number, perforated on the upper edges. These give excellent results and high intensity, 2600 candles in the case of the 10-ring burner with a flame diameter at the focal plane of 5§ in. They are still in use at certain stations. The use of multiple ring and jet gas burners is not being further extended. Gas for light- house purposes generally requires to be specially made; the erection of gas works at the station is thus necessitated and a considerable outlay entailed which is avoided by the use of oil as an illuminant.

Incandescent Coal Gas Burners. — The invention of the Welsbach mantle placed at the disposal of the lighthouse authorities the means of producing a light of high intensity combined with great focal compactness. For lighthouse purposes other gaseous illumi- nants than

coal gas are as a rule more convenient and economical, and give better results with incandescent mantles. _ Mantles have, however, been used with ordinary coal gas in many instances where a local supply is available.

Incandescent Mineral Oil Burners. — Incandescent lighting with high-flash mineral oil was first introduced by the French Lighthouse Service in 1898 at L'tle Penfrct lighthouse. The burners employed are all made on the same principle, but differ slightly in details according to the type of lighting apparatus for which they are intended. The principle consists in injecting the liquid petroleum in the form of spray mixed with air into a vaporizer heated by the

mantle flame or by a subsidiary heating burner. A small reservoir

of Compressed air is used —

charged by means of a hand

pump — for providing the

necessary pressure for injec- tion. On first ignition the

vaporizer is heated by a spirit

flame to the required tempera- ture. A reservoir air pressure

of 125 lb per sq. in. is employed,

a reducing valve supplying air

to the oil at from 60 to 65 lb

per sq. in. Small reservoirs

containing liquefied carbon

dioxide have also been em- ployed for supplying the requi- site pressure to the oil vessel.

The candle-power of appar- atus in which ordinary multiple

wick burners were formerly

employed is increased by over

300 % by the substitution of

suitable incandescent oil

burners. In 1902 incandescent

oil burners were adopted by the

general lighthouse authorities

in the United Kingdom. The

burners used in the Trinity ,, ,

House Service and some of f IP- 44-

those made in France have 0l1 Burner,

the vaporizers placed over the mantle.

flame. In other forms, of

which the ” Chance ” burner (fig. 44) is a type, the vaporization

is effected by means of a subsidiary burner placed under the main

flame.

Particulars of the sizes of burner in ordinary use are given in

the following table.

Mantle’

” Chance” Incandescent with 85 mm. diameter

Diameter of Mantle.

Service Intensity.

Consumption of oil. Pints per hour.

35 mm.

55 mm.

85 mm.

Triple mantle 50 mm.

600 candles.

1200 ,,

2150 „ 330°

•50

I -00

2-25

3-oo

The intrinsic brightness of incandescent burners generally may be taken as being equivalent to from 30 candles to 40 candles per sq. cm. of the vertical section of the incandescent mantle.

In the case of wick burners, the intrinsic brightness varies, ac- cording to the number of wicks and the type of burner from about 3-5 candles to about 12 candles per sq. cm., the value being at its maximum with the larger type of burner. The luminous intensity of a beam from a dioptric apparatus is, ceteris paribus, proportional to the intrinsic brightness of the luminous source of flame, and not of the total luminous intensity. The intrinsic brightness of the flame of oil burners increases only slightly with their focal' diameter, consequently while the consumption of oil increases the efficiency of the burner for a given apparatus decreases. The illuminating power of the condensed beam can only be improved to a slight extent, and, in fact, is occasionally decreased, by increasing the number of wicks in the burner. The same argument applies to the case of multiple ring and multiple jet gas burners which, notwith- standing their large total intensity, have comparatively small intrinsic brightness. The economy of the new system is instanced by the case of the Eddystone bi-form apparatus, which with the concentric 6-wick burner consuming 2500 gals, of oil per annum, gave a total intensity of 79,250 candles. Under the new regime the intensity is 292,000 candles, the oil consumption being practically halved.

Incandescent Oil Gas Burners. — It has been mentioned that

incandescence with low-pressure coal gas produces flames of comparatively small intrinsic brightness. Coal gas cannot be com- pressed beyond a small extent without considerable injurious con- densation and other accompanying evils. Recourse has therefore been had to compressed oil gas, which is capable of undergoing compression to 10 or 12 atmospheres with little detriment, and can conveniently be stored in portable reservoirs. The burner employed resembles the ordinary Bunsen burner with incandescent mantle, and the rate of consumption of gas is 27-5 cub. in. per hour per candle. A reducing valve is used for supplying the gas to the burner at constant pressure. The burners can be left unattended for considerable periods. The system was first adopted in France, where it is installed at eight lighthouses, among others the Ar'men Rock light, and has been extended to other parts of the world including several stations in Scotland and England. The mantles used in France are of 35 mm. diameter. The 35 mm. mantle gives a candle-power of 400, with an intrinsic brightness of 20 candles per sq. cm.

The use of oil gas necessitates the erection of gas works at the lighthouse or its periodical supply in portable reservoirs from a neighbouring station. A complete gas works plant costs about £800. The annual expenditure for gas lighting in France does not exceed £72 per light where works are installed, or £32 where gas is supplied from elsewhere. In the case of petroleum vapour lighting the annual cost of oil amounts to about £26 per station.

Acetylene. — The high illuminating power and intrinsic brightness of the flame of acetylene makes it a very suitable illuminant for lighthouses and beacons, providing certain difficulties attending its use can be overcome. At Grangemouth an unattended 21-day beacon has been illuminated by an acetylene flame for some years with considerable success, and a beacon light designed to run un- attended for six months was established on Bedout Island in Western Australia in 19 10. Acetylene has also been used in the United States, Germany, the Argentine, China, Canada, &c, for lighthouse and beacon illumination. Many buoys and beacons on the German and Dutch coasts have been supplied with oil gas mixed with 20 % of acetylene, thereby obtaining an increase of over 100% in illuminating intensity. In France an incandescent burner consuming acetylene gas mixed with air has been installed at the Chassiron lighthouse (1902). The French Lighthouse Service has perfected an incandescent acetylene burner with a 55 mm. mantle having an intensity of over 2000 candle-power, with intrinsic brightness of 60 candles per sq. cm.

Electricity. — The first installation of electric light for lighthouse

purposes in England took place in 1858 at the South Foreland, where the Trinity House established a temporary plant for experi- mental purposes. This installation was followed in 1862 by the adoption of the illuminant at the Dungeness lighthouse, where, it remained in service until the year 1874 when oil was substituted for electricity. The earliest of the permanent installations now existing in England is that at Souter Point which was illuminated in 1871. There are in England four important coast lights illuminated by electricity, and one, viz. Isle of May, in Scotland. Of the former St Catherine's, in the Isle of Wight, and the Lizard are the most powerful. Elctricity was substituted as an illuminant for the then existing oil light at St Catherine's in 1888. The optical apparatus consisted of a second-order 16-sided revolving lens, which was transferred to the South Foreland station in 1904, and a new second order (700 mm.) four-sided optic with a vertical angle of 139 , exhibiting a flash of -21 second duration every 5 seconds substituted for it. A fixed holophote is placed inside the optic in the dark or landward arc, and at the focal plane of the lamp. This holophote condenses the rays from the arc falling upon it into a pencil of small angle, which is directed horizontally upon a series of reflecting prisms which again bend the light and throw it downwards through

an aperture in the lantern floor on to another series of prisms, which latter direct the rays seaward in the form of a sector of fixed red light at a lower level in the tower. A somewhat similar arrangement exists at Souter Point lighthouse.

The apparatus installed at the Lizard in 1903 is similar to that at St Catherine's, but has no arrangement for producing a subsidiary sector light. The flash is of -13 seconds duration every 3 seconds. The apparatus replaced the two fixed electric lights erected in 1878.

The Isle of May lighthouse, at the mouth of the Firth of Forth, was first illuminated by electricity in 1886. The optical apparatus consists of a second-order fixed-light lens with reflecting prisms, and is surrounded by a revolving system of vertical condensing prisms which split up the vertically condensed beam of light into 8 separate beams of 3 in azimuth. The prisms are so arranged that the apparatus, making one complete revolution in the minute, produces a group characteristic of 4 flashes in quick succession every 30 seconds (fig. 45). The fixed light is not of the ordinary Fresnel

Fig. 45. — Isle of May Apparatus.

section, the refracting portion being confined to an angle of 10°, and the remainder of the vertical section consisting of reflecting prisms.

In France the old south lighthouse at La Heve was lit by electricity in 1863. This installation was followed in 1865 by a similar one at the north lighthouse. In 1910 there were thirteen important coast lights in France illuminated by electricity. In other parts of the world, Macquarie lighthouse, Sydney, was lit by electricity in 1883; Tino, in the gulf of Spezia, in 1885; and Navesink lighthouse, near the entrance to New York Bay, in 1898. Electric apparatus were also installed at the lighthouse at Port Said in 1869, on the opening of the canal; Odessa in 1871; and at the Rothersand, North Sea, in 1885. There are several other lights in various parts of the world illuminated by this agency.

Incandescent electric lighting has been adopted for the illumina- tion of certain light-vessels in the United States, and a few small harbour and port lights, beacons and buoys.

Table VI. gives particulars of some of the more important electric lighthouses of the world.

Electric Lighthouse Installations in France— A list of the thirteen lighthouses on the French coast equipped with electric light installa- tions will be found in table VI. It has been already mentioned that the two lighthouses at La Heve were lit by electric light in 1863 and 1865. These installations were followed within a few years by the establishment of electricity as illuminant at Gris-Nez. In 1882 M. Allard, the then director-general of the French Lighthouse Service, prepared a scheme for the electric lighting of the French littoral by means of 46 lights distributed more or less uniformly along the coast-line. All the apparatus were to be of the same general type, the optics consisting of a fixed belt of 300 mm. focal distance, around the outside of which revolved a system of 24 faces of vertical lenses. These vertical panels condensed the belt of fixed light into beams of 3 amplitude in azimuth, producing flashes of about f sec. duration. To illuminate the near sea the vertical divergence of the lower prisms of the fixed belt was artificially increased. These optics are very similar to that in use at the Souter Point lighthouse, Sunderland. The intensities obtained were 120,000 candles in the case of fixed lights and 900,000 candles with flashing lights. As a result of a nautical inquiry held in 1886, at which date the lights of Dunkerque, Calais, Gris-Nez, La Canche, Baleines and

Planier had been lighted, in addition to the old apparatus at La Heve, it was decided to limit the installation of electrical apparatus to important landfall lights — a decision which the Trinity House had already arrived at in the case of the English coast — and to establish new apparatus at six stations only. These were Crdac'h d'Ouessant (Ushant), Belle-tie, La Coubre at the mouth of the river Gironde, Barfieur, lie d'Yeu and Penmarc'h. At the same time it was determined to increase the powers of the existing electric lights. The scheme as amended in 1886 was completed in 1902. 1

All the electrically lit apparatus, in common with other optics established in France since 1893, have been provided with mercury rotation. The most recent electric lights have been constructed in the form of twin apparatus, two complete and distinct optics being mounted side by side upon the same revolving table and with corresponding faces parallel. It is found that a far larger aggregate candle-power is obtained from two lamps with 16 mm. to 23 mm. diameter carbons and currents of 60 to 120 amperes than with carbons and currents of larger dimensions in conjunction with single optics of greater focal distance. A somewhat similar circumstance led to the choice of the twin form for the two very powerful non-electric apparatus at lie Vierge (figs. 43 and 43A) and Ailly, particulars of which will be seen in table VII.

Several of the de Meritens magneto-electric machines of 5-5 K.W., laid down many years ago at French electric lighthouse stations, are still in use. All these machines have five induction coils, which, upon the installation of the twin optics, were separated into two distinct circuits, each consisting of 2j coils. This modification has enabled the old plants to be used with success under the altered conditions of lighting entailed by the use of two lamps. The gener- ators adopted in the French service for use at the later stations differ materially from the old type of de Meritens machine. The Phare d'Eckmiihl (Penmarc'h) installation serves as a type of the more modern machinery. The dynamos are alternating current two- phase machines, and are installed in duplicate. The two lamps are supplied with current from the same machine, the second dynamo being held in

reserve. The speed is 810 to 820 revolutions per minute.

The lamp generally adopted is a combination of the Serrin and Berjot principles, with certain modifications. Clockwork mechanism with a regulating electro-magnet moves the rods simultaneously and controls the movements of the carbons so that they are dis- placed at the same rate as they are consumed. It is usual to employ currents of varying power with carbons of corresponding dimensions according to the atmospheric conditions. . In the French service two variations are used in the case of twin apparatus produced by currents of 60 and 120 amperes at 45 volts with carbons 14 mm. and 18 mm. diameter, while in single optic apparatus currents of 25, 50 and 100 amperes are utilized with carbon of II mm., 16 mm. and 23 mm. diameter. In England fluted carbons of larger diameter are employed with correspondingly increased current. Alternating currents have given the most successful results in all respects. Attempts to utilize continuous current for lighthouse arc lights have, up to the present, met with little success.

The cost of a first-class electric lighthouse installation of the most recent type in France, including optical apparatus, lantern, dynamos, engines, air compressor, siren, &c, but not buildings, amounts approximately to £5900.

Efficiency of the Electric Light. — In 1883 the lighthouse authorities of Great Britain determined that an exhaustive series of experiments should be carried out at the South Foreland with a view to ascertaining the relative suitability of electricity, gas and oil as lighthouse illuminants. The experiments extended over a period of more than twelve months, and were attended by representatives of the chief lighthouse authorities of the world. The results of the trials tended to show that the rays of oil and gas lights suffered to about equal extent by atmospheric absorption, but that oil had the advantage ovei gas by reason of its greater economy in cost of maintenance and in initial outlay on installation. The electric light was found to suffer to a much larger extent than either oil or gas light per unit of power by atmospheric absorption, but the infinitely greater total intensity of the beam obtainable by its use, both by reason of the high luminous intensity of the electric arc and its focal compactness, more than outweighed the higher percentage of loss in fog. The final conclusion of the committee on the relative merits of electricity, gas or oil as lighthouse illuminants is given in the following words: “That for ordinary necessities of lighthouse illumination, mineral oil is the most suitable and economical illuminant, and that for salient headlands, important landfalls, and places where a very powerful light is required

electricity offers the greater advantages."

5. Miscellaneous Lighthouse Equipment. Lanterns. — Modern lighthouse lanterns usually consist of a cast iron or steel pedestal, cylindrical in plan, on which is erected the lantern glazing, sur-

1 In 1901 one of the lights decided upon in 1886 and installed in 1888 — Creac'h d'Ouessant — was replaced by a still more powerful twin apparatus exhibited at the 1900 Paris Exhibition. Subse- quently similar apparatus to that at Cr6ac'h were installed at Gris- Nez, La Canche, Planier, Barfieur, Belle-lie and La Coubre, and the old Dunkerque optic has been replaced by that removed from Belle-lie

mounted by a domed roof and ventilator (fig. 41). Adequate ventilation is of great importance, and is provided by means of ventilators in the pedestal and a large ventilating dome or cowl in the roof. The astragals carrying the glazing are of wrought steel or gun-metal. The astragals are frequently arranged helically or diagonally, thus causing a minimum of obstruction to the light rays in any vertical section and affording greater rigidity to the structure. The glazing is usually J-in. thick plate-glass curved to the radius of the lantern. In situations of great exposure the thickness is increased. Lantern roofs are of sheet steel or copper secured to steel or cast-iron rafter frames. In certain instances it is found necessary to erect a grille or network outside the lantern to prevent the numer- ous sea birds, attracted by the light, from breaking the glazing by impact. Lanterns vary in diameter from 5 ft. to 16 ft. or more, according to the size of the optical apparatus. For first order apparatus a diameter of 12 ft. or 14 ft. is usual.

Lightning Conductors. — The lantern and principal metallic structures in a lighthouse are usually connected to a lightning con- ductor carried either to a point below low water or terminating in an earth plate embedded in wet ground. Conductors may be of copper tape or copper- wire rope.

Rotating Machinery. — Flashing-light apparatus are rotated by clockwork mechanism actuated by weights. The clocks are fitted with speed governors and electric warning apparatus to indicate variation in speed and when rewinding is required. For occulting apparatus either weight clocks or spring clocks are employed.

Accommodation for Keepers, &c. — At rock and other isolated stations, accommodation for the keepers is usually provided in the towers. In the case of land lighthouses, dwellings are provided in close

proximity to the tower. The service or watch room should be situated immediately under the lantern floor. Oil is usually stored in galvanized steel tanks. A force pump is sometimes used for pumping oil from the storage tanks to a service tank in the watch- room or lantern.

6. Unattended Lights and Beacons. — Until recent years no unattended lights were in existence. The introduction of Pintsch's gas system in the early 'seventies provided a means of illumination for beacons and buoys of which large use has been made. Other illuminants are also in use to a considerable extent.

Unattended Electric Lights. — In 1884 an iron beacon lighted by an incandescent lamp supplied with current from a secondary battery was erected on a tidal rock near Cadiz. A 28-day clock was arranged for eclipsing the light between sunrise and sunset and automatically cutting off the current at intervals to produce an occulting characteristic. Several small dioptric apparatus illuminated with incandescent electric lamps have been made by the firm of Barbier Bernard et Turenne of Paris, and supplied with current from batteries of Daniell cells, with electric clockwork mechanism for occulting the light. These apparatus have been fitted to beacons and buoys, and are generally arranged to automatically switch off the current during the day-time. They run unattended for periods up to two months. Two separate lenses and lamps are usually provided, with lamp changer, only one lamp being in circuit at a time. In the event of failure in the upper lamp of the two the current automatically passes to the lower lamp.

Oil-gas Beacons. — In 1881 a beacon automatically lighted by Pintsch's compressed oil gas was erected on the river Clyde, and large numbers of these structures have since been installed in all parts of the world. The gas is contained in an iron or steel reservoir placed within the beacon structure, refilled by means of a flexible hose on the occasions of the periodical visits of the tender. The beacons,

which remain illuminated for periods up

to three months are charged to 7 atmo- spheres. Many lights are provided with

occulting apparatus actuated by the gas

passing from the reservoir to the burner

automatically cutting off and turning on

the supply. The Garvel beacon (1899)

on the Clyde is shown in fig. 46. The

burner has 7 jets, and the light is

occulting. Since 1907 incandescent

mantle burners for oil gas have been

largely used for beacon illumination, both

for fixed and occulting lights.

Acetylene has also been used for the

illumination of beacons and other un- attended lights.

Lindberg Lights. — In 1881-1882 several

beacons lighted automatically by volatile

petroleum spirit on the Lindberg-Lyth

and Lindberg-Trotter systems were estab- lished in Sweden. Many lights of this

type have subsequently been placed in

different parts of the world. The volatile Fig. 46. — Garvel Beacon.

spirit lamp burns day and night. Occulta-

tions are produced by a screen or series of screens rotated round the

light by the ascending current of heated air and gases from the lamp

acting upon a horizontal fan. The speed of rotation of the fan cannot be accurately adjusted, and the times of occultation therefore are liable to slight variation. The lights run unattended for periods up to twenty-one days.

Benson-Lee Lamps. — An improvement upon the foregoing is the Benson-Lee lamp, in which a similar occulting arrangement is often used, but the illuminant is paraffin consumed in a special burner having carbon-tipped wicks which require no trimming. The flame intensity of the light is greater than that of the burner consuming light spirit. The introduction of paraffin also avoids the danger attending the use of the more volatile spirit. Many of these lights are in use on the Scottish coast. They are also used in other parts of the United Kingdom, and in the United States, Canada and other countries.

Permanent Wick Lights. — About 1 891 the French Lighthouse Service introduced petroleum lamps consuming ordinary high-flash lighthouse oil, and burning without attention for periods of several months. The burners are of special construction, provided with a very thick wick which is in the first instance treated in such a manner as to cause the formation of a deposit of carbonized tar on its exposed upper surface. This crust prevents further charring of the wick after ignition, the oil becoming vaporized from the under side of the crust. Many fixed, occulting and flashing lights fitted with these burners are established in France and other countries. In the case of the occulting types a revolving screen is placed around the burner and carried upon a miniature mercury float. The rotation is effected by means of a small Gramme motor on a vertical axis, fitted with a speed governor, and supplied with current from a battery of primary cells. The oil reservoir is placed in the upper part of the lantern and connected with the burner by a tube, to which is fitted a constant level regulator for maintaining the burning level of the oil at a fixed height. In the flashing or revolving light types the arrangement is generally similar, the lenses being revolved upon a mercury float which is rotated by the electric motor. The flashing apparatus established at St Marcouf in 1901 has a beam intensity of 1000 candle-power, and is capable of running unattended for three months. The electric current employed for rotating the apparatus is supplied by four Lalande and Chaperon primary cells, coupled in series, each giving about 0-15 ampere at a

voltage of 0-65. The power required to work the apparatus is at the maximum about 0-165 ampere at 0-75 volt, the large surplus of power which is provided for the sake of safety being absorbed by a brake or governor connected with the motor.

Wigham Beacon Lights. — Wigham introduced an oil lamp for beacon and buoy purposes consisting of a vertical container filled with ordinary mineral oil or paraffin, and carrying a roller immedi- ately under the burner case over which a long flat wick passes. One end of the wick is attached to a float which falls in the container as the oil is consumed, automatically drawing a fresh portion of the wick over the roller. The other end of the wick is attached to a free counterweight which serves to keep it stretched. The oil burns from the convex surface of the wick as it passes over the roller, a fresh portion being constantly passed under the action of the flame. The light is capable of burning without attention for thirty days. These lights are also fitted with occulting screens on the Lindberg system. The candle-power of the flame is small.

7. Light-Vessels. — The earliest light-vessel placed in English waters was that at the Nore in 1732. The early light-ships were of small size and carried lanterns of primitive construction and small size suspended from the yard-arms. Modern light-vessels are of steel, wood or composite construction. Steel is now generally employed in new ships. The wood and composite ships are sheathed with Muntz metal. The dimensions of English light-vessels vary. The following may be taken as the usual limits:

Length 80 ft. to 114 ft.

Beam 20 ft. to 24 ft.

Depth moulded . . 13 ft. to 15 ft. 6 in. Tonnage . . . . 155 to 280. The larger vessels are employed at outside and exposed stations, the smaller ships being stationed in sheltered positions and in estuaries. The moorings usually consist of 3-ton mushroom anchors and if open link cables. The lanterns in common use are 8 ft. in dia- meter, circular in form, with glazing 4 ft. in height. They are annular in plan, surrounding the mast of the vessel upon which they are hoisted for illumination, and are lowered to the deck level during the day. Fixed lanterns mounted on hollow steel masts are now being used in many services, and are gradually displacing the older type. The first English light-vessel so equipped was constructed in 1904. Of the 87 light-vessels in British waters, including un- attended light-vessels, eleven are in Ireland and six in Scotland. At the present time there are over

750 light- vessels in service through- out the world.

Until about 1895 the illuminating apparatus used in light- vessels was exclusively of catoptric form, usually consisting of 21 in. or 24 in. silvered parabolic reflectors, having 1, 2 or 3-wick mineral oil Durners in focus. The reflectors and lamps are hung in gimbals to preserve the horizontal direction of the beams.

The following table gives the intensity of beam obtained by means of a type of reflector in general use :

21-in. Trinity House Parabolic Reflector

Service Intensity of Beam. Burners I wick ” Douglass ” ... 2715 candles

,, 2 ,, (Catoptric) . 4004 ,,

,, 2 ,, (Dioptric). . 6722 ,,

„ 3 ., ... 7528 ..

In revolving flashing lights two or more reflectors are arranged in parallel in each face. Three, four or more faces or groups of reflectors are arranged around the lantern in which they revolve, and are carried upon a turn-table rotated by clockwork. The intensity of the flashing beam is therefore equivalent to the combined intensities of the beams emitted by the several reflectors in each face. The first light-vessel with revolving light was placed at the Swin Middle at the entrance to the Thames in 1837. Group-flashing characteristics can be produced by special arrangements of the reflectors. Dioptric apparatus is now being introduced in many new vessels, the first to be so fitted in England being that stationed at the Swin Middle in 1905, the apparatus of which is gas illuminated and gives a flash of 25,000 candle-power.

Fog signals, when provided on board light-vessels are generally in the form of reed-horns or sirens, worked by compressed air. The compressors are driven from steam or oil engines. The cost of a modern type of English light-vessel, with power-driven compressed air siren, is approximately £16,000.

In the United States service, the more recently constructed vessels have a displacement of 600 tons, each costing £18,000. They are provided with self-propelling power and steam whistle fog signals. The illuminating apparatus is usually in the form of small dioptric lens lanterns suspended at the mast-head — 3 or more to each mast, but a

few of the ships, built since 1907, are provided with fourth- order revolving dioptric lights in fixed lanterns. There are 53 light- vessels in service on the coasts of the United States with 13 reserve ships.

Electrical Illumination. — An experimental installation of the electric light placed on board a Mersey light- vessel in 1886 by the Mersey Docks and Harbour Board proved unsuccessful. The United States Lighthouse Board in 1892 constructed a light-vessel provided with a powerful electric light, and moored her on the Cornfield Point station in Long Island Sound. This vessel was subsequently placed off Sandy Hook (1894) and transferred to the Ambrose Channel Station in 1907. Five other light- vessels in the United States have since been provided with incandescent electric lights — either with fixed or occulting characteristics — including Nantucket Shoals (1896), Fire Island (1897), Diamond Shoals (1898), Overfalls Shoal (1901) and San Francisco (1902).

Gas Illumination. — In 1896 the French Lighthouse Service completed the construction of a steel light- vessel (Talais), which was ultimately placed at the mouth of the Gironde. The construction of this vessel was the outcome of experiments carried out with a view to produce an efficient light-vessel at moderate cost, lit by a dioptric flashing light with incandescent oil-gas burner. The con- struction of the Talais was followed by that of a second and larger, vessel, the Snouw, on similar lines, having a length of 65 ft. 6 in., beam 20 ft. and a draught of 12 ft., with a displacement of 130 tons. The cost of this vessel complete with optical apparatus and gas- holders, with accommodation for three men, was approximately £5000. The vessel was built in 1898-1899. 1 A third vessel was constructed in 1901-1902 for the Sandettie Bank on the general lines adopted for the preceding examples of her class, but of the following increased dimensions: length 115 ft.; width at water-line 20 ft. 6 in.; and draught 15 ft., with a displacement of 342 tons (fig. 47). Accommodation is provided for a crew of eight men. The optical apparatus (fig. 48) is dioptric, consisting of 4 panels of 250 mm. focal distance, carried upon a ” Cardan ” joint below the lens table, and counter-balanced by a heavy pendulum weight. The apparatus is re- volved by clockwork and illuminated by compressed oil gas with incandescent mantle. The candle-power of the beam is 35,000. The gas is contained in three reservoirs placed in the hold. The apparatus is contained in a 6-ft. lantern constructed at the head of a tubular mast 2 ft. 6 in. diameter. A powerful siren is provided with steam engine and boiler for working the air compressors. The total cost of the vessel, including fog signal and optical apparatus, was £13,600. A vessel of similar construction to the Talais was placed by the Trinity House in 1905 on

the Swin Middle station. The illuminant is oil gas. Gas illuminated light-vessels have also been constructed for the German and Chinese Lighthouse Service.

Unattended Light-vessels. — In 188 1 an unattended light- vessel, illuminated with Pintsch's oil gas, was constructed for the Clyde, and is still in use at the Garvel Point. The light is occulting, and is shown from a dioptric lens fitted at the head of a braced iron lattice tower 30 ft. above water-level. The vessel is of iron, 40 ft. long, 12 ft. beam and 8 ft. deep, and has a storeholder on board containing oil gas under a pressure of six atmospheres capable of maintaining a light for three months. A similar vessel is placed off Calshot Spit in Southampton Water, and several have been constructed for the

1 Both the Talais and Snouw light-vessels have since been converted into unattended light-vessels.

French and other Lighthouse Services. The French boats are pro- vided with deep main and bilge keels similar to those adopted in the larger gas illuminated vessels. In 1901 a light-vessel 60 ft. in length was placed off the Otter Rock on the west coast of Scotland ;

side of the rock. The conductor terminated in a large copper plate, and to the cable end was attached a copper mushroom. Weak currents were induced in the lighthouse conductor by the main current in the cable, and messages received in the tower by the help

3S ».

lanjitudlntl Section Fig. 47. — Sandetti6 Lightship.

it is constructed of steel, 24 ft. beam, 12 ft. deep and draws 9 ft. of water (fig. 49). The focal plane is elevated 25 ft. above the water- line, and the lantern is 6 ft. in diameter. The optical apparatus is of 500 mm. focal distance and hung in gimbals with a pendulum balance and " Cardan " joint as in the Sandettie light-vessel. The illuminant is oil gas, with an occulting characteristic. The store- holder contains 10, goo cub. ft. of gas at eight atmospheres, sufficient to supply the light for ninety days and nights. A bell is provided, struck by clappers moved by the roll of the vessel. The cost of the vessel complete was

£2979. The Northern Lighthouse Com- missioners have four similar vessels in service, and others have been stationed in the Hugh estuary, at Bombay, off the Chinese coasts and elsewhere. In 1909 an unattended gas illuminated light-vessel provided with a dioptric flashing appar- atus was placed at the Lune Deep in Morecambe Bay. It is also fitted with a fog bell struck automatically by a gas operated mechanism.

Electrical Communication of Light-vessels with the Shore. — Experiments were in- stituted in 1886 at the Sunk light- vessel off the Essex coast with the view to maintaining telephonic communication with the shore by means of a submarine cable 9 m. in length. Great difficulties were experienced in maintaining com- munication during stormy weather, breakages in the cable being frequent. These difficulties were subsequently par- tially overcome by the employment of larger vessels and special moorings. Wireless telegraphic installations have now (1910) superseded the cable com- munications with light-vessels in English waters except in four cases. Seven light-vessels, including the four off the Goodwin Sands, are now fitted for wireless electrical communication with the shore.

In addition many pile lighthouses and isolated rock and island stations have been placed in electrical communication with the shore by means of cables or wireless telegraphy. The Fastnet light- house was, in 1894, electrically connected with the shore by means of a non- it being found impossible to maintain a continuous

Fig. 48. — Lantern of Sandettie Lightship.

continuous cable,

cable in shallow water near the rock owing to the heavy wash of the sea. A copper conductor, carried down from the tower to below low-water mark, was separated from the cable proper, laid on the bed of the sea in a depth of 13 fathoms, by a distance of about 100 ft. The lighthouse was similarly connected to earth on the opposite

of electrical relays. On the completion of the new tower on the Fastnet Rock in 1906 this installation was superseded by a wireless telegraphic installation. •

8. Distribution and Distinction of Lights, &c. — Methods of Distinction, — The following are the various light character- istics which may be exhibited to the mariner: —

Fixed. — Showing a continuous or steady light. Seldom used in

modern lighthouses and generally restricted to small port or harbour lights. A fixed light is liable to be confused with lights of shipping or other shore lights.

Flashing. 1 — Showing a single flash, the duration of darkness always being greater than that of light. This characteristic or that immediately following is generally adopted for important lights. The French authorities have given the name Feux- Eclair to flashing lights of short duration.

Group-Flashing. — Showing groups of two or more flashes in quick succession (not necessarily of the same colour) separated by eclipses with a larger interval of darkness between the groups.

Fixed and Flashing. — -Fixed light varied by a single white or coloured flash, which may be preceded and followed by a short eclipse. This type of light, in consequence of the unequal intensities of the beams, is unreliable, and examples are now seldom installed although many are still in service.

Fixed and Group-Flashing. — Similar to the preceding and open to the same objections.

Revolving. — This term is still retained in the ” Lists of Lights ” issued by the Admiralty and some other authorities to denote a light gradually increasing to full effect, then decreasing to eclipse. At short distances and in clear weather a faint continuous light may be observed. There is no essential difference between revolving and flashing lights, the distinction being merely due to the speed of rotation, and the term might well be abandoned as in the United States lighthouse list.

Occulting. — A continuous light with, at regular intervals, one sudden and total eclipse, the duration of light always being equal to or greater than that of darkness. This characteristic is usually exhibited by fixed dioptric apparatus fitted with some form of occulting mechanism. Many lights formerly of fixed characteristic have been converted to occulting.

1 For the purposes of the mariner a light is classed as flashing or occulting solely according to the duration of light and darkness and without any reference to the apparatus employed. Thus, an occulting apparatus, in which the period of darkness is greater than that of light, is classed in the Admiralty ” List of Lights ” as a ” flashing ” light.

DISTRIBUTION OF LIGHTS]

LIGHTHOUSE

Group Occulting. — A continuous light with, at regular intervals, groups of two or more sudden and total eclipses.

Alternating. — Lights of different colours (generally red and white) alternately without any intervening eclipse. This char- acteristic is not to be recommended for reasons which have already been referred to. Many of the permanent and unwatched lights on the coasts of Norway and Sweden are of this description.

Colour.— The colours usually adopted for lights are white, red and green. White is to be preferred whenever possible, owing to the great absorption of light by the use of red or green glass screens.

Sectors. — Coloured lights are often requisite to distinguish cuts or sectors, and should be shown from fixed or occulting light

characteristic of a light should be such that it may be readily deter- mined by a mariner without the necessity of accurately timing the period or duration of flashes. For landfall and other important coast stations flashing dioptric apparatus of the first order (920 mm. focal distance) with powerful burners are required. In countries where the atmosphere is generally clear and fogs are less prevalent than on the coasts of the United Kingdom, second or third order lights suffice for landfalls having regard to the high intensities available by the use of improved illuminants. Secondary coast lights may be of second, third or fourth order of flashing character, and important harbour lights of third or fourth order. Less important harbours and places where considerable range is not required, as in estuaries and narrow seas, may be lighted by flashing lights of fourth order or smaller size. Where sectors are requisite, occulting apparatus should be adopted for the main light : or subsidiary lights, fixed or occulting, may be exhibited from the same tower as the main light but at a lower level. In such cases the vertical distance between the high and the low light must be sufficient to avoid commingling of the two beams at any range at which both lights are visible. Such commingling or blending is due to atmospheric aberration.

Range of Lights. — The range of a light depends first on its elevation above sea-level and secondly on its intensity. Most important lights are of sufficient power to render them visible at the full geographical range in clear weather. On the other hand there are many harbour and other lights which do not meet this condition.

The distances given in lists of lights from which lights are visible — except in the cases of lights of low power for the reason given above — are usually calculated in nautical miles as seen from a height of 15 ft. above sea-level, the elevation of the lights being taken as above high water. Under certain atmospheric conditions, and especially with the more power- ful lights, the glare of the light may be visible considerably beyond the calculated range.

Table III. — Distances at which Objects can be seen at Sea, according to their Respective Elevations and the Elevation of the Eye of the Observer. (A. Stevenson.)

JjJtt.

Distances in

Distances in

Heights

Geographical

Heights

Geographical

in Feet.

or Nautical

in Feet.

or Nautical

Miles.

Miles.

5

2-565

no

12-03

10

3-628

120

12-56

15

4‘443

130

13-08

20

5-130

140

13-57

25

5-736

150

14-02

30

6-283

200

16-22

35

6-787

250

18-14

40

7-255

300

19-87

45

7-696

350

21-46

50

8-II2

400

22-94

55

8-509

450

24-33

60

8-886

500

25-65

65

9-249

55o

26-90

70

9-598

600

28-10

75

9‘935

650

29-25

80

10-26

700

30-28

85

10-57

800

32-45

90

10-88

900

34-54

95

ii-i8

1000

36-28

100

n-47

Fig. 49. — Otter Rock Light-vessel.

apparatus and not from flashing apparatus. In marking the passage through a channel, or between sandbanks or other dangers, coloured light sectors are arranged to cover the dangers, white light being shown over the fairway with sufficient margin of safety between the edges of the coloured sectors next the fairway and the dangers.

Choice of Characteristic and Description of Apparatus. — In deter- mining the choice of characteristic for a light due regard must be paid to existing lights in the vicinity. No light should be placed on a coast line having a characteristic the same as, or similar to, another in its neighbourhood unless one or more lights of dissimilar char- acteristic, and at least as high power and range, intervene. In the case of ” landfall lights ” the characteristic should differ from any other within a range of 100 m. In narrow seas the distance between lights of similar characteristic may be less. Landfall lights are, in a sense, the most important of all and the most powerful apparatus available should be installed at such stations. The distinctive

Example: A tower 200 ft. high will be visible 20-66 nautical miles to an observer, whose eye is elevated 15 ft. above the water; thus, from the table:

15 ft. elevation, distance visible 4-44 nautical miles 200 „ „ 16-22 ,,

20-66 „

Elevation of Ligfils. — The elevation of the light above sea-level need not, in the case of landfall lights, exceed 200 ft., which is sufficient to give a range of over 20 nautical miles. One hundred and fifty feet is usually sufficient for coast lights. Lights placed on high headlands are liable to be enveloped in banks of fog at times when at a lower level the atmosphere is comparatively clear (e.g. Beachy Head). No definite rule can, however, be laid down, and local circumstances, such as configuration of the coast line, must be taken into consideration in every case.

Choice of Site. — " Landfall " stations should receive first considera- tion and the choice of location for such a light ought never to be made subservient to the lighting of the approaches to a port. Subsidiary lights are available for the latter purpose. Lights installed to guard shoals, reefs or other dangers should, when practicable, be placed seaward of the danger itself, as it is desirable that seamen should be able to " make " the light with confidence. Sectors marking dangers

"en

Water

seaward of the light should not be employed except when the danger is in the near vicinity of the light. Outlying dangers require marking by a light placed on the danger or by a floating light in its vicinity.

9. Illuminated Buoys. — Gas Buoys. Pintsch's oil gas has been in use for the illumination of buoys since 1878. In 1883 an automatic occulter was perfected, worked by the gas passing from the reservoir to the burner. The lights placed on these buoys burn continuously for three or more months. The buoys and lanterns are made in various forms and sizes. The spar buoy (fig. 50) may be adopted for situations where strong tides or currents pre- vail. Oil gas lights are frequently fitted to Courtenay whistling (fig. 51) and bell buoys.

In the ordinary type of gas buoy lantern the burner employed is of the multiple-jet, Argand ring, or incandescent type. Incan- descent mantles have been applied to buoy lights in France with successful results. Since 1906, and more recently the same system of illumination has been adopted in England and other countries. The lenses employed are of cylindrical dioptric fixed-light form, usually 100 mm. to 300 mm. diameter. Some of the largest types of gas-buoy in use on the French coast have an elevation from water level to the focal plane of over 26 ft. with a beam intensity of more than 1000 candles. A large gas-buoy with an elevation of 34 ft. to the focal plane was placed at the entrance to the Gironde in 1907. It has an incan- descent burner and exhibits a light of over 1500 candles. Oil gas forms the most trust- worthy and efficient illuminant for buoy pur- poses yet introduced, and the system has been largely adopted by lighthouse and harbour authorities.

There are now over 2000 buoys fitted with oil gas apparatus, in addition to 600 beacons, light-vessels and boats.

Electric Lit Buoys. — Buoys have been fitted with electric light, both fixed and occulting. Six electrically lit spar-buoys were laid down in the Gedney channel, New York lower bay, in 1888. These were illuminated by 100 candle-power Swan lamps with con- tinuous current supplied by cable from a power station on shore. The wear and tear of the cables caused considerable trouble and expense. In 1895 alternating current was introduced. The installation was superseded by gas lit buoys in 1904.

Acetylene and Oil Lighted Buoys. — Acety- lene has been extensively employed for the

lighting of buoys in Canada and in the United States; to a less extent it has also been adopted in other countries. Both the low pressure system, by which the acetylene gas is produced by an automatic generator, and the so- called high pressure system in which purified acetylene is held in solution in a high pressure gasholder filled with asbestos composition saturated with acetone, have been employed for illuminating buoys and beacons. Wigham oil lamps are also used to a limited extent for buoy lighting.

Bell Buoys. — One form of clapper actuated by the roll of the buoy (shown in fig. 52) consists of a hardened steel ball placed in a hori- zontal phosphor-bronze cylinder provided with rubber buffers. Three of these cylinders are arranged around the mouth of the fixed bell, Fig. 50. — Spar Gas w hich is struck by the balls rolling Buoy. backwards and forwards as the

buoy moves. Another form of bell mechanism consists of a fixed bell with three or more suspended clappers placed externally which strike the bell when the buoy rolls.

10. Fog Signals. — The introduction of coast fog signals is of comparatively recent date. They were, until the middle of the 19th century, practically unknown except so far as a few isolated bells and guns were con- cerned. The increasing demands of navigation, and the application of steam power to the propulsion of ships resulting in an increase of their speed, drew attention to the necessity of providing suitable signals as aids to navigation during fog and mist. In times of fog the mariner can expect no certain assistance from even

the most efficient system of coast lighting, since the beams of light from the most powerful electric lighthouse are frequently entirely dispersed and absorbed by the particles of moisture, forming a sea fog of even moderate density, at a distance of less than aim. from the shore. The careful experiments and scientific research which have been de- voted to the subject of coast fog-signal- ling have produced much that is useful and valuable to the mariner, but unfor- tunately the practical results so far have not been so satis- factory as might be desired, owing to (1) the very short range of the most powerful signals yet produced under certain un- favourable acoustic conditions of the atmosphere, (2) the difficulty experi- enced by the mariner in judging at any time how far the atmospheric condi- tions are against him in listening for the expected signal, and (3) the difficulty in locating the position of a sound signal by phonic observations. Bells and Gongs are the oldest and, gener- ally speaking, the least efficient forms

Fig. 51. — Courtenay's Automatic Whistling Buoy.

ft.

A, Cylinder, 27 6 in. long.

B, Mooring shackle.

C, Rudder.

D, Buoy.

E, Diaphragm.

F, Ball valves. of fog signals. Under G, Air inlet tubes, very favourable acoustic conditions the sounds are audible at considerable ranges. On the other hand, 2-ton bells have been inaudible at distances of a few hundred yards. The 1893 United States trials showed that a bell weighing 4000 lb struck by a 450 lb hammer was heard at a distance

H, Air (compressed outlet tube to whistle.

I, Compressed air in- let to buoy.

K, Manhole.

L, Steps.

N, Whistle.

Fig. 52. — Buoy Bell.

of 14 m. across a gentle breeze and at over 9 m. against a io-knot breeze. Bells are frequently used for beacon and buoy signals, and in some cases at isolated rock and other stations where there is insufficient accommodation for sirens and horns, but their use is being gradually discontinued in this country for situations where a

powerful signal is required. Gongs, usually of Chinese manufacture, were formerly in use on board English lightships and are still used to some extent abroad. These are being superseded by more powerful sound instruments.

Explosive Signals. — Guns were long used at many lighthouse and light-vessel stations in England, and are still in use in Ireland and at some foreign stations. These are being gradually displaced by other explosive or compressed air signals. No explosive signals are in use on the coasts of the United States. In 1878 sound rockets charged with gun-cotton were first used at Flamborough Head and were afterwards supplied to many other stations. 1 The nitrated gun-cotton or tonite signals now in general use are made up in 4 oz. charges. These are hung at the end of an iron jib or pole attached to the lighthouse lantern or other structure, and fired by means of a detonator and electric battery. The discharge may take place within 12 ft. of a structure without danger. The cartridges are stored for a considerable period without -deterioration and with safety. This form of signal is now very generally adopted for rock and other stations in Great Britain, Canada, Newfoundland, northern Europe and other parts of the world. An example will be noticed in the illustration of the Bishop Rock lighthouse, attached to the lantern (fig. 13). Automatic hoisting and firing appliances are also in use.

Whistles. — Whistles, whether sounded by air or steam, are not used in Great Britain, except in two instances of harbour signals under local control. It has been objected that their sound has too great a resemblance to steamers' whistles, and they are wasteful of power. In the United States and Canada they are largely used. The whistle usually employed consists of a metallic dome or bell against which the high-pressure steam impinges. Rapid vibrations are set up both in the metal of the bell and in the internal air, producing a shrill note. The Courtenay buoy whistle, already referred to, is an American invention and finds favour in the United States, France, Germany and elsewhere.

Reed-Horns. — These instruments in their original form were the invention of C. L. Daboll, an experimental horn of his manufacture being tried in 1851 by the United States Lighthouse Board. In 1862 the Trinity House adopted the instrument for seven land and light-vessel stations. For compressing air for the reed-horns as well as sirens, caloric, steam, gas and oil engines have been variously used, according to local circumstances. The reed-horn was improved by Professor Holmes, and many examples from his designs are now in use in England and America. At the Trinity House experiments with fog signals at St Catherine's (1901) several types of reed-horn were experimented with. The Trinity House service horn uses air at 15 lb pressure with a consumption of -67 cub. ft. per second and 397 vibrations. A small manual horn of the Trinity House type consumes -67 cub. ft. of air at 5 lb pressure. The trumpets of the latter are of brass.

Sirens. — The most powerful and efficient of all compressed air fog signals is the siren. The principle of this instrument may be briefly explained as follows: — It is well

known that if the tympanic membrane is struck periodically and with sufficient rapidity by air impulses or waves a musical sound is produced. Robinson was the first to construct an instrument by which successive puffs of air under pressure were ejected from the mouth of a pipe. He obtained this effect by using a stop- cock revolving at high speed in such a manner that 720 pulsations per second were produced by the intermittent escape of air through the valves or ports, a smooth musical note being given. Cagniard de la Tour first gave such an instrument the name of siren, and constructed it in the form of an air chamber with perforated lid or cover, the perforations being suc- cessively closed and opened by means of a similarly perforated disk fitted to the cover and revolving at high speed. The perforations being cut at an angle, the disk was self-rotated by the oblique pressure of the air in escaping through the slots. H. W. Dove and Helmholtz introduced many improvements, and Brown of New York patented, about 1870, a steam siren with two disks having radial perforations or slots. The cylindrical form of the siren now generally adopted is due to Slight, who used two concentric cylinders, one revolving within the other, the sides being perforated with vertical slots. To him is also due the centrifugal governor largely used to regulate the speed of rotation of the siren. Over the siren mouth is placed a

1 The Flamborough Head rocket was superseded by a siren fog signal in 1908.

conical trumpet to collect and direct the sound in the desired direc- tion. In the English service these trumpets are generally of con- siderable length and placed vertically, with bent top and bell mouth. Those at St Catherine's are of cast-iron with copper bell mouth, and have a total axial length of 22 ft. They are 5 in. in diameter at the siren mouth, the bell mouth being 6 ft. in diameter. At St Catherine's the sirens are two in number, 5 in. in diameter, being sounded simultaneously and in unison (fig. 53). Each siren is provided with ports for producing a high note as well as a low note, the two notes being sounded in quick succession once every minute. The trumpet mouths are separated by an angle of 120° between their axes. This double form has been adopted in certain instances where the angle desired to be covered by the sound is com- paratively wide. In Scotland the cylin- drical form is used generally, either automatically or motor driven. By the latter means the admission of air to the siren can be delayed until the cylinder is rotating at full speed, and a much sharper sound is produced than in the case of the automatic type. The Scot- tish trumpets are frequently constructed so that the greater portion of the length is horizontal. The Girdleness trumpet has an axial length of 16 ft., II ft. 6 in. being horizontal. The trumpet is capable of being rotated through an angle as well as dipped below the horizon. It is of cast-iron, no bell mouth is used, and _.

the conical mouth is 4 ft. in diameter. flan

In France the sirens are cylindrical and Fig. 53. — St Catherine's very similar to the English self-driven _ Double-noted Siren, type. The trumpets have a short axial

length, 4 ft. 6 in., and are of brass, with bent bell mouth. The Trinity House has in recent years reintroduced the use of disk sirens, with which experiments are still being carried out both in the United Kingdom and abroad. For light-vessels and rock stations where it is desired to distribute the sound equally in all directions the mushroom-head trumpet is occasionally used. The Casquets trumpet of this type is 22 ft. in length, of cast-iron, with a mushroom top 6 ft. in diameter. In cases where neither the mush- room trumpet nor the twin siren is used the single bent trumpet is arranged to rotate through a considerable angle. Table IV. gives particulars of a few typical sirens of the most recent form.

Since the first trial of the siren at the South Foreland in 1873 a

Table IV.

Cub. ft. of air

Station.

Description.

Vibrations

Sounding Pressure in lb per

used per sec. of blast reduced

Remarks.

per sec.

to atmospheric

sq. in.

pressure.

High.

Low.

High.

Low.

St Catherine's (Trinity

Two 5-in. cylindrical,

295

182

25

32

16

The air consump-

House)

automatically driven sirens

tion is for 2 sirens.

Girdleness (N.L.C.) .

7-in. cylindrical siren, motor driven

234

100

30

130

26

Casquets (Trinity

7-in. disk siren, motor

•

98

25

36

House)

driven

French pattern siren .

6-in. cylindrical siren, automatically driven

326

28

H

A uniform note of 326 vibrations per sec. has now been adopted generally in France.

very large number of these instruments have been established both at lighthouse stations and on board light-vessels. In all cases in Great Britain and France they are now supplied with air compressed by steam or other mechanical power. In the United States and some other countries steam, as well as compressed air, sirens are in use.

Diaphones. — The diaphone is a modification of the siren, which has been largely used in Canada since 1903 in place of the siren. It is claimed that the instrument emits a note of more constant pitch than does the siren. The distinction between the two instruments is that in the siren a revolving drum or disk alternately opens and closes elongated air apertures, while in the diaphone a piston pulsating at high velocity serves to alternately cover and uncover air slots in a cylinder.

The St Catherine's Experiments. — Extensive trials were carried out during 1901 by the Trinity House at St Catherine's lighthouse, Isle of Wight, with several types of sirens and reed-horns. Experiments

were also made with different pattern of trumpets, including forms having elliptical sections, the long axis being placed vertically. The conclusions of the committee may be briefly summarized as follows: (i) When a large arc requires to be guarded two fixed trumpets suitably placed are more effective than one large trumpet capable of being rotated. (2) When the arc to be guarded is larger than that effectively covered by two trumpets, the mushroom-head trumpet is a satisfactory instrument for the purpose. (3) A siren rotated by a separate motor yields better results than when sclf- driven. (4) No advantage commensurate with the additional power required is obtained by the use of air at a higher pressure than 25 lb per sq. in. (5) The number of vibrations per second produced by the siren or reed should be in unison with the proper note of the associated trumpet. (6) When two notes of different pitch are employed the difference between these should, if possible, be an octave. (7) For calm weather a low note is more suitable than a high note, but when sounding against the wind and with a rough and noisy sea a high note has the greater range. (8) From causes which cannot be

determined at the time or predicted beforehand, areas sometimes exist in which the sounds of fog signals may be greatly enfeebled or even lost altogether. This effect was more frequently observed during comparatively calm weatherand at no great distance from the signal station. (It has often been observed that the sound of a signal may be entirely lost within a short distance of the source, while heard distinctly at a greater distance and at the same, time.) (9) The siren was the most effective signal experimented with; the reed-horn, although inferior in power, is suitable for situations of secondary importance. (No explosive signals were under trial during the experiments.) (10) A fog signal, owing to the uncertainty attending its audibility, must be regarded only as an auxiliary aid to navigation which cannot at all times be relied upon.

Submarine Bell Signals. — As early as 1841 J. D. Colladon con- ducted experiments on the lake of Geneva to test the suitability of water as a medium for transmission of sound signals and was able to convey distinctly audible sounds through water for a distance of over 21 m., but it was not until 1904 that any successful practical application of this means of signalling was made in connexion with light-vessels. There are at present (1910) over 120 submarine bells in service, principally in connexion with light-vessels, off the coasts of the United Kingdom, United States, Canada, Germany, France and other countries. These bells are struck by clappers actuated by pneumatic or electrical mechanism. Other submerged bells have been fitted to buoys and beacon structures, or placed on the sea bed; in the former case the bell is actuated by the motion of the buoy and in others by electric current, transmitted by cable from the shore. In some cases, when submarine bells are associated with gas buoys or beacons, the compressed gas is employed to actuate the bell striking mechanism. To take full advantage of the signals thus provided it is necessary for ships approaching them to be fitted with special receiving mechanism of telephonic character installed below the water line and in contact with the hull plating. The signals are audible by the aid of ear pieces similar to ordinary telephone receivers. Not only can the bell signals be heard at considerable distances — frequently over 10 m. — and in all conditions of weather, but the direction of the bell in reference to the moving ship can be determined within narrow limits. The system is likely to be widely extended and many merchant vessels and war ships have been fitted with signal receiving mechanism.

The following table (V.) gives the total numbers of fog signals of each class in use on the 1st of January 1910 in certain countries.

or according to its original charter, ” The Master Wardens, and Assistants of the Guild Fraternity or Brotherhood of the most glorious and undivided Trinity and of St Clement, in the Parish of Deptford Strond, in the county of Kent,” existed in the reign of Henry VII. as a religious house with certain duties connected with pilotage, and was incorporated during the reign of Henry VIII. In 1565 it was given certain rights to maintain beacons, &c, but not until 1680 did it own any lighthouses. Since that date it has gradu- ally purchased most of the ancient privately owned lighthouses and has erected many new ones. The act of 1836 gave the corporation control of English coast lights with certain supervisory powers over the numerous local lighting authorities, including the Irish and Scottish Boards. The corporation now consists of a Master, Deputy- master, and 22 Elder Brethren (10 of whom are honorary), together with an unlimited number of Younger Brethren, who, however, perform no executive duties. In Scotland and the Isle of Man the lights are under the control of the Commissioners of Northern Lighthouses constituted in 1786 and incorporated in 1798. The lighting of the Irish coast is in the hands of the Commissioners of Irish Lights formed in 1867 in succession to the old Dublin Ballast Board. The principal local light boards in the United Kingdom are the Mersey Docks and Harbour Board, and the Clyde Lighthouse Trustees. The three general lighthouse boards of the United Kingdom, by the provision of the Mercantile Marine Act of 1854, are subordinate to the Board of Trade, which controls all finances.

On the 1st of January 1910 the lights, fog signals and submarine bells in service under

the control of the several authorities in the United Kingdom were as follows :

Light-

Light-

Fog

Sub-

houses.

vessels.

Signals.

Bells.

Trinity House ....

116

51

97

12

Northern Lighthouse Com-

missioners ....

138

5

44

Irish Lights Commissioners

93

11

35

3

Mersey Docks and Harbour

Board

16

6

13

2

Admiralty

31

2

6

Clyde Lighthouse Trustees

H

1

5

Other local lighting authori-

ties

Totals ....

809

11

89

2

1217

87

289

19

Table

V.

Horns,

g.6g

c ‘in

5 5.

3

Trumpets, &c.

£

be

c

Power.

Manual.

England and Channel Islands

44

27

31

2

15

48

10

16

193

Scotland and Isle of Man

3 = i

6

2

5

16

■*

67

Ireland

12

2

6

11

3

11

3

48

France

12

7

1

1

25

2

48

United States (excluding in-

land lakes and rivers) .

43

35

15

S9

218

I

36

407

British North America (ex-

cluding inland lakes and

rivers)

6

66

5

79

16

8

24

11

215

When two kinds of signal are employed at any one station, one being subsidiary, the latter is omitted from the enumeration. Buoy and unattended beacon bells and whistles are also omitted, but local port and harbour signals not under the immediate jurisdiction of the various lighthouse boards are included, more especially in Great Britain.

11. Lighthouse Administration. The principal countries of the world possess organized and central authorities responsible for the installation and maintenance of coast lights and fog signals, buoys and beacons.

United Kingdom. — In England the corporation of Trinity House,

Some small harbour and river lights of subsidiary character are not included in the above total.

United States. — The United States Lighthouse Board was con- stituted by act of Congress in 1852. The Secretary of Commerce and Labor is the ex-officio president. The board consists of two officers of the navy, two engineer officers of the army, and two

civilian scientific members, with two secretaries, one a naval officer, the other an officer of engineers in the army. The members are appointed by the president of the United States. The coast-line of the states, with the lakes and rivers and Porto Rico, is divided into 16 executive districts for purposes of administration.

The following table shows the distribution of lighthouses, light- vessels, &c, maintained by the lighthouse board in the United States in June 1909. In addition there are a few small lights and buoys

privately maintained.

Lighthouses and beacon lights .

Light-vessels in position .

Light-vessels for relief

Gas lighted buoys in position .

Fog signals operated by steam or oil engines

Fog signals operated by clockwork &c.

Submarine signals

Post lights

Day or unlighted beacons .

Bell buoys in position

Whistling buoys in position

Other buoys

Steam tenders ....

Constructional Staff

Light keepers ; and light attendants

Officers and crews of light-vessels

and tenders 1693

France. — The lighthouse board of France is known as the Com- mission des Phares, dating from 1792 and remodelled in 181 1, and is under the direction of the minister of public works. It consists of four engineers, two naval officers and one member of the Institute, one inspector-general of marine engineers, and one hydrographic engineer. The chief executive officers are an Inspecteur General des Ponts et Chaussees, who is director of the board, and another engineer of the same corps, who is engineer-in-chief and secretary. The board has control of about 750 lights, including those of

1333

S3

13 94

228

205

43

2333

“57

169

94

576o

5i

318

3137

LIGHTHOUSE

649

a

u

X

2fi «’-i

S -Ho £

” £

revol ancls al an at St two

at—

J3 °—S £ˆ

%jli

7

w c ~ 2 —

X

..id

n S C 513

“8

Is

CI ~

•j = : aj aj rn « h 73 : ■OTj-3 3 ” 3 oM !

S S e£$£ So.°£ I E ,3 °S-JS ;

T3 C O O

O rt

ll

,J2 o

« f— * 2 1

10 (3 <"-2

■ c.« ? o’S j

•s

s s

3.2

an ~ a

-3*35

be d

34 ^ ^^S’B

3 » g -5 3 &00 1 feg’B’^SS’S!

;3b

0.2 Is 3 « o.sf s

.S 3 y a

CT3^d

£ 3 3 W

• « 2

■%Ht*

2 82-

3 3 — 00

‘■O .£*>& ft ,. — < .fi ■ O.S2 u 2

.s£“Bls

H 13 <8

Ui t* ^

£ §_£

.Si” ggQ-g

« SPd

3

>.£’*>.

raercur t super 81, sho rated b

.^.£* > H ft

bˆb 1

ftji

Tw

(

lish

flas

4J O

>£x

•2 «j u

S E

O’B

3-^ e

£ 5 3,3 a<

a in u .-

■c o.S gcqcn

«.S

> a

5 c a ˆ

«8 2-

B’SS i

•5 8S/~. ass o

■&&*

E«>

o.g

WW

•S.S.S

tio

ˆ

w

pq

<

S3

O

a3^2-

a

Si

Q

3 o

,33

i!

s u

■°£

.S o •q o

S.»,

B n

£ 8

•cs

a

suoajE^

38t:i] o_\

juaxin3

g c o £ a

-CJ3 u-iCXl N

3 o

.23S-U

- » 2 B «

a 3

>2|d

GO O SO o

E 8.

« t* ^ –

1 in

psuiujjaiap X||Bpujo

}OU J3AiOd-3|pUE3

o o o o o o

o oˆ q 6ˆ

d” o dgo o

ˆB

pouaj

ZrSl

St’ ■Sol

” o

2ˆ

5

.SB

2 id w ‘3 2cˆ w.S

3-n ＞. r£ Smg,

2

am

o

1-1

■ ■3 rt !C ■” j:j «

^^”ˆ gs ti

go jjo’S-g SOUP3CQˆ-a gT3ˆ

•a

3 as

•s-s

ills

5 Z

z: u 1 ＞.

650

LIGHTHOUSE

■o.

-ss ■5

-I

te)

■ft.

W

a

<

0 > A u, 4 >

00 00

10 o oˆo

m to O w

1 = 1

S E E i > S u

, EˆS i.S = .53

t > a v a -v u H u –

c rf c .53

u u

Je

T3 T3

s

e

E

£ E E

00 cj “15 «o : So: S: 85 u . u . u ■

5.3

u

o ■a

o u

rt ˆ P.

u aj rt c a >

•§ 3|«1fisˆ

« = 3 «•§

ITS M H W w

2 £

ˆ £ g

I*

o o

_4) – - J3 — .y *-■

c > c e |- c

§2′

o” «°

u

*3

■a

A

M v

rt

3.2

■dsJd!

tf

J! Ji d

_. U> fcO „

■2 = 3 S

<

•S a S3

g v

< a

a

6

-III

(JU

C rt

Id

Jd

3 *

8

a

E «

0”ui

d

u

§

&H

as

? ■»

3 a

M

J -o

0.3

«

■u

3 W

a

c/i J

a,

M

m

M H in

rt

pa

&

a

3

si

.3

•

H

In

fed

a

™ g 2 SS S3 «

Pi < >p;s*i u

3

OT

2i

d

rt ■ O

JK

£«

Cˆ

?;

O

l-l

J3 U

u a

«J a]

O O

1

.s

5rf

ˆ >■

PkO

w

u

ˆ

fe

Eo

LIGHTING

651

Corsica, Algeria, &c. A similar system has been established in Spain.

English Colonies. — In Canada the coast lighting is in the hands of the minister of marine, and in most other colonies the public works departments have control of lighthouse matters.

Other Countries. — In Denmark, Austria, Holland, Russia, Sweden, Norway and many other countries the minister of marine has charge of the lighting and buoying of coasts; in Belgium the public works department controls the service.

In the Trinity House Service at shore lighthouse stations there are usually two keepers, at rock stations three or four, one being ashore on leave. When there is a fog signal at a station there is usually an additional keeper, and at electric light stations a mechanical engineer is also employed as principal keeper. The crews of light-vessels as a rule consist of 1 1 men, three of them and the master or mate going on shore in rotation.

The average annual cost of maintenance of an English shore lighthouse, with two keepers, is £275. For shore lighthouses with three keepers and a siren fog signal the average cost is £444. The maintenance of a rock lighthouse with four keepers and an explosive fog signal is about £760, and an electric light station costs about £1100 annually to maintain.

A light-vessel of the ordinary type in use in the United Kingdom entails an annual expenditure on maintenance of approximately £1320, excluding the cost of periodical overhaul.

Authorities. — Smeaton, Eddystone Lighthouse (London, 1793) ; A. Fresnel, Memoire sur tin nouveau system d'eclairage des phares (Paris, 1822); R. Stevenson, Bell Rock Lighthouse (Edinburgh, 1824); Alan Stevenson, Skerryvore Lighthouse (1847); Renaud, Memoire sur I'eclairage et le balisage des cotes de France (Paris, 1 864) ; Allard, Memoire sur I'intensite et la portee des phares (Paris, 1876) ; T. Stevenson, Lighthouse Construction and Illumination (London, 1881); Allard, Memoire sur les phares electriques (Paris, 1881); Renaud, Les Phares (Paris, 1881) ; Edwards, Our Sea Marks (London, 1884); D. P. Heap, Ancient and Modern Lighthouses (Boston, 1889); Allard, Les Phares (Paris, 1889); Key, Les Progris d'eclairage des cotes (Paris, 1898) ; Williams, Life of Sir J. N. Douglass (London, 1900); J. F. Chance, The Lighthouse Work of Sir Jas. Chance (London, 1902) ; de Rochemont and Deprez, Cours des travaux maritimes, vol. ii. (Paris, 1902) ; Ribiere, Phares et Signaux maritimes (Paris, 1908) ; Stevenson, " Isle of May Lighthouse," Proc. Inst. Mech. Engineers (1887); J. N. Douglass, "Beacon Lights and Fog Signals," Proc. Roy. Inst. (1889); Ribiere, " Pro- prieties optiques des appareils des phares," Annates des ponts et chaussees (1894); Preller, "Coast Lighthouse Illumination in France," Engineering (1896); "Lighthouse Engineering at the Paris Exhibition," Engineer (1901-1902); N. G. Gedye, " Coast Fog Signals," Engineer (1902); Trans. Int. Nav. Congress (Paris, 1900, Milan, 1905); Proc. Int. Eng. Congress (Glasgow, 1901, St Louis, 1904); Proc. Int. Maritime Congress (London, 1893); J. T. Chance, " On Optical Apparatus used in Lighthouses," Proc. Inst. C.E. vol. xxvi.; J. N. Douglass, "The Wolf Rock Lighthouse," ibid. vol. xxx.; W. Douglass, "Great Basses Lighthouse," ibid. vol. xxxviii.; J. T. Chance, " Dioptric Apparatus in Lighthouses," ibid. vol. lii.; J. N. Douglass, " Electric Light applied to Lighthouse Illumination," ibid. vol. lvii. ; W. T. Douglass, " The New Eddystone Lighthouse," ibid. vol. lxxv. ; Hopkinson, " Electric Lighthouses at Macquarie and Tino," ibid. vol. lxxxvii. ; Stevenson, " Ailsa Craig Lighthouse and Fog Signals," ibid. vol. lxxxix. ; W. T. Douglass, " The Bishop Rock Lighthouses," ibid. vol. cviii. ; Brebner, " Light- house Lenses," ibid. vol. cxi.; Stevenson, " Lighthouse Refractors," ibid. vol. cxvii.; Case, " Beachy Head Lighthouse," ibid. vol. clix.; Notice sur les appareils d'eclairage (French Lighthouse Service exhibits at Chicago and Paris) (Paris, 1893 and 1900); Report on U.S. Lighthouse Board Exhibit at Chicago (Washington, 1894); Reports of the Lighthouse Board of the United States (Washington, 1852, et seq.); British parliamentary reports, Lighthouse Illuminants (1883, et seq.), Light Dues (1896), Trinity House Fog Signal Committee (1901), Royal Commission on Lighthouse Administration (1908); Memoir es de la Societe des

Ingenieurs Civils de France, Annates des ponts et chaussees (Paris) ; Proc. Inst. C.E. ; The Engineer ; Engineering {passim). (W.T. D.; N. G..G.)

LIGHTING. Artificial light is generally produced by raising some body to a high temperature. If the temperature of a solid body be greater than that of surrounding bodies it parts with some of its energy in the form of radiation. Whilst the temperature is low these radiations are not of a kind to which the eye is sensitive; they are exclusively radiations less refrang- ible and of greater wave-length than red light, and may be called infra-red. As the temperature is increased the infra-red radia- tions increase, but presently there are added radiations which the eye perceives as red light. As the temperature is further increased, the red light increases, and yellow, green and blue rays are successively thrown off. On raising the temperature to a still higher point, radiations of a wave-length shorter even than violet light are produced, to which the eye is insensitive,

but which act strongly on certain chemical substances; these may be called ultra-violet rays. Thus a very hot body in general throws out rays of various wave-length; the hotter the body the more of every kind of radiation will it throw out, but the proportion of short waves to long waves becomes vastly greater as the temperature is increased. Our eyes are only sensitive to certain of these waves, viz. those not very long and not very short. The problem of the artificial production of light with economy of energy is the same as that of raising some body to such a temperature that it shall give as large a proportion as possible of those rays which the eye is capable of feeling. For practical purposes this temperature is the highest temperature we can produce. As an, illustration of the luminous effect of the high temperature produced by converting other forms of energy into heat within a small space, consider the following statements. If burned in ordinary gas burners, 120 cub. ft. of 15 candle gas will give a light of 360 standard candles for one hour. The heat produced by the combustion is equivalent to about 60 million foot-pounds. If this gas be burned in a modern gas-engine, about 8 million foot-pounds of useful work will be done outside the engine, or about 4 horse-power for one hour. If this be used to drive a dynamo for one hour, even if the machine has an efficiency of only 80%, the energy of the current will be about 6,400,000 foot-pounds per hour, about half of which, or only 3,200,000 foot-pounds, is converted into radiant energy in the electric arc. But this electric arc will radiate a light of 2000 candles when viewed horizontally, and two or three times as much when viewed from below. Hence 3 million foot-pounds changed to heat in the electric arc may be said roughly to affect our eyes six times as much as 60 million foot-pounds changed to heat in an ordinary gas burner.

Owing to the high temperature at which it remains solid, and to its great emissive power, the radiant body used for artificial illumination is usually some form of carbon. In an oil or ordinary coal-gas flame this carbon is present in minute particles derived from the organic substances with which the flame is supplied and heated to incandescence by the heat liberated in their decomposition, while in the electric light the incandescence is the effect of the heat developed by the electric current passed through a resisting rod or filament of carbon. In some cases, however, other substances replace carbon as the radiating body; in the incandescent gas light certain earthy oxides are utilized, and in metallic filament electric lamps such metals as tungsten or tantalum.

1. Oil Lighting From the earliest times the burning of oil has been a source of light, but until the middle of the 19th century only oils of vegetable and animal origin were employed in indoor lamps for this purpose. Although many kinds were .1^", e a t used locally, only colza and sperm oils had any very «s. extended use, and they have been practically supplanted by mineral oil, which was introduced as an illuminant in 1853. Up to the latter half of the 18th century the lamps were shallow vessels into which a short length of wick dipped; the flame was smoky and discharged acrid vapours, giving the minimum of light with the maximum of smell. The first notable improve- ment was made by Ami Argand in 1784. His burner consisted of two concentric tubes between which the tubular wick was placed; the open inner tube led a current of air to play

upon the inner surface of the circular flame, whilst the combustion was materially improved by placing around the flame a chimney which rested on a perforated gallery a short distance below the burner. Argand's original burner is the parent form of innumerable modifications, all more or less comolex, such as the Carcel and the moderator.

A typical example of the Argand burner and chimney is repre- sented in fig. I, in which the burner is composed of three tubes, d, f, g- The tube g is soldered to the bottom of the tube d, just above 0, and the interval between the outer surface of the tube g and the inner surface of the tube d is an annular cylindrical cavity closed at the bottom, containing the cylindrical cotton wick im- mersed in oil. The wick is fixed to the wick tube ki, which is capable

Fig. i.

of being moved spirally ; within the annular cavity is also the tube f, which can be moved round, and serves to elevate and depress the wick. P is a cup that screws on the bottom of the tube d, and re- ceives the superfluous oil that drops down from the wick along the inner surface of the tube g. The air enters through the holes o, o, and passes up through the tube g to main- tain the combustion in the interior of the circular flame. The air which maintains the combustion on the ex- terior part of the wick enters through the holes m, with which rn is perfor- ated. When the air in the chimney is rarefied by the heat of the flame, the surrounding heavier air, entering the lower part of the chimney, passes up- ward with a rapid current, to restore the equilibrium. RG is the cylindrical glass chimney with a shoulder or constriction at R, G. The oil flows from a side reservoir, and occupies the cavity between the tubes g and d. The part ki is a short tube, which receives the circular wick, and slides spirally on the tube g, by means of a pin working in the hollow spiral groove on the ex- terior surface of g. The wick-tube has also a catch, which works in a perpen- dicular slit in the tube j_; and, by turning the tube /, the wick-tube will be raised or lowered, for which purpose a ring, or gallery, rn, fits on the tube d, and receives the glass chimney RG; a wire S is attached to the tube /, and, bending over, descends along the out- side of d. The part rn, that supports the glass chimney, is connected by four other wires with the ring g, which surrounds the tube d, and can be moved round. When rn is turned round, it carries with it the ring q, the wire S, and the tube /, thus raising or depressing the wick.

A device in the form of a small metallic disk or button, known as the Liverpool button from having been first adopted in the so-called Liverpool lamp, effects for the current of air passing up the interior of the Argand burner the same object as the constriction of the chimney RG secures in the case of the external tube. The button fixed on the end of a wire is placed right above the burner tube g, and throws out equally all round against the flame the current of air which passes up through g. The result of these expedients, when properly applied, is the production of an exceedingly solid .brilliant white light, absolutely smokeless, this showing that the combustion of the oil is perfectly accomplished.

The means by which a uniformly regulated supply of oil is brought to the burner varies with the position of the oil reservoir. In some lamps, not now in use, by ring-formed reservoirs and other ex- pedients, the whole of the oil was kept as nearly as possible at the level of the burner. In what are termed fountain reading, or study lamps, the principal reservoir is above the burner level, and various means are adopted for maintaining a supply from them at the level of the burner. But the most con- venient position for the oil reservoir in lamps for general use is directly under the burner, and

in this case the stand of the lamp itself is utilized as the oil vessel. In the case of fixed oils, as the oils of animal and vegetable origin used to be called, it is necessary with such lamps to introduce some appli- ance for forcing a supply of oil to the burner, and many methods cf effecting this were devised, most of which were ultimately superseded by the moderator lamp. TheCarccl or pump lamp, invented by B. G. Carcel in 1800, is still to some extent used in France. It consists of a double piston or pump, forcing the oil through a tube to the burner, worked by clockwork.

A form of reading lamp still in use is seen in section in fig. 2. The lamp is mounted on a standard on which it can be raised or lowered at will, and fixed by a thumb screw. The oil reservoir is in two parts, the upper ac being an inverted flask which fits into bb, from which the burner is directly fed through the tube d\ h is an overflow cup for any oil that escapes at the burner, and it is pierced

Fig.

2. — Section of Lamp.

Reading

with air-holes for admitting the current of air to the centre tube of the Argand burner. The lamp is filled with oil by withdrawing the flask ac, filling it, and inverting it into its place. The under reservoir bb fills from it to the burner level ee, on a line with the mouth of ac. So soon as that level falls below the mouth of ac, a bubble of air gets access to the upper reservoir, and oil again fills up bb to the level ee.

The moderator lamp (fig. 3), invented by Franchot about 1836, from the simplicity and efficiency of its arrangements rapidly superseded almost all other forms of mechanical lamp for use with animal and vegetable oils. The two essential features of the moderator lamp are (1) the strong spiral spring which, acting on a piston within the cylindrical reservoir of the lamp-, serves to propel the oil to the burner, and (2) the ascending tube C through which the oil passes upwards to the burner. The latter consist of two sections, the lower fixed to and passing through the piston A into the oil reservoir, and the upper attached to the burner. The lower or piston section moves within the upper, which forms a sheath enclosing nearly its whole length when the spring is fully wound up. Down the centre of the upper tube passes a wire, ” the moderator,” G, and it is by this wire that the supply of oil to the burner is regulated. The spring exerts its greatest force on the oil in the reservoir when it is fully wound up, and in proportion as it expands and descends its power decreases. But when the apparatus is wound up the wire passing down the upper tube extends throughout the whole length of the lower and narrower piston tube, obstructing to a certain extent the free flow of the oil. In proportion as the spring uncoils, the length of the wire within the lower tube is decreased ; the upward flow of oil is facilitated in the same ratio as the force urging it upwards is weakened. In all mechanical lamps the flow is in excess of the consuming capacity of the burner, and in the moderator the surplus oil, flowing over the wick, falls back into the reservoir above the piston, whence Fig. 3. — Section of Moderator Lamp, along with new supply oil it

descends into the lower side by means of leather valves a, a. B represents the rack which, with the pinion D, winds up the spiral spring hard against E when the lamp is prepared for use. The moderator wire is seen separately in GG; and FGC illustrates the arrangement of the sheathing tubes, in the upper section of which the moderator is fixed.

As early as 1781 the idea was mooted of burning naphtha, obtained by the distillation of coal at low temperatures, for illuminating purposes, and in 1820, when coal gas was struggling into prominence, light oils obtained o//s> by the distillation of coal tar were employed in the Holliday lamp, which is still the chief factor in illuminating the street barrow of the costermonger. In this lamp the coal naphtha is in a conical reservoir, from the apex of which it flows slowly down through a long metal capillary

to a rose burner, which, heated up by the flame, vaporizes the naphtha, and thus feeds the ring of small jets of flame escaping from its circumference.

It was in 1847 that James Young had his attention drawn to an exudation of petroleum in the Riddings Colliery at Alfreton, in Derbyshire, and found that he could by distillation obtain from it a lubricant of considerable value. The commercial success of this material was accompanied by a failure of the supply, and, rightly imagining that as the oil had apparently come from the Coal Measures, it might be obtained by distillation from material of the same character, Young began investigations in this direction, and in 1850 started distilling oils from a shale known as the " Bathgate mineral," in this way founding the Scotch oil industry. At first little attention was paid to the fitness of the oil for burning purposes, although in the early days at Alfreton Young attempted to burn some of the lighter distillates in an Argand lamp, and later in a lamp made many years before for the consumption of turpentine. About 1853,

however, it was noticed that the lighter distillates were being shipped to Germany, where lamps fitted for the consumption of the grades of oil now known as lamp oil were being made by Stohwasser of Berlin; some of these lamps were imported, and similar lamps were afterwards manufactured by Laidlaw in Edinburgh.

In Pennsylvania in 1859 Colonel E. L. Drake's successful bor- ing for petroleum resulted in the flooding of the market with oil at prices never before deemed possible, and led to the introduction of lamps from Germany for its consumption. Although the first American patent for a petroleum lamp is dated 1850, that year saw forty other applications, and for the next twenty years they averaged about eighty a year.

English lamp-makers were not behind in their attempts to improve on the methods in use for producing the highest results from the various grades of oil, and in 1865 Hinks introduced the duplex burner, while later improvements made in various directions, by Hinks, Silber, and Defries led to the high degree of perfection to be found in the lamps of to-day. Mineral oil for lamps as used in England at the present time may be defined as consisting of those portions of the distillate from shale oil or crude petroleum which have their flash- point above 73 F., and which are mobile enough to be fed by capillarity in sufficient quantity to the flame. The oil placed in the lamp reservoir is drawn up by the capillarity of the wick to the flame, and being there vola- tilized, is converted by the heat of the burning flame into a gaseous mixture of hydrogen and hydrocarbons, which isultimately consumed by the oxygen

in the flame to a far higher incandescence so as to secure a greater illuminating power. This in practice has been done in two ways, first by drawing in the air by the up-suck of the heated and expanded products of combustion in a chimney fitted over the flame, and secondly by creating a draught from a small clockwork fan in the base of the lamp. It is necessary to break the initial rush of the draught : this is mostly effected by disks of perforated metal in the base of the burner, called diffusers, while the metal dome which surrounds and rises slightly above the wick-holder serves to deflect the air on to the flame, as in the Wanzer lamp. These arrangements also act to a certain extent as regenerators, the air passing over the heated metal surfaces being warmed before reaching the flame, whilst disks, cones, buttons, perforated tubes, inner air-tubes, &c, have been introduced to increase the illuminating power and com- plete the combustion.

According to Sir Boverton Redwood, duplex burners which give a flame of 28 candle-power have an average oil consumption of 50 grains per candle per hour, while Argand flames of 38 candle- power consume about 45 grains of oil per candle per hour. These figures were obtained from lamps of the best types, and to obtain information as to the

efficiency of the lamps used in daily practice, a number of the most popular types were examined, using both American and Russian oil. The results obtained are embodied in Table I. The first noteworthy point in this table is the apparent superiority of the American over Russian oil in the majority of the lamps employed, and there is no doubt that the bulk of the

Table I.

Type.

Name.

Grains of Oil per candle-power per hour.

Total Candle-power.

American.

Russian.

American.

Russian.

Circular wick .

Flat wick, single .- ,, duplex

Veritas, 60-line . . . .

30

Ariel, 12-line centre draught . Reading, 14-line . . . . Kosmos, 10-line . . . . Wizard, 15-line . . . . Wanzer, no glass . . . . Solid slip, gauze and cone Old slip, fixed gauze

64-5

42-5

43-75

52-8

97-9

63-9

56-9

42-6

84-4

60-9

56-2

5i-2

II2-5

50-

58-5 70-9

85-4 97-2

5i-3

48-3 84-4 89-3 55-7 46-6

122-5 60 40 18 12

9

18

17 8

7 20 20

78 60

35 18 12

9 19 17

8

7 22 22

American oil — Sp. gr. 0-7904; flash-point, no°F. Russian oil — Sp. gr. 0-823; flash-point, 83° F.

of the air and converted into carbon dioxide and water vapour, the products of complete combustion.

To secure high illuminating power, together with a smokeless flame and only products of complete combustion, strict attention must be paid to several important factors. In the first place, the wick must be so arranged as to supply the right quantity of oil for gasification at the burner-head — the flame must be neither starved nor overfed : if the former is the case great loss of light is occasioned, while an excess of oil, by providing more hydrocarbons than the air-supply to the flame can completely burn, gives rise to smoke and products of incomplete combustion. The action of the wick depending on the capillary action of the microscopic tubes forming the cotton fibre, nothing but long-staple cotton of good quality should be employed ; this should be spun into a coarse loose thread with as little twist in it as possible, and from this the wick is built up. Having obtained a wick of soft texture and loose plait, it should be well dried before the fire, and when put in position in the lamp must fill the wick-holder without being compressed. It should be of sufficient length to reach to the bottom of the oil reservoir and leave an inch or two on the bottom. Such a wick will suck up the oil in a regular and uniform way, provided that the level of the oil is not allowed to fall too low in the lamp, but it must be remembered that the wick acts as a filter for the oil, and that if any sediment be present it will be retained by and choke the capillaries upon which the action of the wick depends, so that a wick should not be used for too long a time. A good rule is that the wick should, when new, trail for 2 in. on the bottom of the oil vessel, and should be discarded when these 2 in. have been burnt off.

When the lamp is lighted the oil burns with a heavy, smoky flame, because it is not able to obtain sufficient oxygen to complete the combustion, and not only are soot flakes produced, but products of incomplete combustion, such as carbon monoxide and even petroleum vapour, escape — the first named highly injurious to health, and the second of an offensive odour. To supply the necessary amount of air to the flame, an artificial draught has to be created which shall impinge upon the bottom of the flame and sweep up- wards over its surface, giving it rigidity, and by completing the combustion in a shorter period of time than could be done otherwise, increasing the calorific intensity and thus raising the carbon particles

lamps on the market are constructed to burn American or shale oil. A second interesting point is that with the flat-flame lamps the Russian oil is as good as the American. We have Redwood's authority, moreover, for the fact that after prolonged burning the Russian oil, even in lamps least suited to it, gives highly improved results. Although the average consumption with these lamps is close upon 60 grains per candle with American oil, yet some of the burners are so manifestly wasteful that 50 grains per candle-power per hour is the fairest basis to take for any calculation as to cost.

The dangers of the mineral oil lamp, which were a grave draw- back in the past, have been very much reduced by improvements in construction and quality, and if it were possible to abolish the cheap and dangerous rubbish sold in poor neighbourhoods, and to prevent the use of side-fillers and glass reservoirs in lamps of better quality, a still larger reduction in the number of accidents would take place. In the use of the lamp for domestic purposes only soft well-fitting wicks should be employed, and the lamp should be filled with oil each day so as never to allow it to burn too low and so leave a large space above the surface of the oil in the reservoir. The lamp should never be moved whilst alight, and it should only be put out by means of a proper extinguisher or by blowing across the top instead of down the chimney. By these means the risk of accident would be so reduced as to compare favourably with other illuminants.

Candles, oil and coal gas all emit the same products of complete combustion, viz. carbon dioxide and water vapour. The quantities of these compounds emitted from different illuminants for every candle of light per hour will be seen from the following table:

Cubic Feet per Candle.

Illuminant.

Carbon Dioxide.

Water Vaj

Sperm candle . . .

0-41

0-41

Oil lamp

0-24

0-18

Gas — Flat flame

0-26

0-67

Argand

0-17

o-45

Regenerative

0-07

0-19

Incandescent

0-03

0-08

From these data it appears that if the sanitary condition of the air of a dwelling-room be measured by the amount of carbon dioxide present, as is usually done, candles are the most prejudicial to health and comfort, oil lamps less so, and gas least, an assumption

which practical experience does not bear out. The explanation of tnis is to be found in these facts: First, where we illuminate a room with candles or oil we are contented with a less intense and more local light than when we are using gas, and in a room of ordinary size would be more likely to use a lamp or two candles than the fat higher illumination we should demand if gas were employed. Secondly, the amount of water vapour given off during the com- bustion of gas is greater than in the case of the other illuminants, and water vapour absorbing radiant heat from the burning gas becomes heated, and, diffusing itself about the room, causes great oppression. Also the air, being highly charged with moisture, is unable to take up so rapidly the water vapour which is always evaporating from the surface of our skin, and in this way the functions of the body receive a slight check, resulting in a feeling of depression.

A very successful type of oil lamp for use in engineering is represented by the Lucigen, Doty, and Wells lights, in which the oil is forced from a reservoir by air-pressure through lamps™* a s P' ra -l heated by the flame of the lamp, and the heated oil, being then ejected partly as vapour and partly as spray, burns with a large and highly luminous flame. The great drawback to these devices is that a certain proportion of the oil spray escapes combustion and is deposited in the vicinity of the light. This form of lamp is often used for heating as well as lighting; the rivets needed for the Forth Bridge were heated in trays by lamps of this type at the spot where they were required. The great advantage of these lamps was that oils of little value could be employed, and the light obtained approximated to 750 candles per gallon of oil consumed. They may to a certain extent be looked upon as the forerunners of perhaps the most successful form of, incandescent oil-burner.

As early as 1885 Arthur Kitson attempted to make a burner for heating purposes on the foregoing principle, i.e. by injecting oil applied '1 tinder pressure from a fine tube into a chamber to laeaa- where it would be heated by the waste heat escaping descent from the flame below, the vapour so produced being lighting. mac i e to issue from a small jet under the pressure caused by the initial air-pressure and the expansion in the gasifying tube. This jet of gas was then led into what was practically an atmospheric burner, and drew in with it sufficient air to cause its combustion with a non-luminous blue flame of great heating power. At the time when this was first done the Welsbach mantle had not yet reached the period of com- mercial utility, and attempts were made to use this flame for the generation of light by consuming it in a mantle of fine platinum gauze, which, although giving a very fine illuminating effect during the first few hours, very soon shared the fate of all platinum mantles — that is, carbonization of the platinum surface took place, and destroyed its power of light emissivity. It was not until 1893 that the perfecting of the Welsbach mantle enabled this method of consuming the oil to be employed. The Kitson lamp, and also the Empire lamp on a similar principle, have given results which ought to ensure their future success, the only drawback being that they need a certain amount of intelligent care to keep them in good working order.

Oil gas and oil vapours differ from coal gas merely in the larger proportion and greater complexity of the hydrocarbon lacan- molecules present, and to render the oil flame avail- deseent able for incandescent lighting it is only necessary to table- cause the oil gas or vapour to become mixed with a lamps. sufficient proportion of air before it arrives at the point of combustion. But with gases so rich in hydrocarbons as those developed from oil it is excessively difficult to get the necessary air intimately and evenly mixed with the gas in sufficient proportion to bring about the desired result. If even coal gas be taken and mixed with 2-27 volumes of air, its luminosity is destroyed, but such a flame would be useless with the incandescent mantle, as if the non-luminous flame be superheated a certain proportion of its luminosity will re- appear. When such a flame is used with a mantle the super- heating effect of the mantle itself very quickly leads to the decomposition of the hydrocarbons and blackening of the mantle, which not only robs it of its light-giving powers, but also rapidly ends its life. If, however, the proportion of air be increased, the appearance of the flame becomes considerably

altered, and the hydrocarbon molecules being burnt up before impact with the heated surface of the mantle, all chance of blackening is avoided.

On the first attempts to construct a satisfactory oil lamp which could be used with the incandescent mantle, this trouble showed itself to be a most serious one, as although it was comparatively easy so to regulate a circular-wicked flame fed by an excess of air as to make it non-luminous, the moment the mantle was put upon this, blackening quickly appeared, while when methods for obtaining a further air supply were devised, the difficulty of producing a flame which would burn for a considerable time without constant necessity for regulation proved a serious drawback. This trouble has militated against most of the incandescent oil lamps placed upon the market.

It soon became evident that if a wick were employed the difficulty of getting it perfectly symmetrical was a serious matter, and that it could only be utilized in drawing the oil up to a heating chamber where it could be volatilized to produce the oil gas, which on then being mixed with air would give the non-luminous flame. In the earlier forms of incandescent oil lamps the general idea was to suck the oil up by the capillarity of a circular wick to a point a short distance below the opening of the burner at which the flame was formed, and here the oil was vaporized or gasified by the heat of the head of the burner. An air supply was then drawn up through a tube passing through the centre of the wick-tube, while a second air current was so arranged as to discharge itself almost horizontally upon the burning gas below the cap, in this way giving a non- luminous and very hot flame, which if kept very carefully adjusted afforded excellent results with an incandescent mantle. It was an arrangement somewhat of this character that was introduced by the Welsbach Company. The lamps, however, required such careful attention, and were moreover so irregular in their performance, that they never proved very successful. Many other forms have reached a certain degree of perfection, but have not so far attained sufficient regularity of action to make them commercial successes. One of the most successful was devised by F. Altmann, in which an in- genious arrangement caused the vaporization of oil and water by the heat of a little oil lamp in a lower and separate chamber, and the mixture of oil gas and steam was then burnt in a burner-head with a special arrangement of air supply, heating a mantle sus- pended above the burner-head.

The perfect petroleum incandescent lamp has not yet been made, but the results thus obtained show that when the right system has been found a very great increase in the amount of light developed from the petroleum may be expected. In one lamp experimented with for some time it was easy to obtain 3500 candle hours per gallon of oil, or three times the amount of light obtainable from the oil when burnt under ordinary conditions.

Before the manufacture of coal-gas had become so universal as it is at present, a favourite illuminant for country mansions and even villages where no coal-gas was available was a mixture of air with the vapour of very volatile hydrocarbons, which is

generally known as ” air-gas.” This was produced by passing a current of dry air through or over petroleum spirit or the light hydrocarbons distilled from tar, when sufficient of the hydrocarbon was taken up to give a luminous flame in flat flame and Argand burners in the same way as coal-gas, the trouble being that it was difficult to regulate the amount of hydrocarbon held in suspension by the air, as this varied very widely with the temperature. As coal-gas spread to the smaller villages and electric lighting became utilized in large houses, the use of air-gas died out, but with the general introduction of the incandescent mantle it again came to the front. In the .earlier days of this revival, air-gas rich in hydrocarbon vapour was made and was further aerated to give a non-luminous flame by burning it in an atmospheric burner.

One of the best illustrations of this system was the Aerogene gas introduced by A. I. van Vriesland, which was utilized for lighting a number of villages and railway stations on the continent of Europe. In this arrangement a revolving coil of pipes continually dips into petroleum spirit contained in a cylinder, and the air passed into the cylinder through the coil of pipes becomes highly carburetted by the time it reaches the outlet at the far end of the cylinder. The resulting gas when burnt in an ordinary burner gives a luminous flame; it can be used in atmospheric burners differing little from those of the ordinary type. With an ordinary Welsbach ” C ” burner it gives a duty of about 30 candles per foot of gas consumed, the high illuminating power being due to the fact that the gas is under a pressure of from 6 to 8 in. With such a gas, containing a considerable percentage of hydrocarbon vapour, any leakage into the air of a room would give rise to an explosive mixture, in the same way that coal-gas would do, but inasmuch as mixtures of the vapour of petroleum spirit and air are only explosive for a very short range, that is, from 1-25 to 5-3%, some systems have been

Air-gas.

introduced in which by keeping the amount of petroleum vapour at 2 % and burning the gas under pressure in a specially constructed non-aerating mantle burner, not only has it been found possible to produce a very large volume of gas per gallon of spirit employed, but the gas is itself non-explosive, increase in the amount of air taking it farther away from the explosive limit. The Hooker, De Laitte and several other systems have been based upon this principle.

2. Gas Lighting

In all measurements of illuminating value the standard of comparison used in England is the light yielded by a sperm candle of the size known as ” sixes,” i.e. six to the pound, consuming 1 20 grains of sperm per hour, and although in photo- metric work slight inequalities in burning have led to the candle being discarded in practice, the standard lamps burning pentane vapour which have replaced them are arranged to yield a light of ten candles, and the photometric results are expressed as before in terms of candles.

When William Murdoch first used coal-gas at his Redruth home in 1779, he burnt the gas as it escaped from the open end of a small iron tube, but soon realizing that this plan en- tailed very large consumption of gas and gave a very small amount of light, he welded up the end of his tube and bored three small holes in it, so arranged that they formed three divergent jets of flame. From the shape of the flame so produced this burner received the name of the ” cockspur ” burner, and it was the one used by Murdoch when in 1807 he fitted up an installation of gas lighting at Phillips & Lee’s works in Manchester. This — the earliest form of gas burner — gave an illuminating value of a little under one candle per cubic foot of gas consumed, and this duty was slightly increased when the burner was improved by flattening up the welded end of

the tube and making a series of small holes in line and close together, the jets of flame from which gave the burner the name of the " cockscomb." It did not need much inventive faculty to replace the line of holes by a saw-cut, the gas issuing from which burnt in a sheet, the shape of which led to the burner being called the " batswing." This was followed in 1820 by the discovery of J. B. Neilson, of Glasgow, whose name is remembered in connexion with the use of the hot-air blast in iron-smelting, that, by allowing two flames to impinge upon one another so as to form a flat flame, a slight increase in luminosity was obtained, and after several preliminary stages the union jet or " fishtail " burner was produced. In this form of burner two holes, bored at the necessary angle in the same nipple, caused two streams of gas to impinge upon each other so that they flattened themselves out into a sheet of flame. The flames given by the batswing and fishtail burners differed in shape, the former being wide and of but little height, whilst the latter was much higher and more narrow. This factor ensured for the fishtail a greater amount of popularity than the batswing burner had obtained, as the flame was less affected by draughts and could be used with a globe, although the illuminating efficiency of the two burners differed little.

In a lecture at the Royal Institution on the 20th of May 1853, Sir Edward Frankland showed a burner he had devised for utilizing the heat of the flame k to raise the tempera- Regeaera- ture f tne a ; r su p p iy necessary for the combustion burner. of the gas. The burner was an Argand of the type then in use, consisting of a metal ring pierced with holes so as to give a circle of small jets, the ring of flame being surrounded by a chimney. But in addition to this chimney, Frankland added a second external one, extending some distance below the first and closed at the bottom by a glass plate fitted air-tight to the pillar carrying the burner. In this way the air needed for the combustion of the gas had to pass down the space between the two chimneys, and in so doing became highly heated, partly by contact with the hot glass, and partly by radiation. Sir Edward Frankland estimated that the tempera- ture of the air reaching the flame was about 5oo°F. In 1854 a very similar arrangement was brought forward by the Rev. W. R. Bowditch, and, as a large amount of publicity was given to it, the inception of the regenerative burner was

generally ascribed to Bowditch, although undoubtedly due to Frankland.

The principle of regeneration was adopted in a number of lamps, the best of which was brought out by Friedrich Siemens in 1879. Although originally made for heating purposes, the light given by the burner was so effective and superior to any- thing obtained up to that time that it was with some slight alterations adapted for illuminating purposes.

Improvements followed in the construction and design of the regenerative lamp, and when used as an overhead burner it was found that not only was an excellent duty obtained per cubic foot of gas consumed, but that the lamp could be made a most efficient engine of ventilation, as an enormous amount of vitiated air could be withdrawn from the upper part of a room through a flue in the ceiling space. So marked was the increase in light due to the regeneration that a considerable number of burners working on this principle were introduced, some of them like the Wenham and Cromartie coming into extensive use. They were, however, costly to instal, so that the flat flame burner retained its popularity in spite of the fact that its duty was comparatively low, owing to the flame being drawn out into a thin sheet and so exposed to the cooling influence of the atmo- sphere. Almost at the same time that Murdoch was introducing the cockscomb and cockspur burners, he also made rough forms of Argand burner, consisting of two concentric pipes between which the gas was led and burnt with a circular flame. This form was soon improved by filling in the space between the tubes with a ring of metal, bored with fine holes so close together that the jets coalesced in burning and gave a more satisfactory flame, the air necessary to keep the flame steady and ensure complete combustion being obtained by the draught created by a chimney placed around it. When it began to be recognized that the temperature of the flame had a great effect upon the amount of light emitted, the iron tips, which had been universally em- ployed, both in flat flame and Argand

burners, were replaced by steatite or other non-conducting material of similar character, to prevent as far as possible heat from being withdrawn from the flame by conduction.

In 1880 the burners in use for coal-gas therefore consisted of flat flame, Argand, and regenerative burners, and the duty given by them with a 16-candle gas was as follows: —

Candle units

per cub. ft.

Burner.

of gas.

Union jet flat flame,

No.

o-59

,, >■

1

0-85

1!

,

2

1-22

,,

i

3

1-63

,,

j

4

1-74

,,

1

5

1-87

,,

>

6

2-15

,,

,

7

2-44

Ordinary Argand

2-90.

Standard Argand

3-20′

Regenerative

7 to 10

The luminosity of a coal-gas flame depends upon the number of carbon particles liberated within it, and the temperature to which they can be heated. Hence the light given by a flame of coal-gas can be augmented by (1) increasing the number of the carbon particles, and (2) raising the temperature to which they are exposed. The first process is carried out by enrichment (see Gas: Manufacture), the second is best obtained by regenera- tion, the action of which is limited by the power possessed by the material of which burners are composed to withstand the superheating. Although with a perfectly made regenerative burner it might be possible for a short time to get a duty as high as 16 candles per cubic foot from ordinary coal-gas, such a burner constructed of the ordinary materials would last only a few hours, so that for practical use and a reasonable life for the burner 10 candles per cubic foot was about the highest commercial duty that could be reckoned on. This limitation naturally caused inventors to search for methods by which the emission of light could be obtained from coal-gas otherwise than by the incandescence of the carbon particles contained within the

flame itself. A coal-gas flame consumed in an atmospheric burner under the conditions necessary to develop its maximum heating power could be utilized to raise to incandescence particles having a higher emissivity for light than carbon. This led to the gradual evolution of incandescent gas lighting.

Long before the birth of the Welsbach mantle it had been known that when certain unburnable refractory substances were heated to a high temperature they emitted light, /nca/i- an(j Goldsworthy Gurney in 1826 showed that a gas light, cylinder of lime could be brought to a state of dazzling brilliancy by the flame of the oxy-hydrogen blowpipe, a fact which was utilized by Thomas Drummond shortly after- wards in connexion with the Ordnance Survey of Ireland. The mass of a lime cylinder is, however, relatively very considerable, and consequently an excessive amount of heat has to be brought to bear upon it, owing to radiation and conduction tending to dissipate the heat. This is seen by holding in the flame of an atmospheric burner a coil of thick platinum wire, the result being that the wire is heated to a dull red only. With wire of medium thickness a bright red heat is soon attained, and a thin wire glows with a vivid incandescence, and will even melt in certain parts of the flame. Attempts were

accordingly made to reduce the mass of the material heated, and this form of lighting was tried in the streets of Paris, buttons of zirconia and magnesia being heated by an oxy-coal-gas flame, but the attempt was soon abandoned owing to the high cost and constant renewals needed. In 1835 W. H. Fox Talbot discovered that even the feeble flame of a spirit lamp is sufficient to heat lime to incan- descence, provided the lime be in a sufficiently fine state of division. This condition he fulfilled by soaking blotting-paper in a solution of a calcium salt and then incinerating it. Up to 1848, when J. P. Gillard introduced the intermittent process of making water-gas, the spirit flame and oxy-hydrogen flame were alone free from carbon particles. Desiring to use the water-gas for lighting as well as heating purposes Gillard made a mantle of fine platinum gauze to fit over the flame, and for a time obtained excellent results, but after a few days the lighting value of the mantle fell away gradually until it became useless, owing to the wire becoming eroded on the surface by the flame gases. This idea has been revived at intervals, but the trouble of erosion has always led to failure.

The next important stage in the history of gas lighting was the discovery by R.W. von Bunsen about 1855 of the atmospheric burner, in which a non-luminous coal-gas flame is obtained by causing the coal-gas before its combustion to mix with a certain amount of air. This simple appliance has opened up for coal-gas a sphere of usefulness for heating purposes as important as its use for lighting. After the introduction of the atmospheric burner the idea of the incandescent mantle was revived early in the eighties by the Clamond basket and a resuscitation of the platinum mantle. The Clamond basket or mantle, as shown at the Crystal Palace exhibition of 1882-1883, consisted of a cone of threads of calcined magnesia. A mixture of magnesium hydrate and acetate, converted into a paste or cream by means of water, was pressed through holes in a plate so as to form threads, and these, after being moulded to the required shape, were ignited. The heat decomposed the acetate to form a luting material which glued the particles of magnesium oxide produced into a solid mass, whilst the hydrate gave off water and became oxide. The basket was supported with its apex down- wards in a little platinum wire cage, and a mixture of coal-gas and air was driven into it under pressure from an inverted blowpipe burner above it.

The Welsbach mantle was suggested by the fact that Auer von Welsbach had been carrying out researches on the rare earths, with constant use of the spectroscope. Desiring to obtain a better effect than that produced by heating his material on a platinum wire, he immersed cotton in a solution of the metallic salt, and after burning off the organic matter found that a replica of the original thread, composed of the oxide of the metal, was left, and that it glowed brightly in the flame. From this he evolved the idea of utilizing a fabric of cotton soaked

in a solution of a metallic salt for lighting purposes, and in 1885 he patented his first commercial mantle. The oxides used in these mantles were zirconia, lanthania, and yttria, but these were so fragile as to be practically useless, whilst the light they emitted was very poor. Later he found that the oxide of thorium • — thoria — in conjunction with other rare earth oxides, not only increased the light-giving powers of the mantle, but added considerably to its strength, and the use of this oxide was pro- tected by his 1886 patent. Even these mantles were very unsatisfactory until it was found that the purity of the oxides had a wonderful effect upon the amount of light, and finally came the great discovery that it was a trace of ceria in admixture with the thoria that gave the mantle the marvellous power of emitting light.

Certain factors limit the number of oxides that can be used in the manufacture of an incandescent mantle. Atmospheric influences must not have any action upon them, and they must be sufficiently refractory not to melt or even soften to any extent at the temperature of the flame; they must also be non- volatile, whilst the shrinkage during the process of ” burning off ” must not be excessive. The following table gives the light-emissivity from pure and commercial samples of the oxides which most nearly conform to the above requirements; the effect of impurity upon the lighting power will be seen to be most marked.

Pure. Commercial. Metals —

Zirconia 1*5 3′ 1

Thoria 0-5 6-o

Earth metals —

Cerite earths — Ceria 0-4 0-9

Lanthania .... 6-o Yttrite earths — Yttria .... 3 -2 Erbia . . . . o-6 1-7 Common earths — Chromium oxide . 0-4 0-4 Alumina . . .0-6 o-6 Alkaline earth metals- Baryta 3-3 3-3

Strontia 5-2 5-5

Magnesia 5-0 5-0

Of these oxides thoria, when tested for shrinkage, duration and strength, stands pre-eminent. It is also possible to employ zirconia and alumina. Zirconia has the drawback that in the hottest part of the flame it is liable not only to shrinkage and semi-fusion, but also to slow volatilization, and the same objections hold good with respect to alumina. With thoria the shrinkage is smaller than with any other known substance, and it possesses very high refractory powers.

The factor which gives thoria its pre-eminence as the basis of the mantle is that in the conversion of thorium nitrate into thorium oxide by heat, an enormous expansion takes place, the oxide occupying more than ten times the volume of the nitrate. This means that the mass is highly spongy, and contains an enormous number of little air-cells which must render it an excellent non-conductor. A mantle made with thoria alone gives practically no light. But the power of light-emissivity is awakened by the addition of a small trace of ceria ; and careful experiment shows that as ceria is added to it little by little, the light which the mantle emits grows greater and greater, until the ratio of 99 % of thoria and I % of ceria is reached, when the maximum illuminating effect is obtained. The further addition of ceria causes gradual diminution of light, until, when with some 10% of ceria has been added, the light given by the mantle is again almost inappreciable. When cerium nitrate is converted by heat into cerium oxide, the expansion which takes place is practically nil, the ceria obtained from a gramme of the nitrate occupying about the same space as the original nitrate. Thus, although by weight the ratio of ceria to thoria is as 1 : 99, by volume it is only as 1 : 999.

The most successful form of mantle is made by taking a cylinder of cotton net about 8 in. long, and soaking it in a solution of nitrates of the requisite metals until the microscopic fibres of the cotton are entirely filled %£um 0/ with liquid. A longer soaking is not advantageous, mantles. as the acid nature of the liquid employed tends to weaken the fabric and render it more delicate to handle. The cotton is then wrung out to free it from the excess of liquid, and one end is sewn together with an asbestos thread, a loop of the same material or of thin platinum wire being fixed across the constricted portion to provide a support by which the mantle may be held by the carrying rod, which is either external to the mantle, or (as is most often the case) fixed centrally in the burner head. It is then ready for ” burning off,” a process in which the organic matter is removed and the nitrates are

converted into oxides. The flame of an atmospheric burner is first applied to the constricted portion at the top of the mantle, whereupon the cotton gradually burns

downwards, the shape of the mantle to a great extent depending on the regularity with which the combustion takes place. A certain amount of carbon is left behind after the flame has died out, and this is burnt off by the judicious application of a flame from an atmospheric blast burner to the interior. The action which takes place during the burning off is as follows: The cellulose tubes of the fibre are filled with the crystallized nitrates of the metals used, and as the cellulose burns the nitrates decompose, giving up oxygen and forming fusible nitrites, which in their semi- liquid condition are rendered coherent by the rapid expansion as the oxide forms. As the action continues the nitrites become oxides, losing their fusibility, so that by the time the organic matter has disappeared a coherent thread of oxide is left in place of the nitrate-laden thread of cotton. In the early days of incandescent lighting the mantles had to be sent out unburnt, as no process was known by which the burnt mantle could be rendered sufficiently strong to bear carriage. As the success of a mantle depends upon its fitting the flame, and as the burn- ing off requires considerable skill, this was a great difficulty. Moreover the acid nature of the nitrates in the fibres rapidly rotted them, unless they had been subjected to the action of ammonia gas, which neutralized any excess of acid. It was dis- covered, however, that the burnt-off mantle could be temporarily strengthened by dipping it in collodion, a solution of soluble guncotton in ether and alcohol together with a little castor-oil or similar material to prevent excessive shrinkage when drying. When the mantle was removed from the solution a thin film of solid collodion was left on it, and this could be burned away when required.

After the Welsbach mantle had proved itself a commercial success many attempts were made to evade the monopoly created under the patents, and, although it was found impossible to get the same illuminating power with anything but the mixture of 99% thoria and 1 % ceria, many ingenious processes were devised which re- sulted in at least one improvement in mantle manufacture. One of the earliest attempts in this direction was the ” Sunlight ” mantle, in which cotton was saturated with the oxides of aluminium, chromium and zirconium, the composition of the burnt-off mantle being: —

Alumina Chromium oxide Zirconia

86-88 8-68 4-44

100-00

The light given by these mantles was entirely dependent upon the proportion of chromium oxides present, the alumina playing the part of base in the same way that the thoria does in the Welsbach mantle, the zirconia being added merely to strengthen the structure. These mantles enjoyed considerable popularity owing to the yellowish pink light they emitted, but, although they could give an initial illumination of 12 to 15 candles per foot of gas consumed, they rapidly lost their light-giving power owing to the slow volatilization of the oxides of chromium and aluminium.

Another method of making the mantle was first to produce a basis of thoria, and, having got the fabric in thorium oxide, to coat it with a mixture of 99 % thoria and 1 % ceria. This modification seems to give an improvement in the initial amount of light given by the mantle. In the Voelker mantle a basis of thoria was pro- duced, and was then coated by dipping in a substance termed by the patentee ” Voelkerite,” a body made by fusing together a number of oxides in the electric furnace. The fused mass was then dissolved in the strongest nitric acid, and diluted with absolute alcohol to the necessary degree. A very good mantle having great lasting power was thus produced. It was claimed that the process of fusing the materials together in the electric furnace altered the composition in some unexplained way, but the true explanation is probably that all water of hydration was eliminated.

The ” Daylight ” mantle consisted of a basis of thoria or thoria mixed with zirconia, dipped in collodion containing a salt of cerium in solution; on burning off the collodion

the ceria was left in a finely divided condition on the surface of the thoria. In this way a very high initial illuminating power was obtained, which, however, rapidly fell as the ceria slowly volatilized.

Perhaps the most interesting development of the Welsbach pro- cess was dependent upon the manufacture of filaments of soluble guncotton or collodion as in the production of artificial silk. In general the process consisted in forcing a thick solution of the nitrated cellulose through capillary glass tubes, the bore of which

was less than the one-hundredth of a millimetre. Ten or twelve of the expressed fibres were then twisted together and wound on a bobbin, the air of the room being kept sufficiently heated to cause the drying of the filaments a few inches from the orifice of the tube. The compound thread was next denitrated to remove its extreme inflammability, and for this purpose the skeins were dipped in a solution of (for instance) ammonium sulphide, which converted them into ordinary cellulose. After washing and drying the skeins were ready for the weaving machines. In 1894 F. de Mare utilized collodion for the manufacture of a mantle, adding the necessary salts to the collodion before squeezing it into threads. O. Knofler in 1895, and later on A. Plaissetty, took out patents for the manu- facture of mantles by a similar process to De Mare's, the difference between the two being that Knofler used ammonium sulphide for the denitration of his fabric, whilst Plaissetty employed calcium sulphide, the objection to which is the trace of lime left in the material. Another method for making artificial silk which has a considerable reputation is that known as the Lehner process, which in its broad outlines somewhat resembles the Chardonnet, but differs from it in that the excessively high pressures used in the earlier method are done away with by using a solution of a more liquid character, the thread being hardened by passing through certain organic solutions. This form of silk lends itself perhaps better to the carrying of the salts forming the incandescent oxides than the previous solutions, and mantles made by this process, known as Lehner mantles, showed promise of being a most important develop- ment of De Mare's original idea. Mantles made by these processes show that it is possible to obtain a very considerable increase in life and light-emissivity, but mantles made on this principle could not now be sold at a price which would enable them to compete with mantles of the Welsbach type.

The cause of the superiority of these mantles having been realized, developments in the required direction were made. The structure of the cotton mantle differed widely from that obtained by the various collodion processes, and this alteration in structure was mainly responsible for the increase in life. Whereas the average of a large number of Welsbach mantles tested only showed a useful life of 700 to 1000 hours, the collodion type would average about 1500 hours, some mantles being burnt for an even longer period and still giving an effective illumination. This being so, it was clear that one line of advance would be found in obtaining some material which, whilst giving a structure more nearly approaching that of the collodion mantle, would be sufficiently cheap to compete with the Welsbach mantle, and this was successfully done.

By the aid of the microscope the structure of the mantle can be clearly defined, and in examining the Welsbach mantle before and after burning, it will be noticed that the cotton thread is a closely twisted and plaited rope of myriads of minute fibres, whilst the collodion mantle is a bundle of separate filaments without plait or heavy twisting, the number of such filaments varying with the pro- cess by which it was made. This latter factor experiment showed to have a certain influence on the useful light-giving life of the mantle, as whereas the Knofler and Plaissetty mantles had an average life of about 1500 hours, the Lehner fabric, which contained a larger number of finer threads, could often be burnt continuously for over 3000 hours, and at the end of that period gave a better light than most of the Welsbach after as many hundred.

It is well known that plaiting gave the cotton candle-wick that power of bending over, when freed from the binding effect of the candle material and influenced by heat, which brought the tip out from the side of the flame. This, by enabling the air to get at it and burn it away, removed the nuisance of having to snuff the candle, which for

many centuries has rendered it a tiresome method of lighting. In the cotton mantle, the tight twisting of the fibre brings this torsion into play. When the cotton fibres saturated with the nitrates of the rare metals are burnt off, and the conversion into oxides takes place, as the cotton begins to burn, not only does the shrinkage of the mass throw a strain on the oxide skeleton, but the last struggle of torsion in the burning of the fibre tends towards disintegration of the fragile mass, and this all plays a part in making the cotton mantle inferior to the collodion type.

If ramie fibre be prepared in such a way as to remove from it all traces of the glutinous coating, a silk-like fabric can be obtained from it, and if still further prepared so as to improve its absorbent powers, it can be formed into mantles having a life considerably greater than is possessed by those of the cotton fabric. Ramie thus seemed likely to yield a cheap competitor in length of en- durance to the collodion mantle, and results have justified this expectation. By treating the fibre so as to remove the objections against its use for mantle-making, and then making it into threads with the least possible amount of twist, a mantle fabric can be made in every way superior to that given by cotton.

The Plaissetty mantles, which as now manufactured also show a considerable advance in life and light over the original Welsbach mantles, are made by impregnating stockings of either cotton or ramie with the nitrates of thorium and cerium in the usual way, and, before burning off, mercerizing the mantle by steeping in ammonia solution, which converts the nitrates into hydrates, and gives greater density and strength to the finished mantle. The manu- facturers of the Plaissetty mantle have also made a modification

in the process by which the saturated fabric can be so prepared as to be easily burnt off by the consumer on the burner on which it is to be used, in this way doing away with the initial cost of burning off, shaping, hardening and collodionizing.

Since 1897 inventions have been patented for methods of intensifying the light produced by burning gas under a mantle and increasing the light generated per unit volume Intensify- f g as The systems have either been self-intensifying systems. or nave depended on supplying the gas (or gas and air) under an increased pressure. Of the self -intensifying systems those of Lucas and Scott-Snell have been the most successful. A careful study has been made by the inventor of the Lucas light of the influence of various sizes and shapes of chimneys in the production of draught. The specially formed chimney used exerts a suction on the gas flame and air, and the burner and mantle are so constructed as to take full advantage of the increased air supply, with the result that the candle power given by the mantle is considerably augmented. With the Scott- Snell system the results obtained are about the same as those given by the Lucas light, but in this case the waste heat from the burner is caused to operate a plunger working in the crown of the lamp which sucks and delivers gas to the burner. Both these systems are widely used for public lighting in many large towns of the United Kingdom and the continent of Europe.

The other method of obtaining high light-power from incan- descent gas burners necessitates the use of some ˆorm of motive power in order to place the gas, or both gas and air, under an increased pressure. The gas compressor is worked by a water motor, hot air or gas engine; a low pressure water motor may be efficiently driven by water from the main, but with large installations it is more economical to drive the compressor by a gas engine. To overcome the intermittent flow of gas caused by the stroke of the engine, a regulator on the floating bell principle is placed after the compressor; the pressure of gas in the apparatus governs automatically the flow of gas

to the engine. With the Sugg apparatus for high power lighting the gas is brought from the district pressure, which is equal to about i\ in. of water, to an average of 12 in. water pressure. The light obtained by this system when the gas pressure is 95 in. is 300 candle power with an hourly consumption of 10 cub. ft. of gas, equivalent to 30 candles per cubic foot, and with a gas pressure equal to 14 in. of water 400 candles are obtained with an hourly consumption of 125 cub. ft., which represents a duty of 32 candles per cubic foot of gas consumed. High pressure incandescent lighting makes it possible to burn a far larger volume of gas in a given time under a mantle than is the case with low pressure lighting, so as to create centres of high total illuminating value to compete with arc lighting in the illumina- tion of large spaces, and the Lucas, Keith, Scott-Snell, Millennium, Selas, and many other pressure systems answer most admirably for this purpose.

The light given by the ordinary incandescent mantle burning in an upright position tends rather to the upward direction, because owing to the slightly conical shape of the burners, mantle the maximum light is emitted at an angle a little above the horizontal. Inasmuch as for working purposes the surface that a mantle illuminates is at angles below 45° from the horizontal, it is evident that a considerable loss of efficient lighting is brought about, whilst directly under the light the burner and fittings throw a strong shadow. To avoid this trouble attempts have from time to time been made to produce inverted burners which should heat a mantle sus- pended below the mouth of the burner. As early as 1882 Clamond made what was practically an inverted gas and air blowpipe to use with his incandescent basket, but it was not until 1900-1901 that the inverted mantle became a possibility. Al- though there was a strong prejudice against it at first, as soon as a really satisfactory burner was introduced, its success was quickly placed beyond doubt. The inverted mantle has now proved itself one of the chief factors in the enormous success achieved by incandescent mantle lighting, as the illumination

given by.it is far more efficient than with the upright mantle, and it also lends itself well to ornamental treatment.

When the incandescent mantle was first introduced in 1886 an ordinary laboratory Bunsen burner was experimentally employed, but unless a very narrow mantle just _ fitting the top of the tube was used the flame could not be got to fit the mantle, and it was only the extreme outer edge of the flame which endowed the mantle fabric with the high incandescent. A wide burner top was then placed on the Bunsen tube so as to spread the flame, and a larger mantle became possible, but it was then found that the slowing down of the rate of flow at the mouth of the burner owing to its enlarge- ment caused flashing or firing back, and to prevent this a wire gauze covering was fitted to the burner head; and in this way the 1886-1887 commercial Welsbach burner was produced. The length of the Bunsen tube, however, made an unsightly fitting, so it was shortened, and the burner head made to slip over it, whilst an external lighting back plate was added. The form of the " C " burner thus arrived at has undergone no important furthe/ change. When later on it was desired to make incan- descent mantle burners that should not need the aid of a chimney to increase the air supply, the long Bunsen tube was reverted to, and the Kern, Bandsept, and other burners of this class all have a greater total length than the ordinary burners. To secure proper mixing of the air and gas, and to prevent flashing back, they all have heads fitted with baffles, perforations, gauze, and other devices which oppose considerable resistance to the flow of the stream of air and gas.

In 1900, therefore, two classes of burner were in commercial existence for incandescent lighting — (1) the short burner with chimney, and (2) the long burner without chimney. Both classes had the burner mouth closed with gauze or similar device, and both needed as an essential that the mantle should fit closely to the burner head.

Prior to 1900 attempts had been made to construct a burner in which an incandescent mantle should be suspended head downwards. Inventors all turned to the overhead

regenerative gas lamps of the Wenham type, or the inverted blowpipe used by Clamond, and in attempting to make an inverted Bunsen employed either artificial pressure to the gas or the air, or to both, or else enclosed the burner and mantle in a globe, and by means of a long chimney created a strong draught. These burners also were all regenerative and aimed at heating the air or gas or mixture of the two, and they had the further drawback of being complicated and costly. Regeneration is a valuable adjunct in ordinary gas lighting as it increases the actions that liberate the carbon particles upon which the luminosity of a flame is dependent, and also increases the temperature; but with the mixture of air and gas in a Bunsen regeneration is not a great gain when low and is a drawback when intense, because in- cipient combination is induced between the oxygen of the air and the coal-gas before the burner head is reached, the proportions of air and gas are disturbed, and the flame instead of being non- luminous shows slight luminosity and tends to blacken the mantle. The only early attempt to burn a mantle in an inverted position without regeneration or artificial pressure or draught was made by H. A. Kent in 1897, and he used, not an inverted Bunsen, but one with the top elongated and turned over to form a siphon, so that the point of admixture of air and gas was below the level of the burner head, and was therefore kept cool and away from the products of combustion.

In 1900 J. Bernt and E. Cervenka set themselves to solve the problem of making a Bunsen burner which should consume gas under ordinary gas pressure in an inverted mantle. They took the short Bunsen burner, as found in the most commonly used upright incandescent burners, and fitted to it a long tube, preferably of non-conducting material, which they called an isolator, and which is designed to keep the flame at a distance from the Bunsen. They found that it burnt fairly well, and that the tendency of the flame, to burn or lap back was lessened, but that the hot up-current of heated air and products of com- bustion streamed up to the air holes of the Bunsen, and by contaminating the air supply caused the flame to pulsate. They then fixed an inverted cone on the isolator to throw the products of combustion outwards and away from the air holes, and found that the addition of this ” deflecting cone ” steadied the flame. Having obtained a satisfactory flame, they attacked

the problem of the burner head. Experiments showed that the burner head must be not only open but also of the same size or smaller than the burner tube, and that by projecting it downwards into the mantle and leaving a space between the mantle and the burner head the maximum mantle surface heated to incandescence was obtained. It was also found that the distance which the burner head projects into the mantle is equivalent to the same amount of extra water pressure on the gas, and with a long mantle it was found useful under certain conditions to add a cylinder or sleeve with perforated sides to carry the gas still lower into the mantle. The principles thus set forth by Kent, Bernt and Cervenka form the basis of construction of all the types of inverted mantle burners which so greatly increased the popularity of incandescent gas lighting at the beginning of the 20th century, whilst improvements in the shape of the mantle for inverted lighting and the methods of attachment to the burner have added to the success achieved. The wonderful increase in the amount of light that can be obtained from gas by the aid of the incandescent gas mantle is realized when one compares the 1 to 3-2 candles per cubic foot given by the burners used in the middle of the 19th century with the duty of incandescent burners, as shown in the following table:—

Light yielded per cubic foot of Gas.

Burner. Candle power.

Low pressure upright incandescent burners . 15 to 20 candles

Inverted burners 14 to 21 „

Kern burners 20 to 24 ,,

High pressure burners 22 to 36 „

~ (V. B. L.)

3. Electric Lightimg.

Electric lamps are of two varieties: (1) Arc Lamps and (2) Incandescent or Glow Lamps. Under these headings we may briefly consider the history, physical principles, and present practice of the art of electric lighting.

1. Arc Lamps.— 11 a voltaic battery of a large number of cells has its terminal wires provided with rods of electrically- conducting carbon, and these are brought in contact and then slightly separated, a form of electric discharge takes place between them called the electric arc. It is not quite certain who first observed this effect of the electric current. The state- ment that Sir Humphry Davy, in 1801, first produced and studied the phenomenon is probably correct. In 1808 Davy had provided for him at the Royal Institution a battery of 2000 cells, with which he exhibited the electric arc on a large scale.

The electric arc may be produced between any conducting materials maintained at different potentials, provided that the source of electric supply is able to furnish a sufficiently large current; but for illuminating purposes pieces of hard graphitic carbon are most convenient. If some source of continuous electric current is connected to rods of such carbon, first brought into contact and then slightly separated, the following facts may be noticed: With a low electromotive force of about 50 or 60 volts no discharge takes place until the carbons are in actual contact, unless the insulation of the air is broken down by the passage of a small electric spark. When this occurs, the space between the carbons is filled at once with a flame or luminous vapour, and the carbons themselves become highly incandescent at their extremities. If they are horizontal the flame takes the form of an arch springing between their tips; hence the name arc. This varies somewhat in appearance according to the nature of the current, whether continuous or alternating, and according as it is formed in the open air or in an enclosed space to which free access of oxygen is pre- vented. Electric arcs between metal surfaces differ greatly in colour according to the nature of the metal. When formed by an alternating current of high electromotive force they resemble a lambent flame, flickering and producing a some- what shrill humming sound.

Electric arcs may be classified into continuous or alternating current arcs, and open or enclosed arcs, carbon arcs with pure

or chemically impregnated carbons, or so-called flame arcs, and arcs formed with metallic or oxide electrodes, such as magnetite. A continuous current arc is formed with an electric current flowing always in the same direction; an alternating current arc is formed with a periodically reversed current. An open arc is one in which the carbons or other material forming the arc are freely exposed to the air; an enclosed arc is one in which they are included in a glass vessel. If carbons im- pregnated with various salts are used to colour or increase the light, the arc is called a chemical or flame arc. The carbons or electrodes may be arranged in line one above the other, or they may be inclined so as to project the light downwards or more in one direction. In a carbon arc if the current is continuous the positive carbon becomes much hotter at the end than the negative, and in the open air it is worn away, partly by combustion, becoming hollowed out at the extremity into a crater. At the same time the negative carbon gradually becomes pointed, and also wears away, though much less quickly than the positive. In the continuous-current open arc the greater part of the light proceeds from the highly incandescent positive crater. When the arc is examined

through dark glasses, or by the optical projection of its image upon a screen, a violet band or stream of vapour is seen to extend between the two carbons, surrounded by a nebulous golden flame or aureole. If the carbons are maintained at ,the right distance apart the arc remains steady and silent, but if the carbons are impure, or the distance between them too great, the true electric arc rapidly changes its place, flickering about and frequently becom- ing extinguished; when this happens it can only be restored by bringing the carbons once more into contact. If the current is alternating, then the arc is symmetrica] , and both carbons possess nearly the same appearance. If it is enclosed in a vessel nearly air-tight, the rate at which the carbons are burnt away is greatly reduced, and if the current is continuous the positive carbon is no longer cratered out and the negative no longer so much pointed as in the case of the open arc.

Davy used for his first experiments rods of wood charcoal which had been heated and plunged into mercury to make them better conductors. Not until 1843 was it Carbons proposed by J. B. L. Foucault to employ pencils cut from the hard graphitic carbon deposited in the interior of gas retorts. In 1846 W. Greener and W. E. Staite patented a process for manufacturing carbons for this purpose, but only after the invention of the Gramme dynamo in 1870 any great demand arose for them. F. P. E. Carre in France in 1876 began to manufacture arc lamp carbons of high quality from coke, lampblack and syrup. Now they are made by taking some specially refined form of finely divided carbon, such as the soot or lampblack formed by cooling the smoke of burning paraffin or tar, or by the carbonization of organic matter, and making it into a paste with gum or syrup. This carbon paste is forced through dies by means of a hydraulic press, the rods thus formed being subsequently baked with such precautions as to preserve them perfectly straight. In some cases they are cored, that is to say, have a longitudinal hole down them, filled in with a softer carbon. Sometimes they are covered with a thin layer of copper by electro-deposition. They are supplied for the market in sizes varying from 4 or 5 to 30 or 40 millimetres in diameter, and from 8 to 16 in. in length. The value of carbons for arc lighting greatly depends on their purity and freedom from ash in burning, and on perfect uniformity of structure. For ordinary purposes they are generally round in section, but for certain special uses, such as lighthouse work, they are made fluted or with a star-shaped section. The positive carbon is usually of larger section than the negative. For continuous- current arcs a cored carbon is generally used as a positive, and a smaller solid carbon as a negative. For flame arc lamps the carbons are specially prepared by impregnating tfiem with salts of calcium, magnesium and sodium. The calcium gives the best results. The rod is usually of a composite type. The outer zone is pure carbon to give strength, the next zone con- tains carbon mixed with the metallic salts, and the inner core

is the same but less compressed. In addition to the metallic salts a flux has to be introduced to prevent the formation of a non-conducting ash, and this renders it desirable to place the carbons in a downward pointing direction to get rid of the slag so formed. Bremer first suggested in 1898 for this pur- pose the fluorides of calcium, strontium or barium. When such carbons are used to form an electric arc the metallic salts de- flagrate and produce a flame round the arc which is strongly coloured, the object being to produce a warm yellow glow, instead of the somewhat violet and cold light of the pure carbon arc, as well as a greater emission of light. As noxious vapours are however given off, flame arcs can only be used out of doors. Countless researches have been made on the subject of carbon manufacture, and the art has been brought to great perfection.

Special manuals must be consulted for further information (see especially a treatise on Carbon making for all electrical purposes, by F. Jehl, London, 1906).

The physical phenomena of the electric arc are best examined by forming a carbon arc between two carbon rods of the above description, held in line in a special apparatus, and Physical arranged so as to be capable of being moved to or from mena'. eacn other with a slow and easily regulated motion. An arrangement of this kind is called a hand-regulated arc lamp (fig. 4). If such an arc lamp is connected to a source of electric supply having an electromotive force preferably of 100 volts, and if some resistance is included in the circuit, say about s ohms, a steady and continuous arc is formed when the carbons are brought together and then slightly separated. Its appearance may be most conveniently examined by projecting its image upon a screen of white paper by means of an achromatic

Fig. 4

lens. A very little examination of the distribution of light from the arc shows that the illuminating or candle-power is not the same in different directions. If the carbons are vertical and the positive carbon is the upper of the two, the illuminating power is greatest in a direction at an angle inclined about 40 or 50 degrees below the horizon, and at other directions has different values, which may be represented by t-he lengths of radial lines drawn from a centre, the extremities of which define a curve called the illuminating curve of the arc lamp (fig. 5) . Considerable differences exist between the forms of the illuminating-power curves of the continuous and alternating current and the open or enclosed arcs. The chief pi ;tion of the emitted light proceeds from the incandescent crater; 'ience the form of the illuminating- power curve, as shown by A. P. Trotter in 1892, is due to the apparent area of the crater surface which is visible to an eye regarding the arc in that direction. The form of the illuminating- power curve varies with the length of the arc and relative size of the carbons. Leaving out of account for the moment the properties of the arc as an illuminating agent, the variable factors with which we are concerned are (i.) the current through the arc; (ii.) the potential difference of the carbons; (iii.) the length of the arc; and (iv.) the size of the carbons. Taking in the first place the typical direct-current arc between solid carbons, and forming arcs of different lengths and with carbons of different sizes, it will be found that, beginning at the lowest current capable of forming a true arc, the potential difference of

the carbons (the arc P.D.) decreases as the current increases. Up to a certain current strength the arc is silent, but at a particular critical value P.D. suddenly drops about 10 volts, the current at the same time rising 2 or 3 amperes. At that moment the arc begins to hiss, and in this hissing condition, if the current is still further increased, P.D. remains constant over wide limits. This drop in voltage on hissing was first noticed by A. Niaudet {La Lumiere electrique, 1881, 3, p. 287). It has been shown by Mrs Ayrton (Journ. Inst. Elec. Eng. 28, 1899, p. 400) that the hissing is mainly due to the oxygen which gains access from the air to the crater, when the latter becomes so large by reason of the increase of the current as to overspread the end of the positive carbon. According to A. E. Blondel and Hans Luggin, hissing takes place whenever the current density becomes greater than about 0-3 or 0-5 ampere per square millimetre of crater area.

The relation between the current, the carbon P.D., and the length of arc in the case of the direct-current arc has been investi- gated by many observers with the object of giving it mathematical expression.

Let V stand for the potential difference of the carbons in volts, A for the current through the arc in amperes, L for the length of the arc in millimetres, R for the resistance of the arc; and let a, b, c d, &c, be constants. Erik Edlund in 1867, and other workers after him, considered that their experiments showed that the re- lation between V and L could be expressed by a simple linear equation,

$$V = a + bh.$$

Later researches by Mrs Ayrton (Electrician, 1898, 41, p. 720), however, showed that

for a direct-current arc of given size with solid carbons, the observed values of V can be better represented as a function both of A and of L 01 the form

c+dh

V = a+Z>L+-

A

In the case of direct-current arcs formed with solid carbons, Edlund and other observers agree that the arc resistance R may be expressed by a simple straight line law, R = e+/L. If the arc is formed with cored carbons, Mrs Ayrton demonstrated that the lines expressing resistance as a function of arc length are no longer straight, but that there is a rather sudden dip down when the length of the arc is less than 3 mm.

The constants in the above equation for the potential difference

of the carbons were determined by Mrs Ayrton in the case of solid

carbons to be —

„ „ , T , H-7 + IO-5L V = 38-9+2-07LH '-^ — 2_.

There has been much debate as to the meaning to be given to the constant a in the above equation, which has a value apparently not far from forty volts for a direct-current arc with solid carbons. The suggestion made in 1867 by Edlund (Phil. Mag., 1868, 36, p. 358), that it implied the existence of a counter-electromotive force in the arc, was opposed by Luggin in 1889 (Wien. Ber. 98, p. 1 198), Ernst Lecher in 1888 (Wied. Ann., 1888, 33, p. 609), and by Franz Stenger in 1892 (Id. 45, p. 33) ; whereas Victor von Lang and L. M. Arons in 1896 (Id. 30, p. 95), concluded that experiment indicated the presence of a counter-electromotive force of 20 volts. A. E. Blondel concludes, from experiments made by him in 1897 (The Electrician, 1897, 39, p. 615), that there is no counter-electro- motive force in the arc greater than a fraction of a volt. Subse- quently W. Duddell (Proc. Roy. Soc, 1901, 68, p. 512) described experiments tending to prove the real existence of a counter-electro- motive force in the arc, probably having a thermo-electric origin, residing near the positive electrode, and of an associated lesser adjuvant e.m.f. near the negative carbon.

This fall in voltage between the carbons and the arc is not uni- formly distributed. In 1898 Mrs Ayrton described the results of experiments showing that if Vi is the potential difference between the positive carbon and the arc, then

Vi=3i-28H ^ — ,

and if V 2 is the potential difference between the arc and the negative carbon, then

V 2 = 7-6 + ^-

where A is the current through the arc in amperes and L is the length of the arc in millimetres.

The total potential difference between the carbons, minus the fall in potential down the arc, is therefore equal to the sum of

V!+V 2 = V 3 .

Hence V 3 = 3 &-88+ 22 " 6 + 3 " •

The difference between this value and the value of V, the total potential difference between the carbons, gives the loss in potential

due to the true arc. These laws are simple consequences of straight- line laws connecting the work spent in the arc at the two electrodes with the other quantities. If W be the work spent in the arc on either carbon, measured by the product of the current and the potential drop in passing from the carbon to the arc, or vice versa, then for the positive carbon W=a + 6A, if the length of arc is constant, \V = c+dL, if the current through the arc is constant, and for the negative carbon W = e+/A.

In the above experiments the potential difference between the carbons and the arc was measured by using a third exploring carbon as an electrode immersed in the arc. This method, adopted by Lecher, F. Uppenborn, S. P. Thompson, and J. A. Fleming, is open to the objection that the introduction of the third carbon may to a considerable extent disturb the distribution of potential.

The total work spent in the continuous-current arc with solid carbons may, according to Mrs Ayrton, be expressed by the equation

W = ii-7 + io-5L + (38-9+2-o7L)A. It will thus be seen that the arc, considered as a conductor, has the property that if the current through it is increased, the difference of potential between the carbons is decreased, and in one sense, therefore, the arc may be said to act as if it were a negative resistance. Frith and Rodgers (Electrician, 1896, 38, p. 75) have suggested that the resistance of the arc should be measured by the ratio between a small increment of carbon potential difference and the resulting small increment of current ; in other words, by the equation d\/dA, and not by the ratio simply of V:A. Considerable discussion has taken place whether an electrical resistance can have a negative value, belonging as it does to the class of scalar mathematical quantities. Simply considered as an electrical conductor, the arc resembles an intensely heated rod of magnesia or other refractory oxide, the true resistance of which is decreased by rise of temperature. Hence an increase of current through such a rod of refractory oxide is accompanied by a decrease in the potential difference of the ends. This, however, does not imply a negative resistance, but merely the presence of a resistance with a negative temperature coefficient. If we plot a curve such that the ordinates are the difference of potential of the carbons and the abscissae the current through the arc for constant length of arc, this curve is now called a characteristic curve of the arc and its slope at any point the instantaneous resistance of the arc.

Other physical investigations have been concerned with the intrinsic brightness of the crater. It has been asserted by many observers, such as Blondel, Sir W. de W. Abney, S. P. Thompson, Trotter, L. J. G. Violle and others, that this is practically independent of the current passing, but great differ- ences of opinion exist as to its value. Abney's values lie between 39 and 116, Trotter's between 80 and 170 candles per square millimetre. Blondel in 1893 made careful determinations of the brightness of the arc crater, and came to the conclusion that it was 160 candles per square millimetre. Subsequently J. E. Petavel found a value of 147 candles per square millimetre for current densities varying from -c6 to -26 amperes per square millimetre (Proc. Roy. Soc, 1899, 65, p. 469). Violle also, in 1893, supported the opinion that the brightness of the crater per square millimetre was independent of the current density, and from certain experiments and assumptions as to the specific heat of carbon, he asserted the temperature of the crater was about35oo°C. It has been concluded that this constancy of temperature, and therefore of brightness, is due to the fact that the crater is at the temperature of the boiling-point of carbon, and in that case its temperature should be raised by increasing the pressure under which the arc works. W. E. Wilson in 1895 attempted to measure the brightness of the crater under various pressures, and found that under five atmospheres the resistance of the arc appeared to increase and the temperature of the crater to fall, until at a pressure of 20 atmospheres the brightness of the crater had fallen to a dull red. In a later paper Wilson and G. F. Fitzgerald stated that these preliminary experiments were not confirmed, and their later researches

throw considerable doubt on the suggestion that it is the boiling-point of carbon which determines the temperature of the crater. (See Electrician, 189S, 35, P- 260, and 1897, 38, p. 343.)

The study of the alternating-current arc has suggested a number of new experimental problems for investigators. In Attentat- tn ‘ s case a ˆ tne factors, namely, current, carbon P.D., log resistance, and illuminating power, are periodically

current varying; and as the electromotive force reverses – . sre ” itself periodically, at certain instants the current

through the an: is zero. As the current can be interrupted for a

moment without extinguishing the arc, it is possible to work the electric arc from an alternating current generator without apparent intermission in the light, provided that the frequency is not much below 50. During the moment that the current is zero the carbon continues to glow. Each carbon in turn be- comes, so to speak, the crater carbon, and the illuminating power is therefore symmetrically distributed. The curve of illumination is as shown in fig. 3. The nature of the variation of the current and arc P.D. can be ex- amined by one of two methods, or their modifications, originally due to Jules Joubert and A. E. Blondel. Joubert’s method, which has been perfected by many observers, consists in attaching to the shaft of the alternator a contact which closes a circuit at an assigned instant during the phase. This contact is made to complete connexion either with a voltmeter or with a galvanometer placed as a shunt across the carbons or in series with the arc. By this arrangement these instruments do not read, as usual, the root-mean-square value of the arc P.D. or current, but give a constant indication determined by, and indicating, the instantaneous values of these quantities at some assigned instant. By progressive variation of the phase-instant at which the contact is made, the successive instantaneous values of the electric quantities can be measured and plotted out in the form of curves. This method has been much employed by Blondel, Fleming, C. P. Steinmetz, Tobey and Walbridge, Frith, H. Gorges and many others. The second method, due to Blondel, depends on the use of the Oscillograph, which is a galvanometer having a needle or coil of very small periodic time of vibration, say ·j-jVu’th part of a second or less, so that its deflections can follow the variations of current passing through the galvanometer. An improved form of oscillograph, devised by Duddell, consists of two fine wires, which are strained transversely to the lines of flux of a strong magnetic field (see Oscillograph). The current to be examined is made to pass up one wire and down the other, and these wires are then slightly displaced in opposite directions. A small mirror attached to the wires is thus deflected rapidly to and fro in synchronism with the variations of the current. From the mirror a ray of light is reflected which falls upon a photographic plate made to move across the field with a uniform motion. In this manner a photographic trace can be obtained of the wave form. By this method the variations of electric quantities in an alternating-current arc can be watched. The variation of illuminating power can be followed by examining and measuring the light of the arc through slits in a revolving stroboscopic disk, which is driven by a motor synchronously with the variation of current through the arc.

The general phenomena of the alternating-current arc are as follow: —

If the arc is supplied by an alternator of low inductance, and soft or cored carbons are employed to produce a steady and silent arc, the potential difference of the carbons periodically varies in a manner not very different from that of the alternator on open circuit. If, however, hard carbons are used, the alternating-current arc deforms the shape of the alternator electromotive force curve ; the carbon P.D. curve may then have a very different form, and becomes, in general, more rectangular in shape, usually having a high peak at the front. The arc also impresses the deformation on the current curve. Blondel in 1893 (Electrician, 32, p. 161) gave a number of potential and current curves for alternating-current arcs, obtained by the Joubert contact method, using two movable coil galvanometers of high resistance to measure respectively potential

difference and current. Blondel's deductions were that the shape of the current and volt curves is greatly affected by the nature of the carbons, and also by the amount of inductance and resistance in the circuit of the alternator. Blondel, W. E. Ayrton, W. E. Sumpner and Steinmetz have all observed that the alternating- current arc, when hissing or when formed with uncored carbons, a6t9 like an inductive resistance, and that there is a lag between the current curves and the potential difference curves. Hence the power-factor, or ratio between the true power and the product of the root-mean-square values of arc current and carbon potential

difference, in this case is less than unity. For silent arcs Blondel found power-factors lying between 0-88 and 0-95, and for hissing ones, values such as 0-70. Ayrton and Sumpner stated that the power- factor may be as low as 0-5. Joubert, as far back as 1881, noticed the deformation which the alternating-current arc impresses upon the electromotive force curve of an alternator, giving an open circuit a simple harmonic variation of electromotive force. Tobey and Walbridge in 1890 gave the results of a number of observations taken with commercial forms of alternating-current arc lamps, in which the same deformation was apparent. Blondel in 1896 came to the conclusion that with the same alternator we can produce carbon P.D. curves of very varied character, according to the material of the core, the length of the arc, and the inductance of the circuit. Hard carbons gave a P.D. curve with a flat top even when worked on a low inductance alternator.

The periodic variation of light in the alternating-current arc has also been the subject of inquiry. H. Gorges in 1895 at Berlin applied a stroboscopic method to steady the variations of illuminat- ing power. Fleming and Petavel employed a similar arrangement, driving the stroboscopic disk by a synchronous motor (Phil. Mag., 1896, 41). The light passing through slits of the disk was selected in one particular period of the phase, and by means of a lens could be taken from any desired portion of the arc or the incandescent carbons. The light so selected was measured relatively to the mean value of the horizontal light emitted by the arc, and accidental variations were thus eliminated. They found that the light from any part is periodic, but owing to the slow cooling of the carbons never quite zero, the minimum value happening a little later than the zero value of the current. The light emitted by a particular carbon when it is the negative, does not reach such a large maximum value as when it is the positive. The same observers made experiments which seemed to show that for a given ex-penditure of power in the arc the alternating current arc in general gives less mean spherical candle-power than the continuous current one.

The effect of the wave form on the efficiency of the alternating- current arc has engaged the attention of many workers. Rossler and Wedding in 1894 gave an account of experiments with alternating- current arcs produced by alternators having electromotive force curves of very different wave forms, and they stated that the effici-ency or mean spherical candle-power per watt expended in the arc was greatest for the flattest of the three wave forms by nearly 50 %. Burnie in 1897 gave the results of experiments of the same kind. His conclusion was, that since the light of the arc is a function of the temperature, that wave form of current is most efficient which maintains the temperature most uniformly throughout the half period. Hence, generally, if the current rises to a high value soon after its commencement, and is preserved at that value, or nearly at that value, during the phase, the efficiency of the arc will be greater when the current curve is more pointed or peaked. An important contribution to our knowledge concerning alternating- current arc phenomena was made in 1899 by W. Duddell and E. W. Marchant, in a paper containing valuable results obtained with their improved oscillograph. 1 They studied the behaviour of the alternating-current arc when formed both with solid carbons, with cored carbons, and

with carbon and metal rods. They found that with solid carbons the arc P.D. curve is always square-shouldered and begins with a peak, as shown in fig. 7 (a), but with cored carbons

it is more sinusoidal. Its shape depends on the total resistance in the circuit, but is almost independent of the type of alternator, whereas the current wave form is largely dependent on the machine used, and on the nature and amount of the impedance in the circuit; hence the im- portance of selecting a suitable alternator for operating alternating- current arcs. The same observers drew attention to the remark- able fact that if the arc is formed between a carbon and metal rod, say a zinc rod, there is a complete interruption of the current over half a period corresponding to that time during which the carbon is positive; this suggests that the rapid cooling of the metal facilitates the flow of the current from it, and resists the flow of current to it. The dotted curve in fig. 7 (b) shows the current curve form in the case of a copper rod. By the use of the oscillograph Duddell and Marchant showed that the hissing continuous-current arc is intermittent, and that the current is oscillatory and may have a frequency of 1000 per second. They also showed that enclosing the arc increases the arc reaction, the front peak of the potential curve becoming more marked and the power-factor of the arc reduced.

1 Journ. Inst. Elec. Eng. 28, p. 1. The authors of this paper give numerous instructive curves taken with the oscillograph, showing the form of the arc P.D. and current curves for a great variety of alternating-current arcs.

Fig. 7.

If a continuous-current electric arc is formed in the open air with a positive carbon having a diameter of about 1 5 millimetres, and a negative carbon having a diameter of about 9 millimetres, and if a current of 10 amperes is employed, ^^°amp S the potential difference between the carbons is gener- ally from 40 to 50 volts. Such a lamp is therefore called a 500-watt arc. Under these conditions the carbons each burn away at the rate of about 1 in. per hour, actual combustion taking place in the air which gains access to the highly-heated crater and negative tip; hence the most obvious means of prevent- ing this disappearance is to enclose the arc in an air-tight glass vessel. Such a device was tried very early in the history of arc lighting. The result of using a completely air-tight globe, how- ever, is that the contained oxygen is removed by combustion with the carbon, and carbon vapour or hydrocarbon compounds diffuse through the enclosed space and deposit themselves on the cool sides of the glass, which is thereby obscured. It was, however, shown by L. B. Marks {Electrician 31, p. 502, and 38, p. 646) in 1893, that if the arc is an arc formed with a small current and relatively high voltage, namely, 80 to 85 volts, it is possible to admit air in such small amount that though the rate of combustion of the carbons is reduced, yet the air destroys by oxidation the carbon vapour escaping from the arc. An arc lamp operated in this way is called an enclosed arc lamp (fig. 8). The top of the enclos- ing bulb is closed by a gas check plug which admits through a small hole a limited supply of air. The peculiarity of an enclosed arc lamp operated with a continuous current is that the carbons do not burn to a crater on the positive, and a sharp tip or mushroom on the negative, but preserve nearly flat surfaces. This feature affects the distribution of the light. The illuminating curve of the enclosed arc, therefore, has not such a strongly marked maximum value as that of the open arc, but on the other hand the true arc or column of incandes- cent carbon vapour is less steady in position, wandering round from place to place on the surface of the carbons. As a compensation for this defect, the combustion of the carbons per hour in commercial forms of enclosed arc lamps is about one-twentieth part of that of an open arc lamp taking the same current.

It was shown by Fleming in 1890 that the column of incandes- cent carbon vapour constituting the true arc possesses a unilateral conductivity (Proc. Roy. Inst. 13, p. 47). If a third carbon is dipped into the arc so as to constitute a third pole, and if a small voltaic battery of a few cells, with a galvanometer in circuit, is connected in between the middle pole and the negative carbon, it is found that when the negative pole of the

battery is in con- nexion with the negative carbon the galvanometer indicates a current, but does not when the positive pole of the battery is in connexion with the negative carbon of the arc.

Turning next to the consideration of the electric arc as a source of light, we have already noticed that the illuminating power in different directions is not the same. If we The arc imagine an electric arc, formed between a pair of vertical carbons, to be placed in the centre of a hollow sphere painted white on the interior, then it would be found that the various zones of this sphere are unequally illumin- ated. If the points in which the carbons when prolonged would intercept the sphere are called the poles, and the line where the horizontal plane through the arc would intercept the sphere

Fig. 8. — Enclosed Arc Lamp.

as an

lllumin-

ant.

is called the equator, we might consider the sphere divided up by lines of latitude into zones, each of which would be differently illuminated. The total quantity of light or the total illumination of each zone is the product of the area of the zone and the intensity of the light falling on the zone measured in candle-power. We might regard the sphere as uniformly illuminated with an intensity of light such that the product of this intensity and the total surface of the sphere was numerically equal to the surface integral obtained by summing up the products of the areas of all the elementary zones and the intensity of the light falling on each. This mean intensity is called the mean spherical candle-power of the arc. If the distribution of the illuminating power is known and given by an illumination curve, the mean spherical candle-power can be at once deduced (La Lumiere electrique, 1890, 37, p. 415).

Let BMC (fig. 9) be a semicircle which by revolution round the diameter BC sweeps out a sphere. Let an arc be situated at A, and let the element of the circumference PQ = MAP and d$ the incre- mental angle PAQ, and if R is the radius of the sphere, we have

ds = Rdd; also, if we project the element PQ on the line DE we have

ab = ds cos 9 , ‘ .”. ab = R cos BdB

and Ia6 = IR cos 6d$.

Let r denote the radius PT of the zone of _ the sphere, then

Fig. q r > a

y r = R cos 0.

Hence the area of the zone swept out by PQ is equal to

2ttR cos e <£s=27rR 2 cos ede

in the limit, and the total quantity of light falling on the zone is equal to the product of the mean intensity or candle-power I in the direction AP and the area of the zone, and therefore to

2xIR 2 cos ede. Let Io stand for the mean spherical candle-power, that is, let Io be defined by the equation

47rR2Io = 2TR2(Io6) where 2 (lab) is the sum of all the light actually falling on the sphere surface, then

8 ._ J

• ˆ7 “\

I. = ˆ2(Ia6)

_ S(Ia6) T

where \ max stands for the maximum candle-power of the arc. If, then, we set off at b a line bH perpendicular to DE and in length proportional to the candle-power of the arc in the direction AP, and carry out the same construction for a number of different observed candle-power readings at known angles above and below the horizon, the summits of all ordinates such as bH will define a curve DHE. The mean spherical candle-power of the arc is equal to the product of the maximum candle-power (I m „j), and a fraction equal to the ratio of the area included by the curve DHE to its circumscribing rectangle DFGE. The area of the curve DHE multiplied by 271-/R gives us the total flux of light from the arc.

Owing to the inequality in the distribution of light from an electric arc, it is impossible to define the illuminating power by a single number in any other way than by stating the mean spherical candle-power. All such commonly used expressions as “an arc lamp of 2000 candle-power ” are, therefore, perfectly meaningless.

The photometry of arc lamps presents particular difficulties,

owing to the great difference in quality betweeh the light radiated

by the arc and that given by any of the ordinarily

P metXot used ˆ sht standards – (For standards of light and are > photometers, see Photometer.) All photometry

depends on the principle that if we illuminate two white surfaces respectively and exclusively by two separate sources of light, we can by moving the lights bring the two surfaces into such a condition that their illumination or brightness is the same without regard to any small colour difference. The quantitative measurement depends on the fact that the illumina- tion produced upon a surface by a source of light is inversely as the square of the distance of the source. The trained eye is capable of making a comparison between two surfaces illumin- ated by different sources of light, and pronouncing upon their equality or otherwise in respect of brightness, apart from a

certain colour difference; but for this to be done with accuracy the two illuminated surfaces, the brightness of which is to be compared, must be absolutely contiguous and not separated by any harsh line. The process of comparing the light from the arc directly with that of a candle or other similar flame standard is exceedingly difficult, owing to the much greater proportion and intensity of the violet rays in the arc. The most convenient practical working standard is an incandescent lamp run at a high temperature, that is, at an efficiency of about 2§ watts per candle. If it has a sufficiently large bulb, and has been aged by being worked for some time previously, it will at a constant voltage preserve a constancy in illuminating power sufficiently long to make the necessary photometric comparisons, and it can itself be compared at intervals with another standard incandescent lamp, or with a flame standard such as a Harcourt pentane lamp.

In measuring the candle-power of arc lamps it is necessary to have some arrangement

by which the brightness of the rays pro- ceeding from the arc in different directions can be measured. For this purpose the lamp may be suspended from a support, and a radial arm arranged to carry three mirrors, so that in whatever position the arm may be placed, it gathers light proceeding at one particular angle above or below the horizon from the arc, and this light is reflected out finally in a constant horizontal direction. An easily-arranged experiment enables us to determine the constant loss of light by reflection at all the mirrors, since that reflection always takes place at 45°. The ray thrown out horizontally can then be compared with that from any standard source of light by means of a fixed photometer, and by sweeping round the radial arm the photometric or illuminating curve of the arc lamp can be obtained. From this we can at once ˆ

determine the nature of A ^^... the illumination which would be produced on a horizontal surface if the arc lamp were suspended at a given distance above it. Let A (fig. 10) be an arc lamp placed at a height /K = AB) above a horizontal plane. "Let ACD be the illuminating power curve of the arc, and hence AC the candle-power in a direction AP. The illumination (I) or brightness on the horizontal plane at P is equal to

AC cos APM/(AP) 2 = FC/(/i 2 +* 2), where * = BP. Hence if the candle-power curve of the arc and its height above the surface are known, we can describe a curve BMN, whose ordinate PM will denote the brightness on the horizontal surface at any point P. It is easily seen that this ordinate must have a maximum value at some point. This brightness is best expressed in candle-feet, taking the unit of illumination to be that given by a standard candle on a white surface at a distance of 1 ft. If any number of arc lamps are placed above a horizontal plane, the brightness at any point can be calculated by adding together the illuminations due to each respectively.

The process of delineating the photometric or polar curve of intensity for an arc lamp is somewhat tedious, but the curve has the advantage of showing exactly the distribution of light in different directions. When only the mean spherical or mean hemispherical candle-power is required the process can be shortened by employing an integrating photometer such as that of C. P. Matthews (Trans. Amer. Inst. Elec. Eng., 1903, 19, p. 1465), or the lumen-meter of A. E. Blondel which enables us to determine at one observation the total flux of light from the arc and therefore the mean spherical candle-power per watt.

In the use of arc lamps for street and public lighting, the question of the distribution of light on the horizontal surface is all-important. In order that street surfaces may be well lighted, the minimum illumination should oxhanx. not fall below o-i candle-foot, and in general, in well- lighted streets, the maximum illumination will be 1 candle-foot and upwards. By means of an illumination photometer, such as that of W. H. Preece and A. P. Trotter, it is easy to measure the illumination in candle-feet at any point in a street surface, and to plot out a number of contour lines of equal illumination. Experience has shown that to obtain satisfactory results the lamps must be placed on a high mast 20 or 25 ft. above the roadway surface. These posts are now generally made of cast iron in various ornamental forms (fig. n), the necessary con- ductors for conveying the current up to the lamp being taken

Fig. io.

inside the iron mast. (The pair of incandescent lamps half- way down the standard are for use in the middle of the night, when the arc lamp would give more light than is required; they are lighted by an automatic switch whenever the arc is extinguished.) The lamp itself is generally enclosed in an opalescent spherical globe, which is woven over with wire- netting so that in case of fracture the pieces may not cause damage.

The necessary trimming, that is, the replacement of carbons, is effected either by lowering the lamp or, preferably, by carrying round a portable ladder enabling the trimmer to reach it. For the purpose of public illumination it is very usual to employ a lamp taking 10 amperes, and therefore absorbing about 500 watts. Such a lamp is called a 500- watt arc lamp, and it is found that a satisfactory illumination is given for most street purposes by placing 500-watt arc lamps at distances varying from 40 to 100 yds., and at a height of 20 to 25 ft. above the roadway. The maxi- mum candle-power of a 500-watt arc enclosed in a roughened or ground-glass globe will not exceed 1500 candles, and that of a 6-8-ampere arc (continuous) about 900 candles. If, how- ever, the arc is an enclosed arc with double globes, the absorption of light would reduce the effective maximum to about 200 c.p. and 120 c.p. respectively. When arc lamps are placed in public thoroughfares not less than 40 yds. apart, the illumination anywhere on the street surface is practically determined by the two nearest ones. Hence the total illumination at any point may be obtained by adding together the illuminations due to each arc separately. Given the photometric polar curves or illuminat- ing-power curves of each arc taken outside the shade or globe, we can therefore draw a curve representing the resultant illumination on the horizontal surface. It is obvious that the higher

the lamps are placed, the more uniform is the street surface il- lumination, but the less its aver- age value; thus two 10-ampere arcs placed on masts 20 ft. above the road surface and 100 ft. apart

03 dr

*•

Fig. 11.

ft =0-95 d. h = o-%$ d. h= „ ft = o-5 d. h = o-s d.

As regards distance apart, a very usual practice is to place the lamps at spaces equal to six to ten times their height above the road surface. Blondel (Electrician, 35, p. 846) gives the following rule for the height (A) of the arc to afford the maximum illumination at a distance (d) from the foot of the lamp-post, the continuous current arc being employed: For naked arc

,, arc in rough glass globe

,, ,, opaline globe

,, ,, opal globe .

„ ,, holophane globe

These figures show that the distribution of light on the hori- zontal surface is greatly affected by the nature of the, enclosing globe. For street illumination naked arcs, although some- times employed in works and factory yards, are entirely un- suitable, since the result produced on the eye by the bright point of light is to paralyse a part of the retina and contract the pupil, hence rendering the eye less sensitive when directed on feebly illuminated surfaces. Accordingly, diffusing globes have to be employed. It is usual to place the arc in the interior of a globe of from 12 to 18 in. in diameter. This may be made of ground glass, opal glass, or be a dioptric globe such as the holophane. The former two are strongly absorptive, as may be seen from the results of experiments by Guthrie and Redhead. The following table shows the astonishing loss of light due to the use of opal globes: —

Fig. 12.

will give a maximum illumination of about i-i and a minimum of about 0-15 candle-feet in the interspace (fig 12). If the lamps are raised on 40-ft. posts the maximum

illumination will fall to 0-3, and the minimum will rise to o- 2. For this reason masts have been em- ployed as high as 90 ft. In docks and railway yards high masts (50 ft.) are an advantage, because the strong contrasts due to shadows of trucks, carts, &c, then become less marked, but for street illumination they should not exceed 30 to 35 ft. in height. Taking the case of 10-ampere and 6-8-ampere arc lamps in ordinary opal shades, the following figures have been given by Trotter as indicating the nature of the resultant horizontal illumination:—

Naked Arc.

Arc

in Clear Globe.

Arc in Rough Glass Globe.

Arc

in Opal Globe.

Mean spherical c.p. Mean hemispherical c.p. Percentage value of trans- mitted light .... Percentage absorption

319 450

100

235 326

53 47

160 215

23

77

144 138

19

81

Arc Current

in

Amperes.

Height above

Road

in Feet.

Distance

apart in Feet.

Horizontal Illumination in Candle-Feet.

Maximum.

Minimum.

10 10 10

6-8 6-8

20

25 40 20 40

120 120 120 90 120

1-85

I-I7 o-5 i-i

o-3

012 0-15

0-28 0-21 0-17

By using Trotter's, Fredureau's or the holophane globe, the light may be so diffused that the whole globe appears uni- formly luminous, and yet not more than 20% of the light is absorbed. Taking the absorption of an ordinary opal globe into account, a 500-watt arc does not usually give more than 500 c.p. as a maximum candle-power. Even with a naked 500-watt arc the mean spherical candle-power is not generally more than 500 c.p., or at the rate of 1 c?p. per watt. The maxi- mum candle-power for a given electrical power is, however, greatly dependent on the current density in the carbon, and to obtain the highest current density the carbons must be as thin as possible. (See T. Hesketh, " Notes on the Electric Arc," Electrician, 39, p. 707.)

For the efficiency of arcs of various kinds, expressed by the mean hemispherical candle power per ampere and per watt expended in the arc, the following figures were given by L. Andrews (" Long-flame Arc Lamps," Journal Inst. Elec. Eng., 1906, 37, p. 4).

Candle-power Candle-power

per ampere. per watt.

82 1-54

55 o-77

259 5-80

200 2-24

Ordinary open caibon arc. Enclosed carbon arc . Chemical carbon or flame arc . High voltage inclined carbon arc

It will be seen that the flame arc lamp has an enormous advantage over other types in the light yielded for a given electric power consumption.

The practical employment of the electric arc as a means of illumination is dependent upon mechanism for automatically keeping two suitable carbon rods in the proper position, and moving them so as to enable a steady arc to be Arc lamp maintained. Means must be provided for holding the carbons in line, and when the lamp is not in opera- tion they must fall together, or come together when the current is switched on, so as to start the arc. As soon as the current passes, they must be moved slightly apart, and gripped in position immediately the current reaches its right value, being

mechan- ism.

Fig. 13.

moved farther apart if fhe current increases in strength, and brought together if it decreases. Moreover, it must be possible for a considerable length of carbon to be fed through the lamp as required.

One early devised form of arc-lamp mechanism was a system of clock-work driven by a spring or weight, which was started and

n stopped by the action of an electromagnet;

in modern lighthouse lamps a similar mechanism is still employed. W. E. Staite (1847), J. B. L. Foucault (1849), V. L. M. Serrin (1857), J. Duboscq (1858), and a host of later inventors, devised numerous forms of mechanical and clock-work lamps. The modern self-regulating type may be said to have been initiated in 1878 by the differential lamp of F. von Hefner-Alteneck, and the clutch lamp of C. F. Brush. The general principle of the former may be explained as follows: There are two solenoids, placed one above the other. The lower one, of thick wire, is in series with the two carbon rods forming the arc, and is hence called the series coil. Above this there is placed another solenoid of fine wire, which is called the shunt coil. Suppose an iron rod to be placed so as to be partly in one coil and partly in another; then when the coils are traversed by currents, the iron core will be acted upon by forces tending to pull it into these solenoids. If the iron core be attached to one end of a lever, the other end of which carries the upper carbon, it will be seen that if the carbons are in contact and the current is switched on, the series coil alone will be traversed by the current, and its magnetic action will draw down the iron core, and therefore pull the carbons apart and strike the arc. The moment the carbons separate, there will be a difference of potential between them, and the shunt coil will then come into action, and will act on the core so as to draw the carbons together. Hence the two solenoids act in opposition to each other, one in- creasing and the other diminishing the length of the arc, and main- taining the carbons in the proper position. In the lamp of this type the upper carbon is in reality attached to a rod having a side- rack gearing, with a train of wheels governed by a pendulum. The action of the series coil on the mechanism is to first lock or stop the train, and then lift it as a whole slightly. This strikes the arc. When the arc is too long, the series coil lowers the gear and finally releases the upper carbon, so that it can run down by its own weight. The principle of a shunt and series coil operating on an iron core in opposition is the basis of the mechanism of a number of arc lamps. Thus the lamp invented by F. Krizik and L. Piette, called from its place of origin the Pilsen lamp, comprises an iron core made in the shape of a double cone or spindle (fig. 13), which is so arranged in a brass tube that it can move into or out of a shunt and ■■ – ,m ■■’■■/ series coil, wound the one with fine and the other 11 — “\ “~*” with thick insulated wire, and hence regulate the position of the carbon attached to it. The move- ment of this core is made to feed the carbons directly without the intervention of any clock- work, as in the case of the Hefner-Alteneck lamp. = In the clutch-lamp mechanism the lower carbon is fixed, and the upper carbon rests upon it by its own weight and that of its holder. The latter consists of a long rod passing through guides, and is embraced somewhere by a ring capable of being tilted or lifted by a finger attached to the armature of an electromagnet the coils of which are in series with the arc. When the current passes through the magnet it attracts the armature, and by tilting the ring lifts the upper carbon-holder and hence strikes the arc. If the current diminishes in value, the upper carbon drops a little by its own weight, and the feed of the lamp is thus effected by a series of small lifts and drops of the upper carbon (fig. 14). Another element sometimes em- ployed in arc-lamp mechanism is the brake-wheel regulator. This is a feature of one form of the 1 Brockie and of the Crompton-Pochin lamps. In these the movement of the carbons is effected by a cord or chain which passes over a wheel, or by a rack geared with the brake wheel. When no current is

passing through the lamp, the wheel is free to move, and the carbons fall together; but when the current is switched on, the chain or cord passing over the brake wheel, or the brake wheel itself is gripped

Fig. 14.

in some way, and at the same time the brake wheel is lifted so that the arc is struck.

Although countless forms of self-regulating device have been invented for arc lamps, nothing has survived the test of time so well as the typical mechanisms which work with carbon rods in one line, one or both rods being moved by a controlling apparatus as required. The early forms of semi-incandescent arc lamp, such as those of R. Werdermann and others, have dropped out of existence. These were not really true arc lamps, the light being produced by the incandescence of the extremity of a thin carbon rod pressed against a larger rod or block. The once famous Jablochkoff candle, invented in 1876, consisted of two carbon rods about 4 mm. in diameter, placed parallel to each other and separated by a partition of kaolin, steatite or other refractory non-conductor. Alternating currents were employed, and the candle was set in operation by a match or starter of high-resistance carbon paste which connected the tips of the rods. When this burned off, a true arc was formed between the parallel carbons, the separator volatilizing as the carbons burned away. Although much ingenuity was expended on this system of lighting between 1877 and 1881, it no longer exists. One cause of its disappearance was its relative inefficiency in light-giving power compared with other forms of carbon arc taking the same amount of power, and a second equally im- portant reason was the waste in carbons. If the arc of the electric candle was accidentally blown out, no means of relighting existed; hence the great waste in half -burnt candles. H. Wilde, J. C. Jamin, J. Rapieff and others endeavoured to provide a remedy, but without success.

It is impossible to give here detailed descriptions of a fraction of the arc-lamp mechanisms devised, and it must suffice to indicate the broad distinctions between various types. (1) Arc lamps may be either continueus-current or alternating-current lamps. For outdoor public illumination the former are greatly preferable, as owing to the form of the illuminating power-curve they send the light down on the road surface, provided the upper carbon is the positive one. For indoor, public room or factory lighting, inverted arc lamps are sometimes employed. In this case the positive carbon is the lower one, and the lamp is carried in an inverted metallic reflector shield, so that the light is chiefly thrown up on the ceiling, whence it is diffused all round. The alternating-current arc is not only less efficient in mean spherical candle-power per watt of electric power absorbed, but its distribution of light is disad- vantageous for street purposes. Hence when arc lamps have to be worked off an alternating-current circuit for public lighting it is now usual to make use of a rectifier, which rectifies the alternating current into a unidirectional though pulsating current. (2.) Arc lamps may be also classified, as above described, into open or en- closed arcs. _ The enclosed arc can be made to burn for 200 hours with one pair of carbons, whereas open-arc lamps are usually only able to work, 8, 16 or 32 hours without recarboning, even when fitted with double carbons. (3) Arc lamps are further divided into focussing and non-focussing lamps. In the former the lower carbon is made to move up as the upper carbon moves down, and the arc is therefore maintained at the same level. This is advisable for arcs included in a globe, and absolutely necessary in the case of lighthouse lamps and lamps for optical purposes. (4) Another subdivision is into hand-regulated and self-regulating lamps. In the hand-regulated arcs the carbons are moved by a screw attachment as required, as in some forms of search-light lamp and lamps for optical lanterns. The carbons in large search-light lamps are usually placed horizon- tally. The self-regulating lamps may be classified into groups depending upon the nature of the regulating appliances. In some cases the regulation is controlled only by a series coil, and in others only by a shunt coil. Examples of the former are the original Giilcher and Brush clutch lamp, and some modern enclosed arc lamps; and of the latter, the Siemens " band " lamp, and the Jackson-Mensing lamp. In series coil lamps the variation of the current in the coil throws into or out of action the carbon-moving

mechanism; in shunt coil lamps the variation in voltage between the carbons is caused to effect the same changes. Other types of lamp involve the use both of shunt and series coils acting against each other. A further classification of the self-regulating Tamps may be found in the nature of the carbon-moving mechanism. This may be some modification of the Brush ring clutch, hence called clutch lamps; or some variety of brake wheel, as employed in Brockie and Crompton lamps; or else some form of electric motor is thrown into or out of action and effects the necessary changes. In many cases the arc-lamp mechanism is provided with a dash-pot, or contrivance in which a piston moving nearly air-tight in a cylinder prevents sudden jerks in the motion of the mechanism, and thus does away with the ” hunting ” or rapid up-and-down movements to which some varieties of clutch mechanism are liable. One very

efficient form is illustrated in the Thomson lamp and Brush- Vienna lamp. In this mechanism a shunt and series coil are placed side by side, and have iron cores suspended to the ends of a rocking arm held partly within them. Hence, according as the magnetic action of the shunt or series coil prevails, the rocking arm is tiMed back-Wards or forwards. When the series coil is not in action the motion is free, and the upper carbon-holder slides down, or the lower one slides up, and starts the arc. The series coil comes into action to withdraw the carbons, and at the same time locks the mechanism. The shunt coil then operates against the series coil, and between them the carbon is fed forwards as required. The control to be obtained is such that the arc shall never become so long as to flicker and become extinguished, when the carbons would come together again with a rush, but the feed should be smooth and steady, the position of the carbons responding quickly to each change in the current.

The introduction of enclosed arc lamps was a great improvement, in consequence of the economy effected in the consumption of carbon and in the cost of labour for trimming. A well-known and widely used form of enclosed arc lamp is the Jandus lamp, which in large current form can be made to burn for two hundred hours without re-carboning, and in small or midget form to burn for forty hours, taking a current of two amperes at ioo volts. Such lamps in many cases conveniently replace large sizes of incandescent lamps, especially for shop lighting, as they give a whiter light. Great improvements have also been made in inclined carbon arc lamps. One reason for the relatively low efficiency of the usual vertical rod arrangement is that the crater can only radiate laterally, since owing to the position of the negative carbon no crater light is thrown directly downwards. If, however, the carbons are placed in a downwards slanting position at a small angle like the letter V and the arc formed at the bottom tips, then the crater can emit downwards all the light it produces. It is found, however, that the arc is unsteady unless a suitable magnetic field is employed to keep the arc in position at the carbon tips. This method has been adopted in the Carbone arc, which, by the employment of inclined carbons, and a suitable electromagnet to keep the true arc steady at the ends of the carbons, has achieved considerable success. One feature of the Carbone arc is the use of a relatively high voltage between the carbons, their potential difference being as much as 85 volts.

Arc lamps may be arranged either (i.) in series, (ii.) in parallel or (iii.) in series parallel. In the first case a number, say 20,

may be traversed by the same current, in that case ment g supplied at a pressure of 1000 volts. Each must have

a magnetic cut-out, so that if the carbons stick together or remain apart the current to the other lamps is not interrupted, the function of such a cut-out being to close the main circuit immediately any one lamp ceases to pass current. Arc lamps worked in

series are generally supplied with a current from a constant current dynamo, which maintains an invariable current of, say 10 amperes, independently of the number of lamps on the external circuit. If the lamps, however, are worked in series off a constant potential circuit, such as one supplying at the same time incandescent lamps, provision must be made by which a resistance coil can be substituted for any one lamp removed or short-circuited. When lamps are worked in parallel, each lamp is independent, but it is then necessary to add a resistance in series with the lamp. By special devices three lamps can be worked in series of 100 volt circuits. Alternating-current arc lamps can be worked off a high-tension circuit in parallel by providing each lamp with a small transformer. In some cases the alternating high-tension current is rectified and supplied as a unidirectional current to lamps in series. If single alternating-current lamps have to be worked off a 100 volt alternating-circuit, each lamp must have in series with it a choking coil or economy coil, to reduce the circuit pressure to that required for one lamp. Alternating- current lamps take a larger effective current, and work with a less effective or virtual carbon P.D., than continuous current arcs of the same wattage.

The cost of working public arc lamps is made up of several items. There is first the cost of supplying the necessary electric

energy, then the cost of carbons and the labour of

recarboning, and, lastly, an item due to depreciation and repairs of the lamps. An ordinary type of open 10 ampere arc lamp, burning carbons 15 and 9 mm. in diameter for the positive and negative, and working every night of the year from dusk to dawn, uses about 600 ft. of carbons per annum. If the positive carbon is 18 mm. and the negative 12 mm., the

Cost.

consumption of each size of carbon is about 70 ft. per 1000 hours of burning. It may be roughly stated that at the present prices of plain open arc-lamp carbons the cost is about 15s. per 1000 hours of burning; hence if such a lamp is burnt every night from dusk to midnight the annual cost in that respect is about £1, 10s. The annual cost of labour per lamp for trimming is in Great Britain from £2 to £3; hence, approximately speaking, the cost per annum of maintenance of a public arc lamp burning every night from dusk to midnight is about £4 to £5, or perhaps £6, per annum, depreciation and repairs included. Since such a 10 ampere lamp uses half a Board of Trade unit of electric energy every hour, it will take 1000 Board of Trade units per annum, burning every night from dusk to midnight; and if this energy is supplied, say at if d. per unit, the annual cost of energy will be about £6, and the upkeep of the lamp, including carbons, labour for trimming and repairs, will be about £10 to £11 per annum. The cost for labour and carbons is considerably reduced by the employment of the enclosed arc lamp, but owing to the absorption of light produced by the inner enclosing globe, and the necessity for generally employing a second outer globe, there is a lower resultant candle-power per watt expended in the arc. Enclosed arc lamps are made to burn without attention for 200 hours, singly on 100 volt circuits, or two in series on 200 volt circuits, and in addition to the cost of carbons per hour being only about one-twentieth of that of the open arc, they have another advantage in the fact that there is a more uniform distribution of light on the road surface, because a greater proportion of light is thrown out horizontally.

It has been found by experience that the ordinary type of open arc lamp with vertical carbons included in an opalescent globe cannot compete in point of cost with modern improvements in gas lighting as a means of street illumination. The violet colour of the light and the sharp shadows, and particularly the non-illuminated area just beneath the lamp, are grave disadvantages. The high-pressure flame arc lamp with inclined chemically treated carbons has, however, put a different com- plexion on matters. Although the treated carbons cost more than the plain carbons, yet there is a great increase of emitted light, and a o-ampere flame arc lamp supplied with electric energy

at ifd. per unit can be used for 1000 hours at an inclusive cost of about £5 to £6, the mean emitted illumination being at the rate of 4 c.p. per watt absorbed. In the Carbone arc lamp, the carbons are worked at an angle of 15° or 20 to each other and the arc is formed at the lower ends. If the potential differ- ence of the carbons is low, say only 50-60 volts, the crater forms between the tips of the carbons and is therefore more or less hidden. If, however, the voltage is increased to 90-100 then the true flame of the arc is longer and is curved, and the crater forms at the exteme tip of the carbons and throws all its light downwards. Hence results a far greater mean hemispherical candle power (M.H.S. C.P.), so that whereas a 1 o-ampere 60 volt open arc gives at most 1200 M.H.S.C.P., a Carbone 10-ampere 85 volt arc will give 2700 M.H.S. C.P. Better results still can be obtained with impregnated carbons. But the flame arcs with impregnated carbons cannot be enclosed, so the consumption of carbon is greater, and the carbons themselves are more costly, and leave a greater ash on burning; hence more trimming is required. They give a more pleasing effect for street lighting, and their golden yellow globe of light is more useful than an equally costly plain arc of the open type. This improvement in efficiency is, however, accompanied by some disadvantages. The flame arc is very sensitive to currents of air and therefore has to be shielded from draughts by putting it under an ” econo- mizer ” or chamber of highly refractory material which surrounds the upper carbon, or both carbon tips, if the arc is formed with inclined carbons. (For additional information on flame arc lamps see a paper by L. B. Marks and H. E. Clifford, Electrician, 1906, 57, p. 975.)

2. Incandescent Lamps. — Incandescent electric lighting, although not the first, is yet in one sense the most obvious method of utilizing electric energy for illumination. It was evolved from the early observed fact that a conductor is heated

when traversed by an electric current, and that if it has a high resistance and a high melting-point it may be rendered in- candescent, and therefore become a source of light. Naturally every inventor turned his attention to the employment of wires of refractory metals, such as platinum or alloys of platinum- iridium, &c, for the purpose of making an incandescent lamp. F. de Moleyns experimented in 1841, E. A. King and J. W. Starr in 1845, J. J. W. Watson in 1853, an d W. E. Staite in 1848, but these inventors achieved no satisfactory result. Part of their want of success is attributable to the fact that the problem of the economical production of electric current by the dynamo machine had not then been solved. In 1878 T. A. Edison devised lamps in which a platinum wire was employed as the light-giving agent, carbon being made to adhere round it by pressure. Abandoning this, he next directed his attention to the construction of an ” electric candle,” consisting of a thin cylinder or rod formed of finely-divided metals, platinum, iridium, &c, mixed with refractory oxides, such as magnesia, or zirconia, lime, &c. This refractory body was placed in a closed vessel and heated by being traversed by an electric current. In a further improvement he proposed to use a block of refractory oxide, round which a bobbin of fine platinum or platinum-iridium wire was coiled. Every other inventor who worked at the problem of incandescent lighting seems to have followed nearly the same path of invention. Long before this date, however, the notion of employing carbon as a substance to be heated by the current had entered the minds of inventors; even in 1843 King had employed a small rod of plumbago as the substance to be heated. It was obvious, however, that carbon could only be so heated when in a space destitute of oxygen, and accordingly King placed his plumbago rod in a barometric vacuum. S. W. Konn in 1872, and S. A. Kosloff in 1875, followed in the same direction.

No real success attended the efforts of inventors until it was finally recognized, as the outcome of the work by J. W. Swan,

T. A. Edison, and, in a lesser degree, St. G. Lane Carbon p ox an(j w E. -Sawyer and A. Man, that the conditions Utmp." °^ success were as follow: First, the substance to

be heated must be carbon in the form of a thin wire rod or thread, technically termed a filament; second, this must be supported and enclosed in a vessel formed entirely of glass; third, the vessel must be exhausted as perfectly as possible; and fourth, the current must be conveyed into and out of the carbon filament by means of platinum wires hermetically, sealed through the glass.

One great difficulty was the production of the carbon filament. King, Sawyer, Man and others had attempted to cut out a suitably shaped piece of carbon from a solid block; but Edison and Swan were the first to show that the proper solution of the difficulty was to carbonize an organic substance to which the necessary form had been previously given. For this purpose cardboard, paper and ordinary thread were originally employed, and even, according to Edison, a mixture of lampblack and tar rolled out into a fine wire and bent into a spiral. At one time Edison employed a filament of bamboo, carbonized after being bent into a horse-shoe shape. Swan used a material formed by treating ordinary crochet cotton- thread with dilute sulphuric acid, the " parchmentized thread " thus produced being afterwards carbonized. In the modern in- candescent lamp the filament is generally constructed by preparing first of all a form of soluble cellulose. Carefully purified cotton-wool is dissolved in some solvent, such as a solution of zinc chloride, and the viscous material so formed is forced by hydraulic pressure through a die. The long thread thus obtained, when hardened, is a semi-transparent substance resembling cat-gut, and when carefully carbonized at a high temperature gives a very dense and elastic form of carbon filament. It is cut into appropriate lengths, which after being bent into horse-shoes, double-loops, or any other shape desired, are tied or folded round carbon formers and immersed in plumbago crucibles, packed in with finely divided plumbago. The crucibles are then heated to a high temperature in an ordinary combustion or electric furnace, whereby the organic matter is destroyed, and a skeleton of carbon remains. The higher the temperature at which this carbonization is conducted, the denser is the resulting product. The filaments so prepared are sorted and measured, and short leading-in wires of platinum are attached to their ends by a carbon cement or by a carbon depositing process, carried out by heating electrically the junction of the carbon and platinum under the surface of a hydrocarbon liquid. They are then

mounted in bulbs of lead glass having the same coefficient of ex- pansion as platinum, through the walls of which, therefore, the platinum wires can be hermetically sealed. The bulbs pass into the exhausting-room, where they are exhausted by some form of mechanical or mercury pump. During this process an electric current is sent through the filament to heat it, in order to disengage the gases occluded in the carbon, and exhaustion must be so perfect that no luminous glow appears within the bulb when held in the hand and touched against one terminal of an induction coil in operation.

In the course of manufacture a process is generally applied to the carbon which is technically termed " treating." The carbon filament is placed in a vessel surrounded by an atmosphere of hydro- carbon, such as coal gas or vapour of benzol. If current is then passed through the filament the hydrocarbon vapour is decomposed, and carbon is thrown down upon the filament in the form of a lustrous and dense deposit having an appearance like steel when seen under the miscroscope. This deposited carbon is not only much more dense than ordinary carbonized organic material, but it has a much lower specific electric resistance. An untreated carbon filament is generally termed the primary carbon, and a deposited carbon the secondary carbon. In the process of treating, the greatest amount of deposit is at any places of high resistance in the primary carbon, and hence it tends to cover up or remedy the defects which may exist. The bright steely surface of a well- treated filament is a worse radiator than the rougher black surface of an untreated one; hence it does not require the expenditure of so much electric power to bring it to the same temperature, and probably on account of its greater density it ages much less rapidly.

Finally, the lamp is provided with a collar having two sole plates on it, to which the terminal wires are attached, or else the terminal

Fig. 15.

wires are simply bent into two loops; in a third form, the Edison screw terminal, it is provided with a central metal plate, to which one end of the filament is connected, the other end being joined to a screw collar. The collars and screws are formed of thin brass embedded in plaster of Paris, or in some material like vitrite or black glass (fig. 15). To put the lamp into connexion with the circuit supplying the current, it has to be fitted into a socket or holder. Three of the principal types of holder in use are the bottom contact (B.C.) or Dornfeld socket, the Edison screw-collar socket and the Swan or loop socket. In the socket of C. Dornfeld (fig. 16, a and a') two spring pistons, in contact with the two sides of the circuit, are fitted into the bottom of a short metallic tube having bayonet joint slots cut in the top. The brass collar on the lamp has two pins, by means of which a bayonet connexion is made between it and the socket; and when this is done, the spring pins are pressed against the sole plates on the lamp. In the Edison socket (fig. 16, b) a short metal tube with an insulating lining has on its interior a screw sleeve, which is in connexion with one wire of the circuit; at the bottom of the tube, and insulated from the screw sleeve, is a central metal button, which is in connexion with the other side of the circuit. On screwing the lamp into the socket, the screw collar of the lamp and the boss or plate at the base of the lamp make contact with the corre- sponding parts of the socket, and complete the connexion. In some cases a form of switch is included in the socket, which is then termed the key-holder. For loop lamps the socket consists of an insulated block, having on it two little hooks, which engage with the eyes of the lamp. This insulating block also.carries some form of spiral spring or pair of spring loops, by means of which the lamp is pressed away from the socket, and the eyes kept tight by the hooks. This spring or Swan socket (fig. 1 6, c) is found useful in places where the lamps are subject to vibration, for in such cases the Edison screw collar cannot well be used, because the vibration loosens the contact of the lamp in the socket. The sockets may be fitted with appliances for holding ornamental shades or conical reflectors.

-(c)

Fig. 16. — Incandescent Lamp Sockets.

The incandescent filament being a very brilliant line of light, various devices are adopted for moderating its brilliancy and dis- tributing the light. A simple method is to sand-blast the exterior of the bulb, whereby it acquires an appearance similar to that of ground glass, or the bare lamp may be enclosed in a suitable glass shade. Such shades, however, if made of opalescent or semi- opaque glass, absorb 40 to 60% of the light; hence various forms of dioptric shade have been invented, consisting of clear glass ruled with prismatic grooves in such a manner as to diffuse the light without any very great absorption. Invention has been fertile in devising etched, coloured, opalescent, frosted and ornamental shades for decorative purposes, and in constructing special forms for use in situations, such as mines and factories for explosives, where the globe containing the lamp must be air-tight. High candle-power lamps, 500, 1000 and upwards, are made by placing in one large glass bulb a number of carbon filaments arranged in parallel between two rings, which are connected with the main leading-in wires. When incandescent lamps are used for optical purposes it is necessary to compress the filament into a small space, so as to bring it into the focus of a lens or mirror. The fila- ment is then coiled or crumpled up into a spiral or zigzag form. Such lamps are called focus lamps.

Incandescent lamps are technically divided into high and low voltage lamps, high and low efficiency lamps, standard

and fancy lamps. The difference between high and ˆjfff, 1 ‘ low efficiency lamps is based upon the relation of the of lamps, power absorbed by the lamp to the candle-power

emitted. Every lamp when manufactured is marked with a certain figure, called the marked volts. This is understood to be the electromotive force in volts which must be applied to the lamp terminals to produce through the filament a current of such magnitude that the lamp will have a practically satis- factory life, and give in a horizontal direction a certain candle- power, which is also marked upon the glass. The numerical product of the current in amperes passing through the lamp, and the difference in potential of the terminals measured in volts, gives the total power taken up by the lamp in watts; and this number divided by the candle-power of the lamp (taking generally a horizontal direction) gives the watts per candle-power. This is an important figure, because it is deter- mined by the temperature; it therefore determines the quality of the light emitted by the lamp, and also fixes the average duration of the filament when rendered incandescent by a current. Even in a good vacuum the filament is not permanent. Apart altogether from accidental defects, the carbon is slowly volatilized, and carbon molecules are also projected in straight lines from different portions of the filament. This process not only causes a change in the nature of the surface of the filament, but also a deposit of carbon on the interior of the bulb, whereby the glass is blackened and the candle-power of the lamp reduced. The volatilization increases very rapidly as the temperature rises. Hence at points of high resistance in the filament, more heat being generated, a higher temperature is attained, and the scattering of the carbon becomes very rapid; in such cases the filament is sooner or later cut through at the point of high resistance. In order that incandescent lighting may be practi- cally possible, it is essential that the lamps shall have a certain average life, that is, duration; and this useful duration is fixed not merely by the possibility of passing a current through the lamp at all, but by the rate at which the candle-power diminishes. The decay of candle-power is called the ageing of the lamp, and the useful life of the lamp may be said to be that period of its existence before it has deteriorated to a point when it gives only 75% of its original candle-power. It is found that in practice carbon filament lamps, as at present made, if worked at a higher efficiency than 25 watts per candle-power, exhibit a rapid deterioration in candle-power and an abbreviated life. Hence lamp manufacturers classify lamps into various classes, marked for use say at 25, 3, 35 and 4 watts per candle. A 25 watt per candle lamp would be called a high-efficiency lamp, and a 4 watt per candle lamp would be called a low-efficiency lamp. In ordinary circumstances the low-efficiency lamp would probably have a longer life, but its light would be less – suitable for many purposes of illumination in which colour discrimination is required.

The possibility of employing high-efficiency lamps depends

greatly on the uniformity of the electric pressure of the supply. If the voltage is exceedingly uniform, then high-efficiency lamps can be satisfactorily employed; but they are not adapted for standing the variations in pressure which are liable to occur with public supply-stations, since, other things being equal, their filaments are less substantial. The classification into high and low voltage lamps is based upon the watts per candle- power corresponding to the marked volts. When incandescent lamps were first introduced, the ordinary working voltage was 50 or 100, but now a large number of public supply-stations furnish current to consumers at a pressure of 200 or 250 volts. This increase was necessitated by the enlarging area of supply in towns, and therefore the necessity for conveying through the same subterranean copper cables a large supply of electric energy without increasing the maximum current value and the size of the cables. This can only be done by employing a higher working electromotive force; hence arose a demand for incandescent lamps having marked volts of 200 and upwards, technically termed high-voltage lamps. The employment of higher pressures in public supply-stations has necessitated greater care in the selection of the lamp

fittings, and in the manner of carrying out the wiring work. The advantages, however, of higher supply pressures, from the point of view of supply-stations, are undoubted. At the same time the consumer desired a lamp of a higher efficiency than the ordinary carbon filament lamp. The demand for this stimulated efforts to produce improved carbon lamps, and it was found that if the filament were exposed to a very high temperature, 3000° C. in an electric furnace, it became more refractory and was capable of burning in a lamp at an efficiency of 25 watts per c.p. In- ventors also turned their attention to substances other than carbon which can be rendered incandescent by the electric current.

The luminous efficiency of any source of light, that is to say, the percentage of rays emitted which affect the eye as light compared with the total radiation, is dependent upon its temperature. In an ordinary oil lamp the luminous m x eais% rays do not form much more than 3 % of the total radiation. In the carbon-filament incandescent lamp, when worked at about 3 watts per candle, the luminous efficiency is about 5%; and in the arc lamp the radiation from the crater contains about 10 to 15% of eye-affecting radiation. The temperature of a carbon filament working at about 3 watts per candle is not far from the melting-point of platinum, that is to say, is nearly 1775° C. If it is worked at a higher efficiency, say 2-5 watts per candle-power, the temperature rises rapidly, and at the same time the volatilization and molecular scattering of the carbon is rapidly increased, so that the average duration of the lamp is very much shortened. An improvement, therefore, in the efficiency of the incandescent lamp can only be obtained by finding some substance which will endure heating to a higher temperature than the carbon filament. Inventors turned their attention many years ago, with this aim, to the refractory oxides and similar substances. Paul Jablochkoff in 1877 described and made a lamp consisting of a piece of kaolin, which was brought to a state of incandescence first by passing over it an electric spark, and afterwards maintained in a state of incan- descence by a current of lower electromotive force. Lane Fox and Edison, in 1878, proposed to employ platinum wires covered with films of lime, magnesia, steatite, or with the rarer oxides, zirconia, thoria, &c; and Lane Fox, in 1870, suggested as an incandescent substance a mixture of particles of carbon with the earthy oxides. These earthy oxides — magnesia, lime and the oxides of the rare earths, such as thoria, zirconia, erbia, yttria, &c. — possess the peculiarity that at ordinary temperatures they are practically non-conductors, but at very high tempera- tures their resistance at a certain point rapidly falls, and they become fairly good conductors. Hence if they can once be brought into a state of incandescence a current can pass through them and maintain them in that state. But at this temperature they give up oxygen to carbon; hence no mixtures of earthy oxides with carbon are permanent when heated, and failure

Nernst lamp.

has attended all attempts to use a carbon filament covered with such substances as thoria, zirconia or other of the rare oxides.

H. W. Nernst in 1897, however, patented an incandescent lamp in which the incandescent body consists entirely of a slender rod or filament of magnesia. If such a rod is heated by the oxyhydrogen blowpipe to a high temperature it becomes conductive, and can then be maintained in an intensely luminous condition by passing a current through it after the flame is withdrawn. Nernst found that by mixing together, in suitable proportions, oxides of the rare earths, he was able to prepare a material which can be formed into slender rods and threads, and which is rendered sufficiently conductive to pass a current with an electromotive force as low as 100 volts, merely by being heated for a few moments with a spirit lamp, or even by the

radiation from a neighbouring platinum spiral brought to a state of incandescence.

The Nernst lamp, therefore (fig. 17), consists of a slender rod of the mixed oxides attached to platinum wires by an oxide paste. Oxide filaments of this description are not enclosed in an exhausted glass vessel, and they can be brought, without risk of destruction, to a temperature consider- ably higher than a carbon filament ; hence the lamp has a higher luminous efficiency. The material now used for the oxide rod or " glower " of Nernst lamps isa mixture of zirconia and yttria, made into a paste and squirted or pressed into slender rods. This material is non-conductive when cold, but when slightly heated it becomes con- ductive and then falls considerably in resistance. The glower, which is straight in some types of the lamp but curved in others, is generally about 3 or 4 cm. long and 1 or 2 mm. in diameter. It is held in suitable terminals, and close to it, or round it, but not touching it, is a loose ' coil of platinum wire, also covered with oxide and called the " heater " (fig. 18). In series with it is a spiral of iron wire, enclosed in a bulb full of hydrogen,

Fig. 17. Nernst Lamp which is called the " ballast resistance."

A Type. The socket also contains a switch con-

trolled by an electromagnet. When the current is first switched on it passes through the heater coil which, becoming incandescent, by radiation heats the glower until it becomes conductive. The glower then takes current, becoming itself brilliantly incandescent, and the electromagnet becoming energized switches the heater coil out of circuit. The iron ballast wire increases in resistance with increase of current, and so operates to keep the total current through the glower constant in spite of small variations of circuit voltage. The disadvantages of the lamp are (1) that it does not light immediately after the current is switched on and is therefore not convenient for domestic use; (2) that it cannot be made in small light units such as 5 c.p.; (3) that the

socket and fixture are large and more complicated than for the carbon fila- ment lamp. But owing to the higher temperature, the light is whiter than that of the carbon glow lamp, and the efficiency or candle power per watt is greater. Since, however, the lamp must be included in an opal globe, some considerable part of this last advantage is lost. On the whole the lamp has found its field of operation rather in external than in domestic lighting.

Great efforts were made in the latter part of the 19th century and the first decade of the 20th to find a material for the filament

of an incandescent lamp which could replace carbon Metallic an(j y et not re q U ; re a preliminary heating like the lamps. oxide glowers. This resulted in the production of

refractory metallic filament lamps made of osmium, tantalum, tungsten and other rare metals. Auer von Welsbach

Fig,

-Nernst Lamp, Burners for B Type, o, low voltage; 6, high voltage.

suggested the use of osmium. This metal cannot be drawn into wire on account of its brittleness, but it can be made into a filament by mixing the finely divided metal with an organic binding material which is carbonized in the usual way at a high temperature, the osmium particles then cohering. The difficulty has hitherto been to construct in this way metallic filament lamps of low candle power (16 c.p.) for 220 volt circuits, but this is being overcome. When used on modem supply circuits of 220 volts a number of lamps may be run in series, or a step-down transformer employed.

The next great improvement came when W. von Bolton produced the tantalum lamp in 1904. There are certain metals known to have a-melting point about 2000 C. or upwards, and of these tantalum is one. It can be produced from the potassium tantalo-fluoride in a pulverulent form. By carefully melting it in vacuo it can then be converted into the reguline form and drawn into wire. In this condition it has a density of 16-6 (water =1), is harder than platinum and has greater tensile strength than steel, viz. 95 kilograms per sq. mm., the value for good steel being 70 to 80 kilograms per sq. mm. The electrical resistance at 15 C. is 0-146 ohms per metre with section of 1 sq. mm. after annealing at 1900° C. in vacuo and therefore about 6 times that of mercury; the temperature coefficient is 0-3 per degree C. At the temperature assumed in an incandescent lamp when working at 1-5 watts per c.p. the resistance is 0-830 ohms per metre with a section of 1 sq. mm. The specific heat is 0-0365. Bolton invented methods of producing tantalum in the form of a long fine wire 0-05 mm. in diameter. To make a 25 c.p. lamp 650 mm., or about 2 ft., of this wire are wound backwards and forwards zigzag oh metallic supports carried on a glass frame, which is sealed into an ex-hausted glass bulb. The tantalum lamp so made (fig. 19), working on a no volt circuit takes 0-36 amperes or 39 watts, and hence has an efficiency of about i-6 watts per c.p. The useful life, that is the time in which it loses 20 % of its initial candle power, is about 400-500 hours, but in general a life of 800-1000 hours can be obtained. The bulb blackens little in use, but the life is said to be shorter with alternat- ing than with direct current. When worked on alternating current circuits the filament after a time breaks up into sections which become curiously sheared with respect to each other but still maintain electrical contact. The re- sistance of tantalum increases with the temperature; hence the temperature coefficient is positive, and sudden rises in working voltage do not cause such variations in candle-power as in the case of the carbon lamp.

Patents have also been taken out for lamps made with filaments of such infusible metals as tungsten and molybdenum, and Siemens and Halske, Sanders and others, have protected methods for employing zirconium and other rare metals. According to the patents of Sanders (German patents Nos. 133701, 137568, 137569) zirconium filaments are manufactured from the hydrogen or nitrogen compounds of the rare earths by the aid of some organic binding material. H. Kuzel of Vienna (British Patent No. 28154 of 1904) described methods of making metallic filaments from any metal. He employs the metals in a colloidal condition, either as hydrosol, organosol, gel, or colloidal suspen- sion. The metals are thus obtained in a gelatinous form, and can be squirted into filaments which are dried and reduced to the metallic form by passing an electric current through them {Electrician, 57, 894). This process has a wide field of applica- tion, and enables the most refractory and infusible metals to be obtained in a metallic wire form. The zirconium and tungsten wire lamps are equal to or surpass the tantalum lamp in efficiency

Fig. 19. — Tantalum Lamp.

and are capable of giving light, with a useful commercial life, at an efficiency of about one watt per candle. Lamps called osram lamps, with filaments composed of an alloy of osmium and tungsten (wolfram), can be used with a life of 1000 hours when run at an efficiency of about 1 • 5 watts per candle.

Tungsten lamps are made by the processes of Just and Hana- man (German patent No. 154262 of 1903) and of Kuzel, and at a useful life of 1000 hours, with a falling off in light-giving power of only 10-15%, they have been found to work at an efficiency of one to 1-25 watts per c.p. Further collected informa- tion on modern metallic wire

lamps and the patent literature thereof will be found in an article in the Engineer for December

7, 1906.

Mention should also be made of the Helion filament glow lamp in which the glower is composed largely of silicon, a carbon filament being used as a base. This filament is said to have a number of interesting qualities and an efficiency of about 1 watt per candle (see the Electrician, 1907, 58, p. 567).

The mercury vapour lamps of P. Cooper-Hewitt, C. O. Bastian and others have a certain field of usefulness. If a glass tube, highly exhausted, contains mercury vapour and a vapour mercury cathode and iron anode, a current can be lamps. passed through it under high electromotive force and will then be maintained when the voltage is reduced. The mercury vapour is rendered incandescent and glows with a brilliant greenish light which is highly actinic, but practically monochromatic, and is therefore not suitable for general illumina- tion because it does not reveal objects in their daylight colours. It is, however, an exceedingly economical source of light. A 3-ampere Cooper-Hewitt mercury lamp has an efficiency of 0-15 to 0‘33 watts per candle, or practically the same as an arc lamp, and will burn for several thousand hours. A similar lamp with mercury vapour included in a tube of uviol glass specially transparent to ultra-violet light (prepared by Schott & Co. of Jena) seems likely to replace the Finsen arc lamp in the treatment of lupus. Many attempts have been made to render the mercury vapour lamp polychromatic by the use of amalgams of zinc, sodium and bismuth in place of pure mercury for the negative electrode.

An important matter in connexion with glow lamps is their photometry. The arrangement most suitable for the photo- Photo- metry and testing of incandescent lamps is a gallery metry of or room large enough to be occupied by several workers, the walls being painted dead black. The photometer, preferably one of the Lummer-Brodhun form, is set up on a gallery or bench. On one side of it must be fixed a working standard, which as first suggested by Fleming is prefer- ably a large bulb incandescent lamp with a specially ” aged ” filament. Its candle-power can be compared, at regular intervals and known voltages, with that of some accepted flame standard, such as the 10 candle pentane lamp of Vernon Harcourt. In a lamp factory or electrical laboratory it is convenient to have a number of such large bulb standard lamps. This working standard should be maintained at a fixed distance on one side of the photometer, such that when worked at a standard voltage it creates an illumination of one candle-foot on one side of the photometer disk. The incandescent lamp to be examined is then placed on the other side of the photometer disk on a travel- ling carriage, so that it can be moved to and fro. Arrangements must be made to measure the current and the voltage of this lamp under test, and this is most accurately accomplished by employing a potentiometer (q.v.). The holder which carries the lamp should allow the lamp to be held with its axis in any required position; in making normal measurements the lamp should have its axis vertical, the filament being so situated that none of the turns or loops overlies another as seen from the photometer disk. Observations can then be made of the candle- power corresponding to different currents and voltages.

The candle-power of the lamp varies with the other variables in accordance with exponential laws of the following kind : —

If A is the current in amperes through the lamp, V the voltage or terminal potential difference, W the power absorbed in watts, c.p.

glow lamps.

the maximum candle-power, and a, b, c, &c, constants, it has been found that A and c.p. are connected by an exponential law such that

c.p. -ah x For carbon filament lamps * is a number lying between 5 and 6, generally

equal to 5-5 or 5-6. Also it has been found that c.p. = bVJ 3 very nearly, and that

c.p. = cV > 1 nearly where c is some other constant, and for carbon filaments y is a number nearly equal to 6. It is obvious that if the candle-power of the lamp varies very nearly as the 6th power of the current and of the voltage, the candle-power must vary as the cube of the wattage.

Sir W. de W. Abney and E. R. Festing have also given a formula connecting candle-power and watts equivalent to c.p. = (W—d) i where d is a constant.

In the case of the tantalum lamp the exponent x has a value near to 6, but the exponent y is a number near to 4, and the same for the osmium filament. Hence for these metallic glowers a certain per- centage variation of voltage does not create so great a variation in candle-power as in the case of the carbon lamp.

Curves delineating the relation of these variables for any incan- descent lamp are called its characteristic-curves. The life or average duration is a function of 'W/c.p., or of the watts per candle-power, and therefore of the voltage at which the lamp is worked. It follows from the above relation that the watts per candle-power vary inversely as the fourth power of the voltage.

From limited observations it seems that the average life of a carbon-filament lamp varies as the fifth or sixth power of the watts per candle-power. If V is the voltage at which the lamp is worked and L is its average life, then L varies roughly as the twenty-fifth power of the reciprocal of the voltage, or

L = aV^ 5 . A closer approximation to experience is given by the formula

V V 1

logioL = i3'5—

10 20,000

(See I. A. Fleming, " Characteristic Curves of Incandescent Lamps, 'Phil. Mag. May 1885).

All forms of incandescent or glow lamps are found to deteriorate in light-giving power with use. In the case of carbon filaments this is due to two causes. As already explained, carbon is scattered from the filament and deposited iJ£p*° upon the glass, and changes also take place in the filament which cause it to become reduced in temperature, even when subjected to the same terminal voltage. In many lamps it is found that the first effect of running the lamp is slightly to increase its candle-power, even although the voltage be kept constant; this is the result of a small decrease in the resistance of the filament. The heating to which it is subjected slightly increases the density of the carbon at the outset; this has the effect of making the filament lower in resistance, and therefore it takes more current at a constant voltage. The greater part, however, of the subsequent decay in candle-power is due to the deposit of carbon upon the buib, as shown by the fact that if the filament is taken out of the bulb and put into a new clean bulb the candle-power in the majority of cases returns to its original value. For every lamp there is a certain point in its career which may be called the " smashing-point," when the candle-power falls below a certain percentage of the original value, and when it is advantageous to replace it by a new one. Variations of pressure in the electric supply exercise a prejudicial effect upon the light-giving qualities of incandescent lamps. If glow lamps, nominally of 100 volts, are supplied from a public lighting-station, in the mains of which the pressure varies between 90 and no volts, their life will be greatly abbreviated, and they will become blackened much sooner than would be the case if the pressure were perfectly constant. Since the candle- power of the lamp varies very nearly as the fifth or sixth power of the voltage, it follows that a variation of 10% in the electro- motive force creates a variation of nearly 50% in the candle- power. Thus a 16 candle-power glow lamp, marked for use at

100 volts, was found on test to give the following candle-powers at voltages varying between 90 and 105: At 105 volts it gave 22-8 c.p.; at 100 volts, 16-7 c.p.; at 95 volts, 12-2 c.p.; and at 90 volts, 8-7 c.p. Thus a variation of 25% in the candle-power was caused by a variation in voltage of only 5%. The same kind of variation in working voltage exercises also a marked effect upon the average duration of the lamp. The following

ELECTRIC]

LIGHTING

671

figures show the results of some tests on typical 3-1 watt lamps run at voltages above the normal, taking the average life when worked at the marked volts (namely, 100) as 1000 hours:

At 101 volts the life was 818 hours.

,, 102 ,, ,, 681 ,,

103 104 105 106

662 452 374 310

regula tors.

Self-acting regulators have been devised by which the voltage at the points of consumption is kept constant, even although it varies at the point of generation. If, however, Voltage SUCD a device is to be effective, it must operate very quickly, as even the momentary effect of increased pressure is felt by the lamp. It is only therefore where the working pressure can be kept exceedingly constant that high-efficiency lamps can be advantageously employed, otherwise the cost of lamp renewals more than counterbalances the economy in the cost of power. The slow changes that occur in the resist- ance of the filament make themselves evident by an increase in the watts per candle-power. The following table shows some typical figures indicating the results of ageing in a 16 candle- power carbon-filament glow lamp: —

Hours run.

Candle-Power.

Watts per Candle-Power.

160

3-16

100

15-8

326

200

15-86

3-13

300

15-68

3-37

400

I5-4I

3-53

500

15-17

3-51

600

14-96

3-54

700

14-74

3-74

The gradual increase in watts per candle-power shown by this table does not imply necessarily an increase in the total power taken by the lamp, but is the consequence of the decay in candle- power produced by the blackening of the lamp. Therefore, to estimate the value of an incandescent lamp the user must take into account not merely the price of the lamp and the initial watts per candle-power, but the rate of decay of the lamp.

The scattering of carbon from the filament to the glass bulb produces interesting physical effects, which have been studied by T. A. Edison, W. H. Preece and J. A. Fleming. effect. If i nt0 an ordinary carbon-filament glow lamp a platinum plate is sealed, not connected to the filament but attached to a third terminal, then it is found that when the lamp is worked with continuous current a galvanometer connected in between the middle plate and the positive terminal of the lamp indicates a current, but not when connected in between the negative terminal of the lamp and the middle plate. If the middle plate is placed between the legs of a horse-shoe- shaped filament, it becomes blackened most quickly on the side facing the negative leg. This effect, commonly called the Edison effect, is connected with an electric discharge and con-vection of carbon which takes place between the two extreme ends of the filament, and, as experiment seems to show, consists in the conveyance of an electric charge, either by carbon molecules or by bodies smaller than molecules. There is, however, an electric discharge between the ends of the filament, which rapidly increases with the temperature of the filament and the terminal voltage; hence one of the difficulties of manu- facturing high-voltage glow lamps, that is to say, glow lamps for use on circuits having an electromotive force of 200 volts and upwards, is the discharge from one leg of the filament to the other.

A brief allusion may be made to the mode of use of incandescent lamps for interior and private lighting. At the present time hardly any other method of distribution is adopted than that of an arrangement in parallel; that is to say, each lamp on the circuit has one terminal connected to a wire which finally terminates at one pole of the generator, and its other terminal connected to a wire leading

Domestic use.

to the other pole. The lamp filaments are thus arranged between the conductors like the rungs of a ladder. In series with each lamp is placed a switch and a fuse or cut-out.

The lamps them- selves are attached to some variety of ornamental fitting, or in many cases suspended by a simple pendant, consisting of an insulated double flexible wire attached at its upper end to a ceiling rose, and carrying at the lower end a shade and socket in which the lamp is placed. Lamps thus hung head downwards are disadvantageously used because their end-on candle-power is not generally more than 60% of their maximum candle-power. In interior lighting one of the great objects to be attained is uniformity of illumination with avoidance of harsh shadows. This can only be achieved by a proper distribution of the lamps. It is impossible to give any hard and fast rules as to what number must be employed in the illumination of any room, as a great deal depends upon the nature of the reflecting surfaces, such as the walls, ceilings, &c. As a rough guide, it may be stated that for every 100 sq. ft. of floor surface one 16 candle-power lamp placed about 8 ft. above the floor will give a dull illumination, two will give a good illumination and four will give a brilliant illumination. We generally judge of the nature of the illumination in a room by our ability to read comfortably in any position. That this may be done, the horizontal illumination on the book should not be less than one candle-foot. The following table shows approximately the illuminations in candle-feet, in various situations, derived from actual experiments: —

In a well-lighted room on the floor or tables i-o to 3-0 c.f.

On a theatre stage 3-0 to 4-0 c.f.

On a railway platform -05 to -5 c.f.

In a picture gallery -65 to 3-5 c.f.

The mean daylight in May in the interior

of a room 30-0 to 40-0 c.f.

In full sunlight 7000 to 10,000 c.f.

In full moonlight i/6oth to i/iooth c.f.

From an artistic point of view, one of the worst methods of lighting a room is by pendant lamps, collected in single centres in large numbers. The lights ought to be distributed in different portions of the room, and so shaded that the light is received only by reflection from surrounding objects. Orna- mental effects are frequently produced by means of candle lamps in which a small incandescent lamp, imitating the flame of a candle, is placed upon a white porcelain tube as a holder, and these small units are distributed and arranged in electroliers and brackets. For details as to the various modes of placing conducting wires in houses, and the various' precautions for safe usage, the reader is referred to the article Electricity Supply. In the case of low voltage metallic filament lamps when the supply is by alternating current there is no difficulty in reducing the service voltage to any lower value by means of a transformer. In the case of direct current the only method available for working such low voltage lamps off higher supply voltages is to arrange the lamps in series.

Additional information on the subjects treated above may be found in the following books and original papers : —

Mrs Ayrton, The Electric Arc (London, 1900); Houston and Kennelly, Electric Arc Lighting and Electric Incandescent Lighting; S. P. Thompson, The Arc Light, Cantor Lectures, Society of Arts (1895); H. Nakano, "The Efficiency of the Arc Lamp," Proc. American Inst. Elec. Eng. (1889); A. Blondel, " Public and Street Lighting by Arc Lamps," Electrician, vols. xxxv. and xxxvi. (1895); T. Heskett, " Notes on the Electric Arc," Electrician, vol. xxxix. (1897); G. S. Ram, The Incandescent Lamp and its Manufacture (London, 1895) ; J. A. Fleming, Electric Lamps and Electric Lighting (London, 1899) ; J. A. Fleming, " The Photometry of Electric Lamps," Jour. Inst. Elec. Eng. (1903), 32, p. I (in this paper a copious bibliography of the subject of photometry

is given) ; J. Dredge, Electric Illumination (2 vols., London, 1882, 1885); A. P. Trotter, ” The Distribution and Measurement of Illumination,” Proc. Inst. C.E. vol. ex. (1892) ; E. L. Nichols, “The Efficiency of Methods of Artificial Illumination,” Trans. American Inst. Elec. Eng. vol. vi. (1889); Sir W. de W. Abney, Photometry, Cantor Lectures, Society of Arts (1894); A. Blondel, ” Photometric Magnitudes and Units,” Electrician (1894); J. E. Petavel, “An Experimental Research on some Standards of Light,” Proc. Roy, Soc. lxv. 469 (1899); F. Jehl, Carbon- Making for all Electrical Purposes (London, 1906) ; G. B. Dyke, ” On the Practical Determination of the Mean Spherical

Candle Power of Incandescent and Arc Lamps,” Phil. Mag. (1905) ; the Preliminary Report of the Sub-Committee of ‘he American Institute of Electrical Engineers on “Standards of Light”; Clifford C. Paterson, ” Investigations on Light Standards and the Present Condition of the High Voltage Glow Lamp,” Jour. Inst. Elec. Eng. (January 24, 1907); J. Swinburne, “New Incandescent Lamps,” Jour. Inst. Elec. Eng. (1907); L. Andrews, “Long Flame Arc Lamps,” Jour. Inst. Elec. Eng. (1906); W. von Bolton and O. Feuerlein, ” The Tantalum Lamp,” The Electrician (Jan. 27, 1905). Also the current issues of The Illuminating Engineer. (J. A. F.)

Commercial A spects. — The cost of supplying electricity depends more upon the rate of supply than upon the quantity supplied; or, as John Hopkinson put it, ” the cost of supplying o/ e ° s electricity for 1000 lamps for ten hours is very much charging, tess than ten times the cost of supplying the same number of lamps for one hour.” Efforts have therefore been made to devise a system of charge which shall in each case bear some relation to the cost of the service. Consumers vary largely both in respect to the quantity and to the period of their demands, but the cost of supplying any one of them with a given amount of electricity is chiefly governed by the amount of his maximum demand at any one time. The reason for this is that it is not generally found expedient to store electricity in large quantities. Electricity supply works generate the electricity for the most part at the moment it is used by the consumer. Electric lamps are normally in use on an average for only about four hours per day, and therefore the plant and organization, if employed for a lighting load only, are idle and unremunerative for about 20 hours out of the 24. It is necessary to have in readiness machinery capable of supplying the maximum possible requirements of all the consumers at any hour, and this accounts for a very large proportion of the total cost. The cost of raw material, viz. coal, water and stores consumed in the generation of electricity sold, forms relatively only a small part of the total cost, the major part of which is made up of the fixed charges attributable to the time during which the works are unproductive. This makes it very desirable to secure demands possessing high ” load ” and ” diversity ” factors. The correct way to charge for electricity is to give liberal rebates to those consumers who make prolonged and regular use of the plant, that is to say, the lower the ” peak ” demand and the more continuous the consumption, the better should be the discount. The consumer must be discouraged from making sudden large demands on the plant, and must be encouraged, while not reducing his total consumption, to spread his use of the plant over a large number of hours during the year. Mr Arthur Wright has devised a tariff which gives effect to this principle. The system necessitates the use of a special indicator — not to measure the quantity of electricity consumed, which is done by the ordinary meter — but to show the maximum amount of current taken by the consumer at any one time during the period for which he is to be charged. In effect it shows the proportion of plant which has had to be kept on hand for his use. If the indicator shows that say twenty lamps is the greatest number which the consumer has turned on simultaneously, then he gets a large discount on all the current which his ordinary meter shows that he has taken beyond the equivalent of one hour’s daily use of those twenty lamps. Generally the rate charged under this system is 7d. per unit for the equivalent of one hour’s daily use of the maximum demand and id. p r unit for all

surplus. It is on this principle that it pays to supply current for tramway and other purposes at a price which prima facie is below the cost of produc- tion; it is only apparently so in comparison with the cost of producing electricity for lighting purposes. In the case of tramways the electricity is required for 15 or 16 hours per day. Electricity for a single lamp would rost on the basis of this “maximum-demand-indicator” system for 15 hours per day only i-86d. per unit. In some cases a system of further discounts to very large consumers is combined with the Wright system. Some undertakers have abandoned the Wright system in favour of average flat rates, but this does not imply any failure of the Wright system; on the contrary, the system, having served to establish the most economical consumption of electricity, has demonstrated the average rate at which the undertakers are

able to give the supply at a fair profit, and the proportion of possible new customers being small the undertakers find it a simplification to dispense with the maximum demand indicator. But in some cases a mistake has been made by offering the unprofitable early-closing consumers the option of obtaining electricity at a flat rate much lower than their load-factor would warrant and below cost price. The effect of this is to nullify the Wright system of charging, for a consumer will not elect to pay for his electricity on the Wright system if he can obtain a lower rate by means of a flat rate system. Thus the long-hour profitable consumer is made to pay a much higher price than he need be charged, in order that the unprofitable short-hour consumer may be retained and be made actually still more unprofitable. It is not improbable that ultimately the supply will be charged for on the basis of a rate determined by the size and character of the consumer’s premises, or the number and dimensions of the electrical points, much in the same way as water is charged for by a water rate determined by the rent of the consumer’s house and the number of water taps.

Most new houses within an electricity supply area are wired for electricity during construction, but in several towns means have to be taken to encourage small shopkeepers and tenants of small houses to use electricity by removing hous° f the obstacle of the first outlay on wiring. The cost of wiring may be taken at 15s. to £2 per lamp installed including all necessary wire, switches, fuses, lamps, holders, casing, but not electroliers or shades. Many undertakers carry out wiring on the easy payment or hire-purchase system. Parliament has sanctioned the adoption of these systems by some local authorities and even authorized them to do the work by direct employment of labour. The usual arrangement is to make an additional charge of fd. per unit on all current used, with a minimum payment of is. per 8 c.p. lamp, consumers having the option of purchasing the installation at any time on specified conditions. The consumer has to enter into an agreement, and if he is only a tenant the landlord has to sign a memorandum to the effect that the wiring and fittings belong to the supply undertakers. Several undertakers have adopted a system of maintenance and renewal of lamps, and at least one local authority undertakes to supply consumers with lamps free of charge.

There is still considerable scope for increasing the business of electricity supply by judicious advertising and other methods. Comparisons of the kilowatt hour consumption per capita in various towns show that where an energetic sumption. policy has been pursued the profits have improved by reason of additional output combined with increased load factor. The average number of equivalent 8 c.p. lamps connected per capita in the average of English towns is about 1-2. The average number of units consumed per capita per annum is about 23, and the average income per capita per annum is about 5s. In a number of American cities 20s. per capita per annum is obtained. In the United States a co-operative electrical develop- ment association canvasses both the general public and the electricity supply undertakers. Funds are provided by the manu- facturing companies acting in concert with the supply authorities and contractors, and the spirit underlying the work is to advertise the merits of electricity — not any particular company or interest. Their efforts are directed to securing new consumers and stimu- lating the increased and more varied use of electricity among actual consumers.

All supply undertakers are anxious to develop the con- sumption of electricity for power purposes even more than for lighting, but the first cost of installing electric motors is a deterrent to the adoption of electricity in small factories and shops, and most undertakers are therefore prepared to let out motors, &c, on hire or purchase on varying terms accord- ing to circumstances.

A board of trade unit will supply one 8 c.p. carbon lamp of 30 hours or 30 such lamps for one hour. In average use an incandescent lamp will last about 800 hours, which is equal to about 12 months normal use; a good lamp will frequently last more than double this time before it breaks down.

A large number of towns have adopted electricity for street lighting. Frank Bailey has furnished particulars of photometric tests which he has made on new and old street lamps in the city of London. From these tests the following comparative figures are deduced: —

Gas-

Average total Cost per c.p. per annum. Double burner ordinary low pressure incandescent

(mean of six tests) n-id.

Single burner high-pressure gas .... 9-0 Double burner high-pressure gas .... 11-7 Arc lamp —

Old type of lantern 8

Flame arc 5

From these tests of candle-power the illumination at a distance of 100 ft. from the source is estimated as follows: —

Candle Ft.

Double ordinary incandescent gas lamp

illumination 0-013

Single high pressure ordinary incan- descent gas lamp illumination . . 0-016

Double high pressure ordinary incan- descent gas lamp illumination . . 0-027

Ordinary arc lamp 0-060

Flame arc lamp 0-120

Ratio.

= 1-24

= 2-10

= 4-50

= 9 00

Testing meters.

The cost of electricity, light for light, is very much less than that of gas. The following comparative figures relating to street lighting at Croydon have been issued by the lighting committee of that corporation: —

Type of Lamp.

Number of Lamps.

Distance apart (yds.)

Total Cost.

Average c.p. per Mile.

Cost per c.p. per annum.

Incandescent gas . Incandescent electric . Electric arcs

2,137

90

428

80 66 65

£7.062

288

7,212

839

1.373

io,537

i5-86d.

13-71 11-32

Apart from cheaper methods of generation there are two main sources of economy in electric lighting. One is the improved arrangement and use of electrical installations, and the other is the employment of lamps of higher efficiency. As regards the first, increased attention has been given to the position, candle-power and shading of electric lamps so as to give the most effective illumination in varying circumstances and to avoid excess of light. The ease with which electric lamps may be switched on and off from a distance has lent itself to arrange- ments whereby current may be saved by switching off lights not in use and by controlling the number of lamps required to be alight at one time on an electrolier. Appreciable economies are brought about by the scientific disposition of lights and the avoidance of waste in use. As regards the other source of economy, the Nernst, the tantalum, the osram, and the metallized carbon filament lamp, although costing more in the first instance than carbon lamps, have become popular owing to their economy in current consumption. Where adopted largely they have had a distinct effect in reducing the rate of increase of output from supply undertakings, but their use has been generally encouraged as tending towards the greater popularity of electric light and an ultimately wider demand. Mercury vapour lamps for indoor and outdoor lighting have also proved their high efficiency, and the use of flame arc lamps has greatly increased the cheapness of outdoor electric lighting.

The existence of a ” daylight load ” tends to reduce the all- round cost of generating

and distributing electricity. This daylight load is partly supplied by power for industrial purposes and partly by the demand for electricity in many domestic operations. The use of electric heating and cooking apparatus (including radiators, ovens, grills, chafing dishes, hot plates, kettles, flat-irons, curling irons, &c.) has greatly developed, and provides a load which extends intermittently throughout the greater part of the twenty-four hours. Electric fans for home ventilation are also used, and in the domestic operations where a small amount of power is required (as in driving sewing machines, boot cleaners, washing machines, mangles, knife cleaners, ” vacuum ” cleaners, &c.) the electric motor is being

largely adopted. The trend of affairs points to a time when the total demand from such domestic sources will greatly exceed the demand for lighting only. The usual charges for current to be used in domestic heating or power operations vary from id. to 2d. per unit. As the demand increases the charges will undergo reduction, and there will also be a reflex action in bring- ing down the cost of electricity for lighting owing to the improved load factor resulting from an increase in the day demand. In the cooking and heating and motor departments also there has been improvement in the efficiency of the apparatus, and its economy is enhanced by the fact that current may be switched on and off as required.

The Board of Trade are now prepared to receive electric measuring instruments for examination or testing at their electrical standardizing laboratory, where they have a battery power admitting of a maximum current of 7000 amperes to be dealt with. The London county council and some other corporations are prepared upon requisi- tion to appoint inspectors to test meters on consumers’ premises.

All supply undertakers now issue rules and regulations for the efficient wiring of electric installations. The rules and regulations issued by the institution of electrical engineers have been accepted by many local authorities and companies, and also by many of the fire insurance companies. The Phoenix fire office rules were the first to be drawn up, and are adopted by many of the fire offices, but some other leading insurance offices have their own rules under which risks are accepted without extra premium. In the opinion of the insurance companies ” the electric light is the safest of all illuminants and is preferable to any others when the installation has been thoroughly well put up.” Regulations have also been issued by the London county council in regard to theatres, <%c, by the national board of fire underwriters of America (known as the " National Electrical Code "), by the fire underwriters association of Victoria (Commonwealth of Australia), by the Calcutta fire insurance agents association and under the Canadian Electric Light Inspection Act. In Germany rules have been issued by the Verband Deutscher Elektrotechniker and by the union of private fire insurance companies of Germany, in Switzerland by the Association Suisse des electriciens, in Austria by the Elektro- technischer Verein of Vienna, in France by ministerial decree and by the syndicat professionel des industries electriques. (For reprints of these regulations see Electrical Trades Directory.) (E. Ga.)

Wiring rales.

LIGHTNING, the visible flash that accompanies an electric discharge in the sky. In certain electrical conditions of the atmosphere a cloud becomes highly charged by the coalescence of drops of vapour. A large drop formed by the fusion of many smaller ones contains the same amount of electricity upon a smaller superficial area, and the electric potential of each drop, and of the whole cloud, rises. When the cloud passes near another cloud stratum or near a hilltop, tower or tree, a discharge takes place from the cloud in the form of lightning. The discharge sometimes takes place from the earth to the cloud, or from a lower to a higher stratum, and sometimes from conductors silently. Rain discharges the electricity quietly to earth, and lightning frequently ceases with rain (see Atmospheric Electricity).

LIGHTNING. CONDUCTOR, or Lightning Rod (Franklin), the name usually given to apparatus designed to protect buildings or ships from the destructive effects of lightning (Fr. paratonnerre, Ger. Blitzableiter) . The upper regions of the atmosphere being at a different electrical potential from the earth, the thick dense clouds which are the usual prelude to a thunder storm serve to conduct the electricity of the upper air down towards the earth, and an electrical discharge takes place across the air space when the pressure is sufficient. Lightning discharges were distinguished by Sir Oliver Lodge into two distinct types — the A and the B flashes. The A flash is of the simple type which arises when an electrically charged cloud approaches the earth without an intermediate cloud intervening. In the second type B, where another cloud intervenes between the cloud carrying the primary charge and the earth, the two clouds practically form a condenser; and when a discharge from the first takes place into the second the free charge on the earth side of the lower cloud is suddenly relieved, and the disruptive discharge

from the latter to earth takes such an erratic course that according to the Lightning Research Committee ” no series of lightning conductors of the hitherto recognized type suffice to protect the building.” In Germany two kinds of lightning stroke have been recognized, one as ” ziindenden ” (causing fire), analogous to the B flash, the other as ” kalten ” (not causing fire), the ordinary A discharge. The destructive effect of the former was noticed in 1884 by A. Parnell, who quoted instances of damage due to mechanical force, which he stated in many cases took place in a more or less upward direction.

The object of erecting a number of pointed rods to form a lightning conductor is to produce a glow or brush discharge and thus neutralize or relieve the tension of the thunder-cloud. This, if the latter is of the A type, can be successfully accom- plished, but sometimes the lightning flash takes place so suddenly that it cannot be prevented, however great the number of points provided, there being such a store of energy in the descending cloud that they are unable to ward off the shock. A B flash may ignore the points and strike some metal work in the vicinity; to avoid damage to the structure this must also be connected to the conductors. A single air terminal is of no more use than an inscribed sign-board; besides multiplying the number of points, numerous paths, as well as interconnexions between the conductors, must be arranged to lead the discharge to the earth. The system of pipes and gutters on a roof must be imitated; although a single rain-water pipe would be suffi- cient to deal with a summer shower, in practice pipes are used in sufficient number to carry off the greatest storm.

Protected Area. — According to Lodge ” there is no space near a rod which can be definitely styled an area of protection, for it is possible to receive violent sparks and shocks from the conductor itself, not to speak of the innumerable secondary discharges that are liable to occur in the wake of the main flash.” The report of the Lightning Research Committee contains many examples of buildings struck in the so-called ” protected area.”

Material for Conductors. — Franklin’s original rods (1752) were made of iron, and this metal is still employed throughout the continent of Europe and in the United States. British architects, who objected to the unsightliness of the rods, eventu- ally specified copper tape, which is generally run round the sharp angles of a building in such a manner as to increase the chances of the lightning being diverted from the conductor. The popular idea is that to secure the greatest protection a rod of the largest area should be erected, whereas a single large conductor is far inferior to a number of smaller ones and copper as a material is not so suitable for the purpose as iron. A copper rod allows the discharge to pass too quickly and produces a violent shock, whereas iron offers more impedance and allows the flash to leak away by damping down the oscillations. Thus there is less chance of a side flash from an iron than from a

copper conductor.

Causes of Failure. — A number of failures of conductors were noticed in the 1905 report of the Lightning Research Committee. One cause was the insufficient number of conductors and earth connexions; another was the absence of any system for connecting the metallic portion of the buildings to the conductors. In some cases the main stroke was received, but damage occurred by side-flash to isolated parts of the roof. There were several examples of large metallic surfaces being charged with electricity, the greater part of which was safely discharged, but enough followed unauthorized paths, such as a speaking-tube or electric bell wires, to cause damage. In one instance a flash struck the building at two points simul- taneously; one portion followed the conductor, but the other went to earth jumping from a small finial to a greenhouse 30 ft. below.

Construction of Conductors. — The general conclusions of the Lightning Research Committee agree with the independent reports of similar investigators in Germany, Hungary and Holland . The following is a summary of the suggestions made : — The conductors may be of copper, or of soft iron protected by

galvanizing or coated with lead. A number of paths to earth must be provided; well-jointed rain-water pipes may be utilized.

Fig. 1. — Holdfast.

Fig. 2.

Fig. 3. — Aigrette.

Every chimney stack or other prominence should have an air

terminal. Conductors should run in the most direct manner

from air to earth, and be kept away from the walls by holdfasts

(fig. 1), in the manner shown by A (fig. 2); the usual method

is seen in B (fig. 2), where the tape follows the contour of the

building and causes side flash. A building

with a long roof should also be fitted with

a horizontal conductor along the ridge, and

to this aigrettes (fig. 3) should be attached; a

simpler method is to support the cable by

holdfasts armed with a spike (fig. 4). Joints

must be held together mechanically as well

as electrically, and should be protected from

the action of the air. At Westminster Abbey

the cables are spliced and inserted in a box

which is filled with lead run in when molten.

Earth Connexion. — A copper plate not less p „ 1,,

than 3 sq. ft. in area may be used as an on ” Roof,

earth connexion if buried in permanently damp ground. Instead of a plate there are advantages in using the tubular earth shown in fig. 5. The cable packed in carbon descends to the bottom of the perforated tube which is driven into the ground, a connexion being made to the nearest rain-water pipe to secure the necessary moisture. No further attention is required. Plate earths should be tested every year. The number of earths depends on the area of the building, but at least two should be provided. Insulators on the conductor are of no advantage, and it is useless to gild or otherwise protect the points of the air-terminals. As heated air offers a good path for lightning (which is the reason why the kitchen-chimney is often selected by the discharge), a number of points should be fixed to high chimneys and there should be at least two con- ductors to earth. All roof metals, such as finials, flashings, rain-water gutters, ventilating pipes, cowls and stove pipes, should be connected to the system of conductors. The efficiency of the in- stallation depends on the interconnexion of all metallic parts, also on the quality of the earth connexions. In the case of magazines used for explosives, it is questionable whether the usual plan of FlG – 5-— Tubular Earth, erecting rods at the sides of the buildings is efficient. The only way to ensure safety is to enclose the magazine in iron; the

next best is to arrange the conductors so that they surround it like a bird cage.

Bibliography. — The literature, although extensive, contains so many descriptions of ludicrous devices, that the student, after reading Benjamin Franklin's Experiments and Observations on Electricity made at Philadelphia (1769), may turn to the Report of the Lightning Rod Conference of December 1881. In the latter work there are abstracts of many valuable papers, especially the reports made to the French Academy, among others by Coulomb, Laplace, Gay-Lussac, Fresnel, Regnault, &c. In 1876 J. Clerk Maxwell read a paper before the British Association in which he brought forward the idea (based on Faraday's experiments) of protecting a building from the effects of lightning by surrounding it with a sort of cage of rods or stout wire. It was not, however, until the Bath meeting of the British Association in 1888 that the subject was fully discussed by the physical and engineering sections. Sir Oliver Lodge showed the futility of single conductors, and advised the interconnexion of all the metal work on a building to a number of conductors buried in the earth. The action of lightning flashes was also demonstrated by him in lectures delivered before the Society of Arts (1888). The Clerk Maxwell system was adopted to a large extent in Germany, and in July 1901 a sub-committee of the Berlin Electro- technical Association was formed, which published rules. In 1900 a paper entitled " The Protection of Public Buildings from Light- ning," by Killingworth Hedges, led to the formation, by the Royal Institute of British Architects and the Surveyors' Institution, of the Lightning Research Committee, on which the Royal Society and the Meteorological Society were represented. The Report, edited by Sir Oliver Lodge, Sir John Gavey and Killingworth Hedges (Hon. Sec), was published in April 1905. An illustrated supplement, compiled by K. Hedges and entitled Modern Lightning Conductors (1905), contains particulars of the independent reports of the German committee, the Dutch Academy of Science, and the Royal Joseph university, Budapest. A description is also given of the author's modified Clerk Maxwell system, in which the metal work of the roofs of a building form the upper part, the rain-water pipes taking the place of the usual lightning-rods. See also Sir Oliver Lodge, Lightning Conductors (London, 1902). (K. H.)

LIGHTS, CEREMONIAL USE OF. The ceremonial use of lights in the Christian Church, with which this article is mainly

concerned, probably has a double origin: in a very cfiti natural symbolism, and in the adaptation of certain religions, pagan and Jewish rites and customs of which the

symbolic meaning was Christianized. Light is every- where the symbol of joy and of

life-giving power, as darkness is of death and destruction. Fire, the most mysterious and impressive of the elements, the giver of light and of all the good things of life, is a thing sacred and adorable in primitive religions, and fire-worship still has its place in two at least of the great religions of the world. The Parsis adore fire as the visible expression of Ahura-Mazda, the eternal principle of light and righteousness; the Brahmans worship it as divine and omni- scient. 1 The Hindu festival of Dewali (Diyawall, from diya, light), when temples and houses are illuminated with countless lamps, is held every November to celebrate Lakhshmi, the goddess of prosperity. In the ritual of the Jewish temple fire and light played a conspicuous part. In the Holy of Holies was a ” cloud of light ” (shekinah), symbolical of the presence of Yahweh, and before it stood the candlestick with six branches, on each of which and on the central stem was a lamp eternally burning; while in the forecourt was an altar on which the sacred fire was never allowed to go out. Similarly the Jewish synagogues have each their eternal lamp; while in the religion of Islam lighted lamps mark things and places specially holy; thus the Ka’ba at Mecca is illuminated by thousands of lamps hanging from the gold and silver rods that connect the columns of the surround- ing colonnade.

The Greeks and Romans, too, had their sacred fire and their ceremonial lights. In Greece the Lampadedromia or Lampade-

phoria (torch-race) had its origin in ceremonies con- aad Rome, nected with the relighting of the sacred fire. Pausanias

(i. 26, § 6) mentions the golden lamp made by Calli- machus which burned night and day in the sanctuary of Athena Polias on the Acropolis, and (vii. 22, §§ 2 and 3) tells of a statue of Hermes Agoraios, in the market-place of Pharae in Achaea,

1 ” O Fire, thou knowest all things ! ” See A. Bourquin, ” Brahma- karma, ou rites sacres des Brahmans,” in the Annates du Musee Cuimet (Paris, 1884, t. vii.).

before which lamps were lighted. Among the Romans lighted candles and lamps formed part of the cult of the domestic tutelary deities; on all festivals doors were garlanded and lamps lighted (Juvenal, Sat. xii. 92; Tertullian, Apol. xxxv.). In the cult of Isis lamps were lighted by day. In the ordinary temples were candelabra, e.g. that in the temple of Apollo Palatinus at Rome, originally taken by Alexander from Thebes, which was in the form of a tree from the branches of which lights hung like fruit. In comparing pagan with Christian usage it is important to remember that the lamps in the pagan temples, were not symbolical, but votive offerings to the gods. Torches and lamps were also carried in religious processions.

The pagan custom of burying lamps with the dead conveyed no such symbolical meaning as was implied in the late Christian custom of placing lights on and about the tombs of martyrs and saints. Its object was to provide the umYs dead with the means of obtaining light in the next world, a wholly material conception; and the lamps were for the most part unlighted. It was of Asiatic origin, traces of it having been observed in Phoenicia and in the Punic colonies, but not in Egypt or Greece. In Europe it was confined to the countries under the domination of Rome. 2

In Christianity, from the very first, fire and light are conceived as symbols, if not as visible manifestations, of the divine nature and the divine presence. Christ is ” the true Light ” (John i. 9), and at his transfiguration ” the fashion Chritama of his countenance was altered, and his raiment was ˆutˆi. ™ white and glistering ” (Luke ix. 29) ; when the Holy Ghost descended upon the apostles, ” there appeared unto them cloven tongues of fire, and it sat upon each of them” (Acts ii. 3); at the conversion of St Paul ” there shined round him a great light from heaven ” (Acts ix. 3); while the glorified Christ is represented as standing ” in the midst of seven candle- sticks … his head and hairs white like wool, as white as snow; and his eyes as a flame of fire ” (Rev. i. 14, 15). Christians are ” children of Light ” at perpetual war with ” the powers of darkness.”

All this might very early, without the incentive of Jewish and pagan example, have

affected the symbolic ritual of the primitive Church. There is, however, no evidence of any ceremonial use of lights in Christian worship during chuteh. * the first two centuries. It is recorded, indeed (Acts xx. 7, 8), that on the occasion of St Paul's preaching at Alexandria in Troas "there were many lights in the upper chamber"; but this was at night, and the most that can be hazarded is that a specially large number were lighted as a festive illumination, as in modern Church festivals (Martigny, Diet, des antiqu. Chret.). As to a purely ceremonial use, such early evidence as exists is all the other way. A single sentence of Tertullian {Apol. xxxv.) sufficiently illuminates Christian practice during the 2nd century. " On days of rejoicing," he says, "we do not shade our door-posts with laurels nor TertuiUma encroach upon the day-light with lamps " (die laeto 'wihn" non laurels posies obumbramus nee lucemis diem infringimus) . Lactantius, writing early in the 4th century, is even more sarcastic in his references to the heathen practice. " They kindle lights," he says, " as though to one who is in darkness. Can he be thought sane who offers the light of lamps and candles to the Author and Giver of all light?" (Div. Inst. vi. de vero cultu, cap. 2, in Migne, Patr. lat. vi. 637).* This is primarily an attack on votive lights, and does not necessarily exclude their ceremonial use in other ways. There is, indeed, evidence that they were so used before Lactantius wrote. The 34th canon of the synod of Elvira (305), which was contemporary with him, forbade candles to be lighted in cemeteries during the daytime, which points to an established custom as well as to an objection to it; and in the Roman catacombs lamps have been found of the 2nd and 3rd centuries which seem to havt

8 J. Toutain, in Daremberg and Saglio, Dictionnaire, s.v. " Lucerna."

3 This is quoted with approval by Bishop Jewel in the homily Against Peril of Idolatry (see below).'

been ceremonial or symbolical. 1 Again, according to the Acta of St Cyprian (d. 258), his body was borne to the grave prae-

lucentibus cereis, and Prudentius, in his hymn on the 2ad »ad martyrdom of St Lawrence (Peristeph. ii. 71, in Migne, centuries. ˆ atr – ˆ at – !*■ 3°°) > says that in the time of St

Laurentius, i.e. the middle of the 3rd century, candles stood in the churches of Rome on golden candelabra. The gift, mentioned by Anastasius (in Syiv.), made by Constantine to the Vatican basilica, of a pharum of gold, garnished with 500 dolphins each holding a lamp, to burn before St Peter's tomb, points also to a custom well established before Christianity became the state religion.

Whatever previous custom may have been — and for the earliest ages it is difficult to determine absolutely owing to the fact

that the Christians held their services at night — by Jerome the close of the 4th century the ceremonial use of *Uatha' lights had become firmly and universally established

in the Church. This is clear, to pass by much other evidence, from the controversy of St Jerome with Vigilantius.

Vigilantius, a presbyter of Barcelona, still occupied the position of Tertullian and Lactantius in this matter. " We see," he wrote, " a rite peculiar to the pagans introduced into the churches on pretext of religion, and, while the sun is still shining, a mass of wax tapers lighted. ... A great honour to the blessed martyrs, whom they think to illustrate with contemptible little candles (de tilissimis cereolis) ! " Jerome, the most influential theologian of the day, took up the cudgels against Vigilantius (he " ought to be called Dormitantius "), who, in spite of his fatherly admonition, had dared again "

to open his foul mouth and send forth a filthy stink against the relics of the holy martyrs " {flier. Ep. cix. al. 53 — ad Ripuarium Presbyl., in Migne, Patr. lat. p. 906). If candles are lit before their tombs, are these the ensigns of idolatry ? In his treatise contra Vigilantium (Patr. lat. t. xxiii.) he answers the question with much common sense. There can be no harm if ignorant and simple people, or religious women, light candles in honour of the martyrs. We are not born, but reborn, Christians," and that which when done for idols was detestable is acceptable when done for the martyrs. As in the case of the woman with the precious box of ointment, it is not the gift that merits reward, but the faith that inspires it. As for lights in the churches, he adds that " in all the churches of the East, whenever the gospel is to be read, lights are lit, though the sun be rising (Jam sole rutilante), not in order to disperse the darkness, but as a visible sign of gladness (ad signum laetiliae demonstrandum)." Taken in connexion with a statement which almost immediately precedes this — " Cereos autem non clara luce accendimus, sicut frustra calumniaris: sed ut nOctis tenebras hoc solatio temperemus " (§ 7) — this seems to point to the fact that the ritual use of lights in the church services, so far as already estab- lished, arose from the same conservative habit as determined the development of liturgical vestments, i.e. the lights which had been necessary at the nocturnal meetings were retained, after the hours of service had been altered, and invested with a symbolical meaning.

Already they were used at most of the conspicuous functions of the Church. Paulinus, bishop of Nola (d. 431), describes

the altar at the eucharist as " crowned with crowded J*"?*" . lights," 2 and even mentions the "eternal lamp." 3 century. F° r their use at baptisms we have, among much other

evidence, that of Zeno of Verona for the West, 4 and that of Gregory of Nazianzus for the East. 6 Their use at funerals is illustrated by Eusebius's description of the burial of Con- stantine, 8 and Jerome's account of that of St Paula.' At ordinations they were used, as is shown by the 6th canon of the council of Carthage (398), which decrees that the acolyte is to hand to the newly ordained deacon ceroferarium cum cereo.

1 This symbolism — whatever it was — was not pagan, i.e. the lamps were not placed in the graves as part of the furniture of the dead — in the Catacombs they are found only in the niches of the galleries and the arcosolia — nor can they have been votive in the sense popularized later.

- " Clara coronantur densis altaria lychnis " (Poem. De S. Felice natalitium, xiv. 99, in Migne, Patr. lat. lxi. 467).

' " Continuum scyphus est argenteus aptus ad usum."

4 " Sal, ignis et oleum " (Lib. i. Tract, xiv. 4, in Migne, xi. 358).

5 In sand. Pasch. c. 2 ; Migne, Patr. graeca, xxxvi. 624).

1 ˆ&ra t* lˆdˆapre; kOkKcˆ kwl

- " Cum alii Pontifices lampadis cereosque proferrent, alii choras peallentium ducerent " (Ep. cviii. ad Eustochium virginem, in Migne).

As to the blessing of candles, according to the Liber pontificalis Pope Zosimus in 417 ordered these to be blessed, 8 and the Gallican and Mozarabic rituals also provided for this ceremony. 9 The Feast of the Purification of the Virgin, known as Candlemas (q.v.), because on this day the candles for the whole year are blessed, was established — according to some authorities — by Pope Gelasius I. about 492. As to the question of "altar lights," however, it must be borne in mind that these were not placed upon the altar, or on a retable behind it, until the 12th century. These were originally the candles carried by the deacons, accord- ing to the Ordo Romanus (i. 8; ii. 5; iii. 7) seven in number, which were set down either on the steps of the altar, or, later, behind

it. In the Eastern Church, to this day, there are no lights on the high altar; the lighted candles cAure™ stand on a small altar beside it, and at various parts of the service are carried by the lectors or acolytes before the officiating priest or deacon. The ” crowd of lights ” described by Paulinus as crowning the altar were either grouped round it or suspended in front of it ; they are represented by the sanctuary lamps of the Latin Church and by the crown of lights suspended in front of the altar in the Greek.

To trace the gradual elaboration of the symbolism and use of ceremonial lights in the Church, until its full development and systematization in the middle ages, would be impossible here. It must suffice to note a few stages in Develop- the process. The burning of lights before the tombs tbe HSe< of martyrs led naturally to their being burned also before relics and lastly before images and pictures. This latter practice, hotly denounced as idolatry during the iconoclastic controversy (see Iconoclasm) , was finally established as orthodox by the second general council of Nicaea (787), which restored the worship of images. A later development, however, by which certain lights themselves came to be regarded as objects of worship and to have other lights burned before them, was con- demned as idolatrous by the synod of Noyon in 1344. 10 The passion for symbolism extracted ever new meanings out of the candles and their use. Early in the 6th century Ennodius, bishop of Pavia, pointed out the three-fold elements of a wax- candle (Opusc. ix. and x.), each of which would make it an offering acceptable to God; the rush- wick is the product of pure water, the wax is the offspring of virgin bees, 11 the flame is sent from heaven. 12 Clearly, wax was a symbol of the Blessed Virgin and the holy humanity of Christ. The later middle ages developed the idea. Durandus, in his Rationale, interprets the wax as the body of Christ, the wick as his soul, the flame as his divine nature; and the consuming candle as symbolizing his passion and death.

8 This may be the paschal candle only. In some codices the text runs: ” Per parochias concessit licentiam benedicendi Cereum Pas- chalem ” (Du Cange, Glossarium, s.v. ” Cereum Paschale “). In the three variants of the notice of Zosimus given in Duchesne’s edition of the Lib. pontif. (1886-1892) the word cera is, however, alone used. Nor does the text imply that he gave to the suburbican churches a privilege hitherto exercised by the metropolitan church. The passage runs: ” Hie constituit ut diaconi leva tecta haberent de pallets linostimis per parrochias et ut cera benedicatur,” &c. Per parrochias here obviously refers to the head-gear of the deacons, not to the candles.

9 See also the Peregrinatio Sylviae (386), 86, &c, for the use of lights at Jerusalem, and Isidore of Seville (Etym. vii. 12; xx. 10) for the usage in the West. That even in the 7th century the blessing of candles was by no means universal is proved by the 9th canon of the council ofjToledo (671), " De benedicendo cereo et lucerna inprivi- legiis Paschae.” This canon states that candles and lamps are not blessed in some churches, and that inquiries have been made why we do it. In reply, the council decides that it should be done to celebrate the mystery of Christ’s resurrection. See Isidore of Seville, Cone, in Migne, Pat. lat. lxxxiv. 369.

10 Du Cange, Glossarium, s.v. ” Candela.”

11 Bees were believed, like fish, to be sexless.

12 ” Venerandis compactam elementis facem tibi, Domine, manci- pamus: in qua trium copula munerum primum de impari numero complacebit : quae quod gratis Deo veniat auctoribus, non habetur incertum: unum quod de fetibus fluminum accedunt nutrimenta flammarum: aliud quod apum tribuit intemerata fecunditas, in quarum partibus nulla partitur damna virginitas: ignis etiam coelo infusus adhibetur ” (Opusc. x. in Migne, Patr. lat. t. lxiii.).

In the completed ritual system of the medieval Church, as still preserved in the Roman

Catholic communion, the use of ceremonial . . lights falls under three heads. (1) They may be sym-

” e bolical of the light of God’s presence, of Christ as ” Light

Cmth’uc of L ‘8 ht ’” or ° • ” the cnildren °f Light ” in conflict with fc« oik ˆ e powers of darkness; they may even be no more ” than expressions of joy on the occasion of great festivals.

(2) They may be votive, i.e. offered as an act of worship (latria) to God. (3) They are, in virtue of their benediction by the Church, sacramentalia, i.e. efficacious for the good of men’s souls and bodies, and for the confusion of the powers of darkness. 1 With one or more of these implications, they are employed in all the public functions of the Church. At the consecration of a church twelve

lights are placed round the walls at the twelve spots Dedication w h ere these are anointed by the bishop with holy oil, a and on every anniversary these are relighted; at the

chimb. dedication of an altar tapers are lighted and censed at each place where the table is anointed (Pontificate Rom. p. ii. De eccl. dedicat. seu consecrat.). At every liturgical service, and especially at Mass and at choir services, there must be at least

two lighted tapers on the altar, 2 as symbols of the presence *, ‘t’i oi Go < * and triDUtes of adoration. For the Mass the and choir ru j e is t j, at there are s ; x ij g hts at High Mass, four at a service*. m issa cantata, and two at private masses. At a Pontifical High Mass (i.e. when the bishop celebrates) the lights are seven, because seven golden candlesticks surround the risen Saviour, the chief bishop of the Church (see Rev. i. 12). At most pontifical functions, moreover, the bishop — as the representative of Christ — is preceded by an acolyte with a burning candle (bugia) on a candle- stick. The Ceremoniale Episcoporum (1. 12) further orders that a burning lamp is to hang at all times before each altar, three in front

of the high altar, and five before the reserved Sacrament, sanctuary as S y m bols of the eternal Presence. In practice, how- temps, ever, it is usual to have only one lamp lighted before the tabernacle in which the Host is reserved. The special symbol of the real presence of Christ is the Sanctus candle, which is lighted

at the moment of consecration and kept burning until

iTh t ˆ ie commumon – The same symbolism is intended by

e/

***’ whenever it is carried in procession, or to the sick and

Presence. dy ;

As symbols of light and joy a candle is held on each side of the deacon when reading the Gospel at Mass; and the same symbolism underlies the multiplication of lights on festivals, their number varying with the importance of the occasion. As to the number of these latter no rule is laid down. They differ from liturgical lights in that, whereas these must be tapers of pure beeswax or lamps fed with pure olive oil (except by special dispensation under certain circumstances), those used merely to add splendour to the cele- bration may be of any material; the only exception being, that in the decoration of the altar gas-lights are forbidden.

In general the ceremonial use of lights in the Roman Catholic Church is conceived as a dramatic representation in fire of the life Tenebrae. °* Christ and of the whole scheme of salvation. On Easter Eve the new fire, symbol of the light of the newly risen Christ, is produced, and from this are kindled all the lights used throughout the Christian year

until, in the gathering darkness (tene- brae) of the Passion, they are gradually extinguished. This quenching of the light of the world is symbolized at the service of Tenebrae in Holy Week by the placing on a stand before the altar of thirteen lighted tapers arranged pyramidally, the rest of the church being in darkness. The penitential psalms are sung, and at the end of each a candle is extinguished. When only the central one is left it is taken dow n and carried behind the altar, thus symbolizing the

1 All three conceptions are brought out in the prayers for the blessing of candles on the Feast of the Purification of the B.V.M. (Candlemas, q.v.). (1) ” O holy Lord, . . . who ... by the com- mand didst cause this liquid to come by the labour of bees to the perfection of wax, . . . we beseech thee ... to bless and sanctify these candles for the use of men, and the health of bodies and souls. . . . ” (2) ” . . . these candles, which we thy servants desire to carry lighted to magnify thy name; that by offering them to thee, being worthily inflamed with the holy fire of thy most sweet charity, we may deserve,” &c. (3) ” O Lord Jesus Christ, the true light, . . . mercifully grant, that as these lights enkindled with visible fire dispel nocturnal darkness, so our hearts illumined by invisible fire,” &c. (Missale Rom.). In the form for the blessing of candles extra diem Purifications B. Mariae Virg. the virtue of the consecrated candles in discomfiting demons is specially brought out : ” that in whatever places they may be lighted, or placed, the princes of dark- ness may depart, and tremble, and may fly terror-stricken with all their ministers from those habitations, nor presume further to disquiet and molest those who serve thee, Almighty God ” (Rituale Rom.).

‘Altar candlesticks consist of five parts: the foot, stem, knob in the centre, bowl to catch the drippings, and pricket (a sharp point on which the candle is fixed). It is permissible to use a long tube, pointed to imitate a candle, in which is a small taper forced to the top by a spring (Cong. Rit., I ith May 1878).

betrayal and the death and burial of Christ. This ceremony can be traced to the 8th century at Rome.

On Easter Eve new fire is made 3 with a flint and steel, and blessed; from this three candles are lighted, the lumen Christi, and from these again the Paschal Candle. 4 This is the _ symbol of the risen and victorious Christ, and burns at * every solemn service until Ascension Day, when it is V^ftT extinguished and removed after the reading of the Gospel Candle. at High Mass. This, of course, symbolizes the Ascension; but meanwhile the other lamps in the church have received their light from the Paschal Candle, and so symbolize throughout the year the continued presence of the light of Christ.

At the consecration of the baptismal water the burning Paschal Candle is dipped into the font ” so that the power of the Holy Ghost may descend into it and make it an effective instrument of regeneration.” This is the symbol of B *P t, * a – baptism as rebirth as children of Light. Lighted tapers are also placed in the hands of the newly-baptized, or of their god-parents, with the admonition ” to preserve their baptism inviolate, so that they may go to meet the Lord when he comes to the wedding.” Thus, too, as ” children of Light,” candidates for ordina- _.. tion and novices about to take the vows carry lights ,£”’!. when they come before the bishop ; and the same idea ”’ underlies the custom of carrying lights at weddings, at the first communion, and by priests going to their first mass, though none of these are liturgically prescribed. Finally, lights are placed round the bodies of the dead and carried beside them to the _ . grave, partly as symbols that they still live in the light « ff of Christ, partly to frighten away the powers of darkness. “J“-

Conversely, the extinction of lights is part of the ceremony of excommunication (Pontificale Rom. pars iii.). Regino, abbot of Prum, describes the ceremony as it was carried out in his day, when, its terrors were yet unabated (De eccles. disciplina, Bxcom- ii. 409). ” Twelve priests should stand about the bishop, “•■■’«-

when, its terrors were yet unabated (De eccles. disciplina, ii. 409). ” Twelve priests

should stand about the bishop, holding in their hands lighted torches, which at the con- t,oa ‘ elusion of the anathema or excommunication they should cast down and trample under foot.” When the excommunication is removed, the symbol of reconciliation is the handing to the penitent of a burning taper.

As a result of the Reformation the use of ceremonial lights was either greatly modified, or totally abolished in the Protestant Churches. In the Reformed (Calvinistic) Churches altar lights were, with the rest, done away with entirely cJˆreJJf?* as popish and superstitious. In the Lutheran Churches they were retained, and in Evangelical Germany have even survived most of the other medieval rites and ceremonies (e.g. the use of vestments) which were not abolished at the Reformation itself.

In the Church of England the practice has been less consistent. The first Prayer-book of Edward VI. directed two lights to be placed on the altar. This direction was omitted in the second Prayer-book; but the ” Ornaments Rubric ” C ˆZ„a’ of Queen Elizabeth’s Prayer-book seemed again to make them obligatory. The question of how far this did so is a much-disputed one and is connected with the whole problem of the meaning and scope of the rubric (see Vestments). An equal uncertainty reigns with regard to the actual usage of the Church of England from the Reformation onwards. Lighted candles certainly continued to decorate the holy table in Queen Elizabeth’s chapel, to the scandal of Protestant zealots. They also seem to have been retained, at least for a while, in certain cathedral and collegiate churches. There is, however, no mention of ceremonial candles in the detailed account of the services of the Church of England given by William Harrison (Description of England, 137°); and the attitude of the Church towards their use, until the ritualistic movement of the 17th century, would seem to be authoritatively expressed- in the Third Part of the Sermon against Peril of Idolatry, which quotes with approval the views of Lactantius and compares ” our Candle Religion ”

8 This is common to the Eastern Church also. Pilgrims from all parts of the East flock to Jerusalem to obtain the ” new fire ” on Easter Eve at the Church of the Holy Sepulchre. Here the fire is supposed to be miraculously sent from heaven. The rush of the pilgrims to kindle their lights at it is so great, that order is main- tained with difficulty by Mahommedan soldiers.

4 The origin of the Paschal Candle is lost in the mists of antiquity. According to the abb6 Chatelain (quoted in Diderot’s Kncyclopidxe, s.v. ” Cierge “) the Paschal Candle was not originally a candle at all, but a wax column on which the dates of the movable feasts were inscribed. These were later written on paper and fixed to the Paschal Candle, a custom which in his day survived in the Cluniac churches.

with th» ” Gentiles Idolaters.” This pronouncement, indeed, though it certainly condemns the use of ceremonial lights in most of its later developments, and especially the conception of them as votive offerings whether to God or to the saints, does not necessarily exclude, though it undoubtedly discourages, their purely symbolical use. 1 In this connexion it is worth pointing out that the homily against idolatry was reprinted, without alteration and by the king’s authority, long after altar lights had been restored under the influence of the high church party supreme at court. Illegal under the Act of Uniformity they seem never to have been. The use of ” wax lights and tapers ” formed one of the indictments brought by P. Smart, a Puritan prebendary of Durham, against Dr Burgoyne, Cosin and others for setting up ” superstitious ceremonies ” in the cathedral ” contrary to the Act of Uniformity.” The indict- ments were dismissed in 1628 by Sir James Whitelocke, chief justice of Chester and a judge of the King’s Bench, and in 1629 by Sir Henry Yelverton, a judge of Common Pleas and himself a strong Puritan (see Hierurgia Anglicana, ii pp. 230 seq.). The use of ceremonial lights was among the indictments in the impeachment of Laud and other

bishops by the House of Commons, but these were not based on the Act of Uniformity. From the Restoration onwards the use of ceremonial lights, though far from universal, was not unusual in cathedrals and collegiate churches. 1 It was not, however, till the ritual revival of the 19th century that their use was at all widely extended in parish churches. The growing custom met with fierce opposi- tion; the law was appealed to, and in 1872 the Privy Council declared altar lights to be illegal (Martin v. Mackonochie). This judgment, founded as was afterwards admitted on insufficient knowledge, produced no effect; and, in the absence of any authoritative pronouncement, advantage was taken of the ambiguous language of the Ornaments Rubric to introduce into many churches practically the whole ceremonial use of lights as practised in the pre-Reformation Church. The matter was again raised in the case of Read and others v. the Bishop of Lincoln (see Lincoln Judgment), one of the counts of the indictment being that the bishop had, during the celebration of Holy Communion, allowed two candles to be alight on a shelf or retable behind the communion table when they were not The necessary for giving light. The archbishop of Canter-

"Uacoia bury, in whose court the case was heard (1889), decided Judg- ˆ that the mere presence of two candles on the table, """" ' burning during the service but lit before it began,

was lawful under the first Prayer-Book of Edward VI. and had never been made unlawful. On the case being appealed to the Privy Council, this particular indictment was dismissed on the ground that the vicar, not the bishop, was responsible for the presence of the lights, the general question of the legality of altar lights being discreetly left open.

The custom of placing lighted candles round the bodies of the dead, especially when " lying in state," has never wholly died out in Protestant countries, though their significance has long been lost sight of. 3 In the 18th century, moreover, it was still customary in England to accompany a funeral with lighted tapers. Picart {op. cit. 1737) gives a plate representing a funeral cortege preceded and accompanied by boys, each carry- ing four lighted candles in a branched candlestick. There seems to be no record of candles having been carried in other processions in England since the Reformation. The usage in this respect in some " ritualistic " churches is a revival of pre-Reformation ceremonial.

See the article " Lucerna," by J. Toutain in Daremberg and Saglio's Diet, des antiquites greeques et romaines (Paris, 1904) ; J. Marquardt, " Romische Privatalterthiimer " (vol. v. of Becker's

1 This homily, written by Bishop Jewel, is largely founded on Bullinger's De origine erroris in Divinorum et sacrorum cultu (1528,

1539).

1 A copper-plate in Bernard Picart's Ceremonies and Religious Customs of the Various Nations (Eng. trans., London, 1737), vi. pt. 1, p. 78, illustrating an Anglican Communion service at St Paul's, shows two lighted candles on the hcly table.

3 In some parts of Scotland it is still .customary to place two lighted candles on a table beside a corpse on the day of burial.

Rom. Allerthiimer) , ii. 238-301;' article " Cierges et kmpes," in the Abbe J. A. Martigny's Diet, des Antiquites Chretiennes (Paris, 1865) ; the articles " Lichter " and " Koimetarien " (pp. 834 seq) in Herzog- Hauck's Realencyklopddie (3rd ed., Leipzig. 1901) ; the article " Licht " in Wetzer and Welte's Kirchenlexikon (Freiburg-i.-B., 1882-1901), an excellent exposition of" the symbolism from the Catholic point of view, also "Kerze" and "Lichter"; W. Smith and S. Cheetham, Diet, of Chr. Antiquities (London, 1875-1880), i. 939 seq. ; in all these numerous further references will be found. See also Miihlbauer, Gesch. u. Bedeutung der Wachslichter bei den kirchliehen Funktionen (Augsburg, 1874) ; V. Thalhofer, Handbuch der Katholisehen Liturgik

(Freiburg-i.-B., 1887), i. 666 seq.; and, for the post-Reformation use in the Church of England, Hierurgia Anglicana, new ed. by Vernon Staley (London, 1903). (W. A. P.)

LIGNE, CHARLES JOSEPH, Prince de (1735-1814), soldier and writer, came of a princely family of Hainaut, and was born at Brussels in 1735- As an Austrian subject he entered the imperial army at an early age. He distinguished himself by his valour in the Seven Years' War, notably at Breslau, Leuthen, Hochkirch and Maxen, and after the war rose rapidly to the rank of lieutenant field marshal. He became the intimate friend and counsellor of the emperor Joseph II., and, inheriting his father's vast estates, lived in the greatest splendour and luxury till the War of the Bavarian Succession brought him again into active service. This war was short and uneventful, and the prince then travelled in England, Germany, Italy, Switzerland and France, devoting himself impartially to the courts, the camps, the salons and the learned assemblies of philosophers and scientists in each country. In 1784 he was again employed in military work, and was promoted to Feldzeug- meister. In 1787 he was with Catherine II. in Russia, ac- companied her in her journey to the Crimea, and was made a Russian field marshal by the empress. In 1788 he was present at the siege of Belgrade. Shortly after this he was invited to place himself at the head of the Belgian revolutionary move- ment, in which one of his sons and many of his relatives were prominent, but declined with great courtesy, saying that " he never revolted in the winter." Though suspected by Joseph of collusion with the rebels, the two friends were not long es- tranged, and after the death of the emperor the prince remained in Vienna. His Brabant estates were overrun by the French in 1792-1793, and his eldest son killed in action at La Croix-du-Bois in the Argonne (September 14, 1792). He was given the rank of field marshal (1809) and an honorary command at court, living in spite of the loss of his estates in comparative luxury and devoting himself to literary work. He lived long enough to characterize the proceedings of the congress of Vienna with the famous mot: " Le Congres danse mais ne marche pas." He died at Vienna on the 13th of December 1814. His grandson, Eugene Lamoral de Ligne (1804-1880), was a distinguished Belgian statesman.

His collected works appeared in thirty-four volumes at Vienna during the last years of his life (Mttanges militaires, litteraires, sentimentaires) , and he bequeathed his manuscripts to the emperor's Trabant Guard, of which he was captain (CEuvres posthumes, Dresden and Vienna, 1817). Selections were published in French and German (CEuvres ehoisies de M. le prince dt Ligne (Paris, 1809); Lettres et pensees du Marechal Prince de Ligne, ed. by Madame de Stael (1809); CEuvres historiques, litteraires . . . correspondance et poesies diver ses (Brussels, 1859); Des Prinzen Karl von Ligne militarische Werke, ed. Count Pappenheim (Sulzbach, 1814). The most important of his numerous works on all military subjects is the Fantaisies et prejuges militaires, which originally appeared in 1780. A modern edition is that published by J. Dumaine (Paris, 1879). A German version (Militarische Vorurtheile und Phantasien, &c.) appeared as early as 1783. This work, though it deals lightly and cavalierly with the most important subjects (the prince even proposes to found an international academy of the art of war, wherein the reputation of generals could be impartially weighed), is a militarv classic, and indispensable to the students of the post-Frederician period. On the whole, it may be said that the prince adhered to the school of Guibert (q.v.), and a full discussion will be found in Max Jahns' Gesch. d. Kriegswissenschaften, iii. 2091 et seq. Another very celebrated work by the prince is the mock autobio- graphy of Prince Eugene (1809).

See Revue de Bruxelles (October 1839) ; Reiffenberg, " Le Feld- marechal Prince Charles Joseph de Ligne," Memoires de I'ucademie de Bruxelles, vol. xix. ; Peetermans, Le Prince de Ligne, ou un ecrivain grand seigneur (Liege, 1857), Etudes et notices historiques concernant Ihistoire des Pays Bas, vol. iii. (Brussels, 1890) ; Memoires

et publications de la Societi des Sciences, &c , du Hainault, vol. iii., 5th series; Dublet Lep.Prince de Ligne et ses contemporains (Paris, 1S89), Wurzbach, Biogr. Lexikon d. Kaiserth. Osterr (Vienna, 1858); Hirtenfeld, Der Militar-Maria-Theresien-Orden, vol. i. (Vienna, 1857) , Ritter von Rettersberg, Biogr. d ausgezeichnetsten Feldherren (Prague, 1829); Schvveigerd, Osterr. Helden, vol. iii. (Vienna, 1854); Thurheim, F. M. Karl Joseph Fiirst de Ligne (Vienna, 1877).

LIGNITE (Lat. lignum, wood), an imperfectly formed coal, usually brownish in colour, and always showing the structure of the wood from which it was derived (see Coal) .

LIGONIER, JOHN (Jean Louis) LIGONIER, Earl (1680- 1770), British Field Marshal, came of a Huguenot family of Castres in the south of France, members of which emigrated to England at the close of the 1 7th century. He entered the army as a volunteer under Marlborough. From 1702 to 1710 he was engaged, with distinction, in nearly every important battle and siege of the war. He was one of the first to mount the breach at the siege of Liege, commanded a company at the Schellenberg and at Blenheim, and was present at Menin (where he led the storming of the covered way), Ramillies, Oudenarde and Malplaquet (where he received twenty-three bullets through his clothing and remained unhurt). In 171 2 he became governor of Fort St Philip, Minorca, and in 1718 was adjutant-general of the troops employed in the Vigo expedition, where he led the stormers of Fort Marin. Two years later he became colonel of the " Black Horse " (now 7th Dragoon Guards), a command which he retained for 29 years. His regiment soon attained an extraordinary degree of efficiency. He was made brigadier- general in 1735, major-general in 1739, and accompanied Lord Stair in the Rhine Campaign of 1742-1743. George II. made him a Knight of the Bath on the field of Dettingen. At Fonte- noy Ligonier commanded the British foot, and acted throughout the battle as adviser to the duke of Cumberland. During the " Forty-Five " he was called home to command the British army in the Midlands, but in January 1746 was placed at the head of the British and British-paid contingents of the Allied army in the Low Countries. He was present at Roucoux (nth Oct. 1746), and, as general of horse, at Val (1st July 1747), where he led the last charge of the British cavalry. In this encounter his horse was killed, and he was taken prisoner, but was ex- changed in a few days. With the close of the campaign ended Ligonier's active career, but (with a brief interval in 1756-1757) he occupied various high civil and military posts to the close of his life. In 1757 he was made, in rapid succession, commander- in-chief, colonel of the 1st Foot Guards (now Grenadier Guards), and a peer of Ireland under the title of Viscount Ligonier of Enniskillen, a title changed in 1762 for that of Clonmell. From 2759 to 1762 he was master-general of the Ordnance, and in 1763 he became Baron, and in 1766 Earl, in the English peerage. In the latter year he became field marshal. He died in 1770. His younger brother, Francis, was also a distinguished soldier; and his son succeeded to the Irish peerage of Lord Ligonier.

See Combes, J. L. Ligonier, une etude (Castres, 1866), and the histories of the 7th Dragoon Guards and Grenadier Guards.

LIGUORI, ALFONSO MARIA DEI (1696-1787), saint and doctor of the Church of Rome, was born at Marianella, near Naples, on the 27th of September 1696, being the son of Giuseppe dei Liguori, a Neapolitan noble. He began life at the bar, where he obtained considerable practice; but the loss of an important suit, in which he was counsel for a Neapolitan noble against the grand duke of Tuscany, and in which he had entirely mistaken the force of a leading document, so mortified him that he withdrew from the legal world. In 1726 he entered the Congregation of Missions as a novice, and became a priest in 1726. In 1732 he founded the " Congregation of the Most Holy Redeemer " at Scala, near Salerno; the headquarters of the Order were afterwards transferred to Nocera dei Pagani. Its members, popularly called Liguorians or Redemptorists, devote themselves to the religious instruction of the poor, more especially in country districts; Liguori specially forbade them to undertake secular educational work. In 1750 appeared his

celebrated devotional book on the Glories of Mary; three years later came his still more

celebrated treatise on moral theology. In 1755 this was much enlarged and translated into Latin under the title of Homo Apostolicus. In 1762, at the express desire of the pope, he accepted the bishopric of Sant' Agata dei Goti, a small town in the province of Benevent; though he had previously refused the archbishopric of Palermo. Here he worked diligently at practical reforms, being specially anxious to raise the standard of clerical life and work. In 1775 he resigned his bishopric on the plea of enfeebled health; he retired to his Redemptorists at Nocera, and died there in 1787. In 1796 Pius VI. declared him " venerable "; he was beatified by Pius VII. in 1816, canonized by Gregory XVI. in 1839, and finally declared one of the nineteen " Doctors of the Church " by Pius IX. in 1871.

Liguori is the chief representative of a school of casuistry and devotional theology still abundantly represented within the Roman Church. Not that he was in any sense its founder. He was simply a fair representative of the Italian piety of his day — amiable, ascetic in his personal habits, indefatigable in many forms of activity, and of more than respectable abilities; though the emotional side of his character had the predominance over his intellect. He was learned, as learning was understood among the Italian clergy of the 18th century; but he was destitute of critical faculty, and the inaccuracy of his quotations is proverbial. In his casuistical works he was a diligent compiler, whose avowed design was to take a middle course between the two current extremes of severity and laxity. In practice, he leant constantly towards laxity. Eighteenth-century Italy looked on religion with apathetic indifference, and Liguori convinced himself that only the gentlest and most lenient treatment could win back the alienated laity; hence he was always willing to excuse errors on the side of laxity as due to an excess of zeal in winning over penitents. Severity, on the other hand, seemed to him not only inexpedient, but positively wrong. By making religion hard it made it odious, and thus prepared the way for unbelief. Like all casuists, he took for granted that morality was a recondite science, beyond the reach of all but the learned. When a layman found himself in doubt, his duty was not to consult his conscience, but to take the advice of his confessor; while the confessor himself was bound to follow the rules laid down by the casuistical experts, who delivered them- selves of a kind of " counsel's opinion " on all knotty points of practical morality. But experts proverbially differ: what was to be done when they disagreed? Suppose, for instance, that some casuists held it wrong to dance on Sunday, while others held it perfectly lawful. In Liguori's time there were four ways of answering the question. Strict moralists — called rigorists, or " tutiorists " — maintained that the austerer opinion ought always to be followed; dancing on Sundays was certainly wrong, if any good authorities had declared it to be so. Probabiliorists maintained that the more general opinion ought to prevail, irrespectively of whether it was the stricter or the laxer; dancing on Sunday was perfectly lawful, if the majority of casuists approved it. Probabilists argued that any opinion might be followed, if it could show good authority on its side, even if there was still better authority against it; dancing on Sunday must be innocent, if it could show a fair sprinkling of eminent names in its favour. The fourth and last school — the " laxists " — carried this principle a step farther, and held that a practice must be unobjectionable, if it could prove that any one " grave Doctor " had defended it; even if dancing on Sunday had hitherto lain under the ban of the church, a single casuist could legitimate it by one stroke of his pen. Liguori's great achieve- ment lay in steering a middle course between these various extremes. The gist of his system, which is known as " equi- probabilism," is that the more indulgent opinion may always be followed, whenever the authorities in its favour are as good, or nearly as good, as those on the other side. In this way he claimed that he had secured Bfoerty in its rights without allowing it to degenerate into licence. However much they might personally disapprove,! zealous priests could not forbid their

parishioners to dance on Sunday, if the practice had won wide- spread toleration; on the other hand, they could not relax the usual discipline of the church on the strength

of a few unguarded opinions of too indulgent casuists. Thus the Liguorian system surpassed all its predecessors in securing uniformity in the confessional on a basis of established usage, two advantages amply sufficient to ensure its speedy general adoption within the Church of Rome.

Lives by A. M. Tannoja, a pupil of Liguori's (3 vols., Naples, 1798- 1802); new ed., Turin, 1857; French trans., Paris, 1842); P. v. A. Giattini (Rome, 1815: Ger trans., Vienna, 1835); F. W. Faber (4 vols., London, 1848-1849); M. A. Hugues (Miinster, 1857); O. Gisler (Einsiedeln, 1887); K. Dilgskron (2 vols., Regensburg, 1887), perhaps the best; A. Capecelatro (2 vols., Rome, I 893); A.des Retours (Paris, 1903); A. C. Berthe (St Louis, 1906).

Works (a) Collected editions. Italian: (Monza, 1819, 1828; Venice, 1830; Naples, 1840 ff.; Turin, 1887, ff.). French: (Tournai, 1855 ft., new ed., 1895 ff.) German: (Regensburg, 1842-1847). English : (22 vols., New York, 1887-1895). Editions of the Theologia Mvralis and other separate works are very numerous, (b) Letters: (2 vols., Monza, 1831 ; 3 vols., Rome, 1887 ff.). See also Meyrick, Moral and Devotional Theology of the Church of Rome, according to the Teaching of S. Alfonso de Liguori (London, 1 857), and art. Casuistry. (St. C.)

LIGURES BAEBIANI, in ancient geography, a settlement of Ligurians in Samnium, Italy. The towns of Taurasia and Cisauna in Samnium had been captured in 298 B.C. by the consul L. Cornelius Scipio Barbatus, and the territory of the former remained Roman state domain. In 180 B.C. 47,000 Ligurians from the neighbourhood of Luna (Ligures Apuani), with women and children, were transferred to this district, and two settlements were formed taking their names from the consuls of 181 B.C., the Ligures Baebiani and the Ligures Corneliani. The site of the former town lies 1 5 m. N. of Beneventum, on the road to Saepinum and Aesernia. In its ruins several inscriptions have been found, notably a large bronze tablet discovered in a public building in the Forum bearing the date a.d. ioi, and relating to the alimentary institution founded by Trajan here (see Veleia). A sum of money was lent to landed proprietors of the district (whose names and estates are specified in the inscription), and the interest which it produced formed the income of the institu- tion, which, on the model of that of Veleia, would have served to support a little over one hundred children. The capital was 401,800 sesterces, and the annual interest probably at 5%, i.e. 20,090 sesterces (£4018 and £201 respectively). The site of the other settlement — that of the Ligures Corneliani— is unknown.

See T. Mommsen in Corp. Inscr. Lat. ix. (Berlin, 1883), 125 sqq.

(T. As}

LIGURIA, a modern territorial division of Italy, lying between the Ligurian Alps and the Apennines on the N., and the Mediter- ranean on the S. and extending from the frontier of France on the W. to the Gulf of Spezia on the E. Its northern limits touch Piedmont and Lombardy, while Emilia and Tuscany fringe its eastern borders, the dividing line following as a rule the summits of the mountains. Its area is 2037 sq. m. The railway from Pisa skirts the entire coast of the territory, throwing off lines to Parma from Sarzana and Spezia, to Milan and Turin from Genoa, and to Turin from Savona, and there is a line from Ventimiglia to Cuneo and Turin by the Col di Tenda. Liguria embraces the two provinces of Genoa and Porto Maurizio (Imperia), which once formed the republic of Genoa. Its sparsely-peopled mountains slope gently northward towards the Po, descending, however, abruptly into the sea at several points; the narrow coast district, famous under the name of the Riviera (q.v.), is divided at Genoa into the Riviera di Ponente towards France, and the Riviera di Levante towards the east. Its principal products are wheat, maize, wine, oranges, lemons, fruits, olives and potatoes, though the olive groves are being rapidly supplanted by flower-gardens, which grow flowers for export. Copper and iron pyrites are mined. The principal industries are iron-works, foundries, iron shipbuilding, engineer- ing, and boiler works (Genoa, Spezia, Sampierdarena, Sestri Ponente, &c), the production of cocoons, and the

manufacture

of cottons and woollens. Owing to the sheltered situation and the mildness of their climate, many of tne coast towns are chosen by thousands of foreigners for winter residence, while the Italians frequent them in summer for sea-bathing. The inhabitants have always been adventurous seamen— Columbus and Amerigo Vespucci were Genoese, — and the coast has several good harbours, Genoa, Spezia and Savona being the best. In educational and general development, Liguria stands high among the regions of Italy. The populations of the respective provinces and their chief towns are, according to the census of 1901 {popolazione residente or legale) — province of Genoa, pop. 931,156; number of communes 197; chief towns — Genoa (219,507), Spezia (66,263), Savona (38,648), Sampierdarena (34,084), Sestri Ponente (17,225).. Province of Porto Maurizio, pop. 144,604, number of communes 106; chief towns— Porto Maurizio (7207), S.'Remo (20,027), Ventimiglia (11,468), Oneglia (8252). Total for Liguria, 1,075,760.

The Ligurian coast became gradually subject to the Romans, and the road along it must have been correspondingly prolonged: up to the end of the Hannibalic war the regular starting-point for Spain by sea was Pisae, in 195 B.C. it was the harbour of Luna (Gulf of Spezia), 1 though Genua must have become Roman a little before this time, while, in 137 B.C., C. Hostilius Mancinus marched as far as Portus Herculis (Villaf ranca) , and in 121 B.C. the province of Gallia Narbonensis was formed and the coastTroad prolonged to the Pyrenees. In 14 B.C. Augustus restored the whole road from Placentia to Dertona (Via Postumia), and thence to Vada Sabatia (Via Aemilia [2]) and the River Varus (Var), so that it thenceforth took the name of Via Julia Augusta (see Aemilia, Via [2]). The other chief roads of Liguria were the portion of the Via Postumia from Dertona to Genua, a road from above Vada through Augusta Bagiennorum and Pollentia to Augusta Taurinorum, and another from Augusta Taurinorum to Hasta and Valentia. The names of the villages — Quarto, Quinto, &c— on the south-east side and Pontedecimo on the north of Genoa allude to their distance along the Roman roads. The Roman Liguria, forming the ninth region of Augustus, was thus far more extensive than the modern, including the country on the north slopes of the Apennines and Maritime Alps between the Trebia and the Po, and extending a little beyond Albinti-milium. On the west Augustus formed the provinces of the Alpes Maritimae and the Alpes Cottiae. Towns of importance were few, owing to the nature of the country. Dertona was the only colony, and Alba Pompeia, Augusta Bagiennorum, Pollentia, Hasta, Aquae Statiellae, and Genua may also be mentioned; but the Ligurians dwelt entirely in villages, and were organized as tribes. The mountainous character of Liguria made the spread of culture difficult; it remained a forest district, producing timber, cattle, ponies, mules, sheep, &c. Oil and wine had to be imported, and when the cultivation of the olive began is not known.

The arrangement made by Augustus lasted until the time of Diocletian, when the two Alpine provinces were abolished, and the watershed became the boundary between Italy and Gaul. At this time we find the name Liguria extended as far as Milan, while in the 6th century the old Liguria was separated from it, and under the Lombards formed the fifth Italian province under the name of Alpes Cottiae. In the middle ages the ancient Liguria north of the Apennines fell to Piedmont and Lombardy, while that to the south, with the coast strip, belonged to the republic of Genoa. (T. As.)

Archaeology and Philology. — It is clear that in earlier times the Ligurians occupied a much more extensive area than the Augustan region; for instance Strabo (i. 2, 92; iv. 1, 7) gives earlier authorities for their possession of the land on which the Greek colony of Massalia (Marseilles) was founded; and Thucy- dides (vi. 2) speaks of a settlement of Ligurians in Spain who expelled the Sicani thence. Southward their domain extended as far as Pisa on the coast of Etruria and Arretium inland in the

1 The dividing line between Liguria and Etruria was the lower course of the river Macra (Magra), so that, while the harbour of Luna was in the former, Luna itself was in the latter.

time of Polybius (ii. 6), and a somewhat vague reference in Lycophron (line 1351) to the Ligurians as enemies of the founders of Agylla (i.e. Caere) suggests that they once occupied even a larger tract to the south. Seneca (Cons ad Helv. vii. 9), states that the population of Corsica was partly Ligurian. By combin- ing traditions recorded by Dionysius (i. 22; xiv. 37) and others (e.g. Serv. ad. Aen. xi. 317) as having been held by Cato the Censor and by Philistus of Syracuse (385 B.C.) respectively, Professor Ridgeway (Who were the Romans? London, 1908, p. 3) decides in favour of identifying the Ligurians with a tribe called the Aborigines who occupy a large place in the early traditions of Italy (see Dionysius i. cc. 10 ff.) ; and who may at all events be regarded with reasonable certainty as constituting an early pre-Roman and pre-Tuscan stratum in the population of Central Italy (see La hum). For a discussion of this question see Volsci. Ridgeway holds that the language of the Ligurians, as well as their antiquities, was identical with that of the early Latins, and with that of the Plebeians of Rome (as contrasted with that of the Patrician or Sabine element), see Rome: History (ad. init.). The archaeological side of this important question is difficult. Although great progress has been made with the study of the different strata of remains in prehistoric Italy and of those of Liguria itself (see for instance the excellent Introduction d I'histoire romaine by Basile Modestov (Paris, 1907, p. 122 ff.) and W. Ridgeway's Early Age of Greece, p. 240 ff.) no general agreement has been reached among archaeologists as to the particular races who are to be identified as the authors of the early strata, earlier, that is, than that stratum which represents the Etruscans.

On the linguistic side some fairly certain conclusions have been reached. D'Arbois de Jubainville (Les Premiers habitants de VEurope, ed. 2, Paris, 1880-1894) pointed out the great frequency of the suffix asco (and usco) both in ancient and in modern Ligurian districts, and as far north as Caranusca near Metz, and also in the eastern Alps and in Spain. He pointed out also, what can scarcely be doubted, that the great mass of the Ligurian proper names (e.g. the streams Vinelasca, Porcobera, Comberanea; mons Tuledo; Venascum), have a definite Indo- European character. Farther Karl Miillenhof in vol. iii. of his Deutsche Alterthumskunde (Berlin, 1898) made a careful collection of the proper names reserved in Latin inscriptions of the Ligurian districts, such as the Tabula Genuatium (C.I.L. i. 99) of 117 B.C. A complete collection of all Ligurian place and personal names known has been made by S. Elizabeth Jackson, B.A., and the collection is to be combined with the inscriptional remains of the district in The Pre-Italic Dialects, edited by R. S. Conway (see The Proceedings of the British Academy). Following Kretschmer Kuhn's Zeitschrift (xxxviii. 97), who discussed several inscriptions found near Ornavasso (Lago Maggiore) and concluded that they showed an Indo-European language, Conway, though holding that the inscriptions are more Celtic than Ligurian, pointed out strong evidence in the ancient place names of Liguria that the language spoken there in the period which preceded the Roman conquest was Indo-European, and belonged to a definite group, namely, languages which preserved the original q as Latin did, and did not convert it into p as did the Umbro-Safine tribes. The same is probably true of Venetia (see Veneti), and of an Indo-European language preserved on inscriptions found at Coligny and commonly referred to the Sequani (see Comptes Rendus de V Ac. d'lnsc, Paris, 1897, 703; E. B. Nicholson, Sequanian, London, 1898; Thurneysen, Zeitschr. f. Kelt. Phil., 1899, 523). Typically Ligurian names are Quiamelius, which contains the characteristic Ligurian word melo- " stone " as in mons Blustiemelus (C.I.L. v. 7749), Intimelium and the modern Vintimiglia. The tribal names Soliceli, Stoniceli, clearly contain the same element as Lat. aequi-coli (dwellers on the plain), sati-cola, &c, namely quel-, cf. Lat. in-quil-inus, colo, Gr. irohtiv, riWeadai. And it should be added that the Ligurian ethnica show the prevailing use of the two suffixes -co – and – ati-, which there is reason to refer to the pre-Roman stratum of population in Italy (see Volsci).

Besides the authorities already cited the student may be referred to C. Pauli,

Altitalische Studien, vol. i., especially for the alphabet of the insc. ; W. Ridgeway, Who were the Romans? (followed by the abstract of a paper by the present writer) in The Proceedings of tke British Academy, vol. iii. p. 42 ; and to W. H. Hall's, The Romans on the Riviera and the Rhone (London, 1898); Issel's La Liguria geologica e preistorica (Genoa, 1892). A further batch of Celto- Ligurian inscriptions from Giubiasco near Bellinzona (Canton Ticino) is published by G. Herbig, in the Anzeiger f. Schweizer. Altertumskunde, vii. (1905-1906), p. 187; and one of the same class by Elia Lattes, Di un 1 Iscriz. ante-Romana trovata a Carcegna sul Lago d' Orta (Alii d. r. Accad. d. Scienze di Torino, xxxix., Feb, 1904)- (R- S. C.)

LI HUNG CHANG (1823-1901), Chinese statesman, was born on the 16th of February 1823 at Hofei, in Ngan-hui. From his earliest youth he showed marked ability, and when quite young he took his bachelor degree In 1847 he became a Tsin-shi, or graduate of the highest order, and two years later was admitted into the imperial Hanlin college. Shortly after this the central provinces of the empire were invaded by the Taiping rebels, and in defence of his native district he raised a regiment of militia, with which he did such good service to the imperial cause that he attracted the attention of Tseng Kuo-fan, the generalissimo in command. In 1859 he was transferred to the province of Fu-kien, where he was given the rank of taotai, or intendant of circuit. But Tseng had not forgotten him, and at his request Li was recalled to take part against the rebels. He found his cause supported by the " Ever Victorious Army," which, after having been raised by an American named Ward, was finally placed under the command of Charles George Gordon. With this support Li gained numerous victories leading to the surrender of Suchow and the capture of Nanking. For these exploits he was made governor of Kiangsu, was decorated with a yellow jacket, and was created an earl. An incident connected with the sur- render of Suchow, however, left a lasting stain upon his character. By an arrangement with Gordon the rebel wangs, or princes, yielded Nanking on condition that their lives should be spared. In spite of the assurance given them by Gordon, Li ordered their instant execution. This breach of faith so aroused Gordon's indignation that he seized a rifle, intending to shoot the falsifier of his word, and would have done so had not Li saved himself by flight. On the suppression of the rebellion (1864) Li took up his duties as governor, but was not long allowed to remain in civil life. On the outbreak of the rebellion of the Nienfei, a remnant of the Taipings, in Ho-nan and Shan-tung (1866) he was ordered again to take the field, and after some misadventures he succeeded in suppressing the movement. A year later he was appointed viceroy of Hukwang, where he remained until 1870, when the Tientsin massacre necessitated his transfer to the scene of the outrage. He was, as a natural consequence, appointed to the viceroyalty of the metropolitan province of Chihli, and justified his appointment by the energy with which he suppressed all attempts to keep alive the anti-foreign sentiment among the people. For his services he was made imperial tutor and member of the grand council of the empire, and was decorated with many-eyed peacocks' feathers.

To his duties as viceroy were added those of the superintendent of trade, and from that time until his death, with a few intervals of retirement, he practically conducted the foreign policy of China. He concluded the Chifu convention with Sir Thomas Wade (1876), and thus ended the difficulty caused by the murder of Mr Margary in Yunnan; he arranged treaties with Peru and Japan, and he actively directed the Chinese policy in Korea. On the death of the emperor T'ungchi in 1875 he, by suddenly introducing a large armed force into the capital, effected a coup d'etat by which the emperor Kwang Sii was put on the throne under the tutelage of the two dowager empresses; and in 1886, on the conclusion of the Franco-Chinese war, he arranged a treaty with France. Li was always strongly impressed with the necessity of strengthening the empire, and when viceroy of Chihli he raised a large well-drilled and well-armed force, and spent vast sums both in fortifying Port Arthur and the Taku forts and in increasing the navy. For years he had watched the successful reforms effected in Japan and had a well-founded dread of coming into conflict with that empire. But

in 1894 events forced his hand, and in consequence of a dispute as to the relative influence of China and Japan in Korea, war broke out. The result proved the wisdom of Li's fears. Both on land and at sea the Chinese forces were ignominiously routed, and in 1895, on the fall of Wei-hai-wei, the emperor sued for peace. With characteristic subterfuge his advisers suggested as peace envoys persons whom the mikado very properly and promptly refused to accept, and finally Li was sent to represent his imperial master at the council assembled at Shimonoseki. With great diplomatic skill Li pleaded the cause of his country, but finally had to agree to the cession of Formosa, the Pescadores, and the Liaotung peninsula to the conquerors, and to the pay- ment of an indemnity of 200,000,000 taels. By a subsequent arrangement the Liaotung peninsula was restored to China, in exchange for an increased indemnity. During the peace discus- sions at Shimonoseki, as Li was being borne through the narrow streets of the town, a would-be assassin fired a pistol point-blank in his face. The wound inflicted was not serious, and after a few days' rest Li was able to take up again the suspended negotiations. In 1896 he represented the emperor at the coronation of the tsar, and visited Germany, Belgium, France, England, and the United States of America. For some time after his return to China his services were demanded at Peking, where he was virtually con- stituted minister for foreign affairs; but in 1900 he was trans- ferred to Canton as viceroy of the two Kwangs. The Boxer movement, however, induced the emperor to recall him to the capital, and it was mainly owing to his exertions that, at the conclusion of the outbreak, a protocol of peace was signed in September 1901. For many months his health had been failing, and he died on the 7th of November 1901. He left three sons and one daughter. (R. K. D.)

LILAC, 1 or Pipe Tree (Syringa vulgaris), a tree of the olive family, Oleaceae. The genus contains about ten species of ornamental hardy deciduous shrubs native in eastern Europe and temperate Asia. They have opposite, generally entire leaves and large panicles of small regular flowers, with a bell-shaped calyx and a 4-lobed cylindrical corolla, with the two stamens character- istic of the order attached at the mouth of the tube. The com- mon lilac is said to have come from Persia in the 16th century, but is doubtfully indigenous in Hungary, the borders of Moldavia, &c. Two kinds of Syringa, viz. alba and caerulca, are figured and described by Gerard (Herball, 1597), which he calls the white and the blue pipe privets. The former is the common privet, Ligus- irum vidgare, which, and the ash tree, Fraxinus excelsior, are the only members of the family native in Great Britain. The latter is the lilac, as both figure and description agree accurately with it. It was carried by the European colonists to north-east America, and is still grown in gardens of the northern and middle states.

There are many fine varieties of lilac, both with single and double flowers; they are among the commonest and most beautiful of spring-flowering shrubs. The so-called Persian lilac of gardens (5. dubia, S. chinensis var. Rolhomagensis) , also known as the Chinese or Rouen lilac, a small shrub 4 to 6 ft. high with intense violet flowers appearing in May and June, is considered to be a hybrid between S. vulgaris and S. persica — the true Persian lilac, a native of Persia and Afghanistan, a shrub 4 to 7 ft. high with bluish-purple or white flowers. Of other species, S. Josikaea, from Transylvania, has scentless bluish-purple flowers; S. Emodi, a native of the Himalayas, is a handsome shrub with large ovate leaves and dense panicles of purple or white strongly scented flowers. Lilacs grow freely and flower profusely in almost any soil and situation, but when neglected are apt to become choked with suckers which shoot up in great numbers from the base. They are readily propagated by means of these suckers.

Syringa is also a common name for the mock-orange Philadelphus coronarius (nat. ord. Saxifragaceae), a handsome shrub 2 to 10 ft. high, with smooth ovate leaves and clusters of white flowers which have a strong orange-like scent. It is a native of western Asia, and perhaps some parts of southern Europe.

LILBURNE, JOHN (c. 1614-1657), English political agitator, was the younger son of a

gentleman of good family in the county of Durham. At the age of twelve he was apprenticed to a clothier in London, but he appears to have early addicted himself to the ” contention, .novelties,, .opposition of government, and

1 The Span, lilac, Fr.Hilac, mod. Was, ace adapted trom Arab. iHak, Pers. Mak, variant olmilak, of a blupppipjjj;,«j7, blue, the indifco-plant-

violent and bitter expressions ” for which he afterwards became so conspicuous as to provoke the saying of Harry Marten (the regicide) that, ” if the world was emptied of all but John Lilburn, Lilburn would quarrel with John, and John with Lilburn.” He appears at one time to have been law-clerk to William Prynne.. In February 1638, for the part he had taken in importing and ; circulating The Litany and other publications of John Bastwick and Prynne, offensive to the bishops, he was sentenced by the Star Chamber to be publicly whipped from the Fleet prison to Palace Yard, Westminster, there to stand for two hours in the pillory, and afterwards to be kept in gaol until a fine of £500 had been paid. He devoted his enforced leisure to his favourite form of literary activity, and did not regain his liberty until November 1640, one of the earliest recorded speeches of Oliver Cromwell being made in support of his petition to the House of Commons (Nov. 9, 1640). In 1641 he received an indemnity of £3000. He now entered the army, and in 1642 was taken prisoner at Brentford and tried for his life; sentence would no doubt have been executed had not the parliament by threatening reprisals forced his exchange. He soon rose to the rank of lieutenant- colonel, but in April 1645, having become dissatisfied with the predominance of Presbyterianism, and refusing to take the covenant, he resigned his commission, presenting at the same time to the Commons a petition for considerable arrears of pay. His violent language in Westminster Hall about the speaker and other public men led in the following July to his arrest and committal to Newgate, whence he was discharged, however, without trial, by order of the House, in October. In January 1647 he was committed to the Tower for accusations against Cromwell, but was again set at liberty in time to become a disappointed spectator of the failure of the ,■” Levellers ” or ultrademocratic party in the army at the Ware rendezvous in the following November. The scene produced a deep impression on his mind, and in February 1649 he along with other petitioners presented to the House of Commons a paper entitled The Serious Apprehensions of a part of the People on behalf of the Common- wealth, which he followed up with a pamphlet, England’s New, Chains Discovered, criticizing Ireton, and another exposing the conduct of Cromwell, Ireton and other leaders of the army since June 1647 {The Hunting of the Foxes from Newmarket and Triploe Heath to Whitehall by Five Small Beagles, the ” beagles ” being Lilburne. Richard Overton, William Walwyn, Prince and another). Finally, the Second Part of England’s New Chains Discovered, a violent outburst against ” the dominion of a council of state, and a constitution of a new and unexperienced nature,” became the subject of discussion in the House, and led anew to the imprisonment of its author in the Tower on the nth of April. His trial in the following October, on a charge of seditious and scandalous practices against the state, resulted in his unanimous acquittal, followed by his release in November. In 1.650 : he was advocating the release of trade from the restrictions of chartered companies and monopolists.

In January 1652, for printing and publishing a petition against Sir Arthur Hesilrige and the Haberdashers’ Hall for what he conceived to have been an injury done to his uncle George Lilburne in 1649, he was sentenced to pay fines amounting to £7000, and to be banished the Commonwealth, with prohibition of return under the pain of death. In June 1653 he nevertheless came back from the Low Countries, where he had busied himself in pamphleteering and such other agitation as was possible, and was immediately arrested; the trial, which was protracted from the 13th of July to the 20th of August, issued in his acquittal, to the great joy of London, but it was nevertheless thought proper to keep him in captivity for ” the peace of the nation,” He was detained successively in the Tower, in Jersey, in Guernsey and in Dover Castle. At Dover he came under Quaker influence, and signified his readiness at last to be done with ” carnal sword fightings and fleshly bustlings and contests “; and in 1655, on giving security for his good behaviour, he was set free. He now settled at Eltham in Kent,

frequently preaching at Quaker meetings in the neighbourhood during the brief remainder of Ms troubled life. He died on the 29th of August 1657.

His brother, Colonel Robert Lilburne, was among those who signed the death-warrant of Charles I. In 1656 he was M.P. for the East Riding of Yorkshire, and at the restoration was sentenced to lifelong imprisonment.

See D. Masson, Life of Milton (iv. 120) ; Clement Walker {History of Independency, ii. 247); W. Godwin {Commonwealth, iii. 163-177), and Robert Bisset {Omitted Chapters of the History of England, 191-251).

LILIACEAE, in botany, a natural order of Monocotyledons belonging to the series Liliiflorae, and generally regarded as representing the typical order of Monocotyledons. The plants art generally perennial herbs growing from a bulb or rhizome, sometimes shrubby as in butcher's broom (Ruscus) or tree-like as in species of Dracaena, Yucca or Aloe. The flowers are with few exceptions hermaphrodite, and regular with parts in threes

(fig. 5), the perianth which is generally peta- loid occupying the two outer whorls, followed by two whorls of stamens, with a superior ovary of three carpels in the centre of the flower; the ovary is generally three-cham- Fig. 2. — Same bered and contains an cut across showing indefinite number of

r- Fl ° > '7« ui ? r th .?. th /. ee ch T b T anatropous ovules on Capsule of Meadow with the seeds at- ., , /

Saffron {Colchicum tached along the axlle placentas _ (see autumnale) dehisc- middle line — axile fig. 2). The fruit is a ing along the septa, placentation. capsule splitting along

the septa (septicidal) (fig. 1), or between them (loculicidal), or a berry (fig. 6, 3); the seeds contain a small embryo in a copious fleshy or cartilaginous endosperm. Liliaceae is one of the larger orders of flowering plants containing about 2500 species in 200 genera; it is of world-wide distribution. The plants show great diversity in vegetative structure, which together with the character and mode of dehiscence of the fruit afford a basis for the subdivision of the order into tribes, eleven of which are recognized. The following are the most important tribes.

Mclanthoideae. — The plants have a rhizome or corm, and the fruit is a capsule. It contains 36 genera, many of which are north temperate and three are represented in Britain, viz. Tofieldia, an arctic and alpine genus of small herbs with a slender scape springing from a tuft of narrow ensiform leaves and bearing a raceme of small green flowers; Nar- thecium (bog-asphodel), herbs with a habit similar to Tofieldia, but with larger golden-yellow flowers; and Colchicum, a genus with about 30 species including 1 6 the meadow saffron or autumn crocus {C. autumnale). Colchicum illustrates the corm-development which is rare in Liliaceae though common in the allied order Iridaceae; a corm is formed by swelling at the base of the axis (figs. 3, 4) and persists after the flowers and leaves, bearing next season's plant as a lateral shoot in the axil of a scale-leaf at its base. Cloriosa, well known in cultivation, climbs by means of its tendril-like leaf- tips; it has handsome flowers with decurved orange-red or yellow petals; it is a native of tropical Asia and Africa. Veratrum is an alpine genus of the north temperate zone.

Asphodeloideae. — The plants generally have a rhizome bearing radical leaves, as in asphodel, rarely a stem with a tuft of leaves as in Aloe, very rarely a tuber {Eriospermum) or bulb {Bowiea). The flowers are borne in a terminal raceme, the anthers open introrsely and the fruit is a capsule, very rarely, as in Dianella, a berry. It

contains 64 genera. Asphodelus (asphodel) is a Mediterranean genus; Simethis, a slender herb with grassy radical leaves, is a native of west and southern Europe extending into south Ireland. Anthericum ami Chlorophytum, herbs with radical often grass-like leaves and sc.ipes bearing a more or less branched inflorescence of small

Fig. 3. — Corm of Meadow Saffron {Col- chicum autumnale). a, Old corm shrivelling; b, young corm produced laterally from the old one.

generally white flowers, are widely Spread in the" tropics. Other genera are Funkia, native of China and Japan, cultivated in the open air in Britain; Hemerofallis, a small gentis of central Europe and temperate Asia — H. flava is known in gardens as the day lily; Phormium, a New Zealand genus to which belongs New Zealand flax, P. tenax, a useful fibre-plant; Kniphofia, South and East Africa, several species of which are cultivated; and Aloe. A small group of Australian genera closely Approach the order Jun- caceae in having small crowded flowers with a scarious or mem- branous perianth ; they include Xanthorrhoea (grass-tree or black- boy) and Kingia, arborescent plants with an erect woody stem crowned with a tuft of long stiff narrow leaves, from the centre of which rises a tall dense flower- spike or a number of stalked flower-heads; this group has been included in Juncaceae.from which it is doubtfully distin- guished only by the absence of the long twisted stigmas which characterize the true rushes.

Allioideae. — The plants grow from a bulb or short rhizome; the inflorescence is an apparent umbel formed of several shortened monochasial cymes and subtended hy a pair of large bracts. It contains 22 genera, the largest of which Allium has about 250 species — 7 are British ; Agapanthus or African lily is a well-known garden plant; in Gagea, a genus of small bulbous herbs found in most parts of Europe, the inflorescence is re- duced to a few flowers or a single flower; G. lutea is a local and rare British plant.

Lilioideae. — Bulbous plants with a terminal racemose in- florescence; the anthers open introrsely and the capsule is loculicidal. It contains 28 genera, several being repre- sented in Britain. The typical genus Lilium and Fritillaria are widely distributed in the tem- perate regions of the northern hemisphere ; F. meleagris, snake's head, is found in moist meadows

in some of the southern and cen- . ,- . , ._

tral English counties; Tulipa autumnale in autumn when the contains more than 50 species P lant ls in Hower – in Europe and temperate Asia, k, Present corm.

h, h, Brown scales covering it.

w, Its roots.

st,

V,

Colchicum

wh,

Its withered flowering stem. Younger corm produced from k.

Roots from k', which grows at expense of k. s, s', s", Sheathing leaves. I', I", Foliage leaves. b, b', Flowers.

k", Young corm produced from k', in autumn, which in succeeding autumn will pro- duce flowers.

and is specially abundant in the dry districts of central Asia; Lloydia, a small slender alpine plant, widely distributed in the northern hemisphere, occurs on Snowdon in Wales ; Scilla (squill) is a large genus, chiefly in Europe and Asia — 5. nutans is the

blue- bell or wild hyacinth; Ornitho- galum (Europe, Africa and west Asia) is closely allied to Scilla — 0. umbellatum, star of Bethle- hem, is naturalized in Britain; Hyacinthus and Muscari are chiefly Mediterranean; M. race-

mosum, grape hyacinth, occurs in sandy pastures in the eastern counties of England. To this group belong a number of tropical and especially South African genera such as Albuca, Vrginea, Dnmia, Lachenalia and others.

Dracaenoideae. — The plants generally have an erect stem with a crown of leaves which are often leathery; the anthers open in- trorsely and the fruit is a berry or capsule. It contains 9 genera, several of which, such as Yucca (fig. 5), Dracaena and Cordyline include arborescent species in which the stem increases in thickness continually by a centrifugal formation of new tissue; an extreme case is afforded by Dracaena Draco, the dragon-tree, of Teneriffe. Yucca and several allied genera are natives of the dry country of the southern and western United States and of Central America. Dracaena and the allied genus Cordyline occur in the warmer regions of the Old World. There is a close relation between the pollination of many yuccas and the life of a moth {Pronuba yuccasella) ; the flowers are open and scented at night when the female moth becomes active, first collecting a load of pollen and then depositing her eggs, generally in a different flower from that which has supplied the pollen. The eggs are deposited in the ovary- wall, usually just below an ovule; after each deposition the moth runs to the top of the pistil and thrusts some pollen into the opening of the stigma.

Development of larva and seed go on together, a few of the seeds serving as food for the insect, which when mature eats through the pericarp and drops to the ground, remaining dormant in its cocoon until the next season of flowering when it emerges as a moth.

A sparagoideae.— Plants growing from a rhizome; fruit a berry. Asparagus contains about ioo species in the dryer warmer parts

Fig. 5. — Yucca

\loriosa. Plant much reduced. 1, Floral diagram. 2, Flower.

of the Old World; it has a short creeping fhizome, from which springs a slender, herbaceous or woody, often very much branched, erect or climbing stem, the ultimate branches of which are flattened 1 ” needle-like leaf -like structures (cladodes\, the true leaves being reduced to scales or, in the climbers, forming short, hard more or less recurved spines. Ruscus aculeatus (fig. 6) is butcher’s broom, an

Fig. 6.— Twig of Butcher’s Broom, Ruscus aculeatus, slightly enlarged. I, Male flower, 2, female flower, both enlarged; 3, berry, slightly reduced.

evergreen shrub with flattened leaf-like cladodes, native in the southerly portion of England and Wales; the small flowers are unisexual and borne on the face of the cladode; the male contains three stamens, the filaments of which are united to form a short

stout column on which are seated the diverging cells of the anthers; in the female the ovary is enveloped by a fleshy staminal tube on which are borne three barren anthers. Polygonatum and Maian- themum are allied genera with a herbaceous leafy stem and, in the former axillary flowers, in the latter flowers in a terminal raceme; both occur rarely in woods in Britain; P. multifiorum is the well- known Solomon’s seal of gardens (fig. 7), so called from the seal-like scars on the rhizome of stems of previous seasons, the hanging flowers of which contain no honey, but are visited by bees for the pollen.

Convallaria is lily of the valley ; Aspi- distra, native of the Himalayas, China and Japan, is a well-known pot plant ; its flowers depart from the normal arrange- ment of the order in having the parts in fours (tetra- merous). Paris, in- cluding the British Herb Paris (P. quadrifolia), solitary tetra

From Strasburger's Lehrbuch dcr Botanik, by permission c< Gustav Fischer.

v • Y'

has "1

to

Fig. 7. — Rhizome of Polygonatum muUifiorum.

a, Bud of next year's aerial shoot.

Scar of this year's, and c, d, e, scars of

_ three preceding years' aerial shoots.

poly-merous flowers w > Roots, terminating the short annual shoot which bears a whorl of four or more leaves below the flower; in this and in some species of the nearly allied genus Trillium (chiefly temperate North America) the flowers have a fetid smell, which together with the dark purple of the ovary and stigmas and frequently also of the stamens and petals, attracts carrion-loving flies, which alight on the stigma and then climb the anthers and become dusted with pollen ; the pollen is then carried to the stigmas of another flower.

Luzurivgoideae are shrubs or undershrubs with erect or climbing branches and fruit a berry. Lapageria, a native of Chile, is a favourite greenhouse climber with fine bell-shaped flowers.

Smilacoideae are climbing shrubs with broad net-veined leaves and small dioecious flowers in umbels springing from the leaf -axils; the fruit is a berry. They climb by means of tendrils, which are stipular structures arising from the leaf-sheath. Smilax is a char- acteristic tropical genus containing about 200 species; the dried roots of some species are the drug sarsaparilla.

The two tribes Ophiopogonoideae and Aletroideae are often included in a distinct order, Haemodoraceae. The plants have a short rhizome and narrow or lanceolate basal leaves; and they are characterized by the ovary being often half-inferior. They contain a few genera chiefly old world tropical and subtropical. The leaves, of species of Sansevieria yield a valuable fibre.

Liliaceae may be regarded as the typical order of the series Liliiflorae. It resembles Juncaceae in the general plan of the flower, which, however, has become much more elaborate and varied in the form and colour of its perianth in association with transmission of pollen by insect agency; a link between the two orders is found in the group of Australian genera referred to above under Asphodeloideae. The tribe Ophiopogonoideae, with its tendency to an inferior ovary, suggests an affinity with the Amaryllidaceae which resemble Liliaceae in habit and in the horizontal plan of the flower, but have an inferior ovary. The tribe Smilacoideae, shrubby climbers with net - veined leaves and small unisexual flowers, bears much the same relationship to the order as a whole as does the order Dioscoreaceae, which have a similar habit, but flowers with an inferior ovary, to the Amaryllidaceae.

LILIENCRON, DETLEV VON (1844-1009), German poet and novelist, was born at Kiel on the 3rd of June 1844. He entered the army and took part in the campaigns of 1866 and 1870-71, in both of which he was wounded. He retired with the rank of captain and spent some time in America, afterwards settling at Kellinghusen in Holstein, where he

remained till 1887. After some time at Munich, he settled in Altona and then at Altrahl-stedt, near Hamburg. He died in July 1909. He first attracted attention by the volume of poems, Adjutantenritte und anderc Gedichte (1883), which was followed by several unsuccessful dramas, a volume of short stories, Eine Sommerschlacht (1886), and a novel Breide Hummelsbuttel (1887). Other collections of short stories appeared under the titles Unter flatternden Fahnen (1888). Per Mdcen (1889), Krieg uni Frieden (1891); of lyric

poetry in 1889, 1890 (Der Heideganger und andere Gedichte), 1893, and 1903 (Bunte Beute). Interesting, too, is the humorous epic Poggjred (1896; 2nd ed. 1904). Liliencron is one of the most eminent of recent German lyric poets; his Adjutantenritte, with its fresh original note, broke with the well-worn literary conventions which had been handed down from the middle of the century. Liliencron's work is, however, somewhat unequal, and he lacks the sustained power which makes the successful

prose writer.

Liliencron's Sa.mO.iche Werke have been published in 14 vols. (1904-1905); his Gedichte having been previously collected in four volumes under the titles Kampf und Spiele, Kampfe und Ziele, Nebel und Sonne and Bunte Beute (1897-1903). See O. J. Bierbaum, D. von Liliencron (1892) ; H. Greinz, Liliencron, eine literarhistorische Wiirdigung (1896); F. Oppenheimer, D. von Liliencron (1898).

LILITH (Heb. lildtu, "night"; hence "night-monster"), a female demon of Jewish folk-lore, equivalent to the English vampire. The personality and name are derived from a Baby- lonian-Assyrian demon Lilit or Lilu. Lilith was believed to have a special power for evil over children. The superstition was extended to a cult surviving among some Jews even as late as the 7th century a.d. In the Rabbinical literature Lilith becomes the first wife of Adam, but flies away from him and becomes a demon.

LILLE, a city of northern France, capital of the department of Nord, 154 m. N. by E. of Paris on the Northern railway. Pop. (1906) 196,624. Lille is situated in a low fertile plain on the right bank of the Deule in a rich agricultural and industrial region of which it is the centre. It is a first-class fortress and headquarters of the I. army corps, and has an enceinte and a pentagonal citadel, one of Vauban's finest works, situated to the west of the town, from which it is divided by the Deule. The modern fortifications comprise over twenty detached forts and batteries, the perimeter of the defences being about 20 m. Before 1858 the town, fortified by Vauban about 1668, occupied an elliptical area of about 2500 yds. by 1300, with the church of Notre-Dame de la Treille in the centre, but the ramparts on the south side have been demolished and the ditches filled up, their place being now occupied by the great Boulevard de la Libert6, which extends in a straight line from the goods station of the railway to the citadel. At the S.E. end of this boulevard are grouped the majority of the numerous educational establish- ments of the city. The new enceinte encloses the old communes of Esquermes, Wazemmes and Moulins-Lille, the area of the town being thus more than doubled. In the new quarters fine boule- vards and handsome squares, such as the Place de la Republique, have been laid out in pleasant contrast with the sombre aspect of the old town. The district of St Andre to the north, the only elegant part of the old town, is the residence of the aristocracy. Outside the enceinte populous suburbs surround the city on every side. The demolition of the fortifications on the north and east of the city, which is continued in those directions by the great suburbs of La Madeleine, St Maurice and Fives, must accelerate its expansion towards Roubaix and Tourcoing. At the demolition of the southern fortifications, the Paris gate, a triumphal arch erected in 1682 in honour of Louis XIV., after the conquest of Flanders, was preserved. On the east the Ghent and Roubaix gates, built in the Renaissance style, with bricks of different colours, date from 1617 and 1622, the time of the Spanish

domination. On the same side the Noble-Tour is a relic of the medieval ramparts. The present enceinte is pierced by numerous gates, including water gates for the canal of the Deule and for the Arbonnoise, which extends into a marsh in the south-west corner of the town. The citadel, which contains the barracks and arsenal, is surrounded by public gardens. The more interesting buildings are in the old town, where, in the Grande Place and Rue Faidherbe, its animation is con- centrated. St Maurice, a church in the late Gothic style, dates in its oldest portions from the 15th century, and was restored in 1872; Ste Catherine belongs to the 15th, 16th and 18th centuries, St Andr6 to the first years of the 18th century, and Ste Madeleine to the last half of the 17th century; all possess valuable pictures, but St Maurice alone, with nave and double

aisles, and elegant modern spire, is architecturally notable. Notre-Dame de la Treille, begun in 1855, in the style of the 15th century, possesses an ancient statue of the Virgin which is the object of a well-known pilgrimage. Of the civil buildings the Bourse (17th century) built round a courtyard in which stands a bronze statue of Napoleon I., the Hotel d'Aigremont, the H6tel Gentil and other houses are in the Flemish style; the Hotel de Ville, dating in the main from the middle of the 19th century, preserves a portion of a palace built by Philip the Good, duke of Burgundy, in the 15th century. The prefecture, the Palais des Beaux-Arts, the law-courts, the school of arts and crafts, and the Lycee Faidherbe are imposing modern buildings. In the middle of the Grande Place stands a column, erected in 1848, commemorating the defence of the town in 1792 (see below), and there are also statues to Generals L. L. C. Faidherbe and F. O. de Negrier, and busts of Louis Pasteur and the popular poet and singer A. Desrousseaux. The Palais des Beaux-Arts contains a museum and picture galleries, among the richest in France, as well as a unique collection of original designs of the great masters bequeathed to Lille by J. B. Wicar, and including a celebrated wax model of a girl's head usually attributed to some Italian artist of the 16th century. The city also possesses a commercial and colonial museum, an industrial museum, a fine collection of departmental and municipal archives, the museum of the Institute of Natural Sciences and a library containing many valuable manuscripts, housed at the Hotel de Ville. The large military hospital, once a Jesuit college, is one of several similar institutions.

Lille is the seat of a prefect and has tribunals of first instance and of commerce, a board of trade arbitrators, a chamber of commerce and a branch of the Bank of France. It is the centre of an academie (educational division) and has a university with faculties of laws, letters, science and medicine and pharmacy, together with a Catholic institute comprising faculties of theology, law, medicine and pharmacy, letters, science, a technical school, and a department of social and political science. Secondary education is given at the Lycee Faidherbe, and , the Lycee Fenelon (for girls), a higher school of commerce, a national technical school and other establishments; to these must be added schools of music and fine arts, and the Industrial and Pasteur Institutes.

The industries, which are carried on in the new quarters of the town and in the suburbs, are of great variety and importance. In the first rank comes the spinning of flax and the weaving of cloth, table-linen, damask, ticking and flax velvet. The spinning of flax thread for sewing and lace-making is specially connected with Lille. The manufacture of woollen fabrics and cotton- spinning and the making of cotton-twist of fine quality are also carried on. There are important printing establishments, state factories for the manufacture of tobacco and the refining of saltpetre and very numerous breweries, while chemical, oil, white lead and sugar-works, distilleries, bleaching-grounds; dye-works, machinery and boiler works and cabinet-making occupy many thousands of workmen. Plant for sugar-works and distilleries, military stores, steam-engines, locomotives, and bridges of all kinds are produced by the company of Fives- Lille. Lille is one of the most important junctions of the Northern railway, and the Deule canal affords communication with neigh- bouring ports and with Belgium. Trade is chiefly in the raw material and machinery for its industries, in the products thereof, and in the wheat and other agricultural products of the surround- ing district.

Lille (File) is said to date its origin from t the time of Count Baldwin IV. of Flanders,

who in 1030 surrounded with walls a little town which had arisen around the castle of Buc. In the first half of the 13th century, the town, which had developed rapidly, obtained communal privileges. Destroyed by Philip Augustus in 1213, it was rebuilt by Joanna of Constantinople, countess of Flanders, but besieged and retaken by Philip the Fair in 1297. After having taken part with the Flemings against the king of France, it was ceded to the latter in 1312. In 1369 Charles V., king of France, gave it to Louis de Male, mho

transmitted his rights to his daughter Margaret, wife of Philip the Bold, duke of Burgundy. Under the Burgundian rule Lille enjoyed great prosperity; its merchants were at the head of the London Hansa. Philip the Good made it his residence, and within its walls held the first chapters of the order of the Golden Fleece. With the rest of Flanders it passed from the dukes of Burgundy to Austria and then to Spain. After the death of Philip IV. of Spain, Louis XIV. reclaimed the territory and besieged Lille in 1667. He forced it to capitulate, but preserved all its laws, customs, privileges and liberties. In 1708, after an heroic resistance, it surrendered to Prince Eugene and the duke of Marlborough. The treaty of Utrecht restored it to France. In 1792 the Austrians bombarded it for nine days and nights without intermission, but had ultimately to raise the siege.

See E. Vanhende, Lille et ses institutions communales de 620 a 1804 (Lille, 1888).

LILLEBONNE, a town of France in the department of Seine- Inferieure, 3ˆ m. N. of the Seine and 24 m. E. of Havre by the Western railway. Pop. (1906) 5370. It lies in the valley of the Bolbec at the foot of wooded hills. The church of Notre- Dame, partly modern, preserves a Gothic portal of the 16th century and a graceful tower of the same period. The park contains a fine cylindrical donjon and other remains of a castle founded by William the Conqueror and rebuilt in the 13th century. The principal industries are cotton-spinning and the manufacture of calico and candles.

Lillebonne under the Romans, Juliobona, was the capital of the Caletes, or inhabitants of the Pays de Caux, in the time of Caesar, by whom it was destroyed. It was afterwards rebuilt by Augustus, and before it was again ruined by the barbarian invasions it had become an important centre whence Roman roads branched out in all directions. The remains of ancient baths and of a theatre capable of holding 3000 persons have been brought to light. Many Roman and Gallic relics, notably a bronze statue of a woman and two fine mosaics, have been found and transported to the museum at Rouen. In the middle ages the fortifications of the town were constructed out of materials supplied by the theatre. The town recovered some of its old importance under William the Conqueror.

LILLIBULLERO, or Lilliburlero, the name of a song popular at the end of the 17th century, especially among the army and supporters of William III. in the war in Ireland during the revolution of 1688. The tune appears to have been much older, and was sung to an Irish nursery song at the beginning of the 17th century, and the attribution of Henry Purcell is based on the very slight ground that it was published in Music's Handmaid, 1689, as " A new Irish Tune " by Henry Purcell. It was also a marching tune familiar to soldiers. The doggerel verses have generally been assigned to Thomas Wharton, and deal with the administration of Talbot, earl of Tyrconnel, appointed by James as his lieutenant in Ireland in 1687. The refrain of the song lilliburUero bullen a la gave the title of the song. Macaulay says of the song " The verses and the tune caught the fancy of the nation. From one end of England to the other all classes were singing this idle rhyme." Though Wharton claimed he had " sung a king out of three kingdoms " and Burnet says " perhaps never had so slight a thing so great an effect " the success of the song was " the effect, and not the cause of that excited state of public feeling which produced the revolution " (Macaulay, Hist, of Eng. chap. ix.).

LILLO, GEORGE (1693-1739), English dramatist, son of a Dutch jeweller, was born in London on the 4th of February 1693. He was brought up to his father's trade and was for many years a partner in the business. His first piece, Silvia, or the Country Burial, was a ballad opera produced at Lincoln's Inn Fields in November 1730. On the 22nd of June 1731 his domestic tragedy, The Merchant, renamed later The London Merchant, or the History of George Barnwell, was produced by Theophilus Cibber and his company at Drury Lane. The piece is written in prose, which is not free from passages which are really blank verse, and is founded on " An excellent ballad of

George Barnwell, an apprentice of London who . . . thrice robbed his master, and murdered his uncle in Ludlow." In breaking through the tradition that the characters of every tragedy must necessarily be drawn from people of high rank and fortune he went back to the Elizabethan domestic drama of passion of which the Yorkshire Tragedy is a type. The obtrusively moral purpose of this play places it in the same literary category as the novels of Richardson. Scoffing critics called it, with reason, a " Newgate tragedy," but it proved extremely popular on the stage. It was regularly acted for many years at holiday seasons for the moral benefit of the apprentices. The last act contained a scene, generally omitted on the London stage, in which the gallows actually figured. In 1734 Lillo celebrated the marriage of the Princess Anne with William IV. of Grange in Britannia and Batavia, a masque. A second tragedy, The Christian Hero, was produced at Drury Lane on the 13th of January 1735. It is based on the story of Scanderbeg, the Albanian chieftain, a life of whom is printed with the play. Thomas Whincop (d. 1730) wrote a piece on the same subject, printed posthumously in 1747. Both Lillo and William Havard, who also wrote a dramatic version of the story, were accused of plagiarizing Whincop's Scanderbeg. Another murder-drama, Fatal Curiosity, in which an old couple murder an unknown guest, who proves to be their own son, was based on a tragedy at Bohelland Farm near Penryn in 1618. It was produced by Henry Fielding at the Little Theatre in the Haymarket in 1736, but with small success. In the next year Fielding tacked it on to his own Historical Register for 1736, and it was received more kindly. It was revised by George Colman the elder in 1782, by Henry Mackenzie in 1784,- &c. Lillo also wrote an adaptation of the Shakespearean play of Pericles, Prince of Tyre, with the title Marina (Covent Garden, August 1st, 1738); and a tragedy, Elmerick, or Justice Triumphant (produced posthumously, Drury Lane, February 23rd, 1740). The statement made in the prologue to this play that Lillo died in poverty seems unfounded. His death took place on the 3rd of September 1739. He left an unfinished version of Arden of Feversham, which was com- pleted by Dr John Hoadly and produced in 1759. Lillo's reputation proved short-lived. He has nevertheless a certain cosmopolitan importance, for the influence of George Barnwell can be traced in the sentimental drama of both France and Germany.

See Lillo's Dramatic Works with Memoirs of the Author by Thomas Davies (reprint by Lowndes, 1810); Cibber's Lives of the Poets, v.; Genest, Some Account of the English Stage; Alois Brand!, " Zu Lillo's Kaufmann in London," in VierteljahrschriftfurLiteratur-geschichte (Weimar, 1890, vol. iii.); Leopold Hoffmann, George Lillo (Marburg, 1888) ; Paul von Hofmann-Wellenhof, Shakspere's Pericles und George Lillo's Marina (Vienna, 1885). There is a novel founded on Lillo's play, Barnwell (1807), by T. S. Surr, and in " George de Barnwell " (Novels by Eminent Hands) Thackeray parodies Bulwer-Lytton's Eugene Aram.

LILLY, WILLIAM (1602-1681), English astrologer, was born in 1602 at Diseworth in Leicestershire, his family having been settled as yeomen in the place for " many ages." He .received a tolerably good classical education at the school of Aehby-de- la-Zouche, but he naively tells us what may perhaps have some significance in reference to his after career, that his master " never taught logic." In his eighteenth year, his father having fallen into great poverty, he went to London and was employed in attendance on an old citizen and his wife. His master, at bis death in 1627, left him an annuity of £20; and, Lilly having soon afterwards married the widow, she, dying in i633,left him property to the value of about £1000. He now began to dabble in astrology, reading all the books on the subject he could fall in with, and occasionally trying his hand at unravelling mysteries by means of his art. The years 1642 and 1643 were devoted to a

careful revision of all his previous reading, and in particular having lighted on Valentine Naibod's Commentary on Alchabitius, he " seriously studied him and found him to be the profoundest author he ever met with." About the same time he tells us that he " did carefully take notice of every grand action betwixt king and parliament, and did first then incline to believe that as all sublunary affairs depend on superior causes, so there was a

possibility of discovering them by the configurations of the superior bodies." And, having thereupon " made some essays," he " found encouragement to proceed further, and ultimately framed to himself that method whichhe everafterwardsfollowed." He then began to issue his prophetical almanacs and other works, which met with serious attention from some of the most prominent members of the Long Parliament. If we may believe himself, Lilly lived on friendly and almost intimate terms with Bulstrode Whitlock, Lenthall the speaker, Sir Philip Stapleton, Elias Ashmole and others. Even Selden seems to have given him some countenance, and probably the chief difference between him and the mass of the community at the 1ˆme was that, while others believed in the general truth of astrology, he ventured to specify the future events to which its calculations pointed. Even from his own account of himself, however, it is evident that he did not trust implicitly to the indications given by the aspects of the heavens, but like more vulgar fortune-tellers kept his eyes and ears open for any information which might make his predictions safe. It appears that he had correspondents both at home and in foreign parts to keep him conversant with the probable current of affairs. Not a few of his exploits indicate rather the quality of a clever police detective than of a profound astrologer. After the Restoration he very quickly fell into dis- repute. His sympathy with the parliament, which his predictions had generally shown, was not calculated to bring him into royal favour. He came under the lash of Butler, who, making allow- ance for some satiric exaggeration, has given in the character of Sidrophel a probably not very incorrect picture ˆof the man; and, having by this time amassed a tolerable fortune, he bought a small estate at Hersham in Surrey, to which he retired, and where he diverted the exercise of his peculiar talents to the practice of medicine. He died in 1681.

Lilly's life of himself, published after his death, is still worth looking into as a remarkable record of credulity. So lately as 1852 a prominent London publisher put forth a new edition of Lilly's Introduction to Astrology, " with numerous emendations adapted to the improved state of the science."

LILOAN, a town of the province of Cebu, Philippine Islands, on the E. coast, 10 m. N.E. of Cebu, the capital of the province. Pop. (1903), after the annexation of Compostela, 15,626. There are seventeen villages or barrios in the town, and eight of them had in 1903 a population exceeding 1000. The language is Visayan. Fishing is the principal industry. Liloan has one of the principal coal beds on the island; and rice, Indian corn, sugar-cane and coffee are cultivated. Coconuts and other tropical fruits are important products.

LILY, Lilium, the typical genus of the botanical order Liliaceae, embracing nearly eighty species, all confined to the northern hemisphere, and widely distributed throughout the north temperate zone. The earliest in cultivation were described in 1597 by Gerard {Herball, p. 146), who figures eight kinds of true lilies, which include L. album (L. candidum) and a variety, bizantinum, two umbellate forms of the type L. bulbiferum, named L. aureum and L. cruentum latifolium, and three with pendulous flowers, apparently forms of the martagon lily. Parkinson, in his Paradisus (1629), described five varieties of martagon, six of umbellate kinds — two white ones, and L. pomponium, L. chalcedonicum, L. carniolicum and L. pyrenaicum — together with one American, L. canadense, which had been introduced in 1629. For the ancient and medieval history of the lily, see M. de Cannart d'Hamale's Monographic historique el

littiraire des lis (Malines, 1870). Since that period many new species have been added. The latest authorities for description and classification of the genus are J. G. Baker (" Revision of the Genera and Species of Tulipeae," Journ. of Linn. Soc. xiv. p. 211, 1874), and J. H. Elwes {Monograph of the Genus Lilium, 1880), who first tested all the species under cultivation, and has published every one beautifully figured by W. H. Fitch, and some hybrids. With respect to the production of hybrids, the genus is remarkable for its power of resisting the influence of foreign pollen, for the seedlings of any species, when crossed, generally resemble that which bears them. A good account of the new species and principal varieties discovered since 1880,

with much information on the cultivation of lilies and the diseases to which they are subject, will be found in the report of the Conference on Lilies, in the Journal of the Royal Horti- cultural Society, 1901. The new species include a number disˆ covered in central and western China by Dr Augustine Henry and other collectors; also several from Japan and California.

The structure of the flower represents the simple type of mono- cotyledons, consisting of two whorls of petals, of three free parts each, six free stamens, and a consolidated pistil of three carpels, ripening into a three-valved capsule containing many winged seeds. In form, the flower assumes three types: trumpet-shaped, with a more or less elongated tube, e.g. L. longiflorum and L. candidum; an open form with spreading perianth leaves, e.g. L. auratum; or assuming a pendulous habit, with the tips strongly reflexed, e.g. the martagon type. All have scaly bulbs, which in three west American species, as L. Humboldti, are remarkable for being somewhat intermediate between a bulb and a creeping rhizome. L. bulbiferum and its allies produce aerial reproductive bulbils in the axils of the leaves. The bulbs of several species are eaten, such as of L. avenaceum in Kamchatka, of L. Martagon by the Cossacks, and of L. ligrinum, the " tiger lily," in China and Japan. Medicinal uses were ascribed to the species, but none appear to have any marked properties in this respect.

The white lily, L. candidum, the Xelpiov of the Greeks, was one

of the commonest garden flowers of antiquity, appearing in the poets

from Homer downwards side by side with the rose and the violet.

According to Hehn, roses and lilies entered Greece from the east by

way of Phrygia, Thrace and

Macedonia {Kulturpflanzen

und Hausthiere, 3rd ed.,

217). The word \dpiov

itself, from which lilium is

derived by assimilation of

consonants, appears to be

Eranian {Ibid. p. 527), and

according to ancient ety- mologists (Lagarde, Ges.

Abh. p. 227) the town of

Susa was connected with the Persian name of the lily

susan (Gr. aovcov, Heb. shSshan). Mythologically the white lily, Rosa Junonis, was fabled to have sprung from the milk of Hera. As the plant of purity it was con- trasted

with the rose of Aphrodite. The word Kplvov, on the other hand, included red and purple lilies, Plin. H.N. xxi. 5 (11, 12), the red lily being best known in Syria and Judaea (Phaselis). This perhaps is the ” red lily of Constantinople ” of Gerard, L. chalcedonicum. The lily of the Old Testa- ment (sh6shan) may be con- jectured to be a red lily from the simile in Cant. v. 13, unless the allusion is to the fragrance rather than the colour of the lips, in which case the white lily must be thought of. The ” lilies of the field,” Matt. vi. 28, are npiva, and the comparison of their beauty with royal robes suggests their identifica- tion with the red Syrian lily of Pliny. Lilies, however, are not a conspicuous feature in the flora cf Palestine, and the red anemone {Anemone coronaria), with which all the hill-sides of Galilee are dotted in the spring, is perhaps more likely to have suggested the figure. For the lily in the pharmacopoeia of the ancients see Adams’s Paul. Aegineta, iii. 196. It was used in unguents and against the bites of snakes, &c. In the middle ages the flower continued to be common and was taken as the symbol of heavenly purity. Th« three golden lilies of France are said to have been originally three lance-heads.

Lily of the valley, Convallaria majaKs, belongs to a different tribe {Asparagoideae) of the same order. It grows wild in woods in some parts of England, and in Europe, northern Asia and the Alleghany Mountains of North America. The leaves and flower-scapes sprinf from an underground creeping stem. The small pendulous bell- shaped flowers contain no honey but are visited by bees for the pollen.

The word ” lily ” is loosely used in connexion with many plant* which are not really liliums at all, but belong to genera which are

Madonna or White Lily {Lilium candidum). About \ nat. size.

quite distinct botanically. Thus, the Lent lily is Narcissus Pseudo- narcissus; the African lily is Agapanlhus umbellatus; the Belladonna lily is Amaryllis Belladonna (g.f.) ; the Jacobaea lily is Sprekelia formosissima; the Mariposa lily is Calochortus ; the lily of the Incas is Alstroemeria pelegrina; St Bernard’s lily is Anthericum Liliago; St Bruno’s lily is Anthericum (or Paradisid) Liliastrum; the water lily is Nymphaea alba; the Arum lily is Richardia africana; and there are many others.

The true lilies are so numerous and varied that no general cultural instructions will be alike suitable to all. Some species, as L. Martagon, candidum, chalcedonicum, Szovitzianum (or colchicum), bulbiferum, croceum, Henryi, pomponium — the ” Turk’s cap lily,” and others, will grow in almost any good garden soil, and succeed admirably in loam of a rather heavy character, and dislike too much peat. But a compost of peat, loam and leaf-soil suits L. auratum, Brownii, concolor, elegans, giganteum, japonicum, longi- florum, monadelphum, pardalinum, speciosum, and the tiger lily (L. tigrinum) well, and a larger proportion of peat is indispensable for the beautiful American L. superbutn and canadense. The margin of rhododendron beds, where there are sheltered recesses amongst the plants, suits many of the more delicate species well, partial shade

Lily of the Valley (Convallaria majalis). About \ nat. size.

and shelter of some kind being essential. The bulbs should be planted from 6 to 10 in. (according to size) below the surface, which should at once be mulched over with half-decayed leaves or coconut fibre to keep out frost.

The noble L. auratum, with its large white flowers, having a yellow band and numerous red or purple spots, is a magnificent plant when grown to perfection; and so are the varieties called rubro-vittatum and cruentum, which have the central band crimson instead of yellow; and the broad-petalled platyphyllum, and its almost pure white sub-variety called virginale. Of L. speciosum (well known to most gardeners as

lancifolium) , the true typical form and the red-spotted and white varieties are grand plants for late summer blooming in the conservatory. The tiger lily, L. tigrinum, and its varieties Fortunei, splendidum and flore-pleno, are amongst the best species for the flower garden; L. Thunbergianum and its many varieties being also good border flowers. The pretty L. Leichtlinii and L. colchicum (or Szovitzianum) with drooping yellow flowers and the scarlet drooping-flowered L. tenuifolium make up, with those already mentioned, a series of the finest hardy flowers of the summer garden. The Indian L. giganteum is perfectly distinct in character, having broad heart-shaped leaves, and a noble stem 10 to 14 ft. high, bearing a dozen or more large deflexed, funnel- shaped, white, purple-stained flowers; L. cordifolium (China and Japan) is similar in character, but dwarfer in habit.

For pot culture, the soil should consist of three parts turfy loam to one of leaf-mould and thoroughly rotted manure, adding enough pure grit to keep the compost porous. If leaf-rnould is not at hand, turfy peat may be substituted for it. The plants should be potted in October. The pots should be plunged in a cold frame and protected from frost, and about May may be removed to a sheltered and

moderately shady place out-doors to remain till they flower, when; they may be removed to the greenhouse. This treatment suits the gorgeous L. auratum, the splendid varieties of L. speciosum (lanci- folium) and also the chaste-flowering trumpet-tubed L. longiflorum and its varieties. Thousands of bulbs of such lilies as longiflorum and speciosum are now retarded in refrigerators and taken out in batches for greenhouse work as required.

Diseases. — Lilies are, under certain conditions favourable to the development of the disease, liable to the attacks of three parasitic fungi. The most destructive is Botrytis cinerea which forms orange- brown or buff specks on the stems, pedicels, leaves and flower-buds, which increase in size and become covered with a delicate grey mould, completely destroying or disfiguring the parts attacked. The spores formed on the delicate grey mould are carried during the summer from one plant to another, thus spreading the disease, and also germinate in the soil where the fungus may remain passive during the winter producing a new crop of spores next spring, or sometimes attacking the scales of the bulbs forming small black hard bodies embedded in the flesh. For prevention, the surface soil covering bulbs should be removed every autumn and replaced by soil mixed with kainit; manure for mulching should also be mixed with kainit, which acts as a steriliser. If the fungus appears on the foliage spray with potassium sulphide solution (2 oz. in 3 gallons of water). Uromyces Erythronii, a rust, sometimes causes consider- able injury to the foliage of species of Lilium and other bulbous plants, forming large discoloured blotches on the leaves. The diseased stems should be removed and burned before the leaves fall; as the bulb is not attacked the plant will start growth next season free from disease. Rhizopus necans is sometimes the cause of extensive destruction of bulbs. The fungus attacks injured roots and afterwards passes into the bulb which becomes brown and finally rots. The fungus hibernates in the soil and enters through broken or injured roots, hence care should be taken when removing the bulbs that the roots are injured as little as possible. An ex- cellent packing material for dormant buds is coarsely crushed wood- charcoal to which has been added a sprinkling of flowers of sulphur. This prevents infection from outside and also destroys any spores or fungus mycelium that may have been packed away along with the bulbs.

When cultivated in greenhouses liliums are subject to attack from aphides (green fly) in the early stages of growth. These pests can be kept in check by syringing with nicotine, soft-soap and quassia solutions, or by ” vaporising ” two or three evenings in succession, afterwards syringing the plants with clear tepid water.

LILYE, or Lily, WILLIAM (c. 1468-1522), English scholar, was born at Odiham in Hampshire. He entered the university of Oxford in i486, and after graduating in arts went on a pilgrim- age to Jerusalem. On his return he put in at Rhodes, which was still occupied by the knights of St John, under whose pro- tection many Greeks had taken

refuge after the capture of Con- stantinople by the Turks. He then went on to Italy, where he attended the lectures of Sulpitius Verulanus and Pomponius Laetus at Rome, and of Egnatius at Venice. After his return he settled in London (where he became intimate with Thomas More) as a private teacher of grammar, and is believed to have been the first who taught Greek in that city. In 1510 Colet, dean of St Paul's, who was then founding the school which afterwards became famous, appointed Lilye the first high master. He died of the plague on the 25th of February 1322.

Lilye is famous not only as one of the pioneers of Greek learning, but as one of the joint-authors of a book, familiar to many generations of students during the 19th century, the old Eton Latin grammar. The Brevissima Institutio, a sketch by Colet, corrected by Erasmus and worked upon by Lilye, contains two portions, the author of which is indisputably Lilye. These are the lines on the genders of nouns, beginning Propria quae maribus, and those on the conjugation of verbs beginning As in praesenti. The Carmen de Moribus bears Lilye's name in the early editions; but Hearne asserts that it was written by Leland, who was one of his scholars, and that Lilye only adapted it. Besides the Brevissima Institutio, Lilye wrote a variety of Latin pieces both in prose and verse. Some of the latter are printed along with the Latin verses of Sir Thomas More in Progym- nasmata Thomae Mori et Gulielmi Lylii Sodalium (15 18). Another volume of Latin verse (Antibossicon ad Gulielmum Hormannum, 1 521) is directed against a rival schoolmaster and grammarian, Robert Whittington, who had " under the feigned name of Bossus, much provoked Lilye with scoffs and biting verses."

See the sketch of Lilye's life by his son George, canon of St Paul's, written for Paulus Jovius, who was collecting for his history the lives of the learned men of Great Britain; and the article by J. H. Lupton, formerly sur-master of St Paul's School, in the Dictionary of National Biography.

LIMA, a city and the county-seat of Allen county, Ohio, U.S.A., on the Ottawa river, about 70 m. S.S.W. of Toledo, Pop. (1890) 15,981; (1900) 21,723, of whom 1457 were

foreign-born and 731 were negroes; (1010 census) 30,508. It is served by the Pennsylvania (Pittsburgh, Ft. Wayne & Chicago division), the Erie, the Cincinnati, Hamilton & Dayton, the Lake Erie & Western, the Detroit, Toledo & Ironton railways, and by six interurban electric lines. Immediately N. of the city is a state asylum for the insane. Lima has a Carnegie library, a city hospital and a public park of 100 acres. Among the principal buildings are the county court house, a masonic temple, an Elks' home and a soldiers' and sailors' memorial building. Lima College was conducted here from 1893 to 1908. Lima is situated in the centre of the great north-western oil-field (Trenton limestone of the Ordovician system) of Ohio, which was first developed in 1885; the product of the Lima district was 20,575,138 barrels in 1896, 15,877,730 barrels in 1902 and 6,748,676 barrels in 1908. The city is a headquarters of the Standard Oil Company, and the refining of petroleum is one of the principal industries. The total value of the factory product in 1905 was $8,155,586, an increase of 31-1% over that in 1900. Lima contains railway shops of the Cincinnati, Hamilton & Dayton and the Lake Erie & Western railways. The city has a large wholesale and jobbing trade. The municipality owns and operates the water- works. Lima was laid out in 1831, and was first organized as a city under a general state law in 1842.

LIMA, a coast department of central Peru, bounded N. by Ancachs, E. by Junin and Huancavelica, S. by lea and W. by the Pacific Ocean. Pop. (1906 estimate) 250,000; area 13,314 sq. m. The eastern boundary follows the crests of the Western Cordillera, which gives to the department the western slopes of this chain with the drainage basins of the rivers Huaura, Chancay, Chillon, Rimac, Lurin, Mala and Canete. Although the department forms part of the rainless region, these rivers, fed from the snows of the high Andes, provide water for the irrigation of large areas devoted to the

raising of cotton, sugar, sorghum, Indian corn, alfalfa, potatoes, grapes and olives. The sugar estates of the Canete are among the best in Peru and are served by a narrow gauge railway terminating at the small port of Cerro Azul. Indian corn is grown in Chancay and other northern valleys, and is chiefly used, together with alfalfa and barley, in fattening swine for lard. The mineral resources are not important, though gold washings in the Canete valley have been worked since early colonial times. One of the most im- portant industrial establishments in the republic is the smelting works at Casapalca, on the Oroya railway, in the Rimac valley, which receives ores from neighbouring mines of the district of Huarochiri. The department is crossed from S.W. to N.E. by the Oroya railway, and several short lines run from the city of Lima to neighbouring towns. Besides Lima (g.v.) the principal towns are Huacho, Canete (port), Canta, Yauyos, Chorrillos, Miraflores and Barranco — the last three being summer resorts for the people of the capital, with variable populations of 15,000, 6000 and 5000 respectively. About 15 m. S. of Lima, near the mouth of the Lurin, are the celebrated ruins of Pachacamac, which are believed to antedate the occupation of this region by the Incas.

LIMA, the principal city and the capital of Peru and of the department and province of Lima, on the left bank of the river Rimac, 7J m. above its mouth and the same distance E. by N. of its seaport Callao, in 12° 2′ 34″ S., 77° 7′ 36″ W. Pop. (1906 estimate) 140,000, of whom a large proportion is of negro descent, and a considerable number of foreign birth. The city is about 480 ft. above sea-level, and stands on an arid plain, which rises gently toward the S., and occupies an angle between the Cerros de San Jeronimo (2493 ft.) and San Cristobal (1411 ft.) on the N. and a short range of low hills, called the Cerros de San Bartolome, on the E. The surrounding region is arid, like all this part of the Pacific coast, but through irrigation large areas have been brought under cultivation, especially along the water- courses. The Rimac has its source about 105 m. N.E. of Lima and is fed by the melting snows of the higher Andes. It is an insignificant stream in winter and a raging torrent in summer. Its tributaries are all of the same character, except the Rio Surco, which rises near Chorrillos and flowing northward joins the

Rimac a few miles above the city. These, with the Rio Lurin, which enters the Pacific a short distance S. of Chorrillos, provide water for irrigating the districts near Lima. The climate varies somewhat from that of the arid coast in general, in having a winter of four months characterized by cloudy skies, dense fogs and sometimes a drizzling rain. The air in this season is raw and chilly. For the rest of the year the sky is clear and the air dry. The mean temperature for the year is 66° F., the winter minimum being 59 and the summer maximum 78 .

The older part of Lima was laid out and built with mathe- matical regularity, the streets crossing each other at right angles and enclosing square areas, called manzanas, of nearly uniform size. Later extensions, however, did not follow this plan strictly, and there is some variation from the straight line in the streets and also in the size and shape of the manzanas. The streets are roughly paved with cobble stones and lighted with gas or electricity. A broad boulevard of modern con- struction partly encircles the city, occupying the site of the old brick walls (18 to 20 ft. high, 10 to 12 ft. thick at the base and 9. ft. at the top) which were constructed in 1585 by a Fleming named Pedro Ramon, and were razed by Henry Meiggs during the administration of President Balta. The water-supply is derived from the Rimac and filtered, and the drainage, once carried on the surface, now passes into a system of subterranean sewers. The streets and suburbs of Lima are served by tramways, mostly worked by electric traction. The suburban lines include two to Callao, one to Magdalena, and one to Miraflores and Chorrillos. On the north side of the river is the suburb or district of San Lazaro, shut in by the encircling hills and occupied in great part' by the poorer classes. The principal squares are the Plaza Mayor, Plaza Bolivar (formerly P. de la. Inquisicion and P. de la Independencia), Plaza de la Exposicion, and Plaza del Acho, on the north side of the river, the site of the bull-ring. The public gardens, connected with the Exposition palace on the S. side of the city, and the Paseo Colon are popular among the Limefios as pleasure resorts. The long Paseo Colon, with its parallel drives and paths, is

ornamented with trees, shrubbery and statues, notably the Columbus statue, a group in marble designed by the sculptor Salvatore Revelli. It is the favourite fashionable resort. A part of the old wagon road from Lima ta| Callao, which was paved and improved with walks and trees by viceroy O'Higgins, is also much frequented. The avenue (3 m. long) leading from the city to Magdalena was beautified by the planting of four rows of palms during the Pierola admini- stration. Among other public resorts are the Botanical garden, the Grau and Bolognesi avenues (parts of the Boulevard), the Acho avenue on the right bank of the Rimac, and the celebrated avenue of the Descalzos, on the N. side of the river, bordered with statuary. The noteworthy monuments of the city are the bronze equestrian statue of Bolivar in the plaza of that name, the Columbus statue already mentioned, the Bolognesi statue in the small square of that name, and the San Martin statue in the Plaza de la Exposicion. The 22nd of May monument, a marble shaft crowned by a golden bronze figure of Victory, stands where the Callao road crosses the Boulevard. Most conspicuous among the public buildings of Lima is the cathedral, whose twin towers and broad facade look down upon the Plaza Mayor. Its foundation stone was laid in 1535 but the cathedral was not consecrated until 1625. The great earthquake of 1746 reduced it to a mass of ruins, but it was reconstructed by 1758, practically, as it now stands. It has double aisles and ten richly-decorated chapels, in one of which rest the remains of Francisco Pizarro, the conqueror of Peru. Also facing the same square are the archiepiscopal and government palaces; the latter formerly the palace of the viceroys. The interesting casa of the Inquisition, whose tribunals rivalled those of Madrid in cruelty, faces upon Plaza Bolivar, as also the old University of San Marcos, which dates from 1 551 and has faculties of theology, law, medicine, philosophy and literature, mathematics, and administrative and political economy. The churches and convents of Lima are richly endowed as a rule, and some of the churches represent a very large expenditure of money. The

convent of San Francisco, near the Plaza Mayor, is the largest monastic establishment in Lima and contains some very fine carvings. Its church is the finest in the city after the cathedral. Other noteworthy churches are those of the convents of Santo Domingo, La Merced and San Augustine. There are a number of conventual establishments (for both sexes), which, with their chapels, and with the smaller churches, retreats, sanctuaries, &c, make up a total of 66 institutions devoted to religious observ- ances. An attractive, and perhaps the most popular public building in Lima is the Exposition palace on the plaza and in the public gardens of the same name, on the south side of the city. It dates from 1872; its halls are used for important public assemblies, and its upper floor is occupied by the National Historical Institute, its museum and the gallery of historical paintings. Other noteworthy edifices and institutions are the National Library, the Lima Geographical Society, founded in 1888; the Mint, which dates from 1565 and is considered to be one of the best in South America; the great bull-ring of the Plaza del Acho, which dates from 1768 and can seat 8000 spectators; the Concepcion market; a modern penitentiary; and various charitable institutions. In addition to the old university on the Plaza Bolivar, which has been modernized and greatly improved, Lima has a school of engineers and mines (founded 1876), the old college of San Carlos, a normal school (founded 1905), a school of agriculture (situated outside the city limits and founded in 1902), two schools for girls under the direction of religious sisters, an episcopal seminary called the Seminario Conciliar de Santo Toribio, and a school of arts and trades in which elementary technical instruction is given. Under the old regime, primary instruction was almost wholly neglected, but the 20th century brought about important changes in this respect. In addition to the primary schools, the government maintains free night schools for workmen.

The residences of the city are for the most part of one storey and have mud walls supported by a wooden framework which enclose open spaces, called patios, around which the living rooms are ranged. The better class of dwellings have two floors and are sometimes built of brick. A projecting, lattice-enclosed window for the use of

women is a prominent feature of the larger Rouses and gives a picturesque effect to the streets.

Manufacturing has had some considerable development since the closing years of the 19th century; the most important manufactories are established outside the city limits ; they produce cotton and woollen textiles, the products of the sugar estates, chocolate, cocaine, cigars and cigarettes, beer, artificial liquors, cotton-seed oil, hats, macaroni, matches, paper, soap and candles. The commercial interests of the city are important, a large part of the interior being supplied from this point. With its port Callao the city is connected by two steam railways, one of which was built as early as 1848; one railway runs northward to Ancon, and another, the famous Oroya line, runs inland 130 m., crossing the Western Cordillera at an elevation of 15,645 ft. above sea- level, with branches to Cerro de Pasco and Huari. The export trade properly belongs to Callao, though often credited to Lima. The Limefios are an intelligent, hospitable, pleasure-loving people, and the many attractive features of their city make it a favourite place of residence for foreigners.

Lima was founded on the 18th of January 1535 by Francisco Pizarro, who named it Ciudad de los Reyes (City of the Kings) in honour of the emperor Charles V. and Dona Juana his mother, or, according to some authorities, in commemoration of the Feast of the Epiphany (6th January) when its site is said to have been selected. The name soon after gave place to that of Lima, a Spanish corruption of the Quichua word Rimac. In 1541 Lima was made an episcopal see, which in 1545 was raised to a metropolitan see. Under Spanish rule, Lima was the principal city of South America, and for a time was the entrep&t for all the Pacific coast colonies south of Panama. It became very prosperous during this period, though often visited by destructive earth- quakes, the most disastrous of which was that of the 28th of October 1746, when the cathedral and the greater part of the city were reduced to ruins, many lives were lost, and the port of

Callao was destroyed. Lima was not materially affected by the military operations of the war of independence until 18 21, when a small army of Argentines and Chileans under General San Martin invested the city, and took possession of it on the 12th of July upon the withdrawal of the Spanish forces. San Martin was proclaimed the protector of Peru as a free state on the 28th of July, but resigned that office on the 20th of September 1822 to avoid a fratricidal struggle with Bolivar. In March 1828 Lima was again visited by a destructive earthquake, and in 1854-1855 an epidemic of yellow fever carried off a great number of its inhabitants. In November 1864, when a hostile Spanish fleet was on the coast, a congress of South American plenipotentiaries was held here to concert measures of mutual defence. Lima has been the principal sufferer in the many revolutions and disorders which have convulsed Peru under the republic, and many of them originated in the city itself. During the earlier part of this period the capital twice fell into the hands of foreigners, once in 1836 when the Bolivian general Santa Cruz made himself the chief of a Bolivian-Peruvian confederation, and again in 1837 when an invading force of Chileans and Peruvian refugees landed at Ancon and defeated the Peruvian forces under President Orbegoso. The city prospered greatly under the two administrations of President Ramon Castilla, who gave Peru its first taste of peace and good government, and under those of Presidents Balta and Pardo, during which many important public improvements were made. The greatest calamity in the history of Lima was its occupation by a Chilean army under the command of General Baquedano after the bloody defeat of the Peruvians at Miraflores on the 15th of January 1 88 1. Chorrillos and Miraflores with their handsome country residences had already been sacked and burned and their helpless residents murdered. Lima escaped this fate, thanks to the intervention of foreign powers, but during the two years and nine months of this occupation the Chileans systematically pillaged the public edifices, turned the old university of San Marcos into barracks, destroyed the public library, and carried away the valuable contents of the Exposition palace, the models and apparatus of the medical school and other educational institutions, and many of the monuments and art treasures with which the city had been enriched. A forced contribution of $1,000,000 a month was imposed upon the population in addition to the revenues of the custom house. When the Chilean garrison under

Captain Lynch was withdrawn on the 22nd of October 1883, it took 3000 wagons to carry away the plunder which had not already been shipped. Of the government palace and other public buildings nothing remained but the bare walls. The buoyant character of the people, and the sympathy and assistance generously offered by many civilized nations, con- tributed to a remarkably speedy recovery from so great a misfortune. Under the direction of its keeper, Don Ricardo Palma, 8315 volumes of the public library were recovered, to which were added valuable contributions from other countries. The portraits of the Spanish viceroys were also recovered, except five, and are now in the portrait gallery of the Exposition palace. The poverty of the country after the war made recovery difficult, but years of peace have assisted it.

See Mariano F. Paz Soldan, Diccionario geogrdfico-estadistico del Peru (Lima, 1877) ; Mateo Paz Soldan and M. F. Paz Soldan, Geografia del Peru (Paris, 1862); Manuel A. Fuentes, Lima, or Sketches of the Capital of Peru (London, 1866); C. R. Markham, Cuzo and Lima (London, 1856), and History of Peru (Chicago, 1892) ; Alexandre Garland, Peru in iqo6 (Lima, 1907) ; and C. R. Enock, Peru (London, 1908). For earlier descriptions see works referred to under Peru. (A. J. L.)

LIMACON (from the Lat. Umax, a slug), a curve invented by Blaise Pascal and further investigated and named by Gilles Personne de Roberval. It is generated by the extremities of a rod which is constrained to move so that its middle point traces out a circle, the rod always passing through a fixed point on the circumference. The polar equation is r — a + b cos 6, where 2a = length of the rod, and b = diameter of the circle. The curve may be regarded as an epitrochoid (see Epicycloid) in which the rolling and fixed circles have equal radii. It is the inverse of a

central conic for the focus, and the first positive pedal of a circle for any point. The form of the limacon depends on the ratio of

the two constants; if a be greater than b, the curve lies entirely outside the circle; if a equals b, it is known as a cardioid (q.v.) ; if a is less than b, the curve has a node within the circle; the particular case when b—2a is known as the trisectrix (q.v.). In the figure (1) is a limacon, (2) the cardioid, (3) the trisectrix.

Properties of the limacon may be deduced from its mechanical con- struction; thus the length of a focal chord is constant and the normals at the extremities of a focal chord intersect on a fixed circle. The area is (b 2 + ar/2)ir, and the length is expressible as an elliptic integral.

LIMASOL, a seaport of Cyprus, on Akrotiri Bay of the south coast. Pop. (1901) 8298. Excepting a fort attributed to the close of the 12th century the town is without antiquities of interest, but in the neighbourhood are the ancient sites of Amathus and Curium. Limasol has a considerable trade in wine and carobs. The town was the scene of the marriage of Richard I., king of England, with Berengaria, in 1191.

LIMB. (1) (In O. Eng. lint, cognate with the O. Nor. and Icel. Hmr, Swed. and Dan. km; probably the word is to be referred to a root li- seen in an obsolete English word ” lith,” a limb, and in the Ger. died), originally any portion or member of the body, but now restricted in meaning to the external members of the body of an animal apart from the head and trunk, the legs and arms, or, in a bird, the wings. It is sometimes used of the lower limbs only, and is synonymous with ” leg.” The word is also used of the main branches of a tree, of the projecting spurs of a range of mountains, of the arms of a cross, &c. As a translation of the Lat. membrum, and with special reference to the church as the ” body of Christ,” ” limb ” was frequently used by ecclesiastical writers of the 16th and 17th centuries of a person as being a component part of the church; cf. such expressions c.s “limb of Satan,” “limb of the law,” &c. From the use of membrum in medieval Latin for an estate dependent on another, the name ” limb ’” is given to an

outlying portion of another, or to the surbordinate members of the Cinque Ports, attached to one of the principal towns; Pevensey was thus a ” limb ” of Hastings. (2) An edge or border, frequently used in scientific language for the boundary of a surface. It is thus used of the edge of the disk of the sun or moon, of the expanded part of a petal or sepal in botany, &c. This word is a shortened form of ” limbo ” or ” limbus,” Lat. for an edge, for the theological use of which see Limbus.

LIMBACH, a town in the kingdom of Saxony, in the manu- facturing district of Chemnitz, 6 m. N.W. of that city. Pop. (1005) i3>7 2 3- It has a public park and a monument to the composer Pache. Its industries include the making of worsteds, cloth, silk and sewing-machines, and dyeing and bleaching.

LIMBER, an homonymous word, having three meanings. (1) A two- wheeled carriage forming a detachable part of the equipment of all guns on travelling carriages and having on it a framework to contain ammunition boxes, and, in most cases, seats for two or three gunners. The French equivalent is avanl- train, the Ger. Protz (see Artillery and Ordnance). (2) An adjective meaning pliant or flexible and so used with reference to a person’s mental or bodily qualities, quick, nimble, adroit. (3) A nautical term for the holes cut in the flooring in a ship above the keelson, to allow water to drain to the pumps.

The etymology of these words is obscure. According to the New English Dictionary the origin of (1) is to be found in the Fr. limoniere, a derivative of limon, the shaft of a vehicle, a meaning which appears in English from the 15th century but is now obsolete, except apparently among the miners of the north of England. The earlier English forms of the word are lymor or limmer. Skeat sug- gests that (2) is connected with ” limp,” which he refers to a Teutonic base lap-, meaning to hang down. The New English Dictionary

points out that while ” limp ” does not occur till the beginning of the 18th century, ” limber ” in this sense is found as early as the 16th. In Thomas Cooper’s (1517 P-I594) Thesaurus Linguae Romanae et Britannicae (1565), it appears as the English equivalent of the Latin lentus. A possible derivation connects it with ” limb,”

LIMBORCH, PHILIPP VAN (1633-1712), Dutch Remonstrant theologian, was born on the 19th of June 1633, at Amsterdam, where his father was a lawyer. He received his education at Utrecht, at Leiden, in his native city, and finally at Utrecht University, which he entered in 1652. In 1657 he became a Remonstrant pastor at Gouda, and in 1667 he was transferred to Amsterdam, where, in the following year, the office of professor of theology in the Remonstrant seminary was added to his pastoral charge. He was a friend of John Locke. He died at Amsterdam on the 30th of April 171 2.

His most important work, Institutiones theologiae christianae, ad praxin pietatis et promotionem pads , christianae unice directae (Amsterdam, 1686, 5th ed., 1735), is a full and clear exposition of the system of Simon Episcopius and Stephan Curcellaeus. The fourth edition (1715) included a posthumous ” Relatio historica de origine et progressu controversiarum in foederato Belgio de prae- destinatione.” Limborch also wrote De veritate religionis Christianae arnica collatio cum erudito Judaeo (Gouda, 1687); Historia Inquisi- tionis (1692), in four books prefixed to the ” Liber Sententiarum Inquisitionis Tolosanae ” (1307-1323) ; and Commentarius in Acta Apostolorum et in Epistolas ad Romanos et ad Hebraeos (Rotterdam, 171 1). His editorial labours included the publication of various works of his predecessors, and of Epistolae ecclesiasticae praestantium ac eruditorum virorum (Amsterdam, 1684), chiefly by Jakobus Arminius, Joannes Uytenbogardus, Konrad Vorstius (1569-1622), Gerhard Vossius (1577-1649), Hugo Grotius, Simon Episcopius (his grand-uncle) and Gaspar Barlaeus; they are of great value for the history of Arminianism. An English translation of the Theologia was published in 1702 by William Jones (A Complete System or Body of Divinity, both Speculative and Practical, founded on Scripture and Reason, London, 1702); and a translation of the Historia Inquisitionis, by Samuel Chandler, with ” a large intro- duction concerning the rise and progress of persecution

and the real and pretended causes of it " prefixed, appeared in 1731. See Herzog-Hauck, Realencyklopadie.

LIMBURG, one of the many small feudal states into which the duchy of Lower Lorraine was split up in the second half of the nth century. The first count, Walram of Arlon, married Judith the daughter of Frederick of Luxemburg, duke of Lower Lorraine (d. 1065), who bestowed upon him a portion of his possessions lying upon both sides of the river Meuse. It received its name from the strong castle built by Count Walram on the river Vesdre , where the town of Limburg now stands. Henry, Walram's son (d. 1119), was turbulent and ambitious. On the death of Godfrey of Bouillon (1089) he forced the emperor Henry IV. to recognize him as duke of Lower Lorraine. He was afterwards deposed and imprisoned by Count Godfrey of Louvain on whom the ducal title had been bestowed by the emperor Henry V. (1106). For three generations the possession of the ducal title was disputed between the rival houses of Limburg and Louvain. At length a reconciliation took place (n 55); the name of duke of Lower Lorraine henceforth disappears, the rulers of the territory on the Meuse become dukes of Limburg, those of the larger territory to the west dukes of Brabant. With the death of Duke Walram IV. (1280) the succession passed to his daughter, Irmingardis, who was married to Reinald I., count of Guelders. Irmingardis died without issue (1282), and her cousin, Count Adolph of Berg, laid claim to the duchy. His rights were disputed by Reinald, who was in possession and was recognized by the emperor. Too weak to assert his claim by force of arms Adolph sold his rights (1283) to John, duke of Brabant (q.v.). This led to a long and desolating war for five years, at the end of which (1288), finding the power of Brabant superior to his own Reinald in his turn sold his rights to count Henry III. of Luxemburg. Henry and Reinald, supported by the archbishop of Cologne and other allies, now ra ; sed a great army. The rival forces met at Woeringen (5th of June 1288) and John of Brabant (q.v.) gained a complete victory". It proved decisive, the duchies of Limburg and Brabant passing under the rule of a common sovereign. The duchy comprised during this period the bailiwicks of Herve, Montzen, Baelen, Sprimont and Wallhorn, and the counties of Rolduc, Daelhem and Falkenberg, to which was added in 1530 the town of

Maastricht. The provisions and privileges of the famous Charter of Brabant, the Joyeuse Entrfe {q.v.), were from the 15th century extended to Limburg and remained in force until the French Revolution. By the treaty of Westphalia (1648) the duchy was divided into two portions, the counties of Daelhem andFalken- berg with the town of Maastricht being ceded by Spain to the United Provinces, where they formed what was known as a " Generality-Land." At the peaceof Rastatt (1714) the southern portion passed under the dominion of the Austrian Habsburgs and formed part of the Austrian Netherlands until the French conquest in 1794. During the period of French rule (1794-1814) Limburg was included in the two French departments of Ourthe and Meuse Inferieure. In 1814 the old name of Limburg was restored to ope of the provinces of the newly created kingdom of the Netherlands, but the new Limburg comprised besides the ancient duchy, a piece of Gelderland and the county of Looz. At the revolution of 1830 Limburg, with the exception of Maas- tricht, threw in its lot with the Belgians, and during the nine years that King William refused to recognize the existence of the kingdom of Belgium the Limburgers sent representatives to the legislature at Brussels and were treated as Belgians. When in 1839 the Dutch king suddenly announced his intention of accepting the terms of the settlement proposed by the treaty of London, as drawn up by representatives of the great powers in 1831, Belgium found herself compelled to relinquish portions of Limburg and Luxemburg. The part of Limburg that lay on the right bank of the Meuse, together with the town of Maastricht and a number of communes — Weert, Haelen, Kepel, Horst, &c. — on the left bank of the river, became a sovereign duchy under the rule of the king of Holland. In exchange for the cession of the rights of the Germanic confederation over the portion of Luxemburg, which was annexed by the treaty to Belgium, the duchy of Limburg (excepting the

communes of Maastricht and Venloo) was declared to belong to the Germanic confederation. This somewhat unsatisfactory condition of affairs continued until 1866, when at a conference of the great powers, held in London to consider the Luxemburg question (see Luxemburg), it was agreed that Limburg should be freed from every political tie with Germany. Limburg became henceforth an integral part of Dutch territory.

See P. S. Ernst, Histoire du Limbourg (7 vols., LieVe, 1837-1852); C. J. Luzac, De Landen van Overmuze in Zonderheia 1662 (Leiden, 1888); M. J. de Poully, Histoire de Maastricht et de ses environs (1850); Diplomaticke bescheiden betreffends de Limburg-Luxem- burgsche aangelegenheden 1866-1867 (The Hague, 1868); and R. Fruin, Geschied. der Staats-Instellingen in Nederland (The Hague, 1901). (G. E.)

LIMBURG, or Limbourg, the smallest of the nine provinces of Belgium, occupying the north-east corner of the kingdom. It represents only a portion of the ancient duchy of Limburg (see above). The part east of the Meuse was transferred to Holland by the London conference, and a further portion was attached to the province of Liege including the old capital now called Dolhain. Much of the province is represented by the wild heath district called the Campine, recently discovered to form an extensive coal-field. The operations for working it were only begun in 1906. North-west of Hasselt is Beverloo, where all the Belgian troops go through a course of instruction annually. Among the towns are Hasselt, the capital, St Trond and Looz. From the last named is derived the title of the family known as the dukes of Looz, whose antiquity equals that of the extinct reigning family of Limburg itself. The title of due de Looz is one of the four existing ducal titles in the Netherlands, the other three being d'Arenberg, Croy and d'Ursel. Limburg contains 603,085 acres or 942 sq. m. In 1904 the population was 255,359, giving an average of 271 per sq. m.

LIMBURG, a town of Germany, in the Prussian province of Hesse-Nassau, on the Lahn, here crossed by a bridge dating from 13 1 5, and on the main line of railway from Coblenz to Lollar and Cassel, with a branch to Frankfort-on-Main. Pop. (1905) 9917. It is the seat of a Roman Catholic bishop. The small seven-towered cathedral, dedicated to St George the martyr, is picturesquely situated on a rocky site overhanging the

river. This was founded by Conrad Kurzbold, count of Nieder- lahngau, early in the 10th century, and was consecrated in 1235. It was restored in 1872-1878. Limburg has a castle, a new town hall and a seminary for the education of priests; its industries include the manufacture of cloth, tobacco, soap, machinery, pottery and leather. Limburg, which wasa flourish- ing place during the middle ages, had its own line of counts until 1414, when it was purchased by the elector of Trier. It passed to Nassau in 1803. In September 1796 it was the scene of a victory gained by the Austrians under the archduke Charles over the French.

See Hillebrand, Limburg an der Lahn unter Pfandherrschaft 1344- 1624 (Wiesbaden, 1899).

LIMBURG, the south-easternmost and smallest province of Holland, bounded N. by Gelderland, N.W. by North Brabant, S.W. by the Belgian province of Limburg, and S. by that of Liege, and E. by Germany. Its area is 850 sq. m., and its popula- tion in 1900 was 281,934. It is watered by the Meuse (Maas) which forms part of its south-western boundary (with Belgium) and then flows through its northern portion, and by such tribu- taries as the Geul and Roer (Ruhr). Its capital is Maastricht, which gives name to one of the two administrative districts into which it is divided, the other being Roermond.

LIMBURG CHRONICLE, or Festi Limpurgenses, the name of a German chronicle written most probably by Tileman Elhen von Wolfhagen after 1402. It is a source for the history of the Rhineland between 1336 and 1398, but is perhaps more valuable for the information about German manners and customs, and the old German folk-songs and stories which it contains. It has also a certain philological interest.

The chronicle was first published by J. F, Faust in 1617, and has been edited by A. Wyss for the Monumenta Germaniae historica. Deutsche Chroniken, Band iv. (Hanover, 1883). See A. Wy ss . Die Limburger Chronik untersucht (Marburg, 1875).

LIMBURGITE, in petrology, a dark-coloured volcanic rock resembling basalt in appearance, but containing normally no felspar. The name is taken from Limburg (Germany) , where they occur in the well-known rock of the Kaiserstuhl. They consist essentially of olivine and augite with a brownish glassy ground mass. The augite may be green, but more commonly is brown or violet; the olivine is usually pale green or colourless, but is sometimes yellow (hyalosiderite). In the ground mass a second generation of small eumorphic augites frequently occurs; more rarely olivine is present also as an ingredient of the matrix. The principal accessory minerals are titaniferous iron oxides and apatite. Felspar though sometimes present is never abundant, and nepheline also is unusual. In some limburgites large phenocysts of dark brown hornblende and biotite are found, mostly with irregular borders blackened by resorption; in others there are large crystals of soda orthoclase or anorthoclase. Hauyne is an ingredient of some of the limburgites of the Cape Verde Islands.- Rocks of this group occur in considerable numbers in Germany (Rhine district) and in Bohemia, also in Scotland, Auvergne, Spain, Africa (Kilimanjaro), Brazil, &c. They are associated principally with basalts, nepheline and leucite basalts and monchiquites. From the last-named rocks the limburgites are not easily separated as the two classes bear a very close resemblance in structure and in mineral Composition, though many authorities believe that the ground mass of the monchiquites is not a glass but crystalline analcite. Limburgites may occur as flows, as sills or dykes, and are sometimes highly vesicular. Closely allied to them are the augitites, which are distinguished only by the absence of olivine; examples are known from Bohemia, Auvergne, the Canary Islands, Ireland, &c.
LIMBUS (Lat. for ” edge,” ” fringe,” e.g. of a garment), a theological term denoting the border of hell, where dwell those who, while not condemned to torture, yet are-deprived of the joy of heaven. The more common form in English is ” limbo,” which is used both in the technical theological sense and derive tively in the sense of ” prison,” or for the condition of being lost, deserted, obsolete. In theology there are (1) the Limbus Infantum, and (2) the Limbus Patrum.

1. The Limbus Infantum or Puerorum is the abode to which

human beings dying without actual sin, but with their original sin unwashed away by baptism, were held to be consigned; the category included, not unbaptized infants merely, but also idiots, cretins and the like. The word ” limbus,” in the theo- logical application, occurs first in the Summa of Thomas Aquinas ; for its extensive currency it is perhaps most indebted to the Commedia of Dante (Inf. c. 4). The question as to the destiny of infants dying unbaptized presented itself to theologians at a comparatively early period. Generally speaking it may be said that the Greek fathers inclined to a cheerful and the Latin fathers to a gloomy view. Thus Gregory of Nazianzus (Oral. 40) says ” that such children as die unbaptized without their own fault shall neither be glorified nor punished by the righteous Judge, as having done no wickedness, though they die un- baptized, and as rather suffering loss than being the authors of it.” Similar opinions were expressed by Gregory of Nyssa, Severus of Antioch and others — opinions which it is almost impossible to distinguish from the Pelagian view that children dying unbaptized might be admitted to eternal life, though not to the kingdom of God. In his recoil from Pelagian heresy, Augustine was compelled to sharpen the antithesis between the state of the saved and that of the lost, and taught that there are only two alternatives— to be with Christ or with the devil, to be with Him or against Him. Following up, as he thought, his master’s teaching, Fulgentius declared that it is to be believed as an indubitable truth that, ” not only men who have come to the use of reason, but infants dying, whether in their mother’s womb or after birth, without baptism in the name of the Father, Son and Holy Ghost, are punished with everlasting

punishment in eternal fire." Later theologians and schoolmen followed Augustine in rejecting the notion of any final position inter- mediate between heaven and hell, but otherwise inclined to take the mildest possible view of the destiny of the irresponsible and unbaptized. Thus the proposition of Innocent III. that " the punishment of original sin is deprivation of the vision of God " is practically repeated by Aquinas, Scotus, and all the other great theologians of the scholastic period, the only outstanding exception being that of Gregory of Rimini, who on this account was afterwards called " tortor infantum." The first authoritative declaration of the Latin Church upon this subject was that made by the second council of Lyons (1274), and confirmed by the council of Florence (1439), with the concurrence of the repre- sentatives of the Greek Church, to the effect that " the souls of those who die in mortal sin or in original sin only forthwith descend into hell, but to be punished with unequal punishments." Perrone remarks (Prael. Theol. pt. iii. chap. 6, art. 4) that the damnation of infants and also the comparative lightness of the punishment involved in this are thus de fide; but nothing is determined as to the place which they occupy in hell, as to what constitutes the disparity of their punishment, or as to their condition after the day of judgment. In the council of Trent there was considerable difference of opinion as to what was implied in deprivation of the vision of God, and no definition was attempted, the Dominicans maintaining the severer view that the "limbus infantum" was a dark subterranean tireless chamber, while the Franciscans placed it in a region of light above the earth. Some theologians continue to maintain with Bellarmine that the infants " in limbo " are affected with some degree of sadness on account of a felt privation; others, following the Nodus praedestinalionis of Celestine Sfrondati (1649-1696), hold that they enjoy every kind of natural felicity, as regards their souls now, and as regards their bodies after the resurrection, just as if Adam had not sinned. In the condemnation (1794) of the synod of Pistoia (1786), the twenty-sixth article declares it to be false, rash and injurious to treat as Pelagian the doctrine that those dying in original sin are not punished with fire, as if that meant that there is an intermediate place, free from fault and punishment, between the kingdom of God and everlasting damnation.

2. The Limbus Patrum, Limbus Inferni or Sinus Abrahae (" Abraham's Bosom "), is defined in Roman Catholic theology as the place in the underworld where the saints of the Old

Testament were confined until liberated by Christ on his " descent into hell." Regarding the locality and its pleasantness or painfulness nothing has been taught as de fide. It is sometimes regarded as having been closed and empty since Christ's descent, but other authors do not think of it as separate in place from the limbus infantum. The whole idea, in the Latin Church, has been justly described as the mere caput mortuum of the old catholic doctrine of Hades, which was gradually superseded in the West by that of purgatory.

LIME (O. Eng. Urn, Lat. limus, mud, from linere, to smear), the name given to a viscous exudation of the holly-tree, used for snaring birds and known as " bird-lime." In chemistry, it is the popular name of calcium oxide, CaO, a substance employed in very early times as a component of mortars and cementing materials. It is prepared by the burning of limestone (a process described by Dioscprides and Pliny) in kilns similar to those described under Cement. The value and subsequent treatment of the product depend on the purity of the limestone; a pure stone yields a " fat " lime which readily slakes; an impure stone, especially if magnesia be present, yields an almost unslakable " poor " lime. See Cement, Concrete and Mortar, for details. Pure calcium oxide " quick-lime," obtained by heating the pure carbonate, is a white amorphous substance, which can be readily melted and boiled in the electric furnace, cubic and acicular crystals being deposited on cooling the vapour. It combines with water, evolving much heat and crumbling to pieces; this operation is termed " slaking " and the resulting product " slaked lime "; it is chemically equivalent to the conversion of the oxide into hydrate. A solution of the hydrate in water, known as lime-water, has a weakly alkaline reaction; it is employed in the detection of carbonic acid. " Milk of lime " consists of a cream of the hydrate and water. Dry lime has no action upon chlorine, carbon dioxide and sulphur dioxide, although in the presence of water combination

ensues.

In medicine lime-water, applied externally, is an astringent and desiccative, and it enters into the preparation of lina- mentum calcis and carron oil which are employed to heal burns, eczema, &c. Applied internally, lime-water is an antacid; it prevents the curdling of milk in large lumps (hence its pre- scription for infants) ; it also acts as a gastric sedative. Calcium phosphate is much employed in treating rickets, and calcium chloride in haemoptysis and haemophylia. It is an antidote for mineral and oxalic acid poisoning.

LIME, 1 or Linden. The lime trees, species of Tilia, are familiar timber trees with sweet-scented, honeyed flowers, which are borne on a common peduncle proceeding from the middle of a long bract. The genus, which gives the name to the natural order Tiliaceae, contains about ten species of trees, natives of the north temperate zone. The general name Tilia europaea, the name given by Linnaeus to the European lime, includes several well-marked sub-species, often regarded as distinct species. These are: (1) the small -leaved lime, T. parvifolia (or T. cordata), probably wild in woods in England and also wild throughout Europe, except in the extreme south-east, and Russian Asia. (2) T. intermedia, the common lime, which is widely planted in Britain but not wild there, has a less northerly distribution than T. cordata, from which it differs in its somewhat larger leaves and downy fruit. (3) The large-leaved lime, T. plalyphyllos (or T. grandifolia) , occurs only as an introduction in Britain, and is wild in Europe south of Denmark. It differs from the other two limes in its larger leaves, often 4 in. across, which are downy beneath, its downy twigs and its prominently ribbed fruit. The lime sometimes acquires a great size; one is recorded in Norfolk as being 16 yds. in circumference, and Ray mentions one of the same girth. The famous linden tree which gave the town of Neuenstadt in Wurttemberg the name of ” Neuenstadt an der grossen Linden ” was 9 ft. in diameter. The lime is a very favourite tree. It is an object of beauty in

1 This is an altered form of O. Eng. and M. Eng. lind ; cf. Ger. Linde, cognate with Gr. *X&tt7, the silver nr. ” Linden ” in English means properly ” made of lime — or lind — wood,” and the transference to the tree is due to the Ger. Lindenbaum.

the spring when the delicately transparent green leaves are bursting from the protection of the pink and white stipules, which have formed the bud-scales, and retains its fresh green during early summer. Later, the fragrance of its flowers, rich in honey, attracts innumerable bees; in the autumn the foliage becomes a clear yellow but soon falls. Among the many famous avenues of limes may be mentioned that which gave the name to one of the best-known ways in Berlin, ” Unter den Linden,” and the avenue at Trinity College, Cambridge.

The economic value of the tree chiefly lies in the inner bark or liber (Lat. for bark), called bast, and the wood. The former was used for paper and mats and for tying garlands by the ancients (Od. i. 38; Pliny xvi. 14. 25, xxiv. 8. 33). Bast mats are now made chiefly in Russia, the bark being cut in long strips, when the liber is easily separable from the corky superficial layer. It is then plaited into mats about 2 yds. square; 14,000,000 come to Britain annually, chiefly from Archangel. The wood is used by carvers, being soft and light, and by architects in framing the models of buildings. Turners use it for light bowls, &c. T. americana (bass-wood) is one of the most common trees in the forests of Canada and extends into the eastern and southern United States. It is sawn into lumber and under the name of white-wood used in the manufacture of wooden ware, cheap furniture, &c, and also for paper pulp (C. S. Sargent, Silva of North America). It was cultivated by Philip Miller at Chelsea in 1752.

The common lime was well known to the ancients. Theophrastus says the leaves are

sweet and used for fodder for most kinds of cattle. Pliny alludes to the use of the liber and wood, and describes the tree as growing in the mountain-valleys of Italy (xvi. 30). See also Virg. Geo. i. 173, &c; Ov. Met. viii. 621, x. 92. Allusion to the lightness of the wood is made in Aristoph. Birds, 1378.

For the sweet lime {Citrus Limetta or Citrus acida) and lime-juice, see Lemon.

LIMERICK, a western county of Ireland, in the province of Munster, bounded N. by the estuary of the Shannon and the counties of Clare and Tipperary, E. by Tipperary, S. by Cork and W. by Kerry. The area is 680,842 acres, or about 1064 sq. m. The greater part of the county is comparatively level, but in the south-east the picturesque Galtees, which extend into Tipperary, attain in Galtymore a height of 3015 ft., and on the west, stretch- ing into Kerry, there is a circular amphitheatre of less elevated mountains. The Shannon is navigable for large vessels to Limerick, above which are the rapids of Doonas and Castleroy, and a canal. The Shannon is widely famous as a sporting river, and Castleconnell is a well-known centre. The Maigne, which rises in the Galtees and flows into the Shannon, is navigable as far as the town of Adare.

This is mainly a Carboniferous Limestone county, with fairly level land, broken by ridges of Old Red Sandstone. On the north- east, the latter rock rises on Slievefelim, round a Silurian core, to 1523 ft. In the south, Old Red Sandstone rises above an enclosed area of Silurian shales at Ballylanders, the opposite scarp of Old Red Sandstone forming the Ballyhoura Hills on the Cork border. Vol- canic ashes, andesites, basalts and intrusive sheets of basic rock, mark an eruptive episode in the Carboniferous Limestone. These are well seen under Carrigogunnell Castle, and in a ring of hills round Ballybrood. At Ballybrood, Upper Carboniferous beds occur, as an outlier of a large area that links the west of the county with the north of Kerry. The coals in the west are not of commercial value. Lead-ore has been worked in places in the limestone.

Limerick includes the greater part of the Golden Vale, the most fertile district of Ireland, which stretches from Cashel in Tipperary nearly to the town of Limerick. Along the banks of the Shannon there are large tracts of flat meadow land formed of deposits of calcareous and peaty matter, exceedingly fertile. The soil in the mountainous districts is for the most part thin and poor, and in- capable of improvement. The large farms occupy the low grounds, and are almost wholly devoted to grazing. The acreage under tillage decreases, the proportion to pasturage being as one to nearly three. All the crops (of which oats and potatoes are the principal) show a decrease, but there is a growing acreage of meadow land. The numbers of live stock, on the other hand, are on the whole well maintained, and cattle, sheep, pigs, goats and poultry are all ex- tensively reared. The inhabitants are employed chiefly in agri- culture, but coarse woollens are manufactured, and also paper, and there are many meal and flour mills. Formerly there were flax-spinning and weaving mills, but the industry is now practically extinct. Limerick is the headquarters of an important salmon- fishery on the Shannon. The railway communications are entirely included in the Great Southern and Western system, whose main line crosses the south-eastern corner of the county, with two branches to the city of Limerick from Limerick Junction and from Charleville, and lines from Limerick south-westward to Tralee in county Kerry, and to Foynes on the Shannon estuary. Limerick is also served by a

line from the north through county Tipperary. The port of Limerick, at the head of the estuary, is the most important on the west coast. The county includes 14 baronies. The number of members returned to the Irish parliament was eight, two being returned fcr each of the boroughs of Askeaton and Kilmallock, in addition to two returned for the county, and two for the county of the city of Limerick. The present county parliamentary divisions are the east and west, each returning one member. The population (158,912 in 1891, 146,098 in 1901) shows a decrease somewhat under the average of the Irish counties generally, emigration being, however, extensive; of the total about 94% are Roman Catholics, and about 73% are rural. The chief towns are Limerick (pop. 38,151), Rathkeale (1749) and Newcastle or Newcastle West (2599). The

city of Limerick constitutes a county in itself. Assizes are held at Limerick, and quarter-sessions at Bruff, Limerick, Newcastle and Rathkeale. The county is divided between the Protestant dioceses of Cashel, Killaloe and Limerick; and between the Roman Catholic dioceses of the same names.

Limerick was included in the kingdom of Thomond. After- wards it had a separate existence under the name of Aine-Cliach,. From the 8th to the nth century it was partly occupied by the Danes (see Limerick, City). As a county, Limerick is one of the twelve generally considered to owe their formation to King John. By Henry II. it was granted to Henry Fitzherbert, but his claim was afterwards resigned, and subsequently various Anglo- Norman settlements were made. About 100,000 acres of the estates of the earl of Desmond, which were forfeited in 1586, were situated in the county, and other extensive confiscations took place after the Cromwellian wars. In 1709 a German colony from the Palatinate was settled by Lord Southwell near Bruff, Rathkeale and Adare.

There are only slight remains of the round tower at Ardpatrick, but that at Dysert is much better preserved; another at Kilmallock is in great part a reconstruction. There are important remains of stone circles, pillar stones and altars at Loch Gur. In several places there are remains of old moats and tumuli. Besides the monasteries in the city of Limerick, the most important monastic ruins are those of Adare abbey, Askeaton abbey, Galbally friary, Kilflin monastery, Kilmallock and Monaster-Nenagh abbey.

LIMERICK, a city, county of a city, parliamentary borough, port and the chief town of Co. Limerick, Ireland, occupying both banks and an island (King's Island) of the river Shannon, at the head of its estuary, 129 m. W.S.W. of Dublin by the Great Southern and Western railway. Pop. (1901) 38,151. The situation is striking, for the Shannon is here a broad and noble stream, and the immediately surrounding country consists of the rich lowlands of its valley, while beyond rise the hills of the counties Clare and Tipperary. The city is divided into English Town (on King's Island), Irish Town and Newtown Pery, the first including the ancient nucleus of the city, and the last the principal modern streets. The main stream of the Shannon is crossed by Thomond Bridge and Sarsfield or Wellesley Bridge. The first is commanded by King John's Castle, on King's Island, a fine Norman fortress fronting the river, and used as barracks. At the west end of the bridge is preserved the Treaty Stone, on which the Treaty of Limerick was signed in 1691 . The cathedral of St Mary, also on King's Island, was originally built in 1142- 1180, and exhibits some Early English work, though largely altered at dates subsequent to that period. The Roman Catholic cathedral of St John is a modern building (i860) in early pointed style. The churches of St Munchin (to whom is attributed the foundation of the see in the 6th century) and St John, Whita- more's Castle and a Dominican priory, are other remains of antiquarian interest; while the principal city and county buildings are a chamber of commerce, a custom house command- ing the river, and court house, town hall and barracks. A picturesque public park adjoins the railway station in Newtown Pery.

The port is the most important on the west coast, and accom- modates vessels of 3000 tons in a floating dock; there is also a graving dock. Communication with the Atlantic is open and secure, while a vast network of inland navigation is opened up by a canal avoiding the rapids above the city. Quays extend for about 1600 yds. on each side of the river, and vessels of 600 tons

can moor alongside at spring tides. The principal imports are grain, sugar, timber and coal. The exports consist mainly of agricultural produce. The principal industrial establishments include Hour-mills (Limerick supplying most of the west of Ireland with flour) , factories for bacon-curing and for condensed milk and creameries. Some brewing, distilling and tanning are carried on, and the manufacture of very beautiful

lace is main- tained at the Convent of the Good Shepherd; but a formerly important textile industry has lapsed. The salmon fisheries of the Shannon, for which Limerick is the headquarters of a district, are the most valuable in Ireland. The city is governed by a corporation, and the parliamentary borough returns one member.

Limerick is said to have been the Regia of Ptolemy and the Rosse-de-Nailleagh of the Annals of Multifernan. There is a tradition that it was visited by St Patrick in the 5th century, but it is first authentically known as a settlement of the Danes, who sacked it in 812 and afterwards made it the principal town of their kingdom of Limerick, but were expelled from it towards the close of the 10th century by Brian Boroimhe. From 1 106 till its conquest by the English in 1 1 74 it was the seat of the kings of Thomond or North Munster, and, although in 11 79 the kingdom of Limerick was given by Henry II. to Herbert Fitz- herbert, the city was frequently in the possession of the Irish chieftains till 1195. Richard I. granted it a charter in 1197. By King John it was committed to the care of William de Burgo, who founded English Town, and for its defence erected a strong castle. The city was frequently besieged in the 13th and 14th centuries. In the 15th century its fortifications were extended to include Irish Town, and until their demolition in 1760 it was one of the strongest fortresses of the kingdom. In 1651 it was taken by General Ireton, and after an unsuccessful siege by William III. in 1690 its resistance was terminated on the 3rd of October of the following year by the treaty of Limerick. The dismantling of its fortifications began in 1 760, but fragments of the old walls remain. The original municipal rights of the city had been confirmed and extended by a succession of sovereigns, and in 1609 it received a charter constituting it a county of a city, and also incorporating a society of merchants of the staple, with the same privileges as the merchants of the staple of Dublin and Waterford. The powers of the corporation were remodelled by the Limerick Regulation Act of 1823. The prosperity of the city dates chiefly from the foundation of Newtown Pery in 1769 by Edmund Sexton Pery (d. 1806), speaker of the Irish House of Commons, whose family subsequently received the title of the earldom of Limerick. Under the Local Government Act of 1898 Limerick became one of the six county boroughs having a separate county council.

LIMERICK, a name which has been adopted to distinguish a certain form of verse which began to be cultivated in the middle of the 19th century. A limerick is a kind of burlesque epigram, written in five lines. In its earlier form it had two rhymes, the word which closed the first or second line being usually employed at the end of the fifth, but in later varieties different rhyming words are employed. There is much uncertainty as to the meaning of the name, and as to the time when it became attached to a particular species of nonsense verses. According to the New Eng. Did. ” a song has existed in Ireland for a very considerable time, the construction of the verse of which is identical with that of Lear’s” (see below), and in which the invitation is repeated, ” Will you come up to Limerick ? ” Unfortunately, the specimen quoted in the New Eng. Diet, is not only not identical with, but does not resemble Lear’s. Whatever be the derivation of the name, however, it is now universally used to describe a set of verses formed on this model, with the variations in rhyme noted above : —

” There was an old man who said ‘ Hush! I perceive a young bird in that bush! ‘

When they said, ‘Is it small? ‘

He replied, ‘ Not at all! It is five times the size of the bush.’ ”

The invention, or at least the earliest general use of this form,

is attributed to Edward Lear, who, when a tutor in the family of the earl of Derby at Knowsley, composed, about 1834, a large number of nonsense-limericks to amuse the little grandchildren of the house. Many of these he published, with illustrations, in 1846, and they enjoyed and still enjoy an extreme popularity. Lear preferred to give a geographical colour to his absurdities, as in: —

” There was an old person of Tartary Who cut through his jugular artery, When up came his wife, And exclaimed, ‘ O my Life, How your loss will be felt through all Tartary!’ ”

but this is by no means essential. The neatness of the form has led to a very extensive use of the limerick for all sorts of mock- serious purposes, political, social and sarcastic, and a good many specimens have achieved a popularity which has been all the wider because they have, perforce, been confined to verbal transmission. In recent years competitions of the ” missing word ” type have had considerable vogue, the competitor, for instance, having to supply the last line of the limerick.

LIMES GERMANICUS. The Latin noun limes denoted gener- ally a path, sometimes a boundary path (possibly its original sense) or boundary, and hence it was utilized by Latin writers occasionally to denote frontiers definitely delimited and marked in some distinct fashion. This latter sense has been adapted and extended by modern historians concerned with the frontiers of the Roman Empire. Thus the Wall of Hadrian in north England (see Britain: Roman) is now sometimes styled the Limes Britannicus, the frontier of the Roman province of Arabia facing the desert the Limes Arabicus and so forth. In particular the remarkable frontier lines which bounded the Roman provinces of Upper (southern) Germany and Raetia, and which at their greatest development stretched from near Bonn on the Rhine to near Regensburg on the Danube, are often called the Limes Germanicus. The history of these lines is the subject of the following paragraphs. They have in the last fifteen years become much better known through systematic excavations financed by the German empire and through other researches connected therewith, and though many important details are still doubtful, their general development can be traced.

From the death of Augustus (a.d. 14) till after a.d. 70 Rome accepted as her German frontier the water-boundary of the Rhine and upper Danube. Beyond these rivers she held only the fertile plain of Frankfort, opposite the Roman border fortress of Moguntiacum (Mainz), the southernmost slopes of the Black Forest and a few scattered t£tes-du-pont. The northern section of this frontier, where the Rhine is deep and broad, remained the Roman boundary till the empire fell. The southern patt was different. The upper Rhine and upper Danube are easily crossed. The frontier which they form is inconveniently long, enclosing an acute-angled wedge of foreign territory — the modern Baden and Wurttemberg. The German populations of these lands seem in Roman times to have been scanty, and Roman subjects from the modern Alsace and Lorraine had drifted across the river eastwards. The motives alike of geographical con- venience and of the advantages to be gained by recognizing these movements of Roman subjects combined to urge a forward policy at Rome, and when the vigorous Vespasian had succeeded the fool-criminal Nero, a series of advances began which gradually closed up the acute angle, or at least rendered it obtuse.

The first advance came about 74, when what is now Baden was invaded and in part annexed and a road carried from the Roman base on the upper Rhine, Strassburg, to the Danube just above Ulm. The point of the angle was broken off. The second advance was made by Domitian about a.d. 83. He pushed out from Moguntiacum, extended the Roman territory east of it and enclosed the whole within a systematically de- limited and defended frontier with numerous blockhouses along it and larger forts in the rear. Among the blockhouses was one which by various enlargements and refoundations grew into the well-known Saalburg fort on the Taunus near Homburg. This

advance necessitated a third movement, the construction of a frontier connecting the annexations of a.d. 74 and 83. We know the line of this frontier which ran from the Main across the upland Odenwald to the upper waters of the Neckar and was defended by a chain of forts. We do not, however, know its date, save that, if not.Domitian’s

work, it was carried out soon after his death, and the whole frontier thus constituted was reorganized, probably by Hadrian, with a continuous wooden palisade reaching from Rhine to Danube. The angle between the rivers was now almost full. But there remained further advance and further fortification. Either Hadrian or, more probably, his successor Pius pushed out from the Odenwald and the Danube, and marked out a new frontier roughly parallel to but in advance of these two lines, though sometimes, as on the Taunus, coinciding with the older line. This is the frontier which is now visible and visited by the curious. It consists, as we see it to-day, of two distinct frontier works, one, known as the Pfahlgraben, is an earthen mound and ditch, best seen in the neighbourhood of the Saalburg but once extending from the Rhine southwards into southern Germany. The other, which begins where the earthwork stops, is a wall, though riot a very formidable wall, of stone, the Teufelsmauer; it runs roughly east and west parallel to the Danube, which it finally joins at Heinheim near Regensburg. The Pfahlgraben is remark- able for the extraordinary directness of its southern part, which for over 50 m. runs mathematically straight and points almost absolutely true for the Polar star. It is a clear case of an ancient frontier laid out in American fashion. This frontier remained for about 100 years, and no doubt in that long period much was done to it to which we cannot affix precise dates. We cannot even be absolutely certain when the frontier laid out by Pius was equipped with the Pfahlgraben and Teufelsmauer. But we know that the pressure of the barbarians began to be felt seriously in the later part of the 2nd century, and after long struggles the whole or almost the whole district east of Rhine and north of Danube Was lost — seemingly all within one short period — about a.d. 250.

The best English account will be found in H. F. Pelham's essay in Trans, of the Royal Hist. Soc. vol. 20, reprinted in his Collected Papers, pp. 178-211 (Oxford, 1910), where the German authorities are fully cited. (F. J. H.)

LIMESTONE, in petrography, a rock consisting essentially of carbonate of lime. The group includes many varieties, some of which are very distinct; but the whole group has certain properties in common, arising from the chemical composition and mineral character of its members. All limestones dissolve readily in cold dilute acids, giving off bubbles of carbonic acid. Citric or acetic acid will effect this change, though the mineral acids are more commonly employed. Limestones, when pure, are soft rocks readily scratched with a knife-blade or the edge of a coin, their hardness being 3; but unless they are earthy or incoherent, like chalk or sinter, they do not disintegrate by pressure with the fingers and cannot be scratched with the finger nail. When free from impurities limestones are white, but they generally contain small quantities of other minerals than calcite which affect their colour. Many limestones are yellowish or creamy, especially those which contain a little iron oxide, iron carbonate or clay. Others are bluish from the presence of iron sulphide, or pyrites or marcasite; or grey and black from admixture with carbonaceous or bituminous substances. Red limestones usually contain haematite; in green limestones there may be glauconite or chlorite. In crystalline limestones or marbles many silicates may occur producing varied colours, e.g. epidote, chlorite, augite (green); vesuvianite and garnet (brown and red); graphite, spinels (black and grey); epidote, chondrodite (yellow). The specific gravity of limestones ranges from 2-6 to 2-8 in typical examples.

When seen in the field, limestones are often recognizable by their method of weathering. If very pure, they may have smooth rounded surfaces, or may be covered with narrow runnels cut out by the rain. In such cases there is very little soil, and plants are found growing only in fissures or crevices where the

insoluble impurities of the limestone have been deposited by the rain. The less pure rocks have often eroded or pitted surfaces, showing bands or patches rendered more resistant to the action of the weather by the presence of insoluble materials such as sand, clay or chert. These surfaces are often known from the crust of hydrous oxides of iron produced by the action of the atmosphere on any ferriferous ingredients of the rock; they are sometimes black when the limestone is carbonaceous; a thin layer of gritty sand grains may be left on the surface of limestones which are slightly

arenaceous. Most limestones which contain fossils show these most clearly on weathered surfaces, and the appearance of fragments of corals, crinoids and shells on the exposed parts of a rock indicate a strong probability that that rock is a limestone. The interior usually shows the organic structures very imperfectly or not at all.

Another characteristic of pure limestones, where they occur in large masses occupying considerable areas, is the frequency with which they produce bare rocky ground, especially at high elevations, or yield only a thin scanty soil covered with short grass. In mountainous districts limestones are often recognizable by these peculiarities. The chalk downs are celebrated for the close green sward which they furnish. More impure limestones, like those of the Lias and Oolites, contain enough insoluble mineral matter to yield soils of great thickness and value, e.g. the Cornbrash. In limestone regions all waters tend to be hard, on account of the abundant carbonate of lime dissolved by percolating waters, and caves, swallow holes, sinks, pot-holes and underground rivers may occur in abundance. Some elevated tracts of limestone are very barren (e.g. the Causses), because the rain which falls in them sinks at once into the earth and passes underground. To a large extent this is true of the chalk downs, where surface waters are notably scarce, though at con- siderable depths the rocks hold large supplies of water.

The great majority of limestones are of organic formation, con- sisting of the debris of the skeletons of animals. Some are fora- miniferal, others are crinoidal, shelly or coral limestones according to the nature of the creatures whose remains they contain. Of foraminiferal limestones chalk is probably the best known; it is fine, white and rather soft, and is very largely made up of the shells of globigerina and other foraminifera (see Chalk). Almost equally important are the nummulitic limestones so Well developed in Mediterranean countries (Spain, France, the Alps, Greece, Algeria, Egypt, Asia Minor, &c). The pyramids of Egypt are built mainly of nummulitic limestone. Nummulites are large cone-shaped fora- minifera with many chambers arranged in spiral order. In Britain the small globular shells of Saccamina are important constituents of some Carboniferous limestones ; but the upper portion of that formation in Russia, eastern Asia and North America is characterized by the occurrence of limestones filled with the spindle-shaped shells of Fusulina, a. genus of foraminifera now extinct.

Coral limestones are being formed at the present day over a large extent of the tropical seas; many existing coral reefs must be of great thickness. The same process has been going on actively since a very early period of the earth's history, for similar rocks are found in great abundance in many geological formations. Some Silurian limestones are rich in corals; in the Devonian there are deposits which have been described as coral reefs (Devonshire, Germany). The Carboniferous limestone, or mountain limestones of England and North America, is sometimes nearly entirely coralline, and the great dolomite masses of the Trias in the eastern Alps are believed by many to be merely altered coral reefs. A special feature of coral limestones is that, although they may be to a considerable extent dolomitized, they are generally very free from silt and mechanical impurities.

Crinoidal limestones, though abundant among the older rocks, are not in course of formation on any great scale at the present time, as crinoids, formerly abundant, are now rare. Many Carboni- ferous and Silurian limestones consist mainly of the little cylindrical joints of these animals. They are easily recognized by their shape, and by the fact that many of them show a tube along their axes, which is often filled up by carbonate of lime ; under the microscope they have a punctate or fenestrate structure and each joint behaves as a simple crystalline plate with uniform optical properties in polarized light. Remains of other echinoderms (starfishes and sea urchins) are often found in plenty in Secondary and Tertiary lime- stones, but very seldom make up the greater part of the rock. Shelly limestones may consist of mollusca or of brachiopoda, the former being common in limestones of all ages while the latter attained their principal development in the Palaeozoic epoch. The shells are often broken and may have been reduced to shell sand before

the rock consolidated. Many rocks of this class are impure and pass

into marls and shelly sandstones which were deposited in shallow waters, where land-derived sediment mingled with remains of the creatures which inhabited the water. Fresh-water limestones are mostly of this class and contain shells of those varieties of mollusca which inhabit lakes. Brackish water limestones also are usually shelly. Corallines (bryozoa, polyzoa, &c), cephalopods (e.g. am- monites, belemnites), crustaceans and sponges occur frequently in limestones. It should be understood that it is not usual for a rock to be built up entirely of one kind of organism though it is classified according to its most abundant or most conspicuous ingredients.

In the organic limestones there usually occurs much finely granular calcareous matter which has been described as limestone mud or limestone paste. It is the finely ground substance which results from the breaking down of shells, &c, by the waves and currents, and by the decay which takes place in the sea bottom before the fragments are compacted into hard rock. The skeletal parts of marine animals are not always converted into limestone in the place where they were formed. In shallow waters, such as are the favourite haunts of mollusca, corals, &c, the tides and storms are frequently sufficiently powerful to shift the loose material on the sea bottom. A large part of a coral reef consists of broken coral rock dislodged from the growing mass and carried upwards to the beach or into the lagoon. Large fragments also fall over the steep outward slopes of the reef and build up a talus at their base. Coral muds and coral sands produced by the waves acting in these detached blocks, are believed to cover two and a half millions of square miles of the ocean floor. Owing to the fragile nature of the shells of f oraminif era they readily become disintegrated, especially at considerable depths, largely by the solvent action of carbonic acid in sea water as they sink to the bottom. The chalk in very great part consists not of entire shells but of debris of foraminifera, and mollusca (such as Inoceramus, &c). The Globigerina ooze is the most widespread of modern calcareous formations. It occupies nearly fifty millions of square miles of the sea bottom, at an average depth of two thou- sand fathoms. Pteropod ooze, consisting mainly of the shells of pteropods (mollusca) also has a wide distribution, especially in northern latitudes.

Consolidation may to a considerable extent be produced by pressure, but more commonly cementation and crystallization play a large part in the process. Recent shell sands on beaches and in dunes are not unfrequently converted into a soft, semi-coherent rock by rain water filtering downwards, dissolving and redepositing carbonate of lime between the sand grains. In coral reefs also the mass soon has its cavities more or less obliterated by a deposit of calcite from solution. The fine interstitial mud or paste presents a large surface to the solvents, and is more readily attacked than the larger and more compact shell fragments. In fresh- water marls considerable masses of crystalline calcite may be produced in this way, enclosing well-preserved molluscan shells. Many calcareous fragments consist of aragonite, wholly or principally, and this mineral tends to be replaced by calcite. The aragonite, as seen in sections under the microscope, is usually fibrous or prismatic, the calcite is more commonly granular with a well-marked network of rhombohe- dral cleavage cracks. Th6 replacement of aragonite by calcite goes on even in shells lying on modern sea shores, and is often very complete in rocks belonging to the older geological periods. By the recry- stallization of the finer paste and the introduction of calcite in solution the interior of shells, corals, foraminifera, &c, becomes occupied by crystalline calcite, sometimes in comparatively large grains, while the original organic structures may be very well- preserved.

Some limestones are exceedingly pure, e.g. the chalk and some varieties of mountain limestone, and these are especially suited for making lime. The majority, however, contain admixture of other substances, of which the commonest are clay and sand.

Clayey or argillaceous limestones frequently occur in thin or thick beds alter- nating with shales, as in the Lias of England (the marlstone series). Friable argillaceous fresh-water limestones are called " marls," and are used in many districts for top dressing soils, but the narrie " marl " is loosely applied and is often given to beds which are not of this nature (e.g. the red marls of the Trias). The " cement stones " of the Lothians in Scotland are argillaceous limestones of Lower Carboniferous age, which when burnt yield cement. The gault (Upper Cretaceous) is a calcareous clay, often containing well-preserved fossils, which lies below the chalk and attains considerable importance in the south-east of England. Arenaceous limestones pass by gradual transitions into shelly sandstones; in the latter the shells are often dissolved leaving cavities, which may be occupied by casts. Some of the Old Red Sandstone is calcareous. In other cases the calcareous matter has recrystallized in large plates which have shining cleavage surfaces dotted over with grains of sand (Lincolnshire limestone). The Fontainebleau sandstone has large calcite rhombohedra filled with sand grains. Limestones sometimes contain much plant matter which has been converted into a dark coaly substance, in which the original woody structures may be preserved or may not. The calcareous petrified plants of Fifeshire occur in such a limestone, and much has been learned from a micro- scopic study of them regarding the anatomy of the plants of the Carboniferous period. Volcanic ashes occur in some limestones, a

good example being the calcareous schalsteins or tuffs of Devon- shire, which are usually much crushed by earth movements. In the Globigerina ooze of the present day there is always a slight admixture of volcanic materials derived either from wind-blown dust, from submarine eruptions or from floating pieces of pumice. Other limestones contain organic matter in the shape of asphalt, bitumen or petroleum, presumably derived from plant remains. The well- known Vol de Trovers is a bituminous limestone of lower Neocomian age found in the valley of that name near Neuchatel. Some of the oil beds of North America are porous limestones, in the cavities of which the oil is stored up. Siliceous limestones, where their silica is original and of organic origin, have contained skeletons of sponges or radiolaria. In the chalk the silica has usually been dissolved and redepbsited as flint nodules, and in the Carboniferous limestone as chert bands. It may also be deposited in the corals and other organic remains, silicifying them, with preservation of the original structures (e.g. some Jurassic and Carboniferous limestones).

The oolitic limestones form a special group distinguished by their consisting of small rounded or elliptical grains resembling fish roe; when coarse they are called pisolites. Many of them are very pure and highly fossiliferous. The oolitic grains in section may have a nucleus, e.g. a fragment of a shell, quartz grain, &c, around which concentric layers have been deposited. In many cases there is also a radiating structure. They consist of calcite or aragonite, and between the grains there is usually a cementing material of lime- stone mud or granular calcite crystals. Deposits of silica, carbonate of iron or small rhombohedra of dolomite are often found in the interior of the spheroids, and oolites may be entirely silicified (Pennsylvania, Cambrian rocks of Scotland). Oolitic ironstones are very abundant in the Cleveland district of Yorkshire and form an important iron ore. They are often impure, and their iron may be present as haematite or as chalybite. Oolitic limestones are known from many geological formations, e.g. the Cambrian and Silurian of Scotland and Wales, Carboniferous limestone (Bristol), Jurassic, Tertiary and Recent limestones. They are forming at the present day in some coral reefs and in certain petrifying springs like those of Carlsbad. Their chief development in England is in the Jurassic rocks where they occur in large masses excellently adapted for building purposes, and yield the well-known freestones of Portland and Bath. Some hold that they are chemical precipitates and that the concentric oolitic structure is produced by successive layers of calcareous deposit laid down on fragments of shells, &c, in highly calcareous waters. An alternative hypothesis is that minute cellular plants (Girvanella, &c), have extracted the carbonate of lime from the water, and have been the principal agents in producing the successive calcareous crusts. Such plants can live even in hot waters, and there seems .much reason for regarding them as of importance in this connexion.

Another group of limestones is of inorganic or chemical origin, having been deposited from solution in water without the inter- vention of living organisms. A good example of these is the ” stalactite ” which forms pendent masses on the roofs of caves in limestone districts, the calcareous waters exposed to evaporation in the air of the cave laying down successive layers of stalactite in the places from which they drip. At the same time and in the same way ” stalagmite ” gathers on the floor below, and often accumulates in thick masses which contain bones of animals and the weapons of primitive cave-dwelling man. Calc sinters are porous limestones deposited by the evaporation of calcareous springs; travertine is a well-known Italian rock of this kind. At Carlsbad oolitic limestones are forming, but it seems probable that minute algae assist in this process. Chemical deposits of carbonate of lime may be produced by the evaporation of sea water in some upraised coral lagoons and similar situations, but it is unlikely that this takes place to any extent in the open sea, as sea water contains very little carbonate of lime, apparently because marine organisms so readily abstract it; still some writers believe that a considerable part of the chalk is really a chemical precipitate. Onyx marbles are banded limestones of chemical origin with variegated colours such as ‘white, yellow, green and red. They are used for orna- mental work and are obtained in Persia, France, the United States, Mexico, &c.

Limestones are exceedingly susceptible to chemical changes of a metasomatic kind. They are readily dissolved by carbonated waters and acid solutions, and their place may then be occupied by deposits of a different kind. The silification of oolites and coral rocks and their replacement by iron ores above mentioned are examples of this process. Many extensive hematite deposits are in this way formed in limestone districts. Phosphatization sometimes takes place, amorphous phosphate of lime being substituted for carbonate of lime, and these replacement products often have great value as sources of natural fertilizers. On ocean rocks in dry climates the droppings of birds (guano) which contain much phosphate, percolatr ing into the underlying limestones change them into a hard white or yellow phosphate rock (e.g. Sombrero, Christmas Island, &c), sometimes known as rock-guano or mineral guano. In the north of France beds of phosphate are found in the chalk; they occur also in England on a smaller scale. All limestones, especially those laid down in deep waters contain some lime phosphate, derived from shells of certain brachiopods, fish bones, teeth, whale bones, &c.

and this may pass into solution and be redeposited in certain horizons, a process resembling the formation of flints. On the sea bottom at the present day phosphatic nodules are found which have gathered round the dead bodies of fishes and other animals. As in flint the organic structures of the original limestone may be well preserved though the whole mass is phosphatized.

Where uprising heated waters carrying mineral solutions are proceeding from deep seated masses of igneous rocks they often deposit a portion of their contents in limestone beds. At Leadville, in Colorado, for example, great quantities of rich silver lead ore, which have yielded not a little gold, have been obtained from the limestones, while other rocks, though apparently equally favourably situated, are barren. The l.-ad and fluorspar deposits of the north of England (Alston Moor, Derbyshire) occur in limestone. In the Malay States the limestones have been impregnated with tin oxide. Zinc ores are very frequently associated with beds of limestone, as at Vieille Montagne in Belgium, and copper ores are found in great quantity in Arizona in rocks of this kind. Apart from ore deposits of economic value a great number of different minerals, often well crystallized, have been observed in limestones.

When limestones occur among metamorphic schists or in the vicinity of intrusive plutonic masses (such as granite), they are usually recrystallized and have lost their organic structures. They are then known as crystalline limestones or marbles (q.v.). (J. S. F.)

LIMINA APOSTOLORUM, an ecclesiastical term used to denote Rome, and especially the church of St Peter and St Paul. A Visitatio Liminum might be undertaken ex voto or ex lege. The former, visits paid in accordance with a vow, were very frequent in the middle ages, and were under the special protection of the pope, who put the ban upon any who should molest pilgrims ” who go to Rome for God’s sake.” The question of granting dispensations from such a vow gave rise to much canonical legislation, in which the papacy had finally to give in to the bishops. The visits demanded by law were of more importance. In 743 a Roman synod decreed that all bishops subject to the metropolitan see of Rome should meet personally every year in that city to give an account of the state of their dioceses. Gregory VII. included in the order all metropolitans of the Western Church, and Sixtus V. (by the bull Romanus Pontifex, Dec. 20, 1584) ordered the bishops of Italy, Dalmatia and Greece to visit Rome every three years; those of France, Ger- many, Spain and Portugal, Belgium, Hungary, Bohemia and the British Isles every four years; those from the rest of Europe every five years; and bishops from other continents every ten years. Benedict XIV. in 1740 extended the summons to all abbots, provosts and others who held territorial jurisdiction.

LIMITATION, STATUTES OF, the name given to acts of parliament by which rights of action are limited in the United Kingdom to a fixed period after the occurrence of the events giving rise to the cause of action. This is one of the devices by which lapse of time is employed to settle disputed claims. There are mainly two modes by which this may be effected. We may say that the active enjoyment of a right — or possession — for a determined period shall be a good title against all the world. That is the method known generally as Prescription (q.v.). It looks to the length of time during which the defendant in a disputed claim has been in possession or enjoyment of the matter in dispute. But the principle of the statutes of limitation is to look to the length of time during which the plaintiff has been out of possession. The point of time at which he might first have brought his action having been ascertained, the lapse of the limited period after that time bars him for ever from bringing his action. In both cases the policy of the law is expressed by the maxim Interest reipublicae ut sit finis litium.

The principle of limitation was first adopted in English law in connexion with real actions, i.e. actions for the recovery of real property. At first a fixed date was taken, and no action could be brought of which the cause had arisen before that date. By the Statute of Westminster the First (3 Edward I. c. 39), the beginning of the reign of Richard I. was fixed as the date of limitation for such actions. This is the well-known ” period of legal memory ” recognized by the judges in a different class of cases to which a rule of prescription was applied. Possession of rights in alieno solo from time immemorial was held to be an indefeasible title, and the courts held time immemorial to begin with the first year of Richard I.

A period absolutely fixed became in time useless for the purposes of limitation, and the method of counting back a certain number of years from the date of the writs was adopted in the Statute 32 Henry VIII. c. 2, which fixed periods of thirty, fifty and sixty years for various classes of actions napied therein. A large number of statutes since that time have established periods of limitation for different kinds of actions. Of those now in force the most important are the Limitation Act 1623 for personal actions in general, and the Real Property Limitation Act 1833 relating to actions for the recovery of land. The latter statute has been repealed and virtually re-enacted by the Real Property Limitation Act 1874, which reduced the period of limitation from twenty years to twelve, for all actions brought after the 1st January 1879. The principal section of the act of 1833 will show the modus operandi: ” After the 31st December 1833, no person shall make an entry or distress, or bring an action to recover any land or rent but within twenty years next after the lime at which the right to make such entry or distress or to bring such action shall have first accrued to some person through whom he claims, or shall have first accrued to the person making or bringing the same.” Another section defines the times at which the right of action or entry shall be deemed to have accrued in particular cases; e.g. when the estate claimed shall have been an estate or interest in reversion, such right shall be deemed to have first accrued

at the time at which such estate or interest became an estate or interest in possession. Thus suppose lands to be let by A to B from 1830 for a period of fifty years, and that a portion of such lands is occupied by C from 1831 without any colour of title from B or A — C's long possession would be of no avail against an action brought by A for the recovery of the land after the determination of B's lease. A would have twelve years after the determination of the lease within which to bring his action, and might thus, by an action brought in 1891, disestablish a person who' had been in quiet possession since 1831. What the law looks to is not the length of time during which C has enjoyed the property, but the length of time which A has suffered to elapse since he might first have brought his action. It is to be observed, however, that the Real Property Limitation Act does more than bar the remedy. It extinguishes the right, differing in this respect from the other Limitation Acts, which, while barring the remedy, preserve the right, so that it may possibly become available in some other way than by action.

By section 14 of the act of 1833, when any acknowledgment of the title of the person entitled shall have been given to him or his agent in writing signed by the person in possession, or in receipt of the profits or rent, then the right of the person (to whom such acknowledgment shall have been given) to make an entry or distress or bring an action shall be deemed to have first accrued at the time at which such acknowledgment, or the last of such acknowledgments, was given. By section 15, persons under the disability of infancy, lunacy or coverture, or beyond seas, and their representatives, are to be allowed ten years from the termination of this disability, or death (which shall have first happened), notwithstanding that the ordinary period of limitation shall have expired.

By the act of 1623 actions of trespass, detinue, trover, replevin or account, actions on the case (except for slander) , actions of debt arising out of a simple contract and actions for arrears of rent not due upon specialty shall be limited to six years from the date of the cause of action. Actions for assault, menace, battery, wounds and imprisonment are limited to four years, and actions for slander to two years. Persons labouring under the dis- abilities of infancy, lunacy or unsoundness of mind are allowed the same time after the removal of the disability. When the defendant was " beyond seas " (i.e. outside the United Kingdom and the adjacent islands) an extension of time was allowed, but by the Real Property Limitation Act of 1874 such an allowance is excluded as to real property, and as to other matters by the Mercantile Law Amendment Act 1856.

An acknowledgment, whether by payment on account or by mere spoken words, was formerly sufficient to take the case out

of the statute. The Act 9 Geo. IV. c. 14 (Lord Tenterden's act) requires any promise or admission of liability to be in writing and signed by the party to be charged, otherwise it will not bar the statute.

Contracts under seal are governed as to limitation by the act of 1883, which provides that actions for rent upon any indenture of demise, or of covenant, or debt or any bond or other specialty, and on recognizances, must be brought within twenty years after cause of action. Actions of debt on an award (the sub- mission being not under seal), or for a copyhold fine, or for money levied on a writ of fieri facias, must be brought within six years. With regard to the rights of the crown, the principle obtains that nullum tempus occurrit regi, so that no statute of limitation affects the crown without express mention. But by the Crown Suits Act 1769, as amended by the Crown Suits Act 1861, in suits relating to land, the claims of the crown to recover are barred after the lapse of sixty years. For the prosecution of criminal offences generally there is no period of limitation, except where they are punishable on summary conviction. In such case the period is six months by the Summary Jurisdiction Act 1848. But there are

various miscellaneous limitations fixed by various acts, of which the following may be noticed. Suits and indictments under penal statutes are limited to two years if the forfeiture is to the crown, to one year if the forfeiture is to the common informer. Penal actions by persons aggrieved are limited to two years by the act of 1833. Prosecutions under the Riot Act can only be sued upon within twelve months after the offence has been committed, and offences against the Customs Acts within three years. By the Public Authorities Protection Act 1893, a prosecution against any person acting in execution of statutory or other public duty must be commenced within six months. Prosecutions under the Criminal Law Amendment Act, as amended by the Prevention of Cruelty to Children Act 1904, must be commenced within six months after the commission of the offence.

Trustees are expressly empowered to plead statutes of limita- tion by the Trustees Act 1888; indeed, a defence under the statutes of limitations must in general be specially pleaded. Limitation is regarded strictly as a law of procedure. The English courts will therefore apply their own rules to all actions, although the cause of action may have arisen in a country in which different rules of limitation exist. This is also a recognized principle of private international law (see J. A. Foote, Private International Law, 3rd ed., 1904, p. 516 seq.).

United States. — The principle of the statute of limitations has passed with some modification into the statute-books of every state in the Union except Louisiana, whose laws of limitation are essentially the prescriptions of the civil law drawn from the Parlidas, or " Spanish Code." As to personal actions, it is generally provided that they shall be brought within a certain specified time — usually six years or less — from the time when the cause of action accrues, and not after, while for land the " general if not universal limitation of the right to bring action or to make entry is to twenty years after the right to enter or to bring the action accrues " (Bouvier's Law Dictionary, art. " Limitations "). The constitutional provision prohibiting states from passing laws impairing the obligation of contracts is not infringed by a law of limitations, unless it bars a right of action already accrued without giving a reasonable term within which to bring the action.

See Darby and Bosanquet, Statutes of Limitations (1899); Hewitt, Statutes of Limitations (1893).

LIMOGES, a town of west-central France, capital of the department of Haute-Vienne, formerly capital of the old province of Limousin, 176 m. S. by W. of Orleans on the railway to Toulouse. Pop. (1906) town, 75,906; commune, 88,597. The station is a junction for Poitiers, Angouleme, Perigueux and Clermont-Ferrand. The town occupies a hill on the right bank of the Vienne, and comprises two parts originally distinct, the Cite with narrow streets and old houses occupying the lower slope, and the town proper the summit. In the latter a street known as the Rue de la Boucherie is occupied by a powerful and ancient corporation of butchers* The site of the fortifications

which formerly surrounded both quarters is occupied by boule- vards, outside which are suburbs with wide streets and spacious squares. The cathedral, the most remarkable building in the Limousin, was begun in 1273. In 1327 the choir was completed, and before the middle of the 16th century the transept, with its fine north portal and the first two bays of the nave; from 1875 to 1890 the construction of the nave was continued, and it was united with the west tower (203 ft. high), the base of which belongs to a previous Romanesque church. In the interior there are a magnificent rood loft of the Renaissance, and the tombs of Jean de Langeac (d. 1541) and other bishops. Of the other churches of Limoges, St Michel des Lions (14th and 15th centuries) and St Pierre du Queyroix (12th and 13th centuries) both contain interesting stained glass. The principal modern buildings are the town hall and the law-courts. The Vienne is crossed by a railway viaduct and four bridges, two of which, the Pont St Etienne and the Pont St Martial, date from the 13th century. Among the chief squares are the Place d'Orsay on the site of a Roman amphitheatre, the Place Jourdan with the statue of Marshal J. B. Jourdan, born at Limoges, and the Place

d'Aine with the statue of J. L. Gay-Lussac. President Carnot and Denis Dussoubs, both of whom have statues, were also natives of the town. The museum has a rich ceramic collection and art, numismatic and natural history collections.

Limoges is the headquarters of the XII. army corps and the seat of a bishop, a prefect, a court of appeal and a court of assizes, and has tribunals of first instance and of commerce, a board of trade arbitration, a chamber of commerce and a branch of the Bank of France. The educational institutions include a lycie for boys, a preparatory school of medicine and pharmacy, a higher theological seminary, a training college, a national school of decorative art and a commercial and industrial school. The manufacture and decoration of porcelain give employment to about 13,000 persons in the town and its vicinity. Shoe- making and the manufacture of clogs occupy over 2000. Other industries are liqueur-distilling, the spinning of wool and cloth- weaving, printing and the manufacture of paper from straw. Enamelling, which flourished at Limoges in the middle ages and during the Renaissance (see Enamel), but subsequently died out, was revived at the end of the 19th century. There is an extensive trade in wine and spirits, cattle, cereals and wood. The Vienne is navigable for rafts above Limoges, and the logs brought down by the current are stopped at the entrance of the town by the inhabitants of the Naveix quarter, who form a special gild for this purpose.

Limoges was a place of importance at the time of the Roman conquest, and sent a large force to the defence of Alesia. In 11 B.C. it took the name of Augustus (Augustoritum); but in the 4th century it was anew called by the name of the Lemovices, whose capital it was. It then contained palaces and baths, had its own senate and the right of coinage. Christianity was intro- duced by St Martial. In the 5th century Limoges was devastated by the Vandals and the Visigoths, and afterwards suffered in the wars between the Franks and Aquitanians and in the invasions of the Normans. Under the Merovingian kings Limoges was celebrated for its mints and its goldsmiths' work. In the middle ages the town was divided into two distinct parts, each surrounded by walls, forming separate fiefs with a separate system of administration, an arrangement which survived till 1792. Of these the more important, known as the Chateau, which grew up round the tomb of St Martial in the 9th century, and was sur- rounded with walls in the 10th and again in the 12th, was under the jurisdiction of the viscounts of Limoges, and contained their castle and the monastery of St Martial; the other, the Cite, which was under the jurisdiction of the bishop, – had but a sparse population, the habitable ground being practically covered by the cathedral, the episcopal palace and other churches and religious buildings. In the Hundred Years' War the bishops sided with the French, while the viscounts were unwilling vassals of the English. In 1370 the Cite, which had opened its gates to the French, was taken by the Black Prince and given over to fire and sword.

The religious wars, pestilence and famine desolated Limoges in turn, and the plague of 1630-1631 carried off more than 20,000 persons. The wise administrations of Henri d'Aguesseau, father of the chancellor, and of Turgot enabled Limoges to recover its former prosperity. There have been several great fires, destroying whole quarters of the city, built, as it hen was, of wood. That of 1700 lasted for two months, and destroyed 192 houses; and that of 1864 laid under ashes a large area. Limoges celebrates every seven years a curious religious festival (F£te d'Ostension), during which the relics of St Martial are exposed for seven weeks, attracting large numbers of visitors. It dates from the 10th century, and commemorates a pestilence (mal des ardents) which, after destroying 40,000 persons, is believed to have been stayed by the intercession of the saint.

Limoges was the scene of two ecclesiastical councils, in 1029 and 103 1. The first proclaimed the title of St Martial as " apostle of Aquitaine "; the second insisted on the observance of the "truce of God." In 1095 Pope Urban II. held a synod of bishops here

in connexion with his efforts to organize a crusade, and on this occasion consecrated the basilica of St Martial (pulled down after 1794).

See Celestin Pore, Limoges, in Joanne's guides, De Paris d Ager (1867); Ducourtieux, Limoges d'apres ses anciens plans (1884) and Limoges el ses environs (3rd ed., 1894). A very full list of works on Limoges, the town, viscounty, bishopric, &c, is given by U. Chevalier in Repertoire des sources hist, du moyen &ge. Topo-bibliogr. (Mont Celiard, 1903), t. ii. s.v.

LIMON, or Port Limon, the chief Atlantic port of Costa Rica, Central America, and the capital of a district also named Limon, on a bay of the Caribbean Sea, 103 m. E. by N. of San Jose. Pop. (1904) 3171. Limon was founded in 1871, and is the terminus of the transcontinental railway to Puntarenas which was begun in the same year. The swamps behind the town, and the shallow coral lagoon in front of it, have been filled in. The harbour is protected by a sea-wall built along the low-water line, and an iron pier affords accommodation for large vessels. A breakwater from the harbour to the island of Uvita, about 1200 yd& E. would render Limon a first-class port. There is an excellent water-supply from the hills above the harbour. Almost the entire coffee and banana crops of Costa Rica are sent by rail for shipment at Limon to Europe and the United States. The district (comarcd) of Limon comprises the whole Atlantic littoral, thus including the Talamanca country inhabited by uncivilized Indians; the richest banana-growing territories in the country; and the valuable forests of the San Juan valley. It is annually visited by Indians from the Mosquito coast of Nicaragua, who come in canoes to fish for turtle. Its chief towns, after Limon, are Reventazon and Matina, both with fever than 3000 inhabitants.

LIMONITE, or Brown Iron Ore, a natural ferric hydrate named from the Gr. Xetjuiv (meadow), in allusion to its occurrence as " bog-ore " in meadows and marshes. It is never crystallized, but may have a fibrous or microcrystalline structure, and commonly occurs in concretionary forms or in compact and earthy masses; sometimes mammillated, botryoidal, reniform or stalactitic. The colour presents various shades of brown and yellow, and the streak is always brownish, a character which distinguishes it from haematite with a red, or from magnetite with a black streak. It is sometimes called brown haematite.

Limonite is a ferric hydrate, conforming typically with the formula Fe 4 03(OH) 6 , or 2Fe2Cy3H 2 0. Its hardness is rather above 5, and its specific gravity varies from 3-5 to 4. In many cases it has been formed from other iron oxides, like haematite and magnetite, or by the alteration of pyrites or chalybite.

By the operation of meteoric agencies, iron pyrites readily pass into limonite often with retention of external form ; and the masses of " gozzan " or " gossan " on the outcrop of certain mineral-veins consist of rusty iron ore formed in this way, and associated with cellular quartz. Many deposits of limonite have been found, on b<' : ng worked, to pass downwards into ferrous carbonate; and crystals of chalybite converted superficially into limonite are well known. Minerals, like glauconite, which contain ferrous silicate, may in like manner yield limonite, on weathering. The ferric hydrate is also readily deposited from ferruginous waters, often by means of organic agencies. Deposits of brown iron ore of great

economic value occur in many sedimentary rocks, such as the Lias, Oolites and Lower Greensand of various parts of England. They appear in some cases to be altered limestones and in others altered glauconitic sandstones. An oolitic structure is sometimes present, and the ores are generally phosphatic, and may contain perhaps 30% of iron. The oolitic brown ores of Lorraine and Luxemburg are known as " minette," a diminutive of the French mine (ore), in allusion to their low content of metal. Granular and concretionary limonite accumulates by organic action on the floor of certain lakes in Sweden, forming the curious " lake ore." Larger concretions formed under other conditions are known as " bean ore." Limonite often forms a cementing medium in ferruginous sands and gravels, forming " pan " ; and in like manner it is the

agglutinating agent in many conglomerates, like the South African ” banket,” where it is auriferous. In iron-shot sands the limonite may form hollow concretions, known in some cases as ” boxes.” The ” eagle stones ” of older writers were generally concretions of this kind, containing some substance, like sand, which rattled whep the hollow nodule was shaken. Bog iron ore is an impure limonite, usually formed by the influence of micro-organisms, and containing silica, phosphoric acid and organic matter, sometimes with manganese. The various kinds of brown and yellow ochre are mixtures of limonite with clay and other impurities; whilst in umber much manganese oxide is present. Argillaceous brown iron ofe is often known in Gerrhany as Thoneisenslein; but the corresponding term in English (clay iron stone) is applied to nodular forms of impure chalybite. J. C. Ullmann’s name of stilpnosiderite, from the Greek ankTtvbs (shining) is sometimes applied to such kinds of limonite as have a pitchy lustre. Deposits of limonite in cavities may have a rounded surface or even a stalactitic form, and may present a brilliant lustre, of blackish colour, forming what is called in Germany Glaskopf (glass head). It often happens that analyses of brown iron ores reveal a larger proportion of water than required by the typical formula of limonite, and hence new species have been recognized. Thus the yellowish brown ore called by E. Schmidt xanthosiderite, from forfos (yellow) and aibitpm (iron), contains Fe 2 0(OH)4, or Fe 2 0.r2H20; whilst the bog ore known as limnite, from \lnvri (marsh) has the formula Fc(OH) 3 , or Fe 2 3 -3H 2 0. On the other hand there are certain forms of ferric hydrate containing less water than limonite and approaching to haematite in their red colour and streak : such is the mineral which was called hydrohaematite by A. Breithaupt, and is now generally known under R. Hermann’s name of turgite, from the mines of Turginsk, near Bogoslovsk in the Ural Mountains. This has the formula Fe 4 5 (OH) 2 , or 2Fe 2 3 -H 2 0. It probably represents the partial dehydration of limonite, and by further loss of water may pass into haematite or red iron ore. When limonite is dehydrated and deoxidized in the presence of carbonic acid, it may give rise to chalybite.

LIMOUSIN (or Limosin), LEONARD (c. 1505-c. 1577), French painter, the most famous of a family of seven Limoges enamel painters, was the son of a Limoges innkeeper. He is supposed to have studied under Nardon Penicaud. He was certainly at the beginning of his career influenced by the German school — indeed, his earliest authenticated work, signed L..L. and dated 1532, is a series of eighteen plaques of the ” Passion of the Lord,” after Albrecht Diirer, but this influence was counterbalanced by that of the Italian masters of the school of Fontainebleau, Primaticcio, Rosso, Giulio Romano and Solario, from whom he acquired his taste for arabesque ornament and for mythological subjects. Nevertheless the French tradition was sufficiently ingrained in him to save him from becoming an imitator and from losing his personal style. In 1530 he entered the service of Francis I. as painter and varlet de chambre, a position which he retained under Henry II. For both these monarchs he executed many portraits in enamel — among them quite a number of plaques depicting Diane de Poitiers in various characters, — plates, vases, ewers, and cups, besides decorative works for the royal palaces, for, though he is best known as an enameller distinguished for rich colour, and for graceful designs in grisaille on black or bright blue backgrounds, he also enjoyed a great reputation as an oil-painter. His last signed works bear the date 1574, but the date of his death is uncertain, though it could not have been later than the beginning of 1577. It is on record that he executed close upon two thousand enamels. He is best represented at the Louvre, which owns his two famous votive tablets for the Sainte Chapelle, each consisting of twenty-three plaques, signed L. L. and dated 1553; “La Chasse,” depicting Henry II. on a white horse, Diane de Poitiers behind him on horseback; and many portraits, including the kings by whom he was employed, Marguerite de Valois, the due de Guise, and the cardinal de Lorraine. Other representative examples are

at the Cluny and Limoges museums. In England some magnifi- cent examples of his

work are to be found at the Victoria and Albert Museum, the British Museum, and the Wallace Collection. In the collection of Signor Rocchi, in Rome, is an exceptionally interesting plaque representing Frances I. consulting a fortune- teller.

See Lionard Limousin: peintre de portraits (L'CEuvre des peintres emailkurs), by L. Boudery and E. Lachenaud (Paris, 1897) — : a careful study, with an elaborate catalogue of the known existing examples of the artist's work. The book deals almost exclusively with the portraits illustrated. See also Alleaume and Duplessis, Les Douze Apotres — emaux de Leonard Limousin, &c. (Paris, 1 865); L. Boudery, Exposition retrospective de Limoges en 1886 (Limoges, 1886) ; L. Boudery, Leonard Limousin et son ceuvre (Limoges, 1895); Limoges et le Limousin (Limoges, 1865); A. Meyer, L'Art de I'dmail de Limoges, ancien et moderne (Paris, 1896); Emile Molinier, L' Umaillerie (Paris, 1891).

LIMOUSIN (Lat. Pagus Lemovicinus, ager Lemovicensis, regio Lemovicum, Lemozinum, Limosinium, &c), a former province of France. In the time of Julius Caesar the pagus Lemovicinus covered the county now comprised in the departments of Haute- Vienne, Correze and Creuse, with the arrondissements of Confolens in Charente and Nontron in Dordogne. These limits it retained until the 10th century, and they survived in those of the diocese of Limoges (except a small part cut off in 13 17 to form that of Tulle) until 1790. The break-up into great fiefs in the 10th century, however, tended rapidly to disintegrate the province, until at the close of the 12th century Limousin embraced only the viscounties of Limoges, Turenne and Comborn, with a few ecclesiastical lordships, corresponding roughly to the present arrondissements of Limoges and Saint Yrien in Haute- Vienne and part of the arrondissements of Brive, Tulle and Ussel in Correze. In the 17th century Limousin, thus constituted, had become no more than a small gouvemement.

Limousin takes its name from the Lemovices, a Gallic tribe whose county was included by Augustus in the province of Aquitanic Magna. Politically its history has little of separate interest; it shared in general the vicissitudes of Aquitaine, whose dukes from 918 onwards were its over-lords at least till 1264, after which it was sometimes under them, sometimes under the counts of Poitiers, until the French kings succeeded in asserting their direct over-lordship. It was, however, until the 14th century, the centre of a civilization of which the enamelling industry (see Enamel) was only one expression. The Limousin dialect, now a mere patois, was regarded by the troubadours as the purest form of Provencal.

See A. Lerceux, Geographie et histoire du Limousin (Limoges, 1892). Detailed bibliography in Chevalier, Repertoire des sources. Topo-bibliogr. (Montbeliard, 1902), t. ii. s.v.

LIMPOPO, or Crocodile, a river of S.E. Africa over 1000 m. in length, next to the Zambezi the largest river of Africa entering the Indian Ocean. Its head streams rise on the northern slopes of the Witwatersrand less than 300 m. due W. of the sea, but the river makes a great semicircular sweep across the high plateau first N.W., then N.E. and finally S.E. It is joined early in its course by the Marico and Notwani, streams which rise along the westward continuation of the Witwatersrand, the ridge forming the water-parting between the Vaal and the Limpopo basins. For a great part of its course the Limpopo forms the north-west and north frontiers of the Transvaal. Its banks are well wooded and present many picturesque views. In descending the escarpment of the plateau the river passes through rocky ravines, piercing the Zoutpansberg near the north- east corner of the Transvaal at the Toli Azime Falls. In the low country it receives its chief affluent, the Olifants river (450 m. long), which, rising in the high veld of the Transvaal east of the sources of the Limpopo, takes a more 1 direct N.E. course than the main stream. The Limpopo enters the ocean in 25° 15′ S. The mouth, about 1000 ft. wide, is obstructed by sand-banks. In the rainy season the Limpopo loses a good deal of its water in the swampy region along its lower course. High- water level is 24 ft. above low-water level, when the depth in the shallowest part does not exceed 3 ft. The river is navigable all the year round by shallow-draught

vessels from its mouth for

about 100 m., to a spot known as Gungunyana's Ford. In flood time there is water communication south with the river Komati (q.v.). At this season stretches of the Limpopo above Gungun- yana's Ford are navigable. The river valley is generally unhealthy.

The basin of the Limpopo includes the northern part of the Transvaal, the eastern portion of Bechuanaland, southern Matabele- land and a large area of Portuguese territory north of Delagoa Bay. Its chief tributary, the Olifants, has been mentioned. Of its many other affluents, the Macloutsie, the Shashi and the Tuli are the most distant north-west feeders. In this direction the Matoppos and other hills of Matabeleland separate the 'Limpopo basin from the valley of the Zambezi. A little above the Tuli confluence is Rhodes's Drift, the usual crossing-place from the northern Transvaal into Matabeleland. Among the streams which, flowing north through the Transvaal, join the Limpopo is the Nylstroom, so named by Boers trekking from the south in the belief that they had reached the river Nile. In the coast region the river has one considerable affluent from the north, the Chengane, which is navigable for some distance.

The Limpopo is a river of many names. In its upper course called the Crocodile that name is also applied to the whole riveˆr, which figures on old Portuguese maps as the Oori(or Oira) and Bembe. Though claiming the territory through which it ran the Portuguese made no attempt to trace the river. This was first done by Captain J. F. Elton, who in 1870 travelling from the Tati goldfields sought to open a road to the sea via the Limpopo. He voyaged down the river from the Shashi confluence to the Toll Azim6 Falls, which he discovered, following the stream thence on foot to the low country. The lower course of the river had been explored I 868-1869 by another British traveller — St Vincent Whitshed Erskine. It was first navigated by a sea-going craft in 1884, when G, A. Chaddock of the British mercantile service succeeded in crossing the bar, while its lower course was accurately surveyed by Portuguese officers in 1 895-1896. At the junction of the Lotsani, one of the Bechuanaland affluents, [with the Limpopo, are ruins of the period of the Zimbabwes.

LINACRE (or Lynaker), THOMAS (c. 1460-1524), English humanist and physician, was probably born at Canterbury. Of his parentage or descent nothing certain is known. He received his early education at the cathedral school of Canterbury, then under the direction of William Celling (William Tilly of Selling), who became prior of Canterbury in 1472. Celling was an ardent scholar, and one of the earliest in England who cultivated Greek learning. From him Linacre must have received his first incentive to this study. Linacre entered Oxford about the year 1480, and in 1484 was elected a fellow of All Souls' College. Shortly afterwards he visited Italy in the train of Celling, who was sent by Henry VIII. as an envoy to the papal court, and he accompanied his patron as far as Bologna. There he became the pupil of Angelo Poliziano, and afterwards shared the instruction which that great scholar imparted at Florence to the sons of Lorenzo de' Medici. The younger of these princes became Pope Leo X., and was in after years mindful of his old companionship with Linacre. Among his other teachers and friends in Italy were Demetrius Chalcondylas, Hermolaus Barbarus, Aldus Romanus the printer of Venice, and Nicolaus Leonicenus of Vicenza. Linacre took the degree of doctor of medicine with great distinction at Padua. On his return to Oxford, full of the learning and imbued with the spirit of the Italian Renaissance, he formed one of the brilliant circle of Oxford scholars, including John Colet, William Grocyn and William Latimer, who are mentioned with so much warm eulogy in the letters of Erasmus.

Linacre does not appear to have practised or taught medicine in Oxford. About the year 1501 he was called to court as tutor of the young prince Arthur. On the accession of Henry VIII. he was appointed the king's physician, an office at that time pf considerable influence and importance, and practised medicine in London, having among his patients most of the great statesmen and prelates of the time, as Cardinal Wolsey, Archbishop Warham and Bishop Fox.

After some years of professional activity, and when in advanced life, Linacre received priest's orders in 1520, though he had for some years previously held several clerical benefices. There is no doubt that his ordination was connected with his retirement from active life. Literary labours, and the cares of the founda- tion which owed its existence chiefly to him, the Royal College

of Physicians, occupied Linacre's remaining years till his death on the 20th of October 1524.

Linacre was more of a scholar than a man of letters, and rather a man of learning than a scientific investigator. It is difficult now to judge of his practical skill in his profession, but it was evidently highly esteemed in his own day. He took no part in political or theological questions, and died too soon to have to declare himself on either side in the formidable contro- versies which were even in his lifetime beginning to arise. But his career as a scholar was one eminently characteristic of the critical period in the history of learning through which he lived. He was one of the first Englishmen who studied Greek in Italy, whence he brought back to his native country and his own uni- versity the lessons of the " New Learning." His teachers were some of the greatest scholars of the day. Among his pupils was one — Erasmus — whose name alone would suffice to preserve the memory of his instructor in Greek, and others of note in letters and politics, such as Sir Thomas More, Prince Arthur and Queen Mary. Colet, Grocyn, William Lilye and other eminent scholars were his intimate friends, and he was esteemed by a still wider circle of literary correspondents in all parts of Europe.

Linacre's literary activity was displayed in two directions, in pure scholarship and in translation from the Greek. In the domain of scholarship he was known by the

rudiments of (Latin) grammar (Progymnasmata Grammatices vulgaria), composed in English, a revised version of which was made for the use of the Princess Mary, and afterwards translated into Latin by Robert Buchanan. He also wrote a work on Latin composition, De emendata structura Latini sermonis, which was published in London in 1524 and many times reprinted on the continent of Europe.

Linacre's only medical works were his translations. He desired to make the works of Galen (and indeed those of Aristotle also) accessible to all readers of Latin. What he effected in the case of the first, though not trifling in itself, is inconsiderable as compared with the whole mass of Galen's writings; and of his translations from Aristotle, some of which are known to have been completed, nothing has survived. The following are the works of Galen trans- lated by Linacre: (1) De sanitate tuenda, printed at Paris in 1517 ; (2) Methodus medendi (Paris, 1519); (3) De temperamenlis et de Inaequali Intemperie (Cambridge, 1521); (4) De. naturalibus facultatibus (London, 1523); (5) De symptomatum differentiis et cansis (London, 1524); (6) De pulsuum Usu (London, without date). He also translated for the use of Prince Arthur an astronomi- cal treatise of Proclus, De spkaera, which was printed at Venice by Aldus in 1499. The accuracy of these translations and their elegance of style were universally admitted. They have been generally accepted as the standard versions of those parts of Galen's writings, and frequently reprinted, either as a part of the collected works or separately.

But the most important service which Linacre conferred upon his own professien and science was not by his writings. To him was chiefly owing the foundation by royal charter of the College of Physicians in London, and he was the first president of the new college, which he further aided by conveying to it his own house, and by the gift of his library. Shortly before his death Linacre obtained from the king letters patent for the establishment of readerships in medicine at Oxford and Cambridge, and placed valuable estates in the hands of trustees for their endowment. Two readerships were founded in Merton College, Oxford, and one in St John's College, Cambridge, but owing to neglect and bad management of the funds, they fell into uselessness and obscurity. The Oxford foundation was revived by the university commis- sioners in 1856 in the form of the Linacre professorship of anatomy. Posterity has done justice to the generosity and public spirit which prompted these foundations; and it is impossible not to recognize a strong constructive genius in the scheme of the College of Physicians, by which Linacre not only first organized the medical profession in England, but impressed upon it for some centuries the stamp of his own individuality.

The intellectual fastidiousness of Linacre, and his habits of minute accuracy were, as Erasmus suggests, the chief cause why he left no more permanent literary memorials. It will be found, perhaps, difficult to justify by any extant work the extremely high reputation which he enjoyed among the scholars of his time. His Latin style was so much admired that, according to the flattering eulogium of Erasmus, Galen spoke better Latin in the version of Linacre than he had before spoken Greek; and even Aristotle displayed a grace which he hardly attained to in his native tongue. Erasmus praises also Linacre's critical judgment (" vir non exacti tantum sed severi judicii "). According to others it was hard to say whether he were more distinguished as a grammarian or a rhetorician. Of Greek he was regarded as a consummate master; and he was equally eminent as a " philosopher," that is, as learned in the works of the ancient philosophers and naturalists. In this there may have been

some exaggeration; but all have acknowledged the elevation of Linacre's character, and the fine moral qualities summed up in the epitaph written by John Caius: " Fraudcs dolosque mire perosus; fidus amicis; omnibus ordinibus juxta carus."

The materials for Linacre's biography are to a large extent con- tained in the older biographical collections of George Lilly (in Paulus Jovius, Descriptio Britanniae), Bale, Leland and Pits, in Wood's Athenae Oxonienses and in the Biographia Britannica; but all are completely collected in the Life of Thomas Linacre, by Dr Noble Johnson (London, 1835). Reference may also be made to Dr Munk's Roll of the Royal College of Physicians (2nd ed., London, 1878); and the Introduction, by Dr J. F. Payne, to a

facsimile reproduction of Linacre's version of Galen de temperamenlis (Cam- bridge, 1881). With the exception of this treatise, none of Linacre's works or translations has been reprinted in modern times.

LINARES, an inland province of central Chile, between Talca on the N. and Nuble on the S., bounded E. by Argentina and W. by the province of Maule. Pop. (1895) i°ij8s8; area, 3942 sq. m. The river Maule forms its northern boundary and drains its northern and north-eastern regions. The province belongs partly to the great central valley of Chile and partly to the western slopes of the Andes, the S. Pedro volcano rising to a height of 11,800 ft. not far from the sources of the Maule. The northern part is fertile, as are the valleys of the Andear foothills, but arid conditions prevail throughout the central districts, and irrigation is necessary for the production of crops. The vine is cultivated to some extent, and good pasturage is found on the Andean slopes. The province is traversed from N. to S. by the Chilean Central railway, and the river Maule gives access to the small port of Constitucion, at its mouth. From Parral, near the southern boundary, a branch railway extends westward to Cauquenes, the capital of Maule. The capital, Linares, is centrally situated, on an open plain, about 20 m. S. of the river Maule. It had a population of 7331 in 1895 (which an official estimate of 1902 reduced to 7256). Parral (pop. 8586 in 1895; est. 10,219 in 1902) is a railway junction and manufacturing town.

LINARES, a town of southern Spain, in the province of Jaen, among the southern foothills of the Sierra Morena, 1375 ft. above sea-level and 3 m. N.W. of the river Guadalimar. Pop. (1900) 38,245. It is connected by four branch railways with the im- portant argentiferous lead mines on the north-west, and with the main railways from Madrid to Seville, Granada and the principal ports on the south coast. The town was greatly improved in the second half of the 19th century, when the town hall, bull-ring, theatre and many other handsome buildings were erected; it contains little of antiquarian interest save a fine fountain of Roman origin. Its population is chiefly engaged in the lead-mines, and in such allied industries as the manufacture of gunpowder, dynamite, match for blasting purposes, rope and the like. The mining plant is entirely imported, principally from England; and smelting, desilverizing and the manufacture of lead sheets, pipes, &c, are carried on by British firms, which also purchase most of the ore raised. Linares lead is unsurpassed in quality, but the output tends to decrease. There is a thriving local trade in grain, wine and oil. About 2 m. S. is the village of Cazlona, which shows some remains of the ancient Castulo. The ancient mines some 5 m. N., which are now known as Los Pozos de Anibal, may possibly date from the 3rd century B.C., when this part of Spain was ruled by the Carthaginians.

LINCOLN, EARLS OF. The first earl of Lincoln was probably William de Roumare (c. 1095-c. 1155), who was created earl about 1 140, although it is possible that William de Albini, earl of Arundel, had previously held the earldom. Roumare's grandson, another William de Roumare (c. 1150-c. n 98), is sometimes called earl of Lincoln, but he was never recognized as such, and about 1 148 Ring Stephen granted the earldom to one of his supporters, Gilbert de Gand (d. 1156), who was related to the former earl. After Gilbert's death the earldom was dormant for about sixty years; then in 12 16 it was given to another Gilbert de Gand, and later it was claimed by the great earl of Chester, Ranulf, or Randulph, de Blundevill (d. 12 32). From Ranulf the title to the earldom passed through his sister Hawise to the family of Lacy, John de Lacy (d. 1240) being made earl of Lincoln in 1232. He was son of Roger de Lacy (d. 1212), justiciar

of England and constable of Chester. It was held by the Lacys until the death of Henry, the 3rd earl. Henry served Edward I. in Wales, France and Scotland, both as a soldier and a diplom- atist. He went to France with Edmund, earl of Lancaster, in 1 296, and when Edmund died in June of this year, succeeded him as commander of the English forces in Gascony;but he did not experience any great success in this capacity and

returned to England early in 1298. The earl fought at the battle of Falkirk in July 1298, and took some part in the subsequent conquest of Scotland. He was then employed by Edward to negotiate successively with popes Boniface VIII. and Clement V., and also with Philip IV. of France; and was present at the death of the English king in July 1307. For a short time Lincoln was friendly with the new king, Edward II., and his favourite, Piers Gaveston; but quickly changing his attitude, he joined earl Thomas of Lancaster and the baronial party, was one of the " ordainers " appointed in 13 10 and was regent of the kingdom during the king's absence in Scotland in the same year. He died in London on the 5th of February 1311, and was buried in St Paul's Cathedral. He married Margaret (d. 1309), granddaughter and heiress of William Longsword, 2nd earl of Salisbury, and his only surviving child, Alice (1 283-1348), became the wife of Thomas, earl of Lancaster, who thus inherited his father-in-law's earldoms of Lincoln and Salisbury. Lincoln's Inn in London gets its name from the earl, whose London residence occupied this site. He founded Whalley Abbey in Lancashire, and built Denbigh Castle.

In 1 349 Henry Plantagenet, earl (afterwards duke) of Lancaster, a nephew of Earl Thomas, was created earl of Lincoln; and when his grandson Henry became king of England as Henry IV. in 1399 the title merged in the crown. In 1467 John de la Pole (c. 1464-1487), a nephew of Edward IV., was made earl of Lincoln, and the same dignity was conferred in 1525 upon Henry Brandon (1516-1545), son of Charles Brandon, duke of Suffolk. Both tlied without sons, and the next family to hold the earldom was that of Clinton.

Edward Fiennes Clinton, 9th Lord Clinton (1512-1585), lord high admiral and the husband of Henry VIII. 's mistress, Elizabeth Blount, was created earl of Lincoln in 1572. Before his elevation he had rendered very valuable services both on sea and land to Edward VI., to Mary and to Elizabeth, and he was in the confidence of the leading men of these reigns, including William Cecil, Lord Burghley. From 1572 until the present day the title has been held by Clinton's descendants. In 1768 Henry Clinton, the 9th earl (1720-1794), succeeded his uncle Thomas Pelham as 2nd duke of Newcastle-under-Lyne, and since this date the title of earl of Lincoln has been the courtesy title of the eldest son of the duke of Newcastle.

See G. E. C.(okayne), Complete Peerage, vol. v. (1893).

LIHCOLN, ABRAHAM (1809-1865), sixteenth president of the United States of America, was born on " Rock Spring " farm, 3 m. from Hodgenville, in Hardin (now Larue) county, Kentucky, on the 12th of February 1809. 1 His grandfather, 2 Abraham Lincoln, settled in Kentucky about 1 780 and was killed by Indians in 1784. His father, Thomas (1778-1851), was born in Rockingham (then Augusta) county, Virginia; he was hospitable, shiftless, restless and unsuccessful, working now as a carpenter and now as a farmer, and could not read or write before his marriage, in Washington county, Kentucky, on the 12th of June 1806, to Nancy Hanks (1783-1818), who was, like him, a native of Virginia, but had much more strength of character and native ability, and seemed to have been, in

1 Lincoln's birthday is a legal holiday in California, Colorado, Connecticut, Delaware, Florida, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Montana, Nevada, New Jersey, New York, North Dakota, Pennsylvania, South Dakota, Utah, Washington, West Virginia and Wyoming.

'Samuel Lincoln (c. 1619-1690), the president's first American ancestor, son of Edward Lincoln, gent., of Hingham, Norfolk, emigrated to Massachusetts in 1637 as apprentice to a weaver and settled with two older brothers in Hingham, Mass. His son and grandson were iron founders; the grandson Mordecai (1686-1736) moved to Chester county, Pennsylvania. Mordecai's son John (171 i-c. 1773), a weaver, settled in what is now RockingHim county, Va., and was the president's great-grandfather.

intellect and character, distinctly above the social class in which she was born. The Lincolns had removed from Elizabethtown, Hardin county, their first home, to the Rock

Spring farm, only a short time before Abraham's birth; about 1813 they removed to a farm of 238 acres on Knob Creek, about 6 m. from Hodgen- ville; and in 18 16 they crossed the Ohio river and settled on a quarter-section, 15 m. E. of the present village of Gentryville, in Spencer county, Indiana. There Abraham's mother died on the 5th of October 1818. In December 18-19 his father married, at his old home, Elizabethtown, Mrs Sarah (Bush) Johnston (d. 1869), whom he had courted years before, whose thrift greatly improved conditions in the home, and who exerted a great in- fluence over her stepson. Spencer county was still a wilderness, and the boy grew up in pioneer surroundings, living in a rude log-cabin, enduring many hardships and knowing only the primitive manners, conversation and ambitions of sparsely settled backwoods communities. Schools were rare, and teachers qualified only to impart the merest rudiments. " Of course when I came of age I did not know much," wrote he years afterward, " still somehow I could read, write and cipher to the rule of three, but that was all. I have not been to school since. The little advance I now have upon this store of education- I have picked up from time to time under the pressure of necessity." His entire schooling, in five different schools, amounted to less than a twelvemonth; but he became a good speller and an excellent penman. His own mother taught him to read, and his stepmother urged him to study. He read and re-read in early boyhood the Bible, Aesop, Robinson Crusoe, Pilgrim's Progress, Weems's Life of Washington and a history of the United States; and later read every book he could borrow from the neighbours, Burns and Shakespeare becoming favourites. He wrote rude, coarse satires, crude verse, and compositions on the American government, temperance, &c. At the age of seventeen he had attained his full height, and began to be known as a wrestler, runner and lifter of great weights. When nineteen he made a journey as a hired hand on a flatboat to New Orleans.

In March 1830 his father emigrated to Macon county, Illinois (near the present Decatur), and soon afterward removed to Coles county. Being now twenty-one years of age, Abraham hired himself to Denton Offutt, a migratory trader and store- keeper then of Sangamon county, and he helped Offutt to build a flatboat and float it down the Sangamon, Illinois and Mississippi rivers to New Orleans. In 183 1 Offutt made him clerk of his country store at New Salem, a small and unsuccessful settlement in Menard county; this gave him moments of leisure to devote to self-education. He borrowed a grammar and other books, sought explanations from the village schoolmaster and began to read law. In this frontier community law and politics claimed a large proportion of the stronger and the more ambitious men; the law early appealed to Lincoln and his general popularity encouraged him as early as 1832 to enter politics. In this year Offutt failed and Lincoln was thus left without employment. He became a candidate for the Illinois House of Representatives; and on the 9th of March 1832 issued an address " To the people of Sangamon county " which betokens talent and education far beyond mere ability to " read, write and cipher," though in its preparation he seems to have had the help of a friend. Before the election the Black Hawk Indian War broke out; Lincoln volunteered in one of the Sangamon county companies on the 2 1 st of April and was elected captain by the members of the company. It is said that the oath of allegiance was administered to Lincoln at this time by Lieut. Jefferson Davis. The company, a part of the 4th Illinois, was mustered out after the five weeks' service for which it volunteered, and Lincoln re- enlisted as a private on the 29th of May, and was finally mustered out on the 16th of June by Lieut. Robert Anderson, who in 1861 commanded the Union troops at Fort Sumter. As captain Lincoln was twice in disgrace, once for firing a pistol near camp and again because nearly his entire company was intoxicated. He was in no battle, and always spoke lightly of his military record. He was defeated in his campaign for the legislature in

1832, partly because of his unpopular adherence to Clay and the American system, but in his own election precinct, he received nearly all the votes cast. With a friend, William Berry, he then bought a small country store, which soon failed chiefly because

of the drunken habits of Berry and because Lincoln preferred to read and to tell stories — he early gained local celebrity as a story-teller — rather than sell; about this time he got hold of a set of Blackstone. In the spring of 1833 the store's stock was sold to satisfy its creditors, and Lincoln assumed the firm's debts, which he did not fully pay off for fifteen years. In May

1833, local friendship, disregarding politics, procured his appoint- ment as postmaster of New Salem, but this paid him very little, and in the same year the county surveyor of Sangamon county opportunely offered to make him one of his deputies. He hastily qualified himself by study, and entered upon the practical duties of surveying farm lines, roads and town sites. " This," to use his own words, " procured bread, and kept body and soul together."

In 1834 Lincoln was elected (second of four successful candi- dates, with only 14 fewer votes than the first) a member of the Illinois House of Representatives, to which he was re-elected ■in 1836, 1838 and 1840, serving until 1842. In his, announcement of his candidacy in 1836 he promised to vote for Hugh L. White of Tennessee (a vigorous opponent of Andrew Jackson in Tennessee politics) for president, and said: '' I go for all sharing the privileges of the government who assist in bearing its burdens. Consequently, I go for admitting all whites to the right of suffrage, who pay taxes or bear arms (by no means excluding females)" — a sentiment frequently quoted to prove Lincoln a believer in woman's suffrage. In this election he led the poll in Sangamon county. In the legislature, like the other representatives of that county, who were called the " Long Nine," because of their stature, he worked for internal improvements, for which lavish appropriations were made, and for the division of Sangamon county and the choice of Springfield as the state capital, instead of Vandalia. He and his party colleagues followed Stephen A. Douglas in adopting the convention system, to which Lincoln had been strongly opposed. In 1837 with one other repre- sentative from-Sangamon county, named Dan Stone, he protested against a series of resolutions, adopted by the Illinois General Assembly, expressing disapproval of the formation of abolition societies and asserting, among other things, that " the right of property in slaves is sacred to the slave holding states under the Federal Constitution "; and Lincoln and Stone put out a paper in which they expressed their belief " that the institution of slavery is founded on both injustice and bad policy, but that the promulgation of abolition doctrines tends rather to increase than abate its evils," "that the Congress of the United States has no power under the Constitution to interfere with the institu- tion of slavery in the different states," " that the Congress of the United States has the power, under the Constitution, to abolish slavery in the District of Columbia, but that the power ought not to be exercised unless at the request of the people of the District." Lincoln was very popular among his fellow legislators, and in 1838 and in 1840 he received the complimentary vote of his minority colleagues for the speakership of the state House of Representatives. In 1842 he declined a renomination to the state legislature and attempted unsuccessfully to secure a nomination to Congress. In the same year he became interested in the Washingtonian temperance movement.

In 1846 he was elected a member of the National House of Representatives by a majority of 1511 over his Democratic opponent, Peter Cartwright, the Methodist preacher. Lincoln was the only Whig member of Congress elected in Illinois in 1846. In the House of Representatives on the 22nd of December 1847 he introduced the " Spot Resolutions," which quoted statements in the president's messages of the nth of May 1846 and the 7th and 8th of December that Mexican troops had invaded the territory of the United States, and asked the president to tell the precise "spot" of invasion; he made a speech on these resolutions in the House on the 1 2th of January 1848. His attitude toward the war and especially his vote for

George Ashmun's amendment to the supply bill at this session, declaring that the Mexican War was " unnecessarily and uncon- stitutionally commenced by the President," greatly displeased his constituents. He later introduced a bill regarding slavery in the District of Columbia, which (in accordance with his state- ment of 1837)

was to be submitted to the vote of the District for approval, and which provided for compensated emancipation, forbade the bringing of Slaves into the District of Columbia, except by government officials from slave states, and the selling of slaves away from the District, and arranged for the emancipa- tion after a period of apprenticeship of all slave children born after the 1st of January 1850. While he was in Congress he voted repeatedly for the principle of the Wilmot Proviso. At the close of his term in 1848 he declined an appointment as governor of the newly organized Territory of Oregon and for a time worked, without success, for an appointment as Com- missioner of the General Land Office. During the presidential campaign he made speeches in Illinois, and in Massachusetts he spoke before the Whig State Convention at Worcester on the 1 2th of September, and in the next ten days at Lowell, Dedham, Roxbury, Chelsea, Cambridge and Boston. He had ‘ become an eloquent and influential public speaker, and in 1840 and 1844 was a candidate on the Whig ticket for presidential elector.

In 1834 his political friend and colleague John Todd Stuart (1807-1885), a lawyer in full practice, had urged him to fit himself for the bar, and had lent him text-books; and Lincoln, working diligently, was admitted to the bar in September 1836. In April 1837 he quitted New Salem, and removed to Springfield, which was the county-seat and was soon to become the capital of the state, to begin practice in a partnership with Stuart, which was terminated in April 1841; from that time until September 1843 he was junior partner to Stephen Trigg Logan (1800-1880), and from 1843 until his death he was senior partner of William Henry Herndon (1818-1891). Between 1849 and 1854 he took little part in politics, devoted himself to the law and became one of the leaders of the Illinois bar. His small fees — he once charged $3-50 for collecting an account of nearly $600-00 — his frequent refusals to take cases which he did not think right and his attempts to prevent unnecessary litigation have become proverbial. Judge David Davis, who knew Lincoln on the Illinois circuit and whom Lincoln made in October 1862 an associate justice of the Supreme Court of the United States, said that he was ” great both at nisi prius and before an appellate tribunal.” He was an excellent cross-examiner, whose candid friendliness of manner often succeeded in eliciting important testimony from unwilling witnesses. Among Lincoln’s most famous cases were: one {Bailey v. Cromwell, 4 111. 71; frequently cited) before the Illinois Supreme Court in July 1841 in which he argued against the validity of a note in payment for a negro girl, adducing the Ordinance of 1787 and other authorities; a case (tried in Chicago in September 1857) for the Rock Island railway, sued for damages by the owners of a steamboat sunk after collision with a railway bridge, a trial in which Lincoln brought to the service of his client a surveyor’s knowledge of mathematics and a riverman’s acquaintance with currents and channels, and argued that crossing a stream by bridge was as truly a common right as navigating it by boat, thus contributing to the success of Chicago and railway commerce in the contest against St Louis and river transportation; the defence (at Beardstown in May 1858) on the charge of murder of William (” Duff “) Armstrong, son of one of Lincoln’s New Salem friends, whom Lincoln freed by controverting with the help of an almanac the testimony of a crucial witness that between 10 and 1 1 o’clock at night he had seen by moonlight the defendant strike the murderous blow- — this dramatic incident is describea in Edward Eggleston’s novel, The Graysons; and the defence on the charge of murder (committed in August 1859) of ” Peachy ” Harrison, a grandson of Peter Cartwright, whose testimony was used with great effect.

From law, however, Lincoln was soon drawn irresistibly back into politics. The slavery question, in one form or another.

had become the great overshadowing issue in national, and even in state politics; the abolition movement, begun in earnest by W. L. Garrison in 1831, had stirred the conscience of the North, and had had its influence even upon many who strongly

deprecated its extreme radicalism; the Compromise of 1850 had failed to silence sectional controversy, and the Fugitive Slave Law, which was one of the compromise measures, had throughout the North been bitterly assailed and to a considerable extent had been nullified by state legislation; and finally in 1854 the slavery agitation was fomented by the passage of the Kansas- Nebraska Act, which repealed the Missouri Compromise and gave legislative sanction to the principle of " popular sovereignty " — the principle that the inhabitants of each Territory as well as of each state were to be left free to decide for themselves whether or not slavery was to be permitted therein. In enacting this measure Congress had been dominated largely by one man — Stephen A. Douglas of Illinois — then probably the most powerful figure in national politics. Lincoln had early put himself on record as opposed to slavery, but he was never technically an abolitionist; he allied himself rather with those who believed that slavery should be fought within the Constitution, that, though it could not be constitutionally interfered with in in- dividual states, it should be excluded from territory over which the national government had jurisdiction. In this, as in other things, he was eminently clear-sighted and practical. Already he had shown his capacity as a forcible and able debater; aroused to new activity upon the passage of the Kansas-Nebraska Bill, which he regarded as a gross breach of political faith, he now entered upon public discussion with an earnestness and force that by common consent gave him leadership in Illinois of the opposition, which in 1854 elected a majority of the legislature; and it gradually became clear that he was the only man who could be opposed in debate to the powerful and adroit Douglas. He was elected to the state House of Representatives, from which he immediately resigned to become a candidate for United States senator from Illinois, to succeed James Shields, a Democrat; but five opposition members, of Democratic antecedents, refused to vote for Lincoln (on the second ballot he received 47 votes — 50 being necessary to elect) and he turned the votes which he controlled over to Lyman Trumbull, who was opposed to the Kansas-Nebraska Act, and thus secured the defeat of Joel Aldrich Matteson (1808-1883), who favoured this act and who on the eighth ballot had received 47 votes to 35 for Trumbull and 1 5 for Lincoln. The various anti-Nebraska elements came together, in Illinois as elsewhere, to form a new party at a time when the old parties were disintegrating; and in 1856 the Republican party was formally organized in the state. Lincoln before the state convention at Bloomington of " all opponents of anti-Nebraska legislation " (the first Republican state convention in Illinois) made on the 29th of May a notable address known as the " Lost Speech." The National Convention of the Republican Party in 1856 cast no votes for Lincoln as its vice-presidential candidate on the ticket with Fremont, and he was on the Republican electoral ticket of this year, and made effective campaign speeches in the interest of the new party. The campaign in the state resulted substantially in a drawn battle, the Democrats gaining a majority in the state for president, while the Republicans elected the governor and state officers. In 1858 the term of Douglas in the United States Senate was expiring, and he sought re-election. On the 16th of June 1858 by unanimous resolution of the Republican state convention Lincoln was declared " the first and only choice of the Re- publicans of Illinois for the United States Senate as the successor of Stephen A. Douglas," who was the choice of his own party to succeed himself. Lincoln, addressing the convention which nominated him, gave expression to the following bold prophecy: — " A house divided against itself cannot stand. I believe this Government cannot endure permanently half slave and half free. I do not expect the Union to be dissolved — 1 do not expect the house to fall — but I do expect it will cease to be divided. It will become all one thing or all the other. Either the opponents of slavery will arrest the further spread of it, and place it where the public mind shall rest in the belief that it is in course of ultimate

extinction; or its advocates will push it forward, till it shall become alike lawful in all the states, old as well as new — North as well as South."

In this speech, delivered in the state House of Representatives, Lincoln charged Pierce, Buchanan, Taney and Douglas with conspiracy to secure the Dred Scott decision.

Yielding to the wish of his party friends, on the 24th of July, Lincoln challenged Douglas to a joint public discussion. 1 The antagonists met in debate at seven designated places in the state. The first meeting was at Ottawa, La Salle County, about go m. south-west of Chicago, on the 21st of August. At Freeport, on the Wisconsin boundary, on the 27th of August, Lincoln answered questions put to him by Douglas, and by his questions forced Douglas to ' 'betray the South" by his enunciation of the "Freeport heresy," that, no matter what the character of Congressional legislation or the Supreme Court's decision " slavery cannot exist a day or an hour anywhere unless it is supported by local police regulations." This adroit attempt to reconcile the principle of popular sover- eignty with the Dred Scott decision, though it undoubtedly helped Douglas in the immediate fight for the senatorship, necessarily alienated his Southern supporters and assured his defeat, as Lincoln foresaw it must, in the presidential campaign of i860. The other debates were: at Jonesboro, in the southern part of the state, on the 15th of September; at Charleston, 150 m. N.E. of Jonesboro, on the 18th of September; and, in the western part of the state, at Galesburg (Oct. 7), Quincy (Oct. 13) and Alton (Oct. 15). In these debates Douglas, the champion of his party, was over-matched in clearness and force of reasoning, and lacked the great moral earnestness of his opponent ; but he dexterously extricated himself time and again from difficult argumentative positions, and retained sufficient support to win the immediate prize. At the November election the Republican vote was 126,084, the Douglas Democratic vote was 121,940 and the Lecompton (or Buchanan) Democratic vote was 5091; but the Democrats, through a favourable apportionment of representative districts, secured a majority of the legislature (Senate: 14 Democrats, 11 Republicans; House : 40 Democrats, 35 Republicans), which re-elected Douglas. Lincoln's speeches in this campaign won him a national fame. In 1859 he made two speeches in Ohio — -one at Columbus on the 16th of September criticising Douglas's paper in the September Harper's Magazine, and one at Cincinnati on the 17th of September, which was addressed to Kentuckians, — and he spent a few days in Kansas, speaking in Elwood, Troy, Doniphan, Atchison and Leavenworth, in the first week of December. On the 27th of February i860 in Cooper Union, New York City, he made a speech (much the same as that delivered in Elwood, Kansas, on the 1st of December) which made him known favourably to the leaders of the Republican party in the East and which was a careful historical study criticising the statement of Douglas in one of his speeches in Ohio that " our fathers when they framed the government under which we live understood this question [slavery] just as well and even better than we do now," and Douglas's contention that " the fathers " made the country (and intended that it should remain) part slave. Lincoln pointed out that the majority of the members of the Constitutional Convention of 1787 opposed slavery and that they did not think that Congress had no power to control slavery in the Territories. He spoke at Concord,

1 Douglas and Lincoln first met in public debate (four on a side) in Springfield in December 1839. They met repeatedly in the campaign of 1840. In 1852 Lincoln attempted with little success to reply to a speech made by Douglas in Richmond. On the 4th of October 1854 in Springfield, in reply to a speech on the Nebraska question by Douglas delivered the day before, Lincoln made a remarkable speech four hours long, to which Douglas replied on the next day; and in the fortnight immediately following Lincoln attacked Douglas's record again at Bloomington and at Peoria. On the 26th of June 1857 Lincoln in a speech at Springfield answered Douglas's speech of the 12th in which he made over his doctrine of popular sovereignty to suit the Dred Scott decision. Before the actual debate in 1858 Douglas made a speech in Chicago on the 9th of July, to which Lincoln replied the next day; Douglas spoke at Bloomington on the 16th of July and Lincoln answered him in Springfield on the 17th.

Manchester, Exeter and Dover in New Hampshire, at Hartford (5th March), New Haven

(6th March), Woonsocket (8th March) and Norwich (9th March). The Illinois State Convention of the Republican party, held at Decatur on the 9th and 10th of May i860, amid great enthusiasm declared Abraham Lincoln its first choice for the presidential nomination, and instructed the delegation to the National Convention to cast the vote of the state as a unit for him.

The Republican national convention, which made ” No Extension of Slavery ” the essential part of the party platform, met at Chicago on the 16th of May i860. At this time William H. Seward was the most conspicuous Republican in national politics, and Salmon P. Chase had long been in the fore-front of the political contest against slavery. Both had won greater national fame than had Lincoln, and, before the convention met, each hoped to be nominated for president. Chase, however, had little chance, and the contest was virtually between Seward and Lincoln, who by many was considered more ” available,” because it was thought that he could (and Seward could not) secure the vote of certain doubtful states. Lincoln’s name was presented by Illinois and seconded by Indiana. At first Seward had the strongest support. On the first ballot Lincoln received only 102 votes to 173ˆ for Seward. On the second ballot Lincoln received 181 votes to Seward’s 184.5. On the third ballot the 50! votes formerly given to Simon Cameron 1 were given to Lincoln, who received 2315 votes to 180 for Seward, and without taking another ballot enough votes were changed to make Lincoln’s total 354 (233 being necessary for a choice) and the nomination was then made unanimous. Hannibal Hamlin, of Maine, was nominated for the vice-presidency. The conven- tion was singularly tumultuous and noisy; large claques were hired by both Lincoln’s and Seward’s managers. During the campaign Lincoln remained in Springfield, making few speeches and writing practically no letters for publication. The campaign was unusually animated — only the Whig campaign for William Henry Harrison in 1840 is comparable to it: there were great torchlight processions of ” wide-awake ” clubs, which did ” rail- fence,” or zigzag, marches, and carried rails in honour of their candidate, the ” rail-splitter.” Lincoln was elected by a popular vote of 1,866,452 to 1,375,157 for Douglas, 847,953 for Breckin- ridge and 590,631 for Bell — as the combined vote of his opponents was so much greater than his own he was often called ” the minority president “; the electoral vote was: Lincoln, 180; John C. Breckinridge, 72; John Bell, 39; Stephen A. Douglas, 12. On the 4th of March 1861 Lincoln was inaugurated as president. (For an account of his administration see United States: History.)

During the campaign radical leaders in the South frequently asserted that the success of the Republicans at the polls would mean that the rights of the slave-holding states under the Federal constitution, as interpreted by them, would no longer be respected by the North, and that, if Lincoln were elected, it would be the duty of these slave-holding states to secede from the Union. There was much opposition in these states to such a course, but the secessionists triumphed, and by the time President Lincoln was inaugurated, South Carolina, Georgia, Alabama, Florida, Mississippi, Louisiana and Texas had formally withdrawn from the Union. A provisional government under the designation ” The Confederate States of America,” with Jefferson Davis as president, was organized by the seceding states, which seized by force nearly all the forts, arsenals and public buildings within their limits. Great division of sentiment existed in the North, whether in this emergency acquiescence or coercion was the preferable policy. Lincoln’s inaugural address declared the Union perpetual and acts of secession void, and announced the determination of the government to defend its authority, and to hold forts and places yet in its possession. He disclaimed any intention to invade, subjugate or oppress

1 Without Lincoln’s knowledge or consent, the managers of his candidacy before the convention bargained for Cameron’s votes by promising to Cameron a place in Lincoln’s cabinet, should Lincoln ue elected. Cameron became Lincoln’s first secretary of war.

the seceding states. ” You can have no conflict,” he said, ” without being yourselves the aggressors.” Fort Sumter, in Charleston harbour, had been besieged by the secessionists

since January; and, it being now on the point of surrender through starvation, Lincoln sent the besiegers official notice on the 8th of April that a fleet was on its way to carry provisions to the fort, but that he would not attempt to reinforce it unless this effort were resisted. The Confederates, however, imme- diately ordered its reduction, and after a thirty-four hours' bom- bardment the garrison capitulated on the 13th of April 1861. (For the military history of the war, see American Civil War.)

With civil war thus provoked, Lincoln, on the 15th of April, by proclamation called 75,000 three months' militia under arms, and on the 4th of May ordered the further enlistment of 64,748 soldiers and 18,000 seamen for three years' service. He instituted by proclamation of the 19th of April a blockade of the Southern ports, took effective steps to extemporize a navy, convened Congress in special session (on the 4th of July) , and asked for legislation and authority to make the war " short, sharp and decisive." The country responded with enthusiasm to his summons and suggestions; and the South on its side was not less active.

The slavery question presented vexatious difficulties in conducting the war. Congress in August 1861 passed an act (approved August 6th) confiscating rights of slave-owners to slaves employed in hostile service against the Union. On the 30th of August General Fremont by military order declared martial law and confiscation against active enemies, with freedom to their slaves, in the State of Missouri. Believing that under existing conditions such a step was both detrimental in present policy and unauthorized in law, President Lincoln directed him (2nd September) to modify the order to make it conform to the Confiscation Act of Congress, and on the nth of September annulled the parts of the order which conflicted with this act. Strong political factions were instantly formed for and against military emancipation, and the government was hotly beset by antagonistic counsel. The Unionists of the border slave states were greatly alarmed, but Lincoln by his moderate conservatism held them to the military support of the government. 2 Meanwhile he sagaciously prepared the way for the supreme act of statesmanship which the gathering national crisis already dimly foreshadowed. On the 6th of March 1862, he sent a special message to Congress recommending the passage of a resolution offering pecuniary aid from the general government to induce states to adopt gradual abolishment of slavery. Promptly passed by Congress, the resolution produced no immediate result except in its influence on public opinion. A practical step, however, soon followed. In April Congress passed and the president approved (6th April) an act emancipat- ing the slaves in the District of Columbia, with compensation to owners — a measure which Lincoln had proposed when in Congress. Meanwhile slaves of loyal masters were constantly escaping to military camps. Some commanders excluded them altogether; others surrendered them on demand ; while still others sheltered and protected them against their owners. Lincoln tolerated this latitude as falling properly within the military discretion pertaining to local army operations. A new case, however, soon demanded his official interference. On the 9th of May 1862 General David Hunter, commanding in the limited areas gained along the southern coast, issued a short order declaring his depart- ment under martial law, and adding — " Slavery and martial law in a free country are altogether incompatible. The persons in these three States — Georgia, Florida and South Carolina — heretofore

2 In November 1861 the president drafted a bill providing (1) that all slaves more than thirty-five years old in the state of Dela- ware should immediately become free; (2) that all children of slave parentage born after the passage of the act should be free ; (3) that all others should be free on attaining the age of thirty-five or after the 1st of January 1893, except for terms of apprenticeship; and (4) that the national government should pay to the state of Delaware $23,200 a year for twenty-one years. But this bill, which Lincoln had hoped would introduce a system of " compensated emancipa- tion," was not approved by the legislature of Delaware, which considered it in February 1862.

held as slaves are, therefore, declared for ever free." As soon as this order, by the slow method of communication by sea, reached the newspapers, L'ncoln (May 19) published a proclama- tion declaring it void; adding further, " Whether it be com- petent for me as commander-in-chief of the army and navy to declare the slaves of any state or states free, and whether at any time or in any case it shall have become a necessity indispensable to the maintenance of the government to exercise such supposed power, are questions which under my responsibility I reserve to myself, and which I cannot feel justified in leaving to the decision of commanders in the field. These are totally different questions from those of police regulations in armies or camps." But in the same proclamation Lincoln recalled to the public his own proposal and the assent of Congress to compensate states which would adopt voluntary and gradual abolishment. " To the people of these states now," he added, " I must earnestly appeal. I do not argue. I beseech you to make the argument for yourselves. You cannot, if you would, be blind to the signs of the times." Meanwhile the anti-slavery sentiment of the North constantly increased. Congress by express act (approved on the 19th of June) prohibited the existence of slavery in all territories outside of states. On July the 12th the president called the representatives of the border slave states to the executive mansion, and once more urged upon them his proposal of compensated emancipation. " If the war continues long," he said, " as it must if the object be not sooner attained, the institution in your states will be extinguished by mere friction and abrasion — by the mere incidents of the war. It will be gone, and you will have nothing valuable in lieu of it." Although Lincoln's appeal brought the border states to no practical decision — the representatives of these states almost without exception opposed the plan — it served to prepare public opinion for his final act. During the month of July his own mind reached the virtual determination to give slavery its coup de grdce; on the 17th he approved a new Confiscation Act, much broader than that of the 6th of August 1861 (which freed only those slaves in military service against the Union) and giving to the president power to employ persons of African descent for the suppression of the rebellion; and on the 22nd he submitted to his cabinet the draft of an emancipation proclamation sub- stantially as afterward issued. Serious military reverses con- strained him for the present to withhold it, while on the other hand they served to increase the pressure upon him from anti-slavery men. Horace Greeley having addressed a public letter to him complaining of " the policy you seem to be pursuing with regard to the slaves of the rebels," the president replied on the 22nd of August, saying, " My paramount object is to save the Union, and not either to save or destroy slavery. If I could save the Union without freeing any slave, I would do it; if I could save it by freeing all the slaves, I would do it; and, if I could do it by freeing some and leaving others alone, I would also do that." Thus still holding back violent reformers with one hand, and leading up halting conservatives with the other, he on the 13th of September replied among other things to an address from a delegation: " I do not want to issue a document that the whole world will see must necessarily be inoperative like the pope's bull against the comet. ... I view this matter as a practical war measure, to be decided on according to the advantages or dis- advantages it may offer to the suppression of the rebellion. . . . I have not decided against a proclamation of liberty to the slaves, but hold the matter under advisement."

The year 1862 had opened with important Union victories. Admiral A.H. Foote captured Fort Henry on the 6th of February, and Gen. U. S. Grant captured Fort Donelson on the 16th of February, and won the battle of Shiloh on the 6th and 7th of April. Gen. A. E. Burnside took possession of Roanoke island on the North Carolina coast (7th February). The famous contest between the new ironclads " Monitor " and " Merrimac " (9th April), though indecisive, effectually stopped the career of the Confederate vessel, which was later destroyed by the Confederates themselves. (See Hampton Roads.) Farragut, with a wooden fleet, ran past the twin forts St Philip and Jackson,

compelled the surrender of New Orleans (26th April), and gained control of the lower Mississippi. The succeeding three months brought disaster and discouragement to the Union army. M'Clellan's campaign against Richmond was made abortive by his

timorous generalship, and compelled the with- drawal of his army. Pope's army, advancing against the same city by another line, was beaten back upon Washington in defeat. The tide of war, however, once more turned in the defeat of Lee's invading army at South Mountain and Antietam in Maryland on the 14th and on the 16th and 17th of September, compelling him to retreat.

With public opinion thus ripened by alternate defeat and victory, President Lincoln, on the 22nd of September 1862, issued his preliminary proclamation of emancipation, giving notice that on the 1st of January 1863, " all persons held as slaves within any state or designated part of a state the people whereof shall then be in rebellion against the United States shall be then, thenceforward and for ever free." In his message to Congress on the 1st of December following, he again urged his plan of gradual, compensated emancipation (to be com- pleted on the 1st of December 1900) " as a means, not in exclusion of, but additional to, all others for restoring and preserving the national authority throughout the Union." On the 1st day of January 1863 the final proclamation of emancipation was duly issued, designating the States of Arkansas, Texas, Mississippi, Alabama, Florida, Georgia, South Carolina, North Carolina, and certain portions of Louisiana and Virginia, as " this day in rebellion against the United States," and pro- claiming that, in virtue of his authority as commander-in- chief, and as a necessary war measure for suppressing rebellion, " I do order and declare that all persons held as slaves within said designated states and parts of states are and henceforward shall be free," and pledging the executive and military power of the government to maintain such freedom. The legal validity of these proclamations was never pronounced upon by the national courts; but their decrees gradually enforced by the march of armies were soon recognized by public opinion to be practically irreversible. 1 Such dissatisfaction as they caused in the border slave states died out in the stress of war. The systematic enlistment of negroes and their incorporation into the army by regiments, hitherto only tried as exceptional experiments, were now pushed with vigour, and, being followed by several conspicuous instances of their gallantry on the battlefield, added another strong impulse to the sweeping change of popular sentiment. To put the finality of emancipation beyond all question, Lincoln in the winter session of 1 863-1 864 strongly supported a movement in Congress to abolish slavery by con- stitutional amendment, but the necessary two-thirds vote of the House of Representatives could not then be obtained. In his annual message of the 6th of December 1864, he urged the im- mediate passage of the measure. Congress now acted promptly: on the 31st of January 1865, that body by joint resolution proposed to the states the 13th amendment of the Federal Con- stitution, providing that " neither slavery nor involuntary servitude, except as a punishment for crime, whereof the party shall have been duly convicted, shall exist within the United States or any place subject to their jurisdiction." Before the end of that year twenty-seven out of the thirty-six states of the Union (being the required three-fourths) had ratified the

1 It is to be noted that slavery in the border slave states was not affected by the proclamation. The parts of Virginia and Louisiana not affected were those then considered to be under Federal juris- diction; in Virginia 55 counties were excepted (including the 48 which became the separate state of West Virginia), and in Louisiana 13 parishes (including the parish of Orleans). As the Federal Govern- ment did not, at the time, actually have jurisdiction over the rest of the territory of the Confederate States, that really affected, some writers have questioned whether the proclamation really emancipated any slaves when it was issued. The proclamation had the most im- portant political effect in the North of rallying more than ever to the support of the administration the large anti-slavery element. The adoption of the 13th amendment to the Federal Constitution in 1865 rendered unnecessary any decision of the U.S. Supreme Court upon the validity of the proclamation.

amendment, and official proclamation made by President Johnson on the 18th of

December 1865, declared it duly adopted.

The foreign policy of President Lincoln, while subordinate in importance to the great questions of the Civil War, nevertheless presented several difficult and critical problems for his decision. The arrest (8th of November 1861) by Captain Charles Wilkes of two Confederate envoys proceeding to Europe in the British steamer ” Trent ” seriously threatened peace with England. Public opinion in America almost unanimously sustained the act; but Lincoln, convinced that the rights of Great Britain as a neutral had been violated, promptly, upon the demand of England, ordered the liberation of the prisoners (26th of December). Later friendly relations between the United States and Great Britain, where, among the upper classes, there was a strong sentiment in favour of the Confederacy, were seriously threatened by the fitting out of Confederate privateers in British ports, and the Administration owed much to the skilful diplomacy of the American minister in London, Charles Francis Adams. A still broader foreign question grew out of Mexican affairs, when events culminating in the setting up of Maximilian of Austria as emperor under protection of French troops demanded the constant watchfulness of the United States. Lincoln’s course was one of prudent moderation. France voluntarily declared that she sought in Mexico only to satisfy injuries done her and not to overthrow or establish local government or to appropriate territory. The United States Government replied that, relying on these assurances, it would maintain strict non-intervention, at the same time openly avowing the general sympathy of its people with a Mexican republic, and that ” their own safety and the cheerful destiny to which they aspire are intimately dependent on the continuance of free republican institutions throughout America.” In the early part of 1863 the French Government proposed a mediation between the North and the South. This offer President Lincoln (on the 6th of February) declined to consider, Seward replying for him that it would only be entering into diplomatic discussion with the rebels whether the authority of the govern- ment should be renounced, and the country delivered over to disunion and anarchy.

The Civil War gradually grew to dimensions beyond all ex- pectation. By January 1863 the Union armies numbered near a million men, and were kept up to this strength till the end of the struggle. The Federal war debt eventually reached the sum of $2,700,000,060. The fortunes of battle were somewhat fluctuating during the first half’ of 1863, but the beginning of July brought the Union forces decisive victories. The reduction of Vicksburg (4th of July) and Port Hudson (9th of July), with other operations, restored complete control of the Mississippi, severing the Southern Confederacy. In the east Lee had the second time marched his army into Pennsylvania to suffer a disastrous defeat at Gettysburg, on the 1st, 2nd and 3rd of July, though he was able to withdraw his shattered forces south of the Potomac. At the dedication of this battlefield as a soldiers’ cemetery in November, President Lincoln made the following oration, which has taken permanent place as a classic in American literature: —

” Fourscore and seven years ago our fathers brought forth on this continent a new nation conceived in liberty and dedicated to the proposition that all men are created equal. Now we are engaged in a great civil war testing whether that nation, or any nation so con- ceived and so dedicated, can long endure. We are met on a great battlefield of that war. We have come to dedicate a portion of that field as a final resting-place for those who here gave their lives that that nation might live. It is altogether fitting and proper that we should do this. But, in a larger sense, we cannot dedicate, we cannot consecrate, we cannot hallow this ground. The brave men, living and dead, who struggled here have consecrated it far above our poor power to add or detract. The world will little note nor long remember what we say here, but it can never forget what they did here. It is for us the living rather to be dedicated here to the unfinished work which they who fought here have thus far so nobly advanced. It is rather for us to be here dedicated to the great task remaining before us — that from these honoured dead we take increased devotion to that cause for which they gave the last full measure of devotion — that we here highly resolve that these

dead shall not have died in vain, that this nation under God shall have a new birth of freedom, and that government of the people, by the people, for the people, shall not perish from the earth."

In the unexpected prolongation of the war, volunteer enlist- ments became too slow to replenish the waste of armies, and in 1863 the government was forced to resort to a draft. The enforcement of the conscription created much opposition in various parts of the country, and led to a serious riot in the city of New York on the i3th-i6th of July. President Lincoln executed the draft with all possible justice and forbearance, but refused every importunity to postpone it. It was made a special subject of criticism by the Democratic party of the North, which was now organizing itself on the basis of a discontinuance of the war, to endeavour to win the presidential election of the following year. Clement L. Vallandigham of Ohio, having made a violent public speech at Mt. Vernon, Ohfo, on the 1st of May against the war and military proceedings, T/as arrested on the 5th of May by General Burnside, tried by military commission, and sentenced on the 16th to imprisonment; a writ of habeas corpus had been refused, and the sentence was changed by the president to transportation beyond the military lines. By way of political defiance the Democrats of Ohio nominated Vallan- digham for governor on the nth of June. Prominent Democrats and a committee of the Convention having appealed for his release, Lincoln wrote two long letters in reply discussing the constitutional question, and declaring that in his judgment the president as commanderˆn-chief in time of rebellion or invasion holds the power and responsibility of suspending the privilege of the writ of habeas corpus, but offering to release Vallandigham if the committee would sign a declaration that rebellion exists, that an army and navy are constitutional means to suppress it, and that each of them would use his personal power and influence to prosecute the war. This liberal off er and their refusal to accept it counteracted all the political capital they hoped to make out of the case; and public opinion was still more powerfully influenced in behalf of the president's action, by the pathos of the query which he propounded in one of his letters: " Must I shoot the simple-minded soldier boy who deserts, while I must not touch a hair of a wily agitator who induces him to desert?" When the election took place in Ohio, Vallandigham was defeated by a majority of more than a hundred thousand.

Many unfounded rumours of a willingness on the part of the Confederate States to make peace were circulated to weaken the Union war spirit. To all such suggestions, up to the time of issuing his emancipation proclamation, Lincoln announced his readiness to stop fighting and grant amnesty, whenever they would submit to and maintain the national authority under the Constitution of the United States. Certain agents in Canada having in 1864 intimated that they were empowered to treat for peace, Lincoln; through Greeley, tendered them safe conduct to Washington. They were by this forced to confess that they possessed no authority to negotiate. The president thereupon sent them, and made public, the following standing offer: —

" To whom it may concern:

" Any proposition which embraces the restoration of peace, the integrity of the whole Union, and the abandonment of slavery, and which comes by and with an authority that can control the armies now at war against the United States, will be received and con- sidered by the Executive Government of the United States, and will be met by liberal terms on substantial and collateral points, and the bearer or bearers thereof shall have safe conduct both ways. " July 18, 1864." " Abraham Lincoln."

A noteworthy conference on this question took place near the close of the Civil War, when the strength of the Confederacy was almost exhausted. F. P. Blair, senior, a personal friend of Jefferson Davis, acting solely on his own responsibility, was permitted to go from Washington to Richmond, where, on the 1 2th of January 1865, after a private and unofficial interview, Davis in writing declared his willingness to enter a conference "to secure peace to the two countries." Report being duly made to President Lincoln, he wrote a note (dated 18th January) consenting to receive any

agent sent informally ” wiLh the view of securing peace to the people of our common country.” Upon

the basis of this latter proposition three Confederate commissioners (A. H. Stevens, J. A. C. Campbell and R. M. T. Hunter) finally came to Hampton Roads, where President Lincoln and Secretary Seward met them on the U.S. steam transport ” River Queen,” and on the 3rd of February 1865 an informal conference of four hours' duration was held. Private reports of the interview agree substantially in the statement that the Confederates proposed a cessation of the Civil War, and postponement of its issues for future adjustment, while for the present the belligerents should unite in a campaign to expel the French from Mexico, and to enforce the Monroe doctrine. President Lincoln, however, although he offered to use his influence to secure compensation by the Federal government to slave-owners for their slaves, if there should be ” voluntary abolition of slavery by the states,” a liberal and generous administration of the Confiscation Act, and the immediate representation of the southern states in Congress, refused to consider any alliance against the French in Mexico, and adhered to the instructions he had given Seward before deciding to personally accompany him. These formulated three indispensable conditions to adjustment: first, the restora- tion of the national authority throughout all the states; second, no receding by the executive of the United States on the slavery question; third, no cessation of hostilities short of an end of the war, and the disbanding of all forces hostile to the govern- ment. These terms the commissioners were not authorized to accept, and the interview ended without result.

As Lincoln's first presidential term of four years neared its end, the Democratic party gathered itself for a supreme effort to regain the ascendancy lost in i860. The slow progress of the war, the severe sacrifice of life in campaign and battle, the enormous accumulation of public debt, arbitrary arrests and suspension of habeas corpus, the rigour of the draft, and the proclamation of military emancipation furnished ample subjects of bitter and vindictive campaign oratory. A partisan coterie which surrounded M'Clellan loudly charged the failure of his Richmond campaign to official interference in his plans. Vallandigham had returned to his home in defiance of his banish- ment beyond military lines, and was leniently suffered to remain. The aggressive spirit of the party, however, pushed it to a fatal extreme. The Democratic National Convention adopted (August 29, 1864) a resolution (drafted by Vallandigham) declaring the war a failure, and demanding a cessation of hostilities; it nominated M'Clellan for president, and instead of adjourning sine die as usual, remained organized, and subject to be con- vened at any time and place by the executive national com- mittee. This threatening attitude, in conjunction with alarming indications of a conspiracy to resist the draft, had the effect to thoroughly consolidate the war party, which had on the 8th of June unanimously renominated Lincoln, and had nominated Andrew Johnson of Tennessee for the vice-presidency. At the election held on the 8th of November 1864, Lincoln received 2,216,076 of the popular votes, and M'Clellan (who had openly disapproved of the resolution declaring the war a failure) but 1,808,725; while of the presidential electors 212 voted for Lincoln and 21 for M'Clellan. Lincoln's second term of office began on the 4th of March 1865.

While this political contest was going on the Civil War was being brought to a decisive close. Grant, at the head of the Army of the Potomac, followed Lee to Richmond and Peters- burg, and held him in siege to within a few days of final surrender. General W. T. Sherman, commanding the bulk of the Union forces in the Mississippi Valley, swept in a victorious march through the heart of the Confederacy to Savannah on the coast, and thence northward to North Carolina. Lee evacuated Rich- mond on the 2nd of April, and was overtaken by Grant and compelled to surrender his entire army on the 9th of April 1865. Sherman pushed Johnston to a surrender on the 26th of April. This ended the war.

Lincoln being at the time on a visit to the army, entered Rich- mond the day after its surrender. Returning to Washington, he made his last public address on the evening of the nth of April, devoted mainly to the question of reconstructing loyal govern-

ments in the conquered states. On the evening of the 14th of April he attended Ford's theatre in Washington. While seated with his family and friends absorbed in the play, John Wilkes Booth, an actor, who with others had prepared a plot to assassin- ate the several heads of government, went into the little corridor leading to the upper stage-box, and secured it against ingress by a wooden bar. Then stealthily entering the box, he discharged a pistol at the head of the president from behind, the ball penetrat- ing the brain. Brandishing a huge knife, with which he wounded Colonel Rathbone who attempted to hold him, the assassin rushed through the stage-box to the front and leaped down upon the stage, escaping behind the scenes and from the rear of the building, but was pursued, and twelve days afterwards shot in a barn where he had concealed himself. The wounded president was borne to a house across the street, where he breathed his last at 7 a.m. on the 15th of April 1865.

President Lincoln was of unusual stature, 6 ft. 4 in., and of spare but muscular build; he had been in youth remarkably strong and skilful in the athletic games of the frontier, where, however, his popularity and recognized impartiality oftener made him an umpire than a champion. He had regular and prepossessing features, dark complexion, broad high forehead, prominent cheek bones, grey deep-set eyes, and bushy black hair, turning to grey at the time of his death. Abstemious in his habits, he possessed great physical endurance. He was almost as tender-hearted as a woman. " I have not willingly planted a thorn in any man's bosom," he was able to say. His patience was inexhaustible. He had naturally a most cheerful and sunny temper, was highly social and sympathetic, loved pleasant conversation, wit, anecdote and laughter. Beneath this, however, ran an undercurrent of sadness; he was occasionally subject to hours of deep silence and introspection that approached a condition of trance. In manner he was simple, direct, void of the least affectation, and entirely free from awkwardness, oddity or eccentricity. His mental qualities were — a quick analytic per- ception, strong logical powers, a tenacious memory, a liberal estimate and tolerance of the opinions of others, ready intuition of human nature; and perhaps his most valuable faculty was rare ability to divest himself of all feeling or passion in weighing motives of persons or problems of state. His speech and diction were plain, terse, forcible. Relating anecdotes with appreciative humour and fas- cinating dramatic skill, he used them freely and effectively in conversation and argument. He loved manliness, truth and justice. He despised all trickery and selfish greed. In arguments at the bar he was so fair to his opponent that he frequently appeared to concede away his client's case. He was ever ready to take blame on himself and bestow praise on others. " I claim not to have controlled events," he said, " but confess plainly that events have controlled me." The Declaration of Independence was his political chart and in- spiration. He acknowledged a universal equality of human rights. " Certainly the negro is not our equal in colour," he said, " perhaps not in many other respects; still, in the right to put into his mouth the bread that his own hands have earned, he is the equal of every other man white or black." He had unchanging faith in self- government. " The people," he said, " are the # rightful masters of both congresses and courts, not to overthrow the constitution, but to overthrow the men who pervert the constitution." Yielding and accommodating in non-essentials, he was inflexibly firm in a principle or position deliberately taken. " Let us have faith that right makes might," he said, " and in that faith let us to the end dare to do our duty as we understand it." The emancipation proclamation once issued, he reiterated his purpose never to retract or modify it. " There have been men base enough," he said, " to propose to me to return to slavery our black warriors of Port Hudson and Olustee, and thus win the respect of the masters they fought. Should I do so I should deserve to be damned in time and eternity. Come what will, I will keep my faith with friend and foe." Benevolence and forgiveness were the very basis of his character; his world-wide humanity is aptly embodied in a phrase of his second inaugural: "With malice toward none, with charity for all." His nature was deeply religious, but he belonged to no denomination.

Lincoln married in Springfield on the 4th of November 1842, Mary Todd (1818-1882), also a native of Kentucky, who bore him four sons, of whom the only one to grow up was the eldest, Robert Todd Lincoln (b. 1843), who graduated at Harvard in 1864, served as a captain on the staff of General Grant in 1865, was admitted to the Illinois bar in 1867, was secretary of war in the cabinets of Presidents Garfield and Arthur in 1881-1885, and United States Minister to Great Britain in 1 889-1 893, and was prominently connected with many large corporations, becoming in 1897 president of the Pullman Co.

Of the many statues of President Lincoln in American cities, the best known is that, in Chicago, by St Gaudens. Among the

others are two by Thomas Ball, one in statuary hall in the Capitol at Washington, and one in Boston; two — one in Rochester, N.Y., and one in Springfield, 111. — by Leonard W. Volk, who made a life-mask and a bust of Lincoln in i860; and one by J. Q. A. Ward, in Lincoln Park, Washington. Francis B. Carpenter painted in 1864 ” Lincoln signing the Emancipation Proclamation,” now in the Capitol at Washington.

See The Complete Works of Abraham Lincoln (12 vols., New York, 1906-1907; enlarged from the 2-volume edition of 1894 by John G. Nicolay and John Hay). There are various editions of the Lincoln- Douglas debates of 1858; perhaps the best is that edited by E. E. Sparks (1908). There are numerous biographies, and biographical studies, including: John G. Nicolay and John Hay, Abraham Lincoln: A History (10 vols., New York, 1890), a monumental work by his private secretaries who treat primarily his official life; John G. Nicolay, A Short Life of Abraham Lincoln (New York, 1904), condensed from the preceding; John T. Morse, Jr., Abraham Lincoln (2 vols., Boston, 1896), in the ” American Statesmen ” series, an excellent brief biography, dealing chiefly with Lincoln’s political career; Ida M.Tarbell, The Early Life of Lincoln (New York, 1896) and Life of Abraham Lincoln (2 vols., New York, 1900), containing new material to which too great prominence and credence is some- times given; Carl Schurz, Abraham Lincoln: An Essay (Boston, 1891), a remarkably able estimate; Ward H. Lamon, The Life of Abraham Lincoln from his Birth to his Inauguration as President (Boston, 1872), supplemented by Recollections of Abraham Lincoln 1847-1865 (Chicago, 1895), compiled by Dorothy Lamon, valuable for some personal recollections, but tactless, uncritical, and marred by the effort of the writer, who as marshal of the District of Columbia, knew Lincoln intimately, to prove that Lincoln’s melancholy was due to his lack of religious belief of the orthodox sort; William H. Herndon and Jesse W. Weik, Abraham Lincoln, the True Story of a Great Life (3 vols., Chicago, 1889; revised, 2 vols., New York, 1892), an intimate and ill-proportioned biography by Lincoln’s law partner who exaggerates the importance of the petty incidents of his youth and young manhood; Isaac N. Arnold, History of Abraham Lincoln and the Overthrow of Slavery (Chicago, 1867), revised and enlarged as Life of Abraham Lincoln (Chicago, 1885), valuable for personal reminiscences; Gideon Welles, Lincoln and Seward (New York, 1874), the reply of Lincoln’s secretary of the navy to Charles Francis Adams’s eulogy (delivered in Albany in April 1873) on Lincoln’s secretary of state, W. H. Seward, in which Adams claimed that Seward was the premier of Lincoln’s administration; F. B. Carpenter, Six Months in the White House (New York, 1866), an excellent account of Lincoln’s daily life while president; Robert T. Hill, Lincoln the Lawyer (New York, 1906) ; A. Rothschild, Lincoln, the Master of Men (Boston, 1906); J. Eaton and E. O. Mason, Grant, Lincoln, and the Freedmen (New York, 1907) ; R. W. Gilder, Lincoln, the Leader, and Lincoln’s Genius for Expression (New York, 1909); M. L. Learned, Abraham Lincoln: An American Migration (Philadelphia, 1909), a careful study of the Lincoln family in America ; W. P. Pickett, The Negro Problem: Abraham Lincoln’s Solution (New York, 1909); James H. Lea and J. R. Hutchinson, The Ancestry of Abraham Lincoln (Boston, 1909), a careful genealogical monograph ; and C. H. McCarthy, Lincoln’s Plan of Reconstruction (New York, 1901). For an excellent account

of Lincoln as president see J. F. Rhodes, History of the United States from the Compromise of 1850 (7 vols., 1893-1906). (J. G. N.-, C. C. W.)

LINCOLN, a city and county of a city, municipal, county and parliamentary borough, and the county town of Lincolnshire, England. Pop. (1901) 48,784. It is picturesquely situated on the summit and south slope of the limestone ridge of the Cliff range of hills, which rises from the north bank of the river Witham, at its confluence with the Foss Dyke, to an altitude of 200 ft. above the river. The cathedral rises majestically from the crown of the hill, and is a landmark for many miles. Lincoln is 130 m. N. by W. from London by the Great Northern railway; it is also served by branches of the Great Eastern, Great Central and Midland railways.

Lincoln is one of the most interesting cities in England. The ancient British town occupied the crown of the hill beyond the Newport or North Gate. The Roman town consisted of two parallelograms of unequal length, the first extending west from the Newport gate to a point a little west of the castle keep. The second parallelogram, added as the town increased in size and importance, extended due south from this point down the hill towards the Witham as far as Newland, and thence in a direction due east as far as Broad Street. Returning thence due north, it joined the south-east corner of the first and oldest parallelogram in what was afterwards known as the Minster yard, and terminated its east side upon its junction with the

north wall in a line with the Newport gate. This is the oldest part of the town, and is named" abovehill." After the departure of the Romans, the city walls were extended still farther in a south direction across the Witham as far as the great bar gate, the south entrance to the High Street of the city; the junction of these walls with the later Roman one was effected immediately behind Broad Street. The " above hill " portion of the city consists of narrow irregular streets, some of which are too steep to admit of being ascended by carriages. The south portion, which is named " below hill," is much more commodious, and contains the principal business premises. Here also are the railway stations.

The glory of Lincoln is the noble cathedral of the Blessed Virgin Mary, commonly known as the Minster. As a study to the architect and antiquary this stands unrivalled, not only as embodying the earliest purely Gothic work extant, but as containing within its compass every variety of style from the simple massive Norman of the central west front, and the later and more ornate examples of that style in the west doorways and towers; onward through all the Gothic styles, of each of which both early and late examples appear. The building material is the oolite and calcareous stone of Lincoln Heath and Haydor, which has the peculiarity of becoming hardened on the surface when tooled. Formerly the cathedral had three spires, all of wood or leaded timber. The spire on the central tower, which would appear to have been the highest in the world, was blown down in 1547. Those on the two western towers were removed in 1808.

The ground plan of the first church, adopted from that of Rouen, was laid by Bishop Remigius in 1086, and the church was consecrated three days after his death, on the 6th of May 1092. The west front consists of an Early English screen {c. 1225) thrown over the Norman front, the west towers rising behind it. The earliest Norman work is part of that of Remigius; the great portals and the west towers up to the third storey are Norman c. 1148. The upper parts of therri date from 1365. Perpendicular windows (c. 1450) are inserted. The nave and aisles were completed c. 1220. The transepts mainly built between 11 86 and 1235 have two fine rose windows, that in the N. is Early English, and that in the S. Decorated. The first has beautiful contemporary stained glass. These are called re- spectively the Dean's Eye and Bishop's Eye. A Galilee of rich Early English work forms the entrance of the S. transept. Of the choir the western portion known as St Hugh's (1 186-1204) is the famous first example of pointed work; the eastern, called the Angel Choir, is a magnificently ornate work completed in 1280. Fine Perpendicular canopied stalls fill the western part. The great east window, 57 ft. in height, is an example of transition from Early English to

Decorated c. 1288. Other noteworthy features of the interior are the Easter sepulchre (c. 1300), the foliage ornamentation of which is beautifully natural ; and tke organ screen of a somewhat earlier date. The great central tower is Early English as far as the first storey, the continuation dates from 1307. The total height is 271 ft.; and the tower contains the bell, Great Tom of Lincoln, weighing over 5 tons. The dimensions of the cathedral internally are — nave, 252X79-6X80 ft.; choir, 158X82X72 ft.; angel choir, which includes presbytery and lady chapel, 166X44X72 ft.; main transept, 220×63×74 ft. ; choir transept, 166×44×72 ft. The west towers are 206 ft. high.

The buildings of the close that call for notice are the chapter- house of ten sides, 60 ft. diameter, 42 ft. high, with a fine vestibule of the same height, built c. 1225, and therefore the earliest of English polygonal chapter-houses, and the library, a building of 1675, which contains a small museum. The picturesque episcopal palace con- tains work of the date of St Hugh, and the great hall is mainly Early English. There is some Decorated work, and much Perpendi- cular, including the gateway. It fell into disuse after the Reforma- tion, but by extensive restoration was brought back to its proper use at the end of the 19th century. Among the most famous bishops were St Hugh of Avalon (1 186-1200); Robert Grosseteste (1235- 1253); Richard Flemming (1420-1431), founder of Lincoln College, Oxford; William Smith' (1495-1514), founder of Braseriose College, Oxford; William Wake (1705-1716); and Edmund Gibson (1716- 1723). Every stall has produced a prelate or cardinal. The see covers almost the whole of the county, with very small portions of Norfolk and Yorkshire, and it included Nottinghamshire until the formation of the bishopric of Southwell in 1884. At its earliest formation, when Remigius, almoner of the abbey of Fecamp, re- moved the seat of the bishopric here from Dorchester in Oxfordshire shortly after the Conquest, it extended from the Humber to the Thames, eastward beyond Cambridge, and westward beyond Leicester. It was reduced, however, by the formation of the sees of Ely, Peterborough and Oxford, and by the rearrangement of diocesan boundaries in 1837.

LINCOLN

711

The remains of Roman Lincoln are of the highest interest. The Newport Arch or northern gate of Lindum is one of the most perfect specimens of Roman architecture in England. It consists of a great arch flanked by two smaller arches, of which one remains. The Roman Ermine Street runs through it, leading northward almost in a straight line to the Humber. Fragments of the town wall remain at various points; a large quantity of coins and other relics have been discovered; and remains of a burial-place and buildings unearthed. Of these last the most important is the series of column-bases, probably belonging to a Basilica, beneath a house in the street called Bail Gate, adjacent to the Newport Arch. A villa in Greet well; a tesselated pave- ment, a milestone and other relics in the cloister; an altar un- earthed at the church of St Swithin, are among many other discoveries. Among churches, apart from the minster, two of outstanding interest are those of St Mary-le-Wigford and St Peter-at-Gowts (i.e. sluice-gates), both in the lower part of High Street. Their towers, closely similar, are fine examples of perhaps very early Norman work, though they actually possess the characteristics of pre-Conquest workmanship. Bracebridge church shows similar early work; but as a whole the churches of Lincoln show plainly the results of the siege of 1644, and such buildings as St Botolph's, St Peter's-at-Arches and St Martin's are of the period 17 20-1 740. Several churches are modern buildings on ancient sites. There were formerly three small priories, five friaries and four hospitals in or near Lincoln. The preponderance of friaries over priories of monks is explained by the fact that the cathedral was served by secular canons. Bishop Grosseteste was the devoted patron of the friars, particularly the Franciscans, who were always in their day the town missionaries. The Greyfriars, near St Swithin's church, is a picturesque two- storied building of the 13th century. Lincoln is rich in early domestic architecture. The building known as John of Gaunt's stables, actually St Mary's Guild Hall, is of tw storeys, with rich Norman doorway and moulding. The Jews' House is another fine example of 12th-century building; and Norman remains appear in several other houses,

such as Deloraine Court and the House of Aaron the Jew. Lincoln Castle, lying W. of the cathedral, was newly founded by William the Conqueror when Remigius decided to found his minster under its protection. The site, with its artificial mounds, is of much earlier, probably British, date. There are Norman remains in the Gateway Tower; parts of the walls are of this period, and the keep dates from the middle of the 1 2 th century. Among medieval gateways, the Exchequer Gate, serving as the finance-office of the chapter, is a fine specimen of 13th-century work. Pottergate is of the 14th century, and Stonebow in High Street of the 15th, with the Guildhall above it. St Dunstan's Lock is the name, corrupted from Dunestall, now applied to the entrance to the street where a Jewish quarter was situated; here lived the Christian boy afterwards known as " little St Hugh," who was asserted to have been crucified by the Jews in 1255. His shrine remains in the S. choir aisle of the minster. Other antiquities are the Per- pendicular conduit of St Mary in High Street and the High Bridge, carrying High Street over the Witham, which is almost unique in England as retaining some of the old houses upon it. Among modern public buildings are the county hall, old and new corn exchanges and public library. Educational establish- ments include a grammar school, a girls' high school, a science and art school and a theological college. The arboretum in Monks Road is the principal pleasure-ground; and there is a race-course. The principal industry is the manufacture of agricultural machinery and implements; there are also iron foundries and makings, and a large trade in corn and agricultural produce. The parliamentary borough, returning one member, falls between the Gainsborough division of the county on the N., and that of Sleaford on the S. Area, 3755 acres.

History. — The British Lindun, which, according to the geography of Claudius Ptolemaeus, was the chief town of the Coritani, was probably the nucleus of the Roman town of Lindum. This was at first a Roman legionary fortress, and on the removal of the troops northward was converted into a municipality with

the title of colonia. Such important structural remains as have been described attest the rank and importance of the place, which, however, did not attain a very great size. Its bishop attended the council of Aries in 314, and Lincoln (Lindocolina, Lincolle, Nicole) is mentioned in the Itinerary of Antoninus written about 320. Although said to have been captured by Hengest in 475 and recovered by Ambrosius in the following year, the next authentic mention of the city is Bede's record that Paulinus preached in Lindsey in 628 and built a stone church at Lincoln in which he consecrated Honorius archbishop of Canterbury. During their inroads into Mercia, the Danes in 877 established themselves at Lincoln, which was one of the five boroughs recovered by King Edmund in 941. A mint established here in the reign of Alfred was maintained until the reign of Edward I. (Mint Street turning from High Street near the Stonebow recalls its existence.) At the time of the Domesday Survey Lincoln was governed by twelve Lawmen, relics of Danish rule, each witn Lereditable franchises of sac and soc. Whereas it had rendered **o annually to King Edward, and £10 to the earl, it then rencered £100. There had been 1150 houses, but 240 had been destroyed since the time of King Edward. Of these 166 had suffered by the raising of the castle by William I. in 1068 partly on ihe site of the Roman camp. The strengtn of the position of the castle brought much fighting on Lincoln. In 1 141 King Sttahen regained both castle and city from tne empress Maud, but was attacked and captured in the same year at the "joust 01 Lincoln." In 1144 he besieged the castle, held by the earl of Chester, and recovered it as a pledge in 1146. In noi it was held by Gerard de Camville for Prince John and was besieged Dy William Longchamp, Richard's chancellor, in vain; in 1210 it stood a siege by the partisans of the French prince ivOius, who were defeated at the battle called Lincoln Fair on the iqth of May 1217. Granted by Henry III. to William Longepee, earl of Salisbury, in 1224, the castle descended by the marriage 01 nis descendant Alice to Thomas Plantagenet, and became part of the duchy of Lancaster.

In 1 1 57 henry II. gave the citizens their first charter, granting them the city at a fee-farm rent and all the liberties which they had had under William II., with their gild merchant for them- selves ana tne men of the county as they had then. In 1 200 the citizens obtained release from all but pleas of the Crown without the wails, and pleas

of external tenure, and were given the pleas of the Crown within the city according to the customs of the city of London, on which those of Lincoln were modelled. The charter also gave them quittance of toll and lastage throughout the kingdom, and of certain other dues. In 1 2 10 the citizens owed the exchequer £100 for the privilege of having a mayor, but the office was abolished by Henry III. and by Edward I. in 1290, though restored by the charter of 1300. In 1275 the citizens claimed the return of writs, assize of bread and ale and other royal rights, and in 1301 Edward I., when confirming the previous charters, gave them quittance of murage, pannage, pontage and other dues. The mayor and citizens were given criminal jurisdiction in 1327, when the burghmanmot held weekly in the gildhall since 1272 by the mayor and bailiffs was ordered to hear all local pleas which led to friction with the judges of assize. The city became a separate county by charter of 1409, when it was decreed that the bailiffs should henceforth be sheriffs and the mayor the king's escheator, and the mayor and sheriffs with four others justices of the peace with defined jurisdiction. As the result of numerous complaints of inability to pay the fee-farm rent of £180 Edward IV. enlarged the bounds of the city in 1466, while Henry VHI. in 1546 gave the citizens four advowsons, and possibly also in consequence of declining trade the city markets were made free of tolls in 1554. Incorporated by Charles I. in 1628 under a common council with 13 aldermen, 4 coroners and other officers, Lincoln surrendered its charters in 1684, but the first charter was restored after the Revolution, and was in force till 1834.

Parliaments were held at Lincoln in 1301, 1316 and 1327, and the city returned two burgesses from 1295 to 1885, when it lost one member. After the 13th century the chief interests

of Lincoln were ecclesiastical and commercial. As early as 1 1 03 Odericus declared that a rich citizen of Lincoln kept the treasure of King Magnus of Norway, supplying him with all he required, and there is other evidence of intercourse with Scandi- navia. There was an important Jewish colony, Aaron of Lincoln being one of the most influential financiers in the kingdom between 1166 and 1186. It was probably jealousy of their wealth that brought the charge of the crucifixion of " little St Hugh "in 1235 upon the Jewish community. Made a staple of wool, leather and skins in 1291, famous for its scarlet cloth in the 13th century, Lincoln had a few years of great prosperity, but with the transference of the staple to Boston early in the reign of Edward III., its trade began to decrease. The craft gilds remained important until after the Reformation, a pageant still being held in 1566. The fair now held during the last whole week of April would seem to be identical with that granted by Charles II. in 1684. Edward III. authorized a fair from St Botolph's day to the feast of SS Peter and Paul in 1327, and William III. gave one for the first Wednesday in September in 1696, while the present November fair is, perhaps, a survival of that granted by Henry IV. in 1409 for fifteen days before the feast of the Deposition of St Hugh.

See Historical Manuscripts Commission, Report, xiv., appendix pt. 8; John Ross, Civitas Lincolina, from Us municipal and other Records (London, 1870); J. G. Williams, " Lincoln Civic Insignia," Lincolnshire Notes and Queries, vols, vi.viii. (Horncastle, 1901 1905); Victoria County History, Lincolnshire.

LINCOLN, a city and the county-seat of Logan county, Illinois, U.S.A., in the N. central part of the state, 156 m. S.W. of Chicago, and about 28 m. N.E. of Springfield. Pop. (1900) 8962, of whom 940 were foreign-born; (1910 census) 10,892. It is served by the Illinois Central and the Chicago & Alton railways and by the Illinois Traction Interurban Electric line. The city is the seat of the state asylum for feeble-minded children (established at Jacksonville in 1865 and removed to Lincoln in 1878), and of Lincoln College (Presbyterian) founded in 1865. There are also an orphans' home, supported by the Independent Order of Odd Fellows, and a Carnegie library. The old court-house in which Abraham Lincoln often practised is still standing. Lincoln is

situated in a productive grain region, and has valuable coal mines. The value of the factory products increased from $375,167 in 1900 to $784,248 in 1905, or 109%. The first settlement on the site of Lincoln was made in 1835, and the city was first chartered in 1857.

LINCOLN, a city of S.E. Nebraska, U.S.A., county-seat of Lancaster county and capital of the state. Pop. (1900) 40,169 (5297 being foreign-born) ; (1910 census) 43,973. It is served by the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Union Pacific, the Missouri Pacific and the Chicago & North-Western railways. Lincoln is one of the most attractive residential cities of the Middle West. Salt Creek, an affluent of the Platte river, skirts the city. On this side the city has repeatedly suffered from floods. The principal buildings include a state capitol (built 1883-1889); a city-hall, formerly the U.S. govern- ment building (1874-1879); a county court-house; a federal building (1904-1906); a Carnegie library (1902); a hospital for crippled children (1905) and a home for the friendless, both suprjorted by the state; a state penitentiary and asylum for the insane, both in the suburbs; and the university of Nebraska. In the suburbs there are three denominational schools, the Nebraska Wesleyan University (Methodist Episcopal, 1888) at University Place; Union College (Seventh Day Ad- ventists, 189 1) at College View; and Cotner University (Disciples of Christ, 1889, incorporated as the Nebraska Christian Uni- versity) at Bethany. Just outside the city limits are the state fair grounds, where a state fair is held annually. Lincoln is the see of a Roman Catholic bishopric. The surrounding country is a beautiful farming region, but its immediate W. environs iare predominantly bare and desolate salt-basins. Lincoln's " factory " product increased from $2,763,484 in 1900 to $5;222,620 in 1905, or 89%, the product for 1905 being 3-4% of the total for the state. The municipality owns and operates its electric-lighting plant and water-works.

The salt-springs attracted the first permanent settlers to the site of Lincoln in 1856, and settlers and freighters came long distances to reduce the brine or to scrape up the dry-weather surface deposits. In 1886-1887 the state sank a test-well 2463 ft. deep, which discredited any hope of a great underground flow or deposit. Scarcely any use is made of the salt waters locally. Lancaster county was organized extra-legally in 1859, and under legislative act in 1864; Lancaster village was platted and became the county-seat in 1864 (never being incorporated); and in 1867, when it contained five or six houses, its site was selected for the state capital after a hard-fought struggle between different sections of the state (see Nebraska). 1 The new city was incorporated as Lincoln (and formally declared the dounty- seat by the legislature) in 1869, and was chartered for the first time as a city of the second class in 1871; since then its charter has been repeatedly altered. After 1887 it was a city of the first class, and after 1889 the only member of the highest subdivision in that class. After a " reform " political campaign, the ousting in 1887 of a corrupt police judge by the mayor and city council, in defiance of an injunction of a federal court, led to a decision of the U.S. Supreme Court, favourable to the city authorities and important in questions of American municipal government. LINCOLN JUDGMENT, THE. In this celebrated English ecclesiastical suit, the bishop of Lincoln (Edward King; q.v.) was cited before his metropolitan, the archbishop of Canterbury (Dr Benson), to answer charges of various ritual offences com- mitted at the administration of Holy Communion in the church of St Peter at Gowts, in the diocese of Lincoln, on the 4th of December 1887, and in Lincoln cathedral on the 10th of December 1887. The promoters were Ernest de Lacy Read, William Brown, Felix Thomas Wilson and John Marshall, all inhabitants of the diocese of Lincoln, and the last two parishioners of St Peter at Gowts. The case has a permanent importance in two respects. First, certain disputed questions of ritual were legally decided. Secondly, the jurisdiction of the archbishop of Canter- bury alone to try one of his suffragan bishops for alleged ecclesi- astical offences was considered and judicially declared to be well founded both by the judicial committee of privy council and by the archbishop of Canterbury with the concurrence of his assessors. The proceedings were begun on the 2nd of June 1888 by a petition presented by the promoters to the archbishop, praying that a citation to the bishop of Lincoln might issue calling on him to answer certain ritual charges. On the 26th of June 1888 the archbishop, by letter,

declined to issue citation, on the ground that until instructed by a competent court as to his jurisdiction, he was not clear that he had it. The promoters appealed to the judicial committee of the privy council, to which an appeal lies under 25 Henry VIII. c. 19 for " lack of justice " in the archbishop's court. The matter was heard on the 20th of July 1888, and on the 8th of August 1888 the committee decided (i.) that an appeal lay from the refusal of the arch- bishop to the judicial committee, and (ii.) that the archbishop had jurisdiction to issue a citation to the bishop of Lincoln and to hear the promoters' complaint, but they abstained from expressing an Opinion as to whether the archbishop had a discre- tion to refuse citation — whether, in fact, he had any power of " veto " over the prosecution. The case being thus remitted to the archbishop, he decided to entertain it, and on the 4th of January 1889 issued a citation to the bishop of Lincoln.

On the 12th of February 1889 the archbishop of Canterbury sat in Lambeth Palace Library, accompanied by the bishops of London (Dr Temple), Winchester (Dr Harold Browne), Oxford (Dr Stubbs) and Salisbury (Dr Wordsworth), and the vicar- general (Sir J. Parker Deane) as assessors. The bishop of Lincoln appeared in person and read a " Protest " to the archbishop's jurisdiction to try him except in a court composed of the arch- bishop and all the bishops of the province as judges. The court adjourned in order that the question of jurisdiction might be argued. On the nth of May the archbishop gave judgment to

•Lincoln was about equally distant from Pawnee City and the Kansas border, the leading Missouri river towns, and the important towns of Fremont and Columbus on the N. side of the Platte.

the effect that whether sitting alone or with assessors he had jurisdiction to entertain the charge. On the 23rd and 24th of July 1889 a further preliminary objection raised by the bishop of Lincoln's counsel was argued. The offences alleged against the bishop of Lincoln were largely breaches of various rubrics in the communion service of the Prayer Book which give direc- tions to the " minister." These rubrics are by the Acts of Uniformity (1 Elizabeth c. 2, and 13 & 14 Car. II. c. 4) made legally binding. But it was argued that a bishop is not a " minister " so as to be bound by the rubrics. The archbishop, however, held otherwise, and the assessors (except the bishop of Salisbury, who dissented) concurred in this decision. At this and subsequent hearings the bishop of Hereford (Dr Atlay) took the place of the bishop of Winchester as an assessor, and the bishop of Rochester (Dr Thorold), originally appointed an assessor, but absent from England at the outset, was present.

The case was heard on its merits in February 1890, before the archbishop and all the assessors, and the archbishop delivered his judgment on the 21st of November 1890. The and alleged offences were eight in number. No facts were

decisions, in dispute, but only the legality of the various matters complained of. I. The bishop was charged with having mixed water with wine in the chalice during the com- munion service, and II. with having administered the chalice so mixed to the communicants. It was decided that the mixing of the water with the wine during service was illegal, because an additional ceremony not enjoined in the Prayer Book, but that the administration of the mixed chalice, the mixing having been effected before service, was in accordance with primitive practice and not forbidden in the Church of England. III. The bishop was charged with the ceremonial washing of the vessels used for the holy communion, and with drinking the water used for these ablutions. It was decided that the bishop had com- mitted no offence, and that what he had done was a reasonable compliance with the requirement of the rubric that any of the consecrated elements left over at the end of the celebration should be then and there consumed. IV. The bishop was charged with taking the eastward position (i.e.

standing at the west side of the holy table with his face to the east and his back to the congregation) during the ante-communion service (i.e. the part of the communion service prior to the consecration prayer). The rubric requires the celebrant to stand at the north side of the table. A vast amount of research convinced the archbishop that this is an intentionally ambiguous phrase which may with equal accuracy be applied to the north end of the table as now arranged in churches, and to the long side of the table, which, in Edward VI. 's. reign, was often placed lengthwise down the church, so that the long sides would face north and south. It was therefore decided (one of the assessors dissenting) that both positions are legal, and that the bishop had not offended in adopting the eastward position. V. The bishop was charged with so standing during the consecration prayer that the " Manual Acts " of consecration were invisible to the people gathered round. It should be stated that the courts (see Ridsdale v. Clifton, L.R. 1 P.D. 316; 2 P.D. 276) had already decided that the eastward position during the consecration prayer was legal, but that it must not be so used by the celebrant as to conceal the " Manual Acts." The archbishop held that the bishop of Lincoln had transgressed the law in this particular. VI. The bishop was charged with having, during the celebration of holy communion, allowed two candles to be alight on a shelf or retable behind the altar when they were not necessary for giving light. The archbishop decided that the mere presence of two altar candles burning during the service, but lit before it began, was lawful under the First Prayer Book of Edward VI., and has never been made unlawful, and, therefore, that the bishop was justified in what he had done. VII. The bishop was charged with having permitted the hymn known as Agnus Dei to be sung immediately after the consecration of the elements at a celebra- tion of the holy communion. The archbishop decided that the use of hymns in divine service was too firmly established to be legally questioned, and that there was nothing to differentiate

the use of this particular hymn at this point of the service from the use of other hymns on other occasions in public worship. VIII. The bishop was charged with making the sign of the Cross in the air with his hand in the benediction and at other times during divine service. The archbishop held that these crossings were ceremonies not enjoined and, therefore, illegal. The judg- ment confined itself to the legal declarations here summarized, and pronounced no monition or other sentence on the bishop of Lincoln in respect of the matters in which he appeared to have committed breaches of the ecclesiastical law.

The promoters appealed to the judicial committee. The bishop did not appear on the appeal, which was therefore argued on the side of the promoters only. The appeal was heard in June and July 1891, before Lords Halsbury, Hobhouse, Esher, Herschell, Hannen and Shand and Sir Richard Couch, with the bishop of Chichester (Dr Durnford), the bishop of St Davids (Dr Basil Jones) and the bishop of Lichfield (Dr Maclagan) as episcopal assessors. The points appealed were those above numbered II., III., IV., VI., VII. Judgment was given on the 2nd of August 1892, and the appeal failed on all points. As to II.; III., IV., and VII. the Committee agreed with the arch- bishop. As to VI. (altar lights) they held that, as it was not shown that the bishop was responsible for the presence of lighted candles, the charge could not be sustained against him, and so dismissed it without considering the general question of the lawfulness of altar lights. They also held that the arch- bishop was within his right in pronouncing no sentence against the bishop, who, it should be added, conformed his practice to the judgment from the date of its delivery. (L. T. D.)

LINCOLNSHIRE, an eastern county of England, bounded N. by the Humber, E. by the German Ocean and the Wash, S.E. for 3 m. by Norfolk, S. by Cambridgeshire and Northampton- shire, S. W. by Rutland, W. by Leicestershire and Nottingham- shire and N. W. by Yorkshire. The area is 2646 sq. m., the county being second to Yorkshire of the English counties in size.

The coast-line, about no m. in length, including the Humber shore, is generally low and marshy, and artificial banks for guard- ing against the inroads of the sea are to be found, in places, all along the coast. From Grimsby to Skegness traces of a sub- marine

forest are visible; but while the sea is encroaching upon some parts of the coast it is receding from others, as shown by Holbeach, which is now 6 m. from the sea. Several thousand acres have been reclaimed from this part of the Wash, and round the mouth of the Nene on the south-east. The deep bay between the coasts of Lincolnshire and Norfolk, called the Wash, is full of dangerous sandbanks and silt ; the navigable portion off the Lincolnshire coast is known as the Boston Deeps. The rapidity of the tides in this inlet, and the lowness of its shores, which ?,re generally indistinct on account of mist from a moderate offing, render this the most difficult portion of the navigation of the east coast of England. On some parts of the coast there are fine stretches of sand, and Cleethorpes, Skegness, Mablethorpe and Sutton-on-Sea are favourite resorts for visitors.

The surface of Lincolnshire is generally a large plain, small portions of which are slightly below the level of the sea. The south-east parts are perfectly flat; and about one-third of the county consists of fens and marshes, intersected in all directions by artificial drains, called locally dykes, delphs, drains, becks, leams and eaux. This flat surface is broken by two ranges of calcareous hills running north and south through the county, and known as the Lincoln Edge or Heights, or the Cliff, and the Wolds. The former range, on the west, runs nearly due north from Grantham to Lincoln, and thence to the Humber, travers- ing the Heaths of Lincolnshire, which were formerly open moors, rabbit warrens and sheep walks, but are how enclosed and brought into high cultivation. The Wolds form a ridge of bold hills extending from Spilsby to Barton-on-Humber for about 40 m., with an average breadth of about 8 m. The Humber separates Lincolnshire from Yorkshire. Its ports on the Lincoln- shire side are the small ferry-ports of Barton and New Holland, and the important harbour of Grimsby. The Trent forms part

of the boundary with Nottinghamshire, divides the Isle of Axholme (g.v.) from the district of Lindsey, and falls into the Humber about 30 m. below Gainsborough. The Witham rises on the S.W. border of the county, flows north past Grantham to Lincoln, and thence E. and S.E. to Boston, after a course of about 80 m. The Welland rises in north-west Northamptonshire, enters the county at Stamford, and, after receiving the Glen, flows through an artificial channel into the Fosdyke Wash. The Nene on the south-east has but a small portion of its course in Lincolnshire; it flows due north through an artificial outfall, called the Wisbech Cut. Between the Wolds and the sea lie the Marshes, a level tract of rich alluvial soil extending from Barton-on-Humber to Wainfleet, varying in breadth from 5 to 10 m. Between the Welland and the Nene in the south-east of the county are Gedney Marsh, Holbeach Marsh, Moulton Marsh and Sutton Marsh.

The Fens (g.v.), the soil of which has been formed partly by tidal action and partly by the decay of forests, occupy the Isle of Axholme on the north-west, the vale of Ancholme on the north, and most of the country south-east of Lincoln. The chief of these are the Holland, Wildmore, West and East Fens draining into the Witham; and the Deeping, Bourn, Great Porsand, and Whaplode Fens draining into the Welland.

The low lands adjoining the tidal reaches of the Trent and Humber, and part of those around the Wash have been raised above the natural level and enriched by the process of warping, which consists in letting the tide run over the land, and retaining it there a sufficient time to permit the deposit of the sand and mud held in solution by the waters.

Geology. — The geological formations for the most part extend in parallel belts, nearly in the line of the length of the county, from north to south, and succeed one another in ascending order from west to east. The lowest is the Triassic Keuper found in the Isle of Axholme and the valley of the Trent in the form of marls, sand- stone and gypsum. Fish

scales and teeth, with bones and foot- prints of the Labyrinthodon, are met with in the sandstone. The red clay is frequently dug for brick-making. The beds dip gently towards the east. At the junction between the Trias and Lias are series of beds termed Rhaetics, which seem to mark a transition from one to the other. These belts are in part exposed in pits near Newark, and extend north by Gainsborough to where the Trent flows into the Humber, passing thence into Yorkshire. The char- acteristic shells are found at Lea, 2 m. south of Gainsborough, with a thin bone-bed full of fish teeth and scales. The Lower Lias comes next in order, with a valuable bed of ironstone now largely worked, This bed is about 27 ft. in thickness, and crops out at Scunthorpe and Frodingham, where the workings are open and shallow. The Middle Lias, which enters the county near Woolsthorpe, is about 20 or 30 ft. thick, and is very variable both in thickness and mineral- ogical character; the iron ores of Denton and Caythorpe belong to this horizon. The Upper Lias enters the county at Stainby, passing by Grantham and Lincoln where it is worked for bricks. The Lias thus occupies a vale about 8 or 10 m. in width in the south, narrowing until on the Humber it is about a mile in width. To this succeed the Oolite formations. The Inferior Oolite, somewhat narrower than the Lias, extends from the boundary with Rutland due north past Lincoln to the vicinity of the Humber; it forms the Cliff of Lincoln- shire with a strong escarpment facing westward. At Lincoln the ridge is notched by the river Witham. The principal member of the I nferior Oolite is the Lincolnshire limestone, which is an important water-bearing bed and is quarried at Lincoln, Ponton, Ancaster, and Kirton Lindsey for building stone. Eastward of the Inferior Oolite lie the narrow outcrops of. the Great Oolite and Cornbrash. The Middle Oolite, Oxford clay and Corallian is very narrow in the south near Wilsthorpe, widening gradually about Sleaford. It then proceeds north from Lincoln with decreasing width to the vicinity of the Humber. The Upper Oolite, Kimeridge clay, starts from the vicinity of Stamford, and after attaining its greatest width near Horncastle, runs north-north-west to the Humber. The Kimeridge clay is succeeded by . the Spilsby sandstone, Tealby limestone, Claxby ironstone, and carstone which represent the highest Jurassic and lowest Cretaceous rocks. In the Cretaceous system of the Wolds, the Lower Greensand runs nearly parallel with the Upper Oolite past South Willingham to the Humber. The Upper Green- sand and Gault, represented in Lincolnshire by the Red Chalk, run north-west from Irby, widening out as far as Kelstern on the east, and cross the Humber. The Chalk formation, about equal in breadth to the three preceding, extends from Burgh across the Humber. The rest of the county, comprising all its south-east portions between the Middle Oolite belt and the sea, all its north- east portions between the chalk belt and the sea, and a narrow tract up the course of the Ancholme river, consists of alluvial

deposits or of reclaimed marsh. In the northern part boulder clay and glacial sands cover considerable tracts of the older rocks. Bunter, Permian, and Coal Measure strata have been revealed by boring to underlie the Keuper near Haxey.

Gypsum is dug in the Isle of Axholme, whiting is made from the chalk near the shores of the Humber, and lime is made on the Wolds. Freestone is quarried around Ancaster, and good oolite building stone is quarried near Lincoln and other places. Ironstone is worked at several places and there are some blast furnaces.

At Woodhall Spa on the Horncastle branch railway there is a much-frequented bromine and iodine spring.

Climate, Soil and Agriculture. — The climate of the higher grounds is healthy, and meteorological observation does not justify the reputation for cold and damp often given to the county as a whole. The soils vary considerably, according to the geological formations; ten or twelve different kinds may be found in going across the country from east to west. A good sandy loam is common in the Heath division; a sandy loam with chalk, or a flinty loam on chalk marl, abounds on portions of the Wolds; an argillaceous sand, merging into rich loam, lies on other portions of the Wolds; a black loam and a rich vegetable mould cover most of the Isle of Axholme on the north-west; a well-reclaimed marine marsh, a rich brown loam, and a stiff cold clay variously occupy the low tracts along the Humber, and between the north Wolds and the sea; a peat

earth, a deep sandy loam, and a rich soapy blue clay occupy most of the east and south Fens; and an artificial soil, obtained by " warping," occupies considerable low strips of land along the tidal reaches of the rivers.

Lincolnshire is one of the principal agricultural, especially grain- producing, counties in England. Nearly nine-tenths of the total area is under cultivation. The wide grazing lands have long been famous, and the arable lands are specially adapted for the growth of wheat and beans. The largest individual grain-crop, however, is barley. Both cattle and sheep are bred in great numbers. The cattle raised are the Shorthorns and improved Lincolnshire breeds. The dairy, except in the vicinity of large towns, receives little attention. The sheep are chiefly of the Lincolnshire and large Leicestershire breeds, and go to the markets of Yorkshire and London. Lincolnshire has long been famous for a fine breed of horses both for the saddle and draught. Horse fairs are held every year at Horncastle and Lincoln. Large flocks of geese were formerly kept in the Fens, but their number has been diminished since the drainage of these parts. Where a large number of them were bred, nests were constructed for them one above another; they were daily taken down by the gooseherd, driven to the water, and then reinstated in their nests, without a single bird being misplaced. Decoys were once numerous in the undrained state of the Fens.

Industries and Communications. — Manufactures are few and, relatively to the agricultural industry, small. The mineral in- dustries, however, are of value, and there are considerable agricul- tural machine and implement factories at Lincoln, Boston, Gains- borough, Grantham and Louth. At Little Bytham a very hard brick, called adamantine clinker, is made of the siliceous clay that the Romans used for similar works. Bone-crushing, tanning, the manufacture of oil-cake for cattle, and rope-making are carried on in various places. Grimsby is an important port both for continental traffic and especially for fisheries; Boston is second to it in the county; and Gainsborough has a considerable traffic on the Trent. Sutton Bridge is a lesser port on the Wash.

The principal railway is the Great Northern, its main; line touch- ing the county in the S.W. and serving Grantham. Its principal branches are from Peterborough to Spalding, Boston, Louth and Grimsby; and from Grantham to Sleaford and Boston, and to Lincoln, and Boston to Lincoln. This company works jointly with the Great Eastern the line from March to Spalding, Lincoln, Gains- borough and Doncaster, and with the Midland that from Saxby to Bourn, Spalding, Holbeach, Sutton Bridge and King's Lynn. The Midland company has a branch from Newark to Lincoln, and the Lancashire, Derbyshire, and East Coast line terminates at Lincoln. The Great Central railway connects the west, Sheffield and Doncaster with Grimsby, and with Hull by ferry from New Holland. Canals connect Louth with the Humber, Sleaford with the Witham, and Grantham with the Trent near Nottingham; but the greater rivers and many of the drainage cuts are navigable, being artificially deepened and embanked.

Population and Administration. — The area of the ancient county is 1,693,550 acres, with a population in 1891 of 472,878 and in 1901 of 498,847. The primary divisions are three trithings or Ridings (q.v.). The north division is called the Parts of Lindsey, the south- west the Parts of Kesteven, and the south-east the Parts of Holland. Each of these divisions had in early times its own reeve or gerefa. Each constitutes an administrative county, the Parts of Lindsey having an area of 967,689 acres; Kesteven, 465,877 acres; and Holland, 262,766 acres. The Parts of Lindsey contain 17 wapen- takes; Kesteven, exclusive of the soke and borough of Grantham and the borough of Stamford, 9 wapentakes; and Holland, 3 wapen- takes. The municipal boroughs and urban districts are as follows : — 1. Parts of Lindsey. — Municipal boroughs — Grimsby, a county borough (pop. 63,138), Lincoln, a city and county borough and the county town (48,784), Louth (9518). Urban districts — Alford

(2478), Barton-upon-Humber (5671)* Brigg (3137), Broughton (1300), Brumby and

Frodingham (2273), Cleethorpes with Thrunscoe (12.578), Crowle (2769), Gainsborough (17,660), Horncastle (4038) Mablethorpe (934), Market Rasen (2188), Roxby-cum-Risby (389) Scunthorpe (6750), Skegness (2140), Winterton (1361), Woodhall Spa (988).

2. Parts of Kesteven.— Municipal boroughs— Grantham U7.593), Stamford (8229). Urban districts— Bourne (4361), Brace- bridge (1752), Ruskington (1196), Sleaford (5468).

3. Parts of Holland. — Municipal borough— Boston (15 667) Urban districts— Holbeach (4755), Long Sutton (2524), Spalding (9385), Sutton Bridge (2105). In the Parts of Holland the borough of Boston has a separate commission of the peace and there are two petty sessional divisions. Lincolnshire is in the Midland circuit. In the Parts of Kesteven the boroughs of Grantham and Stamford have each a separate commission of the peace and separate courts of quarter sessions, and there are 4 petty sessional divisions. In the Parts of Lindsey the county boroughs of Grimsby and Lincoln have each a separate commission of the peace and a separate court of quarter sessions, while the municipal borough of Louth has a separate commission of the peace, and there are 14 petty sessional divisions. The three administrative counties and the county boroughs contain together 761 civil parishes. The ancient county contains 580 ecclesiastical parishes and districts, wholly or in part. It is mostly in the diocese of Lincoln, but in part also in the dioceses of South- well and York. For parliamentary purposes the county is divided into seven divisions, namely, West Lindsey or Gainsborough, North Lindsey or Brigg, East Lindsey or Louth, South Lindsey or Horn- castle, North Kesteven or Sleaford, South Kesteven or Stamford, and Holland or Spalding, and the parliamentary boroughs of Boston, Grantham, Grimsby and Lincoln, each returning one member.

History. — Of the details of the English conquest of the district which is now Lincolnshire little is known, but at some time in the 6th century Engle and Frisian invaders appear to have settled in the country north of the Witham, where they became known as the Lindiswaras, the southern districts from Boston to the Trent basin being at this time dense woodland. In the 7th century the supremacy over Lindsey alternated between Mercia and Northumbria, but few historical references to the district are extant until the time of Alfred, whose marriage with Ealswitha was celebrated at Gainsborough three years before his accession. At this period the Danish inroads upon the coast of Lindsey had already begun, and in 873 Healfdene wintered at Torksey, while in 878 Lincoln and Stamford were included among the five Danish boroughs, and the organization of the districts dependent upon them probably resulted about this time in the grouping of Lindsey, Kesteven and Holland to form the shire of Lincoln. The extent and permanence of the Danish influence in Lincolnshire is still observable in the names of its towns and villages and in the local dialect, and, though about 918 the confederate boroughs were recaptured by Edward the Elder, in 993 a Viking fleet again entered the Humber and ravaged Lindsey, and in 1013 the district of the five boroughs acknowledged the supremacy of Sweyn. The county offered no active resistance to the Conqueror, and though Hereward appears^ in the Domesday Survey as a dispossessed under-tenant of the abbot of Peterborough at Witham-on-the-Hill, the legends surrounding his name do not belong to this county. In his north- ward march in 1068 the Conqueror built a castle at Lincoln, and portioned out the principal estates among his Norman followers, but the Domesday Survey shows that the county on the whole was leniently treated, and a considerable number of English- men retained their lands as subtenants.

The origin of the three main divisions of Lincolnshire is anterior to that of the county itself, and the outcome of purely natural conditions, Lindsey being in Roman times practically an island bounded by the swamps of the Trent and the Witham on the west and south and on the east by the North Sea, while Kesteven and Holland were respectively the regions of forest and of fen. Lindsey in Norman times was divided into three ridings — North, West and South — comprising respectively five, five and seven wapentakes; while, apart from their division into wapentakes, the Domesday Survey

exhibits a unique planning out of the ridings into approximately equal numbers of 12-carucate hundreds, the term hundred possessing here no administrative or local significance, but serving merely as a unit of area for purposes of assessment. The Norman division of Holland into the three wapentakes of Elloe, Kirton and Skirbeck has remained

unchanged to the present day. In Kesteven the wapentakes of Aswardhurn, Aveland, Beltisloe, Haxwell, Langoe, Loveden, Ness, Winnibriggs, and Grantham Soke have been practically unchanged, but the Domesday wapentakes of Boothby and Graffo now form the wapentake of Boothby Graffo. In North- riding Bradley and Haverstoe have been combined to form Bradley Haverstoe wapentake, and the Domesday wapentake of Epworth in Westriding has been absorbed in that of Manley. Wall wapentake in Westriding was a liberty of the bishop of Lincoln, and as late as 1515 the dean and chapter of Lincoln claimed delivery and return of writs in the manor and hundred of Navenby. In the 13th century Baldwin Wake claimed return of writs and a market in Aveland. William de Vesci claimed liberties and exemptions in Caythorpe, of which he was summoned to render account at the sheriff's tourn at Halton. The abbot of Peterborough, the abbot of Tupholme, the abbot of Bardney, the prior of Catleigh, the prior of Sixhills, the abbot of St Mary's, York, the prioress of Stixwould and several lay owners claimed liberties and jurisdiction in their Lincolnshire estates in the 13th century.

The shire court for Lincolnshire was held at Lincoln every forty days, the lords of the manor attending with their stewards, or in their absence the reeve and four men of the vill. The ridings were each presided over by a riding-reeve, and wapentake courts were held in the reign of Henry I. twelve times a year, and in the reign of Henry III. every three weeks, while twice a year all the freemen of the wapentake were summoned to the view of frankpledge or tourn held by the sheriff. The boundaries between Kesteven and Holland were a matter of dispute as early as 1389 and were not finally settled until 1816.

Lincolnshire was originally included in the Mercian diocese of Lichfield, but, on the subdivision of the latter by Theodore in 680, the fen-district was included in the diocese of Lichfield, while the see for the northern parts of the county' was placed at " Sidnacester," generally identified with Stow. Subsequently both dioceses were merged in the vast West-Saxon bishopric of Dorchester, the see of which was afterwards transferred to Winchester, and by Bishop Remigius in 1072 to Lincoln. The archdeaconry of Lincoln was among those instituted by Remigius, and the division into rural deaneries also dates from this period. Stow archdeaconry is first mentioned in 1138, and in 1291 included four deaneries, while the archdeaconry of Lincoln included twenty-three. In 1536 the additional deaneries of Hill, Holland, Loveden and Graffoe had been formed within the archdeaconry of Lincoln, and the only deaneries created since that date are East and West Elloe and North and SouthGrantham in Lincoln archdeaconry. The deaneries of Gartree, Grimsby, Hill, Horncastle, Louthesk, Ludborough, Walshcroft, Wraggoe and Yarborough have been transferred from the archdeaconry of Lincoln to that of Stow. Benedictine foundations existed at Ikanho, Barrow, Bardney, Partney and Crowland as early as the 7 th century, but all were destroyed in the Danish wars, and only Bardney and Crowland were ever rebuilt. The revival of monasticism after the Conquest resulted in the erection of ten Benedictine monasteries, and a Benedictine nunnery at Stainfield. The Cistercian abbeys at Kirkstead, Louth Park, Revesby, Vaudey and Swineshead, and the Cistercian nunnery at Stix- would were founded in the reign of Stephen, and at the time of the Dissolution there were upwards of a hundred religious houses in the county.

In the struggles of the reign of Stephen, castles at Newark and Sleaford were raised by Alexander, bishop of Lincoln, against the king, while Ranulf " Gernons," earl of Chester, in 1140 garrisoned Lincoln for the empress. The seizure of Lincoln by Stephen in 1141 was accompanied with fearful butchery and devastation, and by an accord at

Stamford William of Roumare received Kirton in Lindsey, and his tenure of Gainsborough Castle was confirmed. In the baronial outbreak of 11 73 Roger Mowbray, who had inherited the Isle of Axholme from Nigel d'Albini, garrisoned Ferry East, or Kinnard's Ferry, and Axholme against the king, and, after the destruction of their more northern fortresses in this campaign, Epworth in Axholme became the

principal seat of the Mowbrays. In the struggles between John and his barons Lincoln in 1216 made peace with the king by sur- rendering hostages for the payment of a fine of 1000 marks, but after the landing of Louis the city was captured by Gilbert de Gant, then earl of Lincoln. After his disastrous march to Swineshead Abbey, John journeyed through Sleaford to Newark, where he died, and in the battle of Lincoln in 1217 Gilbert de Gant was captured and the city sacked. At the time of the Wars of the Roses the county, owing to territorial influence, was mainly Lancastrian, and in 146 1 the Yorkist strongholds of Grantham and Stamford were sacked to such effect that the latter never recovered. The Lincolnshire rising of 1470 was crushed by the defeat of the rebels in the skirmish known as " Losecoat Field " near Stamford. In the Civil War of the 17th century, Lindsey for the most part declared for the king, and the Royalist cause was warmly supported by the earl of Lindsey, Viscount Newark, Sir Peregrine Bertie and the families of Dymoke, Heneage and Thorold. Lord Willoughby of Parham was a prominent Parlia- mentary leader, and the Isle of Axholme and the Puritan yeo- manry of Holland declared for the parliament. In 1643 Cromwell won a small victory near Grantham, and the Royalist garrisons at Lynn and Lincoln surrendered to Manchester. In 1644, however, Newark, Gainsborough, Lincoln, Sleaford and Crowland were all in Royalist hands, and Newark only surrendered in 1646. Among other historic families connected with Lincoln- shire were the Wakes of Bourne and the d'Eyncourts, who flourished at Blankney from the Conquest to the reign of Henry VI.; Belvoir Castle was founded by the Toenis, from whom it passed by the Daubeneys, then to the Barons Ros and later to the Manners, earls of Rutland. In the Lindsey Survey of 1115-1118 the name of Roger Marmion, ancestor of the Marmion family, who had inherited the fief of Robert Despenser, appears for the first time.

At the time of the Domesday Survey there were between 400 and 500 mills in Lincolnshire; 21 n fisheries producing large quantities of eels; 361 salt-works; and iron forges at Stow, St Mary and at Bytham. Lincoln and Stamford were flourishing centres of industry, and markets existed at Kirton-in-Lindsey, Louth, Old Bolingbroke, Spalding, Barton and Partney. The early manufactures of the county are all connected with the woollen trade, Lincoln being noted for its scarlet cloth in the 13th century, while an important export trade in the raw material sprang up at Boston. The disafforesting of Kesteven in 1230 brought large areas under cultivation, and the same period is marked by the growth of the maritime and fishing towns, especially Boston (which had a famous fish-market), Grimsby, Barton, Saltfleet, Wainfleet and Wrangle. The Lincolnshire towns suffered from the general decay of trade in the eastern counties which marked the 15th century, but agriculture was steadily improving, and with the gradual drainage of the fen- districts culminating in the vast operations of the 17th century, over 330,000 acres in the county were brought under cultivation, including more than two-thirds of Holland. The fen-drainage resulted in the extinction of many local industries, such as the trade in goose-feathers and the export of wild fowl to the London markets, a 17th-century writer terming this county "the aviary of England, 3000 mallards with other birds having been caught sometimes in August at one draught." Other historic industries of Lincolnshire are the breeding of horses and dogs and rabbit- snaring; the Witham was noted for its pike; and ironstone was worked in the south, now chiefly in the north and west.

As early as 1295 two knights were returned to parliament for the shire of Lincoln, and two burgesses each for Lincoln, Grimsby and Stamford. In the 14th century Lincoln and Stamford were several times the meeting-places of parliament or important councils,

the most notable being the Lincoln Parliament of 1301, while at Stamford in 1309 a truce was concluded between the barons, Piers Gaveston and the king. Stamford discontinued representation for some 150 years after the reign of Edward II.; Grantham was enfranchised in 1463 and Boston in 1552. Under the act of 1832 the county was divided into a northern and southern division, returning each two members, and Great

Grimsby lost one member. Under the act of 1868 the county returned six members in three divisions and Stamford lost one member. Under the act of 1885 the county returned seven members in seven divisions; Lincoln, Boston and Grantham lost one member each and Stamford was disfranchised.

Antiquities. — At the time of the suppression of the monasteries in the reign of Henry VIII. there were upwards of one hundred religious houses ; and among the Fens rose some of the finest abbeys held by the Benedictines. The Gilbertines were a purely English order which took its rise in Lincolnshire, the canons following the Austin rule, the nuns and lay brothers that of the Cistercians. They generally lived in separate houses, but formed a community having a common church in which the sexes were divided by a longitudinal wall. These houses were at Alvingham, Catley, Holland Brigg, Lincoln, before the gate of which the first Eleanor Cross was erected by Edward I. to his wife, Newstead in Lindsey, Sempringham, the chief house of the order, founded by St Gilbert of Gaunt in 1139, of which the Norman nave of the church is in use, Stamford (a college for students) and Wellow. There were nunneries of the order at Haverholme, Nun Ormsby and Tunstal.

The following are a few of the most famous abbeys. Barlings (Premonstratensian), N.E. of Lincoln, was founded 1154ˆ, for fourteen canons. The tower, Decorated, with arcading pierced with windows, and the east wall of the south wing remain. The Benedictine Mitred Abbey of Crowland (q.v.) was founded 716, and refounded in 948. Part of the church is still in use. Thornton Abbey (Black Canons) in the north near the Humber was founded in 1 139. There remain a fragment of the south wing of the transept, two sides of the decagonal chapter-house (1282) and the beautiful west gate-house, Early Perpendicular (1332-1388), with an oriel window on the east. Kirkstead Abbey (Cistercian) was founded in 1 1 39. Little remains beyond an Early English chapel of singular beauty.

In the Parts of Lindsey several churches present curious early features, particularly the well-known towers of St Peter, Barton-on- Humber, St Mary-le-Wigford and St Peter at Gowts, Lincoln, which exhibit work of a pre-Conquest type. Stow church for Norman of various dates, Bottesford and St James, Grimsby, for Early English, Tattershall and Theddlethorpe for Perpendicular are fine examples of various styles.

In the Parts of Kesteven the churches are built of excellent stone which abounds at Ancaster and near Sleaford. The church of St Andrew, Heckington, is the best example of Decorated archi- tecture in the county; it is famed for its Easter sepulchre and fine sedilia. The noble church of St Wulfram, Grantham, with one of the finest spires in England, is also principally Decorated ; this style in fact is particularly well displayed in Kesteven, as in the churches of Caythorpe, Claypole, Navenby and Ewerby. At Stamford (q.v.) there are five churches of various styles.

It is principally in the Parts of Holland that the finest churches in the county are found; they are not surpassed by those of ahy other district in the kingdom, which is the more remarkable as the district is composed wholly of marsh land and is without stone of any kind. It is highly probable that the churches of the south part of this district owe their origin to the munificence of the abbeys of Crowland and Spalding. The church of Long Sutton, besides its fine Norman nave, possesses an Early English tower and spire which is comparable with the very early specimen at Oxford cathedral. Whaplode church is another noteworthy example of Norman work; for Early English work the churches of Kirtoji-in-Holland, Pinch- beck and Weston may be noticed ; for Decorated those at Donington and Spalding; and for Perpendicular, Gedney, together with parts of Kirton church. Of the two later styles, however, by far the most splendid example is the

famous church of St Botolph, Boston (q.v.), with its magnificent lantern-crowned tower or " stump."

There are few remains of medieval castles, although the sites of a considerable number are traceable. Those of Lincoln and Tatter- shall (a fine Perpendicular building in brick) are the most note- worthy, and there are also fragments at Boston and Sleaford, Country seats worthy of note (chiefly modern) are Aswarby Hall, Belton House, Brocklesby, Casewick, Denton Manor, Easton Hall, Grimsthorpe (of the 16th and 18th centuries, with earlier remains), Haverholm Priory, Noct on Hall, Panton Hall, Riby Grove, Somerby Hall, Syston Park and Urnngton. The city of Lincoln is remarkably rich in remains of domestic architecture from the Norman period onward, and there are similar examples at Stamford and elsewhere. In this connexion the remarkable triangular bridge at Crowland of the 14th century (see Bridges) should be mentioned.

See Victoria County History, Lincolnshire; Thomas Allen, The History of the County of Lincoln (2 vols., London, 1834) ; C. G. Smith, A Translation of that portion of the Domesday Booh which relates to Lincolnshire and Rutlandshire (London, 1870); G. S. Streatfield, Lincolnshire and the Danes (London, 1884.) ; Chronicle of the Rebellion in Lincolnshire, 1470, ed. J. E. Nicholls, Camdert Society, Camden Miscellany, vol. i. (London, 1847); The Lincoln- shire Survey, temp. Henry I., ed. James Greenstreet (London, 1884); Lincolnshire Notes and Queries (Horncastle, 1 888); Lincolnshire Record Society (Horncastle, 1891).

LIND, JENNY /1820-1887), the famous Swedish singer, was born at Stockholm on the 6th of October 1820, the daughter of a lace manufacturer. Mile Lundberg, an opera-dancer, first discovered her musical gift, and induced the child's mother to have her educated for the stage; during the six or seven years in which she was what was called an " actress pupil,"

urged her to reappear in opera at her old home. She paid visits to Germany and Sweden again before her departure for America in 1850. Just before sailing she appeared at Liverpool, for the first time in England, in an oratorio of Handel, singing the soprano music in The Messiah with superb art. She remained in America for nearly two years, being for a great part of the time engaged by P. T. Barnum. In Boston, on the 5th of February 1852, she married Otto Goldschmidt (1820-1907), whom she had met at Liibeck in 1850. For some years after her return to England, her home for the rest of her life, she appeared in oratorios and concerts, and her dramatic instincts were as strongly and perhaps as advantageously dis- played in these surroundings as they had been on the stage, for the grandeur of her conceptions in such passages as the " Sanctus " of Elijah, the intensity of conviction which she threw into the scene of the widow in the same work, or the religious fervour of " I know that my Redeemer liveth, " could not have found a place in opera. In her later years she took an active interest in the Bach Choir, conducted by her husband, and not only sang herself in the chorus, but gave the benefit of her training to the ladies of the society. For some years she was professor of singing at the Royal College of Music. Her last public appearance was at Diisseldorf on the 20th of January 1870 when she sang in Ruth, an oratorio composed by her husband. She died at Malvern on the 2nd of November 1887. The supreme position she held so long in the operatic world was due not only to the glory of her voice, and the complete musician- ship which distinguished her above all her contemporaries, but also to the naive simplicity of her acting in her favourite parts, such as Amina, Alice or Agathe. In these and others she had the precious quality of conviction, and identified herself with the characters she represented with a thoroughness rare in her day. Unharmed by the perils of a stage career, she was a model of rectitude, generosity and straightforwardness, carrying the last quality into a certain blunt directness of manner that was sometimes rather startling. (J. A..F. M.)

LINDAU, PAUL (1839-), German dramatist and novelist, the son of a Protestant pastor, was born at Magdeburg on the 3rd of June 1839. He was educated at the gymnasium in Halle and subsequently in Leipzig and Berlin. He spent five years in Paris to further his studies, acting meanwhile as foreign correspondent to German papers. After his return to Germany in 1863 he was engaged in journalism in Diisseldorf and Elberfeld. In 1870 he founded Das neue Blatt at Leipzig; from 1872 to 1881 he edited the Berlin weekly, Die Gegenwart; and in 1878 he founded the well-known monthly, Nord und Siid, which he continued to edit until 1904. Two books of travel, Aus Venetien (Diisseldorf, 1864) and Aus Paris (Stuttgart, 1865); were followed by some volumes of critical studies, written in a light, satirical vein, which at once made him famous. These were Harmlose Brief e eines deutschen Kleinstddters (Leipzig, 2 vols., 1870), Moderne Marchen fur grosse Kinder (Leipzig, 1870) and Literarische Rucksichtslosigkeiten (Leipzig, 1871)* He was appointed intendant of the court theatre at Meiningen in 1895, but removed to Berlin in 1899, where he became manager of the Berliner Theater, and subsequently, until" 1905, of the Deutsches Theater. He had begun his dramatic career in 1868 with Marion, the first of a long series of plays in which he displayed a remarkable talent for stage effect and a command of witty and lively dialogue. Among the more famous were Maria und Magdalena (1872), Tante T her est (1876), Grdfin Lea (1879), Die Erste (1895), Der Abend (1896), Der Herr im Hause (1899), So ich dir (1903;, and he adapted many plays by Dumas, Augier and Sardou for the German stage. Five volumes of his plays have been published (Berlin, 1873-1888). Some of his volumes of short stories acquired great popularity, notably Herr und Frau Bewer (Breslau, 1882) and Toggenburg und andere Geschichten (Breslau, 1883). A novel-sequence entitled Berlin included Der Zug nach dent Westen (Stuttgart, 1886, 10th ed. 1903), Arme Madchen (1887, 9th ed. 1905) and Spitzen (1888, 8th ed. 1904). Later novels were Die Gehilfin (Breslau, 1894), Die Briider, (Dresden-, 1895),

Der Konig von Sidon (Breslau, 1898). His earlier books on Moliere (Leipzig, 1871) and Alfred de Mussel (Berlin, 1877) were followed by some volumes of dramatic and literary criticism, Gesammelle Aufsdtze (Berlin, 1875), Dramaturgische Blatter (Stuttgart, 2 vols., 1875; new series, Breslau, 1878, 2 vols.), Vorspiele auf dem Theater (Breslau, 1895).

His brother, Rudolf Lindau (b. 1829), was a well-known diplomatist and author. His novels and tales were collected in 1893 (Berlin, 6 vols.). The most attractive, such as Reise- gefahrten and Der lange Hollander, deal with the life of Euro- pean residents in the Far East.

See Hadlich, Paul Lindau ah dramalischer Dichler (2nd ed., Berlin, 1876).

LINDAU, a town and pleasure resort in the kingdom of Bavaria, and the central point of the transit trade between that country and Switzerland, situated on two islands off the north-eastern shore of Lake Constance. Pop. (1905) 6531. The town is a terminus of the Vorarlberg railway, and of the Munich-Lindau line of the Bavarian state railways, and is connected with the mainland both by a wooden bridge and by a railway enbankment erected in 1853. There are a royal palace and an old and a new town-hall (che older one having been built in 1422 and restored in 1886-1888), a museum and a municipal library with interesting manuscripts and a collection of Bibles, also classical, commercial and industrial schools. The harbour is much frequented by steamers from Constance and other places on the lake. There are also some Roman remains, the Heidenmauer, and a fine modern fountain, the Reichsbrunnen. Opposite the custom-house is a bronze statue of the Bavarian king Maximilian II., erected in 1856.

On the site now occupied by the town there was a Roman camp, the castrum Tiberii, and the authentic records of Lindau date back to the end of the 9th century, when it was known as Lintowa. In 1274, or earlier, it became a free imperial town; in 133 1 it

joined the Swabian league, and in 1531 became a member of the league of Schmalkalden, having just previously accepted the reformed doctrines. In 1647 it was ineffectually besieged by the Swedes. In 1804 it lost its imperial privileges and passed to Austria, being transferred to Bavaria in 1805.

See Boulan, Lindau, vor altem und jetzt (Lindau, 1872); and Stettners, Fiihrer durch Lindau und Umgebungen (Lindau, 1900).

LINDEN, a town in the Prussian province of Hanover, 3 m. S.W. by rail from the city of that name, of which it practically forms a suburb, and from which it is separated by the Ihme. Pop. (1005) 57,941. It has a fine modern town-hall, and a classical and other schools. Chief among its industries are machine building, weaving, iron and steel works and the manufacture of chemicals, india-rubber goods and carpets.

LINDESAY, ROBERT, of Pitscottie (c. 1530-e. 1590), Scottish historian, of the family of the Lindesays of the Byres, was born at Pitscottie, in the parish of Ceres, Fifeshire, which he held in lease at a later period. His Historie and Cronicles of Scotland, the only work by which he is remembered, is described as a continuation of that of Hector Boece, translated by John Bellenden. It covers the period from 1437 to 1565, and, though it sometimes degenerates into a mere chronicle of short entries, is not without passages of great picturesqueness. Sir Walter Scott made use of it in Marmion; and, in spite of its inaccuracy in details, it is useful for the social history of the period. Lindesay's share in the Cronicles was generally supposed to end with 1565; but Dr Aeneas Mackay considers that the frank account of the events connected with Mary Stuart between 1565 and 1575 contained in one of the MSS. is by his hand and was only suppressed because it was too faithful in its record of contemporary affairs.

The Historie and Cronicles was first published in 1728. A complete edition of the text (2 vols.), based on the Laing MS. No. 218 in the university of Edinburgh, was published by the Scottish Text Society in 1899 under the editorship of Aeneas J. G. Mackay. The MS., formerly in the possession of John Scott of Halkshill, is fuller, and, though in a later hand, is, on the whole, a better representative of Lindesay's text.

LINDET, JEAN BAPTISTE ROBERT (1749-1825), French

revolutionist, was born at Bernay (Eure) . Before the Revolution he was an avocat at Bernay. He acted as procureur-syndic of the district of Bernay during the session of the Constituent Assembly. Appointed deputy to the Legislative Assembly and subsequently to the Convention, he attained considerable prominence. He was very hostile to the king, furnished a Rapport sur les crimes impute" s d Louis Capet (10th of December 1792), and voted for the death of Louis without appeal or respite. He was instrumental in the establishment of the Revolutionary Tribunal and contributed to the downfall of the Girondists. As member of the Committee of Public Safety, he devoted himself particularly to the question of food-supplies, and it was only by dint of dogged perseverance and great ad- ministrative talent that he was successful in coping with this difficult problem. He had meanwhile been sent to suppress revolts in the districts of Rhone, Eure, Calvados and Finistere, where he had been able to pursue a conciliatory policy. Without being formally opposed to Robespierre, he did not support him, and he was the only member of the Committee of Public Safety who did not sign the order for the execution of Danton and his party. In a like spirit of moderation he opposed the Thermidorian reaction, and defended Barere, Billaud-Varenne the Collot d'Herbois from the accusations launched against them on the 22nd of March 1795. Himself denounced on the 20th of May 1795, he was defended by his brother Thomas, but only escaped condemnation by the vote of amnesty of the 4th of Brumaire, year IV. (26th of October 1795). He was minister of finance from the 18th of June to the 9th of November 1799, but refused office under the Consulate and the Empire. In 1816 he was proscribed by the Restoration government as a regicide, and did not return to France until just before his death on the 17th of February 1825. His brother Thomas made some mark as a Constitutional bishop and member of the Convention.

See Amand Montier, Robert Lindet (Paris, 1899); H. Turpin, Thomas Lindet (Bernay, 1886); A. Montier, Correspondance de Thomas Lindet (Paris, 1899).

LINDLEY, JOHN (1 799-1865), English botanist, was born on the 5th of February 1799 at Catton, near Norwich, where his father, George Lindley, author of A Guide to the Orchard and Kitchen Garden, owned a nursery garden. He was educated at Norwich grammar school. His first publication, in 1819, a translation of the Analyse du fruit of L. C. M. Richard, was followed in 1820 by an original Monographia Rosarum, with descriptions of new species, and drawings executed by himself, and in 1821 by Monographia Digitalium, and by " Observations on Pomaceae," contributed to the Linnean Society. Shortly afterwards he went to London, where he was engaged by J. C. Loudon to write the descriptive portion of the Encyclopaedia of Plants. In his labours on this undertaking, which was completed in 1829, he became convinced of the superiority of the " natural " system of A. L. de Jussieu, as distinguished from the " artificial " system of Linnaeus followed in the Encyclopaedia; the con- viction found expression in A Synopsis of British Flora, arranged according to the Natural Order (1829) and in An Introduction to the Natural System of Botany (1830). In 1829 Lindley, who since 1822 had been assistant secretary to the Horticultural Society, was appointed to the chair of botany in University College, London, which he retained till i860; he lectured also on botany from 1831 at the Royal Institution, and from 1836 at the Botanic Gardens, Chelsea., During his professoriate he wrote many scientific and popular works, besides contri- buting largely to the Botanical Register, of which he was editor for many years, and to the Gardener's Chronicle, in which he had charge of the horticultural department from 1841. He was a fellow of the Royal, Linnean and Geological Societies. He died at Turnham Green on the 1st of November 1865.

Besides those already mentioned, his works include An Outline of the First Principles of Horticulture (1832), An Outline of the Structure and Physiology of Plants (1832), A Natural System of Botany (1836), The Fossil Flora of Great Britain (with William Hutton, 1831-1837), Flora Medica (1838), Theory of Horticulture (1840), The Vegetable Kingdom (1846), Folia Orchidacea (1852), Descriptive Botany (1858).

LINDLEY, NATHANIEL LINDLEY, Baron (1828-), English judge, son of John Lindley (q.v.), was bom at Acton Green, Middlesex, on the 99th of November 1828. He was educated at University College School, and studied for a time at University College, London. He was called to the bar at the Middle Temple in 1850, and began practice in the Court of Chancery. In 1855 he published An Introduction to the Study of Jurisprudence, consisting of a translation of the general part of Thibaut's System des Pandekten Rechts, with copious notes. In i860 he published in two volumes his Treatise on the Law of Partnership, including its Application to Joint Stock and other Companies, and in 1862 a supplement including the Companies Act of 1862. This work has since been developed into two text- books well known to lawyers as Lindley on Companies and Lindley on Partnership. He became a Q.C. in January 1872. In 1874 he was elected a bencher of the Middle Temple, of which he was treasurer in 1894. In 1875 ne was appointed a justice of common pleas, the appointment of a chancery barrister to a common-law court being justified by the fusion of law and equity then shortly to be brought about, in theory at all events, by the Judicature Acts. In pursuance of the changes now made be became a justice of the common pleas division of the High Court of Justice, and in 1880 of the queen's bench division. In 1881 he was raised to the Court of Appeal and made a privy councillor. In 1897, Lord Justice Lindley succeeded Lord Eshcr as master of the rolls, and in 1000 he was made a lord of appeal in ordinary with a life peerage and the title of Baron Lindley. He resigned the judicial post in 1905. Lord Lindley was the last serjeant-at-law appointed, and the last judge to wear the Serjeant's coif, or rather the black patch representing it, on the judicial wig. He married in 1858 Sarah Katherine, daughter of Edward John Teale of Leeds.

LINDLEY, WILLIAM (1808-1900), English engineer, was born in London on the 7th of September 1808, and became a pupil under Francis Giles, whom he assisted in designing the Newcastle and Carlisle and the London and Southampton railways. Leaving England about 1837, he was engaged for a time in railway work in various parts of Europe, and then returned, as engineer-in- chief to the Hamburg-Bergedorf railway, to Hamburg, near which city lie had received bis early education, and to which he was destined to stand in much the same relation as Baron Hauss- mann to Paris. His first achievement was to drain the Hammer- brook marshes, and so add some 1400 acres to the available area of the city. His real opportunity, however, came with the great fire which broke out on the 5th of May 1842 and burned for three days. He was entrusted with the direction of the operations to check its spread, and the strong measures he adopted, including the blowing-up of the town hall, brought his life into danger with the mob, who professed to see in him an English agent charged with the destruction of the port of Hamburg. After the extinction of the fire he was appointed consulting engineer to the senate and town council, to the Water Board and to the Board of Works. He began with the construction of a complete sewerage system on principles which did not escape criticism, but which experience showed to be good. Between 1844 and 1848 water- works were established from his designs, the intake from the Elbe being at Rothenburgsort. Subsidence tanks were used for clarification, but in 1853, when he designed large ex- tensions, he urged the substitution of sand-filtration, which, however, was not adopted until the cholera epidemic of 1892- 1893 had shown the folly of the opposition directed against it. In 1846 he erected the Hamburg gas-works; public baths and wash-houses were built, and large extensions to the port executed according to his plans in 1854; and he supervised the construc- tion of the Altona gas and water works in 1855. Among other services he rendered to the city may be mentioned the trigono- metrical survey executed between 1848 and i860, and the conduct of the negotiations which in 1852 resulted in the sale of the ” Steelyard ” on the banks of the Thames belonging to it ■ointly with the two other Hanseatic towns, Bremen and Liibeck. In i860 he left Hamburg, and during the remaining nineteen years of his professional practice, he was responsible for many

engineering works in various European cities, among them being Frankfort-on-the-Main, Warsaw, Pesth, Dusseldorf, Galatz and Basel. In Frankfort he constructed sewerage works on the same principles as those he followed in Hamburg, arid the system was widely imitated not only in Europe, but also in America. He was also consulted in regard to water-works at Berlin, Kiel, Stralsund, Stettin and Leipzig; he advised the New River Company of London on the adoption of the constant supply system in 1851; and he was commissioned by the British Government to carry out various works in Heligoland, including the big retaining wall ” Am Falm.” He died at Blackheath, London, on the 22nd of May 1900.

LINDO, MARK PRAGER (1819-1879), Dutch prose writer, of English-Jewish descent, was born in London on the 18th of September 1819. He went to Holland when nineteen years of age, and once established there as a private teacher of the English language, he soon made up his mind to remain. In 1842 he passed his examination at Arnhem, qualifying him as a professor of English in Holland, subsequently becoming a teacher of the English language and literature at the gymnasium in that town. In 1853 he was appointed in a similar capacity at the Royal Military Academy in Breda. Meanwhile Lindo had obtained a thorough grasp of the Dutch language, partly during his student years at Utrecht University, where in 1854 he gained the degree of doctor of literature. His proficiency in the two languages led him to translate into Dutch several of the works of Dickens, Thackeray and others, and afterwards also of Fielding, Sterne and Walter Scott. Some of Lindo’s translations bore the imprint of hasty and careless work, and all were very unequal in quality. His name is much more likely to endure as the writer of humorous original sketches and novelettes in Dutch, which he published under the pseudonym of De Oude Herr Smits (” Old Mr Smits “). Among the most popular are; Brieven en Ontboesemingen (” Letters and Confessions,” 1853, with three ” Continuations “) ; Familie van Ons (” Family of Ours,” 1855); Bekentenissen eener Jonge Dame (” Confessions of a Young Lady,” 1858); Uittreksels uit het Dagboek van

Wijlen den Heer Janus Snor (" Extracts from the Diary of the late Mr Janus Snor," 1865); Typen ("Types," 1871); and, particularly, Afdrukken van Indrukken (" Impressions from Impressions," 1854, reprinted many times). The last-named was written in collaboration with Lodewyk Mulder, who contributed some of its drollest whimsicalities of Dutch life and character, which, for that reason, are almost untranslatable. Lodewyk Mulder and Lindo also founded together, and carried on, for a considerable time alone, the Nederlandsche Spectator (" The Dutch Spectator ' ') , a literary weekly, still published at The Hague, which bears little resemblance to its English prototype, and which perhaps reached its greatest popularity and influence when Vosmaer contributed to it a brilliant weekly letter under the fanciful title of Vlugmaren (" Swifts "). Lindo's serious original Dutch writings he pub- lished under his own name, the principal one being De Opkomst en Ontwikkeling van het Engelsche Volk (" The Rise and Develop- ment of the British People," 2 vols. 1868-1874) — a valuable history. Lodewyk Mulder published in 1877-1879 a collected edition of Lindo's writings in five volumes, and there has since been a popular reissue. Lindo was appointed an inspector of primary schools in the province of South Holland in 1865, a post he held until his death at The Hague on the 9th of March 1879.

LINDSAY, the family name of the earls of Crawford. The family is one of great antiquity in Scotland, the earliest to settle in that country being Sir Walter de Lindesia, who attended David, earl of Huntingdon, afterwards King David I., in his colonization of the Lowlands early in the 12th century. The descendants of Sir Walter divided into three branches, one of which held the baronies of Lamberton in Scotland, and Kendal and Molesworth in England; another held Luflness and Crawford in Scotland and half Limesi in England; and a third held Breneville and Byres in Scotland and certain lands, not by baronial tenure, in England. The heads of all these branches sat as barons in the Scottish parliament for more than two hundred years before the elevation of the chief of the house to an earldom in 1398. The

Lindsays held the great mountain district of Crawford in Clydes- dale, from which the title of the earldom is derived, from the 12th century till the close of the 15th, when it passed to the Douglas earls of Angus. See Crawford, Earls of.

See A. W. C. Lindsay, afterwards earl of Crawford, Lives of the Lindsays, or a Memoir of the Houses of Crawford and Belcarres (3 vols. , 1843 and 1858).

LINDSAY, a town and port of entry of Ontario, Canada, and capital of Victoria county, on the Scugog river, 57 m. N.E. of Toronto by rail, on the Canadian Pacific railway, and at the junction of the Port Hope and Haliburton branches and the Midland division of the Grand Trunk railway. Pop. (1901) 7003. It has steamboat communication, by way of the Trent canal, with Lake Scugog and the ports on the Trent system. It contains saw and grist mills, agricultural implement and other factories.

LINDSEY, THEOPHILUS (1723-1808), ■ English theologian, was born in Middlewich, Cheshire, on the 20th of June 1723, and was educated at the Leeds Free School and at St John's College, Cambridge, where in 1747 he became a fellow. For some time he held a curacy in Spitalfiekls, London, and from 1754 to 1756 he travelled on the continent of Europe as tutor to the young duke of Northumberland. He was then presented to the living of Kirkby-Wiske in Yorkshire, and after exchanging it for that of Piddletown in Dorsetshire, he removed in 1763 to Catterick in Yorkshire. Here about 1764 he founded one of the first Sunday schools in England. Meanwhile he had begun to entertain anti-Trinitarian views, and to be troubled in conscience about their inconsistency with the Anglican belief; since 1769 the intimate friendship of Joseph Priestley had served to foster his scruples, and in 1771 he united with Francis Blackburne, archdeacon of Cleveland (his father-in-law), John Jebb (1736- 1786), Christopher Wyvill (1740-1822) and Edmund Law 1703- 1787), bishop of Carlisle, in

preparing a petition to parliament with the prayer that clergymen of the church and graduates of the universities might be relieved from the burden of subscribing to the thirty-nine articles, and " restored to their undoubted rights as Protestants of interpreting Scripture for themselves." Two hundred and fifty signatures were obtained, but in February 1772 the House of Commons declined even to receive the petition by a majority of 217 to 71; the adverse vote was repeated in the following year, and in the end of 1773, seeing no prospect of obtaining within the church the relief which his conscience demanded, Lindsey resigned his vicarage. In April 1774 he began to conduct Unitarian services in a room in Essex Street, Strand, London, where first a church, and afterwards the Uni- tarian offices, were established. Here he remained till i793> when he resigned his charge in favour of John Disney (1746-1816), who like himself had left the established church and had become his colleague. He died on the 3rd of November 1808.

Lindsey 's chief work is An Historical View of the State of the Unitarian Doctrine and Worship from the Reformation to our own Times (1783); in it he claims, amongst others, Burnet, Tillotson. S. Clarke, Hoadly and Sir I. Newton for the Unitarian view. His other publications include Apology on Resigning the Vicarage of Catterick (1774), ar, d Sequel to the Apology (1776); The Book of Common Prayer reformed according to the plan of the late Dr Samuel Clarke (1774); Dissertations on the Preface to St John's Gospel and on praying to Jesus Christ (1779); Vindiciae Priestleianae (1788); Conversations upon Christian Idolatry (1792): and Conversations on the Divine Government, showing that everything is from God, and for good to all (1802). Two volumes of Sermons, with appropriate prayers annexed, were published posthumously in 1810; and a volume of Memoirs, by Thomas Belsham, appeared in 1812.

LINDSTR&M, GUSTAF (1829-igoi), Swedish palaeontologist, was born %t Wisby in Gotland on the 27th of August 1829. In 1848 he entered the university at Upsala, and in 1854 he took his doctor's degree. Having attended a course of lectures in Stockholm by S. L. Loven, he became interested in the zoology of the Baltic, and published several papers on the invertebrate fauna, and subsequently on the fishes. In 1856 he became a school teacher, and in 1858 a master in the grammar school at Wisby. His leisure was devoted to researches on the fossils of the Silurian rocks of Gotland, including the corals, brachiopods, gasteropods, pteropods, cephalopods and Crustacea. He described

also remains of the fish Cyaihaspis from Wenlock Beds, and (with T. Thorell) a scorpion Palaeaphonus from Ludlow Beds at Wisby. He determined, the true nature of the operculated coral Calceola; and while he described organic remains from other parts of northern Europe, he worked especially at the Palaeozoic fossils of Sweden. He was awarded the Murchison medal by the Geological Society of London in 1895. In 1876 he was appointed keeper of the fossil Invertebrata in the State Museum at Stock- holm, where he died on the 16th of May 1901.

See obituary (with portrait), by F. A. Bather, in Geol. Mag. (July 1901), p. 333.:

LINDUS, one of the three chief cities of the island of Rhodes; before their synoecism in the city of Rhodes. It is situated on the E. side of the island, and has a finely placed acropolis on a precipitous hill, and a good natural harbour just N. of it. Recent excavations have discovered the early temple of Athena Lindia on the Acropolis, and splendid Propylaea and a staircase, resem- bling those at Athens. The sculptors of the Laocoon are among the priests of Athena Lindia, whose names are recorded by in- scriptions. Some early temples have also been found, and inscriptions cut on the rock recording the sacrifices known as BovKana. There are also traces of a theatre and rock-cut tombs. On the Acropolis is a castle, built by the knights in the 14th century, and many houses in the town show work of the same date.

See Rhodes; also Chr. Blinkenberg and K. F. Kinch, Exploration arch.de Rhodes (Copenhagen, 1904-1907).

LINE, a word of which the numerous meanings may be deduced from the primary ones

of thread or cord, a succession of objects in a row, a mark or stroke, a course or route in any particular direction. The word is derived from the Lat. linea, where all these meanings may be found, but some applications are due more directly to the Fr. ligne. Linea, in Latin, meant originally ” something made of hemp or flax,” hence a cord or thread, from linum, flax. ” Line ” in English was formerly used in the sense of flax, but the use now only survives in the technical name for the fibres of flax when separated by heckling from the tow (see Linen). The ultimate origin is also seen in the verb ” to line,” to cover something on the inside, originally used of the ” lining ” of a garment with linen.

In mathematics several definitions of the line may be framed according to the aspect from which it is viewed. The synthetical genesis of a line from the notion of a point is the basis of Euclid’s definition, ypafi/xfi, 5i p.r\Kos airXarts (” a line is widthless length “), and in a subsequent definition he affirms that the boundaries of a line are points, ypaixurjˆ oh repara OTjjueTa. The line appears in definition 6 as the boundary of a surface: kinavela<: St iripwra ypafi/xcd (" the boundaries of a surface are lines "), Another synthetical definition, also treated by the ancient Greeks, but not by Euclid, regards the line as generated by the motion of a point (pwr« o-yiidov), and, in a similar manner, the " surface " was regarded as the flux of a line, and a " solid " as the flux of a surface. Proclus adopts this view, styling the line Apx4 in respect of this capacity. Analytical definitions, although not finding a place in the Euclidean treat- ment, have advantages over the synthetical derivation. Thus the boundaries of a solid may define a plane, the edges a line, and the corners a point; or a section of a solid may define the surface, a section of a surface the line, and the section of a line the " point." The notion of dimensions follows readily from either system of definitions. The solid extends three ways, i.e. it has length, breadth and thickness, and is therefore three- dimensional; the surface has breadth and length and is therefore two-dimensional; the line has only extension and is unidimen- sional; and the point, having neither length, breadth nor thick- ness but only position, has no dimensions.

The definition of a ” straight ” line is a matter of much com- plexity. Euclid defines it as the line which lies evenly with respect to the points on itself — evdeta ypanp.ii iariv ffrts i% taov rots e<£' ecurrijs oypeiots Keircu: Plato defined it as the line having its middle point hidden by the ends., a definition of no purpose since it only defines the line by the path of a ray of

light. Archimedes defines a straight line as the shortest distance between two points.

A better criterion of rectilinearity is that of Simplicius, an Arabian commentator of the 5th century: Linea recta est quaecumque super duas ipsius. extremitates rotala non movetur de loco suo ad alium locum (” a straight line is one which when rotated about its two extremities does not change its position “). This idea was employed by Leibnitz, and most auspiciously by Gierolamo Saccheri in 1733.

The drawing of a straight line between any two given points forms the subject of Euclid’s first postulate — -ˆirTjaSoj curd iravrds arineiov eirt irav arifielov tvdelav ypannr/p aybytiv, and the producing of a straight line continuously in a straight line is treated in the second postulate — Kal irertpacixivrjv evdetav Kara rd ffwexk br’ eWdas €K(3a\eti’.

For a detailed analysis of the geometrical notion of the line and rectilinearity, see VV. B. Frankland, Euclid’s Elements (1905). In analytical geometry the right line is always representable by an equation or equations of the first degree; thus in Cartesian co- ordinates of two dimensions the equation is of the form $Ax+By+C=0$, in triangular coordinates $Ax + By+Cz = 0$. In three-dimensional coordinates, the line is represented by two linear equations. (See Geometry, Analytical.) Line geometry is a branch of

analytical geometry in which the line is the element, and not the point as with ordinary analytical geometry (see Geometry, Line).

LINE ENGRAVING, on plates of copper or steel, the method of engraving (q.v.), in which the line itself is hollowed, whereas in the woodcut when the line is to print black it is left in relief, and only white spaces and white lines are hollowed.

The art of line engraving has been practised from the earliest ages. The prehistoric Aztec hatchet given to Humboldt in Mexico was just as truly engraved as a modern copper-plate which may convey a design by Flaxman; the Aztec engrav- ing is ruder than the European, but it is the same art. The important discovery which made line engraving one of the multiplying arts was the discovery how to print an incised line, which was hit upon at last by accident, and known for some time before its real utility was suspected. Line engraving in Europe does not owe its origin to the woodcut, but to the chasing on goldsmiths' work. The goldsmiths of Florence in the middle of the 15th century were in the habit of ornamenting their works by means of engraving, after which they filled up the hollows produced by the burin with a black enamel made of silver, lead and sulphur, the result being that the design was rendered much more visible by the opposition of the enamel and the metal. An engraved design filled up in this manner was called a niello. Whilst a niello was in progress the artist could not see it so well as if the enamel were already in the lines, yet he did not like to put in the hard enamel prematurely, as when once it was set it could not easily be got out again. He therefore took a sulphur cast of his niello in progress, on a matrix of fine clay, and filled up the lines in the sulphur with lampblack, thus enabling him- self to judge of the state of his engraving. At a later period it was discovered that a proof could be taken on damped paper by filling the engraved lines with a certain ink and wiping it off the surface of the plate, sufficient pressure being applied to make the paper go into the hollowed lines and fetch the ink out of them. This was the beginning of plate printing. The niello pngravers thought it a convenient way of proving their work — the metal itself — as it saved the trouble of the sulphur cast, but they saw no further into the future. They went on engraving nielli just the same to ornament plate and furniture; nor was it until the 16th century that the new methodof printing was carried out to its great and wonderful results. There are, however, certain differences between plate-printing and block- printing which affect the essentials of art. When paper is driven into a line so as to fetch the ink out of it, the line may be of unl imaginable fineness, it will print all the same; but when the paper is only pressed upon a raised line, the line must have some appreciable thickness; the wood engraving, therefore, can never — except in a tour de force — be so delicate as plate engraving. Again, not only does plate-printing excel block-printing in delicacy ; it excels it also in force and depth. There never was,

and there will never be, a woodcut line having the power ot a deep line in a plate, for in block-printing the line is only a blackened surface of paper slightly impressed, whereas in plate-printing it is a cast with an additional thickness of printing ink.

The most important of the tools used in line-engraving is the burin, which is a bar of steel with one end fixed in a handle rather like a mushroom with one side cut away, the burin itself being shaped so that the cutting end when sharpened takes the form of a lozenge, point downwards. The burin .acts exactly like a plough; it makes a furrow and turns out a shaving of metal as the plough turns the soil of a field. The burin, however, is pushed while the plough is pulled, and this peculiar character of the burin, or graver, as a pushed instrument at once establishes a wide separation between it and all the other instruments employed in the arts of design, such as pencils, brushes, pens and etching needles.

The elements of engraving with the burin upon metal will be best understood by an example of a very simple kind, as in the engraving of letters. The capital letter B contains in itself the rudiments of an engraver's education. As at first drawn, before the blacks are inserted, this letter consists of two perpendicular straight lines and four curves, all the curves differing from each other. Suppose, then, that the engraver has to

make a B, he will scratch these lines, reversed, very lightly with a sharp point or style. The next thing is to cut out the blacks (not the whites, as in wood engraving), and this would be done with two different burins. The engraver would get his vertical black line by a powerful ploughing with the burin between his two preparatory first lines, and then take out some copper in the thickest parts of the two curves. This done, he would then take a finer burin and work out the gradation from the thick line in the midst of the curve to the thin extremities which touch the perpendicular. When there is much gradation in a line the darker parts of it are often gradually ploughed out by returning to it over and over again. The hollows so produced are afterwards filled with printing ink, just as the hollows in a niello were filled with black enamel ; the surplus printing ink is wiped from the smooth surface of the copper, damped paper is laid upon it, and driven into the hollowed letter by the pressure of a revolving cylinder; it fetches the ink out, and you have your letter B in intense black upon a white ground.

When the surface of a metal plate is sufficiently polished to be used for engraving, the slightest scratch upon it will print as a black line, the degree of blackness being proportioned to the depth of the scratch. An engraved plate from which visiting cards are printed is a good example of some elementary principles of engraving. It contains thin lines and thick ones, and a considerable variety of curves. An elaborate line engraving, if it is a pure line engraving and nothing else, will contain only these simple elements in different combinations. The real line engraver is always engraving a line more or less broad and deep in one direction or another; he has no other business than this.

In the early Italian and early German prints, the line is used with such perfect simplicity of purpose that the methods of the artists are as obvious as if we saw them actually at work.

The student may soon understand the spirit and technical quality of the earliest Italian engraving by giving his attention to a few of the series which used erroneously to be called the " Playing Cards of Mantegna," but which have been shown by Mr Sidney Colvin to represent " a kind of encyclopaedia of knowledge."

The history of these engravings is obscure. They are supposed to be Florentine; they are certainly Italian; and their technical manner is called that of Baccio Baldini. But their style is as clear as a style can be, as clear as the artist's conception of his art. In all these figures the outline is the main thing, and next to that the lines which mark the leading folds of the drapery; lines quite classical in purity of form and severity of selection, and especially characteristic in this, that they are always really engraver's lines, such as may naturally be done with the burin-, and they never imitate the freer line of the pencil or etching needle. Shading is used in the greatest moderation with thin straight strokes of the burin, that never overpower the stronger organic lines of the design. Of chiaroscuro, in any complete sense, there is none. The sky behind the figures is represented by white paper, and the foreground is sometimes occupied by flat decorative engraving, much nearer in feeling to calligraphy than to modern painting. Sometimes there is a cast shadow, but it is not studied, and is only used to give relief. In this

early metal engraving the lines are often crossed in the shading, whereas in the earliest woodcuts they are not ; the reason being that when lines are incised they can as easily be crossed as not, whereas, when they are reserved, the crossing involves much labour of a non-artistic kind. Here, then, we have pure line- engraving with the burin, that is, the engraving of the pure line patiently studied for its own beauty, and exhibited in an abstract manner, with care for natural form combined with inattention to the effects of nature. Even the forms are idealized, especially in the cast of draperies, for the express purpose of exhibiting the line to better advantage. Such are the character- istics of

those very early Italian engravings which were attributed erroneously to Mantegna. When we come to Mantegna himself we find a style equally decided. Drawing and shading were for him two entirely distinct things. He did not draw and shade at the same time, as a modern chiaroscurist would, but he first got his outlines and the patterns on his dresses all very accurate, and then threw over them a veil of shading, a very peculiar kind of shading, all the lines being straight and all the shading diagonal. This is the primitive method, its peculiarities being due, not to a learned self-restraint, but to a combination of natural genius with technical inexperience, which made the early Italians at once desire and discover the simplest and easiest methods. Whilst the Italians were shading with straight lines the Germans had begun to use curves, and as soon as the Italians saw good German work they tried to give to their burins something of the German suppleness.

The characteristics of early metal engraving in Germany are seen to perfection in Martin Schongauer and Albert Diirer, who, though with striking differences, had manypoints in common. Schongauer died in 1488; whilst the date of Diirer's death is 1528. Schongauer was therefore a whole generation before Diirer, yet not greatly inferior to him in the use of the burin, though Diirer has a much greater reputation, due in great measure to his singular imaginative powers. Schongauer is the first great German engraver known by name, but he was preceded by an unknown German master, called " the Master of 1466," who had Gothic notions of art (in strong contrast to the classicism of Baccio Baldini), but used the burin skilfully, conceiving of line and shade as separate elements, yet shading with an evident desire to follow the form of the thing shaded, and with lines in various directions. Schongauer's art is a great stride in advance, and we find in him an evident pleasure in the bold use of the burin. Outline and shade, in Schongauer, are not nearly so much separated as in Baccio Baldini, and the shading, generally in curved lines, is far more masterly than the straight shading of Mantegna. Diirer continued Schongauer's curved shading, with increasing manual delicacy and skill; and as he found himself able to perform feats with the burin which amused both himself and his buyers, he over-loaded his plates with quantities of living and inanimate objects, each of which he finished with as much care as if it were the most important thing in the composition. The engravers of those days had no conception of any necessity for subordinating one part of their work to another; they drew, like children, first one object and then another object, and so on until the plate was furnished from top to bottom and from the left side to the right. Here, of course, is an element of facility in primitive art which is denied to the modern artist. In Diirer all objects are on the same plane. In his " St Hubert " (otherwise known as " St Eustace ") of c. 1 505, the stag is quietly standing on the horse's back, with one hoof on the saddle, and the kneeling knight looks as if he were tapping the horse on the nose. Diirer seems to have per- ceived the mistake about the stag, for he put a tree between us and the animal to correct it, but the stag is on the horse's back nevertheless. This ignorance of the laws of effect is least visible and obtrusive in plates which have no landscape distances, such as " The Coat of Arms with the Death's Head " (1503) and " The Coat of Arms with the Cock " (c. 1512).

Diirer's great manual skill and close observation made him a wonderful engraver of objects taken separately. He saw and rendered all objects; nothing escaped him; he applied the same

intensity of study to everything. Though a thorough student of the nude — witness his Adam and Eve (1504) and other plates — he would pay just as much attention to the creases of a gaiter as to the development of a muscle; and though man was his main subject, he would study dogs with equal care (see the five dogs in the "St Hubert"), as well as pigs (seethe" Prodigal Son," c. 1495) ; and at a time when landscape painting was unknown he studied every clump of trees, every visible trunk and branch, nay, every foreground plant, and each leaf of it separately. In his buildings he saw every brick like a bricklayer, and every joint in the woodwork like a carpenter. The immense variety of the objects which he engraved was a training in suppleness of hand. His lines go in every direction, and are made to render both the undulations of surfaces (see the plane in the Melencolia, 1514) and their texture (see the granular texture of the stones

in the same print).

From Diirer we come to Italy again, through Marcantonio, who copied Diirer, translating more than sixty of his woodcuts upon metal. It is one of the most remarkable things in the history of art, that a man who had trained himself by copying northern Work, little removed from pure Gothicism, should have become soon afterwards the great engraver of Raphael, who was much pleased with his work and aided him by personal advice. Yet, although Raphael was a painter, and Marcantonio his interpreter, the reader is not to infer that engraving had as yet subordinated itself to painting. Raphael himself evidently considered engrav- ing a distinct art, for he never once set Marcantonio to work from a picture, but always (much more judiciously) gave him drawings, which the engraver might interpret without going outside his own art; consequently Marcantonio's works are always genuine engravings, and are never pictorial. Marc- antonio was an engraver of remarkable power. In him the real pure art of line-engraving reached its maturity. He retained much of the early Italian manner in his backgrounds, where its simplicity gives a desirable sobriety; but his figures are boldly modelled in curved lines, crossing each other in the darker shades, but left single in the passages from dark to light, and breaking away in fine dots as they approach the light itself, which is of pure white paper. A school of engraving was thu? founded by Raphael, through Marcantonio, which cast aside the minute details of the early schools for a broad, harmonious treatment.

The group known as the engravers of Rubens marked a new development. Rubens understood the importance of engraving as a means of increasing his fame and wealth, and directed Vorsterman and others. The theory of engraving at that time was that it ought not to render accurately the local colour of painting, which would appear wanting in harmony when dis- sociated from the hues of the picture; and it was one of the anxieties of Rubens so to direct his engravers that the result might be a fine plate independently of what he had painted. To this end he helped his engravers by drawings, in which he sometimes indicated what he thought the best direction for the lines. Rubens liked Vorsterfnan's work, and scarcely corrected it, a plate he especially approved being " Susannah and the Elders," which is a learned piece of work well modelled, and shaded everywhere on the figures and costumes with fine curved lines, the straight line being reserved for the masonry. Vorster- man quitted Rubens after executing fourteen important plates, and was succeeded by Paul Pontius, then a youth of twenty, who went on engraving from Rubens with increasing skill until the painter's death. Boetius a Bolswert engraved from Rubens towards the close of his life, and his brother Schelte a Bolswert engraved more than sixty compositions of Rubens, of the most varied character, including hunting scenes and landscapes. This brings us to the engraving of landscape as a separate study. Rubens treated landscape in a broad comprehensive manner, and Schelte's way of engraving it was also broad and compre- hensive. The lines are long and often undulating, the cross- hatchings bold and rather obtrusive, for they often substitute unpleasant reticulations for the refinement and mystery of nature, but it was a beginning, and a vigorous beginning. The technical developments of engraving under the influence of

Rubens may be summed up briefly as follows: (1) The Italian outline had been discarded as the chief subject of attention, and modelling had been substituted for it; (2) broad masses had been substituted for the minutely finished detail of the northern schools; (3) a system of light and dark had been adopted which was not pictorial, but belonged especially to engraving, which it rendered (in the opinion of Rubens) more harmpnious.

The history of line-engraving, from the time of Rubens to the beginning of the 19th century, is rather that of the vigorous and energetic application of principles already accepted than any new development. From the two sources already indicated, the

school of Raphael and the school of Rubens, a double tradition flowed to England and France, where it mingled and directed English and French practice. The first influence on English line-engraving was Flemish, and came from Rubens through Vandyck, Vorsterman, and others; but the English engravers soon underwent French and Italian influences, for although Payne learned from a Fleming, Faithorne studied in France under Philippe de Champagne the painter and Robert Nanteuil the engraver. Sir Robert Strange studied in France under Philippe Lebas, and then five years in Italy, where he saturated his mind with Italian art. French engravers came to England as they went to Italy, so that the art of engraving became in the 1 8th century cosmopolitan. In figure-engraving the outline was less and less insisted upon. Strange made it his study to soften and lose the outline. Meanwhile, the great classical Renaissance school, with Gerard Audran at its head, had carried forward the art of modelling with the burin, and had arrived at great perfection of a sober and dignified kind. Audran was very pro- ductive in the latter half of the 17th century, and died in 1703, after a life of severe self-direction in labour, the best external influence he underwent being that of the painter Nicolas Poussin. He made his, work more rapid by the use of etching, but kept it entirely subordinate to the work of the burin. One of the finest of his large plates is " St John Baptizing," from Poussin, with groups of dignified figures in the foreground and a background of grand classical landscape, all executed with the most thorough knowledge according to the ideas of that time. The influence of Claude Lorrain on the engraving of landscape was exercised less through his etchings than his pictures, which compelled the en- gravers to study delicate distinctions in the values of light and dark. Through Woollett and Vivares, Claude exercised an in- fluence on landscape engraving almost equal to that of Raphael and Rubens on the engraving of the figure, though he did not direct his engravers personally.

In the igth century line-engraving received first an impulse and finally a check. The impulse came from the growth of public wealth, the increasing interest in art and the increase in the commerce of art, which, by means of engraving, fostered in England mainly by John Boydell, penetrated into the homes of the middle classes, as well as from the growing demand for illustrated books, which gave employment to engravers of first- rate ability. The check to line-engraving came from the desire for cheaper and more rapid methods, a desire satisfied in various ways, but especially by etching and by the various kinds of photography. Nevertheless, the 19th century produced most highly accomplished work in line-engraving, both in the figure and in landscape. Its characteristics, in comparison with the work of other centuries, were chiefly a more thorough and delicate rendering of local colour, fight and shade, and texture. The ekk-r engravers could draw as correctly as the moderns, but they either neglected these elements or admitted them sparingly, as opposed to the spirit of their art. In a modern engraving from Landseer may be seen the blackness of a man's boots (local colour), the soft roughness of his coat (texture), and the exact value in light and dark of his face and costume against the cloudy sky. Nay more, there is to be found every sparkle on bit, boot and stirrup. Modern painting pays more attention to texture and chiaroscuro than classical painting did, and engraving necessarily followed in the same directions. But there is a certain sameness in pure line-engraving more favourable to some forms and textures than to others. This sameness of line-engraving.

and its costliness, led to the adoption of mixed methods, extremely prevalent in commercial prints from popular artists. In the well-known prints from Rosa Bonheur, for example, by T. Land- seer, H. T. Ryall, and C. G. Lewis, the tone of the skies is got by machine-ruling, and so is much undertone in the landscape; the fur of the animals is all etched, and so are the foreground plants, the real burin work being used sparingly where most favourable to texture. Even in the exquisite engravings after Turner, by Cooke, Goodall, Wallis, Miller, Willmore, and others, who reached a degree of delicacy in light and shade far surpassing the work of the old masters, the engravers had recourse to etching, finishing with the burin and dry point. Turner's name may be added to those of Raphael, Rubens and Claude in the list of painters who have had a special influence upon engraving. The speciality of Turner's influence was in the direction of delicacy of tone. In this respect the Turner vignettes to Roger's poems were

a high-water mark of human attainment, not likely ever to be surpassed.

The record of the art of line-engraving during the last quarter of the 19th century is one of continued decay. Technical im- provements, it was hoped, might save the art; it was thought by some that the slight revival resultant on the turning back of the burin's cutting-point — whereby the operator pulled the tool towards him instead of pushing it from him — might effect much, in virtue of the time and labour saved by the device. But by the beginning of the 20th century pictorial line-engraving in England was practically non-existent, and, with the passing of Jeens and Stacpoole, the spasmodic demand by publishers for engravers to engrave new plates remained unanswered. Mr C. W. Sherborn, the exquisite and facile designer and engraver of book-plates, has scarcely been surpassed in his own line, but his art is mainly heraldic. There are now no men capable of such work as that with which Doo, J. H. Robinson, and their fellows maintained the credit of the English School. Line- engraving has been killed by etching, mezzotint and the " mixed method." The disappearance of the art is due not so much to the artistic objection that the personality of the line-engraver stands obtrusively between the painter and the public; it is rather that the public refuse to wait for several years for the proofs for which they have subscribed, when by another method they can obtain their plates more quickly. An important line plate may occupy a prodigious time in the engraving; J. H. Robinson's " Napoleon and the Poˆe " took about twelve years. The invention of steel-facing « copper plate would now enable the engraver to proceed n ore expeditiously; but even in this case he can no more compete with the etcher than the mezzotint- engraver can keet) ˆace with the photogravure manufacturer.-

The Art Union of London in the past gave what encourage- ment it could; but with the death of J. Stephenson (1886) and F. Bacon (1887) it was evident that all hope was gone. John Saddler at the end was driven, in spite of his capacity to do original work, to spend most of his time in assisting Thomas Landseer to rule the skies on his plates, simply because there was not enough line-engraving to do. Since then there was some promise of a revival, and Mr Bourne engraved a few of the pictures by Gustave Dore. But little followed. The last of the line-engravers of Turner's pictures died in the person of Sir Daniel Wilson (d. 1892), who, recognizing the hopelessness of his early profession, laid his graver aside, and left Europe for Canada and eventually became president of the university of Toronto.

If line-engraving still flourishes in France, it is due not a little to official encouragement and to intelligent fostering by collectors and connoisseurs. The prizes offered by the Ecole des Beaux Arts would probably not suffice to give vitality to the art but for the employment afforded to the finished artist by the " Chalcographie du Musee du Louvre," in the name of which commissions are judiciously distributed. At the same time, it must be recognized that not only are French engravers less busy than they were in days when line-engraving was the only " important " method of picture-translation, but they work for the most part for much smaller rewards. Moreover, the class of the work has entirely changed, partly through the

reduction of prices paid for it, partly through the change of taste and fashion, and partly, again, through the necessities of the situation. That is to say, that public impatience is but a partial factor in the abandonment of the fine broad sweeping trough cut deep into the copper which was characteristic of the earlier engraving, either simply cut or crossed diagonally so as to form the series of " lozenges " typical of engraving at its finest and grandest period. That method was slow; but scarcely less slow was the shallower work rendered possible by the steel plate by reason of the much greater degree of elabora- tion of which such plates were capable, and which the public was taught— mainly by Finden — to expect. The French engravers were therefore driven at last to simplify their work if they were to satisfy the public and live by the burin. To compensate for loss of colour, the art developed in the direc- tion of

elegance and refinement. Gaillard (d. 1887), Blanchard, and Alphonse Francois (d. 1888) were perhaps the earliest chiefs of the new school, the characteristics of which are the substitution of exquisite greys for the rich blacks of old, sim- plicity of method being often allied to extremely high elaboration. Yet the aim of the modern engraver has always been, while pushing the capability of his own art to the farthermost limit, to retain throughout the individual and personal qualities of the master whose work is translated on the plate. The height of perfection to which the art is reached is seen in the triptych of Mantegna by Achille Jacquet (d. 1909), to whom may perhaps be accorded the first place among several engravers of the front rank. This ” Passion ” (from the three pictures in the Louvre and at Tours, forming the predella of the San Zeno altarpiece in Verona) not only conveys the forms, sentiment, and colour of the master, but succeeds also in rendering the peculiar lumin- osity of the originals. Jacquet, who gained the Prix de Rome in 1870, also translated pictures of Sfeir Joshua Reynolds, and engraved fine plates after Paul Dubois, Cabanel, Bouguereau, Meissonier and Detaille. The freedom of much of his work suggests an affinity with etching and dry-point; indeed, it appears that he uses the etching-needle and acid to lay in some of his groundwork and outlines. Leopold Flameng's engraving after Jan van Eyck's ” Virgin with the Donor," in the Louvre, is one of the most admirable works of its kind, retaining the quality and sentiment of the master, extreme minuteness and elaboration notwithstanding. Jules Jacquet is known for his work after Meissonier (especially the ” Fried- land “) and after Bonnat; Adrien Didier for his plates after Holbein (” Anne of Cleves “), Raphael, and Paul Veronese, among the Old Masters, and Bonnat, Bouguereau, and Roybet among the new. Jazinski (Botticelli's ” Primavera “) , Sulpis (Mantegna and Gustave Moreau), Patricot (Gustave Moreau), Burney, and Champollion (d. 1901), have been among the leaders of the modern school. Their object is to secure the faith- ful transcript of the painter they reproduce, while readily sacrificing the power of the old method, which, whatever its force and its beauty, was easily acquired by mediocre artists of technical ability who were nevertheless unable to appreciate or reproduce anything beyond mechanical excellence.

The Belgian School of engraving is not without vitality. Gustave Biot was equally skilful in portraiture and subject (engraving after Gallait, Cabanel, Gustave Dore, among his best work); A. M. Danse executed plates after leading painters, and elaborated an effective ” mixed method ” of graver- work and dry-point; and de Meerman has engraved a number of good plates; but private patronage is hardly sufficient in Belgium to maintain the school in a state of prosperous efficiency.

In Germany, as might be expected, line-engraving retains not a little of its popularity in its more orthodox form. The novel Stauffer-Bern method, in which freedom and lightness are obtained with such delicacy that the fine lines, employed in great numbers, run into tone, and yield a supposed advantage in modelling, has not been without appreciation. But the more usual virtue of the graver has been best supported,, and many have worked in the old-fashioned manner. Friedrich Zimmer-

mann (d. 1887) began his career by engraving such prints as Guido Reni's ” Ecce Homo ” in Dresden, and then devoted himself to the translation of modern German painters. Rudolph Pfnor was an ornamentist representative of his class; and Joseph Kohlschein, of Diisseldorf, a typical exponent of the intelligent conservative manner. His ” Marriage at Cana ” after Paul Veronese, ” The Sistine Madonna ” after Raphael, and “St Cecilia ” after the same master, are all plates of a high order.

In Italy the art is well-nigh as moribund as in England. When Vittorio Pica (of Naples) and Conconi (of Milan) have been named, it is difficult to mention other successors to the fine school of the 19th century which followed Piranesi and Volpato. A few of the pupils of Rosaspina and Paolo Toschi lived into the last quarter of the century, but to the present generation Asiolo, Jesi, C. Raimondi, L. Bigola, and Antonio Isac are remembered rather for their efforts than for their success in supporting their art against the combined opposition of etching, “process” and public indifference.

Outside Europe line-engraving can no longer be said to exist. Here and there a

spasmodic attempt may be made to appeal to the artistic appreciation of a limited public; but no general attention is paid to such efforts, nor, it may be added, are these inherently worthy of much notice. There are still a few who can engrave a head from a photograph or drawing, or a small en- graving for book : illustration or for book-plates; there are more who are highly proficient in rnechanical engraving for decorative purposes; but the engraving-machine is fast superseding this class. In short, the art of worthily translating a fine painting beyond the borders of France, Belgium, Germany and perhaps Italy can scarcely be said to survive, and even in those countries it appears to exist on sufferance and by hot-house encouragement. Authorities. — P. G. Hamerton, Drawing and Engraving (Edin- burgh, 1892); H. W. Singer and W. Strang, Etching, Engraving, and other methods of Printing Pictures (London, 1897) ; A. de Lostalot, Les Procedes de la gravure (Paris, 1882) ; Le Comte Henri Delaborde, La Gravure (Paris, English trans., with a chapter on English engraving methods, by William Walker, London, 1886); H. W. Singer, Geschichte des Kupferstichs (Magdeburg and Leipzig, 1895), and Der Kupferstich (Bielefeld and Leipzig, 1904); Alex. Waldow, Illustrirte Encyklopddie der Graphischen Kiinste (Leipzig, 1881- 1 884) ; Lippmann, Engraving and Engraving, translated by Martin Hardie (London, 1906) ; and for those who desire books of gossip on the subject, Arthur Hayden, Chats on Old Prints (London, 1906), and Malcolm C. Salaman, The Old Engravers of England (London, 1906). (P. G. H. ; M. H. S.)

LINEN and LINEN MANUFACTURES. Under the name of linen are comprehended all yarns spun and fabrics woven from flax fibre (see Flax).

From the earliest periods of human history till almost the close of the 18th century the linen manufacture was one of the most extensive and widely disseminated of the domestic industries of European countries. The industry was most largely developed in Russia, Austria, Germany, Holland, Belgium, the northern provinces of France, and certain parts of England, in the north of Ireland, and throughout Scotland; and in these countries ‘its importance was generally recognized by the enactment of special laws, having for their object the protection and extension of the trade. The inventions of Arkwright, Hargreaves and Crompton in the later part of the 18th century, benefiting almost exclusively the art of cotton-spinning, and the unparalleled development of that branch of textile manufactures, largely due to the ingenuity of these inventors, gave the linen trade as it then existed a fatal blow. Domestic spinning, and with it hand-loom weaving, immediately began to shrink; the trade which had supported whole villages and provinces entirely disappeared, and the linen manufacture, in attenuated dimensions and changed conditions, took refuge in special localities, where it resisted, not unsuccessfully, the further assaults of cotton, and, with varying fortunes, rearranged its relations in the com- munity of textile industries. The linen industries of the United Kingdom were the first to suffer from the aggression of cotton: more slowly the influence of the rival textile reached othei countries.

In 1810 Napoleon I. offered a reward of one million francs to any inventor who should devise the best machinery for the spinning of flax yarn. Within a few weeks thereafter Philippe de Girard patented in France important inventions for flax spinning by both dry and wet methods. His inventions, however, did not receive the promised reward and were neglected in his native country. In 181 5 he was invited by the Austrian govern- ment to establish a spinning mill at Hirtenberg near Vienna, which was run with his machinery for a number of years, but it failed to prove a commercial success. In the meantime English inventors had applied themselves to the task of adapting machines to the preparation and spinning of flax. The foundation of machine spinning of flax was laid by John Kendrew and Thomas Porthouse of Darlington, who, in 1787, secured a patent for “a mill or machine upon new principles for spinning yarn from hemp, tow, flax or wool.” By innumerable successive improvements and modifications, the invention of Kendrew and Porthouse developed into the perfect system of

machinery with which, at the present day, spinning-mills are furnished; but progress in adapting flax fibres for mechanical spinning, and linen yarn for weaving cloth by power-loom was much slower than in the corresponding case of cotton.

Till comparatively recent times, the sole spinning implements were the spindle and distaff. The spindle, which is the funda- mental apparatus in all spinning machinery, was a round stick or rod of wood about 12 in. in length, tapering towards each extremity, and having at its upper end a notch or slit into which the yarn might be caught or fixed. In general, a ring or " whorl " of stone or clay was passed round the upper part of the spindle to give it momentum and steadiness when in rotation, while in some few cases an ordinary potato served the purpose of a whorl. The distaff, or rock, was a rather longer and stronger bar or stick, around one end of which, in a loose coil or ball, the fibrous material to be spun was wound. The other extremity of the distaff was carried under the left arm, or fixed in the girdle at the left side, so as to have the coil of flax in a convenient position for drawing out to form the yarn. A prepared end of yarn being fixed into the notch, the spinster, by a smart rolling motion of the spindle with the right hand against the right leg, threw it out from her, spinning in the air, while, with the left hand, she drew from the rock an additional supply of fibre which was formed into a uniform and equal strand with the. right. The yarn being sufficiently twisted was released from the notch, wound around the lower part of the spindle, and again fixed in the notch at the point insufficiently twisted; and so the rotating, twisting and drawing out operations went on till the spindle was full. So persistent is an ancient and primitive art of this description that in remote districts of Scotland — a country where machine spinning has attained a high standard — spinning with rock and spindle is still practised; 1 and yarn of extraordinary delicacy, beauty and tenacity has been spun by their agency. The first improve- ment on the primitive spindle was found in the construction of the hand-wheel, in which the spindle, mounted in a frame, was fixed horizontally, and rotated by a band passing round it and a large wheel, set in the same framework. Such a wheel became known in Europe about the middle of the 16th century, but it appears to have been in use for cotton spinning in the East from time immemorial. At a later date, which cannot be fixed, the treadle motion was attached to the spinning wheel, enabling the spinster to sit at work with both hands free; and the intro- duction of the two-handed or double-spindle wheel, with flyers or twisting arms on the spindles, completed the series of mechanical improvements effected on flax spinning till the end of the 18th century. The common use of the two-handed wheel throughout the rural districts of Ireland and Scotland is a matter still within the recollection of some people; but spinning wheels are now seldom seen.

The modern manufacture of linen divides itself into two branches, spinning and weaving, to which may be added the

1 See Sir Arthur Mitchell's The Past in the Present (Edinburgh,

1880).

bleaching and various finishing processes, which, in the 1 case of many linen textures, are laborious undertakings and important branches of industry. The flax fibre is received in bundles from the scutch mill, and after having been classed into various grades, according to the quality of the material, it is labelled and placed in the store ready for the flax mill. The whole operations in yarn manufacture comprise (1) hackling, (2) preparing and (3) spinning.

Hackling. — This first preparatory process consists not only in combing out, disentangling and laying smooth and parallel the separate fibres, but also serves to split up and separate into their ultimate filaments the strands of fibre which, up to this point, have been agglutinated together. The hackling process was originally performed by hand, and it was one of fundamental im- portance, requiring the exercise of much dexterity and judgment. The broken, ravelled and short fibres, which separate out in the hackling process, form tow, an article of much inferior value to the spinner. A good

deal of hand-hackling is still practised, especially in Irish and continental mills; and it has not been found practicable, in any case, to dispense entirely with a rough preparation of the fibre by hand labour. In hackling by hand, the hackler takes a handful or " strick " of rough flax, winds the top end around his hands, and then, spreading out the root end as broad and flat as possible, by a swinging motion dashes the fibre into the hackle teeth or needles of the rougher or " ruffer." The rougher is a board plated with tin, and studded with spikes or teeth of steel about 7 in. in length, which taper to a fine sharp point. The hackler draws his strick several times through this tool, working gradually up from the roots to near his hand, till in his judgment the fibres at the root end are sufficiently combed out and smoothed. He then seizes the root end and similarly treats the top end of the strick. The same process is again repeated on a similar tool, the teeth of which are 5 in. long, and much more closely studded together; and for the finer counts of yarn a third and a fourth hackle may be used, of still increasing fineness and closeness of teeth. In dealing with certain varieties of the fibre, for fine spinning especially, the flax is, after roughing, broken or cut into .three lengths — -the top, middle and root ends. Of these the middle cut is most valuable, being uniform in length, strength and quality. The root end is more woody and harsh, while the top, though fine in quality, is uneven and variable in strength. From some flax of extra length it is possible to take two short middle cuts; and, again, the fibre is occasionally only broken into two cuts. Flax so prepared is known . as " cut line " in contradistinction to " long line ' flax, which is the fibre unbroken. The subsequent treatment of line, whether long or cut, does not present sufficient variation to require further reference to these distinctions.

In the case of hackling by machinery, the flax is first roughed and arranged in stricks, as above described under hand hackling. In the construction of hackling machines, the general principles of those now most commonly adopted are identical. The machines are known as vertical sheet hackling machines, their essential features being a set of endless leather bands or sheets revolving over a pair of rollers in a vertical direction. These sheets are crossed by iron bars, to which hackle stocks, furnished with teeth, are screwed. The hackle stocks on each separate sheet are of one size and gauge, but each successive sheet in the length of the machine is furnished with stocks of increasing fineness, so that the hackling tool at the end where the flax is entered is the coarsest, say about four pins per inch, while that to which the fibre is last submitted has the smallest and most closely set teeth. The finest tools may contain from 45 to 60 pins per inch. Thus the whole of the endless vertical revolving sheet presents a continuous series of hackle teeth, and the machines are furnished with a double set of such sheets revolving face to face, so close together that the pins of one set of sheets intersect those on the opposite stocks. Overhead, and exactly centred between these revolving sheets, is the head or holder channel, from which the flax hangs down while it is undergoing the hackling process on both sides. The flax is fastened in a holder consisting of two heavy flat plates of iron, between which it is spread and tightly screwed up. The holder is 11 in. in length, and the holder channel is fitted to contain a line of six, eight or twelve such holders, accord- ing to the number of separate bands of hackling stocks in the machine. The head or holder channel has a falling and rising motion, by which it first presents the ends and gradually more and more of the length of the fibre to the hackle teeth, and, after dipping down the full length of the fibre exposed, it slowly rises and lifts the flax clear of the hackle stocks. By a reciprocal motion all the holders are then moved forward one length; that at the last and finest ;set of stocks is thrown out, and place is made for filling in an additional holder at the beginning of the series. Thus with a six-tool hackle, or set of stocks, each holder full of flax from beginning to end descends into and rises from the hackle teeth six times in travelling from end to end of the machine. The root ends being thus first hackled, the holders are shot back along an inclined plane, the iron plates undamped, the flax reversed, and the top ends are then submitted to the same hackling operation. The tow made during the hackling

process is carried down by the pins of the sheet, and is stripped from them by means of a circular brush placed immediately under the bottom roller. The brush revolves in the same direction as, but quicker than the sheet, consequently the tow is withdrawn from the pins. The tow is then removed from the brush by a doffer roller, from which it is finally removed by a doffing knife. This material is then carded by a machine similar to, but finer than, the one described under Jute (q.v.). The hackled flax, however, is taken direct to the preparing department.

Preparing. — The various operations in this stage have for their object the proper assortment of dressed line into qualities fit for spinning, and the drawing out of the fibres to a perfectly level and uniform continuous ribbon or sliver, containing throughout an equal quantity of fibre in any given length. From the hackling the now smooth, glossy and clean stricks are taken to the sorting room, where they are assorted into different qualities by the " line sorter," who judges by both eye and touch the quality and capabilities of the fibre. So sorted, the material is passed to the spreading and drawing frames, a series or system of machines all similar in con- struction and effect. The essential features of the spreading frame are: (1) the feeding cloth or creeping sheet, which delivers the flax to (2) a pair of " feed and jockey " rollers, which pass it on (3) to the gill frame or fallers. The gill frame consists of a series of narrow hackle bars, with short closely studded teeth, which travel between the feed rollers and the drawing or " boss and pressing " rollers to be immediately attended to. They are, by an endless screw arrangement, carried forward at approximately the same rate at which the flax is delivered to them, and when they reach the end of their course they fall under, and by a similar screw arrange- ment are brought back to the starting-point; and thus they form an endless moving level toothed platform for carrying away the flax from the feed rollers. This is the machine in which the fibres are, for the first time, formed into a continuous length termed a sliver. In order to form this continuous sliver it is necessary that the short lengths of flax should overlap each other on the spread sheet or creeping sheet. This sheet contains four or six divisions, so that four or six lots of overlapped flax are moving at the same time towards the first pair of rollers — the boss rollers or retaining rollers. The fibre passes between these rollers and is immediately caught by the rising gills which carry the fibre towards the drawing rollers. The pins of the gills should pass through the fibre so that they may have complete control over it, while their speed should be a little greater than the surface speed of the retaining rollers. The fibre is thus carried forward to the drawing rollers, which have a surface speed of from 10 to 30 times that of the retaining rollers. The great difference between the speeds of the retaining and drawing rollers results in each sliver being drawn out to a corresponding degree. Finally all the slivers are run into one and in this state are passed between the delivery rollers into the sliver cans. Each can should contain the same length of sliver, a common length being 1000 yds. A bell is automatically rung by the machine to warn the attendant that the desired length has been deposited into the can. From the spreading frame the cans of sliver pass to the drawing frames, where from four to twelve slivers combined are passed through feed rollers over gilts, and drawn out by drawing rollers to the thickness of one. A third and fourth similar doubling and drawing may be embraced in a preparing system, so that the number of doublings the flax undergoes, before it arrives at the roving frame, may amount to from one thousand to one hundred thousand, according to the quality of yarn in progress. Thus, for example, the doublings on one preparing system may be 6X12X12X12X8 = 82,944. The slivers delivered by the last drawing frame are taken to the roving frame, where they are singly passed through feed rollers and over gills, and, after drafting to sufficient tenuity, they are slightly twisted by flyers and wound on bobbins, in which condition the material — termed " rove " or " rovings " — is ready for the spinning frame. 1

Spinning. — The spinning operation, which follows the roving, is done in two principal ways, called respectively dry spinning and wet spinning, the first being used for the lower counts or heavier yarns, while the second is exclusively adopted in the preparation of fine yarns. The spinning frame does not differ in principle from the throstle spinning machine used in cotton manufacture. The bobbins of flax rove are

arranged in rows on each side of the frame (the spinning frames being all double) on pins in an inclined plane.

1 The preparation of tow for spinning differs in essential features from the processes above described. Tow from different sources, such as scutching tow, hackle tow, &c. differs considerably in quality and value, some being very impure, filled with woody shives, &c. while other kinds are comparatively open and clean. A pre- liminary opening and cleaning is necessary for the dirty much- matted tows, and in general thereafter they are passed through two carding engines called respectively the breaker and the finisher cards till the slivers from their processes are ready for the drawing and roving frames. In the case of fine clean tows, on the other hand, passing through a single carding engine may be sufficient. The processes which follow the carding do not differ materially from those followed in the preparation of rove from line flax.

The rove passes downwards through an eyelet or guide to a pair of nipping rollers between which and the final drawing rollers, placed in the case of dry spinning from 18 to 22 in. lower down, the fibre receives its final draft while passing over and under cylinders and guide-plate, and attains that degree of tenuity which the finished yarn must possess. From the last rollers the now attenuated material, in passing to the flyers receives the degree of twist which compacts the fibres into the round hard cord which constitutes spun yarn; and from the flyers it is wound on the more slowly rotating spool within the flyer arms, centred on the top of the spindle. The amount of twist given to the thread at the spinning frame varies from I 5 to 2 times the square root of the count. In wet spinning the general sequence of operations is the same, but the rove, as unwound from its bobbin, first passes through a trough of water heated to about 120 Fahr. ; and the interval between the two pairs of rollers in which the drawing out of the rove is accomplished is very much shorter. The influence of the hot water on the flax fibre appears to be that it softens the gummy substance which binds the separate cells together, and thereby allows the elementary cells to a certain extent to be drawn out without breaking the con tinuity of the fibre; and further it makes a finer, smoother and more uniform strand than can be obtained by dry spinning. The extent to which the original strick of flax as laid on the feeding roller for (say) the production of a 50 lea yarn is, by doublings and drawings, extended, when it reaches the spinning spindle, may be stated thus: 35 times on spreading frame, 15 times on first drawing frame, 15 times on second drawing frame, 14 times on third drawing frame, 15 times on roving frame and 10 times on spinning frame, in all 16,537,500 times its original length, with 8X12X16 = 1536 doublings on the three drawing frames. That is to say, 1 yd. of hackled line fed into the spreading frame is spread out, mixed with other fibres, to a length of about 9400 m. of yarn, when the above drafts obtain. The drafts are much shorter for the majority of yarns.

The next operation is reeling from the bobbins into hanks. By act of parliament, throughout the United Kingdom the standard measure of flax yard is the ” lea,” called also in Scotland the ” cut ” of 300 yds. The flax is wound or reeled on a reel having a circum- ference of 90 in. (25 yds.) making ” a thread,” and one hundred and twenty such threads form a lea. The grist or count of all fine yarns is estimated by the number of leas in I lb; thus “50 lea” indicates that there are 50 leas or cuts of 300 yds. each in 1 lb of the yard so denominated. With the heavier yarns in Scotland the quality is indicated by their weight per ” spyndle ” of 48 cuts or leas; thus ” 3 lb tow yarn ” is such as weighs 3 ft per spyndle, equivalent to ” 16 lea.”

The hanks of yarn from wet spinning are either dried in a loft with artificial heat or exposed over ropes in the open air. When dry they are twisted back and forward to take the wiry feeling out of the yarn, and made up in bundles for the market as ” grey yarn.” English spinners make up their yarns into ” bundles ” of 20 hanks, each hank containing 10 leas; Irish spinners make hanks of 12 leas, l6| of which form a bundle; Scottish manufacturers adhere to the spyndle containing 4 hanks of 12 cuts or leas.

Commercial qualities of yarn range from about 8 ft tow yarns (6 lea) up to 160 lea line yarn. Very much finer yarn up even to 400 lea may be spun from the system of

machines found in many mills; but these higher counts are only used for fine thread for sewing and for the making of lace. The highest counts of cut line flax are spun in Irish mills for the manufacture of fine cambrics and lawns which are characteristic features of the Ulster trade. Exceedingly high counts have sometimes been spun by hand, and for the preparation of the finest lace threads it is said the Belgian hand spinners must work in damp cellars, where the spinner is guided by the sense of touch alone, the filament being too fine to be seen by the eye. Such lace yarn is said to have been sold for as much as £240 per ft. In the Great Exhibition of 1851, yarn of 760 lea, equal to about 130 m. per lb, was shown which had been spun by an Irish woman eighty-four years of age. In the same exhibition there was shown by a Cambray manufacturing firm hand-spun yarn equal to 1200 warp and 1600 weft or to more than 204 and 272 m. per lb respectively.

Bleaching. — A large proportion of the linen yarn of commerce undergoes a more or less thorough bleaching before it is handed over to the weaver. Linen yarns in the green condition contain such a large proportion of gummy and resinous matter, removable by bleaching, that cloths which might present a firm close texture in their natural unbleached state would become thin and impoverished in a perfectly bleached condition. Nevertheless, in many cases it is much more satisfactory to weave the yarns in the green or natural colour, and to perform all bleaching operations in the piece. Manufacturers allow about 20 to 25% of loss in weight of yarn in bleaching from the green to the fully bleached stage; and the intermediate stages of boiled, improved, duck, cream, half bleach and three-quarters bleach, all indicating a certain degree of bleaching, have corresponding

degrees of loss in weight. The differences in colour resulting from different degrees of bleaching are taken advantage of for producing patterns in certain classes of linen fabrics.

Linen thread is prepared from the various counts of fine bleached line yarn by winding the hanks on large spools, and twisting the various strands, two, three, four or six cord as the case may be, on a doubling spindle similar in principle to the yarn spinning frame, excepting, of course, the drawing rollers. A large trade in linen thread has been created by its use in the machine manufacture of boots and shoes, saddlery and other leather goods, and in heavy sewing-machine work generally. The thread industry is largely developed at Lisburn near Belfast, at Johnstone near Glasgow, Bridport, Dorsetshire, and at Paterson, New Jersey, United States. Fine cords, net twine and ropes are also twisted from flax.

Weaving. — The difficulties in the way of power-loom linen weaving, combined with the obstinate competition of hand-loom weavers, delayed the introduction of factory weaving of linen fabrics for many years after the system was fully applied to other textiles. The principal difficulty arose through the hardness and inelasticity of the linen yarns, owing to which the yarn frequently broke under the tension to which it was subjected. Competition with the hand-loom against the power-loom in certain classes of work is conceivable, although it is absolutely impossible for the work of the spinning wheel to stand against the rivalry of draw- ing, roving and spinning frames. To the present day, in Ireland especially, a great deal of fine weaving is done by hand-loom. Warden states that power was applied on a small scale to the weaving of canvas in London about 1812; that in 1821 power- looms were started for weaving linen at Kirkcaldy, Scotland; and that in 1824 Maberly & Co. of Aberdeen had two hundred power-looms erected for linen manu- facture. The power-loom has been in uninterrupted use in the Broadford factory, Aberdeen, which then be- longed to Maberly & Co., down to the present day, and that firm may be credited with being the effective in- troducers of power-loom weaving in the linen trade.

The various operations connected with linen weaving, such as winding, warping, dressing, beaming and draw- ing-in, do not differ in essential features from the like processes in the case of

cotton weaving, &c, neither is there any significant modification in the looms employed (see Weaving). Dressing is a matter of importance in the preparation of linen warps for beaming. It consists in treating the spread yarn with flour or farina paste, applied to it by flannel-covered rollers, the lowermost of which revolves in a trough of paste. The paste is equalized on the yarn by brushes, and dried by passing the web over steam-heated cylinders before it is finally wound on the beam for weaving.

Linen fabrics are numerous in variety and widely different in their qualities, appearance and applications, ranging from heavy sail-cloth and rough sacking to the most delicate cambrics, Fabrics.] awns an d scrims. The heavier manufactures include as a principal item sail-cloth, with canvas, tarpaulin, sacking and carpeting. The principal seats of the manufacture of these linens are Dundee, Arbroath, Forfar, Kirkcaldy, Aberdeen and Barnsley. The medium weight linens, which are used for a great variety of purposes, such as tent-making, towelling, covers, outer garments for men, linings, upholstery work, &c, include duck, huckaback, crash, tick, dowlas, osnaburg, low sheetings and low brown linens. Plain bleached linens form a class by themselves, and include principally the materials for shirts and collars and for bed sheets. Under the head of twilled linens are included drills, diapers and dimity for household use; and damasks for table linen, of which two kinds are distinguished — single or five-leaf damask, and double or eight-leaf damask, the pattern being formed by the intersection of warp and weft yarns at intervals of five and eight threads of yarn respectively. The fine linens are cambrics, lawns and handkerchiefs ; and lastly, printed and dyed linen fabrics may be assigned to a special though not important class. In a general way it may be said regarding the British industry that the heavy linen trade centres in Dundee; medium goods are made in most linen manufacturing districts; damasks are chiefly produced in Belfast, Dunfermline and

Perth ; and the fine linen manufactures have their seat in Belfast and the north oi Ireland. Leeds and Barnsley are the centres of the linen trade in England.

Linen fabrics have several advantages over cotton, resulting principally from the microscopic structure and length of the flax fibre. The cloth is much smoother and more lustrous than cotton cloth; and, presenting a less ” woolly ” surface, it does not soil so readily, nor absorb and retain moisture so freely, as the more spongy cotton; and it is at once a cool, clean and healthful material for bed-sheeting and clothing. Bleached linen, starched and dressed, possesses that unequalled purity, gloss and smoothness which make it alone the material suitable for shirt-fronts, collars and wristbands; and the gossamer delicacy, yet strength, of the thread it may be spun into fits it for the fine lace-making to which it is devoted. Flax is a slightly heavier material than cotton, while its strength is about double.

As regards the actual number of spindles and power-looms engaged in linen manufacture, the following particulars are taken from the report of the Flax Supply Association for 1905 : —

Country.

Year.

Number of Spindles for Flax

Spinning.

Year.

Number of

Power-looms

for Linen

Weaving.

Austria-Hu

Belgium

England an

France .

Germany

Holland

Ireland

Italy .

Norway

Russia

Scotland

Spain .

Sweden

ngary . . d Wales .

1903 1902

1905 1902 1902 1896

1905 1902

1902 1905

280,414 280,000

49,941

455,838

295.796

8000

851.388

77,000

300,000 160,085

i895

1900

1905 1891

1895 1891

1905 1902 1880 1889

1905 1876 1884

3357 , 3400

4424 18,083

7557

1200

34.498

35oo

120

7312

17.185

1000

286

British Exports of Linen Yarn and Cloth.

Weight of linen yarn in pounds. Length in yards of linen piece goods,

plain, bleached or unbleached Length in yards of linen piece goods,

checked, dyed or printed, also

damask and diaper. .... Length in yards of sailcloth . Total length in yards of all kinds of

linen cloth .....

Weight in pounds of linen thread for

sewing

14,859,900 144,416,700

11,807,600 3,233,400

159.457.700 2,474,100

18,462,300 150,849,300

17,986,100 5,372,600

174,208,000

2,240,300

1901.

12,971,100 137.521,000

8,007,600 4,686,700

150,215,300

1,721,000

1906.

14,978,200 1 73.334.200

13.372,100 4,251,400

190,957.700

2,181,100

Authorities. — History of the trade, &c. : Warden's Linen Trade, Ancient and Modern. Spinning: Peter Sharp, Flax, Tow and Jute Spinning (Dundee); H. R. Carter, Spinning and Twisting of Long Vegetable Fibres (London). Weaving: Woodhouse and Milne, Jute and Linen Weaving, part i., Mechanism, part ii., Calcula- tions and Cloth Structure (Manchester) ; and Woodhouse and Milne, Textile Design: Pure and Applied (London). (T. Wo.)

LINEN-PRESS, a contrivance, usually of oak, for pressing sheets, table-napkins and other linen articles, resembling a modern office copying-press. Linen presses were made chiefly in the 17th and 18th centuries, and are now chiefly interest- ing as curiosities of antique furniture. Usually quite plain, they were occasionally carved with characteristic Jacobean designs.

LINER, or Line of Battle Ship, the name formerly given to a vessel considered large enough to take part in a naval battle. The practice of distinguishing between vessels fit, and those not fit, to " lie in a line of battle," arose towards the end of the 17th century. In the early 18th century all vessels of 5° guns and upwards were considered fit to lie in a line. After the Seven Years' War (1756-63) the 50-gun ships were rejected as too small. When the great revolutionary wars broke out the smallest line of battle ship was of 64 guns. These also came to be considered as too small, and later the line of battle-ships began with those of 74 guns. The term is now replaced by "battleship"; "liner" being the colloquial name given to the great passenger ships used on the main lines of sea transport.

LING, PER HENRIK (1776-1839), Swedish medical-gymnastic practitioner, son of a minister, was born at Ljunga in the south of Sweden in 1776. He studied divinity, and took his degree in 1797, but then went abroad for some years, first to Copenhagen, where he taught modern languages, and then to Germany, France and England. Pecuniary straits injured his health, and he suffered much from rheumatism, but he had acquired mean- while considerable proficiency in gymnastics and fencing. In 1804 he returned to Sweden, and established himself as a teacher in these arts at Lund, being appointed in 1803 fencing-master to the university. He found that his daily exercises had com- pletely restored his bodily health, and his thoughts now turned towards applying this experience for the benefit of others. He attended the classes on anatomy and physiology, and went through the entire curriculum for the training of a doctor; he then elaborated a system of gymnastics, divided into four branches, (1) pedagogical, (2) medical, (3) military, (4) aesthetic, which carried out his theories. After several attempts to interest the Swedish government, Ling at last in 1813 obtained their co-operation, and the Royal Gymnastic Central Institute, for the training of gymnastic instructors, was opened in Stockholm, with himself as principal. The orthodox medical practitioners were naturally opposed to the larger claims made by

Ling and his pupils respecting the cure of diseases — so far at least as anything more than the occasional benefit of some form of skil- fully applied ” massage ” was concerned; but the fact that in 1 83 1 Ling was elected a member of the Swedish General Medical Association shows that in his own country at all events his methods were regarded as consistent with professional recog- nition. Ling died in 1839, having previously named as the repositories of his teaching his pupils Lars Gabriel Branting (1 799-1881), who succeeded him as principal of the Institute, and Karl Augustus Georgii, who became sub-director; his son, Hjalmar Ling (1820-1886), being for many years associated with them. All these, together with Major Thure Brandt, who from about 1 86 1 specialized in the treatment of women (gynecological gymnastics), are regarded as the pioneers of Swedish medical gymnastics.

It may be convenient to summarize here the later history of Ling’s system of medical gymnastics. A Gymnastic Orthopaedic Institute at Stockholm was founded in 1822 by Dr Nils Akerman, and after 1827 received a government grant; and Dr Gustaf Zander elaborated a medico-mechanical system of gymnastics, known by his name, about 1857, and started his Zander Institute at Stockholm in 1865. At the Stockholm Gymnastic Central Institute qualified medical men have supervised the medical department since 1864; the course is three years (one year for qualified doctors). Broadly speaking, there have been two streams of development in the Swedish gymnastics founded on Ling’s beginnings — either in a conservative direction, making certain forms of gymnastic exercises subsidiary to the prescrip- tions of orthodox medical science, or else in an extremely progressive direction, making these exercises a substitute for any other treatment, and claiming them as a cure for disease by themselves. Modern medical science recognizes fully the importance of properly selected exercises in preserving the body from many ailments; but the more extreme claim, which rules out the use of drugs in disease altogether, has naturally not been admitted. Modern professed disciples of Ling are divided, the representative of the more extreme section being Henrik Kellgren (b. 1837), who has a special school and following.

Ling and his earlier assistants left no proper written account of their treatment, and most of the literature on the subject is re- pudiated by one set or other of the gymnastic practitioners. Dr Anders Wide, M.D., of Stockholm, has published a Handbook of Medical Gymnastics (English edition, 1899), representing the more conservative practice. Henrik Kellgren’s system, which, though based on Ling’s, admittedly goes beyond it, is described in The Elements of Kellgren’s Manual Treatment (1903), by Edgar F. Cyriax, who before taking the M.D. degree at Edinburgh had passed out of the Stockholm Institute as a gymnastic director.” See also the encyclopaedic work on Sweden: its People and Industry (1904), p. 348, edited by G. Sundbarg for the Swedish government.

LING 1 (Molva vulgaris), a fish of the family GadidaC, which is readily recognized by its long body, two dorsal fins (of which the anterior is much shorter than the posterior), single long anal fin, separate caudal fin, a barbel on the chin and large teeth in the lower jaw and on the palate. Its usual length is from 3 to 4 ft., but individuals of 5 or 6 ft. in length, and some 70 lb in weight, have been taken. The ling is found in the North Atlantic, from Spitzbergen and Iceland southwards to the coast of Portugal. Its proper home is the North Sea, especially on the coasts of Norway, Denmark, Great Britain and Ireland, it occurs in great abundance, generally at some distance from the land, in depths varying between 50 and 100 fathoms. During the winter months it approaches the shores, when great numbers are caught by means of long lines. On the American side of the Atlantic it is less common, although generally distributed along the south coast of Greenland and on the banks of Newfoundland. Ling is one of the most valuable species of the cod-fish family; a certain number are consumed fresh, but by far the greater portion are prepared for exportation to various countries (Germany, Spain, Italy). They are either salted and sold as ” salt-fish,” or split from head to tail and dried, forming, with similarly prepared cod and coal-fish, the article of which during Lent immense quantities are consumed in Germany and elsewhere under the name of ” stock-fish.” The oil is frequently extracted from the liver and used by the poorer classes

of the coast population for the lamp or as medicine.

LINGARD, JOHN (1771-1851), English historian, was born on the 5th of February 1771 at Winchester, where his father, of an ancient Lincolnshire peasant stock, had established himself as a carpenter. The boy's talents attracted attention, and in 1782 he was sent to the English college at Douai, where he continued until shortly after the declaration of war by England (1793). He then lived as tutor in the family of Lord Stourton, but in October 1794 he settled along with seven other former members of the old Douai college at Crook Hall near Durham, where on the completion of his theological course he became vice- president of the reorganized seminary. In 1795 he was ordained priest, and soon afterwards undertook the charge of the chairs of natural and moral philosophy. In 1808 he accompanied the community of Crook Hall to the new college at Ushaw, Durham, but in 181 1, after declining the presidency of the college at Maynooth, he withdrew to the secluded .mission at Hornby in Lancashire, where for the rest of his life he devoted himself to literary pursuits. In 181 7 he visited Rome, where he made researches in the Vatican Library. In 182 1 Pope Pius VII. created him doctor of divinity and of canon and civil law; and in 1825 Leo XII. is said to have made him cardinal in petto. He died at Hornby on the 17th of July 185 1.

Lingard wrote The Antiquities of the Anglo-Saxon Church (1806), of which a third and greatly enlarged addition appeared in 1845 under the title The History and Antiquities of the Anglo-Saxon Church; containing an account of its origin, government, doctrines, worship, revenues, and clerical and monastic institutions; but the work with which his name is chiefly associated is A History of, England, from the first invasion by the Romans to the commencement of the reign of William III., which appeared originally in 8 vols, at intervals between 1819 and 1830. Three successive subsequent editions had the benefit of extensive revision by the author; a fifth edition in 10 vols. 8vo appeared in 1849, and a sixth, with life of the author by Tierney prefixed to vol. x., in 1854-1855. Soon after its appearance it was translated into French, German and Italian. It is a work of ability and research; and, though Cardinal Wiseman's claim for its author that he was " the only impartial historian of our country" may be disregarded, the book remains interesting as representing the view taken of certain events in English history by a devout, but able and learned, Roman Catholic in the earlier part of the 19th century.

LINGAYAT (from linga, the emblem of Siva), the name of a peculiar sect of Siva worshippers in southern India, who call themselves Vira-Saivas (see Hinduism). They carry on the person a stone linga (phallus) in a silver casket. The founder of

1 As the name of the fish, " ling " is found in other Teut. language:,- cf. Dutch and Ger. Leng, Norw. langa, &c. It is generally connected in origin with " long," from the length of its body. As the name of the common heather, Calluna vulgaris^ (see Heath) the word is Scandinavian; cf. Dutch and Dan. lyng, Swed. ljung.

the sect is said to have been Basava, a Brahman prime minister of a Jain king in the 12th century. The Lingayats are specially numerous in the Kanarese country, and to them the Kanarese language owes its cultivation as literature. Their priests are called Jangamas. In 1901 the total number of Lingayats in all India was returned as more than 2§ millions, mostly in Mysore and the adjoining districts of Bombay, Madras and Hyderabad. LINGAYEN, a town and the capital of the province of Pan- gasinan, Luzon, Philippine Islands, about no m. N. by W. of Manila, on the S. shore of the Gulf of Lingayen, and on a low and fertile island in the delta of the Agno river. Pop. (1903) 21,529. It has good government buildings, a fine church and plaza, the provincial high school and a girls' school conducted by Spanish Dominican friars. The climate is cool and healthy. The chief industries are the cultivation of rice (the most im- portant crop of the surrounding country) , fishing and the making of nipa-wine from the juice of the

nipa palm, which grows abundantly in the neighbouring swamps. The principal language is Pangasinan; Ilocano is also spoken.

LINGEN, RALPH ROBERT WHEELER LINGEN, Baron (1819-1905), English civil servant, was born in February 1819 at Birmingham, where his father, who came of an old Hertfordshire family, with Royalist traditions, was in business. He became a scholar of Trinity College, Oxford, in 1837; won the Ireland (1838) and Hertford (1839) scholarships; and after taking a first-class in Liter ae Humaniores (1840), was elected a fellow of Balliol (1841). He subsequently won the Chancellor's Latin Essay (1843) and the Eldon Law scholarship (1846). After taking his degree in 1840, he became a student of Lincoln's Inn, and was called to the bar in 1847; but instead of practising as a barrister, he accepted an appointment in the Education Office, and after a short period was chosen in 1849 t0 succeed Sir J. Kay Shuttle- worth as its secretary or chief permanent official. He retained this position till 1869. The Education Office of that day had to administer a somewhat chaotic system of government grants to local schools, and Lingen was conspicuous for his fearless dis- crimination and rigid economy, qualities which characterized his whole career. When Robert Lowe (Lord Sherbrooke) became, as vice-president of the council, his parliamentary chief, Lingen worked congenially with him in producing the Revised Code of 1862 which incorporated "payment by results"; but the education department encountered adverse criticism, and in 1864 the vote of censure in parliament which caused Lowe's resignation, founded (but erroneously) on an alleged " editing " of the school inspectors' reports, was inspired by a certain antagonism to Lingen's as well as to Lowe's methods. Shortly before the introduction of Forster's Education Act of 1870, he was transferred to the post of permanent secretary of the treasury. In this office, which he held till 1885, he proved a most efficient guardian of the public purse, and he was a tower of strength to successive chancellors of the exchequer. It used to be said that the best recommendation for a secretary of the treasury was to be able to say " No " so disagreeably that nobody would court a repetition. Lingen was at all events a most successful resister of importunate claims, and his un- doubted talents as a financier were most prominently displayed in the direction of parsimony. In 1885 he retired. He had been made a C.B. in 1869 and a K.C.B. in 1878, and on his retire- ment he was created Baron Lingen. In 1889 he was made one of the first aldermen of the new London County Council, but he resigned in 1892. He died on the 22nd of Ju'iy 1905. He had married in 1852, but left no issue.

LINGEN, a town in the Prussian province of Hanover, on the Ems canal, 43 m. N.N.W. of Minister by rail. Pop. 7500. It has iron foundries, machinery factories, railway workshops and a considerable trade in cattle, and among its other industries are weaving and malting and the manufacture of cloth. Lingen was the seat of a university from 1685 to 1819.

The county of Lingen, of which this town was the capital, was united in the middle ages with the county of Treklenburg. In 1508, however, it was separated from this and was divided into an upper and a lower county, but the two were united in 1541.

A little, later Lingen was sold to the emperor Charles V., from whom it passed to his son, Philip II. of Spain, who ceded it in 1597 to Maurice, prince of Orange. After the death of the English king, William III., in 1702, it passed to Frederick I., king of Prussia, and in 181 5 the lower county was transferred to Hanover, only to be united again with Prussia in 1866.

See Moller, Geschichte der vormaligen Grafschaft Lingen (Lingen, 1874); Herrmann, Die Erwerbung der Stadt und Grafschaft Lingen durch die Krone Preussen (Lingen, 1902) ; and Schriever, Geschichte des Kreiges Lingen (Lingen, 1905).

LINGUET, SIMON NICHOLAS HENRI (1736-1794), French journalist and advocate, was born on the 14th of July 1736, at Reims, whither his father, the assistant principal in the College de Beauvais of Paris, had recently been exiled by lettre de cachet for engaging in the Jansenist controversy. He attended the College de Beauvais and won

the three highest prizes there in 1 751. He accompanied the count palatine of Zweibriicken to Poland, and on his return to Paris he devoted himself to writing. He published partial French translations of Calderon and Lope de Vega, and. wrote parodies for the Opera Comique and pamphlets in favour of the Jesuits. Received at first in the ranks of the philosophes, he soon went over to their opponents, possibly more from contempt than from conviction, the immediate occasion for his change being a quarrel with d'Alembert in 1762. Thenceforth he violently attacked whatever was considered modern and enlightened, and while he delighted society with his numerous sensational pamphlets, he aroused the fear and hatred of his opponents by his stinging wit. He was admitted to the bar in 1764, and soon became one of the most famous pleaders of his century. But in spite of his brilliant ability and his record of having lost but two cases, the bitter attacks which he directed against his fellow advocates, especially against Gerbier (1725-1788), caused his dismissal from the bar in 1775. He then turned to journalism and began the Journal de politique et de litterature, which he employed for two years in literary, philosophical and legal criticisms. But a sarcastic article on the French Academy compelled him to turn over the Journal to La Harpe and seek refuge abroad. Linguet, however, con- tinued his career of free lance, now attacking and now supporting the government, in the Annates politiques, civiles et litteraires, published from 1777 to 1792, first at London, then at Brussels and finally at Paris. Attempting to return to France in 1780 he was arrested for a caustic attack on the due de Duras (1715- 1789), an academician and marshal of France, and imprisoned nearly two years in the Bastille. He then went to London, and thence to Brussels, where, for his support of the reforms of Joseph II., he was ennobled and granted an honorarium of one thousand ducats. In 1786 he was permitted by Vergennes to return to France as an Austrian counsellor of state, and to sue the due d'Aiguillon (1 730-1 798), the former minister of Louis XV., for fees due him for legal services rendered some fifteen years earlier. He obtained judgment to the amount of 24,000 livres. Linguet received the support of Marie Antoinette; his fame at the time surpassed that of his rival Beaumarchais, and almost excelled that of Voltaire. Shortly afterwards he visited the emperor at Vienna to plead the case of Van der Noot and the rebels of Brabant. During the early years of the Revolution he issued several pamphlets against Mirabeau, who returned his ill-will with interest, calling him " the ignorant and bombastic M. Linguet, advocate of Neros, sultans and viziers." On his return to Paris in 1791 he defended the rights of San Domingo before the National Assembly. His last work was a defence of Louis XVI. He retired to Marnes near Ville d'Avray to escape the Terror, but was sought out and summarily condemned to death " for having flattered the despots of Vienna and London." He was guillotined at Paris on the 27th of June

1794.

Linguet was a prolific writer in many fields. Examples of his attempted historical writing are Histoire du siecle d 'Alexandre le Grand (Amsterdam, 1762), and Histoire impartiale des Jesuites (Madrid, 1768), the latter condemned to be burned. His opposition to the philosophes had its strongest expressions in FanaHsme des philosophes (Geneva and Paris, 1764) and Histoire des revolutions de

V empire romain (Paris, 1766-1768). His Theorie des lois civiles (London, 1767) is a vigorous defence of absolutism and attack on the politics of Montesquieu. His best legal treatise is Memoire pour le cotnte de Morangies (Paris, 1772); Linguet's imprisonment in the Bastille afforded him the opportunity of writing his Memoires sur la Bastille, first published in London in 1789; it has been translated into English (Dublin, 1783, and Edinburgh, 1884-1887), and is the best of his works though untrustworthy.

See A. Deverite, Notice pour servir d. I'histoire de la vie et des Merits de S. N. H. Linguet (Liege, 1782); Gardoz, Essai historique sur la vie et les ouvrages de Linguet

(Lyon, 1808) : J. F. Barriere, Memoire de Linguet et de Latude (Paris, 1884) ; Ch. Monselet, Les Oublies et les didaignes (Paris, 1885), pp. 1-41; H. Monin, ” Notice sur Linguet,” in the 1889 edition of Memoires sur la Bastille; J. Cruppi, Un avocat journaliste au 18′ siecle, Linguet (Paris, 1895); A. Philipp. Linguet, ein National okonom des XV 111 Jahrhunderts in seinen recktlichen, socialen und volkswirtschaftlichen Anschauungen (Zurich, 1896); A. Lichtenberger, Le Socialisme utopique (1898;, pp. 77-131.

LINK. (1) (Of Scandinavian origin; cf. Swed. lank, Dan. laenke; cognate with “flank,” and Ger. Gelenk, joint), one of the loops of which a chain is composed; used as a measure of length in surveying, being vˆth part of a “chain.” In Gunter’s chain, a “link”= 7-92 in.; the chain used by American engineers consists of 100 links of a foot each in length (for ” link work ” and ” link motions ” see Mechanics: § Applied, and Steam Engine). The term is also applied to anything used for connecting or binding together, metaphorically or absolutely. (2) (O. Eng. Mine, possibly from the root which appears in ” to lean “), a bank or ridge of rising ground; in Scots dialect, in the plural, applied to the ground bordering on the sea-shore, characterized by sand and coarse grass; hence a course for playing golf. (3) A torch made of pitch or tow formerly carried in the streets to light passengers, by men or boys called ” link- boys ” who plied for hire with them. Iron link-stands supporting a ring in which the link might be placed may still be seen at the doorways of old London houses. The word is of doubtful origin. It has been referred to a Med. Lat. lichinus, which occurs in the form linchinus (see Du Cange, Clossarium) ; this, according to a 15th-century glossary, meant a wick or match. It is an adaptation of Gr. \vxyos, lamp. Another suggestion connects it with a supposed derivation of ” linstock,” from ” lint.” The New English Dictionary thinks the likeliest suggestion is to identify the word with the ” link ” of a chain. The tow and pitch may have been manufactured in lengths, and then cut into sections or ” links.”

LINKOPING, a city of Sweden, the seat of a bishop, and chief town of the district (Ian) of Ostergotland. Pop. (1900) 14,552. It is situated in a fertile plain 142 m. by rail S.W. of Stockholm, and communicates with Lake Roxen (j m. to the north) and the Gota and Kinda canals by means of the navigable Stanga. The cathedral (1150-1499), a Romanesque building with a beautiful south portal and a Gothic choir, is, next to the cathedral of Upsala, the largest church in Sweden. It contains an altar- piece by Martin Heemskerck (d. 1574), which is said to have been bought by John II. for twelve hundred measures of wheat. In the church of St Lars are some paintings by Per Horberg (1746-1816), the Swedish peasant artist. Other buildings of note are the massive episcopal palace (1470-1500), afterwards a royal palace, and the old gymnasium founded by Gustavus Adolphus in 1627, which contains the valuable library of old books and manuscripts belonging to the diocese and state college, and collection of coins and antiquities. There is also the Ostergotland Museum, with an art collection. The town has manufactures of tobacco, cloth and hosiery. It is the head- quarters of the second army division.

Linkoping early became a place of mark, and was already a bishop’s see in 1082. It was at a council held in the town in 1 1 53 that the payment of Peter’s pence was agreed to at the instigation of Nicholas Breakspeare, afterwards Adrian IV. The coronation of Birger Jarlsson Valdemar took place in the cathedral in 1251; and in the reign of Gustavus Vasa several important diets were held in the town. At Stangabro (Stanga Bridge), close by, an obelisk (1898) commemorates the battle of Stangabro (1598), when Duke Charles (Protestant) defeated the Roman Catholic Sigismund. A circle of stones in the Iron

Market of Linkoping marks the spot where Sigismund’s adherents were beheaded in 1600.

LINLEY, THOMAS (1732-1795), English musician, was born at Wells, Somerset, and studied music at Bath, where he settled as a singing-master and conductor of the concerts. From 1774 he was engaged in the management at Drury Lane theatre, London, composing or compiling the music of many of the pieces produced there,

besides songs and madrigals, which rank high among English compositions. He died in London on the 19th of November 1795. His eldest son Thomas (1756-1778) was a remarkable violinist, and also a composer, who assisted his father; and he became a warm friend of Mozart. His works, with some of his father's, were published in two volumes, and these contain some lovely madrigals and songs. Another son, William (1771-1835), who held a writership at Madras, was devoted to literature and music and composed glees and songs. Three daughters were similarly gifted, and were remarkable both for singing and beauty; the eldest of them Elizabeth Ann (1754-1792), married Richard Brinsley Sheridan in 1773, and thus linked the fortunes of her family with his career.

LINLITHGOW, JOHN ADRIAN LOUIS HOPE, ist Marquess of (1860-1908), British administrator, was the son of the 6th earl of Hopetoun. The Hope family traced their descent to John de Hope, who accompanied James V.'s queen Madeleine of Valois from France to Scotland in 1537, and of whose great-grand- children Sir Thomas Hope (d. 1646), lord advocate of Scotland, was ancestor of the earls of Hopetoun, while Henry Hope settled in Amsterdam, and was the ancestor of the famous Dutch bankers oi that name, and of the later Hopes of Bedgebury, Kent. Sir Thomas's son, Sir James Hope of Hopetoun (1614- 1661), Scottish lord of session, was grandfather of Charles, rst carl of Hopetoun in the Scots peerage (1681-1742), who was created earl in 1703; and his grandson, the 3rd earl, was in 1809 made a baron of the United Kingdom. John, the 4th earl (1765- 1823), brother of the 3rd earl, was a distinguished soldier, who for his services in the Peninsular War was created Baron Niddry in 1814 before succeeding to the earldom. The marquessate of Linlithgow was bestowed on the 7th earl of Hopetoun in 1902, in recognition of his success as first governor (1900-1902) of the commonwealth of Australia; he died on the ist of March 1908, being succeeded as 2nd marquess by his eldest son (b. 1887).

An earldom of Linlithgow was in existence from 1600 to 1716, this being held by the Livingstones, a Scottish family descended from Sir William Livingstone. Sir William obtained the barony of Callendar in 1346, and his descendant, Sir Alexander Livingstone (d. c. 1450), and other members of this family were specially pro- minent during the minority of King James II. Alexander Living- stone, 7th Lord Livingstone (d. 1623), the eldest son of William, the 6th lord (d. c. 1580), a supporter of Mary, queen of Scots, was a leading Scottish noble during the reign of James VI. and was created earl of Linlithgow in 1600. Alexander's grandson, George, 3rd earl of Linlithgow (1616-1690), and the latter's son, George, the 4th earl (c. 1652-1695), were both engaged against the Covenanters during the reign of Charles II. When the 4th earl died without sons in August 1695 the earldom passed to his nephew, James Livingstone, 4th earl of Callendar. James, who then became the 5th earl of Linlithgow, joined the Stuart rising in 1715; in 1716 he was attainted, being thus deprived of all his honours, and he died without sons in Rome in April 1723.

The earldom of Callendar, which was thus united with that of Linlithgow, was bestowed in 1641 upon James Livingstone, the third son of the Ist earl of Linlithgow. Having seen military service in Germany and the Netherlands, James was created Lord Livingstone of Almond in 1633 by Charles I., and eight years later the king wished to make him lord high treasurer of Scotland. Before this, however, Almond had acted with the Covenanters, and during the short war between England and Scotland in 1640 he served under General Alexander Leslie, afterwards earl of Leven. But the trust reposed in him by the Covenanters did not prevent him in 1640 from signing the " band of Cumbernauld," an association for defence against Argyll, or from being in some way mixed up with the " Incident," a plot for the seizure of the Covenanting leaders, Hamilton and Argyll. In 1641 Almond became an earl, and, having declined the offer of a high position in the army raised by Charles I., he led a division of the Scottish forces into England in 1644 and helped Leven to capture Newcastle. In 1645 Callendar, who often imagined himself slighted, left the army, and in 1647 he was one of the promoters of the " engagement " for the release of the king. In 1648, when the Scots marched into England, he served

as lieutenant-general under the duke of Hamilton, but the duke found him as difficult to work with as Leven had done previously, and his advice was mainly responsible for the defeat at Preston. After this battle he escaped to Holland. In 1650 he was allowed to return to Scotland, but in 1654 his estates were seized and he was imprisoned ; he came into prominence once more at the Restoration. Callendar died on March 1674, leaving no children, and, according to a special remainder, he was succeeded in the earldom by his nephew Alexander (d. 1685), the second son of the 2nd earl of Linlithgow; and he again was succeeded by his nephew Alexander (d. 1692), the second son of the 3rd earl of Linlithgow. The 3rd earl's son, James, the 4th earl, then became 5th earl of Linlithgow (see supra).

LINLITHGOW, a royal, municipal and police burgh and county town of Linlithgowshire, Scotland. Pop. (iqoi) 4279. It lies in a valley on the south side of a loch, 175 m. W. of Edin- burgh by the North British railway. It long preserved an antique and picturesque appearance, with gardens running down to the lake, or climbing the lower slopes of the rising ground, but in the 19th century much of it was rebuilt. About 4 m. S. by W. lies the old village of Torphichen (pop. 540), where the Knights of St John of Jerusalem had their chief Scottish preceptory. The parish kirk is built on the site of the nave of the church of the establishment, but the ruins of the transept and of part of the choir still exist. Linlithgow belongs to the Falkirk district group of parliamentary burghs with Falkirk, Airdrie, Hamilton and Lanark. The industries include shoe-making, tanning and currying, manufactures of paper, glue and soap, and distilling. An old tower-like structure near the railway station is traditionally regarded as a mansion of the Knights Templar. Other public buildings are the first town house (erected in 1668 and restored in 1848 after a fire) ; the town hall, built in 1888; the county buildings and the burgh school, dating from the pre-Reformation period. There are some fine fountains. The Cross Well in front of the town house, a striking piece of grotesque work carved in stone, originally built in the reign of James V., was rebuilt in 1807. Another fountain is surmounted by the figure of St Michael, the patron-saint of the burgh. Linlithgow Palace is perhaps the finest ruin of its kind in Scotland. Heavy but effective, the sombre walls rise above the green knolls of the promontory which divides the lake into two nearly equal portions. In plan it is almost square (168 ft. by 174 ft.), enclosing a court (91 ft. by 88 ft.), in the centre of which stands the ruined fountain of which an exquisite copy was erected in front of Holyrood Palace by the Prince Consort. At each corner there is a tower with an internal spiral staircase, that of the north-west angle being crowned by a little octagonal turret known as " Queen Margaret's Bower," from the tradition that it was there that the consort of James IV. watched and waited for his return from Flodden. The west side, whose massive masonry, hardly broken by a single window, is supposed to date in part from the time of James III., who later took refuge in one of its vaults from his disloyal nobles; but the larger part of the south and east side belongs to the period of James V., about 1535; and the north side was rebuilt in 1619-1620 by James VI. Of James V.'s portion, architecturally the richest, the main apartments are the Lyon chamber or parliament hall and the chapel royal. The grand entrance, approached by a drawbridge, was on the east side; above the gateway are still some weather- worn remains of rich allegorical designs. The palace was reduced to ruins by General Hawley's dragoons, who set fire to it in 1746. Government grants have stayed further dilapidation. A few yards to the south of the palace is the church of St Michael, a Gothic (Scottish Decorated) building (180 ft. long internally excluding the apse, by 62 ft. in breadth excluding the transepts), probably founded by David I. in 1 242, but mainly built by George Crichton, bishop of Dunkeld (1528-1536). The central west front steeple was till 1821 topped by a crown like that of St Giles', Edinburgh. The chief features of the church are the em- battled and pinnacled tower, with the fine doorway below, the nave, the north porch and the flamboyant window in the south transept. The church contains some fine stained glass, including a window to the memory of Sir Charles Wyville Thomson (1830- 1882), the naturalist, who was born in the parish.

Linlithgow (wrongly identified with the Roman Lindum) was made a royal burgh by David I. Edward I. encamped here the night before the battle of Falkirk (1298), wintered here in 1301, and next year built " a pele [castle] mekill and strong," which in 1 3 13 was captured by the Scots through the assistance of William Bunnock, or Binning, and his hay-cart. In 1369 the customs of Linlithgow yielded more than those of any other town in Scotland, except Edinburgh; and the burgh was taken with Lanark to supply the place of Berwick and Roxburgh in the court of the Four Burghs (1368). Robert II. granted it a charter of immunities in 1384. The palace became a favourite residence of the kings of Scotland, and often formed part of the marriage settlement of their consorts (Mary of Guelders, 1449; Margaret of Denmark, 1468; Margaret of England, 1503). James V. was born within its walls in 151 2, and his daughter Mary on the 7th of December 1542. In 1570 the Regent Moray was assassin- ated in the High Street by James Hamilton of Bothwellhaugh. The university of Edinburgh took refuge at Linlithgow from the plague in 1645-1646; in the same year the national parlia- ment, which had often sat in the palace, was held there for the last time. In 1661 the Covenant was publicly burned here, and in 1745 Prince Charles Edward passed through the town. Iu 1859 the burgh was deprived by the House of Lords of its claim to levy bridge toll and custom from the railway company.

LINLITHGOWSHIRE, or West Lothian, a south-eastern county of Scotland, bounded N. by the Firth of Forth, E. and S.E. by Edinburghshire, S.W. by Lanarkshire and N.W. by Stirlingshire. It has an area of 76,861 acres, or 120 sq. m., and a coast line of 17 m. The surface rises very gradually from the Firth to the hilly district in the south. A few miles from the Forth a valley stretches from east to west. Between the county town and Bathgate are several hills, the chief being Knock (1017 ft.), Cairnpapple, or Cairnnaple (1000), Cocklerue (said to be a corruption of Cuckold-le-Roi, 912), Riccarton Hills (832) terminating eastwards in Binny Craig, a striking eminence similar to those of Stirling and Edinburgh, Torphichen Hills (777) and Bowden (749). In the coast district a few bold rocks are found, such as Dalmeny, Dundas (well wooded and with a precipitous front), the Binns and a rounded eminence of 559 ft. named Glower-o'er-'em or Bonnytoun, bearing on its summit a monument to General Adrian Hope, who fell in the Indian Mutiny. The river Almond, rising in Lanarkshire and pursuing a north-easterly direction, enters the Firth at Cramond after a course of 24 m., during a great part of which it forms the boundary between West and Mid Lothian. Its right-hand tributary, Breich Water, constitutes another portion of the line dividing the same counties. The Avon, rising in the detached portion of Dumbartonshire, flows eastwards across south Stir- lingshire and then, following in the main a northerly direction, passes the county town on the west and reaches the Firth about midway between Grangemouth and Bo'ness, having served as the boundary of Stirlingshire, during rather more than the latter half of its course. The only loch is Linlithgow Lake (102 acres), immediately adjoining the county town on the north, a favourite resort of curlers and skaters. It is 10 ft. deep at the east end and 48 ft. at the west. Eels, perch and braise (a species of roach) are abundant.

Geology. — The rocks of Linlithgowshire belong almost without exception to the Carboniferous system. At the base is the Calci- ferous Sandstone series, most of which lies between the Bathgate Hills and the eastern boundary of the county. In this series are the Queensferry limestone, the equivalent of the Burdiehouse limestone of Edinburgh, and the Binny sandstone group with shales and clays and the Houston coal bed. At more than one horizon in this series oil shales are found. The Bathgate Hills are formed of basaltic lavas and tuffs — an interbedded volcanic group possibly 2000 ft. thick in the Calciferous Sandstone and Carboniferous Limestone series. A peculiar serpentinous Variety of the prevailing rock 1 is quarried at Blackburn for oven floors ; it is known as " lakestone." Binns Hill is the site of one of the volcanic cones of the period. The Carboniferous Limestone series consists of an upper and lower limestone group — including the Petershill, Index, Dykeneuk and Craigenbuck limestones — and a middle group of shales, ironstones and coals; the Smithy, Easter Main, Foul, Red and Splint coals belong to this horizon. Above the Carboniferous Limestone the

Millstone grit series crops in a belt which may be traced from the mouth of the Avon southwards to Whitburn. This is followed by .the true coal-measures with the Boghead or Torbanehill coal, the •Colmburn, Main, Ball, Mill and Upper Cannel or Shotts g a : coals of Armadale, Torbanehill and Fauldhouse.

Oimate and Agriculture.— The average rainfall for the year is 399 in., and the average temperature 47-5° F. (January 38 F.; J ul y 59‘5° F.). More than three-fourths of the county, the agri- culture of which is highly developed, is under cultivation. The best land is found along the coast, as at Carriden and Dalmeny. The farming is mostly arable, permanent pasture being practically stationary (at about 22,000 acres). Oats is the principal grain crop, but barley and wheat are also cultivated. Farms between 100 and 300 acres are the most common. Turnips and potatoes are the leading green crops. Much land has been reclaimed; the parish of Livingston, for example, which in the beginning of the 1 8th century was covered with heath and juniper, is now under rotation. In Torphichen and Bathgate, however, patches of peat moss and swamp occur, and in the south there are extensive moors at Fauld- house and Polkemmet. Live stock does not count for so much in West Lothian as in other Scottish counties, though a considerable number of cattle are fattened and dairy farming is followed success- fully, the fresh butter and milk finding a market in Edinburgh. There is some sheep-farming, and horses and pigs are reared. The wooded land occurs principally in the parks and ” policies ” sur- rounding the many noblemen’s mansions and private estates.

Other Industries. — The shale-oil trade nourishes at Bathgate, Broxburn, Armadale, Uphall, Winchburgh, Philpstoun and Dalmeny. There are important iron-works with blast furnaces at Bo’ness, Kirineil, Whitburn and Bathgate, and coal is also largely mined at these places. Coal-mining is supposed to have been followed since Roman times, and the earliest document extant regarding coalpits in Scotland is a charter granted about the end of the 12th century to William Oldbridge of Carriden. Fire-clay is extensively worked in connexion with the coal, and ironstone employs many hands. Limestone, freestone and whinstone are all quarried. Binny free- stone was used for the Royal Institution and the National Gallery in Edinburgh, and many important buildings in Glasgow. Some fishing is carried on from Queensferry, and Bo’ness is the principal port. v

Communications.— The North British Railway Company’s line from Edinburgh to Glasgow runs across the north of the county, it controls the approaches to the Forth Bridge, and serves the rich mineral district around Airdrie and Coatbridge in Lanarkshire via Bathgate. The Caledonian Railway Company’s line from Glasgow to Edinburgh touches the extreme south of the shire. The Union Canal, constructed in 1818-1822 to connect Edinburgh with the Forth and Clyde Canal near Camelon in Stirlingshire, crosses the county, roughly following the N.B.R. line to Falkirk. The Union Canal, which is 31 m. long and belongs to the North British railway, is carried across the Almond and Avon on aqueducts designed by Thomas Telford, and near Falkirk is conveyed through a tunnel 2100 ft. long.

Population and Administration. — In 1891 the population amounted to 52,808, and in 1901 to 65,708, showing an increase of 24-43% in the decennial period, the highest of any Scottish county for that decade, and a density of 547 persons to the sq. m. In 1901 five persons spoke Gaelic only, and 575 Gaelic and English. The chief towns, with populations in 1901, are Bathgate (7549), Borrowstounness (9306), Broxburn (7099) and Linlithgow (4279). The shire returns one member to parlia- ment. Linlithgowshire is part of the sheriffdom of the Lothians and Peebles, and a resident sheriff-substitute sits at Linlithgow and Bathgate. The county is under school-board jurisdiction, and there are academies at Linlithgow, Bathgate and Bo’ness. The local authorities entrust the bulk of the ” residue ” grant to the County Secondary Education Committee, which subsidizes elementary technical classes (cookery, laundry and dairy) and science and art and technological classes, including their equipment.

History— Traces of the Pictish inhabitants still exist. Near Inveravon is an accumulation of shells — mostly oysters, which have long ceased to be found so far up the Forth— considered by geologists to be a natural bed, but pronounced by antiquaries to be a kitchen midden. Stone cists have been discovered at Carlowrie, Dalmeny, Newliston and elsewhere; on Cairnnaple is a circular structure of remote but unknown date; and at Kipps is a cromlech that was once surrounded by stones. The wall of Antoninus lies for several miles in the shire. The discovery of a fine legionary tablet at Bridgeness in 1868 is held by some to be conclusive evidence that the great rampart terminated at that point and not at Carriden. Roman camps

can be distinguished at several spots. On the hill of Bowden is an earthwork, which J. Stuart Glennie and others connect with the struggle of the ancient Britons against the Saxons of Northumbria. The historical associations of the county mainly cluster round the town of Linlithgow (q.v.). Kingscavil (pop. 629) disputes with Stonehouse in Lanarkshire the honour of being the birthplace of Patrick Hamilton, the martyr (1504-

1528).

See Sir R. Sibbald, History of the Sheriffdoms of Linlithgow and Stirlingshire (Edinburgh, 1710); G. Waldie, Walks along the Northern Roman Wall (Linlithgow, 1883); R. J. H. Cunningham, Geology of the Lothians (Edinburgh, 1838).

LINNAEUS, the name usually given to Carl von Linne (1707-1778), Swedish botanist, who was born on the 13th of May, O.S. (May 23, N.S.) 1707 at Rashult, in the province of Smaland, Sweden, and was the eldest child of Nils Linnaeus the comminister, afterwards pastor, of the parish, and Christina Brodersonia, the daughter of the previous incumbent. In 1 717 he was sent to the primary school at Wexio, and in 1724 he passed to the gymnasium. His interests were centred on botany, and his progress in the studies considered necessary for admission to holy orders, for which he was intended, was so slight that in 1726 his father was recommended to apprentice him to a tailor or shoemaker. He was saved from this fate through Dr Rothman, a physician in the town, who expressed the belief that he would yet distinguish himself in medicine and natural history, and who further instructed him in physi ology. In 1727 he entered the university of Lund, but removed in the following year to that of Upsala. There, through lack of means, he had a hard struggle until, in 1729, he made the acquaintance of Dr Olaf Celsius (1670-1756), professor of theology, at that time working at his Hierobotanicon, which saw the light nearly twenty years later. Celsius, impressed with Linnaeus's knowledge and botanical collections, and finding him necessitous, offered him board and lodging.

During this period, he came upon a critique which ultimately led to the establishment of his artificial system of plant classi- fication. This was a review of Sebastien Vaillant's Sermo de Structura Florum (Leiden, 1718), a thin quarto in French and Latin; it set him upon examining the stamens and pistils of flowers, and, becoming convinced of the paramount importance of these organs, he formed the idea of basing a system of arrange- ment upon them. Another work by Wallin, Ta/jos <}>imav, sive Nuptiae Arborum Dissertatio (Upsala, 1729), having fallen into his hands, he drew up a short treatise on the sexes of plants, which was placed in the hands of the younger Olaf Rudbeck (1660-1740), the professor of botany in the university. In the following year Rudbeck, whose advanced age compelled him to lecture by deputy, appointed Linnaeus his adjunctus; in the spring of 1730, therefore, the latter began his lectures. The academic garden was entirely remodelled under his auspices, and furnished with many rare species, In the preceding year he had solicited appointment to the vacant post of gardener, which was refused him on the ground of his capacity for better things.

In 1732 he undertook to explore Lapland, at the cost of the Academy of Sciences of Upsala; he traversed upwards of 4600 m., and the cost of the journey is given at 530 copper dollars, or about £25 sterling. His own account was published in English by Sir J. E. Smith, under the title Lachesis Lapponica, in 181 1 ; the scientific results were published in his Flora Lapponica (Amsterdam, 1737). In 1733 Linnaeus was engaged at

Upsala in teaching the methods of assaying ores, but was prevented from delivering lectures on botany for academic reasons. At this juncture the governor of Dalecarlia invited him to travel through his province, as he had done through Lapland. Whilst on this journey, he lectured at Fahlun to large audiences; and J. Browallius (1707-1755), the chaplain there, afterwards bishop of Abo, strongly urged him to go abroad and take his degree of M.D. at a foreign university, by which means ht could afterwards settle where he pleased. Accordingly he left Sweden in 1735. Travelling by Liibeck and Hamburg,

he proceeded to Hardeirwijk, where he went through the requisite examinations, and defended his thesis on the cause of intermittent fever. His scanty funds were now nearly spent, but he passed on through Haarlem to Leiden; there he called on Jan Fredrik Gronovius (1690-1762), who, returning the visit, was shown the Sy sterna naturae in MS., and was so greatly astonished at it that he sent it to press at his own expense. This famous system, which, artificial as it was, substituted order for confusion, largely made its way on account of the lucid and admirable laws, and comments on them, which were issued almost at the same time (see Botany). H. Boerhaave, whom Linnaeus saw after waiting eight days for admission, recommended him to J. Burman (1 707-1 780), the professor of botany at Amsterdam, with whom he stayed a twelvemonth. While there he issued his Fundamenta Botanica, an Unassuming small octavo, which exercised immense influence. For some time also he lived with the wealthy banker, G. Clifford (1685-1750), who had a magnificent garden at Hartecamp, near Haarlem.

In 1736 Linnaeus visited England. He was warmly recom- mended by Boerhaave to Sir Hans Sloane, who seems to have received him coldly. At Oxford Dr Thomas Shaw welcomed him cordially; J. J. Dillenius, the professor of botany, was cold at first, but afterwards changed completely, kept him a month, and even offered to share the emoluments of the chair with him. He saw Philip Miller (1691-1771). the Hortulanorum Princeps, at Chelsea Physic Garden, and took some plants thence to Clifford; but certain other stories which are current about his visit to England are of very doubtful authenticity.

On his return to the Netherlands he completed the printing of his Genera Plantarum, a volume which must be considered the starting-point of modern systematic botany. During the same year, 1737, he finished arranging Clifford's collection of plants, living and dried, described in the Hortus Cliffortianus. During the compilation he used to " amuse " himself with drawing up the Critica Botanica, also printed in the Netherlands. But this strenuous and unremitting labour told upon him; the atmosphere of the Low Countries seemed to oppress him beyond endurance; and, resisting all Clifford's entreaties to remain with him, he started homewards, yet on the way he remained a year at Leiden, and published his Classes Plantarum (1738). He then visited Paris, where he saw Antoine and Bernard de Jussieu, and finally sailed for Sweden from Rouen. In September 1738 he established himself as a physician in Stockholm, but, being unknown as a medical man, no one at first cared to consult him; by degrees, however, he found patients, was appointed naval physician at Stockholm, with minor appointments, and in June X739 married Sara Moraea. In 1741 he was appointed to the chair of medicine at Upsala, but soon exchanged it for that of botany. In the same year, previous to this exchange, he travelled through Oland and Gothland, by command of the state, publish- ing his results in Oltindska och Gothldndska Resa (1745). The index to this volume shows the first employment of specific names in nomenclature.

Henceforward his time was taken up by teaching and the preparation of other works. In 1745 he issued his Flora Suecica and Fauna Suecica, the latter having occupied his attention during fifteen years; afterwards, two volumes of observations made during journeys in Sweden, Wastgota Resa (Stockholm, 1747), and Skanska Resa (Stockholm,

1751). In 1748 he brought out his Hortus Upsaliensis, showing that he had added eleven hundred species to those formerly in cultivation in that garden. In 1750 his Philosophia Botanica was given to the world; it consists of a commentary on the various axioms he had published in 1735 in his Fundamenta Botanica, and was dictated to his pupil P. Lofiing (1 729-1 756), while the professor was confined to his bed by an attack of gout. But the most important work of this period was his Species Plantarum (Stockholm, 1753), in which the specific names are fully set forth. In the same year he was created knight of the Polar Star, the first time a scientific man had been raised to that honour in Sweden. In 1755 he was invited by the king of Spain to settle in that country, with a liberal salarv, and full liberty of conscience, but he declined

on the ground that whatever merits he possessed should be devoted to his country's service, and Lofiing was sent instead. He was enabled now to purchase the estates of Safja and Hammarby; at the latter he built his museum of stone, to guard against loss by fire. His lectures at the university drew men from all parts of the world; the normal number of students at Upsala was five hundred, but while he occupied the chair of botany there it rose to fifteen hundred. In 1761 he was granted a patent of nobility, antedated to 1757, from which time he was styled Carl von Linne. To his great delight the tea-plant was introduced alive into Europe in 1763; in the same year his surviving son Carl (1741-1783) was allowed to assist his father in his professorial duties, and to be trained as his successor. At the age of sixty his memory began to fail; an apoplectic attack in 1774 greatly weakened him; two years after he lost the use of his right side; and he died on the 10th of January 1778 at Upsala, in the cathedral Of which he was buried.

With Linnaeus arrangement seems to have been a passion; he delighted in devising classifications, and not only did he systematize the three kingdoms of nature, but even drew up a treatise on the Genera Morborum. When he appeared upon the scene, new plants and animals were in course of daily discovery in increasing numbers, due to the increase of trading facilities; he devised schemes of arrangement by which these acquisitions might be sorted pro- visionally, until their natural affinities should have become clearer. He made many mistakes ; but the honour due to him for having first enunciated the principles for defining genera and species, and his uniform use of specific names, is enduring. His style is terse and laconic; he methodically treated of each organ in its proper turn, and had a special term for each, the meaning of which did not vary. The reader cannot doubt the author's intention; his sentences are business-like and to the point. The omission of the verb in his descriptions was an innovation, and gave an abruptness to his language which was foreign to the writing of his time; but it probably by its succinctness added to the popularity of his works.

No modern naturalist has impressed his own character with greater force upon his pupils than did Linnaeus. He imbued them with his own intense acquisitiveness, reared them in an atmosphere of enthusiasm, trained them to close and accurate observation, and then despatched them to various parts of the globe.

His published works amount to more than one hundred and eighty, including the Amoenitates Academicae, for which he provided the material, revising them also for press; corrections in his hand- writing may be seen in the Banksian and Linnean Society's libraries. Many of his works were not published during his lifetime; those which were are enumerated by Dr Richard Pulteney in his General View of the Writings of Linnaeus (1781). His widow sold his collections and books to Sir J. E. Smith, the first president of the Linnean Society of London. When Smith died in 1828, a subscription was raised to purchase the herbarium and library for the Society, whose property they became. The manuscripts of many of Linnaeus's publications, and the letters he received from his contemporaries, also came into the possession of the Society. (B. D. J.)

LINNELL, JOHN (1792-1882), English painter, was born in London on the 16th of June 1792. His father being a carver and gilder, Linnell was early brought into contact with

artists, and when he was ten years old he was drawing and selling his portraits in chalk and pencil. His first artistic instruction was received from Benjamin West, and he spent a year in the house of John Varley the water-colour painter, where he had William Hunt and Mulready as fellow-pupils, and made the acquaintance of Shelley, Godwin and other men of mark. In 1805 he was admitted a student of the Royal Academy, where he obtained medals for drawing, modelling and sculpture. He was also trained as an engraver, and executed a transcript of Varley's " Burial of Saul." In after life he frequently occupied himself with the burin, publishing, in 1834, a series of outlines from Michelangelo's frescoes in the Sistine chapel, and, in 1840, superintending the issue of a selection of plates from the pictures in Buckingham Palace, one of them, a Titian landscape, being mezzotinted by himself. At first he supported himself mainly by miniature painting, and by the execution of larger portraits, such as the likenesses of Mulready, Whately, Peel and Carlyle. Several of his portraits he engraved with his own hand in line and mezzotint. He also painted many subjects like the " St John Preaching," the " Covenant of Abraham," and the "Journey to Emmaus," in which, while the landscape is usually prominent the figures are yet of sufficient importance to supply the title

of the work. But it is mainly in connexion with his paintings of pure landscape that his name is known. His works commonly deal with some scene of typical uneventful English landscape, which is made impressive by a gorgeous effect of sunrise or sunset. They are full of true poetic feeling, and are rich and glowing in colour. Linnell was able to command very large prices for his pictures, and about 1850 he purchased a property at Redhill, Surrey, where he resided till his death on the 20th of January 1882, painting with unabated power till within the last few years of his life. His leisure was greatly occupied with a study of the Scriptures in the original, and he published several pamphlets and larger treatises of Biblical criticism. Linnell was one of the best friends and kindest patrons of William Blake. He gave him the two largest commissions he ever received for single series of designs — £150 for drawings and engravings of The Inventions to the Book of Job, and a like sum for those illustrative of Dante.

LINNET, O. Eng. Linete and Linet-wige, whence seems to have been corrupted the old Scottish " Lintquhit," and the modern northern English "Lintwhite" — originally a somewhat generalized bird's name, but latterly specialized for the Fringilla cannabina of Linnaeus, the Linota cannabina of recent ornithologists. This is a common song-bird, frequenting almost the whole of Europe south of lat. 64 , and in Asia extending to Turkestan. It is known as a winter visitant to Egypt and Abyssinia, and is abundant at all seasons in Barbary, as well as in the Canaries and Madeira. Though the fondness of this species for the seeds of flax (Linum) and hemp (Cannabis) has given it its common name in so many European languages, 1 it feeds largely, if not chiefly in Britain on the seeds of plants of the order Compositae, especially those growing on heaths and commons. As these waste places have been gradually brought under the plough, in England and Scotland particularly, the haunts and means of subsistence of the linnet have been curtailed, and hence its numbers have undergone a very visible diminution throughout Great Britain. According to its sex, or the season of the year, it is known as the red, grey or brown linnet, and by the earlier English writers on birds, as well as* in many localities at the present time, these names have been held to distinguish at least two species; but there is now no question among ornithologists on this point, though the conditions under which the bright crimson-red colouring of the breast and crown of the cock's spring and summer plumage is donned and doffed may still be open to discussion. Its intensity seems due, however, in some degree at least, to the weathering of the brown fringes of the feathers which hide the more brilliant hue, and in the Atlantic islands examples are said to retain their gay tints all the year round, while throughout Europe there is scarcely a trace of them visible in autumn and winter; but, beginning to appear in spring, they reach their greatest brilliancy towards midsummer; they are never assumed by examples in confinement. The linnet begins to breed in

April, the nest being generally placed in a bush at no great distance from the ground. It is nearly always a neat structure composed of fine twigs, roots or bents, and lined with wool or hair. The eggs, often six in number, are of a very pale blue marked with reddish or purplish brown. Two broods seem to be common in the course of the season, and towards the end of summer the birds — the young greatly preponderating in number — collect in large flocks and move to the sea-coast, whence a large proportion depart for more southern latitudes. Of these emigrants some return the following spring, and are recognizable by the more advanced state of their plumage, the effect presumably of having wintered in countries enjoying a brighter and hotter sun.

Nearly allied to the foregoing species is the twite, so named from its ordinary call-note, or mountain-linnet, the Linota flavirostris, or L. montium of ornithologists, which can be dis- tinguished by its yellow bill, longer tail and reddish-tawny throat. This bird never assumes any crimson on the crown or breast, but the male has the rump at all times tinged more or 1 E.g. Ft. Linotte, Ger. Hanfling, Swed. Hampling.

less with that colour. In Great Britain in the breeding-season it seems to affect exclusively hilly and moorland districts from Herefordshire northward, in which it partly or wholly replaces the common linnet, but is very much more local in its distribu- tion, and, except in the British Islands and some parts of Scandi- navia, it only appears as an irregular visitant in winter. At that season it may, however, be found in large flocks in the low-lying countries, and as regards England even on the sea- shore. In Asia it seems to be represented by a kindred form L. brevirostris.

The redpolls form a little group placed by many authorities in the genus Linota, to which they are unquestionably closely allied, and, as stated elsewhere (see Finch), the linnets seem to be related to the birds of the genus Leucoslicte, the species of which inhabit the northern parts of North-West America and of Asia. L. tephrocotis is generally of a chocolate colour, tinged on some parts with pale crimson or pink, and has the crown of the head silvery-grey. Another species, L. arctoa, was formerly said to have occurred in North America, but its proper home is in the Kurile Islands or Kamchatka. This has no red in its plumage. The birds of the genus Leucoslicte seem to be more terrestrial in their habit than those of Linota, perhaps from their having been chiefly observed where trees are scarce; but it is possible that the mutual relationship of the two groups is more apparent than real. Allied to Leucoslicte is Monti- fringilla, to which belongs the snow-finch of the Alps, M . nivalis, often mistaken by travellers for the snow-bunting, Plectrophanes nivalis. (A. N.)

LINSANG, the native name of one of the members of the viverrine genus Linsanga. There are four species of the genus, from the Indo-Malay countries. Linsangs are civet-like creatures, with the body and tail greatly elongated; and the ground colour fulvous marked with bold black patches, which in one species (L. pardicolor) are oblong. In West Africa the group is represented by the smaller and spotted Poiana richard- soni which has a genet-like hind-foot. (See Carnivora.)

LINSEED, the seed of the common flax {q.v.) or lint, Linum usitatissimum. These seeds, the linseed of commerce, are of a lustrous brown colour externally, and a compressed and elongated oval form, with a slight beak or projection at one extremity. The brown testa contains, in the outer of the four coats into which it is microscopically distinguishable, an abundant secretion of mucilaginous matter; and it has within it a thin layer of albumen, enclosing a pair of large oily cotyledons. The seeds when placed in water for some time become coated with glutinous matter from the exudation of the mucilage in the external layer of the epidermis; and by boiling in sixteen parts of water they exude sufficient mucilage to form with the water a thick pasty decoction. The cotyledons concain the valuable linseed oil referred to below. Linseed grown in tropical countries is much larger and more plump than that obtained in temperate climes, but the seed from the colder countries yields a finer quality of oil.

Linseed formed an article of food among the Greeks and Romans, and it is said that the

Abyssinians at the present day eat it roasted. The oil is to some extent used as food in Russia and in parts of Poland and Hungary. The still prevalent use of linseed in poultices for open wounds is entirely to be reprobated. It has now been abandoned by practitioners. The principal objections to this use of linseed is that it specially favours the growth of micro-organisms. There are numerous clean and efficient substitutes which have all its supposed advantages and none of its disadvantages. There are now no medicinal uses of this substance. Linseed cake, the marc left after the expression of the oil, is a most valuable feeding substance for cattle.

Linseed is subject to extensive and detrimental adulterations, resulting not only from careless harvesting and cleaning, whereby seeds of the flax dodder, and other weeds and grasses are mixed with it, but also from the direct admixture of cheaper and inferior oil-seeds, such as wild raoe, mustard, sesame, poppy, &c, the latter adulterations being known in trade under the generic

name of ” buffum.” In 1864, owing to the serious aspect of the prevalent adulteration, a union of traders was formed under the name of the ” Linseed Association.” This body samples all linseed oil arriving in England and reports on its value.

Linseed oil, the most valuable drying oil, is obtained by expression from the seeds, with or without the aid of heat. Preliminary to the operation of pressing, the seeds are crushed and ground to a fine meal. Cold pressing of the seeds yields a golden-yellow oil, which is often used as an edible oil. Larger quantities are obtained by heating the crushed seeds to 160 F. (71 C), and then expressing the oil. So obtained, it is somewhat turbid and yellowish-brown in colour. On storing, moisture and mucilaginous matter gradually settle out. After storing several years it is known commercially as ” tanked oil,” and has a high value in varnish-making. The delay attendant on this method of purification is avoided by treating the crude oil with I to 2 % of a somewhat strong sulphuric acid, which ahars and carries down the bulk of the impurities. For the prepara- tion of ” artist’s oil,” the finest form of linseed oil, the refined oil is placed in shallow trays covered with glass, and exposed to the action of the sun’s rays. Numerous other methods of purification, some based on the oxidizing action of ozone, have been suggested. The yield of oil from different classes of seed varies, but from 23 to 28 % of the weight of the seed operated on should be obtained. A good average quality of seed weighing about 392 lb per quarter has been found in practice to give out 109 lb of oil.

Commercial linseed oil has a peculiar, rather disagreeable sharp taste and smell; its specific gravity is given as varying from 0-928 to 0-953, and it solidifies at about — 27 . By saponification it yields a number of fatty acids — palmitic, myristic, oleic, linolic, linolenic and isolinolemc. Exposed to the air in thin films, linseed oil absorbs oxygen and forms ” linoxyn,” a resinous semi-elastic, caoutchouc- like mass, of uncertain composition. The oil, when boiled with small proportions of litharge and minium, undergoes the process of resinification in the air with greatly increased rapidity.

Its most important use is in the preparation of oil paints and varnishes. By painters both raw and boiled oil are used, the latter forming the principal medium in oil painting, and also serving separately as the basis of all oil varnishes. Boiled oil.is prepared in a variety of ways — that most common being by heating the raw oil in an iron or copper boiler, which, to allow for frothing, must only be about three-fourths filled. The boiler is heated by a furnace, and the oil is brought gradually to the point of ebullition, at which it is maintained for two hours, during which time moisture is driven off, and the scum and froth which accumulate on the surface arc ladled out. Then by slow degrees a proportion of ” dryers ” is added — usually equal weights of litharge and minium being used to the extent of 3 % of the charge of oil ; and with

these a small proportion of umber is generally thrown in. After the addition of the dryers the boiling is continued two or three hours; the fire is then suddenly withdrawn, and the oil is left covered up in the boiler for ten hours or more. Before sending out, it is usually stored in settling tanks for a few weeks, during which time the uncombined dryers settle at the bottom as ” foots.” Besides the dryers already mentioned, lead acetate, manganese borate, manganese dioxide, zinc sulphate and other bodies are used.

Linseed oil is also the principal ingredient in printing and litho- graphic inks. The oil for ink-making is prepared by heating it in an iron pot up to the point where it either takes fire spontaneously or can be ignited with any flaming substance. After the oil has been allowed to burn for some time according to the consistence of the varnish desired, the pot is covered over, and the product when cooled forms a viscid tenacious substance which in its most concentrated form may be drawn into threads. By boiling this varnish with dilute nitric acid vapours of acrolein are given off, and the substance gradually becomes a solid non-adhesive mass the same as the ultimate oxidation product of both raw and boiled oil.

Linseed oil is subject to various falsifications, chiefly through the addition of cotton-seed, niger-seed and hemp-seed oils; and rosin oil and mineral oils also are not infrequently added. Except by smell, by change of specific gravity, and by deterioration of drying properties, these adulterations are difficult to detect.

LINSTOCK (adapted from the Dutch lontstok, i.e. ” match- stick,” from lonl, a match, slok, a stick; the word is sometimes erroneously spelled ” lintstock ” from a supposed derivation from ” lint ” in the sense of tinder), a kind of torch made of a stout stick a yard in length, with a fork at one end to hold a lighted match, and a point at the other to stick in the ground. ” Linstocks ” were used for discharging cannon in the early days of artillery.

LINT (in M. Eng. linnet, probably through Fr. linette, from lift, the flax-plant; cf. ” line “), properly the flax-plant, now only in Scots dialect; hence the application of such expressions as ” lint-haired,” ” lint white locks ” to flaxen hair. It is also

the term applied to the flax when prepared for spinning, and to the waste material left over which was used for tinder. “Lint ” is still the name given to a specially prepared material for dressing wounds, made soft and fluffy by scraping or ravelling linen cloth.

LINTEL (0. Fr. lintel, mod. linteau, from Late Lat. limitellum, limes, boundary, confused in sense with limen, threshold; the Latin name is supercilium, Ital. soprasogli, and Ger. Sturz), in architecture, a horizontal piece of stone or timber over a door- way or opening, provided to carry the superstructure. In order to relieve the lintel from too great a pressure a ” discharging arch ” is generally built over it.

LINTH, or Limmat, a river of Switzerland, one of the tributaries of the Aar. It rises in the glaciers of the Todi range, and has cut out a deep bed which forms the Grossthal that comprises the greater portion of the canton of Glarus. A little below the town of Glarus the river, keeping its northerly direction, runs through the alluvial plain which it has formed, towards the Walensee and the Lake of Zurich. But between the Lake of Zurich and the Walensee the huge desolate alluvial plain grew ever in size, while great damage was done by the river, which over- flowed its bed and the dykes built to protect the region near it. The Swiss diet decided in 1804 to undertake the ” correction ” of this turbulent stream. The necessary works were begun in 1807 undet the supervision of Hans Conrad Escher of Zurich (1767-1823). The first portion of the undertaking was completed in 181 1, and received the name of the ” Escher canal,” the river being thus diverted into the Walensee. The second portion, known as the ” Linth canal,” regulated the course of the river between the Walensee and the Lake of Zurich and was completed in 1 8 1 6. Many improvements and extra protective works were carried out after 1816, and it was estimated that the total cost of this great engineering undertaking from 1807 to 1902 amounted to about £200,000, the date for the

completion of the work being 191 1. To commemorate the efforts of Escher, the Swiss diet in 1823 (after his death) decided that his male descendants should bear the name of " Escher von der Linth." On issuing from the Lake of Zurich the Linth alters its name to that of " Limmat," it does not appear wherefore, and, keeping the north-westerly direction it had taken from the Walensee, joins the Aar a little way below Brugg, and just below the junction of the Reuss with the Aar. (W. A. B. C.)

LINTON, ELIZA LYNN (1822-1898), English novelist, daughter of the Rev. J. Lynn, vicar of Crosthwaite, in Cumberland, was born at Keswick on the 10th of February 1822. She early manifested great independence of character, and in great measure educated herself from the stores of her father's library. Coming to London about 1845 with a large stock of miscellaneous erudi- tion, she turned this to account in her first novels, Azeth the Egyptian (1846) and Amymone (1848), a romance of the days of Pericles. Her next story, Realities, a tale of modern life (1851), was not successful, and for several years she seemed to have abandoned fiction. When, in 1865, she reappeared with Grasp your Nettle, it was as an expert in a new style of novel-writing-ˆ- stirring, fluent, ably-constructed stories, retaining the attention throughout, but affording little to reflect upon, or to remember. Measured by their immediate success, they gave her an honour- able position among the writers of her day, and secure of an audience, she continued to write with vigour nearly until her death. Lizzie Lorton of Greyrigg (1866), Patricia Kernball (1874), The Atonement of Learn Dundas (1877) are' among the best examples of this more mechanical side of her talent, to which there were notable exceptions in Joshua Davidson (1872), a bold but not irreverent adaptation of the story of the Carpenter of Nazareth to that of the French Commune; and Christopher Kirkland, a veiled autobiography (1885). Mrs Linton was a practised and constant writer in the journals of the day; her articles on the " Girl of the Period " in the Saturday Review produced a great sensation, and she was a constant contributor to the St James's Gazette, the Daily News and other leading news- papers. Many of her detached essays have been collected. In 1858 she married W. J. Linton, the engraver, but the union was

soon terminated by mutual consent; she nevertheless brought up one of Mr Linton's daughters by a former marriage. A few years before her death she retired to Malvern. She died in London on the 14th of July 1898.

Her reminiscences appeared after her death under the title of My Literary Life (1899) and her life has 'been written by G. S. Layard (1901).

LINTON, WILLIAM JAMES (1812-1807), English wood- engraver, republican and author, was born in London. He was educated at Stratford, and in his sixteenth year was apprenticed to the wood-engraver G. W. Bonner. His earliest known work is to be found in Martin and Westall's Pictorial Illustrations of the Bible (1833). He rapidly rose to a place amongst the foremost wood-engravers of the time. After working as a journeyman engraver with two or three firms, losing his money over a cheap political library called the " National," and writing a life of Thomas Paine, he went into partnership (1842) with John Orrin Smith. The firm was immediately employed on the Illustrated London News, just then projected. The following year Orrin Smith died, and Linton, who had married a sister of Thomas Wade, editor of Bell's Weekly Messenger, found himself in sole charge of a business upon which two families were dependent. For years he had concerned himself with the social and European political problems of the time, and was now actively engaged in the republican propaganda. In 1844 he took a prominent part in exposing the violation by the English post-office of Mazzini's correspondence. This led to a friendship with the Italian revolutionist, and Linton threw himself with ardour into European politics. He carried the first congratulatory address of English workmen to the French Provisional Government in 1848. He edited a twopenny weekly paper, The Cause of the People, pub- lished in the Isle of Man, and he wrote political verses for the Dublin Nation, signed " Spartacus." He helped to found

the " International League " of patriots, and, in 1850, with G. H. Lewes and Thornton Hunt, started The Leader, an organ which, however, did not satisfy his advanced republicanism, and from which he soon withdrew. The same year he wrote a series of articles propounding the views of Mazzini in The Red Republican. In 1852 he took up his residence at Brantwood, which he after- wards sold to John Ruskin, and from there issued The English Republic, first in the form of weekly tracts and afterwards as a monthly magazine — " a useful exponent of republican principles, a faithful record of republican progress throughout the world; an organ of propagandism and a medium of communication for the active republicans in England." Most of the paper, which never paid its way and was abandoned in 1855, was written by himself. In 1852 he also printed for private circulation an anonymous volume of poems entitled The Plaint of Freedom. After the failure of his paper he returned to his proper work of wood-engraving. In r8s7 his wife died, and in the following year he married Eliza Lynn (afterwards known as Mrs Lynn Linton) and returned to London. In 1864 he retired to Brantwood, his wife remaining in London. In 1867, pressed by financial diffi- culties, he determined to try his fortune in America, and finally separated from his wife, with whom, however, he always corre- sponded affectionately. With his children he settled at Appledore, New Haven, Connecticut, where he set up a printing-press. Here he wrote Practical Hints on Wood- Engraving (1879), James Watson, a Memoir of Chartist Times (1879), A History of Wood- Engraving in America (1882), Wood-Engraving, a Manual of Instruction (1884), The Masters of Wood-Engraving, for which he made two journeys to England (1890), The Life of Whittier (1893), and Memories, an autobiography (1895). He died at New Haven on the 29th of December 1897. Linton was a singu- larly gifted man, who, in the words of his wife, if he had not bitten the Dead Sea apple of impracticable politics, would have risen higher in the world of both art and letters. As an engraver on wood he reached the highest point of execution in his own line. He carried on the tradition of Bewick, fought for intelligent as against merely manipulative excellence in the use of the graver, and championed the use of the " white line " as well as of the black, believing with Ruskin that the former was the truer and

more telling basis of aesthetic expression in the wood-block printed upon paper.

See W. J. Linton, Memories; F. G. Kitton, article on " Linton" in English Illustrated Magazine (April 1891); G. S. Layard, Life of Mrs Lynn Linton (1901). (G. S. L.)

LINTOT, BARNABY BERNARD (1675-1736), English pub- lisher, was born at Southwater, Sussex, on the 1st of December 1675, and started business as a publisher in London about 1698. He published for many of the leading writers of the day, notably Vanbrugh, Steele, Gay and Pope. The latter's Rape of the Lock in its original form was first published in Lintot's Miscellany, and Lintot subsequently issued Pope's translation of the Iliad and the joint translation of the Odyssey by Pope, Fenton and Broome. Pope quarrelled with Lintot with regard to the supply of free copies of the latter translation to the author's subscribers, and in 1728 satirized the publisher in the Dunciad, and in 1735 in the Prologue to the Satires, though he does not appear to have had any serious grievance. Lintot died on the 3rd of February

1736.

LINUS, one of the saints of the Gregorian canon, whose festival is celebrated on the 23rd of September. All that can be said with certainty about him is that his name appears at the head of all the lists of the bishops of Rome. Irenaeus {Adv. Haer. iii. 3. 3) identifies him with the Linus mentioned by St Paul in 2 Tim. iv. 21. According to the Liber Pontificalis, Linus suffered martyr- dom, and was buried in the Vatican. In the 17th century an inscription was found near the confession of St Peter, which was believed to contain the name Linus; but it is not certain that this epitaph has been read correctly or completely. The apocryphal Latin account of the death of the apostles Peter and Paul is falsely attributed to Linus.

See Acta Sanctorum, Septembris, vi. 539-545; C. de Smedt, Dissertationes. selectae in

primam aetatem hist. eccl. pp. 300-312 (Ghent, 1876); L. Duchesne's edition of the Liber Pontificalis, i. 121 (Paris, 1886); R. A. Lipsius, Die apokryphen Apostelgeschichten, ii. 85-96 (Brunswick, 1883-1890); J. B. de Rossi, Bullettino di archeologia cristiana, p. 50 (1864). (H. De.)

LINUS, one of a numerous class of heroic figures in Greek legend, of which other examples are found in Hyacinthus and Adonis. The connected legend is always of the same character: a beautiful youth, fond of hunting and rural life, the favourite of some god or goddess, suddenly perishes by a terrible death. In many cases the religious background of the legend is preserved by the annual ceremonial that commemorated it. At Argos this religious character of the Linus myth was best preserved: the secret child of Psamathe by the god Apollo, Linus is exposed, nursed by sheep and torn in pieces by sheep-dogs. Every year at the festival Amis or Cynophontis, the women of Argos mourned for Linus and propitiated Apollo, who in revenge for his child's death had sent a female monster (Poine), which tore the children from their mothers' arms. Lambs were sacrificed, all dogs found running loose were killed, and women and children raised a lament for Linus and Psamathe (Pausanias i. 43. 7; Conon, Narrat. 19). In the Theban version, Linus, the son of Amphi- marus and the muse Urania, was a famous musician, inventor of the Linus song, who was said to have been slain by Apollo, because he had challenged him to a contest (Pausanias ix. 29. 6). A later story makes him the teacher of Heracles, by whom he was killed because he had rebuked his pupil for stupidity (Apollodorus ii. 4. 9). On Mount Helicon there was a grotto containing his statue, to which sacrifice was offered every year before the sacrifices to the Muses. From being the inventor of musical methods, he was finally transformed by later writers into a composer of prophecies and legends. He was also said to have adapted the Phoenician letters introduced by Cadmus to the Greek language. It is generally agreed that Linus and Ailinus are of Semitic origin, derived from the words ai lanu (woe to us), which formed the burden of the Adonis and similar songs popular in the East. The Linus song is mentioned in Homer; the tragedians often use the word al \iv

of the tender life of nature and of the vegetation destroyed by the fiery heat of the dog-star.

The chief work on the subject is H. Brugsch, Die Adonisklage und das Linoslied (1852); see also article in Roscher's Lexikon der Mythologie; J. G. Frazer, Golden Bough (ii. 224, 253), where, the identity of Linus with Adonis (possibly a corn-spirit) being assumed, the lament is explained as the lamentation of the reapers over the dead corn-spirit; W. Mannhardt, Wald- und Feldculte, ii. 281.

LINZ, capital of the Austrian duchy and crownland of Upper Austria, and see of a bishop, 117 m. W. of Vienna by rail. Pop. (1900) 58,778. It lies on the right bank of the Danube and is connected by an iron bridge, 308 yds. long, with the market- town of Urfahr (pop. 12,827) on the opposite bank. Linz possesses two cathedrals, one built in 1660-1682 in rococo style, and another in early Gothic style, begunin 1862. In the Capuchin church is the tomb of Count Raimondo Montecucculi, who died at Linz in 1680. The museum Francisco-Carolinum, founded in 1833 and reconstructed in 1895, contains several important collections relating to the history of Upper Austria. In the Franz Josef- Platz stands a marble monument, known as Trinity Column, erected by the emperor Charles VI. in 1723, com- memorating the triple deliverance of Linz from war, fire, and pestilence. The principal manufactories are of tobacco, boat- building, agricultural implements, foundries and cloth factories. Being an important railway junction and a port of the Danube, Linz has a very active transit trade.

Linz is believed to stand on the site of the Roman station Lentia. The name of Linz appears in documents for the first time in 799 and it received municipal rights in 1324.

In 1490 it became the capital of the province above the Enns. It success- fully resisted the attacks of the insurgent peasants under Stephen Fadinger on the 21st and 22nd of July 1626, but its suburbs were laid in ashes. During the siege of Vienna in 1683, the castle of Linz was the residence of Leopold I. In 1741, during the War of the Austrian Succession, Linz was taken by the Bavarians, but was recovered by the Austrians in the following year. The bishopric was established in 1784.

See F. Krackowitzer, Die Donausladt Linz (Linz, 1901).

LION (Lat. leo, leonis; Gr. Xewj'). From the earliest historic times few animals have been better known to man than the lion. Its habitat made it familiar to all the races among whom human civilization took its origin. The literature of the ancient Hebrews abounds in allusions to the lion; and the almost incredible numbers stated to have been provided for exhibition and destruc- tion in the Roman amphitheatres (as many as six hundred on a single occasion by Pompey, for example) show how abundant these animals must have been within accessible distance of Rome.

Even within the historic period the geographical range of the lion covered the whole of Africa, the south of Asia, including Syria, Arabia, Asia Minor, Persia and the greater part of northern and central India. Professor A. B. Meyer, director of the zoological museum at Dresden, has published an article on the alleged existence of the lion in historical times in Greece, a translation of which appears in the Report of the Smithsonian Institution for 1905. Meyer is of opinion that the writer of the Iliad was probably acquainted with the lion, but this does not prove its former existence in Greece. The accounts given by Herodotus and Aristotle merely go to show that about 500 B.C. lions existed in some part of eastern Europe. The Greek name for the lion is very ancient, and this suggests, although by no means demonstrates, that it refers to an animal indigenous to the country. Although the evidence is not decisive, it seems probable that lions did exist in Greece at the time of Herodotus; and it is quite possible that the representation of a lion-chase incised on a Mycenean dagger may have been taken from life. In prehistoric times the lion was spread over the greater part of Europe; and if, as is very probable, the so-called Felis atrox be inseparable, its range also included the greater part of North America.

At the present day the lion is found throughout Africa (save in places where it has been exterminated by man) and in Meso- potamia, Persia, and some parts of north-west India. According xvi. 24

to Dr W. T. Blanford, lions are still numerous in the reedy swamps, bordering the Tigris and Euphrates, and also occur on the west flanks of the Zagros mountains and the oak-clad ranges near Shiraz, to which they are attracted by the herds of swine which feed on the acorns. The lion nowhere exists in the table- land of Persia, nor is it found in Baluchistan. In India it is confined to the province of Kathiawar in Gujerat, though within the 19th century it extended through the north-west parts of Hindustan, from Bahawalpur and Sind to at least the Jumna (about Delhi) southward as far as Khandesh, and in central India through the Sagur and Narbuda territories, BUndelkund, and as far east as Palamau. It was extirpated in Hariana about 1824. One was killed at Rhyli, in the Dumaoh district, Sagur and Narbuda territories, so late as in the cold season of 1 847-1 848; and about the same time a few still remained in the valley of the Sind river in Kotah, central India.

The variations in external characters which lions present, especially in the colour and the amount of mane, as well as in the general colour of the fur, indicate local races, to which

After a Drawing by Woll in Elliot's Monograph of the Fetidae.

Fig. i.— Lion and Lioness (Felis leo).

special names have been given; the Indian lion being F. lee gujratensis. It is noteworthy, however, that, according to Mr F. C. Selous, in South Africa the black-

maned lion and others with yellow scanty manes are found, not only in the same locality, but even among individuals of the same parentage.

The lion belongs to the genus Felis of Linnaeus (for the characters and position of which see Carnivora), and differs from the tiger and leopard in its uniform colouring, and from all the other Felidae in the hair of the top of the head, chin and neck, as far back as the shoulder, being not only much longer, but also differently disposed from the hair elsewhere, being erect or directed forwards, and so constituting the characteristic ornament called the mane. There is also a tuft of elongated hairs at the end of the tail, one upon each elbow, and in most lions a copious fringe along the middle line of the under surface of the body, wanting, however, in some examples. These characters are, however, peculiar to the adults of the male sex; and even as regards coloration young lions show indications of the darker stripes and mottlings so characteristic of the greater number of the members of the genus. The usual colour of the adult is yellowish-brown, but it may vary from a deep red or chestnut brown to an almost silvery grey. The mane, as well as the long hair of the other parts of the body, sometimes scarcely differs from the general colour, but is usually darker and not

unfrequently nearly black. The mane begins to grow when the animal is about three years old, and is fully developed at five or six.

In size the lion is only equalled or exceeded by the tiger among existing Felidae; and though both species present great varia- tions, the largest specimens of the latter appear to surpass the largest lions. A full-sized South African lion, according to Selous, measures slightly less than 10 ft. from nose to tip of tail, following the curves of the body. Sir Cornwallis Harris gives 10 ft. 6 in., of which the tail occupies 3 ft. The lioness is about a foot less.

The internal structure of the lion, except in slight details, re- sembles that of other Felidae, the whole organization being that of an animal adapted for an active, predaceous existence. The teeth especially exemplify the carnivorous type in its highest condition

Fig. 2. — Front View of Skull of Lion.

the lower. They are, however, sufficiently strong to break bones of large size. The tongue is long and flat, and remarkable for the development of the papillae of the anterior part of the dorsal sur- face, which (except near the edge) are modified so as to resemble long, compressed, recurved, horny spines or claws, which, near the middle line, attain the length of one-fifth of an inch. They give the part of the tongue on which they occur the appearance and feel of a coarse rasp. The feet are furnished with round soft pads or cushions covered with thick, naked skin, one on the under surface of each of the principal toes, and one larger one of trilobed form, behind these, under the lower ends of the metacarpal and metatarsal bones, which are placed nearly vertically in ordinary progression. The claws are large, strongly.' compressed, sharp, and exhibit the retractile condition in the highest degree, being drawn backwards and upwards into a sheath by the action of an elastic ligament so long as the foot is in a state of repose, but exerted by muscular action when the animal strikes its prey.

The lion lives chiefly in sandy plains and rocky places inter- spersed with dense thorn-thickets, or frequents the low bushes and tall rank grass and reeds that grow along the sides of streams and near the springs where it lies in wait for the larger herbi- vorous animals on which it feeds. Although .occasionally seen abroad during the day, especially in wild and desolate regions, where it is subject to little molestation, the night is, as in the case of so many other predaceous animals, the period of its greatest activity. It is then that its character- istic roar is chiefly heard, as thus graphically described by Gordon-Cumming : —

” One of the most striking things connected with the lion is his voice, which is extremely grand and peculiarly striking. It con- sists at times of a low deep moaning, repeated five or six times,

ending in faintly audible sighs; at other times he startles the forest with loud, deep-toned, solemn roars, repeated in quick suc- cession, each increasing in loudness to the third or fourth, when his voice dies away in five or six low muffled sounds very much resemb- ling distant thunder. At times, and not unfrequently, a troop may be heard, roaring in concert, one assuming the lead, and two, three or four more regularly taking up their parts, like persons singing a catch. Like our Scottish stags at the rutting season, they roar loudest in cold frosty nights; but on no occasions are their voices to be heard in such perfection, or so intensely powerful, as when two or three troops of strange lions approach a fountain to drink at the same time. When this occurs, every member of each troop sounds a bold roar of defiance at the opposite parties; and when one roars, all roar together, and each seems to vie with his com- rades in the intensity and power of his voice. The power and grandeur of these nocturnal concerts is inconceivably striking and pleasing to the hunter’s ear.”

” The usual pace of a lion,” C. J. Andersson says, ” is a walk, and, though apparently rather slow, yet, from the great length of his body, he is able to get over a good deal of ground in a short time. Occasionally he trots, wnen his speed is not in- considerable. His gallop — or rather succession of bounds- — is, for a short distance, very fast — nearly or quite equal to that of a horse.”

” The lion, as with other members of the feline family,” the same writer says, ” seldom attacks his prey openly, unless compelled by extreme hunger. For the most part he steals upon it in the manner of a cat, or ambushes himself near to the water or a pathway frequented by game. At such times he lies crouched upon his belly in a thicket until the animal approaches sufficiently near, when, with one prodigious bound, he pounces upon it. In most cases he is successful, but should his intended victim escape, as at times happens, from his having miscalculated the distance, he may make a second or even a third bound, which, however, usually prove fruitless, or he returns disconcerted to his hiding-place, there to wait for another opportunity.” His food consists of all the larger herbivorous animals of the country in which he resides — buffaloes, antelopes, zebras, giraffes or even young elephants or rhinoceroses. In cultivated districts cattle, sheep, and even human inhabitants are never safe from his nocturnal ravages. He appears, however, as a general rule, only to kill when hungry or attacked, and not for the mere pleasure of killing, as with some other carnivorous animals. He, moreover, by no means limits himself to animals of his own killing, but, according to Selous, often prefers eating game that has been killed by man, even when not very fresh, to taking the trouble to catch an animal himself.

The lion appears to be monogamous, a single male and female continuing attached to each other irrespectively of the pairing season. At all events the lion remains with the lioness while the cubs are young and helpless, and assists in providing her and them with food, and in educating them in the art of providing for themselves. The number of cubs at a birth is from two to four, usually three. They are said to remain with their parents till they are about three years old.

Though not strictly gregarious, lions appear to be sociable towards their own species, and often are found in small troop* sometimes consisting of a pair of old ones with their nearly full* grown cubs, but occasionally of adults of the same sex; and therl seems to be evidence that several lions will associate for the purpose of hunting upon a preconcerted plan. Their natural ferocity and powerful armature are sometimes turned upon one another; combats, often mortal, occur among male lions under the influence of jealousy; and Andersson relates an instance of a quarrel between a hungry lion and lioness over the carcase of an antelope which they had just killed, and which did not seem sufficient for the appetite of both, ending in the lion not only killing, but devouring his mate. Old lions, whose teeth have become injured with constant wear, become ” man-eaters,” finding their easiest means of obtaining a subsistence in lurking

in the neighbourhood of villages, and dashing into the tents at night and carrying off one of the sleeping inmates. Lions never climb. With regard to the character of the lion, those who have had

opportunities of observing it in its native haunts differ greatly. The accounts of early writers as to its courage, nobility and magnanimity have led to a reaction, causing some modern authors to accuse it of cowardice and meanness. Livingstone goes so far as to say, ” nothing that I ever learned of the lion could lead me to attribute to it either the ferocious or noble character ascribed to it elsewhere,” and he adds that its roar is not dis- tinguishable from that of the ostrich. These different estimates depend to a great extent upon the particular standard of the writer, and also upon the circumstance that lions, like other animals, show considerable individual differences in character, and behave differently under varying circumstances.

(W. H. F.; R. L.*) LIONNE, HUGUES DE (1611-1671), French statesman, was born at Grenoble on the nth of October 161 1, of an old family of Dauphine. Early trained for diplomacy, his remarkable abilities attracted the notice of Cardinal Mazarin, who sent him as secretary of the French embassy to the congress of Miinster, and, in 1642, on a mission to the pope. In 1646 he became secretary to the queen regent; in 1653 obtained high office in the king’s household; and in 1654 was ambassador extraordinary at the election of Pope Alexander VII. He was instrumental in forming the league of the Rhine, by which Austria was cut off from the Spanish Netherlands, and, as minister of state, was associated with Mazarin in the Peace of the Pyrenees (1659), which secured the marriage of Louis XIV. to the infanta Maria Theresa. At the cardinal’s dying request he was appointed his successor in foreign affairs, and, for the next ten years, continued to direct French foreign policy. Among his most important diplomatic successes were the treaty of Breda (1667), the treaty of Aix-la-Chapelle (1668) and the sale of Dunkirk. He died in Paris on the 1st of September 1671, leaving memoirs. He was a man of pleasure, but his natural indolence gave place to an unflagging energy when the occasion demanded it; and, in an age of great ministers, his consummate statesmanship placed him in the front rank.

See Ulysse Chevalier, Lettres inedites de Ungues de Lionne . . . precedtes d’une notice historique sur la famille de Lionne (Valence, ‘879); J’ Vali’rey, La diplomatic francaise au XVIII s siecle: Ungues de Lionne, ses ambassadeurs (2 vols., Paris, 1877-1881). For further works see Rochas, Biogr. du Dauphine (Paris, i860), tome ii. p. 87.

LIOTARD, JEAN ETIENNE (1702-1789), French painter, was born at Geneva. He began his studies under Professor Gardelle and Petitot, whose enamels and miniatures he copied with con- siderable skill. He went to Paris in 1725, studying under J. B. Masse and F. le Moyne, on whose recommendation he was taken to Naples by the Marquis Puysieux. In 1735 he was in Rome, painting the portraits of Pope Clement XII. and several cardinals. Three years later he accompanied Lord Duncannon to Con- stantinople, whence he went to Vienna in 1742 to paint the portraits of the imperial family. His eccentric adoption of oriental costume secured him the nickname of ” the Turkish painter.” Stil under distinguished patronage he returned to ParL; ‘^-1744 visited r’r.gland, where he painted the princess of Wales in 1753, an& went to Holland in 1756, where, in the follow- ing year, he married Marie Fargues. Another visit to England followed in 1772, and in the next two years his name figures among the Royal Academy exhibitors. He returned to his native town in 1776 and died at Geneva in 1789.

Liotard was an artist of great versatility, and though his fame depends largely on his graceful and delicate pastel drawings, of which ” La Liseuse,” the ” Chocolate Girl,” and ” La Belle Lyonnaise ” at the Dresden Gallery are delightful examples, he achieved distinction by his enamels, copperplate engravings and glass painting. He also wrote a

Treatise on the Art of Paint- ing, and was an expert collector of paintings by the old masters. Many of the masterpieces he had acquired were sold by him at high prices on his second visit to England. The museums of Amsterdam, Berne, and Geneva are particularly rich in examples of his paintings and pastel drawings. A picture of a Turk seated is at the Victoria and Albert Museum, while the British Museum owns two of his drawings. The Louvre has, besides twenty-two

drawings, a portrait of General Herault and a portrait of the artist is to be found at the Sala dei pittori, in the Uffizi Gallery, Florence.

See La Vie et les osuvres de Jean Etienne Liotard (1702-1789) , etude biographique et iconographique, by E. Humbert, A. Revilliod, and J. W. R. Tilanus (Amsterdam, 1897).

LIP (a word common in various forms, to Teutonic languages, cf Ger. Lippe, Dan. laebe; Lat. labium is cognate), one of the two fleshy protuberant edges of the mouth in man and other animals, hence transferred to such objects as resemble a lip, the edge of a circular or other opening, as of a shell, or of a wound, or of any fissure in anatomy and zoology; in this last usage the Latin labium is more usually employed. It is also used of any projecting edge, as in coal-mining, &c. Many figurative uses are derived from the connexion with the mouth as the organ of speech. In architecture ” lip moulding ” is a term given to a moulding employed in the Perpendiculai period, from its resem- blance to an overhanging lip. It is often found in base mould- ings, and is not confined to England, there being similar examples in France and Italy.

LIPA, a town of the province of Batangas, Luzon, Philippine Islands, about 90 m. S. by E. of Manila. Pop. (1903) 37,934. Lipa is on high ground at the intersection of old military roads, is noted for its cool and healthy climate, and is one of the largest and wealthiest inland towns of the archipelago. Many of its houses have two storeys above the ground-floor, and its church and convent together form a very large building. The sur- rounding country is very fertile, producing sugar-cane, Indian corn, cacao, tobacco and indigo. The cultivation of coffee was begun here on a large scale about the middle of the 19th century and was increased gradually until 1889-1890 when an insect pest destroyed the trees. The language of Lipa is Tagalog.

LIPAN, a tribe of North American Indians of Athabascan stock. Their former range was central Texas. Later they were driven into Mexico. They were pure nomads, lived entirely by hunting, and were perhaps the most daring of the Texas Indians. A few survivors were brought back from Mexico in 1905 and placed on a reservation in New Mexico.

LIPARI ISLANDS (anc. Alokov vrjaoi, or Aeoliae Insulae), a group of volcanic islands N. of the eastern portion of Sicily. They are seven in number — Lipari (Lipara, pop. in 1901, 15,290), Stromboli (Strongyle), Salina (Didyme, pop. in 1901, 4934), Filicuri (Phoenicusa) , Alicuri (Ericusa), Vulcano (Hiera, Therasia or Thermissa), the mythical abode of Hephaestus, and Panaria (Euonymus). The island of Aiolie, the home of Aiolos, lord of the winds, which Ulysses twice visited in his wanderings, has generally been identified with one of this group. A colony of Cnidians and Rhodians was established on Lipara in 580-577 b.C 1 The inhabitants were allied with the Syra- cusans, and were attacked by the Athenian fleet in 427 B.C., and by the Carthaginians in 397 B.C., while Agathocles plundered a temple on Lipara in 301 B.C. During the Punic wars the islands were a Carthaginian naval station of some importance until the Romans took possession of them in 252 B.C. Sextus Pompeius also used them as a naval base. Under the Empire the islands served as a place of banishment for political prisoners. In the middle ages they frequently changed hands. The island of Lipari contains the chief town (population in 1901, 5855), which bears the same name and had municipal rights in Roman times. It is the seat of a bishop. It is fertile and contains sulphur springs and vapour baths, which were known and used in ancient times. Pumicestone is exported.

Stromboli, 22 m. N.E. of Lipari, is a constantly active volcano, ejecting gas and lava at

brief intervals, and always visible at night. Salina, 3 m. N.W. of Lipari, consisting of the cones of two extinct volcanoes, that on the S.E., Monte Salvatore (3155 ft.), being the highest point in the islands, is the most fertile of the whole group and produces good Malmsey wine: it takes its name from the salt-works on the south coast. Vulcano, 3 m.

1 Greek coins of the Lipari Islands are preserved in the museum at Cefalu.

S. of Lipari, contains a still smoking crater. Sulphur works were started in 1874, Dut have since been abandoned.

See Archduke Ludwig Salvator of Austria, Die Liparischen Inseln, 8 vols, (for private circulation) (Prague, 1893 seqq.).

LIPETSK, a town of Russia, in the government of Tambov, 108 m. by rail W. of the city of Tambov, on the right bank of the river Voronezh. Pop. (1897) 16,353. The town is built of wood and the streets are unpaved. There are sugar, tallow, and leather works, and distilleries, and an active trade in horses, cattle, tallow, skins, honey and timber. The Lipetsk mineral springs (chalybeate) came into repute in the time of Peter the Great and attract a good many visitors.

LIPPE, a river of Germany, a right-bank tributary of the Rhine. It rises near Lippspringe under the western declivity of the Teutoburger Wald, and, after being joined by the Alme, the Pader and the Ahse on the left, and by the Stever on the right, flows into the Rhine near Wesel, after a course of 154 m. It is navigable downwards from Lippstadt, for boats and barges, by the aid of twelve locks, drawing less than 4 ft. of water. The river is important for the transport facilities it affords to the rich agricultural districts of Westphalia.

LIPPE, a principality of Germany and Constituent state of the German empire, bounded N.W., W. and S. by the Prussian province of Westphalia and N.E. and E. by the Prussian provinces of Hanover and Hesse-Nassau and the principality of Waldeck- Pyrmont. It also possesses three small enclaves— Kappel and Lipperode in Westphalia and Grevenhagen near Hoxter. The area is 469 sq. m., and the population (1905) 145,610, showing a density of 125 to the sq. m. The greater part of the surface is hilly, and in the S. and W., where the Teutoburger Wald practically forms its physical boundary, mountainous. The chief rivers are the Weser, which crosses the north extremity of the principality, and its affluents, the Werre, Exter, Kalle and Emmer. The Lippe, which gives its name to the country, is a purely Westphalian river and does not touch the principality at any point. The forests of Lippe, among the finest in Germany, produce abundance of excellent timber. They occupy 28% of the whole area, and consist mostly of deciduous trees, beech preponderating. The valleys contain a considerable amount of good arable land, the tillage of which employs the greater part of the inhabitants. Small farms, the larger proportion of which are under 2ˆ acres, are numerous, and their yield shows a high degree of prosperity among the peasant farmers. The principal crops are potatoes, beetroot (for sugar), hay, rye, oats, wheat and barley. Cattle, sheep and swine are also reared, and the ” Senner ” breed of horses, in the stud farm at Lopshorn, is celebrated. The industries are small and consist mainly in the manufacture of starch, paper, sugar, tobacco, and in weaving and brewing. Lemgo is famous for its meerschaum pipes and Salzuflen for its brine-springs, producing annually about 1500 tons of salt, which is mostly exported. Each year, in spring, about 15,000 brickmakers leave the principality and journey to other countries, Hungary, Sweden and Russia, to return home in the late autumn.

The roads are well laid and kept in good repair. A railway intersects the country from Herford (on the Cologne-Hanover main line) to Altenbeken; and another from Bielefeld to Hameln traverses it from W. to E. More than 95% of the population in 1905 were Protestants. Education is provided for by two gymnasia and numerous other efficient

schools. The principality contains seven small towns, the chief of which are Detmold, the seat of government, Lemgo, Horn and Blomberg. The present constitution was granted in 1836, but it was altered in 1867 and again in 1876. It provides for a representative chamber of twenty-one members, whose functions are mainly consultative. For electoral purposes the population is divided into three classes, rated according to taxation, each of which returns seven members. The courts of law are centred at Detmold, whence an appeal lies to the court- of appeal at Celle in the Prussian province of Hanover. The estimated revenue in 1909 was £113,000 and the expenditure £116,000. The public debt in 1908 was £64,000. Lippe has one vote in the German

Reichstag, and also one vote in the Bundesrat, or federal council. Its military forces form a battalion of the 6th Westphalian infantry.

History. — The present principality of Lippe was inhabited in early times by the Cherusii, whose leader Arminius (Hermann) annihilated in a.d. 9 the legions of Varus in the Teutoburger Wald. It was afterwards occupied by the Saxons and was subdued by Charlemagne. The founder of the present reigning family, one of the most ancient in Germany, was Bernard I. (1113-1144), who received a grant of the territory from the emperor Lothair, and assumed the title of lord of Lippe (edler Herr von Lippe). He was descended from a certain Hoold who flourished about 950. Bernard's successors inherited or obtained several counties, and one of them, Simon III. (d. 1410), introduced the principles of primogeniture. Under Simon V. (d. 1536), who was the first to style himself count, the Reformation was introduced into the country. His grandson, Simon VI. (1555- 16 13), is the ancestor of both lines of the princes of Lippe. In 161 3 the country, as it then existed, was divided among his three sons, the lines founded by two of whom still exist, while the third (Brake) became extinct in 1709. Lippe proper was the patrimony of the eldest son, Simon VII. (1587-1627), upon whose descendant Frederick William Leopold (d. 1802) the title of 'prince of the empire was bestowed in 1789, a dignity already conferred, though not confirmed, in 1720. Philip, the youngest son of Simon VI., received but a scanty part of his father's possessions, but in 1640 he inherited a large part of the count- ship of Schaumburg, including Biickeburg, and adopted the title of count of Schaumburg-Lippe. The ruler of this territory became a sovereign prince in 1807. Simon VII. had a younger son, Jobst Hermann (d. 1678), who founded the line of counts of Lippe-Biesterfeld, and a cadet branch of this family were the counts of Lippe- Weissenfeld. In 1762 these two counties — Biesterfeld and Weissenfeld — passed by arrangement into the possession of the senior and ruling branch of the family. Under the prudent government of the princess Pauline (from 1802 to 1820), widow of Frederick William Leopold, the little state enjoyed great prosperity. In 1807 it joined the Confederation of the Rhine and in 1813 the German Confederation. Pauline's son, Paul Alexander Leopold, who reigned from 1820 to 1851, also ruled in a wise and liberal spirit, and in 1836 granted the charter of rights upon which the constitution is based. In 1842 Lippe entered the German Customs Union (Zollverein), and in 1866 threw in its lot with Prussia and joined the North German Confederation.

The line of rulers in Lippe dates back, as already mentioned, to Simon VI. But besides this, the senior line, the two collateral lines of counts, Lippe-Biesterfeld and Lippe-Weissen- feld and the princely line of Schaumburg-Lippe, The L 'PP e also trace their descent to the same ancestor, and these dispute. three lines stand in the above order as regards their rights to the Lippe succession, the counts being descended from Simon's eldest son and the princes from his youngest son. These facts were not in dispute when in March 1895 the death of Prince Woldemar, who had reigned since 1875, raised a dispute as to the succession. Woldemar's brother Alexander, the last of the senior line, was hopelessly insane and had been declared incapable of ruling. On the death of Woldemar, Prince Adolph of Schaumburg-Lippe, fourth son of Prince Adolph George of that country and brother-in-law of the German emperor, took over the regency by virtue of a decree issued by Prince Woldemar, but which had until the latter's death been kept secret. The Lippe house of representatives consequently passed a special law confirming the regency in the person of Prince Adolph, but with the proviso that the

regency should be at an end as soon as the disputes touching the succession were adjusted; and with a further proviso that, should this dispute not have been settled before the death of Prince Alexander, then, if a competent court of law had been secured before that event happened, the regency of Prince Adolph should continue until such court had given its decision. The dispute in question had arisen because the heads of the two collateral countly lines had

entered a caveat. In order to adjust matters the Lippe govern- ment moved the Bundesrat, on the 5th of July 1895, t0 P ass an imperial law declaring the Reichsgericht (the supreme tribunal of the empire) a competent court to adjudicate upon the claims of the rival lines to the succession. In consequence the Bundesrat passed a resolution on the 1st of February 1896, requesting the chancellor of the empire to bring about a compromise for the appointment of a court of arbitration between the parties. Owing to the mediation of the chancellor a compact was on the 3rd of July 1896 concluded between the heads of the three collateral lines of the whole house of Lippe, binding " both on themselves and on the lines of which they were the heads." By clause 2 of this compact, a court of arbitration was to be appointed, consisting of the king of Saxony and six members selected by him from among the members of the supreme court of law of the empire. This court was duly constituted, and on the 22nd of June 1897 delivered judgment to the effect that Count Ernest of Lippe-Biesterfeld, head of the line of Lippe-Biesterfeld, was entitled to succeed to the throne of Lippe on the death of Prince Alexander. In consequence of this judgment Prince Adolph resigned the regency and Count Ernest became regent in his stead. On the 26th of September 1904 Count Ernest died and his eldest son, Count Leopold, succeeded to the regency; but the question of the succession was again raised by the prince of Schaumburg-Lippe, who urged that the marriage of Count William Ernest, father of Count Ernest, with Modeste von Unruh, and that of the count regent Ernest himself with Countess Carline von Wartensleben were not ebenbiirtig (equal birth), and that the issue of these marriages were therefore excluded from the succession. Prince George of Schaumburg-Lippe and the count regent. Leopold, thereupon entered into a compact, again referring the matter to the Bundesrat, which requested the chancellor of the empire to agree to the appointment of a court of arbitration consisting of two civil senates of the supreme court, sitting at Leipzig, to decide finally the matter in dispute. It was further provided in the compact that Leopold should remain as regent, even after the death of Alexander, until the decision of the court had been given. Prince Alexander died on the 13th of January 1905; Count Leopold remained as regent, and on the 25th of October the court of arbitration issued its award, declaring the marriages in question (which were, as proved by document, contracted with the consent of the head of the house in each case) ebenbiirtig, and that in pursuance of the award of the king of Saxony the family of Lippe-Biesterfeld, together with the collateral lines sprung from Count William Ernest (father of the regent, Count Ernest) were in the order of nearest agnates called to the succession. Leopold (b. 1871) thus became prince of Lippe.

See A Falkmann, Beitrdge zur Geschichte des Fiirstenthums Lippe (IX'tmold, 1857-1892; 6 vols.); Schwanold, Das Fiirstentum Lippe, das Land und seine Bewohner (Detmold, 1899); Piderit, Die lippischen Edelherrn im Mitlelalter (Detmold, 1876); A. Falkmann and O. Preuss, Lippische Regenten (Detmold, 1860-1868); H. Tricpel, Der Streil um die Thronfolge im Fiirstentum Lippe (Leipzig, 1903); and P. Laband, Die Thronfolge im Fursientum Lippe (Frei- burg, 1891) ; and Schiedsspruch in dent Rechtstreit iiber die Thronfolge im Fiirstentum Lippe vom 2$ Okl. 1905 (Leipzig, 1906).

LIPPI, the name of three celebrated Italian painters.

I. Fra Filippo Lippi (1406-1469), commonly called Lippo Lippi, one of the most renowned painters of the Italian quat- trocento, was born in Florence — his father, Tommaso, being a butcher. His mother died in his childhood, and his father survived

his wife only two years. His aunt, a poor woman named Monna Lapaccia, then took charge of the boy; and in 1420, when fourteen years of age, he was registered in the community of the Carmelite friars of the Carmine in Florence. Here he remained till 1432, and his early faculty for fine arts was probably developed by studying the works of Masaccio in the neighbouring chapel of the Brancacci. Between 1430 and 1432 he executed some works in the monastery, which were destroyed by a fire in 1771; they are specified by Vasari, and one of them was particularly marked by its resemblance to Masaccio's style. Eventually Fra Filippo quitted his convent,

but it appears that he was not relieved from some sort of religious vow; in a letter dated in 1439 he speaks of himself as the poorest friar of Florence, and says he is charged with the maintenance of six marriageable nieces. In 1452 he was appointed chaplain to the convent of S. Giovannino in Florence, and in 1457 rector {Rettore Commendatario) of S. Quirico at Legania, and his gains were considerable and uncommonly large from time to time; but his poverty seems to have been chronic, the money being spent, according to one account, in frequently recurring amours.

Vasari relates some curious and romantic adventures of Fra Filippo, which modern biographers are not inclined to believe. Except through Vasari, nothing is known of his visits to Ancona and Naples, and his intermediate capture by Barbary pirates and enslavement in Barbary, whence his skill in portrait-sketch- ing availed to release him. This relates to a period, 1431-1437, when his career is not otherwise clearly accounted for. The doubts thrown upon his semi-marital relations with a Florentine lady appear, however, to be somewhat arbitrary; Vasari's account is circumstantial, and in itself not greatly improbable. Towards June 1456 Fra Filippo was settled in Prato (near Florence) for the purpose of fulfilling a commission to paint frescoes in the choir of the cathedral. Before actually undertaking this work he set about painting, in 1458, a picture for the convent chapel of S. Margherita of Prato, and there saw Lucrezia Buti, the beautiful daughter of a Florentine, Francesco Buti; she was either a novice or a young lady placed under the nuns' guardianship. Lippi asked that she might be permitted to sit to him for the figure of the Madonna (or it might rather appear of S. Margherita); he made passionate love to her, abducted her to his own house, and kept her there spite of the utmost efforts the nuns could make to reclaim her The fruit of their loves was a boy, who became the painter, not less celebrated than his father, Filippino Lippi (noticed below). Such is sub- stantially Vasari's narrative, published less than a century after the alleged events; it is not refuted by saying, more than three centuries later, that perhaps Lippo had nothing to do with any such Lucrezia, and perhaps Lippino was his adopted son, or only an ordinary relative and scholar. The argument that two reputed portraits of Lucrezia in paintings by Lippo are not alike, one as a Madonna in a very fine picture in the Pitti gallery, and the other in the same character in a Nativity in the Louvre, comes to very little; and it is reduced to nothing when the disputant adds that the Louvre painting is probably not done by Lippi at all. Besides, it appears more likely that not the Madonna in the Louvre but a S. Margaret in a picture now in the Gallery of Prato is the original portrait (according to the tradition) of Lucrezia Buti.

The frescoes in the choir of Prato cathedral, being the stories of the Baptist and of St Stephen, represented on the two opposite wall spaces, are the most important and monumental works which Fra Filippo has left, more especially the figure of Salome dancing, and the last of the series, showing the ceremonial mourning over Stephen's corpse. This contains a portrait of the painter, but which is the proper figure is a question that has raised some diversity of opinion. At the end wall of the choir are S. Giovanni Gualberto and S. Alberto, and on the ceiling the four evangelists.

The close of Lippi's life was spent at Spoleto, where he had been commissioned to paint, for the apse of the cathedral, some scenes from the life of the Virgin. In the semidome of the apse is Christ crowning the Madonna, with angels, sibyls and prophets. This series, which is not wholly equal to the one at Prato, was com- pleted by Fra Diamante after Lippi's death. That Lippi died in Spoleto, on or about the 8th of October 1469, is an undoubted fact; the mode of his death is again a matter of dispute. It has been said that the pope granted Lippi a dispensation for marrying Lucrezia, but

that, before the permission arrived, he had been poisoned by. the indignant relatives either of Lucrezia herself, or of some lady who had replaced her in the inconstant painter's affections. This is now generally regarded as a fable; and indeed a vendetta upon a man aged sixty-three for a

seduction committed at the already mature age of fifty-two seems hardly plausible. Fra Filippo lies buried in Spoleto, with a monument erected to him by Lorenzo the Magnificent; he had always been zealously patronized by the Medici family, beginning with Cosimo, Pater Patriae. Francesco di Pesello (called Pesel- lino) and Sandro Botticelli were among his most distinguished pupils.

In 1441 Lippi painted an altarpiece for the nuns of S. Ambrogio which is now a prominent attraction in the Academy of Florence, and has been celebrated in Browning's well-known poem. It re- presents the coronation of the Virgin among angels and saints, of whom many are Bernardine monks. One of these, placed to the right, is a half-length portrait of Lippo, pointed out by an inscription upon an angel's scroll " Is perfecit opus." The price paid for this work in 1447 was 1200 Florentine lire, which seems surprisingly large. For Germiniano Inghirami of Prato he painted the " Death of St Bernard," a fine specimen still extant. His principal altarpiece in this city is a Nativity in the refectory of S. Domenico — the Infant on the ground adored by the Virgin and Joseph, between Sts George and Dominic, in a rocky landscape, with the shepherds playing and six angels in the sky. In the Uffizi is a fine Virgin adoring the infant Christ, who is held by two angels ; in the National Gallery, London, a " Vision of St Bernard." The picture of the " Virgin and infant with an Angel," in this same gallery, also ascribed to Lippi, is disputable.

Few pictures are so thoroughly enjoyable as those of Lippo Lippi ; they show the naivete of a strong, rich nature, redundant in lively and somewhat whimsical observation. He approaches religious art from its human side, and is not pietistic though true to a phase of Catholic devotion. He was perhaps the greatest colourist and technical adept of his time, with good draughtsmanship — a naturalist, with less vulgar realism than some of his contemporaries, and with much genuine episodical animation, including semi-humorous incidents and low characters. He made little effort after perspective and none for foreshortenings, was fond of ornamenting pilasters and other architectural features. Vasari says that Lippi was wont to hide the extremities in drapery to evade difficulties. His career was one of continual development, without fundamental variation in style or in colouring. In his great works the proportions are larger than life.

Along with Vasari's interesting and amusing, and possibly not very unauthentic, account of Lippo Lippi, the work of Crowe and Cavalcaselle should be consulted. Also: E. C. Strutt, Fra Lippo ■ Lippi (1901); C. M. Phillimore, Early Florentine Painters (1881) ; B. Supino, Fra Filippo Lippi (illustrated) (1902). It should be observed that Crowe and Cavalcaselle give 1412 as the date of the painter's birth, and this would make a considerable difference in estimating details of his after career. We have preferred to follow the more usual account. The self-portrait dated 1441 looks like a man much older than twenty-nine.

II. Filippino, or Lippino Lippi (1460-1505), was the natural son of Fra Lippo Lippi and Lucrezia Buti, born in Florence and educated at Prato. Losing his father before he had completed his tenth year, the boy took up his avocation as a painter, studying under Sandro Botticelli and probably under Fra Diamante. The style which he formed was to a great extent original, but it bears clear traces of the manner both of Lippo and of Botticelli — more ornamental than the first, more realistic and less poetical than the second. His powers developed early; for we find him an accomplished artist by 1480, when he painted an altarpiece, the " Vision of St Bernard," now in the Badia of

Florence; it is in tempera, with almost the same force as oil painting. Soon afterwards, probably from 1482 to 1490, he began to work upon the frescoes which completed the decoration of the Brancacci chapel in the Carmine, commenced by Masolino and Masaccio many years before. He finished Masaccio's " Resurrection of the King's Son," and was the sole author of " Paul's Interview with Peter in Prison," the " Liberation of Peter," the " Two Saints before the Proconsul " and the " Cruci- fixion of Peter." These works are sufficient to prove that Lippino stood in the front rank of the artists of his time. The dignified and expressive figure of St Paul in the second-named subject has always been particularly admired, and appears to have furnished a suggestion to Raphael for his " Paul at Athens." Portraits of Luigi Pulci, Antonio Pollajuolo, Lippino himself and various others are in this series. In 1485 he executed the great altarpiece of the " Virgin and Saints," with several other figures, now in the Uffizi Gallery. Another of his leading works is the altarpiece for the Nerli chapel in S. Spirito — the " Virgin En- throned," with splendidly living portraits of Nerli and his wife,

and a thronged distance. In 1489 Lippino was in Rome, painting in the church of the Minerva, having first passed through Spoleto to design the monument for his father in the cathedral of that city. Some of his principal frescoes in the Minerva are still extant, the subjects being in celebration of St Thomas Aquinas. In one picture the saint is miraculously commended by a crucifix; in another, triumphing over heretics. In 1496 Lippino painted the " Adoration of the Magi " now in the Uffizi, a very striking picture, with numerous figures. This was succeeded by his last important undertaking, the frescoes in the Strozzi chapel, in the church of S. Maria Novella in Florence — " Drusiana Restored to Life by St John, the Evangelist," " St John in the Cauldron of Boiling Oil " and two subjects from the legend of St Philip. These are conspicuous and attractive works, yet somewhat grotesque and exaggerated — full of ornate architecture, showy colour and the distinctive peculiarities of the master. Filippino, who had married in 1497, died in 1505. The best reputed of his scholars was Raffaellino del Garbo.

Like his father, Filippino had a most marked original genius for painting, and he was hardly less a chief among the artists of his time than Fra Filippo had been in his; it may be said that in all the annals of the art a rival instance is not to be found of a father and son each of whom had such pre-eminent natural gifts and leadership. The father displayed more of sentiment and candid sweetness of motive; the son more of richness, variety and lively pictorial combination. He was admirable in ali matters of decora- tive adjunct and presentment, such as draperies, landscape back- grounds and accessories ; and he was the first Florentine to introduce a taste for antique details of costurr.c, &c. He formed a large collection of objects of this kind, and left his designs of them to his son. In his later works there is a tendency to a mannered development of the extremities, and generally to facile overdoing. The National Gallery, London, possesses a good and characteristic though not exactly a first-rate specimen of Lippino, the " Virgin and Child between Sts Jerome and Dominic "; also an " Adoration of the Magi," of which recent criticism contests the authenticity. Crowe and Cavalcaselle, supplemented by the writings of Berenson, should be consulted as to this painter. An album of his works is in Newnes' Art-library.

III. Lorenzo Lippi (1606-1664), painter and poet, was born in Florence. He studied painting under Matteo Rosselli, the influence of whose style, and more especially of that of Santi di Tito, is to be traced in Lippi's works, which are marked by taste, delicacy and a strong turn for portrait-like naturalism. His maxim was " to poetize as he spoke, and to paint as he saw." After exercising his art for some time in Florence, and having married at the age of forty the daughter of a rich sculptor named Susini, Lippi went as court painter to Innsbruck, where he has left many excellent portraits. There he wrote his humorous poem named Malmantile Racquistato, which was published under the anagrammatic pseudonym of " Perlone Zipoli." Lippi was some- what self-sufficient, and, when visiting Parma, would not look at the famous Correggios there, saying that they could teach him nothing. He died of pleurisy in 1664, in Florence.

The most esteemed works of Lippi as a painter are a ” Cruci- fixion ” in the Uffizi gallery at Florence, and a ” Triumph of David ” which he executed for the saloon of Angiolo Galli, introducing into it portraits of the seventeen children of the owner. The Malmantile Racquistato is a burlesque romance, mostly compounded out of a variety of popular tales; its principal subject-matter is an ex- pedition for the recovery of a fortress and territory whose queen had been expelled by a female usurper. It is full of graceful or racy Florentine idioms, and is counted by Italians as a ” testo di lingua.” Lippi is more generally or more advantageously remembered by this poem than by anything which he has left in the art of painting. It was not published until 1688, several years after his death. Lanzi as to Lorenzo Lippi’s pictorial work, and Tiraboschi and other literary historians as to his writings, are among the best authorities. (W. M. R.)

LIPPSPRINGE, a town and watering-place in the Prussian province of Westphalia, lying under the western slope of the Teutoburger Wald, 5 m. N. of Paderborn. Pop. (1905) 3100. The springs, the Arminius Quelle and the Liborius Quelle, for which it is famous, are saline waters of a temperature of 70 F., and are utilized both for bathing and drinking in cases of pul- monary consumption and chronic diseases of the respiratory organs. The annual number of visitors amounts to about 6000. Lippspringe is mentioned in chronicles as early as the 9th century,

and here in the 13th century the order of the Templars established a stronghold. It received civic rights about 1400.

See Dammann, Der Kurort Lippspringe (Paderborn, 1900); Koniger, Lippspringe (Berlin, 1893); and Frey, Lippspringe, Kurort fitr Lungenkranke (Paderborn, 1899).

LIPPSTADT, a town in the Prussian province of Westphalia, on the river Lippe, 20 m. by rail W. by S. of Paderborn, on the main line to Dusseldorf. Pop. (1905) 15,436. The Marien Kirche is a large edifice in the Transitional style, dating from the 13th century. It has several schools, among them being one which was originally founded as a nunnery in 1185. The manufactures include cigar-making, distilling, carriage-building and metal- working.

Lippstadt was founded in 1168 by the lords of Lippe, the rights over one half of the town passing subsequently by purchase to the counts of the Mark, which in 1614 was incorporated with Brandenburg. In 1850 the prince of Lippe-Detmold sold his share to Prussia when this joint lordship ceased. In 1620 Lippstadt was occupied by the Spaniards and in 1757 by the French.

See Chalybaus, Lippstadt, ein Beitrag zur deutschen Stddtegeschichle (Lippstadt, 1876).

LIPSIUS, JUSTUS (1347-1606), the Latinized name of Joest (Juste or Josse) Lips, Belgian scholar, born on the 18th of October (15th of November, according to Amiel) 1547 at Overyssche, a small village in Brabant, near Brussels. Sent early to the Jesuit college in Cologne, he was removed at the age of sixteen to the university of Louvain by his parents, who feared that he might be induced to become a member of the Society of Jesus. The publication of his Variarum Lectionum Libri Tres (1 567), dedicated to Cardinal Granvella, procured him an appoint- ment as Latin secretary and a visit to Rome in the retinue of the cardinal. Here Lipsius remained two years, devoting his spare time to the study of the Latin classics, collecting inscriptions and examining MSS. in the Vatican. A second volume of miscel- laneous criticism (Antiquarum Lectionum Libri Quinque, 1575), published after his return from Rome, compared with the Variae Lectioncs of eight years earlier, shows that he had advanced from the notion of purely conjectural emendation to that of emending by collation. In 1570 he wandered over Burgundy, Germany, Austria, Bohemia, and was engaged for more than a year as teacher in the university of Jena, a position which implied an outward conformity to

the Lutheran Church. On his way back to Louvain, he stopped some time at Cologne, where he must have comported himself as a Catholic. He then returned to Louvian, but was soon driven by the Civil War to take refuge in Antwerp, where he received, in 1579, a call to the newly founded university of Leiden, as professor of history. At Leiden, where he must have passed as a Calvinist, Lipsius remained eleven years, the period of his greatest productivity. It was now that he prepared his Seneca, perfected, in successive editions, his Tacitus and brought out a series of works, some of pure scholarship, others collections from classical authors, others again of general interest. Of this latter class was a treatise on politics (Politicorum Libri Sex, 1589), in which he showed that, though a public teacher in a country which professed toleration, he had not departed from the state maxims of Alva and Philip II. He lays it down that a government should recognize only one religion, and that dissent should be extirpated by fire and sword. From the attacks to which this avowal exposed him, he was saved by the prudence of the authorities of Leiden, who prevailed upon him to publish a declaration that his expression, Ure, scca, was a metaphor for a vigorous treatment. In the spring of 1590, leaving Leiden under pretext of taking the waters at Spa, he went to Mainz, where he was reconciled to the Roman Catholic Church. The event deeply interested the Catholic world, and invitations poured in on Lipsius from the courts and universities of Italy, Austria and Spain. But he preferred to remain in his own country, and finally settled at Louvain, as professor of Latin in the Collegium Buslidianum. He was not expected to teach, and his trifling stipend was eked out by the appointments of privy councillor and historiographer to the king

of Spain. He continued to publish dissertations as before, the chief being his De militia romana (Antwerp, 1595) and Lovanium (Antwerp, 1605; 4th ed., Wesel, 1671), intended as an intro- duction to a general history of Brabant. He died at Louvian on the 23rd of March (some give 24th of April) 1606.

Lipsius's knowledge of classical antiquity was extremely limited. He had but slight acquaintance with Greek, and in Latin literature the poets and Cicero lay outside his range. His greatest work was his edition of Tacitus. This author he had so completely made his own that he could repeat the whole, and offered to be tested in any part of the text, with a poniard held to his breast, to be used against him if he should fail. His Tacitus first appeared in 1575, and was five times revised and corrected — the last time in 1606, shortly before his death. His Opera Omnia appeared in 8 vols, at Antwerp (1585, and ed.,

1637)-

A full list of his publications will be found in van der Aa, Bio- graphisch Woordcnboek der Nederlanden (1865), and in Bibliographic Lipsienne (Ghent, 1886-1888). In addition to the biography by A. le Mire (Aubertus Miraeus) (1609), the only original account of his life, see M. E. C. Nisard, Le Triumvirat litteraire au XVI' siecle (1852); A. Rass, Die Convertiten seit der Reformation (1867); P. Bergman's Autobiographic de J. Lipse (1889); L. Galesloot, Particularity sur la vie de J. Lipse (1877); E. Amiel, Un Publiciste du XVI' siecle. Juste Lipse (1884); and L. Miiller, Geschichte der klassischen Philologie in den Niederlanden. The articles by J. J. Thonissen of Louvain in the Nouvelle Biographie generate, and L. Roersch in Biographie nationale de Belgique, may also be consulted.

LIPSIUS, RICHARD ADELBERT (1830-1892), German Protestant theologian, son of K. H. A. Lipsius (d. 1861), who was rector of the school of St Thomas at Leipzig, was born at Gera on the 14th of February 1830. He studied at Leipzig, and eventually (1871) settled at Jena as professor ordinarius. He helped to found the " Evangelical Protestant Missionary Union " and the " Evangelical Alliance," and from 1874 took an active part in their management. He died at Jena on the 19th of August 1892. Lipsius wrote principally on dogmatics and the history of early Christianity from a liberal and critical standpoint. A Neo-Kantian, he was to some extent an opponent of Albrecht Ritschl, demanding " a connected and consistent theory of the universe, which shall comprehend the entire realm of our ex- perience as a whole. He rejects the doctrine of

dualism in a truth, one division of which would be confined to ‘ judgments of value,’ and be unconnected with our theoretical knowledge of the external world. The possibility of combining the results of our scientific knowledge with the declarations of our ethico-religious experience, so as to form a consistent philosophy, is based, according to Lipsius, upon the unity of the personal ego, which on the one hand knows the world scientifically, and on the other regards it as the means of realizing the ethico-religious object of its life ” (Otto Pfleiderer). This, in part, is his attitude in Philosophic und Religion (1885). In his Lekrbuch der evang.- prot. Dogmatik (1876; 3rd ed., 1893) he Meals in detail with the doctrines of ” God,” ” Christ,” ” Justification ” and the ” Church.” From 1875 he assisted K. Hase, 0. Pfleiderer and E. Schrader in editing the Jahrbucher fur prol. Theologie, and from 1885 till 1891 he edited the Theol. Jahresbericht.

His other works include Die Pilatusakten (1871, new ed., 1886), Dogmalische Beitrdge (1878), Die Quellen der dlteslen Ketzer geschichte (1875), Die apokryphen Apostelgeschichten (1883-1890), Hauptpunkle der christl. Glaubenslehre im Umriss dargestellt (1889), and com- mentaries on the Epistles to the Galatians, Romans and Philippians in H. J. Holtzmann’s Handkommentar zum Neuen Testament (1891-

1892).

LIPTON, SIR THOMAS JOHNSTONE, Bart. (1850-), British merchant, was born at Glasgow in 1850, of Irish parents. At a very early age he was employed as errand boy to a Glasgow stationer; at fifteen he emigrated to America, where at first he worked in a grocery store, and afterwards as a tram-car driver in New Orleans, as a traveller for a portrait firm, and on a plantation in South Carolina. Eventually, having saved some money, he returned to Glasgow and opened a small provision shop. Busi- ness gradually increased, and by degrees Lipton had provision shops first all over Scotland and then all over the United King- dom. To supply his retail shops on the most favourable terms, he

purchased extensive tea, coffee and cocoa plantations in Ceylon, and provided his own packing-house for hogs in Chicago, and fruit farms, jam factories, bakeries and bacon-curing establish- ments in England. In 1898 his business was converted into a limited liability company. At Queen Victoria’s diamond jubilee in 1897 he gave £20,000 for providing dinners for a large number of the London poor. In 1898 he was knighted, and in 1902 was made a baronet. In the world of yacht-racing he became well known from his repeated attempts to win the America Cup.

LIQUEURS, the general term applied to perfumed or flavoured potable spirits, sweetened by the addition of sugar. The term ” liqueur ” is also used for certain wines and unsweetened spirits of very superior quality, or remarkable for their bouquet, such as tokay or fine old brandy or whisky. The basis of all the ” liqueurs ” proper consists of (a) relatively strong alcohol or spirit, which must be as pure and neutral as possible; (b) sugar or syrup; and © flavouring matters. There are three distinct main methods of manufacturing liqueurs. The first, by which liqueurs of the highest class are prepared, is the ” distillation ” or ” alcoholate ” process. This consists in macerating various aromatic substances such as seeds, leaves, roots and barks of plants, &c, with strong spirit and subsequently distilling the infusion so obtained generally in the presence of a whole or a part of the solid matter. The mixture of spirit, water and flavouring matters which distils over is termed the ” alcoholate.” To this is added a solution of sugar or syrup, and frequently colouring matter in the shape of harmless vegetable extracts or burnt sugar, and a further quantity of flavouring matter in the shape of essential oils or clear spirituous vegetable extracts. The second method of making liqueurs is that known as the ” essence ” process. It is employed, as a rule, for cheap and inferior articles; the process resolving itself into the addition of various essential

oils, either natural or artificially prepared, and of spirituous extracts to strong spirit, filtering and adding the saccharine matter to the clear nitrate. The third method of manufacturing liqueurs is the " infusion " process, in which alcohol and sugar are added to various fresh fruit juices. Liqueurs prepared by this method are frequently called " cordials." It has been suggested that " cordials " are articles of home manufacture, and that liqueurs are necessarily of foreign origin, but i,t is at least doubtful whether this is entirely correct. The French, who excel in the preparation of liqueurs, grade their products, according to their sweetness and alcoholic strength, into crimes, huiles or baumes, which have a thick, oily consist- ency; and eaux, exlraits or elixirs, which, being less sweetened, are relatively limpid. Liqueurs are also classed, according to their commercial quality and composition, as ordinaires, demi- fines, fines and sur-fines. Certain liqueurs, containing only a single flavouring ingredient, or having a prevailing flavour of a particular substance, are named after that body, for instance, crime de vanille, anisette, kilmmel, creme de menthe, &c. On the other hand, many well-known liqueurs are compounded of very numerous aromatic principles. The nature and quantities of the flavouring agents employed in the preparation of liqueurs of this kind are kept strictly secret, but numerous " recipes " are given in works dealing with this subject. Among the substances frequently used as flavouring agents are aniseed, coriander, fennel, wormwood, gentian, sassafras, amber, hyssop, mint, thyme, angelica, citron, lemon and orange peel, peppermint, cinnamon, cloves, iris, caraway, tea, coffee and so on. The alcoholic strength of liqueurs ranges from close on 80% of alcohol by volume in some kinds of absinthe, to 27 % in anisette. The liqueur industry is a very considerable one, there being in France some 25,000 factories. Most of these are small, but some 600,000 gallons are annually exported from France alone. For absinthe, benedictine, chartreuse, curacoa, kirsch and vermouth see under separate headings. Among other well- known trade liqueurs may be mentioned maraschino, which takes its name from a variety of cherry — the marasca — grown in Dalmatia, the centre of the trade being at Zara; kummel, the flavour of which is largely due to caraway seeds; allasch, which is a rich variety of kummel; and cherry and other " fruit "

brandies and whiskies, the latter being perhaps more properly termed cordials.

See Duplais, La Fabrication des liqueurs; and Rocques, Les Eaux- de-vie et liqueurs.

LIQUIDAMBAR, Liquid Amber or Sweet Gum, a product of Liquidambar slyraciflua (order Hamamelideae), a deciduous tree of from 80 to 140 ft. high, with a straight trunk 4 or 5 ft. in diameter, a native of the United States, Mexico and Central America. It bears palmately-lobed leaves, somewhat resembling those of the maple, but larger. The male and female inflores- cences are on different branches of the same tree, the globular heads of fruit, resembling those of the plane. This species is nearly allied to L. orientalis, a native of a very restricted portion of the south-west coast of Asia Minor, where it forms forests. The earliest record of the tree appears to be in a Spanish work by F. Hernandez, published in 1651, in which he describes it as a large tree producing a fragrant gum resembling liquid amber, whence the name {Nov. Plant., &c, p. .56). In Ray's Historia Plantarum (1686) it is called Slyrax liquida. It was introduced into Europe in 1681 by John Banister, the missionary collector sent out by Bishop Compton, who planted it in the palace gardens at Fulham. The wood is very compact and fine-grained — the heart-wood being reddish, and, when cut into planks, marked transversely with blackish belts. It is employed for veneering in America. Being readily dyed black, it is sometimes used instead of ebony for picture frames, balusters, &c; but it is too liable to decay for out-door work.

The gum resin yielded by this tree has no special medicinal virtues, being inferior in therapeutic properties to many others of its class. Mixed with tobacco, the gum was used for smoking at the court of the Mexican emperors (Humboldt iv. 10). It has long been used in France as a perfume for gloves, &c. It is mainly produced in Mexico, little being obtained from trees growing in higher latitudes of North America, or in England.

LIQUIDATION {i.e. making " liquid " or clear), in law, the clearing off or settling of a

debt. The word was more especially used in bankruptcy law to define the method by which, under the Bankruptcy Act 1869, the affairs of an insolvent debtor were arranged and a composition accepted by his creditors without actual bankruptcy. It was abolished by the Bankruptcy Act 1883 (see Bankruptcy). In a general sense, liquidation is used for the act of adjusting debts, as the Egyptian Law of Liquida- tion, July 1880, for a general settlement of the liabilities of Egypt. In company law, liquidation is the winding up and dissolving a company. The winding up may be either voluntary or compulsory, and an officer, termed a liquidator, is appointed, who takes into his custody all the property of the company and performs such duties as are necessary on its behalf (see Company).

LIQUID GASES. 1 Though Lavoisier remarked that if the earth were removed to very cold regions of space, such as those of Jupiter or Saturn, its atmosphere, or at least a portion of its aeriform constituents, would return to the state of liquid {(Euvres, ii. 805), the history of the liquefaction of gases may be said to begin with the observation made by John Dalton in his essay ” On the Force of Steam or Vapour from Water and various other Liquids ” (1801): ” There can scarcely be a doubt entertained respecting the reducibility of all elastic fluids, of whatever kind into liquids; and we ought not to despair of effecting it in low temperatures and by strong pressures exerted on the un-mixed gases.” It was not, however, till 1823 that the question was investigated by systematic experiment. In that year Faraday, at the suggestion of Sir Humphry Davy, exposed hydrate of chlorine to heat under pressure in the laboratories of the Royal Institution. He placed the substance at the end of one arm of a bent glass tube, which was then hermetically sealed, and decomposing it by heating to ioo° F., he saw a yellow liquid distil to the end of the other arm. This liquid he surmised to be chlorine separated from the water by the heat and ” condensed into a dry fluid by the mere pressure of its own abundant vapour,”” and he verified his surmise by compressing chlorine gas, freed

1 Figs. I, 5, 6, 7, 10 _n, 12, 13 in this article are from Proc. Rey. Inst., by permission

from water by exposure to sulphuric acid, to a pressure of about four atmospheres, when the same yellow fluid was produced {Phil. Trans., 1823, 113, pp. 160-165). He proceeded to experi- ment with a number of other gases subjected in sealed tubes to the pressure caused by their own continuous production by chemical action, and in the course of a few weeks liquefied sulphurous acid, sulphuretted hydrogen, carbonic acid, euchlorine, nitrous acid, cyanogen, ammonia and muriatic acid, the last of which, however, had previously been obtained by Davy. But he failed with hydrogen, oxygen, fluoboric, fluosilicic and phosphuretted hydrogen gases {Phil. Trans., ib. pp. 189-198). Early in the following year he published an ” Historical statement respecting the liquefaction of gases ” {Quart. Journ. Sci., 1824, 16, pp. 229-240), in which he detailed several recorded cases in which previous experimenters had reduced certain gases to their liquid state.

In 1835 Thilorier, by acting on bicarbonate of soda with sulphuric acid in a closed vessel and evacuating the gas thus obtained under pressure into a second vessel, was able to accumu- late large quantities of liquid carbonic acid, and found that when the liquid was suddenly ejected into the air a portion of it was solidified into a snow-like substance {Ann. chim. phys., 1835, 60, pp. 427-432). Four years later J. K. Mitchell in America, by mixing this snow with ether and exhausting it under an air pump, attained a minimum temperature of 146° below zero F., by the aid of which he froze sulphurous acid gas to a solid.

Stimulated by Thilorier’s results and by considerations arising out of the work of J. C. Cagniard de la Tour {Ann. chim. phys., 1822, 21, pp. 127 and 178, and 1823, 22, p. 410), which appeared to him to indicate that gases would pass by some simple law into the liquid state, Faraday returned to the subject about 1844, in the ” hope of seeing nitrogen, oxygen and hydrogen either as liquid or solid bodies, and the latter probably as a metal ” (Phil. Trans., 1845, 135, pp. 155-157). On the basis of Cagniard de la Tour’s observation that at a certain temperature a liquid under sufficient pressure becomes a vapour or gas having the same bulk as the liquid, he inferred that ” at this temperature or one a little higher, it is not likely that any increase of pressure, except perhaps one exceedingly great, would convert the gas into a liquid.” He further surmised that the Cagniard de la Tour condition might have its point of temperature for oxygen, nitrogen, hydrogen, &c, below that belonging to the bath of solid carbonic acid

and ether, and he realized that in that case no pressure which any apparatus would be able to bear would be able to bring those gases into the liquid or solid state, which would require a still greater degree of cold. To fulfil this con- dition he immersed the tubes containing his gases in a bath of solid carbonic acid and ether, the temperature of which was reduced by exhaustion under the air pump to -166 F., or a little lower, and at the same time he subjected the gases to pressures up to 50 atmospheres by the use of two pumps working in series. In this way he added six substances, usually gaseous, to the list of those that could be obtained in the liquid state, and reduced seven, including ammonia, nitrous oxide and sulphuretted hydrogen, into the solid form, at the same time effecting a number of valuable determinations of vapour tensions. But he failed to condense oxygen, nitrogen and hydrogen, the original objects of his pursuit, though he found reason to think that " further diminution of temperature and improved apparatus for pressure may very well be expected to give us these bodies in the liquid or solid state." His surmise that increased pressure alone would not suffice to bring about change of state in these gases was confirmed by subsequent investigators, such as M. P. E. Berthelot, who in 1850 compressed oxygen to 780 atmospheres (Ann. chim. phys., 1850, 30, p. 237), and Natterer, who a few years later subjected the permanent gases to a pressure of 2790 atmospheres, without result; and in 1869 Thomas Andrews (Phil. Trans., 11) by his researches on carbonic acid finally established the conception of the " critical temperature " as that temperature, differing for different bodies, above which no gas can be made to assume the liquid state, no matter what pressure it be subjected to (see Condensation of Gases).

About 1877 the problem of liquefying the permanent gases was taken up by L. P. Cailletet and R. P. Pictet, working almost simultaneously though independently. The former relied on the cold produced by the sudden expansion of the gases at high compression. By means of a specially designed pump he com- pressed about 100 cc. of oxygen in a narrow glass tube to about 200 atmospheres, at the same time cooling it to about 20° C, and on suddenly releasing the pressure he saw momentarily in the interior of the tube a mist (brouillard) , from which he inferred the presence of a vapour very near its point of liquefaction. A few days later he repeated the experiment with hydrogen, using a pressure of nearly 300 atmospheres, and observed in his tube an exceedingly fine and subtle fog which vanished almost instantaneously. At the time when these experiments were carried out it was generally accepted that the mist or fog con sisted of minute drops of the liquefied gases. Even had this been the case, the problem would not have been completely solved, for Cailletet was unable to collect the drops in the form of a true stable liquid, and at the best obtained a " dynamic " not a "static " liquid, the gas being reduced to a form that bears the same relation to a true liquid that the partially condensed steam issuing from the funnel of a locomotive bears to water standing in a tumbler. But subsequent knowledge showed that even this proximate liquefaction could not have taken place, and that the fog could not have consisted of drops of liquid hydrogen, because the cooling produced by the adiabatic ex- pansion would give a temperature of only 44 abs., which is certainly above the critical temperature of hydrogen. Pictet again announced that on opening the tap of a vessel containing hydrogen at a pressure of 650 atmospheres and cooled by the cascade method (see Condensation oe Gases) to – 140 C, he saw issuing from the orifice an opaque jet which he assumed to consist of hydrogen in the liquid form or in the liquid and solid forms mixed. But he was no more successful than Cailletet in collecting any of the liquid, which — whatever else it may have been, whether ordinary air or impurities associated with the hydrogen — cannot have been hydrogen because the means he employed were insufficient to reduce the gas to what has sub- sequently been ascertained to be its critical point, below which of course liquefaction is impossible. It need scarcely be added that if the liquefaction of hydrogen be rejected a fortiori Pictet's claim to have effected its solidification falls to the ground.

After Cailletet and Pictet, the next important names in the history of the liquefaction of gases are those of Z. F. Wroblewski and K. S. Olszewski, who for some years worked together at Cracow. In April 1883 the former announced to the French Academy that he had obtained oxygen in a completely liquid state and (a few days later) that nitrogen at

a temperature of 136° C, reduced suddenly from a pressure of 150 atmospheres to one of 50, had been seen as a liquid which showed a true meniscus, but disappeared in a few seconds. But with hydrogen treated in the same way he failed to obtain even the mist reported by Cailletet. At the beginning of 1884 he performed a more satis factory experiment. Cooling hydrogen in a capillary glass tube to the temperature of liquid oxygen, he expanded it quickly from 100 atmospheres to one, and obtained the appearance of an instantaneous ebullition. Olszewski confirmed this result by expanding from a pressure of 190 atmospheres the gas cooled by liquid oxygen and nitrogen boiling under reduced pressure,, and even announced that he saw it running down the walls of the tube as a colourless liquid.

Wroblewski, however, was unable to observe this phenomenon, and Olszewski himself, when seven years later he repeated the experiment in the more favourable conditions afforded by a larger apparatus, was unable to produce again the colourless drops he had previously reported: the phenomenon of the appearance of sudden ebullition indeed lasted longer, but he failed to perceive any meniscus such as would have been a certain indication of the presence of a true liquid. Still, though neither of these investigators succeeded in reaching the goal at which they aimed, tbsftr work was of great value in elucidating the conditions ojf the, problem and in perfecting the details of the

apparatus employed. Wroblewski in particular devoted the closing years of his life to a most valuable investigation of the isothermals of hydrogen at low temperatures. From the data thus obtained he constructed a van der Waals equation which enabled him to calculate the critical temperature, pressure and density of hydrogen with very much greater certainty than had previously been possible. Liquid oxygen, liquid nitrogen and liquid air — the last was first made by Wroblewski in 1885 — became something more than mere curiosities of the laboratory, and by the year 1891 were produced in such quantities as to be available for the purposes of scientific research. Still, nothing was added to the general principles upon which the work of Cailletet and Pictet was based, and the ” cascade ” method, together with adiabatic expansion from high compression (see Condensation of Gases) , remained the only means of procedure at the disposal of experimenters in this branch of physics.

In some quarters a certain amount of doubt appears to have • arisen as to the sufficiency of these methods for the liquefaction of hydrogen. Olszewski, for example, in 1895 pointed out that the succession of less and less condensible gases necessary for the cascade method breaks down between nitrogen and hydrogen, and he gave as a reason for hydrogen not having been reduced to the condition of a static liquid the non-existence of a gas intermediate in volatility between those two. By 1894 attempts had been made in the Royal Institution laboratories to manufacture an artificial gas of this nature by adding a small proportion of air to the hydrogen, so as to get a mixture with a critical point of about 200 C. When such a mixture was cooled to that temperature and expanded from a high degree of compression into a vacuum vessel, the result was a white mass of solid air together with a clear liquid of very low density. This was in all probability hydrogen in the true liquid state, but it was not found possible to collect it owing to its extreme volatility. Whether this artificial gas might ultimately have enabled liquid hydrogen to be collected in open vessels we can not say, for experiments with it were abandoned in favour of other measures, which led finally to a more assured success.

Vacuum Vessels. — The problem involved in the liquefaction of hydrogen was in reality a double one. In the first place, the gas had to be cooled to such a temperature that the change to the liquid state was rendered possible. In the second, means had to be discovered for protecting it, when so cooled, from the influx of external heat, and since the rate at which heat is transferred from one body to another increases very

rapidly with the difference between their temperatures, the question of efficient heat insula- tion became at once more difficult and more urgent in proportion to the degree of cold attained. The second part of the problem was in fact solved first. Of course packing with non-conducting materials was an obvious expedient when it was not necessary that the contents of the apparatus should be visible to the eye, but in the numerous instances when this was not the case such measures were out of the question. Attempts were made to secure the desired end by surrounding the vessel that contained the cooled or liquid gas with a succession of other vessels, through which was conducted the vapour given off from the interior one. Such devices involved awkward complications in the arrange- ment of the apparatus, and besides were not as a rule very efficient, although some workers, e.g. Dr Kamerlingh Onnes, of Leiden, reported some success with their use. In 1892 it occurred to Dewar that the principle of an arrangement he had used nearly twenty years before for some calorimetric experiments on the physical constants of hydrogenium, which was a natural deduc- tion from the work of Dulong and Petit on radiation, might be employed with advantage as well to protect cold substances from heat as hot ones from cold. He therefore tried the effect of surrounding his liquefied gas with a highly exhausted space. The result was entirely successful. Experiment showed that liquid air contained in a glass vessel with two walls, the space between which -.'was a high vacuum, evaporated at only one fifth the rate it did when in an ordinary vessel surrounded with air at atmospheric pressure, the convective transference of heat by means of the gas particles being enormously reduced owing

to the vacuum. But in addition these vessels lent themselves to an arrangement by which radiant heat could still further be cut off, since it was found that when the inner wall was coated with a bright deposit of silver, the influx of heat was diminished to one-sixth of the amount existing without the metallic coating. The total effect, therefore, of the high vacuum and silvering is to reduce the in-going heat to one-thirtieth part. In making such vessels a mercurial vacuum has been found very satisfactory. The vessel in which the vacuum is to be produced is provided with a small subsidiary vessel joined by a narrow tube with the main vessel, and connected with a powerful air-pump. A quantity of mercury having been placed in it, it is heated in an oil- or air-bath to about 200 C, so as to volatilize the mercury, the vapour of which is removed by the pump. After the process has gone on for some time, the pipe leading to the pump is sealed off, the vessel immediately removed from the bath, and the small subsidiary part immersed in some cooling agent such as solid carbonic acid or liquid air, whereby the mercury vapour is condensed in the small vessel and a vacuum of enormous tenuity left in the large one. The final step is to seal off the tube con- necting the two. In this way a vacuum may be produced having a vapour pressure of about the hundred-millionth of an atmo- sphere at o° C. If, however, some liquid mercury be left in the space in which the vacuum is produced, and the containing part of the vessel be filled with liquid air, the bright mirror of mercury which is deposited on the inside wall of the bulb is still more effective than silver in protecting the chamber from the influx of heat, owing to the high refractive index, which involves great re- flecting power, and the bad heat-conducting powers of mercury. With the discovery of the remarkable power of gas absorption possessed by charcoal cooled to a low temperature (see below), it became possible to make these vessels of metal. Previously this could not be done with success, because gas occluded in the metal gradually escaped and vitiated the vacuum; but now any stray gas may be absorbed by means of charcoal so placed in a pocket within the vacuous space that it is cooled by the liquid in the interior of the vessel. Metal vacuum vessels (fig. 1), of a capacity of from 2 to 20 litres, may be formed of brass, copper, nickel or tinned iron, with necks of some alloy that is a bad conductor of heat, silvered glass vacuum cylinders being fitted as stoppers. Such flasks, when properly constructed, have an efficiency equal to that of the chemically-silvered glass vacuum vessels now commonly used in low temperature investigations, and

Fig. 1. — Metallic Vacuum Vessel.

transport. The

they are obviously better adapted for principle of the Dewar vessel is utilized in the Thermos flasks which are now extensively manufactured and employed for keeping liquids warm in hospitals, &c.

Thermal Transparency -at Low Temperatures. — The proposition, once enunciated by Pictet, that at low temperatures all substances have practically the same thermal transparency, and are equally ineffective as non-conductors of heat, is based on erroneous observa- tions. It is true that if the space between the two walls of a double-walled vessel is packed with substances like carbon, magnesia, or silica, liquid air placed in the interior will boil off even more quickly than it will when the space merely contains air at atmospheric pressure; but in such cases it is not so much the carbon, &c, that bring about the transference of heat, as the air contained in their interstices. If this air be pumped out such substances are seen to exert a very considerable influence in stopping the influx of heat, and a vacuum vessel which has the space between its two walls filled with a non-conducting material of this kind preserves a liquid gas even better than one in which that space is simply exhausted of air. In experiments on this point double-walled glass tubes, as nearly identical in shape and size as possible, were mounted in sets of three on a common stem which communicated with an air-pump, so that the degree of exhaustion in each was equal. In two of each three the space between the double walls was filled with the powdered material it was desired to test, the third being left empty and used as the standard. The time required for a certain quantity of liquid

air to evaporate from the interior of this empty bulb being called I, in each of the eight sets of triple tubes, the times required for the same quantity to boil off from the other pairs of tubes were as follows : —

Charcoal ... 5

Magnesia ... 2

Graphite . . . 1-3

1 Alumina . . . 3-3

1 Calcium carbonate 2-5

! Calcium fluoride . 1-25

[Phosphorus (amor-

I phous) ... 1

. Mercuric iodide . . 1-5

(Lampblack 5

I Silica 4

! Lampblack .... 4 Lycopodium . . .2-5

S Barium carbonate . 1-3

Calcium phosphate . . 2-7

Lead oxide ... 2

Bismuth oxide ... 6

SLea Bis

Other experiments of the same kind made — (a) with similar vacuum vessels, but with the powders replaced by metallic and other septa; and (b) with vacuum vessels having their walls silvered, yielded the following results : —

(a) Vacuum space empty I Three turns silver paper, bright sur- face inside ... 4 Three turns silver paper, bright sur- face outside . . 4

Vacuum space empty 1 Three turns gold paper,

gold outside , . 4 Some pieces of gold- leaf put in so as to make contact between walls of vacuum-tube . . o-j

‘ (6) Vacuum space empty, silvered on inside surfaces . 1

Silica in silvered vacuum space . . 1 • 1

Vacuum space empty Three turns black paper,

1 black outside .

Three turns black paper,

ˆ black inside .

Vacuum space empty .

Three turns, not touch- ing, of sheet lead .

Three turns, not touch- ing, of sheet alumi- nium

f Empty silvered vacuum -! Charcoal in silvered (_ vacuum ....

1-25

tween those temperatures, in the case of a number of hydrated salts and other substances:

Table I.

It appears from these experiments that silica, charcoal, lamp- black, and oxide of bismuth all increase the heat insulations to four, five and six times that of the empty vacuum space. As the chief communication of heat through an exhausted space is by molecular bombardment, the fine powders must shorten the free path of the gaseous molecules, and the slow conduction of heat through the porous mass must make the conveyance of heat- energy more difficult than when the gas molecules can impinge upon the relatively hot outer glass surface, and then directly on the cold one without interruption. (See Proc. Roy. Inst. xv.

821-826.)

Density of Solids and Coefficients of Expansion at Low Tempera- tures. — The facility with which liquid gases, like oxygen or nitrogen, can be guarded from evaporation by the proper use of vacuum vessels (now called Dewar vessels), naturally suggests that the specific gravities of solid bodies can be got by direct weighing when immersed in such fluids. If the density of the liquid gas is accurately known, then the loss of weight by fluid displacement gives the specific gravity compared to water. The metals and alloys, or substances that can be got in large crystals, are the easiest to mani- pulate. If the body is only to be had in small crystals, then it must be compressed under strong hydraulic pressure into coherent blocks weighing about 40 to 50 grammes. Such an amount of material gives a very accurate density of the body about the boiling point of

air, and a similar density taken in a suitable liquid at the ordinary temperature enables the mean coefficient of expansion between + 15° C. and -185 C. to be determined. One of the most interesting results is that the density of ice at the boiling point of air is not more than 0-93, the mean coefficient of expansion being therefore 0-000081. As the value of the same coefficient between 0° C. and -27 C. is 0-000155, it is clear the rate of contraction is diminished to about one-half of what it was above the melting point of the ice. This suggests that by no possible cooling at our command is it likely we could ever make ice as dense as water at o°C, far less 4 C. In other words, the volume of ice at the zero of temperature would not be the minimum volume of the water molecule, though we have every reason to believe it would be so in the case of the majority of known substances. Another substance of special interest is solid carbonic acid. This body has a density of 1-53 at -78 C. and 1-633 at — 185 C, thus giving a mean coefficient of expansion between these temperatures of 0-00057. This value is only about J of the co efficient of expansion of the liquid carbonic acid gas just above its melting point, but it is still much greater at the low temperature than that of highly expansive solids like sulphur, which at 40 C. has a value of 0-00019. The following table gives the densities at the temperature of boiling liquid air (i85°C.) and at ordinary tempera tures (17° C.), together with the mean coefficient of expansion be

Aluminium sulphate (18) 1 Sodium biborate (10) Calcium chloride (6) Magnesium chloride (6) Potash alum (24) Chrome alum (24) . Sodium carbonate (10) . Sodium phosphate (12) . Sodium thiosulphate (5) Potassium ferrocyanide (3) Potassium ferricyanide Sodium nitro-prusside (4) Ammonium chloride Oxalic acid (2) . . . Methyl oxalate .

Paraffin

Naphthalene Chloral hydrate . Urea . Iodoform

Iodine

Sulphur

Mercury

Sodium

Graphite (Cumberland) .

Density

at-185

C.

1-7194 1-7284 1-7187 1 -6039 1-6414 1-7842 1-4926 1-5446

I-7635

1-8988 1-8944 1-7196

1-5757 1-7024 1-5278 0-9770 1-2355 1-9744 1-3617

4-4459 4-8943 2-0989 14-382 1-0056 2-1302

Density

at +17

C.

1-6913 1-6937 1-6775 1-5693 1-6144 1-7669 1 -4460 1-5200 1-7290

1-8533 1-8109 1-6803 1-5188 1-6145 1-4260 0-9103 1-1589 1-9151 1-3190

4-1955 4-6631 2-0522

0-972 2-0990

Mean

coefficient

of expansion

between

-i85°C.and

+ 17° c.

0-0000811

o-oooiooo

0-0001191

0-0001072 ‘

0-0000813

0-0000478

0-0001563

0-0000787

0-0000969

0-0001195

0-0002244

0-0001138

0-0001820

0-0002643

0-0003482

0-0003567

0-0003200

0-0001482

0-0001579

0-0002930

0-0002510

0-0001152

0-0000881 2

0-0001810

0-0000733

1 The figures within parentheses refer to the number of molecules of water of crystallization.

2 -i89° to -38-85° C. It will be seen from this table that, with the exception of carbonate of soda and chrome alum, the hydrated salts have a coefficient of expansion that does not differ greatly from that of ice at low tempera- tures. Iodoform is a highly expansive body like iodine, and oxalate of methyl has nearly as great a coefficient as paraffin, which is a very expansive solid, as are naphthalene and oxalic acid. The coefficient of solid mercury is about half that of the liquid metal, while that of sodium is about the value of mercury at ordinary temperatures. Further details on the subject can be found in the Proc. Roy. Inst. (1895), and Proc. Roy. Soc. (1902).

Density of Gases at Low Temperatures. — The ordinary mode of de- termining the density of gases may be followed, provided that the glass flask, with its carefully ground stop-cock sealed on, can stand an internal pressure of about five atmospheres, and that all the necessary corrections for change of volume are made. All that is necessary is to immerse the exhausted flask in boiling oxygen, and then to allow the second gas to enter from a gasometer by opening the stop-cock until the pressure is equalized. The stop-cock being closed, the flask is now taken out of the liquid oxygen and left in the balance-room until its temperature is equalized. It is then weighed against a similar flask used as a counterpoise. Following such a method, it has been found that the weight of 1 litre of oxygen vapour at its boiling point of 90-5° absolute is 4-420 grammes, and therefore the specific volume is 226-25 cc – According to the ordinary gaseous laws, the litre ought to weigh 4-313 grammes, and the specific volume should be 231-82 cc. In other words, the product of pressure and volume at the boiling point is diminished by 2-46 %. In a similar way the weight of a litre of nitrogen vapour at the boiling point of oxygen was found to be 3-90, and the inferred value for 78 absolute, or its own boiling point, would be 4-51, giving a specific volume of 221-3.

Regenerative Cooling. — One part of the problem being thus solved and a satisfactory device discovered for warding off heat in such vacuum vessels, it remained to arrange some practi- cally efficient method for reducing hydrogen to a temperature sufficiently low for liquefaction. To gain that end, the idea naturally occurred of using adiabatic expansion, not inter- mittently, as when gas is allowed to expand suddenly from a high compression, but in a continuous process, and an obvious way of attempting to carry out this condition was to enclose the orifice at which expansion takes place in a tube, so as to obtain a constant stream of cooled gas passing over it. But further consideration of this plan showed that although the gas jet would be cooled near the point of expansion owing to the conversion of a portion of its sensible heat into dynamical energy of the moving gas, yet the heat it thus lost would be restored to it almost

immediately by the destruction of this mechanical energy through friction and its consequent reconversion into heat. Thus the net result would be nil so far as change of temperature through the performance of external work was concerned. But the con- ditions in such an arrangement resemble that in the experiments of Thomson and Joule on the thermal changes which occur in a gas when it is forced under pressure through a porous plug or narrow orifice, and those experimenters found, as the former of them had predicted, that a change of temperature does take place, owing to internal work being done by the attraction of the gas molecules. Hence the effective result obtainable in practice by such an attempt at continuous adiabatic expansion as that suggested

above is to be measured by the amount of the ” Thomson- Joule effect,” which depends entirely on the internal, not the external, work done by the gas. To Linde belongs the credit of having first seen the essential importance of this effect in connexion with the liquefaction of gases by adiabatic ex- pansion, and he was, further, the first to construct an industrial plant for the production of liquid air based on the application of this principle.

The change of temperature due to the Thomson- Joule effect varies in amount with different gases, or rather with the tempera- ture at which the opera- tion is conducted. At ordinary temperatures oxygen and carbonic acid are cooled, while hydrogen is slightly heated. But hydrogen also is cooled if before being passed through the nozzle or plug it is brought into a thermal condition comparable to that of other gases at ordinary temperatures — that is to say, when it is initially cooled to a tem- perature having the same ratio to its critical point as their temperatures have to their critical points — and similarly the more condensible gases would be heated, and not cooled, by passing through a nozzle or plug if they were employed at a temperature sufficiently above their critical points. Each gas has therefore a point of inversion of the Thomson – Joule effect, and this temperature is, according to the theory of van der Waals, about 6-75 times the critical temperature of the body. Olszewski has determined the inversion-point in the case of hydrogen, and finds it to be 192-5° absolute, the theoretical critical point being thus about 28-5° absolute, small, being for air about

Fig.

2. — Laboratory Liquid

Machine.

Air

A, Air or oxygen inlet.

B, Carbon dioxide inlet.

C, Carbon dioxide valve.

D, Regenerator coils.

F, Air or oxygen expansion valve.

G, Vacuum vessel with liquid air or oxygen.

Carbon dioxide and air outlet. Air coil. Carbon dioxide coil.

H,

O.

The cooling effect obtained is

J° C. per atmosphere difference of pressure at ordinary tern peratures. But the decrement of temperature is proportional to the difference of pressure and inversely as the absolute temperature, so that the Thomson-Joule effect increases rapidly by the combined use of a lower temperature and greater difference of gas pressure. By means of the ” regenerative ” method of

working, which was described by C.W. Siemens in 1857, developed and extended by Ernest Solvay in 1885, and subsequently utilized by numerous experimenters in the construction of low tempera- ture apparatus, a practicable liquid air plant was constructed by Linde. The gas which has passed the orifice and is therefore cooled is made to flow backwards round the tube that leads to the nozzle; hence that portion of the gas that is just about to pass through the nozzle has some of its heat abstracted,

and in consequence on expansion is cooled to a lower temperature than the first portion. In its turn it cools a third portion in the same way, and so the reduction of temperature goes on pro- gressively until ultimately a portion of the gas is liquefied. Apparatus based on this principle has been employed not only by Linde in Germany, but also by Tripler in America and by Hampson and Dewar in England. The last-named experimenter exhibited in December 1895 a laboratory machine of this kind (fig. 2), which when supplied with oxygen initially cooled to -79° C, and at a pressure of 100-150 atmospheres, began to yield liquid in about a quarter of an hour after starting. The initial cooling is not necessary, but it has the advantage of

Fig. 3. — Hydrogen Jet Apparatus. A, Cylinder containing com- pressed hydrogen. B and C, Vacuum vessels containing carbonic acid under exhaustion and liquid air respectively. D, Regenerating coil in vacuum vessel. F, Valve. G, Pin-hole nozzle.

reducing the time required for the operation. The efficiency of the Linde process is small, but it is easily conducted and only requires plenty of cheap power. When we can work turbines or other engines at low temperatures, so as to effect cooling through the performance of external work, then the econorriy in the production of liquid air and hydrogen will be greatly increased.

This treatment was next extended to hydrogen. For the reason already explained, it would have been futile to experiment with this substance at ordinary temperatures, and therefore as a preliminary it was cooled to the temperature of boiling liquid air, about 190° C. At this temperature it is still 2! tim.es above its critical temperature, and therefore its liquefaction in these circumstances would be comparable to that of air, taken at + 6o° C, in an apparatus like that just described. Dewar showed in 1896 that hydrogen cooled in this way and ex panded in a regenerative coil from a pressure of 200 atmospheres was rapidly reduced in temperature to such an extent that after the apparatus had been working a few minutes the issuing jet was seen to contain liquid, which was sufficiently proved to be liquid hydrogen by the fact that it was so cold as to freeze liquid air and oxygen into hard white solids. Though with this apparatus, a diagrammatic representation of which is shown in fig. 3, it was now found possible at the time to collect the

liquid in an open vessel, owing to its low specific gravity and the rapidity of the gas-current, still the general type of the arrange- ment seemed so promising that in the next two years there was laid down in the laboratories of the Royal Institution a large plant — it weighs 2 tons and contains 3000 ft. of pipe — which is designed on precisely the same principles, although its construction is far more elaborate. The one important novelty, without which it is practically impossible to succeed, is the provision of a device to surmount the difficulty of with- drawing the liquefied hydrogen after it has been made. The desideratum is really a means of forming an aperture in the bottom of a vacuum vessel by which the contained liquid may be run out. For this purpose the lower part of the vacuum vessel (D in fig. 3) containing the jet is modified as shown in fig. 4; the inner vessel is prolonged in a fine tube, coiled spirally, which passes through the outer wall of the vacuum vessel, and thus sufficient elasticity is obtained to

p IG . Bottom ena -ble t ne tube to withstand without fracture

of Vacuum Vessel, the great contraction Consequent on the extreme cold to which it is subjected. Such peculiarly shaped vacuum vessels were made by Dewar's directions in Germany, and have subsequently been supplied to and employed by other experimenters.

With the liquefying plant above referred to liquid hydrogen was for the first time

collected in an open vessel on the 10th of May 1898. The gas at a pressure of 180 atmospheres was cooled to 205° C. by means of liquid air boiling in vacuo, and was then passed through the nozzle of the regenerative coil, which was enclosed in vacuum vessels in such a way as to exclude external heat as perfectly as possible. In this way some 20 cc. of the liquid had been collected when the experiment came to a premature end, owing to the nozzle of the apparatus becom ing blocked by a dense solid — air-ice resulting from the con- gelation of the air which was present to a minute extent as an impurity in the hydrogen. This accident exemplifies what is a serious trouble encountered in the production of liquid hydro- gen, the extreme difficulty of obtaining the gas in a state of sufficient purity, for the presence of 1% of foreign matters, such as air or oxygen, which are more condensible than hydrogen, is sufficient to cause complete stoppage, unless the nozzle valve and jet arrangement is of special construction. In subsequent experiments the liquid was obtained in larger quantities — on the 13th of June 1901 five litres of it were successfully con- veyed through the streets of London from the laboratory of the Royal Institution to the rooms of the Royal Society — and it may be said that it is now possible to produce it in any desired amount, subject only to the limitations entailed by expense. Finally, the reduction of hydrogen to a solid state was success- fully undertaken in 1899. A portion of the liquid carefully isolated in vacuum-jacketed vessels was suddenly transformed into a white mass resembling frozen foam, when evaporated under an air-pump at a pressure of 30 or 40 mm., and sub- sequently hydrogen was obtained as a clear transparent ice by immersing a tube containing the liquid in this solid foam.

Liquefaction of Helium. — The subjection of hydrogen com- pleted the experimental proof that all gases can be reduced to the liquid and solid states by the aid of pressure and low tempera- ture, at least so far as regards those in the hands of the chemist at the beginning of the last decade of the 19th century. But a year or so before hydrogen was obtained in the liquid form, a substance known to exist in the sun from spectroscopic re- searches carried out by Sir Edward Frankland and Sir J. Norman Lockyer was shown by Sir William Ramsay to exist on the earth in small quantities. Helium (q.v.), as this substance was named, was found by experiment to be a gas much less condensable than hydrogen. Dewar in 1901 expanded it from a pressure of 80-100 atmospheres at the temperature of solid hydrogen without perceiving the least indication of liquefaction. Olszewski repeated the experiment in 1905, using the still higher initial

compression of 180 atmospheres, but he equally failed to find any evidence of liquefaction, and in consequence was inclined to doubt whether the gas was liquefiable at all, whether in fact it was not a truly ” permanent ” gas. Other investigators, however, took a different and more hopeful view of the matter. Dewar, for instance (Pres. Address Brit. Assoc, 1902), basing his deductions on the laws established by van der Waals and others from the study of phenomena at much higher tempera- tures, anticipated that the boiling-point of the substance would be about 5 absolute, so that the liquid would be about four times more volatile than liquid hydrogen, just as liquid hydrogen is four times more volatile than liquid air; and he expressed the opinion that the gas would succumb on being subjected to the process that had succeeded with hydrogen, except that liquid hydrogen, instead of liquid air, evaporating under exhaustion must be employed as the primary cooling agent, and must also be used to surround the vacuum vessel in which the liquid was collected.

Various circumstances combined to prevent Dewar from actually carrying out the operation thus foreshadowed, but his anticipations were justified and the sufficiency of the method he indicated practically proved by Dr H. Kamerlingh Onnes, who, working with the splendid resources of the Leiden cryogenic laboratory, succeeded in obtaining helium in the liquid state on the 10th of July 1908. Having prepared 200 litres of the gas (160 litres in reserve) from monazite sand, 1 he cooled it with exhausted liquid hydrogen to a temperature of 15 or 16 abs., and expanded it through a regenerative coil under a pressure of 50 to 100 atmospheres, making use of the most elaborate precautions to prevent influx of heat and securing the absence of less volatile gases that might freeze and block the tubes of the apparatus by including in the helium

circuit charcoal cooled to the temperature of liquid air. Operations began at 5-45 in the morning with the preparation of the necessary liquid hydrogen, of which 20 litres were ready by 1-30. The circulation of the helium was started at 4-30 in the afternoon and was con- tinued until the gas had been pumped round the circuit twenty times; but it was not till 7-30, when the last bottle of liquid hydrogen had been brought into requisition, that the surface of the liquid was seen, by reflection of light from below, standing out sharply like the edge of a knife against the glass wall of the vacuum vessel. Its boiling-point has been determined as being 4° abs., its critical temperature 5°, and its critical pressure not more than three atmospheres. The density of the liquid is found to be 0-015 or about twice that of liquid hydrogen. It could not be solidified even when exhausted under a pressure of 2 mm., which in all probability corresponds to a temperature of 2° abs. (see Communications from the physical laboratory at the University of Leiden, 1908-1909).

The following are brief details respecting some of the more important liquid gases that have become available for study within recent years. (For argon, neon, krypton, &c, see Argon.) Oxygen. — Liquid oxygen is a mobile transparent-liquid, possessing a faint blue colour. At atmospheric pressure it boils at —181-5° C. ; under a reduced pressure of 1 cm. of mercury its temperature falls to —210° C. At the boiling point it has a density of 1-124 according to Olszewski, or of 1-168 according to Wroblewski; Dewar obtained the value 1-1375 as the mean of twenty observations by weighing a number of solid substances in liquid oxygen, noting the apparent relative density of the liquid, and thence calculating its real density, Fizeau's values for the coefficients of expansion of the solids being employed. The capillarity of liquid oxygen is about one-sixth that of water; it is a non-conductor of electricity, and is strongly mag- netic. By its own evaporation it cannot be reduced to the solid state, but exposed to the temperature of liquid hydrogen it is frozen

1 It may be noted that now that the commercial production of oxygen is effected by the liquefaction of air, with separation of its constituents in what is essentially a Coffey still, the chemist has at his command large quantities not only of the less volatile con- stituents, krypton and xenon, but also of the more volatile ones, neon and helium. Roughly a million volumes of air contain 20 volumes of neon and helium, about 15 of the former to 5 of the latter, approximately I volume of hydrogen being associated with them, so that in view of the enormous amounts of oxygen that are pro- duced, helium can be obtained in practically any quantity directly from the atmosphere.

into a solid mass, having a pale bluish tint, showing by reflection all the absorption bands of the liquid. It is remarkable that the same absorption bands occur in the compressed gas. Dewar gives the melting-point as 38 ° absolute, and the density at the boiling-point of hydrogen as 1-4526. The refractive index of the liquid for the D sodium ray is 1-2236. .

Ozone.— This gas is easily liquefied by the use of liquid air. 1 he liquid obtained is intensely blue, and on allowing the temperature to rise, boils and explodes about -120 C. About this temperature it may be dissolved in bisulphide of carbon to a faint blue solution. The liquid ozone seems to be more magnetic than liquid oxygen.

Nitrogen forms a transparent colourless liquid, having a density of 0-8042 at its boiling-point, which is -195-5° C. The refractive index for the D line is 1-2053. Evaporated under diminished pressure the liquid becomes solid at a temperature of -215° C, melting under a pressure of 90 mm. The density of the solid at the boiling-point of hydrogen is 1-0265.

Air. — Seeing that the boiling-points of nitrogen and oxygen are different, it might be expected that on the liquefaction of atmospheric air the two elements would appear as

two separate liquids. Such, however, is not the case; they come down simultaneously as one homogeneous liquid. Prepared on a large scale, liquid air may contain as much as 50 % of oxygen when collected in open vacuum- vessels, but since nitrogen is the more volatile it boils off first, and as the liquid gradually becomes richer in oxygen the temperature at which it boils rises from about -192° C. to about -182 C. At the former temperature it has a density of about 0-910. It is a non-conductor of electricity. Properly protected from external heat, and subjected to high exhaustion, liquid air becomes a stiff transparent jelly-like mass, a magma of solid nitrogen containing liquid oxygen, which may indeed be extracted from it by means of a magnet, or by rapid rotation of the vacuum vessel in imitation of a centrifugal machine. The temperature of this solid under a vacuum of about 14 mm. is -216 . At the still lower temperatures attainable bv the aid of liquid hydrogen it becomes a white solid, having, like solid oxygen, a faint blue tint. The refractive index of liquid air is 1 -2068.

Fluorine, prepared in the free state by Moissan's method of electrolysing a solution of potassium fluoride in anhydrous hydro- fluoric acid, was liquefied in the laboratories of the Royal Institution, London, in 1897. Exposed to the temperature of quietly-boiling liquid oxygen, the gas did not change its state, though it lost much of its chemical activity, and ceased to attack glass. But a very small vacuum formed over the oxygen was sufficient to determine lique- faction, a result which was also obtained by cooling the gas to the temperature of freshly-made liquid air boiling at atmospheric pressure. Hence the boiling-point is fixed at about -187 C. The liquid is of a clear yellow colour, possessing great mobility. Its density is 1-14, and its capillarity rather less than that of liquid oxygen. The liquid, when examined in a thickness of I cm., does not show any absorption bands, and it is not attracted by a magnet. Cooled in liquid hydrogen it is frozen to a white solid, melting at about 40° abs. Hydrogen. — Liquid hydrogen is the lightest liquid known to the chemist, having a density slightly less than 0-07 as compared with water, and being six times lighter than liquid marsh-gas, which is next in order of lightness. One litre weighs only 70 grammes, and 1 gramme occupies a volume of 14-15 cc. In spite of its extreme lightness, however, it is easily seen, has a well-defined meniscus and drops well. At its boiling-point the liquid is only 55 times denser than the vapour it is giving off, whereas liquid oxygen in similar condition is 258 times denser than its vapour, and nitrogen 177 times. Its atomic volume is about 14-3, that of liquid oxygen being 13-7, and that of liquid nitrogen 16-6, at their respective boiling-points. Its latent heat of vaporization about the boiling- point is about 121 gramme-calories, and the latent heat of fluidity cannot exceed 16 units, but may be less. Hydrogen appears to have the same specific heat in the liquid as in the gaseous state, about 3-4. Its surface tension is exceedingly low, about one-fifth that of liquid air at its boiling-point, or one-thirty-fifth that of water at ordinary temperatures, and this is the reason that bubbles formed in the liquid are so small as to give it an opalescent appearance during ebullition. The liquid is without colour, and gives no absorption spectrum. Electric sparks taken in the liquid between platinum poles give a spectrum showing the hydrogen lines C and F bright on a background of continuous spectrum. Its refractive index at the boiling-point has theoretically the value i-ii. It was measured by determining the relative difference of focus for a parallel beam 01 light sent through a spherical vacuum vessel filled successively with water, liquid oxygen and liquid hydrogen; the result obtained was 1 -12. Liquid hydrogen is a non-conductor of electricity. The precise determination of its boiling-point is a matter of some difficulty. The first results obtained from the use of a platinum resistance thermometer gave -238° C, while a similar thermometer made with an alloy of rhodium-platinum indicated a value 8 degrees lower. Later, a gold thermometer indicated about -249 C, while with an iron one the result was only -210° C. It was thus evident that electrical resistance thermometers are not to be trusted at these low temperatures, since the laws correlating resistance and temperature are not known for temperatures at and below the boiling-point of hydrogen, though they are certainly not the same

as those which hold good higher up the thermometric scale. The same remarks apply to the use of thermo-electric junctions at such exceptional temperatures. Recourse was therefore had to a constant- volume hydrogen thermometer, working under reduced

pressure, experiments having shown that such a thermometer, filled with either a simple or a compound gas (e.g. oxygen or carbonic acid) at an initial pressure somewhat less than one atmosphere, may be relied upon to determine temperatures down to the respective boiling- points of the gases with which they are filled. The result obtained was -252 C. Subsequently various other determinations were carried out in thermometers filled with hydrogen derived from different sources, and also with helium, the average value given by the experiments being -252-5° C. (See " The Boiling Point of Liquid Hydrogen determined by Hydrogen and Helium Gas Ther- mometers," Proc. Roy. Soc, 7th February 1901.) The critical temperature is about 30° absolute (243° C), and the critical pressure about 15 atmospheres. Hydrogen has not only the lowest critical temperature of all the old permanent gases, but it has the lowest critical pressure. Given a sufficiently low temperature, therefore, it is the easiest gas to liquefy so far as pressure is con cerned. Solid hydrogen has a temperature about 4 less. By exhaustion under reduced pressure a still lower depth of cold may be attained, and a steady temperature reached less than 16 above the zero of absolute temperature. By the use ol high ex- haustion, and the most stringent precautions to prevent the influx of heat, a temperature of 13° absolute (-260 C.) may be reached. This is the lowest steady temperature which can be maintained by the evaporation of solid hydrogen. At this temperature the solid has a density of about 0-077. Solid hydrogen presents no metallic characteristics, such as were predicted for it by Faraday, Dumas, Graham and other chemists and neither it nor the liquid is magnetic.

The Approach to the Absolute Zero. — The achievement of Kamerlingh Onnes has brought about the realization of a temperature removed only 3 from the absolute zero, and the question naturally suggests itself whether there is any proba- bility of a still closer approach to that point. The answer is that if, as is not impossible, there exists a gas, as yet unisolated, which has an atomic weight one-half that of helium, that gas, liquefied in turn by the aid of liquid helium, would render that approach possible, though the experimental difficulties of the operation would be enormous and perhaps prohibitive. The results of experiments bearing on this question and of theory based on them are shown in table II. The third column shows the critical temperature of the gas which can be liquefied by continuous expansion through a regenerative cooling apparatus, the operation being started from the initial temperature shown in the second column, while the fourth column gives the tempera- ture of the resulting liquid. It will be seen that by the use of liquid or solid hydrogen as a cooling agent, it should be possible to liquefy a body having a critical temperature of about 6° to 8° on the absolute scale, and a boiling point of about 4 or 5 , while with the aid of liquid helium at an initial temperature of 5 we could liquefy a body having a critical temperature of 2° and a boiling point of i°.

Table II.

Initial

Critical

Substance.

Temperature.

Temperature.

Boiling Points. Abs. Degrees.

Abs. Degrees.

Abs. Degrees.

(Low red heat) .

304

195 (CO,)

(52° C.). . .

325

130

86 (Air)

Liquid air under

exhaustion

75

30

20 (H)

Liquid hydrogen

20

8

5 (He)

Solid hydrogen .

15

6

4

Liquid helium .

5

2

1

It is to be remarked, however, that even so the physicist would not have attained the absolute zero, and he can scarcely hope ever to do so. It is true he would only be a very short distance from it, but it must be remembered that in a thermo- dynamic sense one degree low down the scale, say at io° absolute, is equivalent to 30 at the ordinary temperature, and as the experimenter gets to lower and lower temperatures, the difficulties of further advance increase, not in arithmetical but in geo- metrical progression. Thus the step between the liquefaction of air and that of hydrogen is, thermodynamically and practically, greater than that between the liquefaction of chlorine and that of air, but the number of degrees of temperature that separates

the boiling-points of the first pair of substances is less titan half what it is in the case of the second pair. But the ratio of the absolute boiling-points in the first pair of substances is as 1 to 4, whereas in the second pair it is only 1 to 3, and it is this value

that expresses the difficulty of the transition.

But though Ultima Thule may continue to mock the physicist's efforts, he will long find ample scope for his energies in the investigation of the properties of matter at the temperatures placed at his command by liquid air and liquid and solid hydrogen. Indeed, great as is the sentimental interest attached to the liquefaction of these refractory gases, the importance of the achievement lies rather in the fact that it opens out new fields of research and enormously widens the horizon of physical science, enabling the natural philosopher to study the properties and behaviour of matter under entirely novel conditions. We propose to indicate briefly the general directions in which such inquiries have so far been carried on, but before doing so will c.all attention to the power of absorbing gases possessed by cooled charcoal, which has on that account proved itself a most valuable agent in low temperature research.

Gas Absorption by Charcoal. — Felix Fontana was apparently the first to discover that hot charcoal has the power of absorbing gases, and his observations were confirmed about 1770 by Joseph Priestley, to whom he had communicated them. A generation later Theodore de Saussure made a number of experiments on the subject, and noted that at ordinary temperatures the absorption is accompanied with considerable evolution of heat. Among subsequent investigators were Thomas Graham and Stenhouse, Faure and Silberman, and Hunter, the last-named showing that charcoal made from coco-nut exhibits greater absorptive powers than other varieties. In 1874 Tait and Dewar for the first time employed charcoal for the production of high vacua, by using it, heated to a red heat, to absorb the mercury vapour in a tube exhausted by a mercury pump; and thirty years afterwards it occurred to the latter investigator to try how its absorbing powers are affected by cooling it, with the result that he found them to be greatly enhanced. Some of his earlier observations are given in table III., but it must be pointed

Table III. — Gas Absorption by Charcoal.

Helium

Hydrogen

Electrolytic gas

Argon

Nitrogen

Oxygen

Carbonic oxide . . . . Carbonic oxide and oxygen

Volume

Volume

absorbed at

absorbed at

0° Cent.

-i85°Cent.

2 cc.

15 cc.

135

12

150

12

175

15

155

18

230

21

190

30

195

out that much larger absorptions were obtained subsequently when it was found that the quality of the charcoal was greatly influenced by the mode in which it was prepared, the absorptive power being increased by carbonizing the coco-nut shell slowly at a gradually increasing temperature. The results in the table were all obtained with the same specimen of charcoal, and the volumes of the gases absorbed, both at ordinary and at low temperatures, were measured under standard conditions — at o° C, and 760 mm. pressure. It appears that at the lower temperature there is a remarkable increase of absorption for every gas, but that the increase is in general smaller as the boiling-points of the various gases are lower. Helium is con- spicuous for the fact that it is absorbed to a comparatively slight extent at both the higher and the lower temperature, but in this connexion it must be remembered that, being the most volatile gas known, it is being treated at a temperature which is relatively much higher than the other gases. At -185° (= 88° abs.) , while hydrogen is at about 45 times its boiling-point (20 abs.), helium is at about 20 times its boiling-point (4-5° abs.), and it might, therefore, be expected that if it were taken at a temperature corresponding to that of the hydrogen, i.e. at 4 or 5

times its boiling-point, or say 20 abs., it would undergo much greater absorption. This expectation is borne out by the results shown in table IV., and it may be inferred that charcoal cooled

Table IV. — Gas Absorption by Charcoal at Low Temperatures.

Temperature.

Helium. Vols, of Carbon.

Hydrogen. Vols, of Carbon.

-185 C. (boiling-point of liquid air) . -210° C. (liquid air under exhaustion) -252 ° C. (boiling-point of liquid hydrogen) -258° C. (solid hydrogen) ....

2j

5 160

195

in liquid helium would absorb helium as freely as charcoal cooled in liquid hydrogen absorbs hydrogen. It is found that a given specimen of charcoal cooled in liquid oxygen, nitrogen and hydrogen absorbs about equal volumes of those three gases (about 260 cc. per gramme; and, as the relation between volume and temperature is nearly lineal at the lowest portions of either the hydrogen or the helium absorption, it is a legitimate inference that at a temperature of 5 to 6° abs. helium would be as freely absorbed by charcoal as hydrogen is at its boiling- point and that the boiling-point of helium lies at about 5 abs. The rapidity with which air is absorbed by charcoal at-i8s° C. and under small pressures is illustrated by table V., which shows the reductions of pressure effected in a tube of 2000 cc. capacity by means of 20 grammes of charcoal cooled in liquid air.

Table V. — Velocity of Absorption.

Time of Exhaustion. sec.	Pressure in mm.	Time of Exhaustion. 60 sec.	Pressure in mm.
2-190		o-347	
10 ,,		1-271	
2 min.		0-153	
20 „		0-869	
5 ..		0-0274	
30 „		0-632	
10 „			

0-00205

40 „

o-543

19 ..

0-00025

50 „

o-435

Charcoal Occlusion Pressures. — For measuring the gas concen- tration, pressure and temperature, use may be made of an apparatus of the type shown in fig. 5. A mass of charcoal, E, immersed in liquid air, is employed for the preliminary exhaustion of the McLeod gauge G and of the charcoal C, which is to be used in the actual experiments, and is then sealed off at S. The bulb C is then placed in a large spherical vacuum vessel containing liquid oxygen which can be made to boil at any definite temperature under diminished pressure which is measured by the manometer R. The volume of gas admitted into the charcoal is determined by the burette D and the pipette P, and the corresponding occlusion pressure at any concentration and any temperature below 90 abs. by the gauge G. In presence of charcoal, and for small concentrations, great variations are shown in the relation between the pressure and the concentration of different gases, all at the same temperature. Table VI. gives the

Table VI.

Volume

of Gas

absorbed.

Occlusion Hydrogen Pressure.

Occlusion Nitrogen Pressure.

cc.

mm.

mm.

5

0-00003 0-0228

0-00005

10

15 20

o-0455

0-0645 0-0861

25 30 35 40 130

0-1105

o-i339

0-1623 0-1870

0-00031

O-OOIIO

500 1000 1500 2500

0-00314 0-01756 0-02920 0-06172

comparison between hydrogen and nitrogen at the temperature of liquid air, 25 grammes of charcoal being employed. It is seen that 15 cc. of hydrogen produce nearly the same pressure (0-0645 mm.) as 2500 cc. of nitrogen (0-06172 mm.). This result shows how

enormously greater, at the temperature of liquid air, is the volatility of hydrogen as compared with that of nitrogen. In the same way the concentrations, for the same pressure, vary greatly with tempera-

7oMtrtWjTilli0

ToMtrcury Rutrttoir

Fig. 5.

ture, as is exemplified by table VII., even though the pressures are not quite constant. The temperatures employed were the boiling- points of hydrogen, oxygen and carbon dioxide.

Table VII.

Concentration

Pressure

Temperature

Gas.

in cc. per grm. of Charcoal.

in mm.

Absolute.

Helium

97

2-2

20°

Hydrogen

397

2-2

20°

Hydrogen

15

2-1

9 °o

Nitrogen .

250

1-6

90

Oxygen

300

10

90

Carbon dioxide .

90

3-6

195°

Heat of Occlusion. — In every case when gases are condensed'to the liquid state there is evolution of heat, and during the absorption of a gas in charcoal or any other occluding body, as hydrogen in palladium, the amount of heat evolved exceeds that of direct lique- faction. From the relation between occlusion-pressure and tempera- ture at the same concentration, the reaction being reversible, it is possible to calculate this heat evolution. Table VIII. gives the

Table VIII.

Gas.

Concentration cc. per grm.

Molecular Latent Heat.

Mean

Temperature

Absolute.

Helium Hydrogen . Hydrogen . Nitrogen . Oxygen Carbon dioxide

97

390

20

250

300

| 90

483-0

524-4 2005-6 3059-0 3146-4 6099-6

18

18°

78″

82° 82°

180

mean molecular latent heats of occlusion resulting from Dewar's experiments for a number of gases, having concentrations in the charcoal as shown. The concentrations were so regulated as to start with an initial pressure not exceeding 3 mm. at the respective boiling-points of hydrogen, nitrogen, oxygen and carbon dioxide.

Production of High Vacua. — Exceedingly high vacua can be obtained by the aid of liquid gases, with or without charcoal. If a vessel containing liquid hydrogen be freely exposed to the atmosphere, a rain of snow (solid air) at once begins to fall upon the surface of the liquid; similarly, if one end of a sealed tube containing ordinary air be immersed in the liquid, the same thing happens, but since there is now no new supply to take the place of the air that has been solidified and has accumulated in the cooled portion of the tube, the pressure is quickly reduced to something like one-millionth of an atmosphere, and a vacuum is formed of such tenuity that the electric discharge can be made to pass only with difficulty. Liquid air can be employed in the same manner if the tube, before sealing, is filled with some less volatile gas or vapour, such as sulphurous acid, benzol or water vapour. But if a charcoal condenser be used in conjunction with the liquid air it becomes possible to obtain a high vacuum when the tube contains air initially. For instance, in one experiment, with a bulb having a capacity of 300 cc. and filled with air at a pressure of about 1-7 mm. and at a temperature of 15 C, when an attached condenser with 5 grammes of charcoal was cooled in liquid air, the pressure was reduced to 0-0545 mm. of mercury in five minutes, to 0-01032 mm. in ten minutes, to 0-000139 mm. in thirty minutes, and to 0-000047 mm. in sixty minutes. The condenser then being cooled in liquid hydrogen the pressure fell to 0-0000154 mm. in ten minutes, and to 0-0000058 mm. in a further ten minutes when solid hydrogen was employed as the cooling agent, and no doubt, had it not been for the presence of hydrogen and helium in the air, an even greater reduction could have been effected. Another illustration of the power of cooled charcoal to produce high vacua is afforded by a Crookes radiometer. If the instrument be filled with helium at atmo- spheric pressure and a charcoal bulb attached to it be cooled in liquid air, the vanes remain motionless even when exposed to the concentrated beam of an electric arc lamp; but if liquid hydrogen be substituted for the liquid air rapid rotation at once sets in. When a similar radiometer was filled with hydrogen and the attached charcoal bulb was cooled in liquid air rotation took place, because sufficient of the gas was absorbed to permit motion. But when the charcoal was cooled in liquid hydrogen instead of in liquid air, the absorption increased and consequently the rarefaction became so high that there was no motion when the light from the arc was directed on the vanes. These experiments again per- mit of an inference as to the boiling- point of helium. A fall of 75% in the temperature of the charcoal bulb, from the boiling-point of air to the boiling- point of hydrogen, reduced the vanes to rest in the case of the radiometer filled with hydrogen; hence it might be in- ferred that a fall of like amount from the boiling-point of hydrogen would reduce the vanes of the helium radio- meter to rest, and consequently that the boiling-point of helium would be about 5 abs.

The vacua obtainable by means of cooled charcoal are so high that it is difficult to determine the pressures by the McLeod gauge, and the radiometer ex- periments referred to above suggested the possibility of another means of ascertaining such pressures, by determin- ing the pressures below which the radio- meter would not spin. The following experiment shows how the limit of pressure can be ascertained by reference to the pressures of mercury vapour which have been very accurately determined through a wide range of temperature. To a radiometer (fig, 6) with attached charcoal bulb B was sealed a tube ending in a small bulb A containing-a globule of mercury. The radiometer and bulb B were heated, exhausted and repeatedly washed out with pure oxygen gas, and then the mercury was allowed to distil

Fig. 6.

The

for some time into the charcoal cooled in liquid air. On exposure to the electric beam the vanes began to spin, but soon ceased when the bulb A was cooled in liquid air. When, however, the mercury was warmed by placing the bulb in liquid water, the vanes began to move again, and in the particular radiometer used this was found to happen when the temperature of the mercury had risen to -23° C. corresponding to a pressure of about one fifty-millionth of an atmosphere.

For washing out the radiometer with oxygen the arrangement shown in fig. 7 is convenient. Here A is a bulb containing perchlorate of potash, which when heated gives off pure oxygen; C is again the radiometer and B the charcoal bulb. The side tube E is for the purpose of examining the gas given off by minerals like thorianite or the gaseous products of the transforma- tion of radioactive bodies.

Analytic Uses. — Another important use of liquid gases is an analytic agents, and for this purpose liquid air is becoming an almost essential laboratory reagent. It is one of the most convenient agents for drying gases and for their purification. If a mixture of gases be subjected to the temperature of liquid air, it is obvious that all the constituents that are more condensable than air will be reduced to liquid, while those that are less condensable will either remain as a gaseous residue or be dissolved in the liquid obtained bodies present in the latter may be separated by fractional

distillation, while the contents of the gaseous residue may be further differentiated by the air of still lower tempera- tures, such as are ob- tainable by liquid hy- drogen. An apparatus such as the following can be used to separate both the less and the more volatile gases of the atmosphere, the former being obtained from their solution in liquid air by fractional distillation at low pres- sure and separation of the condensable part of the distillate by cooling in liquid hydrogen, while the latter are extracted from the residue of liquid air, after the distillation of the first fraction, by allowing it to evaporate gradually at a temperature rising only very slowly.

In fig. 8, A represents a vacuum-jacketed vessel, containing liquid air; this can be made to boil at reduced pressure and there- fore be lowered in temperature by means of an air-pump, which is in communication with the vessel through the pipe s. The liquid boiled away is replenished when necessary from the reservoir C, p being a valve, worked by handle q, by which the flow along r is regulated. The vessel B, immersed in the liquid air of A, com- municates with the atmosphere by a; hence when the temperature of A falls under exhaustion below that of liquid air, the contents of B condense, and if the stop-cock m is kept open, and n shut, air from the outside is continuously sucked in until B is full of liquid, which contains in solution the whole of the most volatile gases of the atmosphere which have passed in through a. At this stage of the operation m is closed and n opened, a passage thus.being opened along b from A to the remainder of the apparatus seen on the left side of the figure. Here E is a vacuum

vessel containing liquid hydrogen, and d a three-way cock by which communication can be established either btween b and D, between h and e, the tube lead- ing to the sparking-tube g, or between D and e. If now d is arranged so that there is a free passage from b to D, and the stop-cock n also opened, the gas dissolved in the liquid in B, together with some of the most volatile part of that liquid, quickly distils over into D, which is at a much lower temperature than B, and some of it con-

denses there in the solid state. When a small fraction of the contents of B has thus distilled over, d is turned so as to close the passage between D and b and open that between D and e, with the result that the gas in D is pumped out by the mercury-pump, shown diagrammatically at F t along the tube e (which is immersed in the

To pump

Fig. 7.

Fig. 8. — Apparatus for Fractional Distillation.

liquid hydrogen in order that any more condensable gas carried along by the current may be frozen out) to the sparking-tube or tubes g, where it can be examined spectroscopically. When the apparatus is used to separate the least volatile part of the gases in the atmosphere, the vessel E and its contents are omitted, and the tube b made to communicate with the pump through a number of sparking-tubes which can be sealed off successively. The nitrogen and oxygen which make up the bulk of the liquid in B are allowed to evaporate gradually, the temperature being kept low so as to check the evaporation of gases less volatile than oxygen. When most of the oxygen and nitrogen have thus been removed, the stop- cock n is closed, and the tubes partially exhausted by the pump; spectroscopic examination is made of the gases they contain, and repeated from time to time as more gas is allowed to evaporate from B. The general sequence of spectra, apart from those of nitrogen, oxygen and carbon compounds, which are never eliminated by the process of distillation alone, is as follows; The spectrum of argon first appears, followed by the brightest (green and yellow) rays of krypton. Then the intensity of the argon spectrum wanes and it gives way to that of krypton, until, as Runge observed, when a Leyden jar is in the circuit, the capillary part of the sparking-tube has a magnificent blue colour, while the wide ends are bright pale yellow. Without a jar the tube is nearly white in the middle and yellow about the poles. As distillation proceeds, the temperature of the vessel containing the residue of liquid air being allowed to rise slowly, the brightest (green) rays of xenon begin to appear, and the krypton rays soon die out,

being superseded

by those of xenon. 11 ‘

At this stage the capillary part of Meg the sparking-tube is, with a jar in circuit, a brilliant green, and it re- mains green, though less brilliant, if the jar is removed.

An improved form of apparatus for the fractiona- tion is repre- sented in fig. 9. The gases to be separated, that is, the least volatile part of atmo- spheric air, enter the bulb B from a gasholder by the Fig. 9.- tube a with stop- cock c. B, which is maintained at

2bpumfi,

-Apparatus for continuous Spectroscopic Examination.

ow temperature by being immersed in liquid hydrogen, A, boiling under reduced pressure, in turn communi- cates through the tube b and stop-cock d with a sparking-tube or tubes /, and so on through e with a mercurial pump. To

use the apparatus, stop-cock d is closed and c opened, and gas allowed to pass from the gasholder into B, where it is con- densed in the solid form. Stop-cock c then being closed and d opened, gas passes into the exhausted tube /, where it is examined with the spectroscope. The vessel D contains liquid air, in which the tube e is immersed in order to condense vapour of mercury which would otherwise pass from the pump into the sparking-tube. The success of the operation of separating all the gases which occur in air and which boil at different temperatures, depends on keeping the temperature of B as low as possible, as will be understood from the following consideration : —

The pressure p, of a gas G, above the same material in the liquid state, at temperature T, is given approximately by the formula

log£ = A-|,

where A and B are constants for the same material. For some *ther gas G' the formula will be

logp, = Ai-5j,

and

Now for argon, krypton and xenon respectively the values of A are 6-782, 6-972 and 6-963, and those of B are 339, 496-3 and 669-2; so that for these substances and many others A-Ai is

always a small quantity, while ' is considerable and increases

as T diminishes. Hence the ratio of p to pi increases rapidly as T diminishes, and by evaporating all the gases from the solid state, and keeping the solid at as low a temperature as possible, the gas that is taken off by the mercurial pump first consists mainly of the substance which has the lowest boiling point, in this case nitrogen, and is succeeded with comparative abruptness by the gas which has the next higher boiling point. Examination of the spectrum in the sparking-tube easily reveals the change from one gas to another, and when that is observed the reservoirs into which the gases are pumped can be changed and the fractions stored separately. Or several sparking-tubes may be arranged so as to form parallel communications between b and e, and can be successively sealed off at the desired stages of fractionation.

Analytical operations can often be performed still more conveniently with the help of charcoal, taking advantage of the selective character of its absorption, the general law of which is that the more volatile the gas the less is it absorbed at a given temperature. The following are some examples of its employ- ment for this purpose. If it be required to separate the helium which is often found in the gases given off by a thermal spring, they are subjected to the action of charcoal cooled with liquid air. The result is the absorption of the less volatile constituents, i.e. all except hydrogen and helium. The gaseous residue, with the addition of oxygen, is then sparked, and the water thus formed is removed together with the excess of oxygen, when helium alone remains. Or the separation may be effected by a method of fractionation as described above. To separate the most volatile constituents of the atmosphere an apparatus such as that shown in ng. 10 may be employed. In one experiment with this, when

w-

condenser D along with some portion of air. The condenser E is then taken out of the liquid air, heated quickly to 15 C. to expel the occluded air and replaced. More air is then passed in, and by repeating the operation several times 50 litres of air can be treated in a short time, supplying sparking-tubes which will show the complete spectra of the volatile constituents of the air.

The less volatile constituents of the atmosphere, krypton and xenon, may be obtained by leading a current of air, purified by passage through a series of tubes cooled in liquid air, through a charcoal condenser also cooled in liquid air. The condenser is then removed and placed in solid carbon dioxide at 78° C. The gas that comes off is allowed to escape, but what remains in the charcoal is got out by heating and exhaustion, the carbon compounds and oxygen are removed and the residue, consisting of nitrogen with krypton and xenon, is separated into its con stituents by condensation and fractionation. Another method is to cover a few hundred grammes of charcoal with old liquid air, which is allowed to evaporate slowly in a silvered vacuum, vessel; the gases remaining in the charcoal are then treated in the manner described above.

Charcoal enables a mixture containing a high percentage of oxygen to be extracted from the atmosphere. In one experiment 50 grammes of it, after being heated and exhausted were allowed to absorb air at 185° C; some 5 or 6 litres were taken up in ten minutes, and it then presumably contained air of the com position of the atmosphere, i.e. 20% oxygen and 80% nitrogen, as shown in fig. 11. But when more air was passed over it, the portion that was not absorbed was found to consist of about 98% nitro- gen, showing that excess of oxygen was being absorbed, and in the course of a few hours the occluded gas

attained a new and apparently definite composition exhibited in fig. 12. When the charcoal containing this mixture was transferred to a vacuum vessel and allowed to warm up slowly, the successive litres of gas when collected and analyzed separately showed the following composition: —

1st litre 18-5% oxygen

2nd litre 20-6 %

3rd litre 53-0%

4th litre 72-0%

5th litre 79-0%

6th litre 84-0%

Calorimetry. — Certain liquid gases lend themselves conveni- ently to the construction of a calorimeter, in which the heat in weighed quantities of any substance with which it is desired to experiment may be measured by the quantity of liquid gas they are able to evaporate. One advantage of this method is that a great range of temperature is available when liquid air, oxygen, nitrogen or hydrogen is employed as the calorimetric substance. Another is the relatively large quantity of gas yielded by the evaporation, as may be seen from table IX.,

Fig. 10.

200 c.c. was supplied from the graduated gas-holder F to the vessel D, containing 15 grammes of charcoal cooled in liquid air, the residue which passed on unabsorbed to the sparking-tube AB, which had a small charcoal bulb C attached, showed the C and F lines of hydrogen, the yellow and some of the orange lines of neon and the yellow and green of helium. By using a second charcoal vessel E, with stop-cocks at H, I, J, K and L to facilitate manipulation, considerable quantities of the most volatile gases can be collected. After the charcoal in E has been saturated, the stop-cock K is closed and I and J are opened for a short time, to allow the less condensable gas in E to be sucked into the second

® ® © ®

&k > sir©

Fig. 11.

Fig. 12.

Table IX.

-

Liquid Gases.

Boiling Point.

Liquid Volume

of 1 gram at

Boiling Point

in c.c.

Latent Heat in gram Calories.

Volume of Gas

at o° C. and

760 mm. per

gram Calorie

in c.c.

Sulphurous acid

Carbonic acid .

Ethylene

Oxygen

Nitrogen

Hydrogen .

Helium

+ IO°C.

- 78-0 -103-0 -182-5

-1956

-252-5

— 269-0

0-7

0-65 (solid)

i-7

09

1-3

14-3

7-0

97 -o

142-4 119-0

53-o

50-0 125-0

13-0

3-6

3-6

7-0

132

15-9

88-9 450-0

which shows the special physical constants of the various gases that are of importance in calorimetry. In consequence it is easy to detect ˆV gram calorie with liquid air and so little as ˆ-for gram calorie with liquid hydrogen.

LIQUID GASES

The apparatus (fig. 13) consists of a large vacuum vessel A, of 2 or 3 litres' capacity, containing liquid air, in which is inserted a smaller vacuum vessel B, of 25-30 c.c. capacity, having sealed to it a long narrow tube G that projects above the mouth of A and is held in place by some loosely packed cotton wool. To the top of this tube the test tube C, containing the material under investiga- tion, is connected by a piece of flexible rubber tubing D ; this enables C to be tilted so as to throw a piece or pieces of the contained material

into the calorimeter. An improved form of this receptacle, attached to B by a flexible tube at D', is shown at C. In this P is a wire movable through a cork Q and having at its end a hook by which a piece of the substance under examination can be pulled up and dropped into B. In the absence of other arrangements the substance is at the temperature of the room, but when lower initial tempera- tures are desired a vacuum vessel H containing solid carbonic acid, liquid ethylene, air or other gas, can be placed to envelop C or C', or higher temperatures may be obtained by filling the surrounding vessel with vapour of water or other liquids. The gas volatilized in B is conveyed by a side tube E to be collected in a graduated receiver F over water, oil or other liquid. If liquid hydrogen is to be used as the calorimetric substance the instrument must be so modified as to prevent the ordinary atmosphere from entering G, and to that end a current of hydrogen supplied from a Kipp apparatus is arranged to flow continuously through D and E until the moment of making the experiment, when it is cut off by a suitable stop-cock. In this case the outer vessel must contain liquid hydrogen instead of liquid air.

Dewar used pure metallic lead for the purpose of conveying definite amounts of heat to liquid gas calorimeters of this kind, that metal being selected on the ground of the small variation in its specific heat at low temperatures. He was thus able to determine the latent heats of evaporation of liquid oxygen, nitrogen and hydrogen directly at their boiling points, and he also ascertained the specific heats of a large number of inorganic and organic bodies, and of some gases in the solid state, such as carbon dioxide, sulphurous acid and ammonia. Perhaps his most interesting results were those which showed the variation in the specific heats of diamond, graphite and ice as typical bodies (table X.). With Professor Curie he used both the liquid

Table X.

Substance.

18° to

-78° C,

or, at

-30 Q C.

-78° to -188° C,

or, at -133° C.

-188″ to -252° C,

or, at -220° C.

Diamond Graphite Ice ....

0-0794 0-1341 0-463*

0-0190 0-0599 0-285

00043 00133 0-146

*This is from -18° to -78° in the ice experiment.

oxygen and the liquid hydrogen calorimeter for preliminary measurements of the rate at which radium bromide gives out energy at low temperatures. The quantity of the salt available was 0-42 gram, and the thermal evolutions were as follows:—

Gas evolved Calories

per minute. per hour.

5-5 cc. 22-8]

5*o „ 31-6 ˆCrystals.

24-1 J 2-0 „ 8-3 After fusion.

2 ‘5 .. 10-3 Emanation condensed.

Liquid oxygen . Liquid hydrogen Melting ice . Liquid oxygen . Liquid oxygen .

The apparent increase of heat evolution at the temperature of liquid hydrogen was probably due to the calorimeter being too small; hydrogen spray was thus carried away with the flax, making the volume of gas too great and inferentially also the heat evolved.

Liquid air. and liquid hydrogen calorimeters open up an almost unlimited field of research in the determination of specific heats and other thermal constants, and are certain to become common laboratory instruments for such purposes.

Chemical Action. — By extreme cold chemical action is enorm- ously reduced, though it may not in all cases be entirely abolished even at the lowest temperatures yet attained; one reas«n for this diminution of activity may doubtless be sought in the. fact that in such conditions most substances are solid, that is, in the state least favourable to chemical combination. Thus an electric pile of sodium and carbon ceases to yield a current when immersed in liquid oxygen. Sulphur, iron and other substances can be made to burn under the surface of liquid oxygen if the combustion is properly established before the sample is im- mersed, and the same is true of a fragment of diamond. Nitric oxide in the gaseous condition combines instantly with free oxygen, producing the highly-coloured gas, nitric peroxide, but in the solid condition it may be placed in contact with liquid oxygen without showing any signs of chemical action. If the combination of a portion of the mixture is started by elevation of temperature, then detonation may take place throughout the cooled mass. The stability of endothermic bodies like nitric oxide and ozone at low temperatures requires further investiga- tion. The behaviour of fluorine, which may be regarded as the most active of the elements, is instructive in this respect. As a gas, cooled to-180 C. it loses the power of attacking glass; similarly silicon, borax, carbon, sulphur and phosphorus at the same temperature do not become incandescent in an atmosphere of the gas. Passed into liquid oxygen, the gas dissolves and imparts a yellowish tint to the liquid; if the oxygen has been exposed to the air for some hours, the fluorine produces a white flocculent precipitate, which if separated by filtering deflagrates with violence as the temperature rises. It appears to be a hydrate of fluorine. As a liquid at —210° fluorine attacks turpentine also cooled to that temperature with explosive force and the evolution of light, while the direction of a jet of hydrogen upon its surface is immediately followed by combination and a flash of flame. Even when the point of a tube containing solid fluorine is broken off under liquid hydrogen, a violent explosion ensues.

Photographic Action. — The action of light on photographic plates, though greatly diminished at-180 , is far from being in abeyance; an Eastman film, for instance, remains fairly sensitive at — 210 . At the still lower temperature of liquid hydrogen the photographic activity is reduced to about half what it is at that of liquid air; in other words, about 10% of the original sensitivity remains. Experiments carried out with an incandescent lamp, a Rontgen bulb and the ultra-violet spark from magnesium and cadmium, to discover at what distances from the source of light the plates must be placed in order to receive an equal photographic impression, yielded the results shown in table XI.

Table XI.

Source of Light.

Cooled Plate.

Uncooled Plate.

Ratio of Intensities at Balance.

16 C.P. lamp . . Rontgen bulb Ultra-violet spark

20 in. 10 in.

22j in.

50 in. 24! in. 90 in.

1 to 6 1 to 6 1 to 16

It appears that the photographic action of both the incan- descent lamp and the Rontgen rays is reduced by the temperature of liquid air to 17% of that exerted at ordinary temperatures, while ultra-violet radiation retains only 6%. It is possible that the greater dissipation of the latter by the photographic film at low temperatures than at ordinary ones is, due to its

absorption and subsequent emission as a phosphorescent glow, and that if the plate could be developed at a low temperature it would show no effect, the photographic action taking place subsequently through an internal phosphorescence in the film during the time it is heating up. With regard to the transparency of bodies to the Rontgen radiation at low temperatures, small tubes of the same bore, filled with liquid argon and chlorine, potassium, phosphorus, aluminium, silicon and sulphur, were exposed at the temperature of liquid air (in order to keep the argon and chlorine solid), in front of a photographic plate shielded with a sheet of aluminium, to an X-ray bulb. The sequence of the elements as mentioned represents the order of increasing opacity observed in the shadows. Sodium and liquid oxygen and air, nitrous and nitric oxides, proved much more transparent than chlorine. Tubes of potassium, argon and liquid chlorine showed no very marked difference of density on the photographic plates. It appears that argon is relatively more opaque to the Rontgen radiation than either oxygen, nitrogen or sodium, and is on a level with potassium, chlorine, phosphorus, aluminium and sulphur. This fact may be regarded as supporting the view that the atomic weight of argon is twice its density relative to hydrogen, since in general the opacity of elements in the solid state increases with the atomic weight.

Phosphorescence. — Phosphorescing sulphides of calcium, which are luminous at ordinary temperatures, and whose emission of light is increased by heating, cease to be luminous if cooled to 80° C. But their light energy is merely rendered latent, not destroyed, by such cold, and they still retain the capacity of taking in light energy at the low temperature, to be evolved again when they are warmed. At the temperature of liquid air many bodies become phosphorescent which do not exhibit the pheno menon at all, or only to a very slight extent, at ordinary tem- peratures, e.g. ivory, indiarubber, egg-shells, feathers, cotton- wool, paper, milk, gelatine, white of egg, &c. Of definite chemical compounds, the platinocyanides among the inorganic bodies seem to yield the most brilliant effects. Crystals of ammonium platinocyanide, if stimulated by exposure to the ultra-violet radiation of the electric arc — or better still of a mercury vapour lamp in quartz— while kept moistened with liquid air, may be seen in the dark to glow faintly so long as they are kept cold, but become exceedingly brilliant when the liquid air evaporates and the temperature rises. Among organic bodies the pheno- menon is particularly well marked with the ketonic compounds and others of the same type. The chloro-, bromo-, iodo-, sulpho- and nitro-compounds show very little effect as a rule. The activity of the alcohols, which is usually considerable, is destroyed by the addition of a little iodine. Coloured salts, &c, are mostly inferior in activity to white ones. When the lower temperature of liquid hydrogen is employed there is a great increase in phosphorescence under light stimulation as compared with that observed with liquid air. The radio-active bodies, like radium, which exhibit self-luminosity in the dark, maintain that luminosity unimpaired when cooled in liquid hydrogen.

Some crystals become for a time self-luminous when placed in liquid hydrogen, because the high electric stimulation due to the cooling causes actual electric discharges between the crystal molecules. This phenomenon is very pronounced with nitrate of uranium and some platinocyanides, and cooling such crystals even to the temperature of liquid air is sufficient to develop marked electrical and luminous effects, which are again observed, when the crystal is taken out of the liquid, during its return to normal temperature. Since both liquid hydrogen and liquid air are good electrical insulators, the fact that electric discharges take place in them proves that the

electric potential generated by the cooling must be very high. A crystal of nitrate of uranium indeed gets so highly charged electrically that it refuses to sink in liquid air, although its density is 2-8 times greater, but sticks to the side of the vacuum vessel, and requires for its displacement a distinct pull on the silk thread to which it is attached. Such a crystal quickly removes cloudiness from liquid air by attracting all the suspended particles to its surface, just as a fog is cleared out of air by electrification. It is interesting to observe that

neither fused nitrate of uranium nor its solution in absolute alcohol shows any of the remarkable effects of the crystalline state on cooling.

Cohesion. — The physical force known as cohesion is greatly increased by low temperatures. This fact is of much interest in connexion with two conflicting theories of matter. Lord Kelvin's view was that the forces that hold together the ultimate particles of bodies may be accounted for without assuming any other forces than that of gravitation, or any other law than the Newtonian. An opposite view is that the phenomena of cohe- sion, chemical union, &c, or the general phenomena of the aggregation of molecules, depend on the molecular vibrations as a physical cause (Tolver Preston, Physics of the Ether, p. 64). Hence at the zero of absolute temperature, this vibrating energy being in complete abeyance, the phenomena of cohesion should cease to exist and matter generally be reduced to an incoherent heap of " cosmic dust." This second view receives no support from experiment. Atmospheric air, for instance, frozen at the temperature of liquid hydrogen, is a hard solid, the strength of which gives no hint that with a further cooling of some 20 degrees it would crumble into powder. On the contrary, the lower the scale of temperature is descended, the more powerful become the forces which hold together the particles of matter. A spiral of fusible metal, which at ordinary temperatures cannot support the weight of an ounce without being straightened out, will, when cooled to the temperature of liquid oxygen, and so long as it remains in that cooled condition, support several pounds and vibrate like a steel spring. Similarly a bell of fusible metal at 182 C. gives a distinct metallic ring when struck. Balls of iron, lead, tin, ivory, &c, thus cooled, exhibit an in creased rebound when dropped from a height; an indiarubber ball, on the other hand, becomes brittle, and is smashed to atoms by a very moderate fall. Tables XII. and XIII., which give the mean results of a large number of experiments, show the increased breaking stress gained by metals while they are cooled to the temperature of liquid oxygen.

Table XII. — Breaking Stress in Pounds of Metallic Wires 0'098 inch

in diameter.

+ 15° c.

Steel (soft)

Iron

Copper

Brass

German silver .

Gold

Silver

420 320 200 310 470 255 330

-182 C.

700 670 300 440 600

Table XIII. — Breaking Stress in Pounds of Cast Metallic Test- pieces; diameter of rod- o-2 inch.

	+ 15° C.	-182° C.
Tin	200	390
Lead	77	170
Zinc	35	26
Mercury	O	31
Bismuth	60	30
Antimony	61	30
Solder	300	645
Fusible, metal (Wood) . .	140	450

In the second series of experiments the test-pieces were 2 in. long and were all cast in the same mould. It will be noticed that in the cases of zinc, bismuth and antimony the results appear to be abnormal, but it may be pointed out that it is difficult to get uniform castings .of crystalline bodies, and it is probable that by cooling such stresses are set up in some set of cleavage planes as to render rupture comparatively easy. In the case of strong steel springs the rigidity modulus does not appear to be greatly affected by cold, for although a number were examined, no measurable differences could be detected in their elongation under repeated additions of the same load. No quantitative experiments have been made on the cohesive properties of the metals at the temperature of boiling hydrogen (-252°), owing to the serious cost that would be involved. A lead wire cooled in liquid hydrogen did not become brittle, as it could be bent backwards and forwards in the liquid.

Electrical Resistivity. — The first experiments on the con- ductivity of metals at low temperatures appear to have been

made by Wroblewsld (Comptes rendus, ci. 160), and by Cailletet and Bouty (Joum. de pkys. 1885, p. 297). The former's experiments were undertaken to test the suggestion made by Clausius that the resistivity of pure metals is sensibly proportional to the absolute temperature; he worked with copper having a conductibility of 98 %, and carried out measurements at various temperatures, the lowest of which was that given by liquid nitrogen boiling under reduced pressure. His general conclusion was that the resistivity decreases much more quickly than the absolute temperature, so as to approach zero at a point not far below the temperature of nitrogen evaporating in vacuo. Cailletet and Bouty, using ethylene as the refrigerant, and experimenting at temperatures ranging from o° C. to -100 C. and -123° C, constructed formulae intended to give the coefficients of variation in electrical resistance for mercury, tin, silver, magnesium, aluminium, copper, iron and platinum. Between 1892 and 1896 Dewar and Fleming carried out a large number of experiments to ascertain the changes of conductivity that occur in metals and alloys cooled in liquid air or oxygen to 200 C. The method employed was to obtain the material under investigation in the form of a fine regular wire and to wind it in a small coil; this was then plunged in the liquid and its resistance determined. The accompanying chart (fig. 14) gives the results in a com

pendious form, the temperatures being expressed not in degrees of the ordinary air-thermometer scale, but in platinum degrees as given by one particular platinum resistance thermometer which was used throughout the investigation. A table showing the value of these degrees in degrees centigrade according to Dickson will be found in the Phil. Mag. for June 1898, p. 527; to give some idea of the relationship, it may be stated here that -100 of the platinum thermometer = 94° 2 C, -150° plat. = – i4o°-78 C, and -200° plat. = – 185° 53 C. In general, the resistance of perfectly pure metals was greatly decreased by cold — so much so that, to judge by the course of the curves on the chart, it appeared probable that at the zero of absolute tempera- ture resistance would vanish altogether and all pure metals become perfect conductors of electricity. This conclusion, however, has been rendered very doubtful by subsequent observations by Dewar, who found that with the still lower temperatures attainable with liquid hydrogen the increases of conductivity became less for each decrease of temperature, until a point was reached where the curves bent sharply round and any further diminution of resistance became very small; that is, the conductivity remained finite. The reduction in resistance of some of the metals at the boiling point of hydrogen is very remarkable. Thus copper has only tt> 3-th, goldˆth, platinumˆth to ■■}--- th, silver ˆ th the resistance at melting ice, but iron is only reduced to Jth part of the same initial resistance. Table XIV. shows the progressive decrease of resistance for certain metals and one alloy as the temperature is lowered from that of boiling water down to that of liquid hydrogen boiling under reduced pressure; it also gives the ” vanishing temperature,” at which the conductivity would become perfect if the resistance continued to decrease in the same ratio with still lower temperatures, the values being derived from the extrapolation curves of the relation between resistance and temperature, according to Callendar and Dickson. It will be seen that many of the sub stances have actually been cooled to a lower temperature than that at which their resistance ought to vanish.

In the case of alloys and impure metals, cold brings about a much smaller decrease in resistivity, and the continuations of the curves at no time show any sign of passing through the zero point. The influence of the presence of impurities in minute quantities is strikingly shown in the case of bismuth. Various specimens of the metal, prepared with great care by purely chemical methods, gave in the hands of Dewar and Fleming some very anomalous results, appearing to reach at -80° C. a maximum of conductivity, and thereafter to increase in resistivity with decrease of temperature. But when the determinations were carried out on a sample of really pure bismuth prepared electrolytically, a normal curve was obtained corresponding to that given by other pure metals. As to alloys, there is usually

some definite mixture of two pure metals which has a maximum resistivity, often greater than that of either of the constituents. It appears too that high, if not the highest, resistivity corresponds to possible chemical compounds of the two metals employed, e.g. platinum S3 parts with silver 66 parts = PtAg 4 ; iron 80 with nickel 2o = Fe4Ni; platinum 80 with iridium 2o = IrPt4j and

15000 —3

-JOU -250 -200 -150 -100 -50 >50 *|00 -ISO

TEMPERATURE in PLATINUM DEGREES”.

Fig. 14. — Chart of the Variation of Electrical Resistance of Pure Metals and Alloys with Temperature. (Dewar and Fleming.)

copper 70 with manganese 30= Cu 2 Mn. The product obtained by adding a small quantity of one metal to another has a higher specific resistance than the predominant constituent, but the curve is parallel to, and therefore the same in shape as, that of the latter (cf . the curves for various mixtures of Al and Cu on the chart). The behaviour of carbon and of insulators like gutta- percha, glass, ebonite, &c, is in complete contrast to the metals,

16

75 8

LIQUID GASES

Table XIV.

Metals.

Platinum.

Platinum- rhodium Alloy.

Gold.

Silver.

Copper.

Iron.

o° C

,, carbonic acid

,, liquid oxvgen

,, ,, nitrogen

,, „ oxygen under exhaustion

„ ,, hydrogen

,, ,, hydrogen under exhaustion Resistance coefficients

Vanishing temperatures (Centigrade) . . . i

39-655

28-851

19-620

7-662

4-634

0-826

0-705

0-003745

-244-50°

-244-15°

36-87 31-93

22-17

20-73

18-96

18-90 0-003607

-543-39°

-530-32

16-10

n-58

3-38o

0-381

0-298

0-003903

-257-90°

-257-8°

8-336 5-990

1-669

0-244

0-226

0-00391 7 -252-26° -252-25°

11-572 8-117

i : 589

1-149

0-077

0-071 0-004257

-225-62° -226-04°

4-290 2-765

0-633

0-356

0-005515

-258-40° C. -246-80° D.

for their resistivity steadily increases with cold. The thermo- electric properties of metals at low temperatures are discussed in the article Thermoelectricity.

Magnetic Phenomena. — Low temperatures have very marked effects upon the magnetic properties of various substances. Oxygen, long known to be slightly magnetic in the gaseous state, is powerfully attracted in the liquid condition by a magnet, and the same is true, though to a less extent, of liquid air, owing to the proportion of liquid oxygen it contains. A magnet of ordinary carbon steel has its magnetic moment temporarily increased by cooling, that is, after it has been brought to a permanent magnetic condition (" aged ")• The effect of the first immersion of such a magnet in liquid air is a large diminution in its magnetic moment, which decreases still further when it is allowed to warm up to ordinary temperatures. A second cooling, however, increases the magnetic moment, which is again decreased by warming, and after a few repetitions of this cycle of cooling and heating the steel is brought into a condition such that its magnetic moment at the temperature of liquid air is greater by a constant percentage than it is at the ordinary temperature of the air. The increase of magnetic moment seems then to have reached a limit, because on further cooling to the temperature of liquid hydrogen hardly any further increase is observed. The percentage differs with the composition of the steel and with its physical condition. It is greater, for example, with a specimen tempered very soft than it is with another specimen of the same steel tempered glass hard. Aluminium steels show the same kind of phenomena as carbon ones, and the same may be said of chrome steels in the permanent condition, though the effect of the first cooling with them is a slight increase of magnetic moment. Nickel steels present some curious phenomena. When

containing small percentages of nickel (e.g. 0-84 or 3-82), they behave under changes of temperature much like carbon steel. With a sample containing 7-65%, the phenomena after the permanent state had been reached were similar, but the first cooling produced a slight increase in magnetic moment. But steels containing 18-64 and 29% of nickel behaved very differently. The result of the first cooling was a reduction of the magnetic moment, io the extent of nearly 50% in the case of the former. Warming again brought about an increase, and the final condition was that at the temperature of liquid air the magnetic moment was always less than at ordinary temperatures. This anomaly is all the more remarkable in that the behaviour of pure nickel is normal, as also appears to be generally the case with soft and hard iron. Silicon, tungsten and manganese steels are also substantially normal in their behaviour, although there are considerable differences in the magnitudes of the variations they display {Proc. Roy. Soc. lx. 57 et seq.; also "The Effect of Liquid Air Temperatures on the Mechanical and other Properties of Iron and its Alloys," by Sir James Dewar and Sir Robert Hadfield, Id. lxxiv. 326-336).

Low temperatures also affect the permeability of iron, i.e. the degree of magnetization it is capable of acquiring under the influence of a certain magnetic force. With fine Swedish iron, carefully annealed, the permeability is slightly reduced by cooling to –185 C. Hard iron, however, in the same circum- stances suffers a large increase of permeability. Unhardened

steel pianoforte wire, again, behaves like soft annealed iron. As to hysteresis, low temperatures appear to produce no appreciable effect in soft iron; for hard iron the observations are undecisive. Biological Research. — The effect of cold upon the life of living organisms is a matter of great intrinsic interest as well as of wide theoretical importance. Experiment indicates that moderately high temperatures are much more fatal, at least to the lower forms of life, than are exceedingly low ones. Professor M'Ken- drick froze for an hour at a temperature of -182° C. samples of meat, milk, &c, in sealed tubes; when these were opened, after being kept at blood-heat for a few days, their contents were found to be quite putrid. More recently some more elaborate tests were carried out at the Jenner (now Lister) Institute of Preventive Medicine on a series of typical bacteria. These were exposed to the temperature of liquid air for twenty hours, but their vitality was not affected, their functional activities re- mained unimpaired and the cultures which they yielded were normal in every respect. The same result was obtained when liquid hydrogen was substituted for air. A similar persistence of life has been demonstrated in seeds, even at the lowest tempera- tures; they were frozen for over 100 hours in liquid air at the instance of Messrs Brown and Escombe, with no other effect than to afflict their protoplasm with a certain inertness, from which it recovered with warmth. Subsequently commercial samples of barley, peas and vegetable-marrow and mustard seeds were literally steeped for six hours in liquid hydrogen at the Royal Institution, yet when they were sown by Sir W. T. Thiselton Dyer at Kew in the ordinary way, the proportion in which • germination, occurred was no smaller than with other batches of the same seeds which had suffered no abnormal treatment. Mr Harold Swithinbank has found that exposure to liquid air has little or no effect on the vitality of the tubercle bacillus, although by very prolonged exposures its virulence is modified to some extent; but alternate exposures to normal and very cold temperatures do have a decided effect both upon its vitality and its virulence. The suggestion once put forward by Lord Kelvin, that life may in the first instance have been conveyed tq v this planet on a meteorite, has been objected to on the ground that any living organism would have been killed before reaching the earth by its passage through the intense cold of interstellar space; the above experiments on the resistance to cold offered by seeds and bacteria show that this objection at least is not fatal to Lord Kelvin's idea.

At the Lister Institute of Preventive Medicine liquid air has been brought into use as an agent in biological research. An inquiry into the intracellular constituents of the typhoid bacillus, initiated under the direction of Dr Allan Macfadyen, necessitated the separation of the cell-plasma of the organism. The method at first adopted for the disintegration of the bacteria was to mix them with silver-sand and churn the whole up

in a closed vessel in which a series of horizontal vanes revolved at a high speed. But certain disadvantages attached to this procedure, and accordingly some means was sought to do away with the sand and triturate the bacilli per se. This was found in liquid air, which, as had long before been shown at the Royal Institution, has the power of reducing materials like grass or the leaves of plants to such a state of brittleness that they can easily be

powdered in a mortar. By its aid a complete trituration of the typhoid bacilli has been accomplished at the Jenner Institute, and the same process, already applied with success also to yeast cells and animal cells, is being extended in other directions.

Industrial Applications. — While liquid air and liquid hydrogen are being used in scientific research to an extent which increases every day, their applications to industrial purposes are not so numerous. The temperatures they give used as simple refriger- ants are much lower than are generally required industrially, and such cooling as is needed can be obtained quite satisfactorily, and far more cheaply, by refrigerating machinery employing more easily condensable gases. Their use as a source of motive power, again, is impracticable for any ordinary purposes, on the score of inconvenience and expense. Cases may be conceived of in which for special reasons it might prove advantageous to use liquid air, vaporized by heat derived from the surrounding atmosphere, to drive compressed-air engines, but any advantage so gained would certainly not be one of cheapness. No doubt the power of a waterfall running to waste might be temporarily conserved in the shape of liquid air, and thereby turned to useful effect. But the reduction of air to the liquid state is a process which involves the expenditure of a very large amount of energy, and it is not possible even to recover all that expended energy during the transition of the material back to the gaseous state. Hence to suggest that by using liquid air in a motor more power can be developed than was expended in producing the liquid air by which the motor is worked, is to propound a fallacy worse than perpetual motion, since such a process would have an efficiency of more than 100%. Still, in conditions where economy is of no account, liquid air might perhaps, with effectively isolated storage, be utilized as a motive power, e.g. to drive the engines of submarine boats and at the same time provide a supply of oxygen for the crew; even without being used in the engines, liquid air or oxygen might be found a convenient form in which to store the air necessary for respiration in such vessels. But a use to which liquid air machines have already been put to a large extent is for obtaining oxygen from the atmosphere. Although when air is liquefied the oxygen and nitrogen are condensed simultaneously, yet owing to its greater volatility the latter boils off the more quickly of the two, so that the remaining liquid becomes gradually richer and richer in oxygen. The fractional distillation of liquid air is the method now universally adopted for the preparation of oxygen on a commercial scale, while the nitrogen simultaneously obtained is used for the production of cyanamide, by its action on carbide of calcium. An interesting though minor application of liquid oxygen, or liquid air from which most of the nitrogen has evaporated, depends on the fact that if it be mixed with powdered charcoal, or finely divided organic bodies, it can be made by the aid of a detonator to explode with a violence comparable to that of dynamite. This explosive, which might properly be called an emergency one, has the disadvantage that it must be prepared on the spot where it is to be used and must be fired without delay, since the liquid evaporates in a short time and the explosive power is lost; but, on the other hand, if a charge fails to go off it has only to be left a few minutes, when it can be withdrawn without any danger of accidental explosion.

For further information the reader may consult W. L. Hardin, Rise and Development of the Liquefaction of Gases (New York, 1899), and Lefevrc, La Liquefaction des gaz et ses applications; also the article Condensation of Gases. But the literature of liquid gases is

mostly contained in scientific periodicals and the proceedings of learned societies. Papers by Wroblewski and Olszewski on the liquefaction of oxygen and nitrogen may be found in the Comptes rendus, vols, xcvi.cii., and there are important memoirs by the former on the relations between the gaseous and liquid states and on the compressibility of hydrogen in Wien. Akad. Sitzber. vols. xciv. and xcvii.; his pamphlet Comme I'air a ete liquefie (Paris, 1885) should also be referred to. For Dewar's work, see Proc. Roy. Inst. from 1878 onwards, including " Solid Hydrogen " (1900); " Liquid Hydrogen Calorimetry " (1904); " New Low Temperature Pheno mena " (1905) ; " Liquid Air and Charcoal at Low Temperatures " (1906) ; " Studies in High Vacua and Helium at Low Temperatures " (1007); also "The Nadir of Temperature and Allied Problems" (Bakerian Lecture), Proc. Roy. Soc. (1901), and the Presidential

Address to the British Association (1902). The researches of Fleming and Dewar on the electrical and magnetic properties of substances at low temperatures are described in Proc. Roy. Soc. vol. lx., and Proc. Roy. Inst. (1896); see also "Electrical Resistance of Pure Metals, Alloys and Non-Metals at the Boiling-point of Oxygen," Phil. Mag. vol. xxxiv. (1892); "Electrical Resistance of Metals and Alloys at Temperatures approaching the Absolute Zero," ibid. vol. xxxvi. (1893); "Thermoelectric Powers of Metals and Alloys between the Temperatures of the Boiling-point of Water and the Boiling-point of Liquid Air, " ibid. vol. xl. (1895) ; and papers on the dielectric constants of various substances at iow temperatures in Proc. Roy. Soc. vols. lxi. and Ixii. Optical and spectroscopic work by Liveing and Dewar on liquid gases is described in Phil. Mag. vols, xxxiv. (1892), xxxvi. (1893), xxxviii. (1894) and xl. (1895); for papers by the same authors on the separation and spectroscopic examination of the most volatile and least volatile constituents of atmospheric air, see Proc. Roy. Soc. vols, lxiv., lxvii. and lxviii. An account of the influence of very low temperatures on the ger- minative power of seeds is given by H. T. Brown and F. Escombe in Proc. Roy. Soc. vol. Ixii., and by Sir W. Thiselton Dyer, ibid. vol. lxv., and their effect on bacteria is discussed by A. Macfadyen, ibid. vols. lxvi. and lxxi. (J. Dr.)

LIQUORICE. The hard and semi-vitreous sticks of paste, black in colour and possessed of a sweet somewhat astringent taste, known as liquorice paste or black sugar, are the inspissated juice of the roots of a leguminous plant, Clycyrrhiza glabra, the radix glycyrrhizae of the pharmacopoeia. The plant is cultivated throughout the warmer parts of Europe, especially on the Mediterranean shores, and to some extent in Louisiana and California. The roots for use are obtained in lengths of 3 or 4 ft., varying in diameter from | to 1 in.; they are soft, flexible and fibrous, and internally of a bright yellow colour, with a character- istic, sweet pleasant taste. To this sweet taste of its root the plant owes its generic name Clycyrrhiza (y\vKvppi.£a, the sweet-root), of which the word liquorice is a corruption. The roots contain grape-sugar, starch, resin, asparagine, malic acid and the glucoside glycyrrhizin, C24 H36 9 , a yellow amorphous powder with an acid reaction and a distinctive bitter-sweet taste. On hydrolysis, glycyrrhizin yields glucose and glycyrrhetin.

Stick liquorice is made by crushing and grinding the roots to a pulp, which is boiled in water over an open fire, and the decoction separated from the solid residue of the root is evaporated till a sufficient degree of concentration is attained, after which, on cooling, it is rolled into the form of sticks or other shapes for the market. The preparation of the juice is a widely extended industry along the Mediterranean coasts; but the quality best appreciated in the United Kingdom is made in Calabria, and sold under the names of Solazzi and Corigliano juice. Liquorice enters into the composition of many cough lozenges and other demulcent preparations; and in the form of aromatic syrups and elixirs it has a remarkable effect in masking the taste of nauseous medicines.

LIQUOR LAWS. In most Western countries the sale of alcoholic liquor is regulated by law. The original and principal object is to check the evils arising from the immoderate use of such liquor, in the interest of public order, morality and health; a secondary object is to raise revenue from the traffic. The form and the stringency of the laws passed for these purposes vary very widely in different countries according to the

habits of the people and the state of public opinion. The evils which it is desired to check are much greater in some countries than in others. Generally speaking they are greater in northern countries and cold and damp climates than in southern and more sunny ones. Climate has a marked influence on diet for physiological reasons over which we have no control. The fact is attested by universal experience and is perfectly natural and inevitable, though usually ignored in those international com- parisons of economic conditions and popular customs which have become so common. It holds good both of food and drink. The inhabitants of south Europe are much less given to alcoholic excess than those of central Europe, who again are more temperate than those of the north. There is even a difference between localities so near together as the east and west of Scotland. The chairman of the Prison Commissioners pointed out before a British royal commission in the year 1897 the greater prevalence of drunkenness in the western half, and attributed it in part to the dampness of the climate on the western coast. But race also has an influence. The British carry the habit of drinking wherever they go, and their colonial

descendants retain it even in hot and dry climates. The Slav peoples and the Magyars in central Europe are much more intemperate than the Teutonic and Latin peoples living under similar climatic conditions. These natural differences lead, in accordance with the principle discerned and enunciated by Montesquieu, to the adoption of different laws, which vary with the local conditions. But social laws of this character also vary with the state of public opinion, not only in different countries but in the same country at different times. The result is that the subject is in a state of incessant flux. There are not only many varieties of liquor laws, but also frequent changes in them, and new experiments are constantly being tried. The general tendency is towards increased stringency, not so much because the evils increase, though that happens in particular places at particular times, as because public opinion moves broadly to- wards increasing condemnation of excess and increasing reliance on legislative interference. The first is due partly to a general process of refining manners, partly to medical influence and the growing attention paid to health; the second to a universal tendency which seems inherent in democracy.

Liquor laws may be classified in several ways, but the most useful way for the present purpose will be to take the principal methods of conducting the traffic as they exist, under four main headings, and after a brief explanation give some account of the laws in the principal countries which have adopted them. The four methods are: (1) licensing or commercial sale for private profit under a legal permit; (2) sale by authorized bodies not for private profit, commonly known as the Scandinavian or company system; (3) state monopoly; (4) prohibition. It is not a scientific classification, because the company system is a form of licensing and prohibition is no sale at all; but it follows the lines of popular discussion and is more intelligible than one of a more technical character would be. All forms of liquor legislation deal mainly with retail sale, and particularly with the sale for immediate consumption on the spot.

1 . Licensing. — This is by far the oldest and the most widely adopted method; it is the one which first suggests itself in the natural course, of things. Men begin by making and selling a thing without let or hindrance to please themselves. Then objections are raised, and when they are strong or general enough the law interferes in the public interest, at first mildly; it says in effect — This must not go on in this way or to this extent; there must be some control, and permission will only be given to duly authorized persons. Such persons are licensed or permitted to carry on the traffic under conditions, and there is obviously room for infinite gradations of strictness in granting permission and infinite variety in the conditions imposed. The procedure may vary from mere notification of the intention to open an establishment up to a rigid and

minutely detailed system of annual licensing laid down by the law. But in all cases, even when mere notification is required, the governing authority has the right to refuse permission or to withdraw it for reasons given, and so it retains the power of control. At the same time holders of the permission may be compelled to pay for the privilege and so contribute to the public revenue. The great merit of the licensing system is its perfect elasticity, which permits adjust- ment to all sorts of conditions and to th'e varying demands of public opinion. It is in force in the United Kingdom, which first adopted it, in most European countries, in the greater part of North America, including both the United States and Canada, in the other British dominions and elsewhere.

2. The Scandinavian or Company System. — The principle of this method is the elimination of private profit on the ground that it removes an incentive to the encouragement of excessive drinking. A monopoly of the sale of liquor is entrusted to a body of citizens who have, or are supposed to have, no personal interest in it, and the profits are applied to public purposes. The system, which is also called " disinterested management," is adopted in Sweden and Norway; and the principle has been applied in a modified form in England and Finland by the operation of philanthropic societies which, however, have no monopoly but are on the same legal footing as ordinary traders.

3. Stale Monopoly. — As the name implies, this system consists in retaining the liquor trade in the hands of the state, which thus secures all the profit and is at the same time able to exercise complete control. It is adopted in Russia, in certain parts of the United States and, in regard to the wholesale trade, in Switzer- land.

4. Prohibition.— This may be general or local; in the latter case it is called " local option " or " local veto." The sale of liquor is made illegal in the hope of preventing drinking altogether or of diminishing it by making it more difficult. General pro hibition has been tried in some American states, and is still in force in a few; it is also applied to native races, under civilized rule, both in Africa and North America. Local prohibition is widely in force in the United States, Canada and Australasia, Sweden and Norway. In certain areas in other countries, including the United Kingdom, the sale of liquor is in a sense prohibited, not by the law, but by the owners of the property who refuse to allow any public-houses. Such cases have nothing to do with the law, but they are mentioned here because reference is often made to them by advocates of legal prohibition.

THE UNITED KINGDOM

England has had a very much longer experience of liquor legislation than any other country, and the story forms an intro- duction necessary to the intelligent comprehension of liquor legislation in general. England adopted a licensing system in 1551, and has retained it, with innumerable modifications, ever since. The English were notorious for hard drinking for centuries before licensing was adopted, and from time to time sundry efforts had been made to check it, but what eventually compelled the interference of the law was the growth of crime and disorder associated with the public-houses towards the end of the 1 5th century. Numbers of men who had previously been engaged in the civil wars or on the establishment of feudal houses were thrown on the world and betook themselves to the towns, particularly London, where they frequented the ale- houses, " dicing and drinking," and lived largely on violence and crime. An act was passed in 1495 against vagabonds and unlawful games, whereby justices of the peace were empowered to " put away cemmon ale-selling in towns and places where they should think convenient and to take sureties of keepers of ale-houses in their good behaviour." That was the beginning of statutory control of the trade. The act clearly recognized a connexion between public disorder and public-houses. The latter were ale-houses, for at that time ale was the drink of the people; spirits had not yet come into common use, and wine, the consumption of which on the premises was prohibited in 1552, was only drunk by the wealthier classes.

Early History of Licensing. — The act of 1551-1552, which introduced licensing, was on the same lines but went further. It confirmed the power of suppressing common ale-selling, and enacted that no one should be allowed to keep a common ale- house or " tippling " house without obtaining the permission of the justices in open session or of two of their number. It further " directed that the justices should take from the persons whom they licensed such bond and surety by recognisance as they should think convenient, and empowered them in quarter session to inquire into and try breaches by licensed persons of the conditions of their recognisances and cases of persons keeping ale-houses without licences and to punish the offenders " (Bonham Carter, Royal Commission on Liquor Licensing Laws, vol. iii.). This act embodied the whole principle of licensing, and the object was clearly stated in the preamble: " For as much as intolerable hurts and troubles to the commonwealth of this realm doth daily grow and increase through such abuses and disorders as are had and used in common ale-houses and other places called tippling houses." The evil was not due merely to the use of alcoholic liquor but to the fact that these houses, being public-houses, were the resort of idle and disorderly characters. The distinction should be borne in mind.

The act seems to have been of some effect, for no further legislation was attempted for half a century, though there is

abundant evidence of the intemperate habits of all classes. Mr Bonham Carter (loc. cit.) observes: —

" The recognisances referred to in the act were valuable instru- ments for controlling the conduct of ale-house keepers. The justices, in exercise of their discretion, required the recognisances to contain such conditions for the management and good order of the business as they thought suitable. In this way a set of regulations came into existence, many of which were subsequently embodied in acts of Parliament. In some counties general rules were drawn up, which every ale-house keeper was bound to observe."

It is interesting to note that among the conditions laid down about this time were the following: Closing at 9 P.m. and during divine service on Sunday; in some cases complete closing on Sunday except to travellers; the licence-holder to notify to the constable all strangers staying for more than a night and not to permit persons to continue drinking or tippling; pro- hibition of unlawful games, receiving stolen goods and harbour- ing bad characters; the use of standard measures and prices fixed by law. There was, however, no uniformity of practice in these respects until the 17th century, when an attempt was made to establish stricter and more uniform control by a whole series of acts passed between 1603 and 1627. The evils which it was sought to remedy by these measures were the existence of unlicensed houses, the use of ale-houses for mere drinking and the prevalence of disorder. It was declared that the ancient and proper use of inns and ale-houses was the refreshment and lodging of travellers, and that they were not meant for " entertainment and harbouring of lewd and idle people to spend and consume their money and their time in lewd and drunken manner." Regulations were strengthened for the suppression of unlicensed houses, licences were made annual, and the justices were directed to hold a special licensing meeting once a year (1618). Penalties were imposed on innkeepers for permitting tippling, and also on tipplers and drunkards (1625). In 1634 licensing was first applied to Ireland. Later in the century heavy penalties were imposed for adulteration.

The next chapter in the history of licensing has to do with spirits, and is very instructive. Spirits were not a native product like beer; brandy was introduced from France, gin from the Netherlands and whisky from Ireland; but down to the year 1690

the consumption was small. The home manufacture was strictly limited, and high duties on imported spirits rendered them too dear for the general public unless smuggled. Con- sequently the people had not acquired the taste for them. But in 1690 distilling was thrown open to any one on the payment of very trifling duties, spirits became extremely cheap and the consumption increased with great rapidity. Regulation of the retail traffic was soon found to be necessary, and by an act passed in 1 700-1 701, the licensing requirements already existing for ale-house keepers were extended to persons selling distilled liquors for consumption on the premises. A new class of public- houses in the shape of spirit bars grew up. In the year 1732 a complete and detailed survey of all the streets and houses in London was carried out by William Maitland, F.R.S. Out of a total of 95,968 houses he found the following: brew-houses 171, inns 207, taverns 447, ale-houses 5975, brandy-shops 8659; total number of licensed houses for the retail sale of liquor 15,288, of which considerably more than one-half were spirit bars. The population was about three-quarters of a million. About one house in every six was licensed at this time, and that in spite of attempts made to check the traffic by restrictive acts passed in 1728-1729. The physical and moral evils caused by the excessive consumption of spirits were fully recognized; an additional duty of 5s. a gallon was placed on the distiller, and retailers were compelled to take out an excise licence of £20 per annum. The object was to make spirits dearer and therefore less accessible. At the same time, with a view to lessening the number of houses, the licensing procedure of the justices was amended by the provision that licences should only be granted at a general meeting of the justices acting in the division where the applicant resided, thus abolishing the power conferred by the original licensing act, of any two justices to grant a licence. This change, effected in 1729, was a

permanent improvement, though it did not prevent the existence of the prodigious numbers of houses recorded by Maitland in 1732. The attempt to make spirits dearer by high excise duties, on the other hand, was adjudged a failure because it led to illicit trade, and the act of 1728 was repealed in 1732. But the evil was so glaring that another and more drastic attempt in the same direction was made in 1736, when the famous Gin Act was passed in response to a petition presented to parlia- ment by the Middlesex magistrates, declaring " that the drinking of geneva and other distilled waters had for some years past greatly increased; that the constant and excessive use thereof had destroyed thousands of His Majesty's subjects; that great numbers of others were by its use rendered unfit for useful labour, debauched in morals and drawn into all manner of vice and wickedness. . . ." The retailing of spirits in. quantities of less than 2 gallons was made subject to a licence costing £50 and the retailer had also to pay a duty of 20s. on every gallon sold. This experiment in "high licensing" was a dis- astrous failure, though energetic attempts were made to enforce it by wholesale prosecutions and by strengthening the regulations against evasion. Public opinion was inflamed against it, and the only results were corruptions of the executive and an enormous increase of consumption through illicit channels. The consump- tion of spirits in England and Wales nearly doubled between 1733 and 1742, and the state of things was so intolerable that after much controversy the high duties were repealed in 1742 with the object of bringing the trade back into authorized channels; the cost of a licence was reduced from £50 to £1 and the retail duty from 20s. to id. a gallon.

This period witnessed the high-water mark of intemperance in England. From various contemporary descriptions it is abundantly clear that the state of things was incomparably worse than anything in modern times, and that women, whose participation in the practice of drinking and frequenting public- houses is recorded by writers in the previous century, were affected as well as men. The experience is particularly instructive because it includes examples of excess and deficiency of oppor- tunities and the ill effects of both on a people naturally inclined to indulgence in drink. It was followed by more judicious action, which showed the adaptability of the licensing system and the advantages of a mean between laxity and severity. Between 1743 and 1753 acts were passed which increased control in a moderate way and proved much more successful than the previous measures. The retail licence duty was

moderately raised and the regulations were amended and made stricter. The class of houses eligible for licensing was for the first time taken into account, and the retailing of spirits was only permitted on premises assessed for rates and, in London, of the annual value of £10; justices having an interest in the trade were excluded from licensing functions. Another measure which had an excellent effect made ” tippling ” debts — that is, small public-houses debts incurred for spirits — irrecoverable at law. The result of these measures was that consumption diminished and the class of houses improved. At the same time (1753) the general licensing provisions were strengthened and extended. The distinction between new licences and the renewal of old ones was for the first time recognized; applicants for new licences in country districts were required’to produce a certificate of character from the clergy, overseers and church-wardens or from three or four householders. The annual licensing sessions were made statutory, and the consent of a justice was required for the transfer of a licence from one person to another during the teTm for which it was granted. Penalties for infringing the law were increased, and the licensing system was extended to Scotland (17 55-1 756). With regard to wine, it has already been stated that consumption on the premises was forbidden in 1552, and at the same time the retail sale was restricted to towns of some importance and the number of retailers, who had to obtain an appointment from the corporation or the justices, was strictly limited. In 1660 consumption on the premises was permitted under a Crown (excise) licence, good for a variable term of years; in 1756 this was changed to an annual excise licence of fixed

amount, and in 1792 wine was brought under the same jurisdic- tion of the justices as other liquors.

It is clear from the foregoing that a great deal of legislation occurred during the 18th century, and that by successive enact- ments, particularly about the middle of the century, the licensing system gradually became adjusted to the requirements of the time and took a settled shape. The acts then passed still form the basis of the law. In the early part of the 1 9th century another period of legislative activity set in. A parliamentary inquiry into illicit trade in spirits took place in i82i,andin 1828 important acts were passed amending and consolidating the laws for England and for Scotland; in 1833 a general Licensing Act was passed for Ireland. These are still the principal acts, though they have undergone innumerable amendments and additions. The English act of 1828 introduced certain important changes. A licence from the justices was no longer required for the sale of liquor for consumption off the nremises, and the power of the justices to suppress public-houses at their discretion (apart from the annual licensing), which they had possessed since 1495, was taken away. The removal of this power, which had long been obsolete, was the natural corollary of the development of the licensing system, its greater stringency and efficiency and the increase of duties imposed on the trade. Men on whom these obligations were laid, and who were freshly authorized to carry on the business every year, could not remain liable to summary deprivation of the privileges thus granted and paid for. The justices had absolute discretion to withhold licences from an applicant whether new or old; but an appeal was allowed to quarter sessions against refusal and also against conviction for offences under the act. The main points in the law at this time were the following. The sale of alcoholic liquors for con- sumption on the premises was forbidden under penalties except to persons authorized according to law by the justices. Licences were granted for one year and had to be renewed annually. The justices held a general meeting each year at a specified time for the purpose of granting licences; those peculiarly interested in the liquor trade were disqualified. The licence contained various provisions for regulating the conduct of the house and maintaining order, but closing was only required during the hours of divine service on Sunday. Applicants for new licences and for the transfer of old ones (granted at a special sessions of the

justices) were required to give notice to the local authorities and to post up notices at the parish church and on the house concerned.

Excise Licences. — It will be convenient at this point to explain the relation between that part of the licensing system which is concerned with the conduct of the traffic and lies in the juris- diction of the justices and that part which has to do with taxation or revenue. The former is the earlier and more important branch of legislative interference; we have traced its history from 1495 down to 1828. Its object from the beginning was the maintenance of public order and good conduct, which were impaired by the misuse of public-houses; and all the successive enactments were directed to that end. They were attempts to suppress or moderate the evils arising from the traffic by regulating it. The excise licensing system has nothing to do with public order or the conduct of the traffic; its object is simply to obtain revenue, and for a long time the two systems were quite independent. But time and change gradually brought them into contact and eventually they came to form two aspects of one unified system. Licensing for revenue was first introduced in 1660 at the same time as duties on the manufacture of beer and spirits: but it was of an irregular character and was only applied to wine, which was not then under the jurisdiction of the justices at all (see above). In 1710 a small annual tax was imposed on the retailers of beer and ale and collected by means of a stamp on the justices' licence. In 1728 an annual excise licence of £20 was imposed on retailers of spirits, and in 1736 this was raised to £50 (see above). The object of these particular imposts, however, was rather to check the sale, as previously explained, than to secure revenue. In 1756 the previous tax on the retail sale of wine for consumption on the premises was

changed to an annual excise licence, which was in the next year extended to " made wines " and " sweets " (British wines). Similar licences, in place of the previous stamps, were temporarily required for beer and ale between 1725 and 1742 and permanently imposed in 1808. Thus the system of annual excise licences became gradually applied to all kinds of liquor. In 1825 the laws relating to them were consolidated and brought into direct relation with the other licensing laws. It was enacted that excise licences for the retail of liquor should only be granted to persons holding a justices' licence or — to use the more correct term — certificate. The actual permission to sell was obtained on pay- ment of the proper dues from the excise authorities, but they had no power to withhold it from persons authorized by the justices. And that was still the system in 1910.

Licensing since 1828. — There was no change in the form of the British licensing system between the consolidation of the law in 1825-1828 and the time (1910) at which we write; but there were a great many changes in administrative detail and some changes in principle. Only the most important can be men- tioned. In 1830 a bold experiment was tried in exempting the sale of beer from the requirement of a justice's licence. Any householder rated to the parish was entitled, under a bond with sureties, to take out an excise licence for the sale of beer for consumption on or off the premises. This measure, which applied to England and was commonly known as the Duke of Wellington's Act, had two objects; one was to encourage the consumption of beer in the hope of weaning the people from spirits; the other was to counteract the practice of " tieing " public-houses to breweries by creating free ones. With regard to the first, it was believed that spirit-drinking was increasing again at the time and was doing a great deal of harm. The reason appears to have been a great rise in the returns of con- sumption, which followed a lowering of the duty on spirits from ns. 8jd. to 7s. a gallon in 1825. The latter step was taken because of the prevalence of illicit distillation. In 1823 the duty had been lowered for the same reason in Scotland from 6s. 2d. and in Ireland from 5s. 7d. to a uniform rate of 2s. 4jd. a gallon, with so much success in turning the trade from illegal to legal channels that a similar change was thought advisable in Eng- land, as stated. The legal or apparent consumption rose at once from 7 to nearly 13 million gallons; but it is doubtful if there was much or any real increase. According to an official state- ment, more than half the spirits consumed in 1820 were illicit. The facts are of much interest in showing what had already been shown in the 18th century, that the liquor trade will not bear unlimited taxation; the traffic is driven

underground. It is highly probable that this accounts for part of the great fall in consumption which followed the raising of the spirit duty from us. to 14s. gd. under Mr Lloyd George's Budget in 1909. With regard to " tied " houses, this is the original form of public- house. When beer was first brewed for sale a " tap " for retail purposes was attached to the brewery, and public-houses may still be found bearing the name " The Brewery Tap." At the beginning of the 19th century complaints were made of the increasing number of houses owned or controlled by breweries and of the dependence of the licence-holders, and in 1817a Select Committee inquired into the subject. The Beerhouse Act does not appear to have checked the practice or to have diminished the consumption of spirits; but it led to a great increase in the number of beer-houses. It was modified in 1834 and 1840, but not repealed until 1869, when beer-houses were again brought under the justices.

Most of the other very numerous changes in the law were concerned with conditions imposed on licence-holders. The hours of closing are the most important of these. Apart from the ancient regulations of closing during divine service on Sunday, there were no restrictions in 1828; but after that at least a dozen successive acts dealt with the point. The first important measure was applied in London under a Police Act in 1839; it ordered licensed houses to be closed from midnight on Saturday to mid-day on Sunday, and produced a wonderful effect on public order. In 1853 a very important act (Forbes Mackenzie)

was passed for Scotland, by which sale on Sunday was wholly forbidden, except to travellers and lodgers, and was restricted on week days to the hours between 8 a.m. and n p.m. This act also introduced a distinction between hotels, public-houses and grocers licensed to sell liquor, and forbade the sale to children under 14 years, except as messengers, and to intoxicated persons. In England, after a series of enactments in the direction of pro- gressive restriction, uniform regulations as to the hours of opening and closing for licensed premises were applied in 1874, and are still in force (see below). In 1878 complete Sunday closing, as in Scotland, was applied in Ireland, with the exemption of the five largest towns, Dublin, Belfast, Cork, Limerick and Waterford; and in 1881 the same provision was extended to Wales.

Other changes worthy of note are the following. In i860 the free sale of wine for consumption off the premises was introduced by the Wine and Refreshment Houses Act, which authorized any shopkeeper to take out an excise licence for this purpose; the licences so created were subsequently known as grocers' licences. By the same act refreshment houses were placed under certain restrictions, but were permitted to sell wine for consumption on the premises under an excise licence. In 1861 spirit dealers were similarly authorized to sell spirits by the bottle. The effect of these measures was to exempt a good deal of the wine and spirit trade from the control of the justices, and the idea was to wean people from public-house drinking by encouraging them to take what they wanted at home and in eating-houses.

In 1869 this policy of directing the habits of the people into channels thought to be preferable, which had been inaugurated in 1830, was abandoned for one of greater stringency all round, which has since been maintained. All the beer and wine retail licences were brought under the discretion of the justices, but they might only refuse " off " licences and the renewal of previously existing beer-house " on " licences upon specified grounds, namely (1) unsatisfactory character, (2) disorder, (3) previous misconduct, (4) insufficient qualification of applicant or premises. In 1872 an important act further extended the policy of restriction; new licences had to be confirmed, and the right of appeal in case of refusal was taken away; penalties for offences were increased and extended, particularly for public drunkenness, and for per-

mitting drunkenness; the sale of spirits to persons under 16 was prohibited. In 1876 many of these provisions were extended to Scotland. In 1886 the sale of liquor for consumption on the premises was forbidden to persons under 13 years. In 1901 the sale for " off " consumption was prohibited to persons under 14, except in sealed vessels; this is known as the Child Messenger Act. These measures for the protection of children were extended in 1008 by an act which came into operation in April 1909, excluding children under 14 from the public-house bars altogether. The progressive protection of children by the law well illustrates the influence of changing public opinion. The successive measures enumerated were not due to increasing contamination of children caused by their frequenting the public-house, but to recognition of the harm they sustain thereby. The practice of taking and sending children to the public-house, and of serving them with drink, is an old one in England. A great deal of evidence on the subject was given before a Select Committee of the House of Commons in 1834; but it is only in recent years, when the general concern for children has undergone a remarkable develop- ment in all directions, that attempts have been made to stop it. In 1002 clubs, which had been increasing, and habitual drunkards, were brought under the law.

In 1904 a new principle was introduced into the licensing system in England, and this, too, was due to change in public opinion. Between 1830 and 1869, under the influence of the legislation described above, a continuous increase in the number of public-houses took place in England; but after 1869 they began to diminish through stricter control, and this process has gone on continuously ever since. Reduction of numbers became a prime object with many licensing benches; they were reluctant to grant new licences, and made a point of extinguishing old ones year by year. At first this was easily effected under the new and stringent provisions of the legislation of 1869-1872, but

it gradually became more difficult as the worst houses disappeared and the remaining ones were better conducted, and gave less and less excuse for interference. But the desire for reduction still gained ground, and a new principle was adopted. Houses against which no ill-conduct was alleged were said to be " super- fluous," and on that ground licences were taken away. But this, again, offended the general sense of justice; it was felt that to take away a man's living or a valuable property for no fault of his own was to inflict a great hardship. To meet the difficulty the principle of compensation was introduced by the act of 1904. It provides that compensation shall be paid to a licence-holder (also to the owner of the premises) whose licence is withdrawn on grounds other than misconduct of the house or unsuitability of premises or of character. The compensation is paid out of a fund raised by an annual charge on the remaining licensed houses. This act has been followed by a large reduction of licences.

Slate of the Law in igio. — In consequence of the long history and evolution of legislation in the United Kingdom and of the innumerable minor changes introduced, only a few of which have been mentioned above, the law has become excessively complicated. The differences between the English, Scottish and Irish codes, the distinction between the several kinds of liquor, between consumption on and off the premises, between new licences and the renewal of old ones, between premises licensed before 1869 and those licensed since, between excise and justices' licences — all these and many other points make the subject exceedingly intricate; and it is further complicated by the uncertainty of the courts and a vast body of case-made law. Only a summary of the chief provisions can be given here.

1. The open sale of intoxicating liquor (spirits, wine, sweets, beer, cider) by retail is confined to persons holding an excise licence, with a few unimportant exceptions, including medicine.

2. A condition precedent to obtaining such a licence is permission granted by the justices who are the licensing authority and called a justices' licence or certificate. Theatres, passenger boats and canteens are exempted from this condition; also certain

dealers in spirits and wine.

3. Justices' licences are granted at special annual meetings of the local justices, called Brewster Sessions. Justices having a pecuniary interest in the liquor trade of the district, except as railway shareholders, are disqualified from acting; " bias " due to other interests may also be a disqualification.

4. Justices' licences are only granted for one year and must be renewed annually, with the exception of a particular class, created by the act of 1904 and valid for a term of years. Dis- tinctions are made between granting a new licence and renewing an old one. The proceedings are stricter and more summary in the case of a new licence; notice of application must be given to the local authorites; the premises must be of a certain annual value; a plan of the premises must be deposited beforehand in the case of an " on " licence; the justices may impose conditions and have full discretion to refuse without any right of appeal; the licence, if granted, must be confirmed by a higher authority. In the case of old licences on the other hand, no notice is required; they are renewed to the former holders on application, as a matter of right; unless there is opposition or objection, which may come from the police or from outside parties or from the justices themselves. If there is objection the renewal may be refused, but only on specified grounds — namely misconduct, unfitness of premises or character, disqualification; otherwise compensa- tion is payable on the plan explained above. There is a right of appeal to a higher court against refusal. In all cases, whether the justices have full discretion or not, they must exercise their discretion in a judicial manner and not arbitrarily.

5. Licences may be transferred from one person to another in case of death, sickness, bankruptcy, change of tenancy, wilful omission to apply for renewal, forfeiture or disqualification. Licences may also be transferred from one house to another in certain circumstances.

6. A licence may be forfeited through the conviction of the holder of certain specified serious offences.

may similarly be disqualified from holding a

7. Persons licence.

8. Liquor may only be sold on the premises specified in the licence and during the following hours: — week-days; London, 5 a.m. to 12.30 p.m. (Saturday, midnight); large towns 6 A.M. to 11 p.m.; other places 6 a.m. to 10 p.m. — Sundays; London, 1 p.m. to 3 p.m., 6 p.m. to 11 p.m.; other places 12.30 p.m. (or 1 p.m.) to 2.30 p.m. (or 3 p.m.), 6 p.m. to 10 p.m.; Christmas Day and Good Friday are counted as Sunday. In Scotland, Wales and Ireland (except the five chief towns) no sale is permitted on Sunday. Licence holders may sell during prohibited hours to lodgers staying in the house and to bona-fide travellers, who must be not less than 3 m. from the place they slept in on the previous night. Extension of hours of sale may be granted for special occasions and for special localities (e.g. early markets).

9. The following proceedings are prohibited in licensed premises: permitting children under 14 to be in a bar, selling any liquor to children under 14 for consumption on the premises, selling liquor to children under 14 as messengers except in corked and sealed vessels, selling spirits for consumption on the premises to persons under 16; selling to drunken persons and to habitual drunkards; permitting drunkenness, permitting disorder, harbouring prostitutes, harbouring constables, supplying liquor to constables on duty, bribing constables, permitting betting (persistent) or gaming, permitting premises to be used as a brothel, harbouring thieves, permitting seditious meetings; permitting the payment of wagers on premises; permitting premises to be used for

election committee rooms. In and within 20 m. of London music and dancing are prohibited on licensed premises except under special licences.

10. The police have the right of entry to licensed premises at any time for the purpose of preventing or detecting offences.

11. The injurious adulteration of any liquor is prohibited; also the dilution of beer; but dilution of spirits is not unlawful if the customer's attention is drawn to the fact.

12. All clubs in which intoxicating liquor is sold must be registered. If the liquor is the collective property of the members no licence is required for retail sale, but no liquor can be sold for consumption off the premises. Clubs run for profit, known as proprietory clubs, arc on the same legal footing as public- houses.

1.5. Penalties incurred by licence-holders for offences under the foregoing pro- visions. For selling any other kind of liquor than that authorized — first offence, fine not exceeding £50 or one month's imprisonment; second offence, fine not exceeding £100 or 3 months' imprison- ment with forfeiture of licence and, if ordered, confiscation of liquor and dis- qualification for five years; third offence, fine not exceeding £100 or six months' imprisonment with forfeiture of licence and, if ordered, confiscation of liquor and unlimited disqualification. Under the Excise Acts the penalty for selling without a licence is — for spirits, a fine of £100, confiscation of liquor, for- feiture of licence and perpetual dis- qualification; for wine, a fine of £20; for beer or cider "on" consumption £20, "off" consumption £10. For sale to children; first offence, fine up to £2, second offence, fine up to £5, Permitting premises to be used as a brothel, fine of £20, forfeiture of licence and perpetual disqualification. Other offences, fine up to £10 for first conviction, up to £20 for second.

14. The following are offences on the part of the public. Being found drunk on any highway or other public place or on

licensed premises; penalty, fine up to 10s. for first conviction, up to 20s. for second, and up to 40s. for third. Riotous or disorderly conduct while drunk; fine up to 40s. Falsely pretend- ing to be a traveller or lodger; fine up to £5. Causing children to be in a bar or sending them for liquor contrary to the law; fine up to £2 for first and up to £5 for second offence. Attempt to obtain liquor by a person notified to the police as an habitual drunkard; fine up to 20s. for first offence, up to 40s. for subse- quent ones. Giving drunken persons liquor or helping them to get it on licensed premises; fine up to 40s. or imprisonment for a month. Causing children under 1 1 to sing or otherwise perform on licensed premises, and causing boys under 14 or girls under 16 to do so between 9 p.m. and 6 a.m.; fine up to £25 or three months' imprisonment.

The foregoing statement of the law does not in all respects apply to Scotland and Ireland, where the administration differs somewhat from that of England. In Scotland the provost and bailies are the licensing authority in royal and parliamentary burghs, and elsewhere the justices. They hold two sessions annually for granting licences and have considerably more power in some respects than in England. The hours of opening are from 8 a.m. to 11 p.m. (week days only), but there is a dis- cretionary power to close at 10 p.m. In Ireland the licensing authority is divided between quarter sessions and petty sessions. Public-house licences are granted and transferred at quarter sessions; renewals and other licences are dealt with at petty sessions. In Dublin, Belfast, Cork, Londonderry and Galway the licensing jurisdiction of quarter sessions is exercised by the recorder, elsewhere by the justices assembled and presided over by the county court judge. The licensing jurisdiction of petty sessions is exercised by two or more justices, but in Dublin by one divisional justice.

Excise Licences and Taxation. — The excise licences may be divided into four classes, (1) manufacturers', (2) wholesale dealers', (3) retail dealers' for " on " consumption, (4) retail dealers' for " off " consumption. Only the two last classes come under the jurisdiction of the justices, as explained above. The total number of different excise

licences is between 30 and 40, but

Licence.

Manufacturers' Licences — Distiller (spirits)

Rectifier (spirits) Brewer .

Sweets (British wines)

Wholesale Dealers' Licences- Spirits .... Beer .... Wine .... Sweets ....

Retail Licences On — • Full or Publican's

(spirits, beer, wine and cider)

Beer-house

Wine (confectioners')

Cider .... Sweets ....

Retail Licences Off —

Spirits .... Spirits (grocers', Scotland)

Spirits (grocers', Ireland) .

Beer (England)

Beer (grocers', Scotland) .

Wine (grocers').

Old Duty.

£io, 10s.

£10, 10s. £1

£1

£lO, IOS.

£3, 6s. id.

£10, IOS.

£5. 5s-

£4, ios. to £60 according to annual value of premises.

£3. ios.

£3- ios.

£1, Ss- £1. 5S-

£3, 3S-

£4, 4s. to

£13, 13s. 6d

£9. 1 8s- 5d. £14, 6s. 7d.

£1, 5s- £2, ios. and £4, 4s £2, ios. od.

New Duty 1909-19 10.

£10 for first 50,000 gallons, £10 for every additional 25,000 gallons.

£l5, I5s.

£1 for first 100 barrels, 12s. for every

additional 50 barrels. £5, 5s-

£i5, I5s. £10, ios. No change. No change.

Half the annual value of premises, with a fixed minimum ranging from £5 in places with less than 2000 inhabitants to £35 in towns having over 100,000 inhabitants.

One-third of annual value of premises, with a minimum as above ranging from £3, ios. to £23, ios.

From £4, ios. to £12 according to annual value.

From £2, 5s. to £6.

From £2, 5s. to £6.

to

From £10 to £50 according to annual

I value.

£i, ios. to £10. £1, ios. to £10. £2, ios. to £10.

several of them are subvarieties and unimportant or are peculiar to Scotland or Ireland. The duties charged on them were greatly changed and increased by the Finance Act of 1909-1910, and it seems desirable to state the changes thus introduced. The table on the previous page gives the principal kinds of licence with the old and the new duties.

There are in addition ” occasional ” licences valid for one or more days, which come under the jurisdiction of the justices; the duty is 2s. 6d. a day for the full licence (raised to 10s.) and is. for beer or wine only (raised to 5s.).

The total amount raised by the excise licences in the United Kingdom for the financial year ending 31st March 1909 was £2,209,928. Of this amount £1,712,160, or nearly four-fifths, was derived from the full or publicans' licence, £126,053 from the wholesale spirit licence and £88,167 from the beer-house licence; the rest are comparatively unimportant. But the licences only represent a small part of the revenue derived from liquor. The great bulk of it is collected by means of duties on manufacture and importation. The total amount for the year ending March 1909 was £37,428,189, or nearly 30% of the total taxation revenue of the country. The excise duties on the manufacture of spirits yielded £17,456,366 and those on beer £12,691,332; customs duties on importation yielded £5,046,949. The excise duty on spirits was at the rate of ns. a gallon, raised at the end of April 1909 to 14s. 9d.; the corresponding duty on beer

is 7s. 9d. a barrel (36 gallons). The relative taxation of the liquor trade in the United States, which has become important as a political argument, is discussed below.

Effects of Legislation. — The only effects which can be stated with precision and ascribed with certainty to legislation are the increase or diminution of the number of licences or licensed premises; secondary effects, such as increase or diminution of consumption and of drunkenness, are affected by so many causes that only by a very careful, well-informed and dispassionate examination of the facts can positive conclusions be drawn with regard to the influence of legislation (see Temperance). There is no more prolific ground for fallacious statements and arguments, whether unconscious or deliberate. The course of legislation traced above, however, does permit the broad conclusion that great laxity and the multiplication of facilities tend to increase drinking and disorder in a country like the United Kingdom, and that extreme severity produces the same or worse effects by driving the trade into illicit channels, which escape control, and thus really increasing facilities while apparently diminishing them. The most successful course has always been a mean between these extremes in the form of restraint judiciously applied and adjusted to circumstances. The most salient feature of the situation as influenced by the law in recent years is the progressive reduction in the number of licensed houses since 1869. Previously they had been increasing in England.

The number of public-houses, including beer-houses for " on " consumption, in 1831 was 82,466; in 1869 it had risen to 118,602; in 1909 it had fallen again to 94,794. But if the proportion of public-houses to population be taken there has been a continuous fall since 1831, as the following table shows: — England and Wales.

Year.

No. of " on " Licences.

Proportion

per 10,000 of

Population.

1831 1871 1901 1909

82,466 112,886 101,940

94.794

59 49 31 26

The change may be put in another way. In 1831 there was one public-house to 168 persons; in 1909 the proportion was 1 10375. The proportional reduction goes back to the 18th century. In 1732 there was in London one public-house to every 50 persons (see above).

In Scotland the number of public-houses has been diminishing since 1829, when there were 17,713; in 1909 there were only 7065, while the population had m<5re than doubled. The number

in proportion to population has therefore fallen far more rapidly than in England, thus — 1831, 1 to 134 persons; 1909, 1 to 690 persons. In Ireland the story is different. There has been a fall in the number of public-houses since 1829, when there were 20,548; but it has not been large or continuous and the popula- tion has been steadily diminishing during the time, so that the proportion to population has actually increased, thus — 1831, 1 to 395 persons; 1909, 1 to 249 persons. As a whole, however, the United Kingdom shows a large and progressive diminution of public-houses to population; nor is this counterbalanced by an increase of " off " licences. If we take the

whole number of licences we get the following movement in recent years : —

No. of Retail Licences (" on " and " off ") per 10,000 of Population.

1893.

1903.

1909.

England and Wales Scotland .... Ireland. .... United Kingdom .

46 37 41

45

42

33 46 42

37 30

45 37

The diminution in the number of public-houses in England was markedly accelerated by the act of 1904, which introduced the principle of compensation. The average annual rate of reduction in the ten years 1 894-1 904 before the act was 359; in the four years 1905-1908; after the act it rose to 1388. The average annual number of licences suppressed with compensation was 1 13 7, and the average annual amount of compensation paid was £1,096,946, contributed by the trade as explained above.

The reduction of public-houses has been accompanied in recent years by a constant increase in the number of clubs. By the act of 1902, which imposed registration, they were brought under some control and the number of legal clubs was accurately ascertained. Previously the number was only estimated from certain data with approximate accuracy. The following table gives the official figures: —

Clubs: England and Wales.

1887.

1896.

1904.

1905-

1906.

1907.

1908.

1909.

Number Proportion per 10,000

1982 07

3655

i-i

6371 1-89

6589

i-93

6721

i-95

6907 1-98

7133

2-02

7353 2-08

Clubs represent alternative channels to the licensed trade and they are under much less stringent control; they have no prohibited hours and the police have not the same right of entry. In so far, therefore, as clubs replace public-houses the reduction of the latter does not mean diminished facilities for drinking, but the contrary. In the years 1903-1908 the average number of clubs proceeded against for offences was 74 and the average number struck off the register was 52. The increase of clubs and the large proportion struck off the register suggest the need of caution in dealing with the licensed trade; over-stringent measures defeat their own end.

Persistent attempts have for many years been made to effect radical changes in the British system of licensing by the introduc- tion of some of the methods adopted in other countries, and particularly those in the United States. But it is difficult to engraft new and alien methods, involving violent change, upon ah ancient system consolidated by successive statutory enactments and confirmed by time and usage. The course of the law and administration since 1869 has made it particularly difficult. The stringent conditions imposed on licence-holders have given those who fulfil them a claim to consideration, and the reduction of licences, by limiting the market, has enhanced their value. An expectation of renewal, in the absence of misconduct, has grown up by usage and been confirmed by the law, which recog- nizes the distinction between granting a new licence and renewing an old one, by the treasury which levies death duties on the assumption that a licence is an enduring property, by local authorities which assess upon the same assumption, and by the High Courts of Justice, whose decisions have repeatedly turned on this point. The consequence of all this is that very large sums

have been invested in licensed property, which has become part of the settled order of society; and to destroy it by some sudden innovation would cause a great shock. The position is entirely different in other countries where no such control has ever been exercised. It is possible to impose a new system where previously there was none, but not to replace suddenly an old and settled one for something entirely different. Only the most convinc- ing proof of the need and the advantages of the change would justify it; and such proof has not been forthcoming. The British system has the great merit of combining adaptability to different circumstances and to changing customs with continuity and steadiness of administration. The advantages of abandoning it for some other are more than doubtful, the difficulties are real and serious. Over a very long period it has been repeatedly readjusted in conformity with the movement of public opinion and of national habits; while under it the executive have gradually got the traffic well in hand, and a great and progressive improve- ment in order and conduct has taken place. The process is gradual but sure, and the record will compare

favourably with that of any other comparable country. Further readjustment will follow and is desirable. The great defect of the law is its extreme complexity; it needs recasting and simplification. There are too many kinds of licence, and the classification does not correspond with the actual conditions of the traffic. Some licences are obsolete and superfluous; others make no distinction between branches of the trade which fulfil entirely different functions and require different treatment. The full or publican's licence, which is incomparably the most important, places on the same legal footing hotels, restaurants, village inns and mere drinking bars, and the lack of distinction is a great stumbling- block. In the attempt made in 1908 to introduce new legisla- tion it was found necessary to incorporate distinctions between different classes of establishment, although that was not con- templated in the original bill. It will always be found necessary whenever the subject is seriously approached, because the law has to deal with things as they actually are. It does not fall within the scope of this article to discuss the numerous contro- versial questions which arise in connexion with various legislative proposals for dealing with the liquor traffic; but an account of the methods which it has been proposed to adopt from other countries will be found below.

The United States

The liquor legislation of the United States presents a great contrast to that of the United Kingdom, but it is not less interest- ing in an entirely different way. In place of a single homogeneous system gradually evolved in the course of centuries it embraces a whole series of different ones based on the most diverse principles and subject to sudden changes and frequent experiments. It is not sufficiently understood in Europe that the legislatures of the several states are sovereign in regard to internal affairs and make what laws they please subject to the proviso that they cannot over-ride the Federal law. There is therefore no uniformity in regard to such matters as liquor legislation, and it is a mistake to speak of any particular system as representing the whole country. The United States government only interferes with the traffic to tax it for revenue, and to regulate the sale of liquor to Indians, to soldiers, etc. The liquor traffic is subject — whether in the form of manufacture, wholesale or retail trade — to a uniform tax of 25 dollars (£5) per annum imposed on every one engaged in it. Congress, under the constitu- tion, controls interstate commerce, and the Supreme Court has decided that without its consent no state can prevent a railway or other carrying agency from bringing liquor to any point within its borders from outside. Thus no state can keep out liquor or prevent its consumption, but any state legislature may make what internal regulations it pleases and may prohibit the manufacture and sale altogether within its own borders. It may go further. In 1887 a judgment was delivered by the Supreme Court of the United States that it is within the dis- cretionary power of a state to protect public health, safety and morals even by the destruction of property without compensation,

and that the constitution of the United States is not thereby violated. Use has been made of this power in Kansas, and it appears therefore that persons who engage in the liquor trade do so at their own risk. There is in fact no stability at all except in a few states which have incorporated some principle in their constitutions, and even that does not ensure continuity of practice, as means are easily found for evading the law or substituting some other system which amounts to the same thing. As a whole the control of the liquor traffic oscillates violently between attempted suppression and great freedom combined with heavy taxation of licensed houses.

In the great majority of the states some form of licensing exists; it is the prevailing system and was adopted, no doubt from England, at an early period. It is exercised in various ways. The licensing authority may be the municipality or a specially constituted body or the police or a judicial body. The last, which is the method in Pennsylvania, seems to be exceptional. According to Mr Fanshawe there is a general tendency, due to the prevailing corruption, to withdraw from municipal authorities power over the licensing, and to place this function in the hands of commissioners, who may be elected or nominated. In New York state the licensing commissioners used

to be nominated in cities by the mayors and elected else- where; but by the Raines law of 1896 the whole administration was placed under a state commissioner appointed by the governor with the consent of the Senate. A similar plan is in force in some important cities in other states. In Boston the licensing is in the hands of a police board appointed by the governor; in Baltimore and St Louis the authority is vested in commissioners similarly appointed; and in Washington the licensing commissioners are appointed by the president. In Pennsylvania, where the court of quarter sessions is the authority, the vesting of licensing in a judicial body dates back to 1676 and bears the stamp of English influence. It is noteworthy that in Philadelphia and Pittsburg (Allegheny county) the judicial court was for a time given up in favour of commissioners, but the change was a great failure and abandoned in 1888. The powers of the licensing authority vary widely; in some cases the only grounds of refusal are conduct and character, and licences are virtually granted to every applicant; in others the discretion to refuse is absolute. In Massachusetts the number of licences allowed bears a fixed ratio to the population, namely 1 to 1000, except in Boston, where it is 1 to 500, but as a rule where licences are given they are given freely. They are valid for a year and granted on conditions. The first and most general condition is the payment of a fee or tax, which varies in amount in different states. Under the " high licence " system (see below) it generally varies according to the size of the locality and the class of licence where different classes are recognized. In Massachusetts there are six licences; three for consumption on the premises — namely (1) full licence for all liquors, (2) beer, cider, and light wine, (3) beer and cider; two for consumption off the premises — namely (1) spirits, (2) other liquors; the sixth is for druggists. In New York state also there are six classes of licence, though they are not quite the same; but in many states there appears to be only one licence, and no distinction between on and off sale, wholesale or retail. Another condition generally imposed in addition to the tax is a heavy bond with sureties; it varies in amount but is usually not less than 2000 dollars (£400) and may be as high as 6000 dollars (£1200). A condition precedent to the granting of a licence imposed in some states is the deposit of a petition or application some time beforehand, which may have to be backed by a certain number of local residents or tax- payers. In Pennsylvania the required number is 12, and this is the common practice elsewhere; in Missouri a majority of tax-payers is required, and the licence may even then be refused, but if the petition is signed by two-thirds of the tax-payers the licensing authority is bound to grant it. This seems to be a sort of genuine local option. Provision is also generally made for hearing objectors. Another condition sometimes required (Massachusetts and Iowa) is the consent of owners of adjoining property. In some states no licences are permitted within a

stated distance of certain institutions; e.g. public parks (Missouri) and schools (Massachusetts). Regulations imposed on the licensed trade nearly always include prohibition of sale to minors under 18 and to drunkards, on Sundays, public holidays and election days, and prohibition of the employment of barmaids. Sunday closing, which is universal, dates at least from 1816 (Indiana) and is probably much older. The hours of closing on week days vary considerably but are usually 10 p.m. or 11 p.m. Other things are often prohibited including indecent pictures, games and music.

State Prohibition. — In a few states no licences are allowed. State prohibition was first introduced in 1846 under the influence of a strong agitation in Maine, and within a few years the example was followed by the other New England states; by Vermont in 1852, Connecticut in 1854, New Hampshire in 1855 and later by Massachusetts and Rhode Island. They have all now after a more or less prolonged trial given it up except Maine. Other states which have tried and abandoned it are Illinois (1851-1853), Indiana (1855-1858), Michigan, Iowa, Nebraska, South Dakota. The great Middle states have either never tried it, as in the case of New York (where it was enacted in 1855 but

declared uncon- stitutional), Pennsylvania and New Jersey, or only gave it a nominal trial, as with Illinois and Indiana. A curious position came about in Ohio, 1 one of the great industrial states. It did not adopt prohibition, which forbids the manufacture and sale of liquor; but in 1851 it abandoned licensing, which had been in force since 1792, and incorporated a provision in the constitution declaring that no licence should thereafter be granted in the state. The position then was that retail sale without a licence was illegal and that no licence could be granted. This singular state of things was changed in 1886 by the " Dow law," which authorized a tax on the trade and rendered it legal without expressly sanction- ing or licensing it. There were therefore no licences and no licensing machinery, but the traffic was taxed and conditions imposed. In effect the Dow law amounted to repeal of pro- hibition and its replacement by the freest possible form of licens- ing. In Iowa, which early adopted a prohibitory law, still nominally in force, a law, known as the " mulct law," was passed in 1894 for taxing the trade and practically legalizing it under conditions. The story of the forty years' struggle in this state between the prohibition agitation and the natural appetites of mankind is exceedingly instructive; it is an extra- ordinary revelation of political intrigue and tortuous proceed- ings, and an impressive warning against the folly of trying to coerce the personal habits of a large section of the population against their will. It ended in a sort of compromise, in which the coercive principle is preserved in one law and personal liberty vindicated by another contradictory one. The result may be satisfactory, but it might be attained in a less expensive manner. What suffers is the principle of law itself, which is brought into disrepute.

State prohibition, abandoned by the populous New England and central states, has in recent years found a home in more remote regions. In 1907 it was in force in five states — Maine, Kansas, North Dakota, Georgia and Oklahoma; in January, 1909, it came into operation in Alabama, Miss- issippi, and North Carolina; and in July 1909 in Tennessee.

Local Prohibition. — The limited form of prohibition known as local veto is much more extensively applied. It is an older plan than state prohibition, having been adopted by the legislature of Indiana in 1832. Georgia followed in the next year, and then other states took it up for several years until the rise of state prohibition in the middle of the century caused it to fall into neglect for a time. But the states which adopted and then abandoned general prohibition fell back on the local form, and a great many others have also adopted it. In 1907 it was in force in over 30 states, including all the most populous and important, with one or two exceptions. But the extent to which it is applied varies very widely and is constantly changing, as different places take it up and drop it again. Some alternate in an almost regular manner every two or three years, or even every year; 1 In 1908 local option was adopted in Ohio.

and periodical oscillations of a general character occur in favour of the plan or against it as the result of organized agitation followed by reaction. The wide discrepancies between the practice of different states are shown by some statistics collected in 1907, when the movement was running favourably to the adop- tion of no licence. In Tennessee the whole state was under prohibition with the exception of 5 municipalities; Arkansas, 56 out of 75 counties; Florida, 35 out of 46′ counties; Mississippi, 56 out of 77 counties; North Carolina, 70 out of 97 counties; Vermont, 3 out of 6 cities and 208 out of 241 towns. These appear to be the most prohibitive states, and they are all of a rural character. At the other end of the scale were Pennsylvania with 1 county and a few towns (" town " in America is generally equivalent to " village " in England) ; Michigan, 1 county and a few towns; California, parts of 8 or 10 counties. New York had 308 out of 933 towns, Ohio, 480 out of 768 towns, Massa- chusetts, 19 out of 33 cities and 249 out of 321 towns. At the end of 1909 a strong reaction against the prohibition policy set in, notably in Massachusetts.

There is no more uniformity in the mode of procedure than in the extent of application. At least five methods are distin- guished. In the most complete and regular form a vote is taken every year in all localities whether there shall be licences or not in the ensuing year and is decided by a bare majority. A second method of applying the general vote is to take it at any time, but not oftener than once in four years, on the demand of one-

tenth of the electorate. A third plan is to apply this principle locally and put the question to the vote, when demanded, in any locality. A fourth and entirely different system is to invest the local authority with powers to decide whether there shall be licences or not; and a fifth is to give residents power to prevent licences by means of protest or petition. The first two methods are those most widely in force; but the third plan of taking a local vote by itself is adopted in some important states, including New York, Ohio and Illinois. Opinions differ widely with regard to the success of local veto, but all independent observers agree that it is more successful than state prohibition, and the prefer- ence accorded to it by so many states after prolonged experience proves that public opinion broadly endorses that view. Its advantage lies in its adaptability to local circumstances and local opinion. It prevails mainly in rural districts and small towns; in the larger towns it is best tolerated where they are in close proximity to " safety valves " or licensed areas in which liquor can be obtained; the large cities do not adopt it. On the other hand, it has some serious disadvantages. The perpetually re- newed struggle between the advocates and opponents of prohibi- tion is a constant cause of social and political strife; and the alternate shutting up and opening of public houses in many places makes continuity of administration impossible, prevents the executive from getting the traffic properly in hand, upsets the habits of the people, demoralizes the trade and stands in the way of steady improvement.

Public Dispensaries. — This entirely different system of con- trolling the traffic has been in general operation in one state only, South Carolina; but it was also applied to certain areas in the neighbouring states of North Carolina, Georgia and Alabama. The coloured element is very strong in these states, especially in South Carolina, where the coloured far exceeds the white popula- tion. The dispensary system was inaugurated there in 1893. It had been preceded by a licensing system with local veto (adopted in 1882), but a strong agitation for state prohibition brought matters to a crisis in 1891. The usual violent political struggle, which is the only constant feature of liquor legislation in the United States, took place, partly on temperance and partly on economic grounds; and a way out was found by adopting an idea from the town of Athens in Georgia, where the liquor trade was run by the municipality through a public dispensary, A law was passed in 1892 embodying this principle but applying it to the whole state. The measure was fiercely contested in the courts and the legislature for years and it underwent numerous amendments, but it survived. Under it the state became the sole purveyor of liquor, buying wholesale from the manufacturers

and selling retail through dispensaries under public management and only for consumption off the premises. Many changes were introduced from time to time without abandoning the principle, but in 1907 the system of state control was replaced by one of county administration. Local veto is also in force, and thus the localities have the choice of a dispensary or no sale at all. The regulations are very strict. The dispensaries are few and only open on week-days and during the day-time; they close at sunset. Liquor is only sold in bottles and in not less quantities than half a pint of spirits and a pint of beer, and it must be taken away; bars are abolished. There is a general consensus of testimony to the effect of the system in improving public order especially among the coloured population, who are very susceptible to drink. The law seems to be well carried out in general, but Charleston and Columbia, the only two considerable towns, are honeycombed with illicit drink-shops, as the writer has proved by personal experience. Columbia is the capital and the seat of cotton manufactures, as are all the larger towns, with the exception of Charleston, which is the port and business centre. The population of the state is predominantly rural, and local prohibition obtains in 18 out of 41 counties.

The following statistical comparison, extracted from the United States Census of 1900

and the Inland Revenue Returns by Mr W. O. Tatum (New Encyclopedia of Social Reform) and here presented in tabular form, is highly instructive. It shows the population and number of liquor dealers paying the United States tax in two prohibition states, one state under what is considered the best licensing system, and South Carolina.

State.

Population.

Wholesale Liquor Dealers.

Retail

Liquor

Dealers.

Maine (Prohibition) Kansas (Prohibition) . Massachusetts (Licence) . S. Carolina (Dispensary) .

694,466

1,470,495 2,805,346 1,340,316

51 129

617 13

1366

3125 5092

534

This table may be said to epitomize the results of the United States restrictive liquor laws. It presents examples of three different systems; the proportion of retail liquor sellers to population is — under complete prohibition, I to 508 and I to 475 ; under licence and local prohibition, 1 to 530; under dispensary and local prohibition, I to 2509. But the remarkable thing is the enormous amount of illicit traffic existing under all three systems. It is incomparably greatest under complete prohibition because the whole of the traffic in these states is illicit. In South Carolina one of the whole- sale dealers and 388 of the 534 retailers were illicit. In Massa- chusetts the number cannot be stated, but it is very large. If the whole state were under licence the total legal number of licences, which is limited in proportion to population (see above), would be 3400 ; and in that case there would be some 1 700 illicit retailers. But a large part of the state, probably more than half, is under local prohibition, so that the majority of the 5000 retail dealers must be illicit. These facts, which are typical and not exceptional, reveal the failure of the laws to control the traffic ; only partial or spas- modic attempts are made to enforce them and to a great extent they are ignored by common consent. The illegal trade is carried on so openly that the United States revenue officers have no difficulty in collecting the federal tax. It is not a satisfactory state of things, or one which countries where law is respected would care to imitate. The example is a good lesson in what to avoid.

Taxation. — Mention has been made above of the federal and state taxation imposed on the liquor trade. The former is uniform ; the latter varies greatly, even in those states which have adopted the ” high licence.” This system is intended to fulfil two purposes; to act as an automatic check on the number of licences and to pro- duce revenue. It was introduced in Nebraska in 1 881, when a tax of 1000 dollars (£200) was placed on saloons (public houses) in large towns, and half that amount in smaller ones. The practice gradually spread and has now been adopted by a large number of states,

noticeably the populous and industrial north-eastern and central states. In Massachusetts, where the high licence was adopted in 1874 when the state returned to licensing after a trial of prohibition, the fees are exceptionally high, the minimum for a fully licensed on and off house being 1300 dollars (£260) ; in Boston the average tax ‘ s £3 10 – In New York state it ranges from 150 dollars (£30) in sparsely populated districts to 1200 dollars (£240), and in Penn- sylvania it is much the same. In New Jersey, on the other hand, it ranges from £20 to £60 ; in Connecticut from £50 to £90 ; in Rhode Island from £40 to £80. In Missouri, which has a special system of its own and a sort of sliding scale, great variations occur and in some cases the tax exceeds £500. In Michigan it is uniform at £100. The mean for the large cities is £133. The revenue derived from this

source is distributed in many ways, but is generally divided in varying proportions between the state, the county and the munici- pality; sometimes a proportion goes to the relief of the poor, to road-making or some other public purpose. The amount levied in the great cities is very large. It will be seen from the foregoing that the taxation of licences is much heavier in the United States than in the United Kingdom. The total yield was ascertained by a special inquiry in 1896 and found to be rather less than 12 millions sterling; in the same year the yield from the same source in the United Kingdom was just under 2 millions. Allowing for difference of population the American rate of taxation was 3J times as great as the British. It has been inferred that the liquor trade is much more highly taxed in the United States and that it would bear largely increased taxation in the United Kingdom ; that argument was brought forward in support of Mr Lloyd George’s budget of 1909. But it only takes account of the tax on licences and leaves out of account the tax on liquor which is the great source of revenue in the United Kingdom, as has been shown above. The scales are much lower in the United States, especially on spirits, which are only taxed at the average rate of 5s. 8d. a gallon against us. (raised to 14s. 9d. in 1909) in the United Kingdom. Mr Frederic Thompson has calculated out the effect of the two sets of rates and shown that if British rates were applied to the United States the average yield in the three years ending 1908 would be raised from 44 millions to 76 millions ; and conversely if American rates were applied to the United Kingdom the average yield would be lowered from 36 millions to 23 millions. Taking licences and liquor taxation together he finds that the application of the British standards for both would still raise the total yield in the United States by 39%; and that even the exceptionally high rates prevailing in Massachusetts would, if applied to the United Kingdom, produce some 4 millions less revenue than the existing taxation. Other calculations based on the consumption and taxation per head lead to the same con- clusion that the trade is actually taxed at a considerably higher rate in the United Kingdom. In the three years ending 1908 the average amount paid per head in taxation was 13s. 8|d. in the United States and 17s. 6|d. in the United Kingdom. It may be added that the method of taxing licences heavily has certain dis- advantages; it stimulates that illicit trade which is the most out-standing feature of the traffic in the United States, and combined with the extreme insecurity of tenure involved in local option it gives licence-holders additional inducements to make as much money as possible by any means available, while they have the opportunity, for no compensation is ever paid for sudden dis- possession. The notion that the trade will stand an indefinite amount of taxation is a dangerous and oft-proved fallacy.

European Countries. With the exception of Sweden, Norway and Russia, which have special systems of their own, the continental countries of Europe have as yet paid comparatively little legislative attention to the subject of the liquor traffic, which is recognized by the law but for the most part freely permitted with a mini- mum of interference. Differences exist, but, generally speaking, establishments may be opened under a very simple procedure, which amounts to an elementary form of licensing, and the permission is only withdrawn for some definite and serious offence. Regulations and conditions are for the most part left to the discretion of the local authority and the police and are not burdensome. The reason for such freedom as compared with the elaborate and stringent codes of the United Kingdom and the United States is not less

concern for public welfare but the simple fact that the traffic gives less trouble and causes less harm through the abuse of drink; the habits of the people are different in regard to the character of the drinks consumed, the mode of consumption and the type of establishment. Cafes, restaurants and beer-gardens are much more common, and mere pot-houses less so than in the English-speaking countries. Where trouble arises and engages the attention of the authorities and the legislature, it is almost invariably found to be associated with the consumption of spirits. In several of the wine-producing countries, which are generally marked by the temperate habits of the people, the widespread havoc among the vines caused some years ago by the phylloxera led to an increased consumption of spirits which had a bad effect and aroused considerable anxiety. This was notably the case in France, where an anti-alcohol congress, held in 1903, marked the rise of public and scientific opinion on the subject. Temperance societies have become active, and in some countries there is a movement towards stricter regulations or at least a demand for it; but in others the present law is a relaxation of earlier ones.

France. — The present law governing the licensing of establish- ments where liquor is sold for consumption on the premises was passed in 1880; it abrogated the previous decree of 1 851, by which full discretion was vested in the local authorities, and freed the traffic from arbitrary restrictions. It provides that any person desiring to open a cafe, cabaret or other place for retailing liquor must give notice to the authorities, with details concerning himself, the establishment and the proprietor, at least 15 days beforehand; the authority in Paris is the prefecture of police and elsewhere the mairie. Transfers of proprietorship or management must be notified within 15 days, and intended transference of location 8 days before- hand. The penalty for infraction is a fine of 16 francs to 100 francs. Legal minors and persons convicted of certain crimes and offences — theft, receiving stolen goods, various forms of swindling, offences against morality, the sale of adulterated articles — are prohibited; in the case of crimes, for ever; in the case of offences, for five years. Otherwise permission cannot be refused, subject to conditions which the local authority has power to lay down regulating the distance | of such establishments from churches, cemeteries, hospitals, schools and colleges. But persons engaged in the trade, who are convicted of the offences mentioned above and of infraction of the law for the suppression of public drunkenness, are disabled, as above. The law practically amounts to free trade and the number of houses has increased under it; in 1900 there was one to every 81 persons. This proportion is only exceeded by Belgium. Under the Local Government Act of 1884 municipal authorities are empowered, for the maintenance of public order, to fix hours of closing, regulate dancing, forbid the employment of girls and the harbouring of prostitutes and make other regulations. The hours of closing differ considerably but usually they are 11 P.M., midnight or 1 a.m. The trade is lightly taxed; retailers pay from 15 to 50 francs a year; wholesale dealers, 125 francs; breweries the same in most departments, distilleries 25 francs. The excise revenue from liquor amounted to £20,000,000 in 1900.

Germany. — The German law and practice are broadly similar to the French, but the several states vary somewhat in detail. Under the imperial law of 1879 inns or hotels and retail trade in spirits for on or off consumption may not be carried on without a permit or licence from the local authority which, however, can only be refused on the ground of character or of unsuitability of premises. This is the general law of the empire; but the state governments are empowered to make the granting of a licence for retailing spirits dependent on proof that it is locally required, and also to impose the same condition on inn-keeping and the retailing of other drinks in places with less than 15,000 inhabitants and in larger ones which obtain a local statute to that effect. Before a licence is granted the opinion of the police and other executive officers is to be taken.

The licensing authority is the mayor in towns and the chairman of the district council in rural areas. The provisions with regard to the dependence of a licence on local requirements have been adopted by Prussia and other states, but apparently little or no use is made of them. Permits are very freely granted, and the number of licensed houses, though not so great as in France, is very high in proportion to population. Three classes of establishment are recognized — (1) Gasl-wirthschaft, (2) Schank-wirthschaft, (3) Klein- handel. Gast-wirthschaft is inn-keeping, or the lodging of strangers in an open house for profit, and includes " pensions " of a public character; the imperial law provides that a licence may be limited to this function and need not include the retailing of liquor. Schank- ■wirthschaft is the retailing for profit of all sorts of drinks, including coffee and mineral waters; it corresponds to cafe in France and refreshment house in England; but the mere serving of food does not come under the law with which we are here concerned. Klein- handel is retail sale either for on or off consumption, and the liquor for which a licence is required in this connexion is described as branntwein or spiritus, and is defined as distilled alcoholic liquor, whether by itself or in combination. A licence for Schank- wirthschaft includes Klein-handel, but not vice-versa; none is re- quired for the retail sale of wine which is the seller's own produce. Licences may be withdrawn for offences against the law. Licensed houses are under the supervision of the police, who fix the hours of closing; it is usually 10 p.m., but is commonly extended to 11 p.m. or midnight in the larger towns and still later in the case of particular establishments. Some cafes in Berlin do not close till 3 A.M. and some never close at all. Persons remaining on the premises in forbidden hours after being ordered to leave by the landlord are liable to punishment. Serving drunkards and persons of school age is for- bidden. Drunkards, in addition to fines or imprisonment for dis- orderly conduct, are liable to be deprived of control of their affairs and placed under guardianship. For music and dancing special permits are required. With regard to taxation, in Prussia all business establishments beyond a certain value pay an annual tax and licensed houses are on the same footing as the rest. Businesses producing less than £75 a year or of less than £150 capital value are tree; the rest are arranged in four classes on a rising scale. In the three lower classes the tax ranges from a minimum of 4s. to a maximum of £24; in the highest class, which represents businesses producing £2500 and upwards (or a capital value of £50,000 and upwards) the tax is 1 % of the profits. There is also a stamp duty on the licence ranging from is. 6d. to £5. The latter goes to the xvi. 25

local revenue, the business tax to the government. Beer and spirits are also subject to an excise tax, from which the imperial revenue derived £7,700,000 in 1901 ; but the total taxation of the liquor trade could only be calculated from the returns of all the federated states.

The laws of France and Germany are fairly representative of the European states, with some minor variations. In Holland the number of licensed spirit retailers is limited in proportion to popula- tion (1 to 500), and the taxation, which is both national and local, ranges from 10 to 25 % of the annual value.

In Austria-Hungary and Rumania the licence duty is graduated according to the population of the place, as used to be the case in Prussia. In 1877 a severe police law was applied to Galicia in order to check the excesses of spirit-drinking. The Poles, it may be observed, are spirit-drinkers, and the exceptional treatment of this part of the Austrian empire is one more illustration of the trouble arising from that habit, which forces special attempts to restrain it. The law, just mentioned, in Holland is another instance; and the particular cases of Russia and Scandinavia, described below, enforce the same lesson. Where the drink of the people is confined to wine and beer there is comparatively little trouble. In Switzerland the manufacture and wholesale sale of spirits has been a federal monopoly since 1887, but the retailing is a licensed trade, as elsewhere, and is less restricted than formerly. Before federation in 1874 the cantons used to direct local authorities to restrict the number of licences in proportion to population ; but under the new constitution the general principle of free trade was laid down, and the Federal Council intimated to the cantonal authorities that it was no longer lawful to refuse a licence on the ground that it was not needed.

Russia. — In 1895 Russia entered upon an experiment in regard to the spirit traffic and began to convert the previously existing licence system into a state monopoly. The experiment was held to be successful and was gradually extended to the whole country. Under this system, which to some extent resembles that of South Carolina but is much less rigid, the distilleries remain in private hands but their output is under government control. The retail sale is confined to government shops, which sell only in sealed bottles for consumption off the premises, and to commercial establishments which sell on commission for the government. Spirit bars are abolished and only in a few high class restaurants are spirits sold by the glass; in ordinary eating-houses and at railway refreshment rooms they are sold in sealed government bottles but may be consumed on the premises. The primary object was to check the excesses of spirit-drinking which were very great in Russia among the mass of the people. The effect has been a very large reduction in the number of liquor shops, which has extended also to the licensed beer-houses though they are not directly affected as such. Presumably when they could no longer sell spirits it did not pay them to take out a licence for beer.

Sweden and Norway. — In these countries the celebrated ” Gothen- burg ” or company system is in force together with licensing and local veto. Like the Russian state monopoly the company system applies only to spirits, and for the same reason ; spirits are or were the common drink of the people and excessive facilities in the early part of the 19th century produced the usual result. The story is very similar to that of England in the 1 8th century, given above. From 1774 to 1788 distilling in Sweden was a crown monopoly, but popular opposition and illicit trade compelled the abandonment of this plan in favour of general permission granted to farmers, inn- keepers and landowners. At the beginning of the 19th century the right to distil belonged to every owner and cultivator of land on payment of a trifling licence duty, and it was further extended to occupiers. In 1829 the number of stills paying licence duty was 173,124 or I to every 16 persons; the practice was in fact universal and the whole population was debauched with spirits. The physical and moral results were the same as those recorded in England a hundred years before. The supply was somewhat restricted by royal ordinance in 1835, but the traffic was not effectively dealt with until 1855 when a law was passed which practically abolished domestic distilling by fixing a minimum daily output of 200 gallons, with a tax of about iod. a gallon. This turned the business into a manufacture and speedily reduced the number of stills. At the same time the retail sale was subjected to drastic regulations. A licensing system was introduced which gave the local authority power to fix the number of licences and put them up to auction or to hand over the retail traffic altogether to a company formed for the purpose of carrying it on. The latter idea, which is the Gothen- burg system, was taken from the example of Falun and Jonkoping which had a few years ago voluntarily adopted the plan. The law of 1855 further gave rural districts the power of local veto. Fouf- fifths of the population live in rural districts, and the great majority of them immediately took advantage of the provision. The company system, on the other hand, was not applied by the towns until 1865, when Gothenburg adopted it.

In Norway the course of events was very similar. There, too, distilling and spirit-drinking were practically universal in the early part of the century under the laws of 1816, but were checked by legislation a few years sooner than in Sweden. In 1845 a special licensing system was introduced, giving the local authority power to fix the number of licences, p.nd in 1848 the small and domestic

stills were stopped. The Gothenburg system was not adopted in Norway until 1871 and then with some modification. The essence of this method of conducting the retail traffic is that the element of private gain is eliminated. A monopoly is granted to a company consisting of a number of disinterested citizens of standing with a capital, and they manage the sale both for “on”and “ofT’consumption in the public interest. The profits, after payment of 5% on the capital, originally went in Sweden mainly to the municipality in relief of rates, in Norway to objects of public utility. The latter was considered preferable because it offers less temptation to make the profits as high as possible. Fault has, however, been found with both methods, and payment of profits to the state is now preferred. In 1894 a law was passed in Norway providing for the following distribution: 65% to the state, 20% to the company, and 15% to the municipality. In 1907 Sweden adopted a law in the same direction. The intention is to eliminate more completely the motive of gain from the traffic. In 1898 the net profits of the companies exceeded half a million sterling in Sweden and reached £117,500 in Norway.

The company system had in 1910 had more than half a century’s trial ; it had gone through some vicissitudes and been subjected to much criticism, which was balanced

by at least as much eulogy. It had held its own in Sweden, where 101 towns had adopted it in 1906. In Norway at the same date ‘it was in force in 32 towns while 29 had adopted local veto, which was extended from the country districts, where it had previously been optional, to the towns by the law of 1894.

As we have already said, it only applies to spirits. In both countries the sale of beer and wine for ” on ” consumption is carried on in the ordinary way under a licensing system; the sale of beer in bottles for consumption off the premises is practically free. The beer traffic is regarded by some as a ” safety valve ” and by others as a defect in the system. The consumption has greatly increased in Sweden; in Norway it increased up to 1900 and has since declined. But other more deleterious substitutes for spirits have come into use in the shape of concocted ” wines ” and methylated spirits. The company management has had the following effects: it has greatly reduced the number of spirit bars, improved their character and conduct, added eating-rooms, where good and cheap meals are served, stopped drinking on credit and by persons under 18 years of age, shortened the hours of sale, raised the price and lowered the strength of spirits. But the restrictions placed on the sale for consumption on the premises has stimulated the retail bottle trade and home drinking.

British Dominions. Canada. — Liquor legislation in Canada has been much influenced by the proximity and example of the United States. Licensing, modified by local veto, prevails throughout the Dominion except in the Indian settlements; but the several provinces have their own laws, which vary in stringency. As a whole the licensing system rather resembles the American than the British type. The licensing authority is either a board of commissioners or the municipality, and there has been the same tendency as in the United States to substitute the former for the latter. In British Columbia no new hotel licence is granted in cities except on the request of two-thirds of the owners and occupiers of the adjoining property, but their consent is not necessary for renewal. In other provinces the muni- cipal authority-has power to limit as well as regulate the licensed trade. Sunday closing is the rule; on week-days the usual closing hour in the large towns is 1 1 P.M. The power of locally prohibiting licensed houses by vote was introduced by the Canada Temperance Act, a federal law passed in 1875 and commonly known as the Scott Act. Extensive use has been made of it, especially in the maritime provinces, where the temperance sentiment is very strong, but in recent years it has rather lost ground. In 1908 it was in force in 22 counties or cities, of which ten were in Nova Scotia, ten in New Brunswick and two in Manitoba; it was nowhere in force in the remaining provinces. Three elections were held under the act in 1907-1908, two in Nova Scotia and one in New Brunswick, and in the first two prohibition was defeated. In 1910 Nova Scotia, apparently dissatisfied with the progress of local prohibition under the Scott Act, passed a prohibitory law for the whole province, exempting Halifax, the capital and only considerable town, but making provision for its subsequent inclusion by a referendum to the ratepayers. There is in Canada the same oscillation of public opinion as in the United States, and the same toleration- of evasion of the law. The writer has stayed in hotels in several prohibition towns, where there was not only a regular bar but a printed wirte list from which anything could be ordered at meals without any concealment at all. The chief difference between the conduct of hotels under prohibition and under licensing is that under licensing the bar is closed at the legal hour, which is usually 11 o’clock, and under prohibition it remains open as long as there are any customers to serve. The law is nominally respected by imposing a periodical fine. In small towns and rural districts local prohibition is much more effective. In short the experience of Canada confirms that of the United States. In addition to the federal law, the local authorities have power, in Quebec, to prohibit as well as to regulate the trade. The high licence system has not been adopted in Canada.

The total revenue derived by the Dominion government in 1908 from taxation of the liquor trade, including duties and licence fees, was £1,800,000.

Australia. — The licensing laws of Australia are less repressive and the practice more resembles the British model. Queensland has adopted local prohibition, but it is not

applied. New South Wales has a limited form of veto applying only to new licences; South Australia has the same together with a provision for the optional reduction of licences; Victoria, on the other hand, allows an option both ways, for reducing or increasing the licences; West Australia and Tasmania merely give the local ratepayers the right of protest; in West Australia it holds good against new licences only and if a majority object the licence is refused; in Tasmania protest may be made against renewals and transfers also, but the decision lies with the licensing authority. There is practically no prohibition in the Commonwealth.

New Zealand. — This state has a licensing system with local option provisions of its own. The licensing authority is a local committee, and there are seven kinds of licence, of which two are for consumption on the premises. The fees range from £1 for a wine licence to £40 for a full publican's licence in towns, or £45 for one permitting an additional hour's sale at night ; the fees go to the revenue of the local authority. In 1907 the total number of licences granted was 2179 and the fees paid amounted to £45,865. Of the whole number, 1367, or I to every 666 persons, were houses licensed for on con- sumption. The closing hour is 10 P.M. except for houses specially licensed to be open till 11 p.m. In 1893 local option was introduced by the Alcoholic Liquors Sale Control Act, which provided for the taking of a poll on the question of licences. The electoral districts for the purpose are the same as for the House of Representatives, except that the cities of Auckland, Wellington, Christchurch and Dunedin each form a single district for the licensing poll. It is taken at the same time as the election of members of the House of Representatives, and three questions are propounded — (1) continu- ance of existing licences, (2) reduction, (3) no licences. A voter may vote for two proposals but not more. An absolute majority of all the votes recorded carries (1); an absolute majority of all the votes recorded carries (2), whereupon the licensing committee re- duces the licences by any number from 5 to 25 % of the total. But if three-fifths of all the votes cast are in favour of no licence then that supersedes (1) and (2). The poll taken in December 1905 gave the following results: of the 68 districts 40 carried no pro- posal (which is equivalent to continuance of existing licences), 18 carried continuance, 4 reduction, 6 no licence, including 3 which had previously adopted no licence. Women, it must be remembered, vote as well as men. The aggregate vote in favour of no licence shows a large proportional increase since the first poll in the present system in 1896.

Authorities. — Royal Commission on Liquor Licensing Laws 1896-1899, Reports and Appendices; Licensing Statistics of England and Wales, annual. Canada Year-book; New Zealand Year-book; Code de Commerce, France; Gewerbeordnung, German Empire; Hand-book of Canada (British Association) ; New Encyclopedia of Social Reform; Brewers' Almanack; Committee of Fifty (New York), The Liquor Problem in its Legislative Aspects (F. H. Wines and J . Koren) ; E. L. Fanshawe, Liquor Legislation in the United States and Canada; E.R.L. Gould, The Gothenburg System (Special Report of the United States Commissioner of Labor) ; E. A. Pratt, Licensing and Temperance in Sweden, Norway and Denmark ; J . Rowntree and A. Sherwell, The Temperance Problem and Social Reform; The Taxation of the Liquor Trade; A. Shad well, Drink, Temperance and Legislation; Strauss und Torney, Schanks-Konzessionswesen; F. W. Thompson, High Licence. See also Temperance. (A. Sl.)

LIRA, the Italian name (Lat. libra, pound) for a silver coin, the Italian unit of value in the Latin Monetary Union, corre- sponding to the French, Swiss and Belgian franc (q.v.), and the drachma of Greece, &c. The name is sometimes used of the Turkish pound, medjidie.

LIRI, or Garigliano (anc. Liris), a river of central Italy, which rises at Cappadocia, 7 m. W. of Avezzano, and traverses a beautiful valley between lofty mountains, running S.S.E. as far as Arce. This valley is followed by the railway from Avezzano to Roccasecca. At Isola del Liri are two fine waterfalls. Below Ceprano, the ancient Fregellae, after it has issued from the mountains, the Liri is joined by the Sacco (anc. Trerus) formed by the union of several torrents between Palestrina and Segni, and the Melfa from the mountains N.E. of Atina, and runs E. through a broader valley. It then

turns S. again through the mountains S.W. of the Via Latina (the line of which is followed by the modern railway to Naples), keeping W. of Rocca Monfina, and falls into the sea just below Minturnae, after a course of 104 m. It is not navigable at any point.

LIROCONITE, a rare mineral consisting of hydrous basic copper and aluminium arsenate, with the probable formula

CugAlˆOEOˆAsCWsˆOEUO. It crystallizes in the monoclinic system, forming flattened octahedra almost lenticular in shape (hence the German name Linsenkupfer). Characteristic is the bright sky-blue colour, though sometimes, possibly owing to differences in chemical composition, it is verdigris-green. The colour of the streak or powder is rather paler; hence the name liroconite, from the Gr. \eip6s, pale, and Kovia, powder. The hardness is 25, and the specific gravity 2-95. The mineral was found at the beginning of the 19th century in the copper mines near Gwennap in Cornwall, where it was associated with other copper arsenates in the upper, oxidized portions of the lodes. (L. J. S.)

LISBON (Lisboa), the capital of the kingdom of Portugal and of the department of Lisbon; on the right bank of the river Tagus, near its entrance into the Atlantic Ocean, in 38° 42′ 24″ N. and 9° n' 10″ W. Pop. (1900) 356,009. Lisbon, the westernmost of European capitals, is built in a succession of terraces up the sides of a range of low hills, backed by the granite mountains of Cintra. It fronts the Tagus, and the view from the river of its white houses, and its numerous parks and gardens, is comparable in beauty with the approach to Naples or Constantinople by sea. The lower reaches of the estuary form a channel (Entrada do Tejo) about 2 m. wide and 8 m. long, which is partially closed at its mouth by a bar of silt. Owing to the reclamation of the foreshore on the right, and the consequent narrowing of the waterway, the current flows very swiftly down this channel, which is the sole outlet for the immense volume of water accumulated in the Rada de Lisboa — a tidal lake formed by the broadening of the estuary in its upper part to fill a basin n m. long with an average breadth of nearly 7 m. The southern or left shore of the channel rises sharply from the water's edge in a line of almost unbroken though not lofty cliffs; the margin of the lake is flat, marshy and irregular. Lisbon extends for more than 5 m. along the shores of both channel and lake, and for more than 3 m. inland. Its suburbs, which generally terminate in a belt of vineyards, parks or gardens, interspersed with villas and farms, stretch in some cases beyond the Estrada Militar, or Estrada da Nova Circumvallacao, an inner line of defence 25 m. long, supplementary to the forts and other military works at the mouth of the Tagus, on the heights of Cintra and Alverca, and at Caxias, Sacavem, Monsanto and Ameixoeira. The climate of Lisbon is mild and equable, though somewhat oppressive in summer. Extreme cold is so rare that in the twenty years 1856-1876 snow fell only thrice; and in the 18th and early 19th centuries Lisbon was justly esteemed as a winter health-resort. The mean annual temperature is 6o-i° F., the mean for winter 50-9°, the average rainfall 29-45 in- As in 1906, when no rain fell between April and September, long periods of drought are not uncommon, although the proximity of the Atlantic and the frequency of sea-fogs keep the atmosphere humid; the mean atmospheric moisture is nearly 71 (ioo = saturation). There is a good water supply, conveyed to the city by two vast aqueducts. The older of these is the Aqueducto das Aguas Livres, which was built in the first half of the 18th century and starts from a point near Bellas, 15 m. W.N.W. Its conduits, which are partly under- ground, are conveyed across the Alcantara valley through a magnificent viaduct of thirty-five arches, exceeding 200 ft. in height. At the Lisbon end of the aqueduct is the Mae d'Agua (i.e. " Mother of Water "), containing a huge stone hall in the midst of which is the reservoir. The Alviella aqueduct, opened in 1880, brings water from Alviella near Pernes, 70 m. N.N.E. Numerous fountains are among the means of distribution. Sewage is discharged into the Tagus, and the sanitation of the city is good, except in the older

quarters.

Divisions of the City. — The four municipal districts (bairros) into which Lisbon is divided are the Alfama, or old town, in the east; the Cidade Baixa, or lower town, which extends inland from the naval arsenal and custom house; the Bairro Alto, comprising all the high ground west of the Cidade Baixa; and the Alcantara, or westernmost district, named after the small river Alcantara, which flows down into the Tagus. Other

names commonly used, though unofficial, are ” Lisboa Oriental ” as an alternative for Alfama; ” Lisboa Occidental ” for the slopes which lead from the Cidade Baixa to the Bairro Alto; ” Buenos Ayres ” (originally so named from the number of its South American residents) for the Bairro Alto S.W. of the Estrella Gardens and E. of the Necessidades Park; ” Campo de Ourique ” and ” Rato ” for the suburbs respectively N.W. and N.E. of Buenos Ayres.

The Alfama. — The Alfama, which represents Roman and Moorish Lisbon, is less rich in archaeological interest than its great antiquity might suggest, although parts of a Roman temple, baths, &c, have been disinterred. But as the earthquake of 1755 did comparatively little damage to this quarter, many of its narrow, steep and winding alleys retain the medieval aspect which all other parts of the city have lost ; and almost rival the slums of Oporto in picturesque squalor. The most conspicuous feature of the Alfama is the rocky hill surmounted by the Castello de Sao Jorge, a Moorish citadel which has been converted into a fort and barracks. The Se Patriarchal, a cathedral founded in n 50 by Alphonso I., is said by tradition to have been a Moorish mosque. It was wrecked by an earthquake in 1344 and rebuilt in 1380, but the earthquake of 1755 shattered the dome, the roof and belfry were subsequently “burned, and after the work of restoration was completed the choir and facade were the only parts of the 14th-century Gothic church unspoiled. In one of the side chapels is the tomb of St Vincent (d. 304), patron saint of Lisbon; a pair of ravens kept within the cathedral precincts are popularly believed to be the same birds which, according to the legend, miraculously guided the saint’s vessel to the city. The armorial bearings of Lisbon, representing a ship and two ravens, commemorate the legend. Other noteworthy buildings in the Alfama are the 12th-century church of Sao Vicente de F6ra, originally, as its name implies, ” outside ” the city; the 13th-century chapel of Nossa Senhora do Monte; the 16th-century church of Nossa Senhora da Graca, which contains a reputed wonder-working statue of Christ and the tomb of Alphonso d’Albuquerque (1453-1515); and a secularized Augustinian monastery, used as the archbishop’s palace.

Modern Lisbon. — West of the Alfama the city dates chiefly from the period after the great earthquake. Its lofty houses, arranged in long straight streets, its gardens and open spaces, a few of its public buildings, and almost all its numerous statues and fountains, will bear comparison with those of any European capital. The centre of social and commercial activity is the district which comprises the Praca do Commercio, Rua Augusta, Rocio, and Avenida da Liberdade, streets and squares occupying the valley of a vanished tributary of the Tagus. Tjie Praca do Commercio is a spacious square, one side of which faces the river, while the other three sides are occupied by the arcaded buildings of the custom house, post office and other government property. In the midst is a bronze equestrian statue of Joseph I., by J. M. de Castro, which was erected in 1775 and gives point to the name of ” Black Horse Square ” commonly applied to the Praca by the British. A triumphal arch on the north side leads to Rua Augusta, originally intended to be the cloth-merchants’ street; for the plan upon which Lisbon was rebuilt after 1755 involved the restriction of each industry to a specified area. This plan succeeded in the neighbouring Rua Aurea and Rua da Prata, still, as their names indicate, famous for goldsmiths’ and silversmiths’ shops. Rua Augusta terminates on the north in the Rocio or Praca de Dom Pedro Quarto, a square paved with mosaic of a curious undulatory pattern and containing two bronze fountains, a lofty pillar surmounted by a statue of Pedro IV., and the royal national theatre (Theatro de Dona Maria Segunda), erected on the site which the Inquisition build- ings occupied from 1520 to 1836. The narrow Rua do Principe, leading past the central railway

station, a handsome Mauresque building, connects the Rocio with the Avenida da Liberdade, one of the finest avenues in Europe. The central part of the Avenida, a favourite open-air resort of Lisbon society, is used for riding and driving; on each side of it are paved double avenues of trees, with flower-beds, statues, ponds, fountains, &c, and

between these and the broad pavements are two roadways for trams and heavy traffic. Thus the Avenida has the appearance of three parallel streets, separated by avenues of trees instead of houses. Its width exceeds 300 ft. It owes its name to an obelisk 98 ft. high, erected in 1882 at its southern end, to commemorate the liberation of Portugal from Spanish rule (December, 1640). North and north-east of the Avenida are the Avenida Park, the Edward VII. Park (so named in memory of a visit paid to Lisbon by the king of England in 1903), Campo Grande, with its finely wooded walks, and Campo Pequeno, with the bull-ring. Other noteworthy public gardens are the Passeio da Estrella, commanding magnificent views of the city and river, the Largo do Principe Real, planted with bananas and other tropical trees, the Tapada das Necessidades, originally the park of one of the royal residences, and the Botanical Gardens of the poly- technic school, with a fine avenue of palms and collections of tropical and subtropical flora hardly surpassed in Europe. There are large Portuguese cemeteries east and west of Lisbon, a German cemetery, and an English cemetery, known also as Os Cypreslcs from the number of its cypresses. This was laid out in 171 7 at the cost of the British and Dutch residents and contains the graves of Henry Fielding (1707-17 54), the novelist, and Dr Philip Doddridge (1702-1751), the Non- conformist divine.

Lisbon is the seat of an archbishop who since 17 16 has borne ex officio the honorary title of patriarch; he presides over the House of Peers and is usually appointed a cardinal. The churches of modern Lisbon are generally built in the Italian style of the 1 8th century; the interiors are overlaid with heavy ornament. Perhaps the finest is the Estrella church, with its white marble dome and twin towers visible for many miles above the city. The late Renaissance church of Sao Roque contains two beautiful chapels dating from the 18th century, one of which is inlaid with painted tiles, while the other was constructed in Rome of coloured marbles, and consecrated by the pope before being shipped to Lisbon. Its mosaics and lapis lazuli pillars are exceptionally fine. The 14th-century Gothic Igreja do Carmo was shattered by the great earthquake. Only the apse, pillared aisles and outer walls remain standing, and the interior has been converted into an archaeological museum. The church of Nossa Senhora da Conceicao has a magnificent Manoeline facade.

The Palacio das Cortes, in which both Houses of Parliament sit, is a 16th-century Benedictine convent, used for its present purpose since 1834. It contains the national archives, better known as the Torre do Tombo collection, because in 1375 the archives were first stored in a tower of that name. The royal palace, or Paco das Necessidades, west of Buenos Ayres, is a vast 18th-century mansion occupying the site of a chapel dedicated to Nossa Senhora das Necessidades (i.e. ” Our Lady who helps at need “)•

The Suburbs of Ajuda and Belem. — In the extreme west of Lisbon, beyond the Alcantara valley, are Belem (i.e. ” Bethlehem “), beside the Tagus, and Ajuda, on the heights above. The Paco de Belem, built in 1700 for the counts of Aveiro, became the chief royal palace under John V. (1706-1750). The Torre de Belem, on the foreshore, is a small tower of beautiful design, built in 1520 for the protection of shipping. The finest ecclesiastical building in Portugal except the monasteries of Alcoba(;a and Batalha also fronts the river. It is the Convcnto dos Jeronymos, a Hieronymite convent and church, founded in 1499 to commemorate the discovery of the sea- route to India by Vasco da Gama. It was built of white limestone by Joao de Castilho (d. 1581), perhaps the greatest of Manoeline archi- tects. Its cloisters form a square with blunted corners, surrounded by a two-storeyed arcade, every available portion of which is

covered with exquisite sculptures. Parts of the building have been restored, but the cloisters and the beautiful central gateway remain unspoiled. The interior contains many royal tombs, including that of Catherine of Braganza (d. 1705), the wife of Charles II. of England. The supposed remains of Camocns and Vasco da Gama were interred here in 1880. In 1834, when the convent was secularized, its build- ings were assigned to the Casa Pia, an orphanage founded by Maria I. Since 1903 they have contained the archaeological collections of the Portuguese Ethnological Museum. The royal Ajuda palace, begun (1816-1826) by John VI. but left unfinished, derives its name from the chapel of N. S. de Ajuda (" Our Lady of Aid "). It contains some fine pictures and historical trophies. In the coach- house there is an unsurpassed collection of state coaches, \he cars

upon which figures of saints are borne in procession, sedan chairs, old cabriolets and other curious vehicles.

The Environs of Lisbon. — The administrative district of Lisbon has an area of 3065 sq. m., with a population of 709,509 in 1900. It comprisesthe lower parts of the Tagus and Sado; the sea-coast from 5 m. S. of Cape Carvoeiro to within 3 m. of the bluff called the Escarpa do Rojo ; and a strip of territory extending inland for a mean distance of 30 m. This region corresponds with the southern part of Estremadura (q.v.). Its more important towns, Setubal, Cintra, Torres Vedras and Mafra, are described in separate articles. Sines, a small seaport on Cape Sines, was the birthplace of Vasco da Gama. On the left bank of the Tagus, opposite Lisbon, are the small towns of Almada, Barreiro, Aldeia Gallega and Seixal, and the hamlet of Trafaria, inhabited by fishermen. The beautiful strip of coast west of Oeiras and south of Cape Roca is often called the " Portuguese Riviera." Its fine climate, mineral springs and sea- bathing attract visitors at all seasons to the picturesque fortified bay of Cascaes, or to Estoril, Mont' Estoril and Sao Joao do Estoril, modern towns consisting chiefly of villas, hotels and gardens. The Boca do Inferno (" Mouth of Hell ") is a cavity in the rocks at Cascaes resembling the Bufador at Peniscola (q.v.). The villages of Carcavellos, Bucellas, Lumiar and Collares produce excellent wines; at Carcavellos is the receiving station for cables, with a large British staff, and a club and grounds where social and athletic meetings are held by the British colony. Alhandra, on the right bank of the Tagus, above Lisbon, was the birthplace of Albuquerque ; fighting bulls for the Lisbon arena are bred in the adjacent pastures.

Railways, Shipping and Commerce. — Lisbon has five railway stations — the central (Lisboa-Rocio), for the lines to Cintra, northern and central Portugal, and Madrid via Valencia de Alcantara; the Santa Apolonia or Caes dos Soldados, at the eastern extremity of the quays, for the same lines (excluding Cintra) and for southern Portugal and Andalusia; the Caes do Sodre and Santos, farther west along the quays, for Cascaes; and the Barreiro, on the left bank of the Tagus, for southern Portugal. In 1902 the railways north and south of the Tagus were connected near Lisbon by a bridge. In the previous year an extensive system of electric tramways replaced the old- fashioned cable cars and mule trams. Electric and hydraulic lifts are used where the streets are too steep for trams. Lisbon is lighted by both electricity and gas; it has an admirable telephone service, and is connected by the Carcavellos cable- station with Cornwall (England), Vigo in Galicia, Gibraltar, the Azores and Madeira.

Ships of the largest size can enter the Tagus, and the Barreiro inlet is navigable at low water by vessels drawing 16 ft. There are extensive quays along the right bank, with- hydraulic cranes, two graving docks, a slipway, warehouses and lines of railway. The government and private docks are on the left bank. Loading and discharging are principally effected by means of lighters. The exports are wines, oil, fruit, tinned fish, salt, colonial produce, cork, pitwood, leather and wool. The imports include cotton and woollen goods, linen, ale and porter, butter, tea, hardware, tin plates, coal, iron, machinery, chemical manure, &c, from Great Britain; grain and petroleum from the United States; dried codfish from Norway and Newfoundland; silks, perfumery and fancy goods from France; hemp, flax, grain, petroleum and cloth from Russia; linen, machinery, hardware, sugar, &c, from Germany and Holland; iron, steel, timber, pitch

and salt fish from the Baltic; cocoa, coffee, wax and rubber from the Portuguese colonies. Towards the close of the 19th century the tourist traffic from Great Britain and Germany attained con- siderable importance, and Lisbon has long been one of the principal ports of debarcation for passengers from Brazil and of embarcation for emigrants to South America. Shipbuilding, including the construction of vessels for the national navy, is a growing industry. The fisheries have always been important, and in no European fishmarket is the produce more varied. Sardines and tunny are cured and tinned for export. In addition to a fleet of about 600 sailing boats, the Tagus is the headquarters of a small fleet of steam trawlers. The industries of Lisbon in- clude dyeing, distillation of spirits and manufactures of woollen, cotton, silk and linen fabrics, of pottery, soap, paper, chemicals, cement, corks, tobacco, preserved foods and biscuits.

Education and Charity. — Although the seat of the only uni- versity in Portugal was fixed at Coimbra in 1527, Lisbon is the educational centre of the Portuguese world, including Brazil.

Its chief learned societies are the Society of Medical Sciences, the Geographical Society, the Royal Academy of Sciences, the Academy of Fine Arts, the Royal Conservatory of Music and the Propaganda de Portugal. The museum of the Academy of Fine Arts contains the largest collection of pictures and statues by native and foreign artists in Portugal The Geographical Society has gained an international reputation; it possesses a valuable library and museum. The National Library, founded in 1796, contains over 400,000 printed books, and upwards of 9000 MSS. There are also colonial, naval, artillery, natural history and commercial museums, meteorological and astronomical ob- servatories, zoological gardens and an aquarium. Purely edu- cational institutions include the medical, polytechnic, military and naval schools, commercial, agricultural and industrial institutes, a school of art, a central lyceum, a school for teachers, &c. The English college for British Roman Catholics dates from 1628. The Irish Dominicans have a seminary, and Portu- guese ecclesiastical schools are numerous. There are hospitals for women, and for contagious diseases, almshouses, orphanages, a foundling hospital and a very large quarantine station on the south bank of the Tagus, founded in 1857 after an outbreak of yellow fever had devastated the city. Foremost among the theatres, circuses and other places of amusement is the royal opera-house of Sao Carlos, built in 1 792-1 793 on the model of the Scala at Milan.

Population. — The population of Lisbon, 187,404′ in 1878, rose to 301,206 in 1890 and 356,009 in 1900. It includes a large foreign colony, composed chiefly of Spaniards, British, Germans, French, Brazilians and immigrants from the Portuguese colonies, among whom are many half-castes. The majority of the Spaniards are domestic servants and labourers from Galicia, whose industry and easily gained knowledge of the kindred Portuguese language enables them to earn a better livelihood here than in their own homes. The British, German and French communities control a large share of the foreign -trade. The Brazilians and colonial immigrants are often merchants and landowners who come to the mother-country to spend their fortunes in a congenial social environment.

The street life of the city is full of interest. The bare-footed, ungainly fishwives, dressed in black and bearing flat trays of fish on their heads; the Galician water-carriers, with their casks; the bakers, bending beneath a hundredweight of bread slung in a huge basket from their shoulders; the countrymen, with their sombreros, sashes and hardwood quarter-staves, give colour and animation to their surroundings; while the bag-pipes played by peasants from the north, the whistles of the knife-grinders, and the distinctive calls of the vendors of fruit, lottery tickets, or oil and vinegar, contribute a babel of sound. For church festivals and holidays the country-folk come to town, the women riding on pillions behind the men, adorned in shawls, aprons and

handkerchiefs of scarlet or other vivid hues, and wearing the strings of coins and ornaments of exquisite gold and silver filigree which represent their savings or dowries. The costumes and manners of all classes may be seen at their best in the great bull-ring of Campo Pequeno, a Mauresque building which holds many thousands of spectators. A Lisbon bull- fight is a really brilliant exhibition of athletic skill and horseman- ship, in which amateurs often take part, and neither horses nor bulls are killed. There is a Tauromachic Club solely for amateurs. History. — The name Lisbon is a modification of the ancient name Olisipo, also written Ulyssippo under the influence of a mythical story of a city founded by Odysseus (Ulysses) in Iberia, which, however, according to Strabo, was placed by ancient tradition rather in the mountains of Turdetania (the extreme south of Spain). Under the Romans Olisipo became a municipium with the epithet of Felicitas Julia, but was inferior in importance to the less ancient Emerita Augusta (Merida). From 407 to 585 it was occupied by Alaric, and thenceforward by the Visigoths until 711, when it was taken by the Moors. Under the Moors the town bore in Arabic the name of Al Oshbuna or Lash- buna. It was the first point of Moslem Spain attacked by the Normans in 844. When Alphonso I. of Portugal took advantage of the decline and fall of the Almoravid dynasty to incorporate the provinces of Estremadura and Alemtejo in his new kingdom, 1 This figure represents the population of a smaller area than that of modern Lisbon, for the civic boundaries were extended by a decree dated the 23rd of December 1886.

Lisbon was the last city of Portugal to fall into his hands, and yielded only after a siege of several months (21st October 1147), in which he was aided by English and Flemish crusaders on their way to Syria. In 1184 the city was again attacked by the Moslems under the powerful caliph Abu Yakub, but the enterprise failed. In the reign of Ferdinand I., the greater part of the town was burned by the Castilian army under Henry II. (1373), and in 1384 the Castilians again besieged Lisbon, but without success. Lisbon became the seat of an archbishop in 1390, the seat of government in 1422. During the 16th century it gained much in wealth and splendour from the establishment of a Portuguese empire in India and Africa. From 1580 to 1640 Lisbon was a provincial town under Spanish rule, and it was from this port that the Spanish Armada sailed in 1588. In 1640 the town was captured by the duke of Braganza, and the independence of the kingdom restored.

For many centuries the city had suffered from earthquakes, and on the 1st of November 1755 the greater part of it was reduced almost in an instant to a heap of ruins. A tidal wave at the same time broke over the quays and wrecked the shipping in the Tagus; fire broke out to complete the work of destruction; between 30,000 and 40,000 persons lost their lives; and the value of the property destroyed was about £20,000,000. The shock was felt from Scotland to Asia Minor. Careful investigation by Daniel Sharpe, an English geologist, has delimited the area in and near Lisbon to which its full force was confined. Lisbon is built in a geological basin of Tertiary formation, the upper portion of which is loose sand and gravel destitute of organic remains, while below these are the so-called Almada beds of yellow sand, calcareous sandstone and blue clay rich in organic remains. The Tertiary deposits, which altogether cover an area of more than 2000 sq. m., are separated near Lisbon from rocks of the Secondary epoch by a great sheet of basalt. The upper- most of these Secondary rocks is the hippurite limestone. It was found that no building on the blue clay escaped destruction, none on any of the Tertiary deposits escaped serious injury, and all on the hippurite limestone and basalt were undamaged. The line at which the earthquake ceased to be destructive thus corresponded exactly with the boundary of the Tertiary deposits.

At the beginning of the 19th century the French invasion, followed by the removal of the court to Rio de Janeiro, the Peninsular War, the loss of Brazil and a period of revolution and dynastic trouble, resulted in the utter decadence of Lisbon, from which the tity only recovered after 1850 (see Portugal: History).

Bibliography. — Every book which deals with the topography, trade or history of Portugal as a whole necessarily devotes a portion of its space to the capital ; see Portugal : Bibliography. The follow- ing treat more exclusively of Lisbon: A. Dayot,

Lisbonne (No. ix. of the " Capitales du monde " series) (Paris, 1892) ; Freire de Oliveira, Elementos para a historia do municipio de Lisboa (9 vols., Lisbon, 1885-1898); J. de Castilho, Lisboa antiga (7 vols., Lisbon, 1890), and (by the same author) A Ribeira de Lisboa (Lisbon, 1893).

LISBURN, a market town, and cathedral city of Co. Antrim, Ireland, situated in a beautiful and fertile district on the Lagan, and on the Great Northern railway, 8 m. S.S.W. of Belfast. Pop. (1901) 11,461. Christ Church (1622) which possesses a fine octagonal spire, is the cathedral church of the united Protestant dioceses of Down, Connor and Dromore, and contains a monument to Jeremy Taylor, who was bishop of the see. The public park was presented to the town by Sir Richard Wallace (d. 1890), and after his death the castle gardens were also given to the town. The staple manufacture is linen, especially damasks and muslins, originally introduced by Huguenots. There are also bleaching and dyeing works, and a considerable agricultural trade. The town is governed by an urban district council. The ruins of Castle Robin, 2 m. N. of the town, stand on a summit of the White Mountains, and the building dates from the time of Queen Elizabeth. At Drumbo, 35 m. E. of Lisburn, is one of the finest examples of early fortification in Ireland, known as the Giant's Ring, with a cromlech in the centre. Here are also a round tower and the remains of a church ascribed to St Patrick.

In the reign of James I., Lisburn, which was then known as Lisnegarvy (Gambler's Fort), was an inconsiderable village, but in 1627 it was granted by Charles I. to Viscount Conway, who erected the castle for his residence, and laid the foundation of the prosperity of the town by the introduction of English and Welsh settlers. In November 1641 the town was taken by the insurgents, who on the approach of superior numbers set fire to it. The troops of Cromwell gained a victory near the town in 1648, and the castle surrendered to them in 1650. The church was constituted a cathedral in 1662 by Charles II., from whom the town received the privilege of returning two members to parliament, but after the Union it returned only one and in 1885 ceased to be a parliamentary borough. Lisburn gives the titles of earl and viscount to the family of Vaughan.

LISIEUX, a town of north-western France, capital of an arrondissement in the department of Calvados, 30 m. E. of Caen by rail. Pop. (1906) 15,194. Lisieux is prettily situated in the valley of the Touques at its confluence with the Orbiquet. Towers of the 1 6th century, relics of the old fortifications, remain, and some of the streets, bordered throughout by houses of the 14th, 15th and 16th centuries, retain their medieval aspect. The church of St Peter, formerly a cathedral, is reputed to be the first Gothic church built in Normandy. Begun in the latter half of the 12th century it was completed in the 13th and 1 6th centuries. There is a lantern-tower over the crossing and two towers surmount the west facade, one only of which has a spire, added towards the end of the 16th century. In the interior there is a Lady-Chapel, restored in the 15th century by Bishop Pierre Cauchon, one of the judges of Joan of Arc. The church of St Jacques (late 15th century) contains beautiful glass of the Renaissance, some remarkable stalls and old frescoes, and a curious picture on wood, restored in 1681. The church of St Desir (18th century) once belonged to a Benedictine abbey. The old episcopal palace near the cathedral is now used as a court-house, museum, library and prison, and contains a beautiful hall called the salle doree. Lisieux is the seat of a sub-prefect, and has tribunals of first instance and of commerce, a chamber of arts and manufactures, a board of trade arbitrators and a communal college. Its manufactures of woollens are important, and bleaching, wool and flax-spinning, tanning, brewing, timber- sawing, metal-founding, and the manufacture of machinery, hosiery and boots and shoes are carried on; there is trade in grain, cattle and cheese.

In the time of Caesar, Lisieux, under the name of Noviomagus, was the capital of the

Lexovii. Though destroyed by the barbarians, by the 6th century it had become one of the most important towns of Neustria. Its bishopric, suppressed in 1802, dates from that period. In 877 it was pillaged by the Normans; and in 911 was included in the duchy of Normandy by the treaty of St Clair-sur-Epte. Civil authority was exercised by the bishop as count of the town. In 1136 Geoffrey Plantagenet laid siege to Lisieux, which had taken the side of Stephen of Blois. The town was not reduced till 1141, by which time both it and the neighbourhood had been brought to the direst extremities of famine. In 1152 the marriage of Henry II. of England to Eleanor of Guienne, which added so largely to his dominions, was celebrated in the cathedral. Thomas a Becket took refuge here, and some vestments used by him are shown in the hospital chapel. Taken by Philip Augustus and reunited to France in 1203, the town was a frequent subject of dispute between the contending parties during the Hundred Years' War, the religious wars, and those of the League.

LISKEARD, a market town and municipal borough in the Bodmin parliamentary division of Cornwall, England, 15 m. W.N.W. of Plymouth, on the Great Western and the Liskeard and Looe railways. Pop. (1901) 4010. It lies high, above two small valleys opening to that of the Looe river, in a hilly, picturesque district. The Perpendicular church of St Martin, with a tower of earlier date, having a Norman arch, is one of the largest ecclesiastical buildings in the county. The site of a castle built by Richard, brother of Henry III. and earl of Cornwall, is occupied by public gardens. At the grammar school,

which formerly occupied a building in those gardens, Dr John Wolcot, otherwise known as Peter Pindar, was educated. Liskeard was formerly an important mining centre. Its manu- factures include leather and woollen goods, and there are iron foundries. The borough is under a mayor, 4 aldermen and 12 councillors. Area, 2704 acres.

Liskeard (Liscarret) was at the time of the Domesday Survey an important manor with a mill rendering i2d. yearly and a market rendering 4s. By the Conqueror it had been given to the count of Mortain by whom it was held in demesne. Ever since that time it has passed with the earldom or duchy of Cornwall. The fertility of its soil and the river Looe probably led to early settlement at Liskeard. Richard, king of the Romans, recognized its natural advantages and built the manor house or castle and resided there occasionally. In 1240 he constituted Liskeard a free borough and its burgesses freemen with all the liberties enjoyed by the burgesses of Launceston and Helston. In 1266 he granted fairs at the Feasts of the Assumption and St Matthew. His son Edmund earl of Cornwall in 1275 granted to the burgesses for a yearly rent of £18 (sold by William III. to Lord Somers) the borough in fee farm with its mills, tolls, fines and pleas, pleas of the crown excepted. Liskeard was made a coinage town for tin in 1304. Edward the Black Prince secured to the burgesses in 1355 immunity from pleas outside their franchise for trespass done within the borough. Queen Elizabeth granted a charter of incorporation in 1580 under which there were to be a mayor, recorder and eight councillors. This charter was surrendered to Charles II. in 1680 and a new one granted by his brother under which the corporation became a self-elected body. From 1295 to 1832 Liskeard sent two members to the House of Commons. The parliamentary franchise, at first exercised by the burgesses, was vested by James' charter in the corporation and freemen. By determining to admit no new freemen the voters became reduced to between 30 and 60. Sir Edward Coke was returned for this borough in 1620, and Edward Gibbon the historian in 1774. In 1832 Liskeard was deprived of one of its members and in 1885 it became merged in the county.

Besides the fairs already mentioned a third was added by Eliza- beth's charter to be held on Ascension Day. These are still among the most considerable cattle fairs in the county. The same charter ratified a market on Mondays and provided for another on Saturdays. The latter is now held weekly, the former twice a month. The flour mill at Lamellion mentioned in the charter of 1275, and pro- bably identical with the mill of the Domesday Survey, is still driven by water.

LISLE, ALICE (c. 1614-1685), commonly known as Lady Alice Lisle, was born about 1614. Her father, Sir White Beckenshaw, was descended from an old Hampshire family; her husband, John Lisle (d. 1664), had been one of the judges at the trial of Charles I., and was subsequently a member of Cromwell's House of Lords — hence his wife's courtesy title. Lady Lisle seems to have leaned to Royalism, but with this attitude she combined a decided sympathy with religious dissent. On the 20th of July 1685, a fortnight after the battle of Sedgemoor, the old lady consented to shelter John Hickes, a well-known Nonconformist minister, at her residence, Moyles Court, near Ringwood. Hickes, who was a fugitive from Monmouth's army, brought with him Richard Nelthorpe, also a partizan of Monmouth, and under sentence of outlawry. The two men passed the night at Moyles Court, and on the follow- ing morning were arrested, and their hostess, who had denied their presence in the house, was charged with harbouring traitors. Her case was tried by Judge Jeffreys at the opening of the "Bloody Assizes " at Winchester. She pleaded that she had no knowledge that Hickes's offence was anything more serious than illegal preaching, that she had known nothing previously of Nelthorpe (whose name was not included in the indictment, but was, nevertheless, mentioned to strengthen the case for the Crown), and that she had no sympathy with the rebellion. The jury reluctantly found her guilty, and, the law recognizing no distinc- tion between principals and accessories in treason, she was sentenced to be burned. Jeffreys ordered that the sentence

should be carried out that same afternoon, but a few days' respite was subsequently granted, and James II. allowed beheading to be substituted for burning. Lady Lisle was executed in Win- chester market-place on the 2nd of September 1685. By many writers her death has been termed a judicial murder, and one of the first acts of parliament of William and Mary reversed the attainder on the ground that the prosecution was irregular and the verdict injuriously extorted by " the menaces and violences and other illegal practices " of Jeffreys. It is, however, extremely doubtful whether Jeffreys, for all his gross brutality, exceeded the strict letter of the existing law.

See Howell, State Trials; H. B. Irving, Life of Judge Jeffreys; Stephen, History of the Criminal Law of England.

LISMORE, an island in the entrance to Loch Linnhe, Argyll- shire, Scotland, 5 m. N.W. of Oban. Pop. (1001) 500. It lies S.W. and N.E., is 05 m. long and i| m. broad, and has an area of 9600 acres. It divides the lower end of the loch into two channels, the Lynn of Morvern on the W. and the Lynn of Lome on the E. The name is derived from the Gaelic lios mdr, " great garden." Several ruined castles stand on the coast, and the highest point of the island is 500 ft. above the sea. The inhabitants raise potatoes, oats, cattle and horses, and these, with dairy produce, form the bulk of the trade. Steamers call at Auchnacrosan. A Columban monastery was founded in Lismore by St Moluag about 592. About 1200 the see of Argyll was separated from Dunkeld by Bishop John, " the English- man," and Lismore soon afterwards became the seat of the bishop of Argyll, sometimes called " Episcopus Lismoriensis," quite distinct from the bishop of the Isles (Sudreys and Isle of Man), called " Episcopus Sodoriensis " or " Insularum," whose see was divided in the 14th century into the English bishopric of Sodor and Man and the Scottish bishopric of the Isles. The Rev. John Macaulay (d. 1789), grandfather of Lord Macaulay, the historian, and the Rev. Donald M'Nicol (1735-1802), who took up the defence of the Highlands against Dr Johnson, were ministers of Lismore.

For the Book of the Dean of Lismore see Celt : Scottish Gaelic Literature.

LISMORE, a town of Rous county, New South Wales, Australia, 320 m. direct N. by E. of Sydney. Pop. (1901) 4378. It is the principal town of the north coast district, and the seat of a Roman Catholic bishop. The surrounding country is partly pastoral, and partly agricultural, the soil being very fertile. The town has a cathedral, school of art, and

other public buildings, while its industrial establishments include saw-mills, sugar-mills, butter factories and an iron foundry. Standing at the head of navigation of the Richmond river, Lismore has a large export trade in dairy produce, poultry, pigs, and pine and cedar timber.

LISMORE, a market town and seat of a diocese in Co. Waterford, Ireland, 43 m. W.S.W. of Waterford by the Waterford and Mallow branch of the Great Southern & Western Railway. Pop. (1901) 15S3. It is beautifully situated on a steep eminence rising abruptly from the Blackwater. At the verge of the rock on the western side is the old baronial castle, erected by King John in 1185, which was the residence of the bishops till the 14th century. It was besieged in 1641 and 1643, and in 1645 it was partly destroyed by fire. The present fabric is largely modern ; while the portico was designed by Inigo Jones. To the east, on the summit of the height, is the cathedral of St Carthagh, of various dates. There are portions probably of the 12th and 13th centuries, but the bulk of the building is of the 17th century, and considerable additions, including the tower and spire, were made in the 19th. There are a grammar school, a free school and a number of charities. Some trade is carried on by means of the river, and the town is the centre of a salmon fishery district.

The original name of Lismore was Maghsciath. A monastery founded here by St Carthagh in 633 became so celebrated as a seat of learning that it is said no fewer than twenty churches were erected in its vicinity. The bishopric, which is said to have originated with this foundation, was united to that of Waterford in 1363. In the 9th and beginning of the 10th centuries the town

was repeatedly plundered by the Danes, and in 978 the town and abbey were burned by the men of Ossory. Henry II., after landing at Waterford, received in Lismore castle the allegiance of the archbishops and bishops of Ireland. In 1518 the manor was granted to Sir Walter Raleigh, from whom it passed to Sir Richard Boyle, afterwards earl of Cork. From the earls of Cork it descended by marriage to the dukes of Devonshire. It was incorporated as a municipal borough in the time of Charles I., when it also received the privilege of returning members to parliament, but at the Union in 1800 it was disfranchised and also ceased to exercise its municipal functions.

LISSA (Serbo-Croation Vis; Lat. Issa), an island in the Adriatic sea, forming part of Dalmatia, Austria. Lissa lies 31 m. S. by W. of Spalato, and is the outermost island of the Dalmatian Archipelago. Its greatest length is io| m.; its greatest breadth 4! m. In shape it is a long, roughly drawn parallelogram, surrounded by a wall of rock, which incloses the fertile central plain, and is broken, on the north, west and east by natural harbours. Its culminating point is Mount Hum (1942 ft.), on the south-west. The island, which belongs to the administrative district of Lesina, is divided between two communes, named after the chief towns, Lissa (Vis), on the north, and Comisa (Komiza), on the west. Lissa, the capital, has a strongly fortified harbour. It contains the palace of the old Venetian counts Gariboldi, the former residence of the English governor, the monastery of the Minorites and at a little distance to the west the ruins of the ancient city of Issa. The islanders gain their livelihood by viticulture, for which Issa was once famous, by sardine fishing and by the distillation of rosemary oil. Pop. (1900) 9918, of whom 5261 belonged to the town and commune of Lissa, and 4657 to Comisa.

Issa is said to have been settled by people from Lesbos, the Issa of the Aegean. The Parians, assisted by Dionysius the Elder of Syracuse, introduced a colony in the 4th century B.C. During the First Punic War (265-241 B.C.) the Issaeans with their beaked ships helped the Roman Duilius; and the great republic, having defended their island against the attacks of Agron of Illyria and his queen Teuta, again found them serviceable allies in the war with Philip of Macedon (c. 215-211). As early as 996 the Venetians ruled the island, and, though they retired for a time before the Ragusans, their power was effectually established in 1278. Velo Selo, then the chief settlement, was destroyed by Ferdinand of Naples in 1483 and by the Turks in 1571. The present city arose shortly afterwards. During the Napoleonic wars, the French held Lissa until 181 1, and during this period the island prospered greatly, its population increasing

from 4000 to 1 2,000 between 1808 and 181 1. In the latter year the French squadron was defeated by the British (see below); though in the same year a French fleet, flying British colours, entered Lissa, and only retired after burning 64 merchantmen. Thenceforward the island gained a valuable trade in British goods, which, being excluded from every port under French control, were smuggled into Dalmatia. In 1812 the British established an administrative system, under native officials, in Lissa and the adjoining islands of Curzola and Lagosta. All three were ceded to Austria in 181 5.

Battles of Lissa. — Two naval actions have been fought in modern times near this island. The first took place on the 13th of March 181 1, and was fought between a Franco-Venetian squadron, under the command of an officer named Dubourdieu (of whom little or nothing else is known), and Captain (afterwards Sir) William Hoste with a small British force. The Franco- Venetian squadron (Venice was then part of the dominions of the emperor Napoleon) consisted of six frigates, of which four were of forty guns, and of five corvettes or small craft. The British squadron was composed of three frigates, the " Amphion," 32 (Captain William Hoste), the " Cerberus " (Captain Henry Whitby) and the " Active," 38 (Captain James A. Gordon). With them was the " Volage," 22 (Captain Phipps Hornby). The action has a peculiar interest because the French captain imitated the method of attack employed by Nelson at Trafalgar. He came down from windward in two lines parallel to one another,

and at an angle to the British squadron. Captain Hoste was not compelled to lie still as the allies did at Trafalgar. He stood on, and as the two French lines had to overtake him as he slipped away at an angle to their course, one of them got in the way of the other. Captain Hoste materially forwarded the success of his manoeuvre by leading the foremost French ship, the " Favorite," 40, on to a reef, which was known to himself, but not to the enemy. Both squadrons then turned, and the Franco- Venetians falling into great confusion were defeated in spite of the gallant fighting of the individual ships. Two prizes were taken and Dubourdieu was killed.

The second naval battle of Lissa was fought between the Austrian and Italian navies on the 20th of July 1866. The island, then in possession of the Austrians, was attacked by an Italian squadron from Ancona of 12 ironclads and 22 wooden vessels. One of the ironclads was damaged in a bombardment of the forts, and two were detached on other service, when an Austrian squadron of 7 ironclads, one unarmoured warship the " Kaiser " and a number of small craft which had left Fasano under the command of Admiral Tegethoff came to interrupt their operations. The Italian admiral Persano arranged his ships in a single long line ahead, which allowing for the necessary space between them meant that the Italian formation stretched for more than 2 m. Just Before the action began Admiral Persano shifted his flag from the " Re d'Italia," the fourth ship in order from the van, to the ram " Affondatore," the fifth. This made it necessary for the " Affondatore " and the ships astern to shorten speed, and, as the leading vessels stood on, a gap was created in the Italian line. Admiral Tegethoff, who was on the port bow of the Italians, attacked with his squadron in three divisions formed in obtuse angles. The Italians opened a very rapid and ill-directed fire at a distance of 1000 yds. The Austrians did not reply till they were at a distance of 300 yds. Under Tegethoff's vigorous leadership, and aided by the disorder in the Italian line, the Austrians brought on a brief, but to the Italians destructive, melee. They broke through an interval between the third and fourth Italian ships. The unarmed Austrian ships headed to attack the unarmed Italians in the rear. At this point an incident occurred to which an exaggerated importance was given. The Italian ironclad " R6 di Portogallo " of 5600 tons, in the rear of the line, stood out to cover the un- armoured squadron by ramming the Austrians. She was herself rammed by the wooden "Kaiser" (5000 tons), but received little injury, while the Austrian was much injured. The " Kaiser " and the wooden vessels then made for the protection of fort San Giorgio on Lissa unpursued. In the centre, where the action was hottest, the Austrian flagship " Ferdinand Max " of

5200 tons rammed and sank the ” Re d’ltalia.” The Italian ” Palestro ” of 2000 tons was fired by a shell and blew up. By midday the Italians were in retreat, and Tegethoff anchored at San Giorgio. His squadron had suffered very little from the wild fire of the Italians. The battle of the 20th July was the first fought at sea by modern ironclad steam fleets, and therefore attracted a great deal of attention. The sinking of the ” Re d’ltalia ” and the ramming of the ” Portogallo ” by the ” Kaiser ” gave an immense impulse to the then popular theory that the ram would be a leading, if not the principal, weapon in modern sea warfare. This calculation has not been borne out by more recent experience, and indeed was not justified by the battle itself, in which the attempts to ram were many and the successes very few. The ” Re d’ltalia ” was struck only because she was suddenly and most injudiciously backed, so that she had no way on when charged by the ” Ferdinand Max.”

For the first battle of Lissa see James’s Naval History, vol. v. (1837). A clear account of the second battle will be found in Sir S. Eardley-Wilmot’s Development of Navies (London, 1892); see also H. W. Wilson’s Ironclads in Action (London, 1896). (D. H.)

LISSA (Polish Lczno), a town in the Prussian province of Posen, 25 m. N.E. from Glogau by rail and at the junction of lines to Breslau, Posen and Landsberg. Pop. (1905) 16,021. The chief buildings are the handsome palace, the medieval town-hall, the four churches and the synagogue. Its manufactures consist

chiefly of shoes, machinery, liqueurs and tobacco; it also possesses a large steam flour-mill, and carries on a brisk trade in grain and cattle.

Lissa owes its rise to a number of Moravian Brothers who were banished from Bohemia by the emperor Ferdinand I. in the 16th century and found a refuge in a village on the estate of the Polish family of Leszczynski. Their settlement received municipal rights in 1561. During the Thirty Years’ War the population was reinforced by other refugees, and Lissa became an important commercial town and the chief seat of the Moravian Brothers in Poland. Johann Amos Comenius was long rector of the celebrated Moravian school here. In 1656 and 1707 Lissa was burned down.

See Voigt, Aus Lissas erster Bltitezeit (Lissa, 1905), and Sanden, Ceschichte der Lissaer Schule (Lissa, 1905).

LIST, FRIEDRICH (1789-1846), German economist, was born at Reutlingen, Wurttemberg, on the 6th of August 1789. Un- willing to follow the occupation of his father, who was a pros- perous tanner, he became a clerk in the public service, and by

1816 had risen to the post of ministerial under-secretary. In

181 7 he was appointed professor of administration and politics at the university of Tubingen, but the fall of the ministry in 1819 compelled him to resign. As a deputy to the Wurttemberg chamber, he was active in advocating administrative reforms. He was eventually expelled from the chamber and in April 1822 sentenced to ten months’ imprisonment with hard labour in the fortress of Asperg. He escaped to Alsace, and after visiting France and England returned in 1824 to finish his sentence, and was released on undertaking to emigrate to America. There he resided from 1825 to 1832, first engaging in farming and afterwards in journalism. It was in America that he gathered from a study of Alexander Hamilton’s work the inspiration which made him an economist of his pronounced ” National ” views. The discovery of coal on some land which he had acquired made him financially independent, and he became United States consul ‘at Leipzig in 1832. He strongly advocated the extension of the railway system in Germany, and the establishment of the Zollverein was due largely to his enthusiasm and ardour. His latter days were darkened by many misfortunes; he lost much of his American property in a financial crisis, ill-health also overtook him, and he brought his life to an end by his own hand on the 30th of November 1846.

List holds historically one of the highest places in economic thought as applied to practical objects. His principal work is entitled Das Nationale System der Politischen

Okonotnie (1841). Though his practical conclusions were different from those of Adam Miiller (1779-1829), he was largely influenced not only by Hamilton but also by the general mode of thinking of that writer, and by his strictures on the doctrine of Adam Smith. It was particularly against the cosmopolitan principle in the modern economical system that he protested, and against the absolute doctrine of free trade, which was in harmony with that principle. He gave prominence to the national idea, and insisted on the special requirements of each nation according to its circumstances and especially to the degree of its development.

He refused to Smith's system the title of the industrial, which he thought more appropriate to the mercantile system, and desig- nated the former as " the exchange-value system." He denied the parallelism asserted by Smith between the economic conduct proper to an individual and to a nation, and held that the immediate private interest of the separate members of the community would not lead to the highest good of the whole. That the nation was an existence, standing between the individual and humanity, and formed into a unity by its language, manners, historical development, culture and constitution. That this unity must be the first con- dition of the security, wellbeing, progress and civilization of the individual; and private economic interests, like all others, must be subordinated to the maintenance, completion and strengthening of the nationality. The nation having a continuous life, its true wealth must consist — and this is List's fundamental doctrine — not in the quantity of exchange-values which it possesses, but in the full and many-sided development of its productive powers. Its economic education should be more important than the immediate production of values, and it might be right that one generation should sacrifice its gain and enjoyment to secure the strength and skill of the future. In the sound and normal condition of a nation which has attained

economic maturity, the three productive powers of agriculture, manufactures and commerce should be alike developed. But the two latter factors are superior in importance, as exercising a more effective and fruitful influence on the whole culture of the nation, as well as on its independence. Navigation, railways, all higher technical arts, connect themselves specially with these factors; whilst in a purely agricultural state there is a tendency to stagnation. But for the growth of the higher forms of industry all countries are not adapted — only those of the temperate zones, whilst the torrid regions have a natural monopoly in the production of certain raw materials; and thus between these two groups of countries a division of labour and confederation of powers spontaneously takes place.

List then goes on to explain his theory of the stages of economic development through which the nations of the temperate zone, which are furnished with all the necessary conditions, naturally pass, in advancing to their normal economic state. These are (i) pastoral life, (2) agriculture, (3) agriculture united with manu- factures; whilst in the final stage agriculture, manufactures and commerce are combined. The economic task of the state is to bring into existence through legislative and administrative action the conditions required for the progress of the nation through these stages. Out of this view arises List's scheme of industrial politics. Every nation, according to him, should begin with free trade, stimulating and improving its agriculture by intercourse with richer and more cultivated nations, importing foreign manufactures and exporting raw products. When it is economically so far advanced that it can manufacture for itself, then a system of protection should be employed to allow the home industries to develop themselves fully, and save them from being overpowered in their earlier efforts by the competition of more matured foreign industries in the home market. When the national industries have grown strong enough no longer to dread this competition, then the highest stage of progress has been reached ; free trade should again become the rule, and the nation be thus thoroughly incorporated with the universal industrial union. What a nation loses for a time in exchange values during

the protective period she much more than gains in the long run in productive power — the temporary expenditure being strictly analogous, when we place ourselves at the point of view of the life of the nation, to thecostofthe industrial education of the individual. The practical conclusion which List drew for Germany was that she needed for her economic progress an extended and conveniently bounded territory reaching to the sea-coast both on north and south, and a vigorous expansion of manufactures and commerce, and that the way to the latter lay through judicious protective legislation with a customs union Comprising all German lands, and a German marine with a Navigation Act. The national German spirit, striving after independence and power through union, and the national industry, awaking from its lethargy and eager to recover lost ground, were favourable to the success of List's book, and it produced a great sensation. He ably represented the tendencies and demands of his time in his own country; his work had the effect of fixing the attention, not merely of the speculative and official classes, but of practical men generally, on questions of political economy; and his ideas were undoubtedly the economic foundation of modern Germany, as applied by the practical genius of Bismarck.

See biographies of List by Goldschmidt (Berlin, 1878) and Jentsch (Berlin, 1901), also Fr. List, ein Vorldufer und ein Opfer fur das Vaterland (Anon., 2 vols., Stuttgart, 1877); M. E. Hirst's Life of Friedrich List (London, 1909) contains a bibliography and a reprint of List's Outlines of American Political Economy (1827).

LIST (O.E. lisle, a Teutonic word, cf. Dut. lijst, Ger. Leiste, adapted in Ital. I is/a and Fr. lisle), properly a border or edging. The word was thus formerly used of a geographical boundary or frontier and of the lobe of the ear. In current usage " list " is the term applied to the " selvage " of a piece of cloth, the edging, i.e. of a web left in an unfinished state or of different material from the rest of the fabric, to be torn or cut off when it is made up, or used for forming a seam. A similar edging prevents unravelling. The material, cut off and collected, is known as " list," and is used as a soft cheap material for making slippers, padding cushions, &c. Until the employment of rubber, list was used to stuff the cushions of billiard tables. The same word probably appears, in a plural form " lists," applied to the barriers or palisades enclosing a space of ground set apart for tilting (see Tournament). It is thus used of any place of contest, and the phrase " to enter the lists " is frequently used in the sense of " to challenge." The word in this applica- tion was taken directly from the O. Fr. lisse, modern lice, in Med. Lat. liciue. This word is usually taken to be a Romanic adaptation of the Teutonic word. In medieval fortifications the Ikes were the palisades forming an outwork in front of the main walls of a castle or other fortified place, and the word was also

used of the space enclosed between the palisades and the en- ceinte; this was used for exercising troops, &c. From a trans- ference of " list," meaning edge or border, to a " strip " of paper, parchment, &c, containing a " list " of names, numbers, &c, comes the use of the word for an enumeration of a series of names of persons or things arranged in order for some specific purpose. It is the most general word for such an enumeration, other words, such as " register," " schedule," " inventory," " cata- logue," having usually some particular connotation. The chief early use of list in this meaning was of the roll containing the names of soldiers; hence to " list a soldier " meant to enter a recruit's name for service, in modern usage " to enlist " him. There are numerous particular applications of " list," as in " civil list " (q.v.), " active or retired list " in the navy or army. The term " free list " is used of an enumeration of such commodities as may at a particular time be exempt from the revenue laws imposing an import duty.

The verb " to list," most commonly found in the imperative, meaning " hark ! " is another form of " listen," and is to be referred, as to its ultimate origin, to an Indo-European root klu-, seen in Gr. xXvietc, to hear, xXeos, glory, renown, and in the English " loud." The same root is seen in Welsh cliist and Irish cluas, err. Another word "list," meaning pleasure, delight, or, as a verb, meaning " to please, choose," is chiefly found in such phrases as " the wind jloweth where it listeth." This is from the O.E. lystan, cf. Dut. lusten, Ger. liisten, to take pleasure in, and is also found in the English

doublet ” lust,” now always used in the sense of an evil or more particularly sexual desire. It is probably an application of this word, in the sense of ” inclination,” that has given rise to the nautical term ” list,” for the turning over of a ship on to its side.

LISTA Y ARAGON, ALBERTO (1775-1848), Spanish poet and educationalist, was born at Seville on the 15th of October 1775. He began teaching at the age of fifteen, and when little over twenty was made professor of elocution and poetry at Seville university. In 1813 he was exiled, on political grounds, but pardoned in 181 7. He then returned to Spain and, after teaching for three years at Bilbao, started a critical review at Madrid. Shortly afterwards he founded the celebrated college of San Mateo in that city. The liberal character of the San Mateo educational system was not favoured by the government, and in 1823 the college was closed. Lista after some time spent in Bayonne, Paris and London was recalled to Spain in 1833 to edit the official Madrid Gazette. He was one of the founders of the Ateneo, the free university of Madrid, and up till 1840 was director of a college at Cadiz. All the leading spirits of the young generation of Spaniards, statesmen, writers, soldiers and diplomatists came under his influence. He died at Seville on the 5th of October 1848.

LISTER, JOSEPH LISTER, 1st Baron (1827-), English surgeon, was born at Upton, in Essex, on the 5th of April 1827. His father, Joseph Jackson Lister, F.R.S., was eminent in science, especially in optical science, his chief claim to remem- brance being that by certain improvements in lenses he raised the compound microscope from the position of a scientific toy, ” distorting as much as it magnified,” to its present place as a powerful engine of research. Other members of Lord Lister’s family were eminent in natural science. In his boyhood Joseph Lister was educated at Quaker schools; first at Hitchin in Hert- fordshire, and afterwards at Tottenham, near London. In 1844 he entered University College, London, as a student in arts, and took his B.A. degree at the University of London in 1847. He continued at University College as a medical student, and became M.B. and F.R.C.S. in 1852. The keen young student was not long in bringing his faculties to bear upon pathology and the practice of medicine. While house-suigeon at University College Hospital, he had charge of certain cases during an out- break of hospital gangrene, and carefully observed the phenomena of the disease and the effects of treatment upon it. He was thus early led to suspect the parasitic nature of the disorder, and searched with the microscope the material of the spreading sore, in the hope of discovering in it some invading fungus; he soon convinced himself of the cardinal truth that its causes were purely local. He also minutely investigated cases of pyaemia, another terrible scourge of hospitals at that time.

and made camera lucida sketches of the appearances revealed by the microscope.

To realize Lister’s work it is necessary to remember the con- dition of surgical practice at that date. About the middle of the 19th century the introduction of anaesthetics had relieved the patient of much of the horror of the knife, and the surgeon of the duty of speed in his work. The agony of the sufferer had naturally and rightly compelled the public to demand rapid if not slap-dash surgery, and the surgeon to pride himself on it. Within decent limits of precision, the quickest craftsman was the best. With anaesthetics this state of things at any rate was changed. The pain of the operation itself no longer counted, and the surgeon was enabled not only to be as cautious and sedulous as dexterous, but also to venture upon long, pro- found and intricate operations which before had been out of the question. Yet unhappily this new enfranchisement seemed to be but an ironical liberty of Nature, who with the other hand took away what she had given. Direct healing of surgical wounds (” by first intention “), far from being the rule, was a piece of luck too rare to enter into the calculations of the operator; while of the graver surgical undertakings, however successful mechanical’ y, the mortality by sepsis was ghastly. Suppuration, phagedaena and septic poisonings of the system carried away even the most promising patients and

followed even trifling operations. Often, toe, these diseases rose to the height of epidemic pestilences, so that patients, however extreme their need, dreaded the very name of hospital, and the most skilful surgeons distrusted their own craft. New hospitals or new wards were built, yet after a very short time the new became as pestiferous as the old; and even scrupulous care in ventilation and housemaids' cleanliness failed to prevent the devastation. Surgery had enlarged its freedom, but only to find the weight of its new responsibilities more than it could bear.

When Lister was appointed to the chair of surgery in Glasgow the infirmary of that city was a hotbed of septic disease; so much so that his hospital visits evidently distressed him greatly. Windows were widely opened, piles of clean towels were supplied, but still the pestilence stalked through the vvards. The building stands to-day as it stood then, with no substantial alteration; but by the genius of Lister its surgical wards are now as free from septic accidents as the most modern hospital in the land. James Simpson, early in the 'sixties, pathetically denounced the awful mortality of operations in hospitals, and indeed uttered desperate protests against the hospital system itself; yet, not long afterwards, Lister came to prove that it was not in the hospital that the causes of that mortality lay hidden, but in the operator himself, his tools and his assistants. Happily this beneficent discovery was made in time to preserve the inestimable boon of the hospital system from the counsels of despair. When Lister took up the task speculation was on the wrong tack; the oxygen of < the air was then supposed to be the chief cause of the dissolution of the tissues, and to prevent access of air was impossible. For instance, a simple fracture, as of a bone of the leg, would do perfectly well, while in the very next bed a compound fracture — one, that is, where the skin is lacerated, and access to the seat of injury opened out — would go disastrously wrong. If the limb were amputated, a large proportion of such cases of amputation succumbed to septic poisoning.

On graduation as bachelor of medicine, Lister went to Edin- burgh, where he soon afterwards became house-surgeon to Mr Syme; and he was much impressed by the skill and judgment of this great surgeon, and also by the superiority of his method of dressing recent wounds with dry lint, as compared with the " water dressing " in use at University College. Yet under these more favourable conditions the amelioration was only one of degree; in most wounds indeed " union by first intention " was rendered impossible by the presence of the silk ligatures employed for arresting bleeding, for these could come away only by a process of suppuration: On the expiry of his house-surgeoncy in Edinburgh, Lister started in that city an extra- academical course of lectures on surgery; and in preparation for these he entered on a series of investigations into inflammation

and allied subjects. These researches, which were detailed fully in three papers in Phil. Trans. (1859), and in his Croonian lecture to the Royal Society in 1863, testified to an earnestness of pur- pose, a persevering accuracy of observation and experiment and an insight of scientific conception which show that if Lister had never developed the aseptic method of surgery, he would have taken a very high place in pathology. In his speech in Paris at the Thirteenth International Congress of Medicine in 1900, Lord Lister said that he had done no more than seize upon Pasteur's discoveries and apply them to surgery. But though Lister saw the vast importance of the discoveries of Pasteur, he saw it because he was watching on the heights; and he was watching there alone. From Pasteur Lister derived no doubt two fruitful ideas: first, that decomposition in organic substances is due to living" germs "; and, secondly, that these lowly and minute forms of vegetable life spring always, like higher organ- isms, from parents like themselves, and cannot arise de novo in the animal body. After his appointment to the Glasgow chair in i860, Lister had continued his researches on inflammation; and he had long been led to suspect that decomposition of the blood in the wound was the main cause of suppuration. The two great theories established by Pasteur seemed to Lister to open out the possibility of what had before appeared hopeless — namely, the prevention of putrefaction in the wound, and conse- quently the forestalling of suppuration. To exclude the oxygen of the air from wounds was impossible, but it might be practicable to protect them from microbes.

The first attempt to realize this idea was made upon com- pound fractures; and the means first employed was carbolic acid, the remarkable efficacy of which in deodorizing sewage made Lister regard it as a very powerful germicide. It was applied to the wound undiluted, so as to form with the blood a dense crust, the surface of which was painted daily with the acid till all danger had passed. The results, after a first failure, were in the highest degree satisfactory, so that, as Lister said in his presidential address to the British Association in Liverpool, he " had the joy of seeing these formidable injuries follow the same safe and tranquil course as simple fractures." The caustic property of undiluted carbolic acid, though insignificant in com- parison with the far greater evils to be avoided in compound fracture, made it unsuited for general surgery. To make it applicable to the treatment of abscesses and incised wounds, it was necessary to mitigate its action by blending it with some inert body; and the endeavour to find the best medium for this purpose, such as to combine perfect antiseptic efficiency with the least possible irritation of the tissues, formed the subject of experiments continued for many years in the laboratory and in the ward. At one stage in these inquiries an attempt was made to provide an atmosphere free from living organisms by means of a fine spray of a watery solution of carbolic acid; for it was then supposed by Lister to be necessary not only to purify the surgeon's hands and instruments and the skin of the patient about the seat of operation, but also to wage war with the microbes which, as Pasteur had shown, people every cubic inch of the air of an inhabited room. Under the use of the spray better results were obtained than ever before, and this success encouraged its use. But researches carried on for several years into the rela- tions of the blood to micro-organisms led Lister to doubt the harmfulness of the atmospheric dust. At the London Congress in 1881 he narrated experiments which proved that the serum of the blood is a very unfavourable soil for the development of the bacteria diffused through the air, and others which showed that the cells of an organizing blood-clot have a very remarkable power of disposing of microbes and of limiting their advance. Hence he considered it probable that in surgical operations the atmosphere might be disregarded altogether. 1 As long, however, as this was only a matter of probability, he did not dare to discard the spray. But at length, at the Berlin Congress in 1890, he was able to announce that the certainty he had so long desired had been arrived at. A careful consideration of the physical 'See Trans, of the International Medical Congress (1881), vol. ii. P- 373-

constitution of the spray had shown him that the microbes of the dust involved in its vortex could not possibly have their vitality destroyed or even impaired by it. Such being the case, the uni- form success obtained when he had trusted the spray implicitly as an aseptic atmosphere, abandoning completely certain other precautions which he had before deemed essential, proved con- clusively to his mind that the air might safely be left entirely out of consideration in operating. 1 Thus he learnt that not the spray only, but all antiseptic irrigations or washings of the wound also, with their attendant irritation of the cut surfaces, might be dispensed with — a great simplification, indirectly due to experi- ments with the spray. The spray had also served a very useful purpose by maintaining a pure condition of the entourage of the operation; not indeed in the way for which it was devised, but as a very mild form of irrigation. And Lister took care to emphasize the necessity for redoubled vigilance on the part of the surgeon and his assistants when this " unconscious caretaker," as he called it, had been discarded.

The announcement that he had given up the spray was absurdly interpreted in some quarters to mean that he had virtually abandoned his theory and his antiseptic methods. The truth is that the spray was only one of many devices tried for a while in the course of the long-continued endeavour to apply the antiseptic principle to the best advantage, and abandoned in favour of something better. Two main objects were always kept steadily in view by him — during the operation to guard the wound against septic microbes by such means as existing knowledge indicated, and afterwards

to protect it against their introduction, avoiding at the same time all needless irritation of the tissues by the antiseptic. Upon the technical methods of attaining these ends this is not the place to enlarge; suffice it to say that the endowments and the industry of the discoverer, as seen in the rapidity and flexibility of mind with which he seized upon and selected the best means, were little less remarkable than the activity of the same faculties in his original ideas.

To illustrate this opinion, his work on the ligature may be taken. It had long been the universal practice of surgeons to employ threads of silk or flax for tying arteries, long ends being left to provide escape of the pus (invariably formed during the tedious process of the separation of the ligature) together with the portion of the arterial coats included in the knot. Lister hoped that if, by antiseptic means, the thread were deprived of living microbes, it would no longer cause suppuration, but might be left with short cut ends to become embedded permanently among the tissues of the wound, which thus would be allowed to heal by primary union throughout. A trial of this method upon the carotid artery of a horse having proved perfectly successful, he applied it in a case of aneurysm in the human subject; and here again the immediate results were all that could be desired. But a year later, the patient having died from other causes, the necropsy showed remnants of the silk thread incompletely absorbed, with appearances around them which seemed to indicate that they had been acting as causes of disturbance. Thus was suggested to him the idea of employing for the ligature some material susceptible of more speedy absorption; and the antiseptic treatment of contused wounds having shown that dead tissue, if protected from putrefaction, is removed by the surrounding structures without the intervention of suppuration, he resolved to try a thread of some such nature. Catgut, which is prepared from one of the constituents of the small intestine of the sheep, after steeping in a solution of carbolic acid, was used in a preliminary trial upon the carotid artery of a calf. The animal was killed a month later, when, on dissection, a very beautiful result was disclosed. The catgut, though removed, had not been simply absorbed; pari passu with its gradual removal, fibrous tissue of new formation had been laid down, so that in place of the dead catgut was seen a living ligature embracing the artery and incorporated with it. The wound meanwhile had healed without a trace of suppuration. This success appeared to justify the use of the catgut ligature in the 1 See Verhandlungen des X inter nationalen Congresses, Bd. i. p. 33.

human subject, and for a while the results were entirely satis- factory. But though this was the case with the old samples of catgut first employed, which, as Lister was afterwards led to believe, had been ” seasoned ” by long keeping, it was found that when catgut was used fresh as it comes from the makers, it was unsuited in various ways for surgical purposes. The attempt by special preparation to obtain an article in all respects trust- worthy engaged his attention from time to time for years after- wards. To quote the words of Sir Hector Cameron, who was for several years assistant to Lord Lister, it required ” labour and toilsome investigation and experiment of which few can have any adequate idea.”

In 1869 Lister succeeded his father-in-law, Syme, in the chair of clinical surgery of Edinburgh. In 1877 he accepted an invita- tion to the chair of surgery at King’s College, London, in the anticipation that here he would be more centrally placed for communication with the surgical world at home and abroad, and might thus exercise his beneficent mission to more immediate advantage. In 1896 Lister retired from practice, but not from scientific study. From 1895 to 1900 he was President of the Royal Society. In 1883 he was created a baronet, and in 1897 he was raised to the peerage as Baron Lister of Lyme Regis. Among the Coronation honours in 1902, he was nominated an original member of the new Order of Merit.

In England Lister’s teaching was slow in making its way. The leading surgeons of Germany were among the first to seize upon the new idea with avidity and practical success; so early as 1875, in the course of a tour he made on the Continent, great festivals were held in his honour in Munich and Leipzig. The countrymen of Pasteur did not lag far behind; and it is no exaggeration to speak of Lister’s appearances in foreign

countries* at this time as triumphal.

The relation of Semmelweiss to Lister is of historical import- ance. Lister's work on- the antiseptic system began in 1864; his first publication on the subject was in March 1867. At this date, and for long afterwards, Semmelweiss was unknown, or ignored, not only by French and Germans, but also by his own Hungarian people; and this neglect broke his heart. The French Academy pronounced against his opinions, and so did the highest pathological authority in Germany. In England, till long after his death, probably his name was not so much as mentioned. In the early 'seventies Lister's method was in full operation in Hungary as elsewhere, yet none of the surgeons of Budapest ever mentioned Semmelweiss; not even when, in 1883, they gave a great banquet to Lister. It was after this occasion that Dr Duka, a Hungarian physician practising in London, wrote a biography of Semmelweiss, which he sent to Lister, and thus brought Semmelweiss before him for the first time. Thenceforth Lister generously regarded Semmelweiss as in some measure his forerunner; though Semmelweiss was not aware of the microbic origin of septic poisons, nor were his methods, magnificent as was their success in lying-in hospitals, suitable for surgical work.

In public Lord Lister's speeches were simple, clear and graceful, avoiding rhetorical display, earnest for the truth, jealous for his science and art, forgetful of himself. His writings, in like manner plain, lucid and forcible, scarcely betray the labour and thought of their production. With the courtesy and serenity of his carriage he combined a passionate humanity, so often characteristic of those who come of the Society of Friends, and a simple love of truth which showed itself in his generous encouragement of younger workers. (T. C. A.)

LISTER, MARTIN (c. 1638-1712), English naturalist and physician, was born at Radclive, near Buckingham. He was nephew of Sir Matthew Lister, physician to Anne, queen of James I., and to Charles I. He was educated at St John's College, Cambridge, 1655, graduated in 165S/9, and was elected a fellow in 1660. He became F.R.S. in 1671. He practised medicine at York until 1683, when he removed to London. In 1684 he received the degree of M.D. at Oxford, and in 1687 became F.R.C.P. He contributed numerous articles on natural history, medicine and antiquities to the Philosophical

Transactions. His principal works were Historiae animalium Angliae Ires tractatus (1678); Historiae Conchyliorum (1685- 1692), and Conchyliorum Bivalvium (1696). As a conchologist he was held in high esteem, but while he recognized the similarity of fossil mollusca to living forms, he regarded them as inorganic imitations produced in the rocks. In 1683 he communicated to the Royal Society (Phil. Trans., 1684), An ingenious proposal for a new sort of maps of countries; together with tables of sands and clays, such as are chiefly found in the north parts of England. In this essay he suggested the preparation of a soil or mineral map of the country, and thereby is justly credited with being the first to realize the importance of a geological survey. He died at Epsom on the 2nd of February 1712.

LISTON, JOHN (c. 1776-1846), English comedian, was born in London. He made his public dSbut on the stage at Weymouth as Lord Duberley in The Heir-at-law. After several dismal failures in tragic parts, some of them in support of Mrs Siddons, he discovered accidentally that his forte was comedy, especially in the personation of old men and country boys, in which he displayed a fund of drollery and broad humour. An introduc- tion to Charles Kemble led to his appearance at the Hay- market on the 10th of June 1805 as Sheepface in the Village Lawyer, and his association with this theatre continued with few interruptions until 1830. Paul Pry, the most famous of all his impersonations, was first presented on the 13th of September 1825, and soon became, thanks to his creative genius, a real personage. Liston remained on the stage till 1837; during his last years his mind failed, and he died on the 22nd of March 1846. He had

married in 1807 Miss Tyrer (d. 1854), a singer and actress.

Several pictures of Liston in character are in the Garrick Club, London, and one as Paul Pry in the South Kensington Museum.

LISTON, ROBERT (1794-1847), Scottish surgeon, was born on the 28th of October 1794 at Ecclesmachan, Linlithgow, where his father was parish minister. He began the study of anatomy under Dr John Barclay (1758-1826) at Edinburgh in 1810, and soon became a skilful anatomist. After eight years' study, he became a lecturer on anatomy and surgery in the Edinburgh School of Medicine; and in 1827 he was elected one of the surgeons to the Royal Infirmary. In 1835 he was chosen professor of clinical surgery in University College, London, and this appointment he held until his death, which occurred in London on the 7th of December 1847. Liston was a teacher more by what he did than by what he said. He taught simplicity in all operative procedures; fertile in expedients, of great nerve and of powerful frame, he is remembered as an extraordinarily bold, skilful and rapid operator. He was the author of The Elements of Surgery (1831-1832) and Practical Surgery (1837), and made several improvements in methods of amputation, and in the dressing of wounds.

LISZT, FRANZ (1811-1886), Hungarian pianist and composer, was born on the 22nd of October 181 1, at Raiding, in Hungary. His appeal to musicians was made in a threefold capacity, and we have, therefore, to deal with Liszt the unrivalled pianoforte virtuoso (1S30-1848); Liszt the conductor of the "music of the future " at Weimar, the teacher of Tausig, Biilow and a host of lesser pianists, the eloquent writer on music and musicians, the champion of Berlioz and Wagner (1848-1861); and Liszt the prolific composer, who for. some five-and-thirty years con- tinued to put forth pianoforte pieces, songs, symphonic orchestral pieces, cantatas, masses, psalms and oratorios (1847-1882). As virtuoso he held his own for the entire period during which he chose to appear in public; but the militant conductor and prophet of Wagner had a hard time of it, and the composer's place is still in dispute. Liszt's father, a clerk to the agent of the Esterhazy estates and an amateur musician of some attainment, was Hungarian by birth and ancestry, his mother an Austrian- German. The boy's gifts attracted the attention of certain Hungarian magnates, who furnished 600 gulden annually for some years to enable him to study music at Vienna and Paris. At Vienna he had lessons in pianoforte playing from Carl Czerny of " Velocity " fame, and from Salieri in harmony and analysis of scores. In his eleventh year he began to play in public there,

and Beethoven came to his second concert in April 1823. During

the three years following he played in Paris, the French provinces

and Switzerland, and paid three visits to England. In Paris

he had composition lessons from Paer, and a six months' course

of lessons in counterpoint from Reicha. In the autumn of 1825

the handsome and fascinating enfant gdte of the salons and ateliers

— "La Neuvieme Merveille du monde" — had the luck to get an

operetta {Don Sancho) performed three times at the Academie

Royale. The score was accidentally destroyed by fire, but a

set of studies a la Czerny and Cramer, belonging to 1826 and

published at Marseilles as 12 Etudes, op. i., is extant, and shows

remarkable precocity. After the death of his father in 1828

young Liszt led the life of a teacher of the pianoforte in Paris,

got through a good deal of miscellaneous reading, and felt the influence of the religious, literary and political aspirations of the time. He attended the meetings of the Saint-Simonists, lent an ear to the romantic mysticism of Pere Enfantin and later to the teaching of Abbe Lamennais. He also played Beethoven and Weber in public — a very courageous thing in those days. The appearance of the violinist Paganini in Paris, 1831, marks the starting-point of the supreme eminence Liszt ultimately attained as a virtuoso. Paganini's marvellous technique inspired him to practise as no pianist had ever practised before. He tried to find equivalents for Paganini's effects, transcribed his violin caprices for the piano, and perfected his own technique to an extraordinary degree. After Paganini he received a fresh impulse from the playing and the compositions of Chopin, who arrived in 1831, and yet another impulse of equal force from a performance of Berlioz's " Symphonie Fantastique, episode de la vie d'un artiste," in 1832. Liszt transcribed this work, and its influence ultimately led him to the composition of his " Poemes symphoniques " and other examples of orchestral programme-music.

From 1833 to 1848 — when he gave up playing in public — he was greeted with frantic applause as the prince of pianists. Five years (1835-1840) were spent in Switzerland and Italy, in semi-retirement in the company of Madame la comtesse d'Agoult (George Sand's friend and would-be rival, known in literary circles as " Daniel Stern," by whom Liszt had three children, one of them afterwards Frau Cosima Wagner) : these years were devoted to further study in playing and composition, and were interrupted only by occasional appearances at Geneva, Milan, Florence and Rome, and by annual visits to Paris, when a famous contest with Thalberg took place in 1837. The enthusiasm aroused by Liszt's playing and his personality — the two are inseparable — reached a climax at Vienna and Budapest in 1839-1840, when he received a patent of nobility from the emperor of Austria, and a sword of honour from the magnates of Hungary in the name of the nation. During the eight years following he was heard at all the principal centres — including London, Leipzig, Berlin, Copenhagen, St Petersburg, Moscow, Warsaw, Constantinople, Lisbon and Madrid. He gained much money, and gave large sums in charity. His munificence with regard to the Beethoven statue at Bonn made a great stir. The subscriptions having come in but sparsely, Liszt took the matter in hand, and the monument was completed at his expense, and unveiled at a musical festival conducted by Spohr and himself in 1845. In 1848 he settled at Weimar with Princess Sayn-Wittgenstein (d. 1887), and remained there till 1861. During this period he acted as conductor at court concerts and on special occasions at the theatre, gave lessons to a number of pianists, wrote articles of permanent value on certain works of Berlioz and the early operas of Wagner, and produced those orchestral and

choral pieces upon which his reputation as a composer mainly depends. His ambition to found a school of composers as well as a school of pianists met with complete success on the one hand and partial failure on the other. His efforts on behalf of Wagner, who was then an exile in Switzerland, culminated in the first performance of Lohengrin on the 28th of August 1850, before a special audience assembled from far and near. Among the works produced for the first time or rehearsed with a view to the furtherance of musical art were

Wagner's Tannhauser, Der ftiegende Hollander, Das Liebesmahl der A postel, and Eine Faust Overture, Berlioz's Benvenuto Cellini, the Symphonie Fantastique, Harold en Italie, Romeo et Juliette, La Damnation de Faust, and L'Enfance du Christ — the last two conducted by the composer- — Schumann's Genoveva, Paradise and the Feri, the music to Manfred and to Faust, Weber's Euryanthe, Schubert's Alfonso und Estrella, Raff's Kbnig Alfred, Cornelius's Der Barbier von Baghdad and many more. It was Liszt's habit to recommend novelties to the public by explanatory articles or essays, which were written in French (some for the Journal des debats and the Gazette musicale of Paris) and translated for the journals of Weimar and Leipzig — thus his two masterpieces of sympathetic criticism, the essays Lohengrin et Tannhauser d Weimar and Harold en Italie, found many readers and proved very effective. They are now included, together with articles on Schumann and Schubert, and the elaborate and rather high- flown essays on Chopin and Des Bohemiens et de lew musique en Hongrie (the latter certainly, and the former probably, written in collaboration with Madame de Wittgenstein), in his Gesam- mellc Schriften (6 vols., Leipzig). The compositions belonging to the period of his residence at Weimar comprise two pianoforte concertos, in E flat and in A, the " Todtentanz," the " Concerto pathetique" for two pianos, the solo sonata "An Robert Schumann," sundry "Etudes," fifteen " Rhapsodies Hongroises," twelve orchestral " Poemes symphoniques, " " Eine Faust Symphonie," and " Eine Symphonie zu Dante's ' Divina Com- media,' " the " 13th Psalm " for tenor solo, chorus and orchestra, the choruses to Herder's dramatic scenes " Prometheus," and the " Missa solennis " known as the " Graner Fest' Messe." Liszt retired to Rome in 1861, and joined the Franciscan order in 1865. 1 From 1869 onwards Abbe Liszt divided his time between Rome and Weimar, where during the summer months he received pupils — - gratis as formerly — and, from 1876 up to his death at Bayreuth on the 31st of July 1886, he also taught for several months every year at the Hungarian Conservatoire of Budapest.

About Liszt's pianoforte technique in general it may be said that it derives its efficiency from the teaching of Czerny, who brought up his pupil on Mozart, a little Bach and Beethoven, a good deal of Clementi and Hummel, and a good deal of his (Czerny 's) own work. Classicism in the shape of solid, respectable Hummel on the one hand, and Carl Czerny, a trifle flippant, perhaps, and inclined to appeal to the gallery, on the other, these gave the musical parentage of young Liszt. Then appears the Parisian Incroyable and grand seigneur — " Monsieur Lits," as the Parisians called him. Later, we find him imitating Paganini and Chopin, and at the same time making a really passionate and deep study of Beethoven, Weber, Schubert, Berlioz. Thus gradually was formed the master of style — • whose command of the instrument was supreme, and who played like an inspired poet. Liszt's strange musical nature was long in maturing its fruits. At the pianoforte his achievements culminate in the two books of studies, twice rewritten, and finally published in 1852 as Etudes a" execution transcendante, the Etudes de concert and the Paganini Studies; the two concertos and the Tod- tentanz, the Sonata in B minor, the Hungarian Rhapsodies and the fine transcriptions of Beethoven's symphonies (the 9th for two pianofortes as well as solo), and of Berlioz's Symphonie fantastique, and the symphony, Harold en Italie. In his orchestral pieces of Liszt appears — next to Berlioz — as the most conspicuous and most thorough-going representative of programme music, i.e. instrumental music expressly contrived to illustrate in detail some poem or some succession of ideas or pictures. It

was Liszt's aim to bring about a direct alliance or amalgamation of instrumental music with poetry. To effect this he made use of the means of musical expression for .purposes of illustration, and relied on points of support outside the pale of music proper. There is always danger of failure when an attempt is thus made

1 It is understood that, in point of fact, the Princess Wittgenstein was determined to marry Liszt; and as neither he nor her family wished their connexion to take this form, Cardinal Hohenlohe quietly had him ordained. — [Ed. £.5.] .

to connect instrumental music with conceptions not in themselves musical, for the order of the ideas that serve as a programme is apt to interfere with the order which the musical exposition naturally assumes — and the result in most cases is but an amalgam of irreconcilable materials. In pieces such as Liszt's " Poemes symphoniques," Ce qu'on entend sur la monlagne (1848-1856), afterapoem by Victor Hugo, and Die Idcale (1853- 1857), after a poem by Schiller, the hearer is bewildered by a series of startling orchestral effects which succeed one another apparently without rhyme or reason. The music does not con- form to any sufficiently definite musical plan — it is hardly in- telligible as music without reference to the programme. Liszt's masterpiece in orchestral, music is the Dante Symphony (1847- 1855), the subject of which was particularly well suited to his temperament, and offered good chances for the display of his peculiar powers as a master of instrumental effect. By the side of it ranks the Faust Symphony (1854-1857), in which the moods of Goethe's characters — Faust, Gretchen and Mephistopheles — – are depicted in three instrumental movements, with a chorus of male voices, supplying a kind of comment, by way of close. The method of presentation in both symphonies is by means of representative themes (Leitmotif), and their combination and interaction. Incidents of the poem or the play are illustrated or alluded to as may be convenient, and the exigencies of musical form are not unfrequently disregarded for the sake of special effects. Of the twelve Poemes symphoniques, Orphee is the most consistent from a musical point of view, and is exquisitely scored. Melodious, effective, readily intelligible, with a dash of the commonplace, Les Prdudes, Tasso, Mazeppa and Fest-Klange bid for popularity. In these pieces, as in almost every production of his, in lieu of melody Liszt offers fragments of melody — touching and beautiful, it may be, or passionate, or tinged with triviality; in lieu of a rational distribution of centres of harmony in accordance with some definite plan, he presents clever com- binations of chords and ingenious modulations from point to point; in lieu of musical logic and consistency of design, he is content with rhapsodical improvisation. The power of persist- ence seems wanting. The musical growth is spoilt, the develop- ment of the themes is stopped, or prevented, by some reference to extraneous ideas. Everywhere the programme stands in the way. In much of Liszt's vocal music, particularly in the songs and choral pieces written to German words, an annoying dis- crepancy is felt to exist between the true sound of the words and the musical accents. The music is generally emotional, the expression direct and passionate; there is no lack of melodic charm and originality, yet the total effect is frequently dis- appointing. In the choral numbers of the five masses, and in the oratorios Die Heilige Elisabeth and Christus, the rarity of fugal polyphony acts as a drawback. Its almost complete absence in some of these works makes for monotony and produces a sense of dullness, which may not be inherent in all the details of the music, but is none the less distinctly present.

Omitting trifles and all publications that have been cancelled, the following list of compositions may be taken as fairlv compre- hensive : — >

Pianoforte Pieces. — Etudes d 'execution transcendante; Etudes de concert; Zwei Etuden, Waldesrauschen, Gnomentanz; Ab Irato; Paganini Studies; Annexes de Pelerinage, 3 sets; Harmonies poe- tiques et religieuses, 1-10; Consolations, 1-6; Ave Maria in E; Sonata in B minor; Konzert-Solo in E minor; Scherzo und Marsch; Ballades, I. II.; Polonaises, I. II.; Apparitions, 1-3; Berceuse; Valse impromptu; Mazurka brillant; 3 Caprices Valses; Galop chromatique; Mephisto-Walzer, I. ,11. ,111. and Polka; Zwei Legenden, " Die Vogelpredigt," " Der heilige Franciscus auf den Wogen schreitend"; "Der Weihnachtsbaum," 1-12; Sarabande und Chaconne ("Almira"); Elegies, I., II. and

III.; La lugubre Gondola; Dem Andenken Petofi's; Mosonyi's Grabgeleit; Romance oubliee; Valses oubliees, 1-3; Liebestraume, 1-3 (originally songs); Hexameron; Rhapsodies Hongroises, 1-18.

Pieces for Two Pianos. — Concerto pathetique (identical with the Konzert-Solo in E minor) ; Dante symphony ; Faust symphony ; Poemes symphoniques, 1-12 ; Beethoven's 9th symphony.

Pianoforte with Orchestra. — Concertos I. in E flat, II. in A; Todtentanz; Fantasie ueber Motif aus Beethoven's " Ruinen von Athen "; Fantasie ueber Ungarische National Melodien; Schubert's I Fantasia in C; Weber's Polacca in E.

Fantaisies de Concert for Piano Solo. — Don Juan; Norma; Son- nambula; I Puritani; Lucia, I., II.; Lucrezia, I., II.; La Juivc; Robert le Diable; Les Huguenots; Le Prophfite, 1-4. Paraphrases, Auber, Tarantella di bravura (Masaniello) ; Verdi, Rigoletto, Ernani, II Trovatore; Mendelssohn, " Hochzeitsmarsch und Elfenreigen " ; Gounod, Valse de Faust, Les Adieux de Romeo et Juliette; Tschai- kowsky, Polonaise; Dargomiyski, Tarantelle; Cui, Tarantella; Saint-Saens, Danse macabre; Schubert, Soirees de Vienne, Valses caprices, 1-9.

Transcriptions. — Beethoven's Nine Symphonies; Berlioz's " Sym- phonic fantastique," " Harold en Italic"; Benediction et Scrment (Benvenuto Cellini); Danse des Sylphes (Damnation de Faust); Weber's overtures, Der Freischutz, Euryanthe, Oberon, Jubilee; Beethoven's and Hummcl's Septets; Schubert's Divertissement a la Hongroise; Beethoven's Concertos in C minor, G and E flat (orchestra for a second piano) ; Wagner's Tannhauser overture, march, romance, chorus of pilgrims; Lohengrin, Festzugˆ und Brautlied, Elsa's Brautgang, Lisa's Traum, Lohengrin's Verweiss an Lisa; Fliegender Hollander, Spinnlicd; Rienzi, Gebet; Rheingold, Walhall; Meistcrsinger, "Am stillen Herd"; Tristan, Isolde's Liebestod; Chopin's six Chants Polonais; Meyerbeer's Schiller- marsch; Bach's six organ Preludes and Fugues; Prelude and Fugue in G minor; Beethoven, Adelaide; 6 miscellaneous and 6 Geisdiche Liedcr; Liederkreis; Rossini's Les Soir6cs musicalcs; Schubert, 59 songs; Schumann, 13 songs; Mendelssohn, 8 songs; Robert Franz, 13 songs.

Organ Pieces. — -Missa pro organo; Fantasia and Fugue, " Ad nos, ad salutarem undam"; B-A-C-H Fugue; Variations on Bach's Basso continuo, " Weinen, Klagen"; Bach's Introduction and Fugue, " Ich hatte viel Bekummerniss " ; Bach's Choral Fugue, " Lob und Ehre "; Nicolai's Kirchliche Festouverttire, " Ein feste Burg"; Allegri's Miserere; Mozart's Ave Verum; Arcadelt's Ave Maria; Lasso's Regina Coeli.

Orchestral Pieces. — Eine Symphonie zu Dante's " Divina Corn- media"; Eine Faust Symphonie; Poemes symphoniques: I. " Ce qu'on entend sur la montagne"; 2. Tasso; 3. Les Preludes; 4. Orphee; 5. Prom6thee; 6. Mazeppa; 7. Fcst-Kliinge; 8. Heroi'dc funebre; 9. Hungaria; 10. Hamlet; 11. Hunncnschlacht; 12. Die ldeale; Zwei Episoden aus Lenau's Faust: I. Der nachtliche Zug, II. Der Tanz in der Dorfschenke; Marches, Rakoczy, Goethe, Hul- digung, " Vom Fels zum Meer " (for a military band); Ungarischcr, Heroischer and Sturmmarsch; Le Triomphe funebre du Tassc; " Von der Wiege bis zum Grab "; six Hungarian rhapsodies; four marches; four songs, and Die Allmacht, by Schubert.

Vocal Music. — Oratorios: " Die Legende von der Heiligen Elisa- beth," " Christus," "Stanislaus" (unfinished). Masses: Missa solennis for the inauguration of the cathedral at Gran; Ungarischc Kronungs-mcsse; Missa choralis (with organ); Missa and Requiem for male voices (with organ); Psalms, 13, 137, 23 and 18; 12 Kirchen-Chor-Gesiinge (with organ). Cantatas: Prometheus-chore; "Beethoven Cantata"; "An die Kiinstler " ;

Die Glocken des Strassburger Munstcrs; 12 Chore fiir Miinnergesang; Songs, 8 books; Scena, Jeanne d'Arc au bucher.

Melodramatic Pieces for Declamation, with Pianoforte Accompani- ment. — Leonore (Biirgcr) ; Der traurige Monch (Lenau); Des tod- ten Dichter's Liebe (Jokai) ; Der blinde Sanger (Tolstoy).

Editions, Text and Variants. — Beethoven's Sonatas ; Weber's Con- certstiick and Sonatas; Schubert Fantasia, 4 Sonatas, Impromptus, Valses and Moments musicaux.

See also L. Ramaun, Fr. Liszt als Kiinstler und Mensch (1880- 1894) ; E. Dannreuther, Oxford Hist, of Music, vol. vi. (1905).

(E. Da.)

LITANY. This word (Xtraceta), like \n-17 (both from Xtro;ucu), is used by Eusebius and Chrysostom, commonly in the plural, in a general sense, to denote a prayer or prayers of any sort, whether public or private; it is similarly employed in the law of Arcadius (Cod. Theod. xvi. tit. 5, leg. 30), which forbids heretics to hold assemblies in the city " ad litaniam faciendam." But some trace of a more technical meaning is found in the epistle (Ep. 63) of Basil to the church of Neocaesarea, in which he argues, against those who were objecting to certain innovations, that neither were " litanies " used in the time of Gregory Thaumaturgus. The nature of the recently introduced litanies, which must be assumed to have been practised at Neocaesarea in Basil's day, can only be conjectured; probably they had many points in common with the " rogationes," which, according to Sidonius Apollinaris, had been coming into occasional use in France about the beginning of the 5th century, especially when rain or fine weather was desired, and, so far as the three fast days before Ascension were concerned, were first fixed, for one particular district at least, by Mamertusor Mamercusof Vienne (a.d. c. 450). We gather that they were penitential and intercessory prayers offered by the community while going about in procession, fasting and clothed in sackcloth. In the following century the

manner of making litanies was to some extent regulated for the entire Eastern empire by one of the Novels of Justinian, which forbade their celebration without the presence of the bishops and clergy, and ordered that the crosses which were carried in procession should not be deposited elsewhere than in churches, nor be carried by any but duly appointed persons. The first synod of Orleans (a.d. 511) enjoins for all Gaul that the " litanies " before Ascension be celebrated for three days; on these days all menials are to be exempt from woik, so that every one may be free to attend divine service. The diet is to be the same as in Quadragesima; clerks not observing these rogations are to be punished by the bishop. In a.d. 517 the synod of Gerunda provided for two sets of " litanies "; the first were to be observed for three days (from Thursday to Saturday) in the week after Pentecost with fasting, the second for three days from November 1. The second council of Vaison (529), consisting of twelve bishops, ordered the Kyrie eleison — now first introduced from the Eastern Church — to be sung at matins, mass and vespers. A synod of Paris (573) ordered litanies to be held for three days at the beginning of Lent, and the fifth synod of Toledo (636) appointed litanies to be observed throughout the kingdom for three days from December 14. The first mention of the word litany in connexion with the Roman Church goes back to the pontificate of Pelagius I. (555), but implies that the thing was at that time already old. In 590 Gregory I., moved by the pestilence which had followed an inundation, ordered a " litania septiformis," sometimes called litania major, that is to say, a sevenfold procession of clergy, laity, rnonks, virgins, matrons, widows, poor and children. It must not be confused with the litania septena used in church on Easter Even. He is said also to have appointed the processions or litanies of April 25 (St Mark's day), which seem to have come in the place of the cere- monies of the old Robigalia. In 747 the synod of Cloveshoe ordered the litanies or rogations to be gone about on April 25 " after the manner of the Roman Church," and on the three days before Ascension " after the manner of our ancestors." The latter are still known in the English Church as

Rogation Days. Games, horse racing, junkettings were forbidden; and in the litanies the name of Augustine was to be inserted after that of Gregory. The reforming synod of Mainz in 813 ordered the major litany to be observed by all for three days in sackcloth and ashes, and bare- foot. The sick only were exempted.

As regards the form of words prescribed for use in these ” litanies ” or ” supplications,” documentary evidence is defective. Sometimes it would appear that the ” procession ” or ” litany ” did nothing else but chant Kyrie eleison without variation. There is no reason to doubt that from an early period the special written litanies of the various churches all showed the common features which are now regarded as essential to a litany, in as far as they consisted of (1) invocations, (2) deprecations, (3) intercessions, (4) supplications. But in details they must have varied immensely. The offices of the Roman Catholic Church at present recognize two litanies, the ” Litaniae majores ” and the ” Litaniae breves,” which differ from one another chiefly in respect of the fulness with which details are entered upon under the heads mentioned above. It is said that in the time of Charlemagne the angels Orihel, Raguhel, Tobihel were invoked, but the names were removed by Pope Zacharias as really belonging to demons. In some medieval litanies there were special invocations of S. Fides, S. Spes, S. Charitas. The litanies, as given in the Breviary, are at present appointed to be recited on bended knee, along with the penitential psalms, in all the six week-days of Lent when ordinary service is held. Without the psalms they are said on the feast of Saint Mark and on the three rogation days. A litany is chanted in procession before mass on Holy Saturday. The ” litany ” or ” general supplica- tion ” of the Church of England, which is appointed ” to be sung or said after morning prayer upon Sundays, Wednesdays and Fridays, and at other times when it shall be commanded by the ordinary,” closely follows the ” litaniae majores ” of the Breviary, the invocations of saints being of course omitted. A similar German litany will be found in the works of Luther.

In the Roman Church there are a number of special litanies peculiar to particular localities or orders, such as the ” Litanies of Mary ” or the “Litanies of the Sacred Name of Jesus.”

There was originally a close connexion between the litany and the liturgy (q.v.). The ninefold Kyrie eleison at the beginning of the Roman Mass is a relic of a longer litany of which a specimen may still be seen in the Stowe missal. In the Ambrosian liturgy, the threefold Kyrie eleison or Lesser Litany occurs thrice, after the Gloria in excelsis, after the gospel and at the end of Mass; and on the first five Sundays in Lent a missal litany is placed before the Oratio super populum, and on the same five Sundays in the Mozarabic rite before the epistle. In Eastern liturgies litanies are a prominent feature, as in the case of the deacon’s litany at the beginning of the Missa fidelium in the Clementine liturgy, immediately before the Anaphora in the Greek liturgy of St James, &c. (F. E. W.)

LITCHFIELD, a township and the county-seat of Litchfield county, Connecticut, U.S.A., about 28 m. W. of Hartford, and including the borough of the same name. Pop. of the township (1800) 3304; (1900) 3214; (1010) 3005; of the borough (1890) 1058; (1900) 1120; (1910) 903. Area of the township, 48-6 sq. m. The borough is served by the New York, New Haven & Hartford railroad. It is situated on elevated land, and is one of the most attractive of southern New England summer resorts. The principal elevation in the township is Mt. Prospect, at the base of which there is a vein of pyrrhotite, with small quantities of nickel and copper. On the southern border of the borough is Lake Bantam (about 900 acres, the largest lake in the state) whose falls, at its outlet, provide water power for factories of carriages and electrical appliances. Dairy- ing is the most important industry, and in 1899 the county ranked first among the counties of the state

in the value of its dairy products — $1,373,957, from 3465 farms, the value of the product for the entire state being $7,090,188.

The lands included in the township of Litchfield (originally called Bantam) were bought from the Indians in 1715-1716 for £15, the Indians reserving a certain part for hunting. The town- ship was incorporated in 17 19, was named Litchfield, after Lichfield in England, and was settled by immigrants from Hart- ford, Windsor, Wethersfield, Farmington and Lebanon (all within the state) in 1720-1721. In 1751 it became the county- seat of Litchfield county, and at the same time the borough of Litchfield (incorporated in 1879) was laid out. From 1776 to 1780 two dep6ts for military stores and a workshop for the Continental army were maintained, and the leaden statue of George III., erected in Bowling Green, New York City, in 1770, and torn down by citizens on the 9th of July 1776, was cut up and taken to Litchfield, where, in the house (still standing) of Oliver Wolcott it was melted into bullets for the American army by Wolcott's daughter and sister. Aaron Burr, whose only sister married Tapping Reeve (1744-1823), lived in Litchfield with Reeve in 1774-1775. In 1784 Reeve established here the Litch- field Law School, the first institution of its kind in America. In 1798 he associated with himself James Gould (1770-1838), who, after Reeve's retirement in 1820, continued the work, with the assistance of Jabez W. Huntington (178S-1847), until 1833. The school was never incorporated, it had no buildings, and the lectures were delivered in the law offices of its instructors, but among its 1000 or more students were many who afterwards became famous, including John C. Calhoun; Levi Woodbury (1 789-1851), United States senator from New Hampshire in 1825-1831 and in 1841-1845, secretary of the navy in 1831- 1834 and of the treasury in 1834-1841, and a justice of the United States Supreme Court from 1845; John Y. Mason; John M. Clayton; and Henry Baldwin (1780-1844), a justice of the United States Supreme Court from 1830. In 1792 Mrs Sarah Pierce made one of the first efforts toward the higher education of women in the United States by opening in Litchfield her Female Seminary, which had an influential career of about forty years, and numbered among its alumnae Harriet Beecher Stowe, Mrs Marshall O. Roberts, Mrs Cyrus W. Field and Mrs Hugh McCulloch. Litchfield was the birthplace of Ethan Allen;

of Henry Ward Beecher; of Harriet Beecher Stowe, whose novel, Poganuc People, presents a picture of social conditions in Litch- field during her girlhood; of Oliver Wolcott, Jr. (1760-1833); of John Pierpont (1785-1866), the poet, preacher and lecturer; and of Charles Loring Brace, the philanthropist. It was also the home, during his last years, of Oliver Wolcott (1726-1797); 01 Colonel Benjamin Tallmadge (1774-1835), an officer on the American side in the War of Independence and later (from 1801 to 1817) a Federalist member of Congress; and of Lyman Beecher, who was pastor of the First Congregational church of Litchfield from 1810 to 1826.

See Payne K. Kilbourne, Sketches and Chronicles of the Town of Litchfield, Connecticut (Hartford, Conn., 1859); George C. Boswell, The Litchfield Book of Days (Litchfield, 1900) ; and for an account of the Litchfield Female Seminary, Emily N. Vanderpoel, Chronicles of a Pioneer School (Cambridge, Mass., 1903).

LITCHFIELD, a city of Montgomery county, Illinois, U. S. A., about 50 m. N.E. of St Louis, Missouri. Pop. (1900) 5918; (1910) 5971. Its principal importance is as a railway and manufacturing centre; it is served by the Chicago, Burlington & Quincy, the Chicago & Alton, the Cleveland, Cincinnati, Chicago & St Louis, the Illinois Central, the Wabash, and the Litchfield & Madison railways, and by electric lines connecting with St Louis and the neighbouring towns. In the vicinity are deposits of bituminous coal, fire-clay and moulding sand. There are various manufactures in the city. Litchfield was incorporated as a town in 1856, and was first chartered as a city in 1859.

LITCHI, or Lee-Chee, the fruit of Nephelium Litchi, a small tree, native of southern China and one of the most important indigenous fruits. It is also cultivated in India. The tree bears large compound leaves with two to four pairs of leathery lan- ceolate pointed leaflets about 3 in. long, and panicles of small flowers without petals. The fruits are commonly roundish, about 1 5 in. in diameter, with a thin, brittle, red shell

which bears rough protuberances. In the fresh state they are filled with a sweet white pulp which envelops a large brown seed, but in the dried condition the pulp forms a blackish fleshy substance. The pulp is of the nature of an aril, that is, an additional seed-coat.

Nephelium Longana, the longan tree, also a native of southern China, is cultivated in that country, in the Malay Peninsula, India and Ceylon for its fruit, which is smaller than that of the litchi, being half an inch to an inch in diameter with a nearly smooth yellowish- brown brittle skin, and containing a pulpy aril resembling that of the litchi in flavour. Another species, N. lappaceum, a tall tree native of the Malay Peninsula, where it is known under the names Ram- butan or Rambosteen, is also cultivated for its pleasantly acid pulpy aril. The fruit is oval, bright red in colour, about 2 in. long and covered with long fleshy hairs.

Nephelium belongs to the natural order Sapindaceae, and contains about twenty-two species.

LITERATURE, a general term which, in default of precise definition, may stand for the best expression of the best thought reduced to writing. Its various forms are the result of race peculiarities, or of diverse individual temperaments, or of political circumstances securing the predominance of one social class which is thus enabled to propagate its ideas and sentiments. In early stages of society, the classes which first attain a distinct literary utterance are priests who compile the chronicles of tribal religious development, or rhapsodes who celebrate the prowess of tribal chiefs. As man feels before he reasons, so poetry generally precedes prose. It embodies more poignantly the sentiment of unsophisticated man. Hence sacred books and war- songs are everywhere the earliest literary monuments, and both are essentially poetic compositions which have received a religious or quasi-religious sanction. The recitation of the Homeric poems at the Panathenaea corresponds to the recitation elsewhere of the sacred texts in the temple; the statement of Phemios {Odyssey, xxii. 347) that a god inspired his soul with all the varied ways of song expresses the ordinary belief of early historical times. Versicles of the sacred chronicles, or fragments of epic poems, were learned by heart and supplied a standard of popular literary taste. The public declamation of long chosen passages by priests, and still more by contending rhapsodes, served to evoke rbe

latent sense of literary criticism; and, at a later stage, the critical spirit was still further stimulated by the performance of dramatic pieces written by competing poets. The epical record of the past was supplemented by the lyrical record of contem- porary events, and as the Homeric poets had immortalized the siege of Troy, so Pindar commemorated Salamis. Prose of any permanent value would first show itself in the form of oratory, and the insertion of speeches by early historians indicates a connexion with rhetoric. The development of abstract reasoning would tend to deprive prose of its superfluous ornament and to provide a simpler and more accurate instrument.

No new genre has been invented since the days of Plato. The evolution of literature is completed in Greece, and there its subdivisions may best be studied. Epic poetry is represented by the Homeric cycle, lyrical poetry by Tyrtaeus, dramatic poetry by Aeschylus, history by Herodotus, oratory by Pericles, philosophy by Plato, and criticism by Zoilus, the earliest of slashing reviewers; and in each department there is a long succession of illustrious names. Roughly speaking, all subse- quent literature is imitative. Ennius transplanted Greek methods to Rome; his contemporary L. Fabius Pictor, the earliest Roman historian, wrote in Greek; and the later Roman poets from Lucretius to Horace abound in imitations of Greek originals. The official adoption of Christianity as the state religion changed the spirit of literature, which became more and more provincial after the downfall of the empire. Literature did not perish during

the " dark ages " which extend from the sixth century to the beginning of the nth, but it was subordinate to scholarship. The dissolution of Latin was not complete till about the middle of the 9th century, and the new varieties of Romance did not become ripe for literary purposes till a hundred years later. Meanwhile, not a single literary masterpiece was produced in western Europe for five centuries; by comparison only do Boethius and Venantius Fortunatus seem to be luminous points in the prolonged night; the promise of a literary renaissance at the court of Charlemagne was unfulfilled, and the task of creating a new literature devolved upon the descendants of the barbarians who had destroyed the old. The Celtic and Teutonic races elaborated literary methods of their own; but the fact that the most popular form of Irish verse is adopted from Latin prosody is conclusive evidence that the influence of Roman — and therefore of Greek — models persisted in the literature of the outlying provinces which had attained political independence. The real service rendered to literature by the provincials lay in the introduction and diffusion of legends freighted with a burden of mystery which had disappeared with Pan, and these new valuable materials went to form the substance of the new poetry.

The home of modern European literature must be sought in France, which assimilated the best elements in Celtic and Teutonic literature. From the nth to the 14th century, France was the centre of intellectual life in Europe, as Greece and Rome had been before, and as Italy was to be afterwards. The chansons de geste, inspired by the sense of patriotism and the yearning for religious unity, inculcate feudal and Catholic doctrine, and as society in the western world was universally committed to feudalism and Catholicism, these literary expressions of both theories were widely accepted and copied. The Germanic origin of the French epic is lost sight of, and imitators are attracted by the French execution, and by the creative power of the chansons de geste. Again, France takes the stories of the Arthurian court from Welsh texts or from the lips of Welsh settlers, re- handles the romantic element, and, through Marie de France and Chretien de Troyes, imparts to the whole a touch of personal artistry which is absent from the chansons de geste. The matiere de Bretagne goes forth to Italy, Germany and England — later to Portugal and Spain — bearing the imprint of the French genius. Thus France internationalizes local subjects, and first assumes a literary function which, with few interruptions, she has since discharged. She further gives to Europe models of allegory in the Roman de la rose, founds the school of modern history through Villehardouin, inaugurates the religious drama and the

secular theatre. She never again dominated the literatures of Europe so absolutely.

The literary sceptre passed from France to Italy during the 14th century. Brunetto Latini, who wrote in French as well as in Italian, is the connecting link between the literatures of the two countries; but Italy owes its eminence not so much to a general diffusion of literary accomplishment as to the emergence of three great personalities. Dante, Boccacio and Petrarch created a new art of poetry and of prose. England yielded to the fascination in the person of Chaucer, Spain in the person of her chancellor Lopez de Ayala, and France in .the person of Charles d'Orleans, the son of an Italian mother. Petrarch, once ambassador in France, alleged that there were no poets out of Italy, and indeed there were no living poets to compare with him elsewhere. But in all countries he raised up rivals — Chaucer, Marot, Garcilaso de la Vega — as Sannazaro did a century and a half later. Sannazaro's Arcadia captured the Portuguese Montemor, whose pastoral novel the Diana, written in Spanish, inspired d'Urfe no less than Sidney, and, as d'Urfe's Astrie is considered the starting-point of the modern French novel, the historical importance of the Italian original cannot be exagger- ated. Spain never obtained any intellectual predominance corresponding to that exercised by France and Italy, or to her political authority during the 16th and 17th centuries. This may be attributed partly to her geographical position which lies off the main roads of Europe, and partly to the fact that her literature is essentially local. Cervantes, indeed, may be said to have influenced all subsequent writers of fiction, and the in- fluence of Spanish literature is visible in the body of European picaresque tales; but, apart from Corneille and a few other dramatists who preceded Moliere in France, and apart from the Restoration drama in England, the influence of the Spanish drama was relatively

small. In some respects it was too original to be imitated with success. Much the same may be said of England as of Spain. Like Spain, she lies outside the sphere of continental influence; like Spain, she has innumerable great names in every province of literature, and, in both cases, to Europe at large these long remained names and nothing more; like Spain, she is prone to reproduce borrowed materials in shapes so transformed and rigid as to be unrecognizable and unadaptable. Moreover, the Reformation isolated England from literary commerce with the Latin races, and till the 18th century Germany was little more than a geographical expression. Even when Germany recovered her literary independence, Lessing first heard of Shakespeare through Voltaire. Neither Shakespeare nor Milton was read in France before the 18th century — the first translated by Ducis, the second by Dupre de Saint-Maur — and they were read with curiosity rather than with rapture. On the other hand, Boileau, Rapin and Le Bossu were regarded as oracles in England, and through them French literature produced the " correctness " of Queen Anne's reign. Horace Walpole is half a Frenchman, Hume imitates Montesquieu's cold lucidity, Gibbon adapts Bossuet's majestic periods to other purposes. On the other hand Voltaire takes ideas from Locke, but his form is always intensely personal and inimitably French. After the 16th century English literature, as a whole, is refractory to external influence. Waves of enthusiasm pass over England — for Rousseau, for Goethe — but leave no abiding trace on English literature. During the latter half of the 18th century France resumed something of her old literary supremacy; the literatures of Italy and Spain at this period are purely derivative, and French influence was extended still further on the continent as the result of the Romantic movement. Since that impulse was exhausted, literature everywhere has been in a state of flux: it is less national, and yet fails to be cosmopolitan. All writers of importance, and many of no importance, are trans- lated into other European languages; the quick succession of diverse and violent impressions has confused the scheme of literature. Literature suffers likewise from the competition of the newspaper press, and as the press has multiplied it has grown less literary. The diversities of modern interests, the want of leisure for concentrated thought, suggest that literature

may become once more the pleasure of a small caste. But the desire for the one just form which always inspires the literary artist visits most men sometimes, and it cannot be doubted that literature will continue to accommodate itself to new conditions. (J-F.-K.)

LITERNUM, an ancient town of Campania, Italy, on the low sandy coast between Cumae and the mouth of the Volturnus. It was probably once dependent on Cumae. In 194 B.C. it became a Roman colony. It is mainly famous as the residence of the elder Scipio, who withdrew from Rome and died here. His tomb and villa are described by Seneca. Augustus is said to have conducted here a colony of veterans, 1 but the place never had any great importance, and the lagoons behind it made it unhealthy, though the construction of the Via Domitiana through it must have made it a posting station. It ceased to exist in the 8th century. No remains are visible.

See J. Beloch, Campanien, ed. ii. (Breslau, 1890), 377.

LITHGOW, WILLIAM (1582-? 1650), Scottish traveller and writer, was born and educated in Lanark. He was caught in a love-adventure, mutilated of his ears by the brothers of the lady (hence the sobriquet " Cut lugged Willie "), and forced to leave Scotland. For nineteen years he travelled, mostly on foot, through Europe, the Levant, Egypt and northern Africa, covering, according to his estimate, over 36,000 m. The story of his adventures may be drawn from The Totall Discourse of the Rare Adventures and painfull Peregrinations of long nine teene Yearcs (London, 1614; fuller edition, 1632, &c); A True and Experimental! Discourse upon the last siege of Breda (London, 1637); and a similar book giving an account of the siege of Newcastle and the battle of

Marston Moor (Edinburgh, 1645). He is the author of a Present Surveigh of London (London, 1643). He left six poems, written between 1618 and 1640 (reprinted by Maidment, Edinburgh, 1863). Of these " Scotland's Welcome to King Charles, 1633 " has considerable antiquarian interest. His writing has no literary merit; but its excessively aureate style deserves notice.

The best account of Lithgow and his works is by F. Hindes Groome in the Diet. Nat. Biog. The piece entitled Scotland's Paraenesis to King Charles II. (1660), ascribed to him in the catalogue of the Advocates' Library, Edinburgh, cannot, from internal evidence, be his.

LITHGOW, a town of Cook county, New South Wales, Aus- tralia, 96 m. W.N. W. of Sydney by rail. Pop. (1901) 5268. The town is situated at an altitude of 3000 ft., in a valley of the Blue Mountains. It has pottery and terra-cotta works, breweries, a tweed factory, iron-works, saw-mills, soap-works and brick- fields. Coal, kerosene shale, iron ore and building stone are found in the district.

LITHIUM [symbol Li, atomic weight 7-00 (0=i6)] , an alkali metal, discovered in 1817 by J. A. Arfvedson {Ann. chim. phys. 10, p. 82). It is only found in combination, and is a constituent of the minerals petalite, triphyline, spodumene and lepidolite or lithia mica. It occurs in small quantities in sea, river and spring water, and is also widely but very sparingly distributed throughout the vegetable kingdom. It may be obtained (in the form of its chloride) by fusing lepidolite with a mixture of barium carbonate and sulphate, and potassium sulphate (L. Troost, Comptes rendus, 1856, 43, p. 921). The fused mass separates into two layers, the upper of which contains a mixture of potassium and lithium sulphates; this is lixiviated with water and converted into the mixed chlorides by adding barium chloride, the solution evaporated and the lithium chloride extracted by a mixture of dry alcohol and ether. The metal may be obtained by heating dry lithium hydroxide with mag- nesium (H. N. Warren, Client. News, 1896, 74, p. 6). L. Kahlen- berg (Jour. phys. Chem., 3, p. 601) obtained it by electrolysing the chloride in pyridine solution, a carbon anode and an iron or platinum cathode being used. O. Ruff and O. Johannsen (Zeit. elektroche-m., 1906, 55, p. 537) electrolyse a mixture of bromide and chloride which melts at 520 . It is a soft, silvery –

1 Mommsen in C.I.L. x. 343 does not accept this statement, but an inscription found in 1885 confirms it.

white metal, which readily tarnishes on exposure. Its specific gravity is 0-59, and it melts at 180° C. It burns on ignition in air, and when strongly heated in an atmosphere of nitro- gen it forms lithium nitride, Li 3 N. It decomposes water at ordinary temperature, liberating hydrogen and forming lithium hydroxide.

Lithium hydride, LiH, obtained by heating the metal in a current of hydrogen at a red heat, or by heating the metal with ethylene to 700 ° C. (M. Guntz, Comptes rendus, 1896, 122, p. 244; 123, p. 1273). is a white solid which inflames when heated in chlorine. With alcohol it forms lithium ethylate, LiOC 2 H s , with liberation of hydrogen. Lithium oxide, L12O, is obtained by burning the metal in oxygen, or by ignition of the nitrate. It is a white powder which readily dissolves in water to form the hydroxide, LiOH, which is also obtained by boiling the carbonate with milk of lime. It forms a white caustic mass, resembling sodium hydroxide in appearance. It absorbs carbon dioxide, but is not deliquescent. Lithium chloride LiCl, prepared by heating the metal in chlorine, or by dissolving the oxide or carbonate in hydrochloric acid, is exceedingly deliquescent, melts below a red heat, and is very soluble in alcohol. Lithium carbonate, L12CO3, obtained as a white amorphous precipitate by adding sodium carbonate to a solution of lithium chloride, is sparingly soluble in water. Lithium phosphate, Li 3 PO*4, obtained by the addi- tion of sodium phosphate to a soluble lithium salt in the presence of sodium hydroxide, is almost insoluble in water. Lithium ammonium, LiNH 3 , is obtained by passing ammonia gas over lithium, the product being heated to 70° C. in order to expel any excess of ammonia. It turns brown-red on exposure to air, and is inflammable. It is decomposed by water evolving

hydrogen, and when heated in vacuo at 50°-6o° C. it gives lithium and ammonia. With ammonia solution it gives hydrogen and lithiamide, LiNH 2 (H.. Moissan, ibid., 1898, 127, p. 685). Lithium carbide, Li2Q, obtained by heating lithium carbonate and carbon in the electric furnace, forms a transparent crystalline mass of specific gravity 1-65, and is readily decomposed by cold water giving acetylene (H. Moissan, ibid., 1896, 122, p. 362).

Lithium is detected by the faint yellow line of wave-length 6104, and the bright red line of wave-length 6708, shown in its flame spectrum. It may be distinguished from sodium and potassium by the sparing solubility of its carbonate and phosphate. The atomic weight of lithium was determined by J. S. Stas from the analysis of the chloride, and also by conversion of the chloride into the nitrate, the value obtained being 7ˆ03 (O = 16).

The preparations of lithium used in medicine are: Lithii Carbonis, dose 2 to 5 grs. ; Lithii Citras, dose 5 to 10 grs. ; and Lithii Citras ejfervescens, a mixture of citric acid, lithium citrate, tartaric acid and sodium bicarbonate, dose 60 to 120 grs. Lithium salts render the urine alkaline and are in virtue of their action diuretic. They are much prescribed for acute or chronic gout, and as a solvent to uric acid calculi or gravel, but their action as a solvent of uric acid has been certainly overrated, as it has been shown that the addition of medicinal doses of lithium to the blood serum does not increase the solubility of uric acid in it. In concentrated or large doses lithium salts cause vomiting and diarrhoea, due to a gastro-enteritis set up by their action. In medicinal use they should therefore be always freely diluted.

LITHOGRAPHY (Gr. \ldos, a stone, and ypafaiv, to write), the process of drawing or laying down a design or transfer, on a specially prepared stone or other suitable surface, in such a way that impressions may be taken therefrom. The principle on which lithography is based is the antagonism of grease and water. A chemically pure surface having been secured on some substance that has an equal affinity for both grease and water, in a method hereafter to be described, the parts intended to print are covered with an unctuous composition and the rest of the surface is moistened, so that when a greasy roller is applied, the portion that is wet resists the grease and that in which an affinity for grease has been set up readily accepts it; and from the surface chus treated it will be seen that it is an easy thing to secure an impression on paper or other material by applying suitable pressure.

The inventor of lithography was Alois Senef elder (1 771-1834); and it is remarkable what a grip he at once seemed to get of his invention, for whereas the invention of printing seems almost a matter of evolution, lithography seems to come upon the scene fully equipped for the battle of life, so that it would be a bold craftsman at the present day who would affirm that he knew more of the principles underlying his trade than Senefelder (q.v.) did within thirty years of its invention. Of course practice has led to dexterity, and the great volume of trade has induced many mechanical improvements and facilities, but the principles have not been taken any further, while some valuable methods

have been allowed to fall into desuetude and would well repay some experimentally disposed person to revive.

Lithography may be divided into two main branches — that which is drawn with a greasy crayon (rather illogically called ” chalk “) on a grained stone, and that which is drawn in ” ink ” on a polished stone. Whatever may be thought in regard to the original work of the artists of various countries who have used lithography as a means of expression, there can be little doubt that in the former method the English professed lithographer has always held the pre-eminence, while French, German and

American artists have surpassed them in the latter.

Chalk lithography subdivides itself into work in which the black predominates, although it may be supported by 5 or 6 shades of modified colour — this branch is known as " black and tint " work — and that in which the black is only used locally like any other colour. Frequently this latter class of work will require a dozen or more colours, while some of the finest examples have had some twenty to thirty stones employed in them. Work of this description is known as chromo-litho- graphy. Each colour requires a separate stone, and work of the highest quality may want two or three blues with yellows, reds, greys and browns in proportion, if it is desired to secure a result that is an approximate rendering of the original painting or drawing. The question may perhaps be asked: " If the well- known three-colour process " (see Process) " can give the full result of the artist's palette, why should it take so many more colours in lithography to secure the same result ? " The answer is that the stone practically gives but three gradations — the solid, the half tint and the quarter tint, so that the combination of three very carefully prepared stones will give a very limited number of combinations, while a moderate estimate of the shades on a toned block would be six; so that a very simple mathe- matical problem will show the far greater number of combinations that the three blocks will give. Beyond this, the chromo-lithographer has to exercise very great powers of colour analysis; but the human mind is quite unable to settle offhand the exact proportion of red, blue and yellow necessary to produce some particular class say of grey, and this the camera with the aid of colour filters does with almost perfect precision.

Notwithstanding these disadvantages, lithography has these strong points: (1) its utility for small editions on account of its, at present, smaller prime cost; (2) its suitability for subjects of large size; (3) its superiority for subjects with outlines, for in such cases the outline can be done in one colour, whereas to secure this effect by the admixture of the three colours requires marvellously good registration, the absence of which would produce a very large proportion of " waste " or faulty copies; (4) capacity for printing on almost any paper, whereas, at the time of writing, the tri-colour process is almost entirely limited to printing on coated papers that are very heavy and not very enduring.

With regard to the two branches of chalk lithography, the firms that maintained the English supremacy for black and tint work in the early days were Hulemandel, Day and Haghe and Maclure, while the best chromo-lithographic work in the same period was done by Vincent Brooks, the brothers Hanhart, Thomas Kell and F. Kell. In reference to the personal work of professed lithographers during the same period, the names of Louis Haghe, J. D. Harding, J. Needham, C. Baugniet, L. Ghemar, William Simpson, R. J. Lane, J. H. Lynch, A. Maclure and Rimanozcy stand for black and tint work; while in chromo- lithography J. M. Carrick, C. Risdon, William Bunney, W. Long, Samuel Hodson, Edwin Buckman and J. Lewis have been conspicuous among those who have maintained the standard of their craft. In the foregoing list will be recognized the names of several who have had admirable works on the walls of the Royal Academy and other exhibitions; Mr Lane, who exhibited lithographs from 1824 to 1872, was for many years the doyen of lithographers, and the only one of their number to attain aca- demic rank, but Lynch and John Cardwell Bacon were his pupils, and Bacon's son, the painter John H. F. .Bacon, was elected

to the Royal Academy in 1903. In the first decade of the 20th century the number of firms doing high-class work, and the artists who aided them in doing it, were more numerous than ever, and scarcely less able, but it would be outside the present purpose to differentiate between them.

The raison d' etre of " stipple " work is its capacity for re- transferring without serious loss of quality, for it can scarcely be contended that it is as artistic as the methods just described. Retransferring is the process of pulling impressions from the original stones with a view to making up a large sheet of one or more small subjects, or where it is desired to print a very large number without deterioration of the original or matrix

stone. The higher class work in this direction has been done in France, Germany and the United States, where for many years superiority has been shown in regard to the excellence and rapidity of retransferring. To this cause may be attributed the fact that the box tops and Christmas cards on the English market were so largely done abroad until quite recent times. The work of producing even a small face in the finest hand stipple is a lengthy and tedious affair, and the English craftsman has seldom shown the patience necessary for this work; but since the American invention known as Ben Day's shading medium was introduced into England the trade has largely taken it up, and thereby much of the tedium has been avoided, so that it has been found possible by its means to introduce a freedom into stipple work that had not before been found possible, and a very much better class of work has since been produced in this department.

About the year 1868 grained paper was invented by Maclure, Macdonald & Co. This method consists in impressing on ordinary Scotch transfer or other suitable paper a grain closely allied to that of the lithographic stone. It appears to have been rather an improvement than a new invention, for drawing paper and even canvas had been coated previously with a material that adhered to a stone and left on the stone the greasy drawing that had been placed thereon; but still from this to the beautifully prepared paper that was placed on the market by the firm of which the late Andrew Maclure was the head was a great advance, and although the first use was by the ordinary craftsman it was not long before artists of eminence saw that a new and convenient mode of expression was opened up to them.

On the first introduction of lithography the artists of every nation hastened to avail themselves of it, but soon the cumbrous character of the stone, and the fact that their subjects had to be drawn backwards in order that they might appear correctly on the paper, wore down their newly-born zeal, and it was only when the grained paper system was perfected, by which they could make their drawings in the comfort of their studios without re- versing, that any serious revival took place. Although excellent work on grained paper had been done by Andrew Maclure, Rimanozcy, John Cardwell Bacon, Rudofsky and other crafts- men, the credit for its furtherance among artists must be given to Thomas Way and his son T. R. Way, who did much valuable pioneer work in this direction. The adhesion of such artists of eminence as Whistler, Legros, Frank Short, Charles Shannon, Fantin Latour, William Strang, Will Rothenstein, Herbert Railton and Joseph Pennell, did not a little to aid lithography in resisting the encroachments of other methods into what may still be considered its sphere. As a means of reproducing effects which an artist would otherwise get by pencil or crayon, it remains entirely unequalled, and it is of obvious advantage to art that twenty-five or fifty copies of an original work should exist, which, without the aid of lithography, might have only been represented by a single sketch, perhaps stowed away among the possessions of one private collector.

In regard to grained paper work, undue stress has often been placed upon the rapid deterioration of the stone, some contending that only a few dozen first-class proofs can be taken; this has led to the feeling that it is unsuited to book illustration, and damage has been done to the trade of lithography thereby. It may be mentioned that quite recently about 100 auto-litho- graphs in black and three colours, the combined work of Mr and

Mrs Herbert Railton, have been treated by the Eberle system of etching described below, and although an infinitesimal loss of quality may have arisen, such as occurs when a copper etching is steel faced, some 2000 to 3000 copies were printed without further deterioration, and an edition of vignetted sketches was secured, far in advance of anything that could have been attained from the usual screen or half-toned blocks.

Grained paper is much used in the ordinary lithographic studio for work such as the hill shading of maps that can be done without much working up, but the velvety effects that in the hands of Louis Haghe and his contemporaries were so conspicuous, cannot be secured by this method. The effects referred to were obtained by much patient work of a " tinter," who practically laid a ground on which the more experienced and artistic craftsman did his work either by scraping or accentuation. Where fine rich blacks are needed, artists will do well to read the notes on the " aqua- tint " and " wash " methods described by Senefelder in his well-known treatise, and afterwards practised with great skill by Hulemandel.

Lithography is of great service in educational matters, as its use for diagrams, wall pictures and maps is very general ; nor does the influence end with schooldays, for in the form of pictures at a moderate price it brings art into homes and lives that need brightening, and even in the form of posters on the much-abused hoardings does something for those who have to spend much of their time in the streets of great cities.

According to the census of 1901, 14,686 people in the United Kingdom found their occupation within the trade, while accord- ing to a Home Office return (1906), 20,367 persons other than lithographic printers were employed by the firms carrying on the business. As it may be assumed that an equal number are employed in France, Germany, the United States of America and the world at large, it is clear that a vast industrial army is employed in a trade that, like letterpress printing, has a very beneficial influence upon those engaged in it.

Technical Details. — The following description of the various methods of lithography is such as may be considered of interest to the general reader, but the serious student who will require formulas and more precise directions will do well to consult one of the numerous text-books on the subject.

Stone and Stone Substitutes. — The quality of stone first used by Alois Senefelder, and discovered by him at the village of Solenhofen in Bavaria, still remains unsurpassed. This deposit, which covers a very large area and underlies the villages of Solenhofen, Moernsheim and Langcnaltheim, has often been described, sometimes for inter- ested motives, as nearly exhausted; but a visit in 1906 revealed that the output — considerable as it had been during a period little short of a century — was very unimportant when compared to the great mass of carbonaceous limestone existing in the neighbourhood. The strong point in favour of this source of supply, in addition to its unrivalled quality, is the evenness of its stratification, and the fact that after the removal of the surface deposits, which are very thin, the stones come out of large size, in thickness of 3 to 5 in., and thus just suited for lithographic purposes and needing only to be wrought in the vertical direction. Other deposits of suitable stone have been found in France, Spain, Italy and Greece, but transit and the absence of suitable stratification have restricted them to little more than local use. Beyond this, few of the deposits other than in the neighbourhood of Solenhofen have been of the exact degree of density necessary, and the heavier varieties do not receive the grease with sufficient readiness. The desire to find other sources of supply has been stimulated by the social conditions existing in southern Bavaria, for the quarries are largely owned by peasant proprietors, who have very well-defined business habits of their own which make transactions difficult. Among other things, they will seldom supply the highest grades and the largest sizes to those who will not take their proportion of lower quality and smaller sizes; and this, in view of the very expensive transit down the Rhine to Rotterdam, with a railway journey at one end and a sea journey at the other, is a source of difficulty to the importer in other countries.

The earliest substitute for lithographic stone was zinc, which has been used from early days and is now more in demand than ever; it requires very careful printing as the grease only penetrates the material to a very slight extent, and the same must be said in regard to the water. From this cause, when not in experienced hands, trouble is likely to arise; and when this has occurred, remedial methods are much more difficult than with stones. When put away for storage, a dry place is very essential, as corrosion

is easily.set up. At first the plates were quite thick, and almost invariably grained by a zinc " muller " and acid; now a bath of acid is more generally

used, and the operation is known as " passing," while the plates are quite thin, which renders them suitable for bending round the cylinders of rotary machines.

So far we have been dealing with plain zinc, but variations are caused, either by the oxidization of the surface or by coating the plate with a composition closely allied to lithographic stone and applied in a form of semi-solution. This class of plate was first invented by Messrs C. & E. Layton, and a modification was invented by Messrs Wezel and Naumann of Leipzig, who brought its use to a high pitch of perfection for transferred work such as Christmas cards. A treat- ment of iron plates by exposing them to a high temperature has recently been patented, and has had some measure of success, while the Parker printing plate, which is practically a sheet of zinc so treated as to secure greater porosity and freedom from oxidization, is rapidly securing a good position as a stone substitute.

Preparation of the Stones. — In this department the cleanliness so necessary right through the lithographic process must be carefully observed, and a leading point is to secure a level surface and to ensure that the front and back of the stone are strictly parallel, i.e. that the stones stand the test of both the straight edge and the callipers. A good plan to ensure evenness on the surface is to mark the front with two diagonal lines of some non-greasy substance till the top stone (which should not be too small, and should be constantly revolved on the larger one) has entirely removed them. The application of the straight edge from time to time will end in securing the desired flatness, on which so much of the future printing quality depends. The usual method is to rub out with sand, and then rub with pumice and polish with water of Ayr or snake stone. For chalk work, the further work of graining has to be done by revolving a small stone muller on the surface with exceedingly fine sand or powdered glass. Many appliances (some very expensive) have been devised for doing the principal part of this work by machine — none more effective than those methods by which a disk of about 12 in. is kept revolving on a rod attached to the ceiling, guided by hand over all parts of the stone; but for large surfaces the ceiling needs to be rather high so as to allow of a long expanding rod reaching the surface at a moderate angle. When this machine is fitted with friction disk driving, very wide variations of speed are possible, and the machine can be driven so slowly and evenly as to secure a very fair (but not first class) grain, in addition to speedy rubbing out, which is the chief aim of the apparatus.

Preparing a Subject in Chalk or Chalk and Tints. — This branch of work is much less in demand than formerly. A grey stone having been selected and finely grained with sand or powdered glass passed through a sieve of 80 to 120 meshes to the lineal inch, and the artist having made his tracing, this tracing is reversed upon the stone with the interposition of a piece of paper coated with red chalk, and the chalk side towards the surface ; the lines on the tracing are then gone over with a tracing point, so that a reproduction in red chalk is left upon the stone. It will then be desirable to secure a stock of pointed Lemercier chalks of at least two grades, hard and soft : the pointing is a matter that requires experience, and is done by the worker drawing a sharp pen-knife towards him in a slicing manner as though trying to put a point upon a piece of cheese. Care should be taken that the falling pieces are gathered into a box, or they may do irreparable mischief to the work. The work of outlining is done with No. I or hard chalk, and until experience is gained it will be well to depend chiefly on this grade, securing rich dark effects by tinting or going over the stone in various directions and then finishing with litho- graphic ink where absolute blacks are required. This ink (Vanhymbeck's or Lemercier's are two good makes) needs careful preparation, the method being to warm a saucer and rub the ink dry upon it, then add a little distilled water and incorporate with the finger. It is of great importance not to use any ink left over for the next day, but always to have a fresh daily supply.

When the drawing is thus completed, it will require what is termed etching, by which the parts intended to receive the printing ink, and already protected by an acid-

resisting grease, will be left above the unprotected surface. The acid and gum mixture varies in accordance with the quality of the work and the character of the stone. A patiently executed specimen will, for instance, stand more etching than a hastily drawn one; while a grey stone will require more of the nitric acid than a yellow one. This is one of the most important tasks that a lithographer has to perform. A proportion of 1-5 parts of acid to 100 parts of a strong solution of gum arabic will be found to be approximately what is required, but the exact proportion must be settled by experience, a safe course being to watch the action that occurs when a small quantity is placed on the unused margin of the stone. Many put the etching mixture on with a flat camel-hair brush, which should be of good width to avoid streaks. The present writer's own preference is to pour the mixture on to the stone when it is in a slanting position; or it is perhaps better to have an etching trough, a strong box lined with pitch, with bearers at the bottom to prevent the stone coming in contact with it, and a hole through which the diluted acid may pass away for subsequent use. The etch- ing is then done with acid and water poured over the stone while in a sloping position, and the subsequent pouring of a solution of gum arabic completes the preparation. The late Mr William Simpson, whose Crimean lithographs are well known, once stated at the Society of Arts that in his opinion Mr Louis Haghe's reproduction

of David Robert's great picture of " The Taking of Jerusalem " was the most important piece of chalk lithography ever executed, and that he well remembered that it took two years to execute it, and that all the combined talent of Messrs Day & Haghe's establishment was utilized in its etching. He stated that, notwithstanding every precaution, it was under-etched, and that after half a dozen im- pressions the great beauty and brilliancy of the work had departed. This incident indicates sufficiently the serious nature of this part of the lithographer's work.

If the chalk drawing has to have tints, it will be necessary to make as many dusted offsetts as there are colours to be used ; in this class of work there are generally only two, — one warm or sandy shade and the other a quiet blue. — and these, with the black and the neutral colour secured by the superposition of the two shades, give an excellent result, of which Haghe's sketches in Belgium may be taken as a leading example.

In making such subjects suitable for present-day printing in the machine, the paper will require to be of a good " rag " quality, free from size and damped before printing. To secure accuracy of register the paper must be kept in a damp cloth to prevent the edges drying, and other machines should be kept available for each of the tints so that all work printed in black in the morning may be com- pleted the same night. In this way large editions might be printed of either original or rctransferred work at prices rendering] the prints suitable for high-class magazines.

Preparing a Chromo Lithograph. — For this purpose the proceedings will be much the same as those suggested for the black and tint work, but the preliminary tracing will be done in lithographic ink on tracing transfer paper or scratched on gelatine, the lines being subsequently filled in with transfer ink, and will be used as a " key," a guide stone that will not be printed ; and the number of stones necessary will probably be much more numerous. The initial point will be to consider if the work is to have the edition printed from it, or whether it has to be transferred after proving and before printing; generally speaking, large subjects such as diagrams or posters will be worked direct, while Christmas cards, postcards, handbills or labels, will be repeated many times on larger stones. For the former class a much wider range of methods is possible, but many of these are difficult to transfei, and the deterioration that arises makes it de- sirable to limit their use when transferring is contemplated. There- fore, chalk-rubbed

tints, varnish tints, stumping, wash, air brush, are the methods for original work, while work that has to be transferred is limited to ink work in line or stipple on a polished stone with the aid of " mediums " as before described, and ink " spluttered " on to the stone from a tooth brush. It should be mentioned that work done on grained paper is more suitable for retransfer than ordinary chalk work, and so is often very useful when a chalk effect is desired from a polished stone. In proving, opaque colours will be got on first, and it will often be found a good plan to put the black on early, for it gives a good idea of how the work is proceeding, and the strength of the touches (for the black should generally be used sparingly) is often pleasantly softened by the semi-opaque colours which should come on next. It is desirable to pull impressions of each colour on thoroughly white paper, and beyond this in important work there should be a progressive colour pattern that will show how the work looked when two, three or more colours were on, for this may at the finish be invaluable to show where error has crept in, and is in any event an immense aid to the machine minder.

In regard to paper, a description made of rag or rag and esparto is most desirable for all work on grained stones, but for work in ink and consequently from polished stone a good coated paper with sufficient " size " in it is frequently desirable; this paper is generally called " chromo " paper.

There is at the present time very little encouragement for the high class of chromo-lithography that was so much in evidence from 1855 to 1875, but there is little doubt that the work could be done equally well by the present-day craftsmen if the demand revived. Belonging to the period mentioned, distinguished examples of chromo-litho-graphy are " Blue Lights," after Turner, by Carrick; " Spanish Peasants " and the Lumley portrait of Shakespeare, by Risdon; " Queen Victoria receiving the Guards," by W. Bunney, after John Gilbert; and the series of chromos after John Leech, produced under the general direction of Vincent Brooks. A small proportion only of the Arundel Society's prints were executed in England, but many reproductions of water-colours after Birket Foster, Richardson, Wainwright and others were executed by Samuel Hodson, James Lewis and others. Perhaps the most consistently good work of modern times has been the reproduction of Pellegrini's and Leslie Ward's drawings for Vanity Fair, which from 1870 to 1906 were with very few exceptions executed by the firm of Vincent Brooks, Day & Son.

Transfers. — A very large proportion of work is got on to the stone by transfer, and there is no more important part of the business perhaps at the present time. When there is so much original litho- graphy done on grained paper by artists of eminence, the trans- ferring of grained paper drawings is the most important. The stone most desirable for this purpose will be neither a grey nor a light yellow, but one that stands mid-way between the two; it should be very carefully polished so as to be quite free from scratches, and brought to blood-heat by being gradually heated in an iron cupboard

prepared with the necessary apparatus. The methods that some- times prevail of pouring boiling water over the stone, heating with the flame of an ordinary plumber's lamp, or even heating the surface in front of a fire, are ineffective substitutes, for the surface may thus become unduly hot and spread the work, and there is no increased tendency for the chalk to enter into the stone and thus give the work a long life. If there are no colours or registration troubles to be considered, it is well to place the transfer in a damping book till the composition adheres firmly to the finger, before placing it on the stone; it should then be pulled through twice, after which it should be damped on the back and pulled through several times; after this has again been well damped the paper will be found to peel easily off the stone, leaving the work and nearly all the composition attached; the latter should then be very gently washed away.

In cases where the work for some reason must not stretch, such as the hills on a map, it will be necessary to keep the transfer dry and put it on a wet stone, but a piece of the margin of the paper should be tested to see that it is of a class that will adhere to the

stone the first time it is pulled through. Unless the adhesion, is very complete it may not be safe to pull it through more than once. For a small number of copies a very moderate ” etch ” is desirable, but for a long run, where the object is to secure a good edition rather than a few good proofs, the Eberle system may be adopted. This method consists in protecting the work with finely powdered resin and then applying the flame of an ordinary plumber’s lamp; this will melt the protecting medium round the base of each grain of work and allow of a very vigorous ” etch ” being applied. As before stated it is not unusual to secure 2000 to 3000 good copies in the machine after this treatment; but the rollers, the ink and the superintendence must be of the best.

When the artist who is not a professed lithographer desires to make tints to his work, a reversed offset on grained paper should be made for each colour; this is done by pulling an impression in the usual way on a hard piece of paper, and while it is yet wet this should be faced with a piece of grained paper and pulled through again, when the grained paper will be found to have received the greater portion of the ink; this should be immediately dusted with offset powder of a red shade to prevent the grease passing into the paper, and the drawing of the tints should then be proceeded with in the usual way. Another method of transfer work is to pull impressions from copper or steel plates in transfer ink; it is in such way that simple etchings like those of Cruikshank, Phiz and others are pro- duced, and nearly all commercial work such as maps, bill heads, &c, are prepared in the same manner.

Beyond this, much work is done in lithographic ink on what is called writing transfer paper, such as circulars, law writing for abstracts, specifications and plans.

Machinery. — The chief items are the hand presses and the machines, whether flat bed or rotary, the principal places of manufacture being Leeds, Otley and Edinburgh. Stimulated by American competition, the standard of excellence in the United Kingdom has been very considerably raised of late years. The rotary machines have only been possible since the more frequent use of aluminium and zinc, but these materials are more suitable to receive transfer than for the general use of an office, the chief reason being that corrections on stone are more easily accomplished and more lasting when done. Preliminary work is therefore frequently done on the stone and transferred to plates for the machine.

The question is very frequently asked as to how the necessary registration of the colours is secured; it may be stated for the benefit of the amateur that in hand printing this is generally done by pricking with a pair of needles through printed marks present on each stone ; but in the machine this has been done in different ways, although in quite early days ” pointing ” or ” needling ” was done even on the machine. On modern machines this registration depends on the accurate cutting of tl;e edge of the paper, of which at least one corner must be_ an absolute right angle. The paper is then laid on a sloping board in such a way that the longest of the two true edges gravitates into the gripper of the machine, the stops of which move slightly forward as the gripper closes; simultaneously what is called the “side lay ” moves forward automatically to a given extent, and in this way at the critical moment the sheet is always in the same position _ in regard to the stone, which has already been firmly secured in the bed of the machine.

Quite recently a new method has come into use that is probably destined to be a great aid to the craft in its competition with other methods. This is known as offset printing ; it is more a matter of evolution than invention, and proceeds from the method adopted in tin-plate decoration so much used for box-making and lasting forms of advertisement. It consists in bringing a sheet of rubber into contact with the charged stone and then setting-off the impression so obtained upon card, paper, pegamoid, cloth or other material, the elasticity of the rubber making it possible to print upon rough surfaces that have been previously unsuited to lithographic printing. Both flat bed and rotary machines are available for this system, the latter being restricted to zinc or aluminium plates, but giving a high speed, while the former can use both stones and metal plates and may be more effective for the highest grade of colour work; by both

classes of machines the finest engraved note headings can be printed on rough paper, and colour work that has for so long been confined

to coated or burnished papers will be available on surfaces such as the artists themselves use.

The following treatises may be referred to with advantage by those in search of more detailed information : A Complete Course of Litho- graphy, by Alois Senefelder (R. Ackermann, London, 1819); The Grammar of Lithography, by W. D. Richmond (13th edition, E. Menken, London); Handbook of Lithography, by David Cumming (London, A. & C. Black). The first of these will only be found in libraries of importance ; the others are present-day text-books.

(F. V. B.) LITHOSPHERE (Gr. \idos , a stone, and

LITHUANIANS and LETTS, two kindred peoples of Indo- European origin, which inhabit several western provinces of Russia and the north-eastern parts of Poland and Prussia, on the shores of the Baltic Sea, and in the basins of the Niemen and oftheDuna. Large colonies of Lithuanian and Lettic emigrants have been established in the United States. The two races number about 3,500,000, of whom 1,300,000 are Letts. Little is known about their origin, and nothing about the time of their appearance in the country they now inhabit. Ptolemy mentions (iii. 5) two clans, the Galindae and Sudeni, who probably belonged to the western subdivision of this racial group, the Borussians. In the 10th century the Lithuanians were already known under the name of Litva, and, together with two other branches of the same stem — the Borussians and the Letts — they occupied the south-eastern coast of the Baltic Sea from the Vistula to the Duna, extending north-east towards the Lakes Vierzi-jarvi and Peipus, south-east to the watershed between the affluents of the Baltic and those of the Black Sea, and south to the middle course of the Vistula (Brest Litovsk) — a tract bounded by Finnish tribes in the north, and by Slavs elsewhere.

Inhabiting a forested, marshy country the Lithuanians have been able to maintain their national character, notwithstanding the vicissitudes of their history. Their chief priest, Krive- Krivryto (the judge of the judges), under whom were seventeen classes of priests and elders, worshipped in the forests; the Waidelots brought their offerings to the divinities at the foot of oaks; even now, the veneration of great oaks is a widely spread custom in the villages of the Lithuanians, and even of the Letts.

Even in the 10th century the Lithuanian stem was divided into three main branches: — the Borussians or Prussians; the Letts (who call themselves Latvis, whilst the name under which they are known in Russian chronicles, Letygola, is an abbreviation of Latvin-galas, ” the confines of Lithuania “); and the Lithuanians, or rather Lituanians, Litva or Letuvininkai, — these last being subdivided into Lithuanians proper, and Zhmud’ {Zmudz, Samog- itians or Zemailey), the ” Lowlanders.” To these main branches must be added the Yatvyags, or Yadzvings, a warlike, black- haired people who inhabited the forests at the upper tributaries of the Niemen and Bug, and the survivors of whom are easily distinguishable as a mixture with White-Russians and Mazurs in some parts of Grodno, Flotsk, Lomza and Warsaw. Nestor’s chronicle distinguishes also the Zhemgala, who later became known under the name of Scmigallia, and in the 10th century inhabited the left bank of the Duna. Several authors consider also as Lithuanians the Kors of Russian chronicles, or Courons of Western authors, who inhabited the peninsula of Courland, and the Golad, a clan settled on the banks of the Porotva, tributary of the Moskva river, which seems to have been thrown far from the main stem during its migration to the north. The Krivichi,

who inhabited what is now the government of Smolensk, seem to belong to the same stem. Their name recalls the Krive-Kriveyto, and their ethnological features recall the Lithuanians; but they are now as much Slavonic as Lithuanian.

All these peoples are only ethnographical subdivisions, and each of them was subdivided into numerous independent clans and villages, separated from one another by forests and marshes; they had no towns or fortified places. The Lithuanian territory thus lay open to foreign invasions, and the Russians as well as the German crusaders availed themselves of the opportunity. The Borussians soon fell under the dominion of Germans, and ceased to constitute a separate nationality, leaving only their name to the state which later became Prussia. The Letts were driven farther to the north, mixing there with Livs and Ehsts, and fell under the dominion of the Livonian order. Only the Lithuanians proper, together with Samogitians, succeeded in forming an independent state. The early history of this state is imperfectly known. During the continuous petty war carried on against Slavonic invasions, the military chief of one of the clans, Ryngold, acquired, in the first half of the 13th century, a certain preponderance over other clans of Lithuania and Black Russia (Yatvyags), as well as over the republics of Red Russia. At this time, the invasions of the Livonian order becoming more frequent, and always extending southward, there was a general feeling of the necessity of some organization to resist them, and Ryngold's son, Mendowg, availed himself of this opportunity to pursue the policy of his father. He made different concessions to the order, ceded to it several parts of Lithuania, and even agreed to be baptized, in 1250, at Novograd Litovsk, receiving in exchange a crown from Innocent IV., with which he was crowned king of Lithuanians. He also ceded the whole of Lithuania to the order in case he should die without leaving offspring. But he had accepted Christianity only to increase his influence among other clans; and, as soon as he had con- solidated a union between Lithuanians, Samogitians and Cours, he relapsed, proclaiming, in 1260, a general uprising of the Lithuanian people against the Livonian order. The yoke was shaken off, but internal wars followed, and three years later Mendowg was killed. About the end of the 13th century a new dynasty of rulers of Lithuania was founded by Lutuwer, whose second son, Gedymin (1316-1341), with the aid of fresh forces he organized through his relations with Red Russia, established something like regular government; he at the same time ex- tended his dominions over Russian countries — over Black Russia (Novogrodok, Zditov, Grodno, Slonim and Volkovysk) and the principalities of Polotsk, Tourovsk, Pinsk, Vitebsk and Volhynia. He named himself Rex Lethowinorum et midtorum Ruthenorum. In 1325 he concluded a treaty with Poland against the Livonian order, which treaty was the first step towards the union of both countries realized two centuries later. The seven sons of Gedymin considered themselves as quite independent; but two of them, Olgierd and Keistut, soon became the more powerful. They represented two different tendencies which existed at that time in Lithuania. Olgierd, whose family relations attracted him towards the south, was the advocate of union with Russia; rather politician than warrior, he increased his influence by diplomacy and by organization. His wife and sons being Christians, he also soon agreed to be baptized in the Greek Church. Keistut represented the revival of the Lithuanian nationality. Continually engaged in wars with Livonia, and remaining true to the national religion, he became the national legendary hero. In 1345 both brothers agreed to re-establish the great principality of Lithuania, and, after having taken Vilna, the old sanctuary of the country, all the brothers recognized the supremacy of Olgierd. His son, Jagiello, who married the queen of Poland, Yadviga, after having been baptized in the Latin Church, was crowned, on the 14th of February 1386, king of Poland. At the beginning of the 15th century Lithuania extended her dominions as far east as Vyazma on the banks of the Moskva river, the present government of Kaluga, and Poutivl, and south-east as far as Poltava, the shores of the Sea of Azov, and Haji-Ley (Odessa), thus including Kiev and Lutsk. The union with

Poland remained, however, but nominal until 1569, when Sigis- mund Augustus was

king of Poland. In the 16th century Lithuania did not extend its power so far east and south-east as two centuries before, but it constituted a compact state, including Polotsk, Moghilev, Minsk, Grodno, Kovno, Vilna, Brest, and reaching as far south-east as Chernigov. From the union with Poland, the history of Lithuania becomes a part of Poland's history, Lithuanians and White-Russians partaking of the fate of the Polish kingdom (see Poland: History). After its three partitions, they fell under the dominion of the Russian empire. In 1792 Russia took the provinces of Moghilev and Polotsk, and in 1793 those of Vilna, Troki, Novgorod-Syeversk, Brest and Vitebsk. In 1797 all these provinces were united together, con- stituting the " Lithuanian government " (Litovskaya Gubernia). But the name of Lithuanian provinces was usually given only to the governments of Vilna and Kovno, and, though Nicholas I. prohibited the use of this name, it is still used, even in official documents. In Russia, all the White-Russian popula- tion of the former Polish Lithuania are usually considered as Lithuanians, the name of Zhmud being restricted to Lithuanians proper.

The ethnographical limits of the Lithuanians are undefined, and their number is variously estimated. The Letts occupy a part of the Courland peninsula of Livonia and of Vitebsk, a few other settlements being spread also in the governments of Kovno, St Petersburg and Moghilev. The Lithuanians proper inhabit the governments of Kovno, Vilna, Suvalki and Grodno; while the Samogitians or Zhmud inhabit the governments of Kovno and Suvalki. To these must be added about 200,000 Borussians, the whole number of Lithuanians and Letts in Russia being, according to the census of 1897, 3,094,469. They are slowly extending towards the south, especially the Letts; numerous emigrants have penetrated into Slavonic lands as far as the government of Voronezh.

The Lithuanians are well built; the face is mostly elongated, the features fine; the very fair hair, blue eyes and delicate skin dis- tinguish them from Poles and Russians. Their dress is usually plain in comparison with that of Poles, and the predominance in it of greyish colours has been frequently noticed. Their chief occupation is agriculture. The trades in towns are generally carried on by men of other races — mostly by Germans, Jews or Poles. The only exception is afforded to some extent by the Letts. The Samogitians are good hunters, and all Lithuanians are given to apiculture and cattle breeding. But the Lithuanians, as well in the Baltic provinces as in the central ones, were not until the most recent time proprietors of the soil they tilled. They have given a few families to the Russian nobility, but the great mass of the people became serfs of foreign landowners, German and Polish, who reduced them to the greatest misery. Since the Polish insurrection of 1863, the Russian govern- ment has given to the Lithuanians the land of the Polish proprietors on much easier terms than in central Russia; but the allotments of soil and the redemption taxes are very unequally distributed; and a not insignificant number of peasants (the chinsheviki) were even deprived of the land they had for centuries considered their own. The Letts remain in the same state as before, and are restrained from emigrating en masse only by coercive measures.

The Letts of Courland, with the exception of about 50,000 who belong to the Greek Church, are Lutherans. Nearly all can read. Those of the government of Vitebsk, who were under Polish dominion, are Roman Catholics, as well as the Lithuanians proper, a part of whom, however, have returned to the Greek Church, in which they were before the union with Poland. The Samogitians are Roman Catholics; they more than other Lithuanians have conserved their national features. But all Lithuanians have maintained much of their heathen practices and creed; the names of pagan divinities, very numerous in the former mythology, are continually mentioned in songs, and also in common speech.

Bibliography. — Schiemann, Russland, Polen und Livland bis ins lyte Jahrhundert (2 vols., Berlin, 1886-1887); S. DaUkantas, Lietuvos Istorija (Plymouth, Pa., 1893); J. de Brye, Elude historique sur la Lithuanie (Paris, 1894); P. D. Bryantsev, Istoriya Litovskago Cosudarstva (Vilna, 1899). (P. A. K.)

Language and Literature. — The Lithuanian, Lettic or Lettish and Borussian or Old

Prussian languages together constitute a distinct linguistic subdivision, commonly called the Baltic subdivision, within the Indo-European family. They have many affinities to the Slavonic languages, and are sometimes included with them in a single linguistic group, the Balto-Slavic. In their phonology, however, though not in their structure the

Baltic languages appear to be more primitive than the Slavonic. Lithuanian, for example, retains the archaic diphthongs which disappear in Slavonic— Lith. veidas, " face," Gr. el8os, O.S. vidu. Among other noteworthy phonological characteristics of Lithuanian are the conversion of k into a sibilant, the loss of h and change of all aspirates into tenues and the retention of primitive consonantal noun-terminations, e.g. the final s in Sans. Vrkds, Lith. vUkas, O.S. viilku. Lettic is phonologically less archaic than Lithuanian, although in a few cases it has preserved Indo-European forms which have been changed in Lithuanian, e.g. the s and z which have become Lith. sz (sh) and 2 (zh). The accent in Lithuanian is free; in Lettic, and apparently in Old Prussian, it ultimately became fixed on the first syllable.

In its morphology Lettic represents a later stage of development than Lithuanian, their mutual relationship being analogous to that between Old High German and Gothic* Both languages have pre- served seven out of the eight Indo-European cases; Lithuanian has three numbers, but Lettic has lost the dual (except in diwi, " two " and abbi, " both "); the neuter gender, which still appears in Lithu- anian pronouns, has also been entirely lost in Lettic; in Lithuanian there are four simple tenses (present, future, imperfect, preterite), but in Lettic the imperfect is wanting. In both languages the number of periphrastic verb-forms and of diminutives is large ; in both there are traces of a suffix article; and both have enriched their vocabu- laries with many words of foreign, especially German, Russian and Polish origin. The numerous Lithuanian dialects are commonly divided into High or Southern, which changes ty and dy into cz, dz, and Low or Northern, which retains ty, dy. Lettic is divided into High (the eastern dialects), Low (spoken in N.W. Courland) and Middle (the literary language). Old Prussian ceased to be a spoken language in the 17th century; its literary remains, consisting chiefly of three catechisms and two brief vocabularies, date almost entirely from the period 1517-1561 and are insufficient to permit of any thorough reconstruction of the grammar.

The literary history of the Lithuanians and Letts dates from the Reformation and comprises three clearly defined periods. (1) Up to 1700 the chief printed books were of a liturgical character. (2) During the 18th century a vigorous educational movement began; dictionaries, grammars and other instructive works were compiled, and written poems began to take the place of songs preserved by oral tradition. (3) The revival of national sentiment at the beginning of the 19th century resulted in the establishment of newspapers and the collection and publication of the national folk-poetry. In both literatures, works of a religious character predominate, and both are rich in popular ballads, folk-tales and fables.

The first book printed in Lithuanian was a translation of Luther's shorter Catechism (Konigsberg, 1547); other transla- tions of devotional or liturgical works followed, and by 1701 59 Lithuanian books had appeared, the most noteworthy being those of the preacher J. Bretkun (1535-1602). The spread of Calvinism led to the publication, in 1701, of a Lithuanian New Testament. The first dictionary was printed in 1^49. But perhaps the most remarkable work of the second period was The Four Seasons, a pastoral poem in hexameters by Christian Donalitius (1714-1780), which was edited by Nesselmann (Konigsberg, 1869) with a German translation and notes. In the 19th century various collections of fables and folk-tales were published, and an epic, the Onikshta Grove, was written by Bishop Baranoski. But it was in journalism that the chief original work of the third period was done. F. Kelch (1801-1877) founded the first Lithuanian newspaper, and between 1834 and 1895 no fewer than 34 Lithuanian periodicals were published in the United States alone.

Luther's Catechism (Konigsberg, 1586) was the first book printed in Lettic, as in the sister speech. In the 17th century various translations of psalms, hymns and other religious works were published, the majority being Calvinistic in tone. The educational movement of the 18th century was inaugurated by G. F. Stender (17 14-1796), author of a Lettic dictionary and grammar, of poems, tales and of a Book of Wisdom which treats of elementary science and history. Much educational work was subsequently done by the Lettic Literary Society, which publishes a magazine (Magazin, Mitau, from 1827), and by the " Young Letts," who published various periodicals and translations of foreign classics, and endeavoured to free

their language and thought from German influences. Somewhat similar tasks were undertaken by the " Young Lithuanians," whose first magazine the Auszra (" Dawn ") was founded in 1883. From 1890 to 1910 the literature of both peoples was marked by an ever-increasing nationalism; among the names most prominent during this period may be mentioned those of the dramatist Steperman and the poet Martin Lap, both of whom wrote in Lettic.

Bibliography. — Lithuanian dictionaries: Nesselmann, Wbrter- buch der litauischen Sprache (Konigsberg, 1851); Kurschat, Worter- buch der litauischen Sprache (Halle, 1870-1883); A. Juszkiewicz, Lilovskiy Slovar (St Petersburg, 1897, &c); P. Saurusaitis, An Abridged Dictionary of the English-Lithuanian Languages, 2 pts. (Waterbury, Conn., 1899-1900); A. Lalis, Dictionary of the Lithu- anian and English Languages (Chicago, 1903, &c). Grammar and Linguistic: Schleicher, Handbuch der litauischen Sprache (Prague, 1856-1857); O. Wiedemann, Handbuch der litauischen Sprache (Strassburg, 1897); A. Bezzenberger, Beitrdge zur Geschichte der litauischen Sprache (Gottingen, 1877); J. Schiekopp, Gramatyka liteivska poczatkowa (Cracow, 1902). Literature: Nesselmann, Litauische Volkslieder (Berlin, 1853); A. Juszkiewicz, Lietuwiskos Dajnos Uzrasytos, &c. (Kazan, 1881); A. Leskien and C. Brugman, Litauische Volkslieder (Strassburg, 1882); C. Bartsch, Melodieen litauischer Volkslieder (Heidelberg, 1886); A. Juszkiewicz, Melodje ludowe litewskie (Cracow, 1900, &c.) ; E. A. Vol'ter, Litovskaya Khreslomatiya (St Petersburg, 1901, &c). ;

Lettic dictionaries and grammars: Bielenstein, Die Lettische Sprache (Berlin, 1863-1864) ; id., Lettische Grammatik (Mitau, 1863) ; L'lmann and Brasche, Lettisches Wbrterbuch (Riga, 1872-1880); A. Bezzenberger, Uber die Sprache der preussischen Letten and lettische Dialekt-Studien (Gottingen, 1885)- Bielenstein, Grenzen des lettischen Volksstammes und der lettischen Sprache (St Petersburg, 1892), Literature: Bielenstein Tausend lettische Rdthsel (Mitau, 1881); V. Treuland, Latyshskiya Narodnyya Skazki (Moscow, 1887, &c); K. Baron and H. Wissendorff , Latwju dainas (Mitau 1894, &c.) ; V. Andreyanov, Lettische Volkslieder und Mythen (Halle. 1896).

Old Prussian: Nesselmann, Die Sprache der alien Preussen (Berlin, 1845); id., Thesaurus linguae prussicae (Berlin, 1873); Berneker, Die preussische Sprache (Strassburg, 1896); M. Schultze, Grammatik der altpreussischen Sprache (Leipzig, 1897).

LITMUS (apparently a corruption of lacmus, Dutch lacmoes, lac, lac, and moes, pulp, due to association with " lit," an obsolete word for dye, colour; the Ger. equivalent is Lackmus, Fr tourncsol), a colouring matter which occurs in commerce in the form of small blue tablets, which, however, consist mostly, not of the pigment proper, but of calcium carbonate and sulphate and other matter devoid of tinctorial value. Litmus is extensively employed by chemists as an indicator for the detection of free acids and free alkalis. An aqueous infusion of litmus, when exactly neutralized by an acid, exhibits a violet colour, which by the least trace of free acid is changed to red, while

free alkali turns it to blue. The reagent is generally used in the form of test paper — bibulous paper dyed red, purple or blue by the respective kind of infusion. Litmus is manufactured in Holland from the same kinds of lichens (species of Roccella and Lecanora) as are used for the preparation of archil (q.v.).

LITOPTERNA, a suborder of South American Tertiary ungulate mammals typified by Macrauchenia, and taking their name (" smooth-heel ") from the presence of a flat facet on the heel-bone, or calcaneum for the articulation of the fibula. The more typical members of the group were digitigrade animals, recalling in general build the llamas and horses; they have small brains, and a facet on the calcaneum for the fibula. The cheek- dentition approximates more or less to the perissodactyle type. Both the terminal faces of the cervical vertebrae are flat, the femur carries a third trochanter, the bones of both the carpus and tarsus are arranged in linear series, and the number of toes, although commonly three, varies between one and five, the third or middle digit being invariably the largest.

Of the two families, the first is the Proterotheriidae, which exhibits, in respect of the reduction of the digits, a curious parallelism to the equine line among the Perissodactyla; in this feature, as well as in the reduction of the teeth, it is more specialized than the second family.

The molar teeth approximate to the Palaeotherium type, but have a more or less strongly developed median longitudinal cleft. The three-toed type is represented by Diadiaphorus , in which the dental formula is t'.j.e.?, p j,ra.jj,andthe feet are very like those of Hipparion. The cervical vertebrae are of normal form, the orbit (as in the second

family) is encircled by bone, the last molar has a third lobe, the single pair of upper incisors are somewhat elongated, and have a gap between and behind them, while the outer lower incisors are larger than the inner pair, the canines being small. The skull has a short muzzle, with elongated nasals. Remains of this and the other repre- sentatives of the group_ are found in the Patagonian Miocene. In Proterotherium, which includes smaller forms having the same, or nearly the same, dental formula, the molar teeth differ from those of Diadiaphorus by the deeper median longitudinal cleft, which com- pletely divides the crown into an inner and an outer moiety, the two cones of the inner half being united. According to the description given by Argentine palaeontologists, this genus is also three-toed, the single-toed representative of the family being Thoatherium, in which the lateral metapodials, or splint-bones, are even more reduced than in the Equidae.

In the second family — Macraucheniidae — the dentition is complete (forty-four) and without a gap, the crowns of nearly all the teeth being of nearly uniform height, while the upper molars are distinguished from those of the Proterotheriidae by a peculiar arrangement of their two inner cones, and the eleva- tion of the antero-posterior portion of the cingulum so as to form an extra pit on the crown. To describe this arrangement in detail is impossible.here, but it may be stated that the two inner cones are closely approximated, and separated by a narrow V-shaped notch on the inner side of the crown. The elongated cervical vertebrae are peculiar in that the arch is perforated by the artery in the same manner as in the llamas.

In the Santa Cruz beds of Patagonia the family is represented by the generalized genus Oxyodontotherium (in which Theosodon may apparently be included). It comprises animals ranging up to the size of a tapir, in which the nostrils were more or less in the normal anterior position, and the cheek-teeth short- crowned, with the inner cones of the upper molars well developed and separated by a notch, and the pits of moderate depth. The last upper premolar is simpler than the molars, and the canine, which may be double-rooted, is like the earlier premolars. The radius and ulna, like the tibia and fibula, are distinct, and the metapodials rudimentary. On the other hand, in Macrau- chenia, which was a much larger llama-like animal, the skull is elongated and narrow, with rudimentary nasals, and the aperture of the nose placed nearly on the line of the

eyes and directed up- wards, the muzzle not improbably terminating in a short trunk. Deep pits on the forehead probably served for the attachment of special muscles connected with the latter. Very curious is the structure of the cheek-teeth, which are high-crowned, with the two inner cones reduced to mere points, and the pits on the crown-surface large and funnel-shaped. In fact, the perissodac- tyle type is almost lost. The cervical vertebrae and limb-bones are very long, the radius and ulna being completely, and the tibia and fibula partially, united. The typical M. patagonica is a Pleistocene form as large as a camel, ranging from Patagonia to Brazil, but remains of smaller species have been found in the Pliocene (?) of Bolivia and Argentina.

The imperfectly known Scalabrinia of the Argentine Pliocene appears to occupy a position intermediate between Oxyodonto- therium and Macrauchenia, having the nasal aperture situated in the middle of the length of the skull, and the crowns of the cheek-teeth nearly as tall as in the latter, but the lower molars furnished with a projecting process in the hinder valley, similar to one occurring in those of the former.

In this place may be mentioned another strange ungulate from the Santa Cruz beds of Patagonia, namely, Astrapotherium, sometimes regarded as typifying a suborder by itself. This huge ungulate had cheek-teeth singularly like those of a rhinoceros, and an enormous pair of tusk-like upper incisors, recalling the upper canines of Machaerodus on an enlarged scale. In the lower jaw are two large tusk-like canines, between which are three pairs of curiously-formed spatulate incisors, and in both jaws there is a long diastema. The dental formula appears tobei.ˆ cl, p.\, m..

Next Astrapotherium may be provisionally placed the genus Homalodontotherium, of which the teeth have much lower crowns, and are of a less decidedly rhinocerotic type than in Astrapotherium, and the whole dentition forms an even and unbroken series. The bodies of the cervical vertebrae are short, with flattened articular

surfaces, the humerus has an enormous deltoid crest, suggestive of fossorial powers, and the femur is flattened, with a third trochanter. According to the Argentine palaeontologists, the carpus is of the alternating type, and the terminal phalanges of the pentedactyle feet are bifid, and very like those of Edentata. Indeed, this type of foot shows many edentate resemblances. The astragalus is square and flattened, articulating directly with the navicular, although not with the cuboid, and having a slightly convex facet for the tibia. From the structure of the above-mentioned type of foot, which is stated to have been found in association with the skull, it has been suggested that Homalodontotherium should be placed in the Ancylopoda (q.v.), but, to say nothing of the different form of the cheek-teeth, all the other South American Santa Cruz ungulates are so distinct from those of other countries that this seems unlikely. It may be suggested that we have rather to deal with an instance of parallelism — a view supported by the parallelism to the Equidae presented by certain members of the Proterotheriidae. (R. L.*)

LITOTES (Gr. Xitottjs, plainness, Xtroj, plain, simple, smooth), a rhetorical figure in which emphasis is secured for a statement by turning it into a denial of the contrary, e.g. ” a citizen of no mean city,” i.e. a citizen of a famous city, “A. is not a man to be neglected.” Litotes is sometimes used for what should be more strictly called “meiosis” (Gr. /xekooxs, lessening, diminu- tion, jxtiuv, lesser), where the expressions used apparently are weak or understated, but the effect is to intensify.

LITTER (through O. Fr. litere or litiere, mod. litiere from Med. Lat. lectaria, classical lectica, leclus, bed, couch), a word used of a portable couch, shut in by curtains and borne on poles by bearers, and of a bed of straw or other suitable substance for animals; hence applied to the number of young produced by an animal at one birth, and also to any disordered heap of waste material, rubbish, &c. In ancient Greece, prior

to the influence of Asiatic luxury after the Macedonian conquest, the Utter (4>opuov) was only used by invalids or by women. The Romans, when the lectica was introduced, probably about the latter half of the 2nd century b.c. (Gellius x. 3), used it only for travelling purposes. Like the Greek or Asiatic litter, it had a roof of skin (pellis) and side curtains {vela, plagae). Juvenal (i v. 20) speaks of transparent sides (lalis specularibus) . The slaves who bore the litter on their shoulders (succollare) were termed lecticarii, and it was a sign of luxury and wealth to employ six or even eight bearers. Under the Empire the litter began to be used in the streets of Rome, and .its use was restricted and granted as a privilege (Suet. Claudius). The travelling lectica must be distinguished from the much earlier lectica funebris or feretrum, the funeral bier on which the dead were carried to their burial-place.

LITTLE FALLS, a city and the county-seat of Morrison county, Minnesota, U.S.A., on both banks of the Mississippi river, about 88 m. N.W. of Minneapolis. Pop. (1890) 2354; (1900) 5774, of whom 1559 were foreign-born, chiefly Germans and Swedes; (1905) 5856; (1910) 6078. It is served by the Northern Pacific railway. The city is situated in a prosperous farming region, and has excellent water-power and various manufactures. Little Falls was settled about 1850, was chartered as a city in 1889 and adopted a new charter in 1902. Here was buried the Chippewa chief, Hole-in-the-Day (c. 1827-1868), or Bagwunagijik, who succeeded his father, also named Hole- in-the-Day, as head chief of the Chippewas in 1846. Like his father, the younger Hole-in-the-Day led his tribe against the Sioux, and he is said to have prevented the Chippewas from joining the Sioux rising in 1862. His body was subsequently removed by his relatives.

LITTLE FALLS, a city of Herkimer county, New York, U.S.A., on the Mohawk river, 21 m. E.S.E. of Utica. Pop. (1890) 8783; (1900) 10,381, of whom 1915 were foreign-born; (1910 census) 12,273. It is served by the New York Central & Hudson River, the West Shore, the Utica & Mohawk Valley (electric), and the Little Falls & Dolgeville railways (the last named being 13 m. long and running only to Salisbury Center and by the Erie canal. The Mohawk river falls here by a series of rapids 45 ft. in less than a mile, furnishing water power. Among the manufactures are cotton yarn, hosiery and knit goods, leather, &c. In 1905 the city's factory products were valued at $4,471,080. The city has one of the largest cheese-markets

in the United States. The manufacture of flour and grist-mill products was formerly an important industry; a mill burned in 1782 by Tories and Indians had supplied almost the entire Mohawk Valley, and particularly Forts Herkimer and Dayton. Near the city is the grave of General Nicholas Herkimer, to whom a monument was erected in 1896. Little Falls was settled by Germans in 1782, and was almost immediately destroyed by Indians and Tories. It was resettled in 1790, and was in- corporated as a village in 181 1 and as a city in 1895.

See George A. Hardin, History of Herkimer County (Syracuse,

1893).

LITTLEHAMPTON, a seaport and watering-place in the Chichester parliamentary division of Sussex, England, at the mouth of the Arun, 62 m. S. by W. from London by the London, Brighton & South Coast railway. Pop. of urban district (1901) 7363. There is a beach of firm sand. The harbour is easily accessible in all weathers, and has a small general trade.

LITTLE ROCK, the capital of Arkansas, U.S.A., and the county-seat of Pulaski county, situated near the centre of the state and on the S. bank of the Arkansas river, at the E. edge of the Ozark foothills. Pop. (1890) 25,874; (1900) 38,307, of whom 14,694 were of negro blood, and 2099 were foreign- born; (1910 census) 45,941- Little Rock is served by the Chicago, Rock Island & Pacific, the St Louis South Western, and the St Louis, Iron Mountain & Southern railways and by river boats. It occupies a comparatively level site of 11 sq. m. at an altitude of 250 to 400 ft. above sea-level and 50 ft. or more above the river, which is crossed here by three railway bridges and by a county bridge.

The city derived its name (originally “le Petit Roche” and “The Little Rock”) from a rocky peninsula in the Arkansas, distinguished from the ” Big Rock ” (the site of the army post, Fort Logan H. Roots), 1 m. W. of the city, across the river. The Big Rock is said to have been first discovered and named ” Le Rocher Francais ” in 1722 by Sieur Bernard de la Harpe, who was in search of an emerald mountain; the Little Rock is now used as an abutment for a railway bridge. The state capitol, the state insane asylum, the state deaf mute institute, the state school for the blind, a state reform school, the penitentiary, the state library and the medical and law departments of the state university are at Little Rock; and the city is also the seat of the United States court for the eastern district of Arkansas, of a United States land office, of Little Rock College, of the St Mary’s Academy, of a Roman Catholic orphanage and a Roman Catholic convent, and of two schools for negroes — the Philander Smith College (Methodist Episcopal, 1877), co-educational, and the Arkansas Baptist College. The city is the seat of Protestant Episcopal and Roman Catholic bishops. Little Rock has a Carnegie library (1908), an old ladies’ home, a Florence Crittenton rescue home, a children’s home, St Vincent’s infirmary, a city hospital, a Catholic hospital, a physicians’ and surgeons’ hospital and the Arkansas hospital for nervous diseases. A municipal park system includes City, Forest, Wonderland and West End parks. Immigration from the northern states has been encouraged, and northern men control much of the business of the city. In 1905 the value of factory products was $4,689,787, being 38-8% greater than the value in 1900. Cotton and lumber industries are the leading interests; the value of cotton-seed oil and cake manufactured in 1905 was $967,043, of planing mill products $835,049, and of lumber and timber products $342,134. Printing and publishing and the manu- facture of foundry and machine shop products and of furniture are other important industries. Valuable deposits of bauxite are found in Pulaski county, and the mines are the most important in the United States.

Originally the site of the city was occupied by the Quapaw Indians. The earliest permanent settlement by the whites was about 1813-1814; the county was organized in 1818 while still a part of Missouri Territory; Little Rock was surveyed in 1821, was incorporated as a town and became the capital of Arkansas in 1821, and was chartered as a city in 1836. In 1850 its population was only 2167, an d in i860 3727; but in 1870

it was 12,380. Little Rock was enthusiastically anti-Union at the outbreak of the Civil War. In February 1861, the United States Arsenal was seized by the state authorities. In September 1863 the Federal generals William Steele (1819-1885) and John W. Davidson (1824-1881), operating against General Sterling Price, captured the city, and it remained throughout the rest of the war under Federal control. Constitutional conventions met at Little Rock in 1836, 1864, 1868 and 1874, and also the Secession Convention of 1861. The Arkansas Gazette, established at Arkansas Post in 18 19 and soon after- wards removed to the new capital, was the first newspaper published in Arkansas and one of the first published west of the Mississippi.

LITTLETON (or Lyttelton), EDWARD, Baron (1589-1645), son of Sir Edward Littleton (d. 162 1) chief-justice of North Wales, was born at Munslow in Shropshire; he was educated at Oxford and became a lawyer, succeeding his father as chief-justice of North Wales. In 1625 he became a member of parliament and acted in 1628 as chairman of the committee of grievances upon whose report the Petition of Right was based. As a member of the party opposed to the arbitrary measures of Charles I. Littleton had shown more moderation than some of his colleagues, and in 1634, three years after he had been chosen recorder of London, the king attached him to his own side by appointing him solicitor-general. In the famous case about ship-money Sir Edward argued against Hampden. In 1640 he was made chief-justice of the common pleas and in 1641 lord keeper of the great seal, being created a peer as Baron Lyttelton. About this time, the lord keeper began to display a certain amount of indifference to the royal cause. In January r642’he refused to put the great seal to the proclamation for the

arrest of the five members and he also incurred the displeasure of Charles by voting for the militia ordinance. However, he assured his friend Edward Hyde, afterwards earl of Clarendon, that he had only taken this step to allay the suspicions of the parliamentary party who contemplated depriving him of the seal, and he under- took to send this to the king. He fulfilled his promise, and in May 1642 he himself joined Charles at York, but it was some time before he regained the favour of the king and the custody of the seal. Littleton died at Oxford on the 27th of August 1645; he left no sons and his barony became extinct. His only daughter, Anne, married her cousin Sir Thomas Littleton, Bart. (d. 1681), and their son Sir Thomas Littleton (c. 1647- 1.7 10), was speaker of the House of Commons from 1698 to 1700, and treasurer of the navy from 1700 to 17 10. Macaulay thus sums up the character of Speaker Littleton and his relations to the Whigs: " He was one of their ablest, most zealous and most steadfast friends; and had been, both in the House of Commons and at the board of treasury, an invaluable second to Montague " (the earl of Halifax).

LITTLETON, SIR THOMAS DE (c. 1407-1481), English judge and legal author, was born, it is supposed, at Frankley Manor House. Worcestershire, about 1407. Littleton's surname was that of his mother, who was the sole daughter and heiress of Thomas de Littleton, lord of Frankley. She married one Thomas Westcote. Thomas was the eldest of four sons of the marriage, and took the name of Littleton, or, as it seems to have been more commonly spelt, Luttelton. The date of his birth is uncertain; a MS. pedigree gives 1422, but it was probably earlier than this. If, as is generally accepted, he was born at Frankley Manor, it could not have been before r407, in which year Littleton's grandfather recovered the manor from a distant branch of the family. He is said by Sir E. Coke to have " at- tended one of the universities," but there is no corroboration of this statement. He was probably a member of the Inner Temple, and lectured there on the statute of Westminster II., De Donis Conditioiialibus. His name occurs in the Past on Letters (ed. J. Gairdner, i. 60) about 1445 as that of a well-known counsel and in 1481/2 he received a grant of the manor of Sheriff Hales, Shropshire, from a Sir William Trussel as a reward for his services as counsel. He appears to have been recorder of Coventry in 1450; he was made escheator of Worcestershire,

and in 1447/8 was under-sheriff of the same county; he became serjeant-at-law in 1453 and was afterwards a justice of assize on the northern circuit. In 1466 he was made a judge of the common pleas, and in 1475 a knight of the Bath. He died, according to the inscription on his tomb in Worcester cathedral, on the 23rd of August 148 1. He married, about 1444, Joan, widow of Sir Philip Chetwind of Ingestrie in Stafford- shire, and by her had three sons, through whom he became ancestor of the families holding the peerages of Cobham (formerly Lyttelton, q.v.) and Hatherton.

His Treatise on Tenures was probably written after he had been appointed to the bench. It is addressed to his second son Richard, who went to the bar, and whose name occurs in the year books of the reign of Henry VII. The book, both histori- cally and from its intrinsic merit, may be characterized as the first text-book upon the English law of property. The law of property in Littleton's time was mainly concerned with rights over land, and it was the law relating to this class of rights which Littleton set himself to digest and classify. The time was ripe for the task. Ever since the Conquest regular courts of justice had been at work administering a law which had grown out of an admixture of Teutonic custom and of Norman feudalism. Under Henry II. the courts had been organized, and the practice of keeping regular records of the proceedings had been carefully observed. The centralizing influence of the royal courts and of the justices of assize, working steadily through three centuries, had made the rules governing the law of property uniform throughout the land; local customs were confined within certain prescribed limits, and were only recognized as giving rise to certain well-defined classes of rights, such, for instance, as the security of tenure acquired by villeins by virtue of the custom of the manor, and the rights of freeholders, in some towns, to dispose of their land by will. Thus, by the time of Littleton (Henry VI. and Edward IV.), an immense mass of material had been ac- quired and preserved in the rolls of the various courts. Reports of important cases were published in the " year books." A glance at Statham's Abridgment, the earliest digest of decided cases,

published nearly at the same time as Littleton's Tenures, is sufficient to show the enormous bulk which reported cases had already attained as materials for the knowledge of English law.

Littleton's treatise was written in that peculiar dialect com- pounded of Norman-French and English phrases called law French. Although it had been provided by a statute of 36 Edward III. that viva voce proceedings in court should no longer be conducted in the French tongue, " which was much unknown in the realm," the practice of reporting proceedings in that language, and of using it in legal treatises, lingered till a much later period, and was at length prohibited by a statute passed in the time of the Commonwealth in 1650. Unlike the preceding writers on English law, Glanville, Bracton and the authors of the treatises known by the names of Britton and Fleta, Little- ton borrows nothing from the sources of Roman law or the commentators. He deals exclusively with English law.

The book is written on a definite system, and is the first attempt at a scientific classification of rights over land. Little- ton's method is to begin with a definition, usually clearly and briefly expressed, of the class of rights with which he is dealing. He then proceeds to illustrate the various characteristics and incidents of the class by stating particular instances, some of which refer to decisions which had actually occurred, but more commonly they are hypothetical cases put by way of illustration of his principles. He occasionally refers to reported cases. His book is thus much more than a mere digest of judicial decisions; to some extent he pursues the method which gave to Roman law its breadth and consistency of principle. In Roman law this result was attained through the practice of putting to jurisconsults hypothetical cases to be solved by them. Littleton, in like manner, is constantly stating and solving by reference to principles of law cases which may or may not have occurred in actual practice.

In dealing with freehold estates Littleton adopts a classification which has been followed by all writers who have attempted to

systematize the English law of land, especially Sir M. Hale and Sir William Blackstone. It is indeed the only possible approach to a scientific arrangement of the intricate " estates in land " known to English law. He classifies estates in land by reference to their duration, or in other words by reference to the differences between the persons who are entitled to succeed upon the death of the person in possession or " tenant." First of all, he describes the character- istics of tenancy in fee simple. This is still as it was in Littleton's time the largest interest in land known to the law. Next in order comes tenancy in fee tail, the various classes of which are sketched by Littleton with brevity and accuracy, but he is silent as to the important practice, which first received judicial recognition shortly before his death, of " suffering a recovery," whereby through a series of judicial fictions a tenant in tail was enabled to convert his estate tail into a fee simple, thus acquiring full power of alienation. After discussing in their logical order other freehold interests in land, he passes to interests in land called by later writers interests less than freehold, namely, tenancies for terms of years and tenancies at will. With the exception of tenancy from year to year, now so familiar to us, but which was a judicial creation of a date later than the time of Littleton, the first book is a complete statement of the principles of the common law, as they for the most part still exist, governing and regulating interests in lands. The first book concludes with a very interesting chapter on copyhold tenures, which marks the exact point at which the tenant by copy of court roll, the successor of the villein, who in his turn represented the freeman reduced to villcnage by the growth of the manorial system, acquired security of tenure.

The second book relates to the reciprocal rights and duties of lord and tenant, and is mainly of historical interest to the modern lawyer. It contains a complete statement of

the law as it stood in Littleton's time relating to homage, fealty and escuage, the money compensa- tion to be paid to the lord in lieu of military service to be rendered to the king, a peculiar characteristic of English as distinguished from Continental feudalism.

Littleton then proceeds to notice the important features of tenure by knight's service with its distinguishing incidents of the right of wardship of the lands and person of the infant heir or heiress, and the right of disposing of the ward in marriage. The non-military freehold tenures are next dealt with; we have an account of " socage tenure," into which all military tenures were subsequently com- muted by a now unrecognized act of the Long Parliament in 1650, afterwards re-enacted by the well-known statute of Charles II. (1660), and of " frankalmoign," or the spiritual tenure by which churchmen held. In the description of burgage tenure and tenure in villenage, the life of which consists in the validity of ancient customs recognized by law, we recognize survivals of a time before the iron rule of feudalism had moulded the law of land in the interests of the king and the great lords. Finally he deals with the law of rents, discussing the various kinds of rents which may be reserved to the grantor upon a grant of lands and the remedies for recovery of rent, especially the remedy by distress. 1

The third and concluding book of Littleton's treatise deals mainly with the various ways in which rights over land can be acquired and terminated in the case of a single possessor or several possessors. This leads him to discuss the various modes in which several persons may simultaneously have rights over the same land, as parceners: — daughters who are co-heiresses, or sons in gavelkind; joint tenants and tenants in common. Next follows an elaborate discussion upon what are called estates upon condition — a class of interests which occupied a large space in the early common law, giving rise on one side to estates tail, on another to mortgages. In Littleton's time a mortgage, which he carefully describes, was merely a conveyance of land by the tenant to the mortgagee, with a condition that, if the tenant paid to the mortgagee a certain sum on a certain day, he might re-enter and have the land again. If the condition was not fulfilled, the interest of the mortgagee became absolute, and Littleton gives no indication of any modification of this strict rule, such as was introduced by courts of equity, permitting the debtor to redeem his land by payment of all that was due to the mortgagee although the day of payment had passed, and his interest had become at law indefeasible. The remainder of the work is occupied with an ex- position of a miscellaneous class of modes of acquiring rights of property, the analysis of which would occupy too large a space.

The work is thus a complete summary of the common law as it stood at the time. It is nearly silent as to the remarkable class of rights which had already assumed vast practical importance— i-quitable interests in lands. These are only noticed incidentally in the chapter on " Releases." But it was already clear in Littleton's time that this class of rights would become the most important of all. Littleton's own will, which has been preserved, may be adduced in proof of this assertion. Although nothing was more opposed to

1 These two books are stated, in a note to the table at the con- clusion of the work, to have been made for the better understanding of certain chapters of the Antient Book of Tenures. This refers to a tract called The Old Tenures, said to have been written in the reign of Edward III. By way of distinguishing it from this work, Littleton's book is called >n all the early editions " Tenores Novelli."

the spirit of Norman feudalism than that a tenant of lands should dispose of them by will, we find Littleton directing by his will the feoffees of certain manors to make estates to the persons named in his will. In other words, in order to acquire over lands powers unknown to the common law, the lands haJ been conveyed to " feoffees " who had full right over them according to the common law, but who were under a conscientious obligation to exercise those rights at the direction and for the exclusive benefit of the person to whose " use " the lands were held. This conscientious obligation was recognized and enforced by the chancellor, and thus arose the class of equitable interests in lands. Littleton is the first writer on English law after these rights

had risen into a prominent position, and it is curious to find to what extent they are ignored by him.

Bibliography. — The work of Littleton occupies a place in the history of typography as well as of law. The earliest printed edition seems to be that by John Lettou and William de Machlinia, two printers who probably came from the Continent, and carried on their business in partnership, as their note to the edition of Littleton states, ” in civitate Londoniarum, juxta ecclesiam omnium sanct- orum.” The date of this edition is uncertain, but the most probable conjecture, based on typographical grounds, places it about the latter part of 1481. The next edition is one by Machlinia alone, probably about two or three years later than the former. Machlinia was then in business alone ” juxta pontem quae vulgo dicitur Fleta brigge.” Next came the Rohan or Rouen edition, erroneously stated by Sir E. Coke to be the earliest, and to have been printed about J533- ˆ was > however, of a much earlier date. Tomlins, the latest editor of Littleton, gives reasons for thinking that it cannot have been later than 1490. It is stated in a note to have been printed at Rouen by William le Tailleur “ad instantiam Richardi Pynson.” Copies of all these editions are in the British Museum. In all these editions the work is styled Tenores Novelli, probably to distinguish it from the ” Old Tenures.”

There are three early MSS. of Littleton in the University Library at Cambridge. One of these formerly contained a note on its first page to the effect that it was bought in St Paul’s Churchyard on July 20, 1480. It was therefore in circulation in Littleton’s lifetime. The other two MSS. are of a somewhat later date; but one of them contains what seems to be the earliest English translation of the Tenures, and is probably not later than 1500.

In the 16th century editions of Littleton followed in rapid succession from the presses of Pynson, Redmayne, Berthelet, Tottyl and others. The practice of annotating the text caused several additions to be introduced, which, however, are easily detected by comparison of the earlier copies. In 1581 West divided the text into 746 sections, which have ever since been preserved. Many of these editions were printed with large margins for purposes of annotation, specimens of which may be seen in Lincoln’s Inn Library.

The practice of annotating Littleton was very general, and was adopted by many eminent lawyers besides Sir E. Coke, amongst others by Sir M. Hale. One commentary of this kind, by an unknown hand of earlier date than Sir E. Coke’s, was edited by Cary in 1829. Following the general practice of dealing with Littleton as the great authority on the law of England, ” the most perfect and absolute work that ever was written in any human science,” Sir E. Coke made it in 1628 the text of that portion of his work which he calls the first part of the institutes of the law of England, in other words, the law of property.

The first printed English translation of Littleton was by Rastell, who seems to have combined the professions of author, printer and serjeant-at-law, between 1514 and 1533. Many English editions by various editors followed, the best of which is Tottyl’s in 1556. Sir E. Coke adopted some translation earlier than this, which has since gone by the name of Sir E. Coke’s translation. He, however, throughout comments not on the translation but on the French text ; and the reputation of the commentary has to some extent obscured the intrinsic merit of the original.

See E. Wambaugh, Littleton’s Tenures in English (Washington, D.C., 1903).

LITTRE\ MAXIMILIEN PAUL &WILE (1801-1881), French lexicographer and philosopher, was born in Paris on the 1st of February 1801. His father had been a gunner, and afterwards sergeant-major of marine artillery, in the French navy, and was deeply imbued with the revolutionary ideas of the day. Settling down as a collector of taxes, he married Sophie Johannot, a free-thinker like himself, and devoted himself to the education of his son Emile. The boy was sent to the Lycee Louis-le-Grand, where he had for friends Hachette and Eugene Burnouf. After he had completed his course at

school, he hesitated for a time as to what profession he should adopt, and meanwhile made himself master, not only of the English and German languages, but of the classical and Sanskrit literature and philology. At last he determined to study medicine, and in 1822 entered his name as a student of medicine. He passed all his examinations in due course, and had only his thesis to prepare in order to obtain

his degree as doctor when in 1827 his father died, leaving his mother absolutely without resources. He at once renounced his degree, and, while attending the lectures of P. F. O. Rayer and taking a keen interest in medicine, began teaching Latin and Greek for a livelihood. He carried a musket on the popular side in the revolution of February 1830, and was one of the national guards who followed Charles X. to Rambouillet. In 18,51 he obtained an introduction to Armand Carrel, the editor of the National, who gave him the task of reading the English and German papers for excerpts. Carrel by chance, in 1835, discovered the ability of his reader, who from that time became a constant contributor, and eventually director of the paper. In 1836 Littre began to contribute articles on all sorts of subjects to the Revue des deux mondes; in 1837 he married; and in 1839 appeared the first volume of his edition of the works of Hippocrates. The value of this work was recognized by his election the same year into the Academie des Inscriptions et Belles-Lettres. At this epoch he came across the works of Auguste Comte, the reading of which formed, as he himself said, ” the cardinal point of his life,” and from this time onward appears the influence of positivism on his own life, and, what is of more importance, his influence on positivism, for he gave as much to positivism as he received from it. He soon became a friend of Comte, and popularized his ideas in numerous works on the positivist philosophy. At the same time he continued his edition of Hippocrates, which was not completed till 1862, published a similar edition of Pliny’s Natural History, and after 1844 took Fauriel’s place on the committee engaged on the Histoire litteraire de la France, where his knowledge of the early French language and literature was invaluable.

It was about 1844 that he started working on his great Diction- naire de la langue francaise, which was, however, not to be completed till thirty years after. In the revolution of July 1848 he took part in the repression of the extreme republican party in June 1849. His essays, contributed during this period to the National, were collected together and published under the title of Conservation, revolution et positivisme in 1852, and show a thorough acceptance of all the doctrines propounded by Comte. However, during the later years of his master’s life, he began to perceive that he could not wholly accept all the dogmas or the more mystic ideas of his friend and master, but he concealed his differences of opinion, and Comte failed to perceive that his pupil had outgrown him, as he himself had outgrown his master Saint-Simon. Comte’s death in 1858 freed Littre from any fear of embittering his master’s later years, and he published his own ideas in his Paroles de la philosophic positive in 1859, and at still greater length in his work in Auguste Comte et la philosophic positive in 1863. In this book he traces the origin of Comte’s ideas through Turgot, Kant and Saint- Simon, then eulogizes Comte’s own life, his method of philosophy, his great services to the cause and the effect of his works, and finally proceeds to show where he himself differs from him. He approved wholly of Comte’s philosophy, his great laws of society and his philosophical method, which indeed he defended warmly against J. S. Mill, but declared that, while he believed in a positivist philosophy, he did not believe in a religion of humanity. About 1863, after completing his Hippocrates and his Pliny, he set to work in earnest on his French dictionary. In the same year he was proposed for the Academie Francaise, but rejected, owing to the opposition of Mgr. Dupanloup, bishop of Orleans, who denounced him in his Avertissement aux peres de famille as the chief of the French materialists. He also at this time started with G. WyroubofT the Philosophic Positive, a review which was to embody the views of modern positivists. His life was thus absorbed in literary work till the overthrow of the empire called on

him to take a part in politics. He felt himself too old to undergo the privations of the siege of Paris, and retired with his family to Britanny, whence he was summoned by M. Gambetta to Bordeaux, to lecture on history, and thence to Versailles to take his seat in the senate to which he had been chosen by the department of the Seine. In December 1871 he was elected a member of the Academie Franchise in spite

of the renewed opposition of Mgr. Dupanloup, who resigned his seat rather than receive him. Littre's Dictionary was com- pleted in 1873. An authoritative interpretation is given of the use of each word, based on the various meanings it had held in the past. In 1875 Littre was elected a life senator. The most notable of his productions in these years were his political papers attacking and unveiling the confederacy of the Orleanists and legitimists, and in favour of the republic, his republication of many of his old articles and books, among others the Con- servation, revolution el positivisme of 1852 (which he reprinted word for word, appending a formal, categorical renunciation of many of the Comtist doctrines therein contained), and a little tract Pour la dernierefois, in which he maintained his unalterable belief in materialism. When it became obvious that the old man could not live much longer, his wife and daughter, who had always been fervent Catholics, strove to convert him to their religion. He had long interviews with Pere Milleriot, a celebrated controversialist, and was much grieved at his death; but it is hardly probable he would have ever been really converted. Nevertheless, when on the point of death, his wife had him baptized, and his funeral was conducted with the rites of the Catholic Church. He died on the 2nd of June 1881.

The following are his most important works: his editions of Hippocrates (1839-1861), and of Pliny's Natural History (1848- 1850); his translation of Strauss's Vie de Jesus (1839-1840), and Miiller's Manuel de physiologie (1851); his edition of the works of Armand Carrel, with notes (1854-1858); the Histoire de la langue francaise, a collection of magazine articles (1862); and his Diction- naire de la langue francaise (1863-1872). In the domain of science must be noted his edition, with Charles Robin, of Nysten's Diction- naire de medicine, de chirurgie, &c. (1855) ; in that of philosophy, his Analyse raisonnee du cours de philosophie positive de M. A. Comte (1845); Application de la philosophie positive au gouvernement (1849); Conservation, revolution et positivisme (1852, 2nd ed., with supplement, 1879); Paroles de la philosophie positive (1859); Auguste Comte et la philosophie positive (1863); La Science au point de vue philosophique (1873); Fragments de philosophie et de sociologie contemporaine (1876); and his most interesting miscellaneous works, his Etudes et glanures (1880); La Verite sur la mbrt d Alexandre le grand (1865); Etudes sur les barbares et le moyen dge (1867); Mede- cine et medecins (1871); Litlerature et histoire (1875); and Discours de reception a l' Academie frangaise (1873).

For his life consult C. A. Sainte-Beuve, Notice sur M. Littre, sa vie et ses travaux (1863); and Nouveaux Lundis, vol. v.; also the notice by M. Durand-Greville in the Nouvelle Revue of August 1881; E. Caro, Littre et le positivisme (1883); Pasteur, Discours de reception at the Academy, where he succeeded Littre, and a reply by E. Renan. (H. M. S.)

LITURGY (Low Lat. liturgia; Gr. Xetros, public, and 'ipyov, work; Xairoi>P7os, a public servant), in the technical language of the Christian Church, the order for the celebration and ad- ministration of the Eucharist. In Eastern Christendom the Greek word \et-Tovpyia is used in this sense exclusively. But in English- speaking countries the word " liturgy " has come to be used in a more popular sense to denote any or all of the various services of the Church, whether contained in separate volumes or bound up together in the form of a Book of Common Prayer. In this article the liturgy is treated in the former and stricter sense. (For the ancient Athenian \aTOvpyiat., as forms of taxation, see Finance.)

In order to understand terms and references it will be con- venient to give the tabular form the chief component parts of a liturgy, selecting the Liturgy of Rome as characteristic of Western, and that of Constantinople as characteristic of Eastern,

Christen- dom; at the same time appending an explanation of some of the technical words which must be employed in enumerating those parts.

Order of the Roman Liturgy Ordinary of the Mass.

1. Introit, or as it is always called in the Sarum rite, ” Office,” a Psalm or part of a Psalm sung at the entry of the priest, or clergy and choir.

2. Kyrie eleison, ninefold, and sometimes lengthily farsed repre- senting an older, now obsolete, litany.

3. Collect, i.e. the collect for the day.

4. Prophetic lection, now obsolete, except on the Wednesday and Saturday Ember Days, Good Friday and Easter Even, and Wednesday after fourth and sixth Sundays in Lent.

5. Epistle.

6. Gradual. A few verses from the Psalms, the shrunken re- mainder of a whole Psalm.

7. Sequence A hymn now obsolete except on Feast of the Seven Dolours, Easter, Pentecost, Corpus Christi and at Masses for the dead.

8. Gospel. 9 Creed.

10. Collect, now obsolete, though the unanswered invitation, ” Let us pray,” still survives.

11. Offertory A verse or verses from the Psalms sung at the offering of the elements.

12. Secret. A prayer or prayers said at the conclusion of the Offertory-

13. Sursum Corda. “Lift up your hearts.” with following versicles.

14. Preface. There are now ten proper or special prefaces and one common preface. In older missals they were extremely numerous, almost every Sunday and Holy-day having one assigned to it. Many of them were very beautiful. In older missals, Nos. 13, 14 and 15 were sometimes arranged not as the concluding part of the Ordinary, but as the opening part of the Canon of the mass.

15. Sanctus, or Tersanctus, or Triumphal Hymn, ” Holy, Holy, Holy,” &c, ending with the Benedictus, ” Blessed is he that cometh,” &c.

Canon of the Mass.

1. Introductory prayer for acceptance. Te igitur, &c.

2. Intercession for the living. Memento, Domine famulorum, &c.

3. Commemoration of apostles and martyrs. Communicantes et memoriam, &c.

4. Prayer for acceptance and consecration of offering. Hanc igitur oblationem, &c.

5. Recital of words of institution. Qui pridie quam pateretur, &c.

6. Oblation. Unde et memores, &c.

7. Invocation. A passage difficult of interpretation, but appar- ently meant to be equivalent to the Eastern Epiklesis or invocation of the Holy Ghost. Supplices te

rogamus, &c.

8. Intercession for the dead. Memento etiam, Domine, famul- orum, &c.

9. Lord's Prayer, with a short introduction and the expansion of the last petition into a prayer known as the " Embolismus."

10. Fraction, i.e. breaking of the host into three parts, to symbolize the death and passion of Christ.

11. Commixture, i.e. placing a small portion of the consecrated bread into the chalice symbolizing the reunion of Christ's body and soul at the resurrection.

12. Agnus Dei, i.e. a three-fold petition to the Lamb of God.

13. Pax, i.e. the kiss of peace. The ancient ritual of the Pax has become almost obsolete.

14. Three prayers, accompanying the Pax and preliminary to communion.

15. Communion of priest and people (if any), a short anthem called " Communio " being sung meanwhile.

16. Ablution of paten and chalice.

17. Post-communion, i.e. a concluding prayer.

18. Dismissal.

The Canon of the Mass strictly ends with No. 9; Nos. 10-18 being an appendix to it.

Liturgy of Constantinople Mass of the Catechumens. After preparation and vesting.

1. The Deacon's Litany.

2. Three Anthems with accompanying prayers.

3. Little Entrance, i.e. ceremonial bringing in of the Book of the Gospels.

4. The Trisagion, i.e. an anthem with an accompanying prayer different from the Latin Sanctus or Tersanctus

5. Epistle.

6. Gospel with a prayer preceding it.

7. Bidding prayer.

8. Prayer for catechumens.

9. Dismissal of catechumens. "O. Spreading of the corporal.

r, Mass of the Faithful.

J 7 ? ->yers of the faithful.

'. 'bic Hymn, " Let us who mystically represent the

" not represented in the Latin liturgy, -ance, i.e. of the unconsecrated elements with incense

all

in proi

J >

•The*. . elusion of £ of certain ˆ

to a tract

ˆercessions.

2 Cor. xiii. 14.

, or ” Triumphal Hymn.” Institution, prefaced by recital of the

22. The invocation or Epiklesis.

23. Intercession for the dead.

24. Intercession for the living.

25. The Lord’s Prayer.

26. Prayer of humble access (a) for people (b) for priest.

27. Elevation with the invitation ” Holy things to holy people.”

28. Fraction.

29. Commixture.

30. Thanksgiving.

31. Benediction.

In both these lists many interesting features of ceremonial, the use of incense, the infusion of warm water (Byzantine only), &c, have not been referred to. The lists must be regarded as skeletons only.

There are six main families or groups of liturgies, four of them being of Eastern and two of them of Western origin and use. They are known either by the names of the apostles with whom they are traditionally connected, or by the names of the countries or cities in which they have been or are still in use.

Group I. The Syrian Rite (St James). — The principal liturgies to be enumerated under this group are the Clementine liturgy, so called from being found in the eighth book of the Apostolic Constitutions, which claim in their title, though erroneously, to have been compiled by St Clement, the ist-century bishop of Rome; the Greek liturgy of St James; the Syriac liturgy of St James. Sixty-four more liturgies of this group have existed, the majority being still in existence. Their titles are given in F. E. Brightman’s Liturgies, Eastern and Western (1896), pp. lviii.-lxi.

Group II. The Egyptian Rite (St Mark). — This group in- cludes the Greek liturgies of St Mark, St Basil and St Gregory, and the Coptic liturgies of St Basil, St Gregory, St Cyril or St Mark; together with certain less known liturgies the titles of which are enumerated by Brightman {op. cit. pp. lxxiii. lxxiv.). The liturgy of the Ethiopian church ordinances and the liturgy of the Abyssinian Jacobites, known as that of the Apostles, fall under this group.

Group III. The Persian Rite (SS. Adaeus and Maris). — This Nestorian rite is represented by the liturgy which bears the names of SS. Adaeus and Maris together with two others named after Theodore of Mopsuestia and Nestorius. This group has sometimes been called ” East-Syrian.” The titles of three more of its now lost liturgies have been preserved, namely those of Narses, Barsumas and Diodorus of Tarsus. The liturgy of the Christians of St Thomas, on the Malabar coast of India, formerly belonged to this

group, but it was almost completely assimilated to the Roman liturgy by Portuguese Jesuits at the synod of Diamper in 1599.

Group IV. The Byzantine Rite. — The Greek liturgies of St Chrysostom, St Basil and St Gregory Dialogus, or The Pre- sanctified, also extant in other languages, are the living repre- sentatives of this rite. The Greek liturgy of St Peter is classified under this group, but it is merely the Roman canon of the Mass &c, inserted in a Byzantine framework, and seems to have been used at one time by some Greek communities in Italy. To this group also belongs the Armenian liturgy, of which ten different forms have existed in addition to the liturgy now in general use named after St Athanasius.

We now come to the two western groups of liturgies, which more nearly concern the Latin-speaking nations of Europe, and which, therefore, must be treated of more fully.

Group V. The Hispano-Gallican Rite (St John). — This group of Latin liturgies, which once prevailed very widely in Western Europe, has been almost universally superseded by the liturgy of the Church of Rome. Where it survives, it has been more or less assimilated to the Roman pattern. It prevailed once throughout Spain, France, northern Italy, Great Britain and Ireland. The term " Ephesine " has been applied to this group or family of liturgies, chiefly by English liturgiologists, and the names of St John and of Ephesus, his place of residence, have been pressed into service in support of a theory of Ephesine origin, which, however, lacks proof and may now be regarded as a discarded hypothesis. Other theories represent the Gallican to be a survival of the original Roman liturgy, or as an importation

into Western Europe from the east through a Milanese channel. The latter is Duchesne's theory (Christian Worship, London, 1904, 2nd ed., p. 94).

We must be content with mentioning these theories without attempting to discuss them.

The chief traces of oriental influence and affinity lie in the following points: — (1) various proclamations made by the deacon, including that of " Silentium facite " before the epistle (Migne, Pat. Lat. torn. lxxxv. col. 534) ; (2) the presence of a third lesson preceding the epistle, taken from the Old Testament ; (3) the occasional presence of " preces " a series of short intercessions resembling the Greek " Ektene " or deacon's litany; (4) the position of the kiss of peace at an early point in the service, before the canon, instead of the Roman position after consecration; (5) the exclamation " Sancta Sanctis " occurring in the Mozarabic rite, being the counterpart of the Eastern " Td a- yia tois ayiois," that is " holy things to holy people "; (6) traces of the presence of the " Epiklesis," that is to say, the invocation of the Holy Spirit, in its Eastern position after the words of institution, as in the prayer styled the Post-pridie in the Mozarabic service for the second Sunday after the octave of the Epiphany: "We beseech thee that thou wouldest sanctify this oblation with the permixture of thy Spirit, and conform it with full transformation into the body and blood of our Lord Jesus Christ " (Migne, Pat. Lat. torn, lxxxv. col. 250). On the other hand the great variableness of its parts, and the immense number of its proper prefaces, ally it to the Western family of liturgies.

We proceed now to give a more detailed account of the chief liturgies of this group.

1. The Mozarabic Liturgy. — This was the national liturgy of the Spanish church till the close of the nth century, when the Roman liturgy was forced upon it. Its use, however, lingered on, till in the 16th century Cardinal Jimenes, anxious to prevent its becoming quite obsolete, had its books restored and printed, and founded a college of priests at Toledo to perpetuate its use. It survives now only in several churches in Toledo and in a chapel at Salamanca, and even there not without certain Roman modifications of its original text and ritual.

Its date and origin, like the date and origin of all existing liturgies, arc uncertain, and enveloped in the mists of antiquity. It is not derived from the present Roman liturgy. Its whole structure, as well as separate details disprove such a parentage, and therefore it is strange to find St Isidore of Seville (Lib. de Eccles. Offic. i. 15) attributing it to St Peter. No proof is adduced, and the only value which can be placed upon such an unsupported assertion is that it shows that a very high and even apostolic antiquity was claimed for it. A theory, originating with Pinius, that it may have been brought by the Goths from Constantinople when they invaded Spain, is as improbable as it is unproven. It may have been derived from Gaul. The Gallican sister stood to it in the relation of twin-sister, if it could not claim that of mother. The resemblance was so great that when Charles the Bald (843-877) wished to get some idea of the character of the already obsolete Gallican rite, he sent to Toledo for some Spanish priests to perform Mass according to the Mozarabic rite in his presence. But there is no record of the conversion of Spain by Gallican missionaries. Christianity existed in Spain from the earliest times. Probably St Paul travelled there (Rom. xv. 24). It may be at least conjectured that its liturgy was Pauline rather than Petrine or Johannine.

2. Gallican Liturgy. — This was the ancient and national liturgy of the church in France till the commencement of the 9th century, when it was suppressed by order of Charlemagne, who directed the Roman missal to be everywhere substituted in its place. All traces of it seemed for some time to have been lost until three Gallican sacramentaries were discovered and published by Thomasius in 1680 under the titles of Missale Gothicum, Missale Gallicum and Missale Francorum, and a fourth was discovered and published by Mabillon in 1687 under the title of Missale Gallicanum. Fragmentary discoveries have been made since. Mone discovered fragments of eleven Gallican masses and published them at Carlsruhe in 1850. Other frag- ments from the library at St Gall have been published by Bunsen (Analecta Anle-Nicaena, iii. 263-266), and from the Ambrosian library at Milan by Cardinal Mai (Scriptt. Vet. Vat. Coll. iii. 2. 247). A single page was discovered in Gonville and Caius College, Cambridge, published in Zeitschrijt fitr Kath. Theologie, vi. 370.

These documents, illustrated by early Gallican canons, and by allusions in the writings of Sulpicius Severus, Caesarius of Aries, Gregory' of Tours, Germanus of Paris and other authors, enable us to reconstruct the greater part of this liturgy. The previously enumerated signs of Eastern origin and influence are founefhere as

well as in the Mozarabic liturgy, together with certain other more or less minute peculiarities, which would be of interest to professed liturgiologists, but which we must not pause to specify here. They are the origin of the Ephesine theory that the Gallican liturgy was introduced into use by Irenaeus, bishop of Lyons (c. 130-200) who had learned it in the East from St Polycarp, the disciple of the apostle St John.

3. Ambrosian Liturgy. — Considerable variety of opinion has existed among liturgical writers as to the proper classification of the “Ambrosian ” or ” Milanese ” liturgy. If we are to accept it in its present form and to make the present position of the great intercession for quick and dead the test of its genus, then we must classify it as ” Petrine ” and consider it as a branch of the Roman family. If, on the other hand, we consider the important variations from the Roman liturgy which yet exist, and the traces of still more marked variation which confront us in the older printed and MS. copies of the Ambrosian rite, we shall detect in it an original member of the Hispano-Gallican group of liturgies, which for centuries underwent a gradual but ever-increasing assimilation to Rome. We know this as a matter of history, as well as a matter of inference from changes in the text itself. Charlemagne adopted the same policy towards the Milanese as towards the Gallican church. He carried off all the Ambrosian church books which he could obtain, with the view of substituting Roman books in their place, but the completion of his intentions failed, partly through the attach- ment of the Lombards to their own rites, partly through the intercession of a Gallican bishop named Eugenius (Mabillon, Mus. Ital. torn. i. Pars. ii. p. 106). It has been asserted by Joseph Vicecomes that this is an originally independent liturgy drawn up by St Barnabas, who first preached the Gospel at Milan (De Missae Rit. 1 capp. xi.

xii.), and this tradition is pre- served in the title and proper preface for St Barnabas Day in the Ambrosian missal (Pamelius, Liturgicon, i. 385, 386), but it has never-been proved.

We can trace the following points in which the Ambrosian differs from the Roman liturgy, many of them exhibiting traces of Eastern influence. Some of them are no longer found in recent Ambrosian missals and only survive in earlier MSS. such as those published by Pamelius (Liturgicon, torn. i. p. 293), Muratori (Lit. Rom. Vet. i. 132) and Ceriani (in his edition, 1881, of an ancient MS. at Milan), (a) The prayer entitled " oratio super sindonem " corresponding to the prayer after the spreading of the corporal ; (6) the proclamation of silence by the deacon before the epistle; (c) the litanies said after the Ingressa (Introit) on Sundays in Lent, closely resembling the Greek Ektene; (d) varying forms of introduction to the Lord's Prayer, in Coena Domini (Ceriani p. 116) in Pascha (lb. p. 129); (e) the presence of passages in the prayer of consecration which are not part of the Roman canon and one of which at least corresponds in import and position though not in words to the Greek Invocation: Tuum veto, est, omnipotens Pater, miltere, &c. (lb. p. 116); (/) the survival of a distinctly Gallican formula of consecration in the Post-sanctus " in Sabbato Sancto." Vere sanctus, vere benedictus Dommus noster, &c. (lb. p. 125) ; (g) the varying nomenclature of the Sundays after Pentecost; (h) the position of the fraction or ritual breaking of bread before the Lord's Prayer; (i) the omission of the second oblation after the words of institution (Muratori, Lit. Rom. Vet. i. J 33); (k) a third lection or Prophetia from the Old Testament preceding the epistle and gospel; (I) the lay offering of the obla- tions and the formulae accompanying their reception (Pamelius, Liturgicon, i. 297) ; (m) the position of the ablution of the hands in the middle of the canon just before the words of institution; (n) the position of the " oratio super populum," which corresponds in matter but not in name to the collect for the day, before the Gloria in Excelsis.

4. Celtic Liturgy. — We postpone the consideration of this liturgy till after we have treated of the next main group.

VI. The Roman Rite (St Peter). — There is only one liturgy to be enumerated under this group, viz. the present liturgy of the Church of Rome,which, though originally local in character and circumscribed in use, has come to be nearly co-extensive with the Roman Catholic Church, sometimes superseding earlier national liturgies, as in Gaul and Spain, sometimes incorporating more or less of the ancient ritual of a country into itself and producing from such incorporation a sub-class of distinct Uses, as in England, France and elsewhere. Even these subordinate Uses have for the most part become, or are rapidly becoming, obsolete.

The date, origin and early history of the Roman liturgy are obscure. The first Christians at Rome were a Greek-speaking community, and their liturgy must have been Greek, and is possibly represented in the so-called Clementine liturgy. But the date when such a state of things ceased, when and by whom the present Latin liturgy was composed, whether it is an original composition, or, as its structure seems to imply, a survival of some intermediate form of liturgy — all these are questions which are waiting for solution.

One MS. exists which has been claimed to represent the Roman liturgy as it existed in the time of Leo I., 440-461. It was discovered at Verona by Bianchini in 1 735 and assigned by him to the 8th century and published under the title of Sacramentarium Leonianum; but this title was from the first conjectural, and is in the teeth of the internal evidence which the MS. itself affords. The question is dis- cussed at some length by Muratori {Lit. Rom. Vet. torn. i. cap. i. col. 16). Assemani published it under the title of Sacramentarium Veronense in torn. vi. of his Codex Liturg. Eccles. Univ.

A MS. of the 7th or 8th century was found at Rome by Thomasius and published by him in 1680 under the title of Sacramentarium Gelasianum. But it was written in France and is certainly not a pure Gelasian codex; and although there is historical evidence of Pope Gelasius I. (492-496) having made some changes in the Roman liturgy, and although MSS. have been published by Gerbertus and others, claiming the title of Gelasian, we neither have nor are likely to have genuine and contemporary MS. evidence of the real state of the liturgy in that pope's time. The most modern and the best edition of the Gelasian Sacramentary is that by H. A. Wilson (Oxford, 1894).

The larger number of MSS. of this group are copies of the Gregorian Sacramentary, that is to say, MSS. representing or purport- ing to represent, the state of Roman liturgy in the days of Pope Gregory the Great. But they cannot be accepted as certain evidence for the following reasons: not one of them was written earlier than the 9th century, not one of them was written in Italy, but every one north of the Alps; every one contains internal evidence of a post- Gregorian date in the shape of masses for the repose or for the intercession of St Gregory and in various other ways.

The Roman liturgy seems to have been introduced into England in the 7th, into France in the 9th and into Spain in the nth century, though no doubt it was known in both France and Spain to some extent before these dates. In France certain features of the service and certain points in the ritual of the ancient national liturgy became interwoven with its text and formed those many varying medieval Gallican Uses which are associated with the names of different French sees.

The chief distinguishing characteristics of the Roman rite are these: (a) the position of the great intercession for quick and dead within the canon, the commemoration of the living being placed just before and the commemoration of the departed just after the words of institution; (b) the absence of an " Epiklesis " or invocation of the Holy Ghost upon the elements; (c) the position of the " Pax " or " Kiss of Peace after the con- secration " and before the communion, whereas in other liturgies it occurs at a much earlier point in the service.

Liturgies of the British Islands.

Period I. The Celtic Church. — Until recently almost nothing was known of the character of the liturgical service of the Celtic church which existed in these islands before the Anglo-Saxon Conquest, and continued to exist in Ireland, Scotland, Wales and Cornwall for considerable though varying periods of time after that event. But in recent times a good deal of light has been thrown on the subject, partly by the publication or re- publication of the few genuine works of Patrick, Columba, Columbanus, Adamnan and other Celtic saints; partly by the discovery of liturgical remains in the Scottish Book of Deer and in the Irish Books of Dimma and Mulling.&nd the Stowe Missal, &c; partly by the publication of medieval Irish compilations, such as the Lcbar Brecc, Liber Hymnorum, Martyrology of Ocngus, &c, which contain ecclesiastical kalendars, legends, treatises, &c, of considerable but very varying antiquity. The evidence collected from these sources is sufficient to prove that the liturgy of the Celtic church was of the Gallican type. In central England the churches, with everything belonging to them, were destroyed by the heathen invaders at the close of the 5th century, but the Celtic church in the remoter parts of England, as well as

in the neighbouring kingdoms of Scotland and Ireland, retained its independence for centuries afterwards.

An examination of its few extant service-books and fragments of service-books yields the following evidence of the Gallican origin and character of the Celtic liturgy: (a) the presence of collects and anthems which occur in the Gallican or Mozarabic but not in the Roman liturgy; (b) various formulae of thanks- giving after communion; (c) frequent biddings or addresses to the people in the form of Gallican Praefationes; (d) the Gallican form of consecration, being a prayer called " Post- Sanctus " leading up to

the words of institution; («) the com- plicated rite of ” fraction ” or ” the breaking of bread,” as described in the Irish treatise at the end of the Stowe Missal, finds its only counterpart in the elaborate ceremonial of the Mozarabic church; (/) the presence of the Gallican ceremonial of Pedilavium or ” Washing of feet ” in the earliest Irish baptismal office.

For a further description of these and other features which are characteristic of or peculiar to the Celtic liturgy the reader is referred to F. E. Warren’s Liturgy and Ritual of the Celtic Church (Oxford,

1881).

Period II. The Anglo-Saxon Church. — We find ourselves here on firmer ground, and can speak with certainty as to the nature of the liturgy of the English church after the beginning of the 7th century. Information is drawn from liturgical allusions in the extant canons of numerous councils, from the voluminous writings of Bede, Alcuin and many other ecclesiastical authors of the Anglo-Saxon period, and above all from a considerable number of service-books written in England before the Norman Conquest. Three of these books are missals of more or less completeness: (1) the Leofric Missal, a composite 10th- to nth- century MS. presented to the cathedral of Exeter by Leofric, the first bishop of that see (1046-1072), now in the Bodleian library at Oxford; edited by F. E. Warren (Oxford, 1883); (2) the missal of Robert of Jumieges, archbishop of Canterbury (1051-1052), written probably at Winchester and presented by Archbishop Robert to his old monastery of Jumieges in the neighbourhood of Rouen, in the public library of which it now lies; edited by H. A. Wilson (London, 1896); (3) the Red Book of Derby, a MS. missal of the second half of the nth century, now in the library of Corpus Christi College, Cambridge.

A perusal of these volumes proves what we should have expected a priori, that the Roman liturgy was in use in the Anglo- Saxon church. This was the case from the very first. That church owed its foundation to a Roman pontiff, and to Roman missionaries, who brought, as we are told by Bede, their native liturgical codices with them (Hist. Eccles. lib. ii. cap. 28). Accordingly, when we speak of an Anglo-Saxon missal, we mean a Roman missal only exhibiting one or more of the following features, which would differentiate it from an Italian missal of the same century, (a) Rubrics and other entries of a miscel- laneous character written in the vernacular language of the country, (b) The commemoration of national or local saints in the kalendar, in the canon of the mass and in the litanies which occur for use on Easter Even and in the baptismal offices, (c) The presence of a few special masses in honour of those local saints, together with a certain number of collects of a necessarily local character, for the rulers of the country, for its natural produce, &c. (d) The addition of certain peculiarities of liturgical structure and arrangement interpolated into the otherwise purely Roman service from an extraneous source. There are two noteworthy examples of this in Anglo-Saxon service-books. Every Sunday and festival and almost every votive mass has its proper preface, although the number of such prefaces in the Gregorian sacramentary of the same period had been reduced to eight. There was a large but not quite equal number of triple episcopal benedictions to be pronounced by the bishop after the Lord’s Prayer and before the communion. This custom must either have been perpetuated from the old Celtic liturgy or directly derived from a Gallican source.

Period III. Anglo-Norman Church. — The influx of numerous foreigners, especially from Normandy and Lorraine, which

preceded, accompanied and followed the Conquest, and the occupation by them of the highest posts in church as well as state had a distinct effect on the liturgy of the

English church. These foreign ecclesiastics brought over with them a preference for and a habit of using certain features of the Gallican liturgy and ritual, which they succeeded in incorporating into the service- books of the church of England. One of the Norman prelates, Osmund, count of Seez, earl of Dorset, chancellor of England, and bishop of Salisbury (1078-1099), is credited with having undertaken the revision of the English service-books; and the missal which we know as the Sarum Missal, or the Missal according to the. Use of Sarum, practically became the liturgy of the English church. It was not only received into use in the province of Canterbury, but was largely adopted beyond those limits — in Ireland in the 12th and in various Scottish dioceses in the 12th and 13th centuries.

It would be beyond our scope here to give a complete list of the numerous and frequently minute differences between a medieval Sarum and the earlier Anglo-Saxon or contemporaneous Roman liturgy. They lie mainly in differences of collects and lections, variations of ritual on Candlemass, Ash Wednesday and throughout Holy Week; the introduction into the canon of the mass of certain clauses and usages of Gallican character or origin; the wording of rubrics in the subjunctive or imperative tense; the peculiar " Preces in prostratione "; the procession of Corpus Christi on Palm Sunday; the forms of ejection and reconciliation of penitents, &c. The varying episcopal bene- dictions as used in the Anglo-Saxon church were retained, but the numerous proper prefaces were discarded, the number being reduced to ten.

Besides the famous and far-spreading Use of Sarum, other Uses, more local and less known, grew up in various English dioceses. In virtue of a recognized diocesan independence, bishops were able to regulate or alter their ritual, and to add special masses or commemorations for use within the limits of their jurisdiction. The better known and the more distinctive of these Uses were those of York and Hereford, but we also find traces of or allusions to the Uses of Bangor, Lichfield, Lincoln, Ripon, St Asaph, St Paul's, Wells and Winchester.

Service-books. — The Eucharistic service was contained in the volume called the Missal (q.v.), as the ordinary choir offices were contained ir. the volume known as the Breviary (q.v.). But besides these two volumes there were a large number of other service-books. Mr W. Maskell has enumerated and described ninety-one such volumes employed by the Western Church only. It must be under- stood, however, that many of these ninety-one names are synonyms (Man. Rit. Eccles. Anglic, 1882, vol. i. p. ccxxx.). The list might be increased, but it will be possible here only to name and briefly describe a few of the more important of them. (1) The Agenda is the same as the Manual, for which see below. (2) The A ntiphonary con- tained the antiphons or anthems, sung at the canonical hours, and certain other minor parts of the service. (3) The Benedictional contained those triple episcopal benedictions previously described as used on Sundays and on the chief festivals throughout the year.

(4) The Collectarium contained the collects for the season, together with a few other parts of the day offices. It was an inchoate breviary.

(5) The Epislolarium contained the epistles, and the Evangelistarium the gospels for the year. (7) The Gradual contained the introit, gradual, sequences, and the other portions of the communion service which were sung by the choir at high mass. (8) The Legenda con- tained the lections which were read at matins and at other times, and may be taken as a generic term to include the Homiliarium, Passional and other volumes. (9) The Manual was the name usually employed in England to denote the Ritual, which contained the baptismal, matrimonial and other offices which might be performed by the parish priest. (10) The Pontifical contained the orders of consecration, ordin; tion, and such other rites as could, ordinarily, only be performed by a b;shop. To these we must add a book which was not strictly a r'nurch office book, but a handy book for the use of the laity, and which was in very popular use and often very highly embellished from the 14th to the 16th century, the Book of Hours, or Horae Beatae Mariae Virginis, also known as the Prymer or Primer. It contained portions of the canonical hours, litanies, the penitential Psalms, and other devotions of a miscellaneous and

Erivate character. Detailed information about all these and other ooks is to be found in C. Wordsworth and H. Littlehales', The Old Service Books of the English Church.

The Eastern Church too possessed and still possesses numerous and voluminous service-books, of which the chief are the following: (1) The Euchologian, containing the liturgy itself with the remaining

sacramentaloffices bound up in the same volume. (2) The Horologion, containing the unvarying portion of the Breviary. (3) The Menaea, being equivalent to a complete Breviary. (4) The Menologion or Martyrology. (5) The Octoechus and (6) The Paracletice, containing Troparia and answering to the Western antiphonary. (7) The Pentecostarion, containing the services from Easter Day to All Saints' Sunday. (8) The Triodion, containing those from Septua- gesima Sunday to Easter Even. (9) The Typicum is a general book of rubrics corresponding to the Ordinale or the Pie of Western Christendom.

Period IV. The Reformed Church. — The Anglican liturgy of Reformation and post-Reformation times is described under the heading of Prayer, Book of Common, but a brief description may be added here of the liturgies of other reformed churches. ,

The Liturgy of the Scottish Episcopal Church. — This liturgy in nearly its present form was compiled by Scottish bishops in 1636 and imposed — or, to speak more accurately, attempted to be imposed — upon the Scottish people by the royal authority of Charles I. in 1637. The prelates chiefly concerned in it were Spottiswood, bishop of Glasgow; Maxwell, bishop of Ross; Wedderburn, bishop of Dunblane; and Forbes, bishop of Edin- burgh. Their work was approved and revised by certain members of the English episcopate, especially Laud, archbishop of Canter- bury; Juxon, bishop of London; and Wren, bishop of Ely. This liturgy has met with varied fortune and has passed through several editions. The present Scottish office dates from 1764. It is now used as an alternative form with the English com- munion office in the Scottish Episcopal Church.

The general arrangements of its parts approximates more closely to that of the first book of Edward VI. than to the present Anglican Book of Common Prayer. Among its noteworthy features are (a) the retention in its integrity and in its primi- tive position after the words of institution of the invocation of the Holy Spirit. That invocation runs thus: " And we most humbly beseech thee, O merciful Father, to hear us and of thy almighty goodness vouchsafe to bless and sanctify with thy word and Holy Spirit these thy gifts and creatures of bread and wine that they may become the body and blood of thy most dearly beloved Son" (edit. 1764). This kind of petition thus placed is found in the Eastern but not in the Roman or Anglican liturgies, (b) The reservation of the sacrament is permitted, by traditional usage, for the purpose of communicating the absent or the sick, (c) The minimum number of communicants is fixed at one or two instead of three or four.

For fuller information see Bishop J. Dowden, The Annotated Scottish Communion Service (Edinburgh, 1884).

American Liturgy. — The Prayer Book of " the Protestant Episcopal Church " in America was adopted by the general convention of the American church in 1789. It is substantially the same as the English Book of Common Prayer, but among important variations we may name the following. – (a) The arrangement and wording of the order for Holy Communion rather resembles that of the Scottish than that of the Englislr liturgy, especially in the position of the oblation and invocation immediately after the words of institution, (b) The Magnificat, Nunc dimittis and greater part of Benedictus were disused; but these were reinstated among the changes made in the Prayer Book in 1892. (c) Ten selections of Psalms are appointed for use as alternatives for the Psalms of the day. (d) Gloria in excelsis is allowed as a substitute for Gloria Patri at the end of the Psalms at morning and evening prayer. In addition to these there are many more both important and unimportant variations from the English Book of Common Prayer.

The Irish Prayer Book. — The Prayer Book in use in the Irish portion of the United Church of England and Ireland was the Anglican Book of Common Prayer, but after the disestablish- ment of the Irish church several changes were introduced into it by a synod held at Dublin in 1870. These changes included such important points as: (a) the excision of all lessons from the Apocrypha, (b) of the rubric ordering the recitation of the Athanasian Creed; (c) of the rubric ordering the vestments ot the second year of Edward VI., (d) of the form of absolution in the office for the visitation of the sick, (e) the addition to the

Catechism of a question and answer bringing out more clearly the spiritual character of the real presence.

The Presbyterian Church. — The Presbyterian churches of Scotland at present possess no liturgy properly so called. Certain general rules for the conduct of divine service are contained in the " Directory for the Public Worship of God " agreed upon by the assembly of divines at Westminster, with the assistance of commissioners from the Church of Scotland, approved and established by an act of the general assembly, and by an act of parliament, both in 1645. In 1554 John Knox had drawn up an order of liturgy closely modelled on the Genevan pattern for the use of the English congregation to which he was then ministering at Frankfort. On his return to Scotland this form of liturgy was adopted by an act of the general assembly in 1560 and became the established form of worship in the Presbyterian church until the year 1645, when the Directory of Public Worship took its place. Herein regulations are laid down for the conduct of public worship, for the reading of Scripture and for extempore prayer before and after the sermon, and in the administration of the sacrament of baptism and the Lord's Supper, for the solemnization of marriage, visitation of the sick and burial of the dead, for the observance of days of public fasting and public thanksgiving, together with a form of ordination and a directory for family worship. In all these cases, though the general terms of the prayer are frequently indicated, the wording of it is left to the discretion of the minister, with these exceptions: At the act of baptism this formula must be used — " I baptize thee in the name of the Father, and of the Son, and of the Holy Ghost "; and for the Lord's Supper these forms are suggested, but with liberty to the minister to use " other the like, used by Christ or his apostles upon this occasion " — " According to the holy institution, command, and example of our blessed Saviour, Jesus Christ, I take this bread, and having given thanks, break it, and give it unto you. Take ye, eat ye; this is the body of Christ which is broken for you; do this in remembrance of him." And again " According to the institution, command and example of our Lord Jesus Christ, I take this cup and give it unto you; this cup is the New Testament in the blood of Christ, which is shed for the remission of the sins of many; drink ye all of it." There is also an unvarying form of words directed to be used before the minister by the man to the woman, and by the woman to the man in the case of the solemnization of matrimony. The form of words on all other occasions, including ordination, is left to the discretion of the officiating minister or of the presbytery.

European Protestant Churches. The Cahinistic Churches. — Rather more of the liturgical element in the shape of a set form of words enters into the service of the French and German Calvinistic Protestants. The Sunday morning service as drawn up by Calvin was to open with a portion of Holy Scripture and the recitation of the ten commandments. Afterwards the minister, inviting the people to accompany him, proceeded to a confession of sins and supplication for grace. Then one of the Psalms of David was sung. Then came the sermon, prefaced by an extempore prayer and concluding with the Lord's Prayer, creed and benediction. The communion service began with an exhortation leading up to the apostles' creed; then followed a long exhortation, after which the bread and wine were distributed to the people, who advanced in reverence and order, while a Psalm was being sung, or a suitable passage of Scripture was being read. After all had communicated a set form of thanksgiving was

said by the minister. Then the Song of Simeon was sung by the congregation, who were then dismissed with the blessing. This form of service has been modified in various ways from time to time, but it remains substantially the type of service in use among the reformed Calvinistic churches of Germany, Switzerland and France.

The Lutheran Church. — Luther was far more conservative than the rest of the Protestant reformers and his conservatism appeared nowhere more than in the service-books which he drew up for the use of the church which bears his name. In 1523 he published a treatise Of the Order of the Service in the Congregation and in 1526 he published the German Mass. Except that the vernacular was substituted for the Latin language, the old framework and order of the Roman missal were closely followed, beginning with the Confiteor, Introit, Kyrie eleison, still always sung in Greek, Gloria in excelsis, &c. The text of this and other Lutheran services is given in Agende fur christliche Gemeinden des Lutherischen Bekenntnisses (Nordlingen, 1853). At the same time Luther was tolerant and expressed a hope that different portions of the Lutheran church

would from time to time make such changes or adaptations in the order of service as might be found convenient. The Lutheran churches of northern Europe have not been slow to avail themselves of this advice and permission. Most of them have drawn up liturgies for themselves, sometimes following very closely, sometimes differing considerably from the original service composed by Luther himself. In 1822, on the union of the Lutheran and Reformed (Calvinistic) churches of Prussia, a new liturgy was published at Berlin. It is used in its entirety in the chapel royal, but great liberty as to its use was allowed to the parochical clergy, and considerable variations of text appear in the more recent editions of this service-book.

The Church of the New Jerusalem (Swedenborgians) and the Catholic Apostolic Church (Irvingites) and other Protestant bodies have drawn up liturgies for themselves, but they are hardly of sufficient historical importance to be described at length here.

The Old Catholics, lastly, published a Rituale in 1875 containing the occasional offices for baptism, matrimony, burial, &c, and a form for reception of Holy Communion, in the German language. This latter is for use in the otherwise unaltered service of the mass, corresponding in purpose to the order of Communion in English published the 8th of March 1548 and in use till Whitsunday 1549.

(F. E. W.)

LITUUS, the cavalry trumpet of the Romans, said by Macro- bius {Saturn, lib. vi.) to have resembled the crooked staff borne by the Augurs. The lituus consisted of a cylindrical tube 4 or 5 ft. long, having a narrow bore, and terminating in a conical bell joint turned up in such a manner as to give the instrument the outline of the letter “J.” Unlike the buccina, cornu and tuba, the other military service instruments of the Romans, the lituus has not been traced during the middle ages, the medieval instrument most nearly resembling it being the cromorne or tournebout, which, however, had lateral holes and was played by means of a reed mouthpiece. A lituus found in a Roman warrior’s tomb at Cervetri (Etruria) in 1827 is preserved in the Vatican. Victor Mahillon gives its length as 1 m. 60, and its scale as in unison with that of the trumpet in G {Catalogue descriptif, 1896, pp. 29-30). (K. S.)

LIUDPRAND (Liutprand, Luitprand) (c. 922-972), Italian historian and author, bishop of Cremona, was born towards the beginning of the 10th century, of a good Lombard family. In 931 he entered the service of King Hugo of Italy as page; he afterwards rose to a high position at the court of Hugo’s successor Berengar, having become chancellor, and having been sent (949) on an embassy to the Byzantine court. Falling into disgrace with Berengar on his return, he attached himself to the emperor Otto I., whom in 961 he accompanied into Italy, and by whom in 962 he was made bishop of Cremona. He was frequently employed in missions to the pope, and in 968 to Constantinople to demand for the younger Otto (afterwards Otto II.) the hand of Theophano, daughter of

the emperor Nicephorus Phocas. His account of this embassy in the Relatio de Legatione Con- stantino politana is perhaps the most graphic and lively piece of writing which has come down to us from the 10th century. The detailed description of Constantinople and the Byzantine court is a document of rare value — though highly coloured by his ill reception and offended dignity. Whether he returned in 971 with the embassy to bring Theophano or not is uncertain. Liudprand died in 972.

He wrote (1) Antapodoseos, sen rerum per Europam gestarum, Libri VI, an historical narrative, relating to the events from 887 to 949, compiled with the object of avenging himself upon Berengar and Willa his queen; (2) Historia Ottonis, a work of greater imparti- ality and merit, unfortunately covering only the years from 960 to 964; and (3) the Relatio de Legatione Constantinopolitana (968-969). All are to be found in the Monum. Germ. Hist, of Pertz, and in the Rer. Ital. Script, of Muratori; there is an edition by E. Diimmler (1877), and a partial translation into German, with an introduction by W. Wattenbach, is given in the second volume of the Geschichls- schreiber der deutschen Vorzeit (1853). Compare Wattenbach, Deutschlands Geschichtsquellen im Mittelalter. Three other works, entitled Adversaria, Chronicon, 606-960, and Opusculum de vitis Romanorum pontificum, are usually, but wrongly, assigned to Liudprand. An English translation of the embassy to Constan- tinople is in Ernest Henderson's Select Documents of the Middle Ages (Bohn series, 1896). A complete bibliography is in A. Potthast's Bibl. Hist. Medii Aevi (Berlin, 1896).

LIVE OAK, a city and the county-seat of Suwannee county, Florida, U.S.A., 81 m. by rail W. of Jacksonville. Pop. (1890) 687; (1900) 1659; (1905) 7200; (1910) 34.50. Live Oak is served

by the Atlantic Coast Line, the Seaboard Air Line, the Live Oak, Perry & Gulf and the Florida railways. There are extensive areas of pine lands in the vicinity, and large quantities of sea- island cotton are produced in the county. Lumber and naval stores are also important products. The first settlement on the site of the city was made in 1865 by John Parshley, of Massa- chusetts, who erected a large saw-mill here. Live Oak was first incorporated as a town in 1874, and in 1903 was chartered as a city.

LIVER (O. Eng. lifer; cf. cognate forms, Dutch lever, Ger. Leber, Swed. lefver, &c; the O. H. Ger. forms are libara, lipora, &c; the Teut. word has been connected with Gr. rjirap and Lat. jeeur) , in anatomy, a large reddish-brown digestive gland situated in the upper and right part of the abdominal cavity. When hardened in situ its shape is that of a right-angled, triangular prism showing five surfaces — superior, anterior, inferior, posterior and right lateral which represents the base of the prism. It weighs about three pounds or one-fortieth of the body Weight.

Although the liver is a fairly solid organ, it is plastic, and moulds itself to even hollow neighbour- ing viscera rather than they to it. The superior surface is in contact with the diaphragm, but has peritoneum between (see Coelom and Serous Membranes). At its posterior margin the peri- toneum of the great sac is reflected on to the diaphragm to form the anterior layer of the coronary ligament. Near the mid line of the body, and at right angles to the last, another reflection, the falciform ligament, runs forward, and the line of attachment of this indicates the junction of the right and left lobes of the liver. The anterior surface is in contact with the diaphragm and the anterior abdominal wall. The attachment of the falciform ligament is continued down it. The posterior sur- face is more complicated (see fig. 1); starting from the right and working toward the left, a large triangular area, uncovered by peritoneum and in direct contact with the diaphragm, is seen. This is bounded on the left by the inferior vena cava, which is sunk into a deep groove in the liver, and into the upper part of this the hepatic veins open. Just to the right of this and at the lower part of the bare area is a t riangular depression for the right supra- renal body. To the left of the vena cava is the Spigelian lobe, which

lies in front of the bodies of the tenth and eleventh thoracic vertebrae, the lesser sac of peritoneum, diaphragm and thoracic aorta intervening. To the left of this is the fissure for the ductus venosus, and to the left of this again, the left lobe, in which a broad shallow groove for the oesophagus may usually be seen. Sometimes the left lobe stretches as far as the left abdominal wall, but more often it ends below the apex of the heart, which is 3! in. to the left of the mid line of the body. The relations of the lower surface can only be understood if it is realized that it looks backward and to the left as well as downward (see fig. 1). Again starting from the right side, two impressions are seen; the anterior one is for the hepatic flexure of the colon, and the posterior for the upper part of the right kidney. To the left of the colic impression is a smaller one for the second part of the duodenum. Next comes the gall bladder, a pear-shaped bag, the fundus of which is in front and below, the neck behind and above. From the neck passes the cystic duct, which is often twisted into the form of an S. To the left of the gall bladder is the quadrate lobe, which is in contact with the pylorus of the stomach. To the left of this is the left lobe of the liver, separated from the quadrate lobe by the umbilical fissure in which lies the round ligament of the liver, the remains of the umbilical vein of the foetus. Sometimes this fissure is partly turned into a tunnel by a bridge of liver substance known as the pons hepatis. XVI. 26

The under surface of the left lobe is concave for the interior surface of the stomach (see Alimentary Canal: Stomach Chamber), while a convexity, known as the tuber omentale, fits into the lesser curvature of that organ. The posterior boundary of the quadrate lobe is the transverse fissure, which is little more than an inch long and more than half an inch wide. This fissure represents the hilum of the liver, and contains the right and left hepatic ducts and the right and left branches of the hepatic artery and portal vein, together with nerves and lym- phatics, the whole being enclosed in some condensed subperitoneal tissue known as Glisson's capsule. Behind the transverse fissure the lower end of the Spigelian lobe is seen as a knob called the tuber papillare, and from the right of this a narrow bridge runs forward and to the right to join the Spigelian lobe to the right

Vena cava in its fossa

Spigelian lobe Fissure of ductus venosus

Omental tuberosity Oesophageal groove

End of right suprarenal vein Suprarenal impression

Right end of caudate lobe Uncovered area of right lobe

Renal impression

Attachment of right lateral ligament

Portal fissure

Umbilical fissure

Quadrate lobe

Portal vein

Gall bladder

Duodenal impression

Colic impression

From A. Birmingham Cunningham's Text-book of Anatomy.

Fig. I. — The Liver from below and behind, showing the whole of the visceral surface

and the posterior area of the parietal surface. The portal fissure has been slightly opened up to show the vessels passing through it ; the other fissures are represented in their natural condition — closed. In this liver, which was hardened in situ, the impressions of the sacculations of the colon are distinctly visible at the colic impression. The round ligament and the remains of the ductus venosus are hidden in the depths of their fissures.

lobe and to shut off the transverse fissure from that for the vena cava. This is the caudate lobe. The right surface of the liver is covered with peritoneum and is in contact with the diaphragm, outside which are the pleura and lower ribs. From its lower margin the right lateral ligament is reflected on to the diaphragm. A similar fold passes from the tip of the left lobe as the left lateral ligament, and both these are the lateral margins of the coronary ligament. Sometimes, especially in women, a tongue-shaped projection downward of the right lobe is found, known as Riedel's lobe; it is of clinical interest as it may be mistaken for a tumour or floating kidney (see C. H. Leaf, Proc. Anat. Soc, February 1899; Journ. Anat. and Phys. vol. 33, p. ix.). The right and left hepatic ducts, while still in the transverse fissure, unite into a single duct which joins the cystic duct from the gall bladder at an acute angle. When these have united the

duct is known as the common bile duct, and runs down to the second part of the duodenum (see Alimentary Canal).

Minute Structure of the Liver. — The liver is made up of an enormous number of lobules of a conical form (see fig. 3). If the portal vein is followed from the transverse fissure, it will be seen to branch and re- branch until minute twigs called interlobular veins (fig. 2, i) ramify around the lobules. From these intralobular capillaries run toward the centre of the lobule, forming a network among the polygonal hepatic cells. On reaching the core of the conical lobule they are collected into a central or intralobular vein (fig. 2, c) which unites with other similar ones to form a sublobular vein (fig. 3, s). These eventually reach the hepatic radicles, and so the blood is conducted

into the vena cava. In man the lobules are not dis- tinctly separated one from the other, but in some animals, e.g. the pig, each one has a fibrous sheath derived from Glisson's cap- sule, (fig. 3, ct.).

Embryology. — The liver first appears as an ento- dermal hollow longitudinal outgrowth from the duo- denum into the ventral mesentery. The upper part of this forms the future liver, and grows up into the septum transversum from which the central part of the diaphragm is formed (seeDiAPHRAGM). Fromthe cephalic part of this primary diverticulum solid rods of cells called the hepatic cylinders grow out, and

Fig. 2.

c,c,

—Transverse section through the hepatic lobules. , Interlobular veins ending in the intralobular capillaries. Central veins joined by the intra- lobular capillaries. At a, a the capillaries of one lobule com- municate with those adjacent to it. these branch again and again until a cellular network is formed surrounding and breaking up the umbilical and vitelline veins. The liver cells, therefore, are entodermal, but the supporting connective tissue mesodermal from the septum transversum. The lower (caudal) part of the furrow-like outgrowth remains hollow and forms the gall bladder. At first the liver is em- bedded in the septum transversum, but later the diaphragm and

it are constricted off one from the other, and soon the liver becomes Aery large and fills the greater part of the abdomen. At birth it is proportionately much larger than in the adult, and forms one- eighteenth instead of one- fortieth of the body weight, the right and left lobes being nearly equal in size.

Comparative Anatomy. — In the Acrania (Amphioxus) the liver is probably represented by a single ventral diver- ticulum from the anterior end of the intestine, which has a hepatic portal circula- tion and secretes digestive fluid. In all the Craniata a solid liver is developed. In the adult lamprey among the Cyclostomata the liver under- Fig. 3. — Vertical section through two goes retrogression, and the hepatic lobules of a pig. bile ducts and gall bladder

c,c, Central veins receiving the intra- disappear, though they are lobular capillaries. present in the larval form

s, Sublobular vein. (Ammocoetes). In fishes and

ct, Interlobular connective tissue amphibians the organ consists forming the capsules of the °f .“g! 11 . and . lcft lorjes > an d. a lobules. Interlobular veins.

t, »,

gall-bladder is present. The same description applies to the reptiles, but a curious net- work of cystic ducts is found in snakes and to a less extent in crocodiles. In the Varanidae (Monitors) the hepatic duct is also retiform (see F. E. Beddard, Proc Zool. Soc, 1888, p. 105). In birds two lobes are also present, but in some of them, e.g. the pigeon, there is no gall-bladder.

In mammals Sir William Flower pointed out that a generalized type of liver exists, from which that of any mammal may be derived by suppression or fusion of lobes. The accompanying diagram of Flower (fig. 4) represents an ideal mammalian liver. It will be seen that the umbilical fissure («) divides the organ into right and left halves, as in the lower vertebrates, but that the ventral part of each half is divided into a central and lateral lobe. Passing from right to left there are therefore: right lateral (rl), right central (re), left central (Ic), and left lateral (It) lobes. The gall-bladder (g), when it is present, is always situated on the caudal surface or in the substance of the right central lobe. The Spigelian (s) and caudate lobes © belong to the right half of the liver, the latter being usually a leaf-

shaped lobe attached by its stalk to the Spigelian, and having its blade flattened between the right lateral lobe and the right kidney. The vena cava (vc) is always found to the right of the Spigelian lobe and dorsal to the stalk of the caudate. In tracing the lobulation of man’s liver back to this generalized type, it is evident at once that his quadrate lobe does not correspond to any one generalized lobe, but is merely that part of the right central which lies between the gall bladder and the umbilical fissure. From a careful study of human variations (see A. Thomson, Journ. Anat. and Phys. vol. 33, p. 546) compared with an Anthropoid liver, such as that of the gorilla, depicted by W. H. L. Duckworth (Morphology and Anthro-

Fig. 4. — Diagrammatic Plan of the Inferior Surface of a Multi- lobed Liver of a Mammal. The posterior or attached border is uppermost.

u, Umbilical vein of the foetus, rlf, The right lateral fissure.

represented by the round cf, The cystic fissure.

ligament in the adult, lying 11, The left lateral lobe.

in the umbilical fissure. Ic, The left central lobe.

dv, The ductus venosus. re, The right central lobe.

vc, The inferior vena cava. rl, The right lateral lobe.

p, The vena portae entering the j, The Spigelian lobe.

transverse fissure. c, The caudate lobe.

///, The left lateral fissure. g, The gall bladder.

pology, Cambridge, 1904, p. 98), it is fairly clear that the human liver is formed, not by a suppression of any of the lobes of the generalized type, but by a fusion of those lobes and obliteration of certain fissures. This fusion is, probably correctly, attributed by Keith to the effect of pressure following the assumption of the erect position (Keith, Proc. Anat. Soc. of Ct. Britain, Journ. Anat. and Phys. vol. 33, p. xii.). The accompanying diagram (fig. 5) shows an abnormal human liver in the Anatomical Department of St Thomas's Hospital which reproduces the generalized type. In its lobulation it is singu- larly like, in many details, that of the baboon (Papio maimon) figured by G. Ruge (Morph. Jahrb., Bd. 35, p. 197); see F. G. Parsons, Proc. Anat. Soc, Feb. 1904, Journ. Anat. and Phys. vol. 33, p. xxiii. Georg Ruge " Die ausscren Formverhaltnisse der Leber bei den Primaten," (Morph. Jahrb., Bd. 29 and 35) gives a critical study of the primate liver, and among other things suggests the re- cognition of the Spigelian and caudate lobes as parts of a single lobe, for which he proposes the name of lobus venae cavae. This doubtless would be an advantage morphologically, though for human descriptive anatomy the present nomenclature is not likely to be altered.

The gall-bladder is usually present in mammals, but is wanting in the odd-toed ungulates (Perissodactyla) and Procavia (Hyrax). In the giraffe it may be absent or present. The cetacea and a few rodents are also without it. In the otter the same curious network of bile ducts already recorded in the reptiles is seen (see P. H. Burne, Proc. Anat. Soc, Journ. Anat. and Phys. vol. 33, p. xi.). (F. G. P.)

Surgery of Liver and Gall-biadder. — Exposed as it is in the upper part of the abdomen, and being somewhat friable, the human liver is often torn or ruptured by blows or kicks, and, the large blood-vessels being thus laid open, fatal haemorrhage

Fig. 5. — Human Liver showing a reversion to the generalized mam- malian type.

Into the belly-cavity may take place. The individual becomes faint, and the faintness keeps on increasing; and there are pain and tenderness in the liver-region. The right thing to do is to open the belly in the middle line, search for a wound in the liver and treat it by deep sutures, or by plugging it with gauze.

Cirrhosis of the Liver. — As the result of chronic irritation of the liver increased supplies of blood pass to it, and if the irritation is unduly prolonged inflammation is the result. The commonest causes of this chronic hepatitis are alcoholism and syphilis. The new fibrous tissue which is developed throughout the liver, as the result of the chronic inflammation, causes general enlarge- ment of the liver with, perhaps, nausea, vomiting and jaundice. Later the new fibrous tissue undergoes contraction and the liver becomes smaller than natural. Blood then finds difficulty in passing through it, and, as a result, dropsy occurs in the belly (ascites). This may be relieved by tapping the cavity with a small hollow needle (Southey's trocar), or by passing into it a large sharp-pointed tube. This relieves the dropsy, but it does not cure the condition on which the dropsy depends. A surgical operation is sometimes undertaken with success for enabling the engorged veins to empty themselves into the blood-stream in a manner so as to avoid the liver-route.

Inflammation of the Liver (hepatitis) may also be caused by an attack of micro-

organisms which have reached it through the veins coming from the large intestine, or through the main arteries. There are, of course, as the result, pain and tenderness, and there is often jaundice. The case should be treated by rest in bed, fomentations, calomel and saline aperients. But when the hepatitis is of septic origin, suppuration is likely to occur, the result being an hepatic abscess.

Hepatic A bscess is especially common in persons from the East who have recently undergone an attack of dysentery. In addition to the local pain and tenderness, there is a high temperature accompanied with shiverings or occasional rigors, the patient becoming daily more thin and miserable. Sometimes the abscess declares itself by a bulging at the surface, but if not an incision should be made through the belly-wall over the most tender spot, and a direct examination of the surface of the liver made. A bulging having been found, that part of the liver which apparently overlies the abscess should be stitched up to the sides of the opening made in belly-wall, and should then be explored by a hollow needle. Pus being found, the abscess should be freely opened and drained. It is inadvisable to explore for a suspected abscess with a hollow needle without first opening the abdomen, as septic fluid might thus be enabled to leak out, and infect the general peritoneal cavity. If an hepatic abscess is injudiciously left to itself it may eventually discharge into the chest, lungs or belly, or it may establish a communication with a piece of intestine. The only safe way for an abscess to evacuate itself is on to the surface of the body.

Hydatic Cysts are often met with in the liver. They are due to a peculiar development of the eggs of the tape-worm of the dog, which have been received into the alimentary canal with infected water or uncooked vegetables, such as watercress. The embryo of the taenia echinococcus finds its way from the stomach or intestine into a vein passing to the liver, and, settling itself in the liver, causes so much disturbance there that a capsule of inflammatory material forms around it. Inside this wall is the special covering of the embryo which shortly becomes distended with clear hydatid fluid. The cyst should be treated like a liver-abscess, by incision through the abdominal or thoracic wall, by circumferential suturing and by exploration and drainage.

Tumours of the Liver may be innocent or malignant. The most important of the former is the gumma of tertiary syphilis; this may steadily and completely disappear under the influence of iodide of potassium. The commonest form of malignant tumour is the result of the growth of cancerous elements which have been brought to the liver by the veins coming up from a primary focus of the large intestine. Active surgical treatment of such a tumour is out of the question. Fortunately it is, as a rule, painless.

The Gall-bladder may be ruptured by external violence, and if bile escapes from the rent in considerable quantities peritonitis will be set up, whether the bile contains septic germs or not. If, on opening the abdomen to find out what serious effects some severe injury has caused, the gall-bladder be found torn-, the rent may be sewn up, or, if thought better, the gall-bladder may be removed. The peritoneal surfaces in the region of the liver should then be wiped clean, and the abdominal wound closed, except for the passage through it of a gauze drain.

Biliary concretions, known as gall stones, are apt to form in the gall-bladder. They are composed of crystals of bile-fat, cholesterine. Sometimes in the course of a post-mortem ex- amination a gall-bladder is found packed full of gall-stones which during life had caused no inconvenience and had given rise to no suspicion of their presence. In other cases gall-stones set up irritation in the gall-bladder which runs on to inflamma- tion, and the gall-bladder being infected by septic germs from the intestine (bacilli coli) an abscess forms.

Abscess of the Gall-bladder gives rise to a painful, tender swelling near the cartilage of the ninth rib of the right side. If the abscess is allowed to take its course, adhesions may form around it and it may burst into the intestine or on to the surface of the abdomen, a biliary fistula remaining. Abscess in the gall-bladder being suspected, an incision should be made down to it, and, its covering having been stitched to the

abdominal wall, the gall-bladder should be opened and drained. The pres- ence of concretions in the gall-bladder may not only lead to the formation of abscess but also to invasion of the gall-bladder by cancer.

Stones in the gall-bladder should be removed by operation, as, if left, there is a great risk of their trying to escape with the bile into the intestine and thus causing a blockage of the common bile-duct, and perhaps a fatal leakage of bile into the peritoneum through a perforating ulcer of the duct. If before opening the gall-bladder the surface is stitched to the deepest part of the abdominal wound, the biliary fistula left as the result of the opening of the abscess will close in due course.

" Biliary colic " is the name given to the distressing symptoms associated with the passage of a stone through the narrow bile- duct. The individual is doubled up with acute pains which, starting from the hepatic region, spread through the abdomen and radiate to the right shoulder blade. Inasmuch as the stone is blocking the duct, the bile is unable to flow into the intestine; so, being absorbed by the blood-vessels, it gives rise to jaundice. The distress is due to spasmodic muscular contraction, and it comes on at intervals, each attack increasing the patient's misery. He breaks out into profuse sweats and may vomit. If the stone happily finds its way into the intestine the distress suddenly ceases. In the meanwhile relief may be afforded by fomentations, and by morphia or chloroform, but if no prospect of the stone escaping into the intestine appears likely, the surgeon will be called upon to remove it by an incision through the gall-bladder, or the bile-duct, or through the intestine at the spot where it is trying to make its escape. Sometimes a gall-stone which has found its way into the intestine is large enough to block the bowel and give rise to intestinal obstruction which demands abdominal section.

A person who is of what used to be called a " biliary nature " should live sparingly and take plenty of exercise. He should avoid fat and rich food, butter, pastry and sauces, and should drink no beer or wine — unless it be some very light French wine or Moselle. He should keep his bowels regular, or even loose, taking every morning a dose of sulphate of soda in a glass of hot water. A course at Carlsbad, Vichy or Contrexeville, may be helpful. It is doubtful if drugs have any direct influence upon gall-stones, such as sulphate of soda, olive oil or oleate of soda. No reliance can be placed upon massage in producing the onward passage of a gall-stone from the gall-bladder towards the intestine. Indeed this treatment might be not only distressing but harmful. (E. O.*)

LIVERMORE, MARY ASHTON [RICE] (1821-1905), American reformer, was born in Boston, Massachusetts, on the 19th of December 1821. She studied at the female seminary at Charles- town, Mass.; taught French and Latin there, taught in a

plantation school in southern Virginia; and for three years conducted a school of her own in Duxbury, Mass. Upon returning from Virginia she had joined the abolitionists, and she took an active part in the Washingtonian temperance movement. 1 In 1845 she married Daniel Parker Livermore (1819-1899), a Universalist clergyman. In 1857 they removed to Chicago, Illinois, where she assisted her husband in editing the religious weekly, The New Covenant (1857-1869). During the Civil War, as an associate member of the United States Sanitary Commission,and as an agent of its North-western branch, she organized many aid societies, contributed to the success of the North-western Sanitary Fair in Chicago in 1863. and visited army posts and hospitals. After the war she devoted herself to the promotion of woman's suffrage and to temperance reform, founding in Chicago in 1869 The Agitator, which in 1870 was merged into the Woman's Journal (Boston), of which she was an associate editor until 1872. She died in Melrose, Mass. on the 23rd of May 1905. She had been president of the Illinois, the Massachusetts and the American woman's suffrage associations, the Massachusetts Woman's Christian Temperance Union and the Woman's Congress, and a member of>

many other societies. She lectured in the United States, England and Scotland, contributed to magazines and wrote: The Children's Army (1844), temperance stories; Thirty Years Too Late (1848), a temperance story; A Mental Transformation (1848); Pen Pictures (1863), short stories; What Shall We Do With Our Daughters? and Other Lectures (1883); My Story of the War (1888); and The Story of My Life (1897). With Frances E. Willard, she edited A Woman of the Century: Bio- graphical Sketches of Leading American Women (1893).

LIVERPOOL, EARLS OF. Charles Jenkinson, 1st earl of Liverpool (1 729-1808), English statesman, eldest son of Colonel Charles Jenkinson (d. 1750) and grandson of Sir Robert Jenkin- son, Bart., of Walcot, Oxfordshire, was born at Winchester on the 16th of May 1729. The family was descended from Anthony Jenkinson (d. 161 1), sea-captain, merchant and traveller, the first Englishman to penetrate into Central Asia. Charles was educated at Charterhouse school and University College, Oxford, where he graduated M.A. in 1752. In 1761 he entered parlia- ment as member for Cockermouth and was made under-secretary of state by Lord Bute; he won the favour of George III., and when Bute retired Jenkinson became the leader of the " king's friends " in the House of Commons. In 1763 George Grenville appointed him joint secretary to the treasury; in 1766, after a short retirement, he became a lord of the admiralty and then a lord of the treasury in the Grafton administration; and from 1778 until the close of Lord North's ministry in 1782 he was secretary-at-war. From 1786 to 1801 he was president of the board of trade and chancellor of the duchy of Lancaster, and he was popularly regarded as enjoying the confidence of the king to a special degree. In 1772 Jenkinson became a privy councillor and vice-treasurer of Ireland, and in 1775 he purchased the lucrative sinecure of clerk of the pells in Ireland and became master of the mint. In 1786 he was created Baron Hawkesbury, and ten years later earl of Liverpool. He died in London on the 17th of December 1808. Liverpool was twice married: firstly to Amelia (d. 1770), daughter of William Watts, governor of Fort William, Bengal, and secondly to Catherine, daughter of Sir Cecil Bisshoff, Bart., and widow of Sir Charles Cope, Bart.; he had a son by each marriage. He wrote several political works, but except his Treatise on the Coins of the Realm (1805) these are without striking merits. They are, Dissertation on the establish- ment of a national and constitutional force in England independent of a standing army (1756); Discourse on the conduct of the govern- ment of Great Britain respecting neutral nations (1758, new ed., 1837); and Collection of Treaties between Great Britain and other

1 This movement was started in 1840 by habitues of a Baltimore (Md.) tavern, who then founded the Washington Temperance Society (named in honour of George Washington). The movement spread rapidly in 1841-1843, but by the close of 1843 it had nearly spent its force. The members of the Society made a pledge not to drink spirituous or malt liquors, wine or cider. Women organized Martha Washington Societies as auxiliary organizations.

Powers 1648-1783 (1785). His Coins of the Realm was reprinted by the Bank of England in 1880.

His son, Robert Banks Jenkinson, 2nd earl (1770-1828), was educated at Charterhouse and at Christ Church, Oxford, where he had George Canning, afterwards his close political associate, for a contemporary. In 1790 he entered parliament as member for Appleby; he became master of the mint in 1799 and foreign secretary in Addington's administration in 1801, when he conducted the negotiations for the abortive treaty of Amiens. On the accession of Pitt to power in 1804, he obtained the home office, having in the previous year been elevated as Baron Hawkesbury to the House of Lords, where he acted as leader of the government. He declined the premiership on the death of Pitt in 1806, and remained out of office until Portland became prime minister in 1807, when he again became secretary of state for home affairs. In 1808 he succeeded his father as earl of Liverpool. In the ministry of Spencer Perceval (1809-1812) he was secretary for war and the colonies. After the assassination of Perceval in May 181 2 he became prime minister, and retained office till compelled in February 1827 to resign by the illness (paralysis) which terminated his life on the 4th of December 1828. The political career of the 2nd Lord Liverpool was of a negative character so far as legislation was concerned; but he held office in years of great danger and depression, during which he " kept order among his colleagues, composed their quarrels, and oiled the wheels to make it possible for the machinery of government to work" (Spencer Walpole). The energy of Castlereagh and Canning secured the success of the foreign policy of his cabinet, but in his home policy he was always retrograde. The introduction of the bill of pains and penalties against Queen Caroline greatly increased his unpopularity, originated by the severe measures of repression employed to quell the general distress, which had been created by the excessive taxation which followed the Napoleonic wars. Lord Liverpool was destitute of wide sympathies and of true political insight, and his resignation of office was followed almost immediately by the complete and permanent reversal of his domestic policy. He was twice married but had no children, and he was succeeded by his half- brother Charles Cecil Cope Jenkinson, 3rd earl (1784-1851), who left three daughters. The baronetcy then passed to a cousin, and the peerage became extinct. But in 1905 the earldom was revived in the person of the 3rd earl's grandson, Cecil George Savile Foljambe (1846-1907), who had been a Liberal member of parliament from 1880 to 1892, and in 1893 was created Baron Hawkesbury. He was succeeded in 1907 by his son, Arthur (b.1870).

For the life of the 2nd earl see the anonymous Memoirs of the Public Life and Administration of Liverpool (1827); C. D. Yonge, Life and Administration of the 2nd Earl of Liverpool (1868); T. E. Kebbel, History of Toryism (1886); and Sir S. Walpole, History of England, vol. ii. (1890).

LIVERPOOL, a city, municipal, county and parliamentary borough, and seaport of Lancashire, England, 201 m. N.W. of London by rail, situated on the right bank of the estuary of the Mersey, the centre of the city being about 3 m. from the open sea. The form of the city is that of an irregular semicircle, having the base line formed by the docks and quays extending about 9 m. along the east bank of the estuary, which here runs nearly north and south, and varies in breadth from 1 to 2 m. On the north the city is partly bounded by the borough of Bootle, along the shore of which the line of docks is continued. The area of the city is 16,619 acres exclusive of water area. The population at the census of 190 1 was 684,958; the estimated population in 1908 was 753,203; the birth-rate for 1907 was 31-7 and the death-rate 18-3; in 1908 the rateable value was £4,679,520.

The city lies on a continuous slope varying in gradient, but in some districts very steep. Exposed to the western sea breezes, with a dry subsoil and excellent natural drainage, the site is naturally healthy. The old borough, lying between the pool, now completely obliterated, and the river, was a conglomeration of narrow alleys without any regard to sanitary provisions; and during the 16th and 17 th centuries it was several times visited by plague. When the town expanded beyond its original limits,

and spread up the slopes beyond the pool, a better state of things began to exist. The older parts of the town have at successive periods been entirely taken down and renovated. The com- rnercial part of the city is remarkable for the number of palatial piles of 6ffices, built chiefly of stone, among which the banks and insurance offices stand pre-eminent. The demand for cottages

about the beginning of the 19th century led to the construction of what are called " courts," being narrow culs de sac, close packed, with no through ventilation. This resulted in a high rate of mortality, to contend with which enormous sums have been expended in sanitary reforms of various kinds. The more modern cottages and blocks of artisan dwellings have tended to reduce the rate of mortality.

Parks. — The earliest public park, the Prince's Park, was laid out in 1843 by private enterprise, and is owned by trustees, but

the reversion has been acquired by the corporation. Sefton Park, the most extensive, containing 269 acres, was opened in 1872. A large portion of the land round the margin has been leased for the erection of villas. Wavertree, Newsham, Sheil and Stanley Parks have also been constructed at the public expense. Con- nected with Wavertree Park are the botanic gardens. A palm house in Sefton Park was opened in 1896 and a conservatory in Stanley Park in 1900. Since 1882 several of the city churchyards and burial grounds and many open spaces have been laid out as gardens and recreation grounds. A playground containing 108 acres in Wavertree was presented to the city in 1895 by an anonymous donor, and in 1902 the grounds of a private residence outside the city boundaries containing 94 acres were acquired and are now known as Calderstones Park. In 1906 about 100 acres of land in Roby, also outside the boundaries, was presented to the city. The total area of the parks and gardens of the city, not including the two last named, is 881ˆ acres. A boulevard about 1 m. in length, planted with trees in the centre, leads to the entrance of Prince's Park.

Public Buildings. — Scarcely any of the public buildings date from an earlier period than the 19th century. One of the earliest, and in many respects the most interesting, is the town-hall in Castle Street. This was erected from the designs of John Wood of Bath, and was opened in 1754. The building has since undergone considerable alterations and extensions, but the main features remain. It is a rectangular stone building in the Corinthian style, with an advanced portico added to the original build- ing in 181 1, and crowned with a lofty dome surmounted by a seated statue of Britannia, added in 1802. The interior was destroyed by fire in 1795, and was entirely remodelled in the restoration. In 1900 considerable altera- tions in the internal structure were made, and the council chamber extended so as to afford accommodation for the enlarged council. It contains a splendid suite of apartments, includ- ing a ball-room approached by a noble stair- case. The building is occupied by the mayor as the municipal mansion house. A range of municipal offices was erected in Dale Street in i860. The building is in the Palladian style, with a dominating tower and square pyramidal spire.

The crowning architectural feature of Liver- pool is St George's Hall, completed in 1854. The original intention was to erect a hall suited for the triennial music festivals which had been held in the town. About the same time the corporation proposed to erect law- courts for the assizes, which had been trans- ferred to Liverpool and Manchester. In the competitive designs, the first prize was gained in both cases by Harvey Lonsdale Elmes. He was employed to combine the two objects in a new design, of which the present building is the outcome. It is fortunate in its situation, occupying the most central position in the town, and surrounded by an area sufficiently extensive to exhibit its proportions, an advantage which was accentuated in 1898 by the removal of St John's church, which previously prevented an uninterrupted view of the west side. The plan is simple. The centre is occupied by the great hall, 169 ft. in length, and, with the galleries, 87 ft. wide and 74 ft. high, covered with a solid vault in masonry. Attached to each end, and opening therefrom,

are the law-courts. A corridor runs round the hall and the courts, communicating with the various accessory rooms. Externally the east front is faced with a fine portico of sixteen Corinthian columns about 60 ft. in height. An advanced portico of similar columns fronts the south end crowned with a pediment filled with sculpture. The style is Roman, but the refinement of the details is suggestive of the best period of Grecian art. The great hall is finished with polished granite columns, marble balustrades and pavements, polished brass doors with foliated tracery. The fine organ was built by Messrs Willis of London, from the specification of Dr Samuel Wesley. Elmes having died in 1847 during the progress of the work, the..building was completed by C. R. Cockerell, R.A.

Next to the public buildings belonging to the city, the most important is the exchange, forming three sides of a quadrangle on the north side of the town-hall. The town-hall was originally built to combine a mercantile exchange with municipal offices, but the merchants preferred to meet in the open street adjoining. This, with other circumstances, led to the erection of a new exchange, a building of considerable merit, which was begun in 1803 and opened in 1808. It had scarcely been in use for more than fifty years when it was found that the wants of commerce had outstripped the accommodation, and the structure was taken down to make room for the present building.

The revenue buildings, begun in 1828 on the site of the original Liverpool dock, formerly combined the customs, inland revenue, post-office and dock board departments but are now only used by the two first named. It is a heavy structure, with three advanced porticoes in the Ilyssus Ionic style. Near by stands the sailors' home, a large building in the Elizabethan style. The Philharmonic Hall in Hope Street, with not much pretension externally, is one of the finest music rooms in the kingdom; it accommodates an audience of about 2500.

The group of buildings forming the county sessions house, the free public library, museum, central technical school and gallery of art are finely situated on the slope to the north of St George's Hall. The library and gallery of art are separate build- ings, connected by the circular reading-room in the middle. The latter possesses some features in construction worthy of note, having a circular floor 100 ft. in diameter without columns or any intermediate support, and a lecture-room underneath, amphitheatrical in form, with grades or benches hewn out of the solid rock. In 1884 the county sessions house just mentioned, adjoining the art gallery was opened for public business. In 1899 new post-office buildings in Victoria Street were completed. In 1907 two important additions were made to the buildings of Liverpool, the new offices of the dock board, built on the site of a portion of the Old George's dock, and the new cotton exchange in Oldhall street. The fine mass of buildings which constitute the university and the Royal Infirmary, bying between Brownlow Hill and Pembroke Place, both groups designed by Alfred Waterhouse, was begun in 1885.

Liverpool cathedral, intended when completed to be the largest in the country, from designs by G. F. Bodley and G. Gilbert Scott, was begun in 1904, when the foundation stone was laid by King Edward VII. The foundations were completed in 1906 and the superstructure begun. The foundation of the chapter-house was laid in that year by the duke of Connaught, and work was then begun on the Lady chapel, the vestries and the choir.

Railways. — There are three terminal passenger stations in Liver- pool, the London & North Western at Lime Street, the Lancashire & Yorkshire at Exchange and the combined station of the Midland, Great Northern & Great Central at Central. By the Mersey tunnel (opened in 1886) connexion is made with the VVirral railway, the Great Central, the Great Western and the London & North Western, on the Cheshire side of

the river. The Liverpool electric overhead railway running along the line of docks from Seaforth to Dingle was opened in 1893, and in 1905 a junction was made with the Lancashire and Yorkshire railway by which through passenger traffic between Southport and the Dingle has been established. In 1895 the River- side station at the Prince's dock was completed, giving direct access from the landing stage to the London and North Western system.

Water Supply. — The original supply of waver was from wells in the sandstone rock, but in 1847 an act was passed, under which extensive

works were constructed at Rivington, about 25 m. distant, and a much larger supply was obtained. The vast increase of population led to further requirements, and in 1880 another act gave power to impound the waters of the Vyrnwy, one of the affluents of the Severn. These works were completed in 1892, a temporary supply having been obtained a year earlier. The corporation had also, however, obtained power to impound the waters of the Conwy and Marchnant rivers, and to bring them into Lake Vyrnwy, the main reservoir, by means of tunnels. This work was completed and opened by the prince of Wales (George V.)in March 1910.

Tramways. — The corporation in 1896 purchased the propertv, rights, powers and privileges of the Liverpool Electric Supply Company, and in the following year the undertaking of the Liverpool Tramway Company, which they formally took over in the autumn of the same year. Since that date a large and extended system of electric tramways has been laid down, which has led to a very remarkable increase in the receipts and the number of passengers carried.

Administration of Justice. — The city has quarter-sessions for criminal cases, presided over by the recorder, and held eight times in the year. At least two police courts sit daily, and more if required. One is presided over by the stipendiary' magistrate and the others by the lay magistrates and the coroner. The court of passage is a very ancient institution, possibly dating from the foundation of the borough by King John, and intended for cases arising out of the imports and exports passing through the town. Its jurisdiction' has been confirmed and settled by parliament and it is competent to try civil cases arising within the city to any amount. The mayor is ex-officio the judge, but the presiding judge is an assessor appointed by the crown and paid by the corporation. The court sits about five times a year. There is a Liverpool district registry of the chancery of the County Palatine of Lancaster which has concurrent juris- diction with the high court (chancery division) within the hundred of West Derby. The vice-chancellor holds sittings in Liverpool. There is a Liverpool district registry of the high court of justice with common law, chancery, probate and admiralty jurisdiction, under two district registrars. The Liverpool county court has the usual limited jurisdiction over a wide local area, together with bankruptcy jurisdiction over the county court districts of St Helens, Widnes, Ormskirk and Southport, and admiralty jurisdiction over the same districts with the addition of Birkenhead, Chester, Runcorn and Warrington. There are two judges attadhed to the court.

Ecclesiastical. — The see of Liverpool was created in 1880 under the act of 1879, by the authority of the ecclesiastical commissioners, an endowment fund of about £100,000 having been subscribed for the purpose. The parish, which was separated from Walton-on-the-Hill in 1699, contained two churches, St Nicholas, the ancient chapel, and St Peter's, then built. There were two rectors, the living being held in medieties. Of recent years changes have been sanctioned by parliament. The living is now held by a single incumbent, and a large number of the churches which have since been built have been formed into parishes by the ecclesiastical commissioners. St Peter's has been constituted the pro-cathedral, pending the erection of the cathedral. Besides the two original parish churches, there are 103 others belonging to the establishment. The Roman Catholics form a very numerous and powerful body in the city, and it is estimated that from a third to a fourth of the entire population are Roman Catholics. A large part of these are Irish settlers or their descend- ants, but this district of Lancashire has always been a stronghold of Roman Catholicism, many of the landed

gentry belonging to old Roman Catholic families.

Charities. — The earliest charitable foundation is the BlHe Coat hospital, established in 1708, for orphans and fatherless children born within the borough. The original building, opened in 1718, is a quaint and characteristic specimen of the architecture of the period. It now maintains two hundred and fifty boys and one hundred girls. In 1906 the school was removed to new buildings at Wavertree. There is an orphan asylum, established in 1840, for boys, girls and infants, and a seamen's orphan asylum, begun in 1869, for boys and girls. The Roman Catholics have similar establishments. The Liverpool dispensaries founded in 1778 were among the pioneers of medical charity. The Royal Infirmary (opened in 1749) had a school of medicine attached, which has been very successful, and is now merged in the university. The sailors' home, opened in 1852, designed to provide board, lodging and medical attendance at a moderate charge for the seamen frequenting the port, is one of Liverpool's best-known charities. The David Lewis Workmen's Hostel is an effort to solve the difficulty of providing accommodation for unmarried men of the artizan class.

Literature, Art and Science. — The free library, museum and gallery of arts, established and managed by the city council, was originated in 1850. The first library building was erected by Sir William Brown. The Derby museum, containing the collections of Edward, the 13th earl, was presented by his son. The Mayer museum of historical antiquities and art was contributed by Mr Joseph Mayer, F.S.A. Sir Andrew Walker (d. 1893) erected in 1877 the art gallery which bears his name. Large additions were made in 1884, the cost being again defrayed by Sir Andrew Walker. An annual exhibition of painting is held in the autumn and a permanent collection has been formed, which was augmented in 1894 when the examples of early

Italian art numbering altogether about 180 pictures, collected at the beginning of the 19th century by William Roscoe, were deposited in the gallery. The Picton circular reading-room, and the rotunda lecture-room were built by the corporation and opened in 1879. Alterations in the museum were completed in 1902 by which its size was practically doubled. The literary and philosophical society was established in 1812. The Royal Institution, established mainly through the efforts of Roscoe in 1817, possessed a fine gallery of early art in the Walker Art Gallery, and is the centre of the literary institutions of the town.

Education. — Sunday schools were founded for poor children in 1784, as the result of a town's meeting. These were soon followed by day-schools supplied by the various denominations. The first were the Old Church schools in Moorfields (1789), the Unitarian schools in Mount Pleasant (1790) and Manesty Lane (1792) and the Wesleyan Brunswick school (1790). In 1 826 the corporation founded two elementary schools, one of which, the North Corporation school, was erected in part substitution for the grammar school founded by John Crosse, rector of St Nicholas Fleshshambles, London, a native of Liverpool, in 1515, and carried on by the Corporation until 1815. From this date onward the number rapidly increased until the beginning of the School Board in 1870, and afterwards. Mention should be made of the training ship " Indefatigable " moored in the Mersey for the sons and orphans of sailors, and the reformatory institution at Heswall, Co. Chester, which has recently replaced the training ship " Akbar " formerly moored in the Mersey. Semi- private schools were founded by public subscription — the Royal Institution school (1819), the Liverpool Institute (1825) and the Liverpool College (1840). The first has ceased to exist. The Institute was a development of the Mechanics' Institute and was managed by a council of subscribers. It was divided into a high school and a commercial school. Under a scheme of the Board of Education under the Charitable Trusts Act this school, together with the Blackburne House high school for girls, became a public secondary school and was handed over to the corporation in 1905. Liverpool College was formerly divided into

three schools, upper, middle and lower, for different classes of the community. The middle and lower schools passed into the control of the corporation in 1907. The Sefton Park elementary school and the Pupil Teachers' College in Clarence Street were transformed into municipal secondary schools for boys and girls in 1907 the corporation has also a secondary school for girls at Aigburth. There are several schools maintained by the Roman Catholics, two schools of the Girls' Public Day School Company and a large number of private schools. A cadet ship, the " Conway," for the training of boys intending to become officers in the mercantile marine, is moored in the Mersey. There are two training colleges for women, one undenominational, and the other conducted by the sisters of Notre Dame for Roman Catholic women. The central municipal technical school is in the Museum Buildings, and there are three branch technical schools. There are also a nautical college, a school of cookery and a school of art controlled by the Education Committee.

Liverpool University, as University College, received its charter of incorporation in 1881, and in 1884 was admitted as a college of the Victoria University. In the same year the medical school of the Royal Infirmary became part of the University College. In 1900 a supplemental charter extended the powers of self-government and brought the college into closer relations with the authorities of the city and with local institutions by providing for their fuller repre- sentation on the court of governors. In 1903 the charter of incorpora- tion of the university of Liverpool was received, thus constituting it an independent university. The university is governed by the king as visitor, by a chancellor, two pro-chancellors, a vice-chancellor and a treasurer, by a court of over 300 members representing donors and public bodies, a council, senate, faculties and convocation. The fine group of buildings is situated on Brownlow Hill.

Trade and Commerce. — In 1800 the tonnage of ships entering the port was 450,060; in 1908 it reached 17,111,814 tons. In 1800 4746 vessels entered, averaging 94 tons; in 1908 there were 25,739, averaging 665 tons. The commerce of Liverpool extends to every part of the world, but probably the intercourse with North America stands pre-eminent, there being lines of steamers to New York, Philadelphia, Boston, Baltimore, Galveston, New Orleans and the Canadian ports. Cotton is the great staple import. Grain comes, next, American (North and South) and Australian wheat and oats occupying a large proportion of the market. An enormous trade in American provisiohs, including live cattle, is carried on. Tobacco has always been a leading article of import into Liverpool, along with the sugar and rum from the West Indies. Timber forms an important part of the imports, the stacking yards extending for miles along the northern docks. In regard to exports, Liverpool possesses decided advantages ; lying so near the great manufacturing districts of Lancashire and the West Riding of Yorkshire, this port is the natural channel of transmission for their goods, although the Manchester ship canal diverts a certain proportion of the traffic, while coal and salt are also largely exported.

Manufactures. — The manufactures of Liverpool are not extensive. Attempts have been repeatedly made to establish cotton mills in and near the city, but have resulted in failure. Engineering works, especially connected with marine navigation, have grown up on a

large scale. Shipbuilding, in the early part of the 19th century, was active and prosperous, but has practically ceased. During the latter half of the 18th century and the beginning of the 19th, pottery and china manufacture flourished in Liverpool. John Sadler, a Liverpool manufacturer, was the inventor of printing on pottery, and during the early period of Josiah Wedgwood's career all his goods which re- quired printing had to be sent to Liverpool. A large establishment, called the Herculaneum Pottery, was founded in a suburb on the bank of the Mersey, but the trade has long disappeared. Litherland, the inventor of the lever watch, was a Liverpool manufacturer, and Liverpool-made watches have always been held in high estimation. There are several extensive sugar refineries and corn mills. The confectionery trade has developed during recent years, several large works having been built, induced by the prospect of obtaining cheap sugar directly from the Liverpool quays. The cutting,

blending and preparing of crude tobacco have led to the erection of factories employing some thousands of hands. There are also large mills for oil-pressing and making cattle-cake.

Docks. — The docks of the port of Liverpool on both sides of the Mersey are owned and managed by the same public trust, the Mersey Docks and Harbour Board. On the Liverpool side they extend along the margin of the estuary 6| m., of which 1 \ m. is in the borough of Bootle. The Birkenhead docks have not such a frontage, but they extend a long way backward. The water area of the Liverpool docks and basins is 418 acres, with a lineal quayage of 27 m. The Birkenhead docks, including the great float of 120 acres, contain a water area of 165 acres, with a lineal quayage of 9ˆ m. The system of enclosed docks was begun by the corporation in 1709. They constituted from the first a public trust, the corporation never having derived any direct revenue from them, though the common council of the borough were the trustees, and in the first instance formed the committee of management. Gradually the payers of dock rates on ships and goods acquired influence, and were introduced into the governing body, and ultimately, by an act of 1857, the corporation was superseded. The management is vested in the Mersey Docks and Harbour Board, consisting of twenty-eight members, four of whom are nominated by the Mersey Con- servancy commissioners, who consist of the first lord of the Admiralty, the chancellor of the duchy of Lancaster and the president of the Board of Trade, and the rest elected by the payers of rates on ships and goods, of whom a register is kept and annually revised. The revenue is derived from tonnage rates on ships, dock rates on goods, town dues on goods, with various minor sources of income.

Down to 1843 the docks were confined to the Liverpool side of the Mersey. Several attempts made to establish docks in Cheshire had been frustrated by the Liverpool corporation, who bought up the land and kept it in their own hands. In 1843, however, a scheme for docks in Birkenhead was carried through which ultimately proved unsuccessful, and the enterprise was acquired in 1855 by Liverpool. The Birkenhead docks were for many years only partially used, but are now an important centre for corn-milling, the importation of foreign cattle and export trade to the East. In addition to the wet docks, there are in Liverpool fourteen graving docks and three in Birkenhead, besides a gridiron on the Liverpool side.

The first portion of the great landing stage, known as the Georges' stage, was constructed in 1847, from the plans of Mr (afterwards Sir) William Cubitt, F.R.S. This was 500 ft. long. In 1857 the Prince's stage, 1000 ft. long, was built to the north of the Georges' stage and distant from it 500 ft. In 1874 the intervening space was filled up and the Georges' stage reconstructed. The fabric had just been completed, and was waiting to be inaugurated, when on the 28th of July 1874 it was destroyed by fire. It was again constructed with improvements. In 1896 it was farther extended to the north, and its length is now 2478 ft. and its breadth 80 ft. It is supported on floating pontoons about 200 in number, connected with the river wall by eight bridges, besides a floating bridge for heavy traffic 550 ft. in length and 35 ft. in width. The southern half is devoted to the traffic of the Mersey- ferries, of which there are seven— New Brighton, Egremoat, Seacombe, Birkenhead, Rock Ferry, New Ferry and Eastham. The northern half is used by ocean-going steamers and their tenders. The warehouses for storing produce form a prominent feature in the commercial part of the city. Down to 1841

these were entirely in private hands, distributed as chance might direct, but in that year a determined effort was made to construct docks with warehouses on the margin of the quays. This met with considerable opposition from those interested, and led to a municipal revolution, but the project was ultimately carried out in the construction of the Albert dock and ware- houses, which were opened by Prince Albert in 1845. For

general produce these warehouses are falling somewhat into disuse, but grain warehouses have been constructed by the dock board at Liverpool and Birkenhead, with machinery for discharging, elevating, distributing, drying and delivering. Warehouses for the storage of tobacco and wool have also been built by the board. The Stanley tobacco warehouse is the largest of its kind in the world, the area of its fourteen floors being some 36 acres.

Dredging operations at the bar of the Queen's channel, in the channel itself and at the landing stage enables the largest ocean liners to enter the river and approach the stage at practically all states of the tide. The dredging at the bar was begun as an experiment in September 1890 by two of the board's ordinary hopper barges of 500 tons capacity each fitted with centrifugal pumps. The result was favourable, and larger vessels have been introduced. Before dredging was begun the depth of water at dead low water of spring tides on the bar was only 11 ft.; now there is about 28 ft. under the same conditions. The space over which dredging has been carried on at the bar measures about 7000 ft. by 1250 ft., the latter being the average width of the buoyed cut or channel through the bar. Dredging has also taken place on shoals and projections of sand-banks in the main sea channels.

Municipality. — Under the Municipal Reform Act of 1835, the boundaries of the original borough were extended by the annexation of portions of the surrounding district, while further additions were made in 1895, 1902 and 1905. The city is divided into thirty-five wards with 103 councillors and 34 aldermen. In 1893 the title of mayor was raised to that of lord mayor. In 1885 the number of members of parliament was increased to nine by the creation of six new wards. The corporation of Liverpool has possessed from a very early period considerable landed property, the first grant having been made by Thomas, earl of Lancaster, in 1309. This land was originally of value only as a source of supply of turf for firing, but in modern times its capacity as building land has been a fruitful source of profit to- the town. A large proportion of the southern district is held in freehold by the corporation and leased to tenants for terms of seventy-five years, renewable from time to time on a fixed scale of fines. There was formerly another source of income now cut off. The fee farm rents and town dues originally belonging to- the crown were purchased from the Molyneux family in 1672 on a long lease, and subsequently in 1777 converted into a perpetuity. With the growth of the commerce of the port these dues enormously increased, and became a cause of great com- plaint by the shipping interest. In 1856 a bill was introduced into parliament, and passed, by which the town dues were transferred to the Mersey Docks and Harbour Board on payment of £1,500,000, which was applied in part to the liquidation of the bonded debt of the corporation, amounting to £1,150,000.

History. — During the Norse irruption of the 8th century colonies of Norsemen settled on both sides of the Mersey, as is indicated by some of the place-names. After the Conquest, the site of Liverpool formed part of the fief (inter Ripam et Mersham) granted by the Conqueror to Roger de Poictou, one of the great family of Montgomery. Although Liverpool is not named in Domesday it is believed to have been one of the six berewicks dependent on the manor of West Derby therein mentioned. After various forfeitures and regrants from the crown, it was handed over by Henry II. to his falconer Warine. In a deed executed by King John, then earl of Mortain, about 1 191, confirming the grant of this with other manors to Henry Fitzwarine, son of the former grantee, the name of Liverpool first occurs. Probably its most plausible derivation is from the Norse HlUhar-pollr, "the pool of the slopes," the pool or inlet at the mouth of which the village grew up being surrounded by gently rising slopes. Another possible derivation is from the Prov. E. lever, the yellow flag or rush, A.S. laefcr.

After the partial conquest of Ireland by Strongbow, earl of Pembroke, under Henry II., the principal ports of communication were Bristol for the south and Chester for the north. The gradual silting up of the river Dee soon so obstructed the navigation as to render Chester unsuitable. A quay was then constructed at Shotwick, about 8 m. below Chester, with a castle to protect it from the incursions of the neighbouring Welsh; but a better site was sought and soon found. Into the tidal waters of the Mersey a small

stream, fed by a peat moss on the elevated land to the eastward, ran from north-east to south-west, forming at its mouth an open pool or sea lake, of which many existed on both sides of the river. The triangular piece of land thus separated formed a promontory of red sandstone rock, rising in the centre about 50 ft. above the sea-level, sloping on three sides to the water. The pool was admirably adapted as a harbour for the vessels of that period, being well protected, and the tide rising from 15 to 21 ft. King John repurchased the manor from Henry Fitzwarine, giving him other lands in exchange. Here he founded a borough, and by letters patent dated at Winchester, 28th of August 1207, invited his subjects to take up burgages.

From the patent rolls and the sheriff's accounts it appears that considerable use was made of Liverpool in the 13th century for shipping stores and reinforcements to Ireland and Wales.

In 1229 a charter was granted by Henry III., authorizing the formation of a merchants' gild, with hanse and other liberties and free customs, with freedom from toll throughout the kingdom. Charters were subsequently granted by successive monarchs down to the reign of William and Mary, which last was the governing charter to the date of the Municipal Reform Act (1835). In 1880 when the diocese of Liverpool was created, the borough was transformed into a city by royal charter.

The crown revenues from the burgage rents and the royal customs were leased in fee-farm from time to time, sometimes to the corporation, at other times to private persons. The first lease was from Henry III., in 1229, at £10 per annum. In the same year the borough, with all its appurtenances, was bestowed with other lands on Ranulf , earl of Chester, from whom it passed to his brother-in-law William de Ferrers, earl of Derby, who seems to have built Liverpool castle between 1232 and 1237. His grandson, Robert de Ferrers, was implicated in the rising of Simon de Montfort and his lands were confiscated in 1266 when Liverpool passed into the hands of Edmund, earl of Lancaster. Ultimately Liverpool again became the property of the crown, when Henry IV. inherited it from his father John of Gaunt, duke of Lancaster. In 1628 Charles I., in great straits for means which were refused by parliament, offered for sale about a thousand manors, among which Liverpool was included. The portion containing Liverpool was purchased by certain merchants of London, who, in 1635, reconveyed the crown rights, including the fee-farm rent of £14, 6s. 8d., to Sir Richard Molyneux, then recently created Viscount Molyneux of Mary- borough, for the sum of £450. In 1672 all these rights and interests were acquired by the corporation.

Apart from the national objects for which Liverpool was founded, its trade developed slowly. From £10 per annum, in the beginning of the 13th century, the crown revenues had increased towards the end of the 14th century, to £38; but then they underwent a decline. The black death passed over Liverpool about 1360, and carried off a large part of the popula- tion. The Wars of the Roses in the 15th century unsettled the north-western districts and retarded progress for at least a century. The crown revenues diminished from £38 to less than half that sum, and were finally leased at £14, 6s. 8d., at which they continued until the sale by Charles I. It is, however, not safe to conclude that the reduced fee-farm rent represents an equivalent decline in prosperity; the privileges conferred by the various leases differed widely and may account for much of the apparent discrepancy.

Liverpool sent no representatives to Simon de Montfort's parliament in 1 264, but to the first royal parliament, summoned in 1295, the borough sent two members, and again in 1307.

The writs of summons were then suspended for two centuries and a half. In 1 547 Liverpool resumed the privilege of returning members. In 1588 the borough was

represented by Francis Bacon, the philosopher and statesman. During the Civil War the town was fortified and garrisoned by the parliament. It sustained three sieges, and in 1644 was escaladed and taken by Prince Rupert with considerable slaughter.

The true rise of the commerce of Liverpool dates from the Restoration. Down to that period its population had been either stationary or retrogressive, probably never exceeding about 1000. Its trade was chiefly with Ireland, France and Spain, exporting fish and wool to the continent, and importing wines, iron and other commodities. The rise of the manufactur- ing industry of south Lancashire, and theopening of the American and West Indian trade, gave the first impulse to the progress which has since continued. By the end of the century the population had increased to 5000. In 1699 the borough was constituted a parish distinct from Walton, to which it had previously appertained. In 1709, the small existing harbour being found insufficient to accommodate the shipping, several schemes were propounded for its enlargement, which resulted in the construction of a wet dock closed with flood-gates im- pounding the water, so as to keep the vessels floating during the recess of the tide. This dock was the first of its kind. The name of the engineer was Thomas Steers.

About this date the merchants of Liverpool entered upon the slave trade, into which they were led by their connexion with the West Indies. In 1 709 a single vessel of 30 tons burden made a venture from Liverpool and carried fifteen slaves across the Atlantic. In 1730, encouraged by parliament, Liverpool went heartily into the new trade. In 1751, fifty-three ships sailed from Liverpool for Africa, of 5334 tons in the aggregate. The ships sailed first to the west coast of Africa, where they shipped the slaves, and thence to the West India Islands, where the slaves were sold and the proceeds brought home in cargoes of sugar and rum. In 1765 the number of Liverpool slavers had in- creased to eighty-six, carrying 24,200 slaves. By the end of the century five-sixths of the African trade centred in Liverpool. Just before its abolition in 1807 the number of Liverpool ships engaged in the traffic was 185, carrying 49,213 slaves in the year.

Another branch of maritime enterprise which attracted the attention of the merchants of Liverpool was privateering, which, during the latter half of the 18th century, was a favourite investment. After the outbreak of the Seven Years' War with France and Spain, in 1756, the commerce of Liverpool suffered severely, the French having overrun the narrow seas with privateers, and the premiums for insurance against sea risks rose to an amount almost prohibitive. The Liverpool merchants took a lesson from the enemy, and armed and sent out their ships as privateers. Some of the early expeditions proving very successful, almost the whole community rushed into priva- teering, with results of a very chequered character. When the War of Independence broke out in 1775 American privateers swarmed about the West India Islands, and crossing the Atlantic intercepted British commerce in the narrow seas. The Liverpool merchants again turned their attention to retaliation. Between August 1778 and April 1779, 120 privateers were fitted out in Liverpool, carrying 1986 guns and 8745 men.

See W. Enfield, Hist, of Leverpool (1773); J. Aikin, Forty Miles round Manchester (1795); T. Troughton, Hist, of Liverpool (1810); M. Gregson, Portfolio of Fragments relating to Hist, of Lancashire (1817); H. Smithers, Liverpool, its Commerce, fife. (1825); R. Syers, Hist, of Everton (1830); E. Baines, Hist, of County Palatine of Lancaster, vol. iv. (1836); T. Baines, Hist, of Commerce and Town of Liverpool (1852); R. Brooke, Liverpool during the last quarter of l8lh Century (1853); J. A. Picton, Memorials of Liverpool (2 vols., 1873); Ramsay Muir and Edith M. Piatt, A History of Municipal Government in Liverpool (1906); Ramsay Muir, A History of Liver- pool (1907). (W. F. I.)

LIVERSEDGE, an urban district in the Spen Valley parlia- mentary division of the West Riding of Yorkshire, England, 7 m. S.S.E. of Bradford, on the Lancashire & Yorkshire, Great Nothern, and London & North Western railways- Pop.

(1901) 13,980. The industries are chiefly the manufacture of woollen goods, the

making of machinery, chemical manu- factures and coal mining.

LIVERY, originally the provision of food, clothing, &c, to household servants. The word is an adaptation of the Anglo- French livree, from livrer, to deliver (Late Lat. liberare, to set free, to serve, to give freely) , in the special sense of distributing. In the sense of a fixed allowance of provender for horses, it sur- vives now only in "livery-stable," i.e. an establishment where horses and carriages are kept or let out for hire. From the meaning of provision of food and clothing the word is applied to a uniform worn by the retainers and servants of a household. In the 1 5th century in England a badge, collar or other insignia, the "livery," was worn by all those who pledged themselves to support one of the great barons in return for his promise of "maintenance," i.e. of protection against enemies; thus arose the custom of "livery and maintenance," suppressed by Henry VII. The members of the London city companies wore a distinctive costume or " livery," whence the term " livery companies." In law, the term "livery" means "delivery," the legal handing of property into the possession of another; for " livery of seisin " see Feoffment.

LIVERY COMPANIES, the name given to particular companies or societies in the city of London. They belong to a class of institutions which at one time were universal in Europe. In most other countries they have disappeared; in England, while their functions have wholly changed, the organization remains. The origin of the city companies is to be found in the craftgilds of the middle ages. The absence of a strong central authority accounts for the tendency of confederation in the beginning of modern societies. Artificial groups, formed in imitation of the family, discharged the duties which the family was no longer able, and the state was not yet able, to undertake. The inhabitants of towns were forced into the societies known as gild-merchants, which in course of time monopolized the muni- cipal government, became exclusive, and so caused the growth of similar societies among excluded citizens. The craftgilds were such societies, composed of handicraftsmen, which entered upon a struggle with the earlier gilds and finally defeated them. The circumstances and results of the struggle were of much the same character in England and on the continent. In London the victory of the crafts is decisively marked by the ordinance of the time of Edward II., which required every citizen to be a member of some trade or mystery, and by another ordinance in 1375 which transferred the right of election of corporate officers (including members of parliament) from the ward-representatives to the trading companies. Henceforward, and for many years, the companies engrossed political and municipal power in the city of London.

The trading fraternities assumed generally the character of corporations in the reign of Edward III. Many of them had been chartered before, but their privileges, hitherto exercised only on sufferance and by payment of their terms, were now confirmed by letters patent. Edward III. himself became a member of the fraternity of Linen Armourers, or Merchant Taylors, and other distinguished persons followed his example. From this time they are called livery companies, "from now generally assuming a distinctive dress or livery." The origin of the Grocers' Company is thus described: " Twenty-two persons, carrying on the business of pepperers in Soper's Lane, Cheapside, agree to meet together, to a dinner, at the Abbot of Bury's, St Mary Axe, and commit the particulars of their formation into a trading society to writing. They elect after dinner two persons of the company so assembled — Roger Osekyn and Lawrence de Haliwell— as their first governors or wardens, appointing, at the same time, in conformity with the pious custom of the age, a priest or chaplain to celebrate divine offices for their souls " (Heath's "Account of the Grocers' Company," quoted in Herbert's Twelve Great Livery Companies, 1836, i. 43). The religious observances and the common feasts were char- acteristic features of those institutions. They were therefore not merely trade unions in the current meaning of that phrase, bUt

may rather be described as forms of industrial self-government, the basis of union being the membership of a common trade, and the authority of the society extending to the general welfare, spiritual and temporal, of its members. It must be remembered that they flourished at a time when the separate interests of master and servant had not yet been created; and, indeed, when that fundamental division of interests arose, the companies gradually lost their functions in the regulation of industry. The fact that the craftsmen were a homogeneous order will account for the wide authority claimed by their societies, and the important public powers which were conceded to them. In the regulation of trade they possessed extensive powers. They required every one carrying on the trade to join the company. In 1363, in answer to a remonstrance against the mischief caused by " the merchants called grocers who engrossed all manner of merchandize vendable, and who suddenly raised the prices of such merchandize within the realm," it was enacted " that all artificers and people of mysteries shall each choose his own mystery 1 before next Candlemas, and that, having so chosen it, he shall henceforth use no other." L. Brentano (On Gilds) holds that it is wrong to represent such regulations as monopolistic, inasmuch as there was no question whatever of a monopoly in that time nor until the degeneration of the craftgilds into limited corporations of capitalists. In the regulation of trade the right of search was an important instrument. The wardens of the grocers are to "assayen weights, powders, confeccions, platers, oyntments and all other things belonging to the same crafte." The goldsmiths had the assay of metals, the fishmongers the oversight of fish, the vintners of the tasting of wine, &c. The companies enforced their regulations on their members by force. Many of their ordinances looked to the domestic affairs and private conduct of the members. The grocers ordain " that no man of the fraternite take his neyghbor's house y' is of the same fraternite, or enhaunce the rent against the will of the foresaid neyghbor." Perjury is to be punished by the wardens and society with such correction as that other men of the fellowship may be warned thereby. Members reduced to poverty by adventures on the sea, increased price of goods, borrowing and pledging, or any other misfortune, are to be assisted " out of the common money, according to his situation, if he could not do without."

Following what appears to be the natural law of their being, the companies gradually lost their industrial character. The course of decay would seem to have been the following. The capitalists gradually assumed the lead in the various societies, the richer members engrossed the power and the companies tended to become hereditary and exclusive. Persons might be members who had nothing to do with the craft, and the rise of great capitalists and the development of competition in trade made the regulation of industry by means of companies no longer possible. For an account of the " degeneration of craft- gilds" a general reference may be made to Brentano, On Gilds (1870), and C. .Gross, The Gild Merchant (2 vols., 1890). The usurpation of power on the part of the richer members was not always effected without opposition. Brentano refers to a pamphlet on the Clothworkers' Company, published in 1649, which asserts that " the commonalty " in the old charters meant, not the whole gild, but only the masters, wardens and assistants. Herbert records a dispute in the Goldsmiths' Company in 1529. The mode of electing officers, and the system of management generally, was challenged by three members who called themselves " artificers, poor men of the craft of goldsmiths." The company, or rather, the wardens, the assistants and livery presented a petition to the lord mayor, which was answered by the dis- contented craftsmen. The dispute was carried into the court of chancery and the star chamber. The artificers accused the com- pany of subverting their grants, misappropriating the funds

1 Properly the ..Word should be spelled, as it was originally, " mistery ;" it comes through the O. Fr. mestier, modern metier, from Lat. ministerium, service, employment, and meant a trade or craft, and hence the plays acted by craftsmen and members of gilds were called "mystery plays" (see Drama). For the word meaning a hidden or secret rite, with which this Jias so often been confused, see Mystery.

and changing the constitution of the society, and they complain of this being done by the usurpation of persons who "were but merchant goldsmiths, and had but little

knowledge in the science." In 1 53 1 the three complainants were expelled from the company, and then the dispute seems to have ended. In the last stage of the companies the members have ceased to have any connexion with the trades, and in most cases their regulative functions have disappeared. The one characteristic which has clung to them throughout is that of owners of property and managers of charitable trusts. The connexion between the companies and the municipality is shortly as follows. The ordinance of Edward II. required freemen of the city to be members of one or other of the companies. By the ordinance of 49 Edw. III. (1375), the trading companies were to nominate the members of common council, and the persons so nominated alone were to attend both at common councils and at elections. An ordinance in 7 Richard II. (1383) restored the elections of common councilmen to the wards, but corporate officers and representatives in parlia- ment were elected by a convention summoned by the lord mayor from the nominees of the companies. An act of common council in 7 Edw. IV. (1467) appointed the election of mayor, sheriffs, &c, to be in the common council, together with the masters and wardens of the companies. By 15 Edw. IV. masters and wardens were ordered to associate with themselves the honest men of their mysteries, and come in their best liveries to the elections; that is to say, the franchise was restricted to the " liverymen " of the companies. At this time the corporation exercised supreme control over the companies, and the companies were still genuine associations of the traders and householders of the city. " The delegation of the franchise to the liverymen was thus, in point of fact, the selection of a superior class of householders to represent the rest. When the corporation lost its control over the com- panies, and the members of the companies ceased to be traders and householders, the liverymen were no longer a representative class, and some change in the system became necessary. The Reform Acts of 1832 and 1867 reformed the representation in several particulars. The liverymen of the companies, being freemen of the city, have still, however, the exclusive power of electing the lord mayor, sheriffs, chamberlain and other corporate officers.

The contributions made by the companies to the public purposes of the state and tfje city are interesting points in their early history. Their wealth and their representative character made them a most appropriate instrument for the enforcement of irregular taxation. The loan of £21,263, 6s. 8d. to Henry VIII. for his wars in Scotland, in 1544, is believed by Herbert to be the first instance of a pecuniary grant to the crown, but the practice rapidly gained ground. The confiscation of ecclesiastical property at the time of the Reformation affected many of the trusts of the companies; and they were compelled to make returns of their property devoted to religious uses, and to pay over the rents to the crown. In course of time the taxation of the companies became " a regular source of supply to govern- ment." The historians of the city have for the most part described these as unjust and tyrannical exactions, but, looking at the representative and municipal character of the companies, and the purposes to which their contributions were applied, we may regard them as a rough but not unfair mode of taxation. The government, when money was wanted for public works, informed the lord mayor, who apportioned the sums required among the various societies, and issued precepts for its payment. Contributions towards setting the poor to work, erecting the Royal Exchange, cleansing the city ditch, discovering new countries, furnishing military and naval armaments, for men, arms and ammunition for the defence of the city, are among what Herbert calls the sponging expedients of the government. The crown occasionally interfered in a more unjustifiable manner with the companies in the exercise of their patronage. The Stuarts made strenuous efforts to get the control of the companies. Terrified by the proceedings in the quo warranto case, most of the companies surrendered their charters to the crown, but such surrenders were annulled by the act of 2 William and Mary

(1690) reserving the j The livery companies Apothecaries. Armourers and Bra-

siers. Bakers. Barbers. Basket Makers. Blacksmiths. Bowyers. Brewers. Broderers. Butchers. Carmen. Carpenters. Clockmakers. Clothworkers. Coach and Coach –

harness Makers. Cooks. Coopers. Cordwainers. Curriers. Cutlers. Distillers. Drapers. Dyers. Fanmakers. Farriers.

Card

udgment in quo warranto against the city, now in existence are the following:

Fellowship Porters.

Feltmakers.

Fishmongers.

Fletchers.

Founders.

Framework Knitters.

Fruiterers.

Girdlers.

Glass Sellers.

Glaziers.

Glovers.

Gold and Silver Wyre-drawers.

Goldsmiths.

Grocers.

Gunmakers.

Haberdashers.

Homers.

Innholders.

Ironmongers.

Joiners.

Leathersellcrs.

Loriners.

Masons.

Mercers.

Merchant Taylors.

Musicians.

Needlemakers.

Painters.

Pattern Makers.

Pewterers.

Plaisterers.

Playi ng Makers.

Plumbers.

Poulters.

Saddlers.

Salters.

Scriveners.

Shipwrights.

Silkthrowstcrs.

Skinners.

Spectacle makers.

Stationers.

Tallow Chandlers.

Tin Plate Workers.

Turners.

Tylers and Brick- layers.

Upholders.

Wax chandlers.

Weavers.

Wheelwrights.

Woolmen.

The following are the twelve great companies in order of civic precedence: Mercers, Grocers, Drapers, Fishmongers, Gold- smiths, Skinners, Merchant Taylors, Haberdashers, Salters, Ironmongers, Vintners, Cloth-workers. The " Irish Society " was incorporated in the n James I. as " the governor and assistants of the new plantation in Ulster, within the realm of Ireland." The twelve companies contributed in equal portions the sum of £60,000 for the new scheme, by which it was intended to settle a Protestant colony in the lands forfeited by the Irish rebels. The companies divided the settlement into twelve nearly equal parts, assigning one to each, but the separate estates are still held to be under the paramount jurisdiction of the Irish Society. The charter of the society was revoked by the court of star chamber in the reign of Charles I., but a new one was granted by Charles II., under which the society still acts.

Most of the companies administer charities of large value. Many of them are governors of important schools, e.g. the Skinners have the Tonbridge Grammar School; the Mercers, St Paul's School; the Merchant Taylors, the school bearing their name, &c. The

consti- tution of the livery companies usually embraces (a) the court, which includes the master and wardens, and is the executive and adminis- trative body; (2) the livery or middle class, being the body from which the court is recruited; and (3) the general body of freemen, from which the livery is recruited. Some companies admit women as freemen. The freedom is obtained either by patrimony (by any person over twenty-one years of age born in lawful wedlock after the admission of his father to the freedom), by servitude (by being bound as an apprentice to a freeman of the company) or by re- demption. Admission to many of the companies is subject to the payment of considerable fees. For example, in the Merchant Taylors the fees are — upon taking up the freedom, by patrimony or servitude, £1, 3s. 4d. ; by redemption, £84; on admission to the livery, £80, 8s.; on election to the court of assistants, £115, 10s. At one time the position of the livery companies was a subject of much political discussion. Two parties threatened to attack them — on one side those who were anxious for extensive reforms in the municipal organization of London ; on the other, those who wished to carry forward the process of inspection and revision of endowments, which had already overtaken the universities, schools and other charities. A Royal Commission was appointed in 1880 to inquire into all the livery companies, into the circumstances and dates of their founda- tion, the objects for which they were founded, and how far those objects were being carried into effect. A very valuable Report and Appendix (4 vols., 1884) was published, containing, inter alia, infor- mation on the constitution and powers of the governing bodies, the mode of admission of members of the companies, the mode of appointment, duties and salaries and other emoluments of the servants of the companies, the property of, or held in trust for, the companies, its value, situation and description. The companies very freely made returns to the commission, the only ones not doing so being the Broderers, Bowyers, Distillers, Glovers, Tin-Plate Workers and Weavers. The Commission estimated the annual income of the companies to be from £750,000 to £800,000, about £200,000 of that amount being trust income, the balance corporate income.

Authorities. — In addition to the Report referred to above the following works may be consulted: H. T. Riley, Memorials oj London and London Life (1868); Chronicle oj London from io8y to 14.83 (ed. by Sir N. H. Nicolas and E. Tyrrel, 1827); Munimenta Gildhallae Londiniensis, in Rolls Series, ed. by H. T. Riley (4 vols., 1859-1862); J. Toulmin Smith, English Gilds (published by Early English Text Society), with essay by L. Brentano (1870); W. Herbert, History of the Twelve Great Livery Companies (1837); C. Gross, The Gild Merchant (2 vols., 1890) ; W. C. Hazlitt, The Livery Companies of the City of London (1892), contains a precis of the Royal Commission; P. H. Ditchfield, The City Companies of London (1904); G. Unwin, The Gilds and Companies of London (1908). (T. A. I.)

LIVIA DRUSILLA (c. 55 b.c.-a.d. 29), Roman empress, was originally the wife of Tiberius Claudius Nero, by whom she had. two sons, Drusus and Tiberius (afterwards emperor). But she attracted the attention of the future emperor Augustus, who in 38 compelled her husband to divorce her and married . her himself, having first got rid of his own wife Scribonia. Her two sons, at their dying father's request, were entrusted to the guardianship of Augustus, to whom she bore no children. Livia was suspected of committing various crimes to secure the throne for Tiberius, whereas Augustus naturally favoured the claims of his blood-relatives. The premature deaths of his nephew Marcellus (whom he had at first fixed upon as his successor) and of his grandsons Gaius and Lucius Caesar, the banishment of his grandson Agrippa Postumus, and even his own death, were attributed to her. But in any case Augustus's affection for his wife appears to have suffered no diminution up to the last; by his will he declared her and Tiberius (whom he had adopted in a.d. 4) his heirs; Livia inherited a third of his property; she was adopted into the Julian gens, and henceforth assumed the name of Julia Augusta. The senate also elected her chief priestess of the college founded in honour of the deified Augustus. She had now reached the summit of her ambition, and at first acted as joint-ruler with Tiberius. Tiberius, however, soon became tired of the maternal yoke; his retirement to Capreae is said to have been caused by his desire to escape from her. Livia continued to live quietly at Rome, in the full enjoyment of

authority, until her death at an advanced age. Tiberius appears to have received the news with indifference, if not with satisfaction; he absented himself from the funeral, and refused to allow her apotheosis; her will was suppressed for a long time and only carried out, and the legacies paid, by Caligula.

See Tacitus, Annals, i. v.; Dio Cassius liii. 33, lv. 14-22, lviii. 2, lix. 2; Suetonius, Tiberius, 50, 51; J. Aschbach, Livia, Gemahlin des Kaisers Augustus (1864); V. Gardthausen, Augustus und seine Zeit, i. 1018 foil., ii. 631 foil.

LIVINGSTON, EDWARD (1764-1836), American jurist and statesman, was born in Clermont, Columbia county, New York, on the 26th of May 1764. He was a great-grandson of Robert Livingston, the first of the family to settle in America (see Livingston, William, below). He graduated at Princeton in 1781, was admitted to the bar in 1785, and began to practise law in New York City, rapidly rising to distinction. In 1795- 1801 he was a Republican representative in Congress, where he was one of the leaders of the opposition to Jay's treaty, introduced the resolution calling upon President Washington for all papers relating to the treaty, and at the close of Washing- ton's administration voted with Andrew Jackson and other radicals against the address to the president. He opposed the Alien and Sedition Laws, introduced legislation on behalf of American seamen, and in 1800 attacked the president for per- mitting the extradition by the British government of Jonathan Robbins, who had committed murder on an English frigate, and had then escaped to South Carolina and falsely claimed to be an American citizen. In the debate on this question Livingston was opposed by John Marshall. In 1801 Livingston was appointed U.S. district-attorney for the state of New York, and while retaining that position was in the same year appointed mayor of New York City. When, in the summer of 1803, the city was visited with yellow fever, Livingston displayed courage and energy in his endeavours to prevent the spread ,of the disease and relieve distress. He suffered a violent attack of

the fever, during which the people gave many proofs of their attachment to him. On his recovery he found his private affairs in some confusion, and he was at the same time deeply indebted to the government for public funds which had been lost through the mismanagement or dishonesty of a confidential clerk, and for which he was responsible as district-attorney. He at once surrendered all his property, resigned his two offices in 1803, and removed early in 1804 to Louisiana. He soon acquired a large law practice in New Orleans, and in 1826 repaid the govern- ment in full, including the interest, which at that time amounted to more than the original principal.

Almost immediately upon his arrival in Louisiana, where the legal system had previously been based on Roman, French and Spanish law, and where trial by jury and other peculiarities of English common law were now first introduced, he was appointed by the legislature to prepare a provisional code of judicial procedure, which (in the form of an act passed in April 1805) was continued in force from 1805 to 1825. In 1807, after con- ducting a successful suit on behalf of a client's title to a part of the batture or alluvial land near New Orleans, Livingston attempted to improve part of this land (which he had received as his fee) in the Batture, Ste Marie. Great popular excitement was aroused against him; his workmen were mobbed; and Governor Claiborne, when appealed to for protection, referred the question to the Federal government. Livingston's case was damaged by President Jefferson, who believed that Livingston had favoured Burr in the presidential election of 1800, and that he had afterwards been a party to Burr's schemes. Jefferson made it impossible for Livingston to secure his title, and in 18 12 published a pamphlet " for the use of counsel " in the case against Livingston, to which Livingston published a crushing reply. Livingston's final victory in the courts brought him little financial profit because of the heavy expenses of the litigation. During the war with England from 1812 to 1815 Livingston was active in rousing the mixed population of New Orleans to resistance. He used his

influence to secure amnesty for Lafitte and his followers upon their offer to fight for the city, and in 1814-1815 acted as adviser and volunteer aide-de-camp to General Jackson, who was his personal friend. In 1821, by appointment of the legislature, of which he had become a member in the preceding year, Livingston began the preparation of a new code of criminal law and procedure, afterwards known in Europe and America as the " Livingston Code." It was prepared in both French and English, as was required by the necessities of practice in Louisiana, and actually consisted of four codes — crimes and punishments, procedure, evidence in criminal cases, reform and prison discipline. Though substantially completed in 1824, when it was accidentally burned, and again in 1826, it was not printed entire until 1833. It was never adopted by the state. It was at once reprinted in England, France and Germany, attracting wide praise by its remarkable simplicity and vigour, and especially by reason of its philanthropic provisions in the code of reform and prison discipline, which noticeably influenced the penal legisla- tion of various countries. In referring to this code, Sir Henry Maine spoke of Livingston as "the first legal genius of modern times" (Cambridge Essays, 1856, p. 17). The spirit of Livingston's code was remedial rather than vindictive; it provided for the abolition of capital punishment and the making of penitentiary labour not a punishment forced on the prisoner, but a matter of his choice and a reward for good behaviour, bringing with it better accommodations. His Code of Reform and Prison Discipline was adopted by Guatemala. Livingston was the leading member of a commission appointed to prepare a new civil code, 1 which for the most part the legislature adopted in 1825, and the most important chapters of which, including all those on contract, were prepared by Livingston alone.

Livingston was again a representative in Congress during

1 Preliminary work in the preparation of a new civil code had been done by James Brown and Moreau Lislet, who in 1808 reported a " Digest of the Civil Laws now in force in the Territory of Orleans with Alterations and Amendments adapted to the present Form of Government "

1823-1829, a senator in 1829-183 1, and for two years(i83i-i833) secretary of state under President Jackson. In this last position he was one of the most trusted advisers of the president, for whom he prepared a number of state papers, the most important being the famous anti-nullification proclamation of the 10th of December 1832. From 1833 to 1835 Livingston was minister plenipotentiary to France, charged with procuring the fulfilment by the French government of the treaty negotiated by W. C. Rives in 1831, by which France had bound herself to pay an indemnity of twenty-five millions of francs for French spoliations of American shipping chiefly under the Berlin and Milan decrees, and the United States in turn agreed to pay to France 1,500,000 francs in satisfaction of French claims. Livingston's negotia- tions were conducted with excellent judgment, but the French Chamber of Deputies refused to make an appropriation to pay the first instalment due under the treaty in 1833, relations between the two governments became strained, and Livingston was finally instructed to close the legation and return to America. He died on the 23rd of May 1836 at Montgomery Place, Dutchess county, New York, an estate left him by his sister, to which he had removed in 1831. Livingston was twice married. His first wife, Mary McEvers, whom he married on the 10th of April 1788, died on the 13th of March 1801. In June 1805 he married Madame Louise Moreau de Lassy (d. i860), a widow nineteen years of age, whose maiden name was Davezac de Castera, and who was a refugee in New Orleans from the revolution in Santo Domingo. She was a woman of extraordinary beauty and intellect, and is said to have greatly influenced her husband's public career.

See C. H. Hunt, Life of Edward Livingston (New York, 1864); Livingston's Works (2 vols., New York, 1873); and Louise Living- ston Hunt, Memoir of Mrs Edward Livingston (New York, 1886).

LIVINGSTON, ROBERT R. (1746-1813), American statesman, son of Robert R. Livingston (1718-1775; a justice of the New York supreme court after 1763) and brother of Edward Living- ston (see above), was born in New York City, on the 27th of

November 1746. He graduated at King's College, New York (now Columbia University), in 1765, was admitted to the bar in 1773, and for a short time was a law partner of John Jay. In 1773 he became recorder of New York City, but soon identified himself with the Whig or Patriot element there, and was forced to give up this position in 1775. He was a member of the second, third and fourth Provincial Congresses of New York (1773-1 777), was a delegate from New York to the Continental Congress in I 77S _I 777 and again in 1779-1780, and was a member of the committee which drafted the Declaration of Independence. He was prevented from signing that document by his absence at the time to attend a meeting of the fourth New York Provincial Congress, which on the 10th of July became the Convention of the Representatives of the state of New York, and by which at Kingston in 1777 the first state constitution was adopted, Livingston having been a member of the committee that drafted this instrument. He was the first chancellor of the state, from 1777 to February 1801, and is best known as " Chancellor " Livingston. In this capacity he administered the oath of office to Washington at his first inauguration to the presidency, in New York, on the 30th of April 1789. Previously, from October 1 781 to June 1783, he had been the first secretary of foreign affairs under the Confederation, and his European correspond- ence, especially with Franklin, was of the utmost value "in accom- plishing peace with Great Britain. In 1 788 he had been a member of the New York Convention, which ratified for that state the Federal Constitution. He became an anti-Federalist and in 1798 unsuccessfully opposed John Jay in the New York guber- natorial campaign. In 1801, having refused an appointment as secretary of the navy, he became minister to France on President Jefferson's appointment. He had refused this post when Washington offered it to him in 1794. He arrived in France in November 1801, and in 1803, in association with James Monroe, effected on behalf of his government the purchase from France of what was then known as " Louisiana," the credit for this purchase being largely his (see Louisiana Purchase). In 1804 Livingston withdrew from public life, and after a year

of travel in Europe returned to New York, where he promoted various improvements in agriculture. He did much to introduce the use of gypsum as a fertilizer, and published an Essay on Sheep (1809). He was long interested in the problem of steam navigation; before he went to France he received from the state of New York a monopoly of steam navigation on the waters of the state and assisted in the experiments of his brother-in-law, John Stevens; in Paris he met Robert Fulton, and with him in 1802 made successful trials on the Seine of a paddle wheel steamboat; in 1803 Livingston (jointly with Robert Fulton) received a renewal of his monopoly in New York, and the first successful steam-vessel, which operated on the Hudson in 1807, was named after Livingston's home, Clermont (N.Y.). He died at Clermont on the 26th of February 1813.

Livingston and George Clinton were chosen to represent New York state in Statuary Hall, in the Capitol, at Washington, D.C.; the statue of Livingston is by E. D. Palmer.

See Frederick de Peyster, Biographical Sketch of Robert R. Living- ston (New York, 1876) ; Robert K. Morton, " Robert R. Livingston: Beginnings of American Diplomacy," in The John P. Branch Historical Papers of Randolph- Macon College, i. 299-324, and ii. 34-46; and J. B. Moore, " Robert R. Livingston and the Louis- iana Purchase," in Columbia University Quarterly, v. 6 (1904), pp.

221-229.

LIVINGSTON, WILLIAM (1 723-1 700), American political leader, was born at Albany, New York, probably on the 30th of November 1723. He was the son of Philip Livingston (1686- 1749), and grandson of Robert Livingston (1654-17 25), who was born at Ancrum, Scotland, emigrated to America about 1673, and received grants (beginning in 1686) to " Livingston Manor " (a tract of land on the Hudson, comprising the greater

part of what are now Dutchess and Columbia counties). This Robert Livingston, founder of the American family, became in 1675 secretary of the important Board of Indian Commissioners; he was a member of the New York Assembly ˆ11711-1715 and 17 16- 1727 and its speaker in 1718-1725, and in 1701 made the pro- posal that all the English colonies in America should be grouped for administrative purposes " into three distinct governments." William Livingston graduated at Yale College in 1741, studied law in the city of New York, and was admitted to the bar in 1748. He served in the New York legislature (1759-1760), but his political influence was long exerted chiefly through pamphlets and newspaper articles. The Livingston family then led the Dissenters, who later became Whigs, and the De Lancey family represented the Anglican Tory interests. Through the columns of the Independent Reflector, which he established in 1752, Livingston fought the attempt of the Anglican party to bring the projected King's College (now Columbia University) under the control of the Church of England. After the suspension of the Reflector in 1753, he edited in the New York Mercury the " Watch Tower " section (1754-1755), which became the recog- nized organ of the Presbyterian faction. In opposition to the efforts of the Anglicans to procure the establishment of an American episcopate, he wrote an open Letter to the Right Reverend Father in God, John Lord, Bishop of Llandaff (1768), and edited and in large measure wrote the " American Whig " columns in the New York Gazette (1768-1769). In 1772 he removed to Elizabeth, New Jersey, where after 1773 he lived on his estate known as " Liberty Hall." He represented New Jersey in the first and second Continental Congresses (1774, 1775- 1776), but left Philadelphia in June 1776, probably to avoid voting on the question of adopting the Declaration of Inde- pendence, which he regarded as inexpedient. He was chosen first governor of the state of New Jersey in 1776, and was regularly re-elected until his death in r79o. Loyal to American interests and devoted to General Washington, he was one of the most useful of the state executives during the War of Inde- pendence. While governor he was a frequent contributor to the New Jersey Gazette, and in this way he greatly aided the American cause during the war by his denunciation of the enemy and appeals to the patriotism of his countrymen. He was a delegate to the Federal Constitutional Convention of 1787, and supported the New Jersey small-state plan. In 1754 he

joined with his brother, Philip Livingston, his brother-in-law, William Alexander {" Lord Stirling ") and others in founding what is now known as the Society Library of New York. With the help of William Smith (1 728-1 793), the New York historian, William Livingston prepared a digest of the laws of New York for the period 1691-1756, which was published in two volumes (1752 and 1762). He died at Elizabeth, New Jersey, on the 25th of July 1790.

See Theodore Sedgwick, Jr., Life of William Livingston (New York, 1833); and E.B.Livingston, The Livingstons of Livingston Manor (1910).

His brother, Peter van Brugh Livingston (1710-1792), was a prominent merchant and a Whig political leader in New York. He was one of the founders of the College of New Jersey (now Princeton University), was a member of the New York Council for some years before the War of Independence, a member and president of the First Provincial Congress of New York (1775), and a member of the Second Provincial Congress

(1775-1776).

Another brother, Philip Livingston (1716-1778), was also prominent as a leader of the New York Whigs or Patriots. He was a member of the New York Assembly in 17 59-1 769, a delegate to the Stamp Act Congress of 1765, a member of the Continental Congress from 1774 until his death and as such a signer of the Declaration of Independence, and in 1777-1778 was a member of the first state senate.

William's son, (Henry) Brockholst Livingston (1757- 1823), was an officer in the American War of Independence, and was an able lawyer and judge. From 1807 until his death he was an associate justice of the United States Supreme Court, and he wrote political pamphlets under the pen-name " Decius."

LIVINGSTONE, DAVID (1813-1873), Scottish missionary and explorer in Africa, was born on the 19th of March 1813, at the village of Blantyre Works, in Lanarkshire, Scotland. David was the second child of his parents, Neil Livingston (for so he spelled his name, as did his son for many years) and Agnes Hunter. His parents were typical examples of all that is best among the humbler families of Scotland. At the age of ten years David left the village school for the neighbouring cotton-mill, and by strenuous efforts qualified himself at the age of twenty-three to undertake a college curriculum. He attended for two sessions the medical and the Greek classes in Anderson's College, Glas- gow, and also a theological class. In September 1838 he went up to London, and was accepted by the London Missionary Society as a candidate. He took his medical degree in the Faculty of Physicians and Surgeons in Glasgow in November

1840. Livingstone had set his heart on China, and it was a great disappointment to him that the society finally decided to send him to Africa. To an exterior in these early years some- what heavy and uncouth, he united a manner which, by universal testimony, was irresistibly winning, with a fund of genuine but simple humour and fun that would break out on the most un- likely occasions, and in after years enabled him to overcome difficulties and mellow refractory chiefs when all other methods failed.

Livingstone sailed from England on the 8th of December 1840. From Algoa Bay he made direct for Kuruman, Bechuanaland, the mission station, 700 m. north, established by Robert Moffat twenty years before, and there he arrived on the 31st of July

1 84 1. The next two years Livingstone spent in travelling about the country to the northwards, in search of a suitable outpost for settlement. During these two years he became convinced that the success of the white missionary in a field like Africa was not to be reckoned by the tale of doubtful conversions he could send home each year — that the proper work for such men was that of pioneering, opening up and starting new ground, leaving native agents to work it out in detail. The whole of his subsequent career was a development of this idea. He selected the valley of Mabotsa, on one of the sources of the Limpopo river, 200 m. north-east of Kuruman, as his first station. Shortly after his settlement here he was attacked by a lion which crushed his left arm. The arm was imperfectly set, and it was a source of trouble tc him at times throughout his life,

and was the means of identifying his body after his death. To a house, mainly built by himself at Mabotsa, Livingstone in 1844 brought home his wife, Mary Moffat, the daughter of Moffat of Kuruman. Here he laboured till 1846, when he removed to Chonuane, 40 m. farther north, the chief place of the Bakwain or Bakwena tribe under Sechele. In 1847 he again removed to Kolobeng, about 40 m. westwards, the whole tribe following their missionary. With the aid and in the company of two English sportsmen, William C. Oswell and Mungo Murray, he was able to undertake a journey to Lake Ngami, which had never yet been seen by a white man. Crossing the Kalahari Desert, of which Livingstone gave the first detailed account, they reached the lake on the 1st of August 1849. In April next year he made an attempt to reach Sebituane, who lived 200 m. beyond the lake, this time in company with his wife and children, but again got no farther than the lake, as the children were seized with fever. A year later, April 1851, Livingstone, again accompanied by his family and Oswell, set out, this time with the intention of settling among the Makololo for a period. At last he succeeded, and reached the Chobe (Kwando), a southern tributary of the Zambezi, and in the end of June reached the Zambezi itself at the town of Sesheke. Leaving the Chobe on the 13 th of August the party reached Cape Town in April 1852. Livingstone may now be said to have completed the first period of his career in Africa, the period in which the work of the missionary had the greatest prominence. Hence- forth he appears more in the character of an explorer, but it must be remembered that he regarded himself to the last as a pioneer missionary, whose work was to open up the country to others.

Having seen his family off to England, Livingstone left Cape Town on the 8th of June 1852, and turning north again reached Linyante, the capital of the Makololo, on the Chobe, on the 23rd of May 1853, being cordially received by Sekeletu and his people. His first object was to seek for some healthy high land in which to plant a station. Ascending the Zambezi, he, however, found no place free from the tsetse fly, and therefore resolved to discover a route to the interior from either the west or east coast. To accompany Livingstone twenty-seven men were selected from the various tribes under Sekeletu, partly with a view to open up a trade route between their own country and the coast. The start was made from Linyante on the nth of November 1853, and, by ascending the Liba, Lake Dilolo was reached on the 20th of February 1854. On the 4th of April the Kwango was crossed, and on the 31st of May the town of Loanda was entered, Livingstone, however, being all but dead from fever, semi-starvation and dysentery. From Loanda Livingstone sent his astronomical observations to Sir Thomas Maclear at the Cape, and an account of his journey to the Royal Geographical Society, which in May 1855 awarded him its patron's medal. Loanda was left on the 20th of September 1854, but Livingstone lingered long about the Portuguese settle- ments. Making a slight detour to the north to Kabango, the party reached Lake Dilolo on the 13th of June 1855. Here Livingstone made a careful study of the hydrography of the country. He " now for the first time apprehended the true form of the river systems and the continent," and the con- clusions he came to have been essentially confirmed by sub- sequent observations. The return journey from Lake Dilolo was by the same route as that by which the party came, Linyante being reached in the beginning of September.

For Livingstone's purposes the route to the west was un- available, and he decided to follow the Zambezi to its mouth. With a numerous following, he left Linyante on the 8th of November 1855. A fortnight afterwards he discovered the famous " Victoria " falls of the Zambezi. He had already formed a true idea of the configuration of the continent as a * great hollow or basin-shaped plateau, surrounded by a ring of mountains. Livingstone reached the Portuguese settlement of Tete on the 2nd of March 1856, in a very emaciated condition. Here he left his men and proceeded to Quilimane, where he arrived on the 20th of May, thus having completed in two years

and six months one of the most remarkable and fruitful journeys on record. The results in geography and in natural science in all its departments were abundant and accurate; his observa- tions necessitated a reconstruction of the map of Central Africa. When Livingstone began his work in Africa the map was virtu- ally a blank from Kuruman to Timbuktu, and nothing but envy or ignorance can throw any doubt on the originality of his discoveries.

On the 12th of- December he arrived in England, after an absence of sixteen years, and met everywhere the welcome of a hero. He told his story in his Missionary Travels and Researches in South Africa (1857) with straightforward simplicity, and with no effort after literary style, and no apparent consciousness that he had done anything extraordinary. Its publication brought what he would have considered a competency had he felt himself at liberty to settle down for life. In 1857 he severed his con- nexion with the London Missionary Society, with whom, however, he always remained on the best of terms, and in February 1858 he accepted the appointment of " Her Majesty's consul at Quilimane for the eastern coast and the independent districts in the interior, and commander of an expedition for exploring eastern and central Africa." The Zambezi expedition, of which Livingstone thus became commander, sailed from Liverpool in H.M.S. " Pearl " on the 10th of March 1858, and reached the mouth of the Zambezi on the 14th of May. The party, which included Dr (afterwards Sir) John Kirk and Livingstone's brother Charles, ascended the river from the Kongone mouth in a steam launch, the " Ma-Robert "; reaching Tete on the 8th of September. The remainder of the year was devoted to an examination of the river above Tete, and especially the Kebrabasa rapids. Most of the year 1859 was spent in the exploration of the river Shire and Lake Nyasa, which was discovered in September; and during a great part of the year i860 Livingstone was engaged in fulfilling his promise to take such of the Makololo home as cared to go. In January of next year arrived Bishop C. F. Mackenzie

and a party of missionaries sent out by the Universities Mission to establish a station on the upper Shire.

After exploring the river Rovuma for 30 m. in his new vessel the ” Pioneer,” Livingstone and the missionaries proceeded up the Shire to Chibisa’s; there they found the slave trade rampant. On the 15th of July Livingstone, accompanied by several native carriers, started to show the bishop the country. Several bands of slaves whom they met were liberated, and after seeing the missionary party settled in the highlands to the south of Lake Chilwa (Shirwa) Livingstone spent from August to November in exploring Lake Nyasa. While the boat sailed up the west side of the lake to near the north end, the explorer marched along the shore. He returned more resolved than ever to do his utmost to rouse the civilized world to put down the desolating slave-trade. On the 30th of January 1862, at the Zambezi mouth, Livingstone welcomed his wife and the ladies of the mission, with whom were the sections of the ” Lady Nyassa,” a river steamer which Livingstone had had built at his own expense. When the mission ladies reached the mouth of the Ruo tributary of the Shire, they were stunned to hear of the death of the bishop and one of his companions. This was a sad blow to Livingstone, seeming to have rendered all his efforts to establish a mission futile. A still greater loss to him was that of his wife at Shupanga, on the 27th of April 1862.

The ” Lady Nyassa ” was taken to the Rovuma. Up this river Livingstone managed to steam 156 m., but farther progress was arrested by rocks. Returning to the Zambezi in the begin- ning of 1863, he found that the desolation caused by the slave trade was more horrible and widespread than ever. It was clear that the Portuguese officials were themselves at the bottom of the traffic. Kirk and Charles Livingstone being compelled to return to England on account of their health, the doctor resolved once more to visit the lake, and proceeded some distance up the west side and then north-west as far as the watershed that separates the Loangwa from the rivers that run into the lake.

Meanwhile a letter was received from Earl Russell recalling the expedition by the end of the year. In the end of April 1864 Livingstone reached Zanzibar in the ” Lady Nyassa,” and on the 23rd of July Livingstone arrived in England. He was naturally disappointed with the comparative failure of this expedition. Still the geographical results, though not in extent to be compared to those of his first and his final expeditions, were of high importance, as were those in various departments of science, and he had unknowingly laid the foundations of the British protectorate of Nyasaland. Details will be found in his Narrative of an Expedition to the Zambesi and its Tributaries, published in 1865.

By Sir Roderick Murchison and his other staunch friends Livingstone was as warmly welcomed as ever. When Murchison proposed to him that he should go out again, although he seems to have had a desire to spend the remainder of his days at home, the prospect was too tempting to be rejected. He was appointed British consul to Central Africa without a salary, and government contributed only £500 to the expedition. The chief help came from private friends. During the latter part of the expedition government granted him £1000, but that, when he learned of it, was devoted to his great undertaking. The Geographical Society contributed £500. The two main objects of the expedi- tion were the suppression of slavery by means of civilizing influences, and the ascertainment of the watershed in the region between Nyasa and Tanganyika. At first Livingstone thought the Nile problem had been all but solved by Speke, Baker and Burton, but the idea grew upon him that the Nile sources must be sought farther south, and his last journey became in the end a forlorn hope in search of the ” fountains ” of Herodotus. Leaving England in the middle of August 1865, via Bombay, Livingstone arrived at Zanzibar on the 28th of January 1866. He was landed at the mouth of the Rovuma on the 22nd of March, and started for the interior on the 4th of April. His company consisted of thirteen sepoys, ten Johanna men, nine African boys from Nasik

school, Bombay, and four boys from the Shire region, besides camels, buffaloes, mules and donkeys. This imposing outfit soon melted away to four or five boys. Rounding the south end of Lake Nyasa, Livingstone struck in a north-north- west direction for the south end of Lake Tanganyika, over country much of which had not previously been explored. The Loangwa was crossed on the 15th of December 1866. On Christmas day Livingstone lost his four goats, a loss which he felt very keenly, and the medicine chest was stolen in January 1867. Fever came upon him, and for a time was his almost constant companion; this, with other serious ailments which subsequently attacked him, and which he had no medicine to counteract, told on even his iron frame. The Chambezi was crossed on the 28th of January, and the south end of Tanganyika reached on the 31st of March. Here, much to his vexation, he got into the company of Arab slave dealers (among them being Tippoo-Tib) by whom his movements were hampered; but he succeeded in reaching Lake Mweru (Nov. 1867). After visiting Lake Mofwa and the Lualaba, which he believed was the upper part of the Nile, he, on the 18th of July 1868, discovered Lake Bangweulu. Proceeding up the west coast of Tanganyika, he reached Ujiji on the 14th of March 1869, " a ruckle of bones." Livingstone recrossed Tanganyika in July, and passed through the country of the Manyema, but baffled partly by the natives, partly by the slave hunters, and partly by his long illnesses it was not till the 29th of March 1871 that he succeeded in reaching the Lualaba, at the town of Nyangwe, where he stayed four months, vainly trying to get a canoe to take him across. It was here that a party of Arab slavers, without warning or provoca- tion, assembled one day when the market was busiest and commenced shooting the women, hundreds being killed or drowned in trying to escape. Livingstone had " the impression that he was in hell," but was helpless, though his " first impulse was to pistol the murderers." The account of this scene which he sent home roused indignation in England to such a degree as to lead to determined and to a considerable extent successful efforts to get the sultan of Zanzibar to suppress the trade. In

sickened disgust the weary traveller made his way back to Ujiji, which he reached on the 13th of October. Five days after his arrival in Ujiji he was inspired with new life by the timely arrival of H. M. Stanley, the richly laden almoner of Mr Gordon Bennett, of the New York Herald. With Stanley Livingstone explored the north end of Tanganyika, and proved conclusively that the Rusizi runs into and not out of it. In the end of the year the two started eastward for Unyamwezi, where Stanley provided Livingstone with an ample supply of goods, and bade him farewell. Stanley left on the 15th of March 1872, and after Livingstone had waited wearily in Unyamwezi for five months, a troop of fifty-seven men and boys arrived, good and faithful fellows on the whole, selected by Stanley himself. Thus attended, he started on the 15th of August for Lake Bangweulu, proceeding along the east side of Tanganyika. His old enemy dysentery soon found him out. In January 1873 the party got among the endless spongy jungle on the east of Lake Bangweulu, Living- stone's object being to go round by the south and away west to find the " fountains." The doctor got worse and worse, and in the middle of April he had unwillingly to submit to be carried in a rude litter. On the 29th of April Chitambo's village on the Lulimala, in Ilala, on the south shore of the lake, was reached. The last entry in the journal is on the 27th of April: " Knocked up quite, and remain — recover — sent to buy milch goats. We are on the banks of the Molilamo." On the 30th of April he with difficulty wound up his watch, and early on the morning of the 1st of May the boys found " the great master," as they called him, kneeling by the side of his bed, dead. His faithful men preserved the body in the sun as well as they could, and, wrapping it carefully up, carried it and all his papers, instruments and other things across Africa to Zanzibar. It was borne to England with all honour, and on the 18th of April 1874, was deposited in Westminster Abbey. His faithfully kept journals during these seven years' wanderings were published under the title of the Last Journals of David Livingstone in Central Africa, in 1874, edited by his old friend the Rev. Horace Waller. In Old Chit- ambo's the time and place of his death are commemorated by a permanent monument, which replaced in 1902 the tree on which his native followers had recorded the event.

In spite of his sufferings and the many compulsory delays, Livingstone's discoveries

during these last years were both extensive and of prime importance as leading to a solution of African hydrography. No single African explorer has ever done so much for African geography as Livingstone during his thirty years' work. His travels covered one-third of the continent, extending from the Cape to near the equator, and from the Atlantic to the Indian Ocean. Livingstone was no hurried traveller; he did his journeying leisurely, carefully observing and recording all that was worthy of note, with rare geographical instinct and the eye of a trained scientific observer, studying the ways of the people, eating their food, living in their huts, and sympathizing with their joys and sorrows. In all the countries through which he travelled his memory is cherished by the native tribes who, almost without exception, treated Livingstone as a superior being; his treatment of them was always tender, gentle and gentlemanly. By the Arab slavers whom he opposed he was also greatly admired, and was by them styled " the very great doctor." " In the annals of exploration of the Dark Continent," wrote Stanley many years after the death of the missionary explorer, " we look in vain among other nationalities for a name such as Livingstone's. He stands pre- eminent above all; he unites in himself all the best qualities of other explorers. . . . Britain . . . excelled herself even when she produced the strong and perseverant Scotchman, Livingstone." But the direct gains to geography and science are perhaps not the greatest results of Livingstone's journeys. Hjs example and his death acted like an inspiration, filling Africa with an army of explorers and missionaries, and raising in Europe so powerful a feeling against the slave trade that through him it may be considered as having received its death- blow. Personally Livingstone was a pure and tender-hearted man, full of humanity and sympathy, simple-minded as a child.

The motto of his life was the advice he gave to some school children in Scotland — " Fear God, and work hard."

See, besides his own narratives and W. G. Blaikic's Life (1880), the publications of the London Missionary Society from 1840, the Journal and Proceedings of the Royal Geographical Society, the despatches to the Foreign Office sent home by Livingstone during his last two expeditions, and Stanley's Autobiography (1909) and How I Found Livingstone (1872). (J. S. K.)

LIVINGSTONE MOUNTAINS, a band of highlands in German East Africa, forming the eastern border of the rift-valley of Lake Nyasa, at the northern end of the lake. In parts these highlands, known also under their native name of Kinga, present rather the character of a plateau than of a true mountain range, but the latter name may be justified by the fact that they form a comparatively narrow belt of country, which falls considerably to the east as well as to the west. The northern end is well marked in 8° 50′ S. by an escarpment falling to the Ruaha valley, which is regarded as a north-eastern branch of the main rift- valley. Southwards the Livingstone range terminates in the deep valley of the Ruhuhu in io° 30′ S., the first decided break in the highlands that is reached from the north, on the east coast of Nyasa, Geologically the range is formed on the side of the lake by a zone of gneiss running in a series of ridges and valleys generally parallel to its axis. The ridge nearest the lake (which in Mount Jamimbi or Chamembe, 9° 41′ S., rises to an absolute height cf 7870 ft., or 6200 ft. above Nyasa) falls almost sheer to the water, the same steep slope being continued beneath the surface. Towards the south the range appears to have a width of some 20 m. only, but northwards it widens out to about 40 m., though broken here by the depression, drained towards the Ruaha, of Buanyi, on the south side of which is the highest known summit of the range (9600 ft.). North and east of Buanyi, as in the eastern half of the range generally, table-topped mountains occur, composed above of horizontally bedded quartzites, sandstones and conglomerates. The uplands are generally clothed in rich grass, forest occurring principally in the hollows, while the slopes towards the lake are covered with poor scrub. Native settlements are scattered over the whole range, and German mission stations have been established at Bulongwa and Mtandala,

a little north of the north end of Nyasa. The climate is here healthy, and night frosts occur in the cold season. European crops are raised with success. At the foot of the mountains on Lake Nyasa are the ports of Wied- hafen, at the mouth of the Ruhuhu, and Old Langenburg, at the north-east corner of the lake. (E. He.)

LIVIUS ANDRONlCUS (c. 284-204 B.C.), the founder of Roman epic poetry and drama. His name, in which the Greek ‘AvSpovacos is combined with the gentile name of one of the great Roman houses, while indicative of his own position as a manumitted slave, is also significant of the influences by which Roman literature was fostered, viz. the culture of men who were either Greeks or ” semi-Graeci ” by birth and education, and the protection and favour bestowed upon them by the more enlightened members of the Roman aristocracy. He is supposed to have been a native of Tarentum, and to have been brought, while still a boy, after the capture of that town in 272, as a slave to Rome. He lived in the household of a member of the gens Livia, probably M. Livius Salinator. He determined the course which Roman literature followed for more than a century after his time. The imitation of Greek comedy, tragedy and epic poetry, which produced great results in the hands of Naevius, Plautus, Ennius and their successors, received its first impulse from him. To judge, however, from the insignificant remains of his writings, and from the opinions of Cicero and Horace, he can have had no pretension either to original genius or to artistic accomplishment. His real claim to distinction was that he was the first great schoolmaster of the Roman people. We learn from Suetonius that, like Ennius after him, he obtained his living by teaching Greek and Latin; and it was probably as a school-book, rather than as a work of literary pretension, that his translation of the Odyssey into Latin Saturnian verse was executed. This work was still used in schools in the time of Horace (Epp. ii. 1., 69), and, although faultily executed,

satisfied a real want by introducing the Romans to a knowledge of Greek. Such knowledge became essential to men in a high position as a means of intercourse with Greeks, while Greek literature stimulated the minds of leading Romans. Moreover, southern Italy and Sicily afforded many opportunities for witness- ing representations of Greek comedies and tragedies. The Romans and Italians had an indigenous drama of their own, known by the name of Sdlura, which prepared them for the reception of the more regular Greek drama. The distinction between this Satura and the plays of Euripides or Menander was that it had no regular plot. This the Latin drama first received from Livius Andronicus; but it did so at the cost of its originality. In 240, the year after the end of the first Punic War, he produced at the ludi Romani a translation of a Greek play (it is uncertain whether a comedy or tragedy or both), and this representation marks the beginning of Roman literature (Livy vii. 2). Livius himself took part in his plays, and in order to spare his voice he introduced the custom of having the solos (cantica) sung by a boy, while he himself represented the action of the song by dumb show. In his translation he discarded the native Saturnian metre, and adopted the iambic, trochaic and cretic metres, to which Latin more easily adapted itself than either to the hexameter or to the lyrical measures of a later time. He continued to produce plays for more than thirty years after this time. The titles of his tragedies — Achilles, Aegisthus, Equus Trojanus, Hermione, Tereus — are all suggestive of subjects which were treated by the later tragic poets of Rome. In the year 207, when he must have been of a great age, he was appointed to compose a hymn of thanksgiving, sung by maidens, for the victory of the Metaurus and an intercessory hymn to the Aventine Juno. As a further tribute of national recognition the ” college ” or ” gild ” of poets and actors was granted a place of meeting in the temple of Minerva on the Aventine.

See fragments in L. Miiller, Livi Andronici et Cn. Naevi FabuU arum Reliquiae (1885) ; also J. Wordsworth, Fragments and Speci- mens of Early Latin (1874) ; Mommsen, Hist, of Rome, bk. iii. ch. 14.

LIVNO, a town of Bosnia, situated on the eastern side of the fertile plain of Livno, at the foot of Mount Krug (6581 ft.). Pop. about 5000. The Dalmatian border is 7 m. W. Livno had a trade in grain, live-stock and silver filigree-work up to 1904, when a fire

swept away more than 500 of the old Turkish houses, together with the Roman citadel. Remains prove that Livno occupies the site of a Roman settlement, the name of which is uncertain. The Roman Catholic convent of Gurici is 6 m. S.

LIVONIA, or Livland (Russian, Liflandia), one of the three Baltic provinces of Russia, bounded W. by the Gulf of Riga, N. by Esthonia, E. by the governments of St Petersburg, Pskov and Vitebsk, and S. by Courland. A group of islands (inc sq. m.) at the entrance of the Gulf of Riga, of which Oesel. Mohn, Runo and Paternoster are the largest, belong to this government. It covers an area of 18,160 sq. m., but of this the part of Lake Peipus which belongs to it occupies 1090. Its surface is diversified by several plateaus, those of Haanhof and of the Livonian Aa having an average elevation of 400 to 700 ft., while several summits reach 800 to 1060 ft. or more. The edges of the plateaus are gapped by deep valleys; the hilly tract between the Dvina and its tributary the Livonian Aa has received, from its picturesque narrow valleys, thick forests and numerous lakes, the name of " Livonian Switzerland." The plateau of Odenpah, drained by tributaries of the Embach river, which flows for 93 m. from Lake Virz-yarvi into Lake Peipus, occupies an area of 2830 sq. m., and has an average elevation of 500 ft. More than a thousand lakes are scattered over Livonia, of which that of Virz-yarvi, having a surface of 106 sq. m. (115 ft. above sea-level), is the largest. Marshes and peat-bogs occupy one-tenth of the province. Of the numerous rivers, the Dvina, which flows for 90 m. along its frontier, the Pernau, Salis, Livonian Aa and Embach are navigable.

The Silurian formation which covers Esthonia, appears in the northern part of Livonia, the remainder of the province consisting of Devonian strata. The whole is overlaid with

glacial deposits, sometimes 400 ft. thick. The typical bottom moraine, with erratics from Finland, extends all over the country. Glacial furrows, striae and elongated troughs are met with everywhere, running mostly from north-west to south-east, as well as asar or eskers, which have the same direction. Sand-dunes cover large tracts on the shores of the Baltic. No traces of marine deposits are found higher than 100 or 150 ft. above the present sea-level. The soil is not very fertile. Forests cover about two-fifths of the surface. The climate is rather severe. The mean temperatures are 43 F. at Riga (winter 23 , summer 63) and 40° at Yuriev. The winds are very variable; the average number of rainy and snowy days is 146 at Riga (rainfall 24-1 in.). Fogs are not uncommon.

The population of Livonia, which was 621,600 in 1816, reached 1,000,876 in 1870, and 1,295,231 in 1897, of whom 43-4% were Letts, 39-9% Ehsts, 7-6% Germans, 5-4% Russians, 2% Jews and 1-2% Poles. The estimated pop. in 1906 was 1,411,000. The Livs, who formerly extended east into the government of Vitebsk, have nearly all passed away. Their native language, of Finnish origin, is rapidly disappearing, their present language being a Lettish patois. In 1846 a grammar and dictionary of it were made with difficulty from the mouths of old people. The Ehsts, who resemble the Finns of Tavastland, have maintained their ethnic features, their customs, national traditions, songs and poetry, and their harmonious language. There is a marked revival of national feeling, favoured by " Young Esthonia." The prevailing religion is the Lutheran (79-8%); 14-3% belong to the Orthodox Greek Church; of the Russians, however, a considerable proportion are Raskolniks (Nonconformists); the Roman Catholics amount to 2-3%, and the Jews to 2%. The Russian civil code was in- troduced in the Baltic provinces in 1835, and the use of Russian, instead of German, in official correspondence and in law courts was ordered in 1867, but not generally brought into practice.

i\ early all the soil belongs to the nobility, the extent of the peasants estates being only 15% of the entire area of the govern- ment. Serfdom was abolished in 1819, but the peasants remained under the jurisdiction of their landlords. The class of peasant pro- prietors being restricted to a small number of wealthy peasants, the bulk have

remained tenants at will; they are very miserable, and about one-fourth of them are continually wandering in search of work. from time to time the emigration takes the shape of a mass movement, which the government stops by forcible measures The average size of the landed estates is 9500 to 11,000 acres, far above the general average for Russia. Agriculture has reached a high degree of perfection on the estates of the landlords. The principal crops are rye, oats barley, flax and potatoes, with some wheat, hemp and buckwheat. Dairy-farming and gardening are on the increase, fishing in Lake Peipus gives occupation to nearly 100,000 persons and is also carried on in the Gulf of Riga and in the rivers. Woollen' cloth cotton and flax mills, steam flour and saw mills, distilleries and breweries, machinery works, paper mills, furniture, tobacco, soap candle and hardware works are among the chief industrial establishments. Livonia carries on a large export trade, especially through Riga and Pernau, in petroleum, wool, oilcake, flax, linseed hemp, grain timber and wooden wares; the Dvina is the chief channel for this trade.

no wiˆTlS V ds ,˚,? a Tf} hi S her . le . vel than elsewhere in Russia, no less than 87 / of the children receiving regular instruction. The higher educational institutions include Yuriev (Dorpat) University, Riga polytechnic and a high school for the clergy y

,.,., if S˚yt r " me . nt ls divided into nine districts, the chief towns of which, with their populations m 1897, are: Riga, capital of the government (282,943); Arensburg, in the islandˆf Oesel (4621V lTZf T W T T (K A2 \ ); & 1Un (? 6 59)= p e™au (12,856) Walk ThA 39) -V w n ! en (6327); Werro (4154); and Wolmar 5124). The capital of the government is Riga. 4

Coins of the time of Alexander the Great, found on the island of Oesel, show that the coasts of the Baltic were at an early period in commercial relation with the civilized world The chronicle of Nestor mentions as inhabitants of the Baltic coast the Chudes, the Livs, the Narova, Letgola, Semigallians and Kors. It was probably about the 9th century that the Chudes became tributary to the Varangian-Russian states. As they reacquired their independence, Yaroslav I. undertook in 1030 a campaign against them, and founded Yuriev (Dorpat) The Germans first penetrated into Livonia in the nth century and in it 58 several Liibeck and Visby merchants landed at the

mouth of the Dvina. In 11 86 the emissaries of the archbishop ot Bremen began to preach Christianity among the Ehsts and Letts, and in 1201 the bishop of Livonia established his residence at Riga. In 1202 or 1204 Innocent III. recognized the order of Brothers of the Sword, the residence of its grand master being at Wenden; and the order, spreading the Christian religion by the sword among the natives, carried on from that time a series of uninterrupted wars against the Russian republics and Lithuania, as well as a struggle against the archbishop of Riga, Riga having become a centre for trade, intermediate between the Hanseatic towns and those of Novgorod, Pskov and Polotsk. The first active interference of Lithuania in the affairs of Livonia took place immediately after the great outbreak of the peasants on Oesel; Olgierd then devastated all southern Livonia. The order, having purchased the Danish part of Esthonia, in 1347, began a war against the bishop of Riga, as well as against Lithuania, Poland and Russia. The wars against those powers were terminated respectively in 1435, 1466 and 1483. About the end of the 15th century the master of the order, Plettenberg, acquired a position of great importance, and in 1527 he was recognized as a prince of the empire by Charles V. On the other hand, the authority of the bishops of Riga was soon completely destroyed (1566). The war of the order with Ivan IV. of Russia in 1558 led to a division of Livonia, its northern part, Dorpat included, being taken by Russia, and the southern part falling under the dominion of Poland. From that time (1561) Livonia formed a subject of dispute between Poland and Russia, the latter only formally abdicating its rights to the country in 1582. In 1621 it was the theatre of a war between Poland and Sweden, and was conquered by the latter power, enjoying thus for twenty-five years a milder rule. In 1654, and again at the beginning of the 18th century, it became the theatre of war between Poland, Russia and Sweden, and was

finally conquered by Russia. The official concession was confirmed by the treaty of Nystad in 1721.

See E Seraphim, Geschichte Liv-, Esth-, und Kurlands (2nd ed Revel, 1897-1904) and Geschichte von Livland (Gotha, 1905 &c)

(P.A.K.; J.f. Be.)

LIVY [Titus Ltvius] (59 b.c.a.d. r 7), Roman historian, was born at Patavium (Padua). The ancient connexion between his native city and Rome helped to turn his attention to the study which became the work of his life. For Padua claimed like Rome, a Trojan origin, and Livy is careful to place its founder Antenor side by side with Aeneas. A more real bond of union was found in the dangers to which both had been exposed from the assaults of the Celts (Livy x. 2), and Padua must have been drawn to Rome as the conqueror of her hereditary foes Moreover, at the time of Livy's birth, Padua had long been in possession of the full Roman franchise, and the historian's family name may. have been taken by one of his ancestors out of compliment to the great Livian gens at Rome, whose con nexion with Cisalpine Gaul is well-established (Suet. Tib 3) and by one of whom his family may have been enfranchized, '

Livy s easy independent life at Rome, and his aristocratic leanings in politics seem to show that he was the son of well-born and opulent parents; he was certainly well educated, being widely read in Greek literature, and a student both of rhetoric and philosophy. We have also evidence in his writings that he had prepared himself for his great work by researches into the history of his native town. His youth and early manhood, spent perhaps chiefly at Padua, were cast in stormy times, and the impression which they left upon his mind was ineffaceable. In the Civil War his personal sympathies were with Pompey and the republican party (Tac. Ann. iv. 34); but far more lasting in its effects was his experience of the licence, anarchy and confusion of these dark days. The rule of Augustus he seems to have accepted as a necessity, but he could not, like Horace and Virgil, welcome it as inaugurating a new and glorious era. He writes of it with despondency as a degenerate and declining age; and, instead of triumphant prophecies of world-wide rule such as we find in Horace, Livy contents himself with pointing out the dangers which already threatened Rome, and exhorting his

contemporaries to learn, in good time, the lessons which the past history of the state had to teach.

It was probably about the time of the battle of Actium that Livy established himself in Rome, and there he seems chiefly to have resided until his retirement to Padua shortly before his death. We have no evidence that he travelled much, though he must have paid at least one visit to Campania (xxxviii. 56), and he never, so far as we know, took any part in political life. Nor, though he enjoyed the personal friendship and patronage of Augustus (Tac. Ann. iv. 34) and stimulated the historical zeal of the future emperor Claudius (Suet. Claud, xli.), can we detect in him anything of the courtier. There is not in his history a trace of that rather gross adulation in which even Virgil docs not disdain to indulge. His republican sympathies were freely expressed, and as freely pardoned by Augustus. We must imagine him devoted to the great task which he had set himself to perform, with a mind free from all disturbing cares, and in the enjoyment of all the facilities for study afforded by the Rome of Augustus, with its liberal encouragement of letters, its newly- founded libraries and its brilliant literary circles. As his work went on, the fame which he had never coveted came to him in ample measure. He is said to have declared in one volume of his history that he had already won glory enough, and the yourtger Pliny (Epist. ii. 3) relates that a Spaniard came' all the way from Gades merely to see him, and, this accomplished, at once

returned home satisfied. The accession of Tiberius (a.d. 14) materially altered for the worse the prospects of literature in Rome, and Livy retired to Padua, where he died. He had at least one son (Quintil. x. 1. 39), who also was possibly an author (Pliny, Nat. Hist. i. 5. 6), and a daughter married to a certain L. Magius, a rhetorician of no great merit (Seneca, Controv. x. 29. 2). Nothing further is known of his personal history.

Analysis of the History. — For us the interest of Livy's life centres in the work to which the greater part of it was devoted, the history of Rome from its foundation down to the death of Drusus (9 B.C.). Its proper title was Ab urbe condita libri (also called historiae and dnnales). Various indications point to the period from 27 to 20 B.C., as that during which the first decade was written. In the first book (19. 3) the emperor is called Augustus, a title which he assumed early in 27 B.C., and in ix. 18 the omission of all reference to the restoration, in 20 B.C., of the standards taken at Carrhae seems to justify the inference that the passage was written before that date. In the epitome of book lix. there is a reference to a law of Augustus which was passed in 18 B.C. The books dealing with the civil wars must have been written during Augustus's lifetime, as they were read by him (Tac. Ann. iv. 34), while there is some evidence that the last part, from book cxxi. onwards, was published after his death a.d. 14.

The work begins with the landing of Aeneas in Italy, and closes with the death of Drusus, 9 B.C., though it is possible that the author intended to continue it as far as the death of Augustus. The division into decades is certainly not due to the author himself, and is first heard of at the end of the 5th century; on the other hand, the division into libri or volumina seems to be original. That the books were grouped and possibly published in sets is rendered probable both by the prefaces which introduce new divisions of the work (vi. 1, xxi. 1, xxxi. 1) and by the description in one MS. of books cix.-cxvi. as " bellorum civilium libri octo." Such arrangement and publication in parts were, moreover, common with ancient authors, and in the case of a lengthy work almost a necessity.

Of the 142 libri composing the history, the first 15 carry us down to the eve of the great struggle with Carthage, a period, as Livy reckons it, of 488 years (xxxi. 1); 15 more (xvi-xxx.) cover the 63 years of the two great Punic wars. With the close of book xlv. we reach the conquest of Macedonia in 167 B.C. Book lviii. described the tribunate of Tiberius Gracchus, 133 B.C. In book lxxxix. we have the dictatorship of Sulla (81 B.C.), in ciii. Caesar's first consulship (59 B.C.), in cix.-cxvi. the civil wars to the death of Caesar (44 B.C.), in cxxiv. the defeat of .Brutus and Cassius at Philippi, in cxxxiii. and cxxxiv. the battle

of Actium and the accession of Augustus. The remaining eight books give the history of the first twenty years of Augustus's reign. Of this vast work only a small portion has come down to modern times; only thirty-five books are now extant (i.-x., xxi.xlv.), and of these xli. and xliii. are incomplete. The lost books seem to have disappeared between the 7th century and the revival of letters in the 15th — a fact sufficiently accounted for by the difficulty of transmitting so voluminous a work in times when printing was unknown, for the story that Pope Gregory I. burnt all the copies of Livy he could lay his hands on rests on no good evidence. Only one important fragment has since been recovered — the portion of book xci. discovered in the Vatican in 1772, and edited by Niebuhr in 1820. Very much no doubt of the substance of the lost books has been preserved both by such writers as Plutarch and Dio Cassius, and by epitomizers like Florus and Eutropius. But our know ledge of their contents is chiefly derived from the so-called periochae or epitomes, of which we have fortunately a nearly complete series, the epitomes of books cxxxvi. and cxxxvii. being the only ones missing. 1 These epitomes have been ascribed without sufficient reason to Florus (2nd century); but, though they are probably of even later date, and are disappointingly meagre, they may be taken as giving, so far as they go, a fairly authentic description of the original. They have been expanded with great ingenuity and learning by Freinsheim in Drakenborch's edition of Livy. 2 The Prodigia of Julius Obsequens and the list of consuls in the Chronica of Cassiodorus are taken directly from Livy, and to that extent reproduce the contents of the lost books. It is probable that Obsequens, Cassiodorus and the compiler

of the epitomes did not use the original work but an abridgment. ‘

Historical Standpoint. — If we are to form a correct judgment on the merits of Livy’s history, we must, above all things, bear in mind what his aim was in writing it, and this he has told us himself in the celebrated preface. He set himself the task of recording the history of the Roman people, ” the first in the world,” from the beginning. The task was a great one, and the fame to be won by it uncertain, yet it would be something to have made the attempt, and the labour itself would bring a welcome relief from the contemplation of present evils; for his readers, too, this record will, he says, be full of instruction; they are invited to note especially the moral lessons taught by the story of Rome, to observe how Rome rose to greatness by the simple virtues and .unselfish devotion of her citizens, and how on the decay of these qualities followed degeneracy and decline. He does not, therefore, write, as Polybius wrote, for students of history. With Polybius the greatness of Rome is a pheno- menon to be critically studied and scientifically explained; the rise of Rome forms an important chapter in universal history, and must be dealt with, not as an isolated fact, but in connexion with the general march of events in the civilized world. Still less has Livy anything in common with the naive anxiety of Dionysius of Halicarnassus to make it clear to his fellow Greeks that the irresistible people who had mastered them was in origin, in race and in language Hellenic like themselves.

Livy writes as a Roman, to raise a monument worthy of the greatness of Rome, and to keep alive, for the guidance and the warning of Romans, the recollection alike of the virtues which had made Rome great and of the vices which had threatened her with destruction. In so writing he was in close agreement with the traditions of Roman literature, as well as with the conception of the nature and objects of history current in his time. To a large extent Roman literature grew out of

1 For the fragments of an epitome discovered at Oxyrhynchus see J. S. Reid in Classical Review (July, 1904) ; E. Kornemann, Die neue Livius-Epitome aus Oxyrhynchus, with text and commentary (Leipzig, 1904) ; C. H. Moore, ” The Oxyrhynchus Epitome of Livy in relation to Obsequens and Cassiodorus,” in American Journal of Philology

(1904), 241. _

2 The various rumours once current of complete copies of Livy in Constantinople, Chios and elsewhere, are noticed by B. G. Niebuhr, Lectures on the History of Rome from the first Punic War (ed. L Schmitz, 1844), i. 65.

pride in Rome, for, though her earliest authors took the form and often the language of their writings from Greece, it was the greatness of Rome that inspired the best of them, and it was from the annals of Rome that their themes were taken. And this is naturally true in an especial sense of the Roman historians; the long list of annalists begins at the moment when the great struggle with Carthage had for the first time brought Rome into direct connexion with the historic peoples of the ancient world, and when Romans themselves awoke to the importance of the part reserved for Rome to play in universal history. To write the annals of Rome became at once a task worthy of the best of her citizens. Though other forms of literature might be thought unbecoming to the dignity of a free-born citizen, this was never so with history. On the contrary, men of high rank and tried statesmanship were on that very account thought all the fitter to write the chronicles of the state they had served. And history in Rome never lost either its social prestige or its intimate and exclusive connexion with the fortunes of the Roman people. It was well enough for Greeks to busy them- selves with the manners, institutions and deeds of the ” peoples outside.” The Roman historians, from Fabius Pictor to Tacitus, cared for none of these things. This exclusive interest in Rome was doubtless encouraged by the peculiar characteristics of the history of the state. The

Roman annalist had not, like the Greek, to deal with the varying fortunes and separate doings of a number of petty -communities, but with the continuous life of a single city. Nor was his attention drawn from the main lines of political history by the claims of art, literature and philosophy, for just as the tie which bound Romans together was that of citizenship, not of race or culture, so the history of Rome is that of the state, of its political constitution, its wars and conquests, its military and administrative system.

Livy's own circumstances were all such as to render these views natural to him. He began to write at a time when, after a century of disturbance, the mass of men had been contented to purchase peace at the price of liberty. The present was at least inglorious, the future doubtful, and many turned gladly to the past for consolation. This retrospective tendency was favourably regarded by the government. It was the policy of Augustus to obliterate all traces of recent revolution, and to connect the new imperial regime as closely as possible with the ancient traditions and institutions of Rome and Italy. . The Aeneid of Virgil, the Fasti of Ovid, suited well with his own restoration of the ancient temples, his revival of such ancient ceremonies as the Ludi Saeculares, his efforts to check the un- Roman luxury of the day, and his jealous regard for the purity of the Roman stock. And, though we are nowhere told that Livy undertook his history at the emperor's suggestion, it is certain that Augustus read parts of it with pleasure, and even honoured the writer with his assistance and friendship.

Livy was deeply penetrated with a sense of the greatness of Rome. From first to last its majesty and high destiny are present to his mind. Aeneas is led to Italy by the Fates that he may be the founder of Rome. Romulus after his ascension declares it to be the will of heaven that Rome should be mistress of the world; and Hannibal marches into Italy, that he may " set free the world " from Roman rule. But, if this ever-present consciousness often gives dignity and elevation to his narrative, it is also responsible for some of its defects. It leads him occasion- ally into exaggerated language {e.g. xxii. 33, " nullius usquam terrarum rei cura Romanos effugiebat "), or into such mis-statements as his explanation of the course taken by the Romans in renewing war with Carthage, that " it seemed more suitable to the dignity of the Roman people." Often his jealousy for the honour of Rome makes him unfair and one-sided. In all her wars not only success but justice is with Rome. To the same general attitude is also due the omission by Livy of all that has no direct bearing on the fortunes of the Roman people. "I have resolved," he says (xxxix. 48), "only to touch on foreign affairs so far as they are bound up with those of Rome." As the result, we get from Livy very defective accounts even of the Italic peoples most closely connected with Rome. Of

the past history and the internal condition of the more distant nations she encountered he tells us little or nothing, even wh«n he found such details carefully given by Polybius.

Scarcely less strong than his interest in Rome is his interest in the moral lessons which her history seemed to him so well qualified to teach. This didactic view of history was a prevalent one in antiquity, and it was confirmed no doubt by those rhetorical studies which in Rome as in Greece formed the chief part of education, and which taught men to look on history as little more than a storehouse of illustrations and themes for declama- tion. But it suited also the practical bent of the Roman mind, with its comparative indifference to abstract speculation or purely scientific research. It is in the highest degree natural that Livy should have sought for the secret of the rise of Rome, not in any large historical causes, but in the moral qualities of the people themselves, and that he should have looked upon the contemplation pf these as the best remedy for the vices of his own degenerate days. He dwells with delight on the unselfish patriotism of the old heroes of the republic. In those times children obeyed their parents, the gods were still sincerely worshipped, poverty was no disgrace, sceptical philosophies and foreign fashions in religion and in daily life were unknown. But this ethical interest is closely bound up with his Roman sympathies. His moral ideal is no abstract one, and the virtues he praises are those which in his view made up the truly Roman type of character. The prominence thus given to the moral aspects of

the history tends to obscure in some degree the true relations and real importance of the events narrated, but it does so in Livy to a far less extent than in some other writers. He is much too skilful an artist either to resolve his history into a mere bundle of examples, or to overload it, as Tacitus is sometimes inclined to do, with reflections and axioms. The moral he wishes to enforce is usually either conveyed by the story itself, with the aid perhaps of a single sentence of comment, or put as a speech into the mouth of one of his characters (e.g. xxiii. 49 ; the devotion of Decius, viii. 10, cf. vii. 40 ; and the speech of Camillus, v. 54); and what little his narrative thus loses in accuracy it gains in dignity and warmth of feeling. In his portraits of the typical Romans of the old style, such as Q. Fabius Maximus, in his descriptions of the unshaken firmness and calm courage shown by the fathers of the state in the hour of trial, Livy is at his best; and he is so largely in virtue of his genuine appreciation of character as a powerful force in the affairs of men.

This enthusiasm for Rome and for Roman virtues is, moreover, saved from degenerating into gross partiality by the genuine candour of Livy's mind and by his wide sympathies with every thing great and good. Seneca (Suasoriae vi. 22) and Quintilian (x. 1. 101) bear witness to his impartiality. Thus, Hasdrubal's devotion and valour at the battle on theMetaurus are described in terms of eloquent praise; and even in Hannibal, the lifelong enemy of Rome, he frankly recognizes the great qualities that balanced his faults. Nor, though his sympathies are unmistakably with the aristocratic party, does he scruple to censure the pride, cruelty and selfishness which too often marked their conduct (ii. 54; the speech of Canuleius, iv. 3; of Sextius and Licinius, vi. 36); and, though he feels acutely that the times are out of joint, and has apparently little hope of the future, he still believes in justice and goodness. He is often righteously indignant, but never satirical, and such a pessimism as that of Tacitus and Juvenal is wholly foreign to his nature.

Though he studied and even wrote on philosophy (Seneca, Ep. 100. 9), Livy is by no means a philosophic historian. We learn indeed from incidental notices that he inclined to Stoicism and disliked the Epicurean system. With the scepticism that despised the gods (x. 40) and denied that they meddled with the affairs of men (xliii. 13) he has no sympathy. The immortal gods are everywhere the same; they govern the world (xxxvii. 45) and reveal the future to men by signs and wonders (xliii. 13), but only a debased superstition will look for their hand in every petty incident, or abandon itself to an indiscriminate belief in the portents and miracles in which popular credulity

delights. The ancient state religion of Rome, with its temples, . priests and auguries, he not only reverences as an integral part of the Roman constitution, with a sympathy which grows as he studies it, but, like Varro, and in true Stoic fashion, he regards it as a valuable instrument of government (i. 19. 21), indispens- able in a well-ordered community. As distinctly Stoical is the doctrine of a fate to which even the gods must yield (ix. 4), which disposes the plans of men (i. 42) and blinds their minds (v. 37), yet leaves their wills free (xxxvii. 45).

But we find no trace in Livy of any systematic application of philosophy to the facts of history. He is as innocent of the leading ideas which shaped the work of Polybius as he is of the cheap theorizing which wearies us in the pages of Dionysius. The events are graphically, if not always accurately, described; but of the larger causes at work in producing them, of their subtle action and reaction upon each other, and of the general conditions amid which the history worked itself out, he takes no thought at all. Nor has Livy much acquaintance with either the theory or the practice of politics. He exhibits, it is true, political sympathies and antipathies. He is on the whole for the nobles and against the commons; and, though the unfavour- able colours in which he paints the leaders of the latter are possibly reflected from the authorities he followed,

it is evident that he despised and disliked the multitude. Of monarchy he speaks with a genuine Roman hatred, and we know that in the last days of the republic his sympathies were wholly with those who strove in vain to save it. He betrays, too, an insight into the evils which were destined finally to undermine the imposing fabric of Roman empire. The decline of the free population, the spread of slavery (vi. 12, vii. 25), the universal craving for wealth (iii. 26), the employment of foreign mercenaries (xxv. 33), the corruption of Roman race and Roman manners by mixture with aliens (xxxix. 3), are all noticed in tones of solemn warning. But his retired life had given him no wide experience of men and things. It is not surprising, therefore, to find that he fails altogether to present a clear and coherent picture of the history and working of the Roman constitution, or that his handling of intricate questions of policy is weak and inadequate.

Sources. — If from the general aim and spirit of Livy's history we pass to consider his method of workmanship, we are struck at once by the very different measure of success attained by him in the two great departments of an historian's labour. ■ He is a consummate artist, but an unskilled and often careless investi- gator and critic. The materials which lay ready to his hand may be roughly classed under two heads: (1) the original evidence of monuments, inscriptions, &c, (2) the written tradition as found in the works of previous authors. It is on the second of these two kinds of evidence that Livy almost exclusively relies. Yet that even for the very early times a certain amount of original evidence still existed is proved by the use which was made of it by Dionysius, who mentions at least three important inscriptions, two dating from the regal period and one from the first years of the republic (iv. 26, iv. 58, x. 32). We know from Livy himself (iv. 20) that the breastplate dedicated by Aulus Cornelius Cossus (428 B.C.) was to be seen in his own day in the temple of Jupiter Feretrius, nor is there any reason to suppose that the libri lintei, quoted by Licinius Macer, were not extant when Livy wrote. For more recent times the materials were plentiful, and a rich field of research lay open to the student in the long series of laws, decrees of the senate, and official registers, reaching back, as it probably did, at least to the beginning of the 3rd century B.C. Nevertheless it seems certain that Livy never realized the duty of consulting these relics of the past, even in order to verify the statements of his authorities. Many of them he never mentions; the others (e.g. the libri lintei) he evidently describes at second hand. Antiquarian studies were popular in his day, but the instances are very few in which he has turned their results to account. There is no sign that he had ever read Varro; and he never alludes to Verrius Flaccus. The haziness and inaccuracy of his topography make it clear that he did not attempt to familiarize himself with the

actual scenes of events even that took place in Italy. Not only does he confuse Thermon, the capital of Aetolia, with Ther- mopylae (xxxiii. 35), but his accounts of the Roman campaigns against Volsci, Aequi and Samnites swarm with confusions and difficulties; nor are even his descriptions of Hannibal's movements free from an occasional vagueness which betrays the absence of an exact knowledge of localities.

The consequence of this indifference to original research and patient verification might have been less serious had the written tradition on which Livy preferred to rely been more trustworthy. But neither the materials out of which it was composed, nor the manner in which it had been put together, were such as to make it a safe guide. It was indeed represented by a long line of respectable names. The majority of the Roman annalists were men of high birth and education, with a long experience of affairs, and their defects did not arise from seclusion of life or ignorance of letters. It is rather in the conditions under which they wrote and in the rules and traditions of their craft that the causes of their short- comings must be sought.

It was not until the 6th century from the foundation of the city that historical writing began in Rome. The father of Roman history, Q. Fabius Pictor, a patrician and a senator, can scarcely have published his annals before the close of the . * ,, t Second Punic War, but these annals covered the whole period from the arrival of Evander in Italy down at least to the battle by Lake Trasimene (217 B.C.). Out of what materials,

then, did he put together his account of the earlier history? Recent criticism has succeeded in answering this question with some degree of certainty. A careful examination of the fragments of Fabius (see H. Peter, Historicorum Romanorum Relliguiae, Leipzig, 1870; and C. W. Nitzsch, Rom. Annalistik, Berlin, 1873) reveals in the first place a marked difference between the kingly period and that which followed the establishment of the republic. The history of the former stretches back into the regions of pure mythology. It is little more than a collection of fables told with scarcely any attempt at criticism, and with no more regard to chronological sequence than was necessary to make the tale run smoothly or to fill up such gaps as that between the flight of Aeneas from Troy and the supposed year of the foundation of Rome. But from its very commencement the history of the republic wears a different aspect. The mass of floating tradition, which had come down from early days, with its tales of border raids and forays, of valiant chiefs and deeds of patriotism, is now rudely fitted into a framework of a wholly different kind. This framework consists of short notices of important events, wars, pro- digies, consecration of temples, &c, all recorded with extreme brevity, precisely dated, and couched in a somewhat archaic style. They were taken probably from one or more of the state registers, such as the annals of the pontiffs, or those kept by the aediles in the temple of Ceres. This bare official outline of the past history of his city was by Fabius filled in from the rich store of tradition that lay ready to his hand. The manner and spirit in which he effected this combination were no doubt wholly uncritical. Usually he seems to have transferred both annalistic notices and popular traditions to his pages much in the shape in which he found them. But he unquestionably gave undue prominence to the tales of the prowess and glory of the Fabii, and probably also allowed his own strong aristocratic sympathies to colour his version of the early political controversies. This fault of partiality was, according to Polybius, a conspicuous blot in Fabius's account of his own times, which was, we are told, full and in the main accurate, and, like the earlier portions, consisted of official annalistic notices, supple- mented, however, not from tradition, but from his own experience and from contemporary sources. But even here Polybius charges him with favouring Rome at the expense of Carthage, and with the undue exaltation of the great head of his house, Q. Fabius Cunctator.

Nevertheless the comparative fidelity with which Fabius seems to have reproduced his materials might have made his annals the starting point of a critical history. But unfortunately intelligent criticism was exactly what they never received. It is true that in some respects a decided advance upon Fabius was made by sub- sequent annalists. M. Porcius Cato (234-149 B.C.) widened the scope of Roman history so as to include that of the chief Italian cities, and made the first serious attempt to settle the chronology. In his history of the Punic wars Caelius Antipater (c. 130 B.C.) added fresh material, drawn probably from the works of the Sicilian Greek Silenus, while Licinius Macer (70 B.C.) distinguished himself by the use he made of the ancient " linen books." No doubt, too, the later annalists, at any rate from Caelius Antipater onwards, improved upon Fabius in treatment and style. But in more essential points we can discern no progress. One annalist after another quietly adopted the established tradition, as it had been left by his prede- cessors, without any serious alterations of its main outlines. Of independent research and critical analysis we find no trace, and the general agreement upon main facts is to be attributed simply to the regularity with which each writer copied the one before him. But, had the later annalists contented themselves with simply reproduc- ing the earlier ones, we should at least have had the old tradition before us in a simple and tolerably genuine form. As it was, while

they slavishly clung to its substance, they succeeded, as a rule, in destroying all traces of its original form and colouring. L. Calpurnius Piso, tribune in 149 B.C. and consul in 133 B.C., prided himself on reducing the old legends to the level of common sense, and im- porting into them valuable moral lessons for his own generation. By Caelius Antipatcr the methods of rhetoric were first applied to history, a disastrous precedent

enough. He inserted speeches, en- livened his pages with chance tales, and aimed, as Cicero tells us, at not merely narrating facts but also at beautifying them. His successors carried still farther the practice of dressing up the rather bald chronicles of earlier writers with all the ornaments of rhetoric. The old traditions were altered, almost beyond the possibility of recognition, by exaggerations, interpolations and additions. Fresh incidents were inserted, new motives suggested and speeches com-

Cosed in order to infuse the required life and freshness into these dry ones of history. At the same time the political bias of the writers, and the political ideas of their day were allowed, in some cases perhaps half unconsciously, to affect their representations of past events. Annalists of the Gracchan age imported into the early struggles of patricians and plebeians the economic controversies of their own day, and painted the first tribunes in the colours of the two Gracchi or of Saturninus. In the next generation they dexterously forced the venerable records of the early republic to pronounce in favour of the ascendancy of the senate, as established by Sulla. To political bias was added family pride, for the gratification of which the archives of the great houses, the funeral panegyrics, or the imagination of the writer himself supplied an ample store of doubt- ful material. Pedigrees were invented, imaginary consulships and fictitious triumphs inserted, and family traditions and family honours were formally incorporated with the history of the state.

Things were not much better even where the annalists were dealing with recent or contemporary events. Here, indeed, their materials were naturally fuller and more trustworthy, and less room was left for fanciful decoration and capricious alteration of the ‘ facts. But their methods are in the main unchanged. What they found written they copied ; the gaps they supplied, where personal experience failed, by imagination. No better proof of this can be given than a comparison of the annalist’s version of history with that of Polybius. In the fourth and fifth decades of Livy the two appear side by side, and the contrast between them is striking. Polybius, for instance, gives the number of the slain at Cynoscephalae as 8000; the annalists raise it as high as 40,000 (Livy xxxiii. 10). In another case (xxxn. 6) Valerius Antias, the chief of sinners in this respect, inserts a decisive Roman victory over the Macedonians, in which 12,000 of the latter were slain and 2200 taken prisoner, an achievement recorded by no other authority.

Such was the written tradition on which Livy mainly relied. We have next to examine the manner in which he used it, and here we are met at the outset by the difficulty of determining with exactness what authorities he is following at any one time ; for of the import- ance of full and accurate references he has no idea, and often for chapters together he gives us no clue at all. More often still he contents himself with such vague phrases as ” they say,” ” the story goes,” ” some think,” or speaks in general terms of ” ancient writers ” or ” my authorities.” Even where he mentions a writer by name, it is frequently clear that the writer named is not the one whose lead he is following at the moment, but that he is noticed incidentally as differing from Livy’s guide for the time being on some point of detail (compare the references to Piso in the first decade, i. 55, ii. 32, &c). It is very rarely that Livy explicitly tells us whom he has selected as his chief source {e.g. Fabius xxii. 7; Polybius xxxiii. 10). By a careful analysis, however, of those portions of his work which admit of a comparison with the text ■of his acknowledged authorities (e.g. fourth and fifth decades, see H. Nissen, Untersuchungen, Berlin, 1863), and elsewhere by compar- ing his version with the known fragments of the various annalists, and with what we are told of their style and method of treatment, we are able to form a general idea of his plan of procedure. As to the first decade, it is generally agreed that in the first and second books, at any rate, he follows such older and simpler writers as Fabius Pictor and Calpurnius Piso (the only ones whom he there refers to by name), to whom, so far as the first book is concerned, Niebuhr (Lectures, p. 33) would add the poet Ennius. With the close of the second book or the opening of the third we come upon the first traces

It is conceded on all hands that Livy in this decade makes con-

1 For Livy's debt to Valerius Antias, see A. A. Howard in Harvard Studies in Classical Philology, xvii. (1906), pp. 161 sqq.

siderable use of other authorities than Polybius (e.g. Fabius xxii. 7; Caelius Antipater xxi. 38, 46, 47, xxii. 31, &c), that he only once mentions Polybius (xxx. 45), and that, if he used him, he p , .. did so to a much less extent than in the fourth and fifth H ˚y'" us – decades, and in a very different manner. It is also agreed that we can detect in Livy's account of the Hannibalic war two distinct elements, derived originally, the one from a Roman, the other from a non-Roman source. But from these generally accepted premises two opposite conclusions have been drawn. On the one hand, it is maintained (e.g. by Lachmann, C. Peter, H. Peter, Hist. Rom. Relliq.) that those parts of Livy's narrative which point to a non-Roman authority (e.g. Hannibal's movements prior to his invasion of Italy) are taken by Livy directly from Polybius, with occasional reference of course to other writers, and with the omission (as in the later decades) of all matters uninteresting to Livy or his Roman readers, and the addition of rhetorical touches and occasional comments. It is urged that Livy, who in the fourth and fifth decades shows himself so sensible of the great merits of Polybius, is not likely to hg.ve ignored him in the third, and that his more limited use of him in the latter case is fully accounted for by the closer connexion of the history with Rome and Roman affairs, and the comparative excellence of the available Roman authorities, and, lastly, that the points of agree- ment with Polybius, not only in matter but in expression, can only be explained on the theory that Livy is directly following the great Greek historian. On the other hand, it is maintained (especially by Schwegler, Nitzsch, and K. Bottcher) that the extent and nature 01 Livy's agreement with Polybius in this part of lys work point rather to the use by both of a common original authority. It is argued that Livy's mode of using his authorities is tolerably uniform, and that his mode of using Polybius in particular is known with certainty from the later decades. Consequently the theory that he used Polybius in the third decade requires us to assume that in this one instance he departed widely, and without sufficient reason, from his usual course of procedure. Moreover, even in the passages where the agreement with Polybius is most apparent, there are so many discrepancies and divergencies in detail, and so many unaccountable omissions and additions, as to render it inconceivable that he had the text of Polybius before him. But all these are made intelligible if we suppose Livy to have been here following directly or indirectly the same original sources that were used by Polybius. The earliest of these original sources was probably Silenus, with whom may possibly be placed, for books xxi. xxii., Fabius Pictor. The latter Livy certainly used directly for some parts of the decade. The former he almost as certainly knew only at second hand, the intermediate authority being probably Caelius Antipater. This writer, who con- fined himself to a history of the Second PunicWar, in seven books, is expressly referred to by Livy eleven times in the third decade; and in other passages where his name is not mentioned Livy can be shown to have followed him (e.g. xxii. 5, 49, 50, 51, xxiv. 9). In the latter books of the decade his chief authority is possibly Valerius Antias.

In the fourth and fifth decades the question of Livy's authorities presents no great difficulties, and the conclusions arrived at by Nissen in his masterly Untersuchungen have met with general acceptance. These may be shortly stated as follows. In the

Eortions of the history which deal with Greece and the East, ivy follows Polybius, and these portions are easily distinguishable from the rest by their superior clearness, accuracy and fulness. On the other hand, for the history of Italy and western Europe he falls back on Roman annalists, especially, it seems, on Claudius Quadrigarius and Valerius Antias — a most unfortunate choice — and from them too he takes the annalistic mould into which his matter is cast.

Livy's general method of using these authorities was certainly not such as would be deemed satisfactory in a modern historian. He is indeed free from the grosser faults of deliberate injustice and falsification, ana he resists that temptation to invent, to which " the minds of authors are only too much inclined " (xxii. 7). Nor is he unconscious of the necessity for some kind of criticism. He distinguishes between rumour and the precise statements of recognized authorities (cf. xxi. 46, v. 21, vii. 6), The latter he

reproduced in the main faithfully, but with a certain exercise of discretion. Where they disagreed, he calls attention to the fact, occasionally pronouncing in favour of one version rather than another (ii. 41 , xxi. 46) though often on no adequate grounds, or attempting to reconcile and explain discrepancies (vi. 12, 38). Where he detects or suspects the insertion of fabulous matter he has no scruple in saying so. Gross exaggerations, such as those in which Valerius Antias indulged, he roundly denounces, and with equal plainness of speech he condemns the family vanity which had so constantly corrupted and distorted the truth. " I suppose," he says (viii. 40), " that the record and memorial of these matters hath been depraved and corrupted by these funeral orations of praises, . . while every house and family draweth to it the honour and renown of noble exploits, martial feats and dignities by any untruth and lie, so it be colourable." The legendary character of the earliest traditions he frankly admits. " Such things as are reported either before'or at the foundation of the city, more beautiful and set out with poets' fables than grounded upon pure and faithful records, I mean neither to aver nor disprove " (Praef.) ; and of the whole history previous

Critical method.

to the sack of Rome by the Gauls (390 B.C.) he writes that it was obscure " both in regard of exceeding antiquity, and also for that in those days there were very few writings and monuments, the only faithful safeguard and true remembrancers of deeds past; and, besides, whatsoever was registered in the commentaries of the priests and in other public or private records, the same for the most part, when the city was burned, perished withal." Further than this, however, Livy's criticism does not go. Where his written authorities are not palpably inconsistent with each other or with probability he accepts and transcribes their record without any further inquiry, nor does he ever attempt to get behind this record in order to discover the original evidence on which it rested. His acceptance in any particular case of the version given by an annalist by no means implies that he has by careful inquiry satisfied himself of its truth. At the most it only presupposes a comparison with other versions, equally second-hand, but either less generally accepted or less in harmony with his own views of the situation ; and in many cases the reasons he gives for his preference of one account over another are eminently unscientific. Livy's history, then, rests on no foundation of original research or even of careful verification. It is a compila- tion, and even as such it leaves much to be desired. For we cannot credit Livy with having made such a preliminary survey of his authorities as would enable him to determine their relations to each other, and fuse their various narratives into a consistent whole. It is clear, on the contrary, that his circle of authorities for any one decade was a comparatively small one, that of these he selected one, and transcribed him with the necessary embellishments and other slight modifications until impelled by various reasons to drop him. He then, without warning, takes up another, whom he follows in the same way. The result is a curious mosaic, in which pieces of all colours and dates are found side by side, and in which even the great artistic skill displayed throughout fails to conceal the lack of internal unity. Thus many of Livy's inconsistencies are due to his having pieced together two versions, each of which gave a differently coloured account of the same event. Mommsen {Rom. Forschungen, ii.) has clearly shown that this is what has happened in his relation of the legal proceedings against the elder Africanus in book xxxviii. ; and in the story of the first secession, as he tells it, the older version which represented it as due to political and the later which explained it by economical grievances are found side by side. Similarly a change from one authority to another leads him not unfrequently to copy from the latter statements inconsistent with those he took from the former, to forget what he has previously said, or to treat as known a fact which has not been mentioned before (cf. ii. 1, xxxiv. 6, and Weissenborn's Introduction, p. 37). In other cases where the same event has been placed by different annalists in different years, or where their versions of it varied, it reappears in Livy as two events. Thus the four campaigns against the Volsci (ii. 17 seq.) are, as Schwegler (R.G. i. 13) rightly

says, simply variations of one single expedition. Other instances of such ” doublettes ” are the two single combats described in xxiii. 46 and xxv. 18, and the two battles at Baecula in Spain (xxvii. 18 and xxviii. 13). Without doubt, too, much of the chronological confusion observable through- out Livy is due to the fact that he follows now one now another authority, heedless of their differences on this head. Thus he vacillates between the Catonian and Varronian reckoning of the years of the city, and between the chronologies of Polybius and the Roman annalists.

To these defects in his method must be added the fact that he does not always succeed even in accurately reproducing the authority he is for the time following. In the case of Polybius, for instance, he allows himself great freedom in omitting what strikes him as ir- relevant, or tedious, or uninteresting to his Roman readers, a process in which much valuable matter disappears. In other cases his desire to give a vividness and point to what he doubtless considered the rather bald and dry style of Polybius leads him into absurdities and inaccuracies. Thus by the treaty with Antiochus (188 B.C.) it was provided that the Greek communities of Asia Minor ” shall settle their mutual differences by arbitration,” and so far Livy correctly transcribes Polybius, but he adds with a rhetorical flourish, ” or, if both parties prefer it, by war ” (xxxviii. 38). Elsewhere his blunders are apparently due to haste, or ignorance or sheer carelessness; thus, for instance, when Polybius speaks of the Aetolians assembling at their capital Thermon, Livy (xxxiii. 35) not only substitutes Thermopylae but gratuitously informs his readers that here the Pylaean assemblies were held. Thanks partly to carelessness, partly to mistranslation, he makes sad havoc (xxxv. 5 seq.) of Polybius’s account of the battle of Cynoscephalae. Finally, Livy cannot be altogether acquitted on the charge of having here and there modified Polybius in the interests of Rome.

Style._ — Serious as these defects in Livy’s method appear if viewed in the light of modern criticism, it is probable that they were easily pardoned, if indeed they were ever discovered, by his contempor- aries. For it was on the artistic rather than on the critical side of history that stress was almost universally laid in antiquity, and the thing that above all others was expected from the historian was not so much a scientific investigation and accurate exposition of the truth, as its skilful presentation in such a form as would charm and interest the reader. Tried by this standard, Livy deservedly won and held a place in the very first rank. Asinius Pollio sneered at his

Patavinity, and the emperor Caligula denounced him as verbose, but with these exceptions the opinion of antiquity was unanimous in pro- nouncing him a consummate literary workman. The classical purity of his style, the eloquence of his speeches, the skill with which he depicted the play of emotion, and his masterly portraiture of great men, are all in turn warmly commended, and in our own day we question if any ancient historian is either more readable or more widely read. It is true that for us his artistic treatment of his- tory is not without its drawbacks. The more trained historical sense of modern times is continually shocked by the obvious untruth of his colouring, especially in the earlier parts of his history, by the palpable unreality of many of the speeches, and by the naivete with which he omits everything, however important, which he thinks will weary his readers. But in spite of all this we are forced to ac- knowledge that, as a master of what we may perhaps call ” narrative history,” he has no superior in antiquity; for, inferior as he is to Thucydides, to Polybius, and even to Tacitus in philosophic power and breadth of view, he is at least their equal in the skill with which he tells his story. He is indeed the prince of chroniclers, and in this respect not unworthy to be classed even with Herodotus (Qumtilian, x. 1. 101). Nor is anything more remarkable than the way in which Livy’s fine taste and sense of proportion, his true poetic feeling and genuine enthusiasm, saved him from the besetting faults of the mode of treatment which he adopted. The most superficial comparison of his account of the earliest days of Rome with that given by Dionysius shows from what depths of tediousness he was preserved by these qualities. Instead of the wearisome prolixity and the mis- placed pedantry which make the latter almost unreadable, we find the old tales briefly and simply told. Their primitive beauty is not marred by any attempt to force them into an historical mould, or disguised beneath an accumulation of the insipid inventions of later times. At the same time they are not

treated as mere tales for children, for Livy never forgets the dignity that belongs to them as the prelude to the great epic of Rome, and as consecrated by the faith of generations. Perhaps an even stronger proof of the skill which enabled Livy to avoid dangers which were fatal to weaker men is to be found in his speeches. We cannot indeed regard therewith the ancients, as the best part of his history, for the majority of them are obviously unhistorical, and nearly all savour Speeches. somewhat too much of the rhetorical schools to be perfectly agreeable to modern taste. To appreciate them we must take them for what they are, pieces of declamation, intended either to enliven the course of the narrative, to place vividly before the reader the feelings and aims of the chief actors, or more frequently still to enforce some lesson Which the author himself has at heart. The substance, no doubt, of many of them Livy took from his authorities, but their form is his own, and, in throwing into them all his own eloquence and enthusiasm, he not only acted in conformity with the established traditions of his art, but found a welcome outlet for feelings and ideas which the fall of the republic had deprived of all other means of expression. To us, therefore, they are valuable not only for their eloquence, but still more as giving us our clearest insight into Livy's own sentiments, his lofty sense of the greatness of Rome, his apprecia- tion of Roman courage and firmness, and his reverence for the simple virtues of older times. But, freely as Livy uses this privilege of speechmaking, his correct taste keeps his rhetoric within reasonable limits. With a very few exceptions the speeches are dignified in tone, full of life and have at least a dramatic propriety, while of such incongruous and laboured absurdities as the speech which Dionysius puts into the mouth of Romulus, after the rape of the Sabine women, there are no instances in Livy.

But, if our estimate of the merits of his speeches is moderated by doubts as to his right to introduce them at all, no such scruples interfere with our admiration for the skill with which he has drawn the portraits of the great men who figure in his pages. We may indeed doubt whether in all cases they are drawn with perfect accuracy and impartiality, but of their life-like vigour and clearness there can be no question. With Livy this portrait-painting was a labour of love. " To all great men," says Seneca, " he gave their due ungrudgingly," but he is at his best in dealing with those who, like Q. Fabius Maximus, " the Delayer," were in his eyes the most perfect types of the true Roman.

The general effect of Livy's narrative is no doubt a little spoilt by the awkward arrangement, adopted from his authorities, which obliges him to group the events by years, and thus to disturb their natural relations and continuity. As the result his history has the appearance of being rather a series of brilliant pictures loosely strung together than a. coherent narrative. But it is impossible not to admire the copious variety of thought and language, and the evenly flowing style which carried him safely through the dreariest periods of his history; and still more remarkable is the dramatic power he displays when some great crisis or thrilling episode stirs his blood,, such as the sack of Rome by the Gauls, the battle by the Metaurus and the death of Hasdrubal.

In style and language Livy represents the best period of Latin prose writing. He has passed far beyond the bald and meagre diction of the early chroniclers. In his hands Latin acquired a flexibility and a richness of vocabulary unknown to itˆbefore. If he writes with less finish and a less perfect rhythm than his favourite model Cicero, he excels him in the varied structure of his periods, and their adaptation

LIZARD

to the subject-matter. It is true that here and there the " creamy richness of his style becomes verbosity, and that he occasion- ally draws too freely on his inexhaustible store of epithets metaphors and turns of speech; but these faults, which did not escape the censure even of friendly critics like Quintilian, are com- paratively rare in the extant parts of his work. From the tendency to use a poetic diction in prose, which was so conspicuous a fault in the writers of the silver age, Livy is not wholly free. In his earlier books especially there are numerous phrases and sentences which have an unmtstakably poetic ring, recalling sometimes Ennius and more often his

contemporary Virgil. But in Livy this poetic element is kept within bounds, and serves only to give warmth and vividness to the narrative. Similarly, though the influence of rhetoric upon his language as well as upon his general treatment, is clearly perceptible he has not the perverted love of antithesis, paradox and laboured word-painting which offends us in Tacitus; and, in spite ot the Venetian richness of his colouring, and the copious flow of his words, he is on the whole wonderfully natural and simple

I hese merits not less than the high tone and easy grace of his narrative and the eloquence of his speeches, gave Livy a hold on Roman readers such as only Cicero and Virgil besides him ever ob- tained. His history formed the groundwork of nearly all that was afterwards written on the subject. Plutarch, writers on rhetoric like the elder Seneca, moralists like Valerius Maximus, went to Livy for their stock examples Floras and Eutropius abridged him; Orosius extracted from him his proofs of the sinful blindness of the paean world ; and in every school Livy was firmly established as a text- book lor the Roman youth.

re** —The received text of the extant thirty-five books of Livy is

IfiVi, r0 ‘cc r ? nt u so ” rces ; and no one ° f ° l »- MSS. contains them all. 1 he MSS of the first decade, some thirty in number, are with one exception derived, more or less directly, from a single archetype viz., the recension made in the 4 th century by the two Nicomarhi! „f‘ an M ar \,Pc eX u er ‘ a ” d by Vict °rianus. This is proved in the case ot the older MSS. by written subscriptions to that effect, and in the case o, the rest by internal evidence. Of all these descendants of the iNicomacnean recension, the oldest is the Codex Parisinus of the loth century, and the best the Codex Mediceus or Florentinus of the nth An independent value attaches to the ancient palimpsest of Verona’ °}u5i j ^ rSt c ? m ,P’ete account was given by Mommsen in Abhandl. der preussischen Akad. der Wissenschaften (1868) It contains the third, fourth, fifth and fragments of the sixth book ‘and according to Mommsen, whose conclusions are accepted by Madvie (Emend. Lwianae, 2nd ed., 1877, p. 37), it is derived, not from the A icomachean recension, but from an older archetype common to both ■ iV,c rd f de cade our chief authority is the Codex Puteanus, an uncial MS. of the 5th century, now at Paris. For the fourth we r V Jf i W ° ! ad V” g J MS ^~ Cod . ex B ambergensis, nth century, and the slightly older Codex Moguntinus, now lost and only known through the Mainz edition of 1518-15×9. What remains of the fifth decade depends on the §th century Laurishamensis or Vindobonensis from the monastery of Lorsch, edited at Basel in 1531.

A bibliography of the various editions of Livy, or of all that has been written upon him, cannot be attempted here. The following nay be consulted for purposes of reference; W. Engelmann, Scrip- lores Lahnt (8th ed. by E. Preuss 1882); J. E. B. Mayor, Bibliographical Clue to Latin Literature (1875); Teuffel-Schwabe, History of Roman Literature (Eng. trans.), 256, 257; M. Schanz, Geschichte der romischen Litteratur ... 1 (2nd ed., 1899). The best editions of the complete text are those of W. Weissenborn (1858-1862, contain- h”v g Vf” I ” tr n duCt ° ry f ssay , ° T n MvXf life and writings; new edition &?? – xS ,er ‘i l9 % 2) ‘ . an , d J – ^ ^ advig and J- L ” Ussin i? (1863- u T 7 ..) a /”? ° nly En S llsh translation of any merit is by Philemon Holland (1600). (H F P ■ X i

LIZARD (Lat. lacerta 1), a name originally referred only to the small European species of four-legged reptiles, but now applied to a whole order (Lacertilia) , which is represented by numerous species in all temperate and tropical regions. Lizards are reptiles which have a transverse external anal opening (instead of a longitudinal slit as in Crocodilians and tortoises) and which have the right and left halves of the mandibles connected by a sutural symphysis. The majority are distinguished from snakes by the possession of two pairs of limbs, of external ear-openings and movable eyelids, but since in not a few of the burrowing, snake-shaped lizards these characters give way entirely, it is well-nigh impossible to find a diagnosis which should be absolutely sufficient for the distinction between lizards and snakes. In such doubtful cases a number of characters have to be resorted to, and, while each of these may fail when taken singly, their combination decides the question. It is certain that the snakes

have been evolved as a specialized branch from some Lacertilian stock, and that both "orders" are intimately related, but it is significant that it is only through the degraded members of the 1 For the etymology of this word, see Crocodile.

lizards that recent representatives of the two great groups seem to run into each other. Such critical characters are:—

Limbs .

Ear-opening

Eyelids

Tongue.

Teeth .

Mandibles .

Columella cranii

Lizards. 2 pairs, 1 or o.

Usually present. Mostly movable. Often not retractile.

Pleuro- or acrodont, not anchylosed.

Mostly firmly united suturally.

Mostly present.

Mostly with bony arches across the temporal region.

Osteoderms common.

Snakes.

o or vestigial hind- limbs.

Always absent.

No movable lids.

Always bifid and re- tractile into itself.

Acrodont, anchylosed.

Never with suture, mostly ligamentous. Absent.

No bony arches. No osteoderms.

The lizards and snakes are the two dominant reptilian orders which are still on the increase in species, though certainly not in size. As a moderate estimate, the number of recent species of lizards is about 1 700. As a group they are cosmopolitan, their northern lirmt approaching that of the permanently frozen subsoil, while in the southern hemisphere the southern point of Patagonia forms the farthest limit. As we approach the tropics the variety of forms and the number of individuals increase the most specialized and developed forms, and also the most degraded, being found in the tropics. In the temperate regions they hibernate. The majority live on broken ground, with or without much vegetation; many are arboreal and many are true desert animals, while a few are more or less aquatic; one, the leguan of the Galapagos, Amblyrhynchus , even enters the sea. borne, like the majority of the geckos, are nocturnal. In adaptation to these varied surroundings they exhibit great variety in shape, size and structure. Most of these modifications are restricted to the skin, limbs, tail or tongue. Most lizards five on animal food, varying from tiny insects and worms to lizards, snakes, birds and mammals, while others prefer a mixed or an entirely vegetable diet. Accordingly, the teeth and the whole digestive tract are modified. But swiftness, the apparatus necessary for climbing, running and digging, the mechanism of the tongue, the muscles of the jaws (hence modifications of the cranial arches) stand also in correlation with the kind of food and with the way in which it has to be procured. Generally the teeth are conical or pointed, more rarely blunt, grooved or serrated. 1 hey are inserted either on the inner side of the margin of the jaws (pleurodonta) or on the edge of the bones {acrodonta). The tongue is generally beset with more or less scaly or velvety papillae and has always a well-marked posterior margin, while the anterior portion may or may not be more or less retractile into the posterior part.

In many lizards the muscles of the segments of the tail are so loosely connected and the vertebrae are so weak that the tail easily breaks off. The severed part retains its muscular irrita- bility for a short time, wriggling as if it were a living creature. A lizard thus mutilated does not seem to be much affected, and the lost part is slowly reproduced. This faculty is of advantage to those lizards which lack other means of escape when pursued by some other animal, which is satisfied with capturing the detached member.

The motions of most lizards are executed with great but not enduring rapidity. With the exception of the chameleon, all drag their body over the ground, the limbs being wids apart turned outwards and relatively to the bulk of the body generally weak. But the limbs show with regard to development great variation, and an uninterrupted transition from the most perfect condition of two pairs with five separate clawed toes to their total disappearance; yet even limbless lizards retain bony vestiges beneath the skin. The motions of these limbless lizards are similar to those of snakes, which they resemble in their elongate body.

The eggs are elliptical in shape, both poles being equal, and are covered with a shell which may be thin and leathery or hard and calcareous. The number of eggs laid is small in comparison

with other reptiles, rarely exceeding a score, and some like the anolids and the geckos deposit only one or two. The parents leave the eggs to hatch where they are deposited, in sand or in mould. Many lizards, however, retain the eggs in the oviducts until the embryo is fully developed; these species then bring forth living young and are called

ovo-viviparous by purists. Some lizards possess a considerable amount of intelligence; they play with each other, become very tame, and act deliberately according to circumstances. As a rule the Iguanids and Varans are as bright as the Agamas are dull. Many have the power of changing colour, a faculty which they share only with various frogs, toads and fishes. Lizards are not poisonous, with the single exception of Heloderma. \

The Lacertilia, or lizards in the wider sense, fall easily into three natural groups: geckos (q.v.), chameleons (q.v.) and lizards.

I. Suborder, Geckones. Pleurodont lizards with well-developed limbs; without temporal bony arches; postthoracic ribs united across the abdomen. Tongue, thick and broad, slightly nicked anteriorly. With few exceptions they have amphicoelous vertebrae, the parietal bones remain separate and they have no eyelids, with very few exceptions.

1. Family, Geckonidae. — Amphicoelous; parietals separate; clavicles dilated and with a perforation near the ventral end. Cosmo- politan, although mainly tropical, with about 270 species (see Gecko).

Nearly all geckos are nocturnal and the pupil contracts into a vertical slit, except in a few diurnal kinds, e.g. Phelsuma of islands in the Indian Ocean, and Lygodactylus of Africa. Aelurosaurus of Borneo and Australia, and Ptenopus of South Africa, have upper and lower movable eyelids. Whilst the skin is mostly soft on the back, with little granular tubercles, scales (except on the belly) are absent, but they are present in Homopholis, in Geckolepis of Mada- gascar, and most fully developed in Teratoscincus scincus. This peculiar little inhabitant of the steppes and desert regions of Turkestan and Persia, by rubbing the imbricating scales upon each other, produces a shrill cricket-like noise, whilst sitting at night in front of its hole in the ground. Furthermore it is so thoroughly adapted to running upon the desert sand that its digits are devoid of adhesive lamellae. The same beautiful adaptation to the surround- ings exists also in Ptenopus (with fringed toes) and Stenodactylus, which are likewise deserticolous. Aeluronyx of Madagascar and Seychelles has cat-like retractile claws. Naultinus elegans of New Zealand is said to be viviparous ; the others lay but one rather large egg at a time. Many species have a feeble voice which resembles a repeated click of the tongue, and their name ” gecko ” is supposed to be an Indian imitation of the sound.

2. Family, Uroplatidae. — Amphicoelous; parietals separate; but the nasal bones are fused together, and the clavicles are not dilated. Genus Ur opiates, with a few species, e.g. U. fimbriates in Madagascar.

3. Family, Eublepharidae. — Procoelous; parietals united; eye- lids functional ; clavicles expanded as in the true geckos which they resemble in other respects. The few genera and species are un- doubtedly a heterogeneous assembly, as indicated by their very scattered distribution, but they all agree in their decidedly handsome colour pattern, bands of dark brown to maroon upon a light ground. Eublepharis, with one species each in Panama, Mexico, Texas and California; two in India. Coleonyx elegans in forests of Central America and Mexico. Psilodactylus in West Africa.

II. Suborder, Chamaeleontes. Acrodont, Old World lizards, with laterally compressed body, prehensile tail and well developed limbs with the digits arranged in opposing, grasping bundles of two and three respectively. The chameleons (q.v.) have many structural peculiarities.

III. Suborder, Lacertae. Procoelous vertebrae; ventral por- tions of the clavicles not dilated ; parietal bones fused into one.

The general appearance is too misleading for the classification of the Lacertae. E. D. Cope (Proc. Ac. Philad., 1864, pp. 224 et seq. and Proc. Amer. Ass. xix., 1871, p. 236, &c.) therefore relied upon more fundamental characters, notably the presence Or absence of osteoderms, the formation of the skull, the teeth and the tongue. G. A. Boulenger (Ann. Nat. Hist. 5, xiv., 1884, p. 117, &c.) has further improved upon the

then prevailing arrangements, and has elaborated a classification which, used by himself in the three volumes of the catalogue of lizards in the British Museum, is followed in the present article with slight alterations in the order of treatment of the families. In the following diagnoses of the families preference is given to such characters as are most easily ascertained.

The 17 " families " fall into 4 or 5 main groups. Presumably the presence of osteoderms and of complete cranial arches are more archaic than their absence, just as we conclude that limbless forms have been evolved from various groups possessed of fully developed limbs. Zonuridae and Anguidae assume a central position, with Agamidae and Iguanidae as two parallel families (not very different from each other) of highest development, one in the Old World, the other in America. Xenosaurus seems to be an offshoot intermediate between the Iguanidae and the Anguidae; a degraded form of

latter is perhaps Aniella of California, whilst Heloderma and Lanthanolus are also specialized and isolated offshoots. A second group is formed by the few American Xantusiidae, the numerous American Tejidae, and the burrowing, degraded American and African Amphisbaenidae. A third group comprises the cosmopolitan Scincidae, the African and Malagasy Gerrhosauridae which in various features remind us of the Anguidae, and the African and Eurasian Lacertidae which are the highest members of this group. Anely- tropidae and perhaps also Dibamidae may be degraded Scincoids. The Varanidae stand quite alone, in many respects the highest of all lizards, with some, quite superficial, Crocodilian resemblances. Lastly there are the few Pygopodidae of the Australian region, with still quite obscure relationship.

Family 1. Agamidae. — Acrodont; tongue broad and thick, not protractile; no osteoderms. Old World.

The agamas have always two pairs of well-developed limbs. The teeth are usually differentiated into incisors, canines and molars. The skin is devoid of ossifications, but large and numerous cutaneous spines are often present, especially on the head and on the tail. The family, comprising some 200 species, with about 30 genera, shows great diversity of form; the terrestrial members are mostly flat- bodied, the arboreal more laterally compressed and often with a very long tail. Most of them are insectivorous, but a few are almost entirely vegetable feeders. They are an exclusively Old World family ; they are most numerous in Australia (except New Zealand) and the Indian and Malay countries; comparatively few live in Africa (none in Madagascar) and in the countries from Asia Minor to India.

The majority of the ground-agamas, and the most common species of the plains, deserts or rocky districts of Africa and Asia, belong to the genera Stellio and Agama. Their scales are mixed with larger prominent spines, which in some species are particularly developed on the tail, and disposed in whorls. Nearly all travellers in the north of Africa mention the Hardhdn of the Arabs (Agama stellio), which is extremely common, and has drawn upon itself the hatred of the Mahommedans by its habit of nodding its head, which they interpret as a mockery of their own movements whilst en- gaged in prayer. In some of the Grecian islands they are still called korkordilos, just as they were in the time of Herodotus. Uromastix is one of the largest of ground-agamas, and likewise found in Africa and Asia. The body is uniformly covered with granular scales, whilst the short, strong tail is armed with powerful spines disposed in whorls. The Indian species (U. hardwicki) is mainly herbivorous; the African U. acanthinurus and U. spinipes, the Dab of the Arabs, take mixed food. Phrynocephalus is typical of the steppes and deserts of Asia. Ceratophora and Lyriocephalus scutatus, the latter remarkable for its chameleon-like appearance, are Ceylonese. Calotes, peculiar to Indian countries, comprises many species, e.g. C. ophiomachus, generally known as the " bloodsucker on account of the red colour on the head and neck displayed during excitement. Draco (see Dragon) is Indo-Malayan. Physignathus is known from Australia to Cochin China.

Of the Australian agamas no other genus is so numerously repre- sented and widely

distributed as Grammatophora, the species of which grow to a length of from 8 to 18 in. Their scales are generally rough and spinous; but otherwise they possess no strikingly distinguishing peculiarity, unless the loose skin of their throat, which is transversely folded and capable of inflation, be regarded as such. On the other hand, two other Australian agamoids have attained some celebrity by their grotesque appearance, due to the extraordinary development of their integuments. One (fig. 1) is the frilled lizard (Chlamy- dosaurus kingi), which is restricted to Queensland and the north coast, and grows to a length of 3 ft., including the long tapering tail. It is provided with a frill-like fold of the skin round the neck, which, when erected, resembles a broad collar. This lizard when startled rises with the fore-legs off the ground and squats and runs on its hind-legs. The other lizard is one which most appropriately has been called Moloch horridus. It is covered with large and small spine-bearing tubercules; the head is small and the tail short. It. is sluggish in its movements, and so harmless that its armature and (to a casual observer) repulsive appearance are its sole means of defence. It grows only to a length of 10 in., and is not uncommon in the flats of South and West Australia.

Family 2. Iguanidae. — Pleurodont; tongue broad and thick, not protractile; no osteoderms. America, Madagascar and Fiji Islands.

According to the very varied habits, their external appearance varies within wide limits, there being amongst the 300 species, with 50 genera, arboreal, terrestrial, burrowing and semi-aquatic forms, and even one semi-marine kind. All have well-developed limbs. In their general structure the Iguanidae closely resemble the Agamidae, from which they differ mainly by the pleurodont dentition. Most of them are insectivorous. Some, especially Anolis and Polychrus, can change colour to a remarkable extent. The family ranges all through the neotropical region, inclusive of the Galapagos and the Antilles, into the southern and western states of North America. Remarkable cases of discontinuous distribution are Chalarodon and Hoplodon in Madagascar, and Brachylophus fasciatus in the Fiji Islands. Conolophus subcristatus and Amblyrhynchus cristatus inhabit the Galapagos; the former feeds upon cactus and

leaves, the latter is semi-marine, diving for the algae which grow below tide-marks. For Basiliscus see Basilisk; Iguana is dealt with under its own heading; allied is Metopoceros cornutus of Hayti. Polychrus, the “chameleon,” and Liolaemus are South American; Ctcnosaura of Central America and Mexico resembles the agamoid Uromastix. Corythophanes and Laemanctus, with only a few species, are rare inhabitants of the tropical forests of Central America and Mexico. Sauromalus, Crotaphytus, Callisaurus, Holbrookia, Uma, Ula are typical Sonoran genera, some ranging from Oregon through Mexico. Allied is Sceloporus, with about 34 species, the most characteristic genus of Mexican lizards; only 4 species live in the United States, and only 3 or 4 are found south of the Isthmus of Tehuantepec and are restricted to Central America. The majority are humivagous, while others are truly arboreal, e.g. S. microlepidotus, a species which, moreover, has the greatest possible altitudinal range, from the hot country of southern Oaxaca to the upper tree-line of Citlaltepetl, about 13,500 ft. elevation; many species are viviparous. Phrynosoma, with about a dozen species, the ” horned toads ” of California to Texas, and through Mexico. Some of these comical- looking little creatures are viviparous, others deposit their eggs in the ground. They are well concealed by the colour of their upper parts, which in most cases agrees with the prevailing tone of their surroundings, mostly arid, stony or sandy localities; the large spikes

Fig. 1. — Frilled Lizard (Chlamydosaurus kingi).

on the head protect them from being swallowed by snakes. The enlarged spiny scales scattered over the back look as if it were sprinkled with the dried husks of seeds. They

are entirely insectivor- ous, bask on the broiling hot sand and then can run fast enough; otherwise they are sluggish, dig themselves into the sand by a peculiar shuffling motion of the fringed edges of their flattened bodies, and when surprised they feign death. The statement, persistently repeated (O. P. Hay, Proc. U.S. Nat. Mus. xv., 1892, pp. 375-378), that some, e.g. P. blainvillei of California, have the power of squirting a blood-red fluid from the corner of the eye, still requires renewed investigation.

The smallest lizards of this family belong to the genus Anolis, extremely numerous as regards species (more than 100) and indi- viduals on bushes and trees of tropical America, and especially of the West Indies. They offer many points of analogy to the humming birds in their distribution, colours and even disposition. Hundreds may be seen on a bright day, disporting themselves on trees and fences, and entering houses. Like the iguanas, they (at least the males) are provided with a large, expansible dewlap at the throat, which is brilliantly coloured, and which they display on the slightest provocation. This appendage is merely a fold of the skin, orna- mental and sexual ; it has no cavity in its interior, and has no com- munication with the mouth or with the respiratory organs; it is supported by the posterior horns of the hyoid bone, and can be erected and spread at the will of the animal. The presence of such dewlaps in lizards is always a sign of an excitable temper. Many, e.g A . carolinensis, the ” chameleon,” Can change colour to an extra- ordinary degree. They are much fed upon by birds and snakes, and have a fragile tail, easily reproduced. They bring forth only one large egg at a time, but probably breed several times during the

Family 3. Xenosauridae. — Pleurodont; solid teeth; anterior part of tongue slightly emarginate and retractile, and covered with flat papillae ; no osteoderms. Mexico.

The only representative of this family is Xenosaurus grandis, recorded from the mountains of Orizaba, Cordoba and Oaxaca. The four-footed creature is less than I ft. in length; the body is de- pressed, covered above with minute granules and tubercles; a distinct fold of skin extends from the axilla to the groin, reminding of the similar fold of some Anguidae, to which this singular genus seems to be allied.

Family 4. Anguidae. — Pleurodont; teeth solid, sometimes (Ophiosaurus) grooved ; anterior part of tongue emarginate and re- tractile into the posterior portion ; osteoderms on the body, and especially on the head where they are roofing over the temporal fossa; entirely zoophagous and ovo- viviparous. America, Europe and India.

Gerrhonotus, 8 species, in mountainous countries, from British Columbia to Costa Rica; like Diploglossus s. Celestus of Mexico, the Antilles and Central America, with well-developed limbs, but with a lateral fold. Anguis fragilis and two species of Ophiosaurus are the only members of this family which are not American, and even the third species of Ophiosaurus, O. centralis, lives in the United States. Ophiosaurus s. Pseudopus, the glass-snake, from Morocco and the Balkan peninsula to Burma and Fokien; also in the U.S.A., with the limbs reduced to a pair of tiny spikes near the vent, and a lateral fold along the snake-like body. Anguis, with its sole species fragilis, the slow- worm or blind- worm, is devoid of a lateral fold, and the limbs are entirely absent. Europe, Algeria and western Asia.

Family 5. Helodermatidae, with Heloderma of Arizona and Mexico, and Lanlhanotus of Borneo. — The teeth of Heloderma are recurved, with slightly swollen bases, loosely attached to the inner edge of the jaws; each tooth is grooved, and those of the lower jaw are in close vicinity of the series of labial glands which secrete a poison; the only instance among lizards. 1 Limbs well developed. Tongue re- sembling that of the Anguidae. The skin of the upper surface is granular, with many irregular bony tubercles which give it an ugly warty look. H. horridum in Mexico, and H. suspectum, the gila monster, in the hot and sandy lowlands of the Gila basin. The animal, which reaches a length of more than 2 ft., is blackish-brown and yeilow or orange, and on the thick tail these ” warning colours ” are arranged in alternate rings. Small animals are probably paralyzed or killed by the bite, the poison being effective enough to produce

severe symptoms even in man. The Zapotecs, who call the creature Talachini, and other tribes of Mexico have endowed it with fabulous properties and fear it more than the most poisonous snakes. Lanlhanotus corneensis, of which only a few specimens are known, is apparently closely allied to Heloderma, although the teeth are not grooved, osteoderms are absent and probably also the poison glands. Family 6. Aniellidae. — One genus, Aniella, with a few worm- or snake-shaped species in California, which seem to be degraded forms of Anguidae. The eyes and ears are concealed, the limbs are entirely absent, body and tail covered with soft, imbricating scales. The tongue is villose, smooth, bifid anteriorly. The few teeth are re- curved, with swollen bases. The skull is much reduced. Total length of A . pulchra up to 8 in. •

Family 7, Zonuridae. — Pleurodont; tongue short, villose, scarcely protractile, feebly nicked at the tip. With osteoderms at least upon the skull, where they roof in the temporal region. Africa and Madagascar.

Only 4 genera, with about 15 species. Zonurus of South Africa and Madagascar has the whole head, neck, back and tail covered with strong bony scales, the horny covering of which forms sharp spikes, especially on the tail. They defend themselves by jerking head and tail sidewards. Z. giganteus reaches 15 in. in length, and is, like the other members of the family, zoophagous. The other genera live in southern and in tropical Africa: Pseudocordylus, Plalysaurus and Chamaesaura ; the latter closely approaches the A nguidae by its snake-shaped body, very long tail and much reduced limbs, which in C. macrolepis are altogether absent.

Family 8. Xantusiidae. — Pleurodont; tongue very short and scaly; no osteoderms; supratemporal fossa roofed over by the cranial bones; eyes devoid of movable lids; tympanum exposed; femoral pores present ; limbs and tail well developed. American.

Xantusia (so named after Xantus, a Hungarian collector), e.g. X. vigilis and a few other species from the desert tracts of Nevada and California to Lower California. Lepidophyma flavomaculatum. Central America ; and Cricosaura typica in Cuba.

Family 9. Tejidae. — Teeth solid, almost acrodont; tongue long and narrow, deeply bifid, beset with papillae; no osteoderms; scales of the back very small or quite granular; limbs sometimes reduced. America.

This large, typically American family comprises more than 100 species which have been arranged in many genera. Some are entirely arboreal, dwellers in forests, while others, like Cnemidophorus and Ameiva, are strictly terrestrial, with great running powers; a few dwell below the surface and are transformed into almost limbless

1 For anatomical detail and experiments, see R. W. Shufeldt, P.Z.S. (1890), p. 178; G. A. Boulenger, ibid. (1891), p. 109, and C. Stewart, ibid. (1891), p. 119.

worm-shaped creatures. The family is essentially neotropical. Of its several dozen genera only two extend through and beyond Central America: Ameiva into the eastern and western Hot-lands of Mexico, Cnemidophorus (monographed by H. Gadow, Proc. Zool. Soc, 1906, pp. 277-375) through Mexico into the United States, where C. sexlinealus, the ” swift,” has spread over most of the Union. Tupinambis teguixin, the ” teju” of South America and the West Indies, is the largest member of the family; it reaches a length of a yard, most of which, however, belongs to the strong, whip-like tail. Teguixin is taken from the Aztec teco-ixin, i.e. rock-lizard, the vernacular name of Sceloporus torquatus which is one of the Iguanidae misspelt and misapplied. The tejus frequent forests and plantations and are carnivorous, eating anything they can overpower. They in turn are much hunted for the sake of their delicate flesh. They defend themselves not only with their powerful jaws and sharp claws, but also with lashing strokes of the long tail. They also use this whip for killing snakes which they

are said to eat. Their long-oval, hard- shelled eggs are deposited in the ground. They retire into self-dug burrows. Cophias and Scolecosaurus have very much reduced limbs. In the genus Tejus the teeth of the adult become molar-like; and in Dracaena they are transformed into large, oval crushers, indicating strictly herbivorous habits, while most members of the family live upon animal food.

Family 10. Amphisbaenidae. — The body is covered with soft skin, forming numerous rings with mere vestiges of scales. Worm- shaped, without limbs, except Chirotes which has short, clawed fore- limbs. Eyes and ears concealed. Tongue slightly elongated, covered with scale-like papillae and bifurcating. Tail extremely short. Acrodont or pleurodont. America, Mediterranean countries, and Africa with the exception of Madagascar.

Chirotes canaliculars, and two other species; Pacific side of Mexico and Lower California. With five, four or three claws on the stout little digging fore-limbs. These pink, worm-like creatures live in sandy, moist localities, burrowing little tunnels and never appear- ing on the surface. Amphisbaena (q.v.). Rhin'eura of Florida, and also known from the Oligocene of South Dakota; Lepidosternum of South America; and Anops in America and Africa; Blanus cinereus, Mediterranean countries. Trogonophis, P achy calamus and Aga- modon of Africa are all acrodont; the other genera are pleurodont. In all about a dozen genera, with some 60, mostly tropical species.

Family 11. Scincidae. — Pleurodont Tongue scaly, feebly nicked in front. Osteoderms on the head and body. Limbs often reduced. Cosmopolitan. The temporal region is covered over, as in the Lacertidae and Anguidae, with strongly developed dermal ossifica- tions. Similar osteoderms underlie the scales of the body and tail. Femoral pores are absent.

All the skinks seem to be viviparous, and they prefer dry, sandy ground, in which they burrow and move quickly about in search of their animal food. This partly subterranean life is correlated with the frequent reduction of the limbs which, in closely allied forms, show every stage from fully developed, five-clawed limbs to complete absence. Some have functional fore-limbs but mere vestiges of hind-limbs; in others this condition is reversed. In some desertic- otaus kinds e.g. Ablepharus, the lower eyelid is transformed into a transparent cover which is fused with the rim of the reduced upper lid. The same applies to the limbless little Ophiopsiseps nasutus of Australia. This large family contains about 400 species, with numerous genera; the greatest diversity in numbers and forms occurs in the tropical parts of the Old World, especially in the Australian region, inclusive of many of the Pacific islands. New Zealand has at least 6 species of Lygosoma. America, notably South America, has comparatively very few skinks.

The skink, which has given the name to the whole family, is a small lizard (Scincus officinalis) of 6 or 8 in. in length, common in arid districts of North Africa and Syria. A peculiarly wedge-shaped snout, and toes provided with strong fringes, enable this animal to burrow rapidly in and under the sand of the desert. In former times large quantities of it were imported in a dry state into Europe for officinal purposes, the drug having the reputation of being efficacious in diseases of the skin and lungs; and even now it may be found in apothecaries' shops in the south of Eurcpe, country people regarding it as a powerful aphrodisiac for cattle.

Mabouia, with many species, in the whole of Africa, southern Asia and in tropical America. M. (Euprepes) vittata, the " poisson de sable " of Algeria, is semi-aquatic. Chalcides s. Seps, of the Mediter- ranean countries and south-western Asia, has a transparent disk on the lower eyelid which is movable; limbs very short or reduced to mere vestiges. Lygosoma circumtropical ; Eumeces, also with many small species, in America, Africa and Asia. Cyclodus s. Tiliqua of Australia, Tasmania and Malay Islands, has stout lateral teeth with rounded-off crowns ; C. gigas of the Moluccas and of New Guinea is the largest member of the family, reaching a length of nearly 2 ft.; the limbs are well developed, as in Trachysaurus rugosus of Australia, which is easily recognized

by the large and rough scales and the short, broad, stump-like tail.

Family 12. Anelytropidae. — An artificial assembly of a few de- graded Scincoids. The worm-shaped body is devoid of osteoderms. The tongue is short, covered with imbricating papillae and slightly nicked anteriorly. Teeth pleurodont. A nelytropsis papillosus, of which only three specimens are known, from the humus of forests

in the state of Vera Cruz. Eyes concealed. Typhlosaurus and Feylinia in tropical Africa and Madagascar.

Family 13. Dibamidae. — Dibamus novae-Guineae of New Guinea, the Moluccas, Celebes and the Nicobar Islands. Tongue arrow- shaped, covered with curved papillae. The vermiform body is covered with cycloid imbricating scales, devoid of osteoderms. Limbs and even their arches are absent, excepting a pair of flaps which represent the hind-limbs in the males.

Family 14. Gerrhosauridae. — Pleurodont. Tongue long, with papillae, like that of the Lacertidae but only feebly nicked anteriorly. Osteoderms on the head and body, roofing over the temporal region. Femoral pores present, also mostly a lateral fold. Limbs sometimes reduced to small stumps. Tail long and brittle. The few genera and species of this family are restricted to Africa, south of the Sahara and Madagascar.

Gerrhosaurus, with. lateral fold and complete limbs; Tetradactylus also with a fold, but with very variable limbs; Condylosaurus ; all in Africa. Zonosaurus and Tracheloptychus in Madagascar.

Family 15. Lacertidae. — Pleurodont. Tongue long and bifid, with papillae or folds, with osteoderms on the head but not on the body. Limbs always well developed. Palaearctic and palaeotrOpical with the exception of Madagascar; not in the Australian region.

The Lacertidae or true lizards comprise about 20 genera, with some 100 species, most abundant in Africa; their northern limit coincides fairly with that of the permanently frozen subsoil. They all are terrestrial and zoophagous. The long, pointed tail is brittle.

Most of the European lizards with four well developed limbs belong to the genus Lacerta. Only three species occur in Great Britain (see fig. 2). _ The common lizard (Lacerta vwipara) frequents heaths and banks in England and Scotland, and is locally met with also in

Fig. 2. — Heads of British Lizards, a, Lacerta vivipara; b, L. agilis; c, L. viridis.

Ireland; it is viviparous. Much scarcer is the second species, the sand-lizard (Lacerta agilis), which is confined to some localities in the south of England, the New Forest and its vicinity; it does not appear to attain on English soil the same size as on the continent of Europe where it abounds, growing sometimes to a length of 9 in. Singularly, a snake (Coronella laevis), also common on the continent, and feeding principally on this lizard, has followed it across the British Channel, apparently existing in those localities only in which the sand-lizard has settled. This lizard is oviparous. The males differ by their brighter green ground colour from the females, which are brown, spotted with black. The third British species, the green lizard (Lacerta viridis), does not occur in England proper; it has found a congenial home in the island of Guernsey, but is there much less developed as regards size and beauty than on the continent. This species is larger than the two preceding; it is green, with minute blackish spots. In Germany and France one other species only (Lacerta muralis) appears; but in the south of Europe the species of Lacerta are much more numerous, the largest and finest, being L. ocellata, which grows to a length of 18 or 20 in., and is brilliantly green, ornamented with blue eye-like spots on the sides. Even the small island-rocks of the Mediterranean, sometimes only a few hundred yards in diameter, are occupied by peculiar races of lizards, which have attracted much attention from the fact that they have assumed under such isolated conditions a more or less dark, almost

black, coloration. L. muralis, with its numerous varieties, has been monographed by G. A. Boulenger, Trans. Zool. Soc. xvii. (1905), PP- 351-422. pl- 22-29.

Other genera are Psammodromus and Acanthodactylus in south- western Europe and northern Africa. Cabrita in India, with trans- parent lower eyelids. Ophiops, likewise with transparent but united lids, from North Africa to India.

Family 16. Varanidae. — Pleurodont. Tongue very long, smooth and bifid. Osteoderms absent. Limbs always well developed. Old World.

This family contains only one genus, Varanus, with nearly 30 species, in Africa, Arabia and southern Asia, and Australia, but not in Madagascar. The generic term is derived from the Arabic Oudran, which means lizard. Owing to a ridiculous muddle, this Arabic Word has been taken to mean ” warning ” lizard, hence the Latin Monitor, one of the many synonyms of this genus, now often used as the

vernacular. Many of the ” monitors ” are semi-aquatic, e.g. V. niloticus, and these have a laterally compressed tail ; others inhabit dry sandy districts, e.g. V. scincus, the ouaran el ard of North Africa; others prefer wooded localities. V. salvator is the largest species, reaching a length of 7 ft. ; it ranges from Nepal and southern China

Fig. 3.— Monitor of the Nile (Varanus niloticus).

to Cape York; a smaller species, common in New Guinea and 1 Australia, is V. gouldi. They all are predaceous, powerful creatures, with a partiality for eggs. Their own eggs are laid in hollow trees, or buried in the sand. The young are prettily spotted with white and black ocelli, but the coloration of the adult is mostly very plain.

The following families are much degraded in conformity with their, in most cases, subterranean life. They are of doubtful relationships and contain each but a few species.

Family 17. Pygopodidae. — Pleurodont, snake-shaped, covered with roundish, imbricating scales. Tail long and brittle. Fore- limbs absent; hind-limbs transformed into a pair of scale-covered flaps. Tongue slightly forked. Eyes functional but devoid of movable lids. Australia, Tasmania and New Guinea.

Pygopus, e.g. P. lepidopus, about 2 ft. long, two-thirds belonging to the tail, distributed over the whole of Australia.

Lialis burtoni, of similar size and distribution, has the hind-limbs reduced to very small, narrow appendages. The members of this family seem to lead a snake-like life, not subterranean, and some are said to eat other lizards. L. jicari, from the Fly river, has a very snake-like appearance, with a long, pointed snout like certain tree- snakes, but with an easily visible ear-opening; their eyelids are reduced to a ring which is composed of two or three rows of small scales. (H. F. G.)

LIZARD POINT, or The Lizard, the southernmost point of Great Britain, in Cornwall, England, in 49° 57′ 30″ N., 5° 12′ W. It is generally the first British land sighted by ships bound up the English Channel, and there are two lighthouses on it. The cliff scenery is magnificent, and attracts many visitors. The coast is fretted into several small bays, such as Housel and, most famous of all, Kynance Cove; caves pierce the cliffs at many points, and bold isolated rocks fringe the shore. The coloured veining of the serpentine rock is a remarkable feature. The Lion’s Den is a chasm formed by the falling in of a sea-cave in 1847; the Stags is a dangerous reef stretching southward from the point, and at Asparagus Island, Kynance Cove, is a natural funnel in which the air is compressed by the waves and causes a violent ejection of foam. The principal village is

Lizard Town, io| m. from Helston, the nearest railway station.

UUNGGREN, GUSTAF HAKAN JORDAN (1823-1905), Swedish man of letters, was born at Lund on the 6th of March 1823. He was educated at Lund university, where he was professor of German (1850-1859), of aesthetics (1859-1889) and rector (1875-1885). He had been a member of the Swedish Academy for twenty years at the time of his death in September 1905. His most important work, Svenska vitterhctens hdfder efler Gustav III.'s dod (5 vols., Lund., 1873-1895), is a comprehensive study of Swedish literature in the 19th century. His other works include : Framslallning af de fornamste estcliska systemema (an exposition of the principal system of aesthetics; 2 vols., 1856-1860); Svenska dramat intill slutet af 17 arhundradet (a history of the Swedish drama down to the end of the 17th century, Lund, 1864); an edition (1864) of the Epistlar of Bell- man and Fredman, and a history of the Swedish Academy in the year of its centenary (1886).

His scattered writings were collected as Smarre Skrifter (3 vols.,

1872-1881).

LLAMA, the Spanish modification of the Peruvian name of the larger of the two domesticated members of the camel- tribe indigenous to South America. The llama (Lama kuanacus glama) is a domesticated derivative of the wild guanaco, which

has been bred as a beast of burden. Chiefly found in southern Peru, it generally attains a larger size than the guanaco, and is usually white or spotted with brown or black, and some- times altogether black. The following account by Augustin de Zarate was given

in 1544:

"In places where

there is no snow, the natives want water, and to supply this they fill the skins of sheep with water and make other living sheep carry them, for, it must be re- marked, these sheep of Peru are large enough to serve as beasts of burden. They can carry about one hundred pounds or more, and the Spaniards used to ride them, and they would go four or five leagues a day. When they are weary they lie down upon the ground, and as there are no means of making them get up, either by beating or assisting them, the load must of necessity be taken off. When there is a man on one of them, if the beast is tired and urged to go on, he turns his head round, and discharges his saliva, which has an un-

pleasant odour, into the rider's face. These animals are of great use and profit to their masters, for their wool is very good and fine, particularly that of the species called pacas, which have very long fleeces ; and the expense of their food is trifling, as a handful of maize suffices them, and they can go four or five days without water. Their flesh is as good as that of the fat sheep of Castile. There are now public shambles for the sale of their flesh in all parts of Peru, which was not the case when the Spaniards came first ; for when one Indian had killed a sheep his neighbours came and took what they wanted, and then another Indian killed a sheep in his turn."

The disagreeable habit of spitting is common to all the group. In a wide sense the term " llama " is used to designate all the South American Camelidae. (See Tylopoda.)

LLANBERIS, a town of Carnarvonshire, N. Wales, 8£ m. E. by S. of Carnarvon, by a branch of the London & North- western railway. Pop. (1001) 3015. It is finely situated in a valley near the foot of Snowdon. The valley has two lakes, Llyn Peris and Llyn Padarn, of over 1 m. and 2 m. long

respectively, about i m. apart. From Padarn rises the Seint, called Rothell in its upper part. Dolbadarn Castle is a circular tower near the foot of Peris lake. Dolbadarn means the " Padarn meadow." Several Welsh churches are dedicated to Padarn. In the castle Owen Goch (Owen the Red) was imprisoned from 1254 to 1277, by the last Llewelyn, whose brother Dafydd held it for some time against Edward I. During the time of Owen Glendower (temp. Henry IV. and Henry V.), the castle often changed hands. Near is Ceunantmawr waterfall. The Vaenol slate quarries are here, and hence is the easiest ascent of Snowdon, with a railway to the summit. From the road over the fine Llanberis pass towards Capel Curig, a turn to the right leads to Beddgelert, through Nant Gwynnant (" white " or " happy valley," or " stream "), where Pembroke and Ieuan ap Robert (for the Lancastrians)had many skirmishes in the time of Edward IV. Gwynnant Lake is about 1 m. long, by j m. broad, and below it is the smaller Llyn Dinas.

LLANDAFF, a city of Glamorganshire, Wales, on the Taff Vale railway, 149 m. from London. Pop. (1001) 5777. It is almost entirely within the parliamentary borough of Cardiff. It is nobly situated on the heights which slope towards the southern bank of the Taff. Formerly the see of Llandaff was looked upon as the oldest in the kingdom; but its origin is obscure, although the first two bishops, St Dubricius and St Teilo, certainly flourished during the latter half of the 6th century. By the 1 2th century, when Urban was bishop, the see had acquired great wealth (as may be seen from the Book of Llandaff, a collec- tion of its records and land-grants compiled probably by Geoffrey of Monmouth), but after the reign of Henry VIII. Llandaff, largely through the alienations of its bishops and the depreda- tions of the canons, became impoverished, and its cathedral was left for more than a century to decay. In the 18th century a new church, in debased Italian style, was planted amid the ruins. This was demolished and replaced (1844-1869) by the present restored cathedral, due chiefly to the energy of Dean Williams. The oldest remaining portion is the chancel arch, belonging to the Norman cathedral built by Bishop Urban and opened in 1 1 10. Jasper Tudor, uncle of Henry VII., was the architect of the north-west tower, portions of which remain. The cathedral is also the parish church. The palace or castle built by Urban was destroyed, according to tradition, by Owen Glendower in 1404, and only a gateway with flanking towers and some frag- ments of wall remain. After this, Mathern near Chepstow became the episcopal residence until about 1690, when it fell into decay, leaving the diocese without a residence until Llandaff Court was acquired during Bishop Ollivant's tenure of the see 1849-1882). For over 120 years the bishops had been non- resident. The ancient stone cross on the green (restored in 1897) is said to mark the spot on which Archbishop Baldwin, and his chaplain Giraldus Cambrensis, preached the Crusade in 1187. Money bequeathed by Thomas Howell, a merchant, who died in Spain in 1540, maintains an intermediate school for girls, managed by the Drapers' Company, Howell's trustees. There is an Anglican theological college, removed to Llandaff from Aberdare in 1907. The city is almost joined to Cardiff, owing to the expansion of that town.

Llandaff Court, already mentioned, was the ancient mansion of the Mathew family, from which Henry Matthews, 1st Viscount Llandaff (b. 1826), was descended. Another branch of this family formerly held the earldom of Llandaff in the Irish peerage. Henry Matthews, a barrister and Conservative M.P., whose father was a judge in Ceylon, was home secretary 1886- 1892, and was created viscount in 1895.

LLANDEILO GROUP, in geology, the middle subdivision of the British Ordovician rocks. It was first described and named by Sir. R. I. Murchison from the neighbourhood of Llandeilo in Carmarthenshire. In the type area it consists of a series of slaty rocks, shales, calcareous flagstones and sandstones; the calcareous middle portion is sometimes termed the " Llandeilo limestone"; and in the upper portion volcanic rocks are inter- calated. A remarkable feature in the history of the Llandeilo rocks in Britain, more especially in North Wales and Cumberland,

was the outbreak of volcanic action; vast piles of Llandeilo lava and ashes form such

hills as Cader Idris, and the Arenigs in Wales, and Helvellyn and Scafell in Westmorland and Cumberland. The series is also found at Builth and in Pembrokeshire. The average thickness in Wales is about 2000 ft. The group is usually divided in this area into three sub-divisions. In the Corndon distrjct of Shropshire the Middleton Series represents the Llandeilo group; it includes, in descending order, the Rorrington black shales, the Meadowlown limestones and flags, and the western grits and shales. In the Lake District the great volcanic series of Borrowdale, green slates and porphyries, 8000 to 9000 ft. in thickness, lies on this horizon; and in the Cross Fell area the Milburn beds of the Skiddaw slates (see Arenig) appear to be of the same age. In Scotland the Llandeilo group is represented by the Glenkiln shales, black shales and yellowish mudstones with radiolarian cherts and volcanic tuffs; by the Barr Series, including the Benan conglomerates, Stinchar lime- stone and Kirkland sandstones; and by the Glenapp con- glomerates and Tappinsstnudstones and grits south of Stinchar. Graptolitic shales, similar to those of southern Scotland, are traceable into the north-east of Ireland.

The fossils of the Llandeilo group include numerous graptolites, Coenograptus gracilis being taken as the zonal fossil of the upper portion, Didymograptus Murchisoni of the lower. Other forms are Climacograptus Scharenbergi and Diplograptus foliaceus. Many trilobites are found in these rocks, e.g. Ogygia Buchi, Asaphus tyrannus, Calymene cambrensis, Cheirurus Sedgwickii. Among the brachiopods are Crania, Leptaena, Lingula, Strophomena; Cardiola and Modiolopsis occur among the Pelecypods ; Euomphalus, Bellero- phon, Murchisonia among the Gasteropods; Conularia and Hyolithes among the Pteropods; the Cephalopods are represented by Ortho- ceras and Cyrtoceras. The green roofing slates and plumbago (graphite) of the Lake District are obtained from this group of rocks, (see Ordovician).

LLANDILO, or Llandeilo Fa we, a market town and urban district of Carmarthenshire, Wales, picturesquely situated above the right bank of the river Towy. Pop. (1901) 1721. Llandilo is a station on the Mid- Wales section of the London & North- western railway, and a terminus of the Llandilo-Llanelly branch ‘ line of the Great Western. The large parish church of St Teilo has a low embattled Perpendicular tower. Adjoining the town is the beautiful park of Lord Dynevor, which contains the ruined keep of Dinefawr Castle and the residence of the Rices (Lords Dynevor), erected early in the 17th century but modernized in 1858. Some of the loveliest scenery of South Wales lies within reach of Llandilo, which stands nearly in the centre of the Vale of Towy.

The name of Llandilo implies the town’s early foundation by St Teilo, the great Celtic missionary of the 6th century, the friend of St David and reputed founder of the see of Llandaff. The historical interest of the place centres in its proximity to the castle of Dinefawr, now commonly called Dynevor, which was originally erected by Rhodri Mawr or his son Cadell about the year 876 on the steep wooded slopes overhanging the Towy. From Prince Cadell ‘s days to the death of the Lord Rhys, last reigning prince of South Wales, in 1196, Dinefawr continued to be the recognized abode of South Welsh royalty. The castle ruins remain in the possession of the Rices, Lords Dynevor, heirs and descendants of Prince Cadell. At one period residence and park became known as New-town, a name now obsolete. Some personal relics of the celebrated Sir Rhys ap Thomas, K.G. (1451-1527), are preserved in the modern house. Dinefawr Castle and its estates were granted away by Henry VIII. on the execution for high treason of Sir Rhys’s grandson, Rhys ap Griffith, but were restored to the family under Queen Mary.

LLANDOVERY (Llan-ym-ddyjfri) , a market town and ancient municipal borough of Carmarthenshire, Wales, situated amid hills near the left bank of the Towy. Pop. (1901) 1809. Llan- dovery is a station on the Mid- Wales section of the London & North Western railway. The old-fashioned town lies in the parish of Llandingat, and contains the two churches of Llandingat and Llanfair-ar-y-bryn. The slight remains of the castle stand on a hillock above the river Bran. The public school was founded here by Sir Thomas Phillips in 1847.

The place probably owes its Celtic name of Llan-ym-ddyffri (the church amid the waters) to the proximity of LJandingat church to the streams of the Towy, Bran and Gwydderig. On account of its commanding position at the head of the fertile vale of Towy, Llandovery was a strategic site of some importance in the middle ages. The castle erected here by the Normans early in the 12th century frequently changed owners during the course of the Anglo-Welsh wars before 1282. In 1485 the borough of Llandovery, or Llanymtheverye, was incorporated by a charter from Richard III., and this king's privileges were subsequently confirmed by Henry VIII. in 1521, and by Elizabeth in 1590, the Tudor queen's original charter being still extant and in the possession of the corporation, which is officially styled " the bailiff and burgesses of the borough of Llanym- theverye, otherwise Llandovery." The bailiff likewise holds the office of recorder, but has neither duties nor emoluments. In the 17th century the vicarage of Llandingat was held by the celebrated Welsh poet and preacher, Rhys Prichard, commonly called " the vicar of Llandovery " (d. 1644). In the middle of the 19th century William Rees of Tonn published at Llandovery many important works dealing with early Welsh history and archaeology.

LLANDOVERY GROUP, in geology, the lowest division of the Silurian (Upper Silurian)in Britain. C. Lapworth in 1879 proposed the name Valenlian (from the ancient north British province of Valentia) for this group. It includes in the type area the Tarannon Shales 1000-1500 ft., Upper Llandovery and May Hill Sandstone 800 ft., Lower Llandovery, 600-1500 ft.

The Lower Llandovery rocks consist of conglomerates, sandstones and slaty beds. At Llandovery they rest unconformably upon Ordovician rocks (Bala), but in many other places no unconformity is traceable. These rocks occur with a narrow crop in Pembrokeshire, which curves round through Llandovery, and in the Rhyader district they attain a considerable thickness. Northwards they thin out towards Bala Lake. They occur also in Cardiganshire and Car- marthenshire in many places where they have not been clearly separated from the associated Ordovician rocks.

There is a change in the fauna on leaving the Ordovician and entering the Llandovery. Among the graptolites the Diplograptidae begin to be replaced by the Monograptidae. Characteristic graptolite zones, in descending order, are: — Monograptus gregarius, Diplo- graptusvesiculosus, D. acuminatus. Common trilobitesare : — Acidaspis, Encrinurus, Phacops, Proetus; among the brachiopods are Orthis elegantula, O. testudinaria, Meristella crassa and Pentamerus (Strick- landinia) lens (Pentamerus is so characteristic that the Llandovery rocks are frequently described as the " Pentamerus beds").

The Upper Llandovery, including the May Hill Sandstone of May Hill, Gloucestershire, is an arenaceous series generally conglomeratic at the base, with local lenticular developments of shelly limestone (Norbury, Hollies and Pentamerus limestones). It occurs with a narrow outcrop in Carmarthenshire at the base of the Silurian, dis- appearing beneath the Old Red Sandstone westward to reappear in Pembrokeshire; north-eastward the outcrop extends to the Long- mynd, which the conglomerate wraps round. As it is followed along the crop it is found to rest unconformably upon the Lower Llandovery, Caradoc, Llandeilo, Cambrian and pre-Cambrian rocks. The fossils include the trilobites Phacops caudata, Encrinurus punctalus, Calymene Blumenbachh ; the brachiopods Pentamerus oblongus, Orthis calligramma, Atrypa reticularis; the corals Favo- siles, Lindostroemia, &c. ; and the zonal graptolites Rastrites maximus and Monograptus spinigerus and others (Monograptus Sedgwicki, M. Clingani, M. proteus, Diplograptus Hughesii).

The Tarannon shales, grey and blue slates, designated by A. Sedgwick the " paste rock," is traceable from Conway into Car- marthenshire; in Cardiganshire, besides the slaty fades, gritty beds make their appearance; and in the neighbourhood of Builth soft dark shales. The group is poor in fossils with the exception of graptolites; of these

Cyrtograptus grayae and Monograptus exiguus are zonal forms. The Tarannon group is represented by the Rhyader Pale Shales in Radnorshire; by the Browgilr beds, with Mono- graptus crispus and M. turriculatus, in the Lake district; in the Moffat Silurian belt in south Scotland by a thick development, including the Hawick rocks and Ardwell beds, and the Queensberry group or Gala (Grieston shales, Buckholm grits and Abbotsford flags) ; in the Girvan area, by the Drumyork flags, Bargany group and Penkill group; and in Ireland by the Treveshilly shales of Strangford Lough, and the shales of Salterstown, Co. Louth.

The Upper and Lower Llandovery rocks are represented in de- scending order by the Pale shales, Graptolite shales, Grey slates and Corwen grit of Merionethshire and Denbighshire. In the Rhyader district the Caban group (Gafalt beds, shales and grits and Caban conglomerate), and the Gwastaden group (Gigrin mudstones, Ddol

shales, Dyffryn flags, Cerig Gwynion grits) lie on this horizon; at Builth also there is a series of grits and shales. In the Lake district the lower part of the Stockdale shales (Skelgill beds) is of Llandovery age. In south Scotland in the central and southern belt of Silurian rocks, which extends across the country from Luce Bay to St Abb's Head, the Birkhill shales, a highly crumpled series of graptolitic beds, represent the Llandovery horizon. In the Girvan area to the north their place is taken by the Camregan, Shaugh Hill and Mullock Hill groups. In Ireland the Llandovery rocks are represented by the Anascaul slates of the Dingle promontory, by the Owenduff and Gowlaun grits, Co. Galway, by the Upper Pomeroy beds, by the Uggool and Ballaghaderin beds, Co. Mayo, and by rocks of this age in Coalpit Bay and Slieve Felim Mountains.

Economic deposits in Llandovery rocks include slate pencils (Teesdale), building stone, flag-stone, road metal and lime. Lead ore occurs in Wales. (See Silurian.) (J. A. H.)

LLANDRINDOD, or Llandrindod Wells, a market town, urban district and health-resort of Radnorshire, Wales, situated in a lofty and exposed district near the river Ithon, a tributary of the Wye. Pop. (1901) 1827. Llandrindod is a station on the Mid-Wales section of the London & North-Western railway. The town annually receives thousands of visitors, and lies within easy reach of the beautiful Wye Valley and the wild district of Radnor Forest. The saline, sulphur and chalybeate springs of Llandrindod have long been famous. According to a treatise published by a German physician, Dr Wessel Linden, in 1754, the saline springs at Ffynon-llwyn-y-gog (" the well in the cuckoos' grove ") in the present parish of Llandrindod had acquired more than a local reputation as early as the year 1696. In the 1 8th century both saline and sulphur springs were largely patron- ized by numbers of visitors, and about 1749 a Mr Grosvenor built a hydropathic establishment near the old church, on a site now covered by a farm-house known as Llandrindod Hall.

LLANDUDNO, a seaside resort in the Arfon parliamentary division of Carnarvonshire, North Wales, in a detached portion of the county east of the Conwy, on a strip of sandy soil terminat- ing in the massive limestone of Great Orme's Head. Pop. of urban district (1901) 9279. The town is reached by the London & North-Western railway, and lies 227 m. N.W. of London. A village in 1850, Llandudno is to-day one of the most flourishing watering-places in North Wales. Sheltered by the Great Orme on the N.W. and by the Little Orme on the E., it faces a wide bay of the Irish Sea, and is back«d by low sandhills. A Marine Drive encircles the Great Orme. The Little Orme has caverns and abounds in sea birds and rare plants. Close to the town are the Gloddaeth woods, open to visitors. On the Great Orme are old circular buildings, an ancient fortress, a " rocking-stone " (crˆd Tudno) and the 7th-century church of St Tudno, restored in 1885. Druidical and other British antiquities are numerous in the district. At Deganwy, or Diganwy, 2 m. from Llandudno, is a castle, Dinas Gonwy (Conwy fort), known to English historians as Gannoc, dating from the nth or (according to the Welsh) earlier than the 9th century.

LLANELLY, a market town, urban district, and seaport of Carmarthenshire, Wales, situated on the north shore of the broad estuary of the river Loughor (Llwchwr), known

as Burry river, which forms an inlet of Carmarthen Bay. Pop. (1901) 25,617. Llanelly is a station on the South Wales section of the Great Western railway. ‘ The town is wholly of modern appear- ance. The mother-church of St Elliw, or Elli (whence the town derives its name) has been practically rebuilt (1906), but it retains its 13th-century tower and other ancient features of the original fabric. Its situation on a broad estuary and its central position with regard to a neighbourhood rich in coal, iron and limestone, have combined to make Llanelly one of the many important industrial towns of South Wales. Anthracite and steam-coal from the collieries of the coast and along the Loughor Valley are exported from the extensive docks; and there are also large works for the smelting of copper and the manufacture of tin plates.

Llanelly, though an ancient parish and a borough by pre- scription under a portreeve and burgesses in the old lordship ol Kidwelly, remained insignificant until the industrial develop- ment in South Wales during the 19th century. In 1810 the combined population of Llanelly, with its four subsidiary hamlets

of Berwick, Glyn, Hencoed and Westowe, only amounted to 2972; in 1840 the inhabitants of the borough hamlet alone had risen to 4173. Llanelly is now the most populous town in Wales outside the confines of Glamorganshire. In 1832 Llanelly was added as a contributory borough to the Carmarthen parlia- mentary district.

LLANES, a seaport of northern Spain, in the province of Oviedo, on the river Carrocedo and the Bay of Biscay. Pop. (1900) 18,684. The streets are mostly narrow and irregular, and contain some curious old houses. The principal buildings are a fine Gothic church and an old Augustinian monastery, which has been converted into a school and meteorological station. In summer the fine climate, scenery and sea-bathing attract many visitors. Llanes is a second-class port for light- draught vessels; but the entrance is narrow, and rather difficult in rough weather. The trade is chiefly in agricultural produce, timber, butter and fish.

LLANGOLLEN, a picturesque market-town and summer resort of Denbighshire, N. Wales, in the Dee (Dyfrdwy) valley, on a branch of the Great Western Railway, 9 m. S.W. of Wrexham, 2025 m. from London by rail. Pop. of urban district (1901) 3303. The Dee is here crossed by a 14th-century bridge of four arches, ” one of the seven wonders of Wales,” built by John Trevor, afterwards bishop of St Asaph (Llanelwy). The Anglican church of St Collen, Norman and Early English, has a monument in the churchyard to the ” Ladies of Llangollen,” Lady Eleanor Butler and Hon. Sarah Ponsonby, of Plas Newydd, (1778 to 1829 and 1831 respectively). The house is now a museum. Castell Dinas Bran (the castle of the town of Bran; the mountain stream below is also called Bran), the ruins of a fortress on a high conical hill about 1 m. from the town, is supposedly British, of unknown date. ” An old ruynous thinge,” as the Elizabethan poet Churchyard calls it even in the 16th century, it was in- habited, apparently, about 1390, by Myfanwy Fechan of the Tudor Trevor family and beloved by the bard Howel ab Einion Llygliw, whose ode to her is still extant. Valle Crucis Abbey (Llan Egwest) is a Cistercian ruin at the foot of Bronfawr hill, some 2 m. N.W. of Llangollen, founded about 1200 by Madoc ab Gruffydd Maelor, lord of Dinas Bran and grandson of Owen Gwynedd, prince of Wales. Llan Egwest, dissolved in 1535, was given by James I. to Lord Edward Wootton. In the meadow adjoining, still called Llwyn y Groes (” grove of the cross “), is “Eliseg’s Pillar.” Eliseg was father of Brochmael, prince of Powys, and his grandson, Concen or Congen, appears to have erected the pillar, which is now broken, with an illegible in- scription; the modern inscription dates only from 1779. At Llangollen are linen and woollen manufactures, and near are collieries, lime and iron works. Brewing, malting and slate- quarrying are also carried on. Within the parish, an aqueduct carries the Ellesmere canal across the Dee.

LLANQUIHUE (pron. lan-ke-wa), a province of southern Chile bordering on the

northern shores of the Gulf and Straits of Chacao, and extending from the Pacific to the Argentine frontier. The province of Valdivia lies N. and is separated from it in part by the Bueno river. Pop. (1895) 78,315. Area 45>5 I 5 S Q- m – It i s a region of forests, rivers and lakes, and the greater part is mountainous. The rainfall is excessive, the average at Puerto Montt being 104 in. a year, and the temperature is singularly uniform, the average for the summer being 585°, of the winter 475°, and of the year 53 F. There are several large lakes in the eastern part of the province — Puyehue, on the northern frontier, Rupanco, Llanquihue and Todos los Santos. Lake Llanquihue is the largest body of fresh water in Chile, having an extreme length from N. to S., or from Octai to Varas, of about 33 m., and extreme breadth of nearly the same. There is a regular steamship service on the lake between Octai and Varas, and its western shores are well settled. The volcanoes of Calbuco and Osorno rise from near its eastern shores, the latter to a height of 7382 ft. The outlet of the lake is through Maullin river, the lower course of which is navigable. The other large rivers of the province are the Bueno, which receives the waters of Lakes Puyehue and Rupanco, and the Puelo, which has

its rise in a lake of the same name in the Argentine territory of Chubut. A short tortuous river of this vicinity, called the Petrohue, affords an outlet for the picturesque lake of Todos los Santos, and enters the Reloncavi Inlet near the Puelo. The southern coast of the province is indented by a number of inlets and bays affording good fishing, but the mouths of the rivers flowing into the Pacific are more or less obstructed by sand-bars. Apart from the lumber industry, which is the most important, the productions of Llanquihue include wheat, barley, potatoes and cattle. The white population is composed in great part of Germans, who have turned large areas of forest lands in the northern districts into productive wheat fields. The capital is Puerto Montt, on a nearly land-locked bay called the Reloncavi, designed to be the southern terminus of the longitudinal railway from Tacna, a distance of 2152 m. An important town in the northern part of the province is Osorno, on the Rahue river, which is chiefly inhabited by Germans. It exports wheat and other farm produce, leather, lumber and beer.

LLANTRISANT, a small town and a contributory° parlia- mentary borough of Glamorganshire, Wales, picturesquely situated with a southern aspect, commanding a fine view of the vale of Glamorgan, in a pass on the mountain range which separates that vale from the valley of the Taff . The population of the parish in 1901 was 10,091 and of the contributory borough 2057. A branch of the Taff Vale railway running from Ponty- pridd to Cowbridge and Aberthaw has a station, Cross Inn, 5 m. below the town, while nearly 2 m. farther south it passes (near the village of Pontyclun) through Llantrisant station on the Great Western railway main line, which is 1561 m. by rail from London and ir m. N.W. from Cardiff. The castle, which according to G. T. Clark was ” second only to Cardiff in military importance,” dates from the reign of Henry III. or Edward I. Of the original building nothing remains, and of a later building only a tall and slender fragment. It was the head of the lordship of Miskin, a great part of which was in the hands of native owners, until the last of them, Howel ap Meredith, was expelled by Richard de Clare ˆ229-1262). Since then it has always been in the hands of the lord of Glamorgan. It was in the near neigh- bourhood of the town that Edward II. was captured in 1327. In 1426 the then lord of Glamorgan, Richard, 5th earl of Warwick, granted to the residents a charter confirming grants made by his predecessors in 1346, 1397 and 1424. The corporation was abolished in 1883, and its property (including 284 acres of common land) is administered by a town trust under a scheme of the charity commissioners. The ” freemen ” of the borough, how- ever, still hold a court leet in the town-hall. The market formerly held here has been discontinued, but there are four annual fairs. The church was dedicated to three saints (Illtyd, Gwyno and Tyfodwg), whence the name Llantrisant. Originally a Norman building, most of the present fabric belongs to the 15th century. There are numerous chapels. Welsh is still the predominant language. Oliver Cromwell’s forbears were natives of this parish, as also was Sir Leoline Jenkins, secretary of state under Charles II. There are tinplate works at Pontyclun and numerous collieries in the district.

LLANTWIT MAJOR (Welsh Llan-Illtyd-Fawr), a small market town in the southern parliamentary division of Glamorganshire, South Wales, about 1 m. from the Bristol Channel, with a station on the Barry railway, 5 m. S. of Cowbridge. Pop. (1901) 1113. About 1 m. N.N.W. of the town there were discovered in 1888 the remains of a large Roman villa within a square enclosure of about 8 acres, w # hich has been identified as part of the site of a Roman settlement mentioned in Welsh writings as Caer Wrgan. The building seemed to have been the scene of a massacre, possibly the work of Irish pirates in the 5th century, as some forty-three human skeletons and the remains of three horses were found within its enclosure. Etymological reasoning have led some to suggest that the Roman station of Bovium was at Boverton, 1 m. E. of the town, but it is more likely to have been at Ewenny (2 m. S.E. of Bridgend) or perhaps at Cowbridge. On the sea coast are two camps, one known as Castle Ditches, commanding the entrance to the creek of Colhugh, once the port

of Llantwit. In the time of Henry I. a small colony of Flemings settled in the district. The town and church derive their name from St Illtyd or Iltutus, styled the ” knight,” a native of Brittany and a great-nephew of Germanus of Auxerre. Having come under the influence of St Cadoc, abbot of Llancarvan, 6 m. E.N.E. of Llantwit, Illtyd established at the latter place, about a.d. 520, a monastic college which became famous as a seat of learning. He attracted a number of scholars to him, especially from Brittany, including Samson, archbishop of Dol, Maglorius (Samson’s successor) and Paul de Leon, while his Welsh students included David, the patron saint of Wales, Gildas the historian, Paulinus and Teilo; The college continued to flourish for several centuries, sending forth a large number of missionaries until, early in the 12th century, its revenues were appropriated to the abbey of Tewkesbury by Fitzhamon, the first Norman lord of Glamorgan. A school seems, however, to have lingered on in the place until it lost all its emoluments in the reign of Henry VIII. The present church of St Illtyd is the result of a sequence of churches which have sprung from a pre-Norman edifice, almost entirely rebuilt and greatly extended in the 13th century and again partially rebuilt late in the 14th century. It consists of an ” eastern ” church which (according to Professor Freeman) belonged probably to the monks, and is the only part now used for worship, a western one used as a parochial church before the dissolution, but now disused, and still farther west of this a chantry with sacristan’s house, now in ruins. The western church consists of the nave of a once cruci- form building, while in continuation of it was built the eastern church, consisting of chancel, nave (of great height and width but very short), aisles and an embattled western tower built over the junction of the two naves. A partial restoration was made in 1888, and a careful and more complete one in 1 900-1905. In the church and churchyard are preserved some early monu- mental remains of the British church, dating from the 9th century, and some possibly from an earlier date. They include two cross-shafts and one cross with inscriptions in debased Latin (one being to the memory of St Illtyd) and two cylindrical pillars, most of them being decorated with interlaced work. There are some good specimens of domestic architecture of the 17th century. The town is situated in a fertile district and” the inhabitants depend almost entirely on agriculture. Its weekly market is mainly resorted to for its stock sales. St Donats castle, 2 m. to the west, was for nearly seven centuries the home of the Stradling family.

As to the Roman remains, see the Athenaeum for October 20 (1888), and the Antiquary for August (1892). As to the church, see the Archaeologia Cambrensis, 3rd ser. iv. 31 (an article by Professor Freeman), 5th ser., v. 409 and xvii. 129, and 6th ser., iii. 56; A. C. Frver, Llantwit- Major: a Fifth Century University (1893).

(D. Ll. T.)

LLANWRTYD WELLS, an urban district of Breconshire, south Wales, with a station on the central Wales section of the London & North Western railway, 231 m. from London.

It is situated in the midst of wild mountain scenery on the river Irfon, a right-bank tributary of the Wye. The place is chiefly noted for its sulphur and chalybeate springs, the former being the strongest of the kind in Wales. The medicinal properties of the sulphur water were discovered, or perhaps rediscovered, in 1732 by a famous Welsh writer, the Rev. Theophilus Evans, then vicar of Llangammarch (to which living Llanwrtyd was a chapelry till 1871). Saline water is obtained daily in the season from Builth Wells. The Irfon is celebrated as a trout-stream. Out of the civil parish, which has an area of 10,785 acres and had in 1001 a population of 854, there was formed in 1907 the urban district, comprising 1611 acres, and with an estimated population at the date of formation of 812. Welsh is the pre- dominant language of the district.

Four miles lower down the Irfon valley, at the junction of the Cammarch and Irfon, and with a station on the London & North Western railway, is the village of Llangammarch, noted for its barium springs. The ancient parish of Llangam- march consists of the townships of Penbuallt and Treflis, the wells being in the former, which comprises 11,152 acres and had

in 1901 a population of only 433. John Penry, the Puritan martyr, was born at Cefn-brith in this parish. Charles Wesley's wife, Sarah Gwynne, was of Garth, an old residence just outside the parish.

LLEWELYN, the name of two Welsh princes.

Llewelyn I., Ab Iorwerth (d. 1240), prince of North Wales, was born after the expulsion of his father, Iorwerth, from the principality. In 1194, while still a youth, Llewelyn recovered the paternal inheritance. In 1201 he was the greatest prince in Wales. At first he was a friend of King John, whose illegitimate daughter, Joanna, he took to wife (1201); but the alliance soon fell through, and in 121 1 John reduced Llewelyn to submission. In the next year Llewelyn recovered all his losses in North Wales. In 1215 he took Shrewsbury. His rising had been encouraged by the pope, by France, and by the English barons. His rights were secured by special clauses in Magna Carta. But he never desisted from his wars with the Marchers of South Wales, and in the early years of Henry III. he was several times attacked by English armies. In 1239 he was struck with paralysis and retired from the active work of government in favour of his son David. He retired into a Cistercian monastery.

See the lists of English chronicles for the reigns of John and Henry III.; also the Welsh chronicle Brut y Tywysogion (ed. Rolls Series) ; O. M. Edwards, History of Wales (1901) ; T. F. Tout in the Political History of England, iii. (1905).

Llewelyn II., Ab Grufeydd (d. 1282), prince of North Wales, succeeded his uncle David in 1246, but was compelled by Henry III. to confine himself to Snowdon and Anglesey. In 1254 Henry granted Prince Edward the royal lands in Wales. The steady encroachment of royal officers on Llewelyn's land began immediately, and in 1256 Llewelyn declared war. The Barons' War engaged all the forces of England, and he was able to make himself lord of south and north Wales. Llewelyn also assisted the barons. By the treaty of Shrewsbury (1265) he was recognized as overlord of Wales; and in return Simon de Montfort was supplied with Welsh troops for his last campaign. Llewelyn refused to do homage to Edward I., who therefore attacked him in 1276. He was besieged in the Snowdon mountains till hunger made him surrender, and conclude the humiliating treaty of Conway (1277). He was released, but in 1282 he revolted again, and was killed in a skirmish with the Mortimers, near Builth in central Wales.

See C. Bemont, Simon de Montfort (Paris, 1884) ; T. F. Tout in the Political History of England, iii. (1905) ; J. E. Morris in The Welsh Wars of Edward I. (1901).

LLORENTE, JUAN ANTONIO (1756-1823), Spanish historian, was born on the 30th of March 1756 at Rincon de Soto in Aragon. He studied at the university of Saragossa, and, having been ordained priest, became vicar-general to the bishop of Calahorra in 1782. In 1785 he became commissary of the Holy Office at Logrofio, and in 1789 its

general secretary at Madrid. In the crisis of 1808 Llorente identified himself with the Bona- partists, and was engaged for a few years in superintending the execution of the decree for the suppression of the monastic orders, and in examining the archives of the Inquisition. On the return of King Ferdinand VII. to Spain in 1814 he withdrew to France, where he published his great work, Hisloria critica de la in- quisition de Espana (Paris, 1815-1817). Translated into English, French, German, Dutch and Italian, it attracted much attention in Europe, and involved its author in considerable persecution, which, on the publication of his Portraits politiques des papes in 1822, culminated in a peremptory order to quit France. He died at Madrid on the 5th of February 1823. Both the personal character and the literary accuracy of Llorente have been assailed, but although he was not an exact historian there is no doubt that he made an honest use of documents relating to the Inquisition which are no longer extant.

The English translation of the Historia (London, 1826) is abridged. Llorente also wrote Memorias para la historia de la revolution espanola (Paris, 1814-1816), translated into French (Paris, 1815- 1819); Noticias historicas sobre las tres provincias va congadas (Madrid, 1 806-1 808); an autobiography, Noticia biografica (Paris, 1 1818), and other works.

LLOYD, EDWARD (1845- ‘), English tenor vocalist, was born in London on the 7th of March 1845, his father, Richard Lloyd, being vicar choralist at Westminster Abbey. From 1852 to 1S60 he sang in the abbey choir, and was thoroughly trained in music, eventually becoming solo tenor at the Chapel Royal. He began singing at concerts in 1867, and in 187 1 appeared at the Gloucester Musical Festival. His fine evenly-produced voice and pure style at once brought him into notice, and he gradually took the place of Sims Reeves as the leading English tenor of the day, his singing of classical music, and especially of Handel, being particularly admired. At the Handel Festivals after 1888 he was the principal tenor, and even in the vast auditorium at the Crystal Palace he triumphed over acoustic difficulties. In 1888, 1890 and 1892 he paid successful visits to the United States; but by degrees he appeared less frequently in public, and in 1900 he formally retired from the platform.

LLOYD, WILLIAM (1627-1717), English divine, successively bishop of St Asaph, of Lichfield and Coventry, and of Worcester, was born at Tilehurst, Berkshire, in 1627, and was educated at Oriel and Jesus Colleges, Oxford. He graduated M.A. in 1646. In 1663 he was prebendary of Ripon, in 1667 prebendary of Salisbury, in 1668 archdeacon of Merioneth, in 1672 dean of Bangor and prebendary of St Paul’s, London, in 1680 bishop of St Asaph, in 1689 lord-almoner, in 1692 bishop of Lichfield and Coventry, and in 1699 bishop of Worcester. Lloyd was an indefatigable opponent of the Roman Catholic tendencies of James II., and was one of the seven bishops who for refusing to have the Declaration of Indulgence read in his diocese was charged with publishing a seditious libel against the king and acquitted (1688). He engaged Gilbert Burnet to write The History of the Reformation of the Church of England and provided him with much material. He was a good scholar and a keen student of biblical apocalyptic literature and himself ” prophesied ” to Queen Anne, Robert Harley, earl of Oxford, William Whiston, and John Evelyn the diarist. Lloyd was a stanch supporter of the revolution. His chief publication was An Historical Account of Church Government as it was in Great Britain and Ireland when they first received the Christian Religion (London, 1684, reprinted Oxford, 1842). He died at Hartlebury castle on the 30th of August 17 17.

LLOYD, WILLIAM WATKISS (1813-1893), English man of letters, was born at Homerton, Middlesex, on the nth of March 1 8 13. He received his early education at Newcastle-under- Lyme grammar school, and at the age of fifteen entered a family business in London, with which he was connected for thirty- five years. He devoted his leisure to

the study of art, architecture, archaeology, Shakespeare, classical and modern languages and literature. He died in London on the 22nd of December 1893. The work by which he is best known is The Age of Pericles (1875), characterized by soundness of scholarship, great learning, and a thorough appreciation of the period with which it deals, but rendered unattractive by a difficult and at times obscure style. He wrote also: Xanthian Marbles (1845); Critical Essays upon Shakespeare's Plays (1875); Christianity in the Cartoons [of Raphael] (1 86 5) , which excited considerable attention from the manner in which theological questions were discussed; The History of Sicily to the Athenian War (1872); Panics and their Panaceas (1869); an edition of Much Ado about Nothing, " now first published in fully recovered metrical form " (1884; the author held that all the plays were originally written in blank verse). A number of manuscripts still remain unpublished, the most important of which have been bequeathed to the British Museum, amongst them being: A Further History of Greece; The Century of Michael Angelo; The Neo-Plaionists.

See Memoir by Sophia Beale prefixed to Lloyd's (posthumously published) Elijah Fenton: his Poetry and Friends (1894), containing a list of published and unpublished works.

LLOYD GEORGE, DAVID (1863-), British statesman, was born at Manchester on the 17th of January 1863. His father, William George, a Welshman of yeoman stock, had left Pembrokeshire for London at an early age and became a school

teacher there, and afterwards in Liverpool and Haverfordwest, and then headmaster of an elementary school at Pwllheli, Car- narvonshire, where he married the daughter of David Lloyd, a neighbouring Baptist minister. Soon afterwards William George became headmaster of an elementary school in Manchester, but after the birth of his eldest son David his health failed, and he gave up his post and took a small farm near Haverfordwest. Two years later he died, leaving his widow in poor circumstances; a second child, another son, was posthumously born. Mrs George's brother, Richard Lloyd, a shoemaker at Llanystumdwy, and pastor of the Campbellite Baptists there, now became her chief support; it was from him that young David obtained his earliest views of practical and political life, and also the means of starting, at the age of fourteen, on the career of a solicitor.

Having passed his law preliminary, he was articled to a firm in Portmadoc, and in 1884 obtained his final qualifications. In 1888 he married Margaret, daughter of Richard Owen of Criccieth. From the first he managed to combine his solicitor's work with politics, becoming secretary of the South Carnarvon- shire Anti-tithe League; and his local reputation was made by a successful fight, carried to the High Court, in defence of the right of Nonconformists to burial in the parish churchyard. In the first county council elections for Carnarvonshire he played a strenuous part on the Radical side, and was chosen an alder- man; and in 1890, at a by-election for Carnarvon Boroughs, he was returned to parliament by a majority of 18 over a strong Conservative opponent. He held his seat successfully at the contests in 1892, 1895 and 1900, his reputation as a champion of Welsh nationalism, Welsh nonconformity and extreme Radical- ism becoming thoroughly established both in parliament and in the country. In the House of Commons he was one of the most prominent guerrilla fighters, conspicuous for his audacity and pungency of utterance, and his capacity for obstruction while the Conservatives were in office. During the South African crisis of 1899-1902 he was specially vehement in opposition to Mr Chamberlain, and took the " pro-Boer " side so bitterly that he was mobbed in Birmingham during the 1900 election when he attempted to address a meeting at the Town Hall. But he was again returned for Carnarvon Boroughs; and in the ensuing parliament he came still more to the front by his resistance to the Education Act of 1902.

As the leader of the Welsh party, and one of the most dashing parliamentarians on the Radical side, his appointment to office when Sir H. Campbell-Bannerman became premier at the end of 1905 was generally expected; but his elevation direct to the cabinet as president of the Board of Trade was somewhat of a surprise. The

responsibilities of administration have, however, often converted a political free-lance into a steady-going official, and the Unionist press did its best to encourage such a tendency by continual praise of the departmental action of the new minister. His settlement of the railway dispute in 1906 was universally applauded; and the bills he introduced and passed for reorganizing the port of London, dealing with Merchant Shipping, and enforcing the working in England of patents granted there, and so increasing the employment of British labour, were greeted with satisfaction by the tariff-reformers, who congratulated themselves that a Radical free-trader should thus throw over the policy of laisser faire. The president of the Board of Trade was the chief success of the ministry, and when Mr Asquith became premier in 1908 and promoted Mr Lloyd George to the chancellorship of the exchequer, the appointment was well received even in the City of London. For that year the budget was already settled, and it was introduced by Mr Asquith himself, the ex-chancellor; but Mr Lloyd George earned golden opinions, both at the Treasury and in parliament, by his industry and his handling of the Finance Bill, especially important for its inclusion of Old Age Pensions, in the later stages.

It was not till the time came nearer for the introduction of the budget for 1909-1910 that opinion in financial circles showed the change which was afterwards to become so marked. A con- siderable deficit, of about £16,000,000, was in prospect, and the

chancellor of the exchequer aroused misgivings by alluding in a speech to the difficulty he had in deciding what " hen roost " to " rob." The government had been losing ground in the country, and Mr Lloyd George and Mr Winston Churchill were conspicuously in alliance in advocating the use of the budget for introducing drastic reforms in regard to licensing and land, which the resistance of the House of Lords prevented the Radical party from effecting by ordinary legislation. The well-established doctrine that the House of Lords could not amend, though it might reject, a money-bill, coupled with the fact that it never had gone so far as to reject a budget, was relied on by the ex- tremists as dictating the obvious party tactics; and before the year 1909 opened, the possibility of the Lords being driven to compel a dissolution by standing on their extreme rights as regards the financial provision for the year was already can- vassed in political circles, though it was hardly credited that the government would precipitate a constitutional crisis of such magnitude. When Mr Lloyd George, on the 29th of April, introduced his budget, its revolutionary character, however, created widespread dismay in the City and among the propertied classes. In a very lengthy speech, which had to be interrupted for half an hour while he recovered his voice, he ended by describing it as a " war budget " against poverty, which he hoped, in the result, would become " as remote to the people of this country as the wolves which once infested its forests." Some of the original proposals, which were much criticized, were subsequently dropped, including the permanent diversion of the Old Sinking Fund to a National Development Fund (created by a separate bill), and a tax on " ungotten minerals," for which was substituted a tax on mineral rights. But the main features of the budget were adhered to, and eventually passed the House of Commons on the 4th of November, in spite of the persistent opposition of the scanty Unionist minority. Apart from certain non-contentious provisions, such as a tax on motor- cars, the main features of the measure were large increases in the spirit and tobacco duties, license duties, estate, legacy and succession duties, and income tax, and an elaborate and novel system of duties on land-values (" increment duty," " reversion duty," " undeveloped land duty "), depending on the setting up of arrangements for valuation of a highly complicated kind. The discussions on the budget entirely monopolized public attention for the year, and while the measure was defended by Mr Lloyd George in parliament with much suavity, and by Mr Asquith, Sir Edward Grey and Mr Haldane outside the House of Commons with tact and moderation, the feelings of its op- ponents were exasperated by a series of inflammatory public speeches at Limehouse and elsewhere from the chancellor of the exchequer, who took these opportunities to rouse

the passions | of the working-classes against the landed classes and the peers. When the Finance Bill went up to the House of Lords, Lord Lansdowne gave notice that on the second reading he would move " that this House is not justified in giving its consent to this bill until it has been submitted to the judgment of the country," and on the last day of November this motion was carried by an overwhelming majority of peers. The government passed a solemn resolution of protest in the House of Commons and appealed to the country; and the general election of January 1910 took place amid unexampled excitement. The Unionists gained a hundred seats over their previous numbers, but the constitutional issue undoubtedly helped the government to win a victory, depending indeed solely on the votes of the Labour members and Irish Nationalists, which a year before had seemed improbable.

Events had now made Mr Lloyd George and his financial policy the centre of the Liberal party programme; but party tactics for the moment prevented the ministry, who remained in office, from simply sending the budget up again to the Lords and allowing them to pass it. There was no majority in the Commons for the budget as such, since the Irish Nationalists only supported it as an engine for destroying the veto of the Lords and thus preparing the way for Irish Home Rule. Instead, therefore, of proceeding with the budget, the government xvi. 27

allowed the financial year to end without one, and brought forward resolutions for curtailing the powers of the Lords, on which, if rejected by them, another appeal could be made to the people (see Parliament). Hardly, however, had the battle been arrayed when the King's death in May upset all calcula- tions. An immediate continuance of hostilities between the two Houses was impossible. A truce was called, and a confer- ence arranged between four leaders from each side — Mr Lloyd George being one — to consider whether compromise on the constitutional question was not feasible. The budget for 1909-10 went quietly through, and before the August adjourn- ment the chancellor introduced his budget for 1910-n, dis- cussion being postponed till the autumn. It imposed no new taxation, and left matters precisely as they were. (H. Ch.)

LLOYD'S, an association of merchants, shipowners, under- writers, and ship and insurance brokers, haying its headquarters in a suite of rooms in the north-east corner of the Royal Exchange, London. Originally a mere gathering of merchants for business or gossip in a coffee-house kept by one Edward Lloyd in Tower Street, London, the earliest notice of which occurs in the London Gazette of the 18th of February 1688, this institution has gradually become one of the greatest organizations in the world in con- nexion with commerce. The establishment existed in Tower Street up to 1692, in which year it was removed by the proprietor to Lombard Street, in the centre of that portion of the city most frequented by merchants of the highest class. Shortly after this event Mr Lloyd established a weekly newspaper furnishing commercial and shipping news, in those days an undertaking of no small difficulty. This paper took the name of Lloyd's News, and, though its life was not long, it was the precursor of the now ubiquitous Lloyd's List, the oldest existing paper, the London Gazette excepted. In Lombard Street the business transacted at Lloyd's coffee-house steadily grew, but it does not appear that throughout the greater part of the 18th century the merchants and underwriters frequenting the rooms were bound together by any rules, or acted under any organization. By and by, however, the increase of marine insurance business made a change of system and improved accommodation necessary, and after finding a temporary resting-place in Pope's Head Alley, the underwriters and brokers settled in the Royal Exchange in March 1 774. One of the first improvements in the mode of effect- ing marine insurance was the introduction of a printed form of policy. Hitherto various forms had been in use; and, to avoid numerous disputes the committee of Lloyd's proposed a general form, which was adopted by the members on the 1 2th of January 1779, and remains in use, with a few slight alterations, to this day. The two "most important events in the history of Lloyd's during the 19th century were the reorganization of the association in 181 1, and the passing of an act in 1871 granting to Lloyd's all the rights and privileges of a corporation sanctioned by parlia- ment. According to this act of incorporation, the three main objects for which the society exists are — first, the carrying out of the business of marine insurance; secondly, the

protection of the interests of the members of the association; and thirdly, the collection, publication and diffusion of intelligence and information with respect to shipping. In the promotion of the last-named object an intelligence department has been developed which for wideness of range and efficient working has no parallel among private enterprises. By Lloyd's Signal Station Act 1888, powers were conferred on Lloyd's to establish signal stations with telegraphic communications, and by the Derelict Vessels (Report) Act 1896, masters of British ships are required to give notice to Lloyd's agents of derelict vessels, which information is published by Lloyd's.

The rooms at Lloyd's are available only to subscribers and members. The former pay an annual subscription of five guineas without entrance fee, but have no voice in the management of the institution. The latter consist of non-underwriting members, who pay an entrance fee of twelve guineas, and of underwriting members who pay a fee of £100. Underwriting members are also required to deposit securities to the value of £5000 to £io,ooo, according to circumstances, as a guarantee for their

engagements. The management of the establishment is delegated by the members to certain of their number selected as a " com- mittee for managing the affairs of Lloyd's." With this body lies the appointment of all the officials and agents of the institution, the daily routine of duty being entrusted to a secretary and a large staff of clerks and other assistants. The mode employed in effecting an insurance at Lloyd's is simple. The business is done entirely by brokers, who write upon a slip of paper the name of the ship and shipmaster, the nature of the voyage, the subject to be insured, and the amount at which it is valued. If the risk is accepted, each underwriter subscribes his name and the amount he agrees to take or underwrite, the insurance being effected as soon as the total value is made up.

See F. Martin, History of Lloyd's and of Marine Insurance in Great Britain (1876).

LLWYD, EDWARD (1660- 1709), British naturalist and antiquary, was born in Cardiganshire in 1660. He was educated at Jesus College, Oxford, but did not graduate; he received the degree of M.A. however in 1701. In 1690, after serving for six years as assistant, he succeeded R. Plot as keeper of the Ashmolean museum, a position which he retained until 1709. In 1699 he published Lilhophylacii Brilannici Ichnographia, in which he described and figured various fossils, personally collected or received from his friends, and these were arranged in cabinets in the museum. They were obtained from many parts of England, but mostly from the neighbourhood of Oxford. A second edition was prepared by Llwyd, but not published until 1760. He issued in 1707 the first volume of Archaeologia Britannica (afterwards discontinued). He was elected F.R.S. in 1708. He died at Oxford on the 30th of June 1709.

LOACH. The fish known as loaches (Cobitinae) form a very distinct subfamily of the Cyprinidae, and are even regarded by some authors as constituting a family. Characters: Barbels, three to six pairs; pharyngeal teeth in one row, in moderate number; anterior part of the air-bladder divided into a right and left chamber, separated by a constriction, and enclosed in a bony capsule, the posterior part free or absent. They are more or less elongate in form, often eel-shaped, and naked or covered with minute scales. Most of the species are small, the largest known measuring 12 (the European Misgurnus fossilis), 13 (the Chinese Botia varicgata), or 14 in. (the Central Asian Nemachilus siluroides) . They mostly live in small streams and ponds, and many are mountain forms. They are almost entirely confined to Europe and Asia, but one species {Nemachilus abyssinicus) has recently been discovered in Abyssinia. About 120 species are known, mostly from Central and South-Eastern Asia. Only two species occur in Great Britain: the common Nemachilus barbatulus and the rarer and more local Cobilis taenia. The latter extends across Europe and Asia to Japan. Many of these fishes delight in the mud at the bottom of ponds, in which they move like eels. In some cases

the branchial respiration appears to be insufficient, and the intestinal tract acts as an accessory breathing organ. The air-bladder may be so reduced as to lose its hydro- static function and become subservient to a sensory organ, its outer exposed surface being connected with the skin by a meatus between the bands of muscle, and conveying the thermo- barometrical impressions to the auditory nerves. Loaches are known in some parts of Germany as ” Wetterfisch.”

LOAD; LODE. The O.E. lad, from which both these words are derived, meant “way,” “journey,” “conveyance,” and is cognate with Ger. Leite. The Teutonic root is also seen in the O. Teut. laidjan, Ger. leiten, from which comes ” to lead.” The meanings of the word have been influenced by a sup- posed connexion with ” lade,” O.E. hladan, a word common to many old branches of Teutonic languages in the sense of ” to place,” but used in English principally of the placing of cargo in a ship, hence ” bill of lading,” and of emptying liquor or fluid out of one vessel into another; it is from the word in this sense that is derived ” ladle,” a large spoon or cup- like pan with a long handle. The two words, though etymo- logically one, have been differentiated in meaning, the influence of the connexion with ” lade ” being more marked in ” load”

than in ” lode,” a vein of metal ore, in which the original mean- ing of ” way ” is clearly marked. A ” load ” was originally a ” carriage,” and its Latin equivalent in the Promplorium Parvul- orum is vectura. From that it passed to that which is laid on an animal or vehicle, and so, as an amount usually carried, the word was used of a specific quantity of anything, a unit of weight, varying with the locality and the commodity. A ” load ” of wheat = 40 bushels, of hay = 36 trusses. Other meanings of ” load ” are: in electricity, the power which an engine or dynamo has to furnish ; and in engineering, the weight to be supported by a structure, the ” permanent load ” being the weight of the structure itself, the ” external load ” that of anything which may be placed upon it.

LOAF, properly the mass of bread made at one baking, hence the smaller portions into which the bread is divided for retailing. These are of uniform size (see Baking) and are named according to shape (“tin loaf,” “cottage loaf,” &c), weight (“quartern loaf,” &c), or quality of flour (“brown loaf,” &c). “Loaf,” O.E. hldf, is a word common to Teutonic languages; cf. Ger. Laib, or Leib, Dan. lev, Goth, hlaifs; similar words with the same meaning are found in Russian, Finnish and Lettish, but these may have been adapted from Teutonic. The ultimate origin is unknown, and it is uncertain whether ” bread ” {q.v.) or ” loaf ” is the earlier in usage. The O.E. hldf is seen in ” Lammas ” and in ” lord,” i.e. hlaford for hlafweard, the loaf- keeper, or ” bread-warder “; cf. the O.E. word for a household servant hl&f-ceta, loaf-eater. The Late Lat. companio, one who shares, panis, bread, Eng. ” companion,” was probably an adaptation of the Goth, gahlaiba, O.H. Ger. gileipo, messmate, comrade. The word ” loaf ” is also used in sugar manufacture, and is applied to sugar shaped in a mass like a cone, a ” sugar- loaf,” and to the small knobs into which refined sugar is cut, or ” loaf-sugar.”

The etymology of the verb ” to loaf,” i.e. to idle, lounge about, and the substantive ” loafer,” an idler, a lazy vagabond, has been much discussed. R. H. Dana {Two Years before the Mast, 1840) called the word ” a newly invented Yankee word.” J. R. Lowell {Biglow Papers, 2nd series, Introd.) explains it as German in origin, and connects it with laufen, to run, and states that the dialectical form lofen is used in the sense of ” saunter up and down.” This explana- tion has been generally accepted. The New English Dictionary rejects it, however, and states that laufen is not used in this sense, but points out that the German Landldufer, the English obsolete word ” landlouper,” or ” landloper,” one who wanders about the country, a vagrant or vagabond, has a resemblance in meaning. J. S. Farmer and W. E. Henley’s Dictionary of Slang and its Analogues gives as French synonyms of ” loafer,” chevalier de la loupe and loupeur.

LOAM (O.E. lam; the word appears in Dut. leem and Ger. Lehm; the ultimate origin is the root lai-, meaning “to be sticky,” which is seen in the cognate ” lime,” Lat. limus, mud, clay), a fertile soil composed of a mixture of sand, clay, and decomposed vegetable matter, the quantity of sand being sufficient to prevent the clay massing

together. The word is also used of a mixture of sand, clay and straw, used for making casting-moulds and bricks, and for plastering walls, &c. (see Soil).

LOAN (adapted from the Scandinavian form of a word common to Teutonic languages, cf. Swed. Ian, Icel. Idn, Dut. leen; the O.E. latn appears in " lend," the ultimate source is seen in the root of Gr. XetTretv and Lat. linquere, to leave), that which is lent; a sum of money or something of value lent for a specific or in- definite period when it or its equivalent is to be repaid or returned, usually at a specified rate of interest (see Usury and Money- Lending). For public loans see Finance, National Debt, and the various sections on finance under the names of the various countries.

LOANDA {Sao Paulo de Loanda), a seaport of West Africa, capital of the Portuguese province of Angola, situated in 8° 48′ S., 13 7′ E., on a bay between the rivers Bango and Kwanza. The bay, protected from the surf by a long narrow island of sand, is backed by a low sandy cliff which at its southern end sweeps out with a sharp curve and terminates in a bold point crowned by Fort San Miguel. The depth of water at the entrance to the bay is 20 fathoms or more. The bay has silted up considerably, but

there is a good anchorage about ij m. from the shore in 7 to 14 fathoms, besides cranage accommodation and a floating dock. Vessels discharge into lighters, and are rarely delayed on account of the weather. A part of the town lies on the foreshore, but the more important buildings — the government offices, the governor's residence, the palace of the bishop of Angola, and the hospital — are situated On higher ground. Most of the European houses are large stone buildings of one storey with red tile roofs. Loanda possesses a meteorological observatory, public garden, tramways, gas-works, statues to Salvador Correia de Sa, who wrested Angola from the Dutch, and to Pedro Alexandrino, a former governor, and is the starting-point of the railway to Ambaca and Malanje.

Loanda was founded in 1576, and except between 1640 and 1648, when it was occupied by the Dutch, has always been in Portuguese possession. It was for over two centuries the chief centre of the slave trade between Portuguese West Africa and Brazil. During that time the traffic of the port was of no small account, and after a period of great depression consequent on the suppression of that trade, more legitimate commerce was. developed. There is a regular service of steamers between the port and Lisbon, Liverpool and Hamburg. The town has some 15,000 inhabitants, including a larger European population than any other place on the west coast of Africa. It is connected by submarine cables with Europe and South Africa. Fully half the imports and export trade of Angola (q.v.) passes through Loanda. LOANGO, a region on the west coast of .Africa, extending from the mouth of the Congo river in 6° S. northwards through about two degrees. At one time included in the " kingdom of Congo " (see Angola, History), Loango became independent about the close ofthe 16th century, and was still of considerable importance in the middle of the 18th century. Buali, the capital, was situated on the banks of a small river not far from the port of Loango, where were several European " factories." The country afterwards became divided into a large number of petty states, while Portugal and France exercised an intermittent sovereignty over the coast. Here the slave trade was longer maintained than anywhere else on the West African seaboard; since its extirpation, palm oil and india-rubber have been the main objects of commerce. The Loango coast is now divided between French Congo and the Portuguese district of Kabinda (see those articles). The natives, mainly members of the Ba-Kongo group of Bantu negroes, and often called Ba-Fiot, are in general well-built, strongly dolichocephalous and very thick of skull, the skin of various shades of warm brown with the faintest suggestion of purple. Baldness is unknown, and many of the men wear beards. Physical deformity is extremely rare. In religious beliefs and in the use of fetishes they resemble the negroes of Upper Guinea.

LOBACHEVSKIY, NICOLAS IVANOVICH (1793-1856), Russian mathematician, was born at Makariev, Nizhniy- Novgorod, on the 2nd of November (N.S.) 1793. His father died about 1800, and his mother, who was left in poor circum- stances, removed to Kazan with her three sons. In 1807 Nicolas, the second boy, entered as a student in the University of Kazan, then recently established. Five years later, having completed the curriculum, he began to take part in the teaching, becoming assistant professor in 1814 and extraordinary professor two years afterwards. In 1823 he succeeded to the ordinary professorship of mathematics, and retained the chair until about 1846, when he seems to have fallen into official disfavour. At that time his connexion with the university to which he had devoted his life practically came to an end, except that in 1855, at the celebration of his jubilee, he brought it as a last tribute his Pangeometrie, in which he summarized the results of his geometrical studies. This work was translated into German by H. Liebmann in 1902. He died at Kazan on the 24th of February (N.S.) 1856. Lobachevskiy was one of the first thinkers to apply a critical treatment to the fundamental axioms of geometry, and he thus became a pioneer of the modern geometries which deal with space other than as treated by Euclid. His first contribution to non-Euclidian geometry is

believed to have been given in a lecture at Kazan in 1826, but the subject is treated in many of his subsequent memoirs, among which may be mentioned the Geometrische Untersuchungen zur Theorie derParallettinien (Berlin, 1840, and a new edition in 1887), and the Pangeometrie already referred to, which in the sub- title is described as a precis of geometry founded on a general and rigorous theory of parallels. (See Geometry, § Non- Euclidean, and Geometry, § Axioms of.) In addition to his geometrical studies, he made various contributions to other branches of mathematical science, among them being an elaborate treatise on algebra (Kazan, 1834). Besides being a geometer of power and originality, Lobachevskiy was an excellent man of business. Under his administration the University of Kazan prospered as it had never done before ; and he not only organized the teaching staff to a high degree of efficiency, but arranged and enriched its library, furnished instruments for its observatory, collected specimens for its museums and provided it with proper buildings. In order to be able to supervise the erection of the last, he studied architecture, with such effect, it is said, that he was able to carry out the plans at a cost considerably below the original estimates.

See F. Engel, N. I. Lobatchewsky (Leipzig, 1899).

LOBANOV-ROETOVSKI, ALEXIS BORISOVICH, Prince (1824-1896), Russian statesman, was born on the 30th of December 1824, and educated, like Prince Gorchakov and so many other eminent Russians, at the lyceum of Tsarskoe Selo. At the age of twenty he entered the diplomatic service, and became minister at Constantinople in 1859. In 1863 a regrettable incident in his private life made him retire temporarily from the public service, but four years later he re-entered it and served for ten years as adlatus to the minister of the interior. At the close of the Russo-Turkish war in 1878 he was selected by the emperor to fill the post of ambassador at Constantinople, and for more than a year he carried out with great ability the policy of his government, which aimed at re-establishing tran. quillity in the Eastern Question, after the disturbances produced by the reckless action of his predecessor, Count Ignatiev. In 1879 he was transferred to London, and in 1882 to Vienna; and in March 1895 he was appointed minister of foreign affairs in succession to M. de Giers. In this position he displayed much of the caution of his predecessor, but adopted a more energetic policy in European affairs generally and especially in the Balkan Peninsula. At the time of his appointment the attitude of the Russian government towards the Slav nationalities had been for several years one of extreme reserve, and he had seemed as ambassador to sympathize with this attitude. But as soon as he became minister of foreign affairs, Russian influence in the Balkan Peninsula suddenly revived. Servia received financial assistance; a large consignment of arms was sent openly from St Petersburg to the prince of Monte- negro; Prince Ferdinand of Bulgaria became ostensibly re- conciled with the Russian emperor, and his son Boris was received into the pastern Orthodox Church; the Russian embassy at Constantinople tried to bring about a reconciliation

between the Bulgarian exarch and the oecumenical patriarch; Bulgarians and Servians professed, at the bidding of Russia, to lay aside their mutual hostility. All this seemed to foreshadow the creation of a Balkan confederation hostile to Turkey, and the sultan had reason to feel alarmed. In reality Prince Lobanov was merely trying to establish a strong Russian hegemony among these nationalities, and he had not the slightest intention of provoking a new crisis in the Eastern Question so long as the general European situation did not afford Russia a convenient opportunity for solving it in her own interest without serious intervention from other powers. Meanwhile he considered that the integrity and independence of the Ottoman empire must be maintained so far as these other powers were concerned. Accordingly, when Lord Salisbury proposed energetic action to protect the Armenians, the cabinet of St Petersburg suddenly assumed the role of protector of the sultan and vetoed the proposal. At the same time efforts were made to weaken the Triple Alliance, the principal instrument employed being the.

entente with France, which Prince Lobanov helped to convert into a formal alliance between the two powers. In the Far East he was not less active, and became the protector of China in the same sense as he had shown himself the protector of Turkey. Japan was compelled to give up her conquests on the Chinese mainland, so as not to interfere with the future action of Russia in Manchuria, and the financial and other schemes for increasing Russian influence in that part of the world were vigorously supported. All this activity, though combined with a haughty tone towards foreign governments and diplomatists, did not produce much general apprehension, probably because there was a widespread conviction that he desired to maintain peace, and that his great ability and strength of character would enable him to control the dangerous forces which he boldly set in motion. However this may be, before he had time to mature his schemes, and when he had been the director of Russian policy for only eighteen months, he died suddenly of heart disease when travelling with the emperor on the 30th of August 1896. Personally Prince Lobanov was a grand seigneur of the Russian type, proud of being descended from the independent princes of Rostov, and at the same time an amiable man of wide culture, deeply versed in Russian history and genealogy, and perhaps the first authority of his time in all that related to the reign of the emperor Paul. (D. M. W.)

LOBAU, a town of Germany, in the kingdom of Saxony, on the Lobau water, 12 m. S.E. of the town of Bautzen, on the Dresden-Gorlitz railway. Pop. (1905) 10,683. There is a spa, Konig Albert-Bad, largely frequented during the summer season. The town has agricultural implement, pianoforte, sugar, machine- building and button works; and trade in grain, yarn, linen and stockings. Other industries are spinning, weaving, dyeing, bleaching and brewing.

Lobau is first mentioned as a town in 12 21; it received civic rights early in the 14th century and, in 1346, became one of the six allied towns of Lusatia. It suffered severely during the Hussite war and was deprived of its rights in 1547.

See Bergmann, Geschickte der Oberlausilzer Sechsstadt Lobau (Bischofswerda, 1896); and Kretschmer, Die Stadl Lobau (Chem- nitz, 1904).

LOBBY, a corridor or passage, also any apartment serving as an ante-room, waiting room or entrance hall in a building. The Med. Lat. labia, laubia or lobium, from which the word was directly adapted, was used in the sense of a cloister, gallery or covered place for walking attached to a house, as defined by Du Cange (Gloss. Med. et Inf. Lat., s.v. Lobia), porticus operla ad spatiandum idonea, aedibus adjuncta. The French form of lobia was loge, cf. Ital. loggia, and this gave the Eng. ” lodge,” which is thus a doublet of ” lobby.” The ultimate derivation is given under Lodge. Other familiar uses of the term “lobby” are its application (1) to the entrance hall of a parliament house,

and (2) to the two corridors known as ” division-lobbies,” into which the members of the House of Commons and other legislative bodies pass on a division, their votes being recorded according to which “lobby,” “aye” or “no,” they enter. The entrance lobby to a legislative building is open to the public, and thus is a convenient place for interviews between members and their constituents or with representatives of public bodies, associations and interests, and the press. The influence and pressure thus brought to bear upon members of legislative bodies has given rise to the use of “to lobby,” “lobbying,” “lobbyist,” &c, with this special significance. The practice, though not unknown in the British parliament, is most prevalent in the United States of America, where the use of the term first arose (see below).

LOBBYING, in America, a general term used to designate the efforts of persons who are not members of a legislative body to influence the course of legislation. In addition to the large number of American private bills which are constantly being introduced in Congress and the various state legislatures, there are many general measures, such as proposed changes in the tariff or in the railway or banking laws, which seriously affect special interests. The people who are most intimately concerned natur- ally have a right to appear before the legislature or its repre-

sentative, the committee in charge of the bill, and present their side of the case. Lobbying in this sense is legitimate, and may almost be regarded as a. necessity. Unfortunately, however, all lobbying is not of this innocent character. The great in- dustrial corporations, insurance companies, and railway and traction monopolies which have developed in comparatively recent years are constantly in need of legislative favours; they are also compelled to protect themselves against legislation which is unreasonably severe, and against what are known in the slang of politics as strikes or hold-ups. 1 In order that these objects may be accomplished there are kept at Washington and at the various state capitals paid agents whose influence is so well recognized that they are popularly called ” the third house.” Methods of the most reprehensible kind have often been employed by tbem.

Atl empts have been made to remedy the evil by constitutional prohibition, by statute law and by the action of the governor of the state supported by.public opinion. Improper lobbying has been declared a felony in California, Georgia, Utah, Tennessee, Oregon, Montana and Arizona, and the constitutions of practi cally all of the states impose restrictions upon the enactment oi special and private legislation. The Massachusetts anti-lobbying act of 1890, which has served as a model for the legislation of Maryland (1900), Wisconsin (1905) and a few of the other states, is bas 3d upon the publicity principle. Counsel and other legisla- tive agents must register with the sergeant-at-arms giving the names and addresses of their employers and the date, term and character of their employment. In 1907 alone laws regulating lobbying were passed in nine states — Alabama, Connecticut, Florida, Idaho, Missouri, Nebraska, North Dakota, South Dakota and Texas.

See James Bryce, American Commonwealth (New York, ed. 1889), i. 673-678; Paul S. Reinsch, American Legislatures and Legislative Methods (New York, 1907), chaps, viii., ix. ; Margaret A. Schaffner, ” Lobbying,” in Wisconsin Comparative Legislation Bulletins, No. 2; and G. M. Gregory, The Corrupt Use of Money in Politics and Laws for its Prevention (Madison, Wis., 1893).

LOBE, any round projecting part, specifically the lower part of the external ear, one of the parts into which the liver is divided, also one of several parts of the brain, divided by marked fissures (see Liver and Brain). The Greek Xoj36s,from which “lobe ” is derived, was applied to the lobe of the ear and of the liver, and to the pod of a leguminous plant.

LOBECK, CHRISTIAN AUGUST (1781-1860), German classical scholar, was born at Naumburg on the 5th of June 1781. After having studied at Jena and Leipzig, he settled at Wittenberg in 1802 as privat-docent, and in 1810 was appointed to a professor- ship in the university. Four years later, he accepted the chair of rhetoric and ancient

literature at Konigsberg, which he occupied till within two years of his death (25th of August i860). His literary activities were devoted to the history of Greek religion and to the Greek language and literature. His greatest work, Aglaophamus (1829), is still valuable to students. In this he maintains, against the views put forward by G. F. Creuzer in his Symbolik (1810-1823), that the religion of the Greek mysteries (especially those of Eleusis) did not essentially differ from the national religion; that it was not esoteric; that the priests as such neither taught nor possessed any higher knowledge of God; that the Oriental elements were a later importation. His edition of the Ajax of Sophocles (1809) had gained him the reputation of a sound scholar and critic; his Phrynichus (1820) and Paralipomena grammaticae graecae (1837) exhibit the widest acquaintance with Greek literature. He had little sympathy with comparative philology, holding that it needed a lifetime to acquire a thorough knowledge of a single language.

See the article by L. Friedlander in Allgemeine deutsche Biographie; C, Bursian's Geschichte der klassischen Philologie in Deutschland (1883); Lehrs, Populdre Aufsdtze aus dem Altertum (2nd ed., Leipzig, 1875); Ludwich, Ausgewdhlte Briefe von und an Chr. Aug. Lobeck und K. Lehrs (1894); also J. E. Sandys, History of Classical Scholarship, i. (1908), 103.

1 Bills introduced for purposes of blackmail.

LOBEIRA, JOAO (e. 1 233-1 285), a Portuguese troubadour of the time of King Alphonso III., who is supposed to have been the, first to reduce into prose the story of Amadis de Gaula (q.v.). D. Carolina Michaelis de Vasconcellos, in her masterly edition of the Cancioneiro de Ajuda (Halle, 1904, vol. i. pp. 523-524), gives some biographical notes on Joao Lobeira, who is represented in the Colocci Brancuti Canzoniere (Halle, 1880) by five poems (Nos. 230-235). In number 230, Joao Lobeira uses the same ritournelk that Oriana sings in Amadis de Gaula, and this has led to his being generally considered by modern supporters of the Portuguese case to have been the author of the romance, in preference to Vasco de Lobeira, to whom the prose original was formerly ascribed. The folklorist A. Thomas Pires (in his Vasco de Lobeira, Elvas, 1905), following the old tradition, would identify the novelist with a man of that name who flourished in Elvas at the close of the 14th and beginning of the 15th century, but the documents he publishes contain no reference to this Lobeira being a man of letters.

LOBELIA, the typical genus of the tribe Lobelieae, of the order Campanulaceae, named after Matthias de Lobel, a native of Lille, botanist and physician to James I. It numbers about two hundred species, natives of nearly all the temperate and warmer regions of the world, excepting central and eastern Europe as well as western Asia. They are annual or perennial herbs or under-shrubs, rarely shrubby; remarkable arborescent forms are the tree-lobelias found at high elevations on the mountains of tropical Africa. Two species are British, L. Dortmanna (named by Linnaeus after Dortmann, a Dutch druggist), which occurs in gravelly mountain lakes ; and L. urens, which is only found on heaths, &c, in Dorset and Cornwall. The genus is distin- guished from Campanula by the irregular corona and completely united anthers, and by the excessive acridity of the milky juice. The species earliest described and figured appears to be L. cardinalis, under the name Trachelium amerieanum sive cardinalis planta, "the rich crimson cardinal's flower"; Parkinson (Paradisus, 1629, p. 357) says, "it groweth neere the riuer of Canada, where the French plantation in America is seated." It is a native of the eastern United States. This and several other species are in cultivation as ornamental garden plants, e.g. the dwarf blue L. Erinus, from the Cape, which, with its numerous varieties, forms a familiar bedding plant. L. splendens and L. fulgens, growing from 1 to 2 ft. high, from Mexico, have scarlet flowers; L. Tupa, a Chilean perennial 6 to 8 ft. high, has reddish or scarlet flowers; L. tenuior with blue flowers is a recent acquisition to the greenhouse section, while L. amaena, from North America, as well as L.

syphilitica and its hybrids, from Virginia, have also blue flowers. The last-named was introduced in 1665. The hybrids raised by crossing cardinalis, fulgens, splendens and syphilitica, constitute a fine group of fairly hardy and showy garden plants. Queen Victoria is a well-known variety, but there are now many others.

The Lobelia is familiar in gardens under two very different forms, that of the dwarf-tufted plants used for summer bedding, and that of the tall showy perennials. Of the former the best type is L. Erinus, growing from 4 to 6 in. high, with many slender stems, bearing through a long period a profusion of small but bright blue two-lipped flowers. The variety speciosa offers the best strain of the dwarf lobelias; but the varieties are being constantly superseded by new sorts. A good variety will reproduce itself sufficiently true from seed for ordinary flower borders, but to secure exact uniformity it is necessary to propagate from cuttings.

The herbaceous lobelias, of which L. fulgens may be taken as the type, may be called hardy except in so far as they suffer from damp in winter; they throw up a series of short rosette-like suckers round the base of the old flowering stem, and these sometimes, despite all the care taken of them, rot off during winter. The roots should either be taken up in autumn, and planted closely side by side in boxes of dry earth or ashes, these being set for the time they are dormant either in a cold frame or in any airy place in the green- house; or they may be left in the ground, in which case a brick or two should be put beside the plants, some coal ashes being first placed round them, and slates to protect the plants being laid over the bricks, one end resting on the earth beyond. About February they should be placed in a warm pit, and after a few days shaken out and the suckers parted, and potted singly into small pots of light rich earth. After being kept in the forcing pit until well established, they should be moved to a more airy greenhouse pit, and eventually to a

cold frame preparatory to planting out. In the more favoured parts of the United Kingdom it is unnecessary to go to this trouble, as the plants are perfectly hardy ; even in the suburbs of London they live for several years without protection except in very severe winters. They should have a loamy soil, well enriched with manure; and require copious waterings when they start into free. growth. They may be raised from seeds, which, being very fine, require to be sown carefully ; but they do not flower usually till the second year unless they are sown very early in heat.

The species Lobelia inflata, the ” Indian tobacco ” of North America, is used in medicine, the entire herb, dried and in flower, being employed. The species derives its specific name from its characteristic inflated capsules. It is somewhat irritant to the nostrils, and is possessed of a burning, acrid taste. The chief con- stituent is a volatile liquid alkaloid (cf. nicotine) named lobeline, which occurs to the extent of about 30%. This is a very pungent body, with a tobacco-like odour. It occurs in combination with lobelic acid and forms solid crystalline salts. The single prepara- tion of this plant in the British Pharmacopeia is the Tinctura Lobeliae Ethereae, composed of five parts of spirits of ether to one of lobelia. The dose is 5 to 15 minims. The ether is employed in order to add to the efficacy of the drug in asthma, but a simple alcoholic tincture would be really preferable.

Lobelia has certain pharmacological resemblances to tobacco. It has no action upon the unbroken skin, but may be absorbed by it under suitable conditions. Taken internally in small doses, e.g. 5 minims of the tincture, it stimulates the peristaltic movements of the coecum and colon. In large doses it is a powerful gastro- intestinal irritant, closely resembling tobacco, and causing giddiness, headache, nausea, vomiting, purging and extreme prostration, with clammy sweats and faltering rapid pulse. Its action on the circula- tion is very decided. The cardiac terminals of the vagus nerves are paralysed, the pulse being thus accelerated by loss of the normal inhibitory influence, and the blood-vessels being relaxed owing to paresis of the vasomotor centre. The blood-pressure thus falls very markedly. The respiratory centre is similarly depressed, death en- suing from this action. Lobelia is thus a typical respiratory poison. In less than toxic doses the motor terminals of the vagi in the bronchi and bronchioles are

paralysed, thus causing relaxation of the bronchial muscles. It is doubtful whether lobelia affects the cere- brum directly. It is excreted by the kidneys and the skin, both of which it stimulates in its passage. In general terms the drug may be said to stimulate non-striped muscular fibres in small, and paralyse them in toxic doses.

Five minims of the tincture may be usefully prescribed to be taken night and morning in chronic constipation due to inertia of the lower part of the alimentary canal. In spasmodic (neurotic) asthma, and also in bronchitis accompanied by asthmatic spasm of the bronchioles, the tincture may be given in comparatively large doses (e.g. one drachm) every fifteen minutes until nausea is pro- duced. Thereafter, whether successful or not in relieving the spasm, the administration of the drug must be stopped.

LOBENSTEIN, a town of Germany, in the principality of Reuss, on the Lemnitz, situated in a pleasant and fertile country, 25 m. N'.W. from Hof by railway. Pop. (1905) 2990. The town, grouped round a rock, upon which stand the ruins of the old castle, is exceedingly picturesque. It contains a spacious parish church, a palace, until 1824 the residence of the princes of Reuss-Lobenstein-Elersdorf, and a hydropathic establishment. The manufactures include dyeing, brewing and cigar-making.

See Zedler and Schott, Fiihrer durch Lobenstein und Umgebung (2nd ed., Lobenstein, 1903).

LOBO, FRANCISCO RODRIGUES (?i575-?i627), Portuguese bucolic writer, a lineal descendant in the family of letters of Bernardim Ribeiro and Christovam Falcao. All we know of his life is that he was born of rich and noble parents at Leiria, and lived at ease in its picturesque neighbourhood, reading philosophy and poetry and writing of shepherds and shepherdesses by the rivers Liz and Lena. He studied at the university of Coimbra and took the degree of licentiate about 1600. He visited Lisbon from time to time, and tradition has it that he died by drowning on his way thither as he was descending the Tagus from Santarem. Though his first book, a little volume of verses (Romances) published in 1596, and his last, a rhymed welcome to King Philip III., published in 1623, are written in Spanish, he composed his eclogues and prose pastorals entirely in Portu- guese, and thereby did a rare service to his country at a time when, owing to the Spanish domination, Castilian was the language preferred by polite society and by men of letters. His Primavera, a book that may be compared to the Diana of Jorge de Montemor- (Montemayor), appeared in 1601, its second part, the Pastor Peregrine, in 1608, and its third, the Desenganado,

in 1614. The dullness of these lengthy collections of episodes without plan, thread or ideas, is relieved by charming and ingenious pastoral songs named serranilhas. His eclogues in endecasyllables are an echo of those of Camoens, but like his other verses they are inferior to his redondilhas, which show the tradi- tional fount of his inspiration. In his Corte na Aldeia (1619), a man of letters, a young nobleman, a student and an old man of easy means, beguile the winter evenings at Cintra by a series of philosophic and literary discussions in dialogue which may still be read with pleasure. Lobo is also the author of an insipid epic in twenty cantos in ottava rima on the Constable D. Nuno Alvares Pereira, the hero of the war of independence against Spain at the end of the 14th century. The characteristics of his prose style are harmony, purity and elegance, and he ranks as one of Portugal's leading writers. A disciple of the Italian school, his verses are yet free from imitations of classical models, his descriptions of natural scenery are unsurpassed in the Portu- guese language, and generally his writings strike a true note and show a sincerity that was rare at the time. Their popularity may be seen by the fact that the Primavera went through seven editions in the r7th century and nine in all, a large number for so limited a market as that of Portugal, while six editions exist of the Pastor Peregrino and four of the epic

poem. An edition of his collected works was published in one volume in Lisbon in 1723, and another in four volumes, but less complete, appeared there in 1774.

See Costa e Silva, Ensaio hiographico critico, v. 5-1 12, for a critical examination of Lobo's writings; also Bouterwek's History of Portuguese Literature. (E. Pr.)

LOBO, JERONIMO (1593-1678), Jesuit missionary, was born in Lisbon, and entered the Order of Jesus at the age of sixteen. In 1621 he was ordered as a missionary to India, and in 1622 he arrived at Goa. With the intention of proceeding to Abyssinia, whose Negus (emperor) Segued had been converted to Roman Catholicism by Pedro Paez, he left India in 1624. He disembarked on the coast of Mombasa, and attempted to reach his destination through the Galla country, but was forced to return. In 1625 he set out again, accompanied by Mendez, the patriarch of Ethiopia, and. eight missionaries. The party landed on the coast of the Red Sea, and Lobo settled in Abyssinia as superintendent of the missions in Tigre. He remained there until death deprived the Catholics of their protector, the emperor Segued. Forced by persecution to leave the kingdom, in 1634 Lobo and his companions fell into the hands of the Turks at Massawa, who sent him to India to procure a ransom for his imprisoned fellow-missionaries. In this he was successful, but could not induce the Portuguese viceroy to send an armament against Abyssinia. Intent upon accomplishing this cherished project, he embarked for Portugal, and after he had been ship- wrecked on the coast of Natal, and captured by pirates, arrived at Lisbon. Neither at this city, however, nor at Madrid and Rome, was any countenance given to Lobo's plan. He accordingly returned to India in 1640, and was elected rector, and afterwards provincial, of the Jesuits at Goa. After some years he returned to his native city, and died there on the 29th of January 1678.

Lobo wrote an account of his travels in Portuguese, which appears never to have been printed, but is deposited in the monastery of St Roque, Lisbon. Balthazar Telles made large use of the information therein in his Historia geral da Ethiopia a Alta (Coimbra, 1660), often erroneously attributed to Lobo (see Machado's Bibliotheca Lusitana). Lobo's own narrative was translated from a MS. copy into French in 1 728 by the Abbe Joachim le Grand, under the title of Voyage historique d'Abissinie. In 1669 a translation by Sir Peter Wyche of several passages from a MS. account of Lobo's travels was published by the Royal Society (translated in M. Thevenot's Relation des voyages in 1673). An English abridgment of Le Grand's edition by Dr Johnson was published in 1735 (reprinted 1789). In a Memoire justificatif en- rehabilitation des peres Pierre Paez et Jerome Lobo, Dr C. T. Beke maintains against Bruce the accuracy of Lobo's statements as to the source of the Abai branch of the Nile. See A. de Backer, Biblio- thlaue de la Compagnie de Jesus (ed. C. Sommervogel, iv., 1893).

LOBSTER (O.E. lopustre, lopystre, a corruption of Lat. locusta, lobster or other marine shell-fish; also a locust), an edible crustacean found on the coasts of the North Atlantic and Medi- terranean. The name is sometimes loosely applied to any

of the larger Crustacea of the order Macrura, especially to such as are used for food.

The true lobsters, forming the family Homaridae, are dis- tinguished from the other Macrura by having the first three pairs of legs terminating in chelae or pincers. The first pair are large and massive and are composed of six segments, while the remaining legs are each composed of seven segments. The sternum of the last thoracic somite is immovably united with the preceding. This last character, together with some peculiarities of the branchial system, distinguish the lobsters from the freshwater crayfishes. The common lobster (Homarus gammarus or vulgaris) is found on the European coasts from Norway to the Mediterranean. The American lobster (Homarus americanus), which should perhaps be ranked as a variety rather than as a distinct species, is found on the Atlantic coast of North America from Labrador to Cape Hatteras. A third species, found at the Cape of Good Hope, is of small size and of no economic importance.

Both in Europe and in America the lobster is the object of an important fishery. It lives

in shallow water, in rocky places, and is usually captured in traps known as lobster-pots, or creels, made of wickerwork or of hoops covered with netting, and having funnel-shaped openings permitting entrance but preventing escape. These traps are baited with pieces of fish, preferably stale, and are sunk on ground frequented by lobsters, the place of each being marked by a buoy. In Europe the lobsters are generally sent to market in the fresh state, but in America, especially in the northern New England states and in the maritime provinces of Canada, the canning of lobsters is an important industry. The European lobster rarely reaches 10 pounds in weight, though individuals of 14 pounds have been found, and in America there are authentic records of lobsters weighing 20 to 23 pounds.

The effects of over-fishing have become apparent, especially in America, rather in the reduced average size of the lobsters caught than in any diminution of the total yield. The imposition of a close time to protect the spawning lobsters has been often tried, but as the female carries the spawn attached to her body for nearly twelve months after spawning it is impossible to give any effective protection by this means. The prohibition of the capture of females carrying spawn, or, as it is termed, “in berry,” is difficult to enforce. A minimum size, below which it is illegal to sell lobsters, is fixed by law in most lobster-fishing districts, but the value of the protection so given has also been questioned. The Norway lobster (Nephrops norvegicus) is found, like the common lobster, from Norway to the Mediterranean. It is a smaller species, with long and slender claws and is of an orange colour, often beautifully marked with red and blue. It is found in deeper water and is generally captured by trawling. It is a curious and unexplained fact that nearly all the individuals’ so captured are males. It is less esteemed for food than the common species. In London it is sold under the name of ” Dublin prawn.”

The rock lobster, spiny lobster, or sea-crawfish (Palinurus vulgaris) belongs to the family Palinuridae, distinguished from the Homaridae by the fact that the first legs are not provided with chelae or pincers”, and that all the legs possess only six segments. The antennae are very long and thick. It is found on the southern and western coasts of the British, Islands and extends to the Mediterranean. It is highly esteemed for the table, especially in France, where it goes by the name of Langouste. Other species of the same family are used for food in various parts of the world, especially on the Pacific coast of North America and in Australia and New Zealand.

In Melbourne and Sydney the name of ” Murray lobster ” is given to a large species of crayfish (Astacopsis spinifer, formerly known as Aslacus, or Potamobius serratus) which is much used for food. (W. T. Ca.)

LOCAL GOVERNMENT, a phrase specially adopted in English usage for the decentralized or deconcentrated administration, within a state or national and central government, of local affairs by local authorities. It is restricted not only in respect

of area but also in respect of the character and extent of the duties assigned to them. It is not to be confused with local self-government in the wider sense in which the words are sometimes employed, e.g. for the granting by the crown of self- government to a colony; the expression, in a general way, may mean this, but ” local government ” as technically used in England refers more narrowly to the system of county or municipal administration, and English usage transfers it to denote the similar institutions in other countries. The growth and persistence of this kind of subordinate government is due practically to the need of relieving the central authority in the state, and to experience of the failure of a completely centralized bureaucracy. The degree to which local government is adopted varies considerably in different countries, and those which are the best examples of it in modern times — the United Kingdom, the United States, France and Germany — differ very much in their local institutions, partly through

historical, partly through temperamental, causes. A certain shifting of ideas from time to time, as to what is local and what is central, is inevitable, and the same view is not possible in countries of different con- figuration, history or political system. The history and present state of the local government in the various countries are dealt with in the separate articles on them (England, Germany, &c), in the sections dealing with government and administration, or political institutions.

The best recent comparative study of local government is Percy Ashley's Local and Central Government (Murray, 1906), an admirable account of the evolution and working of the systems in England, France, Prussia and United States. Other important works, in addition to general works on constitutional law, are J. A. Fairlie's Municipal Administration, Shaw's Municipal Government in Conti- nental Europe, Redlich and Hirst's Local Government in England, Mr and Mrs Sidney Webb's elaborate historical inquiry into English local government (1906), and for Germany, Bornhak's Geschichte des preussischen Verwaltungsrechts.

LOCAL GOVERNMENT BOARD, a department of the adminis- tration of the United Kingdom, constituted in 1871. It is the successor of the General Board of Health, established in 1848 pursuant to the Public Health Act of that year. The General Board of Health continued in existence until 1854, when it was reconstituted. Its existence under its new constitution was originally limited to one year, but was extended from year to year until 1858, when it was allowed to expire, its powers under the various acts for the prevention of diseases being transferred to the privy council, while those which related to the control of local authorities passed to the secretary of state for the home department, to whose department the staff of officers and clerks belonging to the board was transferred. This state of affairs continued until 187 1, when the Local Government Board was created by the Local Government Board Act 1871. It consists of the lord president of the council, the five principal secretaries of state, the lord privy seal, the chancellor of the exchequer and a president appointed by the sovereign. The board itself seldom meets, and the duties of the department are discharged by the president assisted by a parliamentary and a permanent secretary and a permanent staff. The president and one of the secretaries usually have seats in parliament, and the president is generally a member of the cabinet. The salary of the president, formerly £2000, was raised in 1910 to £5°°° a year. The board has all the powers of the secretary of state under the Public Health Act 1848, and the numerous subsequent acts relating to sanitary matters and the government of sanitary districts; together with all the powers and duties of the privy council under the acts relating to the prevention of epidemic disease and to vaccination. The powers and duties of the board have been largely added to by legislation since its creation; it may be said that the board exercises a general supervision over the numerous authorities to whom local government has been entrusted (see England: Local Government). A committee presided over by Lord Jersey in 1904 inquired into the constitution and duties of the board, but made no recommendation as to any change therein. It recommended, however, an increase in the salaries of the president and of the parliamentary and permanent secretaries.

LOCARNO (Ger. Luggarus), a small town of Italian appearance in the Swiss canton of Tessin or Ticino, of which till 1881 it was one of the three capitals (the others being Bellinzona, q.v., and Lugano, q.v.). It is built at the north or Swiss end of the Lago Maggiore, not far from the point at which the Maggia enters that lake, and is by rail 14 m. S.W. of Bellinzona. Its height above the sea-level is only 682 ft., so that it is said to be the lowest spot in Switzerland. In 1900 its population was 3603, mainly Italian-speaking and Romanists. It was taken from the Milanese in 1 51 2 by the Swiss who ruled it till 1798, when it became part of the canton of Lugano in the Helvetic Republic, and in 1803 part of that of Tessin or Ticino, then first erected. In 1555 a number of Protestant inhabitants were expelled for religious reasons, and going to Zurich founded the silk industry there. Above Locarno is the romantically situated sanctuary, of the Madonna del Sasso (now rendered easily accessible by a funicular railway) that commands a glorious view over the lake and the surrounding country. (W. A. B. C.)

LOCH, HENRY BROUGHAM LOCH, ist Baron (1827-1900), British colonial administrator, son of James Loch, M.P., of Drylaw, Midlothian, was born on the 23rd of May 1827. He entered the navy, but at the end of two years' quitted it for the East India Company's military service, and in 1842 obtained a commission in the Bengal Light Cavalry. In the Sikh war in 1845 he was given an appointment on the staff of Sir Hugh Gough, and served throughout the Sutlej campaign. In 1852 he became second in command of Skinner's Horse. At the outbreak of the Crimean war in 1854, Loch severed his connexion with India, and obtained leave to raise a body of irregular Bulgarian cavalry, which he commanded throughout the war. In 1857 he was appointed attache to Lord Elgin's mission to the East, was present at the taking of Canton, and in 1858 brought home the treaty of Yedo. In April i860 he again accompanied Lord Elgin to China, as secretary of the new embassy sent to secure the execution by China of her treaty engagements. The embassy was backed up by an allied Anglo-French force. Witt Harry S. Parkes he negotiated the surrender of the Taku forts. During the advance on Peking Loch was chosen with Parkes to complete the preliminary negotiations for peace at Tungchow. They were accompanied by a small party of officers and Sikhs. It having been discovered that the Chinese were planning a treacherous attack on the British force, Loch rode back and warned the outposts. He then returned to Parkes and his party under a flag of truce hoping to secure their safety. They were all, however, made prisoners and taken to Peking, where the majority died from torture or disease. Parkes and Loch, after enduring irons and all the horrors of a Chinese prison, were afterwards more leniently treated. After three weeks' time the negotiations for their release were successful, but they bad only been liberated ten minutes when orders were received from the Chinese emperor, then a fugitive in Mongolia, for their immediate execution. Loch never entirely recovered his health after this experience in a Chinese dungeon. Returning home he was made C.B., and for a while was private secretary to Sir George Grey, then at the Home Office. In 1863 he was appointed lieutenant- governor of the Isle of Man. During his governorship the House of Keys was transformed into an elective assembly, the first line of railway was opened, and the influx of tourists began to bring fresh prosperity to the island. In 1882 Loch, who had become K.C.B. in 1880, accepted a commissionership of woods and forests, and two years later was made governor of Victoria, where he won the esteem of all classes. In June 1889 he succeeded Sir Hercules Robinson as governor of Cape Colony and high com- missioner of South Africa.

As high commissioner his duties called for the exercise of great judgment and firmness. The Boers were at the same time striving to frustrate Cecil Rhodes's schemes of northern expan- sion and planning to occupy Mashonaland, to secure control of Swaziland and Zululand and to acquire the adjacent lands up to the ocean. Loch firmly supported Rhodes, and, by informing President Kruger that troops would be sent to prevent any invasion of territory under British protection, he effectually

crushed the " Banyailand trek " across the Limpopo (1890-91). Loch, however, with the approval of the imperial government, concluded in July- August 1890 a convention with President Kruger respecting Swaziland, by which, while the Boers withdrew all claims to territory north of the Transvaal, they were granted an outlet to the sea at Kosi Bay on condition that the republic entered the South African Customs Union. This convention was concluded after negotiations conducted with President Kruger by J. H. Hofmeyr on behalf of the high commissioner, and was made at a time when the British and Bond parties in Cape Colony were working in harmony. The Transvaal did not, however, fulfil the necessary condition, and in view of the increasingly hostile attitude of the Pretoria administration to Great Britain Loch became a strong advocate of the annexation by Britain of the territory east of Swaziland, through which the Boer railway to the sea would have passed. He at length induced the British government to adopt his view and on the 15th of March 1895 it was announced that these territories (Amatonga- land, •&c), would be annexed by Britain, an announcement received by Mr

Kruger ” with the greatest astonishment and regret.” Meantime Loch had been forced to intervene in another matter. When the commandeering difficulty of 1894 had roused the Uitlanders in the Transvaal to a dangerous pitch of excite- ment, he travelled to Pretoria to use his personal influence with President Kruger, and obtained the withdrawal of the obnoxious commandeering regulations. In the following year he entered a strong protest against the new Transvaal franchise law. Mean- while, however, the general situation in South Africa was assuming year by year a more threatening aspect. Cecil Rhodes, then prime minister of Cape Colony, was strongly in favour of a more energetic policy than was supported by the Imperial government, and at the end of March 1895 the high commissioner, finding himself, it is believed, out of touch with his ministers, returned home a few months before the expiry of his term of office. In the same year he was raised to the peerage. When the Anglo- Boef war broke out in 1899 Loch took a leading part in raising and equipping a body of mounted men, named after him ” Loch’s Horse.” He died in London on the 20th of June 1900, and was succeeded as 2nd baron by his son Edward (b. 1873). .

LOCHABER, a district of southern Inverness-shire, Scotland, bounded W. by Loch Linnhe, the river and loch Lochy, N. by the Corryarrick range and adjoining hills, N.E. and E. by the district of Badenoch, S.E. by the district of Rannoch and S. by the river and loch Leven. It measures 32 m. from N.E. to S.W. and 25 m. from E. to W., and is remarkable for wild and romantic scenery, Ben Nevis being the chief mountain. The district has given its name to a celebrated type of axe, consisting of a long shaft with a blade like a scythe and a large hook behind it, which, according to Sir Walter Scott, was introduced into the Highlands and Ireland from Scandinavia. It was the weapon of the old City Guard of Edinburgh. The pathetic song of ” Lochaber no more ” was written by Allan Ramsay.

LOCHES, a town in France, capital of an arrondissement in the department of Indre-et-Loire, 29 m. S.E. of Tours by rail, on the left bank of the Indre. Pop. (1906) 3751. The town, one of the most picturesque in central France, lies at the foot of the rocky eminence on which stands the castle of the Anjou family, surrounded by an outer wall if m. in circumference, and con- sisting of the old collegiate church of St Ours, the royal lodge and the donjon. The church of St Ours dates from the 10th to the 1 2th centuries; among its distinguishing features are the huge stone pyramids surmounting the nave and the beautiful carving of the west door. The royal lodge, built by Charles VII. and used as the subprefecture, contains the tomb of Agnes Sorel and the oratory of Anne of Brittany. The donjon includes, besides the ruined keep (12th century), the Martelet, celebrated as the prison of Lodovico Sforza, duke of Milan, who died there in 1508, and the Tour Ronde, built by Louis XL and containing the famous iron cages in which state prisoners, including— according to a story now discredited — their inventor Cardinal Balue, were confined. Loches has an h6tel-de-ville and several

houses of the Renaissance period. It has a tribunal of first instance, a communal college and a training college. Liqueur- distilling and tanning are carried on together with trade in farm- produce, wine, wood and live-stock.

On the right bank of the Loire, opposite the town and practi- cally its suburb, is the village of Beaulieu-les-Loches, once the seat of a barony. Besides the parish ch rch of St Laurent, a beautiful specimen of 12th-century architecture, it contains the remains of the great abbey church of the Holy Sepulchre founded in the nth century by Fulk Nerra, count of Anjou, who is buried in the chancel. This chancel, which with one of the older transepts now constitutes the church, dates from the 15th century. The Romanesque nave is in ruins, but of the two towers one survives intact; it is square, crowned with an octagonal steeple of stone, and is one of the finest extant monu- ments of Romanesque architecture.

Loches (the Roman Leucae) grew up round a monastery founded about 500 by St Ours and belonged to the counts of Anjou from 886 till 1205. In the latter year it was seized from King John of England by Philip Augustus, and from the middle of the 13th century till after the time of Charles IX. the castle was a residence of the kings of France.

LOCHGELLY, a police burgh of Fifeshire, Scotland, 7! m. N.E. of Dunfermline by the North British railway. Pop. (1901) 5472. The town is modern and owes its prosperity to the iron- works and collieries in its immediate vicinity. Loch Gelly, from which the town takes its name, situated § m. S. E., measures 5 m. in length by £ m. in breadth, contains some trout and pike, and has on its west banks Lochgelly House, a seat of the earl of Minto. The Romans are said to have had a station at Loch Ore in the parish of Ballingry, 2j m. N. by W., which was drained about the end of the 18th century and then cultivated. To the N.E. rises the hill of Benarty (1131 ft.). Hallyards, about 2 m. S.E. of Lochgelly, is a ruined house that once belonged to Sir William" Kirkaldy of Grange, who held Edinburgh Castle for Queen Mary. Here James V. was received after his defeat at Solway Moss in 1542, and here a few Jacobites used to meet in 1715.

LOCHGILPHEAD, a municipal and police burgh of Argyll- shire, Scotland, at the head of Loch Gilp, a small arm on the western side of Loch Fyne. Pop. (1901) 1313. The herring- fishery is the chief industry, but there is some weaving of woollens and, in summer, a considerable influx of visitors. Ardrishaig (pop. 1285), a seaport on the west of the mouth of Loch Gilp, is the east terminus of the Crinan Canal. It is the place of tranship- ment from the large Glasgow passenger steamers to the small craft built for the navigation of the canal. It is an important harbour in connexion with the Loch Fyne herring-fishery, and there is also a distillery. During the summer there is a coach service to Ford at the lower end of Loch Awe.

LOCHMABEN, a royal and police burgh of Dumfriesshire, Scotland, 8 m. N.E. of Dumfries, with a station on the Caledonian railway company's branch from Dumfries to Locherbie. Pop. (1901) 1328. It is delightfully situated, there being eight lakes in the immediate neighbourhood, while the river Annan, and the Waters of Ae, Kinnel and Dryfe are in the vicinity. The town hall is a handsome edifice with clock tower. At the south end of Castle Loch, the chief lake, stand the ruins, a mere shell, of Lochmaben Castle, dating from the 13th century, where local tradition declares that Robert Bruce was born — an honour which is also claimed, however, for Turnberry Castle on the coast of Ayrshire. In the parish church is a bell said to have been pre- sented to King Robert by the pope after reconciliation with him. A statue of the king stands in front of the town hall. Whether it were his birthplace or not, the associations of Bruce with Lochmaben were intimate. He exempted his followers in the district from feudal service and their descendants — the " kindly tenants of Lochmaben " — were confirmed in their tenure by the court of session in 1824. The Castle Loch is the only fresh water in Scotland, and possibly in the British Isles, where the vendace (coregonus vandesius) occurs. This fish, which is believed to be growing scarcer, is alleged on doubtful authority to have been

introduced by Queen Mary. It is captured by the sweep-net in August, and is esteemed as a delicacy. The lakes adjoining the town afford the inhabitants exceptional advantages for the game of curling. There was once a team of Lochmaben Curlers entirely composed of shoemakers (souters) who held their own against all comers, and their prowess added the phrase " to souter " to the vocabulary of the sport, the word indicating a match in which the winners scored " game " to their opponents' " love." Lochmaben unites with Annan, Dumfries, Kirkcudbright and Sanquhar (the Dumfries burghs) in returning one member to parliament.

LOCK, MATTHIAS, English 18th-century furniture designer and cabinet-maker. The dates of his birth and death are unknown ; but he was a disciple of Chippendale, and subsequently of the Adams, and was possibly in partnership with Henry Copeland {q.v.). During the greater part of his life he belonged to that flamboyant school which derived its inspiration from Louis XV. models; but when he fell under the influence of Robert Adam he absorbed his manner so completely that it is often difficult to distinguish between them, just as it is sometimes easy to confound Lock's work with

the weaker efforts of Chippendale. Thus from being extravagantly rococo he progressed to a simple ordered classicism. His published designs are not equal to his original drawings, many of which are preserved in the Victoria and Albert Museum, South Kensington, while the pieces them- selves are often bolder and more solid than is suggested by the author's representations of them. He wasa clever craftsman and holds a distinct place among the minor furniture designers of the second half of the 18th century.

Among his works, some of which were issued in conjunction with Copeland, are: A New Drawing Book of Ornaments (n. d.); A New Book of Ornaments (1768); A New Book of Pier Frames, Ovals, Girandoles, Tables, &c. (1769); and A New Book of Foliage

(1769). '

LOCK (from the O. Eng. loc; the word appears, in different forms, in many Teutonic languages, but with such various meanings as "hole," Ger. Loch, "lid," Swed. lock, &c; probably the original was a root meaning " to enclose "), a fastening, particularly one which consists of a bolt held in a certain position by one or more movable parts which require to be placed in definite positions by the aid of a key or of a secret arrangement of letters, figures or signs, before the bolt can be moved. It is with such fastenings that the present article chiefly deals.

The word is also used, in the original sense of an enclosure or barrier, for a length of water in a river or canal, or at the entrance of a dock, enclosed at both ends by gates, the " lock-gates," and fitted with sluices, to enable vessels to be raised from a lower to a higher level or vice versa (see C anal and Dock). In guns and rifles the lock is the mechanism which effects the firing of the charge ; it thus appears in the names of old types of weapons, such as wheel-lock, match-lock, flint-lock (see Arms and Armour, § Firearms; also Gun and Rifle). Lock (Ger. Locke) in the sense of a curl or tuft of hair, the separate groups in which the hair naturally grows, may be, in ultimate origin, connected with the root of the main word. Lock- jaw is the popular name of the disease known as tetanus (q.v.). The name " Lock Hospital " is frequently used in English for a hospital for patients suffering from venereal diseases. According to the New English Dictionary there was in Southwark asearly as 1453 a leper-hospital, known as the Lock Lazar House, which later was used for the treatment of venereal diseases. The name appears to have become used in the present sense as early as the end of the 17th cer \tury. Lock hospitals were established in London in 1 745-1 747 and in Dublin in 1 754-1 755.

The forms in which locks are manufactured, such as padlock, rim-lock, mortise-lock, one-sided or two-sided, &c, are necessarily extremely numerous; and the variations in the details of con- struction of any one of these forms are still more numerous, so that it is impossible to do morei here than describe the main types which have been or are in common use. Probably the earliest locks were of Chinese origin. Specimens of these still extant are quite as secure as any locks manufactured in Europe up to the 1 8th century, but it is impossible to ascertain the date of their manufacture. With the exception, in all probability, of these Chinese examples, the earliest lock of which the con- struction is known is the Egyptian, which was used four thousand

years ago. In fig. 1, aa is the body of the lock, bb the bolt and

cc the key. The three pins p, p, p drop into three holes in the

bolt when it is pushed in, and so hold it fast; and they are

raised again by

putting in the key

through the large

hole in the bolt and

raising it a little, so

that the pins in the

key push the locking

pins up out of the

way of the bolt. It

was evidently to

locks and keys of

this nature that the

prophet alluded: ” And the key of the house of David will I

lay upon his shoulder ” (Isaiah xxii. 22), the word muftah used

in this passage being the common word for key to this day.

In the 1 8th century the European lock was nothing better than a mere bolt, held in its place, either shut or open, by a spring b (fig. 2), which pressed it down, and so held it at either one end or the other of the convex notch aa; and the only impediment to opening it was the wards which the key had to pass before it could turn in the keyhole. But it was always possible to find the shape of the wards by merely putting in a blank key covered with wax, and pressing it against them;

Fig. 1.

Fig. 2.

Fig. 3,

and when this had been done it was unnecessary to cut out the key into the complicated form of the wards (such as fig. 3), because no part of that key does any work except the edge be farthest from the pipe a; and so a key of the form fig. 4 Would do just as well. Thus a small collection of skeleton keys, as they are called, of a few different patterns, was all the stock in trade that a lock-picker required.

The common single-tumbler lock (fig. 5) requires two opera- tions instead of one to open it. The tumbler at turns on a pivot at I, and has a square pin at a, which drops into a notch in the bolt bb, when it is either quite open or quite shut,‘and the tumbler

Fig. 4.

Fig. 5

must be lifted by the key before the bolt can be moved again. The tumbler offered little resistance to picking, as the height to which it might be lifted was not limited and the bolt would operate provided only that this height was sufficient; the improvement which formed the foundation of the modern key lock was the substitution of what is known as the ” lever ” for the tumbler, the difference being that the lever must be lifted to exactly the right height to allow the bolt to pass. This improvement, together with the obvious one of using more than one lever, was introduced in 1778 by Robert Barron, and locks

is illustrated in figs. 6 and 7. Unless the square pin a (fig. 6) is lifted by the key to the proper height and no higher, the bolt cannot move. Fig. 8 illustrates the key of such a lock with four levers, the different distances between the centre of the key barrel and

the edge of the bit being adapted to lift the levers to the respective heights required. This lock differs from the

modern lever lock only in the fact that Barron made his gating in the bolt and carried stumps on his levers, instead of having the main stump riveted into the bolt and the gatings in the levers as is the modern practice.

A lock operating on exactly the same principle but entirely different in construction (fig. 9) was invented by Joseph Bramah

Fig. 6.

Fig. 7.

in 1784. It consists of an outer barrel aaaa, within which is a revolving barrel, cccc, held in place by a steel disk, dd, and pro- vided with a pin b fixed eccentrically for operating the bolt; the barrel is prevented from turning by sheet metal sliders ss, which slide axially in radial grooves in the barrel and project into slots cut into the steel disk which is fastened to the case of the lock. Each slider has a gating cut in its outer edge sufficiently deep to allow it to embrace the inwardly projecting steel plate and turn on it with the barrel. The key is of tubular form having slots cut in its end, each of a depth corresponding to the position of the gating in one of the sliders; so that, on inserting the key, each slider is pushed in — against a spring — exactly far enough to bring its slot opposite the steel disk; in this position the barrel carrying the sliders is turned by the key and actuates the bolt.

Up to 185 1 it was generally believed that well-made lever locks of all types were practically unpickable, but at this time Alfred Charles Hobbs — an American — demonstrated, by picking the locks of Barron, Chubb, Bramah and others, that this belief was a fallacy. The method of Hobbs became widely known as the " tickling " or " tentative " method. In the modern

Fig. 9

lever lock the bolt carries a projecting piece — the " main stump " — which, when the levers are all raised to the proper height, enters the slots — " gatings " — in their faces. If, when the levers are not in this position, pressure is applied to the bolt, the main stump will press against the face of the levers; but owing to inaccuracies of workmanship and other causes the pressure will not be equal on all the levers. If now, the pressure on the bolt being maintained, each lever in turn is carefully raised a little, one will be found on which the pressure of the stump is greatest; this one is lifted till it becomes easy and then care- fully lowered till it is sustained by the pressure of the stump in a new position. Another lever now bears the greatest pressure, and this in its turn is similarly treated. By this gradual or " tentative " process the levers will in time all be raised to the correct height and the bolt will slip back without, if sufficient care has been exercised, any of the levers having been raised

above its correct position. Although this method of picking only became generally known in 1851, it is evident that it was not novel, since in 1817 one of Bramah's workmen, named Russell, invented the use of false notches or gatings, which were slots similar to the true gating but of small depth cut in the face of the levers. Similar false gatings were used in Anthony Radford Strutt's lock in 1819. The only possible object of these gatings — two of which are shown in each of the sliders of Bramah's lock — was to prevent the tentative method of picking. They are, however, not efficient for their purpose although they render the operation more difficult and tedious.

The best-known locks up to 1 8 5 1 were those of Jeremiah Chubb, their popularity being due to their superior workmanship and probably still more to their title " detector." His lock, patented in 1818, contained a device intended to frustrate attempts at picking, and further to detect if such an attempt had been made. This device, at any rate as far as detecting was concerned, bad been anticipated by the patent of Thomas Ruxton in 18 16. Since the device only comes into operation when any lever is raised too high, it is not effective against a skilful application of the tentative method. The original form of this lock is shown in fig. 10, when the lever DT, which turns on a pin in the middle,

Fig. 10.

is acted npon at its end T by a spring S, which will evidently allow some play to the lever on either side of the corner X; but the moment it is pushed past that point the spring will carry it farther in the same direction, like what is called in clock-work a jumper. In its proper position that end always remains above the turning-point; but, if

any one of the tumblers is raised too high, the other end D of the detector, which reaches over all the levers, is lifted so far that the end T is sent down below the corner, and the tooth T then falls into a notch in the bolt, and so prevents it from being drawn back, even though all the levers are raised properly by the right key. It thus at once becomes obvious that somebody has been trying to pick the lock. The way to open it, then, is to turn the key the other way, as if to overlock the bolt; a short piece of gating near the end of the levers allows the bolt to advance just far enough to push the tooth of the detector up again by means of its inclination there, and then the lock can be opened as usual. To render the mechanism of locks more inaccessible for picking purposes, two devices, the “curtain” and the “barrel,” were in use; these devices were simply the one a disk and the other a cylinder carrying a keyhole which revolved with the key and so closed the fixed keyhole in the case.

It is to Hobbs himself that we are indebted for the invention of the movable stump, since called the safety lever, the only device intro- duced rendering the tentative method of picking inoperative. This invention was incorporated in the ” protector ” locks of Hobbs, Hart & Co. ; it consists in the employment of a movable main stump which is not riveted into the bolt as usual, but is set on the end b of a bent lever abc (fig. 11) which lies in a hollow of the bolt A behind it, turning on a pivot in the bolt itself, and kept steady by a small friction-spring e. The stump comes through a hole in the bolt large enough to let it have a little play; and the long end a of the lever stands just above the edge of a square pin d, which is fixed in the back plate of the lock. When the lock is locked, if the bolt be pushed

back, no sensible pressure on the levers is produced, but only just enough to turn this protector lever, as Hobbs called it, on its pivot c, and so bring down its end a in front of the square pin, and then the bolt can no more be pushed back than when held by Chubb’ s detector. The protector is set free again by merely pushing the bolt forward with the key, without reference to the levers. However, the protector could be prevented from acting by a method used by the inventor himself for another purpose, viz., by pushing a piece of watch-spring through the keyhole, and up behind the bolt, so as to reach the protector at a, and keep it up while the bolt was pushed back, or, again, by pushing up the watch-spring between any two of the levers, and holding the end b of the protector with it, so as to press the stump against the levers. Both these devices, however, are prevented now by letting in a feather FF in a groove between the bolt and the back of the lock, which no watch-spring can pass, and also bringing a piece of the feather forward through the front gating of the levers just under the stump. In this form the lock is safe against any mode of picking known. A lock possessing valuable features was invented in 1852 by Sir Edmund Beckett — afterwards Lord Grim- thorpe — but did not come into general use for commercial reasons.

All the locks containing many levers so far described have a common defect in that the levers are moved in one direction by the key and in the other by springs. But it not infrequently happens that dirt or grease gets between the levers and causes two or more to stick together, in which case one of them is lifted too high and the bolt is prevented from operating. To overcome this difficulty locks, especially those intended for safes, have been made so that alternate levers move in opposite directions, the key having two bits on opposite sides. This construction entails that the key enter the body of the levers instead of passing below them, an arrangement that had previously been in use to reduce the space into which gunpowder could be packed through the keyhole.

The key locks chiefly used in English safes have been the ordinary lever lock with 6-8 or 10 levers, Chubb’s ” detector,” Hobbs’ s Keylocks ” P r ˚tector ” or variants of these. In the Yale lock, which ‘ reverts in some degree to the idea of the ancient Egyptian lock, America has produced one key lock which has come into almost universal use in that country and is certainly worthy of note. The key of this lock, shown full size at ha

in fig. 12, is remarkably small,

being stamped from a piece of flat steel and weighing only a small fraction of an ounce. The barrel abc has to turn, as in the Bramah lock, in order to move the bolt, which is not shown in the figure. That may be done cither as in Bramah locks or by a tongue or bit attached to the end ab of the barrel as in several other locks. The barrel is prevented from being turned, except by the proper key, thus. The (apparently) five plugs with spiral springs over them in fig. 12 are really all divided at the cross line be, being all now lifted to the proper height by the key. Consequently the barrel abc can turn round, as there is no plug either projecting from it or projecting into it. But when the key is out, all the plugs are pushed down by the springs, and so the upper ones descend into the barrel and hold it fast. And again, if any of the steps of a false key are too high, some of the lower plugs will be pushed up beyond the barrel into the holes above them, and so the barrel cannot turn. The bevelled end of the key near a enables it to be pushed in under the plugs, though with some friction and resistance.

It is frequently convenient to have a number of different locks so arranged that, whilst each has its own individual.key, yet one special or ” master ” key will operate any of the series. In warded locks this is done by ” differing ” the wards of the individual locks so that each key will only pass its own lock, and then filing away the bit of an extra key so that it will pass all the wards; the objection to this method is that any of the individual keys can easily be filed away and so form a master key. A better method, which meets this objection, consists in making all the levers except one — or if need be two — of each lock alike and cutting another gating or widening the gating in the differing levers, so as to pass the master key which has one — or two — special steps.

The growth of safe deposits has called for special locks so that when a box changes tenants the outgoing tenant’s key shall be useless. In some cases the look has been taken off and another substituted, but this is a clu nay makeshift now rarely

employed, and has been superseded by the use of changeable key locks.

The first of these, invented by Robert Newell in 1841, was intro- duced into Great Britain from America by Hobbs in 1 85 1. A simpler form, the construction of which is clearly shown by fig. 13, was brought out by Hobbs, Hart & Co. The bolt of this lock, instead of the ordinary main stump, carries a set of sliders, PPS, one corre- sponding to each lever and each carrying a projection S correspond- ing to a portion of the main stump. It will be seen that if any key

n

HKjjl

o

Fig. 13.

having steps of certain lengths is inserted when the lock is unlocked and the bolt B thrown thereby, each slider will be raised to a height corresponding to that to which its lever is raised by the key, and the two fixed teeth CC will engage two of the teeth in the front of each slider, so that they will be held in place ready to enter the lever gatings when the same key is inserted.

A changeable key lock introduced by the Chatwood Safe Co. has no gatings in the levers, whose fronts are cut with teeth gearing into similar teeth cut in a set of disks carrying the gatings. The disks are mounted on a stud which can be moved by a key from the back of the lock in such a way that while the main stump is in the gatings — keeping the disks in position — the disks are carried forward out of gear with the levers; the key can then be removed and another

Fig. 14.

having steps of suitable length inserted and turned so as to raise the levers, the disks being then brought back into gear.

Both the above locks require that the key steps should have certain definite lengths corresponding to the teeth, but a later lock re- sembling to some extent that brought out by Hobbs, Hart & Co. has been introduced by the Chatwood Co., in which it is sufficient after unlocking the lock to file any of the key steps and so alter the pattern of the key in any way. In this lock, which is illustrated in fig. 14, unlike all those that have been described, the levers are not pivoted but slide upon guide stumps; the main stump is divided as in Hobbs Hart's lock, the various pieces being clamped together by a screw to form a solid stump. The sliders composing the main stump are not provided with teeth, the changing being effected as follows: when

the bolt is partly shot by the correct key, the screw which binds the sliders together as it comes opposite an opening in the back of the case is loosened, the key is removed and altered — or a fresh key substituted — and is inserted so as to lift the levers to their correct height and expose the clamping screw at the back, which is then

tightened. This lock is now commonly used for safe deposits, combined with a small lever lock of which the custodian carries the key, and which either blocks the bolt of the main lock or covers the keyhole, p . In connexion with changeable

■'■ key locks requiring key steps of

definite lengths, much ingenuity has been displayed in designing keys with movable bits or steps, as fig. 15, which are useful chiefly as duplicates, being built up to match the key from time to time in use, and then deposited in some bank or other secure place to be used in case of emergency.

From the very earliest times secret devices, either to hide keyholes or to take the place of locks proper, have been in use; these are to-day only seriously represented by " com- 1/00 locks, bination " locks which, whilst following the same general principles as key locks, differ entirely in construction. Locks in which the arranging of the internal parts in their proper positions was secured by the manipulation of external parts marked with letters or numbers were common in China in very early times, but their history is un- fortunately lost. This form of lock has been developed to a very high degree of perfection and is, for safes, in almost universal use to-day in America.

The American lock consists of a series of disks mounted upon one spindle, only one, however — the bolt disk — being fixed thereto, and provided each with a gating into which a stump connected with the bolt can drop when all the gatings lie upon a given line parallel to the axis of the spindle. Each disk is provided with a driving pin so arranged that it can impinge on and drive a similar pin in its next neighbour; the gating in the bolt disk and the portion of the stump which enters it are so formed that the disk can draw the bolt back. The spindle is provided on the outside with a knob and graduated disk — usually with 100 divisions — surrounded by an annulus on which a fixed position is denoted. Each disk, including the bolt disk, is provided with a pin projecting from its surface in such a way that the pin of one disk comes into contact with that of the next disk and drives it round. If, then, the bolt disk being at the back, there are three letter disks and the spindle is rotated to the left, the bolt disk will in the course of one revolution pick up letter disk No. 1— counting from the bolt disk — in the second revolution it will pick up No. 2, and in the third No. 3, the revolution being continued for part of a turn till the number corresponding to the correct position of No. 3 is reached. The revolution of the spindle is now reversed. The bolt disk leaves No. I in the first revolution and picks it up again, and the second revolution picks up No. 2. The motion is continued for part of a revolution till No. 2 is brought to the correct position (No. 3 obviously not being disturbed) and is then

reversed. No. 1 is again left behind and picked up in the first revolution to the left, the motion being continued till the correct position of No 1 is reached, when, on reversal, the gating in the bolt disk comes into the correct position, the stump falls and a continuance of the motion to the right draws back the bolt. A lock constructed in this way would be of little utility, as the combination would have to be determined once for all by the maker. The difficulty is got over by making the letter disks in two parts, the inner part carrying the driving pin and the outer the gating ; these two parts are locked together by small cams or other devices which come into such a position that they can be released with the help of a square key when the lock is unlocked. The combination is set by altering the position of the inner disks with the driving pins in relation to the outer part carrying the gatings which are meanwhile held steady by the square key.

One advantage of the combination lock is that there is no key to be lost or stolen, but the means adopted by burglars, especially in America, are such that even this is not a perfect protection, cases having occurred in which a person has been compelled to disclose the combination. With key locks the keyhole through the safe door forms a distinct point of danger, and with combination locks the spindle passing through the door may be attacked by explosives. To obviate these two risks time locks were introduced in America and have been used in Europe. Essentially the time lock consists of a high-class chronometer or watch movement, little liable to get out of order, driving a disk provided with a gating such that the bolt can only enter the gating during certain hours; as a rule

Time locks.

two, three or four chronometers are used, any one of which can release the lock.

The Yale time lock contains two chronometer movements which revolve two dial plates studded with twenty-four pins to represent the twenty-four hours of the day. These pins, when pushed in, form a track on which run rollers supporting the lever which secures the bolt or locking agency, but when they are drawn out the track is broken, the rollers fall down and the bolt is released. By pulling out the day pins, say from 9 till 4, the door is automatically prepared for opening between these hours, and at 4 it again of itself locks up. For keeping the repository closed over Sundays and holidays, a subsidiary segment or track is brought into play by which a period of twenty-four hours is added to the locked interval. Careful pro- vision is made against the eventuality of running down or accidental stoppage of the clock motion, by which the rightful owner might be as seriously incommoded as the burglar. In the Yale lock, just before the chronometers run out, a trigger is released which depresses the lever by which the bolt is held in position. (A. B. Ch.)

LOCKE, JOHN (1632-1704), English philosopher, was born at Wrington, 10 m. W. of Belluton, in Somersetshire, on the 29th of August 1632, six years after the death of Bacon, and three months before the birth of Spinoza. His father was a small landowner and attorney at Pensford, near the northern boundary of the county, to which neighbourhood the family had migrated from Dorsetshire early in that century. The elder Locke, a strict but genial Puritan, by whom the son was carefully educated at home, was engaged in the military service of the parliamentary party. ” From the time that I knew anything,” Locke wrote in 1660, ” I found myself in a storm, which has continued to this time.” For fourteen years his education, more or less interrupted, went on in the rural home at Belluton, on his father’s little estate, half a mile from Pensford, and 6 m. from Bristol. In 1646 he entered Westminster School and remained there for six years. Westminster was uncongenial to him. Its memories perhaps encouraged the bias against public schools which after- wards disturbed his philosophic calm in his Thoughts on Educa- tion. In 1652 he entered Christ Church, Oxford, then under John Owen, the Puritan dean and vice-chancellor of the uni- versity. Christ Church was Locke’s occasional home for thirty years. For some years after he entered, Oxford was ruled by the Independents, who, largely through Owen, unlike the Presbyterians, were among the first in England to advocate genuine religious toleration. But Locke’s hereditary sympathy with the Puritans was gradually

lessened by the intolerance of the Presbyterians and the fanaticism of the Independents. He had found in his youth, he says, that " what was called general freedom was general bondage, and that the popular assertors of liberty were the greatest engrossers of it too, and not unfitly called its keepers." And the influence of the liberal divines of the Church of England afterwards showed itself in his spiritual development.

Under Owen scholastic studies were maintained with a form- ality and dogmatism unsuited to Locke's free inquisitive temper. The aversion to them which he expressed showed thus early an innate disposition to rebel against empty verbal reasoning. He was not, according to his own account of himself to Lady Masham, a hard student at first. He sought the company of pleasant and witty men, and thus gained knowledge of life. He took the ordinary bachelor's degree in 1656, and the master's in 1658. In December 1660 he was serving as tutor of Christ Church, lecturing in Greek, rhetoric and philosophy.

At Oxford Locke was nevertheless within reach of liberal intellectual influence tending to promote self-education and strong individuality. The metaphysical works of Descartes had appeared a few years before he went to Oxford, and the Human Nature and Leviathan of Hobbes during his under- graduate years. It does not seem that Locke read extensively, but he was attracted by Descartes. The first books, he told Lady Masham, which gave him a relish for philosophy, were those of this philosopher, although he very often differed from him. At the Restoration potent influences were drawing Oxford and England into experimental inquiries. Experiment in physics became the fashion. The Royal Society was then founded, and we find Locke experimenting in chemistry in 1663, also in meteorology, in which he was particularly interested all his life.

The restraints of a professional career were not suited to Locke. There is a surmise that early in his Oxford career he contemplated taking orders in the Church of England. His religious disposition attracted him to theology. Revulsion from the dogmatic temper of the Presbyterians, and the unreasoning enthusiasm of the Independents favoured sympathy afterwards with Cambridge Platonists and other liberal Anglican churchmen. Whichcote was his favourite preacher, and close intimacy with the Cudworlh family cheered his later years. But, though he has a place among lay theologians, dread of ecclesiastical impediment to free inquiry, added to strong inclination for scientific investigation, made him look to medicine as his profession, and before 1666 we find him practising as a physician in Oxford. Nevertheless, although known among his friends as " Doctor Locke," he never graduated in medicine. His health was uncertain, for he suffered through life from chronic consumption and asthma. A fortunate event soon withdrew him from the medical profession.

Locke early showed an inclination to politics, as well as to theology and medicine. As early as 1665 he diverged for a short time from medical pursuits at Oxford, and was engaged as secretary to Sir Walter Vane on his mission to the Elector of Brandenburg. Soon after his return in 1666 the incident occurred which determined his career. Lord Ashley, afterwards first earl of Shaftesbury, had come to Oxford for his health. Locke was introduced to him by his physician, Dr Thomas. This was the beginning of a lasting friendship, sustained by common sym- pathy with liberty — civil, religious and philosophical. In 1667 Locke moved from Christ Church to Exeter House, Lord Ashley's London residence, to become his confidential secretary. Although he retained his studentship at Christ Church, .and occasionally visited Oxford, as well as his patrimony at Bellutori, he found a home and shared fortune with Shaftesbury for fifteen years.

Locke's commonplace books throw welcome light on the history of his mind in early life. A paper on the " Roman Commonwealth " which belongs to this period, expresses

con- victions about religious liberty and the relations of religion to the state that were modified and deepened afterwards; objec- tions to the sacerdotal conception of Christianity appear in another article; short work is made of ecclesiastical claims to infallibility in the interpretation of Scripture in a third; a scheme of utilitarian ethics, wider than that of Hobbes, is suggested in a fourth. The most significant of those early revelations is the Essay concerning Toleration (1666), which anticipates conclusions more fully argued nearly thirty years later.

The Shaftesbury connexion must have helped to save Locke from those idols of the " Den " to which professional life and narrow experience is exposed. It brought him into contact with public men, the springs of political action and the duties of high office. The place he held as Shaftesbury's adviser is indeed the outstanding circumstance in his middle life. Exeter House afforded every opportunity for society. He became intimate among others with the illustrious Sydenham; he joined the Royal Society and served on its council. The foundation of the monumental work of his life was laid when he was at Exeter House. He was led to it in this way. It was his habit to en- courage informal reunions of his intimates, to discuss debatable questions in science and theology. One of these, in the winter of 1670, is historically memorable. " Five or six friends," he says, met in his rooms and were discussing " principles of morality and religion. They found themselves quickly at a stand by the difficulties that arose on every side." Locke proposed some criticism of the necessary " limits of human understanding " as likely to open a way out of their difficulties. He undertook to attempt this, and fancied that what he had to say might find sufficient space on " one sheet of paper." What was thus " begun by chance, was continued by entreaty, written by incoherent parcels, and after long intervals of neglect resumed again as humour and occasions permitted." At the end of nearly twenty years the issue was given to the world as Locke's now famous Essay Concerning Human Understanding.

The fall of Shaftesbury in 1675 enabled Locke to escape from English politics. He found a retreat in France, where he could unite calm reflection upon the legitimate operations of " human understanding " with attention to his health. He spent three years partly at Montpellier and partly in Paris. His journals and commonplace books in these years show the Essay in pre- paration. At Paris he met men of science and letters — Peter Guenellon, the well-known Amsterdam physician; Ole Romer, the Danish astronomer; Thoynard, the critic; Melchisedech Thevenot, the traveller; Henri Justel, the jurist; and Francois Bernier, the expositor of Gassendi. But there is no mention of Malebranche, whose Recherche de la virile had appeared three years before, nor of Arnauld, the illustrious rival of Malebranche.

Locke returned to London in 1679. Reaction against the court party had restored Shaftesbury to power. Locke resumed his old confidential relations, now at Thanet House in Aldersgate. A period of often interrupted leisure for study followed. It was a time of plots and counterplots, when England seemed on the brink of another civil war. In the end Shaftesbury was com- mitted to the Tower, tried and acquitted. More insurrectionary plots followed in the summer of 1682, after which, suspected at home, the versatile statesman escaped to Holland, and died at Amsterdam in January 1683. In these two years Locke was much at Oxford and in Somerset, for the later movements of Shaftesbury did not commend themselves to him. Yet the government had their eyes upon him. " John Locke lives a very cunning unintelligible life here," Prideaux reported from Oxford in 1682. " I may confidently affirm," wrote John Fell, the dean of Christ Church, to Lord Sunderland, " there is not any one in the college who has heard him speak a word against, or so much as censuring, the government; and, although very frequently, both in public and private, discourses have been purposely in- troduced to the disparagement of his master, the earl of Shaftes- bury, he could never be provoked to take any notice, or discover in word or look the least concern; so that I believe there is not in the world such a master of taciturnity and passion." Un- published correspondence with his Somerset friend, Edward Clarke of Chipley, describes Locke's life in those troubled years. It also reveals the opening of his intimate intercourse with the Cudworth family, who were friends of the Clarkes, and connected by birth with Somerset. The letters allude to toleration in the state and comprehension

in the church, while they show an indifference to theological dogma hardly consistent with an exclusive connexion with any sect.

In hi3 fifty-second year, in the gloomy autumn of 1683, Locke retired to Holland, then the asylum of eminent persons who were elsewhere denied liberty of thought. Descartes and Spinoza had speculated there; it had been the home of Erasmus and Grotius; it was now the refuge of Bayle. Locke spent more than five years there; but his (unpublished) letters show that exile sat heavily upon him. Amsterdam was his first Dutch home, where he lived in the house of Dr Keen, under the assumed name of Dr Van der Linden. For a time he was in danger of arrest at the instance of the English government. After months of concealment he escaped; but he was deprived of his studentship at Christ Church by order of the king, and Oxford was thus closed against him. Holland introduced him to new friends. The chief of these was Limborch, the successor of Episcopius as Remonstrant professor of theology, lucid, learned and tolerant, the friend of Cudworth, Whichcote . and More. By Limborch he was introduced to Le Clerc, the youthful representative of letters and philosophy in Limborch's college, who had escaped from Geneva and Calvinism to the milder atmosphere of Holland and the Remonstrants. The Bibliotheque universale of Le Clerc was then the chief organ in Europe of men of letters. Locke contributed several articles. It was his first appearance as an author, although he was now fifty-four years of age. This tardiness in authorship is a signifi- cant fact in his life, in harmony with his tempered wisdom.

In the next fourteen years the world received through his books the thoughts which had been gradually forming, and were taking final shape while he was in Holland. The Essay was finished there, and a French epitome appeared in 1688 in Le

Clerc's journal, the forecast of the larger work. Locke was then at Rotterdam, where he lived for a year in the house of a Quaker friend, Benjamin Furley, or Furly, a wealthy merchant and lover of books. At Rotterdam he was a confidant of political exiles, including Burnet and the famous earl of Peterborough, and he became known to William, prince of Orange. William landed in England in November 1688; Locke followed in February 1689, in the ship which carried the princess Mary.

After his return to England in 1689 Locke emerged through authorship into European fame. Within a month after he reached London he had declined an offer of the embassy to Brandenburg, and accepted the modest office of commissioner of appeals. The two following years, during which he lived at Dorset Court in London, were memorable for the publication of his two chief works on social polity, and of the epoch-making book on modern philosophy which reveals the main principles of his life. The earliest of these to appear was his defence of religious liberty, in the Epistola de Tolerantia, addressed to Limborch, published at Gouda in the spring of 1689, and trans- lated into English in autumn by William Popple, a Unitarian merchant in London. Two Treatises on Government, in defence of the right of ultimate sovereignty in the people, followed a few months later. The famous Essay concerning Human Under- standing saw the light in the spring of 1690. He received £30 for the copyright, nearly the same as Kant got in 1781 for his Kritik der reinen Vernunft. In the Essay Locke was the critic of the empirical data of human experience: Kant, as the critic of the intellectual and moral presuppositions of experience, supplied the complement to the incomplete and ambiguous answer to its own leading question that was given in Locke's Essay. The Essay was the first book in which its author's name appeared, for the Epistola de Tolerantia and the Treatises on Government were anonymous.

Locke's asthma was aggravated by the air of London; and the course of public affairs disappointed him, for the settlement at the Revolution fell short of his ideal. In spring, 1691, he took up his residence in the manor house of Otes in Essex, the country seat of

Sir Francis Masham, between Ongar and Harlow. Lady Masham was the accomplished daughter of Ralph Cudworth, and was his friend before he went to Holland. She told Le Clerc that after Locke's return from exile, " by some considerably long visits, he had made trial of the air of Otes, which is some 20 m. from London, and he thought that none would be so suitable for him. His company," she adds, " could not but be very desirable for us, and he had all the assurances we could give him of being always welcome; but, to make him easy in living with us, it was necessary he should do so on his own terms, which Sir Francis at last assenting to, he then believed himself at home with us, and resolved, if it pleased God, here to end his days as he did." At Otes he enjoyed for fourteen years as much domestic peace and literary leisure as was consistent with broken health, and sometimes anxious visits to London on public affairs, in which he was still an active adviser. Otes was in every way his home. In his letters and otherwise we have pleasant pictures of its inmates and domestic life and the occasional visits of his friends, among others Lord Peterborough, Lord Shaftesbury of the Characteristics, Sir Isaac Newton, William Molyneux and Anthony Collins.

At Otes he was busy with his pen. The Letter on Toleration involved him in controversy. An Answer by Jonas Proast of Queen's College, Oxford, had drawn forth in 1690 a Second Letter. A rejoinder in 1691 was followed by Locke's elaborate Third Letter on Toleration in the summer of the following year. In 1691 currency and finance were much in his thoughts, and in the following year he addressed an important letter to Sir John Somers on the Consequences of the Lowering of Interest and Raising the Value of Money. When he was in Holland he had written letters to his friend Clarke of Chipley about the education of his children. These letters formed the substance of the little volume entitled Thoughts on Education (1693), which still holds its place among classics in that department. Nor were the " principles of revealed religion " forgotten. The subtle theo-

logical controversies of the 17th century made him anxious to show how simple after all fundamental Christianity is. In the Reasonableness of Christianity as delivered in the Scriptures (anonymous, 1695), Locke sought to separate the divine essence of Christ's religion from later accretions of dogma, and from reasonings due to oversight of the necessary limits of human thought. This intended Eirenicon involved him in controversies that lasted for years. Angry polemics assailed the book. A certain John Edwards was conspicuous. Locke's Vindication, followed by a Second Vindication in 1697, added fuel to this fire. Above all, the great Essay was assailed and often misinterpreted by philosophers and divines. Notes of opposition had been heard almost as soon as it appeared. John Norris, the meta- physical rector of Bemerton and English disciple of Malebranche, criticized it in 1690. Locke took no notice at the time, but his second winter at Otes was partly employed in An Examination of Malebranche 's Opinion of Seeing all Things in God, and in Remarks upon some of Mr N orris's Books, tracts which throw light upon his own ambiguous theory of perception through the senses. These were published after his death. A second edition of the Essay, with a chapter added on " Personal Identity," and numerous alterations in the chapter on " Power," appeared in 1694. The third, which was only a reprint, was published in 1695. Wynne's well-known abridgment helped to make the book known in Oxford, and his friend William Molyneux intro- duced it in Dublin. In 1695 a revival of controversy about the currency diverted Locke's attention. Events in that year occasioned his Observations on Silver Money and Further Con- siderations on Raising the Value of Money.

In 1696 Locke was induced to accept a commissionership on the Board of Trade. This required frequent visits to London. Meantime the Essay on Human Understanding and the Reason- ableness of Christianity were becoming more involved in a wordy warfare between dogmatists and latitudinarians, trinitarians and unitarians. The controversy with Edwards was followed by a more memorable one with Stillingfleet, bishop of Worcester. John Toland, in his Christianity not Mysterious, had exaggerated doctrines in the Essay, and then adopted them as his own. In the autumn of 1696, Stillingfleet, an argumentative ecclesiastic more than a religious philosopher, in his Vindication of the Doctrine of the Trinity, charged Locke with disallowing mystery in human

knowledge, especially in his account of the metaphysical idea of ” substance. ” Locke replied in January 1697. Stilling- fleet’s rejoinder appeared in May, followed by a Second Letter from Locke in August, to which the bishop replied in the following year. Locke’s Third Letter, in which the ramifications of this controversy are pursued with a copious expenditure of acute reasoning and polished irony, was delayed till 1699, in which year Stillingfleet died. Other critics of the Essay entered the lists. One of the ablest was John Sergeant, a priest of the Roman Church, in Solid Philosophy Asserted Against the Fancies of the Ideisls (1697). He was followed by Thomas Burnet and Dean Sherlock. Henry Lee, rector of Tichmarch, criticized the Essay, chapter by chapter in a folio volume entitled Anti-Scepticism (1702); John Broughton dealt another blow in his Psychologia (1703); and John Norris returned to the attack, in his Theory of the Ideal or Intelligible World (1701-1704). On the other hand Locke was defended with vigour by Samuel Bolde, a Dorsetshire clergyman. The Essay itself was meanwhile spreading over Europe, impelled by the name of its author as the chief philosophi- cal defender of civil and religious liberty. The fourth edition (the last while Locke was alive) appeared in 1 700, with important additional chapters on ” Association of Ideas ” and ” En- thusiasm.” What was originally meant to form another chapter was withheld. It appeared among Locke’s posthumous writings as The Conduct of the Understanding, one of the most character- istic of his works. The French translation of the Essay by Pierre Coste, Locke’s amanuensis at Otes, was issued almost simultaneously with the fourth edition. The Latin version by Richard Burridge of Dublin followed a year after, reprinted in due time at Amsterdam and at Leipzig. In 1700 Locke resigned his commission at the Board of Trade,

and devotee himself to Biblical studies and religious meditation. The Gospels had been carefully studied when he was preparing his Reasonableness of Christianity. He now turned to the Epistles of St Paul, and applied the spirit of the Essay and the ordinary rules of critical interpretation to a literature which he venerated as infallible, like the pious Puritans who surrounded his youth. The work was ready when he died, and was published two years after. A tract on Miracles, written in 1702, also appeared posthumously. Fresh adverse criticism of the Essay was re- ported to him in his last year, and the book was formally con- demned by the authorities at Oxford. ” I take what has been done rather as a recommendation of the book,” he wrote to his young friend Anthony Collins, ” and when you and I next meet we shall be merry on the subject.” One attack only moved him. In 1 704 his adversary, Jonas Proast, revived their old controversy. Locke in consequence began a Fourth Letter on Toleration. A few pages, ending in an unfinished paragraph, exhausted his remaining strength; but the theme which had employed him at Oxford more than forty years before, and had been a ruling idea throughout the long interval, was still dominant in the last days of his life.

All the summer of 1704 he continued to decline, tenderly nursed by Lady Masham and her step-daughter Esther. On the 28th of October he died, according to his last recorded words, ” in perfect charity with all men, and in sincere communion with the whole church of Christ, by whatever names Christ’s followers call themselves.” His grave is on the south side of the parish church of High Laver, in which he often worshipped, near the tombs of the Mashams, and of Damaris, the widow of Cudworth. At the distance of 1 m. are the garden and park where the manor house of Otes once stood.

Locke’s writings have made his intellectual and moral features familiar. The reasonableness of taking probability as our guide in life was in the essence of his philosophy. The desire to see for himself what is true in the light of reasonable evidence, and that others should do the same, was his ruling passion, if the term can be applied to one so calm and judicial. ” I can no more know anything by another man’s understanding,” he would say, ” than I can see by another man’s eyes.” This repugnance to believe blindly what rested on arbitrary authority, as dis- tinguished

from what was seen to be sustained by self-evident reason, or by demonstration, or by good probable evidence, runs through his life. He is typically English in his reverence for facts, whether facts of sense or of living consciousness, in his aversion from abstract speculation and verbal reasoning, in his suspicion of mysticism, in his calm reasonableness, and in his ready submission to truth, even when truth was incapable of being fully reduced to system by man. The delight he took in exercising reason in regard to everything he did was what his friend Pierre Coste remarked in Locke's daily life at Otes. " He went about the most trifling things always with some good reason. Above all things he loved order; and he had got the way of observing it in everything with wonderful exactness. As he always kept the useful in his eye in all his disquisitions, he esteemed the employments of men only in proportion to the good they were capable of producing; for which cause he had no great value for the critics who waste their lives in composing words and phrases in coming to the choice of a various reading, in a passage that has after all nothing important in it. He cared yet less for those professed disputants, who, being taken up with the desire of coming off with victory, justify themselves behind the ambiguity of a word, to give their adversaries the more trouble. And whenever he had to deal with this sort of folks, if he did not beforehand take a strong resolution of keeping his temper, he quickly fell into a passion; for he was naturally choleric, but his anger never lasted long. If he retained any resentment it was against himself, for having given way to so ridiculous a passion; which, as he used to say, " may do a great deal of harm, but never yet did anyone the least good." Large, " round-about " common sense, intellectual strength directed by a virtuous purpose, not subtle or daring speculation sustained by an idealizing faculty, in which he was deficient, is what we

find in Locke. Defect in speculative imagination appears when he encounters the vast and complex final problem of the universe in its organic unity.

Locke is apt to be forgotten now, because in his own generation he so well discharged the intellectual mission of initiating criticism of human knowledge, and of diffusing the spirit of free inquiry and universal toleration which has since profoundly affected the civilized world. He has not bequeathed an imposing system, hardly even a striking discovery in metaphysics, but be is a signal example in the Anglo-Saxon world of the love of attainable truth for the sake of truth and goodness. " If Locke made few discoveries, Socrates made none." But both are memorable in the record of human progress.

In the inscription on his tomb, prepared by himself, Locke refers to his books as a true representation of what he was. They are concerned with Social Economy, Christianity, Education and Philosophy, besides Miscellaneous writings.

I. Social Economy. — (1) Epistola de Tolerantia (1689, translated into English in the same year). (2) Two Treatises on Government (1690) (the Patriarcha of Filmer, to which the First Treatise was a reply, appeared in 1680). (3) A Second Letter concerning Toleration (1690). (4) Some Considerations on the Consequence of Lowering the Rate of Interest and Raising the Value of Money (1691). (5) A Third Letter for Toleration (1692). (6) Short Observations on a printed paper entitled, " For encouraging the Coining of Silver Money in England, and after for Keeping it here " (1695). (7) Further Considerations concerning Raising the Value of Money (1695) (occasioned by a Report containing an " Essay for the Amendment of Silver Coins," published that year by William Lowndes, secretary for the Treasury). (8) A Fourth Letter for Toleration (1706, posthumous).

II. Christianity. — (1) The Reasonableness of Christianity as delivered in the Scriptures (1695). (2) A Vindication of the Reasonable- ness of Christianity from Mr Edwards's Reflections (1695). (3) A Second Vindication of the Reasonableness of Christianity (1697). (4) A Paraphrase and Notes on the Epistles of St Paul to the Galatians, First and Second Corinthians, Romans and Ephesians. To which is prefixed an Essay for the understanding of St Paul's Epistles by con- sulting St Paul himself (1705-1707, posthumous). (5) A Discourse of Miracles (1716, posthumous).

III. Education. — (1) Some Thoughts concerning Education (1693). (2) The Conduct of the Understanding (1706, posthumous). (3) Some Thoughts concerning Reading and Study for a Gentleman (1706, posthumous). (4) Instructions for the Conduct of a Young Gentleman (1706, posthumous). (5) Of Study (written in France in Locke's journal, and published in L. King's Life of Locke in 1830).

IV. Philosophy. — (1) An Essay concerning Human Understand- ing, in four books (1690). (2) A Letter to the Bishop of Worcester concerning some passages relating to Mr Locke's Essay of Human Understanding in a late Discourse of his Lordship's in Vindication of the Trinity (1697). (3) Mr Locke's Reply to the Bishop of Worcester's Answer to his Letter (1697). (4) Mr Locke's Reply to the Bishop of Worcester's Answer to his Second Letter (1699). (5) An Examination of Father Malebranche's Opinion of Seeing all Things in God (1706, posthumous). (6) Remarks upon Some of Air Norris's Books, wherein lie asserts Father Malebranche's Opinion of Seeing all Things in God (1720, posthumous).

Miscellaneous. — (1) A New Method of a Common Place Book (1686). This was Locke's first article in the Bibliotheque of Le Clerc ; his other contributions to it are uncertain, except the Epitome of the Essay, in 1688). (2) The Fundamental Constitutions of Carolina (prepared in 1673 when Locke was Lord Shaftesbury's secretary at Exeter House, remarkable for recognition of the principle of tolera- tion, published in 1706, in the posthumous collection). (3) Memoirs relating to the Life of Anthony, First Earl of Shaftesbury (1706). (4) Elements of Natural Philosophy (1706). (5) Observations upon the Growth and Culture of Vines and Olives (1706). (6) Rules of a Society which met once a Week, for their improvement in Useful Knowledge, and for the Promotion of Truth and Christian Charity (1706). (7) A Letter from a Person of Quality to his Friend in the Country, published in 1875 (included by Des Maizeaux in his Collection of Several Pieces of Mr John Locke's, 1720), and soon afterwards burned by the common hangman by orders from the House of Lords, was disavowed by Locke himself. It may have been dictated by Shaftesbury. There are also miscellaneous writings of Locke first published in the biographies of Lord King (1830) and of Mr Fox Bourne (1876).

Letters from Locke to Thoynard, Limborch, Le Clerc, Guenellon, Molyneux, Collins, Sir Isaac Newton, the first and the third Lord Shaftesbury, Lords Peterborough and Pembroke, Clarke of Chipley and others are preserved, many of them unpublished, most of them in the keeping of Lord Lovelace at Horseley Towers, and of Mr Sanford at Nynehead in Somerset, or in the British Museum. They express the gracious courtesy and playful humour which were natural to him, and his varied interests in human life.

I. Social Economy. — It has been truly said that all Locke's writings, even the Essay on Human Understanding itself, were occasional, and " intended directly to counteract the enemies of reason and freedom

in his own age." This appears in his works on social polity, written at a time when the principles of democracy and toleration were struggling with divine right of kings, and when " the popular assertors of public liberty were the greatest engrossers of it too." " The state " with Locke was the deliberate outcome of free contract rather than a natural growth or organism. That the people, in the exercise of their sovereignty, have the right to govern themselves in the way they judge to be for the common good; and that civil government, whatever form it assumes, has no right to interfere with religious beliefs that are not inconsistent with civil society, is at the founda- tion of his political philosophy. He rested this sovereignty on virtual mutual contract on the part of the people themselves to be so governed. But the terms of the contract might be modified by the sovereign people themselves, from time to time, in accommoda- tion to changing circumstances. He saw that things in this world were in a constant flux, so that no society could remain long in the same state, and that " the grossest absurdities

” must be the issue of “following custom when reason has left the custom.” He was always disposed to liberal ecclesiastical concessions for the sake of peace, and he recommended harmonious co-operation with the civil magistrate in all matters of worship and government that were not expressly determined by Scripture.

The attack on Sir Robert Filmer in Locke’s First Treatise on Government was an anachronism. The democratic principle argued for in the Second Treatise, while in advance of the practice t S rf °ˆ ms a & e ‘ was ‘ n Vˆs anticipated by Aquinas and Bodin, contract. ag we jj as ˆy Grotius and Hooker. Its guiding principle is, that civil rulers hold their power not absolutely but conditionally, government being essentially a moral trust, forfeited if the conditions are not fulfilled by the trustees. This presupposes an original and necessary law of nature or reason, as insisted on by Hooker. But it points to the constitution of civil society in the abstract rather than to the actual origin of government as a matter of fact and past history. There is no historical proof that power was formally en- trusted to rulers by the conscious and deliberate action of the ruled. Indeed Locke seems to allow that the consent was at first tacit, and by anterior law of nature conditional on the beneficial purpose of the trust being realized. His Treatises on Government were meant to vindicate the Convention parliament and the English revolution, as well as to refute the ideas of absolute monarchy held by Hobbes and Filmer. They are classics in the library of English constitutional law and polity.

Locke’s philosophical defence of religious liberty in the four Letters of Toleration is the most far-reaching of his contributions to social polity. He had a more modest estimate of human Religious resources for forming true judgments in religion, and a less pronounced opinion of the immorality of religious error, than either the Catholic or the Puritan. The toleration which he spent his life in arguing for involved a change from the authoritative and absolute to the relative point of view, as regards man’s means of knowledge and belief. It Was a protest against those who in theology ” peremptorily require demonstration and demand certainty where probability only is to be had.” The practice of universal toleration amidst increasing religious differences was an application of the conception of human understanding which governs his Essay. Once a paradox it is now commonplace, and the superabundant argument in the Letters on Toleration fatigues the modern reader. The change is due more to Locke himself than to anyone else. Free thought and liberty of conscience had indeed been pleaded for, on various grounds, in the century in which he lived. Chillingworth, Jeremy Taylor, Glanvill and other philosophical thinkers in the Church of England urged toleration in the state, in conjunction with wide comprehension in the church, on the ground of our necessary intellectual limitation and inability to reach demon- stration in theological debates. Puritans like Owen and Goodwin, whose idea of ecclesiastical comprehension was dogmatic and narrow, were ready to accept sectarian variety, because it was their duty to allow many religions in the nation, but only one form of theology withir. their own sect. The existence of separate nationalities, on the other hand, was the justification of national churches according to the latitudinarian churchmen with whom Locke associated : a national church comprehensive in creed, and thus co-extensive with the nation was their ideal. Locke went far to unite in a higher principle elements in the broad Anglican and the Puritan theories, while he recognized the individual liberty of thought which dis- tinguishes the national church of England. A constant sense of the limits of human understanding was at the bottom of his arguments for tolerance. He had no objection to a national establishment of religion, provided that it was comprehensive enough, and was really the nation organized to promote goodness; not to protect the meta- physical subtleties of sectarian theologians. The recall of the national religion to the simplicity of the gospels would, he hoped, make toleration of nonconformists unnecessary, as few would then remain. To the atheist alone Locke refuses full toleration, on the ground that social obligation can have no hold over him, for ” the taking away of God dissolves all.” He argued, too, against full toleration of the Church of Rome in England, on the ground of its unnational allegiance to a foreign sovereign. The unfitness of persecution as a means of propagating truth is copiously insisted on by Locke. Persecution can only transform a

man into a hypocrite ;

Tolera- tion.

belief is legitimately formed only by discernment of sufficient evidence; apart from evidence, a man has no right to control the understanding ; he cannot determine arbitrarily what his neighbours must believe. Thus Locke's pleas for religious toleration resolve at last into h' s philosophical view of the foundation and limits of human knowledge.

II. The Reasonableness of Christianity. — The principles that governed Locke's social polity largely determined his attitude to Christianity. His " latitudinarianism " was the result of extra- ordinary reverence for truth, and a perception that knowledge may be sufficient for the purposes of human life while it falls infinitely short of speculative completeness. He never loses sight of essential reasonableness as the only ground on which Christian faith can ultimately rest. But Locke accepted Holy Scripture as infallible with the reverence of a Puritan. " It has God for its author, salva- tion for its end, and truth without any mixture of error for its matter." Yet he did not, like many Puritans, mean Scripture as interpreted by himself or by his sect. And faith in its infallibility was combined in Locke with deep distrust in " enthusiasm." This predisposed him to regard physical miracles as the solid criterion for distinguishing reasonable religious conviction from " inclinations, fancies and strong assurances." Assent in religion as in everything else he could justify only on the ground of its harmony with reason; professed " illumination without search, and certainty without proof " was to him a sign of absence of the divine spirit in the pro- fessor. Confidence that we are right, he would say, is in itself no proof that we are right : when God asks assent to the truth of a proposition in religion, he either shows us its intrinsic rationality by ordinary means, or he offers miraculous proof of the reality of which we need reasonable evidence. But we must know what we mean by miracle. Reasonableness, in short, must always at last be our guide. His own faith in Christianity rested on its moral excellence when it is received in its primitive simplicity, combined with the miracles which accompanied its original promulgation. But " even for those books which have the attestation of miracles to confirm their being from God, the miracles," he says, " are to be judged by the doctrine, and not the doctrine by the miracles." Miracles alone cannot vindicate the divinity of immoral doctrine. Locke's Reasonable- ness of Christianity was an attempt to recall religion from the crude speculations of theological sects, destructive of peace among Christians, to its original simplicity; but this is apt to conceal its transcendent mystery. Those who practically acknowledge the supremacy of Jesus as Messiah accept all that is essential to the Christianity of Locke. His own Christian belief, sincere and earnest, was more the outcome of the common sense which, largely through him, moulded the prudential theology of England in the 18th century, than of the nobler elements present in More, Cudworth and other religious thinkers of the preceding age, or afterwards in Law and Berkeley, Coleridge and Schleiermacher.

III. Education.— -Locke has his place among classic writers on the theory and art of Education. His contribution may be taken as either an introduction to or an application of the Essay on Human Understanding. In the Thoughts on Education imaginative sentiment is never allowed to weigh against utility ; information is subordinate to the formation of useful character; the part which habit plays in individuals is always kept in view; the dependence of intelligence and character, which it is the purpose of education to improve, upon health of body is steadily inculcated; to make children happy in undergoing education is a favourite, precept; accumulating facts without exercising thought, and without accustoming the youthful mind to look for evidence, is always referred to as a cardinal vice. Wisdom more than much learning is what he requires in the teacher. In instruction he gives the first place to " that which may direct us to heaven," and the second to " the study of prudence, or discreet conduct, and management of ourselves in the several occurrences of our lives, which most assists our quiet prosperous passage through this present life." The infinity of real existence, in contrast with the necessary finitude of human understanding and experience, is

always in his thoughts. This ” disproportionateness ” between the human mind and the universe of reality imposes deliberation in the selection of studies, and disregard for those which lie out of the way of a wise man. Knowledge of what other men have thought is perhaps of too little account with Locke. ” It is an idle and useless thing to make it one’s business to study what have been other men’s sentiments in matters where only reason is to be judge. ” In his Conduct of the Understanding the pupil is invited to occupy the point at which ” a full view of all that relates to a question ” is to be had, and at which alone a rational discernment of truth is possible. The uneducated mass of mankind, he complains, either ” seldom reason at all,” or ” put passion in the place of reason,” or ” for want of large, sound, round-about sense ” they direct their minds only to one part of the evidence, “converse with one sort of men, read but one sort of books, and will not come in the hearing of but one sort of notions, and so carve out to themselves a little Goshen in the intellectual world, where light shines, and, as they conclude, day blesses them; but the rest of the vast expansion they give up to night and darkness, and avoid coming near it.” Hasty judgment, bias, absence of an a priori ” indifference ” to what the evidence may_ in the end require us to conclude, undue regard for authority, excessive love for custom and antiquity, indolence and sceptical despair are among the states

of mind marked by him as most apt to interfere with the formation of beliefs in harmony with the Universal Reason that is active in the universe.

IV. Philosophy. — The Essay Concerning Human Understanding embodies Locke’s philosophy. It was the first attempt on a great scale, and in the Baconian spirit, to estimate critically the certainty and the adequacy of human knowledge, when confronted with God and the universe.

The ” Introduction ” to the Essay is the keynote to the whole. The ill-fortune of men in their past endeavours to comprehend themselves and their environment is attributed in a great measure to their disposition to extend their inquiries into matters beyond the reach of human understanding. To inquire with critical care into “the original, certainty and extent of human knowledge, together with the grounds and degrees of belief, opinion and assent,” is accordingly Locke’s design in this Essay. Excluding from his enquiry ” the phy- sical consideration of the mind,” he sought to make a faithful report, based on an introspective study of consciousness, as to how far a human understanding of the universe can reach. Although his report might show that our knowledge at its highest must be far short of a ” universal or perfect comprehension of whatsoever is,” it might still be “sufficient ” for us, because ” suited to our individual state.” The ” light of reason,” the ” candle of the Lord,” that is set up in us may be found to shine bright enough for all our purposes. If human understanding cannot fully solve the infinite problem of the universe, man may at least see that at no stage of his finite experi- ence is he necessarily the sport of chance, and that he can practically secure his own wellbeing.

The last book of the Essay, which treats of Knowledge and Pro- bability, is concerned more directly than the three preceding ones with Locke’s professed design. It has been suggested that Locke may have begun with this book. It contains few references to the foregoing parts of the Essay, and it might have appeared separately without being much less intelligible than it is. The other books, concerned chiefly with ideas and words, are more abstract, and may have opened gradually on his mind as he studied more closely the subject treated in the fourth book. For Locke saw that the ultimate questions about our knowledge and its extent presuppose questions about ideas. Without ideas knowledge is impossible. ” Idea ” is thus a leading term in the Essay. It is used in a way peculiar to himself — ” the term which, I think, stands best for whatsoever is the object of the understanding when a man thinks ” or ” whatever it is which the mind can be employed about.” But ideas themselves are, he reminds us, ”

neither true nor false, being nothing but bare appearances," phenomena as we might call them. Truth and false- hood belong only to assertions or denials concerning ideas, that is, to our interpretations of our ideas according to their mutual relations.

That none of our ideas are " innate " is the argument contained in the first book. This means that the human mind, before any laaate ideas are present to it, is a tabula rasa: it needs the Ideas quickening of ideas to become intellectually alive. The

inward purpose of this famous argument is apt to be over- looked. It has been criticized as if it was a speculative controversy between empiricism and intellectuajism. For this Locke himself is partly to blame. It is not easy to determine the antagonist he had in view. Lord Herbert is referred to as a defender of innateness. Locke was perhaps too little read in the literature of philosophy to do full justice to those more subtle thinkers who, from Plato down- wards, have recognized the need for categories of the understanding and presuppositions of reason in the constitution of knowledge. " Innate, " Lord Shaftesbury says, " is a word Mr Locke poorly plays on." For the real question is not about the time when ideas entered the mind, but " whether the constitution of man be such that, being adult and grown up, the ideas of order and administration of a God will not infallibly and necessarily spring up in him." This Locke himself sometimes seems to allow. " That there are certain pro- positions," we find him saying, " which, though the soul from the beginning, or when a man is born, does not know, yet, by assistance from the outward senses, and the help of some previous cultivation, it may afterwards come certainly to know the truth Of, is no more than what I have affirmed in my first book " (" Epistle to Reader," in second edition). And much of our knowledge, as he shows in the fourth book, is rational insight, immediate or else demonstrable, and thus intellectually necessary in its constitution.

What Locke really objects to is, that any of our supposed know- ledge should claim immunity from free criticism. He argues in the first book against the innateness of our knowledge of God and of morality ; yet in the fourth book he finds that the existence of God is demonstrable, being supported by causal necessity, without which there can be no knowledge; and he also maintains that morality is as demonstrable as pure mathematics. The positions are not in- consistent. The demonstrable rational necessity, instead of being innate, or conscious from our birth, may lie latent or subconscious in the individual mind; but for all that, when we gradually become more awake intellectually, such truths are seen to carry their own evidence along with them." Even in the first book he appeals to the common reason, which he calls " common sense." " He would be thought void of common sense who asked, on the one side, or, on the other, went to give a reason, why ' it is impossible for the same thing to be and not to be.' It carries its own light and evidence with it,

and needs no other proof : he that understands the terms assents to it for its own sake, or else nothing else will ever be able to prevail with him to do it " (bk. i. chap. 3, § 4).

The truth is that neither Locke, on the one hand, nor the intel- lectualists of the 17th century, on the other, expressed their meaning with enough of precision; if they had, Locke's argument would probably have taken a form less open to the charge of mere empiri- cism. Locke believed that in attacking " innate principles " he was pleading for universal reasonableness instead of blind reliance on authority, and was thus, as he says, not " pulling up the foundations of knowledge," but " laying those foundations surer." When men heard that there were propositions that could not be doubted, it was a short and easy way to assume that what are only arbitrary pre- judices are " innate " certainties, and therefore must be accepted unconditionally. This " eased the lazy from the pains of search, stopped the inquiry of the doubtful, concerning all that was once styled innate. It was no small advantage to those who affected to be masters and teachers to make this the principle of principles — that principles must not be questioned." The assumption that they were " innate " was enough " to take men off the use of their own reason and judgment, and to put them upon believing and taking upon trust without further examination. . . . Nor is it a small power it gives one man over another to have the authority to make a man swallow that for an innate principle

which may serve his purpose who teacheth them ” (bk. i. chap. 4, § 24).

The second book proposes a hypothesis regarding the genesis of our ideas and closes after an elaborate endeavour to verify it. The hypothesis is, that all human ideas, even the most com- plex and abstract and sublime, ultimately depend upon ” experience.” Otherwise, what we take to be ideas are only empty words. Here the important point is what human ” experience ” involves. Locke says that our ” ideas ” all come, either from the five senses or from reflective consciousness; and he proposes to show that even those concerned with the Infinite depend at iast on one or other of these two sources : our ” complex ideas ” are all made up of ” simple ideas,” either from without or from within. The ” verification ” of this hypothesis, offered in the thirteenth and following chapters of the second book, goes to show in detail that even those ideas which are ” most abstruse,” how remote soever they may seem from original data of outward sense, or of inner conscious- ‘ are only such as the understanding frames to itself by re-

peating and joining together simple ideas that it had at first, either from perceiving objects of sense, or from reflection upon its own operations.”

To prove this, our thoughts of space, time, infinity, power, sub- stance, personal identity, causality, and others which “seem most remote from the supposed original ” are examined in a ” plain historical method,” and shown to depend either on (a) perception of things external, through the five senses, or on (b) reflection upon operations of the mind within. Reflection, ” though it be not sense, as having nothing to do with external objects,” is yet, he says, ” very like it, and might properly enough be called internal sense.” But the suggestion that ” sense ” might designate both the springs of experience is misleading, when we find in the sequel how much Locke tacitly credits ” reflection ” with. The ambiguity of his language makes opposite interpretations of this cardinal part of the Essay possible; the best we can do is to compare one part with another, and in doubtful cases to give him the benefit of the doubt.

Although the second book is a sort of inventory of our ideas, as distinguished from the certainty and boundaries of our knowledge, Locke even here makes the assumption that the ” simple ideas ” of the five senses are practically qualities of things which exist without us, and that the mental ” operations ” discovered by ” reflection ” are those of a person continuously existing. He thus relieves himself of the difficulty of having at the outset to explain how the immediate data of outward sense and reflection are accepted as ” qualities ” of things and persons. He takes this as a fact.

Such, according to Locke, are the only simple ideas which can appear even in the sublimest human speculations. But the mind, in becoming gradually stored with its ” simple ideas ” is able to elaborate them in numberless modes and relations; although it is not in the power of the most exalted wit or enlarged understanding to invent or frame any new simple idea, not taken in in one or the other of these two ways. All that man can imagine about the universe or about God is necessarily confined to them. For proof of this Locke would have any one try to fancy a taste which had never affected his palate, or to frame the idea of a scent he had never felt, or an opera- tion of mind, divine or human, foreign to all human consciousness.

The contrast and correlation of these two data of experience is suggested in the chapter on the ” qualities of matter ” in which we are introduced to a noteworthy vein of speculation (bk. ii. chap. 8). This chapter, on ” things and their qualities,” looks like an interpolation in an analysis of mere ” ideas.” Locke here treats simple ideas of the five senses as qualities of outward things. And the sense data are, he finds, partly (a) revelations of external things themselves in their mathematical relations, and partly (6) sensations, boundless in variety, which are somehow awakened in us through contact and collision with things relatively to their mathematical relations. Locke calls the former sort ” primary, original or essential qualities

of. matter," and the others " secondary or derived qualities." The primary, which are quantities rather than qualities, are inseparable from matter, and virtually identical with the ideas we have of them. On the other hand, there is nothing perceived in the mathematical relations of bodies which in the least resembles their secondary qualities. If there were no sentient beings in existence, the secondary qualities would cease to exist, " except perhaps as unknown modes of the primary, or, if not, as something still more obscure." On the other hand, " solidity, extension, figure and motion would," he assumes, " be really in the world as they are, whether there were any sensible being to perceive them or not."

Thus far the outcome of what Locke teaches "about matter is, that it is Something capable of being expressed in terms of mathematical Matter Quantity, and also in terms of our own sensations. A further step was to suggest the ultimate dependence of the secondary qualities of bodies upon " the bulk, figures, number, situation and motions of the solid parts of which the bodies consist," these mathematical or primary qualities " existing as we think of them whether or not they are perceived." This Locke proposes in a hesitating way. For we, " not knowing what particular size, figure and texture of parts they are on which depend, and from which result, those qualities which make our complex idea, for example, of gold, it is impossible we should know what other qualities result from, or are incompatible with, the same constitution of the insensible parts of gold; and so consequently must always coexist with that com- plex idea we have of it, or else are inconsistent with it."

Some of the most remarkable chapters in the second book concern what may be called " crucial instances " in verification of its funda- mental hypothesis of the dependence of human knowledge upon the simple ideas presented in our dual experience (bk. ii. ch. 13-28). They carry us towards the ultimate mysteries which attract medi- tative minds. The hypothesis, that even our most profound and sublime speculations are all limited to data of the senses and of reflection, is crucially tested by the " modes " and " substances " and " relations " under which, in various degrees of complexity, we somehow find ourselves obliged to conceive those simple phenomena. Such are modes of quantity in space, and time and number, under which Locke reports that we find ourselves mentally impelled towards immensity, eternity and the innumerable — in a word, towards Infinity which seems to transcend quantity; then there is the complex thought of Substance, to which we find ourselves mysteri- ously impelled, when the simple phenomena of the senses come to be regarded as qualities of " something"; again there is the obscure idea of the identity of persons, notwithstanding their constant changes of state; and there is, above all, the inevitable tendency we somehow have to refund a change into what we call its " Cause," with the associated idea of active power. Locke begins with our complex ideas of Space> Succession or Time, and Number.

Space, he says, appears when we use our senses of sight and touch; succession he finds " suggested " by all the changing phenomena of sense, and by " what passes in our minds " ; Immensity numDer ; s "suggested by every object of our senses, and and end- everv thought of our minds, by everything that either doth exist or can be imagined." The modifications of which these are susceptible he reports to be "inexhaustible and truly infinite, extension alone affording a boundless field to the mathematicians." But the mystery latent in our ideas of space and time is, that " something in the mind " irresistibly hinders us from allowing the possibility of any limit to either. We find our- selves, when we try, compelled to lose our positive ideas of finite spaces in the negative idea of Immensity or Boundlessness, and our positive ideas of finite times in the negative thought of Endlessness. We have never seen, and we cannot imagine, an object whose extent is boundless. Yet we find when we reflect that something forces us

to think that space and time must be unlimited. Thus Locke seems by implication to acknowledge something added by the mind to the original “simple ideas” of extension and succession ;, though he finds that what is added is not positively conceivable. When we reflect on immensity and eternity, we find them negations of all that is imaginable; and that whether we try infinite addition or infinite subdivision. He accepts this fact ; he does not inquire why mind finds itself obliged to add without limit and to divide without limit. He simply reports that immensity and eternity are inevitable negative ideas, and also that every endeavour to realize them in positive images must be an attempt to represent as quantity what is beyond quantity. After all our additions we are as far from the infinite idea as we were at the beginning.

Locke is too faithful to facts to overlook the ultimate mysteries in human experience. This is further illustrated in his acknowledg- ment of the inconceivable that is at the root of our idea of Substance. He tries to phenomenalize it, and thus resolve

kssness and In- finity.

Substance and per- sonaltty.

it into simple ideas; but he finds that it cannot be phenomenalized, and yet that we cannot dispense with

it. An unsubstantiated succession of phenomena, without a centre of unity to which they are referable as qualities, is unintelligible : we cannot have a language of adjectives without nouns. Locke had some apprehension of this transcendent intellectual obligation. According to his report,” the mind ” always obliges us to suppose Something beyond positive phenomena to which the phenomena must be attributed; but he was perplexed by this “confused

negative” idea. So for him the word substance means “only an uncertain supposition of we know hot what.” If one were to ask him what the substance is in which this colour and that taste or smell inhere, ” he would find himself in a difficulty like that of the Indian, who, after saying that the world rested on an elephant, and the elephant on a broad-backed tortoise, could only suppose the tortoise to rest on ‘ Something, I know not what.’ ” The attempt to conceive it is like the attempt positively to conceive immensity or eternity: we are involved in an endless, ultimately incomprehensible, regress. We fail when we try either positively to phenomenalize substance or to dispense with the superphenomenal abstraction. Our only positive idea is of an aggregate of phenomena. And it is only thus, he says, that we can approach a positive conception of God, namely by ” enlarging indefinitely some of the simple ideas we received from reflection.” Why man must remain in this mental predicament, Locke did not inquire. He only reported the fact. He likewise struggled bravely to be faithful to fact in his report of the state in which we find ourselves when we try to conceive continued personal identity. The paradoxes in which he here gets involved illustrate this (bk. ii. ch. 27).

Locke’s thoughts about Causality and Active Power are especially noteworthy, for he rests our knowledge of God and of the external universe on those ultimate ideas. The intellectual demand r for”the cause _” of an event iswhatwefind we cannot help t ‘ ausa “v• having; yet it is a demand for what in the end the mind cannot fully grasp. Locke is content to trace the idea of ” cause and effect,” as far as mere natural science goes, to our “constant observation” that ” qualities and finite substances begin to exist, and receive their existence from other beings which produce them.” We find that this connexion is what gives intelligibility to ceaseless and what seemed chaotic changes, converting them into the divinely con- catenated system which we call the universe.” Locke seems hardly to realize all that is implied in scientific prevision or expectation of change. Anything, as far as ” constant observation’ ” tells us, might a priori have been the natural cause of anything; and no finite number of ” observed ” sequences, per se, can guarantee universality and necessity. The idea of power, or active causation, on the other hand, ” is got,” he acknowledges, not through the senses, but ” through our

consciousness of our own voluntary agency, and there- fore through reflection" (bk. ii. ch. 21). In bodies we observe no active agency, only a sustained natural order in the succession of passive sensuous phenomena. The true source of change in the material world must be analogous to what we are conscious of when we exert volition. Locke here unconsciously approaches the spiritual view of active power in the physical universe afterwards taken by Berkeley, forming the constructive principle of his philosophy.

Locke's book about Ideas leads naturally to his Third Book which is concerned with Words, or the sensible signs of ideas. Here he analyses " abstract ideas," and instructively illustrates the confusion apt to be produced in them by the inevitable Ueas aaa imperfection of words. He unfolls the relations between words – verbal signs and the several sorts of ideas ; words being the means fpr enabling us to treat ideas as typical, abstract and general. " Some parts of this third book," concerning Words, Locke tells his friend Molyneux, " though the thoughts were easy and clear enough, yet cost me more pains to express than all the rest of my Essay. And therefore I should not much wonder, if there be in some places of it obscurity and doubtfulness."

The Fourth Book, about Knowledge proper and Probability, closes the Essay. Knowledge, he says, is perception of relations among ideas; it is expressed in our affirmations and _. negations; and real knowledge is discernment of the Theory of relations of ideas to what is real. In the foregoing part ,? w ' of the Essay he had dealt with " ideas " and " simple le ° se ' apprehension," here he is concerned with intuitive " judgment " and demonstrative " reasoning," also with judgments and reasonings about matters of fact. At the end of this patient search among our ideas, he supposes the reader apt to complain that he has been " all this while only building a castle in the air," and to ask what the purpose of all this stir is, if we are not thereby carried beyond mere ideas. " If it be true that knowledge lies only in the agreement or disagreement of ideas, the visions of an enthusiast and the reasonings of a sober man will be equally certain. It is no matter how things themselves are " (bk. iv. 4). This gives the keynote to the fourth book. It does not, however, carry him into a critical analysis of the rational constitution of knowledge, like Kant. Hume had not yet shown the sceptical objections against conclusions which Locke accepted without criticism.. The subtle agnostic, who doubted reason because reason could not be supported in the end by empirical evidence, was less in his view than persons blindly resting on authority or prejudice. Total scepticism he would probably have regarded as unworthy of the serious attention of a wise man. " Where we perceive the agreement or disagreement of any of our ideas there is certain knowledge; and wherever we are sure these ideas agree with the reality of things, there is certain real knowledge " (bk. iv. ch. 4).

Locke's report about human knowledge and its narrow extent forms the first thirteen chapters of the fourth book. The remainder of the book is concerned for the most part with the probabilities on which human life practically turns, as he and Butler are fond of

and de-

moastra*

tlon.

reminding us. As regards kinds of knowledge, he finds that " all knowledge we are capable of " must be assertion or denial of some one of three sorts of relation among our ideas themselves, Four sorts or ^^ Q f re i at j ons between our ideas and reality that bi°T- ex ' sts independently of us and our ideas. Accordingly, " * n "" knowledge is concerned either with (a) relations of identity and difference among ideas, as when we say that " blue is not yellow " ; or (b) with mathematical relations, as that " two

triangles upon equal bases between two parallels must be equal ” ; or © in assertions that one quality does or does not coexist with another in the same substance, as that ” iron is susceptible of magnetical impressions, or that ice is not hot ” ; or (d) with onto- logical reality, independent of our perceptions, as that ” God exists ” or ” I exist ” or ” the universe exists.” The first sort is analytical ; mathematical and ethical knowledge represents the second; physical science forms the third; real knowledge of self, God and the world constitutes the fourth.

Locke found important differences in the way in which knowledge of any sort is reached. In some instances the known relation is self- evident, as when we judge intuitively that a circle cannot Intuition ˆ e a triangle, or that three must be more than two. In other cases the known relation is perceived to be intellectu- ally necessary through the medium of premisses, as in a mathematical demonstration. All that is strictly know- ledge is reached in these two ways. But there is a third sort, namely sense-perception, which hardly deserves the name. For ” our per- ceptions of the particular existence of finite beings without us ‘ go beyond mere probability, yet they are not purely rational. There is nothing self-contradictory in the supposition that our perceptions of things external are illusions, although we are somehow unable to doubt them. We find ourselves inevitably ” conscious of a different sort of perception,” when we actually see the sun by day and when we only imagine the sun at night.

Locke next inquired to what extent knowledge — in the way either of intuitive certainty, demonstrative certainty, or sense perception — is possible, in regard to each of the four (already mentioned) sorts of knowable relation. There is only one of the four in which our knowledge is coextensive with our ideas. It is that of ” identity and diversity”: we cannot be conscious at all without distinguishing, and every affirmation necessarily implies negation. The second sort of knowable relation is sometimes intuitively and sometimes demon- strably discernible. Morality, Locke thinks, as well as mathematical quantity, is capable of being demonstrated. ” Where there is no property there is no injustice,” is an example of a proposition “as certain as any demonstration in Euclid.” Only we are more apt to be biassed, and thus to leave reason in abeyance, in dealing with questions of morality than in dealing with problems in mathematics. Turning from abstract mathematical and moral relations to concrete relations of coexistence and succession among phenomena — the third sort of knowable relation — Locke finds the light of pure reason disappear; although these relations form ” the greatest and most important part of what we desire to know.” Of these, including as they do all inductive science, he reports that demonstrable know- ledge ” is very short, if indeed we have any at all “; and are not thrown wholly on presumptions of probability, or else left in ignor- ance. Man cannot attain perfect and infallible science of bodies. For natural science depends, he thinks, on knowledge of the relations between their secondary qualities on the one hand, and the mathe- matical qualities of their atoms on the other, or else ” on something yet more remote from our comprehension.” Now, as perception of these atoms and their relations is beyond us, we must be satisfied with inductive presumptions, for which ” experimental verification ” affords, after all, only conclusions that wider experience may prove to be inadequate. But this moral venture Locke accepts as ” suffi- cient for our purposes.”

Our knowledge under Locke’s fourth category of relations — real existence — includes (a) intuitive perceptions of our own existence; _ . . tm (b) demonstrable certainty of the existence of God; and tx * ‘ (c) actual perception of the existence of surrounding things, ‘ ce ‘ as long as, but only as long as the things are present to

sense. ” If I doubt all other things, that very doubt makes me perceive my own existence, and will not suffer me to doubt of that ” (iv. 9. 3). Faith in the existence of God is virtually with Locke an expression of faith in the principle of active causality in its ultimate universality. Each person knows that he now exists, and is convinced that he had a beginning; with not less intuitive certainty he knows that ” nothing can no more produce any real being than it can be equal to two right angles.” His final conclusion is that there must be eternally ” a most powerful and most knowing Being, in which, as the origin of all, must be contained all the perfections that can ever after

exist," and out of which can come only what it has already in itself; so that as the cause of my mind, it must be Mind. There is thus causal necessity for Eternal Mind, or what we call " God." This is cautiously qualified thus in a letter to Anthony Collins, written by Locke a few months before he died: " Though I call the thinking faculty in me ' mind,' yet I cannot, because of that name, equal it in anything to that infinite and incomprehensible Being, which, for want of right and distinct conceptions, is called ' Mind ' also." But the immanence of God in the things and persons that compose the universal order, with what this implies, is a con-

ception foreign to Locke, Whose habitual conception was of an extra-mundane deity, the dominant conception in the 18th century. Turning from our knowledge of Spirit to our knowledge. of Matter, nearly all that one can affirm or deny about " things external is," according to Locke, not knowledge but venture or pre- -now-tedfe sumptive trust. We have, strictly speaking, no "know- f t i, e ledge " of real beings beyond our own self-conscious exist- ex f eraa i ence, the existence of God, and the existence of objects wor i m of sense as long as they are actually present to sense. " When I see an external object at a distance, a man for instance, I cannot but be satisfied of his existence while I am looking at him. (Locke might have added that when one only ' sees a man ' it is merely his visible qualities that are perceived; his other qualities are as little ' actual present sensations ' as if he were out of the ranee of sense.) But when the man leaves me alone, I cannot be certain that he still exists." " There is no necessary connexion between his existence a minute since (when he was present to any sense of sight) and his existence now (when he is absent from all my senses) ; by a thousand ways he may have ceased to be. I have not that certainty of his continued existence which we call knowledge; though the great likelihood of it puts it past doubt. But this is but probability and not knowledge " (chap. 11, § 9). Accordingly, purely rational science of external Nature is, according to Locke, impossible. All our " interpretations of nature " are inadequate; only reasonable probabilities, not final rational certainties. This boundless region affords at the best probabilities, ultimately grounded on moral faith, all beyond lies within the veil. Such is Locke's "plain, matter-of- fact " account of the knowledge of the Real that is open to man.

We learn little from Locke as to the rationale of the probabilities on which man thus depends when he deals with the past, the distant or the future. The concluding chapters of the ˆ

fourth book contain wise advice to those whose lives are ra . * _ passed in an ever-changing environment, for avoiding "uifu "" the frequent risk of error in their conclusions, with or y '

without the help of syllogism, the office of which, as a means of discovery, is here critically considered.

Investigation of the foundation of inductive inference was re- sumed by Hume where Locke left it. With a still humbler view of human reason than Locke's, Hume proposed as " a subject , , d worthy of curiosity," to inquire into " the nature of that H ume evidence which assures us of any real existence and matter of fact, beyond the present testimony of our senses and the records of our memory; a part of philosophy that has been little cultivated either by the ancients or the moderns." Hume argues that custom is a sufficient practical explanation of this gradual en- largement of our objective experience, and that no deeper explanation is open to man. All beyond each present transitory " impression " and the stores of memory is therefore reached blindly, through custom or habitual association. Associative tendency, individual or inherited, has since been the favourite constructive factor of human experience in Empirical Philosophy. This factor is not prominent in Locke's Essay. A short chapter on " association of ideas " was added to the second book in the fourth edition. And the' tendency, to associate is there presented, not as the fundamental factor of human knowledge, but as a chief cause of human error.

Kant's critical analysis of pure reason is more foreign to Locke than the attempts of 18th- and 19th-century associationists and evolution- ists to explain experience and science. Kant's aim was to » _-£. .„* show the necessary rational constitution of experience, /rant. Locke's design was less profound. It was his distinction to present to the modern world, in his own " historical plain mechod," perhaps the largest assortment ever made by any individual of facts characteristic of human understanding. Criticism of the presupposi- tions implied in those facts — by Kant and his successors, and in Britain more unpretentiously byReid, all under the stimulus of Hume's sceptical criticism — has employed philosophers since the author of the Essay on Human Understanding collected materials that raised deeper philosophical problems than he tried to solve. Locke's mission was to initiate modern criticism of the foundation and limits of our knowledge. Hume negatively, and the German and Scottish schools constructively, continued what it was Locke's glory to have begun.

Bibliography. — The Essay concerning Human Understanding has passed through more editions than any classic in modern philosophical literature. Before the middle of the 18th century it had reached thirteen, and it has now passed through some forty editions, besides being translated into Latin, French, Dutch, German and modern Greek. There are also several abridgments. In addition to those criticisms which appeared when Locke was alive, among the most important are Leibnitz's Nouveaux Essais sur V entendement humain — written about 1700 and published in 1765, in which each chapter of the Essay of Locke is examined in a corresponding chapter by Leibnitz; Cousin's " Ecole sensualiste: systeme de Locke," in his Histoire de la philosophic au XVIII" siecle (1829) ; and the criticisms in T. H. Green's Introduction to the Philosophical Works of Hume (1874). The Essay, with Prolegomena, biographical, critical and historical, edited by Professor Campbell Fraser and published by the Oxford Clarendon Press in 1894, is the only annotated edition, unless the Nouveaux Essais of Leibnitz may be reduced to this category. The Letters on Toleration, Thoughts on Education and The

Reasonableness of Christianity have also gone through many editions, and been translated into different languages.

The first collected edition of Locke's Works was in 1714, in three folio volumes. The best is that by Bishop Law, in four quartos (1777)- The one most commonly known is in ten volumes (1 812).

The tXoge of Jean le Clerc (Bibliotheque choisie, 1705) has been the basis of the memoirs of Locke prefixed to the successive editions of his Works, or contained in biographical dictionaries. In 1829 a Life of Locke (2nd ed. in two volumes, with considerable additions, 1830), was produced by Peter, 7th Baron King, a descendant of Locke's cousin, Anne Locke. This adds a good deal to what was previously known, as Lord King was able to draw from the mass of correspond- ence, journals and commonplace books of Locke in his possession. In the same' year Dr Thomas Foster published some interesting letters from Locke to Benjamin Furly. The most copious account of the life is contained in the two volumes by H. R. Fox-Bourne (1876), the results of laborious research among the Shaftesbury Papers, Locke MSS. in the British' Museum, the Public Record Office, the Lambeth, Christ Church and Bodleian libraries, and in the Remonstrants' library at Amsterdam. Monographs on Locke by T. H. Fowler in 1880, in " English Men of Letters," and by Fraser, in 1890, in Blackwood's " Philosophical Classics " may be mentioned ; also addresses by Sir F. Pollock and Fraser at the bicentenary com- memoration by the British Academy of Locke's death, published in the Proceedings of the Academy (1904). See also C. Bastide, John Locke; ses theories politiques et leur influence en Angleterre (Paris, 1907) ; H. Ollion, La Philosophie generate de J. L. (1909). (A. C. F.)

LOCKE, MATTHEW (c. 1630-1677), English musician,. perhaps the earliest English writer for the stage, was born at Exeter, where he became a chorister in the cathedral. His music, written with Christopher Gibbons (son of Orlando Gibbons), for Shirley's masque Cupid and Death, was performed in London in 1653. He wrote some music for Davenant's Siege of Rhodes in 1656; and in 1661 was appointed composer in ordinary to Charles II. During the following years he wrote a number of anthems for the Chapel Royal, and excited some criticism on the score of novelty, to which he replied with considerable heat (Modern Church Music; pre-accused, censured and obstructed in its Performance before His Majesty, April isl, 1666, &c; copies in the Fitzwilliam Museum, Cambridge, and the Royal College of Music). A good deal of music for the theatre followed, the most important being for Davenant's productions of The Tempest (1667) and of Macbeth (1672), but some doubt as to this latter has arisen, Purcell, Eccles or Leveridge, being also credited with it. He also composed various songs and instrumental pieces', and published some curious works on musical theory. He died in August 1677, an elegy being written by Purcell.

LOCKERBIE, a municipal and police burgh of Dumfriesshire, Scotland, in the district of Annandale, 14I m. E.N.E. of Dumfries by the Caledonian railway. Pop. (1001) 2358. It has long been famous for its" cattle and sheep sales, but more particularly for the great August lamb fair, the largest in Scotland, at which as many as 126,000 lambs have been sold. The town hall and Easton institute are in the Scottish Baronial style. The police station is partly accommodated in an ancient square tower, once the stronghold of the Johnstones, for a long period the ruling family under whose protection the town gradually grew up. At Dryfe Sands, about 2 m. to the W., a bloody encounter took place in 1593 between the Johnstones and Maxwells. The Maxwells were pursued into Lockerbie and almost exter- minated; hence "Lockerbie Lick" became a proverbial expression, signifying an overwhelming defeat.

LOCKER-LAMPSON, FREDERICK (1821-1895), English man of letters, was born, on the 29th of May 1821, at Greenwich Hospital. His father, who was Civil Commissioner of the Hospital, was Edward Hawke Locker, youngest son of that Captain William Locker who gave Nelson the memorable advice " to lay a Frenchman close, and beat him." His mother, Eleanor Mary Elizabeth Boucher, was a daughter of the Rev. Jonathan Boucher, vicar of Epsom and friend of George Washing- ton. After a desultory education, Frederick Locker began life in a colonial broker's office. Soon deserting this uncongenial calling, he obtained a clerkship in Somerset House, whence he was transferred to Lord Haddington's private office at the Admiralty. Here he became deputy-reader and precis writer. In 1850 he married Lady Charlotte Bruce, daughter of the Lord Elgin who brought the famous marbles to England, and sister

of Lady Augusta Stanley. After his marriage he left the Civil Service, in consequence of ill-health. In 1857 he published London Lyrics, a slender volume of 90 pages, which, with sub- sequent extensions, constitutes his poetical legacy. Lyra Elegantiarum (1867), an anthology of light and familiar verse, and Patchwork (1879), a book of extracts, were his only other publications. In 1872 Lady Charlotte Locker died. Two years later Locker married Miss Hannah Jane Lampson, the only daughter of Sir Curtis Miranda Lampson, Bart., of Rowfant, Sussex, and in 1885 took his wife's surname. At Rowfant he died on the 30th of May 1895. Chronic ill-health debarred Locker from any active part in life, but it did not prevent his delighting a wide circle of friends by his gifts as a host and raconteur, and from accumulating many treasures as a connoisseur. His books are catalogued in the volume called the Rowfant Library (1886), to which an appendix (1900) was added, after his death, under the superintendence of his eldest son. As a poet, Locker belongs to the choir who deal with the gay rather than the grave in verse — with the polished and witty rather than the lofty or emotional. His good, taste kept him as far from the broadly comic on the one side as his kind heart saved him from the purely cynical on the other. To something of Prior, of Praed and of Hood he added qualities of his own which lent his work distinction — a distinction in no wise diminished by his unwearied endeavour after directness and simplicity.

A posthumous volume of Memoirs, entitled My Confidences (1896), and edited by his

son-in-law, Mr Augustine Birrell, gives an interest- ing idea of his personality and a too modest estimate of his gifts as a poet. (A. D.)

LOCKHART, QEORGE (1673-1731), of Carnwath, Scottish writer and politician, was a member of a Lanarkshire family tracing descent from Sir Simon Locard (the name being originally territorial, de Loch Ard), who is said to have.accompanied Sir James Douglas on his expedition to the East with the heart of Bruce, which relic, according to Froissart, Locard brought home from Spain when Douglas fell in battle against the Moors, and buried in Melrose Abbey; this incident was the origin of the " man's heart within a fetterlock " borne on the Lockhart shield, which in turn perhaps led to the altered spelling of the surname. George Lockhart's grandfather was Sir James Lockhart of Lee (d. 1674), a lord of the court of session with the title of Lord Lee, who commanded a regiment at the battle of Preston. Lord Lee's eldest son, Sir William Lockhart of Lee (1621-1675), after fighting on the king's side in the Civil War, attached himself to Oliver Cromwell, whose niece he married, and by whom he was appointed commissioner for the administra- tion of justice in Scotland in 1652, and English ambassador at the French court in 1656, where he greatly distinguished himself by his successful diplomacy. Lord Lee's second son, Sir George Lockhart (c. 1630-1689), was lord-advocate in Cromwell's time, and was celebrated for his persuasive eloquence; in 1674, when he was disbarred for alleged disrespect to the court of session in advising an appeal to parliament, fifty barristers showed their sympathy for him by withdrawing from practice. Lockhart was readmitted in 1676, and became the leading advocate in political trials, in which he usually appeared for the defence. He was appointed lord-president of the court of session in 1685; and was shot in the streets of Edinburgh on the 31st of March 1689 by John Chiesley, against whom the lord-president had adjudicated a cause. Sir George Lockhart purchased the extensive estates of the earls of Carnwath in Lanarkshire, which were inherited by his eldest son, George, whose mother was Philadelphia, daughter of Lord Wharton.

George Lockhart, who was member for the city of Edinburgh in the Scottish parliament, was appointed a commissioner for arranging the union with England in 1705. After the union he continued to represent Edinburgh, and later the Wigton burghs. His sympathies were with the Jacobites, whom he kept informed of all the negotiations for the union; in 17 13 he took 'part in an abortive movement aiming at the repeal of the union. He was deeply implicated in the rising of 1715, the preparations for which he assisted at Carnwath and at.Dryden,

his Edinburgh residence. He was imprisoned in Edinburgh castle, but probably, through the favour of the duke of Argyll, he was released without being brought to trial; but his brother Philip was taken prisoner at the battle of Preston and condemned to be shot, the sentence being executed on the 2nd of December 1 71 5. After his liberation Lockhart became a secret agent of the Pretender; but his correspondence with the prince fell into the hands of the government in 1727, compelling him to go into concealment at Durham until he was able to escape abroad. Argyll's influence was again exerted in Lockhart's behalf, and in 1728 he was permitted to return to Scotland, where he lived in retirement till his death in a duel on the 17th of December 1 73 1. Lockhart was the author of Memoirs of the A fairs of Scotland, dealing with the reign of Queen Anne till the union with England, first published in 17 14. These Memoirs, together with Lockhart's correspondence with the Pretender, and one or two papers of minor importance, were published in two volumes in 181 7, forming the well-known " Lockhart Papers," which are a valuable authority for the history of the Jacobites.

Lockhart married Eupheme Montgomerie, daughter of Alexander, oth earl of Eglinton, by whom he had a large family. His grandson James, who assumed his mother's name of Wishart in addition to that of Lockhart, was in the Austrian service during the Seven Years' War, and was created a baron and count of the Holy Roman Empire. He

succeeded to the estates of Lee as well as of Carnwath, both of which properties passed, on the death of his son Charles without issue in 1802, to his nephew Alexander, who was created a baronet in 1806.

See The Lockhart Papers (2 vols., London, 1817); Andrew Lang, History of Scotland (4 vols., London, 1900). For the story of Sir Simon Lockhart's adventures with the heart of the Bruce, see Sir Walter Scott's The Talisman. (R. J. M.)

LOCKHART, JOHN GIBSON (1794-1854), Scottish writer and editor, was born on the 14th of July 1794 in the manse of Cam- busnethan in Lanarkshire, where his father, Dr John Lockhart, transferred in 1796 to Glasgow, was minister. His mother, who was the daughter of the Rev. John Gibson, of Edinburgh, was a woman of considerable intellectual gifts. He was "sent to the Glasgow high school, where he showed himself clever rather than industrious. He fell into ill-health, and had to be removed from school before he was twelve; but on his recovery he was sent at this early age to Glasgow University, and displayed so much precocious learning, especially in Greek, that he was offered a Snell exhibition at Oxford. He was not fourteen when he entered Balliol College, where he acquired a great store of knowledge outside the regular curriculum. He read French, Italian, German and Spanish, was interested in classical and British antiquities, and became versed in heraldic and genea- logical lore. In 1813 he took a first class in classics in the final schools. For two years after leaving Oxford he lived chiefly in Glasgow before settling to the study of Scottish law in Edinburgh, where he was called to the bar in 1816. A tour on the continent in 181 7, when he visited Goethe at Weimar, was made possible by the kindness of the publisher Blackwood, who advanced money for a promised translation of Schlegel's Lectures on the History of Literature, which was not published until 1838. Edinburgh was then the stronghold of the Whig party, whose organ was the Edinburgh Review, and it was not till 181 7 that the Scottish Tories found a means of expression in Blackwood's Magazine. After a somewhat hum-drum opening, Blackwood suddenly electrified the Edinburgh world by an outburst of brilliant criticism. John Wilson (Christopher North) and Lockhart had joined its staff in 1817. Lockhart no doubt took his share in the caustic and aggressive articles which marked the early years of Blackwood; but his biographer, Mr Andrew Lang, brings evidence to show that he was not responsible for the virulent articles on Coleridge and on " The Cockney School of Poetry," that is on Leigh Hunt, Keats and their friends. He has been persistently accused of the later Blackwood article (August 1818) on Keats, but he showed at any rate a real apprecia- tion of Coleridge and Wordsworth. He contributed to Black- wood many spirited translations of Spanish ballads, which in

1823 were bublishe'd separately. In 1818 the brilliant and handsome young man attracted the notice of Sir Walter Scott, and the acquaintance soon ripened into an intimacy which resulted in a marriage between Lockhart and Scott's eldest daughter Sophia, in April 1820. Five years of domestic happiness followed, with winters spent in Edinburgh and summers at a cottage at Chiefswood, near Abbotsford, where Lockhart's two eldest children, John Hugh and Charlotte; were born; a second son, Walter, was born later at Brighton. In 1820 John Scott, the editor of the London Magazine, wrote a series of articles attacking the conduct of Blackwood's Magazine, and making Lockhart chiefly responsible for its extravagances. A corre- spondence followed, in which a meeting between Lockhart and John Scott was proposed, with Jonathan Henry Christie and Horace Smith as seconds. A series of delays and complicated negotiations resulted early in 1821 in a duel between Christie and John Scott, in which Scott was killed. This unhappy affair, which has been the subject of much misrepresentation, is fully discussed in Mr Lang's book on Lockhart.

Between 1818 and 1825 Lockhart worked in defatigably. In 1819 Peter's Letters to his Kinsfolk appeared, and in 1822 he edited Peter Motteux's edition of Don Quixote, to Which he prefixed a life of Cervantes. Four novels followed: Valerius in 182 1, Some Passages in the Life of Adam Blair, Minister of Gospel at Cross Meikle in 1822, Reginald Dalton in 1823 and Matthew Wold in 1824. But his strength did not lie in novel writing, although the vigorous quality of Adam Blair has been recognized by modern

critics. In 1825 Lockhart accepted the editorship of the Quarterly Review, which had been in the hands of Sir John Taylor Coleridge since Gifford's resignation in 1824. He had now established his literary position, and, as the next heir to his unmarried half-brother's property in Scotland, Milton Lockhart, he was sufficiently independent, though he had aban- doned the legal profession. In London he had great social success, and was recognized as a brilliant editor. He contributed largely to the Quarterly Review himself, his biographical articles being especially admirable. He showed the old railing spirit in an amusing but violent article in the Quarterly on Tennyson's Poems of 1833, in which he failed to discover the mark of genius. He continued to write for Blackwood; he produced for Constable's Miscellany in 1828 what remains the most charming of the bio- graphies of Burns; and he undertook the superintendence of the series called " Murray's Family Library," which he opened in 1829 with a History of Napoleon. But his chief work was the Life of Sir Walter Scott (7 vols., 1837-1838; 2nd ed., 10 vols., 1839). There were not wanting those in Scotland who taxed Lockhart with ungenerous exposure of his subject, but to most healthy minds the impression conveyed by the biography was, arid is, quite the opposite. Carlyle did justice to many of its excellencies in a criticism contributed to the London and West- minster Review (1837). Lockhart's account of the transactions between Scott and the Ballantynes and Constable caused great outcry; and in the discussion that followed he showed unfor- tunate bitterness by his pamphlet, " The Ballantyne Humbug handled." The Life of Scott has been called, after Boswell's Johnson, the most admirable biography in the English language. The proceeds, which were considerable, Lockhart resigned for the benefit of Scott's creditors.

The close of Lockhart's life was saddened by family bereave- ment, resulting in his own breakdown in health and spirits. His eldest boy (the suffering " Hugh Littlejohn " of Scott's Tales of a Grandfather) died in 1831; Scott himself in 1832; Mrs Lockhart in 1837; and the surviving son, Walter Lockhart, in 1852. Resigning the editorship of the Quarterly Review in 1853, he spent the next winter in Rome, but returned to England without recovering his health; and being taken to Abbotsford by his daughter Charlotte, who had become Mrs James Robert Hope-Scott, he died there on the 25th of November 1854. He was buried in Dryburgh Abbey, near Sir Walter Scott.

Lockhart's Life (2 vols., London and New York, 1897) was written by Andrew Lang. A. W. Pollard's edition of the Life of Scott (1900) is the best.

LOCKHART, SIR WILLIAM STEPHEN ALEXANDER (1841- 1900), British general, was born in Scotland on the 2nd of September 1841, his father being a Lanarkshire clergyman. He entered the Indian army in 1858, in the Bengal native infantry. He served in the Indian Mutiny, the Bhutan campaign (1864-66), the Abyssinian expedition (1867-68; mentioned in despatches), the Hazara Black Mountain expedition (1868-69; mentioned in despatches). From 1869 to 1879 he acted as deputy-assistant and assistant quartermaster-general in Bengal. In 1877 he was military attache with the Dutch army in Acheen. He served in the Afghan War of 1878-80, was mentioned in despatches and made a C.B., and from 1880 to 1885 was D.Q.G. in the intelligence branch at headquarters. He commanded a brigade in the Third Burmese War (1886-87), and was made K.C.B.,C.S.L, and received the thanks of the government. An attack of fever brought him to England, where he was employed as assistant military secretary for Indian affairs; but in 1890 he returned to India to take command of the Punjab frontier force, and for five years was engaged in various expeditions against the hill tribes. After the Waziristan campaign in 1894-95 he was made K. C.S.I. He became full general in 1896, and in 1897 he was given the command against the Afridis and Mohmands, and conducted the difficult Tirah campaign with great skill. He was made G.C.B., and in 1898 became commander-in-chief in India. He died on the 18th of March 1900. Sir William Lockhart was not only a first-rate soldier, but also had a great gift for dealing with the native tribesmen. Among the latter he had the sobriquet of Amir

Sahib, on account of their respect and affection for him.

LOCK HAVEN, a city and the county-seat of Clinton county, Pennsylvania, U.S.A., on the west branch of the Susquehanna river, near the mouth of Bald Eagle Creek, about 70 m. N.N.W. of Harrisburg. Pop. (1900) 7210 (618 foreign-born and 122 negroes) ; (1910) 7772. It is served by branches of the Pennsyl- vania and the New York Central & Hudson River railways and by electric interurban railways. The city is pleasantly situated in an agricultural region, and there are large deposits of cement and of fire-brick clay in the vicinity. Lock Haven is the seat of the Central State Normal School (opened 1877), and has a public library and a hospital. There are various manufactures. The municipality owns and operates the water-works. The locality was settled in 1769. A town was founded in 1833, the Penn- sylvania Canal (no longer in use here) was completed to this point in 1834, and the name of the place was suggested by two canal locks and the harbour, or haven, for rafts in the river. Lock Haven was made the county-seat immediately after the erection of Clinton county in 1839, was incorporated as a borough in 1840, and first chartered as a city in 1870.

LOCKPORT, a city of Will county, Illinois, U.S.A., on the Des Plaines river and the Illinois & Michigan Canal, and the terminus of the Chicago Sanitary District Drainage Canal, about 33 m. S.W.of Chicago and 4 m. N.N.E. of Joliet. Pop. (1900) 2659 (552 being foreign-born and 130 negroes); (1910) 2555. Lockport is served by the Chicago & Alton, and the Atchison, Topeka & Santa Fe railways, and by the Chicago & Joliet Electric railway. It is in a picturesque farming country, and there are good limestone quarries in the valley of the Des Plaines river. It has manufactures and a considerable trade, especially in grain. A settlement was made here about 1827; in 1837 the site was chosen as headquarters for the Illinois & Michigan Canal and a village was laid out; it was incorporated in 1853, and was chartered as a city in 1904. In 1892 work was begun on the Chicago Drainage Canal, whose controlling works are here and whose plant, developing 40,000 h. p. from the 40 ft. fall between Joliet and Lockport, supplies Lockport with cheap power and has made it a manufacturing rather than a commercial city.

LOCKPORT, a city and the county-seat of Niagara county, New York, U.S.A., on the Erie Canal, 26 m. by rail N. by E. of Buffalo and 56 m. W. of Rochester. Pop. (1900) 16,581, of whom 2036 were foreign-born and 160 were negroes; (1910 census) 17,970. It is served by the New York Central & Hudson River and the Erie railways, by the International railway

(electric interurban), and by the Erie Canal. The city owes its name to the five double locks of the canal, which here falls 66 ft. (over a continuation of the Niagara escarpment locally known as ” Mountain Ridge “) from the level of Lake Erie to that of the Genesee river. In 1909 a scheme was on foot to replace these five locks by a huge lift lock and to construct a large harbour immediately W. of the city. The surplus water from Tonawanda Creek, long claimed both by the Canal and by the Lockport manufacturers, after supplying the canal furnishes water-powei , and electric power is derived from Niagara. The factory products, mostly paper and wood-pulp, flour and cereal foods, and foundry and machine-shop products, were valued in 1905 at $5,807,980. Lockport lies in a rich farming and fruit (especi- ally apple and pear) country, containing extensive sandstone and Niagara limestone quarries, and is a shipping point for the fruits and grains and the limestone and sandstone of the surrounding country. Many buildings in the business part of the city are heated by the Holly distributing system, which pipes steam from a central station or plant, and originated in Lockport. The city owns and operates the water-works, long operated under the Holly system, which, as well as the Holly distributing system, was devised by Birdsill Holly, a civil engineer of Lock- port. In 1909 a new system was virtually completed, water being taken from the Niagara river at Tonawanda and pumped thence to a stand-pipe in Lockport.

The site, that of the most easterly village in New York state held by the Neutral Nation of Indians, was part of the tract bought by the Holland Company in 1 792-1 793.

Subsequently most of the land on which the city stands was bought from the Holland Company by Esek Brown, the proprietor of a local tavern, and fourteen others, but there were few settlers until after 1820. In 1822 the place was made the county-seat, and in 1823 it was much enlarged by the settlement here of workmen on the Erie Canal, and was the headquarters for a time of the canal contractors. It was incorporated as a village in 1829, was reached by the Erie railway in 1852, and in 1865 was chartered as a city.

LOCKROY, EDOUARD (1838-), French politician, son of Joseph Philippe Simon (1803-1891), an actor and dramatist who took the name of Lockroy, was born in Paris on the 18th of July 1838. He had begun by studying art, but in i860 en- listed as a volunteer under Garibaldi. The next three years were spent in Syria as secretary to Ernest Renan, and on his return to Paris he embarked in militant journalism against the second empire in the Figaro, the Diable a quatre, and eventually in the Rappel, with which his name was thenceforward intimately connected. He commanded a battalion during the siege of Paris, and in February 1871 was elected deputy to the National Assembly where he sat on the extreme left and protested against the preliminaries of peace. In March he signed the proclamation for the election of the Commune, and resigned his seat as deputy. Arrested at Vanves he remained a prisoner at Versailles and Chartres until June when he was released without being tried. He was more than once imprisoned for violent articles in the press, and in 1872 for a duel with Paul de Cassagnac. He was returned to the Chamber in 1873 as Radical deputy for Bouches-du- Rhone in 1876, 1877 and 1881 for Aix, and in 1881 he was also elected in the nth arrondissement of Paris. He elected to sit for Paris, and was repeatedly re-elected. During the elections of 1893 he was shot at by a cab-driver poet named Moore, but was not seriously injured. For the first ten years of his parlia- mentary life he voted consistently with the extreme left, but then adopted a more opportunist policy, and gave his unreserved support to the Brisson ministry of 1885. In the new Freycinet cabinet formed in January he held the portfolio of commerce and industry, which he retained in the Goblet ministry of 1886- 1887. In 1885 he had been returned at the head of the poll for Paris, and his inclusion in the Freycinet ministry was taken to indicate a prospect of reconciliation between Parisian Radi- calism and official Republicanism. During his tenure of the portfolio of commerce and industry he made the preliminary arrangements for the Exposition of 1889, and in a witty letter

he defended the erection of the Tour Eiffel against artistic Paris. After the Panama and Boulangist scandals he became one of the leading politicians of the Radical party. He was vice-president of the Chamber in 1894 and in 1895, when he became minister of marine under Leon Bourgeois. His drastic measures of reform alarmed moderate politicians, but he had the confidence of the country, and held the same portfolio under Henri Brisson (1898) and Charles Dupuy (1898-1899). He gave his support to the Waldeck-Rousseau Administration, but actively criticized the marine policy of Camille Pelletan in the Combes ministry of 1902-1905, during which period he was again vice-president of the Chamber. M. Lockroy was a persistent and successful advocate of a strong naval policy, in defence of which he pub- lished La Marine de Guerre (1890), Six mots rue Royale (1897) , La Defense navale (1900), Du Wcscr a la Vistula (1901), Les Marines franqaise et allemande (1904), Le Programme naval (1906). His other works include M. de Moltke et la guerre future (1891) and Journal d'une bourgeoise pendant la Revolution (1881) derived from the letters of his great-grandmother. M. Lockroy married in 1877 Madame Charles Hugo, the daughter-in-law of the poet.

LOCKWOOD, SIR FRANK (1846-1897), English lawyer, was born at Doncaster. His grandfather and great-grandfather were mayors of Doncaster, and the former for some years filled the office of judge on the racecourse. He was educated at a private school, at Manchester grammar school, and Caius College, Cambridge. Called to the bar at Lincoln's Inn in 1872, he joined the old midland circuit, afterwards going to the north-

eastern, making in his first year 120 guineas and in the next 265 guineas. From that time he had a career of uninterrupted success. In 1882 he was made a queen's counsel, in 1884 he was made recorder of Sheffield, and in 1894 he became solicitor- general in Lord Rosebery's ministry, and was knighted, having first entered parliament as Liberal member for York in 1885, after two unsuccessful attempts, the one at King's Lynn in 1880, the other at York in 1883. He was solicitor-general for less than a year. In 1896 Lord Chief Justice Coleridge, Mr Montague Crackanthorpe and Sir Frank Lockwood went to the United States to attend, as specially invited representatives of the English bar, the nineteenth meeting of the American Bar Associa- tion. On this trip Sir Frank Lockwood sustained the reputa- tion which he enjoyed in England as a humorous after-dinner speaker, and helped to strengthen the bond of friendship which unites the bench and bar of the United States with the bench and bar of England. He died in London on the 18th of December 1897. Lockwood had considerable talent for drawing, inherited from his father, which he employed, chiefly for the amusement of himself and his friends, in the making of admirable caricatures in pen and ink, and of sketches of humorous incidents, real or imaginary, relating to the topic nearest at hand. An exhibition of them was held soon after his death.

See Augustine Birrell's biography of Lockwood and The Frank Lockwood Sketch-Book (1898).

LOCKWOOD, WILTON (1861-), American artist, was born at Wilton, Connecticut, on the 12th of September 1861. He was a pupil and an assistant of John La Farge, and also studied in Paris, becoming a well-known portrait and flower painter. He became a member of the Society of American Artists (1 898) , and of the Copley Society, Boston, and an associate of the National Academy of Design, New York.

LOCKYER, SIR JOSEPH NORMAN (1836-), English

astronomer, was born at Rugby on the 17th of May 1836. After completing his education on the Continent of Europe, he obtained a clerkship in the War Office in 1857. His leisure was devoted to the study of astronomy, and he was appointed in 1870 secretary to the duke of Devonshire's royal commission on science. In 1875 he was transferred to the Science and Art Department at South Kensington, and on the foundation of the Royal College of Science he became director of the solar physics observatory and professor of astronomical physics. Eight British government expeditions for observing total solar eclipses were conducted by him between 1870 and 1905. On the 26th of October 1868

he communicated to the Paris Academy of Sciences, almost simultaneously with Dr P. J. C. Janssen, a spectroscopic method for observing the solar prominences in daylight, and the names of both astronomers appear on a medal which was struck by the French government in 1872 to commemorate the discovery. Lockyer was elected a fellow of the Royal Society in 1869, and received the Rumford medal in 1874. He initiated in 1866 the spectroscopic observation of sunspots; applied Doppler's principle in 1869 to determine the radial velocities of the chromo- spheric gases; and successfully investigated the chemistry of the sun from 1872 onward. Besides numerous contributions to the Proceedings of the Royal and the Royal Astronomical Societies, he published several hooks, both explanatory and speculative. The Chemistry of the Sun (1887) is an elaborate treatise on solar spectroscopy based on the hypothesis of elemental dissociation through the intensity of solar heat. The Meteoritic Hypothesis (1890) propounds a comprehensive scheme of cosmical evolution, which has evoked more dissent than approval, while the Sun's Place in Nature (1897) lays down the lines of a classification of the stars, depending upon their supposed temperature-rela- tions. Among Lockyer's other works are — The Dawn of Astronomy (1894), to which Stonehenge and other British Stone Monuments astronomically considered (1906) may be considered a sequel; Recent and coming Eclipses (1897); and Inorganic Evolution (1900). He was created K.C.B. in 1897, and acted as president of the British Association in 1 903-1 904. His fifth son, William James Stewart Lockyer (b. 1868), devoted himself to solar research, and became chief assistant in the Solar Physics Observatory, South

Kensington.

LOCLE, LE, a town in the Swiss canton of Neuchatel, 24 m. by rail N. of Neuchatel, and 5 m. S.W. of La Chaux de Fonds. It is built (3035 ft. above the sea-level) on the Bied stream in a valley of the Jura, and is about 1 m. from the French frontier. In 1681 Daniel Jean Richard introduced watch-making here, which soon drove out all other industries. In 1900 the popula- tion was 12,559, mainly Protestants and French-speaking. The church tower dates from 1521, but tRe old town was destroyed by fire in 1833. The valley in which the town is situated used to be subject to inundations, but in 1805 a tunrfel was constructed by means of which the surplus waters of the Bied are carried into the Doubs. About 1 m. W. of the town the Bied plunged into a deep chasm, on the steep rock face of which were formerly the subterranean mills of the Col des Roches, situated one above another; but the stream is now diverted by the above-mentioned tunnel, while another serves the railway line from Le Locle to Morteau in France (8 m.). (W. A. B. C.)

LOCMARIAQUER, a village of western France, on the W. shore of the Gulf of Morbihan, in the department of Morbihan, 85 m. S. of Auray by road. Pop. (1906) 756. Locmariaquer has a small port, and oyster culture is carried on close to it. Roman remains are to be seen, but the place owes its celebrity to the megalithic monuments in the vicinity, some of which are among the largest extant. The menhir of Men-er-H'roeck (Fairy stone), which was broken into four pieces by lightning in the 18th century, previously measured about 67 ft. in height, and from 9 to 13 ft. in thickness.

LOCOMOTOR ATAXIA (Gr. d, priv., and rd£«, order; synonyms, Tabes dor sails, posterior spinal sclerosis), a progressive degeneration of the nervous system, involving the posterior columns of the spinal cord with other structures, and causing muscular incoordination and disorder of gait and station. The essential symptoms of the disease — stamping gait, and sway- ing with the eyes shut, the occurrence of blindness and of small fixed pupils — were recognized by Romberg (1851), but it was the clinical genius of Duchenne and his masterly description of the symptoms which led to its acceptance as a definite disease (1858), and he named it locomotor ataxia after its most striking symptom. In 1869 Argyll Robertson discovered that the eye-pupil is in- active to light but acts upon accommodation in the great majority of cases. This most important sign is named the " Argyll Robertson pupil." With an ever-increasing knowledge of the widespread character of this disease and its manifold variations

in the complex of symptoms, the tendency among neurologists is to revert to the term employed by Romberg— tabes dorsalis. " Locomotor ataxia," although it expresses a very character- istic feature of the disease, has this objection: it is a symptom which does not occur in the first (preataxic) stage of the disease ; indeed a great number of years may elapse before ataxy comes on, and sometimes the patient, after suffering a very long time from the disease, may die from some intercurrent complication, having never been ataxic.

It is generally recognized by neurologists that persons who are not the subjects of acquired or hereditary syphilis do not suffer from this disease; and the average time of onset after infection is ten years (see Neuropathology). There are three stages: (i) The preataxic, (2) the ataxic, (3) the bed-ridden paralytic. The duration of the first stage may be from one or two years, up to twenty years or even longer. In this stage various symptoms may arise. The patient usually complains of shooting, lightning- like pains in the legs, which he may attribute to rheumatism. If a physician examines him he will almost certainly find the knee-jerks absent and Argyll Robertson pupils present; prob- ably on inquiry he will ascertain that the patient has had some difficulty in starting urination, or that he is unable to retain his water or to empty his bladder completely. . In other cases, temporary or permanent paralysis of one or more muscles of the eyeball

(which causes squint and double vision), a failure of sight ending in blindness, attacks of vomiting (or gastric crises), painless spontaneous fractures of bones and dislocations of joints, failing sexual power and impotence, may lead the patient to consult a physician, when this disease will be diagnosed, although the patient may not as yet have had locomotor ataxy. All cases, however, if they live long enough, pass into the second ataxic stage. The sufferer complains now of difficulty of walking in the dark; he sways with his eyes shut and feels as if he would fall (Romberg's symptom); he has the sensation of walking on wool, numbness and formication of the skin, and many sensory disturbances in the form of partial or complete loss of sensibility to pain, touch and temperature. These disturbances affect especially the feet and legs, and around the trunk at the level of the fourth to tHe seventh ribs, giving rise to a " girdle sensa- tion." There may be a numbed feeling on the inner side of the arm, and muscular incoordination may affect the upper limb as well as the lower, although there is no wasting or any electrical change. The ataxic gait is very characteristic, owing to the loss of reflex tonus in the muscles, and the absence of guiding sensa- tions from all the deep structures of the limbs, muscles, joints, bones, tendons and ligaments, as well as from the skin of the soles of the feet; therefore the sufferer has to be guided by vision as to where and how to place his feet. This necessitates the bending forward of the body, extension of the knees and broaden- ing of the basis of support; he generally uses a walking stick or even two, and he jerks the leg forward as if he were on wires, bringing the sole of the foot down on the ground with a wide stamping action. If the arm be affected, he is unable to touch the tip of his nose with the eyes shut. Sooner or later he passes into the third bed-ridden stage, with muscles wasted and their tonus so much lost that he is in a perfectly helpless condition.

The complications which may arise in this disease are inter- current affections due to septic conditions of the bladder, bed- sores, pneumonia, vascular and heart affections. About 10% of the cases, at least, develop general paralysis of the insane. This is not surprising seeing that it is due to the same cause, and the etiology of the two diseases is such as to lead many neurologists to consider them one and the same disease affecting different parts of the nervous system. Tabes dorsalis occurs with much greater frequency in men than in women (see Neuropathology) .

The avoidance of all stress of the nervous system, whether physical, emotional or intellectual, is .indicated, and a simple regular life, without stimulants or indulgence of the sexual passion, is the best means of delaying the progress of the disease. Great attention should be paid to micturition, so as to avoid

retention and infection of the bladder. Drugs, even anti- syphilitic remedies, appear to have but little influence upon the course of the disease.

LOCO-WEEDS, or Crazy-Weeds, leguminous plants, chiefly species of Astragalus and Lupinus, which produce a disease in cattle known as " loco-disease." The name is apparently taken from the Spanish loco, mad. The disease affects the nervous system of the animals eating the plants, and is accompanied by exhaustion and wasting.

LOCRI, a people of ancient Greece, inhabiting two distinct districts, one extending from the north-east of Parnassus to the northern half of the Euboean channel, between Boeotia and Malis, the other south-west of Parnassus, on the north shore of the Corinthian Gulf, between Phocis and Aetolia. The former were divided into the northern Locri Epicnemidii, situated on the spurs of Mount Cnemis, and the southern Locri Opuntii, so named from their chief town Opus (q.v.) : and the name Opuntia is often applied to the whole of this easterly district. Homer mentions only these eastern Locrians: their national hero in the Trojan War is Ajax Oileus, who often appears afterwards on Locrian coins. From Hesiod's time on- wards, the Opuntians were thought by some to be of " Lelegian " origin (see Leleges), but they were Hellenized early (though matriarchal customs survived among them) — , and Deucalion, the father of Hellen himself, is described as the first king of Opus. The westerly Locri " in Ozolae " on the Corinthian Gulf, a rude and barbarous people, make no appearance in Greek history till the Peloponnesian War. It was believed that they had separated from

the eastern Locrians four generations before the Trojan War; yet Homer has no hint of their existence. Probably the Locrians were once a single people, extending from sea to sea, till subsequent immigrations forced them apart into two separate districts. The Locrian dialect of Greek is little known, but resembles that of Elis: it has

LOCRI, an ancient city of Magna Graecia, Italy. The original settlers took possession of the Zephyrian promontory (Capo Bruzzano some 12 m. N. of Capo Spartivento), and though after three or four years they transplanted themselves to a site 12 m. farther north, still near the coast, 2 m. S. of Gerace Marina below the modern Gerace, they still retained the name of Locri Epizephyrii (Ao/cpot ol eirifeˆpioi) , which served to distinguish them from the Ozolian and Opuntian Locri of Greece itself (see preceding article). The foundation of Locri goes back to about 683 B.C. It was the first of all Greek communities to have a written code of laws given by Zaleucus in 664 B.C. From Locri were founded the colonies of Meisma and Heiponium (Hipponium). It succeeded in repelling the attacks of Croton (battle on the river Sagras, perhaps sometime in the 6th century), and found in Syracuse a support against Rhegium: it was thus an active adversary or Athenian aggrandisement in the west. Pindar extolls its uprightness and love of the heroic muse of beauty, of wisdom, and of war, in the 10th and nth Olympian Odes. Stesichorus (q.v.) was indeed of Locrian origin. But it owed its greatest external prosperity to the fact that Dionysius I. of Syracuse selected his wife from Locri: its territory was then increased, and the circuit of its walls was doubled, but it lost its freedom. In 356 B.C. it was ruled by Dionysius II. From the battle of Heradea to the year 205 (when it was captured by P. Cornelius Scipio Africanus Maior, and placed under the control of his legateQ.Pleminius), Locri was continually changing its allegiance between Rome and her enemies; but it remained

an ally, and was only obliged like other Greek coast towns to furnish ships. In later Roman times it is often mentioned, but was apparently of no great importance. It is mentioned in- cidentally until the 6th century a.d., but was destroyed by the Saracens in 915.

Excavations in 1889-1890 led to the discovery of an Ionic temple (the Doric style being usual in Magna Graecia) at the north-west angle of the town — originally a cella with two naves, a closed pronaos on the E. and an adytum at the back (W.), later converted into a hexastyle peripheral temple with 34 painted terra-cotta columns. This was then destroyed about 400 B.C. and a new temple built on the ruins, heptastyle perip- teral, with no intermediate columns in the cella and opistho- domos, and with 44 columns in all. The figures from the pediment of the twin Dioscuri, who according to the legend assisted Locri against Crotona, are in the Naples museum(see R. Koldewey and O. Puchstein, Griechische Tempel in Unleritalien und Sicilien, Berlin, 1899, pp. 1 sqq.). Subsequent excavations in 1890-1891 were of the greatest importance, but the results remained unpublished up to 1908. From a short account by P. Orsi in Atti del Congresso Storico, vol. v. (Archeologia) Rome, 1004, p. 201, we learn that the exploration of the environs of the temple led to the discovery of a large number of archaic terra-cottas, and of some large trenches, covered with tiles, containing seme 14,000 scyphoi arranged in rows. The plan of the city was also traced; the walls, the length of which was nearly 5 m., consisted of three parts — the fortified castles (povpia) with large towers, on three different hills, the city proper, and the lower town — the latter enclosed by long walls running down to the sea. In the Roman period the city was restricted to the plain near the sea. Since these excavations, a certain amount of unauthorized work has gone on, and some of the remains have been destroyed. In the course of these excavations some prehistoric objects have been discovered, which confirm the accounts of Thucydides and Polybius that the Greek settlers found the Siculi here before them. (T. As.)

LOCSE (Ger. Leutschau), the capital of the county of Szepes, in Hungary, 230 m. N.E. of

Budapest by rail. Pop. (1900) 6845, mostly Germans and Slovaks. The county of Szepes is the highest part of Hungary, and its north-western portion is occupied by the Tatra Mountains. Locse lies in an elevated position surrounded by mountains, and is one of the oldest towns of Hungary. The church of St James is a Gothic structure of the 13th century, with richly carved altar, several monuments, and a celebrated organ erected in 1623, and long reputed the largest in Hungary. The old town-hall, restored in 1894, contains a Protestant upper gymnasium, founded in 1544, and one of the oldest printing establishments in Hungary, founded in 1585. Bee-keeping and the raising of garden produce are the chief industries.

Founded by Saxon colonists in 1245, Locse had by the early part of the 16th century attained a position of great relative importance. In 1599 a fire destroyed the greater part of the town, and during the 17th century it suffered repeatedly at the hands of the Transylvanian princes and leaders.

LOCUS (Lat. for ” place “; in Gr. r&iros), a geometrical term, the invention of the notion of which is attributed to Plato. It occurs in such statements as these : the locus of the points which are at the same distance from a fixed point, or of a point which moves so as to be always at the same distance from a fixed point, is a circle; conversely a circle is the locus of the points at the same distance from a fixed point, or of a point moving so as to be always at the same distance from a fixed point; and So in general a curve of any given kind is the locus of the points which satisfy, or of a point moving so as always to satisfy, a given condition. The theory of loci is thus identical with that of curves (see Curve and Geometry: § Analytical). The notion of a locus applies also to solid geometry. Here the locus of the points satisfying “a single (or onefold) condition is a surface; the locus of the points satisfying two conditions (or a twofold condition) is a curve in space, which is in general a twisted curve or curve of double curvature.

LOCUST. 1 In its general acceptation this term is applied only to certain insects of the order Orthoplera, family Acridiidae. The family Locustidae is now viewed zoologically in a sense that does not admit of the species best known as ” locusts ” being included therein. The idea of a very destructive insect is univer- sally associated with the term; therefore many orthopterous species that cannot be considered true locusts have been so- called; in North America it has even embraced certain Hetnip- tera-Homoptera, belonging to the Cicadidae, and in some parts of England cockchafers are so designated. In a more narrow definition the attribute of migration is associated with the destructive propensities, and it therefore becomes necessary that a true locust should be a migratory species of the family Acri- diidae. Moreover, the term has yet a slightly different significa- tion as viewed from the Old or New World. In Europe by a locust is meant an insect of large size, the smaller allied species being ordinarily known as ” grasshoppers,” hence the ” Rocky Mountain locust ” of North America is to Eastern ideas rather a grasshopper than a locust.

In Europe, and a greater part of the Old World, the best known migratory locust is that which is scientifically termed Pachytylus cinerascens with which an allied species P. migratorius has been often confounded. Another locust found in Europe and neighbouring districts is Caloptenus italicus, and still another, Acridium peregrinum, has once or twice occurred in Europe, though its home (even in a migratory sense) is more properly Africa and Asia. These practically include all the locusts of the Old World, though a migratory species of South Africa known as Pachytylus pardalinus (presumed to be distinct from P. migratorius) should be mentioned. The Rocky Mountain locust of North America is Caloptenus spretus, and in that continent there occurs an Acridium (A. americanum) so closely allied to A . peregrinum as to be scarcely distinct therefrom, though there it does not manifest migratory tendencies. In the West Indies and Central America A . peregrinum is also reported to occur.

The females excavate holes in the earth in which the eggs are deposited in a long cylindrical mass enveloped in a glutinous secretion. The young larvae hatch and immediately commence their destructive career. As these insects are ” hemimetabolic ” there is no quiescent stage; they go on increasing rapidly in size, and as they approach

the perfect state the rudiments of the wings begin to appear. Even in this stage their locomotive powers are extensive and their voracity great. Once winged and perfect these powers become infinitely more disastrous, redoubled by the development of the migratory instinct. The laws regulating this instinct are not perfectly understood. Food and tempera- ture have a great deal to do with it, and there is a tendency for the flights to take a particular direction, varied by the physical circumstances of the breeding districts. So likewise each species has its area of constant location, and its area of extraordinary migration. Perhaps the most feasible of the suggestions as to the causes of the migratory impulse is that locusts naturally breed in dry sandy districts in which food is scarce, and are impelled to wander to procure the necessaries of life ; but against this it has been argued that swarms bred in a highly productive district in which they have temporarily settled will seek the barren home of their ancestors. Another ingenious suggestion is that migration is intimately connected with a dry condition of the .atmosphere, urging them to move on until compelled to stop for food or procreative purposes. Swarms travel con- siderable distances, though probably generally fewer than 1000 m., though sometimes very much more. As a rule the progress is only gradual, and this adds vastly to the devastating effects. When an extensive swarm temporarily settles in a district, all vegetation rapidly disappears, and then hunger urges it on another stage. The large Old World species, although un- doubtedly phytoijhagous, when compelled by hunger sometimes attack at least dry animal substances, and even cannibalism has been asserted as an outcome of the failure of all other kinds of food. The length of a single flight must depend upon

1 The Lat. locusta was first applied to a lobster or other marine shell-fi.*h and then, from its resemblance, to the insect.

circumstances. From peculiarities in the examples of Acridium peregritmm taken in England in 1869, it has been asserted that they must have come direct by sea from the west coast of Africa; and what is probably the same species has been seen in the Atlantic at least 1 200 m. from land, in swarms completely covering the ship; thus, in certain cases flight must be sustained for several days and nights together. The height at which swarms fly, when their horizontal course is not liable to be altered by moun- tains, has been very variously estimated at from 40 to 200 ft., or even in a particular case to 500 ft. The extent of swarms and the number of individuals in a swarm cannot be accurately ascertained. They come sometimes in such numbers as to com- pletely obscure the sun, when. the noise made by the rustling of the wings is deafening. Nevertheless some idea on this point may be formed from the ascertained fact that in Cyprus in 1881, at the close of the season, 1 ,600,000,000 egg-cases, each containing a considerable number of eggs, had been destroyed; the estimated weight exceeding 1300 tons. Yet two years later, it is believed that not fewer than 5,076,000,000 egg-cases were again deposited in the island.

In Europe the best known and ordinarily most destructive species is Pachytylus cinerascens, and it is to it that most of the numerous records of devastations in Europe mainly refer, but it is probably not less destructive in many parts of Africa and Asia. That the arid steppes of central Asia are the home of this insect appears probable ; still much on this point is enveloped in uncertainty. In any case the area of permanent distribution is enormous, and that of occasional distribution is still greater. The former area extends from the parallel of 40 N. in Portugal, rising to 48 in France and Switzerland, and passing into Russia at 55°, thence continuing across the middle of Siberia, north of China to Japan; thence south to the Fiji Islands, to New Zealand and North Australia; thence again to Mauritius

especially is this the case, because there exists a distinct species, known as P. migratorius, the migratory area of which appears to be confined to Turkestan and eastern Europe.

P. cinerascens is certainly the most common of the “locusts” occasionally found in the British Isles, and E. de Selys-Longchamps is of opinion that it breeds regularly in Belgium, whereas the true P. migratorius is only accidental in that country.

A South African species allied to the preceding and provisionally identified as Pachytylus salcicollis is noteworthy from the manifesta-

Fig. 1. — Pachytylus migratorius. This and the other figures are all natural size.

and over all Africa to Madeira. The southern distribution is un- certain and obscure. Taking exceptional distribution, it is well known that it occasionally appears in the Britisfi Isles, and has in them apparently been noticed as far north as Edinburgh ; so also does it occasionally appear in Scandinavia, and it has probably been seen up to 63 N. in Finland. Looking at this vast area, it is easy to conceive that an element of uncertainty must always exist with regard to the exact determination of the species, and in Europe

Fig. 2. — Acridium peregrinum. tion of the migratory instinct in immature wingless individuals. The families of young, after destroying the vegetation of a district, unite in a vast army and move away in search of fresh pastures, devastating the country as they go and proceeding of necessity on foot, hence they are known to the Dutch as ” voetgangers.” Travel- ling northwards towards the centre of the continent, the home of their parents before migration, they are diverted from their course by no obstacles. Upon reaching a river or stream they search the bank for a likely spot to cross, then fearlessly cast themselves upon the water where they form floating islands of insects, most of which usually succeed in gaining the opposite bank, though many perish in the attempt.

Acridium peregrinum (fig. 2) can scarcely be considered even an accidental visitor to Europe; yet it has been seen in the south of Spain, and in many examples spread over a large part of England in the year 1869. It is a larger insect than P. migratorius. There is every reason to believe that it is the most destructive locust through- out Africa and in India and other parts of tropical Asia, and its ravages are as great as those of P. migratorius. Presumably it is the species occasionally noticed in a vast swarm in the Atlantic, very far from land, and presumably also it occurs in the West Indies and some parts of Central America. In the Argentine Republic a (possibly) distinct species (A. paranense) is the migratory locust.

Caloptenus italicus (fig. 3) is a smaller insect, with a less extended area of migration ; the destruction occasioned in the districts to which it is limited is often scarce less than that of its more terrible allies. It is essentially a species of the Mediterranean district, and especially of the European side of that sea, yet it is also found in North Africa, and appears to extend far into southern Russia.

Caloptenus spretus (fig. 4) is the ” Rocky Mountain locust ” or ” hateful grasshopper ” of the North American continent. Though a comparatively small insect, not so large as some of the grass- hoppers of English fields, its destructiveness has procured for it great notoriety. By early travellers and settlers the species was not recognized as distinct from some of its non-migratory congeners. But in 1877, Congress appointed a United States Entomological Com- mission to investigate the subject. The report of the commissioners (C. V Riley, A. S. Packard and C. Thomas) deals with the whole subject of locusts both in America and the Old World. C. spretus has its home or permanent area in the arid plains of the central region east of the Rocky Mountains, extending slightly into the southern portion of Canada; outside this is a wide fringe to which the term sub-per- manent is applied, and this is again bounded by the limits of only occasional distribution, the whole occupying a large portion of the North American continent ; but it is not known to have crossed the

Rocky Mountains westward, or to have extended into the eastern states.

As to remedial or preventive measures tending to check the ravages of locusts, little unfortunately can be said; but anything that will apply to one species may be used with practically all. Something can be done (as is now done in Cyprus) by offering a price for all the egg-tubes collected, which is the most direct manner of attacking them. Some little can be done by destroying the larvae while in an

Fig. 3. — Caloptenus ilalicus.

unwinged condition, and by digging trenches in the line of march into which they can fall and be drowned or otherwise put an end to. Little can be done with the winged hordes; starvation, the outcome of their own work, probably here does much. In South Africa some success has attended the spraying of the swarms with arsenic. It has been shown that with all migratory locusts the breeding-places, or true homes, are comparatively barren districts (mostly elevated plateaus) ; hence the progress of colonization, and the conversion of those heretofore barren plains into areas of fertility, may (and prob- ably will) gradually lessen the evil.

Locusts have many enemies besides man. Many birds greedily devour them, and it has many times been remarked that migratory swarms of the insects were closely followed by myriads of birds.

Fig. 4. — Rocky Mountain Locust (Caloptenus spretus). (After Riley.)

o, a, a, Female in different posi- tions, ovipositing.

b, Egg-pod extracted from ground, with the end broken open. [ground.

f, A few eggs lying loose on the

d, e show the earth partially re- moved, to illustrate an egg- mass already in place, and one being placed.

/, shows where such a mass has been covered up.

Predatory insects of other orders also attack them, especially when they are in the unwinged condition. Moreover, they have still more deadly insect foes as parasites. Some attack the fully developed winged insect. But the greater part attack the eggs. To such belong certain beetles, chiefly of the family Cantharidae, and especially certain two-winged flies of the family Bombyliidae. These latter, both in the Old and New World, must prevent vast quantities of eggs from producing larvae.

The larger Old World species form articles of food with certain semi-civilized and savage races, by whom they are considered as delicacies, or as part of ordinary diet, according to the race and the method of preparation. (R. M'L. ; R. I. P.)

LOCUST-TREE, or Carob-Tree (Ceratonia siliqua), a member of the tribe Cassieae of the order Leguminosae, the sole species of its genus, and widely diffused spontaneously and by cultiva- tion from Spain to the eastern Mediterranean regions. The name of the genus is derived from the often curved pod (Gr. Ktpa.ri.ov, a little horn). The flowers have no petals and are polygamous or dioecious (male, female and hermaphrodite flowers occur). The seed-pod is compressed, often curved, in- dehiscent and coriaceous, but with sweet pulpy divisions between the seeds, which, as in other genera of the Cassieae, are albumin- ous. The pods are eaten by men and animals, and in Sicily a spirit and a syrup are made from them. These husks being often used for swine are called swine's bread, and are probably referred to in the parable of the Prodigal Son. It is also called St John's bread, from a misunderstanding of Matt. iii. 4. The carob-tree was regarded by Sprengel as the tree with which Moses sweetened the bitter waters of Marah (Exod. xv. 25), as the kharrub, according to Avicenna (p. 205), has the property of sweetening salt and bitter waters. Gerard (Herball, p. 1241) cultivated it in 1597, it

having been introduced in 1570.

LODEVE, a town of southern France, capital of an arrondisse- ment of the department of Herault, 36 m. W.N.W. of Mont- pellier by rail. Pop. (1906), 6142. It is situated in the southern Cevennes at the foot of steep hills in a small valley where the Soulondres joins the Lergue, a tributary of the Herault. Two bridges over the Lergue connect the town with the faubourg of Carmes on the left bank of the river, and two others over the Soulondres lead to the extensive ruins of the chateau de Montbrun (13th century). The old fortified cathedral of St Fulcran, founded by him in 950, dates in its present condition from the 13th, 14th and 16th centuries; the cloister, dating from the 15th and 17th centuries, is in ruins. In the picturesque environs of the town stands the well-preserved monastery of St Michel de Grammont, dating from the 12th century and now used as farm buildings. In the neighbourhood are three fine dolmens. The manufacture of woollens for army clothing is the chief industry. Wool is imported in large quantities from the neighbouring departments, and from Morocco; the exports are cloth to Italy and the Levant, wine, brandy and wood. The town has tribunals of first instance and of commerce, a board of trade-arbitrators, a chamber of arts and manufactures, and a communal college.

Lodeve (Luteva) existed before the invasion of the Romans, who for some time called it Forum Neronis. The inhabitants were converted to Christianity by St Flour, first bishop of the city, about 323. After passing successively into the hands of the Visigoths, the Franks, the Ostrogoths, the Arabs and the Carolingians, it became in the 9th century a separate count- ship, and afterwards the domain of its bishops. During the religious wars it suffered much, especially in 1573, when it was sacked. It ceased to be an episcopal see at the Revolution.

LODGE, EDMUND (17 56-1839), English writer on heraldry, was born in London on the 13th of June 1756, son of Edmund Lodge, rector of Carshalton, Surrey. He held a cornet's com- mission in the army, which he resigned in 1773. In 1782 he became Bluemantle pursuivant-at-arms in the College of Arms. He subsequently became Lancaster herald, Norroy king-at-arms, Clarencieux king-at-arms, and, in 1832, knight of the order of the Guelphs of Hanover. He died in London on the 16th of January 1839. He wrote Illustrations of British History, Bio- graphy and Manners in the reigns of Henry VIII., Edward VI., Mary, Elizabeth and James I .... (3 vols., 1791), consisting of selections from the MSS. of the Howard, Talbot and Cecil families preserved at the College of Arms; Life of Sir Julius Caesar . . . (2nd ed., 1827). He contributed the literary matter to Portraits of Illustrious Personages of Great Britain (18 14, &c), an elaborate work of which a popular edition is included in Bohn's " Illustrated Library." His most important work on heraldry was The Genealogy of the existing British Peerage . . . (1832; enlarged edition, 1859). In The Annual Peerage and Baronetage (1827-1829), reissued after 1832 as Peerage of the British Empire, and generally known as Lodge's Peerage, his share did not go beyond the title-page.

LODGE, HENRY CABOT (1850-), American political leader and author, was born in Boston, Massachusetts, on the 1 2th of May 1850. He graduated at Harvard College in 187 1 and at thfi Harvard Law School in 1875; was admitted to the Suffolk (Massachusetts) bar in 1876; and in 1876-1870 was instructor in American history at Harvard. He was a member of the Massachusetts House of Representatives in 1880-18S1, and of the National House of Representatives in 1 887-1893; succeeded Henry L. Dawes as United States Senator from Massachusetts in 1893; and in 1899 and in 1905 was re-elected to the Senate, where he became one of the most prominent of the Republican leaders, and an influential supporter of President Roosevelt. He was a member of the Alaskan Boundary Com- mission of J 903, and of the United States Immigration Commis- sion of 1907. In the National Republican Convention of 1896 his influence did much to secure the adoption of the gold standard " plank " of the party's

platform. He was the permanent chairman of the National Republican Convention of 1900, and of that of 1908. In 1874-1876 he edited the North American Review with Henry Adams; and in 1879-1882, with John T. Morse, Jr., he edited the International Review. In 1 884-1 890 he was an overseer of Harvard College. His doctoral thesis at Harvard was published with essays by Henry Adams, J. L. Laughlin and Ernest Young, under the title Essays on Anglo- Saxon Land Law (1876). He wrote: Life and Letters of George Cabot (1877); Alexander Hamilton (1882), Daniel Webster (1883) and George Washington (2 vols., 1889), in the " American States- men " series; A Short History of the English Colonies in America (1881); Studies in History (1884); Boston (1891), in the "His- toric Towns" series; Historical and Political Essays (1892); with Theodore Roosevelt, Hero Tales from American History (1895); Certain Accepted Heroes (1897); The Story of the American Revolution (2 vols., 1898); The War with Spain (1899); A Fighting Frigate (1902); A Frontier Town (1906); and, with J. W. Garner, A History of the United States (4 vols., 1906). He edited The Works of Alexander Hamilton (9 vols., 1885-1886) and The Federalist (1891).

His son, George Cabot Lodge (1873-1909), also became known as an author, with The Song of the Wave (1898), Poems, 1899-IQ02 (1902), The Great Adventure (1905), Cain: a Drama (1904), Herakles (1908) and other verse.

LODGE, SIR OLIVER JOSEPH (1851-), English physicist, was born at Penkhull, Staffordshire, on the 12th of June 1851, and was educated at Newport (Salop) grammar school. He was intended for a business career, but being attracted to science he entered University College, London, in 1872, graduating D.Sc. at London University in 1877. In 1875 he was appointed reader in natural philosophy at Bedford College for Women, and in 1879 he became assistant professor of applied mathematics at University College, London. Two years later he was called to the chair of physics in University College, Liverpool, where he remained till in 1900 he was chosen first principal of the new Birmingham University. He was knighted in 1902. His original work in- cludes investigations on lightning, the seat of the electromotive force in the voltaic cell, the phenomena of electrolysis and the speed of the ion, electromagnetic waves and wireless telegraphy, the motion of the aether nea; <.ne earth, and the application of electricity to the dispersal of tog and smoke. He presided over the mathematical and physical section of the British Association in 1891, and served as president of the Physical Society in 1899- 1900 and of the Society for Psychical Research in 1901-1904. In addition to numerous scientific memoirs he wrote, among other works, Lightning Conductors and Lightning Guards, Signalling without Wires, Modern Views of Electricity, Electrons and The Ether of Space, together with various books and papers of a meta- physical and theological character.

LODGE, THOMAS (c. 1558-1625), English dramatist and miscellaneous writer, was born about 1558 at West Ham. He was the second son of Sir Thomas Lodge, who was lord mayor of London in 1 562-1 563. He was educated at Merchant Taylors' School and Trinity College, Oxford; taking his B.A degree in 1577 and that of M.A. in 1581. In 1578 he entered Lincoln's

Inn, where, as in the other Inns of Court, a love of letters and a crop of debts and difficulties were alike wont to spring up in a kindly soil. Lodge, apparently in disregard of the washes of his family, speedily showed his inclination towards the looser ways of life and the lighter aspects of literature. When the penitent Stephen Gosson had (in 1579) published his Schoole of Abuse, Lodge took up the glove in his Defence of Poetry, Music and Stage Plays (1579 or 1580; reprinted for the Shakespeare Society, 1853), which shows a certain restraint, though neither deficient in force of invective nor backward in display of erudi- tion. The pamphlet was prohibited, but appears to have been circulated privately. It was answered by Gosson in his Playes Confuted in Five Actions; and Lodge retorted with his Alarum Against Usurers (1 584, reprinted ib.) — a " tract for the times " which no doubt was in some measure indebted to the author's personal experience. In the same year he produced the first tale written by him on his own account in prose and verse, The Delectable History of Forbonius and Prisceria, both published and reprinted with the Alarum. From 1587 onwards he seems to have

made a series of attempts as a playwright, though most of those attributed to him are mainly conjectural. That he ever became an actor is improbable in itself, and Collier's conclusion to that effect rested on the two assumptions that the " Lodge " of Henslowe's M.S. was a player and that his name was Thomas, neither of which is supported by the text (see C. M. Ingleby, Was Thomas Lodge an Actor? 1868). Having, in the spirit of his age , " tried the waves " with Captain Clarke in his expedition to Terceira and the Canaries, Lodge in 1591 made a voyage with Thomas Cavendish to Brazil and the Straits of Magellan, return- ing home by 1593. During the Canaries expedition, to beguile the tedium of his voyage, he composed his prose tale of Rosalynde, Euphues Golden Legacie, which, printed in 1590, afterwards furnished the story of Shakespeare's As You Like It. The novel, which in its turn owes some, though no very considerable, debt to the medieval Tale of Gamelyn (unwarrantably appended to the fragmentary Cookes Tale in certain MSS. of Chaucer's works), is written in the euphuistic manner, but decidedly attractive both by its plot and by the situations arising from it. It has been frequently reprinted. Before starting on his second expedition he had published an historical romance, The History of Robert, Second Duke of Normandy, surnamcd. Robert the Divell; and he left behind him for publication Catharos, Diogenes in his Singidarily, a discourse on the immorality of Athens (London). Both appeared in 1591. Another romance in the manner of Lyly, Euphues Shadow, the BattaUe of the Sences (1592), appeared while Lodge was still on his travels. His second historical romance, the Life and Death of William Longbeard (1593), was more successful than the first. Lodge also brought back with him from the new world A Margarite of America (published 1596), a romance of the same description interspersed with many lyrics. Already in 1 589 Lodge had given to the world a volume of poems bearing the title of the chief among them, SciUaes Metamorphosis, Enterlaced with the Unfortunate Love of Glaucus, more briefly known as Glaucus and Scilla (reprinted with preface by S. W. Singer in 18 19). To this tale Shakespeare was possibly indebted for the idea of Venus and Adonis. Some readers would perhaps be prepared to give up this and much else of Lodge's sugared verse, fine though much of it is in quality, largely borrowed from other writers, French and Italian in particular, in exchange for the lost Sailor's Kalendar, in which he must in one way or another have recounted his sea adventures. If Lodge, as has been supposed, was the Alcon in Colin Clout's come Home Again, it may have been the influence of Spenser which led to the com- position of Phillis, a volume of sonnets, in which the voice of nature seems only now and then to become audible, published with the narrative poem, The Complaynte of Elstred, in 1593. A Fig for Momus, on the strength of which he has been called the earliest English satirist, and which contains eclogues addressed to Daniel and others, an epistle addressed to Drayton, and other pieces, appeared in 1595. Lodge's ascertained dramatic work is small in quantity. In conjunction with Greene he, probably in 1 590, produced in a popular vein the odd but far from feeble

play of A Looking Glasse for London and England (printed in 1594). He had already written The Wounds of Civile War. Lively set forth in the Tragedies of Marius and Scilla (produced perhaps as early as 1587, and published in 1594), a good second- rate piece in the half-chronicle fashion of its age. Mr F. G. Fleay thinks there were grounds for assigning to Lodge Mucedorus and Amadine, played by the Queen's Men about 1588, a share with Robert Greene in George a Greene, the Pinner of Wakefield, and in Shakespeare's 2nd part of Henry VI.; he also regards him as at least part-author of The True Chronicle of King Leir and his three Daughters (1594); and The Troublesome Raigne of John, King of England (c. 1588); in the case of two other plays he allowed the assignation to Lodge to be purely conjectural. That Lodge is the " Young Juvenal " of Greene's Groatsworth of Wit is no longer a generally accepted hypothesis. In the latter part of his life — possibly about 1596, when he published his Wits Miserie and the World's Madnesse, which is dated from Low Leyton in Essex, and the religious tract Prosopopeia ■ (if, as seems probable, it was his), in which he repents him of his " lewd lines " of other days — he became a Catholic and engaged in the practice of medicine,

for which Wood says he qualified himself by a degree at Avignon in 1600. Two years afterwards he received the degree of M.D. from Oxford University. His works henceforth have a sober cast, comprising translations of Josephus (1602), of Seneca (1614), a Learned Summary of Du Bartas's Divine Sepmaine (1625 and 1637), besides a Treatise of the Plague (1603), and a popular manual, which remained unpublished, on Domestic Medicine. Early in 1606 he seems to have left England, to escape the persecution then directed against the Catholics; and a letter from him dated 1610 thanks the English ambassador in Paris for enabling him to return in safety. He was abroad on urgent private affairs of one kind and another in 1616. From this time to his death in 1625 nothing further concerning him remains to be noted.

Lodge's works, with the exception of his translations, have been reprinted for the Hunterian Club with an introductory essay by Mr Edmund Gosse. This preface was reprinted in Mr Gosse's Seven- teenth Century Studies (1883). Of Rosalynde there are numerous modern editions. See also J. J. Jusserand, English Novel in the Time of Shakespeare (Eng. trans., 1890); F. G. Fleay, Biographical Chronicle of the English Drama (vol. ii., 1891). (A. W. W.)

LODGE, a dwelling-place, small and usually temporary, a hut, booth or tent. The word was in M. Eng. logge, from Fr. loge, arbour, in modern French a hut; also box in a theatre; the French word, like the Italian loggia, came from the Med. Lat. laubia or lobia, the sheltered promenade in a cloister, from which English " lobby " is derived. The Latin is of Teutonic origin from the word which survives in the Mod. Ger. Laube, an arbour, but which earlier was used for any hut, booth, &c. The word is probably ultimately from the root which appears in " leaf," meaning a rough shelter of foliage or boughs. The word is especially used of a house built either in a forest or away from habitation, where people stay for the purpose of sport, as a " hunting lodge," " shooting lodge," &c. The most frequent use of the word is of a small building, usually placed at the entrance to an estate or park and inhabited by a dependant of the owner. In the same sense the word means the room or box inhabited by the porter of a college, factory or public institu- tion. Among Freemasons and other societies the " lodge " is the name given to the meeting-place of the members of the branch or district, and is applied to the members collectively as " a meeting of the lodge." The governing body of the Freemasons presided over by the grand master is called the " Grand Lodge." At the university of Cambridge the house where the head of a college lives is called the " lodge." Formerly the word was used of the den or lair of an animal, but is now only applied to that of the beaver and the otter. It is also applied to the tent of a North American Indian, a wigwam or tepee, and to the number of inhabitants of such a tent. In mining the term is used of a subterraneous reservoir made at the bottom of the pit, or at different levels in the shaft for the purpose of draining the mine. It is used also of a room or landing-place next to the shaft, for discharging ore, &c.

LODGER AND LODGINGS. The term " lodger " (Fr. loger, to lodge) is used in English law in several slightly different senses. It is applied (i.) most frequently and properly to a person who takes furnished rooms in a house, the landlord also residing on the premises, and supplying him with attendance; (ii.) sometimes to a person, who takes unfurnished rooms in a house finding his own attendance; (iii.) to a boarder in a boarding-house (q.v.). It is with (i.) and (ii.) alone that this article is concerned. Where furnished apartments are let for immediate use, the law implies an undertaking on the part of the landlord that they are fit for habitation, and, if this condition is broken, the tenant may refuse to occupy the premises or to pay any rent. But there is no implied contract that the apartments shall continue fit for habitation; and the rule has no application in the case of unfurnished lodgings. In the absence of express agreement to the contrary, a lodger has a right to the use of everything necessary to the enjoyment of the premises, such as the doorbell and knocker and the skylight of a staircase. Whether the rent of apartments can be distrained for by the immediate landlord where he resides on the premises and supplies attendance is a question the answer to which is involved in some uncertainty. The weight of authority seems to support the negative view (see Foa, Landlord and Tenant, 3rd ed. p. 434). To make good a right to distrain it is necessary -to show that the terms of the letting create a tenancy or exclusive

occupation and not a mere licence. Where the owner, although residing on the premises, does not supply attendance, the question depends on whether there is a real tenancy, giving the lodger an exclusive right of occupation as against the owner. The ordinary test is whether the lodger has the control of the outer door. But the whole circumstances of each case have to be taken account of. A lodger is rateable to the poor-rate where he is in exclusive occupation of the apartments let to him, and the landlord does not retain the control and dominion of the whole structure. As to distress on a lodger's goods for rent due by an immediate to a superior landlord, see Rent. As to the termination of short tenancies, as of apartments, see Landlord and Tenant. The landlord has no lien on the goods of the lodger for rent or charges. Over- crowding lodging-houses may be dealt with as a nuisance under the Public Health Acts 1875 and 1891 and the Housing of the Working Classes Acts. As to the lodger franchise, see Registra- tion or Voters. It has been held in England that keepers of lodging-houses do not come within the category of those persons (see Carrier; Innkeeper) who hold themselves out to the public generally as trustworthy in certain employments; but that they are under an obligation to take reasonable care for the safety of their lodgers' goods; see Scarborough v. Cosgrove, 1905, 2 K.B. 805. As to Scots Law see Bell's Prin. s. 236 (4).

In the United States, the English doctrine of an implied warranty of fitness for habitation on a letting of furnished apartments has only met with partial acceptance; it was repudiated , e.g. in the District of Columbia, but has been accepted in Massachusetts. In the French Code Civil, there are some special rules with regard to furnished apartments. The letting is reputed to be made for a year, a month or a day, according as the rent is so much per year, per month or per day; if that test is inapplicable, the letting is deemed to be made according to the custom of the p'ace (art. 1758). There are similar provisions in the Civil Codes of Belgium (art. 1758), Holland (art. 1622) and Spain (Civil Code, art. 1581).

See also the articles, Boarding House, and Flat; and the bibliographies to Flat and Landlord and Tenant. (A. W. R.)

LODI, a town and episcopal see of Piedmont, Italy, in the province of Milan, 205 m. by rail S.E. of that city, on a hill above the right bank of the Adda, 230 ft. above sea-level. Pop. (1901) 19,970 (town), 26,827 (commune). The site of the city is an eminence rising very gradually from the Lombard plain, and the surrounding country is one of the richest dairy districts in Italy. The cathedral (1158), with a Gothic facade and a 16th- century lateral tower, has a restored interior. The church of the Incoronata was erected by Battaggio (1488) in the Bramantesque style. It is an elegant octagonal domed structure, and is

decorated with frescoes by the Piazza family, natives of the town, and four large altar-pieces by Calisto Piazza (died after 1561). There is a fine organ of 1507. The 13th-century Gothic church of San Francesco, restored in 1889, with 14th-century paintings, is also noticeable. The Palazzo Modegnani has a fine gateway in the style of Bramante, and the hospital a cloistered quadrangle. In the Via Pornpeia is an early Renaissance house with fine decorations in marble and terra-cotta. Besides an extensive trade in cheese (Lodi producing more Parmesan than Parma itself) and other dairy produce, there are manu- factures of linen, silk, majolica and chemicals.

The ancient Laus Pompeia lay 3ˆ m. W. of the present city, and the site is still occupied by a considerable village, Lodi Vecchio, with the old cathedral of S. Bassiano, now a brick building, which contains 15th-century frescoes. It was the point where the roads from Mediolanum to Placentia and Cremona diverged, and there was also a road to Ticinum turning off from the former, but it is hardly mentioned by classical writers. It appears to have been a municipium. No ruins exist above ground, but various

antiquities have been found here. From which Pompeius, whether Cn. Pompeius Strabo, who gave citizenship to the Transpadani, or his son, the more famous Pompey, it took its name is not certain. In the middle ages Lodi was second to Milan among -the cities of northern Italy. A dispute with the archbishop of Milan about the investiture of the bishop of Lodi (1024) proved the beginning of a protracted feud between the two cities. In 1111 the Milanese laid the whole place in ruins and forbade their rivals to restore what they had destroyed, and in n 58, when in spite of this prohibition a fairly flourishing settlement had again been formed, they repeated their work in a more thorough manner. A number of the Lodigians had settled on Colle Eghezzone; and their village, the Borgo d'Isella, on the site of a temple of Hercules, soon grew up under the patronage of Frederick Barbarossa into a new city of Lodi (1162). At first subservient to the emperor, Lodi was before long compelled to enter the Lombard League, and in 1198 it formed alliance offensive and defensive with Milan. The strife between the Sommariva or aristocratic party and the Overgnaghi or democratic party was so severe that the city divided into two distinct communes. The Overgnaghi, expelled in 1236, were restored by Frederick II. who took the city after three months' siege. Lodi was actively concerned in the rest of the n Guelph and Ghibelline struggle. In 1416 its ruler, Giovanni Vignati, was treacherously taken prisoner by Filippo Maria Visconti, and after that time it became dependent on Milan. The duke of Brunswick captured it in 1625, in the interests of Spain; and it was occupied by the French (1701), by the Austrians (1706), by the king of Sardinia (1733), by the Austrians (1736), by the Spaniards (1745), and again by the Austrians (1746). On the iothof May 1796 wasfought the battle of Lodi between the Austrians and Napoleon, which made the latter master of Lombardy.

LODZ (Lodz; more correctly Lodzia), a town of Russian Poland, in the government of Piotrkow, 82 m. by rail S.W. of Warsaw. It is situated on the Lodz plateau, which at the beginning of the 19th century was covered with impenetrable forests. Now it is the centre of a group of industrial towns — Zgerz, Lgczyca, Pabianice, Konstantinov and Aleksandrov. Chiefly owing to a considerable immigration of German capitalists and workers, Lodz has grown with American-like rapidity. It consists principally of one main street, 7 m. long, and is a sort of Polish Manchester, manufacturing cottons, woollens and mixed stuffs, with chemicals, beer, machinery and silk, One of the very few educational institutions is a professional industrial school. The population, which was only 50,000 in 1872, reached 351,570 in 1900; the Poles numbering about 37%, Germans 40% and Jews 22^%.

LOESS (Ger. Loss), in geology, a variety of loam. Typical loess is a soft, porous rock, pale yellowish or buff in colour; one characteristic property is its capacity to retain vertical, or even over-hanging, walls in the banks of streams. These vertical walls have been well described by von Richthofen

(Fiihrer fur Forschungsreisende, Berlin, 1886) in China, where they stand in some places 500 ft. high and contain innumerable cave dwellings; ancient roads too have worn their way vertically downwards deep into the deposit, forming trench-like ways. This character in the loess of the Mississippi region gave rise to the name " Bluff formation." A coarse columnar structure is often exhibited on the vertical weathered faces of the rock. Another characteristic is the presence throughout the rock of small capillary tubules, which appear to have been occupied by rootlets; these are often lined with calcite. Typical loess is usually calcareous; some geologists regard this as an essential property, and when the rock has become decalcified, as it fre- quently is on the surface by weathering, they call it " loess- loam " (losslehm). In the lower portions of a loess deposit the calcium carbonate tends to form concretions, which on account of their mimetic forms have received such names as losskindchen, losspuppen, poupees du loess, " loess dolls." In deposits of this nature in South America these concretionary masses form distinct beds. Bedding is absent from typical loess. The mineral composition of loess varies somewhat in different regions, but the particles are always small; they consist of angular grains of quartz, fine particles of hydrated silicates of alumina, mica scales and undecomposed fragments of felspar, hornblende and other rock-forming silicates.

In Europe and America loess deposits are associated with the margins of the great ice sheets of the glacial period ; thus in Europe they stretch irregularly through the centre eastwards from the north- west of France, and are not found north of the 57th parallel. In both regions loess deposits are found within and upon glacial deposits. For this reason the loess is very commonly assigned to the Pleistocene period ; but some of the loess deposits of northern Europe have been in process of formation intermittently from the Miocene period onward, and in South America the great loess formations known as the Pampean or Patagonian belong to the Eocene, Oligocene and Pleistocene periods. Most geologists are agreed that the loess is an aeolian or wind-borne rock, formed most probably during periods of tundra or steppe conditions. The capillary tubules are supposed to have been caused by the roots of grass and herbage which kept growing upon the surface even while the deposit was slowly increasing. Others contend that loess is of the nature of alluvial loam ; this may be true of certain deposits classed as loess, but it cannot be true of most of the typical loess formations, for they lie upon older rocks quite independently of altitude, from near sea level up to 5000 ft. in Europe and to 11,500 ft. in China; they are often developed on one side of a mountain range and not upon the other, and in a series of approximately oarallel valleys the loess is frequently found lying upon one side and that the same in each case, facts pointing to the agency of prevalent winds.

The thickness of loess deposits is usually not more than 33 ft., but in China it reaches 1000 ft. or more ; it also attains a great thickness in South America. Numerous proboscidian and other mammalian fossils have been found in the loess of Europe; the tapir, mastodon and giant sloths occur in South America, but the most common fossils are small land shells and such amphibious pond forms as Succinea. Certain loess deposits in Turkestan have been attributed to rain-wash, this is the so-called ” lake-loess ” (see-loss) ; according to Tukowski the difference between sub-aerial and lake loess is that the former is porous, dry and pervious, while the latter is laminated, plastic and impervious. Two types of loess have been recognized in Russia, the Hill- or Terrace-loess and the Low-level-loess, a product of the weathering of underlying rocks. In South Germany the following order has been recognized: (1) an upper imbedded, non- calcareous loess, (2) the gehangliiss, mixed with subsoil rocks, and (3) the sand or thai-loss, with some gravel. The effect of vegetation on the upper layers of loess is to produce soils of great fertility, such as the black earth (Tschernozom) of southern Russia, the dark Bordeloss of the Magdeburg district, and the black ” cotton soil ” (regur) of the Deccan.

LOFFT, CAPEL (1751-1824), English miscellaneous writer, was born in London on the 14th of November i75t. He was educated at Eton, and Peterhouse, Cambridge, which he left to become a member of Lincoln’s Inn. He was called to the bar in 1775, and left by his father’s and uncle’s deaths with a hand- some property and the family estates. He was a prolific writer on a variety of topics, and a vigorous contentious advocate of parliamentary and other reforms, and carried on a voluminous correspondence with all the literary men of his time. He became the patron of Robert Bloomfield, the author of The Farmer’s Boy, and secured for him the very successful publica- tion of that work. Byron, in a note to his English Bards and

Scotch Reviewers, ridiculed Lofft as ” the Maecenas of shoe- makers and preface- writer general to distressed versemen; a kind of gratis accoucheur to those who wish to be delivered of rhyme, but do not know how to bring forth.” He died at Montcalieri, near Turin, on the 26th of May 1824.

His fourth son Capel Lofft, the younger (1806-1873), also a writer on various topics, inherited his father’s liberal ideas and principles, and carried them in youth to greater extremes. In his old age he abandoned these theories, which had brought him into the company of some of the leading political agitators of the day. He died in America,

where he had a Virginia estate.

LOFOTEN AND VESTERAALEN, a large and picturesque group of islands lying N.E. and S.W. off the N.W. coast of Norway, between 67 30′ and 6o° 20′ N., and between 12 and 16° 35′ E. forming part of the ami (county) of Nordland. The extreme length of the group from Andenaes, at the north of Ando, to Rost, is about 150 m.; the aggregate area about 1 560 sq. m. It is separated from the mainland by the Vestf jord, Tjaeldsund and Vaagsfjord, and is divided into two sections by the Raftsund between Hindo and Ost-Vaago. To the W. and S. of the Raftsund lie the Lofoten Islands proper, of which the most important are Ost-Vaago, Gimso, Vest-Vaago, Flakstado, Moskenaeso, Mosken, Varo and Rost; E. and N. of the Raftsund are the islands of Vesteraalen, the chief being Hindo, Ulvo, Lango, Skogso and Ando. The islands, which are all of granite or metamorphic gneiss, are precipitous and lofty. The highest points and finest scenery are found on Ost- Vaago, in the neighbourhood of the narrow, cliff-bound Raftsund and Troldfjord. The principal peaks are Higrafstind (381 1 ft.), Gjeitgaljartind (3555), Rulten (3483), the Noldtinder (3467), Svartsundtind (3506). The long line of jagged and fantastic peaks seen from the Vestfjord forms one of the most striking prospects on the Norwegian coast, but still finer is the panorama from the Digermuler (1150 ft.), embracing the islands, the Vest- fjord, and the mountains of the mainland. The channels which separate the islands are narrow and tortuous, and generally of great depth; they are remarkable for the strength of their tidal currents, particularly the Raftsund and the famous Maelstrom or Moskenstrom between Moskenaes and Mosken. The violent tempests which sweep over the Vestfjord, which is exposed to the S.W., are graphically described in Jonas Lie's Den Fremsynte (1870) and in H. Schultze's Udvalgte Skrifter (1883), as the Maelstrom is imaginatively by Edgar Allan Poe. Though situated wholly within the Arctic circle, the climate of the Lofoten and Vesteraalen group is not rigorous when com- pared with that of the rest of Norway. The isothermal line which marks a mean January temperature of 32 F. runs south from the Lofotens, passing a little to the east of Bergen onward to Gothenburg and Copenhagen. The prevailing winds are from the S. and W., the mean temperature for the year is 38-5° F., and the annual rainfall is 43-34 in. In summer the hills have only patches of snow, the snow limit being about 3000 ft. The natural pasture produced in favourable localities permits the rearing of cattle to some extent; but the growth of cereals (chiefly barley, which here matures in ninety days) is insignificant. The islands yield no wood. The characteristic industry, and an important source of the national wealth, is the cod fishery carried on along the east coast of the Lofotens in the Vestfjord in spring. This employs about 40,000 men during the season from all parts of Norway, the population being then about doubled, and the surplus accommodated in temporary huts. The average yield is valued at about £35,000. The fish are taken in nets let down during the night, or on lines upwards of a mile in length, or on ordinary hand-lines. The fishermen are paid in cash, and large sums of money are sent to the islands by the Norwegian banks each February. Great loss of life is frequent during the sudden local storms. The fish, which is dried during early summer, is exported to Spain (where it is known as bacalao), Holland, Great Britain, Belgium, &c. Industries arising out of the fishery are the manufacture of cod-liver oil and of artificial manure. The summer cod fisheries and the lobster fishery are also valuable. The herring is taken in large quantities off the

west coasts of Vesteraalen, but is a somewhat capricious visitant. The islands contain no towns properly so called, but Kabelvaag on Ost-Vaago and Svolvaer on a few rocky islets off that island are considerable centres of trade and (in the fishing season) of population; Lodingen also, at the head of the Vestfjord on Hindo, is much frequented as a port of call. A church existed at Vaagen (Kabelvaag) in the 12th century, and here Hans Egede, the missionary of Greenland, was pastor. There are factories for fish guano at Henningvaer (Ost-Vaago), Kabelvaag, Svolvaer, Lodingen, and at Bretesnas on Store Molla. Regular means of communication are afforded by the steamers which trade between Hamburg or Christiania and Hammerfest, and also by local vessels; less accessible spots can be visited by small boats, in the management of which the natives are adepts. There are some roads on Hindo, Lango, and Ando. The largest island in the

group, and indeed in Norway, is Hindo, with an area of 860 sq. m. The south-eastern portion of it belongs to the ami of Tromso. In the island of Ando there is a bed of coal at the mouth of Ramsaa.

LOFT (connected with " lift," i.e. raised in the air; 0. Eng. lyft; cf. Ger. Luft; the French term is grenier and Ger. Boden), the term given in architecture to an upper room in the roof, sometimes called "cockloft"; when applied over stabling it is known as a hay -loft; the gallery over a chancel screen, carrying a cross, is called a rood-loft (see Rood). The term is also given to a gallery provided in the choir-aisle of a cathedral or church, and used as a watching-loft at night.

LOFTUS, ADAM (c. 1533-1605), archbishop of Armagh and Dublin, and lord chancellor of Ireland, the son of a Yorkshire gentleman, was educated at Cambridge. He accompanied the earl of Sussex to Ireland as his chaplain in 1560, and three years later was consecrated archbishop of Armagh by Hugh Curwen, archbishop of Dublin. In 1565 Queen Elizabeth, to supplement the meagre income derivable from the archiepiscopal see owing to the disturbed state of the country, appointed Loftus temporarily to the deanery of St Patrick's; and in the same year he became president of the new commission for ecclesiastical causes. In 1567 he was translated to the arch- bishopric of Dublin, where the queen looked to him to carry out reforms in the Church. On several occasions he temporarily executed the functions of lord keeper, and in August 1581 he was appointed lord chancellor of Ireland. Loftus was constantly occupied in attempts to improve his financial position by obtain- ing additional preferment. He had been obliged to resign the deanery of St Patrick's in 1567, and twenty years later he quarrelled violently with Sir John Perrot, the lord deputy, over the proposal to appropriate the revenues of the cathedral to the foundation of a university. Loftus, however, favoured the project of founding a university in Dublin, though on lines different from Perrot's proposal, and it was largely through his influence that the corporation of Dublin granted the lands of the priory of All Hallows as a beginning of the endowment of Trinity College, of which he was named first provost in the charter creating the foundation in 1591. Loftus, who had an important share in the administration of Ireland under successive lords deputy, and whose zeal and efficiency were commended by James I. on his accession, died in Dublin on the 5th of April 1605. By his wife, Jane Purdon, he had twenty children.

His brother Robert was father of Adam Loftus (c. 1 568-1643), who became lord chancellor of Ireland in 1619, and in 1622 was created Viscount Loftus of Ely, King's county, in the peerage of Ireland. Lord Loftus came into violent conflict with the lord deputy, Viscount Falkland, in 1624; and at a later date his quarrel with Strafford was still more fierce. One of the articles in Strafford's impeachment was based on his dealings with Loftus. The title, which became extinct on the death of his grandson, the 3rd viscount, in 1725 (when the family estate of Monasterevan, re-named Moore Abbey, passed to his daughter's son Henry, 4th earl of Drogheda) , was re-granted in 1756 to (his cousin Nicholas Loftus, a lineal descendant of the archbishop. It again became extinct more than once afterwards, but was on each occasion revived in favour of a descendant through the

female line; and it is now held by the marquis of Ely in con- junction with other family titles.

See Richard Mant, History of the Church of Ireland (2 vols., London, 1840); J. R. O'Flanagan, Lives of the Lord Chancellors of Ireland (2 vols., London, 1870); John D'Alton, Memoirs of the Archbishops of Dublin (Dublin, 1838); Henry Cotton, Fasti Ecclesiae Hibernicae (5 vols., Dublin, 1848-1878); William Monck Mason, History and Antiquities of the College and Cathedral Church of St Patrick, near Dublin (Dublin, 1819); G. E. C, Complete Peerage vol. iii.. sub. " Ely " (London, 1890).

LOG (a word of uncertain etymological origin, possibly onomato- poeic; the New English Dictionary rejects the derivation from Norwegian lag, a fallen tree), a large piece of. generally unhewn, wood. The word is also used in various figurative senses, and more particularly for the " nautical log," an apparatus for ascertaining the speed of ships. Its employment in this sense depends on the fact that a piece of wood attached to a line was thrown overboard to lie like a log in a fixed position, motionless, the vessel's speed being calculated by observing what length of line ran out in a given time (" common log "); and the word has been retained for the modern " patent " or " continuous " log, though it works in an entirely different manner.

The origin of the " common log " is obscure, but the beginnings of the " continuous log " may be traced back to the 16th century. By an invention probably due to Humfray Cole and published in 1578 by William Bourne in his Inventions and Devices, it was proposed to register a ship's. spied by means of a " little small close boat," with a wheel, or wheels, and an axle-tree to turn clockwork in the little boat, with dials and pointers indicating fathoms, leagues, scores of leagues and hundreds of leagues. About 1668 Dr R. Hooke showed some members of the Royal Society an instrument for the same purpose, depending on a vane or fly which rotated as the vessel progressed (Birch, History of the Royal Society, iv. 231), and Sir Isaac Newton in 1 71 5 reported unfavourably on the "marine surveyor " of Henry de Saumarez, which also depended on a rotator. Conradus Mel in his Anliquarius Sacer (1719) described a " pantometron nauticum " which he claimed would show without calculation the distance sailed by the ship; and J. Smeaton in 1754 published improvements on the apparatus of Saumarez. William Foxon of Deptford in 1772, James Guerimand of Middlesex in 1776 (by his "marine perambulator"), and R. H. Gower in 1772, practically demonstrated the registration of a vessel's speed by mechanical means. Viscount de Vaux in 1S07 made use of water-pressure, as did the Rev. E. L. Berthon in T849, and C. E. Kelway invented an electrical log in 1876.

Common Log. — To ascertain the ship's speed by the common log four articles are necessary — a log-ship or log-chip, log-reel, log-line and log-gkss. The log-ship (fig. 1) is a wooden quadrant 5 in. thick, with a radius of 5 or 6 in., the circumference of which is weighted with lead to keep it upright and retard its passage through the water. Two holes are made near its lower angles. One end of a short piece of thin line is passed through one of these p IG j holes, and knotted; the other end

has spliced to it a hard bone peg which is inserted in the other hole. The holes are so placed that the log-ship will hang square from the span thus formed. The log-line is secured to this span and consists of two parts. The portion nearest the log-ship is known as the "stray line "; its length varies from 10 to 20 fathoms, but should be sufficient to ensure that the log-ship shall be outside the dis- turbing element of the ship's wake. The point where it joins the other part is marked by a piece of bunting, and the line from this point towards its other end is marked at known intervals with " knots," which consist of pieces of cord worked in between its strands. A mean degree of the meridian being assumed to be 69-09 statute miles of 5280 ft., the nautical mile ObV degree) is taken as 6080 ft., which is a sufficiently close approximation for practical purposes, and the distances between the J knots are made to bear the same relation to 6080 ft. as 28 seconds to

an hour (3600 seconds); that is, they are placed at intervals of 47 ft. 3 in. The end of the first interval of this length (counting from the piece of bunting) is marked by a bit of leather, the second by a cord with two knots, the third by one with three knots, and so on; the middle of each of these lengths (half -knot) is also marked by a cord with one knot. It follows that, if, say, five knots of the line run out in 28 seconds, the ship has gone 5X473; ft. in that time, or is moving at the rate of 5X6080 ft. (= five nautical miles) an hour; hence the common use of knot as equivalent to a nautical mile. In the log-glass the time is measured by running sand, which, however, is apt to be affected by the humidity of the atmosphere. Sometimes a 30-second glass is used instead of a 28-second one, and the intervals between the knots on the log-line are then made 50 ft. 7 in. instead of 47 ft. 3 in. For speeds over six knots a 14-second glass is employed, and

the speed indicated by the log-line is doubled.

The log-line, after being well soaked, stretched and marked with knots, is wound uniformly on the log-reel, to which its inner end is securely fastened. To ” heave the log,” a man holds the log-reel over his head (at high speeds the man and portable reel are super- seded by a fixed reel and a winch fitted with a brake) , and the officer places the peg in the log-ship, which he then throws clear and to windward of the ship, allowing the line to run freely out. When the bunting at the end of the stray line passes his hand, he calls to his assistant to turn the glass, and allows the line to pay out freely. When all the sand has run through, the assistant calls ” Stop! ” when the log-line is quickly nipped, the knots counted, and the inter- mediate portion estimated. The strain on the log-ship when the log-line is nipped, causes the peg to be withdrawn from it, and the log-ship is readily hauled in. In normal circumstances the log is hove every hour. In a steam vessel running at high speed on an ocean route, with engines working smoothly and uniformly, a careful officer with correct line and glass can obtain very accurate results with the common log.

Ground Log. — In the deltas of shoal rivers, with a strong tide or current and no land visible, a 5 ft lead is substituted for the log-ship; the lead rests on the bottom, and the speed is obtained in a manner similar to that previously described. Such a ” ground-log ” indicates the actual speed over the ground, and in addition, when the log-line is being hauled in, it will show the real course the ship is making over the ground.

Patent Log. — The screw or rotatory log of Edward Massey, invented in 1802, came into general use in 1836 and continued until 1 86 1. The re-

gistering wheel-work 1 — ˆ CT”***ˆ~-ˆ

was contained in aU.’ˆJl — «? JggˆO-Wf-*—

shallow rectangular I— ■ \«>

box (fig. 2), with a p IG 2

float plate on its

upper side, carrying three indicating dials, recording respectively fractions, units and tens of miles (up to a hundred). The rotator was connected to the log by a rope 6 ft. in length, actuat- ing a universal joint on the first spindle of the register; it consisted of an air-tight thin metal tube with a coned fore-end, carrying flat metal vanes set at an angle. Alexander Bain in 1846 suggested enclosing the wheel work in the rotator. In Thomas Walker’s harpoon or frictionless log, introduced in 1861, the wheelwork was enclosed in a cylindrical case of the same diameter as the body of the rotator or fan, and the latter was brought close up to the register, forming a com- pact machine and avoid- ing the use of the 6-ft. line. Two years later a FlG 3 ._ The Al Harpoon Ship Log. heart-shaped float plate

was attached to the case, and the log called the Ai Harpoon ship log (fig. 3). The log should be washed in fresh water when practicable, to prevent oxidization of the wheels, and be lubricated with suitable oil through a hole in the case.

These logs were towed from the ship, but with quick passages and well surveyed coasts, the need arose for a patent log which could be readily consulted from the deck, and from which the distance run under varying speeds could be quickly ascertained. To meet this requirement, Walker in 1878 introduced the Cherub

log (fig. 4), a taffrail one, which, however, is not as a rute used for speeds over 18 knots. Owing to the increased friction produced by a rotator making approximately 900 revolutions per mile, towed at the end of a line varying from 40 fathoms for a 12-knot

Fig. 4. — The Cherub Log.

speed to 60 fathoms for 20 knots, the pull of the line and rotator is borne by coned rollers, having their outlines tapering to a common point in their rotation, thus giving a broad rolling surface. Strong worms and wheels are substituted for the light clockwork. In fig. 4 the shoe H is secured to the taffrail, and the rotator in the water is hooked to the eye of the spindle M by the hook D. The case A contains the registering wheelwork and a

sounding bell. The half gimbal B pivoting in the socket of the base C allows the register to receive the strain in the direct line. The bearings and rollers are lubricated »rith castor oil every twelve hours through holes in the sliding case E, and can be examined by unscrewing the case E and the eye M. When not in use, the register is removed from the shoe by lifting a small screw button near C. The tow line is usually plaited, and to avoid a knot close to the rotator, the latter is secured to the former by a knot inside an egg-shaped shell (fig. 5, Neptune pattern).

Walker’s Neptune log (fig. 6) is used for vessels of high speed. Case A contains the wheelwork, and case E the spindle and steel ball

Fig. 5.-

-Neptune Pattern for securing Rotator.

Fig. 6. — Walker's Neptune Log.

bearings; in each case are openings, closed by sliding tubes, for examination and lubrication. In fig. 6 the cases A and E are shown open. Fig. 7 shows the dial plate. In fig. 8 the ball bearings are shown unscrewed from the body of the log, with eye, cap and spindle. They consist of two rows of balls rolling in two pairs of V races or grooves. The outer pair receive the strain of the rotator, and the inner are for adjustment and to prevent lateral movement. The balls and races are enclosed in a skeleton cage (fig. 9) unscrewing from the cap F (fig. 6) for cleaning or renewal; the adjustment of the bearings is made by screwing up the cage cap b, locked by a special washer and the two screws a, a (figs. 8, 9). If the outer races become worn, the complete cage and bearings are reversed; the strain of the line is then transferred to what had previously been the inner with practically unworn balls and races. It is for this purpose that the skeleton cage is screwed internally at both ends, fitting a screwed ring inside the cap F (fig. 6). To enable the indications of the log xvi. 28

register on the taffrail to be recorded in the chart room or any other part of the vessel as desired, a chart room electric register has been introduced. By means of an electric installation between the log register aft and the electric register in the chart room, every tenth of a mile indicated by the former is recorded by the latter.

Walker's Rocket log (fig. 16) is a taffrail one, with bearings of

.' hardened steel, * and is intended ■'_ _ to be slung or secured, to the taffrail by aline; the gimbal pat- tern has a fitting for the deck. In taffrail logs, the movement ; of the line owing to its length becomes spas- modic and jerky, increasing the vibration and friction; to ob- viate this a governor or fly-wheel is introduced, the hook of the tow line K (fig. 11) and the eye of the register M being attached to the governor. Fig. 11 repre- sents the arrangement fitted to the Neptune log; with the Cherub log, a small piece of line is in- troduced between the Fig. 7.— Dial-plate of Neptune Log. governor and the eye of- ••-...

the register. The two principal American taffrail logs are the Negus and Bliss (Messrs Norie and Wilson). The former bears a general resemblance to the Cherub' log, but the dial plate is horizontal and the faces turn upwards. The main shaft bearings are in two sets and composed of steel balls running in steel cones and cups; the governor is an iron rod about 16 in. long, with I in. balls at the extremities. The Bliss resembles the Rocket log in shape, and is secured to the taffrail by a rope or slung. A governor is not em- ployed. The blades of the rotator are ad- justable, being fitted into its tube or body by slits and holes and then soldered. The outer ends of the blades are slit (fig. 12) to form two tongues, and with the wrench (fig. 12) the angle of the pitch can be altered. All patent logs have errors, the amounts of which should be ascertained by shore observations when passing a well surveyed coast in tideless waters on a calm day. Constant use, increased friction (more especially at high speeds), and damage to the rotator will alter an ascertained log error; head or following seas, strong winds, currents and tidal streams also affect the correctness.

A Log Book is a marine or sea journal, containing, in the British navy, the speed, course, leeway, direction and force of the wind, state of the weather, and barometric and thermometric observa- tions. Under the heading " Remarks " are noted (for a vessels with sail power) making, shorten-

ing and trimming sails; and (for all ships) employment of crew, times of passing prominent landmarks, altering of course, and any subject of interest and

Fig. 8. — Ball Bearings of Neptune Log.

Fig. 9.— Ball Bear- ings of Neptune Log in Skeleton Case. Fig. 10. — Rocket Log.

importance. The deck log book, kept by the officers of the watch, is copied into the ship's log book by the navigating

officer, and the latter is an official journal. In steam yessels a rough and fair engine room register are kept,

Fig. ii. — Neptune Log fitted with Governor.

giving information with regard to In the British mercantile marine

Fig. 12. — Bliss Log.

the engines and boilers, all ships (except those employed exclusively in trading between ports on the coasts of Scotland) are compelled to keep an official log book in a form approved by the Board of Trade. A mate's log book and engine room register are not compulsory, but are usually kept. (J.W. D.)

LOGAN, JOHN (c. 1725-1780), also known as Tahgahjute, American Indian chief, a Cayuga by birth, was the son of Shikel- lamy, a white man who had been captured when a child by the Indians, had been reared among them, and had become chief of the Indians living on the Shamokin Creek in what is now Northumber- land county, Pennsylvania. The name Logan was given to the son in honour of James Logan (1674-1751), secretary of William Penn and a steadfast fiiend of the Indians. John Logan lived for some time near Reedsville, Penn., and removed to the banks of the Ohio river about 1770. He was not technically a chief, but acquired great influence among the Shawnees, into which tribe he married. He was on good terms with the whites until April 1774, when, friction having arisen between the Indians and the whites, a band of marauders, led by one Great- house, attacked and murdered several Indians, including, it appears, Logan's sister and possibly one or more other relatives. Believing that Captain Michael Cresap was responsible for this murder, Logan sent him a declaration of hostilities, the result of which was the bloody conflict known as Lord Dunmore's War. Logan refused to join the Shawnee chief, Cornstalk, in meeting Governor Dunmore in a peace council after the battle of Point Pleasant, but sent him a message which has become famous as an example of Indian eloquence. The message seems to have been given by Logan to Colonel John Gibson, by whom it was delivered to Lord Dunmore. Thomas Jefferson first called general attention to it in his Notes on Virginia (1787), where he quoted it and added: " I may challenge the whole orations of Demosthenes and Cicero, and of any more eminent orator, if Europe has furnished more eminent, to produce a single passage superior to it." Logan became a victim of drink, and in 1780 was killed near Lake Erie by his nephew whom he had attacked. There is a monument to him in Fair Hill Cemetery, near Auburn, New York.

Brantz Mayer's Tahgahjute, or Logan the Indian and Captain Michael Cresap (Baltimore, 1851, 2nd ed., Albany, 1867) defends Captain Cresap againet Jefferson's charges, and also questions the authenticity of Logan's message, about which there has been con- siderable controversy, though its actual wording seems to be that of Gibson rather than of Logan.

LOGAN, JOHN (1748-1788), Scottish poet, was born at Soutra, Midlothian, in 1748. His father, George Logan, was a farmer and a member of the Burgher sect of the Secession church. John Logan was sent to Musselburgh grammar school, and in 1762 to the university of Edinburgh. In 1768-1769 he was tutor to

John, afterwards Sir John, Sinclair, at Ulbster, Caithness, and in 1770, having left the Secession church, he was licensed as a preacher by the presbytery of Haddington. In 1771 he was presented to the charge of South Leith, but was not ordained till two years later. On the death of Michael Bruce (q.i>.) he obtained that poet's MSS. with a view

to publication. In 1 770 he published Poems on Several Occasions, by Michael Bruce with a preface, in which, after eulogizing Bruce, who had been a fellow student of his, he remarked that " to make up a miscellany some poems wrote by different authors are inserted, all of them originals, and none of them destitute of merit. The reader of taste will easily distinguish them from those of Mr Bruce, without their being particularized by any mark." Logan was an active member of the committee of the General Assembly of the Church of Scotland which worked from 1775 to 1781 at revising the " Translations and Paraphrases " for public worship, in which many of his hymns are printed. In 17 70-1 781 he delivered a course of lectures on the philosophy of history at St Mary's Chapel, Edinbuigh. An analysis of these lectures, Elements of the Philosophy of History (1781), bears striking resemblance to A View of Ancient History (1787), printed as the work of Dr W. Rutherford, but thought by Logan's friends to be his. In 1781 he published his own Poems, including the " Ode to the Cuckoo " and some other poems which had appeared in his volume of Michael Bruce's poems, and also his own contributions to the Paraphrases. His other publications were An Essay on the Manners and Governments of Asia (1782), Runnamede, a tragedy (1783), and A Review of the Principal Charges against Warren Hastings (1788). His connexion with the theatre gave offence to his congiegation at South Leith; he was intemperate in his habits, and there was some local scandal attached to his name. He resigned his charge in 1 786, retaining part of his stipend, and proceeded to London, where he became a writer for the English Review. He died on the 28th of December 1788. Two posthum- ous volumes of sermons appeared in 1790 and 1791. They were very popular, and were reprinted in 1810. His Poetical Works were printed in Dr Robert Anderson's British Poets (vol. xi., T-T)S), with a life of the author. They were reprinted in similar collections, and separately in 1805.

Logan was accused of having appropriated in his Poems (1781) verses written by Michael Bruce. The statements of John Birrell and David Pearson on behalf of Bruce were included in Dr Anderson's Life of Logan. The charge of plagiarism has been revived from time to time, notably by Dr W. Mackelvie (1837) and Mr James Mackenzie (1905). The whole controversy has been marked by strong partisanship. The chief points against Logan are the suppression of the major portion of Bruce's MSS. and some proved cases of plagiarism in his sermons and hymns. Even in the beautiful " Braes of Yarrow " one of the verses is borrowed direct from an old border ballad. The traditional evidence in favour of Bruce's authorship of the " Ode to the Cuckoo " can hardly be set aside, but Dr Robertson of Dalmeny, who was Logan's literary executor, stated that he had gone over the MSS. procured at Kinnesswood with Logan.

Logan's authorship of the poems in dispute is defended by David Laing, Ode to the Cuckoo with remarks on its authorship, in a letter to J. C. Shairp, LL.D. (1873) ; by John Small in the British and Foreign Evangelical Review (July, 1877, April and October, 1879); and by R. Small in two papers (ibid., 1878). See also Bruce, Michael.

LOGAN, JOHN ALEXANDER (1S26-1886), American soldier and political leader, was born in what is now Murphysborough, Jackson county, Illinois, on the 9th of February 1826. He had no schooling until he was fourteen; he then studied for three years in Shiloh College, served in the Mexican War as a lieutenant of volunteers, studied law in the office of an uncle, graduated from the Law Department of Louisville University in 1851, and practised law with success. He entered politics as a Douglas Democrat, was elected county clerk in 1849, served in the State House of Representatives in 1853-1854 and in 1857, and for a time, during the interval, was prosecuting attorney of the Third Judicial District of Illinois. In 1858 and i860 he was elected as a Democrat to the National House of Representatives. Though unattached and unenlisted, he fought at Bull Run, and

then returned to Washington, resigned his seat, and entered | the Union army as

colonel of the 31st Illinois Volunteers, which he organized. He was regarded as one of the ablest officers who entered the army from civil life. In Grant's campaigns terminating in the capture of Vicksburg, which city Logan's division was the first to enter and of which he was military governor, he rose to the rank of major-general of volunteers; in November 1863 he succeeded Sherman in command of the XV. Army Corps; and after the death of McPherson he was in command of the Army of the Tennessee at the battle of Atlanta. When the war closed, Logan resumed his political career as a Republican, and was a member of the National House of Repre- sentatives from 1867 to 1871, and of the United States Senate from 1871 until 1877 and again from 1879 until his death, which took place at Washington, D.C., on the 26th of December 1886. He was always a violent partisan, and was identified with the radical wing of the Republican party. In 1868 he was one of the managers in the impeachment of President Johnson. His war record and his great personal following, especially in the Grand Army of the Republic, contributed to his nomination for Vice-President in 1884 on the ticket with James G. Blaine, but he was not elected. His impetuous eratory, popular on the platform, was less adapted to the halls of legislation. He was commander-in-chief of the Grand Army of the Republic from 1868 to 1871, and in this position success- fully urged the observance of Memorial or Decoration Day, an idea which probably originated with him. He was the author of The Great Conspiracy: Its Origin and History (1886), a partisan account of the Civil War, and of The Volunteer Soldier of America (1887). There is a fine statue of him by St Gaudens in Chicago.

The best biography is that by George F. Dawson, The Life and Services of Gen. John A. Logan, as Soldier and Statesman (Chicago and New York, 1887).

LOGAN, SIR WILLIAM EDMOND (1798-1875), British geologist, was born in Montreal on the 20th of April 1798, of Scottish parents. He was educated partly in Montreal, and subsequently at the High School and university of Edinburgh, where Robert Jameson did much to excite his interest in geology. He was in a business house in London from 1817 to 1830. In 183 1 he settled in Swansea to take charge of a colliery and some copper-smelting works, and here his interest in geology found abundant scope. He collected a great amount of information respecting the South Wales coal-field; and his data, which he had depicted on the i-in. ordnance survey map, were generously placed at the disposal of the geological survey under Sir H. T. de la Beche and fully utilized. In 1840 Logan brought before the Geological Society of London his celebrated paper " On the character of the beds of clay lying immediately below the coal-seams of South Wales, and on the occurrence of coal- boulders in the Pennant Grit of that district." He then pointed out that each coal-seam rests on an under-clay with rootlets of Stigmaria, and he expressed his opinion that the under-clay was the old soil in which grew the plants from which the coal was formed. To confirm this observation he visited America in 1 84 1 and examined the coal-fields of Pennsylvania and Nova Scotia, where he found the under-clay almost invariably present beneath the seams of coal. In 1842 he was appointed to take charge of the newly established geological survey in Canada, and he continued as director until 1869. During the earlier years of the survey he had many difficulties to surmount and privations to undergo, but the work was carried on with great tact and energy, and he spared no pains to make his reports trustworthy. He described the Laurentian rocks of the Laurentian mountains in Canada and of the Adirondacks in the state of New York, pointing out that they comprised an immense series of crystalline rocks, gneiss, mica-schist, quartzite and limestone, more than 30,000 ft. in thickness. The series was rightly recognized as representing the oldest type of rocks on the globe, but it is now known to be a complex of highly altered sedimentary and intrusive rocks; and the supposed oldest known fossil, the Eosoon described by Sir J. W. Dawson,

is now regarded as a mineral structure. Logan was elected F.R.S. in 1851, and in 1856 was knighted. In the same year he was awarded the Wollaston medal by the Geological Society of London for his researches on the coal-strata, and for his excellent geological map of Canada. After his retirement in 1869, he returned to England, and eventually settled in South Wales. He died at Castle Malgwyn in Pembrokeshire, on the 22nd of June 1875.

See the Life, by B. J. Harrington (1883). (H. B. Wo.)

LOGAN, a city and the county-seat of Cache county, Utah, U.S.A., on the Logan river, about 70 m. N. of Salt Lake City. Pop. (1900) 5451 (1440 foreign-born); (1910) 7522. It is served by the Oregon Short Line railroad. It lies at the mouth of Logan Canon, about 4500 ft. above the sea, and commands magnificent views of the Wasatch Mountains and the fertile Cache Valley. At Logan is a temple of the Latter-Day Saints (or Mormons), built in 1883, and the city is the seat of the Agricultural College of Utah, of Brigham Young College, and of New Jersey Academy (1878), erected by the women of the Synod of New Jersey and managed by the Woman's Board of Home Missions of the Presbyterian Church. The Agricultural College was founded in 1888 and opened in 1890; an agricultural experiment station is connected with it and the institution comprises schools of agriculture, domesti : science and arts, commerce, mechanic arts and general science. Six experiment stations in different parts of the state and a central experimental farm near St George, Washington county, were in 1908 under the direction of the experiment station in Logan. Brigham Young College was endowed by Brigham Young in 1877 and was opened in 1878; it offers courses in the arts, theology, civil engineering, music, physical culture, domestic science, nurse training and manual training. Logan has various manufactures, and is the trade centre for a fertile farming region. The municipality owns and operates its water works and its electric lighting plant. Logan was settled in 1859 and first incorporated in 1866.

LOGANSPORT, a city and the county-seat of Cass county, Indiana, U.S.A., on the Wabash river, at the mouth of the Eel river, about 67 m. N. by W. of Indianapolis and 117 m. S. by E. of Chicago. Pop. (1900) 16,204, of whom 1432 were foreign- 'born, (1910 census) 19,050. It is served by six divisions of the Pittsburg, Cincinnati, Chicago & St Louis, two divisions of the Vandalia (Pennsylvania Lines), and the Wabash railways, and by electric interurban lines. The city is the seat of the Northern Indiana Hospital for the Insane (1888), and has a public library, and a hospital (conducted by the Sisters of St Joseph). Among the principal buildings are the court house, a Masonic temple, an Odd Fellows' temple, and buildings of the Order of Elks, of the Knights of Pythias, and of the fraternal order of Eagles. Situated in the centre of a rich agricultural region, Logansport is one of the most important grain and produce markets in the state. The Wabash and the Eel rivers provide good water power, and the city has various manufactures, besides the railway repair shops of the Vandalia and of the Pittsburg, Cincinnati, Chicago & St Louis railways. The value of the city's factory product increased from $2,100,394 in 1900 to $2,955,921 in 1905, or 40-7%. Limestone, for use in the manufacture of iron, is quarried in the vicinity. The city owns and operates the water works and the electric-lighting plant. Logansport was platted in 1828, was probably named in honour of a Shawnee chief, Captain Logan (d. 181 2), became the county- seat of Cass county in 1829, and was chartered as a city in

1838.

LOGAR, a river and valley of Afghanistan. The Logar river drains a wide tract of country, rising in the southern slopes of the Sanglakh range and receiving affluents from the Kharwar hills, N.E. of Ghazni. It joins the Kabul river a few miles below the* city of Kabul. The Logar valley, which is watered by its southern affluents, is rich and beautiful, about 40 m. long by 12 wide, and highly irrigated throughout. Lying in the vicinity of the capital, the district contributes largely to its food-supply. The valley was traversed in 1879 by a brigade under Sir F. (afterwards Lord) Roberts.

LOGARITHM (from Gr. X670S, word, ratio, and apiBym, number), in mathematics, a word invented by John Napier to denote a particular class of function discovered by him, and which may be denned as follows: if a, x, m are any three quantities satisfying the equation a x = m, then a is called the base, and * is said to be the logarithm of m

to the base o. This relation between x, a, m, may be expressed also by the equation x — logo m. Properties. — The principal properties of logarithms are given by the equations

logo (tnti) = logo m +log n, log„(»n/n) = log,, m — logo w, logo m r = /- logo »», \o %a'-4m = (ilr) log a m,

which may be readily deduced from the definition of a logarithm. It follows from these equations that the logarithm of the product of any number of quantities is equal to the sum of the logarithms of the quantities, that the logarithm of the quotient of two quantities is equal to the logarithm of the numerator diminished by the logarithm of the denominator, that the logarithm of the rth power of a quantity is equal to r times the logarithm of the quantity, and that the logarithm of the rth root of a quantity is equal to (i/r)th of the logarithm of the quantity.

Logarithms were originally invented for the sake of abbreviat- ing arithmetical calculations, as by their means the operations of multiplication and division may be replaced by those of addition and subtraction, and the operations of raising to powers and extraction of root£ by those of multiplication and division. For the purpose of thus simplifying the operations of arith- metic, the base is taken to be 10, and use is made of tables of logarithms in which the values of *, the logarithm, corre- sponding to values of m, the number, are tabulated. The logarithm is also a function of frequent occurrence in analysis, being regarded as a known and recognized function like sin * or tan x\ but in mathematical investigations the base generally employed is not 10, but a certain quantity usually denoted by the letter e, of value 2-71828 18284 ....

Thus in arithmetical calculations if the base is not expressed it is understood to be 10, so that log m denotes log™ m; but in analytical formulae it is understood to be e.

The logarithms to base 10 of the first twelve numbers to 7 places of decimals are

log 1 =0-0000000 log 5=0-6989700 log 9=0-9542425

log 2=0-3010300 log 6=0-7781513 log 10 = 1-0000000

log 3=0-4771213 log 7=0-8450980 log 11 = 1-0413927

log 4 = 0-6020600 log 8 = 0-9030900 log 12 = 1-0791812

The meaning of these results is that

1=10° j = iqO. 3010300 o = j o 0. 4771213 ...

10 = ioS II = IO 1 – 0413927 l 12 = I0'- m » 1812 .'

The integral part of a logarithm is called the index or char- acteristic, and the fractional part the mantissa. When the base is 10, the logarithms of all numbers in which the digits are the same, no matter where the decimal point may be, have the same mantissa; thus, for example,

log 2-5613=0-4084604, log 25-613 = 1-4084604, log 2561300 = 6-4084604, &c.

In the case of fractional numbers (i.e. numbers in which the integral part is o) the mantissa is still kept positive, so that, for example,

log -25613=7-4084604, log •0025613 = 3-4084604, &c.

the minus sign being usually written over the characteristic, and not before it, to indicate that the characteristic only, and not the whole expression, is negative; thus

7-4084604 stands for — 1 + -4084604.

The fact that when the base is 10 the mantissa of the logarithm is independent of the

position of the decimal point in the number affords the chief reason for the choice of 10 as base. The ex- planation of this property of the base 10 is evident, for a change in the position of the decimal points amounts to multiplication or division by some power of 10, and this corresponds to the addition or subtraction of some integer in the case of the logarithm, the mantissa therefore remaining intact. It should

be mentioned that in most tables of trigonometrical functions, the number 10 is added to all the logarithms in the table in order to avoid the use of negative characteristics, so that the char- acteristic 9 denotes in reality 1, 8 denotes 2, 10 denotes o, &c. Logarithms thus increased are frequently referred to for the sake of distinction as tabular logarithms, so that the tabular logarithm = the true logarithm +10.

In tables of logarithms of numbers to base 10 the mantissa only is in general tabulated, as the characteristic of the logarithm of a number can always be written down at sight, the rule being that, if the number is greater than unity, the characteristic is less by unity than the number of digits in the integral portion of it, and that if the number is less than unity the characteristic is negative, and is greater by unity than the number of ciphers between the decimal point and the first significant figure.

It follows very simply from the definition of a logarithm that logo & X logi, a = 1, logi, m = log„ ff»X (i/logoi).

The second of these relations is an important one, as it shows that from a table of logarithms to base a, the corresponding table of logarithms to base b may be deduced by multiplying all the logarithms in the former by the constant multiplier ijlog a b, which is called the modulus of the system whose base is b with respect to the system whose base is a.

The two systems of logarithms for which extensive tables have been calculated are the Napierian, or hyperbolic, or natural system, of which the base is e, and the Briggian, or decimal, or common system, of which the base is 10; and we see that the logarithms in the latter system may be deduced from those in the former by multiplication by the constant multiplier i/log«io, which is called the modulus of the common system of logarithms. The numerical value of this modulus is 0-43429 44819 03251 82765 1 1 289 . . ., and the value of its reciprocal, log" 10 (by multiplication by which Briggian logarithms may be converted into Napierian logarithms) is 2-30258 50929 94045 68401

79914 ....

The quantity denoted by e is the series,

i + L+J. + !+_

1 1.2 1.2.3 1-2.3.4

+

the numerical value of which is,

2-71828 18284 59°45 23536 02874 • • •

The logarithmic Function. — The mathematical function log * or log, * is one of the small group of transcendental functions, con- sisting only of the circular functions (direct and inverse) sin x, cos x, &c, arc sin x or sin- 1 x,&c, log x and e" which are universally treated in analysis as known functions. The notation log * is generally employed in English and American works, but on the' continent of Europe writers usually denote the function by Ix or lg x. The logarithmic function is most naturally introduced into analysis by the equation

log x

(* > o).

This equation defines log x for positive values of *; if x£o the formula ceases to have any meaning. Thus log * is the integral function of l/x, and it can be shown that log x is a genuinely new transcendent, not expressible in finite terms by means of functions such as algebraical or circular functions. A connexion with the circular functions, however, appears later when the definition of log x is extended to complex values of x.

A relation which is of historical interest connects the logarithmic function with the quadrature of the hyperbola, for, by considering the equation of the hyperbola in the form xy = const., it is evident that the area included between the arc of a hyperbola, its nearest asymptote, and two ordinates drawn parallel to the other asymptote from points on the first asymptote distant a and b from their point of intersection, is proportional to log bja.

The following fundamental properties of log * are readily deducible from the definition

(i.) log *;y = logz-t- logy. . ., ,

(ii.) Limit of (x* — i)/fc = logx, wien h is indefinitely diminished.

Either of these properties might De taken as itself the definition of log *.

There is no series for log * proceeding either by ascending or descending powers of x, but there is an expansion for log (1 +*), viz.

log (i+x)=x-ix* + ix'-ix , + . . . ; the series, however, is convergent for real values of x only when * lies between +1 and — 1. Other formulae which are deducible from this

equation are given in the portion of this article relating to the calcu- lation of logarithms.

The function log * as * increases from o towards » steadily in- creases from — 00 towards +». It has the important property that it tends to infinity with x, but more slowly than any power of x, i.e. that XT" log x tends to zero as * tends to «o for every positive value of m however small.

The exponential function, exp x, may be defined as the inverse of the logarithm : thus * = exp y if y = log x. It is positive for all values of y and increases steadily from o toward 00 as y increases from -00 towards + °° . As y tends towards 00 , exp y tends towards » more rapidly than any power of y.

The exponential function possesses the properties

(i.) exp (x+y)=exp * X exp y.

.... d

(11) gjexp* = expx.

(iii.) exp x = l+x+x*/2 ! + x 3 /3 ! + • • • From (i.) and (ii.) it may be deduced that

exp x = (1+1 + 1/2! +1/3! + ...) r , where the right-hand side denotes the positive xth power of the number 1 + 1 + 1/2! +1/3! + ... usually denoted by e. It is custom- ary, therefore, to denote the exponential function by e', and the result

e* = 1 +x+x?/2 ! +x 3 /3 ! • • • is known as the exponential theorem.

The definitions of the logarithmic and exponential functions may be extended to complex values of x. Thus if x = £+*ij,

log x

-J*

where the path of integration in the plane of the complex variable t is any curve which does not pass through the origin ; but now log * is not a uniform function, that is to say, if x describes a closed curve it does not follow that log x also describes a closed curve: in fact we have

log («+»“ij) =logV (?+j, j)+»(o+2«t), where a is the numerically least angle whose cosine and sine are £/V (?+T ?) and vH (F+ip), and » denotes any integer. Thus even when the argument is real log * has an infinite number of values; for putting >) = and taking { positive, in which case a=»o, we obtain for log £ the infinite system of values log {+2»rt. It follows from this property of the function that we cannot have for log x a series which shall be convergent for all values of x, as is the case with sin x and cos x, for such a series could only represent a uniform function, and in fact the equation

log(l) =x-\x\x*-\x*+ . . . is true only when the analytical modulus of x is less than unity. The exponential function, which may still be defined as the inverse of the logarithmic function, is, on the other hand, a uniform function of x, and its fundamental properties may be stated in the same form as for real values of x. Also

exp (£+tij) =ef (cos ij+» sin n). An alternative method of developing the theory of the exponential function is to start from the definition

exp x = 1 +x+x’/2 ! x*/3 !..., the series on the right-hand being convergent for all values of x and therefore defining an analytical function of x which is uniform and regular all over the plane.

Invention and Early History of Logarithms. — The invention of logarithms has been accorded to John Napier, baron of Merchiston in Scotland, with a unanimity which is rare with regard to important scientific discoveries: in fact, with the exception 01 the tables of Justus Byrgius, which will be referred to further on, there seems to have been no other mathematician of the time whose mind had conceived the principle on which logarithms depend, and no partial anticipations of the discovery are met with in previous writers.

The first announcement of the invention was made in Napier’s Mirifici Logarithmorum Canonis Descriptio . . . (Edinburgh, 1 614). The work is a small quarto containing fifty-seven pages of explanatory matter and a table of ninety pages (see Napier, John). The nature of logarithms is explained by reference to the motion of points in a straight line, and the principle upon which they are based is that of the correspondence of a geometrical and an arithmetical series of numbers. The table gives the logarithms of sines for every minute of seven figures; it is arranged semi-quadrantally, so that the differentiae, which are the differences of the two logarithms in the same line, are the logarithms of the tangents. Napier’s logarithms are not the logarithms now termed Napierian or hyperbolic, that is to say,

logarithms to the base e where e= 2-7182818 . . .; the relation between N (a sine) and L its logarithm, as defined in the Canonis Descriptio, being N=io 7 e~ L/l ° 7 , so that (ignoring the factors 10 7 , the effect of which is to render sines and logarithms integral to 7 figures), the base is e~ l . Napier’s logarithms decrease as the sines increase. If I denotes the logarithm to base e (that is, the so-called ” Napierian ” or hyperbolic logarithm) and L denotes, as above, ” Napier’s ” logarithm, the connexion between / and L is expressed by

L = io 7 log„ io 7 – io 7 / or e l = io 7 e-Vio’

Napier’s work (which will henceforth in this article be referred to as the Descriptio) immediately on its appearance in 1614 attracted the attention of perhaps the two most eminent English mathematicians then living — Edward Wright and Henry Briggs. The

former translated the work into English; the latter was concerned with Napier in the change of the logarithms from those originally invented to decimal or common logarithms, and it is to him that the original calculation of the logarithmic tables now in use is mainly due. Both Napier and Wright died soon after the publication of the Descriptio, the date of Wright's death being 1615 and that of Napier 1617, but Briggs lived until 1631. Edward Wright, who was a fellow of Caius College, Cambridge, occupies a conspicuous place in the history of navigation. In 1599 he published Certaine errors in Navigation delected and corrected, and he was the author of other works; to him also is chiefly due the invention of the method known as Mercator's sailing. He at once saw the value of logarithms as an aid to navigation, and lost no time in preparing a translation, which he submitted to Napier himself. The preface to Wright's edition consists of a translation of the preface to the Descriptio, together with the addition of the following sentences written by Napier himself: " But now some of our countreymen in this Island well affected to these studies, and the more publique good, procured a most learned Mathematician to translate the same into our vulgar English tongue, who after he had finished it, sent the Coppy of it to me, to bee seene and considered on by myselfe. I having most willingly and gladly done the same, finde it to bee most exact and precisely conformable to my minde and the originall. Therefore it may please you who are inclined to these studies, to receive it from me and the Translator, with as much good will as we recommend it unto you." There is a short " preface to the reader " by Briggs, and a description of a triangular diagram invented by Wright for finding the propor- tional parts. The table is printed to one figure less than in the Descriptio. Edward Wright died, as has been mentioned, in 161 s, and his son, Samuel Wright, in the preface states that his father " gave much commendation of this work (and often in my hearing) as of very great use to mariners "; and with respect to the translation he says that " shortly after he had it returned out of Scotland, it pleased God to call him away afore he could publish it." The translation was published in 1616. It was also reissued with a new title-page in 1618.

Henry Briggs, then professor of geometry at Gresham College, London, and afterwards Savilian professor of geometry at Oxford, welcomed the Descriptio with enthusiasm. In a letter to Arch- bishop Usher, dated Gresham House, March 10, 161 5, he wrote, " Napper, lord of Markinston, hath set my head and hands a work with his new and admirable logarithms. I hope to see him this summer, if it please God, for I never saw book which pleased me better, or made me more wonder. 1 I purpose to discourse with him concerning eclipses, for what is there which we may not hope for at his hands," and he also states " that he was wholly taken up and employed about the noble invention of logarithms lately discovered." Briggs accordingly visited Napier in 1615, and stayed with him a whole month. 2 He brought with him some

1 Dr Thomas Smith thus describes the ardour with which Briggs studied the Descriptio: " Hunc in deliciis habuit, in sinu, in manibus, in pectore gestavit, oculisque avidissimis, et mente attentissima, iterum iterumque perlegit, ..." Vitae quorundam eruditissimorum et illustrium virorum (London, 1707).

1 William Lilly's account of the meeting of Napier and Briggs at Merchiston is quoted in the article Napier.

calculations he had made, and suggested to Napier the advantages that would result from the choice of 10 as a base, an improvement which he had explained in his lectures at Gresham College, and on which he had written to Napier. Napier said that he had already thought of the change, and pointed out a further im- provement, viz., that the characteristics of numbers greater than unity should be positive and not negative, as suggested by Briggs. In .1616 Briggs again visited Napier and showed him the work he had accomplished, and, he says, he would gladly have paid him a third visit in 161 7 had Napier's life been spared.

Briggs's Logarithmorum chilias prima, which contains the first published table of decimal or common logarithms, is only a small octavo tract of sixteen pages, and gives the logarithms of numbers from unity to iooo to 14 places of decimals. It was published, probably privately, in 161 7, after Napier's death, 1 and there is no author's name, place or date. The date of publication is, however, fixed as 1617 by a letter from Sir Henry Bourchier to Usher, dated December 6, 1617, containing the passage — " Our kind friend, Mr Briggs, hath lately published a supplement to the most excellent tables of logarithms, which I presume he has sent to you." Briggs's tract of 161 7 is extremely rare, and has generally been ignored or incorrectly described. Hutton erroneously states that it contains the logarithms to 8 places, and his account has been followed by most writers. There is a copy in the British Museum.

Briggs continued to labour assiduously at the calculatipn of logarithms, and in 1624 published his Arithmetica logarithmica, a folio work containing the logarithms of the numbers from 1 to 20,000, and from 90,000 to 100,000 (and in some copies to 101,000) to 14 places of decimals. The table occupies 300 pages, and there is an introduction of 88 pages relating to the mode of calculation, and the applications of logarithms.

There was thus left a gap between 20,000 and 90,000, which was filled up by Adrian Vlacq (or Ulaccus), who published at Gouda, in Holland, in 1628, a table containing the logarithms of the numbers from unity to 100,000 to 10 places of decimals. Having calculated 70,000 logarithms and copied only 30,000, Vlacq would have been quite entitled to have called his a new work. He designates it, however, only a second edition of Briggs's Arithmelica logarithmica, the title running Arithmetica logarithmica sive Logarithmorum Chiliades centum, . . . editio secunda aucta per Adrianum Vlacq, Goudanum. This table of Vlacq's was published, with an English explanation prefixed, at London in 163 1 under the title Logarithmicall Arithmctike . . . London, printed by George Miller, 1631. There are also copies with the title-page and introduction in French and in Dutch (Gouda, 1628).

Briggs had himself been engaged in filling up the gap, and in a letter to John Pell, written after the publication of Vlacq's work, and dated October 25, 1628, he says: —

" My desire was to have those chiliades that are wantinge betwixt 20 and 90 calculated and printed, and I had done them all almost by my selfe, and by some frendes whom my rules had sufficiently in- formed, and by agreement the busines was conveniently parted amongst us; but I am eased of that charge and care by one Adrian Vlacque, an Hollander, who hathe done all the whole hundred chiliades and printed them in Latin, Dutche and Frenche, Iooo bookes in these 3 languages, and hathe sould them almost all. But he hathe cutt off 4 of my figures throughout ; and hathe left out my dedication, and to the reader, and two chapters the 12 and 13, in the rest he hath not varied from me at all."

The original calculation of the logarithms of numbers from unity to 101 ,000 was thus performed by Briggs and Vlacq between 1615 and 1628. Vlacq's table is that from which all the hundreds of tables of logarithms that have subsequently appeared have been derived. It contains of course many errors, which were gradually discovered and corrected in the course of the next two hundred and fifty years.

The first calculation or publication of Briggian or common logarithms of trigonometrical functions was made in 1620 by Edmund Gunter, who was Briggs's colleague as professor of

1 It was certainly published after Napier's death, as Briggs mentions his " librum posthumum." This liber posthumus was the Construct™ referred to later in this article.

astronomy in Gresham College. The title of Gunter's book, which is very scarce, is Canon triangulorum, and it contains logarithmic sines and tangents for every minute of the quadrant to 7 places of decimals. «

The next publication was due to Vlacq, who appended to his logarithms of numbers in

the Arithmetica logarithmica of 1628 a table giving log sines, tangents and secants for every minute of the quadrant to 10 places; there were obtained by calculating the logarithms of the natural sines, &c. given in the Thesaurus mathematicus of Pitiscus (16 13).

During the last years of his life Briggs devoted himself to the calculation of logarithmic sines, &c. and at the time of his death in 1 63 1 he had all but completed a logarithmic canon to every hundredth of a degree. This work was published by Vlacq at his own expense at Gouda in 1633, under the title Trigonometria Britannica. It contains log sines (to 14 places) and tangents (to 10 places), besides natural sines, tangents and secants, at intervals of a hundredth of a degree. In the same year Vlacq published at Gouda his Trigonometria artificialis, giving log sines and tangents to every 10 seconds of the quadrant to 10 places. This work also contains the logarithms of numbers from unity to 20,000 taken from the Arithmetica logarithmica of 1628. Briggs appreciated clearly the advantages of a centesimal division of the quadrant, and by dividing the degree into hundredth parts instead of into minutes, made a step towards a reformation in this respect, and but for the appearance of Vlacq's work the decimal division of the degree might have become recognized, as is now the case with the corresponding division of the second. The calculation of the logarithms not only of numbers but also of the trigonometrical functions is therefore due to Briggs and Vlacq; and the results contained in their four fundamental works— Arithmetica logarithmica (Briggs), 1624; Arithmetica logarithmica (Vlacq), 1628; Trigonometria Britannica (Briggs), *(>33> Trigonometria artificialis (Vlacq), 1633— have n °t been superseded by any subsequent calculations.

In the preceding paragraphs an account has been given of the actual announcement of the invention of logarithms and of the calculation of the tables. It now remains to refer in more detail to the invention itself and to examine the claims of Napier and Briggs to the capital improvement involved in the change from Napier's original logarithms to logarithms to the base 10.

The Descriptio contained only an explanation of the use of the logarithms without any account of the manner in which the canon was constructed. In an " Admonitio " on the seventh page Napier states that, although in that place the mode of con- struction should be explained, he proceeds at once to the use of the logarithms, " ut praelibatis prius usu, et rei utilitate, caetera aut magis placeant posthac edenda, aut minus saltern displiceant silentio sepulta." He awaits therefore the judgment and censure of the learned " priusquam caetera in lucem temere prolata lividorum detrectationi exponantur"; and in an " Admonitio " on the last page of the book he states that he will publish the mode of construction of the canon " si huius inventi usum eruditis gratum fore intellexero." Napier, however, did not live to keep this promise. In 16 17 he published a small work entitled Rabdologia relating to mechanical methods of performing multiplications and divisions, and in the same year he died.

The proposed work was published in 1619 by Robert Napier, his second son by his second marriage, under the title Mirifici logarithmorum canonis constructio. ... It consists of two pages of preface followed by sixty-seven pages of text. In the preface Robert Napier says that he has been assured from un- doubted authority that the new invention is much thought of by the ablest mathematicians, and that nothing would delight them more than the publication of the mode of construction of the canon. He therefore issues the work to satisfy their desires, although, he states, it is manifest that it would have seen the light in a far more perfect state if his father could have put the finishing touches to it; and he mentions that, in the opinion of the best judges, his father possessed, among other most excellent gifts, in the highest degree the power of

explaining the most difficult matters by a certain and easy method in the fewest

possible words.

It is important to notice that in the Conslruciio logarithms are called artificial numbers; and Robert Napier states that the work was composed several years (aliquot annos) before Napier had invented the name logarithm. The Conslructio therefore may have been written a good many years previous to the publication of the Descriptio in 1614.

Passing now to the invention of common or decimal logarithms, that is, to the transition from the logarithms originally invented by Napier to logarithms to the base 10, the first allusion to a change of system occurs in the ” Admonitio ” on the last page of the Descriptio (1614), the concluding paragraph of which is ” Verum si huius inventi usum eruditis gratum fore intellexero, dabo fortasse brevi (Deo aspirante) rationem ac methodum aut hunc canonem emendandi, aut emendatiorem de novo condendi, ut ita plurium Logistarum diligentia,limatior tandem et accuratior, quam unius opera fieri potuit, in lucem prodeat. Nihil in ortu perfectum.” In some copies, however, this ” Admonitio ” is absent. In Wright’s translation of 1616 Napier has added the sentence — ” But because the addition and subtraction of these former numbers may seeme somewhat painfull, I intend (if it shall please God) in a second Edition, to set out such Logarithmes as shall make those numbers above written to fall upon decimal numbers, such as 100,000,000, 200,000,000,. 300,000,000, &c, which are easie to be added or abated to or from any other number ” (p. 19); and in the dedication of the Rabdologia (1617) he wrote ” Quorum quidem Logarithmorum speciem aliam multo praestantiorem nunc etiam invenimus, & creandi methodum, una cum eorum usu (si Deus longiorem vitae & valetudinis usuram concesserit) evulgare statuimus; ipsam autem novi canonis supputationem, ob infirmam corporis nostri valetudinem, viris in hoc studii genere versatis relmquimus: imprimis vero doctissimo viro D. Henrico Briggio Londini publico Geometriae Professori, et amico mihi longe charissimo.”

Briggs in the short preface to his Logarithmorum chilias (1617) states that the reason why his logarithms are different from those introduced by Napier ” sperandum, ejus librum posthumum, abunde nobis propediem satisfacturum.” The ” liber posthumus ” was the Constructio (1610), in the preface to which Robert Napier states that he has added an appendix relating to another and more excellent species of logarithms, referred to by the inventor himself in the Rabdologia, and in which the logarithm of unity is o. He also mentions that he has published some remarks upon the propositions in spherical trigonometry and upon the new species of logarithms by Henry Briggs, “qui novi hujus Canonis supputandi laborem gravissimum, pro singulari amicitia quae illi cum Patre meo L. M. intercessit, animo libentissimo in se suscepit; creandi methodo, et usuum explanatione Inventori relictis. Nunc autem ipso ex hac vita evocato, totius negotii onus doctissimi Briggii humeris incumbere, et Sparta haec ornanda illi sorte quadam obtigisse videtur.”

In the address prefixed to the Arithmelica logarithmica (1625) Briggs bids the reader not to be surprised that these logarithms are different from those published in the Descriptio : —

” Ego enim, cum meis auditoribus Londini, publice in Collegio Greshamensi horum doctrinam explicarem; animadvert! multo futurum commodius, si Logarithmus sinus totius servaretur o (ut in Canone mirifico), Logarithmus autem partis decimae ejusdem sinus totius, nempe sinus 5 graduum, 44, m. 21, s., esset loooooooooo. atque ea de re scripsi statim ad ipsum authorem, et quamprimum per anni tempus, et vacationem a publico docendi munere licuit, profcctus sum Edinburgum; ubi humanissime ab eo acceptus haesi per integrum mensem. Cum autem inter nos de horum mutatione sermo haberetur; ille se idem dudum sensisse, et cupivisse dicebat: veruntamen istos, quos jam paraverat edendos curasse, donee alios, si per negotia et valetudinem liceret, magis commodos confecisset. Istam autem mutationcm ita faciendam censebat, ut o esset Log- arithmus unitatis, et 10000000000 sinus totius: quod ego longe commodissimum esse non potui non agnoscere. Coepi igitur, ejus hortatu, rejectis illis quos antea paraveram, de horum calculo serio cogitare; et sequenti aestate iterum

profectus Edinburgum, horum quos hie exhibeo praecipuos. illi ostendi, idem etiam tertia aestate libentissime facturus, si Deus ilium nobis tamdiu superstitem esse voluisset."

There is also a reference to the change of the logarithms on the title-page of the work.

These extracts contain all the original statements made by Napier, Robert Napier and Briggs which have reference to the origin of decimal logarithms. It will be seen that they are all in perfect agreement. Briggs pointed out in his lectures at Gresham College that it would be more convenient that o should stand for the logarithm of the whole sine as in the Descriptio, but that the logarithm of the tenth part of the whole sine should be 10,000,000,000. He wrote also to Napier at once; and as soon as he could he went to Edinburgh to visit him, where, as he was most hospitably received by him, he remained for a whole month. When they conversed about the change of system, Napier said that he had perceived and desired the same thing, but that he had published the tables which he had already pre- pared, so that they might be used until he could construct others more convenient. But he considered that the change ought to be so made that o should be the logarithm of unity and 10,000,000,000 that of the whole sine, which Briggs could not but admit was by far the most convenient of all. Rejecting therefore, those which he had prepared already, Briggs began, at Napier's advice, to consider seriously the question of the calculation of new tables. In the following summer he went to Edinburgh and showed Napier the principal portion of the logarithms which he published in 1624. These probably included the logarithms of the first chiliad which he published in 1617.

It has been thought necessary to give in detail the facts relating to the conversion of the logarithms, as unfortunately Charles Hutton in his history of logarithms, which was prefixed to the early editions of his Mathematical Tables, and was also published as one of his Mathematical Tracts, has charged Napier with want of candour in not telling the world of Briggs's share in the change of system, and he expresses the suspicion that " Napier was desirous that the world should ascribe to him alone the merit of this very useful improvement of the logarithms." According to Hutton's view, the words, " it is to be hoped that his posthumous work "... which occur in the preface to the Chilias, were a modest hint that the share Briggs had had in changing the logarithms should be mentioned, and that, as no attention was paid to it, he himself gave the account which appears in the Arithmelica of 1624. There seems, however, no ground whatever for supposing that Briggs meant to express anything beyond his hope that the reason for the alteration would be explained in the posthumous work; and in his own account, written seven years after Napier's death and five years after the appearance of the work itself, he shows no injured feeling whatever, but even goes out of his way to explain that he abandoned his own proposed alteration in favour of Napier's, and, rejecting the tables he had already constructed, began to consider the calcula- tion of new ones. The facts, as stated by Napier and Briggs, are in complete accordance, and the friendship existing between them was perfect and unbroken to the last. Briggs assisted Robert Napier in the editing of the " posthumous work," the Constructio, and in the account he gives of the alteration of the logarithms in the Arithmelica of 1624 he seems to have been more anxious that justice should be done to Napier than to him- self; while on the other hand Napier received Briggs most hospitably and refers to him as " amico mihi longe charissimo."

Hutton's suggestions are all the more to be regretted as they occur as a history which is the result of a good deal of investiga- tion and which for years was referred to as an authority by many writers. His prejudice against Napier naturally produced retaliation, and Mark Napier in defending his ancestor has fallen into the opposite extreme of attempting to reduce Briggs to the level of a mere computer. In connexion with this contro- versy it should be noticed that the " Admonitio " on the last page of the Descriptio, containing the reference to the new logarithms, does not occur in all the copies. It is printed on the back of the last page of the table itself, and so cannot have been torn out from the copies that are without it. As there could have been no reason for omitting it after it had once appeared, we may assume that the copies which do not

have it are those which

were first issued. It is probable, therefore, that Briggs's copy contained no reference to the change, and it is even possible that the " Admonitio " may have been added after Briggs had communicated with Napier. As special attention has not been drawn to the fact that some copies have the " Admonitio " and some have not, different writers have assumed that Briggs did or did not know of the promise contained in the " Admonitio " according as it was present or absent in the copies they had themselves referred to. and this has given rise to some confusion. It may also be remarked that the date frequently assigned to Briggs's first visit to Napier is 1616, and not 161 5 as stated above, the reason being that Napier was generally supposed to have died in 1618 until Mark Napier showed that the true date was 161 7. When the Descriptio was published Briggs was fifty- seven years of age, and the remaining seventeen years of his life were devoted with steady enthusiasm to extend the utility of Napier's great invention.

The only other mathematician besides Napier who grasped the idea on which the use of logarithm depends and applied it to the construction of a table is Justus Byrgius (Jobst Biirgi), whose work Arithmetische und geometrische Progress-Tabulen . . . was published at Prague in 1620, six years after the publica- tion of the Descriptio of Napier. This table distinctly involves the principle of logarithms and may be described as a modified table of antilogarithms. It consists of two series of numbers, the one being an arithmetical and the other a geometrical progression: thus

o, 1,0000 0000

10, 1,0001 0000 20, 1,0002 0001

990, 1,0099 4967

In the arithmetical column the numbers increase by 10, in the geometrical column each number is derived from its predecessor by multiplication by 10001. Thus the number 10* in the arith- metical column corresponds to io 8 (i-oooi) 1 in the geometrical column; the intermediate numbers being obtained by interpola- tion. If we divide the numbers in the geometrical column by io 8 the correspondence is between 10* and (i-oooi) 1 , and the table then becomes one of antilogarithms, the base being (i-oooi) 1 / 10 , viz. for example (i-oooi)iV 990 = 1-00994967. The table extends to 230270 in the arithmetical column, and it is shown that 230270-022 corresponds to 9-9999 9999 or 109 in the geometrical column; this last result showing that (i-oooi) 23027-022 = 10. The first contemporary mention of Byrgius's table occurs on page 11 of the " Praecepta " prefixed to Kepler's Tabulae Radolphinae (1627); his words are: "apices logistici J. Byrgio multis annis ante editionem Neperianam viam prae- iverent ad hos ipsissimos logarithmos. Etsi homo cunctator et secretorum suorum custos foetum in partu destituit, non ad usus publicos educavit." Another reference to Byrgius occurs in a work by Benjamin Bramer, the brother-in-law and pupil of Byrgius, who, writing in 1630, says that the latter constructed his table twenty years ago or more. 1

As regards priority of publication, Napier has the advantage by six years, and even fully accepting Bramer's statement, there are grounds for believing that Napier's work dates from a still earlier period.

The power of 10, which occurs as a factor in the tables of both Napier and Byrgius, was rendered necessary by the fact that the decimal point was not yet in use. Omitting this factor in

1 Frisch's Kepleri opera omnia, ii. 834. Frisch thinks Bramer possibly relied on Kepler's statement quoted in the text (" Quibus forte confisus Kepleri verbis Benj. Bramer . . . "). See also vol. vii. p. 298.

The claims of Byrgius are discussed in Kastner's Geschichte der Mathematik, ii. 375, and iii. 14; Montucla's Histoire des mathe- matiques, ii. 10; Delambre's Histoire de I'astronomie moderne, i. 560; de Morgan's article on "Tables" in the English Cyclopaedia ; Mark Napier's Memoirs of John Napier of Merchiston (1834), p. 392, and Cantor's Geschichte der Mathematik, ii. (1892), 662. See also Gieswald, Justus Byrg als Mathematiker und dessen Einleitung in seine Logarithmen (Danzig, 1856).

the case of both tables, the connexion between N a number and L its " logarithm "is

N = (e- 1) 1 (Napier), L = (i-oooi)iSn (Byrgius),

viz. Napier gives logarithms to base e~ l , Byrgius gives anti- logarithms to base (i-oooi)ˆ".

There is indirect evidence that Napier was occupied with logarithms as early as 1594, for in a letter to P. Criigerus from Kepler, dated September 9, 1624 (Frisch's Kepler, vi. 47), there occurs the sentence: "Nihil autem supra Neperianam rationem esse puto: etsi quidem Scotus quidam Uteris ad Tychonem 1594 scriptis jam spem fecit Canonis illius Mirifici." It is here distinctly stated that some Scotsman in the year 1594, in 5. letter to Tycho Brahe, gave him some hope of the logarithms; and as Kepler joined Tycho after his expulsion from the island of Huen, and had been so closely associated with him in his work, he would be likely to be correct in any assertion of this kind. In connexion with Kepler's statement the following story, told by Anthony Wood in the Alhenae Oxonienses, is of some importance: —

" It must be now known, that one Dr Craig, a Scotchman . . . coming out of Denmark into his own country, called upon Joh. Neper, Baron of Mercheston, near Edinburgh, and told him, among other discourses, of a new invention in Denmark (by Longomontanus, as 'tis said), to save the tedious multiplication and division in astro- nomical calculations. Neper being solicitous to know farther of him concerning this matter, he could give no other account of it than that it was by proportional numbers. Which hint Neper taking, he desired him at his return to call upon him again. Craig, after some weeks had passed, did so, and Neper then showed him a rude draught of what he called Canon mirabilis logarithmorum. Which draught, with some alterations, he printing in 1 61 4, it came forthwith into the hands of our author Briggs, and into those of Will. Oughtred, from whom the relation of this matter came."

This story, though obviously untrue in some respects, gives valuable information by connecting Dr Craig with Napier and Longomontanus, who was Tycho Brahe's assistant. Dr Craig was John Craig, the third son of Thomas Craig, who was one of the colleagues of Sir Archibald Napier, John Napier's father, in the office of justice-depute. Between John Craig and John Napier a friendship sprang up which may have been due to their common taste for mathematics. There are extant three letters from Dr John Craig to Tycho Brahe, which show that he was on the most friendly terms with him. In the first letter, of. which the date is not given, Craig says that Sir William Stuart has safely delivered to him, " about the beginning of last winter," the book which he sent him. Now Mark Napier found in the library of the university of Edinburgh a mathematical work bearing a sentence in Latin which he translates, " To Doctor John Craig of Edinburgh, in Scotland, a most illustrious man, highly gifted with various and excellent learning, professor of medicine, and exceedingly skilled in the mathematics, Tycho Brahe hath sent this gift, and with his own hand written this at Uraniburg, 2d November 1588." As Sir William Stuart was sent to Denmark to arrange the preliminaries of King James's marriage, and returned to Edinburgh on the 15th of November 1588, it would seem probable that this was the volume referred to by Craig. It appears from Craig's letter, to which we may therefore assign the date 1589, that, five years before, he had made an attempt to reach Uranienburg, but had been baffled by the storms and rocks of Norway, and that ever since then he had been longing to visit Tycho. Now John Craig was physician to the king, and in 1590 James VI. spent some days at Uranienburg, before returning to Scotland from his matrimonial expedition. It seems not unlikely therefore that Craig may have accompanied the king

in his visit to Uranienburg. 2 In any case it is certain that Craig was a friend and correspondent of Tycho's, and it is probable that he was the " Scotus quidam."

We may infer therefore that as early as 1594 Napier had communicated to some one, probably John Craig, his hope of being able to effect a simplification in the processes of arithmetic. Everything tends to show that the invention of logarithms

2 See Mark Napier's Memoirs of John Napier of Merchiston (1834), p. 362.

was the result of many years of labour and thought, 1 undertaken with this special object, and it would seem that Napier had seen some prospect of success nearly twenty years before the publica- tion of the Descriptio. It is very evident that no mere hint with regard to the use of proportional numbers could have been of any service to him, but it is possible that the news brought by Craig of the difficulties placed in the progress of astronomy by the labour of the calculations may have stimulated him to persevere in his efforts.

The " new invention in Denmark " to which Anthony Wood refers as having given the hint to Napier was probably the method of calculation called prosthaphaeresis (often written in Greek letters irpoadaaip«ris) , which had its origin in the solution of spherical triangles. 2 The method consists in the use of the formula

sin a sin 6 = 2 (cos(a-J)-cos(o+J)},

by means of which the multiplication of two sines is reduced to the addition or subtraction of two tabular results taken from a table of sines; and, as such products occur in the solution of spherical triangles, the method affords the solution of spherical triangles in certain cases by addition and subtraction only. It seems to be due to Wittich of Breslau, who was assistant for a short time to Tycho Brahe; and it was used by them in their calculations in 1582. Wittich in 1584 made known at Cassel the calculation of one case by this prosthaphaeresis; and Justus Byrgius proved it in such a manner that from his proof the extension to the solution of all triangles could be deduced. 3 Clavius generalized the method in his treatise De astrolabio (1593), lib. i. lemma liii. The lemma is enunciated as follows: —

" Quaestiones omnes, quae per sinus, tangentes, atque secantes absolvi solent, per solam prosthaphaeresim, id est, per solam ad- ditionem, subtractionem, sine laboriosa numerorum multiplicatione divisioneque expedire."

Clavius then refers to a work of Raymarus Ursus Dithmarsus as containing an account of a particular case. The work is probably the Fundamentum astronomicum (1588). Longomon- tanus, in his Aslronomia Danica (1622), gives an account of the method, stating that it is not to be found in the writings of the Arabs or Regiomontanus. As Longomontanus is men- tioned in Anthony Wood's anecdote, and as Wittich as well as Longomontanus were assistants of Tycho, we may infer that Wittich's prosthaphaeresis is the method referred to by Wood.

It is evident that Wittich's prosthaphaeresis could not be a good method of practically effecting multiplications unless the quantities to be multiplied were sines, on account of the labour of the interpolations. It satisfies the condition, however, equally with logarithms, of enabling multiplication to be performed by the aid of a table of single entry; and, analytically considered, it is not so different in principle from the logarithmic method. In fact, if we put xy=(X+Y) – (j>{X-Y) , the solutions are 4>(X +Y) = {(x+ y) 2 , and * = sin X, y = sin Y, (X+Y) =-5 cos (X-l-Y). The former solution gives a method known as that of quarter-squares; the latter gives the method of prosthaphaeresis.

An account has now been given of Napier's invention and its publication, the transition to decimal logarithms, the calcula- tion of the tables by Briggs, Vlacq and Gunter, as well as of the claims of Byrgius and the method of prosthaphaeresis. To complete the early history of logarithms it is necessary to return

1 In the Rabdologia (161 7) he speaks of the canon of logarithms as " a me longo tempore elaboratum."

- A careful examination of the history of the method is given by Scheibel in his Einleitung zur mathematischen Biicherkenntniss, Stuck vii. (Breslau, 1775), pp. 13-20; and there is also an account in Kastner's Geschichte der Mathematik, i. 566-569 (1796) ; in Montucla's Histoire des mathematiques, i. 583-585 and 617-619; and in Klugel's Worterbuch (1808), article " Prosthaphaeresis."

' Besides his connexion with logarithms and improvements in the method of prosthaphaeresis, Byrgius has a share in the invention of decimal fractions. See Cantor, Geschichte, ii. 567. Cantor attributes to him (in the use of his prosthaphaeresis) the first intro- duction of a subsidiary angle into trigonometry (vol. ii. 590).

to Napier's Descriptio in order to describe its reception on the continent, and to mention the other logarithmic tables which were published while Briggs was occupied with his calculations.

John Kepler, who has been already quoted in connexion with Craig's visit to Tycho Brahe, received the invention of logarithms almost as enthusiastically as Briggs. His first mention of the subject occurs in a letter to Schikhart dated the nth of March 1618, in which he writes — " Extitit Scotus Baro, cujus nomen mihi excidit, qui praeclari quid praestitit, necessitate omnj multiplicationum et divisionum in meras additiones et sub- tractiones commutata, nee sinibus utitur: at tamen opus est ipsi tangentium canone: et varietas, crebritas, difficultasque additionum subtractionumque alicubi laborem multiplicandi et dividend! superat." This erroneous estimate was formed when he had seen the Descriptio but had not read it; and his opinion was very different when he became acquainted with the nature of logarithms. The dedication of his Ephemeris for 1620 consists of a letter to Napier dated the 28th of July 1619, and he there congratulates him warmly on his invention and on the benefit he has conferred upon astronomy generally and upon Kepler's own Rudolphine tables. He says that, although Napier's book had been published five years, he first saw it at Prague two years before; he was then unable to read it, but last year he had met with a little work by Benjamin Ursinus 4 con- taining the substance of the method, and he at once recognized the importance' of what had been effected. He then explains how he verified the canon, and so found that there were no essential errors in it, although there were a few inaccuracies near the beginning of the quadrant, and he proceeds, " Haec te obiter scire volui, ut quibus tu methodis incesseris, quas non dubito et plurimas et ingeniosissimas tibi in promptu esse, eas publici juris fieri, mihi saltern (puto et caeteris) scires fore gratis- simum; eoque percepto, tua promissa folio 57, in debitum cecidisse intelligeres." This letter was written two years after Napier's death (of which Kepler was unaware), and in the same year as that in which the Construct™ was published. In the same year (1620) Napier's Descriptio (1614) and Constructio (1619) were reprinted by Bartholomew Vincent at Lyons and issued together. 6

Napier calculated no logarithms of numbers, and, as already stated, the logarithms invented by him were not to base e. The first logarithms to the base e were published by John Speidell in his New Logarithmes (London, 1619), which contains hyper- bolic log sines, tangents and secants for every minute of the quadrant to 5 places of decimals.

In 1624 Benjamin Ursinus published at Cologne a canon of logarithms exactly similar to Napier's in the Descriptio of 1614, only much enlarged. The interval of the arguments is 10", and the results are given to 8 places; in Napier's canon the interval is 1', and the number of places is 7. The logarithms are strictly Napierian, and the

arrangement is identical with that in the canon of 16 14. This is the largest Napierian canon that has ever been published.

In the same year (1624) Kepler published at Marburg a table of Napierian logarithms of sines with certain additional columns to facilitate special calculations.

The first publication of Briggian logarithms on the continent is due to Wingate, who published at Paris in 1625 his Arith- melique logarithmetique, containing seven-figure logarithms of.

4 The title of this work is' — Benjaminis Vrsini . . . cursus mathe- matici practici volumen primum continens illuslr. &f generosi Dn. Dn. Johannis Neperi Baronis Merchistonij &fc, Scoti trigonometriam logarithmicam usibus discentiwm accommodatam ... Coloniae . . . CIO IOC XIX. At the end, Napier's table is reprinted, but to two figures less. This work forms the earliest publication of logarithms on the continent.

6 The title is Logarithmorum canonis descriptio, sen arithmeti- carum supputationum mirabilis abbreviatio. Ejusque usus in utraque trigonometria ut etiant in omni logistica mathematica, amplissimi, facillimi & expeditissimi explicatio. Auihore ac in- ventore Ioanne Nepero, Barone Merchistonii, &c. Scoto. Lugduni . . . It will be seen that this title is different from that of Napier's work of 1614; many writers have, however, erroneously given rt as the title of the latter.

numbers up to iooo, and log sines and tangents from Gunter's Canon (1620). In the following year, 1626, Denis Henrion published at Paris a Traicte des Logarithmes, containing Briggs's logarithms of numbers up to 20,001 to 10 places, and Gunter's log sines and tangents to 7 places for every minute. In the same year de Decker also published at Gouda a work entitled Nieuwe Telkonst, inhoudende de Logarithmi voor de Ghetallen beginnende van 1 tot 10,000, which contained logarithms of numbers up to 10,000 to 10 places, taken from Briggs's Arithmetica of 1624, and Gunter's log sines and tangents to 7 places for every minute. 1 Vlacq rendered assistance in the publication of this work, and the privilege is made out to him.

The invention of logarithms and the calculation of the earlier tables form a very striking episode in the history of exact science, and, with the exception of the Principia of Newton, there is no mathematical work published in the country which has pro- duced such important consequences, or to which so much interest attaches as to Napier's Descriptio. The calculation of tables of the natural trigonometrical functions may be said to have formed the work of the last half of the 16th century, and the great canon of natural sines for every 10 seconds to 15 places which had been calculated by Rheticus was published by Pitiscus only in 1 61 3, the year before that in which the Descriptio appeared. In the construction of the natural trigonometrical tables Great Britain had taken no part, and it is remarkable that the discovery of the principles and the formation of the tables that were to revolutionize or supersede all the methods of calculation then in use should have been so rapidly effected and developed in a country in which so little attention had been previously devoted to such questions.

For more detaited information relating to Napier, Briggs and Vlacq, and the invention of logarithms, the reader is referred to the life of Briggs in Ward's Lives of the Professors of Gresham College (London, 1740); Thomas Smith s Vilae quorv.ndam eruditissimorum et illustrium virorum (Vita Henrici Briggii) (London, 1707); Mark Napier's Memoirs of John Napier already referred to, and the same author's Naperi libri qui supersunt (1839); Hutton's History; de Morgan's article already referred to; Delamhre's Histoire de I'Astro- nomie moderne; the report on mathematical tables in the Report of the British Association for 1873; and the Philosophical Magazine for October and December 1872 and May 1873. It may be remarked that the date usually

assigned to Briggs's first visit to Napier is 1616 and not 1615 as stated above, the reason being that Napier was generally supposed to have died in 1618; but it was shown by Mark Napier that the true date is 1617.

In the years 1791-1807 Francis Maseres published at London, in six volumes quarto " Scriptores Logarithmici, or a collection of several curious tracts on the nature and construction of logarithms, mentioned in Dr Hutton's historical introduction to his new edition of Sherwin's mathematical tables . . .," which contains reprints of Napier's Descriptio of 1614, Kepler's writings on logarithms (1624-1625), &c. In 1889 a translation of Napier's Constructio of 1619 was published by Walter Rae Macdonald. Some valuable notes are added by the translator, in one of which he shows the accuracy of the method employed by Xapier in his calculations, and explains the origin of a small error which occurs in Napier's table. Appended to the Catalogue is a full and careful bibliography of all Napier's writings, with mention of the public libraries, British and foreign, which possess copies of each. A facsimile reproduction of Bartholomew Vincent's Lyons edition (1620) of the Constructio was issued in 1895 by A. Hermann at Paris (this imprint occurs on page 62 after the word " Finis ").

It now remains to notice briefly a few of the more important events in the history of logarithmic tables subsequent to the original calculations.

Common or Briggian Logarithms of Numbers. — Nathaniel Roe's Tabulae logarithmicae (1633) was the first complete seven-figure

1 In describing the contents of the works referred to, the language and notation of the present day have been adopted, so that for example a table to radius 10,000,000 is described as a table to 7 places, and so on. Also, although logarithms have been spoken of as to the base e, &c, it is to be noticed that neither Napier nor Briggs, nor any of their successors till long afterwards, had any idea of con- necting logarithms with exponents.

table that was published. It contains seven-figure logarithms of numbers from 1 to 100,000, with characteristics unseparated from the mantissae, and was formed from Vlacq's table (1628) by leaving out the last three figures. All the figures of the number are given at the head of the columns, except the last two, which run down the extreme columns — 1 to 50 on the left-hand side, and 50 to 100 on the right-hand side. The first four figures of the logarithms are printed at the top of the columns. There is thus an advance half way towards the arrangement now universal in seven-figure tables. The final step was made by John Newton in his Trigononometria Britannica (1658), a work which is also noticeable as being the only extensive eight- figure table that until recently had been published ; it contains logarithms of sines, &c, as well as logarithms of numbers.

In 1705 appeared the original edition of Sherwin's tables, the first of the series of ordinary seven-figure tables of logarithms of numbers and trigonometrical functions such as are in general use now. The work went through several editions during the 18th century, and was at length superseded in 1785 by Hutton's tables, which continued in successive editions to maintain their position for a century.

In 1717 Abraham Sharp published in his Geometry Improv'd the Briggian logarithms of numbers from 1 to 100, and of primes from 100 to noo, to 61 places; these were copied into the later editions of Sherwin and other works.

In 1742 a seven-figure table was published in quarto form by Gardiner, which is celebrated on account of its accuracy and of the elegance of the printing. A French edition, which closely resembles the original, was published at Avignon in 1770.

In 1783 appeared at Paris the first edition of Francois Callet's tables, which correspond to those of Hutton in England. These tables, which form perhaps the most complete and practically useful collection of logarithms for the general computer that has' been published, passed through many editions.

In 1794 Vega published his Thesaurus logarithmorum computus, a folio volume containing a reprint of the logarithms of numbers from Vlacq's Arithmetica logarithmica of 1628, and Trigonometria artificialis of 1633. The logarithms of numbers are arranged as in an ordinary seven-figure table. In addition to the logarithms reprinted from the Trigonometria, there are given logarithms for every second of the first two degrees, which were the result of an original calculation. Vega devoted great attention to the detection and correction of the errors in Vlacq's work of 1628. Vega's Thesaurus has been reproduced photographically by the Italian government. Vega also published in 1797, in 2 vols. 8vo, a collection of logarithmic and trigonometrical tables which has passed through many editions, a very useful one volume stereotype edition having been published in 1840 by Hiilsse. The tables in this work may be regarded as to some extent supplementary to those in Callet.

If we consider only the logarithms of numbers, the main line ot descent from the original calculation of Briggs and Vlacq is Roe, John Newton, Sherwin, Gardiner; there are then two branches, viz. Hutton founded on Sherwin and Callet on Gardiner, and the editions of Veg?. form a separate offshoot from the original tables. Among the most useful and accessible of modern ordinary seven- figure tables of logarithms of numbers and trigonometrical functions may be mentioned those of Bremiker, Schron and Bruhns. For logarithms of numbers only perhaps Babbage's table is the most convenient. 2

In 1 87 1 Edward Sang published a seven-figure table of logarithms of numbers from 20,000 to 200,000, the logarithms between 100,000 and 200,000 being the result of a new calculation. By beginning the table at 20,000 instead of at 10,000 the differences are halved in magnitude, while the number of them in a page is quartered. In this table multiples of the differences, instead of proportional parts, are given. 3 John Thomson of Greenock (1782-1855) made an inde- pendent calculation of logarithms of numbers' up to 120,000 to 12 places of decimals, and his table has been used to verify the errata already found in Vlacq and Briggs by Lefort (see Monthly Not. R.A.S. vol. 34, p. 447). A table of ten-figure logarithms of numbers up to 100,009 was calculated by W. W. Duffield and published in the Report of the U.S. Coast and Geodetic Survey for 1805-1806 as Appendix 12, pp. 395-722. The results were compared with Vega's Thesaurus (1794) before publication.

Common or Briggian Logarithms of Trigonometrical Functions. — The next great advance on the Trigonometria artificialis took place more than a century and a half afterwards, when Michael Taylor published in 1792 his seven-decimal table of log sines and tangents to every second of the quadrant; it was calculated by interpolation from the Trigonometria to 10 places and then contracted to 7. On account of the great size of this table, and for other reasons, it never

2 The smallest number of entries which are necessary in a table of logarithms in order that the intermediate logarithms may be calcul- able by proportional parts has been investigated by J. E. A. Steggall in the Proc. Edin. Math. Soc, 1892, 10, p. 35. This number is 1700 in the case of a seven-figure table extending to 100,000.

3 Accounts of Sang's calculations are given in the Trans. Roy. Soc. Edin., 1872, 26, p. 521, and in subsequent papers in the Proceedings of the same society.

came into very general use, Bagay's Nouvelles tables astronomiques (1829), which also contains log sines and tangents to every second, being preferred; this latter work, which for many years was difficult to procure, has been reprinted with the original title-page and date unchanged. The only other logarithmic canon to every second that has been published forms the second volume of Shortrede's Logar- ithmic Tables (1849). In 1784 the French government decided that new tables of sines, tangents, &c,

and their logarithms, should be calculated in relation to the centesimal division of the quadrant. Prony was charged with the direction of the work, and was expressly required " non seulement a composer des tables qui ne laissassent rien a desirer quant a l'exactitude, mais a en faire le monument de calcul le plus vaste et le plus imposant qui eflt jamais etc execute ou mime concu." Those engaged upon the work were divided into three sections: the first consisted of five or six mathematicians, including Legendre, who were engaged in the purely analytical work, or the calculation of the fundamental numbers; the second section con- sisted of seven or eight calculators possessing some mathematical knowledge; and the third comprised seventy or eighty ordinary computers. The work, which was performed wholly in duplicate, and independently by two divisions of computers, occupied two years. As a consequence of the double calculation, there are two manuscripts, one deposited at the Observatory, and the other in the library of the Institute, at Paris. Each of the two manuscripts consists essentially of seventeen large folio volumes, the contents being as follows : — Logarithms of numbers up to 200,000 . . .8 vols.

Natural sines . . . . . / 1 ,,

Logarithms of the ratios of arcs to sines from o«ooooo

to 00-05000, and log sines throughout the quadrant 4 ,, Logarithms of the ratios of arcs to tangents from o»-ooooo to C-05OOO, and log tangents throughout the quadrant . . . . . 4 „

The trigonometrical results are given for every hundred-thousandth of the quadrant (10″ centesimal or 3"-24 sexagesimal). The tables were all calculated to 14 places, with the intention that only 12 should be published, but the twelfth figure is not to be relied upon. The tables have never been published, and are generally known as the Tables du Cadastre, or, in England, as the great French manuscript tables.

A very full account of these tables, with an explanation of the methods of calculation, formulae amployed, &c, was published by Lefort in vol. iv. of the Annates de t observatoire de Paris. The print- ing of the table of natural sines was once begun, and Lefort states that he has seen six copies, all incomplete, although including the last page. Babbage compared his table with the Tables du Cadastre, and Lefort has given in his paper just referred to most important lists of errors in Vlacq's and Briggs's logarithms of numbers which were obtained by comparing the manuscript tables with those con- tained in the Arilhmetica logarithmica of 1624 and of 1628.

As the Tables du Cadastre remained unpublished, other tables appeared in which the quadrant was divided centesimally, the most important of these being Hobert and Ideler's Nouvelles tables trigo- nomitriques (1799), and Bordaand Delambre's Tables trigonometriques decimates (1800-1801), both of which are seven-figure tables. The latter work, which was much used, being difficult to procure, and greater accuracy being required, the French government in 1891 published an eight-figure centesimal table, for every ten seconds, derived from the Tables du Cadastre.

Decimal or Briggian Antilogarithms. — In the ordinary tables of logarithms the natural numbers are all integers, while the logarithms tabulated are incommensurable. In an antilogarithmic table, the 1 >garithms arc exact quantities such as -ooooi, -00002, &c, and the numbers are incommensurable. The earliest and largest table of this kind that has been constructed is Dodson's Antilogarithmic canon (1742), which gives the numbers to 11 places, corresponding to the logarithms from -ooooi to -99999 at intervals of ooooi. Antilogar ithmic tables are few in number, the only other extensive tables of the same kind that have been published occurring in Shortrede's Logarithmic tables already referred to, and in Filipowski's Table oj antilogarithms (1849). Both are similar to Dodson's tables, from which they were derived, but they only give numbers to 7 places.

Hyperbolic or Napierian logarithms (i.e. to base e). — The most elaborate table of

hyperbolic logarithms that exists is due to Wolfram, a Dutch lieutenant of artillery. His table gives the logarithms of all numbers up to 2200, and of primes (and also of a great many com- posite numbers) from 2200 to 10,009, to 48 decimal places. The table appeared in Schulze's Neue und erweiterte Sammlung logarithmischer Tafeln (1778), and was reprinted in Vega's Thesaurus (1794), already referred to. Six logarithms omitted in Schulze's work, and which Wolfram had been prevented from computing by a serious illness, were published subsequently, and the table as given by Vega is complete. The largest hyperbolic table as regards range was published by Zacharias Dase at Vienna in 1850 under the title Tafel der naturlichen Logarithmen der Zahlen.

Hyperbolic antilogarithms are simple exponentials, i.e. the hyper- bolic antilogarithm of x is e x . Such tables can scarcely be said to come under the head of logarithmic tables. See Tables, Mathe- matical : Exponential Ft: notions.

Logistic or Froporticm.1 Logarithms. — The old name for what are

now called ratios or fractions are logistic numbers, so that a table of log (a/x) where x is the argument and a a constant is called a table ol logistic or proportional logarithms ; and since log (a/x) = log a — log x it is clear that the tabular results differ from those given in an ordin- ary table of logarithms only by the subtraction of a constant and a change of sign. The first table of this kind appeared in Kepler's work of 1624 which has been already referred to. The object of a table of log (a/x) is to facilitate the working out of proportions in which the third term is a constant quantity a. In most collections of tables of logarithms, and especially those intended for use in connexion with navigation, there occurs a small table of logistic logarithms in which a = 36oo"(= 1° or i h), the table giving log 3600 — log x, and x being expressed in minutes and seconds. It is also common to find tables in which o = lo8oo"(= 3° or 3 A),and x is ex- pressed in degrees (or hours), minutes and seconds. Such tables are generally given to 4 or 5 places. The usual practice in books seems to be to call logarithms logistic when a is 3600", and proportional when a has any other value.

Addition and Subtraction, or Gaussian Logarithms. — Gaussian logarithms are intended to facilitate the finding of the logarithms of the sum and difference of two numbers whose logarithms are known, the numbers themselves being unknown; and on this account they are frequently called addition and subtraction logarithms. The object of the table is in fact to give log (a = > = b) by only one entry when log a and log b are given. The utility of such logarithms was first pointed out by Leonelli in a book entitled Supplement logarithmique, printed at Bordeaux in the year XI. (1802/3); h e calculated a table to 14 places, but only a specimen of it which appeared in the Supplement was printed. The first table that was actually published is due to Gauss, and was printed in Zach's Monatliche Correspondenz, xxvi. 498 (1812). Corresponding to the argument log x it gives the values of log (1 +x~ l) and log (1 +x).

Dual Logarithms. — This term was used by Oliver Byrne in a series of works published between i860 and 1870. Dual numbers and logarithms depend upon the expression of a number as a product of i-i, i-oi, i-ooi ... or of -9, -99, -999 ....

In the preceding resume only those publications have been mentioned which are of historic importance or interest. 1 For fuller details with respect to some of these works, for an account of tables published in the latter part of the 19th century, and for those which would now be used in actual calculation, reference should be made to the article Tables, Mathematical.

Calculation of Logarithms. — The name logarithm is derived from the words Ao-yaw i.ptf)p.6s, the number of the ratios, and the way of regarding a logarithm which justifies the name may be explained as follows. Suppose that the ratio of I o, or any other particular nu mbcr, to 1 is compounded of a very great number of equal ratios, as, for example, 1,000,000, then it can be shown that the ratio of 2 to 1 is very nearly equal to a ratio compounded of 301,030 of these small ratios, or ratiunculae, that the ratio of 3 to I is very nearly equal to a ratio compounded of 477,121 of them, and so

on. The small ratio, or ratiuncula, is in fact that of the millionth root of 10 to unity, and if we denote it by the ratio of a to I, then the ratio of 2 to 1 will be nearly the same as that of a mm0 to 1, and so on; or, in other words, if a denotes the millionth root of 10, then 2 will be nearly equal to a 301 ‘ 030 , 3 will be nearly equal to a 477,m , and so on.

Napier’s original work, the Descriptio Canonis of 1614, contained, not logarithms of numbers, but logarithms of sines, and the relations between the sines and the logarithms were explained by the motions of points in lines, in a manner not unlike that afterwards employed by Newton in the method of fluxions. An account of the processes by which Napier constructed his table was given in the Constructio Canonis of 1619. These methods apply, however, specially to Napier’s own kind of logarithms, and are different from those actually used by Briggs in the construction of the tables in the Arilhmetica Logarithmica, although some of the latter are the same in principle as the processes described in an appendix to the Constructio.

The processes used by Briggs are explained by him in the preface to the Arilhmetica Logarithmica (1624). His method of finding the logarithms of the small primes, which consists in taking a great number of continued geometric means between unity and the given primes, may be described as follows. He first formed the table of numbers and their logarithms: —

Numbers. Logarithms.

10 1

3-162277 ... 0-5

1-778279 . . . 0-25

I-33352I – - • 0-125

1-154781 . . . 0-0625

each quantity in the left-hand column being the square root of the one above it, and each quantity in the right-hand column being the half

1 In vol. xv. (1875) of the Verhandelingen of the Amsterdam Academy of Sciences, Bierens de Haan has given a list of 553 tables of logarithms. A previous paper of the same kind, containing notices of some of the tables, was published by him in the Verslagen en Mededeelingen of the same academy (Afd. Natuurkunde) deel. iv (1862), p. 15.

of the one above it. To construct this table Briggs, using about thirty places of decimals, extracted the square root of 10 fifty-four times, and thus found that the logarithm of i-ooooo 00000 00000 12781 91403 20032 35 was o-ooooo 00000 00000 05551 11512 31257 82702, and that for numbers of this form (i.e. for numbers beginning with 1 followed by fifteen ciphers, and then by seventeen or a less number of significant figures) the logarithms were proportional to these significant figures. He then by means of a simple proportion deduced that log (i-ooooo 00000 00000 i) = o-ooooo 00000 00000 04342 94481 90325 1804, so that, a quantity I -ooooo 00000 00000 * (where x consists of not more than seventeen figures) having been obtained by repeated extraction of the square root of a given number, the logarithm of I -ooooo 00000 00000 x could then be found by multiplying x by -ooooo 00000 00000 04342

To find the logarithm of 2, Briggs raised it to the tenth power, viz. 1024, and extracted the square root of 1-024 forty-seven times, the result being 1 -ooooo ooooo ooooo

16851 60570 53949 77. Multiplying the significant figures by 4342. . .he obtained the logarithm of this quantity, viz. o-ooooo ooooo ooooo 07318 55936 90623 9336, which multiplied by 2″ gave 0-01029 99566 39811 95265 277444, the logarithm of 1-024, true to 17 or 18 places. Adding the character- istic 3, and dividing by 10, he found (since 2 is the tenth root of 1024) log 2 = -30102 99956 63981 195. Briggs calculated in a similar manner log 6, and thence deduced log 3.

It will be observed that in the first process the value of the modulus is in fact calculated from the formula.

10* — I loge 10′

the value of h being 1/2 51 , and in the second process logi< >2 is in effect calculated from the formula.

logio 2

/ – \

X

1 2″

1 X—

log, 10 io –

Briggs also gave methods of forming the mean proportionals or square roots by differences; and the general method of constructing logarithmic tables by means of differences is due to him.

The following calculation of log 5 is given as an example of the application of a method of mean proportionals. The process consists in taking the geometric mean of numbers above and below 5, the object being to at length arrive at 5-000000. To every geometric mean in the column of numbers there corresponds the arithmetical mean in the column of logarithms. The numbers are denoted by A, B, C, &c, in order to indicate their mode of formation.

A = B =

C=ˆJ(AB) D= V(BC) £= V(CX>) F= V (DE) G=t] (DF) H=y'(FG) /= V(Fff) K= V(H7) L = VOX) M=ˆ(KL) N=

<2=V(OP) #=V(O0 S= V(0£) T= V(05)

v= v(or)

W= V (TV) X= tI(WV)

Y=y<(VX) Z=yl(XY)

Numbers.

i- 000000 io-oooooo

3-162277

5-623413 4216964 4-869674 5-232991 5-048065 4-958069 5-002865 4-980416 4-991627 4-997242 5-000052 4-998647

4-999350 4-999701 4-999876 4999963 5-000008 4-999984 4.999997 5-000003 5-000000

Logarithms.

o- 0000000

1 • 0000000

0-5000000

0-7500000

0-6250000

0-6875000

0-7187500

0-7031250

0-6953125

0-6992187

0-6972656

0-6982421

0-6987304

0-6989745

0-6988525

0-6989135

0-6989440

0-6989592

0-6989668

0-6989707

0-6989687

0-6989697

0-6989702

0-6989700

Great attention was devoted to the methods of calculating logarithms during the 17th and 1 8th centuries, The earlier methods proposed were, like those of Briggs, purely arithmetical, and for a long time logarithms were regarded from the point of view indicated by their name, that is to say, as depending on the theory of com- pounded ratios. The introduction of infinite series into mathematics effected a great change in the modes of calculation and the treatment of the subject. Besides Napier and Briggs, special reference should be made to Kepler (Chilias, 1624) and Mercator (Logarithmotechnia, 1668), whose methods were arithmetical, and to Newton, Gregory, Halley and Cotes, who employed series. A full and valuable account of these methods is given in Hutton's " Construction of Logarithms," which occurs in the introduction to the early editions of his Mathe- matical Tables, and also forms tract 21 of his Mathematical Tracts (vol. i., 1812). Many of the early works on logarithms were re- printed in the Scriptores logarithmici of Baron Maseres already referred to.

In the following account only those formulae and methods

will be referred to which would now be used in the calculation o) logarithms. Since

log.(i + *) = x-ii» + J* > we have, by changing the sign of x,

whence

loge(l *) = * –

r*-ix* + &C,

log« T^f = 2(*-Hx'-r-b 6 + &c),

and, therefore, replacing x by , ,

log.

4.1 (2 = 2) '44 (PJZSt) ' q ~ (p + q \p + q/ s \p + ql

■»l

p-q

+ &c

•I-

in which the series is always convergent, so that the formula affords a method of deducing the logarithm of one number from that of another.

As particular cases we have, by putting q = 1 ,

io,H^M^)^;r + M'

and by putting q — p--l, log e (p + l)-log e p

'- 2 l2p~ + i + i

(2p + l) s + «(2p + l) 5 + &c –) '•

the former of these equations gives a convergent series for \og e p, and the latter a very convergent series by means of which the logarithm of any number may be deduced from the logarithm of the preceding number.

From the formula for log, (/ > /§) we may deduce the following very convergent series for log e 2, log, 3 and log e 5, viz. :—

log,2 = 2(7P + 5Q + 3R), log e 3 = 2(llP + 8Q + 5R), log,5 = 2(16P-r-12Q-t-7R), where

R ~l61 + J

(161)

(161) 6

The following still more convenient formulae for the calculation of log e 2, log«3, &c. were given by J. Couch Adams in the Proc. Roy. Soc, 1878, 27, p. 91. If

i~ 10 1 fi ! \ – 1 25 1 l-i 4 a-loff^-log^l-jjjj, " = lo g2i = - lo gU-uJ0/

then

and

e = logg5 = log(l + ^), d-logg = -log(l-j§ 5),

, 126 , /. . 8 \ e = lo Sˆ23 = lo sl 1 +1000ˆ

log 2 = 7a-2&+3c, log3 = na-3&+5c, log 5 = l6a-4&+7f,

= 190— 4&+8<;-r-e,

log 7 = i(39a-io6 + i7C-d) or = and we have the equation of condition,

a — 2b+c=d+2e. By means of these formulae Adams calculated the values of log, 2, log«3, log,5, and log,7 to 276 places of decimals, and deduced the value of logeio and its reciprocal M, the modulus of the Briggian system of logarithms. The value of the modulus found by Adams is

Mo =0-43429

44819

03251

82765

1 1289

18916

60508

22943

97005

80366

65661

H453

78316

58646

49208

87077

47292

24949

33843

17483

18706

10674

47663

03733

64167

92871

58963

90656

92210

64662

81226

58521

27086

56867

03295

93370

86965

88266

88331

16360

77384

90514

28443

48666

76864

65860

85135

56148

21234

87653

43543 25

43573

17253

83562

21868

which is true certainly to 272, and probably to 273, places (Proc. Roy. Soc, 1886, 42, p. 22, where also the values of the other logarithms are given).

If the logarithms are to be Briggian all the series in the preceding formulae must be multiplied by M, the modulus; thus,

\og 10 (i+x)=M(x-ix* + lx*-lx i +&c),

and so on.

As has been stated, Abraham Sharp's table contains 61-decimal

Briggian logarithms of primes up to 1 100, so that the logarithms of all composite numbers whose greatest prime factor does not ex- ceed this number may be found by simple addition; and Wolfram's table gives 48-decimal hyperbolic logarithms of primes up to 10,009. By means of these tables and of a factor table we may very readily obtain the Briggian logarithm of a number to 61 or a less number of places or of its hyperbolic logarithm to 48 or a less number of places in the following manner. Suppose the hyperbolic logarithm of the prime number 43,867 required. Multiplying by 50, we have 50X43,867=2,193,350, and on looking in Burckhardt's Table des diviseurs for a number near to this which shall have no prime factor greater than 10,009, it appears that

2,193,349 = 23X47X2029; thus

43,867 = f (23X47X2029 + l), and therefore

log. 43,867 = log. 23+log. 47+ log/2029 -log. 50

1 ,1 . , 1

+-,

•-ii

+

-&c.

form (i.e. of factors of the form i-\—i r n) to the construction of logarithms, and calculated a table of logarithms of factors of the form I j(-ooi) r » to 24 places. This was published in 1876 under the title Tables for the formation of logarithms and antilogarithms to twenty -four or any less number of places, and contains the most complete and useful application of the method, with many improvements in points of detail. Taking as an example the calculation of the Briggian logarithm of the number 43,867, whose hyperbolic logarithm has been calculated above, we multiply it by 3, giving 131,601, and find by Gray's process that the factors of 1-31601 are

(1) 1-316 (5) I-(00l)

(2) 1-000007 (6) i-(ooi) s 6o2

(3) l-(ooi) 2 598 (7) i-(ooi) 6 4i2

(4) i-(ooi) 3 78o (8) i-(ooi) 7 340 Taking the logarithms from Gray's tables we obtain the required logarithm by addition as follows: —

"2,193,349 * (2,193,349)' "^ 3 (2,193,349) The first term of the series in the second line is

000000 04559 23795 07319 6286;

dividing this by 2X2,193,349 we obtain

o-ooooo 00000 00103 93325 3457. and the third term is

o-ooooo 00000 00000 00003 1590, so that the series =

000000 04559 23691 13997 4419;

whence, taking out the logarithms from Wolfram's table,

log. 43,867 = 10-68891 76079 60568 10191 3661. The principle of the method is to multiply the given prime (sup- posed to consist of 4, 5 or 6 figures) by such a factor that the product may be a number within the range of the factor tables, and such that, when it is increased by I or 2, the prime factors may all be within the range of the logarithmic tables. The logarithm is then obtained by use of the formula

d d* d 3 log. (+ <)= log.* +— îˆ5+i 8 -&c.,

in which of course the object is to render d/x as small as possible. If the logarithm required is Briggian, the value of the series is to be multiplied by M.

If the number is incommensurable or consists of more than seven figures, we can take the first seven figures of it (or multiply and divide the result by any factor, and take the first seven figures of the result) and proceed as before. An application to the hyperbolic logarithm of t is given by Burckhardt in the introduction to his Table des diviseurs for the second million.

The best general method of calculating logarithms consists, in its simplest form, in resolving the number whose logarithm is required into factors of the form 1 — •i , », where n is one of the nine digits; and making use of subsidiary tables of logarithms of factors of this form. For example, suppose the logarithm of 543839 required to twelve places. Dividing by io 6 and by 5 the number becomes 1-087678, and resolving this number into factors of the form 1 — •Vn we find that

543839 = i° 5 X 5 (i~ i‘8)(i — i 4 6)(i~i 8 6)(i~i«3)(i— 1*3) X(i— i 8 5)(i— i‘7)(i— i 10 9)(i—i 11 3)(i—i 1j 2),

where I— 1 ‘8 denotes i~o8, I— 1 4 6 denotes I— 0006, &c, and so on. All that is required therefore in order to obtain the logarithm of any number is a table of logarithms, to the required number of places, of -n, -9», -9971, -999», &c, for » = I, 2, 3, . . . 9.

The resolution of a number into factors of the above form is easily performed. Taking, for example, the number 1-087678, the object is to destroy the significant figure 8 in the second place of decimals; this is effected by multiplying the number by 1—08, that is, by subtracting from the number eight times itself advanced two places, and we thus obtain 1-00066376. To destroy the first 6 multiply by 1—0006 giving 1-000063361744, and multiplying successively by 1—00006 and 1—000003, we obtain 1 •000000357932, and it is clear that these last six significant figures represent without any further work the remaining factors required. In the corresponding antilogarithmic process the number is expressed as a product of factors of the form I + • I”*.

This method of calculating logarithms by the resolution of numbers into factors of the form I— -I'n is generally known as Weddle's method, having been published by him in The Mathematician for November 1845, and the corresponding method for antilogarithms by means of factors of the form i+(-l) r » is known by the name of Hearn, who published it in the same journal for 1847. In 1846 Peter Gray constructed a new table to 12 places, in which the factors were of the form 1 — (oi) r », so that n had the values 1, 2, ... 99; and subsequently he constructed a similar table for factors of the form 1 4 (-oi)‘n. He also devised a method of applying a table of Hearn's

522 878

280

337

562

704

972 = colog 3

119 255

889

277

936

685

553

9i3 = log fit)

3

040

050

733

157

610

239 = log (2)

259

708

022

525

453

597 = log (3)

33«

749

o95

868 261

752 588

445 178

424 = log (4) 964 = log (5) 278 = log (6) 929 = log (7) 148 = log (8)

4-642 137 934 655 780 757 288 464 = 10ˆ043,867 In Shortrede's Tables there are tables of logarithms and factors of the form i = t(-oi) r » to 16 places and of the form i = t(-i) r »i to 25 places; and in his Tables de Logarithmes a 27 Decimates (Paris, 1867) Fedor Thoman gives tables of logarithms of factors of the form I = t -l r ». In the Messenger of Mathematics, vol. iii. pp. 66-92, 1873, Henry Wace gave a simple and clear account of both the logarithmic and antilogarithmic processes, with tables of both Briggian and hyperbolic logarithms of factors of the form 1 = t ■ Vn to 20 places.

Although the method is usually known by the names of Weddle and Hearn, it is really, in its essential features, due to Briggs, who gave in the Arithmetica logarithmica of 1624 a table of the logarithms of I \-l'n up to r = 9 to 15 places of decimals. It was first formally proposed as an independent method, with great improvements, by Robert Flower in The Radix, a new way of making Logarithms, which was published in 1 77 1 ; and Leonelli, in his Supplement logarithmique (1802-1803), already noticed, referred to Flower and reproduced some of his tables. A complete bibliography of this method has been given by A. J. Ellis in a paper "on the potential radix as a means of calculating logarithms, printed in the Proceedings of the Royal Society, vol. xxxi., 1881, pp. 401-407, and vol. xxxii., 1881, pp. 377- 379. Reference should also be made to Hoppe's Tafeln zur dreissig- stelligen logarithmischen Rechnung (Leipzig, 1876), which give in a somewhat modified form a table of the hyperbolic logarithm of i-Hi'm.

The preceding methods are only appropriate for the calculation of isolated logarithms. If a complete table had to be reconstructed, or calculated to more places, it would undoubtedly be most convenient to employ the method of differences. A full account of this method as applied to the calculation of the Tables du Cadastre is given by Lefort in vol. iv. of the Annates de I ' Observaloire de Paris.

(J.W.L. G.)

LOGAU, FRIEDRICH, Freiherr von (1604-1655), German epigrammatist, was born at Brockut, near Nimptsch, in Silesia, in June 1604. He was educated at the gymnasium of Briegand subsequently studied law. He then entered the service of the duke of Brieg. In 1644 he was made " ducal councillor." He died at Liegnitz on the 24th of July 1655. Logau's epigrams, which appeared in two collections under the pseudonym " Salo- mon von Golaw " (an anagram of his real name) in 1638 (Erstes Hundert Teutscher Reitnenspriiche) and 1654 (Deutscher Sinnge- dichte drei Tausend), show a marvellous range and variety of expression. He had suffered bitterly under the adverse condi- tions of the time; but his satire is not merely the outcome of personal feeling. In the turbulent age of the Thirty Years' War he was one of the few men who preserved intact his intellectual integrity and judged his contemporaries fairly. He satirized with unsparing hand the court life, the useless bloodshed of the war, the lack of national pride in the German people, and their slavish imitation of the French in customs, dress and speech. He belonged to the Fruchtbringende Gesellsckaft under the name Der Verkleinernde, and regarded himself as a follower of Martin Opitz; but he did not allow such ties to influence his inde- pendence or originality.

Logau's Sinngedichte were edited in 1759 by G. E. Lessing and K. W. Ramler, who first drew attention to their merits; a second

edition appeared in 1791. A critical edition was published by G. Eitner in 1872, who also edited a selection of Logau's epigrams for the Deutsche Dichler des XVII. Jahrhunderts (vol. iii., 1870); there is also a selection by H. Oesterley in Kiirschner's Deutsche National- literatur, vol. xxviii. (1885). See H. Denker, Beitrdge zur literarischen Wiirdigung Logaus (1889); W. Heuschkel, Untersuchungen uber Ramlers und Lessings Bearbeitung Logauscher Sinngedichte (1901).

LOGIA, a title used to describe a collection of the sayings of Jesus Christ (Soyia 'l-qaov)

and therefore generally applied to the ” Sayings of Jesus ” discovered in Egypt by B. P. Grenfell and A. S. Hunt. There is some question as to whether the term is rightly used for this purpose. It does not occur in the Papyri in this sense. Each ” saying ” is introduced by the phrase ” Jesus says ” (Kiyet) and the collection is described in the intro- ductory words of the 1903 series as X6701 not as \6yia. Some justification for the employment of the term is found in early Christian literature. Several writers speak of the X6yia tov Kvpiov or tA KvpiaKa \oyia, i.e. oracles of (or concerning) the Lord. Poly- carp, for instance, speaks of ” those who pervert the oracles of the Lord ” (Philipp. 7.), and Papias, as Eusebius tells us, wrote a work with the title ” Expositions of the Oracles of the Lord.” The expression has been variously interpreted. It need mean no more (Lightfoot, Essays on Supernatural Religion, 172 seq.) than narratives of (or concerning) the Lord; on the other hand, the phrase is capable of a much more definite meaning, and there are many scholars who hold that it refers to a document which contained a collection of the sayings of Jesus. Some such document, we know, must lie at the base of our Synoptic Gospels, and it is quite possible that it may have been known to and used by Papias. It. is only on this assumption that the use of the term Logia in the sense described above can be justified.

” The Sayings,” to which the term Logia is generally applied, consist of (a) a papyrus leaf containing seven or eight sayings of Jesus discovered in 1897, (b) a second leaf containing five more sayings discovered in 1903, (c) two fragments of unknown Gospels, the former published in 1903, the latter in 1907. All these were found amongst the great mass of papyri acquired by the Egyptian Exploration Fund from the ruins of Oxyrhynchus, one of the chief early Christian centres in Egypt, situated some 120 m. S. of Cairo. The eight ” sayings ” discovered in 1897 are as follows: —

1 . ... nai Tore bia.fiXkrl’eLs iKfiaXetv to Kap

2. Ae7« ‘Ij7o-oDs kav A”? vrjaTtiariTt tov Kbup.ov ov p-i) tvprjre tt)V ftaa’CKuav tov Oeov’ Kai kav jiij aaftftaria-qTe to aaftparov ovk oˆtade tov irarkpa.

3. A«7et ‘Itjctous 2[

4. [Illegible: possibly joins on to 3] [t] vv irTwxeia>\

5. [Ae7] et [‘IijaoDs 07r] ou kav cJjtc [/if, o!k\ e [t‘ aStoC uai [o] irov ([Is] ioTiv p.6vos, [\e] 7u>, yu> etjitt p.tT’ air [ou] ’ cyei [p] ov t6v \idov Koucei tvp-r\atis /ie, ax- 70 ” T0 ˆv\ov Kayoi eKtt tt/tt.

6. Akyti ‘l-qjovs ovk ianv otKros irpoipi] TT\s kv T7J 7raTpt5t aia [o] D, ovhi iarpbs 7roieI depaireias eis tovs ytvuiKovras avTov.

7. \kyei ‘lyaovs trdXisoi KOOopr)p.kvr] kir’ aKpov [6] povs inprjXov Kai kaT-qpiy pkv- q ot/re Tre [farat ovTt Kpv [@] rjvai.

8. At7« ‘Ii)aovs d/coi/eis [cjis to ty ujiov aov to [6k irepov ovvkKKtio as] . Letters in brackets are missing in the original: letters which are

dotted beneath are doubtful.

1. ” . . .and then shalt thou see clearly to cast out the mote that is in thy brother’s eye.” .

2. ” Jesus saith, Except ye fast to the world, ye shall in no wise find the kingdom of God; and except ye make the sabbath a real sabbath, ye shall not see the Father.”

3. ” Jesus saith, I “stood in the midst of the world and in the flesh was I seen of them, and I found all men drunken, and none found I athirst among them, and my soul grievcth over the sons of men, because they are blind in their heart, and see not. ...”

4. ” . . .poverty. . . ”

5. ” Jesus saith, Wherever there are two, they are not without God, and wherever there is one alone, I say, I am with him. Raise the stone and there thou shalt find me, cleave the wood and there am I.”

6. ” Jesus saith, A prophet is not acceptable in his own country, neither doth a physician work cures upon them that know him.” ‘ 7. ” Jesus saith, A city built upon the top of a high hill and stablished can neither fall nor be hid.”

8. ” Jesus saith, Thou hearest with one ear [but the other ear hast thou closed] .”

The ” sayings ” of 1903 were prefaced by the following intro- ductory statement : —

oi rotot ol \6y0L oi [. . . ovs ekak-qaev ‘Iij(cfoD)s b £wv k [vplos ? . . . «ai Oa > /x£ Kai tlirev [aurots ‘ irSs ocrTts av tcov Xoycof tovt [u > v aKovajj davaTov ov jt«) yevoTiTai.

” These are the (wonderful?) words which Jesus the living (Lord) spake to . . . and Thomas and he said unto (them) every one that hearkens to these words shall never taste of death.”

The ” sayings ” themselves are as follows: —

(i) [\e7e1 ‘l7j(aov)s ‘ pi] iravaaadai £tj [twv . . . ecos av evpy Kai orav evpy [dapft-qd-tjaeT at Kai Oapft-qdtis ftaaiKevati- Ka [i @aai\evaas avairaijjeTai..

(2) X£7et ‘\ [Tj(aovs . . . Tives ... oi e\KovTes ij/xas [ets Trjv jSatrtXetaf ei 7j j6a ko’Tiv ; ra TeTeLva rod ovp [avov Kai tuiv Qt\p’ujiv 5 rt vtto ttjv yrjv €(tt [lv t/ kiri ttjs yijs Kai ot ixBvts ttjs 6aXa [ao-t] s ovtoi ot HXkov- t«s v/xas Kat 17 jSaaJtXeta tcov oiipavQv kvTos vp,£iv [k] aTt [koX ocrrts av eavrov yv < * > TavTqv evpi] [o-eL . . . kavToirs yvoiueoQe [koX iiˆTjaere ort viol %OTt iifieTs tov iraTpos tov t [. . . yvwo-(e

Kttt V CIS kaTt 7 ?7r7 ”o [

(3) [Xe7« ‘Ir)((7oi;)s ovk airoKviiGei dvd [poiTos . . . poiv kirtpoiTTJa at. ira [. . . puiv irepl tov tottov ttj [s ... aeTe ort iroWoi iaovrai 7r [pwrot ˆcrxarot Kai ot ecrx arot irp&Toi Kai [. . .

0”l > \

(4) X«7et ‘Itj((d)-qaeT [ai aoi. ov yap ka- tiv KpviTTov 6 ov ave [pov yevqaeTai Kai TeGap.p:kvov o o [0k kytpd-rjaeTai.

(5) [e$] eTa£ovaiv airrov o [i pad-qrai avrov Kai \t\yovaiv ‘ ttcos vqaTeO [aopev Kai tcos . . .

, . .] p\tBa Kai ttcos [. . .

. . K] at tl TapaT-qpija [op€V. . .

. .] v ; Xt7tt ‘Ii] (aov)s • [. . . , . .] etrat p.Tj 7ro£tr [€ ... . . .] tjs aXtjdeias av [. . .

. .] v a [ir] oKeKp [v ...

. .p.a] Kapt [6s] kaTiv [. . .

. .] to tcrrft . . . I. ..] «. [...

i. ” Jesus saith, Let not him who seeks . . . cease until he finds and when he finds he shall be astonished; astonished he shall reach the kingdom and having reached the kingdom he shall rest.”

2. ” Jesus saith (ye ask? who are those) that draw us (to the kingdom if) the kingdom is in Heaven? . . . the fowls of the air and all beasts that are under the earth or upon the earth and the fishes of the sea (these are they which draw) you and the kingdom of

Heaven is within you and whosoever shall know himself shall find it. (Strive therefore?) to know yourselves and ye shall beaware that ye are the sons of the (Almighty?) Father; (and?) ye shall know that ye are in (the city of God?) and ye are (the city?)."

3. " Jesus saith, A man shall not hesitate ... to ask concerning his place (in the kingdom. Ye shall know) that many that are first shall be last and the last first and (they shall have eternal life?)."

4. " Jesus saith, Everything that is not before thy face and that which is hidden from thee shall be revealed to thee. For there is nothing hidden which shall not be made manifest nor buried which shall not be raised."

5. " His disciples question him and say, How shall we fast and how shall we (pray?) . . . and what (commandment) shall we keep . . . Jesus saith ... do not ... of truth . . . blessed is he . . . "

The fragment of a lost Gospel which was discovered in 1903 contained originally about fifty lines, but many of them have perished and others are undecipherable. The translation, as far as it can be made out, is as follows: —

1-7. " (Take no thought) from morning until even nor from evening until morning either for your food what ye shall eat or for your rai- ment what ye shall put on. 7-13. Ye are far better than the lilies which grow but spin not. Having one garment what do ye (lack)? . . . 13-15- Who could add to your stature? 15-16. He himself will give you your garment. 17-23. His disciples say unto him, When wilt thou be manifest unto us and when shall we see thee? He saith. When ye shall be stripped and not be ashamed . . . 41-46. He

said, The key of knowledge ye hid: ye entered not in yourselves, and to them that were entering in, ye opened not."

The second Gospel fragment discovered in 1907 " consists of a single vellum leaf, practically complete except at one of the lower corners and here most of the lacunae admit of a satisfactory solution. " The translation is as {olio ws : —

. . . before he does wrong makes all manner of subtle excuse. But give heed lest ye also suffer the same things as they: for the evil doers among men receive their reward not among the living only, but also await punishment and much torment. And he took them and brought them into the very place of purification and was walking in the temple. And a certain Pharisee, a chief priest, whose name was Levi, met them and said to the Saviour, Who gave thee leave to walk in this place of purification, and to see these holy vessels when thou hast not washed nor yet have thy disciples bathed their feet? But defiled thou hast walked in this temple, which is a pure place, wherein no other man walks except he has washed himself and changed his garments neither does he venture to see these holy vessels. And the Saviour straightway stood still with his disciples and answered him, Art thou then, being here in the temple, clean? He saith unto him, I am clean; for I washed in the poo! of David and having descended by one staircase, I ascended by another and I put on white and ciean garments, and then 1 came and looked upon these holy vessels. The Saviour answered and said unto him, Woe ye blind, who see not. Thou hast washed in these running waters wherein dogs and swine have been cast night and day and hast cleansed and wiped the outside skin which also the harlots and_flute- girls anoint and wash and wipe and beautify for the lust of men; but within they are full of scorpions and all wickedness. But I and my disciples who thou sayest have not bathed have been dipped in the waters of eternal life which come from. . . . But woeunto.thee. . . .

These documents have naturally excited considerable interest and raised many questions. The papyri of the ” sayings ” date from the 3rd century and most scholars agree that the ” sayings ” themselves go back to the 2nd. The year A.D.140 is generally assigned as the terminus ad quern. The problem as to their origin has been keenly discussed. There are two main types of theory. (1) Some suppose that they are excerpts from an uncanonical Gospel. (2) Others think that they represent an independent and original collection of sayings. The first theory has assumed three main forms, (a) Harnack maintains that they were taken from the Gospel according to the Egyptians. This theory, however, is based upon a hypothetical reconstruction of the Gospel in question which has found very few supporters. (b) Others have advocated the Gospel of the Hebrews as the source of the ” sayings,” on the ground of the resemblance between the first ” saying” of the 1903 series and a well-authenti- cated fragment of that Gospel. The resemblance, however, is not sufficiently clear to support the conclusion, (c) A third view supposes that they are extracts from the Gospel of Thomas — an apocryphal Gospel dealing with the boyhood of Jesus. Beyond the allusion to Thomas in the introductory paragraph to the 1903 series, there seems to be no tangible evidence in support of this view. The second theory, which maintains that the papyri represent an independent collection of ” sayings,” seems to be the opinion which has found greatest favour. It has won the support of W. Sanday, H. B. Swete, Rendel Harris, W. Lock, Heinrici, &c. There is a considerable diversity of judgment, however, with regard to the value of the collection, (a) Some scholars maintain that the collection goes back to the 1st century and represents one of the earliest attempts to construct an account of the teaching of Jesus. They are therefore disposed to admit to a greater or less extent and with widely varying degrees of confidence the presence of genuine elements in the new matter, (b) Sanday and many others regard the sayings as originating early in the 2nd century and think that, though not ” directly dependent on the Canonical Gospels,” they have ” their origin under conditions of thought which these Gospels had created.” The ” sayings ” must be regarded as expansions of the true tradition, and little value is therefore to be attached to the new material.

With the knowledge at our disposal, it is impossible to reach an assurqjl conclusion between these two views. The real problem, to which at present no solution has been found, is to account for the new material in the “sayings.” There seems to be no motive sufficient to explain the additions that have been made to the text of the Gospels. It cannot be proved that the expansions have

been made in the interests of any sect or heresy. Unless new discoveries provide the clue, or some reasonable explanation can otherwise be found, there seems to be no reason why we should not regard the ” sayings ” as containing material which ought to be taken into acco*unt in the critical study of the teaching of Jesus.

The 1903 Gospel fragment is so mutilated in many of its parts that it is difficult to decide upon its character and value. It appears to be earlier than 150, and to be taken from a Gospel which followed more or less closely the version of the teaching of Jesus given by Matthew and Luke. The phrase ” when ye shall be stripped and not be ashamed ” contains an idea which has some affinity with two passages found respectively in the Gospel according to the Egyptians and the so-called Second Epistle of Clement. The resemblance, however, is not sufficiently close to warrant the deduction that either the Gospel of the Egyptians or the Gospel from which the citation in 2 Clement is taken (if these two are distinct) is the source from which our fragment is derived.

The second Gospel fragment (1907) seems to be of later origin than the documents already mentioned. Grenfell and Hunt date the Gospel, from which it is an excerpt, about 200. There is considerable difficulty with regard to some of the details. The statement that an ordinary Jew was required to wash and change his clothes before visiting the inner court of the temple is quite unsupported by any other evidence. Nothing is known about ” the place of purification ” (a.yvfvrljpwv) nor ” the pool of David ” (\ijw77 rod AaveiS). Nor does the statement that “the sacred vessels” were visible from the place where Jesus was standing seem at all probable. Grenfell and

Hunt conclude therefore — “So great indeed are the divergences between this account and the extant and no doubt well-informed authorities with regard to the topography and ritual of the Temple that it is hardly possible to avoid the conclusion that much of the local colour is due to the imagination of the author who was aiming chiefly at dramatic effect and was not really well acquainted with the Temple. But if the inaccuracy of the fragment in this important respect is admitted the historical character of the whole episode breaks down and it is probably to be regarded as an apocryphal elaboration of Matt. xv. 1-20 and Mark vii. 1-23.”

See the Oxyrhynchus Papyri, part i. (1897), part iv. (1904), part v. (1908)- (H. T. A.)

LOGIC (Xoy«i7, sc. Tkxvrj, the art of reasoning), the name given to one of the four main departments of philosophy, though its sphere is very variously delimited. The present article is divided into I. The Problems of Logic, II. History.

I. The Problems of Logic.

Introduction. — Logic is the science of the processes of inference. What, then, is inference ? It is that mental operation which proceeds by combining two premises so as to cause a consequent conclusion. Some suppose that we may infer from one premise by a so-called ” immediate inference.” But one premise can only reproduce itself in another form, e.g. all men are some animals; therefore some animals are men. It requires the com- bination of at least two premises to infer a conclusion different from both. There are as many kinds of inference as there are different ways of combining premises, and in the main three types: —

1. Analogical Inference, from particular to particular: e.g. border- war between Thebes and Phocis is evil; border- war between Thebes and Athens is similar to that between Thebes and Phocis; therefore, border- war between Thebes and Athens is evil.

2. Inductive Inference, from particular to universal: e.g. border-war between Thebes and Phocis is evil; all border- war is like that between Thebes and Phocis; therefore, all border- war is evil.

3. Deductive or Syllogistic Inference, from universal to particu- lar, e.g. all border- war is evil; border- war between Thebes and Athens is border-war; therefore border-war between Thebes and Athens is evil.

In each of these kinds of inference there are three mental judgments capable of being expressed as above in three linguistic propositions; and the two first are the premises which are combined, while the third is the conclusion which is consequent on their combination. Each proposition* consists of two terms, the subject and its predicate, united by the copula. Each in- ference contains three terms. In syllogistic inference the subject of the conclusion is the minor term, and its predicate the major term, while between these two extremes the term common to the two premises is the middle term, and the premise containing the middle and major terms is the major premise, the premise containing the middle and minor terms the minor premise. Thus in the example of syllogism given above, ” border-war between Thebes and Athens ” is the minor term, ” evil ” the major term, and ” border-war ” the middle term. Using S for minor, P for major and M for middle, and preserving these signs for corresponding terms in analogical and inductive inferences, we obtain the following formula of the three inferences: —

A nalogical.

S’isP

S* is similar to S 1

S’ is P.

Inductive. SisP Every M is similar

toS . Every M is P.

Deductive or Syllogistic. Every M is P SisM

.-.Sis P.

The love of unity has often made logicians attempt to resolve these three processes into one. But each process has a pecu- liarity of its own; they are similar, not the same. Analogical and inductive inference alike begin with a particular premise containing one or more instances; but the former adds a par- ticular premise to draw a particular conclusion, the latter requires a universal premise to draw a universal conclusion. A citizen of Athens, who had known the evils of the border-war between Thebes and Phocis, would readily perceive the analogy of a similar war between Thebes and Athens, and conclude analog- ously that it would be evil; but he would have to generalize the similarity of all border-wars in order to draw the inductive conclusion that all alike are evil. Induction and deduction differ still more, and are in fact opposed, as one makes a particular premise the evidence of a universal conclusion, the other makes a universal premise evidence of a particular conclusion. Yet they are alike in requiring the generalization of the universal and the belief that there are classes which are whole numbers of similars. On this point both differ from inference by analogy, which proceeds entirely from particular premises to a particular conclusion. Hence we may redivide inference into particular inference by analogy and universal inference by induction and deduction. Universal inference is what we call reasoning; and its two species are very closely connected, because universal conclusions of induction become universal premises of deduction. Indeed, we often induce in order to deduce, ascending from par- ticular to universal and descending from universal to particular in one act as it were ; so that we may proceed either directly from particular to particular by analogical inference, or indirectly from particular through universal to particular by an inductive- deductive inference which might be called ” perduction.” On the whole, then, analogical, inductive and deductive inferences are not the same but three similar and closely connected processes. The three processes of inference, though different from one another, rest on a common principle of similarity of which each is a different application. Analogical inference requires that one particular is similar to another, induction that a whole number or class is similar to its particular instances, deduction that each particular is similar to the whole number or class. Not that these inferences require us to believe, or assume, or premise or formulate this principle either in general, or in its applied forms: the premises are all that any inference needs the mind to assume. The principle of similarity is used, not assumed by the inferring mind, which in accordance with the similarity of things and the parity of inference spontaneously concludes in the form that similars are similarly determined (” similia similibus convenire “). In applying this principle of similarity, each of the three processes in its own way has to premise both that something is somehow determined and that something is similar,

and by combining these premises to conclude that this is similarly determined to that. Thus the very principle of inference by similarity requires it to be a combination of premises in order to draw a conclusion.

The three processes, as different applications of the principle of similarity, consisting of different combinations of premises, cause different degrees of cogency in their several conclusions. Analogy hardly requires as much evidence as induction. Men speculate about the analogy between Mars and the earth, and infer that it is inhabited, without troubling about all the planets. Induction has to consider more instances, and the

similarity of a whole number or class. Even so, however, it starts from a particular premise which only contains many instances, and leaves room to doubt the universality of its conclusions. But deduction, starting from a premise about all the members of a class, compels a conclusion about every and each of necessity. One border-war may be similar to another, and the whole number may be similar, without being similarly evil; but if all alike are evil, each is evil of necessity. Deduction or syllogism is superior to analogy and induction in combining premises so as to involve or contain the conclusion. For this reason it has been elevated by some logicians above all other inferences, and for this very same reason attacked by others as no inference at all. The truth is that, though the premises contain the conclusion, neither premise alone contains it, and a man who knows both but does not combine them does not draw the conclusion; it is the synthesis of the two premises which at once contains the conclusion and advances our knowledge; and as syllogism consists, not indeed in the discovery, but essentially in the synthesis of two premises, it is an inference and an advance on each premise and on both taken separately. As again the synthesis contains or involves the conclusion, syllogism has the advantage of compelling assent to the consequences of the premises. Inference in general is a combination of premises to cause a conclusion; deduction is such a combination as to compel a conclusion involved in the combination, and following from the premises of necessity.

Nevertheless, deduction or syllogism is not independent of the other processes of inference. It is not the primary inference of its own premises, but constantly converts analogical and inductive conclusions into its particular and universal premises. Of itself it causes a necessity of consequence, but only a hypothetical necessity; if these premises are true, then this con- clusion necessarily follows. To eliminate this " if " ultimately requires other inferences before deduction. Especially, induction to universals is the warrant and measure of deduction from uni- versals. So far as it is inductively true that all border-war is evil, it is deductively true that a given border-war is therefore evil. Now, as an inductive combination of premises does not necessarily involve the inductive conclusion, induction normally leads, not to a necessary, but to a probable conclusion; and whenever its probable conclusions become deductive premises, the deduction only involves a probable conclusion. Can we then infer any certainty at all ? In order to answer this question we must remember that there are many degrees of probability, and that induction, and therefore deduction, draw conclusions more or less probable, and rise to the point at which probability becomes moral certainty, or that high degree of probability which is sufficient to guide our lives, and even condemn murderers to death. But can we rise still higher and infer real necessity ? This is a difficult question, which has received many answers. Some noologists suppose a mental power of forming necessary principles of deduction a priori; but fail to show how we can apply principles of mind to things beyond mind. Some empiricists, on the other hand, suppose that induction only infers probable conclusions which are premises of probable deductions; but they give up all exact science. Between these extremes there is room for a third theory, empirical yet providing a knowledge of the really necessary. In some cases of induction concerned with objects capable of abstraction and simplification, we have a power of identification, by which, not a priori but in the act of inducing a conclusion, we apprehend that the things signified

by its subject and predicate are one and the same thing which cannot exist apart from itself. Thus by combined induction and identification we apprehend that one and one are the same as two, that there is no difference between a triangle and a three-sided rectilineal figure, that a whole must be greater than its part by being the whole, that inter-resisting bodies necessarily force one another apart, otherwise they would not be inter- resisting but occupy the same place at the same moment. Necessary principles,

discovered by this process of induction and identification, become premises of deductive demonstration to conclusions which are not only necessary consequents on the premises, but also equally necessary in reality. Induction thus is the source of deduction, of its truth, of its probability, of its moral certainty, and induction, combined with identification, is the origin of the necessary principles of demonstration or deduction to necessary conclusions.

Analogical inference in its turn is as closely allied with induc- tion. Like induction, it starts from a particular premise, contain- ing one or more examples or instances; but, as it is easier to infer a particular than a universal conclusion, it supplies particular conclusions which in their turn become further particular premises of induction. Its second premise is indeed merely a particular apprehension that one particular is similar to another, whereas the second premise of induction is a universal apprehen- sion that a whole number of particulars is similar to those from which the inference starts; but at bottom these two apprehen- sions of similarity are so alike as to suggest that the universal premise of induction has arisen as a generalized analogy. It seems likely that man has arrived at the apprehension of a whole individual, e.g. a whole animal including all its parts, and thence has inferred by analogy a whole number, or class, e.g. of animals including all individual animals; and accordingly that the particular analogy of one individual to another has given rise to the general analogy of every to each individual in a class, or whole number of individuals, contained in the second premise of induction. In this case, analogical inference has led to induction, as induction to deduction. Further, analogical inference from particular to particular suggests inductive- deductive inference from particular through universal to particular.

Newton, according to Dr Pemberton, thought in 1666 that the moon moves so like a falling body that it has a similar centripetal force to the earth, 20 years before he demonstrated this conclusion from the laws of motion in the Principia. In fact, analogical, inductive and deductive inferences, though different processes of combining premises to cause different conclusions, are so similar and related, so united in principle and interdependent, so consolidated into a system of inference, that they cannot be completely investigated apart, but together constitute a single subject of science. This science of inference in general is logic.

Logic, however, did not begin as a science of all inference. Rather it began as a science of reasoning (\6yos), of syllogism (av\oyis), of deductive inference. Aristotle was its founder. He was anticipated of course by many generations of spontaneous thinking (logica naturalis). Many of the higher animals infer by analogy: otherwise we cannot explain their thinking. Man so infers at first: otherwise we cannot explain the actions of young children, who before they begin to speak give no evidence of universal thinking. It is likely that man began with particular inference and with particular language; and that, gradually generalizing thought and language, he learnt at last to think and say " all," to infer universally, to induce and deduce, to reason, in short, and raise himself above other animals. In ancient times, and especially in Egypt, Babylon and Greece, he went on to develop reason into science or the systematic investigation of definite subjects, e.g. arithmetic of number, geometry of magnitude, astronomy of stars, politics of govern- ment, ethics of goods. In Greece he became more and more reflective and conscious of himself, of his body and soul, his manners and morals, his mental operations and especially his reason. One of the characteristics of Greek philosophers is

their growing tendency, in investigating any subject, to turn round and ask themselves what should be the method of investiga- tion. In this way the Presocratics and Sophists, and still more Socrates and Plato, threw out hints on sense and reason, on inferential processes and scientific methods which may be called anticipations of logic. But Aristotle was the first to conceive of reasoning itself as a definite subject of a special science, which he called analytics or analytic science, specially designed to analyse syllogism and especially demonstrative syllogism, or science, and to be in fact a science of sciences. He was therefore the founder of the science of logic.

Among the Aristotelian treatises we have the following, which together constitute this new science of reasoning : —

1. The Categories, or names signifying things which can become predicates ;

2. The De Interpretationˆ or the enumeration of conceptions and their combinations by (1) nouns and verbs (names), (2) enunciations (propositions) ;

3. The Prior Analytics, on syllogism;

4. The Posterior Analytics, on demonstrative syllogism, or science ;

5. The Topics, on dialectical syllogism ; or argument ;

6. The Sophistical Elenchi, on sophistical or contentious syllogism, or sophistical fallacies.

So far as we know, Aristotle had no one name for all these in- vestigations. ” Analytics ” is only applied to the Prior and Posterior Analytics, and ” logical,” which he opposed to ” analytical,” only suits the Topics and at most the Sophistical Elenchi; secondly, while he analyzed syllogism into premises, major and minor, and premises into terms, subject and predicate, he attempted no division of the whole science ; thirdly, he attempted no order and arrange- ment of the treatises into a system of logic, but only of the Analytics, Topics and Sophistical Elenchi into a system of syllogisms. Never- theless, when his followers had arranged the treatises into the Organon, as they called it to express that it is an instrument of science, then there gradually emerged a system of syllogistic logic, arranged in the triple division — terms, propositions and syllogisms — which has survived to this day as technical logic, and has been the foundation of all other logics, even of those which aim at its de- struction.

The main problem which Aristotle set before him was the analysis of syllogism, which he defined as ” reasoning in which certain things having been posited something different from them of necessity follows by their being those things ” {Prior Analytics, i. 1). What then did he mean by reasoning, or rather by the Greek word X670S of which ” reasoning ” is an approxi- mate rendering? It was meant (cf. Post. An. i. 10) to be both internal, in the soul (6 Xoyos, iv rfl ˆi>xfl), and external, in language (6 ?£to X6705): hence after Aristotle the Stoics distinguished X670S evSiaOeros and Trpo(£opu6s. It meant, then, both reason and discourse of reason (cf. Shakespeare, Hamlet, i. 2). On its mental side, as reason it meant combination of thoughts. On its linguistic side, as discourse it was used for any combination of names to form a phrase, such as the definition ” rational animal,” or a book, such as the Iliad. It had also the mathematical meaning of ratio; and in its use for definition it is sometimes transferred to essence as the object of definition, and has a mixed meaning, which may be expressed by ” account.” In all its uses, however, the common meaning is combination. When Aristotle called syllogism X670S, he meant that it is a combination of premises involving a conclusion of necessity. Moreover, he tended to confine the term X67 os to syllogistic inference. Not that he omitted other inferences (irtcrreis). On the contrary, to him (cf. Prior Analytics, ii. 24) we owe the triple distinction into inference from particular to particular (ira.pa8et.yna,, example, or what we call ” analogy “), inference from particular to universal (brayuyii, induction) , and inference from universal to particular (o-vXKoyio-pfc, syllogism, or deduc- tion). But he thought that inferences other than syllogism are imperfect; that analogical inference is rhetorical induction; and that induction, through the necessary preliminary of syllogism and the sole process of ascent from sense, memory and experience to the principles of science, is itself neither reasoning nor science. To be perfect he thought that all inference must be reduced to syllogism of the first figure, which he regarded as the specially scientific Inference. Accordingly, the syllogism appeared to him to be the rational process (nerd, \6yov), and the demonstrative syllogism from inductively discovered principles to be science

(tinoTTinr)) . Hence, without his saying it in so many words, Aristotle's .logic perforce became a logic of deductive reasoning, or syllogism. As it happened this deductive tendency helped the development of logic. The obscurer premises of analogy and induction, together with the paucity of experience and the back- ward state of physical science in Aristotle's time would have baffled even his analytical genius. On the other hand, the demonstrations of mathematical sciences of his time, and the logical forms of deduction evinced in Plato's dialogues,- provided hjm with admirable examples of deduction, which is also the inference most capable of analysis. Aristotle's analysis of the syllogism showed man how to advance by combining his thoughts in trains of deductive reasoning. Nevertheless, the wider question remained for logic: what is the nature of all in- ference, and the special form of each of its three main processes?

As then the reasoning of the syllogism was the main problem of Aristotle's logic, what was his analysis of it? In distinguishing inner and outer reason, or reasoning and discourse, he added that it is not to outer reason but to inner reason in the soul that demon- stration and syllogism are directed (Post. An. i. 10). One would expect, then, an analysis of mental reasoning into mental judgments (kptueis) as premises and conclusion. In point of fact, he analysed it into premises, but then analysed a premise into terms, which he divided into subject and predicate, with the addition of the copula " is " or " is not." This analysis, regarded as a whole and as it is applied in the Analytics and in the other logical treatises, was evidently intended as a linguistic analysis. So in the Categories; he first divided things said (to. \ey6/j.eva) into uncombined and combined, or names and propositions, and then divided the former into categories; and in the De interpretation he expressly excluded mental conceptions and their combinations, and confined himself to nouns and verbs and enunciations, or, as we should say, to names and propositions. Aristotle apparently intended, or at all events has given logicians in general the impression, that he intended to analyse syllogism into propositions as premises, and premise into names as terms. His logic therefore exhibits the curious paradox of being an analysis of mental reasoning into linguistic elements. The explanation is that outer speech is more obvious than inner thought, and that grammar and poetic criticism, rhetoric and dialectic preceded logic, and that out of those arts of language arose the science of reasoning. The sophist Protagoras had distinguished various kinds of sentences, and Plato had divided the sentence into noun and verb, signifying a thing and the action of a thing. Rhetoricians had enumerated various means of persuasion, some of which are logical forms, e.g. probability and sign, example and enthymeme. Among the dialecticians, Socrates had used inductive arguments to obtain definitions as data of deductive arguments against his opponents, and Plato had insisted on the processes of ascending to and descending from an unconditional principle by the power of giving and receiving argument. All these points about speech, eloquence and argument between man and man were ab- sorbed into Aristotle's theory of reasoning, and in particular the grammar of the sentence consisting of noun and verb caused the iogic of the proposition consisting of subject and predicate. At the same time, Aristotle was well aware that the science of reasoning is no art of language and must take up a different position towards speech as the expression of thought. In the Categories he classified names, not, however, as a grammarian by their structure, but as a iogician by their signification. In the De inter pretal-ione, having distinguished the enunciation, or proposition, from other sentences as that in which there is truth or falsity, he relegated the rest to rhetoric or poetry, and founded the logic of the proposi- tion, in which, however, he retained the grammatical analysis into noun and verb. In the Analytics he took the final step of originating the logical analysis of the proposition as premise into subject and predicate as terms mediated by the copula, and analysed the syllogism into these elements. Thus did he become the founder of the logical but linguistic analysis of reasoning as discourse (& 2£w Xotos) into propositions and terms. Nevertheless, the deeper ques- tion remained, what is the logical but mental analysis of reasoning itself (6 ?

Aristotle thus was the founder of logic as a science. But he laid too much stress on reasoning as syllogism or deduction, and on deductive science; and he laid too much stress on the linguistic analysis of rational discourse into proposition and terms. These two defects remain ingrained in technical logic to this day. But in the course of the development of the science, logicians have endeavoured to correct those defects, and have diverged into two schools. Some have devoted themselves to induction from sense and experience and widened logic till it has become a general science of inference and scientific method. Olhers have devoted themselves to the mental analysis of reasoning,

and have narrowed logic into a science of conception, judgment and reasoning. The former belong to the school of empirical logic, the latter to the school of conceptual and formal logic. Both have started from points which Aristotle indicated without developing them. But we shall find that his true descendants are the empirical logicians.

Aristotle was the first of the empiricists. He consistently maintained that sense is knowledge of particulars and the origin of scientific knowledge of universals. In his view, sense is a congenital form of judgment (Swa/uis crvfXcfrvTOs KpiTiici), Post. An. ii. 19); a sensation of each of the five senses is always true of its proper object; without sense there is no science; sense is the origin of induction, which is the origin of deduction and science. The Analytics end (Post. An. ii. 10) with a detailed system of empiricism, according to which sense is the primary knowledge of particulars, memory is the retention of a sensation, experience is the sum of many memories, induction infers universals, and intelligence is the true apprehension of the uni- versal principles of science, which is rational, deductive, demonstrative, from empirical principles.

This empirical groundwork of Aristotle's logic was accepted by the Epicureans, who enunciated most distinctly the fundamental doctrine that all sensations are true of their immediate objects, and falsity begins with subsequent opinions, or what the moderns call " interpretation." Beneath deductive logic, in the logic of Aristotle and the canonic of the Epicureans, there already lay the basis of empirical logic: sensory experience is the origin of all inference and science. It remained for Francis Bacon to develop these beginnings into a new logic of induction. He did not indeed accept theˆinfallibility of sense or of any other operation unaided. He thought, rather, that every operation becomes infallible by method. Following Aristotle in this order— sense, memory, intellect— he resolved the whole process of induction into three ministrations: —

1 . The ministration to sense, aided by observation and experiment.

2. The ministration to memory, aided by registering and arranging the data, of observation and experiment in tables of instances of agreement, difference and concomitant variations.

3. The ministration to intellect or reason, aided by the negative elimination by means of contradictory instances of whatever in the instances is not always present, absent and varying with the given subject investigated, and finally by the positive inference that whatever in the instances is always present, absent and varying with the subject is its essential cause.

Bacon, like Aristotle, was anticipated in this or that point; but, as Aristotle was the first to construct a system of deduction in the syllogism and its three figures, so Bacon was the first to construct a system of induction in three ministrations, in which the requisites of induction, hitherto recognized only in sporadic hints, were com- bined for the first time in one logic of induction. Bacon taught men to labour in inferring from particular to universal, to lay as much stress on induction as on deduction, and to think and speak of inductive reasoning, inductive science, inductive logic. More- over, while Aristotle had the merit of discerning the triplicity of inference, to Bacon we owe the merit of distinguishing the three processes without reduction : —

1. Inference from particular to particular by Experientia

Literata, in piano;

2. Inference from particular to universal by Inductio, ascendendo;

3. Inference from universal to particular by Syllogism, descen-

dendo.

In short, the comprehensive genius of Bacon widened logic into a general science of inference.

On the other hand, as Aristotle over-emphasized deduction so Bacon over-emphasized induction by contending that it is the only process of discovering universals (axiomata), which deduction only applies to particulars. J. S. Mill in his Logic pointed out this defect, and without departing from Baconian principles remedied it by quoting scientific examples, in which deduction, starting from inductive principles, applies more general to less general universals, e.g. when the more general law of gravitation is shown to include the less general laws of planetary gravitation. Mill's logic has the' great merit of copiously exemplifying the principles of the variety of method according to subject-matter. It teaches us that scientific method is sometimes induction, sometimes deduction, and some- times the consilience of both, either by the inductive verification of previous deductions, or by the deductive explanation of previous inductions.

It is also most interesting to notice that Aristotle saw further than Bacon in this direction. The founder of logic anticipated the latest logic of science, when he recognized, not only the deduction of mathematics, but also the experience of facts followed by de- ductive explanations of their causes in physics.

The consilience of empirical and deductive processes was an Aristotelian discovery, elaborated Iry Mill against Bacon. On

the whole, however, Aristotle, Bacon and Mill, purged from their errors, form one empirical school, gradually growing by adapting itself to the advance of science; a school in which Aristotle was most influenced by Greek deductive Mathematics, Bacon by the rise of empirical physics at the Renaissance, and Mill by the Newtonian combination of empirical facts and mathematical principles in the Principia. From studying this succession of empirical logicians, we cannot doubt that sense, memory and experience are the real origin of inference, analogical, inductive and deductive. The deepest problem of logic is the relation of sense and inference. But we must first consider the mental analysis of inference, and this brings us to conceptual and formal logic.

Aristotle's logic has often been called formal logic; it was really a technical logic of syllogism analysed into linguistic elements, and of science rested on an empirical basis. At the same time his psychology, though maintaining his empiricism, contained some seeds of conceptual logic, and indirectly of formal logic. Intellectual development, which according to the logic of the Analytics consists of sense, memory, experience, induction and intellect, according to the psychology of the De Anima consists of sense, imagination and intellect, and one division of intellect is into conception of the undivided and combination of conceptions as one {De An. iii. 6). The De Interpretations opens with a reference to this psychological distinction, implying that names represent conceptions, pro- positions represent combinations of conceptions.

But the same passage relegates conceptions anc^ their combinations to the De Anima, and confines the De Interpretation to names and propositions in conformity with the linguistic analysis which pervades the logical treatises of Aristotle, who neither brought his psychological distinction between conceptions and their com- binations into his logic, nor advanced the combinations of con- ceptions as a definition of judgment (icpidis), nor employed the mental distinction between conceptions and judgments as an analysis of inference, or reasoning, or syllogism: he was no con- ceptual logician. The history of logic shows that the linguistic distinction between terms and propositions was the sole analysis of reasoning in the logical treatises of Aristotle; that the mental distinction between conceptions {ivvoiai) and judgments (afuojuara in a wide sense) was imported into logic by the Stoics; and that this mental distinction became the logical analysis of reasoning under the authority of St Thomas Aquinas. In his commentary on the De Interpretation, St Thomas, after citing from the De Anima Aristotle's " duplex operatio intellectus," said, " Additur autem et tertia operatio, scilicet ratiocinandi," and concluded that, since logic is a rational science {rationalis scienlia) , its consideration must be directed to all these operations of reason. Hence arose conceptual logic; according to which conception is a simple apprehension of an idea without belief in being or not being, e.g. the idea of man or of running; judg- ment is a combination of conceptions, adding being or not being, e.g. man is running or not running; and reasoning is a com- bination of judgments: conversely, there is a mental analysis of reasoning into judgments, and judgment into conceptions, beneath the linguistic analysis of rational discourse into pro- positions, and propositions into terms. Logic, according to this new school, which has by our time become an old school, has to co-ordinate these three operations, direct them, and, beginning with conceptions, combine conceptions into judgments, and judgments into inference, which thus becomes a complex com- bination of conceptions, or, in modern parlance, an extension of our ideas. Conceptual logicians were, indeed, from the first aware that sense supplies the data, and that judgment and therefore inference contains belief that things are or are not. ' But they held, and still hold that sensation and conception are alike mere apprehensions, and that the belief that things are or are not arises somehow after sensation and conception in judg- ment, from which it passes into inference. At first, they were more sanguine of extracting from these unpromising beginnings some knowledge of things beyond ideas. But at length many of them became formal logicians, who held that logic is the

investigation of formal thinking, or consistent conception, judgment and reasoning; that it shows how we infer formal truths of consistency without material truth of signifying things; that, as the science of the form or process, it must entirely abstract from the matter, or objects, of thought; and that it does not tell us how we infer from experience. Thus has logic drifted further and further from the real and empirical logic of Aristotle the founder and Bacon the reformer of the science.

The great merit of conceptual logic was the demand for a mental analysis of mental reasoning, and the direct analysis of reasoning into judgments which are the sole premises and con- clusions of reasoning and of all mental inferences. Aristotle had fallen into the paradox of resolving a mental act into verbal elements. The Schoolmen, however, gradually came to realize that the result to their logic was to make it a sermocionalis scienlia, and to their metaphysics the danger of nominalism. St Thomas made a great advance by making logic throughout a rationalis scienlia; and logicians are now agreed that reasoning consists of judgments, discourse of propositions. This dis- tinction is, moreover, vital to the whole logic of inference, because we always think all the judgments of which our inference consists, but seldom state all the propositions by which it is expressed. We omit propositions, curtail them, and even express a judgment by a single term, e.g. " Good ! " "„Fire ! ". Hence the linguistic expression is not a true measure of inference; and to say that an inference consists of two propositions causing a third is not strictly true. But to say that it is two judgments causing a third is always true, and the very essence of inference, because we must think the two to conclude the third in " the sessions of sweet silent thought." Inference, in short, consists of actual judgments capable of being expressed in

propositions.

Inference always consists of judgments. But judgment does not always consist of conceptions. It is not a combination of con- ceptions; it does not arise from conceptions, nor even at first require conception. Sense is the origin of judgment. One who feels pained or pleased, who feels hot or cold or resisting in touch, who tastes the flavoured, who smells the odorous, who hears the sounding, who sees the coloured, or is conscious, already believes that some- thing sensible exists before conception, before inference, and before language; and his belief is true of the immediate object of sense, the sensible thing, e.g. the hot felt in touch. But a belief in the existence of something is a judgment and a categorical judgment of existence. Sense, then, outer and inner, or sensation and con- sciousness, is the origin of sensory judgments which are true cate- gorical beliefs in the existence of sensible things ; and primary judgments are such true categorical sensory beliefs that things exist, and neither require conception nor are combinations of con- ceptions. Again, since sense is the origin of memory and experience, memorial and experiential judgments are categorical and existential judgments, which so far as they report sensory judgments are always true. Finally, since sense, memory and experience are the origin of inference, primary inference is categorical and existential, starting from sensory, memorial and experiential judgments as premises, and proceeding to inferential judgments as conclusions, which are categorical and existential, and are true, so far as they depend on sense, memory and experience.

Sense, then, is the origin of judgment; and the consequence is that primary judgments are true, categorical and existential judgments of sense, and primary inferences are inferences from categorical and existential premises to categorical and existential conclusions, which are true so far as they arise from outer and inner sense, and proceed to things similar to sensible things. All other judgments and inferences about existing things, or ideas, or names, whether categorical or hypothetical, are afterthoughts, partly true and partly false.

Sense, then, because it involves a true belief in existence is fitted to be the origin of judgment. Conception on the other hand is the simple apprehension of an idea, particular or universal, but without belief that anything is or is not, and therefore is unfitted to beget judgment. Nor could a combination of conceptions make a difference so fundamental as that between conceiving and believing. The most that it could do would be to cause an ideal judgment, e.g. that the idea of a centaur is the idea of a man-horse ; and even here some further origin is needed for the addition of the copula " is."

So far from being a cause, conception is not even a condition of all judgments; a sensation of hot is sufficient evidence that hot exists, before the idea of hot is either present or wanted. Conception is, however, a condition of a memorial judgment: in order to re- member being hot, we require an idea of hot. Memory, however, is not that idea, but involves a judgment that there previously existed the hot now represented by the idea, which is about the sensible thing beyond the conceived idea; and the cause of this

memorial judgment is past sens? and present memory. So sense, memory and experierlce, the suni of sense and memory, though requiring conception, are the causes of the experiential judgment that there exist and have existed many similar, sensible things, and these sensory, memorial and experiential judgments about the existence of past and present sensible things beyond conceived ideas become the particular premises of primary inference. Starting from them, inference is enabled to draw

conclusions which are inferential judgments about the existence of things similar to sensible things beyond conceived ideas. In rising, however, from particular to universal inference, induction, as we have seen, adds to its particular premise, S is P, a universal premise, every M is similar to S, in order to infer the universal conclusion, every M is P. This universal premise requires a universal conception of a class or whole number of similar particulars, as a condition. But the premise is not that conception; it is a belief that there is a whole number of particulars similar to those already experienced. The generalization of a class is not, as the conceptual logic assumes, the abstraction of a general idea, but an inference from the analogy of a whole individual thing, e.g. a whole man, to a whole number of similar individuals, e.g. the whole of men. The general idea of all men or the combination that the idea of all men is similar to the idea of particular men would not be enough; the universal premise that all men in fact are similar to those who have died is required to induce the universal conclusion that all men in fact die. Universal inference thus requires particular and universal conceptions as its condition; but, so far as it arises from sense, memory, experience, and involves generalization, it consists of judgments which do not consist of conceptions, but are beliefs in things existing beyond conception. Inference then, so far as it starts from categorical and existential premises, causes conclusions, or inferential judgments, which require conceptions, but are categorical and existential judg- ments beyond conception. Moreover, as it becomes more de- ductive, and causes conclusions further from sensory experience, these inferential judgments become causes of inferential conceptions. For example, from the evidence of molar changes due to the obvious parts of bodies, science first comes to believe in molecular changes due to imperceptible particles, and then tries to conceive the ideas of particles, molecules, atoms, electrons. The conceptual logic supposes that conception always precedes judgment; but the truth is that sensory judgment begins and inferential judgment ends by preceding conception. The supposed triple order — con- ception, judgment, reasoning— is defective and false. The real order is sensation and sensory judgment, conception, memory and memorial judgment, experience and experiential judgment, inference, inferential judgment, inferential conception. This is not all: inferential conceptions are inadequate, and finally fail. They are often symbolical; that is, we conceive one thing only by another like it, e.g. atoms by minute bodies not nearly small enough. Often the symbol is not like. What idea can the physicist form of intra-spatial ether? What believer in God pretends to conceive Him as He really is ? We believe many things that we cannot conceive; as Mill said, the inconceivable is not the incredible; and the point of science is not what we can conceive but what we should believe on evidence. Conception is the weakest, judgment the strongest power of man's mind. Sense before conception is the original cause of judgment; and inference from sense enables judgment to continue after conception ceases. Finally, as there is judgment without conception, so there is conception without judgment. We often say " I understand, but do not decide." But this suspension of judg- ment is a highly refined act, unfitted to the beginning of thought. Conception begins as a condition of memory, and after a long continuous process of inference ends in mere ideation. The con- ceptual logic has made the mistake of making ideation a stage in thought prior to judgment.

It was natural enough that the originators of conceptual logic, seeing that judgments can be expressed by propositions, and con- ceptions by terms, should fall into the error of supposing that, as propositions consist of terms, so judgments consist of conceptions, and that there is a triple mental order — conception, judgment, reasoning — parallel to the triple linguistic order — term, proposition, discourse. They overlooked the fact that man thinks long before he speaks, makes judgments which he does not express at all, or expresses them by interjections, names and phrases, before he uses regular propositions, and that he does not begin by conceiving and naming, and then proceed to believing and proposing. Feeling and sensation, involving believing or judging, come before conception and language. As conceptions are not always present in judgment, as they are only occasional conditions, and as they are unfitted to cause beliefs or judgments, and especially judgments of existence, and as judgments both precede conceptions in sense and continue after them in inference, it

follows that conceptions are not the constituents of judgment, and judgment is not a combination of conceptions. Is there then any analysis of judgment ? Paradoxical as it may sound, the truth seems to be that primary judgment, beginning as it does with the simplest feeling and sensation, is not a combination of two mental elements into one, but is a division of one sensible thing into the thing itself and its existence and the belief that it is determined as existing, e.g. that hot exists, cold exists, the pained exists, the pleased exists. Such a judgment has

a cause, namely sense, but no mental elements. Afterwards come judgments of complex sense, e.g. that the existing hot is burning or becoming more or less hot, &c. Thus there is a combination of sensations causing the judgment; but the judgment is still a division of the sensible thing into itself and its being, and a belief that it is so determined. Afterwards follow judgments arising from more complex causes, e.g. memory, experience, inference. But however complicated these mental causes, there still remain these points common to all judgment: — (i) The merital causes of judgment are sense, memory, experience and inference; while conception is a condition of some judgments. (2) A judgment is not a combination either of its causes or of its conditions, e.g. it is not a combination of sensations any more than of ideas. (3) A judgment is a unitary mental act, dividing not itself but its object into the object itself and itself as determined, and signifying that it is so determined. (4) A primary judgment is a judgment that a sensible thing is determined as existing; but later judgments are concerned with either existing things, or with ideas, or with words, and signify that they are determined in all sorts of ways. (5) When a judgment is expressed by a proposition, the proposition expresses the results of the division by two terms, subject and predicate, and by the copula that what is signified by the subject is what is signified by the predicate; and the proposition is a combination of the two terms; e.g. border war is evil. (6) A complex judgment is a combination of two judgments, and may be copulative, e.g. you and I are men, or hypothetical, or disjunctive, &c.

Empirical logic, the logic of Aristotle and Bacon, is on. the right way. It is the business of the logician to find the causes of the judgments which form the premises and the conclusions of inference, reasoning and science. What knowledge do we get by sense, memory and experience, the first mental causes of judgment? What is judgment, and ,what its various kinds? What is inference, how does it proceed by combining judgments as premises to cause judgments as conclusions, and what are its various kinds? How does inference draw conclusions more or less probable up to moral certainty? How does it by the aid of identification convert probable into necessary conclusions, which become necessary principles of demonstration? How is categorical succeeded by conditional inference? What is scientific method as a system of inferences about definite sub- jects? How does inference become the source of error and fallacy? How does the whole process from sense to inference discover the real truth of judgments, which are true so far as they signify things known by sense, memory, experience and inference? These are the fundamental questions of the science of inference. Conceptual logic, on the other hand, is false from the start. It is not the first business of logic to direct us how to form conceptions signified by terms, because sense is a prior cause of judgment and inference. It is not the second business of logic to direct us how out of conceptions to form judgments signified by propositions, because the real causes of judgments are sense, memory, experience and inference. It is, however, the main business of logic to direct us how out of judgments to form inferences signified by discourse; and this is the one point which conceptual logic has contributed to the science of inference. But why spoil the further mental analysis of inference by sup- posing that conceptions are constituents of judgment and therefore of inference, which thus becomes merely a complex combination of conceptions, an extension of ideas? The mistake has been to convert three operations of mind into three pro- cesses in a fixed order — conception, judgment, inference. Con- ception and judgment are decisions: inference alone is a process, from decisions to decision, from judgments to judgment. Sense, not conception, is the origin of judgment. Inference is the process which from judgments about sensible things proceeds to judgments about things similar to sensible things. Though some conceptions are its conditions and some

judgments its causes, inference itself in its conclusions causes many more judgments and conceptions. Finally, inference is an extension, not of ideas, but of beliefs, at first about existing things, after- wards about ideas, and even about words; about anything in short about which we think, in what is too fancifully called ” the universe of discourse.”

Formal logic has arisen out of the narrowness of conceptual logic. The science, of inference no doubt has to deal primarily with formal truth or the consistency of premises and conclusion. But as all truth, real as well as formal, is consistent, formal rules

of consistency become real rules of truth, when the premises are true and the consistent conclusion is therefore true. The science of inference again rightly emphasizes the formal thinking of the syllogism in which the combination of premises involves the conclusion. But the combinations of premises in analogical and inductive inference, although the combination does not involve the conclusion, yet causes us to infer it, and in so similar a way that the science of inference is not complete without investigating all the combinations which characterize different kinds of inference. The question of logic is how we infer in fact, as well as perfectly; and we cannot understand inference unless we consider inferences of probability of all kinds. Moreover, the study of analogical and inductive inference is necessary to that of the syllogism itself, because they discover the premises of syllogism. The formal thinking of syllogism alone is merely necessary consequence ; but when its premises are necessary principles, its conclusions are not only necessary consequents but also necessary truths. Hence the manner in which induction aided by identification discovers necessary principles must be studied by the logician in order to decide when the syllogism can really arrive at necessary conclusions. Again, the science of inference has for its subject the form, or processes, of thought, but not its matter or objects. But it does not follow that it can investigate the former without the latter. Formal logicians say that, if they had to consider the matter, they must either con- sider all things, which would be impossible, or select some, which would be arbitrary. But there is an intermediate alter- native, which is neither impossible nor arbitrary; namely, to consider the general distinctions and principles of all things; and without this general consideration of the matter the logician cannot know the form of thought, which consists in drawing inferences about things on these general principles. Lastly, the science of inference is not indeed the science of sensation, memory and experience, but at the same time it is the science of using those mental operations as data of inference; and, if logic does not show how analogical and inductive inferences directly, and deductive inferences indirectly, arise from experi- ence, it becomes a science of mere thinking without knowledge. Logic is related to all the sciences, because it considers the common inferences and varying methods used in investigating different subjects. But it is most closely related to the sciences of metaphysics and psychology, which form with it a triad of sciences. Metaphysics is the science of being in general, and therefore of the things which become objects apprehended by our minds. Psychology is the science of mind in general, and therefore of the mental operations, of which inference is one. Logic is the science of the processes of inference. These three sciences, of the objects of mind, of the operations of mind, of the processes used in the inferences of mind, are differently, but closely related, so that they are constantly con- fused. The real point is their interdependence, which is so intimate that one sign of great philosophy is a consistent metaphysics, psychology and logic. If the world of things is known to be partly material and partly mental, then the mind must have powers of sense and inference enabling it to know these things, and there must be processes of inference carrying us from and beyond the sensible to the insensible world of matter and mind. If the whole world of things is matter, operations and processes of

mind are themselves material. If the whole world of things is mind, operations and processes of mind have only to recognize their like all the world over. It is clear then that a man's metaphysics and psychology must colour his logic. It is accordingly necessary to the logician to know beforehand the general distinctions and principles of things in metaphysics, and the mental operations of sense, conception, memory and experience in psychology, so as to discover the processes of inference from experience about things in logic.

The interdependence of this triad of sciences has sometimes led to their confusion. Hegel, having identified being with thought, merged metaphysics in logic. But he divided logic into objective and subjective, and thus practically confessed that there is one science of the objects and another of the pro-

cesses of thought. Psychologists, seeing that inference is a mental operation, often extemporize a theory of inference to the neglect of logic. But we have a double consciousness of inference. We are conscious of it as one operation among many, and of its omnipresence, so to speak, to all the rest. But we are also conscious of the processes of the operation of inference. To a certain extent this second consciousness applies to other operations: for example, we are conscious of the process of association by which various mental causes recall ideas in the imagination. But how little does the psychologist know about the association of ideas, compared with what the logician has discovered about the processes of inference! The fact is that our primary consciousness of all mental operations is hardly equal to our secondary consciousness of the processes of the one operation of inference from premises to conclusions permeating long trains and pervading whole sciences. This elabor- ate consciousness of inferential process is the justification of logic as a distinct science, and is the first step in its method. But it is not the whole method of logic, which also and rightly considers the mental process necessary to language, without substituting linguistic for mental distinctions.

Nor are consciousness and linguistic analysis all the instruments of the logician. Logic has to consider the things we know, the minds by which we know them from sense, memory and ex- perience to inference, and the sciences which systematize and extend our knowledge of things; and having considered th«se facts, the logician must make such a science of inference as will explain the power and the poverty of human knowledge.

General Tendencies or Modern Logic

There are Several grounds for hope in the logic of our day. In the first place, it tends to take up an intermediate position between the extremes of Kant and Hegel. It does not, with the former, regard logic as purely formal in the sense of abstracting thought from being, nor does it follow the latter in amalgamating metaphysics with logic by identifying being with thought. Secondly, it does not content itself with the mere formulae of thinking, but pushes forward to theories of method, knowledge and science; and it is a hopeful sign to find this epistemological spirit, to which England was accustomed by Mill, animating German logicians such as Lotze, Diihring, Schuppe, Sigwart and Wundt. Thirdly, there is a determination to reveal the psychological basis of logical processes, and not merely to describe them as they are in adult reasoning, but to explain also how they arise from simpler mental operations and primarily from sense. This attempt is connected with the psychological turn given to recent philosophy by Wundt and others, and is dangerous only so far as psychology itself is hypothetical. Unfortunately, however, these merits are usually connected with a less admirable characteristic — contempt for tradition. Writing his preface to his second edition in 1888, Sigwart says: " Important works have appeared by Lotze, Schuppe, Wundt and Bradley, to name only the most eminent; and all start from the conception which has guided this attempt. That is, logic is grounded by them, not upon an effete tradition but upon a new investigation of thought as it actually is in its psychological foundations, in its significance for knowledge, and its actual operation in scientific methods." How strange! The spirit of every one of the three reforms above enumerated

is an uncon- scious return to Aristotle's Organon. Aristotle's was a logic which steered, as Trendelenburg has shown, between Kantian formalism and Hegelian metaphysics; it was a logic which in the Analytics investigated the syllogism as a means to understanding knowledge and science: it was a logic which, starting from the psychological foundations of sense, memory and experience, built up the logical structure of induction and deduction on the profoundly Aristotelian principle that " there is no process from universals without induction, and none by induction without sense." Wundt's comprehensive view that logic looks backwards to psychology and forward to epistemology was hundreds of years ago one of the many discoveries of Aristotle.

JUDGMENT

Judgment

i. Judgment and Conception. — The emphasis now laid on judgment, the recovery from Hume's confusion of beliefs with ideas and the association of ideas, and the distinction of the mental act of judging from its verbal expression in a proposition, are all healthy signs in recent logic. The most fundamental question, before proceeding to the investigation of inference, is not what we say but what we think in making the judgments which, whether we express them in propositions or not, are both the premises and the conclusion of inference; and, as this question has been diligently studied of late, but has been variously answered, it will be well to give a list of the more important theories of judgment as follows: —

a. It expresses a relation between the content of two ideas, not a relation of these ideas (Lotze).

b. It is consciousness concerning the objective validity of a subjective combination of ideas, i.e. whether between the corre- sponding objective elements an analogous combination exists (Ueberweg).

c. It is the synthesis of ideas into unity and consciousness of their objective validity, not in the sense of agreement with external reality but in the sense of the logical necessity of their synthesis (Sigwart).

d. It is the analysis of an aggregate idea (Gesammtvorstellung) into subject and predicate; based on a previous association of ideas, on relating and comparing, and on the apperceptive synthesis of an aggregate idea in consequence; but itself consisting in an apperceptive analysis of that aggregate idea; and requiring will in the form of apperception or attention (Wundt) .

e. It requires an idea, because every object is conceived as well as recognized or denied; but it is itself an assertion of actual fact, every perception counts for a judgment, and every categorical is changeable into an existential judgment without change of sense (Brentano, who derives his theory from Mill except that he denies the necessity of a combination of ideas, and reduces a categorical to an existential judgment).

/. It is a decision of the validity of an idea requiring will (Berg- mann, following Brentano).

g. Judgment (Urtheii) expresses that two ideas belong together; " by-judgment " (Beurtheilung) is the reaction of will expressing the validity or invalidity of the combination of ideas (Windelband, following Bergmann, but distinguishing the decision of validity from the judgment).

h. Judgment is consciousness of the identity or difference and of the causal relations of the given; naming the actual combinations of the data, but also requiring a priori categories of the understanding, the notions of identity, difference and causality, as principles of thought or laws, to combine the plurality of the given into a unity (Schuppe).

i. Judgment is the act which refers an ideal content recognized as such to a reality beyond the act, predicating an idea of a reality, a what of a that; so that the subject is reality and the predicate the meaning of an idea, while the judgment refers the idea to reality by an identity of content (Bradley and Bosanquet).

k. Judgment is an assertion of reality, requiring comparison and ideas which render it directly expressible in words (Hobhouse, mainly following Bradley).

These theories are of varying value in proportion to their proximity to Aristotle's point that predication is about things, and to Mill's point that judgments and propositions are about things, not about ideas. The essence of judgment is belief that something is (or is not) determined, either as existing (e.g. " I am," " A centaur is not ") or as something in particular (e.g. " I am a man," " I am not a monkey "). Neither Mill, however, nor any of the later logicians whose theories we have quoted, has been able quite to detach judgment from conception; they all suppose that an idea, or ideas, is a condition of all judgment. But judgment starts from sensation (Empfindung) and feeling {Gefiihl), and not from idea {V orstellung) . When I feel pleased or pained, or when I use my senses to perceive a pressure, a temperature, a flavour, an odour, a colour, a sound, or when I am conscious of feeling and perceiving, I cannot resist the belief that something sensible is present; and this belief that something exists is already a judgment, a judgment of existence, and, so far as it is limited to sense without inference, a true judgment. It is a matter of words whether or not we should call this sensory belief a judgment; but it is no matter of choice to the logician, who regards all the constituents of inference as judgments; for the fundamental constituents

are sensory beliefs, which are therefore judgments in the logical sense. Sense is the evidence of inference; directly of analogical and inductive, directly or indirectly of deductive, inference; and therefore, if logic refuses to include sensory beliefs among judgments, it will omit the fundamental constituents of inference, inference will no longer consist of judgments but of sensory beliefs plus judgments, and the second part of logic, the logic of judgment, the purpose of which is to investigate the con- stituents of inference, will be like Hamlet without the prince of Denmark. If, on the other hand, all the constituents of inference are judgments, there are judgments of sense; and the evidence of the senses means that a judgment of sense is true, while a judgment of inference is true so far as it is directly or indirectly concluded from judgments of sense. Now a sensory judgment, e.g. that a sensible pressure is existing, is explained by none of the foregoing theories, because it requires nothing but sensation and belief. It requires no will, but is usually involuntary, for the stimulus forces one's attention, which is not always voluntary; not all judgment then requires will, as Wundt supposes. It requires no reference to reality beyond the sensible pressure, because it is merely a belief that this exists without inference of the external stimulus or any inference at all: not all judgment then requires the reference of subjective to objective supposed by Ueberweg, or the consciousness of logical necessity supposed by Sigwart. It requires in addition to the belief that something exists, no consideration as to whether the belief itself be true, because a man who feels pressure believes in the thing without further question about the belief: not all judgment then requires a decision of validity, as Bergmann supposes. It requires nothing beyond the sensation and belief in the given existence of the given pressure: not all judgment then requires categories of understanding, or notions of identity, difference and causality, or even of existence, such as Schuppe supposes. It requires no comparison in order to express it in words, for a judgment need not, be expressed, and a sensory judgment of pressure is an irresistible belief that a real pressure exists, without waiting for words, or for a comparison which is wanted not to make a sensation a judgment, but to turn a judgment into language: not all judgment then requires com- parison with a view to its expression, as supposed by Hobhouse. Lastly, all the authors of the above-quoted theories err in supposing that all judgment requires conception; for even Mill thinks a combination of ideas necessary, and Brentano, who comes still nearer to the nature of sensory judgment when he says, " Every perception counts for a judgment," yet thinks that an idea is necessary at the same time in order to understand the thing judged. In reality, the sensation and the belief are sufficient; when I feel a sensible pressure, I cannot help believing in its reality, and therefore judging that it is real, without any lertium quid — an idea of pressure, or of existence or of pressure existing—intervening between the sensation and the belief. Only after sensation has ceased does an idea, or representation of what is not presented, become necessary as a substitute for a sensation and as a condition not of the first judgment that there is, but of a second judgment that there was, something sensible. Otherwise there would be no judgment of sensible fact, for the first sensation would not give it, and the idea following the sensation would be still farther off. The sensory judgment then, which is nothing but a belief that at the moment of sense something sensible exists, is a proof that not all judgment requires conception, or synthesis or analysis of ideas, or decision about the content, or about the validity, of ideas, or reference of an ideal content to reality, as commonly, though variously, supposed in the logic of our day.

Not, however, that all judgment is sensory: after the first judgments of sense follow judgments of memory, and memory requires ideas. Yet memory is not mere conception, as Aristotle, and Mill after him, have perceived. To remember, we must have a present idea; but we must also have a belief that the thing, of which the idea is a representation, was (or was not) determined; and this belief is the memorial judgment. Origin- ally such judgments arise from sensory judgments followed by

ideas, and are judgments of memory after sense that something sensible existed, e.g. pressure existed: afterwards come judg- ments of memory after inference, e.g. Caesar was murdered. Finally, most judgments are inferential. These are conclusions which primarily are inferred from sensory and memorial judg- ments; and so far as inference starts from sense of something sensible in the present, and from memory after sense of something sensible in the past, and concludes similar things, inferential judgments are indirect beliefs in being and in existence beyond ideas. When from the sensible pressures between the parts of my mouth, which I feel and remember and judge that they exist and have existed, I infer another similar pressure (e.g. of the food which presses and is pressed by my mouth in eating), the inferential judgment with which I conclude is a belief that the latter exists as well as the former (e.g. the pressure of food without as well as the sensible pressures within). Inference, no doubt, is closely involved with conception. So far as it depends on memory, an inferential judgment presupposes memorial ideas in its data; and so far as it infers universal classes and laws, it produces general ideas. But even so the part played by conception is quite subordinate to that of belief. In the first place, the remembered datum, from which an infer- ence of pressure starts, is not the conceived idea, but the belief that the sensible pressure existed. Secondly, the conclusion in which it ends is not the general idea of a class, but the belief that a class, represented by a general idea, exists, and is (or is not) otherwise determined (e.g. that things pressing and pressed exist and move). Two things are certain about inferential judgment: one, that when inference is based on sense and memory, inferential judgment starts from a combination of sensory and memorial judgment, both of which are beliefs that things exist; the other, that in consequence inferential judgment is a belief that similar things exist. There are thus three primary judgments: judgments of sense, of memory after sense, and of inference from sense. All these are beliefs in being and existence, and this existential belief is first in sense, and afterwards trans- ferred to memory and inference. Moreover, it is transferred in the same irresistible way : frequently we cannot help either feeling pressure, or remembering it, or inferring it; and as there are involuntary sensation and attention, so there are involuntary memory and inference. Again, in a primary judgment existence need not be expressed; but if expressed, it may be expressed either by the predicate, e.g. ” I exist,” or by the subject, e.g. ” I who exist think.” There are indeed differences between primary judgments, in that the sensory is a belief in present, the memorial in past, and the inferential in present, past and future existence. But these differences in detail do not alter the main point that all these are beliefs in the existing, in the real as opposed to the ideal, in actual things which are not ideas. In short, a primary judgment is a belief in something existing apart from our idea of it; and not because we have an idea of it, or by comparing an idea with, or referring an idea to, reality; but because we have a sensation of it, or a memory of it or an inference of it. Sensation, not conception, is the origin of judgment.

2. Different Significations of Being in different Kinds of Judgment. — As Aristotle remarked both in the De Interpretation and in the Sophistici ELenchi, ” not-being is thinkable ” does not mean ” not-being exists.” In the latter treatise he added that it is a fallacia a dido secundum quid ad dictum simpliciter to argue from the former to the latter; ” for,” as he says, ” it is not the same thing to be something and to exist absolutely.” Without realizing their debt to tradition, Herbart, Mill and recently Sigwart, have repeated Aristotle’s separation of the copula from the verb of existence, as if it were a modern discovery that ” is ” is not the same as ” exists.” It may be added that they do not quite reilize what the copula exactly signifies: it does not signify existence, but it does signify a fact, namely, that something is (or is not) determined, either absolutely in a categorical judgment, or conditionally in a conditional judgment. Now we have seen that all primary judgments signify more than this fact; they are also beliefs in the existence of the thing

signified by the subject. But, in the first place, primary judg- ments signify this

existence never by the copula, but sometimes by the predicate, and sometimes by the subject; and, secondly, it does not follow that all judgments whatever signify existence. Besides inference of existence there is inference of non-existence, of things inconsistent with the objects of primary judgments. Hence secondary judgments, which no longer contain a belief that the thing exists, e.g. the judgment, " not-being is thinkable," cited by Aristotle; the judgment, " A square circle is impossible," cited by Herbart; the judgment, " A centaur is a fiction of the poets," cited by Mill. These secondary judgments of non- existence are partly like and partly unlike primary judgments of existence. They resemble them in that they are beliefs in being signified by the copula. They are beliefs in things of a sort ; for, after all, ideas and names are things; their objects, even though non-existent, are at all events things conceivable or nameable; and therefore we are able to make judgments that things, non-existent but conceivable or nameable, are (or are not) determined in a particular manner. Thus the judgment about a centaur is the belief, " A conceivable centaur is a fiction of the poets," and the judgment about a square circle is the belief, " A so-called square circle is an impossibility." But, though beliefs that things of some sort are (or are not) determined, these secondary judgments fall short of primary judgments of existence. Whereas in a primary judgment there is a further belief, signified by subject or predicate, that the thing is an existing thing in the sense of being a real thing (e.g. a man), different from the idea of it as well as from the name for it; in a secondary judgment there is no further belief that the thing has any existence beyond the idea (e.g. a centaur), or even beyond the name (e.g. a square circle) : though the idea or name exists, there is no belief that anything represented by idea or name exists. Starting, then, from this fundamental distinction between judgments of existence and judgments of non-existence, we may hope to steer our way between two extreme views which emanate from two important thinkers, each of whom has produced a flourishing school of psychological logic.

On the one hand, early in the 19th century Herbart started the view that a categorical judgment is never a judgment of existence, but always hypothetical; on the other hand, in the latter part of the century Brentano started the view that all categorical judgments are existential. The truth lies between these contraries. The view of Herbart and his school is con- tradicted by our primary judgments of and from sense, in which we cannot help believing existence; and it gives an inadequate account even of our secondary judgments in which we no longer indeed believe existence, but do frequently believe that a non- existent thing is (or is not) somehow determined unconditionally. It is true, as Herbart says, that the judgment, " A square circle is an impossibility," does not contain the belief, " A square circle is existent " ; but when he goes on to argue that it means, " If a square circle is thought, the conception of impossibility must be added in thought," he falls into a non-sequitur. To be categorical, a judgment does not require a belief in existence, but only that something, existent or not, is (or is not) determined; and there are two quite different attitudes of mind even to a non-existent thing, such as a square circle, namely, unconditional and conditional belief, The judgment, " A non-existent but so-called square circle is an impossibility," is an unconditional, or categorical judgment of non-existence, quite different from any hypothetical judgment, which depends on the conditions " if it is thought," or " if it exists," or any other " if." On the other hand, the view of Brentano and his school is contradicted by these very categorical judgments of non-existence; and while it applies only to categorical judgments of existence, it does so inadequately. To begin with the latter objection, Brentano ' proposed to change the four Aristotelian forms of judgment, A, E, I, O, into the following existential forms: — A. "There is not an immortal man." E. "There is not a live stone." I. "There is a sick man." O. "There is an unlearned man."

This reconstruction, which merges subject and predicate in one expression, in order to

combine it with the verb of existence, is repeated in similar proposals of recent English logicians. Venn, in his Symbolic Logic, proposes the four forms, xy = o, ry = o, zy > o, xy > o (where y means " not-y "), but only as alternative to the ordinary forms. Bradley says that " ' S-P is real' attributes S-P, directly or indirectly, to the ultimate reality," and agrees with Brentano that " ' is ' never stands for anything but ' exists ' "; while Bosanquet, who follows Bradley, goes so far as to define a categorical judgment as " that which affirms the existence of its subject, or, in other words, asserts a fact." Now it is true that our primary judgments do contain a belief in existence; but they do not all contain it in the same way, but are beliefs sometimes that something is determined as existing, and sometimes that something existing is particularly determined. Brentano's forms do not express such a judgment of existence, as "All existing men are mortal": nor does Bradley's form, " Reality includes S-P." Metaphysically, all realities are parts of one ultimate reality; but logically, even philosophers think more often only of finite realities, existing men, dogs, horses, &c; and children know that their parents exist long before they apprehend ultimate reality. The normal form, then, of a judgment of existence is either " S is a real P," or " A real S is P." Hence the reconstruction of all categorical judgments by merging subject and predicate, either on Brentano's or on Bradley's plan, is a misrepresentation even of normal categorical judgments of existence. Secondly, it is much more a misrepresentation of categorical judgments of non-existence. No existential form suits a judgment such as " A centaur is a fiction," when we do not believe that there is a centaur, or that reality includes a centaur. As Mill pointed out; it cannot be implied that. a centaur exists, since the very thing asserted is that the thing has no real existence. In a correspondence with Mill, Brentano rejoined that the centaur exists in imagination; Bradley says, " inside our heads." According to one, then, the judgment becomes "There is an imaginary centaur"; according to the other " Reality includes an imaginary centaur." The rejoinder, however, though partly true, is not to the point. The idea of the centaur does exist in our imagination, and inside our heads, and the name of it in our mouths. But the point is that the centaur conceived and named does not exist beyond the idea of it and the name for it; it is not, like a man, a real thing which is neither the idea of it nor the name for it. No amount of subtlety will remove the difference between a categorical judg- ment of existence, e.g. " An existing man is mortal," and a categorical judgment of non-existence, e.g. " A conceivable centaur is a fiction," because in the former we believe and mean that the thing exists beyond the idea, and in the latter we do not. If, contrary to usage, we choose to call the latter a judg- ment of existence, there is no use in quarrelling about words; but we must insist that new terms must in that case be invented to express so fundamental a difference as that between judg- ments about real men and judgments about ideal centaurs. So long, however, as we use words in the natural sense, and call the former judgments of existence, and the latter judgments of non-existence, then " is " will not be, as Bradley supposes, the same as " exists," for we use " is " in both judgments, but " exists " only in the first kind. Bosanquet's definition of a categorical judgment contains a similar confusion. To assert a fact and to affirm the existence of a subject are not, as he makes out, the same thing: a judgment often asserts a fact and denies existence in the same breath, e.g. " Jupiter is non- existent." Here, as usual in logic, tradition is better than innova- tion. All categorical judgment is an unconditional belief in the fact, signified by the copula, that a thing of some sort is (or is not) determined; but some categorical judgments are also beliefs that the thing is an existing thing, signified either by the subject or by the predicate, while others are not beliefs that the thing exists at all, but are only beliefs in something conceivable, or nameable, or in something or other, without particularizing what. Judgment then always signifies being, but not always existence.

3. Particular and Universal Judgments. — Aristotle, by dis- tinguishing affirmative and negative, particular and universal, made the fourfold classification of judgments, A, E, I and O, the foundation both of opposition and of inference. With regard to inference, he remarked that a universal judgment means by " all," not every individual we know, but every individual absolutely, so that, when it becomes a major premise, we know therein every individual universally, not individually, and often do not know a given individual individually until we add a minor premise in a syllogism. Whereas, then, a

particular judgment is a belief that some, a universal judgment is a belief that all, the individuals of a kind or total of similar individuals, are similarly determined, whether they are known or unknown individuals. Now, as we have already seen, what is signified by the subject may be existing or not, and in either case a judgment remains categorical so long as it is a belief without conditions. Thus, "Some existing men are poets," "All existing men are mortal," " Some conceivable centaurs are human in their fore- quarters," " All conceivable centaurs are equine in their hind- quarters," are all categorical judgments, while the two first are also categorical judgments of existence. Nevertheless these obvious applications of Aristotelian traditions have been recently challenged, especially by Sigwart, who holds in his Logic (sees. 27, 36) that, while a particular is a categorical judgment of existence, a universal is hypothetical, on the ground that it does not refer to a definite number of individuals, or to in- dividuals at all, but rather to general ideas, and that the appro- priate form of " all M is P " is " if anything is M it is P." This view, which has influenced not only German but also English logicians, such as Venn, Bradley and Bosanquet, destroys the fabric of inference, and reduces scientific laws to mere hypotheses. In reality, however, particular and universal judgments are too closely connected to have such different imports. In opposition, a categorical particular is the contradictory of a universal, which is also categorical, not hypothetical, e.g., "not all M is P" is the contradictory of " all M is P," not of " if anything is M it is P." In inference, a particular is an example of a universal which in its turn may become a particular example of a higher universal. For instance, in the history of mechanics it was first inferred from some that all terrestrial bodies gravitate, and then from these as some that all ponderable bodies, terrestrial and celestial, gravitate. How absurd to suppose that here we pass from a particular categorical to a universal hypothetical, and then treat this very conclusion as a particular categorical to pass to a higher universal hypothetical ! Sigwart, indeed, is deceived both about particulars and universals. On the one hand, some particulars are not judgments of existence, e.g. " some imaginary deities are goddesses "; on the other hand, some universals are not judgments of non-existence, e.g. " every existing man is mortal." Neither kind is always a judgment of existence, but each is some- times the one and sometimes the other. In no case is a universal hypothetical, unless we think it under a condition; for in a universal judgment about the non-existing, e.g. about all con- ceivable centaurs, we do not think, " If anything is a centaur," because we do not believe that there are any; and in a universal judgment about the existent, e.g. about all existing men, we do not think, " If anything is a man," because we believe that there is a whole class of men existing at different times and places. The cause of Sigwart's error is his misconception of " all." So far as he follows Aristotle in saying that " all " does not mean a definite number of individuals he is right; but when he says that we mean no individuals at all he deserts Aristotle and goes wrong. By " all " we mean every individual whatever of a kind; and when from the experience of sense and memory we start with particular judgments of existence, and infer universal judgments of existence and scientific laws, we further mean those existing individuals which we have experienced, and every individual whatever of the kind which exists. We mean neither a definite number of individuals, nor yet an infinite number, but an incalculable number, whether experienced or inferred to exist. We do not mean existing here and now, nor yet out of time and place, but at any time and place (semper et ubique) —

past, present and future being treated as simply existing, by what logicians used to call suppositio naturalis. We mean then by " all existing " every similar individual whatever, whenever, and wherever existing. Hence Sigwart is right in saying that " All bodies are extended " means " Whatever is a body is extended," but wrong in identifying this form with " If anything is a body it is extended." " Whatever " is not " if anything." For the same reason it is erroneous to confuse " all existing" with a

general idea. Nor does the use of abstract ideas and terms make any difference. When Bosanquet says that in " Heat is a mode of motion " there is no reference to individual objects, but " a pure hypothetical form which absolutely neglects the existence of objects," he falls far short of expressing the nature of this scientific judgment, for in his Theory of Heat Clerk Maxwell describes it as " believing heat as it exists in a hot body to be in the form of kinetic energy." As Bacon would say, it is a belief that all individual bodies qua hot are individually but similarly moving in their particles. When, again, Bradley and Bosanquet speak of the universal as if it always meant one ideal content referred to reality, they forget that in universal judgments of existence, such as "All men existing are mortal," we believe that every individually existing man dies his own death individually, though similarly to other men; and that we are thinking neither of ideas nor of reality; but of all existent individual men being individually but similarly determined. A universal is indeed one whole; but it is one whole of many similars, which are not the same with one another. This is indeed the very essence of distribution, that a universal is predicable, not singly or collectively, but severally and similarly of each and every individual of a kind, or total of similar individuals. So also the essence of a universal judgment is that every in- dividual of the kind is severally but similarly determined. Finally, a universal judgment is often existential; but whether it is so or not it remains categorical, so long as it introduces no hypothetical antecedent about the existence of the thing signified by the subject. It is true that even in universal judgments of existence there is often a hypothetical element; for example, " All men are mortal " contains a doubt whether every man whatever, whenever and wherever existing, must die. But this is only a doubt whether all the things signified by the subject are similarly determined as signified by the predicate, and not a doubt whether there are such things at all. Hence the hypothetical element is not a hypothetical antecedent " If anything is a man," but an uncertain conclusion that " All existing men are mortal." In other words, a categorical universal is often problematic, but a problematic is not the same as a hypothetical judgment.

4. The Judgment and the Proposition. — Judgment in general is the mental act of believing that something is (or is not) deter- mined. A proposition is the consequent verbal expression of such a belief, and consists in asserting that the thing as signified by the subject is (or is not) determined as signified by the predi- cate. But the expression is not necessary. Sensation irre- sistibly produces a judgment of existence without needing language. Children think long before they speak; and indeed, as mere vocal sounds are not speech, and as the apprehension that a word signifies a thing is a judgment, judgment is originally not an effect, but a cause of significant language. At any rate, even when we have learnt to speak, we do not express all we think, as we may see not only from the fewness of words known to a child, but also from our own adult consciousness. The principle of thought is to judge enough to conclude. The principle of language is to speak only so far as to understand and be under- stood. Hence speech is only a curtailed expression of thought. Sometimes we express a whole judgment by one word, e.g. " Fire! " or by a phrase, e.g. " What a fire! " and only usually by a proposition. But even the normal proposition in the syllo- gistic form tertii adjacentis, with subject, predicate and copula, is seldom a complete expression of the judgment. The consequence is that the proposition, being different from a judgment arising after a judgment, and remaining an imperfect copy of judgment, is only a superficial evidence of its real nature. Fortunately,

we have more profound evidences, and at least three evidences in all: the linguistic expression of belief in the proposition; the consciousness of what we mentally believe; and the analysis of reasoning, which shows what we must believe, and have believed, as data for inference. In these ways we find that a judgment is both different from, and more than, a proposition. But recent logicians, although they perceive the difference, nevertheless tend to make the proposition the measure of the judgment. This makes them omit sensory judgments, and count only those which require ideas, and even general ideas expressed in general terms. Sigwart, for example, gives as instances of our most elementary judgments, " This is Socrates," " This is snow " — beliefs in things

existing beyond ourselves which require consider- able inferences from many previous judgments of sense and memory. Worse still, logicians seem unable to keep the judgment apart from the proposition. Herbart says that the judgment ” A is B ” does not contain the usually added thought that A is, because there is no statement of A’s existence; as if the state- ment mattered to the thought. So Sigwart, in order to reduce universals to hypotheticals, while admitting that existence is usually thought, argues that it is not stated in the universal judgment; so also Bosanquet. But in the judgment the point is not what we state, but what we think; and so long as the existence of A is added in thought, the judgment in question must contain the thought that A exists as well as that A is B, and therefore is a judgment that something is determined both as existing and in a particular manner. The statement only affects the proposition; and whenever we believe the existence of the thing, the belief in existence is part of the judgment thought, whether it is part of the proposition stated or not.

Here Sir William Hamilton did a real service to logic in pointing out that ” Logic postulates to be allowed to state explicitly in language all that is implicitly contained in the thought.” Not that men should or can carry this logical postulate out in ordinary life; but it is necessary in the logical analysis of judgments, and yet logicians neglect it. This is why they confuse the categorical and the universal with the hypothetical. Taking the carelessly ex- pressed propositions of ordinary life, they do not perceive that similar judgments are often differently expressed, e.g. ” I, being a man, am mortal,” and ” If I am a man, I am mortal “; and con- versely, that different judgments are often similarly expressed. In ordinary life we may say, ” All men are mortal,” ” All centaurs are figments,” ” All square circles are impossibilities,” ” AH candi- dates arriving five minutes late are fined ” (the last proposition being an example of the identification of categorical with hypothe- tical in Keynes’s Formal Logic). But of these universal propositions the first imperfectly expresses a categorical belief in existing things, . the second in thinkable things, and the third in nameable things, while the fourth is a slipshod categorical expression of the hypo- thetical belief, ” If any candidates arrive late they are fined.” The four judgments are different, and therefore logically the propositions fully expressing them are also different. The judgment, then, is the measure of the proposition, not the proposition the measure of the judgment. On the other hand, we may go too far in the opposite direction, as Hamilton did in proposing the universal quantification of the predicate. If the quantity of the predicate were always thought, it ought logically to be always stated. But we only some- times think it. Usually we leave the predicate indefinite, because, as long as the thing in question is (or is not) determined, it does not matter about other things, and it is vain for us to try to think all things at once. It is remarkable that in Barbara, and therefore in many scientific deductions, to think the quantity of the predicate is not to the point either in the premises or in the conclusion; so that to quantify the propositions, as Hamilton proposes, would be to express more than a rational man thinks and judges. In judgments, and therefore in propositions, indefinite predicates are the rule, quantified predicates the exception. Consequently, A E I O are the normal propositions with indefinite predicates; whereas propositions with quantified predicates are only occasional forms, which we should use whenever we require to think the quantity of the predicate, e.g. (1) in conversion, when we must think that all men are some animals, in order to judge that some animals are men ; (2) in syllogisms of the 3rd figure, when the predicate of the minor premise must be particularly quantified in thought in order to become the particularly quantified subject of the con- clusion; (3) in identical propositions including definitions, where we must think both that 1 4- 1 are 2 and 2 are 1 + 1. But the normal judgment, and therefore the normal proposition, do not require the quantity of the predicate. It follows also that the normal judgment is not an equation. The symbol of equality (=) is not the same as the copula (is); it means ” is equal to,” where ” equal to ” is part of the predicate, leaving ‘ is ” as the copula.

Now, in all judgment we think " is," but in few judgments predicate "equal to." In quantitative judgments we may think x = y, or,

as Boole proposes, x = vy = —y, or, as Jevons proposes, x = xy, or, as

Venn proposes, x which is not y = o; and equational symbolic logic is useful whenever we think in this quantitative way. But it is a byway of thought. In most judgments all we believe is that x is (or is not) y, that a thing is (or is not) determined, and that the thing signified by the subject is a thing signified by the predicate, but not that it is the only thing, or equal to everything signified by the predicate. The symbolic logic, which confuses " is " with " is equal to," having introduced a particular kind of predicate into the copula, falls into the mistake of reducing all predication to the one category of the quantitative; whereas it is more often in the substantial, e.g. " I am a man," not " I am equal to a man," or in the qualitative, e.g. " I am white," not " I am equal to white," or in the relative, e.g. " I am born in sin," not " I am equal to born in sin." Predication, as Aristotle saw, is as various as the categories of being. Finally, the great difficulty of the logic of judgment is to find the mental act behind the linguistic expression, to ascribe to it exactly what is thought, neither more nor less, and to apply the judgment thought to the logical proposition, without expecting to find it in ordinary propositions. Beneath Hamilton's postulate there is a deeper principle of logic — A rational being thinks only to the point, and speaks only to understand and be understood.

Inference The nature and analysis of inference have been so fully treated in the Introduction that here we may content ourselves with some points of detail.

1 . False Views of Syllogism arising from False Views of Judg- ment. — The false views of judgment, which we have been examin- ing, have led to false views of inference. On the one hand, having reduced categorical judgments to an existential form, Brentano proposes to reform the syllogism, with the results that it must contain four terms, of which two are opposed and two appear twice; that, when it is negative, both premises are nega- tive; and that, when it is affirmative, one premise, at least, is negative. In order to infer the universal affirmative that every professor is mortal because he is a man, Brentano's existential syllogism would run as follows: —

There is not a not-mortal man. There is not a not-human professor. . ' .There is not a not-mortal professor.

On the other hand, if on the plan of Sigwart categorical universals were reducible to hypotheticals, the same inference would be a pure hypothetical syllogism, thus: —

If anything is a man it is mortal. If anything is a professor it is a man. . ' . If anything is a professor it is mortal.

But both these unnatural forms, which are certainly not analyses of any conscious process of categorical reasoning, break down at once, because they cannot explain those moods in the third figure, e.g. Darapti, which reason from universal premises to a particular conclusion. Thus, in order to infer that some wise men are good from the example of professors, Brentano's syllogism would be the following non-sequitur: —

There is not a not-good professor.

There is not a not-wise professor.

There is a wise good (non-sequitur).

So Sigwart 's syllogism would be the following non-sequitur: —

If anything is a professor, it is good. If anything is a professor, it is wise. Something wise is good {non-sequitur).

But as by the admission of both logicians these reconstructions of Darapti are illogical,

it follows that their respective reductions of categorical universals to existentials and hypotheticals are false, because they do not explain an actual inference. Sigwart does not indeed shrink from this and greater absurdities; he reduces the first figure to the modus ponens and the second to the modus follens of the hypothetical syllogism, and then, finding no place for the third figure, denies that it can infer necessity; whereas it really infers the necessary consequence of particular conclusions. But the crowning absurdity is that, if all universals were hypo- thetical, Barbara in the first figure would become a purely hypothetical syllogism — a consequence which seems innocent

enough until we remember that all universal affirmative conclu- sions in all sciences would with their premises dissolve into mere hypothesis. ■ No logic can be sound which leads to the following analysis: —

If anything is a body it is extended. If anything is a planet it is a body. . ” . If anything is a planet it is extended.

Sigwart, indeed, has missed the essential difference between the categorical and the hypothetical construction of syllogisms. In a categorical syllogism of the first figure, the major premise, ” Every M whatever is P,” is a universal, which we believe on account of previous evidence without any condition about the thing signified by the subject M, which we simply believe some times to be existent (e.g. ” Every man existent “), and sometimes not (e.g., “Every centaur conceivable”); and the minor premise, ” S is M,” establishes no part of the major, but adds the evidence of a particular not thought of in the major at all But in a hypothetical syllogism of the ordinary mixed type, the first or hypothetical premise is a conditional belief, e.g. ” If any- thing is M it is P,” containing a hypothetical antecedent, ” If anything is M,” which is sometimes a hypothesis of exist- ence (e.g. ” If anything is an angel “), and sometimes a hypo- thesis of fact (e.g. “If an existing man is wise”); and the second premise or assumption, ” Something is M,” estab- lishes part of the first, namely, the hypothetical antecedent, whether as regards existence (e.g. ” Something is an angel “), or as regards fact (e.g. ” This existing man is wise “). These very different relations of premises are obliterated by Sigwart’s false reduction of categorical universals to hypo- theticals. But even Sigwart’s errors are outdone by Lotze, who not only reduces ” Every M is P ” so ” If S is M, S is P,” but proceeds to reduce this hypothetical to the disjunctive, ” If S is M, S is P 1 or P 2 or P 3 ,” and finds fault with the Aristotelian syllo- gism because it contents itself with inferring ” S is P ” without showing what P. Now there are occasions when we want to reason in this disjunctive manner, to consider whether S is P 1 or P 2 or P 3 , and to conclude that ” S is a particular P “; but ordin- arily all we want to know is that ” S is P “; e.g. in arithmetic, that 2 + 2 are 4, not any particular 4, and in life that all our con- temporaries must die, without enumerating all their particular sorts of deaths. Lotze’s mistake is the same as that of Hamilton about the quantification of the predicate, and that of those symbolists who held that reasoning ought always to exhaust all alternatives by equations. It is the mistake of exaggerating exceptional into normal forms of thought, and ignoring the principle that a rational being thinks only to the point.

2. Quasi- syllogisms.— Besides reconstructions of the syllogistic fabric, we find in recent logic attempts to extend the figures of the syllogism beyond the syllogistic rules. An old error that we may have a valid syllogism from merely negative premises (ex omnibus negativis) , long ago answered by Alexander and Boethius, is now revived by Lotze, Jevons and Bradley, who do not per- ceive that the supposed second negative is really an affirmative containing a ” not ” which can only be carried through the syllogism by separating it from the copula and attaching it to one of the extremes, thus: —

The just are not unhappy (negative). The just are not-recognized (affirmative). . ‘ .Some not-recognized are not unhappy (negative).

Here the minor being the infinite term ” not-recognized ” in the conclusion, must be the same term also in the minor premise. Schuppe, however, who is a fertile creator of

quasi-syllogisms, has managed to invent some examples from two negative premises of a different kind: —

(I)

(2)

(3)

No M is P.

No M is P.

No P is M.

S is not M.

S is not M.

S is not M.

Neither S nor M

. ■ . S may be P.

. • .S may be P

is P.

But (1) concludes with a mere repetition, (2) and (3) with a contingent ” may be,” which, as Aristotle says, also ” may nut be,” and therefore nihil certo colligitur. The same answer

applies to Schuppe’s supposed syllogisms from two particular premises : —

(0

Some M is P. Some S is M. .Some S may be P.

(2)

Some M is P. Some M is S. .’.Some S may be P.

The only difference between these and the previous examples (2) and (3) is that, while those break the rule against two negative premises, these break that against undistributed middle. Equally fallacious are two other attempts of Schuppe to produce syllo- gisms from invalid moods: — ■

(1) 1st Fig. (2) 2nd Fig.

All M is P. P is M.

No S is M. S is M.

.’. S may be P. .’. S is partially identical with P.

In the first the fallacy is the indifferent contingency of the con- clusion caused by the non-sequitur from a negative premise to an affirmative conclusion; while the second is

either a mere repetition of the premises if the conclusion means “S is like P in being M,” or, if it means “S is P,” a non-sequitur on account of the undistributed middle. It must not be thought that this trifling with logical rules has nb effect. The last supposed syllogism, namely, that having two affirmative premises and entailing an undistributed middle in the second figure, is accepted by Wundt under the title “Inference by Comparison” (Vergleichungsschluss), and is supposed by him to be useful for abstraction and subsidiary to induction, and by Bosanquet to be useful for analogy. Wundt, for example, proposes the following premises: —

Gold is a shining, fusible, ductile, simple body.

Metals are shining, fusible, ductile, simple bodies.

But to say from these premises, “Gold and metal are similar in what is signified by the middle term,” is a mere repetition of the premises; to say, further, that “Gold may be a metal” is a non-sequitur, because, the middle being undistributed, the logical conclusion is the contingent “Gold may or may not be a metal,” which leaves the question quite open, and therefore there is no syllogism. Wundt, who is again followed by Bosanquet, also supposes another syllogism in the third figure, under the title of “Inference by Connexion” (Verbindungsschluss), to be useful for induction. He proposes, for example, the following pre- mises: —

Gold, silver, copper, lead, are fusible.

Gold, silver, copper, lead, are metals.

Here there is no syllogistic fallacy in the premises; but the question is what syllogistic conclusion can be drawn, and there is only one which follows without an illicit process of the minor, namely, ” Some metals are fusible.” The moment we stir a step further with Wundt in the direction of a more general conclusion {cin allgemeinerer Satz), we cannot infer from the premises the conclusion desired by Wundt, “Metals and fusible are con- nected”; nor can we infer “All metals are fusible,” nor “Metals are fusible,” nor “Metals may be fusible,” nor “All metals may be fusible,” nor any assertory conclusion, determinate or indeterminate, but the indifferent contingent, “All metals may or may not be fusible,” which leaves the question un- decided, so that there is no syllogism. We do not mean that in Wundt’s supposed ” inferences of relation by comparison and connexion” the premises are of no further use; but those of the first kind are of no syllogistic use in the second figure, and those of the second kind of no syllogistic use beyond particular con- clusions in the third figure. What they really are in the inferences proposed by Wundt is not premises for syllogism, but data for induction parading as syllogism. We must pass the same sentence on Lotze’s attempt to extend the second figure of the syllogism for inductive purposes, thus: —

S is M.

Q is M.

R is M. .”. Every 2, which is common to S, Q, R, is M.

We could not have a more flagrant abuse of the rule Ne eslo plus minusque in conclusione quam in praemissis. As we see from Lotze’s own defence, the conclusion cannot be drawn without.

another premise or premises to the effect that “S, Q, R, are 2, and 2 is the one real subject of M.” But how is all this to be got into the second figure? Again, Wundt and B. Erdmann propose new moods of syllogism with convertible premises, containing definitions and equations. Wundt’s Logic has the following forms: —

(1) 1st Fig. (2) 2nd Fig. (3) 3rd Fig.

Only M is P. x = y. y = x.

No S is M. z = y. y=z.

/.NoSisP. .'.* = z. ,'.x = z.

Now, there is no doubt that, especially in mathematical equations, universal conclusions are obtainable from convertible premises expressed in these ways. But the question is how the premises must be thought, and they must be thought in the converse way to produce a logical conclusion. Thus, we must think in (1) ' All P is M " to avoid illicit process of the major, in (2) "All y is 2" to avoid undistributed middle, in (3) "All x is y" to avoid illicit process of the minor. Indeed, it is the very essence of a convertible judgment to think it in both orders, and especi- ally to think it in the order necessary to an inference from it. Accordingly, however expressed, the syllogisms quoted above are, as thought, ordinary syllogisms, (1) being Camestres in the second figure, (2) and (3) Barbara in the first figure. Aristotle, indeed, was as well aware as German logicians of the force of convertible premises; but he was also aware that they require no special syllogisms, and made it a point that, in a syllogism from a definition, the definition is the middle, and the definilum the major in a convertible major premise of Barbara in the first figure, e.g.: —

The interposition of an opaque body is (essentially) deprivation of light.

The moon suffers the interposition of the opaque earth. .'. The moon suffers deprivation of light.

It is the same with all the recent attempts to extend the syllogism beyond its rules, which are not liable to exceptions, because they follow from the nature of syllogistic inference from universal to particular. To give the name of syllogism to inferences which infringe the general rules against undistributed middle, illicit process, two negative premises, non-sequitur from negative to affirmative, and the introduction of what is not in the premises into the conclusion, and which conse- quently infringe the special rules against affirmative conclusions in the second figure, and against universal conclusions in the third figure, is to open the door to fallacy, and at best to confuse the syllogism with other kinds of inference, without enabling us to understand any one kind.

3. Analytic and Synthetic Deduction. — Alexander the Com- mentator defined synthesis as a progress from principles to consequences, analysis as a regress from consequences to principles; and Latin logicians preserved the same distinction between the progressus a principiis ad principiata, and the regressus a principiatis ad principia. No distinction is more vital in the logic of inference in general and of scientific inference in particular; and yet none has been so little understood, because, though analysis is the more usual order of discovery, synthesis is that of instruction, and therefore, by becoming more familiar, tends to replace and obscure the previous analysis. The distinc- tion, however, did not escape Aristotle, who saw that a progressive syllogism can be reversed thus: —

2. Regression. 1. Progression.

All M is P. All S is M. All S is P.

Proceeding from one order to the other, by converting one of the premises, and substituting the conclusion as premise for the other premise, so as to deduce the latter as conclusion, is what he calls circular inference; and he remarked that the process is fallacious unless it contains propositions which are convertible, as in mathematical equations. Further, he perceived that the difference between the progressive and regressive orders extends from mathematics to physics, and that there are two kinds of syllogism: one progressing a priori from real ground

(1)

(2)

All P is M.

All S is P.

All S is P.

All M is S.

All S is M.

.-.All M is P.

to consequent fact (6 roD 5i6n eruXXoyiayjos), and the other regressing a posteriori from consequent fact to real ground (6 tov cm o-uXXoy 10716s). For example, as he says, the sphericity of the moon is the real ground of the fact of its light waxing; but we can deduce either from the other, as follows: —

1. Progression. What is spherical waxes. The moon is spherical. .The moon waxes.

2. Regression. What waxes is spherical. The moon waxes. . The moon is spherical.

These two kinds of syllogism are synthesis and analysis in the ancient sense. Deduction is analysis when it is regressive from consequence to real ground, as when we start from the proposition that the angles of a triangle are equal to two right angles and deduce analytically that therefore (1) they are equal to equal angles made by a straight line standing on another straight line, and (2) such equal angles are two right angles. Deduction is synthesis when it is progressive from real ground to consequence, as when we start from these two results of analysis as principles and deduce synthetically the proposition that therefore the angles of a triangle are equal to two right angles, in the order familiar to the student of Euclid. But the full value of the ancient theory of these processes cannot be appreciated until we recognize that as Aristotle planned them Newton used them. Much of the Principia consists of synthetical deductions from definitions and axioms. But the discovery of the centripetal force of the planets to the sun is an analytic deduction from the facts of their motion discovered by Kepler to their real ground, and is so stated by Newton in the first regressive order of Aristotle — P-M, S-P, S-M. Newton did indeed first show synthetically what kind of motions by mechanical laws have their ground in a centripetal force varying inversely as the square of the distance (all P is M); but his next step was, not to deduce synthetically the planetary motions, but to make a new start from the planetary motions as facts established by Kepler's laws and as examples of the kind of motions in question (all S is P); and then, by combining these two premises, one mechanical and the other astronomical, he analytically deduced that these facts of planetary motion have their ground in a centripetal force varying inversely as the squares of the distances of the planets from the sun (all S is M). (See Principia I. prop. 2; 4 coroll. 6; III. Phaenomena, 4-5; prop. 2.) What Newton did, in short, was to prove by analysis that the planets, revolving by Kepler's astronomical laws round the sun, have motions such as by mechanical laws are consequences of a centripetal force to the sun. This done, as the major is convertible, the analytic order — P-M, S-P, S-M — was easily inverted into the synthetic order — M-P, S-M, S-P; and in this progressive order the deduction as now taught begins with the centripetal force of the sun as real ground, and deduces the facts of planetary motion as consequences. Thereupon the Newtonian analysis which preceded this synthesis, became forgotten; until at last Mill in his Logic, neglecting the Principia, had the temerity to distort Newton's discovery, which was really a pure example of analytic deduction, into a mere hypothetical deduction; as if the author of the saying " Hypotheses non Jingo " started from the hypothesis of a centripetal force

to the sun, and thence deductively explained the facts of planetary motion, which reciprocally verified the hypothesis. This gross misrepresenta- tion has made hypothesis a kind of logical fashion. Worse still, Jevons proceeded to confuse analytic deduction from consequence to ground with hypothetical deduction from ground to conse- guence under the common term "inverse deduction." Wundt attempts, but in vain, to make a compromise between the old and the new. He re-defines analysis in the very opposite way to the ancients; whereas they defined it as a regressive process from consequence to ground, according to Wundt it is a pro- gressive process of taking for granted a proposition and deducing a consequence, which being true verifies the proposition. He then divides it into two species: one categorical, the other hypothetical. By the categorical he means the ancient analysis from a given proposition to more general propositions. By the hypothetical he means the new-fangled analysis from a given

proposition to more particular propositions, i.e. from a hypothesis to consequent facts. But his account of the first is imperfect, because in ancient analysis the more general propositions, with which it concludes, are not mere consequences, but the real grounds of the given proposition; while his addition of the second reduces the nature of analysis to the utmost confusion, because hypothetical deduction is progressive from hypothesis to consequent facts whereas analysis is regressive from consequent facts to real ground. There is indeed a sense in which all inference is from ground to consequence, because it is from logical ground (principium cognoscendi) to logical consequence. But in the sense in which deductive analysis is opposed to deductive synthesis, analysis is deduction from real consequence as logical ground principiatum as principium) cognoscendi) to real ground {principium essendi), e.g. from the consequential facts of planetary motion to their real ground, i.e. centripetal force to the sun. Hence Sigwart is undoubtedly right in distinguishing analysis from hypothetical deduction, for which he proposes the name ." reduction. " We have only further to add that many scientific discoveries about sound, heat, light, colour and so forth, which it is the fashion to represent as hypotheses to explain facts, are really analytical deductions from the facts to their real grounds in accordance with mechanical laws. Recent logic does scant justice to scientific analysis.

4. Induction. — As induction is the process from particulars to universals, it might have been thought that it would always have been opposed to syllogism, in which one of the rules is against using particular premises to draw universal conclusions. Yet such is the passion for one type that from Aristotle's time till now constant attempts have been made to reduce induction to syllogism. Aristotle himself invented an inductive syllogism in which the major (P) is to be referred to the middle (M) by means of the minor (S), thus: —

A, B, C magnets (S) attract iron (P). A, B, C magnets (S) are all magnets whatever (M). .'. All magnets whatever (M) attract iron (P).

As the second premise is supposed to be convertible, he reduced the inductive to a deductive syllogism as follows: —

Every S is P. Every S is P.

Every S is M (convertibly). Every M is S.

.". Every M is P. .'. Every M is P.

In the reduced form the inductive syllogism was described by Aldrich as "Syllogismus in Barbara cujus minor {i.e. every M is S) reticetur." Whately, on the other hand, proposed an inductive syllogism with the major suppressed, that is, instead of the minor premise above, he supposed a major premise, " Whatever belongs to A, B, C magnets belongs to all." Mill thereupon supposed a still more general premise, an assumption of the uniformity of nature. Since Mill's time, however, the logic of induction tends to revert towards syllogisms more like that of Aristotle. Jevons

supposed induction to be inverse deduction, distinguished from direct deduction as analysis from synthesis, e.g. as division from multiplication; but he really meant that it is a deduction from a hypothesis of the law of a cause to particular effects which, being true, verify the hypothesis. Sigwart declares himself in agreement with Jevpns; except that, being aware of the difference between hypothetical deduction and mathematical analysis, and seeing that, whereas analysis {e.g. in division) leads to certain conclusions, hypothetical deduction is not certain of the hypothesis, he arrives at the more definite view that induction is not analysis proper but hypothetical deduction, or " reduction," as he proposes to call it. Reduction he defines as " the framing of possible premises for given pro- positions, or the construction of a syllogism when the conclusion and one premise is given." On this view induction becomes a reduction in the form: all M is P (hypothesis), S is M (given), . ' . S is P (given). The views of Jevons and Sigwart are in agreement in two main points. According to both, induction, instead of inferring from A, B, C magnets the conclusion " There- fore all magnets attract iron," infers from the hypothesis, " Let every magnet attract iron," to A, B, C magnets, whose given attraction verifies the hypothesis. According to both,

again, the hypothesis of a law with which the process starts contains more than is present in the particular data: according to Jevons, it is the hypothesis of a law of a cause from which induction deduces particular effects; and according to Sigwart, it is a hypothesis of the ground from which the particular data necessarily follow according to universal laws. Lastly, Wundt's view is an interesting piece of eclecticism, for he supposes that induction begins in the form of Aristotle's inductive syllogism, S-P, S-M, M-P, and becomes an inductive method in the form of Jevons's inverse deduction, or hypothetical deduction, or analysis, M-P, S-M, S-P. In detail, he supposes that, while an " inference by comparison," which he erroneously calls an affirmative syllogism in the second figure, is preliminary to induction, a second " inference by connexion," which he erroneously calls a syllogism in the third figure with an indeter- minate conclusion, is the inductive syllogism itself. This is like Aristotle's inductive syllogism in the arrangement of terms; but, while on the one hand Aristotle did not, like Wundt, confuse it with the third figure, on the other hand Wundt does not, like Aristotle, suppose it to be practicable to get inductive data so wide as the convertible premise, " All S is M, and all M is S," which would at once establish the conclusion, " All M is P." Wundt's point is that the conclusion of the inductive syllogism is neither so much as all, nor so little as some, but rather the indeterminate "M and P are connected." The question there- fore arises, how we are to discover "AllMisP," and this question Wundt answers by adding an inductive method, which involves inverting the inductive syllogism in the style of Aristotle into a deductive syllogism from a hypothesis in the style of Jevons, thus: —

(I)

(2)

Sis P.

Every M is P.

SisM.

SisM.

M and P are connected.

. • . S is P.

He agrees with Jevons in calling this second syllogism analytical deduction, and with Jevons and Sigwart in calling it hypothetical deduction. It is, in fact, a common point of Jevons, Sigwart and Wundt that the universal is not really a conclusion inferred from given particulars, but a hypothetical major premise from which given particulars are inferred, and that this major contains presuppositions of causation not contained in the particulars.

It is noticeable that Wundt quotes Newton's discovery of the centripetal force of the planets to the sun as an instance of this supposed hypothetical, analytic, inductive method; as if Newton's analysis were a hypothesis of the centripetal force to the sun, a deduction of the given facts of planetary motion, and a verification of the hypothesis by the given facts, and as if such a process of hypothetical deduction could be identical with either analysis or induction. The abuse of this instance of Newtonian analysis betrays the whole origin of the current confusion of induction with deduction. One confusion has led to another. Mill confused Newton's analytical deduction with hypothetical deduction; and thereupon Jevons confused induction with both. The result is that both Sigwart and Wundt transform the in- ductive process of adducing particular examples to induce a universal law into a deductive process of presupposing a universal law as a ground to deduce particular consequences. But we can easily extricate ourselves from these confusions by comparing induction with different kinds of deduction. The point about induction is that it starts from experience, and that, though in most classes we can experience only some particulars individually, yet we infer all. Hence induction cannot be reduced to Aristotle's inductive syllogism, because experience cannot give the con- vertible premise, "Every S is M, and every M is S" ; that "All A, B, C are magnets" is, but that "All magnets are A, B, C" is not, a fact of experience. For the same reason induction cannot be reduced to analytical deduction of the second kind in the form, S-P, M-S, . ' . M-P; because, though both end in a universal conclusion, the limits of experience prevent induction from such inference as: —

Every experienced magnet attracts iron. Every magnet whatever is every experienced magnet. . • . Every magnet whatever attracts iron.

Still less can induction be reduced to analytical deduction of the first kind in the form — P-M, S-P, . ' . S-M, of which Newton has left so conspicuous an example in his Principia. As the example shows, that analytic process starts from the scientific knowledge of a universal and convertible law (every M is P, and every P is M), e.g. a mechanical law of all centripetal force, and ends in a particular application, e.g. this centripetal force of planets to the sun. But induction cannot start from a known law. Hence it is that Jevons, followed by Sigwart and Wundt, reduces it to deduction from a hypothesis in the form "Let every M be P, S is M, . ' . S is P." There is a superficial resenlblance between induction and this hypothetical deduction. Both in a way use given particulars as evidence. But in induction the given particulars are the evidence by which we discover the universalˆ e.g. particular magnets attracing iron are the origin of an inference that all do; in hypothetical deduction, the universal is the evidence by which we explain the given parti- culars, as when we suppose undulating aether to explain the facts of heat and light. In the former process, the given parti- culars are the data from which we infer the universal; in the latter, they are only the consequent facts by which we verify it. Or rather, there are two uses of induction: inductive discovery before deduction, and inductive verification after deduction. But neither use of induction is the same as the deduction itself: the former precedes, the latter follows it. Lastly, the theory of Mill, though frequently adopted, e.g. by B. Erdmann, need not detain us long. Most inductions are made without any assump- tion of the uniformity of nature; for, whether it is itself induced, or a priori or postulated, this like every assumption is a judg- ment, and most men are incapable of judgment on so universal a scale, when they are quite capable of induction. The fact is that the uniformity of nature stands to induction as the axioms of syllogism do to syllogism; they are not premises, but con- ditions of inference, which ordinary men use spontaneously, as was pointed out in Physical Realism, and afterwards in Venn's Empirical Logic. The axiom of contradiction is not a major premise of a judgment: the dictum de omni et nullo is not a major premise of a syllogism: the principle of

uniformity is not a major premise of an induction. Induction, in fact, is no species of deduction; they are opposite processes, as Aristotle regarded them except in the one passage where he was reducing the former to the latter, and as Bacon always regarded them. But it is easy to confuse them by mistaking examples of deduction for inductions. Thus Whewell mistook Kepler's inference that Mars moves in an ellipse for an induction, though it required the combination of Tycho's and Kepler's observations, as a minor, with the laws of conic sections discovered by the Greeks, as a major, premise. Jevons, in his Principles of Science, constantly makes the same sort of mistake. For example, the inference from the similarity between solar spectra and the spectra of various gases on the earth to the existence of similar gases in the sun, is called by him an induction; but it really is an analytical deduction from effect to cause, thus: —

Such and such spectra are effects of various gases.

Solar spectra are such spectra. . ' . Solar spectra are effects of those gases.

In the same way, to infer a machine from hearing the regular tick of a clock, to infer a player from finding a pack of cards arranged in suits, to infer a human origin of stone implements, and all such inferences from patent effects to latent causes, though they appear to Jevons to be typical inductions, are really deductions which, besides the minor premise stating the par- ticular effects, require a major premise discovered by a previous induction and stating the general kind of effects of a general kind of cause. B. Erdmann, again, has invented an induction from particular predicates to a totality of predicates which he calls " erganzende Induction, " giving as an example, " This body has the colour, extensibility and specific gravity of mag- nesium; therefore it is magnesium." But this inference contains the tacit major, " What has a given colour, &c, is magnesium," and is a syllogism of recognition. A deduction is often like an induction, in inferring from particulars; the difference is that

deduction combines a law in the major with the particulars in the minor premise, and infers syllogistically that the particulars of the minor have the predicate of the major premise, whereas induction uses the particulars simply as instances to generalize a law. An infallible sign of an induction is that the subject and predicate of the universal conclusion are merely those of the particular instances generalized; e.g. " These magnets attract iron, .-. all do."

This brings us to another source of error. As we have seen, Jevons, Sigwart and VVundt all think that induction contains a belief in causation, in a cause, or ground, which is not present in the particular facts of experience, but is contributed by a hypo- thesis added as a major premise to the particulars in order to explain them by the cause or ground. Not so; when an in- duction is causal, the particular instances are already, beliefs in particular causes, e.g. " My right hand is exerting pressure reciprocally with my left," " A, B, C magnets attract iron "; and the problem is to generalize these causes, not to introduce them. Induction is not introduction. It would make no differ- ence to the form of induction, if, as Kant thought, the notion of causality is a priori; for even Kant thought that it is already contained in experience. But whether Kant be right or wrong, Wundt and his school are decidedly wrong in supposing " supple- mentary notions which are not contained in experience itself, but are gained by a process of logical treatment of this experi- ence "; as if our behalf in causality could be neither a posteriori nor a priori, but beyond experience wake up in a hypothetical major premise of induction. Really, we first experience that particular causes have particular effects; then induce that causes similar to those have effects similar to these; finally, deduce that when a particular cause of the kind occurs it has a particular effect of the kind by synthetic deduction, and that when a particular effect of the kind occurs it has a

particular cause of the kind by analytic deduction with a convertible premise, as when Newton from planetary motions, like terrestrial motions, analytically deduced a centripetal force to the sun like centripetal forces to the earth. Moreover, causal induction is itself both synthetic and analytic: according as experiment combines elements into a compound, or resolves a compound into elements, it is the origin of a synthetic or an analytic generaliza- tion. Not, however, that all induction is causal; but where it is not, there is still less reason for making it a deduction from hypothesis. When from the fact that the many crows in our experience are black, we induce the probability that all crows whatever are black, the belief in the particulars is quite independent of this universal. How then can this universal be called, as Sigwart, for example, calls it, the ground from which these particulars follow? I do not believe that the crows I have seen are black because all crows are black, but vice versa. Sigwart simply inverts the order of our knowledge. In all induction, as Aristotle said, the particulars are the evidence, or ground of our knowledge (principium cognoscendi) , of the universal. In causal induction, the particulars further contain the cause, or ground of the being (principium essendi), of the effect, as well as the ground of our inducing the law. In all induction the universal is the conclusion, in none a major premise, and in none the ground of either the being or the knowing of the particulars. Induction is generalization. It is not syllogism in the form of Aristotle's or Wundt's inductive syllogism, because, though starting only from some particulars, it concludes with a universal; it is not syllogism in the form called inverse deduction by Jevons, reduction by Sigwart, inductive method by Wundt, because it often uses particular facts of causation to infer universal laws of causation; it is not syllogism in the form of Mill's syllogism from a belief in uniformity of nature, because few men have believed in uniformity, but all have induced from particulars to universals. Bacon alone was right in altogether opposing induction to syllogism, and in finding inductive rules for the inductive process from particular instances of presence, absence in similar circumstances, and comparison.

5. Inference in General. — There are, as we have seen (ad init.), three types — syllogism, induction and analogy. Different as

they are, the three kinds have something in common: first, they are all processes from similar to similar; secondly, they all consist in combining two judgments so as to cause a» third, whether expressed in so many propositions or not; thirdly, as a judgment is a belief in being, they all proceed from premises which are beliefs in being to a conclusion which is a belief in being. Nevertheless, simple as this account appears, it is opposed in every point to recent logic. In the first place, the point of Bradley's logic is that " similarity is not a principle which works. What operates is identity, and that identity is a universal." This view makes inference easy: induction is all over before it begins; for, according to Bradley, " every one of the instances is already a universal proposition; and it is not a particular fact or phenomenon at all," so that the moment you observe that this magnet attracts iron, you ipso facto know that every magnet does so, and all that remains for deduction is to identify a second magnet as the same with the first, and conclude that it attracts iron. In dealing with Bradley's works we feel inclined to repeat what Aristotle says of the discourses of Socrates: they all exhibit excellence, cleverness, novelty and inquiry, but their truth is a difficult matter; and the Socratic paradox that virtue is knowledge is not more difficult than the Bradleian paradox that as two different things are the same, inference is identification. The basis of Bradley's logic' is the fallacious dialectic of Hegel's metaphysics, founded on the supposition that two things, which are different, but have something in common, are the same. For example, according to Hegel, being and not-being are both indeterminate and therefore the same. " If," says Bradley, " A and B, for instance, both have lungs or gills, they are so far the same." The answer to Hegel is that being and not-being are at most similarly indeterminate, and to Bradley that each animal has its own different lungs, whereby they are only similar. If they were the same, then in descending, two things, one of which has healthy and the other diseased lungs, would be the same; and in ascending, two things, one of which has lungs and the other has not, but both of which have life, e.g. plants and animals, would be so far the same. There would be no

limit to identity either downwards or upwards; so that a man would be the same as a man-of-war, and all things would be the same thing, and not different parts of one universe. But a thing which has healthy lungs and a thing which has diseased lungs are only similar individuals numerically different. Each individual thing is the same only with itself, although related to other things; and each individual of a class has its own individual, though similar, attributes. The consequence of this true metaphysics to logic is twofold: on the one hand, one singular or particular judgment, e.g. ” this magnet attracts iron,” is not another, e.g. ” that magnet attracts iron,” and neither is universal; on the other hand, a universal judgment, e.g. ” every magnet attracts iron,” means, distributively, that each individual magnet exerts its individual attraction, though it is similar to other magnets exerting similar attractions. A universal is not ” one identical point,” but one distributive whole. Hence in a syllogism, a middle term, e.g. magnets, is ” absolutely the same,” not in the sense of ” one identical point ” making each individual the same as any other, as Bradley supposes, but only in the sense of one whole class, or total of many similar individuals, e.g. magnets, each of which is separately though similarly a magnet, not magnet in general. Hence also induction is a real process, because, when we know that this individual magnet attracts iron, we are very far from knowing that all alike do so similarly; and the question of inductive logic, how we get from some similars to all similars, remains, as before, a difficulty, but not to be solved by the fallacy that inference is identification.

Secondly, a subordinate point in Bradley’s logic is that there are inferences which are not syllogisms; and this is true. But when he goes.on to propose, as a complete independent inference, “A is to the right of B,B is to the right of C, therefore A is to the right of C,” he confuses two different operations. When A, B and C are objects of sense, their relative positions are matters, not of inference, but of observation; when they are not, there is I an inference, but a syllogistic inference with a major premise

induced from previous observations, ” whenever of three things the first is to the right of the second, and the second to the right of the third, the first is to the right of the third.” To reply that this universal judgment is not expressed, or that its expres- sion is cumbrous, is no answer, because, whether expressed or not, it is required for the thought. As Aristotle puts it, the syllogism is directed ” not to the outer, but to the inner dis- course,” or as we should say, not to the expression but to the thought, not to the proposition but to the judgment, and to the inference not verbally but mentally. Bradley seems to suppose that the major premise of a syllogism must be explicit, or else is nothing at all. But it is often thought without being expressed, and to judge the” syllogism by its mere explicit expression is to commit an ignoratio denchi; for it has been known all along that we express less than we think, and the very purpose of syllogistic logic is to analyse the whole thought necessary to the conclusion. In this syllogistic analysis two points must always be considered: one, that we usually use premises in thought which we do not express; and the other, that we sometimes use them unconsciously, and therefore infer and reason unconsciously, in the manner excellently described by Zeller in his Vortrage, iii. pp. 249-255. Inference is a deeper thinking process from judgments to judgment, which only occasionally and partially emerges in the linguistic process from propositions to proposition. We may now then reassert two points about inference against Bradley’s logic: the first, that it is a process from similar to similar, and not a process of identification, because two different things are not at all the same thing; the second, that it is the mental process from judgments to judgment rather than the linguistic process from propositions to proposition, because, besides the judgments expressed in propositions, it requires judgments which are not always expressed, and are sometimes even unconscious.

Our third point is that, as a process of judgments, inference is a process of concluding

from twp beliefs in being to another belief in being, and not an ideal construction, because a judgment does not always require ideas, but is always a belief about things, existing or not. This point is challenged by all the many idral theories of judgment already quoted. If, for example, judgment were an analysis of an aggregate idea as Wundt supposes, it would certainly be true with him to conclude that " as judgment is an immediate, inference is a mediate, reference of the members of an aggregate of ideas to one another." But really a judgment is a belief that something, existing, or thinkable, or nameable or what not, is (or is not) determined; and inference is a process from and to such beliefs in being. Hence the fallacy of those who, like Bosanquet, or like Paulsen in his Einleitung in die PhUosophie, represent the realistic theory of inference as if it meant that knowledge starts from ideas arid then infers that ideas are copies of things, and who then object, rightly enough, that we could not in that case compare the copy with the original, but only be able to infer from idea to idea. But there is another realism which holds that inference is a process neither from ideas to ideas, nor from ideas to things, but from beliefs to beliefs, from judgments about things in the premises to judgments about similar things in the conclusion. Logical inference never goes through the impossible process of premising nothing but ideas, and concluding that ideas are copies of things. Moreover, as we have shown, our primary judgments of sense are beliefs founded on sensations without requiring ideas, and are beliefs, not merely that something is determined, but that it is deter- mined as existing; and, accordingly, our primary inferences from these sensory judgments of existence are inferences that other things beyond sense are similarly determined as existing. First press your lips together and then press a pen between them: you will not be conscious of perceiving any ideas: you will be conscious first of perceiving one existing lip exerting pressure reciprocally with the other existing lip; then, on putting the pen between your lips, of perceiving each lip similarly exerting pressure, but not with the other; and consequently of inferring that each existing lip is exerting pressure reciprocally with another existing body, the pen. Inference then, though it is accompanied

by ideas, is not an ideal construction, nor a process from idea to idea, nor a process from idea to thing, but a process from direct to indirect beliefs in things, and originally in existing things. Logic cannot, it is true, decide what these things are, nor what the senses know about them, without appealing to metaphysics and psychology. But, as the science of inference, it can make sure that inference, on the one hand, starts from sensory judg- ments about sensible things and logically proceeds to inferential judgments about similar things beyond sense, and, on the other hand, cannot logically go beyond the similar. These are the limits within which logical inference works, because its nature essentially consists in proceeding from two judgments to another about similar things, existing or not.

6. Truth. — Finally, though sensory judgment is always true of its sensible object, inferential judgments are not always true, but are true so far as they are logically inferred, however in- directly, from sense; and knowledge consists of sense, memory after sense and logical inference from sense, which, we must remember, is not merely the outer sense of our five senses, but also the inner sense of ourselves as conscious thinking persons. We come then at last to the old question — What is truth? Truth proper, as Aristotle said in the Metaphysics, is in the mind: it is not being, but one's signification of being. Its requisites are that there are things to be known and powers of knowing things. It is an attribute of judgments and derivatively of propositions. That judgment is true which apprehends a thing as it is capable of being known to be; and that proposition is true which so asserts the thing to be. Or, to combine truth in thought and in speech, the true is what signifies a thing as it is capable of being known. Secondarily, the thing itself is ambiguously said to be true in the sense of being signified as it is. For example, as I am weary and am conscious of being weary, my judgment and proposition that I am weary are true because they signify what I am and know myself to be by direct consciousness; and my being weary is ambiguously said to be true because it is so signified. But it will be said that Kant has proved that real truth, in the sense of the " agreement of knowledge with the object," is unattainable,

because we could compare knowledge with the object only by knowing both. Sigwart, indeed, adopting Kant's argument, concludes that we must be satisfied with consistency among the thoughts whic^ presuppose an existent; this, too, is the reason why he thinks that induction is reduction, on the theory that we can show the necessary consequence of the given particular, but that truth of fact is unattainable. But Kant's criticism and Sigwart's corollary only derive plausibility from a false definition of truth. Truth is not the agreement of knowledge with an object beyond itself, and therefore ex hypolhesi unknowable, but the agreement of our judgments with the objects of our knowledge. A judgment is true whenever it is a belief that a thing is determined as it is known to be by sense, or by memory after sense, or by inference from sense, however indirect the inference may be, and even when in the form of inference of non-existence it extends consequently from primary to secondary judgments. Thus the judgments " this sensible pressure exists," " that sensible pressure existed," " other similar pressures exist," " a conceivable centaur does not exist but is a figment," are all equally true, because they are in accordance with one or other of these kinds of knowledge. Consequently, as knowledge is attainable by sense, memory and inference, truth is also attainable, because, though we cannot test what we know by something else, we can test what we judge and assert by what we know. Not that all inference is knowledge, but it is sometimes. The aim, of logic in general is to find the laws of all inference, which, so far as it obeys those laws, is always consistent, but is true or false according to its data as well as its consistency; and the aim of the special logic of knowledge is to find the laws of direct and indirect inferences from sense, because as sense produces sensory judgments which are always true of the sensible things actually perceived, inference from sense produces inferential judgments which, so far as they are consequent on sensory judgments, are always true of things similar to sensible things, by the very consistency of inference, or, as we say, by

parity of reasoning. We return then to the old view of Aristotle, that truth is believing in being; that sense is true of its immediate objects, and reasoning from sense true of its mediate objects; and that logic is the science of reasoning with a view to truth, or Logica est ars ratiocinandi, ut discernatur verum a falso. All we aspire to add is that, in order to attain to real truth, we must proceed gradually from sense, memory and experience through analogical particular inference, to inductive and deductive universal inference or reasoning. Logic is the science of all inference, beginning from sense and ending in reason.

In conclusion, the logic of the last quarter of the 19th century may be said to be animated by a spirit of inquiry, marred by a love of paradox and a corresponding hatred of tradition. But we have found, on the whole, that logical tradition rises superior to logical innovation. There are two old logics which still remain indispensable, Aristotle's Organon and Bacon's Novum Organum. If, and only if, the study of deductive logic begins with Aristotle, and the study of inductive logic with Aristotle and Bacon, it will be profitable to add the works of the following recent German and English authors: —

Authorities. — J. Bergmann, Reine Logik (Berlin, 1879); Die Grundprobleme der Logik (and ed., Berlin, 1895); B. Bosanquet, Logic (Oxford, 1888) j The Essentials of Logic (London, 1895); F. H. Bradley, The Principles of Logic (London, 1883); F. Brentano, Psychologie vom empirischen Standpunkte (Vienna, 1874); R. F. Clarke, Logic (London, 1889); W. L. Davidson, The Logic of De- finition (London, 1 885) ; E. Diihring, Logik und Wissenschafts- theorie (Leipzig, 1878); B. Erdmann, Logik (Halle, 1892); T. Fowler, Bacon's Novum Organum, edited, with introduction, notes, &c. (2nd ed., Oxford, 1889); T. H. Green, Lectures on Logic, in Works, vol. iii. (London, 1886); J. G. Hibben, Inductive Logic (Edinburgh and London, 1896) ; F. Hillebrand, Die neuen Theorien der

kategorischen Schlusse (Vienna, 1891) ; L. T. Hobhouse, The Theory of Knowledge (London, 1896); H. Hughes, The Theory of Inference (London, 1894); E. Husserl, Logische Untersuchungen (Halle, 1891, 1901); W. Jerusalem, Die Urtheilsfunction (Vienna and Leipzig, 1895); W. Stanley Jevons, The Principles of Science (3rd ed., London, 1879) ! Studies in Deductive Logic (London, 1880) ; H. W. B. Joseph, Introduction to Logic (1906); E. E. Constance Jones, Elements of Logic (Edinburgh, 1890); G. H. Joyce, Principles of Logic (1908) ; J. N. Keynes, Studies and Exercises in Formal Logic (2nd ed., London, 1887); F. A. Lange, Logische Studien (2nd ed., Leipzig, 1894) ; T. Lipps, Grundziige der Logik (Hamburg and Leipzig, 1893); R. H. Lotze, Logik (2nd ed., Leipzig, 1881, English transla- tion edited by B. Bosanquet, Oxford, 1884); Grundziige der Logik (Diktate) (3rd ed., Leipzig, 1891, English translation by G. T. Ladd, Boston, 1887) ; Werner Luthe, Beitrdge zur Logik (Berlin, 1872, 1877) ; Members of Johns Hopkins University, Studies in Logic (edited by C. S. Peirce, Boston, 1883) ; J. B. Meyer, Ueberweg's System der Logik, funfte vermehrte Auflage (Bonn, 1882); Max Miiller, Science of Thought (London, 1887); Carveth Read, On the Theory of Logic (London, 1878); Logic, Deductive and Inductive (2nd ed., London, 1901) ; E. Schroder, Vorlesungen iiber die Algebra der Logik (Leipzig, 1890, 1 89 1, 1895); W. Schuppe, Erkenntnistheoretische Logik (Bonn, 1878); Grundriss der Erkennlnistheorie und Logik (Berlin, 1894); R. Shute, A Discourse on Truth (London, 1877); Alfred Sidgwick, Fallacies (London, 1883); The Use of Words m Reasoning (London, 1901) ; C. Sigwart, Logik (2nd ed., Freiburg-i.Br. and Leipzig, 1889 1893, English translation by Helen Dendy, London, 1895); K. Uphues, Grundlehren der Logik (Breslau, 1883); J. Veitch, Institutes of Logic (Edinburgh and London, 1885); J. Venn, Symbolic Logic (2nd ed., London, 1894); The Principles of Empirical or Inductive Logic (London, 1889); J. Volkelt, Erfahren und Denken (Hamburg and Leipzig, 1886); T. Welton, A Manual of Logic (London, 1891, 1896); W. Windelband, Praludien (Freiburg-i.-Br., 1884); W. Wundt, Logik (2nd ed., Stuttgart, 1 893-1 895). Text-books are not comprised in this list. (T. Ca.)

II. History

Logic cannot dispense with the light afforded by its history so long as counter-solutions of the same fundamental problems continue to hold the field. A critical review of some of the chief types of logical theory, with a view to determine development, needs no further justification.

Logic arose, at least for the Western world, in the golden age of Greek speculation which culminated in Plato and Aristotle. There is an Indian logic, it is true, but its priority is more than disputable. In any case no influence upon Greek thought can be shown. The movement which ends in the logic of Aris- totle is demonstrably self-contained. When we have shaken ourselves free of the prejudice that allstars are first seen in the

East, Oriental attempts at analysis of the structure of thought may be treated as negligible.

It is with Aristotle that the bookish tradition begins to dominate the evolution of logic. The technical perfection of the analysis which he offers is, granted the circle of presuppositions within which it works, so decisive, that what precedes, even Plato's logic, is not unnaturally regarded as merely preliminary and subsidiary to it. What follows is inevitably, whether directly or indirectly, by sympathy or by antagonism, affected by the Aristotelian tradition.

A. Greek Logic

i. Before Aristotle

Logic needs as its presuppositions that thought should dis- tinguish itself from things and from sense, that the problem of validity should be seen to be raised in the field of thought itself, and that analysis of the structure of physical thought should be

recognized as the one way of solution, phiio- Thought is somewhat late in coming to self-conscious- ness. Implied in every contrast of principle and fact, of rule and application, involved as we see after the event, most decisively when we react correctly upon a world incorrectly perceived, thought is yet not reflected on in the common experience. Its so-called natural logic is only the potentiality of logic. The same thing is true of the first stage of Greek philosophy. In seeking for a single material principle underlying the multiplicity of phenomena, the first nature-philosophers, Thales and the rest, did indeed raise the problem of the one and the many, the endeavour to answer which must at last lead to logic. But it is only from a point of view won by later speculation that it can be said that they sought to determine the predicates of the single subject-reality, or to establish the permanent subject of varied and varying predicates. 1 The direction of their inquiry is per- sistently outward. They hope to explain the opposed appearance and reality wholly within the world of things, and irrespective of the thought that thinks things. Their universal is still a material one. The level of thought on which they move is still clearly pre-logical. It is an advance on this when Heraclitus 8 opposes to the eyes and ears which are bad witnesses ” for such as understand not their language ” a common something which we would do well to follow; or again when in the incom- mensurability of the diagonal and side of a square the Pytha- goreans stumbled upon what was clearly neither thing nor image of sense, but yet was endowed with meaning, and henceforth were increasingly at home with symbol and formula. So far, however, it might well be that thought, contradistinguished from sense with its illusions, was itself infallible. A further step, then, was necessary, and it was taken at any rate by the Eleatics, when they opposed their thought to the thought of others, as the way of truth in contrast to the way of opinion. If Eleatic thought stands over against Pythagorean thought as what is valid or grounded against what is ungrounded or invalid, we are embarked upon dialectic, or the debate in which thought is countered by thought. Claims to a favourable verdict must now be substantiated in this field and in this field alone. It was Zeno, the controversialist of the Eleatic school, who was regarded in after times as the ” discoverer ” of dialectic. 3

Zeno’s amazing skill in argumentation and his paradoxical con- clusions, particular and general, inaugurate a new era. “The philosophical mind,” says Walter Pater, 4 ” will perhaps never be quite in health, quite sane or natural again.” The give and take of thought had by a swift transformation of values come by something more than its own. Zeno’s paradoxes, notably, for example, the puzzle of Achilles and the Tortoise, are still capable of amusing the modern world. In his own age they found him imitators. And there follows the sophistic movement.

1 Cf. Heidel, ” The Logic of the Pre-Socratic Philosophy,” in Dewey’s Studies in Logical Theory (Chicago, 1903).

2 Heraclitus, Fragmm. 107 (Diels, Fragmente der Vorsokratiker) and 2, on which see Burnet, Early Greek Philosophy, p. 153 note (ed. 2).

- e.g. Diog. Laert. ix. 25, from the lost Sophistes of Aristotle.

- Plato and Platonism, p. 24.

The sophists have other claims to consideration than their service to the development of logic. In the history of the origins of logic the sophistic age is simply the age of the free play of Sophists, thought in which men were aware that in a sense anything can be debated and not yet aware of the sense in which all things cannot be so. It is the age of discussion used as a universal solvent, before it has been brought to book by a deliberate unfolding of the principles of the structure of thought determining and

limiting the movement of thought itself. The sophists furthered the transi- tion from dialectic to logic in two ways. In the first place they made it possible. Incessant questioning leads to answers. Hair- splitting, even when mischievous in intent, leads to distinctions of value. Paradoxical insistence on the accidents of speech-forms and thought-forms leads in the end to perception of the essentials. Secondly they made it necessary. The spirit of debate run riot evokes a counter-spirit to order and control it. The result is a self- limiting dialectic. This higher dialectic is a logic. It is no accident that the first of the philosophical sophists, Gorgias, on the one hand, is Eleatic in his affinities, and on the other raises in the charac- teristic formula of his intellectual nihilism 1 issues which are as much logical and epistemological as ontological. The meaning of the copula and the relation of thoughts to the objects of which they are the thoughts are as much involved as the nature of being. It is equally no accident that the name of Protagoras is to be con- nected, in Plato's view at least, with the rival school of Heracliteans. The problems raised by the relativism of Protagoras are no less fundamentally problems of the nature of knowledge and of the structure of thought. The Theaetetus indeed, in which Plato essa'3 to deal with them, is in the broad sense of the word logical, the first distinctively logical treatise that has come down to us. Other sophists, of course, with more practical interests, or of humbler attainments, were content to move on a lower plane of philosophical speculation. As presented to us, for example, in Plato's surely not altogether hostile caricature in the Euthydemus, they mark the intellectual preparation for, and the moral need for, the advance of the next generation.

Among the pioneers of the sophistic age Socrates stands apart. He has no other instrument than the dialectic of his compeers, and he is as far off as the rest from a criticism of the instrument, Socrates, but he uses it differently and with a difference of aim. He construes the give and take of the debate-game with extreme rigour. The rhetorical element must be exorcised. The set harangue of teacher to pupil, in which steps in argument are slurred and the semblance of co-inquiry is rendered nugatory, must be eliminated. The interlocutors must in truth render an account under the stimulus of organized heckling from their equals or superiors in debating ability. And the aim is heuristic, though often enough the search ends in no overt positive conclusion. Something can be found and something is found. Common names are fitted for use by the would- be users being first delivered from abortive conceptions, and there- upon enabled to bring to the birth living and organic notions.

Aristotle would assign to Socrates the elaboration of two logical functions: — general definition and inductive method. 2 Rightly, if we add that he gives no theory of either, and that his practical use of the latter depends for its value on selection. 3 It is rather in virtue of his general faith in the possibility of construction, which he still does not undertake, and because of his consequent insistence on the elucidation of general concepts, which in common with some of his contemporaries, he may have thought of as endued with a certain objectivity, that he induces the controversies of what are called the Socratic schools as to the nature of predication. These result in the formulation of a new dialectic or logic by Plato. Mani- festly Socrates' use of certain forms of argumentation, like their abuse by the sophists, tended to evoke their logical analysis. The use and abuse, confronted one with the other, could not but evoke it. The one in the many, the formula which lies at the base of the possibility of predication, is involved in the Socratic doctrine of general concepts or ideas. The nihilism of Gorgias from the Eleatic point of view of bare identity, and the speechlessness of Cratylus from the Heraclitean ground of absolute difference, are alike dis- owned. But the one in the many, the identity in difference, is so far only postulated, not established- When the personality of Socrates is removed, the difficulty as to the nature of the Socratic universal, developed in the medium of the individual processes of individual minds, carries disciples of diverse . general sympathies, united only through the practical inspiration of the master's life, towards the identity-formula or the difference-formula of other teachers. The paradox of predication, that it seems to deny identity, or to deny difference, becomes a pons asinorum. Know- ledge involves synthesis or nexus. Yet from the points of view alike of an absolute pluralism, of a flux, and of a formula of

bare identity — and a fortiori with any blending of these principles sufficiently within the bounds of plausibility to find an exponent — all knowledge, because all predication of unity, in difference, must be held to be impossible. Plato's problem was to find a way of

1 Nothing is. If anything is, it cannot be known. is known it cannot be communicated.
* Metaphys. n. 10786 28 sq.

If anything

Plato.

1 Metaphys. n. IO78O 28 sqq. * Cf. Arist. Top. B. i. I ad fin.

xvi. 29

escape from this impasse, and among his Socratic contemporaries he seems to have singled out Antisthenes 4 as most in need of re- futation. Antisthenes, starting with the doctrine of identity without difference, recognizes as the only ex- theaes pression proper to anything its own peculiar sign, its name. This extreme of nominalism for which predication is im- possible is, however, compromised by two concessions. A thing can be described as like something else. And a compound can have a X670S or account given of it by the (literally) adequate enumeration of the names of its simple elements or Trpwra. 5 This analytical Myot he offers as his substitute for knowledge.' The simple elements still remain, sensed and named but not known. The expressions of them are simply the speech-signs for them. The account of the compound simply sets itself taken piecemeal as equivalent to itself taken as aggregate. The subject-predicate relation fails really to arise. Euclides 7 found no difficulty in fixing Antisthenes' mode of illus- trating his simple elements by comparison, and therewith perhaps the " induction " of Socrates, with the dilemma; so rar as the example is dissimilar, the comparison is invalid; so far as it is similar, it is useless. It is better to say what the thing is. Between Euclides and Antisthenes the Socratic induction and universal definition were alike discredited from the point of view of the Eleatic logic. It is with the other point of doctrine that Plato comes to grips, that which allows of a certainty or knowledge consisting in an analysis of a compound into simple elements themselves not known. The syllable or combination is, he shows, not known by resolution of it into letters or elements themselves not known. An aggregate analysed into its mechanical parts is as much and as little known as they. A whole which is more than its parts is from Antisthenes' point of view inconceivable. Propositions analytical of a combination in the sense alleged do not give knowledge. Yet knowledge is possible. The development of a positive theory of predication has become quite crucial.

Plato's logic supplies a theory of universals in the doctrine of ideas. Upon this it bases a theory of predication, which, however, is compatible with more than one reading of the metaphysical import of the ideas. And it sets forth a dialectic with a twofold movement, towards differentia- tion and integration severally, which amounts to a formulation of inference. The more fully analysed movement, that which proceeds downward from less determinate to more determinate universals, is named Division. Its associations, accordingly, are to the modern ear almost inevitably those of a doctrine of classification only. Aristotle, however, treats it as a dia- lectical rival to syllogism, and it influenced Galilei and Bacon in their views of inference after the Renaissance. If we add to this logic of " idea," judgment and inference, a doctrine of categories in the modern sense of the word which makes the Theaetetus, in which it first occurs,, a forerunner of Kant's Critique of Pure Reason, we have clearly a very significant contribution- to logic even in technical regard. Its general philosophical setting may be said to enhance its value even as logic.

(a) Of the idea we may say that whatever else it is, and apart from all puzzles as to ideas of relations such as smallness, of negative qualities such as injustice, or of human inventions such as beds, it is opposed to that of which "Hea." it is the idea as its

intelligible formula or law, the truth or validity — Herbart'sword — of the phenomenon from the point of view of nexus or system. The thing of sense in its relative isolation is unstable. It is and is not. What gives stability is the insensible principle or principles which it holds, as it were, in solution. These are the ideas, and their mode of being is naturally quite other than that of the sensible phenomena which they order. The formula for an indefinite number of particular things in particular places at particular times, and all of them presentable in sensuous imagery of a given time and place, is not itself presentable in sensuous imagery side by side with the individual members of the group it orders. The law, e.g., of the equality of the radii of a circle cannot be exhibited to sense, even if equal radii may be so exhibited. It is the wealth of illustration with which Plato expresses his meaning, and the range of application which he gives the idea— to the class

- For whom see Diimmler, Antisthenica (1882, reprinted in his Kleine Schriften, 1901).

6 Aristotle, Metaphys. 10246 32 sqq.

6 Plato, Theaetetus, 201 E. sqq., where, however, Antisthenes is not named, and the reference to him is sometimes doubted. But cf. Aristotle, Met. H 3. 10436 24-28.

7 Diog. Laert. ii. 107.

concepts of natural groups objectively regarded, to categories, to aesthetic and ethical ideals, to the concrete aims of the craftsman as well as to scientific laws — that have obscured his doctrine, viz. that wherever there is law, there is an idea.

(b) The paradox of the one in the many is none, if the idea may be regarded as supplying a principle of nexus or organization

to an indefinite multiplicity of particulars. But if t be many". Antisthenes is to be answered, a further step must be

taken. The principle of difference must be carried into the field of the ideas. Not only sense is a principle of difference. The ideas are many. The multiplicity in unity must be established within thought itself. Otherwise the objection stands: man is man and good is good, but to say that man is good is clearly to say the thing that is not. . Plato replies with the doctrine of the interpenetration of ideas, obviously not of all with all, but of some with some, the formula of identity in difference within thought itself. Nor can the opponent fairly refuse to admit it, if he affirms the participation of the identical with being, and denies the participation of difference with being, or affirms it with not-being. The Sophistcs shows among other things that an identity-philosophy breaks down into a dualism of thought and expression, when it applies the predicate of unity to the real, just as the absolute pluralism on the other hand collapses into unity if it affirms or admits any form of relation whatsoever. Identity and difference are all-pervasive categories, and the speech-form and the corresponding thought-form involve both. For proposition and judgment involve subject and predicate and exhibit what a modern writer calls " identity of reference with diversity of characterization." Plato proceeds to explain by his principle of difference both privative and negative predicates, and also the possibility of false predication. It is obvious that without the principle of difference error is inexplicable. Even Plato, however, perhaps scarcely shows that with it, and nothing else but it, error is explained.

(c) Plato's Division, or the articulation of a relatively inde- terminate and generic concept into species and sub-species with

resultant determinate judgments, presumes of course

the doctrine of the interpenetration of ideas laid down in the Sophistes as the basis of predication, but its use precedes the positive development of that formula, though not, save very vaguely, the exhibition of it, negatively, in the antinomies of the one and the many in the Parmenides. It is its use, however, not the theory of it, that precedes. The latter is expounded in the Politicus (260 sqq.) and Philebus (16c sqq.). The ideal is progressively to determine a universe of discourse till true infimae species are reached, when no further distinction in the determinate many is possible, though there is still the numerical difference of the indefinite plurality of particulars. The process is to take as far as possible the form of a continuous disjunction of contraries. We must bisect as far as may be, but the division is after all to be into limbs, not parts. The later examples of the Politicus show that the permission of three or more co- ordinate species is not nugatory, and that the precept of dicho- tomy is merely in order to secure as little of a saltus as possible; to avoid e.g. the division of the animal world into men and brutes. It is the middle range of the niaa. of Philebus 17a that appeals to Bacon, not only this but their mediating quality that appeals to Aristotle. The media axiomata of the one and the middle term of the other lie in the phrase. Plato's division is never- theless neither syllogism nor exclusiva. It is not syllogism because it is based on the disjunctive, not on the hypothetical relation, and so extends horizontally where syllogism strikes vertically downward. Again it is not syllogism because it is necessarily and finally dialectical. It brings in the choice of an interlocutor at each stage, and so depends on a concession for what it should prove. 1 Nor is it Bacon's method of exclusions, which escapes the imputation of being dialectical, if not that of being unduly cumbrous, in virtue of the cogency of the negative instance. The Platonic division was, however, offered as the scientific method of the school. A fragment of the comic poet

•Aristotle, An. Pr. i. 31, 46a 32 sqq.; cf. 916 12 sqq.

Division.

Epicrates gives a picture of it at work. 5 And the movement of disjunction as truly has a place in the scientific specification of a concept in all its differences as the linking of lower to higher in syllogism. The two are complementary, and the reinstatement of the disjunctive judgment to the more honourable role in inference has been made by so notable a modern logician as Lotze.

(d) The correlative process of Combination is less elaborately

sketched, but in a luminous passage in the Politicus (§ 278),

in explaining by means of an example the nature and _ . .

r 1 t.1 , . ˆ ., , • • Comblaa

use of examples, Plato represents it as the bringing tlOB-

of one and the same element seen in diverse settings to

conscious realization, with the result that it is viewed as a single

truth of which the terms compared are now accepted as the

differences. The learner is to be led forward to the unknown

by being made to hark back to more familiar groupings of the

alphabet of nature which he is coming to recognize with some

certainty. To lead on, tirayeiv, is to refer back, hvarftiv* to what

has been correctly divined of the same elements in clearer cases.

Introduction to unfamiliar collocations follows upon this, and,

only so, is it possible finally to gather scattered examples into a

conspectus as instances of one idea or law. This is not only of

importance in the history of the terminology of logic, but

supplies a philosophy of induction.

(e) Back of Plato's illustration and explanation of predication and dialectical inference there lies not only the question of their metaphysical grounding in the interconnexion of

ideas, but that of their epistemological presuppositions. S y,, (fc es / S . This is dealt with in the Theaetetus (1846 sqq.). The manifold affections of sense are not simply aggregated in the individual, like the heroes in the Trojan horse. There must be convergence in a unitary principle, soul or consciousness, which is that which really functions in perception, the senses and their organs being merely its instruments. It is this unity of apper- ception which enables us to combine the data of more than one sense, to affirm reality, unreality, identity, difference, unity, plurality and so forth, as also the good, the beautiful and their contraries. Plato Calls these pervasive factors in knowledge Koiva, and describes them as developed by the soul in virtue of its own activity. They are objects of its reflection and made explicit in the few with pains and gradually. 4 That they are not, however, psychological or acquired categories, due to " the workmanship of the mind " as conceived by Locke, is obvious from their attribution to the structure of mind 5 and from ˆheir correlation with immanent principles of the objective order. Considered from the epistemological point of view, they are the implicit presuppositions of the construction or avKKoyLo-fibs 6 in which knowledge consists. But as ideas, 7 though of a type quite apart, 8 they have also a constitutive application to reality. Accordingly, of the selected "kinds" by means of which the interpenetration of ideas is expounded in the Sophistes, only motion and rest, the ultimate " kinds " in the physical world, have no counterparts in the " categories " of the Theaetetus. In his doctrine as to iv to irotovv or Kptvov, as generally in that of the activity of the vovs cnradrjs, Aristotle in the de Anima* is in the main but echoing the teaching of Plato. 10

2 Athenaeus ii. 59c. See Usener, Organisation der wissenschaftl. Arbeit (1884; reprinted in his Vortrdge und Aufsdtze, 1907).

3 Socrates' reference of a discussion to its presuppositions (Xeno- phon, Mem. iv. 6, 13) is not relevant for the history of the ter- minology of induction.

4 Theaetetus, 186c

6 Timaeus, 370, b (quoted in H. F. Carlill's translation of the Theaetetus, p. 60). 6 Theaetetus, i86d. 7 Sophistes, 253d.

8 lb. id. ; cf. Theaetetus, igjd.

9 Aristotle, de An. 4306 5, and generally iii. 2, iii. 5.

10 For Plato's Logic, the controversies as to the genuineness of the dialogues may be treated summarily. The Theaetetus labours under no suspicion. The Sophistes is apparently matter for animad- version by Aristotle in the Metaphysics and elsewhere, but derives stronger support from the testimonies to the Politicus which pre- sumes it. The Politicus and Philebus are guaranteed by the use made of them in Aristotle's Ethics. The rejection of the Parmenides would involve the paradox of a nameless

contemporary of Plato

ARIST0TLE1

LOGIC

899

ii. Aristotle.

Plato's episodic use of logical distinctions 1 is frequent. His recourse to such logical analysis as would meet the requirements of the problem in hand 2 is not rare. In the "dialectical" dialogues the question of method and of the justification of its postulates attains at t-'/ist a like prominence with the ostensible subject matter. Therf . is even formal recognition of the fact that to advance in diak 1 v T c is a greater thing than to bring any special inquiry to a successful issue. 3 But to the end there is a lack of interest in, and therefore a relative immaturity of, technique as such. In the forcing atmosphere, however, of that age of controversy, seed such as that sown in the master's treatment of the uttered Xoyos 4 quickly germinated. Plato's successors in the Academy must have developed a system of grammatico logical categories which Aristotle could make his own. Else much of his criticism of Platonic doctrine 5 does, indeed, miss fire. The gulf too, which the Philebus* apparently left un- bridged between the sensuous apprehension of particulars and the knowledge of universals of even minimum generality led with Speusippus to a formula of knowledge in perception («r«m;- fwviKri at

This is embodied in the group of treatises later known as the Organon" and culminates in the theory of syllogism and of S Uoiism demonstrative knowledge in the Analytics. All else is finally subsidiary. In the well-known sentences with which the Organon closes 8 Aristotle has been supposed to lay claim to the discovery of the principle of syllog- ism. He at least claims to have been the first to dissect the procedure of the debate-game, and the larger claim may be

¥

and Aristotle who was inferior as a metaphysician to neither. No other dialogue adds anything to the logical content of these.

Granted their genuineness, the relative dating of three of them is

lven, viz. Theaetetus, Sophistes and Politicus in the order named.

he Philebus seems to presuppose Politicus, 283-284, but if this be an error, it will affect the logical theory not at all. There remains the Parmenides. It can scarcely be later than the Sophistes. The antinomies with which it concludes are more naturally taken as a prelude to the discussion of the Sophistes than as an unnecessary retreatment of the doctrine of the one and the many in a more negative form. It may well be earlier than the Theaetetus in its present form. The stylistic argument shows the Theaetetus re- latively early. The maturity of its philosophic outlook tends to give it a place relatively advanced in the Platonic canon. To meet the problem here raised, the theory has been devised of an earlier and a later version The first may have linked on to the series of Plato's dialogues of search, and to put the Parmenides before it is impossible. The second, though it might still have preceded the Parmenides might equally well have followed the negative criticism of that dialogue, as the beginning of reconstruction. For Plato's logic this question only has interest on account of the introduction of an 'AptiTortXTjs in a non-speaking part in the Parmenides. If this be pressed as suggesting that the philosopher Aristotle was already in full activity at the date of writing, it is of importance to know what Platonic dialogues were later than the debut of his critical pupil.

On the stylistic argument as applied to Platonic controversies Janell's Quaestiones

Platonicae (1901) is important. On the whole question of genuineness and dates of the dialogues, H. Racdcr, Platons philosophische Entwickelung (1905), gives an excellent conspectus of the views held and the grounds alleged. See also Phto.

1 F..g. that of essence and accident, Republic, 454.

2 E.g. the discussion of correlation, ib. 437 sqq.

1 Politicus, 2&$d. i Sophistes, 261c sqq.

6 E.g. in Nic. Eth. i. 6. 6 Philebus, i6d.

7 Principal edition still that of Waitz, with Latin commentary, (2 vols.. 1844-1846). Among the innumerable writers who have thrown light upon Aristotle's logical doctrine, St Hilaire, Trendelen- burg, Ueberweg, Hamilton, Mansel, G. Grote may be named. There a r e, however, others of equal distinction. Reference to PrantI, op. cit., is indispensable. Zeller, Die Philosophie der Griechen, ii. 2, " Aristoteles " (3rd ed., 1879), pp. 185-257 (there is an Eng. trans.), and Maier, Die Syllogistik des Aristoteles (2 vols., 1896, 1900) (some 900 pp.), are also of first-rate importance.

8 Sophist. Elench. 184, espec. b 1-3, but see Maier, loc. cit. i. I.

thought to follow. In the course of inquiry into the formal consequences from probable premises, the principle of mediation or linking was so laid bare that the advance to the analytic determination of the species and varieties of syllogism was natural. Once embarked upon such an analysis, where valid process from assured principles gave truth, Aristotle could find little difficulty in determining the formula of demonstrative knowledge or science. It must be grounded in principles of assured certainty and must demonstrate its conclusions with the use of such middle or linking terms only as it is possible to equate with the real ground or cause in the object of knowledge. Hence the account of axioms and of definitions, both of substances and of derivative attributes. Hence the importance of deter- mining how first principles are established. It is, then, a fair working hypothesis as to the structure of the Organon to place the Topics, which deal with dialectical reasoning, before the Analytics. 9 Of the remaining treatises nothing of fundamental import depends on their order. One, however, the Categories, may be regarded with an ancient commentator, 10 as preliminary to the dialectical inquiry in the Topics. The other, on thought as expressed in language (Hepl epfiyjvelas) is possibly spurious, though in any case a compilation of the Aristotelian school. If genuine, its naive theory that thought copies things and other features of its contents would tend to place it among the earliest works of the philosopher.

Production in the form of a series of relatively self-contained treatises accounts for the absence of a name and general definition of their common field of inquiry. A more important lack which results is that of any clear intimation as tn ˆ t ˆˆ to the relation in which Aristotle supposed it to stand to other disciplines. In his definite classification of the sciences, 11 into First Philosophy, Mathematics and Physics, it has no place. Its axioms, such as the law of contradiction, belong to first philosophy, but the doctrine as a whole falls neither under this head nor yet, though the thought has been entertained, under that of mathematics, since logic orders mathematical reasoning as well as all other. The speculative sciences, indeed, are classified according to their relation to form, pure, abstract or concrete, i.e. according to their objects. The logical inquiry seems to be conceived as dealing with the thought of which the objects are objects. It is to be regarded as a propaedeutic, 12 which, although it is in contact with reality in and through the metaphysical import of the axioms, or again in the fact that the categories, though primarily taken as forms of predication, must also be regarded as kinds of being, is not directly concerned with object-reality, but with the determination for the thinking subject of what constitutes the knowledge correlative to being. Logic, therefore, is not classed as one, still less as a branch of one, among the 'ologies, ontology not excepted. The way in which logical doctrine is developed in the Aristo- telian treatises fits in with this view. Doubtless what we have is in the main a reflex of

the heuristic character of Aristotle's own work as pioneer. But it at least satisfies the requirement that the inquiry shall carry the plain man along with it. Actual modes of expression are shown to embody distinctions which average intelligence can easily recognize and will readily acknow- ledge, though they may tend by progressive rectification funda- mentally to modify the assumption natural to the level of thought from which he begins. Thus we start 13 from the point of view of a world of separate persons and things, in which thought mirrors these concrete realities, taken as ultimate subjects of predicates. It is a world of communication of thought, where persons as thinkers need to utter in language truths objectively valid for the mundus communis. In these truths predicates are accepted or rejected by subjects, and therefore depend on the reflection of fact in \6yoi (propositions). These are combinatory of parts, attaching or detaching predicates, and so involving

9 References such as i85 12 are the result of subsequent editing and prove nothing. See, however, Aristotle.

10 Adrastus is said to have called them irpd tS>v to-wikuv.

11 Metaphys. E. 1.

12 De Part. Animal. A. 1, 639a 1 sqq.; cf. Metaphys. 1005& 2 sqq.

13 De Interpretation 16a sqq.

subject, predicate and copula. 1 At this stage we are as much concerned with speech-forms as the thought-forms of which they are conventional symbols, with Plato's analysis, for instance, into a noun and a verb, whose connotation of time is as yet a difficulty. The universal of this stage is the universal of fact, what is recognized as predicable of a plurality of subjects. The dialectical doctrine of judgment as the declaration of one member of a disjunction by contradiction, which is later so important, is struggling with one of its initial difficulties, 2 viz. the contingency of particular events future, the solution of which remains im- perfect. 3

The doctrine of the Categories is still on the same level of thought, 4 though its grammatico-logical analysis is the more advanced one which had probably been developed" by Tories. ' tne Academy before Aristotle came to think of his friends there as " them " rather than " us." It is what in one direction gave the now familiar classification of parts of speech, in the other that of thought-categories under- lying them. If we abstract from any actual combination of subject and predicate and proceed to determine the types of pre- dicate asserted in simple propositions of fact, we have on the one hand a subject which is never object, a " first substance " or con- crete thing, of which may be predicated in the first place " second substance " expressing that it is a member of a concrete class, and in the second place quantity, quality, correlation, action and the like. The list follows the forms of the Greek language so closely that a category emerges appropriated to the use of the perfect tense of the middle voice to express the relation of the subject to a garb that it dons. In all this the individual is the sole self-subsistent reality. Truth and error are about the individual and attach or detach predicates correctly and in- correctly. There is no committal to the metaphysics in the light of which the logical inquiry is at last to find its complete justifica- tion. The point of view is to be modified profoundly by what follows— by the doctrine of the class-concept behind the class, of the form or idea as the constitutive formula of a substance, or, again, by the requirement that an essential attribute must be grounded in the nature or essence of the substance of which it is predicated, and that such attributes alone are admissible predicates from the point of view of the strict ideal of science. But we are still on the ground of common opinion, and these doctrines are not

yet laid down as fundamental to the develop- ment.

Dialectic then, though it may prove to be the ultimate method of establishing principles in philosophy, 5 starts from probable and conceded premises, 6 and deals with them only in the light of common principles such as may be reason- ably appealed to or easily established against challenge. To the expert, in any study which involves contingent matter, i.e. an irreducible element of indetermination, e.g. to the physician, there is a specific form of this, but the reflection that this is so is something of an afterthought. We start with what is prima facie given, to return upon it from the ground of principles clarified by the sifting process of dialectic 7 and certified by vovs. The Topics deal with dialectic and constitute an anatomy of argumentation, or, according to what seems to be Aristotle's own metaphor, a survey of the tactical vantage-points (tottol) for the conflict of wits in which the prize is primarily victory, though it is a barren victory unless it is also knowledge. It is in this treatise that what have been called "the conceptual categories" 8 emerge, viz. the predicates, or heads of predication as it is analysed in relation to the provisional theory of definition that dialectic allows and requires. A predicate either is expressive of the essence or part of the essence of the subject, viz. that original group of mutually underivable attributes of which the absence of any one destroys its right to the class-name, or it is not. Either it is convertible with the subject or it is not. Here then

1 De InlerprelatiOne 1 6a 24-25. 2 lb. 1 8a 28 sqq.

3 lb. 19a 28-29.

4 As shown e.g. by the way in which the relativity of sense and the object of sense is conceived, 76 35-37.

' Topics 10 ia 27 and 36-6 4. 6 Topics 100.

"Politics 1282a I sqq. s 1036 21.

The Topics.

judgment, though still viewed as combinatory, has the types which belong to coherent systems of implication discriminated from those that predicate coincidence or accident, i.e. any happening not even derivatively essential from the point of view of the grouping in which the subject has found a place. In the theory of dialectic any predicate may be- sjggested for a subject, and if not affirmed of it, must be denieˆ-of it, if not denied must be affirmed. The development of a ul: eory of the ground on which subjects claim their predicates and disown alien predicates could not be long postponed. In practical dialectic the un- limited possibility was reduced to manageable proportions in virtue of the groundwork of received opinion upon which the operation proceeded. It is in the Topics, further, that we clearly have a first treatment of syllogism as formal implication, with the suggestion that advance must be made to a view of its use for material implication from true and necessary principles. It is in the Topics, 9 again, that we have hints at the devices of an inductive process, which, as dialectical, throw the burden of producing contradictory instances upon the other party to the discussion. In virtue of the common-stock of opinion among the interlocutors and their potentially controlling audience, this process was more valuable than appears on the face of things. Obviously tentative, and with limits and ultimate inter- pretation to be determined elsewhere, it failed to bear fruit till the Renaissance, and then by the irony of fate to the discrediting of Aristotle. In any case, however, definition, syllogism, induction all invited further determination, especially if they were to take their place in a doctrine of truth or knowledge. The problem of analytic, i.e. of the resolution of the various forms of inference into their equivalents in that grouping of terms or premises which was most obviously cogent, was a legacy of the Topics. The debate-game had sought for diversion and found truth, and truth raised the logical problem on a different plane. At first the problem of formal analysis only. We proceed with the talk of instances and concern ourselves first with relations of

inclusion and exclusion. The question is *

as to membership of a class, and the dominant formula concept. is the dictum de omni el nullo. Until the view of the individual units with which we are so far familiar has undergone radical revision, the primary inquiry must be into the forms of a class-calculus. Individuals fall into groups in virtue of the possession of certain predicates. Does one group include, or exclude, or intersect another with which it is compared ? We are clearly in the field of the diagrams of the text-books, and much of the phraseology is based upon an original graphic representation . in extension. The middle term, though conceived as an inter- mediary or linking term, gets its name as intermediate in a homogeneous scheme of quantity, where it cannot be of narrower extension than the subject nor wider than the predicate of the conclusion. 10 It is also, as Aristotle adds, 11 middle in position in the syllogism that concludes to a universal affirmative. 11 Again, so long as we keep to the syllogism as complete in itself and without reference to its place in the great structure of knowledge, the nerve of proof cannot be conceived in other than a formal manner. In analytic we work with an ethos different from that of dialectic. We presume truth and not probability or con- cession, but a true conclusion can follow from false premises, and it is only in the attempt to derive the premises in turn from their grounds that we unmask the deception. The passage to the conception of system is still required. The Prior Analytics then are concerned with a formal logic to AaaMks. be knit into a system of knowledge of the real only in virtue of a formula which is at this stage still to seek. The forms of syllogism, however, are tracked successfully through their figures, i.e. through the positions of the middle term that Aristotle recognizes as of actual employment, and all their moods, i.e. all differences of affirmative and negative, universal and particular within the figures, the cogent or legitimate forms are

9 Topics 160a 37-6 5.

10 This is the explanation of the formal definition of induction, Prior Analytics, ii. 23, 684 15 sqq.

11 25ft 36.

alone left standing, and the formal doctrine of syllogism is com- plete. Syllogism already defined 1 becomes through exhibition in its valid forms clear in its principle. It is a speech-and- thought-form (Koyos) in which certain matters being posited something other than the matters posited necessarily results because of them, and, though it still needs to receive a deeper meaning when presumed truth gives way to necessary truth of premises, the notion of the class to that of the class-concept, collective fact to universal law, its formal claim is manifest. “Certain matters being posited.” Subject and predicate not already seen to be conjoined must be severally known to be in relation with that which joins them, so that more than one direct conjunction must be given. ” Of necessity.” If what are to be conjoined are severally in relation to a common third it does perforce relate or conjoin them. “Something other.” The conjunction was by hypothesis not given, and is a new result by no means to be reached, apart from direct perception save by use of at least two given conjunctions. ” Because of them,” therefore. Yet so long as the class-view is prominent, there is a suggestion of a begging of the question. The class is either constituted by enumeration of its members, and, passing by the difficulty involved in the thought of ” its ” members, is an empirical universal of fact merely, or it is grounded in the class-concept. In the first case it is a formal scheme which helps knowledge and the theory of knowledge not at all. We need then to develop the alternative, and to pass from the external aspect of all-ness to the intrinsic ground of it in the universal koB’ avrb Kal fl

oito, which, whatsoever the assistance it receives from induction in some sense of the word, in the course of its development for the individual mind, is secured against depend- ence on instances by the decisive fiat or guarantee of vovs, insight into the systematic nexus of things. The conception of linkage needs to be deepened by the realization of the middle term as the ground of nexus in a real order which is also rational. Aristotle's solution of the paradox of inference, viz. of the fact that in one sense to go beyond what is in the premises is fallacy, while in another sense not to go beyond them is futility, Inference. J' es ln nis formula of implicit and explicit, potential and actual. 2 The real nexus underlying the thought- process is to be articulated in the light of the voucher by intelli- gence as to the truth of the principles of the various departments of knowledge which we call sciences, and at the ideal limit it is possible to transform syllogism into systematic presentation, so that, differently written down, it is definition. But for human thought sense, with its accidental setting in matter itself incogniz- able is always with us. The activity of vovs is never so perfectly realized as to merge implication in intuition. Syllogism must indeed be objective, i.e. valid for any thinker, but it is also a process in the medium of individual thinking, whereby new truth is reached. A man may know that mules are sterile and that the beast before him is a mule, and yet believe her to be in foal " not viewing the several truths in connexion." 3 The doctrine, then, that the universal premise contains the con- clusion not otherwise than potentially is with Aristotle cardinal. The datum of sense is only retained through the universal. 4 It is possible to take a universal view with some at least of the particular instances left uninvestigated. 6 Recognition that the class-concept is applicable may be independent of knowledge of much that it involves. Knowledge of the implications of it does not depend on observation of all members of the class. Syllogism as formula for the exhibition of truth attained, and construction or what not as the instrumental process by which we reach the truth, have with writers since Hegel and Herbart tended to fall apart. Aristotle's view is other. Both are syllo- gisms, though in different points of view. For this reason, if for no other, the conception of movement from the potential possession of knowledge to its actualization remains indispensable.

1 Prior Analytics, i. I. 24a 18-20, SuXXofwrpAs Si i/rrl \6yos iv $ T(Sivr

1 Prior Analytics, ii. 21 ; Posterior Analytics, 1. 1.

' 67a 33-37 1 <") evvdtwp&r t6 koS' iKartpov.

- 67a 39-6 3. ' 790 4-5-

Nona.

Whether this is explanation or description, a problem or its solution, is of course another matter.

In the Posterior Analytics the syllogism is brought into decisive connexion with the real by being set within a system in which its function is that of material implication _ . from principles which are primary, immediate and Analytics. necessary truths. Hitherto the assumption of the probable as true rather than as what will be conceded in debate 6 has been the main distinction of the standpoint of analytic from that of dialectic. But the true is true only in reference to a coherent system in which it is an immediate ascertainment of vovs, or to be deduced from a ground which is such. The ideal of science or demonstrative knowledge is to exhibit as flowing from the definitions and postulates of a science, from its special principles, by the help only of axioms or principles common to all knowledge, and these not as premises but as guiding rules, all the properties of the subject-matter, i.e. all the predicates that belong to it in its own nature. In the case of any subject-kind, its definition and its existence being avouched by vovs, "heavenly body" for example, the problem is, given the fact of a non-self-subsistent characteristic of it, such as the eclipse of the said body, to find a ground, a ftiaov which expressed the cutiov, in virtue of which the adjectival concept can be exhibited as belonging to the subject- concept koJB' aiiro in the strictly

adequate sense of the phrase in which it means also j; auro. 7 We are under the necessity then of revising the point of view of the syllogism of all-ness. We discard the conception of the universal as a predicate applic- able to a plurality, or even to all, of the members of a group. To know merely Kara iravrds is not to know, save accidentally. The exhaustive judgment, if attainable, could not be known to be exhaustive. The universal is the ground of the empirical ” all ” and not conversely. A formula such as the equality of the interior angles of a triangle to two right angles is only scientifically known when it is not of isosceles or scalene triangle that it is known, nor even of all the several types of triangle collectively, but as a predicate of triangle recognized as the widest class-concept of which it is true, the first stage in the progressive differentiation of figure at which it can be asserted. 8 Three points obviously need development, the nature of definition, its connexion with the syllogism in which the middle term is cause or ground, and the way in which we have assurance of our principles.

Definition is either of the subject-kind or of the property that is grounded in it. Of the self-subsistent definition is owias ris yvwpwuSs 9 by exposition of genus and differentia. 10 It Definition. is indemonstrable. It presumes the reality of its sub- ject in a postulate of existence. It belongs to the principles of demonstration. Summa genera and groups below infimae species are indefinable. The former are susceptible of elucidation by indication of what falls under them. The latter are only describable by their accidents. There can here be no true differentia. The artificiality of the limit to the articula- tion of species was one of the points to which the downfall of Aristotle’s influence was largely due. Of a non-self-subsistent or attributive conception definition in its highest attainable form is a recasting of the syllogism, in which it was shown that the attribute was grounded in the substance or self-subsistent subject of which it is. Eclipse of the moon, e.g. is privation of light from the moon by the interposition of the earth between it and the sun. In the scientific syllogism the interposition of the earth is the middle term, the cause or ” because ” (3t6ri), the residue of the definition is conclusion. The difference then is in verbal expression, way of putting, inflexion. 11 If we pluck •246 10-11.

‘ Posterior Analytics, i. 4 koB’ avrb means (1) contained in the definition of the subject ; (2) having the subject contained in its definition, as being an alternative determination of the subject, crooked, e.g. is per se of line; (3) self-subsistent; (4) connected with the subject as consequent to ground. Its needs stricter determination therefore.

8 736 26 sqq., 74a 37 sqq. • 906 16.

10 Metaphys. Z. 12, H. 6 ground this formula metaphysically. “94a 12, 75632.

the fruit of the conclusion, severing its nexus with the stock

from which it springs, v/e have an imperfect form of definition,

while, if further we abandon all idea of making it adequate

by exhibition of its ground, we have, with still the same form of

words, a definition merely nominal or lexicographical. In the

aporematic treatment of the relation of definition and syllogism

identical as to one form and in one view, distinct as to another

form and in another view, much of Aristotle's discussion consists.

The rest is a consideration of scientific inquiry as The middle , „, ., . .. ,. c

term _ converging in juterou $7)tt\(jis, the investigation of

the link or " because " as ground in the nature of

things. To ftiv yap olriav to fiecrov 1 real ground and

thought link fall together. The advance from syllogism as

formal implication is a notable one. It is not enough to have

for middle term a causa cognoscendi merely. We must have a

causa essendi. The planets are near, and we know it by their

not twinkling, 2 but science must conceive their nearness as the

cause of their not twinkling and make the prius in the real

order the middle term of its syllogism. In this irreversible

catena proceeding from ground to consequent, we have left

far behind such things as the formal parity of genus and differentia

considered as falling under the same predicable, 3 and hence

justified in part Porphyry's divergence from the scheme of

predicables. We need devices, indeed, to determine priority

or superior claim to be " better known absolutely or in the

order of nature," but on the whole the problem is fairly faced. 4

Of science Aristotle takes for his examples sometimes celestial physics, more often geometry or arithmetic, sometimes a con- crete science, e.g. botany. 5 In the field of pure form, free from the disconcerting surprises of sensible matter and so of absolute necessity, no difficulty arises as to the deducibility of the whole body of a science from its first principles. In the sphere of abstract form, mathematics, the like may be allowed, abstraction being treated as an elimination of matter from the oiivoSov by one act. When we take into account relative matter, however, and traces of a conception of abstraction as admitting of degree, 6 the question is not free from difficulty. In the sphere of the concrete sciences where law obtains only titt «ri t6 ?roXi> this ideal of science can clearly find only a relative satisfaction with large reserves. In any case, however, the problem as to first principles remains fundamental.

If we reject the infinite regress and the circle in proof (circulus in probando) which resolves itself ultimately into proving A by B Formal anc ˆ ˆ ˆy A, 7 we are confronted by the need for and principles of two kinds, those which conditioi* all search

tcientuic for truth, and those which are the peculiar or proper principles. p r i nc jpl es f special sciences, their ” positions,” viz. the definitions of their subjects and the postulates of the existence of these. All are indemonstrable and cannot be less sure than the body of doctrine that flows from them. They must indeed be recognized as true, primary, causative and the like. But 8 they are not congenitally present in the individual in a determinate shape. The doctrine of latency is mystical and savours of Plato’s reminiscence (anamnesis). Yet they must have some- thing to develop from, and thereupon Aristotle gives an account of a process in the psychological mechanism which he illustrates by comparative psychology, wherein a Xoyos or meaning emerges, a “first” universal recognized by induction. Yet Induction J intelligence, is the principle of first principles. dialectic. It ‘ s infallible, while, whatever the case with perception of the special sensibles, 9 the process which combines particulars is not. On the side of induction we find that experi- ence is said to give the specific principles, 10 ” the phenomena being apprehended in sufficiency.” On the side of intuition, self-evidence of scientific principles is spoken of. 11 Yet dialectic

1 90a 6. Cf. Ueberweg, System der Logik, § 101. .

1 78a 30 sqq. 3 Topics, 101b 18, 19.

- Posterior Analytics, ii. 13. 6 Posterior Analytics, ii. 16.

• Posterior Analytics, i. 13 ad. fin., and i. 27. The form which a mathematical science treats as relatively self-subsistent is certainly not the constitutive idea. 7 Posterior Analytics, i. 3.

‘ Posterior Analytics, ii. 19. ” De Anima, 428ˆ 18, 19.

10 Prior Analytics, i. 30, 46a 18. ” Topics, 100b 20, 21.

is auxiliary and of methodological importance in their establish- ment.” Mutually limiting statements occur almost or quite side by side. We cannot take first principles ” as the bare precipitate of a progressively refined analysis” 13 nor on the other as constitutive a priori forms. The solution seems to lie in the conception of a process that has a double aspect. On the one hand we have confrontation with fact, in which, in virtue of the rational principle which is the final cause of the phenomenal order, intelligence will find satisfaction. On the other we have a stage at which the rational but as yet not reasoned concepts developed in the medium of the psychological mechanism are subjected to processes of reflective comparison and analysis, and, with some modification, maintained against challenge, till at length the ultimate universals emerge, which rational insight can posit as certain, and the whole hierarchy of concepts from the ” first ” universals to to. djuepi} are intuited in a coherent system.

Aristotle's terminology is highly technical, but, as has often been observed, not therefore clear. Here two words at least are ambiguous, " principle " and " induction." By the first he means any starting-point, " that from which the matter in question is primarily to be known," " particular facts therefore, premises, and what not. What then is meant by prin- ciples when we ask in the closing chapter of his logic how they become known ? The data of sense are clearly not the principles in question here. The premises of scientific syllogisms may equally be dismissed. Where they are not derivative they clearly are definitions or immediate transcripts from definitions. There remain, then, primary definitions and the postulates of their realization, and the axioms or common principles, " which he must needs have who is to reach any knowledge." 15 In the case of the former, special each to its own science, Aristotle may be thought to hold that they are the product of the psychological mechanism, but are ascertained only when they have faced the fire of a critical dialectic and have been accepted from the point of view of the integral rationality of the system of con- cepts. Axioms, on the other hand, in which the sciences inter- connect 16 through the employment of them in a parity of relation, seem to be implicit indeed in the psychological mechanism, but to come to a kind of explicitness in the first reflective reaction upon it, and without reference to any particular content of it. They are not to be used as premises but as immanent laws of thought, save only when an inference from true or admitted premises and correct in form is challenged. The challenge must be countered in a reduclio ad impossibile in which the dilemma is put. Either this conclusion or the denial of rationality. Even these principles, however, may get a greater explicitness by dialectical treatment. 17 The relation, then, of the two orders of principle to the psychological mechanism is different. The kind of warrant that intelligence can give to specific principles falls short of infallibility. Celestial physics, with its pure forms and void of all matter save extension, is not such an exemplary science after all. Rationality is continuous throughout. A X670S emerges with some beings in direct sequence upon the persistence of impressions. 18 Sense is of the " first " universal, the form, though not of the ultimate universal. The rally from the rout in Aristotle's famous metaphor is of units that already belong together, that are of the same regiment or order. On the other hand, rationality has two stages. In the one it is relatively immersed in sense, in the other relatively free. The same break is to be found in the conception of the relation of receptive to active mind in the treatise Of the Soul." The one is impressed by things and receives their form without their matter. The other is free from impression. It thinks its system of concepts freely on the occasion of the affections of the receptivity. Aristotle is fond of declaring that knowledge is of the universal, while existence or reality is individual. It seems to follow that the cleavage between knowledge and reality

12 Topics, 101a 25, 36-37, 61-4, &c.

13 Zeller (loc. cit. p. 194), who puts this formula in order to reject it.

14 Metaphys. A I, 1013a 14.

15 Posterior Analytics, 72a 16 seq.

16 Posterior Analytics, 77a 26, 760 37 sqq. " Metaphys. V. 18 Posterior Analytics, ii. 19. 19 de Anima, iii. 4-6.

and reality.

is not bridged by the function of vovs in relation to " induction." What is known is not real, and what is real is not known. The nodus 1 has its cause in the double sense of the word Knowledge " un ; V ersal " and a possible solution in the doctrine of eiSos. The "

form ” of a thing constitutes it what it is, and at the same time, therefore, is constitutive of the group to which it belongs. It has both in- dividual and universal reference. The individual is known in the eKos, which is also the first universal in which by analysis higher universals are discoverable. These are predicates of the object known, ways of knowing it, rather than the object itself. The suggested solution removes certain difficulties, but scarcely all. On seeing Callias my perception is of man, not Callias, or even man-Callias. The recognition of the individual is a matter of his accidents, to which even sex belongs, and the gap from lowest universal to individual may still be conceived as unbridged. It is in induction, which claims to start from particulars and end in universals, 2 that we must, if anywhere within the confines of logical inquiry, expect to find the required bridge. The Aristotelian conception of induction, however, is somewhat ambiguous. He had abandoned for the most part Con _ the Platonic sense of the corresponding verb, viz. to

elusions lead forward to the as yet unknown, and his substitute as to in- is not quite clear. It is scarcely the military metaphor. auction. rp ne adducing of a witness for which he uses the verb 3 is not an idea that covers all the uses. 4 Perhaps confrontation with facts is the general meaning. But how does he conceive of its operation? There is in the first place the action of the psychological mechanism in the process from discriminative sense upwards wherein we realize ” first ” universals. 5 This is clearly an unreflective, prelogical process, not altogether lighted up by our retrojection upon it of our view of dialectical induction based thereon. The immanent rationality of this first form, in virtue of which at the stage when intelligence acts freely on the occasion of the datum supplied it recognizes continuity with its own self-conscious process, is what gives the dialectical type its meaning. Secondly we have this dia- lectical ” induction as to particulars by grouping of similars” 6 whose liability to rebuttal by an exception has been already noted in connexion with the limits of dialectic. This is the incomplete induction by simple enumeration which has so often been laughed to scorn. It is a heuristic process liable to failure, and its application by a nation of talkers even to physics where non-expert opinion is worthless somewhat dis- credited it. Yet it was the fundamental form of induction as it was conceived throughout the scholastic period. Thirdly we have the limiting cases of this in the inductive syllogism ha TravTwv,’ a syllogism in the third figure concluding universally, and yet valid because the copula expresses equivalence, and in analogy 8 in which, it has been well said, instances are weighed and not counted. In the former it has been noted 8 that Aristotle’s illustration does not combine particular facts into a lowest concept, but specific concepts into a generic concept, and 10 that in the construction of definite inductions the ruling thought with Aristotle is already, though vaguely, that of causal relation. It appears safer, notwithstanding, to take the less subtle interpretation u that dialectical induction struggling with instances is formally justified only at the limit, and that this, where we have exhausted and know that we have exhausted the cases, is in regard to individual subjects rarely and accident- ally reached, so that we perforce illustrate rather from the definite class-concepts falling under a higher notion. After

1 Metaphys. M. 10870 10-12; Zeller loc. cit. 304 sqq.; McLeod Innes, The Universal and Particular in Aristotle’s Theory of Know- ledge (1886).

2 Topics, 105a 13. _ 3 Metaphys. 995a 8.

4 E.g., Topics, 1086 10, ” to induce ” the universal.

5 Posterior Analytics, ii. 19, 1006 3, 4.

6 Topics, i. 18, 1086 10. 7 Prior Analytics, ii. 23.

8 Xlapaiayiia, Prior Analytics, ii. 24.

9 Sigwart, Logik, Eng. trans, vol. ii. p. 292 and elsewhere.

10 I’eberweg, System, § 127, with a ref. to de Partibus Animaliam, 667a.

11 See 67a 17 t£ kTrhvruv t&v ajbuoiv.

Summary,

all, Aristotle must have had means by which he reached the conclusions that horses are long-lived and lack gall. It is only then in the rather mystical relation of voxh to the first type of induction as the process of the psychological mechanism that an indication of the direction in which the bridge from individual being to universal knowledge is to be found can be held to lie.

Enough has been said to justify the great place assigned to Aristotle in the history of logic. Without pressing metaphysical formulae in logic proper, he analysed formal implica- tion, grounded implication as a mode of knowledge in the rationality of the real, and developed a justificatory metaphysic. He laid down the programme which the after history of logic was to carry out. We have of course abandoned particular logical positions. This is especially to be noted in the theory of the proposition. The individualism with which he starts, howsoever afterwards mitigated by his doctrine of to ri yv dvai or e?6os constituting the individual in a system of intelligible relations, confined him in an inadmissible way to- the subject-attribute formula. He could not recognize such vocables as the impersonals for what they were, and had perforce to ignore the logical significance of purely reciprocal judgments, such as those of equality. There was necessarily a ” sense ” or direction in every proposition, with more than the purely psychological import that the advance was from the already mastered and familiar taken as relatively stable, to the new and strange. Many attributes, too, were predicable, even to the end, in an external and accidental way, not being derivable from the essence of the subject. The thought of contingency was too easily applied to these attributes, and an unsatisfactory treatment of modality followed. It is indeed the doctrine of the intract- ability of matter to form that lies at the base of the paradox as to the disparateness of knowledge and the real already noted. On the one hand Aristotle by his doctrine of matter admitted a surd into his system. On the other, he assigned to vovs with its insight into rationality too high a function with regard to the concrete in which the surd was present, a power to certify the truth of scientific principles. The example of Aristotle’s view of celestial physics as a science of pure forms exhibits both points. On the Copernican change the heavenly bodies were recognized as concrete and yet subject to calculable law. Intelligence had warranted false principles. The moral is that of the story of the heel of Achilles.

To return to logic proper. The Aristotelian theory of the universal of science as secure from dependence on its instances and the theory of linking in syllogism remain a heritage for all later logic, whether accepted in precisely Aristotle’s formula or no. It is because the intervening centuries had the Aristotelian basis to work on, sometimes in reduced quantity and corrupt form, but always in some quantity and some form, that the rest of our logical tradition is what it is. We stand upon his shoulders.

iii. Later Greek Logic.

After Aristotle we have, as regards logic, what the verdict of after times has rightly characterized as an age of Epigoni. So far as the Aristotelian framework is accepted we meet only minor corrections and extensions of a formal kind. If there is conscious: and purposed divergence from Aristotle, inquiry moves, on the whole, within the circle of ideas where Aristotelianism had fought its fight and won its victory. Where new conceptions emerge, the imperfection of the instruments, mechanical and methodological, of the sciences renders them unfruitful, until their rediscovery in a later age. We have activity without advance, diversity without development. Attempts at comprehensiveness end in the compromises of eclecti- cism.

Illustrations are not far to seek. Theophrastus and in general the elder Peripatetics, before the rise of new schools with new lines of cleavage and new interests had led to new antagonisms and new alliances, do not break away from the Aristotelian iJIJLfc. ” metaphysic. Their interests, however, lie in the sublunary ˆ sciences in which the

substantive achievement of the school was to be found. With Theophrastus, accordingly, in his botanical in- quiries, for example, the alternatives of classification, the normal sequence of such and such a character upon such another, the conclusion of rational probability, are what counts. It is perhaps not wholly fanciful to connect with this attitude the fact that Aristotle's pupils dealt with a surer hand than the master with the

conclusions from premises of unlike modality, and that a formal advance of some significance attributable to Theophrastus and Eudemus is the doctrine of the hypothetical and disjunctive syllo- gisms.

The Stoics are of more importance. Despite the fact that their philosophic interests lay rather in ethics and physics, their activity _. in what they classified as the third department of specula-

' " tion was enormous and has at least left ineffaceable

traces on the terminology of philosophy. Logic is their word, and consciousness, impression and other technical words come to us, at least as technical words, from Roman Stoicism. Even inference, though apparently not a classical word, throws back to the Stoic name for a conclusion. 1 In the second place, it is in the form in which it was raised in connexion with the individualistic theory of perception with which the Stoics started, that one question of fundamental importance, viz. that of the criterion of truth, exercised its influence on the individualists of the Renaissance. Perception, in the view of the Stoics, at its highest both revealed and guaranteed the being of its object. Its hold upon the object in- volved the discernment that it could but be that which it purported to be. Such " psychological certainty " was denied by their agnostic opponents, and in the history of Stoicism we have apparently a modification of the doctrine of <$>a-vT

Another doctrine of the Stoics which has interest in the light of certain modern developments is their insistence on the place of the X«kt6c in knowledge. Distinct alike from thing and mental happening, it seems to correspond to " meaning " as it is used as a technical phrase now-a-days. This anticipation was apparently sterile. Along the same lines is their use of the hypothetical form for the universal judgment, and their treatment of the hypothetical form as the typical form of inference.

The Stoical categories, too, have an historical significance. They are apparently offered in place of those of Aristotle, an acquaintance with whose distinctions they clearly presume. Recognizing a linguistic side to " logical " theory with a natural development in rhetoric, the Stoics endeavour to exorcise considerations of language from the contrasted side. They offer pure categories arising in series, each successive one presupposing those that have gone before. Yet the substance, quality, condition absolute (tt&s ixo") and condition relative of Stoicism have no enduring influence out- side the school, though they recur with eclectics like Galen. The Stoics were too " scholastic " in their speculations.

In Epicureanism logic is still less in honour. The practical end, freedom from the bondage of things with the peace it brings, is all _ , in all, and even scientific inquiry is only in place as a

means to this end. Of the apparatus of method the less aireaas. ˆ ne better. We are in the presence of a necessary evil. Yet, in falling back, with a difference, upon the atomism of Demo- critus, Epicurus had to face some questions of logic. In the inference from phenomena to further phenomena positive verification must be insisted on. In the

inference from phenomena to their non-pheno- menal causes, the atoms with their inaccessibility to sense, a different canon of validity obtains, that of non-contradiction. 2 He dis- tinguishes top between the inference to combination of atoms as universal cause, and inference to special causes beyond the range of sense. In the latter case alternatives may be acquiesced in. 3 The practical aim of science is as well achieved if we set forth possible causes as in showing the actual cause. This pococurantism might easily be interpreted as an insight into the limitations of inverse method as such or as a belief in the plurality of causes in Mill's sense of the phrase. More probably it reflects the fact that Epicurus was, according to tradition through Nausiphanes, on the whole dominated by the influences that produced Pyrrhonism. Democritean physics without a calculus had necessarily proved sterile of determinate concrete results, and this was more than enough to ripen the natural- ism of the utilitarian school into scepticism. Some reading between the lines of Lucretius has led the " logic " of Epicurus to have an effect on the modern world, but scarcely because of its deserts.

The school of Pyrrho has exercised a more legitimate influence. Many of the arguments by which the Sceptics enforced their ad- _ vocacy of a suspense of judgment are antiquated in type,

e but many also are, within the limits of the individualistic

p theory of knowledge, quite unanswerable. Hume had

constant recourse to this armoury. The major premise of s,yllogism, says the Pyfrhonist, is established inductively from the particular

1 'Eiruˆopd. 'Eiri = "in" as in iirayuyii, inductio, and – opd. = -ferentia, as in Siaˆopd, diiferentia.

1 Diog. Laert. x. 33 seq.; Sext. Emp. Adv. Math. vii. 211.

' Diog. Laert. x. 87; cf. Lucretius, vi. 703 sq., v. 526 sqq. (ed. Munro).

instances. If there be but one of these uncovered by the generaliza- tion, this cannot be sound. If the crocodile moves its upper, not its lower, jaw, we may not say that all animals move the lower jaw. The conclusion then is really used to establish the major premise, and if we still will infer it therefrom we fall into the circular proof. 4 Could Mill say more? But again. The inductive enumeration is either of all cases or of some only. The former is in an indeter- minate or infinite subject-matter impossible. The latter is invalid. 6 Less familiar to modern ears is the contention that proof needs a standard or criterion, while this standard or criterion in turn needs proof. Or still more the dialectical device by which the sceptic claims to escape the riposte that his very argument presumes the validity of this or that principle, viz. the doctrine of the equipollence of counter-arguments. Of course the counter-contention is no less valid! So too when the reflection is made that scepticism is after all a medicine that purges out itself with the disease, the disciple of Pyrrho and Aenesidemus bows and says, Precisely! The sceptical suspension of judgment has its limits, however. The Pyrrhonist will act upon a basis of probabilities. Nay, he even treats the idea of cause 6 as probable enough so long as nothing more than action upon expectation is in question. He adds, however, that any attempt to establish it is involved in some sort of dilemma. That, for instance, cause as the correlate of effect only exists with it, and accordingly, cause which is come while effect is still to come is in- conceivable. 7 From the subjectivist point of view, which is mani- festly fundamental through most of this, such arguments suasory of the Pyrrhonist suspense of judgment (iroxv) are indeed hard to answer. It is natural, then, that the central contribution of the Sceptics to the knowledge controversy lies in the modes (rpoirti) in which the relativity of phenomena is made good, that these are elaborated with extreme care, and that they have a modern ring and are full of instruction even to-day. Scepticism, it must be confessed, was at the least well equipped to expose the bankruptcy of the post- Aristotelian dogmatism.

It was only gradually that the Sceptic's art of fence was developed. From the time of Pyrrho overlapping Aristotle himself, who seems to have been well content to use the feints of more than one school among his predecessors, while showing that none of them could claim to get past his guard, down through a period in which the decadent academy under Carneades, otherwise dogmatic in its negations, supplied new thrusts and parries, to Aenesidemus in the late Ciceronian age, and again to Sextus Empiricus, there seems to have been something of plasticity and continuous progress. In this matter the dogmatic schools offer a marked contrast. In especial it is an outstanding characteristic of the younger rivals to Aristote- lianism that as they sprang up suddenly into being to contest the claims of the Aristotelian system in the moment of its triumph, so they reached maturity very suddenly, and thereafter persisted for the most part in a stereotyped tradition, modified only when con- victed of indefensible weakness. The 3rd century B.C. saw in its first half the close of Epicurus' activity, and the life-work of Chrysippus, the refounder of Stoicism, is complete before its close. And subse- quent variations seem to have been of a negligible where not of an eclectic character. In the case of Epicureanism we can happily judge of the tyranny of the literal tradition by a comparison of Lucretius with the recorded doctrine of the master. But the rule apparently obtains throughout that stereotype and compromise offer themselves as the exhaustive alternative. This is perhaps fortunate for the history of doctrine, for it produces the commentator, your Aspasius or Alexander of Aphrodisias, and the substitute for the critic, your Cicero, or your Galen with his attempt at compre- hension of the Stoic categories and the like while starting from Aristotelianism. Cicero in particular is important as showing the effect or philosophical eclecticism upon Roman cultivation, and as the often author and always popularizer of the Latin terminology of philosophy.

The cause of the stereotyping of the systems, apart from political conditions, seems to have been the barrenness of science. Logic and theory of knowledge go together, and without living science, theory of knowledge loses touch with life, and logic becomes a perfunctory thing. Under such circumstances speculative interest fritters itself and sooner or later the sceptic has his way. Plato is full of the faith of mathematical physics. Aristotle is optimistic of achievement over the whole range of the sciences. But the divorce of science of nature from mathematics, the failure of bio- logical inquiry to reach so elementary a conception as that of the nerves, the absence of chemistry from the circle of the sciences, disappointed the promise of the dawn and the relative achievement of the noon-day. There is no development. Physical science remains dialectical, and a physical experiment is as rare in the age of Lucretius aˆ in that of Empedocles. The cause of eclecticism is the unsatisfying character of the creeds of such science, in con- junction with the familiar law that, in triangular or plusquam-triangular controversies a common hatred will produce an alliance

4 Sextus Empiricus, Pyrrhon. Hypotyp. ii. 195, 196.

6 Sextus, op. cit. ii. 204.

8 Op. cit. iii. 17 sqq., and especially 28.

7 The point is raised by Aristotle, 95A.

based on compromise. A bastard Platonism through hostility to Stoicism may become agnostic. Stoicism through hostility to its sceptical critics may prefer to accept some of the positions of the dogmatic nihilist.

Of the later schools the last to arise was Neoplatonism. The mathematical sciences, at least, had not proved disappointing. For those of the school of Plato v.'hc refused the

apostasy f°~ of the new academy, there was hope either in the mathe-

platonism. rnat i ca [s [ˆ s f t (le Pythagoreo- Platonic tradition, or in its ritual and theological side. Neoplatonism is philosophy become theosophy, or it is the sermon on the text that God geometrizes. It is of significance in the general history of thought as the one great school that developed after the decadence had set in. In its meta- physic it showed no failure in dialectical constructiveness. In the history of logic it is of importance because of its production of a whole series of commentators on the Aristotelian logic. Not only the Introduction of Porphyry, which had lasting effects on the Scholastic tradition, but the commentaries of Themistius, and Simplicius. It was the acceptance of the Aristotelian logic by Neo- platonism that determined the Aristotelian complexion of the logic » of the next age. If Alexander is responsible for such doctrines as that of the intellectus acquisitus, it is to Porphyry, with his char- acteristically Platonist preference for the doctrine of universals, and for classification, that we owe the scholastic preoccupation with the realist controversy, and with the guinque voces, i.e. the Aristotelian predicables as restated by Porphyry.

B. Scholasticism

The living force in the spiritual life of the Roman empire was, after all, not philosophy, but religion, and specifically Christianity. With the extension of Christianity to the Gentile world it at length became necessary for it to orientate itself towards what was best in Greek culture. There is a Stoic element in the ethic of the Pauline epistles, but the theological affinity that the Johannine gospel, with its background of philosophic ideas, exhibits to Platonic and Neoplatonist teaching caused the effort at absorption to be directed rather in that direction. Neoplatonism had accepted the Aristotelian logic with its sharper definition than anything handed down from Plato, and, except the logic of the Sceptics, there was no longer any rival discipline of the like prestige. The logic of the Stoics had been discredited by the sceptical onset, but in any case there was no organon of a fitness even comparable to Aristotle's for the task of drawing out the implications of dogmatic premises. Aristo- telian logic secured the imprimatur of the revived Platonism, and it was primarily because of this that it passed into the service of Christian theology. The contact of the Church with Platonism was on the mystical side. Orthodoxy needed to counter heretical logic not with mysticism, itself the fruitful mother of heresies, but with argument. Aristotelianism approved itself as the con- troversial instrument, and in due course held the field alone. The upshot is what is called Scholasticism. Scholasticism is the Aristotelianism of medieval orthodoxy as taught in the " schools " or universities of Western Europe. It takes form as a body of doctrine drawing its premises from authority, sometimes in secular matters from that of Aristotle, but normally from that of the documents and traditions of systematic theology, while its method it draws from Aristotle, as known in the Latin versions, 1 mainly by Boethius, of some few treatises of the Organon together with the Isagoge of Porphyry. It dominates the centres of intellectual life in the West because, despite its claim to finality in its principles or premises, and to universality for its method, it represents the only culture of a philosophic kind available to the adolescent peoples of the Western nations just becoming conscious of their ignorance. Christianity was the one organizing principle that pulsed with spiritual life. The vocation of the student could find fulfilment only in the religious orders. Scholasticism embodied what the Christian community had saved from the wreckage of Greek dialectic. Yet with all its effective manipulation of the formal technique of its translated and mutilated Aristotle, Scholasticism would have gone under long before it did through the weakness intrinsic to its divorce of the form and the matter of knowledge, but for two reasons. The first is the filtering through of some science and »ome new Aristotelian learning from the Arabs. The second

1 See Jourdain, Recherches critiques sur I'dge et I'origine des traductions latines d'Aristote (1843).

is the spread of Greek scholarship and Greek manuscripts west- ward, which was consequent on the Latin occupation of Con- stantinople in 1204. It was respited by the

opportunity which was afforded it of fresh draughts from the Aristotle of a less partial and purer tradition, and we have, accordingly, a golden age of revived Scholasticism beginning in the 13th century, admitting now within itself more differences than before. It is to the schoolmen of the two centuries preceding the Turkish capture of Constantinople that the controversial refinements usually associated with the name of Scholasticism are attribut- able. The Analytics of Aristotle now entered quite definitely into the logical thought of Scholasticism and we have the contrast of a logica vetus and logica nova. That other matters, the parva logicalia and Mnemonics adapted from Psellus and possibly of Stoic origin, entered too did not outweigh this advantage. Confrontation with the historical Aristotle may have brought but little comfort to the orthodox system, but it was a stimulus to dialectical activity within the schools. It provoked the distinction of what was true secundum fidem and what was true secundum rationem among even sincere champions of orthodoxy, and their opponents accepted with a smile so admirable a mask for that thinking for themselves to which the revival of hope of progress had spurred them. The pioneers of the Renaissance owe something of their strength to their training in the develop- ments which the system that they overthrew underwent during this period. The respite, however, was short. The flight of Byzantine scholarship westward in the 15th century revealed, and finally, that the philosophic content of the Scholastic teaching was as alien from Aristotle as from the spirit of the contemporary revolt of science, with its cry for a new medicine, a new nautical astronomy and the like. The doom of the Scholastic Aristotle was nevertheless not the rehabilitation of the Greek Aristotle. Between him and the tide of feeling at the Renaissance lay the whole achievement of Arab science. That impatience of authority to which we owe the Renaissance, the Reformation and the birth of Nationalism, is not stilled by the downfall of Aristotle as the nomen appettativum of the schools. The appeal is to experience, somewhat vaguely defined, as against all authority, to the book of nature and no other. At last the world undertakes to enlarge the circle of its ideas.

C. The Renaissance

Accordingly what is in one sense the revival of classical learning is in another a recourse to what inspired that learning, and so is a new beginning. There is no place for a reformed Aristotelian logic, though the genius of Zabarella was there to attempt it. Nor for revivals of the competing systems, though all have their advocates. Scientific discovery was in the air. The tradition of the old world was too heavily weighted with the Ptolemaic astronomy and the like to be regarded as other than a bar to progress. But from the new point of view its method was inadequate too, its contentment with an induction that merely leaves an opponent silent, when experiment and the application of a calculus were within the possibilities. The transformation of logic lay with the man of science, hindered though he might be – by the enthusiasm of some of the philosophers of nature. Henceforth the Aristotelian logic, the genuine no less than the traditional, was to lie on the other side of the Copernican change.

The demand is for a new organon, a scientific method which shall face the facts of experience and justify itself by its achieve- ment in the reduction of them to control. It is a notable feature of the new movement, that except verbally, in a certain: licence of nominalist expression, due to the swing of the pendulum away from the realist doctrine of universals, there is little that we can characterize as Empiricism. Facts are opposed to abstract universals. Yes. Particulars to controlling formulae. No. Experience is appealed to as fruitful where the formal employ- ment of syllogism is barren. But it is not mere induction, with its ” unanalysed concretes taken as ultimate ” that is set up as the substitute for deduction. Rather a scientific process, which as experiential may be called inductive, but which is itt other regards deductive as syllogism, is set up in constrast to syllogism

daHlel.

and enumeration alike. This is to be seen in Zabarella, 1 in Galilei, 2 and in Bacon. The reformed Aristotelian logic of the first-named with its inductio demonstrativa, the mathematico- physical analysis followed by synthesis of the second, theexclusiva, or method of exclusions of the last, agree at least in this, that the method of science is one and indivisible, while containing both an inductive and a deductive moment. That what, e.g., Bacon says of his method may run counter to this is an accident of the tradition of the quarrel with realism. So, too, with the scholastic universals. Aristotle's forms had been correlated, though inadequately, with the idea of function. Divorced from this they are fairly stigmatized as mental figments or branded as ghostly entities that can but block the path. But consider Bacon's own doctrine of forms. Or watch the mathematical physicist with his formulae. The faith of science looks outward as in the dawn of Greek philosophy, and subjectivism such as Hume's has as yet no hold. Bacon summing up the movement so far as he under- stood it, in a rather belated way, has no theory of knowledge beyond the metaphor of the mirror held up to nature. Yet he offers an ambitious logic of science, and the case is typical.

The science of the Renaissance differs from that of the false dawn in Greek times in the fact of fruitfulness. It had the achievement of the old world in the field of mathe- matics upon which to build. It was in reaction against a dialectic and not immediately to be again entrapped. In scientific method, then, it could but advance, provided physics and mathematics did not again fail of accord. Kepler and Galilei secured it against that disaster. The ubi materia ibi geometria of the one is the battle-cry of the mathematico-physical advance. The scientific instrument of the other, with its moments of analysis and construction, metodo risolutivo and metodo compositivo, engineers the road for the advance. The new method of physics is verifiable by its fruitfulness, and so free of any immediate danger from dialectic. Its germinal thought may not have been new, but, if not new, it had at least needed rediscovery from the beginning. For it was to be at once certain and experiential. A mathematico-physical calculus that would work was in question. The epistemological problem as such was out of the purview. The relation of physical laws to the mind that thought them was for the time a negligible constant. When Descartes, having faithfully and successfully followed the mathematico-physical inquiry of his more strictly scientific predecessors, found himself compelled to raise the question how it was possible for him to know what in truth he seemed to know so certainly, the problem entered on a new phase. The scientific movement had happily been content for the time with a half which, then and there at least, was more than the whole.

Bacon was no mathematician, and so was out of touch with the main army of progress. By temperament he was rather with the Humanists. He was content to voice the cry for the overthrow of the dominant system as such, and to call for a new beginning, with no realist presuppositions. He is with the nominalists of the later Scholasticism and the naturalists of the early Renaissance. He echoes the cry for recourse to nature, for induction, for experiment. He calls for a logic of discovery. But at first sight there is little sign of any greater contribution to the reconstruction than is to be found in Ramus or many another dead thinker. The syllogism is ineffective, belonging to argumentation, and constraining assent where what we want is control of things. It is a mechanical combination of propositions as these of terms which are counters to express concepts often ill-defined. The flight from a cursory survey of facts to wide so-called principles must give way to a gradual progress upward from propositions of minimum to those of medium generality, and in these consists the fruitfulness of science. Yet the induction of the Aristotelians, the dialectical induction of the Topics, content with imperfect enumeration and with showing the burden of disproof upon the critic, is puerile, and at the mercy of a single instance to the contrary.

Bacon.

Mis three Methods.

1 See E. Cassirer, Das Erkennlnisproblem , i. 134 seq. justificatory excerpts, pp. 539 sqq.

‘See Riehl in Vierteljahrschr. f. tviss. Philos. (1893).

and the

In all this there is but little promise for a new organon. It is neither novel nor instrumental. On a sudden Bacon’s conception of a new method begins to unfold itself. It is inductive only in the sense that it is identical in purpose with the ascent from particulars. It were better called exclusiva or elimination of the alternative, which Bacon proposes to achieve, and thereby guarantee his conclusion against the possibility of instance to the contrary.

Bacon’s method begins with a digest into three tables of the facts relevant to any inquiry. The first contains cases of the occurrence of the quality under investigation, colour, e.g., or heat, in varying combinations. The second notes its absence in combinations so allied to certain of these that its pre- sence might fairly have been looked for. The third registers its quantitative variation according to quantitative changes in its concomitants. The method now proceeds on the basis of the first table to set forth the possible suggestions as to a general explanatory formula for the quality in question. In virtue of the remaining tables it rejects any suggestion qualitatively or quantitatively inadequate. If one suggestion, and one alone, survives the process of attempted rejection it is the explanatory formula required. If none, we must begin afresh. If more than one, recourse is to be had to certain devices of method, in the enumeration of which the methods of agreement, difference and concomitant variations 3 find a place, beside the crucial experiment, the glaring instance and the like. An appeal, however, to such devices, though a permissible ” first vintage ” is relatively an imperfection of method, and a proof that the tables need revision. The positive procedure by hypothesis and verification is rejected by Bacon, who thinks of hypothesis as the will o’ the wisp of science, and prefers the cumbrous machinery of negative reasoning.

Historically he appears to have been under the dominance of the Platonic metaphor of an alphabet of nature, with a consequent belief in the relatively small number of ultimate principles to be determined, and of Plato’s conception of Division, cleared of its dialectical associations and used experientially in application to his own molecular physics. True it is that the rejection of all the co- species is a long process, but what if therein their simultaneous or subsequent determination is helped forward ? They, too, must fall to bo determined sometime, and the ideal of science is fully to determine all the species of the genus. This will need co-operative effort as described in the account of Solomon’s House in the New Atlantis. 4 But once introduce the conception of division of labour as between the collector of data on the one hand and the expert of method, the interpreter of nature at headquarters, on the other, and Bacon’s attitude to hypothesis and to negative reasoning is at least in part explained. The hypothesis of the collector, the man who keeps a rain-gauge, or the missionary among savages, is to be discounted from as a source of error. The expert on the other hand may be supposed, in the case of facts over which he has not himself brooded in the course of their acquisition, to approach them without any presumption this way or that. He will, too, have no interest in the isolation of any one of several co-ordinate inquiries. That Bacon underestimates the importance of selective and of provisional explanatory hypotheses even in such fields as that of chemistry, and that technically he is open to some criticism from the point of view that negative judgment is derivate as necessarily resting on positive presuppositions, may be true enough. It seems, however, no less true that the greatness of his conception of organized common effort in science has but rarely met with due appreciation.

In his doctrine of forms, too, the ” universals ” of his logic, Bacon must at least be held

to have been on a path which led forward and not back. His forms are principles whose function falls entirely within knowledge. They are formulae for the ˚ ms ‘

control of the activities and the production of the qualities of bodies. Forms are qualities and activities expressed in terms of the ultimates of nature, i.e. normally in terms of collocations of matter or modes of motion. (The human soul is still an exception.) Form is bound up with the molecular structure and change of structure of a body, one of whose qualities or activities it expresses in wider relations. A mode of motion, for instance, of a certain definite kind, is the form of heat. It is the recipe for, and at the same time is, heat, much as H2O is the formula for and is water. Had Bacon analysed bodies into their elements, instead of their qualities and ways of behaviour, he would have been the logician of the chemical formula. Here, too, he has scarcely received his meed of appreciation.

His influence on his successors has rather lain in the general stimulus of his enthusiasm for experience, or in the success with which he represents the cause of nominalism and in certain special devices of method handed down till, through Hume or Herschel, they affected (he thought of Mill. For the rest he was too Aristotelian, if we take the word broadly enough, or, as the result of his Cambridge studies,

3 Bacon, Novum Organum, ii. 22, 23; cf. also Aristotle, Topics i. 12. 13, ii. 10. 11 (Stewart, ad Nic. Eth. 1139& 27) and Sextus Empiricus, Pyrr. Hypot. iii. 15.

4 Bacon’s Works, ed. Ellis and Speddinj? iii. 164-165.

too Ramist, 1 when the interest in scholastic issues was fading, to bring his original ideas to a successful market.

Bacon’s Logic, then, like Galilei’s, intended as a contribution to scientific method, a systematization of discovery by which, given the fact of knowledge, new items of knowledge may be acquired, failed to convince contemporaries and successors alike of its effici- ency as an instrument. It was an ideal that failed to embody itself and justify itself by its fruits. It was otherwise with the mathe- matical instrument of Galilei.

Descartes stands in the following of Galilei. It is concurrently with signal success in the work of a pioneer in the mathematical Descartes. a ˆ vance tnat ne comes to reflect on method, generalizes the method of mathematics to embrace knowledge as a whole, and raises the ultimate issues of its presuppositions. In the mathematics we determine complex problems by a con- struction link by link from axioms and simple data clearly and distinctly conceived. Three moments are involved. The first is an induction, i.e. an exhaustive enumeration of the simple elements in the complex phenomenon under investigation. This resolution or analysis into simple, because clear and distinct, elements may be brought to a standstill again and again by obscurity and indistinctness, but patient and repeated revision of all that is included in the problem should bring the analytic process to fruition. It is impatience, a perversity of will, that is the cause of error. Upon the analysis there results intuition of the simple data. With Descartes intuition does not connote givenness, but its objects are evident at a glance when induction has brought them to light. Lastly we have deduction the deter- mination of the most complex phenomena by a continuous synthesis or combination of the simple elements. Synthesis is demonstrative and complete. It is in virtue of this view of derived or mediate knowledge that Descartes speaks of the (subsumptive) syllogism as ” of avail rather in the communica- tion of what we already know.” Syllogism is not the synthesis which together with analysis goes to constitute the new instru- ment of science. The celebrated Regulae of Descartes are pre- cepts directed to the achievement of the new methodological ideal in any and every subject matter,

however reluctant.

It is the paradox involved in the function of intuition, the acceptance of the psychological characters of clearness and dis- tinctness as warranty of a truth presumed to be trans-subjec- tive, that leads to Descartes's distinctive contribution to the theory of knowledge. In order to lay bare the ground of certainty he raises the universal doubt, and, although, following Augustine, 2 he finds its limit in the thought of the doubter, this of itself is not enough. Cogito, ergo sum. That I think may be admitted. What I think may still need validation. Descartes's guarantee of the validity of my clear and distinct perceptions is the veracity of God. 3 Does the existence of God in turn call for proof? An effect cannot contain more than its cause, nor the idea of a perfect Being find adequate source save in the actuality of such a Being. Thus the intuition of the casual axiom is used to prove the existence of that which alone gives validity to intuitions. Though the logical method of Descartes has a great and enduring influence, it is the dualism and the need of God to bridge it, the doctrine of " innate " ideas, i.e. of ideas not due to external causes nor to volition but only to our capacity to think, our disposition to develop them, and finally the ontological proof, that affect the thought of the next age most deeply. That essence in the supreme case involves existence is a thought which comes to Spinoza more easily, together with the tradition of the ordo geometricus.

D. Modern Logic i. The Logic of Empiricism The path followed by English thought was a different one. Hobbes developed the nominalism which had been the hall- mark of revolt against scholastic orthodoxy, and, when he brings this into relation with the analysis and synthesis of scientific

1 A notable formula of Bacon's Novum Organum ii. 4 § 3 turns out, Valerius Terminus, cap. 11, to come from Aristotle, Post. An. i. 4 via Ramus. See Ellis in Bacon's Works, iii. 203 sqq.

- De Civitale Dei, xi. 26, " Certum est me esse, si fallor."

3 Cf. Plato, Republic, 381F. seq.

method, it is at the expense of the latter. 4 Locke, when Car- tesianism had raised the problem of the contents of conscious- ness, and the spirit of Baconian positivism could not accept of anything that bore the ill-omened name of innate ideas, elaborated a theory of knowledge which is psychological in the sense that its problem is how the simple data with which the individual is in contact in sensation are worked up into a system. Though he makes his bow to mathematical method, he, even more than Hobbes, misses its constructive character. The clue of mathe- matical certainty is discarded in substance in the English form of " the new way of ideas."

With Hobbes logic is a calculus of marks and signs in the form of names. Naming is what distinguishes man from the brutes. It enables him to fix fleeting memories and to communicate with his fellows. He alone is ° ** capable of truth in the due conjunction or disjunction of names in propositions. Syllogism is simply summation of propositions, its function being communication merely. Analysis is the sole way of invention or discovery. There is more, however, in Hobbes, than the paradox of nominalism. Spinoza could draw upon him for the notion of genetic definition. 5 Leibnitz probably owes to him the thought of a calculus of symbols, and the concep- tion of demonstration as essentially a chain of definitions. 6 His psychological account of syllogism 7 is taken over by Locke. Hume derived from him the explanatory formula of the associa- tion of ideas, 8 which is, however, still with Hobbes a fact to be accounted for, not a theory to account for facts, being grounded physically in " coherence of the matter moved." Finally Mill took from him his definition of cause as sum of conditions,' which played no small part in the applied logic of the 19th century.

Locke is of more importance, if not for his logical doctrine, at least for the theory of knowledge from which it flows. With Locke the mind is comparable to white paper on

which the world of things records itself in ideas of sensation. Lockc – Simple ideas of sensation are the only points of contact we have with things. They are the atomic elements which ” the work- manship of the understanding ” can thereafter do no more than systematically compound and the like. It is Locke’s initial attribution of the primary role in mental process to the simple ideas of sensation that precludes him from the development of the conception of another sort of ideas, or mental contents that he notes, which are produced by reflection on ” the operations of our own mind within us.” It is in the latter group that we have the explanation of all that marks Locke as a forerunner of the critical philosophy. It contains in germ a doctrine of categories discovered but not generated in the psychological processes of the individual. Locke, however, fails to ” deduce ” his cate- gories. He has read Plato’s Theaetetus in the light of Baconian and individualist preconceptions. Reflection remains a sort of ” internal sense,” whose ideas are of later origin than those of the external sense. His successors emphasize the sensationist elements, not the workmanship of the mind. When Berkeley has eliminated the literal materialism of Locke’s metaphors of sense-perception, Hume finds no difficulty in accepting the sensations as present virtually in their own right, any non- sensible ground being altogether unknown. From a point of view purely subjectivist he is prepared to explain all that is to be left standing of what Locke ascribes to the workmanship of the mind by the principle of association or customary conjunction of ideas, which Locke had added a chapter to a later edition of his Essay explicitly to reject as an explanatory formula. Condillac goes a step farther, and sees no necessity for the superstructure at all, with its need of explanation valid or invalid. Drawing upon Gassendi for his psychological atomism and upon Hobbes for a thoroughgoing nominalism, he reproduces, as the logical conclusion from Locke’s premises, the position of Antisthenes.

4 Elementa Philosophic, i. 3. 20, i. 6. 17 seq.

5 Hobbes, Elementa Philosophic, i. 1. 5.

6 Id. ib. i. 6. 16.

7 Id. ib. i. 4. 8 ; cf. Locke’s Essay of Human Understanding. iv. 17.

8 Id. Leviathan, i. 3. » Id. Elem. Philos. i. 6. 10.

9 o8

LOGIC

[EMPIRICISM

The last word is that ” une science bien trait6e n’est qu’une langue bien faite.” *

Locke’s logic comprises, amid much else, a theory of general terms 2 and of definition, a view of syllogism 3 and a declaration as to the possibility of inference from particular to particular, 4 a distinction between propositions which are certain but trifling, and those which add to our knowledge though uncertain, and a doctrine of mathematical certainty. 6 As to the first, “words become general by being made the signs of general ideas, and ideas become general by separating from them ” all ” that may determine them to this or that particular existence. By this way of abstraction they are made capable of representing more individuals than one.” This doctrine has found no acceptance. Not from the point of view for which idea means image. Berkeley, though at length the notions of spirits, acts and relations 6 give him pause, prefers the formula which Hume expresses in the phrase that ” some ideas are particular in their nature but general in their representation,” 7 and the after- history of ” abstraction ” is a discussion of the conditions under which one idea ” stands for ” a group. Not from those for whom general ideas mean schematic concepts, not imageable. The critic from this side has little difficulty in showing that abstraction of the kind alleged still leave the residuum particular this redness, e.g. not redness. It is, however, of the sorts con- stituted by the representation which his abstraction makes possible that definition is

given, either by enumeration of the simple ideas combined in the significance of the sortal name, or ” to save the labour of enumerating,” and ” for quickness and despatch sake,” by giving the next wider general name and the proximate difference. We define essences of course in a sense, but the essences of which men talk are abstractions, ” creatures of the understanding.” Man determines the sorts or nominal essences, nature the similitudes. The fundamentally enumera- tive character of the process is clearly not cancelled by the recognition that it is possible to abbreviate it by means of technique. So long as the relation of the nominal to the real essence has no other background than Locke’s doctrine of perception, the conclusion that what Kant afterwards calls analytical judgments a priori and synthetic judgments a posteriori exhaust the field follows inevitably, with its corollary, which Locke himself has the courage to draw, that the natural sciences are in strictness impossible. Mathematical knowledge is not involved in the same condemnation, solely because of the ” archetypal ” character, which, not without indebtedness to Cumberland, Locke attributes to its ideas. The reality of mathematics, equally with that of the ideals of morals drawn from within, does not extend to the ” ectypes ” of the outer world. The view of reasoning which Locke enunciates coheres with these views. Reasoning from particular to particular, i.e. without the necessity of a general premise, must be possible, and the possibility finds warranty in a consideration of the psycho- logical order of the terms in syllogism. As to syllogism specific- ally, Locke in a passage, 8 which has an obviously Cartesian ring, lays down four stages or degrees of reasoning, and points out that syllogism serves us in but one of these, and that not the all-important one of finding the intermediate ideas. He is prepared readily to ” own that all right reasoning may be reduced to Aristotle’s forms of syllogism,” yet holds that ” a man knows first, and then he is able to prove syllogistically.” The distance from Locke to Stuart Mill along this line of thought is obviously but small.

Apart from the adoption by Hume of the association of ideas as the explanatory formula of the school — it had been allowed by Hume Malebranche within the framework of his mysticism and employed by Berkeley in his theory of vision — there are few fresh notes struck in the logic of sensationalism. The most notable of these are Berkeley’s treatment of ” abstract ”

1 Condillac, Langue des Calculs, p. 7. * Locke, Essay, iii. 3.

3 Id. ib. iv. 17. 4 Loc. cit. § 8. 6 Id. ib. iv. 4, §§ 6 sqq.

6 Berkeley, Of the Principles of Human Knowledge, § 142.

7 Hume, Treatise of Human Nature, i. 1. 7 (from Berkeley, op. cit., introd., §§ 15-16).

8 Essay, iv. 17, § 3.

ideas and Hume’s change of front as to mathematical certainty. What, however, Hume describes as ” all the logic I think proper to employ in my reasoning,” viz. his ” rules by which to judge cause and effects,” 9 had, perhaps, farther-reaching historical effects than either. In these the single method of Bacon is already split up into separate modes. We have Mill’s inductive methods in the germ, though with an emphasis quite older than Mill’s. Bacon’s form has already in transmission through Hobbes been transmuted into cause as antecedent in the time series. It may, perhaps, be accounted to Hume for righteousness that he declares — whether consistently or not is another matter — that ” the same effect never arises but from the same cause,” and that he still follows Bacon in the conception of absentia in proximo. It is ” when in any instance we find our expectation disappointed ” that the effect of one of ” two resembling objects ” will be like that of the other that Hume proposes to apply his method of difference.

No scientific discipline, however, with the doubtful exception of descriptive psychology, stands to gain anything from a temper like that of Hume. The whittling away of its formal or organizing rubrics, as e.g., sameness into likeness, is disconcerting to science wherever the significance of the process is realized. It was

because the aftermath of Newtonian science was so rich that the scientific faith of naturalism was able to retain a place besides its epistemo- logical creed that a logician of the school could arise whose spirit was in some sort Baconian, but who, unlike Bacon, had entered the modern world, and faced the problems stated for it by Hume and by Newton.

Stuart Mill's System of Logic marked a fresh stage in the history of empiricism, for the reason that it made the effort to hold an even balance between the two moments in the thought , s „,,, of the school. Agreement in the use of a common watchword had masked as it seems a real divergence of meaning and purpose. The apostles of inductive method had preached recourse to experience, but had meant thereby nature as a constituted order. They had devised canons for the investigation of the concrete problems of this, but had either ignored altogether the need to give an account of the mirroring mind, or, in the alternative had been, with some naivete, content to assume that their nominalist friends, consistently their allies in the long struggle with traditionalism, had adequately supplied or could adequately supply the need. The exponents of psychological atomism, on the other hand, with the association of ideas for their one principle of agglutination had come to mean by experience the mental phantasmagoria of the individual. They had undermined the foundations of scientific certainty, and so far as the fecundity of contemporary science did not give them pause, were ready, notwithstanding the difference of their starting-point, to acquiesce in the formula as well as the temper of Pyrrhonism. They could concede the triumphant achievement of science only with the proviso that it must be assumed to fall within the framework of their nominalism. Mill aspired after a doctrine of method such as should satisfy the needs of the natural sciences, notably experimental physics and chemistry as under- stood in the first half of the 19th century and, mutatis mutandis, of the moral sciences naturalistically construed. In uniting with this the Associationism which he inherited, through his father, from Hume, he revealed at once the strength and weakness of the dual conception of naturalism. His rare thoroughness and rarer candour made it at once unnecessary and impossible that the work should be done again.

If judged by what he denies, viz. the formal logic of Hamilton and Mansel, whose Aristotelian and scholastic learning did but accentuate their traditionalism, and whose acquiescence in consistency constituted in Mill's view a discouragement of research, such as men now incline to attribute at the least equally to Hume's idealism, Mill is only negatively justified. If judged by his positive contribution to the theory of method he may claim to find a more than negative justification for his teaching in its success. In the field covered by scholastic logic Mill is frankly associationist. He aims at describing what he » Hume, Treatise of Human Nature, i. 3. 15.

finds given, without reference to insensible implications of doubtful validity and value. The upshot is a psychological account of what from one aspect is evidence, from the other, belief. So he explains "concepts or general notions" 1 by an abstraction which he represents as a sort of alt-relief operated by attention and fixed by naming, association with the name giving to a set of attributes a unity they otherwise lack. This is manifestly, when all is said, a particular psychological event, a collective fact of the associative consciousness. It can exercise no organizing or controlling function in knowledge. So again in determining the " import " of propositions, it is no accident that in all save existential propositions it is to the familiar rubrics of associationism — co-existence, sequence, causation and resem- blance — that he refers for classification, while his general formula as to the conjunctions of connotations is associationist through and through. It follows consistently enough that inference is from particular to particular. Mill holds even the ideas of mathematics to be hypothetical, and in theory

knows nothing of a non-enumerative or non-associative universal. A premise that has the utmost universality consistent with this view can clearly be of no service for the establishment of a proposition that has gone to the making of it. Nor again of one that has not. Its use, then, can only be as a memorandum. It is a shorthand formula of registration. Mill's view of ratiocinative process clearly stands and falls with the presumed impossibility of establishing the necessity for universals of another type than his, for what may be called principles of construction. His critics incline to press the point that association itself is only intelligible so far as it is seen to depend on universals of the kind that he denies.

In Mill's inductive logic, the nominalistic convention has, through his tendency to think in relatively watertight com- partments, 2 faded somewhat into the background. Normally he thinks of what he calls phenomena no longer as psychological groupings of sensations, as " states of mind," but as things and events in a physical world howsoever constituted and appre- hended. His free use of relating concepts, that of sameness, for instance, bears no impress of his theory of the general notion, and it is possible to put out of sight the fact that, taken in con- junction with his nominalism, it raises the whole issue of the possibility of the equivocal generation of formative principles from the given contents of the individual consciousness, in any manipulation of which they are already implied. Equally, too, the deductive character, apparently in intention as well as in actual fact, of Mill's experimental methods fails to recall the point of theory that the process is essentially one from particular to particular. The nerve of proof in the processes by which he establishes causal conjunctions of unlimited application is naturally thought to lie in the special canons of the several processes and the axioms of universal and uniform causation which form their background. The conclusions seem not merely to fall within, but to depend on these organic and controlling formulae. They follow not merely according to them but from them. The reference to the rule is not one which may be made and normally is made as a safeguard, but one which must be made, if thought is engaged in a forward and constructive move- ment at all. Yet Mill's view of the function of " universal " propositions had been historically suggested by a theory — Dugald Stewart's — of the use of axioms! 3 Once more, it would be possible to forget that Mill's ultimate laws or axioms are not in his view intuitions, nor forms constitutive of the rational order, nor postulates of all rational construction, were it not that he has made the endeavour to establish them on associationist lines. It is because of the failure of this endeavour to bring the technique of induction within the setting of his Humian psychology of belief that the separation of his contribution to the applied logic of science from his sensationism became necessary, as it happily

1 Mill, Examination of Sir William Hamilton's Philosophy, cap. 17.

2 Cf. Mill, Autobiography, p. 159. " I grappled at once with the problem of Induction, postponing that of Reasoning." lb. p. 182 (when he is preoccupied with syllogism), " I could make nothing satisfactory of Induction at this time."

3 Autobiography, p. 181.

was easy. Mill's device rested special inductions of causation upon the laws that every event has a cause, and every cause has always the same effect. It rested these in turn upon a general induction enumerative in character of enormous and practically infinite range and always uncontradicted. Though obvidusly not exhaustive, the unique extent of this induction was held to render it competent to give practical certainty or psychological necessity. A vicious circle is obviously involved. • It is true, of course, that ultimate laws need discovery, that they are dis- covered in some 'sense in the medium of the psychological mechanism, and that they are nevertheless the grounds of all specific inferences. But that truth is not what Mill expounds, nor is it capable of development within the limits imposed by the associationist formula.

It is deservedly, nevertheless, that Mill's applied logic has retained its pride of place amid what has been handed on, if in modified shape, by writers, e.g., Sigwart, and

Professor Bosanquet, whose theory of knowledge is quite alien from his. He prescribed regulative or limiting formulae for research as it was actually conducted in his world. His grasp of the procedure by which the man of science manipulated his particular concrete problems was admirable. In especial he showed clear understanding of the functions of hypothesis and verification in the investigations of the solitary worker, with his facts still in course of accumulation and needing to be lighted up by the scientific imagination. He was therefore enabled to formulate the method of what Bacon had tended to despise as merely the " first vintage." Bacon spent his strength upon a dream of organization for all future discovery. Mill was content to codify. The difference between Bacon and Mill lies chiefly in this, and it is because of this difference that Mill's contribution, spite of its debt to the Baconian tradition, remains both characteristic and valuable. It is of course possible to criticise even the experimental canons with some severity. The caveats, however, which are relevant within the circle of ideas within which Mill's lesson can be learned and improved on, 4 seem to admit of being satisfied by relatively slight modifications in detail, or by explanations often supplied or easily to be supplied from points brought out amid the wealth of illustration with which Mill accompanied his formal or syste- matic exposition of method. The critic has the right of it when he points out, for example, that the practical difficulty in the Method of Agreement is not due to plurality of causes, as Mill states, but rather to intermixture of effects, while, if the canon could be satisfied exactly, the result would not be rendered uncertain in the manner or to the extent which he supposes. Again the formula of the Joint-Method, which contemplates the enumeration of cases " which have nothing in common but the absence of one circumstance," is ridiculously unsound as it stands. Or, on rather a different line of criticism, the use of corresponding letters in the two series of antecedents and consequents raises, it is said, a false presumption of correlation. Nay, even the use of letters at all suggests that the sort of analysis that actually breaks up its subject-matter is universally or all but universally applicable in nature, and this is not the case. Finally, the conditions of the methods are either realized or not. If they are realized, the work of the scientist falls entirely within the field of the processes preliminary to the satisfaction of the canon. The latter becomes a mere memorandum or formula of registration. So is it possible " to have the enginer hoist with his own petar." But the conditions are not realized, and in an experiential subject-matter are not realizable. Not one circum- stance only in common but " apparently one relevant circum- stance only in common " is what we are able to assert. If we add the qualification of relevance we destroy the cogency pf the method. If we fail to add it, we destroy the applicability.

The objections turn on two main issues. One is the exaggera- tion of the possibilities of resolution into separate elements that is due to the acceptance of the postulate of an alphabet of nature. This so soon as noted can be allowed for. It is to the

4 The insight, for instance, of F. H. Bradley's criticism, Princi- ples of Logic, II. ii. 3, is somewhat dimmed by a lack of sympathy due to extreme difference in the point of view adopted.

combination of this doctrine with a tendency to think chiefly of experiment, of the controlled addition or subtraction of these elements one at a time, that we owe the theoretically premature linking of a as effect to A as cause. This too can be met by a modification of form. The other issue is perhaps of more signi- ficance. It is the oscillation which Mill manifests between the conception of his formula as it is actually applicable to concrete problems in practice, and the conception of it as an expression of a theoretical limit to practical procedure. Mill seems most often to think of the former, while tending to formulate in terms of the latter. At any rate, if relevance in proximo is interpolated in the peccant clause of the canon of the Joint-Method, the

practical utility of the method is rehabilitated. So too, if the canon of the Method of Agreement is never more than approxi- mately satisfied, intermixture of effects will in practice mean that we at least often do not know the cause or antecedent equivalent of a given effect, without the possibility of an alternative. Finally, it is on the whole in keeping with Mill's presuppositions to admit even in the case of the method of difference that in practice it is approximative and instructive, while the theoretical formula, to which it aims at approaching asymptotically as limit, if exact, is in some sense sterile. Mill may well have himself conceived his methods as practically fruitful and normally convincing with the limiting formula in each case more cogent in form but therewith merely the skeleton of the process that but now pulsed with life.

Enough has been said to show why the advance beyond the letter of Mill was inevitable while much in the spirit of Mill must necessarily affect deeply all later experientialism. After Mill experientialism takes essentially new forms. In part because of what Mill had done. In part also because of what he had left undone. After Mill means after Kant and Hegel and Herbart, And it means after the emergence of evolutionary naturalism. Mill, then, marks the final stage in the achievement of a great school of thought. *

ii. The Logic of Rationalism.

A fundamental contrast to the school of Bacon and of Locke is afforded by the great systems of reason, owning Cartesian inspira- s . tion, which are identified with the names of Spinoza

and Leibnitz. In the history of logic the latter thinker is of the more importance. Spinoza's philosophy is expounded ordine geometrico and with Euclidean cogency from a relatively small number of definitions, axioms and postulates. But how we reach our assurance of the necessity of these principles is not made specifically clear. T*he invaluable tractate De Intellectus etnendatione, in which the agreement with and divergence from Descartes on the question of method could have been fully elucidated, is unhappily not finished. We know that we need to pass from what Spinoza terms experientia vaga, 1 where imagination with its fragmentary apprehension is liable to error and neither necessity nor impossibility can be predicated, right up to that which fictionem terminal — namely, intellectio. And what Spinoza has to say of the requisites of definition and the marks of intellection makes it clear that insight comes with coherence, and that the work of method on the " inductive " side is by means of the unravelling of all that makes for artificial limitation to lay bare what can then be seen to exhibit nexus in the one great system. When all is said, however, the geometric method as universalized in philosophy is rather used by Spinoza than expounded.

With Leibnitz, on the other hand, the logical problem holds the foremost place in philosophical inquiry. 2 From the purely logical thesis, developed at quite an early stage of his thinking, 3 that in any true proposition the predicate is contained in the subject, the main principles of his doctrine of Monads are derivable with the minimum of help from his philosophy of dynamics. Praedicatum inest subjecto. All valid

1 Bacon, Novum organum, i. ioo.

- Russell's Philosophy of Leibnitz, capp. 1-5.
- See especially remarks on the letter of M. Arnauld (Gerhardt's edition of the philosophical works, ii. 37 sqq.).

LelboMx.

propositions express in the last resort the relation of predicate or predicates to a subject, and this Leibnitz holds after considering the case of relational propositions where either term may hold the position of grammatical subject, A = B and the like. There is a subject then, or there are subjects which must be recognized as not possible to be predicated, but as absolute. For reasons not purely logical Leibnitz declares for the plurality of such subjects. Each contains all its predicates: and this is true not only

in the case of truths of reason, which are necessary, and ultimately to be exhibited as coming under the law of contra- diction, ” or, what comes to the same thing, that of identity,” but also in the case of truths of fact which are contingent, though a sufficient reason can be given for them which ” inclines ” without importing necessity. The extreme case of course is the human subject. ” The individual notion of each person includes once for all what is to befall it, world without end,” and “it would not have been our Adam but another, if he had had other events.” Existent subjects, containing eternally all their successive predicates in the time-series, are substances, which when the problems connected with their activity, or dynamically speaking their force, have been resolved, demand — and supply — the metaphysic of the Monadology.

Complex truths of reason or essence raise the problem of definition, which consists in their analysis into simpler truths and ultimately into simple — i.e. indefinable ideas, with primary principles of another kind — axioms, and postulates that neither need nor admit of proof. These are identical in the sense that the opposite contains an express contradiction. 4 In the case of non-identical truths, too, there is a priori proof drawn from the notion of the terms, ” though it is not always in our power to arrive at this analysis,” 6 so that the question arises, specially in connexion with the possibility of a calculus, whether the contingent is reducible to the necessary or identical at the ideal limit. With much that suggests an affirmative answer, Leibnitz gives the negative. Even in the case of the Divine will, though it be always for the best possible, the sufficient reason will ” incline without necessitating.” The propositions which deal with actual existence are still of a unique type, with whatever limitation to the calculus.

Leibnitz’s treatment of the primary principles among truths of reason as identities, and his examples drawn inter alia from the ” first principles ” of mathematics, influenced Kant by antago- nism. Identities some of them manifestly were not. The formula of identity passed in another form to Herbart and therefore to Lotze. In recognizing, further, that the relation of an actual individual fact to its sufficient ground was not reducible to identity, he set a problem diversely treated by Kant and Herbart. He brought existential propositions, indeed, within a rational system through the principle that it must be feasible to assign a sufficient reason for them, but he refused to bring them under the conception of identity or necessity, i.e. to treat their opposites as formally self-contradictory. This bore interest in the Kantian age in the treatment alike of cause and effect, and of the onto- logical proof of existence from essence. Not that the Law of Sufficient Reason is quite free from equivoque. Propositions concerning the possible existence of individuals put Leibnitz to some shifts, and the difficulty accounts for the close connexion established in regard to our actual world between the law of sufficient reason and the doctrine of the final cause. This con- nexion is something of an afterthought to distinguish from the potential contingency of the objectively possible the real contingency of the actual, for which the ” cause or reason ” of Spinoza 6 could not account. The law, however, is not invalidated by these considerations, and with the degree of emphasis and the special setting that Leibnitz gives the law, it is definitely his own.

If we may pass by the doctrine of the Identity of Indiscernibles, which played a part of some importance in subsequent philo- sophy, and the Law of Continuity, which as Leibnitz represents it is, if not sheer dogma, reached by something very like a fallacy,

4 Gerhardt, vi. 612, quoted by Russell, loc. cit., p. 19.

6 Ibid., ii. 62, Russell, p. 33.

6 Spinoza, ed. van Vloten and Land, i. 46 (Ethica, i. 11).

we have as Leibnitz's remaining legacy to later logicians the conception of Characteristica Universalis and Ars Combinaloria, a universal denoting by symbols and a calculus working by substitutions and the like. The two positions that a subject contains all its predicates and that all non-contingent proposi- tions — i.e. all propositions not concerned with the existence of individual facts ultimately analyse out into identities— obviously lend themselves to the design of this algebra of thought, though the mathematician in Leibnitz should have been aware that a significant equation is never an identity. Leibnitz, fresh from the battle of the calculus in the mathematical field, and with his conception of logic, at least in some of its aspects, as a generalized mathematic, 1 found a fruitful inspiration, harmonizing well with his own metaphysic, in Bacon's alphabet of nature. He, too, was prepared to offer a new instrument. That the most important section, the list of forms of combination, was never achieved — this too was after the Baconian example while the mode of symbolization was crude with a = ab and the like — matters little. A new technique of manipulation — it is, of course, no more — had been evolved.

It may be said that among Leibnitz's successors there is no Leibnitzian. The system as a whole is something too artificial to secure whole-hearted allegiance. Wolff's formalism is the bastard outcome of the speculation of Leibnitz, and is related to it as remotely as Scholasticism is to Aristotle. Wolff found a sufficient reason for everything and embodied the results of his inquiries in systematic treatises, sometimes in the vernacular. He also, by a transparent petitio principii, brought the law of the sufficient reason under that of non-contradiction. Wolff and his numerous followers account for the charge of dogmatism against " the Leibnitzio-Wolffian school." They are of impor- tance in the history of logic for two reasons only: they affected strongly the German vocabulary of philosophy and they con- stituted the intellectual environment in which Kant grew to manhood.

A truer continuator of Leibnitz in the spirit was Herbart.

iii. Kant's Logic.

Herbart's admitted allegiance, however, was Kantian with the qualification, at a relatively advanced stage of his thinking, that it was " of the year 1828 " — that is, after controversy had brought out implications of Kant's teaching not wholly con- templated by Kant himself. The critical philosophy had indeed made it impossible to hark back to Leibnitz or any other master otherwise than with a difference.

Yet it is not a single and unambiguous logical movement that derives from Kant. Kant's lesson was variously under- stood. Different moments in it were emphasized, with a large diversity of result. As interpreted it was acquiesced in or revolted from and revolt ranged from a desire for some modifications of detail or expression to the call for a radical transformation. Grounds for a variety of developments are to be found in the imperfect harmonization of the rationalistic heritage from the Wolffian tradition which still dominates Kant's pure general logic with the manifest epistemological intention of his transcendental theory. Or again, within the latter in his admission of a duality of thought and " the given " in knowledge, which within knowledge was apparently irreducible, concurrently with hints as to the possibility, upon a wider view, of the sublation of their disparateness at least hypothetically and speculatively. The sense in which there must be a ground of the unity of the supersensible 2 while yet the transcendent use of Reason — i.e. its use beyond the limits of experience was denied theoretical validity — was not unnaturally regarded as obscure.

Kant's treatment of technical logic was wholly traditional, and in itself is almost negligible. It is comprised 3 in an early essay on the mistaken subtlety of the syllogistic figures, and a late compilation by a pupil from the introductory matter and

1 Nouveaux essais, iv. 2 § 9, 17 § 4 (Gerhardt v. 351, 460).

2 Critique of Judgment, Introd. § 2, ad. fin. (Werke, Berlin Academy edition, vol. v. p.

176. 1. 10).

3 Kant's Introduction to Logic and his Essay on the Mistaken Subtlety of the Four Figures, trans. T. K. Abbott (1885).

running annotations with which the master had enriched his interleaved lecture-room copy of Meyer's Compendium of 1752. Wolff's general logic, " the best," said Kant, " that we possess," had been abridged by Baumgarten and Lozk. the abridgment then subjected to commentation by Meyer. With this traditional body of doctrine Kant was, save for matters of minor detail, quite content. Logic was of necessity formal, dealing as it must with those rules without which no exercise of the understanding wouid be possible at all. Upon abstraction from all particular methods of thought these rules were to be discerned a priori or without dependence on experience by reflection solely upon the use of the understanding in general. The science of the form of thought abstracted in this way from its matter or content was regarded as of value both as propaedeutic and as canon. It was manifestly one of the disciplines in which a position of finality was attainable. Aristotle might be allowed, indeed, to have omitted no essential point of the understanding. What the moderns had achieved consisted in an advance in accuracy and methodical completeness. " Indeed, we do not require any new discoverers in logic," 4 said the discoverer of a priori synthesis, " since it contains merely the form of thought." Applied logic is merely psychology, and not properly to be called logic at all. The technical logic of Kant, then, justifies literally a movement among his successors in favour of a formal conception of logic with the law of con- tradiction and the doctrine of formal implication for its equip- ment. Unless the doctrine of Kant's " transcendental logic " must be held to supply a point of view from which a logical development of quite another kind is inevitable, Kant's mantle, so far as logic is concerned, must be regarded as having fallen upon the formal logicians.

Kant's transcendental teaching is summarily as follows: " Transcendental " is his epithet for what is neither empirical — i.e. to be derived from experience — nor yet trans- cendent — i.e. applicable beyond the limits of experi-^.jy^,, ence, the mark of experience being the implication ceadeaUl." of sense or of something which thought contra- distinguishes from its own spontaneous activity as in some sense " the given." Those features in our organized experience are to be regarded as transcendentally established which are the presuppositions of our having that experience at all. Since they are not empirical they must be structural and belong to " the mind " — i.e. the normal human intelligence, and to like intelligence so far as like. If we set aside such transcendental conditions as belong to sensibility or to the receptive phase of mind and are the presuppositions of juxtaposition of parts, the remainder are ascribable to spontaneity or understanding, to thought with its unifying, organizing or focussing function, and their elucidation is the problem of transcendental analytic. It is still logic, indeed, when we are occupied with the trans- cendent objects of the discursive faculty as it is employed beyond the limits of experience where it cannot validate its ideas. Such a logic, however, is a dialectic of illusion, perplexed by para- logisms and helpless in the face of antinomies. In transcendental analytic on the other hand we concern ourselves only with the transcendental " deduction " or vindication of the conditions of experience, and we have a logic of cognition in which we may establish our epistemological categories with complete validity. Categories are the forms according to which the combining unity of self-consciousness (synthetic unity of apperception) pluralizes itself through the various functions involved in the constitution of objectivity in different types of the one act of thought, viz. judgment. The clue to the discovery of transcendental conditions Kant finds in the existence of judgments, most manifest in mathematics and in the pure science of nature, which are certain, yet not trifling, necessary and yet not reducible to identities, synthetic therefore and a priori, and so accounted for neither by Locke nor by Leibnitz. " There lies a transcendental condition at the basis of every necessity."

Kant's mode of conceiving the activity of thought in the constitution of objects and of their connexion in experience 4 Loc. cit., p. 11.

was thought to He open to an interpretation in conformity with the spirit of his logic, in the sense that the form and the content

in knowledge are not merely distinguishable func- *r”T ‘/ tions within an organic whole, but either separable, or Thought. at l east indifferent one to the other in such a way as to

be clearly independent. Thought as form would thus be a factor or an element in a composite unit. It would clearly have its own laws. It would be the whole concern of logic, which, since in it thought has itself for object, would have no reference to the other term of the antithesis, nor properly and immediately to the knowledge which is compact of thought in conjunction with something which, whatever it may be, is prima facie other than thought. There is too much textual warrant for this interpretation of Kant’s meaning. Doubtless there are passages which make against an extreme dualistic interpretation. Even in his ” logic ” Kant speaks of abstraction from all particular objects of thought rather than of a resolution of concrete thinking into thought and its ” other ” as separable co-operating factors in a joint product. He spoke throughout, however, as if form and content were mutually indifferent, so that the abstraction of form from content implied nothing of falsification or mutilation. The reserve, therefore, that it was abstraction and not a decomposing that was in question remained to the admirers of his logic quite nugatory. They failed to realize that permissible abstraction from specific contents or methods of knowledge does not obliterate reference to matter or content. They passed easily from the acceptance of a priori forms of thinking to that of forms of a priori thinking, and could plead the example of Kant’s logic.

Kant’s theory of knowledge, then, needed to be pressed to other consequences for logic which were more consonant with the spirit of the Critique. The forms of thought and what gives thought its particular content in concrete acts of thinking could not be regarded as subsisting in a purely external and indifferent relation one to the other. “Laws according to which the subject thinks ” and ” laws according to which the object is known ” cannot be the concern of separate departments of inquiry. As soon divorce the investigation of the shape and material of a mirror from the laws of the incidence of the rays that form images in it, and call it a science of reflection! An im- portant group of writers developed the conception of an adapta- tion between the two sides of Kant’s antithesis, and made the endeavour to establish some kind of correlation between logical forms and the process of ” the given.” There was a tendency to fall back upon the conception of some kind of parallelism, whether it was taken to be interpretative or rather corrective of Kant’s meaning. This device was never remote from the constructions of writers for whom the teaching of Spinoza and Leibnitz was an integral part of their intellectual equipment Other modes of correlation, however, find favour also, and in some variety. Kant is seldom the sole source of inspiration. His unresolved antithesis 1 is interpreted either diversely or with a

1 Or antitheses. Kant follows, for example, a different line of cleavage between form and content from that developed between thought and the ” given.” And these are not his only unresolved dualities, even in the Critique of Pure Reason. For the logical inquiry, however, it is permissible to ignore or reduce these differ- ences.

The determination too of the sense in which Kant’s theory of knowledge involves an unresolved antithesis is for the logical purpose necessary so far only as it throws light upon his logic and his in- fluence upon logical developments. Historically the question of the extent to which writers adopted the dualistic interpretation or one that had the like consequences is of greater importance.

It may be said summarily that Kant holds the antithesis between thought and ” the given ” to be unresolved and within the limits of theory of knowledge irreducible. The dove of thought falls lifeless if the resistant atmosphere of ” the given ” be withdrawn (Critique of Pure Reason, ed. 2 Introd. Kant’s Werke, ed. of the Prussian Academy, vol. iii. p. 32, 11. 10 sqq.). Nevertheless the thing-in- itself is a problematic conception and of a limiting or negative use merely. He ” had woven,” according to an often quoted phrase of Goethe, ” a certain sly element of irony into his method; ... he pointed as it were with a side gesture beyond the limits which he himself had drawn.” Thus (loc. cit. p. 46, 11. 8, 9) he declares that ” there are two lineages united in human knowledge, which perhaps

difference of emphasis. And the light that later writers bring to bear on Kant’s logic and epistemology from other sides of his speculation varies in kind and in degree.

Another logical movement springs from those whom a corre- lation of fact within the unity of a system altogether failed to satisfy. There must also be development of the correlated terms from a single principle. Form and content must not only corre- spond one to the other. They must be exhibited as distinguish- able moments within a unity which can at one and the same time be seen to be the ground from which the distinction springs and the ground in virtue of which it is over-ruled. Along this line of speculation we have a logic which claims that whatsoever is in one plane or at one stage in the development of thought a residuum that apparently defies analysis must at another stage and on a higher plane be shown so to be absorbed as to fall altogether within thought. This is the view of Hegel upon which logic comes to coincide with the progressive self -unfolding of thought in that type of metaphysic which is known as absolute, i.e. all-inclusive idealism. The exponent of logic as metaphysic, for whom the rational is the real is necessarily in revolt against all that is characteristically Kantian in the theory of knowledge, against the transcendental method itself and against the doctrine of limits which constitutes the nerve of ” criticism.” Stress was to be laid upon the constructive character of the act of thought which Kant had recognized, and without Kant’s qualifications of it. In all else the claim is made to have left the Kantian teaching behind as a cancelled level of speculation.

Transcendental method is indeed not invulnerable. A principle is transcendentally ” deduced ” when it and only it can explain the validity of some phase of experience, some order Limitation of truths. The order of truths, the phase of experience of Trans- and its certainty had to be taken for granted. The ceadeatal sense, for example, in which the irreversibility of Metbe ‘ t – sequence which is the more known in or dine ad hominem in the case of the causal principle differs from merely psychological conviction is not made fully clear. Even so the inference to the a priori ground of its necessity is, it has been often pointed out, subject to the limitation inherent in any process of reduction, in any regress, that is, from conditionate to condition, viz. that in theory an alternative is still possible. The inferred principle may hold ;he field as explanation without obvious competitor potential or actual. Nevertheless its claim to be the sole possible explanation can in nowise be validated. It has been established after all by dialectic in the Aristotelian sense of the word. But if transcendental method has no special pride of place, Kant’s conclusion as to the limits of the competence of intellectual faculty falls with it. Cognition manifestly needs the help of Reason even in its theoretical use. Its speculation can no longer be stigmatized as vaticination in vacuo, nor its results as illusory.

Finally, to logic as metaphysic the polar antithesis is psychology as logic. The turn of this also was to come again. If logic were treated as merely formal, the stress of the problem of knowledge fell upon the determination of the b£ gtc h a ’” , processes of the psychological mechanism. If alleged i ogy , a priori constituents of knowledge — such rubrics as substance, property, relation — come to be explained psycho- logically, the formal logic that has perforce to ignore all that belongs to psychology is confined within too narrow a range to be able to maintain its place as an independent discipline, and tends to be merged in psychology. This tendency is to be seen in the activity of Fries and Herbart and Beneke, and was actualized as the aftermath of their

speculation. It is no accident that it was the psychology of apperception and the voluntaryist theory or practice of Herbart, whose logical theory was so closely allied to that of the formal logicians proper, that contributed most

spring from a common stock, though to us unknown — namely sense and understanding." Some indication of the way in which he would hypothetically and speculatively mitigate the antithesis is perhaps afforded by the reflection that the distinction of the mental and what appears as material is an external distinction in which the one appears outside to the other. " Yet what as thing-in-itself lies back of the phenomenon may perhaps not be so wholly disparate after all " (ib. p. 278, 11. 26 sqq.).

AFTER KANT]

LOGIC

9*3

to the development of the post-Kantian psychological logic. Another movement helped also; the exponents of naturalistic evolution were prepared with Spencer to explain the so-called a priori in knowledge as in truth a posteriori, if not to the individual at any rate to the race. It is of course a newer type of psychological logic that is in question, one that is aware of Kant's " answer to Hume." Stuart Mill, despite of his relation of antagonism to Hamilton and Mansel, who held themselves to be Kantian in spirit, is still wholly pre- Kantian in his outlook.

Kant's influence, then, upon subsequent logic is least of all to be measured by his achievement in his professed contribution to technical logic. It may be attributed in some

slight degree, perhaps, to incidental flashes of logical

Summary.

insight where his thought is least of what he himself calls logic e.g. his exposition of the significance of synthetic judgments c priori, or his explanation of the function of imagery in relation to thought, whereby he offers a solution of the problem of the conditions under which one member of a group unified through a concept can be taken to stand for the rest, or again the way in which he puts his finger on the vital issue in regard to the alleged proof from essence to existence, and illustrations could be multiplied. But much more it belongs to his transformation of the epistemological problem, and to the suggestiveness of his philosophy as a whole for an advance in the direction of a speculative construction which should be able to cancel all Kant's surds, and in particular vindicate a " ground of the unity of the supersensible which lies back of nature with that which the concept of freedom implies in the sphere of practice," ' which is what Kant finally asserts.

iv. After Kant.

Starting from the obvious antithesis of thought and that of which it is the thought, it is possible to view the ultimate relation of its term as that of mutual indifference or, secondly, as that of a correspondence such that while they retain their distinct character modification of the one implies modification of the other, or thirdly and lastly, as that of a mergence of one in the other of such a nature that the merged term, whichever it be, is fully accounted for in a complete theory of that in which it is merged.

The first way is that of the purely formal logicians, of whom Twesten 2 and in England H. L. Mansel may be regarded as typical. They take thought and " the given " as Logicians, self-contained units which, if not in fact separable, are at any rate susceptible of an abstraction the one from the other so decisive as to constitute an ideal

separation. The laws of the pure activity of thought must be independently determined, and since the contribution of thought to knowledge is form they must be formal only. They cannot go beyond the limits of formal consistency or analytic correctness. They are confined to the determination of what the truth of any matter of thought, taken for granted upon grounds psychological or other, which are extraneous to logic, includes or excludes. The unit for logic is the concept taken for granted. The function of logic is to exhibit its formal implications and repulsions. It is questionable whether even this modest task could be really achieved without other reference to the content abstracted from than Mansel, for example, allows. The analogy of the resolution of a chemical compound with its elements which is often on the lips of those who would justify the independence of thought and the real world, with an agnostic conclusion as to non-phenomenal or trans-subjective reality, is not really applicable. The oxygen and hydrogen, for example, into which water may be resolved are not in strictness indifferent one to the other, since both are members of an order regulated according to laws of combination in definite ratios. Or, if applicable, it is double-edged. Suppose

1 Critique of Judgment, Introd. § 2 (Werke, v., 276 11. 9 sqq.); cf. Bernard's " Prolegomena " to his translation of this, pp. xxxviii. sqq.).

- Die Logik, insbesondere die Analytik (Schleswig, 1825). August Detlev Christian Twesten (1789-1876), a Protestant theologian, succeeded Schleiermacher as professor in Berlin in 1835.

oxygen to be found only in water. Were it to become conscious, would it therefore follow that it could infer the laws of a separate or independent activity of its own? Similarly forms of thinking, the law of contradiction not excepted, have their meaning only in reference to determinate content, even though distributively all determinate contents are dispensable. The extreme formalist is guilty of a fallacy of composition in regard to abstraction.

It does not follow, however, that the laws asserted by the formal logicians are invalid or unimportant. There is a per- missible abstraction, and in general they practise this, and although they narrow its range unduly, it is legitimately to be applied to certain characters of thinking. As the living organism includes something of mechanism — the skeleton, for example — so an organic logic doubtless includes determinations of formal consistency. The skeleton is meaningless apart from reference to its function in the life of an organism, yet there are laws of skeleton structure which can be studied with most advantage if other characters of the organism are relegated to the background. To allow, however, that abstraction admits of degrees, and that it never obliterates all reference to that from which it is abstracted, is to take a step forward in the direction of the correlation of logical forms with the concrete processes of actual thinking. What was true in formal logic tended to be absorbed in the correlationist theories.

Those formal logicians of the Kantian school, then, may be summarily dismissed, though their undertaking was a necessary one, who failed to raise the epistemological issue at all, or who, raising it, acquiesced in a na'ive dualism agnostic of the real world as Kant's essential lesson. They failed to develop any view which could serve either in fact or in theory as a corrective to the effect of their formalism. What they said with justice was said as well or better elsewhere.

Among them it is on the whole impossible not to include the names of Hamilton and Mansel. The former, while his erudition in respect to the history of philosophical opinion has rarely been equalled, was not a clear thinker. His general theory of know- ledge deriving from Kant and Reid, and including among other things a contaminatio of their theories of perception, 3 in no way sustains or mitigates his narrow view of logic. He- makes no effective use of his general formula that to think is to condition. He appeals to the direct testimony of consciousness in the sense in which the appeal involves a fallacy. He accepts an ultimate antinomy as to the finiteness or infinity of " the unconditioned," yet applies the law of the excluded middle to insist that one of the

two alternatives must be true, wherefore we must make the choice. And what is to be said of the judgment of a writer who considers the relativity of thought demonstrated by the fact that every judgment unites two members? Hamilton's signi- ficance for the history of logic lies in the stimulus that he gave to the development of symbolic logic in England by his new analytic based upon his discovery or adoption of the principle of the quantification of the predicate. Mansel, too, was learned, specially in matters of Aristotelian exegesis, and much that is of value lies buried in his commentation of the dry bones of the Artis Logicae Rudimenta of Locke's contemporary Aldrich. And he was a clearer thinker than Hamilton. Formal logic of the extremest rigour is nowhere to be found more adequately ex- pressed in all its strength, and it must be added in all its weakness, than in the writings of Mansel. But if the view maintained above that formal logic must compromise or mitigate its rigour and so fail to maintain its independence, be correct, the logical consistency of Mansel's logic of consistency does but emphasize its barrenness. It contains no germ for further development. It is the end of a movement.

The brief logic of Herbart 4 is altogether formal too. Logical forms have for him neither psychological nor metaphysical reference. We are concerned in logic solely with the systematic

» See Sir William Hamilton: The Philosophy of Perception, by J. Hutchison Stirling.

- Hauptpunkle der Logik, 1808 (Werke, ed. Hartenstein, i. 465 sqq.), and specially Lehrbuch der Einleitung in die Philosophic (1813). and subsequently §§ 34 sqq. (Werke, i. 77 sqq.).

Herbart.

clarification of concepts which are wholly abstract, so that they are not merely not ultimate realities, but also in no sense actual moments of our concrete thinking. The first task of logic is to distinguish and group such con- cepts according to their marks, and from their classification there naturally follows their connexion in judgment. It is in the logic of judgment that Herbart inaugurates a new era. He is not, of course, the first to note that even categorical judgments do not assert the realization of their subject. That is a thought which lies very near the surface for formal logic. He had been preceded too by Maimon in the attempt at a reduction of the traditional types of judgment. He was, however, the first whose analysis was sufficiently convincing to exorcise the tyranny of grammatical forms. The categorical and disjunctive judgment reduce to the hypothetical. By means of the doctrine of the quantification of the predicate, in which with his Leibnitzian conception of identity he anticipated Beneke and Hamilton alike, universal and particular judgments are made to pull together. Modal, impersonal, existential judgments are all accounted for. Only the distinction of affirmative and negative judgments remains unresolved, and the exception is a natural one from the point of view of a philosophy of pluralism. There was little left to be done here save in the way of an inevitable mutatis mutandis, even by Lotze and F. H. Bradley. From the judgment viewed as hypothetical we pass by affirmation of the antecedent or denial of the consequent to inference. This point of departure is noteworthy, as also is the treatment of the inductive syllogism as one in which the middle term is resoluble into a group or series (Reihe). In indicating specifically, too, the case of conclusion from a copulative major premise with a dis- junctive minor, Herbart seems to have suggested the cue for Sigwart's exposition of Bacon's method of exclusions.

That it was the formal character of Herbart's logic which was ultimately fatal to its acceptance outside the school as an inde- pendent discipline is not to be doubted. It

stands, however, on a different footing from that of the formal logic hitherto discussed, and is not to be condemned upon quite the same grounds. In the first place, Herbart is quite aware of the nature of abstraction. In the second, there is no claim that thought at one and the same time imposes form on ” the given ” and is susceptible of treatment in isolation by logic. With Herbart the forms of common experience, and indeed all that we can regard as his categories, are products of the psychological mechanism and destitute of logical import. And lastly, Herbart’s logic conforms to the exigencies of his system as a whole and the principle of the bare or absolute self identity of the ultimate ” reals ” in particular It is for this reason that it finally lacks real affinity to the ” pure logic” of Fries. For at the basis of Herbart’s speculation there lies a conception of identity foreign to the thought of Kant with his stress on synthesis, in his thoroughgoing metaphysical use of which Herbart goes back not merely to Wolff but to Leibnitz. It is no mere coincidence that his treatment of all forms of con tinuance and even his positive metaphysic of ” reals ” show affinity to Leibnitz. It was in the pressing to its extreme con- sequences of the conception of uncompromising identity which is to be found in Leibnitz, that the contradictions took their rise which Herbart aimed at solving, by the method of relations and his doctrine of the ultimate plurality of ” reals,” The logic of relations between conceptual units, themselves unaltered by the relation, seems a kind of reflection of his metaphysical method. To those, of course, for whom the only real identity is identity in difference, while identity without difference, like difference with- out identity, is simply a limit or a vanishing point, Herbart’s logic and metaphysic will alike lack plausibility.

The setting of Herbart’s logic in his thought as a whole might of itself perhaps justify separate treatment. His far-reaching influence in the development of later logic must certainly do so. Directly he affected a school of thought which contained one logician of first-rate importance in Moritz Wilhelm Drobisch (1802-1896), professor at Leipzig. In less direct relation stands Lotze, who, although under other influences he developed a different view even in logic, certainly let no point in the doctrine

of his great predecessor at Gottingen escape him. A Herbartian strain is to be met with also in the thought of writers much further afield, for example F. H. Bradley, far though his meta- physic is removed from Herbart’s. Herbart’s influence is surely to be found too in the evolution of what is called Gegenstands- thcorie. Nor did he affect the logic of his successors through his logic alone. Reference has been made above to the effect upon the rise of the later psychological logic produced by Herbart’s psychology of apperception, when disengaged from the back- ground of his metaphysic taken in conjunction with his treatment in his practical philosophy of the judgment of value or what he calls the aesthetic judgment. Emerson’s verdict upon a greater thinker — that his was ” not a mind to nestle in ” — may be true of Herbart, but there can be no doubt as to the stimulating force of this master.

The second way of interpreting the antithesis of thought to what is thought of, was taken by a group of thinkers among whom a central and inspiring figure was Schleiermacher. , fc They in no sense constitute a school and manifest as the radical differences among themselves. They are rationale agreed, however, in the rejection, on the one hand, of the subjectivist logic with its intrinsic implication that knowledge veils rather than reveals the real world, and, on the other hand, of the logic of the speculative construction with its pretension to ” deduce,” to determine, and finally at once to cancel and conserve any antithesis in its all-embracing dialectic. They agree, then, in a maintenance of the critical point of view, while all alike recognize the necessity of bringing the thought- function in knowledge into more intimate relation with its ” other ” than Kant had done, by means of some formula of correlation or parallelism. Such an advance might have taken its cue directly from Kant himself. As an historical fact it tended rather to formulate itself as a reaction towards Kant in view of the course taken by the speculative movement. Thus Schleier- macher’s posthumously published Dialektik (1839) may be characterized as an appeal from the absolutist element in Schelling’s philosophy to the conception of that correlation or parallelism which Schelling had exhibited as flowing from and subsisting within his absolute, and therein as a return upon Kant’s doctrine of limits. Schleiermacher’s

conception of dialectic is to the effect that it is concerned with the

of know- ledge.

Schleier- macher.

principles of the art of philosophizing, as these are susceptible of a relatively independent treatment by a permissible abstraction. Pure thinking or philosophizing is with a view to philosophy or knowledge as an interconnected system of all sciences or departmental forms of knowledge, the mark of know- ledge being its identity for all thinking minds. Dialectic then investigates the nexus which must be held to obtain between all thoughts, but also that agreement with the nexus in being which is the condition of the validity of the thought-nexus. In knowing there are two functions involved, the " organic " or animal function of sensuous experience in virtue of which we are in touch with being, directly in inner perception, mediately in outer experience, and the "intellectual" function of construc- tion. Either is indispensable, though in different departments of knowledge the predominant role falls to one or other, e.g. we are more dependent in physics, less so in ethics. The idea of a perfect harmony of thinking and being is a presupposition that underlies all knowing but cannot itself be realized in knowledge. In terms of the agreement of thought and being, the logical forms of the part of dialectic correspondent to knowledge statically considered have parallels and analogies in being, the concept being correlated to substance, the judgment to causal nexus. Inference, curiously enough, falls under the technical side of dialectic concerned with knowledge in process or becoming, a line of cleavage which Ueberweg has rightly characterized as con- stituting a rift within Schleiermacher's parallelism.

Schleiermacher's formula obviously ascribes a function in knowledge to thought as such, and describes in a suggestive manner a duality of the intellectual and organic functions, resting on a parallelism of thought and being whose collapse into identity it is beyond human capacity to grasp. It is rather,

totze.

however, a statement of a way in which the relations of the terms of the problem may be conceived than a system of necessity. It may indeed be permitted to doubt whether its influence upon subsequent theory would have been a great one apart from the spiritual force of Schleiermacher's personality. Some sort of correlationist conception, however, was an inevitable develop- ment, and the list 1 of those who accepted it in something of the spirit of Schleiermacher is a long one and contains many dis- tinguished names, notably those of Trendelenburg and Ueberweg. The group is loosely constituted however. There was scope for diversity of view and there was diversity of view, according as the vital issue of the formula was held to lie in the relation of intellectual function to organic function or in the not quite equivalent relation of thinking to being. Moreover, few of the writers who, whatsoever it was that they baptized with the name of logic, were at least earnestly engaged in an endeavour to solve the problem of knowledge within a circle of ideas which was on the whole Kantian, were under the dominance of a single in- spiration. Beneke's philosophy is a striking instance of this, with application to Fries and affinity to Herbart conjoined with obligations to Schclling both directly and through Schleier- macher. Lotze again wove together many threads of earlier thought, though the web was assuredly his own. Finally it must not be forgotten that the host of writers who were in reaction against Hegelianism tended to take refuge in some formula of correlation, as a half-way house between that and formalism or psychologism or both, without reference to, and often perhaps without consciousness of, the way in which historically it had taken shape to

meei the problem held to have been left unresolved by Kant.

Lotze on the one hand held the Hegelian ” deduction ” to be untenable, and classed himself with those who in his own phrase ” passed to the order of the day,” while on the other hand he definitely raised the question, how an ” object ” could be brought into forms to which it was not in some sense adapted. Accordingly, though he regards logic as formal, its forms come into relation to objectivity in some sort even within the logical field itself, while when taken in the setting of his system as a whole, its formal character is not of a kind that ultimately excludes psychological and metaphysical reference, at least speculatively. As a logician Lotze stands among the masters. His flair for the essentials in his problem, his subtlety of analysis, his patient willingness to return upon a difficulty from a fresh and still a fresh point of view, and finally his fineness of judgment, make his logic 2 so essentially logic of the present, and of its kind not soon to be superseded, that nothing more than an indication of the historical significance of some of its character- istic features need be attempted here.

In Lotze’s pure logic it is the Herbartian element that tends to be disconcerting. Logic is formal. Its unit, the logical con- cept, is a manipulated product and the process of manipulation may be called abstraction. Processes of the psychological mechanism lie below it. The paradox of the theory of judgment is due to the ideal of identity, and the way in which this is evaded by supplementation to produce a non-judgmental identity, followed by translation of the introduced accessories with conditions in the hypothetical judgment, is thoroughly in Herbart’s manner. The reduction of judgments is on lines already familiar. Syllogism is no instrumental method by which we compose our knowledge, but an ideal to the form of which it should be brought. It is, as it were, a schedule to be filled in, and is connected with the disjunctive judgment as a schematic setting forth of alternatives, not with the hypothetical, and ultimately the apodictic judgment with their suggestion that it is the real movement of thought that is subjected to analysis. Vet the resultant impression left by the whole treatment is not Herbartian. The concept is accounted for in Kantian terms. There is no discontinuity between the pre-logical or sub-logical

1 See Ueberweg, System of Logic and History of Logical Doctrines,

§ 34-

- Drei Biicker der Logik, 1874 (E.T., 1884). The Book on Pure Logic follows inessentials the line of thought of a 11 earlier work (1843).

conversion of impressions into ” first universals ” and the formation of the logical concept. Abstraction proves to be synthesis with compensatory universal marks in the place of the particular marks abstracted from. Synthesis as the work of thought always supplies, beside the mere conjunction or disjunc- tion of ideas, a ground of their coherence or non-coherence. It is evident that thought, even as dealt with in pure logic, has an objectifying function. Its universals have objective validity, though this does not involve direct real reference. The formal conception of pure logic, then, is modified by Lotze in such a way as not only to be compatible with a view of the structural and functional adequacy of thought to that which at every point at which we take thinking is still distinguishable from thought, but even inevitably to suggest it. That the unit for logic is the concept and not the judgment has proved a stumbling-block to those of Lotze’s critics who are accustomed to think in terms of the act of thought as unit. Lotze’s procedure is, indeed, analogous to the way in which, in his philosophy of nature, he starts from a plurality of real beings, but by means of a reductive movement, an application of Kant’s transcendental method, arrives at the postulate or fact of a law of their reciprocal action which calls for a monistic and idealist interpretation. He starts, that is in logic, with conceptual units apparently self-contained and admitting of nothing but external relation, but proceeds to justify the intrinsic relation between the matter of his units by an appeal to the fact of the coherence of all contents of thought. Indeed, if thought admits irreducible units, what can unite? Yet he is left committed to his puzzle as to a reduction of judgment to

identity, which partially vitiates his treatment of the theory of judgment. The outstanding feature of this is, nevertheless, not affected, viz. the attempt that he makes, inspired clearly by Hegel, ” to develop the various forms of judgment systematically as members of a series of opera- tions, each of which leaves a part of its problem unmastered and thereby gives rise to the next.” 3 As to inference, finally, the ideal of the articulation of the universe of discourse, as it is for complete knowledge, when its disjunctions have been thoroughly followed out and it is exhaustively determined, carried the day with him against the view that the organon for gaining knowledge is syllogism. The Aristotelian formula is ” merely the expression, formally expanded and complete, of the truth already embodied in disjunctive judgment, namely, that every S which is a specific form of M possesses as its predicate a particular modification of each of the universal predicates of M to the exclusion of the rest.” Schleiermacher’s separation of inference from judgment and his attribution of the power to knowledge in process cannot find acceptance with Lotze. The psychologist and the formal logician do indeed join hands in the denial of a real movement of thought in syllogism. Lotze’s logic then, is formal in a sense in which a logic which does not find the conception of synthetic truth embarrassing is not so. It is canon and not organon. In the one case, however, where it recognizes what is truly synthesis, i.e. in its account of the concept, it brings the statics of knowledge, so to speak, into integral relation with the dynamics. And throughout, wherever the survival from 1843, the identity bug-bear, is for the moment got rid of in what is really a more liberal conception, the statical doctrine is developed in a brilliant and informing manner. Yet it is in the detail of his logical investigations, something too volatile to fix in summary, that Lotze’s greatness as a logician more especially lies.

With Lotze the ideal that at last the forms of thought shall be realized to be adequate to that which at any stage of actual knowledge always proves relatively intractable is an illuminating projection of faith. He takes courage from the reflection that to accept scepticism is to presume the competence of the thought that accepts. He will, however, take no easy way of parallelism. Our human thought pursues devious and circuitous methods. Its forms are not unseldom scaffolding for the house of knowledge rather than the framework of the house, itself. Our task is not to realise correspondence with something other than thought, 3 Logic, Eng. trans. 35 ad. fin.

but to make explicit those justificatory notions which condition the form of our apprehension. ” However much we may presuppose an original reference of the forms of thought to that nature of things which is the goal of knowledge, we must be pre- pared to find in them many elements which do not directly repro- duce the actual reality to the knowledge of which they are to lead us.” ‘ The impulse of thought to reduce coincidence to coherence reaches immediately only to objectivity or validity. The sense in which the presupposition of a further reference is to be inter- preted and in which justificatory notions for it can be adduced is only determinable in a philosophic system as a whole, where feeling has a place as well as thought, value equally with validity. Lotze’s logic then represents the statical aspect of the function of thought in knowledge, while, so far as we go in knowledge thought is always engaged in the unification of a manifold, which remains contradistinguished from it, though not, of course, completely alien to and unadapted to it. The further step to the determination of the ground of harmony is not to be taken in logic, where limits are present and untranscended.

The position of the search for truth, for which knowledge is a growing organism in which thought needs, so to speak, to feed on something other than itself, is conditioned in the yMefaˆ** post-Kantian period by antagonism to the speculative physic. movement which culminated in the dialectic of Hegel. The radical thought of this

movement was voiced in the demand of Reinhold 2 that philosophy should “deduce” it all from a single principle and by a single method. Kant’s limits that must needs be thought and yet cannot be thought must be thought away. An earnest attempt to satisfy this demand was made by Fichte whose single principle was the activity of the pure Ego, while his single method was the asser- tion of a truth revealed by reflection on the content of conscious experience, the characterization of this as a half truth and the supplementation of it by its other, and finally the harmonization of both. The pure ego is inferred from the fact that the non-ego is realized only in the act of the ego in positing it. The ego posits itself, but reflection on the given shows that we must add that it posits also the non-ego. The two positions are to be conciliated in the thought of reciprocal limitation of the posited ego and non-ego. And so forth. Fichte cannot be said to have developed a logic, but this rhythm of thesis, antithesis and synthesis, foreshadowed in part for Fichte in Spinoza’s formula, ” omnis determinatio est negatio,” and significantly in Kant’s triadic grouping of his categories, gave a cue to the thought of Hegel. Schelling, too, called for a single principle and claimed to have found it in his Absolute, ” the night ” said Hegel, “in which all cows are black,” but his historical influence lay, as we have seen, in the direction of a parallelism within the unity, and he also developed no logic. It is altogether otherwise with Hegel. Hegel’s logic, 3 though it involves inquiries which custom regards as metaphysical, is not to be characterized as a meta- HereL physic with a method. It is logic or a rationale of thought by thought, with a full development among other matters of all that the most separatist of logicians regards as thought forms. It offers a solution of what has throughout appeared as the logical problem. That solution lies doubtless in the evolution of the Idea, i.e. an all-inclusive in which mere or pure thought is cancelled in its separateness by a transfigura- tion, while logic is nothing but the science of the Idea viewed in the medium of pure thought. But, whatever else it be, this Panlogismus, to use the word of J. E. Erdmann, is at least a logic. Thought in its progressive unfolding, of which the history of philosophy taken in its broad outline offers a pageant, neces- sarily cannot find anything external to or alien from itself, though that there is something external for it is another matter.

1 Logic, Introd. § ix.

2 For whom see Hoffding, History of Modern Philosophy, Eng. trans., vol. ii. pp. 122 sqq. ; invaluable for the logical methods of modern philosophers.

3 Wissenschaft der Logik (1812-1816), in course of revision at Hegel’s death in 1831 (Werke, vols, iii.-v.), and Encyklopddie der philosophischen Wissenschaften, i.; Pie Logik (,1817; 3rd ed., 1830); Werke. vol. vi.. Eng. trans., Wallace (2nd ed., 1892).

As Fichte’s Ego finds that its non-ego springs from and has its home within its very self, so with Hegel thought finds itself in its ” other,” both subsisting in the Idea which is both and neither. Either of the two is the all, as, for example, the law of the convexity of the curve is the law of the curve and the law of its concavity. The process of the development of the Idea or Absolute is in one regard the immanent process of the all. Logic- ally regarded, i.e. ” in the medium of mere thought,” it is dialectical method. Any abstract and limited point of view carries necessarily to its contradictory. This can only be atoned with the original determination by fresh negation in which a new thought-determination is born, which is yet in a sense the old, though enriched, and valid on a higher plane. The limita- tions of this in turn cause a contradiction to emerge, and the process needs repetition. At last, however, no swing into the opposite, with its primarily conflicting, if ultimately comple- mentary function, is any longer possible. That in which no further contradiction is possible is the absolute Idea. Bare or indeterminate being, for instance, the first of the determinations of Hegel’s logic, as the being of that which is not anything determinate, of Kant’s thing-in-itself, for example, positively understood, implicated at once the notion of not-being, which negates it, and is one with it, yet with a difference, so that we have the transition to determinate being, the transition being baptized as becoming. And so forth. It is easy to raise diffi- culties not only in regard to the detail in Hegel’s development of his categories, especially the higher ones, but also in regard to the essential rhythm of his method.

The consideration that mere double negation leaves us precisely where we were and not upon a higher plane where the dominant concept is richer, is, of course, fatal only to certain verbal expressions of Hegel's intent. There is a differentiation in type between the two negations. But if we grant this it is no longer obviously the simple logical operation indicated. It is inferred then that Hegel complements from the stuff of experience, and fails to make good the pretension of his method to be by itself and of itself the means of advance to higher and still higher concepts till it can rest in the Absolute. He discards, as it were, and takes in from the stock while professing to play from what he has originally in his hand. He postulates his unity in senses and at stages in which it is inadmissible, and so supplies only a schema of relations otherwise won, a view supported by the way in which he injects certain determinations in the process, e.g. the category of chemism. Has he not cooked the process in the light of the result? In truth the Hegelian logic suffers from the fact that the good to be reached is pre-supposed in the beginning. Nature, e.g., is not deduced as real because rational, but being real its rationality is presumed and, very imperfectly, exhibited in a way to make it possible to con- ceive it as in its essence the reflex of Reason. It is a vision rather than a construction. It is a " theosophical logic." Consider the raticftial-real in the unity that must be, and this is the way of it, or an approximation to the way of it ! It was inevitable that the epistemologists of the search for truth would have none of it. The ideal in whatsoever sense real still needs to be realized. It is from the human standpoint regulative and only hypothetic- ally or formally constitutive. We must not confuse owto with dvcu, nor elvcu with yiyvecrdcu.

Yet in a less ambitious form the fundamental contentions of Hegel's method tend to find a qualified acceptance. In any piece of presumed knowledge its partial or abstract character involves the presence of loose edges which force the conviction of in-adequacy and the development of contradictions. Contradic- tions must be annulled by complementation, with resultant increasing coherence in ascending stages. At each successive stage in our progress fresh contradictions break out, but the ideal of a station at which the thought-process and its other, if not one, are at one, is permissible as a limiting conception. Yet if Hegel meant only this he has indeed succeeded in concealing his meaning.

Hegel's treatment of the categories or thought determinations which arise in the development of the immanent dialectic is rich in flashes of insight, but most of them are in the ordinary

view of logic wholly metaphysical. In the stage, however, of his process in which he is concerned with the notion are to be found conceptj judgment, syllogism. Of the last he declares that it "is the reasonable and everything reasonable" (Encyk. § 181), and has the phantasy to speak of the definition of the Absolute as being " at this stage " simply the syllogism. It is, of course, the rhythm of the syllogism that attracts him. The concept goes out from or utters itself in judgment to return to an enhanced unity in syllogism. Ueberweg (System § 101) is, on the whole, justified in exclaiming that Hegel's rehabilitation of syllogism " did but slight service to the Aristotelian theory of syllogism," yet his treatment of syllogism must be regarded as an acute con- tribution to logical criticism in the technical sense. He insists on its objectivity. The transition from judgment is not brought about by our subjective action. The syllogism of " all-ness " is convicted of a petitio principii {Encyk. § 190), with consequent lapse into the inductive syllogism, and, finally, since inductive syllogism is involved in the infinite process, into analogy. " The syllogism of necessity," on the contrary, does not presup-pose its conclusion in its premises. The detail, too, of the whole discussion is rich in suggestion, and subsequent logicians — Ueberweg himself perhaps, Lotze certainly in his genetic scale of types of judgment and inference, Professor Bosanquet notably in his

systematic development of " the morphology of know- ledge," and others — have with reason exploited it.

Hegel's logic as a whole, however, stands and falls not with his thoughts on syllogism, but with the claim made for the dialectical method that it exhibits logic in its integral unity with metaphysic, the thought-process as the self-revelation of the Idea. The claim was disallowed. To the formalist proper it was self-condemned in its pretension to develop the content of thought and its rejection of the formula of bare-identity. To the epistemologist it seemed to confuse foundation and keystone, and to suppose itself to build upon the latter in a construction illegitimately appropriative of materials otherwise accumulated. At most it was thought to establish a schema of formal unity which might serve as a regulative ideal. To the methodologist of science in genesis it appeared altogether to fail to satisfy any practical interest. Finally, to the psychologist it spelt the failure of intellectualism, and encouraged, therefore, some form of re-habilitated experientialism.

In the Hegelian school in the narrower sense the logic of the master receives some exegesis and defence upon single points of doctrine rather than as a whole. Its effect upon logic is rather to be seen in the rethinking of the traditional body of logical doctrine in the light of an absolute presupposed as ideal, with the postulate that a regulative ideal must ultimately exhibit itself as constitutive, the justification of the postulate being held to lie in the coherence and all-inclusiveness of the result. In such a logic, if and so far as coherence should be attained, would be found something akin to the spirit of what Hegel achieves, though doubtless alien to the letter of what it is his pretension to have achieved. There is perhaps no serious misrepresentation involved in regarding a key-thought of this type, though not necessarily expressed in those verbal forms, as pervading such logic of the present as coheres with a philosophy of the absolute conceived from a point of view that is intellectualist throughout. All other contemporary movements may be said to be in revolt from Hegel.

V. Logic from 1880-1910

Logic in the present exhibits, though in characteristically modified shapes, all the main types that have been found in its past history. There is an intellectualist logic coalescent with an absolutist metaphysic as aforesaid. There is an epistemological logic with sometimes formalist, sometimes methodological leanings. There is a formal-symbolic logic engaged with the elaboration of a relational calculus. Finally, there is what may be termed psychological- voluntaryist logic. It is in the rapidity of development of logical investigations of the third and fourth types and the growing number of their exponents that the present shows most clearly the history of logic in the making. All these

movements are logic of the present, and a very brief indication may be added of points of historical significance.

Of intellectualist logic Francis Herbert Bradley 1 (b. 1846) and Bernard Bosanquet 2 (1848) may be taken as typical ex- ponents. The philosophy of the former concludes to an Absolute by the annulment of contradictions, though the ladder of Hegel is conspicuous by its absence. His metaphysical method, how- ever, is like Herbart's, not identifiable with his logic, and the latter has for its central characteristic its thorough restatement of the logical forms traditional in language and the text-books, in such a way as to harmonize with the doctrine of a reality whose organic unity is all-inclusive. The thorough recasting that this involves, even of the thought of the masters when it occasionally echoes them, has resulted in a phrasing uncouth to the ear of the plain man with his world of persons and things in which the former simply think about the latter, but it is fundamentally necessary for Bradley's purpose. The negative judgment, for example, cannot be held in one and the same un- divided act to presuppose the unity of the real, project an adjec- tive as conceivably applicable to it and assert its rejection. We need, therefore, a restatement of it. With Bradley reality is the one subject of all judgment immediate or mediate. The act of judgment " which refers an

ideal content (recognized as such) to a reality beyond the act ” is the unit for logic. Grammatical subject and predicate necessarily both fall under the rubric of the adjectival, that is, within the logical idea or ideal content asserted. This is a meaning or universal, which can have no detached or abstract self-subsistence. As found in judgment it may exhibit differences within itself, but it is not two, but one, an articulation of unity, not a fusion, which could only be a confusion, of differ- ences. With ‘a brilliant subtlety Bradley analyses the various types of judgment in his own way, with results that must be taken into account by all subsequent logicians of this type. The view of inference with which he complements it is only less satisfactory because of a failure to distinguish the principle of nexus in syllo- gism from its traditional formulation and rules, and because he is hampered by the intractability which he finds in certain forms of relational construction.

Bosanquet had the advantage that his logic was a work of a slightly later date. He is, perhaps, more able than Bradley has shown himself, to use material from alien sources and to penetrate to what is of value in the thought of writers from whom, whether on the whole or on particular issues, he disagrees. He treats the book-tradition, however, a debt to which, nowadays inevitable, he is generous in acknowledging, 3 with a judicious exercise of freedom in adaptation, i.e. constructively as datum, never eclectically. In his fundamental theory of judgment his obliga- tion is to Bradley. It is to Lotze, however, that he owes most in the characteristic feature of his logic, viz., the systematic development of the types of judgment, and inference from less adequate to more adequate forms. His fundamental continuity with Bradley may be illustrated by his definition of inference. ” Inference is the indirect reference to reality of differences within a universal, by means of the exhibition of this universal in differences directly referred to reality.” 4 Bosanquet’s Logic will long retain its place as an authoritative exposition of logic of this type.

Of epistemological logic in one sense of the phrase Lotze is still to be regarded as a typical exponent. Of another type Chr. Sigwart (q.v.) may be named as representative Sigwart’s aim was ” to reconstruct logic from the point of view of method- ology.” His problem was the claim to arrive at propositions universally valid, and so true of the object, whosoever the individual thinker. His solution, within the Kantian circle of ideas, was that such principles as the Kantian principle of causality were justified as ” postulates of the endeavour after complete knowledge.” “What Kant has shown is not that irregular fleeting changes can never be the object of consciousness, but only that the ideal consciousness of complete science would

1 The Principles of Logic (1883).

2 Logic, or The Morphology of Thought (2 vols., 1

3 Logic, Pref . pp. 6 seq. 4 Id. vol. ii. p. 4

be impossible without the knowledge of the necessity of all events. 1 ” The universal presuppositions which form the out- line of our ideal of knowledge are not so much laws which the understanding prescribes to nature ... as laws which the understanding lays down for its own regulation in its investiga- tion and consideration of nature. They are a priori because no experience is sufficient to reveal or confirm them in unconditional universality; but they are a priori . . . only in the sense of presuppositions without which we should work with no hope of success and merely at random and which therefore we must believe.” Finally they are akin to our ethical principles. With this coheres his dictum, with its far-reaching consequences for the philosophy of induction, that ” the logical justification cf the inductive process rests upon the fact that it is an inevitable postulate of our effort after knowledge, that the

given is necessary, and can be known as proceeding from its grounds according to universal laws." 2 It is characteristic of Sigwart's point of view that he acknowledges obligation to Mill as well as to Ueberweg. The transmutation of Mill's induction of inductions into a postulate is an advance of which the psychological school of logicians have not been slow to make use. The comparison of Sigwart with Lotze is instructive, in regard both to their agree- ment and their divergence as showing the .'ange of the epistemo- logical formula.

Of the formal-symbolic logic all that falls to be said here is, that from the point of view of logic as a whole, it is to be regarded as a legitimate praxis as long as it shows itself aware of the sense in which alone form is susceptible of abstraction, and is aware that in itself it offers no solution of the logical problem. "It is not an algebra," said Kant 3 of his technical logic, and the kind of support lent recently to symbolic logic by the Gegenslands- theorie identified with the name of Alexius Meinong (b. 1853) 4 is qualified by the warning that the real activity of thought tends to fall outside the calculus of relations and to attach rather to the subsidiary function of denoting. The future of symbolic logic as coherent with the rest of logic, in the sense which the word has borne throughout its history seems to be bound up with the question of the nature of the analysis that lies behind the symbol- ism, and of the way in which this is justified in the setting of a doctrine of validity. The " theory of the object," itself, while affecting logic alike in the formal and in the psychological con- ception of it very deeply, does not claim to be regarded as logic or a logic, apart from a setting supplied from elsewhere.

Finally we have a logic of a type fundamentally psychological, if it be not more properly characterized as a psychology which claims to cover the whole field of philosophy, including the logical field. The central and organizing principle of this is that know- ledge is in genesis, that the genesis takes place in the medium of individual minds, and that this fact implies that there is a neces- sary reference throughout to interests or purposes of the subject which thinks because it wills and acts. Historically this doctrine was formulated as the declaration of independence of the insur- gents in revolt- against the pretensions of absolutist logic. It drew for support upon the psychological movement that begins with Fries and Herbart. It has been chiefly indebted to writers, who were not, or were not primarily, logicians, to Avenarius, for example, for the law of the economy of thought, to Wundt, whose system, and therewith his logic, 5 is a pendant to his psychology, for the volitional character of judgment, to Herbert Spencer and others. A judgment is practical, and not to be divorced without improper abstraction from the purpose and will that informs it. A concept is instrumental to an end beyond itself, without any validity other than its value for action. A situation involving a need of adaptation to environment arises and the problem it sets must be solved that the will may control environment and be justified by success. Truth is the improvised machinery that is interjected, so far as this works. It is clear that we are in the

1 Logik (1873, 1889), Eng. trans, ii. 17.

1 Op. cit. ii. 289.

- Introd. to Logic, trans. Abbott, p. 10.

4 Ueber Annahmen (1902, &c.).

5 Logik (1880, and in later editions).

presence of what is at least an important half-truth, which intellectuallism with its statics of' the rational order viewed as a completely articulate system has tended to ignore. It throws light on many phases of the search for truth , upon the plain man's claim to start with a subject which he knows whose predicate which he does not know is still to be developed, or again upon his use of the negative form of judgment, when the further determination of his purposive system is served by a positive judgment

from without, the positive content of which is yet to be dropped as irrelevant to the matter in hand. The movement has, however, scarcely developed its logic 6 except as polemic. What seems clear is that it cannot be the whole solution. While man must confront nature from the human and largely the practical standpoint, yet his control is achieved only by the increasing recognition of objective controls. He conquers by obedience. So truth works and is economical because it is truth. Working is proportioned to inner coherence. It is well that the view should be developed into all its consequences. The result will be to limit it, though perhaps also to justify it, save in its claim to reign alone.

There is, perhaps, an increasing tendency to recognize that the organism of knowledge is a thing which from any single view- point must be seen in perspective. It is of course a postulate that all truths harmonize, but to give the harmonious whole in a projection in one plane is an undertaking whose adequacy in one sense involves an inadequacy in another. Nc human archi- tect can hope to take up in succession all essential points of view in regard to the form of knowledge or to logic. " The great campanile is still to finish."

Bibliography. — Historical: No complete history of logic in the sense in which it is to be distinguished from theoretical philosophy in geneial has as yet been written. The history of logic is indeed so little intelligible apart from constant reference to tendencies in philosophical development as a whole, that the historian, when he has made the requisite preparatory studies, inclines to essay the more ambitious task. Yet there are, of course, works devoted to the history of logic proper.

Of these Prantl's Geschichte der Logik im Abendlande (4 vols., 1 855-1 870), which traces the rise, development and fortunes of the Aristotelian logic to the close of the middle ages, is monumental. Next in importance are the works of L. Rabus, Logik und Metaphysik, i. (1868) (pp. 123-242 historical, pp. 453-518 bibliographical, pp. §14 sqq. a section on apparatus for the study of the history of logic), Die neuesten Bestrebungen auf dem Gebiete der Logik bei den Deutschen (1880), Logik (1895), especially for later writers § 17. Ueberweg's System der Logik und Geschichte der logischen Lehren (4th ed. and last revised by the author, 1874, though it has been reissued later, Eng. trans., 1 871) is alone to be named with these. Harms' posthu- mously published Geschichte der Logik (1881) (Die Philosophic in ihrer Geschichte, ii.) was completed by the author only so far as Leibnitz. Blakey's Historical Sketch of Logic, (1851), though, like all this writer's works, closing with a bibliography of some pretensions, is now negligible. Franck, Esquisse d'une histoire de la logique (1838) is the chief French contribution to the subject as a whole.

Of contributions towards the history of special periods or schools of logical thought the list, from the opening chapters of Ramus's Scholae Dialecticae (1569) downwards (v. Rabus loc. cit.) would be endless. What is of value in the earlier works has now been ab- sorbed. The System der Logik (1828) of Bachmann (a Kantian logician of distinction) contains a historical survey (pp. 569-644), as does the Denklehre (1822) of van Calker (allied in thought to Fries) pp. 12 sqq.; Eberstcin's Geschichte der Logik und Metaphysik bei den Deutschen von Leibniz bis auf gegenwdrtige Zeit (latest edition, 1799) is still of importance in regard to logicians of the school of Wolff and the origines of Kant's logical thought. Hoffmann, the editor and disciple of von Baader, published Grundziige einer Ge- schichte der Begrijfe der Logik in Deutschland von Kant bis Baader (1851). Wallace's prolegomena and notes to his Logic of Hegel (1874, revised and augmented 1 892-1 894) are of use for the history and terminology, as well as the theory. Riehl's article entitled Logik in Die Kultur der Gegenwart, vi. 1. Syslematische Philosophie (1907), is excellent, and touches on quite modern developments. Liard, Les Logiciens Anglais Contemporains (5th ed., 1907), deals only with the 19th-century inductive and formal-symbolic logicians down to Jcvons, to whom the book was originally dedicated. Venn's Symbolic Logic (1881) gave a careful history and bibliography of that development. The history of the more recent changes is as yet to be found only in the form of unshaped material in the pages of review and Jahresbericht. (H. W. B.*)

6 Yet see Studies in Logic, by John Dewey and others (1903).

LOGOCYCLIC CURVE, STROPHOID or FOLIATE, a cubic curve generated by increasing or diminishing the radius vector of a variable point Q on a straight line AB by the distance QC of the point from the foot of the perpendicular drawn from the origin to the fixed line. The polar equation is rcos0 = a(i =*= sin0), the upper sign referring to the case when the vector is increased, the lower when it is diminished. Both branches are in- cluded in the Cartesian equation (x 2 y 2) (2a — x) = a 2 x, where a is the distance of the line from the origin. If we take for axes the fixed line and the perpendicular through the initial point, the equation takes the form y V(o —) = V(a*)- The curve resembles the folium of Descartes, and has a node between x = o, * = a, andtwo branches asymptotic to the line x = 2a.

LOGOGRAPHI (\670s, ypk, writers of prose histories or tales), the name given by modern scholars to the Greek historio- graphers before Herodotus. 1 Thucydides, however, applies the term to all his own predecessors, and it is therefore usual to make a distinction between the older and the younger logo- graphers. Their representatives, with one exception, came from Ionia and its islands, which from their position were most favour- ably situated for the acquisition of knowledge concerning the distant countries of East and West. They wrote in the Ionic dialect, in what was called the unperiodic style, and preserved the poetic character of their epic model. Their criticism amounts to nothing more than a crude attempt to rationalize the current legends and traditions connected with the founding of cities, the genealogies of ruling families, and the manners and customs of individual peoples. Of scientific criticism there is no trace whatever. The first of these historians was probably Cadmus of Miletus (who lived, if at all, in the early part of the 6th century) , the earliest writer of prose, author of a work on the founding of his native city and the colonization of Ionia (so Suiidas) ; Pherecydes of Leros, who died about 400, is generally considered the last. Mention may also be made of the following: Hecataeus of Miletus (550-476); Acusilaus of Argos, 2 who paraphrased in prose (correcting the tradition where it seemed necessary) the genealogical works of Hesiod in the Ionic dialect; he con- fined his attention to the prehistoric period, and made no attempt at a real history; Charon of Lampsacus (c. 450), author of histories of Persia, Libya, and Ethiopia, of annals (Sipoi) of his native town with lists of the prytaneis and archons, and of the chronicles of Lacedaemonian kings; Xanthus of Sardis in Lydia (c. 450), author of a history of Lydia, one of the chief authorities used byNicolausof Damascus (/.during the time of Augustus); Hellanicus of Mytilene; Stesimbrotus of Thasos, opponent of Pericles and reputed author of a political pamphlet on Themistocles, Thucydides and Pericles; Hippys and Glaucus, both of Rhegium, the first the author of histories of Italy and Sicily, the second of a treatise on ancient poets and musicians, used by Harpocration and Plutarch; Damastes of Sigeum, pupil of Hellanicus, author of genealogies of the combatants before Troy (an ethnographic and statistical list), of short treatises on poets, sophists, and geographical subjects.

On the early Greek historians, see G. Busolt, Griechische Geschichte (1893), i. 147-153; C. Wachsmuth, Einleitung in das Studium der alien Geschichte (1895); A. Schiifer, Abriss der Quellenkunde der griechischen und romischen Geschichte (ed. H. Nissen, 1889); J. B. Bury, Ancient Greek Historians (1909), lecture i.; histories of Greek literature by Miiller- Donaldson (ch. 18) and W. Mure (bk. iv. ch. 3), where the little that is known concerning the life and writings of the logographers is exhaustively discussed. The fragments will be found, with Latin notes, translation, prolegomena, and copious indexes, in C. W. Midler's Fragmenta hisloricorum Graecorum (1841-1870). See also Greece: History, Ancient (section, " Authorities ").

1 The word is also used of the writers of speeches for the use of the contending parties in the law courts, who were forbidden to employ advocates.

- There is some doubt as to whether this Acusilaus was of Belo- ponnesian or Boeotian Argos. Possibly there were two of the name. For an example of the method of Acusilaus see Bury, op. cit. p. 19.

LOGOS (Koyos), a common term in ancient philosophy and theology. It expresses the idea of an immanent reason in the world, and, under various modifications, is met with in Indian, Egyptian and Persian systems of thought. But the idea was developed mainly in Hellenic and Hebrew philosophy, and we may distinguish the following stages:

1. The Hellenic Logos. — To the Greek mind, which saw in the world a nbo-pos (ordered whole), it was natural to regard the world as the product of reason, and reason as the ruling principle in the world. So we find a Logos doctrine more or less prominent from the dawn of Hellenic thought to its eclipse. It rises in the realm of physical speculation, passes over into the territory of ethics and theology, and makes its way through at least three well-defined stages. These are marked off by the names of Heraclitus of Ephesus, the Stoics and Philo.

It acquires its first importance in the theories of Heraclitus (6th century B.C.), who, trying to account for the aesthetic order of the visible universe, broke away to some extent from the purely physical conceptions of his predecessors and discerned at work in the cosmic process a X670S analogous to the reasoning power in man. On the one hand the Logos is identified with yvcofiri and connected with bUr\, which latter seems to have the function of correcting deviations from the eternal law that rules in things. On the other hand it is not positively distinguished either from the ethereal fire, or from the tlpappivri and the ava/yKTj according to which all things occur. Heraclitus holds that nothing material can be thought of without this Logos, but he does not conceive the Logos itself to be immaterial. Whether it is regarded as in any sense possessed of intelligence and consciousness is a question variously answered. But there is most to say for the negative. This Logos is not one above the world or prior to it, but in the world and inseparable from it. Man's soul is a part of it. It is relation, therefore, as Schleiermacher expresses it, or reason, not speech or word. And it is objective, not sub- jective, reason. Like a law of nature, objective in the world, it gives order and regularity to the movement of things, and makes the system rational. 3

The failure of Heraclitus to free himself entirely from the physical hypotheses of earlier times prevented his speculation from influencing his successors. With Anaxagoras a conception entered which gradually triumphed over that of Heraclitus, namely, the conception of a supreme, intellectual principle, not identified with the world but independent of it. This, however, was vovs, not Logos. In the Platonic and Aristotelian systems, too, the theory of ideas involved an absolute separation between the material world and the world of higher reality, and though the term Logos is found the conception is vague and undeveloped. With Plato the term selected for the expression of the principle to which the order visible in the universe is due is vovs or co(j>ia, not X670S. It is in the pseudo-Platonic Ep inomis that X67 os appears as a synonym forvoOs. In Aristotle, again, the principle which sets all nature under the rule of thought, and directs it towards a rational end, is poOs, or the divine spirit itself; while X670S is a term with many senses, used as more or less identical with a number of phrases, ov tveica, evepytia, eˆT«Xex«a, ovala, tlSos, p.opy, &c.

In the reaction from Platonic dualism, however, the Logos doctrine reappears in great breadth. It is a capital element in the system of the Stoics. With their teleological views of the world they naturally predicated an active principle pervading it and determining it. This operative principle is called both Logos and God. It is conceived of as material, and ig described in terms used equally of nature and of God. There is at the same time the special doctrine of the X670S aireppaTiKos, the seminal Logos, or the law of generation in the world, the principle of the active reason working in dead matter. This parts into X6701 oirtpp.aTi.KoL, which are akin, not to the Platonic ideas, but rather to the Xayot tvvKoi of Aristotle. In man, too, there is a Logos which is his characteristic possession, and which is kvhb.8tTos, as long as it is a thought resident within his breast,

3 Cf. Schleiermacher's Herakleitos der Dunkle; art. Heraclitus and authorities there quoted.

but ■KpopiK6s when it is expressed as a word. This distinction between Logos as ratio and Logos as oratio, so much used sub- sequently by Philo and the Christian fathers, had been so far anticipated by Aristotle's distinction between the e£a> X670S and the ~Kbyos h> rfj ˆv%V- It forms the point of attachment by which the Logos doctrine connected itself with Christianity. The Logos of the Stoics (q.v.) is a reason in the world gifted with intelligence, and analogous to the reason in man.

2. The Hebrew Logos. — In the later Judaism the earlier anthropomorphic conception of God and with it the sense of the divine nearness had been succeeded by a belief which placed God at a remote distance, severed from man and the world by a deep chasm. The old familiar name Yahweh became a secret; its place was taken by such general expressions as the Holy, the Almighty, the Majesty on High, the King of Kings, and also by the simple word "Heaven." Instead of the once powerful confidence in the immediate presence of God there grew up a mass of speculation regarding on the one hand the distant future, on the other the distant past. Various attempts were made to bridge the gulf between God and man, including the angels, and a number of other hybrid forms of which it is hard to say whether they are personal beings or abstractions. The Wisdom, the Shekinah or Glory, and the Spirit of God are intermediate beings of this kind, and even the Law came to be regarded as an independent spiritual entity. Among these conceptions that of the Word of God had an important place, especially the creative Word of Genesis i. Here as in the other cases we cannot always say whether the Word is regarded as a mere attribute or activity of God, or an independent being, though there is a clear tendency towards the latter. The ambiguity lies in the twofold purpose of these activities: (1) to establish communication with God; (2) to prevent direct connexion between God and the world. The word of the God of revelation is represented as the creative principle (e.g. Gen. i. 3; Psalm xxxiii. 6), as the executor of the divine judgments (Hosea vi. 5), as healing (Psalm cvii. 20), as possessed of almost personal qualities (Isaiah lv. n; Psalm cxlvii. 15). Along with this comes the doctrine of the angel of Yahweh, the angel of the covenant, the angel of the presence, in whom God manifests Himself, and who is sometimes identified with Yahweh or Elohim (Gen. xvi. 11, 13; xxxii. 29-31; Exod. iii. 2; xiii. 21), sometimes distinguished from Him (Gen. xxii. 15, &c; xxiv. 7; xxviii. 12, &c), and sometimes presented in both aspects (Judges ii., vi.; Zech. i.). To this must be added the doctrine of Wisdom, given in the books of Job and Proverbs. At one time it is exhibited as an attribute of God (Prov. iii. 19). At another it is strongly personified, so as to become rather the creative thought of God than a quality (Prov. viii. 22). Again it is described as proceeding from God as the principle of creation and objective to Him. In these and kindred passages (Job xv. 7, &c.) it is on the way to become hypostatized.

The Hebrew conception is partially associated with the Greek in the case of Aristobulus, the predecessor of Philo, and, according to the fathers, the founder of the Alexandrian school. He speaks of Wisdom in a way reminding us of the book of Proverbs. The pseudo-Solomonic Book of Wisdom (generally supposed to be the work of an Alexandrian nourishing somewhere between Aristobulus and Philo) deals both with the Wisdom and with the Logos. It fails to hypostatize either. But it represents the former as the framer of the world, as the power pr spirit of God, active alike in the physical, the intellectual, and the ethical domain, and apparently objective to God. In the Targums, on the other hand, the three doctrines of the word, the angel, and the wisdom of God converge in a very definite conception. In the Jewish theology God is re- presented as purely transcendent, having no likeness of nature with man, and making no personal entrance into history Instead of the immediate relation of God to the world the Targums introduce the ideas of the Memra, (word) and the Shechina (real presence). This Memra (= Ma'amar) or, as it is also designated, Dibbura, is a

hypostasis that takes the place of God when direct intercourse with man is in view. In all those passages of the Old Testament where anthropomorphic terms are used of God, the Memra is substituted for God. The Memra proceeds from God, and retains the creaturely relation to God. It does not seem to have been identified with the

Messiah. 1

‘ Cf. the Targum of Onkelos on the Pentateuch under Tien. vii. 16, xvii. 2, xxi 20; Exod. xix. 16, &c; the Jerusalem Targum on

3. Philo. — In the Alexandrian philosophy, as represented by the Hellenized Jew Philo, the Logos doctrine assumes a leading place and shapes a new career for itself. Philo’s doctrine is moulded by three forces — Platonism, Stoicism and Hebraism. He detaches the Logos idea from its connexion with Stoic materialism and attaches it to a thorough-going Platonism. It is Plato’s idea of the Good regarded as creatively active. Hence, instead of being merely immanent in the Cosmos, it has an independent existence. Platonic too is the doctrine of the divine architect who seeks to realize in the visible universe the archetypes already formed in his mind. Philo was thus able to make the Logos theory a bridge between Judaism and Greek philosophy. It preserved the monotheistic idea yet afforded a description of the Divine activity in terms of Hellenic thought; the Word of the Old Testament is one with the X670S of the Stoics. And thus in Philo’s conception the Logos is much more than ” the principle of reason, informing the infinite variety of things, and so creating the World-Order “; it is also the divine dynamic, the energy and self-revelation of God. The Stoics indeed sought, more or less consciously, by their doctrine of the Logos as the Infinite Reason to escape from the belief in a divine Creator, but Philo, Jew to the core, starts from the Jewish belief in a supreme, self-existing God, to whom the reason of the world must be subordinated though related. The conflict of the two conceptions (the Greek and the Hebrew) led him into some difficulty; sometimes he represents the Logos as an independent and even personal being, a ” second God,” sometimes as merely an aspect of the divine activity. And though passages of the first class must no doubt be explained figuratively — for Philo would not assert the existence of two Divine agents — it remains true that the two conceptions cannot be fused. The Alexandrian philosopher wavers between the two theories and has to accord to the Logos of Hellas a semi- independent position beside the supreme God of Judaea. He speaks of the Logos (1) as the agency by which God reveals Himself, in some measure to all men, in greater degree to chosen souls. The appearances recorded in the Old Testament are manifestations of the Logos, and the knowledge of God possessed by the great leaders and teachers of Israel is due to the same source; (2) as the agency whereby man, enmeshed by illusion, lays hold of the higher spiritual life and rising above his partial point of view participates in the universal reason. The Logos is thus the means of redemption; those who realize its activity being emancipated from the tyranny of circumstance into the freedom of the eternal.

4. The Fourth Gospel. — Among the influences that shaped the Fourth Gospel that of the Alexandrian philosophy must be assigned a distinct, though not an exaggerated importance. There are other books in the New Testament that bear the same impress, the epistles to the Ephesians and the Colossians, and to a much greater degree the epistle to the Hebrews. The develop- ment that had thus begun in the time of Paul reaphes maturity in the Fourth Gospel, whose dependence on Philo appears (1) in the use of the allegorical method, (2) in many coincident passages, (3) in the dominant conception of the Logos. The writer narrates the life of Christ from the point of view furnished him by Philo’s theory. True, the Logos doctrine is only men- tioned in the prologue to the Gospel, but it is presupposed throughout the whole book. The author’s task indeed was somewhat akin to that of Philo, ” to transplant into the world of Hellenic culture a revelation originally given through Judaism.” This is not to say that he holds the Logos doctrine in exactly the same form as Philo. On the contrary, the fact that he starts from an actual knowledge of the earthly life of Jesus,

Numb. vii. 89, &c. For further information regarding the Hebrew Logos see, beside Dr

Kaufmann Kohler, s.v. ” Memra,” Jewish Encyc. viii. 464-465, Bousset, Die Religion des Judenthums (1903), p. 341, and Weber, Jiidische Theologie (1897), pp. 180-184. The hypost'atizing of the Divine Word in the doctrine of the Memra was probably later than the time of Philo, but it was the outcome of a mode of thinking already common in Jewish theology. The same tendency is of course expressed in the ” Logos ” of the Fourth Gospel.

while Philo, even when ascribing a real personality to the Logos, keeps within the bounds of abstract speculation, leads him seriously to modify the Philonic doctrine. Though the Alex- andrian idea largely determines the evangelist's treatment of the history, the history similarly reacts on the idea. The pro- logue is an organic portion of the Gospel and not a preface written to conciliate a philosophic public. It assumes that the Logos idea is familiar in Christian theology, and vividly sum- marizes the main features of the Philonic conception — the eternal existence of the Logos, its relation to God (7rpds rov 6e6v, yet distinct), its creative, illuminative and redemptive activity. But the adaptation of the idea to John's account of a historical person involved at least three profound modifications: — (1) the Logos, instead of the abstraction or semi-personification of Philo, becomes fully personified. The Word that became flesh subsisted from all eternity as a distinct personality within the divine nature. (2) Much greater stress is laid upon the redemptive than upon the creative function. The latter indeed is glanced at (” All things were made by him “), merely to pro- vide a link with earlier speculation, but w r hat the writer is concerned about is not the mode in which the world came into being but the spiritual life which resides in the Logos and is communicated by him to men. (3) The idea of Xoyos as Reason becomes subordinated to the idea of Xiryosas Word, the expression of God's will and power, the outgoing of the divine energy, life, love and light. Thus in its fundamental thought the prologue of the Fourth Gospel comes nearer to the Old Testament (and especially to Gen. i.) than to Philo. As speech goes out from a man and reveals his character and thought, so Christ is ” sent out from the Father,” and as the divine Word is also, in accord- ance with the Hebrew idea, the medium of God's quickening power.

What John thus does is to take the Logos idea of Philo and use it for a practical purpose — to make more intelligible to himself and his readers the divine nature of Jesus Christ. That this endeavour to work into the historical tradition of the life and teaching of Jesus — a hypothesis which had a distinctly foreign origin — led him into serious difficulties is a consideration that must be discussed elsewhere.

5. The Early Church. — In many of the early Christian writers, as well as in the heterodox schools, the Logos doctrine is influenced by the Greek idea. The Syrian Gnostic Basilides held (according to Irenaeus i. 24) that the Logos or Word emanated from the coCs, or personified reason, as this latter emanated from the unbegotten Father. The completest type of Gnosticism, the Valentinian, re- garded Wisdom as the last of the series of aeons that emanated from the original Being or Father, and the Logos as an emanation from the first two principles that issued from God, Reason (roOs) and Truth. Justin Martyr, the first of the sub-apostolic fathers, taught that God produced of His own nature a rational power(6wawii' too \oywhp) , His agent in creation, who now became man in Jesus (Dial. c. Tryph. chap. 48, 60). He affirmed also the action of the X&yos airtpnarinds, (Apol. i. 46; ii. 13, &c). With Tatian (Cohort, ad. Gr. chap. 5, &c.) the Logos is the beginning of the world, the reason that comes into being as the sharer of God's rational power. With Athcnagoras (Suppl. chap. 9, 10) He is the prototype of the world and the energizing principle (Ibka koI kvkpyeia) of things. Theophilus (Ad Autolyc. ii. 10, 24) taught that the Logos was in eternity with God as the \6yos ivbiatitTos, the counsellor of God, and that when the world was to be created God sent forth this counsellor (aiiy.f3ov\os) from Himself as the X6fos xpoiˆiopiKos, yet so that the begotten Logos did not cease to be a part of Himself. With Hippolytus (Refut. x. 32, &c.) the Logos, produced of God's own substance, is both the divine

intelligence that appears in the world as the Son of God, and the idea of the universe immanent in God. The early Sabellians (comp. Eusebius, Hist. Reel. vi. 33; Athanasius, Contra Arian. iv.) held that the Logos was a faculty of God, the divine reason, immanent in God eternally, but not in distinct personality prior to the historical manifestation in Christ. Origen, referring the act of creation to eternity instead of to time, affirmed the eternal personal existence of the Logos. In relation to God this Logos or Son was a copy of the original, and as such inferior to that. In relation to the world he was its prototype, the lUa l&t&v and its redeeming power (Contra Cels. v. 608; Frag, de princip. i. 4; De princip. 1. 109, 324).

In the later developments of Hellenic speculation nothing essential was added to the doctrine of the Logos. Philo' s distinction between God and His rational power or Logos in contact with the world was generally maintained by the eclectic Platonists and Neo-Platonists. By some of these this distinction was carried out to the extent of

predicating (as was done by Numenius of Apamea) three Gods:— the supreme God; the second God, or Demiurge or Logos; and the third God, or the world. Plotinus explained the Aofoi as constructive forces, proceeding from the ideas and giving form to the dead matter of sensible things (Enneads, v. I. 8 and Richter's Neu-Plat. Studien) .

See the histories of philosophy and theology, and works quoted under Herachtus, Stoics, Philo, John, The Gospel of, &c, and for a general summary of the growth of the Logos doctrine, E. Caird, Evolution of Theology in the Greek Philosophers (1904), vol. ii. ; A. Harnack, History of Dogma; E. F. Scott, The Fourth Gospel, ch. v. (1906); J. M. Heinze, Die Lehre vom Logos in der griech, Philosophie (1872); J. Reville, La Doctrine du Logos (1881); Aal, Gesch. d. Logos-Idee (1899); and the Histories of Dogma, by A. Harnack, F. Loofs, R. Seeberg. (S. D. F. S.; A. J. G.)

LOGOTHETE (Med. Lat. logotheta, Gr. Xotoˆttjs, from X670S, word, account, calculation, and riid'tvai, to set, i.e. " one who accounts, calculates or ratiocinates "), originally the title of a variety of administrative officials in the Byzantine Empire, e.g. the \oyoderris rod 5p6/iov, who was practically the equivalent of the modern postmaster-general; and the \oyo9hrris rod arparujiTiKov, the logothete of the military chest. Gibbon de- fines the great Logothete as " the supreme guardian of the laws and revenues," who " is compared with the chancellor of the Latin monarchies." From the Eastern Empire the title was borrowed by the West, though it only became firmly established in Sicily, where the logotheta occupied the position of chancellor elsewhere, his office being equal if not superior to that of the magnus cancellarius. Thus the title was borne by Pietro della Vigna, the all-powerful minister of the emperor Frederick II., king of Sicily.

See Du Cange, Glossarium, s.v. Logotheta.

LOGROffO, an inland province of northern Spain, the smallest of the eight provinces formed in 1833 out of Old Castile; bounded N. by Burgos, Alava and Navarre, W. by Burgos, S. by Soria and E. by Navarre and Saragossa. Pop. (1900) 189,376; area, 1946 sq. m. Logrono belongs entirely to the basin of the river Ebro, which forms its northern boundary except for a short distance near San Vicente; it is drained chiefly by the rivers Tiron, Oja, Najerilla, Iregua, Leza, Cidacos and' Alhama, all flowing in a north-easterly direction. The portion skirting the Ebro forms a spacious and for the most part fertile undulating plain, called La Rioja, but in the south Logrono is considerably broken up by offshoots from the sierras which separate that river from the Douro. In the west the Cerro de San Lorenzo, the culminating point of the Sierra de la Demanda, rises 7562 ft., and in the south the Pico de Urbion reaches 7388 ft. The pro- ducts of the province are chiefly cereals, good oil and wine (especially in the Rioja), fruit, silk, flax and honey. Wine is the principal export, although after 1892 this industry suffered greatly from tW protective duties imposed by France. Great efforts have been made to keep a hold upon French and English markets with light red and white Rioja wines. No less than 128,000 acres are covered with vines, and 21,000 with olive groves. Iron and argentiferous lead are mined in small quantities and other ores have been discovered.

The manufacturing industries are insignificant. A railway along the right bank of the Ebro connects the province with Saragossa, and from Miranda there is railway communication with Madrid, Bilbao and France; but there is no railway in the southern districts* where trade is much retarded by the lack even of good roads. The town of Logrono (pop. 1900, 19,237) and the city of Cala- horra (947s) are separately described. The only other towns with upwards of 5000 inhabitants are Haro (7914), Alfaro (5938) and Cervera del Rio Alhama (5930).

LOGROfJO, the capital of the Spanish province of Logrono, on the right bank of the river Ebro and on the Saragossa- Miranda de Ebro railway. Pop. (1900) 19,237. Logrono is an ancient walled town, finely situated on a hill 1204 ft. high. Its bridge of twelve arches across the Ebro was built in 1138, but has frequently been restored after partial destruction by floods. The main street, arcaded on both sides, and the crooked but highly picturesque alleys of the older quarters are in striking contrast with the broad, tree-shaded avenues and squares laid out in modern times. The chief buildings are a bull-ring which

accommodates n,ooo spectators, and a church, Santa Maria de Palacio, called " the imperial," from the tradition that its founder was Constantine the Great (274-337). As the commercial centre of the fertile and well-cultivated plain of the Rioja, Logrofio has an important trade in wine.

The district of Logrofio was in ancient times inhabited by the Berones or Verones of Strabo and Pliny, and their Varia is to be identified with the modern suburb of the city of Logrofio now known as Varea of Barea. Logrofio was named by the Romans Juliobriga and afterwards Lucronius. It fell into the hands of the Moors in the 8th century, but was speedily retaken by the Christians, and under the name of Lucronius appears with frequency in medieval history. It was unsuccessfully besieged by the French in 1521, and occupied by them from 1808 to 1813. It was the birthplace of the dumb painter Juan Fernandez Navarrete (1526-1579).

LOGROSCINO (or Lo Groscino), NICOLA (i7oo?i763 ?), Italian musical composer, was born at Naples and was a pupil of Durante. In 1738 he collaborated with Leo and others in the hasty production of Demelrio; in the autumn of the same year he produced a comic opera L'inganno per inganno, the first of a long series of comic operas, the success of which won him the name of " il Dio dell' opera buffa." He went to Palermo, prob ably in 1747, as a teacher of counterpoint; as an opera composer he is last heard of in 1760, and is supposed to have died about 1763. Logroscino has been credited with the invention of the concerted operatic finale, but as far as can be seen from the score of 77 Governatore and the few remaining fragments of other operas, his finales show no advance upon those of Leo. As a musical humorist, however, he deserves remembrance, and may justly be classed alongside of Rossini.

LOGWOOD (so called from the form in which it is imported), the heart-wood of a leguminous tree, Haematoxylon campechi- anum, native of Central America, and grown also in the West Indian Islands. The tree attains a height not exceeding 40 ft., and is said to be ready for felling when about ten years old. The wood, deprived of its bark and the sap-wood, is sent into the market in the form of large blocks and billets. It is very hard and dense, and externally has a dark brownish-red colour; but it is less deeply coloured within. The best qualities come from Campeachy, but it is obtained there only in small quantity.

Logwood is used in dyeing (

The colouring principle of logwood exists in the timber in the form of a glucoside, from which it is liberated as hacmatoxylin by fer- mentation. Haematoxylin, CieHuOe, was isolated by M. E. Chevreul in 1810. It forms a crystalline hydrate, C16H14O6-I-3H2O, which is a colourless body very sparingly soluble in cold water, but dissolving freely in hot water and in alcohol. By exposure to the air, especially in alkaline solutions, haematoxylin is rapidly oxidized into haematcin, Ci 8 Hj20e, with the development of a fine purple colour. This re- action of haematoxylin is exceedingly rapid and delicate, rendering that body a laboratory test for alkalis. By the action of hydrogen and sulphurous acid, haematcin is easily reduced to haematoxylin. It is chemicallv related to brazilin, found in brazil-wood. Hae- matoxylin and brazilin, and also their oxidation products, haematin and brazilin, have been elucidated by W. H. Perkin and his pupils (see Jour. Chem. Soc, 1908, 1909).

LOHARU, a native state of India, in the south-east corner of the Punjab, between Hissar district and Rajputana. Area, 222 sq. m.; pop. (1901) 15,229; estimated gross revenue, £4800. The chief, whose title is nawab, is a Mahommedan, of Afghan descent. The nawab Sir Amir-ud-din- Ahmad Khan, K.C.I.E., who is a member of the viceroy's legislative council, was until 1905 administrator and adviser of the state of Maler Kotla. The town of Loharu had a population in igoi of 2175.

LOHE, JOHANN KONRAD .WILHELM (1808-1872), German divine and philanthropist, was born on the 2ist of February

1808 in Fiirth near Nuremberg, and was educated at the uni- versities of Erlangen and Berlin. In 183 1 he was appointed vicar at Kirchenlamitz, where his fervent evangelical preaching attracted large congregations and puzzled the ecclesiastical authorities. A similar experience ensued at Nuremberg, where he was assistant pastor of St Egidia. In 1837 he became pastor in Neuendettelsau, a small and unattractive place, where his life's work was done, and which he transformed into a busy and influential community. He was interested in the spiritual condition of Germans who had emigrated to the United States, and built two training homes for missionaries to them. In 1849 he founded the Lutheran Society of Home Missions and in 1853 an institution of deaconesses. Other institutions were added to these, including a lunatic asylum, a Magdalen refuge, and hospitals for men and women. In theology Lohe was a strict Lutheran, but his piety was of a most attractive kind. Originality of conception,

vividness of presentation, fertility of imagination, wide knowledge of Scripture and a happy faculty of applying it, intense spiritual fervour, a striking physique and a powerful voice made him a great pulpit force. He wrote a good deal, amongst his books being Drci Biicher von der Kirche (1845), Samenkorner des Gebeles (over 30 editions) and several volumes of sermons. He died on the 2nd of January 1872.

See his Life, by J. Deinzer (3 vols., Gutersloh, 1873, 3rd ed.,

1901).

LOHENGRIN, the hero of the German version of the legend of the knight of the swan. The story of Lohengrin as we know it is based on two principal motives common enough in folklore: the metamorphosis of human beings into swans, and the curious wife whose question brings disaster. Lohengrin's guide (the swan) was originally the little brother who, in one version of " the Seven Swans," was compelled through the destruction of his golden chain to remain in swan form and attached himself to the fortunes of one of his brothers. The swan played a part in classical mythology as the bird of Apollo, and in Scandinavian lore the swan maidens, who have the gift of prophecy and are sometimes confused with the Valkyries, reappear again and again. The wife's desire to know her husband's origin is a parallel of the myth of Cupid and Psyche, and bore in medieval times a similar mystical interpretation. The Lohengrin legend is localized on the Lower Rhine, and its incidents take place at Antwerp, Nijmwegen, Cologne and Mainz. In its application it falls iftto sharp division in the hands of German and French poets. By the Germans it was turned to mystical use by being attached loosely to the Grail legend (see Grail and Perceval) ; in France it was adapted to glorify the family of Godfrey de Bouillon.

The German story makes its appearance in the last stanzas of Wolfram von Eschenbach's Parzival, where it is related how Parzival's son, Loherangrin, 1 was sent from the castle of the Grail to the help of the young duchess of Brabant. Guided by the swan he reached Antwerp, and married the lady on condition that she should not ask his origin. On the breach of this condition years afterwards Loherangrin departed, leaving sword, horn and ring behind him. Between 1283 and 1290, a Bavarian disciple of Wolfram's 2 adopted the story and developed it into an epic poem of nearly 8000 lines, incorporating episodes of Lohengrin's prowess in tournament, his wars with Henry I. against the heathen Hungarians and the Saracens, 3 and inci- dentally providing a detailed picture of the everyday life of people of high condition. The epic of Lohengrin is put by the anonymous writer into the mouth of Wolfram, who is made to relate it during the Contest of the Singers at the Wartburg in proof of his superiority in knowledge of sacred things over Klingsor the magician, and the poem is thus linked on to German

1 i.e. Garin le Loherin (q.v.), or Garin of Lorraine.

2 Elster (Beitrdge) says that the poem is the work of two poets : the first part by a Thuringian wandering minstrel, the second — which differs in style and dialect — by a Bavarian official.

3 Based on material borrowed from the Sachsische Weltchronik (formerly called Repgowische Chronik from its dubious assignment to Eime von Repgow), the oldest prose chronicle of the world in German (c. 1248 or 1260).

tradition. Its connexion with Parzival implies a mystic applica- tion. The consecrated wafer shared by Lohengrin and the swan on their voyage is one of the more obvious means taken by the poet to give the tale the character of an allegory of the relations between Christ, the Church and the human soul. The story was followed closely in its main outlines by Richard Wagner in his opera Lohengrin.

The French legend of the knight of the swan is attached to the house of Bouillon, and although William of Tyre refers to it about 1 1 70 as fable, it was incorporated without question by later annalists. It forms part of the cycle of the chansons de geste dealing with the Crusade, and relates how Helyas, knight of the swan, is guided by the swan to the help of the duchess of Bouillon and marries her daughter Ida or Beatrix in circumstances exactly parallel to the adventures of Lohengrin and Elsa of Brabant, and with the like result. Their daughter marries Eustache, count of Boulogne, and had three sons, the eldest of whom, Godefroid (Godfrey), is the future king of Jerusalem. But in French story Helyas is not the son of Parzival, but of the king and queen of Lillefort, and the story of his birth, of himself, his five brothers and one sister is, with variations, that of " the seven swans " persecuted by the wicked grand- mother, which figures in the pages of Grimm and Hans Andersen. The house of Bouillon was not alone in claiming the knight of the swan as an ancestor, and the tradition probably originally belonged to the house of Cleves.

German Versions. — See Lohengrin, ed. Riickert (Quedlinburg and Leipzig, 1858); another version of the tale, Lorengel, is edited in the Zeitschr. fur deutsches Altertum (vol. 15); modern German translation of Lohengrin, by H. A. Junghaus (Leipzig, 1878) ; Conrad von Wurzburg's fragmentary Schwanritter, ed. F. Roth (Frankfurt, 1861). Cf. Elster, Beitrdge zur Kritik des Lohengrin (Halle, 1884), and R. Heinrichs, Die Lohengrindichtung und ihre Deutung (Hamra i. West., 1905).

French Versions. — Baron de Reiffenberg, Le Chevalier au cygne et Godfrey de Bouillon (Brussels, 2 vols., 1846-1848), in Mon. pour servir d I'hist. de la province de Namur; C. Hippeau, La Chanson du chevalier au cygne (1874); H. A. Todd, La Naissance du chevalier au cygne, an inedited French poem of the 12th cent. (Mod. Lang. Assoc., Baltimore, 1889); cf. the Latin tale by Jean de Haute Seille (Johannes de Alta Silva) in his Dolopaihos (ed. Oesterley, Strassburg,

1873). .

English Versions. — In England the story first appears in a short poem preserved among the Cotton MSS. of the British Museum and entitled Chevelere assigne. This was edited by G. E. V. Utterson in 1820 for the Roxburghe Club, and again by H. H. Gibbs in 1868 for the Early English Text Society. TheE.E.T.S. edition is accom- panied by a set of photographs of a 14th-century ivory casket, on which the story is depicted in 36 compartments. An English prose romance, Helyas Knight of the Swan, translated by Robert Copland, and printed by W. Copland about 1550, is founded on a French romance La Genealogie . . . 4e Godeffroy de Boulin (printed 1504) and is reprinted by W. J. Thorns in Early Prose Romances, vol. iii. It was also printed by Wynkyn de Worde in 1512. A modern edition was issued in 1901 from the Grolier Club, New York.

LOIN (through O. Fr. loigne or logne, mod. longe, from Lat. Iambus), that part of the body in an animal which lies between t he upper part of the hip-bone and the last of the false ribs on either side of the back-bone, hence in the plural the general term for the lower part of the human body at the junction with the legs, covered by the loin-cloth, the almost universal garment among primitive peoples. There are also figurative uses of the word, chiefly biblical, due to the loins being the supposed seat of male vigour and power of generation. Apart from these uses the word is a butcher's term for a joint of meat cut from this part of the body. The upper part of a loin of beef is known as the " surloin " (Fr. surlonge, i.e. upper loin). This has been commonly corrupted into " sirloin," and a legend invented, to account for the name, of a king, James I. or Charles II., knighting a prime joint of beef " Sir Loin " in pleasure at its excellence. A double surloin, undivided at the back-bone, is known as a " baron of beef," probably from an expansion of the legend of the " Sir Loin."

LOIRE, the longest river of France, rising in the Gerbier de Jonc in the department of Ardeche, at a height of 4500 ft. and flowing north and west to the Atlantic. After a course of 18 m. in Ardeche it enters Haute-Loire, in which it follows

a picturesque channel along the foot of basaltic rocks, through narrow gorges and small plains. At Vorey, where it is joined by the Arzon, it becomes navigable for rafts. Four miles below its entrance into the department of Loire, at La Noirie, river navigation is officially reckoned to begin, and breaking through the gorges of Saint Victor, the Loire enters the wide and swampy plain of Forez, after which it again penetrates the hills and flows out into the plain of Roanne. As in Haute-Loire, it is joined by a large number of streams, the most important being the Coise on the right and the Lignon du Nord or du Forez and the Aix on the left. Below Roanne the Loire is accompanied on its left bank by a canal to Digoin (35 m.) in Saone-et-Loire, thence by the so-called " lateral canal of the Loire " to Briare in Loiret (122 m.). Owing to the exteme irregularity of the river in different seasons these canals form the only certain navigable way. At Digoin the Loire receives the Arroux, and gives off the canal du Centre (which utilizes the valley of the Bourbince) to Chalon-sur-Saone. At this point its northerly course begins to be interrupted by the mountains of Morvan, and flowing north-west it enters the department of Nievre. Just beyond Nevers it is joined by the Allier; this river rises 30 m. S.W. of the Loire in the department of Lozere, and following an almost parallel course has at the confluence a volume equal to two-thirds of that of the main stream. Above Nevers the Loire is joined by the Aron, along which the canal du Nivernais proceeds northward, and the Nievre, and below the confluence of the Allier gives off the canal du Berry to Bourges and the navigable part of the Cher. About this point the valley becomes more ample and at Briare (in Loiret) the river leaves the highlands and flows between the plateaus of Gatinais and the Beauce on the right and the Sologne on the left. In Loiret it gives off the canal de Briare northward to the Seine and itself bends north-west to Orleans, whence the canal d'Orleans, following the little river Cens, communicates with the Briare canal. At Orleans the river changes its north-westerly for a south-westerly course. A striking peculiarity of the affluents of the Loire in Loiret and the three subsequent departments is that they frequently flow in a parallel channel to the main stream and in the same valley. Passing Blois in Loir-et-Cher, the Loire enters Indre-et-Loire and receives on the right the Cisse, and, after passing Tours, the three important left-hand tributaries of the Cher, Indre and theVienne. At the confluence of the Vienne the Loire enters Maine-et-Loire, in its course through which department it is frequently divided by long sandy islands fringed with osiers and willows; while upon arriving at LesPonts-de-Ce it is split into several distinct branches. The principal tributaries are: left, the Thouet at Saumur, the Layon and the Evre; right: the Authion, and, most important tributary of all, the Maine, formed by the junction of the rivers Mayenne, Sarthe and Loir. Through Loire-Inferieure the river is studded with islands until below Nantes, where the largest of them, called Belle-Ile, is found. It receives the Erdre on the right at Nantes and on the opposite shore the Sevre- Nantaise, and farther on the canalized Achenau on the left and the navigable Etier de Mean on the right near Saint Nazaire. Below Nantes, between which point and La Martiniere (below Pellerin) the channel is embanked, the river is known as the Loire Maritime and widens out between marshy shores, passing Paimbceuf on the left and finally Saint-Nazaire, where it is 15 m. broad. The length of the channel of the Loire is about 625 m.; its drainage area is 46,700 sq.m. A lateral canal (built in 1881-1892 at a cost of about £1,000,000) known as the Maritime Canal of the Loire between Le Carnet and La Martiniere enables large ships to ascend to Nantes. It is 05 m. long, and 195 (capable of being increased to 24) ft. deep. At each end is a lock 405 ft. long by 59 ft. wide. The canal de Nantes a Brest connects this city with Brest.

The Loire is navigable only in a very limited sense. During the drought of summer thin and feeble streams thread their way between the sandbanks of the channel; while at other times a stupendous flood submerges wide reaches of land. In the middle part of its course the Loire traverses the western portion of the undulating Paris basin, with its Tertiary marls, sands and clays, and the

alluvium carried off from these renders its lower channel inconstant; the rest of the drainage area is occupied by crystalline rocks, over the hard surface of which the water, undiminished by absorption, Hows rapidly into the streams. When the flood waters of two or more tributaries arrive at the same time serious inundations result. Attempts to control the river must have begun at a very early date, and by the close of the middle ages the bed between Orleans and Angers was enclosed by dykes 10 to 13 ft. high. In 1783 a double line of dykes or turcies 23 ft. high was completed from Bee d'Allier downwards. The channel was, however, so much narrowed that the embankments are almost certain to give way as soon as the water rises 16 ft. (the average rise is about 14, and in 1846 and 1856 it was more than 22). In modern times embankments, aided by dredging operations extending over a large number of years, have ensured a depth of 18 ft. in the channel between La Martiniere and Nantes. Several towns have constructed special works to defend themselves against the floods; Tours, the most exposed of all, is surrounded by a circular dyke.

Various schemes for the systematic regulation of the Loire have been discussed. It has been proposed to construct in the upper valleys of the several affluents a number of gigantic dams or re- servoirs from which the water, stored during flood, could be let off into the river as required. A dam of this kind (built in 171 1) at the village of Pinay, about 18 m. above Roanne, and capable of re- taining from 350 to 450 million cub. ft. of water, has greatly diminished the force of the floods at Roanne, and maintained the comparative equilibrium of the current during the dry season. Three other dams of modern construction are also in existence, one near Firminy, the other two near St Etienne.

LOIRE, a department of central France, made up in 1793 of the old district of Forez and portions of Beaujolais and Lyonnais, all formerly included in the province of Lyonnais. Pop. (1906) 643,943. Area 1853 sq. m. It is bounded N. by the department of Saone-et-Loire, E. by those of Rhone and Isere, S. by Ardeche and Haute-Loire, and W. by Puy-de-D6me and Allier. From 1790 to 1793 it constituted, along with that of Rhone, a single department (Rhone-et-Loire) . It takes its name from the river which bisects it from south to north. The Rhone skirts the S.E. of the department, about one-eighth of which belongs to its basin. After crossing the southern border the Loire runs through wild gorges, passing the picturesque crag crowned by the old fortress of St Paul-en-Cornillon. At St Rambert it issues into the broad plain of Fotez, flows north as far as its confluence with the Aix where the plain ends, and then again traverses gorges till it enters the less extensive plain of Roanne in the extreme north of the department. These two plains, the beds of ancient lakes, are enclosed east and west by chains of mountains running parallel with the river. In the west are the Forez mountains, which separate the Loire basin from that of the Allier; their highest point (Pierre sur Haute, 5381 ft.) is 12 m. W. of Montbrison. They sink gradually towards the north, and are successively called Bois Noirs (4239 ft.), from their woods, and Monts de la Madeleine (3822 to 1640 ft.). In the east the Rhone and Loire basins are separated, by Mont Pilat (4705 ft.) at the north extremity of the Cevennes, and by the hills of Lyonnais, Tarare, Beaujolais and Charolais, none of which rise higher than 3294 ft. Of the affluents of the Loire the most important are the Lignon du Nord, the beautiful valley of which has been called " La Suisse Forezienne," and the Aix on the left, and on the right the Ondaine (on which stand the industrial towns of Chambon-Feugerolles and Firminy), the Furens and the Rhin. The Gier forms a navigable channel to the Rhone at Givors, and has on its banks the industrial towns of St diamond and Rive-de-Gier. From Mont Pilat descends the Deome, in the valley of which are the workshops of Annonay (q.v.). The climate on the heights is cold and healthy, it is unwholesome in the marshy plain of Forez, mild in the valley of the Rhone. The annual rainfall varies from 39 to 48 in. on the Forez mountains, but only reaches 20 to 24 in. in the vicinity of Montbrison.

The plains of Forez and Roanne are the two most important agricultural districts, but the total production of grain within the department is insufficient for the requirements of the population. The pasture lands of the plain of Forez, the western portion of which is irrigated by the canal of Forez, support a large number of live stock. Good pasturage is also found on the higher levels of the Forez mountains, on the north-eastern

plateaus, where oxen of the famous Charolais breed are raised, and on the uplands generally. Wheat and rye are the leading cereal crops; oats come next in

importance, barley and colza occupying a relatively small area. The vine is cultivated in the valley of the Rhone, on the lower slopes of the Forez mountains and on the hills west of the plain of Roanne. The forests of Mont Pilat and the Forez chain yield good-sized pines and wood for mining purposes. The so-called Lyons chestnuts are to a large extent obtained from Forez ; the woods and pasture lands of Mont Pilat yield medicinal plants, such as mint. Poultry-rearing and bee-keeping are considerable industries. The department is rich in mineral springs, the waters of St Galmier, Sail-sous-Couzan, St Romain-le-Puy and St Alban being largely exported. The chief weajth of the department lies in the coal deposits of the basin of St Etienne (q.v.), the second in importance in France, quarrying is also active. Metal-working industries are centred in the S.E. of the department, where are the great manufacturing towns of St Etienne, Rive-de-Gier, St Chamond and Firminy. At St Etienne there is a national factory of arms, in which as many as 10,000 have been employed ; apart from other factories of the same kind carried on by private individuals, the production of hardware, locks, edge- tools, common cutlery, chain cables for the mines, files, rails, &c, occupies thousands of hands. Cast steel is largely manufactured, and the workshops of the department supply the heaviest con- structions required in naval architecture, as well as war material and machinery of every description. The, glass industry is carried on at Rive-de-Gier and St Galmier. St Etienne and St Chamond are centres for the fabrication of silk ribbons, elastic ribbons and' laces, and the dressing of raw silks. Between 50,000 and 60,000 people are employed in the last-named industries. The arrondisse- ment of Roanne manufactures cotton stuffs, muslins and the like. That of Montbrison produces table linen. The department has numerous dye-works, flour-mills, paper works, tanyards, brick- works, silk-spinning works and hat factories. It is served by the Paris-Lyon railway, Roanne being the junction of important lines from Paris to Lyons and St Etienne. Within the department the Loire is hardly used for commercial navigation ; the chief water- ways are the canal from Roanne to Digoin (13 m. in the department), that from Givors to Rive-de-Gier (7 m.) and the Rhone (7 m.).

Loire comprises three arrondissements — St Etienne, Mont- brison and Roanne — with 31 cantons and 335 communes. It falls within the region of the XIII. army corps and the diocise and academie (educational circumscription) of Lyons, where also is its court of appeal. St Etienne is the capital, other leading towns being Roanne, Montbrison, Rive-de-Gier, St Chamond, Firminy and Le Chambon, all separately noticed, St Bonnet-le-Chateau, besides old houses, has a church of the 15th and 16th centuries, containing paintings of the 15th century; St Rambert and St Romain-le-Puy have priory churches of the nth and 12th centuries; and at Charlieu there are remains of a Benedictine abbey founded in the 9th century, including a porch decorated with fine Romanesque carving.

LOIRE-INFERIEURE, a maritime department of western France, made up in 1790 of a portion of Brittany on the right and of the district of Retz on the left of the Loire, and bounded W. by the ocean, N. by Morbihan and Ille-et-Vilaine, E. by Maine-et-Loire and S. by Vendee. Pop. (1906) 666,748. Area 2694 sq. m. The surface is very flat, and the highest point, in the north on the borders of Ille-et-Vilaine, reaches only 377 ft. The line of hillocks skirting the right bank of the Loire, and known as the sillon de Bretagne, scarcely exceeds 250 ft.; below Savenay they recede from the river, and meadows give place to peat bogs. North of St Nazaire and Grande Briere, measuring 9 m. by 6, and rising hardly 10 ft. above the sea-level, still supplies old trees which can be used for joiners' work. A few scattered villages occur on the more elevated spots, but communication is effected chiefly by the canals which intersect it. The district south of the Loire lies equally low; its most salient feature is the lake of Grandlieu, covering 27 sq. m., and surrounded by low and marshy ground, but so shallow (65 ft. at most) that drainage would be comparatively easy. The Loire (q.v.) has a course of 70 m. within the department. On the left bank a canal stretches for 9 m. between Pellerin, where the dikes which protect the Loire valley from inundation terminate, and Paim-becuf, and vessels drawing 17 or 18 ft. can reach Nantes. The principal towns on the

river within the department are Ancenis, Nantes and St Nazaire (one of the most important commercial ports of France) on the right, and Paimbceuf on the left. The chief affluents are, on the right the Erdre and on the left the Sevre, both debouching at Nantes. The Erdre in its lower course broadens in places into lakes which give it the appearance of a large river. Four miles below Nort it coalesces with the

canal from Nantes to Brest. The Sevre is hemmed in by picturesque hills; at the point where it enters the department it flows past the beautiful town of Clisson with its imposing castle of the 13th century. Apart from the Loire, the only navigable channel of importance within the department is the Nantes and Brest canal, fed by the Isac, a tributary of the Vilaine, which separates Loire-Inferieure from Ille-et-Vilaine and Morbihan. The climate is humid, mild and equable. At Nantes the mean annual temperature is 54.” 7° Fahr., and there are one hundred and twenty-two rainy days, the annual rainfall being 25-6 in.

Horse and cattle raising prospers, being carried on chiefly in the west of the department and in the Loire valley. Good butter and cheese are produced. Poultry also is reared, and there is a good deal of bee-keeping. Wheat, oats, buckwheat and potatoes are produced in great abundance; leguminous plants are also largely cultivated, especially near Nantes. Wine, cider and forage crops are the chief remaining agricultural products. The woods are of oak in the interior and pine on the coast. The department has deposits of tin, lead and iron. N.VV. of Ancenis coal is obtained from a bed which is a prolongation of that of Anjou. The salt marshes, about 6000 acres in all, occur for the most part between the mouth of the Vilaine and the Loire, and on the Bay of Bourgneuf, and salt- refining, of which Guerande is the centre, is an important industry. The granite of the sea-coast and of the Loire up to Nantes is quarried for large blocks. Steam-engines are built for the government at Indret, a few miles below Nantes; the forges of Basse-Indre are in good repute for the quality of their iron; and the production of the lead-Smelting works at Coueron amounts to several millions of francs annually. There are also considerable foundries at Nantes, Chantenay, close to Nantes, and St Nazaire, and shipbuilding yards at Nantes and St Nazaire. Among other industries may be mentioned the preparation of pickles and preserved meats at Nantes, the curing of sardines at Le Croisic and in the neighbouring communes, the manufacture of sugar, brushes, tobacco, macaroni and similar foods, soap and chemicals at Nantes, and of paper, sugar and soap at Chantenay. Fishing is prosecuted along the entire coast, particu- larly at Le Croisic. Among the seaside resorts Le Croisic, Pornichet and Pornic, where there are megalithic monuments, may be mentioned. The department is traversed by the railways of the state, the Orleans company and the Western company. The department is dhirted into five arrondissements — Nantes, Ancenis, Ch&teaubriant, Paim- boeuf and St Nazaire — 45 cantons and 219 communes. It has its appeal court at Rennes, which is also the centre of the academie (educational division) to which it belongs.

The principal places are Nantes, the capital, St Nazaire and Chateaubriant, which receive separate treatment. On the west coast the town of Batz, and the neighbouring villages, situated on the peninsula of Batz, are inhabited by a small community possessed of a distinct costume and dialect, and claim- ing descent from a Saxon or Scandinavian stock. Its members are employed for the most part in the salt marshes N.E. of the town. Guerande has well-preserved ramparts and gates of the 15th century, a church dating from the 12th to the 16th centuries, and other old buildings. At St Philbert-de-Grandlieu there is a church, rebuilt in the 16th and 17th centuries, but preserving remains of a previous edifice belonging at least to the beginning of the nth century.

LOIRET, a department of central France, made up of the three districts of the ancient province of Orleanais — Orleanais proper, Gatinais and Dunois — together with

portions of those of Ile-de-France and Berry. It is bounded N. by Seine-et-Oise, N.E. by Seine-et-Marne, E. by Yonne, S. by Nievre and Cher, S.W. and W. by Loir-et-Cher and N.W. by Eure-et-Loin Area, 2629 sq. m. Pop. (1906) 364,999. The name is borrowed from the Loiret, a stream which issues from the ground some miles to the south of Orleans, and after a course of about 7 m. falls into the Loire; its large volume gives rise to the belief that it is a subterranean branch of that river. The Loire traverses the south of the department by a broad valley which, though frequently devastated by disastrous floods, is famed for its rich tilled lands, its castles, its towns and its vine-clad slopes. To the north of the Loire are the Gatinais (capital Montargis) and the Beauce; the former district is so named from its gdtines or wildernesses, of which saffron is, along with honey, the most noteworthy product; the Beauce (q.v.), a monotonous tract of corn-fields without either tree or river, has been called the granary of France. Between the Beauce and the Loire is the extensive

forest of Orleans, which is slowly disappearing before the advances of agriculture. South of the Loire is the Sologne, long barren and unhealthy from the impermeability of its subsoil, but now much improved in both respects by means of pine plantation and draining and manuring operations. The highest point (on the borders of Cher) is 900 ft. above sea-level, and the lowest (on the borders of Seine-et-Marne) is 220 ft. The watershed on the plateau of Orl6ans between the basins of the Seine and Loire, which divide Loiret almost equally between them, is almost imperceptible. The lateral canal of the Loire from Roanne stops at Briare; from the latter town a canal (canal de Briare) connects with the Seine by the Loing valley, which is joined by the Orleans canal below Montargis. The only im- portant tributary of the Loire within the department is the Loiret; the Loing, a tributary of the Seine, has a course of 40 m. from south to north, and is accompanied first by the Briare canal and afterwards by that of the Loing. The Essonne, another important affluent of the Seine, leaving Loiret below Malesherbes, takes its rise on the plateau of Orleans, as also does its tributary the Juine. The department has the climate of the Sequanian region, the mean temperature being a little above that of Paris; the rainfall varies from 18-5 to 27-5 in., according to the district, that of the exposed Beauce being lower than that of the well-wooded Sologne. Hailstorms cause much destruction in the Loire valley and the neighbouring regions.

The department is essentially agricultural in character. A large number of sheep, cattle, horses and pigs are reared; poultry, especially geese, and bees are plentiful. The yield of wheat and oats is in excess of the consumption; rye, barley, meslin, potatoes, beetroot, colza and forage plants are also cultivated. Wine in abundance, but of inferior quality, is grown on the hills of the Loire valley. Buckwheat supports bees by its flowers, and poultry by its seeds. Saffron is another source of profit. The woods consist of oak, elm, birch and pine; fruit trees thrive in the department, and Orleans is a great centre of nursery gardens. The industries are brick and tile making, and the manufacture of faience, for which Gien is one of the most important centres in France. The Briare manufacture of porcelain buttons and pearls employs many work- men. Flour-mills are very numerous. There are iron and copper foundries, which, with agricultural implement making, bell-founding and the manufacture of pins, nails and files, represent the chief metal-working industries. The production of hosiery, wool-spinning and various forms of wool manufacture are also engaged in. A large quantity of the wine grown is made into vinegar (vinaigre d'Orleans). The tanneries produce excellent leather; and paper- making, sugar-refining, wax-bleaching and the manufacture of caoutchouc complete the list of industries. The four arrondissements are those of Orleans, Gien, Montargis and Pithiviers, with 31 cantons and 349 communes. The department forms part of the academie (educational division) of Paris.

Besides Orleans, the capital, the more noteworthy places, Gien, Montargis, Beaugency, Pithiviers, Briare and St Benoit- sur-Loire, are separately noticed. Outside these towns notable examples of architecture are found in the churches of Clery (15th century), of Ferrieres (13th and 14th centuries) of Puiseaux (12th and 13th centuries) and Meung (12th century). At Germigny-des-Pres there is a church built originally at the beginning of the 9th century and rebuilt in the 19th century, on the old plan and to some extent with the old materials. Yevre-le-Ch4tel has an interesting chateau of the 13th century,

and Sully-sur-Loire the fine medieval chateau rebuilt at the beginning of the 17th century by Maximilien de Bethune, duke of Sully, the famous minister of Henry IV. There are remains of a Gallo-Roman town (perhaps the ancient Vellaunodunum) at Trigueres and of a Roman amphitheatre near Montbouy.

LOIR-ET-CHER, a department of central France, formed in 1790 from a small portion of Touraine, the Perche, but chiefly from the Dunois, Vendomois and Blesois, portions of Orleanais. It is bounded N. by Eure-et-Loir, N.E. by Loiret, S.E. by Cher, S. by Indre, S.W. by Indre-et-Loire and N.W. by Sarthe. Pop. (1906) 276,019. Area, 2479 sq. m. The department takes its name from the Loir and the Cher by which it is traversed in the north and south respectively. The Loir rises on the eastern border of the Perche and joins the Maine after a course of 195 m. ; the Cher rises on the Central Plateau near Aubusson, and reaches the Loire after a course of 219 m. The Loire flows through the

department from north-east to south-west, and divides it into two nearly equal portions. To the south-east is the district of the Sologne, to the north-west the rich wheat-growing country of the Beauce (q.v.) which stretches to the Loir. Beyond that river lies the Perche. The surface of this region, which contains the highest altitude in the department (840 ft.), is varied by hills, valleys, hedged fields and orchards. The Sologne was formerly a region of forests, of which those in the neighbourhood of Chambord are the last remains. Its soil, once barren and marshy, has been considerably improved by draining and afforestation, though pools are still very numerous. The district is much frequented by sportsmen. The Cher and Loir traverse pleasant valleys, occasionally bounded by walls of tufa in which dwellings have been excavated, as at Les Roches in the Loir valley; the stone, hardened by exposure to the air, is also used for building purposes. The Loire and, with- the help of the Berry canal, the Cher are navigable. The chief remaining rivers of the department are the Beuvron, which flows into the Loire on the left, and the Sauldre, a right-hand affluent of the Cher. The climate is temperate and mild, though that of the Beauce tends to dryness and that of the Sologne to dampness. The mean annual temperature is between 52 and 53° F.

The department is primarily agricultural, yielding abundance of wheat and oats. Besides these the chief products are /ye, wheat and potatoes. Vines thrive on the valley slopes, the vineyards falling into four groups — those of the Cher, which yield fine red wines, the Sologne, the Blesois and the Vend&mois. In the valleys fruit-trees and nursery gardens are numerous; the asparagus of Romorantin and Vend6me is well-known. The Sologne supplies pine and birch for fuel, and there are extensive forests around Blois and on both sides of the Loir. Pasture is of good quality in the valleys. Sheep are the chief stock; the Perche breed of horses is much sought after for its combination of lightness and strength. Bee-farming is of some importance in the Sologne. Formerly the speciality of Loir-et-Cher was the production of gun flints. Stone quarries are numerous. The chief industries are the cloth-manu- facture of Romorantin, and leather-dressing and glove-making at Vend6me; and lime-burning, flour-milling, distilling, saw-milling, paper-making and the manufacture of ” sabots ” and boots and shoes, hosiery and linen goods, are carried on. The department is served chiefly by the Orleans railway.

The arrondissements are those of Blois, Romorantin and Vendome, with 24 cantons and 297 communes. Loir-et-Cher forms part of the educational division (academie) of Paris. Its court of appeal” and the headquarters of the V. army corps, to the regions of which it belongs, are at Orleans. Blois, the capital, Vend6me, Romorantin and Chambord are noticed separately. In addition to those of Blois and Chambord there are numerous fine chateaux in the department, of which that of Montrichard with its donjon of the nth century, that of Chaumont dating from the 15th and 16th centuries, and that of Cheverny (17th century) in the late Renaissance style are the most important. Those at St Aignan, Lassay, Lavardin and Cellettes may also be mentioned.

Churches wholly or in part of Romanesque archi- tecture are found at Faverolles, Selles-sur-Cher, St Aignan and Suevres. The village of Troo is built close to ancient tumuli and has an interesting church of the 12th century, and among other remains those of a lazar-house of the Romanesque period. At Pontlevoy are the church, consisting of a fine choir in the Gothic style, and the buildings of a Benedictine abbey. At La Poissonniere (near Montoire) is a small Renaissance manor- house, in which Ronsard was born in 1524.

LOISY, ALFRED FIRMIN (1857-), French Catholic theologian, was born at Ambrieres in French Lorraine of parents who, descended from a long line of resident peasantry, tilled there the soil themselves. The physically delicate boy was put into the ecclesiastical school of St Dizier, without any intention of a clerical career; but he decided for the priesthood, and in 1874 entered the Grand Seminaire of Chalons-sur-Marne. Mgr Meignan, then bishop of Chalons, afterwards cardinal and arch- bishop of Tours, ordained him priest in 1879. After being curS successively of two villages in that diocese, Loisy went in May 1881, to study and take a theological degree, to the Institut Catholique in Paris. Here he was influenced, as to biblical languages and textual criticism, by the learned and loyal-minded

Abbe Paulin Martin, and as to a vivid consciousness of the true nature, gravity and urgency of the biblical problems and an Attic sense of form by the historical intuition and the mordant irony of Abbe Louis Duchesne. At the governmental institu- tions, Professors Oppert and Halevy helped further to train him. He took his theological degree in March 1890, by the oral defence of forty Latin scholastic theses and by a French dissertation, Hisioire du canon de I'ancien testament, published as his first book in that year.

Professor now at the Institut Catholique, he published suc- cessively his lectures: Hisioire du canon du N.T. (1891); Histoire critique du texte et des versions de la Bible (1892); and Les Evangiles synoptiques (1893, 1894). The two latter works appeared successively in the bi-monthly L' Enseignement biblique, a periodical written throughout and published by himself. But already, on the occasion of the death of Ernest Renan, October 1892, the attempts made to clear up the main principles and results of biblical science, first by Mgr d'Hulst, rector of the Institut Catholique, in his article " La Question biblique " (Le Correspondant, Jan. 25th, 1893), and then by Loisy himself, in his paper "La Question biblique et l'inspiration des Ecritures" (L' Enseignement biblique,Nov. Dec. 1893), promptly led to serious trouble. The latter article was immediately followed by Loisy's dismissal, without further explanation, from the Institut Catholique. And a few days later Pope Leo XIII. published his encyclical Providentissimus Deus, which indeed directly condemned not Abbe Loisy's but Mgr d'Hulst's position, yet rendered the continued publication of consistently critical work so difficult that Loisy himself suppressed his Enseignement at the end of 1893. Five further instalments of his Synoptiques were published after this, bringing the work down to the Con fession of Peter inclusively.

Loisy next became chaplain to a Dominican convent and girls' school at Neuilly-sur-Seine (Oct. 1894-Oct. 1899), and here ma vred his apologetic method, resuming in 1898 the publication 01 longer articles, under the pseudonyms of Despres and Firmin in the Revue du clerge francais, and of Jacques Simon in the lay Revue d'histoire et de litterature religieuscs. In the former review, a striking paper upon development of doctrine (Dec. 1st, 1898) headed a series of studies apparently taken from an already extant large apologetic work. In October 1899 he resigned his chaplaincy for reasons of health, and settled at Bellevue, some what farther away from Paris. His notable paper, " La Religion d'Israel " {Revue du clerge francais, Oct. 15th, 1900), the first of a series intended to correct and replace Renan's presentation of that great subject, was promptly censured by Cardinal Richard, archbishop of Paris; and though scholarly and zealous ecclesiastics, such as the Jesuit Pere Durand and Monseigneur Mignot, archbishop of Albi, defended the general method and several conclusions of the article, the aged cardinal never rested henceforward till he had secured a papal condemnation also. At the end of 1900 Loisy secured a government lectureship at the Ecole des Hautes

Etudes Pratiques, and delivered there in succession courses on the Babylonian myths and the first chapters of Genesis; the Gospel parables; the narrative of the ministry in the synoptic Gospels ; and the Passion narratives in the same. The first course was published in the Revue d'histoire et de litterature religieuses; and here also appeared instalments of his commentary on St John's Gospel, his critically important Notes sur la Genese, and a Chronique biblique unmatched in its mastery of its numberless subjects and its fearless yet delicate penetration. It was, however, two less erudite little books that brought him a European literary reputation and the culmination of his ecclesiastical troubles. L'Evangile et I'Sglise appeared in November 1902 (Eng. trans., 1903). Its introduction and six chapters present with rare lucidity the earliest conceptions of the Kingdom of Heaven, the Son of God, the Church, Christian dogma and Catholic worship; and together form a severely critico-historical yet strongly Catholic answer to Harnack's still largely pietistic Wesen des Christentums. It develops throughout the principles that " what is essential in Jesus' Gospel is what occupies the first and largest place in His authentic teaching, the ideas for

which He fought and died, and not only that idea which we may consider to be still a living force to-day "; that " it is supremely arbitrary to decree that Christianity must be essentially what the Gospel did not borrow from Judaism, as though what the Gospel owes to Judaism were necessarily of secondary worth "; that " whether we trust or distrust tradition, we know Christ only by means of, athwart and within the Christian tradition "; that " the essence of Christianity resides in the fulness and totality of its life"; and that "the adaptation of the Gospel to the changing conditions of humanity is to-day a more pressing need than ever." The second edition was enlarged by a preliminary chapter on the sources of the Gospels, and by a third section for the Son of God chapter. The little book promptly aroused widespread interest, some cordial sympathy and much vehement opposition; whilst its large companion the Eludes evcigiliques, containing the course on the parables and four sections of his coming commentary on the Fourth Gospel, passed almost un- noticed. On the 21st of January 1903 Cardinal Richard publicly condemned the book, as not furnished with an imprimatur, and as calculated gravely to trouble the faith of the faithful in the fundamental Catholic dogmas. On the 2nd of February Loisy wrote to the archbishop: " I condemn, as a matter of course, all the errors which men have been able to deduce from my book, by placing themselves in interpreting it at a point of view entirely different from that which I had to occupy in composing it." The pope refused to interfere directly, and the nuncio, Mgr Lorenzelli, failed in securing more than ten public adhesions to the cardinal's condemnation from among the eighty bishops of France.

Pope Leo had indeed, in a letter to the Franciscan minister- general (November 1898), and in an encyclical to the French clergy (September 1899), vigorously emphasized the traditionalist principles of his encyclical Providentissimus of 1893; he had even, much to his prompt regret, signed the unfortunate decree of the Roman Inquisition, January 1897, prohibiting all doubt as to the authenticity of the " Three Heavenly Witnesses " passage, 1 John v. 7, a text which, in the wake of a line of scholars from Erasmus downwards, Abbe Paulin Martin had, in 1887, exhaustively shown to be no older than the end of the 4th century a.d. Yet in October 1902 he established a " Commission for the Progress of Biblical Studies," preponderantly composed of seriously critical scholars; and even one month before his death he still refused to sign a condemnation of Loisy's Eludes evangeliques.

Cardinal Sarto became Pope Pius X. on the 4th of August 1903. On the 1st of October Loisy published three new books, Autour d'un petit livre, Le Quatrieme Evangile and Le Discours sur la Montagne. Autour consists of seven letters, on the origin and aim of L Evangile et V&glise; on the biblical question; the criticism of the Gospels; the Divinity of Christ; the Church's foundation and authority; the origin and authority of dogma,

and on the institution of the sacraments. The second and third, addressed respectively to a cardinal (Perraud) and a bishop (Le Camus), are polemical or ironical in tone; the others are all written to friends in a warm, expansive mood; the fourth letter especially, appropriated to Mgr Mignot, attains a grand elevation of thought and depth of mystical conviction. Le Quatrieme Evangile, one thousand large pages long, is possibly over-confident in its detailed application of the allegorical method; yet it constitutes a rarely perfect sympathetic reproduction of a great mystical believer's imperishable intuitions. Le Discours sur la Montagn-e is a fragment of a coming enlarged commentary on the synoptic Gospels. On the 23rd of December the pope ordered the publication of a decree of the Congregation of the Index, incorporating a decree of the Inquisition, condemning Loisy's Religion d' Israel, L' Evangile et l'Eglise, £iudes evangeliques, Autour d'un petit livre and Le Quatrieme Evangile. The pope's secretary of state had on the 19th December, in a letter to Cardinal Richard, recounted the causes of the condemnation in the identical terms used by the latter himself when condemning the Religion d'Israel three years before. On the 12th of January 1904 Loisy wrote to Cardinal Merry del Val that he received

the condemnation with respect, and condemned whatever might be reprehensible in his books, whilst reserving the rights of his conscience and his opinions as an historian, opinions doubtless imperfect, as no one was more ready to admit than himself, but which were the only form under which he was able to repre- sent to himself the history of the Bible and of religion. Since the Holy See was not satisfied, Loisy sent three further declarations to Rome; the last, despatched on the 17th of March, was addressed to the-, pope himself, and remained unanswered. And at the end of March Loisy gave up his lectureship, as he declared, " on his own initiative, in view of the pacification of minds in the Catholic Church." In the July following he moved into a little house, built for him by his pupil and friend, the Assyriologist Francois Thureau Dangin, within tlte latter's park at Garnay, by Dreux. Here he continued his important reviews, notably in the Revue d'histoire et de literature religieuses, and published Morceaux d'exegese (1906), six further sections of his synoptic commentary. In April 1907 he returned to his native Lorraine, to Ceffonds by Montier-en-Der, and to his relatives there.

Five recent Roman decisions are doubtless aimed primarily at Loisy's teaching. The Biblical Commission, soon enlarged so as to swamp the original critical members, and which had become the simple mouthpiece of its presiding cardinals, issued two decrees. The first, on the 27th of June 1906, affirmed, with some significant but unworkable reservations, the Mosaic authorship of the Pentateuch; and the second (29th of May 1907) strenuously maintained the Apostolic Zebedean author- ship of the fourth Gospel, and the strictly historical character of the events and speeches recorded therein. The Inquisition, by its decree Lamentabili sane (2nd of July 1907), condemned sixty-five propositions concerning the Church's magisterium; biblical inspiration and interpretation; the synoptic and fourth Gospels; revelation and dogma; Christ's divinity, human knowledge and resurrection; and the historical origin and growth of the Sacraments, the Church and the Creed. And some forty of these propositions represent, more or less accurately, certain sentences or ideas of Loisy, when torn from their context and their reasons. The encyclical Pascendi Dominici Gregis (Sept. 6th, 1907), probably the longest and most argumentative papal utterance extant, also aims primarily at Loisy, although here the vehemently scholastic redactor's determination to piece together a strictly coherent, complete a priori system of " Modernism " and his self-imposed restriction to medieval categories of thought as the vehicles for describing essentially modern discoveries and requirements of mind, make the identifi- cation of precise authors and passages very difficult. And on the 21st of November 1907 a papal motu propria declared all the decisions of the Biblical Commission, past and future, to be as binding upon the conscience as decrees of the Roman Congregations.

Yet even all this did not deter Loisy from publishing three further books. Les Hvangiles synoptiques, two large 8vo volumes of 1009 and 798 pages, appeared " chezl'auteur, a. Ceffonds, Montier- en-Der, Haute-Marne," in January 1908. An incisive introduc- tion discusses the ecclesiastical tradition, modern criticism; the second, the first and the

third Gospels; the evangelical tradition; the career and the teaching of Jesus; and the literary form, the tradition of the text and the previous commentaries. The commentary gives also a careful translation of the texts. Loisy recognizes two eye-witness documents, as utilized by all three synoptists, while Matthew and Luke have also incorporated Mark. His chief peculiarity consists in clearly tracing a strong Pauline influence, especially in Mark, which there remodels certain sayings and actions as these were first registered by the eye-witness documents. These doctrinal interpretations intro- duce the economy of blinding the Jews into the parabolic teaching; the declaration as to the redemptive character of the Passion into the sayings; the sacramental, institutional words into the account of the Last Supper, originally, a solemnly simple Messianic meal; and the formal night-trial before Caiaphas into the original Passion-story with its informal, morning

decision by Caiaphas, and its one solemn condemnation of Jesus, by Pilate. Mark's narratives of the sepulture by Joseph of Arimathea and of the empty tomb are taken as posterior to St Paul; the narratives of the infancy in Matthew and Luke as later still. Yet the great bulk of the sayings remain substantially authentic; if the historicity of certain words and acts is here refused with unusual assurance, that of other sayings and deeds is established with stronger proofs; and the redemptive con- ception of the Passion and the sacramental interpretation of the Last Supper are found to spring up promptly and legitimately from our Lord's work and words, to saturate the Pauline and Johannine writings, and even to constitute an element of all three synoptic Gospels.

Simple* Reflexions sur le decrel Lamcntabili el sur I'ency clique Pascendi, i2mo, 277 pages, was published from Ceffonds a few days after the commentary. Each proposition of the decree is carefully tracked to its probable source, and is often found to modify the latter's meaning. And the study of the encyclical concludes: " Time is the great teacher ... we would do wrong to despair either of our civilization or of the Church."

The Church authorities were this time not slow to act. On the 14th of February Mgr Amette, the new archbishop of Paris, prohibited his diocesans to read or defend the two books, which " attack and deny several fundamental dogmas of Christianity," under pain of excommunication. The abbe again declared " it is impossible for me honestly and sincerely to make the act of absolute retractation and submission exacted by the sovereign pontiff." And the Holy Office, on the 7th of March, pronounced the major excommunication against him. At the end of March Loisy published Quelques Leltres (December 1003-February 1908), which conclude: "At bottom I have remained in my last writings on the same line as in the earlier ones. I have aimed at establish- ing principally the historical position of the various questions, and secondarily the necessity for reforming more or less the traditional concepts."

Three chief causes appear jointly to have produced M. Loisy's very absolute condemnation. Any frank recognition of the abbe's even general principles involves the abandonment of the identification of theology with scholasticism or even with specifically ancient thought in general. The abbe's central position, that our Lord himself held the proximateness of His second coming, involves the loss by churchmen of the prestige of directly divine power, since Church and Sacraments, though still the true fruits and vehicles of his life, death and spirit, cannot thus be immediately founded by the earthly Jesus him- self. And the Church policy, as old as the times of Constantine, to crush utterly the man who brings more problems and pressure than the bulk of traditional Christians can, at the time, either digest or resist with a fair discrimination, seemed to the authorities the one means to save the very difficult situation.

Bibliography. — Autobiographical passages in M. Loisy's A utour d'un petit livre (Paris, 1903), pp. xv. xvi. 1, 2, 157, 218. A full account of his literary activity and

ecclesiastical troubles will be found in Abbe Albert Houtin's La Question biblique au XIX' si'ecle (Paris, 2nd ed., 1902) and La Question biblique au XX' sii.de (Paris, 1906), but the latter especially is largely unfair to the conservatives and sadly lacking in religious feeling. The following articles and booklets concerning M. Loisy and the questions raised by him are specially remarkable. France: Pere Durand, S. J., £tudes religieuses (Paris, Nov. 1901) frankly describes the condition of ecclesiastical biblical studies; Monseigneur Mignot, archbishop of Albi, Leltres sur les etudes ecclesiastiques 1900-1901 (collected ed., Paris, 1908) and " Critique et tradition " in Le Correspondent (Paris, 10th January 1904), the utterances of a finely trained judgment; Mgr Le Camus, bishop of La Rochelle, Fausse Exegese, mauvaise theologie (Paris, 1902), a timid, mostly rhetorical, scholar's protest; Pere Lagrange, a Dominican who has done much for the spread of Old Testament criticism, La Mithode historique, surtout a propos de l'Ancien Testament (Paris, 1903) and £claircissement to same (ibid. 1903); P. Lagrange, Mgr P. Batiffol, P. Portalie, S. J., " Autour des fondements de la Foi " in the Bulletin de litt. eccl. Toulouse (Paris, December 1903, January 1904), very suggestive papers; Professor Maurice Blondel'9 " Histoire et dogma," in La Quinzaine (Paris January 16, February 16, 1904), F. de Hugel's " Du Christ 6ternei et des christologies successives " (ibid. June 1, 1904), the Abb<3 J. Wehrle's " Le Christ et la conscience catholique " (ibid. August 16, 1904) and F. de Hugel's " Correspondance " (ibid. Sept. 16, 1904)

discuss the relations between faith and the affirmation of phenomenal happenings; Paul Sabatier, " Les Derniers Ouvrages de l'Abb6 Loisy," in the Revue chretienne (D61e, 1904) and Paul Desjardins' Catholicisme et critique (Paris, 1905), a Broad Church Protestant's and a moralist agnostic's delicate appreciations; a revue of Les Eiiangiles synoptiques by the Abbe Mangenot, in Revue du Clerge francais (Feb. 15, 1908) containing some interesting discrimina- tions; a revue by L. in the Revue biblique (1908), pp. 608-620, a mixture of unfair insinuation, powerful criticism and discriminating admissions; and a paper by G. P. B. and Jacques Chevalier in the Annates de philosophic chrUienne (Paris, Jan. 1909) seeks to trace and to refute certain philosophical presuppositions at work in the book's treatment, especially of the Miracles, the Resurrection and the Institution of the Church. Italy: " Lettres Romaines " in Annales de philosophic chretienne (Paris, January-March 1904), an Italian theologian's fearless defence of Loisy's main New Testament positions; Rev. P. Louis Billot S.J., De sacra traditione (Freiburg 1. Br. 1905), the ablest of the scholastic criticisms of the historical method by a highly influential French professor of theology, now many years in Rome; Quello che vogliamo (Rome, 1907, Eng. trans., What we want, by A. L. Lilley, London, 1907), and 77 Programma dei Modernisti (ibid. 1908), Eng. trans., The Programme of Modernism ed. by Lilley (London, eloquent 1098), pleadings by Italian priest, substantially on M. Loisy's lines; " L' Abate Loisy e il Problema dei Vangeli Sinottici," four long papers signed " H," in // Rinnovamento (Milan, 1908, 1909) are candid and circumspect. Germany: Professor E. Troeltsch, " Was heisst Wesen des Christentums?" 6 arts, in Die christliche Well (Leipzig, autumn 1903), a profound criticism of M. Loisy's developmental defence of Catholicism; Professor Harnack's review of L'Uvangile et I'Uglise in the Theol. Literatur-Zeitung (Leipzig, 23rd January 1904) is generous and interesting; Professor H. J. Holtzmann's " Urchristentum u. Reform- Katholizismus," in the Prot. Monatshefte, vii. 5 (Berlin, 1903). " Der Fall Loisy," ibid. ix. I, and his review of " Les Evangiles synoptiques " in Das zwanzigste Jahrhundert (Munich, May 3, 1908) are full of facts and of deep thought; Fr. F. von Hummelauer, Exegetisches zur Inspirationsfra.ee (Freiburg i. Br. 1904) is a favour- able specimen of present-day German Roman Catholic scholarship. America: Professor C. A. Briggs, "The Case of the Abb6 Loisy," Expositor (London, April 1905), and C. A. Briggs and F. von Hiigel, The Papal Commission and the Pentateuch (London, 1907) discuss Rome's attitude towards biblical science. England: The Rev. T. A. Lacey's Harnack and Loisy, with introduction by Viscount Halifax (London, 1904); " The Encyclical and M. Loisy " (Church Times, Feb. 20, 1908) ; " Recent Roman Catholic Biblical Criticism " (The Times Literary Supplement for January 15th, 22nd, 29th*! 1904), and " The Synoptic Gospels " (review in The Times Literary Supplement, March 26, 1908) are interesting pronouncements respectively of two Tractarian High Churchmen and of a disciple of Canon Sanday. Professor Percy Gardner's paper in the

Hibbert Journal, vol. i. (1903) p. 603, is the work of a Puritan-minded, cultured Broad Church layman. (F. V. H.)

LOJA (formerly written Loxa) , a town of southern Spain, in the province of Granada, on the Granada-Algeciras railway. Pop. (1900) 19,143. The narrow and irregular streets of Loja wind up the sides of a steep hill surmounted by a Moorish citadel; many of the older buildings, including a fine Moorish bridge, were destroyed by an earthquake in December 1884, although two churches of the early 16th century remained intact. An iron bridge spans the river Genii, which flows past the town on the north, forcing a passage through the mountains which encircle the fertile and beautiful Vega of Granada. This passage would have afforded easy access to the territory still held by the Moors in the last half of the 15th century, had not Loja been strongly fortified; and the place was thus of great military importance, ranking with the neighbouring town of Alhama as one of the keys of Granada. Its manufactures consist chiefly of coarse woollens silk, paper and leather. Salt is obtained in the neighbourhood.

Loja, which, has sometimes been identified with the ancient Ilipula, or with the Lacibi (Lacibis) of Pliny and Ptolemy, first clearly emerges in the Arab chronicles of the year 890. It was taken by Ferdinand III. in 1226, but was soon afterwards abandoned, and was not finally recaptured until the 28th of May, i486, when it surrendered to Ferdinand and Isabella after a siege.

LOKEREN, an important industrial town of Belgium between Ghent and Antwerp (in East Flanders on the Durme). Pop. (1904) 21,869. It lies at the southern point of the district called Pays de Waes, which in the early part of the 19th century was only sandy moorland, but is now the most highly cultivated and thickly populated tract in Belgium. The church of St Laurence is of some interest.

LOKOJA-ˆLOLLARDS

LOKOJA, a town of Nigeria, at the junction of the Niger and Benue rivers, founded in i860 by the British consul, W. B. Baikie, and subsequently the military centre of the Royal Niger Company. It is in the province of Kabba, 250 m. from the mouth of the Niger, and is of considerable commercial importance (see Nigeria and Kabba).

LOLLARDS, the name given to the English followers of John Wycliffe; they were the adherents of a religious movement which was widespread in the end of the 14th and beginning of the 15th centuries, and to some extent maintained itself on to the Reforma- tion. The name is of uncertain origin; some derive it from lolium, tares, quoting Chaucer (C. T., Shipman's Prologue):—

" This Loller heer wil prechen us somwhat . . . He wolde sowen som difficultee Or springen cokkel in our clene corn " ;

but the most generally received explanation derives the words from lollen or lullen, to sing softly. The word is much older than its English use; there were Lollards in the Netherlands at the beginning of the 14th century, who were akin to the Fratricelli, Beghards and other sectaries of the recusant Franciscan type. The earliest official use of the name in England occurs in 1387 in a mandate of the bishop of Worcester against five " poor preachers," nomine sen ritu Lollardorum confoederatos. It is probable that the name was given to the followers of Wycliffe because they resembled those offshoots from the great Franciscan movement which had disowned the pope's authority and set before themselves the ideal of Evangelical poverty.

The 14th century, so full of varied religious life, made it manifest that the two different ideas of a life of separation from the world which in earlier times had lived on side by side within the medieval church were irreconcilable. The church chose to abide by the idea of Hildebrand and to reject that of Francis of Assisi; and the revolt of Ockham and the Franciscans, of the Beghards and other spiritual fraternities, of Wycliffe and the Lollards, were all protests against that decision. Gradually there came to be facing each other a great political Christendom, whose rulers were statesmen, with aims and policy

of a worldly type, and a religious Christendom, full of the ideas of separation from the world by self-sacrifice and of participation in the benefits of Christ's work by an ascetic imitation. The war between the two ideals was fought out in almost every country in Europe in the 14th century. In England Wycliffe's whole life was spent in the struggle, and he bequeathed his work to the Lollards. The main practical thought with Wycliffe was that the church, if true to her divine mission, must aid men to live that life of evangelical poverty by which they could be separate from the world and imitate Christ, and if the church ceased to be true to her mission she ceased to be a church. Wycliffe was a meta- physician and a theologian, and had to invent a metaphysical theory— the theory of Dominium- — to enable him to transfer, in a way satisfactory to himself, the powers and privileges of the church to his company of poor Christians; but his followers were content to allege that a church which held large landed possessions, collected tithes greedily and took money from starving peasants for baptizing, burying and praying, could not be the church of Christ and his apostles.

Lollardy was most flourishing and most dangerous to the ecclesiastical organization of England during the ten years after Wycliffe's death. It had spread so rapidly and grown so popular that a hostile chronicler could say that almost every second man was a Lollard. Wycliffe left three intimate disciples: • — Nicolas Hereford, a doctor of theology of Oxford, who had helped his master to translate the Bible into English; John Ashton, also a fellow of an Oxford college; and John Purvey, Wycliffe's colleague at Lutterworth, and a co-translator of the Bible. With these were associated more or less intimately, in the first age of Lollardy, John Parker, the strange ascetic William Smith, the restless fanatic Swynderly, Richard Wayts- tract and Crompe. Wycliffe had organized in Lutterworth an association for sending the gospel through all England, a company of poor preachers somewhat after the Wesleyan method of modern times. " To be poor without mendicancy, to unite xvi. 30

929

the flexible unity, the swift obedience of an order, with free and constant mingling among the poor, such was the ideal of Wycliffe's ' poor priests ' " (cf. Shirley, Fasc. Zh. p. xl.), and, although proscribed, these " poor preachers " with portions of their master's translation of the Bible in their hand to guide them, preached all over England. In 1382, two years before the death of Wycliffe, the archbishop of Canterbury got the Lollard opinions condemned by convocation, and, having been promised royal support, he began the long conflict of the church with the followers of Wycliffe. He was able to coerce the authorities of the university of Oxford, and to drive out of it the leading Wycliffite teachers, but he was unable to stifle Oxford sympathies or to prevent the banished teachers preaching throughout the country. Many of the nobles, like Lords Monta- cute and Salisbury, supported the poor preachers, took them ' as private chaplains, and protected them against clerical inter- ference. Country gentlemen like Sir Thomas Latimer of Bray- brooke and Sir Richard Stury protected them, while merchants and burgesses supported them with money. When Richard II. issued an ordinance (July 1382) ordering every bishop to arrest all Lollards, the Commons compelled him to withdraw it. Thus protected, the " poor preachers " won masses of the people to their opinions, and Leicester, London and the west of England became their headquarters.

The organization must have been strong in numbers, but only those who were seized for heresy are known by name, and it is only from the indictments of their accusers that their opinions can be gathered. The preachers were picturesque figures in long russet dress down to the heels, who, staff in hand, preached in the mother tongue to the people in churches and graveyards, in squares, streets and houses, in gardens and pleasure grounds, and then talked privately with those who had been impressed. The Lollard literature was very widely circulated — books by Wycliffe and Hereford and tracts and broadsides — in spite of many edicts proscribing it. In 1395 the Lollards grew so strong that they petitioned parliament through Sir Thomas Latimer and Sir R. Stury to reform the church on Lollardist methods. It is said that the Lollard Conclusions printed by Canon Shirley (p. 360) contain the substance of this petition. If so,

parliament was told that temporal possessions ruin the church and drive out the Christian graces of faith, hope and charity, that the priesthood of the church in communion with Rome was not the priesthood Christ gave to his apostles; that the monk's vow of celibacy had for its consequence unnatural lust, and should not be imposed; that transubstantiation was a feigned miracle, and led people to idolatry; that prayers made over wine, bread, water, oil, salt, wax, incense, altars of stone, church walls, vestments, mitres, crosses, staves, were magical and should not be allowed; that kings should possess the jus episcopate, and bring good government into the church ; that no special prayers should be made for the dead; that auri- cular confession made to the clergy, and declared to be necessary for salvation, was the root of clerical arrogance and the cause of indulgences and other abuses in pardoning sin; that all wars were against the principles of the New Testament, and were but murdering and plundering the poor to win glory for kings; that the vows of chastity laid upon nuns led to child murder; that many of the trades practised in the commonwealth, such as those of goldsmiths and armourers, were unnecessary and led to luxury and waste. These Conclusions really contain the sum of Wycliffite teaching; and, if we add that the principal duty of priests is to preach, and that the worship of images, the going on pilgrimages and the use of gold and silver chalices in divine service are sinful (The Peasants' Rising and the Lollards, p. 47), they include almost all the heresies charged in the indict- ments against individual Lollards down to the middle of the 15th century. The king, who had hitherto seemed anxious to repress the action of the clergy against the Lollards, spoke strongly against the petition and its promoters, and Lollardy never again had the power in England which it wielded up to this year.

If the formal statements of Lollard creed are to be got from these Conclusions, the popular view of their controversy with

the church may be gathered from the ballads preserved in the Political Poems and Songs relating to English History, published in 1859 by Thomas Wright for the Master of the Rolls series, and in the Piers Ploughman poems. Piers Ploughman's Creed (see Langland) was probably written about 1394, when Lollardy was at its greatest strength; the ploughman of the Creed is a man gifted with sense enough to see through the tricks of the friars, and with such religious knowledge as can be got from the creed, and from Wycliffe's version of the Gospels. The poet gives us a " portrait of the fat friar with his double chin shaking about as big as a goose's egg, and the ploughman with his hood full of holes, his mittens made of patches, and his poor wife going barefoot on the ice so that her blood followed " (Early English Text Society, vol. xxx., pref., p. 16); and one can easily see why farmers and peasants turned from the friars to the poor preachers. The Ploughman's Complaint tells the same tale. It paints popes, cardinals, prelates, rectors, monks and friars, who call them- selves followers of Peter and keepers of the gates of heaven and hell, and pale poverty-stricken people, cotless and landless, who have to pay the fat clergy for spiritual assistance, and asks if these are Peter's priests. " I trowe Peter took no money, for no sinners that he sold. . . . Peter was never so great a fole, to leave his key with such a losell."

In 1399 the Lancastrian Henry IV. overthrew the Plantagenet Richard II., and one of the most active partisans of the new monarch was Arundel, archbishop of Canterbury and the most determined opponent of Lollardy. Richard II. had aided the clergy to suppress Lollardy without much success. The new dynasty supported the church in a similar way and not more successfully. The strength of the anti-clerical party lay in the House of Commons, in which the representatives of the shires took the leading part. Twice the Commons petitioned the crown to seize the temporalities of the church and apply them to such national purposes as relief of taxation, maintenance of the poor and the support of new lords and knights. Their anti-clerical policy was not continuous,

however. The court party and the clergy proposed statutes for the suppression of heresy, and twice at least secured the concurrence of the Commons. One of these was the well-known statute De heretico comburendo passed in 1401.

In the earlier stages of Lollardy, when the court and the clergy managed to bring Lollards before ecclesiastical tribunals backed by the civil power, the accused generally recanted and showed no disposition to endure martyrdom for their opinions. They became bolder in the beginning of the 15th century. William Sawtrey (Chartris), caught and condemned, refused to recant and was burnt at St Paul's Cross (March 1401), and other martyrdoms followed. The victims usually belonged to the lower classes. In 1410 John Badby, an artisan, was sent to the stake. His execution was memorable from the part taken in it by the prince of Wales, who himself tried to reason the Lollard out of his convictions. But nothing said would make Badby confess that " Christ sitting at supper did give to His disciples His living body to eat." The Lollards, far from daunted, abated no effort to make good their ground, and united a struggle for social and political liberty to the hatred felt by the peasants towards the Romish clergy. Jak Upland (John Countryman) took the place of Piers Ploughman, and upbraided the clergy, and especially the friars, for their wealth and luxury. Wycliffe had published the rule of St Francis, and had pointed out in a commentary upon the rule how far friars had departed from the maxims of their founder, and had persecuted the Spiriluales (the Fratricelli, Beghards, Lollards of the Netherlands) for keeping them to the letter (cf. Matthews, English Works of Wyclif hitherto unprinled, Early Eng. Text Soc, vol. lxxiv., 1880). Jak Upland put all this into rude nervous English verse:

" Freer, what charitie is this To fain that whoso liveth after your order Liveth most perfectlie,

And next followeth the state of the Apostles In povertie and pennance: And yet the wisest and greatest clerkes of you Wend or send or procure to the court of Rome, . . . and to be assoiled of the vow of povertie."

The archbishop, having the power of the throne behind him, attacked that stronghold of Lollardy the university of Oxford. In 1406 a document appeared purporting to be the testimony of the university in favour of Wycliffe; its genuineness was dis- puted at the time, and when quoted by Huss at the council of Constance it was repudiated by the English delegates. The archbishop treated Oxford as if it had issued the document, and procured the issue of severe regulations in order to purge the university of heresy. In 1408 Arundel in convocation proposed and carried the famous Constitutiones Thomae Arundel intended to put down Wycliffite preachers and teaching. They provided amongst other things that no one was to be allowed to preach without a bishop's licence, that preachers preaching to the laity were not to rebuke the sins of the clergy, and that Lollard books and the translation of the Bible were to be searched for and destroyed.

When Henry V. became king a more determined effort was made to crush Lollardy. Hitherto its strength had lain among the country gentlemen who were the representatives of the shires. The court and clergy had been afraid to attack this powerful class. The new king determined to overawe them, and to this end selected one who had been a personal friend and whose life had been blameless. This was Sir John Oldcastle, in right of his wife, Lord Cobham, " the good Lord Cobham " as the common people called him. Henry first tried, personal persuasion, and when that failed directed trial for heresy. Oldcastle was convicted, but was imprisoned for forty days in the. Tower in hope that he might recant. He escaped, and summoned his co-religionists to his aid. A Lollard plot was formed to seize the king's person. In the end Oldcastle was burnt for an obstinate heretic (Dec. 1417). These persecutions were not greatly protested against ; the wars of Henry V. with France had awakened the martial spirit of the nation, and little sympathy was felt for men who had declared that all war was but the murder and plundering of poor people for the sake of kings. Mocking ballads were composed upon the martyr Oldcastle, and this dislike to warfare was one of the chief accusations made against him (comp. Wright's Political Poems, ii. 244). But Arundel

could not prevent the writing and distribution oi Lollard books and pamphlets. Two appeared about the time of the martyrdom of Oldcastle — The Ploughman's Prayer and the Lanthorne of Light. The Ploughman's Prayer declared that true worship consists in three things — in loving God, and dreading God and trusting in God above all other things; and it showed how Lollards, pressed by persecution, became further separated from the religious life of the church. " Men maketh .now great stouen houses full of glasen windows, and clepeth thilke thine houses and churches. And they setten in these houses mawmets of stocks and stones, to fore them they knelen privilich and apert and maken their prayers, and all this they say is they worship. . . . For Lorde our belief is that thine house is man's soul." Notwithstanding the repression, Lollardy fastened in new parts of England, and Lollards abounded in Somerset, Norfolk, Suffolk, Essex, Lincoln and Buckinghamshire.

The council of Constance (1414-1418) put an end to the papal schism, and also showed its determination to put down heresy by burning John Huss. When news of this reached England the clergy were incited to still more vigorous proceedings against Lollard preachers and books. From this time Lollardy appears banished from the fields and streets, and takes refuge in houses and places of concealment. There was no more wayside preach- ing, but instead there were conventicula occulta in houses, in peasants' huts, in sawpits and in field ditches, where the Bible was read and exhortations were given, and so Lollardy continued. In 1428 Archbishop Chichele confessed that the Lollards seemed as numerous as ever, and that their literary and preaching work went on as vigorously as before. It was found also that many of the poorer rectors and parish priests, and a great many chaplains and curates, were in secret association with the Lollards, so much so that in many places processions were never made and worship on saints' days was abandoned. For the Lollards were hardened by persecution, and became fanatical

in the statement of their doctrines. Thomas Bagley was accused of declaring that if in the sacrament a priest made bread into God, he made a God that can be eaten by rats and mice; that the pharisees of the day, the monks, and the nuns, and the friars and all other privileged persons recognized by the church were limbs of Satan; and that auricular confession to the priest was the will not of God but of the devil. And others held that any priest who took salary was excommunicate; and that boys could bless the bread as well as priests.

From England Lollardy passed into Scotland. Oxford infected St Andrews, and we find traces of more than one vigorous search made for Lollards among the teaching staff of the Scottish university, while the Lollards of Kyle in Ayrshire were claimed by Knox as the forerunners of the Scotch Reformation.

The opinions of the later Lollards can best be gathered from the learned and unfortunate Pecock, who wrote his elaborate Repressor against the " Bible-men," as he calls them. He summed up their doctrines under eleven heads: they condemn the having and using images in the churches, the going on pilgrimages to the memorial or " mynde places " of the saints, the holding of landed possessions by the clergy, the various ranks of the hierarchy, the framing of ecclesiastical laws and ordinances by papal and episcopal authority, the institution of religious orders, the costliness of ecclesiastical decorations, the ceremonies of the mass and the sacraments, the taking of oaths and the maintaining that war and capital punish- ment are lawful. When these points are compared with the Lollard Conclusions of 1395, it is plain that Lollardy had not greatly altered its opinions after fifty-five years of persecution. All the articles of Pecock's list, save that on capital punishment, are to be found in the Conclusions; and, although many writers have held that Wycliffe's own views differed greatly from what have been called the " exaggerations of the later and more violent Lollards," all these views may be traced to Wycliffe himself. Pecock's idea was that all the statements

which he was prepared to impugn came from three false opinions or ” trowings,” viz. that no governance or ordinance is to be esteemed a law of God which is not founded on Scripture, that every humble-minded Christian man or woman is able without ” fail and defaut ” to find out the true sense of Scripture, and that having done so he ought to listen to no arguments to the contrary; he elsewhere adds a fourth (i. 102), that if a man be not only meek but also keep God’s law he shall have a true understanding of Scripture, even though ” no man ellis teche him saue God.” These statements, especially the last, show us the connexion between the Lollards and those mystics of the 14th century, such as Tauler and Ruysbroeck, who accepted the teachings of Nicholas of Basel, and formed themselves into the association of the Friends of God.

The persecutions were continued down to the reign of Henry VIII., and when the writings of Luther began to appear in . England the clergy were not so much afraid of Lutheranism as of the increased life they gave to men who for generations had been reading Wycliffe’s Wickette. ” It is,” wrote Bishop Tunstall to Erasmus in 1523, ” no question of pernicious novelty, it is only that new arms are being added to the great band of Wycliffite heretics.” Lollardy, which continued down to the Reformation, did much to shape the movement in England. The subordination of clerical to laic jurisdiction, the reduction in ecclesiastical possessions, the insisting on a translation of the Bible which could be read by the ” common ” man were all inheritances bequeathed by the Lollards.

Literature. — Fasciculi Zizaniorum Magislri Johannis Wyclif cum Tritico, edited for the Rolls Series by W. W. Shirley (London, 1858); the Chronicon Angliae, auctore monacho quodam Sancti Albani, ed. by Sir E. Maunde Thompson (London, 1874); Historia Anglicana of Thomas Walsingham, ed. by H. T. Riley, vol. iii. (London. 1869); Chronicon of Henry Knighton, ed. by J. R. Lumby (London, 1895); R. L. Poole, Wycliffe and Movements for Reform (London, 1889); R. Pecock, Repressor of overmuch Blaming of the Clergy (2 vols., London, i860); F. D. Matthew, The English Works of John Wyclif (Early English Text Society, London, 1880); T. Wright, Political Poems and Songs (2 vols., London, 1859); G. V. Lechler, Johann von Wiclif, ii. (1873); J. Loserth, Plus und Wycliffe (Prague, 1884, English translation by J. Evans, London, 1884); D- Wilkins, Concilia Magnae Britanniae et Hiberniae, iii. (London, 1773); E. Powell and G. M. Trevelyan, The Peasants’ Rising and the Lollards, a Collection of Unpublished Vocuments(London, 1899); G. M. Trevelyan, England in the Age of Wycliffe (London, 1898, 3rd ed., 1904); the publications of the Wiclif Society; H. S. Cronin, ” The Twelve Conclusions of the Lollards,” in the English Historical Review (April 1907, pp. 292 ff.) ; and J. Gairdner, Lollardy and the Reformation in England (1908). (T. M. L.)

LOLLIUS, MARCUS, Roman general, the first governor of Galatia (25 B.C.), consul in 21. In 16, when governor of Gaul, he was defeated by the Sigambri (Sygambri), Usipetes and Tencteri, German tribes who had crossed the Rhine. This defeat is coupled by Tacitus with the disaster of Varus, but it was disgraceful rather than dangerous. Lollius was: subse- quently (2 B.C.) attached in the capacity of tutor and adviser to Gaius Caesar (Augustus’s grandson) on his mission to the East. He was accused of extortion and treachery to the state, and denounced by Gaius to the emperor. To avoid punishment he is said to have taken poison. According to Velle’ius Paterculus and Pliny, he was a hypocrite and cared for nothing but amassing wealth. It was formerly thought that this was the Lollius whom Horace described as a model of integrity and superior to avarice in Od. iv. 9, but it seems hardly likely that this Ode, as well as the two Lollian epistles of Horace (i. 2 and 18), was addressed to him. All three must have been addressed to the same individual, a young man, probably the son of this Lollius.

See Suetonius, Augustus, 23, Tiberius, 12; Veil. Pat. ii. 97. 102; Tacitus, Annals, i. 10,. iii. 48; “Pliny, Nat. Hist. ix. 35 (58); Dio. Cassius, liv. 6; see also J. C. Tarver, Tiberius the Ty rant (1902), pp. 200 foil.

LOLOS, the name given by the Chinese to a large tribe of aborigines who inhabit the greater part of southern Szechuen. Their home is in the mountainous country called Taliang shan, which lies between the Yangtsze river on the east and the Kien ch’ang

valley on the west, in south Szechuen, but they are found in scattered communities as far south as the Burmese frontier, and west to the Mekong. There seems no reason to doubt that they were, like the Miaotze, one of the aboriginal tribes of China, driven southwards by the advancing flood of Chinese. The name is said to be a Chinese corruption of Lulu, the name of a former chieftain of a tribe who called themselves Nersu., Their language, like the Chinese, is monosyllabic and probably ideographic, and the characters bear a certain resemblance to Chinese. No literature, however, worthy of the name is known to exist, and few can read and write. Politically they are divided into tribes, each under the government of a hereditary chieftain. The community consists of three classes, the " blackbones" or nobles, the " whitebones " or plebeians, and the watze or slaves. The last are mostly Chinese captured in forays, or the descendants of such captives. Within Lolo-land proper, which covers some 1 1 ,000 sq.m. , the Chinese government exercises no jurisdiction. The Lolos make frequent raids on their unarmed Chinese neighbours. They cultivate wheat, barley and millet, but little rice. They have some knowledge of metals, making their own tools and weapons. Women are said to be held in respect, and may become chiefs of the tribes. They do not intermarry with Chinese.

See A. F. Legendre, " Les Lolos. Etude ethnologique et anthro- pologique," in T'oung Pao II., vol. x. (1909); E. C. Baber, Royal Geog. Society Sup. Papers, vol. i. (London, 1882); F. S. A, Bourne, Blue Book, China, No. 1 (1888); A. Hosie, Three Years in Western China (London, 1897).

LOMBARD LEAGUE, the name given in general to any league of the cities of Lombardy, but applied especially to the league founded in 1167, which brought about the defeat of the emperor Frederick I. at Legnano, and the consequent destruction of his plans for obtaining complete authority over Italy.

Lacking often the protection of a strong ruler, the Lombard cities had been accustomed to act together for mutual defence* and in 1093 Milan, Lodi, Piacenza and Cremona formed an alliance against the emperor Henry IV., in favour of his rebellious son Conrad. The early years of the reign of Frederick I. were largely spent in attacks on the privileges of the cities of Lombardy. This led to a coalition, formed in March 1167, between the cities of Cremona, Mantua, Bergamo and Brescia to confine Frederick to the rights which the emperors had enjoyed for the past hundred years. This league or concordia was soon joined by other cities, among which were Milan, Parma, Padua, Verona, Piacenza and Bologna, and the allies began to build a fortress near the confluence of the Tanaro and the

Bormida, which, in honour of Pope Alexander III., was called Alessandria. During the absence of Frederick from Italy from 1168 to 1 1 74, the relations between the pope and the league became closer, and Alexander became the leader of the alliance. Meetings of the league were held in 1172 and 11 73 to strengthen the bond, and to concert measures against the emperor, the penalties of the church being invoked to prevent defection. The decisive struggle began when Frederick attacked Alessandria in 1 1 74. The fortress was bravely defended, and the siege was raised on the approach of succour from the allied cities. Negotiations for peace failed, and the emperor, having marched against Milan, suffered a severe defeat at Legnano on the 29th of May n 76. Subsequently Pope Alexander was detached from his allies, and made peace with Frederick, after which a truce for six years was arranged between the emperor and the league. Further negotiations ripened into the peace of Constance signed on the 25th of June 1183, which granted almost all the demands of the cities, and left only a shadowy authority to the emperor (see Italy).

In 1226, when the emperor Frederick II. avowed his intention of restoring the imperial authority in Italy, the league was renewed, and at once fifteen cities, including Milan

and Verona, were placed under the ban. Frederick, however, was not in a position to fight, and the mediation of Pope Honorius III. was successful in restoring peace. In 1231 the hostile intentions of the emperor once more stirred the cities into activity. They held a meeting at Bologna and raised an army, but as in 1226, the matter ended in mutual fulminations and defiances. A more serious conflict arose in 1234. The great question at issue, the nature and extent of the imperial authority over the Lombard cities, was still unsettled when Frederick's rebellious son, the German king Henry VII., allied himself with them. Having crushed his son and rejected the proffered mediation of Pope Gregory IX., the emperor declared war on the Lombards in 1236; he inflicted a serious defeat upon their forces at Cortenuova in November 1237 and met with other successes, but in 1238 he was beaten back from before Brescia. In 1239 Pope Gregory joined the cities and the struggle widened out into the larger one of the Empire and the Papacy. This was still proceeding when Frederick died in December 1250 and it was only ended by the overthrow of the Hohenstaufen and the complete destruction of the imperial authority in Italy.

For a full account of the Lombard League see C. Vignati, Storia iiplomata delta Lego. Lombarda (Milan, 1866); H. Prutz, Kaiser Friedrich I., Band ii. (Danzig, 1871-1874); W. von Giesebrecht, Geschichte der deutschen Kaiserzeit, Band v. (Leipzig, 1888); and J. Ficker, Zur Geschichte des Lombardenbundes (Vienna, 1868).

LOMBARDO, the name of a family of Venetian sculptors and architects; their surname was apparently Solaro, and the name of Lombardo was given to the earliest known, Martino, who emigrated from Lombardy to Venice in the middle of the 15th century and became celebrated as an architect. He had two sons, Moro and Pietro, of whom the latter (c. 1435-1515) was one of the greatest sculptors and architects of his time, while his sons Antonio (d. 1516) and Tullio (d. 1559) were hardly less celebrated. Pietro's work as an architect is seen in numerous churches, the Vendramini-Calargi palace (1481), the doge's palace (1498), the facade (1485) of the scuola of St Mark and the cathedral of Cividale del Friuli (1502); but he is now more famous as a sculptor, often in collaboration with his sons; he executed the tomb of the doge Mocenigo (1478) in the church of San Giovanni e Paolo at Venice, and a bas-relief for the tomb of Dante at Ravenna, and in 1483 began the beautiful decorations in the church of Sta Maria de' Miracoli at Venice, which is associated with his workshop (see also Venice for numer- ous references to the work of the Lombardi). Antonio's master- piece is the marble relief of St Anthony making a new-born child speak in defence of its mother's honour, in the Santo at Padua (1505). Tullio's best-known works are the four kneeling angels (1484) in the church of San Martino, Venice, a coronation of the Virgin in San Giovanni Crisostomo and two bas-reliefs in the Santo, Padua, besides two others formerly in the Spitzer collec-

tion, representing Vulcan's Forge and Minerva disputing with Neptune.

LOMBARDS, or Langobardi, a Suevic people who appear to have inhabited the lower basin of the Elbe and whose name is believed to survive in the modern Bardengau to the south of Hamburg. They are first mentioned in connexion with the year a.d. 5, at which time they were defeated by the Romans under Tiberius, afterwards emperor. In a.d. 9, however, after the destruction of Varus's army, the Romans gave up their attempt to extend their frontier to the Elbe. At first, with most of the Suevic tribes, they were subject to the hegemony of Maroboduus, king of the Marcomanni, but they revolted from him in his war with Arminius, chief of the Cherusci, in the year 17. We again hear of their interference in the dynastic strife of the Cherusci some time after the year 47. From this time they are not mentioned until the year 165, when a force of Langobardi, in alliance with the Marcomanni, was defeated by the Romans, apparently on the Danubian frontier. It has been inferred from this incident that the Langobardi had already moved south- wards, but the force mentioned may very well have been sent from the old home of the tribe, as the various Suevic peoples seem generally to have preserved some form of political union. From this time onwards we hear no more of them until the end of the 5th century.

In their own traditions we are told that the Langobardi were originally called Winnili and dwelt in an island named Scadi- navia (with this story compare that of the Gothic migration, see Goths). Thence they set out under the leadership of Ibor and Aio, the sons of a prophetess called Gambara, and came into conflict with the Vandals. The leaders of the latter prayed to Wodan for victory, while Gambara and her sons invoked Frea. Wodan promised to give victory to those whom he should see in front of him at sunrise. Frea directed the Winnili to bring their women with their hair let down round their faces like beards and turned Wodan's couch round so that he faced them. When Wodan awoke at sunrise he saw the host of the Winnili and said, " Qui sunt isti Longibarbi?" — " Who are these long-beards?" — and Frea replied, " As thou hast given them the name, give them also the victory." They conquered in the battle and were thenceforth known as Langobardi. After this they are said to have wandered through regions which cannot now be identified, apparently between the Elbe and the Oder, under legendary kings, the first of whom was Agilmund, the son of Aio. ' Shortly before the end of the 5th century the Langobardi appear to have taken possession of the territories formerly occupied by the Rugii whom Odoacer had overthrown in 487, a region which probably included the present province of Lower Austria. At this time they were subject to Rodulf, king of the Heruli, who, however, took up arms against them; according to one story, owing to the treacherous murder of Rodulf's brother, according to another through an irresistible desire for fighting on the part of his men. The result was the total defeat of the Heruli by the Langobardi under their king Tato and the death of Rodulf at some date between 493 and 508. By this time the Langobardi are said to have adopted Christianity in its Arian form. Tato was subsequently killed by his nephew Waccho. The latter' reigned for thirty years, though frequent attempts were made by Ildichis, a son or grandson of Tato, to recover the throne. Waccho is said to have conquered ftie Suabi, possibly the Bavarians, and he was also involved in strife with the Gepidae, with whom Ildichis had taken refuge. He was succeeded by his youthful son Walthari, who reigned only seven years under the guardianship of a certain Audoin. On Walthari's death (about 546 ?) Audoin succeeded. He also was involved in hostilities with the Gepidae, whose support of Ildichis he repaid by protecting Ustrogotthus, a rival of their king Thorisind. In these quarrels both nations aimed at ob- taining the support of the emperor Justinian, who, in pursuance of his policy of playing off one against the other, invited the Langobardi into Noricum and Pannonia, where they now settled. A large force of Lombards under Audoin fought on the imperial side at the battle of the Apennines against the Ostrogothic king

5 Totila in 553, but the assistance of Justinian, though often promised, had no effect on the relations of the two nations, which were settled for the moment after a series of truces by the victory of the Langobardi, probably in 554. The resulting peace was sealed by the murder of Ildichis and Ustrogotthus, and the Langobardi seem to have continued inactive until the death of Audoin, perhaps in 565, and the accession of his son Alboin, who had won a great reputation in the wars with the Gepidae. It was about this time that the Avars, under their first Chagun Baian, entered Europe, and with them, Alboin is said to have made an alliance against the Gepidae under their new king Cunimund. The Avars, however, did not take part in the final battle, in which the Langobardi were completely victorious. Alboin, who had slain Cunimund in the battle, now took Rosa- mund, daughter of the dead king, to be his wife.

In 568 Alboin and the Langobardi, in accordance with a compact made with Baian, which is recorded by Menander, abandoned their old homes to the Avars and passed southwards into Italy, were they were destined to found a new and mighty kingdom. (F. G. M. B.)

The Lombard Kingdom in Italy. — In 568 Alboin, king of the Langobards, with the women and children of the tribe and all their possessions, with Saxon allies, with the

subject tribe of the Gepidae and a mixed host of other barbarians, descended into Italy by the great plain at the head of the Adriatic. The war which had ended in the downfall of the Goths had exhausted Italy; it was followed by famine and pestilence; and the government at Constantinople made but faint efforts to retain the province which Belisarius and Narses had recovered for it. Except in a few fortified places, such as Ticinum or Pavia, the Italians did not venture to encounter the new invaders; and, though Alboin was not without generosity, the Lombards, wherever resisted, justified the opinion of their ferocity by the savage cruelty of the invasion. In 5 7 2, according to the Lombard chronicler, Alboin fell a victim to the revenge of his wife Rosa- mund, the daughter of the king of the Gepidae, whose skull Alboin had turned into a drinking cup, out of which he forced Rosamund to drink. By this time the Langobards had estab- lished themselves in the north of Italy. Chiefs were placed, or placed themselves, first in the border cities, like Friuli and Trent, which commanded the north-eastern passes, and then in other principal places; and this arrangement became characteristic of the Lombard settlement. The principal seat of the settlement was the rich plain watered by the Po and its affluents, which was in future to receive its name from them; but their power ex- tended across the Apennines into Liguria and Tuscany, and then southwards to the outlying dukedoms of Spoleto and Benevento. The invaders failed to secure any maritime ports or any territory that was conveniently commanded from the sea. Ticinum (Pavia), the one place which had obstinately resisted Alboin, became the seat of their kings.

After the short and cruel reign of Cleph, the successor of Alboin, the Lombards (as we may begin for convenience sake to call them) tried for ten years the experiment of a national confederacy of their dukes (as, after the Latin writers, their chiefs are styled), without any king. It was the rule of some thirty-five or thirty-six petty tyrants, under whose oppression and private wars even the invaders suffered. With anarchy among themselves and so precarious a hold on the country, hated by the Italian population and by the Catholic clergy, threatened also by an alliance of the Greek empire with their persistent rivals the Franks beyond the Alps, they resolved to sacrifice their independence and elect a king. In 584 they chose Authari, the grandson of Alboin, and endowed the royal domain with a half of their possessions. From this time till the fall of the Lombard power before the arms of their rivals the Franks under Charles the Great, the kingly rule continued. Authari, " the Long- haired," with his Roman title of Flavius, marks the change from the war king of an invading host to the permanent repre- sentative of the unity and law of the nation, and the increased power of the crown, by the possession of a great domain, to enforce its will. The independence of the dukes was surrendered to the

king. The dukedoms in the neighbourhood of the seat of power were gradually absorbed, and their holders transformed into royal officers. Those of the northern marches, Trent and Friuli, with the important dukedom of Turin, retained longer the kind of independence which marchlands usually give where invasion is to be feared. The great dukedom of Benevento in the south, with its neighbour Spoleto, threatened at one time to be a separate principality, and even to the last resisted, with varying success, the full claims of the royal authority at Pavia.

The kingdom of the Lombards lasted more than two hundred years, from Alboin (568) to the fall of Desiderius (774) — much longer than the preceding Teutonic kingdom of Theodoric and the Goths. But it differed from the other Teutonic conquests in Gaul, in Britain, in Spain. It was never complete in point of territory: there were always two, and almost to the last three, capitals — the Lombard one, Pavia; the Latin one, Rome; the Greek one, Ravenna; and the Lombards never could get access to the sea. And it never was complete over the subject race: it profoundly affected the Italians of the north; in its turn it was entirely transformed by contact with them; but the Lombards never amalgamated with the Italians till their power as a ruling race was crushed by the victory given to the Roman element by the restored empire of the Franks. The Langobards, German in their faults and in their strength, but coarser, at least at first, than the Germans whom the Italians had known, the Goths of Theodoric and Totila, found themselves continually in the presence of a subject population very different

from anything which the other Teutonic conquerors met with among the provincials — like them, exhausted, dispirited, unwarlike, but with the remains and memory of a great civilization round them, intelligent, subtle, sensitive, feeling themselves infinitely superior in experience and knowledge to the rough barbarians whom they could not fight, and capable of hatred such as only cultivated races can nourish. The Lombards who, after they had occupied the lands and cities of Upper Italy, still went on send- ing forth furious bands to plunder and destroy where they did not care to stay, never were able to overcome the mingled fear and scorn and loathing of the Italians. They adapted themselves very quickly indeed to many Italian fashions. Within thirty years of the invasions, Authari took the imperial title of Flavius, even while his bands were leading Italian captives in leash like dogs under the walls of Rome, and under the eyes of Pop£ Gregory; and it was retained by his successors. They soon became Catholics; and then in all the usages of religion, in church building, in founding monasteries, in their veneration for relics, they vied with Italians. Authari's queen, Theodelinda, solemnly placed the Lombard nation under the patronage of St John the Baptist, and at Monza she built in his honour the first Lombard church, and the royal palace near it. King Liutprand (7 1 2- 744) bought the relics of St Augustine for a large sum to be placed in his church at Pavia. Their Teutonic speech dis- appeared; except in names and a few technical words all traces of it are lost. But to the last they had the unpardonable crime of being a ruling barbarian race or caste in Italy. To the end they are " nefandissimi," execrable, loathsome, filthy. So wrote Gregory the Great when they first appeared. So wrote Pope Stephen IV., at the end of their rule, when stirring up the kings of the Franks to destroy them.

Authari's short reign (584-591) was one of renewed effort for conquest. It brought the Langobards face to face, not merely with the emperors at Constantinople, but with the first of the great statesmen popes, Gregory the Great (590-604). But Lombard conquest was bungling and wasteful; when they had spoiled a city they proceeded to tear down its walls and raze it to the ground. Authari's chief connexion with the fortunes of his people was an important, though an accidental one. The Lombard chronicler tells a romantic tale of the way in which Authari sought his bride from Garibald, duke of the Bavarians, how he went incognito in the embassy to judge of her attractions, and how she recognized her disguised suitor. The bride was the Christian Theodelinda, and she became to the Langobards what Bertha was to the Anglo-Saxons and Clotilda to the Franks.

She became theˆnediator between the Lombards and the Catholic Church. Authari, who had brought her to Italy, died shortly after his marriage. But Theodelinda had so won on the Lombard chiefs that they bid her as queen choose the one among them whom she would have for her husband and for king. She chose Agilulf, duke of Turin (592-61 5). He was not a true Langobard, but a Thuringian. It was the beginning of peace between the Lombards and the Catholic clergy. Agilulf could not abandon his traditional Arianism, and he was a very uneasy neighbour, not only to the Greek exarch, but to Rome itself. But he was favourably disposed both to peace and to the Catholic Church. Gregory interfered to prevent a national conspiracy against the Langobards, like that of St Brice's day in England against the Danes, or that later uprising against the French, the Sicilian Vespers. He was right both in point of humanity and of policy. The Arian and Catholic bishops went on for a time side by side; but the Lombard kings and clergy rapidly yielded to the religious influences around them, even while the national antipathies continued unabated and vehement. Gregory, who despaired of any serious effort on the part of the Greek emperors to expel the Lombards, endeavoured to promote peace between the Italians and Agilulf; and, in spite of the feeble hostility of the exarchs of Ravenna, the pope and the king of the Lombards became the two real powers in the north and centre of Italy. Agilulf was followed, after two unimportant reigns, by his son-in-law, the husband of Theodelinda's daughter, King Rothari (636-652), the Lombard legislator, still an Arian

though he favoured the Catholics. He was the first of their kings who collected their customs under the name of laws — and he did this, not in their own Teutonic dialect, but in Latin. The use of Latin implies that the laws were to be not merely the personal law of the Lombards, but the law of the land, binding on Lombards and Romans alike. But such rude legislation could not provide for all questions arising even in the decayed state of Roman civilization. It is probable that among themselves the Italians kept to their old usages and legal precedents where they were not overridden by the conquerors' law, and by degrees a good many of the Roman civil arrangements made their way into the Lombard code, while all ecclesiastical ones, and they were a large class, were untouched by it.

There must have been much change of property; but appearances are conflicting as to the terms on which land generally was held by the old pftssessors or the new comers, and as to the relative legal position of the two. Savigny held that, making allowance for the anomalies and usurpations of conquest, the Roman population held the bulk of the land as they had held it before, and were governed by an uninterrupted and acknowledged exercise of Roman law in their old municipal organization. Later inquirers, including Leo, Troya and Hegel, have found that the supposition does not tally with a whole series of facts, which point to a Lombard territorial law ignoring completely any parallel Roman and personal law, to a great restriction of full civil rights among the Romans, analogous to the condition of the rayah under the Turks, and to a reduction of the Roman occupiers to a class of half-free " aldii," holding immovable tenancies under lords of superior race and privilege, and subject to the sacrifice either of the third part of their holdings or the third part of the produce. The Roman losses, both of property and rights, were likely to be great at first; how far they continued permanent during the two centuries of the Lombard kingdom, or how far the legal distinctions between Rome and Lombard gradually passed into desuetude, is a further question. The legislation of the Lombard kings, in form a territorial and not a personal law, shows no signs of a disposition either to depress or to favour the Romans, but only the purpose to maintain, in a rough fashion, strict order and discipline impartially among all their subjects.

From Rothari (d. 652) to Liutprand (712-744) the Lombard kings, succeeding one another in the irregular fashion of the time, sometimes by descent, sometimes by election, sometimes by conspiracy and violence, strove fitfully to enlarge their boundaries, and contended with the aristocracy of dukes inherent in the original organization of the nation, an element which, though much weakened, always embarrassed the power of the crown, and checked the unity of the nation. Their old enemies the Franks on the west, and the Slavs or Huns, ever ready to break in on the north-east, and sometimes called in by mutinous and traitorous dukes of Friuli and Trent, were constant and serious dangers. By the popes, who represented Italian interests, they

were always looked upon with dislike and jealousy, even when they had become zealous Catholics, the founders of churches and monasteries; with the Greek empire there was chronic war. From time to time they made raids into the unsubdued parts of Italy, and added a city or two to their dominions. But there was no sustained effort for the complete subjugation of Italy till Liutprand, the most powerful of the line. He tried it, and failed. He broke up the independence of the great southern duchies, Benevento and Spoleto. For a time, in the heat of the dispute about images, he won, the pope to his side against the Greeks. For a time, but only for a time, he deprived the Greeks of Ravenna. Aistulf, his successor, carried on the same policy. He even threatened Rome itself, and claimed a capitation tax. But the popes, thoroughly irritated and alarmed, and hopeless of aid from the East, turned to the family which was rising into power among the Franks of the West, the mayors of the palace of Austrasia. Pope Gregory III. applied in vain to Charles Martel. But with his successors Pippin and Charles the popes were more successful. In return for the transfer by the pope of the Frank crown from the decayed line of Clovis to his own, Pippin crossed the Alps, defeated Aistulf and gave to the pope the lands which Aistulf had torn from the empire, Ravenna and the Pentapolis (754-756). But the angry quarrels still went on between the popes and the

Lombards. The Lombards were still to the Italians a ” foul and horrid ” race. At length, invited by Pope Adrian I., Pippin’s son Charlemagne once more descended into Italy. As the Lombard kingdom began, so it ended, with a siege of Pavia. Desiderius, the last king, became a prisoner (774), and the Lombard power perished. Charlemagne, with the title of king of the Franks and Lombards, became master of Italy, and in 800 the pope, who had crowned Pippin king of the Franks , claimed to bestow the Roman empire, and crowned his greater son emperor of the Romans (800).

Effects of the Carolingian Conquest. — To Italy the overthrow of the Lombard kings was the loss of its last chance of independ- ence and unity. To the Lombards the conquest was the destruc- tion of their legal and social supremacy. Henceforth they were equally with the Italians the subjects of the Frank kings. The Carolingian kings expressly recognized the Roman law, and allowed all who would be counted Romans to ” profess ” it. But Latin influences were not strong enough to extinguish the Lombard name and destroy altogether the recollections and habits of the Lombard rule; Lombard law was still recog- nized, and survived in the schools of Pavia. Lombardy re- mained the name of the finest province of Italy, and for a time was the name for Italy itself But what was specially Lombard could not stand in the long run against the Italian atmosphere which surrounded it. Generation after generation passed more and more into real Italians. Antipathies, indeed, survived, and men even in the 10th century called each other Roman or Langobard as terms of reproach. But the altered name of Lombard also denoted henceforth some of the proudest of Italians; and, though the Lombard speech had utterly perished their most common names still kept up the remembrance that their fathers had come from beyond the Alps.

But the establishment of the Frank kingdom, and still more the re-establishment of the Christian empire as the source of law and jurisdiction in Christendom, had momentous influence on the history of the Italianized Lombards. The Empire was the counterweight to the local tyrannies into which the local authorities established by the Empire itself, the feudal powers, judicial and military, necessary for the purposes of government, invariably tended to degenerate. When they became intolerable, from the Empire were sought the exemptions, privileges, im- munities from that local authority, which, anomalous and anarchical as they were in theory, yet in fact were the foundations of all the liberties of the middle ages in the Swiss cantons, in the free towns of Germany and the Low Countries, in the Lombard cities of Italy. Italy was and ever has been a land of cities; and, ever since the downfall of Rome and the decay of the municipal system, the bishops of the cities had really been at the head of the peaceful and industrial part of their population.

and were a natural refuge for the oppressed, and sometimes for the mutinous and the evil doers, from the military and civil powers of the duke or count or judge, too often a rule of cruelty or fraud. Under the Carolingian empire, a vast system grew up in the North Italian cities of episcopal ” immunities,” by which a city with its surrounding district was removed, more or less completely, from the jurisdiction of the ordinary authority, military or civil, and placed under that of the bishop. These ” immunities ” led to the temporal sovereignty of the bishops; under it the spirit of liberty grew more readily than under the military chief. Municipal organization, never quite forgotten, naturally revived under new forms, and with its ” consuls ” at the head of the citizens, with its “arts “and “crafts” and ” gilds,” grew up secure under the shadow of the church. In due time the city populations, free from the feudal yoke, and safe within the walls which in many instances the bishops had built for them, became impatient also of the bishop’s govern- ment. The cities which the bishops had made thus independent of the dukes and counts next sought to be free from the bishops; in due time they too gained their charters of privilege and liberty. Left to take care of themselves, islands in a sea of turbulence, they grew in the sense of self-reliance and independence; they grew also to be aggressive, quarrelsome and ambitious. Thus, by the nth century, the

Lombard cities had become “com- munes,” commonalties, republics, managing their own affairs, and ready for attack or defence. Milan had recovered its great- ness, ecclesiastically as well as politically; it scarcely bowed to Rome, and it aspired to the position of a sovereign city, mistress over its neighbours. At length, in the 12th century, the inevit- able conflict came between the republicanism of the Lombard cities and the German feudalism which still claimed their allegiance in the name of the Empire. Leagues and counter- leagues were formed; and a confederacy of cities, with Milan at its head, challenged the strength of Germany under one of its sternest emperors, Frederick Barbarossa. At first Frederick was victorious; Milan, except its churches, was utterly destroyed; everything that marked municipal independence was abolished in the ”’ rebel ” cities; and they had to receive an imperial magistrate instead of their own (1158-1162). But the Lombard league was again formed. Milan was rebuilt, with the help even of its jealous rivals, and at Legnano (1176) Frederick was utterly defeated. The Lombard cities had regained their independence; and at the peace of Constance (1183) Frederick found himself compelled to confirm it.

From the peace of Constance the history of the Lombards is merely part of the history of Italy. Their cities went through the ordinary fortunes of most Italian cities. They quarrelled and fought with one another. They took opposite sides in the great strife of the time between pope and emperor, and were Guelf and Ghibelline by old tradition, or as one or other faction prevailed in them. They swayed backwards and forwards between the power of the people and the power of the few; but democracy and oligarchy passed sooner or later into the hands of a master who veiled his lordship under various titles, and generally at last into the hands of aˆ family. Then, in the larger political struggles and changes of Europe, they were incorporated into a kingdom, or principality or duchy, carved out to suit the interest of a foreigner, or to make a heritage for the nephew of a pope. But in two ways especially the energetic race which grew out of the fusion of Langobards and Italians between the 9th and the 12th centuries has left the memory of itself. In England, at least, the enterprising traders and bankers who found their way to the West, from the 13th to the 16th centuries, though they certainly did not all come from Lombardy, bore the name of Lombards. In the next place, the Lombards or the Italian builders whom they employed or followed, the ” masters of Como,” of whom so much is said in the early Lombard laws, introduced a manner of building, stately, solemn and elastic, to which their name has been attached, and which gives a character of its own to some of the most interesting churches in Italy. (R. W. C.)

LOMBARDY, a territorial division of Italy, bounded N. by the Alps, S. by Emilia, E. by Venetia and W. by Piedmont. It is divided into eight provinces, Bergamo, Brescia, Como, Cremona, Mantua, Milan, Pavia and Sondrio, and has an area of 9386 sq. m. Milan, the chief city, is the greatest railway centre of Italy; it is in direct communication not only with the other principal towns of Lombardy and the rest of Italy but also with the larger towns of France, Germany and Switzerland,

being the nearest great town to the tunnels of the St Gothard and the Simplon. The other railway centres of the territory are Mortara, Pavia and Mantua, while every considerable town is situated on or within easy reach of the railway, this being rendered comparatively easy owing to the relative flatness of the greater part of the country. The line from Milan to Porto Ceresio is worked in the main by electric motor driven trains, while on that from Lecco to Colico and Chiavenna over-head wires are adopted. The more remote districts and the immediate environs of the larger town are served by steam tramways and electric railways. The most important rivers are the Po, which follows, for the most part, the southern boundary of Lombardy, and the Ticino, one of the largest tributaries of the Po, which forms for a considerable distance the western boundary. The majority of the Italian lakes, those of Garda, Idro, Iseo, Como, Lugano, Varese and Maggiore, lie wholly or in part within it. The climate of Lombardy is thoroughly continental; in summer the heat is greater than in the south of Italy, while the winter is very cold, and bitter winds, snow and mist are frequent. In the summer rain is rare beyond the lower Alps, but a system of irriga- tion, unsurpassed in Europe, and dating from the middle ages, prevails, so that a failure of the crops is

hardly possible. There are three zones of cultivation: in the mountains, pasturage; the lower slopes are devoted to the culture of the vine, fruit- trees (including chestnuts) and. the silkworm; while in the regions of the plain, large crops of maize, rice, wheat, flax, hemp and wine are produced, and thousands of mulberry-trees are grown for the benefit of the silkworms, the culture of which in the province of Milan has entirely superseded the sheep-breeding for which it was famous during the middle ages. Milan is indeed the principal silk market in the world. In 1905 there were 490 mills reeling silk in Lombardy, with 35,407 workers, and 276 throwing-mills with 586,000 spindles. The chief centre of silk weaving is Como, but the silk is commercially dealt with at Milan, and there is much exportation. A considerable amount of cotton is manufactured, but most of the raw cotton (600,000 bales) is imported, the cultivation being insignificant in Italy. There are 400 mills in Lombardy, 277 of which are in the province of Milan. The largest linen and woollen mills in Italy are situated at Fara d'Adda. Milan also manufactures motor-cars, though Turin is the principal centre in Italy for this industry. There are copper, zinc and iron mines, and numerous quarries of marble, alabaster and granite. In addition to the above industries the chief manufactures are hats, rope and paper-making, iron-casting, gun-making, printing and lithography. Lombardy is indeed the most industrial district of Italy. In parts the peasants suffer much from pellagra.

The most important towns with their communal population in the respective provinces, according to the census of 1901, are Bergamo (46,861), Treviglio (14,897), total of province 467,549, number of communes 306; Brescia (69,210), Chiari (10,749), total of province 541,765, number of communes 280; Como (38,174), Varese (17,666), Cantu (10,725), Lecco (10,352), total of province 594,304, number of communes 510; Cremona (36,848), Casalmaggiore (16,407), Soresina (10,358), total of province 329,471, number of communes 133; Mantua (30,127), Viadana (16,082), Quistello (11,228), Suzzara (11,502), St Benedetto Po (10,908), total of province 315,448, number of communes 68; Milan (490,084), Monza (42,124), Lodi (26,827), Busto Arsizio (20,005), Legnano (18,285), Seregno (12,050), Gallarate (11,952), Codogno (11,925), total of province 1,450,214, number of com- munes 297; Pavia (33,922), Vigevano (23,560), Voghera (20,442), total of province 504,382, number of communes 221; Sondrio (7077), total of province 130,966, number of communes 78. The total population of Lombardy was 4,334,099. In most of the provinces of Lombardy there are far more villages than in other parts of Italy except Piedmont; this is attributable partly to their mountainous character, partly perhaps to security from attack by sea (contrast the state of things in Apulia).

Previous to the fall of the Roman republic Lombardy formed a part of Gallia Transpadana, and it was Lombardy, Venetia and Piedmont, the portion of the Italian peninsula N. of the Po,

that did not receive citizenship in 89 B.C. but only Latin rights. The gift of full citizenship in 49 B.C. made it a part of Italy proper, and Lombardy and Piedmont formed the nth region of Augustus (Transpadana) while Venetia and Istria formed the 10th. It was the second of the regions of Italy in size, but the last in number of towns; it appears, however, to have been prosperous and peaceful, and cultivation flourished in its fertile portions. By the end of the 4th century a.d. the name Liguria had been extended over it, and Milan was regarded as the capital of both. Stranger still, in the 6th century the old Liguria was separated from it, and under the name of Alpes Coltiae formed the 5th Lombard province of Italy.

For details of subsequent history see Lombards and Italy; and for architecture see Architecture. G. T. Rivoira in Origini deW Architelturo Lombarda (2 vols. Rome, 1901-1907), successfully demonstrates the classical origin of much that had hitherto been treated by some authorities as " Byzantine." In the development of Renaissance

architecture and art Lombardy played a great part, inasmuch as both Bramante and Leonardo da Vinci resided in Milan at the end of the 15th century.

LOMBOK (called by the natives Sasak), one of the Lesser Sunda Islands, in the Dutch East Indies, E. of Java, between 8° 12′ and 9* 1′ S. and 115° 46′ and 116° 40′ E., with an area of 3136 sq. m. It is separated from Bali by the Strait of Lombok and from Sumbawa by the Strait of Alas. Rising out of the sea with bold and often precipitous coasts, Lombok is traversed by two mountain chains. The northern chain is of volcanic formation, and contains the peak of Lombok (11,810 ft.), one of the highest volcanoes in the Malay Archipelago. It is surrounded by a plateau (with lower summits, and a magnificent lake, Segara Anak) 8200 ft. high. The southern chain rises a little over 3000 ft. Between the two chains is a broad valley or terrace with a range of low volcanic hills. Forest-clad mountains and stretches of thorny jungle alternating with rich alluvial plains, cultivated like gardens under an ancient and elaborate system of irrigation, make the scenery of Lombok exceedingly attractive. The small rivers serve only for irrigation and the growing of rice, which is of superior quality. In the plains are also grown coffee, indigo, maize and sugar, katyang (native beans), cotton and tobacco. All these products are exported. To the naturalist Lombok is of particular interest as the frontier island of the Australian region, with its cockatoos and megapods or mound- builders, its peculiar bee-eaters and ground thrushes. The Sasaks must be considered the aborigines, as no trace of an earlier race is found. They are Mahommedans and distinct in many other respects from the Hindu Balinese, who vanquished but could not convert them. The island was formerly divided into the four states of Karang-Asam Lombok on the W. side, Mataram in the N.W., Pagarawan in the S.W. and Pagutan in the E. Balinese supremacy dated from the conquest by Agong Dahuran in the beginning of the 19th century; the union under a single raja tributary to Bali dated from 1839. In July 1894 a Dutch expedition landed at Ampanam, and advanced towards Mataram, the capital of the Balinese sultan, who had defied Dutch authority and refused to send the usual delegation to Batavia. The objects of that expedition were to punish Mataram and to redress the grievances of the Sasaks whom the Balinese held in cruel subjection. The first Dutch expedition met with reverses, and ultimately the invaders were forced back upon Ampanam. The Dutch at once despatched a much stronger expedition, which landed at Ampanam in September. Mataram was bombarded by the fleet, and the troops stormed the sultan's stronghold, and Tjakra Negara, another chieftain's citadel, both after a desperate resistance. The old sultan of Mataram was captured, and he and other Balinese chiefs were exiled to different parts of the Malay Archipelago, whilst the sultan's heir fell at the hands of his warriors. Thus ended the Balinese domination of Lombok, and the island was placed under direct Dutch-Indian control, an assistant resident being appointed at Ampanam. Lombok is now administered from Bali by the Dutch resident on that island. The people, however, are in undisturbed exercise of their own laws, religions, customs and institutions. Disturbances between the Sasaks and the Lombok

Balinese frequently occur. Lombok has been divided since 1898 into the West, Middle and East Lombok. Its chief towns are Mataram, Praya and Sisi. On the west coast the harbour of Ampanam is the most frequented, though, on account of heavy breakers, it is often difficult of approach. The Sasaks are estimated at 320,000, the Balinese at 50,000, Europeans number about 40, Chinese 300, and Arabs 170.

See A. R. Wallace, Malay Archipelago (London, 1869, and later editions). The famous " Wallace's Line " runs immediately west of Lombok, which therefore has an important part in the work. Captain W. Cool, With the Dutch in the East (Amsterdam and London, 1897), in Dutch and English, is a narrative of the events sketched above, and contains many particulars about the folklore and dual religions of Lombok, which, with Bali, forms the last stronghold of Hinduism east of Java.

LOMBROSO, CESARE (1836-1909), Italian criminologist, was born on the 18th of November 1836 at Verona, of a Jewish family. He studied at Padua, Vienna and Paris, and was in 1862 appointed professor of psychiatry at Pavia, then director of the lunatic asylum at Pesaro, and later professor of forensic medicine and of psychiatry at Turin,

where he eventually filled the chair of criminal anthropology. His works, several of which have been translated into English, include L'Uomo de- linquente (1889); L'Uomo di genio (1888) Genio e follia (1877) and La Donna delinquente (1893). In 1872 he had made the notable discovery that the disorder known as pellagra was due (but see Pellagra) to a poison contained in diseased maize, eaten by the peasants, and he returned to this subject in La Pellagra in Italia (1885) and other works. Lombroso, like Giovanni Bovio (b. 1841), Enrico Ferri (b. 1856) and Colajanni, well-known Italian criminologists, and his sons-in-law G. Ferrero and Carrara, was strongly influenced by Auguste Comte, and owed to him an exaggerated tendency to refer all mental facts to biological causes. In spite of this, however, and a serious want of accuracy and discrimination in handling evidence, his work made an epoch in criminology; for he surpassed all his predecessors by the wide scope and systematic character of his researches, and by the practical conclusions he drew from them. Their net theoretical results is that the criminal population exhibits a higher percentage of physical, nervous and mental anomalies than non-criminals; and that these anomalies are due partly to degeneration, partly to atavism. The criminal is a special type of the human race, standing midway between the lunatic and the savage. This doctrine of a " criminal type "has been gravely criticized, but is admitted by all to contain a substratum of truth. The practical reform to which it points is a classification of offenders, so that the born criminal may receive a different kind of punishment from the offender who is tempted into crime by circumstances (see also Criminology). Lombroso's biological principles are much less successful in his work on Genius, which he explains as a morbid, degenerative condition, presenting analogies to insanity, and not altogether alien to crime. In 1899 he published in French a book which gives a resume of much of his earlier work, entitled Le Crime, causes et remedes. Later works are: Delitti vecchi e delitti nuovi (Turin, 1902); Nuovi studi sul genio (2 vols., Palermo, 1902); and in 1908 a work on spiritualism (Eng. trans., After Death — What? 1909), to which subject he had turned his attention during the later years of his life. He died suddenly from a heart complaint at Turin on the 19th of October 1909. See Kurella, Cesare Lombroso und die Naturgeschichte des Ver- brechers (Hamburg, 1892); and a biography, with an analysis of his works, and a short account of their general conclusions by his daughters, Paola Carrara and Gina Ferrero, written in 1906 on the occasion of the sixth congress of criminal anthropology at Turin.

LOMENIE DE BRIENNE, ETIENNE CHARLES DE (1727- 1794), French politician and ecclesiastic, was born at Paris on the 9th of October 1727. He belonged to a Limousin family, dating from the 15th century, and after a brilliant career as a student entered the Church, as being the best way to attain to a distinguished position. In 17 51 he became a doctor of theology, though there were doubts as to the orthodoxy of his thesis. In 1752 he was appointed grand vicar to the archbishop of Rouen. After visiting Rome, he was made bishop of Condom

(1760), and in 1763 was translated to the archbishopric of Toulouse. He had many famous friends, among them A. R. J. Turgot, the Abbe A. Morellet and Voltaire, and in 1770 became an academician. He was on three occasions the head of the bureau de jurisdiction at the general assembly of the clergy; he also took an interest in political and social questions of the day, and addressed to Turgot a number of memoires on these subjects, one of them, treating of pauperism, being especially remarkable. In 1787 he was nominated as president of the Assembly of Notables, in which capacity he attacked the fiscal policy of Calonne, whom he succeeded as head of the conseil des finances on the 1st of May 1787. Once in power, he succeeded in making the parlement register edicts dealing with internal free trade, the establishment of provincial assemblies and the redemption of the corvee; on their refusal to register edicts on the stamp duty and the proposed new general land-tax, he persuaded the king to hold a lit de justice, to enforce their registration. To crush the opposition to these measures, he persuaded the king to exile the parlement to Troyes (August 15th, 1787). On the

agreement of the parlement to sanction a prolongation for two years to the tax of the two vingtiemes (a direct tax on all kinds of income), in lieu of the above two taxes, he recalled the councillors to Paris. But a further attempt to force the parlement to register an edict for raising a loan of 120 million livres met with determined opposition. The struggle of the parlement against the incapacity of Brienne ended on the 8th of May in its consenting to an edict for its own abolition; but with the proviso that the states-general should be summoned to remedy the disorders of the state. Brienne, who had in the meantime been made archbishop of Sens, now found himself face to face with almost universal opposition; he was forced to suspend the Cour pleniere which had been set up to take the place of the parlement, and himself to promise that the states-general should be summoned. But even these concessions were not able to keep him in power, and on the 29th of August he had to retire, leaving the treasury empty. On the 15th of December following, he was made a cardinal, and went to Italy, where he spent two years. After the outbreak of the Revolution he returned to France, and took the oath of the Civil Constitution of the Clergy in 1790 (see French Revolution). He was repudiated by the pope, and in 1 791 had to give up the biretta at the command of Pius VI. Both his past and present conduct made him an object of suspicion to the revolutionaries; he was arrested at Sens on the 9th of November 1793, and died in prison, either of an apoplectic stroke or by poison, on the 16th of February 1794.

The chief works published by Brienne are: Oraison funebre du Dauphin (Paris, 1766); Comple-rendu au roi (Paris, 1788); Le Conciliateur, in collaboration with Turgot (Rome, Paris, 1754). See also J. Perrin, Le Cardinal Lombnie de Brienne . . . ipisodes de la Revolution (Sens, 1896).

LOMOND, LOCH, the largest and most beautiful of Scottish lakes, situated in the counties of Stirling and Dumbarton. It is about 23 m. long; its width varies from 5 m. towards the south end to J m. at the narrows to the north of the Isle of the Vow; its area is 27 sq. m., and the greatest depth 630 ft. It is only 23 ft. above the sea, of which doubtless it was at one time an arm. It contains 30 islands, the largest of which is Inch-murrin, a deer park belonging to the duke of Montrose. Among other islands are Inch Cailliach (the " Island of Women," from the fact that a nunnery once stood there), Inchfad (" Long Island "), Inchcruin (" Round Island "), Inchtavannach (" Monks' Isle "), Inchconnachan (" Colquhoun's Isle "), Inch- lonaig (" Isle of the Yews," where Robert Bruce caused yews to be planted to provide arms for his bowmen), Creinch, Torrinch and Clairinch (which gave the Buchanans their war-cry). From the west the loch receives the Inveruglas, the Douglas, the Luss, the Finlas and the Fruin. From Balloch in the south it sends off the Leven to the Clyde; from the east it receives the Endrick, the Blair, the Cashell and the Arklet; and from the north the Falloch. Ben Lomond (3192 ft.), the ascent of which is made with comparative ease from Rowardennan, dominates the land- scape; but there are other majestic hills, particularly on the

west and north-west banks. The fish are sea-trout, lake-trout, pike and perch. Part of the shore is skirted by the West High- land railway, opened in 1894, which has stations on the loch at Tarbet and Ardlui, and Balloch is the terminus of the lines from Dumbarton and from Stirling via Buchlyvie. Steamers make the tour of the loch, starting from Balloch and calling at Balmaha, Luss, Rowardennan, Tarbet, Inversnaid and Ardlui. Luss has a considerable population, and there is some stone quarried near it. Inversnaid is the point of arrival and departure for the Trossachs coaches, and here, too, there is a graceful waterfall, fed by the Arklet from the loch of that name, 2% m. to the east, commemorated in Wordsworth's poem of the " Highland Girl." Inversnaid was in the heart of the Macgregor country, and the name of Rob Roy is still given to his cave on the loch side a mile to the north and to his prison 3 m. to the south. Inversnaid was the site of a fort built in 17 13 to reduce the clan to sub- jection. Craig Royston, a tract lying between Inversnaid and Ben Lomond, was also associated with Rob Roy.

LOMON&SOV, MIKHAIL VASILIEVICH (1711-1765), Russian poet and man of science, was born in the year 1 711, in the village of Denisovka (the name of which was

afterwards changed in honour of the poet), situated on an island not far from Kholmogori, in the government of Archangel. His father, a fisherman, took the boy when he was ten years of age to assist him in his calling; but the lad's eagerness for knowledge was unbounded. The few books accessible to him he almost learned by heart; and, seeing that there was no chance of increasing his stock of knowledge in his native place, he resolved to betake himself to Moscow. An opportunity occurred when he was seventeen, and by the intervention of friends he obtained admission into the Zaikonospasski school. There his progress was very rapid, especially in Latin, and in 1734 he was sent from Moscow to St Petersburg. There again his proficiency, especially in physical science, was marked, and he was one of the young Russians chosen to complete their education in foreign countries. He accordingly commenced the study of metallurgy at Marburg; he also began to write poetry, imitating German authors, among whom he is said to have especially admired Giinther. His Ode on the Taking of Khotin from the Turks was composed in 1739, and attracted a great deal of attention at St Petersburg. During his residence in Germany Lomonosov married a native of the country, and found it difficult to maintain his increasing family on the scanty allowance granted to him by the St Petersburg Academy, which, moreover, was irregularly sent. His circum- stances became embarrassed, and he resolved to leave the country secretly and to return home. On his arrival in Russia he rapidly rose to distinction, and was made professor of chemistry in the university of St Petersburg; he ultimately became rector, and in 1764 secretary of state. He died in 1765.

The most valuable of the works of Lomonosov are those relating to physical science, and he wrote upon many branches of it. He everywhere shows himself a man of the most varied learning. He compiled a Russian grammar, which long enjoyed popularity, and did much to improve the rhythm of Russian verse.

LOMZA, or Lomzha, a government of Russian Poland, bounded N. by Prussia and the Polish government of Suwalki, E. by the Russian government of Grodno, S. by the Polieh governments of Siedlce and Warsaw and W. by that of Plock. It covers 4666 sq. m. It is mostly flat or undulating, with a few tracts in the north and south-west where the deeply cut valleys give a hilly aspect to the country. Extensive marshes overspread it, especially on the banks of the Narev, which flows from east to south-west, joining the Bug in the south-western corner of the government. The Bug flows along the southern border, joining the Vistula 20 m. below its confluence with the Narev. There are forests in the east of the government. The inhabitants numbered 501,385 in 1872 and 585,033 in 1897, of whom 279,279 were women, and 69,834 lived in towns. The estimated popula- tion in 1906 was 653,100. By religion 77?% are Roman Catholics, 155% Jews and 55% members of the Orthodox Church. Agriculture is the predominant industry, the chief crops being rye, oats, wheat, barley, buckwheat, peas, potatoes, flax and hemp. Bees are extensively kept, and large numbers of

poultry, especially geese, are reared. Stock raising is carried on to some extent. The wood trade is important; other in- dustries are the production of pottery, beer, flour, leather, bricks, wooden wares, spirits, tobacco and sugar. There is only one railway (between Grodno and Warsaw); the Bug is navig- able, but wood only is floated down the Narev. The govern- ment is divided into seven districts, of which the chief towns, with their populations in 1897, are Lomza (q.v.), Ostrolenka (8679), Mazowiec (3900), Ostrow (1 1,264), Makow (7232), Kolno (4941) and Szczuczyn (5725).

LOMZA, a town of Russia, capital of the government of the same name, on the Narew, 103 m. by rail N.E. from Warsaw. Pop. (1872), 13,860, (1900) 22,428. Lomza is an old town, one of its churches having been erected before 1000. In the 16th century it carried on a brisk trade with Lithuania and Prussia. It was well fortified and had two citadels, but nevertheless often suffered from the invasions of the Germans and Tatars, and in the 17th century it was twice plundered by the Cossacks of the Ukraine. In 1795

it fell under the dominion of Prussia, and after the peace of Tilsit (1807) it came under Russian rule.

LONAULI, a town of India, in the Poona district of Bombay, at the top of the Bhor Ghat pass in the Western Ghats, by which the Great Indian Peninsula railway climbs from Bombay to Poona. Pop. (1901), 6686. It contains the locomotive works of the railway. Lonauli is a place of resort from Bombay during the hot season.

LONDON, a city and port of entry of Middlesex county, Ontario, Canada, situated 121 m. N.W. of Toronto, on the river Thames and the Grand Trunk, Canadian Pacific and Michigan Central railways. Pop. (1901), 37,981; but several suburbs, not included in these figures, are in reality part of the city. The local nomenclature is largely a reproduction of that of the great city whose name it has borrowed. Situated in a fertile agricul- tural district, it is a large distributing centre. Among the industries are breweries, petroleum refineries, and factories for the manufacture of agricultural implements and of railway carriages. The educational institutions include the Hellmuth Ladies' College and the Western University (founded in 1878 under the patronage of the Church of England). London was founded in 1825-1826.

LONDON, the capital of England and of the British Empire, and the greatest city in the world, lying on each side of the river Thames 50 m. above its mouth. 1 The " City," so called both formally and popularly, is a small area (673 acres) on the north bank of the river, forming the heart of the metropolis, and constituting within its boundaries one only, and one of the smallest, of twenty-nine municipal divisions which make up the administrative County of London. The twenty-eight remaining divisions are the Metropolitan Boroughs. The county thus defined has an extreme length (E. to W.) of 16 m., an extreme breadth (N. to S.) of 1 15 m., and an area of 74,839 acres or about 117 sq. m. The boroughs are as follows: —

1. North of the Thames. — Touching the northern boundary of the county, from W. to E. — Hammersmith, Kensington, Paddington, Hampstead, St Pancras, Islington, Stoke Newing- ton, Poplar.

Bounded by the Thames — Fulham, Chelsea, the City of West- minster (here the City of London intervenes), Stepney, Poplar.

Between Westminster, the City and Stepney, and the northern boroughs — St Marylebone (commonly Marylebone), Holborn, Finsbury, Shoreditch, Bethnal Green.

2. South of the Thames. — Wandsworth, Battersea, Lambeth, Southwark, Camberwell, Bermondsey, Deptford, Lewisham, Greenwich, Woolwich (with a small part of the north bank).

These names are all in common use, though their formal application is in some cases extended over several districts of which the ancient names remain familiar. Each borough is noticed in a separate article.

1 See map in London Statistics (vol. xix., 1909), an annual publica- tion of the London County Council, which besides these divisions shows " Water London," the London main drainage area, and the Central Criminal Court district.

I. Extent and Site The County of London is bounded N. and W. by Middle- sex, E. by Essex and Kent, S. by Kent and Surrey. The Metropolitan police area, or " Greater London," however, embraces the whole of Middlesex, with parts of the other three counties and of Hertfordshire. Its extent is 443,419 acres or nearly 693 sq. m., and its population is about seven millions. Only here and there upon its fringe the identity of this great area with the metropolis is lost to the eye, where open country remains unbroken by streets or close-set buildings.

Site. — North of the Thames, and west of its tributary the Lea, which partly bounds the administrative county on the east, London is built upon a series of slight undulations,

only rarely sufficient to make the streets noticeably steep. On the northern boundary of the county a height of 443 ft. is found on the open Hampstead Heath. The lesser streams which flow from this high ground to the Thames are no longer open. Some, however, as well as other natural features effaced by the growth of the city, retain an historical interest through the survival of their names in streets and districts, or through their relation to the original site of London (in the present City). South of the Thames a broken amphitheatre of low hills, approaching the river near Greenwich and Woolwich on the east and Putney and Richmond on the west, encloses a tract flatter than that to the north, and rises more abruptly in the southern districts of Streatham, Norwood and Forest Hill.

In attempting to picture the site of London in its original condition, that is, before any building took place, it is necessary to consider (1) the condition of the Thames unconfined between made banks, (2) the slopes overlooking it, (3) the tributary streams which watered these slopes. The low ground between the slight hills flanking the Thames valley, and therefore mainly south of the present river, was originally occupied by a shallow lagoon of estuarine character, tidal, and interspersed with marshy tracts and certain islets of relatively firm land. Through this the main stream of the Thames pursued an ill-defined course. The tributary streams entered through marshy channels. The natural process of sedimentation assisted the gradual artificial drainage of the marshes by means' of embankments confining the river. The breadth of this low tract, from Chelsea downward, was from 2 to 3 m. The line of the foot of the southern hills, from Putney, where, it nearly approaches the present river, lies through Stockwell and Camberwell to Greenwich, where it again approaches the river. On the north there is a flat tract between Chelsea and Westminster, covering Pimlico, but from Westminster down to, the Tower there is a marked slope directly up from the river bank. Lower still, marshes formerly extended far up the valley of the Lea. The higher slopes of the hills were densely forested (cf. the modern district-name St John's Wood), while the lower slopes, north of the river, were more open (cf. Moor-gate). The original city grew up on the site of the City of London of the present day, on a slight eminence intersected by the Wal- or Wall-brook, and flanked on the west by the river Fleet.

These and other tributary streams have been covered in and built over (in some cases serving as sewers), but it is possible to trace their valleys at various points by the fall and rise 6f streets crossing them, and their names survive, as will be seen, in various modern applications. The Wallbrook rose in a marsh in the modern district of Finsbury, and joined the Thames close to the Cannon Street railway bridge. A street named after it runs south from the Mansion House parallel with its course. The Fleet was larger, rising in, and collecting various small streams from, the high ground of Hampstead. It passed Kentish Town, Camden Town and King's Cross, and followed a line approximating to King's Cross Road. The slope of Farringdon Road, where crossed by Holborn Viaduct, and of New Bridge Street, Blackfriars, marks its course exactly, and that of Fleet Street and Ludgate Hill its steep banks. The name also appears in Fleet Road, Hampstead. From King's Cross downward the batiks were so steep and high that the stream was called

Hollow or Hole-bourne, this name surviving in Holborn; and it was fed by numerous springs (Bagnigge Well, Clerkenwell and others) in this vicinity. It entered a creek which was navigable for a considerable distance, and formed a subsidiary harbour for the City, but by the 14th century this was becoming choked with refuse, and though an attempt was made to clear it, and wharves were built in 1670, it was wholly arched over in 1737- 1765 below Holborn Bridge. Continuing westward, the most important stream was Tyburn (g.v.), which rose at Hampstead, and joined the Thames through branches on either side of Thorney Island, on which grew up the great ecclesiastical

founda- tion of St Peter, Westminster, better known as Westminster Abbey. There is no modern survival of the name of Tyburn, which finds, indeed, its chief historical interest as attaching to the famous place of execution which lay near the modern Marble Arch. The residential district in this vicinity was known at a later date as Tyburnia. The next stream westward was the Westbourne, the name of which is perpetuated in Westbourne Grove and elsewhere in Paddington. It rose on the heights of Hampstead, traversed Paddington, may be traced in the course of the Serpentine lake in Hyde Park, ran parallel to and east of Sloane Street, and joined the Thames close to Chelsea Bridge. The main tributaries of the Thames from the north, to east and west of those described, are not covered, nor is any tributary of importance from the south entirely concealed.

Geology. — London lies within the geological area known as the London basin. Within the confines of Greater London the chalk which forms the basement of this area appears at the surface in isolated patches about Greenwich, while its main line approaches within 10 m. of the City to the south and within 15 to the north-west. In the south and north-west the typical London clay is the principal formation. In the south-east, however, the Blackheath and Woolwich pebble-beds appear, with their belts of Thanet sands bordering the chalk. Valley gravel borders the Thames, with some interruptions, from Kingston to Greenwich, and extends to a wide belt, with ramifications, from Wandsworth south to Croydon, and in a narrower line from Greenwich towards Bromley. Brick earth overlies it from Kensington to Brentford and west thereof, and appears in Chelsea and Fulham, Hornsey and Stoke Newington, and in patches south of the Thames between Battersea and Richmond. The main de- posits of alluvium occur below Lambeth and Westminster, and in the valley of the Wandle, which joins the Thames from the south near Putney. In the north and west the clay is interspersed with patches of plateau gravel in the direction of Finchley (where boulder clay also appears), Enfield and Barnet; and of Bagshot sands on Hamp- stead Heath and Harrow Hill. Gravel is found on the high ground about Richmond Park and Wimbledon. (See further Middlesex.)

Climate. — The climate is equable (though excessive heat is some- times felt for short periods during the summer) and moist, but healthy. Snow is most common in the early months of the year. The fogs of London have a peculiar and perhaps an exaggerated notoriety. They are apt to occur at all seasons, are common from September to February, and most common in November. The atmosphere of London is almost invariably misty in a greater or less degree, but the denser fogs are generally local and of no long duration. They sometimes cause a serious dislocation of railway and other traffic. Their principal cause is the smoke from the general domestic use of coal. The evil is of very long standing, for in I306the citizens petitioned Edward I. to prohibit the use of sea-coal, and he made it a capital offence. The average temperature of the hottest month, July, is 64°-4 F.; of the coldest, January, 37°-a; and the mean annual 50°-4. The mean annual rainfall ranges in different parts of the metropolis from about 20I to 27J in.

II. Topography

London as a whole owes nothing in appearance to the natural configuration of its site. Moreover, the splendid building is nearly always a unit; seldom, unless accidentally, a component part of a broad effect. London has not grown up along formal lines; nor is any large part of it laid out according to the concep- tions of a single generation. Yet not a few of the great thorough- fares and buildings are individually worthy of London's pre- eminence as a city. The most notable of these fall within a circumscribed area, and it is therefore necessary to preface their consideration with a statement of the broader characteristic divisions of the metropolis.

Characteristic Divisions. — In London north of the Thames, the salient distinction lies between West and East. From the western boundary of the City proper, an area covering the greater part

of the city of Westminster, and extending into Chelsea, Kensing- ton, Paddington and

Marylebone, is exclusively associated with the higher-class life of London. Within the bounds of West- minster are the royal palaces, the government offices and many other of the finest public buildings, and the wider area specified includes the majority of the residences of the wealthier classes, the most beautiful parks and the most fashionable places of recreation. ” Mayfair,” north of Piccadilly, and ” Belgravia,” south of Knigh’tsbridge, are common though unofficial names for the richest residential districts. The ” City ” bears in the great commercial buildings fringing its narrow streets all the marks of a centre of the world’s exchanges. East of it there is an abrupt transition to the district commonly known as the ” East End,” as distinguished from the wealthy ” West End,” a district of mean streets, roughly coincident with the boroughs of Stepney and Poplar, Shoreditch and Bethnal Green, and primarily (though by no means exclusively) associated with the problems attaching to the life of the poor. On the Thames below London Bridge, London appears in the aspect of one of the world’s great ports, with extensive docks and crowded shipping. North London is as a whole residential: Hackney, Islington and St Pancras consist mainly of dwellings of artisans and the middle classes; while in Hampstead, St Marylebone and Pad- dington are many terraces and squares of handsome houses. Throughout the better residential quarters of London the number of large blocks of flats has greatly increased in modern times. But even in the midst of the richest quarters, in West- minster and elsewhere, small but well-defined areas of the poorest dwellings occur.

London south of the Thames has none of the grander character- istics of the wealthy districts to the north. Poor quarters lie adjacent to the river over the whole distance from Battersea to Greenwich, merging southward into residential districts of better class. London has no single well-defined manufacturing quarter.

Suburbs. — Although the boundary of the county of London does not, to outward appearance, enclose a city distinct from its suburbs, London outside that boundary may be conveniently considered as suburban. Large numbers of business men and others who must of necessity live in proximity to the metropolis have their homes aloof from its centre. It is estimated that upwards of a million daily enter and leave the City alone as the commercial heart of London, and a great proportion of these travel in and out by the suburban railways. In this aspect the principal extension of London has been into the counties of Kent and Surrey, to the pleasant hilly districts about Sydenham, Norwood and Croydon, Chislehurst and Orpington, Caterham, Redhill and Reigate, Epsom, Dorking and Leatherhead ; and up the valley of the Thames through Richmond to Kingston and Surbiton, Esher and Weybridge, and the many townships on both the Surrey and the Middlesex shores of the river. On the west and north the residential suburbs immediately outside the county include Acton and Ealing, Willesden, Highgate, Finchley and Hornsey; from the last two a densely populated district extends north through Wood Green and Southgate to Barnet and Enfield; while the ” residential influence ” of the metropolis far exceeds these limits, and may be observed at Harrow and Pinner, Bushey and Boxmoor, St Albans, Harpenden, Stevenage and many other places. To the north-east the beauty of Epping Forest attracts numerous residents to Woodford, Chingford and Loughton. The valley of the Lea is also thickly populated, but chiefly by an industrial population working in the numerous factories along this river. The Lea separates the county of London from Essex, but the townships of West Ham and Stratford, Barking and Ilford, Leyton and Walthamstow continue the metropolis in this direction almost without a break. Their population is also largely occupied in local manufacturing establish- ments; while numerous towns on either bank of the lower Thames share in the industries of the port of London.

Streets. — The principal continuous thoroughfares within the metropolis, though each bears a succession of names, are coinci- dent with the main roads converging upon the capital from all parts of England. On the north of the Thames two great thoroughfares from the west meet in the heart of the City. The northern enters the county in Hammersmith as Uxbridge Road, crosses Kensington and borders the north side of Ken- sington Gardens and Hyde Park as Bayswater Road. It then bears successively the names of Oxford Street, New Oxford Street and High Holborn; enters the City, becomes known as Holborn Viaduct from the fact that it is there carried over other

streets which lie at a lower level, and then as Newgate Street and Cheapside. The southern highway enters Hammersmith, crosses the centre of Kensington as Kensington Road and High Street, borders Kensington Gardens and Hyde Park as Kensing- ton Gore and Knightsbridge, with terraces of fine residences, and merges into Piccadilly. This beautiful street, with its northward branches, Park Lane, from which splendid houses overlook Hyde Park, and Bond Street, lined with handsome shops, may be said to focus the fashionable life of London. The direct line of the thoroughfare is interrupted after Piccadilly Circus (the term " circus " is frequently applied to the open space — not necessarily round — at the junction of several roads), but is practically resumed in the Strand, with its hotels, shops and numerous theatres, and continued through the City in Fleet Street, the centre of the newspaper world, and Ludgate Hill, at the head of which is St Paul's Cathedral. Thence it runs by commercial Cannon Street to the junction with Cheapside and several other busy streets. At this junction stand the Royal Exchange, the Mansion House (the official residence of the Lord Mayor of London) and the Bank of England, from which this important point in the communications of London is commonly known as " Bank." From the east two main roads similarly converge upon the City, which they enter by Aldgate (the suffix in this and other names indicating the former existence of one of the City gates). The southern of these highways, approaching through the eastern suburbs as Barking Road, becomes East India Docks Road in Poplar and Commercial Road East in Stepney. The continuous thoroughfare of 12 m. between Hammersmith and the East India Docks illustrates successively every phase of London life. The northern road enters from Stratford and is called Bow Road, Mile End Road, Whitechapel Road and High Street, Whitechapel. From the north of England two roads preserve communication-lines from the earliest times. The Old North Road, entering London from the Lea valley through Hackney and Shoreditch as Stamford Hill, Stoke Newington Road and Kingsland Road, reaches the City by Bishopsgate. The straight highway from the north- west which as Edgware Road joins Oxford Street at the Marble Arch (the north-eastern entrance to Hyde Park) is coincident with the Roman Watling Street. The Holyhead and Great North Roads, uniting at Barnet, enter London by branches through Hampstead and through Highgate, between the Old North and Edgware roads. South of the Thames the thoroughfares crossing the river between Lambeth and Bermondsey converge upon two circuses, St George's and the Elephant and Castle. At the second of these points the majority of the chief roads from the southern suburbs and the south of England are collected. Among them, the Old Kent Road continues the southern section of Watling Street, from Dover and the south-east, through Woolwich and across Blackheath. The road through Streatham, Brixton and Kennington, taking name from these districts successively, is the principal southern highway. The Portsmouth Road from the south-west is well marked as far as Lambeth, under the names of Wandsworth, High Street, St John's Hill, Lavender Hill and Wandsworth Road.

Thames Embankments. — The Thames follows a devious course through London, and the fine embankments on its north side, nowhere continuing uninterruptedly for more than 2 m., do not form important thoroughfares, with the exception of the Victoria Embankment. Mostly they serve rather as beautiful promen- ades. One of them begins over against Battersea Bridge. Its finest portion is the Chelsea Embankment, fronting Battersea Park across the river, shaded by a pleasant avenue and lined with handsome houses. It continues, with some interruptions, nearly as far as the Houses of Parliament. Below these the grandest of the embankments extends to the City at Blackfriars. It was formed in 1864-1870, and is named the Victoria Embank- ment, though its popular title is " The Embankment " simply. Open gardens fringe it in part on the landward side, and it is lined with fine public and private buildings. The bold sweep of the Thames, here some 300 yds. wide, the towers of Westminster on the one hand and the dome of St Paul's on the other, make

up a fine prospect. Below London Bridge the river is embanked for a short distance in front of the Tower of London, and above Westminster Bridge the Albert Embankment extends for nearly 1 m. along the south bank.

Bridges. — Fourteen road-bridges cross the Thames within the county of London. Of these London Bridge, connecting the City with Southwark and Bermondsey, stands first in historical interest and in importance as a modern highway. The old bridge, famous for many generations, bearing its rows of houses and its chapel in the centre, was completed early in the 13th century. It was 308 yds. long and had twenty narrow arches, through which the tides formed dangerous rapids. It stood just below the existing bridge, which was built of granite by John Rennie and his son Sir John Rennie, and completed in 183 1. A widening to accommodate the growth of traffic, after being frequently discussed for many years, was completed in 1904, by means of corbels projecting on either side, without arresting traffic during the work. There was no bridge over the Thames below London Bridge until 1894, when the Tower Bridge was opened. This is a suspension bridge with a central portion, between two lofty and massive stone towers, consisting of bascules which can be raised by hydraulic machinery to admit the passage of vessels. The bridge is both a remarkable engineering work , and architecturally one of the finest modern structures in London. The bridges in order above London Bridge are as follows, railway-bridges being bracketed — Southwark, (Cannon Street), (Blackfriars), Blackfriars, Waterloo, (Hungerford — with a footway), Westminster, Lambeth, Vauxhall, (Grosvenor), Victoria, Albert, Battersea, (Battersea), Wandsworth, (Putney), Putney and Hammersmith. Waterloo Bridge, the oldest now standing within London, is the work of John Rennie, and was opened in 181 7. It is a massive stone structure of nine arches, carrying a level roadway, and is considered one of the finest bridges of its kind in the world. The present Westminster Bridge, of iron on granite piers, was opened in 1862, but another preceded it, dating from 1750; the view from which was appreciated by Wordsworth in his sonnet beginning ” Earth has not anything to show more fair.” The complete reconstruction of Vauxhall Bridge was undertaken in 1902, and the new bridge was opened in 1906. Some of the bridges were built by companies, and tolls were levied at their crossing until modern times; thus Southwark Bridge was made toll-free in 1866, and Waterloo Bridge only in 1878, on being acquired by the City Corporation and the Metropolitan Board of Works respectively. The road- bridges mentioned (except the City bridges) are maintained by the London County Council, who expended for this purpose a sum of £9149 in 1907-1908. The following table shows the capital expenditure on the more important bridges and their cost of maintenance in 1907-1908: —

Net Capital

Cost of Maintenance

Expenditure. Albert Bridge £120,774

1907-1908.

£1296

Battersea Bridge . . . 312,193

512

Hammersmith Bridge . 204,250

421

Lambeth Bridge . . . 47.555

496

Putney Bridge 430,052

653

Vauxhall Bridge (temporary) 270,749

73

Vauxhall Bridge (new) . 457,108

1109

Wandsworth Bridge . . 65,661

410

Waterloo Bridge . . . 552,867

1 102

Westminster Bridge . . 393,189

1491

The properties entrusted to the Corporation for the upkeep of London Bridge are managed by the Bridge House Estates Committee, the revenues from which are also used in the main- tenance of the other three City bridges, £26,989 being thus expended in 1907, the Tower bridge absorbing £17,735 of this amount.

Thames Tunnels. — Some of the metropolitan railway lines cross the river in tunnels beneath its bed. There are also several tunnels under the river below London Bridge, namely: Tower Subway, constructed in 1870 for foot-passengers, but no longer used, Greenwich Tunnel (1902) for foot-passengers, Blackwall Tunnel (1897), constructed by the County Council between Greenwich and Poplar, and Woolwich Tunnel, begun

in 1910. A tunnel between Rotherhithe and Ratcliff was authorized in 1897 and opened in 1908. The Thames Tunnel (1825-1843), 2 m. below London Bridge, became a railway tunnel in 1865. The County Council maintains a free ferry at Woolwich for passengers and vehicular traffic. The capital expenditure on this undertaking was £185,337 and the expense of maintenance in 1907-1908 £20,881. The Greenwich Tunnel (capital expenditure £179,293) in the same year had expended on it for maintenance £3725, and the Blackwall Tunnel (capital expenditure £1,268,951) £11,420. The capital expenditure on the Rotherhithe Tunnel was £1,414,561.

Parks. — The administration and acreage of parks and open spaces, and their provisions for the public recreation, fall for consideration later, but some of them are notable features in the topography of London. The royal parks, namely St James's, Green and Hyde Park, and Kensington Gardens, stretch in an irregular belt for nearly 3 m. between .Whitehall (Westminster) and Kensington. St James's Park was transformed from marshy land into a deer park, bowling green and tennis court by Henry VIII., extended and laid out as a pleasure garden by Charles II., and rearranged according to the designs of John Nash in 1827- 1829. Its lake, the broad Mall leading up to Buckingham Palace, and the proximity of the government buildings in Whitehall, combine to beautify it. Here was established, by licence from James I., the so-called Milk Fair, which remained, its ownership always in the same family, until 1905, when, on alterations being made to the Mall, a new stall was erected for the owners during

their lifetime, though the cow or cows kept here were no longer allowed. St James's Park is continued between the Mall and Piccadilly by the Green Park. Hyde Park, to the west, belonged originally to the manor of Hyde, which was attached to Westminster Abbey, but was taken by Henry VIII. on the dissolution of the monasteries. Two of its gateways are noteworthy, namely that at Hyde Park Corner at the south- east and the Marble Arch at the north-east. The first was built in 1828 from designs of Decimus Burton, and comprises three arches with a frieze above the central arch copied from the Elgin marbles in the British Museum. The Marble Arch was intended as a monument to Nelson, and first stood in front of Buckingham Palace, being moved to its present site in 1851. It no longer forms an entrance to the park, as in 1908 a corner of the park was cut off and a roadway was formed to give additional accommo- dation for the heavy traffic between Oxford Street, Edgware Road and Park Lane. The Marble Arch was thus left isolated. Hyde Park contains the Serpentine, a lake 1500 yds. in length, from the bridge over which one of the finest prospects in London is seen, extending to the distant towers of Westminster. Since the 17th century this park has been one of the most favoured resorts of fashionable society, and at the height of the " season," from May to the end of July, its drives present a brilliant scene. In the 17th and 18th centuries it was a favourite duelling- ground, and in the present day it is not infrequently the scene of political and other popular demonstrations (as is also Trafalgar Square), while the neighbourhood of Marble Arch is the constant resort of orators on social and religious topics. Kensington Gardens, originally attached to Kensington Palace, were sub- sequently much extended; they are magnificently timbered, and contain plantations of rare shrubs and flowering trees. Regent's Park, mainly in the borough of Marylebone, owes its preservation to the intention of George III. to build a palace here. The other most notable open spaces wholly or partly within the county are Hampstead Heath in the north-west, a wild, high-lying tract preserved to a great extent in its natural state, and in the south-west Wimbledon Common, Putney Heath and the royal demesne of Richmond Park, which from its higher parts commands a wonderful view up the rich valley of the Thames. The outlying parts of the county to east, south and north are not lacking in open spaces, but there is an extensive inner area where at most only small gardens and squares break the continuity of buildings, and where in some cases old church- yards serve as public grounds.

Architecture. — While stone is the material used in the construction of the majority of great buildings of London, some modern examples

(notably the Westminster Roman Catholic cathedral) are of red brick with stone dressings; and brick is in commonest use for general domestic building. The smoke-laden atmosphere has been found not infrequently to exercise a deleterious effect upon the stonework of important buildings ; and through the same cause the appearance of London as a whole is by some condemned as sombre. Bright colour, in truth, is wanting, though attempts are made in a few important modern erections to supply it, a notable instance being the Savoy Hotel buildings (1904) in the Strand. Portland stone is frequently employed in the larger buildings, as in St Paul's Cathedral, and under the various influences of weather and atmosphere acquires strongly contrasting tones of light grey and black. Owing to the by-laws of the County Council, the method of raising commercial or residential buildings to an extreme height is not practised in London; the block known as Queen Anne's Mansions, Westminster, is an ex- ception, though it cannot be called high in comparison with American high buildings.

Architectural remains of earlier date than the Norman period are very few, and of historical rather than topographical importance. In architecture of the Norman and Gothic periods London must be considered rich, though its richness is poverty

Ecclesias- tical architec-

when its losses, particularly during the great fire of 1666, are recalled. These losses were confined within the City, ˆf" but, to go no farther, included the Norman and Gothic cathedral of St Paul, perhaps a nobler monument of its period than any which

has survived it, much as it had suffered from injudicious restoration. Ancient architecture in London is principally ecclesi- astical. Westminster Abbey is pre-eminent; in part, it may be, owing to the reverence felt towards it in preference to the classical St Paul's by those whose ideal of a cathedral church is essentially Gothic, but mainly from the fact that it is the burial-place of many of the English monarchs and their greatest subjects, as well as the scene of their coronations (see Westminster). In the survey of London (1598) by John Stow, 125 churches, including St Paul's and Westminster Abbey, are named; of these 89 were destroyed by the great fire. Thirteen large conventual churches were mentioned by Fitzstephen in the time of Henry II., and of these there are some remains.

The church of St Bartholomew the Great, Smithfield, is the finest remnant of its period in London. It was founded in 1 123 by Rahere, who, probably a Breton by birth, was a courtier in the reign of William II. He is said to have been the king's minstrel, and to have spent the earlier part of his life in frivolity. Subsequently he entered holy orders, and in c. 1 120, being stricken with fever while on a pilgrimage to Rome, vowed that he would found a hospital in London. St Bartholomew, appearing to him in a vision, bade him add a church to his foundation. He became an Augustinian canon, and founded his hospital, which is now, as St Bartholomew's Hospital, one of the principal medical institutions in the metropolis. He be- came its first master. Later he erected the priory, for canons of his order, of which the nave and transepts of the church remain. The work is in the main very fine Norman, with triforium, ambulatory and apsidal eastern end. An eastern lady chapel dates from c. 1410, but the upper part is modern, for the chapel was long desecrated. There are remains of the cloisters north of the church, — and praise- worthy efforts have been made since 1903 towards their restoration. The western limit of the former nave of the church is marked by a fine Early English doorway, now forming an entrance to the churchyard. Rahere's tomb remains in the church; the canopy is Perpendicular work, but the effigy is believed to be original. He died in 1 144.

The Temple Church (seelNNSOFCouRT), serving for the Inner and Middle Temples, belonged to the Knights Templars. It is the finest of the four ancient round churches in England, dating from 1185, but an Early English choir opens from the round church. St Saviour's in Southwark (q.v.), the cathedral church of the modern bishopric of Southwark, was the church of the priory of St Mary Overy, and is a large cruciform building mainly Early English in style. There may be mentioned also an early pier in the church of St Katherine Cree or Christ Church, Leadenhall Street, belonging to the priory church of the Holy Trinity; old monuments in the vaults beneath St James's Church, Clerkenwell, formerly attached to a Benedictine nunnery ; and the Perpendicular gateway and the crypt of the church of the priory of St John of Jerusalem (see Finsbury). Among other ancient churches within the City, that of All Hallows Barking, near the Tower of London, is principally Perpendicular and contains some fine brasses. It belonged to the convent at Barking, Essex, and was the burial-place of many who were executed at the scaffold on Tower Hill. St Andrew Undershaft, so named because a Maypole used to be set up before the former church on May-day, is late Perpendicular (c. 1530); and contains a monument to John Stow the chronicler (d. 1605). The church of Austin Friars, origin- ally belonging to a friary founded in 1253, became a Dutch church under a grant of Edward VI., and still remains so; its style is principally Decorated, but through various vicissitudes little of the original work is left. St Giles, Cripplegate, was_ founded c. 1090, but the existing church is late Perpendicular. It is the burial-place of Fox the martyrologist and Milton the poet, and contains some fine wood-carving by Grinling Gibbons. St Helen's, Bishopsgate, belonged to a priory of nuns founded c. 12 12, but the greater part of the building is later. It has two naves parallel, originally for the use

topher Wren,

Later churches.

of the nuns and the parishioners respectively. The church of St Mary-le-Bow, in Cheapside, is built upon a Norman crypt, and that of St Olave's, Hart Street, which was Pepys's church and contains a modern memorial to him, is of the 15th century. Other ancient churches outside the City are few; but there may be noted St Margaret's, under the shadow of Westminster Abbey; and the beautiful Ely Chapel in Holborn (q.v.), the only remnant of a palace of the bishops of Ely, now used by the Roman Catholics. The Chapel Royal, Savoy, near the Strand, was rebuilt by Henry VII. on the site of Savoy Palace, which was erected by Peter, earl of Savoy and Richmond, in 1245, and destroyed in the insurrection of Wat Tyler in 1381. In 1505 Henry VII. endowed here a hospital of St John the Baptist for the poor. The chapel was used as the parish church of St Mary-le-Strand (1564-1717) and constituted a Chapel Royal in 1773; but there are no remains of the rest of the foundation.

The architect to whom, after the great fire of 1666, the opportunity fell of leaving the marks of his influence upon London was Sir Christopher Wren. Had all his schemes been followed out, that influence would have extended beyond architecture alone. He, among others, prepared designs for laying out the City anew. But no such model city was destined to be built; the necessity for haste and the jealous guardianship of rights to old foundations resulted in the old lines being generally followed. It is characteristic of London that St Paul's Cathedral {q.v.) should be closely hemmed in by houses, and its majestic west front approached obliquely by a winding thoroughfare. The cathedral is Wren's crowning work. It is the scene from time to time of splendid ceremonies, and contains the tombs of many great men; but in this respect it cannot compete with the peculiar associations of Westminster Abbey. Of Wren's other churches it is to be noted that the necessity of economy usually led him to pay special attention to a single feature. He generally chose the steeple, and there are many fine examples of his work in this department. The steeple of St Mary-le-Bow, commonly called Bow Church, is one of the most note- worthy. This church has various points of interest besides its Norman crypt, from which it took the name of Bow, being the first church in London built on arches. The ecclesiastical Court of Arches sat here formerly. " Bow bells " are famous, and any person born within hearing of them is said to be a " Cockney," a term now applied particularly to the dialect of the lower classes in London. Wren occasionally followed the Gothic model, as in St Antholin. The classic style, however, was generally adopted in the period succeeding his own. Some fine churches belong to this period, such as St Martin's-in-the-Fields (1726), the Corinthian portico of which rises on the upper part of Trafalgar Square; but other examples are regrettable. While the architecture of the City churches, with the exceptions mentioned, is not as a rule remarkable, many are notable for the rich and beautiful wood- carving they contain. A Gothic style has been 'most commonly adopted in building modern churches; but of these the most notable, the Roman Catholic Westminster Cathedral (see Westminster), is Byzantine, and built principally of brick, with a lofty campanile. The only other ecclesiastical building to be specially mentioned is Lambeth Palace, opposite to the Houses of Parliament across the Thames. It has been a seat of the archbishops of Canterbury since 1 197, and though the present residential portion dates only from the early 19th century, the chapel, hall and other parts are of the 13th century and later (see Lambeth).

Among secular buildings, there is none more venerable than the Tower of London (q.v.), the moated fortress which overlooks the Thames at the eastern boundary of the City. It presents fine examples of Norman architecture; its historical associations are of the highest interest, and its armoury and the regalia of England, which are kept here, attract great numbers of visitors.

The Houses of Parliament, with Westminster Abbey and St Margaret's Church, complete the finest group of buildings which _ _ London possesses; a group essentially Gothic, for the

uovern- Houses of Parliament, completed in 1867 from the designs H'udlnm °^ Barry, are in a late Perpendicular style. They cover a great area, the east front giving immediately upon the Thames. The principal external features are the huge Victoria Tower at the south, and the clock tower, with its well-known chimes and the hour-bell " Big Ben," on the north. Some of the apartments are magnificently adorned within, and the building incorporates the ancient Westminster Hall, belonging to the former royal palace on the site (see Westminster). The government offices are principally in Whitehall, the fine thoroughfare which connects Parliament Square, in the angle between the Houses and the Abbey, with Trafalgar Square. Somerset House (1776-1786), a massive range of buildings by Sir William Chambers, surrounding a quadrangle, and having its front upon the Strand and back upon the Victoria Embankment, occupies the site of a palace founded by the protector Somerset, c. 1548. It contains the Exchequer and Audit, Inland Revenue, Probate, Registrar-General's and other offices, and one wing houses King's College. Other offices are the New Record Office, the repository of State papers and other records, and the Patent Office in Chancery Lane. The Heralds' College or College of Arms, the official authority in matters of armorial bearings and pedigrees,

Tower ot London.

occupies a building in Queen Victoria Street, City, erected subse- quently to the great fire (1683). The Royal Courts of Justice or Law Courts stand adjacent to the Inns of Court, facing the Strand at the point where a memorial marks the site of Old Temple Bar (1672), at the entrance to the City, removed in 1878 and later re-erected at Theobald's Park, near Cheshunt, Hertfordshire. The Law Courts (1882) were erected from the designs of G. E. Street, in a Gothic style.

The buildings connected with local government in London are with one exception modern, and handsome town-halls have been erected for some of the boroughs. The exception is the Guildhall (q.v.) of the City Corporation, with its splendid hall, the scene of meetings and entertainments of the corporation, its council chamber, library and crypt (partly opened to the public in 1910). In 1906 the London County Council obtained parliamentary sanction for the erection of a county hall on the south bank of the Thames, immediately east of Westminster Bridge, and in 1908 a design submitted by Mr Ralph Knott was accepted in competition. The style prescribed was English Renaissance. Several of the great livery companies or gilds of the City possess fine halls, containing portraits and other collections of high interest and value. Among.the more notable of these halls are those of the Mercers, Drapers, Fishmongers, Clothworkers, Armourers and Stationers.

The former royal palaces of Westminster and of Whitehall, of which the fine Jacobean banqueting hall remains, are described under Westminster. The present London residence of the „ . sovereign is Buckingham Palace, on the west side of St nafaces James's Park, with beautiful gardens behind it. Bucking- ham House was built in 1705 for the duke of Buckinghamshire, and purchased by George III. in 1762. The existing palace was finished by John Nash in 1835, but did not meet with approval, and was considerably altered before Queen Victoria occupied it in 1837. As regards its exterior appearance it is one of the least satisfactory of London's great buildings, though the throne room and other state apartments are magnificent within. The picture gallery contains valuable works of Dutch masters and others. The front of the palace forms the background to the public memorial to Queen Victoria, at the head of the Mall. Provision was made in the design, by Sir Aston Webb, for the extension of the Mall to open upon Trafalgar Square, through gateways in a semicircular range of buildings to be occupied by government offices, and for a wide circular space in front of the Palace, with a statue of the Queen by Thomas Brock in its centre. St James's Palace, at the north side of St James's Park, was acquired and rebuilt by Henry VIII. , having been formerly a hospital founded in the 12th century for leprous maidens. It was the royal residence after the destruction of White- hall by fire in the time of William III. until a fire in 1809 destroyed the greater part. Only the gateway and certain apartments remain of the Tudor building. Marlborough House, adjacent to the palace, was built by

the first duke of Marlborough in 1710 from the designs ■ of Wren, came into possession of the Crown in 1817, and has been occupied since 1863 by the prince of Wales. In Kensington (q.v.), on the west side of Kensington Gardens, is the palace acquired by William III. as a country seat, and though no longer used by the sovereign, is in part occupied by members of the royal family, and possesses a deeper historical interest than the other royal palaces, as the birth-place of Queen Victoria and her residence in youth.

There are few survivals of ancient domestic architecture in London, but the gabled and timbered front of Staple Inn, Holborn (q.v.) is a picturesque fragment. In Bishopsgate Street, City, stood Crosby Hall, which belonged to Crosby Place, the mansion of Sir John Crosby (d. 1475). Richard III. occupied the mansion as duke of Gloucester and Lord Protector (cf. Shakespeare's Richard III., Act i. Sc. 3, &c.) The hall was removed in 1908, in spite of strong efforts to preserve it, which resulted in its re-erection on a site in Chelsea. The hall of the Middle Temple is an admirable example of a refectory of later date (1572).

A fine though circumscribed group of buildings is that in the heart of the City which includes the Bank of England, the Royal Exchange and the Mansion House. The Bank is a characteristic building, quadrilateral, massive and low, but covering a large area, without external windows, and almost wholly unadorned ; though the north- west corner is copied from the Temple of the Sibyl at Tivoli. The building is mainly the work of Sir John Soane (c. 1788). The first building for the Royal Exchange was erected and presented to the City by Sir Thomas Gresham (1565-1570) whose crest, a grass- hopper, appears in the wind-vane above the present building. Gresham's Exchange was destroyed in the great fire of 1666; and the subsequent building was similarly destroyed in 1838. The present building has an imposing Corinthian portico, and encloses a court surrounded by an ambulatory adorned with historical paintings by Leighton, Seymour Lucas, Stanhope Forbes and others. The Mansion House was erected c. 1740.

The only other public buildings, beyond those at Westminster, which fall into a great group are the modern museums, the Imperial Institute, London University and other institutions, and Albert Hall, which lie between Kensington Gore and Brompton and Cromwell Roads, and these, together with the National Gallery (in Trafalgar Square) and other art galleries, and the principal scientific, educa- tional and recreative institutions, are considered in Section V.

COMMUNICATIONS]

Monuments and Memorials. — The Monument (1677), Fish Street Hill, City, erected from the designs of Wren in commemoration of the great fire of 1666, is a Doric column surmounted by a gilt representa- tion of a flaming urn. The Nelson Column, the central feature of Trafalgar Square, is from the designs of William Railton (1843), crowned with a statue of Nelson by Baily, and has at its base four colossal lions in bronze, modelled by Sir Edwin Landseer. A statue of the duke of Cambridge, by Captain Adrian Jones, was unveiled in 1907 in front of the War Office, Whitehall. The duke of York's Column, Carlton House Terrace (1833), an Ionic pillar, is surmounted by a bronze statue by Sir Richard Westmacott. The Westminster Column, outside the entrance to Dean's Yard, was erected to the memory of the old pupils of Westminster School who died in the Russian and Indian wars of 1854-1859. The Guards Memorial, Waterloo Place, commemorates the foot guards who died in the Crimea. The Albert Memorial, Kensington Gardens, was erected (1872) by " Queen Victoria and her People to the memory of Albert, Prince Consort," from the designs of Sir Gilbert Scott, with a statue of the Prince (1 876) by John Henry Foley beneath a huge ornate Gothic canopy. At the eastern end of the Strand a memorial with statue by Hamo Thorneycroft of William

Ewart Gladstone was unveiled in 1905. In Parliament Square and elsewhere are numerous statues, some of high merit, but it cannot be said that statuary occupies an important place in the adornment of streets and open places in London. Cleopatra's Needle, an ancient Egyptian monument, was presented to the government by Mehemet Ali in 1819, brought from Alexandria in 1878, and erected on the Victoria embankment on a pedestal of grey granite.

Nomenclature. — Having regard to the destruction of visible evidences of antiquity in London, both through accidental agencies such as the great fire, and through inevitable moderniz- ing influences, it is well that historical associations in nomen- clature are preserved in a great measure unimpaired. The City naturally offers the richest field for study in this direction. The derivations of names may here be grouped into two classes, those having a commercial connexion, and those associated with ancient buildings, particularly the City wall and ecclesiastical foundations. Among examples of the first group, Cheapside is prominent. This modern thoroughfare of shops was in early times the Chepe (O. Eng. ceap, bargain), an open place occupied by a market, having, until the 14th century, a space set apart for popular entertainments. There was a Queen Eleanor cross here, and conduits supplied the city with water. Modern Cheapside merges eastward into the street called the Poultry, from the poulterers' stalls " but lately departed from thence," according to Stow, at the close of the 16th century. Cornhill, again, recalls the cornmarket " time out of mind there holden " (Stow), and Gracechurch Street was corrupted from the name of the church of St Benet Grasschurch (destroyed by the great fire, rebuilt, and removed in 1868), which was said to be derived from a herb-market held under its walls. The Jews had their quarter near the commercial centre, their presence being indicated by the street named Old Jewry, though it is probable that they did not reoccupy this locality after their expulsion in 1290. Lombard Street similarly points to the residence of Lombard merchants, the name existing when Edward II. confirmed a grant to Florentine merchants in 1318, while the Lombards maintained their position until Tudor times. Paternoster Row, still occupied by booksellers, takes name from the sellers of prayer-books and writers of texts who collected under the shadow of St Paul's Cathedral. As regards names derived from ancient buildings, instances are the streets called London Wall and Barbican, and those named after the numerous gates. Of those associated with ecclesiastical foundations several occur in the course of this article (Section II., Ecclesiastical Architecture, &c). Such are Austin Friars, Crutched Friars, Blackfriars and Whitefriars. To this last district a curious alternative name, Alsatia, was given, probably in the 17th century, with reference to its notoriety as a hiding-place of debtors. A derivation is suggested from the disputed territory of Alsace, pointing the contrast between this lawless district and the adjacent Temple, the home of the law itself. The name Bridewell came from a well near the Fleet (New Bridge Street), dedicated to St Bride, and was attached to a house built by Henry VIII. (1522), but is most familiar in its application to the house of correction instituted by Edward VI., whieh remained a prison till 1863. The Minories, a street leading south from Aldgate, takes name

from an abbey of nuns of St Clare (Sorores Minores) founded in 1293. Apart from the City an interesting ecclesiastical survival is the name Broad Sanctuary, Westminster, recalling the place of sanctuary which long survived the monastery under the protection of which it originally existed. Covent Garden, again, took its name from a convent garden belonging to Westminster. Among the survivals of names of non-ecclesiastical buildings Castle Baynard may be noted; it stood in the City on the banks of the Thames, and was held by Ralph Baynard, a Norman, in the time of William the Conqueror; a later building being erected in 1428 by Humphrey duke of Gloucester. Here Richard III. was acclaimed king, and the mansion was used by Henry VII. and Henry VIII. Its name is kept in a wharf and a ward of the City.

The survival of names of obliterated physical features or characteristics is illustrated in Section I.; but additional instances are found in the Strand, which originally ran close to the sloping bank of the Thames, and in Smithfield, now the central meat market, but for long the " smooth field " where a, cattle and hay market was held, and the scene of tournaments and games, and also of executions. Here in 1381 Wat Tyler the rebel was

killed by Sir William Walworth during the parley with Richard II. In the West End of London the majority of important street-names are naturally of a later derivation than those in the ancient City, though Charing Cross (q.v.) is an instance of an exception. The derivation commonly accepted for Piccadilly is from pickadil, a stiff collar or hem in fashion in the early part of the 17th century (Span, picca, a spear-head). In Pall Mall and the neighbouring Mall in St James' Park is found the title of a game resembling croquet (Fr. paille maille) in favour at or before the time of Charles I., though the Mall was laid out for the game by Charles II. Other names pointing to the existence of pastimes now extinct are found elsewhere in London, as in Balls Pond Road, Islington, where in the 17th century was a proprietary pond for the sport of duck-hunting. An entertainment of another form is recalled in the name of Spring Gardens, St James' Park, where at the time of James I. there was a fountain or spring so arranged as to besprinkle those who trod unwarily on the valve which opened it. Many of the names of the rich residential streets and squares in the west have associations with the various owners of the properties; but Mayfair is so called from a fair held on this ground in May as early as the reign of Charles II. Finally there are several survivals, in street-names, of former private mansions and other buildings. Thus the district of the Adelphi, south of Charing Cross, takes name from the block of dwellings and offices erected in 1768 by the brothers (Gr adelphi) Robert and William Adam, Scottish architects. In Piccadilly Clarendon House, erected in 1664 by Edward Hyde, earl of Clarendon, became Albemarle House when acquired by the duke of Albemarle in 1675. Northumberland House, from which is named Northumberland Avenue, opening upon Trafalgar Square, was built c. 1605 by Henry Howard, earl of Northampton, and was acquired by marriage by Algernon Percy, earl of Northumberland, in 1642. It took name from this family, and stood until 1874. Arundel House, originally a seat of the bishops of Bath, was the residence of Thomas Howard, earl of Arundel, whose famous collection of sculpture, the Arundel Marbles, was housed here until pre- sented to Oxford University in 1667. The site of the house is marked by Arundel Street, Strand.

III. Communications

Railways. — The trunk railways leaving London, with their termini, are as follows: (1) Northern. The Great Northern, Midland and London & North-Western systems have adjacent termini, namely King's Cross, St Pancras and Euston, in Euston Road, St Pancras. The terminus of the Great Central railway is Marylebone, in the road of that name. (2) Western. The terminus of the Great Western railway is Paddington (Praed Street); and that of the London & South-Western, Waterloo, south of the Thames in Lambeth. (3) Southern. The London, Brighton & South Coast railway has its western terminus at Victoria, and its central terminus at London Bridge, on the south side of the Thames. The South-Eastern & Chatham railway has four terminal stations, all on or close to the

north bank of the river — Victoria, Charing Cross, 1 Holborn Viaduct and Cannon Street (City). St Paul's Station on the Holborn branch is also terminal in part. (4) Eastern. The principal terminus of the Great Eastern Railway is in Liverpool Street (City), but the company also uses Fenchurch Street (City), the terminus of the London, Tilbury & Southend railway, and St Pancras. These lines, especially the southern lines, the Great Eastern, Great Northern and South-Western carry a very heavy suburban traffic. Systems of joint lines and running powers are maintained to afford communica- tion between the main lines. Thus the West London Extension line carries local traffic between the North Western and Great Western and the Brighton and South-Western systems, while the Metropolitan •Extension through the City connects the Midland and Great Northern with the South-Eastern & Chatham lines.

The railways whose systems are mainly or wholly confined within the metropolitan area are as follows. The North London railway has a terminal station at Broad Street, City, and serves the parts of London implied by its name. The company possesses running powers over the lines of various other companies: thus its trains run as far north as Potter's Bar on the Great Northern line, while it serves Richmond on the west and Poplar on the east. The East London line connects Shoreditch with New Cross (Deptford) by way of the Thames Tunnel, a subway under the river originally built for foot- passengers. The London & India Docks line connects the city with the docks on the north bank of the river as far as North Woolwich. The Metropolitan railway has a line from Baker Street through north-west London to Harrow, continuing to Uxbridge, while the original main line runs on to Rickmansworth, Aylesbury and Verney Junction, but has been worked by the Metropolitan and Great Central companies jointly since 1906. Another line serves the western outskirts (Hammersmith, Richmond, &c.) from the city. Metropolitan trains also connect at New Cross with the south- eastern railway system. This company combines with the Metro- politan District to form the Inner Circle line, which has stations close to all the great railway termini north of the Thames. The Metro- politan District (commonly called the District) system serves Wimbledon, Richmond, Ealing and Harrow on the west, and passes eastward by Earl's Court, South Kensington, Victoria and Mansion House (City) to Whitechapel and Bow. The Metropolitan and the District lines within London are for the most part underground (this feature supplying the title of " the Underground " familiarly applied to both systems) ; the tunnels being constructed of brick. The earliest part of the system was opened in 1863. Although these railways, as far as concerns the districts they serve, form the fastest method of communication from point to point, their discomfort, arising mainly from the impossibility of proper ventilation, and various other disadvantages attendant upon the use of steam traction, led to a determination to adapt the lines to electrical working. Experiments on a short section of the line were made in 1900, and later schemes were set on foot to electrify the District system and bring under one general control this railway, other lines in deep level" tubes " between Baker Street and Waterloo, between Charing Cross, Euston and Hampstead, and between Hammersmith, Brompton, Piccadilly, King's Cross and Finsbury Park, and the London United Tramways Company. The Underground Electric Railways Company, which acquired a controlling influence over these concerns, undertook the construction of a great power station at Chelsea; while the Metropolitan Company, which had fallen into line with the District (not without dispute over the system of electri- fication to be adopted) erected a station at Neasden on the Aylesbury branch. Electric traction was gradually introduced on the Metro- politan and the District lines in 1906. The former company com- bined with the Great Western Company as regards the electrification of, and provision of stock for, the lines which they had previously worked jointly, from Edgware Road by Bishop's Road to Hammer- smith, &c. The Baker Street & Waterloo railway (known as the " Bakerloo ") was opened in 1906 and subsequently extended in one direction to Paddington and in the other to the Elephant and Castle. The Great Northern, Piccadilly & Brompton line, from Finsbury Park to Hammersmith, was opened early in 1907, and the Charing Cross, Euston & Hampstead line later in the same year. Deep- level electric railways (" tubes "), communicating with the surface by lifts, were already familiar in London. The first opened was the City & South London (1890), subsequently extended to run between Euston, the Angel, Islington, the Bank (City) and Clapham. Others are the Waterloo & City (1898) running from the terminus of the South-Western railway without intermediate stations to the Bank ; the Central London (1900), from the Bank to Shepherd's Bush, Hammersmith; and the Great Northern & City (1904) from Finsbury Park (which is an important suburban junction on the Great Northern railway) to Moorgate Street.

Tramways. — The surface tramway system of London cannot be complete, as, within an area roughly represented by the boroughs of Chelsea, Kensington and Fulham, the city of Westminster and a considerable district north thereof, and the city of London, the

1 Charing Cross station was the scene of a remarkable catastrophe on the 5th of December 1905, when a large part of the roof collapsed, and the falling debris did very

serious damage to the Avenue theatre, which stands close to the station at a lower level.

existing streets could not accommodate tram lines along with other traffic over any great distance consecutively, and in point of fact there are few, beyond the embankment line from Blackfriars Bridge to Westminster Bridge, which connects with the southern system. Another line, running south from Islington, uses the shallow-level subway under Kingsway and connects with the embankment line. The northern, western and eastern outskirts and London south of the Thames are extensively served by trams. On the formation of the London County Council there were thirteen tramway com- panies in existence. Powers under the Tramways Act of 1870 were given to the council, enabling it to acquire possession of these undertakings, and within the county of London they have been for the most part so acquired, and are worked by the council. Outside the county both companies and local authorities own and work tramways. Both electric and horse traction are used; the latter, however, has been in great part displaced by the former. The total mileage for greater London is about 240.

Omnibuses. — The omnibus system is very extensive, embracing all the principal streets throughout the county and extending over a large part of Greater London. The two principal omnibus com- panies are the London General Omnibus and the London Road Car. The first omnibus ran between the Bank and Paddington in 1829. In 1905 and following years motor omnibuses (worked mostly by internal combustion engines) began to a large extent to supplant horse traction. The principal existing companies adopted them, and new companies were formed to work them exclusively. With their advantages of greater speed and carrying capacity over the horsed vehicles, their introduction was a most important development, though their working at first imposed a severe financial strain on many companies.

Cabs. — The horse-drawn cabs which ply for hire in the streets, or wait at authorized ” cab-stands,” are of two kinds, the ” hansom,” a two- wheeled vehicle so named after its inventor (1834) an d the ” four-wheeler.” ” Hackney coaches ” for hire are first mentioned in 1625, when they were kept at inns, and numbered 20. Until 1832 their numbers were restricted, in 1662 to 400, in 1694 to 700, in 1771 to 1000. In some cases a driver owns his cab, but the majority of vehicles are let to drivers by owners, and the adjustment of terms between them has led to disputes from time to time. In 1894 a dispute necessitated the formulation of the ” Asquith award ” by the Rt. Hon. H. H. Asquith as home secretary, and subsequent modifications of this were only arrived at, as in 1904, after a strike of the drivers affected. A long-standing cause of complaint on the part of the public has been the common refusal of cab-drivers to accept their legal fares, but, on the other hand, several attempts to introduce cabs with an automatic taximeter failed, until the intro- duction of motor cabs, of which a few had already been plying for some time when in 1907 a large number, provided with taximeters, were put into service. Subsequently, as the number of ” taxicabs ” (see Motor Vehicles) increased, that of horse-cabs decreased.

Traffic Problem. — One of the most serious administrative problems met with in London is that of locomotion, especially as regards the regulation of traffic in the principal thoroughfares and at the busiest crossings. The police have powers of control over vehicles and exer- cise them admirably; their work in this respect is a constant source of wonder to foreign visitors. But this control does not meet the problem of actually lessening the number of vehicles in the main arteries of traffic. At such crossings as that of the Strand and Wellington Street, Ludgate Circus and south of the Thames, the Elephant and Castle, as also in the narrow streets of the City, con- gestion is often exceedingly severe, and is aggravated when any main street is under repair, and diversion of traffic through narrow side streets becomes necessary. Many street improvements were carried out, it is true, in the last half of the 19th century, the dates of the principal being as follows: 1854, Cannon Street; 1 864, South wark Street; 1870, Holborn Viaduct; 1871, Hamilton Place, Queen Victoria Street; 1876, Northumberland Avenue; 1882, Tooley Street; 1883, Hyde Park Corner; 1884, Eastcheap; 1886, Shaftes- bury Avenue; 1887, Charing Cross Road; 1890-1892, Rosebery Avenue. At the

beginning of the 20th century several important local widenings of streets were put in hand, as for example between Sloane Street and Hyde Park Corner, in the Strand and at the Marble Arch (1908). At the same period a great work was undertaken to meet the want of a proper central communication between north and south, namely, the construction of a broad thoroughfare, called Kingsway in honour of King Edward VII., from High Holborn opposite Southampton Row southward to the Strand, connexion with which is established at two points through a crescent named Aldwych. The idea of such a thoroughfare is traceable back to the time of William IV. The magnitude of the traffic problem as a whole may be best appreciated by examples of the vast schemes of im- provement which from time to time have been put forward by responsible individuals. Thus Sir John Wolfe Barry, as chairman of the Council of the Society of Arts in 1899, proposed to alleviate congestion of traffic by bridges over and tunnels under the streets at six points, namely — Hyde Park Corner, Piccadilly Circus, Ludgate Circus, Oxford Street and Tottenham Court Road, Strand and Wellington Street, and Southwark Bridge and Upper Thames Street. Another scheme seriously suggested in 1904, to meet existing dis- abilities of communication between north and south by linking the

northern and southern tramway services, involved the removal of the Charing Cross terminus of the South Eastern and Chatham railway to the south side of the river, and the construction of a new bridge in place of the railway bridge. The mere control of existing traffic, local street improvements and provision of new means of com- munication between casual points, were felt to miss the root of the problem, and in 1903 a Royal Commission was appointed to consider the whole question of locomotion and transport in London, expert evidence being taken from engineers, representatives of the various railway and other companies, of the County Council, borough councils and police, and others. The commission reported in 1905. 1 _ ˆj. With regard to street improvements the most important

commit- recommendation was that of the construction of two . .gl, main avenues 140 ft. wide, one running west and east, ‘ from Bayswater Road to Whitechapel, and passing through the city in the neighbourhood of London Wall, and another from Holloway to the Elephant and Castle, to cross the Thames by a new bridge above Blackfriars. Four lines of surface tramways and four railway lines in shallow tunnels were proposed along these avenues. Many widenings and other improvements of existing thoroughfares, and extensions of tramways were proposed, and detailed recommenda- tions were made as regards urban and suburban railways, and the rehousing of the working population on the outskirts of London. Finally, the commission made the important recommendation that a traffic board should be established for London, to exercise a general supervision of traffic, and to act as a tribunal to which all schemes of railway and tramway construction should be referred.

Thames Steamers. — A local passenger steamboat service on the Thames suffers from the disadvantage that the river does not provide the shortest route between points at any great distance apart, and that the main thoroughfares between east and west do not touch its banks, so that passengers along those thoroughfares are not tempted to use it as a channel of communication. High pier dues, moreover, contributed to the decline of the traffic, and attempts to overcome the disinclination of passengers to use the river (at any rate in winter) show a record of failure. The London, Westminster and Vauxhall Steamboat Company established in 1840 a service of seven steam- boats between London Bridge and Vauxhall. This company was bought up by the Citizen and Iron Steamboat Companies in 1865. The City Steamboat Company, established in 1848, began with eight boats, and by 1865 had increased their fleet to seventeen, running from London Bridge to Chelsea. This company was taken over by the London

Steamboat Company in 1875. The sinking of the " Princess Alice " in 1878 was a serious blow to the London Steam- boat Company, which collapsed, and was succeeded by the River Thames Steamboat Navigation Company, which went into liquida- tion in 1887. The fleet was bought by a syndicate and sold to the Victoria Steamboat Association. The Thames Steamboat Company then took up the service, but early in 1902 announced that it would be discontinued, although in 1904 it was temporarily resumed. Mean- while, however, in 1902 the London County Council had promoted a bill in Parliament to enable them to run a service of boats on the Thames. The bill was thrown out on this occasion, but was revived and passed in 1904, and on the 17th of June 1905 the service was put into operation. The boats, however, were worked at a loss, and the service was discontinued in 1909.

Foreign Communications. — A large pleasure traffic is maintained by the steamers of the New Palace Company and others in summer between London Bridge and Southend, Clacton and Harwich, Ramsgate, Margate and other resorts of the Kent coast, and Calais and Boulogne. Passenger steamers sail from the port of London to the principal ports of the British Isles and northern Europe, and to all parts of the world, but the most favoured passenger services to and from Europe and North America pass through other ports, to which the railways provide special services of trains from London. The principal travelling agency in London is that of Messrs Cook, whose head office is at Ludgate Circus. A number of sub-offices of large steamship lines are congregated in Cockspur Street, Trafalgar Square, and several of the principal railway companies have local offices throughout the centre of the metropolis for the issue of tickets and the collection and forwarding of luggage and parcels.

Post Office. — The General Post Office lies in the centre of the City on either side of the street called St Martin's le Grand. The oldest portion of the buildings, Ionic in style, was designed by Sir Robert Smirke and erected in 1829. Here are the central offices of the letter, newspaper and telegraph departments, with the office of the Post- master General ; but the headquarters of the parcels department are at Mount Pleasant, Clerkenwell; those of the Post Office Savings Bank at Blythe Road, West Kensington, and those of the Money Order department in Queen Victoria Street. The postal area is divided into eight districts, commonly designated by initials (which it is customary to employ in writing addresses) — East Central (E.C., the City, north to Pentonville and City Roads, west to Gray's Inn Road and the Law Courts) ; West Central (W.C., from Euston Road to the Thames, and west to Tottenham Court Road) ; West (W., from Piccadilly and Hyde Park north to Marylebone and Edg-

' The report appeared in eight volumes, the first of which, con- taining the general conclusions to which allusion is here made, bore the number, as a blue-book, Cd. 2597.

ware Roads; the greater part of Paddington and Kensington, north part of Fulham and Hammersmith); South-west (S.W., City of Westminster south of Piccadilly, Chelsea, South Kensington, the greater part of Fulham, and London south of the Thames and west of Vauxhall Bridge); South-east (S.E., remainder of London south of the Thames); East (E., east of the City and Kingsland Road); North (N., west of Kingsland Road; Islington); North-west (N.W., greater part of St Pancras and St Marylebone, and Hampstead). The postal area excludes part of Woolwich within the county; but includes considerable areas outside the county in other directions, as West Ham, Leyton, &c, on the east; Woodford, Chingford, &c, on the north-east; Wood Green, Southgate and Finchley on the north ; Hendon and Willesden on the north-west ; Acton and Ealing, Barnes and Wimbledon on the west ; and Penge and Beckenham on the south, wholly or in part. There are ten district head offices and about a thousand local offices in the metropolitan district.

Telephones. — The National Telephone Company, working under licence expiring on the 31st of December 191 1, had until 1901 practic- ally a monopoly of telephonic communication within London, though the Post Office owned all the trunk lines connecting the various telephone areas of the company. The company's management did not give satisfaction, and the use of the telephone was consequently restricted in

the metropolis, when in 1898 a Select Committee on Telephones reported that " general immediate and effective " com- petition by either the government or local authority was necessary to ensure efficient working. The Post Office thereupon instituted a separate system of exchanges and lines, intercommunication between the two systems being arranged. Charges were reduced and efficiency benefited by this movement. The area covered by the local as distinct from the trunk service is about 630 sq. m. extending to Romford, Enfield, Harrow, &c, north of the Thames, and to Dartford Reigate, Epsom, &c, south of it. Public call offices are provided in numerous shops, railway stations and other public places, and at many post offices. The District Messengers Company affords facilities through local offices for the use of special messengers.

IV. Population, Public Health, &c.

The population of Greater London by the census of 1901 was

6,581,402.

The following table gives comparisons between the figures of certain census returns for Greater London and its chief component parts, namely, the City, the county and the outer ring (i.e. Greater London outside the county). All the figures before those of 1901 are adjusted to these areas.

Year.

City.

County.

Outer Ring.

Greater London.

1801 1841 1881 1901

128,129

123,563

50,569

26,923

831,181 1,825,714 3,779,728 4,509,618

155,334 286,067

936,364 2,044,864

1,114,644

2,235,344 4,766,661 6,581,402

The reason for the decrease in the resident City population is to be found in the rapid extension of business premises, while the widening ramifications of the outer residential areas are illustrated by the increase in the later years of the population of the Outer Ring. The growth and population of London previous to the 19th century is considered under History, ad fin.

The foreign-born population of London was 60,252 in 1881, and 135,377 in I9 01 – During 1901, 27,070 aliens (excluding sailors) arrived at the port, and in 1902, 33,060. Of these last ...

Russians and Poles numbered 21,013; Germans, 3386; Aiunt. Austrians and Hungarians, 2197; Dutch, 1902; Norwegian* Swedes and Danes, 1341 ; and Rumanians, 1016. Other nation- alities numbered below one thousand each. The foreign-born population shows a large increase in percentage to the whole, being 1-57 in 1881 and 2-98 in 1901. Residents of Irish birth have decreased since 1 851; those of Scottish birth have increased steadily, and roughly as the population. German residents are found mainly in the western and west central districts; French mainly in the City of Westminster (especially the district of Soho), St Pancras and St Marylebone; Italians in Holborn (Saffron Hill), Soho and Finsbury; and Russians and Poles in Stepney and Bethnal Green.

Vital Statistics. — The following table shows the average birth rate and death-rate per thousand at stated periods.

Years.

Births.

Deaths.

1861-1880 2

iSgi-igoo 2

1901-1904 2

1905

35-4 30-3 28.5 27-1

23-4 19-2 16-5 156

2 Average.

A comparison of the death-rate of London and those of other great towns in England and abroad is given here : — •

94 6

LONDON

[PUBLIC HEALTH

Average

1895-1904.

1905.

Leicester .

167

13-3

Brussels .

167

14-5

Bristol . .

16-9

14-6

Bradford .

177

15-2

Leeds

19-1

152

London .

18-2

15-6

Birmingham .

20-2

16-2

Nottingham .

18-4

16-5

Newcastle

20-9

16-8

Sheffield . .

19-6

17-0

Berlin

17-8

17-2

Paris

19-2

17-4

Manchester .

22-6

18-0

New York .

20-2

18.3

Vienna

20-0

19-0

Liverpool

23-2

19-6

Rome

19-1

20-6

St Petersburg

25-9

1 25 ‘ 3 1

In igo$ the lowest death-rates among the metropolitan boroughs were returned by Hampstead (9-3), Lewisham (117), Wandsworth (12-6), Woolwich (12-8), Stoke Newington (12-9), and the highest by Shoreditch (197), Finsbury (19-0), Bermondsey (187), Bethnal Green (l8-6) and Southwark (18-5). A return of the percentage of inhabitants dwelling in over-crowded tenements shows 27 for Lewis- ham, 4-5 for Wandsworth, 5-5 for Stoke Newington, and 6-4 for Hampstead, against 35-2 for Finsbury and 29-9 for Shoreditch.

Sanitation. — As regards sanitation London is under special regulations. When the statutes relating to public health were con- solidated and amended in 1875 London was excluded; and the law applicable to it was specially consolidated and amended in 1891. The London County Council is a central sanitary authority; the City and metropolitan boroughs are sanitary districts, and the Cor- poration and borough councils are local sanitary authorities. The County Council deals directly with matters where uniformity of administration is essential, e.g. main drainage, housing of working classes, infant life protection, common lodging-houses and shelters, and contagious diseases of animals. With a further view to uni- formity it has certain powers of supervision and control over local authorities, and can make by-laws respecting construction of local sewers, sanitary conveniences, offensive trades, slaughter-houses and dairies, and prevention of nuisances outside the jurisdiction of local authorities. A medical officer of health for the whole county is appointed by the Council, which also pays half the salaries of local medical officers and sanitary inspectors. The Council may also act in cases of default by the local authorities, or may make representations to the Local Government Board respecting such default, whereupon the Board may direct the Council to withhold payment due to the local authority under the Equalization of Rates Act 1894.

The first act providing for a commission of sewers in London dates from 1 53 1. Various works of a more or less imperfect character were carried out, such as the bridging over in 1637 of the Drainage. r ; ver Fleet, which as early as 1307 had become inaccessible to shipping through the accumulation of filth. Scavengers were employed in early fimes, and sewage was received into wells and pumped into the kennels of the streets. A system of main drainage was inaugurated by the Commissioners of Sewers in 1849, but their work proceeded very slowly. It was carried on more effectively by the Metropolitan Board of Works (1856-1888) which expended over six-and-a-half millions sterling on the work. The London County Council maintained, completed and improved the system. The length of sewers in the main system is about 288 m., and their construction has cost about eight millions. The system covers the county of London, West Ham, Penge, Tottenham, Wood Green, and parts of Beckenham, Hornsey, Croydon, Willesden, East Ham and Acton. There are actually two distinct systems, north and south of the Thames, having separate outfall works on the north and south banks of the river, at Barking and Crossness. The clear effluent flows into the Thames, and the sludge is taken 50 m. out to sea. The annual cost of maintenance of the system exceeds £250,000. The sanitary authorities arc concerned only with the supervision of house drainage, and the construction and maintenance of local sewers discharging into the main system. The Thames and the Lea Conservancies have powers to guard against the pollution of the rivers. ;

Hospitals. — The Metropolitan Asylums Board, though established in 1867 purely as a poor-law authority for the relief of the sick, insane and infirm paupers, has become a central hospital authority for infectious diseases, with power to receive into its hospitals persons, who are not paupers, suffering from fever, smallpox or diphtheria. Both the Board and the County Council have certain powers and duties of sanitary authority for the purpose of epidemic regulations. The local sanitary authorities carry out the provisions of the Infectious Diseases (Notification and Prevention) Acts, which for London are embodied in the Public Health (London) Act 1891. The Board has asylums

Metro- politan Afiylums Board.

for the insane at Tooting Bee (Wandsworth), Ealing (for children); King's Langley, Hertfordshire; Caterham, Surrey; and Darenth, Kent. There are twelve fever hospitals, including northern and southern convalescent hospitals. For smallpox the Board maintains hospital ships moored in the Thames at Dartford, and a land establishment at the same place. There are land and river ambulance services.

There are three regular funds in London for the support of hospitals. (1) King Edward's Hospital Fund (1897) founded by King Edward VII. as Prince of Wales in commemoration of the Diamond Jubilee of Queen Victoria. The League of Mercy, under royal charter, operates in conjunction with the Fund in the collection of small subscriptions. The Order of Mercy was instituted by the King as a reward for distinguished personal service. (2) The Metropolitan Hospital Sunday Fund, founded in 1873, draws the greater part of its revenue from collections in churches on stated occasions. (3) The Metropolitan Hospital Saturday Fund was founded in 1873, and is made up chiefly of small sums collected in places of business, &c. The following is a list of the principal London hospitals, with dates of foundation : —

1. General Hospitals with Medical Schools (all of which, with the exception of that of the Seamen's Hospital, are schools of London University) : —

Charing Cross; Agar Street, Strand (1820).

Guy's; St Thomas Street, Southwark (1724).

King's College; Lincoln's Inn Fields (1839).

London ; Whitechapel (1740).

Middlesex; Mortimer Street, Marylebone (1745).

North London, or University College; Gower Street (1833).

Royal Free; Gray's Inn Road (1828; on present site, 1842).

London School of Medicine for Women. St Bartholomew's; Smithfield (1123; refounded 1547). St George's; Hyde Park Corner (1733). St Mary's; Paddington (1845).

St Thomas'; Lambeth (1213; on present site, 1871). Seamen's Hospital Society; Greenwich (1821). Westminster, facing the Abbey. (1720 ; on present site, 1834).

2. General Hospitals without Schools: —

Great Northern Central; Islington (1856; on present site,

1887).

Metropolitan; Hackney (1836). Poplar Hospital for Accidents (1854). West London; Hammersmith Road (1856).

3. Hospitals for Special Purposes: —

Brompton Consumption Hospital (1841).

Cancer Hospital; Brompton (1851).

City of London Hospital for diseases of the chest; Bethiial Green (1848).

East London Hospital for Children and Dispensary for Women; Shadwell (1868).

Hospital for Sick Children; Bloomsbury (1852).

London Fever Hospital; Islington (1802).

National Hospital for Paralysed and Epileptics ; Bloomsbury

(1859). ‘

Royal Hospital for Incurables; Putney (1854).

Royal London Ophthalmic Hospital; City Road (1804; on present site, 1899). (See also separate articles on boroughs.)

Water Supply. — In the 12th century London was supplied with water from local streams and wells, of which Holy Well, Clerk’s Well (Clerkenwell) and St Clement’s Well, near St Clement’s Inn, were examples. In 1236 the magistrates purchased the liberty to convey the waters of the Tyburn from Paddington to the City by leaden pipes, and a great conduit was erected in West Cheap in 1285. Other conduits were subsequently built (cf. Conduit Street off Bond Street, Lamb’s Conduit Street, Bloomsbury); and water was also supplied by the company of water-bearers in leathern panniers borne by horses. In 1582 Peter Moris, a Dutchman, erected a ” forcier ” on an arch of London Bridge, which he rented for 10s. per annum for 500 years. His works succeeded and increased, and continued in his family till 1 70 1, when a company took over the lease. Other forciers had been set up, and in 1609, on an act of 1605, Sir Hugh Myddelton undertook the task of supplying reservoirs at Clerkenwell through the New river from springs near Ware, Hertfordshire ; and these were opened in 1613. In 1630 a scheme to bring water from Hoddesdon on the Lea was promoted by aid of a lottery licensed by Charles I. The Chelsea Water Company opened its supply from the Thames in 1721; the Lambeth waterworks were erected in 1783; the Vauxhall Company was established in 1805, the West Middlesex, near Hammersmith, and the East London on the river Lea in 1806, the Kent on the Ravensbourne (Deptford) in 1810, the Grand Junction in 181 1, and the Southwark (which amalgamated with the Vauxhall) in 1822.

For many years proposals to amalgamate the working of the companies and displace them by a central public authority were put forward from time to time. The difficulty of administration lay in the fact that of the area of 620 sq. m. constituting what is known as ” Water London ” (see map in London Statistics, vol. xix., issued by the L.C.C., 1909) the London County Council has authority over little more than one-third, and therefore when the Council proposed

Water Board.

to acquire the eight undertakings concerned its scheme was opposed not only by the companies but by the county councils and local authorities outside the County of London. The Council had a scheme of bringing water to London from Wales, in view of increasing demands on a stationary supply. This involved impounding the headwaters of the Wye, the Towey and the Usk, and the total cost was estimated to exceed fifteen millions sterling. The capacity of existing sources, however, was deemed sufficient by a Royal Com- mission under Lord Balfour of Burleigh in 1893, an d this opinion was endorsed by a further Commission under Lord Llandaff. The construction of large storage reservoirs was recommended, and this work was put in hand jointly by the New River, West Middlesex and Grand Junction companies at Staines on the Thames. As regards administration, Lord Llandaff ‘sCommission recommended the creation of a Water Trust, and in 1902 the Metropolis Water Act »» constituted the Metropolitan Water Board to purchase po an an j carr y on trie unc j er takings of the eight companies, and of certain local authorities. It consists of 66 members appointed by the London County Council (14), the City of London and the City of Westminster (2 each) , the other Metropolitan boroughs (1 each), the county councils of Middlesex, Hertfordshire, Essex, Kent and Surrey (1 each), borough of West Ham (2), various

groups of other boroughs and urban districts, and the Thames and the Lea Conservancies. The first election of the Board took place in 1903. The 24th of June, 1904, was the date fixed on which control passed to the Board, and in the meantime a Court of Arbitration adjudicated the claims of the companies for compensation for the acquisition of their properties.

" Water London " is an irregular area extending from Ware in Hertfordshire to Sevenoaks in Kent, and westward as far as Ealing and Sunbury.

A constant supply is maintained generally throughout " Water London," although a suspension between certain hours has been occasionally necessitated, as in 1895 and 1898, when, during summer droughts, the East London supply was so affected. During these periods other companies had a surplus of water, and in 1899 an act was passed providing for the interconnexion of systems. The Thames and Lea are the principal sources of supply, but the Kent and (partially) the New River Company draw supplies from springs. The systems of filtration employed by the different companies varied in efficacy, but both the Royal Commissions decided that water as supplied to the consumer was generally of a very high standard of purity. The expenditure of the Water Board for 1907-1908 amounted to £2,846,265. Debt charges absorbed £1,512,718 of this amount.

Public baths and washhouses are provided by local authorities under various acts between 1846 and 1896, which have been adopted by all the borough councils.

Lighting. — From 1416 citizens were obliged to hang out candles between certain hours on dark nights to illuminate the streets. An act of parliament enforced this in 1661 ; in 1684 Edward Heming, the inventor of oil lamps, obtained licence to supply public lights; and in 1736 the corporation took the matter in hand, levying a rate. Gas-lighting was introduced on one side of Pall Mall in 1807, and in 1810 the Gas Light & Coke Company received a charter, and developed gas-lighting in Westminster. The City of London Gas Company followed in 1817, and seven other companies soon after. Wasteful competition ensued until in 1857 an agreement was made between the companies to restrict their services to separate localities, and the Gas Light & Coke Company, by amalgamating other com- panies, then gradually acquired all the gas-lighting north of the Thames, while a considerable area in the south was provided for by another great gas company, the South Metropolitan. Various acts from i860 onwards have laid down laws as to the quality and cost of gas. Gas must be supplied at 16-candle illuminating power, and is officially tested by the chemists' department of the London County Council. The amalgamations mentioned were effected subsequently to i860, and there are now three principal companies within the county, the Gas Light & Coke, South Metropolitan and Commercial, though certain other companies supply some of the outlying districts. As regards street lighting, the extended use of burners with in- candescent mantles has been of good effect. The Metropolitan Board of Works, and the commissioners of sewers in the City, began experiments with electric light. At the close of the 19th and the beginning of the 20th century a large number of electric light companies came into existence, and some of the metropolitan borough councils, and local authorities within Greater London, also undertook the supply. An extensive use of the light resulted in the principal streets and in shops, offices and private houses.

Fire. — In 1832 the fire insurance companies united to maintain a small fire brigade, and continued to do so until 1866. The brigade was confined to the central part of the metropolis; for the rest, the parochial authorities had charge of protection from fire. The central brigade came under the control of the Metropolitan Board of Works ; and the County Council now manages the Metropolitan Fire Brigade, under a chief officer and a staff numbering about 1300. The cost of maintenance exceeds £200,000 annually; contributions towards this are made by the Treasury and the fire insurance companies. The Council controls the provision of fire escapes in factories employing over 40 persons, under an act of 1901 ; it also compels the mainten-

ance of proper precautions against fire in theatres and places of entertainments. A Salvage Corps is independently maintained by the Insurance Companies.

Cemeteries. — The administrative authorities of cemeteries for the county are the borough councils and the City Corporation and private companies. The large cemetery at Brompton is the property of the government. Kensal Green cemetery, the burial-place of many famous persons, is of great extent, but several large cemeteries outside the metropolis have come into use. Such are that of the . London Necropolis Company at Brookwood near Woking, Surrey, and that of the parishes of St Mary Abbots, Kensington, and St George, Hanover Square, at Hanwell, Middlesex. Crematoria are provided at certain of the companies' cemeteries, and the Cremation Act 1902 enabled borough councils to provide crematoria.

V. Education and Recreation Education. — The British and Foreign School Society (1808) and the National Society (181 1), together with the Ragged Schools Union (1844), were the only special organizations providing for Element- the education of the poorer classes until 1870. To meet a _, the demand for elementary education, increasing as it did education. with population, was beyond the powers of these societies, the churches and the various charitable institutions. Thus a return of 1 87 1 showed that the schools were capable of accommodating only 39% of the children of school-going age. In 1870, however, a School Board had been created in addition, and this body carried out much good work during its thirty-four years of existence. In 1903 the Education (London) Act was passed in pursuance of the general system, put into operation by the Education Act (1902) of bringing education within the scope of municipal government. The County Council was created a local education authority, and given control of secular education in both board and voluntary schools. It appoints an education committee in accordance with a scheme approved by the Board of Education. This scheme must allow of the Council selecting at least a majority of the committee, and must provide for the inclusion of experts and women. Each school or group of schools is under a body of managers, in the appointment of whom the borough council and the County Council share in the following proportions: — (a) Board or provided schools; borough council, two-thirds; county council, one-third: (b) Voluntary or non-provided schools; the foundation, two-thirds; borough council and county council, each one-sixth. The total number of public elementary schools was 963 in 1905, with 752,487 scholars on the register. Other institutions include higher elementary schools for pupils certified to be able to profit by higher instruction; and schools for blind, deaf and defective children. Instruction for teachers is provided in pupil teachers' centres (preparatory), and in residential and day training colleges. There are about 15 such colleges. Previous to the act of 1903 the County Council had educational powers under the Technical Instructions Acts which enabled it to provide * c "J^* technical education through a special board, merged by e uca the act of 1903 in the education committee. The City and Guilds of London Institute, Gresham College, also maintains various technical institutions. The establishment of polytechnics was provided for by the City of London Parochial Charities Act 1883; the charities being administered by trustees. The model in- stitution was that of Mr Quintin Hogg (1880) in Regent Street, where a striking statue by George Frampton (1906) commemorates him. The general scope of the polytechnics is to give instruction both in general knowledge and special crafts or trades by means of classes, lectures and laboratories, instructive entertainments and exhibitions, and facilities for bodily and mental exercise (gymnasia, libraries, &c). Other similar institutions exist primarily for special purposes, as the St Bride Foundation Institute, near Fleet Street, in immediate proximity to the great newspaper offices, for the printing trade, and the Herolds' Institute, a branch of the Borough Polytechnic situated in Bermondsey, for the purposes of the leather trade. The County Council also aids numerous separate schools of art, both general and special, such as the Royal School of Art Needlework and the School of Art Woodcarving; the City and Guilds Institute maintains similar establishments at some of its colleges, and art schools are also generally attached to the polytechnics.

The London County Council maintains a number of industrial schools and

reformatories, both in London and in the country, for children who have shown or are likely to be misled into a tendency towards lawlessness. The City Corporation has separate responsibilities in the same direction, but has no schools of its own. The expenditure of the London County Council on education for 1907-1908 was £4,281 ,291 for elementary education, and £742,962 for higher education.

The work of private philanthropists and philanthropical bodies among the poor of East London, Southwark and Bermondsey, and elsewhere, falls to be noticed at this point. The labours of the regular clergy here lie largely in the direction of social reform, and churches and missions have been established and are maintained by colleges, such as Christ Church, Oxford, schools and other bodies. There are, further, " settlements " where members of the various bodies may reside in order to devote themselves to philanthropical work; and these include clubs, recreation rooms and other institutions for the use of the poor. Such are the Oxford House, Bethnal

Philan- thropical Institu- tions.

Green; the Cambridge House, Camberwell Road; Toynbee Hall, Whitechapel; Mansfield House, Canning Town; the Robert Browning Settlement, Southwark; and the Passmore Edwards Settlement, St Pancras. There are also several women's settlements of a similar character. The People's Palace, Mile End Road, opened in 1887, is both a recreative and an educational institution (called East London College) erected and subsequently extended mainly through the liberality of the Drapers' Company and of private donors.

In early times the priories and other religious houses had generally grammar schools attached to them. Those at St Peter's, Westminster, Public an d St Paul's, attained a fame which has survived, while

tcaools. other similar foundations lapsed, such as St Anthony's (Threadneedle Street, City), at which Sir Thomas More, Archbishop Whitgift and many other men of eminence received education. Certain of the schools were re-endowed after the dissolution of the monasteries. St Peter's College or Westminster School (see Westminster) is unique among English public schools of the highest rank in maintaining its original situation in London. Other early metropolitan foundations have been moved in accordance with modern tendencies either into the country or to sites aloof from the heart of London. Thus Charterhouse school, part of the foundation of Sir Thomas Sutton (161 1), was moved from Finsbury to Godalming, Surrey; St Paul's School occupies modern buildings at Hammersmith, and Christ's Hospital is at Horsham, Sussex. Of other schools, Merchant Taylors' was founded by the Company of that name in 1561 , and has occupied, since 1875, the premises vacated by Charterhouse School. The Mercers' School, Dowgate, was origin- ally attached to the hospital of St Thomas of Aeon, which was sold to the Mercers' Company in 1522, on condition that the company should maintain the school. The City of London School, founded in Milk Street, Cheapside, by the City Corporation in 1835, occupies modern buildings on the Victoria Embankment. Dulwich College originated in the foundation of the College of God's Gift by Edward Alleyn in 1626, and is now constituted as one of the principal English public schools. St Olave's and St Saviour's grammar school, South- wark, received its charter in 1571. Both classical and modern education is provided ; a large number of scholarships are maintained out of the foundation, and exhibitions from the school to the uni- versities and other higher educational institutions.

London University. — The University of London was incorporated by royal charter in 1836, as an examining body for conferring degrees. Its scope and powers were extended by subsequent charters, and in 1900, under the University of London Act

1898, it was reorganized as both a teaching and an examining body. The function of the academic department is to control the teaching branch, internal examinations, &c, and that of the external department to control external examinations, while the university extension system occupies a third department. The university is governed by a senate consisting of a chancellor, chairman of convocation and 54 members, whose appointment is shared by the Crown, convocation, the Royal Colleges of Physicians and of Surgeons, the Inns of Court, the Law Society, the London County Council, City Corporation, City and Guilds Institute, University and King's Colleges and the faculties. The faculties are theology, arts, law, music, medicine, science, engineering and economics. The schools of the University include University College, Gower Street, and King's College, Somerset House (with both of which preparatory schools are connected), East London College and numerous institutions devoted to special faculties both within and without London. The university in part occupies buildings which formerly belonged to the Imperial Institute.

Other Educational Institutions. — The Board of Education directly administers the following educational institutions — the Victoria and Albert Museum, South Kensington, with its branch at Bethnal Green, from both of which objects are lent to various institutions for educational purposes; the Royal College of Science, South Kensington, with which is incorporated the Royal School of Mines; the Geological Survey of the United Kingdom and the Museum of Practical Geology, Jermyn Street; the Solar Physics Observatory, South Kensington ; and the Royal College of Art, South Kensington. At Gresham College,. Basinghall Street, City, founded in 1597 by Sir Thomas Gresham, and moved to its present site in 1843, lectures are given in the principal branches of science, law, divinity, medicine, &c.

Some further important establishments and institutions may be tabulated here : —

Architecture. — The Royal Institute of British Architects, Conduit Street, conducts examinations and awards diplomas.

Education. — The College of Preceptors, Bloomsbury, conducts examinations of persons engaged in education and awards diplomas.

Engineering. — A School of Practical Engineering is maintained at the Crystal Palace, Sydenham.

Law— The Inns of Court are four — Middle Temple, Inner Temple, Lincoln's Inn, Gray's Inn. A joint board of examiners examines students previous to admission. The Council of Legal Education superintends the education and subsequent examination of students. (See Inns of Court.) The Law Society is the superintending body for examination and admission in the case of solicitors.

Medical.— The Royal College of Physicians is in Pall Mall East,

and the Royal College of Surgeons is in Lincoln's Inn Fields. The Society of Apothecaries is in Water Lane, City. The Royal College of Veterinary Surgeons is in Red Lion Square, and the Royal Veterinary College at Camden Town. (The principal hospitals having schools are noted in the list of hospitals, Section VII.)

Military and Naval. — The Royal Military College and the Ordnance College are at Woolwich ; the Royal Naval College at Greenwich.

Music. — The principal educational institutions are — the Royal Academy of Music, Tenterden Street, Hanover Square; the Royal College of Music, South Kensington; Guildhall School, City, near the Victoria Embankment; London College, Great Marlborough Street; Trinity College, Manchester Square; Victoria College, Berners Street; and the Royal College of Organists, Bloomsbury.

Scientific Societies. — Numerous learned societies have their head- quarters in London, and the following may especially be noticed here. Burlington House, in Piccadilly, built

in 1872 on the site of a mansion of the earls of Burlington, houses the Royal Society, the Chemical, Geological, Linnaean and Royal Astronomical Societies, the Society of Antiquaries and the British Association for the Advancement of Science, of which the annual meetings take place at different British or colonial towns in succession. The Royal Society, the most dignified and influential of all, was incorporated by Charles II. in 1663. It originally occupied rooms in Crane Court, City, and was moved in 1780 to Somerset House, where others of the societies named were also located. The Society of Arts, John Street, Adelphi, was established in 1754 for the encouragement of arts, manufactures and commerce. The Royal Institution, Albemarle Street, was founded in 1799, maintains a library and laboratories and promotes research in connexion with the experimental sciences. The Royal Geo- graphical Society, occupying a building close to Burlington House in Savile Row, maintains a map-room open to the public, holds lectures by prominent explorers and geographers, and takes a leading part in the promotion of geographical discovery. The Royal Botanic Society has private gardens in the midst of Regent's Park, where flower shows and general entertainments are held. The Royal Horticultural Society maintains gardens at Wisley, Surrey, and has an exhibition hall in Vincent Square, Westminster. The exhibitions of the Royal Agricultural Society are held at Park Royal, near Willesden. The Zoological Society maintains a magnificent collection of living specimens in the Zoological Gardens, Regent's Park, a popular resort.

Museums, Art Galleries, Libraries. — In the British Museum London possesses one of the most celebrated collections in the world, origin- ated in 1753 by the purchase of Sir Hans Sloane's collection and library by the government. The great building in Bloomsbury (1828-1852) with its massive Ionic portico, houses the collections of antiquities, coins, books, manuscripts and drawings, and contains the reading-rooms for the use of readers. The natural history branch was removed to a building at South Kensington (the Natural History Museum) in 1881, where the zoological, botanical and mineralogical exhibits are kept. Close to this museum is the Victoria and Albert Museum (formerly South Kensington Museum, 1857) for which an extension of buildings, from a fine design by Sir Aston Webb, was begun in 1899 and completed in ten years. Here are collections of pictures and drawings, including the Raphael cartoons, objects of art of every description, mechanical and scientific collections, and Japanese, Chinese and Persian collections, and an Indian section. In the vicinity, also, is the fine building of the Imperial Institute, founded in 1887 as an exhibition to illustrate the resources of all parts of the Empire, as well as an institution for the furtherance of imperial intercourse; though not developed on the scale originally intended. Other museums are Sir John Soane's collection in Lincoln's Inn Fields and the Museum of Practical Geology in Jermyn Street, while the scientific societies have libraries and in some cases collections of a specialized character, such as the museums of the Royal College of Surgeons, the Royal Architectural Society, and the Society of Art and the Parkes Museum of the Sanitary Institute. Among permanent art collections the first place is taken by the National Gallery in Trafalgar Square. This magnificent collection was originated in 1824, and the building dates from 1838, but has been more than once enlarged. The building of the National Portrait Gallery, adjoining it, dates from 1896, but the nucleus of the collec- tion was formed in 1858. The munificence of Sir Henry Tate pro- vided the gallery, commonly named after him, by the Thames near Vauxhall Bridge, which contains the national collection of British art. The Wallace collection of paintings and objects of art, in Hertford House, Manchester Square, was bequeathed to the nation by the widow of Sir Richard Wallace in 1897. Dulwich College possesses a fine series of paintings, of the Dutch and other schools, bequeathed by Sir P. F. Bourgeois in 1811. There are also notable collections of pictures in several of the mansions of the nobility, government buildings, halls of the City Companies and elsewhere. No gallery in London is exclusively or especially devoted to sculpture. Of the periodical art exhibitions that of the Royal Academy is most noteworthy. It is held annually at Burlington House from the first Monday in May to the first Monday in August. It consists mainly of paintings, but includes a few drawings and examples of sculpture. Earlier in each year exhibitions of works by deceased British artists and by old masters are held, and the Gibson and Diploma Galleries are permanent exhibitions.

At the Guildhall special exhibitions are

held from time to time. There are a number of art galleries in and about Bond Street and Piccadilly, Regent Street and Pall Mall, such as the New Gallery, where periodical exhibitions are given by the New English Art Club, the Royal Society of Painters in Water- Colours, the Royal Institute of Painters in Water-Colours, other societies and art dealers.

Municipal provision of public libraries under acts of 1892 and 1893 is general throughout London, and these institutions are ex- ceedingly popular for purposes both of reference and of loan. The acts are extended to include the provisions of museums and art galleries, but the borough councils have not as a rule availed them- selves of this extension. The London County Council administers the Horniman Museum at Forest Hill, Lewisham. The City Corpora- tion maintains the fine Guildhall library and museum. A few free libraries are supported by donations and subscriptions or charities. Besides the Government reference libraries at the British Museum and South Kensington there are other such libraries, of a specialized character, as at the Patent Office and the Record Office. Among lending libraries should be noticed the London Library in St James's Square, Pall Mall.

Theatres and Places of Entertainment. — The principal London theatres lie between Piccadilly and Temple Bar, and High Holborn and Victoria Street, the majority being in Shaftesbury Avenue, the Haymarket, the neighbourhood of Charing Cross and the Strand. At these central theatres successful plays are allowed to " run " for protracted periods, but there are numerous fine houses in other parts of London which are generally occupied by a succession of touring companies presenting either revivals of popular plays or plays successful at the moment in the central theatres. The principal music halls (variety theatres) are in Shaftesbury Avenue, Piccadilly Circus, Leicester Square and the Strand. The Covent Garden theatre is the principal home of grand opera; the building, though spacious, suffers by comparison with the magnificence of opera houses in some other capitals, but during the opera season the scene within the theatre is brilliant. The chief halls devoted mainly to concerts are the Royal Albert Hall, close to the South Kensington museums, and Queen's Hall in Langham Place, Regent Street. For a long time St James's Hall (demolished in 1905) between Regent Street and Piccadilly was the chief concert hall. Oratorio is given usually in the Albert Hall, the vast area of which is especially suited for a large chorus and orchestra, and at the Crystal Palace (q.v.). This latter building, standing on high ground at Sydenham, and visible from far over the metropolis, is devoted not only to concerts, but to general entertainment, and the extensive grounds give ac- commodation for a variety of sports and amusements. Among other popular places of entertainment may be mentioned the exhibition grounds and buildings at Earl's Court ; similar grounds at Shepherd's Bush, where a Franco-British Exhibition was held in 1908, an Imperial Exhibition in 1909, and an Anglo-Japanese in 1910; the great Olympia hall, West Kensington; the celebrated wax-work exhibition of Madame Tussaud in Marylebone Road ; the Alexandra Palace, Muswell Hill, an institution resembling the Crystal Palace; and the Agricultural Hall, Islington, where agricultural and other exhibitions are held. The well-known Egyptian Hall in Piccadilly was taken down in 1906, and the permanent conjuring entertainment for which (besides picture exhibitions) it was noted was removed elsewhere. Theatres, music halls, concert halls and other places of entertainment are licensed by the County Council, except that the licence for stage-plays is granted by the lord chamberlain under the Theatres Act 1843. The council provides for inspection of places of entertainment in respect of precautions against fire, structural safety, &c. The principal clubs are in and about Piccadilly and Pall Mall (see Club). A club for soldiers, sailors and marines in London, called the Union Jack Club,

was opened in Waterloo Road by King Edward VII. in 1907.

Parks and Open Spaces: Administration. — The administration of parks and open spaces in and round London, topographical details of the principal of which are given in Section I., is divided between the Office of Works, the London County Council, the City Corporation and the borough councils. The Office of Works controls the Royal parks, the County Council controls the larger parks and open spaces not under Government or City control, and the borough councils the smaller; while the City Corporation controls certain public grounds outside the County of London. There are a few other bodies con- trolling particular open spaces, as the following list of public grounds exceeding 50 acres (in 1910) will show: —

1. Under the Office of Works: —

Green Park 52J acres

Greenwich Park 185 ,,

Hyde Park 363! ,,

Kensington Gardens 274? > >

Regent's Park 472J ,,

St James's Park 93 ,,

2. Under the War Office: —

Woolwich Common 159 ,,

3. Under the London County Council: —

Avery Hill, Eltham 80

Battersea Park 199J ,,

Blackheath 267 ,,

Bostall Heath and Woods, Woolwich 133I ,,

I27J

acres

205

*»

54i

»»

72

11

"5

»i

Brockwell Park, Heme Hill Clapham Common ....

Clissold Park

Dulwich Park

Finsbury Park

Hackney Marsh 339

Hainault Forest, Essex 805 „

Hampstead Heath 32oJ „

Ladywell Ground, Lewisham . . . 51 J „ Marble Hill, Twickenham .... 66 „

Millfields, Hackney 62j „

Parliament Hill 267I „

Peckham Rye and Park . . . . H2f ,,

Plumstead Common 103 ,,

Southwark Park 63 „

Streatham Common 66} „

Tooting Bee Common 151 1 „

Tooting Graveney Common ... 66 „ Victoria Park, East London . . .217 „ Wandsworth Common . . . 1 55 ,,

Wormwood Scrubbs 193 „

4. Under the City Corporation: —

Burnham Beeches, Buckinghamshire . 375 „

Coulsdon Commons, Surrey . . . 347 „

Epping Forest, Essex 5559i „

Highgate Woods 69 „

West Ham Park 77 ,,

Wimbledon and Putney Commons are under a board of con- servators. The London County Council's parks and open spaces increased in number from 40 in 1890 to 114 in 1907, and in acreage from 2656 to 5006 in the same years. The expenditure in 1907-1908 was £131,582, which sum included £11,987 for bands. (See also separate articles on boroughs.)

Bathing (at certain hours) and boating are permitted in the orna- mental waters in several of the parks, music is provided and much attention is paid to the protection of waterfowl and other birds, while herds of deer are maintained in some places, and also botanical gardens. Surplus plants and cuttings are generally distributed without charge to educational or charitable institutions, and to the poor. Provision is made for cricket, football and other games in a number of the parks. Large gatherings of spectators are attracted to the first-class cricket matches played at Lord's ground, St John's Wood, by the Marylebone Club and the Middlesex County teams, Eton College against Harrow School, and Oxford against Cambridge University; to the Kennington Oval for the matches of the Surrey club, and the Leyton ground for those of the Essex club. In the Crystal Palace grounds the final match for the English Association Football cup is generally played, and huge crowds from both the metropolis and the provinces witness the game. At Queen's Club, West Kensington, the annual Oxford and Cambridge athletic meeting and others take place, besides football matches, and there is covered

accommodation for tennis and other games. Professional association football teams are maintained locally in several parts of London, and much popular interest is taken in their matches. Rugby football is upheld by such notable teams as Blackheath and Richmond. Fashionable society takes its pastimes at such centres as the grounds of the Hurlingham and Ranelagh clubs, at Fulham and Barnes respectively, where polo and other games are played; and Rotten Row, the horse-track in Hyde Park, is the favourite resort of riders. In summer, boating on the lovely reaches of the Thames above the metropolis forms the recreation of thousands. The growth of popu- larity of the cycle, and later of the motor-car, has been a principal factor in the wide development of a tendency to leave London during the " week-end," that is to say, as a rule, for Saturday after- noon and Sunday. With many this is a practice at all seasons, and the railway companies foster the habit by means of tickets at re- duced fares to all parts. The watering-places of the Sussex, Kent and Essex coasts, and pre-eminently Brighton, are specially favoured for these brief holidays.

VI. Commerce

Port of London. — The extent of the Port of London has been variously defined for different purposes, but for those of the Port Authority it is taken to extend from Teddington Lock to a line between Yantlet Creek in Kent and the City Stone opposite Canvey Isle and in Essex. London Bridge is to outward appear- ance the up-river limit of the port. There are wharves and a large carrying trade in barges above this point, but below it the river is crowded with shipping, and extensive docks open on either hand.

Towards the close of the 19th century evidence was accumulat- ing that the development of the Port of London was not keeping pace with that of shipping generally. In 1900 a Royal Com- mission was appointed to investigate the existing administration of the port, the alleged inadequacy of accommodation for vessels and kindred questions, and to advance a scheme cJ

reform. The report, issued in 1902, showed apprehension to be well founded. The rive', it was ascertained, was not kept sufficiently dredged; the re-export trade was noted as showing an especially serious decline, and the administration was found to suffer from decentralization. The recommendations of the Commission included the creation of a single controlling authority to take over the powers of the Thames Conservancy Watermen's Company, and Trinity House and the docks of the companies already detailed. This authority, it was advised, should consist of 40 members, of whom n should be nominated by the London County Council and 3 by the Corporation of the City (supposing these bodies to accept certain financial responsibilities proposed in the direction of river improvements), 5 by the governors of the Bank of England from the mercantile community, 2 by the London Chamber of Commerce, and 1 each by the Admiralty, Board of Trade and Trinity House. The remaining members should be elected by various groups, e.g. shipowners, barge owners, the railway companies interested, &c. Rival schemes, however, were proposed by the London County Council, which proposed to take over the entire control through a committee, by the City Corporation, which suggested that it should appoint 10 instead of 3 members to the new board; and by the London Chamber of Commerce, which proposed a Harbour Trust of ex-officio and elected members. The Thames Conservancy also offered itself as the public authority. In 1902 a Mansion House Conference was convened by the lord mayor and a deputation was appointed which in 1903 pressed the solution of the matter upon the government.

A noteworthy scheme to improve the condition of the Thames, first put forward in

1902-1903, Was that of constructing a dam with four locks across the river between Gravesend Thames anc j Tilbury. The estimated cost was between three scheme. and four millions sterling, to be met by a toll, and it was urged that a uniform depth, independent of tides, would be ensured above the dam, that delay of large vessels wishing to proceed up river would. thus be obviated, that the river would be relieved of pollution by the tides, and the necessity for constant dredging would be abolished. This ” barrage scheme ” was discussed at considerable length, and its theoretical advantages were not universally admitted. The scheme included a railway tunnel beneath the dam, for which, incidentally, a high military importance was claimed.

In 1904 the Port of London Bill, embodying the recommenda- tions of the Royal Commission with certain exceptions, was p ort brought forward, but it was found impossible to carry

authorities it through. In 1908, however, the Port of London Act before -\ Vas passed, and came into force in 1909. This act

provided for the establishment of a Port Authority, the constitution of which is detailed below, which took over the entire control of the port, together with the docks and other property of the several existing companies.

The principal dock companies, with the docks owned by them, were as follows : —

1. London and India Company. — This company had amalgamated all the docks on the north side of the river except the Millwall Docks. Following the river down from the Tower these docks, with dates of original opening and existing extent, are — St Katherine’s (1828; 10ˆ acres), London (1805; 57J acres), West India, covering the northern part of the peninsula called the Isle of Dogs (1802; 121 J acres), East India, Blackwall (1806; 38 acres), Royal Victoria and Albert Docks (1876 and 1880 respectively), parallel with the river along Bugsby’s and Woolwich Reaches, nearly 3 m. in distance (181 acres) and Tilbury Docks, 25 m. below London Bridge, con- structed in 1886 by the East and West India Docks Company (65 acres). Tilbury Docks are used by the largest steamers trading with the port.

2. Millwall Docks (1868), in the south part of the Isle of Dogs, are 36 acres in extent.

3. Surrey Commercial Docks, Rotherhithe (Bermondsey), occupy a peninsula between the Lower Pool and Limehouse Reach. There nave been docks at Rotherhithe since the middle of the 17th century. The total area is 176 acres, a large new dock, the Greenland, being opened in 1904.

The principal railways have wharves and through connexions for goods traffic, and huge warehouses are attached to the docks. The custom house stands on the north bank, a short distance from London Bridge, in Lower Thames Street. It dates from 1817, the body of the

building being by Laing, but the Corinthian fagade was added by Smirke. It includes a museum containing ancient documents and specimens of articles seized by the customs authorities.

The chief authorities concerned in the government of the Port of London till 1909 were: —

1. Thames Conservancy. — For conservancy purposes, regulation of navigation, removal of obstruction, dredging, &c.

2. City Corporation. — Port sanitary purposes from Teddington Lock seawards.

3. Trinity House. — Pilotage, lighting and buoying from London Bridge seawards.

4. The Watermen ‘s and Lightermen’ s Company. — The licensing authority for

watermen and lightermen.

Besides these authorities, the London County Council, the Board of Trade, the Admiralty, the Metropolitan and City Police, police of riparian boroughs, Kent and Essex Fisheries Commissioners, all the dock companies and others played some part in the government and public services of the port.

Port Authority. — The Port of London Authority, as con- stituted by the act of 1908, is a body corporate consisting of a chairman, vice-chairman, 17 members elected by payers of dues, wharfingers and owners of river craft, 1 member elected by wharfingers exclusively, and 10 members appointed by the following existing bodies— Admiralty (one) ; Board of Trade (two) ; London County Council (two from among its own members and two others); City Corporation (one from among its own members and one other); Trinity House (one). The Board of Trade and the County Council must each, under the act, consult with representatives of labour as to the appointment of one of the members, in order that labour may be represented on the Port Authority. The first " elected " members were actually, under the act, appointed by the Board of Trade. The under- takings of the three dock companies mentioned above were transferred to and vested in the Port Authority, an equivalent amount of port stock created under the act being issued to each. The Port Authority has full powers to authorize construction works. All the rights, powers and duties of the Thames Con- servancy, so far as concerns the Thames below Teddington Lock, were transferred to the Port Authority under the act, as also were the powers of the Watermen's Company in respect of the registration and licensing of vessels, and the regulation of lightermen and watermen. The Port Authority fixes the port rates, which, however, must not in any two consecutive years exceed one-thousandth part of the value of all imports and exports, or a three-thousandth of the value of goods discharged from or taken on board vessels not within the premises of a dock. Preferential dock charges are prohibited and a port fund established under the act. The authority has powers to borrow money, but for certain purposes in this connexion, as in other matters, it can only act subject to the approval of the Board of Trade.

Commerce. — The following figures may be quoted for purposes of comparison at different periods: —

Value of Exports of Home Produce (1840), £11,586,037; (1874), £60,232,118; (1880), £52,600,929; (1902- 1 905 average), £60,095,294. Imports (1880), £141,442,907; (1902-1905), £174,059,316. These figures point to the fact that London is essentially a mart, and neither is itself, nor is the especial outlet for, a large manufacturing centre ; hence imports greatly exceed exports.

Vessels entered and cleared (foreign and colonial trade) : —

Year.

Entered.

Cleared.

Tonnage.

Tonnage.

1694

1.35.972

81,148

1750

511,680

179,860

1800

796,632

729.554

1841-1850

1.596,453

1.124,793

(average)

1881

5,810,043

4,478,960

1895

8,435.676

6,110,325

1905

10,814,115

7,9I3,H5

In the coastwise trade, in 1881, 38,953 vessels of 4,545,904 tons entered; in 1895, 43,704 vessels of 6,555,618 tons; but these figures include vessels trading within the Thames estuary (ports of London, Rochester, Colchester and Faversham), which later returns do not. Omitting such vessels, therefore, the number which entered in the coastwise trade in 1905 was 16,358 of 6,374,832 tons.

Business. — The City has been indicated as the business centre of the metropolis. Besides the Royal Exchange, in the building

of which are numerous offices, including ” Lloyd’s,” the centre of the shipping business and marine insurance, there are many exchanges for special articles. Among these are the Corn Exchange in Mark Lane, where the privilege of a fair was origin- ally granted by Edward I.; the Wool Exchange, Coleman Street; the Coal Exchange, Lower Thames Street; the Shipping Exchange, Billiter Street; and the auction mart for landed property in Tokenhouse Yard. The Hop Exchange is across the nver in Southwark. In Mincing Lane are the commercial sale- rooms. Besides the Bank of England there are many banking houses; and the name of Lombard Street, commemorating the former money dealers of Lombardy, is especially associated with them. The majority of the banks are members of the Clearjg- House, Post Office Court, where a daily exchange of drafts representing millions of pounds sterling is effected. The Royal Mint is on Tower Hill. The Stock Exchange is in Capel Court, and numbers of brokers have their offices in the vicinity of the Royal Exchange and the Bank of England.

Manufactures and Retail Trade.— No part of London can be pointed out as essentially a manufacturing quarter, and there is a strong tendency for manufacturing firms to

establish their factories outside the metropolis. There are, however, several large breweries among which that of Messrs Barclay & Perkins, on the riverside in bouthwark, may be mentioned; engineering works are numerous in fcast London by the river, where there are also shipbuilding yards; the .eather industry centres in Bermondsey, the extensive pottery works of Messrs Doulton are in Lambeth, there are chemical works on nle, a and Paper-mills on the Wandle. Certain industries (not

tti?™ to x l aCt0n , es) , haV f long , been as sociated with particular localities. Thus, clock-makers and metal-workers are congregated MiFmsbury, especially Clerkenwell and in Islington; ME harden, near Holborn Viaduct, is a centre for diamond merchants-cabinet-making is carried on in Bethnal Green, Shoreditch and the vicinity; and large numbers in the East End are employed in the ? a -, C V m U / try – c Sllk ” weavin g is still carried on in the district of bpitalfie ds (see Stepney). West of the City certain streets are essentially connected with certain trades. The old-established ™,” , of second-hand book-shops in Holywell Street was only abohshed by the widening of the Strand, and a large proportion then

iTEVt ˆT Cro | S u R ° ad – In the Strand > and more especially in Meet Street and its offshoots, are found the offices of the majority of the most .mportant daily newspapers and other journals. Carriage and motor-car warehouses congregate in Long Acre. In Tottenham (urlZw fi 3re ™ s u howroom s of several large upholstering and furnishing firms. Of the streets most frequented on account of their

SttTˆAU h Tˆ° nd S J reet -‘ Regent Street ‘ 0xford Street, Sloane Street and H‘ <*her commodities is carried on in

Af I S 0n -r n v! 0V ˆ le S ˆ” S by costermongers and hawkers.

Markets.— lhe City Corporation exercises a control over the

“heTlth l„ t H? r , L0n i° n T r , ketS ‘ Which , dates from the close of the 14th century, when dealers were placed under the govern- ance of the mayor and aldermen. The markets thus conSd

die .

Central Markets, Smithneld, for meat, poultry, provisions fruit vegetables flowers and fish. These extend over a great area north of Newgate Street and east of Farringdon Road. Beneath them are ex ens.ve underground railway sidings. A market for horseTand cattle exited here at least as early as the time of Henry II

Leadenhall Market, Leadenhall Street, City, for poultry and meat poˆsTofof tirc’itr 6 ˆ” bef ° re ‘*” Whe ” * Ca ™ i*oX

Brlhngsgate Market by the Thames immediately above the custom house, for fish. Formerly a point of anchorage for small vessels, it was made a free market in i6qq

Smithfield Hay Market.

Dei r tZfrn, t ? at M {W’ . C °P enha gen Fields, Islington. Ueptford Cattle Market (foreign cattle)

Spitalfields Market (iruit, vegetables and flowers).

Shadwell Market (fish).

Of other markets, the Whitechapel Hay Market and Borough

Markˆ‘iˆundirth’e 3 ” ””ˆ V ˆrustcS a ™ I Woolwich market is under the council of that borough. Covent Garden the

fnTheT.nH 111 ˆ WeSt ° f L ° ndon for flowers fruit and vegetables, is

market :arl S v˚iiT a iˆ < r nerS – U appears to have been used as a marKet early in the 17th century. Scenes of remarkable arrivitv may be witnessed here and at Billingsgate in the ™tW hours o tte r«ffi. the St ˚ Ck " br ˚ Ught "' and the wholeˆdistribSS VII. Government

fJ n d r

951

character. Moreover, as complete reform had always been steadily resisted, homogeneity was entirely wanting. Outside the City itself a system of local government can hardly be said to have existed. Greater London (in the '

sense in which that name might then have been applied) was governed by the inhabitants of each parish in vestry assembled, save that in some instances parishes had elected select vestries under the provisions of the Vestries Act 183 1. In neither case had the vestry powers of town management. To meet the needs of particular localities, commissioners or trustees having such powers had been from time to time created by local acts. The resulting chaos was remarkable. In 1855 these local acts numbered 250, administered by not less than 300 bodies, and by a number of persons serving on them computed at 10,448. These persons were either self-elected, or elected for life, or both, and therefore in no degree responsible to the ratepayers. There were two bodies having jurisdiction over the whole metropolis except the City, namely, the officers appointed under the Metro- politan Building Act of 1844, and the Metropolitan Commis- sioners of Sewers, appointed under the Commissioners of Sewers Act 1848. Neither body was responsible to the ratepayers. To remedy this chaotic state of affairs, the Metropolis Manage- ment Act 1855 was passed. Under that act a vestry elected by the ratepayers of the parish was established for each parish in the metropolis outside the City. The vestries so elected for the twenty-two larger parishes were constituted the local authorities. The fifty-six smaller parishes were grouped to- gether in fifteen districts, each under a district board, the members of which were elected by the vestries of the constituent parishes. A central body, styled the Metropolitan Board of Metro . Works, having jurisdiction over the whole metropolis poiitan (including the City) was also established, the members Board ot of which were elected by the Common Council of the Work!1, City, the vestries and district boards, and the previously estab- lished local board of Woolwich (q.v.). Further the area of the metropolis for local government purposes was for the first time defined, being the same as that adopted in the Commissioners of Sewers Act, which had been taken from the area of the weekly bills of mortality. The Metropolitan Board of Works was also given certain powers of supervision over the vestries and district boards, and superseded the commissioners of sewers as authority for main drainage. By an act of the same session it became the central authority for the administration of the Building Acts, and subsequently had m&ny additional powers and duties conferred upon it. The vestries and district boards became the authorities for local drainage, paving, lighting, repairing and maintaining streets, arid for the removal of nuisances, &c.

Acts of 1888 and i8qq.— An objection to the Metropolitan Board of Works soon became manifest, inasmuch as the system of election was indirect. Moreover, some of its actions were open to such suspicion that a royal commission z – oadon was appointed to inquire into certain matters connected coln% with the working of the board. This commission issued an interim report in 1888 (the final report did not appear until 1891), which disclosed the inefficiency of the board in certain respects, and also indicated the existence of corruption. Reform followed immediately. Already in 1884 Sir William Harcourt had attempted to constitute the metropolis a municipal borough under the government of a single council. But in 1888 the Local Government Act, dealing with the area of the metropolis as a separate county, created the London County Council as the central administrative body, possessing not only the powers of an ordinary county council, but also extensive powers of town management, transferred to it from the abolished Board of Works. Here, then, was the central body, under their direct control, which inhabitants of London had hitherto lacked. The question of subsidiary councils remained to be settled. The wealthier metropolitan parishes became discontented with the form of local government to which they remained subject, and in 1897 Kensington and Westminster petitioned to be created boroughs by the

grant of charters under the Municipal Corporation Acts. These, however, were inapplicable to London, and it was realized

that the bringing of special legislation to bear on special cases (as the petition of these two boroughs would have demanded) would be inexpedient as making against homogeneity. Instead, the London Government Act of 1899 was evolved. It brought into existence the twenty-eight Metropolitan boroughs enumerated at the outset of this The county of London may thus be regarded from the administrative standpoint as consisting of twenty-nine contiguous towns, counting the City of London. As regards the dis- tribution of powers and duties between the County Council and the Borough Councils, and the constitution and working of each, the underlying principle may be briefly indicated as giving all powers and duties which require uniformity of action throughout the whole of London to the County Council, and powers and duties that can be locally administered to the Borough Councils.

Summary of Administrative Bodies. — The administrative bodies of the County of London may now be summarized :

1. London County Council. — Consists of 118 councillors, 2 elected by each parliamentary division (but the City of London elects 4) ; and 19 aldermen, with chairman, vice-chairman and deputy-chair- man, elected in council. Triennial elections of councillors by house-holders (male and female) on the rate-books. Aldermen hold office for 6 years.

2. Metropolitan Boroughs. — Councils consist of a mayor and aldermen and councillors in proportion as 1 to 6. The commonest numbers, which cannot be exceeded, are 10 and 60 (see separate article on each borough). Triennial elections.

3. Corporation of the City of London. — The legislation of 1855, 1888 and 1899 left the government of the small area of the City in the hands of an unreformed Corporation. Here at least the medieval system, in spite of any anomalies with respect to modern conditions, has resisted reform, and no other municipal body shares the traditions and peculiar dignity of the City Corporation. This consists of a Lord Mayor, 26 aldermen and 206 common councilmen, forming the Court of Common Council, which is the principal administrative body. Its scope may be briefly indicated as including (a) duties exercised elsewhere by the Borough Councils, and by the London County Council (although that body is by no means powerless within the City boundaries) ; and (b) peculiar duties such as control of markets and police. The election of common councilmen, whose institution dates from the reign of Edward I., takes place annually, the electors being the ratepayers, divided among the twenty-five wards of the City. An alderman (q.v.) of each ward (save that the wards of Cripplegate within and without, share one) is elected for life. The Lord Mayor (q.v.) is elected by the Court of Aldermen from two aldermen nominated in the Court of Common Hall by the Livery, an electorate drawn from the membecs of the ancient trade gilds or Livery Companies (q.v.), which, through their control over the several trades or manufactures, had formerly an influence over the government of the city which from the time of Edward III. was paramount.

Non-administrative Arrangements. — The Local Government Act of 1888 dealt with the metropolis for non-administrative purposes as it did for administrative, that is to say, as a separate county. The arrangements of quarter-sessions, justices, coroners, sheriffs, &c, were thus brought into line with other counties, except in so far as the ordinary organization is modified by the existence of the central criminal court, the metropolitan police, police courts and magistrates, and a paid chairman of quarter-sessions. The powers of the

governing body of the City, moreover, are as peculiar in this direction as in that of municipal administration, and the act left the City as a county of a city practically unchanged. Thus the Lord Mayor and aldermen possess judicial authority, and the police of London are divided into two separate bodies, the Metropolitan and the City Police (see Police).

The chief courts for the trial of criminal cases are the Central Criminal Court and the Court of Quarter-sessions. The Central Charts, Criminal Court, taking the place of the provincial Assizes, was established by an act of 1834. There are twelve sessions annually, under the Lord Mayor, aldermen and judges. They were formerly held in the " Old Bailey " sessions-house, but a fine new building from designs of E. W. Mountford took the place of this in 1906. Quarter-sessions for the county of London are held thirty-six times annually, for the north side of the Thames at the Sessions-house in Clerkenwell (Finsbury) and for the south side at that in Newington Causeway, South- ward For judicial purposes Westminster was merged with the county of London in 1889, and the Liberty of the Tower was abolished in 1894. The separate court of the Lord Mayor and Aldermen is held at the Guildhall. The Metropolitan police courts are fourteen in number, namely — Bow Street, Covent

Garden; Clerkenwell; Great Marlborough Street (Westminster); Greenwich and Woolwich; Lambeth; Marylebone; North London, Stoke Newington Road; Southwark; South Western, Lavender Hill (Battersea); Thames, Arbour Street East (Step- ney); West Ham; West London, Vernon Street (Fulham); Westminster, Vincent Square; Worship Street (Shoreditch). The police courts of the City are held at the Mansion House, the Lord Mayor or an alderman sitting as magistrate, and at the Guildhall, where the aldermen preside in rotation. The prisons within the metropolis are Brixton, Holloway, Pentonville, Wandsworth and Wormwood Scrubbs. In the county of London there are 12 coroners' districts, 19 petty sessional divisions (the City forming a separate one) and 13 county court districts (the City forming a separate one). The boundaries of these divisions do not in any way correspond with each other, or with the police divisions, or with the borough or parish boundaries. The regis- tration county of London coincides with the administrative county.

Parliamentary Representation. — The London Government Act contains a saving clause by which " nothing in or done under this act shall be construed as altering the limits of any parliamentary borough or parliamentary county. ' ' The parliamentary boroughs are thus in many cases named and bounded differently from the metropolitan boroughs. The parliamentary arrangements of each metropolitan borough are indicated in the separate articles on the boroughs. In the following list the boroughs which extend outside the administrative county of London are noted. Each division of each borough, or each borough where not divided, returns one member, save that the City of London returns two members.

(a) North of the Thames. (1) Bethnal Green — Divs. : North- eastern, Soutn-wester'n. (2) Chelsea (detached portion in ad- ministrative county of Middlesex, Kensal Town). (3) Finsbury (detached portion in Middlesex, Muswell Hill) — Divs. : Holborn, Central, Eastern. (5) Fulham. (6) Hackney — Divs.: North, Central, South. (7) Hammersmith. (8) Hampstead. (9) Islington — flits.: Northern, Southern, Eastern, Western. (10) Kensington — Divs. : Northern, Southern; (11) City of London. (12) Maryle- bone — Divs. : Eastern, Western. (13) Paddington (extending into Middlesex) — Divs. : Northern, Southern. (14) St George's Hanover Square. (15) St Pancras— Divs. : Northern, Southern, Eastern, Western. (16) Shoreditch — Divs.: Hoxton, Haggerston. (17) Strand. (18) Tower Hamlets — Divs.: Bow and Bromley, Limehouse, Mile End, Poplar, St George, Stepney, Whitechapel. (19) Westminster.

A detached portion of the parliamentary division of Hornsey, Middlesex, is in the metropolitan borough of Hackney. London University returns a member,

(b) South of the Thames. (1) Battersea and Clapham — Divs.: Battersea, Clapham. (2) Camberwell (extending into Kent) — Divs. : Northern, Peckham, Dulwich. (3) Deptford. (4) Greenwich.

(5) Lambeth — Divs.: Northern, Kennington, Brixton, Norwood.

(6) Lewisham. (7) Newington— Divs. : Western, Walworth. (8) Southwark — Divs. : Western, Rotherhithe, Bermondsey. (9) Wandsworth. (10) Woolwich.

Part of the Wimbledon parliamentary division of Surrey is in the metropolitan borough of Wandsworth.

Ecclesiastical Divisions and Denominations. — London north of the Thames is within the Church of England bishopric of London, the bishop's palace being at Fulham. In this diocese, which covers nearly the whole of Middlesex and a very small portion of Hertfordshire, are the suffragan bishoprics of Islington, Ken- sington and Stepney. The bishopric of Southwark was created in 1904, having been previously a suffragan bishopric in the diocese of Rochester. The county contains 612 ecclesiastical parishes. Westminster is the seat of the Roman Catholic archbishopric in England, and Southwark is a bishopric. Among the numerous chapels of dissenting bodies there may be men- tioned the City Temple, Congregational, on Holborn Viaduct; the Metropolitan Tabernacle, Baptist, in Southwark, the creation of which was the outcome of the labours of the famous preacher Charles Spurgeon (d. 1892) ; and Wesley's Chapel, City Road, in the graveyard of which is the tomb of John Wesley; his house, which adjoins the chapel, being open as a memorial museum. In 1903 the Wesleyans acquired the site of the Royal Aquarium, near Westminster Abbey, for the erection of a central hall. The Great Synagogue of the Jews is in St James' Place, Aldgate.

FINANCE]

The headquarters of the Salvation Army are in Queen Victoria Street, City. There are numerous foreign churches, among which may be mentioned the French Protestant churches in Monmouth Road, Bayswater and Soho Square; the Greek church of St Sophia, Moscow Road, Bayswater; and the German Evangelical church in Montpelier Place, Brompton Road, opened in 1904. (O. J. R. H.)

VIII. Finance In addition to the provisions that have been mentioned above (Section VII.), the London Government Act 1899 simplified ad- ministration in two respects. The duties of overseers in London had been performed by most diverse bodies. In some parishes overseers were appointed in the ordinary manner; in others the vestry, by local acts and by orders under the Local Government Act 1894, was appointed to act as, or empowered to appoint, overseers, whilst in Chelsea the guardians acted as overseers. The act of 1899 swept away all these distinctions, and constituted the new borough councils in every case the overseers for every parish within their respective boroughs, except that the town clerk of each borough performs the duties of overseers with respect to the registration of electors. 1 Again, with regard to rates, there were in all cases three different rates leviable in each parish — the poor rate, the general rate and the sewers rate — whilst in many parishes in addition there was a sepa rate lighting rate. From the sewers rate and lighting rate, land, as opposed to buildings, was entitled to certain exemptions. Under the act of 1899 all these rates are consolidated into a single rate, called the general rate, which is assessed, made, collected and levied as the poor rate, but the interests of persons previously entitled to ex emptions are safeguarded. Further, every precept sent by an authority in London for the purpose of obtaining money (these authorities include the London County Council, the receiver of the Metropolitan Police, the Central Unemployed Body and the Boards of Guardians) which has ultimately to be raised out of a rate within a borough is sent direct to the council of the borough instead of filtering through other authorities before reaching the overseers.

The only exceptions to this rule are: (1) precepts issued by the local government board for raising the sums to be contributed to the metropolitan common poor fund; and (2) precepts issued by poor law authorities representing two or more poor-law unions; in both these cases the precept has of necessity to be first sent to the guardians. The metropolitan borough councils make one general rate, which includes the amount necessary to meet their own

expen- diture, as well as to meet the demands of the various precepting authorities. There was thus raised in the year 1906-1907 a sum of £ r 5>393,956 (in 1898-1899 the amount was £10401,441); of this £11,012,424 was for central rates, which was subdivided into £7,930,275 for county services and £3,082,149 for local services, leaving a balance of £4,381,532, strictly local rates. The total local expenditure of London for the year 1906-1907 was £24,703,087 (in 1898-1899 it was only £14,768,757), the balance of £9,761,734 being made up by receipts-in-aid and imperial subventions. This expen- diture was divided among the following bodies :

London County Council ..... £9,491,271 Metropolitan Borough Councils . . . 5,009,982

Boards of Guardians 3,587,429

Metropolitan Water Board 2,318,618

Metropolitan Police 1,903,441

City Corporation 1,270,406

Metropolitan Asylums Board 934,463

Central (Unemployed) Body 141,284

Overseers — City of London .... 34>757

Market Trustees /Southwark) 10,680

Local Government Board — Common Poor Fund 756

1 Over 200 local acts were repealed by schemes made under the act of 1899.

£24,703,087

The total expenditure was equal to a rate in the pound of 1 is. 4>4d. ; the actual amount raised in rates was equivalent to a rate of 7s. i-od., receipts-in-aid were equivalent to a rate of 3s. 2-5d., and imperial subventions to a rate of is. 3"4d. Practically the whole amount contributed towards the support of public local expenditure, and a considerable amount of that contributed to public national expenditure is based on the estimated annual value of the immovable property situated within the county of London, which in 1876 was £23,240,070; in 1886 £30,716,719; in 1896 £35,793,672; and in 1909 £44,666,651. The produce of a penny rate was, in the

Estimated Income.

Balances

Receipts in aid of expenditure (local taxation licences

and estate duty, beer and spirit duties, &c.) . Government grants in aid of education Interest on loans advanced to local authorities, &c.

Rents, &c

Contributions from revenue-producing undertakings

for interest and repayment of debt

Miscellaneous

Rate contributions —

General, for other than education . . . .

For education

Special

(1) Rate and

£967,740

513.541

1,515,663

586,065

427,767

685,948 3,633

2,698,610

3,675,694

407,946

Debt Accounts.

Estimated Expenditure. Debt (including management) £3 ,905,1 35

Grants (mostly guardians)

Pensions

Establishment charges

Judicial expenses

Services —

Main drainage £295,650

Fire brigade 263,575

Parks and open spaces .... 140,715 Bridges, tunnels, ferry 49,925

Embankments 14,940

Pauper lunatics 78,870

Inebriates Acts 14,045

Coroners 30,925

Weights and measures 14,830

Gas testing 13,785

Building Acts 25,595

Diseases of Animals Acts . . . 19,260 Miscellaneous 63,060

£1,025,175

fc-ducation 4,837,442

Steamboats 14,805

Works Dept 12,100

Parliamentary expenses

Miscellaneous

Total expenditure Balances

645,913 75,665

232,045 52,515

Estimated Income.

Balances

Receipts —

Working class dwellings

Tramways

Small Holdings and Allotments

Parks boating

Transfers

£173,443

2,089,955

410

5,100

£11,484,607

(2) Revenue Producing Undertakings.

Estimated Expenditure. Working expenses —

Working class dwellings. . . . £56,060

Tramways 1,318,620

Small Holdings and Allotments . . 62 1

Parks boating 2,965

Renewals

Reserve

Interest on and repayment of debts Transfer in relief of rates (parks boating) Balances

5,889,522

22,675

6,214

10,829,684 652,923

£11,482,607

£4,055

2,268,908

-> 6,214

£2,279,177

£1,378,266

163,828

44,557

685,946

2,000

4.58o

£2,279,177

95 +

LONDON

[HISTORY:

metropolitan police district in 1908-1909, £226,739, ar »d in the county of London (excluding the City) £161,806. A complete re- valuation of properties in the county of London is made every five years, valuation lists being prepared in duplicate by the borough councils acting as overseers of the parishes in their respective boroughs. They are revised by statutory assessment committees, who hear any objections by ratepayers against their valuation. These lists when revised are sent to the clerk of the County Council, who publishes the totals. By the Metropolitan Poor Act 1867, the metropolitan common poor fund, to which each union in London contributes in proportion to its rateable value, was established. Out of this fund certain expenses of guardians in connexion with the maintenance of indoor paupers and lunatics, the salaries of officers, the maintenance of children in poor- law schools, valuation, vaccination, registration, &c, are paid. The

payments amounted in 1906-1907 to £1,662,942. Under the Local Government Act 1888, the London County Council makes grants to boards of guardians, sanitary authorities and overseers in London in respect of certain services. This grant is in lieu of the grants formerly made out of the exchequer grant in aid of local rates, and amounted in 1906-1907 to £619,489. Finally, in 1894, the fund called the Equalization Fund was established. This fund is raised by the rate of 6d.in the pound on the assessable value of the county of London, and redistributed among the boroughs in proportion to their population. It amounted in 1906-1907 to £1,094,946. But, in spite of attempts at equalization, rates remain very unequal in London, and varied in 1908 from 6s. 2d. in St Anne's, Westminster, to us. 6d. in Poplar. The London County Council levied in 1909-1910 to meet its estimated expenditure for the year a total rate of 36-75d.; i4-5od. of this was for general county purposes, I9'75d. for education purposes and 2-50d. for special county purposes. The preceding tables show the estimated income and expenditure of the London County Council for 1909-1910.

Besides the annual expenditure of the various authorities large sums have been borrowed to defray the cost of works of a permanent nature. The debt of London, like that of other municipalities, has considerably increased and shows a tendency to go on increasing, although certain safeguards against too ready borrowing have been imposed. Every local authority has to obtain the sanction of some higher authority before raising a loan, and there are in addition certain statutory limits of borrowing. Metropolitan borough councils have to obtain the sanction of the Local Government Board to loans for baths, washhouses, public libraries, sanitary conveniences and certain other purposes under the Public Health Acts; for cemeteries the sanction of the Treasury is required, and for all other purposes that of the London County Council; poor law authorities, the metropolitan asylums board, the metropolitan water board and the central (unemployed) body require the sanction of the Local Government Board ; the receiver for the metropolitan police district that of the Home Office, and the London County Council that of parliament and the Treasury. The following table gives the net loans outstanding of the several classes of local authorities in London at the 31st of March 1908:

Local Authorities.

Loans outstanding 31st March 1908.

London County Council {excluding loans

advanced to other authorities) Metropolitan Asylums Board Metropolitan Police (London's proportion). Metropolitan Water Board (proportion) Central (Unemployed) Body .... City of London Corporation .... Metropolitan Borough Councils . Guardians and sick asylum managers .

£49.938,131

3.II3.6I2

226,131

38,726,514

31.845

5.553.173

12,551,204

4,029,013

£114,169,623

Authorities.ˆFuII details and figures relating to the finance of London will be found in the parliamentary papers Local Taxation Returns (England and Wales), part iv. published

annually; Returns relating to the London County Council, published annually; the annual report and accounts of the Metropolitan Water Board, and the metropolitan police accounts. The publications of the London County Council, especially the tramways accounts, the annual estimates, London Statistics, and the Financial Abstract (10 years ended 31st March 1908) have much valuable information. (T. A. I.)

IX. History

1. British and Roman to a.d. 449. — There is practically no record of British London, and considerable difference of opinion exists among antiquaries as to its very existence. Bishop Stillingfleet held that London was of Roman foundation and not older than the time of Claudius {Origines Brit., 1685, p. 43); and Dr Guest affirmed that the notion of a British town having " preceded the Roman camp has no foundation to rest upon " {Archaeological Journal, xxiii. 180). J. R. Green expressed the

same opinion in The Making of 'England (p. 101). On the other side Kemble held that it was difficult to believe that Cair Lunden was an unimportant place even in Caesar's day {Saxons in England, ii. 266); and Thomas Lewin believed that London had attained prosperity before the Romans came, and held that it was probably the capital of Cassivellaunus, which was taken and sacked by Julius Caesar {Archaeologia, xl. 59). The origin of London will probably always remain a subject of dispute for want of decisive facts.

The strongest reason for believing in a British London is to be found in the name, which is undoubtedly Celtic,- adopted with little alteration by the Romans. It is also difficult to believe that Londinium had come to be the important commercial centre described by Tacitus (a.d. 61) if it had only been founded a few years before the conquest of Claudius.

The discovery by General Pitt Rivers in 1867 of the remains of pile dwellings both on the north and on the south of the Thames gives ground for an argument of some force in favour of the date of the foundation of London having been before the Roman occupation of Britain. Of Roman London we possess so many remains that its appearance can be conjectured with little difficulty.

During the centuries when Britain was occupied by the Romans (a.d. 43-409) there was ample time for cities to grow up from small beginnings, to overflow their borders and to be more than once rebuilt. The earliest Roman London must have been a comparatively small place, but it probably contained a military fort of some kind intended to cover the passage of the river.

The Roman general Paulinus Suetonius, after marching rapidly from Wales to put down a serious insurrection, found Londinium unfitted for a base of military operations, and therefore left the place to the mercy of Boadicea, Extent of who entirely destroyed it, and killed the inhabitants. London. After this the need of fortifying Londinium must have been apparent, and a walled city of small dimensions arose soon after the defeat of the British queen. The earliest Roman city probably extended as far as Tower Hill on the east, and there is reason to believe that it did not include any ground to the west of Leadenhall. The excavations at the latter place in 1881 threw great light upon the early history of London. The founda- tion walls of a' ' basilica were discovered, and from the time when that was built until the present day the ground has always been devoted to public uses. How far north the first wall was placed it is difficult to guess. One help towards a settlement of the question may be found in the discovery of burial places. As it was illegal in Roman times to bury within the walls, we are forced to the conclusion that the places where these sepulchral remains have been found were at one time extramural. Now no such remains have been found between Gracechurch Street and the Tower. The northern wall was placed by Roach Smith somewhere along the course of Cornhill and Leadenhall Street. The second extension of the city westwards was probably to Wallbrook.

In the latest or third Roman enclosure the line of the wall ran straight from the Tower to Aldgate, where it bent round somewhat to Bishopsgate. On the east it was bordered by the district subsequently called the Minories and Houndsditch. The line from Bishopsgate ran

eastward to St Giles's churchyard (Cripplegate), where it turned to the south as far as Falcon square; again westerly by Aldersgate round the site of the Greyfriars (afterwards Christ's Hospital) towards Giltspur Street, then south by the Old Bailey to Ludgate, and then down to the Thames, where Dr Edwin Freshfield suggests that a Roman fortress stood on the site of Baynard's Castle. This is most probable, because the Romans naturally required a special protection on the river at the west as well as at the east. So in later times when William the Conqueror planned the Tower he gave the site at the western extremity to his follower Ralph Baynard, where was erected the stronghold known as Baynard's Castle. Roach Smith pointed out that the enclosure indicated above gives dimensions far greater than those of any other town in Britain. There can be no doubt that within the

walls there was originally much unoccupied space, for with the single exception of the larger circuit south of Ludgate, up to where the river Fleet ran, made in 1276 for the benefit of the Black Friars, the line of the walls, planned by the later Romans, remained complete until the Great Fire (1666). The Thames formed the natural barrier on the south, but the Romans do not appear to have been content with this protection, for they built a wall here in addition, which remained for several centuries. Portions of this wall have been discovered at various times.

It is difficult even to guess when the third wall was erected. The emperor Theodosius came to London from Boulogne to mature his plan for the restoration of the tranquillity of the province. As Theodosius is said to have left Britain in a sound and secure condition it has been suggested that to him was due the wall of the later Londinium, but there is little or no evidence for this opinion, and according to an old tradition Constantine the Great walled the city at the request of his mother Helena, presumed to be a native of Britain. There is, however, some evidence in favour of the supposition that the wall was built at a much earlier date. It is not improbable that early in the 2nd century the wall was finished at the west portion and enclosed a cemetery near Newgate. Sir William Tite, in describ- ing a tessellated pavement found in 1854 on the site of the Excise Office (Bishopsgate Street), expresses the opinion that the finished character of the pavement points to a period of security and wealth, and fixes on the reign of Hadrian (a.d. 117- 138), to which the silver coin found on the floor belongs, as the date of its foundation.

The historians of the Roman Empire have left us some par- ticulars of the visits of emperors and generals to Britain, but little or nothing about what happened in London, and we should be more ignorant than we are of the condition of Londinium if it had not been that a large number of excavations have been made in various parts of the city which have disclosed a con- siderable amount of its early history. From these remains we may guess that London was a handsome city in the reign of Hadrian, and probably then in as great a position of im- portance as it ever attained. This being so, there seems to be reason in attributing the completed walls to this period.

The persistence of the relics of the walls of London is one of the most remarkable facts of history. Pieces of the wall are to be seen in various parts of the city, and are oflioman frequently found when extensive excavations are Wall. made for new buildings. In some places where the

Roman wall is not to be seen there still exist pieces of the old wall that stand upon Roman foundations. In Amen Court, where the residences of canons of St Paul's and the later houses of the minor canons are situated, there stretches such a piece of wall, dividing the gardens of the Court from the Old Bailey. Of the few accessible fragments of the Roman wall still existing special mention may be made of the bastion in the churchyard of St Giles's, Cripplegate; a little farther west is a small fragment in St Martin's Court, Ludgate Hill (opposite the Old Bailey), but the best specimen can be seen near Tower Hill just out of

George Street, Trinity Square. Early in the 20th century a fragment nearly 40 ft. long, together with the base of a bastion, was brought to light in digging for the foundation of some large warehouses in Camomile Street, at a depth of 10 ft. below the level of the present street. A con- siderable portion of the old wall was laid bare by the excavations for the new Post Office in St Martin's-le-Grand. From a com- parison of these fragments with the descriptions of Woodward, Maitland and others, who in the early part of the 18th century examined portions of the wall still standing, we learn that the wall was from g to 12 ft. thick, and formed of a core of rough rubble cemented together with mortar (containing much coarse gravel) of extraordinary hardness and tenacity, and a facing for the most part of stone — Kentish rag, freestone or ironstone — but occasionally of flints; about 2 ft. apart are double layers of tiles or bricks which serve as bonding courses. The wall appears to have been about 20 ft. high, the towers from 40 to 50 ft., but when described only the base was Roman. Upon

that was raised a wall of rough rubble rudely faced with stone and flint, evidently a medieval work and about 2! ft. thick; then succeeded a portion wholly of brick, terminating in battle- ments topped with copings of stone.

Although the course of the later Roman walls is clear, we do not know with any certainty the position of the Roman gates. They were not the same as the medieval gates which have left the record of their names in modern London nomenclature. It follows, therefore, that the main ft ˆ/ D ˆ" streets also are not in line with the Roman ways,. except perhaps in a few instances. Many ineffectual attempts have been made to connect the Watling street in the city with the great Roman road so named in medieval times. The name of the small street is evidently a corruption, and in the valuable Report of the MSS. of the Dean and Chapter of St Paul's (Ninth Report of the Historical MSS. Commission, Appendix, p. 4) the original name is given as " Atheling Street," and instances of this spelling are common in the 13th century. The form Watling Street seems to occur first in 1307. Stow spells it Watheling Street (Kingsford's edition of Stow's Survey, 1908, vol. ii. p. 352). Sir William Tite gave reasons for believing that Bishopsgate Street was not a Roman thoroughfare, and in the excavations at Leadenhall the basilica to which allusion has already been made was found apparently crossing the present thoroughfare of Gracechurch Street. Tite also agreed with Dr Stukeley's suggestion that on the site of the Mansion House (formerly Stocks Market) stood the Roman forum, and he states that a line drawn from that spot as a centre would pass by the pave- ments found on the site of the Excise Office. Besides the forum Stukeley suggested the sites of seven other buildings — the Arx Palatina guarding the south-eastern angle of the city where the Tower now stands, the grove and temple of Diana on the site of St Paul's, &c. No traces of any of these buildings have been found, and they are therefore purely conjectural. Stukeley's industrious researches into the history of Roman London cannot be said to have any particular value, although at one time they enjoyed considerable vogue. As to the Temple of Diana, Sir Christopher Wren formed an opinion strongly adverse to the old tradition of its existence (Parentalia, p. 266). Although we know that the Christian church was established in Britain during the later period of the Roman domination, there is little to be learnt respecting it, and the bishop Restitutus, who is said to have attended an Ecclesiastical Council, is a somewhat mythical character. In respect to the discovery of the position of the Roman gates, the true date of the Antonini Itinerarium (q.v.) is of great importance, as it will be seen from it that Londinium was either a starting-point or a terminus in nearly half the routes described in the portion relating to Britain. This would be remarkable if the work dated back to the 2nd century. Probably in the later, as in the earlier time, Londinium had the usual four gates of a Roman city, with the main roads to them. The one on the east was doubtless situated near where Aldgate afterwards stood. On the south the entrance to Londinium must always have been near where London Bridge was subse- quently built. On the west the gate could not have been far from the place afterwards occupied by Newgate. As to Ludgate there is reason to believe that if there was an opening there in Roman times it was merely a postern. On the north the gate may have been near Bishopsgate or at Aldersgate. If we take from the Itinerary the last station before Londinium in all the routes we shall be able to obtain some idea of the position of the gate entered from each route by drawing a line on the map of London to the nearest point. Ammianus Marcellinus (about a.d. 390) speaks twice of Londinium as an ancient town to which the

honourable title of Augusta had been accorded. Some writers have been under the misapprehension that this name for a time superseded that of Londinium. The anonymous Chorographer of Ravenna calls the place Londinium Augusta, and doubtless this was the form adopted.

The most interesting Roman relic is " London Stone." It has generally been supposed to be a " milliarium " or central poiat for measuring distances, but Sir Christopher Wren believed it

was part of some more considerable monuments in the forum {Parentalia, pp. 265, 266). Holinshed (who was followed by Shakespeare in 2 Henry VI., act 4 sc. 6) tells us that stone." when Cade, in 1450, forced his way into London, he first of all proceeded to London Stone, and having struck his sword upon it, said in reference to himself and in explanation of his own action, " Now is Mortimer lord of this city." Mr H. C. Coote, in a paper published in the Trans. London and Middlesex Arch. Soc. for 1878, points out that this act meant something to the mob who followed the rebel chief, and was not a piece of foolish acting. Mr Laurence Gomme (Primitive Folk-Moots, PP- x 55. J S6) takes up the matter at this point, and places the tradition implied by Cade's significant action as belonging to times when the London Stone was, as other great stones were, the place where the suitors of an open-air assembly were ac- customed to gather together and to legislate for the government of the city. Corroborative facts have been gathered from other parts of the country, and, although more evidence is required, such as we have is strongly in favour of the supposition that the London Stone is a prehistoric monument.

One of the most important questions in the history of London that requires settlement is the date of the building of the first bridge, that is whether it was constructed by Britons The tint or by R omans . if the Britons had not already made Bridge. tne bridge before the Romans arrived it must have been one of the first Roman works. As long as there was no bridge to join the north and south banks of the Thames the great object of Roman rule remained unfulfilled. This object was the completion of a system of roads connecting all parts of the Empire with Rome.

Dio Cassius, who lived in the early part of the 3rd century (Hist. Rom. lib. lx. c. 20), states that there was a bridge over the Thames at the time of the invasion of Claudius (a.d. 43), but he places it a little above the mouth of the river (" higher up "). The position is vague, but the mouth of the Thames in these early times may be considered as not far from the present position of London Bridge. Sir George Airy held that this bridge was not far from the site of London Bridge (Proceedings of Institut. Civil Engineers, xlix. 120), but Dr Guest was not prepared to allow that the Britons were able to construct a bridge over a tidal river such as the Thames, some 300 yds. wide, with a difference of level at high and low water of nearly 20 ft. He therefore suggested that the bridge was constructed over the marshy valley of the Lea, probably near Stratford. It needs some temerity to differ from so great an authority as Dr Guest, but it strikes one as surprising that, having accepted the fact of a bridge made by the Britons, he should deny that these Britons possessed a town or village in the place to which he supposes that Aulus Plautius retired.

As the Welsh word for " bridge " is " pont," and this was taken directly from the Latin, the inference is almost conclusive that the Britons acquired their knowledge of bridges from the Romans. Looking at the stage of culture which the Britons had probably reached, it would further be a natural inference that there was no such thing as a bridge anywhere in Britain before the Roman occupation; but, if Dion's statement is correct, it may be suggested as a possible explanation that the increased intercourse with Gaul during the hundred years that elapsed between Julius Caesar's raids and Claudius Caesar's invasion may have led to the construction of a bridge of some kind across the Thames at this point, through the influence and under the guidance of Roman traders and engineers. If so, the word " pont " may have

been borrowed by the Britons before the commencement of the Roman occupation. Much stronger are the reasons for believing that there was a bridge in Roman times. Remains of Roman villas are found in Southwark, which was evidently 3. portion of Londinium, and it therefore hardly seems likely that a bridge-building people such as the Romans would remain contented with a ferry. Roach Smith is a strong advocate for the bridge, and remarks, " It would naturally be erected somewhere in the direct line of road into Kent, which I cannot but think pointed towards the site of Old London Bridge, both from its

central situation, from the general absence of the foundations of buildings in the approaches on the northern side, and from discoveries recently made in the Thames on the line of the old bridge " (Archaeologia, xxix. 160). Smith has, however, still stronger arguments, which he states as follows: " Throughout the entire line of the old bridge, the bed of the river was found to contain ancient wooden piles; and when these piles, subse- quently to the erection of the new bridge, were pulled up to deepen the channel of the river, many thousands of Roman coins, with abundance of broken Roman tiles and pottery, were discovered, and immediately beneath some of the central piles brass medallions of Aurelius, Faustina and Commodus. All these remains are indicative of a bridge. The enormous quanti- ties of Roman coins may be accounted for by consideration of the well-known practice of the Romans to make these imperish- able monuments subservient towards perpetuating the memory, not only of their conquests, but also of those public works which were the natural result of their successes in remote parts of the world. They may have been deposited either upon the building or repairs of the bridge, as well as upon the accession of a new emperor " (Archaeological Journal, i. 113).

At the beginning of the 5th century the Roman legions left Britain, and the Saxon Chronicle gives the exact date, stating that never since a.d. 409 " have the Romans ruled in Britain " — the chronicler setting down the Roman sway at 470 winters and dating from Julius Caesar's invasion. We learn that in the year 418 " the Romans collected all the treasures that were in Britain, and hid some of them in the earth, that no man might afterwards find them, and conveyed some with them into Gaul."

2. Saxon (449-1066). — We are informed in the Saxon Chronicle that about a.d. 449 or 450 the invaders settled in Britain, and in 457 Hengist and Aesc fought against the Britons at Crayford, driving them out of Kent. The vanquished fled to London in terror and apparently found a shelter there. After this entry there is no further mention of London in the Chronicle for n century and a half. This silence has been taken by some historians of weight to imply that London practically ceased to exist. Dr Guest asserted " that good reason may be given for the belief that even London itself for a while lay desolate and uninhabited " (Archaeological Journal, xix. 219). J. R. Green and Mr Loftie strongly supported this view, and in Sir Walter Besant's Early London (1908) the idea of the desolation of the city is taken for granted.

In answer to this contention it may be said that, although the silence of the Chronicle is difficult to understand, it is almost impossible to believe that the very existence of the most im- portant city in the country could suddenly cease and the in- habitants disappear without some special notice. Battles and scenes of destruction are so fully described in other instances that one must believe that when nothing is related nothing special occurred. No doubt the coming of the Saxons, which entirely changed the condition of the country, must have greatly injured trade, but although there was not the same freedom of access to the roads, the Londoners had the highway of the river at their doors. Although the Saxons hated towns and refused to settle in London, they may have allowed the original in- habitants to continue their trade on condition that they re- ceived some share of the profits or a tribute. The only question really is whether London being an exceptional city received exceptional treatment.

Along the banks of the Thames are several small havens whose names have remained to us, such as Rotherhithe, Lambhith (Lambeth), Chelchith (Chelsea), &c, and it is not unlikely that the Saxons, who would not settle in the settle- city itself, associated themselves with these small meat open spots. Places were thus founded over a large space which otherwise might have remained unsettled.

If what is here suggested really occurred it may be that this separation of London from the surrounding country originated the remarkable position of London with its unparalleled privi- leges, which were continued for many centuries and kept it not

only the leader among cities but distinct from all others. Laur- ence Gomme, in The Governance of London (1907), opposes the view that the city was for a time left deserted (a view which, it may be remarked, is a comparatively modern one, probably originating with Dr Guest). H. C. Coote in his Romans of Britain elaborated a description of the survival of Roman influence in English institutions, but his views did not obtain much support from London historians. Mr Gomme's con- tention is to some extent a modification of Mr Coote's view, but it is original in the illustrations that give it force. Londinium was a Roman city, and (as in the case of all such cities) was formed on the model of ancient Rome. It may therefore be expected to retain evidence of the existence of a Pomoerium and Territorium as at Rome. The Pomoerium marked the unbuilt space around the walls. Gomme refers to an open space outside the western wall of Dorchester still called the Pummery as an indication of the Pomoerium in that place; and he considers that the name of Mile End, situated 1 m. from Aldgate and the city walls, marks the extent of the open space around the walls of London known as the Pomoerium. This fact throws a curious light upon the growth of the " Liberties. " It has always been a puzzle that no note exists of the first institution of these liberties. If this open space was from the earliest times attached to the city there would be no Origin of nee(j when it was built upon for any special act to be Liberties, passed for its inclusion in London. " The Territorium of the city was its special property, and it extended as far as the limits of the territorium of the nearest Roman city or as near thereto as the natural boundaries." This explains the position of Middlesex in relation to London. In connexion with these two features of a Roman city supposed to be found in Ancient London the author argues for the continuity of the city through the changes of Roman and Saxon dominion.

One of the most striking illustrations of the probable con- tinuity of London history is to be found in the contrast between York and London. This is only alluded to in Gomme's book, but it is elaborated in an article in the Cornhill Magazine (Novem- ber 1906). These two were the chief Roman cities in Britain, one in the north and the other in the south. They are both equally good examples of important cities under Roman domina- tion. York was conquered and occupied by the Saxons, and there not only are the results of English settlement clear but all records of Roman government were destroyed. In London the Saxon stood outside the government for centuries, and the acceptance of the Roman survival explains much that is otherwise unintelligible.

Gomme finds important evidence of the independence of London in the existence of a merchant law which was opposed to Anglo-Saxon law. He reprints and discusses the ladepead- ce [eD rated Judicia Civitatis Lundoniae of King jEthel- Loadoa. stan's reign — " the ordinance " (as it declares itself) " which the bishop and the reeves belonging to London have ordained." He holds that the Londoners passed " their own laws by their own citizens without reference to the king at all," and in the present case of a king who according to Kemble " had carried the influence of the crown to an extent unexampled in any of his predecessors." He adds: " What happened afterwards was evidently this: that the code passed by the Londoners was sent to the king for him to extend its application throughout the kingdom, and this is done by the eleventh section." The view originated by Gomme certainly explains many difficulties in the history of the transition from Roman to English London, which have hitherto been overlooked by historians.

When the city is next referred to in the Saxon Chronicle it appears to have been inhabited by a population of heathens. Under the date 604 we read: "This year Augustine A 7chri – consecrated two bishops: Mellitus and Justus. He tunHy. sent Mellitus to preach baptism to

the East Saxons, whose king was called Sebert, son of Ricole the sister of iEthelbert, and whom iEthelbert had then appointed king. And /Ethelbert gave Mellitus a bishop's see in Lundenevic and

to Justus he gave Rochester, which is twenty-four miles from Canterbury. " The Christianity of the Londoners was of an unsatisfactory character, for, after the death of Sebert, his sons who were heathens stirred up the multitude to drive out their bishop. Mellitus became archbishop of Canterbury, and London relapsed into heathenism. In this, the earliest period of Saxon history recorded, there appears to be no relic of the Christianity of the Britons, which at one time was well in evidence. What became of the cathedral which we may suppose to have existed in London during the later Roman period we cannot tell, but we may guess that it was destroyed by the heathen Saxons. Bede records that the church of St Paul was built by ˆEthelbert, and from that time to this a cathedral dedicated to St Paul has stood upon the hill looking down on Ludgate.

After the driving out of Mellitus London remained without a bishop until the year 656, when Cedda, brother of St Chad of Lichfield, was invited to London by Sigebert, who had been converted to Christianity by Finan, bishop of the Northumbrians. Cedda was consecrated bishop of the East Saxons by Finan and held the see till his death on the 26th of October 664. He was succeeded by Wini, bishop of Winchester, and then came Earconuald (or St Erkenwald), whose shrine was one of the chief glories of old St Paul's. He died on the 30th of April 693, a day which was kept in memory in his cathedral for centuries by special offices. The list of bishops from Cedda to William (who is addressed in the Conqueror's Charter) is long, and each bishop apparently held a position of great importance in the government of the city.

In the 7th century the city seems to have settled down into a prosperous place and to have been peopled by merchants of many nationalities. We learn that at this time it was the great mart of slaves. It was in the fullest sense a invasions. free-trading town; neutral to a certain extent between the kingdoms around, although the most powerful of the kings conquered their feebler neighbours. During the 8th century, when a more settled condition of life became possible, the trade and commerce of London increased in volume and prosperity. A change, however, came about towards the end of the century, when the Scandinavian freebooters known as Danes began to harry the coasts. The Saxons had become law-abiding, and the fierce Danes treated them in the same way as in former days they had treated the Britons. In 871 the chronicler affirms that Alfred fought nine great battles against the Danes in the kingdom south of the Thames, and that the West Saxons made peace with them. In the next year the Danes went from Reading to London, and there took up their winter quarters. Then the Mercians made peace with them. In 886 Alfred overcame the Danes, restored London to its inhabitants, rebuilt its walls, reannexed the city to Mercia, and committed it to Ethelred, alderman of Mercia. Then, as the chronicler writes, " all the Angle race turned to him (Alfred) that were not in bondage of the Danish men." – In 896 the Londoners came off victorious in their en- counters with the Danes. The king obstructed the river so that the enemy could not bring up their ships, and they therefore abandoned them. The Londoners broke up some, and brought the strongest and best to London. In 91 2 ./Ethelred, the alderman of the Mercians, who had been placed in authority by Alfred, died, and Edward the Elder took possession of London and Oxford, " and all the lands which thereto belonged."

Under ˆEthelstan we find the city increasing in importance and general prosperity. There were then eight mints at work, a fact which exhibits evidence of great activity and the need of coin for the purposes of trade. The folk-moot met in the pre- cincts of St Paul's at the sound of the bell of the famous bell- tower, which also rang out when the armed levy was required to march under St Paul's banner. For some years after the decisive battle of Brunanburh (a.d. 937) the Danes ceased to trouble the country. Fire, however, was almost as great an enemy to London as the Dane. Fabyan when recording the entire destruction of London by fire in the reign of ˆEthelred (981) makes this remarkable statement — " Ye shall understand that this daye the cytie of London had more housynge and buyldinge

from Ludgate toward Westmynstre and lytel or none wher the chief or hart of the citie is now, except (that) in dyvers places were housyng, but they stod without order."

In the reign of jEthelred' II., called the Unready (but more correctly the Redeless), the Danes were more successful in their operations against London, but the inhabitants resisted stoutly. Snorre the Icelander tells us that the Danes fortified Southwark with ditch and rampart, which the English assailed in vain. In 982 London was burnt, and in 994 Olaf and Sweyn (the father of Canute) came with ninety-four ships to besiege it. They tried to set the city on fire, but the townsmen did them more harm than they " ever weened." The chronicler piously adds that " the holy Mother of God on that day manifested her mercy to the townsmen, and delivered them from their foes." The Danes went from the town and ravaged the neighbourhood, so that in the end the king and his witan agreed to give sixteen thousand pounds to be relieved of the presence of the enemy. This was the origin of the Danegelt. In the year 1009 the Danes frequently attacked London, but they had no success, and fared ill in their .attempts. The Londoners withstood Sweyn in 1013, but in the end they submitted and gave him hostages. Three years after this, -rEthelred died in London, and such of the witan as were there and the townsmen chose Edmund Ironside for king, although the witan outside London had elected Canute. Canute's ships were then at Greenwich on their way to London, where they soon afterwards arrived. The Danes at once set to work to dig a great ditch by Southwark, and then dragged their ships through to the west side of the bridge. They were able after this to keep the inhabitants from going either in or out of the town. In spite of all this, after fighting obstinately both by land and by water, the Danes had to raise the siege of London and take the ships to the river Orwell. After a glorious reign of seven months Edmund died in London, and Canute became master of England. The tribute which the townsmen of London had to pay was £10,500, about one-seventh of the amount which was paid by all the rest of the English nation. This shows the growing importance of the city. From this time there appears to have been a permanent Danish settlement in London, probably Aldwich, referred to below.

There is little more to be said of the history of Saxon London than that Edward the Confessor held his Witanagemot there. On his death the Witan which had attended his funeral elected to succeed him Harold, the foremost man in England, and the leader who had attempted to check the spread of the Norman influence fostered by the Confessor. After his defeat and death on the hill on the Sussex Downs then called Senlac, the duke of Normandy had the country at his mercy, but he recognized the importance of London's position, and moved forward with the greatest caution and tact.

Before proceeding with the history of London during the Norman period it is necessary to say something of the counties more especially connected with London.

The walled city of London was a distinct political unit, although it owed a certain allegiance to that one of the kingdoms around it which was the most powerful for the time being. "»' This allegiance therefore frequently changed, but

Counties," London retained its identity and individuality all through. Essex seems seldom to have held an inde- pendent position, for when London first appears as connected with the East Saxons the real power was in the hands of the king of Kent. According to Bede, Wini, being expelled from his bishopric of Wessex in 635, took refuge with Wulfhere, king of the Mercians, of whom he purchased the see of London. Hence the Mercian king must then have been the overlord of London. Not many years afterwards the king of Kent again seems to have held some jurisdiction here. From the laws of the Kentish kings Lhothhere and Eadric (673-685) we learn that the Wic-reeve was an officer of the king of Kent, who exercised a jurisdiction over the Kentish men trading with or at London, or was appointed to watch over their interests.

The origin of the two counties in which London is chiefly situated opens up an interesting

question. It is necessary to

remember that Londori is older than these counties, whose names, Middlesex and Surrey, indicate their relative positions to the city and the surrounding county. We have neither record of their settlement nor of the origin of their names. Both must have been peopled from the river. The name Middle Saxons plainly shows that Middlesex must have been settled after the East and West Saxons had given their names to their respective districts. The name Surrey clearly refers to the southern position of the county.

Reference has already been made to a Danish settlement, and there seems some reason for placing it on the ground now occupied by the parishes of St Clement Danes and St Giles's. For many centuries this district between London and Westminster was a kind of " no man's land " having certain archaic customs. Gomme in his Governance of London (1907) gives an account of the connexion of this with the old village of Aldwich, a name that survived in Wych Street, and has been revived by the London County Council in Aldwych, the crescent which leads to Kingsway.

3. Norman (1066-1154). — To return to the condition of things after the great battle. The citizens of London were a divided body, and Duke William knowing that he had many friends in the city saw that a waiting game was the conquest. best for his cause in the end. The defeated chiefs retired on the city, led by Ansgar the Staller, under whom as sheriff the citizens of London had marched to fight for Harold at Senlac. They elected Edgar Atheling, the grandson of Edmund Ironside, as king, which the Saxon Chronicle says " was indeed his natural right." On hearing of this action William marched towards London, when the citizens sallied forth to meet him. They were repulsed by the Norman horse, but with such loss to the latter that the duke thought it imprudent to lay siege to the city at that time, and he retired to Berkhampstead. 1 It is reported that William sent a private message to Ansgar asking for his support. The result was that Edgar and Earls Edwin and Morkere and " the best men of London " repaired to Berk- hampstead, where they submitted themselves and swore fealty to the Conqueror.

Thus ends the Saxon period, and the Norman period in London begins with the submission of the citizens as distinct from the action of the rest of the kingdom, which submission resulted soos afterwards in the Conqueror's remarkable i„thP S charter to William the bishop and Gosfrith the port- city. reeve, supposed to be the elder Geoffrey de Mandeville. A great change was at once made both in the appearance and in the government of the city under Norman rule. One of the earliest acts of the Conqueror was to undertake the erection of a citadel which should overawe the citizens and give him the command of the city. The Tower was situated at the eastern limit of the city, and not far from the western extremity Castle Baynard was built.

The- position of the city grew in importance, but the citizens suffered from severe laws and from serious restrictions upon their liberties. In August 1077 occurred a most extensive fire, such a one, says the Chronicle, as " never was before since London was founded." This constant burning of large portions of the city is a marked feature of its early history, and we must remember that, although stone buildings were rising on all sides, these were churches, monasteries, and other public edifices; the ordinary houses remained as before, small wooden structures. The White Tower, the famous keep of the Tower of London, was begun by Gundulph, bishop of Rochester, c. 1078. In 1083 the old cathedral of St Paul's was begun on the site of the church which /Ethelbert is said to have founded in 610. But four years afterwards the chronicler tells us " the holy monastery of St Paul, the episcopal see of London, was burnt, and many other monasteries, and the greatest and fairest part of the whole

1 A valuable article on " The Conqueror's Footprints in Domes- day " was published in the English Historical Review in 1898 (vol. xiii. p. 17). This article contains an account of Duke William's movements after the battle of Senlac between Enfield, Edmonton s I Tottenham and Berkhampstead.

city." In this same year (1087) William the Conqueror died. In 1090 a tremendous hurricane passed over London, and blew down six hundred houses and many churches. The Tower was injured, and a portion of the roof of the church of St Mary-le- Bow, Cheapside, was carried off and fell some distance away, being forced into the ground as much as 20 ft., a proof of the badness of the thoroughfares as well as of the force of the wind. William Rufus inherited from his father a love for building, and in the year 1097 he exacted large sums of money from his subjects with the object of carrying on some of the undertakings he had in hand. These were the walling round of the Tower and the rebuilding of London Bridge, which had been almost destroyed by a flood. In 1100 Rufus was slain, and Henry I. was crowned in London. This king granted the citizens their first real charter, but this was constantly violated. When Stephen seized the crown on the death of Henry I., he tried successfully to obtain the support of the people of London. He published a charter confirming in general terms the one granted by Henry, and commanding that the good lav/s of Edward the Confessor should be observed. The citizens, how- ever, did not obtain their rights without paying for them, and in 1 139 they paid Stephen one hundred marks of silver to enable them to choose their own sheriffs. In this reign the all-powerful- ness of the Londoners is brought prominently forward. Stephen became by the shifting fortune of war a prisoner, and the empress Matilda might, if she had had the wisdom to favour the citizens, have held the throne, which was hers by right of birth. She, however, made them her enemies by delivering up the office of justiciary of London and the sheriffwick to her partisan Geoffrey, earl of Essex, and attempting to reduce the citizens to the enslaved condition of the rest of the country. This made her influential enemies, who soon afterwards replaced Stephen upon the throne. The Norman era closes with the death of Stephen in n 54.

One of the most striking changes in the appearance of Norman London was caused by the rebuilding of old churches and the building of new ones, and also by the foundation of the great monastic establishments. The early history of the parishes of London is one of great difficulty and complexity. Although some of the parishes must be of great antiquity, we have little authentic information respecting them before the Conquest. The dedications of many of the churches indicate their great age, but the constant fires in London destroyed these buildings. The original churches appear to have been very small, as may be judged from their number. It is not easy, however, to understand how it was that when the first parishes were formed so small an area was attached to each. The parish church of which we have the most authentic notice before the Conquest is St Helen's, Bishopsgate. It was in existence many years before the priory of the nuns of St Helen's was founded. Bishop Stubbs in his Introduction to the Historical Works of Ralph de Diceto writes: " St Paul's stood at the head of the religious life of London, and by its side, at some considerable interval, however, St Martin's le Grand (1056), St Bartholomew's, Smithfield (1123) and the great and ancient foundation of Trinity, Aldgate " (1 108). The great Benedictine monastery of Black Monks was situated away from Religious t jj e c ; t y at Westminster, and it was the only monastic ° ua "' house subject to the rule of St Benedict in the neigh- bourhood of London, although the houses of nuns, of which there were many dotted over the suburbs of London, were governed by this rule. In course of time there was a wide- spread desire in Europe for a stricter rule among the monks, and reforms of the Benedictine rule were instituted at Cluni (910), Chartreuse (about 1080) and Citeaux (1098). All these reforms were represented in London.

Cluniac Order. — This order was first brought to England by William, earl of Warren (son-in-law of William the Conqueror), who built the first house at Lewes in Sussex about 1077. The priory of Bermondsey in Surrey was founded by Aylwin Child, citizen of London about 1082.

Carthusians. — When this order was brought to England in 1 178 the first house was founded at Witham in Somersetshire. In all there

Early parishes,

were nine houses of the order in England. One of these was the Charterhouse of London which was not founded until 1371 by Sir Walter Manny, K.G.

Cistercians. — It was usual to plant these monasteries in solitary and uncultivated places, and no other house, even of their own order, was allowed to build within a certain distance of the original establishment. This makes it surprising to learn that there were two separate houses of this order in the near neighbourhood of London. A branch of the order came to England about 1128 and the first house was founded at Waverley in Surrey. Very shortly after (about 1 134) the abbey of Stratford Langthornein Essex was founded by William de Montfichet, who endowed it with all his lordship in West Ham. It was not until two centuries afterwards that the second Cistercian house in the immediate neighbourhood of London was founded. This was the Abbey of St Mary Graces, East-Minster or New Abbey without the walls of London, beyond Tower Hill, which Edward III. instituted in 1350 after a severe scourge of plague (the so-called Black Death).

The two great Military Orders — the Knights Hospitallers of St John of Jerusalem and the Templarsˆfollowed the Augustinian rule and were both settled in London. The Hospital or Priory of St John was founded in 1100 by Jordan Briset and his wife Muriel, outside the northern wall of London, and the original village of Clerkenwell grew up around the buildings of the knights. A few years after this the Brethren of the Temple of Solomon at Jerusalem or Knights of the Temple came into being at the Holy City, and they settled first on the south side of Holborn near Southampton' Row. They re- moved to Fleet Street or the New Temple in 1 184. On the suppres- sion of the order by command of the pope the house in Fleet Street was given in 1313 by Edward II. to Aymer de Valence, earl of Pembroke, at whose death in 1324 the property passed to the knights of St John, who leased the new Temple to the lawyers, still the occupants of the district.

■*The queen of Henry I. (Matilda or Maud) was one of the chief founders of religious houses, and so great was the number of monasteries built in this king's reign that it was said almost all the labourers became bricklayers and carpenters and there was much discontent in consequence.*

4. Plantagenci {1154-1485). — Henry II. appears to have been to a certain extent prejudiced against the citizens of London on account of their attitude towards his mother, arid p ltz . he treated them with some severity. In n 76 the Stephen's rebuilding of London Bridge with stone was begun by descrip- Peter of Colechurch. This was the bridge which was pulled down early in the 19th century. It consisted of twenty stone arches and a drawbridge. There was a gatehouse at each end and a chapel or crypt in the centre, dedicated to St Thomas of Canterbury, in which Peter of Colechurch was buried in 1205. The large amount of building at this time proves that the citizens were wealthy. Fitzstephen, the monk of Canterbury, has left us the first picture of London. He speaks of its wealth, commerce, grandeur and magnificence — of the mildness of the climate, the beauty of the gardens, the sweet, clear and salubrious springs, the flowing streams, and the pleasant clack of the watermills. Even the vast forest of Middlesex, with its densely wooded thickets, its coverts of game, stags, fallow deer, boars and wild bulls is pressed into the description to give a contrast which shall enhance the beauty of the city itself. Fitzstephen tells how, when the great marsh that washed the walls of the city on the north (Moorfields) was frozen over, the young men went out to slide and skate and sport on the ice. Skates made of bones have been dug up in this district. This sport was' allowed to fall into' disuse, and was not again prevalent until it was introduced from Holland after the Restoration.

In spite of Fitzstephen 's glowing description we must remember that the houses of London were wholly built of wood and thatched with straw or reeds. These houses were specially liable to be destroyed by fire, and in order to save the city from this imminent danger the famous Assize of Building known as " Fitz-Ailwyne's Assize " was drawn up in 1189. In this document the following statement was made: " Many citizens, to, avoid such danger, built according to their means, on their ground, a stone house covered and protected by thick tiles against the fury of fire, whereby it often happened that when a fire arose in the city and burnt many edifices and had reached such a house, not being able to injure it, it then became extinguished, so that many neighbours' houses were wholly saved from fire by that

house." Various privileges were conceded to those who built in stone, but no provision was made as to the material to be used in

tioa of London.

roofing tenements. This Assize, which has been described as the earliest English Building Act, is of great value from an historical point of view, but unfortunately it had little practical effect, and in 121 2 what was called " Fitz- Ail wyne's Second Assize," with certain compulsory regulations, was enacted. Thenceforth everyone who built a house was strictly charged not to cover it with reeds, rushes, stubble or straw, but only with tiles, shingle boards or lead. In future, in order to stop a fire, houses could be pulled down in case of need with an alderman's hook and cord. For the speedy removal of burning houses each ward was to provide a strong iron hook, with a wooden handle, two chains and two strong cords, which were to be left in the charge of the bedel of the ward, who was also provided with a good horn, " loudly sounding."

Richard I. was a popular king, but his fighting in the Holy Land cost his subjects much. London had to pay heavily towards his ransom; and, when the king made his triumphal entry into London after his release from imprisonment, a German nobleman is said to have remarked that had the emperor known of the wealth of England he would have insisted on a larger sum. The Londoners were the more glad to welcome Richard back in that the head of the regency, Longchamp, bishop of Ely, was very unpopular from the encroachments he made upon the city with his works at the Tower.

The first charter by which the city claims the jurisdiction and conservancy of the river Thames was granted by Richard I. John granted several charters to the city, and it was expressly stipulated in Magna Charta that the city of London should have all its ancient privileges and free customs. The citizens opposed the king during the wars of the barons. In the year 1215 the barons having received intelligence secretly that they might enter London with ease through Aldgate, which was then in a very ruinous state, removed their camp from Bedford to Ware, and shortly after marched into the city in the night-time. Having succeeded in their object, they determined that so important a gate should no longer remain in a defenceless condition. They therefore spoiled the religious houses and robbed the monastery coffers in order to have means wherewith to rebuild it. Much of the material was obtained from the destroyed houses of the unfortunate Jews, but the stone for the bulwarks was obtained from Caen, and the small bricks or tiles from Flanders.

Allusion has already been made to the great change in the aspect of London and its surroundings made during the Norman period by the establishment of a large number of monasteries. A still more important change in the configuration of the interior of London was made in the 13th century, when the various orders of the friars established themselves there. The Bene- dictine monks preferred secluded sites; the Augustinians did not cultivate seclusion so strictly; but the friars chose the interior of towns by preference. At the beginning of the 13th century the remarkable evangelical revival, instituted almost simultaneously by St Dominic and St Francis, swept over Europe.

The four chief orders of Mendicant friars were magnificently housed in London: —

Blackfriars. — The Black, Preaching or Dominican Friars came to England in 122 1 and their first house was at Oxford. Shortly after «.^.< this they came to London and settled in Holborn near .. Lincoln s Inn, where they

Man,

remained for more than fifty years. In 1276 they removed to the neighbourhood of Baynard

Castle, and their house gave a name to a London district which it still retains.

Greyfriars. — The Greyfriars, Minorites or Franciscans, first settled in Cornhill, and in 1224 John Ewin made over to them an estate situated in the ward of Farringdon Within and in the parish of St Nicholas in the Shambles, where their friary was built. Christ Church, Newgate Street, occupies the site of the choir of the great church of the Greyfriars.

Austin Friars. — The house of the Austin Friars or Friars Eremites was founded in Broad Street Ward in 1253.

While Friars. — The Friars of the Blessed Virgin of Mount Carmel or Carmelites or Whitefriars came to London in 1241, and made their home on land between Fleet Street and the Thames given by Edward I.

Besides the four chief orders of friars there were the Crutched Friars in the parish of St Olave, Hart Street (about 1298), and the

Friars of the Sac first outside Aldersgate (about 1257) and afterwards in the Old Jewry.

The names of places in London form valuable records of the habitations of different classes of the population. The mon- asteries and friaries are kept in memory by their names in various parts of London. In the same way the residences of the Jews have been marked. When Edward I. expelled the Jews from England in 1290 the district in which they had lived since William the Conqueror's day came to be called the Old Jewry. On their return after many centuries of exile most of them settled in the neighbourhood of Aldgate and Aldersgate. There is a reminder of them in the names of Jewry Street near the former and of Jewin Street near the latter place. Jewin Street was built on the site of the burying-place of the Jews before the expulsion.

In the middle ages there was a constant succession of pageants, processions and tournaments. The royal processions arranged in connexion with coronations were of great antiquity, p a „ anIII. in 1236, which was chronicled by Matthew Paris. After the marriage at Canterbury of the king with Eleanor of Provence the royal personages came to London, and were met by the mayor, aldermen and principal citizens to the number of 360, sumptuously apparelled in silken robes embroidered, riding upon stately horses. After the death of Henry III. (1272) the country had to wait for their new king, who was then in the Holy Land. Edward I. came to London on the 2nd of August 1274, when he was received with the wildest expressions of joy. The streets were hung with rich cloths of silk arras and tapestry; the aldermen and principal men of the city threw out of their windows handsful of gold and silver, to signify their gladness at the king's return; and the conduits ran with wine, both white and red.

Dr Jessopp gives a vivid picture of what occurred when King Edward III. entered London in triumph on the 14th of October 1347. He was the foremost man in Europe, and England had reached a height of power and glory such as she had never attained before. Ten years after this, one of the most famous scenes in the streets of London occurred, when Edward the Black Prince brought the French King John and other prisoners after the battle of Poitiers to England. This was a scene unequalled until Henry V. returned from the glorious field of Agincourt in 1415. The mayor and aldermen apparelled in orient-grained scarlet, and four hundred commoners in murrey, well mounted, with rich collars and chains, met the king at Blackheath. At the entrance to London Bridge the towers were adorned with banners of the royal arms, and in the front of them was inscribed Civitas Regis Justicie.

During the troubles of the 15th century the authorities had seen the necessity of paying more attention to the security of the gates and walls of the city, and when Thomas Nevill, son of William, Lord Fauconberg, made his attack upon London in 1 47 1 he experienced a spirited resistance. He first attempted to land from his ships in the city, but the Thames side from Baynard's Castle to the Tower was so well fortified that he had to seek a quieter and less prepared position. He then set upon the several gates in succession, and was repulsed at all. On the nth of May he made a desperate attack upon Aldgate, followed by 500 men. He won the bulwarks and some of his followers entered into the city, but the portcullis being let

down these were cut off from their own party and were slain by the enemy. The port- cullis was drawn up, and the besieged issued forth against the rebels, who were soon forced to flee.

When Richard, duke of Gloucester, laid his plans for seizing the crown, he obtained the countenance of the lord mayor, Sir Edmund Shaw, whose brother Dr Shaw praised Richard at Paul's Cross. Crosby Hall, in Bishopsgate Street, then lately built, was made the lodging of the Protector. There he acted the accessible prince in the eyes of the people, for the last of the Plantagenets was another of the usurpers who found favour in the eyes of the men of London. His day, however, was short, and with the battle of Bosworth ends Plantagenet London.

HISTORY]

LONDON

961

5. Tudor (148 5- 1 60 3). —It was during this period that the first maps of London were drawn. No representation of the

_ˆ city earlier than the middle of the 16th century has

of London, been discovered, although it seems more than probable that some plans must have been produced at an earlier period. 1 The earliest known view is the drawing of Van den Wyngaerde in the Bodleian Library (dated 1550). Braun and Hogenberg's map was published in 1572-1573, and the so-called Agas's map was probably produced soon afterwards, and was doubtless influenced by the publication of Braun and Hogenberg's excellent engraving; Norden's maps of London and Westminster are dated 1593. Some of these maps were pasted upon walls, and must have been largely destroyed by ordinary wear and tear. It is curious that the only two existing copies of Agas's map 2 were published in the reign of James I., although apparently they had not been altered from the earlier editions of Elizabeth's reign which have been lost. By the help of these maps we are able to obtain a clear notion of the extent and chief characteristics of Tudor London. Henry VII. did little to connect his name with the history of London, although the erection of the exquisite specimen of florid Gothic at Westminster Abbey has carried his memory down in its popular name of Henry VII. 's chapel. Soon after this king ob- tained the throne he borrowed the sum of 3000 marks from the city, and moreover founded the excellent precedent of repaying it at the appointed time. The citizens were so pleased at this unexpected occurrence that they willingly lent the king £6000 in 1488, which he required for military preparations against France. In 1497 London was threatened by the rebels favour- able to Perkin Warbeck, who encamped on Blackheath on the 17th of June. At first there was a panic among the citizens, but subsequently the city was placed in a proper state of defence, and the king himself encamped in St George's Fields. On June 22 he entirely routed the rebels; and some time afterwards Perkin Warbeck gave himself up, and was conducted in triumph through London to the Tower. |

As the chief feature of Norman London was the foundation of monasteries, and that of Plantagenet London was the estab- Sappret- lishment of friaries, so Tudor London was specially tloa of characterized by the suppression of the whole of these niiftoaM religious houses, and also of the almost numberless house: religious gilds and brotherhoods. When we remember that more than half of the area of London was occupied by these establishments, and that about a third of the inhabitants were monks, nuns and friars, it is easy to imagine how great must have been the disorganization caused by this root and branch reform. One of the earliest of the religious houses to be suppressed was the hospital cf St Thomas of Aeon (or Acre) on the north side of Cheapside, the site of which is now occupied by Mercers' Hall. The larger houses soon followed, and the Black, the White and the Grey Friars, with the Carthusians and many others, were all condemned in November

1538.

Love of show was so marked a characteristic of Henry VIII. that we are not surprised to find him encouraging the citizens in the same expensive taste. On the occasion of his marriage with Catherine of Aragon the city was gorgeously ornamented with rich silks and tapestry, and Goldsmiths' Row (Cheapside) and part of Cornhill were hung with golden brocades. When on the eve of St John's Day, 15 10, the king in the habit of a yeoman of his own guard saw the famous march of the city watch, he was so delighted that on the following St Peter's Eve he again attended in Cheapside to see the march, but this time he was accompanied by the queen and the principal nobility. The cost of these two marches in the year was very considerable, and, having been suspended in 1528 on account of the preval-

1 " A map of London engraved on copper-plate, dated 1497," which was bought by Ferdinand Columbus during his travels in Europe about 1518-1525, is entered in the catalogue of Ferdinand's books, maps, &c, made by himself and preserved in the Cathedral Library at Seville, but there is no clue to its existence.

- *One is in the Guildhall Library, and the other among the Pepysian maps in Magdalene College, Cambridge.*

XVI. 31

ence of the sweating sickness, they were soon afterwards for- bidden by the king, and discontinued during the remainder of his reign. Sir John Gresham, mayor in 1548, revived the march of the city watch, which was made more splendid by the addition of three hundred light horsemen raised by the citizens for the king's service.

The best mode of utilizing the buildings of the suppressed religious houses was a difficult question left unsolved by Henry VIII. That king, shortly before his death, refounded Rahere's St Bartholomew's Hospital, " for the continual relief and help of an hundred sore and diseased," but most of the large buildings were left unoccupied to be filled by his successor. The first parliament of Edward's reign gave all the lands and possessions of colleges, chantries, &c, to the king, when the different com- panies of London redeemed those which they had held for the payment of priests' wages, obits and lights at the price of £20,000, and applied the rents arising from them to charitable purposes. In 1550 the citizens purchased the manor of Southwark, and with it they became possessed of the monastery of St Thomas, which was enlarged and prepared for the reception of " poor, sick and helpless objects." Thus was refounded St Thomas's Hospital, which was moved to Lambeth in 1870-1871. Shortly before his death Edward founded Christ's Hospital in the Grey Friars, and gave the old palace of Bridewell to the city " for the lodging of poor wayfaring people, the correction of vagabonds and disorderly persons, and for finding them work." On the death of Edward VI. Lady Jane Grey was received at the Tower as queen, she having gone there by water from Durham House in the Strand. The citizens, however, soon found out their mistake, and the lord mayor, aldermen and recorder proclaimed Queen Mary at Cheapside. London was then gay with pageants, but when the queen made known her intention of marrying Philip of Spain the discontent of the country found vent in the rising of Sir Thomas Wyat, and the city had to prepare itself against attack. Wyat took possession of Southwark, and ex- pected to have been admitted into London; but finding the gates shut against him and the drawbridge cut down he marched to Kingston, the bridge at which place had been destroyed. This he restored, and then proceeded towards London. In consequence of the breakdown of some of his guns he im- prudently halted at Turnham Green. Had he not done so it is probable that he might have obtained possession of the city. He planted his ordnance on Hay Hill, and then marched by St James's Palace to Charing Cross. Here he was attacked by Sir John Gage with a thousand men, but he repulsed them and reached Ludgate without further opposition. He was disappointed at the resistance which was made, and after musing a while " upon a stall over against the Bell Savadge Gate " he turned back. His retreat was cut off, and he surrendered to Sir Maurice Berkeley. We have somewhat fully described this historical incident here because it has an important bearing on the history of London, and shows also the small importance of the districts outside the walls at that period.

We now come to consider the appearance of London during the reign of the last of the

Tudors. At no other period were so many great men associated with its history; the latter years of Elizabeth's reign are specially interest- London. ing to us because it was then that Shakespeare lived in London, and introduced its streets and people into his plays. In those days the frequent visitation of plagues made men fear the gathering together of multitudes. This dread of pestil- ence, united with a puritanic hatred of plays, made the citizens do all they could to discountenance theatrical entertainments. The queen acknowledged the validity of the first reason, but she repudiated the religious objection provided ordinary care was taken to allow " such plays only as were fitted to yield honest recreation and no example of evil." On April n, 1582, the lords of the council wrote to the lord mayor to the effect that, as " her Majesty sometimes took delight in those pastimes, it had been thought not unfit, having regard to the season of the year and the clearance of the city from infection, to allow of certain companies of players in London, partly that they might thereby

. IF

attain more dexterity and perfection the better to content her Majesty " (Analytical Index to the Remembrancia) . When theatres were established the lord mayor took care that they should not be built within the city. The " Theatre " and the " Curtain " were situated at Shoreditch; the " Globe," the " Swan," the " Rose " and the " Hope " on the Bankside ; and the Blackfriars theatre, although within the walls, was without the city jurisdiction.

In 1 56 1 St Paul's steeple and roof were destroyed by lightning, and the spire was never replaced. This circumstance allows us to test the date of certain views; thus Wyngaerde's map has the spire, but Agas's map is without it. In 1566 the first stone was laid of the " Burse," which owed its origin to Sir Thomas Gresham. In 1571 Queen Elizabeth changed its name to the Royal Exchange. The Strand was filled with noble mansions washed by the waters of the Thames, but the street, if street it could be called, was little used by pedestrians. Lon- doners frequented the river, which was their great highway. The banks were crowded with stairs for boats, and the watermen of that day answered to the chairmen of a later date and the cabmen of to-day. The Bankside was of old a favourite place for entertainments, but two only — the bull-baiting and the bear-baiting — were in existence when Agas's map was first planned. On Norden's map, 1 however, we find the gardens of 'Paris Garden, the bearhouse and the playhouse.

The settled character of the later years of Elizabeth's reign appears to have caused a considerable change in the habits of the people. Many of the chief citizens followed the example of the courtiers, and built for themselves country residences in Middlesex, Essex and Surrey; thus we learn from Norden that Alderman Roe lived at Muswell Hill, and we know that Sir Thomas Gresham built a fine house and planned a beautiful park at Osterley. The maps .show us much that remains somewhat the same as it was, but also much that has greatly altered. St Giles's was literally a village in the fields; Piccadilly was " the wave to Redinge," Oxford Street " the way to Uxbridge," Covent Garden an open field or garden, and Leicester Fields lammas land. Moorfields was drained and laid out in walks in Elizabeth's reign. At Spitalfields crowds used to congregate on Easter Monday and Tuesday to hear the Spital sermons preached from the pulpit cross. The ground was originally a Roman Cemetery, and about the year 1576 bricks were largely made from the clayey earth, the recollection of which is kept alive in the name of Brick Lane. Citizens went to Holborn and Bloomsbury for change of air, and houses were there prepared for the reception of children, invalids and convalescents. In the north were sprinkled the outlying villages of Islington, Hoxton and Clerkenwell.

6. Stuart {1603-1714). — The Stuart period, from the accession of James I. to the death of Queen Anne, extends over little more than a century, and yet greater changes occurred during those years than at any previous period. The early years of Stuart London may be

said to be closely linked with the last years of Elizabethan London, for the greatest men, such as Raleigh, Shakespeare and Ben Jonson, lived on into James's reign. Much of the life of the time was "then in the City, but the last years of Stuart London take us to the 18th century, when social life had permanently shifted to the west end. In the middle of the period occurred the civil wars, and then the fire which changed the whole aspect of London. When James came to the throne the term suburbs had a bad name, as all those dis-reputable persons who could find no shelter in the city itself ■settled in these outlying districts. Stubbs denounced suburban gardens and garden houses in his Anatomy of Abuses, and another writer observed "how happy were cities if they had no suburbs."

The preparations for the coronation of King James were interrupted by a severe visitation of the plague, which killed off as many as 30,57-8 persons, and it was not till March 15, 1604, that the king, the queen and Prince Henry passed triumphantly from the Tower to Westminster. The lord mayor's shows, which had been discontinued for some years, were revived by order of the king in 1609. The dissolved monastery of the Charterhouse, which had been bought and sold by the courtiers several times, was obtained from Thomas, earl of Suffolk, by Thomas Sutton for £13,000. The new hospital chapel and

1 This map of London by Norden is dated 1503, as stated above. The same topographer published in his Middlesex a map of West- minster as well as this one of the Coyof London.

schoolhouse were begun in 161 1, and in the same year Sutton died.

With the death of James I. in 1625 the older history of London may be said to have closed. During the reign of his successor the great change in the relative positions of London within and without the walls had set in. Before ocb " fe " going on to consider the chief incidents of this change it will be well to refer to some features of the social life of James's reign. Ben Tonson places one of the scenes of Every Man in his Humour in Moorfields, which at the time he wrote the play had, as stated above, lately been drained and laid out in walks. Beggars frequented the place, and travellers from the village of Hoxton, who crossed it in order to get into London, did so with as much expedition as possible. Adjoining Moorfields were Finsbury Fields, a favourite practising ground for the archers. Mile End, a common on the Great Eastern Road, was long famous as a rendezvous for the troops. These places are frequently referred to by the old dramatists; Justice Shallow boasts of his doings at Mile End Green when he was Dagonet in Arthur's Show. Fleet Street was the show-place of London, in which were exhibited a constant succession of puppets, naked Indians and strange fishes. The great meeting-place of Londoners in the day-time was the nave of old St Paul's. Crowds of merchants with their hats on transacted business in the aisles, and used the font as a counter upon which to make their payments; lawyers received clients at their several pillars; and masterless serving-men waited to be engaged upon their own particular bench. Besides those who came on business there were gallants dressed in fashionable finery, so that it was worth the tailor's while to stand behind a pillar and fill his table-books with notes. The middle or Mediterranean aisle was the Paul's Walk, also called the Duke's Gallery from the erroneous supposition that the tomb of Sir Guy Beauchamp, earl of Warwick, was that of the " good " Humphrey, duke of Gloucester. After the Restora- tion a fence was erected on the inside of the great north door to hinder a concourse of rude people, and when the cathedral was being rebuilt Sir Christopher Wren made a strict order against any profanation of the sacred building. St Paul's churchyard was 'from the earliest days of printing until the end of the 1 8th century the headquarters of the book trade, when it shifted to Paternoster Row. Another of the favourite haunts of the people was the garden of Gray's Inn, where the choicest society was to be met. There, under the shadow of the elm trees which Bacon had planted, Pepys and his wife constantly walked. Mrs Pepys went on one occasion specially to observe the fashions of the ladies because she was then "making some clothes."

In those days of public conviviality, and for many years afterwards, the taverns of London held a very important place. The Boar's Head in Great Eastcheap was an inn of r Shakespeare's own day, and the characters he introduces into his plays are really his own contemporaries. The " Mermaid " is sometimes described as in Bread Street, and at other times in Friday Street and also in Cheapside. We are thus able to fix its exact position; for a

little to the west of Bow church is Bread Street, then came a block of houses, and the next thorough- fare was Friday Street. It was in this block that the " Mermaid " was situated, and there appear to have been entrances from each street. What makes this fact still more certain is the circumstance that a haberdasher in Cheapside living " 'twixt Wood Street and Milk Street," two streets on the north side opposite Bread and Friday Streets, described himself as " over against the Mermaid tavern in Cheapside." The Windmill tavern occupies a prominent position in the action of Every Man in his Humour. 2 The Windmill stood at the corner of the Old Jewry towards Lothbury, and the Mitre close by the Mermaid in Bread Street. The Mitre in Fleet Street, so intimately associated with Dr Johnson, also existed at this time. It is mentioned in a comedy entitled Ram Alley (161 1) and Lilly the

2 Various changes in the names of the taverns are made in the folio edition of this play (1616) from the quarto (1601) ; thus the Mermaid, of the quarto becomes the Windmill in the folio, and the Mitre of !"«■ quarto is the Star of the folio.

HISTORY]

LONDON

9 6 3

Theatres.

" West Bad."

astrologer frequented it in 1640. At the Mermaid Ben Jonson had such companions as Shakespeare, Raleigh, Beaumont, Fletcher, Carew, Donne, Cotton and Selden, but at the Devil in Fleet Street, where he started the Apollo Club, he was omni- potent. Herrick, in his well-known Ode to Ben, mentions several of the inns of the day.

Under James I. the theatre, which established itself so firmly in the latter years of Elizabeth, had still further increased its influence, and to the entertainments given at the many playhouses may be added the masques so expensively produced at court and by the lawyers at the inns of court. In 1613 The Masque of Flowers was presented by the members of Gray's Inn in the Old Banqueting House in honour of the marriage of the infamous Carr, earl of Somerset, and the equally infamous Lady Frances, daughter of the earl of Suffolk. The entertainment was prepared by Sir Francis Bacon at a cost of about £2000.

It was during the reign of Charles I. that the first great exodus of the wealthy and fashionable was made to the West End. The great square or piazza of Covent Garden was formed The from the designs of Inigo Jones about 1632. The

neighbouring streets were built shortly afterwards, and the names of Henrietta, Charles, James, King and York Streets were given after members of the royal family. Great Queen Street, Lincoln's Inn Fields, was built about 1629, and named in honour of Henrietta Maria. Lincoln's Inn Fields had been planned some years before. With the Restoration the separation of fashionable from city life became complete.

When the Civil War broke out London took the side of the parliament, and an extensive system of fortification was at once projected to protect the town against the threatened attack of the royal army. A strong earthen rampart, flanked with bastions and redoubts, surrounded the City, its liberties, West- minster and Southwark, making an immense enclosure.

London had been ravaged by plague on many former occasions, but the pestilence that began in December 1664 lives in history as " the Plague of London." On the 7th of June 1665 Samuel Pepys for the first time saw two or three houses marked with the red cross and the words " Lord, have mercy upon us," on the doors. The deaths daily increased, and business was stopped. Grass grew in the area of the Royal Exchange, at Whitehall, and in the principal streets of the city. On the 4th of September 1665 Pepys writes an interesting letter to Lady Carteret from Woolwich: "I have stayed in the city till above 7400 died in one

week, and of them about 6000 of the plague, and little noise heard day or night but tolling of bells." The plague was scarcely stayed before the whole city was in flames, a calamity of the first magnitude, but one which in the end caused much good, as the seeds of disease were destroyed, and London has never since been visited by such an epidemic. On the 2nd of September 1666 the fire broke out at one o'clock in the morning at a house in Pudding Lane. A violent east wind fomented the Fin. flames, which raged during the whole of Monday and

great part of Tuesday. On Tuesday night the wind fell somewhat, and on Wednesday the fire slackened. On Thursday it was extinguished, but on the evening of that day the flames again burst forth at the Temple. Some houses were at once blown up by gunpowder, and thus the fire was finally mastered. Many interesting details of the fire are given in Pepys's Diary. The river swarmed with vessels filled with persons carrying away such of their goods as they were able to save. Some fled to the hills of Hampstead and Highgate, but Moorfields was the chief resort of the houseless Londoner. Soon paved streets and two-storey houses were seen in that swampy place. The people bore their troubles heroically, and Henry Oldenburg, writing to the Hon. Robert Boyle on September 10, says: " The citizens, instead of complaining, discoursed almost of nothing but of a survey for rebuilding the city with bricks and large streets." Within a few days of the fire three several plans were presented to the king for the rebuilding of the city, by Christopher Wren, John Evelyn and Robert Hooke. Wren proposed to build

The Plague.

*main thoroughfares north and south, and east and west, to insulate all the churches in conspicuous positions, to form the most public places into large piazzas, to unite the halls of the twelve chief companies into one regular square annexed to Guildhall and to make a fine quay on the bank of the river from Blackfriars to the Tower. His streets were to be Rebuild- of three magnitudes — 90 ft., 60 ft. and 30 ft. wide ir- respectively. Evelyn's plan differed from Wren's Wren's chiefly in proposing a street from the church of St sc * eme – Dunstan's in the East to the cathedral, and in having no quay or terrace along the river. In spite of the best advice, however, the jealousies of the citizens prevented any systematic design from being carried out, and in consequence the old lines were in almost every case retained. But though the plans of Wren and Hooke were not adopted, it was to these two fellows of the Royal Society that the labour of rebuilding London was committed. Wren's great work was the erection of the cathedral of St Paul's, and the many churches ranged round it as satellites. Hooke's task was the humbler one of arranging as city surveyor, for the building of the houses. He laid out the ground of the several proprietors in the rebuilding of the city, and had no rest early or late from persons soliciting him to set out their ground for them at once. The first great impetus of change in the configuration of London was given by the great fire, and Evelyn records and regrets that the town in his time had grown almost as large again as it was within his own memory. Although for several centuries attempts had been made in favour of building houses with brick or stone, yet the carpenters continued to be the chief house- builders. As late as the year 1650 the Carpenters' Company drew up a memorial in which they "gave their reasons that tymber buildings were more commodious for this citie than brick buildings were." The Act of Parliament " for rebuilding the city of London " passed after the great fire, gave the coup de grace to the carpenters as house-builders. After setting forth that " building with brick was not only more comely and durable, but also more safe against future perils of fire," it was enacted "that all the outsides of all buildings in and about the city should be made of brick or stone, except doorcases and window- frames, and other parts of the first story to the front between the piers," for which substantial oaken timber might be used "for conveniency of shops." In the winter of 1683-1684 a fair was held for some time upon the Thames. The frost, which began about seven weeks before Christmas and continued for six weeks after, was the greatest on record; the ice was n in. thick.*

The revocation of the edict of Nantes in October 1685, and the consequent migration of a large number of industrious French Protestants, caused a considerable growth in the east end of London. The silk manufactories at Spitalfields were then established.

During the short reign of James II. the fortunes of the city were at their lowest, and nowhere

was the arrival of the prince of Orange more welcomed.

William III. cared little for London, the smoke of which gave him asthma, and when a great part of Whitehall was burnt in 1691 he purchased Nottingham House and made it into Kensington Palace. Kensington was then an insignificant village, but the arrival of the court soon caused it to grow in importance. Although the spiritual wants of the city were amply provided for by the churches built by Wren, the large districts outside the city and its liberties had been greatly neglected. The act passed in the reign of Queen Anne for building fifty new churches (1710) for a time supplied the wants of large districts.

7. Eighteenth Century. — London had hitherto grown up by the side of the Thames. In the 18th century other parts of the town were more largely built upon. The inhabitants used coaches and chairs more than boats, and the banks of the river were neglected. London could no longer be seen as a whole, and became a mere collection of houses. In spite of this the 18th century produced some of the most devoted of Londoners — men who considered a day lived out of London as one lost out of their lives. Of this class Dr Johnson and Hogarth are striking examples. The exhibitions of vice and cruelty that were

constantly to be seen in the capital have been reproduced by- Hogarth, and had they not been set down by so truthful an observer it would have been almost impossible to believe that such enormities could have been committed in the streets of a great city. A few days after his accession George I. addressed the representatives of the city in these words: " I have lately been made sensible of what consequence the city of London is, and therefore shall be sure to take all their privileges and interests into my particular protection." On the following lord mayor's day the king witnessed the show in Cheapside and attended the banquet at Guildhall. Queen Anne and the first three Georges were all accommodated, on the occasions of their visits to the city to see the show, at the same house opposite Bow church. In the time of Queen Anne and George I. David Barclay (the son of the famous apologist for the Quakers) was an apprentice in the house, but he subsequently became master, and had the honour of receiving George II. and George III. as his guests. There was a large balcony extending along the front of the house which was fitted with a canopy and hangings of crimson damask silk. The building, then numbered 108 Cheapside, was pulled down in 1861.

Early in the 18th century there was a considerable extension of building operations in the West End. Still, however, the north of London remained .unbuilt upon. In 1756 f X «r/s?* an< ^ ^ or some y ear s subsequently the land behind century. Montague House (now the British Museum) was occupied as a farm, and when in that year a proposal was made to plan out a new road the tenant and the duke of Bedford strongly opposed it. In 1772 all beyond Portland Chapel in Great Portland Street was country. Bedford House in Bloomsbury Square had its full view of Hampstead and High- gate from the back, and Queen's Square was built open to the north in order that the inhabitants might obtain the same prospect.*

In 1737 the Fleet ditch between Holborn Bridge and Fleet Bridge was covered over, and Stocks Market was removed from the site of the Mansion House to the present Farringdon Street, and called Fleet market. On October 25, 1739, the first stone of the Mansion House was laid. Previously the first magistrates lived in several different houses. A frost almost as severe as the memorable one of 1683-1684 occurred in the winter of 1739- 1740, and the Thames was again the scene of a busy fair. In 1758 the houses on London Bridge were cleared away, and in 1 760-1 762 several of the city gates were taken down and sold. Moorgate is said to have fetched £166, Aldersgatefoi, Aldgate £177, Cripplegate £90, and Ludgate £148. The statue of Queen Elizabeth which stood on the west side of Ludgate was pur- chased by Alderman Gosling and set up against the east end of St Dunstan's church in

Fleet Street, where it still remains.

8. Nineteenth Century. — In 1806 London saw the public funerals of three of England's greatest men. On the 8th February the body of Nelson was borne with great pomp from the Admiralty to St Paul's Cathedral, where it was interred in the presence of the prince of Wales and the royal dukes. Pitt was buried on the 22nd of February, and Fox on the 10th of October, both in Westminster Abbey.

The first exhibition of Winsor's system of lighting the streets with gas took place on the king's birthday (June 4) 1807, and was made in a row of lamps in front of the colonnade before Carlton House. Finsbury Square was the first public place in which gas fighting was actually adopted, and Grosvenor Square the last. In the winter of 1813-1814 the Thames was again frozen over. The frost began on the evening of December 27, 1813, with a thick fog. After it had lasted for a month, a thaw of four days, from the 26th to the 29th of January, took place, but this thaw was succeeded by a renewal of the frost, so severe that the river soon became one immovable sheet of ice. There was a street of tents called the City Road, which was daily thronged with visitors. In 1838 the second Royal Exchange was destroyed by fire; and on October 28, 1844, the Queen opened the new Royal Exchange, built by Mr (afterwards Sir William) Tite. The Great Exhibition of 1851 brought a

larger number of visitors to London than had ever been in it before at one time. The great and continuous increase in the buildings and the enlargement of London on all sides dates from this period.

London within the walls has been almost entirely rebuilt, although in the neighbourhood of the Tower there are still many old houses which have only been refronted. From the upper rooms of the houses may be seen a large number of old tiled roofs.

Unlike many capitals of Europe which have shifted their centres the city of London in spite of all changes and the continued enlargement of the capital remains the centre and head-quarters of the business of the country. The Bank of England, the Royal Exchange and the Mansion House are on the site of Ancient London.

In 1863 on the occasion of the marriage of King Edward VII. (when prince of Wales) the streets of London were illuminated as they had never been before. Among other events which made the streets gay and centred in processions to St Paul's may be specially mentioned the Thanksgiving Day on the 27th of February 1872 for the recovery of the prince of Wales after his dangerous illness; and the rejoicings at the Jubilee of Queen Victoria in 1887, and the Diamond Jubilee in 1897.

The first great emigration of the London merchants westward was about the middle of the 18th century, but only those who had already secured large fortunes ventured so far as Hatton Garden. At the beginning of the 19th century it had become common for the tradesmen of the city to live away from their businesses, but it was only about the middle of the 19th century that it became at all usual for those in the West End to do the same.

During the first half of the 19th century the position of the City Corporation had somewhat fallen in public esteem, and some of the most influential men in the city were unconnected with it, but a considerable change took place in the latter half of the century. Violent attacks were made upon the Livery Companies, but of late years, largely owing to the public spirit of the companies in devoting large sums of money towards the improvement of the several industries in connexion with which they were founded, and the establishment of the City and Guilds of London Technical Institute, a complete change has taken place as to the public estimation in which they are held.

Growth and Population

Much has been written upon the population of medieval London, but little certainty has resulted therefrom. We know the size of London at different periods and are able to guess to some ;n e(Heva | extent as to the number of its inhabitants, but most of the Poaaia. figures which have come down to us are mere guesses. The t ˆ results of the poll-tax have often been

considered as trust- worthy substitutes for population returns, but Professor Oman has shown that little trust can be placed in these results. As an instance he states that the commissioners of the poll-tax reported that there were only two-thirds as many contributaries in 1381 as in 1377. The adult population of the realm had ostensibly fallen from 1,355,201 to 896,481. These figures were monstrous and incredible. 1

The Bills of Mortality of the 16th and 17th centuries are of more value, and they have been considered and revised by such able statisticians as John Graunt and Sir William Petty. It was not, however, before the 19th century that accurate figures were obtain- able. The circuit of the walls of London which were left by the Romans was never afterwards enlarged, and the population did not overflow into the suburbs to any extent until the Tudor period. Population was practically stationary for centuries owing to pesti- lences and the large proportion of deaths among infants. We have no materials to judge of the number of inhabitants before the Norman Conquest, but we can guess that there were many open spaces within the walls that were afterwards filled up. It is scarcely worth while to guess as to the numbers in Saxon London, but it is possible that in the early period there were about 10,000 inhabitants, growing later to about 20,000. During the latter part of the Saxon period the numbers of the population of the country began to decay ; this decay, however, was arrested by the Norman Conquest. The population increased during ten peaceful years of Henry III., and increased slowly until the death of Edward II., and then it began to fall off, and continued to decrease during the period of the Wars of the Roses and of the Barons until the accession of the first Tudor monarch.

1 The Great Revolt of 1381 (Oxford, 1906), p. 27. . –

The same causes that operated to bring about these changes in the whole kingdom were of course also at work in the case of the City of London.

One of the earliest statements as to the population of London occurs in a letter of about the year 1 199 written to Pope Innocent III. by Peter of Blois, then archdeacon of London, and therefore a man of some authority on the subject. He states that the City contained 120 parish churches and 40,000 inhabitants. These numbers have been very generally accepted as fairly correct, and Dr Creighton l comes to the conclusion after careful consideration that the population of London from the reign of Richard I. to that of Henry VII. varied within a limit of about forty to fifty thousand inhabitants.

Dr Creighton points out that the number given by certain chroniclers of the deaths from the early pestilences in London are incredible; such for instance as the statement that forty " or fifty thousand bodies were buried in Charterhouse "mln »h, churchyard at the time of the Black Death in 1348-1349. Mortality, These numbers have been taken as a basis for calculation of population, and one statistician reasoned that if 50,000 were buried in one churchyard 100,000 should represent the whole mortality of London. If this were allowed the population at this time must have been at least 200,000, an impossible amount.*

Although the mortality caused by the different plagues had a great effect upon the population of the country at large the city soon recovered the losses by reason of the numbers who came to London from outside in hopes of obtaining work. Although there were fluctuations in the numbers at different periods there is evidence to show that on the average the amount of forty to fifty thousand fixed by Dr Creighton for the years between 1 189 and 1509 is fairly correct. The medieval period closed with the accession of the Tudor dynasty, and from that time the population of London continued to increase, in spite of attempts by the government to prevent it. One of the first periods of increase was after the dissolution of the religious houses ; another period of increase was after the Restoration.

A proclamation was issued in 1580 prohibiting the erection within 3 m. of the city gates of

any new houses or tenements " where no former house hath been known to have been." In a subsequent proclamation Queen Elizabeth commanded that only one family should live in one house, that empty houses erected within seven years were not to be let and that unfinished buildings on new foundations were to be pulled down. In spite of these restrictions London continued to grow. James I. and Charles I. were filled with the same fear of the increasing growth of London. In 1630 a similar proclamation to that of 1 580 was published. During the greater part of the 1 8th century there was a serious check to the increase of population, but at the end of the century a considerable increase occurred, and in the middle of the 19th century the enormous annual increase became particularly marked. To return to the 16th century when the Bills of Mortality came into existence. 2 Mention is made of these bills as early as 1517, but the earliest series now known dates from 1532. Dr Creighton had access to the Bins or manuscript returns of burials and christenings for five Mortality. years f rom j^g t0 isfi 2 preserved in the library at Hatfield House. The history of the Bills of Mortality which in the early years were intermittent in their publication is of much interest, aijd Dr Creighton has stated it with great clearness. The Company of Parish Clerks is named in an ordinance of 1581 (of which there is a copy in the Record Office) as the body responsible for the bills, and their duties were then said to be " according to the Order in that behalf heretofore provided." John Bell, clerk to the company, who wrote an essay during the great plague of 1665, had no records in his office of an earlier date than 1593, and he was not aware that his company had been engaged in registering births and deaths before that year. The fire of 1666 destroyed all the documents of the Parish Clerks Company, and in its hall in Silver Street only printed tables from about the year 1700 are to be found. There is a set of Annual Bills from 1658 (with the exception of the years 1756 to 1764) in the library of the British Museum. 3

These bills were not analysed and general results obtained from them until 1662, when Captain John Graunt first published his valuable Natural and Political Observations upon the Bills of

1 In a valuable paper on " The Population of Old London" in Blackwood's Magazine for April 1891.

2 The old Bills of Mortality, although of value from being the only authority on the subject, were never complete owing to various causes: one being that large numbers of Roman Catholics and Dis- senters were not registered in the returns of the parish clerk who was a church officer. The bills were killed by the action of the Registra- tion Act for England and Wales, which came into operation July I, 1837. The Weekly Returns of the Registrar-General began in 1840.

- *" The invention of ' bills of mortality ' is not so modern as has been generally supposed, for their proper designation may be found in the language of ancient Rome. Libitina was the goddess of funerals; her officers were the Libitinarii our undertakers; her temple in which all business connected with the last rites was trans- acted, in which the account of deaths— ratio Libitinae — was kept, served the purpose of a register office." — Journal Statistical Society, xvii. 117 (1854).*

Mortality. Sir William Petty followed with his important inquiries upon the population (Essay on Political Arithmetic, 1683).

It is not worth while to refer to all the wild guesses that were made by various writers, but Dr Creighton shows the absurdity of one of these calculations made in 1554 by Soranzo, the Venetian am- bassador for the information of the doge and senators of Venice. He estimates the population to have been 180,000 persons, which Dr Creighton affirms to be nearly three times the number that we obtain by a moderate calculation from the bills of mortality in 1532

Following on his calculations from 1509, when the ta ^ iB

population may be supposed to have been about 50,000, , „ .

Dr Creighton carries on his numbers to the Restoration , .

-“■■ centuries.

in the following table : —

1532-1535 • ■ 62,400 1605 . . . 224,275

1563 . . . 93,276 1622 . . . 272,207

1580 . . . 123,034 1634 . . . 339.824

1593-1595 • • 152,478 1661 . . . 460,000

The numbers for 1661 are those arrived at by Graunt, and they are just about half the population given authoritatively in the first census 1801 (864,845). It therefore took 140 years to double the numbers, while in 1841 the numbers of 1801 were more than doubled. These numbers were arrived at with much care and may be con- sidered as fairly accurate although some other calculations conflict with a few of the figures. The first attempt at a census was in August 1631 when the lord mayor returned the number of mouths in the city of London and Liberties at 130,268, which is only about half the number given above. This is accounted for by the larger area con- tained in the bills of mortality compared with that containing only the city and its liberties. 4 Howell’s suggestion that the population of London in 1631 was a million and a half need only be mentioned as a specimen of the wildest of guesses.

Petty’s numbers for 1682 are 670,000 and those of Gregory King for 1696, 530,000. The latter are corroborated by those of 1700, which are given as 550,000. Maitland gives the numbers ˆj, in 1737 as 725,903. With regard to the relative size of aatary great cities Petty affirms that before the Restoration the people of Paris were more in number than those of London and Dublin, whereas in 1687 the people of London were more than those of Paris and Rome or of Paris and Rouen.

It is not necessary to give any further numbers for the population of the 1 8th century, as that has been already stated to have been almost stationary. This is proved by Gregory King’s figures for J696 (530,000) when compared with those of the first census for 1801 (864,035). A corroboration is also to be found in the report of the first census for 1801, where a calculation is made of the probable population of the years 1 700 and 1 750. These are given respectively as 674,350 and 676,250. These figures include (1) the City of London within and (2) without the walls, (3) the City and Liberties of West- minster, (4) the outparishes within the bills of mortality and (5) the parishes not within the bills of mortality. No. 5 is given as 9150 in 1700, and 22,350 in 1750. It is curious to find that already in the 1 8th century a considerable reduction in the numbers of the city of London is supposed to have taken place, as is seen in the following figures : —

1700. 1750.

City of London within the walls . . 139,300 87,000

,, ,, without the walls . 69,000 57,3O0

As the increase in Westminster is not great (130,000 in 1700 and 152,000 in 1750) and there is little difference in the totals it will be seen that the amount is chiefly made up by the increase in the parishes without the bills of mortality. The extraordinary growth of London did not come into existence until about the middle of the 19th century (see § IV. above).

Government

We know little of “the government of London during the Saxon period, and it is only incidentally that we learn how the Londoner had become possessed of special privileges which he Saxoa

continued to claim with success through many centuries. Period One Of the chief of these was the claim to a separate voice in the election of the king. The citizens did not dispute the

right of election by the kingdom but they held that that election did not necessarily include the choice of London.

An instance of this is seen in the election of Edmund Ironside, although the Witan outside London had elected Canute. The remarkable instance of this after the Conquest was the election of Stephen, but William the Conqueror did not feel secure until he had the sanction of the Londoners to his kingship, and his attitude towards London when he hovered about the neighbourhood of the city for a time shows that he was anxious to obtain this sanction freely rather than by compulsion. His hopes and expectations were fulfilled when

4 The return was made " by special command from the Right Honourable the Lords of His Majesty's Privy Council." The Privy Council were at this time apprehensive of an approaching scarcity of food. The numbers (130,268) were made up as follows: London Within the Walls 71,029, London Without the Walls 40,579, Old Borough of Southwark (Bridge Without) 18,660.

the gates of London were opened to receive him, as already related. Athelstan's acceptance of the London-made law for the whole kingdom, as pointed out by Mr Gomme, is another instance of the independence of the Londoner. When William the Conqueror granted the first charter to London he addressed the bishop and the portreeve — the bishop as the ecclesiastical governor and the portreeve as the representative of the civil power.

The word " port " in the title " portreeve " does not indicate the Port of London as might naturally be supposed, for Stubbs has pointed out that it is porta not portus, and "although used for the city generally, seems to refer to it specially in its character of a Mart or City of Merchants." The Saxon title of reeve was continued during the Norman period and the shire-reeve or sheriff has continued to our own time. There were originally several distinct reeves, all ap- parently officers appointed by the king. Some writers have supposed that a succession of portreeves continued in London, but J. H. Round holds that this title disappeared after the Conqueror's charter. Henry I. granted to the city by charter the right of appointing its own sheriffs; this was a great privilege, which, however, was recalled in the reigns of Henry II. and Richard I., to be restored by John in

1 199.

J. H. Round holds that the office of Justiciar was created by Henry I.'s charter, and as he was the chief authority in the city this somewhat takes off from the value of the privilege of appointing sheriffs.

In the 12th century there was a great municipal movement over Europe. Londoners were well informed as to what was going on abroad, and although the rulers were always willing to wait for an opportunity of enlarging their liberties, they remained ready to take advantage of such circumstances as might occur. Their great oppor- tunity occurred while Richard I. was engaged abroad as a crusader. In 1889 a medal was struck to commemorate the 700th anniversary of the mayoralty which according to popular tradition was founded in 1 189. With respect to this tradition Round writes {Commune of London, p. 223): " The assumption that the mayoralty of London dates from the accession of Richard I. is an absolute perversion of history," and he adds that " there is record evidence which com- pletely confirms the remarkable words of Richard of Devizes, who declares that on no terms whatever would King Richard or his father have ever assented to the establishment of the Communa in London."

In October 1191 the conflict between John the king's brother and Longchamp the king's representative became acute. The latter bitterly offended the Londoners, who, finding that they could turn the scales to either side, named the Commune as the price of their support of

John. A small party of the citizens under Henry of Cornhill remained faithful to the chancellor Longchamp, but at a meeting held at St Paul's on the 8th of October, the barons welcomed the archbishop of Rouen as chief justiciar (he having produced the king's sign manual appointing a new com- mission), and they saluted John as regent. Stubbs, in his intro- duction to the Chronicle of Roger de Hoveden, writes: " This done, oaths were largely taken: John, the Justiciar and the Barons swore to maintain the Communa of London ; the oath of fealty to Richard was then sworn, John taking it first, then the two archbishops, the bishops, the barons, and last the burghers with the express under- standing that should the king die without issue they would receive John as his successor." Referring to this important event Mr Round writes: "The excited citizens, who had poured out overnight, with lanterns and torches, to welcome John to the capital, streamed together on the morning of the eventful 8th of October at the well- known sound of the great bell swinging out from its campanile in St Paul's Churchyard. There they heard John take the oath to the ' Commune ' like a French king or lord ; and then London for the first time had a municipality of her own."

Little is known as to what the Commune then established really was. Round's remarkable discovery among the manuscripts of the British Museum of the Oath of the Commune proves for The Mayor j^g fj rst t ; me t jj at L onc]on in 1193 possessed a fully developed " Commune " of the continental pattern. A striking point in this municipal revolution is that the new privileges extended to the city of London were entirely copied from those of continental cities, and Mr Round shows that there is con- clusive proof of the assertion that the Commune of London derived its origin from that of Rouen. This MS. gives us information which was unknown before, but upsets the received opinions as to the early governing position of the aldermen. From this we learn that the government of the city was in the hands of a mayor and twelve echevins {skivini) ; both these names being French, seem for a time to have excluded the Saxon aldermen.

Twelve years later (1205-1206) we learn from another document, preserved in the same volume as the oath, that alii probi homines were associated with the mayor and echevins to form a body of twenty-four (that is, twelve skivini and an equal number of councillors). Round holds that the Court of Skivini and alii probi homines, of which at present we know nothing further than what is contained in the terms of the oaths, was the germ of the Common Council. We must not suppose that when the city of London obtained the privilege of appointing a mayor, and a citizen could boast in 1194 that " come what may the Londoners shall have

The Commune.

and Echevins.

no king but their mayor," that the king did not occasionally exert his power in suspending the liberties of the city. There were really constant disagreements, and sometimes the king degraded the mayor and appointed a custos or warden in his place. Several instances of this are recorded in the 13th and 14th centuries. It is very im- portant to bear in mind that the mayors of London besides holding a very onerous position were mostly men of great distinction. They often held rank outside the city, and naturally took their place among the rulers of the country. They were mostly representatives of the landed interests as well as merchant princes.

There is no definite information as to when the mayor first received the title of lord. A claim has been set up for Thomas Legge, mayor for the second time in 1354, that he was the first lord mayor, but there is positively no authority whatever for this claim, although it is boldly stated that he was created lord mayor by Edward III. in this year. Apparently the title was occasionally used, and the use gradually grew into a prescriptive right. There is no evidence of any grant, but after 1540 the title had become general.

No record has been found of the date when the aldermen became the official advisers of the mayor. The various wards were each presided over by an alderman from an early period, but … we cannot fix the time when they were united as a court erme . of aldermen. Stubbs writes: "The governing body of London in the 13th century was composed of the mayor, twenty-five aldermen of the wards and two sheriffs."

As we do not find any further evidence than the oath of the Commune alluded to of the existence of " echevins " in London, it is possible that aldermen were elected on the mayor's council under this title. This, however.is not the opinion of Mr Round, who,as before stated, is inclined to believe that the body of echevins became in course of time the Court of Common Council. The aldermen are not mentioned as the colleagues of the mayor until the very end of the 13th century, except in the case of Fitz-Ailwin'sAssize of 1 189, and this, of course, related specially to the duties of aldermen as heads of the wards of the city.

In March 1298-1299 letters were sent from "the Mayor and Commune of the City of London " to the municipalities of Bruges, Caen and Cambray. Although the official form of "The Mayor and Commune " was continued until the end of the 13th century, and it was not until early in the 14th century that the form " Mayor, Aldermen and Common Council " came into existence, there is sufficient evidence to show that the aldermen and common council before that time were acting with the mayor as governors of the city. In 1377 it was ordered that aldermen could be elected annually, but in 1384 the rule was modified so as to allow an alderman to be re- elected for his ward at the expiration of his year of office without any interval.

In 1394 the Ordinance respecting annual elections was repealed by the king (Richard II.). Distinct rank was accorded to aldermen, and in the Liber Albus we are told that " it is a matter of experience that ever since the year of our Lord 1350, at the sepulture of aldermen, the ancient custom of interment with baronial honours was ob- served." When the poll-tax of 1379 was imposed the mayor was assessed as an earl and the aldermen as barons.

The government of the city by reeves dates back to a very early period, and these reeves were appointed by the king. The prefix of the various kinds of reeves made but little difference in the „, „. duties of the office, although the area of these duties er s '

might be different. There was slight difference between the office of sheriff and that of portreeve, which latter does not appear to have survived the Conquest.

After the establishment of the Commune and the appointment of a mayor the sheriffs naturally lost much of their importance, and they became what they are styled in Liber Albus " the Eyes of the Mayor." When Middlesex was in farm to London the two sheriffs were equally sheriffs of London and Middlesex. There is only one instance in the city records of a sheriff of Middlesex being mentioned as distinct from the sheriffs, and this was in 1283 when Anketin de Betteville and Walter le Blond are described as sheriffs of London, and Gerin as sheriff of Middlesex. By the Local Government Act of 1888 the citizens of London were deprived of all right of jurisdiction over the county of Middlesex, which had been expressly granted by various charters.

In 1383 it was ordained and agreed " that no person shall from henceforth be mayor in the said city if he have not first been sheriff of the said city, to the end that he may be tried in governance and bounty before he attains such estate of the mayoralty."

*The two courts — that of aldermen and that of the common council — were probably formed about the same time, but it is remarkable that we have no definite information on the subject. The number of members of the common council varied greatly Common at different times, but the right to determine the number *' ounc "- was indirectly granted by the charter of Edward III. (1341) which enables the city to amend customs and usages which have become hard.*

There have also been many changes in the mode of election. The common council were chosen by the wards until 1351, when the appointments were made by certain companies. In 1376 an ordin- ance was made by the mayor and aldermen, with the assent of the whole commons, to the effect that the companies should select men

with whom they were content, and none other should come to the elections of mayors and sheriffs; that the greater companies should not elect more than six, the lesser four and the least two. Forty- seven companies nominated 156 members. In 1383 the right of election reverted to the wards, but was obtained again by the livery companies in 1467.

The Common Hall was the successor of thefolkmote, the meetings of which were originally held in the open air at the east end of St Paul's and afterwards in the Guildhall. These general Common assemblies of the citizens are described in the old city records as immense communitas or immensa multitude) civium. The elections in Common Hall were by the whole body of citizens until Edward I. 's reign,- citizens were then specially summoned to Common Hall by the mayor. In Edward IV. 's reign the elections of mayor, sheriffs and other officers and members of parliament were transferred to liverymen. Various alterations were subsequently made and now the qualification of electors at the election of the corporate offices of lord mayor, sheriffs, chamberlain and minor offices in Common Hall is that of being a liveryman of a livery company and an enrolled freeman of London. The election of aldermen and common councilmen takes place in the wardmotes.

The recorder, the chief official, is appointed for life. He was

formerly appointed by the city, but since the Local Government

Act of 1888 he is nominated by the city and approved by

tth ˆ e ' 0r< ˆ chancellor. The common sergeant was formerly

J appointed by the city, but since 1888 by the lord

c y ' chancellor. The town clerk is appointed by the city and

re-elected annually.

The chamberlain or comptroller of the king's chamber is ap- pointed by the livery. He was originally a king's officer and the office was probably instituted soon after the Conquest. The re- membrancer is appointed by the common council.

The common hunt, an office abolished in 1807, was filled by John Courtenay in 141 7. The sword-bearer is noticed in the Liber Albus (1419) and the first record of an appointment is dated 1426.

Few fundamental alterations have been made in the constitution of the city, but in the reign of Charles II. the most arbitrary pro- ceedings were taken against its liberties. The king and Mi # ˆ' S brother had long entertained designs against the city, Istoryot anc j f Qr £j]e p Ur p 0se f crushing them two pretexts were

oratf'n set U P — (ˆ ' a new rate °ˆ mar ' cet to " s na d been levied p ° ' by virtue of an act of common council, and (2) that a petition to the king, in which it was alleged that by the prorogation of parliament public justice had been interrupted, had been printed by order of the Court of Common Council. Charles directed a writ quo warranto against the corporation of London in 1683, and the Court of King's Bench declared its charter forfeited. Soon after- wards all the obnoxious aldermen were displaced and others appointed in their room by royal commission. When James II. found himself in danger from the landing of the Prince of

Orange he sent for the lord mayor and aldermen and informed them of his determination to restore the city charter and privileges, but he had no time to do anything before his flight. The Convention which was summoned to meet on the 22nd of January 1689 was converted by a formal act into a true parliament (February 23). One of the first motions put to the House was that a special Committee should be appointed to consider the violations of the liberties and franchises of all the corporations of the kingdom " and particularly of the City of London." The motion was lost but the House resolved to bring in a bill for repealing the Corporation Act, and ten years later (March 5) the Grand Committee of Grievances reported to the House its opinion (1) that the rights of the City of London in the election of sheriffs in the year 1682 were invaded and that such invasion was illegal and a grievance, and (2) that the judgment given upon the Quo Warranto against the city was illegal and a grievance. The committee's opinion on these two points (among others) was en- dorsed by the House and on the 16th of March it ordered a Bill to be brought in to restore all corporations to the state and condi- tion they were in on the 29th of May 1660, and to confirm the liberties and franchises which at that time they respectively held and enjoyed. 1

When the Act for the reform of Municipal Corporations was passed in 1835 London was specially excepted from its provisions. When the Metropolitan Board of Works was formed by the Metropolis Management Act of 1855 the city was affected to a certain extent, but by the Local Government Act of 1888 which founded the London County Council the right of appointing a sheriff for Middlesex was taken away from the city of London.

When the county of Middlesex was dissociated from the city of London one portion was joined to the administrative county of London, and the other to the county of Middlesex.

The lord mayor of London has certain very remarkable privileges which have been religiously guarded and must be of great antiquity. Prfv// It is only necessary to mention these here, but each

of (he lord °^ tne privileges requires an exhaustive examination mayor. as to ' ts origin. They all prove the remarkable position of Old London, and mark it off from all other cities of modern Europe. Shortly stated the privileges are four :

1 R. R. Sharpe, London and the Kingdom (1894), i. 541.

1. The closing of Temple Bar to the sovereign.

2. The mayor's position in the city, where he is second only to the

king.

3. His summons to the Privy Council on the accession of a new

sovereign.

4. His position of butler at the coronation banquets.

The last may be considered in abeyance as there has not been any coronation banquet since that of George IV. In the case of the coronation of King Edward VII. the claim was excluded from the consideration of the Court of Claims under the royal proclamation. The terms of the judgment on a further claim are as follows: " The Court considers and adjudges that the lord mayor has by usage a right, subject to His Majesty's pleasure, to attend the Abbey during the coronation and bear the crystal mace."

Bibliography. — The earliest description of London is that written by the monk Fitzstephen in 1 174 as an introduction to his life of Archbishop Thomas a Becket. This was first printed by Stow in his Survey. It was reprinted by Strype in his editions of Stow; by Hcarne in his edition of Leland's Itinerary (vol. 8), by Samuel Pegge in 1772, and elsewhere. The first history is contained in A Survey of London by John Stow (1598, 1603). The author died in 1605, and his work was continued by Anthony Munday and others (1618, 1633) and in the next century by John Strype (1720, 1754- J 755)- Stow's original work was reprinted by W.

J. Thorns in 1842 and a monumental edition has been published by C. L. Kingsford (Oxford, 1908).

The following are the most important of subsequent histories arranged in order of publication ; James Howell, Londinopolis (1657); W. Stow, Remarks on London and Westminster (1722); Robert Seymour (John Mottley), Survey of the Cities of London and Westminster (1734, another edition 1753); William Maitland, History of London (1739, other editions 1756, 1760, 1769, continued byJohnEntick 1775); John Entick, A New and Accurate History of London, Westminster, Southwark (1766); The City Remembrancer, Narratives of the Plague 1665, Fire 1666 and Great Storm 1703 (1769) ; A New and Compleat History and Survey, by a Society of Gentlemen (1770, revised by H. Chamberlain, folio revised by W. Thornton 1784); J. Noorthouck, A New History (1773); Walter Harrison, A New and Universal History (1775); J. P. Malcolm, Londinium Redivivum or an Ancient History and Modern Description of London (1803); David Hughson (E. Pugh), London (1805-1809); B. Lambert, History and Survey of London (1806); Henry Hunter, History of London (181 1); J. W. Abbott, History of London (182 1); Thomas Allen, History and Antiquities of London (1827-1829, con- tinued by Thomas Wright 1839); William Smith, A New History of London (1833); Charles Mackay, A History of London (1838); The History of London, illustrated by W. G. Fearnside (1838); George Grant, A Comprehensive History of London (Dublin, 1849); John Timbs, Curiosities of London (1855, later editions 1855, 1868, 1875, 1876); Old London Papers, Archaeological Institute (1867); W. J. Loftie, A History of London (1883); W. J. Loftie, Historic Towns (London, 1887); Claude de la Roche Francis, London, Historic and Social (Philadelphia, 1902) ; Sir Walter Besant, The Survey of London (1902-1908) — Early London, Prehistoric, Roman, Saxon and Norman (1908) ; Medieval London, vol. I, Historical and Social (1906), vol. 2, Ecclesiastical (1906) ; London in the Time of the Tudors (1904) ; London in the Time of the Stuarts (1903) ; London in the Eighteenth Century (1902); H. B. Wheatley, The Story of London [Medieval Towns] (London, 1904).

The following are some of the Chronicles of London which have been printed, arranged in order of publication: R. Grafton j Chronicle 1189-1558 (1809); R. Arnold, London Chronicle (181 1); A Chronicle of London from 1089 to 1483 written in the Fifteenth Century (1827); William Gregory's Chronicle of London, 1189-1469 (1876); Historical Collections of a Citizen of London, edited by James Gairdner (Camden Society, 1876); Chronicles of London [1200- 1516], edited by C. L. Kingsford (Oxford, I9°5)-

Many books have been published on the government of London, of which the following is a selection: City Law (1647, 1658); Lex Londinensis or the City Law (1680) ; W. Bohun, Privilegia Londini (1723); Giles Jacob, City Liberties (1733); Laws and Customs, Rights, Liberties and Privileges of the City of London (1765); David' Hughson, Epitome of the Privileges of London (1816) ; George Norton, Commentaries on the History, Constitution and Chartered Franchises of the City of London (1829, 3rd ed. 1869); Munimenta Gildhallae Londoniensis, edited by H. T. Riley — vol. 1, Liber Albus (1419), vol. 2, Liber Custumarum (1859); Liber Albus: the White Book of the City of London, translated by H. T. Riley (1861); H. T. Riley, Memorials of London and London Life in the 13th, 14th and 15th centuries (1868); De Antiquis Legibus Liber. Cur ante Thoma Stapleton (Camden Society, 1846); Chronicles of the Mayors and Sheriffs of London 1188-1274, translated from the Liber de Antiquis Legibusby H. T. Riley. French Chronicle of London 1259-1343 (1863); Analytical Index to the Series of Recordˆ known as the Remembrancia 1579-1664 (1888); Calendar of Letter-Books [circa 1275-1399] pre- served among the Archives of the Corporation of London at the Guildhall, edited by Reginald R. Sharpe, D.C.L. (1899-1907) ; W. and R. Woodcock, Lives of Lord Mayors (1846) ; J. F. B. Firth, Municipal London (1876); Walter Delgray Birch, Historical Charters and

Constitutional Documents of the City of London (1884, 1887); J. H. Round, The Commune of London and other Studies (1899) ; Reginald R. Sharpe, London and the Kingdom; a History derived mainly from the Archives at Guildhall (1894); G. L. Gomme, The Governance of London. Studies on the Place occupied by London in English Insti- tutions

(1907) ; Alfred B. Beaven, The Aldermen of the City of London temp. Henry III. (1908).

In connexion with the government of London may be noted works on the following: Inns of Court. William Herbert, Antiquities of the Inns of Court and Chancery (1804); Robert P. Pearce, History (1848). Artillery Company, Anthony Highmore, History of the Hon. Artillery Co. of London to 1802 (1804); G. A. Raikes, History of the Hon. Artillery Co. (1878). William Herbert published in 1837 History of the Twelve great Livery Companies of London, and in 1869 Thomas Arundell published Historical Reminiscences of the City and its Livery Companies. Since then have appeared The Livery Companies of the City of London, by W. Carew Hazlitt (1892); The City Companies of London, by P. H. Ditchfield (1904) ; The Gilds and Companies of London, by George Unwin (1908). Separate histories have been published of the chief London companies.

The following are some of the chief works connected with the topography of London: Thomas Pennant, Of London (1790, 1793, 1805, 1813, translated into German 1791); John T. Smith, Antient Topography of London (1815); David Hugnson [E. Pugh], Walks through London (1817); London (edited by Charles Knight 1841- 1844, reprinted 1851, revised by E. Walford 1875-1877) ; J. H. Jesse, Literary and Historical Memorials of London (1847); Leigh Hunt, The Town, its Memorable Character and Events (1848, new ed. 1859) ; Peter Cunningham, A Handbook of London past and present (1849, 2nd ed. 1850, enlarged into a new work in 1891); Henry 6. Wheatley, London past and present; Vestiges of Old London, etchings by J. W. Archer (1851); A New Survey of London (1853); G. W. Thornbury, Haunted London (1865, new ed. by E. Walford 1880); Old and New London, vols, i.-ii. by G. W. Thornbury, vols, iii.-vi. by Edward Walford (1873-1878); Walter Besant, London, West- minster, South London, East London (1891-1902); East London Antiquities, edited by Walter A. Locks (East London Advertiser, 1902); Philip Norman, London vanished and vanishing (1905); Records of the London Topographical Society; Monographs of the Committee for the Survey of the Memorials of Greater London.

The following books on the population of London have been published: John Graunt, Natural and Political Observations on the Bills of Mortality (1661, other editions 1662, 1665, 1676); Essay in Political Arithmetick (1683) ; Five Essays on Political Arithmetick (1687); Several Essays in Political Arithmetick (1699,1711,1751, '755) ; Essay concerning the Multiplication of Mankind (1682, 1683, 1686), all by Sir William Petty; Corby n Morris, Observations on the past Growth and present State of the City of London (1751) ; Collection of the Yearly Bills of Mortality from i6$7 to 1758 (ed. by T. Birch, D.D. 1759); Graunt's Observations, Petty's Another Essay and C. Morris's Observations are reprinted in this collection. Graunt and Petty's Essavs are reprinted in Economic Writings of Sir W. Petty (1899). – (H. B. W.)*

LONDON CLAY, in geology, the most important member of the Lower Eocene strata in the south of England. It is well developed in the London basin, though not frequently exposed, partly because it is to a great extent covered by more recent gravels and partly because it is not often worked on a large scale. It is a stiff, tenacious, bluish clay that becomes brown on weathering, occasionally it becomes distinctly sandy, some- times glauconitic, especially towards the top; large calcareous septarian concretions are common, and have been used in the manufacture of cement, being dug for this purpose at Sheppey, near Southend, and at Harwich, and dredged off the Hamp- shire coast. Nodular lumps of pyrites and crystals of selenite are of frequent occurrence. The clay has been employed for making bricks, tiles and coarse pottery, but it is usually too tenacious for this purpose except in well-weathered or sandy portions. The base of the clay is very regularly indicated by a few inches of rounded flint pebbles with green and yellowish sand, parts of this layer being frequently cemented by car- bonate of lime. The average thickness of the London Clay in the London basin is about 430 ft.; at Windsor it is 400 ft. thick ; beneath London it is rather thicker, while in the south of Essex it is over 480 ft. In Wiltshire it only reaches a few feet in thickness, while in Berkshire it is some 50 or 60 ft. It is found in the Isle of Wight, where it is 300 ft. thick at Whitecliff Bay — here the beds are vertical and even slightly reversed — and in Alum Bay it is 220 ft. thick. In Hampshire it is sometimes known as the Bognor Beds, and certain layers of calcareous sandstone within the clays are called Barnes or Bognor Rock. In the eastern part of the London basin in east Kent the pebbly

basement bed becomes a thick deposit (60 ft.), forming part «f the Oldhaven and Blackheath Beds.

The London Clay is a marine deposit, and its fossils indicate a moderately warm climate, the flora having a tropical aspect. Among the fossils may be mentioned Panopoea intermedia, Ditrupa plana, Teredina personata, Conus concinnus, Rostellaria ampla, Nautilus centralis, Belosepia, foraminifera and diatoms. Fish remains include Otodus obliquus, Sphyroenodus crassidens; birds are represented by Halcyornis Toliapicus, Lithornis and Odontopteryx, and reptiles by Chelone gigas, and other turtles, Palaeophis, a serpent and crocodiles. Hyracotherium leporinum, Palaeotherium and a few other mammals are recorded. Plant remains in a pyritized condition are found in great abundance and perfection on the shore of Sheppey ; numerous species of palms, screw pines, water lilies, cypresses, yews, leguminous plants and many others occur ; logs of coniferous wood bored through by annelids and Teredo are common, and fossil resin has been found at Highgate.

See Eocene ; also W. Whitaker, " The Geology of London and part of the Thames Valley," Mem. Geol. Survey (1889), and Sheet Memoirs of the Geol. Survey, London, Nos. 314, 315, 268, 329, 332, and Memoirs on the Geology of the Isle of Wight (1889).

LONDONDERRY, EARLS AND MARQUESSES OF. The

1st earl of Londonderry was Thomas Ridgeway (c. 1565-1631), a Devon man, who was treasurer in Ireland from 1606 to 1616 and was engaged in the plantation of Ulster. Ridgeway was made a baronet in 1611, Baron Ridgeway in 1616 and earl of Londonderry in 1623. The Ridgeways held the earldom until March 17 14, when Robert, the 4th earl, died without sons. In 1726 Robert's son-in-law, Thomas Pitt (c. 1 688-1 729), son of Thomas Pitt, " Diamond Pitt," governor at Madras and uncle of the great earl of Chatham, was created earl of Londonderry, the earldom again becoming extinct when his younger son Ridgeway, the 3rd earl of this line, died unmarried in January 1765. In 1796 Robert Stewart (1739-1821), of Mount Stewart, Co. Down, was made earl of Londonderry in the Irish peerage. He had been created Baron Londonderry in 1789 and Viscount Castlereagh in 1795; in 1816 he was advanced to the rank of marquess of Londonderry. The 3rd marquess married the heiress of the Vane-Tempests and took the name of Vane instead of Stewart; the 5th marquess called himself Vane-Tempest and the 6th marquess Vane-Tempest-Stewart.

LONDONDERRY, CHARLES WILLIAM STEWART (VANE), 3RD Marquess of (1778-1854), British soldier and diplomatist, was the son of the 1st marquess by a second marriage with the daughter of the 1st Earl Camden. He entered the army and served in the Netherlands (1794) on the Rhine and Danube (1795), in the Irish rebellion (1798), and Holland (1799), rising to be colonel; and having been elected to parliament for Kerry he became under secretary for war under his half-brother Castlereagh in 1807. In 1808 he was given a cavalry command in the Peninsula, where he brilliantly distinguished himself. In 1809, and again in the campaigns of 181 o, 1811, having become a major-general, he served under Wellington in the Peninsula as his adjutant-general, and was at the capture of Ciudad Rodrigo, but at the beginning of 181 2 he was invalided home. Castlereagh (see Londonderry, 2nd Marquess of) then sent him to Berlin as minister, to represent Great Britain in the allied British, Russian and Prussian armies; and as a cavalry leader he played an important part in the subsequent fighting, while ably seconding Castlereagh's diplomacy. In 1814 he was made a peer as Baron Stewart, and later in the year was appointed ambassador at Vienna, and was a member of the important congresses which followed. In 1822 his half- brother's death made him 3rd marquess of Londonderry, and shortly afterwards, disagreeing with Canning, he resigned, being created Earl Vane (1823), and for some years lived quietly in England, improving his Seaham estates. In 1835 he was for a short time ambassador at St Petersburg. In 1852, after the death of Wellington, when he was one of the pall-bearers, he received the order of the Garter. He died on the 6th of March 1854. He was twice married, first in 1808 to the daughter of the earl of Darnley, and secondly in 1819 to the heiress of Sir Harry Vane-Tempest (a descendant of Sir Piers Tempest, who served at Agincourt, and heir to Sir Henry Vane, Bart.), when he assumed the name of Vane. Frederick William Robert (1805-

1872), his son by the first marriage, became 4th marquess; and on the latter's death in 1872, George Henry (1821-1884), the eldest son by the second marriage, after succeeding as Earl Vane (according to the patent of 1823), became 5th marquess. In 1884 he was succeeded as 6th marquess by his son Charles Stewart Vane-Tempest-Stewart (b. 1852), a prominent Conserva- tive politician, who was viceroy of Ireland(i886-i88g), chairman of the London School Board (1895-1897), postmaster-general (1900-1902), president of the Board of Education (1902-1905) and lord president of the Council (1903-1905).

LONDONDERRY, ROBERT STEWART, 2ND Marquess of (1769-1822), British statesman, was the eldest son of Robert Stewart of Ballylawn Castle, in Donegal, and Mount Stewart in Down, an Ulster landowner, of kin to the Galloway Stewarts, who became baron, viscount, earl and marquess in the peerage of Ireland. The son, known in history as Lord Castlereagh, was born on the 18th of June in the same year as Napoleon and Wellington. His mother was Lady Sarah Seymour, daughter of the earl of Hertford. He went from Armagh school to St John's College, Cambridge, but left at the end of his first year. With Lord Downshire, then holding sway over the County Down, Lord Stewart had a standing feud, and he put forward his son, in July 1790, for one of the seats. Young Stewart was returned, but at a vast cost to his family, when he was barely twenty-one. He took his seat in the Irish House of Commons at the same time as his friend, Arthur Wellesley, M.P. for Trim, but sat later for two close boroughs in England, still remaining member for Down at College Green.

From 1796, when his father became an earl, he took the courtesy title of Viscount Castlereagh, and becoming keeper of the privy seal in Ireland, he acted as chief secretary, during the prolonged absence of Mr Pelham, from February 1797. Castle- reagh's conviction was that, in presence of threatened invasion and rebellion, Ireland could only be made safe by union with Great Britain. In Lord Camden, as afterwards in Lord Corn- wallis, Castlereagh found a congenial chief; though his favour with these statesmen was jealously viewed both by the Irish oligarchy and by the English politicians who wished to keep the machine of Irish administration in their own hands. Pitt himself was doubtful of the expediency of making an Irishman chief secretary, but his view was changed by the influence of Cornwallis. In suppressing Lord Edward Fitzgerald's con- spiracy, and the rebellion which followed in 1798, Castlereagh's vigilance and firmness were invaluable. His administration was denounced by a faction as harsh and cruel — a charge after- wards repudiated by Grattan and Plunket — but he was always on the side of lenity. The disloyal in Ireland, both Jacobins and priest-led, the Protestant zealots and others who feared the consequence of the Union, coalesced against him in Dublin. Even there Castlereagh, though defeated in a first campaign (1799), impressed Pitt with his ability and tact. With Cornwallis he joined in holding out, during the second Union campaign (1800), the prospect of emancipation to the Roman Catholics. They were aided by free expenditure of money and promises of honours, methods too familiar in Irish politics. When the Act of Union was carried through the Irish parliament, in the summer of 1800, Castlereagh's official connexion with his native land practically ended. Before the Imperial Parliament met he urged upon Pitt the measures which he and Cornwallis thought requisite to make the Union effective. In spite of his services and of Pitt's support, disillusion awaited him. The king's reluctance to yield to the Roman Catholic claims was under- estimated by Pitt, while Cornwallis imprudently permitted himself to use language which, though not amounting to a pledge, was construed as one. George III. resented the arguments brought forward by Castlereagh — " this young man " who had come over to talk him out of his coronation oath. He peremp- torily refused to sanction emancipation, and Pitt and his cabinet made way for the Addington administration. Thereupon Castlereagh resigned, with Cornwallis. He took his seat at Westminster for Down, the constituency he had represented for ten years in Dublin. The leadership of an Irish party was

offered to him, but he declined so to limit his political activity. His father accepted, at Portland's request, an Irish marquessate, on the understanding that in the future he or his heirs might claim the same rank in the Imperial Legislature; so that Castlereagh was able to

sit in the House of Commons as Marquess in 1821-1822. Wilberforce discussed with Pitt the possibility of sending out Castlereagh to India as governor-general, when the friction between Lord Wellesley and the directors became grave; but Pitt objected, as the plan would remove Castlereagh from the House of Commons, which should be " the theatre of his future fame."

In 1802, Castlereagh, at Pitt's suggestion, became president of the Board of Control in the Addington cabinet. He had, though not in office, taken charge of Irish measures under Addington, including the repression of the Rebellion Bill, and the temporary suspension of the Habeas Corpus in 1801, and continued to advocate Catholic relief, tithe reform, state payment of Catholic and dissenting clergy and " the steady application of authority in support of the laws." To Lord Wellesley's Indian policy he gave a staunch support, warmly recognized by the governor-general. On Pitt's return to office (May 1804), Castlereagh retained his post, and, next year, took over also the duties of secretary for war and the colonies. Socially and politically, the gifts of his wife, Lady Emily Hobart, daughter of a former Irish viceroy, whom he had married in 1794, assisted him to make his house a meeting-place of the party; and his influence in parliament grew notwithstanding his defects of style, spoken and written. As a manager of men he had no equal. After Pitt's death his surviving colleagues failed to form a cabinet strong enough to face the formidable combination known as " All the Talents," and Castlereagh acquiesced in the resignation. But to the foreign policy of the Fox-Greville ministry and its conduct of the war he was always opposed. His objections to the Whig doctrine of withdrawal from " Continental entangle- ments " and to the reduction of military expenditure were justified when Fox himself was compelled " to nail his country's colours to the mast."

The cabinet of " All the Talents," weakened by the death of Fox and the renewed quarrel with the king, went out in April 1807. Castlereagh returned to the War Office under Portland, but grave difficulties arose, though Canning at the Foreign Office was then thoroughly at one with him. A priceless oppor- tunity had been missed after Eylau. The Whigs had crippled the transport service, and the operations to avert the ruin of the coalition at Friedland came too late. The Tsar Alexander believed that England would no longer concern herself with the Continental struggle, and Friedland was followed by Tilsit. The secret articles of that compact, denied at the time by the Opposition and by French apologists, have now been revealed from official records in M. Vandal's work, Napolton et Alexandre. Castlereagh and Canning saw the vital importance of nullifying the aim of this project. The seizure of the Danish squadron at Copenhagen, and the measures taken to rescue the fleets of Portugal and Sweden from Napoleon, crushed a combination as menacing as that defeated at Trafalgar. The expedition to Portugal, though Castlereagh's influence was able only to secure Arthur Wellesley a secondary part at first, soon dwarfed other issues. In the debates on the Convention of Cintra, Castlereagh defended Wellesley against parliamentary attacks: " A brother," the latter wrote, " could not have done more." The depression produced by Moore's campaign in northern Spain, and the king's repugnance to the Peninsular operations, seemed to cut short Wellesley's career; but early in 1809, Castlereagh, with no little difficulty, secured his friend's appointment as commander-in-chief of the second Portuguese expedition. The merit has been claimed for Canning by Stapleton, but the evidence is all the other way.

Meanwhile, Castlereagh's policy led to a crisis that clouded his own fortunes. The breach between him and Canning was not due to his incompetence in the conduct of the Walcheren expedi- tion. In fact, Castlereagh's ejection was decided by Canning's intrigues, though concealed from the victim, months before

the armament was sent out to the Scheldt. In the selection of the earl of Chatham as commander the king's personal preference was known, but there is evidence also that it was one of Canning's schemes, as he reckoned, if Chatham succeeded, on turning him into a convenient ministerial figurehead. Canning was not openly opposed to the Walcheren

expedition, and on the Penin- sular question he mainly differed from Castlereagh and Wellington in fixing his hopes on national enthusiasm and popular uprisings. Military opinion is generally agreed that the plan of striking from Walcheren at Antwerp, the French naval base, was sound. Napoleon heard the news with dismay; in principle Wellington approved the plan. Castlereagh's proposal was for a coup de main, under strict conditions of celerity and secrecy, as Antwerp was unable to make any adequate defence. But Chatham, the naval authorities and the cabinet proceeded with a deliberation explained by the fact that the war secretary had been con- demned in secret. The expedition, planned at the end of March, did not reach Walcheren till the end of July 1809; and more time was lost in movements against Batz and Flushing, pro- tracted until an unhealthy autumn prostrated the army, which was withdrawn, discredited and disabled, in September. Public opinion threw the whole blame upon Castlereagh, who then found that, in deference to Canning, his colleagues had decreed his removal half a year earlier, though they kept silence till the troops were brought back from Walcheren. When Castlereagh learned from Percival that the slur cast on him had its origin in a secret attack on him many months before, he was cruelly hurt. The main charge against him was, he says, that he would not throw over officers on whom unpopularity fell, at the first shadow of ill-fortune. His refusal to rush into censure of Moore, following Canning's sudden change from eulogy to denunciation, requires no defence. According to the ideas then prevailing Castlereagh held himself justified in sending a challenge to the original author, as he held, of a disloyal intrigue against a col- league. In the subsequent duel Canning was wounded and the rivals simultaneously resigned. In private letters to his father and brother, Castlereagh urged that he was bound to show that he

From March 181 2 to July 1822 Castlereagh's biography is, in truth, the history of England. Though never technically prime minister, during these years he wielded a power such as few ministers have exercised. ■-. Political opponents and personal ill- wishers admitted that he was the ablest leader who ever con- trolled the House of Commons for so long a period. As a diplo- matist, nobody save Marlborough had the same influence over men or was given equal freedom by his colleagues at home. Foreigners saw in him the living presence of England in the camp of the Allies. At the War Office he had been hampered by the lack of technical knowledge, while nature had not granted him, as an organizer, the powers of a Carnot or Roon. But in diplomacy his peculiar combination of strength and charm, of patience and conciliatory adroitness, was acknowledged by all. At the Foreign Office he set himself at once to meet Napoleon's designs in northern Europe, where Russia was preparing for her life-

and-death struggle. Lord Wellesley paid a high tribute to Castlereagh's conduct in this situation, and Wellington declared that he had then " rendered to the world the most important service that ever fell to the lot of any individual to perform." Castlereagh wisely rejected Napoleon's insincere overtures for peace. After the Moscow debacle Napoleon's fate was affected not only by Wellington's progress in Spain, but by the attitude of the northern powers and by the action of Turkey, due to Castlereagh's opportune disclosure to the Porte of the scheme of partition at Tilsit. At home, the repeal of the Orders in Council was carried, the damage to British trade plainly out- weighing the injury inflicted on France by the restrictive system. The British subsidies to the Allies were largely increased as the operations of 1813 developed, but all Castlereagh's skill was needed to keep the Coalition together. The Allied powers were willing, even after Leipzig, to treat with France on the basis of restoring her " natural frontiers " — the Rhine, the Alps and the Pyrenees; but Castlereagh protested. • He would not allow the enemy to take ground for another tiger- spring. Before the Con- ference of Chatillon, where Napoleon sent Caulaincourt to negotiate for peace — with the message scribbled on the margin of his instructions, " Ne signez rien " — Aberdeen wrote to hasten Castlereagh's coming: " Everything which has been so long smothered is now bursting forth "; and again, " Your presence has done much and would, I have no doubt, continue to sustain them (the Allies) in misfortune." The Liverpool cabinet then, and later were as urgent in pressing him to return to lead the House of Commons. He had lost his seat for Down in 1805, and afterwards sat for British boroughs; but in 181 2 he was re-elected by his old constituents; and again in 1818 and 1820, sitting, after he became marquess of Londonderry in 1821, for Orford. Early in 1814 his colleagues reluctantly

consented to his visit to the allied head-quarters. The Great Alliance showed signs of weakness and division. Austria was holding back; Prussia had almost broken away; above all, the am- biguous conduct of Alexander bred alarm and doubt. This situation became increasingly serious while Napoleon was giving daily proofs that his military genius, confronting a hesitant and. divided enemy, was at its best. Castlereagh strove to keep the Allies together, to give no excuse for those separate arrange- ments upon which Napoleon was reckoning, to assert no selfish policy for England, to be tied by no theoretical consistency. At the Chatillon conferences England was represented by others, but Castlereagh was present with supreme authority over all, and it was he who determined the result. He declined to commit his country either to a blank refusal to negotiate with Napoleon or to the advocacy of a Bourbon restoration. He was ready to give up almost the whole of England's conquests, but he insisted on the return of France within her ancient limits as the basis of a settlement. Caulaincourt's advice was to take advantage of these overtures; but his master was not to be advised. The counter-projects that he urged Caulaincourt to submit to were advanced after his victory at Montereau, when he boasted that he was nearer to Munich than the Allies were to Paris. Even before the Chatillon conference was dissolved (March 18th), Castlereagh saw that Caulaincourt's efforts would never bend Napoleon's will. The Allies adopted his view and signed the treaty of Chaumont (March 1st), " my treaty," as Castlereagh called it, with an unusual touch of personal pride; adding " Upon the face of the treaty this year our engagement is equivalent to theirs united." The power of England when she threw her purse into the scale had been just exhibited at Bar- sur-Aube, when at a council of all the representatives of the powers the retreat of the allied armies was discussed. Berna- dotte, playing a waiting game in Holland, was unwilling to reinforce Bliicher, then in a dangerous position, by the Russian and Prussian divisions of Winzingerode and Billow, temporarily placed under his orders. Having asked for and received the assurance that the military leaders were agreed in holding the transfer necessary, Castlereagh declared that he took upon himself the responsibility of bringing the Swedish prince to reason. The withholding of the British subsidies was a vital

matter, not only with Bernadotte but with all the powers. Castlereagh's avowed intention to take this step without waiting for sanction from his cabinet put an end to evasion and delay. Bliicher was reinforced by the two divisions; the battle of Laon was fought and won, and the allies occupied the French capital. In April 1814 Castlereagh arrived in Paris. He did not disguise his discontent with Napoleon's position at Elba, close to the French coast, though he advised England not to separate herself at this crisis from her allies. His uneasiness led him to summon Wellington from the south to the Embassy in Paris. He hastened himself to London during the visit of the allied sovereigns, and met with a splendid reception. He was honoured with the Garter, being one of the few commoners ever admitted to that order. When the House of Commons offered to the Crown its congratulations upon the treaty of peace, Castlereagh's triumph was signalized by a brilliantly eloquent panegyric from Canning, and by a recantation of his former doubts and denunciations from Whitbread. His own dignified language vindicated his country from the charge of selfish ambition.

His appointment as British representative at Vienna, where the congress was to meet in September, was foreseen; but meanwhile he was not idle. The war with the United States, originating in the non-intercourse dispute and the Orders in Council, did not cease with the repeal of the latter. It lasted through 18 14 till the signing of the treaty of Ghent, soon before the flight from Elba. In parliament the ministry, during Castlereagh's absence, had been poorly championed. Canning had thrown away his chance by his unwise refusal of the Foreign Office. None of the ministers had any pretension to lead when Castlereagh was busy abroad and Canning was sulking at home, and Castlereagh's letter<-, to Vansittart, the chancellor of the exchequer, show how these difficulties weighed upon him in facing the position at Vienna, where it was imperative for him to appear. At Vienna he realized at once that the ambition of Russia might be as formidable to Europe and to Great Britain as that of the fallen tyrant. His aim throughout had been to rescue Europe from military domination; and when he found that Russia and Prussia were pursuing ends incompatible with the

general interest, he did not hesitate to take a new line. He brought about the secret treaty (Jan. 3, 181 5) between Great Britain, Austria and France, directed against the plans of Russia in Poland and of Prussia in Saxony. Through Castlereagh's efforts, the Polish and Saxon questions were settled on the basis of compromise. The threat of Russian interference in the Low Countries was dropped.

While the Congress was still unfinished, Napoleon's escape from Elba came like a thunderclap. Castlereagh had come home for a short visit (Feb. 1815), at the urgent request of the cabinet, just before the flight was known. The shock revived the Great Alliance under the compact of Chaumont. All energies were directed to preparing for the campaign of Waterloo. Castle- reagh's words in parliament were, " Whatever measures you adopt or decision you arrive at must rest on your own power and not on reliance on this man." Napoleon promptly published the secret treaty which Castlereagh had concluded with Metter- nich and Talleyrand, and the last left in the French archives. But Russia and Prussia, though much displeased, saw that, in the face of Bonaparte's return, they dared not weaken the Alliance. British subsidies were again poured out like water. After Napoleon's overthrow, Castlereagh successfully urged his removal to St Helena, where his custodians were charged to treat him " with all the respect due to his rank, but under such pre- cautions as should render his escape a matter of impossibility." Some of the continental powers demanded, after Waterloo, fines and cessions that would have crushed France; but in November a peace was finally concluded, mainly by Castlereagh's endeavours, minimising the penalties exacted, and abandoning on England's part the whole of her share of the indemnity. The war created an economic situation at home which strengthened the Whigs and Radicals, previously discredited by their hostility to a patriotic struggle. In 1816 the Income Tax was remitted, despite Castlereagh's contention that something should first be done to reduce the Debt Charge. His policy, impressed upon

British representatives abroad, was " to turn the confidence Great Britain inspired to the account of peace, by- exercising a conciliatory influence in Europe." Brougham's action, at the end of 1815, denouncing the Holy Alliance, even in its early form, was calculated to embarrass England, though she was no party to what Castlereagh described as a " piece of sublime mysticism and nonsense."

While he saw no reason in this for breaking up the Grand Alliance, which he looked upon as a convenient organ of diplo- matic intercourse and as essential for the maintenance of peace, he regarded with alarm " the little spirit of German intrigue," and agreed with Wellington that to attempt to crush France, as the Prussians desired, or to keep her in a perpetual condition of tutelage under a European concert from which she herself should be excluded, would be to invite the very disaster which it was the object of the Alliance to avoid. It was not till Metter- nich's idea of extending the scope of the Alliance, by using it to crush " the revolution " wherever it should raise its head, began to take shape, from the conference of Aix-la-Chapelle (1818) onward, that Great Britain's separation from her continental allies became inevitable. Against this policy of the reactionary powers Castlereagh from the first vigorously protested. As little was he prepared to accept the visionary schemes of the emperor Alexander for founding an effective " confederation of Europe " upon the inclusive basis of the Holy Alliance (see Alexander I. of Russia).

Meanwhile financial troubles at home, complicated by the resumption of cash payments in 1819, led to acute social tension. " Peterloo " and the " Six Acts " were furiously denounced, though the bills introduced by Sidmouth and Castlereagh were carried in both Houses by overwhelming majorities. The danger that justified them was proved beyond contest by the Cato Street Conspiracy in 1820. It is now admitted by Liberal writers that the " Six Acts," in the circumstances, were reason- able and necessary. Throughout, Castlereagh maintained his tranquil ascendancy in the House of Commons, though he had few colleagues who were capable of standing up against Brougham. Canning, indeed, had returned to office and had de- fended the " Six Acts," but Castlereagh bore the whole burden of parliamentary leadership, as well as the enormous responsibilities of the Foreign Office. His appetite for work caused him to engage in debates and enquiries on financial and legal questions when he might have delegated the task to others. Althorp was struck with his unsleeping energy on the Agricultural Distress Committee; " His exertions, coupled with his

other duties — and unfortunately he was always obstinate in refusing assistance — strained his constitution fearfully, as was shown by his careworn brow and increasing paleness." In 1821, on Sidmouth's retirement, he took upon himself the laborious functions of the Home Office. The diplomatic situation had become serious. The policy of " intervention," with which Great Britain had consistently refused to identify herself, had been proclaimed to the world by the famous Troppau Protocol, signed by Russia, Austria and Prussia (see Troppau, Congress of). The immediate occasion was the revolution at Naples, where the egregious Spanish constitution of 181 2 had been forced on the king by a military rising. With military revolts, as with paper constitutions of an unworkable type, Castlereagh had no sympathy; and in this particular case the revolution, in his opinion, was wholly without excuse or palliation. He was prepared to allow the intervention of Austria, if she considered her rights under the treaty of 1813 violated, or her position as an Italian Power imperilled. But he protested against the general claim, embodied in the Protocol, of the European powers to interfere, uninvited, in the internal concerns of sovereign states; he refused to make Great Britain, even tacitly, a party to such interference, and again insisted that her part in the Alliance was defined by the letter of the treaties, beyond which she was not prepared to go. In no case, he affirmed, would Great Britain " undertake the moral responsibility for administering a general European police, "which she would never tolerate as applied to herself. ■ To Troppau, accordingly, no British plenipotentiary was

sent, since the outcome of the conferences was a foregone conclu- sion; though Lord Stewart came from Vienna to watch the course of events. At Laibach an attempt to revive the Troppau proposals was defeated by the firm opposition of Stewart; but a renewal of the struggle at Verona in the autumn of 1822 was certain. Castlereagh, now marquess of Londonderry, was again to be the British representative, and he drew up for himself instructions that were handed over unaltered by Canning, his successor at the Foreign Office, to the new plenipotentiary, Wellington. In the threatened intervention of the continental powers in Spain, as in their earlier action towards Naples and Sardinia, England refused to take part. The Spanish revolu- tionary movement, Castlereagh wrote, " was a matter with which, in the opinion of the English cabinet, no foreign power had the smallest right to interfere." Before, however, the question of intervention in Spain had reached its most critical stage the development of the Greek insurrection against the Ottoman government brought up the Eastern Question in an acute form, which profoundly modified the relations of the powers within the Alliance, and again drew Metternich and Castlereagh together in common dread of an isolated attack by Russia upon Turkey. A visit of King George IV. to Hanover, in October 1821, was made the occasion of a meeting between Lord Londonderry and the Austrian chancellor. A meeting so liable to misinterpretation was in Castlereagh's opinion justified by the urgency of the crisis in the East, "a practical consideration of the greatest moment," which had nothing in common with the objectionable " theoretical " question with which the British government had refused to concern itself. Yet Castlereagh, on this occasion, showed that he could use the theories of others for his own practical ends; and he joined cordially with Metternich in taking advantage of the emperor Alexander's devotion to the principles of the Alliance to prevent his taking an independent line in the Eastern Question. It was, indeed, the belief that this question would be made the matter of common discussion at the congress that led Castlereagh to agree to be present at Verona; and in his Instructions he foreshadowed the policy afterwards carried out by Canning, pointing out that the development of the war had made the recognition of the belligerent rights of the Greeks inevitable, and quoting the precedent of the Spanish American colonies as exactly applicable. With regard to the Spanish colonies, moreover, though he was not as yet prepared to recognize their independence de jure, he was strongly of opinion that the Spanish government should do so since " other states would acknowledge them sooner or later, and it is to the interest of Spain herself to find the means of restoring an intercourse when she cannot succeed in restoring a dominion."

But the tragic ending of Castlereagh's strenuous life was near; and the credit of carrying out

the policy foreshadowed in the Instructions was to fall to his rival Canning. Lord Londonderry's exhaustion became evident during the toilsome session of 1822. Both the king and Wellington were struck by his overwrought condition, which his family attributed to an attack of the gout and the lowering remedies employed. Wellington warned Dr Bankhead that Castlereagh was unwell, and, perhaps, mentally disordered. Bankhead went down to North Cray and took due precautions. Castlereagh's razors were taken away, but a penknife was forgotten in a drawer, and with this he cut his throat (August 12, 1822). He had just before said, "My mind, my mind, is, as it were, gone"; and, when he saw his wife and Bankhead talking together, he moaned " there is a conspiracy laid against me." It was as clear a case of brain disease as any on record. But this did not prevent his enemies of the baser sort from asserting, without a shadow of proof, that the suicide was caused by terror at some hideous and undefined charge. The testimony of statesmen of the highest character and of all parties to Castlereagh's gifts and charm is in strong contrast with the flood of vituperation and calumny poured out upon his memory by those who knew him not.

Bibliography. — Castlereagh's correspondence and papers were published by his brother and successor (1 850-1 853) in twelve

volumes. Sir Archibald Alison's Biography in three volumes came out in 1 86 1, with copious extracts from the manuscripts preserved at Wynyard. It was made the subject of an interesting essay in the Quarterly Review for January 1 862, reprinted in Essays by the late Marquis of Salisbury (London, 1905). A graceful sketch by Theresa, Marchioness of Londonderry (London, 1904), originally brought out in the Anglo-Saxon Review, contains some extracts from Castle- reagh's unpublished correspondence with his wife, the record of an enduring and passionate attachment which throws a new light on the man. (E. D. J. W.)

LONDONDERRY, a northern county of Ireland in the province of Ulster, bounded N. by the Atlantic, W. by Lough Foyle and Donegal, E. by Antrim and Lough Neagh, and S. by Tyrone. The area is 522,315 acres, or about 816 sq. m. The county consists chiefly of river valleys surrounded by elevated table- lands rising occasionally into mountains, while on the borders of the sea-coast the surface is generally level. The principal river is the Roe, which flows northward from the borders of Tyrone into Lough Foyle below Newton-Limavady, and divides the county into two unequal parts. Farther west the Faughan also falls into Lough Foyle, and the river Foyle passes through a small portion of the county near its north-western boundary. In the south-east the Moyola falls into Lough Neagh, and the Lower Bann from Lough Neagh forms for some distance its eastern boundary with Antrim. The only lake in the county is Lough Finn on the borders of Tyrone, but Lough Neagh forms about 6 m. of its south-eastern boundary. The scenery of the shores of Lough Foyle and the neighbouring coast is attractive, and Castlerock, Downhill, Magilligan and Portstewart are favourite seaside resorts. On the flat Magilligan peninsula, which forms the eastern horn of Lough Foyle, the base-line of the trigonometrical survey of Ireland was measured in 1826. The scenery of the Roe valley, with the picturesque towns of Limavady and Dungiven, is also atrractive, and the roads from the latter place to Draperstown and to Maghera, traversing the passes of Evishgore and Glenshane respectively, afford fine views of the Sperrin and Slieve Gallion mountains.

The west of this county consists of Dalradian mica-schist, with some quartzite, and is a continuation of the northern region of Tyrone. An inlier of these rocks appears in the rising ground east of Dungiven, including dark grey crystalline limestone. Old Red Sandstone and Lower Carboniferous Sandstone overlie these old rocks in the south and east, meeting the igneous " green rocks " of Tyrone, and the granite intrusive in them, at the north end of SHeve Gallion. Triassic sandstone covers the lower slope of Slieve Gallion on the south-east towards Moneymore, and rises above the Carbon- iferous Sandstone from Dungiven northward. At Moneymore we reach the western scarp of the White Limestone (Chalk) and the over- lying basalt of the great plateaus, which dip down eastward under Lough Neagh. The basalt scarp, protecting chalk and patches of Liassic and Rhaetic strata, rises to 1260 ft. in Benevenagh north of Limavady, and repeats the finest features of the Antrim coast. A raised shelf with post-glacial marine clays forms the flat land west of Limavady. Haematite has been mined on the south flank of Slieve Gallion.

The excessive rainfall and the cold and uncertain climate are un- favourable for agriculture. Along the sea-coast there is a district of red clay formed by the decomposition of sandstone, and near the mouth of the Roe there is a tract of marl. Along the valleys the soil is often fertile, and the elevated districts of the clay-slate region afford pasture for sheep. The acreage of pasture-land does not greatly exceed that of tillage. Oats, potatoes and turnips are chiefly grown, with some flax; and cattle, sheep, pigs and poultry are kept in considerable numbers. The staple manufacture of the county is linen. The manufacture of coarse earthenware is also carried on, and there are large distilleries and breweries and some salt-works. There are fisheries for salmon and eels on the Bann, for which Coleraine is the headquarters. The deep-sea and coast fisheries are valuable, and are centred at Moville in Co. Donegal. The city of Londonderry is an important railway centre. The Northern Counties (Midland) main line reaches it by way of Coleraine and the north coast of the county, and the same railway serves the eastern part of the county, with branches from Antrim to Magherafelt, and Maghera- felt to Cookstown (Co. Tyrone), to Draperstown and to Coleraine, and from Limavady to Dungiven. The Great Northern railway reaches Londonderry from the south, and the city is also the starting- point of the County Donegal, and the Londonderry and Lough Swilly railways.

The population decreases (152,009 in 1891; 144,404 in 1901) and emigration is extensive, though both decrease and emigration are well below the average of the Irish counties. Of the total, about 43% are Roman Catholics, and nearly 50% Presbyterians or

Protestant Episcopalians. Londonderry (pop. 38,892), Coleraine (6958) and Limavady (2692) are the principal towns, while Mag- herafelt and Moneymore are lesser market towns. The county comprises six baronies. Assizes are held at Londonderry, and quarter sessions at Coleraine, Londonderry and Magherafelt. The county is represented in parliament by two members, for the north and south divisions respectively. The Protestant and Roman Catholic dioceses of Armagh, Derry and Down each include parts of the county.

At an early period the county was inhabited by the O'Cathans or O'Catrans, who were tributary to the O'Neills. Towards the close of the reign of Elizabeth the county was seized, with the purpose of checking the power of the O'Neills, when it received the name of Coleraine, having that town for its capital. In 1609, after the confiscation of the estates of the O'Neills, the citizens of London obtained possession of the towns of London- derry and Coleraine and adjoining lands, 60 acres out of every 1000 being assigned for church lands. The common council of London undertook to expend £20,000 on the reclamation of the property, and elected a body of twenty-six for its manage- ment, who in 16 13 were incorporated as the Irish Society, and retained possession of the towns of Londonderry and Coleraine, the remainder of the property being divided among twelve of the great livery companies. Their estates were sequestrated by James I., and in 1637 the charter of the Irish Society was cancelled. Cromwell restored the society to its former position, and Charles II. at the Restoration granted it a new charter, and confirmed the companies in their estates. In the insurrection of 1 64 1 Moneymore was seized by the Irish, and Magherafelt and Bellaghy, then called Vintner's Town, burned, as well as other towns and villages. There are several stone circles, and a large number of artificial caves. The most ancient castle of Irish origin is that of Carrickreagh; and of the castles erected by the English those of Dungiven and Muff are in good preservation. The abbey of Dungiven, founded in 1109, and standing on a rock about 200 ft. above the river Roe, is a picturesque ruin.

LONDONDERRY, or Derry, a city, county of a city, parlia- mentary borough (returning one member) and the chief town of Co. Londonderry, Ireland, 4 m. from the junction of the river Foyle with Lough Foyle, and 95 m. N.N.W. of Belfast. Pop. (1901) 38,892. The city is situated on an eminence rising abruptly from the west side of the river to a height of about 120 ft. The eminence is surrounded by hills which reach, a few miles to the north, an elevation of upwards of 1500 ft., and the river and lough complete an admirable picture. The city is surrounded by an ancient rampart about a mile in circumference, having seven

gates and several bastions, but buildings now extend beyond this boundary. The summit of the hill, at the centre of the town, is occupied by a quadrangular area from which the main streets diverge. Some old houses with high pyramidal gables remain but are much modernized. The Protestant cathedral of St Columba, in Perpendicular style, was completed from the design of Sir John Vanbrugh in 1633, at a cost of £4000 con- tributed by the city of London, and was enlarged and restored in 1887. The spire was added in 1778 and rebuilt in 1802. The bishop's palace, erected in 1716, occupies the site of the abbey founded by Columba. The abbot of this monastery, on being made bishop, erected in 1164 Temple More or the " Great Church," one of the finest buildings in Ireland previous to the Anglo-Norman invasion. The original abbey church was called the " Black Church," but both it and the " Great Church " were demolished in 1600 and their materials used in fortifying the city. There is a large Roman Catholic cathedral, erected c. 1870 and dedicated to St Eugenius. For Foyle College, founded in 161 7, a new building was erected in 1814. This and the Academical Institution, a foundation of 1868, were amalga- mated in 1896. Magee College, taking its name from its foundress, Mrs Magee of Dublin, was instituted in 1857 as a training-school for the Presbyterian ministry.

The staple manufacture of the town is linen (especially shirt- making), and there are also shipbuilding yards, iron-foundries, saw-mills, manure-works, distilleries, breweries and flour-mills. rbfc salmon fishery on the Foyle is valuable. The river affords

a commodious harbour, its greatest depth being 33 ft. at high tide, and 12 ft. at low tide. It is under the jurisdiction of the Irish Society. The port has a considerable shipping trade with ' Great Britain, exporting agricultural produce and provisions. Regular services of passenger steamers serve Londonderry from Glasgow, Liverpool, Morecambe, Belfast and local coast stations. In 1898 Londonderry was constituted one of the six county boroughs which have separate county councils.

About 5 m. W. of the city, on a hill 803 ft. high, is a remarkable fort, consisting of three concentric ramparts, and an interior fortification of stone. It is named the Grianan of Aileach, and was a residence of the O'Neills, kings of Ulster. It was restored in 1878.

Derry, the original name of Londonderry, is derived from Doire, the "place of oaks." It owes its origin to the monastery founded by Columba about 546. With the bishopric which arose in connexion with this foundation, that of Raphoe was amalgamated in 1834. From the 9th to the nth century the town was frequently in the possession of the Danes, and was often devastated, but they were finally driven from it by Murtagh O'Brien about the beginning of the 12th century. In 13 n it was granted by Edward II. to Richard de Burgh. After the Irish Society of London obtained possession of it, it was incor- porated in 1 613 under the name of Londonderry. From this year until the Union in 1800 two members were returned to the Irish parliament. The fortifications, which were begun in 1600, were completed in 1618. In 1688 Derry had become the chief stronghold of the Protestants of the north. On the 7th of December certain of the apprentices in the city practically put themselves and it in a stage of siege by closing the gates, and on the 19th of April 1689 the forces of James II. began in earnest the famous siege of Derry. The rector of Donaghmore, George Walker, who, with Major Baker, was chosen to govern Derry, established fame for himself for his bravery and hopefulness during this period of privation, and the historic answer of " No surrender," which became the watchword of the men of Derry, was given to the proposals of the besiegers. The garrison was at the last extremity when, on the 30th of July, ships broke through the obstruction across the harbour and brought relief. Walker and the siege are commemorated by a lofty column (1828), bearing a statue of the governor, on the Royal Bastion, from which the town standards defied the enemy; and the anniversary of the relief is still observed.

LONG, GEORGE (1800-1879), English classical scholar, was born at Poulton, Lancashire, on the 4th of November 1800, and educated at Macclesfield grammar-school and Trinity College, Cambridge. He was Craven university scholar in 1821 (bracketed with Lord Macaulay and Henry Maiden), wrangler and senior chancellor's medallist in 1822 and became a fellow of Trinity in 1823. In 1824 he was elected professor of ancient languages in the new university of Virginia at Charlottesville, U.S.A., but after four years returned to

England as the first Greek professor at the newly founded university of London. In 1842 he succeeded T. H. Key as professor of Latin at Univer- sity College; in 1 846-1 849 he was reader in jurisprudence and civil law in the Middle Temple, and finally (1849-187 r) classical lecturer at Brighton College. Subsequently he lived in retire- ment at Portfield, Chichester, in receipt (from 1873) of a Civil List pension of £100 a year obtained for him by Gladstone. He was one of the founders (1830), and for twenty years an officer, of the Royal Geographical Society; an active member of the Society for the Diffusion of Useful Knowledge, for which he edited the quarterly Journal of Education (1831-1835) as well as many of its text-books; the editor (at first with Charles Knight, afterwards alone) of the Penny Cyclopaedia and of Knight's Political Dictionary; and a member of the Society for Central Education instituted in London in 1837. He contributed the Roman law articles to Smith's Dictionary of Greek and Roman Antiquities, and wrote also for the companion dictionaries of Biography and Geography. He is remembered, however, mainly as the editor of the Bibliolheca Classica series — the first serious attempt to produce scholarly editions of classical texts

with English commentaries — to which he contributed the edition of Cicero's Orations (1851-1862). He died on the 10th of August 1870.

Among his other works are: Summary of Herodotus (1829); editions of Herodotus (1830-1833) and Xenophon's Anabasis (1831) ; revised editions of J. A. Macleane's Juvenal and Persius (1867) and Horace (1869); the Civil Wars of Rome; a translation with notes of thirteen of Plutarch's Lives (1844-1848) ; translations of the Thoughts of Marcus Aurelius (1862) and the Discourses of Epictetus (1877); Decline of the Roman Republic (1864-1874), 5 vols. See H. J. Matthews, " In Memoriam," reprinted from the Brighton College Magazine, 1879.

LONG, JOHN DAVIS (1838-), American lawyer and political leader, was born in Buckfield, Oxford county, Maine, on the 27th of October 1838. He graduated at Harvard in 1857, studied law at the Harvard Law School and in 1861 was admitted to the bar. He practised in Boston, became active in politics as a Republican, was a member of the Massachusetts House of Representatives in 1875-1878 and its speaker in 1876- 1878, lieutenant-governor of the state in 1879, and governor in 1880-1882. In 1883-1889 he was a member of the National House of Representatives, and from March 1897 to May 1902 was secretary of the navy, in the cabinet, first of President McKinley and then of President Roosevelt. In 1902 he became president of the Board of Overseers of Harvard College. His publications include a version of the Aeneid (1879) ,Afler-Dinntr and Other Speeches (1895) and The New American Navy (1903). LONG BRANCH, a city of Monmouth county, New Jersey, U.S.A., on the easternmost or " long " branch of the Shrewsbury river and on the Atlantic coast, about 30 m. S. of New York City. Pop. (1890) 7231; (1900) 8872, of whom 1431 were foreign- born and 987 were negroes; (1910 census) 13,298. It is served by the Pennsylvania, the Central of New Jersey, the New York & Long Branch, and electric railways, and by steamboats to New York. The carriage roads in the vicinity are unusually good. Long Branch is one of the oldest American watering- places'. It is situated on a bluff which rises abruptly 20-35 ft. above the beach, and along the front of which bulkheads and jetties have been erected as a protection from the waves; along or near the edge of the bluff, Ocean Avenue, 60 ft. wide and about 5 m. long (from Seab right to Deal), commands delightful views of the ocean. A " bluff walk " runs above the water for 2 m. The city has one public park, Ocean Park (about 10 acres), and two privately owned parks, one of which is Pleasure Bay Park (25 acres), on the Shrewsbury river, where operas are given in the open air. The principal public institu- tions are the Monmouth Memorial Hospital and the Long Branch Circulating Library. In Long Branch the Monmouth County Horse Show is held annually in July. The southern part of Long Branch, known as Elberon, contains some beautiful summer residences — in one of its cottages General U. S. Grant spent his summers for many years, and in another, the Francklyn, President J. A. Garfield died in 188 1. In 1909 a monument to Garfield was erected in Ocean Park. Adjoining Long Branch on the N.

is the borough of Monmouth Beach (incorporated in 1906; population, 1910, 485). Before the War of Independence the site of Long Branch was owned by Colonel White, a British officer. It was confiscated as a result of the war, and late in the century its development as a watering place began. Long Branch was chartered as a city in 1904.

LONGCHAMP, WILLIAM (d. 1197), chancellor of England and bishop of Ely, entered public life at the close of Henry II. 's reign as official to the king's son Geoffrey, for the arch-deaconry of Rouen. Henry II., who disliked him, called him the " son of two traitors." He soon deserted Geoffrey for Richard, who made him chancellor of the duchy of Aquitaine. He always showed himself an able diplomatist. He first dis- tinguished himself at Paris, as Richard's envoy, when he defeated Henry II.'s attempt to make peace with Philip Augustus (1189). On Richard's accession William became chancellor of the king- dom and bishop of Ely. When Richard left England (Dec. 1 189), he put the tower of London in his hands and chose him to share with Hugh de Puiset, the great bishop of Durham, the office of chief justiciar. William immediately quarrelled

with Hugh, and by April n 90 had managed to oust him com- pletely from office. In June 1190 he received a commission as legate from Pope Celestine. He was then master in church as well as state. But his disagreeable appearance and manners, his pride, his contempt for everything English made him de- tested. His progresses through the country with a train of a thousand knights were ruinous to those on whom devolved the burden of entertaining him. Even John seemed preferable to him. John returned to England in 1191; he and his adherents were immediately involved in disputes with William, who was always worsted. At last (June 1191) Geoffrey, archbishop of York and William's earliest benefactor, was violently arrested by William's subordinates on landing at Dover. They exceeded their orders, which were to prevent the archbishop from entering England until he had sworn fealty to Richard. But this outrage was made a pretext for a general rising against William, whose legatine commission had now expired, and whose power was balanced by the presence of the archbishop of Rouen, Walter Coutances, with a commission from the king. William shut himself up in the Tower, but he 'was forced to surrender his castles and expelled from the kingdom. In n 93 he joined Richard in Germany, and Richard seems to have attributed the settlement soon after concluded between himself and the emperor, to his " dearest chancellor." For the rest of the reign Longchamp was employed in confidential and diplomatic mis- sions by Richard all over the continent, in Germany, in France and at Rome. He died in January 1 197. His loyalty to Richard was unswerving, and it was no doubt through his unscrupulous devotion to the royal interest that he incurred the hatred of Richard's English subjects.

Authorities. — Benedictus, Gesta Henrici, vol. ,ii. ; Giraldus Cambrensis, De Vita Galfridi; Stubbs' Preface to Roger of Hoveden, vol. iii. ; L. Bovine-Champeaux, Notice sur Guillaume de Longchamp (Evreux, 1885).

LONGCLOTH, a plain cotton cloth originally made in compara- tively long pieces. The name was applied particularly to cloth made in India. Longcloth, which is now commonly bleached, comprehends a number of various qualities. It is heavier than cambric, and finer than medium or Mexican. As it is used principally for underclothing and shirts, most of the longcloth sold in Great Britain passes through the hands of the shirt and underclothing manufacturers, who sell to the shopkeepers, though there is still a considerable if decreasing retail trade in piece-goods. The lower kinds of longcloth, which are made from American cotton, correspond in quality to the better kinds of " shirting " made for the East, but the best longcloths are made from Egyptian cotton, and are fine and fairly costly goods.

LONG EATON, an urban district in the Ilkeston parliamentary division of Derbyshire, England, 10 m. E.S.E. of Derby, on the Midland railway. Pop. (1891) 9636; (1901) 13,045. It lies in the open valley of the Trent, at a short distance from the river, and near the important Trent Junction on the Midland railway system. The church of St Lawrence has Norman portions, and an arch and window apparently of pre-Conquest date. The large industrial population of the town is occupied in the manufacture of lace, which extended hither from Notting- ham; there are also railway carriage works. To the north is the township of Sandiacre (pop. 2954), where the church has a fine Decorated chancel.

LONGEVITY, a term'applied to express either the length or the duration of life in any organism, but, as cases of long duration excite most interest, frequently used to denote a relatively unusual prolongation of life. There is no reason to suppose that protoplasm, the living material of organisms, has a neces- sarily limited duration of life, provided that the conditions proper to it are maintained, and it has been argued that since every living organism comes into existence as a piece of the proto- plasm of a pre-existing living organism, protoplasm is potentially immortal. Living organisms exist, however, as particles or communities of particles of protoplasm (see Life), and as such have a limited duration of life. Longevity, as E. Ray Lankester pointed out in 1869, for practical purposes must be understood

to mean the " length of time during which life is exhibited in an individual." The word " individual " must be taken in its ordinary sense as a wholly or partially independent, organized mass produced from a pre-existing organized mass, as otherwise the problem will be confused by arguments as to the meaning of biological individuality.

Empirical Data. — A multitude of observations show that only a very brief life, ranging from a few hours to a few days, is the normal fate of the vast majority of single-celled organisms, whether these be animal or vegetable or on the border-line between the two kingdoms. Death comes to them rapidly from internal or external causes, or the individual life ends in con- jugation or division or spore-formation. Under special conditions, natural or artificial, the individual life may be prolonged by desiccation, or freezing, or by some similar arrest of functional activity.

The duration of life among plants is varied. The popular division into annuals, biennials and perennials is not absolute, for natural and artificial conditions readily prolong the lives of annuals and biennials for several seasons, whereas the case of perennials is much complicated by the mode of growth, and the problem of individuality, however we desire to exclude it, obtrudes itself. In the vast majority of cases where a plant is obviously a simple individual, its life is short, ranging from a few days in the case of fungi, to two seasons in the case of biennial herbs. Most of the simple algae are annual, their life enduring only for part of the year; the branching algae are more often perennial, but in their cases not only are observations as to duration lacking, but however simply we may use the term individual, its application is difficult. The larger terrestrial plants with woody tissues which we denote roughly as shrubs and trees have an individuality which, although different from that of a hyacinth or carrot, is usually obvious. Shrubs live from four to ten or more years, and it apparently is the case that odoriferous shrubs such as sage and lavender display the longer duration. Trees with soft wood, such as poplars and willows, last for about fifty years, fruit-trees rather longer. Estimates of the age which large trees can attain, based partly on attempts to count the annual rings, have been given by many writers, and range from about three hundred years in the case of the elm to three to five thousand years in the case of Sequoia gigantea of California, and over five thousand years in that of the baobab (Adansotiia digitata) of Cape Verde. It is impossible to place exact reliance on these estimates, but it is at least certain that very many trees have a duration of life exceedingly great in comparison with the longest-lived animals.

The duration of life amongst multicellular invertebrate animals is little known, except in the frequent instances where it is normally brief. Many sponges and polyps die at the end of the season, leaving winter eggs or buds. The much-branched masses of the larger sponges and compound hydrozoa certainly may be perennial. A sea-anemone (Actinia mesembryanthemum) , captured in 1828 by Sir John Dalyell, a Scottish naturalist, and then guessed to be about seven years old, lived in captivity in Edinburgh until 1887, the cause of death being unknown. As other instances of great ages attained by sea-anemones are on record, it is plain that these animals, although simple polyps, are long-lived. Echinoderms are inferred to live to considerable ages, as they grow slowly and as there is great difference in size amongst fully adult specimens. On similar reasoning, consider- able age is attributed

to the larger annulates and Crustacea, but the smaller forms in many cases are known to have very short lives. The variation in the length of life of molluscs appears to be great. Many species of gastropods live only a few years; others, such as Natica heros, have reached thirty years, whilst the large Tridacna gigas is stated to live from sixty to a hundred years. Among insects, the adult stage has usually only a very short duration of life, extending from a few hours to a few months, but the larval stages may last much longer. Including these latter, the range of duration among insects, taking the whole life from hatching to death, appears to lie between the limits of a few weeks in the case of plant-lice to seventeen

years in the case of the American Cicada septemdecim, the larva of which lives seventeen years, the adult only a month. Most butterflies are annuals, but those which fail to copulate may hibernate and live through a second season, whilst the lives of some have been preserved artificially for seven years. Worker bees and drones do not survive the season, but queens may live from two to five years. In the case of vertebrates, the duration of life appears to be greater among fish and reptiles than among birds and mammals. The ancient Romans have noted that eels, kept in aquaria, could reach the age of sixty years. Estimates based on size and rate of growth have led to the inference that salmon may live to the age of a hundred years, whilst G. L. L. Buffon set down the period of life of carp in ponds as one hundred and fifty years, and there is evidence for a pike having reached the age of over two centuries. More recently it has been claimed that the age of fish can be ascertained exactly by counting the annual rings of the otoliths. No great ages have as yet been recorded by this method, whilst, on the other hand, by revealing great variations of weight and size in fishes with the same number of annual rings, it has thrown doubt on the validity of estimates of age based on size and rate of growth. The evidence as a whole is unsatisfactory, but it is highly probable that in the absence of accidents most fish can attain very great ages. The duration of life among batrachia is little known, but small frogs have been recorded as living over twelve years, and toads up to thirty- six years.

Almost nothing is known as to the longevity of snakes and lizards, but it is probable that no great ages are reached. Croco- diles, alligators and caymans grow slowly and are believed to live very long. There is exact evidence as to alligators in cap- tivity in Europe reaching forty years without signs of senescence, and some of the sacred crocodiles of India are believed to be more than a hundred years old. Chelonians live still longer. A tortoise has lived for eighty years in the garden of the governor of Cape Town, and is believed to be at least two hundred years old. There are records of small land-tortoises that have been kept in captivity for over a century, whilst the very large tortoises of the Galapagos Islands certainly attain ages of at least two centuries and possibly much more. A considerable body of information exists regarding the longevity of birds, and much of this has been brought together by J- H. Gurney. From his lists, which include more than fifty species, it appears that the duration is least in the case of small passerine and picarian birds, where it ranges from eight or nine years (goat-suckers and swifts) to a maximum of twenty-five years, the latter age having been approached by larks, canaries and goldfinch. Gulls have been recorded as living over forty years, ducks and geese over fifty years (the duchess of Bedford has recorded the case of a Chinese goose having been in possession of the same family for fifty-seven years). Parrots frequently live over eighty years, swans nearly as long, ravens and owls rather less, whilst there is excellent evidence of eagles and falcons considerably exceeding a hundred years. Notwithstanding their relatively large size, struthious birds do not reach great ages. The records for casso- waries and rheas do not exceed thirty years, and the maximum for ostriches is fifty years, and that on doubtful evidence.

Exact records regarding the longevity of mammals are sur- prisingly few. There is no evidence as to Monotremes. The life of Marsupials in captivity is seldom long; a phalanger has lived in the London Zoological Gardens and showed no signs of age at more than ten years old; it may be inferred that the larger forms are capable of living longer. Reliable records as to Edentates do not exist; those in captivity have short lives, but the size and structure of some of the extinct forms suggests that they may have reached a great age. Nothing is known regarding the longevity of Sirenians, except that they do not live long in captivity. In the case of Cetaceans, estimates based on the growth of whale-bone assign an age of several centuries to whale-bone whales; exact records do not exist. More is known

regarding Ungulates, as many of these are domesticated, semi- domesticated or are frequently kept in captivity. Great length of life has been assigned to the rhinoceros, but the longest actual

record is that of an Indian rhinoceros which lived for thirty- seven years in the London Zoological Gardens. The usual duration of life in the case of horses, asses and zebras is from fifteen to thirty years, but instances of individuals reaching fifty years are fairly well authenticated. Domestic cattle may live from twenty-five to thirty years, sheep and goats from twelve to fourteen years, antelopes rather longer, especially in the case of the larger forms. A giraffe has lived for nineteen years in the London Zoological Gardens. Deer are reputed to live longer than sheep, and records of individuals at the London Gardens confirm this, but it is doubtful if they live as long as cattle. Camels are long-lived, according to repute, but actual records show no great age; a llama which died in the London Gardens at the age of seventeen years showed unmistakable signs of senility. The hippopotamus is another large ungulate to which great longevity has been assigned, but the longest actual record is the case of a female born in the London Gardens which died in its thirty-fifth year. The duration of life assigned to domestic swine is about twenty years; an Indian wild boar, alive in the London Zoological Gardens in ioio, and appar- ently in full vigour, was fifteen years old. Elephants are usually supposed capable of reaching great ages, but the actual records of menagerie and military animals show that thirty to forty years is a normal limit. Facts as to rodents are not numerous; the larger forms such as hares and rabbits may live for ten years, smaller forms such as rats and mice, for five or six years. Bats have a reputation for long duration of life, and tropical fruit-bats are known to have lived for seventeen years. No great ages have been recorded for Carnivora, but the average is fairly high. Twenty-five years appears to be a limit very rarely exceeded by lions, tigers or bears; domestic cats may live for from twelve to twenty-three years, and dogs from sixteen to eighteen years, though cases of as many as thirty-four years have been noted. Less is known of the smaller forms, but menagerie records show that ages between twelve and twenty are frequently reached. There were in iqio in the London Zoological Gardens, apparently in good health, a meerkat at least twelve years old, a sand-badger fourteen years and a ratel nineteen years of age. Records regarding monkeys are unsatisfactory, for these creatures are notoriously delicate in captivity, and it is practically certain that under such circumstances they rarely die of old age. A grey lemur eleven years old and a chimpanzee eleven and a half, both in good health in the London Zoological Gardens, appear to be the oldest primates definitely recorded. Estimates based on size, condition of the skull and so forth obtained by examina- tion of wild specimens that have been killed would seem to establish a rough correspondence between the size of monkeys and their duration of life, and to set the limits as between seven or eight and thirty years.

With regard to the human race, there seems to be almost no doubt but that the average duration of life has increased with civilization; the generally improved conditions of life, the greater care of the young and of the aged and the advance in medical and surgical science far more than outweigh any depress- ing effect caused by the more strenuous and nervous activity required by modern social organization. The expectation of life of those who attain the age of sixty varies with race, sex and occupation, but is certainly increasing, and an increasing number of persons have a chance of reaching and do reach ages between ninety and one hundred. Careful investigation has thrown doubt almost amounting to disproof on the much-quoted cases of great longevity, such as that of Thomas Parr, the Shropshire peasant, who was supposed to have reached his hundred and fifty-third year, and, although the existence of centenarians is thoroughly established, any ages exceeding a hundred by more than two or three years are, at the most, dubious.

A survey of the facts of longevity, so far as these are estab- lished on reasonable evidence, discloses that the recorded ages both of men and animals are much shorter than those assigned in popular belief. The duration of life is usually brief in the animal kingdom, and except for some fish and reptiles, and

average duration of life and that centenarians occur more frequently amongst men than amongst most of the lower animals. Theories of Longevity. — Ray Lankester has pointed out that several meanings are attached to the word longevity. It may be used of an individual, and in this sense has little importance, partly because of the inevitable variability of the individual, and partly because there may be individuals that are abnormal in duration of life, just as there are abnormalities in weight or height. It may be used for the average duration of life of all the individuals of a species and so be another way of expressing the average mortality that affects the species, and that varies not only with structure and constitution but with the kind of enemies, accidents and conditions to which the members of the species are subject. If we reflect on the large incidence of mortality from external causes affecting a species and particularly the young of a species, we shall see that we must conclude that intrinsic, physiological causes can have relatively little weight in determining the average mortality rate. Finally, longevity may be used, and is most conveniently used, to denote the specific potential longevity, that is to say the duration of life that would be attained by normal individuals of a species if the conditions were most favourable. It is necessary to keep in mind these various applications of the term when considering the theoretical explanations that have been associated with the empirical facts. There is a certain relation between size and longevity. As a general rule small animals do not live so long as larger creatures. Whales survive elephants, elephants live longer than camels, horses and deer, and these again than rabbits and mice. But the relation is not absolute; parrots, ravens and geese live longer than most mammals and than many larger birds. G. L. L. Buffon tried to find a more definite measure of longevity, and believed that it was given by the ratio between the whole period of life and the period of growth. He believed that the possible duration of life was six or seven times that of the period of growth. Man, he said, takes fourteen years to grow, and his duration of life is ninety to one hundred years; the horse has reached its full size at four years of age and may live for a total period of twenty-five to thirty years. M. J. P. Flourens attempted to make Buffon 's suggestion more exact; he took the end of the period of growth as the time at which the epiphyses of the long bones united with the bones themselves, and on this basis held that the duration of life was five times the length of the period of growth. The theories of Buffon and Flourens, however, do not apply to all vertebrates and have no meaning in the case of invertebrates. Y. Bunge has suggested that in the case of mammals the period taken by the new-born young to double in weight is an index of the rapidity of growth and is in a definite relation to the possible duration of life. M. Oustalet has discussed the existence of definite relations between duration of life and size, rate of growth, period of gestation and so forth, and found so many exceptions that no general conclusion could be drawn. He finally suggested that diet was the chief factor in determining the span of life. E. Metchnikoff has provided the most recent and fullest criticism and theory of the physiological causes of longevity. He admits that many factors must be involved, as the results vary so much in different kinds of animals. He thinks that too little is known of the physiological processes of invertebrates to draw any valid conclusions in their case. With regard to vertebrates, he calls attention to the gradual reduction of longevity as the scale of life is ascended. On the whole, reptiles live much longer than birds, and birds than mammals, the contrast being specially notable when birds and mammals are compared. He dismisses the effect of the reproductive tax from possible causes of short duration of life, for the obvious reason that longevity is nearly equal in the two sexes, although females have a much greater reproductive drain. He points out that the hind-gut or large intestine is least developed in fishes, relatively small in reptiles, still small but relatively larger in birds and largest in mammals, relatively and absolutely, the caecum or caeca being reckoned as part of the hind-gut. The area of the intestinal tract in question is of

possibly whales, it is certain that a man enjoys the longest I relatively little importance in digestion, although a considerable

amount of absorption may take place from it. It serves chiefly as a reservoir of waste matter and is usually the seat of extensive putrefactive change. The products of putrefaction are

absorbed by the blood and there results a constant auto-intoxication of the body which Metchnikoff believes to be the principal agent in senile degeneration. Mammals, if they escape from enemies, diseases and accidents, fall victims to premature senility as the result of the putrefactive changes in their intestines, and the average mortality of the species is much too high, the normal specific longevity being rarely if ever attained. Metchnikoff urges, and so far probably is followed by all competent authorities, that improvements in the conditions of life, greater knowledge of disease and of hygiene and simplification of habits are tending to reduce the average mortality of man and the domestic animals, and to bring the average longevity nearer the specific longevity. He adds to this, however, a more special theory, which, although it appears rapidly to be gaining ground, is yet far from being accepted. The theory is that duration of life may be prolonged by measures directed against intestinal putrefaction.

The process of putrefaction takes place in masses of badly- digested food, and may be combated by careful dieting, avoidance of rich foods of all kinds and particularly of flesh and alcohol. Putrefaction, however, cannot take place except in the presence of a particular group of bacteria, the entrance of which to the body can be prevented to a certain extent. But it would be impossible or impracticable to secure a sterilized diet, and Metchnikoff urges that the bacteria of putrefaction can be replaced or suppressed by another set of microbes. He found that there was a widely spread popular belief in the advantage of diet consisting largely of products of soured milk and that there was a fair parallel between unusual longevity and such a diet. Experimentally he showed that the presence of the bacilli which produce lactic acid inhibited the process of putrefaction. Accordingly he recommends that the diet of human beings should include preparations of milk soured by cultures of selected lactic acid bacilli, or that the spores of such bacilli should be taken along with food favourable to their development. In a short time the bacilli establish themselves in the large intestine and rapidly stop putrefactive change. The treatment has not yet been persisted in sufficiently long by a sufficient number of different persons to be accepted as universally satisfactory, and there is even more difference of opinion as to Metchnikoff's theory that the chief agent in senile degeneration is the stimula- tion of phagocytes by the products of putrefaction with the resulting destruction of the specific cells of the tissues. Metchni- koff, however, gave it to the world, not as a proved and com- pleted doctrine, but as the line of inquiry that he himself had found most promising. He has suggested further that if the normal specific longevity were attained by human beings, old and not degenerate individuals would lose the instinct for life and acquire an instinct for death, and that as they had fulfilled the normal cycle of life, they would accept death with the same relieved acquiescence that they now accept sleep.

The various writers whose opinions have been briefly discussed agree in supposing that there is a normal specific longevity, although Metchnikoff alone has urged that this differs markedly from the average longevity, and has propounded a theory of the causes of the divergence. It is common ground that they believe the organism to be wound up, so to say, for a definite period, but have no very definite theory as to how this period is determined. A. Weismann, on the other hand, in a well-known essay on the duration of life, has developed a theory to explain the various fashions in which the gift of life is measured out to different kinds of creatures. He accepts the position that purely physiological conditions set a limit to the number of years that can be attained by each kind of multi-cellular organism, but holds that these conditions leave room for a considerable amount of variation. Duration of life, in fact, according to Weismann, is a character that can be influenced by the environment and that by a process of natural selection can be adapted to the conditions of existence of different species.

If a species is to maintain its existence or to increase, it is obvious that its members must be able to replace the losses caused by death. It is necessary, moreover, for the success of the species, that an average population of full vigour should be maintained. Weismann argues that death itself is an adapta- tion to secure the removal of useless and worn-out individuals and that it comes as soon as may be after the period of repro- ductive activity. It is understood that the term reproductive activity covers not merely the production of new individuals but the care of these by the parents until they are self-sufficient. The average longevity, according to Weismann, is adapted to the needs of the species; it is sufficiently

long to secure that the requisite number of new individuals is produced and protected. He has brought together a large number of instances which show that there is a relation between duration of life and fertility. Birds of prey, which breed slowly, usually producing an annual brood of no more than one or two, live to great ages, whilst rabbits which produce large litters at frequent invervals have relatively short lives. Allowance has to be made in cases where the young are largely preyed upon by enemies, for this counter- acts the effect of high fecundity. In short, the duration of life is so adapted that a pair of individuals on the average succeed in rearing a pair of offspring. Metchnikoff, however, has pointed out that the longevity of such fecund creatures must have arisen independently, as otherwise species subject to high risks of this nature would have ceased to exist and would have disappeared, as many species have vanished in the past of the world's history.

The normal specific longevity, the age to which all normal individuals of a species would survive under the most favourable conditions, must depend on constitution and structure. No doubt selection is involved, as it is obvious that creatures would perish if their constitution and structure were not such that they could live long enough to reproduce their kind. The direct explanation, however, must be sought for in size, complexity of structure, length of period of growth, capacity to withstand the wear and tear of life and such other intrinsic qualities. The average specific longevity, on the other hand, depends on a multitude of extrinsic conditions operating on the intrinsic constitution; these extrinsic conditions are given by the environment of the species as it affects the young and the adults, enemies, diseases, abundance of food, climatic conditions and so forth. It would seem most natural to suppose that in all cases, except perhaps those of intelligent man and the domestic animals or plants he harbours, the average longevity must vary enormously with changing conditions, and must be a factor of greater importance in the survival of the species than the ideal normal specific longevity. It also seems more probable that the reproductive capacity, which is extremely variable, has been adapted to the average longevity of the species, than that, as Weismann supposed, it should itself be the determining cause of the duration of life.

References. — G. L. L. Buffon, Histoire naturelle genirale it particuliere, vol. ii. (Paris, 1749); Y. Bunge, Archiv. f. die gesammte Physiologie, vol. xcv. (Bonn, 1903); M. J. P. Flourens, De la longevity humaine et de la quantity de vie sur le globe (Paris, 1 855); J. H. Gurney, On the Comparative Ages to which Birds live, Ibis, p. 19 (1899); Sir E. Ray Lankester, Comparative Longevity in Man and the Lower Animals (London, 1870) ; E. Metchnikoff, The Prolongation of Life (London, 1908); M. Oustalet, La Nature, p. 378 (1900); A. Weismann, Essays upon Heredity (Oxford, 1889). (P. C. M.)

LONGFELLOW, HENRY WADSWORTH (1807-1882), 1

American poet, was born on the 27th of February 1807, at Portland, Maine. His ancestor, William Longfellow, had immigrated to Newbury, Massachusetts, in 1676, from Yorkshire, England. His father was Stephen Longfellow, a lawyer and United States congressman, and his mother, Zilpha Wadsworth, a descendant of John Alden and of " Priscilla, the Puritan maiden."

Longfellow's external life presents little that is of stirring interest. It is the life of a modest, deep-hearted gentleman, whose highest ambition was to be a perfect man, and, through sympathy and love, to help others to be the same. His boyhood was spent mostly in his native town, which he never ceased to

love, and whose beautiful surroundings and quiet, pure life he has described in his poem " My Lost Youth." Here he grew up in the midst of majestic peace, which was but once broken, and that by an event which made a deep impression on him — the War of 1812. He never forgot

" the sea-fight far away,

How it thundered o'er the tide, And the dead captains as they lay In their graves o'erlooking the tranquil bay,

Where they in battle died."

The " tranquil bay " is Casco Bay, one of the most beautiful in the world, studded with bold, green islands, well fitted to be the Hesperides of a poet's boyish dreams. At the age of fifteen Longfellow entered Bowdoin College at Brunswick, a town situated near the romantic falls of the Androscoggin river, about 25 m. from Portland, and in a region full of Indian scenery and legend. Here he had among his classfellows, Nathaniel Haw- thorne, George B. Cheever and J. S. C. Abbott. During the latter years of his college life he contributed to the United States Literary Gazette some half-dozen poems, which are interesting for two reasons — (1) as showing the poet's early, book-mediated sympathy with nature and legendary heroisms, and (2) as being almost entirely free from that supernatural view of nature which his subsequent residence in Europe imparted to him. He graduated in 1825, at the age of eighteen, with honours, among others that of writing the " class poem " — taking the fourth place in a class of thirty-eight. He then entered his father's law office, without intending, however, it would appear, to devote himself to the study of the law. For this profession he was, both by capacity and tastes, utterly unfitted, and it was fortunate that, shortly after his graduation, he received an offer of a professorship of modern languages at Bowdoin College. In order the better to qualify himself for this appointment, he went to Europe (May 15th, 1826) and spent three years and a half travelling in France, Italy, Spain, Germany, Holland and England, learning languages, for which he had unusual talent, and drinking in the spirit of the history and life of these countries. The effect of Longfellow's visit was twofold. On the one hand, it widened his sympathies, gave him confidence in himself and supplied him with many poetical themes; on the other, it traditionalized his mind, coloured for him the pure light of nature and rendered him in some measure unfit to feel or express the spirit of American nature and life. His sojourn in Europe fell exactly in the time when, in England, the reaction against the sentimental atheism of Shelley, the pagan sensitivity of Keats, and the sublime, Satanic outcastness of Byron was at its height; when, in the Catholic countries, the negative exaggerations of the French Revolution were inducing a counter current of positive faith, which threw men into the arms of a half-sentimental, half-aesthetic medievalism; and when, in Germany, the aristo- cratic paganism of Goethe was being swept aside by that tide of dutiful, romantic patriotism which flooded the country, as soon as it began to feel that it still existed after being run over by Napoleon's war-chariot. He returned to America in 1829, and remained six years at Bowdoin College (1829-1835), during which he published various text-books for the study of modern languages. In his twenty-fourth year (1831) he married Miss Mary Story Potter, one of his " early loves." In 1833 he made a series of translations from the Spanish, with an essay on the moral and devotional poetry of Spain, and these were incorpor- ated in 1835 in Outre-mer : a Pilgrimage beyond the Sea.

In 1835 Longfellow was chosen to succeed George Ticknor as professor of modern languages and belles-lettres in Harvard. On receiving this appointment, he paid a second visit of some fifteen months to Europe, this time devoting special attention to the Scandinavian countries and Switzerland. During this visit he lost his wife, who died at Rotterdam, on the 29th of, November 1835.

On Ms return to America in December 1836, Longfellow took up his residence in Cambridge, and began to lecture at Harvard and to write. In his new home he found himself amid surroundings entirely congenial to him. Its spaciousness and

free rural aspect, its old graveyards and towering elms, its great university, its cultivated society and its vicinity to humane, substantial, busy Boston, were all attractions for such a man. In 1837-1838 several essays of Longfellow's appeared in the North American Review, and in 1839 he published Hyperion : a Romance, and his first volume of original poetry, entitled Voices of the Night. Hyperion, a poetical account of his travels, had, at the time of its publication, an immense popularity, due mainly to its sentimental romanticism. At present few persons beyond their teens would care to read it through, so unnatural and stilted is its language, so thin its material and so consciously mediated its sentiment. Never- theless it has a certain historical importance, for two reasons — (1) because it marks that

period in Longfellow's career when, though he had left nature, he had not yet found art, and (2) because it opened the sluices through which the flood of German sentimental poetry flowed into the United States. The Voices of the Night contains some of his best minor poems, e.g. " The Psalm of Life " and " Footsteps of Angels." In 1842 Long- fellow published a small volume of Ballads and other Poems, containing some of his most popular pieces, e.g. " The Skeleton in Armour," " The Wreck of the Hesperus," " The Village Black- smith," "To a Child," "The Bridge," "Excelsior." In the same year he paid a third brief visit to Europe, spending the summer on the Rhine. During his return-passage across the Atlantic he wrote his Poems on Slavery (1842), with a dedication to Channing. These poems went far to wake in the youth of New England a sense of the great national wrong, and to prepare them for that bitter struggle in which it was wiped out at the expense of the lives of so many of them. In 1843 he married again, his wife being Miss Frances Elizabeth Appleton of Boston, a daughter of Hon. Nathan Appleton, one of the founders of Lowell, and a sister of Thomas G. Appleton, himself no mean poet.

About the same time he bought, and fixed his residence in, the Craigie House, where he had formerly only been a lodger, an old " revolutionary house," built about the beginning of the 18th century, and occupied by General Washington in 1776. This quaint old wooden house, in the midst of a large garden full of splendid elms, continued to be his chief residence till the day of his death. Of the lectures on Dante which he delivered about this time, James Russell Lowell says: " These lectures, illustrated by admirable translations, are remembered with grateful pleasure by many who were thus led to learn the full significance of the great Christian poet." Indeed, as a professor, Longfellow was eminently successful. Shortly after the Poems on Slavery, there appeared in 1843 a more ambitious work, The Spanish Student, a Play in Three Acts, a kind of sentimental " Morality," without any special merit but good intention If published nowadays it would hardly attract notice; but in those gushing, emotion-craving times it had considerable popularity, and helped to increase the poet's now rapidly widening fame. A huge collection of translations of foreign poetry edited by him, and entitled The Poets and Poetry of Europe, appeared in 1845, and, in 1846, a few minor poems — songs and sonnets — under the title The Belfry of Bruges. In 1847 he published at Boston the greatest of all his works, Evangeline, a Tale of Acadie. It was, in some degree, an imitation of Goethe's Hermann and Dorothea, and its plot, which was derived from Hawthorne's American Note-Books, is even simpler than that of the German poem, not to say much more touching. At the violent removal by the British government of a colony of French settlers from Acadie (Nova Scotia) in 1755, a young couple, on the very day of their wedding, were separated and carried in different direc- tions, so that they lost all trace of each other. The poem de- scribes the wanderings of the bride in search of her lover, and her final discovery of him as an old man on his death-bed, in a public hospital which she had entered as a nurse. Slight as the story is, it is worked out into one of the most affecting poems in the language, and gives to literature one of its most perfect types of womanhood and of " affection that hopes and endures and is patient." Though written in a metre deemed foreign

to English ears, the poem immediately attained a wide popu- larity, which it has never lost, and secured to the dactylic hexa- meter a recognized place among English metres.

In 1849 Longfellow published a novel of no great merit, Kavanagh, and also a volume of poems entitled The Seaside and the Fireside, a title which has reference to his two homes, the seaside one on the charming peninsula of Nahant, the fireside one in Cambridge. One of the poems in this collection, " Resig- nation," has taken a permanent place in literature; another, " Hymn for my Brother's Ordination," shows plainly the nature of the poet's Christianity. His brother, the Rev. Samuel Long- fellow, was a minister of the Unitarian Church.

Longfellow's genius, in its choice of subjects, always oscillated between America and Europe, between the colonial period of American history and the Middle and Romantic Ages

of European feeling. When tired of the broad daylight of American activity, he sought refuge and rest in the dim twilight of medieval legend and German sentiment. In 1851 appeared The Golden Legend, a long lyric drama based upon Hartmann von Aue's beautiful story of self-sacrifice, Der arme Heinrich. Next to Evangeline, this is at once the best and the most popular of the poet's longer works, and contains many passages of great beauty. Bringing his imagination back to America, he next applied himself to the elaboration of an Indian legend. In 1854 he' 'resigned his professorship. In the following year he gave 'to the world the Indian Edda, The Song of Hiawatha, a conscious imitation, both in subject and metre, of the Finnish epic, the Kalevala, with which he had become acquainted during his second visit to Europe. The metre is monotonous and easily ridiculed, but it suits the subject, and the poem is very popular. In 1858 appeared The Courtship of Miles Standish, based on a charming incident in the early history of the Plymouth colony, and, along with it, a number of minor poems, included under the modest title, Birds of Passage. One of these is " My Lost Youth."

Two events now occurred which served to cast a gloom over the poet's life and to interrupt his activity, — the outbreak of the Civil War, and the tragic fate of his wife, who, having accidentally allowed her dress to catch fire, was burnt to death in her own house in 1861. It was long before he recovered from the shock caused by this terrible event, and in his subsequent published poems he never ventured even to allude' to it. When he did in some measure find himself again, he gave to the world his charming Tales of a Wayside Inn (1863), and in 1865 his Household Poems. Among the latter is a poem entitled " The Children's Hour," which affords a glance into the home life of the widowed poet, who had been left with five children — two sons, Ernest and Charles, and three daughters, " Grave Alice, and laughing Allegra, And Edith with golden hair."

A small volume entitled Flower de Luce (1867) contains, among other fine things, the beautiful " threnos " on the burial of Hawthorne, and " The Bells of Lynn." Once more the poet sought refuge in medieval life by completing his translation of the Divina Commedia, parts of which he had rendered into English as much as thirty years before. This work appeared in 1867, and gave a great impulse to the study of Dante in America. It is a masterpiece of literal translation. Next came the New England Tragedies (1868) and The Divine Tragedy (1871), which found no large pubjic. In 1868-1869 the poet visited Europe, and was everywhere received with the greatest: honour. In 1872 appeared Three Books of Song, containing translated as well as original pieces, in 1873 Aftermath and. in 1875 The Mask of Pandora, and other Poems. Among these " other poems " were " The Hanging of the Crane," " Morituri Salutamus " and " A Book of Sonnets." The Mask of Pandora is a proof of that growing appreciation of pagan naturalism which marked the poet's later years. Though not a great poem, it is full of beautiful passages, many of which point to the riddle of life as yet unsolved, a conviction which grew ever more and more upon the poet, as the ebulliency of romanticism gave way to the calm of, classic feeling. In the " Book of Sonnets " are

some of the finest things he ever wrote, especially the five sonnets entitled " Three Friends of Mine." These " three friends " were Cornelius Felton, Louis Agassiz and Charles Sumner, whom he calls

" The noble three, Who half my life were more than friends to me." The loss of Agassiz was a blow from which he never entirely recovered; and, when Sumner also left him, he wrote: — " Thou hast but taken thy lamp and gone to bed; I stay a little longer, as one stays To cover lip the embers that still burn." He did stay a little longer; but the embers that still burnt in him refused to be covered up. He would fain have ceased writing, and used to say, " It's a great thing to know when to stop "; but he could not stop, and did not stop, till the last. He continued to publish from time to time, in the magazines, poems which showed a clearness of vision and a perfection of workmanship such as he never had equalled at any period of his life. Indeed it may be said that his finest poems were his last. Of these a small collection appeared under the title of Keramos, and other Poems (1878). Besides these, in the years 1875-1878 he edited a collection of Poems of Places in thirty-one small volumes. In 1880 appeared Ultima Thule, meant to be his last work, and it was nearly so. In October 1881 he wrote a touching sonnet on the death of President Garfield, and in January 1882,

when the hand of death was already upon him, his poem, Hermes Trismegistus, in which he gives utterance, in language as rich as that of the ,early gods, to that strange feeling of awe without fear, and hope without form, with which every man of spotless life and upright intellect withdraws from the phenomena of time to the realities of eternity.

In the last years of his life he suffered a great deal from rheumatism, and was, as he sometimes cheerfully, said, " never free from pain." Still he remained as sunny and genial as ever, looking from his Cambridge study windows across the Brighton meadows to the Brookline hills, or enjoying the " free wild winds of the Atlantic," and listening to "The Bells. of Lynn" in his Nahant home. He still continued to receive all visitors, and to take occasional runs up to Castine and Portland, the homes of his family. About the beginning of 1882, however, a serious change took place in his condition. Dizziness and want of strength confined him to his room for some time, and, although after some weeks he partially recovered, his elasticity and powers were gone. On the 19th of March he was seized with what proved to be peritonitis, and he died on the 24th. The poet was buried two days afterwards near his " three friends " in Mount Auburn cemetery. The regret for his loss was universal; for no modern man was ever better loved or better deserved to be loved.

Longfellow was made an LL.D. of Bowdoin College in 1828, at the age of twenty-one, of Harvard in 1859 and of Cambridge (England) in 1868, and D.iC.L. of Oxford in 1869. In 1873 he was elected a member of ..the Russian Academy of Science,' and in 1877 of the Spanish Academy.

In person, Longfellow was rather below middle height, broad shouldered and well built. His head and face were extremely handsome, his forehead broad and high, his eyes full of clear, warming fire, his nose Straight and graceful, his chin and lips rich and full of feeling as those of the Praxitelean Hermes, and his voice low, melodious and full of tender cadences. His hair, originally dark, became, in his later years, silyery white,, and its wavy locks. combined with those of his flowing beard to give him that leonine appearance so familiar through his later por- traits. Charles Kingsley said of Longfellow's face that it was the most beautiful human face he had eyer seen. A bust to his memory was erected in the Poet's Corner in Westminster Abbey in 1884.

In Longfellow, the poet was the flower and fruit of the man. His nature was essentially poetic, and his life the greatest of his poems. Those who knew only the poems he wrote could form but a faint notion of the harmony, the sweetness, the manliness and the tender- ness of that which he lived. What he would have been as a poet, if, instead of visiting Europe in early life and drinking in the spirit of the I lrikfdle ages under the shaldows of cathedral towers, he had, like

Whittier, grown old amid American scenery and life, we can only guess from his earlier poems, which are as naturalistic, fresh and un- mystical as could be desired; but certain it is that, from his long familiarity with the medieval view of nature, and its semi-pagan offspring, the romantic view, he was brought, for the greater part of his life, to look upon the world of men and things either as the middle scene of a miracle play, with a heaven of rewarding happiness above and a purgatory of purifying pain below, or else as a garment con- cealing, while it revealed, spiritual forms of unfathomed mystery. During this time he could hear " the trailing garments of the night sweep through her marble halls," and see " the stars come out to listen to the music of the seas." Later on, as he approached his second youth (he was spared a second childhood) , he tended to a more pagan view. About the time when he was writing The Mask of Pandora, he could see " in the sunset Jason's fleece of gold," and hear " the waves of the distracted sea piteously calling and lamenting " his lost friend. But through all the periods of his life his view of the world was essentially religious and subjective, and, consequently, his manner of dealing with it hymnal or lyric. This fact, even more than his merits as an artist, serves to account for his immense popularity. Too wellrinformed, too appreciative and too modest to deem himself the peer of the " grand old

masters," or one of " those far stars that come in sight once in a century," he made it his aim to write something that should " make a purer faith and manhood shine in the untutored heart," and to do this in the way that should best reach that heart. This aim determined at once his choice of subjects and his mode of treating them.

The subjects of Longfellow's poetry are, for the most part, aspects of nature as influencing human feeling, either directly or through historical association, the tender or pathetic sides and incidents of life, or heroic deeds preserved in legend or history. He had a special fondness for records of human devotion and self-sacrifice, whether they were monkish legends, Indian tales, Norse drdpas or bits of American history. His mode of treatment is subjective and lyric. No matter what form his works assume, whether the epic, as in Evangeline, The Courtship of Miles Standish and Hiawatha, the dramatic, as in The Spanish Student, The Golden Legend and The Mask of Pandora, or the didactic, as in The Psalm of Life and many of the minor poems; they are all subjective. This is not the highest praise that can be given to works of art; but it implies less dispraise in Longfellow's case than in almost any other, by reason of his noble subjectivity.

If we look in Longfellow's poetry for originality of thought, pro- found psychological analysis or new insights into nature, we shall be disappointed. Though very far from being hampered by any dogmatic philosophical or religious system of the past, his mind, until near the end, found sufficient satisfaction in the Christian view of life to make it indifferent to the restless, inquiring spirit of the present, and disinclined to play with any more recent solution of life's problems. He had no sympathy with either scepticism or formal dogmatism, and no need to hazard rash guesses respecting man's destiny. He disliked the psychological school of art, believing it to be essentially morbid and unhealthy. He had no sympathy with the tendency represented by George Eliot, or with any attempt to be analytic in art. He held art to be essentially synthetic, creative and manifesting, not analytic, destructive or questioning. Hence he never strove to draw from nature some new secret, or to show in her relations never discovered before. His aim was to impress upon her familiar facts and aspects the seal of his own gracious nature. A man in intellect and courage, yet without conceit or bravado; a woman in sensibility and tenderness, yet without shrinking or weakness; a saint in purity of life and devotion of heart, yet without asceticism or religiosity; a knight-errant in hatred of wrong and con- tempt of baseness, yet without self-righteousness or cynicism; a prince in dignity and courtesy, yet without formality or conde- scension; a poet in thought and feeling, yet without jealousy or affectation ; a scholar in tastes and habits, yet without aloofness or bookishness; a dutiful son, a loving husband, a judicious father, a trusty friend, a useful citizen and an enthusiastic patriot, — he united in his strong, transparent humanity almost every virtue under heaven. A thoroughly healthy, well-balanced, harmonious nature, accepting life as it came, with all its joys and sorrows, and living it beautifully and hopefully, without canker and without uncharity. No man ever lived more completely in the light than Henry Wads- worth Longfellow.

Perhaps the most remarkable traits in Longfellow's character were his accessibility and his charity. Though a great worker, he seemed always to have time for anything he was asked to do. He was never too busy to see a caller, to answer a letter, or to assist, by word or deed, any one that needed assistance. His courtesy to all visitors, even to strangers and children who called to look at him, or who, not venturing to call, hung about his garden-gate in order to catch a glimpse of him, was almost a marvel. He always took it for granted that they had come to see Washington's study, and, accordingly, took the greatest interest in showing them that. He never, as long as he could write, was known to refuse his autograph, and so far was he from trying to protect himself from intruders that he rarely drew the blinds of his study windows at night, though that study was on the ground floor and faced the street. His acts of charity, though performed in secret, were neither few nor small.

Of him it may be said with perfect truth, " He went about doing good "; and not with his money merely, but also with his presence and his encouragement. To how many sad hearts did he come like an angel, with the rich tones of his voice waking harmonics of hope, where before there had been despair and silence? How many young literary people, disappointed at the unsuccess of their first attempts, did he comfort and spur on to renewed and higher efforts ! How careful he was to quench no smoking flax ! How utterly free he was from

jealousy or revengef ulness ! While poor, morbid Edgar Allan Poe was writing violent and scurrilous articles upon him, accusing him of plagiarism and other literary misdemeanours, he was delivering enthusiastic lectures to his classes on Poe's poetry. His charity was unbounded. Once, when the present writer proposed to the president of the Harvard University Visiting Committee that Longfellow should be placed on that committee, the president replied : " What would be the use? Longfellow could never be brought to find fault with anybody or anything." And it was true. His whole life was bathed in that sympathy, that love which suffers long and envies not, which forgives unto seventy times seven times, and as many more if need be. Even in his last years, when loss of friends and continual physical pain made life somewhat " cold, and dark and dreary " for him, he never complained, lamented or blamed the arrangements of nature, and the only way in which it was possible to know that he suffered was through his ever-increasing delight in the health and strength of younger men. His whole nature was summed up in the lines of his favourite poet : —

" Luce intellettual, piena d'amore, Amor di vero ben, pien di letizia, Letizia che trascende ogni dolzore." See his Life . . . with Extracts from his Journals and Correspondence, by Samuel Longfellow, and the " Riverside " edition of the prose and poems (Boston, 11 vols., 1886-1890). An enlarged edition of the Life (3 vols., 1891) included the journals and correspondence, 1866- 1882, published in 1887 as Final Memorials (Boston and New York). Also the volume by T. W. Higginson in the " American Men of Letters " series (1902) ; E. C. Stedman's criticism in Poets of America ; and an article in W. D. Howells' My Literary Friends and Acquaint- ance (New York, 1900) which contains a valuable account of Long- fellow's later life. (T. Da.)

LONG FIVES. This game, though played in a tennis-court, bears but a slight resemblance to tennis, but is nevertheless a valuable form of preparatory practice. The game is 8 or 11 points, each stroke won counting one point to the winner. The server gives 3 points in 8, or 4 points in n to the striker-out. There are no chases. The winning openings count as at tennis. If a ball be struck into any other gallery or opening, it may be counted, by arrangement, either as a " let " (the rest being annulled) or against the striker; a similar arrangement is made for balls that make any chase on the hazaTd-side, or a chase of the last gallery on the service-side.

LONGFORD, a county of Ireland in the province of Leinster, bounded N.W. by Leitrim, N.E. by Cavan, E. and S. by West- meath and W. by Lough Ree and Roscommon. With the exception of Carlow, Louth and Dublin, it is the smallest county in Ireland, the area being 269,408 acres, or about 421 sq. m. The general level surface is broken occasionally by low hills, which cover a considerable area at its northern angle. The principal rivers are the Camlin, which rises near Granard and flows past Longford to the Shannon, and the Inny, which entering the county from Westmeath crosses its southern corner and falls into Lough Ree. Lough Ree is partly included in Longford, and the other principal lakes are Lough Gowna, Derrylough, Lough Drum and Lough Bannow.

The Silurian axis of Newry reaches the north of this county, where Lough Gowna lies upon it. The rest of the county, but for anti- clinals which bring up Old Red Sandstone at Longford town and Ardagh, belongs to the Carboniferous Limestone plain, in which Lough Ree forms a very characteristic lake, with signs of extension by solution along its shores. Marble of fine quality has been raised. In the north indications of iron are abundant, and there are also some traces of lead.

The climate is somewhat moist and cold, and there is a large extent of marsh and bog. The soil in the southern districts resting on the limestone is a deep loam well adapted for pasture, but in the north it is often poor. The proportion of tillage to pasture is roughly as I to 2. Oats and potatoes, in decreasing quantities, are the principal crops. The numbers of cattle, sheep, pigs and poultry are well maintained. The population is almost wholly rural, but the principal industry of agriculture is supplemented by a slight manufacture of coarse woollens and linen. The Midland Great Western line from Mullingar to Sligo crosses the centre of the county by way of the county town of Longford ; and the Cavan branch touches the ex- treme east. The Royal Canal enters the county in the south at Abbeyshrule, and joins

the Shannon near Cloondara.

The population (52,647 in 1891 ; 46,672 in 1901) decreases seriously, owing to emigration. About 90 % of the total are Roman Catholics. The only towns of any importance are Longford (the county town, P°P; 3747) and Granard (1622). The county includes six baronies. Assizes are held at Longford, and quarter sessions at Bally mahon, Granard and Longford. The county is in the Protestant diocese of Ardagh, and the Roman Catholic dioceses of Ardagh and Meath. It is divided into two parliamentary divisions, north and south, each returning one member.

The early name of Longford was Annaly or Anale, and it was a principality of the O'Farrels. Along with the province of Meath, in which it was then included, it was granted by Henry II. to Hugh de Lacy, who planted an English colony. On the division of Meath into two counties in 1543, Annaly was included in Westmeath, but under a statute of 1569, for the shiring of countries not already shired, it was made shire ground under the name of Longford.

Among antiquarian remains the chief ruin is the rath called the Moat of Granard, at the end of the main street of that town. There are monastic remains at Ardagh, a former bishopric, Longford, Moydow and on several of the islands of Lough Ree. The principal old castles are those of Rathcline near Lanes- borough, and Bally mahon on the Inny. The principal modern seats are those of Carrickglass on the Camlin, and Castle Forbes, the seat of the earls of Granard. Oliver Goldsmith was born at Pallas, a village near Ballymahon, in this county; and at Edgeworthstown the family of Edgeworth, of which the famous novelist Maria Edgeworth was a member, established themselves in the 16th century.

LONGFORD, the county town of Co. Longford, Ireland, on the river Camlin, and on a branch of the Midland Great Western railway, 75 m. W.N.W. of Dublin. Pop. (1901) 3747. The principal building is St Mel's Roman Catholic cathedral for the diocese of Ardagh, one of the finest Roman Catholic churches in Ireland. The town has a considerable trade in grain, butter and bacon. There are corn-mills, a spool factory and tanneries. Longford is governed by an urban district council. The ancient name of the town was Athfada, and here a monastery is said to have been founded by St Idus, a disciple of St Patrick. The town obtained a fair and market from James I. and a charter of incorporation from Charles II., as well as the right to return two members to parliament. It was disfranchised at the Union in 1800.

LONQHI, PIETRO (1702-1762), Venetian painter, was born in Venice. He was a pupil of Antonio Palestra and Giuseppe Maria Crespi at Bologna, and devoted himself to the painting of the elegance of the social life in 18th-century Venice. The republic was dying fast, but her sons, even in this period of political decline, retained their love of pageants and ceremonies and of extravagant splendour in attire. The art of Venice was vanishing like her political power; and the only painters who attempted to stem the tide of artistic decadence were the Cana- letti, Guardi, Tiepolo and Longhi. But whilst the Canaletti and Guardi dwelt upon the architectural glories of Venice, and Tiepolo applied himself to decorative schemes in which he continued the tradition of Paolo Veronese and Tintoretto, Longhi became the chronicler of the life of his compatriots. In a way his art may be set beside Hogarth's, though the Venetian did not play the part of a satirical moralist. He has aptly been called the Goldoni of painting. His sphere is that of light social comedy — the life at the cafe, the hairdresser's, at the dancing- school, at the dressmaker's. The tragic, or even the serious, note is hardlysounded in his work, which, in its colour,is generally distinguished by a rich mellow quality of tone. Most of his paintings are in the public and private collections of Venice. They are generally on a small scale, but the staircase of the Palazzo Grassi in Venice is decorated by him with seven frescoes, representing scenes of fashionable life. At the Venice academy are a number of his genre pictures and a portrait of the architect Temanza; at the Palazzo Quirini-Stampalia the portrait of Daniele Dolfino, " The Seven Sacraments " (etched by Pitteri), a " Temptation of St Anthony," a " Circus," a " Gambling

Scene," and several other genre pictures and portraits; at the

Museo Correr a dozen scenes of Venetian life and a portrait of Goldoni. In England the National Gallery owns " The Ex- hibition of a Rhinoceros in an Arena," a " Domestic Group," " The Fortune-Teller," and the portrait of the Chevalier Andrea Tron; two genre pictures are at Hampton Court Palace, and others in the Richter and Mond collections. Many of his works have been engraved by Alessandro Longhi, Bartolozzi, Cattini, Faldoni and others. Longhi died in Venice in 1762.

LONGINUS, CASSIUS (c. a.d. 213-273), Greek rhetorician and philosophical critic, surnamed Philologus. The origin of his gentile name Cassius is unknown; it can only be conjectured that he adopted it from a Roman patron. He was perhaps a native of Emesa (Homs) in Syria, the birthplace of his uncle Fronto the rhetorician. He studied at Alexandria under Origen the heathen, and taught for thirty years at Athens, one of his pupils being the Neoplatonist Porphyry. Longinus did not embrace the new speculations then being developed by Plotinus, but continued a Platonist of the old type. He upheld, in opposi- tion to Plotinus, the doctrine that the Platonic ideas existed outside the divine Now (ori e£a> rod vov i>#e

Longinus was the author of a large number of works, nearly all of which have perished. Among those mentioned by Suldas are Quaestiones Homericae, An Homerus fuerit phttosophus, Problemata Homeri et solutiones, Atticorum vocabulorum editiones duae; the most important of his philological works, $1X6X0701 6ni\iat (Philological Discourses) consisting of at least 21 books, is omitted. A considerable fragment of the Uepi rkkovs (De finibus, On the Chief End) is preserved in the Life of Plotinus by Porphyry (§ 20). Under his name there are also extant Prolegomena to the Encheiridion of Hephaestion on metre (printed in R. Westphal, Scriptores Metrici Graeci, i. 1866) and the fragment of a treatise on rhetoric (L. Spengel, Rhetores Graeci, i. pp. 299-320), inserted in the middle of a similar treatise by Apsines. It gives brief practical hints on invention, arrange- ment, style, memory and other things useful to the student. Some important excerpts tKruv Aoyyivov (Spengel, i. 325-328) may possibly be from the #1X6X0701 6/xiXiai .

It is as the reputed author of the well-known and remarkable work Iltpl !nf>ovs (generally, but inadequately, rendered On the Sublime) that Longinus is best known. Modern scholars, however, with few exceptions, are agreed that it cannot with any certainty be ascribed to him, and that the question of authorship cannot be determined (see Introduction to Roberts's edition). The following are the chief arguments against Longinus. (1) The treatise is not mentioned by any classical author, nor in any lists of the works attributed to him. (2) The evidence of the MSS. shows that doubts existed even in early times. In the most important (No. 2036 in the Paris Library, 10th century) the heading is Aiovwlov (j AovyItou, thus giving an alternative author Dionysius; in the Laurentian MS. at Florence the title has ivurbpov, implying that the author was unknown. The ascription in the Paris MS. led to the addition of Dionysius to the name of the reputed author — Dionysius Cassius Longmus, accounted for by the supposition that his early name was Dionysius, Cassius Longinus being subsequently adopted from a Roman patron whose client he had beeen. (3) The absence of any reference to the famous writers on rhetoric of the age of the Antonines, such as Hermogenes and Alexander son of Numenius. (4) The opening sentences show that the Ilepl S^ou was written with a view of correcting the faults of style and method in a treatise by Caecilius (q.v.) of Calacte on the same subject. As Caecilius flourished during the reign of Augustus, it is hardly likely that his work would have been selected for purposes of criticism in the 3rd century. (§) General considerations of style and language and of the point of view from which the work is written. In favour of Longinus: (1) The traditional ascription, which held its ground^*

unchallenged till the beginning of the. 1 8th century. (2) The philo- sophical colouring of the first chapter and the numerous quotations from Pfato are in accordance with what is known of his philosophical opinions. (3) The treatise is the kind of work to be expected from one

who was. styled " the first of critics." (4) The Ammonius referred to (xiii. 3) is supposed to be Ammonius Saccas (c. 175-242), but it appears from the Venetian scholia to the Iliad that there was an earlier Ammonius (fl. c. 140 B.C.), a pupil and successor of Aristarchus at Alexandria, who, judging from the context, is no doubt the writer in question. The reference is therefore an argument against Longinus. •

The work is dedicated to a certain Terentianus, of whom nothing is known (see Roberts's edition, p. 18).

The alternative author Dionysius of the MSS. has been variously identified with the rhetorician and historian Dionysius of Halicar- nassus, the Atticist Aelius Dionysius of Halicarnassus, Dionysius Atticus of Pergamum, Dionysius of Miletus. Other suggested, claimants to the authorship are Plutarch (L. Vaucher in Etudes critiques sur le Iraite du sublime (Geneva, 1854) and Aelius Theon of Alexandria (W. Christ), the author of a workonthe Arrangement of Speech. But it seems most probable that the author was an unknown writer who flourished in the 1st century soon after Caecilius and before Hermogenes. WiTamowitz-Mollendorff gives his date as about A.D. 40.

The rendering On the Sublime implies more than is intended by the Greek lltpi inpova (" impressivene3s in style," Jebb). Nothing abnormal, such as is associated with the word " sublime," is the subject of discussion ; it is rather a treatise on style. According to the author's own-definitions, " Sublimity is a certain distinction and excellence in expression," " sublimity consists in elevation," " sublimity is the echo (or expression) of a great soul " (see note in Roberts).

The treatise is especially valuable for the numerous quotations from classical authors, above all, for the preservation of the famous fragment of Sappho, the ode to Anactoria, beginning

4 > aiveTal juoi ktjvos icros Beolaiv,

imitated by Catullus (li.) Ad Lesbiam,

" file mi par esse de.o.videtur." ■" Its main object is to point out the essential elements of an im- pressive style which, avoiding all tumidity, puerility, affectation and bad taste, finds its inspiration in grandeur of thought and intensity of feeling, and its expression in nobility of diction and in skilfully ordered composition " (Sandys).

A full bibliography of the subject will be found in the edition by \V. R. Roberts (Cambridge, 2nd ed., J907), containing an Introduc- tion, Analysis, Translation and Appendices (textual, linguistic, literary and bibliographical), to which may be added F. Marx, Wiener Studien, xx. (1898), and F. Kaibel, Hermes, xxxiv. (1899), who respectively advocate and reject the claims of Longinus to the authorship; J. E. Sandys, History of Classical Scholarship "(2nd ed., 1906), pp. 288, 338, should also be consulted. The number of trans- lations in all the languages of Europe is, large, including the famous one by Boileau, which made the work a favourite text-book of the bellelettristic critics of the 1 8th century. A text and translation was published by A. O. Prickard (1907-1908).

LONG ISLAND, an island, 118 m. long and 12 to 23 m. wide, with its axis E.N.E. and W.S.W., roughly parallel with tbeS. shore of Connecticut, U.S.A., from which it is separated by Long Island Sound (115 m. long and 20-25 m. wide) and lying S.E. of the mainland of New York state, of which it is a part, and immediately E. of Manhattan Island. Area, 1682 sq. m. The east' end is divided into two narrow peninsulas (the northern culminating in Orient Point about 25 m. long, the southern ending in Montauk Point, the eastern extremity of the island, about 40 m. long) by the three bays, Great Peconic, Little Peconic (in which lies Shelter Island) and Gardiners (in which lies Gar- diners Island). The N. shore is broken in its western half by the fjords of Flushing Bay, Little Neck Bay, Manhasset Bay, Cold Spring Harbor; Huntington Bay (nearly landlocked), Sffiithtown Bay and Port Jefferson Harbor, which also is nearly landlocked. East of Port Jefferson the N. shore is comparatively unbroken. The S. shore has two bays, Jamaica Bay with many low islands and nearly cut off from the ocean by the narrow spur of Rockaway Beach; and the ill-defined Great South Bay, which is separated from the Atlantic by the narrow Long Beach,

Jones Beach and Oak Island Beach, and by the long peninsula (35 or 40 m.), called Fire Island or Great South Beach. Still farther E. and immediately S. of Great Peconic Bay is Shinnecock Bay, about 10 m. long and cut off from the ocean by a narrow beach.

The N. side of the island was largely built by deposits along the front of the continental glacier, and its peculiar surface is due to such

deposits. At Astoria the dark gneiss bed rock is visible. The S. half of the island is mostly built of a light sandy or loamy soil and is low, except for the hills (140-195 ft.) of Montauk peninsula, which are a part of the "back-bone " of the island elsewhere running through the centre from E. to W. and reaching its highest point in its western extremity, Oakley's High Hill (384 ft.) and Hempstead Hirbor Hill, W. of which are the fiat and fertile Hempstead Plains. North of the back-bone or central ridge the country is hilly with glacial drift and many boulders along the coast and with soil stonier and more fertile • than that of the" South Side." There is good clayatWhitestoneand at Lloyd's Point on the north side. This north shore is comparatively well wooded; the middle of the island is covered with stunted oaks and scrubby pines ; the south side is a floral mean between the other divisions. It is cut in its middle part by a few creeks and tidal rivers 1 flowing into the Great South Bay. Another " river," the Peconic, about 15 m. long, runs E. into Peconic Bay. On the north side there are few waterways save Nissequoge river, partly tidal, which runs N. into Smithtown Bay. Near the centre of the island is Lake Ronkon- koma, which is well below the level of the surrounding country, and whose deep cold waters with their unexplained ebb and flow are said to have been so feared by the Indians that they would not fish there. There are salt marshes (probably 100 sq. m. in all), on the shore of the Sound and of the Great South Bay.

As regards its fauna Long Island is a meeting-place for equatorial and arctic species of birds and fish ; in winter it is visited occasion- ally by the auk and in summer sometimes:by the turkey buzzard. James E. DeKay in his botanical and zoological survey (1847-1ˆ49) of New York state estimated that on Long Island there were repre- sentatives of two-thirds of the species of land birds of the United States and seven-eighths of the water birds — probably an exaggerated estimate for the time and certainly not true now. There is snipe and duck shooting, especially on the shores of the Great South Bay; there is good deer hunting, especially in Islip town; and there are several private preserves, some stocked with English game birds, within 50 m. of New York City. There are many excellent trout streams and the island was known in aboriginal times for its' fresh and salt water fish. Indian names referring to fishing places are discussed in Wm. W. Tooker's Some Indian Fishing Stations upon Long Island. Long Island wampum was singularly good — the Indian name, Seawanhacky (Seawanhaka, &c), of the island has been interpreted to mean " shell treasury " — and black wampum was made from the purple part of the shell of the quahaug. Soft clams are dug on the north shore at low tide and hard clams are found along the southern shore, where (at Islip) they were first successfully canned; scallops and other small shell fish are taken, especially at the E. end of the island. But the most important shell fishery is that of oysters. The famous Blue Points grow in the Great South Bay, particularly at Sayville and Bellport, where seed oysters planted from Long Island Sound develop into the Blue Points with charac- teristics of no other variety of oyster. Farther west, on the S. shore are grown the well-known Rockaway oysters. The New York State Fish Commission has a hatchery at Cold Spring Harbor on the N. shore. The largest commercial fisheries are on the south side, in the ocean off Fire Island Beach, where there are great' " pounds " in which captured fish are kept alive before shipment to market. Sag Harbor and East Hampton on the E. end of the island were im- portant , whaling ports in the 18th century and the first part of the, 19th, and they and other fishing villages afterward did a large business in the capture of menhaden (Brevoortia tyrannus), a small, shad-like fish, which, following the custom of the Indians, they manufactured into fertilizer. At Glen Cove there are now great starch factories.

The west end of the island has been called New: York's market , garden. On the Hempstead Plains and immediately E. of them along the north shore great quantities of cabbage and cucumbers are grown and manufactured into sauerkraut arid pickles. There are large cranberry fields near the village of Calverton, immediately W. of Riverhead.

There are a few large farms on Long Island, mostly on the north side, but it is becoming more and more a place of suburban : residence. This change is due in part to cool summer and warm winter winds from the ocean, which makes the July mean tem- perature 68° to 70 F. at the east end and the south side, and 72° on the north shore, as contrasted with 74° for the west end and New York City. The range of temperature is said to be less than in any other place in the United States with the exception of ■Corpus Christi (Tex.), Eureka (California), Galveston (Texas), and Key West (Florida) . Even on the south shore the humidity for August and September is less than that of any location on the Atlantic coast, or Los Angeles and San Diego on the Pacific, according to Dr Le Grand N. Denslow in a paper, " The Climate of Long Island " (1901). Surf bathing on the south shore,

1 G. K. Gilbert, in an article, " The Deflection of Streams " in the American Journal of Science (xxvii. 427-432), points' out that each of these streams is " bounded on the west or right side by a bluff 10 to 20 ft. high." .'..■•-*

yachting and boating on the Sound, the Great South Bay and the Ocean, and hunting and fishing are attractions. At Garden City, Nassau (Glen Cove), Great River and Shinnecock Hills are well-known golf links; there are several hunt clubs; and at Southampton are some of the best turf tennis-courts in the United States. Few parts of the island are summer resorts in the ordinary use of the word; there are large hotels hardly anywhere save on Coney Island, at Far Rockaway, on Long Beach and on Shelter Island; and a large part of the summer population lives in private mansions. Some Long Island " country places " are huge estates with game and fish preserves and luxurious " chateaux." The roads are good. The course of the Vanderbilt automobile races is along the roads of the Hemp- stead Plains. Also on the Hempstead Plains are the Creedmoor Rifle Range, where, in an Interstate Park, E. of Jamaica, annual international rifle shooting tournaments for the championship of America were held until 1909; Garden City, which was founded by A. T. Stewart for the purpose of providing comfort- able homes at low cost to his employes and others, and where are the Protestant Episcopal Cathedral of the Incarnation, St Paul's School for Boys and St Mary's School for Girls; and, near Hempstead, the grounds of the Meadowbrook (hunt and polo) Club and those of the Farm Kennel Club. The only railway is the Long Island Railroad (owned by the Pennsylvania Rail- road) with western termini on Manhattan and in Long Island City and Brooklyn, whence lines meet at Jamaica, and thence three principal lines branch, the north shore to Wading River, the main line to Greenport, and the south side to Montauk.

Long Island is a part of New York State, its western third forming Brooklyn and Queens boroughs of New York City — these boroughs were formed respectively from Kings county and from the W. half of Queens county upon the erection of Greater New York. What was formerly the E. half of Queens county then became Nassau county (area 252 sq. m.; pop., in 1900, 55,448, in 1905, 69,477), whose county-seat is Mineola. The eastern and the larger part of the island is the less thickly settled Suffolk county with an area of 918 sq. m. and a popula- tion in 1900 of 77,582 and in 1905 of 81,653. The county-seat of Suffolk county is Riverhead, so named from its position at the head of the Peconic river on the W. end of Great Peconic Bay. The ten townships of Suffolk county are large govern- mental units, showing, by their similarity to the towns of New England, the relation of the early settlers to New England. The largest in area is Brookhaven, which reaches all the way across the island near its central part. The townships of Suffolk county with their population in 1905 were: Huntington (10,236). Babylon (7919), Smithtown (3325), Islip (13,721), Brookhaven (16,050), Riverhead (4950), Shelter Island (1105), Easthampton (4303), Southold (8989) and Southampton (11,024). The total population of Long Island was 1,452,611 in 1900, and 1,718, 056 in 1905 (state census), the population of the borough of Brooklyn alone for these years being 1,166,582 and 1,358,686.

History. — The principal Indian tribes on Long Island at the time of the first settlement by the whites were the Montauk, en the eastern end of the island, where they gave their name

to the " point " and where their last " king," David Pharoah, died in 1785; the Shinnecock, who, much admixed with negro blood, now live on the reservation between Canoe Place and Shinnecock Hills; the Manhasset, on what is now Shelter Island; the Patchogue, near the present village of that name; the Massa- pequa, between the Hempstead Plains and what is now Islip, who were defeated and practically exterminated in 1653 by John Underhill; the Canarsie, who lived near the present Jamaica; and on the north side the Nessaquague or Nissequoge (in the present town of Smithtown), and the Sealtocot who gave their name to Setauket in Brookhaven town. The first pastor of the church (Presbyterian-Congregational) at Easthampton, Thomas James {c. 1620-1696), is supposed to have translated a catechism and parts of the Bible into the dialect of the Montauk, among whom Samson Occum had a school between 1755 and

1765.

The territory of Long Island was included in the grant of

1620 by James I. to the Plymouth Company and in 1635 wa s conveyed to William Alexander, earl of Stirling. The conflicting claims of English and Dutch were the subject of the treaty con- cluded at Hartford, Connecticut, in 1650, by which the Dutch were to hold everything west of Oyster Bay, the English every- thing east — a provision which accomplished no agreement, since Oyster Bay itself was the matter of contention, and English settlers on what the Dutch called the west side of Oyster Bay refused to remove. Long Island was included in the territory assigned to the duke of York in 1663-1664, when the New England towns on the island objected to separation from Con- necticut. On the recovery of New York by the Dutch in 1673 the eastern towns refused to submit to the Dutch governor. In 1674 by the treaty of Westminster Long Island became a part of the British colony of New York. The Dutch settlements were more important ethnically than historically; on the west end of the Island the Dutch Reformed Church is still strong and there are many Dutch names; at West Sayville, on the " south side," about 50 m. from New York, in a settlement made about 1786 by Gustav Tukker, who did much to develop the oyster fisheries, Holland Dutch was the common speech until the last quarter of the 19th century. The "Five Dutch Towns " were: Nieuw Amersfoord (after 1801 officially called Flatlands), oil Jamaica Bay, where the first settlement was made about 1623 and the first grant in 1636; Midwout (later Vlackte-Bosch and Flat- bush), settled between 1645 an d 1650 and having in 1654 the first Dutch church; Nieuw Utrecht, settled soon after 1650 and incorporated in r66o; Breuckelen (now Brooklyn), which was settled a little before its organization as a town in 1646; and Boswijck (Bushwick), first settled by Swedes and Norwegians and incorporated in 1660. These five towns became one ad- ministrative district in 1661.

Apparently the earliest English settlement was at Hempstead in 1640 by colonists from Lyn- n, Massachusetts, who based their claim on the patent (1621) of Nova Scotia to Lord Stirling, but were almost immediately driven out by the Dutch. In 1643 another English settlement was made at Hempstead by men from Stamford, Connecticut, who in 1644 secured a patent from Governor Kieft of New Netherland. In r645 Kieft granted land at , Gravesend to Lady Deborah Moody, who had settled there about 1643, when she had left Lynn and the Salem church because of her anti-pedobaptist views. At Gravesend in 1664 Colonel Richard Nicolls first landed the English troops which occupied the island; and in 1693 it became one of its three ports of entry. The Connecticut towns on Long Island were as follows: South- ampton was settled in 1640 by the Lynn men driven out of Hempstead by the Dutch, and in 1644-1664 was in the Connec- ticut jurisdiction. Southold (the " South Hold of New Haven "), called from 1640 until 1644 by the Indian name Yennicock, had a church in 1640, and a court based on the Levitical law, which was abolished in 1643 upon the remonstrance of the authorities of New Haven. The Southold settlers were from Hingham, Norfolk and New Haven, and the colony joined New Haven in 1648, in which year the colony of Forrett's (now Shelter) Island also submitted to New Haven. Easthampton was settled in 1 648 from Lynn. Oyster Bay was also settled by Lynn men in 1640 and contested by the Dutch and English. New- town, officially called Middleburgh, was settled in 1652, purchased from the Indians in 1656, "annexed to the other side of the Sound " in 1662, in the same year took the name of Hastings, in 1 706 was the scene of the arrest of

the Presbyterian itinerants Francis Mackemie and John Hampton, and in 1766 was the site of the Methodist Episcopal Society at Middle Village, the second oldest of that denomination in America. Huntington was settled in 1653 from New Haven, Hempstead, Southold and Southampton. Other early settlements were: Jamaica, about 1657; Brookhaven, 'first settled at Ashford (now Setauket) from Boston in 1655, and Smithtown, patented in 1677 to Richard Smith of Setauket, who was said to be a soldier of Cromwell, and of whom there is a story that having bargained with the Indians for as much land as a bull could cover in a day he rode his trained bull in a great circuit about the land he coveted and

was thereafter known as " Bull " Smith. Almost all these English settlements were made by Presbyterians and from Jamaica east this was the prevailing denomination. During the War of Independence the battle of Long Island (see below) was fought within what is now the borough of Brooklyn.

Authorities. — Benj. F. Thompson, The History of Long Island (New York, 2nd ed. 1843) ; Nathaniel S. Prime, History of Long Island (New York, 1845), especially valuable for ecclesiastical history, particularly of the Presbyterian church; Martha B. Flint, Early Long Island (New York, 1896); Gabriel Furman, Antiquities of Long Island (New York, 1875), edited by Frank Moore; and the publications of the Long Island Historical Society (of Brooklyn) and of the Suffolk County Historical Society (of Riverhead). (R. We.)

Battle of Long Island, 1776. — The interest of this battle lies in the fact that it was the first engagement in the campaign of 1776 (see American War or Independence) and was expected in England to be decisive of the contest in the colonies. After the evacuation of Boston (March 1776), Lord Howe moved against New York City, which he thought would afford a better base of operations for the future. The Americans undertook its defence although recognizing the difficulties in the case, as the bay and rivers adjoining would enable the British fleet to co-operate effectively with the army. To protect his left flank Washington was forced to throw a portion of his troops over to the Long Island side of the East river; they fortified themselves there on the si te of the present Borough of B rooklyn. Lord Howe, who had encamped on Staten Island at the entrance to the harbour, determined to attack this isolated left wing, and on the 22nd of August landed at Gravesend Bay, Long Island, with about 20,000 men. The Americans maintained strong outposts in the wooded hills in advance of their fortified lines. On the morning of the 27th Howe, after four days' reconnaissance, attacked these posts with three columns, the left and centre delivering the holding attack, and the right and strongest column turning the enemy's left by a detour. Howe himself, accompanied by Generals (Sir H.) Clinton and Lord Cornwallis, led the turning movement, which came upon the rear of the enemy at the moment when they were engaged with the two other columns. By noon the Americans had been driven back into the Brooklyn fines in considerable confusion, and with the loss of about half their number. This constituted the battle. The completeness of the English victory was due to the neglect of the Americans in guarding the left of their outposts. Howe has been criticized for not immediately assaulting the American works which he might have carried on the evening of the battle. In view of the fact that he had only defeated a small portion of the American forces, and that the works were of considerable strength, he decided to make a formal siege, and Washington took advantage of the delay in operations to retreat across the river to New York on the night of the 29th. This successful movement repaired to some extent the bad moral effect of the defeat of the 27th in the American camp. In the engagement of Long Island Washington lost about 1200 prisoners and 30 guns, and 400 killed and wounded; of the latter the British lost nearly the same number. (C. F. A.)

LONG ISLAND CITY, formerly a city of Queens county, New York, U.S.A., and since the 1st of January 1898 the first ward of the Borough of Queens, New York City. Pop. (1880) 17,129, (1890) 30,506, (1900) 48,272, of whom 15,899 were foreign-born. It has a river front, on East river and Long Island Sound, of 10 m., and is the eastern terminal and the headquarters of the Long Island railway, having a large Y.M.C.A. building (the gift of Mrs

Russell Sage) for employees of this railway. Among manufactures are chemicals, pottery, varnish, silk, &c, and there are oil-storage warehouses. Most of the borough offices of Queens borough are in Long Island City, which was formerly the county-seat of Queens county. The first settlement within the limits of what subsequently became Long Island City was made in 1640 by a Dutch blacksmith, Hendrick Harmensen, who soon afterward was murdered by an Indian. Other settlers, both Dutch and English, soon followed, and established detached villages, which became known as Hunter's Point, Blissville, Astoria, Ravenswood, Dutch Kills, Middleton and Steinway.

In 1853 this group of villages, by that time virtually one com- munity, was called Long Island City, and it was formally incorporated under that name in 1870. In 1871-1872 the city was laid out by a commission of which General W. B. Franklin was president. Political convictions, economic considerations and fear combined to make the residents in this region largely loyalist in their attitude during the War of Independence. From 1776 to 1783 British troops occupied Newtown, a village to the S.E. In January 1776 the committee on the state of New York in Congress reported a resolution that "Whereas a majority of the inhabitants of Queens county, in the colony of New York, being incapable of resolving to live and die free men, . . .all such persons as voted against sending deputies to the present convention in New York ... be put out of the protection of the United Colonies," &c, an action which led to the arrest and imprisonment of many of the accused persons.

See J. S. Kelsey, History of Long Island City (Long Island City,

1896).

LONGITUDE (from Lat. longitudo, "length"), the angle which the terrestrial meridian from the pole through a point on the earth's surface makes with some standard meridian, commonly that of Greenwich. It is equal to the difference between local time on the standard meridian, and at the place defined, one hour of time corresponding to 15° difference of longitude. Formerly each nation took its own capital or principal observatory as the standard meridian from which longitudes were measured. Another system had a meridian passing through or near the island of Ferro, defined as 20° W. of Paris, as the standard. While the system of counting from the capital of the country is still used for local purposes, the tendency in recent years is to use the meridian of Greenwich for nautical and international purposes. France, however, uses the meridian of the Paris observatory as its standard for all nautical and astronomical purposes (see Time). In astronomy, the longitude of a celestial body is the distance of its projection upon the ecliptic from the vernal equinox, counted in the direction west to east from o° to 360 .

LONGLEY, CHARLES THOMAS (1794-1868), archbishop of Canterbury, was born at Rochester, and educated at Westminster and Oxford- He was ordained in 1818, and was appointed vicar of Cowley, Oxford, in 1823. In 1827 he received the rectory of West Tytherley, Hampshire, and two years later he was elected headmaster of Harrow. This office he held until 1836, when he was consecrated bishop of the new see of Ripon. In 1856 he was translated to the see of Durham, and in i860 he became archbishop of York. In 1862 he succeeded John Bird Sumner as archbishop of Canterbury. Soon afterwards the questions connected with the deposition of Bishop Colenso were referred to him, but, while regarding Colenso's opinions as heretical and his deposition as justifiable, he refused to pronounce upon the legal difficulties of the case. The chief event of his primacy was the meeting at Lambeth, in 1867, of the first Pan- Anglican conference of British, colonial and foreign bishops (see Lambeth Conferences) . His published works include numerous sermons and addresses. He died on the 27th of October 1868 at Addington Park, near Croydon.

LONGMANS, a firm of English publishers. The founder of the firm, Thomas Longman (1) (1699-1755), born in 1699, was the son of Ezekiel Longman (d. 1708), a gentleman of Bristol. Thomas was apprenticed in 17 16 to John Osborn, a London bookseller. At the expiration of his apprenticeship he married Osborn's daughter, and in August 1724 purchased the stock and household goods of William Taylor, the first publisher of Robinson Crusoe, for £2282 9s. 6d. Taylor's two shops were known respectively as the Black Swan and the Ship, and occupied the ground in Paternoster Row upon which the present

publishing • house stands. Osborn, who afterwards entered into partnership with his son-in-law, held one-sixth of the shares in Ephraim Chambers's Cyclopaedia of the Arts and Sciences, and Thomas Longman was one of the six booksellers who undertook the resDonsibility of Samuel Johnson's Dictionary. In 1754 Thomas

Longman took his nephew into partnership, the title of the firm becoming T. and T. Longman.

Upon the death of his uncle in 175s, Thomas Longman (2) (1 730-1 797) became sole proprietor. He greatly extended the colonial trade of the firm. He had three sons. Of these, Thomas Norton Longman (3) (1771-1842) succeeded to the business. In 1794 Owen Rees became a partner, and Thomas Brown, who was for many years after 181 1 a partner, entered the house as an apprentice. Brown died in 1869 at the age of 92. In 1799 Longman purchased the copyright of Lindley Murray's English Grammar, which had an annual sale of about 50,000 copies; he also purchased, about 1800, the copyright, from Joseph Cottle, of Bristol, of Southey's Joan of Arc and Wordsworth's Lyrical Ballads. He published the works of Wordsworth, Coleridge, Southey and Scott, and acted as London agent for the Edinburgh Review, which was started in 1802. In 1804 two more partners were admitted; and in 1824 the title of the firm was changed to Longman, Hurst, Rees, Orme, Brown & Green. In 1814 arrangements were made with Thomas Moore for the publication of Lalla Rookh, for which he received £3000; and when Archibald Constable failed in 1826, Longmans became the proprietors of the Edinburgh Review. They issued in 1829 Lardner's Cabinet Encyclopaedia, and in 1832 M'Culloch's Commercial Dictionary.

Thomas Norton Longman (3) died on the 29th of August 1842, leaving his two sons, Thomas (4) (1804-1879) and William Longman (1813-1877), in control of the business in Paternoster Row. Their first success was the publication of Macaulay's Lays of Ancient Rome, which was followed in 1849 by the issue of the first two volumes of his History of England, which in a few years had a sale of 40,000 copies. The two brothers were well known for their literary talent; Thomas Longman edited a beautifully illustrated edition of the New Testament, and William Longman was the author of several important books, among them a History of the Three Cathedrals dedicated to St Paul (1869) and a work on theHistory of the Life and Times of Edward III. (1873). In 1863 the firm took over the business of Mr J. W. Parker, and with it Fraser's Magazine, and the publication of the works of John Stuart Mill and J. A. Froude; while in 1890 they incorporated with their own all the publications of the old firm of Rivington, established in 17 n. The family control of the firm (now Longmans, Green & Co.) was continued by Thomas Norton Longman(5), son of Thomas Longman (4). • LONGOMONTANUS (or Longberg), CHRISTIAN SEVERIN (1562-1647), Danish astronomer, was born at the village of Longberg in Jutland, Denmark, on the 4th of October 1562. The appellation Longomontanus was a Latinized form of the name of his birthplace. His father, a poor labourer called Soren, or Severin, died when he was eight years old. An uncle thereupon took charge of him, and procured him instruction at Lemvig; but after three years sent him back to his mother, who needed his help in field-work. She agreed, however, to permit him to study during the winter months with the clergy- man of the parish; and this arrangement subsisted until 1577, when the illwill of some of his relatives and his own desire for knowledge impelled him to run away to Viborg. There he attended the grammar-school, defraying his expenses by manual labour, and carried with him to Copenhagen in 1588 a high reputation for learning and ability. Engaged by Tycho Brahe in 1589 as his assistant in his great astronomical observatory of Uraniborg, he rendered him invaluable services there during eight years. He quitted the island of Hveen with his master, but obtained his discharge at Copenhagen on the 1st of June 1597, for the purpose of studying at some German universities. He rejoined Tycho at Prague in January 1600, and having completed the Tychonic lunar theory, turned homeward again in August. He visited Frauenburg, where Copernicus had made his observations, took a master's degree at Rostock, and at Copen- hagen found a patron in Christian Friis, chancellor of Denmark, who gave him employment in his household. Appointed in 1603 rector of the school of Viborg, he was elected two years later to a professorship in the university of Copenhagen, and his

promotion to the chair of mathematics ensued in 1607. post he held till his death, on the 8th of October 1647.

Longomontanus, although an excellent astronomer, was not an advanced thinker. He adhered to Tycho's erroneous views about refraction, held comets to be messengers of evil and imagined that he had squared the circle. He found that the circle whose diameter is 43 has for its circumference the square root of 18252 — which gives 3-14185 . . . for the value of it. John Pell and others vainly endeavoured to convince him of his error. He inaugurated, at Copenhagen in 1632, the erection of a stately astronomical tower, but did not live to witness its completion. Christian IV. of Denmark, to whom he dedicated his Astronomia Danica, an exposition of the Tychonic system of the world, conferred upon him the canonry of Lunden in Schleswig.

The following is a list of his more important works in mathematics and astronomy : Systematis Mathematici, &c. (161 1); Cyclometria e Lunulis reciproce demonstrata, &c. (1612) ; Disputatio de Eclipsibus (1616); Astronomia Danica, &c. (1622); Disputationes quatuor Astrologicae (1622); Pentas Problematum Philosophise (1623); De Chronolabio Historico, seu de Tempore Disputationes tres (1627) ; Geometriae quaesita XIII. de Cyclometria rationali et vera (1631); Inventio Quadraturae Circuli (1634) '< Disputatio de Matheseos Indole (1636) ; Coronis Problematica ex Mysteriis trium Numerorum (1637); Problemata duo Goemetrica (1638); Problema contra Paulum Guldinum de Circuli Mensura (1638) ; Introductio in Theatrum Astronomicum (1639); Rotundi in Piano, &c. (1644); Admiranda Operatio trium Numerorum 6, 7, 8, &c. (1645) ; Caput tertium Libri primi de absoluta Mensura Rotundi plani, &c. (1646).

See E. P. F. Vindingius, Regia Academia Havinensis, p. 212 (1665) ; R. Nyerup and Kraft, Almindeligt Litteraturlexikon, p. 350 (1820); Ch. G. Jocher, Allgemeines Gelehrten-lexikon, ii. 2518, iii. 2111 ; Jens Worm, Forsog til et Lexikon over danske, norshe og islandske laerde Maend,p. 617, 1771, &c. ; P. Bayle, Hist, and Crit. Dictionary, iii. 861 (2nd ed. 1736); J. B. J. Delambre, Hist, de Vastr. moderne, i. 262; J. S. Bailly, Hist, de Vastr. moderne, ii. 141; J. L. E. Dreyer, Tycho Brahe, pp. 126, 259, 288, 299; F. Hoeffer, Hist, del' astronomic, P- 39 1 ; J- Madler, Geschichte der Himmelskunde, i. 195; J. F. Weidler, Hist. Astronomiae, p. 451.

LONGSTREET, JAMES (1821-1904), American soldier, lieutenant-general in the Confederate army, was born on the 8th of February 1821 in Edgefield district, South Carolina, and graduated at West Point in 1842. He served in the Mexican War, was severely wounded, and received two brevets for gallantry. In 1861, having attained the rank of major, he re- signed when his state seceded, and became a brigadier-general in the Confederate army. In this rank he fought at the first battle of Bull Run, and subsequently at the head of a division in the Peninsular campaign and the Seven Days. This division subsequently became the nucleus of the I. corps, Army of Northern Virginia, which was commanded throughout the war by Longstreet. This corps took part in the battles of second Bull Run and Antietam, and held the left of Lee's front at Fredericksburg. Most of the corps was absent in North Carolina when the battle of Chancellorsville took place, but Longstreet, now a lieutenant-general, returned to Lee in time to take part in the campaign of Gettysburg. At that battle he disapproved of the attack because of the exceptionally strong position of the Federals. He has been charged with tardiness in getting into the action, but his delay was in part authorized by Lee to await an absent brigade, and in part was the result of instructions to conceal his movements, which caused circuitous marching. The most conspicuous fighting in the battle was conducted by Longstreet. In September 1863 he took his corps to the west and bore a conspicuous part in the great battle of Chickamauga. In November he commanded the unsuccessful expedition against Knoxville. In 1864 he rejoined Lee's army in Virginia, and on the 6th of May arrived upon the field of the Wilderness as the Confederate right had been turned and routed. His attack was a model of impetuosity and skill, and drove the enemy back until their entire force upon that flank was

in confusion. At this critical moment, as Longstreet in person, at the head of fresh troops, was pushing the attack in the forest, he was fired upon by mistake by his own men and desperately wounded. This mischance stayed the Confederate assault for two hours, and enabled the enemy to provide effective means to meet it. In October 1864 he resumed command of his corps, which he

retained until the surrender, although paralysed in his right arm. During the period of Reconstruction Longstreet's attitude towards the political problem, and the discussion of certain military incidents, notably the responsibility for the Gettysburg failure, brought the general into extreme unpopularity, and in the course of a controversy, which lasted for many years, much was said and written by both sides which could be condoned only by irritation. His acceptance of a Federal office at New Orleans brought him, in a riot, into armed conflict with his old Confederate soldiers. His admiration for General Grant and his loyalty to the Republican party accentuated the ill-feeling of the Southern people. But in time his services in former days were recalled, and he became once more " General Lee's war- horse " to his old soldiers and the people of the South. He held several civil offices, among them being that of minister to Turkey under Grant and that of commissioner of Pacific railways under Presidents McKinley and Roosevelt. In 1896 he published From Manassas to Appomattox, and in his later years . he prepared an account of Gettysburg, which was published soon after his death, with notes and reminiscences of his whole military career. General Longstreet died at Gainesville, Georgia, on the 2nd of January 1904.

See Lee and Longstreet at High Tide, by Helen D. Longstreet (Gainesville, Ga., 1904).

LONGTON, a market-town of Staffordshire, England, on the North Staffordshire railway, 2J m. S.E. of Stoke-on-Trent, within which parliamentary and municipal borough it is included. Pop. (1901) 35,815. The town is in the Potteries district, and in the neighbourhood of coal and iron mines. It was governed by a mayor, 10 aldermen and 30 councillors until under the " Potteries Federation " scheme (1908) it became part of the borough of Stoke-on-Trent in'1910.

LONGUEVILLE, the name of a French family which originated with Jean, count of Dunois, the " Bastard of Orleans, " to whom Charles VII. gave the countship of Longueville in Normandy in 1443. Francois of Orleans, count of Longueville, was created duke in 1505. The marriage of his brother Louis with Jeanne, daughter and heiress of Philip, count of Baden-Hochberg- Sausenberg (d. 1503), added considerable estates to the house of Longueville. Henry, due de Longueville (d. 1663), took an important part in the Fronde, and for a long time held the royal troops in check in Normandy. His wife, Anne Genevieve (see below), was a leading figure in the political dissensions of the time. The last of the family was Jean Louis, the Abbe d'Orleans, who died in 1694. The numismatist, Charles d'Orleans-Rothelin (1 69 1 -1 744) , belonged to a bastard branch of the family.

LONGUEVILLE, ANNE GENEVIEVE, Duchesse de (1619- 1679), was the only daughter of Henri de Bourbon, Prince de Conde, and his wife Charlotte Marguerite de Montmorency, and the sister of Louis, the great Conde. She was born on the 28th of August 1619, in the prison of Vincennes, into which her father and mother had been thrown for opposition to Marshal D'Ancre, the favourite of Marie de' Medici, who was then regent in the minority of Louis XIII. She was educated with great strictness in the convent of the Carmelites in the Rue St Jacques at Paris. Her early years were clouded by the execution of the due de Montmorency, her mother's only brother, for intriguing against Richelieu in 1631, and that of her mother's cousin the comte de Montmoreney-Boutteville for duelling in 1635; but her parents made their peace with Richelieu, and being introduced into society in 1635 she soon became one of the stars of the Hotel Rambouillet, at that time the centre of all that was learned, witty and gay in France. In 1642 she was married to the due de Longueville, governor of Normandy, a widower twice her age. The marriage was not happy. After

Richelieu's death her father became chief of the council of regency during the minority of Louis XIV., her brother Louis won the great victory of Rocroy in 1643 (see Conde), and the duchess became of political importance. In 1646 she accompanied her husband to Miinster, where he was sent by Mazarin as chief envoy, and where she charmed the German diplomatists who were making the treaty of Westphalia, and was addressed as the " goddess of peace and concord." On

her return she fell in love with the due de la Rochefoucauld, the author of the Maxims, who made use of her love to obtain influence over her brother, and thus win honours for himself. She was the guiding spirit of the first Fronde, when she brought over Armand, Prince de Conti, her second brother, and her husband to the malcontents, but she failed to attract Conde himself, whose loyalty to the court overthrew the first Fronde. It was during the first Fronde that she lived at the Hotel de Ville and took the city of Paris as god-mother for the child born to her there. The peace did not satisfy her, although La Roche- foucauld won the titles he desired. The second Fronde was largely her work, and in it she played the most prominent part in attracting to the rebels first Conde and later Turenne. In the last year of the war she was accompanied into Guienne by the due de Nemours, her intimacy with whom gave La Roche- foucauld an excuse for abandoning her, and who himself im- mediately returned to his old mistress the duchesse de Chevreuse. Thus abandoned, and in disgrace at court, the duchess betook herself to religion. She accompanied her husband to his govern- ment at Rouen, and devoted herself to good works. She took for her director M. Singlin, famous in the history of Port Royal. She chiefly lived in Normandy till 1663, when her husband died, and she came to Paris. There she became more and more Jansenist in opinion, and her piety and the remembrance of her influence during the disastrous days of the Fronde, and above all the love her brother, the great Conde, bore her, made her con- spicuous. The king pardoned her and in every way showed respect for her. She became the great protectress of the Jan- senists; it was in her house that Arnauld, Nicole and De Lane were protected; and to her influence must be in great part attributed the release of Lemaistre De Sacy from the Bastille, the introduction of Pomponne into the ministry and of Arnauld to the king. Her famous letters to the pope are part of the history of Port Royal (q.v.), and as long as she lived the nuns of Port Royal des Champs were left in safety. Her elder son resigned his title and estates, and became a Jesuit under the name of the Abbe d'Orleans, while the younger, after leading a debauched life, was killed leading the attack in the passage of the Rhine in 1673. As her health failed she hardly ever left the convent of the Carmelites in which she had been educated. On her death in 1679 she was buried with great splendour by her brother Conde, and her heart, as she had directed, was sent to the nuns of the Port Royal des Champs.

The chief authority for Madame de Longuevflle's life is a little book in two volumes by Villefore the Jansenist, published in 1738. Victor Cousin has devoted four volumes to her, which, though im- mensely diffuse, give a vivid picture of her time. See also Sainte- Beuve, Portraits des femmes (1840). Her connexion with Port Royal should be studied in Arnauld's Memoirs, and in the different histories of that institution.

LONGUS, Greek sophist and romancer, author of Daphnis and Chloe. Nothing is known of his life, and all that can be said is that he probably lived at the end of the 2nd or the beginning of the 3rd century a.d. It has been suggested that the name Longus is merely a misreading of the last word of the title Aeo-picuc&v tponiK&v \6yoi 5′ in the Florentine MS.; Seiler also observes that the best MS. begins and ends with X67011 (not ~kbyyov) iroifitviK&v. If his name was really Longus, he was probably a freedman of some Roman family which bore it. Longus'sstyle is rhetorical, his shepherds and shepherdesses are wholly conventional, but he has imparted human interest to a purely fanciful picture. As an analysis of feeling, Daphnis and Chloe makes a nearer approach to the modern novel than its chief rival among Greek erotic romances, the Aethiopica of Heliodorus, which is remarkable • mainly for the ingenious succession of incidents. Daphnis and Chloe, two children found by shepherds, grow up together, nourishing a mutual love which neither suspects. The develop- ment of this simple passion forms the chief interest, and there are few incidents. Chloe is carried off by a pirate, and ultimately regains her family. Rivals alarm the peace of mind of Daphnis; but the two lovers are recognized by their parents, and return to a happy married life in the country. Daphnis and Chloe was the model of La Sireine of

Montemayor, the Aminta of Tasso, and The Gentle Shepherd of Allan Ramsay. The celebrated Paul et Virginie is an echo of the same story.

See J. Dunlop's History of Prose Fiction (1888), and especially E. Rohde, Der griechische Roman (1900). Longus found an incomparable translator in Jacques Amyot, bishop of Auxerre, whose French version, as revised by Paul Louis Courier, is better known than the original. It appeared in 1559, thirty-nine years before the publica- tion of the Greek text at Florence by Columbani. The chief subse- quent editions are those by G. Jungermann (1605), J. B. de ViUoison (1778, the first standard text with commentary), A. Coraes (Coray) (1802), P. L. Courier (1810, with a newly discovered passage), E. Seiler (1835), R. Hercher (1858), N. Piccolos (Paris, 1866) and Kiefer (Leipzig, 1904), W. D. Lowe (Cambridge, 1908). A. J. Pons's edition (1878) of Courier's version contains an exhaustive bibliography. There are English translations by G. Thorneley (1733, reprinted 1893), C. V. Le Grice (1803), R. Smith (in Bohn's Classical Library), and the rare Elizabethan version by Angel Day from Amyot's trans- lation (ed. J. Jacobs in Tudor Library, 1890). The illustrated editions, generally of Amyot's version, are numerous and some are beautiful, Prudhon's designs being especially celebrated.

LONGWY, a fortified town of north-eastern France in the department of Meurthe-et-Moselle, 89 m. N.N.W. of Nancy by rail. Pop. (1906) 8523. Longwy is situated on a plateau overlooking the Chiers, a right-bank affluent of the Meuse, near the frontiers of Belgium and Luxemburg. It comprises an upper and a lower town; the former, on a hill, 390 ft. above the Chiers valley, commands the Luxemburg road, and is strengthened by an enceinte and a few out-lying fortifications. There is garrison accommodation for 5000 men and 800 horses, but the permanent garrison is small. The lower town is the industrial centre. The 17th-century church has a lofty square tower, the hotel de ville dates from 1730, and there is a fine hospital. Iron is extensively mined in the district, and supplies numerous blast furnaces. Several iron and steel works are in operation, and metal utensils, fire-proof ware and porcelain are manufactured. Longwy {Longus vicus) came into the possession of the French in 1678 and was at once fortified by Vauban. It was captured by the Prussians in 1792, 1815 and 1871.

LONNROT, ELIAS (1802-1884), Finnish philologist and discoverer of the Kalevala, was born at Nyland in Finland on the 9th of April 1802. He was an apothecary's assistant, but entered the university of Abo in 1822, and after taking his successive degrees became a physician in 1832. But before this, as early as 1827, he had begun to publish contributions to the study of the ancient Finnish language, and to collect the national ballads and folk-lore, a field which was at that time uncultivated. In 1833 he settled as a doctor in the country district of Kajana, and began to travel throughout Finland and the adjoining Russian provinces in his leisure time, collecting songs and legends. In this way he was able to put together the great epic of Finland, the Kalevala,ihe first edition of which he published in 1835; he continued to add to it, and in 1849 issued a larger and completer text. In 1840 Lonnrot issued his important collection of the Kanteletar, or folk-songs of ancient Finland, which he had taken down from oral tradition. The Proverbs of Finland followed in 1842. In 1853, on the death of Castren, Lonnrot became professor of the Finnish language and literature at the high school of Helsingfors; he retired from this chair in 1862. He died on the igth of March 1884.

LONSDALE, EARLS OF. This English earldom is held by the ancient family of Lowther, which traces its descent to Sir Hugh Lowiher, who flourished in the reign of Edward I. Sir Hugh's descendant Sir Richard Lowther (1520-1607) received Mary queen of Scots on her flight into England in 1568, and in the two following years was concerned with his brother Gerard in attempts to release her from captivity. He was sheriff of Cumberland and lord warden of the west marches. A house built by Gerard Lowther at Penrith is now the " Two

Lions Inn." Sir Richard's eldest son, Sir Christopher Lowther (d. 1617), was the ancestor of the later Lowthers, and another son, Sir Gerard Lowther (d. 1624), was judge of the common pleas in Ireland.

One of Sir Christopher's descendants was Sir John Lowther, Bart. (d. 1706), the founder of the trade of Whitehaven, and

another was John Lowther (1655-1700), who was created Viscount Lonsdale in 1696. Before this creation John had succeeded his grandfather, another Sir John Lowther (d. 1675), as a baronet, and had been member of parliament for Westmorland from 1675 to 1696. In 1688 he was serviceable in securing Cumberland and Westmorland for William of Orange; in 1690 he was first lord of the treasury, and he was lord privy seal • from March 1699 until his death in July 1700. Lonsdale wrote : Memoirs of the Reign of James II., which were printed in 1808 and again in 1857. His family became extinct when his son Henry, the 3rd viscount (1694-1751), died unmarried in March

i75i-

James Lowther, 1st earl of Lonsdale (1736-1802), was a son of Robert Lowther (d. 1745) of Maulds Meaburn, Westmorland, who was for some time governor of Barbados, and was descended from Sir Christopher Lowther; through his mother Catherine Pennington, James was a great-grandson of the 1st viscount Lonsdale. He inherited one of the family baronetcies in 1751, and from three sources he obtained immense wealth, being the heir of the 3rd viscount Lonsdale, of Sir James Lowther, Bart, (d. 1755) of Whitehaven, and of Sir William Lowther, Bart, (d. 1756). From 1757 to 1784 he was a member of parliament, exercising enormous influence on elections in the north of England and usually controlling nine seats in the House of Commons, where his nominees were known as " Sir James's ninepins." He secured the election of William Pitt as member for his borough of Appleby in 1781, and his dispute with the 3rd duke of Portland over the possession of the socage manor of Carlisle and the forest of Inglewood gave rise to lengthy proceedings, both in parliament and in the law courts. In 1784 Lowther was created earl of Lonsdale and in 1797 Viscount Lowther with an extended remainder. The earl's enormous wealth enabled him to gratify his political ambitions. Sir N. W. Wraxall {Historical and Posthumous Memoirs, ed. H.B. Wheatley, 1884), who gives interesting glimpses of his life, speaks of his " prodigious property " and quotes Junius, who called him " the little contemptible tyrant of the north." He was known as the " bad earl," and Horace Walpole and others speak slight- ingly of him; he was, however, a benefactor to Whitehaven, where he boasted he owned the " land, fire and water."

He married Mary (1768-1824) daughter of George III.'s favourite, John Stuart, 3rd earl of Bute, but died childless on the 24th of May 1802, when the earldom became extinct; but a kinsman, Sir William Lowther, Bart. (1757-1844), of Swillington, became 2nd viscount Lowther. This viscount, who was created earl of Lonsdale in 1807, is chiefly famous as the friend of Wordsworth and the builder of Lowther Castle, Penrith. His son, William Lowther, 3rd earl of Lonsdale (1787-1872), held several subordinate positions in various Tory ministries, and was lord president of the council in 1852. He died unmarried, and was succeeded by his nephew Henry (1818-1876), whose son Hugh Cecil (b. 1857) succeeded his brother as 6th earl of Lonsdale in 1882.

Other prominent members of the Lowther family are the Right Hon. James William Lowther (b. 1855), who became speaker of the House of Commons in 1905; Sir Gerard Augustus Lowther (b. 1858), who became British ambassador at Constantinople in 1908; and the Right Hon. James Lowther (1840-1904), who was a well-known Conservative member of parliament from 1865 . onwards, and chief secretary for Ireland from 1878 to 1880..

LONSDALE, WILLIAM (1794-1871), English geologist and palaeontologist, was born at Bath on the 9th of September 1794. He was educated for the army and in 1810 obtained a commission as ensign in the 4th (King's Own) regiment. He served in the Peninsular War at the battles of Salamanca and Waterloo, for both of which he received medals; and he retired as lieutenant. Residing afterwards for some years at Batheaston he collected a series of

rocks and fossils which he presented to the Literary and Scientific Institution of Bath. He became' the first honorary curator of the natural history department of the museum, and worked until 1829 when he was appointed assistant secretary and curator of t he Geological Society of London

at Somerset House. There he held office until 1842, when ill- health led him to resign. The ability with which he edited the publications of the society and advised the council " on every obscure and difficult point " was commented on by Murchison in his presidential address (1843). In 1829 Lonsdale read before the society an important paper " On the Oolitic District of Bath " (Trans. Geol. Soc. ser. 2, vol. iii.), the results of a survey begun in 1827; later he was engaged in a survey of the Oolitic strata of Gloucestershire (1832), at the instigation of the Geological Society, and he laid down on the one-inch ordnance maps the boundaries of the various geological formations. He gave particular attention to the study of corals, becoming the highest authority in England on the subject, and he described fossil forms from the Tertiary and Cretaceous strata of North America and from the older strata of Britain and Russia. In 1837 he suggested from a study of the fossils of the South Devon lime- stones that they would prove to be of an age intermediate between the Carboniferous and Silurian systems. This suggestion was adopted by Sedgwick and Murchison in 1839, and may be regarded as the basis on which they founded the Devonian system. Lonsdale's paper, " Notes on the Age of the Limestones of South Devonshire" (read 1840), was published in the same volume of the Transactions of the Geological Society (ser. 2, vol. v.) with Sedgwick and Murchison's famous paper " On the Physical Structure of Devonshire," and these authors observe that " the conclusion arrived at by Mr Lonsdale, we now apply without reserve both to the five groups of our North Devon section, and to the fossiliferous slates of Cornwall." The later years of Lonsdale's life were spent in retirement, and he died at Bristol on the nth of November 1871. (H. B. Wo.)

LONS-LE-SAUNIER, a town of eastern France, capital of the department of Jura, 76 m. N.N.E. of Lyons on the Paris-Lyons railway, on which it is a junction for Chalon-sur-Saone, D61e, Besancon and Champagnole. Pop. (1906) 10,648. The town is built on both sides of the river Valliere and is surrounded by the vine-clad hills of the western Jura. It owes its name to the salt mines of Montmorot, its western suburb, which have been used from a very remote period. The church of St Desire, a building of the 12th and 15th centuries, preserves a huge Romanesque crypt. The town is the seat of a prefect? and of a court of assizes, and there are tribunals of first instance and of commerce, a chamber of commerce, lycees and training-colleges for both sexes, and a branch of the Bank of France. There is an establishment for the use of the mineral waters, which are sodio-chlorinated and have strengthening properties. The principal industry of the place is the manufacture of sparkling wines, the Etoile growth being the best for this purpose. Trade is in cheese, cereals, horses, cattle, wood, &c.

Lons-le-Saunier, known as Ledo in the time of the Gauls, was fortified by the Romans, who added the surname Salinarius to the Gallic name. An object of contention owing to the value of its salt, it belonged for a long time during the medieval period to the powerful house of Chalon, a younger branch of that of Burgundy. It was burned in 1364 by the English, and again in 1637, when it was seized by the duke of Longueville for Louis XIII. It became definitively French in 1674. It was here that the meeting between Ney and Napoleon took place, on the return of the latter from Elba in 1815. Rouget de l'lsle, the author of the Marseillaise, was born at Montaigu near this town, where there is a statue erected to him.

LOO (formerly called " Lanterloo," Fr. lanturlu, the refrain of a popular 17th-century song), a round game of cards, played by any number of persons; from five to seven makes the best game. " Three-card loo " is the game usually played. An ordinary pack of fifty-two cards is used and the deal passes after each round. Each player must have the same number of deals; but if there is a " loo " (the sum forfeited by a player who plays, but does not win a trick) in the last deal of a round, the game continues till there is a hand without a loo. The

dealer deals three cards face downwards, one by one, to each player and an extra hand called " miss," and turns up the top of the undealt cards for trumps. Each player contributes to

the pool a sum previously agreed upon. The unit for a single stake should be divisible by three without a remainder, e.g. three counters or three pence. The players are bound to put in the stake before the deal is completed. Each player in rotation, beginning from the dealer's left, looks at his cards, and declares whether he will play, or pass, or take " miss." If the former, he says " I play." If he takes miss he places his cards face downwards in the middle of the table, and takes up the extra hand. If he passes, he similarly places his cards face downwards in the middle of the table. If miss is taken, the subsequent players only have the option of playing or passing. A player who takes miss must play. Those who are now left in play one card each in rotation, beginning from the dealer's left, the cards thus played constituting a trick. The trick is won by the highest card of the suit led, or, if trumped, by the highest trump, the cards ranking as at whist. The winner of the trick leads to the next, and so on, until the hand is played out. The cards remain face upwards in front of the persons placing them. If the leader holds ace of trumps he must lead it (or king, if ace is turned up). If the leader has two trumps he must lead one of them, and if one is ace (or king, ace being turned up) he must lead it. With this exception the leader is not bound to lead his highest trump if more than two declare to play; but if there are only two declared players the leader with more than one trump must lead the highest. Except with trumps as above stated he may lead any card he chooses. The subsequent players must head the trick if able, and must follow suit if able. Holding none of the suit led, they must head the trick with a trump, if able. Otherwise they may play any card they please. The winner of the first trick is subject to the rules already stated respecting the lead, and in addition he must lead a trump if able (called trump after trick).

When the hand has been played out, the winners of the tricks divide the pool, each receiving one-third of the amount for each trick. If only one has declared to play, the dealer plays miss either for himself or for the pool. If he plays for the pool he must declare before seeing miss that he does not play for himself. Any tricks he may win, when playing for the pool, remain there as an addition to the next pool. Other rules provide that the dealer must play, if only one player stands, with his own cards or with " miss." If miss is gone and against him, he may defend with the three top cards of the pack, excluding the trump card; these cards are called " master."

If each declared player wins at least one trick it is a single, i.e. a fresh pool is made as already described; but if one of the declared players fails to make a trick he is looed. Then only the player who is looed contributes to the next pool. If more than one player is looed, each has to contribute.

At unlimited loo each player looed has to put in the amount there was in the pool. But it is often agreed to limit the loo, so that it shall not exceed a certain fixed sum. Thus, at eighteen-penny loo, the loo is generally limited to half a guinea. If there is less than the limit in the pool the payment is regulated as before; but if there is more than the limit, the loo is the fixed sum agreed on.

The game is sometimes varied by " forces," i.e. by compelling every one to play in the first deal, or when there is no loo the previous deal, or whenever clubs are trumps (" club law "). When there is a force no miss is dealt. " Irish loo " is played by allowing declared players to exchange some or all of their cards for cards dealt from the top of the pack. There is no miss, and it is not compulsory to lead a trump with two trumps, unless there are only two declared players. At " five-card loo " each player has five cards instead of three, and a single stake should be divisible by five. " Pam " (knave of clubs) ranks as the highest trump, whatever suit is turned up. There is no miss, and cards may be exchanged as at Irish loo. If ace of trumps is led, the leader says " Pam be civil," when the holder of that card must pass the trick if he can do so without revoking. A flush (five cards of the same suit, or four with Pam) " loos the board," i.e. the holder receives the amount of a loo from every one, and the hand is not played. A trump flush takes precedence of flushes in other suits. If more than one flush is held, or if Pam is held, the holder is ex- empted from payment. As between two

flushes which do not take precedence, the elder hand wins. A single stake should be divisible by five.

LOOE, a seaport and market town in the Bodmin parlia- mentary division of Cornwall, England, 17 m. by sea W. of Plymouth, a terminus of the Liskeard & Looe light railway.

Pop. (1901) 254.8. It is divided by the river into East Looe and West Looe; and is sheltered so completely by the surrounding hills that myrtles, geraniums, fuchsias and other delicate plants flourish at all seasons in the open air. Its lanes are narrow, steep and winding; many of the houses are entered by wooden staircases; and though considerably modernized the town has a medieval air. Inland, the shores of the river are richly wooded; and towards the sea they rise on the south into rugged cliffs. The parish church of St Martin, which stands 1 m. outside the town, has a Norman doorway and font. Among other buildings may be mentioned the ancient chapel of St Nicholas in West Looe, restored in 1862; and the old town-hall, where the ancient pillory is preserved. A considerable export trade in copper, tin and granite was formerly carried on, and the last is still exported, but the chief trade is in grain; while timber, coal and limestone are imported. There are also thriving fisheries, the Looe fisher- men being particularly expert with the seine on a rocky bottom. The inlet of Trelawne is one of the most exquisite wooded coombes in Cornwall. At its head are the remains of a camp, connected with the Giant's Hedge, a raised earthwork which extends for 7 m. in a straight line, as far as a larger camp, on Bury Down, and is of Danish or Saxon construction. Trelawne, a fine old mansion belonging to the family of Trelawny, dates in part from the isth century, but has been very largely restored.

The harbourage was probably the original cause of settlement at Looe. At the time of the Domesday Survey East Looe was assessed under Pendrym, which was of the king's demesne and West Looe under Hamelin's manor of Trelowia. In the 14th century the former manor was held by the family of Bod- rugan; the latter by that of Dauney, who had inherited it from the Treverbyns. In 1237 Henry Bodrugan received the grant of a market on Fridays and a fair at Michaelmas in his manor of Pendrym. In 1301 his grandson and namesake granted to East Looe a market and fair, view of frank pledge, ducking stool and pillory and assize of bread and ale. Otto Bodrugan in 1320 granted the burgesses the privilege of electing their own portreeve and controlling the trade of the town. A charter of incorporation was granted in 1558 under which the common council was to con- sist of a mayor and 8 chief burgesses. There was to be a court of record, a market on Saturdays and fairs at Michaelmas and Candlemas. In 1685 James II. provided that there should be a mayor and 1 1 aldermen, 36 free burgesses, 4 fairs and a court of pie powder. East Looe was governed under this charter until 1885. West Looe (known also as Porpighan or Porbuan) bene- fited by a charter granted by Richard king of the Romans to Odo Treverbyn and ratified in 1325 constituting it a free borough whose burgesses were to be free of all custom throughout Corn- wall. Residence for a year and a day within the borough conferred freedom from servitude. There were to be a market on Wednesdays and a fair at Michaelmas. Hugh son of Odo Treverbyn gave West Looe the privileges enjoyed by Helston and Launceston. Upon the attainder of the earl of Devon in 1530 the borough fell to the crown and was annexed to the duchy. In 1 574 a charter of incorporation was granted, providing for a mayor and n burgesses, also for a market on Wednesdays and two fairs. West Looe continued to be administered under this charter until i860, when the death of the mayor deprived the council of its only surviving member and elector. Parlia- mentary representation was conferred upon East Looe in 1571 and upon West Looe in 1353. In the debate on the reform bill O'Connell stated that there was but one borough more rotten than East Looe and that was West Looe. Looe was second only to Fowey as a port in the 1 5th century. It furnished 20 ships for the siege of Calais. Of the markets and fairs only the markets on Wednesdays and Saturdays and a fair on the 6th of May remain. LOOM, or Loon (Icelandic, L6mr), a name applied to water- birds of three distinct families, remarkable for their clumsy gait on land. 1 The first is the Colymbidae, to which the term diver 1 The word also takes the form " lumme " (fide Montagu), and, as Professor Skeat

observes, is probably connected with lame. The signification of loon, a clumsy fellow, and metaphorically a simpleton, is obvious to any one who has seen the attempt of the birds to which the name is given to walk.

(q.v.) is usually restricted in books; the second the Podicipedidae, or grebes (q.v.); and the third the Alcidae. The form loon is most commonly used both in the British Islands and in North America for all species of the genus Colymbus, or Eudytes accord- ing to some ornithologists, frequently with the prefix sprat, indicating the fish on which they are supposed to prey; though it is the local name of the great crested grebe (Podiceps cristaius) wherever that bird is sufficiently well known to have one; and, ns appears from Grew (Mus. Reg. Soc. p. 69), it was formerly given to the little grebe or dabchick (P. fluviatUis or minor). The other form loow seems more confined in its application to the north, and is said by T. Edmonston (Etym. Gloss. Shell. and Orkn. Dialect, p. 67) to be the proper name in Shetland of Colymbus septentrionalis; 2 but it has come into use among Arctic seamen as the name of the guillemot (Alca arra or bruennichi) which throngs the cliffs of northern lands, from whose " loomeries " they obtain a wholesome food; while the writer believes he has heard the word locally applied to the razorbill (q.v.). (A. N.)

LOOM, a machine for weaving fabrics by intersecting the longitudinal threads, the " warp," i.e. " that which is thrown across " (O.E. wearp, from weorpan, to throw, cf. Ger. iverfen) with the transverse threads, the " weft," i.e. " that which is woven " (O.E. wefta, from wefan, to weave, cf. Ger. weben). The O.E. geloma and M.E. lome meant an implement or tool of any kind. In the sense of property, furniture, &c, it appears in heirloom (q.v.). The earliest example with its specific mean- ing quoted by the New English Dictionary is from the Nottingham Records of 1404 (see Weaving).

" Loom " in the sense of " to appear indistinctly," to come into view in an exaggerated indistinct shape, must be distinguished from the above word. This appears to have been a sailor's term for the indistinct or exaggerated appearance of land, a vessel or other object through haze or darkness at sea. It is of obscure origin, but has been connected through the O. Fr. lumer, modern aUumer, with Lat. lumen, light, and with the root seen in " lame," in the sense of " moving slowly towards one."

L06N, the largest town of the province of Bohol, island of Bohol, Philippine Islands, on the extreme W. coast. Pop. (1903) 18,114. Loon is picturesquely situated on the W. slope of a hill, and is reached from the sea by steps cut in the rocks. The harbour is in a sheltered bay on the N. side of the town. The cultivation of coco-nuts, coffee, cocoa, maguey, tobacco, cotton and Indian corn, and the raising of livestock are the principal industries; there is also considerable commerce and some manufacturing. The language is chiefly Bohol- Visayan.

LOOP. (1) A curve or bend, particularly a bend in a string, rope, &c, formed by doubling back one part so as to leave an opening; similarly a ring of metal or other material leaving an aperture. (2) In architecture or fortification, " loop,'" more usually in the form " loophole," is an opening in the wall of a building, very narrow on the outside and splayed within, from which arrows or darts might be discharged on an enemy, or through which light might be admitted. They are often in the form of a cross, and generally have round holes at the ends (see Oillets). (3) The word is also a term in iron and steel manufacturing for a mass of metal ready for hammering or rolling, a " bloom."

This last word is represented in French by loupe, from which it is probably adapted. The earlier English form was also loupe, and it was also applied to precious stones which were of inferior brilliancy; the same also appears in French. Of the word in its two first meanings, a bend or circle in a line of string, metal, rails, &c, and " loophole," the derivation is uncertain. Skeat takes the word in both meanings to be the same and to be of Scandinavian origin, the old Norwegian hlaup, a leap, being the direct source. The base is the Teutonic hlaufan, to run, to leap, German laufen. The New English Dictionary considers the Swedish example, lop-knut, " running knot," and others given by Skeat in support of his derivation to be German- isms, and also that the pronunciation of the word would have been lowp rather than lup. " Loop " in meaning (2) " loophole " is alio taken to be a different word, and is derived from Dutch luipen, to peer, watch. In modern Dutch the word for a narrow opening

is gluip.

2 Dunn and Saxby, however, agree in giving ” rain-goose ” as the name of the species in Scotland.

LOOSESTRIFE, in botany, the common name of Lysimachia vulgaris, an erect plant, 2 to 4 ft. high, common on river banks in England; the branched stem bears tapering leaves in pairs or whorls, and terminal panicles of rather large deep yellow flowers. It is a member of the primrose family. L. nemorum, yellow pimpernel, or wood loosestrife, a low-growing plant with slender spreading stem, and somewhat similar yellow flowers standing singly in the leaf -axils, is frequent in copses. L. Nummularia is the well-known creeping jenny or money-wort, a larger plant with widely creeping stem, pairs of shining leaves and large solitary yellow flowers; it is found on banks of rivers and damp woods, and is a common rockery plant. Purple loose- strife, Lythrum Salicaria, belongs to a different family, Lyth- raceae. It is a handsome plant growing 2 to 6 ft. high on river banks and ditches, with a branched angled stem bearing whorls of narrow pointed stalkless leaves and ending in tall tapering spikes of beautiful rose-purple flowers. The flowers ‘ are tri- morphic, that is to say, exist in three forms which differ in the relative length of the styles and stamens and are known as long- styled, mid-styled and short -styled forms respectively; the size and colour of % the pollen also differ. These differences play an important part in the pollination of the flower.

LOOT, plunder or spoil taken from an enemy in war, especially the indiscriminate plunder taken by the victor after the capture of a city. The word came into English from India. It is adapted from the Hindi hit, which is either from Sanskrit lunt, to rob, plunder, or lotra, loptra, booty.

LOPES, FERnXo (i38o?i45Q?), the patriarch of Portuguese historians, was appointed keeper of the royal archives, then housed in the castle of St George in Lisbon, by King John I. in November 1418. He acted as private secretary to the Infants D. Duarte and D. Fernando, and when the “former ascended the throne he charged Lopes, by letter of the 19th of March 1434, with the work of ” putting into chronicles the stories of the kings of old time as well as the great and lofty actions of the most virtuous king my lord and father ” (John I.). The form of the appointment marked its limits, and is a sufficient reply to those modern critics who have censured Lopes for partiality. Not withstanding his official title of chief chronicler of the realm, he was the king’s man (Vassallodel Red), and received his salary from the royal treasury. King Alphonso V. confirmed him in his post by letter of the 3rd of June 1440, and in 1454, after thirty-six years’ service in the archives and twenty as chronicler, he resigned in favour of Gomez Eannes de Azurara. The latter pays a tribute to his predecessor as ” a notable person, a man of rare knowledge and great authority,” and the modern historian Herculano says, ” there is not only history in the chronicles of Fernao Lopes, there is poetry and drama as well; there is the middle age with its faith, its enthusiasm, its love of glory.” Lopes has been called the Portuguese Froissart, and that rare gift, the power of making their subjects live, is common to the two writers; indeed, had the former written in a better-known language, there can be little doubt that the general opinion of critics would have confirmed that of Robert Southey, who called Lopes ” beyond all comparison the best chronicler of any age or nation.” Lopes was the first to put in order the stories of the earlier Portuguese monarchs, and he composed a general chronicle of the kingdom, which, though it never appeared under his name, almost certainly served as a foundation for the chronicles of Ruy de Pina (q.v.). Lopes prepared himself for his work with care and diligence, as he tells us, not only by wide reading of books ‘n different languages, but also by a study of the archives be- longing to municipalities, monasteries and churches, both in Portugal and Spain. He is usually a trustworthy guide in facts, and charms the reader by the naive simplicity of his style.

His works that have come down are: (1) Chronica del Rei D. Joao I. de boa memoria, parts I

and 2 (Lisbon, 1644). The third part relating the capture of Ceuta was added by Azurara. A corrected text of the chronicle has been issued by instalments in the Archivo Historico Portuguez. (2) " Chronica do senhor rei D. Pedro I'.," in vol. iv. of the Colleccao de Livros Ineditos da Historia Portugueza, published by the Academy of Sciences (Lisbon, 1816); a much better text than that published by Father Bayao in his edition of

the same chronicle (Lisbon, 1760). (3) Chronica do senhor rei D. Fernando published in the same volume and collection. The British Museum has some important 16th-century MSS. of the chronicles.

See Damiao de Goes, Chronica del Rei Dom Manoel, part iv. ch. 38 ; Araago Morato, introduction to vol. iv. of the above collection; Herculano, Opusculos, vol. v. (E. Pr.)

LOPEZ, CARLOS ANTONIO (1790-1862), Paraguayan auto- crat, was born at Asuncion on the 4th of November 1790, and was educated in the ecclesiastical seminary of that city. He attracted the hostility of the dictator, Francia, and he was forced to keep in hiding for several years. He acquired, however, so unusual a knowledge of law and governmental affairs that, on Francia's death in 1840, he obtained an almost undisputed control of the Paraguayan state, which he maintained un- interruptedly until his death on the 10th of September 1862. He was successively secretary of the ruling military junta (1840- 1841), one of the two consuls (1 841-1844), and president with dictatorial powers (1844-1862) by successive elections for ten and three years, and in 1857 again for ten years, with power to nominate his own successor. Though nominally a president acting under a republican constitution, he ruled despotically. His government was in general directed with wise energy towards developing the material resources and strengthening the military power of the country. His jealousy of foreign approach several times involved him in diplomatic disputes with Brazil, England, and the United States, which nearly resulted in war, but each time he extricated himself by skilful evasions.

His eldest son, Francisco Solano Lopez (1826-1870), was born near Asuncion on the 24th of July 1826. When in his nineteenth year he was made commander-in-chief of the Para- guayan army, during the spasmodic hostilities then prevailing with the Argentine Republic. He was sent in 1853 as minister to England, France and Italy, and spent a year and a half in Europe. He purchased large quantities of arms and military supplies, together with several steamers, and organized a project for building a railroad and establishing a French colony in Paraguay. He also formed the acquaintance of Madame Lynch, an Irish adventuress of many talents and popular qualities, who became his mistress, and strongly influenced his later ambitious schemes. Returning to Paraguay, he became in 1855 minister of war, and on his father's death in 1862 at once assumed the reins of government as vice- president, in accordance with a provision of his father's will, and called a congress by which he was chosen president for ten years. In 1864, in his self-styled capacity of " protector of the equilibrium of the La Plata," he demanded that Brazil should abandon her armed interference in a revolutionary struggle then in progress in Uruguay. No attention being paid to his demand, he seized a Brazilian merchant steamer in the harbour of, Asuncion, and threw into prison the Brazilian governor of the province of Matto Grosso who was on board. In the following month (December 1864) he despatched a force to invade Matto Grosso, which seized and sacked its capital Cuyaba, and took possession of the province and its diamond mines. Lopez next sought to send an army to the relief of the Uruguayan president Aguirro against the revolutionary aspirant Flores, who was supported by Brazilian troops. The refusal of the Argentine president, Mitre, to allow this force to cross the intervening province of Corrientes, was seized upon by Lopez as an occasion for war with the Argentine Republic. A congress, hastily summoned, and com- posed of his own nominees, bestowed upon Lopez the title of marshal, with extraordinary war powers, and on April 13, 1865, he declared war, at the same time seizing two Argentine war- vessels in the bay of Corrientes, and on the next day occupied the town of Corrientes, instituted a provisional government of his Argentine partisans, and summarily announced the annexa- tion to Paraguay of the provinces of Corrientes and Entre Rios. Meantime the party of Flores had been successful in Uruguay, and that state on April the 18th united with the Argentine Republic in a declaration of war on Paraguay. On the 1st of May Brazil joined these two states in a secret alliance, which stipulated that they should unitedly prosecute the war " until the existing

government of Paraguay should be overthrown,"

and " until no arms or elements of war should be left to it." This agreement was literally carried out. The war which ensued, lasting until the 1st of April 1870, was carried on with great stubbornness and with alternating fortunes, though with a steadily increasing tide of disasters to Lopez (see Paraguay). In 1868, when the allies were pressing him hard, his mind, natur- ally suspicious and revengeful, led him to conceive that a con- spiracy had been formed against his life in his own capital and by his chief adherents. Thereupon several hundred of the chief Paraguayan citizens were seized and executed by his order, including his brothers and brothers-in-law, cabinet ministers, judges, prefects, military officers, bishops and priests, and nine- tenths of the civil officers, together with more than two hundred foreigners, among them several members of the diplomatic legations. Lopez was at last driven with a mere handful of troops to the northern frontier of Paraguay, where, on the 1st of April 1870, he was surprised by a Brazilian force and killed as he was endeavouring to escape by swimming the river Aquidaban.

LOPEZ DE G6MARA, FRANCISCO (isio?iS55?), Spanish historian, was educated at the university of Alcala, where he took orders. Soon after 1540 he entered the household of the famous Cortes, who supplied him with most of the material for his Historia de las Indias (1552), and Cronica de la conquista de Nueva Espana .(!S5 2) The pleasing style and novel matter enchanted the Spanish public, but the unmeasured laudation of Cortes at the expense of his lieutenants and companions brought about a violent reaction. Though the Historia was dedicated to Charles V., both works were forbidden on the 17 th of November 1553, and no editions of them were issued between 1554 and 1727. Italian and French versions of his books were published in 1556 and 1578 respectively.

LOP-NOR or Lob-nor, a lake of Central Asia, in the Gobi Desert, between the Astin-tagh (Altyn-tagh) on the south and the Kuruk-tagh on the north. Previous to 1876 it was placed in nearly all maps at 42° 30′ N., a position which agreed with the accounts and the maps of ancient Chinese geographers. In the year mentioned the Russian explorer Przhevalsky discovered two closely connected lake-basins, Kara-buran and Kara-koshun, fully one degree farther south, and considerably east of the site of the old Lop-nor, which lake-basins he nevertheless regarded as being identical with the old Lop-nor of the Chinese. But the water they contained he pronounced to be fresh water. This identification was disputed by Baron von Richthofen, on the ground that the Lop-nor, the " Salt Lake " of the Chinese geographers, could not be filled with fresh water; moreover, being the final gathering basin of the desert stream, the Tarim, it was bound to be salt, more especially as the lake had no outflow. Przhevalsky visited the Lop-nor region again in 1885, and adhered to his opinion. But ten years later it was explored anew by Dr Sven Hedin, who ascertained that the Tarim empties part of its waters into another lake, or rather string of lakes (Avul)u- kol, Kara-kol, Tayek-kol and Ark a-kol), which are situated in 42 30′ N., and thus so far justified the views of von Richthofen, and confirmed the Chinese accounts. At the same time he advanced reasons for believing that Przhevalsky's lake-basins, the southern Lop-nor, are of quite recent origin — indeed, he fixed upon 1720 as the probably approximate date of their formation, a date which von Richthofen would alter to 1750. Besides this, Sven Hedin argued that there exists a close inter-relation between the northern Lop-nor lakes and the southern Lop-nor lakes, so that as the water in the one group increases, it decreases to the same propor- tion and volume in the other. He also argued that the four lakes of northern Lop-nor are slowly moving westwards under the incessant impetus of wind and sandstorm {bur an). These con- clusions were afterwards controverted by the Russian traveller, P. K. Kozlov, who visited the Lop-nor region in 1893-1894 — that is, before Dr Sven Hedin's examination. He practically only reiterated Przhevalsky's contention, that the ancient Chinese maps were erroneously drawn, and that the Kara-koshun, in spite of the freshness of its water, was the old Lop-nor, the Salt Lake par excellence of the Chinese. Finally, in 1900, Dr Sven

Hedin, following up the course of the Kum-darya, discovered — at the foot of the Kuruk-tagh, and at the E. (lowest) extremity of the now desiccated Kuruk-darya, with traces of dead forest and other vegetation beside it and beside the river-bed — the basin of a desiccated salt lake, Which he holds to be the true ancient Lop-nor of the Chinese geographers, and at the same time he found that the Kara-koshun or Lop-nor of Przhevalsky had extended towards the: north, but shrunk on the south. Thus the old Lop-nor no longer exists, but in place of it there are a number of much smaller lakes of newer formation. It may fairly be inferred that, owing to the uniform level of the region, the sluggish flow of the Tarim, its unceasing tendency to divide and reunite, conjoined with the violence and persistency of the winds (mostly from the east and north-east), and the rapid and dense growth of the reed-beds in the shallow marshes, the drainage waters of the Tarim basin gather now in greater volume in one depression, and now in greater volume in another; and this view derives support from the extreme shallowness of the lakes in both Sven Hedin's northern Lop-nor and Przhevalsky's southern Lop-nor, together with the uniformly horizontal level of the entire region.

See Delmar Morgan's translation of Przhevalsky's From Kuja' across the Tian-shan to Lop-nor (London, 1879) ; Von Richthofen's " Bemerkungen zu den Ergebnissen von Oberst-Leutenant Prje- walskis Reise nach dem Lop-nor " in Verhandl. der Cesch. f. Erdkunde zu Berlin (1878), pp. 121 seq.;'Sven Hedin's Scientific Results of a Journey in Central Asia, 1899-1902 (vols. i. andii., Stockholm, 1905-1906), where Kozlov's share of the controversy is summarized (cf. ii., 270-280). (J. T. Be.) _■

LOQUAT, Japanese Plum Or Japanese Medlar, known botanically as Eriobotrya japonica, small evergreen tree belonging to the natural order Rosaceae, with large thick oval-oblong leaves borne near the ends of the branches, and dark green above with a rusty tomentum on the lower face. The fruit is pear-shaped, yellow, about i| in. long and contains large stony seeds; it has an agreeable acid flavour. The plant is a native of China and Japan, but is widely grown for its fruit and as a decorative plant. It is a familiar object in the Mediterranean region and in the southern United States. '

LORAIN, a city of Lorain county, Ohio, U.S.A., on Lake Erie, at the mouth of the Black river, and about 25 m. W. by S. of Cleveland. Pop. (1890) 4863; (1900) 16,028, of "whom 4730 were foreign-born and 359 negroes; (1910 census) 28,883. Lorain is served by the New York, Chicago & St. Louis, and the Baltimore & Ohio railways, by the Lake Shore Electric railway, and by several of the more important steamboat lines on the Great Lakes. It has a Carnegie library, the Lake View Hospital and the Saint Joseph's Hospital. There is a good harbour, and the city's chief interests are in the shipping of great quantities of coal, iron-ore, grain and lumber, in the building of large steel .vessels, in railway shops, and in the manufacture of iron pipes, gas engines, stoves and automatic steam shovels. The value of the factory products increased from $9,481,388 in 1900 to $14,491,091 in 1905, or 52-8%. The municipality owns and operates the waterworks. A Moravian mission was established here in 1787-1788, and a trading post in 1807, but no permanent settlement was made until several years later. In 1836 the place was incorporated as a village under the name "Charleston"; in 1874 the present name was adopted, and in 1896 Lorain became a city of the second class.

LORALAI, a town and district of India, in Baluchistan. The town, which is situated 4700 ft. above the sea, .35 m. by road from the railway station of Harnai, was occupied as a military station in 1886, and has quarters for a native cavalry and a, native infantry regiment. Pop. (1901) 3561. < .

The District of Loralai was formed in 1903. It consists of a series of long, narrow valleys, hemmed in by rugged mountains, and bordered E. by Dera Ghazi Khan district of the Punjab. Area 7999 sq. m.; pop. (1901) 67,864, of whom the majority are Afghans. The principal crops are wheat and millet; but the chief wealth of the inhabitants is derived from their herds of cattle, sheep and goats.

LORCA, a town of eastern Spain, in the province of Murcia, on the right bank of the river Sangonera (here called the Guadalantin or Guadalentin) and on the Murcia-Baza railway. Pop. (1900) 69,836. It occupies a height crowned by a medieval fortress, among the foothills of the Sierra del Carlo. Its older parts, Moorish in many features and with narrow irregular streets, contrast with the modern parts, which have broad streets and squares, and many fine public buildings — theatre, town hall, hospitals, courts of justice and a bridge over the Sangonera. There is an important trade in agricultural products and live stock, as well as manufactures of woollen stuffs, leather, gun- powder, chemicals and porcelain. Silver, sulphur and lead are found in the neighbourhood.

Lorca is the Roman Eliocroca (perhaps also the Ilorci of Pliny, N.H. iii. 3) and the Moorish Lurka. It was the key of Murcia during the Moorish wars, and was frequently taken and retaken. On the 30th of April 1802 it suffered severely by the bursting of the reservoir known as the Pantano de Puentes, in which the waters of the Sangonera were stored for purposes of irriga- tion (1775-1785); the district adjoining the river, known as the Barrio de San Cristobal, was completely ruined, and more than six hundred persons perished. In 1810 Lorca suffered greatly from the French invasion. In 1886 the Pantano, which was one of the largest of European reservoirs, being formed by a dam 800 ft. long and 160 ft. high, was successfully rebuilt.

LORCH, a town in the Prussian province of Hesse-Nassau, romantically situated on the right bank of the Rhine, 8 m. below Riidesheim by the railway Frankfort-on-Main-Wiesbaden-Cologne. Pop. (1905) 2269. It has a fine Gothic Roman Catholic church — St Martin's — dating from the 14th century. The slopes of the hills descending to the Rhine are covered with vineyards, which produce excellent wine. In the neighbourhood of Lorch, which was mentioned as early as 832, is the ruined castle of Nollich.

LORCH, a town in the kingdom of Wiirttemberg, on the Rems, 26 m. E. from Stuttgart by the railway to Nordlingen. Pop. (1905) 3033. It possesses a fine Protestant church dating from the 1 2th century. Its industries include carriage-building and the manufacture of cement and paper. On the Marienberg lying above the town stands the former Benedictine monastery of Lorch, founded about 1108 by Frederick of Hohenstaufen, and in 1563 converted into an Evangelical college. Here Schiller passed a portion of his school days. The church contains several tombs of the Hohenstaufen family. The Roman limes began at Lorch and Roman remains have been found in the neighbourhood of the town.

See Kirn, Fuhrer durch das Kloster Lorch (Lorch, 1888); and Steimle, Kastell Lorch (Heidelberg, 1897).

LORD, JOHN (1810-1894), American historical writer and lecturer, was born in Portsmouth, New Hampshire, on the 27th of December 1810. He was the nephew of Nathan Lord (1792- 1870), president of Dartmouth College from 1828 to 1863. He graduated at Dartmouth in 1833, and at Andover Theological Seminary in 1837. His course at the Seminary was interrupted by a period of teaching — at Windham, Connecticut (1834), and at Norwich (1834-1835) — and by a tour in 1836 through New York and Ohio, in which he lectured on the dark ages. He was agent and lecturer for the American Peace Society (1837-1839), and for a brief time was a Congregational pastor in turn at New Marlboro and West Stockbridge, Massachusetts, and at Utica, New York. About 1840 he became a professional lecturer on history. He lectured extensively for fifty years, especially in the United States and Great Britain, and introduced, with success, the mid-day lecture. He was lecturer on history in Dartmouth from 1869 to 1876. He received, in 1864, the degree of LL.D. from the University of the City of New York. From 1854 he made his home in Stamford, Connecticut, where he died on the 15th of December 1894. His works include, besides several school and college histories, The Old Roman

World: the Grandeur and Failure of Civilization (1867); Ancient States and Empires (1869); Two German Giants: Frederick the Great and Bismarck (1885); and Beacon Lights of History (8 vols., 1884-1896), his chief contribution to historical literature.

See The Life of John Lord (1896) by Rev. Alexander S. Twombley, D. D. (in " Beacon Lights of History "), which is based chiefly upon Lord's Reminiscences of Fifty Years in the Lecture Field.

LORD (O. Eng. hldford, i.e. hldfweard, the warder or keeper of bread, hldf, loaf; the word is not represented in any other Teutonic language), in its primary sense, the head of a household, the master of those dependent on him for their daily bread, correlative to O. Eng. hldf-aita, loaf -eater, servant; the word frequently occurs in this sense in the Bible, cf. Matt. xxiv. 45. As a term implying the ownership of property, " lord " survives in " lord of the manor " and " landlord." The chief applications are due to its use as the equivalent of Lat. dominus, Gr. Kvpux and Fr. seigneur; thus in the Old Testament it represents Yahweh, Jehovah, and in the New Testament Kvpios, as a title of Jesus Christ. Selden's words may be quoted for the more general meanings of " lord "; " the name Dominus is . . . to be thought of only as a distinguishing attribute of Greatness and as our English word Lord is; and that without any relation of it to an Interest of property or to servitude, and only as it denotes such Superiours as King or Subjects of the greater Nobility with us and men of special Eminency in other States, known by the names of Heeren, Dons, Sieurs, signiors, seigneurs . . . and the like." It is thus not only a general word for a prince or sovereign, but also the common word for a feudal superior, and particularly of a feudal tenant holding directly of the king, a baron (q.v.), hence a peer of the realm, a member of the House of Lords, constituted of the lords temporal and the lords spiritual; this is the chief modern usage. The prefix " lord " is ordinarily used as a less formal alternative to the full title, whether held by right or by courtesy, of marquess, earl or viscount, and is always so used in the case of a baron (which in English usage is generally confined to the holder of a foreign title). Where the name is territorial, the " of " is dropped, thus, the marquess of A., but Lord A. The younger sons of dukes and marquesses have, by courtesy, the title of Lord prefixed to the Christian and surname, e.g. Lord John Russell. In the case of bishops, the full and formal title of address is the Lord Bishop of A., whether he be a spiritual peer or not. Many high officials of the British government have the word " lord " prefixed to their titles; some of them are treated in separate articles; for lord privy seal see Privy Seal. In certain cases the members of a board which has taken the place of an office of state are known as lords commissioners or, shortly, lords of the office in question, e.g. lords of the treasury, civil or naval lords of the admiralty. For lord lieutenant and lord mayor see Lieutenant and Mayor. As the proper form of address " my lord " is used not only to those members of the nobility to whom the title " Lord " is applicable, and to bishops, but also to all judges of the High Court in England, and of the Scottish and Irish Superior Courts, and to lord mayors and lord provosts (see also Lady).

LORD ADVOCATE, or king's advocate, the principal law- officer of the crown in Scotland. His business is to act as a public prosecutor, and to plead in all causes that concern the crown. He is at the head of the system of public prosecutions by which criminal justice is administered in Scotland, and thus his functions are of a far more extensive character than those of the English law-officers of the crown. He is aided by a solicitor- general and by subordinate assistants called advocates-depute. The office of king's advocate seems to have been established about the beginning of the 16th century. Originally he had no power to prosecute crimes without the concurrence of a private party; but in the year 1597 he was empowered to prosecute crimes at his own instance. He has the privilege of pleading in court with his hat on.

PUNTED IN U.S.A.

VOL17_LORD_CH-MECKLEN

Britannica

THE

ENCYCLOPEDIA BRITANNICA

ELEVENTH EDITION

FIRST

edition,

published in three volumes, 1768 — 1771.

SECOND

»»

> > ten 9

1777— 1784.

THIRD

»

,, eighteen ,

1788 — 1797.

FOURTH

»>

,, twenty ,

1801 — 1810.

FIFTH

> >

„ twenty ,

1815—1817.

SIXTH

99

,, twenty ,

1823 — 1824.

SEVENTH

99

„ twenty-one ,

1830 — 1842.

EIGHTH

9)

„ twenty-two ,

1853—1860.

NINTH

99

,, twenty-five ,

1875— 1889.

TENTH

99.

ninth edition and eleven

supplementary volumes,

1902 — 1903.

ELEVENTH

99

published in twenty-nine volume

s, 1910— 1911.

COPYRIGHT

in all countries subscribing to the

Bern Convention

by

THE CHANCELLOR, MASTERS AND SCHOLARS

of the UNIVERSITY OF CAMBRIDGE

All rights reserved

THE ENCYCLOPAEDIA BRITANNICA DICTIONARY OF ARTS, SCIENCES, LITERATURE AND GENERAL INFORMATION

ELEVENTH EDITION

VOLUME XVII

LORD CHAMBERLAIN to MECKLENBURG

New York

Encyclopaedia Britannica, Inc.

342 Madison Avenue

Copyright, in the United States of America, 1911,

by

The Encyclopaedia Britannica Company.

INITIALS USED IN VOLUME XVII. TO IDENTIFY INDIVIDUAL CONTRIBUTORS, 1 WITH THE HEADINGS OF THE ARTICLES IN THIS VOLUME SO SIGNED.

A.C. G.

A.

C.

S.

A.

E.

J.

A.

F.

P.

A.

G.

D.

A.

Ha.

A.

H

F.

A.

H

S.

A.

H

-S.

A

J.

G.*

A. J. H.

A. M. C. A. M. CI.

A. M. F. A. N.

A. N. W. A. R. C.

Maxima; Minima.

Macalpine, John.

Albert Charles Lewis Gotthilf Gunther, M.A., M.D., Ph.D., F.R.S. f

Keeper of Zoological Department, British Museum, 1875-1895. Gold Medalist, J M-pir-,.] /:„ t. n ~i\ Royal Society, 1878. Author of Catalogues of Colubrine Snakes, Batrachia salienua, axm ‘^ ol,sl \™ V aTl > and Fishes in the British Museum; &c. *-

Algernon Charles Swinburne. f Marlowe, Christopher;

See the biographical article: Swinburne, Algernon Charles. I Mary, Queen of Scots.

Arthur Ernest Jolltffe, M.A.

Fellow, Tutor and Mathematical Lecturer, Corpus Christi College, Oxford. Senior Mathematical Scholar, 1892.

Albert Frederick Pollard, M.A., F.R.Hist.Soc.

Professor of English History in University of London. Fellow of All Souls’ College, Oxford. Author of England under the Protector Somerset; Henry VIII.; &c.

Arthur George Doughty, C.M.G., M.A., Lrrr.D., F.R.Hist.S. f

Dominion Archivist of Canada. Member of the Geographical Board of Canada. J „.p -p Author of The Cradle of New France; &c. Joint-editor of Documents relating to’) ” xcl » ee > *• the Constitutional History of Canada. L

Adolf Harnack.

See the biographical article: Harnack, Adolf.

Rev. Andrew Hollingsworth Frost, M.A.

Principal of Church Missionary College, Islington, 1870-1874.

Rev. Archibald Henry Sayce, LL.D., Litt.D.

See the biographical article : Sayce, Archibald Henry.

Sir A. Houtum-Schindler, CLE.

General in the Persian Army. Author of Eastern Persian Irak.

fManichaeism (in part); \ Marcion.

\ Magic Square. I Lycia; Lydia.

Mazandaran.

Arthur James Grant, M.A.

King's College, Cambridge. Professor of History in the University of Leeds.

Alfred J. Hipkins, F.S.A. (1826-1003).

Formerly Member of Council and Hon. Curator of the Royal College of Music, London. Member of Committee of the Inventions and Music Exhibition, 1885; of the Vienna Exhibition, 1892; and of the Paris Exhibition, 1900. Author of Musical Instruments; &c.

Agnes Mary Clerke.

See the biographical article : Clerke, A. M.

Agnes Muriel Clay (Mrs Edward Wilde). C

Formerly Resident Tutor of Lady Margaret Hall, Oxford. Joint-editor of Sources < Magistrate. of Roman History, 133-7 Q B.C. (_

/Louis XIII., XIV. \ France.

Lute (in part); Lyre (in part).

Maskelyne;

Mayer, Johann Tobias.

and XV. of

Rev. Andrew Martin Fairbairn, M.A., D.D., LL.D. See the biographical article: Fairbairn, A. M.

Alfred Newton, F.R.S.

See the biographical article: Newton, Alfred.

{

Martineau, James.

Lory; Love-Bird; Lyre-Bird; Macaw; Magpie; Mallemuck; Manakin; Manucode; Martin.

Alfred North Whitehead, M.A., D.Sc, F.R.S.

Fellow and Senior Lecturer in Mathematics, Trinity College, Cambridge, of A Treatise on Universal Algebra.

Author J Mathematics.

Alexander Ross Clarke, C.B., F.R.S. [

Colonel R.E. Royal Medal of Royal Society, 1887. In charge of Trigonometrical^ Map: Projections (in part).

Operations of the Ordnance Survey, 1854-1881. I

1 A complete list, showing all individual contributors, appears in the final volume.

A. R. L.*

A. SI.

A. Sy. A.Wa.

INITIALS AND HEADINGS OF ARTICLES

Arthur Robert Ling, F.I.C.

Editor of the Journal of the Institute of Brewing. Lecturer on Brewing and Malting -l Malt at the Sir John Cass Institute, London. Vice-President of the Society of Chemical 1 Industry. >-

:!,

Industry,

Arthur Shadwell, M.A., M.D., LL.D.

Member of Council of Epidemiological Society. Author of The London Water- Supply; Industrial Efficiency; Drink, Temperance and Legislation.

Arthur Symons.

See the biographical article : Symons, Arthur.

Arthur Waugh, M.A.

Managing Director of Chapman & Hall, Ltd., Publishers. Formerly Literary Adviser' to Kegan Paul & Co. Author of Alfred Lord Tennyson; Legends of the Wheel; Robert Browning in "Westminster Biographies.," Editor of Johnson's Lives of the Poets.

Malaria {in pari); Massage.

i Mallarmi, Stephane.

Lytton, 1st Baron.

A. W. H.*

Arthur William Holland.

Formerly Scholar of St John's College, Oxford.

Bacon Scholar of Gray's Inn, 1900.

A

. W. Hu.

A

. W. M.

A

W.B.

B

W.

C.

A. M. P.

C.

B.P.

C.

Ch.

C.

F.A.

C.

P. CI.

c.

G. Cr.

c.

H. Ha.

c.

L. K.

c.

M.

c.

PI.

c.

R.B.

Louis J., II., III. and IV.:

Roman Emperors; Louis the German; Louis II. and III. of France; Louis the Child; Magna Carta; Maximilian I.: Roman Emperor. Rev. Arthur Wollaston Hutton, M.A. T

Rector of Bow Church, London. Formerly Librarian of the National Liberal Club. -I Manning, Cardinal. Author of Life of Cardinal Manning ; &c. (_

Arthur William Moore, C.V.O., M.A. (1853-1000). f”

Trinity College, Cambridge. Formerly Speaker of the House of Keys, and J. P. for < Man, Isle of. the Isle of Man. Author of A History of the Isle of Man; &c. [

■ ii! Alexander Wood Renton, M.A. , LL.B.

Puisne Judge of the Supreme Court of Ceylon. of England.

Editor of Encyclopaedia of the Laws 1 Maxims, Legal.

Benjamin Williamson, M.A., D.Sc, F.R.S.

Professor of Natural Philosophy, and Vice-Provost of Trinity College, Dublin, -j Maclaurin, Colin. Author of Differential Calculus; &c.

Charles Augustus Maude Fennell, M.A., Litt.D.

Formerly Fellow of Jesus College, Cambridge. Editor of Pindar’s Odes and Frag- «j Magic Square (in part). ments, and of the Stanford Dictionary of Anglicized Words and Phrases.

Catherine Beatrice Phillips, B.A. (Mrs W. Alison Phillips). Associate of Bedford College, London.

Charles Chree, M.A., LL.D., D.Sc, F.R.S.

Superintendent, Kew Observatory.’ Formerly Fellow of King’s College, Cambridge. President of Physical Society of London. Watt Medallist, Institute of Civil En- gineers, 1905.

Charles Francis Atkinson.

Formerly Scholar of Queen’s College, Oxford. Captain, 1st City of London (Royal – Fusiliers). Author of The Wilderness and Cold Harbour.

Charles Frederick Close,. C.M.G.

Lieutenant-Colonel, R.E. Head of the Geographical Section, British General Staff. Formerly British Representative on the Nyasa-Tanganyika Boundary Commission. ” Author of Text-Book of Topographical Surveying ; &c. , L

Charles George Crump, M.A. f

Balliol College, Oxford. Clerk in H.M. Public Record Office, London. Editor of •{ Manor: in England. Lander’s Works; &c.

Carlton Huntley Hayes, A.M., Ph.D.

Assistant Professor of History in Columbia University, New York City. Member of the American Historical Association.

I Louis XVIII. of France; L Marie Antoinette.

Magnetism, Terrestrial,

Machine-Gun.

Map: Projections (in part).

Matilda, Countess of Tuscany; Lucius.

Charles Lethbridge Kingsford, M.A., F.R.Hist.S., F.S.A.

Assistant Secretary to the Board of Education. Author of Life of Henry V. of Chronicles of London and Stow’s Survey of London.

E ,. J Lovell, Viscount;

1 Margaret of Anjou.

D. B. Ma.

Carl Theodor Mirbt, D.Th. f r r .. f .

Professor of Church History in the University of Marburg. Author of Publizistik i „ y ons * ^ ™ cub °h im Zeitalter Gregor VII.; Quellen zur Geschichte des Papstthums; &c. j_ Marburg, Colloquy 01.

Christian Pfister, D. es L. r

Professor at the Sorbonne, Paris. Chevalier of the Legion of Honour. Author of J. Mayor of the Palace.

Eludes sur le regne de Robert le Pieux. [

Charles Raymond Beazt.ey, M.A., D.Litt. ■ ■ . f „

Professor of Modern History in the University of Birmingham. Formerly Fellow J Magellan; of Merton College, Oxford. University Lecturer in the History of Geography, j Marignolli (in part). Author of Henry the Navigator; The Dawn of Modern Geography; &c. L

Duncan Black Macdonald, M.A D D , „ . f Ma hommedan Institutions;

Professor of Semitic Languages, Hartford Theological Seminary, U.S.A. Author of I Mahommpdan Law

Development of Muslim Theology, Jurisprudence and Constitutional Theory ; Religious Attitude and Life in Islam; &c.

Malik Ibn Anas.

INITIALS AND HEADINGS OF ARTICLES

ˆni

D. F. T. D. G. H.

D. H. D. Mn. D. M. W.

D. S. M.*

E. A. J.

E. Bn. E. C. B.

E.G.

E. Gr. E. G. R.

E. H. M. E. L. W.

E. M. T.

E. 0.* E. Pr.

E. R. B. B. Tn.

Donald Francis Tovey.

Author of Essays in Musical Analysis, comprising The Classical

Concerto, The Goldberg Variations and analyses of many other classical works. •

Madrigal (in music); Mass (in music).

Magnesia; Malatia; Manisa; Marash; Maronites.

Marryat, Frederick; Mast; Mathews, Thomas.

David George Hogarth, M. A.

Fellow of Magdalen College, Oxford. Fellow of the British Academy. Keeper of the Ashmolean Museum, Oxford. Excavated at Paphos, 1888; Naucratis, 1899″ and 1903; Ephesus, 1904-1905; Assiut, 1906-1907; Director, British School at Athens, 1 897-1900; Director, Cretan Exploration Fund, 1899.

David Hannay.

Formerly British Vice-Consul at Barcelona. Author of Short History of the Royal Navy ; Life of Emilio Castelar ; &c.

Rev. Dugald Macfadyen, M.A.

Minister of South Grove Congregational Church, Highgate. Author of Constructive -j Mackennal, Alexander. Congregational Ideals ; &c.

Sir Donald Mackenzie Wallace, K.C.I.E., K.C.V.O.

Extra Groom of the Bedchamber to H.M. King George V. Director of the Foreign Department of The Times, 1891-1899. Member of Institut de Droit International and Officier de l'lnstruction Publique of France. Joint-editor of New Volumes (10th ed.) of the Encyclopaedia Britannica. Author of Russia; Egypt and the Egyptian Question ; The Web of Empire ; &c.

David Samuel Margoliouth, M.A., D.Litt.

Laudian Professor of Arabic, Oxford. Fellow of New College. Author of Arabic Papyri of the Bodleian Library; Mohammed and the Rise of Islam; Cairo, Jerusalem and Damascus.

E. Alfred Jones.

Author of Old English Gold Plate ; Old Church Plate of the Isle of Man ; Old Silver Sacramental Vessels of Foreign Protestant Churches in England ; Illustrated Catalogue -*, Mace. of Leopold de Rothschild's

Collection of Old Plate; A Private Catalogue of the Royal Plate at Windsor Castle ; &c.

Loris-Melikov.

Mahomet.

Eduard Bernstein.

Member of the German Reichstag, 1902-1906. des Socialismus; &c.

Author of Zur Theorie und Geschichte < Marx.

Rt. Rev. Edward Cuthbert Butler, O.S.B., D.Litt. (DubL). [Mabillon; Maurists;

Abbot of Downside Abbey, Bath. Author-of the Lausiac History of Palladius, A Mechitharists. in ” Cambridge Texts and Studies.” I

Edmund Gosse, LL.D., D.C.L.

See the biographical article : Gosse, Edmund.

Ernest Arthur Gardner, M.A.

See the biographical article: Gardner, Percy.

Loti, Pierre; Lyrical Poetry; Macaronics; Madrigal (in verse); Maeterlinck.

Mantineia (in part); Marathon (in part).

Ernest George Ravenstein, M.A., Ph.D.

Professor of Geography at Bedford College, London, 1 882-1 883. Formerly in ,

Topographical (now Intelligence) Department of the War Office. Author of The “j Map (in part).

Russians on the Amur; A Systematic Atlas; &c. I

Ellis Hovell Minns, M.A. r

University Lecturer in Palaeography, Cambridge. Lecturer and Assistant Librarian \ Massagetae. at Pembroke College, Cambridge. Formerly Fellow of Pembroke College. [_

Sir Edward Leader Williams (1828-1910).

Formerly Vice-President, Institute of Civil Engineers. Consulting Engineer, Manchester Ship Canal. Chief Engineer of the Manchester Ship Canal during its construction. Author of papers printed in Proceedings of Institute of Civil Engineers.

Sir Edward Maunde Thompson, G.C.B., I.S.O., D.C.L., Litt.D., LL.D.

Director and Principal Librarian, British Museum, 1898-1909. Sandars Reader in Bibliography, Cambridge, 1895-1896. Hon. Fellow of University College, Oxford. Correspondent of the Institute of France and of the Royal Prussian Academy of ” Sciences. Author of Handbook of Greek and Latin Palaeography. Editor of Chronicon Angliae.

Edmund Owen, M.B., F.R.C.S., LL.D., D.Sc.

Consulting Surgeon to St Mary’s Hospital, London, and to the Children’s Hospital, Great Ormond Street, London. Chevalier of the Legion of Honour. Late . Examiner in Surgery at the Universities of Cambridge, London and Durham. Author of A Manual of Anatomy for Senior Students. ■

Edgar Prestage.

Special Lecturer in Portuguese Literature in the University of Manchester. Ex- aminer in Portuguese in the Universities of London, Manchester, &c. Commendador, Portuguese Order of S. Thiago. Corresponding Member of Lisbon Royal Academy of Sciences, Lisbon Geographical Society, &c. Editor of Letters of a Portuguese Nun; Azurara’s Chronicle of Guinea; &c.

Edwyn Robert Bevan, M.A. f Macedonian Empire;

Formerly Scholar of New College, Oxford. Author of House of Seleucus; Jerusalem i T™ima«Vino i under the High Priests jˆysimacnus.

Rev. Ethelred Luke Taunton (d. 1907). ■ f

Author of The English Black Monks of St Benedict; History of the Jesuits in \ Loyola. England. [

Manchester Ship Canal.

Manuscript.

Lung; Lupus;

Mammary Gland: Diseases.

Macedo; Manuel de Mello.

Vlll

£• W« 0i

N

P. A. P.

F. C. C.

F. G. H.

B.

P. G. P.

INITIALS AND HEADINGS OF ARTICLES

P.J.H.

F.

J.S.

F.

K.

F.

LLG.

P.

Po.

F.

R. C.

F.

W.R.*

G. A. Gr.

G.Br.

G. B. S. G C.L.

G. G.*

S. G.S.

G. Ha C.

G. R.P.

G. Sa.

G. W. Tc

Edward Williams Byron Nicholson, M.A.

Librarian of the Bodleian Library, Oxford. Principal Librarian and Superintendent of the London Institution, 1873-1882. Author of Keltic Researches.

Frederick Apthorp Paley, LL.D.

See the biographical article: Paley, F. A.

Frederic Cornwallis Conybeare, M.A., D.Th. (Giessen).

Fellow of the British Academy. Formerly Fellow of University College, Oxford. Author of The Ancient Armenian Texts of Aristotle; Myth, Magic and Morals; &c.

Frederick George Meeson Beck, M.A.

Fellow and Lecturer in Classics, Clare College, Cambridge.

Mandeville, Sir John.

4 Lucian.

Manichaeism {in pari).

Lothian.

Frederick Gymer Parsons, F.R.C.S., F.Z.S., F.R.Anthrop. Inst. f

Vice-President, Anatomical Society of Great Britain and Ireland. Lecturer on J Lymphatic System {in part) ; Anatomy at St Thomas's Hospital and the London School of Medicine for Women. | Mammary Gland: Anatomy. Formerly Hunterian Professor at the Royal College of Surgeons. L

Francis John Haverfield, M.A., LL.D.

Camden Professor of Ancient History at Oxford University. Fellow of Brasenose T . College, Oxford. Fellow of the British Academy. Member of the German Imperial J ˆUgUOUnum; Archaeological Institute. Formerly Senior Censor, Student, Tutor and Librarian I Mancunium. of Christ Church, Oxford. Ford's Lecturer, 1906. Author of Monographs on Roman History, &c.

Frederick John Snell, M.A.

Balliol College, Oxford. Author of The Age of Chaucer; &c.

Fernand Khnopff.

See the biographical article: Khnopff, Fernand E. J. M.

Francis Ll.ewellyn Griffith, M.A., Ph.D., F.S.A.

Reader in Egyptology, Oxford University. Editor of the Archaeological Survey and Archaeological Reports of the Egypt Exploration Fund. Fellow of Imperial German Archaeological Institute.

Sir Frederick Pollock, Bart., LL.D., D.C.L.

See the article : Pollock (family).

Frank R. Cana.

Author of South Africa from the Great Trek to the Union.

Frederick William Rudler, I.S.O., F.G.S.

Curator and Librarian at the Museum of Practical Geology, London, 1879-1902. President of the Geologists' Association, 1887-1889.

George Abraham Grierson, CLE., Ph.D., D.Litt. (Dublin).

Indian Civil Service, 1873-1903. In charge of Linguistic Survey of

India, 1898- 1902. Gold Medallist, Royal Asiatic Society, 1909. Vice-President of the Royal Asiatic Society. Formerly Fellow of Calcutta University. Author of The Lan- guages of India; &c.

Rev. George Bryce, M.A., D.D., LL.D., F.R.S. (Canada).

President of the Royal Society of Canada. Head of Faculty of Science and Lecturer in Biology and Geology in Manitoba University, 1891-1904. Author of Manitoba; A Short History of the Canadian People ; &c.

George Barnett Smith.

Author of William I. and the German Empire ; Life of Queen Victoria ; &c.

George Collins Levey, C.M.G.

Member of Board of Advice to Agent-General of Victoria. Formerly Editor and Proprietor of the Melbourne Herald. Secretary to Commissioners for Victoria at the Exhibitions in London, Paris, Vienna, Philadelphia and Melbourne.

George Gladden.

Associate Editor of Current Literature, 1904-1905. Editor of Biography, New International Encyclopaedia, 1901-1904, 1906-1907, and New International Year Book, 1907-1908; &c.

George Gregory Smith, M.A.

Professor of English Literature, Queen’s University of Belfast. Author of The Days of James I V. ; The Transition Period ; Specimens of Middle Scots ; &c.

George Herbert Carpenter, B.Sc.

Professor of Zoology in the Royal College of Science, Dublin. Author of Insects: their Structure and Life.

George Robert Parkin, LL.D., D.C.L.

See the biographical article : Parkin, George Robert.

Lydgate.

Madou.

Luxor; Manetho.

-I Maine, Sir Henry. \ Mandingo.

J Magnetite; y Malachite.

Marathi.

Manitoba {in part). Macmahon. McCulloch, Sir James.

Martha's Vineyard.

George Saintsbury, LL.D., D.C.L. ,

See the biographical article : Saintsbury, George E. B.

J Lyndsay, Sir David.

: J May-Fly {in part).

JMacdonald, Sir John \ Alexander.

Maistre, Joseph de; Malherbe, Francois de; Marguerite de Valois; Marivaux, Pierre; Marot, Clement.

Rev. Griffithes Wheeler Thatcher, M.A., B.D.

Warden of Camden College, Sydney, N.S.W. Formerly Tutor in Hebrew and . Old Testament History at Mansfield College, Oxford.

Luqman;

Mahommedan Religion; Mandaeans {in part); Maqqarl; . MaqrizI; Mas'udi.

INITIALS AND HEADINGS OF ARTICLES

IX

H. B. Wo.

H. CI.

H. C. H.

H.

De.

H.

E. S.*

H.

Fr.

H.

Le.

H. Lb.

H. L. H.

H. M. S.

H. S.*

Horace Bolingbroke Woodward, F.R.S., F.G.S.

Formerly Assistant Director, Geological Survey of England and Wales. Wollaston * Medallist, Geological Society. Author of The History of the Geological Society of London; &c.

Sir Hugh Charles Clifford, K.C.M.G.

Colonial Secretary, Ceylon. Fellow of the Royal Colonial Institute. Formerly Resident, Pahang. Colonial Secretary, Trinidad and Tobago, 1903-1907. Author ‘ of Studies in Brown Humanity; Further India; &c. Joint-author of A Dictionary of the Malay Language.

Rev. Horace Carter Hovey, A.M., D.D.

Fellow of the American Association for the Advancement of Science, _ Geological Society of America, National Geographic Society and Societe de Speleologie (France). ■ Author of Celebrated American Caverns; Handbook of Mammoth Cave of Kentucky; &c.

Rev. Hippolyte Delehaye, SJ.

Bollandist. Joint-editor of the Ada Sanctorum.

Horace Elisha Scudder (d. 1902).

Formerly Editor of the Atlantic Monthly. History of the United States ;

&c.

Henri Frantz.

Art Critic, Gazette des Beaux- Arts (Paris).

Herbert Martin James Loewe, M.A.

Queen's College, Cambridge. Curator of Oriental Literature, University Library, . Cambridge. Formerly Chief English Master at the Schools of the Alliance at Cairo and Abyassiyyeh, Egypt. Author of Kitab el Ansab of Samani; &c.

Horace Lamb, M.A., LL.D., D.Sc, F.R.S.

Professor of Mathematics, University of Manchester. Formerly Fellow and Assistant Tutor of Trinity College, Cambridge. Member of Council of Royal ■ Society, 1894-1896. Royal Medallist, 1902. President of London Mathematical Society, 1 902-1904. Author of Hydrodynamics; &c.

Harriet L. Hennessy, M.D. (Brux.), L.R.C.S.I., L.R.C.P.I.

Henry Morse Stephens, M.A., Litt.D.

Balliol College, Oxford. Professor of History in the University of California. Author of History of the French Revolution; &c.

Author of Life of James Russell Lowell;

Lyell, Sir Charles.

Malacca;

Malay Peninsula;

Malays;

Malay States: Federated,

Luray Cavern; Mammoth Cave.

Lucia, St; Marcellinus, St; . Margaret, St; Martyrplogy.

Lowell, James Russell. I Manet.

Maimonides.

Mechanics: Theoretical:

Malaria (in part).

Maintenon, Madame de; Mazarin.

Sir Herbert Stephen, Bart., Trinity College, Cambridge. Circuit.

M.A., LL.M. Barrister-at-Law.

Clerk of Assize for the Northern < Lytton, 1st Earl of.

H.St.

H. W. C. D.

H. W. R.*

H. Y. I. A.

J. A. C. J. A. S. J. A. V.*

J. Bt.

J. C. R. C. J. D. B.

Henry Sturt, M.A. J

Author of Idola Theatri; The Idea of a Free Church; Personal Idealism; &c.]

I

Henry William Carless Davis, M.A.

Fellow and Tutor of Balliol College, Oxford. Fellow of All Souls' College, Oxford, 1895-1902. Author of England under the Normans and Angevins; Charlemagne.

Lotze {in part).

Mandeville, Geoffrey de; Marsh, Adam; Matilda, Queen; Matthew of Paris.

Rev. Henry Wheeler Robinson, M.A. f

Professor of Church History in Rawdon College, Leeds. Senior Kennicott Scholar, J jyjalachi (in part).

Oxford, 1901. Author of Hebrew Psychology in Relation to Pauline Anthropology 1

(in Mansfield College Essays) ; &c. I

Sir Henry Yule, K.C.S.I., C.B. J Mandeville, Sir John (in part);

See the biographical article: Yule, Sir Henry. \ Marignolli (in part).

Israel Abrahams, M.A.

Reader in Talmudic and Rabbinic Literature in the University of Cambridge. Formerly President, Jewish Historical Society of England. Author of A Short History of Jewish Literature; Jewish Life in the Middle Ages; Judaism; &c.

Sir Joseph Archer Crowe, K.C.M.G.

See the biographical article: Crowe, Sir J. A.

John Addington Symonds.

See the biographical article: Symonds, J. A.

John Augustus Voelcker, M.A., Ph.D., F.I.C, F.L.S.

Consulting Chemist to the Royal Agricultural Society of England, &c. Author of The Woburn Experiments ; &c.

James Bartlett.

Lecturer on Construction, Architecture, Sanitation, Quantities, &c, at King's College, London. Member of Society of Architects. Member of Institute of Junior Engineers.

Sir John Charles Ready Colomb, K.C.M.G. See the biographical article : Colomb, P. H.

James David Bourchier, M.A., F.R.G.S.

King's College. Cambridge. Correspondent of The Times in South-Eastern Europe. Commander of the Orders of Prince Danilo of Montenegro and of the Saviour of Greece, and Officer of the Order of St Alexander of Bulgaria.

Luria;

Luzzatto, Moses Hayim; Luzzatto, Samuel David; Mapu; Marano.

Mabuse

Machiavelli; Manutius.

J. F.-K. J. Ga.

J. 6* sH3#

J. Hn.

J. H. F. J. H. “R.

J. HI. R.

J.I. J. J. T.

INITIALS AND flEAlDINGScOF ARTICLES

J.

L.

W.

J.

M.

Gr.

J.

M.

M.

J.

P.

P.

Jno.

S.

J

Si

•

J. S. Bl. J. S. Co.

J. S. F.

J. T. Be. J. T. C.

J. T. M.

Author of Burma -A Mandalay,

James Fitzmaurice-Kelly, Litt.D., F.R.Hist.S. •

Gilmour Professor of Spanish' Language and Literature, Liverpool University. Norman McColI Lecturer, Cambridge University. Fellow of the British Academy. Member of the Council of the Hispanic Society of America. Knight Commander pf N the, Order of Alphonso XII. Author of A History of Spanish Literature.

i Ja»e1 ©A!M)ner, C.B., LL.D.

Sjaet the: biographical article: Gairdner, James.

; SiR° ; jpAfiES' George Scott, K.C.I.E.

Superintendent and Political Officer, Southern Shan States. The Upper Burma Gazetteer.

JtfSTUS HASHAGEN, PH.D: •

Privatdozent in Medieval and Modern History, University of Bonn. Das Rheinland unter die franzosische Herrschaft.

John Henry Freese, M.A.

Formerly Fellow of St John's College, Cambridge.

John Horace Round, M.A., LL.D. (Edin.).

Author of Feudal England; Studies in Peerage and Family History; Pedigree.

John Holland Rose, M.A., Litt.D.

Christ's College, Cambridge. Lecturer on Modern History to the Cambridge University Local Lectures Syndicate. Author of Life of Napoleon I. ; Napoleonic Studies; The Development of the European Nations; The Life, of Pitt; chapters in the Cambridge Modern History.

Jules Isaac.

Professor of History at the Lycee of Lyons.

{

r.

Lull, Raimon; Maupassant.

Mary I., Queen.

Author of i Louis I. and II. of Bavaria.

-j Lycaon.

r Lord Great Chamberlain;

Peerage and\ Mar, Earldom of; L Marquess.

Lowe, Sir Hudson; Maret.

Louis XII. of Franee.

Matter.

Sir Joseph John Thomson, D.Sc., LL.D., Ph.D., F.R.S.

Cavendish Professor of Experimental Physics and Fellow of Trinity College, Cam- i M«ffnotn_r»n« < > c" bridge. President of the British Association, 1909-1910. Author of A Treatise < ul »Sneio-upu6S, on the Motion of Vortex Rings; Application of Dynamics to Physics and Chemistry; Recent Researches in Electricity and Magnetism ; &c.

Jessie, Laidlay Weston.

Author of Arthurian Romances unrepresented in Malory. (_ Map Walter.

James Moncrieff Grierson, C.B., C.M.G., C.V.O. r

Major-General, R.A. Commanding 1st Division Aldershot , Command.

Director J „ iwiif

of Military Operations at Headquarters, 1904-1906. Served through South Af-rican 1 Manoeuvres, military. War, 1900-1901. Author of Staff Duties in the Field; &c. I

f Malory, Sir Thomas; I Map,

John Malcolm Mitchell.

Sometime Scholar of Queen's College, Oxford. Lecturer in Classics, East London College (University of London). Joint-editor of Grote's History of Greece.

Mandeville, Bernard de; Marcus Aurelius Antoninus.

John Percival Postgate, M.A., Litt.D. r

Professor of Latin in the University of Liverpool. Fellow of Trinity College, J T , . »

Cambridge. Fellow of the British Academy. Editor of the Classical Quarterly.] ˆ u ˚an [tn part). Editor-in-chief of the Corpus Po'etarum Latinorum; &c. [

Sir John Scott, K.C.M.G., D.C.L. (1841-1904).

Deputy Judge Advocate-General to the Forces, 1898-1904. Judicial Adviser to • the Khedive of Egypt, 1890-1898. Hon. Fellow of Pembroke College, Oxford.

Rev. James Sibree, F.R.G.S.

Principal Emeritus, United College (L.M.S. and F.F.M.A.), Antananarivo, Mada- gascar. Membre de l'Academie Malgache. Author of Madagascar and its People; ' Madagascar before the Conquest; A Madagascar Bibliography; &c.

Martial Law.

Joint-editor of

John Sutherland Black, M.A., LL.D.

Assistant-editor of the 9th edition of the Encyclopaedia Britannica. the Encyclopaedia Biblica.

James Sutherland Cotton, M.A.

Editor of the Imperial Gazetteer of India. Hon. Secretary of the Egyptian Ex- ploration Fund. Formerly Fellow and Lecturer of Queen's College, Oxford. Author of India; &c. (_

John Smith Flett, D.Sc, F.G.S. r

Petrographer to the Geological Survey. Formerly Lecturer on Petrology in J Marble; Edinburgh University. Neill Medallist of the Royal Society of Edinburgh. Bigsby 1 fli a rL Medallist of the Geological Society of London. [_

Madagascar; Mauritius.

' Mary: Mother of Jesus

(in part). Mazzini.

Mahrattas (in part).

John Thomas Bealby. r

Joint-author of Stanford's Europe. Formerly Editor of the Scottish Geographical J Magazine. Translator of Sven Hedin's Through Asia, Central Asia and Tibet; &c. (_

Maritime Province

(in part).

Joseph Thomas Cunningham, M.A., F.Z.S. C

Lecturer on Zoology at the South-Western Polytechnic, London. Formerly m „„, „„ /• . a Fellow of University College, Oxford. Assistant Professor of Natural History in i maCKerei (»« part). the 'University of Edinburgh and Naturalist to the Marine Biological Association. [_

John Theodore Merz, LL.D., Ph.D., D.C.L-

Chairman of the Newcastle-upon-Tyne Electric Supply Co., History of European thought in the XlXth Century; &c.

Ltd. Author of \ Lotze '(*» P ari >-

INITIALS AND HEADINGS OF ARTICLES

XI

J.

T. S.*

J.

v.*

J.

V. B.

K,

.G.J.

K

K.

K

.L,

K. S. L.J. 8.

L.V*

L. W. V-H. M. A. W.

IS. Br.

M. Ja.

M. N. T.

M. 0.

B.

C

M P.

N.D.

H.

N.V=

N. W. T.

0. R.

P. A. A. P. A. K. P.O. P. GL

{

James Thomson Shotwell, Ph.D.

Professor of History in Columbia University, New York City.

Jules ViarDv ;

Archivist at the National Archives, Paris. Officer of Public Instruction, France Author of La France sous Philippe VI de Valois ; &c.

James Vernon Bartlet, M.A., D.D. (St Andrews). r

Professor of Church History, Mansfield College, Oxford. Author of The Apostolic < Age; &c. '-

Louis VI., VII., IX., X. and XI. of France.

Lore, Ambroise de; Louvet, Jean; Marcel, lJtienne.

Mark, St (in part); Matthew, St; Luke, St.

Kingsley Garland Jayne.

Sometime Scholar of Wadham College, Oxford. Author of Vasco da Gama and his Successors.

Matthew Arnold Prizeman, 1903.] Mala y Archipelago.

Konrad Kessler, Ph.D.

Formerly Professor of Semitic Languages at the University of Greifswald.

Rev. Kirsopp Lake, M.A.

Lincoln College, Oxford. Professor of Early Christian Literature and New Testa- ment Exegesis in the University of Leiden. Author of The

Text of the New Testa- ment; The Historical Evidence for the Resurrection of Jesus Christ; &c. ‘

Kathleen Schlesinger.

Editor of Portfolio of Musical Archaeology. Orchestra.

Author of The Instruments of the –

Mandaeans (in part).

Mary, Mother of Jesus

(in part).

Lute (in part); Lyre (in part); Mandoline.

Leonard James Spencer, M.A., F.G.S. f

Assistant, Department of Mineralogy, Natural History Museum, South Kensington. J Manganite; Formerly Scholar of Sidney Sussex College, Cambridge, and Harkness Scholar. Marcasite. Editor of the Mineralogical Magazine. L

Luigi Villari. [

Italian Foreign Office (Emigration Dept.). Formerly Newspaper Correspondent in -j Mazzini: Bibliography. East of Europe. Author of Italian Life in Town and Country; &c.

L. W. Vernon-Harcourt (d. 1009).

Barrister-at-Law. Author of His Grace the Steward and the Trial of Peers.

Mary A. Ward (Mrs Humphry Ward).

See the biographical article: Ward, Mary Augusta.

Margaret Bryant.

\ Lord High Steward.

JLyly. ■

f Louis VIII. and XVII. I of France.

Morris Jastrow, Jr., Ph.D.

Professor of Semitic Languages, University of Pennsylvania. of the Babylonians and Assyrians; &c.

Marcus Niebuhr Tod, M.A.

Fellow and Tutor of Oriel College, Oxford. University Lecturer in Epigraphy. Joint-author of Catalogue of the Sparta Museum.

Author of Religion i Marduk. .

J Lycurgus: Spartan Lawgiver;

[Lysander.

Maximilian Otto Bismarck Caspari, M.A. (Oxon.). f Mantineia (in part); >

Reader in Ancient History at London University. Lecturer in Greek at Birmingham 1 Manuel I., Comnenus; University, 1905-1908. I Marathon (in part) .

Mark Pattison, LL.D.

See the biographical article : Pattison, Mark.

Newton Dennison Mereness, A.M., Ph.D. : Author of Maryland as a Proprietary Province.

Joseph Marie Noel Valois. r

Member of Academie des Inscriptions et Belles-Lettres, Paris. Honorary Archivist J Marsilius of Padua; at the Archives Nationales. Formerly President of the Soci6t6 de l'Histoire del Martin L-V.: Popes. France, and of the Society de l'Ecole des Chartes. (_ '

Northcote Whitridge Thomas, M.A. j"

Government Anthropologist to Southern Nigeria. Corresponding Member of the J Lyeantnropy; Soci6t6 d'Anthropologie de Paris. Author of Thought Transference ; Kinship and 1 Magic.

Macaulay. ■I Maryland.

Marriage in Australia; &c

Osborne Reynolds, M.A., LL.D., F.R.S. M.Inst.C.E. Formerly Professor of Engineering, Victoria University, Fellow of Queens' College,

Cambridge.

Philip A. Ashworth, M.A., Doc. Juris. New College, Oxford. Barrister-at-Law.

Prince Peter Alexeivitch Kropotkin.

See the biographical article: Kropotkin, Prince, P. A.

Percy Gardner, M.A., Litt.D., LL.D.

See the biographical article: Gardner, Percy.

Peter Giles, M.A., LL.D., Litt.D.

Manchester Honorary J Lubrication.

J Ltibeck (in part).

■I Maritime Province (in part).

i Lysippus.

Fellow and Classical Lecturer of Emmanuel College, Cambridge, and University J jˆ

Formerly Secretary of the Cambridge Phik> ; [

Reader in Comparative Philology, logical Society.

Xll

G.T.

VL

R,

A.*

R.

B. McK.

R.

C.J.

R.

G.

R.

H. C.

INITIALS AND HEADINGS OF ARTICLES

R. J. M. R. K. D.

R.L.*

R. M'L. R. M. n

R. N* B*

R. P. R. P. S.

R. Po. R.S.C

R.T. R. We.

S. A. C.

Peter Guthrie Tait, LL.D.

See the biographical article: Tait, Peter Guthrie.

Paul Vinogradov, D.C.L., LL.D.

See the biographical article : Vinogradoff, Paul.

Robert Anchel.

Archivist to the Department de l'Eure.

Ronald Brunlees McKerrow, M.A.

Trinity College, Cambridge. Editor of The Works of Thomas Nashe; &c.

Sir Richard Claverhouse Jebb, D.C.L., LL.D.

See the biographical article: Jebb, Sir Richard Claverhouse.

Richard Garnett, LL.D., D.C.L.

See the biographical article : Garnett, Richard.

Rev. Robert Henry Charles, M.A., D.Litt.

Grinfield Lecturer on the Septuagint at Oxford, 1905-1907. Fellow of the British Academy. Professor of Biblical Greek at Trinity College, Dublin, 1898-1906. ” Hibbert Lecturer at Oxford, 1898; Jowett Lecturer, 1898-1899. Author of Critical History of a Future Life ; &c.

. j Maxwell, James Clerk. -j Manor (in part). -f Louis XVI.; Marat. -I Marprelate Controversy. j Lysias (in pari).

{

Luoan (in part); Max Mtiller.

Ronald John McNeill, M.A.

Christ Church, Oxford. Barrister-at-law. Gazette, London.

Formerly Editor of the St James’s.

Sir Robert Kennaway Douglas.

Formerly Professor of Chinese, King’s College, London. Keeper of Oriental Printed Books and MSS. at British Museum, 1892-1907. Member of the Chinese Consular Service, 1 858-1 865. Author of The Language and Literature of China; China; Europe and the Far East ; &c.

Richard Lydekker, F.R.S., F.G.S., F.Z.S.

Member of the Staff of the Geological Survey of India, 1874-1882. Author of Catalogues of Fossil Mammals, Reptiles and Birds in the British Museum; The Deer of all Lands; The Game Animals of Africa; &c.

Manasses, Prayer of.

Lundy, Robert; Macdonnell, Sortey Boy; McNeile, Hugh; Manchester,Earls and Dukes oft March, Earls of; Margaret, Queen of Scotland; Masham, Abigail.

Manchuria.

Loris; Macaque; Machaerodus; Mammalia (in part); Mammoth (in part); Manati; Mandrill; Mai-mot; MarsupiaHa; Mastodon.

j May-Fly (in part).

Robert M'Lachlan, F.R.S.

Editor of the Entomologists' Monthly Magazine.

Richard Mountford Deeley, M.Inst.CE., M.I.Mech.E., F.G.S. f

Late Locomotive Superintendent, Midland Railway. Joint-author of Lubrication <, Lubricants and Lubricants. ˆ

Louis I. and II.

Robert Nisbet Bain (d. 1909).

Assistant Librarian, British Museum, 1883-1909. Author of Scandinavia, the Political History of Denmark, Norway and Sweden, 1S13-1900 ; The First Romanovs, 1613 to 1725 ; Slavonic Europe, the Political History of Poland and Russia from 1469 to 1796 ; &c.

Reinhold Pauli.

See the biographical article : Pauli, Reinhold.

of Hungary; Malachowski;

Margaret, Queen; Martinuzzi; Matthias I., Hunyadi; Matvyeev; I Mazepa-Koledinsky.

J Lftbeck (in part).

Manor-House.

R. Phene Spiers, F.S.A., F.R.I.B.A.

Formerly Master of the Architectural School, Royal Academy, London. Past President of Architectural Association. Associate and Fellow of King's College, – London. Corresponding Member of the Institute of France. Editor of Fergusson's History of Architecture. Author of Architecture: East and West; &c.

Rene Poupardin, D. es L. r

Secretary of the fecole des Chartes. Honorary Librarian at the

Bibliotheque J Lorraine;

Nationale, Paris. Author of Le Royaume de Provence sous les Carolingiens; Recueil'] Louis IV. and V. of France,

. des chartes de Saint-Germain ; &c. |_

Robert Seymour Conway, M.A., D.Litt. (Cantab.). r Mamertini*

Professor of Latin and Indo-European Philology in the University of Manchester. J ivro rru ei ni •' Formerly Professor of Latin in University College, Cardiff; and Fellow of Gonville 1 ™ arrucln * > and Caius College, Cambridge. Author of The Italic Dialects. I Marsi.

Sir Richard Temple.

See the biographical article : Temple, Sir Richard.

Richard Webster, A.M. (Princeton).

Formerly Fellow in Classics, Princeton University Maximianus; &c.

Stanley Arthur Cook, M.A.

Lecturer in Hebrew and Syriac, and formerly Fellow, Gonville and Caius College, Cambridge. Editor for Palestine Exploration Fund. Examiner in Hebrew and Aramaic, London University, 1904-1908. Author of Glossary of Aramaic In- scriptions ; The Laws of Moses and the Code of Hammurabi ; Critical Notes on Old Testament History; Religion of Ancient Palestine; &c.

Editor of The Elegies

1

4 Mahrattas (in part).

J Mather, Increase; 0/ [Mather, Richard.

Lot; Manasseh.

INITIALS AND HEADINGS OF ARTICLES

Xlll

S. Bi.

S.C. S.N.

T.As.

T. 6a.

T. P. C. f . G. Br.

T. H. H.* T. M. L. T. R. R. S. T. Se. T. W. R. D.

V. H. S.

W. A. B. C.

W. A. G.

W. A. P. W. D. L. W. E. A. A.

W. E. D. W. E. G. F.

Shelford Bidwell, M.A., D.Sc, F.R.S. (1848-1909).

Gonville and Caius College, Cambridge. Formerly President of the Physical Society and Member of Council of the Royal Society.

Sidney Colvin, LL.D.

See the biographical article : Colvin, Sidney.

Magnetism.

Simon Newcomb, LL.D., D.Sc.

See the biographical article: Newcomb, Simon.

Thomas Ashby, M.A., D.Litt., F.S.A.

Director of the British School of Archaeology at Rome. Corresponding Member of the Imperial German Archaeological Institute. Formerly Scholar of Christ Church, – Oxford; Craven Fellow, Oxford, 1897. Author of The Classical Topography of the Roman Campagna; &c.

Sir Thomas Barclay.

Member of the Institute of International Law. Member of the Supreme Council of the Congo Free State. Officer of the Legion of Honour. Author of Problems of' International Practice and Diplomacy; &c. M.P. for Blackburn, 1910.

Theodore Freylinghuysen Collier, Ph.D.

Assistant Professor of History, Williams College, Williamstown, Mass., U.S.A.

Thomas Gregor Brodie, M.D., F.R.S. f

Professor of Physiology in the University of Toronto. Author of Essentials of J. Lymph and Lymph Formation.

Experimental Physiology. |_

Sir Thomas Hungerford Holdich, K.C.M.G., K.C.I.E., D.Sc. f

Superintendent, Frontier Surveys, India, 1892-1898. Gold Medallist, R.G.S., _ London, 1887. Author of The Indian Borderland; The Countries of the King's Award; India; Tibet.

Marcantonio.

Mars: Planet.

Lucania; Lucca; Lucena; Lucretilis, Mons; Lucus Feroniae; Luna; Magna Graecia; Manduria; Manfredonia; Marches, The; Marino; . Marzabotto.

Mare Clausum. -I Marcellus.

Makran.

Thomas Martin Lindsay, LL.D., D.D.

Principal of the United Free Church College, Glasgow. Formerly Assistant to the Professor of Logic and Metaphysics in the University of Edinburgh. Author of History of the Reformation ; Life of Luther ; &c.

Thomas Roscoe Rede Stebbing, M.A., F.R.S., F.L.S., F.Z.S.

Fellow of King's College, London. Hon. Fellow of Worcester College, Oxford. – Zoological Secretary of Linnaean Society, 1903-1907. Author of A History of Crustacea; The Naturalist of Cumbrae; &c.

Thomas Seccombe, M.A.

Balliol College, Oxford. Lecturer in History, East London and Birkbeck Colleges, „ University of London. Stanhope Prizeman, Oxford, 1887. Assistant Editor of Dictionary of National Biography, 1891-1901.

Author of The Age of Johnson; &c.

Thomas William Rhys Davids, M.A., Ph.D., LL.D.

Professor of Comparative Religion in the University of Manchester. Professor of Pali and Buddhist Literature, University College, London, 1882-1904. President – of the Pali Text Society. Fellow of the British Academy. Secretary and Librarian of Royal Asiatic Society, 1885-1902. Author of Buddhism; &c.

Rev. Vincent Henry Stanton, M.A., D.D.

Ely Professor of Divinity in the University of Cambridge. Canon of Ely. Formerly Fellow, Dean, Tutor and Lecturer of Trinity College, Cambridge. Author of The • Jewish and the Christian Messiahs; &c.

Rev. William Augustus Brevoort Coolidge, M.A., F.R.G.S.

Fellow of Magdalen College, Oxford. Professor of English History, St David's College, Lampeter, 1 880-1 881. Author of Guide to Switzerland; The Alps in Nature * and in History ; &c. Editor of the Alpine Journal, 1880-1889.

Walter Armstrong Graham.

His Siamese Majesty's Resident Commissioner for the Siamese Malay State of Kelantan. Adviser to his Siamese Majesty's Minister for Lands and Agriculture. " Author of Kelantan, a Handbook ; &c.

Walter Alison Phillips, M.A.

Formerly Exhibitioner of Merton College and Senior Scholar of St John's College, – Oxford. Author of Modern Europe ; &c.

William Draper Lewis, LL.B., Ph.D.

Dean of the Law School, University of Pennsylvania. Lecturer on Economics, – Haverford College, Pennsylvania, 1 890-1 896. Editor of Great American Lawyers; &c.

William Edmund Armytage Axon, LL.D.

Formerly Deputy Chief Librarian of the Manchester Free Libraries. On Literary Staff of Manchester Guardian, 1874-1905. Member of the Gorsedd, with the " bardic name of Manceinion. Author of Annals of Manchester; &c.

William Ernest Dalby, M.A., M.Inst.C.E., M.I.M.E.

Professor of Civil and Mechanical Engineering at the City and Guilds of London Institute Central Technical College, South Kensington. Formerly University Demonstrator in the Engineering Department, Cambridge. Author of The Balanc- ing of Engines ; Valves and Valve-Gear Mechanism ; &c.

J Luther, Martin; 1 Lutherans.

\ Malacostraca.

Marlowe, Christopher {in part) ; Marston, Philip Bourke.

LumbinI;

Mahavamsa;

Maitreya.

Mark, Gospel of St; Matthew, Gospel of St; Luke, Gospel of St.

Lotschen Pass;

Lucerne: Canton, Town, Lake

of; Lugano, Lake of; Maggiore, Lago.

Malay States:

Non-Federated. Malay States: Siamese. Louis Philippe; Mahmud II.; – Mass: Church.

Marshall, John.

Manchester.

Mechanics: Applied

(in pari).

William Edward Garrett Fisher, M.A. Author of The Transvaal and the Boers.

1 Marbles.

XIV W. F.*

W. Ho, W. H. F.

W. J. M. R. W. L. C* W. L. F.

W. L. G.

W. M. R. W. M. Ra. W. P. C. W. R. S. W. Wn.

W. W. F.* W. Y. S.

INITIALS AND HEADINGS OF ARTICLES

Rev. William Fairweather, M.A., D.D.

Minister of Dunnikier United Free Church, Kirkcaldy, N.B. Author of Maccabees (Cambridge Bible for Schools) ; The Background of the Gospels ; &c.

Wynnard Hooper, M.A. Clare College, Cambridge.

Financial Editor of The Times, London.

Sir William Henry Flower, F.R.S.

See the biographical article : Flower, Sir W. H.

William John Macquorn Rankine, LL.D.

See the biographical article: Rankine, William John Macquorn.

William Lee Corbin, A.M.

Associate Professor of English, Wells College, Aurora, New York.

Maccabees; Maccabees, Books of.

■j Market.

Mammalia (in pari); Mammoth (in part); Mandrill (in part); Marten.

j Mechanics: Applied (in part]

-j Mather, Cotton.

Author of Documentary

Lynch Law; McGillivray, Alexander.

Walter Lynwood Fleming, A.M., Ph.D.

Professor of History in Louisiana State University. History of Reconstruction; &c.

William Lawson Grant, M.A. f .

Professor at Queen's University, Kingston, Canada. Formerly Beit Lecturer in J Mackenzie, William Lyon:

Colonial History at Oxford University. Editor of Acts of the Privy Council,} Manitoba (in part).

(" Colonial " series); Canadian Constitutional Development (in collaboration). I

„. ,, „ fLuini; Mantegna;

William Michael Rossetti. J Martini . Masa ccio-

See the biographical article: Rossetti, Dante G. 1 ™ arum > ™ asaccl0 >

iMasolmo da Pamcale.

Sir William Mitchell Ramsay, LL.D., D.C.L. J

See the biographical article: Ramsay, Sir William Mitchell. (ˆ Lycaonia.

William Prideaux Courtney, D.C.L.

See the article: Courtney, L. H., Baron.

William Robertson Smith, LL.D.

See the biographical article : Smith, William P.obertson.

William Watson, D.Sc, F.R.S.

Assistant Professor of Physics, Royal College of Science, London. Vice-President – of the Physical Society.

William Warde Fowler, M.A.

Fellow of Lincoln College, Oxford. Sub-Rector, 1881-1904. Gifford Lecturer, Edinburgh University, 1908. Author of The City-State of the Greeks and Romans; ‘ The Roman Festivals of the Republican Period; &c.

William Young Sellar, LL.D.

See the biographical article: Sellar, William Young.

\ Marlborough, 1st Duke of.

fMalaehi (in part); \ Mecca.

J Magnetograph; 1 Magnetometer.

Mars: Mythology; Mauretania.

f Martial; Lucilius (in part); Lucretius.

Lord Chamberlain.

Lotteries.

Louisiana,

Lourdes.

Loyalists.

Luchu Archipelago.

Lutzen.

Lyons.

Macabre.

McKinley, William.

Madeira.

PRINCIPAL

Madison, James.

Madras.

Madrid.

Mafia.

Magnesium.

Magnolia.

Maine, U.S.A.

Maize.

Malplaquet,

Malta.

Mandamus,

AL UNSIGNED ARTICLES

Manganese.

Marseilles.

Manila.

Marshal.

Manipur.

Marston Moor.

Manna.

Maryland.

Maori.

Massachusetts.

Maple.

Match.

March.

Mayo.

Marengo.

Mayor.

Marionettes.

Measles.

Marriage.

Mecklenburg.

ENCYCLOPEDIA BRITANNICA

ELEVENTH EDITION

VOLUME XVII

LORD CHAMBERLAIN, in England, an important officer of the king's household, to be distinguished from the lord great chamberlain (q.v.). He is the second dignitary of the court, and is always a member of the government of the day (before 1782 the office carried cabinet rank), a peer and a privy councillor. He carries a white staff, and wears a golden or jewelled key, typical of the key of the palace, which is supposed to be in his charge, as the ensigns of his office. He is responsible for the necessary arrangements connected with state ceremonies, such as coronations and royal marriages, christenings and funerals; he examines the claims of those who desire to be presented at court; all invitations are sent 'out in his name by command of the

sovereign, and at drawing-rooms and levees he stands next to the sovereign and announces the persons who are approaching the throne. It is also part of his duty to conduct the sovereign to and from his carriage. 1 The bedchamber, privy chamber and presence chamber, the ward- robe, the housekeeper's room, the guardroom and the chapels royal are in the lord chamberlain's department. He is regarded as chief officer of the royal household, and he has charge of a large number of appointments, such as those of the royal physicians, tradesmen and private attendants of the sovereign. All theatres in the cities of London and Westminster (except patent theatres), in certain of the London boroughs and in the towns of Windsor and Brighton, are licensed by him and he is also licenser of plays (see Theatre: Law; and Revels, Master of the). His salary is £2000 a year.

The vice-chamberlain of the household is the lord chamberlain's assistant and deputy. He also is one of the ministry, a white-staff officer and the bearer of a key ; and he is generally a peer or the son of a peer as well as a prrvy councillor. He receives £700 a year. Next to the vice-chamberlain comes the groom of the stole, an office only in use during the reign of a king. He has the charge of the vestment called the stole worn by the sovereign on state occasions.

1 The lord chamberlain of the household at one time discharged some -important political functions, which are described by Sir Harris Nicolas (Proceedings of the Privy Council, vol. vi., Preface, p. xxiii).

2 The office of master of the ceremonies was created by James I. The master of the ceremonies wears a medal attached to a gold chain round his neck, on one side being an emblem of peace with the motto " Beati pacifici," and on the other an emblem of war with the motto " Dieu et mon droit " (see Finetti Philoxensis, by Sir John Finett, master of the ceremonies to James f. and Charles I., 1656; and D'Israeli's Curiosities of Literature, 10th ed., p. 242 seq.).

' See May, Parliamentary Practice, pp. 236, 244.

XVII. 1

In the lord chamberlain's department also are the master, assistant master, marshal of the ceremonies and deputy-marshal of the ceremonies, officers whose special function it is to enforce the ob- servance of the etiquette of the court. The reception of foreign potentates and ambassadors is under their particular care, and they assist in the ordering of all entertainments and festivities at the palace. 2 The gentleman usher of the black rod — the black rod which

he carries being the ensign of his office — is the principal usher of the' court and kingdom. He is one of the original functionaries of the order of the Garter, and is in constant attendance on the House of Lords, from whom, either personally or by his deputy, the yeoman usher of the black rod, it is part of his duty to carry messages and summonses to the House of Commons. There are "six lords and six grooms " in waiting " who attend on the sovereign throughout the year and whose terms of attendance are of a fortnight's or three weeks' duration at a time. Usually " extra " lords and grooms in waiting are nominated by the sovereign, who, however, are unpaid and have no regular duties. Among the serjeants-at-arms there are two to whom special duties are assigned: the one attending the speaker in the House of Commons, and the other attending the lord chancellor in the House of Lords, carrying their maces and execut- ing their orders. 3 The comptroller and examiner of accounts, the paymaster of the household, the licenser of plays, the dean and subdean of the chapels royal, the clerk and deputy clerks of the closet, the groom of the robes, the pages of the backstairs, of the chamber and of the presence, the poet laureate, the royal physi- cians and surgeons, chaplains, painters and sculptors, librarians and musicians, &c, are all under the superintendence of the lord chamberlain of the household. 4

The queen consort's household is also in the department of the lord chamberlain of the household. It comprises a lord chamberlain, a vice-chamberlain and treasurer, equerry and the various ladies of the royal household, a groom and a clerk of the robes. The ladies of the household are the mistress of the robes, the ladies of the bedchamber, the bedchamber women and the maids of honour. The mistress of the robes in some measure occupies the position of the groom of the stole. 6 She is the only lady of the court who comes into office and goes out with the administration. She is always a duchess, and attends the queen consort at all state ceremonies and entertainments, but is never in permanent residence at the palace. 8 The ladies of the bedchamber share the personal attendance on

- The offices of master of the great wardrobe and master of the jewel house in the lord chamberlain's department were abolished in

1782. _ .

s In the reign of Queen Anne, Sarah duchess of Marlborough from 1704, and Elizabeth duchess of Somerset from 1710, held the com- bined offices of mistress of the robes and groom of the stole.

6 Since the great ” bedchamber question ” of 1839 the settled practice has been for all the ladies of the court except the mistress of the robes to receive and continue in their appointments inde- pendently of the political connexions of their husbands, fathers and brothers (see Gladstone’s Gleanings of Past Years, i. 40; and Torrens’s Memoirs of Lord Melbourne, ii. 304).

the queen consort throughout the year. Of these there are eight, always peeresses, and each is in waiting for a fortnight or three weeks at a time. But the women of the bedchamber, of whom there are also eight, appear only at court ceremonies and entertainments according to a roster annually issued under the authority of the lord chamberlain of the queen consort. They are usually the daughters of peers or the wives of the sons of peers, and formerly, like the mistress of the robes and the ladies of the bedchamber, habitually assisted the queen at her daily toilette. But this has long ceased to be done by any of them. The eight maids of honour have the same terms of waiting as the ladies of the bedchamber. They are commonly if not always the daughters or granddaughters of peers, and when they have no superior title and precedence by birth are called ” honourable ” and placed next after the daughters of barons. LORD CHIEF JUSTICE, in England, the presiding judge of the king’s bench division of the High Court of Justice, and in the absence of the lord chancellor, president of the High Court. He traces his descent from the justiciar of the Norman kings. This officer appears first as the lieutenant or deputy of the king, exercising all the functions of the regal office in the absence of the sovereign. ” In this capacity William Fitz-Osbern, the steward of Normandy, and Odo of Bayeux, acted during the Conqueror’s visit to the continent in 1067; they were left, according to William of Poitiers, the former to govern the north of England, ths latter to hold rule in Kent, vice sua; Florence of Worcester describes them as “custodes Angliae,” and Ordericus Vitalis gives to their office the name of ” praefectura.” It would seem most probable that William Fitz-Osbern at least was left in his character of steward, and that the Norman seneschalship was thus the origin of the English justiciarship ” (Stubbs’s Constitutional History, i. 346). The same authority observes that William of Warenne and Richard Clare (Bienfaite), who were left in charge of England in 1074, are named by a writer in the next generation ” praecipui Angliae justitiarii “; but he considers the name to have not yet been definitely attached to any particular office, and that there is no evidence to show that officers appointed to this trust

exercised any functions at all when the king was at home, or in his absence exercised supreme judicial authority to the exclusion of other high officers of the court. The office became permanent in the reign of William Rufus, and in the hands of Ranulf Flambard it became co-extensive with the supreme powers of government. But it was not till the reign of Henry II. that the chief officer of the crown acquired the exclusive right to the title of capitalis or tolius Angliae justitiarius. Stubbs considers that the English form of the office is to be accounted for by the king's desire to prevent the administration falling into the hands of an hereditary noble. The early justiciars were clerics, in whom the possession of power could not become hereditary. The justiciar continued to be the chief officer of state, next to the king, until the fall of Hubert de Burgh (in the reign of King John), described by Stubbs as the last of the great justiciars. Henceforward, according to Stubbs, the office may be said to have survived only in the judicial functions, which were merely part of the official character of the chief justiciar. He was at the head of the curia regis, which was separating itsel ::' into the three historical courts of common law about the time when the justiciarship was falling from the supreme place. The chancellor took the place of the justiciar in council, the treasurer in the exchequer, while the two offshoots from the curia regis, the common pleas and the exchequer, received chiefs of their own. The king's bench represented the original stock of the curia regis, and its chief justice the great justiciar. The justiciar may, therefore, be said to have become from a political a purely judicial officer. A similar development awaited his successful rival the chancellor. Before the Judicature Act the king's bench and the common pleas were each presided over by a lord chief justice, and the lord chief justice of the king's bench was nominal head of all the three courts, and held the title of lord chief justice of England. The titles of lord chief justice of the common pleas and lord chief baron were abolished by the Judicature Act 1873, and all the common law divisions of the High Court united into the king's bench division, the president of which is the lord chief justice of England.

The lord chief justice is, next to the lord chancellor, the highest judicial dignitary in the kingdom. He is an ex-officio judge »3 the

court of appeal. He holds office during good behaviour, and can only be removed by the crown (by whom he is appointed) after a joint address of both houses of parliament. He is now the only judicial functionary privileged to wear the collar of SS. There has been much discussion as to the origin and history of this collar ; l it was a badge or insignia attached to certain offices entitling the holders to wear it only so long as they held those offices. The collar of SS. was worn by

the chiefs of the three courts previous to their amalgamation in 1 $73, and that now worn by the lord chief justice of England was provided by Sir A. Cockburn in 1859 and entailed by him on all holders of the office. The salary is £8000 a year.

In the United States the supreme court consists of a chief justice and eight associate justices, any six of whom make a quorum. The salary of the chief justice is $13,000 and that of the associates $12,500. The chief justice takes rank next after the president, and he administers the oath on the inauguration of a new president and vice-president. The principal or presiding judge in most of the state judicatures also takes the title of chief justice.

LORD GREAT CHAMBERLAIN, in England, a functionary who must be carefully distinguished from the lord chamberlain; he is one of the great officers of state, whose office dates frorr Norman times; and the only one who still holds it under a creation of that period. As his name implies, he was specially connected by his duties with the king's chamber (camera curie) ; but this phrase was also used to denote the king's privy purse, and the chamberlain may be considered as originally the financial officer of the household. But as he was always a great baron, deputies performed his financial work, and his functions became, as they are now, mainly ceremonial, though the emblem of his office is still a key. The office had been held by Robert Malet, son of a leading companion of the Conqueror, but he was forfeited by Henry I., who, in 1133, gave the great chamberlainship to Aubrey de Vere and his heirs. Aubrey's son was created earl of Oxford, and the earls held the office, with some intermission, till 1526, when the then earl left female heirs. His heir-male succeeded to the earldom, but the crown, as is now established, denied his right to the office, which was thenceforth held under grants for life till Queen Mary and Elizabeth admitted in error the right of the earls on the strength of their own allegation. So matters continued till 1626, when an earl died and again left an heir-male and an heir-female. After an historic contest the office was adjudged to the former, Lord Willoughby d'Eresby. No further question arose till 1779, when his heirs were two sisters. In 1 781 the House of Lords decided that it belonged to them jointly, and that they could appoint a deputy, which they did. Under a family arrangement the heirs of the two sisters respec- tively appointed deputies in alternate reigns till the death of Queen Victoria, when Lord Ancaster, the heir of the elder, who was then in possession, claimed that he, as such, had sole right to the office. Lord Cholmondeley and Lord Carrington as co- heirs of the younger sister, opposed his claim, and the crown also claimed for itself on the ground of the action taken by the king in 1526. After a

long and historic contest, the House of Lords (1902) declined to re-open the question, and merely re-affirmed the decision of 1781, and the office, therefore, is now vested jointly in the three peers named and their heirs.

The lord great chamberlain has charge of the palace of Westminster, especially of the House of Lords, in which he has an office; and when the sovereign opens parliament in person he is responsible for the arrangements. At the opening or closing of the session of parliament by the sovereign in person he dis- poses of the sword of state to be carried by any peer he may select, and walks himself in the procession on the right of the sword of state, a little before it and next to the sovereign. He issues the tickets of admission on the same occasions. He assists at the introduction of all peers into the House of Lords on their creation, and at the homage of all bishops after their consecration. At coronations he emerges into special importance; he still asserts before the court of claims his archaic right to bring the king his ” shirt, stockings and drawers ” and to dress him on coronation day and to receive his ancient fees, which include the king’s bed and ” night robe.” He also claims in error to serve the king

1 Notes and Queries, series 1, vol. ii. ; series 4, vols. ii. ix. x. ; series 6, vols. ii. iii. ; Planche, Dictionary of Costume, p. 126; Foss, Lives of the Judges, vol. vii. ; Dugdale, Orig. Jud. fol. 102.

with water before and after the banquet, which was the function of the ” ewry,” a distinct office held by the earls of Oxford. At the actual coronation ceremony he takes an active part in investing the king with the royal insignia.

See J. H. Round, “The Lord Great Chamberlain ” (Monthly Review, June 1902) and ” Notes on the Lord Great Chamberlain Case ” (Ancestor, No. IV.). (J. H. R.)

LORD HIGH CHANCELLOR, one of the great officers of state of the United Kingdom, and in England the highest judicial functionary. The history of the office and of the growth of the importance of the lord chancellor will be found under Chancellor. The lord chancellor is in official rank the highest civil subject in the land outside the royal family, and takes precedence immediately after the archbishop of Canterbury. His functions have sometimes been exercised by a lord keeper of the great seal (see Lord Keeper), the only real difference between the two offices being in the appointment of the keeper by

mere delivery of the seal, while a lord chancellor receives letters patent along with it. He is by office a privy councillor, and it has long been the practice to make him a peer and also a cabinet minister. He is by prescription Speaker or prolocutor of the House of Lords, and as such he sits upon the woolsack, which is not strictly within the House. Unlike the Speaker of the House of Commons, the lord chancellor takes part in debates, speaking from his place in the House. He votes from the woolsack instead of going into the division lobby. The only function which he discharges as Speaker practically is putting the question; if two debaters rise together, he has no power to call upon one, nor can he rule upon points of order. Those taking part in debates address, not the lord chancellor, but the whole House, as " My Lords." The lord chancellor always belongs to a political party and is affected by its fluctua- tions. This has often been denounced as destructive of the independence and calm deliberativeness essential to the purity and efficiency of the bench. In defence, however, of the ministerial connexion of the chancellor, it has been said that, while the other judges should be permanent, the head of the law should stand or fall with the ministry, as the best means of securing his effective responsibility to parliament for the proper use of his extensive powers. The transference of the judicial business of the chancery court to the High Court of Justice removed many of the objections to the fluctuating character of the office. As a great officer of state, the lord chancellor acts for both England and Scotland, and in some respects for the United Kingdom, including Ireland (where, however, an Irish lord chancellor is at the head of the legal system). By Article XXIV. of the Act of Union (1705) one great seal was appointed to be kept for all public acts, and in this department the lord chancellor's authority extends to the whole of Britain, and thus the commissions of the peace for Scotland as well as England issue from him. 1 As an administrative officer, as – a judge and as head of the law, he acts merely for England. His English ministerial functions are thus briefly described by Blackstone: " He be- came keeper of the king's conscience, visitor, in right of the king, of all hospitals and colleges of the king's foundation, and patron of all the king's livings under the value of twenty marks per annum in the king's books. He is the general guardian of all infants, idiots and lunatics, and has the general super- intendence of all charitable uses in the kingdom." But these duties and jurisdiction by modern statutes have been distributed for the most part among other offices or committed to the judges of the High Court (see Charity and Charities; Infant; Insanity). Under the Judicature Act 1873 the lord chancellor is a member of the court of appeal, and, when he sits, its president, and he is also a judge of the High Court of Justice. He is named as president of the chancery division of the latter

court. His judicial patronage is very extensive, and he is by usage the adviser of the crown in the appointment of judges 2 of the

1 The great seal, which exists in duplicate for Irish use, is the great seal of the United Kingdom.

2 Except the lord chief justice, who is appointed on the nomination of the prime minister.

High Court. He presides over the hearing of appeals in the House of Lords. His proper title is ” Lord High Chancellor of Great Britain and Ireland.” His salary is £10,000 per annum, and he is entitled to a pension of £5000 P er annum.

Authorities.— Observations concerning the Office of Lord Chancellor (1651), attributed to Lord Chancellor Ellesmere; Blackstone’s Commentaries; Campbell’s Lives of the Chancellors; and D. M. Kerly, Historical Sketch of the Equitable Jurisdiction of the Court of Chancery (1890).

LORD HIGH CONSTABLE, in England, the seventh of the great officers of state. His office is now called out of abeyance for coronations alone. The constable was originally the com- mander of the royal armies and the master of the horse. He was also, in conjunction with the earl marshal, president of the court of chivalry or court of honour. In feudal times martial law was administered in the court of the lord high constable. The constableship was granted as a grand serjeanty with the earldom of Hereford by the empress Maud to Milo of Gloucester, and was carried by his heiress to the Bohuns, earls of Hereford and Essex. Through a coheiress of the Bohuns it descended to the Staff ords, dukes of Buckingham; and on the attainder of Edward Stafford, third duke of Buckingham, in the reign of Henry VIII. it became merged in the crown. The Lacys and Verduns were hereditary constables of Ireland from the 12th to the 14th century; and the Hays, earls of Erroll, have been hereditary constables of Scotland from early in the 14th century. LORD HIGH STEWARD. The Lord High Steward of England, who must not be confused with the Lord Steward, ranks as the first of the great officers of state. Appointments to this office are now made only for special occasions, such as the coronation of a sovereign or the trial of a peer by his peers. The history of the office is noteworthy. The household of the Norman and Angevin kings of England included certain persons of secondary rank, styled dapifers, seneschals or stewards (the prototypes of the lord steward), who were entrusted with domestic and state duties; the former duties were those of purveyors and sewers to the king, the latter were undefined. At

coronations, however, and great festivals it became the custom in England and else- where to appoint magnates of the first rank to discharge for the occasion the domestic functions of the ordinary officials. In accordance with this custom Henry II. appointed both Robert II., earl of Leicester, and Hugh Bigod, earl of Norfolk, to be his honorary hereditary stewards; and at the Christmas festival of 1 186 the successors in title of these two earls, with William, earl of Arundel, who held the similar honorary office of hereditary butler, are described as serving the king at the royal banqueting table. Subsequently the earls of Leicester bought out the rights of the earls of Norfolk for ten knights' fees.

The last of these earls of Leicester to inherit the hereditary stewardship was Simon V. de Montfort; how he served as steward at the coronation of Eleanor, queen of Henry III., is described in the Exchequer Red Book. The office of steward in France, then recently suppressed, had for some time been the highest office of state in that kingdom, and Simon de Montfort appears to have considered that his hereditary stewardship entitled him to high official position in England; and after his victory at Lewes he repeatedly figures as steward of England in official documents under the great seal. After Simon's death at Eves- ham his forfeited estates were conferred on his son Edmund of Lancaster, who also obtained a grant of the stewardship, but only for life. Edmund was succeeded by Thomas, earl of Lancaster, who received a fresh grant of the stewardship to himself and the heirs of his body from Edward II.; and this earl it was who, during the weak administration of the last- mentioned king, first put forward in a celebrated tract the claim of the steward to be the second personage in the realm and supreme judge in parliament, a claim which finds some slight recognition in the preamble to the statute passed against the Despencers in the first year of Edward III.

Earl Thomas was executed for treason, and though his attainder was reversed he left no issue, and was succeeded in the earldom by his brother Henry. The subsequent earls and dukes of Lancaster were all recognized as stewards of England,

LORD HIGH TREASURER;

f:i.\}-h

the office apparently being treated as annexed to the earldom, or honor, of Leicester. John of Gaunt, indeed, at a time when it was possible that he would never obtain the Leicester moiety of the Lancastrian estates, seems to have made an ingenious but quite

unfounded claim to. the office as annexed to the honor of Hinckley. Strictly speaking, none of the Lancasters after Thomas had any clear title either by grant or otherwise; such title as they had merged in the crown when Henry IV. usurped the throne. Meanwhile the stewardship had increased in im- portance. On the accession of Edward III., Henry, earl of Lancaster, as president of the council, had superintended the coronation of the infant king; John of Gaunt did the same for the infant Richard II.; and, as part of the duties involved, sat in the White Hall of Westminster to hear and determine the claims to perform coronation services. The claims were made by petition, and included amongst others: the claim of Thomas of Woodstock to act as constable, the rival claims of John Dymock and Baldwin de Frevile to act as champion, and the claim of the barons of the Cinque Ports to carry a canopy over the king. Minutes of these proceedings, in which the duke is stated to have sat " as steward of England," were enrolled by his order. This is the origin of what is now called the Court of Claims. The precedent of Richard II. has been followed on all subsequent occasions, except that in modern times it has been the practice to appoint commissioners instead of a steward to superintend this court. In 1397 John of Gaunt created a notable precedent in support of the steward's claim to be supreme judge in parlia- ment by presiding at the trial of the earl of Arundel and others. When Henry IV. came to the throne he appointed his young son Thomas, afterwards duke of Clarence, to the office of steward. Clarence held the office until his death. He himself never acted as judge in parliament; but in 141 5 he was appointed to preside at the judgment of peers delivered in Southampton against Richard, earl of Cambridge, and Lord Scrope of Masham, who had been previously tried by commissioners of oyer and terminer. No permanent steward was ever again created; but a steward was always appointed for coronations to perform the various ceremonial services associated with the office, and, until the Court of Claims was entrusted to commissioners, to preside over that court. Also, in the 1 5th century, it gradually became the custom to appoint a steward pro hac vice to preside at the trial, or at the proceedings upon the attainder of a peer in parliament; and later, to preside over a court, called the court of the lord high steward, for the trial of peers when parliament was not sitting. To assist in establishing the latter court a precedent of 1400 appears to have been deliberately forged. This precedent is reported in the printed Year-Book of 1400, first published in 1553; it describes the trial of " the earl of H " for participation in the rebellion of that year, and gives details of procedure. John Holand, earl of Huntingdon, is undoubtedly the earl indicated, but the evidence is conclusive that he was murdered in Essex without any trial. The court of the lord high

steward seems to have been first definitely instituted in 1499 for the trial of Edward Plantagenet, earl of Warwick; only two years earlier Lord Audley had been condemned by the court of chivalry, a very different and unpopular tribunal. The Warwick trial was most carefully schemed: the procedure, fundamentally dis- similar to that adopted in 1415, follows exactly the forged precedent ; but the constitution of the court was plainly derived from the Southampton case. The record of the trial was con- signed to a new repository (commonly but wrongly called the Baga de Secretis), which thenceforth became the regular place of custody for important state trials. Latterly, and possibly from its inception, this repository consisted of a closet with three locks, of which the keys were entrusted, one to the chief justice of England, another to the attorney-general and the third to the master of the crown office, or coroner. Notwithstanding the irregular origin of the steward's court, for which Henry VII. must be held responsible, the validity of its jurisdiction cannot be questioned. The Warwick proceedings were confirmed by act of parliament, and ever since this court has been fully recognized as part of the English constitution.

. For about acentaˆy .ˆnd a half prior to the reign of James I. the criminal jurisdiction of parliament remained in abeyance, and bills of attainder were the vogue. The practice of appoint- ing a steward on these occasions to execute judgment upon a peer was kept up till 1477, when George, duke of Clarence, was attainted, and then dropped. Under the Stuarts the criminal jurisdiction of parliament was again resorted to, and when the proceedings against a peer were founded on indictment the appointment of a steward followed as a matter of settled practice. The proper procedure in cases of impeachment had, on the contrary, never been defined. On the impeachment of Strafford the lords themselves appointed Arundel to be high steward. In Danby's case a commission under the great seal issued in the common form adopted for the court of the steward; this was recalled, and the rule agreed to by a joint committee of both houses that a steward for trials of peers upon impeachments was unnecessary. But, as such an appointment was obviously convenient, the lords petitioned for a steward; and a fresh commission was accordingly issued in an amended form, which recited the petition, and omitted words implying that the appoint- ment was necessary. This precedent has been treated as settling the practice of parliament with regard to impeachments.

Of the proceedings against peers founded upon indictment very few trials antecedent to the revolution took place in parlia- ment. The preference given to the steward's court was largely due to the

practice, founded upon the Southampton case, of summoning only a few peers selected by the steward, a practice which made it easy for the king to secure a conviction. This arrangement has been partially abrogated by the Treason Act of William III., which in cases of treason and misprision of treason requires that all peers of parliament shall be summoned twenty days at least before every such trial. The steward's court also differed in certain other particulars from the high court of parliament. For example, it was ruled by Lord Chan- cellor Jeffreys, as steward at the trial of Lord Delamere, that, in trials of peers which take place during the recess of parliament in the steward's court, the steward is the judge of the court, the court is held before him, his warrant convenes the prisoner to the bar, his, summons convenes the peers for the trial, and he is to determine by his sole authority all questions of law that arise in the course of the trial, but that he is to give no vote upon the issue of guilty or not guilty; during a session of parliament, on the contrary, all the peers are both triers and judges, and the steward is only as chairman of the court and gives his vote together with the other lords. Lord Delamere was tried in 1685 in the steward's court ; since then all trials of peers have taken place before the lords in parliament. The most recent trial was that of Earl Russell in 1901, when Lord Chancellor Halsbury was made lord high steward. The steward is addressed as " his grace," he has a rod of office, and the commission appointing him is dissolved according to custom by breaking this rod.

A court of claims sat and a steward was appointed for the coronation of Edward VII.; and during the procession in West- minster Abbey the duke of Marlborough, as steward, carried " St Edward's crown" in front of the bearer of the Bible (the bishop of London), who immediately preceded the king; this function of the steward is of modern origin. The steward's ancient and particular services at coronations are . practically obsolete; the full ceremonies, procession from Westminster Hall and banquet in which he figured prominently, were aban- doned on the accession of William IV.

For the early history of the steward see L. Wˆ Vernon-Harcourt, His Grace the Steward and Trial of Peers (1907) ; for the later history of the office see Sir E. Coke, Institutes (1797) ; Cobbett and Howell, State Trials (1809, seq.) ; S. M. Phillipps, State Trials (1826); John Hatsell, Precedents, vol. 4 (1818); and Sir M. Foster, Crown Law (1809). See also the various works on Coronations for the steward's services on these occasions. (L. W. V.-H.)

LORD HIGH TREASURER, in England, once the third great officer of state. The office was of Norman origin and dated from 1216. The duty

of the treasurer originally was to act as keeper of the royal treasure at Winchester, while as officer of the exchequer he sat at Westminster to receive the accounts

of the sheriffs, and appoint officers to collect the revenue. The treasurer was subordinate to both the justiciar and the chancellor, but the removal of the chancery from the exchequer in the reign of Richard I., and the abolition of the office of justiciars in the reign of Henry III., increased his importance. Indeed, from the middle of the reign of Henry III. he became one of the chief officers of the crown. He took an important part in the equitable jurisdiction of the exchequer, and was now styled not merely king's treasurer or treasurer of the exchequer, but lord high treasurer and treasurer of the exchequer. The first office was conferred by delivery of a white staff, the second by patent. Near the end of the 16th century he had developed into an official so occupied with, the general policy of the country as to be prevented from supervising personally the details of the department, and Lord Burleigh employed a secretary for this purpose. On the death of Lord Salisbury in 1612 the office was put in commission; it was filled from time to time until 1714, when the duke of Shrewsbury resigned it; since that time it has always been in commission (see Treasury). The Scottish treasury was merged with the English by the Act of Union, but the office of lord high treasurer for Ireland was continued until 1816.

LORD HOWE, an island of the southern Pacific Ocean, lying about 31 36′ S., 159° 5′ E., 520 m. E.N.E. of Sydney. Pop. 120. It was discovered in 1778 by Lieutenant Ball (whose name is commemorated in the adjacent islet of Ball's Pyramid), and is a dependency of New South Wales. It measures about sJ m. by 1 m., and is well wooded and hilly (reaching a height of 2840 ft. at the southern end), being of volcanic formation, while there are coral reefs on the western shore. It has a pleasant climate. The name Lord Howe is given also to an islet of the Santa Cruz group, and to two islands, also known under other names — Mopiha, of the Society group, and Ongtong Java of the Solomon Islands.

LORD JUSTICE CLERK, in Scotland, a judge next in rank to the lord justice-general. He presides in the second division of the court of session, and in the absence of the lord justice- general, presides in the court of justiciary. The justice clerk was originally not a judge at all, but simply clerk and legal assessor of the justice court. In course of time he was raised from the clerk's table to the bench, and by custom

presided over the court in the absence of the justice-general. Up to 1672 his position was somewhat anomalous, as it was doubtful whether he was a clerk or a judge, but an act of that year, which suppressed the office of justice-depute, confirmed his position as a judge, forming him, with the justice-general and five of the lords of session into the court of justiciary. The lord justice clerk is also one of the officers of state for Scotland, and one of the commissioners for keeping the Scottish Regalia. His salary is £4800 a year.

LORD JUSTICE-GENERAL, the highest judge in Scotland, head of the court of justiciary, called also the lord president, and as such head of the court of session and representative of the sovereign. The office of justice-general was for a consider- able time a sinecure post held by one of the Scottish nobility, but by the Court of Session Act 1830, it was enacted that, at the termination of the existing interest, the office should be united with that of lord president of the court of session, who then became presiding judge of the court of justiciary. The salary is £5000 a year.

LORD KEEPER OF THE GREAT SEAL, in England, formerly a great officer of state. The Great Seal of England, which is affixed on all solemn occasions to documents expressing the pleasure of the sovereign, was first adopted by Edward the Confessor (see Seals), and entrusted to a chancellor for keeping. The office of chancellor from the time of Becket onwards varied much in importance; the holder being an ecclesiastic, he was not only engaged in the business of his diocese, but sometimes was away from England. Consequently, it became not unusual to place the personal custody of the great seal in the hands of a vice-chancellor or keeper; this, too, was the practice followed during a temporary vacancy in the chancellorship. This office

gradually developed into a permanent appointment, and the lord keeper acquired the right of discharging all the duties connected with the great seal. He was usually, though not necessarily, a peer, and held office during the king's pleasure, he was appointed merely by delivery of the seal, and not, like the chancellor, by patent. His status was definitely fixed (in the case of lord keeper Sir Nicholas Bacon) by an act of Elizabeth, which declared him entitled to " like place, pre-eminence, jurisdiction, execution of laws, and all other customs, com-modities, and advantages " as the lord chancellor. In sub- sequent reigns the lord keeper was generally raised to the chancellorship, and retained the custody of the seal. The last lord keeper was Sir Robert Henley (afterwards Lord Northington) , who was made chancellor on the accession of George III.

LORD MAYOR'S DAY, in England, the 9th of November, the date of the inauguration of the lord mayor of London (see Vol. XVI., p. 966), marked by a pageant known as the Lord Mayor's Show. The first of these pageants was held in 1215. The idea originated in the stipulation made in a charter then granted by John that the citizen chosen to be mayor should be presented to the king or his justice for approval. The crowd of citizens who accompanied the mayor on horse- back to Westminster developed into a yearly pageant, which each season became more elaborate. Until the 15th century the mayor either rode or walked to Westminster, but in 1453 Sir John Norman appears to have set a fashion of going by water. From 1639 to 1655 the show disappeared owing to Puritan opposition. With the Restoration the city pageant was revived, but interregnums occurred during the years of the plague and fire, and in 1683 when a quarrel broke out between Charles and the city, ending in the temporary abrogation of the charter. In 1711 an untoward accident befell the show, the mayor Sir Gilbert Heathcote (the original of Addison's Sir Andrew Freeport) being thrown by his horse. The next year a coach was, in consequence, provided for the chief magistrate. In r757 this was superseded by a gilded and elaborately decorated equipage costing £10,065 which was used till 1896, when a replica of it was built to replace it.

LORD PRESIDENT OF THE COUNCIL, in England, one of the great officers of state, and a member of the ministry. It was only in 1679 that the office of lord president became permanent. Previously either the lord chancellor, the lord keeper of the seal, or some particular court official took formal direction of the Privy Council. In the reign of Charles I. a special lord president of the council was appointed, but in the following reign the office was left unfilled. The office was of considerable importance when the powers of the Privy Council, exercised through various committees, were of greater extent than at the present time. For example, a committee of the lords of the council was formerly responsible for the work now dealt with by the secretary of state for foreign affairs; so also with that now discharged by the Board of Trade. The lord president up to 1855 — when a new post of vice-president of the council was created — was responsible for the education department. He was also responsible for the duties of the council in regard to public health, now transferred to the Local Government Board, and for duties in regard to agriculture, now transferred to the Board of Agriculture and Fisheries. The duties of the office now consist of presiding on the not very frequent occasions when the Privy Council meets, and of the drawing up of minutes of council upon subjects which do not belong to any other department of

state. The office is very frequently held in conjunction with other ministerial offices, for example, in Gladstone's fourth ministry the secretary of state for India was also lord president of the council, and in the conservative ministry of 1903 the holder of the office was also president of the Board of Education. The lord president is appointed by a declaration made in council by the sovereign. He is invariably a member of the House of Lords, and he is also included in the cabinet.

LORDS JUSTICES OF APPEAL, in England, the ordinary judges of the court of appeal, the appellate division of the High Court of Justice. Their style was provided for by the Supreme

Court of Judicature Act 1877. The number was fixed at five by the Supreme Court of Judicature Act 1881, s. 3. Their salary is £5000 a year (see Appeal).

LORDS OF APPEAL IN ORDINARY, in England, certain persons (limited to four), who, having held high judicial office or practised at the bar for not less than fifteen years, sit as members of the House of Lords to adjudicate in cases before that House in its legal capacity, and also to aid the judicial committee of the Privy Council in hearing appeals. Of the four lords of appeal in ordinary one is usually appointed from the Irish bench or bar and one from Scotland. Their salary is £6000 a year. They hold office on the same conditions as other judges. Bythe Appellate Jurisdiction Act 1876, under which they are appointed, lords of appeal in ordinary are, by virtue of and according to the date of their appointment, entitled during life to rank as barons and during the time that they continue in office are entitled to a writ of summons to attend, and to sit and vote in the House of Lords. They are life peers only. The patent of a lord of appeal in ordinary differs from that of a baron in that he is not " created " but " nominated and appointed to be a Lord of Appeal in Ordinary by the style of Baron."

LORD STEWARD, in England, an important official of the king's household. He is always a member of the government, a peer and a privy councillor. Up to 1782, the office was one of considerable political importance and carried cabinet rank. The lord steward receives his appointment from the sovereign in person, and bears a white staff as the emblem and warrant of his authority. He is the first dignitary of the court. In the Statutes of Eltham he is called " the lord great master," but in the Household Book of Queen Elizabeth " the lord steward," as before and since. In an act of Henry VIII. (1539) "for

placing of the lords," he is described as " the grand master or lord steward of the king's most honourable household." He presides at the Board of Green Cloth. 1 In his department are the treasurer and comptroller of the household, who rank next to him. These officials are usually peers or the sons of peers and privy councillors. They sit at the Board of Green Cloth, carry white staves, and belong to the ministry. But the duties which in theory belong to the lord steward, treasurer and comptroller of the household are in practice performed by the master of the household, who is a permanent officer and resides in the palace. He is a white-staff officer and a member of the Board of Green Cloth but not of the ministry, and among other things he pre- sides at the daily dinners of the suite in waiting on the sovereign. In his case history repeats itself. He is not named in the Black Book of Edward IV. or in the Statutes of Henry VIII., and is entered as " master of the household and clerk of the green cloth " in the Household Book of Queen Elizabeth. But he has superseded the lord steward of the household, as the lord steward of the household at one time superseded the lord high steward of England.

In the lord steward's department are the officials of the Board of Green Cloth, the coroner (" coroner of the verge "),and pay- master of the household, and the officers of the almonry (see Almoner). Other offices in the department were those of the cofferer of the household, the treasurer of the chamber, and the paymaster of pensions, but these, with six clerks of the Board of Green Cloth, were abolished in 1782. The lord steward had formerly three courts besides the Board of Green Cloth under him. First, the lord steward's court, superseded (1541) by — second — the Marshalsea court, a court of record having jurisdic- tion, both civil and criminal within the verge (the area within a radius of 12 m. from where the sovereign is resident), and originally held for the purpose of administering justice between the domestic servants of the sovereign, " that they might not be drawn into other courts and their service lost." Its criminal

1 A committee of the king's household, consisting of the lord steward and his subordinates, charged with the duty of examining and passing all the accounts of the household. The board had also power to punish all offenders within the verge or jurisdiction of the palace, which extended in every direction for 200 yds. from the gates of the court yard. The name is derived from the green-covered table at which the transactions of the board were originally conducted.

jurisdiction had long fallen into disuse and its civil jurisdiction was abolished in 1849. Third, the palace court, created by letters patent in 1612 and renewed in 1665 with jurisdiction over all personal matters

arising between parties within 12 m. of White- hall (the jurisdiction of the Marshalsea court, the City of London, and Westminster Hall being excepted). It differed from the Marshalsea court in that it had no jurisdiction over the sovereign's household nor were its suitors necessarily of the household. The privilege of practising before the palace court was limited to four counsel. It was abolished in 1849. The lord steward or his deputies formerly administered the oaths to the members of the House of Commons. In certain cases (messages from the sovereign under the sign-manual) " the lords with white staves" are the proper persons to bear communications between the sovereign and the houses of parliament.

Authorities. — Statutes of Eltham; Household Book of Queen Elizabeth; Coke, Institutes; Reeves, History of the Law of England; Stephen, Commentaries on the Laws of England; Hatsell, Precedents of Proceedings in the House of Commons; May, Parliamentary Practice.

LORE, AMBROISE DE (1396-1446), baron of Ivry in Nor- mandy and a French commander, was born at the chateau of Lore (Orne, arrondissement of Domfront). His first exploit in arms was at the battle of Agincourt in 1415; he followed the party of the Armagnacs and attached himself to the dauphin Charles. He waged continual warfare against the English in Maine until the advent of Joan of Arc. He fought at Jargeau, at Meung-sur-Loire and at Patay (1429). Using his fortress of Saint Ceneri as a base of operations during the next few years, he seized upon Matthew Gough near Vivoin in 1431, and made an incursion as far as the walls of Caen, whence he brought away three thousand prisoners. Taken captive himself in 1433, he was exchanged for Talbot. In 1435 he and Dunois defeated the English near Meulan, and in 1436.be helped the constable Arthur, earl of Richmond (de Richmond), to expel them from Paris. He was appointed provost of Paris in February 1437, and in 1438 he was made " judge and general reformer of the malefactors of the kingdom." He was present in 1439 at the taking of Meaux, in 1441 at that of Pontoise, and he died on the 24th of May 1446.

See the Nouvelle Biographic Generate, vol. xxxi., and the Revue Historique du Maine, vols. iii. and vi. (J. V.*)

LORE, properly instruction, teaching, knowledge. The O. Eng. Idr, as the Dutch leer and Ger. Lehre, represents the Old Teutonic root, meaning to impart or receive knowledge, seen in " to learn," " learning." In the Gentleman's Magazine for June 1830ft was suggested that " lore " should be used as a termination instead of the Greek derivative -ology in the names of the various sciences. This was never

done, but the word, both as termination and alone, is frequently applied to the many traditional beliefs, stories, &c, connected with the body of knowledge concerning some special subject; e.g. legendary lore, bird-lore, &c. The most familiar use is in ” folk-lore ” (q.v.).

LORELEI (from Old High Ger. Lur, connected with modern Ger. lauern, ” to lurk,” ” be on the watch for,” and equivalent to elf, and lai, ” a rock “). The Lorelei is a rock in the Rhine near St Goar, which gives a remarkable echo, which may partly account for the legend. The tale appears in many forms, but is best known through Heinrich Heine’s poem, beginning Ich weiss nicht was soil es bedeuten. In the commonest form of the story the Lorelei is a maiden who threw herself into the Rhine in despair over a faithless lover, and became a siren whose voice lured fishermen to destruction. The 13th-century minnesinger, known as Der Marner, says that the Nibelungen treasure was hidden beneath the rock. The tale is obviously closely con- nected with the myth of Holda, queen of the elves. On the Main she sits combing her locks on the Hullenstein, and the man who sees her loses sight or reason, while he who listens is con- demned to wander with her for ever. The legend, which Clemens Brentano claimed as his own invention when he wrote his poem ” Zu Bacharach am Rheine ” in his novel of Godwi (1802), bears all the marks of popular mythology. In the 19th century it formed material for a great number of songs, dramatic sketches,

operas and even tragedies, which are enumerated by Dr Hermann Seeliger in his Lordeysage in Dichtung und Musik (Leipzig- Reudnitz, 1898). The favourite poem with composers was Heine’s, set to music by some twenty-five musicians, the settings by Friedrich Silcher (from an old folk-song) and by Liszt being the most famous.

LORETO, an episcopal see and pilgrimage resort of the Marches, Italy, in the province of Ancona, 15 m. by rail S.S.E. of that town. Pop. (1901) 1 178 (town), 8033 (commune). It lies upon the right bank of the Musone, at some distance from the railway station, on a hill-side commanding splendid views from the Apennines to the Adriatic, 341 ft. above sea-level. The town itself consists of little more than one long narrow street, lined with shops for the sale of rosaries, medals, crucifixes and similar objects, the manufacture of which is the sole industry of the place. The number of pilgrims is said to amount to 50,000 annually, the chief festival being held on the 8th of September, the Nativity of the Virgin. The principal buildings, occupying the four sides of the piazza, are the college of the Jesuits, the Palazzo

Apostolico, now Reale (designed by Bramante), which contains a picture gallery with works of Lorenzo Lotto, Vouet and Caracci and a collection of majolica, and the cathedral church of the Holy House (Chiesa della Casa Santa), a Late Gothic structure continued by Giuliano da Maiano, Giuliano da Sangallo and Bramante. The handsome facade of the church was erected under Sixtus V., who fortified Loreto and gave it the privileges of a town (1 586) ; his colossal statue stands in the middle of the flight of steps in front. Over the principal doorway is a life-size bronze statue of the Virgin and Child by Girolamo Lombardo; the three superb bronze doors executed at the latter end of the 16th century and under Paul V. (1605-1621) are also by Lom- bardo, his sons and his pupils, among them Tiburzio Vergelli, who also made the fine bronze font in the interior. The doors and hanging lamps of the Santa Casa are by the same artists. The richly decorated campanile, by Vanvitelli, is of great height; the principal bell, presented by Leo X. in 15 16, weighs n tons. The interior of the church has mosaics by Domenichino and Guido Reni and other works of art. In the sacristies on each side of the right transept are frescoes, on the right by Melozzo da Forli, on the bft by Luca Signorelli. In both are fine intarsias.

But the chief object of interest is the Holy House itself. It is a plain stone building, 28 ft. by 125 and 135 ft. in height; it has a door on the north side and a window on the west; and a niche contains a small black image of the Virgin and Child, in Lebanon cedar, and richly adorned with jewels. St Luke is alleged to have been the sculptor; its workmanship suggests the latter half of the 15th century. Around the Santa Casa is a lofty marble screen, designed by Bramante, and executed under Popes Leo X., Clement VII. and Paul III., by Andrea Sansovino, Girolamo Lombardo, Bandinelli, Guglielmo della Porta and others. The four sides represent the Annunciation, the Nativity, the Arrival of the Santa Casa at Loreto and the Nativity of the Virgin respectively. The treasury contains a large variety of rich and curious votive offerings. The architectural design is finer than the details of the sculpture. The choir apse is decorated with modern German frescoes, which are somewhat out of place.

The legend of the Holy House seems to have sprung up (how is not exactly known) at the close of the crusading period.

It is briefly referred to in the Italia Illustrata of Flavius Blondus, secretary to Popes Eugenius IV., Nicholas V., Calixtus III. and Pius II. (ob. 1464) ; it is to be read in all its fullness in the ” Redemptoris mundi Matris Ecclesiae Lauretana historia,” by a certain Teremannus, contained in the Opera Omnia (1576) of Baptista Mantuanus.

According to this narrative the house at Nazareth in which Mary had been born and brought up, had received the annunciation, and had lived during the childhood of Jesus and after His ascension, was converted into a church by the apostles. In 336 the empress Helena made a pilgrimage to Nazareth and caused a basilica to be erected over it, in which worship continued until the fall of the kingdom of Jerusalem. Threatened with destruction by the Turks, it was carried by angels through the air and deposited (1291) in the first instance

on a hill at Tersatto in Dalmatia, where an appearance of the Virgin and numerous miraculous cures attested its sanctity, which was confirmed by investigations made at Nazareth by messengers from the governor of Dalmatia. In 1294 the angels carried it across the Adriatic to a wood near Recanati; from this wood (lauretum), or from the name of its proprietrix (Laureta), the chapel derived the name which it still retains (" sacellum gloriosae Virginis in Laureto "). From this spot it was after- wards (1295) removed to the present hill, one other slight adjustment being required to fix it in its actual site. Bulls in favour of the shrine at Loreto were issued by Pope Sixtus IV. in 149 r and by Julius II. in 1507, the last alluding to the trans- lation of the house with some caution (" ut pie creditur et fama est"). The recognition of the sanctuary by subsequent pontiffs has already been alluded to. In the end of the 17th century Innocent XII. appointed a " missa cum officio proprio" for the feast of the Translation of the Holy House, and the feast is still enjoined in the Spanish Breviary as a " greater double " (December 10). See also U. Chevalier, Notre-Dame de Lorette (Paris, 1906).

LORETO, an inland department of Peru, lying E. of the Andean Cordilleras and forming the N.E. part of the republic. Extensive territories, nominally parts of this department, are in dispute between Peru and the neighbouring republics of Brazil, Colombia and Ecuador (see Peru), and the northern and eastern boundaries of the territory are therefore not definitely determined. Loreto is bounded W. by the departments of Amazonas and San Martin (the latter a new department, with an area of 30,744 sq. m., taken from Loreto, lying between the central and eastern Cordilleras and extending from the 6th to the 9th parallels, approximately), and S. by Huanuco and Cuzco. The area of the department, including the territories claimed by Peru, is estimated at 257,798 sq. m. The population is estimated (1906) at 120,000. The aboriginal population is not numerous, as the thick, humid forests are inhabited only where lakes and streams make open spaces for sunlight and ventilation. With the exception of the eastern Andean slopes and a little-known range of low mountains on the Brazilian frontier, called the Andes Conomamas, the suiface is that

of a thickly wooded plain sloping gently towards the Marafion, or Upper Amazon, which crosses it from W. to E. There are open plains between the Ucayali and Huallaga, known as the Pampas del Sacramento, but otherwise there are no extensive breaks in the forest. The elevation of the plain near the base of the Andes is 526 ft. on the Ucayali, 558 on the Huallaga, and 453 at Barranca, on the Marafion, a few miles below the Pongo de Manseriche. The eastward slope of the plain is about 250 ft. in the 620 m. (direct) between this point and Tabatinga, on the Brazilian frontier; this not only shows the remarkably level character of the Amazon valley of which it forms a part, but also the sluggish character of its drainage. From the S. the principal rivers traversing Loreto are the Ucayali and Huallaga, the former entering from Cuzco across its southern boundary and skirting the eastern base of the Andes for about four degrees of latitude before it turns away to the N.E. to join the Marafion, and the latter breaking through the Eastern Cordillera between the 6th and 7 th parallels and entering the Marafion 143 m. below Yurimaguas, where navigation begins. The lower Ucayali, which has a very tortuous course, is said to have 868 m. of navigable channel at high water and 620 m. at low water. North of the Marafion several large rivers pass through Peruvian territory between the Santiago and Napo (see Ecuador), nearly all having navigable channels. On the level plains are a number of lakes, some are formed by the annual floods and are temporary in character. Among the permanent lakes are the Gran Cocama, of the Pampas del Sacramento, the Caballococha — a widening of the Amazon itself about 60 m. N.W. of Tabatinga — and Rimachuma, on the north side of the Marafion, near the lower Pastaza.

The natural resources of this extensive region are incalculable, but their development has been well nigh impossible through lack of transport facilities. They include the characteristic woods of the Amazon valley, rubber, nuts, cinchona or Peruvian

bark, medicinal products, fish, fruits and fibres. The cultivated products include cocoa, coffee, tobacco and fruits. Straw hats and hammocks are manufactured to some extent. The natural outlet of this region is the Amazon river, but this involves 2500 m. of river navigation from Iquitos before the ocean is reached. Communication with the Pacific coast cities and ports of Peru implies 4he crossing of three high, snow-covered ranges of the Andes by ext remely difficult trails and passes. A rough mountain road has been constructed from

Oroya to Puerto Bermudez, at the head of navigation on the Pachitea, and is maintained by the government pending the construction of a railway, but the distance is 210 m. and it takes nine days for a mule train to make the journey. At Puerto Bermudez a river steamer connects with Iquitos, making the distance of 930 m. in seven days. From Lima to Iquitos by this route, therefore, involves 17 days travel over a distance of 1268 m. The most feasible route from the department to the Pacific coast is that which connects Puerto Limon, on the Marafion, with the Pacific port of Payta, a distance of 410 m., it being possible to cross the Andes on this route at the low elevation of 6600 ft. The climate of Loreto is hot and humid, except on the higher slopes of the Andes. The year is divided into a wet and a dry season, the first from May to October, and the average annual rainfall is estimated at 70 in. though it varies widely between distant points. The capital and only town of importance in the department is Iquitos.

LORIENT, a maritime town of western France, capital of an arrondissement in the department of Morbihan, on the right bank of the Scorff at its confluence with the Blavet, 34 m. W. by N. of Vannes by rail. Pop. (1906) 40,848. The town is modern and regularly built. Its chief objects of interest are the church of St Louis (1709) and a statue by A. Mercie of Victor Masse, the composer, born at Lorient in 1822. It is one of the five maritime prefectures in France and the first port for naval construction in the country. The naval port to the east of the town is formed by the channel of the Scorff, on the right bank of which the chief naval establishments are situated. These include magazines, foundries, forges, fitting-shops, rope-works and other workshops on the most extensive scale, as well as a graving dock, a covered slip and other slips. A floating bridge connects the right bank with the peninsula of Caudan formed by the union of the Scorff and Blavet. Here are the shipbuilding yards covering some 38 acres, and comprising nine slips for large vessels and two others for smaller vessels, besides forges and workshops for iron ship- building. The commercial port to the south of the town consists of an outer tidal port protected by a jetty and of an inner dock, both lined by fine quays planted with trees. It separates the older part of the town, which is hemmed in by fortifications from a newer quarter. In 1905, 121 vessels of 28,785 tons entered with cargo and 145 vessels of 38,207 tons cleared. The chief export is pit-timber, the chief import is coal. Fishing is actively carried on. Lorient is the seat of a sub-prefect, of commercial and maritime tribunals and of a tribunal of first instance, and has a chamber of commerce, a board of trade-arbitrators, a lycee, schools of navigation, and naval artillery. Private industry is also engaged in iron-working and engine making. The

trade in fresh fish, sardines, oysters (which are reared near Lorient) and tinned vegetables is important and the manufacture of basket-work, tin-boxes and passementerie, and the preparation of preserved sardines and vegetables are carried on. The road- stead, formed by the estuary of the Blavet, is accessible to vessels of the largest size; the entrance, 3 or 4 m. south from Lorient, which is defended by numerous forts, is marked on the east by the peninsula of Gavres (an artillery practising ground) and the fortified town of Port Louis; on the west are the fort of Loqueltas and, higher up, the battery of Kernevel. In the middle of the channel is the granite rock of St Michel, occupied by a powder magazine. Opposite it, on the right bank of the Blavet, is the mouth of the river Ter, with fish and oyster breeding establish-ments from which 10 millions of oysters are annually obtained. The roadstead is provided with six lighthouses. Above Lorient on the Scorff, here spanned by a suspension bridge, is Kerentrech, a pretty village surrounded by numerous country houses.

Lorient took the place o£ Port: Louis jasitJwrpbtt- of the Blavet. The latter stands, on the-, istte\ of an .ancient hamlet which was fortified during ithe wars of the League and handed over by Philip Emmanuel, duke of Morcceur, to the Spaniards. After the treaty of Vervins it was restored to France, and it received its name of Port Louis under Richelieu. Some Breton merchants trading with the Indies had established themselves first at Port Louis, but in 1628 they built their warehouses on the other bank. The Compagnie des Indes Orientales, created in 1664, took possession of these, giving them the name of l'Orient. In 1745 the Compagnie des Indes, then at the acme of its prosperity, owned thirty-five ships of the largest class and many others of considerable size. Its decadence dates from the English conquest of India, and in 1770 its property was ceded to the state. In 1782 the town was purchased by Louis XVI. from its owners, the Rohan-Guemene family. In 1746 the English under Admiral Richard Lestock made an unsuccessful attack on Lorient.

LORINER, or Lorimer (from O. Fr. loremier or lorenier, a maker of lorains, bridles, from Lat. lorum, thong, bridle; the proper form is with the n; a similar change is found in Latimer for Latiner, the title of an old official of the royal household, the king's interpreter), one who makes bits and spurs and the metal mountings for saddles and bridles; the term is also applied to a worker in wrought iron and to a maker of small iron ware. The word is now rarely used except as the name of one of the London livery companies (see Livery Company).

LORIS, a name of uncertain origin applied to the Indo-Malay representatives of the lemurs, which, together with the African pottos,

constitute the section Nycticebinae of the family Nyctice- bidae (see Primates). From their extremely slow movements and lethargic habits in the daytime these weird little creatures are commonly called sloths by Anglo-Indians. Their soft fur, huge staring eyes, rudimentary tails and imperfectly developed index-fingers render lorises easy of recognition. The smallest is the slender loris (Loris gracilis) of the forests of Madras and Ceylon, a creature smaller than a squirrel. It is of such exceeding strangeness and beauty that it might have been thought it would be protected by the natives; but they hold it alive before a fire till its beautiful eyes burst in order to afford a supposed remedy for ophthalmia! The mainland and Cingalese animals form distinct races. Both in this species and the slow loris there is a pair of rudimentary abdominal teats in addition to the normal pectoral pair, The slow loris (Nycticebus tardigradus) is a heavier built and larger animal, ranging from eastern Bengal to Cochin China, Siam, the Malay Peninsula, Java and Sumatra. There are several races, mostly grey in colour, but the Sumatran N. t. hilleri is reddish. (R. L.*)

LORIS-MELIKOV, MICHAEL TARIELOVICH, Count (1825?- 1888), Russian statesman, son of an Armenian merchant, was born at Tiflis in 1825 or 1826, and educated in St Petersburg, first in the Lazarev School of Oriental Languages, and afterwards in the Guards' Cadet Institute. He joined a hussar regiment, and four years afterwards (1847) ne was sent to the Caucasus, where he remained for more than twenty years, and made for himself during troublous times the reputation of a distinguished cavalry officer and an able administrator. In the latter capacity, though a keen soldier, he aimed always at preparing the warlike and turbulent population committed to his charge for the transition from military to normal civil administration, and in this work his favourite instrument was the schoolmaster. In the Russo-Turkish War of 1877-78 he commanded a separate corps d'armee on the Turkish frontier in Asia Minor. After taking the fortress of Ardahan, he was repulsed by Mukhtar Pasha at Zevin, but subsequently defeated his opponent at Aladja Dagh, took Kars by storm, and laid siege to Erzerum. For these services he received the title of Count. In the following year he was appointed temporary governor-general of the region of the Lower Volga, to combat an outbreak of the plague. The measures he adopted proved so effectual that he was transferred to the provinces of Central Russia to combat the Nihilists and Anarchists, who had adopted a policy of terrorism, and had succeeded in assassinating the governor of Kharkov. His

success in this struggle led to his being appointed chief of the Supreme Executive Commission which had been created in St Petersburg to deal with the revolutionary agitation in general. Here, as in the Caucasus, he showed a decided preference for the employment of ordinary legal methods rather than excep- tional extra-legal measures, and an attempt on his own life soon after he assumed office did not shake his convictions. In his opinion the best policy was to strike at the root of the evil by removing the causes of popular discontent, and for this purpose he recommended to the emperor a large scheme of administrative and economic reforms. Alexander II., who was beginning to lose faith in the efficacy of the simple method of police repression hitherto employed, lent a willing ear to the suggestion; and when the Supreme Commission was dissolved in August 1880, he appointed Count Loris-Melikov Minister of the Interior with exceptional powers. The proposed scheme of reforms was at once taken in hand, but it was never carried out. On the very day in March 1881 that the emperor signed a ukaz creating several commissions, composed of officials and eminent private individuals, who should prepare reforms in various branches of the administration, he was assassinated by Nihilist conspirators; and his successor, Alexander III., at once adopted a strongly reactionary policy. Count Loris-Melikov immediately resigned, and lived in retirement until his death, which took place at Nice on the 22nd of December 1888. (D. M. W.)

LORIUM, an ancient village of Etruria, Italy, on the Via Aurelia, 12 m. W. of Rome. Antoninus Pius, who was educated here, afterwards built a palace, in which he died. It was also a favourite haunt of Marcus Aurelius. Remains of ancient buildings exist in the neighbourhood of the road on each side (near the modern Castel di Guido) and remains of tombs, inscrip- tions, &c, were excavated in 1823-1824. Two or three miles farther west was probably the post-station of Bebiana, where inscriptions show that some sailors of the fleet were stationed — no Houbt a detachment of those at Centumcellae, which was reached by this road.

LORRACH, a town in the grand-duchy of Baden, in the valley of the Wiese, 6 m. by rail N.E. of Basel. Pop. (1905) 10,794. It is the seat of considerable industry, its manufactures including calico, shawls, cloth, silk, chocolate, cotton, ribbons, hardware and furniture, and has a trade in wine, fruit and timber. There is a fine view from the neighbouring Schutzenhaus, 1085 ft. high. In the neighbourhood also is the castle of Rotteln, formerly the residence of the counts of Hachberg and of the margraves of Baden; this was destroyed by the French in r678, but was rebuilt in 1867. Lorrach received market rights in 1403, but did not obtain municipal privileges until 1682. See

Hochstetter, Die Stadt Lorrach (Lorrach, 1882). LORRAINE, one of the former provinces of France. The name has designated different districts in different periods. Lotharingia, or Lothringen, i.e. regnum Lotharii, is derived from the Lotharingi or Lotharienses (O.G. Lotheringen, Fr. Loherains, Lorrains), a term applied originally to the Prankish subjects of Lothair, but restricted at the end of the 9th century to those who dwelt north of the southern Vosges.

Lorraine in Medieval Times. — The original kingdom of Lorraine was the northern part of the territories allotted by the treaty of Verdun (August 843) to the emperor Lothair I., and in 855 formed the inheritance of his second son, King Lothair. This kingdom of Lorraine was situated between the realms of the East and the West Franks, and originally extended along the North Sea between the mouths of the Rhine and the Ems, including the whole or part of Frisia and the cities on the right bank of the Rhine. From Bonn the frontier followed the Rhine as far as its confluence with the Aar, which then became the boundary, receding from the left bank in the neighbourhood of Bingen so as to leave the cities of Worms and Spires to Germany, and embracing the duchy of Alsace. After crossing the Jura, the frontier joined the Saone a little south of its con fluence with the Doubs, and followed the Sadne for some distance, and finally the valleys of the Meuse and the Scheldt. Thus the kingdom roughly comprised the region watered by the Moselle

and the Meuse, together with the dioceses of Cologne, Trier, Metz, Toul, Verdun, Liege and Cambrai, Basel, Strassburg and Besancon, and corresponded to what is now Holland and Belgium, parts of Rhenish Prussia, of Switzerland, and of the old province of Franche-Comt6, and to the district known later as Upper Lorraine, or simply Lorraine. Though apparently of an absolutely artificial character, this kingdom corresponded essentially to the ancient Francia, the cradle of the Carolingian house, and long retained a certain unity. It was to the in- habitants of this region that the name of Lotharienses or Lotharingi was primitively applied, although the word Lotharingia, as the designation of the country, only appears in the middle of the 10th century.

The reign of King Lothair (q.v.), which was continually disturbed by quarrels with his uncles, Charles the Bald and Louis the German, and by the difficulties caused by the divorce of his queen Teutberga, whom he had forsaken for a concubine called Waldrada, ended on the 8th of August 869. His inherit- ance was disputed by his uncles, and was divided by the treaty of Meersen (8th of August 870), by which Charles the Bald received part of the province of Besancon and some

land between the Moselle and the Meuse. Then for a time the emperor Charles the Fat united under his authority the whole of the kingdom t>f Lorraine with the rest of the Carolingian empire. After the deposition of Charles in 888 Rudolph, king of Burgundy, got himself recognized in Lorraine. He was unable to maintain , himself there, and succeeded in detaching definitively no more than the province of Besancon. Lorraine remained in the power of the emperor Arnulf, who in 895 constituted it a distinct kingdom in favour of his son Zwentibold. Zwentibold quickly became embroiled with the nobles and the bishops, and especially with Bishop Radbod of Trier. Among the lay lords the most important was Regnier (incorrectly called Long-neck), count of Hesbaye and Hainault, who is styled duke by the Lotharingian chronicler Reginon, though he does not appear ever to have borne the title. In 898 Zwentibold stripped Regnier of his fiefs, whereupon the latter appealed to the king of France, Charles the Simple, whose intervention, however, had no enduring effect. After the death of Arnulf in 899, the Lotharingians appealed to his successor, Louis the Child, to replace Zwentibold, who, on the r3th of August 900, was killed in battle. In spite of the dissensions which immediately arose between him and the Lotharingian lords, Louis retained the kingdom till his death. The Lotharingians, however, refused to recognize the new German king) Conrad L, and testified their attachment to the Carolingian house by electing as sovereign the king of the West Franks, Charles the Simple. Charles was at first supported by Giselbert, son and successor of Regnier, but was abandoned by his ally, who in 919 appealed to the German king, Henry I. The struggle ended in the treaty of Bonn (921), by which appar- ently the rights of Charles over Lorraine were recognized. The revolt of the Frankish lords in 922 and the captivity of Charles finally settled the question. After an unsuccessful attack by Rudolph or Raoul, king of France, Henry became master of Lorraine in 925, thanks to the support of Giselbert, whom he rewarded with the hand of his daughter Gerberga and the title of duke of Lorraine. Giselbert at first remained faithful to Henry's son, Otto the Great, but in 938 he appears to have joined the revolt directed against Otto by Eberhard, duke of Franconia. In 939, in concert with Eberhard and Otto's brother, Henry of Saxony, he declared open war against Otto and appealed to Louis d'Outremer, who penetrated into Lorraine and Alsace, but was soon called back to France by the revolt of the count of Vermandois. In the same year Giselbert and Eberhard were defeated and killed near Andernach, and Otto at once made himself recognized in the whole of Lorraine, securing it by a treaty with Louis d'Outremer, who married Giselbert's widow Gerberga, and entrusting the government of it to Count Otto, son of Ricuin, until Giselbert's son Henry should have

attained his majority.

After the deaths of the young Henry and Count Otto in 944, Otto the Great gave Lorraine to Conrad the Red, duke of

Franconia, the husband of his daughter Liutgard, a choice which was not completely satisfactory to the Lotharingians. In 953 Conrad, in concert with Liudulf, the son of the German king, revolted against Otto, but was abandoned by his supporters. Otto stripped Conrad of his duchy, and in 954 gave the govern- ment of it to his own brother Bruno, archbishop of Cologne. Bruno had to contend against the efforts of the last Carolingians of France to make good their claims on Lorraine, as well as against the spirit of independence exhibited by the Lotharingian nobles; and his attempts to raze certain castles built by brigand lords and to compel them to respect their oath of fidelity resulted in serious sedition. To obviate these difficulties Bruno divided the ducal authority, assigning Lower Lorraine to a certain Duke Godfrey, who was styled dux Ripuariorum, and Upper Lorraine to Frederick (d. 959), count of Bar, a member of the house of Ardenne and son-in-law of Hugh the Great, with the title of dux Mosellanorum; and it is probable that the partition of the ancient kingdom of Lorraine into two new duchies was confirmed by Otto after Bruno's death in 965. In 977 the emperor Otto II. gave the government of Lower Lorraine to Charles I., a younger son of Louis d'Outremer, on condition that that prince should acknowledge himself his vassal and should oppose any attempt of his brother Lothair on Lorraine. The consequent expedition of the king of France in 978 against Aix-la-Chapelle had no enduring result, and Charles retained his duchy till his death about 992. He left two sons, Otto, who succeeded him and died without issue, and Henry, who is sometimes regarded as the ancestor of the landgraves of Thuringia. The duchy of Lower Lorraine, sometimes called Lothier (Lotharium), was then given to Godfrey (d. 1023), son of Count Godfrey of Verdun, and for some time the history of Lorraine is the history of the attempts made by the dukes of Lothier to seize Upper Lorraine. Gothelon (d. 1043) , son of Duke Godfrey, obtained Lorraine at the death of Frederick II., duke of Upper Lorraine, in 1027, and victoriously repulsed the incursions of Odo (Eudes) of Blois, count of Champagne, who was defeated and killed in a battle near Bar (1037). At Gothelon's death in 1043, his son Godfrey the Bearded received from the emperor only Lower Lorraine, his brother Gothelon II. obtaining Upper Lorraine. Godfrey attempted to

seize the upper duchy, but was defeated and imprisoned in 1045. On the death of Gothelon in 1046, Godfrey endeavoured to take Upper Lorraine from Albert of Alsace, to whom it ha4 been granted by the emperor Henry III. The attempt, however, also failed; and Godfrey was for some time deprived of his own duchy of Lower Lorraine in favour of Frederick of Luxemburg. Godfrey took part in the struggles of Pope Leo IX. against the Normans in Italy, and in 1053 married Beatrice, daughter of Duke Frederick of Upper Lorraine and widow of Boniface, margrave of Tuscany. On the death of Frederick of Luxemburg in 1065 the emperor Henry IV. restored the duchy of Lower Lorraine to Godfrey, who retained it till his death in 1069, when he was succeeded by his son Godfrey the Hunchback (d. 1076), after whose death Henry IV. gave the duchy to Godfrey of Bouillon, the hero of the first crusade, son of Eustace, count of Boulogne, and Ida, sister of Godfrey the Hunchback. On the death of Godfrey of Bouillon in 1100 Lower Lorraine was given to Henry, count of Limburg. The new duke supported the emperor Henry IV. in his struggles with his sons, and in consequence was deposed by the emperor Henry V., who gave the duchy in 1106 to Godfrey, count of Louvain, a descendant of the Lotharingian dukes of the beginning of the 10th century. This Godfrey was the first hereditary duke of Brabant, as the dukes of Lower Lorraine came to be called.

Upper Lorraine. — The duchy of Upper Lorraine, or Lorraine Mosellana, to which the name of Lorraine was restricted from the nth century, consisted of a tract of undulating country watered by the upper course of the Meuse and Moselle, and bounded N. by the Ardennes, S. by the table-land of Langres, E. by the Vosges and W. by Champagne. Its principal fiefs were the countship of Bar which Otto the Great gave in 951 to Count Frederick of Ardenne, and which passed in 1093 to the lords of Montbeliard; the countship of Chiny, formed at the end

of the 10th century, of which, since the 13th, Montmedy was the capital; the lordship of Commercy, whose rulers bore the special title of damoiseau, and which passed in the 13th century to the house of Saarebriicken; and, finally the three important ecclesiastical lordships of the bishops of Metz, Toul and Verdun. Theodoric, or Thierri (d. 1026), son of Frederick, count of Bar and first duke of Upper Lorraine, was involved in a war with the emperor Henry II., a war principally remarkable for the siege of Metz (1007). After having been the object of numerous attempts on the part of the dukes of Lower Lorraine, Upper Lorraine was given by the emperor Henry III. to Albert of Alsace, and passed in 1048 to Albert's brother Gerard, who died by poison in 1069, and who was the ancestor of the hereditary house of

Lorraine. Until the 15th century the representatives of the hereditary house were Theodoric II., called the Valiant (1 060-1 1 1 5), Simon (1115-1139), Matthew(ii30-n76), Simon II. (n 76-1 205), Ferril. (1 205-1 206), Ferri II. (1 206-1 213), Theobald (Thibaut) I. (1213-1220), Matthew II. (1220-1251), Ferri III. (1251-1304), Theobald II. (1304-1312), Ferri IV., called the Struggler (1312-1328), Rudolph, or Raoul (1328-1346), John (1346-1391) and Charles II. or I., called the Bold (1391-1431). The 1 2th century and the first part of the 13th were occupied with wars against the counts of Bar and Champagne. Theobald I. intervened in Champagne to support Erard of Brienne against the young count Theobald IV. The regent of Champagne, Blanche of Navarre, succeeded in forming against the duke of Lorraine a coalition consisting of the count of Bar and the emperor Frederick II., who had become embroiled with Theobald over the question of Rosheim in Alsace. Attacked by the emperor, the duke of Lorraine was forced at the treaty of Amance (12 18) to acknowledge himself the vassal of the count of Cham- pagne, and to support the count in his struggles against his ancient ally the count of Bar. The long government of Ferri III. was mainly occupied with wars against the feudal lords and the bishop of Metz, which resulted in giving an impulse to the municipal movement through Ferri's attempt to use the move- ment as a weapon against the nobles. The majority of the municipal charters of Lorraine were derived from the charter of Beaumont in Argonne, which was at first extended to the Barrois and was granted by Ferri, in spite of the hostility of his barons, to La Neuveville in 1257, to Frouard in 1263 and to Luneville in 1265. In the church lands the bishops of Toul and Metz granted liberties from the end of the 12th century to the communes in their lordship, but not the Beaumont charter, which, however, obtained in the diocese of Verdun in the 14th and 15th centuries.

By the will of Duke Charles the Bold, Lorraine was to pass to his daughter Isabella, who married Rene of Anjou, duke of Bar, in 1420. But Anthony of Vaudemont, Charles's tiephew and heir male, disputed this succession with Ren6, who obtained from the king of France an army commanded by Arnault Guilhem de Barbazan. Ren6, however, was defeated and taken prisoner at the battle of Bulgneville, where Barbazan was killed (2nd of July 1431). The negotiations between Ren6's wife and Anthony had no result, in spite of the intervention of the council of Basel and the emperor Sigismund, and it was not until 1436 that Rene obtained his liberty by paying a ransom of 200,000 crowns, and was enabled to dispute with Alfonso of Aragon the kingdom of Naples, which he had inherited in the previous year. In 1444 Charles VII. of France and the dauphin Louis went to Lorraine,

accompanied by envoys from Henry VI. of England, and procured a treaty (confirmed at Chalons in 1445), by which Yolande, Rene's eldest daughter, married Anthony's son, Ferri of Vaudemont, and Rene's second daughter Margaret became the wife of Henry VI. of England. After his return to Lorraine in 1442, Rene was seldom in the duchy. Like his successor John, duke of Calabria, who died in 1470, he was continually occupied with expeditions in Italy or in Spain. John's son and successor, Nicholas (d. 1473), who supported the duke of Burgundy, Charles the Bold, against the king of France, died without children, and his heir was Ren6, son of Frederick of Vaudemont. The duke of Burgundy,

however, disputed this inheritance, and carried off the young Rene and his mother, but on the intervention of Louis XI. had to set them at liberty. Rene helped the Swiss during their wars with Charles the Bold, who invaded Lorraine and was killed under the walls of Nancy (1477). Rene's last years were mainly spent in expeditions in Provence and Italy. He died in 1508, leaving by his second wife three sons — Anthony, called the Good, who succeeded him; Claude, count (and afterwards duke) of Guise, the ancestor of the house of Guise; and John (d. 1 550), known as the cardinal of Lorraine. Anthony, who was declared of age at his father's death by the estates of Lorraine, although his mother had tried to seize the power as regent, had been brought up from the age of twelve at the French court, where he became the friend of Louis XII., whom he accompanied on his Italian expeditions. In 1525 he had to defend Lorraine against the revolted Alsatian peasants known as ruslauds (boors), whom he defeated at Lupstein and Scher- weiler; and he succeeded in maintaining a neutral position in the struggle between Francis I. of France and the emperor Charles V. He died on the 14th of June 1 544, and was succeeded by his son Francis I., who died of apoplexy (August 1545) at the very moment when he was negotiating peace between the king of France and the emperor.

Lorraine in Modern Times. — Francis's son Charles III. or II., called the Great, succeeded under the tutelage of his mother and Nicholas of Vaudemont, bishop of Metz. Henry II. of France took this opportunity to invade Lorraine, and in 1552 seized the three bishoprics of Metz, Toul and Verdun. In the same year the emperor laid siege to Metz, but was forced to retreat with heavy loss before the energetic resistance of Duke Francis of Guise. On leaving Lorraine, Henry II. took Charles to

France, brought him up at the court and married him to his daughter Claude. After the accession of Francis II., the young duke returned to Lorraine, and, while his cousins the Guises . endeavoured to make good the claims of the house of Lorraine to the crown of France by virtue of its descent from the Carolin- gians through Charles, the son of Louis d'Outremer, he devoted himself mainly to improving the administration of his duchy. He reconstituted his domain by revoking the alienations irregu- larly granted by his predecessors, instructed his chambre des comptes to institute inquiries on this subject, and endeavoured to ameliorate the condition of industry and commerce by re- organizing the working of the mines and saltworks, unifying weights and measures and promulgating edicts against vagabonds. His duchy suffered considerably from the passage of German bands on their way to help the Protestants in France, and also from disturbances caused by the progress of Calvinism, especially in the neighbourhood of the three bishoprics. To combat Calvinism Charles had recourse to the Jesuits, whom he established at Pont-a Mousson, and to whom he gave over the university he had founded in that town in 1572. To this foundation he soon added, chairs of medicine and law, the first professor of civil law being the tnaitre des requetes, the Scotsman William Barclay, and the next Gregory of Toulouse, a pupil of the jurist Cujas. Charles died on the 14th of May 1608, and was succeeded by his eldest son Henry II., called the Good, who rid Lorraine of the German bands and died in 1624 without issue.

Henry was succeeded by his brother Francis II., who abdicated on the 26th of November 1624 in favour of his son Charles IV. or III. At the beginning of the reign of Louis XIII. Charles embroiled himself with France by harbouring French malcontents. Louis entered Lorraine, and by the treaty of Vic (31st of December 163 1) bound over Charles to desist from supporting the enemies of France, and compelled him to cede the fortress of Marsal. Charles's breach of this treaty led to a renewal of hostilities, and the French troops occupied St Mihiel, Bar-le-duc, Pont-a-Mousson and Nancy, which the duke was forced to cede for four years (1633). In 1632, by the treaty of Liverdun, he had already had to abandon the fortresses of Stenay and Clermont in Argonne. On the 19th of January 1634 he abdicated in favour of his younger brother Francis Nicholas, cardinal of

Lorraine, and withdrew to Germany, the parlement of Paris declaring him guilty of rebellion and confiscating his estates. After vain attempts to regain his estates with the help of the emperor, he decided to negotiate with France; and the treaty of St Germain (29th of March 1641) re-established him in his duchy on condition that he should cede Nancy, Stenay and other fortresses until the general peace. This

treaty he soon broke, joining the Imperialists in the Low Countries and defeating the French at Tuttlingen (December 1643). He was restored, however, to his estates in 1644, and took part in the wars of the Fronde. He was arrested at Brussels in 1654, imprisoned at Toledo and did not recover his liberty until the peace of the Pyrenees in 1659. On the 28th of February 1661 the duchies of Lorraine and Bar were restored to him by the treaty of Vincennes, on condition that he should demolish the fortifications of Nancy and cede Clermont, Saarburg and Pfalzburg. In 1662 Hugues de Lionne negotiated with him the treaty of Montmartre, by which Charles sold the succession to the duchy to Louis XIV. for a life-rent; but the Lorrainers, perhaps with the secret assent of their prince, refused to ratify the treaty. Charles, too, was accused of intriguing with the Dutch, and was expelled from his estates, Marshal de Crequi occupying Lorraine. He withdrew to Germany, and in 1673 took an active part in the coalition of Spain, the Empire and Holland against France. After an unsuccessful invasion of Franche-Comte he took his revenge by defeating Crequi at Conzer Briicke (nth of August 1675) and forcing him to capitulate at Trier. On the 18th of September 1675 died this adventurous prince, who, as Voltaire said, passed his life in losing his estates. His brother Francis, in favour of whom he had abdicated, was a cardinal at the age of nineteen and subsequently bishop of Toul, although he had never taken orders. He obtained a dispensation to marry his cousin, Claude of Lorraine, and died in 1670. He had one son, Charles, who in 1675 took the title of duke of Lorraine and was recognized by all the powers except France. After an unsuccess- ful attempt to seize Lorraine in 1676, Charles vainly solicited the throne of Poland, took an active part in the wars in Hungary, and married Eleanor of Austria, sister of the emperor Leopold I., in 1678. At the treaty of Nijmwegen France proposed to restore his estates on condition that he should abandon a part of them; but Charles refused, and passed the rest of his life in Austria, where he took part in the wars against the Turks, whom he defeated at Mohacz (1687). He died in 1690.

Leopold, Charles's son and successor, was restored to his estates by the treaty of Ryswick (1697), but had to dismantle all the fortresses in Lorraine and to disband his army with the exception of his guard. Under his rule Lorraine flourished. While diminishing the taxes, he succeeded in augmenting his revenues by wise economy. The population increased enormously during his reign — that of Nancy, for instance, almost trebling itself between the years 1699 and 1 735. Leopold welcomed French immigrants, and devoted himself to the development of commerce and industry, particularly to the

manufacture of stuffs and lace, glass and paper. He was respon- sible, too, for the compilation of a body of law which was known as the ” Code Leopold.” Some time after his death, which occurred on the 27th of March 1729, his heir Francis III. was betrothed to Maria Theresa of Austria, the daughter and heiress of the emperor Charles VI. France, however, could not admit the possibility of a union of Lorraine with the Empire; and in 1735, at the preliminaries of Vienna, Louis XV. negotiated an arrangement by which Francis received the duchy of Tuscany, which was vacant by the death of the last Medici, in exchange for Lorraine, and Stanislaus Leszczynski, the dethroned king of Poland and father-in-law of Louis XV., obtained Lorraine, which after his death would pass to his daughter — in other words, to France. These arrangements were confirmed by the treaty of Vienna (18th of November 1738). In 1736, by a secret agree- ment, Stanislaus had abandoned the financial administration of his estates to Louis XV. for a yearly subsidy. The intendant, Chaumont de la Galaiziere, was instructed to apply the French system of taxation in Lorraine; and in spite of the severity of

the administration Lorraine preserved a grateful memory of the good king Stanislaus, who held his brilliant little court at Luneville, and founded an academy and several libraries and hospitals. At his death in February 1766 the two duchies of Lorraine and Bar became definitively incorporated in the kingdom of France. The treaties of 1735 and 1736, however, guaranteed their legislation, the privileges enjoyed by the three orders, and their common law and customs tariffs, which they retained until the French Revolution. Lorraine and Barrois formed a large government corresponding, together with the little government of the three bishoprics, to the intendance of Lorraine and the glntraiite of Metz. For legal purposes, Metz had been the seat of a parlement since 1633, and the parlement of Nancy was created in 1776. There was, too, a chambre des comptes at Metz, and another at Bar-le-duc. (For the later history see Alsace-Lorraine.)

See Dora. A. Calmet, Histoire ecclesiastique et civile de Lorraine (2nd ed., Nancy, 1747-1757); A. Digot, Histoire de Lorraine (1879- 1880) ; E. Huhn, Geschichte Lothringens (Berlin, 1877) ; R. Parisot, Le Royaume de Lorraine sous les Carolingiens (Paris, 1899); Comte D’Haussonville, Histoire de la reunion de la Lorraine a la France (2nd ed., Paris, i860); E. Bonvalot, Histoire du droit et des insti- tutions de la Lorraine et des Trois-Hviches (Paris, 1895); and E. Duvernoy, Les

Htdts Generaux des duchesde Lorraine et de Barjusqu'd la majorite de Charles III. (Paris, 1904), (R. Po.)

LORTZING, GUSTAV ALBERT (1801-1851), German composer, was born at Berlin on the 23rd of October 1801. Both his parents were actors, and when he was nineteen the son began to play youthful lover at the theatres of Diisseldorf and Aachen, sometimes also singing in small tenor or baritone parts. His first opera Ali Pascha von Jannina appeared in 1824, but his fame as a musician rests chiefly upon the two operas Der Wild- schiitz (1842) and Czar und Zimmermann (1837). The latter, although now regarded as one of the masterpieces of German comic opera, was received with little enthusiasm by the public of Leipzig.* Subsequent performance in Berlin, however, provoked such a tempest of applause that the opera was soon placed on all the stages of Germany. It was translated into English, French, Swedish, Danish, Dutch, Bohemian, Hungarian and Russian. Der Wildschiitz was based on a comedy of Kotzebue, and was a satire on the unintelligent and exaggerated admiration for the highest beauty in art expressed by the bourgeois gentil- homme. Of his other operas it is only necessary to note Der Pole und sein Kind, produced shortly after the Polish insurrection of 1831, and Undine (1845). Lortzing died at Berlin on the 21st of January 1851.

LORY, CHARLES (1823-1889), French geologist, was born at Nantes on the 30th of July 1823. He graduated D. es Sc. in 1847; in 1852 he was appointed to the chair of geology at the University of Grenoble, and in 1881 to that of the Ecole Normale Superieure in Paris. He was distinguished for his researches on the geology of the French Alps, being engaged pn the geological survey of the departments of Isere, Drome and the Hautes Alpes, of which he prepared the maps and explanatory memoirs. He dealt with some of the disturbances in the Savoy Alps, describing the fan-like structures, and confirming the views of J. A. Favre with regard to the overthrows, reversals and duplication of the strata. His contributions to geological literature include also descriptions of the fossils and strati- graphical divisions of the Lower Cretaceous and Jurassic rocks of the Jura. He died at Grenoble on the 3rd of May 1889.

LORY (a word of Malayan origin signifying parrot, in general use with but slight variation of form in many European languages) , the name of certain birds of the order Psittaci, mostly from the Moluccas and New Guinea, remarkable for their bright scarlet or crimson colouring, though also, and perhaps subsequently, applied to some others in which the plumage is chiefly green. The lories have been referred to a considerable number of genera, of which Lorius (the Domicella of

some authors), Eos and Chalcopsittacus may be here particularized, while under the name of ” lorikeets ” may be comprehended such genera as Tricho- glossus, Charmosyna, Loriculus and Coriphilus. By most systematists some of these forms have been placed far apart, even in different families of Psittaci, but A. H. Garrod has

shown (Proc. Zool. Society, 1874, pp. 586-598, and 1876, p. 692) the many common characters they possess, which thus goes some way to justify the relationship implied by- their popular designation. A full account of these birds is given in the first part of Count T. Salvadori’s Ornitologia delta Papuasia e delle Molucche (Turin 1880), whilst a later classification appeared in Salvadori’s section of the British Museum Catalogue of Birds, xx., 1891.

Though the name lory has often been used for the species of Eclectus, and some other genera related thereto, modern writers would restrict its application to the birds of the genera Lorius, Eos, Chalcopsittacus and their near allies, which are often placed in a subfamily, Loriinae, belonging to the so-called family of Trichoglossidae or ” brush-tongued ” parrots. Garrod in his investigations on the anatomy of Psittaci was led not to attach much importance to the structure indicated by the epithet ” brush-tongued ” stating {Proc. Zool. Society, 1874, P- 597) that it ” is only an excessive development of the papillae which are always found on the lingual surface.” The birds of this group are very characteristic of the New Guinea subregion, 1 in which occur, according to Count Salvadori, ten species of Lorius, eight of Eos and four of Chalcopsittacus; but none seem here to require any further notice, 2 though among them, and particularly in the genus Eos, are included some of the most richly-coloured birds in the whole world; nor does it appear that more need be said of the lorikeets.

The family is the subject of an excellent monograph by St George Mivart (London, 1896). (A. N.)

LOS ANDES, a former state of Venezuela under the redivision of 1 88 1, which covered the extreme western part of the republic N. of Zamora and S. of Zulia. In the redivision of 1904 Los Andes was cut up into three states— Merida “Tachira and Trujillo.

. LOS ANGELES, a city and the county-seat of Los Angeles county, in southern California, U.S.A., along the small Los Angeles river, in the foothills of the San Gabriel Mountains; a narrow strip, 18 m. long, joins the main part of the city to its water front on the ocean, San Pedro Bay. Pop. (1880) 11,183, (1890) 50,395, (1900) 102,479, of whom 19,964 were foreign-born; 3 the growth in population since

1900 has been very rapid and in 1910 it was 319,198. The city had in 1910 an area of 85-1 sq. m., of which more than one-half has been added since 1890. Los Angeles is served by the Southern Pacific, the Atchison, Topeka & Santa Fe, and the San Pedro, Los Angeles & Salt Lake railways; by steamers to San Francisco; and by five systems of urban and suburban electric railways, which have 300 m. of track within the city and 700 m. within a radius of 30 m. beyond its limits. Inclined railways ascend Third Street Hill and Court Street Hill, in the heart of the city; and a system of subways extends from the centre of the city to its western limits. The harbour, San Pedro Bay, originally open and naturally poor, has been greatly improved by the Federal government; a breakwater 9250 ft. long was begun in 1898 and the bar has been deepened, and further improvements of the inner harbour at Wilmington (which is nearly landlocked by a long narrow island lying nearly east and west across its mouth) were begun in 1907. Important municipal docks have been built by the city.

The situation of the city between the mountains and the sea is attractive. The site of the business district is level, and its plan regular; the suburbs are laid out on hills. Although not specifically a health resort, Los Angeles enjoys a high

1 They extend, however, to Fiji, Tahiti and Fanning Island.

2 Unless it be Oreopsittacus arfaki, of New Guinea, remarkable as the only parrot known as yet to have fourteen instead of twelve rectrices.

3 In addition to the large foreign-born population (4023 Germans, 3017 English, 2683 English Canadians, 1885 Chinese, 1720 Irish and smaller numbers of French, Mexicans, Swedes, Italians, Scots, Swiss, Austrians, Danes, French Canadians, Russians, Norwegians, Welsh and Japanese) 26,105 of the native white inhabitants were of foreign parentage (i.e. had one or both parents not native born), so that only 54,121 white persons were of native parentage. German, French and Italian weekly papers are published in Los Angeles.

reputation for its climate. From July 1877 to 1008 (inclusive) the mean of the minima for January, the coldest month of the year, was 44-16° F.; the mean of the minima for August, the warmest month, was 6o-i° F.; and the difference of the mean temperature of the coldest and the warmest month was about 1 8° F.; while on five days only in

this period (and on no day in the years 1904-1908) did the official thermometer fall below 32° F. There are various pleasure resorts in the mountains, and among seaside resorts are Santa Monica, Ocean Park, Venice, Playa del Rey, Hermosa, Redondo, Terminal Island, Long Beach, Alamitos Bay, Huntington Beach, Newport, Balboa and Corona del Mar. There are excellent roads throughout the country. Los Angeles has beautiful shade trees and a wealth of semi-tropic vegetation. Its residential portions are characterized by detached homes set in ample and beautiful grounds. Towering eucalyptus, graceful pepper trees, tropic palms, rubber trees, giant bananas, yuccas and a wonderful growth of roses, heliotrope, calla lilies in hedges, orange trees, jasmine, giant geraniums and other flowers beautify the city throughout the year. There are 22 parks, with about 3800 acres within or on the borders of the city limits; among the parks are Griffith (3015 acres), Elysian (532 acres), Eastlake (57 acres), Westlake (35 acres) and Echo (38 acres). The old Spanish- Moorish mission architec- ture has considerably influenced building styles. Among the important buildings are the Federal Building, the County Court House, the City Hall, a County Hall of Records, the Public Library with about 1 10,000 volumes in 1908, the large Auditorium and office buildings and the Woman's Club. The exhibit in the Chamber of Commerce Building illustrates the resources of southern California. Here also are the Coronel Collection, given in 1901 by Dona Mariana, the widow of Don Antonio Coronel, and containing relics of the Spanish and Mexican regime in California; and the Palmer Collection of Indian antiquities. In Los Angeles also are the collections of the Southwest Society (1904; for southern California, Arizona and New Mexico) of the Archaeological Institute of America. On the outskirts of the city, near Eastlake Park, is the Indian Crafts Exhibition, which contains rare collections of aboriginal handiwork, and where Indians may be seen making baskets, pottery and blankets. Of interest to visitors is that part of the city called Sonora Town, with its adobe houses, Mexican quarters, old Plaza and the Church of Our Lady, Queen of the Angels (first erected in 1822; rebuilt in 1861), which contains interesting paintings by early Indian converts. Near Sonora Town is the district known as Chinatown. The principal educational institutions are the University of Southern California (Methodist Episcopal, 1880), the Maclay College of Theology and a preparatory school; Occidental College (Presbyterian, 1887), St Vincent's College (Roman Catholic, founded 1865; chartered 1869) and the Los Angeles State Normal School (1882).

The economic interests of Los Angeles centre in the culture of fruits. The surrounding country is very fertile when irrigated, producing

oranges, lemons, figs and other semi-tropical fruits. Thousands of artesian wells have been bored, the region between Los Angeles, Santa Clara and San Bernardino being one of the most important artesian well regions of the world. The city, which then got its water supply from the Los Angeles river bed, in 1907 author- ized the issue of $23,000,000 worth of 4% bonds for the construction of an aqueduct 209 m. long, bringing water to the city from the Owens river, in the. Sierra Nevada Mountains. It was estimated that the project would furnish water for one million people, beside supplying power for lighting, manufacturing and transportation purposes. All the water in excess of the city's actual needs may be employed for irrigation. Work on the aqueduct was begun in 1908, and it was to be completed in five years. From 1900 to 1905 the value of the factory products increased from $15,133,696 to $34,814,475 or 130%, and the capital employed in manufactures from $10,045,095 to $28,181,418 or 180-5%. The leading manu- facturing industries in 1905; with the product-value of each in this year, were slaughtering and meat-packing ($4,040,162), foundry and machine shop work ($3,146,914), flour and grist milling ($2,798,740), lumber manufacturing and planing ($2,519,081), printing and publishing (newspapers and periodicals, $2,097,339; and book and job printing, $1,278,841), car construction and repair- ing ($1,549,836) — in 1910 there were railway shops here of the Southern Pacific, Pacific Electric, Los Angeles Street, Salt Lake and Santa Fe railways — and the manufacture of confectionery ($953,915),

furniture ($879,910) and malt liquors ($789,393). The canning and preserving of fruits and vegetables are important industries. There is a large wholesale trade with southern California, with Arizona and with the gold-fields of Nevada, with which Los Angeles is connected by railway. Los Angeles is a port of entry, but its foreign commerce is relatively unimportant. The value of its imports increased from $721,705 in 1905 to $1,654,549 in 1907; in 1908 the value was $1,193,552. The city's exports were valued at $45,000 in 1907 and at $306,439 in 1908. The coastwise trade is in lumber (about 700,000,000 ft. annually), shipped from northern California, Oregon and Washington, and in crude oil and general merchandise. There are rich oil-fields N. and W. of the city and wells throughout the city; petroleum is largely employed as fuel in factories. The central field, the Second Street Park field in the city, was developed between 1892 and 1895 and wells were drilled farther E. until in 1896 the eastern field was tapped with wells at Adobe and College streets; the wells within the city are gradually being abandoned. The western field and the western part of the central field were first worked in 1 899-1 900.

The Salt Lake field, controlled by the Salt Lake Oil Company, near Rancho de Brea, W.S.W. of the city, first became important in 1902 and in 1907 it was the most valuable field in California, S. of Santa Barbara county, and the value of its product was $1,749,980. In 1905 the value of petroleum refined in Los Angeles was $461,281.

Land has not for many years been cheap (i.e. absolutely) in the southern Calif ornian fruit country, and immigration has been, generally, of the comparatively well-to-do. This fact has greatly affected the character and development of the city. The assessed valuation of property increased more than threefold from 1900 to 1910, being $276,801,517 in the latter year, when the bonded city debt was $17,259,312-50. Since 1896 there has been a strong independent movement in politics, marked by the organization of a League for Better City Government (1896) and a Municipal League (1900), and by the organization of postal primaries to secure the co-operation of electors pledged to independent voting. Since 1904 the public school system has been administered by a non-partisan Board of Education chosen from the city at large, and not by wards as there- tofore.

Los Angeles, like all other Californian cities, has the privilege of making and amending its own charter, subject to the approval of the state legislature. In 1902 thirteen amendments were adopted, including provisions for the initiative, the referendum and the recall. The last of these provides that 25% of the voters choosing a municipal officer may, by signing a petition for his recall, force a new election during his term of office and thereby remove him if another candidate receives a greater number of votes. This provision, introducing an entirely new principle into the American governmental system, came into effect in January 1903, and was employed in the following year when a previously elected councilman who was ” recalled ” by petition and was unsuccessful in the 1904 election brought suit to hold his office, and on a mere technicality the Supreme Court of the state declared the recall election invalid. In 1909 there was a recall election at which a mayor was removed and another chosen in his place.

The Pueblo de Nuestra Senora la Reina de los Angeles was founded in 1781. The Franciscan mission of San Gabriel — still a famous landmark — had been established ten years earlier a few miles eastward. Beginning about 1827, Los Angeles, being the largest pueblo of the territory, became a rival of Monterey for the honour of being the capital of California, was the seat of conspiracies to overthrow the Mexican authority, and the stronghold of the South California party in the bickerings and struggles that lasted down to the American

occupation. In 1835 it was made a city by the Mexican Congress, and declared the capital, but the last provision was not enforced and was soon recalled. In 1836-1838 it was the headquarters of C. A. Carrillo, a legally-named but never de facto governor of California, whose jurisdiction was never recognized in the north; and in 1845-1847 it was the actual capital. The city was rent by factional quarrels when war broke out between Mexico and the United States, but the appearance of United States troops under Commodore Robert F. Stockton and General John C. Fremont before Los Angeles caused both factions to unite against a common foe. The defenders of Los Angeles fled at the approach of the troops, and on the 13th of August 1846 the American flag was raised over the city. A garrison of fifty men, left in control, was compelled in October to withdraw on account of a revolt of the inhabitants, and Los Angeles was not retaken until

General Philip Kearny and Commodore Stockton entered the city on the 18th of January 1847. This was the only important overt resistance to the establishment of the new regime in California. The city was chartered in 1850. It continued to grow steadily thereafter until it attained railway connexion with the Central Pacific and San Francisco in 1876, and with the East by the Santa Fe system in 1885. The completion of the latter line precipitated one of the most extraordinary of American railway wars and land booms, which resulted in giving southern California a great stimulus. The growth of the city since 1890 has been even more remarkable. In 1909 the township of Wilmington (pop. in 1900, 2983), including the city of San Pedro (pop. in 1900, 1787), Colegrove, a suburb W.N.W. of the city, Cahuenga (pop. in 1900, 1586), a township N.W. of the former city limits, and a part of Los Feliz were annexed to the city.

LOS ISLANDS (Islas de los Idolos), a group of islands off the coast of French Guinea, West Africa, lying south of Sangarea Bay, between 9 25′ and 9° 31′ N. and 13 46′ and 13 51′ W., and about 80 m. N.N.W. of Freetown, Sierra Leone. There are five principal islands: Tamara, Factory, Crawford, White (or Ruma) and Coral. The two largest islands are Tamara and Factory, Tamara, some 8 m. long by 1 to 2 m. broad, being the largest. These two islands lie parallel to each other, Tamara to the west; they form a sort of basin, in the centre of which is the islet of Crawford. The two other islands are to the south. The archipelago is of volcanic formation, Tamara and Factory islands forming part of a ruined crater, with Crawford Island as the cone. The

highest point is a knoll, some 450 ft. above sea-level, in Tamara. All the islands are richly clothed with palm trees and flowering underwood. Tamara has a good harbour, and contains the principal settlement. The inhabitants, about 1500, are immigrants of the Baga tribe of Senegambian negroes, whose home is the coast land between the Pongo and Nunez rivers. These are chiefly farmers. The Church of England has a flourishing mission, with a native pastorate. At one time the islands were a great seat of slave-traders and pirates. The latter are supposed to have buried large amounts of treasure in them. In an endeavour to stop the slave trade and piracy, the islands were garrisoned (1812-1813) by British troops, but the unhealthiness of the climate led to their withdrawal. In 1818 Sir Charles McCarthy, governor of Sierra Leone, obtained the cession of the islands to Great Britain from the chiefs of the Baga country, and in 1882 France recognized them to be a British possession. They were then the headquarters of several Sierra Leone traders. By article 6 of the Anglo-French conven- tion of the 8th of April 1904, the islands were ceded to France. They were desired by France because of their geographical position, Konakry, the capital of French Guinea, being built on an islet but 3 m. from Factory Island, and at the mercy of long range artillery planted thereon. The islands derive their name from the sacred images found on them by the early European navigators.

See A. B. Ellis, West African Islands (London, 1885), and the works cited under French Guinea.

LOSSIEMOUTH, a police burgh of Elginshire, Scotland. Pop. (1901) 3904. It embraces the villages of Lossiemouth, Branderburgh and Stotfield, at the mouth of the Lossie, 5? m. N.N.E. of Elgin, of which it is the port, by a branch line of the Great North of Scotland railway. The industries are boat- building and fishing. Lossiemouth, or the Old Town, dates from 1700; Branderburgh, farther north, grew with the harbour and began about 1830; Stotfield is purely modern and contiguous to the splendid golf-course. The cliffs at Covesea, 2 m. W., contain caves of curious shape. Sir Robert Gordon of Gordons- town used one as a stable in the rebellion of 1745; weapons of prehistoric man were found in another, and the roof of a third is carved with ornaments and emblems of early Celtic art.

Kinneddar Castle in the parish of Drainie — in which Lossiemouth is situated — was a seat of the bishops of Moray, and Old Duffus Castle, 2| m. S.W.. was built in the reign of David II. The estate of Gordonstown, close by, was founded by Sir Robert Gordon (1580-1656), historian of the Sutherland family, and grandfather of the

baronet who, because of his inventions and scientific attainments, was known locally as ” Sir Robert the Warlock ” (1647-1704). Nearly midway between Lossiemouth and Elgin stand the massive ruins of the palace of Spynie, formerly a fortified residence of the bishops of Moray. ” Davie’s Tower,” 60 ft. high with walls 9 ft. thick, was built by Bishop David Stewart about 1470. The adjacent loch is a favourite breeding-place for the sea-birds, which resort to the coast of Elginshire in enormous numbers. A mile S.E. of the lake lies Pitgaveny, one of the reputed scenes of the murder of King Duncan by Macbeth.

LOSSING, BENSON JOHN (1813-1891), American historical writer, was born in Beekman, New York, on the 12th of February 1 813. After editing newspapers in Poughkeepsie he became an engraver on wood, and removed to New York in 1839 for the practice of his profession, to which he added that of drawing illustrations for books and periodicals. He likewise wrote or edited the text OI numerous publications. His Pictorial Field- Book of the Revolution (first issued in 30 parts, 1850-1852, and then in 2 volumes) was a pioneer work of value in American historical literature. In its preparation he travelled some 9000 m. during a period of nearly two years; made more than a thousand sketches of extant buildings, battlefields, &c; and presented his material in a form serviceable to the topographer and interesting to the general reader. Similar but less character- istic and less valuable undertakings were a Pictorial Field-Book of the War of 1812 (1868), and a Pictorial History of the Civil War in the United States of America (3 vols. 1866-1869). His other books were numerous: an Outline History of the Fine Arts; many illustrated histories, large and small, of the United States; popular descriptions of Mount Vernon and other localities associated with famous names; and biographical sketches cf celebrated Americans, of which The Life and Times of Major-General Philip Schuyler (2 vols. 1860-1873) was the most considerable. He died at Dover Plains, New York, on the 3rd of June 1891.

LOSSNITZ, a district in the kingdom of Saxony, extending for about 5 m. along the right bank of the Elbe, immediately N.W. of Dresden. Pop. (1905) 6929. A line of vine-clad hills shelters it from the north winds, and so warm and healthy is the climate that it has gained for the district the appellation of the ” Saxon Nice.” Asparagus, peaches, apricots, strawberries, grapes and roses are largely cultivated and find a ready market in Dresden.

LOST PROPERTY. The man who loses an article does not lose his right thereto, and he may recover it from the holder whoever he be, unless his claim be barred by some Statute of Limitations or special custom, as sale in market overt. The rights and duties of the finder are more complex. If he know or can find out the true owner, and yet convert the article to his own use, he is guilty of theft. But if the true owner Cannot be discovered, the finder keeps the property, his title being superior to that of every one except the true owner. But this is only if the find be in public or some public place. Thus if you pick up bank notes in a shop where they have been lost by a stranger, and hand them to the shopkeeper that he may discover and repossess the true owner, and he fail to do so, then you can recover them from him. The

owner of private land, however, is entitled to what is found on it. Thus a man sets you to clear out his pond, and you discover a diamond in the mud at the bottom. The law will compel you to hand it over to the owner of the pond. This applies even against the tenant. A gas company were lessees of certain premises; whilst making excavations therein they came upon a prehistoric boat; and they were forced to surrender it to their lessor. An aerolite becomes the property of the owner of the land on which it falls, and not of the person finding or digging it out. The principle of these three last cases is that whatever becomes part of the soil belongs to the proprietor of that soil.

Property lost at sea is regulated by different rules. Those who recover abandoned vessels are entitled to salvage. Property absolutely lost upon the high seas would seem to belong to the finder. It has been claimed for the crown, and the American courts have held, that apart from a decree the finder is only entitled to salvage rights, the court retaining the rest, and thus

practically taking it for the state on the original owner not being found. The modern English law on the subject of wreck (includ- ing everything found on the shore of the sea or tidal river) is contained in the Merchant Shipping Act 1894. The finder must forthwith make known his discovery to the receiver of wreck under a penalty. He is entitled to a salvage reward, but the property belongs to the crown or its grantee unless the true owner claims within a year. In the United States unclaimed wreck after a year generally becomes the property of the state. In Scotland the right to lost property is theoretically in the crown, but the finder would not in practice be interfered with except under the provisions of the Burgh Police (Scotland) Act 1892. Section 412 requires all persons finding goods to deliver them forthwith “to the police under a penalty. If the true owner is not discovered within six months the magistrates may hand them over to the finder. If the owner appears he must pay a reasonable reward. Domestic animals, including swans, found straying without an owner may be seized by the crown or lord of the manor, and if not claimed within a year and a day they become the property of the crown or the lord, on the observance of certain formalities. In Scotland they were held to belong to the crpwn or its donatory, usually the sheriff of a county. By the Burgh Police Act above quoted provision is made for the sale of lost animals and the disposal of the free proceeds for the purposes of the

act unless such be claimed. In the United States there is diversity of law and custom. Apart from special rule, lost animals become the property of the finder, but in many cases the proceeds of their sale are applied to public purposes. When property is lost by carriers, innkeepers or railway companies, special provisions as to their respective responsibilities apply. As to finds of money or the precious metals, see Treasure Trove.

LOSTWITHIEL, a market town and municipal borough in the Bodmin parliamentary division of Cornwall, England, 305 m. W. of Plymouth by the Great Western railway. Pop. (1901) 1379. It is pleasantly situated on the banks of the river Fowey. The church of St Bartholomew is remarkable for a fine Early English tower surmounted by a Decorated spire; there are also beautiful Decorated windows and details in the body of the church, and a richly carved octagonal font. A bridge of the 14th century crosses the river. The shire hall includes remains of a building, called the Stannary prison, dating from the 13th century. The Great Western railway has workshops at Lostwithiel.

Lostwithiel owed its ancient liberties — probably its existence — to the neighbouring castle of Restormel. The Pipe Rolls (1194- 1203) show that Robert de Cardinan, lord of Restormel, paid ten marks yearly for having a market at Lostwithiel. By an undated charter still preserved with the corporation's muniments he surrendered to the burgesses all the liberties given them by his predecessors (antecessores) when they founded the town. These included hereditary succession to tenements, exemption from sullage, the right to elect a reeve (praepositus) if the grantor thought one necessary and the right to marry without the lord's interference. By Isolda, granddaughter of Robert de Cardinan, the town was given to Richard, king of the Romans, who in the third year of his reign granted to the burgesses a gild merchant sac and soc, toll, team and infangenethef, freedom from pontage, lastage, &c, throughout Cornwall, and exemption from the jurisdiction of the hundred and county courts, also a yearly fair and a weekly market. Richard transferred the assizes from Launceston to Lostwithiel. His son Edmund, earl of Cornwall, built a great hall at Lostwithiel and decreed that the coinage of tin should be at Lostwithiel only. In 1325 Richard's charter was confirmed and the market ordered to be held on Thursdays. In 1386 the assizes were transferred back to Launceston. In 1609 a charter of incorporation provided for a mayor, recorder, six capital burgesses and seventeen assistants and courts of record and pie powder. The boundaries of the borough were extended in 1733. Under the reformed charter granted in 1885 the corporation consists of a mayor, four aldermen and twelve councillors. From 1305 to 1832 two members represented

Lostwithiel in parliament. The electors after r6o9 were th>" twenty-five members of the corporation. Under the Reform Act (1832) the borough became merged in the county. For the Thursday market granted in 1326 a Friday market was sub stituted in r733, and this continues to be held. The fair granted in 1326 and the three fairs granted in 1733 have all given place to others. The archdeacon's court, the sessions and the county elections were long held at Lostwithiel, but all have now been removed. For the victory gained by Charles I. over the earl of Essex in 1644, see Great Rebellion.

LOT, in the Bible, the legendary ancestor of the, two Palestinian peoples, Moab and Ammon (Gen. xix. 30-38; cp. Ps. lxxxiii. 8); he appears to have been represented as a Horite or Edomite (cp. the name Lotan, Gen. xxxvi. 20, 22). As the son of Haran and grandson of Terah, he was Abraham's nephew (Gen. xi. 31), and he accompanied his uncle in his migration from Haran tp Canaan. Near Bethel 1 Lot separated from Abraham, owing tc disputes between their shepherds, and being offered the first choice, chose the rich fields of the Jordan valley which were as fertile and well irrigated as the " garden of Yahweh " (i.e. Eden, Gen. xiii. 7 sqq.). It was in this district that the cities of Sodom and Gomorrah were situated. He was saved from their fate by two divine messengers who spent the night in his house, and next morning led Lot, his wife, and his two unmarried daughters out of the city. His wife looked back and was changed to a pillar of salt, 2 but Lot with his two daughters escaped first to Zoar and then to the mountains east of the Dead Sea, where the daughters planned and executed an incest by which they became the mothers of Moab and Ben-Ammi {i.e. Ammon; Gen. xix,). The account of Chedorlaomer's invasion and of Lot's rescue by Abraham belongs to an independent source (Gen. xiv.), the age and historical value of which has been much disputed. (See further Abraham; Melchizedek.) Lot's character is made to stand in strong^'contrast with that of Abraham, notably in the representation of his^selfishness (xiii. 5 sqq.), and reluctance to leave the sinful city (xix. 16 sqq.); relatively, however, he was superior to the rest (with the crude story of his insistence upon the inviolable rights of guests, xix. 5 sqq.; cf. Judges xix. 22 sqq.), and is regarded in 2 Pet. ii. 7 seq. as a type of righteousness.

Lot and his daughters passed into Arabic tradition from the Jews. The daughters are named Zahy and Ra'wa by Mas'udi ii. 139; but other Arabian writers give other forms. Paton (Syria and Palestine, pp. 43, 123) identifies Lot-Lotan with Ruten, one of the Egyptian names for Palestine; its true meaning is obscure. For traces of mythical elements in the story see Winckler, Altorient. Forsch. ii. 87 seq. See further, j. Skinner, Genesis, pp. 310 sqq. (S. A. C.)

LOT (Lat. Oltis), a river of southern France flowing westward across the central plateau, through the departments of Lozere, Aveyron, Lot and Lot-et-Garonne. Its length is about 300 m., the area of its basin 4444 sq. m. The river rises in the Cevennes on the Mont du Goulet at a height of 4918 ft. about 15 m. E. of Mende, past which it flows. Its upper course lies through gorges between the Causse of Mende and Aubrac Mountains on the north and the tablelands (causses) of Sauveterre, Severac and Comtal on the south. Thence its sinuous course crosses the plateau of Quercy and entering a wider fertile plain flows into the Garonne at Aiguillon between Agen and Marmande. Its largest tributary, the Truyere, rises in the Margeride moun- tains and after a circuitous course joins it on the right at Entraygues (department of Aveyron), its affluence more than

1 The district is thus regarded as the place where the Hebrews, on the one side, and the Moabites and Ammonites, on the other, com- mence their independent history. Whilst the latter settle across the Jordan, Abraham moves down south to Hebron.

2 Tradition points to the Jebel Usdum (cp. the name Sodom) at the S.W. end of the Dead Sea. It consists almost entirely of pure crystallized salt with pillars and pinnacles such as might have given rise to the story (see Driver, Genesis, p. 201 ; and cf. also Palestine Explor. Fund, Quart. Statements, 1 87 1, p. 16, 1885, p. 20; Conder, Syrian Stone-lore, p. 279 seq.). Jesus cites the story of Lot and his wife to illustrate the sudden coming of the kingdom of God (Luke xvii. 28-32). The history of the interpretation of the legend by the early and medieval church down to the era of rational and scientific investigation will be found in A. D. White, Warfare of Science with Theology, ii. ch. xviii.

doubling the volume of the river. Lower down it receives the Dourdou de Bozouls (or du Nord) on the left and on the right the Cele above Cahors (department of Lot), which is situated on a peninsula skirted by one of the river's many windings. Villeneuve-sur-Lot (department of Lot-et-Garonne) is the only town of any importance between this point and its mouth. The Lot is canalized between Bouquies, above which there is no navigation, and the Garonne (160 m.).

LOT, a department of south-western France, formed in 1790 from the district of Quercy, part of the old province of Guyenne. It is bounded

N. by Correze, W. by Dordogne and Lot-et-Garonne, S. by Tarn-et-Garonne, and E. by Aveyron and Cantal. Area 2017 sq. m. Pop. (1906) 216,611. The department extends over the western portion of the Massif Central of France; it slopes towards the south-west, and has a maximum altitude of 2560 ft. on the borders of Cantal with a minimum of 213 ft. at the point where the river Lot quits the department. The Lot, which traverses it from east to west, is navigable for the whole distance (106 m.) with the help of locks; its principal tributary within the department is the Cel6 (on the right). In the north of the department the Dordogne has a course of 37 m.; among its tributaries are the Cere, which has its rise in Cantal, and the Ouysse, a river of no great length, but remarkable for the abundance of its waters. The streams in the south of Lot all flow into the Tarn. The eastern and western portions of the department are covered by ranges of hills; the north, the centre, and part of the south are occupied by a belt of limestone plateaus or causses, that to the north of the Dordogne is called the Causse de Martel; between the Dordogne and the Lot is the Causse de Gramat or de Rocamadour; south of the Lot is the Causse de Cahors. The causses are for the most part bare and arid owing to the rapid disappearance of the rain in clefts and chasms in the limestone, which are known as igues. These are most numerous in the Causse de Gramat and are sometimes of great beauty; the best known is the Gouffre de Padirac, 7 m. N.E. of Rocamadour. The altitude of the causses (from 700 to 1300 ft., much lower than that of the similar plateaus in Lozere, Herault and Aveyron) permits the cultivation of the vine; they also yield a small quantity of cereals and potatoes and some wood. The deep intervening valleys are full of verdure, being well watered by abundant springs. The climate is on the whole that of the Girondine region; the valleys are warm, and the rainfall is somewhat above the average for France. The difference of temperature between the higher parts of the department belong- ing to the central plateau and the sheltered valleys of the south-west is considerable. Wheat, maize, oats and rye are the chief cereals. Wine is the principal product, the most valued being that of Cahors grown in the valley of the Lot, which is, in general, the most productive portion of the department. It is used partly for blending with other wines and partly for local consumption. The north-east cantons produce large quantities of chestnuts; walnuts, apples and plums are common, and the department also grows potatoes and tobacco and supplies truffles. Sheep are the most abundant kind of live stock; but pigs, horned cattle, horses, asses, mules and goats are also reared, as well as poultry and bees. Iron and coal are mined, and there are important zinc deposits (Planioles). Lime- stone is quarried. There are oil-works and numerous mills, and wool spinning and carding as well as cloth

making, tanning, currying, brewing and the making of agricultural implements are carried on to some extent. The three arrondissements are those of Cahors, the capital, Figeac and Gourdon; there are 29 cantons and 329 communes.

Lot belongs to the 17th military district, and to the academie of Toulouse, and falls within the circumscription of the court of appeal at Agen, and the province of the archbishop of Albi. It is served by the Orleans railway. Cahors, Figeac and Roca- madour are the principal places. Of the interesting churches and chateaux of the Hepartment, may be mentioned the fine feudal fortress at Castelnau occupying a commanding natural position, with an audience hall of the 12th century, and the Romanesque abbey-church at Souillac with fine sculpturing

on the principal entrance. The plateau of Puy dTssolu, near Vayrac, is believed by most authorities to be the site of the ancient Uxcellodunum, the scene of the last stand of the Gauls against Julius Caesar in 51 B.C. Lot has many dolmens, the finest- being that of Pierre Martine, near Livernon (arr. of Figeac).

LOT-ET-GARONNE, a department of south-western France, formed in 1790 of Agenais and Bazadais, two districts of the old province of Guienne, and of Condomois, Lomagne, Brullois and pays d'Albret, formerly portions of Gascony. It is bounded W. by Gironde, N. by Dordogne, E. by Lot and Tarn-et- Garonne, S. by Gers and S.W. by Landes. Area 2079 sq. m. Pop. (1906) 274,610. The Garonne, which traverses the department from S.E. to N.W., divides it into two unequal parts. . That to the north is a country of hills and deep ravines, and the slope is from east to west, while in the region to the south, which is a continuation of the plateau of Lannemezan and Armagnac, the slope is directly from south to north. A small portion in the south-west belongs to the sterile region of the Landes (q.v.); the broad valleys of the Garonne and of its affluent the Lot are proverbial for their fertility. The wildest part is towards the north-east on the borders of Dordogne, where a region of causses (limestone plateaus) and forests begins; the highest point (896 ft.) is also found here. The Garonne, where it quits the department, is only some 20 ft. above the sea-level; it is navig- able throughout, with the help of its lateral canal, as also are the Lot and Baise with the help of locks. The Drot, a right affluent of the Garonne in the north of the department, is also navigable in the lower part of its course. The climate is that of the Girondine region — mild and fine — the mean temperature of Agen being 56-6° Fahr., or 5° above that of Paris; the annual rainfall, which, in the plain of Agen, varies from 20 to 24 in., is nearly the least in

France. Agriculturally the department is one of the richest. Of cereals wheat is the chief, maize and oats coming next. Potatoes, vines and tobacco are important sources of wealth. The best wines are those of Clairac and Buzet. Vegetable and fruit-growing are prosperous. Plum-trees (pruniers d'ente) are much cultivated in the valleys of the Garonne and Lot, and the apricots of Nicole and Tonneins are well known. The chief trees are the pine and the oak; the cork-oak flourishes in the Landes, and poplars and willows are abundant on the borders of the Garonne. Horned cattle, chiefly of the Garonne breed, are the principal live stock. Poultry and pigs are also reared profitably. There are deposits of iron in the department. The forges, blast furnaces and foundries of Fumel are important; and agricultural implements and other machines are manu- factured. The making of lime and cement, of tiles, bricks and pottery, of confectionery and dried plums (pruneaux d'Agen) and other delicacies, and brewing and distilling, occupy many of the inhabitants. At Tonneins (pop. 4691 in 1906) there is a national tobacco manufactory. Cork cutting, of which the centre is Mezin, hat and candle making, wool spinning, weaving of woollen and cotton stuffs, tanning, paper-making, oil-making, dyeing and flour and saw-milling are other prominent industries. The peasants still speak the Gascon patois. The arrondissements are 4 — Agen, Marmande, Nerac and Villeneuve-sur-Lot — and there are 35 cantons and 326 communes.

Agen, the capital, is the seat of a bishopric and of the court of appeal for the department of Lot-et-Garonne. The depart- ment belongs to the region of the XVII. army corps, the acadimie of Bordeaux, and the province of the archbishop of Bordeaux. Lot-et-Garonne is served by the lines of the Southern and the Orleans railways, its rivers afford about 160 m. of navigable waterway, and the lateral canal of the Garonne traverses it for 54 m. Agen, Marmande, Nerac and Villeneuve-sur-Lot, the principal places, are treated under separate headings. The department possesses Roman remains at Mas d' Agenais and at Aiguillon. The churches of Layrac, Monsempron, Mas d' Agenais, Moirax, Mezin and Vianne are of interest, as also are the fortifica- tions of Vianne of the 13th century, and the chateaux of Xaintrailles, Bonaguil, Gavaudun and of the industrial town of Casteljaloux.

LOTHAIR L— LOTHAIR II.

17

LOTHAIR I. (795-855), Roman emperor, was the eldest son of the emperor Louis I., and his wife Irmengarde. Little is known of his early

life, which was probably passed at the court of his grandfather Charlemagne, until 815 when he became ruler of Bavaria. When Louis in 81 7 divided the Empire between his sons, Lothair was crowned joint emperor at Aix-la-Chapelle and given a certain superiority over his brothers. In 821 he married Irmengarde (d. 851), daughter of Hugo, count of Tours; in 822 undertook the government of Italy; and, on the 5th of April 823, was crowned emperor by Pope Paschal I. at Rome. In November 824 he promulgated a statute concerning the relations of pope and emperor which reserved the supreme power to the secular potentate, and he afterwards issued various ordinances for the good government of Italy. On his return to his father's court his step-mother Judith won his consent to her plan for securing a kingdom for her son Charles, a scheme which was carried out in 829. Lothair, however, soon changed his attitude, and spent the succeeding decade in constant strife over the division of the Empire with his father. He was alter- netely master of the Empire, and banished and confined to Italy ; at one time taking up arms in alliance with his brothers and at another fighting against them; whilst the bounds of his appointed kingdom were in turn extended and reduced. When Louis was dying in 840, he sent the imperial insignia to Lothair, who, disregarding the various partitions, claimed the whole of the Empire. Negotiations with his brother Louis and his half-brother Charles, both of whom armed to resist this claim, were followed by an alliance of the younger brothers against Lothair. A decisive battle was fought at Fontenoy on the 25th of June 841, when, in spite of his personal gallantry, Lothair was defeated and fled to Aix. With fresh troops he entered upon a war of plunder, but the forces of his brothers were too strong for him, and taking with him such treasure as he could collect, he abandoned to them his capital. Efforts to make peace were begun, and in June 842 the brothers met on an island in the Saone, and agreed to an arrangement which developed, after much difficulty and delay, into the treaty of Verdun signed in August 843. By this Lothair received Italy and the imperial title, together with a stretch of land between the North and Mediterranean Seas lying along the valleys of the Rhine and the Rhone. He soon abandoned Italy to his eldest son, Louis, and remained in his new kingdom, engaged in alternate quarrels and reconciliations with his brothers, and in futile efforts to defend his lands from the attacks of the Normans and the Saracens. In 855 he became seriously ill, and despairing of recovery renounced the throne, divided his lands between his three sons, and on the 23rd of September entered the monastery of Prum, where he died six days later. He was buried at Prum, where his remains were found in i860. Lothair was entirely untrustworthy and quite unable to maintain either the unity or the dignity of the empire of Charlemagne.

See ” Annales Fuldenses “; Nithard, ” Historiarum Libri,” both in the Monumenla Germaniae historica. Scriptores, Bande i. and ii. (Hanover and Berlin, 1826 fol.); E. Muhlbacher, Die Regesten des Kaiserreichs unter den Karolingern (Innsbruck, 1881); E. Diimmler, Geschichle des ostfrdnkischen Reichs (Leipzig, I 887-1888) ; B. Simson, Jahrbiicher des deutschen Retches unter Ludwig dem Frommen (Leipzig,

1874-1876).

LOTHAIR II. or III. (c. 1070-1137), surnamed the ” Saxon,” Roman emperor, son of Gebhard, count of Supplinburg, belonged to a family possessing extensive lands around Helmstadt in Saxony, to which he succeeded on his father’s death in 1075. Gebhard had been a leading opponent of the emperor Henry IV. in Saxony, and his son, taking the same attitude, assisted Egbert II., margrave of Meissen, in the rising of 1088. The position and influence of Lothair in Saxony, already considerable, was increased when in 1100 he married Richenza, daughter of Henry, count of Nordheim, who became an heiress on her father’s death in 1101, and inherited other estates when her brother Otto died childless in 11 16. Having assisted the German king, Henry V., against his father in 1104, Lothair was appointed duke of Saxony by Henry, when Duke Magnus, the last of the Billungs, died in 1106. His first care was to establish his

authority over some districts east of the Elbe; and quickly making himself independent of the king, he stood forth as the representative of the Saxon race. This attitude brought him into collision with Henry V., to whom, however, he was forced to submit after an unsuccessful rising in 1112. A second rising was caused when, on the death of Ulrich II., count of Weimar and Orlamunde, without issue in 1112, Henry seized these counties as vacant fiefs of the empire, while Lothair supported the claim of Siegfried, count of Ballenstadt, whose mother was a relative of Ulrich. The rebels were defeated, and Siegfried was killed at Warnstadt in n 13, but his son secured possession of the disputed counties. After the defeat by Lothair of Henry’s forces at Welfesholz on the nth of February n 15, events called Henry to Italy; and Lothair appears to have been undisturbed in Saxony until n 23, when the death of Henry II., margrave of Meissen and Lusatia raised a dispute as to the right of appoint- ment to the vacant margraviates. A struggle ensued, in which victory remained with the duke. The Saxony policy of Lothair during these years had been to make himself independent, and to extend his authority; to this end he allied himself with the papal party, and easily revived the traditional hostility of the Saxons to the Franconian emperors.

When Henry V. died in 11 25, Lothair, after a protracted election, was chosen German king at Mainz on the 30th of August 1 1 25. His. election was largely owing to the efforts of Adalbert, archbishop of Mainz, and the papal party, who disliked the candidature of Henry's nephew and heir, Frederick II. of Hohenstaufen, duke of Swabia. The new king was crowned at Aix-la-Chapelle on the 13th of September 1125. Before suffering a severe reverse, brought about by his interference in the internal affairs of Bohemia, Lothair requested Frederick of Hohenstaufen to restore to the crown the estates bequeathed to him by the emperor Henry V. Frederick refused, and was placed under the ban. Lothair, unable to capture Nuremberg, gained the support of Henry the Proud, the new duke of Bavaria, by giving him his daughter, Gertrude, in marriage, and that of Conrad, count of Zahringen, by granting him the administration of the kingdom of Burgundy, or Aries. As a counterstroke, however, Conrad of Hohenstaufen, the brother of Frederick, was chosen German king in December 1127, and was quickly recognized in northern Italy. But Lothair gained the upper hand in Germany, and by the end of n 29 the Hohenstaufen strongholds, Nuremberg and Spires, were in his possession. This struggle was accompanied by disturbances in Lorraine, Saxony and Thuringia, but order was soon restored after the resistance of the Hohenstaufen had been beaten down. In 1131 the king led an expedition into Denmark, where one of his vassals had been murdered by Magnus, son of the Danish king, Niels, and where general confusion reigned; but no resistance was offered, and Niels promised to pay tribute to Lothair.

The king's attention at the time was called to Italy where two popes, Innocent II. and Anacletus II., were clamouring for his support. At first Lothair, fully occupied with the affairs of Germany, remained heedless and neutral; but in March 1 13 1 he was visited at Liege by Innocent, to whom he promised his assistance. Crossing the Alps with a small army in September 1132, he reached Rome in March 1133, accompanied by Innocent. As St Peter's was held by Anacletus, Lothair's coronation as emperor took place on the 4th of June 1133 in the church of the Lateran. He then received as papal fiefs the vast estates of Matilda, marchioness of Tuscany, thus securing for his daughter and her Welf husband lands which might otherwise have passed to the Hohenstaufen. His efforts to continue the investiture controversy were not very serious. He returned to Germany, where he restored order in Bavaria, and made an expedition against some rebels in the regions of the lower Rhine. Resuming the struggle against the Hohenstaufen, Lothair soon obtained the submission of the brothers, who retained their lands, and a general peace was sworn at Bamberg.

The emperor's authority was now generally recognized, and the annalists speak highly of the peace and order of his later years. In 1 13 5, Eric II., king of Denmark, acknowledged himself a vassal of Lothair;

Boleslaus III., prince of the Poles, promised tribute and received Pomerania and Rtigen as German fiefs; while the eastern emperor, John Comnenus, implored Lothair's aid against Roger II. of Sicily.

The emperor seconded the efforts of his vassals, Albert the Bear, margrave of the Saxon north mark, and Conrad I., margrave of Meissen and Lusatia, to extend the authority of the Germans in the districts east of the Elbe, and assisted Norbert, archbishop of Magdeburg, and Albert I., archbishop of Bremen, to spread Christianity. In August 1 136, attended by a large army, Lothair set out upon his second Italian journey. The Lombard cities were either terrified into submission or taken by storm; Roger II. was driven from Apulia; and the imperial power enforced over the whole of southern Italy. A mutiny among the German soldiers and a breach with Innocent concerning the overlordship of Apulia compelled the emperor to retrace his steps. An arrangement was made with regard to Apulia, after which Lothair, returning to Germany, died at Breitenwang, a village in the Tirol, on the 3rd or 4th of December 1137. His body was carried to Saxony and buried in the monastery which he had founded at Konigslutter. Lothair was a strong and capable ruler, who has been described as the " imitator and heir of the first Otto." Contemporaries praise his justice and his virtue, and his reign was regarded, especially by Saxons and churchmen, as a golden age for Germany.

The main authorities for the life and reign of Lothair are: " Vita Norberti archiepiscopi Magdeburgensis " ; Otto von Freising, " Chronicon Annalista Saxo " and " Narratio de electione Lotharii " all in the Monumcnta Germaniae historica. Scriptores, Bande vi., xii. and xx. (Hanover and Berlin, 1826-1892). The best modern works are: L von Ranke, Weltgeschichte, pt viii. (Leipzig, 1887- 1888); W. von Giesebrecht, Geschichte der Deutschen Kaiserzeit, Band iv. (Brunswick, 1877), Band v. (Leipzig, 1888); Ph. Jaffe, Geschichte des Deutschen Reiches unter Lothar (Berlin, 1843); W. Bernhardi, Lothar von Supplinburg (Leipzig, 1879); O. von Heine- mann, Lothar der Sachse und Konrad III. (Halle, 1869); and Ch. Volkmar, " Das Verhaltniss Lothars III. zur Investiturfrage," in the Forschungen zur Deutschen Geschichte, Band xxvi. (Gottingen,

1862-1886).

LOTHAIR (941-986), king of France, son of Louis IV., suc- ceeded his father in 954, and was at first under the guardianship of Hugh the Great, duke of the Franks, and then under that of his maternal uncle Bruno, archbishop of Cologne. The beginning of his reign was occupied with wars against the vassals, particu- larly against the duke of Normandy. Lothair then seems to have conceived the design of recovering Lorraine. He attempted to precipitate matters by a sudden attack, and in the spring of 978 nearly captured the emperor Otto II. at Aix-la-Cha'pelle. Otto took his revenge in the autumn by invading France. He penetrated as far as Paris, devastating the country through which he passed, but failed to take the town, and was forced to retreat with heavy loss. Peace was concluded in 980 at Margut-sur-Chiers, and in 983 Lothair was even chosen guardian to the young Otto III. Towards 980, however, Lothair quarrelled with Hugh the Great's son, Hugh Capet, who, at the instigation of Adalberon, archbishop of Reims, became reconciled with Otto III. Lothair died on the 2nd of March 986. By his wife Emma, daughter of Lothair, king of Italy, he left a son who succeeded him as Louis V.

See F. Lot, Les Derniers Carolingiehs (Paris, 1891); and the Recueil des actes de Lothair e et de Louis V., edited by L. Halphen and F. Lot (1908).

LOTHAIR (825-869), king of the district called after him Lotharingia, or Lorraine, was the second son of the emperor Lothair I. On his father's death in 855, he received for his kingdom a district. lying west of the Rhine, between the North Sea and the Jura mountains, which was called Regnum Lotharii and early in the 10th century became known as Lotharingia or Lorraine. On the death of his brother Charles in 863 he added some lands south of the Jura to this inheritance, but, except for a few feeble expeditions against the Danish pirates, he seems to have done little for its government or its defence. The reign was chiefly occupied by efforts on the part of Lothair to obtain a divorce from his wife Teutberga, a sister of Hucbert, abbot of St Maurice (d. 864) ; and his relations with his uncles,

Charles the Bald and Louis the German, were inflf ejjcˆd; by his desire to obtain their support to this plan. Although quarrels and reconciliations between the three kings followed each other in quick succession, in general it may be said that Louis favoured the divorce, and Charles opposed it, while neither lost sight of the fact that Lothair was without male issue. Lothair, whose desire for the divorce was prompted by his affection for a certain Waldrada, put away Teutberga

; but Hucbert took up arms on her behalf, and after she had submitted successfully to the ordeal of water, Lothair was compelled to restore her in 858. Still pursuing his purpose, he won the support of his brother, the emperor Louis II., by a cession of lands, and obtained the consent of the local clergy to the divorce and to his marriage with Waldrada, which was celebrated in 862. A synod of Frankish bishops met at Metz in 863 and confirmed this decision, but Teutberga fled to the court of Charles the Bald, and Pope Nicholas I. declared against the decision of the synod. An attack on Rome by the emperor was without result, and in 865 Lothair, convinced that Louis and Charles at their recent meeting had discussed the partition of his kingdom, and threatened with excommunication, again took back his wife. Teutberga, however, either from inclination or compulsion, now expressed her desire for a divorce, and Lothair went to Italy to obtain the assent of the new pope Adrian II. Placing a favourable interpretation upon the words of the pope, he had set out on the return "journey, when he was seized with fever and died at Piacenza on the 8th of August 869. He left, by Waldrada, a son Hugo who was declared illegitimate, and his kingdom was divided between Charles the Bald and Louis the German.

See Hincmar, " Opusculum de divortio Lotharii regis et Tetbergae reginae," in Cursus computus patrologiae, tome cxxv., edited by J. P. Migne (Paris, 1857-1879); M. Sdralek, Hinkmars von Rheims Kanonistisches Gutachten iiber die Ehescheidung des Kbnigs Lothar II. (Freiburg, 1881); E. Dummler, Geschichte des ostfrdnkischen Reiches (Leipzig, 1887-1888) ; and E. Muhlbacher, Die Regenten des Kaiser-reichs unter den Karolingern (Innsbruck, 1881).

LOTHIAN, EARLS AND MARQUESSES OF. Mark Kerr, 1st earl of Lothian (d. 1609), was the eldest son of Mark Kerr (d. 1584), abbot, and then commendator, of Newbattle, or Newbottle, and was a member of the famous border family of Ker of Cessford. The earls and dukes of Roxburghe, who are also descended from the Kers of Cessford, have adopted the spelling Ker, while the earls and marquesses of Lothian have taken the form Kerr. Like his father, the abbot of Newbattle, Mark Kerr was an extraordinary lord of session under the Scottish king James VI.; he became Lord Newbattle in 1587 and was created earl of Lothian in 1606. He was master of inquests from 1577 to 1606, and he died on the 8th of April 1609, having had, as report says, thirty-one children by his wife, Margaret (d. 1617), daughter of John Maxwell, 4th Lord Herries. His son Robert, the 2nd earl, died without sons in July 1624. He had, in 162 1, obtained a charter from the king enabling his daughter Anne to succeed to his estates provided that she married a member of the family of Ker.

Consequently in 1631- she married William Ker, son of Robert, 1st earl of Ancrum (1578-1654), a member of the family of Ker of Ferniehurst, whose father, William Ker, had been killed in 1590 by Robert Ker, afterwards 1st earl of Roxburghe. Robert was in attendance upon Charles I. both before and after he came to the throne, and was created earl of Ancrum in 1633. He was a writer and a man of culture, and among his friends were the poet Donne and Drummond of Hawthornden. His elder son William was created earl of Lothian in 1631, the year of his marriage with Anne Kerr, and Sir William Kerr of Blackhope, a brother of the 2nd earl, who had taken the title of earl of Lothian in 1624, was forbidden to use it (see Correspondence of Sir Robert Ker, earl of Ancrum, and his son William, third earl of Lothian, 1875).

William Ker (c. 1605-1675), who thus became 3rd earl of Lothian, signed the Scottish national covenant in 1638 and marched with the Scots into England in 1640, being present when the English were routed at Newburn, after which he became governor of Newcastle-on-Tyne. During the Civil War he was

prominent rather as a politician than as a soldier; he became a Scottish secretary of state in 1649, and was one of the com- missioners who visited Charles II. at Breda in 1650. He died at Newbattle Abbey, near Edinburgh, in October 1675. William's eldest son Robert, the 4th earl (1636-1 703), supported the Revolu- tion of 1688 and served William III. in several capacities; he became 3rd earl of Ancrum on the death of his uncle Charles in 1690, and was created marquess of Lothian in 1701. His eldest son William, the 2nd marquess (c. 1662-1722), who had been a Scottish peer as Lord Jedburgh smce 1692, was a supporter of the union with England. His son William, the 3rd marquess (c. 1690-1 767), was the father of William Henry, the 4th marquess, who was wounded at Fontenoy and was present at Culloden. He was a member of parliament for some years and had reached the rank of general in the army when he died at Bath on the 12th of April 1775. His grandson William, the 6th marquess (1763-1824), married Henrietta (1762-1805), daughter and heiress of John Hobart, 2nd earl of Buckinghamshire, thus bringing Blickling Hall and the Norfolk estates of the Hobarts into the Kerr family. In 182 1 he was created a peer of the United Kingdom as Baron Ker and he died on the 27th of April 1824. In 1900 Robert Schomberg Kerr (b. 1874) succeeded his father, Schomberg Henry, the 9th marquess

(1833-1900), as 10th marquess of Lothian.

LOTHIAN. This name was formerly applied to a considerably larger extent of country than the three counties of Linlithgow, Edinburgh and Haddington. Roxburghshire and Berwickshire at all events were included in it, probably also the upper part of Tweeddale (at least Selkirk). It would thus embrace the eastern part of the Lowlands from the Forth to the Cheviots, i.e. all the English part of Scotland in the nth century. This region formed from the 7th century onward part of the kingdoms of Bernicia and Northumbria, though we have no definite inf orma- tipn as to the date or events by which it came into English hands. In Roman times, according to Ptolemy, it was occupied by a people called Otadini, whose name is thought to have been preserved in Manaw Gododin, the home of the British king Cunedda before he migrated to North Wales. There is no reason to doubt that the district remained in Welsh hands until towards the close of the 6th century; for in the Historia Britlonum the Bernician king Theodoric, whose traditional date is 572-579, is said to have been engaged in war with four Welsh kings. One of these was Rhydderch Hen who, as we know from Adamnan, reigned at Dumbarton, while another named Urien is said to have besieged Theodoric in Lindisfarne. If this statement is to be believed it is hardly likely that the English had by this time obtained a firm footing beyond the Tweed. At all events there can be little doubt that the whole region was conquered within the next fifty years. Most probably the greater part of it was conquered by the Northumbrian king /Ethelfrith, who, according to Bede, ravaged the territory of the Britons more often than any other English king, in some places reducing the natives to dependence, in others exterminating them and replacing them by English settlers.

In the time of Oswic the English element became predominant in northern Britain. His supremacy was acknowledged both by the Welsh in the western Lowlands and by the Scots in Argyllshire. On the death of the Pictish king Talorgan, the son of his brother Eanfrith, he seems to have obtained the sovereignty over a considerable part of that nation also. Early in Ecgfrith's reign an attempt at revolt on the part of the Picts proved un- successful. We hear at this time also of the establishment of an English bishopric at Abercorn, which, however, only lasted for a few years. By the disastrous overthrow of Ecgfrith in 685 the Picts, Scots and some of the Britons also recovered their independence. Yet we find a succession of English bishops at Whithorn from 730 to the 9th century, from which it may be inferred that the south-west coast had already 6y this time become English. The Northumbrian dominions were again enlarged by Eadberht, who in 750 is said to have annexed Kyle, the central part of Ayrshire, with

other districts. In conjunction with (Engus mac Fergus, king of the Picts, he also reduced the

whole of the Britons to submission in 756. But this subjugation was not lasting, and the British kingdom, though now reduced to the basin of the Clyde, whence its inhabitants are known as Strathclyde Britons, continued to exist for nearly three centuries. After Eadberht's time we hear little of events in the northern part of Northumbria, and there is some reason for suspecting that English influence in the south-west began to decline before long, as our list of bishops of Whithorn ceases early in the 9th century; the evidence on this point, however, is not so decisive as is commonly stated. About 844 an important revolution took place among the Picts. The throne was acquired by Kenneth mac Alpin, a prince of Scottish family, who soon became formidable to the Northumbrians. He is said to have invaded " Saxonia " six times, and to have burnt Dunbar and Melrose. After the disastrous battle at York in 867 the Northumbrians were weakened by the loss of the southern part of their territories, and between 883 and 889 the whole country as far as Lindisfarne was ravaged by the Scots. In 919, however, we find their leader Aldred caJlling in Constantine II., king of the Scots, to help them. A few years later together with Constantine and the Britons they acknowledged the supremacy of Edward the Elder. After his death, however, both the Scots and the Britons were for a time in alliance with the Norwegians from Ireland, and consequently ˆEthelstan is said to have ravaged a large portion of the Scottish king's territories in 934. Brunanburh, where ˆEthelstan defeated the confederates in 937, is believed by many to have been in Dumfriesshire, but we have no information as to the effects of the battle on the northern populations. By this time, how- ever, the influence of the Scottish kingdom certainly seems to have increased in the south, and in 945 the English king Edmund gave Cumberland, i.e. apparently the British kingdom of Strath clyde, to Malcolm I., king of the Scots, in consideration of his alliance with him. Malcolm's successor Indulph (954-962) succeeded in capturing Edinburgh, which thenceforth remained in possession of the Scots. His successors made repeated attempts to extend their territory southwards, and certain late chroniclers state that Kenneth II. in 971-975 obtained a grant of the whole of Lothian from Edgar. Whatever truth this story may contain, the cession of the province was finally effected by Malcolm II. by force of arms. At his first attempt in 1006 he seems to have suffered a great defeat from Uhtred, the son of earl Waltheof. Twelve years later, however, he succeeded in conjunction with Eugenius, king of Strathclyde, in annihilating the Northumbrian army at Carham on the Tweed, and Eadulf Cudel, the brother and successor of Uhtred,

ceded all his territory to the north of that river as the price of peace. Henceforth in spite of an in- vasion by Aldred, the son of Uhtred, during the reign of Duncan, Lothian remained permanently in possession of the Scottish kings. In the reign of Malcolm III. and his son, the English element appears to have acquired considerable influence in the kingdom. Some three years before he obtained his father's throne Malcolm had by the help of earl Siward secured the government of Cumbria (Strathclyde) with which Lothian was probably united. Then in 1068 he received a large number of exiles from England, amongst them the ˆEtheling Eadgar, whose sister Margaret he married. Four other sons in succession occupied the throne, and in the time -of the youngest, David, who held most of the south of Scotland as an earldom from 1107-1124 and the whole kingdom from n 24-1 153, the court seems already to have been composed chiefly of English and Normans.

Authoritiesˆ — Bede, Historia Ecclesiasticd (ed. C. Plummer, Oxford, 1896); Anglo-Saxon Chronicle (ed. Earle and Plummer, Oxford, 1899); Simeon of Durham (Rolls Series, ed. T. Arnold, 1882); W. F. Skene, Chronicle of Picts and Scots (Edinburgh, 1867), and Celtic Scotland (Edinburgh, 1876-1880); and J. Rhys, Celtic Britain (London). (F. G. M. B.)

LOTI, PIERRE [the pen-name of Louis Marie Juxien Viaud] (1850-), French author, was born at Rochefort on the 14th of January 1850. The Viauds are an old Protestant family, and Pierre Loti consistently adhered, at least nominally, to the faith of his fathers. Of the picturesque and touching incidents of his childhood he has given a very vivid account

in Le Roman d'un enfant (1 890) . His education began in Roche- fort, but at the age of seventeen, being destined for the navy, he entered the naval school, Le Borda, and gradually rose in his profession, attaining the rank of captain in 1906. In January 1910 he was placed on the reserve list. His pseudonym is said to be due to his extreme shyness and reserve in early life, which made his comrades call him after le Loti, an Indian flower which loves to blush unseen. He was never given to books or study (when he was received at the French Academy, he had the courage to say, " Loti ne sait pas lire "), and it was not until 1876 that he was persuaded to write down and publish some curious experiences at Constantinople, in Aziyade, a book which,

like so many of Loti's, seems half a romance, half an autobiography. He proceeded to the South Seas, and on leaving Tahiti published the Polynesian idyl, originally called Rarahu (1880), which was reprinted as Le Mariage de Loti, and which first introduced to the wider public an author of remarkable originality and charm. Le Roman d'un spahi, a record of the melancholy adventures of a soldier in Senegambia, belongs to 1881.' In 1882 Loti issued a collection of short studies under the general title of Fleurs d' ennui. In 1883 he achieved the widest celebrity, for not only did he publish Mon jrere Yves, a novel describing the life of a French bluejacket in all parts of the world — perhaps his most characteristic production — but he was involved in a public discussion in a manner which did him great credit. While taking part as a naval officer in the Tongking War, Loti had exposed in the Figaro a series of scandals which followed on the capture of Hue (1883), and was suspended from the service for more than a year. He continued for some time nearly silent, but in 1886 he published a novel of life among the Breton fisher- folk, called Pecheur d'islande, the most popular of all his writings. In 1887 he brought out a volume of extraordinary merit, which has not received the attention it deserves; this is Propos d'exil, a series of short studies of exotic places, in his peculiar semi- autobiographic style. The fantastic novel of Japanese manners, Madame Chrysanthime, belongs to the same year. Passing over one or two slighter productions, we come in 1890 to AuMaroc, the record of a journey to Fez in company with a French embassy. A collection of strangely confidential and sentimental reminiscences, called Le Livre de la pitie et de la mort, belongs to 1891. Loti was on board his ship at the port of Algiers when news was brought to him of his election, on the 21st of May 1891, to the French Academy. In 1892 he published Fantdme d'orient, another dreamy study of life in Constantinople, a sort of con- tinuation of Aziyade. He described a visit to the Holy Land, somewhat too copiously, in three volumes (1895-1896), and wrote a novel, Ramuntcho (1897), a story of manners in the Basque province, which is equal to his best writings. In 1900 he visited British India, with the view of describing what he saw; the result appeared in 1903 — L'Inde {sans les Anglais). At his best Pierre Loti was unquestionably the finest descriptive writer of the day. In the delicate exactitude with which he reproduced the impression given to his own alert nerves by unfamiliar forms, colours, sounds and perfumes, he was without a rival. But he was not satisfied with this exterior charm; he desired to blend with it a moral sensibility of the extremest refinement, at once sensual and ethereal. Many of his best books are long sobs of remorseful memory, so personal, so intimate, that an English reader is amazed to find such depth of feeling compatible with the power of minutely and publicly

recording what is felt. In spite of the beauty and melody and fragrance of Loti's books his mannerisms are apt to pall upon the reader, and his later books of pure description were rather empty. His greatest successes were gained in the species of confession, half-way between fact and fiction, which he essayed in his earlier books. When all his limitations, however, have been rehearsed, Pierre Loti remains, in the mechanism of style and cadence, one of the most original and most perfect French writers of the second half of the 19th century. Among his later works were: La Troisieme jeunesse de Mme Prune (1905); Les Desenchantees (1906, Eng. trans, by C. Bell); La Mort de Philae (1908); Judith Renaudin (Theatre Antoine, 1904), a five-act historical play based on an earlier

book; and, in collaboration with Emile Vedel, a translation of King Lear, also produced at the Theatre Antoine in 1904. (E.G.)

LOTSCHEN PASS, or Lotschberg, an easy glacier pass (8842 ft.) leading from Kandersteg in the Bernese Oberland to the Lotschen valley in the Valais. It is a very old pass, first mentioned distinctly in 1352, but probably crossed previously by the Valaisans who colonized various parts of the Bernese Oberland. In 1384 and again in 1419 battles were fought on it between the Bernese and the Valaisans, while in 1698 a mule path (of which traces still exist) was constructed on the Bernese slope, 'though not continued beyond owing to the fear of the Valaisans that the Bernese would come over and alter their religion. In 1906 the piercing of a tunnel (8| m. long) beneath this pass was begun, starting a little above Kandersteg and ending at Goppenstein near the mouth of the Lotschen valley. Subsidies were granted by both the confederation and the canton of Bern. This pass is to be carefully distinguished from the Lotschenlucke (10,512 ft.), another easy glacier pass which leads from the head of the Lotschen valley to the Great Aletsch glacier. (W. A. B. C.)

LOTTERIES. The word lottery x has no very definite significa- tion. It may be applied to any process of determining prizes by lot, whether the object be amusement or gambling or public profit. In the Roman Saturnalia and in the banquets of aristo- cratic Romans the object was amusement; the guests received apophoreta. The same plan was followed on a magnificent scale by some of the emperors. Nero gave such prizes as a house or a slave. Heliogabalus introduced an element of absurdity — ' one ticket for a golden vase, another for six flies. This custom descended to the festivals given by the feudal and merchant princes of Europe, especially of Italy; and it formed a prominent feature of the splendid court hospitality of Louis XIV. In the Italian republics of the 16th century the lottery principle was applied to

encourage the sale of merchandise. The lotto of Florence and the seminario of Genoa are well known, and Venice established a monopoly and drew a considerable revenue for the state. The first letters patent for a lottery in France were granted in 1539 by Francis I., and in 1656 the Italian, Lorenzo Tonti (the originator of ” Tontines “) opened another for the building of a stone bridge between the Louvre and the Faubourg St Germain. The institution became very popular in France, and gradually assumed an important place in the government finance. The parlements frequently protested against it, but it had the support of Mazarin, and L. Phelypeaux, comte de Pontchartrain, by this means raised the expenses of the Spanish Succession War. Necker, in his Administration des finances, estimates the public charge for lotteries at 4,000,000 livres per annum. There were also lotteries for the benefit of religious com- munities and charitable purposes. Two of the largest were the Loteries de PiUt and Des Enfans Trouvis. These and also the great Loterie de I’Ecole militaire were practically merged in the Loterie Roy ale by the decree of 1776, suppressing all private lotteries in France. The financial basis of these larger lotteries was to take ˆjths for expenses and benefit, and return sfths to the public who subscribed. The calculation of chances had become a familiar science. It is explained in detail by Caminade de Castres in Enc. meth. finances, ii. s.v. ” Loterie.” The names of the winning numbers in the first drawing were (1) extrait, (2) ambe, (3) terne, (4) quaterne, (5) quine. After this there were four drawings called primes gratuites. The extrait gave fifteen times the price of the ticket; the quine gave one

1 The word ” lottery ” is directly derived from Ital. lotteria, cf. Fr. loterie, formed from lotto, lot, game of chance. ” Lot ” is in origin a Teutonic word, adopted into Romanic languages. In O. Eng. it appears as Mot, cf . Dutch lot, Ger. Loos, Dan. lod, &c. The meaning of the Teutonic root hleut from which these words have derived is unknown. Primarily ”’ lot ” meant the object, such as a disk or counter of wood, a pebble, bean or the like, which was drawn or cast to decide by chance, under divine guidance, various matters, such as disputes, divisions of property, selection of officers and frequently as a method of divination in ancient times. From this original sense the meaning develops into that which falls to a person by lot, chance or fate, then to any portion of land, &c, allotted to a person, and hence, quite generally, of a quantity of anything.

million times the price. These are said to be much more favour- able terms than were given in Vienna, Frankfort and other leading European cities at the end of the 18th century. The Loterie Roy ale was ultimately suppressed in 1836. Under the law of the 29th of May 1844 lotteries may be held for the assistance of charity and the fine arts. In 1878 twelve million lottery tickets of one franc each were sold in Paris to pay for prizes to exhibitors in the great Exhibition and expenses of working-men visitors. The first prize was worth £5°°°; the second, £4000, and the third and fourth £2000 each. The Societe du Credit Fonder, and many of the large towns, are permitted to contract loans, the periodical repayments of which are determined by lot. This practice, which is prohibited in Germany and England, resembles the older system of giving higher and lower rates of interest for money according to lot. Lotteries were suppressed in Belgium- in 1830, Sweden in 1841 and Switzerland in 1865, but they still figure in the state budgets of Austria-Hungary, Prussia and other German States, Holland, Spain, Italy and Denmark. In addition to lottery loans, ordinary lotteries (occasion lotteries) are numerous in various countries of the con- tinent of Europe. They are of various magnitude and are organized for a variety of purposes, such as charity, art, agricul- ture, church-building, &c. It is becoming the tendency, however, to discourage private and indiscriminate lotteries, and even state lotteries which contribute to the revenue. In Austria-Hungary and Germany, for instance, every year sees fewer places where tickets can be taken for them receive licenses. In 1904 a proposal for combining a working-class savings bank with a national lottery was seriously considered by the Prussian ministry. The scheme, which owes its conception to August Scherl, editor of the Berlin Lokalanzeiger , is an endeavour to utilize the love of gambling for the purpose of promoting thrift among the working-classes. It was proposed to make weekly collections from subscribers, in fixed amounts, ranging from sixpence to four shillings. The interest on the money deposited would not go to the depositors but would be set aside to form the prizes. Three hundred thousand tickets, divisible into halves, quarters and eighths, according to the sum deposited weekly, would form a series of 12,500 prizes, of a total value of £27,000. At the same time, the subscriber, while having his ordinary lottery chances of these prizes, still has to his credit intact the amount which he has subscribed week by week.

In England the earliest lotteries sanctioned by government were for such purposes as the repair of harbours in 1569, and the Virginia Company in 1612. In the lottery of 1569, 40,000 chances were sold at ten shillings each, the prizes being ” plate, and certain sorts of

merchandises.” In 1698 lotteries, with the exception of the Royal Oak lottery for the benefit of the Royal Fishing Company, were prohibited as common nuisances, by which :hildren, servants and other unwary persons had been ruined. This prohibition was in the 18th century gradually extended o illegal insurances on marriages and other events, and to a great many games with dice, such as faro, basset, hazard, except backgammon and games played in the royal palace. In spite of these prohibitions, the government from 1709 down to 1824 annually raised considerable sums in lotteries authorized by act of parliament. The prizes were in the form of terminable or perpetual annuities. The £10 tickets were sold at a premium of say 40 % to contractors who resold them in retail (sometimes in one-sixteenth parts) by ” morocco men,” or men with red leather books who travelled through the country. As the drawing ex- tended over forty days, a very pernicious system arose of insuring the fate of tickets during the drawing for a small premium of 4d. or 6d. This was partly cured by the Little Go Act of 1802, directed against the itinerant wheels which plied between the state lotteries, and partly by Perceval’s Act in 1806, which confined the drawing of each lottery to one day. From 1793 to 1824 the government made an average yearly profit of £346,765. Cope, one of the largest contractors, is said to have sperit £36,000 in advertisements in a single year. The English lotteries were used to raise loans for general purposes, but latterly they were confined to particular objects, such as the improvement of

London, the disposal of a museum, the purchase of a picture gallery, &c. Through the efforts of Lord Lyttleton and others a strong public opinion was formed against them, and in 1826 they were finally prohibited. An energetic proposal to revive the system was made before the select committee on metropolitan improvements in 1830, but it was not listened to. By a unique blunder in legislation, authority was given to hold a lottery under an act of 1831 which provided a scheme for the improve- ment of the city of Glasgow. These ” Glasgow lotteries ” were suppressed by an act of 1834. Art Unions were legalized by the Art Unions Act 1846. The last lottery prominently before the public in England was that of Dethier’s twelfth-cake lottery, which was suppressed on the 27th of December i860. As defined at the beginning of this article, the word lottery has a meaning wide enough to include missing-word competitions, distributions by tradesmen of prize coupons, sweepstakes, &c. See Report of Joint Select Committee on Lotteries, &c. (1908). The statute law in Scotland is the same as in England. At common law in Scotland it is probable that all lotteries and raffles, for whatever purpose held, may be indicted as nuisances. The art unions are supposed to be protected by

a special statute. United States. — The American Congress of 1776 instituted a national lottery. Most states at that time legalized lotteries for public objects, and before 1820 the Virginia legislature passed seventy acts authorizing lotteries for various public purposes, such as schools, roads, &c. — about 85% of the subscriptions being returned in prizes. At an early period (1795) the city of Washington was empowered to set up lotteries as a mode of raising money for public purposes; and this authorization from the Maryland legislature was approved by an act of the Federal Congress in 181 2. In 1833 tne y were prohibited in New York and Massachusetts and gradually in the other states, until they survived only in Louisiana. In that state, the Louisiana State Lottery, a company chartered in 1868, had a monopoly for which it paid $40,000 to the state treasury. Its last charter was granted in 1879 for a period of twenty-five years, and a renewal was refused in 1890. In 1890 Congress forbade the use of the mails for promoting any lottery enterprise by a statute so stringent that it was held to make it a penal offence to employ them to further the sale of Austrian government bonds, issued under a scheme for drawing some by lot for payment at a premium (see Homer v. United States, 147 United States Reports, 449). This had the effect of compelling the Louisiana State Lottery to move its quarters to Honduras, in which place it still exists, selling its bonds to a considerable extent in the Southern States.

Since lotteries have become illegal there have been a great number of judicial decisions defining a lottery. In general, where skill or judgment is to be exercised there is no lottery, the essenvial element of which is chance or lot. There are numerous statutes against lotteries, the reason being given that they ” tend to promote a gambling spirit,” and that it is the duty of the state to ” protect the morals and advance the welfare of the people.” In New York the Constitution of 1846 forbade lotteries, and by § 324 of the Penal Code a lottery is declared ” unlawful and a public nuisance.” ” Contriving ” and advertising lotteries is also penal. The following have been held illegal lotteries : In New York, a concert, the tickets for which entitled the holder to a prize to be drawn by lot ; in Indiana, offering a gold watch to the purchaser of goods who guesses the number of beans in a bottle; in Texas, selling ” prize candy ” boxes; and operating a nickel-in-the-slot machine — so also in Louisiana; in Massachusetts, the ” policy ” or ” envelope game,” or a ” raffle ” ; in Kentucky (1905), prize coupon packages, the coupons having to spell a certain word (U.S. v. Jefferson, 134 Fed. R. 299); in Kansas (1907) it was held by the Supreme Court that the gift of a hat-pin to each purchaser was not illegal as a ” gift enterprise,” there being no chance or lot. In

Oklahoma (1907) it was held that the making of contracts for the payment of money, the certainty in value of return being dependent on chance, was a lottery (Fidelity Fund Co. v. Vaughan, 90 Pac. Rep. 34). The chief features of a lottery are ” procuring through lot or chance, by the investment of a sum of money or something of value, some greater amount of money or thing of greater value. When such are the chief features of any scheme whatever it may be christened, or however it may be guarded or concealed by cunningly devised conditions or screens, it is under the law a lottery ” (U.S. v. Wallace, 58, Fed. Rep. 942). In 1894

and 1897 Congress forbade the importation of lottery tickets or „j. — 4.:* ^- •_.- .v. tt..,.j <-,.._ j n l899i gating up ,„.

advertisements into the United States.

promoting lotteries in Alaska was prohibited by Congress, and in 1900 it forbade any lottery or sale of lottery tickets in Hawaii. In Porto Rico lotteries, raffles and gift-enterprises are forbidden (Penal Code, 1902, § 291).

Authorities.— Critique hist. pol. mor. earn, el comm. sur les loteries anc. et mod. spirituelles et temporelles des etats et des eglises (3 vols., Amsterdam, 1697), by the Bolognese historian Gregorio Leti; J. Dessaulx, De la passion du jeu depuis les anciens temps jusqu’a nos jours (Paris, 1779); Endemann, Beitrage zur Geschichte der Lottrie und zur heutigen Lotterie (Bonn, 1882); Larson, Lottrie und Volkswirthschaft (Berlin, 1894); J. Ashton, History of English Lotteries (1893); Annual Report of the American Historical Associa- tion (1892) ; Journal of the American Social Science Association, xxxvi. 17.

LOTTI, ANTONIO (1667 ?- 1740), Italian musical composer, was the son of Matteo Lotti, Kapellmeister to the court of Hanover. He was born, however, at Venice and as a pupil of Legrenzi. He entered the Doge’s chapel as a boy, and in 1689 was engaged as an alto singer, succeeding later to the posts of deputy organist (1690), second organist (1692), first organist (1704), and, finally, in 1736 Maestro di Cappella at St Mark’s church. He was also a composer of operas, and having attracted the interest of the crown prince of Saxony during his visit to Venice in 171 2, he was invited to Dresden, where he went in 1717. After producing three operas there he was obliged to return to

his duties at Venice in 17 19. He died on the 5th of January 1740. Like many other Venetian composers he wrote operas for Vienna, and enjoyed a considerable reputation outside Italy. A volume of madrigals published in 1705 contains the famous In una siepe ombrosa, passed off by Bononcini as his own in London. Another is quoted by Martini in his Saggio di Contrappunto. Among his pupils were Alberti, Bassani, Galuppi, Gasparini and Marcello. Burney justly praises his church music, which is severe in style, but none the less modern in its grace and pathos. A fine setting of the Dies Irae is in the Imperial Library at Vienna, and some of his masses have been printed in the collections of Proske and Luck.

LOTTO, LORENZO (c. 1480-1556), Italian painter, is variously stated to have been born at Bergamo, Venice and Treviso, between 1475 and 1480, but a document published by Dr Bampo proves that he was born in Venice, and it is to be gathered from his will that 1480 was probably the year of his birth. Over- shadowed by the genius of his three great contemporaries, Titian, Giorgione and Palma, he had been comparatively neglected by art historians until Mr Bernhard Berenson devoted to him an ” essay in constructive art criticism,” which not only restores to him his rightful position among the great masters of the Renaissance, but also throws clear light upon the vexed question of his artistic descent. Earlier authorities have made Lotto a pupil of Giovanni Bellini (Morelli), of Previtali (Crowe and Cavalcaselle), of Leonardo da Vinci (Lomazzo), whilst others discovered in his work the influences of Cima, Carpaccio, Durer, Palma and Francia. Mr Berenson has, however, proved that he was the pupil of Alvise Vivarini, whose religious severity and asceticism remained paramount in his work, even late in his life, when he was attracted by the rich glow of Giorgione’s and Titian’s colour. What distinguishes Lotto from his more famous contemporaries is his psychological insight into character and his personal vision — his unconventionality, which is sufficient to account for the comparative neglect suffered by him when his art is placed beside the more typical art of Titian and Giorgione, the supreme expression of the character of the period.

That Lotto, who was one of the most productive painters of his time, could work for thirty years without succumbing to the mighty influence of Titian’s sumptuous colour, is explained by the fact that during these years he was away from Venice, as is abundantly proved by documents and by the evidence of signed and dated works. The first of these documents, dated 1503, proves him to have lived at Treviso at this period. His earliest authentic pictures, Sir Martin Conway’s ” Danae ” (about 1498) and the ” St Jerome ” of the Louvre (a similar subject is at the Madrid Gallery ascribed to Titian), as

indeed all the works executed before 1509, have unmistakable Vivarin- esque traits in the treatment of the drapery and landscape, and cool grey tonality. To this group belong the Madonnas at

Bridgewater House, Villa Bofghese, Naples, a«id Sta Cristina near Treviso, the Recanati altarpiece, the ” Assumption of the Virgin ” at Asolo, and the portrait of a young man at Hampton Court. We find him at Rome between 1508 and 1512, at the time Raphael was painting in the Stanza della Signatura. A document in the Corsini library mentions that Lotto received 100 ducats as an advance payment for fresco-work in the upper floor of the Vatican, but there is no evidence that this work was ever executed. In the next dated works, the ” Entombment ” at Jesi (1512), and the ” Transfiguration,” ” St James,” and ” St Vincent ” at Recanati, Lotto has abandoned the dryness and cool colour of his earlier style, and adopted a fluid method and a blonde, joyful colouring. In 1513 we find him at Bergamo, where he had entered into a contract to paint for 500 gold ducats an altarpiece for S. Stefano. The picture was only completed in 15 16, and is now at S. Bartolommeo. From the next years, spent mostly at Bergamo, with intervals in Venice and Jesi in the Marches, date the Dresden ” Madonna,” ” Christ taking leave of his Mother ” at the Berlin Gallery, the ” Bride and Bridegroom ” at Madrid, the National Gallery ” Family Group ” and portrait of the Protonothary Giuliano, several portraits in Berlin, Milan and Vienna, numerous altarpieces in and near Bergamo, the strangely misnamed ” Triumph of Chastity ” at the Rospigliosi Palace in Rome, and the portrait of Andrea Odoni at Hampton Court. In 1526 or 1527 Lotto returned to Venice, where Titian ruled supreme in the world of art; and it was only natural that the example of the great master should have fired him to emulation, though his experiments in this direction were confined to an attempt at rivalling the master’s rich and ruddy colour-schemes. Even in the Carmine altarpiece, the ” St Nicholas of Bari,” which is his nearest approach to Titian, he retained his individual-ized, as opposed to Titian’s generalized, expression of emotion. But it was only a passing phase, and he soon returned to the cooler schemes of his earlier work. Among his chief pictures executed in Venice between 1529 and 1540 are the ” Christ and the Adulteress,” now at the Louvre, the ” Visitation ” at the Jesi Library, the ” Crucifixion ” at Monte S. Giusto, the Madonna at the Uffizi, the ” Madonna and Saints ” at Cingoli, and some portraits at the Berlin and Vienna museums, the Villa Borghese and Doria Palace in Rome, and at Dorchester House. He is again to be found at Treviso from 1 542-1 545, at Ancona in 1 550, the year in which he entirely lost his voice; and in 1552 he ” devoted his person and all his property to the Holy Virgin of Loreto ” and took

up his abode with the monks of that shrine. He died in 1556. A codex in his own handwriting, discovered in the archives of Loreto, not only includes a complete statement of his accounts from about 1539 to his death, but has a most interesting entry from which we gather that in 1540 Lotto completed the portraits of Martin Luther and his wife. These portraits could not have been painted from life; they were presumably executed from some contemporary engraving.

See Lorenzo Lotto, by Bernard Berenson (London, 1901).

LOTTO (Ital. for ” lot “), a gambling game usually called Keno in America, played by any number of persons upon large boards or cards, each of which is divided into three horizontal rows of nine spaces, four spaces in each row being left blank and the other five marked with numbers up to 90. Each card is designated by a general number. The cards usually lie on the gambling-table, and a player may buy from the bank as many as he cares to use, each card being registered or pegged on an exposed table as soon as bought. Ninety small ivory markers, generally balls flattened on one side, numbered from 1 to 90, are placed in a bag and shaken out one by one, or, more usually, in a so-called keno-goose, a kind of urn with a spout through which the balls are allowed to roll by means of a spring. When a number falls out, the banker, or keno-roller, calls it out distinctly, and each player upon whose card that number occurs places a mark over it. This is repeated until one player has all the numbers in one row of his card covered, upon which he calls out ” Keno ! ” and wins all the money staked excepting a percentage to the bank.

LOTUS, a popular name applied to several plants. The lotus fruits of the Greeks belonged to Zizyphus Lotus, a bush native

in south Europe with fruits as large as sloes, containing a mealy substance which can be used for making bread and also a fer- mented drink. In ancient times the fruits were an important article of food among the poor; whence ” lotophagi ” or lotus- eaters. Zizyphus is a member of the natural order Rhamnaceae to which belongs the British buckthorn. The Egyptian lotus was a water-lily, Nymphaea Lotus; as also is the sacred lotus of the Hindus, Nelumbium speciosum. The lotus tree, known to the Romans as the Libyan lotus, and planted by them for shade, was probably Celtis auslralis, the nettle-tree (q.v.), a southern European tree, a native of the elm family, with fruits like

small cherries, which are first red and then black. Lotus of botanists is a genus of the pea-family (Leguminosae) , containing a large number of species of herbs and undershrubs widely distributed in the temperate regions of the old world. It is represented in Britain by L. corniculatus, bird's foot trefoil, a low-growing herb, common in pastures and waste places, with clusters of small bright yellow pea-like flowers, which are often streaked with crimson; the popular name is derived from the pods which when ripe spread like the toes of a bird's foot.

LOTUS-EATERS (Gr. Aoncxfrayoi) , a Libyan tribe known to the Greeks as early as the time of Homer. Herodotus (iv. 177) describes their country as in the Libyan district bordering on the Syrtes, and says that a caravan route led from it to Egypt. Victor Berard identifies it with the modern Jerba. When Odysseus reached the country of the Lotophagi, many of his sailors after eating the lotus lost all wish to return home. Both Greeks and Romans used the expression " to eat the lotus " to denote forgetfulness (cf. Tennyson's poem " The Lotus-Eaters ").

There has been considerable discussion as to the identification of the Homeric lotus. Some have held that it is a prickly shrub, Zizyphus Lotus, which bears a sweet-tasting fruit, and still grows in the old home of the Lotophagi. It is eaten by the natives, who atso make a kind of wine from the juice. P. Chanjpault (Pheniciens et Grecs en Italie d'apres I'Odyssee, p. 400, note 2), however, maintains that the lotus was a date; Victor B6rard (Les Pheniciens et I'Odyssee, 1902-1903, ii. 102) is doubtful, but contends that it was certainly a tree-fruit. If either of these be correct, then the lotus of Od. iv. 603-604 is quite a different plant, a kind of clover. Now Strabo (xvii. 829a) calls the lotus iroav tivo. k

LOTZE, RUDOLF HERMANN (1817-1881), German philoso- pher, was born in Bautzen on the 21st of May 1817, the son of a physician. He received his education in the gymnasium of Zittau under teachers who inspired him with an enduring love of the classical authors, as we see from his translation of the Antigone of Sophocles into Latin verse, published when he had reached middle life. He went to the university of Leipzig as a student of philosophy and natural sciences, but entered officially as a student of medicine. He was then only seventeen. It appears that thus early Lotze's studies were governed by two distinct interests. The first was scientific, based upon mathe- matical and physical studies under the guidance of E. H. Weber, W. Volckmann and G. T. Fechner. The other was his aesthetical and artistic interest, which was developed under the care of C. H. Weisse. To the former he

owes his appreciation of exact investigation and a complete knowledge of the aims of science, to the latter an equal admiration for the great circle of ideas which had been diffused by the teaching of Fichte, Schelling and Hegel. Each of these influences, which early in life must have been familiar to him, tempered and modified the other. The true method of science which he possessed forced him to condemn as useless the entire form which Schelling's and Hegel's expositions had adopted, especially the dialectic method of the latter, whilst his love of art and beauty, and his appreciation of moral, purposes, revealed to him the existence of a trans- phenomenal world of values into which no exact science could penetrate. It is evident how this initial position at once defined to him the tasks which philosophy had to perform. First there were the natural sciences, themselves only just emerging from a confused conception of their true method; especially those

which studied the borderland of physical and mental phenomena, the medical sciences; and pre-eminently that science which has since become so popular, the science of biology.

Lotze's first essay was his dissertation De fulurae biologiae principibus philosophicis, with which he gained (1838) the degree of doctor of medicine, after having only four months previously got the degree of doctor of philosophy. Then, secondly, there arose the question whether the methods of exact science sufficed to explain the connexion of phenomena, or whether for the ex- planation of this the thinking mind was forced to resort to some hypothesis not immediately verifiable by observation, but dictated by higher aspirations and interests. And, if to satisfy these we were forced to maintain the existence of a world of moral standards, it was, thirdly, necessary to form some opinion as to the relation of these moral standards of value to the forms and facts of phenomenal existence. These different tasks, which philosophy had to fulfil, mark pretty accurately the aims of Lotze's writings, and the order in which they were published. He laid the foundation of his philosophical system very early in his Metaphysik (Leipzig, 1841) and his Logik (1843), short books published while he was still a junior lecturer at Leipzig, from which university he migrated to Gottingen, succeeding Herbart in the chair of philosophy. But it was only during the last decade of his life that he ventured, with much hesitation, to present his ideas in a systematic and final form. The two books mentioned remained unnoticed by the reading public, and Lotze first became known to a larger circle through a series of works which aimed at establishing in the study of the physical and mental phenomena of the human

organism in its normal and diseased states the same general principles which had been adopted in the investigation of in- organic phenomena. These works were his Allgemeine Pathologie und Therapie als mechanische Naturwissenschaften (Leipzig, 1842, 2nd ed., 1848), the articles ” Lebenskraft ” (1843) and ” Seele und Seelenleben ” (1846) in Rud. Wagner’s Handworter- buch der Physiologie, his Allgemeine Physiologie des Korper- lichen Lebens (Leipzig, 1851), and his Medizinische Psychologie oder Physiologie der Seele (Leipzig, 1852).

When Lotze published these works, medical science was still much under the influence of Schelling’s philosophy of nature. The mechanical laws, to which external things were subject, were conceived as being valid only in the inorganic world; in the organic and mental worlds these mechanical laws were conceived as being disturbed or overridden by other powers, such as the influence of final causes, the existence of types, the work of vital and mental forc.es. This confusion Lotze, who had been trained in the school of mathematical reasoning, tried to dispel. The laws which govern particles of matter in the inorganic world govern them likewise if they are joined into an organism. A phenomenon a, if followed by b in the one case, is followed by the same b also in the other case. Final causes, vital and mental forces, the soul itself can, if they act at all, only act through the inexorable mechanism of natural laws. As we therefore have only to do with the study of existing complexes of material and spiritual phenomena, the changes in these must be explained in science by the rule of mechanical laws, such as obtain everywhere in the world, and only by such. One of the results of these investigations was to extend the meaning of the word mechanism, and comprise under it all laws which obtain in the phenomenal world, not excepting the phenomena of life and mind. Mechanism was the unalterable connexion of every phenomenon a with other phenomena 6, c, d, either as following or preceding it; mechanism was the inexorable form into which the events of this world are cast, and by which they are connected. The object of those writings was to establish the all-pervading rule of mechanism. But the mechanical view of nature is not identical with the material- istic. In the last of the above-mentioned works the question is discussed at great length how we have to consider mind, and the relation between mind and body; the answer is — we have to consider mind as an immaterial principle, its action, however, on the body and vice versa as purely mechanical, indicated

by the fixed laws of a psycho-physical mechanism. These doctrines of Lotze — though pronounced with the distinct and reiterated reserve that they did not contain a solution of the philosophical question regarding the nature, origin, or deeper, meaning of this all-pervading mechanism, neither an explanation how the action of external things on each other takes place nor yet of the relation of mind and body, that they were merely a preliminary formula of practical scientific value, itself requiring a deeper interpretation — these doctrines were nevertheless by many considered to be the last word of the philosopher who, denouncing the reveries of Schelling or the idealistic theories of Hegel, established the science of life and mind on the same basis as that of material things. Published as they were during the years when the modern school of German materialism was at its height, 1 these works of Lotze were counted among the opposition literature which destroyed the phantom of Hegelian wisdom and vindicated the independent and self-sufficing position of empirical philosophy. Even philosophers of the eminence of I. H. Fichte (the younger) did not escape this mis- interpretation of Lotze's true meaning, though they had his Metaphysik and Logik to refer to, though he promised in his Allgemeine Physiologie (185 1) to enter in a subsequent work upon the " bounding province between aesthetics and physi- ology," and though in his Medizinische Psychologie he had distinctly stated that his position was neither the idealism of Hegel nor the realism of Herbart, nor materialism, but that it was the conviction that the essence of everything is the part it plays in the realization of some idea which is in itself valuable, that the sense of an all-pervading mechanism is to be sought in this, that it denotes the ways and means by which the highest idea, which we may call the idea of the good, has voluntarily chosen to realize itself.

The misinterpretations which he had suffered induced Lotze to publish a small pamphlet of a polemical character (Streit- schrijten, Leipzig, 1857), in which he corrected two mistakes. The opposition which he had made to Hegel's formalism had induced some to associate him with the materialistic school, others to count him among the followers of Herbart. Lotze publicly and formally denied that he belonged to the school of Herbart. though he admitted that historically the same doctrine which might be considered the forerunner of Herbart's teachings might lead to his own views, viz. the monadology of Leibnitz.

When Lotze wrote these explanations, he had already given to the world the first volume of his great work, Mikrokosmus (vol. i. 1856,

vol. ii. 1858, vol. iii. 1864; 3rd ed., 1876-1880). In many passages of his works on pathology, physiology, and psychology Lotze had distinctly stated that the method of research which he advocated there did not give an explanation of the phenomena of life and mind, but only the means of observing and connecting them together; that the meaning of all phenomena, and the reason of their peculiar connexions, was a philosophical problem which required to be attacked from a different point of view; and that the significance especially which lay in the phenomena of life and mind would only unfold itself if by an exhaustive survey of the entire life of man, individually, socially, and historically, we gain the necessary data for deciding what meaning attaches to the existence of this microcosm, or small world of human life, in the macrocosm of the universe. This review, which extends, in three volumes, over the wide field of anthropology, beginning with the human frame, the soul, and their union in life, advancing to man, his mind, and the course of the world, and concluding with history, progress, and the connexion of things, ends with the same idea which was expressed in Lotze's earliest work, his Metaphysik. The view peculiar to him is reached in the end as the crowning conception towards which all separate channels of thought have tended, and in the light of which the life of man in nature and mind, in the individual and in society, had been surveyed. This view can be briefly stated as follows: Every- where in the wide realm of observation we find three distinct

'See Vogt, Physiologische Briefe (1845-1847); Moleschott, Der Kreisiauf des Lebens (1852) ; Buchner, Kraft und Stoff (1855).

regions,— the region of facts, the region of laws and the region of standards of value. These three regions are separate only in our thoughts, not in reality. To comprehend the real position we are forced to the conviction that the world of facts is the field in which, and that laws are the means by which, those higher standards of moral and aesthetical value are being realized; and such a union can again only become intelligible through the idea of a personal Deity, who in the creation and preservation of a world has voluntarily chosen certain forms and laws, through the natural operation of which the ends of His work are gained. Whilst Lotze had thus in his published works closed the circle of .his thought, beginning with a iconception metaphysically gained, proceeding to an exhaustive contemplation of things in the light it afforded, and ending with the stronger conviction of its truth which observation, experience, and life could afford, he had all the time been lecturing on the various branches of philosophy according to the scheme of academical instruction transmitted from his predecessors. Nor can it be considered

anything but a gain that he was thus induced to expound his views with regard to those topics, and in connexion with those problems, which were the traditional forms of philosophical utterance. His lectures ranged over a wide field: he delivered annually lectures on psychology and on logic (the latter including a survey of the entirety of philosophical research under the title Encyclopiidie der Philosophic), then at longer intervals lectures on metaphysics, philosophy of nature, philosophy of art, philosophy of religion, rarely on history of philosophy and ethics. In these lectures he expounded his peculiar views in a stricter form, and during the last decade of his life he embodied the substance of those courses in his System der Philosophie, of which only two volumes have appeared (vol. i. Logik, 1st ed., Leipzig, 1874, 2nd ed., 1880; vol. ii. Metaphysik, 1879). The third and concluding volume, which was to treat in a more condensed form the principal problems of practical philosophy, of philosophy of art and religion, never appeared. A small pamphlet on psychology, containing the last form in which he had begun to treat the subject in his lectures (abruptly terminated through his death on the 1st of July 1881) during the summer session of 1881, has been published by his son. Appended to this volume is a complete list of Lotze's writings, compiled by Professor Rehnisch of Gottingen.

To understand this series of Lotze's writings, it is necessary to begin with his definition of philosophy. This is given after his exposition of logic has established two points, viz. the existence in our mind of certain laws and forms according to which we connect the material supplied to us by our senses, and, secondly, the fact that logical thought cannot be usefully employed without the assump- tion of a further set of connexions, not logically necessary, but assumed to exist between the data of experience and observation. These connexions of a real not formal character are handed to us by the separate sciences and by the usage and culture of everyday life. Language has crystallized them into certain definite notions and expressions, without which we cannot proceed a single step, but which we have accepted without knowing their exact meaning, much less their origin. In consequence the special sciences and the wisdom of common life entangle themselves easily and frequently in contradictions. A problem of a purely formal character thus presents itself, viz. this — to try to bring unity and harmony into the scattered thoughts of our general culture, to trace them to their primary assumptions and follow them into their ultimate conse- quences, to connect them all together, to remodel, curtail or amplify them, so as to remove their apparent contradictions, and to combine them in the unity of an harmonious, view of things, and especially to investigate those conceptions which

form the initial assumptions of the several sciences, and to fix the limits of their applicability This is the formal definition of philosophy. Whether an harmonious conception thus gained will represent more than an agreement among our thoughts, whether it will represent the real connexion of things and thus possess objective not merely subjective value, cannot be decided at the outset. It is also unwarranted to start with the expectation that everything in the world should be explained by one principle, and it is a needless restriction of our means to expect unity of method. Nor are we able to start our philosophical investigations by an inquiry into the nature of human thought and its capacity to attain an objective knowledge, as in this case we would be actually using that instrument the usefulness of which we were trying to determine. The main proof of the objective value of the view we may gain will rather lie in the degree in which it succeeds in assigning to every element of culture its due position, or in which it is able to

appreciate and combine different and apparently opposite tendencies and interests, in the sort of justice with which it weighs our manifold desires and aspirations, balancing them in due proportions, refusing to sacrifice to a one-sided principle any truth or conviction which experience has proven to be useful and necessary. The investigations will then naturally divide themselves into three parts, the first of which de*ls with those to our mind inevitable forms in which we are obliged to think about things, if we think at all (metaphysics), the second being devoted to the great region of facts, trying to apply the results of metaphysics to these, specially the two great regions of external and mental phenomena (cosmology and psy- chology), the third dealing with those standards of value from which we pronounce our aesthetical or ethical approval or dis- approval. In each department we shall have to aim first of all at views clear and consistent within themselves, but, secondly, we shall in the end wish to form some general idea or to risk an opinion how laws, facts and standards of value may be combined in one compre- hensive view. Considerations of this latter kind will naturally present themselves in the two great departments of cosmology and psychology, or they may be delegated to an independent research under the name of religious philosophy. We have already mentioned the final conception in which Lotze's speculation culminates, that of a personal Deity, Himself the essence of all that merits existence for its own sake, who in the creation and government of a world has voluntarily chosen certain laws and forms

through which His ends are to be realized. We may add that according to this view nothing is real but the living spirit of God and the world of living spirits which He has created; the things of this world have only reality in so far as they are the appearance of spiritual substance, which underlies everything. It is natural that Lotze, having this great and final conception always before him, works under its influence from the very beginning of his speculations, permitting us, as we progress, to gain every now and then a glimpse of that inter- pretation of things which to him contains the solution of our difficulties.

The key to Lotze's theoretical philosophy lies in his metaphysics, to the exposition of which important subject the first and last of his larger publications have been devoted. To understand Lotze's

f)hilosophy, a careful and repeated perusal of these works is abso- utely necessary. The object of his metaphysics is so to remodel the current notions regarding the existence of things and their connexions with which the usage of language supplies us as to make them consistent and thinkable. The further assumption, that the modified notions thus gained have an objective meaning, and that they somehow correspond to the real order of the existing world which of course they can never actually describe, depends upon a general confidence which we must have in our reasoning powers, and in the significance of a world in which we ourselves with all the necessary courses of our thoughts have a due place assigned. The principle therefore of these investigations is opposed to two attempts frequently repeated in the history of philosophy, viz.: (1) the attempt to establish general laws or forms, which the development of things must have obeyed, or which a Creator must have followed in the creation of a world (Hegel) ; and (2) the attempt to trace the genesis of our notions and decide as to their meaning and value (modern theories of knowledge). Neither of these attempts is practicable. The world of many things surrounds us; our notions, by which we manage correctly or incorrectly to describe it, are also ready made. What remains to be done is, not to explain how such a world manages to be what it is, nor how we came to form these notions, but merely this — to expel from the circle and totality of our conceptions those abstract notions which are inconsistent and jarring, or to remodel and define them so that they may constitute a consistent and harmonious view. In this endeavour Lotze discards as useless and untenable many favourite conceptions of the school, many crude notions of everyday life. The course of things and their connexion is only thinkable by the assumption of a plurality of existences, the reality of which (as distinguished from our knowledge of them) can be conceived only as a multitude of relations. This quality of standing in relation to other

things is that which gives to a thing its reality. And the nature of this reality again can neither be con- sistently represented as a fixed and hard substance nor as an un- alterable something, but only as a fixed order of recurrence of continually changing events or impressions. But, further, every attempt to think clearly what those relations are, what we really mean, if we talk of a fixed order of events, forces upon us the necessity of thinking also that the different things which stand in relations or the different phases which follow each other cannot be merely externally strung together or moved about by some indefinable external power, in the form of some predestination or inexorable fate. The things themselves which exist and their changing phases must stand in some internal connexion; they themselves must be active or passive, capable of doing or suffering. This would lead to the view of Leibnitz, that the world consists of monads, self-sufficient beings, leading an inner life. But this idea involves the further conception of Leibnitz, that of a pre-established harmony, by which the Creator has taken care to arrange the life of each monad, so that it agrees with that of all others. This conception, according to Lotze, is neither necessary nor thoroughly intelligible. Why not interpret at once and render intelligible the common conception originating

in natural science, viz. that of a system of laws which governs the many things? But, in attempting to make this conception quite clear and thinkable, we are forced to represent the connexion of things as a universal substance, the essence of which we conceive as a system of laws which underlies everything and in its own self connects everything, but imperceptible, and known to us merely through the impressions it produces on us, which we call things. A final reflection then teaches us that the nature of this universal and all-pervading substance can only be imagined by us as some- thing analogous to our own mental life, where alone we experience the unity of a substance (which we call self) preserved in the multi- tude of its (mental) states. It also becomes clear that only where such mental life really appears need we assign an independent existence, but that the purposes of everyday life as well as those of science are equally served if we deprive the material things outside of us of an independence, and assign to them merely a connected existence through the universal substance by the action of which alone they can appear to us.

The universal substance, which we may call the absolute, is at this stage of our investigations not endowed with the attributes of a personal Deity, and it will remain to be seen by further analysis in how far we are able — without contradictibn — to identify it with the object of religious veneration, in how far that which to metaphysics is merely a postulate can be gradually brought nearer to us and become

a living power. Much in this direction is said by Lotze in various passages of his writings; anything complete, however, on the subject is wanting. Nor would it seem as if it could be the intention of the author to do much more than point out the lines on which the further treatment of the subject should advance. The actual result of his personal inquiries, the great idea which lies at the foundation of his philosophy, we know. It may be safely stated that Lotze would allow much latitude to individual convictions, as indeed it is evident that the empty notion of an absolute can only become living and significant to us in the same degree as experience and thought have taught us to realize the seriousness of life, the significance of creation, the value of the beautiful and the good, and the supreme worth of personal holiness. To endow the universal substance with moral attributes, to maintain that it is more than the metaphysical ground of everything, to say it is the perfect realization of the holy, the beautiful and the good, can only have a meaning for him who feels within himself what real not imaginary values are clothed in those expressions.

We have still to mention that aesthetics formed a principal and favourite study of Lotze's, and that he has treated this subject also in the light of the leading ideas of his philosophy. See his essays Ueber den B e griff der Schonheit (Gottingen, 1845) and Ueber Bedin- gungen der Kunstschonheit, ibid. (1847) ; and especially his Geschichte der Aesthetik in Deutschland (Munich, 1868).

Lotze's historical position is of much interest.' Though he dis- claims being a follower of Herbart, his formal definition of philosophy and his conception of the object of metaphysics are similar to those of Herbart, who defines philosophy as an attempt to remodel the notions given by experience. In this endeavour he forms with Her- bart an opposition to the philosophies of Fichte, Schelling and Hegel, which aimed at objective and absolute knowledge, and also to the criticism of Kant, which aimed at determining the validity of all human knowledge. But this formal agreement includes material differences, and the spirit which breathes in Lotze's writings is more akin to the objects and aspirations of the idealistic school than to the cold formalism of Herbart. What, however, with the idealists was an object of thought alone, the absolute, is to Lotze only inadequately definable in rigorous philosophical language; the aspirations of the human heart, the contents of our feelings and desires, the aims of art and the tenets of religious faith must be grasped in order to fill the empty idea of the absolute with meaning. These manifestations of the divine spirit again cannot be traced and understood by reducing (as Hegel did) the growth of the human mind in the individual, in society and in history

to the monotonous rhythm of a speculative schematism; the essence and worth which is in them reveals itself only to the student of detail, for reality is larger and wider than philosophy; the problem, ” how the one can be many,” is only solved for us in the numberless examples in life and experience which surround us, for which we must retain a lifelong interest and which constitute the true field of all useful human work. This conviction of the emptiness of terms and abstract notions, and of the fulness of individual life, has enabled Lotze to combine in his writings the two courses into which German philosophical thought had been moving since the death of its great founder, Leibnitz. We may define these courses by the terms esoteric and exoteric — the former the philosophy of the school, cultivated principally at the universities, trying to systematize everything and reduce all our knowledge to an intelligible principle, losing in this attempt the deeper meaning of Leibnitz’s philosophy; the latter the unsystematized philosophy of general culture which we find in the work of the great writers of the classical period, Lessing, Winkelmann, Goethe, Schiller and Herder, all of whom expressed in some degree their indebtedness to Leibnitz. Lotze can be said to have brought philosophy out of the lecture- room into the market-place of life. By understanding pnd combining what was great and valuable in those divided and scattered en- deavours, he became the true successor of Leibnitz.

The age in which Lotze lived and wrote in Germany was not one peculiarly fitted to appreciate the position he took up. Frequently misunderstood, yet rarely criticized, he was nevertheless greatly admired, listened to by devoted hearers and read by an increasing circle. But this circle never attained to the unity of a philosophical school. The real meaning of Lotze’s teaching is reached only by patient study, and those who in a larger or narrower sense call them- selves his followers will probably feel themselves indebted to him more for the general direction he has given to their thoughts, for the tone he has imparted to their inner life, for the seriousness with which he has taught them to consider even small affairs and practical duties, and for the indestructible confidence with which his philosophy permits them to disregard the materialism of science, the scepticism of shallow culture, the disquieting results of philosophical and historical criticism.

See E. Pfleiderer, Lotze’s philosophische Weltanschauung nach ihren Grundzugen (Berlin, 1882; 2nd ed., 1884); E. von Hartmann, Lotze’s

Philosophic (Leipzig, 1888); O. Caspari, H. Lotze in seiner Stellung zu der durch Kant begrundeten neuesten Geschichte der Phil- osophie (Breslau, 1883; 2nd ed., 1894); R. Falckenberg, Hermann Lotze (Stuttgart, 1901); Henry Jones, A Critical Account of the Philosophy of Lotze (Glasgow, 1895); Paul Lange, Die Lehre vom Instincte bei Lotze und Darwin (Berlin, 1896) ; A. Lichtenstein, Lotze und Wundt (Bern, 1900). (J. T. M.; H. St.)

LOUBET, EMILE FRANCOIS (1838-), 7th president of the French republic, was born on the 30th of December 1838, the son of a peasant proprietor at Marsanne (Drome), who was more than once mayor of Marsanne. He was admitted to the Parisian bar in 1862, and took his doctorate-in-law next year. He was still a student when he witnessed the sweeping triumph of the Republican party in Paris at the general election in 1863. He settled down to the exercise of his profession in Montelimar, where he married in 1869 Marie Louis Picard. He also inherited a small estate at Grignan. At the crisis of 1870 he became mayor of Montelimar, and thenceforward was a steady supporter of Gambetta's policy. Elected to the Chamber of Deputies in

1876 by Montelimar he was one of the famous 363 who in June

1877 passed the vote of want of confidence in the ministry of the due de Broglie. In the general election of October he was re-elected, local enthusiasm for him being increased by the fact that the government had driven him from the mayoralty. In the Chamber he occupied himself especially with education, fighting the clerical system established by the Loi Falloux, and working for the establishment of free, obligatory and secular primary instruction. In 1880 he became president of the depart- mental council in Drome. His support of the second Jules Ferry ministry and his zeal for the colonial expansion of France gave him considerable weight in the moderate Republican party. He had entered the Senate in 1885, and he became minister of public works in the Tirard ministry (December 1887 to March

In 1892 President Sadi Carnot, who was his personal

friend, asked him to form a cabinet. Loubet held the portfolio of the interior with the premiership, and had to deal with the anarchist crimes of that year and with the great strike of Carmaux, in which he acted as arbitrator, giving a decision regarded in many quarters as too favourable to the strikers. He was defeated in November on the question of the Panama scandals, but he retained the ministry of the interior in the next cabinet under Alexandre Ribot, though he resigned

on its re- construction in January. His reputation as an orator of great force and lucidity of exposition and as a safe and honest states- man procured for him in 1896 the presidency of the Senate, and in February 1899 he was chosen president of the republic in succession to Felix Faure by 483 votes as against 279 recorded by Jules Meline, his only serious competitor. He was marked out for fierce opposition and bitter insult, as the representative of that section of the Republican party which sought the revision of the Dreyfus case. On the day of President Faure's funeral Paul Deroulede met the troops under General Roget on their return to barracks, and demanded that the general should march on the Elysee. Roget sensibly took his troops back to barracks. At the Auteuil steeplechase in June the president was struck on the head with a cane by an anti-Dreyfusard. In that month President Loubet summoned Waldeck-Rousseau to form a cabinet, and at the same time entreated Republicans of all shades of opinion to rally to the defence of the state. By the

efforts of Loubet and Waldeck-Rousseau the Dreyfus affair was settled, when Loubet, acting on the advice of General Galliffet, minister of war, remitted the ten years' imprisonment to which Dreyfus was condemned at Rennes. Loubet's presidency saw an acute stage of the clerical question, which was attacked by Waldeck-Rousseau and in still more drastic fashion by the Combes ministry. The French ambassador was recalled from the Vatican in April 1905, and in July the separation of church and state was voted in the Chamber of Deputies. Feeling had run high between France and England over the mutual criticisms passed on the conduct of the South African War and the Dreyfus case respectively. These differences were composed by the Anglo-French entente, and in 1904 a convention between the two countries secured the recognition of French claims in Morocco in exchange for non-interference with the English occupation of Egypt. President Loubet was a typical example of the peasant-proprietor class, and had none of the aristocratic, not to say monarchical, proclivities of President Faure. He inaugurated the Paris Exhibition of 1900, received the tsar Nicholas II. in September 1901 and paid a visit to Russia in 1902. He also exchanged visits with King Edward VII., with the king of Italy and the king of Spain. The king of Spain's visit in 1905 was the occasion of an attempt on his life, a bomb being thrown under his carriage as he was proceeding with his guest to the opera. His presidency came to an end in January 1906, when he retired into private life.

LOUDON, ERNST GIDEON, Freiherr von (1717-1790), Austrian soldier, was born at Tootzen in Livonia, on the 2nd of February 1717. His family, of Scottish origin, 1 had been settled in that country since

before 1400. His father was a lieutenant- colonel, retired on a meagre pension from the Swedish service, and the boy was sent in 1732 into the Russian army as a cadet. He took part in Field Marshal Miinnich's siege, of Danzig in 1734, in the march of a Russian corps to the Rhine in 1735 and in the Turkish war 1 738-1 739. Dissatisfied with his prospects he resigned in 1741 and sought military employment elsewhere. He applied first to Frederick the Great, who declined his services. At Vienna he had better fortune, being made a captain in Trenck's free corps. He took part in its forays and marches, though not in its atrocities, until wounded and taken prisoner in Alsace. He was shortly released by the advance of the main Austrian army. His next active service, still under Trenck, was in the Silesian mountains in 1745, in which campaign he greatly dis- tinguished himself as a leader of light troops. He was present also at Soor. He retired shortly afterwards, owing to his distaste for the lawless habits of his comrades in the irregulars, and after long waiting in poverty for a regular commission he was at last made a captain in one of the frontier regiments, spending the next ten years in half -military, half - administrative work in the Carlstadt district. At Bunich, where he was stationed, he built a church and planted an oak forest now called by his name. He had reached the rank of lieutenant-colonel when the outbreak of the Seven Years' War called him again into the 'field. From this point began his fame as a soldier. Soon promoted colonel, he distinguished himself repeatedly and was in 1757 made a General-feldwacht-meister (major-general of cavalry) and a knight of the newly founded order of Maria Theresa. In the campaign of 1758 came his first opportunity for fighting an action as a commander-in-chief, and he used it so well that Frederick the Great was obliged to give up the siege of Olmtitz and retire into Bohemia (action of Dom-stadtl, 30th of June). He was rewarded with the grade of lieutenant-field-marshal and having again shown himself an active and daring com- mander in the campaign of Hochkirch, he was created a Freiherr in the Austrian nobility by Maria Theresa and in the peerage of the Holy Roman Empire by her husband the emperor Francis. Maria Theresa gave him, further, the_ grand cross of the order she had founded and an estate near Kuttenberg in Bohemia. He was placed in command of the Austrian contingent sent to

1 His name is phonetically spelt Laudon or Laudohn by Germans, and the latter form was that adopted by himself and his family. In 1 759, however, he reverted to the original Scottish form.

join the Russians on the Oder. At Kunersdorf he turned defeat into a brilliant victory, and was promoted Feldzeugmeister and made commander-in-chief in Bohemia, Moravia and Silesia. In 1760 he destroyed a whole corps of Frederick's army under Fouque at Landshut and stormed the important fortress of Glatz. In 1760 he sustained a reverse at Frederick's hands in the battle of Liegnitz (Aug. 15th, 1760), which action led to bitter controversy with Daun and Lacy, the commanders of the main army, who, Loudon claimed, had left his corps unsupported. In 1 761 he operated, as usual, in Silesia, but he found his Russian allies as timid as they had been after Kunersdorf, and all attempts against Frederick's entrenched camp of Bunzelwitz (see Seven Years' War) failed. He brilliantly seized his one fleeting opportunity, however, and stormed Schweidnitz on the night of Sept. 30/October 1st, 1761. His tireless activity continued to the end of the war, in conspicuous contrast with the temporizing strategy of Daun and Lacy. The student of the later campaigns of the Seven Years' War will probably admit that there was need of more aggressiveness than Daun displayed, and of more caution than suited Loudon's genius. But neither recognized this, and the last three years of the war are marked by an ever- increasing friction between the " Fabius " and the " Marcellus," as they were called, of the Austrian army.

After the peace, therefore, when Daun became the virtual commander-in-chief of the army, Loudon fell into the back- ground. Offers were made, by Frederick the Great amongst others, to induce Loudon to transfer his services elsewhere. Loudon did not entertain these proposals, although negotiations went on for some years, and on Lacy succeeding Daun as president of the council of war Loudon was made inspector-general of infantry. Dissensions, however, continued between Loudon and Lacy, and on the accession of Joseph II., who was intimate with his rival, Loudon retired to his estate near Kuttenberg. Maria Theresa and Kaunitz caused him, however, to be made commander-in-chief in Bohemia and Moravia in 1769. This post he held for three years, and at the end of this time, con- templating retirement from the service, he settled again on his estate. Maria Theresa once more persuaded him to remain in the army, and, as his estate had diminished in value owing to agrarian troubles in Bohemia, she repurchased it from him (1776) on generous terms. Loudon then settled at Hadersdorf near Vienna, and shortly afterwards was made a field-marshal. Of this Carlyle {Frederick the Great) records that when Frederick the Great met Loudon in 1776 he deliberately addressed him in the emperor's presence as " Herr Feldmarschall." But the hint was not taken until February 1778.

In 1778 came the War of the Bavarian Succession. Joseph and Lacy were now reconciled to Loudonˆ and Loudon and Lacy commanded the two armies in the field. On this occasion, however, Loudon seems to have in a measure fallen below his reputation, while Lacy, who was opposed to Frederick's own army, earned new laurels. For two years after this Loudon lived quietly at Hadersdorf, and then the reverses of other generals in the Turkish War called him for the last time into the field. Though old and broken in health, he was commander-in- chief in fact as well as in name, and he won a last brilliant success by capturing Belgrade in three weeks, 1789. He died within the year, on the 14th of July at Neu-Titschein in Moravia, still on duty. His last appointment was that of commander-in-chief of the armed forces of Austria, which had been created for him by the new emperor Leopold. Loudon was buried in the grounds of Hadersdorf. Eight years before his death the emperor Joseph had caused a marble bust of this great soldier to be placed in the chamber of the council of war.

His son Johann Ludwig Alexius, Freiherr von Loudon (1762-1822) fought in the Revolutionary and Napoleonic Wars with credit, and rose to the rank of lieutenant-field-marshal.

See memoir by v. Arncth in Allgemeine deutsche Biographic, s.v. " Laudon," and life by G. B. Malleson.

LOUDOUN, JOHN CAMPBELL, ist Earl of (1598-1663), Scottish politician, eldest son of Sir James Campbell of Lawers, became Baron Loudoun in right of his wife Margaret, grand-

daughter of Hugh Campbell, ist Baron Loudoun (d. 1622-). He was created earl on the 12th of May 1633, but in consequence of his opposition to Charles I.'s church policy in Scotland the patent was stopped in Chancery. In 1637 he was one of the supplicants against the introduction of the English liturgy; and with John Leslie, 6th earl of Rothes, he took a leading part in the promulgation of the Covenant and in the General Assembly which met at Glasgow in the autumn of 1638. He served under General Leslie, and was one of the Scottish commissioners at the Pacification of Berwick in June 1639. In November of that year and again in 1640 the Scottish estates sent Loudoun with Charles Seton, 2nd earl of Dunfermline, to London on an embassy to Charles I. Loudoun intrigued with the French ambassador and with Thomas Savile, afterwards earl of Sussex, but without much success. He was in London when John Stewart, earl of Traquair, placed in Charles's hands a letter signed by Loudoun and six others and addressed to Louis XIII. In spite of his protest that the letter was never sent, and that it would in any case be covered by the

amnesty granted at Berwick, he was sent to the Tower. He was released in June, and two months later he re-entered England with the Scottish invading army, and was one of the commissioners at Ripon in October. In the following August (1641) Charles opened parliament at Edinburgh in person, and in pursuance of a policy of conciliation towards the leaders of the Covenant Loudoun was made lord chancellor of Scotland, and his title of earl of Loudoun was allowed. He also became first commissioner of the treasury. In 1642 he was sent by the Scottish council to York to offer to mediate in the dispute between Charles and the parliament, and later on to Oxford, but in the second of these instances Charles refused to accept his authority. He was constantly employed in subsequent negotiations, and in 1647 was sent to Charles at Carisbrooke Castle, but the ” Engage- ment ” to assist the king there made displeased the extreme Covenanters, and Loudoun was obliged to retract his support of it. He was now entirely on the side of the duke of Argyll and the preachers. He assisted in the capacity of lord chancellor at Charles II. ‘s coronation at Scone, and was present at Dunbar. He joined in the royalist rising of 1653, but eventually sur- rendered to General Monk. His estates were forfeited by Cromwell, and a sum of money settled on the countess and her heirs. At the Restoration he was removed from the chancellor- ship, but a pension of £1000 granted him by Charles I. in 1643 was still allowed him. In 1662 he was heavily fined. He died in Edinburgh on the 15th of March 1663.

The earl’s elder son, James (d. 1684), 2nd earl of Loudoun, passed his life out of Great Britain, and when he died at Leiden was suc- ceeded by his son Hugh (d. 1731). The 3rd earl held various high positions in England and Scotland, being chosen one of the repre- sentative peers for Scotland at the union of the parliaments in 1707. He rendered good service to the government during the rising of 1715, especially at the battle of Sheriffmuir, and was succeeded as 4th earl by his son John (1705-1782), who fought against the Jacobites in 1745, was commander-in-chief of the British force in America in 1756 and died unmarried. The title then passed to James Mure Campbell (d. 1786), a grandson of the and earl, and was afterwards borne by the marquesses of Hastings, descendants of the 5th earl’s daughter and heiress, Flora (1780-1840). Again revert- ing to a female on the death of Henry, 4th marquess of Hastings, in 1868, it came afterwards to Charles (b. 1855), a nephew of this marquess, who became nth earl of Loudoun.

LOUDUN, a town of western France, capital of an arrondisse- ment in the department of Vienne, on an eminence overlooking a fertile plain, 45 m. by rail S.W. of Tours. Pop. (1906) 3931. It was formerly surrounded by walls, of which a single gateway and two towers

remain. Of the old castle of the counts of Anjou which was destroyed under Richelieu, the site now forming a public promenade, a fine rectangular donjon of the 12th century is preserved; at its base traces of Roman constructions have been found, with fragments of porphyry pavement, mosaics and mural paintings. The Carmelite convent was the scene of the trial of Urban Grandier, who was burnt alive for witchcraft in 1634; the old Romanesque church of Sainte Croix, of which he was cure, is now used as a market. The church of St Pierre-du- Marche, Gothic in style with a Renaissance portal, has a lofty stone spire. There are several curious old houses in the town.

Theophraste Renaudot (d. 1653), founder of the Gazette de France, was born at Loudun, where there is a statue of him. The manu- facture of lace and upholstery trimming and of farm implements is carried on, and there is a considerable trade in agricultural products, wine, &c. Loudun (Laudunum in ancient times) was a town of importance during the religious wars and gave its name in 1616 to a treaty favourable to the Protestants.

LOUGHBOROUGH, a market town and municipal borough in the Lou'ghborough (Mid) parliamentary division of Leicestershire, England, near the river Soar and on the Loughborough canal. Pop. (1001) 21,508. It is no m. N.N.W. of London by the Midland railway, and is served by the Great Central and a branch of the London and North- Western railways. The neigh- bourhood is a rich agricultural district, and to the S.W. lies the hilly tract known as Charnwood Forest. The church of All Saints stands on rising ground, and is a conspicuous object for many miles round; it is of Decorated work, and the tower is Perpendicular. The other churches are modern. Public build- ings include the town hall and exchange, town offices, county hall and free library. The grammar school, founded in 1495 under the charity of Thomas Burton, occupies modern buildings in pleasant grounds. There is also a girls' grammar school partly dependent on the same foundation. The principal industry is hosiery making; there are also engineering, iron and dye works and bell foundries. The great bell for St Paul's cathedral, London, was cast here in 1881. Loughborough was incorporated in 1888. Area, 3045 acres.

The manor of Loughborough (Luctebume, Lucteburg, Lughte- burgh) was granted by William the Conqueror to Hugh Lupus, from whom it passed to the Despensers. In 1226-1227 when it belonged to Hugh

Despenser he obtained various privileges for himself and his men and tenants there, among which were quittance from suits at the county and hundred courts, of sheriffs', aids and of view of frankpledge, and also a market every Thursday and a fair on the vigil, day and morrow of St Peter ad vincula. The market rights were purchased by the town in 1880 from the trustees of Thomas Cradock, late lord of the manor. Edward II. visited the manor several times when it belonged to his favourite, Hugh Despenser the elder. Among the subsequent lords were Henry de Beaumont and Alice his wife, Sir Edward Hastings, created Baron Hastings of Loughborough in 1558, Colonel Henry Hastings, created baron in 1645, and the earls of Huntingdon. Alexander Wedderburn was created Baron Loughborough in 1780 when he became chief justice of the common pleas. During the 19th century most of the manorial rights were purchased by the local board. Loughborough was at first governed by a bailiff, afterwards by a local board, and was finally incorporated in 1888 under a mayor, 6 aldermen and 18 councillors. It has never been represented in parliament. Lace-making was formerly the chief industry, but machines for making lace set up in the town by John Heathcote were destroyed by the Luddites in 1816, and the manufacture lost its importance. Bell-founding was introduced in 1840. John Cleveland, the Royalist poet, was born at Loughborough in 1613, John Howe the painter in 1630 and Richard Pulteney the botanist in 1730.

See Victoria County History, Leicestershire; W. G. D. Fletcher, Chapters in the History of Loughborough (1883); Sir Thomas Pochin, " Historical Description of Loughborough " (1770) (vol. viii. of Bibliotheca topographica Britannica) .

LOUGHREA, a market town of Co. Galway, Ireland, pleasantly situated on the N. shore of Lough Rea, 1 16 m. W. from Dublin by a branch from Attymon Junction on the Midland Great Western railway. Pop. (1901), 2815. There are slight remains of an Early English Carmelite friary dating c. 1300, which escaped the Dissolution. Loughrea is the seat of the Roman Catholic bishop of Clonfert, and has a cathedral built in 1900- 1905. A part of the castle of Richard de Burgh, the founder of the friary, still survives, and there are traces of the town fortifica- tions. In the neighbourhood are a cromlech and two ruined towers, and crannogs, or ancient stockaded islands, have been discovered in the lough. Apart from the surroundings of the lough, the neighbouring country is peculiarly desolate.

LOUGHTON, an urban district in the Epping parliamentary division of Essex, England, 115 m. N.N.E. of Liverpool Street station, London, by the Great Eastern railway. Pop. (1901), 4730. This is one of the

villages which has become the centre of a residential district, and is frequented by holiday-makers from London, owing to its proximity to the pleasant woodland scenery of Epping Forest. It lies on the eastern outskirts of the Forest, near the river Roding. There are several modern churches. The lordship of the manor was granted to Waltham Abbey. In the vicinity are large earthworks, probably of British origin, known as Loughton Camp.

LOUHANS, a town of east-central France in the old province of Franche-Comte, now capital of an arrondissement in the department of Saone-et-Loire, 34 m. N.N.E. of Macon by road. Pop. (1 906) ,3216. Its church has a fine tower of the 1 5th century, of which the balustrade is carved so as to form the first words of the Ave Maria. There are also a hospital of the 17th century with a collection of ancient earthenware, a town-hall of the 18th century and remains of ramparts of the 16th and 17th century. The town is the central market of the agricultural plain of Bresse; chickens form the chief article of commerce. There is also a large felt-hat manufactory.

LOUIS, or Lewis (from the Frankish CModowtch, CModwig, Latinized as CModowius, Lodhuwicus, Lodhuvicus, whence — in the Strassburg oath of 842 — O. Fr. Lodhuwigs, then Chlovis, Loys and later Louis, whence Span. Luiz and — through the Angevin kings — Hungarian Ldjos; cf. Ger. Ludwig or Ludewig, from O. H. Ger. Hluduwtc, Hludwig, Ludhuwig, M. H. Ger. Ludewlc; Ital. Lodovico), a masculine proper name, meaning ” Fame-fight ” or ” Famous in fight,” from old Frankish Mud, chlod (O. H. Ger. Mud, Mod), ” fame,” and wick (O. H. Ger. wtc, wig, A.S. wtg) ” war,” ” battle ” (cf, Gr. KXuro/uaxos). The name has been borne by numerous European sovereigns and others, of whom some are noticed below in the following order: (1) Roman emperors and Frankish and German kings, (2) kings of Bavaria, (3) kings of France, (4) kings of Hungary, (5) kings of Naples, (6) Louis of Nassau. (Louis Philippe, king of the French, is dealt with separately.)

LOUIS I. (778-840), surnamed the ” Pious,” Roman emperor, third son of the emperor Charlemagne and his wife Hildegarde, was born at Chasseneuil in central France, and crowned king of Aquitaine in 781. He received a good education; but as his tastes were ecclesiastical rather than military, the government of his kingdom was mainly conducted by his counsellors. Louis, however, gained sound experience in warfare in the defence of Aquitaine, shared in campaigns against the Saxons and the Avars, and led an army to Italy in 792. In 794 or 795 he married Irmengarde, daughter of Ingram, count of Haspen. After the deaths of his two elder brothers, Louis, at his father’s command, crowned himself co-emperor at Aix-la-Chapelle

on the nth of September 813, and was formally associated in the government of the Empire, of which he became sole ruler, in the following January. He earned the surname of ” Pious ” by banishing his sisters and others of immoral life from court; by attempting to reform and purify monastic life; and by showing great liberality to the church. In October 816 he was crowned emperor at Reims by Pope Stephen IV.; and at Aix in July 817, he arranged for a division of his Empire among his sons. This was followed by a revolt of his nephew, Bernard, king of Italy; but the rising was easily suppressed, and Bernard was mutilated and killed. The emperor soon began to repent of this cruelty, and when his remorse had been accentuated by the death of his wife in 818, he pardoned the followers of Bernard and restored their estates, and in 822 did public penance at Attigny. In 819 he married Judith, daughter of Welf I., count of Bavaria, who in 823 bore him a son Charles, afterwards called the Bald. Judith made unceasing efforts to secure a kingdom for her child; and with the support of her eldest step-son Lothair, a district was carved out for Charles in 829. Discontent at this arrangement increased to the point of rebellion, which broke out the following year, provoked by Judith’s in- trigues with Bernard, count of Barcelona, whom she had installed

as her favourite at court. Lothair and his brother Pippin joined the rebels, and after Judith had been sent into a convent and Bernard had fled to Spain, an assembly was held at Compiegne, when Louis was practically deposed and Lothair became the real ruler of the Empire. Sympathy was, however, soon aroused for the emperor, who was treated as a prisoner, and a second assembly was held at Nimwegen in October 830 when, with the concurrence of his sons Pippin and Louis, he was restored to power and Judith returned to court.

Further trouble between Pippin and bis father led to the nominal transfer of Aquitaine from Pippin to his brother Charles in 831. The emperor’s plans for a division of his dominions then led to a revolt of his three sons. Louis met them in June 833 near Kolmar, but owing possibly to the influence of Pope Gregory IV., who took part in the negotiations, he found himself deserted by his supporters, and the treachery and falsehood which marked the proceedings gave to the place the name of Lugenfeld, or the ” field of lies.” Judith, charged with infidelity, was again banished; Louis was sent into the monastery of St Medard at Soissons; and the government of the Empire was assumed by his sons. The emperor was forced to confess his sins, and

declare himself unworthy of the throne, but Lothair did not succeed in his efforts to make his father a monk. Sympathy was again felt for Louis, and when the younger Louis had failed to induce Lothair to treat the emperor in a more becoming fashion, he and Pippin took up arms on behalf of their father. The result was that in March 834 Louis was restored to power at St Denis; Judith once more returned to his side and the kingdoms of Louis and Pippin were increased. The struggle with Lothair continued until the autumn, when he submitted to the emperor and was confined to Italy. To make the restoration more complete, a great assembly at Dieden- hofen declared the deposition of Louis to have been contrary to law, and a few days later he was publicly restored in the cathedral of Metz. In December 838 Pippin died, and a new arrangement was made by which the Empire, except Bavaria, the kingdom of Louis, was divided between Lothair, now reconciled to his father, and Charles. The emperor was returning from suppressing a revolt on the part of his son Louis, provoked by this disposition, when he died on the 20th of June 840 on an island in the Rhine near Ingelheim. He was buried in the church of St Arnulf at Metz. Louis was a man of strong frame, who loved the chase, and did not shrink from the hardships of war. He was, however, easily influenced and was unequal to the govern- ment of the Empire bequeathed to him by his father. No sustained effort was made to ward off the inroads of the Danes and others, who were constantly attacking the borders of the Empire. Louis, who is also called Le Debonnaire, counts as Louis I., king of France.

See Annales Fuldenses; Annates Bertiniani; Thegan, Vita Hludowici; the Vita Hludowici attributed to Astronomus; Er- moldus- Nigellus, In honorem Hludowici imperatoris ; Nithard, Historiarum libri, all in the Monumenta Germaniae historica. Scrip- tores, Bande i. and ii. (Hanover and Berlin, 1826 fol.) ; E. Miihl- bacher, Die Regesten des Kaiserreichs unter den Karolingern (Inns- bruck, 1881); and Deutsche Geschichte unter den Karolingern (Stutt- gart, 1886); B. Simson, Jahrbiicher des frdnkischen Reichs unter Ludwig dem Frommen (Leipzig, 1874-1876); and E. Dummler, Geschichte des ostfrdnkischen Reiches (Leipzig, 1 887-1 888).

(A. W. H.*)

LOUIS II. (825-875), Itoman emperor, eldest son of the emperor Lothair I., was designated king of Italy in 839, and taking up his residence in that country was crowned king at Rome by Pope Sergius II. on the 15th of June 844. He at once preferred a claim to the rights of an emperor in the city, which was decisively rejected; but in 850 he was crowned joint emperor at Rome by Pope Leo IV., and soon

afterwards married his cousin, Engel- berga, a daughter of King Louis the German, and undertook the independent government of Italy. He took the field against the Saracens; quashed some accusations against Pope Leo; held a diet at Pavia; and on the death of his father in September 855 became sole emperor. The division of Lothair's dominions, by which he obtained no territory outside Italy, aroused his discontent, and in 857 he allied himself with Louis the German

against his brother Lothair, king of Lorraine, and King Charles the Bald. But after Louis had secured the election of Nicholas I. as pope in 858, he became reconciled with his brother, and received some lands south of the Jura in return for assistance given to Lothair in his efforts to obtain a divorce from his wife, Teutberga. In 863, on the death of his brother Charles, Louis received the kingdom of Provence, and in 864 came into collision with Pope Nicholas I. over his brother's divorce. The arch- bishops, who had been deposed by Nicholas for proclaiming this marriage invalid, obtained the support of the emperor, who reached Rome with an army in February 864; but, having been seized with fever, he made peace with the pope and left the city. In his efforts to restore order in Italy, Louis met with considerable success both against the turbulent princes of the peninsula and against the Saracens who were ravaging southern Italy. In 866 he routed these invaders, but could not follow up his successes owing to the want of a fleet. So in 869 he made an alliance with the eastern emperor, Basil 1., who sent him some ships to assist in the capture of Bari, the headquarters of the Saracens, which succumbed in 871. Mean- while his brother Lothair had died in 869, and owing to his detention in southern Italy he was unable to prevent the partition of Lorraine between Louis the German and Charles the Bald. Some jealousy between Louis and Basil followed the victory at Bari, and in reply to an insult from the eastern emperor Louis attempted to justify his right to the title " emperor of the Romans." He had withdrawn into Benevento to prepare for a further campaign, when he was treacherously attacked in his palace, robbed and imprisoned by Adelchis, prince of Benevento, in August 871. The landing of fresh bands of Saracens compelled Adelchis to release his prisoner a month later, and Louis was forced to swear he would take no revenge for this injury, nor ever enter Benevento with an army. Return- ing to Rome, he was released from his oath, and was crowned a second time as emperor by Pope Adrian II. on the 18th of May 872. He won further successes against the Saracens, who were driven from Capua, but the attempts of the emperor to punish Adelchis were not very successful. Returning to northern Italy, he died, somewhere in the province of Brescia, on the 12th of August 875, and was buried in the church of St

Ambrose at Milan, having named as his successor in Italy his cousin Carloman, son of Louis the German. Louis was an excellent ruler, of whom it was said ” in his time there was great peace, because every one could enjoy his own possessions.”

See Annales Bertiniani, Chronica S. Benedicti Casinensis, both in the Monumenta Germaniae historica. Scriptores, Bande i. and iii. (Hanover and Berlin, 1826 fol.); E. Mtihlbacher, Die Regesten des Kaiserreichs unter den Karolingern (Innsbruck, 1881); Th. Sickel, Acta regum et imperatorum Karolinorum, digesta et enarrata (Vienna, 1 867-1 868); and E. Dummler, Geschichte des ostfrdnkischen Riiches (Leipzig, 1887-1888). (A. W. H.*)

LOUIS III. (c. 880-928), surnamed the “Blind,” Roman emperor, was a son of Boso, king of Provence or Lower Burgundy, and Irmengarde, daughter of the emperor Louis II. The emperor Charles the Fat took Louis under his protection on the death of Boso in 887; but Provence was in a state of wild disorder, and it was not until 890, when Irmengarde had secured the support of the Bavarian king Arnulf and of Pope Stephen V., that Louis was recognized as king. In 900, after the death of the emperor Arnulf, he went to Italy to obtain the imperial crown. He was chosen king of the Lombards at Pavia, and crowned emperor at Rome in February 901 by Pope Benedict IV. He gained a temporary authority in northern Italy, but was soon compelled by his rival Berengar, margrave of Friuli, to leave the country and to swear he would never return. In spite of his oath he went again to Italy in 904, where he secured the submission of Lombardy; but on the 21st of July 905 he was surprised at Verona by Berengar, who deprived him of his sight and sent him back to Provence, where he passed his days in enforced inactivity until his death in September 928. He married Adelaide, possibly a daughter of Rudolph L, king of Upper Burgundy. His eldest son, Charles Constantine, succeeded to no more than the county of Vienne.

3Q

LOUIS IV.

See Forschungen zur deutschen GeschbJite, Bande ix. and x. | (Gottingen, 1862-1886) ; E. Dummler, Geschichte des ostfrankischen Reichs (Leipzig, 1887-1888); and Gesta Berengarii imperaloris (Halle, 1871); and F. de Gingins-la-Sarra. Memoires pour servir d, I’histoire de Provence et de Bourgogne Jurane (Zurich, 1851).

(A. W. H.*)

LOUIS IV., or V. (c. 1 287-1347), surnamed the Bavarian, Roman emperor and duke of Upper Bavaria, was the second son of Louis II., duke of Upper Bavaria and count palatine of the Rhine, and Matilda, daughter of the German king Rudolph I. Having lost his father in 1294 he inherited, jointly with his elder brother Rudolph, Upper Bavaria and the Palatinate, but passed his time mainly at the court of the Habsburgs in Vienna, while his early experiences of warfare were gained in the campaigns of his uncle, the German king Albert I. He was soon at variance with his brother over their joint possessions. Albert taking the part of Louis in this quarrel, Rudolph promised in 1 30 1 to admit his brother to a share in the government of Bavaria and the Palatinate. When Albert was murdered in May 1308, Louis became a candidate for the German throne; but his claim was not strongly supported. The new king, Henry VII , was very friendly with Rudolph, and as the promise of 1301 had not been carried out, Louis demanded a partition of their lands. Upper Bavaria was accordingly divided in 13 10, and Louis received the north-western part of the duchy; but Rudolph refused to surrender any part of the Palatinate. In 1310, on the death of Stephen I., duke of Lower Bavaria, Louis undertook the guardianship of his two young sons. This led to a war between the brothers, which lasted till June 1313, when peace was made at Munich. Many of the nobles in Lower Bavaria", however, angered at Louis, called in the aid of Frederick I. (the Fair), duke of Austria; but he was defeated at Gammelsdorf on the oth of November 1313, a victory which not only led to peace, but conferred considerable renown on Louis.

In August 1 31 3 the German throne had again become vacant, and Louis was chosen at Frankfort on the 20th of October 13 14 by a majority of the electors, and his coronation followed at Aix-la-Chapelle on the 25th of November. A minority of princes had, however, supported Frederick of Austria; and a war followed between the rivals, during which Louis was supported by the cities and the districts of the middle and lower Rhine. His embarrassments were complicated by a renewal of the dispute with his brother; but when this had been disposed of in 1317 by Rudolph's renunciation of his claims on upper Bavaria and the Palatinate in consideration of a yearly subsidy, Louis was able to give undivided attention to the war with Frederick, and obtained several fresh allies. On the 28th of September 1322 a battle was fought at Miihldorf, which ended in a complete victory for Louis, owing mainly to the timely aid of Frederick IV. of Hohenzollern, burgrave of Nuremburg. Frederick of Austria was taken prisoner, but the struggle was continued by his brother Leopold until the latter's death in 1326. Attempts to enable

the two kings to rule Germany jointly failed, and about 1326 Frederick returned to Austria, leaving Louis in undisputed posses- sion of the country. Before this conclusion, however, a new enemy had taken the field. Supported by Philip V. of France in his desire to free Italy entirely from German influence, Pope John XXII. refused to recognize either Frederick or Louis, and asserted his own right to administer the empire during a vacancy. After the battle of Miihldorf Louis sent Berthold of Neifen, count of Marstetten, into Italy with an army, which soon com- pelled the papal troops to raise the siege at Milan. The pope threatened Louis with excommunication unless he resigned his kingdom within three months. The king thereupon appealed to a general council, arid was placed under the papal ban on the 23rd of March 1324, a sentence which he answered by pub- lishing his charges against the pope. In the cbntest Louis was helped by the Minorites, who were upholding against John the principal of clerical poverty, and by the writings of Marsilius of Padua (who dedicated to Louis his Defensor pads), William of Occam, John of Jandun and others. Taking the offensive, Louis met his Ghibelline supporters at Trent and reached Italy in March 1327; and in May he received the Lombard crown

at Milan. Although the pope renewed his fulminations Louis compelled Pisa to surrender, and was hailed with great re- joicing in Rome. On the 17th of January 1328 he was crowned emperor in St Peter's by Sciarra Colonna, a Roman noble; and he answered the continued attacks of Pope John by pronouncing his deposition, and proclaiming Peter of Corvara pope as Nicholas V. He then undertook an expedition against John's ally, Robert, king of Naples, but, disunion among his troops and scarcity of money and provisions, drove him again to Rome, where) finding that his exactions had diminished his popularity, he left the city, and after passing six months at Pisa, returned to Germany in January 1330. The struggle with the pope was renewed in Germany, and when a formidable league had been formed against Louis, his thoughts turned to a reconciliation. He was prepared to assent to very humiliating terms, and even agreed to abdicate; but the negotiations, which were prolonged by further demands on the part of the pope, were interrupted by his death in December 1334. John's successor, Benedict XII., seemed more anxious to come to an arrangement, but was prevented from doing so by the influence of Philip VI. of France. Overtures for peace were made to Philip, but without success; and in July 1337 Louis concluded an alliance with Edward III., king of England, and made active preparations for war. During these years his attention was also occupied by a quarrel with John, king of Bohemia, over the possession of Tirol, by a campaign in

Lower Bavaria, and a futile expedition against Nicholas I., bishop of Constance. But although his position was shaken by the indifferent success which attended these campaigns, it was improved when the electors meeting at Rense in July 1338 banded themselves together to defend their elective rights, and when the diet at Frankfort confirmed a decree which declared that, the German king did not need the papal appro- bation to make his election valid.

Louis devoted considerable thought and time to extending the possessions of the Wittelsbach family, to which he belonged. Tirol had for some time been a subject of .contention between the emperor and other princes. The heiress of this county, Margaret Maultasch, had married John Henry, margrave of Moravia, son of King John of Bohemia. Having quarrelled with her husband, Margaret fled to the protection of Louis, who seized the opportunity to declare her marriage void and to unite her in 1342 with his son Louis. The emperor also increased his possessions by his own marriage. In 1322 his first wife, Beatrice, daughter of Henry III., count of Glogau, had died after thirteen years of married life, and Louis then married Margaret, daughter of William III., count of Holland. When her brother, count William IV., died childless in 1345, the emperor obtained posses- sion of Holland, Zealand and Friesland. In 1341 he recovered a portion of the Palatinate, and soon deserted Edward of England and came to terms with Philip of France. The acquisition of the territories, and especially of Tirol, had provided Louis with many enemies, prominent among whom were John of Bohemia and his family, that of Luxemburg. John, therefore, entered into an alliance with Pope Clement VI. The course of the war which ensued in Germany was such as to compel the emperor to submit to humiliating terms, though he stopped short of accepting the election of Charles, margrave of Moravia (afterwards the emperoi Charles IV.) as German king in July 1346. Charles consequently attacked Tirol; but Louis, who appeared to have considerable chances of success, died suddenly at a bear-hunt near Munich on the- nth of October 1347. He was buried in the Frauenkirche at Munich, where a statue was erected to his memory in 1622 by Maximilian I., elector of Bavaria, and where a second was unveiled in 1905. He had seven sons, three of whom were sub- sequently electors of Brandenburg, and ten daughters.

Various estimates have been formed of the character of Louis. As a soldier he possessed skill as well as bravery, but he lacked perseverance and decision in his political relations. At one time haughtily defying the pope, at another abjectly craving his pardon, he seems a very inglorious figure; and the fact that he remained almost undisturbed in the possession of Germany 1 in spite of the utmost

efforts of the popes, is due rather to the

political and intellectual tendencies of the time than to his own good qualities. Nevertheless he ruled Bavaria with consider- able success. He befriended the towns, encouraged trade and commerce and gave a new system of laws to the duchy. German took the place of Latin in the imperial charters, and although not a scholar, the emperor was a patron of learning. Louis was a man of graceful appearance, with ruddy countenance and prominent nose.

Bibliography. — Many of the authorities for the life and reign of Louis are found in the Pontes rerum Germanicarum, Bande i. and iv., edited by J. F. Bohmer (Stuttgart, 1843-1868). Among these is the Vita Ludovici IV., by an unknown author. A number of important documents are found in the Regesta imperii 1314-1347, edited by J. F. Bohmer and J. Ficker (Innsbruck, 1865); Acta imperii selecta, edited by J. F. Bohmer and J. Ficker (Innsbruck, 1870) ; Urkunden zur Geschichte des Rbmerzuges Konigs Ludwigs des Bayern, edited by J. Ficker (Innsbruck, 1865); Urkundliche Beitrage zur Geschichte Kaisers Ludwigs IV., edited by C. Hofler (Munich, 1839); Vatikan- ische Urkunden zur Geschichte Kaisers Ludwigs des Bayern, Bande v. and vi. (Stuttgart, 1877-1888); Valikanische Akten zur Deutschen Geschichte in der Zeit Kaisers Ludwigs des Bayern, edited by S. Riezler (Innsbruck, 1891). In the Forschungen zur Deutschen Geschichte (Gottingen, 1862-1886), Band xx., is found Urkunden zur Bairischen und Deutschen Geschichte 1256-1343, edited by S. Riezler; and in Band xiii. is C. Hautle's Beitrage zum Itinerar Kaiser Ludwigs.

The following may also be consulted: C. Gewoldus, Defensio Ludovici IV. contra A. Bzovium (Ingolstadt, 1618); J. G. Herwartus, Ludovicus IV. imperator defensus (Mainz, 1618); N. Burgundus, Historia Bavarica sive Ludovicus IV. imperator (Ingolstadt, 1636). The best modern authorities are F. von Weech, Kaiser Ludwig der Bayer und Konig Johann von Bbhmen (Munich, i860); S. Riezler, Die literarischen Widersacher der Pdpste zur Zeit Ludwigs des Bayern (Leipzig, 1874); C. Muhling, Die Geschichte der Doppelwahl des Jahres 1314 (Munich, 1882); R. Dobner, Die Auseinandersetzung zwischen Ludwig IV. dem Bayern und Friedrich dem Schonen von Oesterreich (Gottingen, 1875); W. Altmann, Der Romerzug Ludwigs des Bayern (Berlin, 1886); A. Chroust, Beitrage zur Geschichte Ludwigs des Bayern und- seiner Zeit (Gotha, 1877); K. Miiller, Der

Kampf Ludwigs des Bayern mit der rbmischen Curie (Tubingen, 1879-1880); VV. Preger, Der Kirchenpolitische Kampf unter Ludwig dem Bayern (Munich, 1877); Sievers, Die politischen Beziehungen Kaiser Ludwigs des Bayern zu Frankreich (Berlin, 1896); Steinberger, Kaiser Ludwig der Bayer (Munich, 1901); and Ueding, Ludwig der Bayer und die niederrheinischen Stddte (Pader- born, 1904). (A. W. H.*)

LOUIS (804-876) surnamed the " German," king of the East Franks, was the third son of the emperor Louis I. and his wife Irmengarde. His early years were partly spent at the court of his grandfather Charlemagne, whose special affection he is said to have won. When the emperor Louis divided his dominions between his sons in 817, Louis received Bavaria and the neighbouring lands, but did not undertake the government until 825, when he became involved in war with the Slavonic tribes on his eastern frontier. In 827 he married Emma, daughter of Welf I., count of Bavaria, and sister of his stepmother Judith; and he soon began to interfere in the quarrels arising from Judith's efforts to secure a kingdom for her own son Charles, and the consequent struggles of Louis and his brothers with the emperor Louis I. (q.v.). When the elder Louis died in 840 and his eldest son Lothair claimed the whole Empire, Louis in alliance with his half-brother, king Charles the Bald, defeated Lothair at Fontenoy on the 25th of June 841. In June 842 the three brothers met on an island in the Saone to negotiate a peace, and each appointed forty representatives to arrange the boundaries of their respective kingdoms. This developed into the treaty of Verdun concluded in August 843, by which Louis received the bulk of the lands of the Carolingian empire lying east of the Rhine, together with a district around Spires, Worms and Mainz, on the left bank of the river. His territories included Bavaria, where he made Regensburg the centre of his government, Thuringia, Franconia and Saxony. He may truly be called the founder of the German kingdom, though his attempts to main- tain the unity of the Empire proved futile. Having in 842 crushed a rising in Saxony, he compelled the Abotrites to own his authority, and undertook campaigns against the Bohemians, the Moravians and other tribes, but was not very successful in freeing his shores from the ravages of Danish pirates. At his instance synods and assemblies were held where laws were

decreed for the better government of church and state. In 853 and the following years Louis made more than one attempt to secure the throne of Aquitaine, which the people of that country offered him in their disgust with the cruel misrule of Charles the Bald. But though he met with sufficient success to encourage him to issue a charter in 858,

dated ” the first year of the reign in West Francia,” treachery and desertion in his army, and the loyalty to Charles of the Aquitanian bishops brought about the failure of the enterprise, which Louis renounced by a treaty signed at Coblenz on the 7th of June 860.

In 855 the emperor Lothair died, and was succeeded in Italy by his eldest son Louis II., and in the northern part of his kingdom’ by his second son, Lothair. The comparative weakness of these kingdoms, together with the disorder caused by the matrimonial troubles of Lothair, afforded a suitable opening for the intrigues of Louis and Charles the Bald, whose interest was increased by the fact that both their nephews were without male issue. Louis supported Lothair in his efforts to divorce his wife Teutberga, for which he received a promise of Alsace, while Charles opposed the divoroe. But in 865 Louis and Charles meeting near Toul, renewed the peace of Coblenz, and doubtless discussed the possibility of dividing Lothair’s kingdom. In 868 at Metz they agreed definitely to a partition; but when Lothair died in 869, Louis was lying seriously ill, and his armies were engaged with the Moravians. Charles the Bald accordingly seized the whole kingdom; but Louis, having recovered, compelled him by a threat of war to agree to the treaty of Mersen, which divided it between the claimants. The later years of Louis were troubled by risings on the part of his sons, the eldest of whom, Carloman, revolted in 861 and again two years later; an example that was followed by the second son Louis, who in a further rising was joined by his brother Charles. A report that the emperor Louis II. was dead led to peace between father and sons. The emperor, however, was not dead, but a prisoner; and as he was not only the nephew, but also the son-in-law of Louis, that monarch hoped to secure both the imperial dignity and the Italian kingdom for his son Carloman. Meeting his daughter Engelberga, the wife of Louis II., at Trent in 872, Louis made an alliance with her against Charles the Bald, and in 874 visited Italy doubtless on the same errand. The emperor, having named Carloman as his successor, died in August 875, but Charles the Bald reached Italy before his rival, and by persuading Carloman, when he did cross the Alps, to return, secured the imperial crown. Louis was preparing for war when he died on the 28th of September 876 at Frankfort, and was buried at Lorsch, leaving three sons and three daughters. Louis was in war and peace alike, the most competent of the descendants of Charlemagne. He obtained for his kingdom a certain degree of security in face of the attacks of Normans, Hungarians, Moravians and others. He lived in close alliance with the Church, to which he was very generous, and entered eagerly into schemes for the con- version of his heathen neighbours.

See Annates Fuldenses; Annates Bertiniani; Nithard, Histori- arum Libri, all in the Monumenta Germaniae histqrica. Scriptores, Bande i. and ii. (Hanover and Berlin, 1826 seq.) ; E. Dummler, Geschichte des oslfrdnkischen Reiches (Leipzig, 1887-1888); Th. Sickel, Die Urkunden Ludwigs des Deutschen (Vienna, 1861-1862); E. Miihlbacher, Die Regesten des Kaiserreichs unter den Karolingern (Innsbruck, 1881) ; and A. Krohn, Ludwig der Deutsche (Saarbriicken, 1872). (A. W. H.*)

LOUIS I., king of Bavaria (1 786-1868), son of the then prince, afterwards duke and elector, Max Joseph of Zweibrucken and his wife Princess Augusta of Hesse-Darmstadt (-1 796), was born at Strassburg on the 25th of August 1786. He received a careful education at home, afterwards (in 1803) going to the Bavarian national university of Landshut and to Gottingen. As a young man he was drawn into the Romantic movement then at its height; but both the classics and contemporary classical poetry took hold upon his receptive mind (he visited Goethe in 1827). He had himself strong artistic tendencies, though his numerous poems show but little proof of this, and as a patron of the arts he proved himself as great as any who had ever occupied a

German throne, and more than a mere dilettante. His first visit to Italy, in 1804, had an important influence upon this side of his development.

But even in Italy the crown prince (his father had become elector in 1799 and king of Bavaria in 1805) did not forget his nationality. He soon made himself leader of the small anti- French party in Bavaria. Napoleon sought in vain to win him over, and Louis fell more and more out of favour with him. Napoleon was even reported to have said: “Qui m’empeche de laisser fusilier ce prince?” Their relations continued to be strained, although in the campaigns of 1807 and 1809, in which Bavaria was among the allies of France, Louis won his laurels in the field.

The crown prince was also averse from a Napoleonic marriage, and preferred to marry (October 12, 1810) the Princess Therese of Saxe-Hildburghausen (1792-1854). Three daughters and four sons were born of this marriage, one of whom succeeded him as Maximilian II., while another, Luitpold, became prince regent of Bavaria on the death of Louis II.

During the time that he was crown prince Louis resided chiefly at Innsbruck or Salzburg as governor of the circle of the Inn and Salzach. In 1815 he attended the Congress of Vienna, where he was especially occupied in endeavouring to obtain the restoration of Alsace and Lorraine to Germany; and later in the year he was with the allies in Paris, using his influence to secure the return of the art treasures carried off by the French.

After 1815 also the crown prince maintained his anti- French attitude, and it was mainly his influence that in 181 7 secured the fall of Montgelas, the minister with French sympathies. Opposed to absolutism, Louis took great interest in the work of organizing the Bavarian constitution (1818) and defended it against Metter- nich and the Carlsbad Decrees (T819); he was also one of the most zealous of the ardent Philhellenes in Germany at the time. He succeeded to the crown of Bavaria on the 12th of October 182*5, and at once embarked upon a moderate constitutional policy, in which he found himself in general agreement with the parliament. Although he displayed a loyal attachment to the Catholic Church, especially owing to his artistic sympathies, he none the less opposed all its more exaggerated pretensions, especially as represented by the Jesuits, whom he condemned as un-German. In the year of his accession he abolished an old edict concerning the censorship. He also furthered in many ways the internal administration of the state, and especially that of the finances. His personal tastes, apart from his activities as a Maecenas, being economical, he endeavoured also to limit public expenditure, in a way which was not always a benefit to the country. Bavaria's power of self-defence especially was weakened by his economies and by his lack of interest in the military aspect of things.

He was a warm friend of learning, and in 1826 transferred the university of Landshut to Munich, where he placed it under his special protection. Prominent scholars were summoned to it, mostly belonging to the Romantic School, such as Goerres, Schubert and Schelling, though others were not discouraged. In the course of his visits to Italy he formed friendships with famous artists such as Thorwaldsen and Cornelius. He was especially anxious to obtain works of art, mainly sculpture, for the famous Munich collections which he started, and in this he had the advantage of the assistance of the painter Martin Wagner. He also set on foot movements for excavation and the collection of works of art in Greece, with excellent results.

Under the influence of the July revolution of 1830, however, he also began to be drawn into the current of reaction; and though he still

declared himself openly against absolutism, and never took up such a hostile attitude towards constitutional ideas as his brother-in-law King Frederick William IV., he allowed the reactionary system of surveillance which commended itself to the German Confederation after 1830 to be introduced into Bavaria (see Bavaria: History). He continued, on the other hand, to do much for the economic development of the country. As a follower of the ideas of Friedrich List, he furthered the foundation of the Zollverein in the year 1833 and the

making of canals. Railways he looked upon as a ” necessary evil.”

In external politics peace was maintained on the whole after 1825. Temporary diplomatic complications arose between Bavaria and Baden in connexion with Louis’s favourite project of winning back the part then belonging to Baden of the old Palatinate, the land of his birth, which was always very dear to him.

Of European importance was his enthusiasm for the liberation of Greece from the rule of Turkey. Not only did he erect the Propylaen at Munich in her honour, but he also helped her in the most generous way both with money and diplomatic resources. And after his second son Otto had become king of Greece in 1832, Greek affairs became from time to time the central point of his foreign policy. In 183 5 he made a visit to Greece, partly political, partly inspired by his old interest in art. But his son proved unequal to his task, and in 1862 was forced to abdicate (see Otho, king of Greece). For this unfortunate issue Louis was not without blame; for from the very first, owing to an exaggerated idealism and love of antiquity, he had totally misunderstood the national character of the Greeks and the problems involved in the attempts to govern them by bureaucratic methods.

In Bavaria, too, his government became more and more con- servative, especially after Karl Abel became the head of the ministry in 1837. The king had not yet, it is true, altogether committed himself to the clerical ultras, and on the occasion of the dispute about the bishops in Prussia in the same year had taken up a wise attitude of compromise. But in Bavaria itself the strict Catholic party influenced affairs more and more decisively. For a while, indeed, this opposition did not impair the king’s popularity, due to his amiable character, his extra-ordinary services in beautifying his capital of Munich, and to his benevolence (it has been reckoned that he personally received about 10,000 letters asking for help every year, and that the money he devoted to charity amounted to about a fifth of his income). The year 1846, however, brought a change which had sad consequences. This

was due to the king's relations with the Spanish dancer Lola Montez, who appeared in Munich in October 1846, and soon succeeded by her beauty and wit in fascinating the king, who was always susceptible to feminine charms. The political importance of this lay in the fact that the royal mistress began to use her great influence against the clerical policy of the Abel ministry. So when the king was preparing the way for ennobling her, in order to introduce her into court circles, which were unwilling to receive her, the ministry protested in the famous memorandum of the nth of February 1847 against the king's demand for her naturalization as a Bavarian, the necessary preliminary to her ennoblement. The position was still further embittered by the fact that, owing to an indiscretion, the memorandum became known to the public. Thereupon the king, irritated and outraged, replaced Abel's Clerical ministry by a more accommodating Liberal one under Zu Rhein under which Lola Montez without more difficulty became Countess Landsberg. Meanwhile, the criticism and opposition of the people, and especially of the students, was turned against the new leader of the court of Munich. On top of this came the revolutionary movement of 1848. The king's position became more and more difficult, and under the pressure of popular opposition he was forced to banish the countess. But neither this nor the king's liberal proclamation of the 6th of March succeeded in esta- blishing peace, and in the capital especially the situation became increasingly threatening. All this made such a deep impression on the king, that on the 20th of March 1848 he abdicated in favour of his son Maximilian.

He now retired entirely into private life, and continued to play the Maecenas magnificently, frequently staying at his villa in Rome, the Villa Malta, and enjoying extraordinary vigour of mind and body up to the end of his days. His popu- larity, which had been shaken by the Montez affair, he soon recovered, especially among artists. To him Munich owes hei finest art collections and most remarkable buildings. The

monarch's artistic sense led him not only to adorn his house with a number of works of antique art, but also to study German medieval art, which he did to good effect. To him Munich owes the acquisition of the famous Rhenish collection of the Boisseree brothers. The king also worked with great zeal for the care of monuments, and the cathedrals of Spires and Cologne en- joyed his special care. He was also an unfailing supporter of contemporary painting, in so far as it

responded to his romantic tendencies, and he gave a fresh impulse to the arts of working in metal and glass. As visible signs of his permanent services to art Munich possesses the Walhalla, the Glyptothek, the two Pinakotheken, the Odeon, the University, and many other magnificent buildings both sacred and profane. The role which the Bavarian capital now plays as the leading art centre of Germany would have been an impossibility without the splendid munificence of Louis I.

He died on the 28th of February 1868 at Nice, and on the 9th of March was buried in Munich, amid demonstrations of great popular feeling.

The chief part of Louis's records is contained in seven sealed chests in the archives of his family, and by the provisions of his will these were not to be opened till the year 1918. These records contain an extraordinarily large and valuable mass of historical material, including, as one item, 246 volumes of the king's diary.

Bibliography. — Of the numerous pamphlets, especially of the years 1846-1848, we need only mention here: P. Erdmann, Lola Montez und die Jesuiten (1847); Geheimbericht ilber Bayern (1847), published by Fowmier in Deutsche Revue, vol. 27. See also F. v. Ritter, Beitrage zur Regierungsgeschichte Konig Ludwigs I. (1825-1826) (2 vols., 1853-1855); Sepp, Ludwig I. Augustus, Konig von Bayern und das Zeitalter der Wtedergeburt der Kiinste (1869; 2nd ed., 1903); Ottokar Lorenz, Drei Biicher Geschichte (1876; 2nd ed., 1879); K. Th. v. Heigel, Ludwig I. (1872; 2nd ed., 1888); " Ludwig 1. und Martin Wagner," Neue historische Vortrage (1883); "Ludwig I.," Allgemeine deutsche Biographie (1884); "Ludwig I. als Freund der Geschichte " and " Kronprinz Ludwig in den Feld- ziigen von 1807 und 1809," in Historische Vortrage und Studien (1887); Die Verlegung der Universitdt nach Miinchen, Rektoratsrede (1887); " Ludwig I. und die Miinchener Hochschule," Quellen und Abhandlungen zur Geschichte Bayerns, n.s. (1890); "Ludwig I. als Erzieher seines Volkes," ib. ; Reidelbach, Ludwig I. und seine Kunstschopfungen (1887; 2nd ed., 1888); L. Trose, Ludwig I. in seinen Briefen an seinen Sohn, den Konig Otto von Griechenland (1891); L. v. Kobell, Unter den vier ersten Kbnigen Bayerns (1894); A. Fournier, " Aus den Tagen der Lola Montez," Neue Deutsche Rundschau (1901); M. Doebere, "Ludwig I. und die deutsche Frage," Festgabe fur Heigel (1903); E. Fuchs, Lola Montez in der Karrikatilre (1904) ; L. Brunner, Nurnberg 1848-1849 (1907).

(J. Hn.) LOUIS II., king of Bavaria (1845-1886), son of his predecessor

Maximilian II. and his wife Maria, daughter of Prince William of Prussia, was born at Nymphenburg on the 25th of August 1845. Together with his brother Otto, three years younger than himself, Louis received, in accordance with the wishes of his learned father, a simple and serious education modelled on that of the German Gymnasien, of which the classical languages are the chief feature. Of modern languages the crown prince learnt only French, of which he remained fond all his life. The practical value of the prince's training was small. It was not till he was eighteen years old that he received his first pocket- money, and at that age he had no ideas about money and its value. Military instruction, physical exercises and sport, in spite of the crown prince's strong physique, received little attention. Thus Louis did not come enough into contact with young men of his own age, and consequently soon developed a taste for solitude, which was found at an early age to be com- bined with the romantic tendencies and musical and theatrical tastes traditional jn his family.

Louis succeeded to the throne on the 10th of March 1864, at the age of eighteen. The early years of his reign were marked by a series of most serious political defeats for Bavaria. In the Schleswig Holstein question, though he was opposed to Prussia and a friend of Duke Frederick VIII. of Augustenburg, he did not command the material forces necessary effectively to resist the powerful policy of Bismarck. Again, in the war of 1866, Lctris and his minister von der Pfordten took the side of Austria,

xvn. >

and at the conclusion of peace (August 22) Bavaria had, in addition to the surrender of certain small portions of her territory, to agree to the foundation of the North German Confederation under the leadership of Prussia. The king's Bavarian patriotism, one of the few steadfast ideas underlying his policy, was deeply wounded by these occurrences, but he was face to face with the inevitable, and on the 10th of August wrote a letter of reconcilia- tion to King William of Prussia. The defeat of Bavaria in 1866 showed clearly the necessity for a reform of the army. Under the new Liberal ministry of Hohenlohe (December 29, 1866- February 13, 1870) and under Prauckh as minister of war, a series of reforms were carried through which prepared for the victories of 1870. As regards his ecclesiastical policy, though Lou's remained personally true to the Catholic Church, he strove for a greater independence of the Vatican. He maintained friendly relations with Ignaz von Dollinger, the leader of the more liberal Catholics who opposed the definition of papal infallibility, but without extending his protection to the anti- Roman movement of the

Old Catholics. In spite of this the Old Bavarian opposition was so aroused by the Liberalism of the Hohenlohe ministry that at the beginning of 1870 Louis had to form a more Conservative cabinet under Count Bray- Steinburg. On the outbreak of the Franco-Prussian War he at once took the side of Prussia, and gave orders for mobilization. In 187 1 it was he who offered the imperial crown to the king of Prussia; but this was not done on his own initiative. Bis- marck not only determined the king of Bavaria to take the decisive step which put an end to a serious diplomatic crisis, but actually drafted the letter to King William which Louis copied and despatched without changing a word. Louis placed very few difficulties in the way of the new German Empire under the leadership of Prussia, though his Bavarian particularism remained unchanged.

Though up till the beginning of the year 1880 he did not cease to give some attention to state affairs, the king's- interests lay in quite other spheres. His personal idiosyncrasies had, in fact, developed meanwhile in a most unhappy direction. His enthusiasm for all that is beautiful soon led him into dangerous bypaths. It found its most innocent expression in the earliest years of his reign when he formed an intimate friendship with Richard Wagner, whom from May 1864 to December ˆ865 he had constantly in his company. Louis was entirely possessed by the soaring ideas of the master, and was energetic in their realization. He not only established Wagner's material position at the moment by paying 18,000 gulden of debts for him and granting him a yearly income of 4000 gulden (afterwards in- creased to 8000), but he also proceeded to realize the ambitious artistic plans of the master. A series of brilliant model per- formances of the Wagnerian music-dramas was instituted in Munich under the personal patronage of the king, and when the further plan of erecting a great festival theatre in Munich for the performance of Wagner's " music of the future " broke down in the face of the passive resistance of the local circles interested, the royal enthusiast conceived the idea of building at Bayreuth, according to Wagner's new principles, a theatre worthy of the music-dramas. For a time Louis was entirely under Wagner's influence, the fantastic tendencies of whose art cast a spell over him, and there is extant a series of emotional letters of the king to Wagner. Wagner, on the whole, used his influence in artistic and not in political affairs. 1 In spite of this the opposition to him became permanent. Public opinion in Bavaria for the most part turned against him. He was attacked for his foreign origin, his extravagance, his intrigues, his artistic Utopias, and last but by no means least, for his unwholesome influence over the king. Louis in the end was compelled to give him up. But the relations between king and artist were by no

means at an end. In face of the war which was imminent in 1866, and in the midst of the preparation for war, the king hastened in May to Triebschen, near Lucerne,

1 It was on Wagner's advice that the king appointed Hohenlohe prime minister in 1866. See Hohenlohe-Schillingfurst, Prince Chlodwig zu, under Hohenlohe. [Ed.]

in order to see Wagner again. 1 In 1868 they were seen together in public for the last time at the festival performances in Munich. In 1876 Wagner's Ring des Nibelungen was performed for the first time at Bayreuth in the presence of the king. Later, in 1 88 1, the king formed a similar friendship with Joseph Kainz the actor, but it soon came to an end. In January 1867 the young king became betrothed to Duchess Sophie of Bavaria (afterwards Duchesse d'Alencon), daughter of Duke Max and sister of the empress of Austria; but the betrothal w"as dissolved in October of the same year.

Though even in his later years he remained interested in lofty and intellectual pursuits, as may be gathered, apart from his enthusiasm for art and nature, from his wide reading in history, serious poetry and philosophy, yet in his private life there became increasingly marked the signs of moral and mental weakness which gradually gained the mastery over his once pure and noble nature. A prominent feature was his blind craving for solitude. He cut himself off from society, and avoided all intercourse with his family, even with his devotedly affectionate mother. With his ministers he came to communicate in writing, only. At the end he was surrounded only by inferior favourites and servants. His life was now spent almost entirely in his castles far from the capital, which irked him more and more, or in short and hasty journeys, in which he always travelled incognito. Even the theatre he could now only enjoy alone. He arranged private performances in his castles or in Munich at fabulous cost, and appointed an official poet to his household. Later his avoidance of society developed into a dread of it, accom- panied by a fear of assassination and delusions that he was being followed.

Side by side with this pathological development his inborn self-consciousness increased apace, turning more and more to megalomania, and impelling the weak-willed monarch to those extraordinary displays of magnificence which can still be admired to-

day in the castles built or altered by him, such as Berg on the Starnberger See, Linderhof, Herrenchiemsee, Hohensch- wangau, Neuschwanstein, &c, which are among the most splendid buildings in Germany. It is characteristic of the extravagance of the king's ideas that he adopted as his model the style of Louis XIV. and fell into the habit of imitating the Roi Soldi. He no longer stayed for any length of time in one castle. Often he scoured the country in wild nocturnal rides, and madness gained upon him apace. His mania for buying things and making presents was comparatively harmless, but more serious matters were the wild extravagance which in 1880 involved him in financial ruin, his fits of destructive rage, and the tendency to the most cruel forms of abnormal vice. None the less, at the time when the king's mental weakness was increasing, his character still retained lovable traits — his simple sense of beauty, his kindliness, and his highly developed understanding of art and artistic crafts. Louis's love of beauty also brought material profit to Bavaria.

But the financial and political dangers which arose from the king's way of life were so great that interference became necessary. On the 8th of June 1886 medical opinion declared him to be affected with chronic and incurable madness and he was pronounced incapable of governing. On the 10th of June his uncle, Prince Luitpold, assumed the regency, and after violent resistance the late king was placed under the charge of a mental specialist. On the 13th of June 1886 he met with his death by drowning in the Starnberger See, together with his doctor von Gudden, who had unwisely gone for a walk alone with his patient, whose physical strength was enormous. The details of his death will never be fully known, as the only possible eye-witness died with him. An examination of the brain revealed a condition of incurable insanity, and the faculty submitted a report giving the terrible details of his malady. Louis's brother Otto, who succeeded him as king of Bavaria, was also incurably insane.

1 Hohenlohe (Denkwurdigkeiten) comments on the lact that the king did not even take the trouble to review the troops proceeding to the war. [Ed.]

Bibliography.— K. v. Heigel, Ludwig II. (1893); Luise v. Kobell, Unter den vier ersten Kbnigen Bayerns (.1-894) ; C. Bujer, Ludwig II. (1897); Luise v. Kobell, " Wilhelm I. und Ludwig II." Deutsche Revue, 22; Ludwig II. und die Kunst (1898); Ludwig II. und Bismarck (1870, 1899); Anonym, Endlich vollige Klarheit uber den Tod des Konigs Ludwig II. . . . (1900) ; Freiherr v. Voldern- dorff, " Aus meiner Hofzeit," in Velhagen und Klasings Monatshefte (1900); Francis Gerard, The Romance of Ludwig II. of Bavaria; J. Bainville, Louis II. de

Baviere (Paris, 1900); E. v. Possart, Die Separatvorstellungen von Konig Ludwig II. (1901); O. Bray-Stein- burg, Denkwurdigkeiten (1901); S. Rocke, Ludwig II. und Richard Wagner (1903) ; W. Busch, Die Kdmpfe uber Reichsver fas sung und Kaisertum (1906); Chlodwig Hohenlohe, Denkwurdigkeiten (2 vols., 1907) ; A. v. Ruvitle, Bayern und die Wiederaufrichtung des Deutschen Reiches (1909); K. A. v. Miiller, Bayern im Jahre 1866 und die Berufung des Fiirsten Hohenlohe (1909) ; G. Kuntzel, Bismarck und Bayern in der Zeit der Reichsgriindung (1910); Hesselbarth, Die Enstehung des deutsch-franzbzischen Krieges (1910) ; W. Strohmayer, " Die Ahnentafel Ludwigs II. und Ottos I.," Archiv fur Rassen- und Gesellschaftsbiologie, vol. vii. (1910). (J. Hn.)

LOUIS II. 2 (846-879), king of France, called " Ie Begue " or " the Stammerer," was a son of Charles II. the Bald, Roman emperor and king of the West Franks, and was born on the 1st of November 846. After the death of his elder brother Charles in 866 he became king of Aquitaine, and in October 877 he succeeded his father as king of the West Franks, but not as emperor. Having made extensive concessions to the nobles both clerical and lay, he was crowned king by Hincmar, arch- bishop of Reims, on the 8th of December following, and in September 878 he took advantage of the presence of Pope John VIII. at the council of Troyes to be consecrated afresh. After a feeble and ineffectual reign of eighteen months Louis died at Compiegne on the 10th or nth of April 879. The king is described as " un homme simple et doux, aimant la paix, la justice et la religion." By his first wife, Ansgarde, a Burgundian princess, he had two sons, his successors, Louis III. and Carloman; by his second wife, Adelaide, he had a posthumous son, Charles the Simple, who also became king of France. (A. W. H.*)

LOUIS III. (c. 863-882), king of France, was a son of Louis II. and with his brother Carloman succeeded his father as king in April 879. A strong party, however, cast some doubts upon the legitimacy of the young princes, as the marriage of their parents had not been recognized by the emperor Charles the Bald; consequently it was proposed to offer the crown to the East Frankish ruler Louis, a son of Louis the German. But this plan came to nothing, and in September 879 the brothers were crowned at Ferrieres by Ansegisus, archbishop of Sens. A few months later they divided their kingdom, Louis receiving the part of France north of the Loire. They acted together against the Northmen, over whom in August 881 they gained a memorable victory. They also turned against Boso who had been set up as king in Burgundy and Provence. On the 5th of August 882 Louis died at St Denis. He left no sons and Carloman became sole king. (A.

W, H.*)

LOUIS IV. (921-954), king of France, surnamed ” d’Outremer ” (Transmarinus) , was the son of Charles III. the Simple. In consequence of the imprisonment of his father in 922, his mother Odgiva (Eadgyfu), sister of the English king ˆJthelstan, fled to England with the young Louis — a circumstance to which he owes his surname. On the death of the usurper Rudolph (Raoul), Ralph of Burgundy, Hugh the Great, count of Paris, and the other nobles between whom France was divided, chose Louis for their king, and the lad was brought over from England and consecrated at Laon on the 19th of June 936. Although his de facto sovereignty was confined to the town of Laon and to some places in the north of France, Louis displayed a zeal beyond his years in procuring the recognition of his authority by his turbulent vassals. The beginning of his reign was marked by a disastrous irruption of the Hungarians into Burgundy and Aquitaine (937). In 939 Louis became involved in a struggle with the emperor Otto the Great on the question of Lorraine, the nobles of which district had sworn an oath of fidelity to the

king of France. When Louis married Gerberga, sister of Otto,

and widow of Giselbert, duke of Lorraine, there seemed to be a 2 The emperor Louis I. is counted as Louis I., king of France.

u

fair prospect of peace; but the war was resumed, Otto supporting the rebel lords of the kingdom of France, and peace was not declared until 942, at the treaty of Vise-sur-Meuse. On the death of William Longsword, duke of Normandy, who had been assassinated by Arnulf, count of Flanders, in December 942, Louis endeavoured to obtain possession of the person of Richard, the young son and heir of the late duke. After an unsuccessful expedition into Normandy, Louis fell into the hands of his adversaries, and was for some time kept prisoner at Rouen (945), and subsequently handed over to Hugh the Great, who only consented to release him on condition that he should surrender Laon. Menaced, however, by Louis’ brother-in-law, Otto the Great, and excommunicated by the council of Ingelheim (948), the powerful vassal was forced to make submission and to restore Laon to his sovereign. The last years of the reign were troubled by fresh difficulties with Hugh the Great and also by an irruption of the Hungarians into the south of France. Louis died on the 10th of

September 954, and was succeeded by his son Lothair.

The chief authority for the reign is the chronicler Flodoard. See also Ph. Lauer, La Regne de Louis IV a" Outre- Mer (Paris, 1900) ; and A. Heil, Die politisdien Beziehungen zwischen Otto dem Grossen und Ludwig IV. von Frankreich (Berlin, 1904). (R. Po.)

LOUIS V. (967-987), king of France, succeeded his father Lothair in March 986 at the age of nineteen, and finally embroiled the Carolingian dynasty with Hugh Capet and Adalberon, archbishop of Reims. From the absence of any important event in his one year's reign the medieval chroniclers designated him by the words " qui nihil fecit," i.e. " le Faineant " or " do- nothing." Louis died in May 987, his mother Emma being accused of having poisoned him. He had married Adelaide, sister of Geoffrey Grisegonelle, count of Anjou, but had no issue. His heir by blood was Charles, duke of Lower Lorraine, son of Louis IV., but the defection of the bishops and the treason of Adalberon (Ascelinus), bishop of Laon, assured the success of Hugh Capet.

See F. Lot, Les Verniers Carolingiens (Paris, 1891); and the Recueil des actes de Lothaire et de Louis V, edited by L. Halphen and F. Lot (1908). (R. Po.)

LOUIS VI. (1081-1137), king of France, surnamed " the Fat," was the son of Philip I. of France and Bertha of Holland. He was also surnamed the "Wide-awake" and "the Bruiser," and lost none of his energy when he earned the nickname by which he is known in history. In 1098 Louis was made a knight, and about the same time was associated with his father in the government, which the growing infirmities of Philip left more and more to his son, in spite of the opposition of Bertrada, the queen, whose criminal union with Philip had brought the anathema of the church. From 1100 to 1108 Louis by his victorious wars on the English and brigands had secured the army on his side, while the court supported Bertrada. Unable to make headway against him in war she attempted to poison him, and contem- porary chroniclers attributed to this poison the pallor of his face, which seems to have been in remarkable contrast to his stalwart, and later his corpulent figure. Louis' reign is one of the most important in the history of France. He is little less than the second founder of the Capetian dynasty. When the feeble and incompetent Philip I. died (29th of July 1108) Louis was faced by feudal barons as powerful as himself, and ready to rise against him. He was forced to have himself hurriedly crowned at Orleans, supported by a handful of vassals and some ecclesiastics. As king he continued the policy he had

followed during the previous eight years, of securing the roads leading to Paris by putting down feudal brigands and destroying their strongholds in the lle-de- France. The castle of the most notorious of these, Hugues du Puiset, was three times taken and burned by the king's men, but Hugues was spared to go back each time to his robber life, until he died on a crusade. In the north, Thomas de Marie, son of Enguerrand de Coucy, carried on a career of rapine and murder for almost thirty years before the king succeeded in taking him prisoner (1130). Twenty-four years of continuous war finally rooted out the robber barons who lived on the plunder of the roads leading to Paris: the lords of Montlheri, who com-

manded the roads to Orleans, Melun and the south, those of Montmorency near St Denis on the north (who had to restore what they had robbed the abbey of St Denis), those of Le Puiset toward the west, on the way to Chartres, and many others. Parallel with this consolidation of his power in the ancestral domains Louis met energetically the Anglo-Norman danger, warring with Henry I. of England for twenty-five years. After the victory of Tinchebray (1106) Louis supported the claims of William Clito, son of Robert, duke of Normandy, against Henry I. A ruthless war followed, in which Louis was at times reduced to the sorest straits. In 1 1 19, at a council held at Reims under the presidency of Pope Calixtus II., the enemies were reconciled; but William Clito's claims were not satisfied, and in 1 1 23 war began again on a larger scale. Henry I. induced the emperor Henry V. to join in the attack upon France; and, his heir having been drowned in the loss of the " White Ship," won the count of Anjou by marrying his only daughter Matilda to Geoffrey, the Angevin heir (1127). The invasion of Henry V. was met by something like a national army, which gathered under Louis at Reims. " For a few days at least, the lord of the lle- de-France was truly a king of France " (Luchaire). Suger proudly gives the list of barons who appeared. Henry V. came no farther than Metz. Royalty had won great prestige. Even Theobald, count of Chartres, the king's greatest enemy, the soul of feudal coalitions, came with his contingent. Shortly afterwards (1126), Louis was able to overawe the great count of Aquitaine, William IX., and force his vassal, the count of Auvergne, to treat justly the bishop of Clermont. In Flanders Louis interfered upon the assassination of Charles the Good. He caused the barons to elect as their count in Arras the same William Clito who claimed Normandy, and who was closely bound to the king. For a while Louis had Flanders absolutely at his disposal, but he had hardly left William alone (n 27) when his brutal oppression roused both towns and nobles, who declared that Louis had no right to interfere in Flanders.

The death of William Clito, and a savage war with his own seneschal, prevented Louis from effectually resenting this attitude; but Thierry of Alsace, the new count, consented in n 28 to receive from Louis the investiture of all his French fiefs, and henceforth lived on good terms with him. In all his wars — those mentioned are but a part of them — Louis fought in person. Proud of his strength, reckless in the charge as on the march, plunging into swollen rivers, entering blazing castles, he gained the reputa- tion of a national hero, the protector of the poor, the church, the peasants and the towns. The communal movement grew during his reign, and he encouraged it on the fiefs of his vassals in order to weaken them; but the title ” Father of the Communes ” by which he was known in history is not deserved, though he did grant some privileges to towns on his domains. Neither was Louis the author of the movement for the emancipation of the serfs, as was formerly claimed. His attitude toward the move- ment was like that of his predecessors and contemporaries, to favour emancipation when it promised greater chance of profit, greater scope for exploitation of the peasants; otherwise to oppose it. He was a great benefactor to the church, aided the new, reformed monastic congregations of Citeau, Premontre and Fontevrault, and chose his two chief ministers from the clergy. Etienne de Garlande, whom Louis raised from obscurity to be archdeacon of Notre Dame at Paris, chancellor and seneschal of France, was all-powerful with the king from 1108 to 1127. His relatives monopolized the highest offices of the state. But the queen Adelaide became his enemy; both Ivo of Chartres and St Bernard bitterly attacked him; and the king suddenly stripped him of all his offices and honours. Joining the re- bellious barons, Etienne then led a bitter war against the king for three years. When Louis had reduced him to terms he pardoned him and restored him to the chancellorship (1132), but not to his old power. Suger (q.v.), administrator of St Denis, enters the scene toward the close of this reign, but his great work belongs to the next. Louis VI. died on the 1st of August 1 13 7, just a few days after his son, Louis the Young, had set out for the far south-west, the Aquitaine which Wd been

3ˆ

won by the marriage with Eleanor. His wife was Adelaide, or Alice, daughter of Humbert II., count of Savoy, by whom he had seven sons and a daughter.

See A. Luchaire, Louis le Gros, annates de sa vie et son regne (1890), and the same writer's volume, Les Premiers Capetiens, in E. Lavisse's Histoire de France. (J. T. S.*)

LOUIS VII. (c. 1121-1180), king of France, son of Louis VI. the Fat, was associated with his father and anointed by Innocent II. in 1131. In 1137 he succeeded his father, and in the same year married at Bordeaux Eleanor, heiress of William II., duke of Aquitaine. In the first part of his reign he was vigorous and jealous of his prerogatives, but after his crusade his religiosity developed to such an extent as to make him utterly inefficient. His accession was marked by no disturbances, save the risings of the burgesses of Orleans and of Poitiers, who wished to organize communes. But soon he came into violent conflict with Pope Innocent II. The archbishopric of Bourges became vacant, and the king supported as candidate the chancellor Cadurc, against the pope's nominee Pierre de la Chatre, swearing upon relics that so long as he lived Pierre should never enter Bourges. This brought the interdict upon the king's lands. At the same time he became involved in a war with Theobald, count of Champagne, by permitting Rodolphe (Raoul), count of Ver- mandois and seneschal of France, to repudiate his wif e, Theobald's niece, and to marry Petronille of Aquitaine, sister of the queen of France. The war, which lasted two years (1142-44), was marked by the occupation of Champagne by the royal army and the capture of Vitry, where many persons perished in the burning of the church. Geoffrey the Handsome, count of Anjou, by his conquest of Normandy threatened the royal domains, and Louis VII. by a clever manoeuvre threw his army on the Norman frontier and gained Gisors, one of the keys of Normandy. At his court which met in Bourges Louis declared on Christmas Day 1 145 his intention of going on a crusade. St Bernard assured its popularity by his preaching at Vezelay (Easter n 46), and Louis set out from Metz in June 1147, on the overland route to Syria. The expedition was disastrous, and he regained France in 1149, overcome by the humiliation of the crusade. In the rest of his reign he showed much feebleness and poor judgment. He committed a grave political blunder in causing a council at Beaugency (on the 21st of March n 52) to annul his marriage with Eleanor of Aquitaine, under pretext of kinship, but really owing to violent quarrels during the crusade. Eleanor married Henry II. of England in the following May,

and brought him the duchy of Aquitaine. Louis VII. led a half-hearted war against Henry for having married without the authorization of his suzerain; but in August 1154 gave up his rights over Aquitaine, and contented himself with an indemnity. In 1154 Louis married Constance, daughter of the king of Castile, and their daughter Marguerite he affianced imprudently by the treaty of Gisors (1158) to Henry, eldest son of the king of England, promising as dowry the Vexin and Gisors. Five weeks after the death of Constance, on the 4th of October 1160, Louis VII. married Adele of Champagne, and Henry II. to counterbalance the aid this would give the king of France, had the marriage of their infant children celebrated at once. Louis VII. gave little sign of understanding the danger of the growing Angevin power, though in 1159 he made an expedition in the south to aid Raymond V., count of Toulouse, who had been attacked by Henry II. At the same time the emperor Frederick I. in the east was making good the imperial claims on Aries. When the schism . broke out, Louis took the part of the. pope Alexander III., the enemy of Frederick, and after two comedy-like failures of Frederick to meet Louis VII. at Saint Jean de Losne (on the 29th of August and the 22nd of September 1162), Louis definitely gave himself up to the cause of Alexander, who lived at Sens from n63ton65. Alexander gave the king, in return for his loyal support, the golden rose. Louis VII. received Thomas Becket and tried to reconcile him with King Henry II. He supported Henry's rebellious sons, but acted slowly and feebly, and so contributed largely to the break up of the coalition (1173-1174). Finally in 1177 the pope intervened to bring the

two kings to terms at Vitry. By his third wife, Adele, Louis had an heir, the future Philip Augustus, born on the 21st of August 1165. He had him crowned at Reims in 1179, but, already stricken with paralysis, he himself was not able to be present at the ceremony, and died on the 18th of September 1180. His reign from the point of view of royal territory and military power, was a period of retrogression. Yet the royal authority had made progress in the parts of France distant from the royal domains. More direct and more frequent connexion was made with distant feudatories, a result largely due to the alliance of the clergy with the crown. Louis thus reaped the reward for services rendered the church during the least successful portion of his reign.

See R. Hirsch, Studien zur Geschichte Konig Ludwigs VII. von Frankreieh (1892); A. Cartellieri, Philipp II. August von Frankreich bis zum Tode seines Vaters, 1165-1180 (1891); and A. Luchaire in E. Lavisse's Histoire de France, tome iii. 1st part, pp. 1-81.

(J. T. S.») LOUIS VIII. (1187-1226), king of France, eldest son of Philip Augustus and of Isabella of Hainaut, was born in Paris on the 5th of September 1187. Louis was short, thin, pale-faced, with studious tastes, cold and placid temper, sober and chaste in his life. He left the reputation of a saint, but was also a warrior prince. In 12 13 he led the campaign against Ferrand, count of Flanders; in 1214, while Philip Augustus was winning the victory of Bouvines, he held John of England in check, and was victorious at La Roche-aux-Moines. In the autumn of 1215 Louis received from a group of English barons, headed by Geoffrey de Mandeville, a request to ” pluck them out of the hand of this tyrant ” (John). Some 7000 French knights were sent over to England during the winter and two more contingents followed, but it was only after twenty-four English hostages had arrived in Paris that Louis himself prepared to invade England. The expedition was forbidden by the papal legate, but Louis set out from Calais on the 20th and landed at Stonor on the 22nd of May 1 216. In three months he had obtained a strong foothold in eastern England, and in the end of July he laid siege to Dover, while part of his army besieged Windsor with a view to securing the safety of London. The pretexts on which he claimed the English crown were set down in a memorandum drawn up by French lawyers in 1215. These claims — that John had forfeited the crown by the murder of his nephew, Arthur of Brittany, and that the English barons had the right to dispose of the vacant throne — lost their plausibility on the death of King John and the accession of his infant son as Henry III. in October 12 16. The papal legate, Gualo, who had forbidden the enterprise, had arrived in England at the same time as Louis. He excom- municated the French troops and the English rebels, and Henry III. found a valiant defender in William Marshal, earl of Pembroke. After the ” Fair of Lincoln,” in which his army was defeated, Louis was compelled to resign his pretensions, though by a secret article of the treaty of Lambeth (September 1 217) he secured a small war indemnity. Louis had assisted Simon de Montfort in his war against the Albigenses in 1215, and after his return to France he again joined the crusade. With Simon’s son and successor, Amauri de Montfort, he directed the brutal massacre which followed the capture of Marmande. Philip II., suspicious of his son until the close of his life, took precautions to assure his obedience, narrowly watched his administration in Artois, which Louis held from his mother Isabella, and, contrary to the custom of the kings of France, did not associate his son with him by having him crowned. Philip Augustus dying on the 14th of July 1223, Louis VIII. was anointed at Reims on the 6th of August following. He surrounded himself with councillors whom his father had chosen and formed, and continued his father’s policy. His reign was taken up with

two great designs: to destroy the power of the Plantagenets, and to conquer the heretical south of France. An expedition conquered Poitou and Saintonge (1224); in 1226 he led the crusade against the Albigenses in the south, forced Avignon to capitulate and received the submission of Languedoc. While passing the Auvergne on his return to Paris, he was stricken with dysentery, and died at Montpensier on the 8th of

November 1226. His reign, short as it was, brought gains both to the royal domains and to the power of the crown over the feudal lords. He had married in 1200 Blanche of Castile, daughter of Alphonso IX. of Castile and granddaughter of Henry II. of England, who bore him twelve children; his eldest surviving son was his successor, Louis IX.

See C. Petit-Dutaillis, Iztude sur la vie el le regne de Louis VIII. (Paris, 1894) ; and E. Lavisse, Histoire de France, tome iii. (1901).

(M. Br.)

LOUIS IX. (12 14-1270), king of France, known as Saint Louis, was born on the 25th of April 1214, and was baptized at Poissy. His father, Louis VIII., died in 1226, leaving the first minority since the accession of the Capetians, but his mother, Queen Blanche of Castile, proved more than a match for the feudal nobility. She secured her son's coronation at Reims on the 29th of November 1226; and, mainly by the aid of the papal legate, Romano Bonaventura, bishop of Porto (d. 1243), and of Thibaut IV., count of Champagne, was able to thwart the rebellious plans of Pierre Mauclerc, duke of Brittany, and Philippe Hurepel, a natural son of Philip Augustus. Mauclerc's opposition was not finally overcome, however, until 1234. Then in 1 236 Thibaut, who had become king of Navarre, turned against the queen, formed an alliance with Brittany, marrying his daughter without royal consent to Jean le Roux, Mauclerc's son, and attempted to make a new feudal league. The final triumph of the regent was shown when the king's army assembled at Vincennes. His summons met with such general and prompt obedience as to awe Thibaut into submission without striking a blow. Thus the reign of Louis IX. began with royal prerogatives fully maintained; the kingdom was well under control, and Mauclerc and Thibaut were both obliged to go on crusade. But the influence of the strong-willed queen-mother continued to make itself felt to the close of her life. Louis IX. did not lack independence of

character, but his confidence in his mother had been amply justified and he always acted in her presence like a child. This confidence he withheld from his wife, Margaret, daughter of Raymond Berenger, count of Provence, whom he married at Sens in May 1234. The reign was comparatively uneventful. A rising of the nobles of the south-west, stirred up by Isabella, widow of King John of England, and her husband, Hugh de Lusignan, count of the Marche, upon the occasion of the investment of Alphonse of Poitiers with the fiefs left him by Louis VIII. as a result of the Albigensian crusade, reached threatening dimensions in 1242, but the king's armies easily overran Count Hugh's territories, and defeated Henry III. of England, who had come to his aid, at Saintes. Isabella and her husband were forced to submit, and Raymond VII., count of Toulouse, yielded without resistance upon the advent of two royal armies, and accepted the peace of Lorris in January 1243. This was the last rising of the nobles in Louis's reign.

At the end of 1244, during an illness, Louis took the cross. He had already been much distressed by the plight of John of Brienne, emperor at Constantinople, and bought from him the crown of thorns, parts of the true cross, the holy lance, and the holy sponge. The Sainte Chapelle in Paris still stands as a monument to the value of these relics to the saintly king. But the quarrel between the papacy and the emperor Frederick II., in which Louis maintained a watchful neutrality — only interfering to prevent the capture of Innocent IV. at Lyons — and the difficulties of preparation, delayed the embarkation until August 1248. His defeat and capture at Mansura, in February 1250, the next four years spent in Syria in captivity, in diplomatic intrigues, and finally in raising the fortifications of Caesarea and Joppa,— these events belong to the history of the crusades (q.v.). His return to France was urgently needed, as Blanche of Castile, whom he had left as regent, had died in November 1252, and upon the removal of her strong hand feudal turbulence had begun to show itself.

This period between his first and second crusades (1254-1269) is the real age of Saint Louis in the history of France. He imposed peace between warring factions of his nobility by mere moral force, backed up by something like an awakened public

opinion. His nobles often chafed under his unrelenting justice but never dared rebel. The most famous of his settlements was the treaty of Paris, drawn up in May 1258 and ratified in December 1259, by which the claims of Henry III. of England were adjusted. Henry renounced absolutely Normandy, Anjou, Touraine, Maine and Poitou, and received, on condition of recognizing Louis as liege suzerain, all the fiefs and domains of the king of France in the dioceses of Limoges,

Cahors and Perigueux, and the expectation of Saintonge south of the Charente, and Agenais, if they should fall to the crown of France by the death of Alphonse of Poitiers. In addition, Louis promised to provide Henry with sufficient money to maintain 500 knights for two years. This treaty was very unpopular in France, since the king surrendered a large part of France that Henry had not won; but Louis was satisfied that the absolute sovereignty over the northern provinces more than equalled the loss in the south. Historians still disagree as to its wisdom. Louis made a similar compromise with the king of Aragon in the treaty of Corbeil, 1258, whereby he gave up the claims of kings of France to Roussillon and Barcelona, which went back to the conquest of Charlemagne. The king of Aragon in his turn gave up his claims to part of Provence and Languedoc, with the exception of Narbonne. Louis's position was strikingly shown in 1264 when the English barons submitted their attempt to bind Henry III. by the Provisions of Oxford to his arbitration. His reply in the " Dit " or Mise of Amiens was a flat denial of all the claims of the barons and failed to avert the civil war. Louis was more successful in preventing feuds between his own nobles: between the counts of Brittany and Champagne over the succession to Navarre; the dauphin of Vienne (Guigues VII.) and Charles of Anjou; the count of Burgundy and the count of Chalons; Henry of Luxemburg and the duke of Lorraine with the count of Bar. Upon the whole he maintained peace with his neighbours, although both Germany and England were torn with civil wars. He reluctantly consented to sanction the conquest of Naples by his brother, Charles, duke of Anjou, and it is possible that he yielded here in the belief that it was a step toward another crusade.

On the 24th of March 1267, Louis called to Paris such of his knights as were not with Charles of Anjou in Naples. No one knew why he had called them; but when the king in full assembly proclaimed his purpose of going on a second crusade, few ventured to refuse the cross. Three years of preparation followed; then on the 1 st of July 1270 they sailed from Aigues Mortes for Tunis, whither the expedition seems to have been directed by the machinations of Charles of Anjou, who, it is claimed, persuaded his brother that the key to Egypt and to Jerusalem was that part of Africa which was his own most dangerous neighbour. After seventeen days' voyage to Carthage, one month of the summer's heat and plague decimated the army, and when Charles of Anjou arrived he found that Louis himself had died of the plague on the 25th of August 1270.

Saint Louis stands in history as the ideal king of the middle ages. An accomplished knight, physically strong in spite of his ascetic practices, fearless in battle, heroic in adversity, of imperious temperament,

unyielding when sure of the justness of his cause, energetic and firm, he was indeed ” every inch a king.” Joinville says that he was taller by a head than any of his knights. His devotions would have worn out a less robust saint. He fasted much, loved sermons, regularly heard two masses a day and all the offices, dressing at midnight for matins in his chapel, and surrounded even when he travelled by priests on horseback chanting the hours. After his return from the first crusade, he wore only grey woollens in winter, dark silks in summer. He built hospitals, visited and tended the sick himself, gave charity to over a hundred beggars daily. Yet he safeguarded the royal dignity by bringing them in at the back door of the palace, and by a courtly display greater than ever before in France. His naturally cold temperament was somewhat relieved by a sense of humour, which however did not prevent his making presents of haircloth shirts to his friends. He had no favourite, nor prime minister. Louis was canonized in 1297.

38

LOUIS X.— LOUIS XL

As a statesman Louis IX. has left no distinct monument. The famous ” Etablissemenls of St Louis ” has been shown in our own day to have been private compilation. It was a coutumier drawn up before 1273, including, as well as some royal decrees, the civil and feudal law of Anjou, Maine and the Orleanais. Recent researches have also denied Louis the credit of having aided the communes. He exploited them to the full. His standpoint in this respect was distinctly feudal. He treated his clergy as he did his barons, enforcing the supremacy of royal justice, and strongly opposing the exactions of the pope until the latter part of his reign, when he joined forces with him to extort as much as possible from the clergy. At the end of the reign most of the sees and monasteries of France were in debt to the Lombard bankers. Finally, the reign of Saint Louis saw the introduction of the pontifical inquisition into France.

There are numerous portraits of St Louis, but they are unauthentic and contradictory. In 1903 M. Salomon Reinach claimed to have found in the heads sculptured in the angles of the arches of the chapel at St Germain portraits of St Louis, his brothers and sisters, and Queen Marguerite, or Blanche, made between 1235 and 1240. This conjectured portrait somewhat resembles the modern type, which is based upon a statue of Charles V. once in the church of the Celestins in Paris, and which Lenoir mistakenly identified as that of Louis IX. The king had eleven children, six sons and five daughters, among

them being his successor, Philip III., and Robert, count of Clermont, the ancestor of Henry IV.

The best contemporary accounts of Louis IX. are the famous Memoirs of the Sire Jean de Joinville (q.v.), published by N. de Wailly for the Soc. de I'Hist. de France, under the title Histoire de Saint Louis (Paris, 1868), and again with translation (1874); English translation by J. Hutton (1868). See also William of Nangis, Gesta Ludovici IX., edited by M. Bouquet in vol. xx. of the Recueil des historiens des Gaules et de la France. Of modern works may be mentioned C. V. Langlois in E. Lavisse's Histoire de France, tome iii., with references to literature; Frederick Perry, Saint Louis, the Most Christian King (New York, 1901); E. J. Davis, The Invasion of Egypt by Louis IX. of France (1898); H. A. Wallon, Saint Louis et son temps (1875) ; A. Lecoy de la Marche, Saint Louis (Tours, 1891) ; and E. Berger, Saint Louis et Innocent IV (Paris, 1893), and Histoire de Blanche de Castille (1895). See also The Court of a Saint, by Winifred F. Knox (1909). (J. T. S.*)

LOUIS X. (1289-1316), king of France and Navarre, called le Hulin or " the Quarreller," was the son of Philip IV. and of Jeanne of Navarre. He was born at Paris on the 4th of October 1289, took the title king of Navarre on the death of his mother, on the 2nd of April 1305, and succeeded Philip IV. in France on the 29th of November 1314, being crowned at Reims in August 1315. The origin of his surname is uncertain. Louis X. is a somewhat indistinct figure among the kings of France, the preponderating influence at court during his short reign being that of his uncle, Charles of Valois. The reigri began with reaction against the policy of Philip IV. Private vengeance was wreaked on Enguerrand de Marigny, who was hanged, Pierre de Latilli, bishop of Chalons and chancellor, and Raoul de Presle, advocate of the parlement, who were imprisoned. The leagues of the lesser country gentry, formed in 13 14 before the accession of Louis, continued to demand the ancient privileges of the nobility, — tourneys, private wars and judgment of nobles not by king's officers but by their peers — and to protest against the direct call by the king of their vassals to the royal army. Louis X. granted them charters in which he made apparent concessions, but used evasive formulas which in reality ceded nothing. There was a charter to the Normans, one to the Burgundians, one to the Languedocians (1315). Robert de Bethune, count of Flanders, refused to do homage, and his French fiefs were declared confiscate by a court of his peers. In August 1315 Louis X. led an army toward Lille, but the flooded Lys barred his passage, the ground was so soaked with rains that the army could not advance, and it was thrown back, without a battle, on Tournai. Need of money inspired one famous ordinance of this reign; in 1315 the serfs of the

royal domains were invited to buy their civil liberty, — an in- vitation which did not meet with great enthusiasm, as the freedman was merely freed for further exploitation, and Philip V. was obliged to renew it in 1318. Louis X. died suddenly on the 5th of June 13 16. His first wife was Margaret, daughter

of Robert II., duke of Burgundy; she was accused of adultery and died a prisoner in the chateau Gaillard. By her he had one daughter, Jeanne, wife oi Philip, count of Evreux and king of Navarre. By his second wife Clemence, daughter of Charles Martel, titular king of Hungary, he left a posthumous son, King John I.

See Ch. Dufayard, ” La reaction feodale sous les fils de Philippe le Bel,” in Revue historique (1894) ‘< P au ' Lehugeur, Histoire de Philippe le Long, roi de France (Paris, 1897); and Joseph Petit, Charles de Valois (Paris, 1900). (J. T. S.*)

LOUIS XI. (1423-1483), king of France, the son of Charles VII. and his queen, Marie of Anjou, was born on the 3rd of July 1423, at Bourges, where his father, then nicknamed the” King of Bourges,” had taken refuge from the English. At the birth of Louis XL part of France was in English hands; when he was five years old, Joan of Arc appeared; he was just six when his father was crowned at Reims. But his boyhood was spent apart from these stirring events, in the castle of Loches, where his father visited him rarely. John Gerson, the foremost theo- logian of France, wrote a manual of instructions (still extant) for the first of his tutors, Jean Majoris, a canon of Reims. His second tutor, Bernard of Armagnac, was noted for his piety and humility. If, as has been claimed, Louis owed to them any of his tendency to prefer the society of the poor, or rather of the bourgeois, to that of the nobility, their example was his best lesson in the craft of kingship. In June 1436, when scarcely thirteen, he was married to Margaret (c. 1425-1445), daughter of James I. of Scotland, a princess of about his own age, but sickly and romantic, and in every way his opposite. Three years after this unhappy marriage Louis entered upon his stormy political career. Sent by his father in 1439 to direct the defence of Languedoc against the English, and to put down the brigandage in Poitou, he was induced by the rebellious nobles to betray his trust and place himself at the head of the Praguerie (q.v.). Charles VII. pardoned him this rebellion, due to his ambition and the seductive proposal of the nobles to make him regent. The following year he was fighting- the English, and in 1443 aided his father to suppress the revolt of the count of Armagnac. His first important command, however, was in the next year, when he led an army of from 15,000 to 20,000 mercenaries and brigands, — the product of

the Hundred Years' War, — against the Swiss of the canton of Basel. The heroism of some two hundred Swiss, who for a while held thousands of the French army at bay, made a great impression on the young prince. After an ineffective siege of Basel, he made peace with the Swiss confederation, and led his robber soldiers into Alsace to ravage the country of the Habsburgs, who refused him the promised winter quarters. Meanwhile his father, making a parallel campaign in Lorraine, had assembled his first brilliant court at Nancy, and when Louis returned it was to find the king completely under the spell of Agnes Sorel. He at first made overtures to members of her party, and upon their re- jection through fear of his ambition, his deadly hatred of her and of them involved the king. The death in 1445 of his wife Margaret, who was a great favourite of Charles VII., made the rupture complete. From that year until the death of the king father and son were enemies. Louis began his rebellious career by a futile attempt to seduce the cities of Agenais into treason, and then he prepared a plot to seize the king and his minister Pierre de Br6ze. Antoine de Chabannes, who was to be the instrument of the plot, revealed it to Charles, and Louis was mildly punished by being sent off to Dauphine (1447). He never saw his father again.

Louis set out to govern his principality as though it were an independent state. He dismissed the governor; he determined advantageously to himself the boundaries between his state and the territories of the duke of Savoy and of the papacy; and he enforced his authority over perhaps the most unruly nobility in western Europe, both lay and ecclesiastical. The right of private warfare was abolished; the bishops were obliged to give up most of their temporal jurisdiction, the scope of their courts was limited, and appeals to Rome were curtailed. On

the other hand, Louis granted privileges to the towns and con- sistently used their alliance to overthrow the nobility. He watched the roads, built new ones, opened markets, protected the only bankers of the country, the Jews, and reorganized the administration so as to draw the utmost revenue possible from the prosperity thus secured. His ambition led him into foreign entanglements; he made a secret treaty with the duke of Savoy which was to give him right of way to Genoa, and made arrange- ments for a partition of the duchy of Milan. The alliance with Savoy was sealed by the marriage of Louis with Charlotte, daughter of Duke Lodovico, in 1452, in spite of the formal

prohibition of Charles VII. The king marched south, but withdrew again leaving his son unsubdued. Four years later, as Charles came to the Bourbonnais, Louis, fearing for his life, fled to Flanders to the court of Philip the Good, duke of Bur- gundy, leaving Dauphine to be definitely annexed to the crown of France. The policy of the dauphin was reversed, his ten years' work was undone. Meanwhile he was installed in the castle of Genappe, in Brabant, where he remained until the death of his father. For this he waited impatiently five years, keeping himself posted by spies of every stage of the king's last illness, and thus laying himself open to the accusation, believed in by Charles himself, that he had hastened the end by poison, a charge which modern historians deny.

On the 15th of August 1461, Louis was anointed at Reims, and Philip of Burgundy, as doyen of the peers of France, placed the crown on his head. For two months Philip acted as though the king were still his protege. But in the midst of the festivities with which he was entertaining Paris, the duke found that Louis ventured to refuse his candidates for office, and on the 24th of September the new king left abruptly for Touraine. His first act was to strike at the faithful ministers of Charles VII. Pierre de Breze and Antoine de Chabannes were captured and im- prisoned, as well as men of sterling worth like Etienne Chevalier. But the king's shrewdness triumphed before long over his venge- ance, and the more serviceable of the officers of Charles VII. were for the most part soon reinstated, Louis' advisers were mostly men of the middle class. He had a ready purse for men of talent, drawing them from England, Scotland, Italy, Spain and Portugal. Such a motley throng of competent men had never before been seen at the court of France. Their origin, their previous crimes or virtues, their avarice or brutality, were indifferent to him so long as they served him loyally. Torture and imprisonment awaited them, whether of high or low degree, if he fancied that they were betraying him. Among the most prominent of these men in addition to Breze, Chevalier and Chabannes, were Tristan Lermite, Jean de Daillon, Olivier le Dain (the barber), and after 1472, Philippe de Commines, drawn from the service of Charles the Bold of Burgundy, who became his most intimate adviser and biographer. Surrounded by men like these Louis fought the last great battle of French royalty with feudalism.

Louis XL began his reign with the same high-handed treat- ment of the nobles which had marked his rule in Dauphine, going so far as to forbid them to hunt without his permission. He forced the clergy to pay long-neglected feudal dues, and intrigued against the great houses of Anjou and Orleans in Italy. The mal- content nobles soon began to

plan revolt. Discharged officers of Charles VII. like Jean Dunois and John II. duke of Bourbon, stirred up hostility to the new men of the king, and Francis II. duke of Brittany was soon embroiled with Louis over an attempt to assert royal control over that practically independent duchy. The dissatisfied nobility found their greatest ally in Charles the Bold, afterwards duke of Burgundy, and in 1465 formed a ” league of public welfare ” and declared war on their king. The nominal head was the king’s brother Charles, duke of Berry, then eighteen years old, a weak character, the tool of the rebels as he was later the dupe of the king. Every great noble in France was in the league, except Gaston de Foix — who kept the south of France for the king, — and the counts of Vendome and Eu. The whole country seemed on the verge of anarchy. It

was saved by the refi

ja* */t .ut,

lesser gentry to rise, and by the

alliance of the king with the citizen class, which was not led astray by the pretences of regard for the public weal which cloaked the designs of the leaguers. After a successful campaign in the Bourbonnais, Louis fought an indecisive battle with the Burgundians who had marched on Paris at Montlhery, on the 16th of July 1465, and then stood a short siege in Paris. On the z3th of September he made a truce with Charles the Bold, and in October the treaties of Conflans and Saint Maur-les-Fosses, ended the war. The king yielded at all points; gave up the ” Somme towns ” in Picardy, for which he had paid 200,000 gold crowns, to Philip the Good, thus bringing the Burgun- dians close to Paris and to Normandy. Charles, the king’s brother, was given Normandy as an apanage, thus joining the territories of the rebellious duke of Brittany with those of Charles the Bold. The public weal was no longer talked about, while the kingdom was plundered both by royal tax gatherers and by unsubdued feudal lords to pay the cost of the war.

After this failure Louis set to work to repair his mistakes. The duke of Bourbon was won over by the gift of the government of the centre of France, and Dunois and Chabannes by restoring them their estates. Two months after he had granted Normandy to Charles, he took advantage of a quarrel between the duke of Brittany and his brother to take it again, sending the duke of Bourbon ” to aid ” Charles, while Dunois and Chabannes prepared for the struggle with Burgundy. The death of Duke Philip, on the 15th of June 1467, gave Charles the Bold

a free hand. He gained over Edward IV. of England, whose sister Margaret he married; but while he was celebrating the wedding Louis invaded Brittany and detached Duke Francis from alliance with him. Normandy was completely reduced. The king had won a great triumph. It was followed by his greatest mistake. Eager as he always was to try diplomacy instead of war, Louis sent a gift of 60,000 golden crowns to Charles and secured a safe conduct from him for an interview. The interview took place on the 9th of October 1468 at Peronne. News came on the nth that, instigated by the king of France, the people of Liege had massacred their bishop and the ducal governor. The news was false, but Charles, furious at such apparent duplicity, took Louis prisoner, only releasing him, three days later, on the king signing a treaty which granted Flanders freedom from interference from the parlement of Paris, and agreeing to accom- pany Charles to the siege of his own ally, Liege. Louis made light of the whole incident in his letters, but it marked the greatest humiliation of his life, and he was only too glad to find a scapegoat in Cardinal Jean Balue, who was accused of having plotted the treason of Peronne. Balue thereupon joined Guillaume de Harancourt, bishop of Verdun, in an intrigue to induce Charles of France to demand Champagne and Brie in accordance with the king's promise to Charles the Bold, instead of distant Guienne where the king was determined to place him. The discovery of this conspiracy placed these two high dignitaries in prison (April 1469). Balue (q.v.) spent eleven years in prison quarters, com- fortable enough, in spite of the legend to the contrary, while Harancourt was shut up in an iron cage until 1482. Then Louis, inducing his brother to accept Guienne, — where, surrounded by faithful royal officers, he was harmless for the time being, — under- took to play off the Lancastrians against Edward IV. who, as the ally of Charles the Bold, was menacing the coast of Normandy. Warwick, the king-maker, and Queen Margaret were aided in the expedition which in 1470 again placed Henry VI. upon the English throne. In the autumn Louis himself took the offensive, and royal troops overran Picardy and the Maconnais to Burgundy itself. But the tide turned against Louis in 1471. While Edward IV. won back England by the battles of Barnet and Tewkesbury, Charles the Bold besieged Amiens, and Louis was glad to make a truce, availing himself of the double dealing of the constable, the count of Saint Pol, who, trying to win an independent position for himself in Picardy, refused his aid to Charles unless he would definitely join the French nobility in another rising against the king. This rising was to be aided by the invasion of France by John II. of Aragon, Yolande, duchess of Savoy, and Edward IV.

of England, who was to be given the old Plantagenet inheritance. The country was saved a desperate civil war by the death of the king's brother, Charles, the nominal head of the coalition, on the 24th of May 1472. Louis' joy on receiving news of this death knew no bounds. Charles the Bold, who had again invaded France, failed to take Beauvais, and was obliged to make a lasting truce. His projects were henceforth to be directed towards Germany. Louis then forced the duke of Brittany to make peace, and turned against John V. count of Armagnac, whose death at the opening of March 1473 ended the power of one of the most dangerous houses of the south. The first period of Louis' reign was closed, and with it closed for ever the danger of dismemberment of France. John of Aragon continued the war in Roussillon and Cerdagne, which Louis had seized ten years before, and a most desperate rising of the inhabitants protracted the struggle for two years. After the capture of Perpignan on the 10th of March 1475, tne w i se ar »d temperate government of Imbert de Batarnay and Boffile de Juge slowly pacified the new provinces. The death of Gaston IV. count of Foix in 1472 opened up the long diplomatic struggle for Navarre, which was destined to pass to the loyal family of Albret shortly after the death of Louis. His policy had won the line of the Pyrenees for France.

The overthrow of Charles the Bold was the second great task of Louis XL This he accomplished by a policy much like that of Pitt against Napoleon. Louis was the soul of all hostile coalitions, especially urging on the Swiss and Sigismund of Austria, who ruled Tirol and Alsace. Charles's ally, Edward IV., invaded France in June 1475, but Louis bought him off on the 29th of August at Picquigny — where the two sovereigns met on a bridge ever the Somme, with a strong grille between them, Edward receiving 7S,ooo crowns, and a promise of a pension of 50,000 crowns annually. The dauphin Charles was to marry Edward's daughter. Bribery of the English ministers was not spared, and in September the invaders recrossed to England. The count of Saint Pol, who had continued to play his double part, was surrendered by Charles to Louis, and executed, as was also Jacques d'Armagnac, duke of Nemours. With his vassals terrorized and subdued, Louis continued to subsidize the Swiss and Ren6 II. of Lorraine in their war upon Charles. The defeat and death of the duke of Burgundy at Nancy on the 5th of January 1477 was the crowning triumph of Louis' diplomacy. But in his eagerness to seize the whole inheritance of his rival, Louis drove his daughter and heiress, Mary of Burgundy, into marriage with Maximilian of Austria (afterwards the emperor Maximilian I.), who successfully defended Flanders after a savage raid

by Antoine de Chabannes. The battle of Guinegate on the 7th of August 1479 was indecisive, and definite peace was not established until after the death of Mary, when by the treaty of Arras (1482) Louis received Picardy, Artois and the Boulonnais, as well as the duchy of Burgundy and Franche Comt6. The Austrians were left in Flanders, a menace and a danger. Louis failed here and in Spain; this failure being an indirect cause of that vast family compact which surrounded France later with the empire of Charles V. His interference in Spain had made both John II. of Aragon and Henry IV. of Castile his enemies, and so he was unable to prevent the marriage of their heirs, Ferdinand and Isabella. But the results of these marriages could not be foreseen, and the unification of France proved of more value than the possession of so wide-spread an empire. This unification was completed (except for Brittany) and the frontiers enlarged by the acquisition, upon the death of Ren6 of Anjou in 1480, of the duchies of Anjou and Bar, and in 1481 of Maine and Provence upon the death of Charles II., count of Maine. Of the inheritance of the house of Anjou only Lorraine escaped the king.

Failure in Spain was compensated for in Italy. Without waging war Louis made himself virtual arbiter of the fate of the principalities in the north, and his court was always besieged by ambassadors from them. After the death of Charles the Bold, Yolande, duchess of Savoy, was obliged to accept the control of Louis, who was her brother. In Milan he helped to

place Lodovico il Moro in power in 1479, but he reaped less from this supple tyrant than he had expected. Pope Sixtus IV. the enemy of the Medici, was also the enemy of the king of France. Louis, who at the opening of his reign had denounced the Pragmatic Sanction of 1438, had played fast and loose with the papacy. When Sixtus threatened Florence after the Pazzi conspiracy, 1478, Louis aided Lorenzo dei Medici to form ap alliance with Naples, which forced the papacy to come to terms. More than any other king of France, Louis XL was a ” bourgeois king.” The upper bourgeois, the aristocracy of his ” good cities,” were his allies both against the nobles and against the artisan class, whenever they revolted, driven to desperation by the oppressive royal taxes which furnished the money for his wars or diplomacy. He ruled like a modern capitalist; placed his bribes like investments in the courts of his enemies; and, while draining the land of enormous sums, was pitiless toward the two productive portions of his realm, the country population and the artisans. His heartlessness toward the former provoked even an accomplice like Commines to protest. The latter were kept down by numerous edicts, tending to restrict to certain privileged families the rank of master workman in the gilds.

There was the paternalism of a Frederick the Great in his encouragement of the silk industry, — ” which all idle people ought to be made to work at,” — in his encourage- ment of commerce through the newly acquired port of Marseilles and the opening up of market placed. He even dreamed of a great trading company ” of two hundred thousand livres or more,” to monopolize the trade of the Mediterranean, and planned to unify the various systems of weights and measures. In 1479 he called a meeting of two burgesses from each ” good city ” of his realm to consider means for preventing the influx of foreign coin. Impatient of all restraint upon his personal rule, he was continually in violent dispute with the parlement of Paris, and made ” justice ” another name for arbitrary govern- ment; yet he dreamed of a unification of the local customary laws (coiitumes) of France. He was the perfect model of a tyrant. The states-general met but once in his reign, in 1468, and then no talk of grievances was allowed; his object was only to get them to declare Normandy inalienable from the crown. They were informed that the king could raise his revenue without consulting them. Yet his budgets were enormously greater than ever before. In 1481 the tattle alone brought in 4,600,000 livres, and even at the peaceful close of his reign his whole budget was 4,655,000 livres— as against 1,800,000 livres at the close of his father’s reign.

The king who did most for French royalty would have made a sorry figure at the court of a Louis XIV. He was ungainly, with rickety legs. His eyes were keen and piercing, but a long hooked nose lent grotesqueness to a face marked with cunning rather than with dignity. Its ugliness was emphasized by the old felt hat which he wore, — its sole ornament the leaden figure of a saint. Until the close of his life, when he tried to mislead ambassadors as to the state of his health by gorgeous robes, he wore the meanest clothes. Dressed in grey like a pilgrim, and accompanied by five or six trustworthy servants, he would set out on his interminable travels, ” ambling along on a good mule.” Thus he traversed France, avoiding all ceremony, entering towns by back streets, receiving ambassadors in way- side huts, dining in public houses, enjoying the loose manners and language of his associates, and incidentally learning at first hand the condition of his people and the possibilities of using or taxing them— his needs of them rather than theirs of him. He loved to win men, especially those of the middle class, by affability and familiarity, employing all his arts to cajole and seduce those whom he needed. Yet his honied words easily turned to gall. He talked rapidly and much, sometimes for hours at a time, and most indiscreetly. He was not an agreeable companion, violent in his passions, nervous, restless, and in old age extremely

irascible. Utterly unscrupulous, and without a trace of pity, he treated men like pawns, and was content only with absolute obedience. But this Machiavellian prince was the genuine son of St Louis.

His religiosity was genuine if degenerate. He lavished presents on influential saints, built shrines, sent gifts to churches, went on frequent pilgrimages and spent much time in prayer — employ- ing his consummate diplomacy to win celestial allies, and rewarding them richly when their aid secured him any advantage. St Martin of Tours received 1200 crowns after the capture of Perpignan. He tried to bribe the saints of his enemies, as he did their ministers. An unfaltering faith taught him the value of religion — as a branch of politics. Finally, more in the spirit of orthodoxy, he used the same arts to make sure of heaven. When the ring of St Zanobius and the blood of Cape Verde turtles gave him no relief from his last illness, he showered gifts upon his patron saints, secured for his own benefit the masses of his clergy, and the most potent prayers in Christendom, those of the two most effective saints of his day, Bernardin of Doulins and Francis of Paolo.

During the last two or three years of his life Louis lived in great isolation, ” seeing no one, speaking with no one, except such as he commanded,” in the chateau of Plessis-les-Tours, that ” spider’s nest ” bristling with watch towers, and guarded only by the most trusty servitors. A swarm of astrologers and physicians preyed upon his fears — and his purse. But, however foolish in his credulity, he still made his strong hand felt both in France and in Italy, remaining to the last ” the terrible king.” His fervent prayers were interrupted by instructions for the regency which was to follow. He died on the 30th of August 1483, and was buried, according to his own wish, without royal state, in the church at Clery, instead of at St Denis. He left a son, his successor, Charles VIII., and two daughters.

See the admirable resume’ by Charles Petit-Dutaillis in Lavisse’s Histoire de France, tome iv. pt. ii. (1902), and bibliographical indi- cations given there. Michelet’s wonderful depiction ia his Histoire de France (livres 13 to 17) has never been surpassed for graphic word- painting, but it is inaccurate in details, and superseded in scholarship. Of the original sources for the reign the Letlres de Louis XI. (edited by Charavay and Vaesen, 8 vols., 1883-1902), the celebrated Memoires of Philippe de Commines and the Journal of Jean de Royl naturally come first. The great mass of literature on the period is analysed in masterly

fashion by A. Molinier, Sources de I'histoire de France (tome v. pp. 1-146), and to this exhaustive bibliography the reader is referred for further research. See also C. Hare, The Life of Louis XI. (London, 1907). (J. T. S.*)

LOUIS XII. (1462-1515), king of France, was grandson of Louis of Orleans, the brother of Charles VI., and son of the poet prince, Charles of Orleans, who, after the battle of Agin- court, spent twenty-five years of captivity in England. Louis was duke of Orleans until his accession to the throne, and he was fourteen years old when Louis XI. gave him the hand of his second daughter, Joan the Lame. In the first years of the reign of Charles VIII. , Louis made a determined stand against the government of the Beaujeus, stirred up coalitions of the feudal nobles against them, and was finally defeated and taken prisoner at St Aubin du Cormier in 1488. Charles VIII. set him at liberty in 1491. These successive checks tamed him a little. In the Italian expedition of 1494 he commanded the vanguard of the royal army, occupied Genoa, and remained in the north of Italy, menacing Milan, on which he was already dreaming of asserting his rights. The children of Charles VIII. having died in infancy, he became heir-presumptive to the throne, and succeeded Charles in 1499. Louis was then thirty-six years old, but he seems to have grown old prematurely. He was fragile, narrow-shouldered and of a sickly constitution. His intelligence was mediocre, his character weak, and he allowed himself to be dominated by his wife, Anne of Brittany, and his favourite the Cardinal d'Amboise. He was a good king, full of moderation and humanity, and bent upon maintaining order and improving the administration of justice. He enjoyed a genuine popularity, and in 1506 the estates of Tours conferred on him trie surname of Pere du Peuple. His foreign policy, which was directed wholly towards Italy, was for the most part unskilful; to his claims on Naples he added those on Milan, which he based on the marriage of his grandfather, Louis of Orleans, with Valentina Visconti. He led in person several armies into Italy, and proved as severe and pitiless towards

his enemies as he was gentle and clement towards his subjects. Louis had two daughters. After his accession he had divorced his virtuous and ill-favoured queen, Joan, and had married, in 1499, Anne of Brittany, the widow of Charles VIII. On her death in January 15 14, in order to detach England from the alliance against him, he married on the 9th of October 15 14, Mary Tudor, sister of Henry VIII. of England (see Mary, queen of France). He died on the 1st of January 1515.

For a bibliography of the printed sources see Henri Hauser, Les Sources de I'histoire de France, XVI" siecle, vol. 1. (Paris, 1906). The

principal secondary authorities are De Maulde, Histoire de Louis XII. (Paris, 1889-1893); Le Roux de Lincy, Vie de la reine Anne de Bretagne (Paris, i860); H. Lemonnier, Les Guerres d'ltalie (Paris, 1903) in the Histoire de France by E. Lavisse. (J. I.)

LOUIS XIII. (1601-1643), king of France, was the son of Henry IV. and of Marie de' Medici. He became king on his father's assassination in 1610; but his mother at once seized the full powers of regent. She determined to reverse the policy of her husband and to bring France into alliance with Spain and the Austrian house, upon which power Henry had been meditating an attack at the time of his death. Two marriages were designed to cement this alliance. Louis was to marry Anne of Austria, daughter of the Spanish king, Philip III., and the Spanish prince, afterwards Philip IV., himself was to marry the Princess Elizabeth, the king's sister. Notwith- standing the opposition of the Protestants and nobles of France, the queen carried through her purpose and the marriages were concluded in 16 15. The next years were full of civil war and political intrigue, during which the queen relied upon the Marshal d'Ancre. Louis XIII. was a backward boy, and his education had been much neglected. We have the fullest details of his private life, and yet his character remains some- thing of a mystery. He was fond of field sports and seemed to acquiesce in his mother's occupation of power and in the rule of her favourites. But throughout his life he concealed his purposes even from his closest friends; sometimes it seems as if he were hardly conscious of them himself. In 161 7 he was much attached to Charles d'Albert, sieur de Luynes; and with his help he arrested Marshal d'Ancre, and on his resistance had him assassinated. From this time to her death the relation between the king and his mother was one of concealed or open hostility. The article on France must be consulted for the intricate events of the following years.

The decisive incident for his private life as well as for his reign was the entrance of Cardinal Richelieu, hitherto the queen's chief adviser, into the king's council in 1624. Hence- forth the policy of France was directed by Richelieu, who took up in its main features the system of Protestant alliances and opposition to the power of Austria and Spain, which had been begun by Henry IV. and had been interrupted by the queen- mother during the regency; while he asserted the power of the crown against all rivals at home. This policy had remarkable results for the king's private life. It not only brought him into unremitting conflict with the Protestants and the nobles of France, but also made him the enemy of his mother, of his brother Gaston of Orleans, who made himself the champion of the cause of the nobles, and sometimes even of his wife. It is not easy to define his relations to Richelieu. He

was convinced of his loyalty and of his genius, and in the end always supported his policy. But he disliked the friction with his family circle which this policy produced. In the difficulty with which he expressed himself and in a certain indecision of character the king was curiously unlike his father, the frank and impetuous Henry of Navarre, and his absolute son Louis XIV. He took a great interest in all the externals of war. He was present, and is said to have played an important part at the passage of Susa in 1629, and also eagerly participated in the siege of Rochelle, which surrendered in the same year. But for the most part his share in the great events of the reign was a passive one. The one all-important fact was that he supported his great minister. There were certain occasions when it seemed as if that support would be denied. The chief of these was what is known as the

” Day of Dupes ” (1630). Then the queen-mother and the king’s

brother passionately attacked the minister, and for a moment it was believed that Richelieu was dismissed and that the queen- mother and a Spanish policy had triumphed. But the sequel only strengthened the power of the minister. He regained his ascendancy over the king, punished his enemies and forced Marie de’ Medici and Gaston of Orleans to sue for pardon. In 1 63 1 Gaston fled to Lorraine and the queen-mother to Brussels. Gaston soon returned, to plot, to fail and to sue for pardon again and again; but Marie de’Medici ended her life in exile.

Richelieu’s position was much strengthened by these incidents, but to the end of life he had to struggle against conspiracies which were designed to deprive him of the king’s support, and usually Gaston of Orleans had some share in these movements. In 1632 the duke of Montmorency’s conspiracy brought its leader to the scaffold. But tht last great effort to overthrow Richelieu was closely connected with the king. Louis XIII. had from the beginning of his reign had favourites — young men for the most part with whom he lived freely and intimately and spoke of public affairs lightly and unreservedly; and who in consequence often exaggerated their influence over him. Henri d’Effiat, marquis de Cinq-Mars, was the last of these favourites. The king is said to have allowed him to speak hostilely of Richelieu and even to recall the assassination of Marshal d’Ancre. Cinq-Mars believed himself secure of the king’s favour. He entered into negotiations with Spain and was secretly supported by Gaston of

Orleans. But Richelieu discovered his treasonous relations with Spain and by this, means defeated his plot. Louis was reconciled to his minister. ” We have lived too long together to be separated ” he is reported to have said (September 1642). Yet when Richelieu died in December of the same year he allowed himself to speak of him in a jealous and satirical tone. He died himself a few months later (May 1643).

His nature was timid, lethargic and melancholy, and his court was not marked by the scandals which had been seen under Henry IV. Yet Mademoiselle de la Fayette and Madame d’Hautefort and others are said to have been his mistresses. His brother Gaston survived him, but gave unexpectedly little trouble during the wars of the Fronde which ensued on the death of Louis XIII.

The chief source of information on Louis XIII. ‘s life is to be found in the contemporary memoirs, of which the chief are : Bassompierre, Fontenay-Mareuil, Gaston d’Orleans, Montresor, Omer Talon. Richelieu’s own Memoirs are chiefly concerned with politics and diplomacy. Of modern works those most directly bearing on the king’s personal life are R. de Beauchamp, Louis XIII. d apres sa correspondance avec le cardinal de Richelieu; G. Hanotaux, Histoire du cardinal de Richelieu (1893-1896); Rossignol, Louis XIII. avant Richelieu; M. Topin, Louis XIII. et Richelieu (1876). See too Professor R. Lodge, Richelieu; J. B. H. R. Capefigue, Richelieu, Mazarin et la Fronde (1835-1836); and Dr J. H. Bridges, Richelieu, Mazarin and Colbert (1866).

For full bibliography see G. Monod, Bibliographic de Vhistoire de France; Cambridge Modern History, vol. iv. (” The Thirty Years’ War “); Lavisse et Rambaud, Histoire generate, vol. v. (” Guerres de religion “). (A. J. G.*)

LOUIS XIV. (1638-1715), king of France, was born at Saint- Germain-en-Laye on the 5th of September 1638. His father, Louis XIII., had married Anne of Austria, daughter of Philip III., king of Spain, in 1615, but for twenty years the marriage had remained without issue. The childlessness of the king was a constant threat to the policy of his great minister Richelieu; for the king’s brother and heir, Gaston of Orleans, was a deter- mined opponent of that policy. The birth of the prince who was destined to reign as Louis XIV. was therefore hailed as a triumph, not less important than any of those won by diplomacy or arms. The death of his father made Louis XIV. king on the 14th of May 1643, but he had to wait sixteen years before he began to rule. Power lay for some time in the hands of the queen-mother and in those of

her minister, Cardinal Mazarin, who found it difficult to maintain the power of the throne and the integrity of French territory during the domestic troubles of the Fronde and the last stages of the Thirty Year's War. The minister was hated as a foreigner, and the childhood of the king

weakened the royal authority. Twice the court had to flee' from Paris; once when there was a rumour of intended flight the populace was admitted to see the king in his bed. The memory of these humiliations played their part in developing later the autocratic ideas of Louis. Mazarin, in spite of all disadvantages, triumphed alike over his domestic and his foreign opponents. The Fronde was at an end by 1653; the pea'ce of Westphalia (1648) and the peace of the Pyrenees (1659) marked the success of the arms and of the diplomacy of France. Louis XIV. was now twenty-one years of age and was anxious to rule as well as to reign. The peace of the Pyrenees was a decisive event in his personal history as well : as in that of France, for one of its most important stipulations referred to his marriage. He had already been strongly attracted to one of the nieces of Mazarin, but reasons of state triumphed over personal impulse; and it was agreed that the new friendship with Spain should be cemented by the marriage of Louis to his cousin, the Infanta Maria Theresa. A large dowry was stipulated for; and in consideration of this the king promised to forgo all claims that his wife might otherwise possess to the Spanish crown or any part of its territories. The dowry was never paid, and the king held himself free of his promise.

The marriage took place at once, and the king entered Paris in triumph in 1660. Mazarin died in the next year; but so strong was the feeling that the kings of France could only rule through a first minister that it was generally expected that Mazarin would soon have a successor. The king, however, at once announced his intention of being his own first minister; and from this resolution he never swerved. Whatever great qualities he may have lacked he certainly possessed industry and patience in the highest degree. He built up a thoroughly personal system of government, and presided constantly over the council and many of its committees. He was fond of gaiety and of sport; but' neither ever turned him away from the punctual and laborious discharge of his royal duties. Even the greatest of his ministers found themselves controlled by the king. Fouquet, the finance minister, had accumulated enormous wealth during the late disturbances, and seemed to possess power and ambition too great for a subject. Louis XIV. found it necessary almost to conspire against him; he was overthrown and condemned to perpetual imprisonment. Those who had most of the king's confidence afterwards were Colbert

for home affairs; Lionne for diplomacy; Louvois for war; but as his reign proceeded he became more self-confident and more intolerant of independence of judgment in his ministers.

His court was from the first one of great brilliance. In art and in literature, the great period, which is usually called by the king's name, had in some respects passed its zenith when he began to reign. But France was unquestionably the first state in Europe both in arms and arts, and within France the authority of the king was practically undisputed. The nation, proud of its pre-eminence and weary of civil war, saw in the king its true representative and the guarantee of its unity and success. Louis was singularly well fitted by his physical and intellectual gifts for the role of Grand Monarque and he played it to perfection. His wife Maria Theresa bore him children but there was no community of tastes between them, and the chief influence at court is to be found not in the queen but in the succession of avowed mistresses. Mademoiselle de la Valliere held the position from 1662 to 1670; she was then ousted by Madame de Montespan, who had fiercely intrigued for it, and whose proud and ambitious temper offered a great contrast to her rival. She held her position from 1670 to 1679 and then gave place to the still more famous Madame de Maintenon, who ruled, however, not as mistress but as wife. The events that brought about this incident form the strangest episode in the king's private life. Madame de Maintenon was the widow of the dramatist Scarron, and first came into relationship with the king as governess to his illegitimate children. She was a woman of unstained life and strongly religious temperament; and it was by this that she gained so great an influence over the king. Through her influence the king was reconciled to his wife, and, when Maria Theresa-

died in 1683, Madame de Maintenon shortly afterwards (in 1684) became the king's wife, though this was never officially declared. Under her influence the court lost most of its gaiety, and religion came to exercise much control over the life and the policy of the king.

The first years of the king's rule were marked by the great schemes of Colbert for the financial, commercial, industrial and naval reorganization of France, and in these schemes Louis took a deep interest. But in 1667 began the long series of wars, which lasted with little real intermission to the end of the reign (see France). In the steps that led to these wars and in their conduct the egotistic ambition and

the vanity of the king played an important part; though he never showed real military skill and took no share in any military operations except in certain sieges. The War of Devolution (cr the Queen's War) in 1667-68 to enforce the queen's claim to certain districts in the Spanish Netherlands, led to the Dutch War (1672-78), and in both these wars the supremacy of the French armies was clearly apparent. The next decade (1678-1688) was the real turning-point in the history of the reign, and the strength of France was seriously diminished. The chief cause of this is to be found in the revoca- tion of the Edict of Nantes. The church had always opposed this settlement and had succeeded in altering it in many points. Now the new religious zeal and the autocratic temper of Louis XIV. came to the support of the church. The French Huguenots found their privileges decreased, and then, in 1685, the edict was altogether withdrawn. The results were ruinous to France. It was not only that she lost many thousands of her best citizens, but this blow against Protestantism deprived her of those Protestant alliances in Europe which had been in the past her great diplomatic support. Then the English Revolution came in 1688 and changed England from a wavering ally into the most determined of the enemies of France.

The war with the Grand Alliance, of which King William III. was the heart and soul, lasted from 1688 to 1697; and the treaty of Ryswick, which brought it to an end, deprived France of certain territories on her frontier. But Louis saw in the Spanish question a chance of more than making up for this loss. The Spanish king Charles II. was dying, and the future of the possessions of Spain was doubtful. The astute diplomacy of Louis succeeded in winning the inheritance for his grandson Philip. But this involved France and Europe in an immense war (1700) and by the peace of Utrecht (1713), though the French prince retained the Spanish crown, France had again to make concessions of territory.

Louis XIV. had shown wonderful tenacity of purpose during this disastrous war, and sometimes a nobler and more national spirit than during the years of his triumphs. But the condition of France was terrible. She was burdened with debt; the reforms of Colbert were ruined; and opposition to the king's regime began to make itself felt. Peace brought some relief to France, but the last years of the king's life were gloomy in the extreme. His numerous descendants seemed at ■ one time to place the succession beyong all difficulty. But his eldest son, the dauphin, died in April 17.11; his eldest grandson the duke of Burgundy in February 17 12; and his great-grandson the duke of Brittany in March 1712. The heir to the throne was now the duke of Burgundy's son, the duke of Anjou, afterwards Louis XV. The king

died on the 1st of September 1715, after the longest recorded reign in European history. The judgment, of posterity has not repeated the flattering verdict of his contemporaries; but he remains the model of a great king in all that concerns the externals of kingship.

The reign of Louis XIV. fs particularly rich in memoirs describing the life of the court. The chief are Madame de Motteville's memoirs for the period of the Fronde, and the letters cf Madame de Sevigne' and the memoirs of Saint-Simon for the later period. The king's ideas are best seen in the Memoir es de Louis XIV. pour I 'instruction du dauphin (edited by Dreyss, 2 vols.). His private life is revealed in the letters of Madame de Maintenon and in those of Madame, Duchesse d'Orleans. Of the ordinary historians of France Michelet is fullest on the private life of the king. Mention may also be made of Voltaire, Steele de Louis XIV. ; P. Clement, Histoire de la vie et de V administration de Colbert; Sainte-Beuve, Causeries de lundi. Full

bibliographies of the reign will be found in G. Monod's pibliographie de I' histoire de France; vol. v. (" The Age of Louis XIV.") of the Cambridge Modern History; and vol. vi. ("Louis XIV.") of the Histoire generate of Lavisse and Rambaud. (A. J. G.*)

LOUIS XV. (1710-1774), king of France, was the great-grand- son of Louis XIV. and the third son of Louis, duke of Burgundy, and Marie Adelaide, princess of Savoy. The first son had died in 1705, and in 1712 the second son, the duke of Brittany, as well as his father and mother, was carried off by a mysterious disease. Louis was thus unexpectedly brought into the line of the succession, and was only five years old when Louis XIV. died. The dead king had endeavoured by his will to control the administration even after his death by a carefully selected council of regency, in which the duke of Orleans should have only the nominal presidency; but with the help of the parlement of Paris the arrangement was at once set aside, and the duke was declared regent with full traditional powers. The duke had capacity, but his life was so licentious that what influence he had upon the king was for evil. Fleury, bishop of Frejus, was appointed his tutor, and the little king was sincerely attached to him. The king attained his legal majority at the age of thirteen, shortly before the death of the duke of Orleans. His first minister was the incapable duke of Bourbon, who in 1725 procured the repudiation of the Spanish princess, to whom the king had been betrothed, and his marriage to Maria Leszczynska, daughter of the exiled king of Poland, then resident in Alsace. In 1726 the duke of Bourbon was displaced by the king's tutor, Bishop (afterwards Cardinal) Fleury, who exercised almost absolute power, for the king took little interest in affairs of

state. His administration was successful and peaceful until the year 1734, when a disputed succession in Poland brought about the interference of France on behalf of the queen's father. France was unsuccessful in her immediate object, but at the peace of Vienna (1735) secured the possession of Lorraine. Up to this point the reign had been prosperous; but from this time on it is a record of declining national strength, which was not compensated by some days of military glory. Fleury's great age (he died still in office at the age of ninety) prevented him from really controlling the policy of France and of Europe. In 1740 the war of the Austrian Succession broke out and France drifted into it as an ally of Frederick of Prussia and the enemy of England, and of Maria Theresa of Austria. ˆ On Fleury's death in 1743 no one took his place, and the ■fing professed to adopt the example of Louis XIV. and to establish a personal autocracy. But he was not strong enough in will or intellect to give unity to the administration. The marquis d'Argenson writes that at the council table Louis " opened his mouth, said little and thought not at all," and again that " under the appearance of personal monarchy it was really anarchy that reigned." He had followed too in his domestic life the example of his predecessors. The queen for some time seems to have secured his affections, and she bore him seven children. But soon we hear of the royal mistresses. The first to acquire notoriety was the duchess of Chateauroux, the third sister of one family who held this position. She was at least in part the cause of the only moment of popularity which the king enjoyed. She urged him to take part personally in the war. France had just received a humiliating check at Dettingen, and the invasion of the north-eastern frontier was feared. The king went to Metz in 1744, and his presence there did something to ward off the danger. While the nation felt genuine gratitude for his energy and its success, he was reported to have fallen dangerously ill. The king, of whom it was said that the fear of hell was the only part of religion which had any reality for him, now dismissed the duchess of Chateauroux and promised amendment. Prayers were offered everywhere for his recovery, and the country was swept by a delirium of loyal enthusiasm, which conferred on him the title of Louis le Men aimi. But his future life disappointed all these hopes. The duchess of Chateauroux died in the same year, but her place was taken in 1745 by Madame de Pompadour. This woman had philanthropic impulses and some real interest in art and

letters; but her influence on public affairs was a fatal one. , She had

many rivals during her lifetime and on her death in 1764 she was succeeded by Madame du Barry (q.v.). But the mention of these three women gives no idea of the degradation of the king's life. There has doubtless been exaggeration as to certain details, and the story of his seraglio at the Pare aux cerfs is largely apocryphal. But it would be difficult to mention the name of any European king whose private life shows such a record of vulgar vice unredeemed by higher aims of any kind. He was not without ambition, but without sufficient tenacity of purpose to come near to realizing it. To the last he main- tained the pretence of personal rule, but the machinery of government fell out of gear, and the disorder of the finances was never remedied before the revolution of 1789.

The peace of Aix-la-Chapelle (1748), which ended the war of the Austrian Succession, brought no gains to France in spite of her victories at Fontenoy and Raucoux; and the king was blamed for the diplomatic failure. The interval between this war and the Seven Years' War (1756) saw that great reversal of alliances which is sometimes called the " Diplomatic Revolu- tion"; whereby France repudiated the alliance of Frederick the Great and joined hands with her old enemy Austria. The intrigues of Madame de Pompadour played in this change an important though not a decisive part. It was the cause of immense disasters to France; for after a promising beginning, both by land and sea, France suffered reverses which lost her both India and Canada and deprived her of the leading position which she had so long held in Europe. Her humiliation was declared by the peace of Paris (1763).

The article on the history of France (q.v.) shows how there arose during the last years of Louis XV. 's reign a strong reaction against the monarchy and its methods. Military success had given it its strength; and its prestige was ruined by military failure. In the parlements, provincial and Parisian; in religion and in literature, a note of opposition is struck which was never to die until the monarchy was overthrown. France annexed Corsica in 1768, but this was felt to be the work of the minister Chauvelin, and reflected no credit on the king. He died in 1774 of smallpox. If the reign of his predecessor shows us almost the ideal of personal monarchy we may see in that of Louis XV. all the vices and errors exemplified which lie in wait for absolute hereditary rule which has survived the period of its usefulness, *

For the king's life generally see the memoirs of Saint-Simon, d'Argenson, Villars and Barbier, and for the details of his private life E. Boutaric, Correspondance secrete de Louis XV. \ Madame de Pompadour's Correspondance published by P. Malassi; Dietric, Les

Mattresses de Louis XV. ; and Fleury, Louis XV. intimes et les petites mattresses (1909).

For the system of secret diplomacy and organized espionage, known as the Secret du roi, carried on under the auspices of Louis XV., see Albert due de Broglie, Le Secret du roi. Correspondance secrete de Louis XV. avec ses agents diplomatiques 17 52-1774 (Paris, 1878) ; and for a general account of the reign, H. Carr6, La France sous Louis XV. (Paris, 1891). For other works, general and special, see G. Monod, Bibliographic de la France, and the bibliography in the Histoire generate of Lavisse and Rambaud, vol. vii., and the Cambridge Modern History, vol. vi. (A. J. G.*)

LOUIS XVI. (1754-1793), king of France, was the son of Louis, dauphin of France, the son of Louis XV., and of Marie Joseph of Saxony, and was born at Versailles on the 23rd of August 1754, being baptized as Louis Augustus. His father's death in 1765 made him heir to the throne, and in 1770 he was married to Marie Antoinette, daughter of the empress Maria Theresa. He was just twenty years old when the death of Louis XV. on the 10th of May 1774 placed him on the throne. He began his reign under good auspices, with Turgot, the greatest living French statesman, in charge of the disorganized finances; but in less than two years he had yielded to the demand of the vested interests attacked by Turgot's reforms, and dismissed him. Turgot's successor, Necker, however, continued the r6gime of reform until 1 781, and it was only with Necker's dismissal that the period of reaction began. Marie Antoinette then obtained that ascendancy over her husband which was partly responsible for

the extravagance of the ministry of Calonne, and brought on the Revolution by the resulting financial embarrassment. 1 The third part of his reign began with the meeting of the states- general on the 4th of May 1789, which marked the opening ol the Revolution. The revolt of Paris and the taking of the Bastille on the 14th of July were its results. The suspicion, not without justification, of a second attempt at a coup d'Stat led on the 6th of October to the " capture " of the king and royal family at Versailles by a mob from Paris, and their transference to the Tuileries. In spite of the growing radicalism of the clubs, however, loyalty to the king remained surprisingly strong. When he swore to maintain the constitution, then in progress of construction, at the festival of the federation on the 14th of July 1790, he was at the height of his popularity. Even his attempted flight on the 20th of June 1791 did not entirely turn the nation against him, although he left documents which proved his opposition to the whole Revolution. Arrested at Varennes, and brought back to Paris, he was maintained as

a constitutional king, and took his oath on the 13th of September 1791. But already a party was forming in Paris which demanded his deposition. This first became noticeable in connexion with the affair of the Champ de Mars on the 17th of July 1791. Crushed for a time the party gained strength through the winter of 1 791-1792. The declaration of war against the emperor Francis II., nephew of Marie Antoinette, was forced upon the king by those who wished to discredit him by failure, or to compel him to declare himself openly an enemy to the Revolution. Their policy proved effec- tive. The failure of the war, which intensified popular hatred of the Austrian queen, involved the king; and the invasion of the Tuileries on the 20th of June 1792 was but the prelude to the conspiracy which resulted, on the 10th of August, in the capture of the palace and the ” suspension ” of royalty by the Legislative Assembly until the convocation of a national convention in September. On the 21st of September 1792 the Convention declared royalty abolished, and in January it tried the king for his treason against the nation, and condemned him to death. He was executed on the 21st of January 1793.

Louis XVI. was weak in character and mentally dull. His courage and dignity during his trial and on the scaffold has left him a better reputation than he deserves. His diary shows how little he understood, or cared for, the business of a king. Days on which he had not shot anything at the hunt were blank days for him. The entry on the 14th of July 1789 was ” nothing “! The greater part of his time was spent hunting. He also amused himself making locks, and a little at masonry. Awkward and uncourtly, at heart shy, he was but a poor figure- head for the stately court of France. At first he did not care for Marie Antoinette, but after he came under her influence, her thoughtless conduct compromised him, and it was largely she who encouraged him in underhand opposition to the Revolution while he pretended to accept it. The only point on which he had of his own initiative shown a strong objec- tion to revolutionary measures was in the matter of the civil constitution of the clergy. A devoted and sincere Roman Catholic, he refused at first to sanction a constitution for the church in France without the pope’s approval, and after he had been compelled to allow the constitution to become law he resolved to oppose the Revolution definitely by intrigues. His policy was both feeble and false. He was singularly un- fortunate even when he gave in, delaying his acquiescence until it had the air of a surrender. It is often said that Louis XVI. was the victim of the faults of his predecessors. He was also the victim of his own.

Having lost his elder son in 1789 Louis left two children, Louis Charles, usually known as Louis XVII., and Marie Th6rese Charlotte

(1778-1851), who married her cousin, Louis, duke of Angouleme, son of Charles X., in 1799. The ” orphan of the Temple,” as the princess was called, was in prison for three years,

1 The responsibility of Marie Antoinette for the policy of the king before and during the Revolution has been the subject of much controversy. In general it may be said that her influence on politics has been much exaggerated. (See Marie Antoinette.) [Ed.]

during which time she remained ignorant of the fate which had befallen her parents. She died on the 19th of October 1851. Her life by G. Lenotre has been translated into English by J. L. May (1908).

See the articles French Revolution and Marie Antoinette. F. X. J. Droz, Hisloire du regne de Louis XVI. (3 vols., Paris, i860), a sane and good history of the period ; and Arsene Houssaye, Louis XVI. (Paris, 1891). See also the numerous memoirs of the time, and the marquis de Segur’s Au couchant de la monarchic, Louis XVI. et Turgot (19 10).

For bibliographies see G. Monod, Bibl. de la France • Lavisse et Rambaud, Hist. Univ., vols. vii. and viii. ; and the Cambridge Modern History, vol. viii. (R. A.*)

LOUIS XVII. (1785-1795?), titular king of France, second son of Louis XVI. and Marie Antoinette, was born at Versailles on the 27th of March 1785, was christened the same day Louis Charles, and given the title of duke of Normandy. Louis Charles became dauphin on the death of his elder brother on the 4th of June 1789. It is only with his incarceration in the Temple on the 13th of August 1792, that his history, apart from that of his parents, becomes of interest. The royal party included, beside the king and queen, their daughter Marie Therese Charlotte (Madame Royale), the king’s sister Madame Elisabeth, the valet Clery and others. The prisoners were lodged at first in the smaller Tower, but were removed to the larger Tower on the 27th of October. Louis Charles was then separated from His mother and aunt to be put in his father’s charge, except for a few hours daily, but was restored to the women when Louis was isolated from his family at the beginning of his trial in December.

On the 21st of January 1793 Louis became, for the royalists, king of France, and a week later the comte de Provence arrogated to himself the title of regent. From that moment began new plots for the escape

of the prisoners from the Temple, the chief of which were engineered by the Chevalier de Jarjayes, 1 the baron de Batz, 2 and the faithful Lady Atkyns. 3 On the 3rd of July the little dauphin was again separated from his mother, this time to be given into the keeping of the cobbler Antoine Simon 4 who had been named his guardian by the Committee of General Security. The tales told by the royalist writers of the barbarous cruelty inflicted by Simon and his wife on the child are not proven. Marie Jeanne, in fact, took great care of the child's person, and there is documentary evidence to prove that he had air and food. But the Simons were obviously grotesquely unfit guardians for a prince, and they doubtless caused much suffering to the impressionable child, who was made on occasion to eat and drink to excess, and learnt the language of the gutter. But the scenes related by A. de Beauchesne of the physical martyrdom of the child are not supported by any other testimony, though he was at this time seen by a great number of people. On the 6th of October Pache, Chaumette, Hebert and others visited him and secured from him admissions of infamous accusations against his mother, with his signature to a list of her alleged crimes since her entry in the Temple, and next day he was con- fronted with his sister Marie Therese for the last time.

1 F. A. Regnier de Jarjayes (1745-1822). See P. Gaulot, Un Complot sous la Terreur.

'Jean, baron de Batz (1761-1822), attempted to carry off the dauphin in 1794. See G. Len&tre, Un Conspirateur royaliste pendant la Terreur, le baron de Batz (1896).

8 Charlotte Walpole (c. 1785-1836), an English actress who married in 1779 Sir Edward Atkyns, and spent most of her life in France. She expended large sums in trying to secure the escape of the prisoners of the Temple. See F. Barbey, A Friend of Marie Antoinette (Eng. ed. 1906).

- Antoine Simon (1736-1794) married Marie Jeanne Aladame, and belonged to the section of the Cordeliers. They owed their position to Anaxagoras Chaumette, procureur of the Commune, and to the fact that Simon had prevented one of the attempts of the baron de Batz. Simon was sent to the guillotine with Robespierre in 1794, and two years later Marie Jeanne entered a hospital for in- curables in the rue de Sevres, where she constantly affirmed the dauphin's escape. She was secretly visited after the Restoration by the duchess of AngoulSme. On the 16th of November 1816, she was interrogated by the police, who frightened her into silence about the supposed substitution

of another child for the dauphin. She died in 1819 See G. Lendtre, Vieilles maisons, vieux papiers (2nd series, «9°3)-

Simon's wife now fell ill, and on the 19th of January 1794 the Simons left the Temple, after securing a receipt for the safe trans- fer of their prisoner, who was declared to be in good health. A large part of the Temple records from that time onwards were destroyed under the Restoration, so that exact knowledge of the facts is practically impossible. Two days after the departure of the Simons the prisoner is said by the Restoration historians to have been put in a dark room which was barricaded like the cage of a wild animal. The story runs that food was passed through the bars to the child, who survived in spite of the accumulated filth of his surroundings. Robespierre 5 visited Marie Therese on the nth of May, but no one, according to the legend, entered the dauphin's room for six months until Barras visited the prison after the 9th Thermidor (July 27, 1794). Barras's account of the visit describes the child as suffering from extreme neglect, but conveys no idea of the alleged walling in. It is nevertheless certain that during the first half of 1794 he was very strictly secluded; he had no special guardian, but was under the charge of guards changed from day to day. The child made no complaint to Barras of his treatment, probably because he feared to do so. He was then cleansed and re-clothed, his room cleaned, and during the day he was visited by his new attendant, a Creole and a compatriot of Josephine de Beauharnais, named Jean Jacques Christophe Laurent (1770-1807), who had from the 8th of November onwards assistance for his charge from a man named Gomin. The child was now taken out to walk on the roof of the Tower. From about the time of Gomin's entrance the prisoner was inspected, not by delegates of the Commune, but by representatives of the civil committee of the 48 sections of Paris. The rare recurrence of the same inspectors would obviously facilitate fraud, if any such were intended. From the end of October onwards the child maintained an obstinate silence, explained by Laurent as a determination taken on the day he made his deposition against his mother. On the 19th of December 1794 he was visited by three commissioners from the Committee of General Security — J. B. Harmand de la Meuse, J. B. C. Mathieu and J. Reverchon — who extracted no word from him. On Laurent's retirement Etienne Lasne was appointed on the 31st of March 1795 to be the child's guardian. In May 1795 the prisoner was seriously ill, and a doctor, P. J. Desault, well acquainted with the dauphin, having visited him seven months earlier, was summoned. Desault died suddenly, not without suspicion of poison, on the 1st of June, and it was some days before doctors Pelietan and Dumangin were called. Then it was announced that on

the 8th Louis Charles died. Next day an autopsy was held at which it was stated that a child apparently about ten years of age, ” which the commissioners told us was the late Louis Capet’s son,” had died of a scrofulous affection of long standing. He was buried on the 10th in the cemetery of Ste Marguerite, but no stone was erected to mark the spot.

The weak parts of this story are the sudden and unexplained departure of the Simons; the subsequent useless cruelty of treating the child like a wild beast and keeping him in a dark room practically out of sight (unless any doubt of his identity was possible), while his sister was in comparative comfort; the cause of death, declared to be of long standing, but in fact developed with such rapidity; the insufficient excuse provided for the child’s muteness under Gomin’s regime (he had answered Barras) and the irregularities in the formalities in attending the death and the funeral, when a simple identification of the body by Marie Therese would have prevented any question of resuscitated dauphins. Both Barras and Harmand de la Meuse

6 In a bulletin dated May 17-24, Paris, and enclosed by Francis Drake (June 17, 1794) at Milan to Lord Grenville, it is stated (Hist. MSS. Comm. Fortescue Papers at Dropmore, vol. ii. 576-577) that Robespierre in the night of 23-24 May fetched the king (the dauphin) from the Temple and took him to Meudon. ” The fact is certain, although only known to the Committee of Public Safety. It is said to be ascertained that he was brought back to the Temple the night of 24-25th, and that this was a test to assure the ease of seizing him.” This police report at least serves to show the kind of rumous I then current.

are said to have given leave for the brother and sister to see each other, but the meeting was never permitted. The argument from the sudden disappearance of persons in a position to know something of the rruth is of a less convincing character. It may be noted that the more famous of the persons alleged by partisans of subsequent pretenders to have been hustled out of the world for their connexion with the secret are the empress Josephine, the due d’Enghien and the due de Berri.

Immediately on the announcement of the dauphin’s death there arose a rumour that he had escaped. Simien-Despreaux, one of Louis XVIII.‘s

own authors, stated at a later period (1814) that Louis XVII. was living and that among the signatories of the treaty of April 13th were some who possessed proofs of his existence; and Eckard, one of the mainstays of the official account, left among his unpublished papers a statement that many members of “an assembly of our wise men ” obstinately named Louis XVII. as the prince whom their wishes demanded. Unfortunately the removal of the child suited the plans of the comte de Provence (now Louis XVIII. for the imigres) as well as it suited the revolutionary government, and no serious attempt was made by the royal family to ascertain the truth, though they paid none of the tributes to the memory of the dead king which might reasonably have been expected, had they been convinced of his death. Even his sister wore no mourning for him until she arrived at Vienna and^^y that this was ex- pected of her. In spite of the masJBˆliterature which has accumulated on the subject, neither his death in the Temple nor his escape therefrom has been definitely established, though a very strong presumption is established in favour of the latter.

Some forty candidates for his honours were forthcoming under the Restoration. The most important of these pretenders were Karl Wilhelm Naundorff and the comte de Richemont. Naundorff’s story rested on a series of complicated intrigues. According to him Barras determined to save the dauphin in order to please Josephine Beauharnais, the future empress, having conceived the idea of using the dauphin’s existence as a means of dominating the comte de Provence in the event of a restoration. The dauphin was concealed in the fourth storey of the Tower, a wooden figure being substituted for him. Laurent, to protect himself from the consequences of the substitution, replaced the wooden figure by a deaf mute, who was presently exchanged for the scrofulous child of the death certificate. The deaf mute was also concealed in the Temple. It was not the dead child, but the dauphin who left the prison in the coffin, whence he was extracted by his friends on the way to the cemetery. Richemont’s tale that the woman Simon, who was genuinely attached to him, smuggled him out in a basket, is simple and more credible, and does not necessarily invalidate the story of the subsequent operations with the deaf mute and the scrofulous patient, Laurent in that case being deceived from the beginning, but it renders them extremely unlikely. A third pretender, Eleazar Williams, did not affect to know anything of his escape. He possessed, he said, no consciousness of his early years, only emerging from idiocy at the age of thirteen, when he was living with an Indian family in New York State. He was a missionary to the Indians when the prince de Joinville, son of Louis Philippe, met him, and after some conversation asked him to sign a document

abdicating his rights in favour of Louis Philippe, in return for which he, the dauphin (alias Eleazar Williams), was to receive the private inheritance which was his. This Eleazar refused to do. The wildness of this tale refutes itself.

Richemont (Henri Ethelbert Louis Victor Hebert) was in prison in Milan for seven years and began to put forward his claims in Paris in 1828. In 1833 he was again arrested, was brought to trial in the following year and was condemned to twelve years' imprisonment. He escaped after a few months and left the country, to return in 1840. He died at Gleize on the ioth of August 1853, the name of Louis Charles de France being inscribed on his tomb until the government ordered its removal.

Naundorff, or Naundorff, who had arrived from nowhere in Berlin in 1810, with papers giving the name Karl Wilhelm Naundorff, in order to escape the persecutions of which he declared himself the object, settled at Spandau in 181 2 as a clockmaker, and married in 1818 Johanna Einert. In 1822 he removed to Brandenburg, and in 1828 to Crossen, near Frankfort. He was imprisoned from 1825 to 1828 for coining, though apparently on insufficient evidence, and in 1833 came to push his claims in Paris, where he was recognized as the dauphin by many persons formerly connected with the court of Louis XVI. Expelled from France in 1836, the day after bringing a suit against the duchess of Angouleme for the restitution of the daupnin's private property, he lived in exile till his death at Delft on the ioth of August 1845, and his tomb was inscribed " Louis XVII. , roi de France et de Navarre (Charles Louis, due de Normandie)." The Dutch authorities who had inscribed on his death certificate the name of Charles Louis de Bourbon, due de Normandie (Louis XVII.) permitted his son to bear the name de Bourbon, and when the family appealed in 1850-1851, and again in 1874, for the restitution of their civil rights as heirs of Louis XVI. no less an advocate than Jules Favre pleaded their cause. Of all the pre- tenders Naundorff has the best case. He was certainly not the Jew of Prussian Poland which his enemies declared him to be, and he has to this day a circle of devoted adherents. Since he was sincerely convinced of his own rights, it is surprising that he put forward no claim in 1814.

If the dauphin did escape, it seems probable that he perished shortly afterwards or lived in a safe obscurity. The account of the substitution in the Temple is well substantiated, even to the names of the substitutes. The curious imbroglio deceived royalists and republicans alike. Lady Atkyns was trying by every possible means to get the dauphin out of his prison when he was apparently already in safe

hands, if not outside the Temple walls. A child was in fact delivered to her agents, but he was a deaf mute. That there was fraud, and complicated fraud, in the guardians of the dauphin may be taken as proved by a succession of writers from 1850 onwards, and more recently by Frederic Barbey, who wisely attempts no ultimate solution. When the partisans of Richemont or Naundorff come to the post-Temple careers of their heroes, they become in most cases so uncritical as to be unconvincing.

The official version of the dauphin's history as accepted under the Restoration was drawn up by Simien Despreaux in his uncritical Louis XVII. (1817), and is found, fortified'by documents, in M. Eckard' s Memoires historiques sur Louis XVII. (18 17) and in A. de Beauchesne's Louis XVII., sa vie, son agonie, sa mort. Captivity de la famille royale au Temple (2 vols., 1852, and many subsequent editions), containing copies of original documents, and essential to the study of the question, although its sentimental pictures of the boy martyr can no longer be accepted. L. de la Sicotitire, "■■ Les faux Louis XVII.," in Revue des questions historiques (vol. xxxii., 1882), deals with the pretenders Jean Marie Hervagault, Mathurin Bruneau and the rest ; see also Dr Cabanes, Les Marts niysterieuses de I'histoire (1901), and revised catalogue of the J. Sanford Saltus collection of Louis XVII. books (New York, 1908). Catherine Welch, in The Little Dauphin (1908) gives a r6sum6 of the various sides of the question.

Madame Royale's own account of the captivity of the Temple was first printed with additions and suppressions in 1817, and often subsequently, the best edition being that from her autograph text by G. Len6tre, La Fille de Louis XVI., Marie There.se Charlotte de France, duchesse d ' Angoulhne, le Temple, I'echange, I'exil (1907). There are two collections of writings on the subject: Marie Therese de France, compiled (I 8_52) by the marquis de Pastoret, and com- prising beside the memoir written by Marie Therese herself, articles by M. de Montbel, Sainte-Beuve, J. Lemoine, La Gueronniere and extracts from Joseph Weber's memoirs; and Memoires de Marie Thirese duchesse d' Angouleme, comprising extracts from the narra- tives of Charles Goret (Mon Temoignage, 1852), of C. F. Beaulieu {Memoire adressie d la nation, 1795), of L. G. Michaud {Opinion d'un Franqais, 1795) and of Mme de Tourzel {Memoires 1883). Cf . A. Lanne, La Sceur de Louis X VII. , and the articles on " Madame Royale," on the " Captivity de la famille royale au Temple " and on the " Mise en liberty de Madame " in M. Tourneux's Bibliographic de I'histoire de Paris pendant la revolution francaise (vol. iv., 1906, and vol. i., 1890).

Naundorff. — For the case of Naundorff see his own narrative, Abrege

de I'histoire des infortunes du Dauphin (London, 1836; Eng. trans., 1838); also Modeste Gruau de la Barre, Intrigues

dtvoilees ou Louis XVII. ... (3 vols., Rotterdam, 1846-1848); O. Friedrichs, Correspondance inlime et inedite de Louis XVII. (Naundorff) 1834-1838 (2 vols., 1904) ; Plaidoirie de Jules Favre devant la cour d'appel de Paris pour les heritiers de feu Charles-Guillaume Naundorff (1874); H. Provins, Le Dernier roi legitime de France (2 vols., the first of which consists of destructive criticism of Beauchesne and his followers, 1889) ; A. Lanne, " Louis XVII. et le secret de la Revolution," Bulletin mensuel (1893 et seq.) of the Societe des etudes sur la question Louis XVII., also La Legitimate (Bordeaux, Toulouse, 1S83-1898). See further the article " Naundorff " in M. Tourneux, Bibl. de la ville de Paris pendant la Revolution, vol. iv.

(1906).

Williams. — J. H. Hanson, The Lost Prince: Facts tending to prove the Identity of Louis XVII. of France and the Rev. Eleazer Williams (London and New York, 1854).

De Richemont. — Memoires du due de Normandie, fits de Louis XVI., ecrits et publies par lui-meme (Paris, 1831), compiled, according to Querard, by E. T. Bourg, called Saint Edme; Morin de Gueriviere, Quelques souvenirs . . . (Paris, 1832) ; and J. Suvigny, La Restauration convaincue . . . ou preuves de V existence du fils de Louis X VI. (Paris, 1851).

The widespread interest taken in Louis XVII. is shown by the fact that since 1905 a monthly periodical has appeared in Paris on this subject, entitled Revue historique de la question Louis XVII., also by the promisjJkxamination of the subject by the Societe d'Histoire

contemporl

(M. Br.)

LOUIS XVIII. (Louis le Desire) (1735-1824). Louis- Stanislas-Xavier, comte de Provence, third son of the dauphin Louis, son of Louis XV., and of Maria Josepha of Saxony, was born at Versailles on the 17th of November 1755. His education was supervised by the devout due de la Vauguyon, but his own taste was for the writings of Voltaire and

the encyclopaedists. On the 14th of May 177 1 took place his marriage with Louise- Marie- Josephine of Savoy, by whom he had no children. His position at court was uncomfortable, for though ambitious and conscious of possessing greater abilities than his brother (Louis XVI.), his scope for action was restricted; he consequently devoted his energies largely to intrigue, especially against Ma.rie Antoinette, whom he hated. 1 During the long absence of heirs to Louis XVI., ” Monsieur,” as heir to the throne, courted popularity and took an active part in politics, but the birth of a dauphin (1781) was a blow to his ambitions. 2 He opposed the revival of the parlements, wrote a number of political pamphlets, 3 and at the Assembly of Notables presided, like the other princes of the blood, over a bureau, to which was given the name of the Comite des sages; he also advocated the double representation of the tiers. At the same time he cultivated literature, entertaining poets and writers both at the Luxembourg and at his chateau of Brunoy (see Dubois-Corneau, Le Comte de Provence a Brunoy, 1909), and gaining a reputation for wit by his verses and mots in the salon of the charming and witty comtesse de Balbi, one of Madame’s ladies, who had become his mistress, 4 and till 1793 exerted considerable influence over him. He did not emigrate after the taking of the Bastille, but, possibly from motives of ambition, remained in Paris. Mirabeau thought at one time of making him chief minister in his projected constitutional government (see Corr. de Mirabeau et La Marck, ed. Bacourt, i. 434, 436, 442), but was disappointed by his caution and timidity. The affaire Favras (Dec. 1789) aroused great feeling against Monsieur, who was believed by many to have conspired with Favras, only to abandon him (see Lafayette’s Mems. and Corr. of Mirabeau). In June 1791, at the time of the

1 See Arneth and Geffroy, Corr. de Marie-Therese avec le comte de Mercy- Argenteau, vol. i., ” Mercy to Maria Theresa, June 22nd, 1771,” also i. 261, ii. 186, 352, 393. Marie Antoinette says (ii. 393) : ” . . . a un caractere tres faible, il joint une marche souterraine, et quelquefois tres basse.”

2 See his letters to Gustavus III. of Sweden in A. Geffroy, Gustave III et la cour de France, vol. ii. appendix.

3 Two pamphlets at least are ascribed to him: ” Les Mannequins, conte ou histoire, comme Ton voudra ” (against Turgot; anon., Paris, 1776) and ” Description historique d’un monstre symbolique pris vivant sur les bords du lac Fagua, pres de Santa-Fe, par les soins de Francisco Xaveiro de Neunris ” (against Calonne; Paris, 1 784) (A. Debidour in La Grande Encyclopedic).

4 It has frequently been alleged that his relations with Mme de Balbi, and indeed with women generally, were of a platonic nature. De Reiset (La Comtesse de Balbi, pp. 152-161) produces evidence to disprove this assertion.

flight to Varennes, Monsieur also fled by a different route, and, in company with the comte d'Avaray 6 — who subsequently replaced Mme de Balbi as his confidant, and largely influenced his policy during the emigration — succeeded in reaching Brussels, where he joined the comte d'Artois and proceeded to Coblenz, which now became the headquarters of the emigration.

Here, living in royal state, he put himself at the head of the counter-revolutionary movement, appointing ambassadors, soliciting the aid of the European sovereigns, and especially of Catherine II. of Russia. Out of touch with affairs in France and surrounded by violent anti-revolutionists, headed by Calonne and the comte d'Artois, he followed an entirely selfish policy, flouting the National Assembly (see his reply to the summons of the National Assembly, in Daudet, op. cit. i. 96), issuing uncompromising manifestoes (Sept. 1 791, Aug. 1792, &c), and obstructing in every, way the representatives of the king and queen. 6 After Valmy he had to retire to Hamm in Westphalia, where, on the death of Louis XVI., he proclaimed himself regent; from here he went south, with the idea of encouraging the royalist feeling in the south of France, and settled at Verona, where on the death of Louis XVII. (8th of June 1795) he took the title of Louis XVIII. At this time ended his liaison with Mme de Balbi, and the influence of d'Avaray reached its height. From this time onward his life is a record of constant wanderings, negotiations and conspiracies. In April 1796 he joined Conde's army on the German frontier, but was shortly requested to leave the country, and accepted the hospitality of the duke of Bruns- wick at Blanckenberg till 1797, when, this refuge being no longer open to him, the emperor Paul I. permitted him to settle at Mittau in Courland, where he stayed till 1801. All this time he was in close communication with the. royalists in France, but was much embarrassed by the conflicting policy pursued by the comte d'Artois from England, and was largely at the mercy of corrupt and dishonest agents. 7 At Mittau was realized his cherished plan of marrying Madame Royale, daughter of Louis XVI., to the due d'Angouleme, elder son of the comte d'Artois. From Mittau, too, was sent his well-known letter to Bonaparte (1799) calling upon him to play the part of Monk, a proposal contemptuously refused (E. Daudet, Hist, de V emigration, ii. 371, 436), though Louis in turn declined to accept a pension from Bonaparte, and later, in 1803, though his fortunes were at their lowest ebb, refused to abdicate at his suggestion and accept an

indemnity.

Suddenly expelled from Mittau in 1801 by the capricious Paul I., Louis made his way, in the depth of winter, to Warsaw, where he stayed for three years. All this time he was trying to convert France to the royalist cause, and had a ” conseil royal ” in Paris, founded at the end of 1799 by Royer-Collard, Montesquiou and Clermont-Gallerande, the actions of which were much impeded by the activity of the rival committee of the comte d’Artois (see E. Daudet, op. cit. ii., and. Remade, Bonaparte et les Bourbons, Paris, 1899), but after 1800, and still more after the failure of the royalist conspiracy of Cadoudal, Pichegru and Moreau, followed by the execution of the due d’Enghien (March 1804), and the assumption by Napoleon of the title of emperor (May 1804), the royalist cause appeared quite hopeless. In September 1804 Louis met the comte d’Artois at Calmar in Sweden, and they issued a protest against Napoleon’s action, but being warned that he must not return to Poland, he gained permission from Alexander I. again to retire to Mittau. After Tilsit, however (1807), he was again forced to depart, and took refuge in England, where he stayed first at Gosfield in Essex, and afterwards (1809 onwards) at Hart well in Buckinghamshire.

ˆ s Antoine-Louis-Francois de Besiade, comte, afterwards due, d’Avaray. In spite of his loyalty and devotion, the effect of his influence on Louis XVIII. may be gathered from a letter of J. de Maistre to Blacas, quoted by E. Daudet, Hist, de V emigration, ii. 11: ” celui qui n’a pu dans aucun pays aborder aucun homme politique sans l’aliener n’est pas fait pour les affaires.”

6 See Klinckowstrom, Le Comte de Fersen et la cour de France. Fersen says (i. 7), ” Monsieur ferait mieux seul, mais il est entiere- ment subjugue par l’autre ” {i.e. the comte dArtois, who was in turn under the influence of Calonne). See Daudet, op. cit. vol. i.

7 See E. Daudet, La Conjuration de Pichegru (Paris, 1901).

In 1810 his wife died, and in 181 1 d’Avaray died, his place as favourite being taken by the comte de Blacas. 1 After Napoleon’s defeats in 1813 the hopes of the royalists revived, and Louis issued a fresh manifesto, in which he promised to recognize the results of the Revolution. Negotiations were also opened with Bernadotte, who

seemed willing to support his cause, but was really playing for his own hand.

In March 1814 the Allies entered Paris, and thanks to Talley- rand's negotiations the restoration of the Bourbons was effected, Louis XVIII. entering Paris on the 2nd of May 1814, after issuing the declaration of St Ouen, in which he promised to grant the nation a constitution {octroy er une charte). He was now nearly sixty, wearied by adversity, and a sufferer from gout and obesity. But though clear-sighted, widely read and a good diplomatist, his impressionable and sentimental nature made him too subject to personal and family influences. .His concessions to the reactionary and clerical party of the Emigres, headed by the comte d'Artois and the duchesse d' Angouleme, aroused suspicions of his loyalty to the constitution, the creation of his Maison militaire alienated the army, and the constant presence of Blacas made the formation of a united ministry impossible. After the Hundred Days, during which the king was forced to flee to Ghent, the dismissal of Blacas was made one of the conditions of his second restoration. On the 8th of July he again entered Paris, " in the baggage train of the allied armies," as his enemies said, but in spite of this was received with the greatest enthusiasm 2 by a people weary of wars and looking for constitutional govern- ment. He was forced to retain Talleyrand and Fouche in his first ministry, but took the first opportunity of ridding himself of them when the elections of 1815 assured him of a strong royalist majority in the chamber (the chambre introuvable, a name given it by Louis himself). At this time he came into contact with the young comte (afterwards due) Decazes, prefect of the police under Fouch6, and minister of police in Richelieu's ministry, who now became his favourite and gained his entire confidence (see E. Daudet, Louis XVIII. et le due Decazes). Having obtained a ministry in which he could trust, having as members the due de Richelieu and Decazes, the king now gave it his loyal support and did his best to shield his ministers from the attacks of the royal family. In September 1816, alarmed at the violence of the chambre introuvable, he was persaaded to dissolve it. An attempt on the part of the Ultras to regain their ascendancy over the king, by conniving at the sudden return of Blacas from Rome to Paris, 3 ended in failure.

The events and ministerial changes of Louis XVIII. 's reign are described under the article France: History, but it may be said here that the king's policy throughout was one of prudence and common sense. His position was more passive than active, and consisted in giving his support as far as possible to the 1 Pierre-Louis-Casimir, comte (afterwards due) de Blacas d'Aulps, was as rigidly royalist as d'Avaray, but more able. E. Daudet, Hist, de V emigration, i. 458,

quotes a judgment of him by J. de Maistre: ” II est ne homme d’etat et ambassadeur.”

1 See account by Decazes in E. Daudet, Louis XVIII. et le due Decazes, pp. 48-49, and an interesting ” secret and confidential ” letter of Castlereagh to Liverpool (July 8, 1815) in the unpublished Foreign Office records: “The king sent for the duke and me this evening to the Thuilleries. . . . We found him in a state of great emotion and exaltation at the reception he had met with from his subjects, which appears to have been even more animated than on his former entrance. Indeed, during the long audience to which we were admitted, it was almost impossible to converse, so loud were the shouts of the people in the Thuilleries Gardens, which were full, though it was then dark. Previous to the king’s dismissing us, he carried the duke and me to the open window. Candles were then brought, which enabled the people to see the king with the duke by his side. They ran from all parts of the Gardens, and formed a solid mass of an immense extent, rending the air with acclamations. The town is very generally illuminated, and I understand from men who have traversed the principal streets that every demonstration of joy was manifested by the inhabitants.”

3 It is as yet not proved that Blacas returned from his embassy in response to a summons from the Ultras. But whether it was on his own initiative or not, there can be no doubt as to the hopes which they built on his arrival (see Daudet, Louis XVIII. et le due Vecazes-

ministry of the day. While Decazes was still in power, the king’s policy to a large extent followed his, and was rather liberal and moderate, but after the assassination of the due de Berry (1820), when he saw that Decazes could no longer carry on the govern- ment, he sorrowfully acquiesced in his departure, showered honours upon him, and transferred his support to Richelieu, the head of the new ministry. In the absence of Decazes a new favourite was found to amuse the king’s old age, Madame du Cayla (Zoe Talon, comtesse du Cayla), a protegee of the vicomte Sosthene de la Rochefoucauld and consequently a creature of the Ultras. As the king became more and more infirm, his power of resistance to the intrigues of the Ultras became weaker. The birth of a posthumous son to the due de Berry (Sept. 1820), the death of Napoleon (5th of May 1821) and the resignation of Richelieu left him entirely in their hands, and after Villele had formed a ministry of a royalist character the comte d’Artois was associated with the government, which passed more and more out of the king’s hands. He died on the 16th of September 1824, worn out in body, but still retaining flashes of his former clear insight and

scepticism. The character of Louis XVIII. may be summed up in the words of Bonaparte, quoted by Sorel (L' Europe et la Rev. fr. viii. 416 footnote), " C'est Louis XVI. avec moins de franchise et plus d'esprit." He had all the Bourbon characteristics, especially their love of power, combined with a certain nobility of demeanour, and a consciousness of his dignity as king. But his nature was cold, unsympathetic and calculating, combined with a talent for intrigue, to which was added an excellent memory and a ready wit. An interesting judgment of him is contained in Queen Victoria's Letters, vol. i., in a letter of Leopold I., king of the Belgians, to the queen before her accession, dated the 18th of November 1836, "Poor Charles X. is dead. . . . History will state that Louis XVIII. was a most liberal monarch, reigning with great mildness and justice to his end, but that his brother, from his despotic and harsh disposi- tion, upset all the other had done and lost the throne. Louis XVIII. was a clever, hard-hearted man, shackled by no principle, very proud and false. Charles X. an honest man, a kind friend," &c. &c. This seems fairly just as a personal estimate, though it does not do justice to their respective political roles.

Bibliography. — There is no trustworthy or complete edition of the writings and correspondence of Louis XVIII. The Memoires de Louis XVIII. recueillis et mis en ordre par M. le due de D. . . . (12 vols., Paris, 1832-1833) are compiled by Lamothe-Langon, a well-known compiler of more or less apocryphal memoirs. From the hand of Louis XVIII. are: Relation d'un voyage d Bruxelles et & Coblentz, 1701 (Paris, 1823, with dedication to d'Avaray) ; and Journal de Marie-Therese de France, duchesse d'AngouUme, corrige et annote par Louis XVIII., ed. Imbert de St Amand (Paris, 1896). Some of his letters are contained in collections, such as Lettres d'Artwell; correspondance politique et privee de Louis XVIII., roi de France (Paris, 1830; letters addressed to d'Avaray); Lettres ei instructions de Louis XVIII. au comte de Saint-Priest, ed. Barante (Paris, 1845) ; Talleyrand et Louis XVIII., corr. pendant le congres de Vienne, 1814-1815, ed. Pallain (1881 ; trans., 2 vols., 1881); see also the corr. of Castlereagh, Metternich, J. de Maistre, the Wellington Dispatches, &c, and such collections as Corr. diplomatique de Pozzo di Borgo avec le comte de Nesselrode (2 vols., 1890-1897), the corre- spondence of C. de Remusat, Villele, &c. The works of E. Daudet are of the greatest importance, and based on original documents; the chief are: La Terreur Blanche (Paris, 1878) ; Hist, de la restaura- tion 1814.-1830 (1882) ; Louis XVIII. et le due Decazes (1899) ; Hist. de V emigration, in three studies: (i.) Les Bourbons et la Russie (1886), (ii.) Les Emigres et la seconde coalition (1886), (iii.) Coblenz, 1780-1703 (1890). Developed from these with the addition of much further material is

his Hist, de V Emigration (3 vols., 1904-1907). Also based on original documents is E. Romberg and A. Malet, Louis XVIII. et les cent-jours d. Gand (1898). See also G. Stenger, Le Retour des Bourbons (1908) ; Cte. L. de Remade, Bonaparte et les Bourbons. Relations secrets des agents du cte. de Provence sous le consulat (Paris, 1899). For various episodes, see Vicomte de Reiset, La Comtesse de Balbi (Paris, 1908; contains a long bibliography, chiefly of memoirs concerning the emigration, and is based on documents) ; J. B. H. R. Capefigue, La Comtessedu Cayla (Paris, 1866) ; J. Turquan, Les Favorites de Louis XVIII. (Paris, 1900); see also the chief memoirs of the period, such as those of Talleyrand, Chateaubriand, Guizot, due de Broglie, Villele, Vitrolles, Pasquier, the comtesse de Boigne (ed. Nicoullaud, Paris, 1907), the Vicomte L. F. Sosthene de la Rochefoucauld (15 vols., Paris, 1861-1864); and the writing* of Benjamin Constant, Chateaubriand, &c.

LOUIS L— LOUIS II.

49

General Works. — See the histories of France, the Emigration, the Restoration and especially the very full bibliographies to chapters i., ii. and iii. of Cambridge Modern History, and Lavisse and Rambaud, Hist. givSrale, vol. x. (C. B. P.)

LOUIS I. (1326-1382), called “the great,” king of Hungary and Poland, was the third son of Charles Robert, king of Hungary, and Elizabeth, daughter of the Polish king, Ladislaus Lokietek. In 1342 he succeeded his father as king of Hungary and was crowned at Szekesfehervar on the 21st of July with great en- thusiasm. Though only sixteen he understood Latin, German and Italian as well as his mother tongue. He owed his relatively excellent education to the care of his mother, a woman of pro- found political sagacity, who was his chief counsellor in diplo- matic affairs during the greater part of his long reign. Italian politics first occupied his attention. As a ruler of a rising great power in search of a seaboard he was the natural adversary of the Venetian republic, which already aimed at making the Adriatic a purely Venetian sea and resented the proximity of the Magyars in Dalmatia. The first trial of strength began in 1345, when the city of Zara placed herself under the protection of Hungary and was thereupon invested by the Venetians. Louis fought a battle beneath the walls of Zara (July 1st, 1346), which has been immortalized by Tintoretto, but was defeated and compelled to abandon the city to the republic. The struggle was renewed eleven years later when Louis, having formed, with infinite trouble, a league of all the enemies of Venice, including

the emperor, the Habsburgs, Genoa and other Italian towns, attacked his maritime rival with such vigour that she sued for peace, and by the treaty of Zara (February 18th, 1358) ceded most of the Dalmatian towns and renounced the title of duke of Dalmatia and Croatia, hitherto borne by the doge. Far more important than the treaty itself was the consequent volun- tary submission of the independent republic of Ragusa to the suzerainty of the crown of St Stephen the same year, Louis, in return for an annual tribute of 500 ducats and a fleet, under- taking to defend Ragusa against all her enemies. Still more glorious for Hungary was Louis's third war with Venice (1378-1381), when he was again aided by the Genoese. At an early stage of the contest Venice was so hardly pressed that she offered to do homage to Hungary for all her possessions. But her immense resources enabled her to rally her forces, and peace was finally concluded between all the powers concerned at the congress of Turin (1381), Venice virtually surrendering Dalmatia to Louis and undertaking to pay him an annual tribute of 7000 ducats. The persistent hostility of Venice is partially attribut- able to her constant fear lest Louis should inherit the crown of Naples and thus threaten her trade and her sea-power from two sides simultaneously. Louis's younger brother Andrew had wedded Joanna, grand-daughter and heiress of old King Robert of Naples, on whose death, in 1343, she reigned in her own right, refused her consort any share in the government, and is very strongly suspected of having secured his removal by assassination on the night of the 19th of September 1345. She then married Prince Louis of Taranto, and strong in the double support of the papal court at Avignon and of the Venetian republic (both of whom were opposed to Magyar aggrandisement in Italy) questioned the right of Louis to the two Sicilies, which he claimed as the next heir of his murdered brother. In 1347, and again in 1350, Louis occupied Naples and craved per- mission to be crowned king, but the papal see was inexorable and he was compelled to withdraw. The matter was not decided till 1378 when Joanna, having made the mistake of recognizing the antipope Clement VII.,- was promptly deposed and ex-communicated in favour of Prince Charles of Durazzo, who had been brought up at the Hungarian court. Louis, always in- exhaustible in expedients, determined to indemnify himself in the north for his disappointments in the south. With the Habsburgs, Hungary's natural rivals in the west, Louis generally maintained friendly relations. From 1358 to 1368, however, the restless ambition of Rudolph, duke of Austria, who acquired Tirol and raised Vienna to the first rank among the cities of Europe, caused Louis great uneasiness. But Louis always

preferred arbitration to war, and the peace congresses of Nagys-

zombat (1360) and of Pressburg (1360) summoned by him adjusted all the outstanding differences between the central European powers. Louis's diplomacy, moreover, was materially assisted by his lifelong alliance with his uncle, the childless Casimir the Great of Poland, who had appointed him his suc- cessor; and on Casimir's death Louis was solemnly crowned king of Poland at Cracow (Nov. 17, 1370). This personal union of the two countries was more glorious than profitable. Louis could give little attention to his unruly Polish subjects and was never very happy among them. Immovably entrenched behind their privileges, they rendered him only the minimum of service; but he compelled their representatives, assembled at Kassa, to recognize his daughter Maria and her affianced husband, Count Sigismund of Brandenburg, as their future king and queen by locking the gates of the city and allowing none to leave it till they had consented to his wishes (1374). Louis is the first European monarch who came into collision with the Turks. He seems to have arrested their triumphant career (c. 1372), and the fine church erected by him at Maria-Zell is a lasting memorial of his victories. From the first he took a just view of the Turkish peril, but the peculiar local and religious difficul- ties of the whole situation in the Balkans prevented him from dealing with it effectually (see Hungary, History). Louis died suddenly at Nagyszombat on the 10th of September 1382. He left two daughters Maria and Jadwiga (the latter he destined for the throne of Hungary) under the guardianship of his widow, the daughter of the valiant ban of Bosnia, Stephen Kotromanic, whom he married in 1353, and who was in every way worthy of him.

See Rationes Collectorum Pontif. in Hungaria, 1281-1375 (Buda- pest, 1887) ; Dano Gruber, The Struggle of Louis I. with the Venetians for Dalmatia (Croat.) (Agram, 1903) ; Antal Por, Life of Louis the Great (Hung.) (Budapest, 1892); and History of the Hungarian Nation (Hung.) (vol. 3, Budapest, 1895). (R. N. B.)

LOUIS II. (1506-1526), king of Hungary and Bohemia, was the only son of Wladislaus II., king of Hungary and Bohemia, and the French princess Anne of Candale. Prematurely born at Buda on the 1st of July 1506, it required all the resources of medical science to keep the sickly child alive, yet he developed so precociously that at the age of thirteen he was well bearded and moustached, while at eighteen his hair was silvery white. His parts were good and he could speak and write six languages at a very early age, but the zeal of his guardians and tutors to make a man of him betimes nearly ruined his feeble con- stitution, while the riptous life led by him and his young consort, Maria of Austria, whom he wedded on the 13th of January 1522, speedily disqualified him for affairs, so that at last he became an

object of ridicule at his own court. He was crowned king of Hungary on the 4th of June 1508, and king of Bohemia on the nth of May 1509, and was declared of age when he succeeded his father on the nth of December 1521. But during the greater part of his reign he was the puppet of the magnates and kept in such penury that he was often obliged to pawn his jewels to get proper food and clothing. His guardians, Cardinal Bakocz and Count George of Brandenburg-Anspach, shamefully neglected him, squandered the royal revenues and distracted the whole kingdom with their endless dissensions. Matters grew even worse on the death of Bakocz, when the magnates Istvan Bathory, Janos Zapolya and Istvan Verboczy fought each other furiously, and used the diets as their tools. Added to these troubles was the ever-present Turkish peril, which became acute after the king, with insensate levity, arrested the Ottoman envoy Berham in 1521 and refused to unite with Suleiman in a league against the Habsburgs. Nevertheless in the last ex- tremity Louis, showed more of manhood than any of his coun- sellors. It was he who restored something like order by interven- ing between the magnates and the gentry at the diet of 1525. It was he who collected in his camp at Tolna the army of 25,000 men which perished utterly on the fatal field of Mohacs on the 29th of August 1526. He was drowned in the swollen stream of Csele on his flight from the field, being the second

prince of the house of Jagiello who laid down his . life for Hungary.

See Rerum Hungaricarum libri (vol. 2, ed. Ferencz Toldy, Buda- pest, 1867) ; and Jozsef Podhradczky, King Louis (Hung.) (Budapest, i860). (R. N. B.)

LOUIS, the name of three kings of Naples, members of the house of Anjou.

Loins I., duke of Anjou and count of Maine (1339-1384), was the second son of John II., king of France, and was born at Vincennes on the 23rd of July 1339. Having been given the duchy of Anjou in 1356 he led a wing of the French army at the battle of Poitiers and was sent to England as a hostage after the conclusion of the treaty of Bretigny in 1360, but he broke his parole in 1363 and so brought about King John's return into captivity. He took part in the war against England which was renewed in 1369, uniting the rival houses of Foix and Armagnac in the common cause, and in other ways rendering good

service to his brother, King Charles V. Anjou's entrance into the troubled politics of Italy was one result of the papal schism which opened in 1378. Anxious to secure the support of France, the antipope Clement VII. persuaded the queen of Naples, Joanna I., to name Louis as her heir, and about the same time the death of Charles V. (September 1380) placedˆthe duke in the position of regent of France. Neglecting France to prosecute his ambitions in Italy, he collected money and marched oh Naples; but although helped by Amadeus VI., count of Savoy, he was unable to drive his rival, Charles, duke of Durazzo, from Naples. His army was destroyed by disease and Louis himself died at Biseglia, near Bari, on the 20th of September 1384, leaving two sons, his successor, Louis II., and Charles, duke of Calabria.

Louis II., duke of Anjou (1377-1417), born at Toulon on the 7th of October 1377, took up the struggle for Naples after his father's death and was crowned king by Clement VII. in 1389. After carrying on the contest for some years his enemies prevailed and he was compelled to take refuge in France, where he took part in the intestine strife which was desolating that kingdom. A few years later he made other attempts to secure the kingdom of Naples, which was now in the possession of Ladislas, a son of his father's foeman, Charles of Durazzo, and he gained a victory at Roccoserra in May 141 1. Soon, however, he was again driven back to France, and after sharing anew in the civil wars of his country he died at Angers on the 29th of April 141 7. His wife was Yolande, a daughter of John I., king of Aragon, and his son was his successor, Louis III.

Louis III., duke of Anjou (1403-1434), born on the 23th of September 1403, made in his turn an attempt to conquer Naples. This was in 1420, and he had met with Considerable success in his task when he died at Cosenza on the 15th of November 1434. In 1424 Louis received from King Charles VII. the duchy of Touraine. Another titular king of Naples of this name was Louis, a son of Philip, prince of Taranto. In 1346 he became the husband of Joanna I., queen of Naples, and in 1352 he was crowned king. After making an attempt to conquer Sicily he died on the 26th of May 1362.

LOUIS (893-911), surnamed the " Child," king of the Franks, son of the emperor Arnulf, was born at Ottingen, designated by Arnulf as his successor in Germany in 897, and crowned on the 4th of February 900. Although he never received the imperial crown, he is sometimes referred to as the emperor Louis IV. His chief adviser was HattO I., archbishop of Mainz; and during his reign the kingdom was ravaged by Hungarians and torn with internal strife. He appears to have passed

his time in journeys from place to place, and in 910 was the nominal leader of an expedition against the Hungarians which was defeated near Augsburg. Louis, who was the last of the German Carolingians, died in August or September 911 and was buried at Regensburg.

See Regino von Priim, ” Chronicon,” in the Monumenta Ger- maniae historica. Scriptores, Band i. (Hanover and Berlin, 1826) ; E. Diimmler, Geschichte des ostfrdnkischen Reichs (Leipzig, 1887- 1888) ; O. Dietrich, Beitrdge zur Geschichte Arnolfs von Karnthen und Ludwigs des Kindes (Berlin, 1890) ; and E. Miihlbacher, Die Regesten des Kaiserreichs unter den Karolingern (Innsbruck, 1881).

(A. W. H.*)

LOUIS OF NASSAU (1538-1574), son of William, count of Nassau, and Juliana von Stolberg, and younger brother of William the Silent, took an active part in the revolt of the Nether- lands against Spanish domination. He was one of the leaders of the league of nobles who signed the document known as ” the Compromise ” in 1566, and a little later was a member of the deputation who presented the petition of grievances called ” the Request ” to the regent, Margaret of Parma. It was on this occasion that the appellation of ” the Beggars ” {les Gueux) was first given to the opponents of King Philip’s policy. On the arrival of Alva at Brussels, Count Louis, with his brother William, withdrew from the Netherlands and raised a body of troops in defence of the patriot cause. In the spring of 1568 Louis invaded Friesland, and at Heiligerlee, on the 23rd of May, completely defeated a Spanish force under Count Aremberg, who was killed. Alva then advanced to meet the invaders with a large army, and at Jemmingen (July 21), with very slight loss, annihilated the levies of Louis, who himself escaped by swimming from the field across an estuary of the Ems. He now joined the army of his brother William, which had in October to beat a hasty retreat before Alva’s superior skill. Then Louis, in company with his brothers William and Henry, made his way across the French frontier to the camp of the Huguenot leader, Admiral Coligny. Louis took an active part in the campaign and fought heroically at Jarnac and Moncontour. In 1572 Louis, not deterred by previous disaster, raised a small force in France, and, suddenly entering Hainaut, captured Mons (May 23). Here he was besieged by Don Frederick of Toledo, Alva’s natural son, who blockaded all approach to the town. William made an attempt to relieve his brother, but failed, and Mons had to surrender (September 17). Louis, who was sick with fever, with- drew to his ancestral home, Dillenburg, to recruit his health, and then once more to devote his energies to the raising of money and troops for another invasion of the Netherlands.

In the hope of drawing away the Spaniards from the siege of Leiden by a diversion in the south, Louis, with his brothers John and Henry, at the head of a force of mixed nationalities and little discipline, crossed the frontier near Maastricht, and advanced as far as the Mookerheide near Nijmwegen. Here he was attacked by a body of Spanish veterans under an experienced leader, Sancho d'Avila, and speedily routed. In the disorderly flight both Louis and his younger brother Henry, refusing to abandon the field, lost their lives. Their bodies were never recovered. Thus perished at the age of thirty-six one of the most chivalrous and gifted of a gallant band of brothers, four of whom laid down their lives in their country's cause.

See P. J. Blok, Lodewijk von Nassau, 1538-1574 (The Hague, 1689), and the Cambridge Modern History, vol. iii. chs. vi. and vii., and bibliography (1904); also A. J. Van der Aa, Biographisch woordenboeh der Nederlanden (22 vols., Haarlem, 1852-1878). _,

LOUIS, JOSEPH DOMINIQUE, Baron (1755-1837), French statesman and financier, was born at Toul (Meurthe) on the 13th of November 1755. At the outbreak of the Revolution the abbe Louis (he had early taken orders) had already some reputa- tion as a financial expert. He was in favour of the constitutional movement, and on the great festival of federation (July 14, 1790) he assisted Talleyrand, then bishop of Autun, to celebrate mass at the altar erected in the Champ de Mars. In 1792, however, he emigrated to England, where he spent his time studying English institutions and especially the financial system of Pitt. Returning to France on the establishment of the Consulate he served successively in the ministry of war, the council of state, and in the finance department in Holland and in Paris. Made a baron of the empire in 1809 he nevertheless supported the Bourbon restoration and was minister of finance in 1814-1815. Baron Louis was deputy from 181 5 to 1824 and from 1827 to 1832. He resumed the portfolio of finance in 1815, which he held also in the Decazes ministry of 1818; he was the first minister of finance under the government of Louis Philippe, and held the same portfolio in 1831-1832. In 1832 he was made a peer of France and he died on the 26th of August

1837.

LOUIS PHILIPPE I.

5 1

LOUIS PHILIPPE I., king of the French (1773-1850), was the eldest

son of Louis Philip Joseph, duke of Orleans (known during the Revolution as Philippe Egalite) and of Louise Marie Adelaide de Bourbon, daughter of the due de Penthievre, and was born at the Palais Royal in Paris on the 6th of October 1773. On his father's side he was descended from the brother of Louis XIV., on his mother's from the count of Toulouse, "legitimated " son of Louis XIV. and Madame de Montespan. The legend that he was a supposititious child, really the son of an Italian police constable named Chiapponi, is dealt with elsewhere (see Maria Stella, countess of Newborough). The god-parents of the duke of Valois, as he was entitled till 1785, were Louis XVI. and Queen Marie Antoinette; his governess was the famous Madame de Genlis, to whose influence he doubtless owed many of the qualities which later distinguished him: his wide, if superficial knowledge, his orderliness, and perhaps his parsimony. Known since 1785 as the due de Chartres, he was sixteen at the outbreak of the Revolution, into which — like his father — he threw himself with ardour. In 1790 he joined the Jacobin Club, in which the moderate elements still predominated, and was assiduous in attendance at the debates of the National Assembly. He thus became a persona grata with the party in power; he was already a colonel of dragoons, and in 1792 he was given a command in the army of the North. As a lieutenant-general, at the age of eighteen, he was present at the cannonade of Valmy (Sept. 20) and played a conspicuous part in the victory of Jemappes (Nov. 6).

The republic had meanwhile been proclaimed, and the due de Chartres, who like his father had taken the name of Egaliti, posed as its zealous adherent. Fortunately for him, he was too young to be elected deputy to the Convention, and while his father was voting for the death of Louis XVI. he was serving under Dumouriez in Holland. He shared in the disastrous day of Neerwinden (March 18,1793) ; was an accomplice of Dumouriez in the plot to march on Paris and overthrow the republic, and on the 5th of April escaped with him from the enraged soldiers into the Austrian lines. He was destined not to return to France for twenty years. He went first, with his sister Madame Adelaide, to Switzerland where he obtained a situation for a few months as professor in the college of Reichenau under an assumed name, 1 mainly in order to escape from the fury of the imigres. The execution of his father in November 1793 had made him duke of Orleans, and he now became the centre of the intrigues of the Orleanist party. In 1795 he was at Hamburg with Dumouriez, who still hoped to make him king. With characteristic caution Louis Philippe refused to commit himself by any overt preten- sions, and announced his intention of going to America; but in the hope that something

might happen in France to his advantage, he postponed his departure, travelling instead through the Scandinavian countries as far north as Lapland. But in 1796, the Directory having offered to release his mother and his two brothers,' who had been kept in prison since the Terror, on condition that he went to America, he set sail for the United States, and in October settled in Philadelphia, where in February 1797 he was joined by his brothers the due de Montpensier and the comte de Beaujolais. Two years were spent by them in travels in New England, the region of the Great Lakes, and of the Mississippi; then the news of the coup d'etat of 18 Brumaire decided them to return to Europe. They returned in 1800, only to find Napoleon Bonaparte's power firmly established. Imme- diately on his arrival, in February 1800, the duke of Orleans, at the suggestion of Dumouriez, sought an interview with the comte d'Artois, through whose instrumentality he was reconciled with the exiled king Louis XVIII., who bestowed upon his brothers the order of the Saint Esprit. The duke, however, refused to join the army of Cond6 and to fight against France, an attitude in which he persisted throughout, while maintaining his loyalty to the king. 2 He settled with his brothers at Twickenham, near

1 As M. Chabaud de la Tour. He was examined as to his fitness before being appointed. Gruyer, p. 165.

2 This at least was his own claim and the Orleanist view. The matter became a question of partisan controversy, the legitimists asserting that he frequently offered to serve against France, but that

London, where he lived till 1807 — for the most part in studious retirement.

On the 1 8th of May 1807 the due de Montpensier died at Christchurch in Hampshire, where he had been taken for change of air, of consumption. The comte de Beaujolais was ill of the same disease and in 1808 the duke took him to Malta, where he died on the 29th of May. The duke now, in response to an invitation from King Ferdinand IV., visited Palermo where, on the 25th of November 1809 he married Princess Maria Amelia, the king's daughter. He remained in Sicily until the news of Napoleon's abdication recalled him to France. He was cordially received by Louis XVIII.; his military rank was confirmed, he was named colonel-general of hussars, and such of the vast Orleans estates as had not been sold were restored to him by royal ordinance. The object may have been, as M. Debidour suggests, to compromise him with the revolutionary parties and to bind him to the throne; but it is more probable that it was no more than an

expression of the good will which the king had shown him ever since 1800. The immediate effect was to make him enormously rich, his wealth being increased by his natural aptitude for business until, after the death of his mother in 1821, his fortune was reckoned at some £8,000,000.

Meanwhile, in the heated atmosphere of the reaction, his sympathy with the Liberal opposition brought him again under suspicion. His attitude in the House of Peers in the autumn of 1 81 5 cost him a two years' exile to Twickenham; he courted popularity by having his children educated en bourgeois at the public schools; and the Palais Royal became the rendezvous of all the leaders of that middle-class opinion by which he was ultimately to be raised to the throne.

His opportunity came with the revolution of 1830. During the three "July days" the duke kept himself discreetly in the background, retiring first to Neuilly, then to Raincy. Meanwhile, Thiers issued a proclamation pointing out that a Republic would embroil France with all Europe, while the duke of Orleans, who was " a prince devoted to the principles of the Revolution" and had " carried the tricolour under fire " would be a " citizen king " such as the country desired. This view was that of the rump of the chamber still sitting at the Palais Bourbon, and a deputation headed by Thiers and Laffitte waited upon the duke to invite him to place himself at the head of affairs. He returned with them to Paris on the 30th, and was elected by the deputies lieutenant-general of the realm. The next day, wrapped in a tricolour scarf and preceded by a drummer, he went on foot to the Hotel de Ville — the headquarters of the republican party — where he was publicly embraced by Lafayette as a symbol that the republicans acknowledged the impossibility of realizing their own ideals and were prepared to accept a monarchy based on the popular will. Hitherto, in letters to Charles X., he had protested the loyalty of his intentions, 3 and the king now nomi- nated him lieutenant-general and then, abdicating in favour of his grandson the comte de Chambord appointed him regent. On the 7th of August, however, the Chamber by a large majority declared Charles X. deposed, and proclaimed Louis Philippe "King of the French, by the grace of God and the will of the people."

The career of Louis Philippe as King of the French is dealt with elsewhere (see France: History). Here it must suffice to note something of his personal attitude towards affairs and the general effects which this produced. For the trappings of authority he cared little. To conciliate the revolutionary

his offers were contemptuously refused. A. Debidour in the article ” Louis-Philippe ” in La Grande Encyclopedie supports the latter view; but see Gruyer, La Jeunesse, and E. Daudet, ” Une reconcilia- tion de famille en 1800,” in the Revue des Deux Mondes, Sept. 15, 1905, p. 301. M. Daudet gives the account of the interview left by the comte d’Artois, and he also makes it clear that Louis Philippe, while protesting his loyalty to the head of his house, did not disguise his opinion that a Restoration would only be possible if the king accepted the essential changes made by the Revolution.

3 To say that these protestations were hypocritical is to assume too much. Personal ambition doubtless played a part; but he must have soon realized that the French people had wearied of ” legitim- ism ” and that a regency in the circumstances was impossible.

passion for equality he was content to veil his kingship for a while under a middle-class disguise. He erased the royal lilies from the panels of his carriages; and the Palais Royal, like the White House at Washington, stood open to all and sundry who cared to come and shake hands with the head of the state. This pose served to keep the democrats of the capital in a good temper, and so leave him free to consolidate the somewhat unstable foundation of his throne and to persuade his European fellow-sovereigns to acknowledge in him not a revolutionary but a conservative force. But when once his position at home and abroad had been established, it became increasingly clear that he possessed all the Bourbon tenaciousness of personal power. When a ” party of Resistance ” came into office with Casimir-Perier in March 1831, the speech from the throne proclaimed that ” France has desired that the monarchy should become national, it does not desire that it should be powerless “; and the migration of the royal family to the Tuileries symbolized the right of the king not only to reign but to rule. Republican and Socialist agitation, culminating in a series of dangerous risings, strengthened the position of the king as defender of middle-class interest; and since the middle classes constituted the pays legal which alone was represented in Parliament, he came to regard his position as unassailable, especially after the suppression of the risings under Blanqui and Barbes in 1839. Little by little his policy, always supported by a majority in a house of representatives elected by a corrupt and narrow franchise, became more reactionary and purely dynastic. His position in France seeming to be unassailable, he sought to strengthen it in Europe by family alliances. The fact that his

daughter Louise was the consort of Leopold I., king of the Belgians, had brought him into intimate and cordial relations with the English court, which did much to cement the entente cordiale with Great Britain. Broken in 1840 during the affair of Mehemet Ali (q.v.) the entente was patched up in 1841 by the Straits Convention and re-cemented by visits paid by Queen Victoria and Prince Albert to the Chateau d'Eu in 1843 and 1845 and of Louis Philippe to Windsor in 1844,' only to be irretrievably wrecked by the affair of the " Spanish marriages," a deliberate attempt to revive the traditional Bourbon policy of French predominance in Spain. If in this matter Louis Philippe had seemed to sacrifice the international position of France to dynastic interests, his attempt to re-establish it by allying himself with the reactionary monarchies against the Liberals of Switzerland finally alienated from him the French Liberal opinion on which his authority was based. When, in February 1848, Paris rose against him, he found that he was practically isolated in France.

Charles X., after abdicating, had made a dignified exit from France, marching to the coast surrounded by the cavalry, infantry and artillery of his Guard. Louis Philippe was less happily situated. Escaping with the queen from the Tuileries by a back entrance, he made his way with her in disguise to Hohfleur, where the royal couple found refuge in a gardener's cottage. They were ultimately smuggled out of the country by the British consul at Havre as Mr and Mrs Smith, 1 arriving at Newhaven " unprovided with anything but the clothes they wore." They settled at Claremont, placed at their disposal by Queen Victoria, under the incognito of count and countess of Neuilly. Here on the 26th of August 1850, Louis Philippe died. The character of Louis Philippe is admirably traced by Queen Victoria in a memorandum of May 2, 1855, in which she com- pares him with Napoleon III. She speaks of his " vast know- ledge upon all and every subject," and " his great activity of mind." He was, unlike Napoleon, " thoroughly French in char- acter, possessing all the liveliness and talkativeness of that people." But she also speaks of the " tricks and over-reachings " practised by him, " who in great as well as in small things took a pleasure in being cleverer and more cunning than others, often when there was no advantage to be gained by it, and which was,

1 There is a vivid account in Mr Featherstonhaugh to Lord Pal-merston, Havre, March 3, 1848, in The Letters of Queen Victoria (pop. ed., ii. 156).

unfortunately, strikingly displayed in the transactions connected with the Spanish marriages, which led to the king's downfall, and ruined him in the eyes of all Europe " (Letters, pop. ed., iii. 122).

Louis Philippe had eight children. His eldest son, the popular Ferdinand Philippe, duke of Orleans (b. 1810), who had married Princess Helena of Mecklenburg, was killed in a carriage accident on the 13th of July 1842, leaving two sons, the comte de Paris and the due de Chartres. The other children were Louise, consort of Leopold I., king of the Belgians; Marie, who married Prince Alexander of Wiirttemberg and died in 1839; Louis Charles, due de Nemours; Clementine, married to the duke of Coburg-Kohary; Francois Ferdinand, prince de Joinville; Henri Eugene, due d'Aumale (q.v.); Antoine Philippe, due de Montpensier, who married the Infanta, younger sister of Queen Isabella of Spain.

Authorities. — F. A. Grayer, La Jeunesse du roi Louis-Philippe, d'apres les pourtraits et des tableaux (Paris, 1909), edition de luxe, with beautiful reproductions of portraits, miniatures, &c. ; Marquis de Flers, Louis-Philippe, vie anecdotique, 1773-1850 (Paris, 1891); E. Daudet, Hist, de V emigration (3 vols., Paris, 1886-1890). Of general works on Louis Philippe's reign may be mentioned Louis Blanc, Hist, de Dix Ans, 1830-1840 (5 vols., Paris, 1841-1844), from the republican point of view; J. O. d'Haussonville, Hist, de la politique exterieure de la monarchic de juillet, 1830-1848 (2 vols., Paris, 1850); V. de Nouvion, Hist, de Louis-Philippe (4 vols., Paris, 1857-1861) ; F. Guizot, France under Louis Philippe, 1841-1847 (Eng. trans., 1865) ; Karl Hillebrand, Geschichte Frankreichs von der Thronbesteigung Louis Philippes, 1830-1841 (2 vols., Gotha, 1877- 1879); V. du Bled, Hist, de la monarchic de juillet (2 vols., Paris, 1887); P. Thureau-Dangin, Hist, de la monarchie de juillet (Paris, 1887, &c); A. Malet, " La France sous la monarchie de juillet," in Lavisse and Rambaud's Hist. Generate, vol. x. ch. x. (Paris, 1898); G. Weill, La France sous la monarchie de juillet (Paris, 1902); Emile Bourgeois, " The Orleans Monarchy," ch. xv. of vol. x., and " The Fall of Constitutionalism in France," ch. ii. of vol. xi. of the Cambridge Modern History (Cambridge, 1907 and 1909). Further works will be found in the bibliographies attached by M. Bourgeois to his chapters (vol. x. p. 844, vol. xi. p. 874; the latter including works on the revolution of 1848 and the Second Republic). To the list of published correspondence and memoirs there mentioned may be added the Chronique of the duchesse de DinO (Paris, 1909).

Louis Philippe himself published the Journal du due de Chartres, 1700-1701; Mon Journal, evenements de 1815 (2 vols., 1849); Discours, allocutions et reponses de S. M. Louis-Philippe, 1830- 1846; and after his death was issued his Correspondance,memoire et discours inedits (Paris, 1863). (W. A. P.)

LOUISBURG, a town and port of entry of Cape Breton county, Nova

Scotia, Canada, on the Sydney & Louisburg railway, 39 m. from Sydney. Pop. (1901) 1588. Under the French regime, Louisburg was second only to Quebec. A fortress was erected at enormous expense, and the city was the centre of the cod-fisheries. The fortress was, however, captured in 1 74 5 by the American colonists, under Sir William Pepperrell (1696-1759), assisted by the British fleet, and again in 1758 by a British land and sea force under General Jeffrey Amherst (1717-1797) and Admiral Boscawen. The jealousy of the British settlement of Halifax led to its almost utter destruction, and only a few case- mates now remain. Under English rule a fishing village grew up on the other side of the harbour, and has now become the winter shipping port of the Dominion Coal Company. The harbour is deep, spacious and open all the year round, though occasionally blocked by drift ice in the spring.

LOUISE [AUGUSTE WlLHELMINE AMALIE LuISe] (1776-1810),

queen of Prussia, was born on the ioth of March 1776 in Hanover, where her father, Prince Charles of Mecklenburg-Strelitz, was field-marshal of the household brigade. Her mother was a princess of Hesse-Darmstadt. In 1793 Louise met at Frankfort the crown prince of Prussia, afterwards King Frederick William III., who was so fascinated by her beauty, and by the nobleness of her character, that he asked her to become his wife. They were married on the 24th of December of the same year. As queen of Prussia she commanded universal respect and affection, and nothing in Prussian history is more pathetic than the dignity and unflinching courage with which she bore the sufferings inflicted on her and her family during the war between Prussia and France. After the battle of Jena she went with .her husband

to Konigsberg, and when the battles of Eylau and Friedland had placed Prussia absolutely at the mercy of France, she made a personal appeal to Napoleon at his headquarters in Tilsit, but without success. Early in 1808 she accompanied the king from Memel to Konigsberg, whence, towards the end of the year, she visited St Petersburg, returning to Berlin on the 23rd of December 1809. During the war Napoleon attempted to destroy the queen’s reputation, but the only effect cf his charges in Prussia was to make her more deeply beloved. On the 19th of July 1810 she died in her husband’s arms, while visiting her father in Strelitz. She was buried in the garden of the

palace at Charlottenburg, where a mausoleum, containing a fine recumbent statue by Rauch, was built over her grave. In 1840 her husband was buried by her side. The Louise Foundation (Luisenstift) for the education of girls was established in her honour, and in 1814 Frederick William III. instituted the Order of Louise (Luisen- orden). In 1880 a statue of Queen Louise was erected in the Thiergarten at Berlin.

See F. Adami, Luise, Konigin von Preussen (7th ed., 1875); E. Engel, Konigin Luise (1876); A. Kluckhohn, Luise, Konigin von Preussen (1876); Mommsen and Treitschke, Konigin Luise (1876); in English, Hudson, Life and Times of Louisa, Queen of Prussia (1874); G. Horn, Das Buck von der Konigin Luise (Berlin, 1883); A. Lonke, Konigin Luise von Preussen (Leipzig, 1903) ; H. von Petersdorff, ” Konigin Luise,” Frauenleben, Bd. i. (Bielefeld, 1903, 2nd ed., 1904).

LOUISE OF SAVOY (1476-1531), duchess of Angouleme, mother of Francis I. of France, was daughter of a cadet of the house of Savoy, Philip, count of Bresse, afterwards duke of Savoy. Through her mother, Marguerite de Bourbon, she was mece of Pierre de Bourbon, sire de Beaujeu, afterwards duke of Bourbon. At the age of twelve she was married to Charles of Valois, count of Angouleme, great-grandson of King Charles V. The count died in 1496, leaving her the mother of two children, Marguerite (b. 1492) and Francis (b. 1494). The accession of Louis XII., who was childless, made Francis of Angouleme the heir-presumptive to the throne of .France. Louise brought her children to the court, and received Amboise as her residence. She lived henceforth in fear lest Louis should have a son; and in consequence there was a secret rivalry between her and the queen, Anne of Brittany. Finally, her son became king on the 1st of January 1515. by the death of Louis XII. From him Louise received the county of Angouleme, which was erected into a duchy, the duchy of Anjou, and the counties of Maine and Beaufort. She was then given the title of “Madame.” From 1515 to her death, she took the chief share in the govern- ment. The part she played has been variously judged, and is not yet completely elucidated. It is certain that Louise had a clear head, practical good sense and tenacity. In the critical situation after the battle of Pavia (1525) she proved herself equal to the emergency, maintained order in the kingdom, and manoeuvred very skilfully to detach Henry VIII. of England from the imperial alliance. But she appears to have been pas- sionate, exceedingly rapacious and ever careful of her own interest. In her malignant disputes with the constable de Bourbon on the question of his wife’s succession, she goaded him to extreme measures, and her rapacity showed itself also in her dealings with the surintendant des finances, J. de Beaune,

baron de Samblancay (d. 1527), who diverted the money intended for the French soldiers in Italy into the coffers of the queen, and suffered death in consequence. She died in 1531, and Francis reunited to the crown her domains, which comprised the Bourbonnais, Beaujolais, Auvergne, la Marche, Angoumois, Maine and Anjou.

There is extant a Journal of Louise of Savoy, the authenticity of which seems certain. It consists of brief notes — generally very exact and sometimes ironical — which go as far as the year 1522. The only trustworthy text is that published by Guichenon in his Histoire genealogique de la maison de Savoie (ed. of 1 778-1 780, vol. iv.).

See Poesies de Francois I" et de Louise de Savoie . . . , ed. by Champollion-Figeac (1847) ; De Maulde, Louise de Savoie et Francois I" (1895); G. Jacqueton, La Politique exterieure de Louise de Savoie . . . (1892); H. Hauser, " Etude critique sur le Journal de Louise de Savoie," in the Revue historique, vol. 86 (1904).

LOUISIADE ARCHIPELAGO, a chain of islands in the Pacific Ocean, extending south-eastward from the easternmost promon- tory of New Guinea, and included in the Australian territory of Papua (British New Guinea). The islands number over eighty, and are interspersed with reefs. They are rich in tropical forest products, and gold has been discovered on the chief island, Tagula or South-east (area 380 sq. m.) and on Misima or St Aignan. The natives are of Papuan type, and practise can- nibalism. The islands were probably observed by Torres in 1606, but were named by L. A. de Bougainville in 1768 after Louis XV.

LOUISIANA, one of the Southern States of the United States of America, lying on the N. coast of the Gulf of Mexico. Begin- ning on the N., its boundary follows eastward the parallel of 33° N., separating Louisiana from Arkansas; then descends the Mississippi river, separating it from the state of Mississippi, southward to 31 ; passes eastward on this parallel to the Pearl river, still with the state of Mississippi on the E.; and descends this river to the Gulf. On the W. the Sabine river, from the Gulf to 32° N., and, thence to the parallel of 33 , a line a little W. of (and parallel to) the meridian of 94 W., separate Louisiana from Texas. Including islands in the Gulf, the stretch of latitude is approximately 4° and of longitude 5 . The total area is 48,506 sq. m., of which 3097 sq. m. are water surface (including 1060 sq. m. of landlocked coastal bays called "lakes"). The coast line is about 1 500 m.

Physical Features. — Geologically Louisiana is a very recent creation,

and belongs to the ” Coastal Plain Province.” Most of the rocks or soils composing its surface were formed as submarine deposits; the easternmost and southernmost parts are true river deposits. These facts are the key to the state’s chorography. The average elevation of the state above the sea is only about 75 ft., and practically the only parts more than 400 ft. high are hills in Sabine, Claiborne and Vernon parishes. The physiographic features are few and very simple. The essential elements are five 1 : diluvial plains, coast marshes, prairies, ” bluffs ” and ” pine-hills ” (to use the local nomenclature). These were successive stages in the geo- logic process which has created, and is still actively modifying, the state. They are all seen, spread from N. to S., west of the Mississippi, and also, save only the prairies, in the so-called ” Florida parishes ” E. of the Mississippi.

These different elements in the region W. of the Mississippi are arranged from N. to S. in the order of decreasing geologic age and maturity. Beginning with elevations of about 400 ft. near the Arkansas line, there is a gentle slope toward the S.E. The northern part can best be regarded as a low plateau (once marine sediments) sloping southward, traversed by the large diluvial valleys of the Mississippi, Red and Ouachita rivers, and recut by smaller tributaries into smaller plateaus and rather uniform flat-topped hills. The ” bluffs ” (remnants of an eroded plain formed of alluvion deposits over an old, mature and drowned topography) run through- the second tier of parishes W. of the Mississippi above the Red river. Below this river prairie areas become increasingly common, con- stituting the entire S.W. corner of the state. They are usually only 20 to 30 ft. above the sea in this district, never above 70, and are generally treeless except for marginal timber along the sluggish, meandering streams. One of their peculiar features — the sandy circular ” mounds,” 2 to 10 ft. high and 20 to 30 or even 50 ft. in diameter, sometimes surmounted by trees in the midst of a treeless plain and sometimes arranged in circles and on radii, and decreasing in size with distance from the centre of the field — has been variously explained. The mounds were probably formed by some gentle eruptive action like that exhibited in the ” mud hills ” along the Mississippi below New Orleans; but no explanation is generally accepted. The prairies shade off into the coast marshes. This fringe of wooded swamp and sea marsh is generally 20 to 30, but in places even 50 and 60 m. in width. Where the marsh is open and grassy, flooded only at high tides or in rainy seasons, and the ground firm enough to bear cattle, it is used as range. Considerable tracts have also been diked and reclaimed for cotton, sugar and especially for rice culture. The tidal action of the gulf is so slight and the marshes are so low that perfect drainage cannot be obtained through

tide gates, which must therefore be supplemented by pumping machinery when rains are heavy or landward winds long prevail. Slight ridges along the streams and bayous" which traverse it, and occasional patches of slightly elevated prairie, relieve in a measure the monotonous expanse. It is in and along the borders of this coast swamp region that most of the rice and much of the sugar cane

1 A sixth, less characteristic, might be included, viz. the " pine flats," generally wet, which are N. of Lake Pontchartrain, between the alluvial lands and the pine hills, and, in the S.E. corner of the state, between the hills and the prairie.

of the state are grown. Long bar-like " islands " (conspicuous high land rising above the marsh and prairie) — Orange, Petite Anse, Grand Cote, Cote Blanche and Belle Isle — offer very interesting topographical and geological problems. " Trembling prairies " — land that trembles under the tread of men or cattle — are common near the coast. Most of the swamp fringe is reclaimable. The marshes encroach most upon the parishes of St Charles, Orleans and Plaquemines. In St Charles the cultivable strip of land along the river is only about 3 m. wide. In Orleans the city of New Orleans occupies nearly all the high ground and encroaches on the swamps. In Plaquemines there is practically no cultivable land below Forts Jackson and St Philip, and above there is only a narrow strip.

The alluvial lands include the river flood plains. The principal rivers are the Mississippi, which flows nearly 600 m. through and along the border of the state, the Red river, the Ouachita (or Washita) , Sabine and Pearl; all except the last are navigable at all stages of the water. There are many " bayous," several of which are of great importance, both for navigation and for drainage. They may be characterized as secondary outlets of the rivers or flood distributaries. Among them are Bayou Teche, Bayou Plaquemine, Atchafalaya Bayou, 1 Bayou Lafourche and Bayou Bceuf. Almost all secondary water-courses, particularly if they have sluggish currents, are known as bayous. Some might well be called lakes, and others rivers. The alluvial portion of the state, especially below the mouth of the Red river, is an intricate network of these bayous, which, before their closure by a levee system, served partially, in time of flood, to carry off the escaping surplus of river waters. They are comparatively in- active at all seasons; indeed, the action of the tides and back-waters and the tangle

of vegetation in the sombre swamps and forests through which they run, often render their currents almost im- perceptible at ordinary water. Navigable waters are said to pene- trate all but four of the parishes of the state, their total length approximating 3800 m.

Each of the larger streams, as well as a large proportion of the smaller ones, is accompanied by a belt of bottom land, of greater or less width, lying low as regards the stream, and liable to overflow at times of high water. These flood plains form collectively what is known as the alluvial region, which extends in a broad belt down the Mississippi, from the mouth of the Ohio to the Gulf of Mexico, and up the Ouachita and its branches and the Red river to and beyond the limits of the state. Its breadth along the Mississippi within Louisiana ranges from 10 to 50 or 60 m., and that along the Red river and the Ouachita has an average breadth of 10 m. Through its great flood-plain the Mississippi river winds upon the summit of a ridge formed by its own deposits. In each direction the country falls away in a succession of minor undulations, the summits of the ridges being occupied by the streams and bayous. Nearly all of this vast flood-plain lies below the level of high water in the Missis- sippi, and, but for the protection afforded by the levees, every con- siderable rise of its waters would inundate vast areas of fertile and cultivated land. The low regions of Louisiana, including the alluvial lands and the coast swamps, comprise about 20,000 sq. m., or nearly one-half the area of the state. The remainder consists of the uplands of prairie and forest.

The alluvial region of the state in 1909 was mainly protected against overflow from the Mississippi river by 754 m. of levee on the Mississippi river within the state, and 84 m. on the Mississippi river, Cypress and Amos Bayou in Arkansas, forming part of the general system which extends through other states, 1000 m. up to the highlands about the junction of the Ohio river. The state and the national government co-operate in the construction and maintenance of this system, but the Federal government did not give material aid (the only exception being the grant of swamp lands in 1850) until the exceptionally disastrous flood in 1882. For about a century and a half before that time, levee building had been undertaken in a more or less spasmodic and tentative way, first by riparian proprietors, then by local combinations of public and private interests, and finally by the state, acting through levee districts, advised by a Board of Engineers. The Federal government, after its participation in the work, acted through a Board of Engineers, known as the ” Mississippi River Commission.” The system of 754 m. of Missis- sippi river levees, within the state, was built almost entirely after 1866, and represents an expenditure of about $43,000,000 for primary construction alone;

of this sum, the national government contributed probably a third (the state expended about $24,000,000 on levees before the Civil War). Some of the levees, especially those in swampy regions where outlet bayous are closed, are of extra- ordinary solidity and dimensions, being 20 to 40 ft. high, or even more, across streams or bayous — formerly outlets — with bases of 8 or 10 ft. to one of height. The task of maintenance consists almost entirely in closing the gaps which occur when the banks on which the levees are built cave into the river. Levee systems on some of the interior or tributary rivers, aggregating some 602 m., are ex- clusively built and maintained by the state. Louisiana also contri- butes largely to the 84 m. of levee in Arkansas, necessary to its security from overflow. The improvement of bayous, channels, the

'The original channel of the Red river. It has been so useful in relieving the Mississippi of floods, that the Red river may possibly be permanently diverted again into the bayou artificially.

construction of canals and the drainage of swamp lands also contri- bute to the protection of the state.

The lakes are mainly in three classes. First come the coast lagoons, many of which are merely land-locked salt-water bays, the waters of which rise and fall with the tides. Of this class are Pontchartrain, Borgne, Maurepas and Sabine. These are simply parts of the sea which have escaped the filling-in process carried on by the great river and the lesser streams. A second class, called "ox-bow" lakes, large in numbers but small in area, includes ordinary cut-off meanders along the Mississippi and Red rivers. A third class, those upon the Red river and its branches, are caused mainly by the partial stoppage of the water above Shreveport by the "raft," a mass of drift such as frequently gathers in western rivers, which for a distance of 45 m. almost completely closed the channel until it was broken up by government engineers. These lakes are much larger at flood season than at other times, and have been much reduced in size by the cutting of a channel through the raft. Lakes of this class are sometimes formed by the choking of the mouth of feeble tributaries by silt deposited by the Red river where the currents meet.

Mineral Resources. — Mineral resources are few, but important. In the Tertiary region are found small quantities of iron ore and an indifferent brown coal. The important mineral products are salt, sulphur, petroleum and natural gas. The deposit of rock salt on Petite Anse Island, in the coast swamp region, has been extensively worked since its discovery during the Civil War. The deposit is in places 1000

ft. thick, and yields salt of extraordinary purity (some- times 99 % pure). There are large deposits also on Orange Island (in places at least 1800 ft. thick), on Week's Island, on Belle Isle and probably beneath the intervening marshes. In 1907 Louisiana ranked sixth among the salt-producing states of the country (after New York, Michigan, Ohio, Kansas and California), its output being valued at $226,892, only a few hundred dollars more than that of Texas. Near Lake Charles, at Sulphur, are very extraordinary sulphur deposits. The beds lie several (for the most part four to six) hundred feet underground and are of disputed origin. Many regard them as products of an extinct volcano; according to others they are of vegetable origin (they are found in conjunction with gypsum). They were discovered before 1870 by searchers after petroleum, but their exploitation remained in the experimental stage until about 1900. The sulphur is dissolved by superheated water forced down

Eipes, and the water with sulphur in solution is forced upward by ot air pressure through other pipes; the sulphur comes, 99 % pure, to the surface of the ground, where it is cooled in immense bins, and then broken up and loaded directly upon cars for shipment. These mines divide with the Sicilian mines the control of the sulphur market of the world. The value of the sulphur taken from the mines of Louisiana in 1907 was a little more than $5,000,000. Evidences of petroleum were discovered long ago, in the very field where in recent years the Beaumont and Vinton wells were bored. In 1909 Jennings was the chief field in Louisiana, lesser fields being at Welsh, Anse la Butte, Caddo and Vinton. The Jennings field, one of the greatest in the United States, produced up to and including 1907 more than 26,000,000 barrels of high-grade oil, twelve-thir- teenths of which came from an area of only 50 acres, one well pro- ducing a tenth of the entire output. In 1907 the state produced 5,000,221 barrels of petroleum, valued at $4,063,033. Natural gas is found in Caddo parish, about 20 m. N. of Shreveport. The depth of the wells is from 840 to 2150 ft.; two wells completed in 1907 had a daily capacity estimated at 35,000,000 to 50,000,000 ft. Shreveport, Oil City, Blanchard, Mooringsport, Bossier City and Texarkana are supplied with natural gas by pipe lines from this field. Kaolin is found in the state; in 1907 the total value of all clay products was $928,579.

Climate. — The climate is semi-tropical and exceptionally equable over large areas. In the S. and S.E. the equable temperature is largely the effect of the network of bays, bayous and lakes, and throughout the state the climate is materially influenced by the pre- vailing southerly winds from the Gulf of Mexico. Some daily varia- tion in the temperature of adjoining localities is caused by a dark soil in the one

and a light soil in the other, but the differences of mean annual temperature are almost wholly due to differences of latitude and elevation. The mean annual temperature for a period of nineteen years (Jan. 1888 to Dec. 1906) ranged from 70° F. at Port Eads, in the extreme S.E., to 65 F. at Lake Providence, in the N.E. The mean temperature of July, the hottest month, is comparatively uniform over the state, varying only from 81 ° to 83 ; the mean for January, the coldest month, varies from 46 in the extreme north to 56° in the extreme south. Even in the coldest localities eight or nine months are wholly free from frost, and in the coast parishes frost occurs only a few days in each year. Rainfall is usually heavy in the S.E., but it decreases toward the N.W. As much as 85-6 in. have fallen within a year at New Orleans, but in this locality the average for a year is about 57-6 in.; at Shreveport the average is 46 in., and for the entire state it is 55 in. Much more rain fails in summer than in any other season, but in some parts the heaviest rainfall is in the spring and in others in the winter. A light fall of snow is not uncommon in the northern parishes, but in the southern part of the state snow falls not oftener than once in three to five years. Hailstorms are infrequent everywhere, but especially so

O Qˆg

to • i-< 2. J

• r p C/5 – . =

o

in the south. Only a fourth to a half of the days of the different months are wholly or partly clear even in the north, and in the same district the monthly means of relative humidity vary from 65 to 70. Fauna. — The entire state is included within the Austro-riparian life zone ; the higher portions fall within the Carolinian area and the lower portions, including the Gulf and the Mississippi embayment almost to the N.E. corner of the state, constitute a special semi-tropical region. The native fauna of the state resembles in its general features that of the other Gulf states. The feral fauna was once rather varied. Black bears, wolves and deer are not yet extinct, and more rarely a ” wild cat ” (lynx) or ” panther ” (puma) is seen in the swamps. Of smaller mammals, raccoons, squirrels and opossums are very common. Every bayou contains alligators; and reptiles of various species, such as turtles, lizards, horned toads, rattlesnakes and moccasins are abundant. Shrimps, frogs (of great commercial importance), terrapin, clams and oysters are common. Only in very recent years have oysters, though plentiful, become of competitive importance in the national market; they are greatly favoured by state protective legislation. In 1904 a state oyster commission was created to supplant the independent control by the parishes. An important boundary dispute with Mississippi arose over beds lying near the state line. The state leases the beds at a low annual rental in tracts (limited for each person, firm or corpora- tion to 1000 acres), and draws from them a considerable revenue. The avifauna is varied and abundant, comprising eagles, vultures (protected by law), hawks, owls, pelicans, cranes, turkeys, geese, ” partridges ” (called quail or ” Bob White ” elsewhere), ducks, &c, besides numerous smaller species, many of which are brilliant of plumage but harsh of voice.

Flora. — Heavy rainfall, high temperature and fertile soil combine to cover the greater part of the state, and particularly the alluvial regions and the coast swamps, with a most luxuriant subtropical vegetation, both arborescent and herbaceous. Louisiana is justly celebrated for the beauty and fragrance of its flowers. The range of temperature is not sufficient to give the variety of annual wild flowers of more northern climates; nevertheless flowers cover the bottom lands and uplands in great profusion. The upland flora is the more diversified. Flowering annuals are mainly aquatic. Water lilies, water hyacinths, which are an obstruction in many streams, and irises in rich variety give colour to the coast wastes and sombre bayous. Notable among the flora are

roses, japonicas, hibiscus shrubs of various species, poinsettias, tea olives, crepe myrtle, jasmines, magnolias, camellias, oleanders, chrysanthemums, ger- aniums and plumbagos. The value and variety of the timber are very great. Much of the river swamp region is covered with cypress trees festooned with Spanish moss. The most common species in the alluvial regions and, to a less degree, in the drier portions of the swamps and in the stream bottoms of the prairies are various oaks, black, sweet and tupelo gum, holly, cotton-wood, poplar, magnolia sweet bay, the tulip tree, catalpa, black walnut, pecans, hickories, ash, beech and short-leaf pine. On drier and higher soils are the persimmon, sassafras, red maple, elm, black haw, hawthorn, various oaks (in all 10 species occur), hickories and splendid forests of long- leaf and loblolly yellow pine.

Forestry. — These forests are the greatest and finest of their kind remaining in the United States. In 1898 it was estimated by Henry Gannett (followed by the Federal census of 1900) that the timbered area covered 28,300 sq. m. Professor C. S. Sargent estimated in 1884 that the stand of short-leaf and long-leaf pines aggregated respectively 21,625 and 26,558 million feet. The timber product of 1900 ($17,294,444) was almost ten times that of 1880 ($1,764,640) ; and in 1905 the product value ($35,192,374) was more than twice that of 1900. Nevertheless, in 1900 the cypress forests remained practically untouched, only slight impression had been made upon the pine areas, and the hard-wood forests, except that they had been culled of their choicest oak, remained in their primal state (U.S. census). Between 1900 and 1905 furniture factories and planing mills became somewhat important. Pond pine occurs only near the Pearl river. Curly pine is fairly abundant. The eastern pine belt is composed of the long-leaf pine, interspersed with some loblolly. It covers an area of about’ 3900 sq. m. The south-western pine belt contains the heaviest growth of long-leaf pine timber in the world, covering an area of about 4200 sq. m., and occasionally interspersed with short-leaf pine. The short-leaf growth is especially heavy in the north-western portion of the state, while the long-leaf is found mainly in large masses N. and S. of the Red river around Alexandria as a centre. The cypress forests of the alluvial and overflowed lands in the S. of the state are among the largest and the most heavily timbered known. The hard-woods are found in the river bottoms throughout the state.

Agriculture and Soils. — Agriculture is the chief industry of the state. In 1900 26-2% of the land was in farms, and of this area about two-fifths was improved. The size of the average farm decreased in the two preceding decades from 171-3 to 95-4 acres. The percentage of farms operated by owners (i.e. owners, part owners, owners and tenants, and

managers) fell from 64-8 to 42-1% from 1880 to 1900, and the percentage operated by

cash tenants increased from 13-8 in 1880 to 24-9 in 1900, and by share tenants from 21-5 in 1880 to 33-0 in 1900; the percentage of farms operated by white farmers was 49-8 in 1900. The value of farm property, $198,536,906 in 1900, increased 79-8% in the preceding decade. The value of live stock in the latter year was $28,869,306. The total value of all farm products in 1899 was $72,667,302, of which $59,276,092 was the value of the distinctive crops — cotton, sugar and rice. The state bureau of agriculture in 1903 estimated that of the total area 14-9 millions of acres were timber land, 5-7 millions pasture and marsh, and 5-0 millions cultivated farm land.

In the N. there are many sandy districts in the uplands, also sandy clays; in the " second bottoms " of the streams fertile sandy loams; abundant tertiary marls in the north-central region; some gypsum in the cretaceous "islands"; and some f ossilif erous marls with decomposed limestones. The prairies of south-western Louisiana have much yellow marl underlying them. Alluvial soil and bluff, the location of which has been indicated, are of primary agricultural importance. Reclaimed marsh-land and fresh alluvium (the so-called " front-lands " on rivers and bayous) are choice soil for Indian corn, sugar-cane, perique tobacco, semi-tropical fruits and cotton. The bluff lands are simply old alluvium now well drained and above all floods. The prairies of the S.W. are devoted almost exclusively to rice. On the hills yellow-leaf tobacco can be grown. Cereals and forage plants can be successfully grown everywhere, and varied and profitable agriculture is possible even on the " pine-barrens " or uplands of the N.; but more intelligent and more intensive farming is necessary than that practised by the average " piney- woods " farmer. The alluvial section of lower Louisiana is mostly devoted to sugar, and farther northward to Indian corn and cotton.

Cotton is the principal crop. In 1907 Louisiana ranked eighth in acreage of cotton (1,622,000 acres) among the states of the United States, and in 1907-1908 the cotton crop (675,428 bales) was eighth among the crops of the states. The average yield per acre varies from about -45 to -75 bale according to the season. In good seasons and exceptional localities the yield may approach a bale per acre, as in Assumption parish, and in the Mississippi valley at the junction of Louisiana, Mississippi and Arkansas. For many years there has been a reaction against the all-cotton farming system. In general, the small cotton farmer was at the mercy of the commission merchant, to whom he mortgaged his crops in advance; but this evil has lessened, and in

some districts the system of advancing is either non- existent or very slightly developed.

In 1 907-1908 all the sugar produced from cane grown in the United States came from Louisiana (335,000 long tons) and Texas (12,000 tons) ; in the same year cane sugar from Hawaii amounted to 420,000 tons, from Porto Rico to 217,000 tons and from the Philip- pines to 135,000 tons; and the total yield of beet sugar from the United States was 413,954 tons. Of all the cane grown, an amount between one-sixth and one-quarter — and that the best — must be reserved for seed every other year, and this is a great handicap to the state in competing with other cane regions and with the sugar beet. Of the total sugar consumption of the country in 1899-1904 Louisiana produced somewhat more than a fifteenth. Since about 1880 there have been central factories, and their increase has been a very prominent factor in the development of the industry, as it has been in Cuba, Though very much of the region S. of the Red river is fairly well suited to sugar-growing, it is still true that sugar cannot, over much of this area, be grown to so great advantage as other crops. Its hold upon the delta region is, however, almost un- challenged, especially since the rice farmers have found in the prairie lands that excel the delta for their purposes. Sugar is grown also in St Landry and the eastern part of Attakapas — a name formerly loosely applied to what are now St Mary, Iberia, Vermilion, St Martin and Lafayette parishes. Though introduced with success from Santo Domingo about the middle of the 18th century, the sugar industry practically dates from 1796, when Etienne Bore first suc- ceeded in crystallizing and clarifying the syrup. Steam motive power was first introduced on the plantations in 1822. The average product of the ten seasons 1894-1904 was 299,745 tons. A state sugar experiment station is maintained at Audubon Park in New Orleans, its work embracing the development of seedlings, the improvement of cane varieties, the study of fungus diseases of the cane, the improvement of mill methods and the reconciliation of such methods (for example, the use of sulphur as a bleaching and clarifying agent) with the requirements of ” pure food ” laws. Good work has also been done by the Audubon sugar school of the state university, founded ” for the highest scientific training in the growing of sugar cane and in the technology of sugar manufacture.”

c6

LOUISIANA

Tobacco might be grown profitably over a large part of the state, but in reality very little is grown. The strong, black perique of the delta —

cultivated very generally in the lower alluvial region before the Civil War, but now almost exclusively in St James parish — is a famous leaf, grown since early colonial times. Bright or yellow plug and smoking leaf are grown on the pine uplands and pine ” flats,” and a small amount of cigar tobacco on the flats, prairies and ” bluffs.” The total value of the tobacco crop of 35,000 lb in 1907 was only $10,000, an amount exceeded by each of the other 24 tobacco-growing states, and the crop was about one-twentieth of 1 % of the product of the whole United States.

Rice farming, which had its beginning immediately after the Civil War and first became prominent in the ‘seventies, has developed enormously since 1880. From 1879 to 1899 the product increased twenty-five fold. Formerly the grain was raised by preference in the river bottoms, which still yield, almost invariably, the earliest rice of the season and perhaps the finest. The ” buckshot clays ” of the backlands, which are so stiff that they can scarcely be ploughed until flooded and softened, and are remarkably retentive of moisture, are ideal rice soil; but none of the alluvial lands has an underlying hardpan, and they cannot as a rule be drained sufficiently to make the use of heavy harvesting machinery possible. In 1880 the prairies of the S.W. were opened to settlement by the railway. These prairies are traversed by ridges, which facilitate irrigation, and are underlaid by an impervious subsoil, which facilitates both effective storage and drainage. Thus the use of machinery became possible, and this revolutionized the entire industry. The year 1884 may be taken as the initial date of the new period, and the grain is now harvested exactly as is wheat in the west-central states. Previously the grain had ordinarily been cut with sickles and harvested by hand. The farms were also small, usually from 5 to 10 acres. They are now very much larger. All the prairies district — the centre of which is Crowley — is becoming one great rice field. Some rice also is grown on the lowlands of the Mississippi valley, notably in Plaquemines, Jefferson and Lafourche parishes. In the decade 1881-1890 Louis- iana produced about half of the total yield of the country, and from 1891 to 1900 about five-sevenths. In 1904 and 1906 the Louisiana crop, about one-half of the total yield of the country, was larger than that of any other state; but in 1905 and in 1907 (6,192,955 lb and 7,378,000 lb respectively) the Louisiana crop was second in size to ‘that of Texas. Carolina and Honduras rices were practically the only varieties until aftef 1896. Since that time select Japanese species, chosen for superior milling qualities, have been widely intro- duced, as the market prejudice in favour of head rice made the large percentage of broken rice a heavy handicap to the farmers. Hun- dreds of varieties have

been tested by the state and federal agri- cultural experiment stations. A strong tendency to run to red rice (hardier, but not so marketable) has been a second great difficulty to overcome.

Irrigation is almost entirely confined to rice farms. In the prairie region there is abundant water at depths of 100 to 400 ft. beneath the surface, but this was little used for irrigation for the first few years of the development of this field, when water was pumped from the streams and canals. In 1902 nearly one-eighth of the acreage irrigated was by systems supplied from wells. The irrigated rice area increased 92-9% from 1899 to 1902, and the construction cost of irrigation works ($4,747,359 in 1902 ; $12.25 P er irrigated acre) &7 – 7 % in the same years. This increase was almost wholly in the prairie parishes. Of the total irrigated area for rice of 387,580 acres in 1902, 310,670 acres were in the parishes of Calcasieu, Acadia and Vermilion. In the Mississippi valley water is taken from the river by flumes in the levees or by siphons. The danger of floods and the difficulty of drainage make the extension of the practice unprofitable, and the opening of the prairies has made it unnecessary.

Many of the fruits of warm-temperate and semi-tropical lands, whether native or exotic, including oranges, olives ; figs, grape-fruit, kumquats and pomegranates are cultivated. Oranges are grown especially on the coast. There are many fine groves on the Mississippi below New Orleans. The fig is a common door-yard tree as in other Gulf and South Atlantic states, and is never killed down by frost. Louisiana produced in 1899 only a fifth as great a value in sub- tropic fruits as Arizona and Texas combined. Orchard fruits are fairly varied, but, compared with other states, unimportant; and the production of small fruits is comparatively small, the largest crop being strawberries. Oranges and pears are seriously damaged by insect and fungus pests. The total value of fruit products in 1899 was $412,933. Among nuts the native pecan is exceptionally abundant, the product (637,470 lb in 1899) being much greater than that of any other state save Texas.

The total value of cereal products in 1899 was $14,491,796, in- cluding Indian corn valued at $10,327,723 and rice valued at $4,044,489; in 1907 it was more than $27,300,000, including Indian corn valued at $19,600,000, rice valued at $7,378,000 and oats valued at $223,000. Indian corn is grown only for home use. Dairying interests are not largely developed, and in Texas and the adjoining states the ” Texas fever ” and ” charbon ” have done great damage to cattle. Forage crops are little grown, though soil conditions are favourable. Cowpeas are a common fertilizer. Garden trucking is very slightly developed, but has been successful where it has been tried.

The state maintains a crop pest commission, the

duties of which include the inspection of all nursery stock sold in the state.

Manufactures. — The state's manufacturing interests have during the last few decades grown greatly in importance. From 1890 to 1900 the capital invested, the cost of materials used and the value of output (in 1900 , $121,181,683) increased respectively 225-4, 147-3 and 109 6% The value of the factory products in 1900 was $111,397,919; in 1905 it was $186,379,592. Slightly above one-half of the product of 1900 was from New Orleans, and in 1905 about 45-4%. A constitutional amendment of 1902 exempted from parochial and municipal taxes between 1900 and 19 10 practically all factories and mines in the state, employing at least five hands. Manufacturing industries are for the most part closely related to the products of the soil, about two-thirds of the value of all manufactures in 1900 and in 1905 being repre- sented by sugar and molasses refining, lumber and timber products, cotton-seed oil and cake, and rice cleaned and polished.

Rice is milled at New Orleans, Crowley, Abbeville, Gayden, Jennings and Lake Charles. Ramie fibre and jute are available for coarse cloth; cotton weaving is almost non-existent. The lumber industry is centred chiefly in Calcasieu parish. Lake Charles, West- lake, Bogalusa, Bon Ami, Carson, Fisher, Fullerton, Leesville, Oakdale and Pickering were the leading sawmill towns of the state in 1908. Of the rarer woods particular mention may be made of curly pine, yielding a wood of beautiful figure and polish ; magnolia, hard, close-grained, of fine polish and of great lasting qualities; and cypress, light, strong, easily worked and never-rotting. The timber cut ofiooo was officially stated as 1,214,387 M. ft. B.M.,of which two-thirds were of yellow pine and most of the remainder of cypress. In some localities, especially in the " Florida parishes," small quantities of rosin and turpentine are taken from the long-leaf pine, but this industry was unimportant in Louisiana before 1908. Sawdust, slabs, stumps and large quantities of logs are wasted. Other manufactures with a product value in 1905 of between $4,000,000 and $1,000,000 were: bags (not paper); foundry and machine-shop products; planing-mill products; railway cars, construction and repairs; malt liquors; men's clothing; cooperage; food preparations; roasted and ground coffee and spice; fertilizers; cigars and cigarettes; cotton goods; and manufactured ice.

Communications. — The length of railway in the state was 1740 m. in 1890 and 4943-55 m. at the end of 1908. By the state constitution of 1898 and by amendments of 1902 and 1904 tax exemptions for ten

years were granted to newly-built railroads completed before 1909. The principal roads are the Missouri Pacific (St Louis, Iron Mountain & Southern, New Orleans & North-western and St Louis, Watkins & Gulf), the Southern Pacific (Morgan's Louisiana & Texas Railroad & Steamship Co. and the Louisiana Western), the Texas & Pacific, the Kansas City Southern, the Vicksburg, Shreveport & Pacific, the Louisiana Railway & Navigation Co., the Yazoo & Mississippi Valley, the Illinois Central, and the Louisiana & Arkansas. The Illinois Central, the first railway giving Louisiana connexion with the north, and of immense importance in the trade of New Orleans, has only about 100 m. of double track in the state. The problem of inland waterways has always been a most important one in northern, eastern and southern Louisiana, where there are systems of improved bayous, lakes and canals which, with the levees, make this region something like Holland, on a greater scale. Many bayous are con- vertible by improvement into excellent drainage and irrigation canals. The canal system is especially well developed in the parishes of the Mississippi delta, where, at the close of 1907, there were about 50 m. of these waterways of decided commercial importance. They serve the trade of Lake Pontchartrain and the Florida parishes, the lumber, coal, fish, oyster and truck trade of New Orleans, and to some extent are the highway of a miscellaneous coasting trade. The most important canal is probably the new Atchafalaya Bay canal (14 ft. deep), opened in 1907, connecting the Atchafalaya river and Morgan City with the Gulf of Mexico. In 1907 active prelimin- ary work was begun on the Louisiana section of a great interstate inland waterway projected by the national government between the Mississippi and Rio Grande rivers, almost parallel to the Gulf Coast and running through the rice and truck-farm districts from the Teche to the Mermenton river (92 m.). The competition of the water lines is felt by all the railways, and the importance of water transportation is rapidly increasing. A state railroad commission, organized in 1899, has power to regulate railway, steamer, sleeping- car, express, telephone and telegraph rates within the state. Foreign commerce is almost wholly centred at New Orleans.

Population. — The population of the state increased in the ten decades from 1810 to 1910 successively by 100-4, 4°'6, 63-4, 46-9, 36-7, 2-7, 29-3, 19-0, 23-5 and 19-9%. In 1910 it was 1,656,388 (36-5 per sq. m.). 1 In 1900 47-1% was of negro

ir rhe population was 76,556 in 1810; 153,407 in 1820; 215,739 in 1830; 352,411 in 1840; 517,762 in 1850; 708,002 in i860; 726,915 in 1870; 939,946 in 1880; 1,118,588 in 1890; and 1,381,825 in 1900.

blood, as compared with 51ˆ5 in 1890. In 1910 there were nine cities with more than 5000 inhabitants each: New Orleans (339, 075); Shreveport (28,015); Baton Rouge (14,897), the capital; Lake Charles (11,449); Alexandria (11,213); Monroe (10,209); New Iberia (7449) ; Morgan (5477); Crowley (5099). The urban element is larger than in any other southern state, owing to the large population of New Orleans. The Acadians (see § History below) to-day are settled mainly in St Mary, Acadia and Ver- milion parishes; lesser numbers are in Avoyelles and St Landry; and some are scattered in various other parishes. The parishes of St Mary, Iberia, Vermilion, St Martin and Lafayette are known as the Attakapas country from an Indian name. A colony of Germans sent over by John Law to the Arkansas removed to the Mississippi above New Orleans, and gave to its bank the name of the "German Coast," by which it is still known. In recent years there has been an immigration of Italians into Louisiana, which seems likely to prove of great social and economic importance. The industrial activity of the state has required more labour than has been available. The negroes have moved more and more from the country to the towns, where they easily secure work at good wages. Owing to the inadequate supply of labour two important immigration leagues of business men were formed in 1904 and 1905, and in 1907 the state government began officially to attempt to secure desirable foreign immigration, sending agents abroad to foster it. Roman Catholics greatly predominate among religious denominations, having in 1906 477,774 members out of a total of 778,901 for all denominations; in the same year there were 185,554 Baptists, 79,464 Methodists, 9070 Protestant Episcopalians and 8350 Presbyterians.

Administration. — Since the admission of the state to the Union in 1 81 2 there have been eight state constitutions (not counting that of 1 861) admirably illustrating — and not less the Territorial government preceding them — the development of American democracy and the problems connected with the negroes. Under the Territorial government the legislative officers were not at first elective. The "parishes" date from 1807; they were based on an earlier Spanish division for religious purposes — whence the names of saints in parish nomenclature. The con- stitution of 181 2 allowed the General Assembly to name the governor from the two candidates receiving the highest number of votes; gave the governor large powers of appointment, even of local functionaries; and required a property qualifica- tion for various offices, and even for voters. The constitution

of 1845 made the popular suffrage final in the choice of the governor, abolished property qualification^, and began to pare executive powers for the benefit of the Gerieral Assembly or the people. From it dates also the constitutional recognition of the public schools. In 1852 even the judges of the supreme court were placed among the officers chosen by popular vote. The con- stitutions of 1864 and 1868 were of importance primarily as bearing on negro status and national politics. That of 1879 showed a profound distrust of legislative action, bred of recon- struction experiences. Nearly all special legislation was for- bidden. The last constitution (1898, with 26 amendments 1898-1906), unlike all others after that of 1812, was not submitted to the people for ratification.

Under this constitution sessions of the General Assembly are bi- ennial (meeting the second Monday in May in even-numbered years) and are limited to sixty days. The number of senators is fixed by the constitution at 39; the number of representatives is to be not more than 1 16 or less than 98. Any elector is eligible for election as a representative if he has been a citizen of the state for five years and a resident of the district or parish from which he is elected for two years immediately preceding the election; a change of residence from the district or parish from which he was elected vacates the seat of a representative or senator. A senator must be at least 25 years of age. Members of the legislature are elected for four years. Revenue or appropriation bills originate in the House of Repre- sentatives, but may be amended by the Senate. Contingent appro- priations are forbidden, and the constitution contains a long list of subjects on which special laws may not be passed. The chief executive officers have four-year terms, neither the governor nor the treasurer being eligible for immediate re-election. The governor must be at least 30 years old and must have been a citizen of the United States and a resident of the state for 10 years next preceding his election. Within five days after the passage of any bill by the

General Assembly he may veto this measure, which then becomes a law only if passed by a two-thirds vote of all members elected to each house of the General Assembly. The lieutenant governor (and then the secretary of state) succeeds to the office of governor if the governor is removed, dies or leaves the state. The five judges of the supreme court of the state are elected by the people for a term of twelve years. The supreme court is almost with- out exception a court of appeal with jurisdiction in cases involving at least $2000, in cases of divorce, in suits regarding adoption, legitimacy and custody of children and as regards the legality and constitutionality of taxes, fines, &c. The supreme court appoints courts of appeal to judge cases involving less

than $2000. The constitution prohibits lotteries and the sale of lottery tickets.

The suffrage clauses are of particular interest, as they accomplish the practical disfranchisement of the negroes. The constitution requires that a voter must (in addition to other qualifications) either be able to show conclusively ability to read and write, or be the owner of property within the state assessed at not less than $300, on which, if personalty, all taxes are paid. But it excepts from these requirements — thus letting down the bars for illiterate whites excluded with negroes by the foregoing clauses — persons who were entitled to vote in some state on or before the 1st of January 1867 (i.e. before the adoption of the Fourteenth and Fifteenth Amend- ments of the United States Constitution) ; also the sons or grandsons of such voters, not under 21 years of age, on the 12th of May 1898; and males of foreign birth who have resided in the state for five years next preceding the date of application for registration and who were naturalized prior to 1898. The constitution provides that no person less than 60 years of age shall be permitted to vote unless he has paid an annual poll-tax of one dollar for the two years next preceding the year in which he offers to vote. Convicts not pardoned with an explicit restoration of suffrage privileges are disfranchised — a rare clause in the United States. Suffrage was by this constitution first extended to women tax-payers in questions ” submitted to the tax-payers, as such.” The creation of a railroad commission was ordered and the preparation of a code of criminal law.

The Louisiana Board of Levee Commissioners was organized in 1 865. The state board of health was the first one effectively organized (1855) in the United States. It encountered many difficulties, and until the definite proof of the stegomyia hypothesis of yellow- fever inoculation made by the United States army surgeons in Cuba in 1900, the greatest problem seemed insoluble. Since that time conditions of health in New Orleans have been revolutionized (in 1907 state control of maritime quarantine on the Mississippi was supplanted by that of the national government), and smaller cities and towns have been stimulated to take action by her example. Sanitary institutes are held by the state board at various towns each year for the instruction of the public. Boards of appraisers and equalization oversee the administration of the tax system; the cost of collection, owing to the fee system for payment of collectors, was higher than in any other state of the Union until 1907, when the fees were greatly reduced. The state assessment in 1901 totalled $301,215,222 and in 1907 was $508,000,000. Schools and levees absorb about half of all revenues, leaving half for the payment of interest on the state debt (bonded debt

on 1st of April 1908, $11,108,300) and for expenses of government. A general primary election law for the selection, by the voters, of candidates for state office came into effect in 1906.

Law. — Louisiana has been peculiar among the states of the Union in the history of the development of its legal system. In Louisiana alone (as the state is known to-day), out of all the territory acquired from France as the Louisiana Purchase in 1803, was the civil law so established under French and Spanish rule that it persisted under American dominion. In all the othei states formed from the Purchase, the civil law, never existent practically, was early expressly abrogated, and the common law of England established in its place. After O'Reilly established his power in 1769 (see History, below), the Spanish law was supreme. All the old codes of the Peninsula, as well as the lawr of the Indies and special royal decrees and schedules, were in force in the colony. The United States left the task of altering the laws to the people, as far as there was no conflict between them and the Constitution of the United States and fundamental American legal customs. Copies of the Spanish codes were very rare, and some of them could not be had in the colonies. Dis- cussions of the Roman Institute and Pandects were common in the deliberations of the courts. Great confusion prevailed in the first years of American dominion owing to the diversities of languages and the grafting of such Anglo-Saxon institutions as the jury upon the older system. A provisional code of judicial procedure, prepared by Edward Livingston, was in effect in 1805 to 1825. The earliest digest, completed in 1808, was mainly a compilation of Spanish laws. The project of the Code NapoUon,

however — the code itself not being available in Louisiana, though promulgated in France in 1804 — was used by the com- pilers in the arrangement and substance of their work; and the French traditions of the colony, thus illustrated, were naturally introduced more and more into the organic commentaries and developments that grew up around the Code Napoleon. This evolution was little marked, so similar in large parts were the systems of France and Spain (although in other parts, due to the Gothic element in the Spanish, they were very different) — a similarity which explains the facility with which O'Reilly and his successors introduced the Spanish laws after 1769. The Louisiana code of 1808 was not, however, exhaustive; and the courts continued to go back to the old Spanish sources whenever the

digest was inconclusive. Thus so late as 1810, when the legislature ordered the compilation of such parts of King Alfonso's Siete Partidas (the most common authority in the colony) as were considered in force, this compilation filled a considerable volume. In 1821 the legislature authorized Livingston to prepare the " Livingston Code " of criminal law and procedure, completed in 1824 (in French and English) and published in 1833, but never adopted by the state. In 1825 legislative sanction was given to the greater part of a civil code prepared by a commission (in- cluding Livingston) appointed in 1821, and the French element became steadily more important. In its present form the law shows plainly the Latin and English elements. English law has largely moulded, for example, criminal and commercial law and the law of evidence; the development of the law of corporations, damages, prohibitions and such extraordinary remedies as the mandamus has been very similar to that in other states; while in the fusion of law and equity, and the law of successions, family relations, &c, the civil law of Spain and France has been unaffected.

•Education. — Schooling was very scant before the creation of the public schools in 1854. Very little was done for education in the French and Spanish period, although the Spanish governors made commendable efforts in this regard; the first American Territorial legislature began the incorporation of feeble " colleges " and " academies." To some of these the state gave financial aid ($1,613,898) before 1845. The public schools were flourishing at the outbreak of the Civil War. War and reconstruction threw upon them the new burden of the black children. The constitution of 1879 was illiberal in this respect, but a healthier public opinion soon prevailed. The money given by the state to the public schools is distributed among the parishes according to their school population, and the constitution of 1898 set a generous minimum to such aid. An annual poll-tax is also collected for the schools from every adult male. Local taxes, besides, are imposed, and these are becoming heavier. The parishes retain primary control of the schools. In- stitutes, summer schools and rural libraries have been introduced. The salaries of white teachers advanced from a monthly average of $38.87 in 1903 to $61.84 in 1906. The average attendance of en- rolled black and white pupils is practically identical, but the enrol- ment of whites (about 52 % in 1902) is somewhat higher and that of the blacks about a third lower than their ratio in the population. The school term for white children is much longer than for negroes, and white teachers are paid much better salaries — in 1906 the average monthly salary of a negro teacher was $29.15. The total enrolment is very low. But progress is now being made very rapidly in the improvement of the educational

system. Higher schools include: the State University and Agricultural and Mechanical College (i860) at Baton Rouge (q.v.) ; Tulane University of Louisiana (1864) in New Orleans; Jefferson College (1864; Roman Catholic) at Convent; the College of the Immaculate Conception (1847; Roman Catholic) in New Orleans; St Charles College (1835; Roman Catholic) at Grand Couteau; St Joseph's College (1849; Roman Catholic) at Baton Rouge; the following colleges for women — Silli- man Collegiate Institute (1852; Presbyterian) at Clinton, Mansfield Female College (1854; Methodist Episcopal, South) at Mansfield, the H. Sophie Newcomb Memorial College for women (a part of Tulane University) in New Orleans and the Louisiana Female College (1856; Baptist) at Keatchie; the State Normal School of Louisiana (1884) at Natchitoches and the New Orleans Normal and Training School; the South-western Louisiana Industrial Institute at Lafayette; the Louisiana Industrial Institute at Ruston; and, among schools for negroes, the Peabody State Normal and Industrial School at Alexandria and New Orleans University (1873; Methodist Episcopal), Luther College (Evangelical Lutheran), Leland Uni- versity (1870; Baptist), Straight University (Congregational) and Southern University (1883; aided by the state), all in New Orleans. Charitable and Penal Institutions. — The State Board of Charities and Correction, for which the constitution of 1898 first made pro-

vision, and which was organized under an act of 1904, is composed of six members, appointed by the governor for six years, with the governor as ex-officio chairman. The members of the board serve gratuitously, but elect a salaried secretary. The board has no ad- ministrative or executive power, but makes annual inspections of all public charitable, correctional or reformatory institutions, all private institutions which receive aid from, or are used by municipal or parochial authorities, and all private asylums for the insane; and reports annually to the governor on the actual condition of the institutions. Any suggestions as to improvements in institutions must be approved by the majority of the governing body of that institution before they may be put into effect. The charitable institutions include two charity hospitals — at New Orleans (1832) and Shreveport; an Eye, Ear, Nose and Throat Hospital, a H6tel Dieu, the Touro Infirmary and a Home for Incurables, all at New Orleans ; an Institute for the Deaf and Dumb (for whites — there is no state provision for negro deaf and dumb) and an Institute for the Blind, both at Baton Rouge; an Insane Hospital at Jackson and another at Pineville; and the Louisiana Retreat for the Insane at New Orleans. At Monroe there is a State Reform School, and at New Orleans a Coloured Industrial Home and School. There is also a state home for disabled Confederate

soldiers at New Orleans on Bayou St John. The State Penitentiary is at Baton Rouge, and a House of Detention at New Orleans ; and there are parish prisons. State convicts, and all places in which they are confined or employed, are under the supervision of a Board of Control appointed by the governor. This board may allow commutation or diminution of sentence for good behaviour, meritorious services or exemplary conduct. The leasing or hiring of state convicts is prohibited by the constitution, but parish convicts may be hired or leased for farm and factory work, work on roads and levees, and other public under- takings. Such convicts are classified according to physical ability and a minimum rate is fixed for their hire, for not more than ten hours a day. Many state convicts are employed in levee con- struction, and there are convict farms at Angola, Hope, Oakley and Monticello.

History. — The early history of Louisiana belongs to the romance of American history. It is possible that the mouth of the Mississippi was discovered in 1519 by Alonso Alvarez de Pineda, but this interpretation of his vague manuscript remains conjectural; and that it was discovered by the expedition of Panfilo de Narvaez cannot be established. That Hernando de Soto entered the borders of the present state of Louisiana, and that his burial place in the Mississippi was where that river takes the waters of the Red, are probable enough, but incapable of conclusive proof. Survivors of de Soto's expedition, however, descended the Mississippi to its mouth in 1542. Spain 'set up no claim to the region, and when Robert Cavalier, Sieur de la Salle, came down the river in 1682 from the French possessions to the north, he took possession in the name of France, which hereby gained her first title to the vast drainage basin of the Mississippi. In honour of Louis XIV. the new possession was named " Louis- iana " — a name then and until 1812 applied to a much larger area than that of the present state. La Salle attempted to settle a colony in 1684, but missed the Mississippi's mouth and landed in Texas, where he was murdered in 1687 by some of his followers. In 1697, after Ryswick, Pierre le Moyne dTberville (1662-1706) was chosen to lead another colony, which reached the Gulf coast early in 1699. Soon after Iberville had built Fort Maurepas (near the present city of Biloxi, Mississippi) in 1699, a fort was erected on the Mississippi river about 40 m. above the mouth.

This was the earliest settlement in what is now the state of Louisiana. It was unhealthy and unprosperous. From 171 2 to 1717 " Louisiana," or the French possessions of the Mississippi valley, was held by Antoine Crozat (1655-1738) as a private grant from the king. It proved as great a drain upon his purse as it had proved to the crown,

and he willingly parted with it to the so-called ” Western Company,” afterwards incorporated with the great Company of the Indies. The head of this company was John Law, who, after spreading glowing accounts of the new land, launched his famous ” Mississippi scheme ” (see Law, John. The company accomplished much for the colony of Louisiana. Jean Baptiste le Moyne, Sieur de Bienville (1680- 1768), a brother of Iberville, was sent out as governor. For forty years he was the life of the colony. One of his first acts was to found the city of New Orleans on its present site in 17 18. In this same year seven vessels were sent from France with stores and immigrants; eleven followed during the next year. Five

hundred negroes from the Guinea coast were imported in 17 19, and many hundreds more soon followed. The Law company eventually came to an end fatal to its creditors in France, but its misfortunes did not check the prosperity of ” Louisiana.” The company retained its grant of the coldny until 1731, when it reverted to the crown. Meantime New Orleans had become the seat of government in 1722. In 1766 an official census showed a total population of 5552. The years of royal rule were uneventful. Cotton culture began in 1740, and sugar-cane was successfully introduced from Santo Domingo by the Jesuits in 1751. Tafia rum and a waxy, sticky sugar syrup subsequently became important products; but not until the end of the century were the means found to crystallize sugar and so give real prosperity to the industry.

By a secret treaty of the 3rd of November 1762, ” Louisiana ” was transferred from France to Spain. This treaty was not made public for a year and a half, and Spain did not take full possession of the colony until 1769. By a treaty between Spain and France on the one hand and Great Britain and’ Portugal on the other, signed at Paris in February 1763, all that portion lying E. of the Mississippi river, the Iberville river, and Lakes Maurepas and Pontchartrain was ceded to Great Britain. The international interests thus created, and others that sprang from them, heavily burdened the diplomacy, and even threatened the safety of the United States after they were placed in possession of the eastern bank of the Mississippi down to 31 in 1783.

The news of the cession of the colony to Spain roused strong discontent among the colonists. Antonio de Ulloa (1716-1795), a distinguished Spanish naval officer and scholar, came to New Orleans

in 1766 to take possession for his king. Merchants, people, and many civil officers held toward him from the begin- ning a hostile attitude; the military, especially, refused to pass into the Spanish service as stipulated in the treaty; and Ulloa was compelled to continue in an ambiguous and anomalous position — which his lack of military force probably first com- pelled him to assume — ruling the colony through the French governor, Philippe Aubry (who loyally supported him through- out), without publicly exhibiting his powers. The fear of Spanish commercial laws powerfully stimulated resistance to the transfer, and though Ulloa made commercial and monetary concessions, they were not sufficient. When the colonists found protests at Paris unavailing, they turned to the idea of inde- pendence, but sought in vain the armed support of the British at Pensacola. Nevertheless they compelled Ulloa to leave the colony or exhibit his credentials. He took his leave in November 1768. The open resistance by the colonists (October 1768) was a care- fully planned revolt. There is no doubt that the men who led the Creole opposition contemplated independence, and this gives the incident peculiar interest. In the summer of 1769 Alejandro O'Reilly came to New Orleans with a strong military force (3600 troops). Beginning his rule with an affability that allayed suspicions and securing from Aubry proofs against the popular leaders, he invited them to a reception and arrested them while they were his guests. Five were put to death and others were imprisoned at Havana. O'Reilly put down the rebellion with determination and in accord with the instructions of his king. Regarded without republican sympathies, and in the light of 18th-century doctrines of allegiance, his acts, however severe, in no way deserve the stigma of cruelty ordinarily put upon them. He was liberal and enlightened in his general rule. Among the incidents of these troubled years was the arrival in Louisiana (after 1765) of some hundreds of French exiles from Acadia, who made their homes in the Attakapas country. There their descendants live to-day, still somewhat primitively, and still in somewhat of the glamour thrown over land and people by the Evangeline of Longfellow.

On the 1 8th of August 1769 Louisiana was formally transferred to Spain. Spanish law and Spanish tongue replaced the French officially, but the colony remained essentially French. The Spanish rulers made efforts to govern wisely and liberally, show- ing great complaisance, particularly in heeding the profit of the colony, even at the expense of Spanish colonial commercial

regulations. The judicial system was much improved, a better grade of officials became the rule, many French Creoles were appointed to office, intermarriages of French and Spanish and even English were

encouraged by the highest officials, and in general a liberal and conciliatory policy was followed, which made Louisiana under Spanish rule quiet and prosperous. Ber- nardo de Galvez (1756-1794), a brilliant young officer of twenty- one, when he became the governor of the colony, was one of the most liberal of the Spanish rulers and of all the most popular. During the American War of Independence he gave valuable aid to the United States; and when Spain finally joined in the war against Great Britain, Galvez, in a series of energetic and brilliant campaigns (1779-1781), captured all the important posts in the British colony of West Florida. The chief interest of the Spanish period lies in the advance of settlement in the western territories of the United States, the international in- trigues — British, French and Spanish — involving the future of the valley, the demand of the United States for free navigation on the Mississippi, and the growing consciousness of the supreme importance of the river and New Orleans to the Union. With the Spanish governor Estevan Miro, who succeeded Galvez in 1785, James Wilkinson of Kentucky, arrested at New Orleans with a flat-boat of supplies in 1787, intrigued, promising him that Kentucky would secede from the United States and would join the Spanish; but Wilkinson was unsuccessful in his efforts to carry out this plan. In 1794 Spain, hard pressed by Great Britain and France, turned to the United States, and by the treaty of 1794 the Mississippi river was recognized by Spain as the western boundary of the United States, separating it from Louisiana, and free navigation of the Mississippi was granted to citizens of the United States, to whom was granted for three years the right ” to deposit their merchandise and effects in the port of New Orleans, and to export them from thence without paying any other duty than a fair price for the hire of the stores.” At the expiration of the three years the Spanish governor refused the use of New Orleans as a place of deposit, and contrary to the treaty named no other port in its place. Spanish rule, however, came unexpectedly to an end by the retrocession of Louisiana to France in 1800; and French dominion gave way in turn in 1803 — as the result of a chain of events even more unexpected, startling, and for the United States fortunate — to the rule of the last-named country. On the 30th of November 1803 the representatives of the French republic received formal possession from the Spanish governor, and on the 20th of Decem- ber lower Louisiana was transferred to the United States. (See Louisiana Purchase.)

By an Act of Congress of the 25th of March 1804, 1 that portion of the Louisiana Purchase S. of 35° was organized as the Territory of Orleans, and was given a government less democratic than might otherwise have been the case, because it was intended to prepare gradually for

self-government the French and Spanish inhabitants of the territory, who desired immediate statehood. The foreign slave-trade was forbidden by this organic act. English was made the official language. The introduction of English law, and the changes made in the judicial and legal systems of Louisiana after 1804 have already been described.

The machinations of Aaron Burr are of interest in connexion with Louisiana annals, and likewise the settlement and revolu- tionizing of-West Florida by Americans. In November 181 1 a convention met at New Orleans and framed a constitution under which, on the 30th of April 1812, the Territory of Orleans became the state of Louisiana. A few days later the portion of West Florida between the Mississippi and Pearl rivers (the present ” Florida Parishes “) was included in its boundaries, making them as they are to-day. In this same year the first steamboat reached New Orleans. It descended the Ohio and Mississippi from Pittsburg, whence there had already been a thriving river trade to New Orleans for about thirty years. During the War of 18 1 2 a decisive victory was won by the American forces at Chalmette, near New Orleans, on the 8th of January 1815. Up

1 Other acts bearing on Territorial government are those of the 31st of October 1803 and the 23rd of March 1805.

to i860 the development of the state in population, agriculture and commerce was very rapid. Donaldsonville was the (nominal) capital in. 1825-1831, Baton Rouge in 1849-1864 and again after 1882. At other times New Orleans has been the capital, and here too have always been various state offices which in other states ordinarily are in the state capital.

By an ordinance of secession passed on the 26th of January 1 86 1, Louisiana joined the Confederate States. In the first year there was very little military activity in the state, but in April 1862 Admiral D. G. Farragut, with a powerful fleet, ascended the Mississippi past Forts Jackson and St Philip, which defended the approach to New Orleans, and a military force under General B. F. Butler occupied that city The navigation of the river being secured by this success and by later operations in the north ending in July 1863 with the capture of Vicksburg and Port Hudson, the state was wholly at the mercy of the Union armies. The intervening months were signalized by the capture

of Baton Rouge in May 1862 — the Confederates vainly attempting to recapture it in August. Later, in April 1864, the Confederates under General Richard Taylor won a success against the Unionists under General N. P. Banks at Sabine Cross Roads near Mansfield and were themselves repulsed at Pleasant Hill, these battles being incidental to a campaign undertaken by the Union forces to crush opposition in western Louisiana. A large portion of the state was occupied by them in 1862-1865. There were various minor skirmishes in 1862 and 1863 (including the capture of the Federal camp at Berwick Bay in June 1863).

As early as December 1862 the Union military government, at President Lincoln's direction, had ordered elections for Congress, and the men chosen were admitted in February 1863. In March 1864 also a state government to supersede the military rule was established under the president's auspices. By 1863 twQ parties had arisen among the loyal classes: one of radicals, who demanded the calling of a constitutional convention and the abolition of slavery; the other of conservatives. The former prevailed, and by a convention that assembled in April 1864 a constitution was framed closely following that of 1852 but repudiating the debt incurred by Louisiana as one of the Con- federate states and abolishing slavery. Two-thirds of the delegates were from New Orleans. The legislature was ordered to establish free schools for the blacks, and was empowered to give them the suffrage: neither of these provisions, however, was earned out. The extent of the Union control is shown by the fact that the legislature of 1864 represented half of the area and two-thirds of the population of the state. The army stood at the back of the new government, and by the end of 1864 Louisiana was apparently " reconstructed." But in 1864 the opposition of Congress to presidential reconstruction had clearly developed, so that the electoral votes of Louisiana (like those of Tennessee) for president were not counted. By the spring of 1866 the ex-Confederates had succeeded in gaining possession of most of the local government and most of the state offices, although not of the governorship. The Republican party naturally became extremely radical. The radicals wished to have negro suffrage in order to get possession of the govern- ment. They, therefore, wanted still another constitutional convention. A clause in the constitution of 1864 provided for the reconvening of the convention in certain circumstances, but this clause referred only to necessities prior to the establish- ment of a government, and had therefore determined. Neverthe- less, the radicals, because it was impossible to call a convention through the medium of the state government, took advantage of this clause to reconvoke the old

convention at New Orleans. The day set was the 30th of July 1866. The ex-Confederate party determined to prevent the gathering, but the idea of interference by force seems to have been abandoned. A street riot was precipitated, however, incidental to a procession of armed negroes; the metropolitan police fired upon the assembled convention; and altogether some 200 persons, mostly negroes, were killed. This incident raised the crucial question of national politics in 1866: namely, whether the states reconstructed by the president should not again be reconstructed.

This being settled affirmatively, Louisiana was reconstructed with vigour. A constitution' of 1868 gave suffrage to the blacks, and disfranchised all whites made ineligible to office under the proposed Fourteenth Amendment to the national Constitution, and also (practically)' those who had by word, pen or vote defended secession. Then the state ratified the Fourteenth Amendment, and was declared readmitted to the Union in July 1868. Probably no other southern state suffered equally with Louisiana from the corruption of " carpet-bag," " scalawag," negro legislatures. For four years (1868-1872) the government expenses increased to ten times their normal volume, taxation was enormously increased, and about $57,000,000 of debt was created. But a quarrel broke out among the Republicans (1872), the result of which was the installation of two governors and legislatures, one supported by the Democrats and Liberal Republicans and the other by the radical Republicans, the former being certainly elected by the people. The rivalry of these two state governments, clashes of arms, the recognition by the Federal authorities of the radical Republican government (Pinchback and Kellogg, successively governors) followed. One historic clash in New Orleans (on the 14th of September 1874) between the " White League " (" White Man's Party") and the Republican police is commemorated by a monument, and the day is regarded by Louisianans as a sort of state independence- day. Finally, in 1876, Francis Tillon Nicholls (b. 1834), a Democrat, was chosen governor, but the Republican candidate, S. B. Packard, claimed the election, and with a Republican legislature for a time occupied the State House. In the national election of 1876 there were double returns (Republican: 75,315 for Hayes and 70,508 for Tilden; and Democratic: 83,723 for Tilden and 77,174 for Hayes) from Louisiana, which, as was the case with the double electoral returns from Florida, Oregon and South Carolina, were adjudicated by the Electoral Commis- sion in favour of the Republican electors voting for Hayes. Civil war being threatened within the state President Hayes sent to Louisiana a commission composed of Wayne McVeagh, Gen. J. R. Hawley, Charles B. Lawrence, J. M. Harlan, and John C. Brown, ex-

Governor of Tennessee, which was instructed to promote ” an acknowledgment of one government within the state.” The rival legislatures united, organizing under the Nicholls government, which the commission found was upheld by public opinion. The president ordered the withdrawal of Federal troops from the capitol on the 20th of April 1877, and the white party was thus left in control.

After 1877 the state prospered markedly in all material respects. Of subsequent political events perhaps the most notable, besides the practical disfranchisement of the negroes, are those connected with the Louisiana State Lottery Company (1868-1803). F° r the renewal of its privileges in 1890 the company finally agreed to give the state $1,250,000 yearly, and despite strenuous opposition by a powerful party the legislature voted a renewal, but this measure was vetoed by the governor. The United States government, however, forbade lotteries the use of the mails, and the company withdrew its offers. The constitution of 1898 prohibits lotteries and the sale of lottery tickets within the state. In 1891 the lynching of eleven Italians at New Orleans gave rise to grave difficulties involving Italy, the United States, and the state of Louisiana. Since 1900 a white Republican Party has made some headway in Louisiana politics, but in national and state elections the state has been uninterruptedly and overwhelmingly Democratic since 1877. Governors of Louisiana ‘

French Domination 1682-1762.

A. le Moyne, Sieur de Sauvolle (died in office) . 1699-1701

J. B. le Moyne, Sieur de Bienville . . . 1701-1713 M. de Muys, appointed 1707, died en route, Bienville continuing to serve.

Lamothe Cadillac 1713-1716

Sieur de Bienville, acting governor 1716-1717

De l’Epinay 1717-1718

Sieur de Bienville 1718-1724

1 Terms of actual service in Louisiana ; Gayarre is the authority for the French and Spanish period.

Boisbriant, ad interim 1724-1726

Perier . 1726-1733

Sieur de Bienville I 733 -I 743

Marquis de Vaudreuil I 743 _I 753 ‘

L. Billouart, Chevalier de Kerlerec . . . 1753-1763

D’Abbadie 1763-1765

Philippe Aubry 1 765-1 769

Spanish Domination 1J62 (i?6o)~i8o3.

Antonio de Ulloa 1 1 766-1 768

Alejandro O’Reilly 2 1 769-1 770

Luis de Unzaga 1 770-1 777

Bernardo de Galvez 3 1777— 1785

Estevan Miro (ad interim 1785-1786) . . 1785-1791 F. L. Hector, Baron de Carondelet . 30 Dec. 1 791-1797 M. Gayoso de Lemos (died in office) . 1 797-1 799 Francisco Bouligny, Jose M. Vidal, acting military and civil-political governors . 1799 Sebastian de Casa Calvo de la Puerta, Marquis

de Casa Calvo 1799— 1801

Juan M. de Salcedo 1801-1803

French Domination 1800-1803.*

Laussat, Colonial Prefect . . 30 N0V.-20 Dec. 1 803

American Domination since 1803.

Territorial Period.

William C. C. Claiborne (appointed 1803) . 1804-1812

Statehood Period.

William C. C. Claiborne, Democratic Republican 1812-1816

Jacques Villere, Democratic Republican . . 1816-1820 Thomas B. Robertson, Democratic Republican

(resigned) 1 820-1 822

Henry S. Thibodaux, Democratic Republican

(acting) 1 822-1 824

Henry S. Johnson, Democratic Republican 1 824-1 828 Pierre Derbigny, Democratic Republican (died

in office) 1 828-1 829

Armand Beauvais and Jacques Dupr6 (acting) 1829-1831

Andre B. Roman, Whig 1831-1835

Edward D. White, Whig 1835-1839

Andre B. Roman, Whig 1 839-1 843

Alfred Mouton, Whig 1843-1846

Isaac Johnson, Democrat 1846-1850

Joseph Walker, Democrat 1 850-1 853

Paul O. Hebert, Democrat 1 853-1 856

Robert C. Wickliffe, Democrat 1856-1860

Thomas O. Moore, Democrat 1 860-1 862

George F. Shepley, Military Governor . . 1862-1864

Henry W. Allen, Confederate 1 864-1 865

Michael Hahn, Unionist and Military . . 1864-1865

James M. Wells, Democrat (acting). . . 1865-1867

Benjamin F. Flanders, Military. . . 1867

Joshua Baker, Military 1867-1868

Henry C. Warmoth, Republican . . 1868-1873 Pinckney B. S. Pinchback, Republican (acting) 1873 John McEnery, 5 Democrat-

Liberal Republican 1873 William P. Kellogg, Radical Republican . . 1 873-1 877 Stephen B. Packard, 6 Radical Republican (con- testant) 1877

Francis T. Nicholls, Democrat .... 1877-1880 Louis A. Wiltz, Democrat (died in office) 1 880-1 881 Samuel D. McEnery, Democrat (Lieutenant- Governor, succeeded) 1881-1884

Samuel D. McEnery, Democrat. . 1884-1888

Francis T. Nicholls, Democrat 1888-1892

Murphy J. Foster, Democrat 1892-1900

William W. Heard, Democrat 1900-1904

Newton C. Blanchard, Democrat . . . 1904-1908

Jared Y. Sanders, 7 Democrat 190S

Bibliography. — Compare the bibliography under New Orleans and consult also the following. For general description : Tlie Geology and Agriculture of Louisiana (Baton Rouge, Agric. Exper. Station, pts. 1-6, 1892-1902); also publications of U.S. Geological Survey, e.g. Water Supply and Irrigation Papers, No. 101, " Underground Waters of Southern Louisiana " For fauna and flora: publications of U.S. Biological Survey (Department of Agriculture, Biblio- graphies). For climate: U.S. Department of Agriculture, Climate and Crop Service, Louisiana series (monthly). For soil and agri-

1 Did not openly assume power or supersede Aubry.

2 Captain-general charged to establish order and settle Unzaga as governor.

- At first, till 1779, only acting governor. 4 Actual exercise of power 20 days.

6 Counted out by partisan returning-board and not recognized by U.S. government.

• Not recognized by U.S. government.

7 Elected U.S Senator 1910; accepted, but afterward withdrew.

culture: the above state geological report and material on irrigation in publications of the U.S. Geological Survey and in the U.S. Census

publications; also Commissioners of Agriculture of the State of Louisiana, Annual Report (Baton Rouge, biennial until 1899); State Agricultural Society, Proceedings (annual) ; Louisiana State University and Agricultural and Mechanical College, Bulletin of the Agricultural Experiment Station and Biennial Report of same (Baton Rouge); U.S. Department of Agriculture, various publications of the divisions of botany, agrostology, pomology, forestry, farmers' bulletins, &c. For manufactures and other industries: primarily the publications of the national Census, 1900, and preceding decades. For commerce and communications: Railroad Commissioners of Louisiana, Annual Report (New Orleans, 1900 ff.) ; U.S. Interstate Commerce Commission, Statistics of Railways (annual, Washington) ; on river navigation and river improvements, especially of the Mississippi, an enormous mass of material in the Annual Reports of the Chief of Engineers, U.S. Army (consult Index to Reports of same, 1 866-1900, 3 vols., Washington, 1902, and cp. article on Mississippi River) ; on river commerce see U.S. Census of 1880, vol. 4 (report on steam navigation of the United States by T. C. Purdy), and Census of 18 go (report on transportation by T. J. Vivian; Rivers of the Mississippi Valley). For population: various national cen- suses and Bulletins of the Bureau of Census, 1900, e.g. No. 8, " Negroes in the United States " ; on the Acadians, In Acadia, The Acadians in Song and Story (New Orleans, 1893; compiled by M. A. Johnston). For pictures of Creole life and traits, George W. Cable, The Creoles of Louisiana (New York, 1884), and his later writings; but Mr Cable's views of the Creoles are very unpopular in Louisiana; for other views of them, and for a guide to the English and Creole litera- ture of Louisiana, consult Alcee Fortier, Louisiana Studies — Litera- ture, Customs and Dialects, History and Education (New Orleans, 1894). For administration: see reports of the various executive officers of the state (Baton Rouge) ; the various constitutions are printed in the report of the Secretary of State, as well as in B. Perley Poore's Constitutions (2 vols., Washington, 1877); a special account of the government of the territorial period may be found in D. Y. Thomas, History of Military Government in Newly Acquired Territory of the United States (Columbia University Studies in History, Econo- mics and Public Law, vol. xx. No. 2, 1904); for the Civil War and Reconstruction period compare below, also American Historical Association, Annual Report, 1892; (for courts during Civil War); also John R. Ficklen, History and Civil Government of Louisiana (Chicago, New York, c. 1899), a brief and popular account; on education, in addition to the Biennial Reports of the Board of Education, consult annual reports of the U.S. Commissioner of Education.

For history: the standard work is that of Charles E. A. Gayarre\

coming down to the war, based on deep and scholarly research, and greatly altered in successive editions. The style is that of the classic school, that of Prescott and Motley, full of colour, characterization and spirit. The editions are as follows : Romance of the History of Louisiana (New York, 1837, 1848) ; Histoire de la Louisiane (2 vols., Nouvelle Orleans, 1 846-1 847); Louisiana: its Colonial History and Romance (N.Y., 1851); Louisiana: its History as a French Colony, Third Series of Lectures (N.Y., 1852); then, based upon the preceding, History of Louisiana: The French Domination (2 vols., N.Y., 1854) and The Spanish Domination (N.Y., 1854); The American Domination (N. Y., 1867) ; and third edition (4 vols., New Orleans, 1885). More important for the recent period is Alcee Fortier; AHistory of Louisiana (N.Y., 4 vols., 1904) devoting two volumes to American domination. The History and General Description of New France of P. F. X. de Charlevoix (best ed. by J. G. Shea, New York, 1866, 6 vols.) is a famous old work, but now negligible. Judge F. X. Martin's History of Louisiana (2 vols., New Orleans, 1827-1829, later ed. by J. F. Condon, continued to 1861, New Orleans, 1882) is also valuable and supplements Gayarrei. Le Page du Pratz, author of Histoire de la Louisiane (3 vols., Paris, 1758; 2 vols., London, 1763), was the first historian of Louisiana. Berquin- Duvallon,. Vue de la colonie espagnole du Mississippi (Paris, 1805; published in English under the name of John Davis, New York t 1806); L. N. Baudry de Lozieres, Voyage a la Louisiane (Paris, 1802) and Second Voyage a la Louisiane (Paris, 1803) may be mentioned among the travels just preceding, and A. Stoddard, Sketches of Louisiana (New York, 181 1), among those just following the establishment of American dominion. The Histoire de la Louisiane, et de la cession de colonie par la France aux Etats-Unis (Paris, 1829; in English, Philadelphia, 1830) by Barb6-Marbois has great importance in diplomatic history. The rarest and most valuable of early memoirs and much archive material are embodied in Benj. F. French's Historical Collections of Louisiana (5 series, N.Y., 1 846-1 853) and Historical Collections of Louisiana and Florida, New Series (N.Y., 1869, 1875). Documentary materials on the greater " Louisiana " between the Gulf of Mexico and Canada will be found in the Jesuit Relations, edited by R. G. Thwaites (Cleveland, 1896 ff.); and on early voyages in Pierre Margry, Decouvertes et etablissements des Francois (6 vols., Paris, 1879-1888). John G. Shea published an edition of Louis Hennepin's Description of Louisi- ana. . . . Translated from the Edition of 1683, &c. (New York, 1880). On this greater " Louisiana " the student should also, consultthe works of Francis Parkman. And see publications of the Louisiana

Historical Society (New Orleans). Of brief general histories there is that of J. R. Ficklen above cited, another by the same author in collaboration with Grace King (New Orleans, 1902) and another (more valuable) by Albert Phelps (Boston, 1905), in the American Commonwealth Series. For the Reconstruction period see bibliography under United States.

LOUISIANA, a city of Pike county, Missouri, U.S.A., situated below the mouth of the Salt river, on the western bank of the Mississippi, about 90 m. N. of St. Louis. Pop. (1900) 5131, in- cluding 1075 negroes and 161 foreign-born; (1910) 4454; there is also a considerable suburban population. Louisiana is served by the Chicago, Burlington & Quincy and the Chicago & Alton railways, and by several lines of river steamboats. The river is spanned here by a railway bridge. The city is laid out fairly regularly in the river valley and on bluffs along the river, and has attractive residential districts, commanding good views. It has very active and varied industries, and is a trade centre for a large grain- and fruit-producing and stock-raising region, and has one of the largest nurseries in the United States. Louisiana was laid out in 1818, was the county-seat from that date until 1825, was incorporated as a town in 1845 and was chartered as a city in 1849.

LOUISIANA PURCHASE, a large portion of the area of the United States of America, purchased from the – French Republic in 1803. The territory to which France held explorer's title originally included the entire valley of the Mississippi (see Louisiana) ; but the " Louisiana " which was ceded by her to Spain in 1762 (England refusing it, preferring the Floridas), retroceded to France in 1800, 1 and ceded by Napoleon to the United States — in violation of his pledge to Spain that he Would not alienate the province — embraced only the portion W. of the river and the island of New Orleans on the E. (and, as might be claimed with some show of argument, West Florida to the Perdido river).

With the settlement of the trans- Alleghany region, the freedom of the Mississippi had become of vital importance to the western settlements, and Spain had recognized these interests in her treaty with the United States of 1795, by guaranteeing freedom of navigation and the privilege of deposit at New Orleans. The transfer of Louisiana from a weak neighbour to so powerful and ambitious a state as France was naturally unwelcome to the United States, and Robert R. Livingston, the American minister in Paris, was instructed by Secretary-of-State Madison to endeavour to prevent the consummation of the

retrocession; or, should that be irrevocable, to endeavour to buy the Floridas (either from France, if they had passed with Louisiana, or through her goodwill from Spain) — or at least West Florida — and if possible New Orleans, so as to give the United States a secure position on the Mississippi, and insure the safety of her commerce. The United States was also trying to collect claims of her merchants for spoliations by French cruisers during the late war between France and Great Britain. In his preliminary propositions Livingston lightly suggested to Talleyrand a cession of Louisiana to satisfy these claims; following it with the more serious demand that France should pledge observance of the Spanish concession to the Mississippi trade. This pledge Napoleon readily gave. But during these negotiations a sus- pension by the Spanish governor of the right of deposit aroused extreme apprehension in America and resulted in warlike votes in Congress. Of these, and of London reports of a British expedition against New Orleans preparing in anticipation of the imminent rupture of the peace of Amiens, Livingston made most capable use; and pressed for a cession of West Florida, New Orleans and Louisiana north of the Arkansas river. But without New Orleans Louisiana was of little present worth, and Napoleon — the collapse of whose American colonial schemes seemed involved in his failure in Santo Domingo, who was persuaded he could not hold Louisiana against Great Britain, and who was already turning from projects of colonial empire

1 By the treaty of San Ildefonso, signed the 1st of October 1800. This was never ratified by Charles IV. of Spain, but the treaty of Madrid of the 21st of March 1801, which confirmed it, was signed by him on the 15th of October 1802.

toward his later continental policy — suddenly offered to Living- ston the whole of the province. Livingston disclaimed wanting the part below the Arkansas. In even mentioning Louisiana he had gone outside his instructions. At this stage James Monroe became associated with him in the negotiations. They were quickly closed, Barbe Marbois acting for Napoleon, and by three conventions signed on the 30th of April 1803 the American ministers, without instructions, boldly accepted for their country a territory approximately 1,000,000 sq. m. in area — about five times the area of continental France. For this imperial domain, perhaps the richest agricultural region of the world, the United States paid 60,000,000 francs ($11,250,000) outright, and assumed the claims of her citizens against France to the extent of 20,000,000 francs ($3,750,000) additional; the interest payments incidental to the final settlement raising the total eventually to $27,267,622, or about four cents an acre.

Different writers have emphasized differently the various factors in this extraordinary diplomatic episode. Unquestion- ably the western people were ready to war for the navigation of the Mississippi; but, that being guaranteed, it seems certain that France might peaceably have taken and held the western shore. The acquisition was not a triumph of American diplomacy, but a piece of marvellous diplomatic good fortune; for the records abundantly prove, as Madison said, that the cause of success was a sudden policy of Napoleon, forced by European con- tingencies. Livingston alone of the public men concerned showed indubitably before the event a conception of the feasibility and desirability of the acquisition of a vast territory beyond the Mississippi. Jefferson had wished to buy the Floridas, but alarmed by the magnitude of the cession, declared his belief that the United States had no power to acquire Louisiana. Though such strict construction of the constitution was a cardinal dogma of the Democratic party, this dogma was abandoned outright in practice, Jefferson finding ” but one opinion as to the necessity of shutting up the constitution ” (or amending it, which was not done) and seeking justification of the means in the end. The Federalist party, heretofore broad-constructionists, became strict-constructionists under’ the temptation of factious politics, and a very notable political struggle was thus precipitated — notable among other things for strong expressions of sectionalism. The net result was the establishment of the doctrine of ” implied powers ” in interpret- ing the constitution; a doctrine under which the Supreme Court presently found power to acquire territory implied in the powers to wage war and make peace, negotiate treaties, and ” dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States.”

The exact limits of the acquisition were not definitely drawn. The French archives show that Napoleon regarded the Rio Grande as the W. boundary of the territory of which he was to take possession, and the United States up to 1819 ably maintained the same claim. She also claimed all West Florida as part of Louisiana — which, in the usage of the second half of the 1 8th century, it apparently was not. When she acquired the Floridas in 18 19-182 1 she abandoned the claim to Texas. The line then adopted between the American and Spanish possessions on the W. followed the Sabine river from the Gulf of Mexico to the parallel of 32 N., ran thence due N. to the Red river, followed this to the meridian of 100 W. and this line N. to the Arkansas river, thence along this to its source, thence N. to the parallel of 42°, and along this line to the Pacific. Such is the accepted description of the W. boundary of the Louisiana Purchase — waiving

Texas— thus retrospectively deter- mined, except that that boundary ran with the crest of the Rocky Mountains N. of its intersection with the parallel of 42 . No portion of the Purchase lay west of the mountains, although for some years after 1870 the official maps of the United States government erroneously included Oregon as so acquired — an error finally abandoned by 1900.

On the 20th of December 1803, at New Orleans, the United States took possession of the lower part of the province, and on the 9th of March 1804, at St Louis, of the upper. The entire

region then contained possibly 80,000 residents. The treaty of cession required the incorporation of Louisiana in the Union, and the admission of its inhabitants, ” as soon as possible, according to the principles of the Federal Constitution, to the enjoyment of all the rights, advantages and immunities of citizens of the United States.” By act of the 26th of March 1804 the region below 33° N. was organized as the Territory of Orleans (see Louisiana), and that above as the District of Louisiana. The region above 33°, renamed in 1805 the Territory of Louisiana, and in 181 2 the Territory of Missouri, was divided as time went on into many Indian reservations, territories and states. Thus were carved from the great domain of the Purchase Louisiana, Missouri, Arkansas, Iowa, Minnesota, North and South Dakota, Nebraska and Oklahoma in their entirety, and much the greatest part of Kansas, Colorado, Wyoming and Montana. There is justification for the saying of Thiers that the United States were ” indebted for their birth and for their greatness ” — at least for an rarly assurance of greatness — ” to the long struggle between France and England.” The acquisition of so vast a territory proved thus of immense influence in the history of the United States. It made it possible for them to hold a more independent and more dignified position between France and England during the Napoleonic wars; it established for ever in practice the doctrine of implied powers in the interpretation of the Federal Constitution; it gave the new republic a grand basis for material greatness; assured its dominance in North America; afforded the field for a magnificent experiment in expansion, and new doctrines of colonization; fed the national land hunger; incidentally moulded the slavery issue; and precipitated its final solution.

It is generally agreed that after the Revolution and the Civil War, the

Louisiana Purchase is the greatest fact in American history. In 1904 a world's fair, the Louisiana Purchase Exposi- tion, was held at St Louis in commemoration of the cession. After one hundred years the wilderness then acquired had become the centre of the power and wealth of the Union. It contained in 1903 15,000,000 inhabitants, and its taxable wealth alone was four hundred times the fifteen millions given to Napoleon.

Authorities. — The official literature is in the American State Papers, Foreign Relations, vol. 2, and Public Lands, vol. 2; diplo- matic papers repented in House Document 431, 57th Congress, 2nd Session (1903); to which add the Histoire de la Louisiane et de la cession (Paris, 1829; Eng. trans., Philadelphia, 1830), by Francois Barbe-Marbois. This book abounds in supposed " speeches " of Napoleon, and " sayings " by Napoleon and Livingston that would have been highly prophetic in 1803, though no longer so in 1829. They have been used liberally and indiscnminatingly by the most prominent American historians. See also T. Donaldson, The Public Domain, House Miscellaneous Document 45, pt. 4, 47th Congress, 2nd Session. For the boundary discussions by J. Q. Adams and Don L. de Onis, 1818-1819, American State Papers, Foreign Relations, vol. 4; also in Onis's Official Correspondence between Don Luis de Onis . . . and John Quincy Adams, &c. (London, 1818), or Memoria sobre las negociaciones entre Espana y los Estados Unidos que dieron motivo al tratado de 1819 (Madrid, 1820). See also discussion and map in U.S. Census, iqoo. Bulletin 74; and the letters of Thomas Jefferson, James Madison, Rufus King and other statesmen of the time. By far the best general account of the diplomacy is in Henry Adams's History of the United States, vols. 1 and 2 ; and of Western conditions and American sentiment in J. B. McMaster's History of the United States, vols. 2 and 3. Consult also Justin Winsor, Narra- tive and Critical History, vol. 7; and various valuable periodical articles, especially in the American Historical Review, by F. J. Turner and others. Reference may be made to B. Hermann, The Louisiana Purchase (Washington, 1898), and Theodore Roosevelt's Winning of the West, vol. 4. Of the various special but popular accounts (by J. K. Hosmer, Ripley Hitchcock, R. Blanchard, K. E. Winship, &c), not one is worthy of its subject, and all contain various inaccuracies.

LOUISVILLE, the largest city of Kentucky, U.S.A., and the county-seat of Jefferson county, on the Ohio river, no m. by rail and 130 m. by water S.W. of Cincinnati. Pop. (1890) 161,129; (1900) 204,731, of whom 21,427 were foreign-born (including 12,383 Germans and 4198 Irish) and 39,139 were negroes; (1910 census) 223,928.

Louisville occupies 40 sq. m. of a plain, about 70 sq. m. in extent, about 60 ft. above the low- water mark of the river,

and nearly enclosed by hills. The city extends for 8 m. along the river (spanned here by three bridges), which falls 26 ft. in 2 m., but for 6 m. above the rapids spreads out into a beautiful sheet of quiet water about 1 m. wide. The streets intersect at right angles, are from 60 to 120 ft. wide, and are, for the most part, well-shaded. The wholesale district, with its great tobacco warehouses, is largely along Main Street, which runs E. and W. not far from the river; and the heart of the shopping district is along Fourth Street in the dozen blocks S. of Main Street. Adjoining the shopping district on the S. is the old residence section; the newer residences are on “The Highlands” at the E. end and also at the W. end. The city is served by the Balti- more & Ohio South- Western, the Chesapeake & Ohio, the Pittsburg, Cincinnati, Chicago & St Louis, the Louisville, Henderson & St Louis, the Illinois Central, the Chicago, Indiana & Louisville, the Cleveland, Cincinnati, Chicago & St Louis, the Southern and the Louisville & Nashville railways; by steam- boat lines to Memphis, Cairo, Evansville, Cincinnati and Pitts- burg; by an extensive system of inter-urban electric lines; and by ferries to Jeffersonville and New Albany, .Indiana, two attractive residential suburbs.

Many of the business houses are old-fashioned and low. The principal public buildings are the United States government building, the Jefferson county court house and the city hall. In front of the court house stands a bronze statue of Thomas Jefferson, designed by Moses Ezekiel (b. 1844), and inside of the court house a marble statue of Henry Clay by Joel T. Hart (1810- 1870). There are few or no large congested tenement-house districts; most of the wage-earners own their own homes or rent cottages. Louisville has an extensive park system, most of which was acquired after 1889 and is on the outskirts. From the heart of the city South Parkway, 150 ft. wide, extends S. 6 m. to the entrance to Iroquois Park (670 acres) on a wooded hill. At the E. end of Broadway, is Cherokee Park (nearly 330 acres), near which is the beautiful Cave Hill Cemetery, containing the grave of George Rogers Clark, the founder of the city, and the graves of several members of the family of George Keats, the poet’s brother, who lived in Louisville for a time; and at the W. end of Broadway, Shawnee Park (about 170 acres), with a long sandy river beach frequented by bathers. Central Park occupies the space of two city squares in the old fashionable residence districts. Through the efforts of a Recreation League organized in 1901 a few playgrounds are set apart for children. Louisville is a noted racing centre and has some fine tracks; the Kentucky Derby is held here annually in May.

The United States government has a marine hospital, and a life-saving station at the rapids of the river. The state has a school for the blind, in connexion with which is the American Printing House for the Blind. There are state hospitals and many other charitable institutions.

The principal educational institutions are the university of Louisville, which has a College of Liberal Arts (1907), a law department (1847), and a medical department (1837) — with which in 1907 were consolidated the Hospital College of Medicine (1873), the Medical Department of Kentucky University (1898), the Louisville Medical College (1869), and the Kentucky School of Medicine (1850); the Southern Baptist Theological Seminary (1859); the Presbyterian Theological Seminary of Kentucky, which was formed in 1901 by the consolidation of the Theological Seminary of the Presbyterian Church at Danville (1853) and the Louisville Presbyterian Theological Seminary (1893); the Louisville College of Pharmacy (1871), and the Louisville College of Dentistry (1887), a department of Central University. There are many musical clubs, and a spring festival for which a local chorus furnishes the nucleus, is held annually. The Louisville Public Library was established in 1902, and 1904 acquired the library, the small museum (containing the Troost collection of minerals) and the art gallery of the Polytechnic Society of Louis- ville (1878), which for many years had maintained the only public library in the city. The principal newspapers are the Courier Journal (Democratic, morning), the Her aid, (Republican, morning), the Evening Post (Independent Democratic), and the

Times (Democratic, evening). The Courier Journal is one of the most influential newspapers in the South. Henry Watterson became editor in 1868, when the Courier (1843), established and owned by Walter N. Haldeman, was consolidated with the Journal (1830), of which Watterson had become editor in 1867, and with the Democrat (1844).

The richness of the surrounding country in agricultural produce, timber, coal and iron, and its transport facilities have made Louis- ville a large commercial and manufacturing centre. The leaf- tobacco market is the largest in the world, most of the leaf-tobacco produced in Kentucky, which in 1900 was 34-9 % of the entire crop of the United States, being handled in Louisville; the city's trade in whisky, mules and cement 1 is notably large, and that in pork, wheat, Indian corn, coal and lumber is extensive. The total value of the

manulactured products increased from $54,515,226 in 1890 to $78,746,390 in 1900 or 44-4%, and between 1900 and 1905 the Value of the factory-made product increased from $66,110,474 to $83,204,125, an increase of 25-9%. Large quantities of fine bourbon whisky are distilled here; in 1905 the value of the factory product of the city was $3,878,004. The most valuable manu- facture in the same year was smoking and chewing tobacco (especi- ally plug tobacco) and snuff valued at $11,635,367 — which product with that of cigars and cigarettes ($1,225,347) constituted 15-5% of the value of the factory products of the city. Other important manufactures in 1905 were: packed meats, particularly pork; men's clothing, especially " Kentucky jeans " ; flour and grist mili products; cotton-seed oil and cake; leather, especially sole leather; foundry and machine shop products; steam-railway cars; cooper- age; malt liquors; carriages and wagons, especially farm wagons; and carriage and wagon materials; agricultural implements, especially ploughs; and plumbers' supplies, including cast-iron gas and water pipes. Besides, there were many other manufactures.

The city's water-supply is taken from the Ohio river a few miles above the city limits, and purified by large filtering plants. Nearly all the capital stock of the water-works company is owned by the municipality.

Louisville is governed under a charter of 1893, which is in the form of an act of the state legislature for the government of cities of the first class (Louisville is the only city of the first class in the state). The mayor is elected for four years, and appoints, subject to the approval of the board of aldermen, the controller and the members of the two principal executive boards — the board of public works and the board of public safety. The legislative power is vested in a general council composed of 12 aldermen and 24 councilmen. Both aldermen and councilmen serve without pay, and are elected on a general ticket for a term of two years; not more than two councilmen may be residents of the same ward, but there is no such limitation in regard to aldermen. The treasurer, tax-receiver, auditor, judge of the police court, clerk of the police court, members of the board of school trustees (1 from each legislative district) and members of the park commission are elected by popular vote; the assessor, by the general council. The duration of franchises given by the city is limited to 20 years.

History. — The site of the city was probably visfted by La Salle in 1669 or 1670. In July 1773, Captain Thomas Bullitt, 2 acting under a commission from the College of William and Mary, surveyed a tract of

2000 acres, lying opposite the Falls of the Ohio, and laid out a town site upon this tract. Colonel William Preston, county surveyor of Fincastle county, within which the 2000-acre tract lay, refused to approve Captain Bullitt's survey, and had the lands resurveyed in the following year, nevertheless the tract was conveyed in December 1773 by Lord Dunmore to his friend Dr John Connolly, a native of Lancaster county, Pennsylvania, who had served in the British army, as commander of Fort Pitt (under Dunmore's appointment), was an instigator of Indiaji troubles which culminated in the Battle of Point Pleasant, and was imprisoned from 1775 until nearly the close of the War of American Independence for attempting under Dunmore's instructions to organize the " Loyal Foresters," who

1 Louisville cement, one of the best-known varieties of natural cement, was first manufactured in Shipping Port, a suburb of Louisville, in 1829 for the construction of the Louisville & Portland Canal ; the name is now applied to all cement made in the Louisville District in Kentucky and Indiana. There is a large Portland cement factory just outside the city.

2 Captain Thomas Bullitt (1730-1778), a Virginian, commanded a company under Washington at Great Meadows (July 4, 1754), was in Braddock's disastrous expedition in 1755, and after the defeat of Major James Grant in 1758 saved his disorganized army by a cleverly planned attack upon the pursuers. He became Adjutant- General of Virginia after the peace of 1763, and took part in the movements which forced Lord Dunmore to leave Norfolk. Subse- quently he served m South Carolina under Colonel Lee.

were to be sent against the rebellious colonists in the West. The city of Louisville was laid out on the upper half of this Connolly tract. It is possible that there was a settlement on what was afterward called Corn Island (which has now practically dis- appeared), at the Falls of the Ohio, as early as 1775; in May 1778, General George Rogers Clark, while proceeding, by way of the Ohio river, against the British posts in the Illinois terri- tory, landed on this island and built block-houses for his stores and cabins for about twenty families of emigrants who had come with him. These emigrants (or the greater part of them) removed to the mainland in the winter of 1778-1779, and established themselves in a fort built within the present limits of Louisville. A town government was organized by them in April 1779, the settlement at this time being known as " the Falls of the Ohio." On the 14th of May 1780, the legislature of Virginia, in response to a petition of the inhabitants, declared that Connolly had forfeited his title, and incorporated the settlement under the name of Louisville, in

recognition of the assistance given to the colonies in the War of Independence by Louis XVI. of France. In 1828 Louisville was chartered as a city; in 1851 it received a second city charter; in 1870, a third; and in 1893, a fourth. The city's growth was greatly promoted by the introduction of successful steam navigation on the Ohio in 181 1 and still further by the opening of the canal around the rapids (generally called the " Falls of the Ohio "). This canal, which is 2§ m. in length and is known as the Louisville and Portland canal, was author- ized by the legislature in 1825 and was opened in December 1830; between 1855 and 1872 Congress made appropriations for enlarging it, and in 1874 it passed entirely under Federal control. The first railway to serve the city, the Louisville & Frankfort, was completed in 1851. The 6th of August is locally known as " Bloody Monday "; on this day in 1855 some members of the Know Nothing Party incited a riot that resulted in the loss of several lives and of considerable property. In March 1890 a tornado caused great loss in life and property in the city. General Clark made his home in Louisville and the vicinity after his return from the Illinois country in 1779. Louisville was also the early home of the actress Mary Anderson; John James Audubon Jived here in 1808-1812; and 5 m. E. of the city are the old home and the grave (with a monument) of Zachary Taylor.

See Reuben T. Durrett, The Centenary of Louisville (Louisville, 1893), being No. 8 of the Filson Club Publications; J. S. Johnston (ed.), Memorial History of Louisville (Chicago, 1896); and L. V. Rule, " Louisville, the Gateway City to the South," in L. P. Powell's Historic Towns of the Southern States (New York, 1900).

LOUL£, a town of southern Portugal, in the district of Faro (formerly the province of Algarve); beautifully situated in an inland hilly district, 10 m N.N.W. of the seaport of Faro and 5 m. from Sao Joao da Venda on the Lisbon-Faro railway. Pop. (1900) 22,478. Apart from Lisbon, Oporto and Braga, Louie is the most populous town in the kingdom. It is sur- rounded by walls and towers dating from the Moorish period. The neighbouring church of Nossa Senhora da Piedade is a favourite resort of pilgrims. Basket-making is the principal industry; leather, porcelain and various products of the palm, agave and esparto grass are also manufactured.

LOURDES, a town of south-western France in the department of Hautes-Pyrenees, at the foot of the Pyrenees, 12 m. S.S.W. of Tarbes on the main line of the Southern railway between that town and Pau. Pop. (1906) 7228. Lourdes is divided into an old arid a new town by the Gave de Pau, which at this point leaves the valley of Argeles and

turns abruptly to the west. The old quarter on the right bank surrounds on three sides a scarped rock, on which stands the fortress now used as a prison. Its large square keep of the 14th century is the chief survival of feudal times. Little is left of the old fortifications except a tower of the 13th or 14th century, surmounting a gateway known as the Tour de Garnabie. The old quarter is united with the new town by a bridge which is continued in an esplanade leading to the basilica, the church of the Rosary and the Grotto, with its spring of healing water. The present fame of Lourdes is entirely associated with this grotto^ where the Virgin Mary is believed

in the Roman Catholic world to have revealed herself repeatedly to a peasant girl named Bernadette Soubirous in T858. A statue of the Virgin stands on a rock projecting above the grotto, the walls of which are covered with crutches and other votive offer- ings; the spot, which is resorted to by multitudes of pilgrims from all quarters of the world, is marked by a basilica built above the grotto and consecrated in 1876. In addition the church of the Rosary, a rich' building in the Byzantine style, was erected in front of and below the basilica from 1884 to 1889. Not far from the grotto are several other caves, where prehistoric remains have been found. The Hospice de Notre-Dame de Douleurs is the chief of the many establishments provided for the accommodation of pilgrims.

Lourdes is a fortified place of the second class; and is the seat of the tribunal of first instance of the arrondissement of Argeles. There are marble and slate quarries near the town. The pastures of the neighbourhood support a breed of Aquitaine cattle, which is most highly valued in south-western France.

The origin of Lourdes is uncertain. From the 9th century onwards it was the most important place in Bigorre, largely owing to the fortress which is intimately connected with its history. In 1360 it passed by the treaty of Bretigny from French to English hands, and its governor was murdered by Gaston Phoebus viscount of Beam, for refusing to surrender it to the count of Anjou. Nevertheless the fortress did not fall into the possession of the French till 1406 after a blockade of eighteen months. Again during the wars of religion the castle held out successfully after the town had been occupied by the troops of the Protestant captain Gabriel, count of Montgomery. From the reign of Louis XIV. to the beginning of the 19th century the castle was used as

a state prison. Since the visions of Bernadette Soubirous, their authentication by a commission of enquiry appointed by the bishop of Tarbes, and the authorization by the .pope of the cult of Our Lady of Lourdes, the quarter on the left bank of the Gave has sprung up and it is estimated that 600,000 pilgrims annually visit the town. The chief of the pilgrimages, known as the national pilgrimage, takes place in August.

Several religious communities have been named after Our Lady of Lourdes. Of these one, consisting of sisters of the third order of St Francis, called the Congregation of Our Lady of Lourdes (founded 1877), has its headquarters in Rochester, Minnesota. Another, the Order of Our Lady of Lourdes, was founded in 1883 for work in the archdiocese of New Orleans.

See G. Mares, Lourdes et ses environs (Bordeaux, 1894) ; Fourcade, L' Apparition de la grotte de Lourdes (Paris, 1862) and L 'Apparition . . . consider te au point de vue de I' art Chretien (Bordeaux, 1862) ; Boissarie, Lourdes, histoire medicale (Paris, 1891); Bertrin, Hist, critique des evenements de Lourdes (2nd ed., Paris, 1905), written under authority of the bishop of Tarbes; H. Lasserre, Miraculous Episodes of Lourdes (London, 1884, tr.); R. F. Clarke, Lourdes and its Miracles (ib., 1889) and Medical Testimony to the Miracles (ib., 1892); D. Barbe, Lourdes hier, aujourd'hui, demain (Paris, 1893; Eng. trans, by A. Meynell, London, 1894); J. R. Gasquet, The Cures at Lourdes (London, 1895); Les Pelerinages de Lourdes. Cantiques, insignes, costumes (Lourdes, 1897); W. Leschner, The Origin of Lourdes (London, 1900). Zola's Lourdes (Paris, 1894), a criticism from the sceptical point of view, in the form of a realistic novel, has called forth many replies from the Catholic side.

LOURENgO MARQUES, capital of Portuguese East Africa, or Mozambique, on the north bank of the Espirito Santo or English river, Delagoa Bay, and 396 m. by rail via Pretoria from Johannesburg. Pop. (1904) 9849, of whom 4691 were Europeans and 1690 Asiatics. The town is situated close to

are the lighthouse, barracks and the private residences of the wealthy citizens. At its mouth the English river is about 2 m. across. Lourenco Marques is the nearest seaport to the Rand gold mines. The port is 8374 m. from Southampton via Cape Town and 7565 m. via the Suez canal. It is served by British, Portuguese and German liners, the majority of the goods imported being shipped at Southampton, Lisbon or Hamburg. Over 50% of the import trade of Johannesburg is with Lourenco Marques. Great Britain and British possessions take some

40% of the import trade, Portugal, Germany, Norway, Sweden and America coming next in order. Most of the imports, being forwarded to the Transvaal, figure also as exports. The chief articles of import are food-stuffs and liquors, iron, mineral oils, inks and dyes, timber and live stock. These all form part of the transit trade. There is practically no export trade by sea save in coal, which is brought chiefly from the collieries at Middelburg in the Transvaal. At Port Matolla, 20 m. from the town, on the river of that name, one of the feeders of the English river, is a flourishing timber trade. The average value of the total trade of Lourenco Marques for the five years 1897-1899 and 1902-1903 (1900 and 1001 being years during which trade was disorganized by the Anglo-Boer War) was over £3,500,000. In 1905 the value of the trade of the port was £5,682,000; of this total the transit trade was worth over £4,500,000 and the imports for local consumption £1,042,000." The retail trade, and trade with the natives, is almost entirely in the hands of Indians. The chief import for local consumption is cheap wine from Portugal, bought by the Kaffirs to the extent of over £500,000 yearly. These natives form the bulk of the Africans who work in the Rand gold mines.

Lourenco Marques is named after a Portuguese navigator, who with a companion (Antonio Calderia) was sent in 1544 by the governor of Mozambique on a voyage of exploration. They explored the lower courses of the rivers emptying their waters into Delagoa Bay, notably the Espirito Santo. The various forts and trading stations which the Portuguese established, abandoned and reoccupied on the north bank of the river were all called Lourenco Marques. The existing town dates from about 1850, the previous settlement having been entirely destroyed by the natives. In 1871 the town was described as a poor place, with narrow streets, fairly good flat-roofed houses, grass huts, decayed forts and rusty cannon, enclosed by a wall 6 ft. high then recently erected and protected by bastions at intervals. The growing importance of the Transvaal led, how- ever, to greater interest being taken in Portugal in the port. A commission was sent by the Portuguese government in 1876 to drain the marshy land near the settlement, to plant the blue gum tree, and to build a hospital and a church. It was not, however, until the end of the 19th century that any marked development took place in the town, and up to 1903 cargo had to be discharged in tugs and lighters.

In 1873-1877 Mr Burgers, president of the Transvaal, en- deavoured, unsuccessfully, to get a railway built from Pretoria to Delagoa Bay. In 1878-1879 a survey was taken for a line from Lourenco Marques to the Transvaal, and in 1883 the Lisbon cabinet granted to Colonel Edward McMurdo, an American citizen, a concession — which took

the place of others which had lapsed — for the building of a railway from Lourenco Marques to the Transvaal frontier, the Boer government having agreed

883) to continue the line to Pretoria. Under this concession Colonel McMurdo formed in London in 1887 a company — the

the mouth of the river in 25° 53′ S. and 32° 30′ E., and is built upon a low-lying spit of sand, formerly surrounded by swamps. The streets are regularly laid out and adorned by several fine buildings. The principal thoroughfare, the Avenida Aguiar, 2 m. long goes from the centre of the town to Reuben Point. The harbour is well equipped with piers, quays, landing sheds and electric cranes, which enable large steamers to discharge cargoes direct into the railway trucks. The depth of water at low tide is 18 ft. The streets are lit by electricity and there is an electric tramway system 7 m. in extent. At Reuben Point, which marks the soot where the English river enters the bay,

Delagoa Bay and East African Railway Company — to construct the line. Meantime a secret agreement had been come to between President Kruger and Portugal for the concession to the Transvaal of a ” steam tramway ” parallel to the projected railway, should the company not complete the line in the time specified. The company, however, built the line to the frontier shown on the Portuguese maps of 1883 within the time limit, the railway being opened on the 14th of December 1888. The frontier by this date had been fixed at Komati Poort, 5 m. farther from the coast. Portugal had previously agreed to grant the company ” a reasonable extension of time ” to complete

the line if the frontier should be traced farther inland than shown on the 1883 maps. The Lisbon government required the exten- sion to Komati Poort to be completed in eight months (five of which were in the rainy season), an impossible stipulation. The railway not being finished, the Portuguese seized the line on the 25th of June 1889 and cancelled the concession. Portugal in so doing acted, to all appearance, under pressure from the Transvaal. Great Britain and

America at once protested, Portugal admitted the illegality of her act and consented to refer the amount of compensation to the decision of three Swiss jurists. This was in 1890, when Portugal paid £28,000 on account. It was not until the 29th of March 1900 that the award was made known. The arbitrators ordered Portugal to pay — in addition to the £28,000 — a sum, including interest, of £950,000. The damages were promptly paid. Meantime the railway had been continued from Komati Poort and was opened for through traffic to Pretoria on the 8th of July 1895. In 1906-1910 another railway (47 m. long) was built from Lourenco Marques due west to the Swaziland frontier, being a link in a new line to shorten the distance by rail between the Rand and the sea by some 60 m.

See also Delagoa Bay and the authorities there cited. The text of the railway arbitration award was published in French at Berne in 1900. Annual reports on the trade of Lourengo Marques are issued by the British Foreign Office.

LOUSE (0. Eng. lUs, cf. Du. luis, Ger. Laus, Dan. and Swed. lus), a term applied to small wingless insects, parasitic upon birds and mammals, and belonging strictly speaking to the order Anoplura, often included among the Hemiptera, though the term is frequently extended to the bird-lice constituting the sub- order Mallophaga, formerly included among the Neuroptera. Both agree in having nothing that can be termed a metamor- phosis; they are active from the time of their exit from the egg to their death, gradually increasing in size, and undergoing several moults or changes of skin. The true lice (or Anoplura) are found on the bodies of many Mammalia, and occasion by their presence intolerable irritation. The number of genera is few. Two species of Pediculus are found on the human body, and are known ordinarily as the head-louse (P. capitis) and the body-louse (P. vestimenti); P. capitis is found on the head, especially of children. The eggs, laid on the hairs, and known as ” nits,” hatch in about eight days, and the lice are full grown in about a month. Such is their fecundity that it has been asserted that one female (probably of P. vestimenti) may in eight weeks produce five thousand descendants. Want of cleanliness favours their multiplication in a high degree — the idea once existed, and is probably still held by the very ignorant, that they are directly engendered from dirt. The irritation is caused by the rostrum of the insect being inserted into the skin, from which the blood is rapidly pumped up. A third human louse, known as the crab-louse (Phlhirius pubis) is found amongst the hairs on other parts of the body, particularly those of the pubic region, but probably never on the head. The louse of monkeys is now generally considered as forming a separate genus (Pedicinus), but the greater part of those infesting

domestic and wild quadrupeds are mostly grouped in the large genus Haematopinus, and very rarely is the same species found on different kinds of animals.

The bird-lice (Mallophaga) are far more numerous in species, although the number of genera is comparatively small. With the exception of the genus Trichodecies, the various species of tfhich are found on mammalia, all infest birds (as their English names implies) (see Bird-Louse). Louse-infestation is known as phthiriasis in medical and veterinary terminology.

Authorities. — The following works are the most important: Denny, Monographia Anoplurorum Britanniae (London, 1843); Giebel, Insecla Epizoa (which contains the working-up of Nitzsch's posthumous materials; Leipzig, 1874); van Beneden, Animal Parasites (London, 1876) ; Piaget, Les Pediculines (Leiden, 1880) ; M6gnin, Les Parasites el les maladies parasitaires (Paris, 1880); Neumann, Parasites and Parasitic Diseases of Domesticated Animals (1892); Osborn, Pediculi and Mallophaga affecting Man and the Lower Animals (Washington, i89i;U.S. Dept. Agr.); Enderlein, " Lause-Studien," Zool. Anz. xxviii. (1904).

LOUTH, a maritime county in the province of Leinster, Ireland, bounded N.E. by Carlingford Bay and Co. Down, E. by the Irish Sea, S.W. by Meath, and N.W. by Monaghan and Armagh. It is the smallest county in Ireland, its area being 202,731 acres or about 3 1 7 sq. m. The greater part of the surface is undulating, with occasionally lofty hills; in the north-east, on the borders of Carlingford Lough, there is a mountain range approaching 2000 ft. in height. Many of the hills are finely wooded, and towards the sea the scenery, in the more elevated districts, is strikingly picturesque. With the exception of the promontory of Clogher Head, which rises abruptly to a height of 180 ft., the coast is for the most part low and sandy. The narrow and picturesque Carlingford Lough is navigable beyond the limits of the county, and Carlingford and Greenore are well-known watering-places on the county Louth shore. The Bay of Dundalk stretches to the town of that name and affords convenient shelter. The principal rivers, the Fane, the Lagan, the Glyde and the Dee, flow eastwards. None of these is navigable, but the Boyne, which forms the southern boundary of the county, is navigable for large vessels as far as Drogheda.

Almost all this county is occupied by an undulating lowland of much-folded Silurian shales and fine-grained sandstones; but Carboniferous Limestone overlies these rocks north and east of Dundalk. Dolerite and gabbro, in turn invaded by granite, have broken through the limestone

north of Dundalk Bay, and form a striking and mountainous promontory. There is now no doubt that these rocks, with those on the adjacent moorland of Slieve Gullion, belong to the early Cainozoic igneous series, and may be compared with similar masses in the Isle of Skye. A raised beach provides a flat terrace at Greenore. Lead ore has been worked in the county, as in the adjacent parts of Armagh and Monaghan.

In the lower regions the soil is a very rich deep mould, admirably adapted both for cereals and green crops. The higher mountain regions are covered principally with heath. Agriculture generally is in an advanced condition, and the farms are for the most part well drained. The acreage of tillage is but little below that of pasture. Oats, barley, flax, potatoes and turnips are all satisfactorily culti- vated. Cattle, sheep, pigs and poultry represent the bulk of the live stock. Linen manufactures are of some importance. The deep- sea and coast fishery has its headquarters at Dundalk, and the salmon fisheries at Dundalk (Castletown river) and Drogheda (river Boyne). These fisheries, together with oyster beds in Carlingford Lough, are of great value. The county is traversed from S. to N. by the Great Northern railway, with a branch westward from Dundalk; while the same town is connected with the port of Greenore by a line owned by the London & North-Western railway of England. From Greenore the London & North-Western railway passenger steamers run regularly to Holyhead. The town of Ardee is served by a branch from the Great Northern line at Dromin.

The population (71,914 in 1891 ; 65,820 in 1901) decreases at about an average rate, and a considerable number of the inhabitants emigrate. Of the total population about 92 % are Roman Catholics. The principal towns are Dundalk (pop. 13,076), Drogheda (12,760) and Ardee (1883). The county includes six baronies and sixty-four parishes. Assizes are held at Dundalk and quarter sessions at Ardee, Drogheda and Dundalk. Louth was represented by two county and ten borough members in the Irish parliament; the two present divisions are the north and south, each returning one member. The county is in the Protestant dioceses of Armagh and Clogher and the Roman Catholic diocese of Armagh.

The territory which afterwards became the county Louth was included in the principality of Uriel, Orgial or Argial, which comprehended also the greater part of Meath, Monaghan and Armagh. The chieftain of the district was conquered by John de Courcy in n 83, and Louth or Uriel was among the shires generally considered to have been created by King John, and peopled by English settlers. Until the time of Elizabeth

it was included in the province of Ulster. County Louth is rich in antiquarian remains. There are ancient buildings of all dates, and spears, swords, axes of bronze, ornaments of gold, and other relics have been discovered in quantities. Among Druidical remains is the fine cromlech of Ballymascanlan, between Dundalk and Greenore. Danish raths and other forts are numerous. It is said that there were originally twenty religious houses in the county. Of the remains of these the most interesting are at Monasterboice and Mellifont, both near Drogheda. At the former site are two churches, the larger dating probably from the 9th century, the smaller from the 13th; a fine round tower,

no ft. in height, but not ‘quite perfect; and three crosses, two of which, 27 and 15 ft. in height respectively, are adorned with

moulding, sculptured figures and tracery, and are among the finest in Ireland. At Mellifont are the remains of the first Cistercian monastery founded in Ireland, in 1 142, with a massive gatehouse, an octagonal baptistery and chapter-house. Carling- ford and Drogheda have monastic remains, and at Dromiskin is a round tower, in part rebuilt. Ardee, an ancient town, incorpor- ated in 1376, has a castle of the 13th century. At Dunbar a charter of Charles II. (1670) gave the inhabitants the right to elect a sovereign. Louth, 55 m. S.W. from Dundalk, is a decayed town which gave its name to the county, and contains ruins of an abbey to which was attached one of the most noted early schools in Ireland.

LOUTH, a market-town and municipal borough in the E. Lindsey or Louth parliamentary division of Lincolnshire, England, on the river Lud, 1415 m. N. of London by the Grimsby branch of the Great Northern railway. Pop. (1901) 9518. By a canal, completed in 1763, there is water communication with the Humber. The Perpendicular church of St James, completed about 1515, with a spire 300 ft. in height, is one of the finest ecclesiastical buildings in the county. Traces of a building of the 13th century are perceptible. There are a town hall, a corn exchange and a market-hall, an Edward VI. grammar school, which is richly endowed, a commercial school founded in 1676, a hospital and several almshouses. Thorpe Hall is a picturesque building dated 1584. In the vicinity are the ruins of a Cistercian abbey (Louth Park). The industries include the manufacture of agricultural implements, iron-founding, brewing, malting, and rope and brick-

making. The town is governed by a mayor, 6 aldermen and 18 councillors. Area, 2749 acres.

Louth {Lud.es, Loweth) is first mentioned in the Domesday record as a borough held, as it had been in Saxon times, by the bishop of Lincoln, who had a market there. The see retained the manor until it was surrendered by Bishop Holbeach to Henry VIII., who granted it to Edward, earl of Lincoln, but it was recovered by the Crown before 1 562. Louth owed much of its early prosperity to the adjacent Cistercian abbey of Louth Park, founded in 1139 by Alexander bishop of Lincoln. The borough was never more than prescriptive, though burgesses were admitted throughout the middle ages and until 1711, their sole privilege being freedom from tolls. The medieval government of the town was by the manor court under the presidency of the bishop's high steward, the custom being for the reeve to be elected by eighteen ex-reeves. The original parish church was built about n 70. During the 13th and 14th centuries nine religious gilds were founded in the town. Fear of confiscation of the property of these gilds seems to have been one of the chief local causes of the Lincolnshire Rebellion, which broke out here in 1536. The disturbance began by the parishioners seizing the church ornaments to prevent their surrender. • The bishop's steward, who arrived to open the manorial court for the election of a reeve, agreed to ride to ask the king the truth about the jewels, but this did not satisfy the people, who, while showing respect to a royal commission, seized and burnt the papers of the bishop's registrar. After swearing several country gentlemen to their cause, the rebels dispersed, agreeing to meet on the following day under arms. Edward VI. in 1551 incorporated Louth under one warden and six assistants, who were to be managers of the school founded by the same charter. This was confirmed in 1564 by Elizabeth, who granted the manor of Louth to the corporation with all rights and all the lands of the suppressed gilds at an annual fee-farm rent of £84. James I. gave the commission of the peace to the warden and one assistant in 1605; a further charter was obtained in 1830. Louth has never been a parlia- mentary borough. The markets said to have been held from ancient times and the three fairs on the third Sunday after Easter and the feasts of St Martin and St James were confirmed in 1 55 1. Louth was a seat of the wool trade as early as 1297; the modern manufactures seem to have arisen at the end of the 18th century, when, according to the charter of 1830, there was a great increase in the population, manufactures, trade and commerce of the town.

See E. H. R. Tatham, Lincolnshire in Roman Times (Louth, 1902) ; Richard W. Goulding, Louth Old Corporation Records (Louth,

1891).

LOUVAIN (Flem. Leuven), a town of Belgium in the province of Brabant, of which it was the capital in the 14th century before the rise of Brussels. Pop. (1904) 42,194. Local tradition attributes the establishment of a permanent camp at this spot to Julius Caesar, but Louvain only became important in the nth century as a place of residence for the dukes of Brabant. In 1356 Louvain was the scene of the famous Joyeuse Entrev of Wenceslas which represented the principal charter of Brabant. At that time it had a population of at least 50,000 and was very prosperous as the centre of the woollen trade in central Belgium. The gild of weavers numbered 2400 members. The old walls of Louvain were 45 m. in circumference, and have been replaced by boulevards, but within them there is a considerable extent of cultivated ground. Soon after the Joyeuse Entree a serious feud began between the citizens and the patrician class, and eventually the duke threw in his lot with the latter. After a struggle of over twenty years' duration the White Hoods, as the citizens called themselves, were crushed. In 1379 they massacred seventeen nobles in the town hall, but this crime brought down on them the vengeance of the duke, to whom in 1383 they made the most abject and complete surrender. With this civil strife the importance and prosperity of Louvain declined. Many weavers fled to Holland and England, the duke took up his residence in the strong castle of Vilvorde, and Brussels prospered at the expense of Louvain. What it lost in trade it partially recovered as a seat of learning, for in 1423, Duke John IV. of Brabant founded there a university and ever since Louvain University has enjoyed the first place in Belgium. It has always prided itself most on its theological teaching. In 1679 the university was established in the old Cloth Workers' Hall, a building dating from 13 17, with long arcades and graceful pillars supporting the upper storeys. The library contains 70,000 volumes and some 500 manuscripts. Attached to the university are four residential colleges at which the number of students average two thousand. In the 16th century when the university was at the height of its fame it counted six thousand.

The most remarkable building in Louvain is the H6tel de Ville, one of the richest and most ornate examples of pointed Gothic in the country. If less ornate than that of Oudenarde it is more harmonious in its details. It was the work of Mathieu de Layens, master mason, who worked at it from 1448 to 1463. The building is one of three storeys each with ten pointed windows forming the facade facing the square. Above is a graceful balustrade behind which is a lofty roof, and at the angles are towers perforated for the passage of the light. The other

three sides are lavishly decorated with statuary. The interior is not noteworthy.

Opposite the Hotel de Ville is the fine church of St Pierre, in the form of a cross with a low tower to which the spire has never been added. The existing edifice was built on the site of an older church between 1425 and 1497. It contains seven chapels, in two of which are fine pictures by Dierich Bouts formerly attributed to Memling. Much of the iron and brass work is by Jean Matseys. There is also an ancient tomb, being the monument of Henry I., duke of Brabant, who died in 1235. There are four other interesting churches in Louvain, viz. Ste Gertrude, St Quentin, St Michael and St Jacques. In the last-named is a fine De Crayer representing St Hubert. Some ruins on a hill exist of the old castle of the counts of Louvain whose title was merged in the higher style of the dukes of Brabant.

LOUVER, Louvre or Luffer, in architecture, the lantern built upon the roof of the hall in ancient times to allow the smoke to escape when the fire was made on the pavement in the middle of the hall. The term is also applied to the flat overlapping slips of wood, glass, &c, with which such openings are closed, arranged to give ventilation without the admission of rain. Openings fitted with louvers are now utilized for the purposes of ventilation in schools and manufactories.

The word has been derived from the French I'ouvert, the " open" space. This, Minsheu's guess, is now generally abandoned. The Old French form, of which the English is an adaptation, was lover or lovier. The medieval Latin lodium, lodarium, is suggested as the ultimate origin. Du Cange (Glossarium, s.v. " lodia ") defines it as lugurium, i.e. a small hut. The English form " louvre " is due to a confusion with the name of the palace in Paris. The origin of that name is also unknown; louverie, place of wolves, is one of the suggestions, the palace being supposed to have originally been a hunting-box (see Paris).

LOUVET, JEAN (c. 1370-c. 1440), called the president of Provence, occupied the position of president of the Chambre des Comptes at Aix in 141 5. Towards the end of that year he went to Paris with Louis II. of Anjou, king of Sicily, attached himself to the dauphin Charles, and after having been chief steward of the household to Queen Isabella he turned against her. He was one of the principal agents of the

Armagnac party, and became the most influential adviser of Charles VII. during the first years of his reign. But his rapacity gained him enemies, and when the constable Arthur, earl of Richmond, attained a preponderating influence over Charles VII. Louvet retired to his captaincy of Avignon. He still remained a personage of importance in his exile, and played an influential part even in his last years.

See Vallet de Viriville in the Nouvelle Biographie generate, and G. du FresnedeBeaucourt,Histow-edeC7kw/e.s VII. (1881-1891). (J. V.*)

LOUVET DE COUVRAI, JEAN BAPTISTE (1760-1797), French writer and politician, was born in Paris on the 12th of June 1760, the son of a stationer. He became a bookseller's clerk, and first attracted attention with a not very moral novel called Les Amours du chevalier de Faublas (Paris, 1787-1780). The character of the heroine of this book, Lodoiska, was taken from the wife of a jeweller in the Palais Royal, with whom he had formed a liaison. She was divorced from her husband in 1792 and married Louvet in 1793. His second novel, Emilie de ■ Varmont. was intended to prove the utility and necessity of divorce and of the marriage of priests, questions raised by the Revolution. Indeed all his works were directed to the ends of the Revolution. He attempted to have one of his unpublished plays, L'Anobli conspiraleur, performed at the Theatre Francais, and records naively that one of its managers, M. d'Orfeuil, listened to the reading of the first three acts " with mortal impatience," exclaiming at last: " I should need cannon in order to put that piece on the stage." A " sort of farce " at the expense of the army of the imigris, La Grande Revue des armees noire et blanche, had, however, better success: it ran for twenty- five nights.

Louvet was, however, first brought into notice as a politician by his Paris justijit, in reply to a "truly incendiary" pamphlet in which Mounier, after the removal of the king to Paris in October 1789, had attacked the capital, " at that time blameless," and argued that the court should be established elsewhere. This led to Louvet's election to the Jacobin Club, for which, as he writes bitterly in his Memoirs, the qualifications were then " a genuine civisme and some talent." A self-styled philosophe of the true revolutionary type, he now threw himself ardently into the campaign against " despotism " and " reaction," i.e. against the moderate constitutional royalty advocated by Lafayette, the Abbe Maury and other " Machiavellians." On the 25th of December 1791 he presented at the bar of the Assembly his Petition contre les princes, which had " a prodigious success in the senate and the empire." Elected deputy to the Assembly for the department of Loiret, he made his first speech in January 1792. He attached himself

to the Girondists, whose vague deism, sentimental humanitarianism and ardent republicanism he fully shared, and from March to November 1792 he published, at Roland's expense, a bi-weekly journal- affiche, of which the title, La Sentinelle, proclaimed its mission to be to " enlighten the people on all the plots " at a time when, Austria having declared war, the court was " visibly betraying our armies." On the 10th of August he became editor of the Journal des debats, and in this capacity, as well as in the Assembly, made himself conspicuous by his attacks on Robespierre, Marat and the other Montagnards, whom he declares he would have

succeeded in bringing to justice in September but for the poor support he received from the Girondist leaders. It is more probable, however, that his ill-balanced invective contributed to their ruin and his own; for him Robespierre was a " royalist," Marat " the principal agent of England," the Montagnards Orleanists in masquerade. His courageous attitude at the trial of Louis XVI., when he supported the " appeal to the people," only served still further to discredit the Girondists. He defended them, however, to the last with great courage, if with little discretion; and after the crisis of the 31st of May 1793 he shared the perils of the party who fled from Paris (see Girondists). His wife, " Lodoiska," who had actively co- operated in his propaganda, was also in danger.

After the fall of Robespierre, he was recalled to the Convention, when he was instrumental in bringing Carrier and the others responsible for the Noyades of Nantes to justice. His influence was now considerable; he was elected a member of the Committee of the Constitution, president of the Assembly, and member of the Committee of Public Safety, against the overgrown power of which he had in earlier days protested. His hatred of the Mountain had not made him reactionary; he was soon regarded as one of the mainstays of the " Jacobins," and La Sentinelle reappeared, under his auspices, preaching union among re- publicans. Under the Directory (1795) he was elected a member of the Council of Five Hundred, of which he was secretary, and also a member of the Institute. Meanwhile he had returned to his old trade and set up a bookseller's shop in the Palais Royal. But, in spite of the fact that he had once more denounced the Jacobins in La Sentinelle, his name had become identified with all that the combative spirits of the jeunesse doree most disliked; his shop was attacked by the "young men" with cries of " A bas la Loupe, a has la belle Lodoiska, a bas les gardes du corps de Louvet!" he and his wife were insulted in the streets and the theatres: " A bas les Louvets et les Louvetants!" and he was compelled to leave Paris. The Directory appointed him to the consulship at Palermo, but he died on the '2 5th of August 1797

before taking up his post.

In 1795 Louvet published a portion of his Memoirs under the title of Quelques notices pour I'histoire et le recit de mes perils depuis le 31 mai 1793. They were mainly written in the various hiding-places in which Louvet rook refuge, and they give a vivid picture of the sufferings of the proscribed Girondists. They form an invaluable document for the study of the psychology of the Revolution; for in spite of their considerable literary art, they are artless in their revelation of the mental and moral state of their author, a characteristic type of the honest, sentimental, somewhat hysterical and wholly unbalanced minds nurtured on the abstractions of the philosophes. The first complete edition of the Memoires de Louvet de Couvrai, edited, with preface, notes and tables, by F. A. Aulard, was published at Paris in 1889.

LOUVIERS, a town of north-western France, capital of an arrondissement in the department of Eure, 175 m. S.S.E. of Rouen by road. Pop. (1906) 9449. Louviers is pleasantly situated in a green valley surrounded by wooded hills, on the Eure, which here divides into several branches. The old part of the town, built of wood, stands on the left bank of the river; the more modern portions, in brick and hewn stone, on the right. There are spacious squares, and the place is surrounded by boulevards. The Gothic church of Notre-Dame has a south portal which ranks among the most beautiful works of the kind produced in the 15th century; it contains fine stained glass of the 15th and 16th centuries and other works of art. The h6tel-de-ville, a large modern building, contains a museum and library. The chief industry is cloth and flannel manufacture. There are wool-spinning and fulling mills, thread factories and manu- factories of spinning and weaving machinery, and enamel ware; leather-working, dyeing, metal-founding and bell-founding are also carried on. The town is the seat of a sub-prefect and has a court of first instance, a tribunal of commerce, a chamber of arts and manufactures, and a council of trade arbitrators.

Louviers (Lovera) was originally a villa of the dukes of Normandy and in the middle ages belonged to the archbishops of Rouen; its cloth-making industry first arose in the beginning of the 13th century. It changed hands once and again during the Hundred Years' War, and from Charles VII. it received extensive privileges.

LOUVOIS, MARQUIS DE-

and the title of Louviers le Franc for the bravery of its inhabitants in driving the English from Pont de l'Arche, Verneuil and Harcourt. It passed through various troubles successively at the period of the League of the Public .Weal under Louis XL, in the religious wars (when the parlement of Rouen sat for a time at Louviers) and in the wars of the Fronde. See G. Petit, Hist, de Louviers (Louviers, 1877).

LOUVOIS, FRANCOIS MICHEL LE TELLIER, Marquis de (1641-1691), French statesman, war minister of Louis XIV., was born at Paris on the 18th of January 1641. His father, Michel le Tellier (g.v.), married him to an heiress, the marquise de Courtenvaux, and instructed him in the management of state business. The young man won the king's confidence, and in 1666 he succeeded his father as war minister. His talents were per- ceived by Turenne in the war of Devolution (1667-68), who gave him instruction in the art of providing armies. After the peace of Aix-la-Chapelle, Louvois devoted himself to organizing the French army. The years between 1668 and 1672, says Camille Rousset, " were years of preparation, when Lionne was labouring with all his might to find allies, Colbert to find money, and Louvois soldiers for Louis." The work of Louvois in these years is bound up with the historical development of the French army and of armies in general (see Army). Here need only be men- tioned Louvois's reorganization of the military orders of merit, his foundation of the Hotel des Invalides, and the almost forcible enrolment of the nobility and gentry of France, in which Louvois carried out part of Louis's measures for curbing the spirit of independence by service in the army or at court. The success of his measures is to be seen in the victories of the great war of 1672-78. After the peace of Nijmwegen Louvois was high in favour, his father had been made chancellor, and the influence of Colbert was waning. The ten years of peace between 1678 and 1688 were distinguished in French history by the rise of Madame de Maintenon, the capture of Strassburg and the revocation of the Edict of Nantes, in all of which Louvois bore a prominent part. The surprise of Strassburg in 1681 in time of peace was not only planned but executed by Louvois and Monclar. A saving clause in the revocation of the Edict of Nantes, which provided for some liberty of conscience, if not of worship, Louvois sharply annulled with the phrase " Sa majeste vcut qu'on fasse sentir les dernieres rigueurs a ceux qui ne voudront pas se faire de sa religion." He claimed also the credit of inventing the dragon- nades, and mitigated the rigour of the

soldiery only in so far as the licence accorded was prejudicial to discipline. Discipline, indeed, and complete subjection to the royal authority was the political faith of Louvois. Colbert died in 1683, and had been replaced by Le Pelletier, an adherent of Louvois, in the controller- generalship of finances, and by Louvois himself in his ministry for public buildings, which he took that he might be the minister able to gratify the king's two favourite pastimes, war and build- ing. Louvois was able to superintend the successes of the first years of the war of the League of Augsburg, but died suddenly of apoplexy after leaving the king's cabinet on July 16, 1691. His sudden death caused a suspicion of poison. Louvois was one of the greatest of the rare class of great war ministers. French history can only point to Carnot as his equal. Both had to organize armies out of old material on a new system, both were admirable contrivers of campaigns, and both devoted themselves to the material well-being of the soldiers. In private life and in the means employed for gaining his ends, Louvois was un- scrupulous and shameless.

The principal authority for Louvois's life and times is Camille Rousset's Histoire de Louvois (Paris, 1872), a great work founded on the 900 volumes of his despatches at the Depot de la Guerre. Saint Simon from his class prejudices is hardly to be trusted, but Madame de Sevigne throws many side-lights on his times. Testament politique de Louvois (1695) is spurious.

LOUYS, PIERRE (1870-), French novelist and poet, was born in Paris on the 10th of December 1870. When he was nineteen he founded a review, La Conque, which brought him into contact with the leaders of the Parnassians, and counted Swinburne, Maeterlinck, Mallarme and others among its con- tributors. He won notoriety by his novel Aphrodite (1896), which gave a vivid picture of Alexandrian morals at the

beginning of the Christian era. His Chansons de Bilitis, roman lyrique (1894), which purported to be a translation from the Greek, is a glorification of Sapphic love, which in subject-matter is objectionable in the highest degree; but its delicate decadent prose is typical of a modern French literary school, and some of the " songs " were set to music by Debussy and others. Later books are: La Femme et le pantin (1898); Les Aventures du roi Pausole (1900); Sanguines (1903); Archipel (1906). Louys married in 1899 Louise de Heredia, younger daughter of the poet. LOVAT, SIMON FRASER, 12TH Baron (c. 1667-1747), Scottish chief and Jacobite intriguer, was born about 1667 and was the second son of Thomas Fraser, third son of the 8th Lord Lovat. The barony of Lovat dates from about 1460, in the person

of Hugh Fraser, a descendant of Simon Fraser (killed at Halidon Hill in 1338) who acquired the tower and fort of Lovat near Beauly, Inverness-shire, and from whom the clan Fraser was called ” Macshimi ” (sons of Simon) . Young Simon was educated at King’s College, Aberdeen, and his correspondence afterwards gives proof, not only of a command of good English and idiomatic French, but of such an acquaintance with the Latin classics as to leave him never at a loss for an apt quotation from Virgil or Horace. Whether Lovat ever felt any real loyalty to the Stuarts or was actuated by self-interest it is difficult to determine, but that he was a born traitor and deceiver there can be no doubt. One of his first acts on leaving college was to recruit three hundred men from his clan to form part of a regiment in the service of William and Mary, in which he himself was to hold a command, — his object being to have a body of well-trained soldiers under his influence, whom at a moment’s notice he might carry over to the interest of King James. Among other outrages in which he was engaged about this time was a rape and forced marriage committed on the widow of the 10th Lord Lovat with the view apparently of securing his own succession to the estates; and it is a curious instance of influence that, after being subjected by him to horrible ill-usage, she is said to have become seriously attached to him. A prosecution, however, having been instituted against him by Lady Lovat’s family, Simon retired first to his native strongholds in the Highlands, and afterwards to France, where he found his way in July 1702 to the court of St Germain. In 1699, on his father’s death, he assumed the title of Lord Lovat. One of his first steps towards gaining influence in France seems to have been to announce his conversion to the Catholic faith. He then proceeded to put the project of restoring the exiled family into a practical shape. Hitherto nothing seems to have been known among the Jacobite exiles of the efficiency of the Highlanders as a military force. But Lovat saw that, as they were the only part of the British population accustomed to the independent use of arms, they could be at once put in action against the reigning power. His plan therefore was to land five thousand French troops at Dundee, where they might reach the north-eastern passes of the Highlands in a day’s march, and be in a position to divert the British troops till the Highlands should have time to rise. Immediately afterwards five hundred men were to land on the west coast, seize Fort William or Inver- lochy, and thus prevent the access of any military force from the south to the central Highlands. The whole scheme indicates Lovat’s sagacity as a military strategist, and his plan was continuously kept in view in all future attempts of the Jacobites, and finally acted on in the outbreak of 1745. The advisers of the Pretender seem to have been either slow to trust their coadjutor or to comprehend his

project. At last, however, he was despatched (1703) on a secret mission to the Highlands to sound those of the chiefs who were likely to rise, and to ascertain what forces they could bring into the field. He found, however, that there was little disposition to join the rebellion, and he then apparently made up his mind to secure his own safety by revealing all that he knew to the government of Queen Anne. He persuaded the duke of Queensberry that his rival, the duke of Atholl, was in the Jacobite plot, and that if Queensberry supported him he could obtain evidence of this at St Germain. Queensberry foolishly entered into the intrigue with him against Atholl, but when Lovat had gone to France with a pass from

Queensberry the affair was betrayed to Atholl by Robert Ferguson, and resulted in Queensberry's discomfiture. The story is obscure, and is complicated by partisanship on either side; but Lovat was certainly playing a double game. His agility, however, was not remunerative. On returning to Paris suspicions got afloat as to Lovat's proceedings, and he was imprisoned in the castle of Angouleme. He remained nearly ten years under supervision, till in November 17 14 he made his escape to England. For some twenty-five years after this he was chiefly occupied in lawsuits for the recovery of his estates and the re-establishment of his fortune, in both of which objects he was successful. The intervals of his leisure were filled up by Jacobite and Anti-Jacobite intrigues, in which he seems to have alternately, as suited his interests, acted the traitor to both parties. But he so far obtained the confidence of the government as to secure the appointments of sheriff of Inverness and of colonel of an independent company. His disloyal practices, however, soon led to his being suspected; and he was deprived of both his appointments. When the rebellion of 1745 broke out, Lovat acted with characteristic duplicity. He represented to the Jacobites — what was probably in the main true — that though eager for their success his weak health and advanced years prevented him from joining the standard of the prince in person, while to the Lord President Forbes he professed his cordial attachment to the existing state of things, but lamented that his son, in spite of all his remonstrances, had joined the Pretender, and succeeded in taking with him a strong force from the clan of the Frasers. The truth was that the lad was unwilling to go, but was compelled by his father. Lovat's false professions of fidelity did not long deceive the government, and after the battle of Culloden he was obliged to retreat to the Highlands, after seeing from a distant height his castle of

Dounie burnt by the royal army. Even then, broken down by disease and old age, carried on a litter and unable to move without assistance, his mental resources did not fail; and in a conference with several of the Jacobite leaders he proposed that they should raise a body of three thousand men, which would be enough to make their mountains impregnable, and at length force the government to give them advantageous terms. The project was not carried out, and Lovat, after enduring incredible hardships in his wanderings, was at last arrested on an island in Loch Morar. He was conveyed in a litter to London, and after a trial of five days sentence of death was pronounced on the 19th of March 1747. His execution took place on the 9th of April. His conduct to the last was dignified and even cheerful. Just before submitting his head to the block he repeated the line from Horace —

” Dulce et decorum est pro patria mori.”

His son Simon Fraser, Master of Lovat (1726-1782) (not to be confused with another Simon Fraser who saw somewhat similar service and was killed in 1777 at the battle of Saratoga), was a soldier, who at the beginning of the Seven Years’ War raised a corps of Fraser Highlanders for the English service, and at the outbreak of the American War of Independence raised another regiment which took a prominent part in it. He fought under Wolfe in Canada, and also in Portugal, and rose to be a British major-general. The family estates were restored to him, but the title was not revived till 1837. On his death without issue, and also of his successor, his half-brother Archibald Campbell Fraser (1736-1815), the Lovat estates passed to the Frasers of Strichen, Aberdeenshire. The 16th Baron Lovat (b. 1 871) raised a corps of mounted infantry (Lovat’s Scouts) in the Boer war of 1899-19,02.

See Memoirs of Lord Lovat (1746 and 1767); J. Hill Burton, Life of Simon, Lord Lovat (1847); J. Anderson, Account of the Family of Frizell or Fraser (Edinburgh, 1825); A. Mackenzie, History of the Frasers of Lovat (Inverness, 1896); Mrs A. T. Thomson, Memoirs of the Jacobites (1845-6); and W. C. Mackenzie, Simon Fraser, Lord Lovat (1908).

LOVE-BIRD, a name somewhat indefinitely bestowed, chiefly by dealers and their customers, on some of the smaller short- tailed parrots, from the affection which examples of opposite sexes exhibit towards each other. By many ornithologists the birds

thus named, brought almost entirely from Africa and South America, have been retained in a single genus, Psittacula, though those

belonging to the former country were by others separated as Agapornis. This separation, however, was neither generally approved nor easily justified, until Garrod (Proc. Zool. Society, 1874, p. 593) assigned good anatomical ground, afforded by the structure of the carotid artery, for regarding the two groups as distinct, and thus removed the puzzle presented by the geographical distribution of the species of Psittacula in a large sense, though Huxley (op. cit. 1868, p. 319) had suggested one way of meeting the difficulty. As the genus is now restricted, only one of the six species of Psittacula enumerated in the Nomenclator Avium of Sclater and Salvin is known to be found outside the Neotropical Region, the exception being the Mexican P. cyanopygia, and not one of the seven recognized by the same authors as forming the nearly allied genus Urochroma. On the other hand, of Agapornis, from which the so-called genus Polio- psitta can scarcely be separated, five if not six species are known, all belonging to the Ethiopian Region, and all but one, A. cana (which is indigenous to Madagascar, and thence has been widely disseminated), are natives of Africa. In this group probably comes also Psittinus, with a single species from the Malayan Subregion. One of the birds most commonly called love-birds, but with no near relationship to any of the above, being a long- tailed though very small parrot, is the budgerigar (Melopsittacus undulaius) now more familiar in Europe than most native birds, as it is used to ” tell fortunes ” in the streets, and is bred by hundreds in aviaries. Its native country is Australia. (A. N.)

LOVEDALE, a mission station in the Victoria East division of the Cape province, South Africa. It lies 1720 ft. above the sea on the banks of the Tyumie (Chumie) tributary of the Keiskama river, some 2 m. N. of Alice, a town 88 m. N.W. by rail of East London. The station was founded in 1824 by the Glasgow Missionary Society and was named after Dr John Love, one of the leading members of, and at the time secretary to, the society. The site first chosen was in the Ncera valley. But in 1834 the mission buildings were destroyed by the Kaffirs. On rebuilding, the station was removed somewhat farther north to the banks of the Tyumie. In 1846 the work at Lovedale was again interrupted, this time by the War of the Axe (see Cape Colony: History). On this occasion the buildings were converted into a fort and garrisoned by regular troops. Once more, in 1850, the Kaffirs threatened Lovedale and made an attack on the neighbouring Fort Hare, 1 built during the previous war.

Until 1841 the missionaries had devoted themselves almost entirely to evangelistic work; in that year the Lovedale Missionary Institute was founded by the Rev. W. Govan, who, save for brief intervals, continued at its head until 1870. He was then succeeded by the Rev.

James Stewart (1831-1905), who had joined the mission in 1867, having previously (1861-1863), and partly in company with David Livingstone, explored the Zambezi regions. To Stewart, who remained at the head of the institute till his death, is due the existing organization at Love- dale. The institute, in addition to its purely church work— in which no sectarian tests are allowed — provides for the education of natives of both sexes in nearly all branches of learning (Stewart discontinued the teaching of Greek and Latin, adopting English as the classic) ; it also takes European scholars, no colour dis- tinction being allowed in any department of the work. The institute gives technical training in many subjects and maintains various industries, including such diverse enterprises as farming and printing-works. It also maintains a hospital. The school buildings rival in accommodation and completeness those of the schools in large English cities. The sum paid in fees by scholars (of whom fully nine-tenths were Kaffirs) in the period 1841-1908 was £84,000. The educational and industrial methods initiated at Lovedale have been widely adopted by other

1 This lort was named after Colonel John Hare (d. 1846) of the 27th Regiment, from 1838 lieutenant-governor of the eastern provinces and commander of the first division of the field force in the War of the Axe.

missionary bodies. Lovedale is now a branch of the work of the United Free Church of Scotland.

See R. Young, African Wastes Reclaimed and Illustrated in the Story of the Lovedale Mission (London, 1902) ; J. Stewart, Lovedale, Past and Present (London, 1884), and Dawn in the Dark Continent (London, 1903) ; J. Wells, Stewart of Lovedale (London, 1908).

LOVELACE, RICHARD (1618-1658), English poet, was born at Woolwich in 1618. He was a scion of a Kentish family, and inherited a tradition of military distinction, maintained by successive generations from the time of Edward III. His father, Sir William Lovelace, had served in the Low Countries, received the honour of knighthood from James I., and was killed at Grolle in 1628. His brother, Francis Lovelace, the ” Colonel Francis ” of Lucasta, served on the side of Charles I., and de- fended Caermarthen in 1644. His mother’s family was legal; her grandfather had been chief baron of the exchequer. Richard was educated at the Charterhouse and at Gloucester Hall, Oxford, where he matriculated in 1634. Through the request of one of

the queen's ladies on the royal visit to Oxford he was made M.A., though only in his second year at the university. Lovelace's fame has been kept alive by a few songs and the romance of his career, and his poems are commonly spoken of as careless improvisations, and merely the amusements of an active soldier. But the unhappy course of his life gave him more leisure for verse-making than opportunity of soldiering. Before the outbreak of the civil war in 1642 his only active service was in the bloodless expedition which ended in the Pacification of Berwick in 1640. On the conclusion of peace he entered into possession of the family estates at Bethersden, Canterbury, Chart and Halden in Kent. By that time he was one of the most distinguished of the company of courtly poets gathered round Queen Henrietta, who were influenced as a school by contemporary French writers of vers de societe". He wrote a comedy, The Scholar, when he was sixteen, and a tragedy, The -Soldier, when he was twenty-one. From what he says of Fletcher, it would seem that this dramatist was his model, but only the prologue and epilogue to his comedy have been preserved. When the rupture between king and parliament took place, Lovelace was committed to the Gatehouse at Westminster for presenting to the Commons in 1642 a petition from Kentish royalists in the king's favour. It was then that he wrote his most famous song, " To Althea from Prison." He was liberated, says Wood, on bail of £40,000 (more probably £4000), and throughout the civil war was a prisoner on parole, with this security in the hands of his enemies. He contrived, however, to render considerable service to the king's cause. He provided his two brothers with money to raise men for the Royalist army, and befriended many of the king's adherents. He was especially generous to scholars and musicians, and among his associates in London were Henry Lawes and John Gamble, the Cottons, Sir Peter Lely, Andrew Marvell and probably Sir John Suckling. He joined the king at Oxford in 1645, and after the surrender of the city in 1646 he raised a regiment for the service of the French king. He was wounded at the siege of Dunkirk, and with his brother Dudley, who had acted as captain in his brother's command, returned to England in 1648. It is not known whether the brothers took any part in the disturbances in Kent of that year, but both were imprisoned at Petre House in Alders- gate. During this second imprisonment he collected and revised for the press a volume of occasional poems, many if not most of which had previously appeared in various publications. The volume was published in 1649 under the title of Lucasta, his poetical name — contracted from Lux Casta — for a lady rashly identified by Wood as Lucy Sacheverell, who, it is said, married another during his absence in France, on a report that he had died of his wounds at Dunkirk. The last ten years of

Lovelace's life were passed in obscurity. His fortune had been exhausted in the king's interest, and he is said to have been supported by the generosity of friends. He died in 1658 " in a cellar in Long-acre," according to Aubrey, who, however, possibly exaggerates his poverty. A volume of Lovelace's Posthume Poems was published in 1659 by his brother Dudley. They are of inferior merit to his own collection.

The world has done no injustice to Lovelace in neglecting all but a few of his modest offerings to literature. But critics often do him injustice in dismissing him as a gay cavalier, who dashed off his verses hastily and cared little what became of them. It is a mistake to class him with Suckling; he has neither Suckling's easy grace nor his reckless spontaneity. We have only to compare the version of any of his poems in Lucasta with the form in which it originally appeared to see how fastidious was his revision. In many places it takes time to decipher his meaning. The expression is often elliptical, the syntax inverted and tortuous, the train of thought intricate and discontinuous. These faults — they are not of course to be found in his two or three popular lyrics, " Going to the Wars," " To Althea from Prison," " The Scrutiny " — are, however, as in the case of his poetical master, Donne, the faults not of haste but of over-elabora- tion. His thoughts are not the first thoughts of an improvisatore, but thoughts ten or twenty stages removed from the first, and they are generally as closely packed as they are far-fetched.

His poems were edited by W. C. Hazlitt in 1864.

LOVELL, FRANCIS LOVELL, Viscount (1454-1487), sup- porter of Richard III., was son of John, 8th Baron Lovell. As a young man he served under Richard of Gloucester in the expedition to Scotland in 1480. After the death of Edward IV. he became one of his patron's strongest supporters. He had been created a viscount on the 4th of January 1483, and whilst still Protector Richard made him Chief Butler. As soon as Richard became king, Lovell was promoted to be Lord Chamberlain. Lovell helped in the suppression of Buckingham's rebellion, and as one of Richard's most trusted ministers was gibbeted in Collingbourne's couplet with Catesby and Ratcliffe: — " The catte, the ratte and Lovell our dogge Rulyth all England under a hogge." He had command of the fleet which was to have stopped Henry Tudor's landing in 1485, but fought for Richard at Bosworth and after the battle fled to sanctuary at Colchester. Thence he escaped next year to organize a dangerous revolt in York- shire. When that failed he fled to

Margaret of Burgundy in Flanders. As a chief leader of the Yorkist party he had a foremost part in Lambert Simnel's enterprise. With John de la Pole, earl of Lincoln, he accompanied the pretender to Ireland and fought for him at Stoke on the 16th of June 1487. He was seen escaping from the battle, but was never afterwards heard of; Bacon relates that according to one report he lived long after in a cave or vault {Henry VII., p. 37, ed. Lumby). More than 200 years later, in 1708, the skeleton of a man was found in a secret chamber in the family mansion at Minster Lovell in Oxfordshire. It is supposed that Francis Lovell had hidden himself there and died of starvation.

Collingbourne's couplet is preserved by Fabyan, Chronicle, p. 672. For the discovery at Minster Lovell see Notes and Queries, 2nd ser. i. and 5th ser. x. (C. L. K.)

LOVER, SAMUEL (1797-1868), Irish novelist, artist, song- writer and musician, was born in Dublin on the 24th of February 1797. His father was a stockbroker. Lover began life as an artist, and was elected in 1828 a member of the Royal Hibernian Academy — a body of which two years afterwards he became secretary. He acquired repute as a miniature painter, and a number of the local aristocracy sat to him for their portraits. His love for music showed itself at an early age. At a dinner given to the poet Tom Moore in 1818 Lover sang one of his own songs, which elicited special praise from Moore. One of his best-known portraits was that of Paganini, which was exhibited at the Royal Academy. He attracted attention as an author by his Legends and Stories of Ireland (1832), and was one of the first writers for the Dublin University Magazine. He went to London about 1835, where, among others, he painted Lord Brougham in his robes as lord chancellor. His gifts rendered him popular in society; and he appeared often at Lady Blessington's evening receptions. There he sang several of his songs, which were so well received that he published them (Songs and Ballads, 1839). Some of them illustrated Irish superstitions, among these being " Rory O'More," " The Angel's Whisper," " The May Dew " and " The Four-leaved Shamrock." In 1837 appeared Rory O'More, a National Romance, which at once made him a , reputation as a novelist; he afterwards dramatized it for the Adelphi Theatre, London. In 1842 was published his best -known * work, Handy Andy, an Irish Tale. Meanwhile his pursuits had

affected his health; and in 1844 he gave up writing for some time,

substituting instead public entertainments, called by him ” Irish Evenings,” illustrative of his own works. These were successful both in Great Britain and in America. In addition to publishing numerous songs of his own, Lover edited a collec- tion entitled The Lyrics of Ireland, which appeared in 1858. He died on the 6th of July 1868. Besides the novels already mentioned he wrote Treasure Trove (1844), and Metrical Tales and Other Poems (i860).

His Life was written in 1874 by Bayle Bernard.

LOVERE, a town of Lombardy, Italy, in the province of Bergamo, at the north-west end of the Lago d’ Iseo, 522 ft. above sea-level. Pop. (1901) 3306. It is a picturesque town, the houses having the overhanging wooden roofs of Switzerland united with the heavy stone arcades of Italy, while the situation is beautiful, with the lake in front and the semicircle of bold mountains behind. The church of Santa Maria in Valvendra, built in 1473, has frescoes by Floriano Ferramola of Brescia (d. 1528). The Palazzo Tadini contains a gallery of old pictures, some sculptures by Benzoni and Canova, and a zoological collec- tion. Lovere possesses a silk-spinning factory, and the Stablimento Metallurgico Gregorini, a large iron-work and cannon foundry, employs 1600 workmen. Lovere is reached by steamer from Sarnico at the south end of the lake, and there is a steam tramway through the Val Camonica, which is highly cultivated, and contains iron- and silk-works. From Cividate, the terminus, the road goes on to Edolo (2290 ft.), whence passes lead into Tirol and the Valtellina.

LOW, SETH (1850-), American administrator and edu- cationist, was born in Brooklyn, New York, on the 18th of January 1850. He studied in the Polytechnic Institute of Brooklyn and in Columbia University, where he graduated in 1870. He became a clerk (1870) and then a partner (1875) in his father’s tea and silk-importing house, A. A. Low & Brothers, which went out of business in 1888. In 1878 he organized, and became president of, the Brooklyn Bureau of Charities. In 1882-1886 he was mayor of the city of Brooklyn, being twice elected on an independent ticket; and by his administration of his office he demonstrated that a rigid ” merit ” civil-service system was practicable — in September 1884 the first municipal civil-service rules in the United Service were adopted in Brooklyn. He was president of Columbia University from 1890 to 1901, and did much for it by his business administration, his liberality (he gave $1,000,000 for the erection of a library) and his especial interest in the department of Political Science. In his term Columbia became a well-organized and closely-knit university. Its official name was changed from Columbia College to Columbia University. It was removed to a new site on

Morningside Heights, New York City. The New York College for the Training of Teachers became its Teachers' College of Columbia; a Faculty of Pure Science was added; the Medical School gave up its separate charter to become an integral part of the university; Barnard College became more closely allied with the university; relations were entered into between the university and the General, Union and Jewish theological seminaries of New York City and with Cooper Union, the Metropolitan Museum of Fine Arts and the American Museum of Natural History; and its faculty and student body became less local in character. Dr Low was a delegate to the Hague Peace Conference in 1899. He was prominent among those who brought about the chartering of Greater New York in 1897, and in this year was an unsuccessful candidate, on an independent ticket, for mayor of New York City; in 1900, on a fusion ticket, he was elected mayor and served in 1901-1903.

LOW, WILL HICOK (1853-), American artist and writer on art, was born at Albany, New York, on the 31st of May 1853. In 1873 he entered the atelier of J. L. Gerome in the Ecole des Beaux Arts at Paris, subsequently joining the classes of Carolus- Duran, with whom he remained until 1877. Returning to New York, he became a member of the Society of American Artists in 1878 and of the National Academy of Design in 1890. His pictures of New England types, and illustrations of Keats, brought

him into prominence. Subsequently he turned his attention to decoration, and executed panels and medallions for the Waldorf-Astoria Hotel, New York, a panel for the Essex County Court House, Newark, New Jersey, panels for private residences and stained-glass windows for various churches, including St Paul's Methodist Episcopal Church, Newark, N.J. He was an in- structor in the schools of Cooper Union, New York, in 1882- 1885, and in the school of the National Academy of Design in 1889-1892. Mr Low, who is known to a wider circle as the friend of R. L. Stevenson, published some reminiscences, A Chronicle of Friendships, 187 3-1900 (1908). In 1909 he married Mary (Fairchild), formerly the wife of the sculptor MacMonnies.

LOWBOY, a small table with one or two rows of drawers, so called in contradistinction to the tallboy, or double chest of drawers. Both were favourite pieces of the 18th century, both in England and America; the lowboy was most frequently used as a dressing-table, but sometimes as a side-table. It is usually made of oak, walnut or mahogany, with brass handtes and escutcheons. The more elegant examples of the Chippendale period have cabriole legs, claw-and-ball feet and carved knees, and are sometimes sculptured with the favourite shell motive

beneath the centre drawer.

LOW CHURCHMAN, a term applied to members of the Church of England or its daughter churches who, while accepting the hierarchical and sacramental system of the Church, do not consider episcopacy as essential to the constitution of the Church, reject the doctrine that the sacraments confer grace ex opere operato (e.g. baptismal regeneration) and lay stress on the Bible as the sole source of authority in matters of faith. They thus differ little from orthodox Protestants of other denominations, and in general are prepared to co-operate with them on equal terms.

The name was used in the early part of the 18th century as the equivalent of ” Latitudinarian,” i.e. one who was prepared to concede much latitude in matters of discipline and faith, in contradistinction to ” High Churchman,” the term applied to those who took a high view of the exclusive authority of the Established Church, of episcopacy and of the sacramental system. It subsequently fell into disuse, but was revived in the 19th century when the Tractarian movement had brought the term ” High Churchman ” into vogue again in a modified sense, i.e. for those who exalted the idea of the Catholic Church and the sacramental system at the expense both of the Establishment and of the exclusive authority of Scripture. ” Low Churchman ” now became the equivalent of ” Evangelical,” the designation of the movement, associated with the name of Simeon, which laid the chief stress on the necessity of personal ” conversion.” ” Lati- tudinarian ” gave place at the same time to ” Broad Churchman,” to designate those who lay stress on the ethical teaching of the Church and minimize the value of orthodoxy. The revival of pre-Reformation ritual by many of the High Church clergy led to the designation ” ritualist ” being applied to them in a some- what contemptuous sense; and ” High Churchman ” and ” Ritualist ” have often been wrongly treated as convertible terms. Actually many High Churchmen are not Ritualists, though they tend to become so. The High Churchman of the “Catholic” type is further differentiated from the “old- fashioned High Churchman ” of what is sometimes described as the ” high and dry ” type of the period anterior to the Oxford Movement.

LOWE, SIR HUDSON (1 769-1844), English general, was the son of an army surgeon, John Lowe, and was born at Galway on the 28th of July 1769. His mother was a native of that county. His childhood was spent in various garrison towns but he was educated chiefly at Salisbury grammar school. He obtained a post as ensign in the East Devon Militia before his twelfth year, and subsequently entered his father’s regiment, the 50th, then at Gibraltar (1787) under Governor-

General O'Hara. After the outbreak of war with France early in 1793, Lowe saw active service successively in Corsica, Elba, Portugal and Minorca, where he was entrusted with the command of a

battalion of Corsican exiles, called The Corsican Rangers. With these he did good work in Egypt in 1800-1801. After the peace of Amiens, Lowe, now a major, became assistant quartermaster- general; but on the renewal of war with France in 1803 he was charged, as lieutenant-colonel, to raise the Corsican battalion again and with it assisted in the defence of Sicily. On the capture of Capri he proceeded thither with his battalion and a Maltese regiment; but in October 1808 Murat organized an attack upon the island, and Lowe, owing to the unsteadiness of the Maltese troops and the want of succour by sea, had to agree to evacuate the island. The terms in which Sir William Napier and others have referred to Lowe's defence of Capri are unfair. His garrison consisted of 1362 men, while the assailants numbered between 3000 and 4000. In the course of the year 1809 Lowe and his Corsicans helped in the capture of Ischia and Procida, as well as of Zante, Cephalonia and Cerigo. For some months he acted as governor of Cephalonia and Ithaca, and later on of Santa Maura. He returned to England in i8i2,and in January 18 1 3 was sent to inspect a Russo-German legion then being formed, and he accompanied the armies of the allies through the campaigns of 1813 and 1814, being present at thirteen important battles. He won praise from Blucher and Gneisenau for his gallantry and judgment. He was chosen to bear to London the news of the first abdication of Napoleon in April 1814. He was then knighted and became major-general; he also received decora- tions from the Russian and Prussian courts. Charged with the duties of quartermaster-general of the army in the Netherlands in i8i4-i8i5,he was about to take part in the Belgian campaign when he was offered the command of the British troops at Genoa; but while still in the south of France he received (on the 1st of August 181 5) news of his appointment to the position of custodian of Napoleon, who had surrendered to H.M.S. " Bellerophon " off Rochefort. Lowe was to be governor of St Helena, the place of the ex-emperor's exile.

On his arrival there at Plantation House he found that Napoleon had already had scenes with Admiral Cockburn, of H.M.S. " Northumberland," and that he had sought to induce the former governor, Colonel Wilks, to infringe the regulations prescribed by the British government (see Monthly Review, January 1901). Napoleon

and his followers at Longwood pressed for an extension of the limits within which he could move without surveillance, but it was not in Lowe's power to grant this request. Various matters, in some of which Lowe did not evince much tact, produced friction between them. The news that rescue expeditions were being planned by the Bonapartists in the United States led to the enforcement of somewhat stricter regulations in October 1816, Lowe causing sentries to be posted round Longwood garden at sunset instead of at 9 p.m. This was his great offence in the eyes of Napoleon and his followers. Hence their efforts to calumniate Lowe, which had a surprising success. O'Meara, the British surgeon, became Napoleon's man, and lent himself to the campaign of calumny in which Las Cases and Montholon showed so much skill. In one of the suppressed passages of his Journal Las Cases wrote that the exiles had to " reduce to a system our demeanour, our words, our sentiments, even our privations, in order that we might thereby excite a lively interest in a large portion of the population of Europe, and that the opposition in England might not fail to attack the ministry." As to the privations, it may be noted that Lowe recommended that the government allowance of £8000 a year to the Longwood household should be increased by one-half. The charges of cruelty brought against the governor by O'Meara and others have been completely refuted; and the most that can be said against him is that he was occasionally too suspicious in the discharge of his duties. After the death of Napoleon in May 1821, Lowe returned to England and received the thanks of George IV. On the publication of O'Meara's book he resolved to prosecute the author, but, owing to an unaccountable delay, the application was too late. This fact, together with the reserved behaviour of Lowe, prejudiced the public against him, and the government did nothing to clear his reputation. In 1825-1830 he commanded the forces in Ceylon, but was not appointed

to the governorship when it fell vacant in 1830. In 1842 he became colonel of his old regiment, the 50th; he also received the G.C.M.G. He died in 1844.

See W. Forsyth, History of the Captivity of Napoleon at St Helena (3 vols., London, 1853); Gourgaud, Journal inedite de Sainte- Helene (1815-1818; 2 vols., Paris, 1899); R. C. Seaton, Napoleon's Captivity in relation to Sir Hudson Lowe (London, 1903) ; Lieut.-Col. Basil Jackson, Notes and Reminiscences of a Staff-Officer (London, I 9°3); the earl of Rosebery, Napoleon; the Last Phase (London 1900) ; J- H. Rose, Napoleonic Studies (London, 1904). (J. Hl. R.)

LOWE, JOHANN KARL GOTTFRIED (1796-1869), German composer,

was born at Lobejiin, near Halle, on the 30th of November 1796, and was a choir-boy at Kothen from 1807 to 1809, when he went to the Franke Institute at Halle, studying music with Turk. The beauty of Lowe's voice brought him under the notice of Madame de Stael, who procured him a pension from Jerome Bonaparte, then king of Westphalia; this stopped in 1 8 1 3, on the flight of the king. He entered the University of Halle as a theological student, but was appointed cantor at Stettin in 1820, and director of the town music in 1821, in which year he married Julie von Jacob, who died in 1823. His second wife, Auguste Lange, was an accomplished singer, and they appeared together in his oratorio performances with great success. He retained his office at Stettin for 46 years, when, after a stroke of paralysis, he was somewhat summarily dismissed. He retired to Kiel, and died on the 20th of April 1869. He undertook many concert tours during his tenure of the post at Stettin, visiting Vienna, London, Sweden, Norway and Paris. His high soprano voice (he could sing the music of the " Queen of Night " in Die Zauberflote as a boy) had developed into a fine tenor. Lowe was a voluminous composer, and wrote five operas, of which only one, Die drei Wiinsche, was performed at Berlin in 1834, without much success; seventeen oratorios, many of them for male voices unaccompanied, or with short instrumental interludes only; choral ballads, cantatas, three string quartets, a pianoforte trio; a work for clarinet and piano, published posthumously; and some piano solos. But the branch of his art by which he is remembered, and in which he must be admitted to have attained perfection, is the solo ballad with pianoforte accompaniment. His treatment of long narrative poems, in a clever mixture of the dramatic and lyrical styles, was undoubtedly modelled on the ballads of Zumsteeg, and has been copied by many composers since his day. His settings of the " Erlkonig " (a very early example), " Archibald Douglas," " Heinrich der Vogler," " Edward " and " Die Verfallene Miihle," are particularly fine.

LOWELL, ABBOTT LAWRENCE (1856-), American educationalist, was born in Boston, Massachusetts on the 13th of December 1856, the great-grandson of John Lowell, the " Columella of New England," and on his mother's side, a grand- son of Abbott Lawrence. He graduated at Harvard College in 1877, with highest honours in mathematics; graduated at the Harvard Law School in 1880; and practised law in 1880- 1897 in partnership with his cousin, Francis Cabot Lowell (b. 1855), with whom he wrote Transfer of Stock in Corporations (1884). In 1897 he became lecturer and in 1898 professor of government at Harvard, and in 1909 succeeded Charles William Eliot as president of the university. In the same year he was president of the American

Political Science Association. In 1900 he had succeeded his father, Augustus Lowell (1830- 1901), as financial head of the Lowell Institute of Boston. He wrote Essays on Government (1889), Governments and Parties in Continental Europe (2 vols., 1896), Colonial Civil Service (1900; with an account by H. Morse Stephens of the East India College at Haileybury), and The Government of England (2 vols., 1908). His brother, Percival Lowell (1855-), the well-known astronomer, graduated at Harvard in 1876, lived much in Japan between 1883 and 1893, and in 1894 established at Flagstaff, Arizona, the Lowell Observatory, of whose Annals (from 1898) he was editor. In 1902 he became non-resident professor of astronomy at the Massachusetts Institute of Technology. He wrote several books on the Far East, including Choson (1885), The Soul of the Far East (1886), Nolo, an Unexplored Corner

of Japan (1891), and Occult Japan (1895), but he is best known for his studies of the planet Mars — he wrote Mars (1895), Mars and Its Canals (1907), and Mars, the Abode of Life (1908) — -and his contention that the ” canals ” of Mars are a sign of life and civilization on that planet (see Mars). He published The Evolution of Worlds in 1909.

LOWELL, CHARLES RUSSELL (1835-1864), American soldier, was born on the 2nd of January 1835 in Boston, Massa- chusetts. His mother, Anna Cabot Jackson Lowell (1819-1874), a daughter of Patrick Tracy Jackson, married Charles Russell Lowell, a brother of James Russell Lowell; she wrote verse and books on education. Her son graduated at Harvard in 1854, worked in an iron mill in Trenton, New Jersey, for a few months in 1855, spent two years abroad, and in 1858-1860 was local treasurer of the Burlington & Missouri river railroad. In i860 he took charge of the Mount Savage Iron Works, in Cumberland, Maryland. He entered the Union army in June 1861 (commission May 14) as captain of the 3rd (afterwards 6th) U.S. cavalry; on the 15th of April 1863 he became colonel of the 2nd Massa- chusetts cavalry; he was wounded fatally at Cedar Creek on the 19th of October 1864, when he was promoted brigadier- general of U.S. Volunteers, and died on the next day at Middle- town, Va. Lowell married in October 1863, Josephine Shaw (1843-1905), a sister of Colonel R. G. Shaw. Her home when she was married was on Staten Island, and she became deeply interested in the social problems of New York City. She was a member of the State Charities Aid Society,

and from 1877 to 1889 was a member of the New York State Board of Charities, being the first woman appointed to that board. She founded the Charity Organization Society of New York City in 1882, and wrote Public Relief and Private Charity (1884) and Industrial Arbitration and Conciliation (1893).

See Edward E. Emerson (ed.), The Life and Letters of Charles Russell Lowell (Boston, 1907).

LOWELL, JAMES RUSSELL (1810-1891), American author and diplomatist, was born at Elmwood, in Cambridge, Massa- chusetts, en the 22nd of February 1819, the son of Charles Lowell(i782-i86i). 1 On his mother's side he was descended from the Spences and Traills, who made their home in the Orkney Islands, his great-grandfather, Robert Traill, returning to England on the breaking out of hostilities in 1775. He was brought up in a neighbourhood bordering on the open country, and from his earliest years he found a companion in nature; he was also early initiated into the reading of poetry and romance, hearing Spenser and Scott in childhood, and introduced to old ballads by his mother. He had for schoolmaster an Englishman who held by the traditions of English schools, so that before he entered Harvard College he had a more familiar acquaintance with Latin verse than most of his fellows — a familiarity which showed itself later in his mock-pedantic accompaniment to The Biglow Papers and his macaronic poetry. He was a wide reader, but a somewhat indifferent student, graduating at Harvard without special honours in 1838. During his college course he wrote a number of trivial pieces for a college magazine, and shortly after graduating printed for private circulation the poem which his class asked him to write for their graduation festivities.

He was uncertain at first what vocation to choose, and vacil- lated between business, the ministry, medicine and law. He decided at last to practise law, and after a course at the Harvard law school, was admitted to the bar. While studying for his profession, however, he contributed poems and prose articles to various magazines. He cared little for the law, regarding it simply as a distasteful means of livelihood, yet his experiments in writing did not encourage him to trust to this for support. An unhappy adventure in love deepened his sense of failure, but he became betrothed to Maria White in the autumn of 1840, and the next twelve years of his life were deeply affected by her influence. She was a poet of delicate power, but also possessed a lofty enthusiasm, a high conception of purity and justice, and a practical temper which led her to concern herself 1 See under Lowell, John.

in the movements directed against the evils of intemperance and slavery. Lowell was already looked upon by his companions as a man marked by wit and poetic sentiment; Miss White was admired for her beauty, her character and her intellectual gifts, and the two became thus the hero and heroine among a group of ardent young men and women. The first-fruits of this passion was a volume of poems, published in 1841, entitled A Year's Life, which was inscribed by Lowell in a veiled dedica- tion to his future wife, and was a record of his new emotions with a backward glance at the preceding period of depression and irresolution. The betrothal, moreover, stimulated Lowell to new efforts towards self-support, and though nominally maintaining his law office, he threw his energy into the establishment, in company with a friend, Robert Carter, of a literary journal, to which the young men gave the name of The Pioneer. It was to open the way to new ideals in literature and art, and the writers to whom Lowell turned for assistance — Hawthorne, Emerson, Whittier, Poe, Story and Parsons, none of them yet possessed of a wide reputation — indicate the acumen of the editor. Lowell himself had already turned his studies in dramatic and early poetic literature to account in another magazine, and continued the series in The Pioneer, besides contributing poems; but after the issue of three monthly numbers, beginning in January 1843, the magazine came to an end, partly because of a sudden disaster which befell Lowell's eyes, partly through the inexperience of the conductors and unfortunate business connexions.

The venture confirmed Lowell in his bent towards literature. At the close of 1843 he published a collection of his poems, and a year later he gathered up certain material which he had printed, sifted and added to it, and produced Conversations on some of the Old Poets. The dialogue form was used merely to secure an undress manner of approach to his subject; there was no attempt at the dramatic. The book reflects curiously Lowell's mind at this time, for the conversations relate only partly to the poets and dramatists of the Elizabethan period; a slight suggestion sends the interlocutors off on the discussion of current reforms in church and state and society. Literature and reform were dividing the author's mind, and continued to do so for the next decade. Just as this book appeared Lowell and Miss White were married, and spent the winter and early spring of 1845 in Philadelphia. Here, besides continuing his literary contributions to magazines, Lowell had a regular engagement as an editorial writer on The Pennsylvania Freeman, a fortnightly journal devoted to the Anti-Slavery cause. In the spring of 1845 the Lowells returned to Cambridge and made their home at Elmwood. On the last day of the

year their first child, Blanche, was born, but she lived only fifteen months. A second daughter, Mabel, was born six months after Blanche's death, and lived to survive her father; a third, Rose, died an infant. Lowell's mother meanwhile was living, sometimes at home, some- times at a neighbouring hospital, with clouded mind, and his wife was in frail health. These troubles and a narrow income conspired to make Lowell almost a recluse in these days, but from the retirement of Elmwood he sent forth writings which show how large an interest he took in affairs. He contributed poems to the daily press, called out by the Slavery question; he was, early in 1846, a correspondent of the London Daily News, and in the spring of 1848 he formed a connexion with the National Anti-Slavery Standard of New York, by which he agreed tp furnish weekly either a poem or a prose article. The poems were most frequently works of art, occasionally they were tracts; but the prose was almost exclusively concerned with the public men and questions of the day, and forms a series of incisive, witty and sometimes prophetic diatribes. It was a period with him of great mental activity, and is represented by four of his books which stand as admirable witnesses to the Lowell of 1848, namely, the second series of Poems, containing among others " Columbus," " An Indian Summer Reverie," " To the Dande- lion," "The Changeling"; A Fable for Critics, in which, after the manner of Leigh Hunt's The Feast of the Poets, he charac- terizes in witty verse and with good-natured satire American

contemporary writers, and in which, the publication being anony- mous, he included himself; The Vision of Sir Launfal, a romantic story suggested by the Arthurian legends — one of his most popular poems; and finally The Biglow Papers.

Lowell had acquired a reputation among men of letters and a cultivated class of readers, but this satire at once brought him a wider fame. The book was not premeditated; a single poem, called out by the recruiting for the abhorred Mexican war, couched in rustic phrase and sent to the Boston Courier, had the inspiriting dash and electrifying rat-tat-tat of this new recruiting sergeant in the little army of Anti-Slavery re- formers. Lowell himself discovered what he had done at the same time that the public did, and he followed the poem with eight others either in the Courier or the Anti-Slavery Standard. He developed four well-defined characters in the process— a country farmer, Ezekiel Biglow, and his son Hosea; the Rev. Homer Wilbur, a

shrewd old-fashioned country minister; and Birdofredum Sawin, a Northern renegade who enters the army, together with one or two subordinate characters; and his stinging satire and sly humour are so set forth in the vernacular of New England as to give at once a historic dignity to this form of speech. (Later he wrote an elaborate paper to show the survival in New England of the English of the early 17th century.) He embroidered his verse with an entertaining apparatus of notes and mock criticism. Even his index was spiced with wit. The book, a caustic arraignment of the course taken in connexion with the annexation of Texas and the war with Mexico, made a strong impression, and the political philo- sophy secreted in its lines became a part of household literature. It is curious to observe how repeatedly this arsenal was drawn upon in the discussions in America about the " Imperialistic " developments of 1900. The death of Lowell's mother, and the fragility of his wife's health, led Lowell, with his wife, their daughter Mabel and their infant son Walter, to go to Europe in 1851, and they went direct to Italy. The early months of their stay were saddened by the death of Walter in Rome, and by the news of the illness of Lowell's father, who had a slight shock of paralysis. They returned in November 1852, and Lowell published some recollections of his journey in the magazines, collecting the sketches later in a. prose volume, Fireside Travels. He took some part also in the editing of an American edition of the British Poets, but the low state of his wife's health kept him in an uneasy condition, and when her death (27th October 1853) released him from the strain of anxiety, there came with the grief a readjustment of his nature and a new intellectual activity. At the invitation of his cousin, he delivered a course of lectures on English poets before the Lowell Institute in Boston in the winter of 1855. This first formal appearance as a critic and historian of literature at once gave him a new standing in the community, and was the occasion of his election to the Smith Professorship of Modern Languages in Harvard College, then vacant by the retirement of Longfellow. Lowell accepted the appointment, with the proviso that he should have a year of study abroad. He spent his time mainly in Germany, visiting Italy, and increasing his acquaintance with the French, German, Italian and Spanish tongues. He returned to America in the summer of 1856, and entered upon his college duties, retaining his position for twenty years. As a teacher he proved himself a quickener of thought amongst students, rather than a close and special instructor. His power lay in the interpretation of literature rather than in linguistic study, and his influence over his pupils was exercised by his own fireside as well as in the relation, always friendly and familiar, which he held to them in the classroom. In 1856 he married Miss Frances Dunlap, a lady who had since his

wife's death had charge of his daughter Mabel.

In the autumn of 1857 The Atlantic Monthly was established, and Lowell was its first editor. He at once gave the magazine the stamp of high literature and of bold speech on public affairs. He held this position only till the spring of 1861, but he continued to make the magazine the vehicle of his poetry and of some prose for the rest of his life; his prose, however, was more

abundantly presented in the pages of The North American Review during the years 1862-1872, when he was associated with Mr Charles Eliot Norton in its conduct. This magazine especially gave him the opportunity of expression of political views during the eventful years of the War of the Union. It was in The Atlantic during the same period that he published a second series of The Biglow Papers. Both his collegiate and editorial duties stimulated his critical powers, and the publication in the two magazines, followed by republication in book form, of a series of studies of great authors, gave him an important place as a critic. Shakespeare, Dryden, Lessing, Rousseau, Dante, Spenser, Wordsworth, Milton, Keats, Carlyle, Thoreau, Swinburne, Chaucer, Emerson, Pope, Gray — these are the principal subjects of his prose, and the range of topics indicates the catholicity of his taste. He wrote also a number of essays, such as " My Garden Acquaintance," " A Good Word for Winter," " On a Certain Condescension in Foreigners," which were incursions into the field of nature and society. Although the great bulk of his writing was now in prose, he made after this date some of his most notable ventures in poetry. In 1868 he issued the next collection in Under the Willows and other Poems, but in 1865 he had delivered his " Ode recited at the Harvard Commemora- tion," and the successive centennial historical anniversaries drew from him a series of stately odes.

In 1877 Lowell, who had mingled so little in party politics that the sole public office he had held was the nominal one of elector in the Presidential election of 1876, was appointed by President Hayes minister resident at the court of Spain. He had a good knowledge of Spanish language and literature, and his long-continued studies in history and his quick judgment enabled him speedily to adjust himself to these new relations. Some of his despatches to the home government were published in a posthumous volume — Impressions of Spain. In 1880 he was transferred to London as American minister, and remained there till the close of President Arthur's administration in the spring of 1885. As a man of letters he was already well known in England, and he was in much demand as an orator on public occasions, especially of a literary nature; but he also proved himself a

sagacious publicist, and made himself a wise interpreter of each country to the other. Shortly after his retirement from public life he published Democracy and other Addresses, all of which had been delivered in England. The title address was an epigrammatic confession of political faith as hopeful as it was wise and keen. The close of his stay in England was saddened by the death of his second wife irr 1885. After his return to America he made several visits to England. His public life had made him more of a figure in the world; he was decorated with the highest honours Harvard could pay officially, and with degrees of Oxford, Cambridge, St Andrews, Edinburgh and Bologna. He issued another collection of his poems, Heartsease and Rue, in 1888, and occupied himself with revising and re- arranging his works, which were published in ten volumes in 1890. The last months of his life were attended by illness, and he died at Elmwood on the 12th of August 1891. After his death his literary executor, Charles Eliot Norton, published a brief collection of his poems, and two volumes of added prose, besides editing his letters.

The spontaneity of Lowell's nature is delightfully disclosed in his personal letters. They are often brilliant, and sometimes very penetrating in their judgment of men and books; but the most constant element is a pervasive humour, and this humour, by turns playful and sentimental, is largely characteristic of his poetry, which sprang from a genial temper, quick in its sympathy with nature and humanity. The literary refinement which marks his essays in prose is not conspicuous in his verse, which is of a more simple character. There was an apparent conflict in him of the critic and the creator, but the conflict was superficial. The man behind both critical and creative work was so genuine, that through his writings and speech and action he impressed himself deeply upon his generation in America, especially upon the thoughtful and scholarly class who looked upon him as especially their representative. This is not to say that he was

a man of narrow sympathies. On the contrary, he was demo- I cratic in his thought, and outspoken in his rebuke of whatever | seemed to him antagonistic to the highest freedom. Thus, without taking a very active part in political life, he was recog- nized as one of the leaders of independent political thought. He found expression in so many ways, and was apparently so inexhaustible in his resources, that his very versatility and the ease with which he gave expression to his thought sometimes stood in the way of a recognition of his large, simple

political ideality and the singleness of his moral sight.

Writings. — The Works of James Russell Lowell, in ten volumes (Boston and New York, Houghton, Mifflin & Co., 1890); edition de luxe, 61 vols. (1904); Latest Literary Essays and Addresses (1891); The Old English Dramatists (1892); Conversations on some of the Old Poets (Philadelphia, David M'Kay; reprint of the volume pub- lished in 1843 and subsequently abandoned by its author, 1893); The Power of Sound: a Rhymed Lecture (New York, privately printed, 1896); Lectures on English Poets (Cleveland, The Rowfant Club, 1899).

Memoirs. — Letters of James Russell Lowell, edited by Charles Eliot Norton, in two volumes (New York, Harper & Brothers, 1899); Life of James Russell Lowell (2 vols.), by Horace E. Scudder (Houghton, Mifflin & Co., 1901); James Russell Lowell and his Friends (Boston, 1899), by Edward Everett Hale. (H. E. S.*)

LOWELL, JOHN (1 743-1802), American jurist, was born in Newburyport, Massachusetts, on the 17th of June 1743, and was a son of the Reverend John Lowell, the first pastor of Newburyport, and a descendant of Perceval Lowle or Lowell (1571-1665), who emigrated from Somersetshire to Massachusetts Bay in 1639 and was the founder of the family in New England. John Lowell graduated at Harvard in 1760, was admitted to the bar in 1763, represented Newburyport (1776) and Boston (1778) in the Massachusetts Assembly, was a member of the Massa- chusetts Constitutional Convention of 17 70-1 780 and, as a member of the committee appointed to draft a constitution, secured the insertion of the clause, " all men are born free and equal," which was interpreted by the supreme court of the state in 1783 as abolishing slavery in the state. In 1781-1783 he was a member of the Continental Congress, which in 1782 made him a judge of the court of appeals for admiralty cases; in 1784 he was one of the commissioners from Massachusetts to settle the boundary line between Massachusetts and New York; in 1789-1801 he was a judge of the U.S. District Court of Massa- chusetts; and from 1801 until his death in Roxbury on the 6th of May 1802 he was a justice of the U.S. Circuit Court for the First Circuit (Maine, New Hampshire, Massachusetts and Rhode Island).

His son, John Lowell (1 769-1840), graduated at Harvard in 1786, was admitted to the bar in 1789 (like his father, before he was twenty years old), and retired from active practice in 1803. He opposed French influence and the policies of the Democratic party, writing many spirited pamphlets (some signed " The Boston Rebel," some " The Roxbury Farmer "), including: The Antigallican (1797), Remarks

on the Hon. J. Q. Adams's Review of Mr Ames's Works (1809), New England Patriot, being a Candid Comparison of the Principles and Conduct of the Washington and Jefferson Administrations (1810), Appeals to the People on the Causes and Consequences of War with Great Britain (1811) and Mr Madison's War (1812). These pamphlets contain an extreme statement of the anti-war party and defend impress- ment as a right of long standing. After the war Lowell abandoned politics, and won for himself the title of " the Columella of New England " by his interest in agriculture — he was for many years president of the Massachusetts Agricultural Society. He was a benefactor of the Boston Athenaeum and the Massachusetts General Hospital.

Another son of the first John Lowell, Francis Cabot Lowell (1775-1817), the founder in the United States of cotton manu- facturing, was born in Newburyport on the 7th of April 1775, graduated at Harvard in 1793, became a merchant in Boston, and, during the war of 181 2, with his cousin (who was also his brother-in-law), Patrick Tracy Jackson, made use of the knowledge of cotton-spinning gained by Lowell in England (whither he had gone for his health in 1810) and devised a power

loom. Experiments were successfully carried on at Waltham in 1814. Lowell worked hard to secure a protective tariff on cotton goods. The city of Lowell, Massachusetts, was named in his honour. He died in Boston on the 10th of August 1817.

Charles Lowell (1782-1861), brother of the last named, was born in Boston, graduated at Harvard in 1800, studied law and then theology, and after two years in Edinburgh and one year on the Continent was from 1806 until his death pastor of the West Congregational (Unitarian) Church of Boston, a charge in which Cyrus A. Bartol was associated with him after 1837. Charles Lowell had a rare sweetness and charm, which reappeared in his youngest son, James Russell Lowell (?.».).

Francis Cabot Lowell's son, John Lowell (1 799-1836), was born in Boston, travelled in India and the East Indies on business in 1816 and 1817, in 1832 set out on a trip around the world, and on the 4th of March 1836 died in Bombay. By a will made, said Edward Everett, " on the top of a palace of the Pharaohs," he left $237,000 to establish what is now known as the Lowell Institute (q.v.).

See the first lecture delivered before the Institute, Edward Everett's A Memoir of Mr John Lowell, Jr. (Boston, 1840).

A grandson of Francis Cabot Lowell, Edward Jackson Lowell (1845-1894), graduated at Harvard in 1867, was admitted to the Suffolk county (Mass.) bar in 1872, and practised law for a few years. He wrote The Hessians and the Other German Auxiliaries of Great Britain in the Revolutionary War (1884), The Eve of the French Revolution (1892) and the chapter, “The United States of America 1775-1782 : their Political Relations with Europe,” in vol. vii. (1888) of Winsor’s Narrative and Critical History of America.

LOWELL, a city and one of the county-seats (Cambridge being the other) of Middlesex county, Massachusetts, U.S.A., situated in the N.E. part of the county at the confluence of the Concord and Merrimack rivers, about 25 m. N.W. of Boston. Pop. (1890) 77,696; (1900) 94,969, of whom 40,974 were foreign- born (14,674 being French Canadian, 12,147 Irish, 4485 English Canadian, 4446 English, 1 203 Greek, 1099 Scotch) ; (1910 census), 106,294. Lowell is served by the Boston & Maine and the New York, New Haven & Hartford railways, and by interurban electric lines. The area of Lowell is 14-1 sq. m., much the larger part of which is S. of the Merrimack. The city is irregularly laid out. Its centre is Monument Square, in Merrimack Street, where are a granite monument to the first Northerners killed in the Civil War, Luther C. Ladd and A. O. Whitney (both of Lowell), whose regiment was mobbed in Baltimore on the 19th of April 1861 while marching to Wash- ington; and a bronze figure of Victory (after one by Rauch in the Valhalla at Ratisbon) , commemorating the Northern triumph in the Civil War. The Lowell textile school, opened in 1897, offers courses in cotton manufacturing, wool manufacturing, designing, chemistry and dyeing, and textile engineering; evening drawing schools and manual training in the public schools have contributed to the high degree of technical perfec- tion in the factories. The power gained from the Pawtucket Falls in the Merrimack river has long been found insuffi- cient for these. A network of canals supplies from 14,000 to 24,000 h.p. ; and a small amount is also furnished by the Concord river, but about 26,000 h.p. is supplied by steam. In factory output ($46,879,212 in 1905; $41,202,984 in 1900) Lowell ranked fifth in value in 1905 and fourth in 1900 among the cities of Massachusetts; more than three-tenths of the total population are factory wage-earners, and nearly 19% of the population are in the cotton mills. Formerly Lowell was called the ” Spindle City ” and the ” Manchester of America,” but it was long ago surpassed in the manufacture of textiles by Fall River and New Bedford: in 1905 the value of the cotton product of Lowell, $19,340,925, was less than 60% of the value of cotton goods made at Fall River. Woollen goods made in Lowell in 1 905 were valued at

$2,579,363; hosiery and knitted goods, at $3,816,964; worsted goods, at $1,978,552. Carpets and textile machinery are allied manufactures of importance. There are other factories for machinery, patent medicines, boots and shoes,

perfumery and cosmetics, hosiery and rubber heels. Lowell was the home of the inventor of rubber heels, Humphrey O'Sullivan.

The founders of Lowell were Patrick Tracy Jackson (1780- 1847), Nathan Appleton (1779-1861), Paul Moody (1779-1831) and the business manager chosen by them, Kirk Boott (1790- 1837). The opportunity for developing water-power by the purchase of the canal around Pawtucket Falls (chartered for navigation in 1792) led them to choose the adjacent village of East Chelmsford as the site of their projected cotton mills; they bought the Pawtucket canal, and incorporated in 1822 the Merrimack Manufacturing Company; in 18-23 the first cloth was actually made, and in 1826 a separate township was formed from part of Chelmsford and was named in honour of Francis Cabot Lowell, who with Jackson had improved Cartwright's power loom, and had planned the mills at Waltham. In 1836 Lowell was chartered as a city. Lowell annexed parts of Tewksbury in 1834, 1874, 1888 and 1906, and parts of Dracut in 1851, 1874 and 1879. Up to 1840 the mill hands, with the exception of English dyers and calico printers, were New England girls. The " corporation," as the employers were called, provided from the first for the welfare of their employees, and Lowell has always been notably free from labour disturbances.

The character of the early employees of the mills, later largely displaced by French Canadians and Irish, and by immigrants from various parts of Europe, is clearly seen in the periodical, The Lowell Offering, written and published by them in 1840-1845. This monthly magazine, organized by the Rev. Abel Charles Thomas (1807- 1880), pastor of the First Universalist Church, was from October 1840 to March 1841 made up of articles prepared for some of the many improvement circles or literary societies; it then became broader in its scope, received more spontaneous contributions, and from October 1842 until December 1845 was edited by Harriot F. Curtis (1813-1889), known by her pen name, " Mina Myrtle," and by Harriet Farley (1817-1907), who became manager and proprietor, and published selections from the Offering under the titles Shells from the

Strand of the Sea of Genius (1847) and Mind among the Spindles (1849), with an introduction by Charles Knight. In 1854 she married John Intaglio Donlevy (d. 1872). Famous contributors to the Offering were Harriet Hanson (b. 1825) and Lucy Larcom (1824-1893). Harriet Hanson wrote Early Factory Labor in New England (1883) and Loom and Spindle (1898), an important contri- bution to the industrial and social history of Lowell. She was prominent in the anti-slavery and woman suffrage agitations in Massachusetts, and wrote Massachusetts in the Woman Suffrage Movement (1881). She married in 1848 William Stevens Robinson (1818-1876), who wrote in 1856-1876 the political essays signed ” Warrington ” for the Springfield Republican. Lucy Larcom, 1 born in Beverly, came to Lowell in 1835, where her widowed mother kept a ” corporation ” boarding-house, and where she became a ” doffer,” changing bobbins in the mills. She wrote much, especially for the Offering; became an ardent abolitionist and (in 1843) the friend of Whittier; left Lowell in 1846, and taught for several years, first in Illinois, and then in Beverly and Norton, Massachusetts. An Idyl of Work (1875) describes the life of the mills and A New England Girlhood (1889) is autobiographical; she wrote many stories and poems, of which Hannah Binding Shoes is best known.

Benjamin F. Butler was from boyhood a resident of Lowell, where he began to practise law in 1841. James McNeill Whistler was born here in 1834, and in 1907 his birthplace in Worthen Street was purchased by the Art Association to be used as its headquarters and as an art museum and gallery; it was dedicated in 1908, and in the same year a replica of Rodin’s statue of Whistler was bought for the city.

See S. A. Drake, History of Middlesex County, 2, p. 53 et seq. (Boston, 1880); Illustrated History of Lowell, Massachusetts (Lowell, 1897); the books of Harriet H. Robinson and Lucy Larcom already named as bearing on the industrial conditions of the city between 1835 and 1850; and the famous description in the fourth chapter of Dickens’s American Notes.

LOWELL INSTITUTE, an educational foundation in Boston, Massachusetts, U.S.A., providing for free public lectures, and en- dowed by the bequest of $237,000 left by John Lowell, junior, who died in 1836. Under the terms of his will 10% of the net income was to be added to the principal, which in 1909 was over a million dollars. None of the fund was to be invested in a building tor the lectures; the trustees of the Boston Athenaeum were made visitors of the fund; but the trustee of the fund is author- ized to select his own successor, although in doing so he must ” always choose in preference to all

others some male descendant

1 See D. D. Addison, Lucy Larcom; Life, Letters and Diary (Boston, 1897).

of my grandfather John Lowell, provided there is one who is competent to hold the office of trustee, and of the name of Lowell," the sole trustee so appointed having the entire selection of the lecturers and the subjects of lectures. The first trustee was John Lowell junior's cousin, John Amory Lowell, who administered the trust for more than forty years, and was succeeded in 1881 by his son, Augustus Lowell, who in turn was succeeded in 1900 by his son Abbott Lawrence Lowell, who in 1909 became president of Harvard University.

The founder provided for two kinds of lectures, one popular, " and the other more abstruse, erudite and particular." The popular lectures have taken the form of courses usually ranging from half a dozen to a dozen lectures, and covering almost every subject. The fees have always been large, and many of the most eminent men in America and Europe have lectured there. A large number of books have been published which consist of those lectures or have been based upon them. As to the advanced lectures, the founder seems to have had in view what is now called university extension, and in this he was far in advance of his time; but he did not realize that such work can only be done effectively in connexion with a great school. In pursuance of this provision public instruction of various kinds has been given from time to time by the Institute. The first freehand drawing in Boston was taught there, but was given up when the public schools undertook it. In the same way a school of practical design was carried on for many years, but finally, in 1903, was transferred to the Museum of Fine Arts. Instruction for working men was given at the Wells Memorial Institute until 1908, when the Franklin Foundation took up the work. A Teachers' School of Science is maintained in co-operation with the Natural History Society. For many years advanced courses of lectures were given by the professors of the Massachusetts Institute of Technology, but in 1904 they were superseded by an evening school for industrial foremen. In 1907, under the title of " Collegiate Courses," a number of the elementary courses in Harvard University were offered free to the public under the same conditions of study and examination as in the university.

For the earlier period, see Harriett Knight Smith, History of the Lowell Institute (Boston, 1898).

LOWENBERG, a town of Germany, in the Prussian province of Silesia, on the Bober, 39 m. E. of Gorlitz by rail. Pop. 5682. It is one of the oldest towns in Silesia; its town hall dates from the 16th century, and it has a Roman Catholic church built in the 13th century and restored in 1862. The town has sandstone and gypsum quarries, breweries and woollen mills, and cultivates fruit and vegetables. Lowenberg became a town in 1217 and has been the scene of much fighting, especially during the Napoleonic wars. Near the town is the village and estate of Hohlstein, the property of the Hohenzollern family.

LOWENSTEIN, a town of Germany, in the kingdom of Wurttemberg, capital of the mediatized county of that name, situated under the north slope of the Lowenstein range, 6 m. from Heilbronn. Pop. 1527. It is dominated by the ruined castle of the counts of Lowenstein, and enclosed by medieval walls. The town contains many picturesque old houses. There is also a modern palace. The cultivation of vines is the chief industry, and there is a brine spring (Theusserbad).

Lowenstein was founded in n 23 by the counts of Calw, and belonged to the Habsburgs from 1281 to 1441. In 1634 the castle was destroyed by the imperialists. The county of Lowen- stein belonged to a branch of the family of the counts of Calw before 1281, when it was purchased by the German king Rudolph I., who presented it to his natural son Albert. In 1441 Henry, one of Albert's descendants, sold it to the elector palatine of the Rhine, Frederick I., and later it served as a portion for Louis (d. 1524), a son of the elector by a morganatic marriage, who became a count of the Empire in 1494. Louis's grandson Louis II. (d. 161 1) inherited the county of Wertheim and other lands by marriage and called himself count of Lbwenstein-Wertheim; his two sons divided the family into two branches. The heads of the two branches, into which the older and Pro- testant line was afterwards divided, were made princes by the

king of Bavaria in 1812 and by the king of Wtirttemberg in 1813; the head of the younger, or Roman Catholic line, was made a prince of the Empire in 1711. Both lines are flourishing, their present representatives being Ernst (b. 1854) prince of Lowenstein- Wertheim-Freudenberg, and Aloyse (b. 1871) prince of Lowenstein- Wertheim-Rosenberg. The lands of the family were mediatized after the dissolution of the Empire in 1806. The area of the county of Lowenstein was about 53 sq. m.

See C. Rommel, Grundzixge einer Chronik der Stadt Lowenstein (Lowenstein, 1893).

LOWESTOFT, a municipal borough, seaport and watering- place in the Lowestoft parliamentary division of Suffolk, England, 1 1 75 m. N.E. from London by the Great Eastern railway. Pop. (1901) 29,850. It lies on either side of the formerly natural, now artificial outlet of the river Waveney to the North Sea, while to the west the river forms Oulton Broad and Lothing Lake. The northern bank is the original site. South Lowestoft arose on the completion of harbour improvements, begun in 1844, when the outlet of the Waveney, reopened in 1827, was deepened. The old town is picturesquely situated on a lofty declivity, which includes the most easterly point of land in England. The church of St Margaret is Decorated and Per- pendicular. South Lowestoft has a fine esplanade, a park (Bellevue) and other adjuncts of a watering-place. Bathing facilities are good. There are two piers enclosing a harbour with a total area of 48 acres, having a depth of about 16 ft. at high tide. The fisheries are important and some 600 smacks belong to the port. Industries include ship and boat building and fitting, and motor engineering. The town is governed by a mayor, 8 aldermen and 24 councillors. Area 2178 acres.

Lowestoft (Lothu Wistoft, Lowistoft, Loistoft) owes its origin to its fisheries. In 1086 it was a hamlet in the demesne of the royal manor of Lothingland. The men of Lowestoft as tenants on ancient demesne of the crown possessed many privileges, but had no definite burghal rights until 1885. For several centuries before 1740 the fisheries were the cause of constant dispute between Lowestoft and Yarmouth. During the last half of the 18th century the manufacture of china flourished in the town. A weekly market on Wednesdays was granted to John, earl of Richmond, in 1308 together with an eight days' fair beginning on the vigil of St Margaret's day, and in 1445 John de la Pole, earl of Suffolk, one of his successors as lord of the manor, received a further grant of the same market and also two yearly fairs, one on the feast of St Philip and St James and the other at Michaelmas. The market is still held on Wednes- days, and in 1792 the Michaelmas fair and another on May-day were in existence. Now two yearly fairs for small wares are held en the 13th of May and the nth of October. In 1643 Cromwell performed one of his earlier exploits in taking Lowestoft, captur- ing large supplies and making prisoners of several influential royalists. In the war of 1665 the Dutch under Admiral Opdam were defeated off Lowestoft by the English fleet commanded by

the duke of York.

See Victoria County History, Suffolk; E. Gillingwater, An His- torical Account of the Town of Lowestoft (ed. 1790).

LOWIN, JOHN (1 576-1 659), English actor, was born in London, the son of a carpenter. His name frequently occurs in Henslowe's Diary in 1602, when he was playing at the Rose Theatre in the earl of Worcester's company, and he was at the Blackfriars in 1603, playing with Shakespeare, Burbage and the others, and owning — by 1608— a share and a half of the twenty shares in that theatre. About 1623 he was one of the managers. He lived in Southwark, and Edward Alleyn speaks of his dining with him in 1620. " Lowin in his latter days kept an inn (the Three Pigeons) at Brentford, where he deyed very old." Two of his favourite parts were Falstaff , and Melanteus in The Maid's Tragedy.

LOWLAND, in physical geography, any broad expanse of land with a general low level. The term is thus applied to the land- ward portion of the upward slope from oceanic depths to con- tinental highlands, to a region of depression in the interior of a mountainous region, to a plain of denudation or to any region in contrast to a highland. The Lowlands and Highlands of Scotland are typical.

LOWNDES, THOMAS (1692-1748), founder of the Lowndean professorship of astronomy at Cambridge university, England, was born in 1692, both his father and mother being Cheshire landowners. In 1725 he was appointed provost marshal of South Carolina, a post he preferred to fill by deputy. In 1727 Lowndes claimed to have taken a prominent part in inducing the British government to purchase Carolina, but he surrendered his patent when the transfer of the colony to the crown was completed. His patent was renewed in 1730, but he resigned it in 1733. He then brought various impractical schemes before the government to check the illicit trade in wool between Ireland and France; to regulate the paper currency of New England; and to supply the navy with salt from brine, &c. He died on the 1 2th of May 1748. By his will he left his inherited Cheshire properties to the university of Cambridge for the foundation of a chair of astronomy and geometry.

LOWNDES, WILLIAM THOMAS (1798-1843), English biblio- grapher, was born about 1798, the son of a London bookseller. His principal work, The Bibliographer's Manual of English Literature — the first systematic work of the kind — was published in four volumes in 1834. It took Lowndes fourteen years to compile, but, despite its merits, brought him neither fame nor money. Lowndes, reduced to poverty, subsequently became cataloguer to Henry George Bohn, the bookseller

and publisher. In 1839 he published the first parts of The British Librarian, designed to supplement his early manual, but owing to failing health did not complete the work. Lowndes died on the 31st of July 1843.

LOW SUNDAY, the first Sunday after Easter, so called because of its proximity to the ” highest” of all feasts and Sundays, Easter. It was also known formerly as White Sunday, being still officially termed by the Roman Catholic Church Dominica in albis, ” Sunday in white garments,” in allusion to the white garments anciently worn on this day by those who had been baptized and received into the Church just before Easter. Alb Sunday, Quasimodo and, in the Greek Church, Antipascha, and 17 devreporpcorr] Kypta/07 (literally ” second-first Sunday,” i.e. the second Sunday after the first) were other names for the day. LOWTH, ROBERT (1710-1787), English divine and Orientalist, was born at Winchester on the 27th of November 1710. He was the younger son of William Lowth (1661-1732), rector of Buriton, Hampshire, a theologian of considerable ability. Robert was educated on the foundation of Winchester College, and in 1729 was elected to a scholarship at New College, Oxford. He gradu- ated M.A. in 1737, and in 1741 he was appointed professor of poetry at Oxford, in which capacity he delivered the Praelectiones Academicae de Sacra Poesi Hebraeorum. Bishop Hoadly ap- pointed him in 1744 to the rectory of Ovington, Hampshire, and in 1750 to the archdeaconry of Winchester. In 1753 he was collated to the rectory of East Woodhay, Hampshire, and in the same year he published his lectures on Hebrew poetry. In 1754 he received the degree of doctor of divinity from his university, and in 1755 he went to Ireland for a short time as first chaplain to the lord-lieutenant, the 4th duke of Devonshire. He declined a presentation to the see of Limerick, but accepted a prebendal stall at Durham and the rectory of Sedgefield. In 1758 he published his Life of William of Wykeham; this was followed in 1762 by A Short Introduction to English Grammar. In 1765, the year of his election into the Royal Societies of London and Gottingen, he engaged in controversy with William Warburton on the book of Job, in which he was held by Gibbon to have had the advantage. In June 1766 Lowth was consecrated bishop of St David’s, and about four months afterwards he was translated to Oxford, where he remained till 1777, when he became bishop of London and dean of the Chapel Royal. In 1778 appeared his last work, Isaiah, a new Translation, with a Preliminary Dis- sertation, and Notes, Critical, Philological, and Explanatory. He declined the archbishopric of Canterbury in 1783, and died at Fulham on the 3rd of November 1787.

The Praelectiones, translated in 1787 by G. Gregory as Lectures on the

Sacred Poetry of the Hebrews, exercised a great influence both in England and on the continent. Their chief importance lay in the

idea of looking at the sacred poetry as poetry, and examining it by the ordinary standards of literary criticism. Lowth's aesthetic criti- cism was that of the age, and is now in great part obsolete, a more natural method having been soon after introduced by Herder. The principal point in which Lowth's influence has been lasting is his doctrine of poetic parallelism, and even here his somewhat mechanical classification of the forms of Hebrew sense-rhythm, as it should rather be called, is open to serious objections. Editions of the Lectures and of the Isaiah have been numerous, and both have been translated into German. A volume of Sermons and other Remains, with memoir by the topographer, Peter Hall (1802- 1849), was published in 1834, and an edition of the Popular Works of Robert Lowth in 3 vols, appeared in 1843.

LOXODROME (from Gf. Aoijos, oblique, and dpdfws, course), the line on the earth's surface making a constant angle with the meridian.

LOYALISTS or TORIES, in America, the name given to the colonists who were loyal to Great Britain during the War of Independence. In New England and the Middle Colonies loyalism had a religious as well as a political basis. It repre- sented the Anglican as opposed to the Calvinistic influence. With scarcely an exception the Anglican ministers were ardent Loyalists, the writers and pamphleteers were the ministers and teachers of that faith, and virtually all the military or civil leaders were members of that church. The Loyalists north of Maryland represented the old Tory traditions. In the southern colonies, where Anglicanism predominated, the division did not follow religious lines so closely. In Virginia and South Carolina the Whig leaders were almost without exception members of the established church. Out of twenty Episcopal ministers in South Carolina only five were Loyalists. Although many of the wealthy Anglican planters of the tide-water section fought for the mother country, the Tories derived their chief support from the non-Anglican Germans and Scotch in the upper country. The natural leaders in these colonies were members of the same church as the governor and vied with him in their zeal for the support of that church. Since religion was not an issue, the disputes over questions purely political in character, such as taxation, distribution of land and appointment of

officials, were all the more bitter. The settlers on the frontier were snubbed both socially and politically by the low-country aristo- cracy, and in North Carolina and South Carolina were denied courts of justice and any adequate representation in the colonial assembly. Naturally they refused to follow such leaders in a war in defence of principles in which they had no material interest. They did not drink tea and had little occasion for the use of stamps, since they were not engaged in commerce and had no courts in which to use legal documents. The failure of the British officers to realize that conditions in the south differed from those in the north, and the tendency on their part to treat all Dissenters as rebels, were partly responsible for the ultimate loss of their southern campaign. The Scotch- Irish in the south, influenced perhaps by memories of commercial and religious oppression in Ulster, were mostly in sympathy with the American cause.

Taking the Thirteen Colonies as a whole, loyalism drew its strength largely from the following classes: (1) the official class — men holding positions in the civil, military and naval services, and their immediate families and social connexions, as, for example, Lieutenant-Governor Bull in South Carolina, Governor Dunmore in Virginia and Governor Tryon in New York; (2) the professional classes — lawyers, physicians, teachers and ministers, such as Benjamin Kissam, Peter Van Schaack and Dr Azor Betts of New York and Dr Myles Cooper, president of King's College (now Columbia University); (3) large landed proprietors and their tenants, e.g. William Wragg in South Carolina and the De Lanceys, De Peysters and Van Cortlandts in New York; (4) the wealthy commercial classes in New York, Albany, Philadelphia, Baltimore and Charleston, whose business interests would be affected by war; (5) natural conservatives of the type of Joseph Galloway of Pennsylvania, and numerous political trimmers and opportunists. Before 1776 the Loyalists may be divided into two groups. There was a minority of extremists led by the Anglican ministers and teachers, who

favoured an unquestioning obedience to all British legislation. The moderate majority disapproved of the mother country's unwise colonial policy and advocated opposition to it through legally organized bodies. Many even sanctioned non-importation and non-exportation agreements, and took part in the election of delegates to the First Continental Congress. The aggressive attitude of Congress, the subsequent adoption of the Declara- tion of Independence, and the refusal to consider Lord Howe's conciliatory propositions finally forced them into armed opposi- tion. Very few really sanctioned the British policy as a whole, but all felt that it was their first duty to fight

for the preservation of the empire and to leave constitutional questions for a later settlement. John Adams's estimate that one-third of all the people in the thirteen states in 1776 were Loyalists was perhaps approximately correct. In New England the number was small, perhaps largest in Connecticut and in the district which afterwards became the state of Vermont. New York was the chief stronghold. The " De Lancey party " or the " Episcopalian party " included the majority of the wealthy farmers, merchants and bankers, and practically all communicants of the Anglican church. New Jersey, Pennsylvania, Delaware, Maryland and Virginia contained large and influential Loyalist minorities; North Carolina was about equally divided; South Carolina probably, and Georgia certainly, had Loyalist majorities. Some of the Loyalists joined the regular British army, others organized guerilla bands and with their Indian allies inaugurated a reign of terror on the frontier from New York to Georgia. New York alone furnished about 15,000 Loyalists to the British army and navy, and about 8500 militia, making in all 23,500 Loyalist troops. This was more than any other colony supplied, perhaps more than all the others combined. Johnson's " Loyal Greens " and Butler's " Tory Rangers " served under General St Leger in the Burgoyne campaign of 1777, and the latter took part in the Wyoming and Cherry Valley massacres of 1778. The strength of these Loyalists in arms was weakened in New York by General Sullivan's success at Newtown (now Elmira) on the 29th of August 1779, and broken in the north-west by George Rogers Clark's victories at Kaskaskia and Vincennes in 1778 and 1779, and in the south by the battles of King's Mountain and Cowpens in 1780. Severe laws were passed against the Loyalists in all the states. They were in general disfranchised and forbidden to hold office or to practise law. Eight of the states formally banished certain prominent Tories either conditionally or unconditionally, and the remaining five, Connecticut, New Jersey, Delaware, Maryland and Virginia, did practically the same indirectly. Social and commercial ostracism forced many others to flee. Their property was usually confiscated for the support of the American cause. They went to England, to the West Indies, to the Bahamas, to Canada and to New York, Newport, Charleston and other cities under British control. According to a trustworthy estimate 60,000 persons went into exile during the years from 1775 to 1787. The great majority settled in Nova Scotia and in Upper and Lower Canada, where they and their descendants became known as " United Empire Loyalists." Those who remained in the United States suffered for many years, and all the laws against them were not finally repealed until after the War of 181 2. The British government, however, endeavoured to look after the interests of its loyal colonists. During

the war a number of the prominent Loyalists (e.g. Joseph Galloway) were appointed to lucrative positions, and rations were issued to many Loyalists in the cities, such as New York, which were held by the-British. During the peace negotiations at Paris the treatment of the Loyalists presented a difficult problem, Great Britain at first insisting that the United States should agree to remove their disabilities and to act toward them in a spirit of conciliation. The American commissioners, knowing that a treaty with such provisions would not be accepted at home, and that the general government had, moreover, no power to bind the various states in such a matter, refused to accede; but in the treaty, as finally ratified, the United States agreed (by Article V.) to recommend to the legislatures of the various states that Loyalists should ” have free liberty

to go to any part or parts of any of the thirteen United States, and therein to remain twelve months, unmolested in their en- deavours to obtain the restitution of such of their estates, rights and properties as may have been confiscated,” that acts and laws in the premises be reconsidered and revised, and that restitution of estates, &c, should be made. The sixth article provided ” that there shall be no future confiscations made, nor any prosecutions commenced against any person ” for having taken part in the war; and that those in confinement on such charges should be liberated. In Great Britain opponents of the government asserted that the Loyalists had virtually been betrayed; in America the treaty aroused opposition as making too great concessions to them. Congress made the promised recommendations, but they were unheeded by the various states, in spite of the advocacy by Alexander Hamilton and others of a conciliatory treatment of the Loyalists; and Great Britain, in retaliation, refused until 1796 to evacuate the western posts as the treaty prescribed. Immediately after the war parliament appointed a commission of five to examine the claims of the Loyalists for compensation for services and losses; and to satisfy these claims and to establish Loyalists in Nova Scotia and Canada the British government expended fully £6,000,000.

See C, H. van Tyne, The Loyalists in the American Revolution (New York, 1902), which contains much valuable information but does not explain adequately the causes of loyalism. More useful in this respect is the monograph by A. C. Flick, Loyalism in New York during the American Revolution (New York, 1901). On the bio- graphical side see

Lorenzo Sabine, Biographical Sketches of Loyalists of the American Revolution (2 vok., Boston, 1864); on the literary side, M. C Tyler, Literary History of the American Revolution, 1763- 1J83 (2 vols., New York, 1897).

LOYALTY, allegiance to the sovereign or established govern- ment of one's country, also personal devotion and reverence to the sovereign and royal family. The English word came into use in the eariy part of the 15th century in the sense of fidelity to one's oath, or in service, iove, &c; the later and now the ordinary sense appears in the 16th century. The O. Fr. loialti, mod. loyaule, is formed from loial, loyal, Scots leal, Lat. legalis, legal, from lex, law. This was used in the special feudal sense of one who has full legal rights, a legalis homo being opposed to the exlex, ullegatus, or outlaw. Thence in the sense of faithful, it meant one who kept faithful allegiance to his feudal lord, and so loyal in the accepted use of the word.

LOYALTY ISLANDS (Fr. lies Loyalty or Loyaule), a group in the South Pacific Ocean belonging to France, about 100 m. E. of New Caledonia, with a total land area of about 1050 sq. m. and 20,000 inhabitants. It consists of Uea or Uvea (the northern- most), Lifu (the largest island, with an area of 650 sq. m.), Tiga and several small islands and Mare or Nengone. They are coral islands of comparatively recent elevation, and in no place rise more than 250 ft. above the level of the sea. Enough of the rocky surface is covered with a thin coating of soil to enable the natives to grow yams, taro, bananas, &c, for their support; cotton thrives well, and has even been exported in small quantities, but there is no space available for its cultivation on any considerable scale. Fresh water, rising and falling with the tide, is found in certain large caverns in Lifu, and by sinking to the sea-level a supply may be obtained in any part of the island. The chief product of the islands are bananas ; the chief export sandal-wood.

The Loyalty islanders are Melanesians; the several islands have each its separate language, and in Uea one tribe uses a Samoan and another a New Hebridean form of speech. The Loyalty group was discovered at the beginning of the 19th century, and Dumont d'Urville laid down the several islands in his chart. For many years the natives had a reputation as dangerous cannibals, but they are now among the most civilized Melanesians. Christianity was introduced into Mare by native teachers from Rarotonga and Samoa; missionaries were settled by the London Missionary Society at Mare in 1854, at Lifu in 1859 and at Uea in 1865: Roman Catholic missionaries also arrived from New Caledonia; and in 1864 the French, considering the islands a

dependency of that colony, formally instituted a commandant. An attempt was made by this official to put a stop to the English missions by violence; but the report of his conduct led to so much indignation in Australia and in England that the emperor Napoleon, on receipt of a protest from Lord Shaftesbury and others, caused a commission of inquiry to be appointed and free liberty of worship to be secured to the Protestant missions. A further persecution of Christians in Uea, during 1875, called forth a protest from the British government.

LOYOLA, ST IGNATIUS OF (1491-1556), founder of the Society of Jesus. Inigo Lopez de Recalde, son of Beltran, lord of the noble houses of Loyola and Onaz, was born, according to the generally accepted opinion, on the 24th of December 1491 at the castle of Loyola, which is situated on the river Urola, about 1 m. from the town of Azpeitia, i-n the province of Guipuzcoa. He was the youngest of a family of thirteen. As soon as he had learnt the elements of reading and writing, he was sent as a page to the court of Ferdinand and Isabella; after-wards, until his twenty-sixth year, he took service with Antonio Maurique, duke of Nagera, and followed the career of arms. He was free in his relations with women, gambled and fought; but he also gave indications of that courage, constancy and prudence which marked his after life. In a political mission to settle certain disputes in the province he showed his dexterity in managing men.

Despite the treaty of Noyon (1 5 1 6) , Charles V. kept Pampeluna, the capital of Navarre. Andre de Foix, at the head of the French troops, laid siege to the town in 1521 and Ignatius was one of the defending garrison. In the hour of danger, the claims of religion reasserted themselves on the young soldier, and, following a custom when no priest was at hand, he made his confession to a brother officer, who in turn also confessed to him. During the final assault on the 19th of May 1521 a cannon ball struck him, shattering one of his legs and badly wounding the other. The victorious French treated him kindly for nearly two weeks, and then sent him in a litter to Loyola. The doctors declared that the leg needed to be broken and set again; and the operation was borne without a sign of pain beyond a clenching of his fist. His vanity made him order the surgeons to cut out a bone which protruded below the knee and spoilt the symmetry of his leg. He was lame for the rest of his days. Serious illness followed the operations, and, his life being despaired of, he received the last sacraments on the 28th of June. That night, however, he began to mend, and in a few days he was out of danger. During convalescence two books that were to influence his life were brought to him. These were a Castilian translation of The Life of Christ by Ludolphus of Saxony, and the popular Flowers of the Saints, a series of pious

biographies. He gradually became interested in these books, and a mental struggle began. Some- times he would pass hours thinking of a certain illustrious lady, devising means of seeing her and of doing deeds that would win her favour; at other times the thoughts suggested by the books got the upper hand. He began to recognize that his career of arms was over: so he would become the knight of Christ. He determined to make the pilgrimage to Jerusalem and to practise all the austerities that he read of in The Flowers of the Saints. Expiating his sins was not so much his aim as to accomplish great deeds for God. During the struggle that went on in his soul, he began to take note of his psychological state; and this was the first time that he exercised his reason on spiritual things; the experience thus painfully gained he found of great use after- wards in directing others. One night while he lay awake, he tells us, he saw the likeness of the Blessed Virgin with her divine Son; and immediately a loathing seized him for the former deeds of his life, especially for those relating to carnal desires; and he asserts that for the future he never yielded to any such desires. This was the first of many visions. Ignatius proposed after returning from Jerusalem to join the Carthusian order at Seville as a lay brother. About the same time Martip Luther was in the full course of his protest against the papal supremacy and had already burnt the pope's bull at Worms. The two opponents were girding themselves for the struggle; and

what the Church of Rome was losing by the defection of the Augustinian was being counterbalanced by the conversion of the founder of the Society of Jesus.

As soon as Ignatius had regained strength, he started ostensibly to rejoin the duke of Nagera, but in reality to visit the great Benedictine abbey of Montserrato, a famous place of pilgrimage. On the way, he was joined by a Moor, who began to jest at some of the Christian doctrines, especially at the perpetual virginity of the Blessed Virgin. Ignatius was no controversialist; and the Moor rode off victorious. The chivalrous nature of Ignatius was aroused. Seized with a longing to pursue and kill the Moor on account of his insulting language, Ignatius, still doubting as to his best course, left the matter to his mule, which at the dividing of the ways took the path to the abbey, leaving the open road which the Moor had taken. Before reaching Mont- serrato, Ignatius purchased some sackcloth for a garment and hempen shoes, which, with a staff and gourd, formed the usual

pilgrim's dress. Approaching the abbey he resolved to do as his favourite hero Amadis de Gaul did — keep a vigil all night before the Lady altar and then lay aside his worldly armour to put on that of Christ. He arrived at the abbey just about the feast of St Benedict (the 21st of March 1522), and there made a confession of his life to a priest belonging to the monastery. He found in use for the pilgrims a translation of the Spiritual Exercises of the former abbot, Garcia di Cisneros (d. 1510); and this book evidently gave Ignatius the first idea of his more famous work under the same title. Leaving his mule to the abbey, and giving away his worldly clothes to a beggar, he kept his watch in the church during the night of the 24th-25th of March, and placed on the Lady altar his sword and dagger. Early the next morning he received the Holy Eucharist and left before any one could recognize him, going to the neighbouring town of Manresa, where he first lived in the hospice. Here began a series of heavy spiritual trials which assailed him for many months. Seven hours a day he spent on his knees in prayer and three times a day he scourged his emaciated body. One day, almost overcome with scruples, he was tempted to end his miseries by suicide. At another time, for the same reason, he kept an absolute fast for a week. He tells us that, at this time, God wrought with him as a master with a schoolboy whom he teaches. But his energies were not confined to himself. He assisted others who came to him for spiritual advice; and seeing the fruit reaped from helping his neighbour, he gave up the extreme severities in which he had delighted and began to take more care of his person, so as not needlessly to offend those whom he might influence for good.

During his stay at Manresa, he lived for the most part in a cell at the Dominican convent; and here, evidently, he had severe illnesses. He recounts the details of at least two of these attacks, but says nothing about the much-quoted swoon of eight days, during which he is supposed to have seen in vision the scheme of the future Society. Neither does he refer in any way to the famous cave in which, according to the Ignatian myth, the Spiritual Exercises were written. Fortunately we have the first-hand evidence of his autobiography, which is a surer guide than the lines written by untrustworthy disciples. Ignatius remained at Manresa for about a year, and in the spring of 1523 set out for Barcelona on his way to Rome, where he arrived on Palm Sunday. After two weeks he left, having received the blessing of Pope Adrian VI., and proceeded by Padua to Venice, where he begged his bread and slept in the Piazza di San Marco until a rich Spaniard gave him shelter and obtained an order from the doge for a passage in a pilgrim ship bound for Cyprus, whence he could get to Jaffa. In due course Ignatius arrived at Jerusalem, where he intended

to remain, in order continuously to visit the holy places and help souls. For this end he had obtained letters of recommendation to the guardian, to whom, however, he only spoke of his desire of satisfying his devotion, not hinting his other motive. The Franciscans gave him no encouragement to remain; and the provincial threatened him with excommunication if he persisted. Not only had the friars great difficulty in supporting themselves,

but they dreaded an outbreak from the fanatical Turks who resented some imprudent manifestations of Loyola's zeal. Ignatius returned to Venice in the middle of January 1524; and, determining to devote himself for a while to study, he set out for Barcelona, where he arrived in Lent. Here he consulted Isabella Roser, a lady of high rank and piety, and also the master of a grammar school. These both approved his plan; the one promised to teach him without payment and the other to provide him with the necessaries of life. Here, in his thirty-third year, he began to learn Latin, and after two years his master urged him to go to Alcala to begin philosophy. During his stay of a year and a half in this university, besides his classes, he found occasion to give to some companions his Spiritual Exercises in the form they had then taken and certain instructions in Christian doctrine. On account of these discourses Ignatius came into conflict with the Inquisition. He and his companions were denounced as belonging to the sects of Sagati and Illuminali. Their mode of life and dress was peculiar and hinted at innovation. But, always ready to obey authority, Ignatius was able to disarm any charges that, now and at other times, were brought against him. The Inquisition merely advised him and his companions to dress in a less extraordinary manner and to go shod. Four months later he was suddenly cast into prison; and, after seventeen days, he learnt that he was falsely accused of sending two noble ladies on a pilgrimage to Jaen. During their absence, from the 21st of April 1527 to the 1st of June, he remained in prison, and was then set free with a prohibition against instructing others until he had spent four years in study. Seeing his way thus barred at Alcala, he went with his companions to Salamanca. Here the Dominicans, doubting the orthodoxy of the new-comers, had them put into prison, where they were chained foot to foot and fastened to a stake set up in the middle of the cell. Some days afterwards Ignatius was examined and found without fault. His patience won him many friends; and when he and his companions remained in prison while the other prisoners managed to escape, their conduct excited much admiration. After twenty-two days they were called up to receive sentence. No fault was found in their life and teaching; but they were forbidden to define any sins as being mortal or venial until they had studied for

four years. Hampered again by such an order, Ignatius determined to go to Paris to continue his studies. Up to the present he was far from having any idea of founding a society. The only question before him now was whether he should join an order, or continue his wandering existence. He decided upon Paris for the present, and before leaving Salamanca he agreed with his companions that they should wait where they were until he returned; for he only meant to see whether he could find any means by which they all might give themselves to study. He left Barcelona and, travelling on foot to Paris, he arrived there in February 1528. The university of Paris had reached its zenith at the time of the council of Constance (1418), and was now losing its intellectual leadership under the attacks of the Renaissance and the Reformation. In 1521 the university had condemned Luther's Babylonish Captivity, and in 1527 Erasmus's Colloquies met with the same fate. Soon after his arrival, Ignatius may have seen in the Place de Greve the burning of Louis de Berquin for heresy. 1 At this period there were between twelve and fifteen thousand students attending the university, and the life was an extraordinary mixture of licentiousness and devout zeal. When Ignatius arrived in Paris, he lodged at first with some fellow-countrymen; and for two years attended the lectures on humanities at the college de Montaigu, supporting himself at first by the charity of Isabella Roser; but, a fellow- lodger defrauding him of his stock, he found himself destitute and compelled to beg his bread. He retired to the hospice

1 Louis de Berquin, who died on the 17th of April 1529, belonged to a noble family of Artois. He was a man of exemplary life and a friend of Erasmus and the humanists, besides being a persona grata at the court of Louise of Savoy and Francis I. His main offence was that he attacked the monks and clergy, and that he advocated the reading of the Scriptures by the people in the vulgar tongue. — (W. A. P.)

of St Jacques; and, following the advice of a Spanish monk, spent his vacations in Flanders, where he was helped by the rich Spanish merchants. At Bruges he became acquainted with the famous Spanish scholar, Juan Luis Vives, with whom he lodged. In the summer of 1530 he went to London, where he received alms more abundantly than elsewhere. As he could only support himself at Paris with difficulty, it was impossible to send for his companions in Salamanca. Others, however, joined him in Paris, and to some of them he gave the Spiritual Exercises, with the result that the Inquisition made him give

up speaking on religious subjects during the time he was a student. At the end of 1520 he came into contact with the men who were eventually to become the first fathers of the Society of Jesus. He won over the Savoyard Pierre Lefevre (Faber), whose room he shared, and the Navarrese Francis Xavier, who taught philosophy in the college of St Barbara. Afterwards he became acquainted with the young Castilian, Diego Laynez, who had heard of him at Acala and found him out in Paris. With Laynez came two other young men, the Toledan Alfonso Salmeron and the Portuguese Simon Rodriguez. Nicholas Bobadilla, a poor Spaniard who had finished his studies, was the next to join him. The little company of seven determined to consecrate their union by vows. On the 15th of August 1534, the Feast of the Assumption, they assembled in the crypt of the church of St Mary on Montmartre, and Faber, the only one who was a priest, said Mass. They then took the vows of poverty and chastity, and pledged themselves to go to the Holy Land as missionaries or for the purpose of tending the sick; or if this design should prove impracticable, to go to Rome and place themselves at the disposal of the pope for any purpose. But, whatever may have been the private opinion of Ignatius, there was on this occasion no foundation of any society. The vows were individual obligations which could be kept quite apart from membership in a society. A provision was made that if, after waiting a year at Venice, they were unable to go to Jerusalem, this part of the vow should be cancelled and they should at once betake themselves to Rome.

At this time Ignatius was again suffering from his former imprudent austerities; and he was urged to return for a while to his native air. He left Paris for Spain in the autumn of 1535, leaving Faber in charge of his companions to finish their studies. During the absence of Ignatius, Faber gained three more adherents. But before leaving Paris Ignatius heard once more that complaints had been lodged against him at the Inquisition ; but these like the others were found to be without any foundation. When he arrived near Loyola he would not go to the castle, but lived at the public hospice at Azpeitia, and began his usual life of teaching Christian doctrine and reforming morals. Falling ill again he went to other parts of Spain to transact business for his companions. Then, sailing from Valencia to Genoa, he made his way to Venice, where he arrived during the last days of 1535. Here he waited for a year until his companions could join him, and meanwhile he occupied himself in his usual good works, gaining several more companions and meeting Giovanni Piero Caraffa, afterwards Paul IV., who had lately founded the Theatines. What happened between the two does not appear; but henceforth Caraffa seems to have borne ill

will towards Ignatius and his companions. At Venice Ignatius was again accused of heresy, and it was said that he had escaped from the Inquisition in Spain and had been burnt in effigy at Paris. These charges he met successfully by insisting that the nuncio should thoroughly inquire into the matter.

After a journey of fifty-four days his companions arrived at Venice in January 1537; and here they remained until the beginning of Lent, when Ignatius sent them to Rome to get money for the proposed voyage to Palestine. He himself stayed behind, as he feared that, if he went with them, Caraffa at Rome, together with Dr Ortiz, a German opponent in Paris and now Charles V.'s ambassador at the Vatican, would prejudice the pope against them. But Ortiz proved a friend and presented them to Paul III., who gave them leave to go to Palestine to preach the Gospel, bestowing upon them abundant alms. He

likewise gave licence for those not yet priests to be ordained by any catholic bishop on the title of poverty. They had returned to Venice where Ignatius and the others were ordained priests on the 24th of June 1537, after having renewed their vows of poverty and chastity to the legate Verallo. Ignatius, now a priest, waited for eighteen months before saying Mass, which he did for the first time on the 25th of December 1538 in the church of Santa Maria Maggiore in Rome.

The year of waiting passed away without any chance of going to the Holy Land. Finding it impossible to keep this part of their vow, the fathers met at Vicenza, where Ignatius was staying in a ruined monastery; and here after deliberation it was deter- mined that he, Laynez and Faber should go to Rome to place the little band at the disposal of the pope. It was now that the Society began to take some visible form. A common rule was devised and a name adopted. Ignatius declared that having assembled in the name of Jesus, the association should henceforth bear the name of the " Company of Jesus." The word used shows Loyola's military ideal of the duties and methods of the nascent society.

On the road to Rome a famous vision took place, as to which we have the evidence of Ignatius himself. In a certain church, a few miles before Rome, whilst in prayer he was aware of a stirring and a change in his soul; and so openly did he see God the Father placing him with Christ, that he could not dare to doubt that God the Father had so placed him. Subsequent writers add that Christ, looking at him with a benign countenance, said: "I shall be propitious to you"; while others add the significant words, " at Rome." Ignatius, however, says nothing about so important a matter; indeed he understood the vision to mean

that many things would be adverse to them, and told his companions when they reached the city that he saw the windows there closed against him. He also said: ” We must of necessity proceed with caution; and we must not make the acquaintance of women unless they be of very high rank.” They arrived in Rome in October 1537; and lived at first in a little cottage in a vineyard and near the Trinita dei Monti. The pope appointed Faber to teach Holy Scripture, and Laynez scholastic theology, in the university of the Sapienza. Ignatius was left free to carry on his spiritual work, which became so large that he was obliged to call his other companions to Rome. During the absence of the pope, a certain hermit began to spread heresy and was opposed by Ignatius and his companions. In revenge the hermit brought up the former accusations concerning the relations to the Inquisition, and proclaimed Ignatius and his friends to be false, designing men and no better than concealed heretics. The matter was examined and the legate ordered the suit to be quashed. But this did not suit Ignatius. It was necessary for his own good repute and the future of his work that a definitive sentence should be pronounced and his name cleared once and for all. The legate demurred; but on the pope’s return sentence was formally given in his favour.

The life of Ignatius is now mainly identified with the formation and growth of his Society (see Jesuits) , but his zeal found other outlets in Rome. He founded institutions for rescuing fallen women, started orphanages and organized catechetical instruc- tions. He obtained, after difficulty, the official recognition of his Society from Paul III. on the 27th of September 1540, and successfully steered it through many perils that beset it in its early days. He was unanimously elected the first general in April 1541; and on the 22nd of that month received the first vows of the Society in the church of San Paolo fuori la mura. Two works now chiefly occupied the remainder of his life: the final completion of the Spiritual Exercises and the drawing up of the Constitutions, which received their final form after his death. These two are so constantly connected that the one cannot be understood without the other. The Constitutions are discussed in the article on the Jesuits. In these he taught his followers to respond to the call; by the Spiritual Exercises he moulded their character.

The Book of the Spiritual Exerciseshasbeenone of the world-moving books. In its strict conception it is only an application of the Gospel

precepts to the individual soul. Its object is to convince a man of sin, of justice and of judgment. The idea of the book is not original to Ignatius At Montserrato he had found in use a popular trans- lation of the Exercitatorio de la vida spiritual (1500), written in Latin by Abbot Garcias de Cisneros (d. 1510), and divided into three ways or periods during which purity of soul, enlightenment and union are to be worked for; a fourth part is added on contemplation. This book evidently afforded the root idea of the Ignatian and more famous book. But the differences are great. While taking the title, the idea of division by periods and the subjects of most of the medi- tations from the older work, Ignatius skilfully adapted it to his own requirements. Above all the methods of the two are essentially different. The Benedictine work follows the old monastic tradition of the direct intercourse of the soul with God. Ignatius, with his military instinct and views of obedience, intervenes with a director who gives the exercises to the person who in turn receives them. If this introduction of the director is essential to the end for which Ignatius framed his Exercises, in it we also find dangers. A director, whose aim is only the personal advantage of the one who is receiving the exercises, will be the faithful interpreter of his founder's inten- tions: but in the case of one whose esprit de corps is unbalanced, the temporary and pecuniary advantage of the Society may be made of more importance than that of the exercitant. Another danger may come when minuteness of direction takes away the wholesome sense of responsibility. Apart from these abuses the Spiritual Exercises have proved their value over and over again, and have received the sincerest form of flattery in countless imita- tions. The original parts of the book are principally to be found in the meditations, which are clearly Ignatian in conception as well as method. These are The Reign of Christ, wherein Christ as an earthly king calls his subjects to war: and Two Standards, one of Jesus Christ and the other of Lucifer. Besides these there are various additions to the series of meditations, which are mostly the practical results of the experiences which Ignatius went through in the early stages of his conversion. He gives various methods of prayer; methods of making an election; his series of rules for the discernment of spirits; rules for the distribution of alms and the treatment of scruples; tests of orthodoxy. These additions are skilfully worked into the series of meditations; so that when the exercitant by meditation has moved his soul to act, here are practical directions at hand.

The exercises are divided into four series of meditations technically called " weeks," each of which may last as long as the director con- siders necessary to achieve the end for which each week is destined. But the whole period is generally concluded in the space of a month.

The first week is the foundation, and has to do with the consideration of the end of man, sin, death, judgment and hell. Having purified the soul from sin and obtained a detestation thereof, the second week treats of the kingdom of Christ, and is meant to lead the soul to make an election of the service of God. The third and fourth weeks are intended to confirm the soul in the new way chosen, to teach how difficulties can be overcome, to inflame it with the love of God and to help it to persevere.

The Book of the Spiritual Exercises was not written at Manresa, although there is in that place an inscription testifying to the supposed fact. Ignatius was constantly adding to his work as his own personal experience increased, and as he watched the effects of his method on the souls of those to whom he gave the exercises. The latest critics, even those of the Society itself, give 1548 as the date when the book received its final touches; though Father Roothaan gives Rome, the 9th of July 1541 , as the date at the end of the ancient MS. version. Ignatius wrote originally in Spanish, but the book was twice translated into Latin during his lifetime. The more elegant version (known as the common edition) differs but slightly from the Spanish. Francisco Borgia, while duke of Gandia, petitioned Paul III. to have the book examined and approved. The pope appointed censors for both translations, who found the work to be replete with piety and holiness, highly useful and wholesome. Paul III. on re- ceiving this report confirmed it on the 31st of July 1548 by the breve Pastoralis officii cura. This book, which is rightly called the spiritual arm of the Society, was the first.book published by the Jesuits.

The progress of the Society of Jesus in Loyola's lifetime was rapid (see Jesuits). Having always had an attraction for a life of prayer and retirement, in 1547 he tried to resign the general- ship, and again in 1550, but the fathers unanimously opposed the project. One of his last trials was to see in 1556 the election as pope of his old opponent Caraffa, who soon showed his intention of reforming certain points in the Society that Ignatius considered vital. But at this difficult crisis he never lost his peace of mind. He said: " If this misfortune were to fall upon me, provided it happened without any fault of mine, even if the Society were to melt away like salt in water, I believe that a quarter of an hour's recollection in God would be sufficient to console me and to re- establish peace within me." It is clear that Ignatius never dreamed of putting his Society before the church nor of identifying the two institutions.

In the beginning of 1556 Ignatius grew very weak and resigned the active government to three fathers, Polanco, Madrid and Natal. Fever

laid hold of him, and he died somewhat suddenly on the 31st of July 1556, without receiving or asking for the last sacraments. He was beatified in 1609 by Paul V. and canonized in 1628 by Gregory XV. His body lies under the altar in the north transept of the Gesu in Rome.

His portrait is well known. The olive complexion, a face emaciated by austerities, the large forehead, the brilliant and small eyes, the high bald head tell their own tale. He was of medium height and carried himself so well that his lameness was hardly noticeable. His character was naturally impetuous and enthusiastic, but became marked with great self-control as he gradually brought his will under his reason. There was always that love of overcoming difficulty inherent in a chivalrous nature; and this also accounts for that desire of surpassing every one else that marked his early days. Whilst other Chris- tians, following St Paul, were content to do all things for the glory of God, Ignatius set himself and his followers to strive after the greater glory. Learning by his own experience and errors, he wisely developed a sovereign prudence which nicely adjusted means to the end in view. He impressed on his followers the doctrine that in all things the end was to be considered. Never would Ignatius have countenanced so perverted an idea as that the end justified the means, for with his spiritual light and zeal for God's glory he saw clearly that means in themselves unjust were opposed to the very end he held in view. As a ruler he displayed the same common sense. Obedience he made one of his great instruments, yet he never intended it to be a galling yoke. His doctrine on the subject is found in the well-known letter to the Portuguese Jesuits in 1553, and if this be read carefully together with the Constitutions his meaning is clear. If he says that a subject is to allow himself to be moved and directed, under God, by a superior just as though he were a corpse or as a staff in the hands of an old man, he is also careful to say that the obedience is only due in all things " wherein it cannot be defined (as it is said) that any kind of sin appears." The way in which his teaching on obedience is practically carried out is the best correc- tive of the false ideas that have arisen from misconceptions of its nature. His high ideas on the subject made him a stern ruler. There are certain instances in his life which, taken by themselves, show a hardness in treating individuals who would not obey; but as a rule, he tempered his authority to the capacity of those with whom he had to deal. When he had to choose between the welfare of the Society and the feelings of an individual it was clear to which side the balance would fall.

There was in his character a peculiar mixture of conservatism and a keen sense of the requirements of the day. In intellectual matters he

was not in advance of his day. The Jesuit system of education, set forth in the Ratio studiorum, owes nothing to him. While he did not reject any approved learning, he abhorred any intellectual culture that destroyed or lessened piety. He wished to secure uniformity in the judgment of the Society even in points left open and free by the church: ” Let us all think in the same way, let us all speak in the same manner if possible.” Bartole, the official biographer of Ignatius, says that he would not permit any innovation in the studies; and that, were he to live five hundred years, he would always repeat ” no novelties ” in theology, in philosophy or in logic — not even in grammar. The revival of learning had led many away from Christ; in- tellectual culture must be used as a means of. bringing them back. The new learning in religion had divided Christendom; the old learning of the faith, once delivered to the saints, was to reconcile them. This was the problem that faced Ignatius, and in his endeavour to effect a needed reformation in the individual and in society his work and the success that crowned it place him among the moral heroes of humanity.

Bibliography. — The Ignatian literature is very large. Fortun- ately we have in the Acta quaedam what is in effect the autobiography of the saint. This has been translated into English under the title of The testament of Ignatius Loyola, being sundry acts of our Father Ignatius, under God, (he first founder of the Society of Jesus, taken down from the Saint’s own lips by Luis Gonzales (London, 1900) ; and the

above account of Ignatius is taken in most places directly from this, I the highest point is 4826 ft. The causses of Lozere, having an area

which is not only the best of all sources but also a valuable corrective of the later and more imaginative works. Next to the Acta quaedam comes in value Polanco’s Vita Ignatii Loiolae, which is published in the Monumenta historica Societatis Jesu now in progress. Polanco was the saint’s secretary towards the end of his life. Ribadeneira, who as a youth had been associated with the founder, wrote his Vida del S. Ignacio de Loyola (Madrid, 1594), based on an early Latin work (Naples, 1572). Bartole, the official biographer, wrote his Delia vita e dell’ institute di S. Ignatio (Rome, 1650, 1659) ; Genelli wrote Das Leben des heiligen Ignatius von Loyola (Innsbruck, 1 848) ; Nicolas Orlandinus gives a life in the first volume of the Historiae Societatis Jesu (Rome, 1615). It would be impossible to give a list even of the other lives, most of which are without value as histories, being written

mainly for edification. But the student may be referred to the modern books Henri Joli's 5/ Ignace de Loyola (Paris, 1899), which is based on the best authorities, and to H. Miiller's curious Les Origines de la Compagnie de Jesus (Paris, 1898), in which the author tries to establish a Mahommedan origin for many of the ideas adopted by the saint.

The literature connected with the Spiritual Exercises is also large. It will be sufficient here to mention: A Book of Spiritual Exercises, written by Garcias de Cisneros (London, 1876) ; the official Latin text in the third volume of the Avignon edition of the Constitutions (1830); Roothaan's Exercitia spiritualia S. P. Ignatii de Loyola, cum versione litterali ex autographo Hispanico, notis illustrata (Namur, 1841); Diertino, Historia exercihorum S. P. Ignatude Loyola (1887). Especially worthy of notice is P. Watrigant's La Genese des exercices de Saint Ignace de Loyola, republished from Les Eludes (20th May, 20th July, 20th October 1897). (E. Tn.)

LOZENGE (from the Fr. losenge, or losange; the word also appears in Span, losanje, and Ital. losanga; perhaps derived from a word meaning a stone slab laid on a grave, which appears in forms such as Provencal lousa, Span, losa, the ultimate origin of which is unknown, the Lat. lapis, stone, oxlaus, praise, in the sense of epitaph, have been suggested), properly a four equal- sided figure, having two acute and two obtuse angles, a rhomb or " diamond." The figure is frequently used as a bearing in heraldry and especially as a shield so shaped on which the arms of a widow or spinster are emblazoned. It is used also to denote the diamond-shaped facets of a precious stone when cut, also the diamond panes of a casement window. In the 14th century the " lozenge pattern " was a favourite design for decoration. The word is also applied to a small tablet of sugar, originally diamond shaped, containing either medical drugs or some simple flavouring, or to a tablet of any concentrated substance, such as a meat-lozenge. In the reign of James I. of Scotland (1406-1437) a Scotch gold coin having a lozenge-shaped shield with the arms of Scotland on the obverse side was called a " lozenge-lion."

LOZERE, a department of south-eastern France belonging to the central plateau, composed of almost the whole of Gevaudan and of some portions of the old dioceses of Uzes and Alais, districts all formerly included in the province of Languedoc. Pop. (1906) 128,016. Area, 1999 sq. m. It is bounded N. by Cantal and Haute-Loire, E. by Ardeche and Gard, S. by Gard and Aveyron and W. by Aveyron and Cantal. Lozere is moun- tainous throughout and in average elevation is the highest of all the French departments. It has three distinct regions

— the Cevennes proper to the south-east, the causses to the south-west and the mountain tracts which occupy the rest of its area. The Cevennes begin (within Lozere) with Mont Aigoual, which rises to a height of more than 5100 ft.; parallel to this are the moun- tains of Bouges, bold and bare on their southern face, but falling gently with wooded slopes towards the Tarn which roughly limits the Cevennes on the north. To the north of the Tarn is the range of Lozere, including the peak of Finiels, the highest point of the department (5584 ft.). Farther on occurs the broad marshy plateau of Montbel, which drains southward to the Lot, northwards to the Allier, eastward by the Chassezac to the Ardeche. From this plateau extend the mountains of La Margeride, undulating granitic tablelands partly clothed with woods of oak, beech and fir, and partly covered with pastures, to which flocks are brought from lower Languedoc in summer. The highest point (True de Randon) reaches 5098 ft. Adjoining the Margeride hills on the west is the volcanic range of Aubrac, a pastoral district where horned cattle take the place of sheep;

of about 564 sq. m., are calcareous, fissured and arid, but separated from each other by deep and well-watered gorges, contrasting with the desolate aspect of the plateaus. The causse of Sauve- terre, between the Lot and the Tarn, ranges from 3000 to 3300 ft. in height; that of Mejan has nearly the same average altitude, but has peaks some 1000 ft. higher. Between these two causses the Tarn valley is among the most picturesque in France. Lozere is watered entirely by rivers rising within its own bound- aries, being in this respect unique. The climate of Lozere varies greatly with the locality. The mean temperature of Mende (50 F.) is below that of Paris; that of the mountains is always low, but on the causses the summer is scorching and the winter severe; in the Cevennes the climate becomes mild enough at their base (656 ft.) to permit the growth of the olive. Rain falls in violent storms, causing disastrous floods. On the Mediter- ranean versant there are 76 in., in the Garonne basin 46 and in that of the Loire only 28. Sheep and cattle-rearing and cheese- making are the chief occupations. Bees are kept, and, among the Cevennes, silkworms. Large quantities of chestnuts are exported from the Cevennes, where they form an important article of diet. In the valley of the Lot wheat and fruit are the chief products; elsewhere rye is the chief cereal, and oats, barley, meslin and potatoes are also grown. Fruit trees and leguminous plants are irrigated by small canals {Mais) on terraces made and maintained with much labour. Lead, zinc and antimony are found. Saw-milling, the manufacture of wooden shoes and wool- spinning are carried on; otherwise industries are few and unimportant. Of mineral springs, those of Bagnols-les-Bains are most frequented.

The line of the Paris-Lyon company from Paris to Nimes traverses the eastern border of the department, which is also served by the Midi railway with the line from Neussargues to Beziers via Marvejols. The arrondissements are Mende, Florae and Marvejols; the cantons number 24, the communes 198. Lozere forms the diocese of Mende and part of the ecclesiastical province of Albi. It falls within the region of the XVI. army corps, the circumscriptions of the academic (educational division) of Montpellier and the appeal court of Nimes. Mende (q.v.) is its most important town.

LUANG-PRABANG, a town of French Indo-China, capital of the Lao state of that name, on the left bank of the Me Kong river. It lies at the foot of the pagoda hill which rises about 200 ft. above the plain on the promontory of land round which the Nam Kan winds to the main river. It has a population of about 9000 and contains the ” palace ” of the king of the state and several pagodas. In 1887 it was taken and sacked by the Haw or Black Flags, robber bands of Chinese soldiery, many of them survivors of the Taiping rebellion. In 1893 Siam was compelled to renounce her claims to the left bank of the Me Kong, including Luang-Prabang and the magnificent highlands of Chieng Kwang. That portion of the state which was on the right bank of the Me Kong was not affected by the treaty, except in so far as a portion of it fell within the sixteen miles’ zone within which Siam agreed not to keep troops. Trade is in the hands of Chinese or Shan traders; hill rice and other jungle products are imported from the surrounding districts by the Kha or hill people. The exports, which include rubber, gum benjamin, silk, wax, sticklac, cutch, cardamon, a little ebony, cinnamon, indigo, rhinoceros and deer horns, ivory and fish roe, formerly all passed by way of Paklai to the Me Nam, and so to Bangkok, but have now almost entirely ceased to follow that route, the object of the French government being to deflect the trade through French territory. Luang-Prabang is the terminus of navigation on the upper Me Kong and the centre of trade thereon.

LUBAO, a town in the south-western part of the province of Pampanga, Luzon, Philippine Islands, about 30 m. N.W. of Manila. Pop. (1903) 19,063. Lubao is served by the Manila & Dagupan railway, and has water communication with Manila by tidal streams and Manila Bay. Its products are, therefore, readily marketed. It lies in a low, fertile plain, suited to the growing of rice and sugar. Many of the inhabitants occupy

themselves in the neighbouring nipa swamps, either preparing the nipa leaves for use in house construction, or distilling ” nipa- wine ” from the juice secured by tapping the blossom stalks. The language is Pampangan.

LUBBEN, a town of Germany, in the Prussian province of Brandenburg, on the Spree, 47 m. S.S.E. of Berlin, on the railway to Gorlitz. Pop. (1905) 7173. It is the chief town of the Spreewald, and has saw-mills and manufactories of hosiery, shoes and paper, and is famous for its gurken, or small pickling cucumbers. The poet Paul Gerhardt (1607-1676) was pastor here and is buried in the parish church.

LUBECK, a state and city (Freie und Hansestadt Liibeck) of Germany. The principality of Liibeck, lying north of the state, is a constituent of the grand-duchy of Oldenburg (q.v.). The state is situated on an arm of the Baltic between Holstein and Mecklenburg-Schwerin. It consists of the city of Liibeck, the town of Travemiinde, 49 villages and the country districts, embraces 115 sq. m. of territory, and had a population in 1907 of 1 09, 2 6 5 , of which 93 ,9 7 8 were incl uded in the city and its immediate suburbs. The state lies in the lowlands of the Baltic, is diversified by gently swelling hills, and watered by the Trave and its tributaries, the Wakenitz and the Stecknitz. The soil is fertile, and, with the exception of forest land (14% of the whole area), is mostly devoted to market gardening. Trade is centred in the city of Liibeck.

The constitution of the free state is republican, and, by the fundamental law of 1875, amended in 1905 and again in 1907, consists of two assemblies. (1) The Senate of fourteen members, of whom eight must belong to the learned professions, and six of these again must be jurists, while of the remaining six, five must be merchants. The Senate represents the sovereignty of the state and is presided over by the Oberbiir germeister, who during his two years’ term of office bears the title of ” magnificence.” (2) The House of Burgesses (Biirgerschaft), of 120 members, elected by free suffrage and exercising its powers partly in its collective capacity and partly through a committee of thirty members. Purely commercial matters are dealt with by the chamber of commerce, composed of a praeses, eighteen members and a secretary. This body controls the exchange and appoints brokers, shipping agents and underwriters. The executive is in the hands of the Senate, but the House of Burgesses has the right of initiating legislation, including that relative to foreign treaties; the sanction of both chambers is required to the passing of any new law. Liibeck has a court of first instance (Amlsgericht) and a high court of

justice (Landgericht) ; from the latter appeals lie to the Hanseatic court of appeal (Oberlandes- gericht) at Hamburg, and from this again to the supreme court of the empire (Reichsgericht) in Leipzig. The people are nearly all Lutherans, and education is compulsory between the ages of six and fourteen.

The estimated revenue for the year 1908-1909 amounted to about £650,000, and the expenditure to a like sum. The public debt amounted, in 1908, to about £2,518,000. Liibeck has one vote in the federal council (Bundesrat) of the German Empire, and sends one representative to the imperial parliament (Reichstag) .

History of the Constitution. — At the first rise of the town justice was administered to the inhabitants by the Vogt (advocatus) of the count of Holstein. Simultaneously with its incorporation by Henry the Lion, duke of Saxony, who presented the city with its own mint toll and market, there appears a magistracy of six, chosen probably by the Vogt from the Schojfen (scabini, probi homines). The members of the town council had to be freemen, born in lawful wedlock, in the enjoyment of estates in freehold and of unstained repute. Vassals or servants of any lord, and tradespeople, were excluded. A third of the number had annually to retire for a year, so that two-thirds formed the sitting council. By the middle of the 13th century there were two burgomasters (magistri burgensium). Meanwhile, the number of magistrates (consules) had increased, ranging trom twenty to forty and upwards. The council appointed its own officers in the various branches of the administration.

In the face of so much self-government the Vogt presently dis- appeared altogether. There were three classes of inhabitants, full freemen, half freemen and guests or foreigners. People of Slav origin being considered unfree, all intermarriage with them tainted the blood; hence nearly all surnames point to Saxon, especially Westphalian, and even Flemish descent. The magis- tracy was for two centuries almost exclusively in the hands of the merchant aristocracy, who formed the companies of traders or ” nations,” such as the Bergcn-fahrer, Novgorod- fahrer, Riga-fahrer and Stockholm-fahrer. From the beginning, however, tradesmen and handicraftsmen had settled in the town, all of them freemen of German parentage and with property and houses of their own. Though not eligible for the council, they shared to a certain extent in the self-government through the aldermen of each corporation or gild, of which some appear as early as the statutes of 1240. Naturally, there arose much jealousy between the gilds and the aristocratic companies, which exclusively ruled the republic. After an attempt to upset the merchants had been suppressed

in 1384, the gilds succeeded, under more favourable circumstances, in 1408. The old patrician council left the city to appeal to the Hansa and to the imperial authorities, while a new council with democratic tendencies, elected chiefly from the gilds, took their place. In 1416, however, owing to the pressure brought to bear by the Hansa, by the emperor Sigismund and by Eric, king of Denmark, there was a restoration. The aristocratic government was again expelled under the dictatorship of Jiirgen Wullenweber (c. 1492-1537), till the old order was re-established in 1535. In the constitution of 1669, under the pressure of a large public debt, the great companies yielded a specified share in the financial administration to the leading gilds of tradesmen. Nevertheless, the seven great com- panies continued to choose the magistrates by co-optation among themselves. Three of the four burgomasters and two of the senators, however, had henceforth to be graduates in law. The constitution, set aside only during the French occupation, has subsequently been slowly reformed. From 1813 the popular representatives had some share in the management of the finances. But the reform committee of 1814, whose object was to obtain an extension of the franchise, had made little progress, when the events of 1 848 led to the establishment of a representative assembly of 120 members, elected by universal suffrage, which obtained a place beside the senatorial government. The republic has given up its own military contingent, its coinage and its postal dues to the German Empire; but it has preserved its municipal self-government and its own territory, the inhabitants of which enjoy equal political privileges with the citizens.

The City of Liibeck. — Liibeck, the capital of the free state, was formerly the head of the Hanseatic League. It is situated oil a gentle ridge between the rivers Trave and Wakenitz, 10 m. S.W. of the mouth of the former in the bay of Liibeck, 40 m. by rail N.E. of Hamburg, at the junction of lines to Eutin, Biichen, Travemiinde and Strassburg (in Mecklenburg-Schwerin) and consists of an inner town and three suburbs. The former ramparts between the Trave and the old town ditch have been converted into promenades. The city proper retains much of its ancient grandeur, despite the tendency to modernize streets and private houses. Foremost among its buildings must be mentioned its five chief churches, stately Gothic edifices in glazed brick, with lofty spires and replete with medieval works of art — pictures, stained glass and tombs. Of them, the Marienkirche, built in the 13th century, is one of the finest specimens of early Gothic in Germany. The cathedral, or Domkirche, founded in 1 173, contains some curious sarcophagi and a magnificent altar- piece in one of the chapels, while the churches of St James {J akobikirche) , of St Peter (Petrikirche) and

of St Aegidius (Aegidienkirche) are also remarkable. The Rathaus (town hall) of red and black glazed brick, dating from various epochs during the middle ages, is famous for its staircase, the vaulted wine cellar of the city council beneath and magnificent wood carving. There should also be mentioned the Schijfershaus; the medieval gates (Holstentor, Burgtor); and the Hospital of the Holy Ghost, remarkable for ancient frescoes and altars in rich wood,.

carving, the entrance hall of which is a 13th-century chapel, restored in 1866 and decorated in 1898. The museum preserves the most remarkable municipal archives in existence as well as valuable collections of historical documents.

The poet, Emanuel Geibel (1889), and the painter, Johann Friedrich Overbeck (1789-1869), were natives of Lubeck. This city is famous for the number and wealth of its charitable institutions. Its position as the first German emporium of the west end of the Baltic has been to some extent impaired by Hamburg and Bremen since the construction of the North Sea and Baltic Canal, and by the rapid growth and enterprise of Stettin. In order to counterbalance their rivalry, the quays have been extended, a canal was opened in 1900 between the Trave and the Elbe, the river up to the wharves has been deepened to 25 ft. or more. The river is kept open in winter by ice-breakers. A harbour was made in 1 899-1 900 on the Wakenitz Canal for boats engaged in inland traffic, especially on the Elbe and Elbe- Trave Canal. Lubeck trades principally with Denmark, Sweden, Finland, Russia, the eastern provinces of Prussia, Great Britain and the United States. The imports amounted in value to about £4,850,000 in 1906 and the exports to over £10,000,000. The chief articles of import are coal, grain, timber, copper, steel and wine, and the exports are manufactured goods principally to Russia and Scandivania. The industries are growing, the chief being breweries and distilleries, saw-mills and planing-mills, shipbuilding, fish-curing, the manufacture of machinery, engines, bricks, resin, preserves, enamelled and tin goods, cigars, furniture, soap and leather. Pop. (1885) 55,399; (1905) 91,541.

History. — Old Lubeck stood on the left bank of the Trave, where it is joined by the river Schwartau, and was destroyed in 1 138. Five years later Count Adolphus II. of Holstein founded new Lubeck, a few miles farther up, on the peninsula Buku, where the TraVe is joined on the right by the Wakenitz, the emissary of the lake of Ratzeburg. An

excellent harbour, sheltered against pirates, it became almost at once a competitor for the commerce of the Baltic. Its foundation coincided with the beginning of the advance of the Low German tribes of Flanders, Friesland and Westphalia along the southern shores of the Baltic — the second great emigration of the colonizing Saxon element. In 1140 Wagria, in 1142 the country of the Polabes (Ratzeburg and Lauenburg), had been annexed by the Holtsaetas (the Transalbingian Saxons). From 1166 onwards there was a Saxon count at Schwerin. Frisian and Saxon merchants from Soest, Bardowiek and other localities in Lower Germany, who already navigated the Baltic and had their factory in Gotland, settled in the new town, where Wendish speech and customs never entered. About n 57 Henry the Lion, duke of Saxony, forced his vassal, the count of Holstein, to give up Lubeck to him; and in 1163 he removed thither the episcopal see of Oldenburg (Stargard), founding at the same time the dioceses of Ratzeburg and Schwerin. He issued the first charter to the citizens, and constituted them a free Saxon community having their own magistrate, an advantage over all other towns of his dominions. He invited traders of the north to visit his new market free of toll and custom, providing his subjects were promised similar privileges in return. From the beginning the king of Denmark granted them a settlement for their herring fishery on the coast of Schoonen. Adopting the statutes of Soest in Westphalia as their code, Saxon merchants exclusively ruled the city. In concurrence with the duke's Vogt (advocatus) they recognized only one right of judicature within the town, to which nobles as well as artisans had to submit. Under these circumstances the population grew rapidly in wealth and influence by land and sea, so that, when Henry was attainted by the emperor, Frederick I., who came in person to besiege Lubeck in 1 181, this potentate," in consideration of its revenues and its situation on the frontier of the Empire," fixed by charter, dated the 19th of September 1188, the limits, and enlarged the liberties, of the free town. In the year 1201 Lubeck was conquered by Waldemar II. of Denmark. But in 1223 it regained its liberty, after the king had been taken captive by the count of Schwerin. In 1226 it was made a free city of the Empire by Frederick II.,

and its inhabitants took part with the enemies of the Danish king in the victory of Bornhovede in July 1227. The citizens repelled the encroachments of their neighbours in Holstein and in Mecklenburg. On the other hand their town, being the principal emporium of the Baltic by the middle of the 13th century, acted as the firm ally of the Teutonic knights in Livonia. Emigrants founded new cities and new sees of Low German speech among alien and pagan races; and thus in

the course of a century the commerce of Lubeck had supplanted that of Westphalia. In connexion with the Germans at Visby, the capital of Gotland, and at Riga, where they had a house from 1 23 1, the people of Lubeck with their armed vessels scoured the sea between the Trave and the Neva. They were encouraged by papal bulls in their contest for the rights of property in wrecks and for the protection of shipping against pirates and slave- hunters. Before the close of the century the statutes of Lubeck were adopted by most Baltic towns having a German population, and Visby protested in vain against the city on the Trave having become the court of appeal for nearly all these cities, and even for the German settlement' in Russian Novgorod. In course of time more than a hundred places were embraced in this relation, the last vestiges of which did not disappear until the beginning of the 18th century. From about 1299 Lubeck presided over a league of cities, Wismar, Rostock, Stralsund, Greifswald and some smaller ones, and this Hansa of towns became heir to a Hansa of traders simultaneously on the eastern and the western sea, after Lubeck and her confederates had been admitted to the same privileges with Cologne, Dortmund and Soest at Bruges and in the steelyards of London, Lynn and Boston. The union held its own, chiefly along the maritime outskirts of the Empire, rather against the will of king and emperor, but nevertheless Rudolph of Habsburg and several of his successors issued new charters to Lubeck. As early as 1241 Lubeck, Hamburg and Soest had combined to secure their highways against robber knights. Treaties to enforce the public peace were concluded in 1 291 and 1338 with the dukes of Brunswick, Mecklenburg and Pomerania, and the count of Holstein. Though the great federal armament against Waldemar IV., the destroyer of Visby, was decreed by the city representatives assembled at Cologne in 1367, Lubeck was the leading spirit in the war which ended with the surrender of Copenhagen and the peace concluded at Stralsund on the 24th of May 1370. Her burgomaster, Brun Warendorp, who commanded the combined naval and land forces, died on the field of battle. In 1368 the seal of the city, a double-headed eagle, which in the 14th century took the place of the more ancient ship, was adopted as the common seal of the confederated towns (civitales maritimae) , some seventy in number. Towards the end of the 15th century the power of the Hanseatic League began to decline, owing to the rise of Burgundy in the west, of Poland and Russia in the east and the emancipation of the Scandinavian kingdom from the union of Calmar. Still Lubeck, even when nearly isolated, strove to preserve its predominance in a war with Denmark (1 501-12), supporting Gustavus Vasa in Sweden, lording it over the north of Europe during the years 1534 and 1535 in the person of Jiirgen Wullenweber, the democratic burgo- master,

who professed the most advanced principles of the Reformation, and engaging with Sweden in a severe naval war

(1536-70).

But the prestige and prosperity of the town were beginning to decline. Before the end of the 16th century the privileges of the London Steelyard were suppressed by Elizabeth. As early as 1425 the herring, a constant source of early wealth, began to forsake the Baltic waters. Later on, by the discovery of a new continent, commerce was diverted into new directions. Finally, with the Thirty Years' War, misfortunes came thick. The last Hanseatic diet met at Lubeck in 1630, shortly after Wallenstein's unsuccessful attack on Stralsund; and from that time merciless sovereign powers stopped free intercourse on all sides. Danes and Swedes battled for the possession of the Sound and for its heavy dues. The often changing masters of Holstein and Lauenburg abstracted much of the valuable landed property I of the city and of the chapter of Lubeck. Towards the end of

the 1 8th century there were signs of improvement. Though the Danes temporarily occupied the town in 1801, it preserved its freedom and gained some of the chapter lands when the imperial constitution of Germany was broken up by the act of February 1803, while trade and commerce prospered for a few years. But in November 1806, when Bliicher, retiring from the catastrophe of Jena, had to capitulate in the vicinity of Liibeck, the town was sacked by the French. Napoleon annexed it to his empire in December 1810. But it rose against the French in March 1813, was re-occupied by them till the 5th of December, and was ultimately declared a free and Hanse town of the German Confederation by the act of Vienna of the 9th of June 1815. The Hanseatic League, however, having never been officially dissolved, Liibeck still enjoyed its traditional connexion with Bremen and Hamburg. In 1853 they sold their common property, the London Steelyard; until 1866 they enlisted by special contract their military contingents for the German Confederation, and down to 1879 they had their own court of appeal at Liibeck. Liibeck joined the North German Confederation in 1866, profiting by the retirement from Holstein and Lauenburg of the Danes, whose interference had prevented as long as possible a direct railway between Liibeck and Hamburg. On the 27th of June 1867 Liibeck concluded a military convention with Prussia, and on the nth of August 1868 entered the

German Customs Union (Zollverein), though reserving to itself certain privileges in respect of its considerable wine trade and commerce with the Baltic ports.

See E. Deecke, Die Freie und Hansestadt Liibeck (4th ed., Liibeck, 1881) and Liibische Geschichten und Sagen (Liibeck, 1891); M. Hoffmann, Geschichte der Freien und Hansestadt Liibeck (Liibeck, 1889-1892) and Chronik von Liibeck (Liibeck, 1908); Die Freie und Hansestadt Liibeck, published by Die geographische Gesellschaft in Liibeck (Liibeck, 1891); C. W. Pauli, Lubecksche Zustande-im Mittelalter (Liibeck, 1846-1878) ; J. Geffcken, Liibeck in der Mitte des i6′ en Jahrhunderts (Liibeck, 1905); P. Hasse, Die Anfange Liibecks (Liibeck, 1893); H. Bodeker, Geschichte der Freien und Hansestadt Liibeck (Lubeck, 1898); A. Holm, Liibeck, die Freie und Hansestadt (Bielefeld, 1900) ; G. Waitz, Lubeck unter Jiirgen Wullenweber (Berlin, 1 855-1 856); Klug, Geschichte Liibecks wdhrend der Vereinigung mil dem franzosischen Kaiserreich (Lubeck, 1857); F. Frensdorff, Die Stadt- und Gerichtsverfassung Liibecks im 12. und 13. Jahrhundert (Lubeck, 1861); the urkundenbuch der Stadt Lubeck (Lubeck, 1843- 1904); the Liibecker Chroniken (Leipzig, 1884-1903); and the Zeitschrift des Vereins fur lubeckische Geschichte (Lubeck, i86ofol.).

(R. P. ; P. A. A.)

LUBLIN, a government of Russian Poland, bounded N. by Siedlce, E. by Volhynia (the Bug forming the boundary), S. by Galicia, and W. by Radom (the Vistula separating the two) . Area, 6499 sq. m. The surface is an undulating plain of Cretaceous deposits, 800 to 900 ft. in altitude, and reaching in one place 1050 ft. It is largely covered with forests of oak, beech and lime, intersected by ravines and thinly inhabited. A marshy lowland extends between the Vistula and the Wieprz. The government is drained by the Vistula and the Bug, and by their tributaries the Wieprz, San and Tanev. Parts of the government, being of black earth, are fertile, but other parts are sandy. Agriculture is in good condition. Many Germans settled in the government before immigration was stopped in 1887; in 1897 they numbered about 26,000. Rye, oats, wheat, barley and potatoes are the chief crops, rye and wheat being exported. Flax, hemp, buckwheat, peas, millet and beetroot are also cultivated. Horses are carefully bred. In 1897 the population was 1,165,122, of whom 604,886 were women. The Greek Orthodox (chiefly Little Russians in the south-east) amounted to 20-1% of the whole; Roman Catholics (i.e. Poles) to 62-8%; Jews to 14-2%-, and Protestants to 2-8%. The urban popula- tion was 148,196 in 1897. The estimated population in 1906 was 1,362,500. Industrial establishments consist chiefly of distilleries, sugar-works, steam flour-

mills, tanneries, saw-mills and factories of bent-wood furniture. Domestic industries are widely developed in the villages. River navigation employs a considerable portion of the population. The government is divided into ten districts, the chief towns of which, with their populations in 1897, are — Lublin, capital of the province (50,152) ; Biegoray (6286); Cholm (19,236); Hrubieszow (10,699);

Yanow (7927); Krasnystaw or Kraznostav (8879); Lubartow (5249); Nova-Alexandrya or Pulawy (3892); Samostye (12,400); and Tomaszow (6224). . ■

LUBLIN, a town of Russian Poland, capital of the government of the same name, 109 m. by rail S.E. of Warsaw, on a small tributary of the Wieprz. Pop. (1873) 28,900; (1897) 50,152. It is the most important town of Poland after Warsaw and Lodz, being one of the chief centres of the manufacture of thread- yarn, linen and hempen goods and woollen stuffs; there is also trade in grain and cattle. It has an old citadel, several palaces of Polish nobles and many interesting churches, and is the head- quarters of the XIV. army corps, and the see of a Roman Catholic bishop. The cathedral dates from the 16th century. Of the former fortifications nothing remains except the four gates, one dating from 1342.

Lublin was in existence in the 10th century, and has a church which is said to have been built in 986. During the time the Jagellon dynasty ruled over Lithuania and Poland it was the most important city between the Vistula and the Dnieper, having 40,000 inhabitants (70,000 according to other authorities) and all the trade with Podolia, Volhynia and Red Russia. Indeed, the present town is surrounded with ruins, which prove that it formerly covered a much larger area. But it was frequently destroyed by the Tatars (e.g. 1240) and Cossacks (e.g. 1477). In 1 568-1 569 it was the seat of the stormy convention at which the union between Poland and Lithuania was decided. ‘ In 1702 another convention was held in Lublin, in favour of Augustus II. and against Charles XII. of Sweden, who carried the town by assault and plundered it. In 1831 Lublin was taken by the Russians. The surrounding country is rich in reminiscences of the struggle of Poland for independence.

LUBRICANTS. Machines consist of parts which have relative motion and generally slide and rub against each other. Thus the axle of a cart or railway vehicle is pressed against a metallic bearing surface supporting the body of “the vehicle, and the two opposed surfaces slide upon each other and are pressed together with great force. If the metallic surfaces be clean, the speed of rubbing high, and the force

pressing the surfaces together considerable, then the latter will abrade each other, become hot and be rapidly destroyed. It is possible, however, to prevent the serious abrasion of such opposing surfaces, and largely to reduce the frictional resistance they oppose to relative motion by the use of lubricants (Lat. lubricare, lubricus, slippery). These substances are caused to insinuate themselves between the surfaces, and have the property of so separating them as to prevent serious abrasion. The solid and semi-solid lubricants seem to act as rollers between the surfaces, or form a film between them which itself suffers abrasion or friction. The liquid lubricants, however, maintain themselves as liquid 51ms between the surfaces, upon which the bearing floats. The frictional resistance is then wholly in the fluid. Even when lubricants are used the friction, i.e. the resistance to motion offered by the opposing surfaces, is considerable. In the article Friction will be found a statement of how friction is measured and the manner in which it is expressed. The coefficient of friction is obtained by dividing the force required to cause the surfaces to slide over each other by the load pressing them to- gether. For clean unlubricated surfaces this coefficient may be as great as 0-3, whilst for well-lubricated cylindrical bearings it may be as small as 0-0006. Engineers have, therefore, paid particular attention to the design of bearings with the object of reducing the friction, and thus making use of as much as possible of the power developed by prime movers. The import- ance of doing this will be seen when it is remembered that the energy wasted is proportional to the coefficient of friction, and that the durability of the parts depends upon the extent to which they are separated by the lubricant and thus prevented from injuring each other.

There is great diversity in the shapes of rubbing surfaces, the loads they have to carry vary widely, and the speed of rubbing ranges from less than one foot to thousands of feet per minute. There is also a large number of substances which act as lubricants,

some being liquids and others soft solids. In many instruments or machines where the surfaces in contact which have to slide upon each other are only lightly pressed together, and are only occasion- ally given relative motion, the lubricant is only needed to prevent abrasion. Microscopes and mathematical instruments are of this kind. In such cases, the lubricant which keeps the surfaces from abrading each other is a mere contamination film, either derived from the air or

put on when the surfaces are finished. When such lubricating films are depended upon, the friction surfaces should be as hard as possible and, if practicable, of dissimilar metals. In the absence of a contamination film, most metals, if rubbed when in contact, will immediately adhere to each other. A large number of experiments have been made to ascertain the co- efficient of friction under these imperfect conditions of lubrica- tion. Within wide limits of load, the friction is proportional to the pressure normal to the surfaces and is, therefore, approxi- mately independent of the area of the surfaces in contact. Although the static coefficient is often less than the kinetic at very low speeds, within wide limits the latter coefficient de- creases with increasing speed. These laws apply to all bearings the velocity of rubbing of which is very small, or which are lubricated with solid or semi-solid materials.

When the speed of rubbing is considerable and the contamina- tion film is liable to be destroyed, resort is had to lubricants which possess the power of keeping the surfaces apart, and thereby reducing the friction. The constant application of such substances is necessary in the case of such parts of machine tools as slide rests, the surfaces of which only move relatively to each other at moderate speeds, but which have to carry heavy loads. In all ordinary cases, the coefficient of friction of flat surfaces, such as those of slide blocks or pivot bearings, is high, owing to the fact that the lubricant is not easily forced between the surfaces. In the case of cylindrical bearing surfaces, such as those of journals and spindles, owing to the fact that the radius of the bearing ourf ace is greater than that of the journal or spindle, the lubricant, if a liquid, is easily drawn in and entirely separates the surfaces (see Lubrication). Fortunately, cylindrical bear- ings are by far the most common and important form of bearing, and they can be so lubricated that the friction coefficient is very low. The lubricant, owing to its viscosity, is forced between the surfaces and keeps them entirely apart. This property of vis- cosity is one of the most important possessed by liquid lubricants. Some lubricants, such as the oils used for the light spindles of textile machinery, are quite thin and limpid, whilst others, suitable for steam engine cylinders and very heavy bearings, are, at ordinary temperatures, as thick as treacle or honey. Gener- ally speaking, the greater the viscosity of the lubricant the greater the load the bearing will carry, but with thick lubricants the frictional coefficient is correspondingly high. True lubricants differ from ordinary liquids of equal viscosity inasmuch as they possess the property of ” oiliness.” This is a property which enables them to maintain an unbroken film between surfaces when the loads are heavy. It is possessed most markedly by vegetables and

animal oils and fats, and less markedly by mineral oils. In the case of mineral lubricating oils from the same source, the lower the specific gravity the greater the oiliness of the liquid, as a rule. Mixtures of mineral oil with animal or vegetable oil are largely used, one class of oil supplying those qualities in which the other is deficient. Thus the mineral oils, which are comparatively cheap and possess the important property of not becoming oxidized into gummy or sticky sub- stances by the action of the air, which also are not liable to cause spontaneous ignition of cotton waste, &c, and can be manufactured of almost any desired viscosity, but which on the other hand are somewhat deficient in the property of oiliness, are mixed with animal or vegetable oils which possess the latter property in marked degree, but are liable to gum and become acid and to cause spontaneous ignition, besides being compara- tively expensive and limited in quantity. Oils which become acid attack the bearings chemically, and those which oxidize may become so thick that they fail to run on to the bearings properly.

The following table shows that the permissible load on bearings varies greatly: —

Description of Bearing. Load in lb

per sq. in. Hard steel bearings on which the load is inter- mittent, such as the crank pins of shearing

machines 3000

Bronze crosshead neck journals 1200

Crank pins of large slow engines .... 800-900 Crank pins of marine engines 400-500

Main crank-shaft bearings, slow marine . . 600

Main crank-shaft bearings, fast marine . . 400 Railway coach journals 300-400

Fly-wheel shaft journals 150-200

Small engine crank pins 150-200

Small slide blocks, marine engines . . . 100

Stationary engine slide block 25-125

Stationary engine slide block, usually . . . 30-60

Propeller thrust bearings 50-70

Shafts in cast iron steps, high speed … 15

Solid Lubricants. — Solid substances, such as graphite or plumbago, soapstone, &c, are used as lubricants when there is some objection to liquids or soft solids, but the surfaces between which they are placed should be of very hard materials. They are frequently mixed with oils or greases, the lubricating properties of which they improve. Semi-solid Lubricants. — The contrast in lubricating properties between mineral and fatty oils exists also in the case of a pure mineral grease like vaseline and an animal fat such as tallow, the latter possessing in a far greater degree the property of greasiness. A large number of lubricating greases are made by incorporating or emulsifying animal and vegetable fats with soap and water; also by thickening mineral lubricating oils with soap. Large quantities of these greases are used with very good results for the lubrication of railway waggon axles, and some of them are excellent lubricants for the bearings of slow moving machinery. Care must be taken, how- ever, that they do not contain excess of water and are not adulterated with such useless substances as china clay ; also, that they melt as a whole, and that the oil does not run down and leave the soap. This is liable to occur with badly made greases, and hot bearings are the result. Except in special cases, greases should not be used for quick-running journals, shafts or spindles, on account of the high frictional resistance which they offer to motion. In the case of fats and greases whose melting points are not much above the tempera- ture of surrounding objects it generally happens that the lubricating films are so warmed by friction that they actually melt and act as oils. These lubricants are generally forced into the bearings by a form of syringe fitted with a spring piston, or are squeezed between the faces by means of a screw-plug.

Liquid Lubricants. — Generally speaking, all bearings which it is necessary should run with as little friction as possible must be sup- plied with liquid lubricants. These may be of animal, vegetable or mineral origin. The mineral oils are mixtures of hydrocarbons of variable viscosity, flashing-point, density and oiliness. They are obtained by distillation from American, Russian and other petroleums. The fixed oils obtained from animal and vegetable substances are not volatile without decomposition, and are found ready made in the tissues of animals and plants. Animal oils are obtained from the adipose tissue by simple heat or by boiling with water. They are usually either colourless or yellow. The oils of plants occur usually in

the seeds or fruit, and are obtained either by expression or by means of solvents such as ether or petroleum. They are of various shades of yellow and green, the green colour being due to the presence of chlorophyll. The fundamental difference between fixed oils and mineral oils exists in their behaviour towards oxygen. Mineral oils at ordinary temperatures are indifferent to oxygen, but all fixed oils combine with it and thicken or gum more or less, generating heat at the same time. Such oils are, therefore, dangerous if dropped upon silk, cotton or woollen waste or other combustible fibrous materials, which are thus rendered liable to spontaneous ignition.

Liquid lubricants are used for all high speed bearings. In some cases the rubbing surfaces work in a bath of the lubricant, which can then reach all the rubbing parts with certainty. Small engines for motor cars or road waggons are often lubricated in this way. In the case of individual bearings, such as those of railway vehicles, a pad of cotton, worsted and horse hair is kept saturated with the lubricant and pressed against the under side of the journal. The journal is thus kept constantly wetted with oil, and the film is forced beneath the brass as the axle rotates. In many cases, oil-ways and grooves are cut in the bearings, and the lubricant is allowed to run by gravity into them and thus finds its way between the opposing surfaces. To secure a steady feed various contrivances are adopted, the most common being a wick of cotton or worsted used as a siphon. In cases where it is important that little if any wear should take place, the lubricant is forced by means of a pump between the friction surfaces and a constant film of oil is thereby maintained between them.

For the spindles of small machines such as clocks, watches and other delicate mechanisms, which are only lubricated at long intervals

and are often exposed to extremes of temperature, the lubricant must be a fluid oil as free as possible from tendency to gum or thicken by oxidation or to corrode metal, and must often have a low freez- ing-point. It must also possess a maximum of ” oiliness.” The lubricants mostly used for such purposes are obtained from porpoise or dolphin jaw oils, bean oil, hazel nut oil, neatsfoot oil, sperm oil or olive oil. These oils are exposed for some time to temperatures as low as the mechanism is required to work at, and the portion which remains fluid is separated and used. Free acid should be entirely eliminated by chemical refining. A little good mineral oil may with advantage be mixed with the fatty oil.

For all ordinary machinery, ranging from the light ring spindles of textile mills to the heavy shafts of large engines, mineral oils are almost universally employed, either alone or mixed with fatty oils, the general rule being to use pure mineral oils for bath, forced or circulating pump lubrication, and mixed oils for drop, siphon and other less perfect methods of lubrication. Pure mineral oils of relatively low viscosity are used for high speeds and low pressures, mixed oils of greater viscosity for low speeds and high pressures. In selecting oils for low speeds and great pressures, viscosity must be the first consideration, and next to that ” oiliness.” If an oil of sufficiently high viscosity be used, a mineral oil may give a result as good or better than a pure fixed oil ; a mixed oil may give a better result than either. If a mineral oil of sufficient viscosity be not available, then a fixed oil or fat may be expected to give the best result.

In special cases, such as in the lubrication of textile machines, where the oil is liable to be splashed upon the fabric, the primary consideration is to use an oil which can be washed out without leaving a stain. Pure fixed oils, or mixtures composed largely of fixed oils, are used for such purposes.

In other special cases, such as marine engines working in hot places, mixtures are used of mineral oil with rape or other vegetable oil artificially thickened by blowing air through the heated oil, and known as ” blown ” oil or ” soluble castor oil.”

In the lubrication of the cylinders and valves of steam, gas and oil engines, the lubricant must possess as much viscosity as possible at the working temperature, must not evaporate appreciably and must not decompose and liberate fatty acids which would corrode the metal and choke the steam passages with metallic soaps; for gas and oil engines the lubricant must be as free as possible from tendency to

decompose and deposit carbon when heated. For this reason steam cylinders and valves should be lubricated with pure mineral oils of the highest viscosity, mixed with no more fixed oil than is necessary to ensure efficient lubrication. Gas and oil engines also should be lubricated with pure mineral oils wherever possible.

For further information on the theory and practice of lubrication and on the testing of lubricants, see Friction and Lost Work in Machinery and MM Work, by R. H. Thurston (1903) ; and Lubri- cation and Lubricants, by L. Archbutt and R. M. Deeley (1906).

(R. M. D.)

LUBRICATION. Our knowledge of the action of oils and other viscous fluids in diminishing friction and wear between solid surfaces from being purely empirical has become a connected theory, based on the known properties of matter, subjected to the definition of mathematical analysis and verified by experiment. The theory was published in 1886 {Phil. Trans., 1886, 177, pp. 157-234); but it is the purpose of this article not so much to explain its application, as to give a brief account of the intro- duction of the misconceptions that so long prevailed, and of the manner in which their removal led to its general acceptance.

Friction, or resistance to tangential shifting of matter over matter, whatever the mode and arrangement, differs greatly according to the materials, but, like all material resistance, is essentially limited. The range of the limits in available materials has a primary place in determining mechanical possibilities, and from the earliest times they have demanded the closest attention on the part of all who have to do with structures or with machines, the former being concerned to find those materials and their arrangements which possess the highest limits, and the latter the materials in which the limits are least. Long before the reformation of science in the 15th and 16th centuries both these limits had formed the subject of such empirical research as disclosed numerous definite although disconnected circumstances under which they could be secured; and these, however far from the highest and lowest, satisfied the exigencies of practical mechanics at the time, thus initiating the method of extending knowledge which was to be subsequently recognized as the only basis of physical philosophy. In this purely empirical research the conclusion arrived at represented the results for the actual circumstance from which they were drawn, and thus afforded no

place for theoretical discrepancies. However, in the attempts at

generalization which followed the reformation of science, opportunity was afforded for such discrepancies in the mere enunciation of the circumstances in which the so-called laws of friction of motion are supposed to apply. The circumstances in which the great amount of empirical research was conducted as to the resistance between the clean, plane, smooth surfaces of rigid bodies moving over each other under pressure, invariably include the presence of air at atmospheric pressure around, and to some extent between, the surfaces; but this fact had received no notice in the enunciation of these laws, and this constitutes a theoretical departure from the conditions under which the experience had been obtained. Also, the theoretical division of the law of frictional resistance into two laws — one dealing with the limit of rest, and the other asserting that the friction of motion, which is invariably less in similar circumstances than that of rest, is independent of the velocity of sliding — involves the theoretical assumption that there is no asymptotic law of diminution of the resistance, since, starting from rest, the rate of sliding increases. The theoretical substitution of ideal rigid bodies with geometrically regular surfaces, sliding in contact under pressure at the common regular surface, for the aerated surfaces in the actual circumstances, and the theoretical sub- stitution of the absolute independence of the resistance of the rate of sliding for the limited independence in the actual circum- stances, prove the general acceptance of the conceptions — (1) that matter can slide over matter under pressure at a geometric- ally regular surface; (2) that, however much the resistance to sliding under any particular pressure (the co-efficient of friction) may depend on the physical properties of the materials, the sliding under pressure takes place at the geometrically regular surface of contact of the rigid bodies; and (3) as the consequence of (1) and (2), that whatever the effect of a lubricant, such as oil, might have, it could be a physical surface effect. Thus not only did these general theoretical conceptions, resulting from the theoretical laws of friction, fail to indicate that the lubricant may diminish the resistance by the mere mechanical separation of the surfaces, but they precluded the idea that such might be the case. The result was that all subsequent attempts to reduce the empirical facts, where a lubricant was used, to such general laws as might reveal the separate functions of the complex circumstances on which lubrication depends, com- pletely failed. Thus until 1883 the science of lubrication had not advanced beyond the empirical stage.

This period of stagnation was terminated by an accidental phenomenon observed by Beauchamp Tower, w T hile engaged on his research on the friction of the journals of railway carriages. His

observation led him to a line of experiments which proved that in these experiments the general function of the lubricant was the mechanical separation of the metal surfaces by a layer of fluid of finite thickness, thus upsetting the preconceived ideas as expressed in the laws of the friction of motion. On the publica- tion of Tower's reports (Proc. Inst. M.E., November 1883), it was recognized by several physicists (B.A. Report, 1884, pp. 14, 625) that the evidence they contained afforded a basis for further study of the actions involved, indicating as it did the circumstances — namely, the properties of viscosity and cohesion possessed by fluids — account of which had not been taken in previous conclusions. It also became apparent that continuous or steady lubrication, such as that of Tower's experiments, is only secured when the solid surfaces separated by the lubricant are so shaped that the thickness at the ingoing side is greater than that at the outgoing side.

When the general equations of viscous fluids had been shown as the result of the labours of C. L. M. H. Navier, 1 A. L. Cauchy, 2 S. D. Poisson, 3 A. J. C. Barre de St Venant, 4 and in 1845 of Sir G. Gabriel Stokes, 5 to involve no other assumption than that the stresses, other than the pressure equal in all directions,

1 Mem. de V Acad. (1826), 6, p. 389. 5 Mem. des sav. Urang. 1. 40. Mem. de VAcad. (1831), 10, p. 345. 4 B.A. Report (1846)

6 Cambridge Phil. Trans. (1845 and 1857).

are linear functions of the distortional rates of strain multiplied by a constant coefficient, it was found that the only solutions of which the equations admitted, when applied to fluids flowing between fixed boundaries, as water in a pipe, were singular solutions for steady or steady periodic motion, and that the conclusions they entailed, that the resistance would be pro- portional to the velocity, were for the most part directly at variance with the common experience that the resistances varied with the square of the velocity. This discrepancy was sometimes supposed to be the result of eddies in the fluid, but it was not till 1883 that it was discovered by experiments with colour bands that, in the case of geometrically similar boundaries, the existence or non-existence of such eddies depended upon a definite relation between the mean velocity (U) of the fluid, the distance between the boundaries, and the ratio of the co- efficient of viscosity

to the density (p./p) , expressed by XJDpjfi = K, where K is a physical constant independent of units, which has a value between 1900 and 2000, and for parallel boundaries D is four times the area of the channel divided by the perimeter of the section (Phil. Trans., 1883, part iii. 935-982). K is thus a criterion at which the law of resistance to the mean flow changes suddenly (as U increases), from being proportional to the flow, to a law involving higher powers of the velocity at first, but as the rates increase approaching an asymptote in which the power is a little less that the square.

This sudden change in the law of resistance to the flow of fluid between solid boundaries, depending as it does on a complete change in the manner of the flow — from direct parallel flow to sinuous eddying motion — serves to determine analytically the circumstances as to the velocity and the thickness of the film under which ally fluid having a particular coefficient of viscosity can act the part of a lubricant. For as long as the circumstances are such that UDp/jU is less than K, the parallel flow is held stable by the viscosity, so that only one solution is possible — that in which the resistance is the product of /j multiplied by the

rate of distortion, as jujr; in this case the fluid has lubricating

properties. But when the circumstances are such that UDp/fj, is greater than K, other solutions become possible, and the parallel flow becomes unstable, breaks down into eddying motion, and the resistance varies as pu n , which approximates to ptt 1 ‘ 78 as the velocity increases; in this state the fluid has no lubricating properties. Thus, within the limits of the criterion, the rate of displacement of the momentum of the fluid is in- significant as compared with the viscous resistance, and may be neglected; while outside this limit the direct effects of the eddying motion completely dominate the viscous resistance, which in its turn may be neglected. Thus K is a criterion which separates the flow of fluid between solid surfaces as definitely as the flow of fluid is separated from the relative motions in elastic solids, and it is by the knowledge of the limit on which this distinction depends that the theory of viscous flow can with assurance be applied to the circumstance of lubrication.

Until the existence of this physical constant was discovered, any theoretical conclusions as to whether in any particular circumstances the resistance of the lubricant would follow the law of viscous flow or that of eddying motion was impossible. Thus Tower, being unaware of the discovery of the criterion, which was published in the same year as his reports, was thrown off the scent in his endeavour to verify the

evidence he had obtained as to the finite thickness of the film by varying the velocity. He remarks in his first report that, ” according to the theory of fluid motion, the resistance would be as the square of the velocity, whereas in his results it did not increase according to this law.” The rational theory of lubrication does not, however, depend solely on the viscosity within the interior of fluids, but also depends on the surface action between the fluid and the solid. In many respects the surface actions, as indicated by surface tension, are still obscure, and there has been a general tendency to assume that there may be discontinuity in the velocity at the common surface. But whatever these actions may be in other respects, there is abundant evidence

that there is no appreciable discontinuity in the velocity at the surfaces as long as the fluid has finite thickness. Hence in the case of lubrication the velocities of the fluid at the surfaces of the solids are those of the solid. In as far as the presence of the lubricant is necessary, such properties as cause oil in spite of its surface tension to spread even against gravity over a bright metal surface, while mercury will concentrate into globules on the bright surface of iron, have an important place in securing lubrication where the action is intermittent, as in the escapement of a clock. If there is oil on the pallet, although the pressure of the tooth causes this to flow out laterally from between the surfaces, it goes back again by surface tension during the intervals; hence the importance of using fluids with low surface tension like oil, or special oils, when there is no other means of securing the presence of the lubricant.

The differential equations for the equilibrium of the lubricant are what the differential equations of viscous fluid in steady motion become when subject to the conditions necessary for lubrication as already defined — (1) the velocity is below the critical value;

(2) at the surfaces the velocity of the fluid is that of the solid;

(3) the thickness of the film is small compared with the lateral dimensions of the surfaces and the radii of curvature of the surfaces. By the first of these conditions all the terms having p as a factor may be neglected, and the equations thus become the equations of equilibrium of the fluid ; as such, they are applicable to fluid whether incompressible or elastic, and however the pressure may affect the viscosity. But the analysis is greatly simplified by omitting all terms depending on compressibility and by taking fi constant ; this may be done without loss of generality in a qualitative sense. With these limitations we have for the differential equation of the equili- brium of the lubricant : —

dp

‘ dx

o = p v

, to o du , dv , dw]

•mvV&c&c, 0 = ˆ + ˆ + ˆ!

(du,dv\ ”” \dy + dx) ‘

(0

&c, &c.

These are subject to the boundary conditions (2) and (3). Taking x as measured parallel to one of the surfaces in the direction of rela- tive motion, y normal to the surface and z normal to the plane of xy by condition (3), we may without error disregard the effect of any curvature in the surfaces. Also v is small compared with u and w, and the variations of u and w in the directions x and z are small compared with their variation in the direction y. The equations (1) reduce to

_dp dju _dp dp dhv _du dv .dwˆ °-dx~> i dy i ‘ °~dy’ °”°dz~> i dy*’ °~dx + dy + dz

(2)

du dw .

° = Pv*-i t 2~y’ c “P>”~> i Sy’ P”’ = – For the boundary conditions, putting /(«, z) as limiting the lateral area of the lubricant, the conditions at the surfaces may be expressed thus: —

when;y = o, « = Uo, w = o, v = o

wheny = fe, w = Ui, w = o, “i = Ui-j- + Vi

(3)

when /(x, z) = o, p = pa Then, integrating the equations (2) over y, and determining the constants by equations (3), we have, since by the second of equations (2) p is independent of y,

1 dp I (4)

Then, differentiating equations (4) with respect to x and z respectively, and substituting in the 4th of equations (2), and integrating from ‘y = o to y = h, so that only the values of v at the surfaces may be required, we have for the differential equation of normal pressure at any point x, z, between the boundaries : —

& M0 +Tz (#) = **6 ‘ i W+Uog+aV. j (5) Again differentiating equations (4), with respect to x and z respec- tively, and substituting in the 5th and 6th of equations (2), and putting** / and f z for the intensities of the tangential stresses at the lower and upper surfaces : — ■

, ** [^

J’~* F 2dx

LUCAN

9 1

Equations (5) and (6) are the general equations for the stresses at the boundaries at x, z, when h is a continuous function of x and z, ix and p being constant.

For the integration of equations (6) to get the resultant stresses and moments on the solid boundaries, so as to obtain the conditions of their equilibrium, it is necessary to know how x and 2 at any point on the boundary enter into h, as well as the equation f(x, 2)=o, which determines the limits of the lubricating film. If y, the normal to one of the surfaces, has not the same direction for all points of this surface, in other words, if the surface is not plane, x and 2 be- come curvilinear co-ordinates, at all points perpendicular to y. Since, for lubrication, one of the surfaces must be plane, cylindrical, or a surface of revolution, we may put x = KB, y = r — R, and z perpendicular to the plane of motion. Then, if the data are sufficient, the resultant stresses and moments between the surfaces are obtained by integrat- ing the intensity of the stress and moments of intensity of stress over the surface.

This, however, is not the usual problem that arises. What is generally wanted is to find the thickness of the film where least (ho) and its angular position with respect to direction of load, to resist a definite load with a particular surface velocity. If the surfaces are plane, the general solution involves only one arbitrary constant, the least thickness (ho) ; since in any particular case the variation of h with x is necessarily fixed, as in this case lubrication affords no auto- matic

adjustment of this slope. When both surfaces are curved in the plane of motion there are at least two arbitrary constants, ho, and the angular position of ho with respect to direction of load ; while if the surfaces are both curved in a plane perpendicular to the direction of motion as well as in the plane of motion, there are three arbitrary constants, ho, o, Zo- The only constraint necessary is to prevent rotation in the plane of motion of one of the surfaces, leaving this surface free to move in any direction and to adjust its position so as to be in equilibrium under the load.

The integrations necessary for the solutions of these problems are practicable — complete or approximate — and have been effected for circumstances which include the chief cases of practical lubrication, the results having been verified by reference to Tower's experiments. In this way the verified theory is available for guidance outside the limits of experience as well as for determining the limiting conditions. But it is necessary to ta"ke into account certain subsidiary theories. These limits depend on the coefficient of viscosity, which diminishes as the temperature increases. The total work in overcoming the resistance is spent in generating heat in the lubricant, the volume of which is very small. Were it not for the escape of heat by conduction through the lubricant and the metal, lubrication would be impossible. Hence a knowledge of the empirical law oi the variation of the viscosity of the lubricant with temperature, the coefficients of conduction of heat in the lubricant and in the metal, and the application of the theory of the flow of heat in the particular circumstances, are necessary adjuncts to the theory of lubrication for determining the limits of lubrication. Nor is this all, for the shapes of the solid surfaces vary with the pressure, and more particularly with the temperature.

The theory of lubrication has been applied to the explanation of the slipperiness of ice (Mem. Manchester Lit. and Phil. Soc, 1899).

(O. R.) LUCAN [Marcus Annaeus Lucanus], (a.d. 39-65), Roman poet of the Silver Age, grandson of the rhetorician Seneca and nephew of the philosopher, was born at Corduba. His mother was Acilia; his father, Marcus Annaeus Mela, had amassed great wealth as imperial procurator for the provinces. From a memoir which is generally attributed to Suetonius we learn that Lucan was taken to Rome at the age of eight months and displayed remarkable precocity. One of his instructors was the Stoic philosopher, Cornutus, the friend and teacher of Persius. He was studying at Athens when Nero recalled him to Rome and made him quaestor. These friendly relations did not last long. Lucan is said to have defeated Nero in a public poetical contest;

Nero forbade him to recite in public, and the poet's indignation made him an accomplice in the conspiracy of Piso. Upon the discovery of the plot he is said to have been tempted by the hope of pardon to denounce his own mother. Failing to obtain a reprieve, he caused his veins to be opened, and expired repeating a passage from one of his poems descriptive of the death of a wounded soldier. His father was involved in the proscription, his mother escaped, and his widow Polla Argentaria survived to receive the homage of Statius under Domitian. The birthday of Lucan was kept as a festival after

his death, and a poem addressed to his widow upon one of these occasions and containing information on the poet's work and career is still extant (Statius's Silvae, ii. 7, entitled Genethliacon Lucani) .

Besides his principal performance, Lucan's works included poems on the ransom of Hector, the nether world, the fate of Orpheus, a eulogy of Nero, the burning of Rome, and one in honour of his wife (all mentioned by Statius), letters, epigrams, an unfinished tragedy on the subject of Medea and numerous miscellaneous pieces. His minor works have perished except for a few fragments, but all that the author wrote of the Pharsalia has come down to us. It would probably have concluded with the;battle of Philippi, but breaks off abruptly as Caesar is about to plunge into the harbour of Alexandria. The Pharsalia opens with a panegyric of Nero, sketches the causes of the war and the characters of Caesar and Pompey, the crossing of the Rubicon by Caesar, the flight of the tribunes to his camp, and the panic and confusion in Rome, which Pompey has abandoned. The second book describes the visit of Brutus to Cato, who is persuaded to join the side of the senate, and his marriage a second time to his former wife Marcia, Ahenobarbus's capitulation at Corfinium and the retirement of Pompey to Greece. In the third book Caesar, after settling affairs in Rome, crosses the Alps for Spain. Massilia is besieged and falls. The fourth book describes the victories of Caesar in Spain over Afranius and Petreius, and the defeat of Curio by Juba in Africa. In the fifth Caesar and Antony land in Greece, and Pompey's wife Cornelia is placed in security at Lesbos. The sixth book describes the repulses of Caesar round Dyrrhachium, the seventh the defeat of Pompey at Pharsalia, the eighth his flight and assassination in Egypt, the ninth the operations of Cato in Africa and his march through the desert, and the landing of Caesar in Egypt, the tenth the opening incidents of the Alexandrian war. The incompleteness of the work should not be left out of account in the estimate of its merits, for, with two capital exceptions, the faults of the Pharsalia are such as revision might have mitigated or rendered. No such pains, certainly, could have amended the deficiency of unity of action, or supplied the want

of a legitimate protagonist. The Pharsalia is not true to history, but it cannot shake off its shackles, and is rather a metrical chronicle than a true epic. If it had been completed according to the author's design, Pompey, Cato and Brutus must have successively enacted the part of nominal hero, while the real hero is the arch-enemy of liberty and Lucan, Caesar. Yet these defects, though glaring, are not fatal or peculiar to Lucan. The false taste, the strained rhetoric, the ostentatious erudition, the tedious harangues and far-fetched or commonplace reflections so frequent in this singularly unequal poem, are faults much more irritating, but they are also faults capable of amendment, which the writer might not improbably have removed. Great allowance should also be made in the case of one who is emulating predecessors who have already carried art to its last perfection. Lucan's temper could never have brooked mere imitation; his versifica- tion, no less than his subject, is entirely his own; he avoids the appearance of outward resemblance to his great predecessor with a persistency which can only have resulted from deliberate purpose, but he is largely influenced by the declamatory school of his grandfather and uncle. Hence his partiality for finished antithesis, contrasting strongly with his generally breathless style and turbid diction. Quintilian sums up both aspects of his genius with pregnant brevity, " Ardens et concitatus et sententiis clarissimus," adding with equal justice, " Magis oratoribus quam poetis annumerandus." Lucan's oratory, however, frequently approaches the regions of poetry, e.g. the apotheosis of Pompey at the beginning of the ninth book, and the passage in the same book where Cato, in the truest spirit of the Stoic philosophy, refuses to consult the oracle of Jupiter Ammon. Though in many cases Lucan's rhetoric is frigid, hyperbolical, and out of keeping with the character of the speaker, yet his theme has a genuine hold upon him; in the age of Nero he celebrates the republic as a poet with the same energy with which in the age of Cicero he might have defended it as an orator.

But for him it might almost have been said that the Roman republic never inspired the Roman muse.

Lucan never speaks of himself, but his epic speaks for him. He must have been endowed with no common ambition, industry and self-reliance, an enthusiastic though narrow and aristocratic patriotism, and a faculty for appreciating magnanimity in others. But the only personal trait positively known to us is his conjugal affection, a

characteristic of Seneca also.

Lucan, together with Statius, was preferred even to Virgil in the middle ages. So late as 1493 his commentator Sulpitius writes: ” Magnus profecto est Maro, magnus Lucanus; adeoque prope par, ut quis sit major possis ambigere.” Shelley and Southey, in the first transport of admiration, thought Lucan superior to Virgil; Pope, with more judgment, says that the fire which burns in Virgil with an equable glow breaks forth in Lucan with sudden, brief and interrupted flashes. Of late, notwithstanding the enthusiasm of isolated admirers, Lucan has been unduly neglected, but he has exercised an important influence upon one great department of modern literature by his effect upon Corneille, and through him upon the classical French drama.

Authorities. — The Pharsalia was much read in the middle ages, and consequently it is preserved in a large number of manuscripts, the relations of which have not yet been thoroughly made out. The most recent critical text is that of C. Hosius (2nd ed. 1906), and the latest complete commentaries are those of C. E. Haskins (1887, with a valuable introduction by W. E. Heitland) and C. M. Prancken (1896). There are separate editions of book i. by P. Lejay (1894) and book vii. by J. P. Postgate (1896). Of earlier editions those of Oudendorp (which contains the continuation of the Pharsalia to the death of Caesar by Thomas May, 1728), Burmann (1740), Bentley (1816, posthumous) and Weber (1829) may be mentioned. There are English translations by C. Marlowe (book i. only, 1600), Sir F. Gorges (1614), Thomas May (1626), N. Rowe (1718) and Sir E. Ridley (2nd ed. 1905), the two last being the best.

(R.G.;J. P.P.)

LUCANIA, in ancient geography, a district of southern Italy, extending from the Tyrrhenian Sea to the Gulf of Tarenturn. To the north it adjoined Campania, Samnium and Apulia, and to the south it was separated by a narrow isthmus from the district of Bruttii. It thus comprised almost all the modern province of the Basilicata, with the greater part of the pro- vince of Salerno and a portion of that of Cosenza. The precise limits were the river Silarus on the north-west, which separated it from Campania, and the Bradanus, which flows into the Gulf of Tarenturn, on the north-east; while the two little rivers Laus and Crathis, flowing from the ridge of the Apennines to the sea on the west and east, marked the limits of the district on the side of the Bruttii.

Almost the whole is occupied by the Apennines, here an irregular

group of lofty masses. The main ridge approaches the western sea, and is continued from the lofty knot of mountains on the frontiers of Samnium, nearly due south to within a few miles of the Gulf of Policastro, and thenceforward is separated from the sea by only a narrow interval till it enters the district of the Bruttii. Just within the frontier of Lucania rises Monte Pollino, 7325 ft., the highest peak in the southern Apennines. The mountains descend by a much more gradual slope to the coastal plain of the Gulf of Tarenturn. Thus the rivers which flow to the Tyrrhenian Sea are of little importance compared with those that descend towards the Gulf of Tarenturn. Of these the most important are — the Bradanus (Bradano), the Casuentus (Basiento), the Aciris (Agri), and the Siris (Sinno). The Crathis, which forms at its mouth the southern limit of the province, belongs almost wholly to the territory of the Bruttii, but it receives a tributary, the Sybaris (Coscile), from the mountains of Lucania. The only considerable stream on the western side is the Silarus (Sele), which constitutes the northern boundary, and has two important tributaries in the Calor (Calore) and the Tanager (Negro) which joins it from the south.

The district of Lucania was so called from the people bearing the name Lucani (Lucanians) by whom it was conquered about the middle of the 5th century B.C. Before that period it was included under the general name of Oenotria, which was applied

by the Greeks to the southernmost portion of Italy. The mountainous interior was occupied by the tribes known as Oenotrians and Chones, while the coasts on both sides were occupied by powerful Greek colonies which doubtless exercised a protectorate over the interior (see Magna Graecia). The Lucanians were a southern branch of the Samnite or Sabelline race, who spoke the Osca Lingua (q.v.). We know from Strabo that they had a democratic constitution save in time of war, when a dictator was chosen from among the regular magistrates. A few Oscan inscriptions survive, mostly in Greek characters, from the 4th or 3rd century B.C., and some coins with Oscan legends of the 3rd century (see Conway, Italic Dialects, p. 1 1 sqq. ; Mommsen, C.I.L. x. p. 21; Roehl, Inscripliones Graecae Anti- quissimae, 547). The Lucanians gradually conquered the whole country (with the exception of the Greek towns on the coast) from the borders of Samnium and Campania to the southern extremity of Italy. Subsequently the inhabitants of the peninsula, now known as Calabria, broke into insurrection, and under the name of Bruttians established their independence, after which the Lucanians became confined within the limits already described. After this we find them engaged in hostilities with the Tarentines, and with Alexander, king of Epirus, who was

called in by that people to their assistance, 326 b.c. In 298 B.C. (Livy x. 11 seq.) they made alliance with Rome, and Roman influence was extended by the colonies of Venusia (291 B.C.), Paestum (273), and above all Tarenturn (272). Subsequently they were sometimes in alliance, but more frequently engaged in hostilities, during the Samnite wars. On the landing of Pyrrhus in Italy (281 B.C.) they were among the first to declare in his favour, and found themselves exposed to the resentment of Rome when the departure of Pyrrhus left his allies at the mercy of the Romans. After several campaigns they were reduced to subjection (272. B.C.). Notwithstanding this they espoused the cause of Hannibal during the Second Punic War (216 B.C.), and their territory during several campaigns was ravaged by both armies. “The country never recovered from these disasters, and under the Roman government fell into decay, to which the Social War, in which the Lucanians took part with the Samnites against Rome (90-88 B.C.) gave the finishing stroke. In the time of Strabo the Greek cities on the coast had fallen into insignificance, and owing to the decrease of population and cultivation the malaria began to obtain the upper hand. The few towns of the interior were of no importance. A large part of the province was given up to pasture, and the mountains were covered with forests, which abounded in wild boars, bears and wolves. There were some fifteen independent communities, but none of great importance.

For administrative purposes under the Roman empire, Lucania was always united with the district of the Bruttii. The two together constituted the third region of Augustus.

The towns on the east coast were — Metapontum, afew miles south of the Bradanus; Heraclea, at the mouth of the Aciris; and Siris, on the river of the same name. Close to its southern frontier stood Sybaris, which was destroyed in 510 B.C., but subsequently replaced by Thurii. On the west coast stood Posidonia, known under the Roman government as Paestum; below that came Elea or Velia, Pyxus, called by the Romans Buxentum, and Laus, near the frontier of the province towards Bruttium. Of the towns of the interior the most considerable was Potentia, still called Potenza. To the north, near the frontier of Apulia, was Bantia (Aceruntia belonged more properly to Apulia) ; while due south from Potentia was Grumentum, and still farther in that direction were Nerulum and Muranum. In the upland valley of the Tanagrus wereAtina, Forum Popilii and Consilinum; Eburi (Eboli) and Volceii (Buccino), though to the north of the Silarus, were also included in Lucania. The Via Popillia traversed the district from N. to S., entering it at the N.W. extremity; the Via Herculia, coming southwards from the Via Appia and passing through Potentia and

Grumentum, joined the Via Popillia near the S.W. edge of the district: while another nameless road followed the east coast and other roads of less import- ance ran W. from Potentia to the Via Popillia, N.E. to the Via Appia and E. from Grumentum to the coast at Heraclea. (T. As.)

LUCARIS, CYRILLOS (1572-1637), Greek prelate and theo- logian, was a native of Crete. In youth he travelled, studying at Venice and Padua, and at Geneva coming under the influence I of the reformed faith as represented by Calvin. In 1602 he was

elected patriarch of Alexandria, and in 1621 patriarch of Con- stantinople. He was the first great name in the Orthodox Eastern Church since 1453, and dominates its history in the 17th century. The great aim of his life was to reform the church on Calvinistic lines, and to this end he sent many young Greek theologians to the universities of Switzerland, Holland and England. In 1629 he published his famous Confessio, ‘Calvinistic in doctrine, but as far as possible accommodated to the language and creeds of the Orthodox Church. It appeared the same year in two Latin editions, four French, one German and one English, and in the Eastern Church started a controversy which culminated in 1691 in the convocation by Dositheos, patriarch of Jerusalem, of a synod by which the Calvinistic doctrines were condemned. Lucaris was several times temporarily deposed and banished at the instigation of his orthodox opponents and of the Jesuits, who were his bitterest enemies. Finally, when Sultan Murad was about to set out for the Persian War, the patriarch was accused of a design to stir up the Cossacks, and to avoid trouble during his absence the sultan had him killed by the Janissaries (June 1637). His body was thrown into the sea, recovered and buried at a distance from the capital by his friends, and only brought back to Constantinople after many years.

The orthodoxy of Lucaris himself continued to be a matter of debate in the Eastern Church, even Dositheos, in view of the reputation of the great patriarch, thinking it expedient to gloss over his heterodoxy in the interests of the Church.

See the article ” Lukaris ” by Ph. Meyer in Herzog-Hauck, Realencyklop. (3rded., Leipzig, 1902), which gives further authorities.

LUCARNE, a French architectural term for a garret window, also for the lights or small windows in spires.

LUCAS, SIR CHARLES (d. 1648), English soldier, was the son of Sir Thomas Lucas of Colchester, Essex. As a young man he saw service in the Netherlands under the command of his brother, and in the " Bishops' War " he commanded a troop of horse in King Charles I.'s army. In 1639 he was made a knight. At the outbreak of the Civil War Lucas naturally took the king's side, and at the first cavalry fight, Powick Bridge, he was wounded. Early in 1643 he raised a regiment of horse, with which he defeated Middleton at Padbury on July 1st. In January 1644 he commanded the forces attacking Nottingham, and soon afterwards, on Prince Rupert's recommendation, he was made lieutenant-general of Newcastle's Northern army. When New- castle was shut up in York, Lucas and the cavalry remained in the open country, and when Rupert's relieving army crossed the mountains into Yorkshire he was quickly joined by New- castle's squadrons. At Marston Moor Lucas swept Fairfax's Yorkshire horse before him, but later in the day he was taken prisoner. Exchanged during the winter, he defended Berkeley Castle for a short time against Rainsborough, but was soon in the field again. As lieutenant-general of all the horse he accompanied Lord Astley in the last campaign of the first war, and, taken prisoner at Stow-on-the-Wold, he engaged not to bear arms against parliament in the future. This parole he must be held to have broken when he took a prominent part in the seizure of Colchester in 1648. That place was soon invested, and finally fell, after a desperate resistance, to Fairfax's army. The superior officers had to surrender " at mercy," and Lucas and Sir George Lisle were immediately tried by court martial and sentenced to death. The two Royalists were shot the same evening in the Castle of Colchester.

See Lloyd, Memoirs of Excellent Personages (1669) ; and Earl de Grey, A Memoir of the Life of Sir Charles Lucas (1845).

LUCAS, CHARLES (1713-1771), Irish physician and politician, was the son of a country gentleman of small means in Co. Clare. Charles opened a small business as an apothecary in Dublin, and between 1735 and 1741 he began his career as a pamphleteer by publishing papers on professional matters which led to legislation requiring inspection of drugs. Having been elected a member of the common council of Dublin in 1741 he detected and exposed encroachments by the aldermen on the electoral rights of the citizens, and entered upon a controversy on the subject, but failed in legal proceedings against the alder-

men in 1744. With a view to becoming a parliamentary candi- date for the city of Dublin he issued in 1 748-1 749 a series of political addresses in which he advocated the principles of Molyneux and Swift; and he made himself so obnoxious to the government that the House of Commons voted him an enemy to the country, and issued a proclamation for his arrest, thus compelling him to retire for some years to the continent. Having studied medicine at Paris, Lucas took the degree of M.D. at Leiden in 1752. In the following year he started practice as a physician in London, and in 1756 he published a work on medicinal waters, the properties of which he had studied on the continent and at Bath. The essay was reviewed by Dr Johnson, and although it was resented by the medical profession it gained a reputation and a considerable practice for its author. In 1760 he renewed his political pamphleteering; and having obtained a pardon from George III., he proceeded to Dublin, where he received a popular welcome and a Doctor's degree from Trinity College. He was elected member for the city of Dublin in 1761, his colleague in the representation being the recorder, Henry Grattan's father. On the appointment of Lord Halifax as lord lieutenant in the same year Lucas wrote him a long letter (19th of Sept. 1761, MSS. Irish State Paper Office) setting forth the grievances which Ireland had suffered in the past, chiefly on account of the exorbitant pensions enjoyed by government officials. The cause of these evils he declared to be the un- representative character of the Irish constitution; and among the remedies he proposed was the shortening of parliaments. Lucas brought in a bill in his first session to effect this reform, but was defeated on the motion to have the bill sent to England for approval by the privy council; and he insisted upon the independent rights of the Irish parliament, which were after- wards in fuller measure successfully vindicated by Grattan. He also defended the privileges of the Irish Protestants in the press, and especially in the Freeman's Journal, founded in 1763. His contributions to the press, and his Addresses to the Lord Mayor and other political pamphlets made him one of the most popular writers in Ireland of his time, although he was anti- catholic in his prejudices, and although, as Lecky observes, " there is nothing in his remains to show that he possessed any real superiority either of intellect or knowledge, or even any remarkable brilliancy of expression." He died on the 4th of November 1 7 7 1 , and was accorded a public funeral. As an orator Charles Lucas appears to have had little power, and he made no mark in the House of Commons.

See R. R. Madden, Hist, of Irish Periodical Literature from the End of the ifth to the Middle of the 19th Century (2 vols., London, 1867);

Francis Hardy, Memoirs of the Earl of Charlemont (2 vols., London, 1812) ; W. E. H. Lecky, History of Ireland in the Eighteenth Century, vols. i. and ii. (5 vols., London, 1892).

LUCAS, JOHN SEYMOUR (1849-), English painter, was born in London, and was a student in the Royal Academy Schools. He was elected an associate of the academy in 1886 and academician in 1898, and became a constant exhibitor of pictures of historical and domestic incidents, notably of the Tudor and Stuart periods, painted with much skill and with close attention to detail. One of his most important works is a panel in the Royal Exchange, presented by the corporation of London, representing William the Conqueror granting the first charter to the city; and one of his earlier pictures, ” After Culloden: Rebel Hunting,” is in the National Gallery of British Art.

LUCAS VAN LEYDEN (c. 1494-1533), Dutch painter, was born at Leiden, where his father Huig Jacobsz gave him the first lessons in art. He then entered the painting-room of Cornelis Engelbrechtszen of Leiden, and soon became known for his capacity in making designs for glass, engraving copper-plates, painting pictures, portraits and landscapes in oil and distemper. According to van Mander he was born in 1494, and painted at the age of twelve a ” Legend of St Hubert ” for which he was paid a dozen florins. He was only fourteen when he finished a plate representing Mahomet taking the life of Sergius, the monk, and at fifteen he produced a series of nine plates for a “Passion,” a “Temptation of St Anthony,” and a “Conversion

of St Paul.” The list of his engravings in 1510, when, according to van Mander, he was only sixteen, includes subjects as various as a celebrated ” Ecce Homo,” ” Adam and Eve expelled from Paradise,” a herdsman and a milkmaid with three cows, and a little naked girl running away from a barking dog. Whatever may be thought of the tradition embodied in van Mander’s pages as to the true age of Lucas van Leyden, there is no doubt that, as early as 1508, he was a master of repute as a copper- plate engraver. It was the time when art found patrons among the public that could ill afford to buy pictures, yet had enough interest in culture to satisfy itself by means of prints. Lucas van Leyden became the representative man for the public of Holland as Diirer for that of Germany; and a rivalry grew up between the two engravers, which came to be so close that on the neutral market of Italy the products of each were all but evenly quoted. Vasari affirmed

that Diirer surpassed Lucas as a designer, but that in the use of the graver they were both unsurpassed, a judgment which has not been reversed. But the rivalry was friendly. About the time when Diirer visited the Netherlands Lucas went to Antwerp, which then flourished as an international mart for productions of the pencil and the graver, and it is thought that he was the master who took the freedom of the Antwerp gild in 1521 under the name of Lucas the Hollander. In Diirer's diary kept during his travels in the Low Countries, we find that at Antwerp he met Lucas, who asked him to dinner, and that Diirer accepted. He valued the art of Lucas at its true figure, and exchanged the Dutchman's prints for eight florins' worth of his own. In 1527 Lucas made a tour of the Netherlands, giving dinners to the painters of the gilds of Middleburg, Ghent, Malines and Antwerp. He was accompanied during the trip by Mabuse, whom he imitated in his style as well as in his love of rich costume. On his return home he fell sick and remained ailing till his death in 1533, and he believed that poison had been administered to him by some envious comrade.

A few days before his death Lucas van Leyden was informed of the birth of a grandson, first-born of his Only daughter Gretchen. Gretchen's fourth son Jean de Hoey followed' the profession of his grandfather, and became well known at the Parisian court as painter and chamberlain to the king of France, Henry IV.

As an engraver Lucas van Leyden deserves his reputation. He has not the genius, nor had he the artistic tact, of Diirer; and he displays more cleverness of expression than skill in distribution or in refinement in details. But his power in handling the graver is great, and some

f his portraits, especially his own, are equal to anything by the master of Nuremberg. Much that he accomplished as a painter has been lost, because he worked a good deal upon cloth in distemper. In 1522 he painted the " Virgin and Child with the Magdalen and a Kneeling Donor," now in the gallery of Munich. His manner was then akin to that of Mabuse. The " Last Judgment " in the town- gallery of Leiden is composed on the traditional lines of Cristus and Memling, with monsters in the style of Jerom Bosch and figures in the stilted attitudes of the South German school ; the scale ofcolours in yellow, white and grey is at once pale and gaudy, the quaintest contrasts are produced by the juxtaposition of alabaster flesh in females and bronzed skin in males, or black hair by the side of yellow, or rose-coloured drapery set sharply against apple-green or black; yet some of the heads are painted with great delicacy and modelled with exquisite feeling. Dr Waagen gave a favourable opinion of a triptych now at the Hermitage at St Petersburg, exe- cuted, according to van Mander, in

1531, representing the ” Blind Man of Jericho healed by Jesus Christ.” Here too the German critic observed the union of faulty composition with great finish and warm flesh-tints with a gaudy scale of colours. The same defects and qualities will be found in such specimens as are preserved in public collections, among which may be mentioned the ” Card Party ” at Wilton House, the ” Penitent St Jerome ” in the gallery of Berlin, and the hermits ” Paul ” and ” Anthony ” in the Liechtenstein collection at Vienna. There is a characteristic ” Adoration of the Magi ” at Buckingham Palace.

LUCCA (anc. Luca), a town and archiepiscopal see of Tuscany, Italy, capital of the province of Lucca, 13 m. by rail N.E. of Pisa. Pop. (1001) 43,566 (town); 73,465 (commune). It is situated 62 ft. above the level of the sea, in the valley of the

Serchio, and looks out for the most part on a horizon of hills and mountains. The fortifications, pierced by four gates, were begun in 1504 and completed in 1645, and long ranked among

the most remarkable in the peninsula. They are still well- preserved and picturesque, with projecting bastions planted with trees.

The city has a well-built and substantial appearance, its chief attraction lying in the numerous churches, which belong in the main to a well-marked basilican type, and present almost too richly decorated exteriors, fine apsidal ends and quadrangular campaniles, in some cases with battlemented summits, and windows increasing in number as they ascend. In style they are an imitation of the Pisan. It is remarkable that in the arcades a pillar generally occupies the middle of the facade. The cathe- dral of St Martin was begun in 1063 by Bishop Anselm (later Pope Alexander II.); but the great apse with its tall columnar arcades and the fine campanile are probably the only remnants of the early edifice, the nave and transepts having been rebuilt in the Gothic style in the 14th century, while the west front was begun in 1204 by Guidetto (lately identified with Guido Bigarelli of Como), and ” consists of a vast portico of three magnificent arches, and above them three ranges of open galleries covered with all the devices of an exuberant fancy.” The ground plan is a Latin cross, the nave being 273 ft. in length and 84 ft. in width, and the transepts 144 ft. in length. In the nave is a little octagonal temple or chapel, which serves as a shrine for the most precious of the relics of Lucca, a cedar-wood crucifix, carved, according to the legend, by Nicodemus, and miraculously con- veyed to Lucca in 782. The Sacred Countenance (Volto Santo), as it is generally called, because the face of the Saviour is con- sidered a true likeness, is only shown thrice a year. The chapel

was built in 1484 by Matteo Civitali, a local sculptor of the early Renaissance (1436-1501); he was the only master of Tuscany outside Florence who worked thoroughly in the Florentine style, and his creations are among the most charming works of the Renaissance. The cathedral contains several other works by him — the tomb of P. da Noceto, the altar of S. Regulus and the tomb of Ilaria del Carretto by Jacopo della Quercia of Siena (described by Ruskin in Modern Painters, ii.), the earliest of his extant works (1406), and one of the earliest decorative works of the Renaissance. In one of the chapels is a fine Madonna by Fra Bartolommeo; in the municipal picture gallery are a fine ” God the Father ” and another Madonna by him; also some sculptures by Civitali, and some good wood carving, including choir stalls. In the cathedral choir is good stained glass of 1485. The church of St Michael, founded in the 8th century, and built of marble within and without, has a lofty and magnificent western facade (n 88) — an architectural screen rising much above the roof of the church. The interior is good but rather bare. The church of St Martino at Arliano near Lucca belongs to the first half of the 8th century; it is of basilican plan (see G. T. Rivoira, Origini dell’ Architettura Lombarda, iii. [Rome, 1901] 138). St Frediano or Frigidian dates originally from the 7th century, but was built in the Romanesque style in 111:2-1147, though the interior, originally with four aisles and nave, shows traces of the earliest structure; the front occupies the site of the ancient apse; in one of its chapels is the tomb of Santa Zita, patroness of servants and of Lucca itself. In S. Francesco, a fine Gothic church, is the tomb of Castruccio Castracane. San Giovanni (originally of the 12th century), S. Cristoforo, San Romano (rebuilt in the 17th century, by Vincenzo Buonamici), and Santa Maria Fori- sportam (of the 1 2th century) also deserve mention.

Among the secular buildings are the old ducal palace, begun in 1578 by Ammanati, and now the residence of the prefect and seat of the provincial officers and the public picture gallery; the early Renaissance Palazzo Pretorio, or former residence of the podesta, now the seat of the civil and correctional courts; the palace, erected in the 15th century by a member of the Guinigi family, of brick, in the Italian Gothic style, and now serving as a poor-house; the 16th-century palace of the marquis Guidiccioni, now used as a depository for the archives, the earliest documents going back to a.d. 790. The Palazzo Mansi contains a collection of Dutch pictures. There are several other fine late 16th-century palaces. The principal market-place in the city {Piazza del Mercato) has taken possession of the arena of the

ancient amphitheatre, the outer arches of which can still be seen in the surrounding buildings. The whole building, belonging probably to the early Empire, measured 135 by 105 yds., and the arena 87J by 58 yds. The outline of the ancient theatre can be traced in the Piazza delle Grazie, and some of its substructure walls are preserved. The ancient forum was on the site of the Piazza S. Michele in the centre of the town; remains of a small public building or shrine were found not far off in 1906 (L. Pernier in Notizie degli Scavi, 1906, p. 117). The rectangular disposition of the streets in the centre of the town is a survival of Roman times. Besides the academy of sciences, which dates from 1584, there are several institutions of the same kind — a royal philo- mathic academy, a royal academy of arts and a public library of 50,000 volumes. The archiepiscopal library and archives are also important, while the treasury contains some fine goldsmith's work, including the 14th-century Croce dei Pisani, made by the Pisans for the cathedral.

The river Serchio affords water-power for numerous factories. The most important industries are the manufacture of jute goods (carried on at Ponte a Moriano in the Serchio valley, 6 m. N. of Lucca), tobacco, silks and cottons. The silk manufacture, intro- duced at Lucca about the close of the nth century, and in the early part of the 16th the means of subsistence for 30,000 of its inhabitants, now gives employment (in reeling and throwing) to only about 1500. The bulk of the population is engaged in agriculture. The water supply is maintained by an aqueduct built in 1 823-1 83 2 with 459 arches, from the Pisan mountains.

The ancient Luca, commanding the valley of the Serchio, is first mentioned as the place to which Sempronius retired in 218 B.C. before Hannibal; but there is some doubt as to the correctness of Livy's statement, for, though there were continual wars with the Ligurians, after this time, it is not mentioned again until we are told that in 177 B.C. a Latin colony was founded there in territory offered by the Pisans for the purpose. 1 It must have become a municipium by the lex Julia of 90 B.C., and it was here that Julius Caesar in 56 b.c. held his famous conference with Pompey and Crassus, Luca then being still in Liguria, not in Etruria. A little later a colony was conducted hither by the triumvirs or by Octavian; whether after Philippi or after Actium is uncertain. In the Augustan division of Italy Luca was as- signed to the 7th region (Etruria); it is little mentioned in the imperial period except as a meeting-point of roads — to Florentia (see Clodia, Via), Luna and Pisae. The road to Parma given in the itineraries,

according to some authorities, led by Luna and the Cisa pass (the route taken by the modern railway from Sarzana to Parma), according to others up the Serchio valley and over the Sassalbo pass (0. Cuntz in Jahreshefte des oesterr. arch. Instituts, 1904, 53). Though plundered and deprived of part of its territory by Odoacer, Luca appears as an important city and fortress at the time of Narses, who besieged it for three months in a.d. 553, and under the Lombards it was the residence of a duke or marquis and had the privilege of a mint. The dukes gradually extended their power over all Tuscany, but after the death of the famous Matilda the city began to constitute itself an independent community, and in 1160 it obtained from Welf VI., duke of Bavaria and marquis of Tuscany, the lordship of all the country for 5 m. round, on payment of an annual tribute. In- ternal discord afforded an opportunity to Uguccione della Fag- giuola, with whom Dante spent some time there, to make himself master of Lucca in 13 14, but the Lucchesi expelled him two years afterwards, and handed over their city to Castruccio Castracane, under whose masterly tyranny it became "for a moment the leading state of Italy," until his death in 1328 (his tomb is in S. Francesco). Occupied by the troops of Louis of Bavaria, sold to a rich Genoese Gherardino Spinola, seized by John, king of Bohemia, pawned to the Rossi of Parma, by them ceded to Martino della Scala of Verona, sold to the Florentines, surrendered to the Pisans, nominally liberated by the emperor Charles IV. and governed by bis vicar, Lucca managed, at first as a demo-

1 Some confusion has arisen owing to the similarity of the names Luca and Luna; the theory of E. Bormann in Corp. Inscrip. Latin. (Berlin, 1888), xi. 295 is here followed.

cracy, and after 1628 as an oligarchy, to maintain " its independ ■ ence alongside of Venice and Genoa, and painted the word Libertas on its banner till the French Revolution." In the begin- ning of the 1 6th century one of its leading citizens, Francesco Burlamacchi, made a noble attempt to give political cohesion to Italy, but perished on the scaffold (1548); his statue by Ulisse Cambi was erected on the Piazza San Michele in 1863.* As a principality formed in 1805 by Napoleon in favour of his sister Elisa and her husband Bacchiocchi, Lucca was for a few years wonderfully prosperous. It was occupied by the Neapolitans in 1814; from 1816 to 1847 it was governed as a duchy by Maria Luisa, queen of Etruria, and her son Charles Louis; and it after- wards formed one of the divisions of Tuscany.

The bishops of Lucca, who can be traced back to 347, received exceptional marks of distinction, such as the pallium in n 20, and the archiepiscopal cross from Alexander II. In 1726 Benedict XIII. raised

their see to the rank of an archbishopric, without suffragans.

See A. Mazzarosa, Sloria di Lucca (Lucca, 1833);. E. Ridolfi, L ‘Arte in Lucca studiata nella sua Cattedrale (1882) ; Guidi di Lucca; La Basilica di S. Michele in Foro in Lucca. 1 (T. As.)

LUCCA, BAGNI DI (Baths of Lucca, formerly Bagno a Cor send), a commune of Tuscany, Italy, in the province of Lucca, containing a number of famous watering-places. Pop. (1901) 13,685. The springs are situated in the valley of the Lima, a tributary of the Serchio; and the district is known in the early history of Lucca as the Vicaria di Val di Lima. Ponte Serraglio (16 m. N. of Lucca by rail) is the principal village (pop. 1312), but there are warm springs and baths also at Villa, Docce Bassi, Bagno Caldo, &c. The springs do not seem to have been known to the Romans. Bagno a Corsena is first mentioned in 1284 by Guidone de Corvaia, a Pisan historian (Muratori, R.I.S. vol. xxii.). Fallopius, who gave them credit for the cure of his own deafness, sounded their praises in 1569; and they have been more or less in fashion since. The temperature of the water varies from 98° to 130° Fahr.; in all cases it gives off carbonic acid gas and contains lime, magnesium and sodium products. In the village of Bagno Caldo there is a hospital constructed largely at the expense of Nicholas Demidoff in 1826. In the valley of the Serchio, 3 m. below Ponte a Serraglio, is the medieval Ponte del Diavolo (1322) with its lofty central arch.

LUCCEIUS, LUCIUS, Roman orator and historian, friend and correspondent of Cicero. A man of considerable wealth and literary tastes, he may be compared with Atticus. Disgusted at his failure to become consul in 60, he retired from public life, and devoted himself to writing a history of the Social and Civil Wars. This was nearly completed, when Cicero earnestly requested him to write a separate history of his (Cicero’s) consul- ship. Cicero had already sung his own praises in both Greek and Latin, but thought that a panegyric by Lucceius, who had taken considerable interest in the affairs of that critical period, would have greater weight. Cicero offered to supply the material, and hinted that Lucceius need not sacrifice laudation to accuracy. Lucceius almost promised, but did not perform. Nothing remains of any such work or of his history. In the civil war he took the side of Pompey; but, having been pardoned by Caesar, returned to Rome, where he lived in retirement until his death.

Cicero’s Letters (ed. Tyrrell and Purser), especially Ad Fatn. v. 12; and Orelli, Onomaslicon Tullianum.

LUCCHESINI, GIROLAMO (1751-1825), Prussian diplomatist, was

born at Lucca on the 7th of May 1751, the eldest son of Marquis Lucchesini. In 1779 he went to Berlin where Frederick the Great gave him a court appointment, making use of him in his literary relations with Italy. Frederick William II., who recognized his gifts for diplomacy, sent him in 1787 to Rome to obtain the papal sanction for the appointment of a coadjutor to the bishop of Mainz, with a view to strengthening the German Fiirstenbund. In 1788 he was sent to Warsaw, and brought about a rapprochement with Prussia and a diminution of Russian influence at Warsaw. He was accredited ambassador to the king and republic of Poland on the 12th of April 1789.

Frederick William was at that time intriguing with Turkey, then at war with Austria and Russia. Lucchesini was to rouse Polish feeling against Russia, and to secure for Prussia the concourse of Poland in the event of war with Austria and Russia. All his power of intrigue was needed in the conduct of these hazardous negotiations, rendered more difficult by the fact that Prussian policy excluded the existence of a strong Polish govern- ment. A Prusso-Polish alliance was concluded in March 1790. Lucchesini had been sent in January of that year to secure the alliance of Saxony against Austria, and in September he was sent to Sistova, where representatives of the chief European powers were engaged in settling the terms of peace between Austria and Turkey, which were finally agreed upon on the 4th of August 1 791. Before he returned to Warsaw the Polish treaty of which he had been the chief author had become a dead letter owing to the engagements made between Prussia and Austria at Reichenbach in July 1790, and Prussia was already contemplating the second partition of Poland. He was recalled at the end of 1791, and in July 1792 he joined Frederick William in the invasion of France. He was to be Prussian ambassador in Paris when the allied forces should have reinstated the authority of Louis XVI. He was opposed alike to the invasion of France and the Austrian alliance, but his prepossessions did not interfere with his skilful conduct of the negotiations with Kellermann after the allies had been forced to retire by Dumouriez's guns at Valmy, nor with his success in securing the landgrave of Hesse-Darmstadt's assistance against France. In 1793 he was appointed ambassador to Vienna, with the ostensible object of securing financial assistance for the Rhenish campaign. He accompanied Frederick William through the Polish campaign of 1793-94, and in the autumn returned to Vienna. His anti-Austrian bias

made him extremely unpopular with the Austrian court, which asked in vain for his recall in 1795. In 1797, after a visit to Italy in which he had an interview with Napoleon at Bologna, these demands were renewed and acceded to. In 1800 he was sent by Frederick William III. on a special mission to Paris. Despatches in which he expressed his distrust of Bonaparte's peaceful professions and his conviction of the danger of the continuance of a neutral policy were inter- cepted by the first consul, who sought his recall, but eventually accepted him as regular ambassador (1802). He consistently sought friendly relations between France and Prussia, but he warned his government in 1806 of Napoleon's intention of restoring Hanover to George III. and of Murat's aggressions in Westphalia. He was superseded as ambassador in Paris in September just before the outbreak of war. After the disaster of Jena on the 14th of October he had an interview with Duroc near Wittenberg to seek terms of peace. After two unsuccessful attempts at negotiation, the first draft being refused by Napoleon, the second by Frederick William, he joined the Prussian court at Konigsberg only to learn that his services were no longer required. He then joined the court of Elisa, grand duchess of Tuscany, at Lucca and Florence, and after Napoleon's fall devoted himself to writing. He died on the 20th of October

1825.

He published in 1819 three volumes, Sulle cause et gli effetti delta confederazione rhenana, at Florence, but revealed little that was not already available in printed sources. His memoirs remained in MS. His despatches are edited by Bailleu in Preussen und Frankreich (Leipzig, 1887, Publikationen aus den preussischen Staatsarchiven) .

LUCENA, a town of southern Spain, in the province of Cordova, 37 m. S.S.E. of Cordova, on the Madrid-Algeciras railway. Pop. (1900) 21,179. Lucena is situated on the Cascajar, a minor tributary of the Genii. The parish church dates from the beginning of the 16th century. The chief industries are the manufacture of matches, brandy, bronze lamps and pottery, especially the large earthenware jars (linajas) used throughout Spain for the storage of oil and wine, some of which hold more than 300 gallons. There is considerable trade in agricultural produce, and the horse fair is famous throughout Andalusia. Lucena was taken from the Moors early in the 14th century; it was in the attempt to recapture it that King Boabdil of Granada was taken prisoner in 1483.

LUCERA, a town and episcopal see of Apulia, Italy, 12I m. W.N.W. by rail of Foggia. Pop. (1901) 16,962. It is situated upon a lofty plateau,

the highest point of which (823 ft.), pro- jecting to the W., was the ancient citadel, and is occupied by the well-preserved castle erected by Frederick II., and rebuilt by Pierre d'Angicourt about 1280. The cathedral, originally Romanesque, but restored after 1300 is in the Gothic style; the fafade is good, and so is the ciborium. The interior was restored in 1882. The town occupies the site of the ancient Luceria, the key of the whole country. According to tradition the temple of Minerva, founded by Diomede, contained the Trojan Palladium, and the town struck numerous bronze coins; but in history it is first heard of as on the Roman side in the Samnite Wars (321 B.C.), and in 315 or 314 B.C. a Latin colony was sent here. It is mentioned in subsequent military history, and its position oh the road from Beneventum, via Aecae (mod. Troja) to Sipontum, gave it some importance. Its wool was also renowned. It now contains no ancient remains above ground, though several mosaic pavements have been found and there are traces of the foundations of an amphitheatre outside the town on the E. The town-hall contains a statue of Venus, a mosaic and some inscriptions (but cf. Th. Mommsen's remarks on the local neglect of antiquities in Corp. Inscr. Lat. ix. 75). In 663 it was destroyed by Constans II., and was only restored in 1223 by Frederick II., who transported 20,000 Saracens hither from Sicily. They were at first allowed religious freedom, but became Christians under compulsion in 1300. Up to 1806 Lucera was the capital of the provinces of Basilicata and Molise. (T. As.)

LUCERNE (Ger. Luzern; Ital. Lucerna), one of the cantons of central Switzerland. Its total area is 579-3 sq. m., of which 530-2 sq. m. are classed as "productive" (forests covering 120-4 sq. m., and vineyards 04 sq. m.). It contains no glaciers or eternal snows, its highest points being the Brienzer Rothhorn (7714 ft.) and Pilatus (6995 ft.), while the Rothstock summit (5453 ft) and the Kaltbad inn, both on the Rigi, are included in the canton, the loftiest point of the Rigi range (the Kulm) being entirely in Schwyz. The shape of the canton is an irregular quadrilateral, due to the gradual acquisition of rural districts by the town', which is its historical centre. The northern portion, about 15J sq. m., of the Lake of Lucerne is in the canton. Its chief river is the Reuss, which flows through it for a short distance only receiving the Kleine Emme that flows down through the Entlebuch. In the northern part the Wigger, the Suhr and the Wynen streams flow through shallow valleys, separated by low hills. The canton is fairly well supplied with railways. The lakes of Sempach and Baldegg are wholly within the canton, which also takes in small portions of those of Hallwil and of Zug.

In 1900 the population numbered 146,519, of which 143,337 were

German-speaking, 2204 Italian-speaking and 747 French- speaking, while 134,020 were Romanists, 12,085 Protestants and 319 Jews. Its capital is Lucerne (q.v.); the other towns are Kriens (pop. 5951), Willisau (4131), Ruswil (3928), Littau (3699), Emmen (3162) and Escholzmatt (3127). The peasants are a fine race, and outside the chief centres for foreign visitors have retained much of their primitive simplicity of manners and many local costumes. In the Entlebuch particularly the men are of a robust type, and are much devoted to wrestling and other athletic exercises. That district is mainly pastoral and is famous for its butter and cheese. Elsewhere in the canton the pastoral industry (including swine-breeding) is more extended than agriculture, while chiefly in and around Lucerne there are a number of industrial establishments. The Industrie des etrangers is greatly developed in places frequented by foreign visitors. The population as a whole is Conservative in politics an

The canton ranks officially third in the Swiss confederation next after Zurich and Bern. It was formerly in the diocese ot Constance, and is now in that of Basel. It contains 5 adminis- trative districts and 107 communes. The existing cantonal

constitution dates in its main features from 1875. The legislature or Grossrath consists of members elected in 55 electoral circles, in the proportion of 1 to every 1000 souls (or fraction over 500) of the Swiss population, and lasts for 4 years. On the 4th of April 1909 proportional representation was adopted for elections of members of the Grossrath. Since 1905 the executive of 7 members is elected by a popular vote for 4 years, as are the 2 members of the federal Stdnderath and the 7 members of the federal Nationalrath. Five thousand citizens can demand a facultative referendum as to all legislative projects and important financial decrees, or as to the revision of the cantonal constitution, while the same number can also revoke the mandate of the cantonal legislature before its proper term of office has ended, though this revocation does not affect the executive. Four thousand citizens have the right of ” initiative ” as to constitu- tional amendments or legislative projects.

The canton is composed of the various districts which the town acquired, the dates being those at which the particular region was finally secured — Weggis (1380), Rothenburg, Kriens, Horw, Sempach and Hochdorf (all in 1394) , Wolhusen and the Entlebuch (1405), the

so-called ” Habsburger region ” to the N.E. of the town of Lucerne (1406), Willisau (1407), Sursee and Beromiinster (1415), Makers (1477) and Littau (1481), while in 1803, in exchange for Hitzkirch, Merenschwand (held since 1397) was given up. (W. A. B. C.)

LUCERNE, the capital of the Swiss canton of the same name. It is one of the principal tourist centres of Switzerland, being situated on the St Gotthard railway line, by which it is 59 m. from Basel and 180 m. from Milan. Its prosperity has always been bound up with the St Gotthard Pass, so that the successive improvements effected on that route (mule path in the 13th century, carriage road 1820-1830, and railway tunnel in 1882) have had much effect on its growth. It is beautifully situated on the banks of the river Reuss, just as it issues from the Lake of Lucerne, while to the south-west rises the rugged range of Pilatus, balanced on the east by the more smiling ridge of the Rigi and the calm waters of the lake. The town itself is very picturesque. On the rising ground to its north still stand nine of the towers that defended the old town wall on the Musegg slope. The Reuss is still crossed by two quaint old wooden bridges, the upper being the Kapellbriicke (adorned by many paintings illustrating the history of Switzerland and the town and clinging to the massive Wasserthurm) and the lower the Muhlenbrucke (also with paintings, this time of the Dance of Death). The old Hofbrucke (on the site of the Schweizerhof quay) was removed in 1852, when the process of embanking the shore of the lake began, the result being a splendid series of quays, along which rise palatial hotels. The principal building is the twin-towered Hofkirche (dedicated to St Leger or Leodegar) which, though in its present form it dates only from 1633-1635, was the centre round which the town gradually gathered; originally it formed part of a Benedictine monastery, but since 1455 has been held by a college of secular canons. It has a fine 17th-century organ. The 16th-century town-hall (Rathhaus) now houses the cantonal museum of antiquities of all dates. Both the cantonal and the town libraries are rich in old books, the latter being now specially devoted to works (MS. or printed) relating to Swiss history before 1848. The Lion monument, designed by Thorwaldsen, dedicated in 182 1, and consisting of a dying lion hewn out of the living sandstone, commemorates the officers and men of the Swiss Guard (26 officers and about 760 men) who were slain while defending the Tuileries in Paris in 1792, and is reflected in a clear pool at its foot. In the im- mediate neighbourhood is the Glacier Garden, a series of potholes worn in the sandstone rock bed of an ancient glacier. Among modern buildings are the railway station, the post office and the Museum of War and Peace, all in the new quarter on the left bank of the Reuss. In the interior of the town

are many quaint old private houses. In 1799 the population numbered but 4337, but had doubled by 1840. Since then the rise has been rapid and continuous, being 29,255 in 1900. The vast majority are German-speaking (in 1900 there were 1242 Italian-speaking and xvu. 4

529 French-speaking persons) and Romanists (in 1900 there were 4933 Protestants and 299 Jews).

The nucleus of the town was a Benedictine monastery, founded about 75oonthe right bank of the Reuss by the abbey of Mur bach in Alsace, of which it long remained a ” cell.” It is first men- tioned in a charter of 840 under the name of ” Luciaria,” which is probably derived from that of the patron saint of the monastery, St Leger or Leodegar (in O. Ger. Leudegar or Lutgar) — the form ” Lucerrun ” is first found in 1252. Under the shadow of this monastery there grew up a small village. The germs of a municipal constitution appear in 1252, while the growing power of the Habsburgs in the neighbourhood weakened the ties that bound Lucerne to Murbach. In 1291 the Habsburgs finally pur- chased Lucerne from Murbach, an act that led a few weeks later to the foundation of the Swiss Confederation, of which Lucerne became the fourth member (the first town to be included) in 1332. But it did not get rid of all traces of Habsburg domination till after the glorious victory of Sempach (1386). That victory led also to the gradual acquisition of territory ruled by and from the town. At the time of the Reformation Lucerne clave to the old faith, of which ever since it has been the great stronghold in Switzerland. The papal nuncio resided here from 1601 to 1873. In the 16th century, as elsewhere in Switzerland, the town government fell into the hands of an aristocratic oligarchy, whose power, though shaken by the great peasant revolt (1653) in the Entlebuch, lasted till 1798. Under the Helvetic republic (1798-1803) Lucerne was the seat of the central government, under the Act of Mediation (1803-1814) one of the six ” Direc- torial ” cantons and from 1815 to 1848 one of the three ruling cantons. The patrician government was swept away by the cantonal constitution of 1831. But in 1841 the Conservatives regained power, called in the Jesuits (1844) and so brought about the Sonderbund War (1847) in which they were defeated, the decisive battle taking place at Gisikon, not far from Lucerne. Since 1848 Lucerne has been in disfavour with the Radicals who control the federal government, and has not been chosen as the site of any great federal institution. The Radicals lost power in the canton in 187 1, after which date the Conservatives became predominant in the canton, though in the town the Radicals were in the majority.

See J. J. Blumer, Slaats-und Rechtsgeschichte d. schweiz. Demo-

kratien (3 vols., St Gall, 1 850-1 859) ; A. L. Gassmann, Das Volkslied im Luzerner Wiggerthal u. Hinterland (Basel, 1906) ; Geschichtsfreund (organ of the Historical Society of the Forest Cantons) from 1843. A. von Liebenau, Charakterbilder aus Luzem's Vergangenheit (2 vols., Lucerne, 1884-1891); T. von Liebenau, Das alte Luzern (Lucerne, 1 881) and " Der fuzernische Bauernkrieg vom 1653 " (3 articles in vols, xviii.-xx., 1893-1895, of the Jahrbuch f. Schweizerische Ge- schichte); Heimathkunde fur den Kanton Luzern (6 vols., Lucerne, 1 867-1 883); A. Liitolf, Sagen, Brauche, Legenden aus d. Fiinf Orlen (Lucerne, 1862); K. Pfyffer, Der Kanton Luzern (2 vols., 1858- 1859) and Geschichte d. Stadt u. Kanton Luzern (2 vols., new ed., 1 861); A. P. von Segesser, Rechtsgeschichte d. Stadt u. Republik Luzern (4 vols., 1850-1858) and 45 Jahre {1841-1887) im Luzernischen Staatsdienst (Bern, 1887); J. Sowerby, The Forest Cantons 0} Switzerland (London, 1892). (W. A. B. C.)

LUCERNE, LAKE OF, the name usually given by foreigners to the principal lake of Central Switzerland. In French it is called the Lac des Quatre Cantons, and in German the Vierwald- stdltersee, this term being often wrongly translated " Lake of the Four Forest Cantons," whereas it means the " Lake of the Four Valleys " — valles — which form the four Cantons of Lucerne, Unterwalden, Uri and Schwyz. It takes its name from the town of Lucerne, which is situated at its west end, just where the Reuss issues from the lake, after having entered it at Fluelen at the east end and so practically formed it; the Muota enters the lake at Brunnen (northern shore) and the two mountain streams called the Engelberg and the Sarnen Aa at Buochs and Alpnach- stad respectively (S.). The lake is generally supposed to be, on the whole, the most beautiful in Switzerland. This is partly due to the steep limestone mountains between which it lies, the best known being the Rigi (5906 ft.) to the N., and Pilatus (6995 ft.) to the S.W., and to the great promontories that thrust themselves into its waters, such as those of Horw (S.), of Biirgen- stock (S.), of Meggenhorn (N.) and of Seelisberg (S.), and partly

to the irregularity of its shape. It is, in fact, composed of four main basins (with two side basins), which represent four different valleys, orographically distinct, and connected only by narrow and tortuous channels. There is, first, the most easterly basin, the Bay of Uri, extending from Fliielen on the south to Brunnen on the north. At Brunnen the great delta of the Muota forces the lake to the west, so

that it forms the Bay of Gersau or the Gulf of Buochs, extending from the promontory of Seelisberg (E.) to that of the Burgenstock (W.). Another narrow strait between the two ” Noses ” (Nasen) leads westwards to the Basin ofWeggis, enclosed between the Rigi (N.) and the Burgenstock promontory (S.) . This last named bay forms the eastern arm of what is called the Cross of Lucerne, the western arm of which is formed by the Bay of Lucerne, while the northern arm is the Bay of Kussnacht and the southern that of HergiswU, prolonged S.W. by the Bay of Alpnack, with which it is joined by a very narrow channel, spanned by the Acher iron bridge. The Bay of Uri offers the sternest scenery, but is the most interesting, by reason of its connexion with early Swiss history — at Brunnen the Everlasting League of 131s was really made, while the legendary place of meeting of the founders of Swiss freedom was the meadow of the Riitli on the west (purchased by the Confederation in 1859), and the site of Tell’s leap is marked by the Chapel of Tell (E.). Nearly opposite Brunnen, close to the west shore, an isolated rock (the Schillerstein or Mythenstein) now bears an inscription in honour of Friedrich Schiller, the author of the famous play of William Tell (1804). In the Bay of Gersau the most interesting spot is the village of Gersau (N.), which formed an independent republic from 1390 to 1798, but in 1818 was finally united to the canton of Schwyz. In the next basin to the west is Weggis (N.), also for long in the middle ages a small independent state; to the S.E. of Weggis, on the north shore of the lake, is Vitznau, whence a rack railway (187 1) leads up to the top of the Rigi (4j m.), while S.W. of Weggis, on the south shore of the lake, is Kehrsiten, whence an electric railway leads up to the great hotels on the Burgenstock promontory (2854 ft.). The town of Lucerne is connected with Fliielen by the main line of the St Gotthard railway (32 m.), though only portions of this line (from Lucerne to Kussnacht, io§ m., and from Brunnen to Fliielen, 7 m.) run along the shore; Brunnen is also connected with Fliielen by the splendid carriage road known as the Axen- strasse (7! m.)and is the starting-point of an electric line (1905) up to Morschach (S.E.) and the great hotels of Axensteiri and Axenfels near it. On the promontory between Lucerne and Ktissnacht stands the castle of New Habsburg (modern), while from Kussnacht a carriage road leads through the remains of the ” Hollow Way ” (Hohle Gasse), the scene of the legendary murder of Gessler by William Tell. The west shore of the southern arm, or the basin of Hergiswil and the Bay of Alpnach, is traversed from Horw to Alpnachstad by the Brtinig railway (55 m.), which continues towards Sarnen (Obwalden) and the Bernese Oberland, S.W. from Alpnachstad, whence a rack railway leads N.W. up Pilatus (2! m.). Opposite Hergiswil, but on the east shore of the Basin of Hergiswil, is Stanstad, the port of Stans

(Nidwalden), which is connected by an electric line with Engelberg (14 m.). The first steamer was placed on the lake in 1835. Lucerne is the only town of importance, but several spots serve as ports for neighbouring towns or large villages (Brunnen for Schwyz, Fliielen for Altdorf, Stanstad for Stans, Alpnachstad for Sarnen). Most of the villages on the shores are frequented in summer by visitors (Gersau also in winter), especially Hertenstein, Weggis, Gersau, Brunnen, Beckenried and Hergiswil, while great hotels, commanding magnificent views, have been built on heights above it, such as the Burgenstock, Seelisberg, and near Morschach, above Brunnen, besides those on the Rigi, Pilatus and the Stanserhorn. The area of the lake is about 445 sq.m., its length about 24 m., its greatest width only 2 m. and its greatest depth 702 ft., while the surface of the water is 1434 ft. above sea-level. Of the total area about 15J sq. m. are in the Canton of Lucerne, 13 sq. m. in that of Nidwalden, 75 sq. m. in that of Uri, 75 sq. m. in that of Schwyz, and about 1 sq. m. in that of Obwalden. (W. A. B. C.)

LUCERNE, Purple Medick or Alfalfa, known botanically as Medicago saliva, a plant of the natural order Leguminosae. In England it is still commonly called ” lucerne,” but in America ” alfalfa,” an Arabic term (“the best fodder “), which, owing to its increasing cultivation in the western hemisphere, has come into widening usage since the introduction of the plant by the Spaniards. It is an erect perennial herb with a branched hollow stem 1 to 2 ft. high, trifoliolate leaves, short dense racemes of small yellow, blue or purple flowers, and downy pods coiled two or three times in a loose spiral. It has a characteristic long tap-root, often extending 15 ft. or more into the soil. It is a native of the eastern Mediter- ranean region, but was intro- duced into Italy in the 1st century a.d., and has become more widely naturalized in Europe; it occurs wild in hedges and fields in Britain, where it was first cultivated about 1650. It seems to have been taken from Spain to Mexico and South America in the 16th century, but the extension of its cultiva- tion in the Western States of the American Union practically dates from the middle of the 19th century, and in Argentina its development as a staple crop is more recent. It is much culti- vated as a forage crop in France and other parts of the continent of Europe, but has not come into such general use in Britain, where, however, it is frequently met with in small patches in districts where the soil is very light, with a dry subsoil. Its Lucerne (Medicago sativa), § nat. thick tap-roots penetrate very s ‘ ze –

deeply into the soil; and, if a ‘• S°^’ enlarged.

j • vA • j ,1. 2 < Half-npe fruit,

good cover is once obtained, the , Fruit, enlarged, plants will yield abundant cut- tings of herbage for eight or ten years, provided they are properly top-dressed and kept free from perennial weeds. The time te cut it is, as with clover and sainfoin, when it is in early flower.

In the United States alfalfa has become the staple leguminous forage crop throughout the western half of the country. Some idea of the increase in its cultivation may be obtained from the figures for Kansas, where in 1891 alfalfa was cultivated over 34,384 acres, while in 1907 the number was 743,050. The pro- gress of irrigation has been an important factor in many districts. The plant requires a well-drained soil (deep and permeable as possible), rich in lime and reasonably free from weeds.

See, for practical directions as to cultivation, Farmers' Bulletin 339 of the U.S. Department of Agriculture, by J. M. Westgate (Washington, December 1908).

LUCHAIRE, DENIS JEAN ACHILLE (1846-1908), French historian, was born in Paris on the 24th of October 1846. In 1879 he became a professor at Bordeaux and in 1889 professor of medieval history at the Sorbonne; in 1895 he became a member of the Academie des sciences morales et politiques, where he obtained the Jean Reynaud prize just before his death on the 14th of November 1908. The most important of Achilie Luchaire's earlier works is his Histoire des institutions monarchiques de la France sous les premiers Capitiens (1883 and again 1891); he also wrote a Manuel des institutions francaises: piriode des Capetiens directs (1892); Louis VI. le Gros, annales'de sa vie et de son regne (1890); and Etude sur les actes de Louis VII. (1885). His later writings deal mainly with the history of the papacy, and took the form of an elaborate work on Pope Innocent III. This is divided into six parts: (i.) Rome et Italie

nat. size.

(1904); (ii.) La Croisade des Albigeois (1905); (iii.) La Papaute et I 'empire (1905); (iv.) La Question d'Orient (1906); (v.) Les Royautes vassales du Saint-Siege (1908); and (vi.) Le Concile de Lair an et la reforme de I'Eglise (1908). He wrote two of the earlier volumes of E. Lavisse's Histoire de France.

LUCHU ARCHIPELAGO (called also Riukiu, Loo-choo and Liukiu), a

long chain of islands belonging to Japan, stretching from a point 80 m. S. of Kiushiu to a point 73 m. from the N.E. coast of Formosa, and lying between 24 and 30° N. and 123 and 130° E. Japanese cartographers reckon the Luchu islands as 55, having a total coast-line of 768 m., an area of 935 sq. m., and a population of about 455,000. They divide them into three main groups, of which the northern is called Oshima- shoto; the central, Okinawa-gunto; and the southern, Saki- shima-retto. The terms sholo, gunto and retlo signify ” archi-pelago,” “cluster of islands” and “string of islands” respectively. The last-named group is subdivided into Miyako-gunto and Yayeyama-gunto. The principal islands of these various groups are : —

Oshima-shoto — Amami-Oshima . . . . 34 m. long and 17 m. broad Tokuno-shima …. 16 ,, 8j ,,

Okinawa-gunto — Okinawa-shima(GreatLuchu)63j m. long and 145 m. broad

Kume-shima 9f „ 7J „

Okinoerabu-shima 9! „ 5 ,,

Ihiya-shima 5 „ 2j „

Miyako-gunto — Miyako-shima …. I2j m. long and 12 m. broad

Erabu-shima 4J ,, 3I ,,

Yayeyama-gunto — – Ishigaki-shima …. 242 m. long and 145 m. broad Iriomoto-shima …. 14J „ 14 „

Yonakuni-shima ..-73 ., 3j ,,

The remaining islands of the archipelago are of very small size, although often thickly populated. Almost at the extreme north of the chain are two islands with active volcanoes: Nakano-shima (3485 ft.) and Suwanose-shima (2697 ft.), but the remaining members of the group give no volcanic indica- tions, and the oniy other mountain of any size is Yuwan-dake (2299 ft.) in Amami-Oshima. The islands ” are composed chiefly of Palaeozoic rocks — limestones and quartzites found in the west, and clay, slate, sandstone and pyroxenite or amphibolite on the east. . . . Pre-Tertiary rocks have been erupted through these. The outer sedimentary zone is of Tertiary rocks.” 1 The capital is Shuri in Okinawa, an old-fashioned place with a picturesque castle. The more modern town of Nafa, on the same island, possesses the principal harbour and has considerable trade.

The scenery of Luchu is unlike that of Japan. Though so close to the tropics, the islands cannot be said to present tropical features : the bamboo is rare ; there is no high grass or tangled undergrowth ; open plains are numerous; the trees are not crowded together; lakes are wanting; the rivers are insignificant; and an unusual aspect is imparted to the scenery by numerous coral crags. The temperature in Nafa ranges from a mean of 82 F. in July to 6o° in January. The climate is generally (though not in all the islands) pleasant and healthy, in spite of much moisture, the rainfall being very heavy.

The fauna includes wild boars and deer, rats and bats. Excellent small ponies are kept, together with cattle, pigs and goats. The majority of the islands are infested with venomous snakes called habu (Trimeresurus) , which attain a length of 6 to 7 ft. and adiametcr of from 2j to 3 in. Their bite generally causes speedy death, and in the island of Amami-Oshima they claim many victims every year. The most important cultivated plant is the sugar-cane, which provides the principal staple of trade.

Luchu is noted for the production of particularly durable vermilion-coloured lacquer, which is much esteemed for table utensils in Japan. The islands also manufacture certain fabrics which are considered a speciality. These are Riukiu-tsumugi, a kind of fine pongee ; the so-called Satsuma-gasuri, a cotton fabric greatly used for summer wear; basho-fu, or banana-cloth (called also aka-basho), which is woven from the fibre of a species of banana; and hoso-jofu, a particularly fine hempen stuff, na e in Miyako-shima, and demanding such

1 Note in Geographical Journal, xx., on S. Yoshiwara, ” Raised Coral Reefs in the Islands of the Riukiu Curve,” in Journ. Coll. of Science, Imp. Univ., Tokyo (1901).

difficult processes that six months are required to weave and dye a piece 95″ yds. long.

People. — Although the upper classes in Luchu and Japan closely resemble each other, there are palpable differences between the lower classes, the Luchuans being shorter and better proportioned than the Japanese; having higher foreheads, eyes not so deeply set, faces less flattened, arched and thick eyebrows, better noses, less marked cheek-bones and much greater hairiness. The last characteristic has been attributed to the presence of Ainu blood, and has suggested a theory that when the Japanese race entered south-western Japan from Korea, they drove the Ainu northwards and southwards, one portion of the latter finding their way to Luchu, the other to Yezo. Women of the

upper class never appear in public in Luchu, and are not even alluded to in conversation, but women of the lower orders go about freely with uncovered faces. The Luchu costume resembles that of Japan, the only marked difference being that the men use two hairpins, made of gold, silver, pewter or wood, according to the rank of the wearer. Men shave their faces until the age of twenty- five, after which moustache and beard are allowed to grow, though the cheeks are kept free from hair. Their burial customs are peculiar and elaborate, and their large sepulchres, generally mitre-shaped, and scattered all over the country, according to Chinese fashion, form a striking feature of the landscape. The marriage customs are also remarkable. Preliminaries are negotiated by a middleman, as in China and Japan, and the subsequent procedure extends over several days. The chief staple of the people's diet is the sweet potato, and pork is the principal luxury. An ancient law, still in force, requires each family to keep four pigs. In times of scarcity a species of sago (obtained from the Cycas revolutd) is eaten. There is a remarkable absence of religious influence in Luchu. Places of worship are few, and the only function discharged by Buddhist priests seems to be to officiate at funerals. The people are distinguished by gentle- ness, courtesy and docility, as well as by marked avoidance of crime. With the exception of petty thefts, their Japanese administrators find nothing to punish, and for nearly three centuries no such thing as a lethal weapon has been known in Luchu. Professor Chamber- lain states that the Luchuan language resembles the Japanese in about the same degree as Italian resembles French, and says that they are sister tongues, many words being identical, others differing only by letter changes which follow certain fixed analogies, and sentences in the one being capable of translation into the other word for word, almost syllable for syllable.

History. — Tinsunshi," Grandson of Heaven," is the mythical founder of the Luchu monarchy. Towards the close of the 12th century his descendants were driven from the throne by rebellion, but the old national party soon found a victorious leader in Shunten, son of Tametomo, a member of the famous Minamoto family, who, having been expelled from Japan, had come to Luchu and married there. The introduction of the arts of reading and writing are assigned to Shunten's reign. Chinese invasions of Luchu may be traced back to a.d. 605, but they did not result in annexation; and it was in 1372 that China first obtained from the Luchuans recognition of supremacy. Luchuan relations with Japan had long been friendly, but at the end of the 16th century the king refused Japan assistance against Korea, and in 1609 the prince of Satsuma invaded the islands with 3000 men, took the capital by storm, captured the king and carried him off to

Kagoshima. A few years later he was restored to his throne on condition of acknowledging Japanese suzerainty and paying tribute. The Luchuans nevertheless continued to pay tribute to China also.

The Chinese government, however, though taking a benevolent interest in the welfare of the islanders, never attempted to bring them under military sway. The incongruity of this state of affairs did not force itself upon Japan's attention so long as her own empire was divided into a number of semi-independent principalities. But in 1879 the Japanese government, treating Luchu as an integral part of the mikado's dominions, dethroned its prince, pensioned him as the other feudal chiefs had been pensioned, and converted Luchu into a prefecture under the name of Okinawa. This name signifies " extended rope," and alludes to the attenuated nature of the archipelago. China remonstrat- ing, a conference was held in Peking, when plenipotentiaries of the two empires signed an agreement to the effect that the archipelago should be divided equally between the claimants. The Chinese government, however, refused to ratify this com- promise, and the Japanese continued their measures for the effective administration of all the islands. Ultimately (1895) Formosa also came into Japan's possession, and her title to the whole chain of islands ceased to be disputed.

Though Captain Broughton, of H.M.S. " Providence," was wrecked on Miyako-shima and subsequently visited Nafa in 1797, it was not till the " Alceste " and "Lyra " expedition in 1816-1817, under Captains Basil Hall and Murray Maxwell, that detailed information was obtained about Luchu. The people at that time showed a curious mixture of courtesy and shyness. From 1844 efforts were made by both Catholic (French) and Protestant missionaries to Christianize them, but though hospitable they made it clear that these efforts were unwelcome. Further visits were made by British vessels under Captain Beechey (1826) and Sir Edward Belcher (1845). The American expedition under Commodore M. C. Perry (1853) added largely to knowledge of the islands, and concluded a treaty with the Luchuan government.

See Basil Hall, Account of a Voyage of Discovery to the West Coast of Corea and the Great Loo-choo Island (London, 1818); Comm. M. C. Perry, Narrative of the Expedition of an American Squadron to the China Seas and Japan, 1852-1854 (Washington, 1856); B. H.

Chamberlain, ” The Luchu Islands and their Inhabitants,” in the Geographical Journal, vol. v. (1895) ; ” Contributions to a Bibliography of Luchu,” in Trans. Asiatic Soc. Japan, xxiv. (1896) ; C. S. Leavenworth, ” History of the Loo-choo Islands,” Journ. China Br. Royal Asiatic Soc. xxxvi. (1905).

LUCIA (or Lucy), ST, virgin and martyr of Syracuse, whose name figures in the canon of the mass, and whose festival is celebrated on the 13th of December. According to thelegend, she lived in the reign of Diocletian. Her mother, having been miraculously cured of an illness at the sepulchre of St Agatha in Catania, was persuaded by Lucia to distribute all her wealth to the poor. The youth to whom the daughter had been betrothed forthwith denounced her to Pascasius, the prefect, who ordered that she should be taken away and subjected to shameful outrage. But it was found that no force which could be applied was able to move her from the spot on which she stood; even boiling oil and burning pitch had no power to hurt her, until at last she was slain with the sword. The most important documents concerning St Lucy are the mention in the Mariyrologium Hieronymianum and the ancient inscription discovered at Syracuse, in which her festival is indicated. Many paintings represent her bearing her eyes in her hand or on a salver. Some artists have even represented her blind, but nothing in her Acta justifies this representation. It is probable that it originated in a play upon words (Lucia, from Lat. lux, light), just as St Clair is invoked in cases of eye-disease.

See O. Caietanus, Vitae sanctorum Siculorum, i. 114-121 (Palermo, 1657) ; Ioannes de Ioanne, Acta sincera sanctae Luciae (Palermo, 1758); Analecta Bollandiana, xxii. 492; Cahier, Caracttristiques des saints, i. 105 (Paris, 1867). (H. De.)

LUCIAN (d. 312), Christian martyr, was born, like the famous, heathen writer of the same name, at Samosata. His parents, who were Christians, died when he was in his twelfth year. In his youth he studied under Macarius of Edessa, and after receiving baptism he adopted a strictly ascetic life, and devoted himself with zeal to the continual study of scripture. Settling at Antioch when Malchion was master of the Greek school he became a presbyter, and, while supporting himself by his skill as a rapid writer, became celebrated as a teacher, so that he is regarded as the founder of the famous theological school of Antioch. He did not escape suspicion of heresy, and is repre- sented as the connecting link between Paul of Samosata and Arius. Indeed, on the deposition of the former (a.d. 268) he was excluded from ecclesiastical fellowship by three successive bishops of

Antioch, while Arius seems to have been among his pupils (Theodoret, Hist. Eccl. i. 3, 4). He was, however, restored before the outbreak of persecution, and the reputation won by his high character and learning was confirmed by his courage- ous martyrdom. He was carried to Nicomedia before Maximin Daza, and persisting in his faith perished on the 7th of January 312, under torture and hunger, which he refused to satisfy with food offered to idols. His defence is preserved by Rufinus (ix. 6; on Eusebius, Hist. Eccl. ix. 9). His remains were conveyed to Drepanum in Bithynia, and under Constantine the town was founded anew in his honour with the name of Helenopolis, and exempted from taxes by the emperor (a.d. 327)

(see Chron. Pasch., Bonn ed., p. 527). Here in 387, on the anniversary of his death, Chrysostom delivered the panegyrical homily from which, with notices in Eusebius, Theodoret and the other ecclesiastical historians, the life by Jerome (Vir. III. cap. 77), but especially from the account by S. Metaphrastes (cited at length in Bernhardy's notes to Suidas, s.v. vodeiiei), the facts above given are derived. See also, for the celebration of his day in the Syriac churches, Wright, Cat. of Syr. MSS. p. 283.

Jerome says that Lucian wrote Libelli de fide and several letters, but only a short fragment of one epistle remains {Chron. Pasch., ed. Dindorf, i. 516). The authorship of a confession of faith ascribed to Lucian and put forth at the semi-Arian synod of Antioch (a.d. 341) is questioned. Lucian's most important literary labour was his edition of the Greek Old Testament corrected by the Hebrew text, which, according to Jerome (Adv. Ruf. ii. 77), was in current use from Constantinople to Antioch. That the edition of Lucian is represented by the text used by Chrysostom and Theodoret, as well as by certain extant MSS., such as the Arundelian of the British Museum, was proved by F. Field (Prol. ad Origenis Hexapla, cap. ix.).

Before the publication of Field's Hexapla, Lagarde had already directed his attention to the Antiochian text (as that of Lucian may be called) and ultimately published the first part (Genesis, 2 Esdras, Esther) of a provisional reconstructed text. The distinguishing marks of the Lucianic recension are thus summarized by S. R. Driver, Notes on Heb. Text of Samuel, p. Ii. seq. : (1) The substitution of synonyms for the words employed by the Septuagint; (2) the occurrence of double renderings; (3) the occurrence of renderings " which presuppose a Hebrew original self-evidently superior in the passages concerned to the existing Massoretic text," a peculiarity which makes it very important for the criticism of the Hebrew Bible. From a statement of Jerome in his preface to the gospels it seems probable

that Lucian had also a share in fixing the Syrian recension of the New Testament text, but of this it is impossible to speak with certainty. He was associated in his work with the Hebraist Dorotheus.

See, generally, A. Harnack's art. in Hauck-Herzog, Realencyk. vol. xi., and for " remains " Routh, Rel. Sac. iv. 3-17. A full account of his recension of the Septuagint is given in H. B. Swete's Introduc- tion to the Old Testament in Greek, p. 81 sqq. ; and a good account of his doctrinal position in the prolegomena to the volume on Athanasius in the series of Nicene and Post-Nicene Fathers (p. xxviii.) and A. Harnack's History of Dogma, especially vol. iv.

LUCIAN [AovKiavos] (c. a.d. 120-180), Greek satirist of the Silver Age of Greek literature, was born at Samosata on the Euphrates in northern Syria. He tells us in the Somnium or Vita Luciani, 1, that, his means being small, he was at first apprenticed to his maternal uncle, a statuary, or rather sculptor of the stone pillars called Hermae. Having made an unlucky beginning by breaking a marble slab, and having been well beaten for it, he absconded and returned home. Here he had a dream or vision of two women, representing Statuary and Literature. Both plead their cause at length, setting forth the advantages and the prospects of their respective professions; but the youth chooses IlatSeia, and decides to pursue learning. For some time he seems to have made money as a pr\T

1 In the Alexander (25) we are told that the province of Pontus, due north of Syria, was " full of Christians."

2 Philopatris, 12, inj/ipkSovra Qedv p.kyav S.p.0poTov oipavuova, vi&v Harp6s, Ilv6vp.a kit irarpds kiciropevdfievov, iv Ik rpi&v koX ££ evds rpla, a passage which bears on the controverted procession "a Patre Filioque."

and bad actions of men, 1 seem to have come from the same source, though the notion of a written catalogue of human actions to be used in judgment was familiar to Aeschylus and Euripides.

As a satirist and a wit Lucian occupies in prose literature the unique position which Aristophanes holds in Greek poetry. But whether he is a mere satirist, who laughs while he lashes, or a misanthrope, who hates while he derides, is not very clear. In favour of the former view it may be said that the two main objects of his ridicule are mythology

and the sects of philosophy; in favour of the latter, his bitter exposure of imposture and chicanery in the Alexander, and the very severe attacks he makes on the ” humbug ” of philosophy, 2 which he everywhere assails with the most acrimonious and contemptuous epithets.

As a writer Lucian is fluent, easy and unaffected, and a close follower of the best Attic models, such as Plato and the orators. His style is simpler than Plutarch’s, and some of his compositions, especially the Dialogues of the Gods (pp. 204-287) and of the Marine Deities (288-327), and, above all, the Dialogues of the Dead (329-454), are models of witty, polished and accurate Greek composition. Not less clever, though rather lax in morality, are the eraipiKol Siakoyot, (pp. 280-325), which remind us somewhat of the letters of Alciphron. The sarcasms on the popular mythology, the conversations of Pluto, Hermes, Charon and others of the powers in Hades, show a positive disbelief in any future state of existence. The model Lucian followed in these dialogues, as well in the style as in the sparkling and playful repartee, was the Platonic conversations, founded on the drama, of which the dialogue may be called the prose repre- sentative. Aristotle never adopted it, perhaps regarding it as beneath the true dignity of philosophy. The dialogue, in fact, was revived and improved by Lucian, 3 the old traditions of the \x>yoTOtoi and ~koyoypaoi, and, above all, the immense influence of rhetoric as an art, having thrown some discredit on a style of composition which, as introduced by Plato, had formed quite a new era in Greek prose composition. For rhetoric loved to talk, expatiate and declaim, while dialectic strove to refute by the employment of question and answer, often in the briefest form.

Lucian evinces a perfect mastery over a language as wonderful in its inflections as in its immense and varied vocabulary; and it is a well-merited praise of the author to say that to a good Greek scholar the pages of Lucian are almost as easy and as enter- taining as an English or French novel. It is true that he employs some forms and compounds which were not in use in the time of Plato or Demosthenes, and, as one who lived under Roman rule, has a tendency towards Latinisms. But his own sentiments on the propriety of diction are shown by his reproof to Lexiphanes, ” if anywhere you have picked up an out-of-the-way word, or coined one which you think good, you labour to adapt the sense of it, and think it a loss if you do not succeed in dragging it in somewhere, even when it it not really wanted.”

Lucian founded his style, or obtained his fluency, from the successful study of rhetoric, by which he appears to have made a good income

from composing speeches which attracted much attention. At a later period in life he seems to have held a lucrative legal office in Egypt, which he retained till his death.

His extant works are so numerous that of some of the principal only a short sketch can be given. More than 80 pieces have come down to us under his name (including three collections of 71 shorter dialogues) , of which about 20 are spurious or of

1 Philopatris, 13. Aesch. Eum. 265, 8eXroTP Si navr' ejruiirj ptvi.

2 In Hermotimus (51) Hermotimus says to Lycinus (who must be assumed to represent Lucian himself), u/3pit\oao4>lav koI cs toDs < £i\o(ro#oDeras 6.iro(TK&irTeis. In Icaromenippus (5; see also 29) he says he always guessed who were the best physical philosophers " by their sour-faced looks, their paleness of complexion and the length of their beards."

3 He says (speaking as Zupos in Bis accusatus, 34) that he found dialogue somewhat out of repute from the too numerous questions (i.e. employed by Plato), and brought it up to a more human and natural standard, substituting banter and /epartee for dialectic quibbles and close logical reasoning.

doubtful authorship. To understand them aright we must remember that the whole moral code, the entire " duty of man," was included, in the estimation of the pagan Greek, in the various schools of philosophy. As these were generally rivals, and the systems they taught were more or less directly antagon- istic, truth presented itself to the inquirer, not as one, but as manifold. The absurdity and the impossibility of this forms the burden of all Lucian's writings. He could only form one conclusion, viz. that there is no such thing as truth.

One of the best written and most amusing treatises of antiquity is Lucian's True History, forming a rather long narrative in two books, which suggested Swift's Gulliver's Travels, Rabelais's Voyage of Pantagruel and Cyrano de Bergerac's Journey to the Moon. It is composed, the author tells us in a brief intro- duction, not only as a pastime and a diversion from severer studies, but avowedly as a satire on the poets and logographers who had written so many marvellous tales. He names Ctesias and Homer; but Hellanicus and Herodotus, perhaps other Xoyoitoioi still earlier, appear to have been in his mind. 4 The only true statement in his History, he wittily says (p. 72), is that it contains nothing but lies from beginning to end.

The main purport of the story is to describe a voyage to the moon. He set out, he tells us, with fifty companions, in a well- provisioned ship, from the ” Pillars of Hercules,” intending to explore the western ocean. After eighty days’ rough sailing they came to an island on which they found a Greek inscription, ” This was the limit of the expedition of Heracles and Dionysus “; and the visit of the wine-god seemed attested by some miraculous vines which they found there. After leaving the island they were suddenly carried up, ship and all, by a whirlwind into the air, and on the eighth day came in sight of a great round island shining with a bright light (p. 77), and lying a little above the moon. In a short time they are arrested by a troop of gigantic ” horse-vultures ” and brought as captives to the ” man in the moon,” who proves to be Endymion. He is engaged in a war with the inhabitants of the sun, which is ruled by King Phaethon, the quarrel having arisen from an attempt to colonize the planet Venus (Lucifer). The voyagers are enlisted as ” Moonites,” and a long description follows of the monsters and flying dragons engaged in the contest. A fight ensues, in which the slaughter is so great that the very clouds are tinged with red (p. 84). The long description of the inhabitants of the moon is extremely droll and original. After descending safely into the sea, the ship is swallowed by a huge ” sea serpent ” more than 100 miles long. The adventures during the long confinement in the creature’s belly are most amusing; but at last they sail out through the chinks between the monster’s teeth, and soon find themselves at the ” Fortunate Islands.” Here they meet with the spirits of heroes and philosophers of antiquity, on whom the author expatiates at some length. The tale comes to an abrupt end with an allusion to Herodotus in the promise that he ” will tell the rest in his next books.”

Another curious and rather long treatise is entitled Aovkios f) “Ovos, the authorship of which is regarded as doubtful. Parts of the story are coarse enough; the point turns on one Lucius visiting in a Thessalian family, in which the lady of the house was a sorceress. Having seen her changed into a bird by anoint- ing herself with some potent drug, he resolves to try a similar experiment on himself, but finds that he has become an ass, retaining, however, his human senses and memory. The mistake arose from his having filched the wrong ointment; however, he is assured by the attendant, Palaestra, that if he can but procure roses to eat, his natural form will be restored. In the night a party of bandits break into the house and carry off the stolen goods into the mountains on the back of the unfortunate donkey, who gets well beaten for stumbling on the rough road. Seeing, as he fancies, some roses in a garden, he goes in quest of them,

4 He says (p. 127) that he saw punished in Hades, more severely than

any other sinners, writers of false narratives, among whom were Ctesias of Cnidus and Herodotus. Yet in the short essay inscribed Herodotus (p. 831), he wishes it were possible for him to imitate the many excellencies of that writer.

and again gets beaten as a thief by the gardener (p. 585). After many adventures with the bandits, he attempts to run away, but is caught. A council is held, and he is condemned to die together with a captive girl who had essayed to escape on his back. Suddenly, however, soldiers appear, and the bandits are arrested (p. 595). Again the ass escapes ” to the great and populous city of Beroea in Macedonia ” (p.603). Here he is sold to a strolling conjurer, afterwards to a market-gardener; and both experiences are alike painful. Again he passes into the possession of a cook, where he gets fat and sleek on food more suited to his concealed humanity than the hard fare he has of late lived upon (p. 614). At last, during an exhibition in the theatre, he sees some roses being carried past, and, making a successful rush to devour them, he recovers his former shape. ” I am Lucius,” he exclaims to the wondering president of the exhibition, ” and my brother’s name is Caius. It was a Thes- salian witch that changed me into a donkey.” Thus all ends well, and he returns safe to his country.

The treatise On the Syrian Goddess (Mylitta, the moon-goddess, the Semitic Aphrodite) is written in the Ionic dialect in imita- tion perhaps of the style of Herodotus, though the resemblance is by no means close. The writer professes to be an Assyrian (p. 452), and to describe the wonders in the various temples of Palestine and Syria; he descants on the eunuchs of Syria and the origin of the self-imposed privation of manhood professed and practised by the Galli. The account of the temples, altars and sacrifices is curious, if really authentic; after the manner of Pausanias it is little more than a list, with the reasons in most cases added, or the origin of the custom explained.

De Morte Peregrini is a narrative of one Proteus, a Cynic, who after professing various doctrines, and among them those of Christianity, ended his own life by ascending a burning pyre (see Peregrinus Proteus).

. Bis accusatus (” Twice Accused “) is a dialogue beginning with a satire on the folly of the popular notion that the gods alone are happy. Zeus is represented as disproving this by enumerating the duties that

fall to their lot in the government of the world, and Hermes remarks on the vast crowds of philo- sophers of rival sects, by whose influence the respect and worship formerly paid to the gods have seriously declined. A trial is supposed to be held under the presidency of the goddess AUr\, between the Academy, the Porch, the schools of the Cynics and Epicureans, and Pleasure, Revelry, Virtue, Luxury, &c, as variously impugned or defended by them. Then Conversation and Rhetoric come before the court, each having an action for defamation to bring against Syrus the essayist, who of course is Lucian himself (p. 823). His defence is heard, and in both cases he is triumphantly acquitted. This essay is brilliant from its clever parodies of Plato and Demosthenes, and the satire on the Socratic method of arguing by short questions and answers.

The Lover of Lying (

The dialogue Navigium seu Vota ("The Ship or the Wishes ") gives an apparently authentic account of the measurements and fittings of an Egyptian ship which has arrived with a cargo of corn at the Peiraeus, driven out of its course to Italy by adverse winds. The full length is 180 ft., the breadth nearly 50, the depth from deck to the bottom of the hold 43 ft. The " wishes "

turn on a party of friends, who have been to see the ship, declaring what they would most desire to possess. One would have the ship filled with gold, another a fine house with gold plate; a third would be a " tyrant " with a large force devoted to his interests; a fourth would like to make himself invisible, enter any house that he pleased, and be transported through the air to the objects of his affection. After hearing them all, the first speaker, Lycinus (Lucian), says that he is content with the privilege of laughing heartily at the vanity of human wishes, especially when they are those of professed philosophers.

The dialogue between Philo and Lycinus, Convivium seu Lapithae, is a very amusing description of a banquet, at which a party of dignified philosophers quarrelled over their viands at a marriage feast, and came to blows. The style is a good imitation of Plato, and the scene reminds one of the " clients' dinner " in the fifth satire of Juvenal. Matters come to a climax by the attempt of one of the guests, Zenothemis, to secure for himself a fatter fowl which had been served to his next neighbour Hermon. Each seizes his bird and hits the other with it in the face, at the same time pulling his beard. Then a general fight ensues. The story is a satire on philosophy, the favourite topic of a writer who believed neither in gods nor in men.

The Piscalor (" Fisherman "), a dialogue between Lucian, Socrates, Pythagoras, Empedocles, Plato and others, commences with a general attack on the author as the enemy of philosophy. Socrates proposes that the culprit should be tried, and that Philosophia should assist in the prosecution. Lucian declares that he does not know where such a person lives, long as he has been looking for her (n). She is found at last, but declares Lucian has never disparaged her, but only impostors and pre- tenders under her name (15). He makes a long defence (pp. 598- 606), abusing the philosophers in the sort of language in which some schools of theologians abuse the monks of the middle ages (34). The trial is held in the Acropolis of Athens, and the sham philosophers, dreading a verdict against them, throw themselves from the rock. A Cynic flings away his scrip in the hurry, and on examination it is found to contain, not books or loaves of bread, but gold coins, dice and fragrant essences (44). At the end Lucian baits his hook with a fig and a gold coin, and catches gluttonous strollers in the city while seated on the wall of the Acropolis.

The Voyage Home (KarcurXous) opens with the complaint that Charon's boat is kept waiting for Hermes, who soon appears with his troop of ghosts. Among them is a rvpavvos, one Mega- penthes, who, as his name is intended to express, mourns greatly over the life he has just left. Amusing appeals are made by other souls for leave to return to life, and even bribes are offered to the presiding goddess of destiny, but Clotho is inexorable. The moral of the piece is closely like that of the parable of Dives and Lazarus: the rich and prosperous bewail their fate, while the poor and afflicted find rest from their troubles, and have no desire to return to them. The rvpavvos here is the man clothed in purple and fine linen, and Lucian shows the same bitter dislike of tyrants which Plato and the tragic writers display. The heavy penalty is adjudged to Megapenthes that he may ever remember in the other world the misdeeds done in life.

The Sales of Lives is an auction held by Zeus to see what price the lives of philosophers of the rival sects will bring. A Pytha- gorean, who speaks in the Ionic dialect, first undergoes an examination as to what he can teach, and this contains an enumeration of the doctrines usually ascribed to that sect, including metempsychosis. He is valued at 7s. 6d., and is suc- ceeded by Diogenes, who avows himself the champion of truth, a cosmopolitan (8), and the enemy of pleasure. Socrates brings two talents, and is purchased by Dion, tyrant of Syracuse (19). Chrysippus, who gives some specimens of his clever quibbles, 1 is bought for fifty pounds, Aristotle for nearly a hundred, while Pyrrho the sceptic (or one of his school), who professes to " know

1 E.g. ” A stone is a body; a living creature is a body; you are a living creature; therefore you are a stone.” Again: ” Is every body possessed of life? ” ” No. ” ” Is a stone possessed of life?” ” No.” ” Are you • a body ?” ” Yes.” ” A living body ?” ” Yes.” ” Then, if a living body, you are not a stone.”

nothing,” brings four pounds, ” because he is dull and stupid and has no more sense than a grub ” (27). But the man raises a doubt, ” whether or not he has really been bought,” and refuses to go with the purchaser till he has fully considered the matter.

Timon is a very amusing and witty dialogue. The misanthrope, once wealthy, has become a poor farm-labourer, and reproaches Zeus for his indifference to the injustice of man. Zeus declares that the noisy disputes in Attica have so disgusted him that he has not been there for a long time (9). He tells Hermes to con- duct Plutus to visit Timon, and see what can be done to help him. Plutus, who at first refuses to go, is persuaded after a long conversation with Hermes, and Timon is found by them digging in his field (31). Poverty is unwilling to resign her votary to wealth; and Timon himself is with difficulty per- suaded to turn up with his mattock a crock of gold coins. Now that he has once more become rich, his former flatterers come cringing with their congratulations and respects, but they are all driven off with broken heads or pelted with stones. Between this dialogue and the Plutus of Aristophanes there are many close resemblances.

Hermotimus (pp. 739-831) is one of the longer dialogues, Hermotimus, a student of the Stoic philosophy for twenty years (2), and Lucian (Lycinus) being the interlocutors. The long time — forty years at the least — required for climbing up to the temple of virtue and happiness, and the short span of life, if any, left for the enjoyment of it, are discussed. That the greatest philosophers do not always attain perfect indifference, the Stoic ultimatum, is shown by the anecdote of one who dragged his pupil into court to make him pay his fee (9), and again by a violent quarrel with another at a banquet (11). Virtue is compared to a city with just and good and contented inhabitants; but so many offer themselves as guides to the right road to virtue that the inquirer is bewildered (26). What is truth, and who are the right teachers of it? The question is argued at length, and illustrated by a peculiar custom of watching the pairs of athletes and setting aside the reserved combatant (irapeSpos) at the Olympian

games by the marks on the ballots (40-43). This, it is argued, cannot be done till all the ballots have been examined; so a man cannot select the right way till he has tried all the ways to virtue. But to know the doctrines of all the sects is impossible in the term of a life (49). To take a taste of each, like trying a sample of wine, will not do, because the doctrines taught are not, like the crock of wine, the same throughout, but vary or advance day by day (59). A suggestion is made (68) that the searcher after truth should begin by taking lessons in the science of discrimination, so as to be a good judge of truth before testing the rival claims. But who is a good teacher of such a science ? (70). The general conclusion is that philosophy is not worth the pursuit. " If I ever again," says Hermotimus, " meet a philo- sopher on the road, I will shun him, as I would a mad dog."

The Anacharsis is a dialogue between Solon and the Scythian philosopher, who has come to Athens to learn the nature of the Greek institutions. Seeing the young men performing athletic exercises in the Lyceum, he expresses his surprise at such a waste of energy. This gives Socrates an opportunity of descanting at length on training as a discipline, and emulation as a motive for excelling. Love of glory, Solon says, is one of the chief goods in life. The argument is rather ingenious and well put; the style reminds us of the minor essays of Xenophon.

The Alexander or False Prophet is the subject of a separate article (see Alexander the Paphlagonian) .

These are the chief of Lucian's works. Many others, e.g. Prometheus, Menippus, Life of Demonax, Toxaris, Zeus Tra- goedus, The Dream or the Cock, Icaromenippus (an amusing satire on the physical philosophers), are of considerable literary value. (F. A. P.)

Bibliography. — Editio princeps (Florence, 1496); valuable editions with notes by T. Hemsterhuis and J. F. Reitz (1743-1746, with Lexicon Lucianeum by C. C. Reitz) and J. T. Lehmann (1822- 1831). Editions of the text by C. Jacobitz (1886-1888) and J. Sommerbrodt (1886-1899). The scholia have been edited by H. Rabe in the Teubner series (1906). There are numerous editions of separate portions of Lucian's works and translations in most

European languages; amongst the latter may be mentioned the German version by C. M. Wieland (1788), with valuable notes and commentaries: English; one by several hands (1711), for which Dryden had previously written an unsatisfactory life of the author, by T. Francklin (1780) and W. Tooke (1820): and French; of The Ass, by

P. L. Courier, with full bibliography by A. J. Pons (1887), and of the complete works by E. Talbot (1866) and Belin de Ballu (1789; revised ed. by L. Humbert, 1896). A complete modern English translation, racy and colloquial, appeared in 1905, The Works of Lucian of Samosata, by H. W. Fowler and F. G. Fowler. On Lucian generally, the best work is M. Croiset's Essai sur la vie et les ceuvres de Lucien (1882); see also E. Egger, " Parallele de Lucien et Voltaire," in Memoires de litterature ancienne (1862); C. Martha, Les Moralistes sous Vempire romain (1866) ; H. W. L. Hime, Lucian, the Syrian Satirist (1900) ; Sir R. C. Jebb, Essays and Addresses (1907) ; " Lucian," by W. L. Collins in Blackwood's Ancient Classics for English Readers; the Prolegomena to editions of select works with notes by Sommerbrodt ; and the exhaustive bibliography of the earlier literature in Engelmann, Scriptores Graeci (1880). On some special questions see E. Rohde, Uber Lucians Schrift Aou/aos f) "Oos (Leipzig, 1869); C. Buerger, De Lucio Patrensi (Berlin, 1887); J. Bernays, Lucian und die Kyniker (Berlin, 1879) ; C. G. Jacob, Characleristik Lucians von Samosata (Hamburg, 1832); C. F. Her- mann, Charakteristik Lucians (Gottingen, 1849); P. M. Bolderman, Studia Lucianea (Leiden, 1893); R. Helm, "Lucian unci die Philosophenschulen," in Neue Jahrb. f. das klassische Altertum (1901), pp. 188, 263, 367.

LUCIFER (d. 370/1), bishop of Cagliari (hence called Cara- litanus), an ardent supporter of the cause of Athanasius. After the unfavourable result of the synod of Aries in 353 he volunteered to endeavour to obtain a new and impartial council. He was accordingly sent by Pope Liberius, with Pancratius the presbyter and Hilarius the deacon, but could not prevent the condemnation of Athanasius, which was renewed at Milan in 355. For his own persistent adherence to the orthodox creed he was banished to Germanicia in Commagene; he afterwards lived at Eleuther- opolis in Palestine, and finally in the upper Thebaid. His exile came to an end with the publication of Julian's edict in 362. From 363 until his death in 371 he lived at Cagliari in a state of voluntary separation from ecclesiastical fellowship with his former friends Eusebius of Vercelli, Athanasius and the rest, on account of their mild decision at the synod of Alexandria in 362 with reference to the treatment of those who had unwillingly Arianized under the persecutions of Constantius. Lucifer was hardly sufficiently educated to appreciate the real question at issue, and the sect which he thus founded did not continue long after his death. It is doubtful whether it ever formulated any distinctive doctrine; certainly it developed none of any importance. The memory of Lucifer is still cherished in Sardinia; but, although popularly regarded there as a saint, he has never been canonized.

The controversial writings of Lucifer, dating from his exile, are chiefly remarkable for their passionate zeal, and for the boldness and violence of the language addressed to the reigning emperor, whom he did not scruple to call the enemy of God and a second Saul, Ahab and Jeroboam. Their titles, in the most probable chrono- logical order, are De non parcendis in Deum delinquentibus, De regibus apostaticis, Ad Constantium Augustum pro Athanasio libri ii., De non conveniendo cum haereticis and Moriendum esse pro Filio Dei. Their quotations of Scripture are of considerable value to the critical student of the Latin text before Jerome. They were first collected and edited by Tilius (Paris, 1568); the best edition is that of W. Hartel in the Vienna Corpus, Script. Eccl. Lat. (1886). See also G. Kriiger, Lucifer Bischof von Cagliari und das Schisma der Luciferianer (Leipzig, 1886); F. G. Kenyon, Textual Criticism, pp. 181, 221.

LUCIFER (the Latinized form of Gr. oi6pos, ” light- bearer “), the name given to the ” morning star,” i.e. the planet Venus when it appears above the E. horizon before sunrise, and sometimes also to the ” evening star,” i.e. the same planet in the W. sky after sundown, more usually called Hesperus (?.».). The term ” day star ” (so rendered in the Revised Version) was used poetically by Isaiah for the king of Babylon: ” How art thou fallen from heaven, O Lucifer, son of the morning! how art thou cut down to the ground, which didst weaken the nations ” (Is. xiv. 12, Authorized Version). The words ascribed to Christ in Luke x. 18: “I beheld Satan as lightning fall from heaven” (cf. Rev. ix. 1), were interpreted by the Christian Fathers as referring to the passage in Isaiah; whence, in Christian theology, Lucifer came to be regarded as the name of

Satan before his fall. This idea finds its most magnificent literary expression in Milton’s Paradise Lost. In this sense the name is most commonly associated with the familiar phrase ” as proud as Lucifer.”

LUCILIUS, GAIUS (c. 180-103 B.C.), the earliest Roman satirist, of whose writings only fragments remain, was born at Suessa Aurunca in Campania. The dates assigned by Jerome for his birth and death are 148 and 103 or 102 B.C. But it is impossible to reconcile the first of these dates with other facts recorded of him, and the date given by Jerome must be due to an error, the true date being about 180 B.C. We learn from Velleius Paterculus that he served under Scipio at the

siege of Numantia in 134. We learn from Horace that he lived on the most intimate terms of friendship with Scipio and Laelius, and that he cele- brated the exploits and virtues of the former in his satires. Fragments of those books of his satires which seem to have been first given to the world (books xxvi.-xxix.) clearly indicate that they were written in the lifetime of Scipio. Some of these bring the poet before us as either corresponding with, or engaged in controversial conversation with, his great friend. One line —

Percrepa pugnam Popilli, facta Corneli cane — in which the defeat of M. Popillius Laenas, in 138, is contrasted with the subsequent success of Scipio, bears the stamp of having been written while the news of the capture of Numantia was still fresh. It is in the highest degree improbable that Lucilius served in the army at the age of fourteen; it is still more unlikely that he could have been admitted into the familiar intimacy of Scipio and Laelius at that age. It seems a moral impossibility that between the age of fifteen and nineteen — i.e. between 133 and 129, the year of Scipio's death — he could have come before the world as the author of an entirely new kind of composition, and one which, to be at all successful, demands especially maturity of judgment and experience. It may further be said that the well-known words of Horace (Satires, ii. 1, 33), in which he characterizes the vivid portraiture of his life, character and thoughts, which Lucilius bequeathed to the world,

quo fit ut omnis

Votiva pateat veluti descripta tabella

Vita senis, 1

lose much of their force unless senis is to be taken in its ordinary sense — which it cannot be if Lucilius died at the age of forty-six. He spent the greater part of his life at Rome, and died, according to Jerome, at Naples. Lucilius belonged to the equestrian order, a fact indicated by Horace's notice of himself as " infra Lucili censum." Though not himself belonging to any of the great senatorial families, he was in a position to associate with them on equal terms. This circumstance contributed to the boldness, originality and thoroughly national character of his literary work. Had he been a " semi-Graecus," like Ennius and Pacuvius, or of humble origin, like Plautus, Terence or Accius, he would scarcely have ventured, at a time when the senatorial power was strongly in the ascendant, to revive the role which had proved disastrous to Naevius; nor would he have had the intimate knowledge of the political and social life of his day which

fitted him to be its painter. Another circumstance deter- mining the bent of his mind was the character of the time. The origin of Roman political and social satire is to be traced to the same disturbing and disorganizing forces which led to the revolutionary projects and legislation of the Gracchi.

The reputation which Lucilius enjoyed in the best ages of Roman literature is proved by the terms in which Cicero and Horace speak of him. Persius, Juvenal and Quintilian vouch for the admiration with which he was regarded in the first century of the empire. The popularity which he enjoyed in his own time is attested by the fact that at his death, although he had filled none of the offices of state, he received the honour of a public funeral. His chief claim to distinction is his literary originality. He may be called the inventor of poetical satire, as he was the first to impress upon the rude inartistic medley, known to the Romans by the name of satura, that character of aggressive

1 ” And so it happens that the whole life of the old man stands clearly before us, as if it were represented on a votive picture.”

and censorious criticism of persons, morals, manners, politics, literature, &c. which the word satire has ever since denoted. In point of form the satire of Lucilius owed nothing to the Greeks. It was a legitimate development of an indigenous dramatic enter- tainment, popular among the Romans before the first introduc- tion of the forms of Greek art among them; and it seems largely also to have employed the form of the familiar epistle. But the style, substanc? and spirit of his writings were apparently as original as the form. He seems to have commenced his poetical career by ridiculing and parodying the conventional language of epic and tragic poetry, and to have used the language com- monly employed in the social intercourse of educated men. Even his frequent use of Greek words, phrases and quotations, reprehended by Horace, was probably taken from the actual practice of men, who found their own speech as yet inadequate to give free expression to the new ideas and impressions which they derived from their first contact with Greek philosophy, rhetoric and poetry. Further, he not only created a style of his own, but, instead of taking the substance of his writings from Greek poetry, or from a remote past, he treated of the familiar matters of daily life, of the politics, the wars, the administration of justice, the eating and drinking, the money-making and money-spending, the scandals and vices, which made up the public and private life of Rome in the last quarter of the 2nd century B.C. This he did in a singularly frank, independent and courageous spirit, with no private ambition to serve, or party cause to

advance, but with an honest desire to expose the iniquity or incompetence of the governing body, the sordid aims of the middle class, and the corruption and venality of the city mob. There was nothing of stoical austerity or of rhetorical indignation in the tone in which he treated the vices and follies of his time. His character and tastes were much more akin to those of Horace than of either Persius or Juvenal. But he was what Horace was not, a thoroughly good hater; and he lived at a time when the utmost freedom of speech and the most unrestrained indulgence of public and private animosity were the characteristics of men who took a prominent part in affairs. Although Lucilius took no active part in the public life of his time, he regarded it in the spirit of a man of the world and of society, as well as a man of letters. His ideal of public virtue and private worth had been formed by intimate association with the greatest and best of the soldiers and statesmen of an oldergeneration.

The remains of Lucilius extend to about eleven hundred, mostly unconnected lines, most of them preserved by late grammarians, as illustrative of peculiar verbal usages. He was, for his time, a voluminous as well as a very discursive writer. He left behind him thirty books of satires, and there is reason to believe that each book, like the books of Horace and Juvenal, was composed of different pieces. The order in which they were known to the grammarians was not that in which they were written. The earliest in order of composition were probably those numbered from xxvi. to xxix., which were written in the trochaic and iambic metres that had been employed by Ennius and Pacuvius in their Saturae. In these he made those criticisms on the older tragic and epic poets of which Horace and other ancient writers speak. In them too he speaks of the Numantine War as recently finished, and of Scipio as still living. Book i., on the other hand, in which the philosopher Carneades, who died in 128, is spoken of as dead, must have been written after the death of Scipio. Most of the satires of Lucilius were written in hexa- meters, but, so far as an opinion can be formed from a number of unconnected fragments, he seems to have written the trochaic tetrameter with a smoothness, clearness and simplicity which he never attained in handling the hexameter. The longer fragments produce the impression of great discursiveness and carelessness, but at the same time of considerable force. He appears, in the com- position of his various pieces, to have treated everything that occurred to him in the most desultory fashion, sometimes adopting the form of dialogue, sometimes that of an epistle or an imaginary discourse, and often to have spoken in his own name, giving an account of his travels and adventures, or of amusing scenes that he had witnessed, or expressing

the results of his private meditations and experiences. Like Horace he largely illustrated his own obser- vations by personal anecdotes and fables. The fragments clearly show how often Horace has imitated him, not only in expression, but in the form of his satires (see for instance i. 5 and ii. 2), in the topics which he treats of, and the class of social vices and the types of character which he satirizes. For students of Latin literature, the

chief interest of studying the fragments of Lucilius consists in the light which they throw on the aims and methods of Horace in the composition of his satires, and, though not to the same extent, of his epistles. They are important also as materials for linguistic study ; and they have considerable historical value.

Editions by F. D. Gerlach (1846), L. Muller (1872), C. Lachmann (1876, posthumous), F. Marx (1905); see also L. Muller, Leben und Werke des Lucilius (1876); ” Luciliana,” by H. A. J. Munro, in the Journal of Philology, vii. (1877); Mommsen, Hist, of Rome, bk. iv. ch. 13; “Luciliana,” by A. E. Housman, in Classical Quarterly (April, 1907); C. Cichorius, Vntersuchungen zu Lucilius (Berlin, 1908). (W. Y. S.;X.)

LUCILIUS JUNIOR, a friend and correspondent of the younger Seneca, probably the author of Aetna, a poem on the origin of volcanic activity, variously attributed to Virgil, Cornelius Severus (epic poet of the Augustan age) and Manilius. Its composition has been placed as far back as 44 B.C., on the ground that certain works of art, known to have been removed to Rome about that date, are referred to as being at a distance from the city. But as the author appears to have known and made use of the Quaestiones Naturaies of Seneca (written a.d. 65), and no mention is made of the great eruption of Vesuvius (a.d. 79), the time of its composition seems to lie between these two dates. In favour of the authorship of Lucilius are the facts that he was a friend of Seneca and acquainted with his writings; that he had for some time held the office of imperial procurator of Sicily, and was thus familiar with the locality; that he was the author of a poem on Sicilian subjects. It is objected that in the 79th letter of Seneca, which is the chief authority on the question, he apparently asks that Lucilius should introduce the hackneyed theme of Aetna merely as an episode in his contemplated poem, not make it the subject of separate treatment. The sources of the Aetna are Posidonius of Apamea, and perhaps the pseudo- Aristotelian De Mundo, while there are many reminiscences of Lucretius. It has come down in a very corrupt state,

and its difficulties are increased by the unpoetical nature of the subject, the straining after conciseness, and the obtrusive use of metaphor.

Editions by J. Scaliger (1595), F. Jacob (1826), H. A. J. Munro (1867), M. Haupt (in his edition of Virgil, 1873), E. Bahrens (in Poetae latini minores, ii.), S. Sudhaus (1898), R. Ellis (1901, containing a bibliography of the subject); see also M. Haupt's Opuscula, i. 40, ii. 27, 162, iii. 437 (notes, chiefly critical); R. Ellis in Journal of Philology, xvi. 292; P. R. Wagler, De Aetna poemate quaestiones criticae (1884); B. Kruczkiewicz, Poema de Aetna Monte (1883, in which the ancient view of the authorship of Virgil is upheld) ; L. Al-zinger, Studia in Aetnam collata (1896); R. Hildebrandt, Beitrdge zur Erklarung des Gedichtes Aetna (1900); J. Vessereau (text, trans- lation and commentary, 1905) ; Teuffel-Schwabe, Hist, of Roman Literature (Eng. trans. §§ 307, 308).

LUCINA, goddess of light, a title given to Juno and Diana as presiding over childbirth and bringing children into the light of the world. The full name is lucina dea, " the light-bringing goddess " {lux, light, hence adj. lucinus). It is also given to Hecate (Tibullus 3. 4. 13), as the bringer of terrible dreams, and is used metaphorically as a synonym for child-birth (Virg. Georg. iii. 60; Ovid, Ars. Amat. iii. 785).

LUCIUS, the name of three popes.

Lucius I., pope for eight months (253-254), spent a short period of his pontificate in exile. He is referred to in several letters of Cyprian (see Epist. lxviii. 5) as having been in agree- ment with his predecessor Cornelius in preferring the milder view on the question as to how the lapsed penitent should be treated. He is commemorated on the 4th of March. (L. D.*)

Lucius II. (Gherardo Caccianemici dal Orso), pope from the 1 2th of March 1144 to the 15th of February 1145, a Bolognese, successively canon at his native city, cardinal priest of Sta Croce in Gerusalemme, treasurer of the Roman Church, papal legate in Germany for Honorius II., chancellor and librarian under Innocent II., was the successor of Celestine II. His stormy pontificate was marked by the erection of a revolutionary republic at Rome which sought to deprive the pope of his temporal power, and by the recognition of papal suzerainty over Portugal. He was succeeded by Eugenius III.

His letters are in J. P. Migne, Patrol. Lat. vol. 179. A single unreliable writer, Godfrey of Viterbo (in J. M. Watterich, Pontif. Roman. Vitae),

is authority for the statement that Lucius II. perished in an attempt to storm the Capitol. See JafM-Wattenbach, Regesta

!°5

pontif. Roman. (1885-1888); J. Langen, Geschichte der romischen Kirche von Gregor VII. bis Innocenz III. (Bonn, 1893) ; F. Gregorovius, Rome in the Middle Ages, vol. 4, trans, by Mrs G. W. Hamilton (London, 1896).

Lucius III. (Ubaldo Allucingoli), pope from the 1st of Sep- tember 1181 to the 25th of November 1185, a native of Lucca and a Cistercian monk, named cardinal-priest of Sta Prassede by Innocent II. and cardinal-bishop of Ostia and Velletri by Adrian IV., succeeded Alexander III. He lived at Rome from November 1181 to March 1182, but dissensions in the city com- pelled him to pass the remainder of his pontificate in exile, mainly at Velletri, Anagni and Verona. He disputed with the emperor Frederick I. the disposal of the territories of the Countess Matilda. In November 11 84 he held a synod at Verona which condemned the Cathari, Paterines, Waldensians and Arnoldists, and anathematized all heretics and their abettors. Lucius died in the midst of preparations for a crusade in answer to appeals of Baldwin IV. of Jerusalem. His successor was Urban III.

His letters are in J. P. Migne, Patrol. Lat. vol. 201. Consult J. M. Watterich, Pontif. Roman. Vitae, vol. 2 (Leipzig, 1862); and JafK-Wattenbach, Regesta Pontif. Roman. (1885-1888). See J. Langen, Geschichte der romischen Kirche von Gregor VII. bis Innocenz III. (Bonn, 1893); F. Gregorovius, Rome in the Middle Ages, vol. 4, trans, by Mrs G. W. Hamilton (London, 1896) ; P. Scheffer-Boichorst, ” Zu den mathildinischen Schenkungen,” in Mittheilungen des osterreichen Instiluts (1888). (C. H. Ha.)

LUCK, a term for good or bad fortune, the unforeseen or unrecognized causes which bring success or failure in any enter- prise, particularly used of the result of chances in games of skill or chance (see Probability). The word does not occur in English before the 16th century. It was taken from the Low Ger. luk, a shortened form of geluh, cf. Modern Ger. Gliick, happiness, good fortune. The New English Dictionary considers the word to have been introduced from the Low Countries as a gambling term. The ultimate origin is doubtful; it has been connected with the German gelingen, to succeed (cf. Druck, pressure, from dringen), or with locken, to entice.

At Eden Hall in Cumberland, the seat of the Musgrave family, has

been long preserved a vessel known as ” the luck,” supposed to be of Venetian or Byzantine make, and dating from the 10th century. It is a chalice of enamelled glass, and on its safe preservation the fortunes of the Musgrave family are supposed to depend, in accordance with the rhyme: —

” Should this cup either break or fall, Farewell the luck of Edenhall.”

LUCRE, GOTTFRIED CHRISTIAN FRIEDRICH (1 791-1855), German theologian, was born on the 24th of August 1791, at Egeln near Magdeburg, where his father was a merchant. He studied theology at Halle and Gottingen. In 1813 he became repelent at Gottingen, and in 18 14 he received the degree of doctor in philosophy from Halle; in 1816 he removed to Berlin, where he became licentiate in theology, and qualified as privat- docent. He soon became intimate with Schleiermacher and de Wette, and was associated with them in 1819 in the redaction of the Theologische Zeitschrift. Meanwhile his lectures and publications (among the latter a Grundriss der N eulestament- lichen Hermeneutik, 1816) had brought him into considerable repute, and he was appointed professor extraordinarius in the new university of Bonn in the spring of 1818; in the following autumn he became professor ordinarius. From Bonn, where he had J. C. W. Augusti (1772-1841), J. K. L. Gieseler, and Karl Immanuel Nitzsch for colleagues, he was called in 1827 to Gottingen to succeed K. F. Staudlin (1761-1826). In that year he helped to found the Theologische Sludien und Kritiken, the chief organ of the “mediation” theology {Vermittelungs- theologie). At Gottingen he remained, declining all further calls elsewhere, as to Erlangen, Kiel, Halle, Tubingen, Jena and Leipzig, until his death, which occurred on the 4th of February 1855.

Lucke, who was one of the most learned, many-sided and influential of the so-called ” mediation ” school of evangelical theologians (Vermittelungstheologie) , is now chiefly known by his Kommentar uber die Schriften d. Evangelisten Johannes (4 vols., 1820-1832); it has since passed through two new and improved editions (the last volume of the 3rd edition by E. Bertheau, 1856). He is an intelligent

maintainer of the Johannine authorship of the Fourth Gospel; in connexion with this thesis he was one of the first to argue for the early date and non-apostolic authorship of the Apocalypse. His Einleitung in

die Offenbarung Johannis was published in 1832 (2nd ed., 1848-1852). He also published a Synopsis Evangeliorum, con- jointly with W. M. L. de Wette (1818, 2nd ed., 1840). See Herzog- Hauck, Realencyklopadie.

LUCKENWALDE, a town in the Prussian province of Branden- burg, on the Nuthe, 30 m. S. of Berlin, on the main line to Dresden and Leipzig. Pop. (1905) 22,263. Its cloth and wool manufactories are among the most extensive in Prussia. Among its other industries are cotton printing and dye works, brewing, and the making of metal and bronze goods.

The site of Luckenwalde was occupied in the 12th century by a Cistercian monastery, but the village did not spring up till the reign of Frederick the Great. It was made a town in 1808.

LUCKNOW, a city, district and division of British India. The city was the capital of Oudh from 1775 until it was merged in the United Provinces in 1901. Pop. (1901) 264,049. It lies mainly on the right bank of the winding river Gumti, which is crossed by two railway and three road bridges. It contains the Canning college (1864), with an Oriental department, and La Martiniere college, where about 100 boys are educated, the institution being in part supported by an endowment left by General Claude Martin in 1800. There are native manufactures of gold and silver brocade, muslins, embroidery, brass and copper wares, pottery and moulding in clay. There are also important European industrial establishments, such as iron- works and paper-mills. Lucknow is the centre of the Oudh and Rohilkhand railway system, with large workshops. Lines radiate to Cawnpore, Bareilly, Gonda, Fyzabad and Rae Bareli. Lucknow is the headquarters of the 8th division of the northern army. The cantonments are situated 3 m. E. of the city.

Lucknow is chiefly notable in the history of British India as the capital of the nawabs who had dealings with Warren Hastings, and their successors the kings of Oudh, whose deposi tion by Lord Dalhousie was one of the chief causes of the Mutiny. Amongst the events of the Mutiny the defence of the residency of Lucknow comes only second in historic interest to the massacre at Cawnpore itself. For the two sieges, see Indian Mutiny. The name of the residency is now applied not only to the resid- ency itself, but to the whole of the outbuildings and entrench- ments in which Sir Henry Lawrence concentrated his small force. These entrenchments covered almost 60 acres of ground, and consisted of a number of detached houses, public edifices, outhouses and casual buildings, netted together, and welded by ditches,

parapets, stockades and batteries into one connected whole. On the summit of the plateau stands the residency proper, the official residence of the chief commissioner, a lofty building three storeys high, with a fine portico. Near the residency comes the banqueting hall, and beyond the Baillie Guardgate lie the ruins of the surgeon's house, where Sir Henry Lawrence died of a shell-wound, and where the ladies of the garrison were sheltered in underground rooms. Round the line of the entrenchments are pillars marked with the name of the various " posts " into which the garrison was distributed. The most dangerous of these was the Cawnpore battery post, where the stockade was directly exposed to the enemy's fire. The mutineers had rifles fixed in rests in the house opposite, and swept the road that led through the residency enclosure at this point. Close to the residency is the Lawrence Memorial, an artificial mound 30 ft. high crowned by a marble cross.

Among the other buildings of interest in Lucknow is the Imambara, which is one of the largest rooms in the world(i62 ft. by 54), having an arched roof without supports. This room was built by the Nawab Asaf-ud-dowlah in 1784, to afford relief to the famine-stricken people. The many monuments of his reign include his country palace of Bibiapur, outside the city. Among later buildings are the two palaces of Chhattar Manzil, erected for the wives of Ghazi-ud-din Haidar (1814), the remains of the Farhat Baksh, dating from the previous reign, and ad- joining the greater Chhattar Manzil, the observatory (now a bank) of Nasir-ud-din Haidar (1827), the imambara or mausoleum

and the unfinished great mosque (Jama Masjid) of Mahommed Ali Shah (1837), and the huge debased Kaisar Bagh, the palace of Wajid Ali Shah (1847-1856).

The District of Lucknow lies on both sides of the river Gumti, and has an area of 967 sq. m. Its general aspect is that of an open champaign, well studded with villages, finely wooded and in parts most fertile and highly cultivated. In the vicinity of rivers, however, stretch extensive barren sandy tracts (bhur), and there are many wastes of saline efflorescence {usdr) . The country is an almost dead level, the average slope, which is from N.W. to S.E., being less than a foot per mile. The principal rivers are the Gumti and the Sai with their tributaries. The population in 1901 was 793,241, showing an increase of 2-5 % in the preceding decade.

The Division of Lucknow contains the western half of the old province of Oudh. It comprises the six districts of Lucknow, Unao, Sitapur, Rae

Bareli, Hardoi and Kheri. Its area is 12,051 sq. m. and its population in 1901 was 5,977,086, showing an increase of 2-06% in the decade.

See Lucknow District Gazetteer (Allahabad, 1904). For a fuller description of the city see G. W. Forrest, Cities of India (1903).

LUQON, a town of western France, in the department of Vendee, 23 m. S.E. of La Roche-sur-Yon, on the railway from Nantes to Bordeaux, and on the canal of Lucon (9 m. long), which affords communication with the sea in the Bay of Aiguillon. Pop. (1906) 6163. Between Lucon and the sea stretch marshy plains, the bed of the former gulf, partly drained by numerous canals, and in the reclaimed parts yielding excellent pasturage, while in other parts are productive salt-marshes, and ponds for the rearing of mussels and other shell-fish. Lucon is the seat of a bishopric, established in 13 17, and held by Richelieu from 1607 to 1624. The cathedral, partly of the 12th-century and partly of later periods, was originally an abbey church. The facade and the clock tower date from about 1 700, and the tower is surmounted by a crocketed spire rising 275 ft. above the ground, attributed to the architect Francois Leduc of Tuscany. The cloisters are of the late 15th century. Adjacent is the bishop's palace, possessing a large theological library and Titian's "Disciples of Emmaus," and there is a fine public garden. A communal college and an ecclesiastical seminary are among the public institutions. During the Vendean wars, Lucon was the scene of several conflicts, notably in 1793.

LUCRE (Lat. lucrum, gain; the Indo-European root is seen in Gr. airohavecv , to enjoy, and in Ger. Lohn, wages), a term now only used in the disparaging sense of unworthy profit, or money that is the object of greed, especially in the expression " filthy lucre " (1 Tim. iii. 3). In the adjective " lucrative," profitable, there is, however, no sense of disparagement. In Scots law the term " lucrative succession " (lucrativa acquisitio) is used of the taking by an heir, during the lifetime of his ancestor, of a free grant of any part of the heritable property.

LUCRETIA, a Roman lady, wife of Lucius Tarquinius Col- latinus, distinguished for her beauty and domestic virtues. Having been outraged by Sextus Tarquinius, one of the sons of Tarquinius Superbus, she informed her father and her husband, and, having exacted an oath of vengeance from them, stabbed herself to death. Lucius Junius. Brutus, her husband's cousin, put himself at the head of the people, drove out the Tarquins, and established a republic. The accounts of this tradition in later writers present many points of divergence.

Livy i. 57-59; Dion. Halic. iv. 64-67, 70, 82; Ovid, Fasti, ii. 721- 852 ; Dio Cassius, frag. 1 1 (Bekker) ; G. Cornewall Lewis, Credibility of Early Roman History, i.

LUCRETILIS MONS, a mountain of the Sabine territory, mentioned by Horace (Od. i. 17, 1) as visible from his Sabine farm, and probably identical with the ” Mons Lucretius ” men- tioned in the Liber Pontificalis (ed. Duchesne, i. 183), which speaks of ” possessio in territorio Sabinensi quae cognominatur ad duas casas sub monte Lucretio ” in the time of Constantine. The name ” ad duas casas ” is supposed to survive in the chapel of the Madonna della Casa near Rocca Giovane, and the Mons Lucretilis is generally (and rightly) identified with Monte Gennaro, a limestone peak 4160 ft. high, which forms a promi- nent feature in the view N.E. of Rome. Excavations on the supposed site of Horace’s farm were begun by Professor Pasqui in September 1909. (T. As.)

LUCRETIUS (Titus Lucretius Carus) (c. 98-55 B.C.), the great Latin didactic poet. Our sole information concerning his life is found in the brief summary of Jerome, written more than four centuries after the poet’s death. Jerome followed, often carelessly, the accounts contained in the lost work of Suetonius De Viris Illustribus, written about two centuries after the death of Lucretius; and, although it is likely that Suetonius used the information transmitted by earlier grammarians, there is nothing to guide us to the original sources. According to this account the poet was born in 95 B.C.; he became mad in consequence of the administration of a love-philtre; and after composing several books in his lucid intervals, which were subsequently corrected by Cicero, he died by his own hand in the forty-fourth year of his age. Donatus states in his life of Virgil, a work also based on the lost work of Suetonius, that Lucretius died on the same day on which Virgil assumed the toga virilis, that is, in the seventeenth year of Virgil’s life, and on the very day on which he was born, and adds that the consuls were the same, that is . Cn. Pompeius Magnus and M. Licinius Crassus, consuls in 70 and again in 55. The statements cannot be perfectly reconciled; but we may say with certainty that Lucretius was born between 98 and 95 B.C., and died in 55 or 54. A single mention of his poem, the De rerum natura (which from the condition in which it has reached us may be assumed to have been published posthumously) in a letter of Cicero’s to his brother Quintus, written early in 54 B.C., confirms the date given by Donatus

as that of the poet's death. The statements of Jerome have been questioned or disbelieved on the ground of their intrinsic improbability. They have been regarded as a fiction invented later by the enemies of Epicureanism, with the view of discredit- ing the most powerful work ever produced by any disciple of that sect. It is more in conformity with ancient credulity than with modern science to attribute a permanent tendency to derangement to the accidental administration of any drug, however potent. A work characterized by such strength, consistency and continuity of thought is not likely to have been composed " in the intervals of madness " as Jerome says. Donatus, in mentioning the poet's death, gives no hint of the act of suicide. The poets of the Augustan age, who were deeply interested both in his philosophy and in his poetry, are entirely silent about the tragical story of his life. Cicero, by his professed antagonism to the doctrines of Epicurus, by his inadequate appreciation of Lucretius himself and by the indifference which he shows to other contemporary poets, seems to have been neither fitted for the task of correcting the unfinished work of a writer whose genius was so distinct from his own, nor likely to have cordially undertaken such a task.

Yet these considerations do not lead to the absolute rejection of the story. The evidence afforded by the poem rather leads to the conclusion that the tradition contains some germ of fact. It is remarkable that in more than one passage of his poem Lucretius writes with extraordinary vividness of the impression produced both by dreams and by waking visions. It is true that the philosophy of Epicurus put great stress on these, as affording the explanation of the origin of supernatural beliefs. But the insistence with which Lucretius returns to the subject, and the horror with which he recalls the effects of such abnormal phenomena, suggest that he himself may have been liable to such hallucinations, which are said to be consistent with perfect sanity, though they may be the precursors either of madness or of a state of despair and melancholy. Other passages, where he describes himself as ever engaged, even in his dreams, on his task of inquiry and composition, produce the impression of an unrelieved strain of mind and feeling, which may have ended in some extreme reaction of spirit, or in some failure of intellectual power, that may have led him to commit suicide. But the strongest confirmation of the tradition is the unfinished condition in which the poem has reached us. The subject appears indeed to have been fully treated in accordance with the plan sketched out in the introduction to the first book. But that book is the only one which is finished in style and in the arrangement of its matter. In all the others, and especially in the last three,

the continuity of the argument is frequently broken by passages which must have been inserted after the first draft of the argu- ments was written out. Thus, for instance, in his account of the transition from savage to civilized life, he assumes at v. ion the discovery of the use of skins, fire, &c, and the first beginning of civil society, and proceeds at 1028 to explain the origin of language, and then again returns, from 1090 to 1160, to speculate upon the first use of fire and the earliest stages of political life. These breaks in continuity show what might also be inferred from frequent repetitions of lines which have appeared earlier in the poem, and from the rough workmanship of passages in the later books, that the poem could not have received the final revision of the author. Nor is there any great difficulty in believing that Cicero edited it; the word ” emendavit,” need not mean more than what we call ” preparing for press.”

From the absence of any claim on the part of any other district of Italy to the honour of having given birth to Lucretius it is inferred that he was of purely Roman origin. No writer certainly is more purely Roman in personal character and in strength of understanding. His silence on the subject of Roman greatness and glory as contrasted with the prominence of these subjects in the poetry of men of provincial birth such as Ennius, Virgil and Horace, may be explained by the principle that familiarity had made the subject one of less wonder and novelty to him. The Lucretian gens to which he belonged was one of the oldest of the great Roman houses, nor do we hear of the name, as we do of other great family names, as being diffused over other parts of Italy, or as designating men of obscure or servile origin. It may well be assumed that Lucretius was a member of the Roman aristocracy, belonging either to a senatorian or to one of the great equestrian families. If the Roman aristocracy of his time had lost much of the virtue and of the governing qualities of their ancestors, they showed in the last years before the establishment of monarchy a taste for intellectual culture which might have made Rome as great in literature as in arms and law. A new taste for philosophy had developed among members of the governing class during the youth of Lucretius, and eminent Greek teachers of the Epicurean sect settled at Rome at the same time, and lived on terms of intimacy with them. The inference that Lucretius belonged to this class is confirmed by the tone in which he addresses Gaius Memmius, a man of an eminent senatorian family, to whom the poem is dedicated. His tone is quite unlike that in which Virgil or even Horace addresses Maecenas. He addresses him as an equal; he expresses sympathy with the prominent part he played in public life, and admiration for his varied accomplishments, but on his own subject claims to speak to him with

authority.

Although our conception of the poet's life is necessarily vague and meagre, yet his personal force is so remarkable and so vividly impressed on his poem, that we seem able to form a consistent idea of his qualities and characteristics. We know, for example, that the choice of a contemplative life was not the result of indifference to the fate of the world, or of any natural coldness or even calmness of temperament. In the opening lines of the second and third books we can mark the recoil of a humane and sensitive spirit from the horrors of the reign of terror which he witnessed in his youth, and from the anarchy and confusion which prevailed at Rome during his later years. We may also infer that he had not been through his whole career so much estranged from the social life of his day as he seems to have been in his later years. Passages in his poem attest his familiarity with the pomp and luxury of city life, with the attractions of the public games and with the pageantry of great military spectacles. But much the greater mass of the illustrations of his philosophy indicate that, while engaged on his poem he must have passed much of his time in the open air, exercising at once the keen observation of a naturalist and the contemplative vision of a poet. He seems to have found a pleasure, more congenial to the modern than to the ancient temperament, in ascending mountains or wandering . among their solitudes (vi. 469, iv. 575). References to companionship in these wanderings, and

the well-known description of the charm of a rustic meal (ii. 29) speak of kindly sociality rather than of any austere separation from his fellows.

Other expressions in his poem (e.g. iii. 10, &c.) imply that he was also a student of books. Foremost among these were the writings of Epicurus; but he had also an intimate know- ledge of the philosophical poem of Empedocles, and at least an acquaintance with the works of Democritus, Anaxagoras, Heraclitus, Plato and the Stoical writers. Of other Greek prose writers he knew Thucydides and Hippocrates; while of the poets he expresses in more than one passage the highest admira- tion of Homer, whom he imitated in several places. Next to Homer Euripides is most frequently reproduced by him. But his poetical sympathy was not limited to the poets of Greece. For his own countryman Ennius he expresses an affectionate admiration; and he

imitates his language, his rhythm and his manner in many places. The fragments of the old tragedian Pacuvius and of the satirist Lucilius show that Lucretius had made use of their expressions and materials. In his studies he was attracted by the older writers, both Greek and Roman, in whose masculine temperament and understanding he recognized an affinity with his own.

His devotion to Epicurus seems at first sight more difficult to explain than his enthusiasm for Empedocles or Ennius. Probably he found in his calmness of temperament, even in his want of imagination, a sense of rest and of exemption from the disturbing influences of life; while in his physical philosophy he found both an answer to the questions which perplexed him and an inexhaustible stimulus to his intellectual curiosity. The combative energy, the sense of superiority, the spirit of satire, characteristic of him as a Roman, unite with his loyalty to Epicurus to render him not only polemical but intolerant and contemptuous in his tone toward the great antagonists of his system, the Stoics, whom, while constantly referring to them, he does not condescend even to name. With his admiration of the genius of others he combines a strong sense of his own power. He is quite conscious of the great importance and of the difficulty of his task; but he feels his own ability to cope with it.

It is more difficult to infer the moral than the intellectual characteristics of a great writer from the personal impress left by him on his work. Yet it is not too much to say that there is no work in any literature that produces a profounder impression of sincerity. No writer shows a juster scorn of all mere rhetoric and exaggeration. No one shows truer courage, not marred by irreverence, in confronting the great problems of human destiny, or greater strength in triumphing over human weakness. No one shows a truer humanity and a more tender sympathy with natural sorrow.

The peculiarity of the poem of Lucretius, that which makes it unique in literature, is that it is a reasoned system of philosophy, written in verse. The prosaic title De Rerum Natura, a transla- tion of the Gr. irepl 4>baeu>s, implies the subordination of the artistic to a speculative motive. As in the case of nearly all the great works of Roman literary genius, the form of the poem was borrowed from the Greeks. The rise of speculative philosophy in Greece was coincident with the beginning of prose composition, and many of the earliest philosophers wrote in the prose of the Ionic dialect ; others, however, and especially the writers of the Greek colonies in Italy and Sicily, expounded their systems in continuous poems composed in the epic hexameter. Most famous in connexion with this kind of poetry are

Xenophanes and Parmenides, the Eleatics and Empedocles of Agrigentum. The last was less important as a philosopher, but greater than the others both as a poet and a physicist. On both of these grounds he had a greater attraction to Lucretius. The fragments of the poem of Empedocles show that the Roman poet regarded that work as his model. In accordance with this model he has given to his own poem the form of a personal address, he has developed his argument systematically, and has applied the sustained impetus of epic poetry to the treatment of some of the driest and abstrusest topics. Many ideas and expressions of the Sicilian have been reproduced by the Roman poet; and the same tone of

impassioned solemnity and melancholy seems to have pervaded both works. But Lucretius, if less original as a thinker, was probably a much greater poet than Empedocles. What chiefly distinguishes him from his Greek prototypes is that his purpose is rather ethical than purely speculative; the zeal of a teacher and reformer is more strong in him than even the intellectual passion of a thinker. His speculative ideas, his moral teaching and his poetical power are indeed interdependent on one another, and this interdependence is what mainly constitutes their power and interest. But of the three claims which he makes to immortality, the importance of his subject, his desire to liberate the mind from the bonds of superstition and the charm and lucidity of his poetry— that which he himself regarded as supreme was the second. The main idea of the poem is the irreconcilable opposition between the truth of the laws of nature and the falsehood of the old superstitions. But, further, the happiness and the dignity of life are regarded by him as absolutely dependent on the acceptance of the true and the rejection of the false doctrine. In the Epicurean system of philosophy he believed that he had found the weapons by which this war of liberation could be most effectually waged. Following Epicurus he sets before himself the aim of finally crushing that fear of the gods and that fear of death resulting from it which he regards as the source of all the human ills. Incidentally he desires also to purify the heart from other violent passions which corrupt it and mar its peace. But the source even of these — the passions of ambition and avarice — he finds in the fear of death; and that fear he resolves into the fear of eternal punishment after death.

The selection of his subject and the order in which it is treated are determined by this motive. Although the title of the poem implies that it is a treatise on the ” whole nature of things,” the aim of Lucretius is to treat only those branches of science which are necessary to clear the mind from the fear of the gods and the terrors of a future state. In the two earliest books, accordingly, he lays down and largely

illustrates the first prin- ciples of being with the view of showing that the world is not governed by capricious agency, but has come into existence, continues in existence, and will ultimately pass away in accord- ance with the primary conditions of the elemental atoms which, along with empty space, are the only eternal and immutable substances. These atoms are themselves infinite in number but limited in their varieties, and by their ceaseless movement and combinations during infinite time and through infinite space the whole process of creation is maintained. In the third book he applies the principles of the atomic philosophy to explain the nature of the mind and vital principle, with the view of showing that the soul perishes with the body. In the fourth book he discusses the Epicurean doctrine of the images, which are cast from all bodies, and which act either on the senses or immediately on the mind, in dreams or waking visions, as affording the ex- planation of the belief in the continued existence of the spirits of the departed. The fifth book, which has the most general interest, professes to explain the process by which the earth, the sea, the sky, the sun, moon and stars, were formed, the origin of life, and the gradual advance of man from the most savage to the most civilized condition. All these topics are treated with the view of showing that the world is not itself divine nor directed by divine agency. The sixth book is devoted to the explanation, in accordance with natural causes, of some of the more abnormal phenomena, such as thunderstorms, volcanoes, earthquakes, &c, which are special causes of supernatural terrors.

The consecutive study of the argument produces on most readers a mixed feeling of dissatisfaction and admiration. They are repelled by the dryness of much of the matter, the unsuitable- ness of many of the topics discussed for poetic treatment, the arbitrary assumption of premises, the entire failure to establish the connexion between the concrete phenomena which the author professes to explain and these assumptions, and the erroneousness of many of the doctrines which are stated with dogmatic confidence. On the other hand, they are constantly impressed by his power of reasoning both deductively and inductively, by the subtlety and fertility of invention with which

he applies analogies, by the clearness and keenness of his observa- tion, by the fulness of matter with which his mind is stored, and by the consecutive force, the precision and distinctness of his style, when employed in the processes of scientific exposition. The first two books

enable us better than anything else in ancient literature to appreciate the boldness and, on the whole, the reasonableness of the ancient mind in forming hypotheses on great matters that still occupy the investigations of physical science. The third and fourth books give evidence of acuteness in psychological analysis; the fourth and sixth of the most active and varied observation of natural phenomena; the fifth of original insight and strong common sense in conceiving the origin of society and the progressive advance of man to civiliza- tion. But the chief value of Lucretius as a thinker lies in his firm grasp of speculative ideas, and in his application of them to the interpretation of human life and nature. All phenomena, moral as well as material, are contemplated by him in their relation to one great organic whole, which he acknowledges under the name of ” Natura daedala rerum,” and the most beneficent manifestations of which he seems to symbolize and almost to deify in the ” Alma Venus,” whom, in apparent con- tradiction to his denial of a divine interference with human affairs, he invokes with prayer in the opening lines of the poem. In this conception of nature are united the conceptions of law and order, of ever-changing life and interdependence, of immensity, individuality, and all-pervading subtlety, under which the universe is apprehended both by his intelligence and his imagina- tion.

Nothing can be more unlike the religious and moral attitude of Lucretius than the old popular conception of him as an atheist and a preacher of the doctrine of pleasure. It is true that he denies the doctrines of a supernatural government of the world and of a future life. But his arguments against the first are really only valid against the limited and unworthy concep- tions of divine agency involved in the ancient religions; his denial of the second is prompted by his vital realization of all that is meant by the arbitrary infliction of eternal torment after death. His war with the popular beliefs of his time is waged, not in the interests of licence, but in vindication of the sanctity of human feeling. The cardinal line of the poem,

” Tantum religio potuit suadere malorum,”

is elicited from him as his protest against the sacrifice of Iphigenia by her father. But in his very denial of a cruel, limited and capricious agency of the gods, and in his imaginative recognition of an orderly, all-pervading, all-regulating power, we find at least a nearer approach to the higher conceptions of modern theism than in any of the other imaginative conceptions of ancient poetry and art. But his conception even of the ancient gods and of their indirect influence on human life is more worthy than the popular one. He conceives of them as living a life of eternal peace and exemption from passion, in a world of their

own; and the highest ideal of man is, through the exercise of his reason, to realize an image of this life. Although they are conceived of as unconcerned with the interest of our world, yet influences are supposed to emanate from them which the human heart is capable of receiving and assimilating. The effect of unworthy conceptions of the divine nature is that they render a man incapable of visiting the temples of the gods in a calm spirit, or of receiving the emanations that ” announce the divine peace ” in peaceful tranquillity. The supposed ” atheism ” of Lucretius proceeds from a more deeply reverential spirit than that of the majority of professed believers in all times.

His moral attitude is also far removed from that of ordinary ancient Epicureanism or of modern materialism. Though he acknowledges pleasure to be the law of life, yet he is far from regarding its attainment as the end of life. What man needs is not enjoyment, but ” peace and a pure heart.” The victory to be won by man is the triumph over fear, ambition, passion, luxury. With the conquest over these nature herself supplies all that is needed for happiness. Self-control and renunciation are the lessons which he preaches.

It has been doubted whether Cicero, 1 in his short criticism in the letter already referred to, concedes to Lucretius both the gifts of genius and the accomplishment of art or only one of them. Readers of a later time, who could compare his work with the finished works of the Augustan age, would certainly disparage his art rather than his power. But with Cicero it was different. He greatly admired, or professed to admire, the genius of the early Roman poets, vfhile he shows indifference to the poetical genius of his younger contemporaries. Yet he could not have been insensible to the immense superiority in rhythmical smoothness which the hexameter of Lucretius has over that of Ennius and Lucilius. And no reader of Lucretius can doubt that he attached the greatest importance to artistic execution, and that he took a great pleasure, not only in ” the long roll of his hexameter,” but also in producing the effects of alliteration, assonance,’ &c, which are so marked a peculiarity in the style of Plautus and the earlier Roman poets. He allows his taste for these tricks of style to degenerate into mannerism. And this is the only drawback to the impression of absolute spontaneity which his style produces. He was unfortunate in living before the natural rudeness of Latin art had been successfully grappled with. His only important precursors in serious poetry were Ennius and Lucilius, and, though he derived from the first of these an impulse to shape the Latin tongue into a fitting vehicle for the expression of elevated emotion and imaginative conception, he could find in neither a guide to follow in

the task he set before himself. The difficulty and novelty of his task enhances our sense of his power. His finest passages are thus characterized by a freshness of feeling and enthusiasm of discovery. But the result of these conditions and of his own inadequate conception of the proper limits of his art is that his best poetry is clogged with a great mass of alien matter, which no treatment in the world could have made poetically endurable. (W.Y.S.)

Authorities. — The two most ancient manuscripts of Lucretius, O and Q, are both at Leiden, one being a folio {oblongus) and the other a quarto (quadratus). Upon these alone the modern texts are founded. The scientific editing of the text began with C. C. Lach- raann (1852) whose work still holds the field. The most important commentary is that of H. A. J. Munro (4th ed., 1886) with a prose translation. For the earlier editions it is sufficient to refer to the account in Munro's Introduction, vol. i. pp. 3 sqq. Giussani's com- plete edition (with Italian notes, 1896) and R. Heinze's edition of book iii. (1897) are also of value. So too are A. Brieger's numerous contributions in German periodicals and his text in the Teubner series (2nd ed., 1899).

The philosophy of Lucretius has been much studied in recent times. Amongst special treatises may be mentioned K. H. Usener's Epicurea (1887); J. Woltjer's Lucretii philosophia cum fontibus comparata (•877); John Masson's Atomic Theory of Lucretius (1884) and Lucretius: Epicurean and Poet (1909) ; and several papers and treatises by Brieger and Giussani.

On the characteristics of the poet as a whole, C. Martha's Le Poeme de Lucrece (4th ed., Paris, 1885) and W. Y. Sellar in chaps, xi. sqq. of the Roman Poets of the Republic, may be consulted. There are useful bibliographies in W. S. Teuffel's History of Roman Literature (English trans, by G. C. W. Warr) and Martin v. Schanz's Geschichte der rbmischen Litteratur.

The following translations into English verse are known : T. Creech (1683), J. M. Good (1805), T. Busby (1813), C. F.Johnson (New York, 1872), T. C. Baring (1884). There is also a translation by Cyril Bailey (Oxford, 1910).

LUCRINUS LACUS, or Lucrine Lake, a lake of Campania, Italy, about 5 m. to the N. of Lake Avernus, and only separated from the sea (Gulf of Pozzuoli) by a narrow strip of land, traversed by the coast road, Via Herculanea, which runs on an embank- ment, the construction of which was traditionally attributed to Heracles in Strabo's time — and the modern railway. Its size has been much reduced by the rise of the

crater of the Monte- nuovo in 1538. Its greatest depth is about 15 ft. In Roman days its fisheries were important and were let out by the state

1 Ad Q. Fralr. ii. 9 (11), 13. Both sense and words have been much disputed. The general sense is probably that given by the following restoration, ” Lucretii poemata, ut scribis, ita sunt multis hominibus ingenii multae etiam (MSS. tamen) artis, sed cum ad umbilicum (omitted in MSS.) veneris, virum te putabo, si Sallustii Empedoclea legeris, hominem non putabo.” This would concede Lucretius both genius and art, but imply at the same time that he was not easy reading.

to contractors. Its oyster-beds were, as at the present day, re- nowned; their foundation is attributed to one Sergius Orata, about 100 B.C. It was also in favour as a resort for pleasure excursions from Baiae (cf. Martial i. 63), and its banks were covered with villas, of which the best known was Cicero’s Academia, on the E. bank. The remnants of this villa, with the village of Tripergola, disappeared in 1538.

See J. Beloch, Campanien, ed. 2 (Breslau, 1890), 172. LUCULLUS, the name of a Roman plebeian family of the Licinian gens. By far the most famous of its members was Lucius Licinius Lucullus (c. 110-56), surnamed Ponticus from his victories in Asia Minor over Mithradates VI. of Pontus. His father, of the same name, had held an important military command in Sicily, but on his return to Rome he was prosecuted on a charge of bribery and condemned to exile. His mother was Caecilia, of the family of the Metelli, and sister of Quintus Caecilius Metellus Numidicus. Early in life he attached himself to the party of Sulla, and to that party he remained constant. He attracted Sulla’s notice in the Social War (90) and in 88, when Sulla was appointed to the command of the war against Mithradates, accompanied him as quaestor to Greece and Asia Minor. While Sulla was besieging Athens, Lucullus raised a fleet and drove Mithradates out of the Mediterranean. He won a brilliant victory off Tenedos, and had he been more of a patriot and less of a party man he might have ended a perilous war. In 84 peace was concluded with Mithradates. Sulla returned to Rome, while Lucullus remained in Asia, and by wise and generous financial reforms laid the foundation of the prosperity of the province. The result of his policy was that he became extremely popular with the provincials, but offended many of the publicani, a

powerful class which farmed the public revenue. In 80 he returned to Rome as curule aedile, in which capacity he exhibited games of exceptional magnificence. Soon after- wards (77) he was elected praetor, and was next appointed to the province of Africa, where he again won a good name as a just and considerate governor. In 74 he became consul, and went to Asia at the head of about 30,000 foot and 2000 horse, to defend the province of Bithynia against Mithradates, who was besieging his colleague, Marcus Aurelius Cotta, in Chalcedon on the Propontis. Mithradates was forced to retire along the sea-coast till he halted before the strong city of Cyzicus, which he besieged. Lucullus, however, cut off his communications on the land side, and, aided by bad weather, forced him to raise the siege. In the autumn of 73 Lucullus marched to Cabeira or Neocaesarea, where the king had gone into winter quarters with a vague hope that his son-in-law, Tigranes, king of Armenia, and possibly even the Parthians, might come to his aid. Al- though the forces of Mithradates were far superior in numbers, his troops were no match for the Roman legionaries. A large detachment of his army having been cut up by one of Lucullus's lieutenant-generals, the king decided on instant retreat. The retreat soon became a disorderly flight, Mithradates himself escaping with difficulty into Lesser Armenia.

Thus Pontus, with the exception of some of the maritime cities, such as Sinope, Heraclea and Amisus, became Roman territory. Two years were occupied in the capture of these strongholds, while Lucullus busied himself with a general reform of the administration of the province of Asia. His next step was to demand the surrender of Mithradates and to threaten Tigranes with war in the event of refusal. In the spring of 69, at the head of only two legions, he marched through Sophene, the south-western portion of Armenia, crossed the Tigris, and pushed on to the newly-built royal city, Tigranocerta, situated on one of the affluents of that river. A motley host, made up out of the tribes bordering on the Black Sea and the Caspian, hovered round his small army, but failed to hinder him from laying siege to the town. Lucullus showed consummate military capacity, contriving to maintain the siege and at the same time to give battle to the enemy's vastly superior forces. There might now have been peace but for the interference of Mithradates, who pressed Tigranes to renew the war and to seek the aid and alliance of Parthia. The Parthian king, however, preferred a

treaty with Rome to a treaty with Armenia, and desired simply to have the Euphrates recognized as his western boundary. Mithradates next appealed to the national spirit of the peoples of the East generally, and endeavoured to rouse them to a united effort. The

position of Lucullus was critical. The home govern- ment was for recalling him, and his army was disaffected. Nevertheless, though continually harassed by the enemy, he persisted in marching northwards from Tigranocerta over the high table-land of central Armenia, in the hope of reaching Artaxata on the Araxes. But the open mutiny of his troops compelled him to recross the Tigris into the Mesopotamian valley. Here, on a dark tempestuous night, he surprised and stormed Nisibis, the capital of the Armenian district of Meso- potamia, and in this city, which yielded him a rich booty, he found satisfactory winter quarters. Meantime Mithradates was again in Pontus, and in a disastrous engagement at Ziela the Roman camp was taken and the army slaughtered to a man. Lucullus was obliged to retreat into Asia Minor, leaving Tigranes and Mithradates masters of Pontus and Cappadocia. The work of eight years of war was undone. In 66 Lucullus was superseded by Pompey. He had fairly earned the honour of a triumph, but his powerful enemies at Rome and charges of maladministration, to which his immense wealth gave colour, caused it to be deferred till 63. From this time, with the exception of occasional public appearances, he gave himself up to elegant luxury, with which he combined a sort of dilettante pursuit of philosophy, literature and art. As a general he does not seem to have possessed the entire confidence of his troops, owing probably to his natural hauteur and the strict discipline which he imposed on them. The same causes made him unpopular with the Roman capitalists, whose sole object was the accumulation of enormous fortunes by farming the revenue of the provinces.

Among the Roman nobles who revelled in the newly acquired riches of the East, Lucullus stood pre-eminent. His park and pleasure grounds near Rome, and the costly and laborious works in his parks and villas at Tusculum, near Naples, earned for him from Pompey (it is said) the title of the ” Roman Xerxes.” On one of his luxurious entertainments he is said to have spent upwards of £2000. He was a liberal patron of Greek philosophers and men of letters, and he collected a valuable library, to which such men had free access. He himself is said to have been a student of Greek literature, and to have written a history of the Marsian war in Greek, inserting solecisms to show that he was a Roman. He was one of the interlocutors in Cicero’s Academica, the second book (first edition) of which was called Lucullus. Sulla also entrusted him with the revision of his Memoirs. The introduction of the cherry-tree from Asia into Europe is attri- buted to him. It appears that he became mentally feeble some years before his death, and was obliged to surrender the manage- ment of his affairs to his brother Marcus. The usual funeral panegyric was pronounced on him in the

Forum, and the people would have had him buried by the side of Sulla in the Campus Martius, but at his brother's request he was laid in his splendid villa at Tusculum.

See Plutarch's Lucullus; Appian's Mithridatic War; the epitomes of the lost books of Livy; and many passages in Cicero. Some allusions will also be found in Dio Cassius, Pliny and Athenaeus. For the Mithradatic wars, see bibliography under Mithradates (VI. of Pontus) ; and generally G. Boissier, Cicero and his Friends (Eng: trans, by A. D. Jones, 1897); H. Peter, Hist. Rom. Reliquiae, i. p. cclxxxv. ; W. Drumann, Geschichte Roms, iv. His Elogium is given in C.I.L. i. 292.

His brother, Marcus Licinius Lucullus, was adopted by Marcus Terentius Varro, and was hence known as Marcus Terentius Varro Lucullus. In 82 B.C. he served under Sulla against Marius. In 79 he was curule aedile with his brother, in 77 praetor, in 73 consul with Gaius Cassius Varus. When praetor he forbade the carrying of arms by slaves, and with his colleague in the consulship passed the lex Terenlia Cassia, to give authority for purchasing corn with the public money and retailing it at a fixed price at Rome. As proconsul in Macedonia he made war with great cruelty against the Dardani and Bessi, and compelled them to acknowledge the supremacy of Rome.

LUCUS FERONIAE— LUDENSCHEID

in

Having enjoyed a triumph, he was sent out to the East to settle the affairs of the provinces conquered by his brother. He sided with Cicero during the Catilinarian conspiracy, did his utmost to prevent his banishment, and subsequently supported his claim for the restoration of his house. He was one of the better representatives of the optimates, and enjoyed some reputation as an orator.

See Cicero, De Domo, 52; Pro Tullio, 8; In Verrem, iii. 70, v. 21 ; Florus, iii. 4, 7; Ammianus Marcellinus xxvii. 4, 11; Plutarch, Sulla, 27; Lucullus, 35, 36, 43; Orelli's Onomasticon Tullianum.

LUCUS FERONIAE, an ancient shrine in Etruria. It was visited both by Latins and Sabines even in the time of Tullus Hostilius and was plundered by Hannibal in 211 B.C. It was undoubtedly in the territory of Capena {q.v.); but in imperial times it became an independent community receiving a colony of Octavian's veterans (Colonia Iulia felix Lucoferensis) and possessing an amphitheatre. Its site has been disputed. Some authorities place it on the Colle Civitucola (but see

Capena), others at the church of S. Abbondio near Rignano, others (and probably rightly) at Nazzano, which was reached by a branch road from the Via Flaminia, where remains of a circular temple have been found.

See E. Bormann in Corp. Inscr. Lai. xi. 569 sqq.; H. Nissen, Ilalische Landeskunde, ii. 369 sqq. (T. As.)

LUCY, RICHARD DE (d. 1179), called the “loyal,” chief justiciar of England, appears in the latter part of Stephen’s reign as sheriff and justiciar of the county of Essex. He became, on the accession cf Henry II., chief justiciar conjointly with Robert de Beaumont, earl of Leicester; and after the death of the latter (11 68) held the office without a colleague for twelve years. The chief servant and intimate of the king he was among the first of the royal party to incur excommunication in the Becket controversy. In 11 73 he played an important part in suppressing the rebellion of the English barons, and commanded the royalists at the battle of Fornham. He resigned the justiciar- ship in 1 1 79, though pressed by the king to continue in office, and retired to Lesues Abbey in Kent, which he had founded and where he died. Lucy’s son, Godfrey de Lucy (d. 1204), was bishop of Winchester from n 89 to his death in September 1204; he took a prominent part in public affairs during the reigns of Henry II., Richard I. and John.

See J. H. Round, Geoffrey de Mandeville (1892) ; Sir J. H. Ramsay, Angevin Empire (1903) ; and VV. Stubbs, Constitutional History, vol. i.

LUCY, SIR THOMAS (1532-1600), the English Warwickshire squire who is traditionally associated with the youth of William Shakespeare, was born on the 24th of April 1532, the son of William Lucy, and was descended, according to Dugdale, from Thurstane de Cherlecote, whose son Walter received the village of Charlecote from Henry de Montfort about 1190. Walter is said to have married into the Anglo-Norman family of Lucy, and his son adopted the mother’s surname. Three of Sir Thomas Lucy’s ancestors had been sheriffs of Warwickshire and Leicester- shire, and on his father’s death in 1552 he inherited Sherborne and Hampton Lucy in addition to Charlecote, which was rebuilt for him by John of Padua, known as John Thorpe, about 1558. By his marriage with Joyce Acton he inherited Sutton Park in Worcestershire, and became in 1586 high sheriff of the county. He was knighted in 1365- He is said to have been under the tutorship of John Foxe, who is supposed to have imbued his pupil with the Puritan principles which he displayed as knight of the shire

for Warwick in the parliament of 1571 and as sheriff of the county, but as Mrs Carmichael Stopes points out Foxe only left Oxford in 1545, and in 1547 went up to London, so that the connexion must have been short. He often appeared at Straff ord-on- Avon as justice of the peace and as commissioner of musters for the county. As justice of the peace he showed great zeal against the Catholics, and took his share in the arrest of Edward Arden in 1583. In 1585 he introduced into parlia- ment a bill for the better preservation of game and grain, and his reputation as a preserver of game gives some colour to the Shakespearian tradition connected with his name. Nicholas Rowe, writing in 1 7 10, told a story that Lucy prosecuted Shake- speare for deer-s*

Shakespeare aggravated the offence by writing a ballad on his prosecutor. The trouble arising from this incident is said to have driven Shakespeare from Stratford to London. The tale was corroborated by Archdeacon Davies of Sapperton, Gloucester- shire, who died in 1708. The story is not necessarily falsified by the fact that there was no deer park at Charlecote at the time, since there was a warren, and the term warren legally covers a preserve for other animals than hares or rabbits, roe-deer among others. Shakespeare is generally supposed to have caricatured the local magnate of Stratford in his portrait of Justice Shallow, who made his first appearance in the second part of Henry IV., and a second in the Merry Wives of Windsor. Robert Shallow is a justice of the peace in the county of Glou- cester and his ancestors have the dozen white luces in their coats, the arms of the Lucys being three luces, while in Dug- dale's Warwickshire (ed. 1656) there is drawn a coat-of-arms in which these are repeated in each of the four quarters, making twelve in all. There are many considerations which make it unlikely that Shallow represents Lucy, the chief being the note- worthy difference in their circumstances. Lucy died at Charle- cote on the 7th of July 1600. His grandson, Sir Thomas Lucy (1 585-1640), was a friend of Lord Herbert of Cherbury, and was eulogized by John Davies of Hereford ini6io. The Charlecote estates eventually passed to the Rev. John Hammond through his marriage with Alice Lucy, and in 1789 he adopted the name of Lucy.

For a detailed account of Sir Thomas Lucy, with his son and grand- son of the same name, see Mrs C. Carmichael Stopes, Shakespeare's Warwickshire Contemporaries (2nd ed., 1907). Cf. also an article by Mrs Stopes in the Fortnightly Review (Feb. 19*03), entitled " Sir Thomas Lucy not the Original of Justice Shallow," and J. O. Halli- well-Phillipps, Observations on the Charlecote Traditions (Brighton,

1887).

LUDDITES, the name given to organized bands of English rioters for the destruction of machinery, who made their first appearance in Nottingham and the neighbouring districts to- wards the end of 181 1. The origin of the name is given in Pellew's Life of Lord Sidmouth (iii. 80). In 1779 there lived in a village in Leicestershire a person of weak intellect, called Ned Ludd, who was the butt of the boys of the village. On one occasion Ludd pursued one of his tormentors into a house where were two of the frames used in stocking manufac- ture, and, not being able to catch the boy, vented his anger on the frames. Afterwards, whenever any frames were broken, it became a common saying that Ludd had done it. The riots arose out of the severe distress caused by the war with France. The leader of the riotous bands took the name of " General Ludd." The riots were specially directed against machinery because of the widespread prejudice that its use produced a scarcity in the demand for labour. Apart from this prejudge, it was inevitable that the economic and social revolution implied in the change from manual labour to work by machinery should give rise to great misery. The riots began with the destruction of stocking and lace frames, and, continuing through the winter and the following spring, spread into Yorkshire, Lancashire, Derbyshire and Leicestershire. They were met by severe repressive legislation, introduced by Lord Liverpool's govern- ment, a notable feature in the opposition to, which was Lord Byron's speech in the House of Lords. In 1816 the rioting was resumed, caused by the depression which followed the peace of 181 5 and aggravated by one of the worst of recorded harvests. In that year, although the centre of the rioting was again in Nottingham, it extended over almost the whole kingdom. The rioters were also thoroughly organized. While part of the band destroyed the machinery, sentinels were posted to give warning of the approach of the military. Vigorous repressive measures, and, especially, reviving prosperity, brought the movement to an end.

See G. Pellew, Life and Correspondence of H. Addington, isl Viscount Sidmouth (London, 1847); Spencer Walpole, History of England, vol. i. (London, 1890); and the Annual Register for 1811, 1812 and 1816.

LUDENSCHEID, a town in the Prussian province of West- phalia, 19 m. by rail S.S.E. of Hagen. Pop. (1905) 28,921. It

is the seat of various hardware manufactures, among them metal-plated and tin-plated goods, buckles, fancy nails and brooches, and

has iron-foundries and machine shops. From the counts of" Altena Liidenscheid passed to the counts of the Mark, with which district it was ceded to Brandenburg early in the 17th century.

LUDHIANA, a town and district of British India, in the Jullundur division of the Punjab. The town is 8 m. from the present left bank of the Sutlej, 228 m. by rail N.W. of Delhi. Pop. (1001) 48,649. It is an important centre of trade in grain, and has manufactures of shawls, &c, by Kashmiri weavers, and of scarves, turbans, furniture and carriages. There is an American Presbyterian mission, which maintains a medical school for Christian women, founded in 1894.

The District or Ludhiana lies south of the river Sutlej, and north of the native states of Patiala, Jind, Nabha and Maler Kotla. Area 1455 sq. m. The district consists for the most part of a broad plain, without hills or rivers, stretching north- ward from the native borders to the ancient bed of the Sutlej. The soil is a rich clay, broken by large patches of shifting sand. On the eastern edge, towards Umballa, the clay is covered by a bed of rich mould, suitable for the cultivation of cotton and sugar-cane. Towards the west the sand occurs in union with the superficial clay, and forms a light friable soil, on which cereals form the most profitable crop. Even here, however, the earth is so retentive of moisture that good harvests are reaped from fields which appear mere stretches of dry and sandy waste. These southern uplands descend to the valley of the Sutlej by an abrupt terrace, which marks the former bed of the river. The principal stream has shifted to the opposite side of the valley, leaving an alluvial strip, 10 m. in width, between its ancient and its modern bed. The Sutlej itself is here only navigable for boats of small burden. A branch of the Sirhind canal irrigates a large part of the western area. The population in 1901 was 673,097. The principal crops are wheat, millets, pulse, maize and sugar-cane. The district is crossed by the main line of the North-Western railway from Delhi to Lahore, with two branches.

During the Mussulman epoch, the history of the district is bound up with that of the Rais of Raikot, a family of converted Rajputs, who received the country as a fief under the Sayyid dynasty, about 1445. The town of Ludhiana was founded in 1480 by two of the Lodi race (then ruling at Delhi), from whom it derives its name, and was built in great part from the pre- historic bricks of Sunet. The Lodis continued in possession until 1620, when it again fell into the hands of the Rais of Raikot. Throughout the palmy days of the Mogul empire the Raikot family held sway, but the Sikhs took advantage of the troubled period which accompanied the Mogul decadence to establish their supremacy south of the Sutlej. Several of their chieftains made encroachments on

the domains of the Rais, who were only able to hold their own by the aid of George Thomas, the famous adventurer of Hariana. In 1806 Ranjit Singh crossed the Sutlej and reduced the obstinate Mahommedan family, and distributed their territory amongst his co-religionists. Since the British occupation of the Punjab, Ludhiana has grown in wealth and population.

See Ludhiana District Gazetteer (Lahore, I907).

LUDIN6T0N, a city and the county-seat of Mason county, Michigan, U.S.A., on Lake Michigan, at the mouth of the Mar- quette river, about 85 m. N.W. of Grand Rapids. Pop. (1900) 7166 (2259 foreign-born); (1904, state census) 7259; (1910) 9132. It is served by the Pere Marquette, and the Ludington and Northern railways, and by steamboat lines to Chicago, Mil- waukee and other lake ports. To Manitowoc, Milwaukee, Kewanee and Two Rivers, Wisconsin, on the W. shore of Lake Michigan, cars, especially those of the Pere Marquette railway, are ferried from here. Ludington was formerly well known as a lumber centre, but this industry has greatly declined. There are various manufactures, and the city has a large .grain trade. On the site of the city Pere Marquette died and was buried, but his body was removed within a year to Point St Ignace. Luding-

ton was settled about 1859, and was chartered as a city in 1873. It was originally named Pere Marquette, but was renamed in 1871 in honour of James Ludington, a local lumberman.

LUDLOW, EDMUND (c. 1617-1692), English parliamentarian, son of Sir Henry Ludlow of Maiden Bradley, Wiltshire, whose family had been established in that county since the 1 5th century, was born in 161 7 or 1618. He went to Trinity College, Oxford, and was admitted to the Inner Temple in 1638. When the Great Rebellion broke out, he engaged as a volunteer in the life guard of Lord Essex. His first essay in arms was at Worcester, his next at Edgehill. He was made governor of Wardour Castle in 1643, but had to surrender after a tenacious defence on the 18th of March 1644. On being exchanged soon afterwards, he engaged as major of Sir A. Hesilrige's regiment of horse. He was present at the second battle of Newbury, October 1644, at the siege of Basing House in November, and took part in an expedition to relieve Taunton in December. In January his regiment was surprised by Sir M. Langdale, Ludlow himself escaping with difficulty. In 1646 he was elected M.P. for Wilts in the room of his father and attached himself to the republican party. He opposed the negotiations with the king, and was one of the chief promoters of Pride's Purge in 1648. He was one of the king's judges, and signed the

warrant for his execution. In February he was elected a member of the council of state. In January 1651 Ludlow was sent into Ireland as lieutenant-general of horse, holding also a civil commission. Here he spared neither health nor money in the public service. Ireton, the deputy of Ireland, died on the 26th of November 1651; Ludlow then held the chief command, and had practically completed the conquest of the island when he resigned his authority to Fleetwood in October 1652. Though disapproving Cromwell's action in dissolving the Long Parliament, he maintained his employment, but when Cromwell was declared Protector he declined to acknowledge his authority. On returning to England in October 1655 he was arrested, and on refusing to submit to the government was allowed to retire to Essex. After Oliver Cromwell's death Ludlow was returned for Hindon in Richard's parliament of 1659, but opposed the continuance of the protectorate. He sat in the restored Rump, and was a member of its council of state and of the committee of safety after its second expulsion, and a commissioner for the nomination of officers in the army. In July he was sent to Ireland as commander-in-chief. Returning in October 1659, he endeavoured to support the failing republican cause by reconciling the army to the parliament. In December he returned hastily to Ireland to suppress a movement in favour of the Long Parliament, but on arrival found himself almost without supporters. He came back to England in January 1660, and was met by an impeachment presented against liim to the restored parliament. His influence and authority had now disappeared, and all chance of regaining them vanished with Lambert's failure. He took his seat in the Convention parlia- ment as member for Hindon, but his election was annulled on the 1 8th of May. Ludlow was not excepted from the. Act of In- demnity, but was included among the fifty-two for whom punish- ment less than capital was reserved. Accordingly, on the proclamation of the king ordering the regicides to come in, Ludlow emerged from his concealment, and on the 20th of June surrendered to the Speaker; but finding that his life was not assured, he succeeded in escaping to Dieppe, travelled to Geneva and Lausanne, and thence to Vevey, then under the protection of the canton of Bern. There he remained, and in spite of plots to assassinate him he was unmolested by the government of that canton, which had also extended its protection to other regicides. He steadily refused during thirty years of exile to have anything to do with the desperate enterprises of republican plotters. But in 1689 he returned to England, hoping to be employed in Irish affairs. He was however remembered only as a regicide, and an address from the House of Commons was presented to William III. by Sir Edward Seymour, requesting the king to issue a proclamation for his arrest. Ludlow escaped again, and returned to

Vevey, where he died in 1692. A monu- ment raised to his memory by his widow is in the church of

St Martin. Over the door of the house in which he lived was placed the inscription ” Omne solum forti patria, quia Patris.” Ludlow married Elizabeth, daughter of William Thomas, of Wenvoe, Glamorganshire, but left no issue.

His Memoirs, extending to the year 1672, were published in 1698-1699 at Vevey and have been often reprinted; a new edition, with notes and illustrative material and introductory memoir, was issued by C. H. Firth in 1894. They are strongly partisan, but the picture of the times is lifelike and realistic. Ludlow also published ” a letter from Sir Hardress Waller … to Lieutenant-General Ludlow with his answer ” (1660), in defence of his conduct in Ireland. See C. H. Firth’s article in Diet. Nat. Biog. ; Guizot’s Monk’s Contempo- raries ; A. Stein’s Brief e Englischer Fliichtlinge in der Schweiz.

LUDLOW, a market town and municipal borough in the Ludlow parliamentary division of Shropshire, England, on the Hereford-Shrewsbury joint line of the Great Western and London & North Western railways, 162 m. W.N.W. from London. Pop. (1901) 4552. It is beautifully situated at the junction of the rivers Teme and Corve, upon and about a wooded eminence crowned by a massive ruined castle. Parts of this castle date from the nth century, but there are many additions such as the late Norman circular chapel, the Decorated state rooms, and details in Perpendicular and Tudor styles. The parish church of St Lawrence is a cruciform Perpendicular building, with a lofty central tower, and a noteworthy east window, its isth-century glass showing the martyrdom of St Lawrence. There are many fine half-timbered houses of the 17th century, and one of seven old town-gates remains. The grammar school, founded in the reign of John, was incorporated by Edward I. The principal public buildings are the guildhall, town-hall and market-bouse, and public rooms, which include a museum of natural history. Tanning and flour-milling are carried on. The town is governed by a mayor, 4 aldermen and 1 2 councillors. Area 416 acres.

The country neighbouring Ludlow is richly wooded and hilly, while the scenery of the Teme is exquisite. Westward, Vinnal Hill reaches 1235 ft., eastward lies Titterstone Clee (1749 ft.). Richard’s Castle, 3

m. S. on the borders of Herefordshire, dates from the reign of Edward the Confessor, but little more than its great artificial mound remains. At Bromfield, 3 m. above Ludlow on the Teme, the church and some remains of domestic buildings belonged to a Benedictine monastery of the 12th century.

Ludlow is supposed to have existed under the name of Dinan in the time of the Britons. Eyton in his history of Shropshire identifies it with one of the ” Ludes ” mentioned in the Domesday Survey, which was held by Roger de Lacy of Osbern FitzRichard and supposes that Roger built the castle soon after 1086, while a chronicle of the FitzWarren family attributes the castle to Roger earl of Shrewsbury. The manor afterwards belonged to the Lacys, and in the beginning of the 14th century passed by marriage to Roger de Mortimer and through him to Edward IV. Ludlow was a borough by prescription in the 13th century, but the burgesses owe most of their privileges to their allegiance to the house of York. Richard, duke of York, in 1450 confirmed their government by 1 2 burgesses and 24 assistants, and Edward IV. on his accession incorporated them under the title of bailiffs and burgesses, granted them the town at a fee-farm of £24, 3s. 4d., a merchant gild and freedom from toll. Several confirmations of this charter were granted; the last, dated 1665, continued in force (with a short interval in the reign of James II.) until the Municipal Corporations Act of 1835. By the charter of Edward IV. Ludlow returned 2 members to parliament, but in 1867 the number was reduced to one, and in 1885 the town was disfranchised. The market rights are claimed by the corporation under the charters of Edward IV. (1461) and Edward

VI. (1552). The court of the Marches was established at Ludlow in the reign of Henry VII., and continued to be held here until it was abolished in the reign of William III. Ludlow castle was granted by Edward IV. to his two sons, and by Henry

VII. to Prince Arthur, who died here in 1502. In 1634 Milton’s Comus was performed in the castle under its original style of ” A Masque presented at Ludlow Castle,” before the earl of

Bridgewater, Lord President of Wales. The castle was garrisoned in 1642 by Prince Rupert, who went there after the battle of Naseby, but in 1646 it surrendered to Parliament and was afterwards dismantled.

See Victoria County History, Shropshire; Thomas Wright, The History of Ludlow and its Neighbourhood (1826).

LUDLOW GROUP, or Ludlovian, in geology, the uppermost

subdivision of the Silurian rocks in Great Britain. This group contains the following formations in descending order: — Tilestones, Downton Castle sandstones (90 ft.), Ledbury shales (270 ft.), Upper Ludlow rocks (140 ft.), Aymestry limestone (up to 40 ft.), Lower Ludlow rocks (350 to 780 ft.). The Ludlow group is essentially shaly in character, except towards the top, where the beds become more sandy and pass gradually into the base of the Old Red Sandstone. The Aymestry limestone, which is irregular in thickness, is sometimes absent, and where the underlying Wenlock limestones are absent the shales of the Ludlow group graduate, downwards into the Wenlock shales. The group is typically developed between Ludlow and Aymestry, and it occurs also in the detached Silurian areas between Dudley and the mouth of the Severn.

The Lower Ludlow rocks are mainly grey, greenish and brown mudstones and sandy and calcareous shales. They contain an abundance of fossils. The series has been zoned by means of the graptolites by E. M. R. Wood; the following in ascending order, are the zonal forms : Monograptus vulgaris, M. Nilssoni, M. scanicus, M. tumescens and M. leintwardinensis. Cyathaspis ludensis, the earliest British vertebrate fossil, was found in these rocks at Leint- wardine in Shropshire, a noted fossil locality. Trilobites are numerous (Phacops caudatus, Lichas anglicus, Homolonotus delphinocephalus , Calymene Blumenbachii) ; brachiopods (Leptaena fhomboidalis , Rhynchonella Wilsoni, Atrypa reticularis), pelecypods (Cardiola interrupta, Ctenodonta sulcata) and gasteropods and cephalopods (many species of Orthoceras and also Gomphoceras, Trochoceras) are well represented. Other fossils are Ceratiocaris , Pterygotus, Protaster, Palaeocoma and Palaeodiscus.

The Upper Ludlow rocks are mainly soft mudstones and shales with some harder sandy beds capable of being worked as building-stones. These sandy beds are often found covered with ripple-marks and annelid tracks; one of the uppermost sandy layers is known as the ” Fucoid bed ” from the abundance of the seaweed-like impressions it bears. At the top of this sub-group, near Ludlow, a brown layer occurs, from a quarter of an inch to 4 in. in thickness, full of the frag- mentary remains of fish associated with those of Pterygotus and mol- lusca. This layer, known as the ” Ludlow Bone bed,” has been traced over a very large area (see Bone Bed). The common fossils include plants (Actinophyllum, Chondrites), ostracods, phyllocarids, eurypterids, trilobites (less common than in the older groups), numerous brachiopods (Lingula minima, Chonetes striatella), gastero- pods, pelecypods and cephalopods (Orthoceras bullatum). Fish include Cephalaspis, Cyathaspis, Auchenaspis. The Tilestones, Downton Castle

Sandstone and Ledbury shales are occasionally grouped together under the term Downtonian. They are in reality passage beds between the Silurian and Old Red Sandstone, and were originally placed in the latter system by Sir R. I. Murchison. They are mostly grey, yellow or red micaceous, shaly sandstones. Lingula cornea, Platyschisma helicites and numerous phyllocarids and ostra- cods occur among the fossils.

In Denbighshire and Merionethshire the upper portion of the Denbighshire Grits belongs to this horizon: viz. those from below upwards, the Nantglyn Flags, the Upper Grit beds, the Mono- graptus leintwardinensis beds and the Dinas Bran beds. In the Silurian area of the Lake district the Coldwell beds, forming the upper part of the Coniston Flags, are the equivalents of the Lower Ludlow; they are succeeded by the Coniston Grits (4000 ft.), the Bannisdale Slates (5200 ft.) and the Kirkby Moor Flags (2000 ft.).

In the Silurian areas of southern Scotland, the Ludlow rocks are represented in the Kirkcudbright Shore and Riccarton district by the Raeberry Castle beds and Balmae Grits (500-750 ft.). In the northern belt — Lanarkshire and the Pentland Hills — the lower portion (or Ludlovian) consists of mudstones, flaggy shales and greywackes; but the upper (or Downtonian) part is made up principally of thick red and yellow sandstones and conglomerates with green mudstones. The Ludlow rocks of Ireland include the ” Salrock beds ” of County Gal way and the ” Croagmarhin beds ” of Dingle promontory.

See Silurian, and, for recent papers, the Q.J. Geol. Soc. (London) and Geological Literature (Geol. Soc, London) annual.

LUDOLF (or Leutholf), HIOB (1624-1704), German orienta- list, was born at Erfurt on the 15th of June 1624. After studying philology at the Erfurt academy and at Leiden, he travelled in order to increase his linguistic knowledge. While in Italy he became acquainted with one Gregorius, an Abyssinian

scholar, and acquired from him an intimate knowledge of the Ethiopian language. In 1652 he entered the service of the duke of Saxe-Gotha, in which he continued until 1678, when he retired to Frankfort-on-Main. In 1683 he visited England to promote a cherished scheme for establishing trade with Abyssinia, but his efforts were

unsuccessful, chiefly through the bigotry of the authorities of the Abyssinian Church. Returning to Frankfort in 1684, he gave himself wholly to literary work, which he con- tinued almost to his death on the 8th of April 1704. In 1690 he was appointed president of the collegium imperiale historicum. The works of Ludolf, who is said to have been acquainted with twenty-five languages, include Sciagraphia historiae aethiopicae (Jena, 1676); and the Historia aethiopica (Frankfort, 1681), which has been translated into English, French and Dutch, and which was supplemented by a Commentarius (1691) and by Appendices (1693- 1694). Among his other works are: Grammatica linguae amharicae (Frankfort, 1698); Lexicon amharico-latinum (Frankfort, 1698); Lexicon aethiopico-latinum (Frankfort, 1699) ; and Grammatica aethiopica (London, 1661, and Frankfort, 1702). In his Grammatik der athiopischen Sprache (1857) August Dillmann throws doubt on the story of Ludolf ‘s intimacy with Gregorius.

See C. Juncker, Commentarius de vita et scriptis Jobi Ludolfi (Frankfort, 17 10); L. Diestel, Geschichte des alten Testaments in der christlichen Kirche (Jena, 1868); and J. Flemming, ” Hiob Ludolf,” in the Beitrage zur Assyriologie (Leipzig, 1890-1891).

LUOWIG, KARL FRIEDRICH WILHELM (1816-1895), German physiologist, was born at Witzenhausen, near Cassel, on the 29th of December 1816. He studied medicine at Erlangen and Marburg, taking his doctor’s degree at Marburg in 1839. He made Marburg his home for the next ten years, studying and teaching anatomy and physiology, first as prosector to F. L. Fick (1841), then as privat-docent (1842), and finally as extraordinary professor (1846). In 1849 he was chosen professor of anatomy and physiology at Zurich, and six years afterwards he went to Vienna as professor in the Josephinum (school for military surgeons). In 1865 he was appointed to the newly created chair of physiology at Leipzig, and continued there until his death on the 23rd of April 1895. Ludwig’s name is prominent in the history of physiology, and he had a large share in bringing about the change in the method of that science which took place about the middle of the 19th century. With his friends H. von Helmholtz, E. W. Briicke and E. Du Bois- Reymond, whom he met for the first time in Berlin in 1847, he rejected the assumption that the phenomena of living animals depend on special biological laws and vital forces different from those which operate in the domain of inorganic nature; and he sought to explain them by reference to the same laws as are applicable in the case of physical and chemical phenomena. This point of view was expressed in his celebrated Text-book of Human Physiology (1852-1856), but it is as evident in his earliest paper (1842) on the process of urinary secretion as in all his subsequent work. Ludwig

exercised enormous influence on the progress of physiology, not only by the discoveries he made, but also by the new methods and apparatus he introduced to its service. Thus in regard to secretion, he showed that secretory glands, such as the submaxillary, are more than mere niters, and that their secretory action is attended by chemical and thermal changes both in themselves and in the blood passing through them. He demonstrated the existence of a new class of secretory nerves that control this action, and by showing that if the nerves are appropriately stimulated the salivary glands continue to secrete, even though the animal be decapitated, he initiated the method of experimenting with excised organs. He devised the kymograph as a means of obtaining a written record of the variations in the pressure of the blood in the blood- vessels; and this apparatus not only conducted him to many important conclusions respecting the mechanics of the circulation, but afforded the first instance of the use of the graphic method in physiological inquiries. For the purpose of his researches on the gases in the blood, he designed the mercurial blood-pump which in various modifications has come into extensive use, and by its aid he made many investigations on the gases of the lymph, the gaseous interchanges in living muscle, the significance of oxidized material in the blood, &c. There is indeed scarcely any branch of physiology, except the physiology of the senses,

to which he did not make important contributions. He was also a great power as a teacher and the founder of a school. Under him the Physiological Institute at Leipzig became an organized centre of physiological research, whence issued a steady stream of original work; and though the papers containing the results usually bore the name of his pupils only, every investigation was inspired by him and carried out under his personal direction. Thus his pupils gained a practical acquaintance with his methods and ways of thought, and, coming from all parts of Europe, they returned to their own countries to spread and extend his doctrines. Possessed himself of extraordinary manipulative skill, he abhorred rough and clumsy work, and he insisted that experiments on animals should be planned and prepared with the utmost care, not only to avoid the infliction of pain (which was also guarded against by the use of an anaesthetic), but to ensure that the deductions drawn from them should have their full scientific value.

LUDWIG, OTTO (1813-1865), German dramatist, novelist and critic, was born at Eisfeld in Thuringia, on the nth of February 1813. His father, who was syndic of Eisfeld, died when the boy was twelve years old, and he was brought up amidst uncongenial conditions. He had devoted his leisure to poetry and music, which unfitted him for the

mercantile career planned for him. The attention of the duke of Meiningen was directed to one of his musical compositions, an opera, Die Kohlerin, and Ludwig was enabled in 1839 to continue his musical studies under Mendelssohn in Leipzig. But ill-health and constitutional shyness caused him to give up a musical career, and he turned exclusively to literary studies, and wrote several stories and dramas. Of the latter, Der Erbforster (1850) attracted immediate attention as a masterly psychological study. It was followed by Die MakkabUer (1852), in which the realistic method of Der Erbforster was transferred to an historical milieu, which allowed more brilliant colouring and a freer play of the imagina- tion. With these tragedies, to which may be added Die Rechte des Herzens and Das Fraulein von Scuderi, the comedy Hans Frey, and an unfinished tragedy on the subject of Agnes Bernauer, Ludwig ranks immediately after Hebbel as Germany's most notable dramatic poet at the middle of the 19th century. Meanwhile he had married and settled permanently in Dresden, where he turned his attention to fiction. He published a series of admirable stories of Thuringian life, characterized by the same attention to minute detail and careful psychological analysis as his dramas. The best of these are Die Heiteretei und ihr Widerspiel (1851), and Ludwig's masterpiece, the power- fulnovel, Zwischen Himmel und Erde (1855). In bis Shakes peare- Studien (not published until 1891) Ludwig showed himself a dis- criminating critic, with a fine insight into the hidden springs of the creative imagination. So great, however, was his enthusiasm for Shakespeare, that he was led to depreciate Schiller in a way which found little favour among his countrymen. He died at Dresden on the 25th of February 1865.

Ludwig's Gesammelte Schriften were published by A. Stern and E. Schmidt in 6 vols. (1891-1892) ; also by A. Bartels (6 vols., 1900). See A. Stern, Otto Ludwig, ein Dicltlerleben (1891; 2nd ed., 1906), and A. Sauer, Otto Ludwig (1893).

LUDWIGSBURG, a town in the kingdom of Wurttemberg, 9 m. to the N. of Stuttgart by rail and ij m. from the river Neckar. Pop. (1905) 23,093. It was founded and laid out at the beginning of the 18th century by the duke of Wurttemberg, Eberhard Louis, and was enlarged and improved by Duke Charles Eugene. Constructed as the adjunct of a palace the town bears the impress of its origin, with its straight streets and spacious squares. It is now mainly important as the chief military depot in Wurttemberg. The royal palace, one of the finest in Germany, stands in a beautiful park and contains a portrait gallery and the burial vault of the rulers of Wurttemberg. The industries include the manufacture of organs and pianos, of cotton, woollen and linen goods, of chemicals, iron and wire goods, and

brewing and brick-making. In the vicinity is the beautiful royal residence of Monrepos, which is connected with the park of Ludwigsburg by a fine avenue of lime trees. From 1758 to

1824 the town was famous for the production of a special kind of porcelain.

See Belschner, Ludwigsburg in zwei Jahrhunderten (Ludwigsburg,

1904).

LUDWIGSHAFEN, a town of Germany, in the Bavarian Palatinate, on the left bank of the Rhine, immediately opposite to Mannheim, with which it is connected by a steam ferry and a railway bridge. Pop. (1885) 21,042, (1900) 61,905, (1905) 72,168. It has an increasing trade in iron, timber, coal and agricultural products, a trade which is fostered by a harbour opened in 1897; and also large factories for making aniline dyes and soda. Other industries are the manufacture of cellulose, artificial manure, flour and malt; and there are saw-mills, iron foundries and breweries in the town. The place, which was founded in 1843 by Louis I., king of Bavaria, was only made a town in 1859.

See J. Esselborn, Geschichte der Stadt Ludwigshafen (Ludwigshafen,

LUDWIGSLUST, a town of Germany, in the grand-duchy of Mecklenburg-Schwerin, 22 m. by rail S. by E. of Schwerin. Pop. (1905) 6728. The castle was built by the duke of Mecklenburg-Schwerin, Frederick II., in 1772-1776. There is also another ducal residence, a fine park and a monument of the grand duke, Frederick Francis I. (d. 1837). The town has a church constructed on the model of a Greek temple. It has manufactures of chemicals and other small industries. Ludwigs- lust was founded by the duke Frederick, being named after this duke's father, Christian Louis II. It became a town in 1876.

LUG, a verb meaning to pull a heavy object, to drag, now mainly used colloquially. It is probably Scandinavian in origin; the Swedish lugg, forelock, lock of hair, gives lugga, to pull, tug; and " lug " in some north-eastern English dialects is still chiefly used in the sense of pulling a person's hair. " Luggage," passengers' baggage, means by origin that which has to be " lugged " about. The Scandinavian word

may be also the source of ” lug,” in the sense of ” ear,” in Scotland the regular dialectical word, and in English commonly applied to the ear-shaped handles of metal or earthenware pots, pitchers, &c. If so the word means something that can be pulled or tugged. This is also possibly the origin of the ” lug ” or ” lug-sail,” a four- sided sail attached to a yard which is hung obliquely to the mast, whence probably the name ” lugger ” of a sailing-vessel with two or three masts and fore and aft lug-sails. The word may, however, be connected with the Dutch logger, a fishing-boat using drag-nets. ” Lug ” is also the name of a marine worm, Arenicola marina, used as bait.

LUGANO (Ger. Lauis), the most populous and most thriving town in the Swiss canton of Ticino or Tessin, situated (906 ft.) on the northern shore of the lake of Lugano. Pop. (1900) 9394, almost all Italian-speaking and Romanists. To the S. it is dominated by the Monte Salvatore (3004 ft.) and on the S.E. (across the lake) by the Monte Generoso (5591 ft.) — a magnificent view point. Both mountains are accessible by railways. By rail Lugano is 124 m. from Lucerne and 512 rn- from Milan. Situated on the main St Gotthard railway line, Lugano is now easily reached, so that it is much frequented by visitors (largely German) in spring and in autumn. Though politically Swiss since 1512, Lugano is thoroughly Italian in appearance and character. Of recent years many improvements have been made in the town, which has two important suburbs — Paradiso to the south and Cassarate to the east. The railway station (1109 ft.) is above the town, and is connected with the fine quays by a funicular railway. On the main quay is a statue of William Tell by the sculptor Vincenzo Vela (1820-1891), a native of the town, while other works by him are in the gardens of private villas in the neighbourhood. The principal church, San Loretizo, in part dates back earlier than the 15th century, while its richly sculptured facade bears the figures 1517. This church is now the cathedral church of the bishop of Lugano, a see erected in 1888, with jurisdiction over the Italian parts of Switzerland. The church of Santa Maria degli Angioli, built

about 1499, and till 1848 occupied by Franciscans, contains several very fine frescoes (particularly a Crucifixion) painted 1529- 1 530 by Bernardino Luini. A gallery containing modern pictures has been built on the site of the old palace of the bishops of Como. During the struggle of 1848-1866 to expel the Austrians from Lombardy, Lugano served as headquarters for Mazzini and his followers. Books and tracts intended for distribution in Italy were produced there and at Capolago (9 m. distant, at the S.E. end of the lake), and the efforts of the Austrian police to prevent their circulation were completely powerless. (W. A. B. C.)

LUGANO, LAKE OF (also called Ceresio), one of the smaller lakes in Lombardy, N. Italy, lying between Lago Maggiore (W.) and the Lake of Como (E). It is of very irregular shape, the great promontory of Monte Salvatore (3004 ft.) nearly cutting off the western arm from the main lake. The whole lake has an area of 19ˆ sq. m., its greatest length is about 22 m., its greatest width 2 m., and its greatest depth 945 ft., while its surface is 899 ft. above sea-level. Between Melide (S. of the town of Lugano) and Maroggia (on the east shore) the lake is so shallow that a great stone dam has been built across for the St Gotthard railway line and the carriage road. The chief town is Lugano (at its northern end), which by the St Gotthard line is 19 m. from Bellinzona and 9 m. from Capolago, the station at the south- eastern extremity of the lake, which is but 8 m. by rail from Como. At the south-western extremity a railway leads S.W. from Porto Ceresio to Varese (9 m.). Porlezza, at the east end of the lake, is 8 m. by rail from Menaggio on the Lake of Como, while Ponte Tresa, at the west end of the lake, is about the same distance by a steam tramway from Luino on Lago Maggiore. Of the total area of the lake, about 75 sq. m. are in the Swiss Canton of Ticino (Tessin), formed in 1803 out of the conquests made by the Swiss from the Milanese in 1512. The remainder of the area is in Italy. The lake lies among the outer spurs of the Alps that divide the Ticino (Tessin) basin from that of the Adda, where the calcareous strata have been disturbed by the intrusion of porphyry and other igneous rocks. It is not connected with any considerable valley, but is fed by numerous torrents issuing from short glens in the surrounding mountains, while it is drained by the Tresa, an unimportant stream flowing into Lago Maggiore. The first steamer was placed on the lake in 1856. (W. A. B. C.)

LUGANSK (also Lugan and Luganskiy Zavod), a town of southern Russia, in the government of Ekaterinoslav. Pop. (1900) 34,175. It has a technical railway school and a meteoro- logical observatory, stands on the small river Lugan, 10 m. from its confluence with the northern Donets, in the Lugan mining district, 213 m. E. of the city of Ekaterinoslav, and has prospered greatly since 1890. This district, which comprises the coal- mines of Lisichansk and the anthracite mines of Gorodishche, occupies about 110,000 acres on the banks of the Donets river. Although it is mentioned in the 16th century, and coal was dis- covered there at the time of Peter the Great, it was not until 1795 that an Englishman, Gascoyne or Gaskoin, established its first iron-works for supplying the Black Sea fleet and the southern fortresses with guns and shot. This proved &, failure, owing to the great distance from the sea; but during the Crimean War the iron-works of Lugan again produced shot, shell and gun- carriages. Since

1864 agricultural implements, steam-engines, and machinery for beetroot sugar- works, distilleries, &c, have been the chief manufactures. There is an active trade in cattle, tallow, wools, skins, linseed, wine, corn and manufactured wares.

LUGARD, SIR FREDERICK JOHN DEALTRY (1858-), British soldier, African explorer and administrator, son of the Rev. F. G. Lugard, was born on the 22nd of January 1858. He entered the army in 1878, joining the Norfolk regiment. He served in the Afghan War of 1870-80, in the Sudan campaign of 1884-85, and in Burma in 1886-87. In May 1888, while on temporary half-pay, he took command of an expedition organized by the British settlers in Nyasaland against the Arab slave traders on Lake Nyasa, and was severely wounded. He left Nyasaland in April 1889, and in the same year was engaged by the Imperial

British East Africa Company. In their service he explored the Sabaki river and the neighbouring region, and elaborated a scheme for the emancipation of the slaves held by the Arabs in the Zanzibar mainland. In 1890 he was sent by the company to Uganda, where he secured British predominance and put an end to the civil disturbances, though not without severe fighting, chiefly notable for an unprovoked attack by the ” French ” on the ” British ” faction. While administering Uganda he journeyed round Ruwenzori to Albert Edward Nyanza, mapping a large area of the country. He also visited Albert Nyanza, and brought away some thousands of Sudanese who had been left there by Emin Pasha and H. M. Stanley. In 1892 Lugard returned to England, where he successfully opposed the abandon- ment of Uganda by Great Britain, a step then contemplated by the fourth Gladstone administration. In 1894 Lugard was despatched by the Royal Niger Company to Borgu, where, distancing his French and German rivals in a country up to then unvisited by any Europeans, he secured treaties with the kings and chiefs acknowledging the sovereignty of the British company. In 1896-1897 he took charge of an expedition to Lake Ngami on behalf of the British West Charterland Company. From Ngami he was recalled by the British government and sent to West Africa, where he was commissioned to raise a native force to protect British interests in the hinterland of Lagos and Nigeria against French aggression. In August 1897 he raised the West African Frontier Force, and commanded it until the end of December 1899. The differences with France were then com- posed, and, the Royal Niger Company

having surrendered its charter, Lugard was chosen as high commissioner of Northern Nigeria. The part of Northern Nigeria under effective control was small, and Lugard's task in organizing this vast territory was rendered more difficult by the refusal of the sultan of Sokoto and many other Fula princes to fulfil their treaty obligations. In 1903 a successful campaign against the emir of Kano and the sultan of Sokoto rendered the extension of British control over the whole protectorate possible, and when in September 1906 he resigned his commissionership, the whole country was being peacefully administered under the supervision of British residents (see Nigeria). In April 1907 he was appointed governor of Hong-Kong. Lugard was created a C.B. in 1895 and a K.C.M.G. in 1 901. He became a colonel in 1905, and held the local rank of brigadier-general. He married in 1902 Flora Louise Shaw (daughter of Major-General George Shaw, C.B., R.A.), who for some years had been a distinguished writer on colonial subjects for The Times. Sir Frederick (then Captain) Lugard published in 1893 The Rise of our East African Empire (partly auto-bio- graphical), and was the author of various valuable reports on Northern Nigeria issued by the Colonial Office. Throughout his African administrations Lugard sought strenuously to secure the amelioration of the condition of the native races, among other means by the exclusion, wherever possible, of alcoholic liquors, and by the suppression of slave raiding and slavery.

LUGO, a maritime province of north-western Spain, formed in 1833 of districts taken from the old province of Galicia, and bounded N. by the Atlantic, E. by Oviedo and Leon, S. by Orense, and W. by Pontevedra and Corunna. Pop. (1900) 465,386; area, 3814 sq. m. The coast, which extends for about 40 m. from the estuary of Rivadeo to Cape de Vares, is extremely rugged and inaccessible, and few of the inlets, except those of Rivadeo and Vivero, admit large vessels. The province, especi- ally in the north and east, is mountainous, being traversed by the Cantabrian chain and its offshoots; the sierra which separates it from Leon attains in places a height of 6000 ft. A large part of the area is drained by the Mifio. This river, formed by the meeting of many smaller streams in the northern half of the province, follows a southerly direction until joined by the Sil, which for a considerable distance forms the southern boundary. Of the rivers flowing north into the Atlantic, the most important are the Navia, which has its lower course through Oviedo; the Eo, for some distance the boundary between the two provinces; the Masma, the Oro and the Landrove.

Some of the valleys of Lugo are fertile, and yield not only corn

but fruit and wine. The principal agricultural wealth, however, is on

the Mifio and Sil, where rye, maize, wheat, flax, hemp and a little silk are produced. Agriculture is in a very backward condition, mainly owing to the extreme division of land that prevails throughout Galicia. The exportation of cattle to Great Britain, formerly a flourishing trade, was ruined by American and Australian competition. Iron is found at Caurel and Incio, arsenic at Castroverde and Cervantes, argentiferous lead at Riotorto; but, although small quantities of iron and arsenic are exported from Rivadeo, frequent strikes and lack of transport greatly impeded the development of mining in the earlier years of the 20th century. There are also quarries of granite, marble and various kinds of slate and building-stone. The only important manufacturing industries are those connected with leather, preserves, coarse woollen and linen stuffs, timber and osier work. About 250 coasting vessels are registered at the ports, and about as many boats constitute the fishing fleet, which brings in lampreys, soles, tunny and sardines, the last two being salted and tinned for export. The means of communication are insufficient, though there are over 100 m. of first-class roads, and the railways from Madrid and northern Portugal to Corunna run through the province.

Lugo the capital (pop. 1900, 26,959) and the important towns of Chantada (15,003), Fonsagrada (17,302), Mondofiedo (10,590), Monforte (12,912), Pantou (12,988), Villalba (13,572) and Vivero (12,843) are described in separate articles. The province contained in 1900 twenty-six towns of more than 7000 inhabitants, the largest being Sarria (11,998) and Savifiao (11,182). For a general description of the people and the history of this region see Galicia.

LUGO, capital of the above Spanish province, is situated on the left bank of the river Mifio and on the railway from Corunna to Madrid. Pop. (1900) 26,959. Lugo is an episcopal see, and was formerly the capital of Galicia. Suburbs have grown up round the original town, the form of which, nearly quadrangular, is defined by a massive Roman wall 30 to 40 ft. high and 20 ft. thick, with projecting semicircular towers which numbered 85 as late as 1809, when parts of the fortifications were destroyed by the French. The wall now serves as a promenade. The Gothic cathedral, on the south side of the town, dates from the 1 2th century, but was modernized in the 18th, and possesses no special architectural merit. The conventual church of Santo Domingo dates from the 14th century. The principal industries are tanning, and the manufacture of linen and woollen cloth. About 1 m. S., on the left bank of the Mifio, are the famous hot sulphur baths of Lugo.

Lugo (Lucus Augusti) was a flourishing city under Roman rule (c. 19

b.c.-a.d. 409) and was made by Augustus the seat of a conventus juridicus (assize). Its sulphur baths were even then well known. It was sacked by barbarian invaders in the 5th century, and suffered greatly in the Moorish wars of the 8th century. The bishopric dates from a very early period, and it it said to have acquired metropolitan rank in the middle of the 6th century; it is now in the archiepiscopal province of Santiago de Compostela.

LUGOS, the capital of the county of Krasso-Szoreny, Hungary, 225 m. S.E. of Budapest by rail. Pop. (1900) 16,126. It is situated on both banks of the river Temes, which divides the town in two quarters, the Rumanian on the right and the German on the left bank. It is the seat of a Greek-United (Rumanian) bishop. Lugos carries on an active trade in wine, and has several important fairs, while the surrounding country, which is moun- tainous and well-wooded, produces large quantities of grapes and plums. Lugos was once a strongly fortified place and of greater relative importance than at present. It was the last seat of the Hungarian revolutionary government (August 1849), and the last resort of Kossuth and several other leaders of the national cause, previous to their escape to Turkey.

LUGUDUNUM, or Lugdunum, an old Celtic place-name (fort or hill of the god Lugos or Lug) used by the Romans for. several towns in ancient Gaul. The most important was the town at the confluence of the Saone and Rhone now called Lyons (?.».). This place had in Roman times two elements. One was a Roman colonia (municipality of Roman citizens, self-governing) situated

on the hill near the present Fourvieres (Forum vetus). The other, territorially distinct from it for reasons of statecraft, was the Temple of Roma and Augustus, to which the inhabitants of the 64 Gallic cantons in the three Roman provinces of Aquitania, Lugudunensis and Belgica — the so-called Tres Galliae — sent delegates every summer to hold games and otherwise celebrate the worship of the emperor which was supposed to knit the provincials to Rome. The two elements together composed the most important town of western Europe in Roman times. Lugudunum controlled the trade of its two rivers, and that which passed from northern Gaul to the Mediterranean or vice versa; it had a mint; it was the capital of all northern Gaul, despite its position in the south, and its wealth was such that, when Rome was burnt in Nero's reign, its inhabitants subscribed largely to the relief of

the Eternal City. (F. J. H.)

LUINI, BERNARDINO (?i46s-?iS4o), the most celebrated master of the Lombard school of painting founded upon the style of Leonardo da Vinci, was born at Luino, a village on Lago Maggiore. He wrote his name as ” Bernardin Lovino,” but the spelling ” Luini ” is now generally adopted. Few facts are known regarding his life, and until a comparatively recent date many even of his works had, in the lapse of years and laxity of attribu- tion, got assigned to Leonardo da Vinci. It appears that Luini studied painting at Vercelli under Giovenone, or perhaps under Stephano Scotto. He reached Milan either after the departure of Da Vinci in 1500, or shortly before that event; it is thus uncertain whether or not the two artists had any personal acquaintance, but Luini was at any rate in the painting-school established in Milan by the great Florentine. In the later works of Luini a certain influence from the style of Raphael is superadded to that, far more prominent and fundamental, from the style of Leonardo ; but there is nothing to show that he ever visited Rome. His two sons are the only pupils who have with confidence been assigned to him; and even this can scarcely be true of the younger, who was born in 1530, when Bernardino was well advanced in years. Guadenzio Ferrari has also been termed his disciple. One of the sons, Eˆ angelista, has left little which can now be identified; the other, Aurelio, was accom- plished in perspective and landscape work. There was likewise a brother of Bernardino, named Ambrogio, a competent painter. Bernardino, who hardly ever left Lombardy, had some merit as a poet, and is said to have composed a treatise on painting. The precise date of his death is unknown; he may perhaps have survived till about 1540. A serene, contented and happy mind, naturally expressing itself in forms of grace and beauty, seems stamped upon all the works of Luini. The same character is traceable in his portrait, painted in an upper group in his fresco of ” Christ crowned with Thorns ” in the Ambrosian library in Milan ■ — a venerable bearded personage. The only anecdote which has been preserved of him tells a similar tale. It is said that for the single figures of saints in the church at Saronno he received a sum equal to 22 francs per day, along with wine, bread and lodging; and he was so well satisfied with this remuneration that, in completing the commission, he painted a Nativity for nothing. A dignified suavity is the most marked characteristic of Luini’s works. They are constantly beautiful, with a beauty which depends at least as much upon the loving self-withdrawn expression as upon the mere refinement and attractiveness of form. This quality of expression appears in all Luini’s produc- tions, whether secular or sacred, and imbues the latter with a peculiarly religious grace — not ecclesiastical

unction, but the devoutness of the heart. His heads, while extremely like those painted by Leonardo, have less subtlety and involution and less variety of expression, but fully as much amenity. He began indeed with a somewhat dry style, as in the ” Pieta, ” in the church of the Passione; but this soon developed into the quality which distinguishes all his most renowned works; although his execution, especially as regards modelling, was never absolutely equal to that of Leonardo. Luini’s paintings do not exhibit an impetuous style of execution, and certainly not a negligent one; yet it appears that he was in fact a very rapid worker, as his picture of the ” Crowning with Thorns,” painted for the College

del S. Sepolcro, and containing a large number of figures, is recorded to have occupied him only thirty-eight days, to which an assistant added eleven. His method was simple and ex- peditious, the shadows being painted with the pure colour laid on thick, while the lights are of the same colour thinly used, and mixed with a little white. The frescoes exhibit more freedom of hand than the oil pictures; and they are on the whole less like the work of Da Vinci, having at an early date a certain resem- blance to the style of Mantegna, as later on to that of Raphael. Luini’s colouring is mostly rich, and his light and shade forcible. Among his principal works the following are to be mentioned. At Saronno are frescoes painted towards 1525, representing the life of the Madonna — her ” Marriage,” the ” Presentation of the Infant Saviour in the Temple,” the ” Adoration of the Magi ” and other incidents. His own portrait appears in the subject of the youthful ‘ ‘ Jesus with the Doctors in the Temple. ‘ ‘ This series — in which some comparatively archaic details occur, such as gilded nimbuses — was partly repeated from one which Luini had executed towards 1520 in S. Croce. In the Brera Gallery, Milan, are frescoes from the suppressed church of La Pace and the Convent della Pelucca — the former treating subjects from the life of the Virgin, the latter, of a classic kind, more decorative in manner. The subject of girls playing at the game of ” hot-cockles,” and that of three angels depositing St Catherine in her sepulchre, are particularly memorable, each of them a work of perfect charm and grace in its way. In the Casa Silva, Milan, are frescoes from Ovid’s Metamorphoses. The Monastero Maggiore of Milan (or church of S. Maurizio) is a noble treasure-house of Luini’s art — including a large Crucifixion, with about one hundred and forty figures; ” Christ bound to the Column,” between figures of Saints Catherine and Stephen, and the founder of the chapel kneeling before Catherine; the martyr- dom of this saint; the ” Entombment of Christ,” and a large number of other subjects. In the Ambrosian library is the fresco (already mentioned), covering one entire wall of the Sala della

S. Corona, of ” Christ crowned with Thorns,” with two executioners, and on each side six members of a confraternity ; in the same building the “Infant Baptist playing with a Lamb”; in, the Brera, the ” Virgin Enthroned, with Saints ” (dated 1521); in the Louvre, the ” Daughter of Herodias receiving the Head of the Baptist “; in the Esterhazy Gallery, Vienna, the ” Virgin between Saints Catherine and Barbara “; in the National Gallery, London, ” Christ disputing with the Doctors ” (or rather, perhaps, the Pharisees). Many or most of these gallery pictures used to pass for the handiwork of Da Vinci. The same is the case with the highly celebrated ” Vanity and Modesty ” in the Sciarra Palace, Rome, which also may nevertheless in all probability be assigned to Luini. Another singularly beautiful picture by him is in the Royal Palace in Milan — a large composition of ” Women Bathing.” That Luini was also pre-eminent as a decora- tive artist is shown by his works in the Certosa of Pavia.

A good account of Luini by Dr G. C. Williamson was published in 1900. (W. M. R.)

LUKE, the traditional author of the third Gospel and of the Book of Acts, and the most literary among the writers of the New Testament. He alone, too, was of non-Jewish origin (Col. iv. 11, 14), a fact of great interest in relation to his writings. His name, a more familiar form of Lucanus (cf. Silas for Silvanus, Acts xvii. 4, 1 Thess. i. 1, and see Encycl. Biol, s.v., for instances of AoukSs on Egyptian inscriptions), taken together with his profession of physician (Col. iv. 14), suggests that he was son of a Greek freedman possibly connected with Lucania in south Italy; and as Julius Caesar gave Roman citizenship to all physicians in Rome (Sueton. Jul. 42), Luke may even have inherited this status from his father. But in any case such a man would have the attitude to things Roman which appears in the works attributed to Luke. He was a fellow-worker of Paul’s when in Rome (Philemon 24), where he seems to have remained in constant attendance on his leader, as physician as well as attached friend (Col. iv. 14; 2 Tim. iv. 11). That Luke, before he became a Christian, was an adherent of the synagogue — not a full proselyte, but one of those ” worshippers ” of God to whom Acts makes frequent reference — is fairly certain from the familiarity with the Septuagint indicated in Acts, as well as from its sympathy with the Hellenistic type of piety as distinct from specific Paulinism, of which there is but little trace.

The earliest extra-biblical reference to him is perhaps in the Muratonian Canon, which implies that his name already stood in MSS. of both Gospel (probably so even in Marcion’s day) and Acts, and says that Paul took him for his companion quasi ut juris studiosum (” as

being a student of law “). Here juris is almost certainly corrupt; and whether we take the sense to have

been ” as being devoted to travel ” (ut juris = itineris) or ” as skilled in disease ” (yboov passing into vbfiov in the Greek original), it is probably a mere inference from biblical data. Beyond references in Irenaeus, Clement of Alexandria (cf. Hebrews) and Tertullian, which add nothing to our knowledge, we have the belief to which Origen {Horn. i. in Lucam) witnesses as existing in his day, that Luke was the ” brother ” of 2 Cor. viii. 18, ” whose praise in the Gospel ” (as preached) was ” throughout all the churches.” Though the basis of the identification be a mistake, yet that this ” brother,” ” who was also appointed by the churches (note the generality of this) to travel with us in the matter of the charity,” was none other than Paul’s constant companion Luke is quite likely; e.g. he seems to have been almost the only non-Macedonian (as demanded by 2 Cor. ix. 2-4) of Paul’s circle available 1 at the time (see Acts xx. 4). Our next witness, a prologue to the Lucan writings (originally in Greek, now known only in Latin, see Nov. Test. Latine (Oxford), I. hi., II. i.), perhaps preserves a genuine tradition in stating that Luke died in Bithynia at the age of seventy-four. It is hard to see why this should be fiction, which usually took the form of martyrdom, as in a later tradition touching his end. The same prologue, and indeed all early tradition, connects him originally with Antioch (see Euseb. Hist. Eccl. iii. 4, 6, possibly after Julius Africanus in the first half of the 3rd century).

That he was actually a native of Antioch is as doubtful as the statement that he was a Syrian by race (Prologue). But internal evidence bears out the view that he practised his profession in Antioch, where (or in Tarsus) he probably first met Paul. Whether any of his information in Acts as to the Gospel in Antioch (xi. 19 ff., xiu. 1 ff., xiv. 26-xv. 35) was due to an Antiochene- document used by him (cf. A. Harnack, The Acts of the Apostles, 245 ff.) or not, this knowledge in any case suggests Luke’s connexion with that church. He shows, too, local knowledge on points unlikely to have stood in any such source (e.g. it was in Antioch that the name ” Christians ” was first coined, xi. 26), which points to his share in early Church life there. The Bezan reading in Acts xi. 27, ” when we.were assembled,” may imply memory of this.

But while Luke probably met Paul in Antioch, and thence started with

him on his second great missionary enterprise (xv. 36 ff.), partly at least as his medical attendant (cf. Gal. iv. 13), it is possible that he had also some special connexion with the north-eastern part of the Aegean. Sir W. M. Ramsay and others fancy that Luke's original home was Philippi, and that in fact he may have been the " certain Macedonian " seen in vision by Paul at Troas, inviting help for his countrymen (xvi. 9 f.). But this is as precarious as the view that, because "we" ceases at Philippi in xvi. 17, and then re- emerges in xx. 6, Luke must have resided there during all the interval. The use and disuse of the first person plural, identifying Paul and his party, has probably a more subtle and psychological 2 meaning (see Acts). The local connexion in question may have been subse- quent to that with Antioch, dating from his work with Paul in the province of Asia, and being resumed after Paul's martyrdom. This accords at once with Harnack's argument that Luke wrote Acts in Asia 3 (Luke the Physician, p. 149 ff.), and with the early tradition, above cited, that he died in Bithynia at the age of seventy-four, without ever having married (this touch may be due to an ascetic feeling current already in the 2nd century).

The later traditions about Luke's life are based on fanciful inference or misunderstanding, e.g. that he was one of the Seventy (Adamantius Dial, de recta fide, 4th century), or the story (in Theodorus Lector, 6th century) that he painted a portrait of the Virgin Mother. But a good deal can still be gathered by sympathetic study of his writings as to the manner of man he was. It was a beautiful soul from which came " the most beautiful book " ever written, as Renan styled his Gospel. The selection of stories which he gives us — especially in the section mainly peculiar to himself (ix. 5 l-xviii. 14) — reflects his own character as well as that of the source he mainly follows. .His was indeed a religio medici in its pity for frail and suffering humanity, and in its sympathy with the triumph of the Divine " healing art " upon the bodies and souls of men (cf. Harnack, The Acts, Excursus, iii.). His was also a humane* spirit, a spirit so

1 Tychicus may be the other " brother," in viii. 22.

2 So also A. Hilgenfeld, Zeit. f. theol. Wissenschaft (1907), p. 214, argues that " we " marks the author's wish to give his narrative more vividness at great turning-points of the story — the passage from Asia to Europe, and again the real beginning of the solemn progress of Paul towards the crisis in Jerusalem, as yet later towards Rome, xxvii. 1 ff .

3 Note that Luke is at pains to explain why Paul passed by Asia and Bithynia in the first instance (xvi. 6 f.).

4 Compare what A. W. Verrall has said of the poet Statius and ” the gentle doctrine of humanity ” on Hellenic soil, as embodied in his description of The Altar of Mercy at Athens (Oxford and Cambridge Review, i. 101 ff.).

tender that it saw further than almost any save the Master himself into the soul of womanhood. In this, as in his joyousness, united with a feeling for the poor and suffering, he was an early Francis of Assisi. Luke, ” the physician, the beloved physician,” that was Paul’s characterization of him; and it is the impression which his writings have left on humanity. How great his contribution to Christianity has been, in virtue of what he alone preserved of the historical Jesus and of the embodiment of his Gospel in his earliest followers, who can measure? Harnack even maintains (The Acts, p. 301) that his story of the Apostolic age was the indispensable condition for the incorporation of the Pauline epistles in the Church’s canon of New Testament scriptures. Certainly his conception of the Gospel, viz. a Christian Hellenistic universalism (with some slight infusion of Pauline thought) passed through a Graeco- Roman mind, proved more easy of assimilation, and so more directly influential for the ancient Church, than Paul’s own distinctive teaching (ib. 281 ff. ; cf. Luke the Physician, pp. 139-145).

Literature. — Introductions to commentaries like A. Plummer’s on Luke’s Gospel in the ” Intern. Crit.” series, R. B. Rackham’s Act s of the Apostles (” Oxford Coram.”); the article ” Luke ” in Hastings’s Diet, of the Bible and Diet, of Christ and the Gospels, the Encycl. Biblica and Hauck’s Realencyklopadie, vol. xi.; Sir W. M. Ramsay’s Paul the Traveller and Pauline and other Studies, and A. Harnack’s Lukas der Arzt (1906, Eng. trans. 1907) and Die Apostelgeschichte (1908, Eng. trans. 1909). For the Luke of legend, see authorities quoted under Mark. (J, V. B.)

LUKE, GOSPEL OF ST, the third of the four canonical Gospels of the Christian Church.

1. Authorship and Date. — The earliest indication which we possess of the belief that the author was Luke, the companion of the Apostle Paul (Col. iv. 14; Philem. 24; 2 Tim. iv. n), is found in Justin Martyr, who, in his Dialogue with Trypho (c. 103), when making a statement found only in our Luke, instead of referring for it simply to the ” Apostolic Memoirs,” his usual formula, says that it is contained in the memoirs composed by ” the Apostles and those that followed them.” But the first distinct mention of Luke as the author of the Gospel is that by Irenaeus in his famous passage about the Four Gospels (Adv. Haer. III.

i. 2, c. a.d. 180).

This tradition is important in spite of the fact that it first comes clearly before us in a writer belonging to the latter part of the 2nd century, because the prominence and fame of Luke were not such as would of themselves have led to his being singled out to have a Gospel attributed to him. The question of the authorship cannot, however, be decided without considering the internal evidence, the interpretation of which in the case of the Third Gospel and the Acts (the other writing attributed to Luke) is a matter of peculiar interest. It is generally admitted that the same person is the author of both works in their present form. This is intimated at the beginning of the second of them (Acts i. 1); and both are marked, broadly speaking throughout, though in some parts much more strongly than in others, by stylistic characteristics which we may conveniently call ” Lucan ” without making a premature assumption as to the authorship. The writer is more versed than any other New Testament writer except the author of the Epistle to the Hebrews, and very much more than most of them, in the literary Greek of the period of the rise of Christianity; and he has, also, like other writers, his favourite words, turns of expression and thoughts. The variations in the degree to which these appear in different passages are in the main to be accounted for by his having before him in many cases documents or oral reports, which he reproduces with only slight alterations in the language, while at other times he is writing freely.

We have next to observe that there are four sections in Acts (xvi. 9-17, xx. 4-16, xxi. 1-17, xxvii. i-xxviii. 16) in which the first person plural is used. Now it is again generally admitted that in these sections we have the genuine account of one who was a member of Paul’s company, who may well have been Luke. But it has been and is still held by many critics that the author of Acts is a different person, and that as in the Third Gospel he has used documents for the Life of Christ, and perhaps also in the earlier half of the Acts for the history of the beginnings of the Christian Church, so in the ” we ” sections, and possibly in som-e other portions of this narrative of Paul’s missionary life, he has used a kind of travel-diary by one who accompanied the Apostle

on some of his journeys. That neither this, nor any other, com- panion of Paul can have been the author of the whole work is supposed to

follow both from its theological temper and from discrepancies between its statements and those of the Pauline Epistles on matters of fact.

A careful examination, however, of the ” we ” sections shows that words and expressions characteristic of the author of the third Gospel and the Acts are found in them to an extent which is very remarkable, and that in many instances they belong to the very texture of the passages. This linguistic evidence, which is of quite unusual force, has never yet been fairly faced by those who deny Luke’s authorship of Acts. Moreover, the difficulties in the way of supposing that the author of Acts could at an earlier period of his life have been a companion of St Paul do not seem to be so serious as some critics think. Indeed it is easier to explain some of the differences between the Acts and St Paul’s Epistles on this assumption than on that of authorship by a writer who would have felt more dependent upon the information which might be gathered from those Epistles, and who would have been more likely to have had a collection of them at hand, if his work was composed c. a.d. 100, as is commonly assumed by critics who reject the authorship by Luke.

There is then strong reason for believing the tradition that Luke, the companion of the Apostle Paul, was the author of our third Gospel and the Acts. Another argument in support of this belief, upon which much reliance has been placed, is found in the descriptions of diseases, and the words common in Greek medical writers, contained in these two works. These, it is said, point to the author’s having been a physician, as Luke (Col. iv. 14) was (see esp. Hobart, The Medical Language of St Luke, 1882). The instances alleged are, many of them at least, not very distinctive. Yet they have some value as confirming the conclusion based on a comparison of the ” we ” sections of the Acts, with the re- mainder of the two books. (-

If we may assume that the writer who uses the first person plural in Acts xvi. 10 sqq. was the author of the two works, they can hardly have been composed later than a.d. 96; he would then have been about 65 years old, even if he was a very young man when he first joined the Apostle. An earlier date than a.d. 96 cannot be assigned if it is held that his writings show acquaintance with the Antiquities of the Jewish People by Josephus. The grounds for supposing this appear, however, to be wholly insufficient (see article on Acts by Bishop Lightfoot in 2nd ed. of Smith’s Diet, of Bible, p. 39) and it is not easy to see why he should have deferred writing so long. On the other hand, a comparison of Luke xxi. 20-24 with Mark xiii. 14 seq. seems to show that in using his document Luke here mingled with the

prophecy the interpretation which events had suggested and that the siege of Jerusalem in a.d. 70 and dispersion of its in- habitants had already taken place some little time before. Circa a.d. 80 may with probability be given as the time of the com- position of his Gospel.

2. Contents, Sources and Arrangement. — In the preface to his Gospel, i. 1-4, Luke alludes to other Gospel-records which pre- ceded his own. He does not say whether he made any use of them, but he seems to imply that his own was more complete. And this was true in regard to the two which, from a comparison of his Gospel with the other two Synoptics, we know that he did use. These we may call his Marcan and his Logian document. Luke also claims that he has written ” in order.” The instances in which he has departed from the Marcan order, and the manner in which he has introduced his additional matter into the Marcan outline, do not suggest the idea that he had any independent knowledge of an exact kind of the chronological sequence of events. By the phrase ” in order ” he may himself have intended chiefly to contrast the orderliness and consecutiveness of his account with the necessarily fragmentary character of the cate- chetical instruction which Theophilus had received. He may, also, have had in view the fact that he has prefixed a narrative of the birth and infancy of Jesus and of John and so begun the history at what he considered to be its true point of departure; to this hc;plainly alludes when he says that he has ” traced the

course of all things accurately from the first.” He may, also, in part be thinking of those indications which he — and he alone among the evangelists — has given of the points in the course of secular history at which Jesus was born and the Baptist began to preach (ii. 1-3, iii. 1, 2), though it may be doubted whether these are in all respects accurate.

Chap. i. 5 — ii. 52. The Birth and Infancy of John and of Jesus. — This portion of the Gospel differs in style and character from all the remainder. Its source may be an Aramaic or a Hebrew document. Some critics, however, hold that it is wholly Luke’s own composition, and that the Hebraic style — in which he was able to write in conse- quence of his familiarity with the LXX. — has been adopted by him as suitable to the subject in hand. Perhaps an intermediate view may be the most probable one; he may have obtained part of his materials, especially the hymns, from some source, and have skilfully worked these into his narrative.

Chap. iii. i-iv. 13. From the Commencement of the Preaching of the Baptist to the End of the Temptation in the Wilderness. — The

accounts of the Baptist's preaching and of the temptation are taken from the Logian document. The genealogy of Jesus here given is peculiar to this Gospel.

Chap. iv. 14-vi. 16. From the Commencement of the Ministry of Jesus xn Galilee to the Appointment of the Twelve. — In the main Luke here follows his Marcan document. He has, however, independent narratives of the visit of Jesus to Nazareth (iv. 16-30) and the call of the first disciples (v. 1-11). The former, which in Mark is placed some way on in the Galilean ministry (vi. 1-60), is given by Luke at the very beginning of it, perhaps because of the previous con- nexion of Jesus with Nazareth. But that it is not in its right position here, before any mention of the work in Capernaum, appears from verse 23. Luke has also slightly altered the position of the call of the first disciples in the sequence of events.

Chap. vi. 17-viii. 3. — This is an insertion into the Marcan outline of matter chiefly taken from the Logian document (the Address, Luke vi. 20-49, corresponds with portions of the Sermon on the Mount in Matt, v.-vii. ; the healing of the centurion's servant, Luke vii. 1-10 = Matt. viii. 5-T3; the message of the Baptist and the discourse for which it gave occasion, Luke vii. 18-35 = Matt. xi. 2-19). He includes besides, a few pieces peculiar to this Gospel which Luke had probably himself collected.

Chap. viii. 4-ix. 50. From the A doption of Parabolic Teaching to the End of the Ministry in Galilee. — He begins again to follow his Marcan document for what he gives. Many sections, however, contained in the corresponding part of Mark have no parallel in Luke, while the parallel to one of them is placed later and differs considerably in form. Possibly this fact points to his Marcan document having been briefer than our Mark, and to its having afterwards received interpolations (see Mark, Gospel of St).

Chap. ix. 51-xviii. 14. Incidents and Teaching connected with Journey towards Jerusalem. — This is another insertion into the Marcan outline, much longer than the previous one, and consisting partly of matter taken from the Logian document (warnings to men who offer to bfeoome disciples, Luke ix. 57-60 = Matt. viii. 19-22; a mission-charge, Luke x. 2-i6 = Matt. ix. 37 and x. 7-16, 40; thanksgiving that the Father reveals to the simple that which is hidden from the wise, Luke x. 2i-24 = Matt. xi. 25-27 and xiii. 16, 17, &c, &c.) and partly of sections peculiar to Luke, about which the same remark may be made as before.

Chap, xviii. 15-xxii. 13. From the Bringing of young Children to Jesus to the Preparation for the Passover. — Luke again takes up his Marcan document, nearly at the point at which he left it, and follows it in the main, though he adds the story of Zacchaeus and the parable of the Minae (the Ten Pieces of Money), and omits the withering of the fig-tree and some matter at the end of the discourse on the Last Things, which are given in Mark.

Chap. xxii. 14 to end. The Last Supper, Passion and Resurrection. — Though in this portion of his Gospel signs of use of Mark are not wanting, he also has much that is peculiar to himself. It is supposed by some that he here made use of another document. It seems more likely that he had a good many distinct oral traditions for this part of the history and that he used them freely, sometimes substituting them for passages of the Marcan document, sometimes altering the latter in accordance therewith.

3. Doctrinal, Ethical and Literary Characteristics. — The thought of divine forgiveness, as set forth in the teaching of Jesus and manifested in His own attitude towards, and power over, the hearts of the outcasts among the people, is peculiarly prominent in this Gospel. This feature of Christ's ministry appears only in one passage of Mark; some other illustrations of it are mentioned in Matthew, but in Luke there are several more which are peculiar to himself (see the three individual cases vii. 36 sqq. ; xix. 1 sqq., xxiii. 40 sqq. ; also the description at xv. 1, and the three parables that follow). These were " lost sheep of the house of Israel "; but Christ's freedom from Jewish exclusive- ness is also brought out (1) as regards Samaritans, by the rebuke

administered to the disciples at ix.52 sqq., the parable in x. 30 sqq., and the incident at xvii. 15-19; whereas they are not mentioned in Mark, and in Matthew only in the saying (x. 5) in which the Twelve are forbidden to enter any village of theirs; (2) as regards Gentiles, by the words of Jesus at iv. 2 5-2 7 , not to mention sayings which have parallels in the other Gospels. The promises of Old Testament prophets that the Gentiles would share in the blessing of the coming of Christ are also recalled, ii. 3 2-iii. 6. Once more the word evayyekiˆ toOai (" to proclaim good tidings ") is a favourite one with Luke. These are all traits which we should expect to find in one who was a companion of Paul and a Gentile (Col. iv. 1 1 , 14) . With the breadth and depth of

the Saviour's sympathy, which are so fully exhibited in this Gospel, we may connect the clearness with which His true humanity is here portrayed. An incident of His boyhood is related in which His sense of vocation is revealed, and this is followed by the years of quiet growth that succeeded (ii. 41-52). Further, during the years of His public ministry more glimpses of His inner life are given us than in either Matthew or Mark. His being engaged in prayer is mentioned several times where there is no parallel in those Gospels (iii. 21, v. 16, vi. 12, ix. 18, 28, 29, xi. 1). Again, besides narrating the Temptation in the Wilderness and the Agony in the Garden, this evangelist gives a saying which implies that Jesus had under- gone many temptations, or rather a life of temptation (xxii. 2S). Once more he records a saying that shows Christ's sense of the intense painfulness of the work He was sent into the world to do, arising from the divisions which it caused (xii. 49 sqq.).

Among practical duties, the stress laid on that of almsgiving is remarkable (see especially xi. 41, xii. 33, xvi. 9 sqq., which are peculiar to this Gospel). In the second of these passages the disciples are exhorted to choose a life of voluntary poverty; the nearest parallel is the ideal set before the rich young man at Mark x. 21 = Matt. xix. 21 =Luke xviii. 22. In the Beatitudes in Luke vi. 20, 21 a condition of physical want is contemplated, not, as in Matt. v. 3 , 6, poverty of spirit and spiritual hunger, while woes are denounced against the rich and the full (vi. 24, 25). The folly of absorption in the amassing and enjoyment of wealth is also shown (xii. 15 sqq. and xvi. 19 sqq.). But it would be an exagger- ation to say, as some have done, that the poor are represented as being the heirs of a blessed hereafter, simply on the ground that they are now poor. In the Beatitudes Christ's own disciples are addressed, who were blessed though poor, whereas the rich as a class were opposed or indifferent to the kingdom of God. Again, the contrast between Lazarus and Dives in the future state pictures vividly the reversals that are in store; but it is un- reasonable to take it as implying that every poor man, whatever his moral character, will be blessed.

But while there is in Luke's Gospel this strain of asceticism ■ — as to many in modern times it will appear to be — the prevailing spirit is gentle and tender, and there is in it a note of spiritual gladness, which is begun by the song and the messages of angels and the hymns and rejoicing of holy men and women, accom- panying the birth of the Christ (chaps, i. and ii., passim), and prolonged by the expressions of joy, the ascriptions of thanks- giving and praise, called forth by the words and works of Christ and the wonders of the cross and resurrection, which are peculiarly frequent and full (iv. 15, v. 25, 26,

vii. 16, x. 17, xiii. 13, 17, xvii. 15-18, xviii. 43, xix. 6, 37, 38, xxiii. 47, xxiv. 41, 52, 53. Cf. also xv. 5, 7, 10, 32).

The peculiar charm which this Gospel has been generally felt to possess is largely due to the spiritual and ethical traits which have been noted. But from a purely literary point of view, also, it is distinguished by great excellences. The evangelist's phraseology is indeed affected to some extent by the rhetorical style of the period when he wrote. Nevertheless his mode of narration is simple and direct. And the many fascinating character-sketches, which he has added to the portrait gallery of Scripture, are drawn clearly and without signs of effort. In some cases he has skilfully suggested parallelisms and con- trasts. The chief instance is his careful interweaving of the accounts of the births and early years of John the Baptist and of Jesus. Later examples are the two sisters, Martha and Mary

(x. 38-42), and the penitent and the impenitent thief (xxiii. 39-48). That he was a man of great versatility appears in the Acts from the speeches introduced on various occasions, if (as is probable) they were in part, at least, his own composition. In the Gospel he had no opportunity for showing his power in a manner strictly analogous. But if the hymns in the two intro- ductory chapters owe even their Greek form in any measure to him, he was a poet of no mean order. His style variesgreatly ; at times, as in i. 1-4, it is Hellenistic; at others, as in i. 5 to end of ii., it is strongly Hebraic. Such differences are largely due, no doubt, to the degree in which he was in various parts inde- pendent of, or dependent upon, sources. But he would seem in some degree to have adapted his manner of writing to the subject- matter in hand. And at all events it is worthy of note that we pass without any sense of jar from passages in one style tff those in another.

See Godet, Commentaire sur V&vangile de S. Luc (Eng. trans., 1875); Plummer's Comm. on St Luke (in international Series, 4th ed., 1906); W. Ramsay, Was Christ born in Bethlehem? (3rd ed., 1905); A. Harnack, Lukas der Arzl (1906); B. Weiss, Die

Snellen des Lukas-evangeliums (1907); also books on the Four ospels, or the Synoptic Gospels, mentioned at end of article Gospel.

(V. H. S.)

LULEA, a seaport of Sweden, capital of the district {Ian) of Norrbotten, on the peninsula of Sando, at the mouth of the Lule river and the north-west corner of the Gulf of Bothnia. Pop. (1900) 9484. It is connected at Boden (22 m. N.) with the main line of railway from Stockholm to Gellivara and Narvik on Of o ten Fjord in Norway. By this line Lulea is 723 m. N.N.E. of Stockholm. It is the shipping place for the iron ore mined at Gellivara, 127 m. N. by W., and there are smelting works at Karlsvik in the vicinity. Timber is also exported, being floated in large quantities down the Lule. As a rule the port is closed by ice from November to the end of May. The town was almost entirely burnt down in 1887, and its buildings are new — the church (1 888-1 893), the Norrbotten Museum and a technical school being the most important. Lulea as founded by Gustavus Adolphus was 7 m. higher up the river, but was moved to the present site in 1649.

LULL (or Lully), RAIMON, or Raymond (c. 1235-1315), Catalan author, mystic and missionary, was born at Palma (Majorca). Inheriting the estate conferred upon his father for services rendered during the victorious expedition (1229) against the Balearic Islands,

Lull was married at an early age to Blanca Picany, and, according to his own account, led a dissipated life till 1266 when, on five different occasions, he beheld the vision of Christ crucified. After his conversion, he resolved to devote himself to evangelical work among the heathen, to write an exposure of infidel errors, and to promote the teaching of foreign tongues in seminaries. He dedicated nine years to the study of Arabic, and in 1275 showed such signs of mental exaltation that, at the request of his wife and family, an official was appointed to administer his estate. He withdrew to Randa, there wrote his Ars major and Ars generalis, visited Montpellier, and persuaded the king of Majorca to build a Franciscan monastery at Miramar. .There for ten years he acted as professor of Arabic and philosophy, and composed many controversial treatises. After a fruitless visit to Rome in 1285- 1286, he journeyed to Paris, residing in that city from 1287 to 1289, and expounding his bewildering theories to auditors who regarded him as half insane. In 1289 he went to Montpellier, wrote his Ars veritatis invenliva, and removed to Genoa where he translated this treatise into Arabic. In 1291, after many timorous doubts and hesitations for which he bitterly blamed himself, Lull sailed for Tunis where he publicly preached Chris- tianity for a year; he was finally imprisoned and expelled. In January 1293 he reached Naples where tradition alleges that he studied alchemy; there appears to be no foundation for this story, and the treatises on alchemy which bear his name are all apocryphal. 1 His efforts to interest Clement V. and Boniface

1 The alchemical works ascribed to Lull, such as Testamentum, Codicillus seu Testamentum and Experimenta, are of early although uncertain date. De Luanco ascribes some of them to a Raimundo

VIII. in his favourite project of establishing missionary colleges were unavailing; but a visit to Paris in 1298 was attended with a certain measure of success. He was, however, disappointed in his main object, and in 1300 he sailed to Cyprus to seek support for his plan of teaching Oriental languages in universities and monasteries. He was rebuffed once more, but continued his campaign with undiminished energy. Between 1302 and 1305 he wrote treatises at Genoa, lectured at Paris, visited Lyons in the vain hope of enlisting the sympathies of Pope Clement V., crossed over to Bougie in Africa, preached the gospel, and was imprisoned there for six months. On being released he lectured with increasing effect at Paris, attended the General Council

at Vienne in 1311, and there witnessed the nominal adoption of his cherished proposals. Though close on eighty years of age, Lull's ardour was unabated. He carried on his propaganda at Majorca, Paris, Montpellier and Messina, and in 13 14 crossed over once more to Bougie. Here he resumed his crusade against Mahommedanism, raised the fanatical spirit of the inhabitants, was stoned outside the city walls and died of his wounds on the 29th of June 1315. There can be no reasonable doubt that these events actually occurred, but the scene is laid by one biographer at Tunis instead of Bougie.

The circumstances of Lull's death caused him to be regarded as a martyr, local patriotism helped to magnify his merits, and his fantastic doctrines found many enthusiastic partisans. The doctor illuminatus was venerated throughout Catalonia and afterwards throughout Spain, as a saint, a thinker and a poet; but his doctrines were disapproved by the powerful Dominican order, and in 1376 they were formally condemned in a papal bull issued at the instance of the inquisitor, Nicolas Emeric. The authenticity of this docu- ment was warmly disputed by Lull's followers, and the bull was annulled by Martin V. in 1417. The controversy was renewed in 1503 and again in 1578; but the general support of the Jesuits and the staunch fidelity of the Majorcans saved Lull from condemnation. His philosophical treatises abound with incoherent formulae to which, according to their inventor, every demonstration in every science 'may be reduced, and posterity has ratified Bacon s disdainful verdict on Lull's pretensions as a thinker; still the fact that he broke away from the scholastic system has recommended him to the historians of philosophy, and the subtle ingenuity of his dialectic has compelled the admiration of men so far apart in opinion as Giordano Bruno and Leibniz.

The speculations of Lull are now obsolete outside Majorca where his philosophy still flourishes, but his more purely literary writings are extremely curious and interesting. In Blanquerna (1283), a novel which describes a new Utopia, Lull renews the Platonic tradition and anticipates the methods of Sir Thomas More, Campan- ula and Harrington, and in the Libre de Maravelles (1286) he adopts the Oriental apologue from Kalilah and Dimnah. And as a poet Lull takes a prominent position in the history of Catalan literature; such pieces as El Desconort (1295) and Lo Cant de Ramon (1299) combine in a rare degree simple beauty of expression with sublimity of thought and impassioned sincerity.

Bibliography. — Histoire litteraire de la France (Paris, 1885), vol. xxix. ; Obras rimadas de Ramon Lull (Palma, 1859), edited by G.

Rossello; Obras de Ramon Lull (Palma, in progress), edited by G. Rossello; Jose R. de Luanco, Ramon Lull, considerado como alquimista (Barcelona, 1870) and La Alquimia en Espana (2 vols., Barcelona, 1889-1897); K. Hofmann, " Ein Katalanische Thiere- pos," in the Bavarian Academy's Abhandlungen (Munich, 1872), vol. xii. pp. 173-240; M. Menendez y Pelayo, Origenes de la novela (Madrid, 1905), pp. 72-86; Havelock Ellis in Contemporary Review (May 1906). (J. F.-K.)

LULLABY, a cradle-song, a song sung to children to " lull " them to sleep; the melody being styled in Fr. berceuse and in Ger. Wiegenlied. " Lull," cf. Swed. lulla, Du. lullen, &c, is of echoic or onomatopoeic origin, cf. Lat. lallare, to chatter.

LULLY, JEAN-BAPTISTE (c. 1633-1687), Italian composer, was born in Florence. Through the due de Guise he entered the services of Madame de Montpensier as scullery-boy, and with the help of this lady his musical talents were cultivated. A scurrilous poem on his patroness resulted in his dismissal. He then studied the theory of music under Metra and entered the orchestra of the French court, being subsequently appointed director of music to Louis XIV. and director of the Paris opera. The influence of his music produced a radical revolution in the

de Tarraga (c. 1370), a converted Jew who studied the occult. Others are ascribed by Morhof to a Raymundus Lullius Neophytus, who lived about 1440. See Alchemy, and also J. Ferguson, Biblio- theca chemica (1906).

stvle of the dances of the court itself. Instead of the slow and stately movements which had prevailed until then, he introduced lively ballets of rapid rhythm. In December 1661 he was naturalized as a Frenchman, his original name being Giovanni Battista Lulli. In 1662 he was appointed music master to the royal family. In 1681 he was made a court secretary to the king and ennobled. While directing a Te Deum on the 8th of January 1687 with a rather long baton he injured his foot so seriously that a cancerous growth resulted which caused his death on the 22nd of March. Having found a congenial poet in Quinault, Lully composed twenty operas, which met with a most enthusi- astic reception. Indeed he has good claim to be considered the founder of French opera, forsaking the Italian method of separate recitative and aria for a dramatic consolidation of the two and a quickened action of the story such as was more congenial to the taste of the French public. He effected important improvements in the composition of the orchestra, into which he introduced several new

instruments. Lully enjoyed the friendship of Moliere, for some of whose best plays he composed illustrative music. His Miserere, written for the funeral of the minister • Sequier, is a work of genius; and very remarkable are also his minor sacred compositions. On his death-bed he wrote Bisogna morire, peccatore.

LUMBAGO, a term in medicine applied to a painful ailment affecting the muscles of the lower part of the back, generally regarded as of rheumatic origin. An attack of lumbago may occur alone, or be associated with rheumatism in other parts of the body. It usually comes on by a seizure, often sudden, of pain in one or both sides of the small of the back, of a severe cutting or stabbing character, greatly aggravated on movement of the body, especially in attempting to rise from the recumbent posture and also in the acts of drawing a deep breath, coughing or sneezing. So intense is the suffering that it is apt to suggest the existence of inflammation in some of the neighbouring internal organs, such as the kidneys, bowels, &c, but the absence of the symptoms specially characteristic of these latter complaints, or of any great constitutional disturbance beyond the pain, renders the diagnosis a matter of no great difficulty. Lumbago seems to be brought on by exposure to cold and damp, and by the other exciting causes of rheumatism. Sometimes it follows a strain of the muscles of the loins. The attack is in general of short duration, but occasionally it continues for a long time, as a feeling of soreness and stiffness on movement. The treat- ment includes that for rheumatic affections in general (see Rheu- matism) and the application of local remedies to allay the pain.
LUMBER, a word now meaning (1) useless discarded furniture or other rubbish, particularly if of a bulky or heavy character; (2) timber, when roughly sawn or cut into logs or beams (see Timber) ; (3) as a verb, to make a loud rumbling noise, to move in a clumsy heavy way, also to burden with useless material, to encumber. ” Lumber ” and ” lumber-house ” were formerly used for a pawnbroker’s shop, being in this sense a variant of ” Lombard,” a name familiar throughout Europe for a banker, money-changer or pawnbroker. This has frequently been taken to be the origin of the word in sense (1), the reference being to the store of unredeemed and unsaleable articles accumulating in pawnbrokers’ shops. Skeat adopts this in preference to the connexion with ” lumber ” in sense (3), but thinks that the word may have been influenced by both sources {Elym. Diet., 1910), This word is probably of Scandinavian origin, and is cognate with a Swedish dialect word lomra, meming “to roar,” a frequentative of ljumma, ” to make a noise.” The English word may be of native origin and merely onomatopoeic. The New English Dictionary, though admitting the probability of the association with ” Lombard,” prefers the second

proposed derivation. The application of the word to timber is of American origin; the New English Dictionary quotes from Suffolk (Mass.) Deeds of 1662 — ” Freighted in Boston, with beames . . . boards . . . and other lumber.”

LUMBINI, the name of the garden or grove in which Gotama, the Buddha, was born. It is first mentioned in a very ancient Pali ballad preserved in the Sutta Nipata (verse 583). This

is the Song of Nalaka (the Buddhist Simeon), and the words put in the mouth of the angels who announce the birth to him are: ” The Wisdom-child, that jewel so precious, that cannot be matched, has been born at LumbinI, in the Sakiya land, for weal and for joy in the world of men.” The commentaries on the Jdtakas (i. 52, 54), and on a parallel passage in the Majjhima (J.R.A.S., 1895, p. 767), tell us that the mother of the future Buddha was on her way from Kapilavastu (Kapilavatthu), the capital of the Sakiyas, to her mother’s home at Devadaha, the capital of the adjoining tribe, the Koliyas, to be confined there. Her pains came upon her on the way, and she turned aside into this grove, which lay not far from Devadaha, and gave birth there to her son. All later Buddhist accounts, whether Pali or Sanskrit, repeat the same story.

A collection of legends about Asoka, included in the Divyava- ddna, a work composed probably in the 1st or 2nd century A.D., tells us (pp. 389, 390) how Asoka, the Buddhist emperor, visited the traditional site of this grove, under the guidance of Upagupta. This must have been about 248 B.C. Upagupta (Tissa: see Pali) himself also mentions the site in his Katha Vatthu (p. 559). The Chinese pilgrims, Fa Hien and Hsuan Tsang, visiting India in the 5th and 7th centuries a.d., were shown the site; and the latter (ed. Watters, ii. 15-19) mentions that he saw there an Asoka pillar, with a horse on the top, which had been split, when Hsuan Tsang saw it, by lightning. This pillar was re-discovered under the following circumstances.

The existence, a few miles beyond the Nepalese frontier, of an inscribed pillar had been known for some years when, in 1895, the discovery of another inscribed pillar at Nigllva, near by, led to the belief that this other, hitherto neglected, one must also be an Asoka pillar, and very probably the one mentioned by Hsuan Tsang. At the request of the Indian government the Nepalese government had the

pillar, which was half- buried, excavated for examination; and Dr Ftihrer, then in the employ of the Archaeological Survey, arrived soon after- wards at the spot.

The stone was split into two portions, apparently by lightning, and was inscribed with Pali characters as used in the time of Asoka. Squeezes of the inscription were sent to Europe, where various scholars discussed the meaning, which is as follows: ” His Majesty, Piyadassi, came here in the 21st year of his reign and paid reverence. And on the ground that the Buddha, the Sakiya sage, was born here, he (the king) had a flawless stone cut, and put up a pillar. And further, since the Exalted One was born in it, he reduced taxation in the village of LumbinI, and established the dues at one-eighth part (of the crop).”

The inscription, having been buried for so many centuries beneath the soil, is in perfect preservation. The letters, about an inch in height, have been clearly and deeply cut in the stone. No one of them is doubtful. But two words are new, and scholars are not agreed in their interpretation of them. These are the adjective vigaQabhi applied to the stone, and rendered in our translation “flawless”; and secondly, the last word, rendered in our translation ” one-eighth part (of the crop).” Fortunately these words are of minor importance for the historical value of this priceless document. The date, the twenty-first year after the formal coronation of Asoka, would be 248 B.C. The name Piyadassi is the official epithet always used by Asoka in his inscriptions when speaking of himself. The inscription confirms in every respect the Buddhist story, and makes it certain that, at the time when it was put up, the tradition now handed down in the books was current at the spot. Any further inference that the birth really took place there is matter of probability on which opinions will differ.

The grove is situate about 3 m. north of Bhagwanpur, the chief town of a district of the same name in the extreme south of Nepal, just over the frontier dividing Nepal from the district of Basti in British territory. It is now called Rummin-dei, i.e. the shrine of the goddess of Rummin, a name no doubt derived from the ancient name LumbinI. There is a small shrine at the spot, containing a bas-relief representing the birth of the Buddha. But the Buddha is now forgotten there, and the bas-

relief is reverenced only for the figure of the mother, who has been turned into a tutelary deity of the place. Except so far as the excavation of the pillar is concerned the site has not been explored, and four small stupas there (already noticed by Hsuan Tsang) have not

been opened.

Authorities. — Sutta Nipata, ed. V. Fansboll (London Pali Text Society, 1884); Katha Vatthu, ed. A. C. Taylor (London, 1897); Jataka, ed. V. Fansboll, vol. i. (London, 1877); Divyavadana, ed. Cowell and Niel (Cambridge, 1886) ; G. Buhler in the Proceedings of the Vienna Academy for Jan. 1897, in Epigraphia Indica, vol. v. (London, 1898) and in the Journal of the Royal Asiatic Society (1897), p. 429. See also ibid. (1895), pp. 751 ff . ; (1897) pp. 615, 644; (1898) pp. 199-203; A. Barth in the Journal des savants (Paris, 1897); R. Pischel in Sitzungsberichte der kbnigl. preussischen Akademie for the 9th July 1903; Babu P. Mukherji, Report on a Tour of Exploration of the Antiquities in the Terai (Calcutta, 1903); V. A. Smith in Indian Antiquary (Bombay, 1905). (T. W. R. D.)

LUMP-SUCKER, or Lump-Fish (Cyclopterus lumpus), a marine fish, .which with another British genus (Liparis) and a few other genera forms a small family (Cyclopteridae). Like many littoral fishes of other families, the lump-suckers have the ventral fins united into a circular concave disk, which, acting as a sucker, enables them to attach themselves firmly to rocks or stones. The body (properly so called) is short and thick, with a thick and scaleless skin, covered with rough tubercles, the larger of which are arranged in four series along each side of the body. The first dorsal fin is almost entirely concealed by the skin, appearing merely as a lump on the back. The lump- sucker inhabits the coasts of both sides of the North Atlantic; it is not rare on the British coasts, but becomes more common farther north. It is so sluggish in its habits that individuals have been caught with sea-weed growing on their backs. In the spring the fish approaches the shores to spawn, clearing out a hollow on a stony bottom in which it deposits an immense quantity of pink-coloured ova. Fishermen assert that the male watches the spawn until the young are hatched, a statement which receives confirmation from the fact that the allied gobies, or at least some of them, take similar care of their progeny. The vernacular name, ” cock and hen paddle,” given to the lump- fish on some parts of the coast, is probably expressive of the difference between the two sexes in their outward appearance, the male being only half or one-third the size of the female, and assuming during the spawning season a bright blue coloration, with red on the lower parts. This fish is generally not esteemed as food, but Franz Faber (Fische Islands, p. 53) states that the Icelanders consider the flesh of the male as a delicacy. 1 The bones are so soft, and contain so little inorganic matter, that the old ichthyologists placed the lump-sucker among the cartilagin- ous fishes.

LUMSDEN, SIR HARRY BURNETT (1821-1896), Anglo- Indian soldier, son of Colonel Thomas Lumsden, C.B., was born on the 12th of November 1821. He joined the 59th Bengal Native Infantry in 1838, was present at the forcing of the Khyber Pass in 1842, and went through the first and second Sikh wars, being wounded at Sobraon. Having become assistant to Sir Henry Lawrence at Lahore in 1846, he was appointed in 1847 to raise the Corps of Guides. The object of this corps, composed of horse and foot, was to provide trustworthy men to act as guides to troops in the field, and also to collect intelligence beyond as well as within the North- West frontier of India. The regiment was located at Mardan on the Peshawar border, and has become one of the most famous in the Indian army. For the equipment of this corps, Lumsden originated the khaki uniform. In 1857 he was sent on a mission to Kandahar with his younger brother, Sir Peter Lumsden, in connexion with the subsidy paid by the Indian government to the amir, and was in Afghanistan throughout the Mutiny. He took part in the Waziri Expedition of i860, was in command of the Hyderabad Contingent from 1862, and left India in 1869. He became lieutenant-general in 1875, and died on the 12th of August 1896.

See Sir Peter Lumsden and George Elsmie, Lumsden of the Guides

(1899)-

1 The “cock-padle ” was formerly esteemed also in Scotland, and figures in the Antiquary, chap. xi.

LUNA, ALVARO DB (d. 1453), Constable of Castile, Grand Master of Santiago, and favourite of King John II. of Castile, was the natural son of Alvaro de Luna, a Castilian noble. He was introduced to the court as a page by his uncle Pedro de Luna, archbishop of Toledo, in 1410. Alvaro soon secured a command- ing influence over John II., then a mere boy. During the regency of the king’s uncle Ferdinand, which ended in 141 2, he was not allowed to be more than a servant. When, however, Ferdinand was elected king of Aragon, and the regency remained in the hands of the king’s mother, Constance, .daughter of John of Gaunt, a foolish and dissolute woman, Alvaro became a very important person. The young king regarded him with an affection which the superstition of the time attributed to witch- craft. As the king was surrounded by greedy and unscrupulous nobles, among

whom his cousins, the sons of Ferdinand, com- monly known as the Infantes (princes) of Aragon, were perhaps the worst, his reliance on a favourite who had every motive to be loyal to him is quite intelligible. Alvaro too was a master of all the accomplishments the king admired — a fine horseman, a skilful lance and a writer of court verse. Until he lost the king's protection he was the central figure of the Castilian history of the time. It was a period of constant conflict conducted by shifting coalitions of the nobles, who under pretence of freeing the king from the undue influence of his favourite were intent on making a puppet of him for their own ends. The part which Alvaro de Luna played has been diversely judged. To Mariana he appears as a mere self-seeking favourite. To others he has seemed to be a loyal servant of the king who endeavoured to enforce the authority of the crown, which in Castile was the only alternative to anarchy. He fought for his own hand, but his supremacy was certainly better than the rule of gangs of plunder- ing nobles. His story is in the main one of expulsions from the court by victorious factions, and of his return when his con- querors fell out among themselves. Thus in 1427 he was solemnly expelled by a coalition of the nobles, only to be recalled in the following year. In 1431 he endeavoured to employ the restless nobles in a war for the conquest of Granada. Some successes were gained, but a consistent policy was impossible with a re- bellious aristocracy and a king of indolent character. In 1445 the faction of the nobles allied with Alvaro's main enemies, the Infantes de Aragon, were beaten at Olmedo, and the favourite, who had been constable of Castile and count of Santesteban since 1423, became Grand Master of the military order of Santiago by election of the Knights. His power appeared to be thoroughly established. It was, however, based on the personal affection of the king. The king's second wife, Isabella of Portugal, was offended at the immense influence of the constable, and urged her husband to free himself from slavery to his favourite. In 1453 the king succumbed, Alvaro was arrested, tried and con- demned by a process which was a mere parody of justice, and executed at Valladolid on the 2nd of June 1453.

The Chronicle of Alvaro de Luna (Madrid, 1784), written by some loyal follower who survived him, is a panegyric and largely a romance. The other contemporary authority — the Chronicle of John II. — is much less favourable to the constable. Don Jose Quintana has summarized the two chronicles in his life of Luna in the Vidas de Espanoles celebres; Biblioteca de Autores Espanoles (Madrid, 1 846-1 880), vol. xix.

LUNA (mod. hunt), an ancient city of Etruria, Italy, 4! m. S.E. of the modern Sarzana. It was the frontier town of Etruria, on the left bank

of the river, Macra, the boundary in imperial times between Etruria and Liguria. When the Romans first appeared in these parts, however, the Ligurians were in possession of the territory as far as Pisa. It derived its importance mainly from its harbour, which was the gulf now known as the Gulf of Spezia, and not merely the estuary of the Macra as some authors have supposed. The town was apparently not established until 177 B.C., when a colony was founded here, though fhe harbour is mentioned by Ennius, who sailed hence for Sardinia in 205 B.C. under Manlius Torquatus. An inscription of 155 B.C., found in the forum of Luna in 1857, was dedicated to M. Claudius Marcellus in honour of his triumph over the Ligurians and Apuani. It lost much of its importance under the Empire,

though traversed by the coast road (Via Aurelia), and it was renowned for the marble from the neighbouring mountains of Carrara, which bore the name of Luna marble. Pliny speaks of the quarries as only recently discovered in his day. Good wine was also produced. There are some remains of the Roman period on the site, and a theatre and an amphitheatre may be distinguished. No Etruscan remains have come to light. O. Cuntz's investigations (Jahreshefte des Osterr. Arch. Instituts, 1904, 46) seem to lead to the conclusion that an ancient road crossed the Apennines from it, following the line of the modern road (more or less that of the modern railway from Sarzana to Parma), and dividing near Pontremoli, one branch going to Borgotaro, Veleia and Placentia, and the other over the Cisa pass to Forum Novum (Fornovo) and Parma. The town was destroyed by the Arabs in 1016, and the episcopal see transferred to Sarzana in 1 204.

See G. Dennis, Cities and Cemeteries of Etruria (London, 1883), ii. 63. (T. As.)

LUNATION, the period of return of the moon {fund) to the same position relative to the sun; for example, from full moon to full moon. Its duration is 29-5305884 days.

LUNA V ADA, a native state in India, in the Gujarat division of Bombay. Area, 388 sq. m.; pop. (1901) 63,967, showing a decrease of 28% in the decade, due to famine. The chief, whose title is maharana, is a Rajput of high lineage. Estimated Tevenue, £12,000; tribute, £1000. The capital is Lunavada town, said to have been founded in 1434; pop. (1901) 10,277.

LUNCHEON, in present usage the name given to a meal be- tween breakfast and tea or dinner. When dinner was taken at an early hour, or when it is still the principal midday meal, luncheon was and is still

a light repast. The derivation of the word has been obscured, chiefly owing to the attempted con- nexion with ” nuncheon,” with which the word has nothing to do etymologically. ” Luncheon ” is an extended form of ” lunch ” (another form of ” lump,” as ” hunch ” is of ” hump “). Lunch and luncheon in the earliest meanings found are applied to a thick piece of bread, bacon, meat, &c.

The word “nuncheon,” or “nunchion,” with which “luncheon” has been frequently connected, appears as early as the 14th century in the form noneschenche. This meant a refreshment or distribution, properly of drink, but also accompanied with some small quantity of meat, taken in the early afternoon. The word means literally ” noon-drink,” from none or noon, i.e. nona hora, the ninth hour, originally 3 o’clock p.m., but later ” midday ” — the church office of “nones,” and also the second meal of the day, having been shifted back — and schenchen, to pour out; cf. German schenken, which means to retail drink and to give, present. Schenche is the same as “Shank,” the shin-bone, and the sense development appears to be shin-bone, pipe, hence tap for drawing liquor. See also Skeat, Etymological Diet, of English Language (1910), s.v. ” nunchion.”

LUND, TROELS FREDERIK (1840-), Danish historian, was born in Copenhagen on the 5th of September 1840. He entered the university of Copenhagen in 1858. About the age of thirty he took a post which brought before his notice the treasures of the archives of Denmark. His first important work, Historiske Skitser, did not appear until 1876, but after that time his activity was stupendous. In 1879 was published the first volume of his Danmarks og Norges Historie i Slutningen af del xvi. Aarhundrede, a history of daily life in Denmark and Norway at the close of the 16th century. Troels Lund was the pioneer of the remarkable generation of young historians who came forward in northern Europe about 1880, and he remained the most original and conspicuous of them. Saying very little about kings, armies and governments, he concentrates his attention on the life, death, employments, pleasures and prejudices of the ordinary men and women of the age with which he deals, using to illustrate his theme a vast body of documents previously neglected by the official historian. Lund was appointed historio- grapher-royal to the king of Denmark and comptroller of the Order of the Dannebrog. There was probably no living man to whom the destructioa of the archives, when Christiansborg Castle was accidentally burned in 1884, was so acute a matter of distress. But his favourite and peculiar province, the MSS. of the 1 6th century, was happily not involved in that calamity.

LUND, a city of Sweden, the seat of a bishop, in the district (Ian) of Malmohus, 10 m. N.E. of Malmo by rail. Pop. (1900) 16,621. A university was founded here in 1668 by Charles XI., with faculties of law, medicine, theology and philosophy. The number of students ranges from 600 to 800, and there are about 50 professors. Its library of books and MSS. is entitled to receive a copy of every work printed in Sweden. Important buildings include the university hall (1882), the academic union of the students (1851) containing an art museum; the astronomi- cal observatory, built in 1866, though observations have been carried on since 1760; the botanical museum, and ethnographical and industrial art collections, illustrating life in southern Sweden from early times. Each student belongs to one of twelve nations (landskap), which mainly comprises students from a particular part of the country. The Romanesque cathedral was founded about the middle of the 10th century. The crypt under the raised transept and choir is one of the largest in the world, and the church is one of the finest in Scandinavia. A statue of the poet Esaias Tegner stands in the Tegners Plads, and the house in which he lived from 1813 to 1826 is indicated by an inscribed stone slab. The chief industries are sugar-refining, iron and brick works, and the manufacture of furniture and gloves.

Lund (Londinum Gothorum), the “Lunda at Eyrarsund” of Egil’s Saga, was of importance in Egil’s time (c. 920). It appears that, if not actually a seaport, it was at least nearer the Sound than now. In the middle of the nth century it was made a bishopric, and in 1103 the seat of an archbishop who received primatial rank over all Scandinavia in 1163, but in 1536 Lund was reduced to a bishopric. Close to the town, at the hill of Sliparabacke, the Danish kings used to receive the homage of the princes of Skare, and a monument records a victory of Charles XL over the Danes (1676), which extinguished the Danish claim to suzerainty over this district.

LUNDY, BENJAMIN (1 789-1839), American philanthropist, prominent in the anti-slavery conflict, was bom of Quaker parentage, at Hardwick, Warren county, New Jersey, on the 4th of January 1789. As a boy he worked on his father’s farm, attending school for only brief periods, and in 1808-1812 he lived at Wheeling, Virginia (now W. Va.), where he served an appren- ticeship to a saddler, and where — Wheeling being an important headquarters of the inter-State slave trade — he first became deeply impressed with the iniquity of the institution of slavery, and determined to devote his life to the cause of abolition. In 1815, while living at Saint Clairsville, Ohio, he organized

an anti- slavery association, known as the ” Union Humane Society,” which within a few months had a membership of more than five hundred men. For a short time he assisted Charles Osborne in editing the Philanthropist; in 1819 he went to St Louis, Missouri, and there in 1819-1820 took an active part in the slavery controversy; and in 1821 he founded at Mount Pleasant, Ohio, an anti-slavery paper, the Genius of Universal Emancipation. This periodical, first a monthly and later a weekly, was published successively in Ohio, Tennessee, Maryland, the District of Columbia and Pennsylvania, though it appeared irregularly, and at times, when Lundy was away on lecturing tours, was issued from any office that was accessible to him. From September 1829 until March 1830 Lundy was assisted in the editorship of the paper by William Lloyd Garrison (q.v.). Besides travelling through many states of the United States to deliver anti-slavery lectures, Lundy visited Haiti twice — in 1825 and 1829, the Wilberforce colony of freedmen and refugee slaves in Canada in 1830-1831, and in 1832 and again in i833’(Texas, all these visits being made, in part, to find a suitable place outside the United States to which emancipated slaves might be sent. Between 1820 and 1830, according to a statement made by Lundy himself, he travelled ” more than 5000 m. on foot and 20,000 in other ways, visited nineteen states of the Union, and held more than 200 public meetings.” He was bitterly denounced by slaveholders and also by such non-slaveholders as disapproved of all anti- slavery agitation, and in January 1827 he was assaulted and seriously injured by a slave-trader, Austin Woolfolk, whom he had severely criticized in his paper. In 1836-1838 Lundy edited

in Philadelphia a new anti-slavery weekly, The National Enquirer, which he had founded, and which under the editorship of John G. Whittier, Lundy’s successor, became The Pennsylvania Freeman. In 1838 Lundy removed to Lowell, La Salle county, Illinois, where he printed several copies of the Genius of Universal Emancipation. There, on the 22nd of August 1839, he died. Lundy is said to have been the first to deliver anti-slavery lectures in the United States.

See The Life, Travels and Opinions of Benjamin Lundy (Phila- delphia, 1847), compiled (by Thomas Earle) ” under the direction and on behalf of his children.”

LUNDY, ROBERT (fl. 1689), governor of Londonderry. Nothing is known of Lundy’s parentage or early life; but he had seen service in the foreign wars before 1688, when he was at Dublin with the rank of lieutenant-colonel in the regiment of Lord Mountjoy. When the apprentices of Derry closed the gates in the face of the earl of Antrim, who was approaching the city at the head of an Irish Catholic force in

the interests of James II., the viceroy Tyrconnel despatched Mountjoy to pacify the Protestants. Mountjoy and his regiment were well received in the north, and the citizens of Derry permitted him to leave within their walls a small Protestant garrison under the command of Lundy, who assumed the title of governor. Popular feeling in Derry ran so strongly in favour of the prince of Orange that Lundy quickly declared himself an adherent of William; and he obtained from him a commission confirming his appointment as governor. Whether Lundy was a deliberate traitor to the cause he had embraced with explicit asseveration of fidelity in a signed document, or whether, as Macaulay sug- gests, he was only a cowardly poltroon, cannot certainly be known. What is certain is that from the moment Londonderry was menaced by the troops of King James, Lundy used all his endeavours to paralyse the defence of the city. In April 1689 he was in command of a force of Protestants who encountered some troops under Richard Hamilton at Strabane, when, instead of holding his ground, he told his men that all was lost and ordered them to shift for themselves; he himself was the first to take flight back to Derry. King James, then at Omagh on his way to the north, similarly turned in flight towards Dublin on hearing of the skirmish, but returned next day on receiving the true account of the occurrence. On the 14th of April English ships appeared in the Foyle with reinforcements for Lundy under Colonel Cunningham. Lundy dissuaded Cunningham from landing his regiments, representing that a defence of Londonderry was hopeless; and that he himself intended to withdraw secretly from the city. At the same time he sent to the enemy's headquarters a promise to surrender the city at the first summons. As soon as this became known to the citizens Lundy's life was in danger, and he was vehemently accused of treachery. When the enemy appeared before the walls Lundy gave orders that there should be no firing. But all authority had passed out of his hands. The people flew to arms under the direction of Major Henry Baker and Captain Adam Murray, who organized the famous defence in conjunction with the Rev. George Walker (q.v.). Lundy, to avoid popular vengeance, hid himself until nightfall, when by the connivance of Walker and Murray he made his escape in disguise. He was appre- hended in Scotland and sent to the Tower of London. He was excluded from the Act of Indemnity in 1690, but his subsequent fate is unknown.

See Lord Macaulay, History of England, vol. in. (Albany edition of complete works, London, 1898); Rev. George Walker, A True Account of the Siege of Londonderry (London, 1689); J. Mackenzie, Narrative of the Siege of Londonderry (London, 1690) ; John Hempton, The Siege and History of Londonderry (Londonderry, 1861); Rev. John

Graham, A History of the Siege of Derry and Defence of Enniskillen, 1688-9 (Dublin, 1829). (R. J. M.)

LUNDY, an English island at the entrance of the Bristol Channel, 12 m. N. W. by N. of the nearest point on the mainland, namely Hartland Point on the Devonshire coast. The nearest ports are Clovelly and Bideford. The extreme length of the island is 3 m. from N. to S., the mean breadth about half a mile, but at the south the breadth is nearly 1 m. The area is about 1150

acres. The component rock is a hard granite, except at the south, where slate occurs. This granite was used in the construction of the Victoria Embankment, London. An extreme elevation of about 450 ft. is found in the southern half of the island; the northern sloping gently to the sea, but the greater part of the coast is cliff-bound and very beautiful. The landing, at the south-east, is sheltered by the small Rat Island, where the once common black rat survives. There are a few prehistoric remains on Lundy, and the foundations of an ancient chapel of St Helen. There are also ruins, and the still inhabited keep, of Marisco Castle, occupying a strong precipitous site on the south-east, held in the reign of Henry II. by Sir Jordan de Marisco. The Mariscos, in their inaccessible retreat, lived lawlessly until in 1242 Sir William Marisco was hanged for instigating an attempt on the life of Henry III. In 1625 the island was reported to be captured by Turkish pirates, and in 1633 by Spaniards. Later it became an object of attack and a hiding place for French privateers. The island, which is reckoned as extra-parochial, has some cultivable land and heath pasture, and had a population in iqoi of 94.

LUNEBURG, a town of Germany, in the Prussian province of Hanover, situated near the foot of a small hill named the Kalkberg, on the navigable Ilmenau, 14 m. above its confluence with the Elbe and 30 m. by rail S.E. of Hamburg by the main line to Hanover. Pop. (1905) 26,751. Numerous handsome medieval buildings testify to its former prosperity as a prominent member of the Hanseatic league, and its many quaint houses with high gables and overhanging eaves have gained for it the appellation ” the Nuremberg of the North.” Portions of the old walls survive, but the greater part of the former circum-vallation has been converted into promenades and gardens, outside which a modern town has sprung up. The finest of its squares are the market-place and the so-called Sand. The churches of St John, with

five aisles and a spire 375 ft. in height; of St Michael, containing the tombs of the former princes of Liineburg, and of St Nicolas, with a huge nave and a lofty spire, are fine Gothic edifices of the 14th and 15th centuries. The old town-hall in the market square is a huge pile, dating originally from the 13th century, but with numerous additions. It has an arcade with frescoes, restored by modern Munich artists, and contains a magnificent hall — the FUrstensaal — richly decorated with wood-carving and stained-glass windows. Galvanoplastic casts of the famous Liineburg silver plate, con- sisting of 36 pieces which were acquired in 1874 by the Prussian government for £33,000 and are now housed in the art museum in Berlin, are exhibited here. Among other public edifices are the old palace; the convent of St Michael (now converted into a school and law court), and the Kaufhaus (merchants' hall). There are a museum, a library of 36,000 volumes, classical and commercial schools, and a teachers' seminary. Liineburg owes its importance chiefly to the gypsum and lime quarries of the Kalkberg, which afford the materials for its cement works, and to the productive salt-spring at its base which has been known and used since the 10th century. Hence the ancient saying which, grouping with these the commercial facilities afforded by the bridge over the Ilmenau, ascribes the prosperity of Liine- burg to its mons, fans, pons.' Other industries are the making of chemicals, ironware, soda and haircloth. There is a con- siderable trade in French wines, for which Liineburg has for centuries been one of the chief emporia in north Germany, and also in grain and wool. Celebrated are its lampreys, Liine- burger Bricken.

Liineburg existed in the days of Charlemagne, but it did not gain importance until after the erection of a convent and a castle on the Kalkberg in the 10th century. After the destruc- tion of Bardowiek, then the chief commercial centre of North Germany, by Henry the Lion, duke of Saxony, in 1189, Liine- burg inherited much of its trade and subsequently became one of the principal towns of the Hanseatic league. Having belonged to the extensive duchy of Saxony it was the capital of the duchy of Brunswick-Liineburg from 1235 to 1369; later it belonged to one or other of the branches of the family of Brunswick, being

involved in the quarrels, and giving its name to cadet lines, of this house. From the junior line of Brunswick-Liineburg the reigning family of Great Britain is descended. The re- formed doctrines were introduced into the town in 1530 and it suffered heavily during the Thirty Years' War. It reached the height of its prosperity in the 15th century, and in the 17th century it was the depot for much of the merchandise exported from Saxony and Bavaria to the mouth of the

Elbe; then after a period of decay the 19th century witnessed a revival of its prosperity. In 18 13 the German war of liberation was begun by an engagement with the French near Liineburg.

See W. F. Volger, Vrkundenbuch der Stadt Liineburg (3 vols., Liineburg, 1872-1877); E. Bodemann, Die alteren Zunfturkunden der Stadt Liineburg (Hanover, 1883) ; O. Jiirgens, Geschtchte der Stadt Liineburg (Liineburg, 1891); Des Propstes Jakob Schomaker Luneburger Chronik, edited by T. Meyer (Hanover, 1904) ; A. Wrede, Die Einfiihrung der Reformation in Liineburg (Gottingen, 1887), and W. Reiaecke,LuneburgsdltestesStadtbuchund Verfasstungsregister (Hanover, 1903). For the history of the principality see von Leuthe, Archiv fiir Geschichte und Verfassung des Fiirstentums Liineburg (Celle, 1854-1863).

LUNEBURGER HEIDE, a district of Germany, in the Prussian province of Hanover, lying between the Aller and the Elbe and intersected by the railways Harburg-Hanover and Bremen- Stendal. Its main character is that of a broad saddle-back, running for 55 m. from S.E. to N.W. of a mean elevation of about 250 ft. and attaining its greatest height in the Wilseder Berg (550 ft.) at its northern end. The soil is quartz sand and is chiefly covered with heather and brushwood. In the north, and in the deep valleys through which the streams descend to the plain, there are extensive forests of oak, birch and beech, and in the south, of fir and larch. Though the climate is raw and good soil rare, the heath is not unfertile. Its main products are sheep — the celebrated Heidschnucken breed, — potatoes, bilberries, cranberries and honey. The district is also remarkable for the numerous Hun barrows found scattered throughout its whole extent.

See Rabe, Die Liineburger Heide und die Bewirthschaftung der Heidhofe (Jena, 1900) ; Kniep, Fiihrer durch die Liineburger Heide (Hanover, 1900) ; Linde, Die Liineburger Heide (Liineburg, 1905), and Kiick, Das alte Bauernleben der Liineburger Heide (Leipzig, 1906).

LUNETTE (French diminutive of lune, moon), a crescent- shaped, semi-circular object. The term is particularly applied in architecture to a circular opening at the intersection of vaulting by a smaller vault, as in a ceiling for the entrance of light or in the lower stories of towers for the passage of bells. It is also used of a panel space of semi-circular shape, filled by a fresco or other decorative treatment. In fortification a “lunette” was originally an earthwork of half-moon shape; later it became a redan with short flanks, in trace somewhat resembling a bastion standing by itself without curtains on either side. The gorge was generally open.

LUNEVILLE, an industrial and garrison town of north-eastern France, capital of an arrondissement in the department of Meurthe-et-Moselle, 21 m. E.S.E. of Nancy on the railway to Strassburg. Pop. (1906) town, 19,199; commune, 24,266 (including troops). The town stands on the right bank of the Meurthe between that river and its affluent the Vezouze, a little above their confluence. Its chateau, designed early in the 18th century by the royal architect Germain Boffrand, was the favourite residence of Duke Leopold of Lorraine, where he gathered round him an academy composed of eminent men of the district. It is now a cavalry barracks, and the gardens form a public promenade. Luneville is an important cavalry station with a large riding school. The church of St Jacques with its two domed towers dates from 1730-1745. There are statues of General Count Antoine de Lasalle, and of the Conven- tional Abbe Henri Gregoire. The town is the seat of a sub-prefect, and has a tribunal of first instance and a communal college. It carries on cotton-spinning and the manufacture of railway material, motor vehicles, porcelain, toys, hosiery, embroidery, straw-hats and gloves. Trade is in grain, wine, tobacco, hops and other agricultural produce.

The name of Luneville (Lunae villa) is perhaps derived from

an ancient cult of Diana, the moon goddess, a sacred fountain and medals with the effigy of this goddess having been found at Leormont, some 2 m. E. of the town. Lun6vUle belonged to Austrasia, and after various changes fell, in 1344, to the house of Lorraine. A walled town in the middle ages, it suffered in the Thirty Years' War and in the campaigns of Louis XIV. from war, plague and famine. The town flourished again under Dukes Leopold and Stanislas, on the death of the latter of whom, which took place at Luneville, Lorraine was united to France (1766). The treaty of Luneville between France and Austria (1801) confirmed the former power in the possession of the left bank of the Rhine.

LUNG, in anatomy, the name of each of the pair of organs of respiration in man and other air-breathing animals, the corresponding organs in fishes being the branchiae or gills (see Respiratory System). The word in Old English was lungen; it appears in many Teutonic languages, cf. Ger. Lunge, Du. long, Swed. lunga; the Teutonic root from which these are derived meant " light," and the lungs were so-called from their lightness. The word " lights " was formerly used as

synonymous with ” lungs,” but is now confined to the lungs of sheep, pigs or cattle; it is etymologically connected with ” lung,” the pre-Teutonic root being seen in Sansk. laghu, Gr. eXa$p6s.

Surgery of the Lung and Pleura. — When a person meets with a severe injury to the chest, as from a wheel passing over him, the ribs may be broken and driven into the lung. Air then entering into the pleural space, the lung collapses, and breathing becomes so difficult that death may ensue from asphyxia. Short of this, however, there is a cough with the spitting of frothy, blood-stained mucus or of bright red blood. All that can be done is to place the person on his back, slightly propped up by pillows, and to combat syncope by subcutaneous injections of ether and strychnia.

Empyema means the presence of an abscess between the lung and the chest wall, i.e. in the pleural space; it is the result of a septic inflammation of the pleura by the micro-organisms of pneumonia or. of typhoid fever, or by some other germs. As the abscess increases in size, the lung is pushed towards the spine, and that side of the chest gives a dull note on percussion. If much fluid collects the heart may be pushed out of its place, and, the lung-space being taken up, respiration is embarrassed. Having made sure of the presence of an abscess by exploring with syringe and hollow needle, the surgeon opens and drains it. The drainage is made more effectual by removing an inch or so of one of the ribs, for, unless this is done, there is a risk of the rubber drainage tube being compressed as the ribs come closer together again.

The lung itself has sometimes to be operated on, as when it is the seat of an hydatid cyst, or when it contains an abscess cavity which cannot otherwise be drained, or when it becomes necessary to remove a foreign body the exact situation of which has been revealed by the X-rays. Portions of some of the ribs having been resected, the pleural cavity is opened, and if the lung has not already become glued to the chest-wall by inflammatory adhesions, it is stitched up to the chest-wall, and in a few days, when adhesions have taken place, an incision is safely made into the lung-tissue. See also Respiratory System. (E. O.*)

LUNG, one of the four symbolical creatures of Chinese legend. It is a dragon with a scaly snake-like body, long claws, horns, a bristly face, and its back-bone armed with spikes. Originally three-clawed, it has become, as the official dragon of the present dynasty, a five-clawed beast. The form is embroidered on the state robes of the emperor of China, and it is traditionally connected with the dynasty’s history and

fortunes.

LUNGCHOW, a town in the province of Kwangsi, China, in 22° 21′ N., 106 45′ E., near the Tongking frontier, and at the junction of the Sung-chi and Kao-ping rivers. Pop. (estimate) 22,000. The town is prettily situated in a circular valley. From a military point of view it is considered important, and considerable bodies of troops are stationed here. It was selected as the seat of frontier trade by the French convention of 1886, and was opened in 1889. In 1898 the total value of its trade amounted to only £20,000, but in 1904 the figures increased to £56,692.

LUNGE, GEORG (1839-), German chemist, was born at Breslau on the 15th of September 1839. He studied at Heidel- berg (under R. W. Bunsen) and Breslau, graduating at the latter university in 1859. Turning his attention to technical chemistry, he became chemist at several works both in Germany and England, and in 1876 he was appointed professor of technical

chemistry at Zurich polytechnic. Lunge's original contributions cover a very wide field, dealing both with technical processes and analysis. In addition, he was a voluminous writer, enriching scientific literature with many standard works. His treatises Coal Tar and Ammonia (5th ed. 1909; 1st ed. 1867), Destination des Steinkohlentheers) and Sulphuric Acid and Alkali (1st ed. 1878, 4th ed. 1909), established his position as the highest authority on these subjects, while the Chemische-technische Untersuchungs-Methoden (1899-1900; Eng. trans.), to which he contributed, testified to his researches in technical analysis. His jubilee was celebrated at Zurich on the 15th of September

1909.

LUPERCALIA, a very ancient, possibly pre-Roman, pastoral festival in honour of Lupercus. Its rites were under the super- intendence of a corporation of priests called Luperci, 1 whose institution is attributed either to the Arcadian Evander, or to Romulus and Remus. In front of the Porta Romana, on the western side of the Palatine hill, close to the Ficus Ruminalis and the Casa Romuli, was the cave of Lupercus; in it, according to the legend, the she-wolf had suckled the twins, and the bronze wolf, which is still preserved in the Capitol, was placed in it in 296 B.C. But the festival itself, which was held on February 15th, contains no reference to the Romulus legend, which is probably later in origin, though earlier than the grecizing Evander legend. The festival began with the sacrifice by the Luperci (or the flamen dialis)

of goats and a dog; after which two of the Luperci were led to the altar, their foreheads were touched with a bloody knife, and the blood wiped off with wool dipped in milk; then the ritual required that the two young men should laugh. The smearing of the forehead with blood probably refers to human sacrifice originally practised at the festival. The sacrificial feast followed, after which the Luperci cut thongs from the skins of the victims and ran in two bands round the walls of the old Palatine city, the line of which was marked with stones, striking the people who crowded near. A blow from the thong prevented sterility in women. These thongs were called februa, the festival Februatio, and the day dies februatus (februare = to purify); hence the name of the month February, the last of the old Roman year. The object of the festival was, by expiation and purifica- tion, to secure the fruitfulness of the land, the increase of the flocks and the prosperity of the whole people. The Lupercal (cave of Lupercus), which had fallen into a state of decay, was rebuilt by Augustus; the celebration of the festival had been maintained, as we know from the famous occurrence of it in 44 B.C. It survived until a.d. 494, when it was changed by Gelasius into the feast of the Purification. Lupercus, in whose honour the festival was held, is identified with Faunus or Inuus, Evander (EfWSpos), in the Greek legend being a translation of Faunus (the ” kindly “). The Luperci were divided into two collegia, called Quinctiliani (or Quinctiales) and Fabiani, from the gens Quinctilia (or Quinctia) 2 and Fabia; at the head of each of these colleges was a magister. In 44 B.C. a third college, Luperci Julii, was instituted in honour of Julius Caesar, the first magister of which was Mark Antony. In imperial times the members were usually of equestrian standing.

See Marquardt, Romische Staatsverwaltung, iii. (1885) p. 438 ; W. Warde Fowler, Roman Festivals (1899), p. 390 foil., and article in Smith’s Dictionary of Greek and Roman Antiquities (3rd ed. 1S91).

LUPINE (Lupinus), in botany, a genus of about 100 species of annual and perennial herbaceous plants of the tribe Genisteae, of the order Leguminosae. Species with digitate leaves range along the west side of America from British Columbia to northern Chile, while a few occur in the Mediterranean regions. A few others with entire leaves are found in Brazil and eastern North America. The leaves are remarkable for ” sleeping ” in three different ways. From being in the form of a horizontal star by day, the leaflets either fall and form a .hollow cone with their

1 Many derivations are suggested, but it seems most probable that Luperci simply means ” wolves ” (the last part of the word exhibiting a similar formation to nov-erca), the name having its origin in the

primitive worship of the wolf as a wolf-god.

2 Mommsen considers the Quinctia to be the older gens, and the Quinctilia a later introduction from Alba.

bases upwards (L. pilosus), or rise and the cone is inverted {L. luteus), or else the shorter leaflets fall and the longer rise, and so together form a vertical star as in many species; the object in every case being to protect the surfaces of the leaflets from radiation and consequent wetting with dew (Darwin, Movements of Plants, p. 340). The flowers are of the usual ” papilionaceous ” or pea-like form, blue, white, purple or yellow, in long terminal spikes. The stamens are monadelphous and bear dimorphic anthers. The species of which earliest mention is made is probably L. Termis, which was cultivated by the ancient Egyptians. It is wild in some parts of the Mediterranean area and is extensively cultivated ‘in Egypt. Its seeds are eaten by the poor after being steeped in water to remove their bitterness; the stems furnish fuel and charcoal for gunpowder. The lupine of the ancient Greeks and Romans was probably L. albus, which is still extensively cultivated in Italy, Sicily and other Mediterranean countries for forage, for ploughing in to enrich the land, and for its round flat seeds, which form an article of food. Yellow lupine (L. luteus) and blue lupine (L. angustifolius) are also cultivated on the European continent as farm crops for green manuring.

Lupines are easily cultivated in moderately good garden soil; they include annuals which are among the most ornamental and most easily grown of summer flowering plants (sow in open borders in April and May), and perennials, which are grown from seed or propagated by dividing strong plants in March and April. Many of the forms in cultivation are hybrid. One of the best known of the perennial species is L. polyphyllus, a western North American species. It grows from 3 to 6 ft. high, and has numerous varieties, including a charming white-flowered one. The tree lupine (L. arboreus) is a Californian bush, 2 to 4 ft. high, with fragrant yellow flowers. It is only hardy in the most favoured parts of the kingdom.

LUPUS, PUBLIUS RUTILIUS, Roman rhetorician, flourished during the reign of Tiberius. He was the author of a treatise on the figures of speech {XxVPO-to- X4£«os), abridged from a similar work by the rhetorician Gorgias (of Athens, not the well-known sophist of

Leontini), the tutor of Cicero's son. In its present form it is incomplete, as is clearly shown by the express testimony of Quintilian (Instil, ix. 2, 103, 106) that Lupus also dealt with figures of sense, rhetorical figures (2xˆM £ "" a 5t,avolas). The work is valuable chiefly as containing a number of examples, well translated into Latin, from the lost works of Greek rhetoricians. The author has been identified with the Lupus mentioned in the Ovidian catalogue of poets (Ex Ponte, iv. 16), and was perhaps the son of the Publius Rutilius Lupus, who was a strong supporter of Pompey.

Editions by D. Ruhnken (1768), F. Jacob (1837), C. Halm in Rhetores latini minores (1863); see also monographs by G. Dzialas (i860 and 1869), C. Schmidt (1865), J. Draheim (1874), Thilo Krieg

(1896).

LUPUS (Lat. lupus, wolf), a disease characterized by the formation in the skin or mucous membrane of small tubercles or nodules consisting of cell growth which has an inclination to retrograde change, leading to ulceration and destruction of the tissues, and, if it heals, to the subsequent formation of permanent white scars. Lupus vulgaris is most commonly seen in early life, and occurs chiefly on the face, about the nose, cheeks or ears. But it may also affect the body or limbs. It first shows itself as small, slightly prominent, nodules covered with thin crusts or scabs. These may be absorbed and removed at one point whilst spreading at another. Their disappearance is followed by a permanent white cicatrix. The disease may be superficial, in which case both the ulceration and the resulting scar are slight (lupus non-exedens); or the ulcerative process may be deep and extensive, destroying a large portion of the nose or cheek, and leaving much disfigurement (lupus exedens). A milder form, lupus erythematosus, occurs on the nose and adjacent portions of the cheeks in the form of red patches covered with thin scales, underneath which are seen the widened openings of the sebaceous ducts. With a longitudinal patch on the nose and spreading symmetrical patches on each cheek the appearance is usually that of a large butterfly. It is slow in disappearing, but does not leave a scar. Lupus is more frequently seen in women than in men; it is connected with a tuberculous constitution. In the superficial variety the applica-

tion of soothing ointments when there is much redness, and linear incisions, or scrapings with a sharp spoon, to destroy the increased blood supply, are often serviceable. In the ordinary form the local treatment is to remove the new tissue growth by solid points of caustic thrust into the tubercles to break them up, or by scraping with a sharp

spoon. The light-treatment has been successfully applied in recent years. As medicines, cod-liver oil, iron and arsenic are useful. (E. O.*)

LUQMAN, or Lokman, the name of two, if not of three (cf. note to Terminal Essay in Sir Rd. Burton's translation of the Arabian Nights), persons famous in Arabian tradition. The one was of the family of 'Ad, and is said to have built the great dike of Marib and to have received the gift of life as long as that of seven vultures, each of which lived eighty years. The name of the seventh vulture — Lubad — occurs in proverbial literature. The name of the second Luqman, called " Luqirian the Sage," occurs in the Koran (31, n). Two accounts of him are current in Arabian literature. According to Mas'udi (i. no) he was a Nubian freedman who lived in the time of David in the district of Elah and Midian. According to some commentators on the Koran (e.g., Baidawi) he was the son of Ba'ura, one of the sons of Job's sister or maternal aunt. Derenbourg in his Fables de Loqm&n le sage (1850) identifies Ba'ura with Beoi, and believes the name Luqman to be a translation of Balaam. The grave of Luqman was shown on the east coast of the lake of Tiberias, also in Yemen (cf. Yaqut, vol. iii. p. 512).

The so-called Fables of Luqman are known to have existed in the 13th century, but are not mentioned by any Arabian writer. They were edited by Erpenius (Leiden, 1615) and have been reprinted many times. For the relation of these to similar literature in other lands, see J. Jacobs's edition of Caxton's Fables of Aesop, vol. i. (London, 1889). The name of Luqman also occurs in many old verses, anecdotes and proverbs; cf. G. Freytag's Arabum Proverbia (Bonn, 1838-1843) and such Arabian writers as Tabarl, Mas'udi, Damiri and the Kitab al-Mu'ammann (ed. by I. Goldziher, Leiden, 1899). (G. W. T.)

LURAY CAVERN, a large cave in Page county, Virginia, U.S.A., 39 35′ N. and 78 17′ W., near the village of Luray, on the Norfork & Western railway. The valley, here 10 m. wide, extends from the Blue Ridge to the Massanutton Mountain. The ridges lie in vast folds and wrinkles; and elevations in the valley are often found to be pierced by erosion. Cave Hill, 300 ft. above the water-level, had long been an object of local interest on account of its pits and oval hollows or sink-holes, through one of which, on the 13th of August 1878, Andrew J. Campbell and others entered, thus discovering the cavern now described.

The Luray cavern does not date beyond the Tertiary period, though carved from the Silurian limestone. At some period, long subsequent to its original excavation, and after many large stalactites had grown, it was completely filled with glacial mud charged with acid, whereby

the dripstone was eroded into singularly grotesque shapes. After the mud had been mostly removed by flowing water, these eroded forms remained amid the new growths. To this contrast may be ascribed some of the most striking scenes in the cave. The many and extraordinary monuments of aqueous energy include massive columns wrenched from their place in the ceiling and prostrate on the floor; the Hollow Column, 40 ft. high and 30 ft. in diameter, standing erect, but pierced by a tubular passage from top to bottom; the Leaning Column nearly as large, undermined and tilting like the campanile of Pisa; the Organ, a cluster of stalactites in the chamber known as the Cathedral; besides a Vast bed of dis- integrated carbonates left by the whirling flood in its retreat through the great space called the Elfin Ramble.

The stalactitic display exceeds that of any other cavern known. The old material is yellow, brown or red; and its wavy surface often shows layers like the gnarled grain of costly woods. The new stalactites growing from the old, and made of hard carbonates that had already once been used, are usually white as snow, though often pink, blue or amber-coloured. The Empress Column is a stalagmite 35 ft. high, rose-coloured, and elaborately draped. The double column, named from Professors Henry and Baird, is made of two fluted pillars side by side, the one 25 and

the other 60 ft. high, a mass of snowy alabaster. Several stalactites in the Giant Hall exceed 50 ft. in length. The smaller pendants are innumerable; in the canopy above the Imperial Spring it is estimated that 40,000 are visible at once.

The ” cascades ” are wonderful formations like foaming cataracts caught in mid-air and transformed into milk-white or amber alabaster. The Chalcedony Cascade displays a variety of colours. Brand’s Cascade, the finest of all, is 40 ft. high and 30 ft. wide, and is unsullied and wax-like white, each ripple and braided rill seeming to have been polished.

The Swords of the Titans are monstrous blades, eight in number, 50 ft. long, 3 to 8 ft. wide, hollow, 1 to 2 ft. thick, but drawn down to an extremely thin edge, and filling the cavern with tones like tolling bells when struck heavily by the hand. Their origin and also that of certain so-called scarfs and blankets is from carbonates deposited by water

trickling down a sloping and corrugated surface. Sixteen of these alabaster scarfs hang side by side in Hovey's Balcony, three white and fine as crape shawls, thirteen striated like agate with every shade of brown,

Luray Cavern.

Scale 51

I.

The Vestibule.

19.

2.

Washington's Pillar.

20.

3-

Flower Garden.

21.

4-

Amphitheatre.

22.

5-

Natural Bridge.

23-

6.

Fish Market.

24.

7-

Crystal Spring.

25-

8.

Proserpine’s Pillar.

26.

9-

The Spectral Column.

27-

10.

Hovey’s Balcony.

28.

11.

Oberon’s Grot.

29.

12.

Titania’s Veil.

3°-

13-

Saracen’s Tent.

3i-

14.

The Organ.

32-

15-

Tower of Babel.

33-

16.

Empress Column.

34-

17-

Hollow Column.

35-

18.

Henry-Baird Column.

36-

Chalcedony Cascade. Coral Spring. The Dragon. Bootjack Alley. Scaly Column. Lost Blanket. Helen's Scarf. Chapman's Lake. Broaddus Lake. Castles on the Rhine. Imperial Spring. The Skeleton. The Twin Lakes. The Engine Room. Miller's Room. Hawes Cabinet. Specimen Avenue. Proposed Exit.

and all perfectly translucent. Down the edge of each a tiny rill glistens like silver, and this is the ever-plying shuttle that weaves the fairy fabric.

Streams and true springs are absent, but there are hundreds of basins, varying from 1 to 50 ft. in diameter, and from 6 in. to 15 ft. in depth. The water in them is exquisitely pure, except as it is impregnated by the carbonate of lime, which often forms concretions, called according to their size, pearls, eggs and snowballs. A large one is known as the cannon ball. On fracture these spherical growths are found to be radiated in structure.

Calcite crystals, drusy, feathery or fern-like, line the sides and bottom of every water-filled cavity, and indeed constitute the sub-

stance of which they are made. Variations of level at different periods are marked by rings, ridges and ruffled margins. These are strongly marked about Broaddus Lake and the curved ramparts of the Castles on the Rhine. Here also are polished stalagmites, a rich buff slashed with white, and others, like huge mushrooms, with a velvety coat of red, purple or olive-tinted crystals. In some of the smaller basins it

sometimes happens that, when the excess of carbonate acid escapes rapidly, there is formed, besides the crystal bed below, a film above, shot like a sheet of ice across the surface. One pool 12 ft. wide is thus covered so as to show but a third of its surface. The quantity of water in the cavern varies greatly at different seasons. Hence some stalactites have their tips under water long enough to allow tassels of crystals to grow on them, which, in a drier season, are again coated over with stalactitic matter; and thus singular distortions are occasioned. Contiguous stalactites are often inwrapped thus till they assume an almost globular form, through which by making a section the primary tubes appear. Twig-like projections, to which the term helictite has been applied by the present writer, are met with in certain portions of the cave, and are interesting by their strange and un- couth contortions. Their presence is due to lateral outgrowths of crystals shooting from the side of a growing stalactite, or to deflec- tions caused by currents of air, or to the existence of a diminutive fungus peculiar to the locality and designated from its habitat Mucor stalactitis. The Toy-Shop is an amusing collection of these freaks of nature.

The dimensions of the various chambers included in Luray Cavern cannot easily be stated, on account of the great irregu- larity of their outlines. Their size may be seen from the diagram. But it should be understood that there are several tiers of galleries, and the vertical depth from the highest to the lowest is 260 ft. The large tract of land owned by the Luray Caverns Corporations covers all possible modes of entrance.

The waters of this cavern appear to be entirely destitute of life; and the existing fauna comprises only a few bats, rats, mice, spiders, flies and small centipedes. When the cave was first entered, the floor was covered with thousands of tracks of raccoons, wolves and bears — most of them probably made long ago, as impressions made in the tenacious clay that com- poses most of the cavern floor would remain unchanged for centuries. Layers of excrementitious matter appear, and also many small bones, along with a few large ones, all of existing species. The traces of human occupation are pieces of charcoal, flints, moccasin tracks and a single skeleton embedded in stalag- mite- in one of the chasms, estimated, from the present rate of stalagmitic growth, to have lain where found for not more than five hundred years.

The temperature is uniformly 54° Fahr., coinciding with that of Mammoth Cave, Kentucky. The air is very pure, and the avenues are not uncomfortably damp. The portions open to the public are now

lighted by electric lamps. The registered number of visitors in 1906 was 18,000. A unique and highly successful experiment merits mention, by which the cool pure air of Luray Cavern is forced through all the rooms of the Limair sanatorium erected in 1901, by Mr T. C. Northcott, president of the Luray Caverns Corporation, on the summit of Cave Hill. Tests made for several successive years by means of culture media and sterile plates, demonstrated the perfect bacteriologic purity of the air, first drawn into the caverns through myriads of rocky crevices that served as natural filters, then further cleansed by floating over the transparent springs and pools, and finally supplied to the inmates of the sanatorium.

For a full description see an article by Dr G. L. Hunner, of Johns Hopkins University, in the Popular Science Monthly for April 1904.

(H. C. H.)

LURCH, a word with several meanings, the etymological relationships of which are obscure. The chief uses which sur- vive are — (1) in the phrase ” to leave in the lurch,” to abandon some one, to leave him in a position of great difficulty; (2) a stagger, sudden leaning over, originally a nautical expression of a sudden ” list ” made by a ship; (3) the name of a dog, the ” lurcher ” used by poachers, properly a cross between a sheep- dog or collie and a greyhound. In (1) ” lurch ” is the name of a game, of which nothing is known (it is supposed to have resembled backgammon), and also of a state of the score in various games, in which the loser either scores nothing or is beaten by very heavy points. In this sense the term is practically obsolete.

It was taken from Fr. lourche, connected with many German forms, now only dialectical such as Lortsch, Lurtsch, Lorz, Lurz, all for some kind of game, but also meaning left-hand, wrong, which the New English Dictionary thinks is the origin of the word, it being first used as a term in gambling. In (2) ” lurch ” occurs first in the form ” lee- lurches,” sudden rolls a ship takes to leeward in a heavy sea, which may be a corruption of ” lee- latch,” defined in Smyth’s Sailor’s Word Book as dropping to lee- ward of the course. In (3) ” lurch ” is probably another form of ” lurk,” to Me in wait for, watch stealthily, hence to pilfer, steal. LURGAN, a market town of Co. Armagh, Ireland, well situated on high ground overlooking Lough Neagh a few miles to the north; 20 m. S.W. of Belfast by the Great Northern railway. Pop.

(1901) 11,782. The parish church of Shankill (this parish including Lurgan) has a finely proportioned tower. Contiguous to the town is Lurgan Castle, a fine modern Eliza bethan structure, the seat of Lord Lurgan. Lurgan is famed for its diapers, and the linen trade is of the first importance, but there are also tobacco factories and coach factories. It is governed by an urban district council. Lurgan was founded by William Brownlow, to whom a grant of the town was made by James I. In 1619 it consisted of forty-two houses, all inhabited by English settlers. It was burned by the insurgents in 1641, and again by the troops of James II. After its restoration in 1690 a patent for a market and fair was obtained.

LURIA, ISAAC BEN SOLOMON (1534-1572), Jewish mystic, was born in Jerusalem. From his German descent he was sur- named Ashkenazi (the German), and we find that epithet applied to him in a recently discovered document of date 1559. In that year Isaac Luria was living in Cairo and trading as a spice merchant with his headquarters in Alexandria. He had come to Egypt as a boy after his father's death, and was brought up by his wealthy maternal uncle Mordecai Francis. The boy, according to the legends which soon grew round his life, was a " won3er-child," and early displayed marvellous capacity. He married as a lad of fifteen, his bride being his cousin. For some time he continued his studies; later on when engaged in business there was no break in this respect. Two years after his marriage he became possessed of a copy of the Kabbalistic " Bible " — the Zohar of Moses de Leon (q.v.). In order to meditate on the mystic lore he withdrew to a hut by the Nile, returning home for the Sabbath. Luria afterwards gave to the Sabbath a mystic beauty such as it had never before possessed. Thus passed several years; he was still young, but his new mode of life produced its effects on a man of his imagination and saintly piety. He became a visionary. Elijah, who had been his godfather in his babyhood, now paid him frequent visits, initiating him into sublime truths. By night Luria's soul ascended to heaven and conversed with celestial teachers who had once been men of renown on earth.

In 1566 at earliest Luria removed to Safed. This Palestinian town was in the 16th century the headquarters of the Kabbala. A large circle of Talmudists lived there; at their head Joseph Qaro, then over eighty years of age. Qaro's son married Luria's daughter, and Qaro rejoiced at the connexion, for he had a high opinion of Luria's learning. Mysticism is often the expression of a revolt against authority, but in Luria's case mysticism was not divorced from respect for tradition. After his arrival at Safed Luria lived at most six years, and died in 1572. But these years were momentous for Judaism. He established an

extra- ordinary reputation; his personality had a winning attractiveness ; and he founded a school of mystics who powerfully affected Judaism after the master's death. The Holy Spirit, we are told, rested on him, drawn to him by the usual means of the mystics — self-flogging, ablutions and penance. He had wonderful gifts of insight, and spoke to the birds. Miracles abounded. More soberly true is the statement that he went on long walks with enthusiastic disciples, whom he taught without books. Luria himself wrote no mystical works; what we know of his doctrines and habits comes chiefly from his Boswell, Hayim Vital.

There was little of originality in Luria's doctrines; the theory of emanations, the double belief in the process of the Divine Essence

as it were self-concentrating (Zimzum) and on the other hand as expanding throughout creation; the philosophical " sceptism " which regards God as unknowable but capable of direct intuition by feeling — these were all common elements of mystical thought'. Luria was an inspirer of saintly conduct rather than an innovator in theories. Not beliefs, he said, but believers need rebirth. As he rose in the morning he prayed: " O God, grant that throughout this coming day I may be able to love my neighbour as myself." Never would he retire to rest until he had fulfilled his definite engagements to those who had served him. Luria and his school altered the very look of the Jewish Prayer Book. Prayer was his main prop. By it men became controllers of the earthly world and reached God. He or his school introduced innumerable ritual customs, some of them beautiful enough. On Sabbath he dressed in white, wearing a four-fold garment to typify the four letters of the Divine Name. The Sabbath was to him an actual cult. It was a day of the most holy joy. Resuming the Talmudic idea of an Over-soul present in every Israelite on the Sabbath, Luria and his school made play with this Over-soul, fed it with spiritual and material dainties and evolved an intricate maze of mystic ceremonial, still observed by countless masses. Another strong point with Luria was penance. The con- fessions of sin which he introduced descend to minute ritual details and rise to the most exalted aspects of social and spiritual life. He deprecated general confessions and demanded that the individual must lay bare the recesses of his heart. Hayim Vital reports that on his death-bed Luria said to his disciples: " Be at peace with one another: bear with one another: and so be worthy ot my coming again to reveal to you what no mortal ear has heard before." His mystic ceremonial became a guide to religious practice, and though with this there came in much meaningless and even

bewildering formalism, yet the example of his life and character was a lasting inspiration to saintliness.

See S. Schecher, Studies in Judaism, second series, pp. 251 seq.; Jewish Encyclopedia, viii. 210; E. Worman in Revue des Titudes Juives, lvii. 281. (LA.)

XURISTAN, in the wider sense (as its name implies) the ” Land of the Lurs,” namely that part of western Persia which is bounded by Turkish territory on the west and extends for about 400 m. N.W.-S.E. from Kermanshah to Fars with a breadth of 100 to 140 m. It is chiefly mountainous, being intersected by numerous ranges running N.W.-S.E. The central range has many summits which are almost within the line of perpetual snow, rising to 13,000 ft. and more, and in it are the sources of Persia’s most important rivers, as the Zayendeh-rud, Jarahi, Karun, Diz, Abi, Kerkheh. Between the higher ranges are many fertile plains and low hilly districts, well watered but comparatively little cultivated in consequence of intertribal feuds. The Lurs are thought’ to be aboriginal Persians with a mixture of Semitic blood. Their language is a dialect of Persian and does not differ materially from Kurdish. Outwardly they are Mussulmans of the Shiah branch, but most of them show little veneration for either Prophet or Koran, and the religion of some of them seems to be a mixture of Ali-Illahism involving a belief in successive incarna- tions combined with mysterious, ancient, heathen rites. The northern part of Luristan, which was formerly known as Luri- kuchik (little Luristan), is inhabited by the Feili Lurs and these are divided into the Pishkuh (cis-montane) Lurs in the east and Pushtkuh (ultra-montane) Lurs in the west adjoining Turkish territory. They number about 350,000. Little Luristan was governed by a race of independent princes of the Khurshidi dynasty, and called atabegs, from n 55 to the beginning of the 17 th century when the last atabeg, Shah Verdi Khan, was re-moved by Shah Abbas I. and the government of the province given to Husain Khan, the chief of a rival tribe, with the title of vali in exchange for that of atabeg. The descendants of Husain Khan have retained the title but now govern only the Pushtkuh Lurs, to whom only the denomination of Feili is at present applied. The southern part of Luristan was formerly known as Lur i Buzurg (great Luristan) and is composed of the Bakhtiari division of the Arabistan province and the districts of the Mamasennis and Kuhgilus which belong to Fars. The Bakhtiaris number about 2oo,qoo, the others 40,000. Great Luristan was an independent state under the Fazlevieh atabegs from 1160 until 1424, and its capital was Idaj, now represented by mounds and ruins at Malamir 60 m. S.E. of Shushter.

LUSATIA (Ger. Lausitz), a name applied to two neighbouring I districts in Germany, Upper and Lower Lusatia, belonging now

mainly to Prussia, but partly to Saxony. The name is taken from the Lusitzi, a Slav tribe, who inhabited Lower Lusatia in the 9th and ioth centuries.

In the earliest times Lower Lusatia reached from the Black Elster to the Spree; its inhabitants, the Lusitzi, were conquered by the German king, Henry the Fowler, and by the margrave Gero in the ioth century. Their land was formed into a separate march, which for about three centuries was sometimes attached to, and sometimes independent of, the margraviate of Meissen, its rulers being occasionally called margraves of Lusatia. In 1303 it was purchased by the margrave of Brandenburg, and after other changes it fell in 1368 into the hands of the king of Bohemia, the emperor Charles IV., who already possessed Upper Lusatia. During the Hussite wars its people remained loyal to the Roman Catholic Church. In 1469 they recognized Matthias Corvinus, king of Hungary, as their sovereign, but in 1490 they came again under the rule of the Bohemian king.

The district now known as Upper Lusatia was occupied by a Slav tribe, the Milzeni, who like the Lusitzi, were subdued by Henry the Fowler early in the ioth century. For about three centuries it was called Baudissin (Bautzen), from the name of its principal fortress. In the 1 1 th and 1 2th centuries it was connected at different periods with Meissen, Poland and Bohemia. To- wards 1 1 60 the emperor Frederick I. granted it to Ladislas, king of Bohemia, and under this ruler and his immediate successors it was largely colonized by German immigrants. In 1253 it passed to the margrave of Brandenburg, and about the same time it was divided into an eastern and a western part, Baudissin proper and Gorlitz. In 1319 the former was restored to Bohemia, which also recovered Gorlitz in 1329. During the 14th century the nobles and the townsmen began to take part in the govern- ment, and about this time Upper Lusatia was known as the district of the six towns {Sechsstadtelandes), these being Bautzen, Gorlitz, Zittau, Lobau, Lauban and Kamenz. From 1377 to 1396 Gorlitz was a separate duchy ruled by Johii, a son of the emperor Charles IV., and, like Lower Lusatia, Upper Lusatia owned the

authority of Matthias Corvinus from 1469 to 1490, both districts passing a little later with the kingdoms of Hungary and Bohemia to the German king, Ferdinand I. The " six towns " were severely punished for their share in the war of the league of Schmalkalden, and about this time the reformed teach- ing made very rapid progress in Lusatia, the majority of the inhabitants becoming Protestants. The name of Lusatia hitherto confined to Lower Lusatia, was soon applied to both districts, the adjectives Upper and Lower being used to distinguish them. In 1620, early in the Thirty Years' War, the two Lusatias were conquered by the elector of Saxony, John George I., who was allowed to keep them as the price of his assistance to the emperor Ferdinand I. In 1635 by the treaty of Prague they were definitely transferred from Bohemia to Saxony, although the emperor as king of Bohemia retained a certain supremacy for the purpose of guarding the rights and privileges of the Roman Catholics. They suffered much during the wars of the 18th century. By the peace of Vienna (181 5) the whole of Lower Lusatia and part of Upper Lusatia were transferred from Saxony to Prussia.

The area of the part of Upper Lusatia retained by Saxony was slightly increased in 1845; it is now about 960 sq. m. In 1900 Lower Lusatia contained 461,973 inhabitants, of whom 34,837 were Wends; the portion of Upper Lusatia belonging to Prussia had 305,080 inhabitants, of whom 24,361 were Wends. There were 405,173 inhabitants, including 28,234 Wends, in Saxon Upper Lusatia. Laws relating to this district, after passing through the Saxon parliament must be submitted to the Lusatian diet at Bautzen. The chief towns of Upper Lusatia are Bautzen, Zittau, Lobau, Kamenz, Gorlitz, Rothenburg, Hoyerswerda and Lauban; in Lower Lusatia they are Guben, Kottbus, Forst, Lubben and Spremberg. The principal rivers are the Spree with its tributaries, the Black Elster and the Neisse. Upper Lusatia is generally mountainous and picturesque, Lower Lusatia is flat and sandy. The chief industries are linen weaving, cloth making and coal mining.

For the history of Lusatia see the collections, Scriptores rerum Lusaticarum antiqui et recentiores, edited by C. G. Hoffmann (4 vols., Leipzig and Bautzen, 1719); and Scriptores rerum Lusaticarum (4 vols., Gorlitz, 1839-1870). See also W. Lippert, Wettiner und Wittelsbacher sowie die Niederlausitz im 14 Jahrhundert (Dresden, 1894); T. Scheltz, Gesamtgeschichte der Ober- und Niederlausitz, Band i. (Halle, 1847), Band ii. (Gorlitz, 1882); J. G. Worbs, Urkundenbuch zur Geschichte des Markgraftums Niederlausitz (Lubben 1897); and J. A. E. Kohler, Die Geschichte der Oberlausitz (Gorlitz,

1867).

LUSHAI HILLS, a mountainous district of Eastern Bengal and Assam, south of Cachar, on the border between Assam and Burma. Area, 7227 sq. m.; pop. (1901) 82,434. The hills are for the most part covered with dense bamboo jungle and rank undergrowth; but in the eastern portion, owing probably to a smaller rainfall, open grass-covered slopes are found, with groves of oak and pine interspersed with rhododendrons. These hills are inhabited by the Lushais and cognate tribes, but the popula- tion is extremely scanty. From the earliest known times the original inhabitants were Kukis, and the Lushais were not heard of until 1840, when they invaded the district from the north. Their first attack upon British territory took place in November 1849, and after that date they proved one of the most troublesome tribes on the north-east frontier of India; but operations in 1890 resulted in the complete pacification of the northern Lushai villages, and in 1892 the eastern Lushais were reduced to order. The management of the South Lushai hill country was transferred from Bengal to Assam in 1898. To obtain more efficient control over the country the district has been divided into eighteen circles, each in charge of an interpreter, through whom all orders are transmitted to the chiefs. The Welsh Presbyterian Mission began work at Aijal in 1897, and the people have shown un- expected readiness to accept education. According to the census of 1901 the total number of Lushais in Assam was 63,452. See Colonel T. H. Lewin, Wild Races of N.E. India (1870) ; Lushai Hills Gazetteer (Calcutta, 1906).

LUSIGNAN, the name of a family which sprang from Poitou 1 and distinguished itself by its connexion with the kingdom of Jerusalem, and still more by its long tenure of the kingdom of Cyprus (1192-1475). A Hugh de Lusignan appears in the ill- fated crusade of iioo-noi; another Hugh, the Brown, came as a pilgrim to the Holy Land in 1164, and was taken prisoner by Nureddin. In the last quarter of the 12th century the two brothers Amalric and Guy, sons of Hugh the Brown, played a considerable part in the history of the Latin East. About 11 80 Amalric was constable of the kingdom of Jerusalem; and he is said to have brought his handsome brother Guy to the notice of Sibylla, the widowed heiress of the kingdom.' Guy and Sibylla were married in n 80; and Guy thus became heir pre- sumptive of the kingdom, if the young Baldwin V., Sibylla's son by her first marriage to William of Montferrat, should die without issue. He acted as regent in 1183, but he showed some incapacity in the struggle with Saladin, and was deprived of all right of succession. In 1186, however, on the death of Baldwin V., he succeeded in obtaining the crown, in spite of the opposi- tion of Raymund of Tripoli. Next year he suffered a

crushing defeat at the battle of Hittin, and was taken prisoner by Saladin. Released on parole in 1188, he at once broke his parole, and began the siege of Acre. Difficulties, however, had arisen with Conrad of Montferrat; and when Guy lost his wife Sibylla in 1 190, and Conrad married Isabella, her sister, now heiress of the kingdom, these difficulties culminated in Conrad's laying claim to the crown. Guy found his cause espoused in 1191 by the overlord of his house, Richard I. of England; but Conrad's superior ability, and the support of the French crusaders, ulti- mately carried the day, and in n 92 Richard himself abandoned the pretensions of Guy, and recognized Conrad as king. Though Conrad was almost immediately assassinated, the crown did not 1 A branch of the line continued in Poitou during the 13th century, and ruled in LaMarche till 1303. Hugh de la Marche, whose betrothed wife, Isabella of Angoullme, King John of England seized (thus bringing upon himself the loss of the greater part of his French possessions), was a nephew of Guy of Lusignan. He ultimately married Isabella, after the death of John, and had by her a number of sons, half-brothers of Henry III. of England, who came over to England, amongst other foreign favourites, during his reign.

return to Guy, but went to Henry of Champagne, who married the widowed Isabella. Guy found some satisfaction for his loss in buying from the Templars the island of Cyprus, and there he reigned for the last two years of his life (1192-1194). He is judged harshly by contemporary writers, as simplex and in- sufficiens; but Dodu (in his Hisloire des institutions du royaume de Jerusalem) suggests that Guy was depreciated because the kingdom had been lost in his reign, in much the same way as Godfrey of Bouillon was exalted because Jerusalem had just been won at his accession. Guy was a brave if not a particularly able knight ; and his instant attack on Acre after his release by Saladin shows that he had the sentiment de ses devoirs.

He was succeeded in Cyprus by his brother Amalric, who acquired the title of king of Cyprus from the emperor Henry VI., and became king of Jerusalem in 1197 by his marriage to Isa- bella, after the death of Henry of Champagne (see Amalric II.). Amalric was the founder of a dynasty of kings of Cyprus, which lasted till 1475, while after 1269 his descendants regularly enjoyed the title of kings of Jerusalem. The scions of the house of Lusignan proved themselves the most sincere of crusaders. They possessed in Cyprus a kingdom, in which they had vindi- cated for themselves a stronger hold over their feudatories than

the kings of Jerusalem had ever enjoyed, and in which trading centres like Famagusta flourished vigorously; and they used the resources of their kingdom, in conjunction with the Hospi- tallers of Rhodes, to check the progress of the Mahommedans.

Among the most famous members of the house who ruled in Cyprus three may be mentioned. The first is Hugh III. (the Great), who was king from 1267 to 1285: to him, apparently, St Thomas dedicated his De Regimine Principum; and it is in his reign that the kingdom of Jerusalem becomes permanently connected with that of Cyprus. The second is Hugh IV. (1324- 1359), to whom Boccaccio dedicated one of his works, and who set on foot an alliance with the pope, Venice and the Hospi- tallers, which resulted in the capture of Smyrna (1344). The last is Peter I., Hugh's second son and successor, who reigned from 1359 to 1369, when he was assassinated as the result of a conspiracy of the barons. Peter and his chancellor de Mezieres represent the last flicker of the crusading spirit (see Crusades).

Before the extinction of the line in 1475, it had succeeded in putting a branch on the throne of Armenia. Five short-lived kings of the house ruled in Armenia after 1342, " Latin exiles," as Stubbs says, " in the midst of several strange populations all alike hostile." The kingdom of Armenia fell before the sultan of Egypt, who took prisoner its last king Leo V. in 1375, though the kings of Cyprus afterwards continued to bear the title; the kingdom of Cyprus itself continued to exist under the house of Lusignan for 100 years longer. The mother of the last king, James III. (who died when he was two years old), was a Venetian lady, Catarina Cornaro. She had been made a daughter of the republic at the time of her marriage to the king of Cyprus; and on the death of her child the republic first acted as guardian for its daughter, and then, in 1489, obtained from her the cession of the island.

See J. M. J. L. de Mas-Latrie, Hisloire de Vile de Chypre sous les princes de la maison de Lusignan (Paris, 1852-1853); W. Stubbs, Lectures on Medieval and Modern History (3rd ed., Oxford, 1900).

LUSSIN, a small island in the Adriatic Sea, in the Gulf of Quarnero, forming together with the adjacent islands of Veglia and Cherso an administrative district in the Austrian crownland of Istria. Pop. (1900) 11,615. The island is 24 m. in length, is of an average breadth of 1 -64 m., being little more than 300 yds. wide at its narrowest point, and has an area of 29 sq. m. The chief town and principal harbour is Lussinpiccolo (pop. 7207), which is the most important trading centre in the Quarnero group. The town has become a favourite winter resort, its climate resembling that of Nice. To the south-east of it is

Lussingrande (pop. 2349), with an old Venetian palace and a shipbuilding wharf. The island was first peopled at the end of the 14th century. Its inhabitants are renowned seamen.

LUSTRATION, a term that includes all the methods of purifica- tion and expiation among the Greeks and Romans. Among

the Greeks there are two ideas clearly distinguishable — that human nature must purify itself (nadapcns) from guilt before it is fit to enter into communion with God or even to associate with men, and that guilt must be expiated voluntarily (tXatr/ios) by certain processes which God has revealed, in order to avoid the punishment that must otherwise overtake it. It is not possible to make such a distinction among the Latin terms lustratio, piacula, piamenta, caerimoniae, and even among the Greeks it is not consistently observed. Guilt and impurity arose in various ways; among the Greeks, besides the general idea that man is always in need of purification, the species of guilt most insisted on by religion are incurred by murder, by touching a dead body, by sexual intercourse, and by seeing a prodigy or sign of the divine will. The last three spring from the idea that man had been without preparation and improperly brought into communication with God, and was therefore guilty. The first, which involves a really moral idea of guilt, is far more important than the others in Hellenic religion. Among the Romans we hear more of the last species of impurity ; in general the idea takes the form that after some great disaster the people become convinced that guilt has been incurred and must be expiated. The methods of purification consist in ceremonies performed with water, fire, air or earth, or with a branch of a sacred tree, especially of the laurel, and also in sacrifice and other ceremonial. Before entering a temple the worshipper dipped his hand in the vase of holy water (wepippavrripLOV, aqua luslralis) which stood at the door; before a sacrifice bathing was common; salt-water was more efficacious than fresh, and the celebrants of the Eleusinian mysteries bathed in the sea {aka&e, (ivcttcll); the water was more efficacious if a firebrand from the altar were plunged in it. The torch, fire and sulphur (rd deiov) were also powerful purifying agents. Purification by air was most frequent in the Dionysiac mysteries; puppets suspended and swinging in the air (oscilla) formed one way of using the lustrative power of the air. Rubbing with sand and salt was another method. The sacrifice chiefly used for purifica- tion by the Greeks was a pig; among the Romans it was always, except in the Lupercalia, a pig, a sheep and a bull (suovetaurilia) . In Athens a purificatory sacrifice and prayer was held before every meeting of the ecclesia; the Maimacteria, 1 in honour of Zeus Maimactes (the god of wrath), was an annual festival of purification, and at the Thargelia

two men (or a woman and a man) were sacrificed on the seashore, their bodies burned and the ashes thrown into the sea, to avert the wrath of Apollo. On extraordinary occasions lustrations were performed for a whole city. So Athens was purified by Epimenides after the Cylonian massacre, and Delos in the Peloponnesian War (426 B.C.) to stop the plague and appease the wrath of Apollo. In Rome, besides such annual ceremonies as the Ambarvalia, Lupercalia, Cerlalia, Paganalia, &c, there was a lustration of the fleet before it sailed, and of the army before it marched. Part of the ceremonial always consisted in leading or carrying the victims round the impure persons or things. After any disaster the lustratio classium or exercitus was often again performed, so as to make certain that the gods got all their due. The Amburbium, a solemn procession of the people round the boundaries of Rome, was a similar ceremonial performed for the whole city on occasions of great danger or calamity; the Ambilustrium (so called from the sacrificial victims being carried round the people assembled on the Campus Martius) was the purificatory ceremony which took place after the regular quinquennial census {lustrum) of the Roman people.

See C. F. Hermann, Griechische Altertumer, ii. ; G. F. Schomann, ib. ii. ; P. Stengel, Die griechischen Kultusaltertiimer (1898); Marquardt, Romische Staatsverwaltung, iii. p. 200 (1885); P. E. von Lasaulx, Die Silhnopfer der Griechen und Rdmer (1841); J. Donaldson, ” On the Expiatory and Substitutionary Sacrifices of the Greeks,” in Transactions of the Royal Society of Edinburgh, xxvii., 1876; and the articles by A. Bouch£-Leclercq in Daremberg and Saglio, Dictionnaire des antiquites, and by W. Warde Fowler in Smith’s Dictionary of Greek and Roman Antiquities (3rd ed., 1891).

1 Maimacteria does not actually occur in ancient authorities as the name of a festival.

LUTE (Arabic aVud, “the wood”; Fr. luth; Ital. liuto; Span, laud; Ger. Laute; Dut. luit), an ancient stringed musical instrument, derived in form as well as name from the Arabs. The complete family consisted of the pandura, tanbur or mandoline as treble, the lute as alto or tenor, the barbiton or theorbo as bass, and the chitarrone as double bass. The Arab instrument, with convex sound-body, pointing to the resonance board or membrane having been originally placed upon a gourd, was strung with silk and played with a plectrum of shell or

quill. It was adopted by the Arabs from Persia. Instruments with vaulted backs are all undoubtedly of Eastern origin; the distinct type, resembling the longitudinal section of a pear, is more specially traced in ancient India, Persia and the countries influenced by their civilization. This type of instrument in- cludes many families which became known during the middle ages of western Europe, being introduced into southern Europe and Spain by the Moors, into southern Russia by the Persians of the Sassanian period, into Greece from the confines of the Byzantine Empire. As long as the strings were plucked by fingers or plectrum the large pear-shaped instrument may be identified as the archetype of the lute. When the bow, obtained from Persia, was applied to the instrument by the Arabs, a fresh family was formed, which was afterwards known in Europe as rebab and later rebec. The largest member of the ancient lute family — the bass lute or theorbo — has been identified with the barbiton.

Until recently the existence of these ancient stringed instruments was presumed on the evidence of the early medieval European instru- ments and of the meagre writings extant, such as those of Farabi. 1 But a chain of plastic evidence can now be offered, beginning with the Greek post-Mycenaean age (c. 1000 B.C.). A statuette of a female musician playing upon a large lute with only an embryonic neck, on

which nevertheless the left hand is stopping strings, was unearthed in Egypt in a tomb of the XXth Dynasty in the cemetery of Goshen by the members of the British School of Archaeology in Egypt, 2 under the direction of Professor Flinders Petrie, to whose courtesy we owe the photo- graph (fig. i) here reproduced. It is difficult to form a conclusive opinion as to the number of strings the artist intended to represent, owing to the decorative figures following the direc- tion of the strings, but, judging from the position of the right hand pluck- ing a string, there may have been seven. Among a number of terra-cotta figures of musicians, brought to light during the excavations in a Tell at Suza and dating from the 8th century B.C., 3 although there is no instrument that might be identified with the alto lute, the treble lute or tanbur is represented with a long, curved neck and a head bent back to increase the tension, and there is also an instrument having a smaller and more elongated body than the lute. On one of the friezes from Afghanistan presented to the British Museum by Major-General Cunningham, which formed the risers of steps leading to the tope at Jumal Garhi, dating from the 1st century A.D are represented scenes of music and dancing. Here the arche- type of the lute appears several times; it had four strings, and the head was bent back at right angles to the neck. In the 6th cen- tury A.D. illustrations of this early lute are no longer rare, more especially on Persian silver-work of the Sassanian

period 4 and in

1 See Latin translation by J. G. L. Kosegarten, Alii Ispahenensis Liber . . . Arabice editur adjectaque translatione adnotationibusque illustratus (Greifswald, 1840).

2 See Hyksos and Israelite Cities, by W. M. Flinders Petrie and J. Garrow Duncan, 1906 (double volume), Brit. Sch. of Arch.

3 J. de Morgan, Delegation en Perse (Paris, 1900), vol. i. pi. viii. Nos. 8, 7 and 9.

- See ” The Treasures of the Oxus,” catalogue of the Franks Bequest to the British Museum by Ormonde M. Dalton (London, I9°5)» pi- xxvi. No. 190; see also J. R. Aspelin, ” Les antiquites du nord,” No. 608; also for further references, Kathleen Schlesinger, ” Precursors of the Violin Family,” pt. ii. of The Instruments of the Orchestra, pp. 407-408, and appendix B, pp. 492-493; and Gazette archeologique (Paris, 1886), vol. xi. pi. x. and p. 70.

the paintings of the Buddhist cave-temples of Ajanta. 5 Several representations of the barbiton are extant from the classical Roman period.

The modern Egyptian ‘ud is the direct descendant of the Arabic lute, and, according to Lane, is strung with seven pairs of catgut strings played by a plectrum. A specimen in the Victoria and Albert Museum, given by the khedive, has four pairs only, which appears to have been the old stringing of the instrument. When frets (cross- lines dividing the neck or finger-board to show the fingering) are employed they are of catgut disposed according to the Arabic scale of seventeen intervals in the octave, consisting of twelve limmas, an interval rather less than our equal semitone, and five commas, which are very small but quite recognizable differences of pitch.

The lute family is separated from the guitars, also of Eastern origin, by the formation of the sound body, which is in all lutes pear-shaped, without the sides or ribs necessary to the structure of the flat-backed guitar and cither. Observing this distinction, we include with the lute the little Neapolitan mandoline of 2 ft. long and the large double-necked Roman chitarrone, not infrequently 6 ft. long. Mandolines are partly strung with wire, and are played with a plectrum, indispensable for metal or short strings. Perhaps the earliest lutes were so played, but the large lutes and theorbos strung with catgut have been invariably touched by the fingers only, the length permitting this more sympathetic means of producing the tone.

Praetorius, 6 writing when the lute was in universal favour, mentions seven varieties distinguished by size and tuning. The smallest would be larger than a mandoline, and the melody string, the ” chanterelle,” often a single’ string, lower in pitch. Praetorius calls this an octave lute, wich the chanterelle C or D. The two discant lutes have respectively B and A, the alto G, the tenor E, the bass D, and the great octave bass G, an octave below the alto lute which may be taken as the model lute culti- vated by the amateurs of the time. The bass lutes were theorbos, that is, double-necked lutes, as described below. The accord-

Fig. I. — Post-Mycenaean terra-cotta figure, with ancient lute (1000 B.C.) from the cemetery at Goshen.

ance of an alto lute was 61

± =t=

g

founded upon that of the original eight-stringed European lute, to which the highest and lowest notes had, in course of time, been

added. A later addition was the r±E3—b: also on the .finger- board, and bass strings, double or single, known as diapasons, which, descending to the deep C of the violoncello, were not stopped with the fingers. The diapasons were tuned as the key of the piece of music required. Fig. 2 represents an Italian instrument made by one of the most celebrated lute makers, Venere of Padua, in 1600; it is 3 ft. 6 in. high, and has six pairs of unisons and eight single diapasons. The finger-board, divided into approximately equal half tones by the frets, as a rule eight in number, was often further divided on the higher notes, for ten, eleven, or, as in the woodcut, even twelve, semitones.

The head, bearing the tuning pegs, was placed at an obtuse or a right angle to the neck, to increase the bearing of the strings upon the nut, and be con- venient for sudden requirements of tuning during performance, the trouble of keeping a lute in tune being proverbial.

The lute was in general use during the 16th and 17th centuries. In the 1 8th it declined; still J. S. Bach wrote a ” partita ” for it. The latest date we have met with of an en- graved publication for the lute is

1760.

The large double-necked lute, with two sets of tuning pegs, the lower for the finger-board, the higher for the diapason strings, was known as the theorbo; also, and especially in England, as the arch- lute; and, in a special form, the neck being then very long, as the chitarrone. Theorbo and chitarrone appear together at the close of the 16th century, and their introduction was synchronous with the rise of accompanied monody in music, that is, of the oratorio and the opera. Peri, Caccini and Monteverde used theorbos to

6 By John Griffiths (London, 1896), vol. ii. pi. 105, cave I. 10, e. 6 Syntagm. Music, pt. ii., ” Organographie ” (Wolfenbtittel, 1618), pp. 30 and 58-61.

Fig. 2. — Lute, by Venere of Padua.

accompany their newly-devised recitative, the invention of which in Florence, from the impulse of the Renaissance, is well known. The height of a theorbo varied from 3 ft. 6 in. to 5 ft., the Paduan being always the largest, excepting the Roman 6-ft. long chitarrone. These large lutes had very deep notes, and doubtless great liberties were allowed in tuning, but the strings on the finger-board followed the lute accordance already given, or another quoted by Baron {Untersuchung des Instruments der Lauten, Nuremberg, 1727) as the old theorbo or ” violway ” (see Mace, Mustek’s Monument, London,

1676):-

We find again both these accordances varied and transposed a tone higher, perhaps with thinner strings, or to accommodate local differ- ences of pitch. Praetorius recommends the chanterelles of theorbos being tuned an octave lower on account of the great strain. By such a

change, another authority, the Englishman Thomas Mace, says, the life and spruceness of airy lessons were quite lost. The theorbo or archlute had at last to give way to the violoncello and double bass, which are still used to accompany the ” recitativo secco ” in oratorios and operas. Handel wrote a part for a theorbo in Esther (1720); after that date it appears no more in orchestral scores, but remained in private use until nearly the end of the century.

The lute and the organ share the distinction of being the first instruments for which the oldest instrumental compositions we possess were written. For the lute, however, they were not written in our present notation, but in tablature, ” lyrawise,” a system by which as many lines were drawn horizontally as there were pairs of strings on the finger-board, the frets, distributed at intervals of a semitone, being distinguished by the letters of the alphabet, repeated from A, representing the open string, for each line. This was the English and French manner; the Italian was by numbers instead of letters. The signs of time were placed over the stave, and were not repeated unless the mensural values changed. (A. J. H. ; K. S.)

LUTHARDT, CHRISTOPH ERNST (1823-1902), German Lutheran theologian, was born at Maroldsweisach, Bavaria, on the 22nd of March 1823. He studied theology at Erlangen and Berlin, and in 1856 became professor ordinarius of systematic theology and New Testament exegesis at Leipzig. In 1865 he was ‘made a counsellor to the consistory, in 187 1 canon of Meissen cathedral, and in 1887 a privy councillor to the church. He died at Leipzig on the 21st of September 1902. A strictly orthodox theologian, and a clear writer, though not a very profound scholar, Luthardt became widely appreciated as the author of apologetic lectures. These were collected under the title Apologie des Christentums (vol. i., 1864, 14th ed. 1896; vol. ii. 7th ed., 1901; vol. iii. 7th ed., 1898; vol. iv. 2nd ed., 1880), a work of which the first three volumes have been trans- lated into English. In 1868 he founded and edited the Allgemeine evang.-lutherische Kirchenzeitung, with its supplement the Theologisches Litter aturblatt, and in 1880 became editor of the Zeitschrijt fiir kirckl. Wissenschaft und kirchl. Leben.

His other works include Das Johanneische Evangelium . . . erkldrt (1852-1853; 2nd ed. in 2 vols., 1875-1876), Offenbarung Johannis erkldrt (1861), Lehre von den letzten Dingen (1861; 3rd ed. 1885); Kompendium der Dogmatik (1865; 9th ed., 1893), Geschichte der christlichen Ethik (2 vols., 1888-1893), Gnade und Wahrheit (1874), Das Wort des Lebens (1877) and Gnade und Frieden (1880). His autobiography was published with the title Erinnerungen aus

vergangenen Tagen (1889; 2nd ed., 1891).

LUTHER, MARTIN (1483-1546), the great German religious reformer, was born at Eisleben on the 10th of November 1483. His father, Hans Luther (Lyder, Luder, Ludher), a peasant from the township of Mohra in Thuringia, after his marriage with Margarethe Ziegler, had settled in Mansfeld, attracted by the prospects of work in the mines there. The counts of Mansfeld, who, many years before, had started the mining industry, made a practice of building and letting out for hire small furnaces for smelting the ore. Hans Luther soon leased one, then three. In 1 49 1 he became one of the four elected members of the village council (vier Herren von der Gemeinde); and we are told that the counts of Mansfeld held him in esteem. The boy grew up amid the poor, coarse surroundings of the German peasant life, imbibing its simple beliefs. He was taught that the Emperor protected the poor people against the Turk, that the Church was the ” Pope’s House,” wherein the Bishop of Rome had all the rights of the house-father. He shared the common super- stitions of the time and some of them never left him.

Young Martin went to the village school at Mansfeld; to a school at Magdeburg kept by the Brethren of the Common Lot; then to the well-known St George’s school at Eisenach. At Magdeburg and Eisenach Luther was ” a poor student,” i.e. a boy who was received into a hospice where he lived rent-free, attended school without paying fees, and had the privilege of begging for his bread at the house-doors of the town; in return for which he sang as a chorister in the church to which the school was attached. Luther was never a ” wandering student ” ; his parents were too careful of their child to permit him to lead the life of wandering licence which marked these pests of medieval German scholastic life. At Eisenach he attracted the notice of the wife of a wealthy merchant of Eisenach, whom his biographers usually identify as Frau Cotta.

After three happy years at Eisenach, Luther entered the university of Erfurt (1 501), then the most famous in Germany. Hans Luther had been prospering, and was more than ever resolved to make his son a lawyer. Young Luther entered his name on the matriculation book in letters which can still be read ” Martinus Ludher ex Mansfelt,” a free student, no longer embarrassed by great poverty. In Luther’s time Erfurt was the intellectual centre of Germany and its students were exposed to a variety of influences which could not fail to stimulate young men of mental ability.

Its theology was, of course, scholastic, but of what was then called the

modern type, the Scotist; its philosophy was the nominalist system of William of Occam, whose great disciple, Gabriel Biel (d. 1495), had been one of its most famous professors; Nicholas de Lyra's (d. 1340) system of biblical interpretation had been long taught there by a succession of able teachers; Humanism had won an early entrance to the university; the anti-clerical teaching of John of Wessel, who had himself taught at Erfurt for fifteen years (1445-1460), had left its mark on the place and was not forgotten. Hussite propagandists, even in Luther's time, secretly visited the town and whispered among the students their anti-clerical Christian socialism. Papal legates to Germany seldom failed to visit the university and by their magnificence bore witness to the majesty of the Roman church.

A study of the scholastic philosophy was then the preliminary training for a course of law, and Luther worked so hard at the prescribed studies that he had little leisure, he said, for classical learning. He attended none of the Humanist lectures, but he read a good many of the Latin authors and also learned a little Greek. He never was a member of the Humanist circle; he was too much in earnest about religious questions and of too practical a turn of mind. The young Humanists would have gladly welcomed him into their select band. They dubbed him the " philosopher," the " musician," recalled in after days his fine social disposition, his skill in playing the lute, and his ready power in debate. He took the various degrees in an unusually brief time. He was bachelor in 1502 and master in 1505. His father, proud of his son's steady application and success, sent him the costly present of a Corpus Juris. He may have begun to study law. Suddenly he plunged into the Erfurt Convent of the Augustinian Eremites and after due noviciate became a monk. The action was so unexpected that his contemporaries felt bound to give all manner of explanations which have been woven into accounts which are legendary. Nothing is known about the cause of the sudden plunge but what Luther has himself revealed. He has told us that he entered the monastery because he doubted of himself, and that his action was sudden because he knew that his father would have disapproved of his intention.

The word " doubt " has made historians think of intellectual difficulties — of the " theological scepticism " taught by Occam and Biel, of the disintegrating criticism of Humanism. But there is no trace of any theological difficulties in Luther's mind in the struggles which sent him into the convent and distracted him there. He was driven to do what he did by the pressure of a practical religious need, the desire to save his soul. The fires of hell and the shades of purgatory, which are the constant

background of Dante's " Paradiso," were present to Luther from childhood.

Luther was the greatest religious genius which the 16th century produced, and the roots of the movement in which he was the central figure must be sought for in the popular religious life of the last decades of the 15th and opening decades of the 1 6th centuries — a field which has been neglected by almost all his biographers. When it is explored traces of at least five different types of religious sentiment can be discovered. Pious parents, whether among the burghers or peasants, seem to have taught their children a simple evangelical faith. Martin Luther and thousands of children like him were trained at home to know the creed, the ten commandments, the Lord's prayer, and such simple hymns as Ein Kindelein so lobelich, Nun bitten wir den Heiligen Geist and Crist ist erstanden; and they were taught to believe that God for Christ's sake freely pardons sin. They learned that simple faith which Luther afterwards expounded in his Small Catechism and called the Kinderlehre. When lads trained like himself entered school and college they came in contact with that religious revival which characterized the last half of the 15th century. Fear seemed to brood over the peoples of Western Europe. The plague devastated the badly drained towns, new diseases spread death, the fear of the Turks was permanent. All this went to feed revival, which, founded on fear, refused to see in Jesus Christ anything but a stern judge, and made the Virgin Mother and Anna the " grandmother " the intercessors; which found consolation in pilgrimages from shrine to shrine; which believed in crude miracles, and in the thought that God could be best served within convent walls. Luther's mind was caught in this current of feeling. He records how it was burnt into him by pictures which filled his boyish imagination. Jesus in the painted window of Mansfeld church, stern of face, sword in hand, sitting on a rainbow, coming to judge; an altarpiece at Magdeburg, in which a ship with its crew was sailing on to heaven, carrying no layman on board; the deeds of St Elizabeth emblazoned on the window of St George's parish church at Eisenach; the living pictures of a young nobleman who had turned monk to save his soul, of a monk, the holiest man Luther had ever known, who was aged far beyond his years by his maceration; and many others of the same kind.

Alongside this we can trace the growth of another religious movement of a different kind. We can see a sturdy common- sense religion taking

possession of multitudes in Germany, which insisted that laymen might rule in many departments supposed to belong exclusively to the clergy. The jus episcopate which ” Luther afterwards claimed for the secular authorities had been practically exercised in Saxony and Brandenburg; cities and districts had framed police regulations which set aside ecclesi- astical decrees about holidays and begging; the supervision of charity was passing from the hands of the church into those of laymen; and religious confraternities which did not take their guidance from the clergy were increasing. Lastly, the medieval Brethren were engaged in printing and distributing tracts, mystical, anti-clerical, sometimes socialist. All these influences abounded as Luther was growing to manhood and laid their marks upon him. It was the momentary power of the second which drove him into the convent, and he selected the mon- astic order which represented all that was best in the revival of the latter half of the 15th century — the Augustinian Eremites.

In the convent Luther set himself to find salvation. The last word of that Scotist theology which ruled at the close of the middle ages was that man must work out his own salvation, and Luther tried to do so in the most approved later medieval fashion by the strictest asceticism. He fasted and scourged himself; he practised all the ordinary forms of maceration and invented new ones, all to no purpose. His theological studies, part of the convent education, told him that pardon could be had through the Sacrament of Penance, and that the first part of the sacra- ment was sorrow for sin. The older theology declared that such sorrow must be based on love to God. Had he this love? God

always appeared to him as an implacable judge, threatening punishment for breaking a law which it was impossible to keep. He confessed to himself that he often hated this arbitrary Will which Scotist theology called God. The later theology, taught in the convent by John of Palz and John Nathih, said that sorrow might be based on a meaner motive provided the Sacra- ment of Penance was continually resorted to. Luther wearied his superiors with his attendance at the confessional. He was looked upon as a young saint, and his reputation extended throughout the convents of his order. The young saint felt himself to be no nearer the pardon of God; he thought that he was ” gallows-ripe.” At last his superiors seemed to discover his real difficulties. Partly by their help, partly by study of the scriptures, he came to understand that God’s pardon was to be won by trusting to His promises. Thus after two years of in- describable mental conflicts Luther found peace. The struggle marked him for life. His victory gave him a sense of freedom, and the feeling that life was given by God to

be enjoyed. In all external things he remained unchanged. He was a faithful son of the medieval church, with its doctrines, ceremonies and usages.

Soon after he had attained inward peace, Luther was ordained. He continued his studies in theology, devoting himself to the more ” experimental ” portions of Augustine, Bernard and Gerson. He showed himself a good man of business and was advanced in his order. In 1508 he was sent with some other monks to Wittenberg to assist the small university which had been opened there in 1502 by Frederick the Wise, elector of Saxony. It was there that Luther began to preach, first in a small chapel to the monks of his order; later taking the place of one of the town’s clergy who was in ill-health. From Witten- berg he was sent by the chiefs of the German Augustinian Eremites to Rome on a mission concerning the organization of the order. He went up with the feelings of the medieval pilgrim rather than with the intoxication of the ardent Humanist. On his return (1512) he was sent by Staupitz, his vicar-general, to Erfurt to take the necessary steps for higher graduation in theology, in order to succeed Staupitz himself as professor of theology in Wittenberg. He graduated as Doctor of the Holy Scripture, took the Wittenberg doctor’s oath to defend the evangelical truth vigorously (viriliter), became a member of the Wittenberg Senate, and three weeks later succeeded Staupitz as professor of theology.

From the first Luther’s lectures in theology differed from those ordinarily given at the time. He had no opinions on theological subjects at variance with the theology taught at Erfurt and elsewhere. No one attributed any heretical views to the young Wittenberg professor. He differed from others because he looked at theology in a more practical way. He thought it ought to be made useful to guide men to the grace of God and to tell them how to persevere in a life of joyous obedience to God and His commandments. His teaching was ” experi- mental ” from the beginning. Besides he believed that he had been specially set apart to lecture on the Holy Scriptures, and he began by commenting on the Psalms and on the Epistles of St Paul. He never knew much Hebrew and was not specially strong in Greek; so he used the Vulgate in his prelections. He had a huge widely printed volume on his desk, and wrote the notes for his lectures on the margins and between the lines. Some of the pages survive. They contain in the germ the leading thoughts of what became Lutheran theology. At first he ex- pressed himself in the phrases common to scholastic theology, when these were found to be inadequate in words borrowed from the mystical writers of the 14th and 15th centuries, and then in new phrases more appropriate to the circle of fresh

thoughts. Those new thoughts at first simply pushed aside the ordinary theology taught in the schools without staying to criticize it. Gradually, however, Luther began to find that there was some real opposition between what he was teaching and the theology he had been taught in the Erfurt convent. It appeared charac- teristically enough on the practical and not on the speculative side of theology in a sermon on Indulgences preached in July 1 5 16.

Once begun the breach widened, until Luther could contrast ” our theology ” with what was taught at Erfurt, and by Sep- tember he began to write against the scholastic theology, to declare that it was Pelagian at heart, that it repudiated the Augustinian doctrines of grace, and neglected to teach the supreme value of that faith ” which throws itself upon God.”

These lectures and the teaching they contained soon made a great impression. Students began to flock to the small obscure university of Wittenberg, and the elector grew proud of the teacher who was making his university famous. It was at this interesting stage of his own religious career that he felt himself compelled to stand forth in opposition to what he believed to be a great religious scandal, and almost unconsciously to become a Reformer.

Luther began his work as a Reformer by proposing to discuss the true meaning of Indulgences. The occasion was an In- dulgence proclaimed by Pope Leo X., farmed by the archbishop of Mainz, and preached by John Tetzel, a Dominican monk and a famed seller of Indulgences. Many of the German princes had no great love for Indulgence sellers, and Frederick of Saxony had prohibited Tetzel from entering his territories. But it was easy to reach most parts of Electoral Saxony without actually crossing the frontiers. The Red Cross of the Indulgence seller had been set up at Zerbst and at Jiiterbogk, and people had gone from Wittenberg to buy the Papal Tickets. Luther believed that the sales were injurious to the morals of the townsmen; he had heard reports of Tetzel’s sermons; he had become wrathful on reading the letter of recommendation of the archbishop; and friends had urged him to interfere. He protested with a characteristic combination of caution and courage. The church of All Saints (the castle church) was closely connected with the university of Wittenberg. Its doors were commonly used for university proclamations. The Elector Frederick was a great coUector of relics and had stored them in his church. He had procured an Indulgence for all who attended its services on All Saints’ Day, and crowds commonly

gathered. Luther nailed ninety-five theses on the church door on that day, the i st of November 1517, when the crowd could see and read them.

The proceeding was strictly academic. The matter discussed, to judge by the writings of theologians, was somewhat obscure; and Luther offered his theses as an attempt to make it clearer. No one was supposed to be committed to every opinion he advanced in such a way. But the theses posted somehow touched heart and conscience in a way unusual in the common subjects of academic disputation. Every one wanted to read them. The University Press could not supply copies fast enough. They were translated into German, and were known throughout Germany in less than a fortnight. Within a month they had been heard of all over western and southern Europe. Luther himself was staggered at the way they were received. He said he had never meant to determine, but to debate.

The theses were singularly unlike what might have been expected from a professor of theology. They made no attempt at theological definition, no pretence at logical arrangement; they were anything but a brief programme of reformation. They were simply ninety-five sledge-hammer blows directed against the most flagrant ecclesiastical abuse of the age. They were addressed to the ” common ” man and appealed to his common sense of spiritual things.

The practice of offering, selling and buying Indulgences (see Indulgence) was everywhere common in the beginning of the 16th century. The beginnings go back more than a thousand years before the time of Luther. In the earliest church life, when Christians fell into sin, they were required to make public confession before the congregation, to declare their sorrow, and to vow to perform certain acts which were regarded as evidence of the sincerity of their repentance. When the custom of public confession before the congregation had changed to private confession to the clergy, it became the confessor’s duty to impose these satisfactions. It was thought only right that there should be some uniformity in dealing with repentant

sinners, and books appeared giving lists of sins and what were supposed to be suitable satisfactions. When the sins confessed were very heinous the satisfactions were correspondingly severe and sometimes lasted over many years. About the 7th century arose a custom of commuting or relaxing these imposed satisfac- tions. A

penance of several years fasting might be commuted into saying so many prayers, or giving an arranged amount in alms, or even into a money-fine. In the last case the analogy of the Wergeld of the German tribal codes was commonly followed. The usage generally took the form that any one who visited a church, to which the Indulgence had been attached, on a day named, and gave a contribution to its funds, had his penance shortened by one-seventh, one-third or one-half, as might be arranged. This was the origin of Indulgences properly so-called. They were always mitigations of satisfactions or penances which had been imposed by the church as outward signs of inward sorrow, tests of fitness for pardon, and the needful precedents of absolution. Luther uttered no protest against Indulgences of this kind. He held that what the church had imposed the church could remit.

This old and simple conception of Indulgences had been greatly altered since the beginning of the 13th century. The institution of penance had been raised to the dignity of a sacrament, and this had changed both the place and the character of satisfactions. Under the older conception the order had been Sorrow (Contritio) , Confession, Satisfaction (or due manifestation of sorrow in ways prescribed) and Absolution. Under the newer theory the order was Sorrow, Confession, Absolution, Satisfaction, and both satisfaction and sorrow took new meanings. It was held that Absolution removed guilt and freed from eternal punishment, but that something had to be done to free the penitent from temporal punishment whether in this life or in purgatory. Satisfactions took the new meaning of the temporal punishments due in this life and the substitute for the pains of purgatory. The new thought of a treasury of merits (thesaurus meritorum) introduced further changes. It was held that the good deeds over and above what were needed for their own salvation by the living or by the saints in heaven, together with the inexhaustible merits of Christ, were all deposited in a treasury out of whkh they could be taken by the pope and given by him to the faˆflil. They could be added to the satisfactions actually done by penitents. Thus Satisfactions became not merely signs of sorrow but actual merits, which freed men from the need to undergo the temporal pains here and in purgatory which their sins had rendered them liable to. By an Indulgence merits could be transferred from the storehouse to those who required them. The change made in the character of Sorrow made Indulgences all the more necessary for the indifferent penitent. On the older theory Sorrow {Contritio) had for its one basis love to God; but on the newer theory the starting-point might be a less worthy king of sorrow (Attritio) which it was held would be changed into the more worthy kind in the Sacrament of Penance. The

conclusion was naturally drawn that a process of penitence which began with sorrow of the more unworthy kind needed a larger amount of Satisfactions or penance than what began with Contrition. Hence for the indifferent Christian, Attrition, Confession and Indulgence became the three heads in the scheme of the church of the later middle ages for his salvation. The one thing which satisfied his conscience was the burdensome thing he had to do, and that was to procure an Indulgence — a matter made increasingly easy for him as time went on.

This doctrine of Attrition had not the undivided support of the theologians of the later medieval church ; but it was taught by the Scotists and was naturally a favourite theme with the sellers of Indulgences. Nor were all theologians at one upon the whole theory of Indulgences. The majority of the best theologians held that Indulgences had nothing to do with the pardoning of guilt, but only with freeing from temporal penalties in this life or in purgatory. But the common people did not discriminate, and believed that when they bought an Indulgence they were purchasing pardon from sin ; and Luther placed himself in the position of the ordinary Christian uninstructed in the niceties of theological distinctions.

His Ninety-five Theses made six different assertions about Indulgences and their efficacy : —

i. An Indulgence is and can only be the remission of a merely ecclesiastical penalty; the church can remit what the church has imposed ; it cannot remit what God has imposed. .

ii. An Indulgence can never remit guilt; the pope himself cannot do such a thing ; God has kept that in His own hand.

iii. It cannot remit the divine punishment for sin ; that also is in the hands of God alone.

iv. It can have no efficacy for souls in Purgatory; penalties imposed by the church can only refer to the living ; death dissolves them; what the pope can do for souls in Purgatory is by prayer, not by jurisdiction or the power of the keys.

v. The Christian who has true repentance has already received pardon from God altogether apart from an Indulgence, and does not need one

; Christ demands this true repentance from every one. vi. The Treasury of Merits has never been properly denned; it is hard to say what it is, and it is not properly understood by the people; it cannot be the merits of Christ and of His saints, because these act of themselves and quite apart from the intervention of the pope; it can mean nothing more than that the pope, having the power of the keys, can remit ecclesiastical penalties imposed by the church ; the true Treasure-house of merits is the Holy Ghost of the grace and glory of God.

The unexpected effect of the Theses was that the sale of Indulgences began to decline rapidly, and the archbishop of Mainz, disappointed in his hopes of revenue, sent a copy to Rome. The pope thinking that the whole dispute was a monkish quarrel, contented himself with asking the general of the Augustinian Eremites to keep his monks quiet. This was not easy. Tetzel, in conjunction with a friend, Conrad Wimpina, had published a set of counter-theses. John Mayr of Eck, a noted contro- versialist and professorof theology in the university of Ingolstadt, scented the Hussite heresy in the Theses, and denounced them in a tract entitled Obelisks. Luther at once answered in his Asterisks. A controversy raged in Germany. Meanwhile, at Rome, Silvester Mazzolini of Prierio, a Dominican monk and Inquisitor, had been studying the Theses, was profoundly dissatisfied with them, and wrote a Dialogue about the Power of the Pope, against the presumptuous conclusions of Martin Luther. This book reached Germany about the middle of January 1518, and increased the tumult.

Luther's friends had been provokingly silent about the Theses; but in April 1518, at the annual chapter of the Augustinian Eremites held at Heidelberg, Luther heard his positions temper- ately discussed, and found somewhat to his astonishment that his views were not acceptable to all his fellow monks. On his return to Wittenberg he began an answer to his opponents. He care- fully considered his positions, found them unassailable, and published his Resolutions, the most carefully written of all his works. The book practically discarded all the ideas and practices concerning Indulgences which had come into the medieval church since the beginning of the 13th century, and all the ingenious explanations of the scholastic theologians from Bonaventura and Thomas Aquinas downwards. The effect of the controversy was a great decrease in the sale of Indulgences in Germany, and the Papal Curia saw with alarm a prolific source of revenue decaying. It was felt that Luther must be silenced. He was accordingly summoned to Rome. To obey would have meant death; to refuse in his own name would have been contumacy. But the peremptory summons could be construed as an attack on the university of Wittenberg, and both the elector of Saxony and the

emperor Maximilian so regarded it. The result was that Pope Leo cancelled the summons, and it was arranged that Luther should appear before the papal Legate to the German Diet, Thomas de Vio, Cardinal Cajedtan, at Augsburg. The interview was not very successful. At its conclusion Luther wrote two appeals — one from the pope ill- informed to the pope well-informed, and the other to a General Council. True to his habit of taking the German people into his confidence, he wrote an account of his interview with the Legate, and published it under the title of the Acta Augustana.

The publication greatly increased the sympathy of almost all classes in Germany for Luther. They saw in him a pious man, an esteemed professor, who had done nothing but propose a discussion on the notoriously intricate subject of Indulgences, peremptorily ordered to recant and to remain silent. The elector Frederick shared the common feelings and resolved to

defend the man who had made his university so famous. His action compelled the Roman Curia to pause. Germany was on the eve, it was believed, of an election of a king of the Romans; it was possible that an imperial election was not far distant; Frederick was too . important a personage to offend. So the condemnation by the Cardinal-Legate was withdrawn for the time, and the pope resolved to deal with the matter otherwise. He selected one of his chamberlains, Charles von Miltitz, the elector's private agent at Rome, and commissioned him to deal with the matter as he best could. Miltitz received the " golden rose " to give to Frederick, and was furnished with several letters in all of which the pope spoke of Luther as a "child of the devil." His holiness had probably forgotten the fact when he addressed Luther some months later as " his dear son."

When Miltitz arrived in Germany he discovered that the movement was much more important than the Roman Curia had imagined. He had not to deal with the opposition of a recalcitrant monk, but with the awakening of a nation. He resolved to meet with Tetzel and with Luther privately before he produced his credentials. Tetzel he could not see; the man was afraid to leave his convent; but he had lengthy interviews with Luther in the house of Spalatin the chaplain and private secretary of the elector Frederick. There he disowned the sermons of the pardon- sellers, let it be seen that he did not approve of the action of the Legate, and so prevailed with Luther that the latter promised to write a submissive letter to the pope, to exhort people to rever- ence the Roman See, to say that Indulgences were useful to remit canonical penances, and to promise to write no more on the matter unless he happened to be attacked. Luther did all this. A

reconciliation might have taken place had the Roman Curia supported Miltitz. But the Curia did not support Miltitz, and placed more faith in Eck, who was eager to extinguish Luther in a public discussion.

Luther had been spending the time between his interview with the Legate at Augsburg (Oct. 1518) and the Leipzig Dis- putation (June 1 519) in severe and disquieting studies. He had found that all his opponents had pursued one line of argu- ment: the power to issue an Indulgence is simply one case of the universal papal jurisdiction; Indulgences are what the pope proclaims them to be, and to attack them is to attack the power of the pope; the pope represents the Roman church, which is actually the universal church, and to oppose the pope is to defy the whole church of Christ; whoever attacks such a long-established system as that of Indulgences is a heretic. Such was the argument. Luther felt himself confronted with the pope's absolute supremacy in all ecclesiastical matters. It was a plea whose full force he felt. The papal supremacy was one of his oldest inherited beliefs. He re-examined his convictions about justifying faith and whether they did lead to his declara- tions about Indulgences. He could come to no other con- clusion. It then became necessary to examine the papal claims. He set himself to study the Decretals, and to his amazement and indignation he found that they were full of frauds. It is hard to say whether the discovery brought him more joy or more grief. His letters show him half-exultant and half-terrified. While he was in this state of mind he received Eck's challenge to dispute with him at Leipzig on the papal supremacy.

This Leipzig Disputation was perhaps the most important point in Luther's career. He met Eck in June 1519. It soon appeared that the intention of that practised debater was to force Luther into some admission which would justify opponents in accusing him of holding the opinions of Huss, who had been condemned by the great German Council of Constance. In this he was eminently successful. Eck left Leipzig triumphant, and Luther returned to Wittenberg much depressed. As usual he wrote out and published an account of the Disputation, which was an appeal to his fellow Germans. The result surpassed his expectations. The Disputation made him see that his protest against the abuses of Indulgences was no criticism of an ex- crescence on the medieval ecclesiastical system, but an attack on its centre of existence. He saw that he stood for the spiritual

priesthood of all believers and that medievalism in religion meant that man cannot approach God without a priestly mediator. The people also saw his position and rallied round him; and the Humanists discerned in him a champion against the old intolerance against which they had been revolting in vain. Luther's depression fled. Sermons, pamphlets, letters from his tireless pen flooded the land, and Luther began to be the leader of a German revolt against Rome.

The year 1 5 20 saw the publication of his three most important works, all written at a time when he was fully convinced that he had broken for ever with Rome. They were, On the Liberty of a Christian Man, An Address to the Nobility of the German Nation, and On the Babylonian Captivity of the Church of God — the three primary treatises, as they have been called.

Meanwhile at Rome the pope had entrusted Eck and Prierias with the preparation of a bull {Exurge Domine) against Luther — a bull which followed the line of Eck's charges at Leipzig. The reformer had been expecting it ever since the Disputation at Leipzig, and had resolved to answer it by one striking act which would impress the imagination of every man. He posted up a notice inviting the Wittenberg students to witness the burning of the bull (10th of December 1520). Rome had shot its last ecclesiastical bolt. Nothing remained but an appeal to the secular power, and this was at once prepared.

The emperor Maximilian had died suddenly (12th January 1519), and for long Germany was disturbed with intrigues about the succession — the papal policy being specially tortuous. The widely expressed desire for a German emperor secured the unanimous election of Charles, the grandson of Maximilian and the king of Spain. Never were a people more mistaken and disappointed. The veins of Charles were full of German blood, but he was his mother's son. It was the Spaniard, not the German, who faced Luther at Worms.

Charles was crowned at Aachen, 23rd of October 1520, and opened his first German diet at Worms, 22nd of January 1521. The pope had selected two envoys to wait on the young emperor, one of them, Jerome Aleander, being specially appointed to secure the outlawry of Luther. The agenda of the diet contained many things seriously affecting all Germany, but the one problem which every one was thinking about was how Luther would be dealt with. The Electoral College was divided. The archbishop of Cologne, the elector of Brandenburg and his brother the archbishop of Mainz were for instant outlawry, while the elector of Saxony, who was resolved to protect Luther, had great influence with the archbishop of Trier and the Count

Palatine of the Rhine.

Aleander had no difficulty in persuading Charles, while both were still in the Netherlands, to put Luther under the ban within his hereditary dominions, and the papal nuncio expected that the decree would be extended to the whole German empire. But Charles at first refused to deal summarily with Luther so far as Germany was concerned. The emperor even wrote to the elector of Saxony, asking him to bring Luther with him to the diet for examination. Gradually he came to think that Luther might be condemned without appearing. The members of the diet were slow to come to any conclusion. At last they made up their minds, and presented a memorial to the emperor (19th of February 15 21) in which they reminded him that no imperial edict could be published against Luther without their sanction, and proposed that he should be invited to Worms under a safe-conduct and be there examined. They also suggested that Luther should be heard upon the papal claims, and ended by asking the emperor to deliver Germany from the papal tyranny. The emperor agreed to summon Luther under a safe- conduct, and that he should be heard; but he refused to mix his case with that of grievances against Rome. He had no sooner made the promise than he seems to have repented it. He saw no need for Luther's appearance. He tried to get him condemned unheard. An edict against Luther had been drafted (15th of February) which the diet refused to sanction. A few days later a second edict was drafted which ordered the burning of Luther's books. The diet again objected. Finally four days

after the safe-conduct had been despatched the emperor revised this second edict, limited it to the seizure of Luther's books, and published it on his own authority without consulting the diet (10th March). After Luther had begun his journey, this edict was posted up along his route in order to intimidate him; other means were taken to make him turn aside from Worms; but he was resolved to go there and nothing daunted him. He reached the town (16th April) and was met by encouraging crowds. He was summoned to appear before the diet on the 17 th and measures were taken to prevent him doing more than answering definite questions put to him. He was asked whether certain books had been written by him and whether he was prepared to maintain or to abjure what he had written. He asked time to prepare an answer to the second question. The diet was anxious to hear Luther, if the emperor was not, and his request was granted. He thus defeated the plot to keep him silent. On the 18th he made his second appearance and delivered the speech, which electrified his audience. At the close he was threatened by Spaniards in the diet. The Germans ringed him round, and, with their hands raised high in the

fashion of a landsknecht who had struck a successful blow, passed out into the street and escorted him to his lodgings. Next day (April 19th) the emperor proposed to place Luther under the ban of the empire and read to the assembly a brief statement of his own views. The diet objected, and asked for a conference between Luther and some selected members. Conferences were held, but came to nothing. No compromise was possible between the declaration that man's conscience could only be bound by the Word of God and the emperor's belief in the infallibility of a general council. The commission had to report that its efforts had failed. Luther was ordered to leave Worms and to return to Wittenberg. His safe-conduct was to expire twenty-one days after the 16th of April. Then he was liable to be seized and put to death as a pestilent heretic. There only remained to draft and publish the edict containing the ban. Days passed and it did not appear. Suddenly the startling news reached Worms that Luther had disappeared, no one knew where. It was reported that his body had been found in a silver-mine pierced with a dagger. The news flew over Germany and beyond it that he had been slain by papal emissaries. At Worms the indignation of the populace was intense. The public buildings were placarded during the night with an intimation that four hundred knights had sworn not to leave Luther unavenged, and tlie ominous words Bundschuh, Bundschuh, Bundschuh (the watchword of peasant revolts) were written at the foot. The combination suggested an alliance between the lesser knights and the peasants, dreaded by all the ruling classes. The true story of Luther's disappearance was not known until long after- wards. After the failure of the conference the elector of Saxony had commissioned two of the councillors to convey Luther to a place of safety without telling him where it was. Many weeks elapsed before Frederick himself learned that Luther was safe in his own castle of the Wartburg. The dis- appearance did not mean that Luther had ceased to be a leader of men; but it marked the beginning of an organized national opposition to Rome.

It was not till the 25th of May that the edict against Luther was presented to a small number of members of the diet, after the elector of Saxony and many important members had left Worms. It threatened all Luther's sympathisers with extermina- tion, and practically proclaimed an Albigensian war in Germany. But few public documents prepared with so much care have proved so futile. The latter half of 1521 saw the silent spread of Lutheran opinions all over Germany. This was not un- accompanied with dangers. Every movement for reform carries within it the seeds of revolution, and Luther's was no exception to the rule.

The revolution began in Wittenberg during Luther's seclusion in the Wartburg. Andrew Boden of Carlstadt, a colleague of Luther's in the university of Wittenberg, was strongly impressed with the contradiction which he believed to exist between evangelical teaching and the usages of medieval ecclesiastical

life. He denounced monastic vows, a distinctive dress for the clergy, the thought of a propitiatory mass, and the presence of images and pictures in the churches. Zwilling, a young Augus- tinian Eremite, added his fiery denunciations. His preaching stirred the commonalty. Turbulent crowds invaded two of the churches and rioted inside. The excitement of the people was increased by the arrival of three men known in history as the Zwickau prophets. Melanchthon felt himself powerless to restrain the tumult. The magistrates of the town were won over and issued an ordinance which attempted to express in legislation the new evangelical ideas. Duke George of Saxony, a resolute opponent of the Reformation, threatened to make the diet interfere. Luther became alarmed, and, not without a private hint from the elector of Saxony, 1 left his retreat and appeared among his townsmen. His presence and exertions restored order, and the conservative reformation resumed its quiet course. From this time onwards to the outbreak of the Peasants' War (1525) Luther was the real leader of the German nation, and every- thing seemed to promise a gradual reformation without tumult. The Peasants' War ended this anticipation. From one point of view this insurrection was simply the last, the most wide- spreading and the most disastrous of these revolts, which had been almost chronic in Germany during the later decades of the 15th and earlier years of the 16th century and which had been almost continuous between 1503 and 1517. All the social and economic causes which produced them were increasingly active in 1524 and 1525- But it is undoubted that the religious revolt intensified the rebellion of the lower classes. Luther's voice awoke echoes he never dreamt of. The times were ripe for revolution, and the message which spoke of a religious democracy could not fail to suggest the social democracy also. In his appeal to the Nobility of the German Nation he had stated with severe precision the causes of social discontent. Himself a peasant's son and acquainted with the grievances under which the peasant lived, he had at' various times formulated most of the demands which afterwards figured conspicuously in the Twelve Articles. The insurgents had good cause to regard him as a sympathiser. But Luther, rightly or wrongly,

believed that of the two ways in which wrongs can be set right — the way of war and the path of peace— the latter is the only sure road in the long run. He did his best therefore to prevent the rising and risked his life among the infuriated peasants as readily as when he stood before the emperor and the diet. When the rebellion was at its height and Thomas Munzer had sent forth fiery proclamations urging the peasantry " not to let the blood cool on their swords," Luther issued the pamphlet, which casts a stain on his whole life, in which he hounds on the ruling classes to suppress the insurgents with all violence. In the end the rebellion, formidable as it seemed for a few months, was crushed, and a heavier yoke was laid on the shoulders of the unfortunate peasants.

This year, 1525, saw the parting of the ways in the movement for reform. It ceased to be national and became ecclesiastical. It divided into three separate parts. One, guided by Luther himself, ended, after a long struggle with pope and emperor, in the establishment of evangelical churches under the rule of the secular authorities of the territories which adopted the Lutheran Reformation. Another, remaining true to the prin- ciples, doctrines, usages and hierarchy of the medieval church, dreamt only of a purification of moral life, and saw its end realised in the reforms of the council of Trent. The third, gathering together the more revolutionary impulses, expanded into that complex movement called Anabaptism — which spread over western Europe from England to Poland and from Scandinavia to northern Italy, and endured a long and sanguinary persecution at the hands of the civil authorities in most European countries. Its strength and popularity, especially among the artizan classes, have been very much underrated by most historians.

1 Enders, Dr Martin Luther's Briefwechsel, iii. 292-295 ; von Bezold, Zeitschrift fur Kirchengeschichte xx. 186 sqq.; Barge, Andreas Bodenstein von Karlstadt, i. 432 sqq.

During the storm of the Peasants' War (13th of June 1525) Luther married Catherine von Bora, the daughter of a noble but impoverished family belonging to Meissen. She had been a Cistercian nun in the convent of Nimtzch near Grimma — a convent reserved for ladies of noble birth. Luther's writings, circulating through Saxony, had penetrated the convent walls and had convinced most of the inmates of the unlawfulness of monastic vows. Catherine and eight companions resolved to escape. Their relatives refused to aid them, and they applied to Luther. He entrusted the business to Leonhard Koppe of Torgau, and the rescue was safely carried out(4th of April 1523). The rescued nuns found places of refuge in the families of

Wittenberg burghers. The elector John of Saxony (who had succeeded his brother Frederick) gave Luther the house which had served as the Augustinian Convent. The family gathered in this three-storeyed building, with its back windows looking over the Elbe and its front door opening on a great garden, was latterly Luther and his wife, their three sons and two daughters, Magdelena von Bora, Catherine's aunt, two orphan nieces and a grandniece. At the beginning of his married life Luther must have been in straitened circumstances. He married a portionless nun. On to 1532 his salary was two hundred gulden annually (about £160 in present money); after 1532 the stipend was increased to £240 with various payments in kind — corn, wood, malt, wine, &c. — which meant a great deal more. The town added occasional gifts to enable Luther to entertain the great personages who came to consult him frequently. Princes made him presents in money. This enabled Luther to purchase from his wife's brother the small estate of Zulsdorf. Catherine, too, was an excellent house-wife. She made the long-neglected garden profitable; kept pigs and poultry; rented other gardens; stocked a fishpond; farmed in a small way; and had her house full of boarders. Luther had a high opinion of her intelligence; she took rank among those consulted on all important occasions; in one letter to her, seldom quoted, he gives the fairest statement he ever made about the views of Zwingli on the Sacrament of the Supper.

The diet of Speyer (1526) saw Germany divided into a Pro- testant and a Romanist party. After much debate a compromise was arrived at, which foreshadowed the religious peace of Augsburg of 1555. It was resolved that the Word of God should be preached without disturbance, that indemnity should be given for past offences against the edict of Worms, and that meanwhile each state should live religiously as it hoped to answer for its conduct to God and the emperor. The Lutherans interpreted this to mean the right to frame ecclesiastical regula- tions for various principalities and to make changes in public worship. Luther busied himself in simplifying the service, in giving advice, anxiously sought for, about the best modes of organising ecclesiastical affairs. In the diet held at Speyer in 1529 a compact Roman Catholic majority faced a weak Lutheran minority. The emperor declared through his com- missioners that he abolished " by his imperial and absolute authority" the clause in the ordinance of 1526 on which the Lutherans had relied when they began to organize their territorial churches. The majority of the diet supported the emperor in this, and further proceeded to decree that no ecclesiastical body was to be deprived of its revenues or authority. This meant that throughout all Germany medieval ecclesiastical rule was to be upheld,

and that none of the re-*nues of the medieval church could be appropriated for Protestant uses. On this a portion of the Protestant minority drafted a legal protest, in which the signers declared that they meant to abide by the decision of the diet of 1526 and refused to be bound by that of 1529. From this protest came the name Protestant.

A minority in such a case could only maintain their protest if they were prepared to defend each other by force in case of an attack. Three days after the protest had been read, many of the protesting cities and states concluded ” a secret and particular treaty,” and Philip of Hesse, the ablest statesman among the Protesters, saw the need for a general union of all evangelical Christians in the empire. The difficulties in the way

were great. The Saxons and the Swiss, Luther and Zwingli, were in fierce controversy about the true doctrine of the sacra- ment of the Supper. Luther was a patriotic German who was for ever bewailing the disintegration of the Fatherland; Zwingli was full of plans for confederations of Swiss cantons with South German cities, which could not fail to weaken the empire. Luther had but little trust in the ” common man “;. Zwingli was a thorough democrat. When Luther thought of the Swiss reformer he muttered as Archbishop Parker did of John Knox — ” God keep us from such visitations as Knox hath attempted in Scotland; the people to be orderers of things.” Above all Luther had good grounds for believing that at the conference at Memmingen friends of Zwingli had helped to organize ft Peasants’ War and to link the social revolution to the religious awakening. All these suspicions were in Luther’s mind when he consented very half-heartedly to meet Zwingli at a conference to be held in Philip of Hesse’s castle at Marburg. The debate proceeded as such debates usually do. Zwingli attacked the weakest part of Luther’s theory — the ubiquity of the body of Christ; and Luther attacked Zwingli’s exegesis of the words of the institution. Neither sought to bring out their points of agreement. Yet the conference did good; it showed that the Protestants were agreed on all doctrinal points but one. If union was for the present impossible, there were hopes for it in the future.

In 1530 the emperor Charles, resolved to crush the Reforma- tion, himself presided at the diet. The Protestant divisions were manifest. Three separate confessions were presented to the emperor — one from

Zwingli, one by the theologians of the four cities of Strassbourg, Constance, Lindau and Memmingen (Confessio Telrapolitana), and the Augsburg Confession, the future symbol of the Lutheran church. The third was the most im- portant, and the emperor seriously set himself to see whether it might not be made the basis of a compromise. He found that reconciliation was hopeless. Thereupon the diet resolved that the edict of Worms was to be enforced against Luther and his partizans; that the ecclesiastical jurisdictions were to be pre- served; and that all the church property taken possession of by the Lutheran princes was to be restored; and that in all cases of dispute the last court of appeal was to be the Imperial Court of Appeals. The last provision meant that the growing Protestant- ism was to be fought by harrassing litigation — nicht fechten sondern rechten was the phrase.

Luther was not present at the diet nor at the negotiations. He was still an outlaw according to imperial ideas. Melanchthon took his place as leader.

The decision of the diet compelled the Protestant princes to face the new and alarming situation. They met in conference in mid-winter at the little town of Schmalkald, and laid the founda- tions of what became the powerful Schmalkald League, which effectually protected the Protestants of Germany until it was broken up by the intrigues of the imperial party. From the time of the formation of this league, Luther retired gradually from the forefront of a reformation movement which had become largely political, and busied himself with reforms in public worship and suggestions for an organization of the polity of the Evangelical church. In this work his natural conservatism is apparent, and he contented himself with such changes as would make room for the action of evangelical principles. He dis- claimed the right of suggesting a common order of worship or a uniform ecclesiastical polity; and Lutheran ritual and polity, while presenting common features, did not follow one common use. It may be said generally that while Luther insisted on a service in the vernacular, including the singing of German hymns, he considered it best to retain most of the ceremonies, the vestments and the uses of lights on the altar, which had existed in the unreformed church, while he was careful to explain that their retention might be dispensed with if thought necessary. To the popular mind the great distinction between the Lutheran and the medieval church service, besides the use of the vernacular and the supreme place assigned to preaching, was that the people partook of the cup in the sacrament of the Lord's Supper; and the Lutheran service became popularly distinguished from the

Reformed because it retained, while the Reformed did away with,

most of the medieval ceremonies and vestments (see Lutherans). The variations in the details of the polity of the Lutheran churches were very numerous, but they all preserved the same distinctive principles. Two conceptions lay at the basis— the thought of the spiritual priesthood of all believers and the belief that the state was a divine ordinance, that the magistracy might represent the whole body of believers and that discipline and administration might be exercised through courts constituted somewhat like the consistorial courts of the medieval bishops, their members being appointed by the magistracy.

The last years of Luther's life were spent in incessant labour disturbed by almost continuous ill-health. He was occupied in trying to unite firmly together the whole evangelical movement; he laboured to give his countrymen a good system of schools; he was on the watch to defeat any attempt of the Roman Curia to regain its hold over Germany; and he was the confidential adviser of a large number of the evangelical princes. Luther's intimacy with his own elector, first John, then John Frederick, helped to give him the place accorded to him by the princes. The chiefs of the Houses of Anhalt and Liineburg, Duke Henry of Saxony, Joachim II. of Brandenburg, Albert of Brandenburg and the counts of Mansfeld, were among Luther's most devoted supporters and most frequently sought his advice. Princely correspondence was not always pleasant. It took its most dis-agreeable form when Philip of Hesse besieged Luther with requests to give his sanction to taking a second wife while his first was still alive. Luther's weakness brought the second great blot on his career. The document sanctioning the bigamy of the landgrave was signed by Martin Bucer, Luther and Melanchthon, and is a humiliating paper. It may be thus summarized. According to the original commandment of God, marriage is between one man and one woman, and this original precept has been confirmed by our Lord; but sin brought it about that first Larnech, then the heathen, and then Abraham, took more than one wife, and this was permitted under the law. We are now living under the Gospel, which does not give prescribed rules for the external life and has not expressly prohibited bigamy. The law of the land expresses the original command- ment of God, and the plain duty of the pastorate is to denounce bigamy. Nevertheless, the pastorate, in single cases of the direst need and to prevent worse, may sanction bigamy in a purely exceptional way. Such a bigamous marriage is a true marriage in the sight of God (the necessity being proved), but it is not a true marriage in the eye of public law and custom. Such a marriage and the dispensation for it ought to be kept secret; if it is made known, the dispensation becomes eo ipso invalid and the marriage is mere concubinage. The principle which underlies this

extraordinary paper is probably the conception that the Protestant church has the same dispensing power which the medieval church claimed, but that it was to be exercised altogether apart from fees of any kind.

In his later years Luther became more tolerant on the sacra- mental question which divided him from the South German cities, although he never departed from his strong opposition to the supposed views of Zwingli himself. He consented to a conference, which, as he was too ill to leave home, met at Witten- berg (May- June 1536). After prolonged discussion the differ- ences were narrowed to one point — the presence of the body of Christ extended in space in the sacrament of the Supper. It was agreed in the Wittenberg Concord to leave this an open question. Thus North and South Germany were united. It is possible that had Luther lived longer his followers might have been united with the Swiss. He repeatedly expressed an admiration for Calvin's writings on the subject of the sacrament ; and Melanch- thon believed that if the Swiss accepted Calvin's theory of the Supper, the Wittenberg Concord could be extended to include them. But the Consensus Tigurinus, which dates the adhesion of the Swiss to the views of Calvin, was not signed until 1549, when Luther was already dead.

Year by year Luther had been growing weaker, his attacks of illness more frequent and his bodily pains more continuous*

Despite the entreaties of wife and elector he resolved to do what he could to end ; . some trifling dispute about inheritance which threatened the peace of the House of Mansfeld. He left Wittenberg in bitterly cold weather on the 23rd of January 1546, and the journey was tedious and hazardous. He was accepted as arbiter and his decision brought an end to the strife. He preached in Eisleben (February 14) with all his old fervour; but suddenly said quietly: " This and much more is to be said about the Gospel; but I am too weak and we will close here." These were his last words in the pulpit. On the 16th and 17th the deeds of reconciliation were signed and Luther's work was done. The end came swiftly. He was very ill on the evening of the 17th; he died on the early morning of the 18th of February 1546 in his sixty-third year.

The elector of Saxony and Luther's family resolved that he must be

buried at Wittenberg, and on the 20th the funeral pro- cession began its long march. The counts of Mansfeld, the magistrates of the city and all the burghers of Eisleben accom- panied the coffin to the gates of their town. A company of fifty light-armed troops commanded by the young counts of Mansfeld headed the procession and went with it all the way to Witten- berg. The following was temporarily swelled as it passed through villages and towns. Delegates from the elector of Saxony met it as it crossed the boundaries of the principality. Luther was laid to rest in the Castle church on whose door he had nailed the theses which had kindled the great conflagration. Bibliography. — (a) For Luther's life as a whole: Melanchthon, " Historia de vita et actis Lutheri " (Wittenberg, 1545), in the Corpus Reformatorum, vi. ; Mathesius, Historien von . . . Martini Lutheri, Anfang, Lehre, Leben und Sterben (Prague, 1896); Myconius, Historia Reformationis 1517-1542 (Leipzig, 1718); Ratzeberger, Geschichte iiber Luther und seine Zeit (Jena, 1850); Wrampelmeyer, Tagebuch uber Dr Martin Luther gefuhrt von Dr Conrad Cordatus, 1537 (Halle, 1885) ; Forstemann, Neues Urkundenbuch zur Geschichte der evangelischen Kirchenreformation (Hamburg, 1842); Kolde, Analecta Lutherana (Gotha, 1883); G. Losche, Analecta Lutherana et Melanchthoniana (Gotha, 1892); G. Losche, Vollstandige Refor- mations- A eta und Documenta (Leipzig, 1 720-1 729); Enders, Dr Martin Luther's Briefwechsel (5 vols., Frankfurt, 188ˆ.1893); J. Cochlaeus (Rom. Cath.), Commentarius de actis et scriptis M. Lutheri, &c. (St Victor prope Moguntiura). See also J. Kostlin, Martin Luther, sein Leben und seine Schriften (2 vols., Berlin, 1889) ; Th. Kolde, Martin Luther, Eine Biographie (2 vols., Gotha, 1884 1893) ; A. Hausrath, Luther's Leben (2 vols., Berlin, 1904) ; Lindsay, Luther and the German Reformation (Edinburgh, 1900) ; Cambridge Modern History, ii. (Cambridge, 1903) ; History of the Reformation, i. (Edinburgh, 1906).

(6) For special incidents: The Theses and their publication: W. Kohler, Luthers 95 Theses sammt seinen Resoluttonen, den Gegen- schriften von Wimpina-Tetzel, Eck and Prierias, und den Antworten Luthers darauf (Leipzig, 1903); Emil Reich, Select Documents illustrating Medieval and Modern History (London, 1905); The Leipzig Disputation: Seidemann, Die Leipziger Disputation im Jahre 1519 (Dresden, 1843); Luther before the Diet of Worms: Deutsche Reichstagsakten unter Kaiser Karl V. (Gotha, 1893-1901), ii. ; The Marburg Colloquy; Schirrmacher, Brief e und Aden zu der Geschichte des Religionsgespraches zu Marburg, 152Q, und des Reichs- tages zu Augsburg 1530 (Gotha, 1876); Hospinian, Historia Sacra- mentaria, ii. 1236-1266; Ehrard, Das Dogma vom heiligen Abendmahl und seine Geschichte, ii. (Frankfurt a M., 1846); The Augsburg Confession :

SchafF , The Creeds of the Evangelical Protestant Churches (London, 1877), History of the Creeds of Christendom (London, 1877).

(T. M. L.)

LUTHERANS, the general title given to those Christians who have adopted the principles of Martin Luther in his opposition to the Roman Church, to the followers of Calvin, and to the sectaries of the times of the Reformation. Their distinctive name is the Evangelical, as opposed to the Reformed church. Their dogmatic symbols are usually said to include nine separate creeds which together form the Book of Concord (Liber Concordiae) . Three belong to the Early Christian church — the Apostles' Creed, the Nicene Creed (in its Western form, i.e. with the filioque), and the so-called Athanasian Creed; six come from the 1 6th century — the Augsburg Confession, the Apology for the Augsburg Confession, the Schmalkald Articles, Luther's two Catechisms, and the Form of Concord. But only the three early creeds and the Augsburg Confession are recognized by all Lutherans. Luther's Catechisms, especially the shorter of the two, have been almost universally accepted, but the

Form of Concord was and is expressly rejected by many Lutheran churches. The Augsburg Confession and Luther's Short Cate- chism may therefore be said to contain the distinctive principles which all Lutherans are bound to maintain, but, as the principal controversies of the Lutheran church all arose after the publica- tion of the Augsburg Confession and among those who had accepted it, it does not contain all that is distinctively Lutheran. Its universal acceptance is perhaps due to the fact that it exists in two forms (the variata and the invariata) which vary slightly in the way in which they state the doctrine of the sacrament of the Supper. The variata edition was signed by Calvin, in the meaning, he said, of its author Melanchthon.

After Mither's death the more rigid Lutherans declared it to be their duty to preserve the status religionis in Germania per Lutherum instauratus, and to watch over the depositum Jesu Christi which he had committed to their charge. As Luther was a much greater preacher than a systematic thinker, it was not easy to say exactly what this deposit was, and controversies resulted among the Lutheran theologians of the 16th century. The Antinomian controversy was the earliest (1537-1560). It arose from differences about the precise meaning of the word " law " in Luther's distinction between law and gospel. Luther limited the meaning of the word to mean a definite command accompanied by threats, which counts on terror to produce obedience. He declared that Christ was not under the dominion of the

law in this sense of the word, and that believers enter the Christian life only when they transcend a rule of life which counts en selfish motives for obedience. But law may mean ethical rule, and the Antinomians so understood it, and inter- preted Luther's declaration to mean that believers are not under the dominion of the moral law. The controversy disturbed the Lutheran church for more than twenty years.

The Arminian controversy in the Reformed church, the Jansenist controversy in the Roman Catholic church, had their parallel in three separate disputes among the Lutherans lasting from 1550 to 1580. (1) George Major, discussing the relation of good works to conversion, declared that such works were both useful and necessary to holiness. He was attacked by Flacius and Amsdorf, and after a long controversy, full of ambiguities and lacking in the exhibition of guiding principles, he was condemned because his statement savoured of Pelagian- ism. (2) The same problem took a new form in the Synergist controversy, which discussed the first impulse in conversion. One party taught that while the first impulse must come from the Holy Spirit the work might be compared to reviving a man apparently dead. It was answered that the sinner was really dead, and that the work of the Spirit was to give an actually new life. The latter assertion was generally approved of. (3) Then a fresh controversy was started by the assertion that sin was part of the substance of man in his fallen condition. It was answered that sin had not totally destroyed man's ethical nature, and that grace changed what was morally insensitive into what was morally sensitive, so that there could be a co- operation between God's grace and man's will.

The controversy raised by Andrew Osiander was more im- portant. He felt that Luther had omitted to make adequate answer to an important practical question, how Christ's death on the cross could be brought into such actual connexion with every individual believer as to be the ground of his actual justification. The medieval church had spanned the centuries by supposing that Christ's death was continuous down through the age in the sacrifice of the Mass; Protestant theology had nothing equivalent. He proposed to supply the lack by the theory that justification is a real work done in the individual by the same Christ who died so many centuries ago. Redemption, he said, was the result of the historical work of Christ; but justification was the work of the living risen Christ, dwelling within the believer and daily influencing him. Osiander's theory did not win much support, but it was the starting-point of two separate doctrines. In the Lutheran church, Striegel taught that the principal effect of Christ's work on the cross I was to change the attitude of God towards the whole human

race, and that, in consequence, when men come into being and have faith, they can take advantage of the change of attitude effected by the past historical work of Christ. The Reformed church, on the other hand, constructed their special doctrine of the limited reference in the atonement.

The other controversies concerned mainly the doctrine of the sacrament of the Supper, and Luther's theory of Con- substantiation. This required a doctrine of Ubiquity, or the omnipresence of the body of Christ extended in space, and therefore of its presence in the communion elements. Calvin had taught that the true way to regard substance was to think of its power {vis), and that the presence of a substance was the immediate application of its power. The presence of the body of Christ in the sacramental elements did not need a presence extended in space. Melanchthon and many Lutherans accepted the theory of Calvin, and alleged that Luther before his death had approved of it. Whereupon the more rigid Lutherans accused their brethren of Crypto-Calvinism, and began contro- versies which dealt with that charge and with a defence of the idea of ubiquity.

The university of Jena, led by Matthias Flacius, was the headquarters of the stricter Lutherans, while Wittenberg and Leipzig were the centres of the Philippists or followers of Melanchthon. Conferences only increased the differences. The Lutheran church seemed in danger of falling to pieces. This alarmed both parties. New conferences were held and various articles of agreement were proposed, the most notable being the Torgau Book (1576). In the end, the greater proportion adopted the Book of Concord (1577), drafted chiefly by Jacob Andreae of Tubingen, Martin Chemnitz of Brunswick and Nicolas Selnecker of Leipzig. Its recognition was mainly due to the efforts of Augustus, elector of Saxony. This Book of Concord was accepted by the Lutheran churches of Sweden and of Hungary in 1593 and 1597; but it was rejected by the Lutheran churches of Denmark, of Hesse, of Anhalt, of Pomerania and of several of the imperial cities. It was at first adopted and then rejected by Brunswick, the Palatinate and Brandenburg. The churches within Germany which refused the Book of Concord became for the most part Calvinistic or Reformed. They published, as was the fashion among the Reformed churches, separate creeds for themselves, but almost all accepted the Heidelberg Catechism. These differences in the German Pro- testant churches of the second half of the 16th century are reflected in the great American

Lutheran church. The church exists in three separate organizations. The General Synod of the Evangelical Church of the United States, organized in 1820, has no other creed than the Augsburg Confession, so liberally interpreted as not to exclude Calvinists. The Synodical Con- ference of North America, organized in 1872, compels its pastors to subscribe to the whole of the nine creeds contained in the Book of Concord. The General Council, a secession from the General Synod, was organized in 1867, and accepts the ” un- altered ” (invariata) Augsburg Confession in its original sense, and the other Lutheran symbols as explanatory of the Augsburg Confession.

The divided state of German Protestantism, resulting from these theological differences, contributed in no small degree to the disasters of the Thirty Years' War, and various attempts were made to unite the two confessions. Conferences were held at Leipzig (1631), Thorn (1645), Cassel (1661); but without success. At length the union of the two churches was effected by the force of the civil authorities in Prussia (1817), in Nassau (1817), in Hesse (1823), in Anhalt-Dessau (1827) and elsewhere. These unions for the most part aimed, not at incorporating the two churches in doctrine and in worship, but at bringing churches or congregations professing different confessions under one government and discipline. They permitted each congregation to use at pleasure the Augsburg Confession or the Heidelberg Catechism. The enforced union in Prussia was combined with the publication of a new liturgy intended for common use. This led to secessions from the state church. These seceders were at first treated with great harshness, but have won their

way to toleration, and form the Lutheran Free churches of Germany.

The most important of these latter is the Evangelical Lutheran church of Prussia, sometimes called the Old Lutherans. It came into being in 181 7 and gradually gained the position of a tolerated nonconformist church (1845 being the date of its complete recognition by the state). At the 1905 census it numbered 51,600 members under 75 pastors. Its affairs are managed by an Oberkirchencollegium, with four ordained and two lay members. The Evangelical Lutheran Immanuel Synod came into being in 1864, and has a membership of 5300 with 13 ordained pastors. Its headquarters is Liegnitz. The In- dependent Evangelical Lutheran church in the lands of Hesse arose partly on account of the slumbering opposition to the union of 1823 and more particularly in consequence of an attempt made at a stricter union in 1874. It has a membership of about 1800. The renitente church of Lower Hesse has a membership of 2400. The Evangelical Lutheran Free Church of Hanover has a membership of 3050 under 10 ordained

pastors. The Hermannsburg Free Church has a membership of about 2000 under 2 pastors. The Evangelical Lutheran Community in Baden has a membership of about 1100 with 2 ordained pastors. The Evangelical Lutheran Free Church of Saxony has a member- ship of about 3 780 with 1 5 ordained pastors. These free churches exist separate from the State Evangelical United Church (Evan- gelische unirte Landskirche) .

The general system of ecclesiastical government which prevails among all Lutheran churches is called the consistorial. It admits of great variety of detail under certain common features of organization. It arose partly from the makeshift policy of the times of the Reformation, and partly from Luther's strong belief that the jus episcopate belonged in the last resort to the civil authorities. It may be most generally described by saying that the idea was taken from the consistorial courts through which the medieval bishops managed the affairs of their dioceses. Instead of the appointments to the membership of the con- sistories being made by the bishops, they were made by the supreme civil authority, whatever that might be. Richter, in his Evangelische Kirchenordnungen des i6ten Jahrhunderts (2 vols., 1846), has collected more than one hundred and eight separate ecclesiastical constitutions, and his collection is con- fessedly imperfect. The publication of a complete collection by Emil Sehling was begun in 1902.

The liturgies of the Lutheran churches exhibit the same diversities in details as appear in their constitutions. It may be said in general that while Luther insisted that public worship ought to be conducted in a language understood by the people, and that all ideas and actions which were superstitious and obscured the primary truth of the priesthood of all believers should be expurged, he wished to retain as much as possible of the public service of the medieval church. The external features of the medieval churches were retained; but the minor altars, the tabemacula to contain the Host, and the light per- manently burning before the altar, were done away with. The ecclesiastical year with its fasts and festivals was retained in large measure. In 1526 Luther published the German Mass and order of Divine Service, which, without being slavishly copied, served as a model for Lutheran communities. It retained the altar, vestments and lights, but explained that they were not essential and might be dispensed with. The peril attending the misuse of pictures in churches was recognized, but it was believed to be more than counterbalanced by the instruction given through them when their presence was not abused. In short Luther contented himself with setting forth general principles of divine service, leaving them to be applied as his

followers thought best. The consequence was that there is no uniform Lutheran liturgy. In his celebrated Codex Liturgicus Ecclesiae Lutheranae in epitomen redactus (Leipzig, 1848), Daniel has used 98 different liturgies and given specimens to show the differences which they exhibit.

The divergences in ritual and organization, the principle underlying all the various ecclesiastical unions, viz. to combine

two different confessions under one common government, and, resulting from it, the possibility of changing from one confession to another, have all combined to free the state churches from any rigid interpretation of their theological formulas. A liberal and a conservative theology (rationalist and orthodox) exist side by side within the churches, and while the latter clings to the theology of the 16th century, the former ventures to raise doubts about the truth of such a common and simple standard as the Apostles' Creed. The extreme divergence in doctrinal position is fostered by the fact that the theology taught in the univer- sities is in a great measure divorced from the practical religious life of the people, and the theological opinions uttered in the theological literature of the country cannot be held to express the thoughts of the members of the churches. In each state the sovereign is still held to be the summus episcopus. He appoints a minister of public worship, and through him nominates the members of the governing body, the Oberkirchenrath or Con- sistorium or Directorium. This council deals with the property, patronage and all other ecclesiastical matters. But each parish elects its own council for parochial affairs, which has a legal status and deals with such matters as the ecclesiastical assess- ments. Delegates from these parish councils form the Landes- synode. In cases that call for consultation together, the Con- sistorium and the Synod appoint committees to confer. In Alsace-Lorraine about half of those entitled to vote appear at the polls; but in other districts of Germany very little interest is shown in the elections to the parish councils.

The income of the state churches is derived from four sources. The state makes an annual provision for the stipends of the clergy, for the maintenance of fabrics and for other ecclesiastical needs. The endowments for church purposes, of which there are many, and which are destined to the support of foreign missions, clerical pensions, supply of books to the clergy, &c. are administered by the supreme

council. The voluntary contributions of the people are all absorbed in the common income of the national churches and are administered by the supreme council. Each parish is legally entitled to levy ecclesiastical assessments for denned purposes.

Appointments to benefices are in the hands of the state (sometimes with consent of parishes), of private patrons and of local parish councils. The number of these benefices is always increasing; and in 1897 they amounted to 16,400, or 300 more than in 1800. The state appoints to 56 % , private and municipal patrons to 34%, and congregations to 10% of the whole. Customs vary in different states; thus in Schleswig-Holstein the state nominates but the parish elects; in Alsace-Lorraine the directorium or supreme consistory appoints, but the appointment must be confirmed by the viceroy; in Baden the state offers the parish a selection from six names and then appoints the one chosen.

The Lutheran state churches of Denmark, Sweden and Norway have retained the episcopate. In all of them the king is recog- nized to be the summus episcopus or supreme authority in all ecclesiastical matters, but in Norway and Sweden his power is somewhat limited by that of parliament; The king exercises his ecclesiastical authority through a minister who super- intends religion and education. The position and functions of the bishops vary in the different countries. In all the rite of ordination is in their hands. In Denmark they are the inspectors of the clergy and of the schools. In Sweden they preside over local consistories composed of clerical and lay members. The episcopate in all three countries accommodates itself to some- thing like the Lutheran consistorial system of ecclesiastical government.

The two leading religions within Germany are the Evangelical (Lutheran) and the Roman Catholic, including respectively 58 and 39% of the population. The proportions are continually varying, owing to the new migratory habits of almost every class of the population. Generally speaking, the Roman Catholics are on the increase in Prussia, Bavaria, Saxony and Wiirttem- burg; and the Evangelicals in the other districts of Germany, especially in the large cities. There is a growing tendency to

mixed marriages, which are an important factor in religious changes.

Bibliography. — Richter, Die evangelischen Kirchenordnungen des sechzehnten Jahrhunderts (Weimar, 1846) ; Sehling, Die evangelischen Kirchenordnungen des idten Jahrhunderts (Leipzig, 1902, &c); Richter, Lehrbuch des katholischen und evangelischen

Kirchenrechts (8th ed., Leipzig, 1886); Hundeshagen, Beitrage zur Kirchenver- fassungsgeschichte und Kirchenpolitik inbesondere des P.rotestantismus, i. (Wiesbaden, 1864), or in Ausgewahlte kl. Schriften, ii. (Gotha, 1875); Hofling, Grundsatze der evangelischen-Lutherischen Kirchen- verfassung (Erlangen, 1850, 3rd ed., 1853); Drews, Das kirchl. Leben d. deutschen evangelischen Landeskirchen (Tubingen, 1902) ; Erich Forster, Die Enstehung der preussischen Landeskirchen unter der Regierung Konig Friedrich Wilhelms III., i. (Tubingen, 1905); Emil Sehling, Geschichte_ der protestantischen Kirchenverfassung (Leipzig, 1907); articles in Herzog's Realencyklopadie fur protest. Theologie (3rd ed.), on Kirchenregiment, Kirchenrecht, Kirchen- ordnung, Konsistorien, Episcopalsystem, Gemeinde, Kollegial- system, Territorialsystem ; Schaff, History of the Creeds of Christen- dom (London. 1877). (T. M. L.)

LUTHER LEAGUE, a religious association for young people in the United States of America. It began with a local society founded by delegates of six Lutheran church societies in New York City in 1888. The first national convention was held at Pittsburg, Pennsylvania, on the 30th and 31st of October 1895. The basis of the league is the Augsburg Confession. Its member- ship is open to " any society of whatever name connected with a Lutheran congregation or a Lutheran institution of learning." According to the constitution its objects are " to encourage the formation of the young people's societies in all Lutheran congregations in America, to urge their affiliation with their respective state or territorial leagues, and with this league to stimulate the various young people's societies to greater Christian activity and to foster the spirit of loyalty to the church." The league publishes a monthly paper, The Luther League Review, in Washington. According to its official report it had 70,000 members in 1906, which had increased to more than 100,000 in

1910.

LUTON, a market town and municipal borough in the southern or Luton parliamentary division of Bedfordshire, England, 30 m. N.W. by N. of London by the Midland railway, served also by a branch of the Great Northern. Pop. (1901) 36,404. It lies in a narrow valley on the south flank of the Chiltern Hills, on the upper part of the river Lea. The church of St Mary is mainly Decorated, but has portions of Early English and Perpendicular work. It has brasses and monuments of interest and a late Decorated baptistery of stone, an ornate roofed structure, octagonal in form. The font within it is Early English. Luton is the principal seat in England of the straw-plait manufacture, and

large quantities of hats and other straw goods have been exported, though in recent years the industry has suffered from increased foreign competition. The industry originated with the colony of straw-plaiters transplanted by James I. from Scotland, whither they had been brought from Lorraine by Queen Mary. The town has also foundries, motor car works and other manu- factures. The borough is under a mayor, 6 aldermen and 18 councillors. Area, 3133 acres.

LUTSK (Polish, Luck), a town of southern Russia, in the government of Volhynia, on the Styr, 51 m. by rail N.W. of Kovel. Pop. (1900) 17,701. It is supposed to have been founded in the 7th century; in the nth century it was known as Luchesk, and was the chief town of an independent principality. In the 1 5th century it was the seat of a bishop and became wealthy, but during the wars between Russia and Poland in the second half of the 1 6th century, and especially after the extermination of its 40,000 inhabitants, it lost its importance. In 1791 it was taken by Russia. Its inhabitants, many of them Jews, live mainly by shipping goods on the Styr. Among its buildings is a 16th-century castle. Lutsk is the seat of a Roman Catholic bishop.

LUTTERWORTH, a market town in the Harborough parlia- mentary division of Leicestershire, England; 90 m. N.N.W. from London by the Great Central railway. Pop. (1901) 1734. It lies in a pleasant undulating country on the small river Swift, an affluent of the Avon. The church of St Mary is a fine building,

mainly Decorated and Perpendicular, wherein are preserved relics of John Wycliffe, who was rector here from 1374 until his death in 1384. The exhumation and burning of his body in 1428, when the ashes were cast into the Swift, gave rise to the saying that their distribution by the river to the ocean resembled that of Wycliffe's doctrines over the world. Wycliffe is further commemorated by a modern obelisk in the town. Trade is principally agricultural.

LUTTRELL, HENRY (c. 1765-1851), English wit and writer of society verse ; was the illegitimate son of Henry Lawes Luttrell, 2nd earl of Carhampton (1743-1821), a grandson of Colonel Henry Luttrell (c. 1655-1717), who served James II. in Ireland in 1689 and 1690, and afterwards deserted him, being murdered in Dublin in November 1717. Colonel Luttrell's son Simon (1713-1787) was created earl of Carhampton in 1785, and the latter's son was Henry Lawes Luttrell.

Before succeeding to the peerage, the 2nd earl, then Colonel Luttrell, had won notoriety by opposing John Wilkes at the Middlesex election of 1769. He was beaten at the poll, but the House of Commons declared that he and not Wilkes had been elected. In 1796 he was made commander of the forces in Ireland and in 1798 he became a general. Being an Irish peer, Carhampton was able to sit in the English parliament until his death in April 1821. The earl- dom became extinct on the death of his brother John, the 3rd earl, in 1829.

Henry Luttrell secured a seat in the Irish parliament in 1798 and a post in the Irish government, which he commuted for a pension. Introduced into London society by the duchess of Devonshire, his wit made him popular. Soon he began to write verse, in which the foibles of fashionable people were outlined. In 1820 he published his Advice to Julia, of which a second edition, altered and amplified, appeared in 1823 as Letters to Julia in Rhyme. This poem, suggested by the ode to Lydia in the first book of Horace's Odes, was his most important work. His more serious literary contemporaries nicknamed it " Letters of a Dandy to a Dolly." In 1827 in Crockford House he wrote a satire on the high play then in vogue. Byrcn characterized him as " the best sayer of good things, and the most epigrammatic conversationist I ever met "; Sir Walter Scott wrote of him as " the great London wit," and Lady Blessington described him as the one talker " who always makes me think." Luttrell died in London on the 19th of December 1851.

LUTTRINGHAUSEN, a town of Germany, in the Prussian Rhine province, 6 m. S.E. of Elberfeld by rail. Pop. (1905) 11,829. It is the seat of various iron and other metal industries, and has cloth and calico mills.

LUTZEN, a town in Prussian Saxony, in the circle of Merseburg (pop. in ic.05, 3981), chiefly famous as the scene of a great battle fought on the 6/i6th of November 1632 between the Swedes, under King Gustavus Adolphus, and the Imperialists, under Wallenstein. On the 5/1 5th November, Gustavus, with some 20,00c men, advanced from Naumburg on the Saale to meet a contingent of his German allies at Grimma, S.E. of Leipzig, but becoming aware of the presence of Wallenstein's army near Liitzen, and that it had been weakened by a large detachment sent away under Pappenheim towards Halle, he turned towards Liitzen. Wallenstein's posts at Weissenfels and Rippach pre- vented him from fighting his main battle the same evening, and the Swedes went into camp near Rippach, a little more than an hour's march from Liitzen.

Wallenstein made ready to give battle on the following day and recalled Pappenheim. The latter had taken a small castle, the reduction of which was one of the objects of his expedition, but his men had dispersed to plunder and could not be rallied before the following morning. Gustavus had now to choose between proceeding to Grimma and fighting Wallenstein on the chance that Pappenheim had not rejoined. He chose the latter. In the mist of the early morning Wallenstein's army was formed in line of battle along the Leipzig road with its right on Liitzen. Its left was not carried out as far as the Flossgraben in order to leave room on that flank for Pappenheim. His infantry was ai ranged in five huge oblongs, four of which (in lozenge

formation) formed the centre and one the right wing at Liitzen. These "battalias" had their angles strengthened in the old- fashioned way that had prevailed since Marignan, with small outstanding bodies of musketeers, so that they resembled rectangular forts with bastions. On either side of this centre was the cavalry in two long lines, while in front of the centre and close to the right at Liitzen were the two batteries of heavy artillery. Liitzen was set on fire as a precaution. Skirmishers lined the bank and the ditch of the Leipzig road. The total strength of the Imperial army was about 12,000 foot and 8000 horse.

Gustavus's hopes of an early decision were frustrated by the fog, which delayed the approach and deployment of the Swedes. It was 8 a.m. before all was ready. The royal army was in two lines. The infantry in the centre was arrayed in the small and handy battalions then peculiar to Gustavus's army, the horse on either wing extended from opposite Liitzen to some distance beyond Wallenstein's left, which Pappenheim was to extend on his arrival. By the accident of the terrain, or perhaps, following the experience of Breitenfeld (q.v.), by design, the right- of the Swedes was somewhat nearer to the enemy than the left. In front, near the centre, were the heavy guns and each infantry battalion had its own light artillery. The force

BATTLE OF LUTZEN November 16th., 1632

Scale of 1 Mile •4 H H

German Army 1 ' Q > i

Swedish Army MB C2i

of infantry and cavalry on either side was about equal, the Swedes had perhaps rather less cavalry and rather more infantry, but their artillery was superior to Wallenstein's. Not until 1 1 was it possible to open

fire, for want of a visible target, but about noon, after a preliminary cannonade, Gustavus gave the word to advance.

The king himself commanded the right wing, which had to wait until small bodies of infantry detached for the purpose had driven in the Imperialist skirmish line, and had then to cross a ditch leading the horses. They were not charged by the Imperialists at this moment, for Pappenheim had not yet arrived, and the usual cavalry tactics of the day were founded on the pistol and not on the sword and the charging horse. Gaining at last room to form, the Swedes charged and routed the first line of the Imperial cavalry but were stopped by the heavy squadrons of cuirassiers in second line, and at that moment Gustavus galloped away to the centre where events had taken a serious turn. The Swedish centre (infantry) had forced their way across the Leipzig road and engaged Wallen- stein's living forts at close quarters. The " Blue " brigade — Gustavus's infantry wore distinctive colours^overran the

battery of heavy guns, and the " Swedish " l and " Yellow " brigades engaged the left face of the Imperialist lozenge with success. But a gap opened between the right of the infantry and the left of the cavalry and Wallenstein's second line squadrons pressed into it. It was this which brought Gustavus from the extreme right, and he was killed here in leading a counter charge.

On the extreme left, meanwhile, the " Green " brigade had come to close quarters with Wallenstein's infantry and guns about Liitzen, and the heavy artillery had gone forward to close range between the " Green " and the " Yellow " infantry. But the news of Gustavus's death spread and the fire of the assault died out. Wallenstein advanced in his turn, recaptured his guns and drove the Swedes over the road.

But the fiery Duke Bernhard of Saxe-Weimar took up the command and ordered a fresh advance. He was too good a soldier to waste his reserves and only brought up a few units of the second line to help the disordered brigades of the first. Again the Imperialists were driven in and their guns recaptured, this time all along the line. About three in the afternoon the Swedes were slowly bearing back Wallenstein's stubborn infantry when Pappenheim appeared. The famous cavalry leader had brought on his mounted men ahead of the infantry and asking, " Where is the king of Sweden ?" charged at once in the

direction of the enemy's right. Wallenstein thus gained time to re establish his order, and once more the now exhausted brigades of the Swedish first line were driven over the road. But Pappen- heim fell in the moment of victory and his death disheartened the Imperialists almost as much as the fall of Gustavus had disheartened the Swedes. For the last time Bernhard, wounded as he was, forced the Swedish army to the attack. The three infantry brigades of his second line had not been engaged, 2 and as usual the last closed reserve, resolutely handled, carried the day. Wallenstein's army gave way at all points and the Swedes slept on the battlefield. The infantry of Pappenheim's corps did not appear on the field until the battle was over. Of the losses on either side no accurate statement can be given, but the Swedish " Green " and " Yellow " brigades are said to have lost five-sixths of their numbers. Near the spot where Gustavus fell a granite boulder was placed in position on the day after the battle. A canopy of cast-iron was erected over this " Schwedenstein " in 1832, and close by, a chapel, built by Oskar Ekman. a citizen of Gothenburg (d. 1907), was dedicated on the 6th of November 1907.

Liitzen is famous also as the scene of a victory of Napoleon over the Russians and Prussians on the 2nd of May 1813 (see Napoleonic Campaigns). This battle is often called Gross Gorschen.

Bibliography. — The foregoing account of Gustavus's last victory is founded chiefly upon Lieut. Colonel Hon. E. Noel's Gustaf Adolf (London, 1 904) and a paper by the same officer in the Journal of the United States Institution of India (Oct. 1908), which should be con sulted for further details.

LUTZOW, ADOLF, Freiherr von (1782-1834), Prussian lieutenant-general, entered the army in 1795, and eleven years later as a lieutenant took part in the disastrous battle of Auer- stadt. He achieved distinction in the siege of Colberg, as the leader of a squadron of Schill's volunteers. In 1808, as a major, he retired from the Prussian army, indignant at the humiliating treaty of Tilsit. He took part in the heroic venture of his old chief Schill in 1809; wounded at Dodendorf and left behind, he thereby escaped the fate of his comrades. In 1811 he was restored to the Prussian army as major, and at the outbreak of the " war of liberation " received permission from Scharnhorst to organize a " free corps " consisting of infantry, cavalry and Tirolese marksmen, for operating in the French rear and rallying the smaller governments into the ranks of the allies. This corps played a marked part in the campaign of 1813. But Liitzow was unable to coerce the minor states, and the wanderings of the corps had little military influence. At Kitzen (near Leipzig) the whole corps,

warned too late of the armistice of Poischwitz, was caught on the French side of the line of demarca-

1 So called as being the only brigade containing no foreign elements in the army.

2 They had, However, found detachments to reinforce the first line.

tion and, as a fighting force, annihilated. Liitzow himself, wounded, cut his way out with the survivors, and immediately began reorganizing and recruiting. In the second part of the campaign the corps served in more regular warfare under Wallmoden. Liitzow and his men distinguished themselves at Gadebusch (where Korner fell) and Gohrde (where Liitzow himself, for the second time, received a severe wound at the head of the cavalry). Sent next against Denmark, and later employed at the siege of Jiilich, Liitzow in 1814 fell into the hands of the French. After the peace of 1814 the corps was dissolved, the infantry becoming the 25th Regiment, the cavalry the 6th Ulans. At Ligny he led the 6th Ulans to the charge, but they were broken by the French cavalry, and he finally remained in the hands of the enemy, escaping, however, on the day of Waterloo. Made colonel in this year, his subsequent promotions were: major-general 1822, and lieutenant-general (on retire- ment) 1830. He died in 1834. One of the last acts of his life for which Liitzow is remembered is his challenge (which was ignored) to Bliicher, who had been ridden down in the rout of the 6th Ulans at Ligny, and had made, in his official report, comments thereon, which their colonel considered disparaging.

See Koberstein in Preussisches Jahrbuch, vol. xxiii (Berlin, 1868), and Preussisches Bilderbuch (Leipzig, 1889); K. von Liitzow, Adolf Liitzows Freikorps (Berlin, 1 884); Fr. von Jagwitz, Geschichte des Liitzow' schen Freikorps (Berlin, 1892); and the histories of the campaigns of 1813 and 18 15.

LUXEMBURG, FRANCOIS HENRI DE MONTMORENCY- BOUTEVILLE, Duke of (1628-1695), marshal of France, the comrade and successor of the great Conde, was born at Paris on the 8th of January 1628. His father, the comte de Mont- morency-Bouteville, had been executed six months before his birth for killing the marquis de Beuvron in a duel, but his aunt, Charlotte de Montmorency, princess of Conde, took charge of him and educated him with her son, the due d'Enghien. The young Montmorency (or Bouteville as he was then called) attached himself to his cousin, and shared his successes and reverses throughout the troubles of the Fronde. He returned to France in 1659 and was pardoned, and Conde, then much attached to the duchesse de

Chatillon, Montmorency's sister, contrived the marriage of his adherent and cousin to the greatest heiress in France, Madeleine de Luxemburg-Piney, princesse de Tingry and heiress of the Luxemburg dukedom (1661), after which he was created due de Luxembourg and peer of France. At the opening of the War of Devolution (1667-68), Conde, and consequently Luxemburg, had no command, but during the second campaign he served as Conde's lieutenant- general in the conquest of Franche Comte. During the four years of peace which followed Luxemburg cultivated the favour of Louvois, and in 1672 held a high command against the Dutch. He defeated the prince of Orange at Woerden and ravaged Holland, and in 1673 made his famous retreat from Utrecht to Maestricht with only 20,000 men in face of 70,000, an exploit which placed him in the first rank of generals. In 1674 he was made captain of the gardes du corps, and in 1675 marshal of France. In 1676 he was placed at the head of the army of the Rhine, but failed to keep the duke of Lorraine out of Philipsburg; in 1677 he stormed Valenciennes; and in 1678 he defeated the prince of Orange, who attacked him at St Denis after the signa- ture of the peace of Nijmwegen. His reputation was now high, and it is reputed that he quarrelled with Louvois, who managed to involve him in the " affair of the poisons " (see La Voisin, Catherine) and get him sent to the Bastille. Rousset in his Histoire de Louvois has shown that this quarrel is probably apocryphal. There is no doubt that Luxemburg spent some months of 1680 in the Bastille, but on his release took up his post at court as capitaine des gardes. When the war of 1690 broke out, the king and Louvois recognized that Luxemburg was the only general fit to cope with the prince of Orange, and he was put in command of the army of Flanders. On the 1st of July 1690 he won a great victory over the prince of Waldeck at Fleurus. In the following year he commanded the army which covered the king's siege of Mons and defeated William III.

of England at Leuze on September 18, 1691. Again in the next campaign he covered the king's siege of Namur, and defeated William at Steenkirk (q.v.) on June 5, 1692; and on July 29, 1693, he won his greatest victory over his old adversary at Neerwinden, after which he was called le tapissier de Ndtre Dame from the number of captured colours that he sent to the cathedral. He was, received with enthusiasm at Paris by all but the king, who looked coldly on a relative and adherent of the Condes. St Simon describes in the first volume of his Memoirs how, instead of ranking as eighteenth peer of

France according to his patent of 1661, he claimed through his wife to be due de Piney of an old creation of 1571, which would place him second on the roll. The affair is described with St Simon's usual interest in the peerage, and was chiefly checked through his assiduity. In the campaign of 1694, Luxemburg did little in Flanders, except that he conducted a famous march from Vignamont to Tournay in face of the enemy. On his return to Versailles for the winter he fell ill, and died on January 4, 1695. In his last moments he was attended by the famous Jesuit priest Bourdaloue, who said on his death, " I have not lived his life, but I would wish to die his death." Luxemburg's morals were bad even in those times, and he had shown little sign of religious conviction. But as a general he was Conde's grandest pupil. Though slothful like Conde in the management of a campaign, at the moment of battle he seemed seized with happy inspirations, against which no ardour of William's and no steadiness of Dutch or English soldiers could stand. His death and Catinat's disgrace close the second period of the military history of the reign of Louis XIV., and] Catinat and Luxemburg, though inferior to Conde and Turenne, were far superior to Tallard and Villeroi. He was distinguished for a pungent wit. One of his retorts referred to his deformity. " I never can beat that cursed humpback," William was reputed to have said of him. " How does he know I have a hump ? " retorted Luxemburg, " he has never seen my back." He left four sons, the youngest of whom was a marshal of France as Marechal de Montmorency.

See, besides the various memoirs and histories of the time, Beaurain's Hisloire militaire du due de Luxembourg (Hague and Paris, 1756); Memoires pour servir a I'histoire du marechal due de Luxembourg (Hague and Paris, 1758) ; Courcelles, Dictionnaire des g&n&raux francais (Paris, 1823), vol. viii. There are some interesting facts in Desormeaux's Histoire de la maison de Montmorency (1764), vols. iv. and v. Camille Rousset's Louvois and the recent biography of Luxemburg by Count de Segur (1907) should also be studied.

LUXEMBURG, a district in the European low countries, of which the eastern part forms the grand-duchy of Luxemburg, and the western is the Belgian province of that name (for map, see B elgium) . The name is derived from the chief town.

Under the Romans the district was included in the province of Belgica prima, afterwards forming part of the Frankish kingdom of Austrasia and of the empire of Charlemagne. About 1060 it came under the rule of Conrad (d. 1086), who took the title of count of Luxemburg. His descendants ruled the county, first in the male and then in the female line, until the death of the emperor Sigismund in 1437. Through the

marriage of Sigismund's daughter, Elizabeth, with the German king, Albert II., Luxemburg, which had been made a duchy in 1354, passed to the house of Habsburg, but was seized in 1443 by Philip III. the Good, duke of Burgundy, who based his claim upon a bargain concluded with Sigismund's niece Elizabeth (d. 1451). Regained by the Habsburgs in 1477 when Mary, daughter and heiress of duke Charles the Bold, married the German king Maximilian I., the duchy passed to Philip II. of Spain in 1555, though subject to the laws of the empire, of which it still formed part. After a section had been ceded to France in 1659, the remainder was given to the emperor Charles VI. by the treaty of Utrecht in 171 3. It was conquered by France in 1795, and retained by that power until the end of the Napoleonic wars. The congress of Vienna (1814-1815) erected Luxemburg into a grand-duchy, added part of the duchy of Bouillon to it, and assigned it to William I., king of the Netherlands, in return for the German territories of the house of Orange-Nassau, which Napoleon had

confiscated in 1806, and which were given by the congress to the king of Prussia. In 1830 when the Belgian provinces separated from Holland, an effort was made to include Luxemburg in the new kingdom of the Belgians; but in November 1831 the powers decided that part of the grand-duchy should be retained by the king of Holland, who refused to accept this arrangement. Consequently the whole of Luxemburg remained in the possession of the Belgians until 1838, when the treaty of the 19th of April, concluded at the conference of London, enforced the partition of 1831.

The grand-duchy of Luxemburg, the portion under the rule of William I. retaining the name, was ruled by the kings of Holland until the death of William III. in 1890. William's daughter, Wilhelmina, succeeded to the throne of Holland, but under the Salic law l the grand-duchy passed to his kinsman, Adolphus, duke of Nassau, who died in 1905, and was succeeded by his son William (b. 1852).

By modifications of the treaty of Vienna the garrisoning of the fortress of Luxemburg had passed into Prussian hands, an arrangement which lasted until 1867. In the previous year the German Confederation, to which the grand-duchy of Luxem- burg had belonged since 1815, had been dissolved; but the Prussians maintained their garrison in Luxemburg, which was not included in the new North German Confederation, while King William III. proposed to sell his rights over the grand-duchy to France. The Prussians were irritated by this proposal, but war was averted, and the question was referred to a conference of the powers in London. The treaty of London, signed on the nth of May 1867, decided that the Prussian garrison must be

withdrawn and the fortress dismantled, which was done in 1872. At the same time the great powers guaranteed the neutrality of the grand-duchy, and although a member of the German Zollverein, Luxemburg now forms a sovereign and independent state.

The Grand-Duchy lies S.E. of Belgium. Its area is 999 sq. m., with a population (1905) of 246,455. The people are nearly all Catholics. The country is rich in iron ore. The hills in the south of the duchy are a continuation of the Lorraine plateau, and the northern districts are crossed in all directions by out- runners from the Ardennes. The streams mostly join the Moselle, which forms the boundary between Luxemburg and the Rhine province for about 20 m. The Sure or Sauer, the most important stream in the duchy, rises at Vaux-les-Rosieres in Belgian Luxemburg, crosses the duchy, and forms the eastern boundary from the confluence of the Our till it joins the Moselle after a course of 50 m., during which it receives the Wiltz, Attert, Alzette, White and Black Ernz, &c. The soil of Luxemburg is generally good; the southern districts are on the whole the most fertile as well as the most populous. Building materials of all sorts are obtained throughout the duchy. Besides the iron furnaces, situated in the south near the Lorraine plateau, there are tanneries, weaving and glove-making factories, paper-mills for all sorts of paper, breweries and distilleries, and sugar refineries. A German patois mixed with French words is spoken throughout the country; but French, which is employed by the commercial community, is also the common speech on the French and Belgian frontiers. Though liberty of worship prevails, Roman Catholicism is almost the sole form. The government is in the hands of the grand-duke, who sanctions and promulgates the laws. There is a council (staaisrat) of 15 members. There is a chamber of deputies with 48 members elected by the cantons (12 in number) for six years, half the body being elected every three years. No law can be passed without the consent of the chamber. Bills are introduced by the grand-duke, but the house has also the right of initiative. A single battalion (150) of volunteers composes the grand-ducal army. The gendarmerie consists of about 150 men. There are cantonal courts and two 1 It should be noticed, however, that the Salic law is subordinate to the Nassau family law, which provides for the succession in the case of the complete extinction of males. Thus Article xlii. of the Nassau Pact of the 30th of June 1783 provides ” that in the event of the extinction of males, the rights of succession pass to the daughter or nearest heiress of the last male.”

district courts, one at Luxemburg, the other at Diekirch, and a high court at Luxemburg. The bishopric of Luxemburg holds its authority directly from the Holy See. From 13,000,000 to 17,000,000 francs is the annual amount of the state budget, and the debt, consisting of loans contracted principally for the construction of railways, of which there are about 350 m., is 12,000,000 francs.

Among towns next to the capital, Luxemburg, are Echternach and Diekirch, both worthy of note for their blast furnaces. Grevenmacher is the centre of a great wine district.

The Province of Luxemburg is the largest and least populous of the nine provinces of Belgium. Its capital is Arlon, which lies near the borders of the grand-duchy. A considerable part of the province is forested and the state requires systematic re- planting. Marble, granite and slate quarries are worked in different districts. Successful attempts have been made to introduce fruit cultivation. The province is well watered by the Ourthe, the Semois and the Sure. The general elevation of the country is about 500 ft., but the hills and plateaus which form the prominent feature in the scenery of Luxemburg range from 1200 to 1500 ft. The highest point of the province is the Baraque de Fraiture (1980 ft.), N.E. of La Roche. The woods are well stocked with red and roe deer, wild boar, hares, rabbits, pheasants, woodcock and snipe. The area of the province is 1725 sq. m. The population was 225,963 in 1904.

The House of Luxemburg was descended from Count Conrad

(d. 1086), and its fortunes were advanced through the election of

Count Henry IV. as German king in 1308 and his coronation as

emperor under the title of Henry VII. Henry's son was John, king

of Bohemia, who fell on the field of Cr6cy, and John's eldest son

was the emperor Charles IV., while another famous member of the

family was Baldwin, archbishop of Treves (1285-1354), who took an

active part in imperial affairs. Two of the sons of Charles IV.,

Wenceslaus and Sigismund, succeeded in turn to the imperial

throne, and one of his nephews, Jobst, margrave of Moravia, was

chosen German king in opposition to Sigismund in 1410. The French branch of the Luxemburg family was descended from Waleran (d. 1288), lord of Ligny and Roussy, a younger son of Count Henry II. Waleran's great-grandson was Guy (d. 1371), who married Matilda, sister and heiress of Guy V., count of Saint-Pol (d. 1360), and was created count of Ligny in 1367. Guy's son, Waleran (d. 1417), who became constable of France in 1412, had been

carried as a prisoner to England, and had married Matilda, daughter of Thomas Holland, earl of Kent (d. 1360) and half-sister of King Richard II. To avenge Richard's death he made a raid on the Isle of Wight, and then took part in the civil wars in France. He left no sons, and was succeeded by his nephew, Peter, count of Brienne (d. 1433), who, like his brother Louis (d. 1443), cardinal archbishop of Rouen and chancellor of France, was found on the side of the English in their struggle against France. Another of Peter's brothers, John (d. 1440), a stout supporter of England, was made governor of Paris by Henry V. He sold Joan of Arc to the English. Peter's son and successor, Louis, fought at first for England, but about 1440 he entered the service of France and obtained the office of constable. King Louis XL accused him of treachery, and he took refuge with Charles the Bold, duke of Burgundy; but the duke handed him over to the king and he was beheaded in 1475. The elder branch of his descendants became extinct in the male line in 1482, and was merged through the female line in the house of Bourbon- Vend6me.

Louis's third son, Anthony (d. 1510), founded the family of Luxemburg-Brienne, the senior branch of which became extinct in 1-608. A junior branch, however, was the family of the duke of Luxemburg-Piney, whose last representative, Margaret-Charlotte (d. 1680), married firstly L6on d'Albert de Luynes (d. 1630) and secondly Charles Henry de Clermont-Tonnerre (d. 1 674). Her daughter by her second husband, Madeleine Charlotte, married Francis Henry de Montmorenci (d. 1695) and de Luynes, and, subsequently, members of the family of Montmorenci claimed the title of duke of Luxemburg. The Luxembourg palace in Paris owes its name to the fact that it was built on a site belonging to the duke of Luxemburg-

Piney.

See N. van Werveke, Beitrage zur Geschichte des Luxemburger Landes (Luxemburg, 1 886-1 887); J. Schotter, Geschichte des Luxem- burger Landes (Luxemburg, 1882) ; and N. Vigner, Histoire de la maisonde Luxembourg (Paris, 1619).

LUXEMBURG, or Lutzelburg {i.e. the little fortress or town), the capital of the grand-duchy of the same name (see above), situated on the Alzette, a tributary of the Sure. Pop. (1905) 20,984. The situation is romantic, steep- cliffs over- hanging the winding river, and the principal portion of the town with the palace and public buildings covering a central

plateau. The more densely populated parishes of Clausen, Pfaffenthal and Grund lie in the valley. As a fortress Luxem- burg was considered the strongest in Europe after Gibraltar, which it was supposed to resemble because many of its casemates were cut into the rock. It was dismantled in 1867. Two colossal viaducts carry the railway and the approach from the railway station to the town. Since the place ceased to be a fortress the population has more than doubled, and the Alzette is lined with tanneries, breweries and distilleries. The Hotel de Ville dates from 1844 and contains a collection of antiquities. The church of Notre Dame was built in 1613, and that of St Michael, with parts dating from 1320, contains the tomb of blind John of Luxemburg, king of Bohemia, slain at Crecy. There are two annual fete days, one in honour of Our Lady of Luxemburg, patroness of the city, held on the Sunday before Ascension Day, and the other the annual fair or Schobermesse (tent fair), instituted in 1340 and held each year on the 24th of August.

LUXEUIL-LES-BAINS, a town of eastern France, in the department of Hiute-Saone, 18 m. N.E. of Vesoul. Pop. (1906) 5195. It is situated in a region of forests on the right bank of the Breuchin. It has an abbey-church dating from the 13th and 14th centuries, containing a curious 17th-century organ loft in the form of an immense bracket supported by a colossal figure of Hercules. The abbot’s palace (16th and 18th centuries) serves as presbytery and town hall. A cloister of the 15th century and other buildings of the 17th century also remain. There are several mansions and houses dating from various periods from the 14th to the 16th century. The Maison Carree, once the town hall, an interesting specimen of 15th-century architecture, was built by Perrin Jouffroy, father of Cardinal Jouffroy. The cardinal, who was born at Luxeuilin 141 2, built the house with a graceful balcony and turret

which faces the Maison Carree. The Maison de la Bailie and the Maison Franfois I. are of the Renaissance period. The fine modern Grammont Hospital is in the style of Louis XIII. Luxeuil is renowned for its mineral springs, of which there are seventeen, two being ferruginous, and the rest charged with chloride of sodium; their temperatures range from 70 to 158 F. The water is employed for drinking and for baths. The bathing establishment contains a museum of Gallo-Roman antiquities and there are also remains of Roman baths and aqueducts to be seen in or near it. Luxeuil has a communal college. Copper-founding, the spinning and weaving of cotton, lace-making, dyeing and the distilling of kirsch are carried on.

Luxeuil was the Roman Lixovium and contained many fine buildings at the time of its destruction by the Huns under Attila in 451. In 590 St Columban here founded a monastery, afterwards one of the most famous in Franche Comt6. In the 8th century it was destroyed by the Saracens; afterwards rebuilt, monastery and town were devastated by the Normans in the 9th century and pillaged on several occasions afterwards. The abbey schools were celebrated in the middle ages and the abbots had great influence; but their power was curtailed by the emperor Charles V. and the abbey was suppressed at the Revolution.

See H. Beaumont, Htude hist, sur Vabbaye de Luxeuil, 590-17QO (Lux. 1895); Grandmongin and A. Gamier, Hist, de la mile et des thermes'de Luxeuil (Paris, 1866), with 16 plates.

LUXOR, more properly El-Aksur, " The Castles" (plur. of kasr), a town of Upper Egypt, on the east bank of the Nile 450 m. above Cairo by river and 418 by rail. Pop. (1907 census) 12,644. It is the centre for visitors to the ruins of and about Thebes, and is frequented by travellers and invalids in the winter season, several fine hotels having been built for their accom- modation. There are Anglican and Roman Catholic churches, and a hospital for natives, opened in 1891. The district is the seat of an extensive manufacture of forged antiques.

The temple of Luxor is one of the greatest of the monuments of Thebes (q.v.). It stands near the river bank on the S.W. side of the town and measures nearly 300 yds. from back to front. There may have been an earlier temple here, but the present structure, dedicated to the Theban triad of Amnion, Mut and

Khons, was erected by Amenophis III. The great colonnade, which is its most striking feature, was apparently intended for the navo of a hypostyle hall like that of Karnak, but had to be hastily finished without the aisles. After the heresy of Amenophis IV. (Akhenaton), the decoration of this incomplete work was taken in hand by Tutenkhamun and Haremhib. The axis of the temple ran from S.W. to N.E.; a long paved road bordered by recumbent rams led from the facade to the temples of Karnak (q.v.) in a somewhat more easterly direction, and Rameses II. adopted the line of this avenue in adding an extensive court to the work of Amenophis, producing a curious change of axis. He embellished the walls and pylons of his court with scenes from his victories over Hittites and Syrians, and placed a number of colossal statues within it. In front of the pylon Rameses set up colossi and a pair of obelisks (one of which was taken to Paris in 183 1 and re-erected in the Place de la Concorde). A few scenes and inscriptions were added by later kings, but the above is practically the history of the temple until Alexander the Great rebuilt the sanctuary itself. The chief religious festival of Thebes was that of ” Southern Opi,” the ancient name of Luxor. The sacred barks of the divinities preserved in the sanctuary of Karnak were then conveyed in procession by water to Luxor and back again; a representation of the festal scenes is given on the walls of the great colonnade. The Christians built churches within the temple. The greater part of the old village of Luxor lay inside the courts: it was known also as Abu ‘1 Haggag from a Moslem saint of the 7th century, whose tomb- mosque, mentioned by Ibn Batuta, stands on a high heap of debris in the court of Rameses. This is the last of the buildings and rubbish which encumbered the temple before the expro- priation and clearances by the Service des Antiquites began in 1885. The principal street of Luxor follows the line of the ancient avenue.

See G. Daressy, Notice explicative des mines du temple de Louxor (Cair6, 1893) ; Baedeker’s Egypt. (F. Ll. G.)

LUXORIUS, Roman writer of epigrams, lived in Africa during the reigns of the Vandal kings Thrasamund, Hilderic and Gelimer (a.d. 496-534). He speaks of his poor circumstances, but from the superscription claHssimus and spectabilis in one MS., he seems to have held a high official position. About a hundred epigrams by him in various metres (the elegiac pre- dominating) have been preserved. They are after the manner of Martial, and many of them are coarse. They deal chiefly with the games of the circus and works of art, and the language shows the author to have been well acquainted with the legends and antiquities of the classical period of Rome.

Luxorius also wrote on grammatical subjects (see R. Ellis in Journal of Philology, viii., 1879). The epigrams are contained in the Anthologia Latina, edited by F. Bucheler and A. Riese (1894).

LUYNES, a territorial name belonging to a noble French house. The family of Albert, which sprang from Thomas Alberti (d. 1455), seigneur de Boussargues, bailli of Viviers and Valence, and viguier of Bagnolsand Pont St Esprit in Languedoc, acquired the estate of Luynes (dep. of Indre-et-Loire) in the 16th century. Honore d'Albert (d. 1592), seigneur de Luynes, was in the service of the three last Valois kings and of Henry IV., and became colonel of the French bands, commissary of artillery in Languedoc and governor of Beaucaire. He had three sons: Charles (1578-1621), first duke of Luynes, and favourite of Louis XIII.; Honore (1581-1649), seigneur de Cadenet, who married Charlotte Eugenie d'Ailly, countess of Chaulnes, in 1619, and was created duke of Chaulnes in 1621; and Leon, seigneur de Brantes, who became duke of Luxemburg-Piney by his marriage in 1620 with Margaret Charlotte of Luxemburg.

By her marriage with Claude of Lorraine, duke of Chevreuse, Marie de Rohan, the widow of the first duke of Luynes, acquired in 1655 the duchy of Chevreuse, which she gave in 1663 to Louis Charles d'Albert, her son by her first husband; and from that time the title of duke of Chevreuse and duke of Luynes was borne by the eldest sons of the family of Luynes, which also inherited the title of duke of Chaulnes on the extinction of the descendants of Honore d'Albert in 1698. The branch of the dukes of Luxem- burg-Piney became extinct in 1697.

Charles (1578-1621), the first duke of Luynes, was brought up at court and attended the dauphin, who later became Louis XIII. The king shared his fondness for hunting and rapidly advanced him in favour. In 161 5 he was appointed commander of the Louvre and counsellor, and the following year grand falconer of France. He used his influence over the king in the court intrigues against the queen-mother Marie de Medici and her favourite Concini. It was Luynes who, with Vitry, captain of the guard, arranged the plot that ended in Concini's assassina- tion (1617) and secured all the latter's possessions in Italy and France. In the same year he was appointed captain of the Bastille and lieutenant-general of Normandy, and married Marie de Rohan, daughter of the duke of Montbazon. He employed extreme measures against the pamphleteers of the time, but sought peace in Italy and with the Protestants. In 1619 he negotiated the treaty of Angouleme by which Marie de Medici was accorded complete liberty. He was made governor of Picardy in 1619; suppressed an uprising of nobles in 1620; and in 1621, with slight military ability or achievement, was

ap- pointed constable of France. His rapid rise to power made him a host of enemies, who looked upon him as but a second Concini. In order to justify his newly-won laurels, Luynes undertook an expedition against the Protestants, but died of a fever in the midst of the campaign, at Longueville in Guienne, on the 15th of December 1621.

His brother Honore (1581-1649), first duke of Chaulnes, was governor of Picardy and marshal of France (1619), and defended his province successfully in 1625 and 1635. Louis Auguste d'Albert d'Ailly (1676-1744), duke of Chaulnes, also became marshal of France (1741). Louis Joseph d'Albert de Luynes (1670-1750), prince of Grimberghen, was in the service of the emperor Charles VII., and became field-marshal and ambassador in France.

Several members of the family of Albert were distinguished in letters and science. Louis Charles d'Albert (1620-1690), duke of Luynes, son of the constable, was an ascetic writer and friend of the Jansenists; Paul d'Albert de Luynes (1703- 1788), cardinal and archbishop of Sens, an astronomer; Michel Ferdinand d'Albert d'Ailly (1714-1769), duke of Chaulnes, a writer on mathematical instruments, and his son Marie Joseph Louis (1 741-1793), a chemist; and Honore Theodore Paul Joseph (1802-1867), duke of Luynes, a writer on archaeology.

For the first duke see Recueil des pieces les plus curieuses qui ont este fattes pendant le regne du connestable M. de Luynes (2nd ed., 1624); Le Vassor, Histoire de Louis XIII. (PaTris, 1757); Griffet, Histoire du regne de Louis XIII., roi de France et de Navarre (Paris, J 758); V. Cousin, " Le Due et conn£table de Luynes," in Journal des savants (1861-1863) ; B. Zeller, Etudes critiques sur le regne de Louis XIII.: le connetable de Luynes, Montauban et la Valteline (Paris, 1879); E. Pavie, La Guerre entre Louis XIII. et Marie de Mteicis (Paris, 1899); Lavisse, Histoire de France, vi. 2 , 141-216 (Paris, 1905).

luzAn claramunt de suelves y gurrea, IGNACIO

(1702-17 54), Spanish critic and poet, was born at Saragossa on the 28th of March 1702. His youth was passed under the care of his uncle, and, after studying at Milan, he graduated in philosophy at the university of Catania. In 1723 he took minor orders, but abandoned his intention of entering the church and took up his residence at Naples, where he read assiduously. Business took him to Spain in 1733, and he became known in Madrid as a scholar with a tendency towards innovations in literature. La Poetica, 6 Reglas de la poesia en general y de sus principales especies (1737) proved that this impression was correct. He at once took rank as the leader of the

literary reformers, and his courteous determination earned him the respect of his opponents. In 1747 he was appointed secretary to the Spanish embassy in Paris and, on returning to Madrid in 1750, was elected to the " Academia Poetica del Buen Gusto," where, on account of his travels, he was known by the sobriquet of El Peregrino. He became master of the mint and treasurer of the royal library. He died at Madrid, after a short illness, on the 19th of May 1754. Luzan was not the pioneer of Franco- Italian theories in Spain, but he was their most powerful

exponent, and his Poltica is an admirable example of destructive criticism. The defects of Lope de Vega and Calderon are indi- cated with vigilant severity, but on the constructive side Luzan is notably weak, for he merely proposes to substitute one ex- hausted convention for another. The doctrine of the dramatic unities had not the saving virtues which he ascribed to it, and, though he succeeded in banishing the older dramatists from the boards, he and his school failed to produce a single piece of more than mediocre merit. His theories, derived chiefly from Muratori, were ineffective in practice; but their ingenuity cannot be denied, and they acted as a stimulus to the partisans of the national tradition.

LUZ-SAINT-SAUVEUR, a town of south-western France in the department of Hautes-Pyrenees, 21 m. S. of Lourdes by rail. Pop. (1906) 1069. Luz is beautifully situated at a height of 2240 ft. on the Bastan. It has a remarkable church, built by the Templars in the 12th and 13th centuries and fortified later. The crenelated ramparts with which it is surrounded, and the tower to the north of the apse resembling a keep, give it the aspect of a fortress; other interesting features are the Romanesque north door and a chapel of the 16th century. The village of St Sauveur lies a little above Luz on the left bank of the gorge of the Gave de Pau, which is crossed higher up by the imposing Pont Napoleon (i860). It is a pleasant summer resort, and is visited for its warm sulphurous springs. Discovered in the 16th century, the waters came into vogue after 1820, in which year they were visited by the duchesses of Angouleme and Berry. There is much picturesque mountain scenery in the vicinity; 12 m. to the south is the village of Gavarnie, above which is the magnificent rock amphitheatre or cirque of Gavarnie, with its cascade, one of the highest in Europe.

LUZZATTI, LUIGI (1841-), Italian economist and financier, was born

of Jewish parents at Venice on the nth of March 1841. After completing his studies in law at the university of Padua, he attracted the attention of the Austrian police by his lectures on political economy, and was obliged to emigrate. In 1863 he obtained a professorship at the Milan Technical Institute; in 1867 he was appointed professor of constitutional law at Padua, whence he was transferred to the university of Rome. Gifted with eloquence and energy, he popularized in Italy the economic ideas of Schultze-Delitzsch, worked for the establishment of a commercial college at Venice, and contri- buted to the spread of people's banks on a basis of limited liability throughout the country. In 1869 he was appointed by Minghetti under secretary of state to the ministry of agriculture and commerce, in which capacity he abolished government control over commercial companies and promoted a state inquiry into the conditions of industry. Though theoretically a free trader, he was largely instrumental in creating the Italian protective system. In 1877 he participated in the commercial negotiations with France, in 1878 compiled the Italian customs tariff, and subsequently took a leading part in the negotiations of all the commercial treaties between Italy and other countries. Appointed minister of the treasury in the first Di Rudini cabinet of 1 89 1, he imprudently abolished the system of frequent clear- ings of bank-notes between the state banks, a measure which facilitated the duplication of part of the paper currency and hastened the bank crisis of 1893. In 1896 he entered the second Di Rudini cabinet as minister of the treasury, and by timely legislation helped to save the bank of Naples from failure. After his fall from office in June 1898, his principal achievement was the negotiation of the Franco-Italian commercial treaty, though, as deputy, journalist and professor, he continued to take an active part in all political and economic manifestations. He was again minister of the treasury from November 1903 to March 1905 in Giolitti's second administration, and for the third time from February to May 1906, under Sonnino's premiership. During the latter term of office he achieved the conversion of the Italian 5% debt (reduced to 4% by the tax) to 3!% to be eventually lowered to 35%, an operation which other ministers had attempted without success; although the actual con- version was not completed until after the fall of the cabinet of

which he formed part the merit is entirely his. In 1907 he was president of the co-operative congress at Cremona.

See L. Carpi's Risorgimento Italiano, vol. ii. (Milan, 1886), which contains a biographical sketch of Luzzatti.

LUZZATTO, MOSES HAYIM (1707-1747), Hebrew dramatist and

mystic, was born in Padua 1707, and died at Acre 1747. He was influenced by Isaac Luria (q.v.) on the mystical side, and on the poetical side by Italian drama of the school of Guarini (q.v.). He attacked Leon of Modena's anti-Kabbalistic treatises, and as a result of his conflict with the Venetian Rabbinate left Italy for Amsterdam, where, like Spinoza, he maintained him- self by grinding lenses. Here, in 1740, he wrote his popular religious manual the Path of the Upright (Messilath Yesharim) and other ethical works. He visited London, but finally settled in Palestine, where he died. Luzzatto's most lasting work is in the realm of Hebrew drama. His best-known compositions are: the Tower of Victory (Migdal 'Oz) and Glory to the Upright (Layesharim Tehillah). Both of these dramas, which were not printed at the time but were widely circulated in manuscript, are of the type which preceded the Shakespearean age — they are allegorical and all the characters are types. The beautiful Hebrew style created a new school of Hebrew poetry, and the Hebrew renaissance which resulted from the career of Moses Mendelssohn owed much to Luzzatto.

See Gratz, History of the Jews, v. ch. vii. ; I. Abrahams, Jewish Life in the Middle Ages., pp. 190, 268; N. Slouschz, The Renascence of Hebrew Literature, ch. i. (I. A.)

LUZZATTO, SAMUEL DAVID (1800-1865), Jewish scholar, was born at Trieste in 1800, and died at Padua in 1865. He was the most distinguished of the Italian Jewish scholars of the 19th century. The first Jew to suggest emendations to the text of the Hebrew Bible, he edited Isaiah (1856-1867), and wrote a com- mentary on the Pentateuch (1871). His grammatical works were mostly written in Italian. He also contributed to the history of the Synagogue liturgy, and enjoys with Geiger (q.v.) and Zunz (q.v.) the honour of reviving interest in the medieval Hebrew hymnology and secular verse.

See Gratz, History of the Jews (Eng. trans.), v. 622 seq. ; N. Slouschz, The Renascence of Hebrew Literature, pp. 84-92 ; the Jewish Encyclopedia, viii. 225-226, with list of works. (I. A.)

LYALL, SIR ALFRED COMYN (1835-), Anglo-Indian civil servant and man of letters, son of the Rev. Alfred Lyall, was born in 1835, and educated at Eton and Haileybury. He entered the Bengal civil service in 1855, saw service during the Mutiny in the Bulandshahr district, at Meerut, and with the Khaki Risala of volunteers. He was commissioner in Berar (1867), secretary to the government of India in the Home and Foreign departments, lieutenant-governor of the North-western Provinces (1882-1887), and member of the Council of India (1888-1903). Among his writings, his Verses Written in India (1889)

attained considerable popularity, and in his Asiatic Studies (1882 and 1899) he displays a deep insight into Indian life and character. He wrote the Life of Lord Dufferin (1905), and made numerous contributions to periodical literature.

LYALL, EDNA, the pen-name of Ada Ellen Bayly (1857- 1903), English novelist. She was born at Brighton in 1857, the daughter of a barrister. Her parents died while she was a child, and she was brought up at Caterham, Surrey. At Eastbourne, where most of her life was spent, she was well known for her philanthropic activity. She died on the 8th of February 1903. Edna Lyall's vogue as a novelist was the result of a combination of the story-teller's gift with a sincere ethical and religious spirit of Christian tolerance, which at the time was new to many readers. Though her Won by Wailing (1879) had some success, it was with Donovan (1882) and We Two (1884), in which the persecuted atheist was inevitably identified with Charles Brad- laugh, that she became widely popular. Other novels were In the Golden Days (1885), a story of the Great Rebellion; Knight Errant (1887); Autobiography of a Slander (1887); A Hardy Norseman (1889); Derrick Vaughan, The Story of a Novelist (1889); To Right the Wrong (1892); Doreen (1894), a statement of the case for Irish Home Rule; The Autobiography of a Truth (1896), the proceeds of which were devoted to the

Armenian Relief Fund; In Spile of All (1901), which had origin- ally been produced by Mr Ben Greet as a play; and The Bruges Letters (1902), a book for children.

A Life by J. N. Escreet appeared in 1904, and a shorter account of her by the Rev. G. A. Payne was printed at Manchester in 1903.

LYALLPUR, a district of India, in the Multan division of the Punjab. It was constituted in 1904 to comprise the " Chenab Colony," being the waste portion of the former Jhang district that is now irrigated by the Lower Chenab canal. Area, 3075 sq. m.; pop. (1906) 654,666. It is traversed by a section of the North-western railway. The headquarters are at Lyallpur town (pop. in 1906, 13,483), named after Sir James Lyall, a lieutenant-governor. It contains several factories for ginning and pressing cotton.

See Chenab Colony Gazetteer (Lahore, 1904).

LYCAEUS (Mons Lycaeus, Kvxaiov opos: mod. Diapkorti), a mountain in Arcadia, sacred to Zeus Lycaeus, who was said to have been born and brought up on it, and the home of Pelasgus and his son Lycaon, who is said to have founded the ritual of Zeus practised on its summit. This seems to have involved a human sacrifice, and a feast in which the man who received the portion of a human victim was changed to a wolf, as Lycaon had been after sacrificing a child. The altar of Zeus consists of a great mound of ashes with a retaining wall. It was said that no shadows fell within the precincts; and that any who entered it died within the year.

LYCANTHROPY (Gr. Xu/cos, wolf, avdpuiros, man), a name employed (1) in folk-lore for the liability or power of a human being to undergo transformation into an animal; (2) in pathology for a form of insanity in which the patient believes that he is transformed into an animal and behaves accordingly.

I. Although the term lycanthropy properly speaking refers to metamorphosis into a wolf (see Werwolf), it is in practice used of transformation into any animal. The Greeks also spoke of kynanthropy (kvoiv, dog); in India and the Asiatic islands the tiger is the commonest form, in North Europe the bear, in Japan the fox, in Africa the leopard or hyena, sometimes also the lion, in South America the jaguar; but though there is a tendency for the most important carnivorous animal of the area to take the first place in stories and beliefs as to transformation, the less important beasts of prey and even harmless animals like the deer also figure among the wer-animals.

Lycanthropy is often confused with transmigration; but the essential feature of the wer-animal is that it is the alternative form or the double of a living human being, while the soul-animal is the vehicle, temporary or permanent, of the spirit of a dead human being. The vampire is sometimes regarded as an example of lycanthropy; but it is in human form, sometimes only a head, sometimes a whole body, sometimes that of a living person, at others of a dead man who issues nightly from the grave to prey upon the living.

Even if the denotation of lycanthropy be limited to the animal-metamorphosis of living human beings, the beliefs classed together under this head are far from uniform, and the term is somewhat capriciously applied. The transformation may be voluntary or involuntary, temporary or permanent; the wer- animal may be the man himself metamorphosed, it may be his double whose activity leaves the real man to all appearance unchanged, it may be his soul, which goes forth seeking whom it may devour and leaving its body in

a state of trance; or it may be no more than the messenger of the human being, a real animal or a familiar spirit, whose intimate connexion with its owner is shown by the fact that any injury to it is believed, by a phenomenon known as repercussion, to cause a corresponding injury to the human being.

The phenomenon of repercussion, the power of animal metamorphosis, or of sending out a familiar, real or spiritual, as a messenger, and the supernormal powers conferred by association with such a familiar, are also attributed to the magician, male and female, all the world over; and witch superstitions are closely parallel to, if not identical with, lycanthropic beliefs, the occasional involuntary character of lycanthropy being

almost the sole distinguishing feature. In another direction the phenomenon of repercussion is asserted to manifest itself in connexion with the bush-soul of the West African and the nagual of Central America; but though there is no line of demarcation to be drawn on logical grounds, the assumed power of the magician and the intimate association of the bush-soul or the nagual with a human being are not termed lycanthropy. Nevertheless it will be well to touch on both these beliefs here.

In North and Central America, and to some extent in West Africa, Australia and other parts of the world, every male acquires at puberty a tutelary spirit (see Demonology); in some tribes of Indians the youth kills the animal of which he dreams in his initiation fast; its claw, skin or feathers are put into a little bag and become his ” medicine ” and must be care- fully retained, for a ” medicine ” once lost can never be replaced. In West Africa this relation is said to be entered into by means of the blood bond, and it is so close that the death of the animal causes the man to die and vice versa. Elsewhere the possession of a tutelary spirit in animal form is the privilege of the magician. In Alaska the candidate for magical powers has to leave the abodes of men; the chief of the gods sends an otter to meet him, which he kills by saying ” O ” four times; he then cuts out its tongue and thereby secures the powers which he seeks. The Malays believe that the office of pawang (priest) is only hereditary if the soul of the dead priest, in the form of a tiger, passes into the body of his son. While the familiar is often regarded as the alternative form of the magician, the nagual or bush-soul is commonly regarded as wholly distinct from the human being. Transitional beliefs, however, are found, especially in Africa, in which the power of transformation is attributed to the whole of the population of certain areas. The people of Banana are said to change themselves by magical means, composed of human embryos and other

ingredients, but in their leopard form they may do no hurt to mankind under pain of retaining for ever the beast shape. In other cases the change is supposed to be made for the purposes of evil magic and human victims are not prohibited. We can, therefore, draw no line of demarcation, and this makes it probable that lycanthropy is connected with nagualism and the belief in familiar spirits, rather than with metempsychosis, as Dr Tylor argues, or with totemism, as sug- gested by J. F. M'Lennan. A further link is supplied by the Zulu belief that the magician's familiar is really a transformed human being; when he finds a dead body on which he can work his spells without fear of discovery, the wizard breathes a sort of life into it, which enables it to move and speak, it being thought that some dead wizard has taken possession of it. He then burns a hole in the head and through the aperture extracts the tongue. Further spells have the effect of changing the revivified body into the form of some animal, hyena, owl or wild cat, the latter being most in favour. This creature then becomes the wizard's servant and obeys him in all things; its chief use is, however, to inflict sickness and death upon persons who are disliked by its master.

Lycanthropy in Europe. — The wolf is the commonest form of the wer-animal (see Werwolf), though in the north the bear disputes its pre-eminence. In ancient Greece the dog was also associated with, the belief. Marcellus of Sida, who wrote under the Antonines, gives an account of a disease which befell people in February; but a pathological state seems to be meant.

Lycanthropy in Africa. — In Abyssinia the power of transformation is attributed to the Boudas, and at the same time we have records of pathological lycanthropy (see below). Blacksmiths are credited with magical powers in many parts of the world, and it is significant that the Boudas are workers in iron and clay ; in the Life of N. Pearce (i. 287) a European observer tells a story of a supposed trans- formation which took place in his presence and almost before his eyes; but it does not appear how far hallucination rather than coincidence must be invoked to explain the experience.

The Wer-tiger of the East Indies. — The Poso-Alfures of central Celebes believe that man has three souls, the inosa, the angga and the tanoana. The inosa is the vital principle; it can be detected in the veins and arteries; it is given to man by one of the great natural phenomena, more especially the wind. The angga is the intellectual part of man; its seat is unknown; after death it goes to the under-world, and, unlike the inosa, which is believed to be dissolved into its original elements, takes possession of an

immaterial body. The tanoana is the divine in man and after death returns to its lord, Poewempala boeroe. It goes forth during sleep, and all that it sees it whispers into the sleeper's ear and then he dreams. According to another account, the tanoana is the sub- stance by which man lives, thinks and acts; the tanoana of man, plants and animals is of the same nature. A man's tanoana can be strengthened by those of others; when the tanoana is long away or destroyed the man dies. The tanoana seems to be the soul of which lycanthropic feats are asserted.

Among the Toradjas of central Celebes it is believed that a man's " inside " can take the form of a cat, wild pig, ape, deer or other animal, and afterwards resume human form; it is termed lamboyo. The exact relation of the lamboyo to the tanoana does not seem to be settled ; it will be seen below that the view seems to vary. According to some the power of transformation is a gift of the gods, but others hold that werwolfism is contagious and may be acquired by eating food left by a werwolf or even by leaning one's head against the same pillar. The Todjoers hold that any one who touches blood becomes a werwolf. In accordance with this view is the belief that wer- wolfism can be cured ; the breast and stomach of the werman must be rubbed and pinched, just as when any other witch object has to be extracted. The patient drinks medicine, and the contagion leaves the body in the form of snakes and worms. There are certain marks by which a werman can be recognized. His eyes are unsteady and sometimes green with dark shadows underneath. He does not sleep soundly and fireflies come out of his mouth. His lips remain red in spite of betel chewing, and he has a long tongue. The Todjoers add that his hair stands on end.

Some of the forms of the lamboyo are distinguishable from ordinary animals by the fact that they run about among the houses ; the wer-buffalo has only one horn, and the wer-pig transforms itself into an ants' nest, such as hangs from trees. Some say that the werman does not really take the form of an animal himself, but, like the sorcerer, only sends out a messenger. The lamboyo attacks by prefer- ence solitary individuals, for he does not like to be observed. The victim feels sleepy and loses consciousness; the lamboyo then assumes human form (his body being, however, still at home) and cuts up his victim, scattering the fragments all about. He then takes the liver and eats it, puts the body together again, licks it with his long tongue and joins it together. When the victim comes to himself again he has no idea that anything unusual has happened to him. He goes home, but soon

begins to feel unwell. In a few days he dies, bilt before his death he is able sometimes to name the werman to whom he has fallen a victim.

From this account it might be inferred that the lamboyo was identical with the tanoana; the absence of the lamboyo seems to entail a condition of unconsciousness, and it can assume human form. In other cases, however, the lamboyo seems to be analogous to the familiar of the sorcerer. The Toradjas tell a story of how a man once came to a house and asked the woman to give him a rendezvous; it was night and she was asleep; the question was put three times before the answer was given " in the tobacco plantation." The husband was awake, and next day followed his wife, who was irresistibly drawn thither. The werman came to meet her in human form, although his body was engaged in building a new house, and caused the woman to faint by stamping three times on the ground. Thereupon the husband attacked the werman with a piece of wood, and the latter to escape transformed himself into a leaf; this the husband put into a piece of bamboo and fastened the ends so that he could not escape. He then went back to the village and put the bamboo in the fire. The werman said " Don't," and as soon as it was burnt he fell dead.

in another case a woman died, and, as her death was believed to be due to the malevolence of a werwolf, her husband watched by her body. For, like Indian witches, the werwolf, for some reason, wishes to revive his victim and comes in human form to carry off the coffin. As soon as the woman was brought to life the husband attacked the werwolf, who transformed himself into a piece of wood and was burnt. The woman remained alive, but her murderer died the same night.

According to a third form of the belief, the body of the werman is itself transformed. One evening a man left the hut in which a party were preparing to pass the night; one of his companions heard a deer and fired into the darkness. Soon after the man came back and said he had been shot. Although no marks were to be seen he died a few days later.

In Central Java we meet with another kind of wer-tiger. The power of transformation is regarded as due to inheritance, to the use of spells, to fasting and will-power, to the use of charms, &c. Save when it is hungry or has just cause for revenge it is not hostile to man; in fact, it is said to take its animal form only at night and to guard the plantations from wild pigs, exactly as the balams (magicians) of Yucatan were said to guard the corn fields in animal form. Variants of this belief assert that the werman does not recog- nize his friends

unless they call him by name, or that he goes out as a mendicant and transforms himself to take vengeance on those who refuse him alms. Somewhat similar is the belief of the Khonds; for them the tiger is friendly; he reserves his wrath for their enemies, and a man is said to take the form of a tiger in order to wreak a just vengeance.

Lycanthropy in South America. — According to K. F. P. v. Martius the kanaima is a human being who employs poison to carry out his function of blood avenger; other authorities represent the kanaima as a jaguar, which is either an avenger of blood or the familiar of a cannibalistic sorcerer. The Europeans of Brazil hold that the seventh child of the same sex in unbroken succession becomes a wer-man or woman, and takes the form of a- horse, goat, jaguar or pig.

II. As a pathological state lycanthropy may be described as a kind of hysteria, and may perhaps be brought into con- nexion with the form of it known as latah. It is characterized by the patient's belief that he has been metamorphosed into an animal, and is often accompanied by a craving for strange articles of food, including the flesh of living beings or of corpses. In the lower stages of culture the state of the patient is commonly explained as due to possession, but where he leaves the neighbour- hood of man real metamorphosis may be asserted, as in ordinary lycanthropic beliefs. Marcellus of Sida says that in Greece the patients frequented the tombs at night; they were recognizable by their yellow complexion, hollow eyes and dry tongue. The Garrows of India are said to tear their hair when they are seized with the complaint, which is put down to the use of a drug applied to the forehead; this recalls the stories of the witch's salve in Europe. In Abyssinia the patient is usually a woman; two forms are distinguished, caused by the hyena and the leopard respectively. A kind of trance ushers in the fit ; the fingers are clenched, the eyes glazed and the nostrils distended; the patient, when she comes to herself, laughs hideously and runs on all fours. The exorcist is a blacksmith; as a rule, he applies onion or garlic to her nose and proceeds to question the evil spirit.

Bibliography. — For the anthropological side of the subject see bibliography to Werwolf ; also Tijdskrift voor indische Taal, Land en Volkenkunde, xxviii. 338, xli. 548, 568; Med. Zendelingsgenoot- schap, xxxix. 3, 16; O. Stoll, Suggestion, p. 418; W. H. Brett, Indians of British Guiana. For the pathological side, see Hack Tuke, Diet, of Psychological Medicine, s.v. "Lycanthropy"; Diet, des sciences medicates; Waldmeier, Autobiography, p. 64; A. J. Hayes, Source of Blue Nile, p. 286 seq. ; Abh. phil.-hist. Klasse kgl. sdchsische Gesellschaft der Wiss. 17, No. 3. (N. W. T.)

LYCAON. in Greek mythology, son of Pelasgus, the mythical first king of Arcadia. He, or his fifty impious sons, entertained Zeus and set before him a dish of human flesh; the god pushed away the dish in disgust and either killed the king and his sons by lightning or turned them into wolves (Apollodorus iii. 8; Ovid, Metam. i. 198). Some say that Lycaon slew and dished up his own son Nyctimus (Clem. Alex. Protrept. ii. 36; Nonnus, Dionys. xviii. 20; Arnobius iv. 24). The deluge was said to have been sent by Zeus in the time of Deucalion in consequence of the sons' impiety. Pausanias (viii. 2) says that Lycaon sacrificed a child to Zeus on the altar on mount Lycaeus, and immediately after the sacrifice was turned into a wolf. This gave rise to the story that a man was turned into a wolf at each annual sacrifice to Zeus Lycaeus, but recovered his human form if he abstained from human flesh for ten years. The oldest city, the oldest cultus (that of Zeus Lycaeus), and the first civilization of Arcadia are attributed to Lycaon. His story has been variously interpreted. According to Weizsacker, he was an old Pelasgian or pre-Hellenic god, to whom human sacrifice was offered, bearing a non-Hellenic name similar to Xiwos, whence the story originated of his metamorphosis into a wolf. His cult was driven out by that of the Hellenic Zeus, and Lycaon himself was afterwards represented as an evil spirit, who had insulted the new deity by setting human flesh before him. Robertson Smith considers the sacrifices offered to the wolf-Zeus in Arcadia to have been originally cannibal feasts of a wolf-tribe, who recognized the wolf as their totem. Usener and others identify Lycaon with Zeus Lycaeus, the god of light, who slays his son Nyctimus (the dark) or is succeeded by him, in allusion to the perpetual succession of night and day. Accord- ing to Ed. Meyer, the belief that Zeus Lycaeus accepted human sacrifice in the form of a wolf was the origin of the myth that Lycaon, the founder of his cult, became a wolf, i.e. participated in the nature of the god by the act of sacrifice, as did all who afterwards duly performed it. W. Mannhardt sees in the ceremony an allusion to certain agricultural rites, the object of

which was to prevent the failure of the crops and to avert pestilence (or to protect them and the flocks against the ravages of wolves). Others (e.g. V. B6rard) take Zeus Lycaeus for a Semitic Baal, whose worship was imported into Arcadia by the Phoenicians; Immerwahr identifies him with Zeus Phyxios, the god of the exile who flees on account of his having shed blood. Another explanation is that the place of the sacred wolf once worshipped in Arcadia was taken in cult

by Zeus Lycaeus, and in popular tradition by Lycaon, the ancestor of the Arcadians, who was supposed to have been punished for his insulting treat- ment of Zeus. It is possible that the whole may be merely a reminiscence of a superstition similar to the familiar werwolf stories.

See articles by P. Weizsacker in Roscher's Lexikon and by G. Fougeres (s.v. " Lykaia ") in Daremberg and Saglio's Dictionnaire des antiquites; W. Immerwahr, Die Kulte und Mythen Arkadiens, 1. (1891), p. 14; L. R. Farnell, Cults of the Greek Stales, i. (1896), p. .40; A. Lang, Myth, Ritual and Religion (1899); C. Pascal, Studii di antichita e mitologia (1896), who sees in Lycaon a god of death honoured by human sacrifice; Ed. Meyer, Forschungen zur alien Geschichte, i. (1892), p. 60; W. Mannhardt, Wald- und Feldkulte, ii. (1905); G. Fougeres, Manlin'ee el VArcadie orientate (1898), p. 202; V. Berard, De Vorigine des cultes arcadiens (1894); H. D. Miiller, Mythologie der griechischen Stdmme, ii. (1861), p. 78; H. Usener, Rheinisches Museum, liii. (1898), p. 375; G. Gorres, Berliner Studien fur classische Philologie, x. 1 (1889), who regards the Lycaea as a funeral festival connected with the changes of vegetation; Vollgraf, De Ovidii mythopoeia; a concise statement of the various forms of the legend in O. Gruppe, Griechische Mythologie, ii. p. 920, n. 4; see also Lycanthropy; D. Bassi, " Apollo Liceo," in Rivista di storia antica, i. (1895) ; and Frazer's Pausanias, iv. p. 189.

a. h. f.)

LYCAONIA, in ancient geography, a large region in the interior of Asia Minor, north of Mount Taurus. It was bounded on the E. by Cappadocia, on the N. by Galatia, on the W. by Phrygia and Pisidia, while to the S. it extended to the chain of Mount Taurus, where it bordered on the country popularly called ' in earlier times Cilicia Tracheia and in the Byzantine period Isauria; but its boundaries varied greatly at different times. The name is not found in Herodotus, but Lycaonia is mentioned by Xenophon as traversed by Cyrus the younger on his march through Asia. That author describes Iconium as the last city of Phrygia; and in Acts xiv. 5 St Paul, after leaving Iconium, crossed the frontier and came to Lystra in Lycaonia. Ptolemy, on the other hand, includes Lycaonia as a part of the province of Cappadocia, with which it was associated by the Romans for administrative purposes; but the two countries are clearly distinguished both by Strabo and Xenophon and by authorities generally.

Lycaonia is described by Strabo as a cold region of elevated plains,

affording pasture to wild asses and to sheep; and at the present day sheep abound, but asses are practically unknown. Amyntas, king of Galatia, to whom the district was for a time subject, maintained there not less than three hundred flocks. It forms part of the interior tableland of Asia Minor, and has an elevation of more than 3000 ft. It suffers from want of water, aggravated in some parts by abundance of salt in the soil, so that the northern portion, extending from near Iconium to the salt lake of Tatta and the frontiers of Galatia, is almost wholly barren, only small patches being cultivated near Iconium and the large villages. The soil, where water is supplied, is produc- tive. In ancient times great attention was paid to storing and distributing the water, so that much land now barren was formerly cultivated and supported a large number of cities.

The plain is interrupted by some minor groups of mountains, of volcanic character, of which the Kara Dagh in the south, a few miles north of Karaman, rises above 7000 ft., while the Karadja Dagh, north-east of it, though of inferior elevation, presents a striking range of volcanic cones. The mountains in the north-west, near Iconium and Laodicea, are the termination of the Sultan Dagh range, which traverses a large part of Phrygia.

The Lycaonians appear to have been in early times to a great extent independent of the Persian empire, and were like their neighbours the lsaurians a wild and lawless race of freebooters; but their country was traversed by one of the great natural lines

of high road through Asia Minor, from Sardis and Ephesus to the Cilician gates, and a few considerable towns grew up along or near this line. The most important was Iconium, in the most fertile spot in the country, of which it was always regarded by the Romans as the capital, although ethnologically it was Phrygian. It is still called Konia, and it was the capital of the Seljuk Turkish empire for several centuries. A little farther north, immediately on the frontier of Phrygia, stood Laodicea (Ladik), called Combusta, to distinguish it from the Phrygian city of that name; and in the south, near the foot of Mount Taurus, was Laranda, now called Karaman, which has given name to the province of Karamania. Derbe and Lystra, which appear from the Acts of the Apostles to have been considerable towns, were between Iconium and Laranda. There were many other towns, which became bishoprics in Byzantine times. Lycaonia was Christianized very early; and its ecclesiastical system was more completely organized in its final form during the 4th century than that of any other region of Asia Minor.

After the defeat of Antiochus the Great, Lycaonia was given by the Romans to Eumenes II., king of Pergamos. About 160 B.C. part of it, the " Tetrarchy of Lycaonia," was added to Galatia; and in 129 B.C. the eastern half (usually called during the following 200 years Lycaonia proper) was given to Cappa- docia as an eleventh strategia. In the readjustment of the Provinciae, 64 B.C., by Pompey after the Mithradatic wars, he gave the northern part of the tetrarchy to Galatia and the eastern part of the eleventh strategia to Cappadocia. The re- mainder was attached to Cilicia. Its administration and group- ing changed often under the Romans. In a.d. 371 Lycaonia was first formed into a separate province. It now forms part of the Konia vilayet.

The Lycaonians appear to have retained a distinct nationality in the time of Strabo, but their ethnical affinities are unknown. The mention of the Lycaonian language in the Acts of the Apostles (xiv. n) shows that the native language was spoken by the common people at Lystra about a.d. 50; and probably it was only later and under Christian influence that Greek took its place.

See Sir W. M. Ramsay, Historical Geography of Asia Minor (1890), Historical Commentary on Galatians (1899) and Cities of St Paid (1907); also an article on the topography in the Jahreshefte des Oesterr. Archaeolog. Instituts, 194 (Beiblatt) pp. 57-132.

(W. M. Ra.)

LYCEUM, the latinized form of Gr. hvntuov, the name of a gymnasium and garden with covered walks, near the temple of Apollo Lyceus (‘AroKKwv Aii/cetos) at Athens. Aristotle taught here, and hence the name was applied to his school of philosophy. The name had been used in many languages for places of instruc- tion, &c. In France the term lycee is given to the secondary schools which are administered by the state, in contradistinction to the communal colleges.

LYCIA, in ancient geography, a district in the S.W. of Asia Minor, occupying the coast between Caria and Pamphylia, and extending inland as far as the ridge of Mt Taurus. The region thus designated is a peninsula projecting southward from the great mountain masses of the interior. It is for the most part a rugged mountainous country, traversed by offshoots of the Taurus range, which terminate on the coast in lofty promontories. The coast, though less irregular than that of Caria, is indented by a succession of bays — the most marked of which is the Gulf of Macri (anc. Glaucus Sinus) in the extreme west. A number of smaller bays, and broken rocky headlands, with a few small

islets, constitute the coast-line thence to the S.E. promontory of Lycia, formed by a long narrow tongue of rocky hill, known in ancient times as the ” Sacred Promontory ” (Hiera Acra), with three small adjacent islets, called the Chelidonian islands, which was regarded by some ancient geographers as the commencement of Mt. Taurus. Though the mountain ranges of Lycia are all offshoots of Mt. Taurus, in ancient times several of them were distinguished by separate names. Such were Daedala in the west, adjoining the Gulf of Macri, Cragus on the sea-coast, west of the valley of the Xanthus, Massicytus (10,000 ft.) nearly in

the centre of the region, and Solyma in the extreme east above Phaselis (7800 ft.). The steep and rugged pass between Solyma and the sea, called the Climax (” Ladder”), was the only direct communication between Lycia and Pamphylia.

The only two considerable rivers are: (1) the Xanthus, which descends from the central mass of Mt Taurus, and flows through a narrow valley till it reaches the city of the same name, below which it forms a plain of some extent before reaching the sea, and (2) the Limyrus, which enters the sea near Limyra. The small alluvial plains at the mouths of these rivers are the only level ground in Lycia, but the hills that rise thence towards the mountains are covered with a rich arborescent vegetation. The upper valleys and mountain sides afford good pasture for sheep, and the main Taurus range encloses several extensive upland basin-shaped valleys (yailas), which are characteristic of that range throughout its extent (see Asia Minor).

The limits of Lycia towards the interior seem to have varied at different times. The high and cold upland tract to the north-east, called Milyas, was by some writers included in that province, though it is naturally more connected with Pisidia. According to Artemidorus (whose authority is followed by Strabo), the towns that formed the Lycian league in the days of its integrity were twenty- three in number; but Pliny states that Lycia once possessed seventy towns, of which only twenty-six remained in his day. Recent re- searches have fully confirmed the fact that the sea-coast and the valleys were thickly studded with towns, many of which are proved by existing remains to have been places of importance. By the aid of inscriptions the position of the greater part of the cities mentioned in ancient authors can be fixed. On the gulf of Glaucus, near the frontiers of Caria, stood

Telmessus, an important place, while a short distance inland from it were the small towns of Daedala and Cady- anda. At the entrance of the valley of the Xanthus were Patara, Xanthus itself, and, a little higher up, Pinara on the west and Tlos on the east side of the valley, while Araxa stood at the head of the valley, at the foot of the pass leading into the interior. Myra, one of the most important cities of Lycia, occupied the entrance of the valley of the Andriacus; on the coast between this and the mouth of the Xanthus stood Antiphellus, while in the interior at a short distance were found Phellus, Cyaneae and Candyba. In the alluvial plain formed by the rivers Arycandus and Limyrus stood Limyra, and encircling the same bay the three small towns of Rhodiapolis, Corydalla and Gagae. Arycanda commanded the upper valley of the river of the same name. On the east coast stood Olympus, one of the cities of the league, while Phaselis, a little farther north, which was a much more important place, never belonged to the Lycian league and appears always to have maintained an independent position.

The cold upland district of the Milyas does not seem to have contained any town of importance. Podalia appears to have been its chief place. Between the Milyas and the Pamphylian Gulf was the lofty mountain range of Solyma, which was supposed to derive its name from the Solymi, a people mentioned by Homer in con- nexion with the Lycians and the story of Bellerophon. In the flank of this mountain, near a place called Deliktash, was the celebrated fiery source called the Chimaera, which gave rise to many fables. It has been visited in modern times by Captain F. Beaufort, T. A. B. Spratt and Edward Forbes, and other travellers, and is merely a stream of inflammable gas issuing from crevices in the rocks, such as are found in several places in the Apennines. No traces of recent volcanic action exist in Lycia.

History. — The name of the Lycians, Lukki, is first met with in the Telel-Amarna tablets (1400 B.C.) and in the list of the nations from the eastern Mediterranean who invaded Egypt in the reign of Mineptah, the successor of Rameses II. At that time they seem to have occupied the Cilician coast. Their occupation of Lycia was probably later, and since the Lycian inscriptions are not found far inland, we may conclude that they entered the country from the sea. On the other hand the name appears to be preserved in Lycaonia, where some bands of them may have settled. According to Herodotus they called them- selves Termilae, written Trmmile in the native inscriptions, and he further states that the original inhabitants of the country were the Milyans and Solymi, the Lycians being invaders from Crete. In this tradition there is a reminiscence of the fact that the Lycians had been

sea-rovers before their settlement in Lycia. The Lycian Sarpedon was believed to have taken part in the Trojan war. The Lydians failed to subdue Lycia, but after the fall of the Lydian empire it was conquered by Harpagus the general of Cyrus, Xanthus or Arnna, the capital, being com- pletely destroyed. While acknowledging the suzerainty of

Persia, however, the Lycians remained practically independent, and for a time joined the Delian league. ” The son of Harpagus ” on the obelisk of Xanthus boasts of having sacked numerous cities in alliance with the Athenian goddess. The Lycians were incorporated into the empire of Alexander and his successors, but even after their conquest by the Romans, preserved their federal institutions as late as the time of Augustus. According to Strabo the principal towns in the league were Xanthus, Patara, Pinara, Olympus, Myra and Tlos; each of these had three votes in the general assembly, while the other towns had only two or one. Taxation and the appointment of the Lyciarch and other magistrates were vested in the assembly. Under Claudius Lycia was formally annexed to the Roman empire, and united with Pamphylia: Theodosius made it a separate province. Antiquities. — Few parts of Asia Minor were less known in modern times than Lycia up to the 19th century. Captain Beaufort was the first to visit several places on the sea-coast, and the remarkable rock-hewn tombs of Telmessus had been already described by Dr Clarke, but it was Sir Charles Fellows who first discovered and drew attention to the extraordinary rich- ness of the district in ancient remains, especially of a sepulchral character. His visits to the country in 1838 and 1840 were followed by an expedition sent by the British government in 1842 to transport to England the valuable monuments now in the British Museum, while Admiral Spratt and Edward Forbes explored the interior, and laid down its physical features on an excellent map. The monuments thus brought to light are among the most interesting of those discovered in Asia Minor, and prove the existence of a distinct native architecture, especially in the rock-cut tombs. But the theatres found in almost every town, some of them of very large size, are sufficient to attest the per- vading influence of Greek civilization; and this is confirmed by the sculptures, which are for the most part wholly Greek. None of them, indeed, can be ascribed to a very early period, and hardly any trace can be found of the influence of Assyrian or other Oriental art. ;

One of the most interesting results of these recent researches has been the discovery of numerous inscriptions in the native language of the country, and written in an alphabet peculiar to Lycia. A few of these inscriptions are bilingual, in Greek and Lycian, and the clue thus afforded to their interpretation has been followed up, first by Daniel

Sharpe and Moritz Schmidt, and in more recent years by J. Imbert, W. Arkwright, V. Thomsen, A. Torp, S. Bugge and E. Kalinka.

The alphabet was derived from the Doric alphabet of Rhodes, but ten other characters were added to it to express vocalic and other sounds not found in Greek. The attempts to connect the language with the Indo-European family have been unsuccessful; it belongs to a separate family of speech which we may term ” Asianic.” Most of the inscriptions are sepulchral; by far the longest and most important is that on an obelisk found at Xanthus, which is a historical document, the concluding part of it being in a peculiar dialect, supposed to be an older and poetical form of the language. Among the deities mentioned are Trzzube (Trosobis) and Trqqiz or Trqqas.

Lycian art was modelled on that of the Greeks. The rock-cut tomb usually represented the house of the living, with an elaborate facade, but in one or two instances, notably that of the so-called Harpy-tomb, the facade is surmounted by a tall, square tower, in the upper part of which is the sepulchral chamber. Lycian sculpture followed closely the development of Greek sculpture, and many of the sculptures with which the tombs are adorned are of a high order of merit. The exquisite bas-reliefs on a Lycian sarcophagus now in the museum of Constantinople are among the -finest surviving examples of classical art. The bas-reliefs were usually coloured. For the coinage, see Numismatics, section “Asia Minor.”

Authorities. — C. Fellows, Journal in Asia Minor (1839) and Discoveries in Lycia (1841); T. A. B. Spratt and E. Forbes, Travels in Lycia (1847); O. Benndorf and G. Niemann, Reisen im sudwest- lichen Kleinasien (1884); E. P3tersen and F. von Luschan, Reisen in Lykien (1889) ; O. Treuber, Geschichte der Lykier (1887) ; G. Perrot and C. Chipiez, Histoire de I’art dans I’antiquite, v. (1890) ; P.

Kretschmer, Einleitung in die Geschichte der griechischen Sprache i (1896); S. Bugge, Lykische Studien (from 1897); A. Torp, Lykische \ Beitrdge (from 1898); V. Thomsen, Etudes lyciennes (1899); E. j Kalinka and R. Heberdey, Tituli Asiae Minoris, i. (1901); see also j articles Xanthus, Myra, Patara. (A. H. S.)

LYCK, or Lyk, a town of Germany, in the Prussian province of East Prussia, 112 m. by rail S.E. of Konigsberg, and close to the frontier of

Poland, on a lake and river of the same name. Pop. (1900) 11,386. It is the chief town of the region known as Masuria. On an island in the lake is a castle formerly belonging to the Teutonic order, and dating from 1273, now used as a prison. There are iron-foundries, distilleries, breweries, tan- neries, paper mills and flour mills, and a trade in grain and cattle.

LYCOPHRON, Greek poet and grammarian, was born at Chalcis in Euboea. He flourished at Alexandria in the time of Ptolemy Philadelphus (285-247 B.C.). According to Sui'das, he was the son of Socles, but was adopted by Lycus of Rhegium. He was entrusted by Ptolemy with the task of arranging the comedies in the Alexandrian library, and as the result of his labours composed a treatise On Comedy. His own compositions, however, chiefly consisted of tragedies (Sui'das gives the titles of twenty, of which very few fragments have been preserved), which secured him a place in the Pleiad of Alexandrian tragedians. One of his poems, Alexandra or Cassandra, containing 1474 iambic lines, has been preserved entire. It is in the form of a prophecy uttered by Cassandra, and relates the later fortunes of Troy and of the Greek and Trojan heroes. References to events of mythical and later times are introduced, and the poem ends with a reference to Alexander the Great, who was to unite Asia and Europe in his world-wide empire. The style is so enigmatical as to have procured for Lycophron, even among the ancients, the title of "obscure" (aKoTeivos) . The poem is evidently intended to display the writer's knowledge of obscure names and uncommon myths; it is full of unusual words of doubtful meaning gathered from the older poets, and many long-winded compounds coined by the author. It has none of the qualities of poetry, and was probably written as a show-piece for the Alexandrian school. It was very popular in the Byzantine period, and was read and commented on very frequently; the collection of scholia by Isaac and John Tzetzes is very valuable, and the MSS. of the Cassandra are numerous. 1 A few well-turned lines which have been preserved from Lycophron's tragedies show a much better style; they are said to have been much admired by Menedemus of Eretria, although the poet had ridiculed him in a satyric drama. Lycophron is also said to have been a skilful writer of anagrams.

Editio princeps (1513); J. Potter (1697, 1702); L. Sebastiani (1803); L. Bachmann (1830); G. Kinkel (1880); E. Scheer (1881- 1908), vol. ii. containing the scholia. The most complete edition is by C. von Holzinger (with translation, introduction and notes, 1895). There are translations by F. Deheque (1853) and Viscount Royston (1806; a work of great merit). See also Wilamowitz- Mollendorff, De Lycophronis Alexandra (1884); J. Konze, De Die- Hone Lycophronis

(1870). The commentaries of the brothers Tzetzes have been edited by C. O. Miiller (181 1).

LYCOPODIUM, the principal genus of the Lycopodiaceae, a natural order of the Fern-allies (see Pteridophyta). They are flowerless herbs, with an erect, prostrate or creeping widely- branched stem, with small simple leaves which thickly cover the stem and branches. The ” fertile ” leaves are arranged in cones, and bear spore-cases (sporangia) in their axils, containing spores of one kind only. The prothallium developed from the spore is a subterranean mass of tissue of considerable size, and bears the male and female organs (antheridia and archegonia). There are about a hundred species widely distributed in tem- perate and tropical climates; five occur in Britain on heaths and moors, chiefly in mountainous districts, and are known as club-

1 Two passages of the Cassandra, 1446-1450 and 1226-1282, in which the career of the Roman people and their universal empire are spoken of, could not possibly have been written by an Alexandrian poet of 250 B.C. Hence it has been maintained by Niebuhr and others that the poem was written, by a later poet mentioned by Tzetzes, but the opinion of Welcker that these paragraphs are a later interpolation is generally considered more probable.

mosses. The commonest species, L. clavatum, is also known as stag-horn moss.

Gerard, in 1597, described two kinds of lycopodium (Herball, P- !373) under the names Muscus denticulatus and Muscus clavatus {L. clavatum) as ” Club Mosse or Woolfes Clawe Mosse,” the names being in Low Dutch, ” Wolfs Clauwen,” from the resemblance of the club-like or claw-shaped shoots to the toes of a wolf, ” whereupon we first named it Lycopodion.” Gerard also speaks of its emetic and many other supposed virtues. L. Selago and L. catharticum (a native of the Andes) have been said to be, at least when fresh, cathartic;

From Strasburger’s Lehrbuch der Botanik, by permission of Gustav Fischer. Fig. 1. — Lycopodium clavatum.

A, Old prothallus.

B, Prothallus bearing a young

sporophyte. G, Polian of a mature plant, showing the creeping habit, the adventitious roots and

the specialized erect branches

bearing the strobile or cones.

H, Sporophyte bearing the single

sporangium on its upper

surface.

J, Spore.

but, with the exception of the spores of L. clavatum (" lycopodium powder "), lycopodium as a drug has fallen into disuse. The powder is used for rolling pills in, as a dusting powder for infants' sores, &c. A tinctura lycopodii, containing one part of the powder to ten of alcohol (9c %), has been given, in doses of 15 to 60 minims, in cases of irritation and spasm of the bladder. The powder is highly inflammable, and is used in pyrotechny and for artificial lightning on the stage. If the hand be covered with the powder it cannot be wetted on being plunged into water. Another use of lycopodium is for dyeing; woollen cloth boiled with species of lycopodium, as L. clavatum, becomes blue when dipped in a bath of Brazil wood.

LYCOSURA (mod. Palaeokaslro or Siderokastro) , a city of Arcadia, reputed to be the most ancient city in Greece, and to have been founded by Lycaon the son of Pelasgus. Its fame in later times was chiefly associated with the temple of Despoena, containing the colossal group made by Damophon of Messene, of Despoena and Demeter seated, with Artemis and the Titan Anytus standing beside them. The temple and considerable remains of the group of sculpture were found in 1889. The date of both has been a matter of dispute, Damophon being placed at dates varying from the 4th century B.C. to the age of Hadrian. But it has now been shown that he lived in the 2nd century B.C. Remains of a portico, altars and other structures have also been found.

See TUpaKTUii. rijs 'Apx- 'Ercupfas (1896); G. Dickens, Annual of British School at Athens, xii. and xiii.

LYCURGUS (Gr. AvKovpryos), in Greek history, the reputed founder of the Spartan constitution. Plutarch opens his

biography of Lycurgus with these words: " About Lycurgus the

lawgiver it is not possible to make a single statement that is not called in question. His genealogy, his travels, his death, above all, his legislative and constitutional activity have been variously recorded, and there is the greatest difference of opinion as to his date. ” Nor has modern historical criticism arrived at any certain results. Many scholars, indeed, suppose him to be in reality a god or hero, appealing to the existence of a temple and cult of Lycurgus at Sparta as early as the time of Herodotus, (i. 66), and to the words of the Delphic oracle (Herod, i. 65) —

Jif» tJ at 6(dv liavraiaonai. lj &v8pwTov &W in (coi fiaXAoy Btov SXjro/aai, ai Avuoopye. If this be so, he is probably to be connected with the cult of Apollo Lycius or with that of Zeus Lycaeus. But the majority of modern historians agree in accepting Lycurgus as an historical person, however widely they may differ about his work.

According to the Spartan tradition preserved by Herodotus, Lycurgus was a member of the Agiad house, son of Agis I. and brother of Echestratus. On the death of the latter he became regent and guardian of his nephew Labotas (Leobotes), who was still a minor. Simonides, on the other hand, spoke of him as a Eurypontid, son of Prytanis and brother of Eunomus, and later the tradition prevailed which made him the son of Eunomus and Dionassa, and half-brother of the king Polydectes, on whose death he became guardian of the young king Charillus. Accord- ing to Herodotus he introduced his reforms immediately on becoming regent, but the story which afterwards became gener- ally accepted and is elaborated by Plutarch represented him as occupying for some time the position of regent, then spending several years in travels, and on his return to Sparta carrying through his legislation when Charillus was king. This latter version helped to emphasize the disinterestedness of the lawgiver, and also supplied a motive for his travels — the jealousy of those who accused him of trying to supplant his nephew on the throne. He is said to have visited Crete, Egypt and Ionia, and some versions even took him to Spain, Libya and India. ‘

Various beliefs were held as to the source from which Lycurgus derived his ideas of reform.ˆ Herodotus found the tradition current among the Spartans that they were suggested to Lycurgus by the similar Cretan institutions, but even in the 5th century there was a rival theory that he derived them from the Delphic oracle. These two versions are united by Ephorus, who argued that, though Lycurgus had really derived his system from Crete, yet to give it a religious sanction he had persuaded the Delphic priestess to express his views in oracular form.

The Reforms. — Herodotus says that Lycurgus changed ” all the customs,” that he created the military organization of evw/ioTiai (enomoties), rpiTj/cdSes (triecades) and avaairia {syssitia), and that he instituted the ephorate and the council of elders. To him, further, are attributed the foundation of the apella (the citizen assembly), the prohibition of gold and silver currency, the partition of the land (717s avadaafids) into equal lots, and, in general, the characteristic Spartan training (aywyij). Some of these statements are certainly false. The council of elders and the assembly are not in any sense peculiar to Sparta, but are present in the heroic government of Greece as depicted in the Homeric poems. The ephors, again, are almost universally held to be either an immemorial heritage of the Dorian stock or — and this seems more probable — an addition to the Spartan con- stitution made at a later date than can be assigned to Lycurgus. Further, the tradition of the Lycurgan partition of the land is open to grave objections. Grote pointed out (History of Greece, pt. ii. ch. 6) that even from the earliest historical times we find glaring inequalities of property at Sparta, and that the tradition was apparently unknown to all the earlier Greek historians and philosophers down to Plato and Aristotle: Isocrates (xii. 259) expressly denied that a partition of land had ever taken place in the Spartan state. Again, the tradition presupposes the conquest by the Spartans of the whole, or at least the greater part, of Laconia, yet Lycurgus must fall in the period when the Spartans had not yet subjugated even the middle Eurotas plain, in which their city lay. Finallv, we can point to an adequate

explanation of the genesis of the tradition in the ideals of the reformers of the latter part of the 3rd century, led by the kings Agis IV. and Cleomenes III. (q.v.). To them the cause of Sparta’s decline lay in the marked inequalities of wealth, and they looked upon a redistribution of the land as the reform most urgently needed. But it was characteristic of the Greeks to represent the ideals of the present as the facts of the past, and so such a story as that of the Lycurgan yrjs avadaaim may well have arisen at this time. It is at least noteworthy that the plan of Agis to give 4500 lots to Spartans and 15,000 to perioeci suspiciously resembles that of Lycurgus, in whose case the numbers are said to have been 9000 and 30,000 respectively. Lastly, the prohibi- tion of gold and silver money cannot be attributed to Lycurgus, for at so early a period coinage was yet unknown in Greece.

Lycurgus, then, did not create any of the main elements of the Spartan constitution, though he may have regulated their powers and denned their position. But tradition represented him as finding Sparta the prey of disunion, weakness and lawlessness, and leaving her united, strong and subject to the most stable government which the Greek world had

ever seen. Probably Grote comes near to the truth when he says that Lycurgus “is the founder of a warlike brotherhood rather than the law-giver of a political community.” To him we may attribute the unification of the several component parts of the state, the strict military organization and training which soon made the Spartan hoplite the best soldier in Greece, and above all the elaborate and rigid system of education which rested upon, and in turn proved the strongest support of, that subordination of the individual to the state which perhaps has had no parallel in the history of the world.

Lycurgus’s legislation is very variously dated, and it is not possible either to harmonize the traditions or to decide with confidence between them. B.Niese (Hermes, xlii. 440 sqq.) assigns him to the first half of the 7th century B.C. Aristotle read Lycurgus’s name, together with that of Iphitus, on the discus at Olympia which bore the terms of the sacred truce, but even if the genuineness of the document and the identity of this Lycurgus with the Spartan reformer be granted, it is uncertain whether the discus belongs to the so-called first Olympiad, 776 B.C., or to an earlier date. Most traditions place Lycurgus in the 9th century: Thucydides, whom Grote follows, dates his reforms shortly before 804, Isocrates and Ephorus go back to 869, and the chronographers are divided between 821, 828 and 834 B.C. Finally, according to a tradition recorded by Xenophon (Resp. Laced, x. 8), he was contemporary with the Heraclidae, in which case he would belong to the 10th century B.C.

Authorities. — Our chief ancient authorities, besides Plutarch’s biography, are: — Herodotus i. 65; Xenophon, Respublica Lacedaemomorum; Ephorus ap. Strabo x. 481, 482; Aristotle, Politics, ii.; Pausanias iii. and v. 4; and scattered passages in Plato, Isocrates, Polybius, Diodorus, Polyaenus, &c. Of modern works the most important are: E. Meyer, ” L’ykurgos von Sparta,” in Forschungen zur alten Geschichte (Halle, 1892), i. 211 sqq.; A. Kopstadt, De rerum Laconicarum constitutionis Lycurgeae origine et indole (Greifswald, 1849); H. K. Stein, Kritik der Uberlieferung iiber den spartanischen Geselzgeber Lykurg (Glatz, 1882); S. Wide, ” Bemerkungen zur spartanischen Lykurglegende,” in Skand. Archiv. i. (1891), 90 sqq.; E. Nusselt, Das Lykurgproblem (Erlangen, 1898); H. Bazin, De Lycurgo (Paris, 1885); C. Reuss, De Lycurgea quae fertur agrorum divisione (Pforzheim, 1878); A. Busson, Lykurgos und die grosse Rhetra (Innsbruck, 1887); H. Gelzer, “Lykurg und die delphische Pnesterschaft ” in Rhein. Mus. xxviii. I sqq.; F. Winicker, Stand der Lykurgischen Frage (Graudenz, 1884); G. Attinger, Essai sur Lycurgue et ses institutions (Neuch&tel, 1892); the general Greek histories, and the works on the Spartan constitution cited under Sparta. (m. N. T.)

LYCURGUS (c. 396-325 B.C.), one of the ” ten ” Attic orators. Through his father, Lycophron, he belonged to the old Attic priestly family of the Eteobutadae. He is said to have been a pupil both of Plato and of Isocrates. His early career is unknown, but after the real character of the struggle with Philip of Macedon became manifest he was recognized, with Demosthenes and Hypereides, as one of the chiefs of the national party. He left the care of external relations to his colleagues, and devoted himself to internal organization and finance. He

managed the finances of Athens for twelve successive years (338-326), at first directly as treasurer of the revenues (6 &ri rj htx > iKT)

Lycurgus was a man of action; his orations, of which fifteen were published, are criticized by the ancients for their awkward arrangement, harshness of style, and the tendency to digressions about mythology and history, although their noble spirit and lofty morality are highly praised. The one extant example, Against Leocrates, fully bears out this criticism. After the battle of Chaeroneia (338), in spite of the decree which forbade emigration under pain of death, Leocrates had fled from Athens. On his return (probably about 332) he was impeached by Lycurgus, but acquitted, the votes of the judges being equally divided.

The speech has been frequently edited. Editio princeps (Aldine, 1513) ; F. G. Kiessling (1847) with M. H. E. Meier’s commentary on pseudo-Plutarch’s Life of Lycurgus and the fragments of his speeches ; C. Rehdantz (1876); T. Thalheim (1880); C. Scheibe (1885); F. Blass (ed. major, 1889), with bibliography of editions and articles (ed. minor, 1902); E. Sofer (Leipzig, 1905), with notes and introd. There is an index to Andocides, Lycurgus and Dinarchus by L. L. Forman (Oxford, 1897). The exhaustive treatise of F. Diirrbach, L’Orateur Lycurgue (1890), contains a list of the most important review articles on the financial and naval administration of Lycurgus and on his public works; see also C. Droege, De Lycurgo publicarum pecuniarum administratore (Minden, 1880). Several fragments of his various laws have been preserved in inscriptions (Corpus inscrip- tionum atticarum, ii. 162, 163, 173, 176, 180). On the history of the period see authorities under Demosthenes.

LYCURGUS, ” theLogothete ” (1772-1851), Greek leader in the War of

Independence, was born in the island of Samos. He was educated at Constantinople, received the usual training, and followed the customary career of a Phanariot Greek. He accompanied Constantine Ypsilanti when he was appointed hospodar of Walachia, as secretary, and served Ypsilanti's successor, Alexander Soutzos, as treasurer and chancellor (Logothete). In 1802 he returned to Samos, and having become suspected by the Turkish government was imprisoned. He fled to Smyrna, when he was pardoned and released by the Turks. When the War of Independence began he induced his country- men to declare Samos independent, and was chosen ruler. His share in the War of Independence is chiefly memorable because he provoked the massacre of Chios in 1822. Lycurgus con- ducted an expedition of 2500 to that island, which was held by a Turkish garrison under Velna Pasha. His force was in- sufficient, the time was ill-chosen, for a strong Turkish fleet was at sea, and Lycurgus displayed utter incapacity as a military

leader. After these events, he was deposed by the Samians, but recovered some influence and had a share in the defence of Samos against the Turks in 1824. When the island was left under the authority of Turkey by the protocol of the 3rd of February 1830, he helped to obtain autonomy for the Samians. He retired to Greece and died on the 22nd of May 1851. See G. Finlay, History of the Greek Revolution (London, 1861).

LYDD, a market town and municipal borough in the southern parliamentary division of Kent, England, 713 m. S.E. by E. of London by a branch of the South-Eastern & Chatham railway. Pop. (1901) 2675. It lies in the open lowland of Dunge Marsh. To the south-east are the bare shingle banks of the promontory of Dungeness. Its church of All Saints has a beautiful Perpendicular tower with rich vaulting within. The neighbourhood affords pasture for large flocks of sheep. On the land known as the Rypes, in the neighbourhood, there is a military camp, with artillery and rifle ranges; hence the name given to the explosive " lyddite." The town is governed by a mayor, 4 aldermen and 12 councillors. Area, 12,043 acres.

The first settlement at Lydd (Hlide, Lide, Lyde) was probably due to its convenience as a fishing-station. After the Conquest it became a seaport of some consequence and although now, owing to the alteration of the coast, it stands nearly 3 m. inland a number of its inhabitants are still fishermen. In 774 land in Lydd was granted by Offa to the monks of Christ Church, Canterbury, and the archbishop of Canterbury evidently held the lordship of the town from an early date. At some time before the reign of Edward I. Lydd was made a member

of the Cinque Port of Romney, and in 1290 was granted the same liberties and free customs as the Cinque Ports on condition of aiding the service of its head-port to the crown with one ship. This charter was confirmed by Edward III. in 1365. The corporation also possesses documents of 1154, 1399 and 1413, granting to the archbishop's men of Lydd the privileges enjoyed by the Cinque Ports and confirming all former privileges. Lydd is called a borough in the Hundred Rolls. Its incorporation under a bailiff, of which there is evidence in the 15th century, may have been due to the archbishop or to the court of Shepway, but it was not incorporated by the crown until 1885, when, by a charter under the Municipal Acts, the last bailiff was elected the first mayor. In 1494 a grant was made to the bailiff, jurats and commonalty of a yearly fair on the 12th of July and two days following. A fair was held under this grant until 1874.

LYDENBURG, a town and district of the Transvaal, South Africa. The town is 60 m. by rail N.N.E. of Belfast on the Pretoria-Delagoa Bay railway. Pop. (1904) 1523. It is pictur- esquely situated on the Spekboom tributary of the Olifants river at an altitude of 4900 ft. Some 15 m. E. is the Mauchberg (8725 ft.), the highest point in the Transvaal. The town is the chief centre for the Lydenburg goldfields. Next to Lydenburg the most important settlement in these goldfields is Pilgrim's Rest, pop. (1904) 1 188, 23 m. N.E. of Lydenburg. Lydenburg (the town of suffering) was founded in 1846 by Boers who two years previously had established themselves farther north at Ohrigstad, which they abandoned on account of the fever endemic there. Lydenburg at once became the capital of a district (of the same name) which then embraced all the eastern part of the Transvaal. In 1 856 the Boers of Lydenburg separated from their brethren and proclaimed an independent republic, which was, however, incorporated with the South African Republic in i860. The discovery of gold near the town was made in 1869, and in 1873 the first successful goldfield in the Transvaal was opened here. It was not until 1910, however, that Lydenburg was placed in railway communication with the rest of the country. The present district of Lydenburg consists of the north-east and central parts of the original district. In the Lulu Mountains, a spur of the Drakensberg, and some 40 m. N.W. of Lydenburg, was the stronghold of the Kaffir chief Sikukuni, whose conflict with the Boers in 1876 was one of the causes which led to the annexation of the Transvaal by Great Britain in 1877. (See Transvaal: History.)

LYDFORD, or Lidford, a village, once an important town, in the western parliamentary division of Devonshire, England, near the western confines of Dartmoor, 27 m. N. of Plymouth by the London & South- Western railway. From its Perpen- dicular church of St Petrock fine views of the Dartmoor tors are seen. The village stands on the small river Lyd, which traverses a deep narrow chasm, crossed by a bridge of single span ; and at a little distance a tributary stream forms a cascade in an exquisite glen. Close to the church are slight remains of the castle of Lydford.

Lydford (Lideford) was one of the four Saxon boroughs of Devon, and possessed a mint in the days of ˆEthelred the Unready. It first appears in recorded history in 997, when the Danes made a plundering expedition up the Tamar and Tavy as far as ” Hlidaforda.” In the reign of Edward the Confessor it was the most populous centre in Devonshire after Exeter, but the Domesday Survey relates that forty houses had been laid waste since the Conquest, and the town never recovered its former prosperity; the history from the 13th century centres round the castle, which is first mentioned in 1216, when it was granted to William Briwere, and was shortly afterwards fixed as the prison of the stannaries and the meeting-place of the Forest Courts of Dartmoor. A gild at Lideford is mentioned in 1 1 80, and the pipe roll of 1195 records a grant for the re- establishment of the market. In 1238 the borough, which had hitherto been crown demesne, was bestowed by Henry III. on Richard, earl of Cornwall, who in 1268 obtained a grant of a Wednesday market and a three days’ fair at the feast of St Petrock. The borough had a separate coroner and bailiff in 1275, but it was never incorporated by charter, and only once, in 1300, returned members to parliament. Lydford prison is described in 1512 as ” one of the most hainous, contagious and detestable places in the realm,” and ” Lydford Law ” was a by-word for injustice. At the time of the Commonwealth the castle was entirely in ruins, but in the 18th century it was restored and again used as a prison and as the meeting-place of the manor and borough courts.

LYDGATE, JOHN (c. 1370-c. 1451), English poet, was born at the village of Lydgate, some 6 or 7 m. from Newmarket. It is, however, with the Benedictine abbey of Bury St Edmunds that he is chiefly associated. Probably he was educated at the school attached to the monastery, and in his Testament he has drawn a lively picture of himself as a typical orchard-robbing boy, who had scant relish for matins, fought, and threw creed and paternoster at the cock. He was ordained sub-deacon in 1389, deacon in 1393, and priest in 1397. These dates are valuable as enabling us to fix approximately the date of his birth, which must have occurred somewhere about 1370.

Lydgate passed as a portent of learning, and, according to Bale, he pursued his studies not only at both the English universities but in France and Italy. Koeppel (see Latirents de Premierjait und John Lydgates Bearbeitungen von Boccaccios De Casibus, Munich, 1885) has thrown much doubt on this statement as regards Italy, but Lydgate knew P'rance and visited Paris in an official capacity in 1426. Bale is also the authority for another assertion that figures in what has been aptly termed the poet's " traditional biography," viz. that Lydgate, on completing his own education, kept school for the sons of noblemen and gentlemen. This " traditional biography " prolongs his life to the year 1461, but it is quite improbable that he lived many years after 1446, when Abbot Curteys died and John Baret, treasurer of Bury, signed an extant receipt for a pension which he shared with Lydgate, and which continued to be paid till 1449. If it be true, as Bishop Alcock of Ely affirms, that Lydgate wrote a poem on the loss of France and Gascony, it seems necessary to suppose that he lived two years longer, and thus indications point to the year 1451, or thereabouts, as the date of his death.

Lydgate had a consuming passion for literature, and it was probably that he might indulge this taste more fully that in 1434 he retired from the priorate of Hatfield Broadoak (or Hatfield Regis), to. which he had been appointed in June 1423. After 1390 — but whilst he was still a young man — he made the

acquaintance of Geoffrey Chaucer, with whose son Thomas he was on terms of considerable intimacy. This friendship appears to have decided Lydgate's career, and in his Troy-book and elsewhere are reverent and touching tributes to his " master." The passages in question do not exaggerate his obligations to the " well of English." The themes of all his more ambitious poems can be traced to Chaucerian sources. The Story of Thebes, for instance, was doubtless suggested by the " romance " which Cressida and her companions are represented as reading when interrupted by Pandarus {Troilus and. Cressida, II. xii.-xvi). The Falls of Princes, again, is merely the Monk's Tale " writ large."

Lydgate is a most voluminous writer. The Falls of Princes alone comprises 7000 stanzas; and his authentic compositions reach the enormous total of 150,000 lines. Cursed with such immoderate fluency Lydgate could not sustain himself at the highest level of artistic excellence; and, though imbued with a sense of the essentials of poetry, and eager to prove himself in its various manifestations, he stinted himself of the self-discipline necessary to perfection of form. As the result the bulk of his composition is wholly or comparatively

rough-hewn. That he was capable of better work than is suggested by his average accomplishment is shown by two allegorical poems — the Complaint of the Black Knight and the Temple of Glass (once attributed to Hawes). In these he reveals himself as a not unworthy successor of Chaucer, and the pity of it is that he should have squandered his powers in a futile attempt to create an entire literature. For a couple of centuries Lydgate's reputation equalled, if it did not surpass, that of his master. This was in a sense only natural, since he was the real founder of the school of which Stephen Hawes was a distinguished ornament, and which " held the field " in English letters during the long and dreary interval between Chaucer and Spenser. One of the most obvious defects of this school is excessive attachment to poly- syllabic terms. Lydgate is not quite so great a sinner in this respect as are some of his successors, but his tendency cannot be mistaken, and John Metham is amply justified in his censure — Eke John Lydgate, sometime monk of Bury, His books indited with terms of rhetoric And half-changed Latin, with conceits of poetry.

Pedantry was an inevitable effect of the early Renaissance. French literature passed through the same phase, from which indeed it was later in emerging; and the ultimate consequence was the enrichment of both languages. It must be conceded as no small merit in Lydgate that, in an age of experiment he should have succeeded so often in hitting the right word. Thomas Warton remarks on his lucidity. Since his writings are read more easily than Chaucer's, the inference is plain — that he was more effectual as a maker of our present English. In spite of that, Lydgate is characteristically medieval — medieval in his prolixity, his platitude, his want of judgment and his want of taste; medieval also in his pessimism, his Mariolatry and his horror of death. These attributes jarred on the sensitive Ritson, who racked his brains for contumelious epithets such as " stupid and disgusting," "cart-loads of rubbish," &c; and during the greater part of the 18th and 19th centuries Lydgate's reputation was at its lowest ebb. Recent criticism has been far more impartial, and almost too much respect has been paid to his attainments, especially in the matter of metre, though Lydgate himself, with offensive lightheartedness, admits his poor crafts- manship.

Lydgate's most doughty and learned apologist is Dr Schick, whose preface to the Temple of Glass embodies practically all that is known or conjectured concerning this author, including the chronological order of his works. With the exception of the Damage and Destruction in Realms— an account of Julius Caesar, his wars and his death — they are all in verse and extremely multifarious — narrative, de-

votional hagiological, philosophical and scientific, allegorical and moral, historical, satirical and occasional. The Troy-book, undertaken at the command of Henry V., then prince of Wales, dates from 1412-1420; the Story of Thebes from 1420-1422; and the Falls of Princes towards 1430. His latest work was Secreta Secretorum or Secrets of Old Philosophers, rhymed extracts from a pseudo-Aristotelian treatise. Lydgate certainly possessed extraordinary versatility,

which enaDied him to turn from elaborate epics to quite popular poems like the Mumming at Hertford, A Ditty of Women's Horns and London Lickpenny. The humour of this last is especially bright and effective, but, unluckily for the author, the piece is believed to have been retouched by some other hand. The longer efforts partake of the nature of translations from sundry medieval compilations like those of Guido di Colonna and Boccaccio, which are in Latin.

See publications of the Early English Text Society, especially the Temple of Glass, edited by Dr Schick; Koeppel's Lydgate's Story of Thebes, eine Quellenuntersuchung (Munich, 1884), and the same scholar's Laurents de Premierfait und John Lydgates Bearbeitungen von Boccaccios De Casibus Illustrium Virorum (Munich, 1885); Warton's History of English Poetry; Ritson's Bibliotheca Anglo-Poetica; Furnivall's Political Poems (E. E. T. S.) ; and Sidney Lee's article in the Diet. Nat. Biog. (F. J. S.)

LYDIA, in ancient geography, a district of Asia Minor, the boundaries of which it is difficult to fix, partly because they varied at different epochs. The name is first found under the form of Luddi in the inscriptions of the Assyrian king Assur- bani-pal, who received tribute from Gyges about 660 B.C. In Homer we read only of Maeonians (77. ii. 865, v. 43, x. 431), and the place of the Lydian capital Sardis is taken by Hyde (77. xx. 385), unless this was the name of the district in which Sardis stood (see Strabo xiii. p. 626). 1 The earliest Greek writer who mentions the name is Mimnermus of Colophon, in the 37th Olympiad. According to Herodotus (i. 7), the Meiones (called Maeones by other writers) were named Lydians after Lydus, the son of Attis, in the mythical epoch which preceded the rise of the Heraclid dynasty. In historical times the Maeones were a tribe inhabiting the district of the upper Hermus, where a town called Maeonia existed (Pliny, N.H. v. 30; Hierocles, p. 670). The Lydians must originally have been an

allied tribe which bordered upon them to the north-west, and occupied the plain of Sardis or Magnesia at the foot of Tmolus and Sipylus. They were cut off from the sea by the Greeks, who were in possession, not only of the Bay of Smyrna, but also of the country north of Sipylus as far as Temnus in the pass (boghaz), through which the Hermus forces its way from the plain of Magnesia into its lower valley. 2 In a Homeric epigram the ridge north of the Hermus, on which the ruins of Temnus lie, is called Sardene. Northward the Lydians extended at least as far as the Gygaean Lake (Lake Coloe, mod. Mermereh), and the Sardene range (mod. Dumanli Dagh). The plateau of the Bin Bir Tepe, on the southern shore of the Gygaean Lake, was the chief burial-place of the inhabitants of Sardis, and is still thickly studded with tumuli, among which is the ” tomb of Alyattes ” (260 ft. high). Next to Sardis the chief city was Magnesia ad Sipylum (q.v.), in the neighbourhood of which is the famous seated figure of ” Niobe ” (77. xxiv. 614-617), cutout of the rock, and probably intended to represent the goddess Cybele, to which the Greeks attached their legend of Niobe. According to Pliny (v. 31), Tantalis, afterwards swallowed up by earthquake in the pool Sale or Saloe, was the ancient name of Sipylus and “the capital of Maeonia” (Paus. vii. 24; Strabo xii. 579). Under the Heraclid dynasty the limits of Lydia must have been already extended, since according to Strabo (xiii. 590), the authority of Gyges reached as far as the Troad. Under the Mermnads Lydia became a maritime as well as an inland power. The Greek cities were conquered, and the coast of Ionia included within the Lydian kingdom. The successes of Alyattes and of Croesus finally changed the Lydian kingdom into a Lydian empire, and all Asia Minor westward of the Halys, except Lycia, owned the supremacy of Sardis. Lydia never again shrank back into its original dimensions. After the Persian conquest the Maeander was regarded as its southern boundary, and in the Roman period it comprised the country between Mysia and Caria on the one side and Phrygia and the Aegean on the other.

Lydia proper was exceedingly fertile. The hill-sides were clothed with vine and fir, and the rich broad plain of Hermus produced large quantities of corn and saffron. The climate of the plain was soft but healthy, though the country was subject to frequent earthquakes. The Pactolus, which flowed from the fountain of Tarne in the Tmolus mountains, through the centre of Sardis, into the Hermus, was believed to be full of golden sand;

1 Pliny (v. 30) makes it the Maeonian name.

2 See Sir W. M. Ramsay in the Journal of Hellenic Studies, ii. 2.

and gold mines were worked in Tmolus itself, though by the time of Strabo the proceeds had become so small as hardly to pay for the expense of working them (Strabo xiii. 591). Maeonia on the east contained the curious barren plateau known to the Greeks as the Katakekaumene (“Burnt country “), once a centre of volcanic disturbance. The Gygaean lake (where remains of pile dwellings have been found) still abounds with carp.

Herodotus (i. 171) tells us that Lydus was a brother of Mysus and Car. The statement is on the whole borne out by the few Lydian, Mysian and Carian words that have been preserved, as well as by the general character of the civilization prevailing among the three nations. The race was probably a mixed one, consisting of aborigines and Aryan immigrants. It was character- ized by industry and a commercial spirit, and, before the Persian conquest, by bravery. The religion of the Lydians resembled that of the other civilized nations of Asia Minor. It was a nature worship, which at times became wild and sensuous. By the side of the supreme god Medeus stood the sun-god Attis, as in Phrygia the chief object of the popular cult. He was at once the son and bridegroom of Cybele (q.v.) or Cybebe, the mother of the gods, whose image carved by Broteas, son of Tantalus, was adored on the cliffs of Sipylus (Paus. iii. 22). The cult may have been brought westward by the Hittites who have left memorials of themselves in the pseudo-Sesostris figures of Kara-bel (between Sardis and Ephesus) as well as in the figure of the Mother- goddess, the so-called Niobe. At Ephesus, where she was adored under the form of a meteoric stone, she was identified with the Greek Artemis (see also Great Mother of the Gods). Her mural crown is first seen in the Hittite sculptures of Boghaz Keui (see Pteria and Hittites) on the Halys. The priestesses by whom she was served are depicted in early art as armed with the double-headed axe, and the dances they perfoimed in her honour with shield and bow gave rise to the myths which saw in them the Amazons, a nation of woman-warriors. The pre- Hellenic cities of the coast — Smyrna, Samorna (Ephesus), Myrina, Cyme, Priene and Pitane — were all of Amazonian origin, and the first three of them have the same name as the Amazon Myrina, whose tomb was pointed out in the Troad. The prosti- tution whereby the Lydian girls gained their dowries (Herod, i. 93) was a religious exercise, as among the Semites, which marked their devotion to the goddess Cybele. In the legend of Heracles, Omphale takes the place of Cybele, and was perhaps her Lydian title. Heracles is here the sun-god Attis in a new form; his Lydian name is unknown, since E. Meyer has shown {Zeitschr. d. Morg. Gesell. xxxi. 4) that Sandon belongs not to Lydia but to Cilicia. By the side of Attis stood Manes or Men, identified later

with the Moon-god.

According to the native historian Xanthus (460 B.C.) three dynasties ruled in succession over Lydia. The first, that of the Attiads, is mythical. It was headed by a god, and included geographical personages like Lydus, Asies and Meles, or such heroes of folk-lore as Cambletes, who devoured his wife. To this mythical age belongs the colony which, according to Herodotus (i. 94), Tyrsenus, the son of Attis, led to Etruria. Xanthus, however, puts Torrhebus in the place of Tyrsenus, and makes him the eponym of a district in Lydia. It is doubtful whether Xanthus recognized the Greek legends which brought Pelops from Lydia, or rather Maeonia, and made him the son of Tantalus. The sec6nd dynasty was also of divine origin, but the names which head it prove its connexion with the distant East. Its founder, a descendant of Heracles and Omphale, was, Herodotus tells us (i. 7) , a son of Ninus and grandson of Belus. The Assyrian inscriptions have shown that the Assyrians had never crossed the Halys, much less known the name of Lydia, before the age of Assur-bani-pal, and consequently the theory which brought the Heraclids from Nineveh must be given up. But the Hittites, another Oriental people, deeply imbued with the elements of Babylonian culture, had overrun Asia Minor and established themselves on the shores of the Aegean before the reign of the Egyptian king Rameses II.

The subject allies who then fight under their banners include the Masu or Mysians and the Dardani of the Troad, while the

Hittites have left memorials in Lydia. G. Dennis discovered an inscription in Hittite hieroglyphics attached to the figure of ” Niobe ” on Sipylus, and a similar inscription accompanies the figure (in which Herodotus, ii. 106, wished to see Sesostris or Rameses II.) in the pass of Karabel. We learn from Eusebius that Sardis was first captured by the Cimmerii 1078 B.C.; and since it was four centuries later before the real Cimmerii (q.v.) appeared on the horizon of history, we may perhaps find in the statement a tradition of the Hittite conquest. As the authority of the Hittite satraps at Sardis began to decay the Heraclid dynasty arose. According to Xanthus, Sadyattes and Lixus were the successors of Tylon the son of Omphale. After lasting five hundred and five years, the dynasty came to an end in the person of Sadyattes, as he is called by Nicolas of Damascus, whose account is doubtless derived from Xanthus. The name Can- daules, given him by

Herodotus, meant ” dog strangler ” and was a title of the Lydian Hermes. Gyges (q.v.) put him to death and established the dynasty of the Mermnads, 687 B.C. Gyges initiated a new policy, that of making Lydia a maritime power; but towards the middle of his reign the kingdom was overrun by the Cimmerii. The lower town of Sardis was taken, and Gyges sent tribute to Assur-bani-pal, as well as two Cimmerian chief- tains he had himself captured in battle. A few years later Gyges joined in the revolt against Assyria, and the Ionic and Carian mercenaries he despatched to Egypt enabled Psam- metichus to make himself independent. Assyria, however, was soon avenged. The Cimmerian hordes returned, Gyges was slain in battle (652 B.C.), and Ardys his son and successor returned to his allegiance to Nineveh. The second capture of Sardis on this occasion was alluded to by Callisthenes (Strabo xiii. 627). Alyattes, the grandson of Ardys, finally succeeded in extirpating the Cimmerii, as well as in taking Smyrna, and thus providing his kingdom with a port. The trade and wealth of Lydia rapidly increased, and the Greek towns fell one after the other before the attacks of the Lydian kings. Alyattes’s long reign of fifty-seven years saw the foundation of the Lydian empire. All Asia Minor west of the Halys acknowledged his sway, and the six years’ contest he carried on with the Medes was closed by the marriage of his daughter Aryenis to Astyages. The Greek cities were allowed to retain their own institutions and government on con- dition of paying taxes and dues to the Lydian monarch, and the proceeds of their commerce thus flowed into the imperial exchequer. The result was that the king of Lydia became the richest prince of his age. Alyattes was succeeded by Croesus (q.v.), who had probably already for some years shared the royal power with his father, or perhaps grandfather, as V. Floigl thinks (Geschichte des semilischen Alterthums, p. 20). He reigned alone only fifteen years, Cyrus the Persian, after an indecisive battle on the Halys, marching upon Sardis, and capturing both acropolis and monarch (546 B.C.). The place where the acropolis was entered was believed to have been overlooked by the mythical Meles when he carried the lion round his fortress to make it invulnerable; it was really a path opened by one of the landslips, which have reduced the sandstone cliff of the acropolis to a mere shell, and threaten to carry it altogether into the plain below. The revolt of the Lydians under Pactyas, whom Cyrus had appointed to collect the taxes, caused the Persian king to disarm them, though we can hardly credit the statement that by this measure their warlike spirit was crushed. Sardis now became the western capital of the Persian empire, and its burning by the Athenians was the indirect cause of the Persian War. After Alexander the Great’s death, Lydia passed to Antigonus; then Achaeus made himself king at Sardis, but was defeated and put to death by Antiochus. The country was

presented by the Romans to Eumenes, and subsequently formed part of the proconsular province of Asia. By the time of Strabo (xiii. 631) its old language was entirely supplanted by Greek.

The Lydian empire may be described as the industrial power of the ancient world. The Lydians were credited with being the inventors, not only of games such as dice, huckle-bones and ball (Herod, i. 94), but also of coined money. The oldest known coins are the electrum coins of the earlier Mermnads (Madden, Coins of the Jews, pp. 19-21), stamped on one side with a lion's head or the

figure of a king with bow and quiver; these were replaced by Croesus with a coinage of pure gold and silver. To the latter monarch were probably due the earliest gold coins of Ephesus (Head, Coinage of Ephesus, p. 16). The electrum coins of Lydia were of two kinds, one weighing 168-4 grains for the inland trade, and another of 224 grains for the trade with Ionia. The standard was the silver mina of Carchemish (as the Assyrians called it) which contained 8656 grains. Originally derived by the Hittites from Babylonia, but modified by themselves, this standard was passed on to the nations of Asia Minor during the period of Hittite conquest, but was eventually superseded by the Phoenician mina of 11,225 grains, and continued to survive only in Cyprus and Cilicia (see also Numismatics). The inns, which the Lydians were said to have been the first to establish (Herod, i. 94), were connected with their attention to commercial pursuits. Their literature has wholly perished. They were cele- brated for their music and gymnastic exercises, and their art formed a link between that of Asia Minor and that of Greece. R. Heberdey's excavations at Ephesus since 1896, like those of D. G. Hogarth in 1905, belong to the history of Greek and not native art. The ivory figures, however, found by Hogarth on the level of the earliest temple of Artemis show Asiatic influence, and resemble the so-called "Phoe- nician " ivories from the palace of Sargon at Calah (Nimrud). For a description of a pectoral of white gold, ornamented with the heads of animals, human faces and the figure of a goddess, discovered in a tomb on Tmolus, see Academy, January 15, 1881, p. 45. Lydian sculpture was probably similar to that of the Phrygians. Phallic emblems, for averting evil, were plentiful ; the summit of the tomb of Alyattes is crowned with an enormous one of stone, about 9 ft. in diameter. The tumulus itself is 281 yds. in diameter and about half a mile in circumference. It has been partially excavated by G. Spiegelthal and G. Dennis, and a sepulchral chamber discovered in the middle, composed of large well-cut and highly polished blocks of marble, the chamber being 11 ft. long, nearly 8 ft. broad and 7 ft. high. Nothing was found in it except a few ashes and a broken vase of Egyptian alabaster. The stone

basement which, according to Herodotus, formerly surrounded the mound has disappeared.

‘ Bibliography. — A. von Olfers, Tiber die lyiischen Kbnigsgrdber bei Sardes (1858); H. Gelzer in the Rheinisches Museum (1874); R. Schubert, Geschichte der Konige von Lydien (1884) ; G. Perrot and C. Chipiez, Histoire de I’art dans Vantiquite, v. (1890) ; O. Radet, La Lydie et le monde grec au temps des Mermnades (1893); G. Maspero, Dawn of Civilization, pp. 232-301 (1892) and Passing of the Empires, pp. 339, 388, 603-62 1 (1900) ; J. Keiland A. von Premerstein, Bericht iiber eine Reise in Lydien (1908). (A. H. S.)

LYDUS (“The Lydian”), JOANNES LAURENTIUS, Byzan- tine writer on antiquarian subjects, was born at Philadelphia in Lydia about a.d. 490. At an early age he set out to seek his fortune in Constantinople, and held high court and state offices under Anastasius and Justinian. In 552 he lost favour, and was dismissed. The date of his death is not known, but he was probably alive during the early years of Justin II. (reigned 565— 578). During his retirement he occupied himself in the compila- tion of works on the antiquities of Rome, three of which have been preserved: (1) De Ostentis (Jltpl Siocrqfiei&v) , on the origin and progress of the art of divination; (2) De Magistratibus reipublicae Romanae (Uepl apx&v ttjs ‘Pajjucucop 7roXtmas), especially valuable for the administrative details of the time of Justinian; (3) De Mensibus (Ilepi yvrjvuiv) , a history of the different festivals of the year. The chief value of these books consists in the fact that the author made use of the works (now lost) of old Roman writers on similar subjects. Lydus was also com- missioned by Justinian to compose a panegyric on the emperor, and a history of his successful campaign against Persia; but these, as well as some poetical compositions, are lost.

Editions of (1) by C. Wachsmuth (1897), with full account of the authorities in the prolegomena; of (2) and (3) by R. Wunsch (1898-1903); see also the essay by C. B. Hase (the first editor of the De Ostentis) prefixed to I. Bekker’s edition of Lydus (1837) in the Bonn Corpus scriptorum hist. Byzantinae.

LYE (O. Eng. leag, cf. Dutch hog, Ger. Lauge, from the root meaning to wash, see in Lat. lavare, and Eng. ” lather,” froth of soap and water, and ” laundry “), the name given to the solution of alkaline salts obtained by leaching or lixiviating wood ashes with water, and sometimes to a solution of a caustic alkali. Lixiviation (Lat. lixivium, lye, lix, ashes) is the action of separat- ing, by the percolation of water, a soluble from an insoluble substance. ” Leaching,” the native

English term for this process, is from ” leach,” to water, the root probably being the same as in ” lake.”

LYELL, SIR CHARLES (1797-1875), British geologist, was the eldest son of Charles Lyell of Kinnordy, Forfarshire, and

was born on the 14th of November 1797, on the family estate in Scotland. His father (1767-1849) was known both as a botanist and as the translator of the Vita Nuova and the Convito of Dante : the plant Lyellia was named after him. From his boyhood Lyell had a strong inclination for natural history, especially ento- mology, a taste which he cultivated at Bartley Lodge in the New Forest, to which his family had removed soon after his birth. In 1816 he entered Exeter College, Oxford, where the lectures of Dr Buckland first drew his attention to geological study. After taking his degree of B.A. in 1819 (M.A. in 1821) he entered Lincoln’s Inn, and in 1825, after a delay caused by chronic weakness of the eyes, he was called to the bar, and went on the western circuit for two years. During this time he was slowly gravitating towards the life of a student of science. In 1819 he had been elected a fellow of the Linnean and Geological Societies, communicating his first paper, ” On a Recent Formation of Fresh-water Limestone in Forfarshire,” to the latter society in 1822, and acting as one of the honorary secretaries in 1823. In that year he went to France, with introductions to Cuvier, Hum- boldt and other men of science, and in 1824 made a geological tour in Scotland in company with Dr Buckland. In 1826 he was elected a fellow of the Royal Society, from which in later years he received both the Copley and Royal medals; and in 1827 he finally abandoned the legal profession, and devoted himself to geology.

At this time he had already begun to plan his chief work, The Principles of Geology. The subsidiary title, ” An Attempt to Explain the Former Changes of the Earth’s Surface by Reference to Causes now in Operation,” gives the keynote of the task to which Lyell devoted his life. A journey with Murchison in 1828 gave rise to joint papers on the volcanic district of Auvergne and the Tertiary formations of Aix-en-Provence. After parting with Murchison he studied the marine remains of the Italian Tertiary Strata and then conceived the idea of dividing this geological system into three or four groups, characterized by the proportion of recent to extinct species of shells. To these groups, after consulting Dr Whewell as to the best nomenclature, he gave the names

now universally adopted — Eocene {dawn of recent), Miocene (less of recent), and Pliocene (more of recent); and with the assistance of G. P. Deshayes he drew up a table of shells in illustration of this classification. The first volume of the Principles of Geology appeared in 1830, and the second in January 1832. Received at first with some opposition, so far as its leading theory was concerned, the work had ultimately a great success, and the two volumes had already reached a second edition in 1833 when the third, dealing with the successive forma- tions of the earth's crust, was added. Between 1830 and 1872 eleven editions of this work were published, each so much enriched with new material and the results of riper thought as to form a complete history of the progress of geology during that interval. Only a few days before his death Sir Charles finished revising the first volume of the 12th edition; the revision of the second volume was completed by his nephew Mr (after- wards Sir) Leonard Lyell; and the work appeared in 1876.

In August 1838 Lyell published the Elements of Geology, which, from being originally an expansion of one section of the Principles, became a standard work on stratigraphical and palaeontological geology. This book went through six editions in Lyell's lifetime (some intermediate editions being styled Manual of Elementary Geology), and in 187 1 a smaller work, the Student's Elements of Geology, was based upon it. His third great work, The Antiquity of Man, appeared in 1863, and ran through three editions in one year. In this he gave a general survey of the arguments for man's early appearance on the earth, derived from the discoveries of flint implements in post-Pliocene strata in the Somme valley and elsewhere; he discussed also the deposits of the Glacial epoch, and in the same volume he first gave in his adhesion to Darwin's theory of the origin of species. A fourth edition appeared in 1873.

In 1831-1833 Lyell was professor of geology at King's College, London, and delivered while there a course of lectures, whieh became the foundation of the Elements of Geology. In 1832 he

married Mary (1809-1873) eldest daughter of Leonard Horner (q.v.), and she became thenceforward associated with him in all his work, and by her social qualities making his home a centre of attraction. In 1834 he made an excursion to Denmark and Sweden, the result of which was his Bakerian lecture to the Royal Society " On the Proofs of the gradual Rising of Land in certain Parts of Sweden." He also brought before the Geological Society a paper " On the Cretaceous and Tertiary Strata of Seeland and Moen." In 1835 he became president of the Geological Society. In 1837 he was again in Norway and Denmark,

and in 1841 he spent a year in travelling through the United States, Canada and Nova Scotia. This last journey, together with a second one to America in 1845, resulted not only in papers, but also in two works not exclusively geological, Travels in North America (1845) and A Second Visit to the United States (1849). During these journeys he estimated the rate of recession of the falls of Niagara, the annual average accumulation of alluvial matter in the delta of the Mississippi, and studied those vegetable accumulations in the ” Great Dismal Swamp ” of Virginia, which he afterwards used in illustrating the forma- tion of beds of coal. He also studied the coal-formations in Nova Scotia, and discovered in company with Dr (afterwards Sir J. W.) Dawson (q.v.) of Montreal, the earliest known landshell, Pupa vetusta, in the hollow stem of a Sigillaria. In bringing a knowledge of European geology to bear upon the extended formations of North America Lyell rendered immense service. Having visited Madeira and Teneriffe in company with G. Hartung, he accumulated much valuable evidence on the age and deposition of lava-beds and the formation of volcanic cones. He also revisited Sicily in 1858, when he made such observations upon the structure of Etna as refuted the theory of ” craters of elevation ” upheld by Von Buch and Elie de Beaumont (see Phil. Trans., 1859).

Lyell was knighted in 1848, and was created a baronet in 1864, in which year he was president of the British Association at Bath. He was elected corresponding member of the French Institute and of the Royal Academy of Sciences at Berlin, and was created a knight of the Prussian Order of Merit.

During the later years of his life his sight, always weak, failed him altogether. He died on the 22nd of February 1875, and was buried in Westminster Abbey. Among his characteristics were his great thirst for knowledge, his perfect fairness and sound judgment; while the extreme freshness of his mind enabled him to accept and appreciate the work of younger men.

The Lyell Medal, established in 1875 under the will of Sir Charles Lyell, is cast in bronze and is to be awarded annually (or from time to time) by the Council of the Geological Society. The medallist may be of any country or either sex. Not less than one-third of the annual interest of a sum of £2000 is to be awarded with the medal; the remaining interest, known as the Lyell Geological Fund, is to be given in one or more portions at the discretion of the Council for the encouragement of geological science.

See Life, Letters and Journals of Sir Charles Lyell, Bart., edited by his

sister-in-law, Mrs Lyell (2 vols., 1881) ; Charles Lyell and Modern Geology, by T. G. Bonney (1895). (H. B. Wo.)

LYLY (Lilly, or Lylie), JOHN (1553-1606), English writer, the famous author of Euphues, was born in Kent in 1553 or 1554. At the age of sixteen, according to Wood, he became a student of Magdalen College, Oxford, where in due time he proceeded to his bachelor's and master's degrees (1573 and 1575), and from whence we find him in 1574 applying to Lord Burghley "for the queen's letters to Magdalen College to admit him fellow." The fellowship, however, was not granted, and Lyly shortly after left the university. He complains of what seems to have been a sentence of rustication passed upon him at some period in his academical career, in his address to the gentlemen scholars of Oxford affixed to the second edition of the first part of Euphues, but in the absence of any further evidence it is impossible to fix either its date or its cause. If we are to believe Wood, he never took kindly to the proper studies of the university. " For so it was that his genius being naturally bent to the pleasant paths of poetry (as if Apollo had given to him a wreath of his own bays without snatching or struggling) did in a manner

neglect academical studies, yet not so much but that he took the degrees in arts, that of master being compleated 1575-" After he left Oxford, where he had already the reputation of " a noted wit," Lyly seems to have attached himself to Lord Burgh- ley. " This noble man," he writes in the " Glasse for Europe," in the second part of Euphues (1580), " I found so ready being but a straunger to do me good, that neyther I ought to forget him, neyther cease to pray for him, that as he hath the wisdom of Nestor, so he may have the age, that having the policies of Ulysses he may have his honor, worthy to lyve long, by whom so many lyve in quiet, and not unworthy to be advaunced by whose care so many have been preferred." Two years later we possess a letter of Lyly to the treasurer, dated July 1582, in which the writer protests against some accusation of dis- honesty which had brought him into trouble with his patron, and demands a personal interview for the purpose of clearing his character. What the further relations beween them were we have no means of knowing, but it is clear that neither from Burghley nor from the queen did Lyly ever receive any sub- stantial patronage. In 1578 he began his literary career by the composition of Euphues, or the Anatomy of Wit, which was licensed to Gabriel Cawood on the 2nd of December, 1578, and pub- lished in

the spring of 1 5 79. In the same year the author was incor- porated M.A. at Cambridge, and possibly saw his hopes of court advancement dashed by the appointment in July of Edmund Tylney to the office of master of the revels, a post at which, as he reminds the queen some years later, he had all along been encouraged to ” aim his courses.” Euphues and his England appeared in 1580, and, like the first part of the book, won im- mediate popularity. For a time Lyly was the most successful and fashionable of English writers. He was hailed as the author of “a new English,” as a ” raffineur de l’Anglois”; and, as Edmund Blount, the editor of his plays, tells us in 1632, ” that beautie in court which could not parley Euphuism was as little regarded as she which nowe there speakes not French.” After tne publication of Euphues, however, Lyly seems to have entirely deserted the novel form himself, which passed into the hands of his imitators, and to have thrown himself almost exclusively into play-writing, probably with a view to the mastership of revels whenever a vacancy should occur. Eight plays by him were probably acted before the queen by the children of the Chapel Royal and the children of St Paul’s between the years 1584 and 1589, one or two of them being repeated before a popular audience at the Blackfriars Theatre. Their brisk lively dialogue, classical colour and frequent allusions to persons and events of the day maintained that popularity with the court which Euphues had won. Lyly sat in parliament as member for Hindon in 1589, for Aylesbury in 1593, for Appleby in 1597 and for Aylesbury a second time in 1601. In 1589 Lyly published a tract in the Martin Marprelate controversy, called Pappe with an hatchet, alias a figge for my Godsonne; Or Crack me this nut; Or a Countrie Cuffe, &C. 1 About the same time we may probably date his first petition to Queen Elizabeth. The two petitions, transcripts of which are extant among the Harleian MSS., are undated, but in the first of them he speaks of having been ten years hanging about the court in hope of preferment, and in the second he extends the period to thirteen years. It may be conjectured with great probability that the ten years date from 1579, when Edmund Tylney was appointed master of the revels with a tacit understanding that Lyly was to have the next reversion of the post. ” I was entertained your Majestie’s servaunt by your own gratious favor,” he says, ” strengthened with condicions that I should ayme all my courses at the Revells (I dare not say with a promise, but with a hopeful Item to the Revercion) for which these ten yeres I have attended with an unwearyed patience.” But in 1589 or 1590 the mastership of the revels was as far off as ever — Tylney in fact held the post for thirty-one years — and that 1 The evidence for his authorship may be found in Gabriel Harvey’s Pierce’s Supererogation (written November 1589, published 1593), in Nash’s Have with you to

Saffron Walden (1596), and in various allusions in Lyly's own plays. See Fairholt's Dramatic Works of John Lilly, i. 20.

Lyly's petition brought him no compensation in other directions may be inferred from the second petition of 1593. " Thirteen yeres your highnes servant but yet nothing. Twenty freinds that though they saye they will be sure, I finde them sure to be slowe. A thousand hopes, but all nothing; a hundred promises but yet nothing. Thus casting up the inventory of my friends, hopes, promises and tymes, the summa totalis amounteth to just nothing." What may have been Lyly's subsequent fortunes at court we do not know. Edmund Blount says vaguely that Elizabeth " graced and rewarded " him, but of this there is no other evidence. After 1590 his works steadily declined in influence and reputation; other stars were in possession of the horizon; and so far as we know he died poor and neglected in the early part of James I.'s reign. He was buried in London at St Bartholomew the Less on the 20th of November, 1606. He was married, and we hear of two sons and a daughter.

Comedies. — In 1632 Edmund Blount published " Six Court Comedies," including Endymion (1591), Sappho and Phao (1584), Alexander and Campaspe (1584), Midas (1592), Mother Bombie (1594) and Gallathea (1592). To these should be added the Woman in the Moone (Lyly's earliest play, to judge from a passage in the prologue and therefore earlier than 1584, the date of Alexander and Campaspe), and Love's Metamorphosis, first printed in 1601. Of these, all but the last are in prose. A Warning for Faire Women (1599) and The Maid's Metamorphosis (1600) have been- attributed to Lyly, but on altogether insufficient grounds. The first editions of all these plays were issued between 1584 and 1 601, and the majority of them between 1584 and 1592, in what were Lyly's most successful and popular years. His importance as a dramatist has been very differently esti- mated. Lyly's dialogue is still a long way removed from the dialogue of Shakespeare. But at the same time it is a great advance in rapidity and resource upon anything which had gone before it; it represents an important step in English dramatic art. His nimbleness, and the wit which struggles with his pedantry, found their full development in the dialogue of Twelfth Night and Much Ado about Nothing, just as " Marlowe's mighty line " led up to and was eclipsed by the majesty and music of Shakespearian passion. One or two of the songs introduced into his plays are justly famous and show a real lyrical gift. Nor in estimating his dramatic position and his effect upon his time must it be forgotten that his classical and mythological plots, flavourless and dull as they would be to a modern audience, were charged with interest to those courtly hearers who saw in Midas Philip

II., Elizabeth in Cynthia and perhaps Leicester “s unwelcome marriage with Lady Sheffield in the love affair between Endymion and Tellus which brings the former under Cynthia’s displeasure. As a matter of fact his reputation and popularity as a play-writer were considerable. Gabriel Harvey dreaded lest Lyly should make a play upon their quarrel; Meres, as is well known, places him among ” the best for comedy ” ; and Ben Jonson names him among those foremost rivals who were ” outshone ” and outsung by Shakespeare.

Euphues. — It was not, however, as a dramatist, but as the author of Euphues, that Lyly made most mark upon the Eliza- bethan world. His plays amused the court circle, but the ” new English ” of his novel threatened to permanently change the course of English style. The plot of Euphues is extremely simple. The hero, whose name may very possibly have been suggested by a passage in Ascham’s Schoolmaster, is introduced to us as still in bondage to the follies of youth, ” preferring fancy before friends, and this present humour before honour to come.” His travels bring him to Naples, where he falls in love with Lucilla, the governor’s light-minded daughter. Lucilla is already pledged to Euphues’s friend Philautus, but Euphues’s passion betrays his friendship, and the old lover finds himself thrown over by both friend and mistress. Euphues himself, however, is very soon forsaken for a more attractive suitor. He and Philautus make up their quarrel, and Euphues writes his friend ” a cooling card,” to be ” applied to all lovers,” which i» so severe upon the fair sex that Lyly feels it necessary to balance it by a sort of apology addressed ” to the grave matrons

and honest maidens of Italy.” Euphues then leaves Naples for his native Athens, where he gives himself up to study, of which the first fruits are two long treatises — the first, ” Euphues »nd his Ephoebus,” a disquisition on the art of education uddressed to parents, and the second, ” Euphues and Atheos,” a discussion cf the first principles of religion. The remainder of the book is filled up with correspondence between Euphues and his friends. We have letters from Euphues to Philautus on the death of Lucilla, to another friend on the death of his daughter, to one Botonio ” to take his exile patiently,” and to the ‘outh Aldus, remonstrating with him on his bad behaviour at ♦he university. Finally a pair of letters, the first from Li via •’ at the emperour’s court to Euphues at Athens,” answered by ” Euphues to Livia,” wind up the first part, and announce to us Euphues’s intention of visiting England.

An address from Lyly to Lord Delawarr is affixed, to which was added in the second edition ” An Address to the Gentlemen Scholars of England.”

Euphues and his England is rather longer than the first part. Euphues and Philautus travel from Naples to England. They arrive at Dover, halt for the night at Fidus’s house at Canterbury, and then proceed to London, where they make acquaintance with Surius, a young English gentleman of great birth and noble blood; Psellus, an Italian nobleman reputed ” great in magick “; Martius, an elderly Englishman; Camilla, a beautiful English girl of insignificant family; Lady Flavia and her niece Fraunces. After endless correspondence and conversation on all kinds of topics, Euphues is recalled to Athens, and from there corresponds with his friends. ” Euphues’ Glasse for Europe ” is a flattering description of England sent to Livia at Naples. It is the most interesting portion of the book, and throws light upon one or two points of Lyly’s own biography. The author naturally seized the opportunity for paying his inevitable tribute to the queen, and pays it in his most exalted style. ” O’ fortunate England that hath such a queene, ungratefull if thou praye not for hir, wicked if thou do not love hir, miserable if thou lose hir! ” — and so on. The book ends with Philautus’s announcement of his marriage to Fraunces, upon which Euphues sends characteristic congratulations and retires, ” tormented in body and grieved in mind,” to the Mount of Silexedra, ” where I leave him to his musing or Muses.”

Such is a brief outline of the book which for a time set the fashion for English prose. Two editions of each part appeared within the first year after publication, and thirteen editions of both are enumerated up to 1636, after which, with the excep- tion of a modernized version in 17 18, Euphues was never reprinted until 1868, when Dr Arber took it in hand. The reasons for its popularity are not far to seek. As far as matter was concerned it fell in with all the prevailing literary fashions. Its long disquisitions on love, religion, exile, women or education, on court life and country pleasures, handled all the most favourite topics in the secularized speculation of the time; its foreign background and travel talk pleased a society of which Lyly himself said ” trafic and travel hath woven the nature of all nations into ours and made this land like arras full of device which was broadcloth full of workmanship”; and, although Lyly steered clear in it of the worst classical pedantries of the day, the book was more than sufficiently steeped in classical learning, and based upon classical material, to attract a literary circle which was nothing if not humanist. A large proportion of its matter indeed was drawn from classical sources. The general tone of sententious moralizing may be traced to Plutarch,

from whom the treatise on education, ” Euphues and his Ephoebus,” and that on exile, ” Letter to Botonio to take his exile patiently,” are literally translated, as well as a number of other shorter passages either taken direct from the Latin versions or from some of the numerous English translations of Plutarch then current. The innumerable illustrations based upon a kind of pseudo natural history are largely taken from Pliny, while the mythology is that of Virgil and Ovid.

It was not the matter of Euphues, however, so much as the style which made it famous (see Euphuism). The source of Lyly’s

peculiar style has been traced by Dr Landmann {Der Euphuismus, sein Wesen, seine Quelle, seine Geschichte, &c. Giessen, 1881) to the influence of Don Antonio de Guevara, whose Libro Aureo de Marco Aurelio (1529) — a sort of historical romance based upon Plutarch and upon Marcus Aurelius’s Meditations, the object of which was to produce a ” mirror for princes,” of the kind so popular throughout the Renaissance— became almost immedi- ately popular in England. The first edition, or rather a French version of it, was translated into English by Lord Berners in 1531, and published in 1534. Before 1560 twelve editions of Lord Berners’s translation had been printed, and before 1578 six different translators of this and later works of Guevara had appeared. The translation, however, which had most influence upon English literature was that by North, the well-known translator of Plutarch, in 1557, called The Dial for Princes, Compiled by the Reverend Father in God Don Antony of Guevara, Byshop of Guadix, & ˚c, Englished out of the Frenche by Th. North. The sententious and antithetical style of the Dial for Princes is substantially that of Euphues, though Guevara on the whole handles it better than his imitator, and has many passages of real force and dignity. The general plan of the two books is also much the same. In both the biography is merely a peg on which to hang moral disquisitions and treatises. The use made of letters is the same in both. Even the names of some of the characters are similar. Thus Guevara’s Lucilla is the flighty daughter of Marcus Aurelius. Lyly’s Lucilla is the flighty daughter of Ferardo, governor of Naples; Guevara’s Livia is a lady at the court of Marcus Aurelius, Lyly’s Livia is a lady at the court ” of the emperor,” of whom no further description is given. The 9th, 10th, nth and 12th chapters of the Dial for Princes suggested the discussion between Euphues and Atheos. The letter from Euphues to Alcius is substantially the same in subject and treatment as that from Marcus Aurelius to his nephew Epesipo. Both Guevara and Lyly translated Plutarch’s work De

educatione liberorum, Lyly, however, keeping closer than the Spanish author to the original. The use made by Lyly of the university of Athens was an anachronism in a novel in- tended to describe his own time. He borrowed it, however, from Guevara, in whose book a university of Athens was of course entirely in place. The ” cooling card for all fond lovers ” and the address to the ladies and gentlemen of Italy have their counterparts among the miscellaneous letters by Guevara affixed by North to the Dial for Princes; and other instances of Lyly’s use of these letters, and of two other treatises by Guevara on court and country life, could be pointed out.

Lyly was not the first to appropriate and develop the Guevar- istic style. The earliest book in which it was fully adopted was A petite Pallace of Pettie his Pleasure, by George Pettie, which appeared in 1576, a production so closely akin to Euphues in tone and style that it is difficult to believe it was not by Lyly. Lyly, however, carried the style to its highest point, and made it the dominant literary fashion. His principal followers in it were Greene, Lodge and Nash, his principal opponent Sir Philip Sidney; the Arcadia in fact supplanted Euphues, and the Euphuistic taste proper may be said to have died out about 1 590 after a reign of some twelve years. According to Landmann, Shakespeare’s Love’s Labour Lost is a caricature of the Italianate and pedantic fashions of the day, not of the peculiar style of Euphues. The only certain allusion in Shakespeare to the characteristics of Lyly’s famous book is to be found in Henry IV., where Falstaff, playing the part of the king, says to Prince Hal, ” Harry, I do not only marvel where thou spendest thy time, but also how thou art accompanied; for, though the camomile the more it is trodden on the faster it grows, yet youth the more it is wasted the sooner it wears.” Here the pompous antithesis is evidently meant to caricature the peculiar Euphuistic sentence of court parlance. (M. A. W.)

See Lyly’s Complete Works, ed. R. W. Bond (3 vols., 1902); Euphues, from early editions, by Edward Arber (1868) ; A. W. Ward, English Dramatic Literature, i. 151 ; J. P. Collier, History of Dramatic Poetry, iii. 172 ; ” John Lilly and Shakespeare,”, by C. C. Hense in the Jahrbuch der deutschen Shakesp. Gesellschaft, vols. vii. and viii. (1872, J873) I F. W. Fairholt, Dramatic Works of John Lilly (2 vols.,

1858); Shakespeare’s Euphuism, by W. L. Rushton; H. Morley,

“Euphuism” in the Quarterly] Review (1861); R. W. Bond, ” John Lyly, Novelist and Dramatist,” in the Quarterly Review (Jan. 1896); J. A. Symonds, Shakespeare’s Predecessors (1883); J. D. Wilson, John Lyly (Cambridge, 1905) ; A. Ainger, ” Euphuism,” in Lectures and Essays (1905) ; and Albert Feuillerat, John Lyly. Contribution a Vhistoire de la Renaissance en Angleterre (1910).

LYME REGIS, a market town and municipal borough and watering-place in the western parliamentary division of Dorset- shire, England, 151m. W.S.W. of London by the London & South Western railway, the terminus of a light railway from Axminster. Pop. (1901) 2095. It is situated at the mouth of a narrow combe or valley opening upon a fine precipitous coast-line; there is a sandy shore affording excellent bathing, and the country inland is beautiful. The church of St Michael and All Angels is mainly Perpendicular, but the tower (formerly central) and the portion west of it are Norman. A guildhall and assembly rooms are the chief public buildings. The principal industries are stone- quarrying and the manufacture of cement. There is a curved pier of ancient foundation known as the Cobb. The harbour, with a small coasting trade, is under the authority of the corpora- tion. The borough is under a mayor, 4 aldermen and r2 councillors. Area, 1237 acres.

No evidence of settlement on the site of Lyme Regis exists before that afforded by a grant, dated 774, purporting to be by Cynewulf , king of the West-Saxons, of land here to the church of Sherborne, and a similar grant by King ˆEthelstan to the church of Glastonbury. In 1086 three manors of Lyme are mentioned: that belonging to Sherborne abbey, which was granted at the dissolution to Thomas Goodwin, who alienated it in the following year; that belonging to Glastonbury, which seems to have passed into lay lands during the middle ages, and that belonging to William Belet. The last was acquired by the family of Bayeux, from whom it passed by marriage to Elias de Rabayne, whose nephew, Peter Baudrat, surrendered it to the crown in 13 r 5-13 16 when the king became lord of one moiety of the borough, hence- forth known as Lyme Regis. Lyme ranked as a port in 1 234, and Edward I. in 1284 granted to the town a charter making it a free borough, with a merchant gild, and in the same year the mayor and bailiffs are mentioned. In the following January the bailiffs were given freedom from pleading without the borough, freedom from toll and privileges implying considerable foreign trade; the importance of the port is also evident from the demand of two ships for the king’s service in i3ir. In 1332-1333 Edward III. granted Lyme to the burgesses at a fee-farm of 32 marks; on the petition of the inhabitants, who were impoverished by tempests and high tides, this was reduced to 100 shillings in 1410

and to s marks in 1481. In 1591 Elizabeth incorporated Lyme, and further charters were obtained from James I., Charles II. and William III. Lyme returned two members to parliament from 1295 to 1832 when the representation was reduced to one. The borough was disfranchised in 1867. The fairs granted in 1553 for the rst of February and the 20th of September are now held on altered dates. Trade with France in wine and cloth was carried on as early as 1284, but was probably much increased on the erection of the Cobb, first mentioned in 1328 as built of timber and rock. Its medieval importance as the only shelter between Portland Roads and the river Exe caused the "burgesses to receive grants of quayage for its maintenance in 1335 and many subsequent years, while its convenience prcbably did much to bring upon Lyme the unsuccessful siege by Prince Maurice in 1644. In 1685 Lyme was the scene of the ' landing of James, duke of Monmouth, in his attempt upon the throne.

LYMINGTON, a municipal borough and seaport in the New Forest parliamentary division of Hampshire, England, 98 m. S.W. from London by the London & South Western railway. Pop. (1901) 4165. It lies on the estuary of the Lymington, which opens into the Solent. The church of St Thomas a Becket is an irregular structure, dating from the reign of Henry VI., but frequently restored. There is some coasting trade, and yacht-building is carried on. Regular passenger steamers serve Yarmouth in the Isle of Wight. In summer the town is fre-

quented for sea-bathing. It is governed by a mayor, 4 aldermen and 12 councillors. Area, 1515 acres.

There was a Roman camp near Lymington (Lentune, Lementon) , and Roman relics have been found, but there is no evidence that a town existed here until after the Conquest. Lymington dates its importance from the grant of the town to Richard de Redvers, earl of Devon, in the reign of Henry I. No charter has been found, but a judgment given under a writ of quo warranto in 1578 confirms to the burgesses freedom from toll, passage and pontage, the tolls and stallage of the quay and the right to hold two fairs — privileges which they claimed under charters of Baldwin de Redvers and Isabel de Fortibus, countess of Albe- marle, in the 13th century, and Edward Courtenay, earl of Devon, in 1405. The town was governed by the mayor and burgesses until the corporation was reformed in 1835. A writ for the election of a member to parliament was issued in the reign of Edward III., but no return was made. From 1585 two members were regularly returned; the number was reduced to one in 1867, and in 1885 the representation was merged in that of the county. Fairs on the 13th and 14th of May and the 2nd and 3rd of October, dating from the 13th

century, are still held. The Saturday market probably dates from the same century. Lymington was made a port in the reign of Henry I., and its large shipping trade led to frequent disputes with Southampton as to the levying of duties. The case was tried in 1329 and decided against Lymington, but in 1750 the judgment was reversed, and since then the petty customs have been regularly paid. From an early date and for many centuries salt was the staple manufacture of Lymington. The rise of the mineral salt- works of Cheshire led to its decline in the 18th century, and later the renewed importance of Southampton completed its decay.

See E. King, Borough and Parish of Lymington (London, 1879).

LYMPH and LYMPH FORMATION. Lying close to the blood-vessels of a limb or organ a further set of vessels may be observed. They are very pale in colour, often almost trans- parent and very thin-walled. Hence they are frequently difficult to find and dissect. These are the lymphatic vessels, and they are found to be returning a fluid from the tissues to the blood- stream. When traced back to the tissues they are seen to divide and ultimately to form minute anastomosing tubules, the lymph capillaries. The capillaries finally terminate in the spaces between the structures of the tissue, but whether their free ends are closed or are in open communication with the tissue spaces is still undecided. The study of their development shows that they grow into the tissue as a closed system of minute tubes, which indicates that in all probability they remain permanently closed. If we trace the lymphatic vessels towards the thorax we find that in some part of their course they terminate in structures known as lymphatic glands. From these again fresh lymphatic vessels arise which carry the fluid towards the main lymph- vessel, the thoracic duct. This runs up the posterior wall of the thorax close to the aorta, and finally opens into the junction of the internal jugular and left subclavian veins. The lymph- vessels from the right side of the head and neck and from the right arm open, however, into the right subclavian vein (see Lymphatic System below).

Chemical Constitution of Lymph. — The lymph collected from the thoracic duct during hunger is almost water clear and yellowish in colour. Its specific gravity varies from 1015 to 1025. It tastes salt and has a faint odour. It is alkaline in reaction, but is much less alkaline than blood-serum. Like blood it clots, but clots badly, only forming a soft clot which quickly contracts. The lymph collected from a lymphatic before it has passed through a lymph gland contains a few leucocytes, and though the number of lymphocytes is greater in the lymph after it has flowed through a gland it is never very great. In

normal states there are no red blood corpuscles.

The total solids amount to 3-6 to S”7%i the variations depending upon the amount of protein present. The lymph during hunger contains only a minute quantity of fat. Sugar (dextrose) is present in the same concentration as in the blood. The inorganic constituents are the same as in blood, but

apparently the amounts of Ca, Mg and P 2 05 are rather less than in serum. Urea is present to the same amount as in blood. If the lymph be collected after a meal, one important alteration is to be found. It now contains an abundance of fat in a very fine state of subdivision, if fat be’ present in the food. The concentrations of protein and dextrose are not altered during the absorption of these substances.

The Significance of Lymph. — In considering the signi- ficance and use of lymph we must note in the first place that it forms an alternative medium for the removal of water, dissolved materials, formed elements or particles away from the tissues. All materials supplied to a tissue are brought to it by the blood, and are discharged from the blood through the capillary wall. They thus come to lie in the tissue spaces between the cells, and from this supply of material in a dissolved state the cells take up the food they require. In the opposite direction the cell dis- charges its waste products into this same tissue fluid. The removal of material from the tissue fluid may be effected either by its being absorbed through the capillary wall into the blood-stream, or by sending it into the lymphatic vessels and thus away from the tissue. From this point of view the lymphatics may be looked upon in a sense as a drainage system of the tissues. Again, besides discharging fluid and dissolved material into the tissue spaces, the blood may also discharge leucocytes, and under many conditions this emigration of leucocytes may be very extensive. These also may leave the tissue space by the path of the lymph channels. Moreover, the tissues are at any time liable to be injured, and the injury as well as damaging many cells may cause rupture of capillaries (as in bruising) with escape of red blood-cells into the tissue spaces. If this occurs we know that the damaged cells are destroyed and their debris removed either by digestion by leucocytes or by disintegration and solution. The damage of a tissue also commonly involves an infection of the damaged area with living micro-organisms, and these are at once admitted to the tissue spaces. Hence we see that the lymphatics may be provided as channels by which a variety of substances can be removed from the tissue spaces. The question at once arises, is the lymph channel at all times open to receive the materials present in the tissue space? If such be the case, lymph is simply tissue fluid, and anything that modifies the constitution or amount of the tissue fluid should in like proportion lead to a variation in the amount and constitution of the lymph. But if the lymph capillary is a closed tubule at its commencement this does not follow.

From these considerations we see that in the first instance the whole problem of lymph formation is intimately bound up with the study of the interchanges of material between the blood and the various tissue cells. The exchange of material between blood and tissue cell may possibly be determined in one or both of two ways. Either it may result from changes taking place within the tissue cell, or the tissue cell remaining passive material may be sent to or withdrawn from it owing to a change occurring either in the composition of the blood or to a change in the circulation through the tissue. Let us take first the

results following increased activity of a tissue. We know that increased activity of a tissue means increased chemical change within the tissue and the production of new chemical bodies of small molecular size (e.g. water, carbonic acid, &c). The production of these metabolites means the destruction of some of the tissue substance, and to make good this loss the tissue must take a further amount of material from the blood. We know that this takes place, and moreover that the waste products resulting from activity are ultimately removed. The question then becomes: When does this restoration take place, and what is the intermediate state of the tissue? We know that increased activity is always accompanied by an increase in the blood- supply, indicating a greater supply of nutritive material, though it may be that the increased supply required at the actual time of activity is oxygen only. Simultaneously the opportunity for a more rapid removal of the waste products is provided. We have to inquire then: Does this increased vascularity neces- sarily mean an increased outpouring of water and dissolved

material into the tissues, for this might follow directly from the greater filling of the capillaries, or from the increased attracting power of the tissues to water (osmotic effect) due to the sudden production of substances of small molecular size within the tissue? The other possibility is that the increased volume of blood sent to the tissue is for the sole purpose of giving it a more rapid supply of oxygen, and that the ordinary normal blood-supply would amply suffice for renewing the chemical material used up during activity. Tissues undoubtedly vary among themselves in the amount of water and other materials they take from the blood when thrown into activity, and their behaviour in this respect depends upon the work they are called upon to perform. We must discriminate between the substance required by and consumed by the tissue, the chemical food which on combustion yields the energy by which the tissue performs work, and, on the other hand, the substance taken from the blood and either with or without further elaboration discharged from the tissue (as, for instance, in the process of secretion). The tissue contains in itself a store of food amply sufficient to enable it to continue working for a long time after its blood-supply has been stopped, and everything indicates that the supply of chemical energy to the tissue may be slow or even withheld for a considerable time. Hence we are led to conclude that the increased flow of blood sent to a tissue when it is thrown into activity is first and fore- most to give that tissue an increased oxygen supply; secondly, to remove waste carbonic acid; thirdly, and only in the case of some tissues, to provide water salts and other materials for the outpouring of a secretion, as an instance of

which we may take the kidney as a type. Hence there is no need to suppose that an extensive accumulation of fluid and dissolved substances takes place within a tissue when it becomes active. This must be an accumulation which would lead to an engorgement of the tissue spaces and then to a discharge of fluid along the lymph channels. To enable us to determine the various points just raised we must know whether an increased blood-supply to a tissue necessarily means an increased exudation of fluid into the tissue spaces, and moreover we must study the exchange of fluid between a tissue and the blood under as varied a series of conditions as possible, subsequently examining whether exchange of fluid and other substances between the tissue and the blood necessarily determines quantitatively the amount of lymph flowing from the tissue. Hence we will first study the exchanges between the blood and a tissue, and then turn our attention to the lymph-flow from the tissues.

The Exchanges of Fluids and dissolved Substances between the Blood and the Tissues. — Numerous experiments have been performed in studying the conditions under which fluid passes into the tissues and tissue spaces — or in the reverse direction into the blood. We may group them into (1) conditions during which the total volume of circulating fluid is increased or decreased; (2) conditions in which the character of the blood is altered, e.g. it is made more watery or its saline concentration is altered; (3) conditions in which the blood-supply to the part is altered; (4) conditions in which the physical character of the capillary wall is altered.

1. The total volume of blood in an animal has been increased among other ways by the transfusion of the blood of one animal directly into the veins of a second of the same species. It is found that within a very short time a large percentage of the plasma has been discharged from the blood-vessels. It has been sent into the tissues, notably the muscles, and it may be noted in passing without producing any increase in the lymph-flow from these vessels. An analogous experiment, but one which avoids the fallacy introduced by injecting a second animal's blood, has been performed by driving all the blood out of one hind limb by applying a rubber bandage tightly round it from the foot upwards. This increases the volume of blood circulating in the rest of the body, and again a rapid disappearance of the fluid part of the blood from the vessels was observed — the fluid being mainly sent into the muscles, as was indicated by showing that the specific gravity of the muscles fell during the experiment. The experiments converse to these have also been studied.

Bleeding is very rapidly followed by a large inflow of fluid into the circulating blood — this fluid being derived from all the tissues, and especially again from the muscles. Or again, when the bandage from the limb in the above-cited experiment was removed, the total capacity of the circulatory system was thereby suddenly increased, and it was found that the total volume of blood increased correspondingly, the increased volume of fluid being drawn from the tissues and especially again from the muscles. The rapidity with which this movement of fluid into or out of the blood takes place is very striking. The ex- planation usually offered is that the movement is effected by changes in the capillary pressure due to the alteration in the volume of blood circulating. While this seems feasible when the volume of blood is increased, it does not offer a satisfactory explanation of the rapid movement of fluid from the tissues when the volume of the blood is decreased. One must therefore look for yet further factors in this instance.

2. Let us next turn attention to the second of our three main variations, viz. that in which the composition of the blood is altered. It has long been known that the injection of water, or of solutions of soluble bodies such as salts, urea, sugar, &c, leads to a very rapid exchange of water and salts between the blood and the tissues. Thus if a solution less concentrated than the blood be injected, the blood is thereby diluted, but with very great rapidity water leaves the blood and is taken up by the tissues. Again, if a strong sugar or salt solution be injected, the first effect is a big discharge of water from thj tissues into the blood and the movement of fluid is effected with great rapidity. In these instances a new physical factor is brought into play, viz. that of osmosis. When a solution of lower osmotic pressure than the blood is injected the osmotic pressure of the blood falls temporarily below that of the tissues, and water is therefore attracted to the tissues. The converse is the case when a solution of osmotic pressure higher than the blood is injected. This at first sight seems to be an all-sufficient ex- planation of the results recorded, but difficulties arise when we find that the tissues are not equally active in producing the effects. Thus it is found that the muscles and skin act as the chief water depot, while such tissues as the liver, intestines or pancreas take a relatively small share in the exchange. Again, when a strong sodium chloride solution is injected a considerable part of the sodium chloride is soon found to have left the blood, and it has been shown that the chloride depot is not identical with the water depot. The lung, for instance, is found to take up relatively far more of the salt than other tissues. Simultane- ously with the passage of the salt

into the tissue an exchange of water from the tissue into the blood can be observed, both processes being carried out very rapidly. The result is that the blood very quickly returns to a state in which its osmotic pressure is only slightly raised; the tissue, on the other hand, loses water and gains salt, and its osmotic pressure and specific gravity therefore rises. Again, the tissues do not participate equally in producing the final result, nor is the tissue which gives up the largest amount of water necessarily that which gains the largest amount of salt. The results following the injection of solutions of other bodies of small molecular size, e.g. urea or sugar, are quite analogous to those above described in the case of the non- toxic salt solutions. Hence we see that the rate of exchange of fluid and dissolved substance between a tissue and the blood can be extremely rapid and that the exchange can take place in either direction. We may also conclude that the main cause of the exchange, and possibly the only one, is the osmotic action set up by the solution injected, and that muscle tissue is partic- larly active in the process.

Seeing that a very considerable amount of water or of dis- solved substance can be taken up from the blood into a tissue, the question next arises: Where is this material held, in the tissue cell or in the tissue space? Immediately the water or salt leaves the blood it reaches the tissue space, but unless the process be extreme in amount it probably passes at once into the tissue cell itself and is stored there. If the process is excessive oedema is set up and fluid accumulates in the tissue space.

These, taken quite briefly, are some of the more important conditions under which fluid exchanges take place. They are selected here because of the extent and rapidity of the changes effected.

3. The third factor which may bring about a change in the amount of fluid sent to a tissue is a variation in the capillary pressure. A rise in capillary pressure will, if filtration can occur through the capillary wall, cause an increased exudation of fluid from the blood. Thus the rise in general blood-pressure following the injection of a salt solution could cause an increased filtration into the tissues. Or again, the hydraemia following a salt in- jection would favour an increased exudation because the blood would be more readily filtrable. We, however, know very little of the effect of changes in capillary pressure upon movement of fluid into the tissue spaces and tissues, most of such observa- tions being confined to a study of their effect upon lymph-flow. We will therefore return to them in this connexion.

4. The remaining factor to be mentioned is a change in the character

of the capillary wall. It is well known that many poisons can excite an increased exudation from the blood and the tissue may become oedematous. Of such bodies we may mention cantharidin and the lymphogogues of Class 1 (see later) . A like change is also probably the cause of the oedema of nephritis and of heart disease. It has also been suggested that the capil- laries of different organs show varying degrees of permeability, a suggestion to which we will return later.

Lymph Formation. — There are two theories current at the present day offering explanations of the manner in which lymph is formed. The first, which owes its inception to Ludwig, explains lymph formation upon physical grounds. Thus according to this theory the lymphatics are open capillary vessels at their origin in the tissues along which the tissue fluid is driven. The tissue fluid is discharged from the blood by filtration, and there- fore its amount varies directly with the capillary pressure. The amount of fluid movement also is further determined by osmotic actions and by the permeability of the capillary wall.

The second theory first actively enunciated by Heidenhain regards lymph formation as a secretory process of the capillary wall, i.e. one in the discharge of which these cells perform work and are not merely passive as in the former theory. As we shall see, it is now probable that neither theory is completely correct.

In considering lymph formation we have to examine both the total amount of lymph formed in the body and the variations in amount leaving each separate organ under different conditions. In most investigations the lymph was collected from the thoracic duct, i.e. it was the lymph returned from all parts of the body with the exception of the right arm and right side of the head and neck. The collection of the lymph from organs is much more difficult to effect, and hence has not, to the present, been so extensively studied. We will consider first variations in the amount of the thoracic duct lymph. Lymph is always flowing along the thoracic duct, and if the body is at rest, it has been shown that this lymph is coming practically entirely from the intestines and liver, chiefly, moreover, from the liver. The variations in the amount flowing under various conditions has been extensively studied. We will discuss them under the follow- ing headings: Changes brought about (a) by altered circulatory conditions, (6) by the injection of various substances, and © as a result of throwing an organ into activity.

Ligature of the portal vein leads to an increased flow of duct lymph. Ligature of the inferior vena cava above the diaphragm also leads to a

large increase in the flow of duct lymph. Ligature of the aorta may result in either an increased or decreased flow of direct lymph. One explanation of these results has been offered from a study of the changes in capillary pressure set up in the main organs involved. Thus, after ligature of the portal vein the capillary pressure in the intestines rises, and it was proved that the increase in thoracic duct lymph came from trie intestines. Ligaturing the inferior vena cava causes a big rise in the pressure in the liver capillaries, the intestinal capillary pressure remaining practically unaltered. Here it was proved that the increase in lymph-flow came from the liver and was

more copious in amount than in the former instance. A further difference is that this lymph is more concentrated, a feature which always characterizes liver lymph. Ligature of the aorta may or may not cause a rise in the liver capillary pressure, and it has been shown that if the pressure rises there is an increased lymph-flow from the liver and conversely. The increase of lymph comes entirely in this instance also from the liver. It is in fact but a special instance of the former experiment. From these results it has been argued that lymph formation is simply a filtration fundamentally, and the lymph-flow is determined mainly by the capillary pressure. Variations in the quantity of lymph issuing from different organs have been on this theory ascribed to differences in the permeability of the capillaries of the organs. Thus as liver lymph is richest in protein content and is produced in greatest amount, it has been concluded that the liver capillaries possess the highest permeability. The intestines stand next in producing a concentrated lymph, and their capillaries are therefore assumed to stand second as regards permeability. Lastly, the lymph coming from limbs and other organs is much poorer in solids and much less copious in amount. Hence it is argued that their capillaries show the least perme- ability. It is, however, very unsafe to compare the liver capil- laries with those of other organs, since they are not in reality capillaries but rather venous sinuses, and their relation to the liver cells is characteristically different from that of ordinary capillaries. If an animal is at rest, no lymph 3ows from the hind limbs. To obtain a sample of limb lymph it is necessary to massage the limb. If, however, the veins to the limb be liga- tured, we obtain a flow of lymph. The ligature of course causes a rise of the capillary pressure, and it has been argued that this rise of pressure starts a nitration through the capillary wall and hence a flow of lymph. But the stoppage of the blood-flow also damages the capillary wall and tissue

cells by asphyxiation, and the resulting lymph-flow is in all probability the resultant of many complex processes. This case is analogous to the pro- duction of oedema in cases of heart disease where the circulation is feeble and the oxygen supply to the parts deficient. The results of these experiments form the main evidence in support of the filtration theory of lymph formation. They were first systematically studied by Heidenhain, to whom we owe so much of our knowledge of lymph formation. He did not, however, conclude that they established the filtration theory.

In continuing his observations Heidenhain next studied the results following the injection of a number of substances into the blood. He found many which on injection gave rise to an increased lymph-flow from the thoracic duct, and arranged them in two classes. As instances of lymphogogues of the first class we may mention extract of mussels, leech extract, peptone, extract of crayfish muscle, extract of strawberries, of raspberries and many other like substances. Lymphogogues of the second class comprise neutral salt solutions, urea, sugar, &c. Considering the latter class first we may take as a type a solution of sodium chloride. Injection of such a solution causes a large increase in the lymph-flowˆ and it has been proved that the lymph comes from the liver and intestines only — chiefly from the former. It is especially to be noted that there is no lymph-flow from the limbs, and the same is true for all lymphogogues of this class. As indicated above, the injection of a saline solution leads to a large and rapidly effected transport of fluid from the blood into muscle tissue, but though there is this large increase in tissue fluid, no lymph flows from the tissue. This result very power- fully disfavours the filtration theory of lymph formation. It practically refutes the idea that lymph formation is solely de- pendent upon such processes as filtration, osmosis and capillary permeability only. It brings out quite clearly that the exchange of fluid and dissolved salts, &c, between the blood and a tissue, and the flow of lymph from that tissue, are two separate and distinct processes, and especially that the first does not determine the second. Also it is to be noted that the injection of a strong salt solution also excites a flow of d’\ct lymph, again arising from the liver and intestines, but none from the limbs. In this in- stance, as previously stated, the muscles of the limbs are losing

water, and so presumably are the liver and intestinal cells. This independence of tissue-blood exchange and lymph-flow is distinctly in favour of the view, which is rapidly gaining ground from histological observations, that in all instances the lymphatics commence in a tissue as closed capillary vessels.

Turning, in the next place, to the lymphogogues of the first class, it has been proved that the origin of this increase of flow is again from the liver. Very many of the substances of this class are bodies which may when taken cause urticarial (nettle- rash) eruptions, a state which is generally regarded as being due to an action upon the capillary endothelium. Their action as lymphogogues is also generally ascribed to an effect upon the capillary wall rendering it according to some more permeable, according to others leading to a direct secretory action on the part of the endothelium. We also know that many of the bodies of this class act upon the liver in other directions than in exciting an increased lymph production. Thus they may cause an increase in bile secretion, or, as in the case of peptone, the liver cells may be excited to produce a new chemical material, in this instance an antithrombin.

We have now to consider the effect of throwing an organ into activity upon the lymph-flow from the organ. In all cases in which it has been examined it is found that increased activity is accompanied by increased lymph-flow. Thus, to take the instance of the submaxillary gland, which at rest does not dis- charge any lymph, stimulation of the chorda tympani is followed by a flow of lymph accompanying the flow of saliva simul- taneously excited. The stimulation of the nerve also produces dilatation of the blood-vessels and therefore a rise in capillary pressure. But that this vascular change is not the factor determining the lymph-flow is proved by the administration of a small dose of atropine, which arrests the secretion without influencing the vascular reaction following chorda stimulation. After the atropine no lymph-flow occurs on stimulating the nerve. Many other instances of a similar kind might be ad- duced. Thus, we have seen that peptone specifically excites the liver cells and also causes an increased lymph-flow from the liver; or, as a last instance, the injection of bile salt excites a flow of bile and also excites a flow of lymph from the liver. The supporters of the filtration theory have argued that as activity of a tissue is necessarily accompanied by the discharge of metabolites from the active tissue cells, and as these are of small molecular size, they must set up an osmotic effect. Water is therefore drawn into the tissue spaces, and this rise in fluid content results mechanically in a flow of lymph from the organ. The lymph simply drains away along the open lymphatics. This argument, however, loses all its force when we recall the fact that we may set up an enormous flow of fluid and salt into a tissue and its tissue spaces without causing the least flow of lymph. Further, there is no reason to suppose that the meta- bolites discharged from a tissue during activity are produced in large quantities. The chief metabolite is undoubtedly carbonic acid, and this

diffuses very rapidly and is quickly carried away by the blood. If, moreover, as is probably the case, the lym- phatics commence as closed capillaries, we have a further difficulty in explaining how the fluid is driven through the lymphatic wall. Either we must imagine the wall to be porous or there must be a greater pressure outside than inside, and it is very difficult to conceive how this is possible. As a general conclusion, then, it seems much more probable that we are here dealing with a secretory process, and that the active tissue produces some substance or substances — it may be carbonic acid — which throws the lymphatic capillary cells into activity.

To sum up in a few words the present state of our knowledge as to lymph formation we may say that the exchange of water and salts between the blood and the tissues is probably entirely determined by processes of filtration and osmosis. Further, that the physical condition of the capillary cells is frequently altered by many chemical substances, and that in consequence it may permit exudation into the tissue spaces much more freely. In the next place, the flow of lymph from a tissue is not solely determined by the amount of the tissue fluids. The lymph

capillaries start as closed tubules, and the endothelial walls of these tubules play an active part (secretory) in determining when water and other substances shall be admitted into the capillary and further determine the quantity of such discharge. Apparently, too, these cells are specifically excited when the tissue is thrown into activity, the exciting substance being a metabolite from the active tissue. Leucocytes also are capable of passing through or between the endothelial cells of the lymph capillary. (T. G. Br.)

LYMPHATIC SYSTEM. In anatomy, the lymphatic system (Lat. lympha, clear water) comprises the lymphoid or adenoid tissue so plentifully distributed about the body, especially in the course of the alimentary canal (see Connective Tissues), lymph spaces, lymphatic vessels of which the lacteals are modi- fications, lymphatic glands, haemolymph glands, and the thoracic and right lymphatic ducts by which the lymph (q.v.) finally reaches the veins.

Lymph spaces are mere spaces in the connective tissue, which usually have no special lining, though sometimes there is a layer of endothelial cells like those of the lymphatic and blood vessels. Most of

these spaces are very small, but sometimes, as in the case of the sub-epicranial space of the scalp, the capsule of Tenon in the orbit, and the retropharyngeal space in the neck, they are large and are adaptations to allow free movement. Opening from these spaces, and also communicating with the serous membranes by small openings called stomata, 1 are the lymph capillaries (see Vascular System), which converge to the lymphatic vessels. These resemble veins in having an internal layer of endothelium, a middle unstriped muscular coat, and an external coat of fibrous tissue, though in the smaller vessels the middle coat is wanting. They have numerous endothelial valves, formed of two crescentic segments allowing the lymph to pass toward the root of the neck. When the vessels are engorged these valves are marked by a constriction, and so the lymphatics have a beaded appearance. The vessels divide and anastomose very freely, and for this reason they do not, like the veins, increase in calibre as they approach their destination. It is usual to divide the lymphatic vessels into a superficial and a deep set; speaking generally, the superficial ones are found near the course of the superficial veins, while the deeper ones accompany the arteries. Probably any single drop of lymph passes sooner or later through one or more lymphatic glands, and so those vessels which are approaching a gland are called afferent, while those leaving are spoken of as efferent lymphatics. The lacteals are special lymphatic vessels which carry the chyle from the intestine; they begin in lymphatic spaces in the villi and round the solitary and agminated glands, and pass into the mesentery, where they come in contact with a large number of mesenteric glands before reaching the receptaculum chyli.

The lymphatic glands are pink bodies situated in the course of the lymphatic vessels, to which they act as filters. They are generally oval in shape and about the size of a bean, but sometimes, especially in the groin, they form irregular flattened masses 2 in. long, while, at other times, they are so small as almost to escape notice. They are usually found in groups.

Each gland has a fibrous capsule from which trabeculae pass toward the centre, where they break up and interlace, forming a net- work, and in this way a cortical and medullary region for each gland is distinguished; the intervals are nearly filled by lymphoid tissue, but close to the trabeculae is a lymph path or sinus, which is only crossed by the reticular stroma of the lymphoid tissue, and this probably acts as a mechanical sieve, entangling foreign particles; as an example of this the bronchial glands are black from carbon strained off in its passage from the lungs, while the axillary glands in a tattooed arm are blue. The blood-vessels enter at one spot, the hilum, and are

distributed along the trabeculae. In addition to their function as filters the lymphatic glands are probably one of the sources from which the leucocytes are derived.

The exact position of the various groups of glands is very im- portant from a medical point of view, but here it is only possible to give a brief sketch which will be helped by reference to the ac- companying diagram. In the head are found occipital and mastoid glands (fig. 1, | 8), which drain the back of the scalp; internal maxillary

glands, in the zygomatic fossa, draining the orbit, palate, nose and membranes of the brain; preauricular glands (fig. 1, o), embedded in the parotid, draining the side of the scalp, pinna, tympanum and lower eyelid; and buccal glands, draining the cheek region. In the neck are the superficial cervical glands (fig. 1 , 7) , along the course of the external jugular vein, draining the surface of the neck; the sub-maxillary glands (fig. i, 8), lying just above the salivary gland of the same name and draining the front of the face and scalp; the sub-mental glands (fig. 1,6), beneath the chin, draining the lower lip, as well as sometimes the upper, and the front of the tongue; the retropharyngeal glands, draining the naso-pharynx and tympanum; the pretracheal glands, draining the trachea and lower part of the thyroid body; and the deep cervical glands, which are by far the most important and form a great mass close to the internal jugular vein; they receive afferent vessels from most of the glands already mentioned and so are liable to be affected in any trouble of the head or neck, especially of the deeper parts. Into them the lymphatics of the brain pass directly. The lower part of this mass is sometimes distinguished as a separate group called the supra-clavicular glands, which drain the back of the neck and receive afferents from the occipital and axillary glands. The efferents from the deep cervical glands join to form a common

vessel known as the jugular lym- phatic trunk, and this usually opens into the thoracic duct on the left

side and the right lymphatic duct

on the right.

In the thorax are found intercostal

glands (fig. 2, I.), near the vertebral

column draining the back of the

thoracic walls and pleura; internal

mammary glands, draining the front

of the same parts as well as the

inner part of the breast and the

upper part of the abdominal wall;

diaphragmatic glands, draining that

structure and the convex surface

of the liver; anterior, middle, pos- terior and superior mediastinal

glands, draining the contents of

those cavities. The bronchial glands,

draining the lungs, have already

been referred to.

In the abdomen and pelvis the

glands are usually grouped round

the large arteries and are divided

into visceral and parietal. Among

the visceral are the gastric glands,

draining the stomach (these are

divided into' coronary, subpyloric Fig. i— Superficial Lymphatic

Vessels and Glands. Preauricular. Mastoid.

Superficial cervical. Submaxillary. Submental. Infraclavicular. Anterior axillary. Supratrochlear. Antecubital. Inguinal. Superficial femoral.

1 It has recently been stated that stomata do not exist in the peritoneum.

and retropyloric groups) ; the splenic glands at the hilum of the

spleen, a, draining that organ, the tail of the 0, pancreas and the fundus of the y, stomach ; the hepatic glands in the S, small omentum, draining the lower e, surface and deep parts of the liver ; f , the pancreatic glands, behind the ij, lesser sac of the peritoneum, drain- q, ing the head and body of the 1, pancreas, the superior mesenteric k, glands; from one to two hundred /, in number, lying in the mesentery and receiving the lacteals ; the ileo-caecal glands, draining the caecum, one of which is known as the appendicular gland and drains the vermiform appendix and right ovary ; the colic glands along the right and middle colic arteries, draining the ascending and transverse colon ; the inferior mesenteric glands in the course of that artery, drain- ing the descending iliac and pelvic colons ; the rectal glands, behind the rectum, draining its upper part.

Among the parietal glands are the external iliac glands, divided into a lateral and mesial set (see fig. 2, E.I.), and receiving the inguinal efferent vessels and lymphatics from the bladder, prostate, cervix uteri, upper part of the vagina, glans penis vel clitoridis and urethra. The supra and infra-umbilical glands receive the deep lymphatics of the abdominal wall, the former communicating with the liver, the latter with the bladder. From the latter, vessels pass to the epi- gastric gland lying in front of the termination of the external iliac artery. The internal iliac glands (fig. 2, I. I.) are situated close to the branches of this artery and drain the rectum, vagina, prostate, urethra, buttock and perinaeum. Common iliac glands (fig. 2, C.I.) lie around that artery and receive afferents from the external and internal iliac glands as well as a few from the pelvic viscera. 2 The

2 For further details of the pelvic glands see ” Seventh Report of the Committee of Collective Investigation,” Journ. Anat. and Phys. xxxii. 164.

aortic glands are grouped all round the length of the aorta, and are divided into pre-, retro- and lateral aortic groups (fig. 2 P.A. and L), all of which communicate freely. The upper preaortic glands are massed round the coeliac axis, and receive afferents from the gastric, hepatic, splenic and pancreatic glands; they are known as coeliac glands. The lateral aortic glands drain the kidney, adrenal, testis, ovary, fundus of uterus and lateral abdominal walls. In the upper extremity a few small glands are sometimes found near the deep arteries of the forearm. At the bend of the elbow are the ante- cubital

glands (fig. I X) and just above the internal condyle, one or

From A. M. Paterson, Cunningham's Text-book of Anatomy.

Fig. 2. — Deep Lymphatic Glands and Vessels of the Thorax and Abdomen (diagrammatic). Afferent vessels are represented by continuous lines and efferent and interglandular vessels by dotted lines.

C. Common iliac glands. C.I. Common intestinal trunk. D.C. Deep cervical glands. E.I. External iliac glands. I. Intercostal glands and

vessels. I.I. Internal iliac glands. L. Lateral aortic glands.

M. Mediastinal glands and vessels. [vessels.

P.A. Pre-aortic glands and R.C. Receptaculum chylii. R.L.D. Right lymphatic duct. S. Sacral glands.

S.A. Scalenus anticus muscle. T.D. Thoracic duct.

two supra-trochlear glands (fig. 1,9). The axillary glands (fig. I, y) are perhaps the most practically important in the body. They are divided into four sets: (1) external, along the axillary vessels, draining the greater part of the arm ; (2) anterior, behind the lower border of the pectoralis major muscle, draining the surface of the thorax including the breast and upper part of the abdomen; (3) posterior along the subscapular artery, draining the back and side of the trunk as low as the umbilical zone; (4) superior or infra-clavicular glands (fig. I, f), receiving the efferents of the former groups as well as lymphatics accompanying the cephalic vein. In the lower limb all the superficial lymphatics pass up to the groin, where there are two sets of glands arranged like a T. The superficial femoral glands (fig. 1, X) are the vertical ones, and are grouped round the internal saphenous vein ; they are very large, drain the surface of the leg, and are usually in two parallel rows. The inguinal glands form the

cross bar of the T (fig. 1 , k) , and drain part of the buttock, the surface of the abdomen below the umbilicus and the surface of the genital organs. The deep lymphatics of the leg drain into the anterior tibial gland on that artery, the popliteal glands in that space, and the deep femoral glands surrounding the common femoral vein.

The thoracic duct begins as an irregular dilatation known as the receptaculum chyli, opposite the first and second lumbar verte- brae, which receives all the abdominal lymphatics as well as those of the

lower intercostal spaces. The duct runs up on the right of the aorta through the posterior mediastinum and then traverses the superior mediastinum to the left of the oesophagus. At the root of the necji it receives the lymphatics of the left arm and left side of the neck and opens into the beginning of the left innominate vein, usually by more than one opening.

The right lymphatic duct collects the lymphatics from the right side of the neck and thorax, the right arm, right lung, right side of the heart and upper surface of the liver; it is often represented by several ducts which open separately into the right innominate vein.

Haemolymph glands are structures which have only been noticed since 1884. They differ from lymphatic glands in their much greater vascularity. They assist the spleen in the destruction of red blood corpuscles, and probably explain or help to explain the fact that the spleen can be removed without ill effects. In man they extend along the vertebral column from the coeliac axis to the pelvis, but are specially numerous close to the renal arteries.

T. Lewis suggests that lymphatic and haemolymph glands should be classified in the following way : — • ‘ Haemal glands. S Simple.

(Specialized (Spleen). Haemolymph Ci. Blood and lymph

Glands. – Haemal lymphatic] sinuses separate,

glands. 1 2. Blood lymph sinuses.

I3. Other combined form*. . Lymphatic glands. Details and references will be found in papers by T. Lewis, J. Anat. & Phys. vol. xxxviii. p. 312; W. B. Drummond, Journ. Anat. and Phys. vol. xxxiv. p. 198; A. S. Warthin, Journ. Med. Research, 1901, p. 3, and H. Dayton, Am. Journ. of Med. Sciences, 1904, p. 448. For further details of man’s lymphatic system see The Lymphatics by Delamere, Poirier and Cuneo, translated by C. H. Leaf (London, 1903).

Embryology. — The lymphatic vessels are possibly developed by the hollowing out of mesenchyme cells in the same way that the arteries are; these cells subsequently coalesce and form tubes (see Vascular System). There is, however, a good deal of evidence to show that they are originally offshoots of the venous system, and that their permanent openings into the veins are either their primary points of communication or are secondarily acquired. The lymphatic and haemolymph glands are probably formed by the proliferation of lympho- cytes around networks of lymphatic vessels; the dividing

lymphocytes form the lymphoid tissue, and eventually the network breaks up to form distinct glands into which blood vessels penetrate. If the blood vessels enlarge more than the lymphatic, haemolymph glands result, but if the lymphatic vessels become predominant ordinary lymphatic glands are formed. At an early stage in the embryo pig two thoracic ducts are formed, one on either side of the aorta, and the incomplete fusion of these may account for the division often found in man's duct. In the embryo pig too there have been found two pairs of lymph hearts for a short period.

See A. S. Warthin, Journ. Med. Research, vol. vii. p. 435 ; F. R. Sabin, Am. Journ. of Anat. i., 1902; and, for litera- ture, Development of the Human Body, by J. P. McMurrich (London, 1906), and Quain's Anatomy (vol. 1., London, 1908). Comparative Anatomy. — A lymphatic system is recognized in all the Craniata, and in the lower forms (fishes and Amphibia) it consists chiefly of lymph spaces and sinuses in communication with the coelom. In fishes, for instance, there is a large subvertebral lymph sinus surrounding the aorta and another within the spinal canal. In Amphibia the subvertebral sinus is also found, and in the Anura (frogs and toads) there is a great subcutaneous lymph sinus. Lymph hearts are muscular dilatations of vessels and are found in fishes, amphibians, reptiles and bird embryos, and drive the lymph into the veins ; they are not known in adult mammals.

In birds the thoracic duct is first recognized, and opens into both right and left precaval veins, as it always does in some mammals. In birds, however, some of the lymphatics open into the sacral veins, and it is doubtful whether true lymphatic glands ever occur In birds and mammals lymphatic vessels become more definite and numerous and are provided with valves. . .

Haemolymph glands are present in mammals and birds, but have not been seen lower in the scale, though S. Vincent and S. Harrison point out the resemblance of the structure of the head kidney of certain Teleostean fishes to them (Journ. Anat. and Phys. vol. xxxi. p. 176).

For further details see Comparative Anat. of Vertebrates, by R. Wiedersheim (London, 1907). (F. 6. P.)

Diseases of the Lymphatic System and Ductless Glands.

Lymphadenitis or inflammatory infection of the lymphatic glands, is a condition characterized by hyperaemia of and exudation into the gland, which becomes redder, firmer and larger than usual. Three varieties may be distinguished : simple, suppurative and tuberculous. The cause is always the absorption of some toxic or infective material from the periphery. This may take place in several of the acute infectious diseases, notably in scarlet fever, mumps, diphtheria and German measles, or may be the result of poisoned wounds. The lymphatic glands are also affected in con- stitutional diseases such as syphilis. Simple lymphadenitis usually subsides of its own accord, but if toxins are produced in the inflamed area the enlargement is obvious and painful, while if pyogenic organisms are absorbed the inflammation progresses to suppuration. Tuberculous lymphadenitis (scrofula) is due to the infection of the lymph glands by Koch's tubercle bacillus. This was formerly known as " King's Evil," as it was believed that the touch of the royal hand had power to cure it. It occurs most commonly in children and young adults whose surroundings are unhealthy, and who are liable to develop tuberculous disease from want of sufficient food and fresh air. Some local focus of irritation is usually present. The ways in which the tubercle bacillus enters the body are much disputed, but catarrh of the mucous membranes is regarded as a predisposing factor, and the tonsils as a probable channel of infection. Any lymphoid tissue in the body may be the seat of tuberculous disease, but the glands of the neck are the most commonly involved. The course of the disease is slow and may extend over a period of years. The earliest manifestation is an enlargement of the gland. It is possible in this stage for spontaneous healing to take place, but usually the disease progresses to caseation, in which tuberculous nodules are found diffused throughout the gland. Occasionally this stage may end in calcification of the caseous matter, the gland shrink- ing and becoming hard; but frequently suppuration follows from liquefaction of the caseating material. Foci of pus occur throughout the gland, causing destruction of the tissue, so that the gland may become a single abscess cavity. If left to itself the abscess sooner or later bursts at one or several points, leaving ulcerated openings through which a variable amount of pus escapes. Temporary healing may take place, to be again followed by further breaking down of the gland. This condition, if untreated, may persist for years and may finally give rise to a general tuberculosis. The treatment consists mainly in improving the general health with good diet, fresh air (particularly sea air), cod-liver oil and iron, and the removal of all sources of local irritation such as enlarged tonsils, adenoids, &c. Vac- cination with tuberculin (TR) may be useful. Suppuration and ex- tension of the disease require operative measures,

and removal of the glands en masse can now be done through so small an opening as to leave only a very slight scar.

In Tabes mesenterica (tuberculosis of the mesenteric glands), usually occurring in children, the glands of the mesentery and retro-peritonaeum become enlarged, and either caseate or occasionally suppurate. The disease may_ be primary or may be secondary to tuberculous disease of the intestines or to pulmonary phthisis. The patients are pale, wasted and anaemic, and the abdomen may be enormously enlarged. There is usually moderate fever, and thin watery diarrhoea. The caseating glands may liquefy and give rise to an inflammatory attack which may simulate appendicitis. Limited masses are amenable to surgical treatment and may be removed, while in the earlier stages constitutional treatment gives good results. Tuberculous peritonitis frequently supervenes on this condition.

Lymphadenoma (Hodgkin's Disease), a disease which was first fully described by Hodgkin in 1832, is characterized by a progressive enlargement of the lymphatic glands all over the body, and generally starts in the glands of the neck. The majority of cases occur in young adults, and preponderate in the male sex. The first symptom is usually enlargement of a gland in the neck, with generally progressive growth of the glands in the submaxillary region and axilla. The inguinal glands are early involved, and after a time the internal lymph glands follow. The enlargements are at first painless, but in the later stages symptoms are caused by pressure on the surround- ing organs, and when the disease starts in the deeper structures the first symptoms may be pain in the chest and cough, pain in the abdomen, pain and oedema in the legs. The glands may increase until they are as large as eggs, and later may become firmly adherent one to another, forming large lobulated tumours. Increase of growth in this manner in the neck may cause obstructive dyspnoea and even death. In the majority of cases the spleen enlarges, and in rare instances lymphoid tumours may be found on its surface. Anaemia is common and is secondary in character; slight irregular fever is present, and soon a great and progressive emaciation takes

place. The cases are of two types, the acute cases in which the en-largements take place rapidly and death may occur in two to three months, and the chronic cases in which the disease may remain apparently stationary. In acute lymphadenoma the prognosis is very unfavourable. Recovery sometimes takes place in the chronic type of the disease. Early surgical intervention has in some cases been followed by success. The application of X-rays is a valuable method of treatment, superficial glands undergoing a rapid diminu- tion in size.

Of drugs arsenic is of the most service, and mercurial inunction has been recommended by Dreschfeld. Organic extracts have of late been used in the Seatment of lymphadenoma.

Glandular Fever is an acute infectious fever, generally occurring in epidemics, and was first described by E. Pfeiffer in 1889. It usually affects childrenand has a tendency to run through all the children of a family. The incubation period is said to be about 7 days. The onset is sudden, with pain in the neck and limbs, headache, vomiting, difficulty in swallowing and high temperature. On the second day, or sometimes on the first, swelling of the cervical glands is noticed, and later the posterior cervical, axillary and inguinal glands become enlarged and tender. In about half the cases the spleen and liver are enlarged and there is abdominal tenderness. West found the mesenteric nodes enlarged in 37 cases. Nephritis is an occasional complication, and constipation is very usual. The disease tends to subside of itself, and the fever usually disappears after a few days ; the glandular swellings may, however, persist from one to three weeks. Considerable anaemia has been noticed to follow the illness. Rest in bed while the glands are enlarged, and cod-liver oil and iron to meet the anaemia, are the usual treatment.

Status lymphaticus (lymphatism) is a condition found in children and some adults, characterized by an enlargement of the lymphoid tissues throughout the body and more particularly by enlargement of the thymus gland. There is a special lowering of the patient's powers of resistance, and it has been said to account for a number of cases of sudden death. In all cases of status lymphaticus the thymus has been found enlarged. At birth the gland (according to Bovaird and Nicoll) weighs about 6 grammes, and does not increase after birth. In lymphatism it may weigh from 10 to 50 grammes. The clinical features are indefinite, and the condition frequently passes unrecognized during life. In most cases there is no hint of danger until the fatal syncope sets in, which may be after any slight exertion or shock, the patient becoming suddenly faint, gasping and cyanosed, and the heart stopping altogether before the respirations have ceased. The most trifling causes have brought on fatal issues, such as a wet pack (Escherich) or a hypodermic injection, or even a sudden plunge into water though the head is not immersed. The greater number of deaths occur during the administration of anaesthetics, which seem peculiarly dangerous to these subjects. When an attack of syncope takes place no treatment is of any avail.

Virchow, West and Goodhardt have described a form of asthma in adults which they ascribe to a hypertrophied thymus gland and term ”

thymic asthma.”

Diseases of the Spleen. — Physiological variations and abnormalities and absence of the spleen are so rare as to require no comment. The most usual pathological condition which gives rise to symptoms is that of wandering spleen, which may or may not be secondary to a wandering left kidney. It may produce symptoms of dragging and discomfort, dyspepsia, vomiting and abdominal pain, and sometimes jaundice (Treves), or the pedicle may become twisted, producing extremely severe symptoms. The treatment is entirely surgical. Abscess in the spleen occasionally occurs, usually in association with infective endocarditis or with general pyaemia. The spleen may be the seat of primary new growths, but these are rare, and only in a small portion of cases does it share in the metastatic reproduction of carcinoma. Infection of the spleen plays a prominent part in many diseases, such as malaria, typhoid fever, lymphadenoma and leucaemia.

Diseases of the thyroid gland (see Goitre) and Addison’s disease (of the suprarenal glands) are treated separately. (H. L. H.)

LYNCH, PATRICIO (1825-1886) Chilean naval officer, was born in Valparaiso on the 18th of December 1823, his father being a wealthy Irish merchant resident in Chile, and his mother, Carmen Solo de Saldiva, a descendant of one of the best-known families in the country. Entering the navy in 1837, he took part in the operations which led to the fall of the dictator, Santa Cruz. Next, he sought a wider field, and saw active service in the China War on board the British frigate ” Calliope.” He was mentioned in despatches for bravery, and received the grade of midshipman in the British service. Returning to Chile in 1847 he became lieutenant, and seven years later he received the command of a frigate, but was deprived of his command for refusing to receive on board his ship political suspects under arrest. The Spanish War saw him again employed, and he was successively maritime prefect of Valparaiso, colonel of National Guards, and, finally, captain and minister of marine in 1872. In the Chile-Peruvian War a brilliant and destructive naval raid, led by him, was

followed by the final campaign of Chorrillos and Mirafiores (1880), in which he led at first a brigade (as colonel) and afterwards a division

under Baquedano. His services at the battle of Chorrillos led to his appointment to command the Army of Occupation in Peru. This difficult post he filled with success, but his action in putting the Peruvian president, Garcia Calderon, under arrest excited considerable comment. His last act was to invest Iglesias with supreme power in Peru, and he returned to his own country in 1883. Promoted rear-admiral, he served as Chilean Minister at Madrid for two years, and died at sea in 1886. Lynch is remembered as one of the foremost of Chile's naval heroes.

LYNCHBURG, a city of Campbell county, Virginia, U.S.A., on the James river, about 125 m. W. by S. of Richmond. Pop. (1900) 18,891, of whom 8254 were negroes; (1910) 29,494. It is served by the Southern, the Chesapeake & Ohio and the Norfolk & Western railways. Its terraced hills command fine views of mountain, valley and river scenery, extending westward to the noble Peaks of Otter and lesser spurs of the Blue Ridge about 20 m. distant. On an elevation between Rivermont Avenue and the James river are the buildings of Randolph-Macon Woman's college (opened in 1893), which is conducted by a self-perpetuat- ing board under the auspices of the Methodist Episcopal Church, South, and is one of the Randolph-Macon system of colleges and academies (see Ashland, Va.). In Lynchburg, too, are the Virginia Christian college (co-educational, 1903), and the Virginia collegiate and industrial school for negroes. The city has a public library, well-equipped hospitals, public parks and the Rivermont Viaduct, 1100 ft., long and 140 ft. high. Lynch- burg is the see of a Protestant Episcopal bishop. Tobacco of a superior quality and large quantities of coal, iron ore and granite are produced in the neighbourhood. Good water power is furnished by the James river, and Lynchburg is one of the principal manufacturing cities of the state. The boot and shoe industry was established in 1900, and is much the most important. In 1905 the city was the largest southern manufacturer of these articles and one of the largest distributors in the country. The factory products increased in value from $2,993,551 in 1900 to $4,905,43S in 1905, or 65-9%.

Lynchburg, named in honour of John Lynch, who inherited a large tract of land here and in 1757 established a ferry across the James, was established as a village by Act of Assembly in 1786, was incorporated as a town in 1805, and became a city in 1852. During the Civil War it was an important base of supplies for the Confederates; on the 16th of June 1864 it was invested by Major-General David Hunter (1802-1886), but three days later he was driven away by General Jubal A. Early. In 1908 the city's corporate limits were extended.

LYNCH LAW, a term loosely applied to various forms of executing rough popular justice, or what is thought to be justice, for the punishment of offenders by a summary procedure, ignor- ing, or even contrary to, the strict forms of law. The word lynching ” originally signified a whipping for reformatory purposes with more or less disregard for its legality ” (Cutler), or the infliction of minor punishments without recourse to law; but during and after the Reconstruction Period in the United States, it came to mean, generally, the summary infliction of capital punishment. Lynch law is frequently prevalent in sparsely settled or frontier districts where government is weak and officers of the law too few and too powerless to enforce law and preserve order. The practice has been common in all countries when unsettled frontier conditions existed, or in periods of threatened anarchy. In what are considered civilized countries it is now found mainly in Russia, south-eastern Europe and in America, but it is essentially and almost peculiarly an American institution. The origin of the name is obscure; different writers have attempted to trace it to Ireland, to England, to South Carolina, to Pennsylvania and to Virginia. It is certain that the name was first used in America, but it is not certain whether it came from Lynch’s Creek, South Carolina, where summary justice was administered to outlaws, or from Virginia and Pennsylvania, where men named Lynch were noted for dealing

out summary punishment to offenders. 1 In Europe early examples of a similar phenomenon are found in the proceedings of the Vehmgerichte in medieval Germany, and of Lydford law, gibbet law or Halifax law, Cowper justice and Jeddart justice in the thinly settled and border districts of Great Britain; and since the term ” lynch law ” came into colloquial use, it is loosely employed to cover any case in which a portion of the community takes the execution of its ideas of justice into its own hands, irrespective of the legal authorities.

In America during the 18th and 19th centuries the population expanded westward faster than well-developed civil institutions could follow, and on the western frontier were always desperadoes who lived by preying on the better classes. To suppress these desperadoes, in the absence of strong legal institutions, resort was continually made to lynch law. There was little necessity for it until the settlement crossed the Alleghany Mountains, but the following instances of lynching in the East may be mentioned: (1) the mistreatment of Indians in New England and the Middle Colonies in disregard of laws protecting them; (2) the custom found in various colonies of administering summary justice to wife-beaters, idlers and other obnoxious persons; (3) the acts of the Regulators of North Carolina, 1 767-1 771; (4) the popular tribunals of the Revolutionary period,

when the disaffection toward Great Britain weakened the authority of the civil governments and the war replaced them by popular governments, at a time when the hostilities between ” Patriots ” and ” Tories ” were an incentive to extra-legal violence. In the South, lynching methods were long employed in dealing with agitators, white and black, who were charged with endeavouring to excite the slaves to insurrection or to crime against their masters, and in dealing with anti-slavery agitators generally.

In the West, from the Alleghanies to the Golden Gate, the pioneer settlers resorted to popular justice to get rid of bands of outlaws, and to regulate society during that period when laws were weak or confused, when the laws made in the East did not suit western conditions, and when courts and officials were scarce and distant. The Watauga settlements and the ” State ” of Franklin furnished examples of lynch law procedure almost reduced to organization. Men trained in the rough school of the wilderness came to have more regard for quick, ready-made, personal justice than for abstract justice and statutes; they were educated to defend themselves, to look to no law for protection or regulation; consequently they became impatient of legal forms and lawyers' technicalities; an appeal to statute law was looked upon with suspicion, and, if some personal matter was involved, was likely to result in deadly private feuds. Thus were formed the habits of thought and action of the western pioneers. Lynch law, not civil law, cleared the western forests, valleys and mountain passes of horse and cattle thieves, and other robbers and outlaws, gamblers and murderers. This was especially true of California and the states of the far West. H. H. Bancroft, the historian of Popular Tribunals, wrote in 1887 that ” thus far in the history of these Pacific States far more has been done toward righting wrongs and administering justice outside the pale of law than within it.” However, the lack of regard for law fostered by the con- ditions described led to a survival of the lynching habit after the necessity for it passed away. In parts of the Southern states, where the whites are few and greatly outnumbered by the blacks, certain of the conditions of the West have prevailed, and since emancipation released the blacks from restraint many of the latter have been lawless and turbulent. The Reconstruction, by giving to the blacks temporary political supremacy, increased the friction between the races, and greatly 1 The usual explanation is that the name was derived from Charles Lynch (1736-1796), a justice of the peace in Virginia after 1774, who in 1780, toward the close of the War of Independence, greatly exceeded his powers in the punishment of Tories or Loyalists detected in a conspiracy in the neighbourhood of his home in Bedford

county, Va. Lynch was a man of influence in his community, was for many years a member of the Virginia legislature, was a member of the famous Virginia Convention of 1776 and was later (in 1781) an officer in the American army. See an article, ” The Real Judge Lynch,” in the Atlantic Monthly, vol. lxxxviii. (Boston, 1901).

deepened prejudice. The numerous protective societies of whites, 1865-1876, culminating in the Ku Klux movement, may be described as an application of lynch law. With the increase of negro crimes came an increase of lynchings, due to prejudice, to the fact that for some time after Reconstruction the governments were relatively weak, especially in the districts where the blacks outnumber the whites, to the fact that negroes nearly always shield criminals of their own race against the whites, and to the frequent occurrence of the crime of rape by negro men upon white women.

Since 1882 the Chicago Tribune has collected statistics of lynching, and some interesting facts may be deduced from these tables. 1 During the twenty-two years from 1882 to 1903 in- clusive, the total number of persons lynched in the United States was 3337, the number decreasing during the last decade; of these 2385 were in the South and 752 in the North; of those lynched in the East and West 602 were white and 75 black, and of those in the South 567 were white and 1985 black. 2 Lynchings occur mostly during periods of idleness of the lower classes; in the summer more are lynched for crimes against the person and in the winter (in the West) for crimes against property; the principal causes of lynching in the South are murder and rape, in the North and West, murder and offences against property; more blacks than whites were lynched between 1882 and 1903, the numbers being 2060 negroes, of whom 40 were women, and n 69 whites, of whom 23 were women; of the 707 blacks lynched for rape 675 were in the South; 783 blacks were lynched for murder, and 753 of these were in the South; most of the lynchings of whites were in the West; the lynching of negroes increased somewhat outside of the South and decreased somewhat in the South. Lynching decreases and disappears in a community as the population grows denser and civil institutions grow stronger; as better communications and good police make it harder to commit crime; and as public sentiment is educated to demand legal rather than illegal and irregular infliction of punishment for even the most horrible of crimes.

See James E. Cutler, Lynch Law (New York, 1905), an ad- mirable and unbiased discussion of the subject; H. H. Bancroft, Popular Tribunals (2 vols., San Francisco, 1887); C. H. Shinn, Mining Camps: A Study in American Frontier Government (New York, 1885); and J. C. Lester and D. L. Wilson, Ku Klux Klan (New Vork, 1905). (W. L. F.)

LYNDHURST, JOHN SINGLETON COPLEY, Baron (1772- 1863), lord chancellor of England, was born at Boston, Massa- chusetts, in 1772. He was the son of John Singleton Copley, the painter. He was educated at a private school and Cambridge university, where he was second wrangler and fellow of Trinity. Called to the bar at Lincoln's Inn in 1804, he gained a consider- able practice. In 1817 he was one of the counsel for Dr J. Watson, tried for his share in the Spa Fields riot. On this occasion Copley so distinguished himself as to attract the atten- tion of Castlereagh and other Tory leaders, under whose patron- age he entered parliament as member for Yarmouth in the Isle of Wight. He afterwards sat for Ashburton, 1818-1826, and for Cambridge university 1826-1827. He was solicitor-general in 1819, attorney-general in 1824, master of the rolls in 1826 and lord chancellor in 1827, with the title of Lord Lyndhurst. Before being taken up by the Tories, Copley was a man of the most advanced views, a republican and Jacobin; and his accession to the Tories excited a good deal of comment, which he bore with the greatest good humour. He gave a brilliant and eloquent but by no means rancorous support to all the re- actionary measures of his chief. The same year that he became

1 They have been corrected and somewhat modified by Dr. J. E. Cutler, from whose book the figures above have been taken. Lynch- ing as used in this connexion applies exclusively to the illegal in- fliction of capital punishment.

2 For present purposes the former slave states (of i860) constitute the South; the West is composed of the territory west of the Mississippi river, excluding Missouri, Arkansas, Louisiana, Texas and Oklahoma ; the East includes those states east of the Mississippi river not included in the Southern group; the East and the West make up the North as here used — that is, the former free states of i860.

solicitor-general he married the beautiful and clever widow of Lieut.- Colonel Charles Thomas of the Coldstream Guards, and began to take a conspicuous place in society, in which his noble figure, his ready wit and his never-failing bonhomie made him a distinguished favourite.

As solicitor-general he took a prominent part in the trial of Queen

Caroline. To the great Liberal measures which marked the end of the reign of George IV. and the beginning of that of William IV. he gave a vigorous opposition. He was lord chief baron of the exchequer from 1831 to 1834. During the Melbourne administration from 1835 to 1 84i he figured con- spicuously as an obstructionist in the House of Lords. In these years it was a frequent practice with him, before each prorogation of parliament, to entertain the House with a ” review of the session,” in which he mercilessly attacked the Whig government. His former adversary Lord Brougham, disgusted at his treatment by the Whig leaders, soon became his most powerful ally in opposition; and the two dominated the House of Lords. Throughout all the Tory governments from 1827 Lyndhurst held the chancellorship (1827-1830 and 1834-1835); and in the Peel administration (1 841-1846) he resumed that office for the last time. As Peel never had much confidence in Lyndhurst, the latter did not exert so great an influence in the cabinet as his position and experience entitled him to do. But he con- tinued a loyal member of the party. As in regard to Catholic emancipation, so in the agitation against the corn laws, he opposed reform till his chief gave the signal for concession, and then he cheerfully obeyed. After 1846 and the disintegration of the Tory party consequent on Peel’s adoption of free trade, Lord Lyndhurst was not so assiduous in his attendance in parliament. Yet he continued to an extreme old age to take a lively interest in public affairs, and occasionally to astonish the country by the power and brilliancy of his speeches. That which he made in the House of Lords on the 19th of June 1854, on the war with Russia, made a sensation in Europe; and throughout the Crimean War he was a strong advocate of the energetic prosecution of hostilities. In 1859 he denounced with his old energy the restless ambition of Napoleon III. When released from office he came forward somewhat as the advocate of liberal measures. His first wife had died in 1834, and in August 1837 he had married Georgina, daughter of Lewis Gold- smith. She was a Jewess; and it was therefore natural that he strenuously supported the admission of Jews into parliament. He also advocated women’s rights in questions of divorce. At the age of eighty-four he passed the autumn at Dieppe, ” helping to fly paper kites, and amusing himself by turns with the writings of the Greek and Latin fathers on divorce and the amorous novels of Eugene Sue.” His last speech, marked by ” his wonted brilliancy and vigour,” was delivered in the House of Lords at the age of eighty-nine. He died in London on the 12th of October 1863. He left no male issue and the title became extinct.

See Lives of the Lord Chancellors of England, vol. viii. (Lords Lyndhurst and Brougham), by Lord Campbell (1869). Campbell was a

personal friend, but a political opponent. Brougham's Memoirs; Greville Memoirs; Life of Lord Lyndhurst (1883) by Sir Theodore Martin; J. B. Atlay, The Victorian Chancellors (1906).

LYNDSAY, SIR DAVID (c. 1490-c. 1555), Scottish poet, was the son of David Lyndsay of the Mount, near Cupar-Fife, and of Garmylton, near Haddington. His place of birth and his school are undetermined. It is probable th%t his college life was spent at St Andrews university, on the books of which appears an entry " Da Lindesay " for the session 1508-1509. He was engaged at court, first as an equerry, then as an " usher " to the young Prince James, afterwards James V. In 1522 he married Janet Douglas, a court seamstress, and seven years later was appointed Lyon King of Arms, and knighted. He was several times engaged in diplomatic business (twice on embassies abroad — to the Netherlands and France), and he was, in virtue of his heraldic office, a general master of ceremonies. After the death of James V., in 1542, he continued to sit in parliament as commissioner for Cupar-Fife; and in 1548 he

was member of a mission to Denmark which obtained certain privileges for Scottish merchants. There is reason to believe that he died in or about 1555.

Most of Lyndsay's literary work, by which he secured great reputation in his own day and by which he still lives, was written during the period of prosperity at court. In this respect he is unlike his predecessor Gavin Douglas (?.».), who forsook literature when he became a politician. The explanation of the difference is partly to be found in the fact that Lyndsay's muse was more occasional and satirical, and that the time was suitable to the exercise of his special gifts. It is more difficult to explain how he enjoyed a freedom of speech which is without parallel even in more secure times. He chastised all classes, from his royal master to the most simple. There is no evidence that he abjured Catholicism; yet his leading purpose was the exposure of its errors and abuses. His aid was readily accepted by the reforming party, and by their use of his work he shared with their leaders throughout many generations a reputation which is almost exclusively political and ecclesiastical.

Lyndsay's longer poems are The Dreme (1134 lines), The Testament and Complaynt of the Papynago (1190 lines), The Testament of

Squyer Meldrum (1859 lines), Ane Dialog betwix Experience and ane Courteour of the Miserabyll Estait of the World (6333 lines), and Ane Pleasant Satyre of the Thrie Estaitis (over 4000 lines) . These represent, with reasonable completeness, the range of Lyndsay's literary talent. No single poem can give him a chief place, though here and there, especially in the last, he gives hints of the highest competence. Yet the corporate effect of these pieces is to secure for him the allowance of more than mere intellectual vigour and common sense. There is in his craftsmanship, in his readiness to apply the traditional methods to contemporary requirements, something of that accomplishment which makes even the second-rate man of letters interesting.

Lyndsay, the last of the Makars, is not behind his fellow-poets in acknowledgment to Chaucer. As piously as they, he repro- duces the master's forms; but in him the sentiment and outlook have suffered change. His nearest approach to Chaucer is in The Testament of Squyer Meldrum, which recalls the sketch of the "young squire"; but the reminiscence is verbal rather than spiritual. Elsewhere his memory serves him less happily, as when he describes the array of the lamented Queen Magdalene in the words which Chaucer had applied to the eyes of his wanton Friar. So too, in the Dreme, the allegorical tradition survives only in the form. " Remembrance " conducts the poet over the old-world itinerary, but only to lead him to specula- tion on Scotland's woes and to an " Exhortatioun to the Kingis Grace " to bring relief. The tenor is well expressed in the motto from the Vulgate — " Pr Ophelias nolite spernere. Omnia autem probate: quod bonum est tenete." This didactic habit is freely exercised in the long Dialog (sometimes called the Monarche), a universal history of the medieval type, in which the falls of princes by corruption supply an object lesson to the unreformed church of his day. The Satyre is more direct in its attack on ecclesiastical abuse; and its dramatic form permits more lively treatment. This piece is of great historical interest, being the only extant example of a complete Scottish morality. It is in respect of literary quality Lyndsay's best work, and in dramatic construction and delineation of character it holds a high place in this genre. The farcical interludes (in places too coarse for modern taste) supply many touches of genuine comedy; and throughout the play there are passages, as in the speeches of Veritie in the First Part and of Dame Chastitie in the " Interlude of the Sowtar and the Taylor," in which word and line are happily conceived. The Testament of the Papyngo (popinjay), drawn in the familiar medieval manner, is another tract for the time, full of admonition to court and clergy. Of his shorter pieces, The Complaynt and Publict Confessions of the

Kingis Auld Hound, callit Bagsche, directit to Bawtie, the Kingis best belovit Dog, and his companyeonis, and the Answer to the Kingis Flyting have a Uke pulpit resonance. The former is interesting as a forerunner M Burns's device in the " Twa Dogs." The Deploratioun of the

Deith of Queen Magdalene is in the extravagant style of commemoration illustrated in Dunbar's Elegy on the Lord Aubigny. The Justing betwix James Watsoun and Jhone Barbour is a contribution to the popular taste for boisterous fun, in spirit, if not in form, akin to the Christis Kirk on the Grene series; and indirectly, with Dunbar's Turnament and Of ane Blak-Moir, a burlesque of the courtly tourney. Lyndsay approaches Dunbar in his satire The Supplicatioun in contemptioun of syde iaillis ("wide" trains of the ladies), which recalls the older poet's realistic lines on the filthy condition of the city streets. In Lyndsay's Descriptioun of Pedder Cojfeis (pedlars) we have an early example of the studies in vulgar life which are so plentiful in later Scottish literature. In Kitteis Confessioun he returns, but in more sprightly mood, to his attack on the church.

In Lyndsay we have the first literary expression in Scotland of the Renaissance. His interest lies on the theological side of the revival; he is in no sense a humanist, and he is indifferent to the artistic claims of the movement. Still he appeals to the principle which is fundamental to all. He demands first-hand impression. He feels that men must get their lesson direct, not from intermediaries who understand the originals no more " than they do the ravyng of the rukis." Hence his persistent plea for the vernacular, nowhere more directly put than in the Dialog, in the " Exclamatioun to the Redar, toucheyng the wrytting of the vulgare and maternall language." Though he is concerned only in the theological and ecclesiastical application of this, he undoubtedly stimulated the use of the vernacular in a Scotland which in all literary matters beyond the concern of the irresponsible poet still used the lingua franca of Europe.

A complete edition of Lyndsay's poetical works was published by David Laing in 3 vols, in 1879. This was anticipated during the process of preparation by a cheaper edition (slightly expurgated) by the same editor in 1871 (2 vols.). The E.E.T.S. issued the first part of a complete edition in 1865 (ed. F. Hall). Five parts have appeared, four edited by F. Hall, the fifth by J. A. H. Murray. For the bibliography see Laing's 3 vol. edition, u.s. iii. pp. 222 et seq., and the E.E.T.S. edition passim. See also the editions by Pinkerton (1792), Sibbald (1803), and Chalmers (1806); and the critical ac- counts in Henderson's Scottish Vernacular Literature (1898), Gregory Smith's Transition Period

(1900), and J. H. Millar's Literary History of Scotland (1903). A professional work prepared by Lyndsay in the Lyon Office, entitled the Register of Scottish Arms (now preserved in MS. in the Advocates' Library), was printed in 1821 and reprinted in 1878. It remains the most authoritative document on Scottish heraldry. (G. G. S.)

LYNEDOCH, THOMAS GRAHAM, ist Baron (1748-1843), British general, was the son of Thomas Graeme, laird of Bal- gowan, and was born on the 19th of October 1748. He was educated by private tutors, among whom was James Macpherson (

up in Mantua with Wiirmser's army, escaped in disguise, and after many adventures reached the relieving army of Alvinzi just before the battle of Rivoli. On returning to his regiment he served in more " conjunct " expeditions, in one of which, at Messina, he co-operated with Nelson, and in 1799 he was sent as brigadier-general to invest the fortress of Valetta, Malta. He blockaded the place for two years, and though Major-General Pigot arrived shortly before the close of the blockade and assumed command, the conquest of Malta stands almost wholly to the credit of Graham and his naval colleague Sir Alexander Ball. In 1801 Graham proceeded to Egypt, where his regiment was engaged in Abercromby's expedition, but arrived too late to take part in any fighting. He took the opportunity afforded by the peace of Amiens to visit Turkey, Austria, Germany and France, and only resumed command of his regiment in 1804. When the latter was ordered to the West Indies he devoted himself to his duties as a member of parliament. He sat for Perthshire until 1807, when he was defeated, as he was again in 181 2. Graham was with Moore in Sweden in 1808 and in Spain 1808-1809, and was present at his death at the battle of Corunna. In 1809 he- became a major-general, and after taking part in the disastrous Walcheren expedition he was promoted lieutenant-general and sent to Cadiz (i8ro).

In 181 1, acting in conjunction with the Spanish army under General la Pefia (see Peninsular War), he took the offensive, and won the brilliant action of Barossa (5th of March). The victory was made barren of result by the timidity of the Spanish generals. The latter nevertheless claimed more than their share of the credit, and Graham answered them with spirit. One of the Spanish officers he called out, fought and disarmed, and after refusing with contempt the offer of a Spanish dukedom, he resigned his command in the south and joined

Wellington in Portugal. His seniority as lieutenant-general made him second in command of Wellington's army. He took part in the siege of Ciudad Rodrigo, and commanded a wing of the army in the siege of Badajoz and the advance to Salamanca. In July 181 2, his eyesight becoming seriously impaired, he went home, but re- joined in time to lead the detached wing of the army in the wide- ranging manoeuvre which culminated in the battle of Vittoria. Graham was next entrusted with the investment and siege of San Sebastian, which after a desperate defence fell on the 9th of September 1813. He then went home, but in 1814 accepted the command of a corps to be despatched against Antwerp. His assault on Bergen op Zoom was, however, disastrously repulsed (3rd of February 18 14).

At the peace Graham retired from active military employment. He was created Baron Lynedoch of Balgowan in the peerage of the United Kingdom, but refused the offered pension of £2000 a year. In 1813 he proposed the formation of a military club in London, and though Lord St Vincent considered such an assemblage of officers to be unconstitutional, Wellington sup- ported it and the officers of the army and navy at large received the idea with enthusiasm. Lynedoch's portrait, by Sir T. Lawrence, is in possession of this club, the (Senior) United Service. In his latter years he resumed the habits of his youth, travelling all over Europe, hunting with the Pytchley so long as he was able to sit his horse, actively concerned in politics and voting consistently for liberal measures. At the age of ninety- two he hastened from Switzerland to Edinburgh to receive Queen Victoria when she visited Scotland after her marriage. He died in London on the 18th of December 1843. He had been made a full general in 1821, and at the time of his death was a G.C.B., Colonel of the 1st (Royal Scots) regiment, and governor of Dumbarton Castle.

See biographies by John Murray Graham (2nd ed., Edinburgh, 1877) and Captain A. M. Delavoye (London, 1880); also the latter's History of the 90th (Perthshire Volunteers) (London, 1 880), Philip- parts' Royal Military Calendar (1820), ii. 147, and Gentleman's Magazine, new series, xxi. 197.

LYNN, a city and seaport of Essex county, Massachusetts, 9 m. N.E. of Boston, on the N. shore of Massachusetts Bay. Pop. (1900) 68,5r3, of whom 17,742 were foreign-born (6609

being English Canadians, 5306 Irish, 1527 English and 1280 French Canadians), and 784 were negroes; (1910 census) 89)336. It is served by the Boston & Maine and the Boston, Revere Beach & Lynn railways, and by an interurban electric railway, and has an area of 10-85 sq. m.

The business part is built near the shore on low, level ground, and the residential sections are on the higher levels. Lynn Woods, a beautiful park, covers more than 2000 acres. On the shore, which has a fine boulevard, is a state bath house. The city has a handsome city hall, a free public library, founded in 1862, a soldiers' monument and two hospitals. Lynn is primarily a manufacturing city. The first smelting works in New England were established here in 1643. More important and earlier was the manufacture of boots and shoes, an industry introduced in 1636 by Philip Kert- land, a Buckingham man; a corporation of shoemakers existed here in 1651, whose papers were lost in 1765. There were many court orders in the seventeenth century to butchers, tanners, bootmakers and cordwainers; and the business was made more important by John Adam Dagyr (d. 1808), a Welshman who came here in 1750 and whose work was equal to the best in England. In 1767 the output was 80,000 pairs; in 1795 about 300,000 pairs of women's shoes were made by 600 journeymen and 200 master workmen. The product of women's shoes had become famous in 1764, and about 1783 the use of morocco had been introduced by Ebenezer Breed. In 1900 and 1905 Lynn was second only to Brockton among the cities of the United States in the value of boots and shoes manufactured, and out- ranked Brockton in the three allied industries, the manufacture of boots and shoes, of cut stock and of findings. In the value of its total manufactured product Lynn ranked second to Boston in the state in 1905, having been fifth in 1900; the total number of factories in 1905 was 431; their capital was $23,139,185; their employees numbered 21,540; and their product was valued at $55,003,023 (as compared with $39,347,493 in 1900). Patent medicines and compounds and the manufacture of electrical machinery are prominent industries. The Lynn factories of the General Electric Company had in 1906 an annual product worth between $15,000,000 and $20,000,000. The foreign export of manufactured products is estimated at $5,000,000 a year.

Lynn was founded in 1629 and was called Saugus until 1637, when the present name was adopted, from Lynn Regis, Norfolk, the home of the Rev. Samuel Whiting (1597-1679), pastor at Lynn from 1636 until his death. From Lynn Reading was separated in 1644, Lynnfield in 1782, Saugus in 1815, and, after the incorporation of the city of Lynn in 1850, Swampscott in 1852, and in 1853 Nahant, S. of Lynn, on a picturesque peninsula and now a fashionable summer resort.

See James R Newhall, History of Lynn (Lynn, 1883), and H. K. Sanderson, Lynn in the Revolution (19 10).

LYNTON and LYNMOUTH, two seaside villages in the Barn- staple

parliamentary division of Devonshire, England, on the Bristol Channel; 17 m. E. of Ilfracombe, served by the Lynton light railway, which joins the South Western and Great Western lines at Barnstaple. Both are favoured as summer resorts. Lynmouth stands where two small streams, the East Lyn and West Lyn, flow down deep and well-wooded valleys to the sea. Lynton is on the cliff-edge, 430 ft. above. A lift connects the villages. The industries are fishing and a small coasting trade. Not far off are the Doone Valley, part of the vale of the East Lyn, here called Badgeworthy water, once the stronghold of a notorious band of robbers and famous through R. D. Blackmore's novel Lorna Doone; Watersmeet, where two streams, the Tavy and Walkham, join amid wild and beautiful scenery; and the Valley of Rocks, a narrow glen strewn with immense boulders. Lynton is an urban district, with a population (1901) of 1641.

LYNX (Lat. Lynx, Gr. Xi>-y£, probably connected with \evocreiv, to see), a genus of mammals of the family Felidae, by some naturalists regarded only as a subgenus or section of the typical genus Felis (see Carnivora). As an English word(lynx)the name is used of any animal of this group. It is not certain to which of these, if to any of them, the Greek name X6y£ was especially applied, though it was more probably the caracal (q.v.) than any

of the northern species. The so-called lynxes of Bacchus were generally represented as resembling leopards rather than any of the species now known by the name. Various fabulous properties were attributed to the animal, whatever it was, by the ancients, that of extraordinary powers of vision, including ability to see through opaque substances, being one; whence the epithet " lynx-eyed," which has survived to the present day.

Lynxes are found in the northern and temperate regions of both the Old and New World; they are smaller than leopards, and larger than true wild cats, with long limbs, short stumpy tail, ears tufted at the tip, and pupil of the eye linear when contracted. Their fur is generally long and soft, and always longish upon the cheeks. Their colour is light brown or grey, and generally spotted with a darker shade. The naked pads of the feet are more or less covered by the hair that grows between them. The skull and skeleton do not differ markedly from those of the other cats. Their habits are exactly those of the other wild cats. Their food consists of any mammals or birds which they can

overpower. They commit extensive ravages upon sheep and poultry. They generally frequent rocky places and forests, being active climbers, and passing much of their time among the branches of the trees. Their skins are of considerable value in the fur trade. The northern lynx {L. lynx or L. borealis) of Scandinavia, Russia,

From a drawing by Wolf in Elliot's Monograph of the Felidae.
European Lynx.

northern Asia, and till lately the forest regions of central Europe, has not inhabited Britain during the historic period, but its remains have been found in cave deposits of Pleistocene age. Dr W. T. Blanford says that the characters on which E. Blyth relied in separating the Tibetan lynx (L. isabellinus) from the European species are probably due to the nature of its habitat among rocks, and that he himself could find no constant character justifying separation. The pardine lynx (L. pardinus) from southern Europe is a very handsome species; its fur is rufous above and white beneath.

Several lynxes are found in North America; the most northerly has been described as the Canadian lynx (L. canadensis) ; the bay lynx (L. rufus), with a rufous coat in summer, ranges south to Mexico, with spotted and streaked varieties — L. maculatus in Texas and southern California, and L. fasciatus in Washington and Oregon. The first three were regarded by St George Mivart as local races of the northern lynx. A fifth form, the plateau lynx (L. baileyi), was described by Dr C. H. Merriam in 1890 , but the differences between it and the bay lynx are slight and unimportant.

LYON, MARY MASON (1797-1849), American educationalist, was born on the 28th of February 1797 on a farm near Buckland, Franklin county, Massachusetts. She began to teach when she

was seventeen, and in 181 7, with the earnings from her spinning and weaving, she went to Sanderson Academy, Ashfield. She supported herself there, at Amherst Academy, where she spent one term, and at the girls' school in Byfield, established in 1819 by Joseph Emerson (1777-1833), where she went in 1821, by teaching in district schools and by conducting informal normal schools. In 1822-1824 she was assistant principal of Sanderson Academy, and then taught in Miss Zilpah P. Grant's Adams Female Academy, in Londonderry (now Derry), N.H. This school had only summer sessions, and Miss Lyon spent her winters in teaching, especially at Buckland and at Ashfield, and in studying chemistry and natural science with Edward Hitchcock, the geologist. In 1828-1834 she taught in Miss Grant's school, which

in 1828 had been removed to Ipswich, and for two years managed the school in Miss Grant's absence. In 1828-1830 she had kept up her winter " normal " school at Buckland, and this was the beginning of her greater plan, " a permanent institution consecrated to the training of young women for usefulness . . . designed to furnish every advantage which the state of education in this country will allow … to put within reach of students of moderate means such opportunities that none can find better." She was assisted by Dr Hitchcock, and her own mystical enthusiasm and practical common sense secured for her plan ready financial support. In 1835 a site was selected near the village of South Hadley and Mount Holyoke ; in 1836 the school was incorporated as Mount Holyoke Female Seminary; and on the 8th of November 1837 it opened with Mary Lyon as principal, and, as assistant, Miss Eunice Caldwell, afterwards well known as Mrs J. P. Cowles of Ipswich Academy. Miss Lyon died at Mount Holyoke on the 5th of March 1849, having served nearly twelve years as principal of the seminary, on a salary of $200 a year. From her work at Holyoke sprang modern higher education for women in America.

See Edward Hitchcock, Life and Labors of Mary Lyon (1851); B. B. Gilchrist, Life of Mary Lyon (Boston, 1910).

LYON, NATHANIEL (1818-1861), American soldier, was born in Ashford, Connecticut, on the 14th of July 1818, and graduated at West Point in 184 1. He was engaged in the Seminole War and the war with Mexico, won the brevet of captain for his gallantry at Contreras and Churubusco, and was wounded in the assault on the city of Mexico. In 1850, while serving in California, he con- ducted a successful expedition against the Indians. He was promoted captain in 1851, and two years later was ordered to the East, when he became an ardent opponent of " States' Rights " and slavery. He was stationed in Kansas and in Missouri on the eve of the Civil War. In Missouri not only was sentiment divided, but the two factions were eager to resort to force long before they were in the other border states. Lyon took an active part in organizing the Union party in Missouri, though greatly hampered, at first by the Federal government which feared to provoke hostilities, and afterwards by the military commander of the department, General W. S. Harney. On Harney's removal in April 1 86 1, Lyon promptly assumed the command, called upon Illinois to send him troops, and mustered the Missouri contingent into the United States' service. He broke up the militia camp at St Louis established by the secessionist governor of Missouri, Clai- borne F. Jackson, and but for the express prohibition of Harney, who had resumed the command, would have proceeded at once to active hostilities. In all this Lyon had co-operated closely with Francis P. Blair, Jr., who now

obtained from President Lincoln the definitive removal of Harney and the assignment of Lyon to command the Department of the West, with the rank of brigadier- general. On Lyon's refusal to accede to the Secessionists' proposal that the state should be neutral, hostilities opened in earnest, and Lyon, having cleared Missouri of small hostile bands in the central part of the state, turned to the southern districts, where a Confederate army was advancing from the Arkansas border. The two forces came to action at Wilson's Creek on the 10th of August 1861. The Union forces, heavily outnumbered, were defeated, and Lyon himself was killed while striving to rally his troops. He bequeathed almost all he possessed, some $30,000, to the war funds of the national government.

See A. Woodward, Memoir of General Nathaniel Lyon (Hartford, 1862); James Peckham, Life of Lyon (New York, 1866); and T. L. Snead, The Fight for Missouri (New York, 1886). Also Last Political Writings of General Nathaniel Lyon (New York, 1862).

LYONNESSE, Lyonesse, Leonnoys or Leonais, a legendary country off the south coast of Cornwall, England. Lyonnesse is the scene of many incidents in the Arthurian romances, and especially in the romances of Tristram and Iseult. It also plays an important part in purely Cornish tradition and folklore. Early English chronicles, such as the Chronicon e chronicis of Florence of Worcester, who died in 11 18, described minutely and without a suggestion of disbelief the nourishing state of Lyon- nesse, and its sudden disappearance beneath the sea. The legend may be a greatly exaggerated version of some actual subsidence of inhabited land. There is also a very ancient local tradition, apparently independent of the story of Lyonnesse, that the Scilly Islands formed part of the Cornish mainland within historical times.

See Florentii Wigorniensis monachi Chronicon ex chronicis, &c, ed. B. Thorpe (London, 1 848-1 849).

LYONS, EDMUND LYONS, Baron (1790-1858), British admiral, was born at Burton, near Christchurch, Hampshire, on the 21st of November 1790. He entered the navy, and served in the Mediterranean, and afterwards in the East Indies, where in 1 8 10 he won promotion by distinguished bravery. He became post-captain in 1814, and in 1826 commanded the "Blonde" frigate at the blockade of Navarino, and took part with the French in the capture of Kasteo

Morea. Shortly before his ship was paid off in 1835 he was knighted. From 1840 till 1853 Lyons was employed on the diplomatic service, being successively minister to Greece, Switzerland and Sweden. On the outbreak of the war with Russia he was appointed second in command of the British fleet in the Black Sea under Admiral Dundas, whom he succeeded in the chief command in 1854. As admiral of the inshore squadron he had the direction of the landing of the troops in the Crimea, which he conducted with marvellous energy and despatch. According to Kinglake, Lyons shared the ” intimate counsels ” of Lord Raglan in regard to the most momentous questions of the war, and toiled, with a ” painful consuming passion,” to achieve the object of the campaign. His principal actual achievements in battle were two — the support he rendered with his guns to the French at the Alma in attacking the left flank of the Russians, and the bold and brilliant part he took with his ship the ” Agamemnon ” in the first bombardment of the forts of Sebastopol; but his constant vigilance, his multifarious activity, and his suggestions and counsels were much more advantageous to the allied cause than his specific exploits. In 1855 he was created vice-admiral; in June 1856 he was raised to the peerage with the title of Baron Lyons of Christchurch. He died on the 23rd of November 1858.

See Adam S. Eardley-Wilmot, R.N., Life of Lord Lyons (1898).

LYONS, RICHARD BICKERTON PEMELL LYONS, ist Eari (1817-1887), British diplomatist, son of the preceding, was born at Lymington on the 26th of April 181 7. He entered the diplomatic service, and in 1859-1864 was British minister at Washington, where, after the outbreak of the Civil War, the extremely important negotiations connected with the arrest of the Confederate envoys on board the British mail-steamer “Trent” devolved upon him. After a brief service at Constantinople, he succeeded Lord Cowley at the Paris embassy in 1867. In the war of 1870 he used his best efforts as a mediator, and accom- panied the provisional government to Tours. He continued to hold his post with universal acceptance until November 1887. He died on the 5th of December 1887, when the title became extinct.

LYONS (Fr. Lyon), a city of eastern France, capital of the department of Rh6ne, 315 m. S.S.E. of Paris and 218 m. N. by W. of Marseilles on the Paris-Lyon railway. Pop. (1906) town, 430,186; commune, 472,114. Lyons, which in France is second only to Paris in commercial and military importance, is situated at the confluence of the Rhone and the Sa6ne at an altitude of 540 to 1000 ft. above sea-level. The rivers, both flowing south, are separated on the north by the hill on which lies the populous working quarter of Croix-Rousse, then by the

narrow tongue of

land ending in the Perrache Quarter. The peninsula thus formed is over 3 m. long and from 650 to 1000 yds. broad. It is traversed lengthwise by the finest streets of the city, the rue de la Re- publique, the rue de l'Hotel de Ville, and the rue Victor Hugo. Where it enters Lyons the Sadne has on its right the faubourg of Vaise and on its left that of Serin, whence the ascent is made to the top of the hill of Cioix-Rousse. Farther on, its right bank is bordered by the scarped heights of Fourviere, St Irenee, Ste Foy, and St Just, leaving room only for the quays and one or two narrow streets; this is the oldest part of the city. The river sweeps in a semicircle around this eminence (410 ft. above it), which is occupied by convents, hospitals and seminaries, and has at its summit the famous church of Notre-Dame de Fourviere, the resort of many thousands of pilgrims annually.

On the peninsula between the rivers, at the foot of the hill of Croix-Rousse, are the principal quarters of the town : the Terreaux, containing the h6tel de ville, and the chief commercial establishments; the wealthy residential quarter, centring round the Place Bellecour, one of the finest squares in France; and the Perrache. The Rhone and Saone formerly met on the site of this quarter, till, in the 18th century, the sculptor Perrache reclaimed it; on the peninsula thus formed stands the principal railway station, the Gare de Perrache with the Cours du Midi, the most extensive promenade in Lyons, stretching in front of it. Here, too, are the docks of the Sadne, factories, the arsenal, gas-works and prisons. The Rhone, less confined than the Saone, flows swiftly in a wide channel, broken when the water is low in spring by pebbly islets. On the right hand it skirts first St Clair, sloping upwards to Croix-Rousse, and then the districts of Terreaux, Bellecour and Perrache; on the left it has a low-lying plain, occupied by the Pare de la Tete d'Or and the quarters of Brot- teaux and Guillotiere. The park, together with its lake, com- prises some 285 acres, and contains a zoological collection, botanical and pharmaceutical gardens, and the finest greenhouses in France, with unique collections of orchids, palm-trees and Cycadaceae. It is defended from the Rhone by the Quai de la Tete d'Or, while on the east the railway line to Geneva separ- ates it from the race-course. Brotteaux is a modern residential quarter. Guillotiere to the south consists largely of workmen's dwellings, bordering wide, airy thoroughfares. To the east extend the manufacturing suburbs of Villeurbanne and Montchat. The population, displaced by the demolition of the lofty old houses and the widening of the streets on the peninsula, migrates to the left bank of the Rhone, the extension of the city into the plain of Dauphine being unhindered.

The Rhone and the Saone are bordered by fine quays and crossed by 24 bridges — n over the Rhone, 12 over the Sa6ne, and 1 at the confluence. Of these the Pont du Change over the Sa6ne and the Pont de la Guillotiere over the Rhone have replaced medieval bridges, the latter of the two preserving a portion of the old structure.

Of the ancient buildings Notre-Dame de Fourviere is the most celebrated. The name originally applied to a small chapel built in the 9th century on the site of the old forum (Jorum vetus) from which it takes its name. It has been often Buildings. rebuilt, the chief feature being a modern Romanesque tower surmounted by a cupola and statue of the Virgin. In 1872 a basilica was begun at its side in token of the gratitude of the city for having escaped occupation by the German troops. The building, finished in 1894, consists of a nave without aisles flanked at each exterior corner by a turret and terminating in an apse. The facade, the lower half of which is a lofty portico supported on four granite columns, is richly decorated on its upper half with statuary and sculpture. Marble and mosaic have been lavishly used in the ornamentation of the interior and of the crypt. Round the apse runs a gallery from which, accord- ing to an old custom, a benediction is pronounced upon the town annually on the 8th of September. From this gallery a mag- nificent view of the city and the surrounding country can be obtained. At the foot of the hill of Fourviere rises the cathedral of St Jean, one of the finest examples of early Gothic architecture in France. Begun in the 12th century, to the end of which the

transept and choir belong, it was not finished till the 15th century, the gable and flanking towers of the west front being completed in 1480. A triple portal surmounted by a line of arcades and a rose window gives entrance to the church. Two additional towers, that to the north containing one of the largest bells in France, rise at the extremities of the transept. The nave and choir contain fine stained glass of the 13th and 14th centuries as well as good modern glass. The chapel of St Louis or of Bourbon, to the right of the nave, is a masterpiece of Flamboyant Gothic. To the right and left of the altar stand two crosses preserved since the council of 1274 as a symbol of the union then agreed upon between the Greek and Latin churches. Adjoining St Jean is the ancient Manecanterie or singers' house, much mutilated and frequently restored, but still preserving graceful Romanesque arcades along its front. St Martin d'Ainay, on the peninsula, is the oldest

church in Lyons, dating from the beginning of the 6th century and subsequently attached to a Benedictine abbey. It was rebuilt in the 10th and nth centuries and restored in modern times, and is composed of a nave with four aisles, a transept and choir terminating in three semicircular apses ornamented with paintings by Hippolyte Flandrin, a native of Lyons. The church is surmounted by two towers, one in the middle of the west front, the other at the crossing; the four columns supporting the latter are said to have come from an altar to Augustus. A mosaic of the 12th century, a high altar decorated with mosaic work and a beautifully carved confes- sional are among the works of art in the interior. St Nizier, in the heart of the city, was the first cathedral of Lyons; and the crypt in which St Pothinus officiated still exists. The present church is a Gothic edifice of the 15th century, with the exception of the porch, constructed by Philibert Delorme, a native of Lyons, in the r6th century. The Church of St Paul (12th and 15th centuries), situated on the right bank of the Saone, pre- serves an octagonal central tower and other portions of Roman- esque architecture; that of St Bonaventure, originally a chapel of the Cordeliers, was rebuilt in the 15th and 19th centuries. With the exception of the imposing prefecture, the vast buildings of the faculties, which are in the Guillotiere quarter, and the law court, the colonnade of which overlooks the Saone from its right bank, the chief civil buildings are in the vicinity of the Place des Terreaux. The east side of this square (so called from the terrcaux or earth with which the canal formerly connecting the Rhone and the Saone hereabouts was filled) is formed by the hotel de ville (17th century), the east facade of which, towards the Grand Theatre, is the more pleasing. The south side of the square is occupied by the Palais des Arts, built in the 17th century as a Benedictine convent and now accommodating the school of fine arts, the museums of painting and sculpture, archaeology and natural history, and the library of science, arts and industry. The museums are second in importance only to those of Paris. The collection of antiquities, rich in Gallo-Roman inscriptions, contains the bronze tablets discovered in 1528, on which is engraved a portion of a speech delivered in a.d. 48, by the emperor Claudius, advocating the admission of citizens of Gallia Comata to the Roman senate. The ” Ascension,” a masterpiece of Perugino, is the chief treasure of the art collection, in which are works by nearly all the great masters. A special gallery contains the works of artists of Lyons, among whom are numbered Antoine Berjon, Meissonier, Paul Chenavard, Puvis de Chavannes. In the Rue de la Republique, between the Place de la Bourse and the Place des Cordeliers, each of which contains one of its highly ornamented fronts, stands the Palais du Commerce et de la Bourse, the finest of the modern buildings of Lyons. The Bourse

(exchange) has its offices on the ground floor round the central glass-roofed hall; the upper storeys accommodate the commercial tribunal, the council of trade arbitration, the chamber of commerce and the Musee historique des Tissus, in which the history of the weaving industry is illustrated by nearly 400,000 examples. In the buildings of the lycee on the right bank of the Rhone are the municipal library and a collection of globes, among them the great terrestrial globe made at Lyons in 1701, indicating the great African lakes.

The Hotel Dieu, instituted according to tradition in the beginning of the 6th century by King Childebert, is still one of the chief charitable establishments in the city. The present building dates from the 18th century; its facade, fronting the west quay of the Rhone for over 1000 ft., was begun according to the designs of SoufHot, architect of the Pantheon at Paris. The Hospice de la Charite and the military hospital are on the same bank slightly farther down stream. The Hospice de l'Antiquaille, at Fourviere, occupies the site of the palace of the praetorian prefects, in which Germanicus, Claudius and Caracalla were born. Each of these hospitals contains more than 1000 beds. Lyons has many other benevolent institutions, and is also the centre of the operations of the Societe de la Propagation de la Foi. The chief monuments are the equestrian statue of Louis XIV. in the Place Bellecour, the monuments of President Carnot, Marshal Suchet, the physicist Andre-Marie Ampere, and those in honour of the Republic and in memory of the citizens of the department who fell in the war of 1870-71. The most note- worthy fountain is that in the Place des Terreaux with the leaden group by Bartholdi representing the rivers on their way to the ocean.

There are Roman remains — baths, tombs and the relics of a theatre — in the St Just quarter on the right bank of the Sa6ne. Three ancient aqueducts on the Fourviere level, from Mont- romant, Mont d'Or and Mont Pilat, can still be traced. Magnifi- cent remains of the latter work may be seen at St Irenee and Chaponost. Traces also exist along the Rhone of a subterranean canal conveying the water of the river to a naumachia (lake for mimic sea-fights). Agrippa made Lyons the starting-point of the principal Roman roads throughout Gaul; and it remains an important centre in the general system of communication owing to its position on the natural highway from north to south-eastern France. The Sa6ne above the town and the Rhone below have large barge and steamboat traffic. The main line of the Paris-Lyon-Mediterranee railway runs first through the station at Vaise, on the right bank of the Saone, and thence to that of Perrache, the chief station in the city. The line next in importance, that to Geneva, has its station in the Brotteaux quarter, and the line of the eastern Lyonnais

to St Genix d'Aoste has a terminus at Guillotiere; both these lines link up with the Paris-Lyon main line. The railway to Montbrison starts from the terminus of St Paul in Fourviere and that to Bourg, Trevoux and the Dombes region from the station of Croix-Rousse. A less important line to Vaugneray and Mornant has a terminus at St Just. Besides the extensive system of street tramways, cable tramways (ficelles) run to the summits of the eminences cf Croix-Rousse, Fourviere and St Just.

Lyons is, next to Paris, the principal fortress of the interior of France, and, like the capital, possesses a military governor. The immediate protection of the city is provided for on the east side by a modern enceinte, of simple trace, in the plain (subsidiary to this is a group of fairly modern detached forts forming an advanced position at the village of Bron), and on the west by a line of detached forts, not of recent design, along the high ground on the right bank of the Sa6ne. Some older forts and a portion of the old enceinte are still kept up in the city itself, and two of these forts, Montessuy and Caluire, situated on the peninsula, serve with their annexes to connect the northern extremities of the two lines above mentioned. The main line of defence is as usual the outer fort-ring, the perimeter of which is more than 40 m., and the mean distance from the centre of the city 6J m. This naturally divides into four sections. In Defence. the eastern plain, well in advance of the enceinte, eight principal sites have been fortified, Feyzin, Corbas, St Priest, Genas, Azieu, Meyzieux, Decines and Chaurant. These form a semicircle from the lower to the upper reaches of the Rhone. The northern (or north eastern) section, between the Rhone and the Saone, has for^^jflvron and Vancia as its principal defences; these and theiˆgˆBWaiary batteries derive some additional support from the forts Montessuy and Caluire mentioned above. On the north-west side there is a strong group of works disposed like a redan, of which the salient, fort Verdun and annexes, is on the high plateau of Mont d'Or pointing northward, and the faces, represented by forts Fr6ta and Paillet, are lower down on the spurs of the ridge, facing north-east and north- west respectively. The south-western section comprises three principal groups, Bruisson, C6te-Lorette and Montcorin-Champ- villard, the last-named crossing its fire over the Lower Rhone with Fort Feyzin. Lastly a connecting battery was built near Chapoly in 1895 to close the gap between the north-western and south-western

sections and to command the westward approaches by the valley of Charbonnieres.

Lyons is the headquarters of the XIV. army-corps, the seat of an archbishop who holds the title of primate of the Gauls and also that of archbishop of Vienne, and of a prefect, a court of appeal, a court of assizes, tribunals of commerce and of first instance, and of two boards of trade arbitration (conseils de prud'hommes). It is the centre of an academie (educational division) and has a university with faculties of law, letters, science and medicine and pharmacy. There are also Catholic faculties (facultSs libres) of law, theology, science and letters, three lycees, training colleges for teachers and numerous minor educational establishments. There are besides many special schools at Lyons, the more important being the school of fine arts which was founded in the 18th century to train competent designers for the textile manufactures, but has also done much for painting and sculpture; an army medical school, schools of drawing, agriculture, music, commerce (ecole superieure de commerce), weaving, tanning, watch-making and applied chemistry, and the ecoles La Martiniere for free instruction in science- and art as applied to industry. The veterinary school, instituted in 1761, was the first of its kind in Europe; its laboratory for the study of comparative physiology is admirably equipped. Besides the Academie des Sciences, Belles Lettres et Arts (founded in 1700), Lyons possesses societies of agriculture, natural history, geography, horticulture, &c.

Its trade in silk and silk goods has formed the basis of the prosperity of Lyons for several centuries. Derived from Italy, this industry Industry ra Pidly developed, thanks to the monopoly granted to the and trade, "ty in 1450 by Charles VII. and to the patronage of Francis I., Henry II. and Henry IV. From time to time new kinds of fabrics were invented — silk stuffs woofed with wool or with gold and silver threads, shawls, watered silks, poplins, velvets, satinades, moires, &c. In the beginning of the 19th century J. M. Jacquard introduced his famous loom by which a single work- man was enabled to produce elaborate fabrics as easily as the plainest web, and by changing the "cartoons " to make the most different textures on the same looms. In the 17th century the silk manufacture employed at Lyons, 9000 to 12,000 looms. After the revocation of the edict of Nantes the number sank to 3000 or 4000; but after the Reign of Terror was past it rose again about 1801 to 12,000. Towards the middle of the 19th century the weaving branch of the industry began to desert Lyons for the surrounding districts. The city remains the business centre for the trade and carries on dyeing, printing and other accessory processes. Lyons disputes with Milan the position of the leading silk market of

Europe. In 1905 the special office {la Condition des soies) which determines the weight of the silk examined over 4700 tons of silk. France furnished barely one-tenth of this quantity, two-thirds came from China and Japan, the rest from Italy and the Levant. The traders of Lyons re-export seven-twelfths of these silks, the industries of the town employing the remainder. An almost equal quantity of cotton, wool and waste-silk threads is mixed with the silk. A few thousand hand-looms are still worked in the town, more especially producing the richest materials, 50,000 or 55,000 in the surrounding districts, and some 33,000 machine looms in the suburbs and neighbouring departments. Allied industries such as dyeing, finishing and print- ing, employ 12,000 workers. Altogether 360,000 workpeople depend upon the silk industry. In 1905 the total value of the manufacture was £15,710,000, the chief items being pure silk textures (plain) £3.336.ooo; textures of silk mixed with other materials £3,180,000; silk and foulards £1,152,000; muslins £3,800,000, this product having increased from £100,000 in 1894. Speaking roughly the raw material represents half the value, and the value of the labour the remaining half. About 30% of the silk goods of Lyons finds a market in France. Great Britain imported them to the value of over £6,000,000, and the United States to the value of over £1 ,600,000, notwithstanding the heavy duty. The dyeing industry and the manufacture of chemicals have both developed considerably to meet the requirements of the silk trade. Large quantities of mineral and vegetable colouring matters are produced and there is besides a large output of glue, gelatine, superphosphates and phosphorus, all made from bones and hides, of picric, tartaric, sulphuric and hydrochloric acids, sulphates of iron and copper, and pharmaceutical and other chemical products.

Lyons does a large trade in metals, iron, steel and copper, and utilizes them in the manufacture of iron ‘buildings, framework, bridges, machinery, railway material, scales, metal cables, pins and needles, copper-founding and the making of clocks and bronzes. Gold and silver- working is of importance, especially for embroidery and articles used in religious ceremonies. Other industries are those of printing, the manufacture of glass goods, of tobacco (by the state), the preparation of hides and skins (occupying 20,000 workmen), those connected with the miller’s trade, the manufacture of various forms of dried flour-paste (macaroni, vermicelli, &c), brewing, hat-making, the manufacture of chocolate, and the pork-butcher’s industry. Apart from the dealings in silk and silk goods, trade is in cloth, coal and charcoal, metals and metal goods, wine and spirits, cheese and chestnuts. Four miles south-west of Lyons is Oullins (pop. 9859) which has the important works of the Paris-Lyon railway.

Lyons is the seat of important financial companies; of the Credit Lyonnais, which does business to the amount of £200,000,000 annually

in Lyons alone; also of coal and metallurgical companies and gas companies, the former extending their operations as far as Russia, the latter lighting numerous towns in France and foreign countries.

History.— -The earliest Gallic occupants of the territory at the confluence of the Rhone and the Saone were the Segusians. In 59 B.C. some Greek refugees from the banks of the Herault, having obtained permission of the natives to establish themselves beside the Croix-Rousse, called their new town by the Gallic name Lugudunum (q.v.) or Lugdunum; and in 43 b.c. Lucius Munatius Plancus brought a Roman colony to Fourvieres from Vienne. This settlement soon acquired importance, and was made by Agrippa the starting-point of four great roads. Augustus, besides building aqueducts, temples and a theatre, gave it a senate and made it the seat of an annual assembly of deputies from the sixty cities of Gallia Comata. At the same time the place became the Gallic centre for the worship of Rome and the emperor. Under the emperors the colony of Forum Vetus and the municipium of Lugdunum were united, receiving the jus senatus. The town was burnt in a.d. 59 and afterwards rebuilt in a much finer style with money given by Nero; it was also adorned by Trajan, Adrian and Antoninus. The martyrdom of Pothinus and Blandina occurred under Marcus Aurelius (a.d. 177), and some years later a still more savage persecution of the Christians took place under Septimius Severus, in which Irenaeus, according to some authors, perished.

After having been ravaged by the barbarians and abandoned by the empire, Lyons in 478 became capital of the kingdom of the Burgundians. It afterwards fell into the hands of the Franks, and suffered severely from the Saracens, but revived under Charlemagne, and after the death of Charles the Bald became part of the kingdom of Provence. From 1032 it was a fief of the emperor of Germany. Subsequently the authority over the town was a subject of dispute between the archbishops of Lyons and the counts of Forez; but the supremacy of the French kings was established under Philip the Fair in 13 1 2. The citizens were constituted into a commune ruled by freely elected consuls (1320). In the 13th century two ecclesiastical councils were held at Lyons— one in 1245, presided over by Innocent IV., at which the emperor Frederick II. was deposed; the second, the oecumenical, under the presidency of Gregory X., in 1274, at which five hundred bishops met. Pope Clement V. was crowned here in 1305, and his successor, John XXII., elected in 1316. The Protestants

obtained possession of the place in 1562; their acts of violence were fiercely avenged in 1572 after the St Bartholomew massacre. Under Henry III. Lyons sided with the League; but it pronounced in favour of Henry IV. The executions of Henri d'Effiat, marquis of Cinq-Mars, and of Francois de Thou, who had plotted to overthrow Richelieu, took place on the Place des Terreaux in 1642. In 1793 the Royalists and Girondists, powerful in the city, rose against the Convention, but were compelled to yield to the army of the republic under General Kellermann after enduring a siege of seven weeks (October 10). Terrible chastisement ensued: the name of Lyons was changed to that of Ville-affranchie; the demolition of 'its buildings was set about on a wholesale scale; and vast numbers of the proscribed, whom the scaffold had spared, were butchered with grape shot. The town resumed its old name after the fall of Robespierre, and the terrorists in their turn were drowned in large numbers in the Rhone. Napoleon rebuilt the Place Bellecour, reopened the churches, and made the bridge of Tilsit over # the Saone between Bellecour and the cathedral. In 1814 and 1815 Lyons was occupied by the Austrians. In 1831, 1834, 1849, 1870 and 1871 it was the scene of violent industrial or political disturbances. In 1840 and 1856 disastrous floods laid waste portions of the city. International exhibitions were held here in 1872 and 1894, the latter occasion being marked by the assassination of President Carnot. –

See S. Charlety, Histoire de Lyon (Lyon, 1903); J. Godart, LOuvrier en soie. Monographie du tisseur lyonnais (Lyon, 1899); A. Vachet, A travers les rues de Lyon (Lyon, 1902); A. Steyert, Nouvelle Histoire de Lyon et des provinces de Lyonnais Forez, Beaujolais (3 vols., Lyon, 1 895-1 899).

LYONS, COUNCILS OF. The first Council of Lyons (the thirteenth general council) met at the summons of Pope Innocent

IV. in June and July of 1245, to deliberate on the conflict between Church and emperor, on the assistance to be granted to the Holy Land and the Eastern empire, on measures of protection against the Tatars, and on the suppression of heresy. Among the tasks of the council mentioned in the writs of con- vocation, the most important, in the eyes of the pope, was that it should lend him effectual aid in his labours to overthrow the emperor Frederick II.; and, with this object in view, he had described the synod as a general council. Since its

numbers were not far in excess of 150 bishops and archbishops, and the great majority of these came from France, Italy and Spain; while the schismatic Greeks and the other countries — especially Germany, whose interests were so deeply involved — were but weakly represented; the ambassador of Frederick, Thaddaeus of Suessa, contested its oecumenicity in the assembly itself. The condemnation of the emperor was a foregone conclusion. The articles of indictment described him as the ” prince of tyranny, the destroyer of ecclesiastical dogma, the annihilator of the faith, the master of cruelty,” and so forth; while the grossest calumnies were treated as approved facts. The objec- tions of the ambassador, that the accused had not been regularly cited, that the pope was plaintiff and judge in one, and that therefore the whole process was anomalous, achieved as little success as his appeal to the future pontiff and to a truly oecumeni- cal council. The representatives of the kings of England and France were equally unfortunate in their claim for a prorogation of the decision. On the 17th of July the verdict was pronounced by Innocent IV., excommunicating Frederick and dethroning him on the grounds of perjury, sacrilege, heresy and felony. All oaths of fealty sworn to him were pronounced null and void, and the German princes were commanded to proceed with the election of a new sovereign. In addition the council enacted decrees against the growing irregularities in the Church, and passed resolutions designed to support the Crusaders and revive the struggle for the Holy Land.

See Mansi, Collectio conciliorum, torn, xxiii.; Huillard-Breholles, Historia diplomatica Frederici II., 6 torn. (Paris, 1852-1861); Hefele, Conciliengeschichte, ed. 2, vol. v. (1886), pp. 1105-1126; Fr. W. Schirrmacher, Kaiser Friederich der Zweite (4 vols., Gottingen, 1859-1865); H. Schulz, in Herzog-Hauck, Realencyklopadie, ed. 3, vol. ix. (1901), p. 122 sqq., s.v. ” Innocenz IV. ; A. Folz, Kaiser Friedrich II. u. Papst Innocenz IV. (Strassburg, 1905).

The second Council of Lyons (the fourteenth general council) met from the 7th of May to the 17th of July 1274, under the presidency of Pope Gregory X., and was designed to resolve three problems: to terminate the Greek schism, to decree a new Crusade, and to counteract the moral corruption among clerics and laity. The council entered on its third task at a very late period, with the result that the requisite time for an adequate deliberation was not available. Nevertheless, on the 1 st of November, Gregory was enabled to publish thirty-one constitutions, which may be taken to represent the fruits of the synod and its labours. The most important of the enact- ments passed is that regulating the papal election. It pre- scribed that the new election conducted by the college of cardinals should be held

in conclave (q.v.), and its duration abridged by progressive simplification of the cardinal's diet. The motive for this decision, which has maintained its ground in ecclesi- astical law, was given by the circumstances which followed the death of Clement IV. (1268). The pope felt a peculiar interest in the Holy Land, from which he was recalled by his elevation to the pontifical throne. He succeeded in bringing influential interests to work in the cause; but his scheme of a great enter- prise backed by the whole force of the West came to nothing, for the day of the Crusades was past. His projected Crusade was interwoven with his endeavours to end the schism; and the political straits of the emperor Michael Palaeologus in Constantinople came to the aid of these aspirations. To ensure his safety against the attacks of King Charles of Sicily, who had pledged himself to assist the ex-emperor Baldwin in his reconquest of the Latin empire, Michael was required to own the supremacy of the pope in the spiritual domain; while Gregory, in return, would restrain the Sicilian monarch from his

bellicose policy with regard to the Eastern empire. The ambas- sadors of the emperor appeared at the council with letters acknowledging the Roman pontiff and the confession of faith previously dispatched from the eternal city, and submitted similarly-worded declarations from the heads of the Byzantine Church. One member of the embassy, the Logothete Georgius Acropolites, was authorized by the emperor to take an oath in his name, renouncing the schism. In short, the subjection of the East to the Roman see was completed in the most binding forms, and the long-desired union seemed at last assured. Gregory himself did not live to discover its illusory character. The Council of Lyons was, moreover, of importance for the German dynastic struggle: for Gregory took the first public step in favour of Count Rudolph of Habsburg, the king-elect, by receiving his deputy and denying an audience to the delegate of the rival claimant, King Alphonso of Castile.

See Mansi, Collectio conciliorum, torn. xxiv. ; Hefele, Conciliengeschichte, vol. vi. ed. 2 (1890), p. 1 19 sqq. Also C. Mirbt, in Herzog-Hauck, Realencyklop. f. protestantische Theologie, vol. vii. (1899), p. 122, s.v. " Gregor X." (C. M.)

LYRA (" The Harp "), in astronomy, a constellation in the northern hemisphere, mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.). Ptolemy catalogued 10 stars in this constellation; Tycho Brahe n and Hevelius 17. a Lyrae or Vega, is the second brightest star in the northern hemisphere, and notable for the whiteness of its light, which is about 100 times that of the sun. The name " vega " is a

remnant of an Arabic phrase meaning ” falling eagle,” ” Altair,” or a Aquilae, is the similar remnant of ” flying eagle.” € Lyrae is a multiple star, separated by the naked eye or by a small telescope int« two stars; these are each resolved into two stars by a 3″ telescope, while a more powerful instrument (4”) reveals three smaller stars between the two pairs. (} Lyrae and R. Lyrae are short period variables. There is the famous ring or annular nebula, M. 57 Lyrae, in the middle of which is a very faint star, which is readily revealed by photography; and also the meteoric swarm named the Lyrids, which appear in April and have their radiant in this constellation (see Meteor).

LYRE (Gr. \vpa), an ancient stringed musical instrument. The recitations of the Greeks were accompanied by it. Yet the lyre was not of Greek origin; no root in the language has been discovered for \vpa, although the special names bestowed upon varieties of the instrument are Hellenic. We have to seek in Asia the birthplace of the genus, and to infer its introduction into Greece through Thrace or Lydia. The historic heroes and improvers of the lyre were of the Aeolian or Ionian colonies, or the adjacent coast bordering on the Lydian empire, while the mythic masters, Orpheus, Musaeus and Thamyris, ‘were Thracians. Notwithstanding the Hermes tradition of the invention of the lyre in Egypt, the Egyptians seem to have adopted it from Assyria or Babylonia.

To define the lyre, it is necessary clearly to separate it from the allied harp and guitar. In its primal form the lyre differs from the harp, of which the earliest, simplest notion is found in the bow and bowstring. While the guitar (and lute) can be traced back to the typical ” nefer ” of the fourth Egyptian dynasty, the fretted finger-board of which, permitting the production of different notes by the shortening of the string, is as different in conception from the lyre and harp as the flute with holes to shorten the column of air is from the syrinx or Pandean pipes. The frame Of a lyre consists of a hollow body or sound-chest (r\ %uov). From this sound-chest are raised two arms (infae’s), which are sometimes hollow, and are bent both outward and forward. They are connected near the top by a crossbar or yoke (f vyov, f fryco/m, or, from its having once been a reed, naKapios). Another crossbar (/jdXas, vvokvpiov), fixed on the sound-chest, forms the bridge which transmits the vibrations of the strings. The deepest note was the farthest from the player; but, as the strings did not differ much in length, more weight may have been gained for the deeper notes by thicker strings, as in the violin and similar modern instruments, or they were turned with slacker tension. The strings were of gut ixopSv,

whence chord). They were stretched between the yoke and bridge, or to a tailpiece below the bridge. There were two ways of tuning: one was to fasten the strings to pegs which might be turned (k6XXci/3oi, KoXXo7res) ; the other was to change the place of the string upon the crossbar; probably both expedients were simultaneously employed. It is doubtful whether f) xopSoro vos meant the tuning key or the part of the instrument where the pegs were inserted. The extensions of the arms above the yoke were known as Ktpara, horns.

The number of strings varied at different epochs, and possibly in different localities — four, seven and ten having been favourite numbers. They were used without a finger-board, no Greek description or representation having ever been met with that can be construed as referring to one. Nor was a bow possible, the flat sound-board being an insuperable impediment. The plectrum, however (ttXtjktpqv), was in constant use. It was held in the right hand to set the upper strings in vibration {KptKtiv, Kpoveiv t

With Greek authors the lyre has several distinct names; but we are unable to connect these with anything like certainty to the varieties of the instrument. Chelys (x«Xi/s, ” tortoise “) may mean the smallest lyre, which, borne by one arm or supported by the knees, offered in the sound-chest a decided resemblance to that familiar animal. That there was a difference between lyre and cithara (Kidapa) is certain, Plato and other writers separating them. Hermes and Apollo had an altar at Olympia in common because the former had invented the lyre and the latter the cithara. The lyre and chelys on the one hand, and the cithara and phorminx on the other, were similar Fig. i.— -Chelys or near iy identical. Apollo is said to have

vlseSVthi Brirish ™™ d a g° lde » P h °™ , . < *• '• H | Museum, where also There are three lines of evidence that are fragments of establish the difference between the lyre such an instrument, an(j cithara: (1) There are certain vase paintings in which the name \vpa accom- panies the drawing of the instrument, as, for instance, in fig. 2 where the tortoise-shell lyre is obviously represented. 1 (2) In all legends accounting for the invention of the lyre, the shell or body of the tortoise is in- variably mentioned as forming the back of the instrument, whereas the tortoise has never been connected with the cithara. (3) The lyre is emphatically distinguished as the most suitable instrument for the musical training of young men and maidens and as the instrument of the amateur, whereas the cithara was the instrument of citharoedus or citharista, pro- fessional performers at the Pythian

Games, at ceremonies and festivals, the former using his instrument to accompany epic recitations and odes, the latter for purely instrumental music. The costume worn by citharoedus and citharista was exceedingly rich and quite distinct from any other. 2

We find the lyre represented among scenes .of domestic life, in lessons, receptions, at shelf Lyre from^a banquets and in mythological scenes; it is Greek vase in found in the hands of women no less than Munich. men, and the costume of the performer

is invariably that of an ordinary citizen. Lyres were of many sizes and varied in outline according to period and nationality.

We therefore possess irrefutable evidence of identification in both cases, all of which tallies exactly. Examination of the

1 See Ed. Gerhard, Auserlesene griech. Vasenbilder, part iii. (Berlin, 1847), pi. 236 and p. 157.

2 See Aristotle, Polit. v. 6. 5.

the back of which is of shell.

Gerhard, Auserl. triech. Vasenbilder.

construction of the instruments thus indentified reveals the fact that both possessed characteristics which have persisted through- out the middle ages to the present day in various instruments evolved from these two archetypes. The principal feature of both lyre and cithara was the peculiar method of construction adopted in the sound-chest, which may be said to have been almost independent of the outline. In the lyre the sound-chest consisted of a vaulted back, in imitation of the tortoise, over which was directly glued a flat sound-board of wood or parch- ment. In the cithara (q.v.) the sound-chest was shallower, and the back and front were invariably connected by sides or ribs. These two methods of constructing the sound-chests of stringed instruments were typical, and to one or the other may be referred every stringed instrument with a neck which can be traced during the middle ages in miniatures, early printed books, on monuments and other works of art. (K. S.)

Passing by the story of the discovery of the lyre from a vibrating tortoise-shell by Hermes, we will glance at the real lyres of Egypt and Semitic Asia. The Egyptian lyre is unmistakably Semitic. The oldest representation that has been discovered is in one of the tombs of Beni Hassan, the date of the painting being in the Xllth Dynasty, that is,

shortly before the invasion of ” the shepherd kings ” (the Hyksos). In this painting, which both Rosellini and Lepsius have reproduced, an undoubted Semite carries a seven or eight- stringed lyre, or rather cithara in transition, similar to the rotta of the middle ages. The instrument has a four-cornered body and an irregular four-cornered frame above it, and the player carries it horizontally from his breast, just as a modern Nubian would his kissar. He plays as he walks, using both hands, a plectrum being in the right. Practical knowledge of these ancient instruments may be gained through two remarkable specimens preserved in the museums of Berlin (fig. 3) and Leiden (see Cithara). During the rule of the Hyksos the lyre became naturalized in Egypt, and in the 18th dynasty it is frequently depicted, and with finer grace of form. In the 19th and 20th dynasties the lyre is sometimes still more slender, or is quite unsymmetrical and very strong, the horns sur- mounted by heads of animals as in the Berlin one, which has horses’ heads at those extremi- ties. Prokesch copied one in the ruins of Wadi Haifa, splendid in blue and gold, with a serpent wound round it. The Egyptians always strung their lyres fan-shaped, Fl < >- 3.— Egyptian Cithara now at Berlin, like the modern Nubian kissar. Their paintings show three to eight or nine strings, but the painters’ accuracy may not be unimpeachable; the Berlin instrument had fifteen. The three- stringed lyre typified the three seasons of the Egyptian year — the water, the green and the harvest; the seven, the planetary system from the moon to Saturn. The Greeks had the same notion of the harmony of the spheres.

There is no evidence as to what the stringing of the Greek lyre was in the heroic age. Plutarch says that Olympus and Terpander used but three strings to accompany their recitation. As the four strings led to seven and eight by doubling the tetrachord, so the trichord is connected with the hexachord or six-stringed iyre de- picted on so many archaic Greek vases. We cannot insist on the accuracy of this representation, the vase painters being little mindful of the complete expression of details; yet we may suppose their tendency would be rather to imitate than to invent a number. It was their constant practice to represent the strings as being damped by the fingers of the left hand of the player, after having been struck by the plectrum which he held in the right hand. Before the Greek civilization had assumed its historic form, there was likely to be great freedom and independence of different localities in the matter of lyre stringing, which is corroborated by the antique use of the chromatic (half-tone) and enharmonic (quarter-tone) tunings, pointing to an early exuberance, and perhaps also to an Asiatic bias towards refinements of intonation, from which came the \p6ai, the hues of tuning, old Greek

modifications of tetrachords entirely disused in the classic period. The common scale of Olympus

remained, a double trichord which had served as the scaffolding for the enharmonic varieties.

We may regard the Olympus scale, however, as consisting of two tetrachords, eliding one interval in each, for the tetrachord, or series of four notes, was very early adopted as the fundamental principle of Greek music, and its origin in the lyre itself appears sure. The basis of the tetrachord is the employment of the thumb and first three fingers of the left hand to twang as many strings, the little finger not being used on account of natural weakness. As a succession of three whole tones would form the disagreeable and untunable interval of a tritonus, two whole tones and a half-tone were tuned, fixing the tetrachord in the consonant interval of the perfect fourth. This succession of four notes being in the grasp of the hand was “ailed

The conjunct scale of seven notes

attributed to Terpander, was long the norm for stringing and tuning the lyre. When the disjunct scale

i

te r-‘g-

=5=23-

2

the octave scale attributed to Pythagoras, was admitted, to preserve the time-honoured seven strings one note had to be omitted ; it was thetefore customary to omit the C, which in Greek practice was a dissonance. The Greek names for the strings of seven and eight stringed lyres, the first note being highest in pitch and nearest the player, were as follows: Nele, Paranete, Paramese; Mese, Lichanos, Parhypate, Hypate; or Nete, Paranete, Trite, Paramese; Mese, Lichanos, Parhypate, Hypate — the last four from Mese to Hypate being the finger tetrachord, the others touched with the plectrum. The highest string in pitch was called the last, «&7tj; the lowest in pitch was called the highest, i/warri, because it was, in theory at least, the longest string. The keynote and thumb string was iiiar\, middle ; the next lower was \ixavos, the first finger or lick-finger string; tp’lti), the third, being in the plectrum division, was also known as d£tia, sharp, perhaps from the dissonant quality to which we have referred as the cause of its omission. The plectrum and finger tetrachords together

were Siairaa&p, through all: in the dis- junct scale, an octave.

In transcribing the Greek notes into our notation, the absolute pitch cannot be represented ; the relative positions of the semitones are alone determined. We have already quoted the scale of Pytha- goras, the Dorian or true Greek succession : —

Shifting the semitone one degree upwards in each tetrachord, we have the Phrygian

Another degree gives the Lydian

which would be our major scale of E were not the keynote A. The names imply an Asiatic origin. We need not here pursue further the much-debated question of Greek scales and their derivation; it will suffice to remark that the outside notes of the tetrachords were fixed in their tuning as perfect fourths — the inner strings being, as stated, in diatonic sequence, or when chromatic two half-tones were tuned, when enharmonic two quarter-tones, leaving respectively the wide intervals of a minor and major third, and both impure, to cpm- plete the tetrachord. (A. J. H.)

See the article by Theodore Reinach in Darerriberg and Saglio, Antiguites grecques el romaines ; Wilhelm Johnsen, Die Lyra, ein

Beitrag zur griechischen Kunstgeschichte (Berlin, 1876); Hortense Panum, ” Harfe und Lyra in Nord Europa,” Intern. Mus. Ges., Sbd. vii. 1, pp. 1-40 (Leipzig, 1905); A. J. Hipkins, “Dorian and Phrygian, reconsidered from a non-harmonic point of view,” in Intern. Mus Ges. (Leipzig. 1903), iv. 3.

LYRE-BIRD, the name by which one of the most remarkable birds of Australia is commonly known, the Menura superba or M. novae-hollandiae of ornithologists. It was first observed in 1798 in New South Wales, and though called by its finders a ” pheasant “- from its long tail — the more learned of the colony seem to have regarded it as a bird-of-Paradise. 1 A specimen having reached England in 1799, it was described by General Davies as forming a new genus of birds, in the Linnean Society’s Transactions (vi. p. 207, pi. xxii.), no attempt, however, being made to fix its systematic place. In 1802 L. P. Vieillot figured and described it in a supplement to his Oiseaux Boris as a bird-of-Paradise (ii. pp. 30 seq., pls.14-16), from drawings by Sydenham Edwards, sent him by Parkinson, the manager of the Leverian Museum. The first to describe any portion of its anatomy was T. C. Eyton, who in 1841 {Ann. Nat. History, vii. pp. 4953) perceived that

it was a Passerine bird and that it presented some points of affinity to the South American genus Pteroptochus. In 1867 Huxley stated that he was disposed to divide his very natural assemblage the Coracomorphae (essentially identical with Eyton's Insessores) into two groups, " one containing Menura, and the other all the other genera which have yet been examined " (Proc. Zool. Soc, 1867, p. 472) — a still further step in advance. 2 In 1875 A. Newton put forth the opinion in his article on birds, in the 9th edition of this Encyclopaedia, that Menura had an ally in another Australian form, Atrichia (see Scrub-Bird), which he had found to present peculiarities hitherto unsuspected, and he regarded them as standing by themselves, though each constituting a distinct family. This opinion was partially adopted in the following year by A. H. Garrod, who {Proc: Zool. Society, 1876, p. 518) formally placed these two genera together in his group Of Abnormal Acromyodian Oscines under ' the name of Menurinae; ornithologists now generally recognize at once the alliance and distinctness of the families Menuridae and Atrichiidae, and place them together to form the group Suboscines of the Diacromyodian Passeres.

Since the appearance in 1865 of J. Gould's Handbook to the Birds of Australia, little important information has been pub- lished concerning the habits of this form, and the account therein given must be drawn upon for what here follows. Of all birds, says that author, the Menura is the most shy and hard to procure- He has been among the rocky and thick " brushes "—its usual haunts— hearing its loud and liquid call-notes for days together without getting sight of one. Those who wish to see it must advance only while it is singing or scratching up the earth and leaves; and to watch its actions they must keep perfectly still. The best way of procuring an example seems to be by hunting it with dogs, when it will spring upon a branch to the height of 10 ft. and afford an easy shot ere it has time to ascend farther or escape as it does by leaps. Natives are said to hunt it by fixing on their heads the erected tail of a cock-bird, which alone is allowed to be seen above the brushwood. The greater part of its time is said to be passed upon the ground, and seldom are more than a pair to be found in company. One of the habits of the cock is to form small round hillocks, which he constantly visits during the day, mounting upon them and displaying his tail by erecting it over his head, drooping his wings, scratching and pecking at the soil, and uttering various cries — some his own natural notes, others an imitation of those of other animals. The tail, his most characteristic feature, only attains perfection in the bird's third or fourth year, and then not until the month of June, remaining until October, when the feathers are shed to be renewed the following

season. The food consists of insects; especially beetles and myriapods, as well as snails. The nest is 1 Collins, Account of Neiv South Wales, ii. 87-92 (London, 1802). . 2 Owing to the imperfection of the specimen at his disposal, Huxley's brief description of the bones of the head in Menura is not absolutely correct. A full description of them, with elaborate figures, 1 is given by Parker in the same Society's Transactions (ix, 306-309, pi. Ivi. figs. 1-5).

placed near to or on the ground, at the base of a rock or foot of a tree, and is closely woven of fine but strong roots or other fibres, and lined with feathers, around all which is heaped a mass, in shape of an oven, of sticks, grass, moss and leaves, so as to project over and shelter the interior structure, while an opening in the side affords entrance and exit. Only one egg is laid, and this of rather large size in proportion to the bird, of a purplish-grey colour, suffused and blotched with dark purplish-brown.

Incubation is believed to begin in July or August, and the young is hatched about a month later. It is at first covered with dark down, and appears to remain for some weeks in the nest. It is greatly to be hoped that so remarkable a form as the lyre- bird, the nearly sole survivor apparently of a very ancient race of beings, will not be allowed to become extinct — its almost certain fate so far as can be judged — without many more observa- tions of its manners being made. Several examples of Menura have been brought alive to Europe, and some have long survived in captivity.

Three species of Menura have been indicated — the old M. superba, the lyre-bird proper, which inhabits New South Wales, the southern part of Queensland, and perhaps some parts of Victoria; M. victoriae, separated from the former by Gould (Proc. Zool. Soc, 1862, p. 23), and said to take its place near Mel- bourne; and M. alberti, first described by C. L. Bonaparte (Consp. Avium, i. 215) on Gould's authority, and, though discovered on the Richmond river in New South Wales, having apparently a more northern range than the other two. All 6 those have the apparent bulk of a hen pheasant, but are really much smaller, and their general plumage is of a sooty brown, relieved by rufous on the chin, throat, some of the wing-feathers and the tailTCOverts. The wings, consisting of twenty-one remiges, are rather short and rounded; the legs 1 and feet very strong, with long, nearly straight claws. In the immature and female the tail is somewhat

long, though affording no very remarkable char- acter, except the possession of sixteen rectrices; but in the fully-plumaged male of M. superba and M. victoriae it is developed in the extraordinary fashion that gives the bird its common English name. The two exterior feathers (fig. 1, a, b) have the outer web very narrow, the inner very broad, and they

Fig. 1.

Fig. 2. Fig. 3.

curve at first outwards, then somewhat inwards, and near the tip outwards again, bending round forwards so as to present a lyre-like form. But this is not all; their broad inner web, which is of a lively chestnut colour, is apparently notched at regular intervals by spaces that, according to the angle at which they are viewed, seem either black or transparent; and this effect is, on examination, found to be due to the barbs at those 1 The metatarsals are very remarkable in form, as already noticed by Eyton (Ioc. cil), and their tendons strongly ossified.

spaces being destitute of barbules. The micfdle pair of feathers (fig. 2, a, b) is nearly as abnormal. These have no outer web, and the inner web very narrow; near their base they cross each other, and then diverge, bending round forwards near their tip. The remaining twelve feathers (fig. 3) except near the base are very thinly furnished with barbs, about j in. apart, and those they possess, on their greater part, though long and flowing, bear no barbules, and hence have a hair-like appearance. The shafts of all are exceedingly strong. In the male of M. alberti the tail is not only not lyriform, but the exterior rectrices are shorter than the rest. (A.N.)

LYRICAL POETRY, a general term for all poetry which is, or can be supposed to be, susceptible of being sung to the accom- paniment of a musical instrument. In the earliest times it may be said that all poetry was of its essence lyrical. The primeval oracles were chanted in verse, and the Orphic and Bacchic Mysteries, which were celebrated at Eleusis and elsewhere, combined, it is certain, metre with music. Homer and Hesiod are each of them represented with a lyre, yet if any poetry can be described as non-lyrical, it is surely the archaic hexameter of the Iliad and the Erga. These poems were styled epic, in direct contradistinction to the lyric of Pindar and Bacchylides. But inexactly, since it is plain that they were recited, with a plain accompaniment on a stringed instrument. However, the distinc- tion between epical and lyrical, between to. emj, what was said, and ra fik

\rj, what was sung, is accepted, and neither Homer nor Hesiod is among the lyrists. This distinction, however, is often without a difference, as for example, in the case of the so-called Hymns of Homer, epical in form but wholly lyrical in character. Hegel, who has gone minutely into this question in his Esthelik, contends that when poetry is objective it is epical, and when it is subjective it is lyrical. Thisisto ignore the metrical form of the poem, and to deal with its character only. It would constrain us to regard Wordsworth's Excursion as a lyric, and Tennyson's. Revenge (where the subject is treated exactly as one of the Homeridae would have treated an Ionian myth) as an epic. This is impossible, and recalls us to the importance of taking the form into consideration. But, with this warning, the definition of Hegel is valuable. It is, as he insists, the personal thought, or passion, or inspiration, which gives its character to lyrical poetry. The lyric has the function of revealing, in terms of pure art, the secrets of the inner life, its hopes, its fantastic joys, its sorrows, its delirium. It is easier to exclude the dramatic species from lyric than to banish the epic. There are large sections of drama which it is inconceivable should be set to music, or sung, or even given in recitative. The tragedies of Racine, for ex- ample, are composed of the purest poetry, but they are essen' tially non-lyrical, although lyrical portions are here and there attached to them. The intensity of feeling and the melody of verse in Othello does not make that work an example of lyrical poetry, and this is even more acutely true of Le Misanthrope, which is, nevertheless, a poem. The tendency of modern drama is to divide itself further and further from lyric, but in early ages the two kinds were indissoluble. Tragedy was goat-song, and the earliest specimens of it were mainly composed of choruses. As Prof. G. G. Murray says, in the Suppliants of Aeschylus, the characters " are singing for two-thirds of the play," accompanied by tumultuous music. This primitive feature has gradually been worn away; the chorus grew less and less prominent, and disappeared; the very verse-ornament of drama tends to vanish, and we have plays essentially so poetical as those of Ibsen and Maeterlinck written from end to end in bare prose.

To return again to Greece, there was an early distinction, soon accentuated, between the poetry chanted by a choir of singers, and the song Which expressed the sentiments of a single poet. The latter, the ju«Xos or song proper, had reached a height of technical perfection in " the Isles of Greece, where burning Sappho loved and sung," as early as the 7th century B.C. That poetess, and her contemporary Alcaeus, divide the laurels of the pure Greek song of Dorian inspiration. By their side, and later, [flourished the great poets who set words to music for choirs, [Alcman, Arion, Stesichprus, Simonides and Ibycus,

at the close of the 5th century to Bacchylides and Pindar, in whom the magnificent tradition of the dithyrambic odes reached its highest splendour of development. The practice of Pindar and Sappho, we may say, has directed the course of lyrical poetry ever since, and will, unquestionably, continue to do so. They discovered how, with the maximum of art, to pour forth strains of personal magic and music, whether in a public or a private way. The ecstasy, the uplifted magnificence, of lyrical poetry could go no higher than it did in the unmatched harmonies of these old Greek poets, but it could fill a much wider field and be expressed with vastly greater variety. It did so in their own age. The gnomic verses of Theognis were certainly sung; so were the satires of Archilochus and the romantic reveries of Mimnermus.

At the Renaissance, when the traditions of ancient life were taken up eagerly, and hastily comprehended, it was thought proper to divide poetry into a diversity of classes. The earliest English critic who enters into a discussion of the laws of prosody, William Webbe, lays it down, in 1586, that in verse ” the most usual kinds are four, the heroic, elegiac, iambic and lyric.” Similar confusion of terms was common among the critics of the 15th and 1 6th centuries, and led to considerable error. It is plain that a border ballad is heroic, and may yet be lyrical; here the word ” heroic ” stands for ” epic.” It is plain that whether a poem is lyrical or not had nothing to do with the question whether it is composed in an iambic measure. Finally, it is undoubted that the early Greek ” elegies ” were sung to an accompaniment on the flute, whether they were warlike, like those of Tyrtaeus, or philosophical and amatory like those of Theognis. But (see Elegy) the present significance of ” elegy,” and this has been the case ever since late classical times, is funereal; in modern parlance an elegy is a dirge. Whether the great Alexandrian dirges, like those of Bion and of Moschus, on which our elegiacal tradition is founded, were actually sung to an accompaniment or not may be doubted; they seem too long, too elaborate, and too ornate for that. But, at any rate, they were composed on the convention that they would be sung, and it is conceivable that music might have been wedded to the most complex of these Alexandrian elegies. Accordingly, although Lycidas and Adonais are not habitually ” set to music,” there is no reason why they should not be so set, and their rounded and limited although

extensive form links them with the song, not with the epic. There are many odes of Swinburne's for which it would be more difficult to write music than for his Ave atque Vale. In fact, in spite of its solemn and lugubrious regularity, the formal elegy or dirge is no more nor less than an ode, and is therefore entirely lyrical.

More difficulty is met with in the case of the sonnet, for although no piece of verse, when it is inspired by subjective passion, fits more closely with Hegel's definition of what lyrical poetry should be, yet the rhythmical complication of the sonnet, and its rigorous uniformity, seem particularly ill-fitted to inter- pretation on a lyre. When F. M. degli Azzi put the book of Genesis (1700) into sonnets, and Isaac de Benserade the Meta- morphoses of Ovid (1676) into rondeaux, these eccentric and laborious versifiers produced what was epical rather than lyrical poetry, if poetry it was at all. But the sonnet as Shakespeare, Wordsworth and even Petrarch used it was a cry from the heart, a subjective confession, and although there is perhaps no evi- dence that a sonnet was ever set to music with success, yet there is no reason why that might not be done without destroying its sonnet-character.

Jouffroy was perhaps the first aesthetician to see quite clearly that lyrical poetry is, really, nothing more than another name for poetry itself, that it includes all the personal and enthusiastic part of what lives and breathes in the art of verse, so that the divisions of pedantic criticism are of no real avail to us in its consideration. We recognize a narrative or epical poetry; we recognize drama; in both of these, when the individual inspira- tion is strong, there is much that trembles on the verge of the lyrical. But outside what is pure epic and pure drama, all, or almost all, is lyrical. We say almost all, because the difficulty

arises of knowing where to place descriptive and didactic poetry. The Seasons of Thomson, for instance, a poem of high merit and lasting importance in the history of literature — where is that to be placed? What is to be said of the Essay on Man? In primitive times, the former would have been classed under epic, the second would have been composed in the supple iambic trimeter which so closely resembled daily speech, and would not have been sharply distinguished from prose. Perhaps this classification would still serve, were it not for the element of versification, which makes a sharp line of demarcation between poetic art and prose. This complexity of form, rhythmical and stanzaic, takes much of the place which was taken in antiquity by such music as Terpander is supposed to have supplied. In a perfect lyric by a modern writer the instrument is the metrical form, to which the words have to adapt themselves. There is perhaps no writer who

has ever lived in whose work this pheno- menon may be more fruitfully studied than it may be in the songs and lyrics of Shelley. The temper of such pieces as ” Arethusa ” and ” The Cloud ” is indicated by a form hardly more ambitious than a guitar; Hellas is full of passages which suggest the harp; in his songs Shelley touches the lute or viol de gamba, while in the great odes to the ” West Wind ” and to ” Liberty ” we listen to a verse-form which reminds us by its volume of the organ itself. On the whole subject of the nature of lyric poetry no commentary can be more useful to the student than an examina- tion of the lyrics of Shelley in relation to those of the song- writers of ancient Greece.

See Hegel, Die Phanomenologie des Geistes (1807); T. S. Jouffroy, Cours d’esthetique (1843); W. Christ, Metrik der Griechen und Romer, 2te. Aufl. (1879). (E. G.)

LYSANDER (Gr. Av<7av8pos) , son of Aristocritus, Spartan admiral and diplomatist. Aelian (Var. Hist. xii. 43) and Phylar- chus (ap. Athen. vi. 271 e) say that he was a mothax, i.e. the son of a helot mother (see Helots)., but this tradition is at least doubtful; according to Plutarch he was a Heraclid, though not of either royal family. We do not know how he rose to eminence : he first appears as admiral of the Spartan navy in 407 B.C. The story of his influence with Cyrus the Younger, his naval victory off Notium, his quarrel with his successor Callicratidas in 406, his appointment as hnaroKebs in 405, his decisive victory at Aegos- potami, and his share in the siege and capitulation of Athens belong to the history of the Peloponnesian War (q.v.). By 404 he was the most powerful man in the Greek world and set about completing the task of building up a Spartan empire in which he should be supreme in fact if not in name. Everywhere democracies were replaced by oligarchies directed by bodies of ten men (decarchies, SeKapxtai) under the control of Spartan governors (harmosts, dp/iocrrat). But Lysander's boundless in- fluence and ambition, and the superhuman honours paid him* roused the jealousy of the kings and the ephors, and, on being accused by the Persian satrap Pharnabazus, he was recalled to Sparta. Soon afterwards he was sent to Aihens with an army to aid the oligarchs, but Pausanias, one of the kings, followed him and brought about a restoration of democracy. On the death of Agis II., Lysander secured the succession of Agesilaus (q.v.), whom he hoped to find amenable to his influence. But in this he was disappointed. Though chosen to accompany the king to Asia as one of his thirty advisers (avufiovKot.) , he was kept in- active and his influence was broken by studied affronts, and finally he was sent at his own request as envoy to the Hellespont. He soon returned to Sparta to mature plans for overthrowing the hereditary kingship and

substituting an elective monarchy open to all Heraclids, or even, according to another version, to all Spartiates. But his alleged attempts to bribe the oracles were fruitless, and his schemes were cut short by the outbreak of war with Thebes in 395. Lysander invaded Boeotia from the west, receiving the submission of Orchomenus and sacking Lebadea, but the enemy intercepted his despatch to Pausanias, who had meanwhile entered Boeotia from the south, containing plans for a joint attack upon Haliartus. The town was at once strongly garrisoned , and when Lysander marched against it he was defeated and slain. He was buried in the territory of Panopeus, the

nearest Phocian city. An able commander and an adroit diplomatist, Lysander was fired by the ambition to make Sparta supreme in Greece and himself in Sparta. To this end he shrank from no treachery or cruelty; yet, like Agesilaus, he was totally free from the characteristic Spartan vice of avarice, and died, as he had lived, a poor man.

See the biographies by Plutarch and Nepos; Xen. Hellenica, i. 5-iii. 5; Diod. Sic. xiii. 70sqq., 104 sqq,, xiv. 3, 10, 13, 81 ; Lysias xii, 60 sqq.; Justin v. 5-7; Polyaenus i. 45, vii. 19; Pausanias in., ix. 32, 5-10, x. 9, 7-1 1 ; C. A. Gehlert, Vita Lysandri (Bautzen, 1874); W. Vischer, Alkibiades und Lysandros (Basel, 1845); O. H. J. Nitzsch, De Lysandro (Bonn, 1847) ; and the Greek histories in general. .,

(M. N.T.)

LYSANIAS, tetrarch of Abilene (see Abila), according to Luke iii. 1, in the time of John the Baptist. The only Lysanias mentioned in profane history as exercising authority in this district was executed in 36 B.C. by M. Antonius (Mark Antony). This Lysanias was the son of Ptolemy Mennaeus, the ruler of an independent state, of which Abilene formed only a small portion. According to Josephus (Ant. xix. 5, 1) the emperor Claudius in a.d. 42 confirmed Agrippa I. in the possession of ” Abila of Lysanias” already bestowed upon him by Caligula, elsewhere described as “Abila, whiclv had formed the tetrarchy of Lysanias.” It is argued that this cannot refer to the Lysanias executed by M. Antonius, since his paternal inheritance, even allowing for some curtailment by Pompey, must have been of far greater extent. It is therefore assumed by some authorities that the Lysanias in Luke (a.d. 28-29) is a younger Lysanias, tetrarch of Abilene only, one of the districts into which the original kingdom was split up after the death

of Lysanias I. This younger Lysanias may have been a son of the latter, and identical with, or the father of, the Claudian Lysanias. On the other hand, Josephus knows nothing of a younger Lysanias, and it is suggested by others that he really does refer to Lysanias I. The explanation given by M.- Krenkel (Josephus und Lucas, Leipzig, 1894, p. 97) is that Josephus does not mean to imply that Abila was the only possession of Lysanias, and that his calls it the tetrarchy or kingdom of Lysanias because it was the last remnant of the domain of Lysanias which remained under direct Roman administration until the time of Agrippa. The expression was borrowed from Josephus by Luke, who wrongly imagined that Lysanias I. had ruled almost up to the time of the bestowal of his tetrarchy upon Agrippa, and therefore to the days of John the Baptist. Two inscriptions are adduced as evidence for the existence of a younger Lysanias— Bockh, C./.G. 4521 and 4523. The former is inconclusive, and in the latter the reading A.v

See E. Schurer, Geschichte des judischen Volkes (3rd ed., 1901), i. p. 712; and (especially orl the inscriptional evidence) E. Renan, ” Memoire sur la dynastie des Lysanias d’Abilene ” in MSmoireS de I’institut imperial de France (xxvi., 1870); also P. W. Schmiedel in the Encyclopaedia Biblica, s.v.

LYSIAS, Attic orator, was born, according to Dionysius of Halicarnassus and the author of the life ascribed to Plutarch, in 459 B.C. This date was evidently obtained by reckoning back from the foundation of Thurii (444 B.C.), since there was a tradi- tion that Lysias had gone thither at the age of fifteen. Modern critics would place his birth later, — between 444 and 436 B.C.,— because,, in Plato’s Republic, of which the scene is laid about 430 B.C., Cephalus, the father of Lysias, is among the dramatis personae, and the emigration of Lysias to Thurii was said to have followed his father’s death. The latter statement, however, rests only on the Plutarchic life; nor can Plato’s dialogue be safely urged as a minutely accurate authority. The higher date assigned by the ancient writers agrees better with the tradition that Lysias reached, or passed, the age of eighty. 1 Cephalus, his father, was a native of Syracuse, and on the invitation of Pericles had settled at Athens. The opening scene of Plato’s Republic is laid at the house of his eldest son, Polemarchus, in Peiraeus. The tone of the picture warrants the inference that

1 [W. Christ, Gesch. der griech. Litt., gives the date of birth as about 450.]

the Sicilian family were well known to Plato, and that their houses must often have been hospitable to such gatherings. At Thurii, the

colony newly planted on the Tarentine Gulf (see Pericles), the boy may have seen Herodotus, now a man in middle life, and a friendship may have grown up between them. There, too, Lysias is said to have commenced his studies in rhetoric — doubtless under a master of the Sicilian school- possibly, as tradition said, under Tisias, the pupil of Corax, whose name is associated with the first attempt to formulate rhetoric as an art. In 413 B.C. the Athenian armament in Sicily was anni- hilated. The desire to link famous names is illustrated by the ancient ascription to Lysias of a rhetorical exercise purporting to be a speech in which the captive general Nicias appealed for mercy to the Sicilians. The terrible blow to Athens quickened the energies of an anti-Athenian faction at Thurii. Lysias and his elder brother Polemarchus, with three hundred other persons, were ” accused of Atticizing.” They were driven from Thurii and settled at Athens (412 B.C.).

Lysias and Polemarchus were rich men, having inherited property from their father; and Lysias claims that, though merely resident aliens, they discharged public services with a liberality which shamed many of those who enjoyed the franchise (In Eratosth. id). The fact that they owned house property shows that they were classed as iaoTtKtis, i.e. foreigners who paid only’ the same tax as citizens, being exempt from the special tax (neroliuov) on resident aliens. Polemarchus occupied a house in Athens itself, Lysias another in the Peiraeus, near which was their shield manufactory, employing a hundred and twenty skilled slaves. In 404 the Thirty Tyrants were established at Athens under the protection of a Spartan garrison. One of their earliest measures was an attack upon the resident aliens, who were represented as disaffected to the new govern- ment. Lysias and Polemarchus were on a list of ten singled out to be the first victims. Polemarchus was arrested, and compelled to drink hemlock. Lysias had a narrow escape, with the help of a large bribe. He slipped by a back-door out of the house in which he was a prisoner, and took boat to Megara. It appears that he had rendered valuable services to the exiles during the reign of the tyrants, and in 403 Thrasybulus proposed that these services should be recognized by the bestowal of the citizenship. The Boule, however, had not yet been reconstituted, and hence the measure could not be introduced to the ecclesia by the requisite ” preliminary resolution ” (irpofiovhevfia) . On this ground it was successfully opposed.

During his later years Lysias — now probably a comparatively

poor man owing to the rapacity of the tyrants and his own

generosity to the Athenian exiles — appears as a hard-working member of a new profession — that of writing speeches to be delivered in the law-courts. The thirty-four extant are but a small fraction. From 403 to about 380 B.C. his industry must have been incessant. The notices of his personal life in these years are scanty. In 403 he came forward as the accuser of Eratosthenes, one of the Thirty Tyrants. This was his only direct contact with Athenian politics. The story that he wrote a defence for Socrates, which the latter declined to use, probably arose from a confusion. Several years after the death of Socrates the sophist Polycrates composed a declamation against him, to which Lysias replied. A more authentic tradition represents Lysias as having spoken his own Olympiacus at the Olympic festival of 388 B.C., to which Dionysius I. of Syracuse had sent a magnificent embassy. Tents embroidered with gold were pitched within the sacred enclosure; and the wealth of Dionysius was vividly shown by the number of chariots which he had entered. Lysias lifted up his voice to denounce Dionysius as, next to Artaxerxes, the worst enemy of Hellas, and to impress upon the assembled Greeks that one of their foremost duties was to deliver Sicily from a hateful oppression. The latest work of Lysias which we can date (a fragment of a speech For Pherenicus) belongs to 381 or 380 B.C. He probably died in or soon after 380 B.C.

Lysias was a man of kindly and genial nature, warm in friendship, loyal to country, with a keen perception of character.

and a fine though strictly controlled sense of humour. The literary tact which is so remarkable in the extant speeches is that of a singularly flexible intelligence, always obedient to an instinct of gracefulness. He owes his distinctive place to the power of concealing his art. It was obviously desirable that a speech written for delivery by a client should be suitable to his age, station and circumstances. Lysias was the first to make this adaptation really artistic. His skill can be best appreciated if we turn from the easy flow of his graceful language to the majestic emphasis of Antiphon, or to the self-revealing art of Isaeus. Translated into terms of ancient criticism, he became the model of the ” plain style ” (loxvos xˆpo-ˆPt iˆXVV, Xittj, dˆeXjjs Ae£«: genus tenue or subtile). Greek and then Roman critics distinguished three styles of rhetorical composi- tion — the ” grand ” (or ” elaborate “), the ” plain ” and the ” middle,” the ” plain ” being nearest to the language of daily life. Greek rhetoric began in the ” grand ” style; then Lysias set an exquisite pattern of the ” plain “; and Demosthenes might be considered as having effected an almost ideal compromise.

The vocabulary of Lysias is pure and simple. Most of the rhetorical ” figures ” are sparingly used — except such as consist in the parallelism or opposition of clauses. The taste of the day — not yet emancipated from the influence of the Sicilian rhetoric — probably demanded a large use of antithesis. Lysias excels in vivid description; he has also a happy knack of marking the speaker’s character by light touches. The structure of his sentences varies a good deal according to the dignity of the subject. He has equal command over the ” periodic ” style {KarecTpannevTi Xe£is) and the non-periodic or ” continuous ” (tipofjuivri, SiaXeKvuevrj). His disposition of his subject-matter is always simple. The speech has usually four parts — introduc- tion (TpooL/uov) , narrative of facts (Sirryqais) , proofs (t’ktth’s) , which may be either external, as from witnesses, or internal, derived from argument on the facts, and, lastly, conclusion (eirt\o70s). It. is in the introduction and the narrative that Lysias is seen at his best. In his greatest extant speech’ — that Against Eratosthenes — and also in the fragmentary Olympiacus, he has pathos and fire; but these were not characteristic qualities of his work. In Cicero’s judgment (De Or at. iii. 7, 28) Demosthenes was peculiarly distinguished by force (vis), Aeschines by resonance (sonilus), Hypereides by acuteness (acumen),

Isocrates by sweetness (suavitas); the distinction which he assigns to Lysias is subtilitas, an Attic refinement — which, as he elsewhere says (Brutus, 16, 64) is often joined to an admirable vigour (lacerti). Nor was it oratory alone to which Lysias rendered service; his work had an important effect on all sub- sequent Greek prose, by showing how perfect elegance could be joined to plainness. Here, in his artistic use of familiar idiom, he might fairly be called the Euripides of Attic prose. And his style has an additional charm for modern readers, because it is employed in describing scenes from the everyday life of Athens. 1

Thirty-four speeches (three fragmentary) have come down Under the name of Lysias; one hundred and twenty-seven more, now lost, are known from smaller fragments or from titles. In the Augustan age four hundred and twenty-five works bore his name, of which more than two hundred were allowed as genuine by the critics. Our thirty-four works may be classified as follows : —

A. Epideictic. — 1. Olympiacus, xxxiii. 388 B.C.; 2.Epitaphius,ii. (purporting to have- been spoken during the Corinthian War; certainly spurious), perhaps composed about 380-340 B.C. (" soon after 387," Blass).

B. Deliberative.— Plea for the Constitution, xxxiv., 403 B.C.

C. Forensic, in Public Causes. — I. Relating to Offences directly, against the State (ypcupal b-nnooiuv &8ik7jˆAto»<) ; such as treason, mal- versation in office, embezzlement of public moneys. 1. For Poly-r stratus, xx., 407 B.C.; 2. Defence on a Charge of Taking Bribes, xxi., 402 B.C.; 3. Against Ergocles, xxviii., 389 B.C.; 4. Against Epicrates, xxvii., 389 B.C.; 5. Against Nicomachus, xxx., 399 B.C.; 6. Against the Corndealers, xxii., 386 B.C. (?) II. Cause relating to Unconstitu- tional Procedure (ypcufrr) Tapavb/uav). On the Property of the Brother of Nicias,xviii.,395B.c III. Causes relating to Claims for Money with- held from the State (biro~ypaal). 1. For the Soldier, ix. (probably not by Lysias, but by an imitator, writing for a real cause), 394 B.C. (?) ; 2. On the Property of Aristophanes, xix., 387 B.C.; 3. Against Philo-

l See further Jebb, The Attic Orators from Antiphon to Isaeus, i. 142-316.

crates, xxix., 389 B.C. IV. Causes relating to a Scrutiny (&oKip.dala) ; especially the Scrutiny, by the Senate, of Officials Designate. 1. Against Evandrus, xxvi., 382 B.C.; 2. For Mantitheus, xvi., 392 B.C.; 3. Against Philon, xxxi., between 404 and 395 B.C.; 4. Defence on a

Charge of Seeking to Abolish the Democracy, xxv., 401 B.C. ; 5. For the Invalid, xxi v., 402 B.C. (?) V. Causes relating to Military Offences (ypajpal A«roTa£io», Aarpardas) . I. Against Alcibiades, I. and II. (xiv., xv.), 395 B.C. VI. Causes relating to Murder or Intent to Murder (ypatjxd 6vov, rpaiiiaros in. irpovoias) . I. Against Eratosthenes, xii., 403 B.C.; 2. Against Agoratus, xiii., 399 B.C. ; 3. On the Murder of Eratosthenes, i. (date uncertain) ; 4. Against Simon, iii., 393 B.C. ; 5. On Wounding with Intent, iv. (date uncertain). VII. Causes re- lating to Impiety (ypa.al aueˆeios). I. Against Andocides, vi. (certainly spurious, but perhaps contemporary); 2. For Callias, v. (date un- certain); 3. On the Sacred Olive, vii., not before 395 B.C.

D. Forensic, in Private Causes.— I. Action for Libel (Uki\ KaKriyoptas). Against Theomnestus, x., 384-383 B.C. (the so-called second speech, xi., is merely an epitome of the first). II. Action by a Ward againsta Guardian (&Urj kirtTpoirijs). Against Diogeiton, xxxii.,4O0B.c. III. Trial of a Claim to Property (SiaSuiaaia). On the property of Eraton, xvii., 397 B.C. IV. Answer to a Special Plea (irpbsirapaypcupiiv). Against Pancleon, xxiii. (date uncertain).

E. Miscellaneous.— 1. To his Companions, a Complaint of Slanders, viii. (certainly spurious); 2. The kpoiruios in Plato's Phaedrus, pp. 230 E-234. This has generally been regarded as Plato's own work; but the certainty of this conclusion will. be doubted by those who observe (1) the elaborate preparations made in the dialogue for a recital of the ipwru

F. Fragments. — Three hundred and fifty-five of these are collected by Sauppe, Oratores Attici, ii. 170-216. Two hundred and fifty-two of them represent one hundred and twenty-seven speeches of known title; and of six the fragments are comparatively large. Of these, the fragmentary speech For Pherenicus belongs to 381 or 380 B.C., and is thus the latest known work of Lysias. 2

In literary and historical interest, the first place among the extant speeches of Lysias belongs to that Against Eratosthenes (403 B.C.), one of the Thirty Tyrants, whom Lysias arraigns as the murderer of his brother Polemarchus. The speech is an eloquent and vivid picture of the reign of terror which the Thirty established at Athens; the concluding appeal, to both parties among the citizens, is specially powerful. Next in importance is the speech Against Agoratus (399 B.C.), one of our chief authorities for the internal history of Athens during the months which immediately followed the defeat at Aegospptami. The Olympiacus (388 B.C.) is a brilliant fragment, expressing the spirit of the festival at Olympia, and exhorting Greeks

to unite against their common foes. The Plea for the Constitution (403 B.C.) is interesting for the manner in which it argues that the wellbeing of Athens— now stripped of empire— is bound up with the maintenance of democratic principles. The speech For Mantitheus (392 B.C.) is a graceful and animated portrait of a young Athenian in-ireis, making a spirited defence of his honour against the charge of disloyalty. The defence For the Invalid is a humorous character-sketch. The speech Against Pancleon illustrates the intimate relations between Athens and Plataea, while it gives us some picturesque glimpses of Athenian town life. The defence of the person who had been charged with destroying a moria, or sacred olive, places us amidst the country life of Attica. And the speech Against Theomnestus deserves attention for its curious evidence of the way in which the ordinary vocabulary of Athens had changed between 600 and 400 B.C.

AH MSS. of Lysias yet collated have been derived, as H. Sauppe first showed, from the Codex Palatinus X. (Heidelberg). The next most valuable MS. is the Laurentianus C (15th century), which L Bekker chiefly followed. Speaking generally, we may say that these two MSS. are the only two which carry much weight where the text is seriously corrupt. In Oratt. i.ix. Bekker occasionally con sulted eleven other MSS., most of which contain only the above nine speeches: viz., Marciani F, G, I, K (Venice); Laurentiani D, E (Florence) ; Vaticani M, N ; Parisini U, V ; Urbinas O.

Bibliography. — Editio princeps, Aldus (Venice, 1513); by I. Bekker (1823) and W. S. Dobson (I828) in Oratores Attici; C. Scheibe (1852) and T. Thalheim (1901, Teubner series, with biblio- graphy); C. G. Cobet (4th ed., by J. J: Hartman, 1 905); with variorum notes, by J. J. Reiske (1772). Editions of select speeches by J. H. Bremi (1845); R. Rauchenstein (1848, revised by C. Fuhr, 1880-1881); H. Frohberger (1866-1871); H. van Herwerderi (1863); A. Weidner (1888); E. S. Shuckburgh (1882); A. Westermann and W. Binder (1887-1890); G. P. Bristol (1892), M. H. Morgan (1895), C. D. Adams (1905), all three published in America. There is a special, lexicon to Lysias by D. H. Holmes (Bonn, 1895). See also Jebb's Attic Orators (1893) and Selections from the Attic Orators (2nd

2 [Some remains of the speech against Theozotides have been found in the Hibeh papyri ; see W. H. D. Rouse's The Year's Work in Classical Studies (1907)].

ed., 1888) and F. Blass, Die Attische Beredsamkeit (2nd ed., 1887-1898); W. L. Devries, Ethopoiia. A rhetorical study of the types of character in the orations of Lysias (Baltimore, 1892). (R. C. J. ; X.)

LYSIMACHUS (c. 355-281 B.C.), Macedonian general, son of Agathocles, was a citizen of Pella in Macedonia. During Alexander's Persian campaigns he was one of his immediate bodyguard and distinguished himself in India. After Alexander's death he was appointed to the government of Thrace and the Chersonese. For a long time he was chiefly occupied with fighting against the Odrysian king Seuthes. In 315 he joined Cassander, Ptolemy and Seleucus against Antigonus, who, however, diverted his attention by stirring up Thracian and Scythian tribes against him. In 309, he founded Lysimachia in a commanding situation on the neck connecting the Cher- sonese with the mainland. He followed the example of Antigonus in taking the title of king. In 302 when the second alliance between Cassander, Ptolemy and Seleucus was made, Lysi- machus, reinforced by troops from Cassander, entered Asia Minor, where he met with little resistance. On the approach of Antigonus he retired into winter quarters near Heraclea, marrying its widowed queen Amastris, a Persian princess. Seleucus joined him in 301, and at the battle of Ipsus Antigonus was slain. His dominions were divided among the victors, Lysimachus receiving the greater part of Asia Minor. Feeling that Seleucus was becoming dangerously great, he now allied himself with Ptolemy, marrying his daughter Arsinoe. Amastris, who had divorced herself from him, returned to Heraclea. When Antigonus's son Demetrius renewed hostilities (297), during his absence in Greece, Lysimachus seized his towns in Asia Minor, but in 294 concluded a peace whereby Demetrius was recognized as ruler of Macedonia. He tried to carry his power beyond the Danube, but was defeated and taken prisoner by the Getae, who, however, set him free on amicable terms. Demetrius subsequently threatened Thrace, but had to retire in consequence of 'a rising in Boeotia, and an attack from Pyrrhus of Epirus. In 288 Lysimachus and Pyrrhus in turn invaded Macedonia, and drove Demetrius out of the country. Pyrrhus was at first allowed to remain in possession of Macedonia with the title of king, but in 285 he was expelled by Lysimachus. Domestic troubles embittered the last years of Lysimachus's life. Amas- tris had been murdered by her two sons; Lysimachus treacher- ously put them to death. On his return Arsinoe asked the gift of Heraclea, and he granted her request, though he had promised to free the city. In 284 Arsinoe, desirous of gaining the succes- sion for her sons in preference to Agathocles (the eldest son of Lysimachus), intrigued against him with the help of her brother Ptolemy Ceraunus; they accused him of

conspiring with Seleucus to seize the throne, and he was put to death. This atrocious deed of Lysimachus aroused great indignation. Many of the cities of Asia revolted, and his most trusted friends deserted him. The widow of Agathocles fled to Seleucus, who at once invaded the territory of Lysimachus in Asia. Lysi- machus crossed the Hellespont, and in 281 a decisive battle took place at the plain of Corus (Corupedion) in Lydia. Lysi- machus was killed; after some days his body, watched by a faithful dog, was found on the field, and given up to his son Alexander, by whom it was interred at Lysimachia.

See Arrian, Anab. v. 13, vi. 28; Justin xv. 3, 4, xvii. 1; Quintus Curtius v. 3, x. 30; Diod. Sic. xviii. 3; Polybius v. 67; Plutarch, Demetrius, 31. 52, Pyrrhus, 12; Appian, Syriaca, 62; Thirlwall, History of Greece, vol. viii. (1847); J. P. Mahaffy, Story of Alex- ander's Empire; Droysen, Hellenismus (2nd ed., 1877); A. Holm, Griechische Geschichte, vol. iv. (1894); B. Niese, Gesch. d. griech. u. maked. Staaten, vols. i. and ii. (1893, 1899); J. Beloch, Griech. Gesch.

vol. iii. (1904) ; Hiinerwadel, Forschungen zur Gesch. des Konies Lysimachus (1900); Possenti, // Re Lisimaco di Tracia (1901);

Ghione, Note sul regno di Lisimaco [Atti d. real. Accad. di Torino,

xxxix.); and Macedonian Empire. (E. R. B.)

LYSIPPUS, Greek sculptoT, was head of the school of Argos and Sicyon in the time of Philip and Alexander of Macedon. His works are said to have numbered 1500, some of them colossal. Some accounts make him the continuer of the school of Poly- clitus; some represent him as self-taught. The matter in which he especially innovated was the proportions of the male

human body; he made the head smaller than his predecessors, the body more slender and hard, so as to give the impression of greater height. He also took great pains with hair and other details. Pliny (N.H. 34, 61) and other writers mention many of his statues. Among the gods he seems to have produced new and striking types of Zeus (probably of the Otricoli class), of Poseidon (compare the Poseidon of the Lateran, standing with raised foot), of the Sun-god and others; many of these were colossal figures in bronze. Among heroes he was specially attracted by the mighty physique of Hercules. The Hercules Farnese of Naples, though signed by Glycon of Athens, and a later and exaggerated transcript, owes something, including the motive of rest after labour, to Lysippus. Lysippus made many statues of Alexander the Great, and so satisfied his patron, no doubt by idealizing him, that

he became the court sculptor of the king, from whom and from whose generals he received many commissions. The extant portraits of Alexander vary greatly, and it is impossible to determine which among them go back to Lysippus. The remarkable head from Alexandria (Plate II. fig. 56, in Greek Art) has as good a claim as any.

As head of the great athletic school of Peloponnese Lysippus naturally sculptured many athletes; a figure by him of a man scraping himself with a strigil was a great favourite of the Romans in the time of Tiberius (Pliny, N.H. 34, 61); and this has been usually regarded as the original copied in the Apoxyomenus of the Vatican (Greek Art, Plate VI. fig. 79). If so, the copyist has modernized his copy, for some features of the Apoxyomenus belong to the Hellenistic age. With more certainty we may see a copy of an athlete by Lysippus in the statue of Agias found at Delphi (Greek Art, Plate V. fig. 74), which is proved by inscriptions to be a replica in marble of a bronze statue set up by Lysippus in Thessaly. And when the Agias and the Apoxyomenus are set side by side their differences are so striking that it is difficult to attribute them to the same author, though they may belong to the same school. (P. G.)

LYSIS OF TARENTUM (d. c. 390 B.C.), Greek philosopher. His life is obscure, but it is generally accepted, that in the persecution of the Pythagoreans at Crotona and Metapontum he escaped and went to Thebes, where he came under the influence of Philolaus. The friend and companion of Pythagoras, he has been credited with many of the works usually attributed to Pythagoras himself. Diogenes Laertius viii. 6 gives him three, and Mullach even assigns to him the Golden Verses. But it is generally held that these verses are a collection of lines by many authors rather than the work of one man.

LYSISTRATUS, a Greek sculptor of the 4th century B.C., brother of Lysippus of Sicyon. We are told by Pliny (Nat. Hist. 35, 153) that he followed a strongly realistic line, being the first sculptor to take impressions of human faces in plaster. LYTE, HENRY FRANCIS (1793-1847), Anglican divine and hymn-writer, was born near Kelso on the 1st of June 1793, and was educated at Enniskillen school and at Trinity College, Dublin. He took orders in 1815, and for some time held a curacy near Wexford. Owing to infirm health he came to England, and after several changes settled, in 1823, in the parish of Brixham. In 1844 his health finally gave way; and he died at Nice on the 20th of November 1847.

Lyte’s first work was Tales in Verse illustrative of Several of the Petitions in the Lord’s Prayer (1826), which was written at Lymington

and was commended by Wilson in the Noctes Ambrosianae. He next published (1833) a volume of Poems, chiefly Religious, and in 1834 a little collection of psalms and hymns entitled The Spirit of the Psalms. After his death, a volume of Remains with a memoir was published, and the poems contained in this, with those in Poems, chiefly Religious, were afterwards issued in one volume (1868). His best known hymns are “Abide with me! fast falls the eventide “; ” Jesus, I my cross have taken “; ” Praise, my soul, the King of Heaven “; and ” Pleasant are Thy courts above.”

LYTHAM, an urban district and watering-place in the Black- pool parliamentary division of Lancashire, England, on the north shore of the estuary of the Ribble, 13ˆ m. W. of Preston by a joint line of the London & North Western and Lancashire & Yorkshire railways. Pop. (1901) 7185. It has a pier, a

pleasant promenade and drive along the shore, and other appointments of a seaside resort, but it is less wholly devoted to holiday visitors than Blackpool, which lies 8 m. N.W. A Benedictine cell was founded here at the close of the 12th century by the lord of the manor, Richard Fitz-Roger.

LYTTELTON, GEORGE LYTTELTON, ist Baron (1700- 1773), English statesman and man of letters, born at Hagley, Worcestershire, was a descendant of the great jurist Sir Thomas Littleton (g.v.). He was the eldest son of Sir Thomas Lyttelton, 4th bart. (d. 1751), who at the revolution of 1688 and during the following reign was one of the ablest Whig debaters of the House of Commons. 1 Lyttelton was educated at Eton and Oxford, and in 1728 set out on the grand tour, spending con- siderable periods at Paris and Rome. On his return to England he sat in parliament for Okehampton, Devonshire, beginning public life in the same year with Pitt. From 1744 to 1754 he held the office of a lord commissioner of the treasury. In 1755 he succeeded Legge as chancellor of the exchequer, but in 1756 he quitted office, being raised to the peerage as Baron Lyttelton, of Frankley, in the county of Worcester. In the political crisis of 1765, before the formation of the Rockingham administration, it was suggested that he might be placed at the head of the treasury, but he declined to take part in any such scheme. The closing years of his life were devoted chiefly to literary pursuits. He died on the 22nd of August 1773.

Lyttelton's earliest publication (1735), Letters from a Persian in England to his Friend at Ispahan, appeared anonymously. Much greater celebrity was achieved by his Observations on the Conversion and Apostleship of St Paul, also anonymous, published in 1747. It takes the form of a letter to Gilbert West, and is designed to show that St Paul's conversion is of itself a sufficient demonstration of the divine character of Christianity. Dr Johnson regarded the work as one " to which infidelity has never been able to fabricate a specious answer." Lord Lyttelton's Dialogues of the Dead, a creditable per- formance, though hardly rivalling either Lucian or Landor, appeared in 1760. His History of Henry II. (1767-1771), the fruit of twenty years' labour, is not now cited as an authority, but is painstaking and fair. Lyttelton was also a writer of verse; his Monody on his wife's death has been praised by Gray for its elegiac tenderness, and his Prologue to the Coriolanus of his friend Thomson shows genuine feeling. He was also the author of the well-known stanza in the Castle of Indolence, in which the poet himself is described. A com- plete collection of the Works of Lord Lyttelton was published by his nephew, G. E. Ayscough in 1774.

His son Thomas (1744-1779), who succeeded as 2nd baron, played some part in the political life of his time, but his loose and prodigal habits were notorious, and he is known, in dis- tinction to his father " the good lord, " as the wicked Lord Lyttelton. He left no lawful issue, and the barony became extinct; but it was revived in 1794 in the person of his uncle William Henry, ist baron of the new creation (1724-1808), who was governor of S. Carolina and later of Jamaica, and ambassador to Portugal. The new barony went after him to his two sons. The 3rd baron (1 782-1837) was succeeded by his son George William Lyttelton, 4th baron (1817-1876), who was a fine scholar, and brother-in-law of W. E. Gladstone, having married Miss Mary Glynne. He did important work in educa- tional and poor law reform. He had eight sons, of whom the eldest, Charles George (b. 1842), became 5th baron, and in

1 Sir Thomas (or Thomas de) Littleton, the jurist, had three sons, William, Richard and Thomas. From the first, William, was descended Sir Thomas Lyttelton, 1st bart. of Frankley (1596- 1650), whose sons were Sir Henry, 2nd bart. (d. 1693), and Sir Charles, 3rd bart. (1629-1716), governor of Jamaica. The latter's son was Sir Thomas, 4th bart., above mentioned, who was also the father of Charles Lyttelton (1 7 14-1768), bishop of Carlisle, and president of the Society of Antiquaries. The male descendants of the second, Richard, died out with Sir Edward Littleton, bart., of Pillaton, Staffordshire, in 1812, but the latter's grandnephew, Edward John Walhouse

(1791-1863) of Hatherton, took the estates by will and also the name of Littleton, and was created Ist Baron Hatherton in 1835; he was chief secretary for Ireland (1833-1834). From Thomas, the third son, was descended, in one line, Edward, Lord Littleton, of Munslow (1589-1645), recorder of London, chief justice of the common pleas, and eventually lord keeper; and in another line, the baronets of Stoke St Milborough, Shropshire, of whom the best known and last was Sir Thomas Littleton, 3rd bart. (1647- 1710), speaker of the House of Commons (1698-1700), and treasurer of the navy.

1889 succeeded, by the death of the 3rd duke of Buckingham and Chandos, to the viscounty of Cobham, in which title the barony of Lyttelton is now merged. Other distinguished sons were Arthur Temple Lyttelton (d. 1903), warden of Selwyn College, Cambridge, and bishop-suffragan of Southampton; Edward Lyttelton (b. 1855), headmaster of Haileybury (1890- 1905) and then of Eton; and Alfred Lyttelton (b. 1857), secre- tary of state for the colonies (1903-1906). It was a family of well-known cricketers, Alfred being in his day the best wicket- keeper in England as well as a fine tennis player.

For the ist baron see Sir R. Phillimore's Memoirs and Corre- spondence of Lord Lyttelton, 1734-1773 (2 vols., 1845).

LYTTELTON, a borough of New Zealand, the port of Christ- church (q.v.) on the E. coast of South Island, on an inlet on the north-western side of Banks Peninsula. Pop. (1906) 3941. It is surrounded by abrupt hills rising to 1600 ft., through which a railway communicates with Christchurch (7 m. N.W.) by a tunnel if m. long. Great breakwaters protect the harbour, which has an area of no acres, with a low-tide depth of 20 to 27 ft. There is a graving dock accessible for vessels of 6000 tons. The produce of the rich agricultural district of Canterbury is exported, frozen or preserved. Lyttelton, formerly called Port Cooper and Port Victoria, was the original settlement in this district (1850).

LYTTON, EDWARD GEORGE EARLE LYTTON, BULWER- LYTTON, ist Baron (1803-1873), English novelist and politician, the youngest son of General William Earle Bulwer of Heydon Hall and Wood Dalling, Norfolk, was born in London on the 25th of May 1803. He had two brothers, William (1799-1877) and Henry (1801-1872), afterwards LordDalling (q.v.). Bulwer's father died when the boy was four years old. His mother, Elizabeth Barbara, daughter of Richard Warburton Lytton of Knebworth, Hertfordshire, after her husband's death settled in London. Bulwer, who was delicate and neurotic, gave evidence of precocious talent and was sent to various boarding schools, where he

was always discontented, until in the establishment of a Mr Wallington at Ealing he found in his master a sympathetic and admiring listener. Mr Wallington induced him to publish, at the age of fifteen, an immature volume entitled Ishmael and other Poems. About this time Bulwer fell in love, and became extremely morbid under enforced separation from the young lady, who was induced by her father to marry another man. She died about the time that Bulwer went to Cambridge, and he declared that her loss affected all his after-life. In 1822 he entered Trinity College, Cambridge, but removed shortly afterwards to Trinity Hall, and in 1825 won the Chancellor's medal for English verse with a poem on " Sculpture." In the following year he took his B.A. degree and printed for private circulation a small volume of poems, Weeds and Wild Flowers, in which the influence of Byron was easily traceable. In 1827 he published O'Neill, or the Rebel, a romance, in heroic couplets, of patriotic struggle in Ireland, and in 1831 a metrical satire, The Siamese Twins. These juvenilia he afterwards ignored.

Meanwhile he had begun to take his place in society, being already known as a dandy of considerable pretensions, who had acted as second in a duel and experienced the fashionable round of flirtation and intrigue. He purchased a commission in the army, only to sell it again without undergoing any service, and in August 1827 married, in opposition to his mother's wishes, Rosina Doyle Wheeler (1802-1882), an Irish beauty, niece and adopted daughter of General Sir John Doyle. She was a brilliant but passionate girl, and upon his marriage with her, Bulwer's mother withdrew the allowance she had hitherto made him. He had £200 a year from his father, and less than £100 a year with his wife, and found it necessary to set to work in earnest. In the year of his marriage he published Falkland, a novel which was only a moderate success, but in 1828 he attracted general attention with Pelham, a novel for which he had gathered material during a visit to Paris in 1825. This story, with its intimate study of the dandyism of the age, was immediately popular, and gossip was busy in identifying the characters of the romance with the leading men of the time. In the same year he

published The Disowned, following it up with Devereux (1829), Paul Clifford (1830), Eugene Aram (1832) and Godolphin (1833). All these novels were designed with a didactic purpose, some- what upon the German model. To embody the leading features of a period, to show

how a criminal may be reformed by the development of his own character, to explain the secrets of failure and success in life, these were the avowed objects of his art, and there were not wanting critics ready to call in question his sincerity and his morality. Magazine controversy followed, in which Bulwer was induced to take a part, and about the same time he began to make a mark in politics. He became a follower of Bentham, and in 1831 was elected member for St Ives in Huntingdon. During this period of feverish activity his relations with his wife grew less and less satisfactory. At first she had cause to complain that he neglected her in the pursuit of literary reputation; later on his disregard became rather active than passive. After a series of distressing differences they decided to live apart, and were legally separated in 1836. Three years later his wife published a novel called Ckeveley, or the Man of Honour, in which Bulwer was bitterly caricatured, and in June 1858, when her husband was standing as parliamentary candidate for Hertfordshire, she appeared at the hustings and indignantly denounced him. She was consequently placed under restraint as insane, but liberated a few weeks later. For years she continued her attacks upon her husband's character, add outlived liinVby nine years, dying at Upper Sydenham in March 1882. There is little doubt that her passionate imagination gravely exaggerated the tale of her wrongs, though Bulwer was certainly no model for husbands. It was a case of two undisciplined natures in domestic bondage, and the consequences of their union were as inevitable as they were unfortunate.

Bulwer, meanwhfle, was full of activity, both literary and political. After representing St Ives, he was returned for Lincoln in 1832, and sat in parliament for that city for nine years. He spoke in favour of the Reform Bill, and took the leading part in securing the reduction, after vainly essaying the repeal, of the newspaper stamp duties. His pamphlet, issued when the Whigs were dismissed from office in 1834, and entitled " A Letter to a Late Cabinet Minister on the Crisis," was immensely influential, and Lord Melbourne offered him a lordship of the admiralty, which he declined as likely to interfere with his activity as an author. At this time, indeed, his pen Was indefatigable. Godolphin was followed by The Pilgrims 0} the Rhine (1834), a graceful fantasy, too German in sentiment to be quite successful in Eng- land, and then in The Last Days of Pompeii (1834) and Rienzi (1835) he reached the height of his popularity. He took great pains with these stories, and despite their lurid colouring and mannered over-emphasis, they undoubtedly indicate the high – water mark of his talent. Their reception was enthusiastic, and Ernest Maltravers (1837) and Alice, or the Mysteries (1838) were hardly less successful. At the same time he

had been plunging into journalism. In 1831 he undertook the editorship of the New Monthly, which, however, he resigned in the following year, but in 1 84 1, the year in which he published Night and Morning, he started the Monthly Chronicle, a semi-scientific magazine, for which he wrote Zicci, an unfinished first draft afterwards ex- panded into Zanoni (1842). As though this multifarious fecundity were not sufficient, he had also been busy in the field of dramatic literature. In 1838 he produced The Lady of Lyons, a play which Macready made a great success at Covent Garden: in 1839 Richelieu and The Sea Captain, and in 1840ˆ Money. All, except The Sea Captain, were successful, and this solitary failure he revived in 1869 under the title of. The Rightful Heir. Of the others it may be said that, though they abound in examples of strained sentiment and false taste, they have nevertheless a certain theatrical flair, which has enabled them to survive a whole library of stage literature of greater sincerity and truer feeling. The Lady of Lyons and Money have long held the stage, and to the last-named, at least, some of the most talented of modern comedians have given new life and probability.

In 1838 Bulwer, then at the height of his popularity, was created a baronet, and on succeeding to the Knebworth estate

in 1843 added Lytton to his surname, under the terms of his mother's will. From 1841 to 1852 he had no seat in parliament, and spent much of his time in continental travel. His literary activity waned somewhat, but was still remarkably alert for a man who had already done so much. In 1843 he issued The Last of the Barons, which many critics have considered the mbst historically sound and generally effective of all his romances; in 1847 Lucretia, or the Children of the Night, and in 1848 Harold, the last of the Saxon Kings. In the intervals between these heavier productions he had thrown off a volume of poems in 1842, another of translations from Schiller in 1844, and a satire called The New Timon in 1846, in which Tennyson, who had just received a Civil List pension, was bitterly lampooned as " school miss Alfred," with other unedifying amenities; Tennyson retorted with some verses in which he addressed Bulwer-Lytton aS " you band-box." These pdetic excursions were followed by his most ambitious work in metre, a romantic epic entitled King Arthur, of which he expected much, and he was greatly dis- appointed by its apathetic reception. Having experienced some rather acid criticism, questioning the morality of his novels, he next essayed a form of fiction which he was determined should leave no loophole to suspicion, and in The Caxtons (1849), pub- lished at first anonymously, gave further proof of his versatility and resource. My Novel (1853) and What will he do with it? were designed to prolong the same strain.

In 1852 he entered the political field anew, and in the con- servative interest. He had differed from the policy of Lord John Russell over the corn laws, and now separated finally from the liberals. He stood for Hertfordshire and was elected, holding the seat till 1866, when he was raised to the peerage as Baron Lytton of Knebworth. His eloquence gave him the ear of the House of Commons, and he often spoke with influence and authority. In 1858 he was appointed secretary for the colonies. In the House of Lords he was comparatively inactive. His last novels were A Strange Story (1862), a mystical romance with spiritualistic tendencies; The Coming Race (1871), The Parisians (1873) — both unacknowledged at the time of his death; and Kenelm Chillingly, which was in course of publication in Blackwood's Magazine when Lytton died at Torquay on the 1 8th' of January 1873. The last three of his stories were classed by his son, the 2nd Lord Lytton, as a trilogy, animated by a common purpose, to exhibit the influence of modern ideas upon character and conduct.

Bulwer-Lyt ton's attitude towards life was theatrical, the language of his sentiments was artificial and over-decorated, and the tone of his work was often so flamboyant as to give an im- pression of false taste and judgment. Nevertheless, he built up each of his stories upon a deliberate and careful framework: he was assiduous according to his lights in historical research; and conscientious in the details of workmanship. As the fashion of his day has become obsolete the immediate appeal of his work has diminished. It will always, however, retain its interest, not only for the merits of certain individual novels, but as a mirror of the prevailing intellectual movement of the first half of the 19th century.

See T. H. S. Escott, Edward Bulwer, 1st Baron Lytton of Kneb- worth (1910). (A. Wav) .-.

LYTTON, EDWARD ROBERT BULWER-LYTTON, ist Earl of (1831-1891), English diplomatist and poet, was the only son of the ist Baron Lytton. He was born in Hertford Street, Mayfair, on the 8th of November 1831. Robert Lytton and his sister were brought up as children principally by a Miss Green. In 1840 the boy was sent to a school at Twickenham, in 1842 to another at Brighton, and in 1845 to Harrow. From his earliest childhood Lytton read voraciously and wrote copiously, quickly developing a genuine and intense love of literature and-a remarkable facility of expression. In 1849 he left Harrow and studied for a year at Bonn with an English tutor, arid on his return with another tutor in England. In 1850 he entered the diplomatic service as unpaid attache to his uncle, Sir Henry Bulwer, who was then minister at Washington. His advance

in the diplomatic service was continuous, his successive appointments being: as second secretary — 1852, Florence; 1854, Paris; 1857, The Hague; 1859, Vienna; as first secretary or secretary of legation — 1863, Copenhagen; 1864, Athens; 1865, Lisbon; 1868, Madrid; 1868, Vienna; 1873, Paris; as minister — 1875, Lisbon. In 1887 he was appointed to succeed Lord Lyons as ambassador at Paris, and held that office until his death in 1891. This rapid promotion from one European court to another indicates th.e esteem in which Lytton was held by successive foreign secretaries. In 1864, immediately before taking up his appointment at Athens, he married Edith,«daughter of Edward Villiers, brother of the earl of Clarendon, and in 1873, upon the death of his father, he succeeded to the peerage and the estate of Kneb worth in Hertfordshire.

Early in 1875 Lord Lytton declined an offer of appointment as governor of Madras, and in November of that year he was nominated governor-general of India by Disraeli. The moment was critical in the history of India. In Central Asia the advance of Russia had continued so steadily and so rapidly that Shere Ali, the amir of Afghanistan, had determined to sesk safety as the vassal of the tsar. Lytton went out to India with express instructions from the British government to recover the friendship of the amir if possible, and if not so to arrange matters on the north-west frontier as to be able to be indifferent to his hostility. For eighteen months Lytton and his council made every effort to conciliate the friendship of the amir, but when a Russian agent was established at Kabul, while the mission of Sir Neville Chamberlain was forcibly denied entrance into the amir's dominions, no choice was left between acknowledging the right of a subsidized ally of Great Britain to place himself within Russian control and depriving him of the office which he owed to British patronage and assistance. The inevitable war began in November 1878, and by the close of that year the forces prepared by Lytton for that purpose had achieved their task with extraordinary accuracy and economy. Shere Ah fled from Kabul, and shortly afterwards died, and once more it fell to the Indian government to make provision for the future of Afghanistan. By the treaty of Gandamak in May 1879 Yakub Khan, a son of Shere Ali, was recognized as amir, the main conditions agreed upon being that the districts of Kuram, Pishin and Sibi should be " assigned " to British administration, and the Khyber and other passes be under British control; that there should be a permanent British Resident at Kabul, and that the amir should be subsidized in an amount to be

afterwards determined upon. The endeavour of the Indian government was to leave the internal administration of Afghanistan as little affected as possible, but considerable risk was run in trusting so much, and especially the safety of a British envoy, to the power and the goodwill of Yakub Khan. Sir Louis Cavagnari, the British envoy entered Kabul at the end of July, and was, with his staff, massacred in the rising which took place on the 3rd of September. The war of 1879-80 immediately began, with :the occupation of Kandahar by Stewart and the advance upon Kabul by Roberts, and the military operations which followed were not concluded when Lytton resigned his office in April 1880.

A complete account of Lytton's viceroyalty, and a lucid exposition of the principles of his government and the main outlines of his policy, may be found in Lord Lytton's Indian Administration, by his daughter, Lady Betty Balfour (London, 1899). The frontier policy which he adopted, after the method of a friendly and united Afghanistan under Yakub Khan had been tried and had failed, was that the Afghan kingdom should be destroyed. The province of Kandahar was to be occupied by Great Britain , and administered by a vassal chief, Shere Ali Khan, who was appointed " Wali " with a solemn guarantee of British support (unconditionally withdrawn by the government succeed- ing Lytton's). The other points of the Indian frontier were to be made as secure as possible, and the provinces of Kabul and Herat were to be left absolutely to their own devices. In con- sequence of what had been said of Lytton by the leaders of the parliamentary opposition in England, it was impossible for him to retain his office under a government formed by them, and he

accordingly resigned at the same time as the Beaconsfield ministry. This part of his policy was thereupon revoked. Abdur Rahman, proving himself the strongest of the claimants to the throne left vacant by Yakub Khan's deposition, became amir as the subsidized ally of the Indian, government.

The two most considerable events of Lytton's viceroyalty, besides the Afghan wars, were the assumption by Queen Victoria of the title of empress of India on the ist of January 1877, and the famine which prevailed in various parts of India in 1876-78. He satisfied himself that periodical famines must be expected in Indian history, and that constant preparation during years of comparative prosperity was the only condition whereby their destructiveness could be modified. Accordingly he ohtained the appointment of the famine commission of 1878, to inquire, upon lines laid down by him, into available means of mitigation. Their report, made in 1880, is the foundation of the later

system of irrigation, development of communications, and ” famine insurance.” The equalization and reduction of the salt duty were effected, and the abolition of the cotton duty commenced, during Lytton’s term of office, and the system of Indian finance profoundly modified by decentralization and the regulation of provincial responsibility, in all which matters Lytton enthusiastically supported Sir John Strachey, the financial member of his council.

Upon Lytton’s resignation in 1880 an earldom was conferred upon him in recognition of his services as viceroy. He lived at Knebworth until 1887, in which year he was appointed to succeed Lord Lyons as ambassador at Paris. He died at Paris on the 24th of November 1891, of a clot of blood in the heart, when apparently recovering from a serious illness. He was succeeded by his son (h. 1876) as 2nd earl.

Lytton is probably better known as a poet — under the pen- name of ” Owen Meredith ” — than as a statesman. The list of his published works is as follows: Clytemnestra, and other Poems, 1855; The Wanderer,. 1858; Lvcile, i860; Serbski Pesme, or National Songs of Servia, 1861, Tannhduser (in collaboration with Mr Julian , Fane), 1861; Chronicles and Characters, 1867; Orval, or The Fool of Time, 1868; Fables in Song (2 vols.), 1874; Glenaveril, or The Metamorphoses; 1885; After Paradise, or the Legends of Exile, and other Poems, 1887; Marah, 1892; .King Poppy, 1892. The two last-mentioned volumes were published posthumously. A few previously unpublished pieces are included in a volume of Selections pub- lished, with an introduction by Lady Betty Balfour, in i8o4- His metrical style was easy and copious, but not precise. . It often gives the impression of having been produced with facility, because the flow of his thought carried him along, and of not having undergone prolonged or minute polish. It was frequently suggestive of the work of other poets, especially in his earlier productions. The friend who wrote the inscription for the monument to be erected to him at St Paul’s described him as ” a poet of many styles, each the expression of his habitual thoughts.” Lucile, a novel in verse, presents a romantic style and considerable wit; and Glenaveril, which also contains many passages of great beauty and much poetic thought, has much of the same narrative character. Besides his volumes of poetry, Lytton published in 1883 two volumes of a biography of his father. The second of these contains the beginning of the elder Lytton’s unfinished novel, Greville, and his life is brought down only to the year 1832, when he was twenty-six years of age, so that the completion of the book upon the same scale would have required at least four more volumes. The executrix of Lytton’s mother chose to consider that the publication was injurious to that lady’s memory, and issued a volume

purporting to contain Bulwer-Lytton's letters to his wife. This Lytton suppressed by injunction, thereby procuring a fresh exposition of the law that the copyright in letters remains in the writer or his representatives, though the property in them, belongs to the recipient. Lytton's appointment to the Parisian embassy caused the biography of his father to be finally laid aside.

The Personal and Literary Letters of Robert, zst Earl of Lytton, have been edited by Lady Betty Balfour (1906). (H. S*.)

MThe thirteenth letter of the Phoenician and Greek alphabets, the twelfth of the Latin, and the thirteenth of the languages of western Europe. Written origin- ally from right to left, it took the form vv\ which sur- vivies in its earliest representations in Greek. The greater length of the first limb of m is characteristic of the earliest forms. From this form, written from left to right, the Latin abbreviation M' for the praenomen Manius is supposed to have developed, the apostrophe representing the fifth stroke of the original letter. In the early Greek alphabets the four-stroke M with legs of equal length represents not m but s; m when written with four strokes is /A. The five-stroke forms, however, are confined practically to Crete, Melos and Cumae; from the last named the Romans received it along with the rest of their alphabet. The Phoenician name of the symbol was mem, the Greek name y.v is formed on the analogy of the name for n. M represents the bilabial nasal sound, which was generally voiced. It is com- monly a stable sound, but many languages, e.g. Greek, Ger- manic and Celtic, change it when final into «, its dental correlative. It appears more frequently as an initial sound in Greek and Latin than in the other languages of the same stock, because in these s before m (as also before I and n) disappeared at the beginning of words. The sounds m and b are closely related, the only difference being that, in pronouncing m, the nasal pas sage is not closed, thus allowing the sound to be prolonged, while b is an instantaneous or explosive sound. In various languages 6 is inserted between m and a following consonant, as in the Gr. fieo-qˆpia " mid-day," or the English " number," Fr. nombre from Lat. numerus. The sound m can in unaccented syllables form a syllable by itself without an audible vowel, e.g. the Enghlish word fathom comes from an Anglo-Saxon / ol'w, where the m was so used. (For more details as to this phonetic principle, which has important results in the history of language, see under N.) (P. Gi.)

HAAS, JOSEPH (1847-1886), English tenor singer, was born at Dartford, and became a chorister in Rochester Cathedral. He went to study singing in Milan in 1869; in February 1871 he made his first success by taking Sims Reeves's place at a concert in London. In 1878 he became principal tenor in Carl Rosa's company, his beautiful voice and finished style more than com- pensating for his poor acting. He died in London on the 16th of January 1886.

MAASIN, a town on the S.W. coast of the island of Leyte, Philippine Islands, at the mouth of the Maasin River. Pop. (1903), 21,638. Maasin is an important port for hemp and copra. The well-built town occupies a narrow coastal plain. The river valleys in the vicinity produce cotton, pepper, tobacco, rice, Indian corn and fruit. Native cloths and pottery are manufactured. Maasin is the only place on the west coast of Leyte where a court of justice is held. The language is Visay an. MAASSLUIS, a river port of Holland, in the province of South Holland, on the New Waterway, 10 m. by rail W. of Rotterdam. Pop. (1903), 801 1. It rose into importance as a fishing harbour towards the end of the 16th century, and its prosperity rapidly increased after the opening of the New Waterway (the Maas ship canal) from Rotterdam to the sea. The fort erected here in 1572 by Philip of Marnix, lord of St Aldegonde, was captured by the Spanish in 1573.

MAASTRICHT, or Maestricht, a frontier town and the capital of the province of Limburg, Holland, on the left bank of the Maas at the influx of the river Geer, 19 m. by rail N.N.E. of Liege in Belgium. Pop. (1904), 36,146. A small portion of the town, known as Wyk, lies on the right bank. A stone bridge connecting the two replaced a wooden structure as early as 1280, and was rebuilt in 1683. Formerly a strong fortress, Maastricht is still a considerable garrison town, but its ramparts were dismantled in 1871-1878. The town-hall, built by Pieter Post and completed in 1683, contains some interesting pictures

and tapestry. The old town-hall (Oud Stadhuis), a Gothic building of the 15th century, is now used as a museum of antiquities. The church of St Servatius is said to have been founded by Bishop Monulphus in the 6th century, thus being the oldest church in Holland; according to one account it was rebuilt and enlarged as early as the time of Charlemagne. The crypt with the tomb of the patron saint dates from the original building. The varied character of its late Romanesque and later Gothic architecture bears evidence of the frequency with which the church has been restored and altered. Over the porch is the fine emperor's hall, and the church has a marble statue of Charlemagne. The church of Our Lady, a late Romanesque building, has two ancient

crypts and a 13th- century choir of exceptional beauty, but the nave suffered severely from a restoration in 1764. The present Gothic building of St Martin (in Wyk) was erected in 1859; the original church is said by tradition to have occupied the site of an old heathen temple. The Protestant St Janskerk, a Gothic building of the 13 th and 15th centuries, with a fine tower, was formerly the baptistery of the cathedral. The various hospitals, the poor-house, the orphanage and most of the other charitable foundations are Roman Catholic institutions. Maastricht contains the provincial archives, a library and geological collections. Though mainly indebted for its com- mercial prosperity to its position on the river, the town did not begin to reap the full advantages of its situation till the opening of the railways between 1853 and 1865. At first a trade was carried on in wine, colonial wares, alcoholic liquors and salt; there are now manufactures of earthenware, glass and crystal, arms, paper, woollens, tools, lead, copper and zinc work, as well as breweries, and tobacco and cigar factories, and a trade in corn and butter.

A short distance south of Maastricht are the great sandstone quarries of Pietersberg, which were worked from the time of the Romans to near the end of the 19th century; the result is one of the most extraordinary subterranean labyrinths in the world, estimated to cover an area 15 m. by 9 m. In the time of the Spanish wars these underground passages served to hide the peasants and their cattle.

Maastricht was originally the trajectus superior (upper ford) of the Romans, and was the seat of a bishop from 382 to 721. Having formed part of the Frankish realm, it was ruled after 1204 jointly by the dukes of Brabant and the prince-bishops of Liege. In 1579 it was besieged by the Spaniards under the duke of Parma, being captured and plundered after a heroic resistance. It was taken by the French in 1673, 1748 and

1794.

MABILLON, JOHN (1632-1707), Benedictine monk of the Congregation of St Maur (see Maurists), was the son of a peasant near Reims. In 1653 he became a monk in the abbey of St Remi at Reims. In 1664 he was placed at St Germain-des- Pres in Paris, the great literary workshop of the Maurists, where he lived and worked for twenty years, at first under d'Achery, with whom he edited the nine folio volumes of Acta of the B enedictine Saints. In Mabillon's Prefaces (reprinted separately) these lives were for the first time made to illustrate the ecclesi- astical and civil history of the early middle ages. Mabillon's masterpiece was the De re diplomatica (1681; and a supplement, 1704) in which were first laid down the principles for

determining the authenticity and date of medieval charters and manuscripts. It practically created the science of Latin palaeography, and is still the standard work on the subject. In 1685-1686 Mabillon visited the libraries of Italy, to purchase MSS. and books for the King's Library. On his return to Paris he was called upon to defend against de Ranee, the abbot of La Trappe, the legiti- macy for monks of the kind of studies to which the Maurists de- voted themselves: this called forth Mabillon's Traits des itudes monastiques and his Reflexions sur la rSponse de M. I'abbi de la

Trappe (1691-1692), works embodying the ideas and programme of the Maurists for ecclesiastical studies. Mabillon produced in all some twenty folio volumes and as many of lesser size, nearly all works of monumental erudition (the chief are named in the article Maurists). A very competent judge declared that, "he knew well the 7th, 8th, 9th, 10th and nth centuries, but nothing earlier or later." Mabillon never allowed his studies to interfere with his life as a monk; he was noted for his regular attendance at the choral recitation of the office and the other duties of the monastic life, and for his deep personal religion, as well as for a special charm of character. He died on the 26th of December 1707, in the midst of the production of the colossal Benedictine Annals.

The chief authority for his life is the Abrege de la vie de D. J. M. (also in Latin), by his disciple and friend Ruinart (1709). See also, for a full summary of his works, Tassin, Hist, littiraire de la congr. de St Maur (1770), pp. 205-269. Of modern biographies the best are those of de Broglie (2 vols., 1888) and Baumer (1892) — the former to be especially recommended. A brief sketch by E. C. Butler may be found in the Downside Review (1893). (E. C. B.)

MABINOGION (plural of Welsh mabinogi, from mabinog, a bard's apprentice), the title given to the collection of eleven Welsh prose tales (from the Red Book of Hergest) published (1838) by Lady Charlotte Guest, but applied in the Red Book to four only. (See Celt: Welsh Literature.)

MABUSE, JAN (d. 1532), the name adopted (from his birth- place, Maubeuge) by the Flemish painter Jenni Gosart, or Jennyn van Hennegouwe (Hainault), as he called himself when he matriculated in the gild of St Luke, at Antwerp, in 1503. We know nothing of his early

life, but his works tell us that he stood in his first period under the influence of artists to whom plastic models were familiar; and this leads to the belief that he spent his youth on the French border rather than on the banks of the Scheldt. Without the subtlety or power of Van der Weyden, he had this much in common with the great master of Tournai and Brussels, that his compositions were usually framed in architectural backgrounds. But whilst Mabuse thus early betrays his dependence on the masters of the French frontier, he also confesses admiration for the great painters who first gave lustre to Antwerp; and in the large altar-pieces of Castle Howard and Scawby he combines in a quaint and not unskilful medley the sentiment of Memling, the bright and decided con- trasts of pigment peculiar to coloured reliefs, the cornered and packed drapery familiar to Van der Weyden, and the bold but Socratic cast of face remarkable in the works of Quentin Matsys. At Scawby he illustrates the legend of the count of Toulouse, who parted with his wordly goods to assume the frock of a hermit. At Castle Howard he represents the Adoration of the Kings, and throws together some thirty figures on an architectural background, varied in detail, massive in shape and fanciful in ornament. He surprises us by pompous costume and flaring contrasts of tone. His figures, like pieces on a chess-board, are often rigid and conventional. The landscape which shows through the colonnades is adorned with towers and steeples in the minute fashion of Van der Weyden. After a residence of a few years at Antwerp, Mabuse took service with Philip, bastard of Philip the Good, at that time lord of Somerdyk and admiral of Zeeland. One of his pictures had already become celebrated — a Descent from the Cross (50 figures), on the high altar of the monastery of St Michael of Tongerloo. Philip of Burgundy ordered Mabuse to execute a replica for the church of Middel- burg; and the value which was then set on the picture is apparent from the fact that Diirer came expressly to Middelburg (1521) to see it. In 1 568 the altar-piece perished by fire. In 1508 Mabuse accompanied Philip of Burgundy on his Italian mission; and by this accident an important revolution was effected in the art of the Netherlands. Mabuse appears to have chiefly studied in Italy the cold and polished works of the Leonardesques. He not only brought home a new style, but he also introduced the fashion of travelling to Italy; and from that time till the age of Rubens and Van Dyck it was considered proper that all Flemish painters should visit the peninsula. The Flemings grafted Italian mannerisms on their own stock; and the cross turned out so

unfortunately that for a century Flemish art lost all trace of originality.

In the summer of 1509 Philip returned to the Netherlands, and,

retiring to his seat of Suytburg in Zeeland, surrendered himself to the pleasures of planning decorations for his castle and ordering pictures of Mabuse and Jacob of Barbari. Being in constant communication with the court of Margaret of Austria at Malines, he gave the artists in his employ fair chances of pro- motion. Barbari was made court painter to the regent, whilst Mabuse received less important commissions. Records prove that Mabuse painted a portrait of Leonora of Portugal, and other small pieces, for Charles V. in 1516. But his only signed pictures of this period are the Neptune and Amphitrite of 15 16 at Berlin, and the Madonna, with a portrait of Jean Carondelet of 1517, at the Louvre, in both of which we clearly discern that Vasari only spoke by hearsay of the progress made by Mabuse in ” the true method of producing pictures full of nude figures and poesies.” It is difficult to find anything more coarse or misshapen than the Amphitrite, unless we except the grotesque and un- gainly drayman who figures for Neptune. In later forms of the same subject — the Adam and Eve at Hampton Court, or its feebler replica at Berlin — we observe more nudity, combined with realism of the commonest type. Happily, Mabuse was capable of higher efforts. His St Luke painting the portrait of the Virgin in Sanct Veit at Prague, a variety of the same subject in the Belvedere at Vienna, the Madonna of the Baring collection in London, or the numerous repetitions of Christ and the scoffers (Ghent and Antwerp), all prove that travel had left many of Mabuse’s fundamental peculiarities unaltered. His figures still retain the character of stone; his architecture is as rich and varied, his tones are as strong as ever. But bright contrasts of gaudy tints are replaced by soberer greys; and a cold haze, the sfumato of the Milanese, pervades the surfaces. It is but seldom that these features fail to obtrude. When they least show, the master displays a brilliant palette combined with smooth surface and incisive outlines. In this form the Madonnas of Munich and Vienna (1527), the likeness of a girl weighing gold pieces (Berlin), and the portraits of the children of the king of Denmark at Hampton Court, are fair specimens of his skill. As early as 1523, when Christian II. of Denmark came to Belgium, he asked Mabuse to paint the likenesses of his dwarfs. IniS28herequested the artist to furnish to Jean de Hare the design for his queen Isabella’s tomb in the abbey of St Pierre near Ghent. It was no doubt at this time that Mabuse completed the portraits of John, Dorothy and Christine, children of Christian II., which came into the collection of Henry VIII. No doubt, also, these portraits are identical with those of three children at Hampton Court, which were long known and often copied as likenesses of Prince Arthur, Prince Henry and Princess Margaret of England. One of the copies at Wilton, inscribed with the forged name of ” Hans Holbein, ye father,” and the false date of 1495, has often

been cited as a proof that Mabuse came to England in the reign of Henry VII.; but the statement rests on no foundation whatever. At the period when these portraits were executed Mabuse lived at Middelburg. But he dwelt at intervals elsewhere. When Philip of Burgundy became bishop of Utrecht, and settled at Duerstede, near Wyck, in 1517, he was accompanied by Mabuse, who helped to decorate the new palace of his master. At Philip's death, in 1524, Mabuse designed and erected his tomb in the church of Wyck. He finally retired to Middelburg, where he took service with Philip's brother, Adolph, lord of Veeren. Van Mander's biography accuses Mabuse of habitual drunkenness ; yet it describes the splendid appearance of the artist as, dressed in gold brocade, he accompanied Lucas of Leyden on a pleasure trip to Ghent, Malines and Antwerp in 1527. The works of Mabuse are those of a hardworking and patient artist; the num- ber of his still extant pictures practically demonstrates that he was not a debauchee. The marriage of his daughter with the painter Henry Van der Heyden of Louvain proves that he had a home, and did not live habitually in taverns, as Van Mander suggests. His death at Antwerp, on the 1st of October 1532, is recorded in the portrait engraved by Jerome Cock. (J. A. C.)

MACABEBE, a town of the province of Pampanga, island of Luzon, Philippine Islands, on the Pampanga Grande river > about 10 m. above its mouth and about 25 m. N.W. of Manila. Pop. (1903), after the annexation of San Miguel, 21,481. The language is Pampango. Many of the male inhabitants serve in the U.S. Army as scouts. Macabebe's principal industries are the cultivation of rice and sugar cane, the distilling of nipa alcohol, and the weaving of hemp and cotton fabrics.

MACABRE, a term applied to a certain type of artistic or literary composition, characterized by a grim and ghastly humour, with an insistence on the details and trappings of death. Such a quality, deliberately adopted, is hardly to be found in ancient Greek and Latin writers, though there are traces of it in Apuleius and the author of the Satyricon. The outstanding instances in English literature are John Webster and Cyril Tourneur, with E. A. Poe and R. L. Stevenson. The word has gained its sig- nificance from its use in French, la danse macabre, for that alle- gorical representation, in painting, sculpture and tapestry, of the ever-present and universal power of death, known in English as the " Dance of Death," and in German as Totentanz. The

typical form which the allegory takes is that of a series of pictures, sculptured or painted, in which Death appears, either as a dancing skeleton or as a shrunken corpse wrapped in grave- clothes to persons representing every age and condition of life, and leads them all in a dance to the grave. Of the numerous examples painted or sculptured on the walls of cloisters or church- yards through medieval Europe few remain except in woodcuts and engravings. Thus the famous series at Basel, originally at the Klingenthal, a nunnery in Little Basel, dated from the beginning of the 14th century. In the middle of the 15th cen- tury this was moved to the churchyard of the Predigerkloster at Basel, and was restored, probably by Hans Kluber, in 1568; the fall of the wall in 1805 reduced it to fragments, and only drawings of it remain. A Dance of Death in its simplest form still survives in the Marienkirche at Liibeck in a 15th-century painting on the walls of a chapel. Here there are twenty-four figures in couples, between each is a dancing Death linking the groups by outstretched hands, the whole ring being led by a Death playing on a pipe. At Dresden there is a sculptured life- size series in the old Neustadter Kirchhoff, removed here from the palace of Duke George in 1701 after a fire. At Rouen in the aitre (atrium) or cloister of St Maclou there also remains a sculptured danse macabre. There was a celebrated fresco of the subject in the cloister of Old St Paul's in London, and another in the now destroyed Hungerford Chapel at Salisbury, of which a single woodcut, " Death and the Gallant," alone remains. Of the many engraved reproductions, the most celebrated is the series drawn by Holbein. Here the long ring of connected dancing couples is necessarily abandoned, and the Dance of Death becomes rather a series of imagines mortis.

Concerning the origin of this allegory in painting and sculpture there has been much dispute. It certainly seems to be as early as the 14th century, and has often been attributed to the over- powering consciousness of the presence of death due to the Black Death and the miseries of the Hundred Years' War. It has also been attributed to a form of the Morality, a dramatic dialogue between Death and his victims in every station of life, ending in a dance off the stage (see Du Cange, Gloss., s.v. " Machabaeorum chora"). The origin of the peculiar form the allegory has taken has also been found, somewhat needlessly and remotely, in the dancing skeletons on late Roman sarcophagi and mural paintings at Cumae or Pompeii, and a false connexion has been traced with the " Triumph of Death," attributed to Orcagna, in the Campo Santo at Pisa.

The etymology of the word macabre is itself most obscure. According to Gaston Paris {Romania, xxiv., 131; 1895) it first occurs in trfe form

macabri in Jean le Fevre's Respit de la mort (1376), " Je lis de Macabre la danse," and he takes this accented form to be the true one, and traces it in the name of the first painter of the subject. The more usual explanation is based on the Latin name, Machabaeorum chora. The seven tortured brothers, with their mother and Eleazar (2 Mace, vi., vii.)were

prominent figures on this hypothesis in the supposed dramatic dialogues. Other connexions have been suggested, as for example with St Macarius, or Macaire, the hermit, who, according to Vasari, is to be identified with the figure pointing to the decaying corpses in the Pisan "Triumph of Death," or with an Arabic word magbarah, " cemetery."

See Peignot, Recherches sur les danses des morts (1826); Douce, Dissertation on the Dance of Death (1833) ; Massmann, Litteratur der Totentanze (1840); J. Charlier de Gerson, La Danse macabre des Stes Innocents de Paris (1874); , Seelmann, Die Totentanze des Mittelalters (1893).

McADAM, JOHN LOUDON (1756-1836), Scottish inventor, who gave his name to the system of road-making known as "macadamizing," was born at Ayr, Scotland, on the 21st of September 1756, being descended on his father's side from the clan of the McGregors. While at school he constructed a model road-section. In 1770 he went to New York, entering the counting-house of a merchant uncle. He returned to Scotland with a Considerable fortune in 1783, and purchased an estate at Sauhrie, Ayrshire. Among other public offices he held that of road trustee. The highways of Great Britain were at this time in a very bad condition, and McAdam at once began to consider how to effect reforms. At his own expense he began at Sauhrie, despite much opposition, a series of experiments in road-making. In 1798 he removed to Falmouth, where he had received a government appointment, and continued his experiments there. His general conclusion was that roads should be constructed of broken stone (see Roads). In 181 5, having been appointed surveyor-general of the Bristol roads, he was able to put his theories into practice. In 1819 he published a Practical Essay on the Scientific Repair and Preservation of Roads, followed, in 1820, by the Present State of Road-making. As the result of a parliamentary inquiry in 1823 into the whole question of road- making, his views were adopted by the public authorities, and in 1827 he was appointed general surveyor of roads. In pur- suing his investigations he had travelled over thirty thousand miles of road and expended over £5000. Parliament recouped him for his expenses and gave him a handsome gratuity, but he declined a proffered knighthood. He died at Moffat, Dumfries- shire, on the 26th

of November 1836.

MACAIRE, a French chanson de geste. Macaire (12th century) and La reine Sibille (14th century) are two versions of the story of the false accusation brought against the queen of Charlemagne, called Blanchefleur in Macaire and Sibille in the later poem. Macaire is only preserved in the Franco- Venetian geste of Charle- magne (Bibl. St Mark MS. fr. xiii.). La Reine Sibille only exists in fragments, but the tale is given in the chronicle of Alberic Trium Fontium and in a prose version. Macaire is the product of the fusion of two legends: that of the unjustly repudiated wife and that of the dog who detects the murderer of his master. For the former motive see Genevieve of Brabant. The second is found in Plutarch, Script, moral., ed. Didot ii. (1186), where a dog, like Aubri's hound, stayed three days without food by the body of its master, and subsequently attacked the murderers, thus leading to their discovery. The duel between Macaire and the dog is paralleled by an interpolation by Giraldus CambrensisinaMS.ofthe.H'examerowof Saint Ambrose. Aubri's hound received the name of the " dog of Montargis," because a representation of the story was painted on a chimney-piece in the chateau of Montargis in the 15th century. The tale was early divorced from Carolingian tradition, and Jean de la Taille, in his Discours notable des duels (Paris, 1607), places the incident under Charles V.

See Macaire (Paris, 1866), ed. Guessard in the series of Anc. poetesdela France; P. Paris in Hist. litt. de la France, vol. xxiii. (1873) ; L. Gautier, £pop6es francaises, vol. iii. (2nd ed., 1880) ; G. Paris, Hist, poet, de Charlemagne (1865); M. J. G. Isola, Storie nerbonesi, vol. i. (Bologna, 1877); F. Wolf, tjber die beiden . . . Volksbiicher von der K. Sibille u. Huon de Bordeaux (Vienna, 1857) and Uber die neuesten Leistungen der Franzosen (Vienna, 1833). The Dog of Montargis; or, The Forest of Bondy, imitated from the play of G. de Pixerecourt, was played at Covent Garden (Sept. 30, 1814).

" Robert Macaire " was the name given to the modern villain in the Auberge des Adrets (1823), a melodrama in which Frederick

Lemaitre made his reputation. The type was sensibly modified in Robert Macaire (1834), a sequel written by Lemaitre in collaboration with Benjamin Antier, and well-known on the English stage as Macaire. R. L. Stevenson and W. E. Henley used the same type in their

play Macaire.

MCALESTER, a city and the county-seat of Pittsburg county, Oklahoma, about no m. E.S.E. of Guthrie. Pop. (1900), 3479; (1907) 8144 (1681 negroes and 105 Indians); (1910) 12,954. McAlester is served by the Chicago, Rock Island & Pacific and the Missouri, Kansas & Texas railways and is an important railway junction; it is connected with the neighbouring mining district by an electric line. There are undeveloped iron deposits and rich coal-mines in the surrounding country, and coke-making is the principal manufacturing industry of the city. There is a fine Scottish Rite Masons' consistory and temple in McAlester. The city owns its waterworks. The vicinity was first settled in 1885. The city of South McAlester was incorporated in 1899, and in 1906 it annexed the town of McAlester and adopted its name.

MACALPINE (or Maccabeus), JOHN (d. 1557), Protestant theologian, was born in Scotland about the beginning of the 1 6th century, and graduated at some Scottish university. From 1532 to 1534 he was prior of the Dominican convent of Perth; but having in the latter year been summoned with Alexander Ales [q.v.) and others to answer for heresy before the bishop of Ross, he fled to England, where he was granted letters of denization on the 7th of April 1537, and married Agnes Macheson, a fellow-exile for religion; her sister Elizabeth became the wife of Miles Coverdale. The reaction of 1539 made England a doubtful refuge, and on the 25th of November 1540 Macalpine matriculated at the university of Wittenberg. He had already graduated B.A. at Cologne, and in 1542 proceeded to his doctorate at Wittenberg. In that year, being now known as Maccabeus, he accepted Christian III.'s offer of the chair of theology at the university of Copenhagen, which had been endowed out of the spoils of the Church. Melanchthon spoke well of Macalpine, and with Peter Plade (Palladius), who had also studied at Wittenberg, Macalpine took a prominent part in building up the Lutheran Church of Denmark. A joint exposure by Plade and Macalpine of Osiander's errors was published in 1552 and reprinted at Leipzig and Copenhagen in 1768; and Macalpine was one of the four translators of Luther's German Bible into Danish. He also encouraged Sir David Lindsay, who visited him in 1548, to publish his Monarchic, and persuaded Christian III. to inter- cede with Queen Mary Tudor on behalf of Coverdale and invite him to Denmark. Macalpine died at Copenhagen on the 6th of December 1557.

See Diet. Nat. Biog. and authorities there cited; Corpus reforma- ' torum, iii. (1066), iv. 771, 793; Foerstemann, Album academiae vitebergensis (1841), p. 186, and Liber decanorum (1838), p. 32;

Rockwell, Die Doppelehe des Landgrafen Philipp (1904), pp. 114- 116; Letters and Papers of Henry VIII. (1537), 1. 1103 (12); (1542), pp. 46,218. (A. F. P.)

MACAO (A-Ma-ngao, “Harbour of the goddess A-Ma”; Port. Macau), a Portuguese settlement on the coast of China, in 22 N., 132° E. Pop. (1896), Chinese, 74,568; Portuguese, 3898; other nationalities, 161-ˆ- total, 78,627. It consists of a tongue of land 25 m. in length and less than 1 m. in breadth, running S.S.W. from the island of Hiang Shang (Port. Ancam) on the western side of the estuary of the Canton River. Bold and rocky hills about 300 ft. high occupy hoth extremities of the peninsula, the picturesque city, with its flat-roofed houses painted blue, green and red, lying in the undulating ground between. The forts are effective additions to the general view, but do not add much to the strength of the place. Along the east side of the peninsula runs the Praya Grande, or Great Quay, the chief promenade in Macao, on which stand the governor’s palace, the administrative offices, the consulates and the leading commercial establishments. The church of St Paul (1594-1602), the seat of the Jesuit college in the 1 7th century, was destroyed by fire in 1835. The Hospital da Misericordia (1 569) was rebuilt in 1640. The Camoens grotto, where the exiled poet found leisure to celebrate the achievements of his ungrateful country,

lies in a secluded spot to the north of the town, which has been partly left in its native wildness strewn with huge granite boulders and partly tfansformed into a fine botanical garden. During the south-west (summer) monsoon great quantities (67 in.) of rain fall, especially in July and August. The mean temperature is 74-3° F.; in July, the hottest month, the temperature is 84-2°; in February, the coldest, it is 59°. On the whole the climate is moist. Hurricanes are frequent. Of the Portuguese inhabitants more than three-fourths are natives of Macao — a race very inferior in point of physique to their European ancestors. Macao is connected with Hong-Kong by a daily steamer. Being open to the south-west sea breezes, it is a favourite place of resort from the oppressive heat of Hong- Kong. It is ruled by a governor, and, along with Timor (East Indies), constitutes a bishopric, to which belong also the Portuguese Christians in Malacca and Singapore. Though most of the land is under garden cultivation, the mass of the people is dependent more or less directly on mercantile pursuits; for, while the exclusive policy both of Chinese and Portuguese which prevented Macao becoming a free port till 1845-1846 allowed what was once the great emporium of European commerce in eastern Asia to be outstripped by its younger and more liberal rivals, the local, though not the foreign, trade of the place is

still of very considerable extent. Since the middle of the 19th century, indeed, much of it has run in the most questionable channels; the nefarious coolie traffic gradually increased in extent and in cruelty from about 1848 till it Was prohibited in 1874, and much of the actual trade is more or less of the nature of smuggling. The commodities otherwise mostly dealt in are opium, tea, rice, oil, raw cotton, fish and silk. The total value of exports and imports was in 1876-1877 upwards of £1,536,000. In 1880 it had increased to £2,259,250, and in 1898 to £3,771,615. Commercial intercourse is most intimate with Hong-Kong, Canton, Batavia and Goa. The preparation and packing of tea is the principal industry in the town. In fishing a large number of boats and men are employed.

In 1557 the Portuguese were permitted to erect factories on the peninsula, and in 1573 the Chinese built across the isthmus the wall which still cuts off the barbarian from the rest of the island. Jesuit missionaries established themselves on the spot; and in 1580 Gregory XIII. constituted a bishopric of Macao. A senate was organized in 1583, and in 1628 Jeronimo de Silveira became first royal governor of Macao. Still the Portuguese remained largely under the control of the Chinese, who had never surrendered their territorial rights and maintained their authority by means of mandarins— these insisting that even European criminals should be placed in their hands. Ferreira do Amaral, the Portuguese governor, put an end to this state of things in 1849, and left the Chinese officials no more authority in the peninsula than the representatives of other foreign nations; and, though his antagonists procured his assassination (Aug. 22), his successors succeeded in carrying out his policy.

Although Macao is de facto a colonial possession of Portugal, the Chinese government persistently refused to recognize the claim of the Portuguese to territorial rights, alleging that they were merely lessees or tenants at will, and until 1849 the Portu- guese paid to the Chinese an annual rent of £71 per annum. This diplomatic difficulty prevented the conclusion of a commer- cial treaty between China and Portugal for a long time, but an arrangement for a treaty was come to in 1887 on the following basis: (1) China confirmed perpetual occupation and govern- ment of Macao and its dependencies by Portugal; (2) Portugal engaged never to alienate Macao and its dependencies without the consent of China; (3) Portugal engaged to co-operate in opium revenue work at Macao in the same way as Great Britain at Hong-Kong. The formal treaty Was signed in the same year, and arrangements were made whereby the Chinese imperial customs were able to collect duties on vessels trading with Macao in the same way as they had already arranged for their collection at the British colony

of Hong-Kong. For a short time in 1802, and again in 1808, Macao was occupied by the English as a precaution against seizure by the French.

MACAQUE, a name of French origin denoting the monkeys of the mainly Asiatic genus Macacus, of which one species, the Barbary ape, inhabits North Africa and the rock of Gibraltar. Displaying great variability in the length of the tail, which is reduced to a mere tubercle in the Barbary ape, alone representing the subgenus Inuus, macaques are heavily-built monkeys, with longer muzzles than their compatriots the langurs (see Primates) , and large naked callosities on the buttocks. They range all over India and Ceylon, thence northward to Tibet, and east- wards to China, Japan, Formosa, Borneo, Sumatra and Java; while by some naturalists the black ape of Celebes (Cynopithecus niger) is included in the same genus. Mention of some of the more important species, typifying distinct sub-generic groups, made in the article Primates. Like most other monkeys, macaques go about in large troops, each headed by an old male. They feed on seeds, fruits, insects, lizards, &c; and while some of the species are largely terrestrial, the Barbary ape is wholly so. Docile and easily tamed when young, old males of many of the species become exceedingly morose and savage in captivity. (R. L.*)

MACARONI (from dialectic Ital. maccare, to bruise or crush), a preparation of a glutinous wheat originally peculiar to Italy, where it is an article of food of national importance. The same substance in different forms is also known as vermicelli, pasta or Italian pastes, spaghetti, taglioni, fanti, &c. These substances are prepared from the hard, semi-translucent varieties of wheat which are largely cultivated in the south of Europe, Algeria and other warm regions, and distinguished by the Italians as grano duro or grano da semolino. These wheats are much richer in gluten and other nitrogenous compounds than the soft or tender wheats of more northern regions, and their preparations are more easily preserved. The various preparations are met with as fine thin threads (vermicelli), thin sticks and pipes (spaghetti, macaroni), small lozenges, stars, disks, ellipses, &c. (pastes). These various forms are prepared in a uniform manner from a granular product of hard wheat, which, under the name of semolina or middlings, is a commercial article. The semolina is thoroughly mixed with boiling water and incorporated in a kneading machine, such as is used in bakeries, into a stiff paste or dough. It is

then further kneaded by passing frequently between rollers or under edge runners, till a homogeneous mass has been produced which is placed in a strong steam-jacketed cylinder, the lower end of which is closed with a thick disk pierced with openings corresponding with the diameter or section of the article to be made. Into this cylinder an accurately fitting plunger or piston is introduced and subjected to very great pressure, which causes the stiff dough to squeeze out through the openings in the disk in continuous threads, sticks or pipes, as the case may be. Vermicelli is cut off in short bundles and laid on trays to dry, while macaroni is dried by hanging it in longer lengths over wooden rods in stoves or heated apartments through which currents of air are driven. It is only genuine macaroni, rich in gluten, which can be dried in this manner; spurious fabrications will not bear their own weight, and must, therefore, be laid out flat to be dried. In making pastes the cylinder is closed with a disk pierced with holes having the sec- tional form of the pastes, and a set of knives revolving close against the external surface of the disk cut off the paste in thin sections as it exudes from each opening. True macaroni can be dis- tinguished by observing the flattened mark of the rod over which it has been dried within the bend of the tubes; it has a soft yellowish colour, is rough in texture, elastic and hard, and breaks with a smooth glassy fracture. In boiling it swells up to double its original size without becoming pasty or adhesive. It can be kept any length of time without alteration or deteriora- tion; and it is on that account, in many circumstances, a most convenient as well as a highly nutritious and healthful article of food.

MACARONICS, a species of burlesque poetry, in which words from a modern vernacular, with Latin endings, are introduced into Latin verse, so as to produce a ridiculous effect. Sometimes Greek is used instead of Latin. Tisi degli Odassi issued a Carmen

macaronicum de Patavinis in 1400. The real founder of the practice, however, was Teofilo Folengo (1491-1544), whose mock- heroic Liber Macaronices appeared in 1517. Folengo (q.v.) was a Benedictine monk, who escaped from his monastery and wan- dered through Italy, living a dissolute life, and supporting himself by his absurd verses, which he described as an attempt to produce in literature something like macaroni, a gross, rude and rustic mixture of flour, cheese and butter. He wrote under the pseudonym of Merlinus Coccaius, and his poem is an elaborate burlesque epic, in twenty-five books, or macaronea; it is an extraordinary medley of chivalrous feats, ridiculous and squalid adventures, and satirical allegory. Its effect upon the mind of Rabelais was so extraordinary that no examination of Pantagmel can be complete without a reference to it (cf. Gargantua,

i. 10). It was immediately imitated in Italy by a number of minor poets; and in France a writer whose real name was Antoine de la Sable, but who called himself Antonius de Arena (d. 1544), published at Avignon in 1573 a Meygra enlrepriza, which was a burlesque account of Charles V.'s disastrous campaign in Provence. Folengo in Italy and Arena in France are considered as the macaronic classics. In the 17th century, Joannes Caecilius Frey (1 580-1631) published a Recitus veritabilis, on a skirmish between the vine-growers of Rueil and the bowmen of Paris. Great popularity was achieved later still by an anonymous macaronic, entitled Funestissimus trepassus Micheli Morini, who died by falling off the branch of an elm-tree: —

De branche in brancham degringolat, et faciens pouf Ex ormo cadit, et duties obvertit Olympo.

Moliere employed macaronic verse in the ceremonial scene with the doctors in Le Malade imaginaire. Works in macaronic prose are rarer. An Anti-Clopinus by Antony Hotman may be mentioned and the amusing Epistolae obscurorum virorum (151 5). Macaronic prose was not unknown as an artifice of serious oratory, and abounds (e.g.) in the sermons of Michel Menot (1440-1518), who says of the prodigal son, Emit sibi pulcheras caligas d'icarlate, Men tirees.

The use of true macaronics has never been frequent in Great Britain, where the only prominent example of it is the Polemo- Middinia ascribed to William Drummond of Hawthornden. This short epic was probably composed early in the 17th cen- tury, but was not published until 1684. The Polemo-Middinia follows the example set by Arena, and describes with burlesque solemnity a quarrel between two villages on the Firth of Forth. Drummond shows great ingenuity in the tacking on of Latin terminations to his Lowland Scots vernacular: —

Lifeguardamque sibi saevas vocat improba lassas, Maggaeam, magis doctam milkare cowaeas, Et doctam sweepare flooras, et sternere beddas, Quaeque novit spinnare, et longas ducere threedas.

There is a certain macaronic character about many poems of Skelton and Dunbar, as well as the famous Barnabae itinerarium (1638) of Richard Brathwait (1588-1673), but these cannot be considered legitimate specimens of the type as laid down by Folengo.

See Ch. Nodier, Du Langage factice appele macaronique (1834); Genthe, Histoire de la poksie macaronique (1831). (E. G.)

MACARSCA (Serbo-Croatian, Makarska), the chief town of an

administrative district in Dalmatia, Austria; situated oppo- site to the island of Brazza, about 32 m. S.E. of Spalato. Pop. (1900), of town 1805; of commune, 11,016, chiefly Serbo-Croa- tian. Macarsca is a port of call for the Austrian Lloyd steamers, and has a brisk trade in wine, grain and fruit. Under the name of Mocrum, Macarsca was a thriving Roman city, and a bishopric until 639, when it was destroyed by “the Avars. In the 10th century it is mentioned by Constantine Porphyrogehitus as a city of the pagan Narentines. Its bishopric was revived in 1320, but the bishops resided at Almissa. In 148 1 the city was purchased from the duke of Herzegovina by Venice; in 1499 it was conquered by the Turks; and in 1646, after a successful revolt, it again welcomed the sovereignty of Venice. The see of Macarsca was merged in that of Spalato in 1830.

MACARTNEY, GEORGE MACARTNEY, Earl (173 7-1806), was descended from an old Scottish family, the Macartneys of Auchinleck, who had settled in 1649 at Lissanoure, Antrim, Ireland, where he was born on the 14th of May 1737. After graduating at Trinity College, Dublin, in 1759, he became a student of the Temple, London. Through Stephen Fox, elder brother of C. J. Fox, he was taken up by Lord Holland. Appointed envoy extraordinary to Russia in 1764, he succeeded in negotiating an alliance between England and that country. After occupying a seat in the English parliament, he was in 1769 returned for Antrim in the Irish parliament, in order to discharge the duties of chief secretary for Ireland. On resigning this office he was knighted. In 1775 he became governor of the Caribbee Islands (being created an Irish baron in 1776), and in 1780 governor of Madras, but he declined the governor- generalship of India, and returned to England in 1786. After being created Earl Macartney in the Irish peerage (1792), he was appointed the first envoy of Britain to China. On his return from a confidential mission to Italy (1795) he was raised to the English peerage as a baron in 1796, and in the end of the same year was appointed governor of the newly acquired terri- tory of the Cape of Good Hope, where he remained till ill health compelled him to resign in November 1 798. He died at Chiswick, Middlesex, on the 31st of May 1806, the title becoming extinct, and his property, after the death of his widow (daughter of the 3rd earl of Bute), going to his niece, whose son took the name.

An account of Macartney’s embassy to China, by Sir George Staunton, was published in 1797, and has been frequently reprinted. The Life

and Writings of Lord Macartney, by Sir John Barrow, appeared in 1807. See Mrs Helen Macartney Robbins's biography, The First English Ambassador to China (1908), based on previously unpublished materials in possession of the family.

MACASSAR (Makassar, Mangkasar), the capital of a district of the same name in the island of Celebes, Dutch East Indies, and the chief town of the Dutch government of Celebes. Pop. 17,925 (940 Europeans, 2618 Chinese, 168 Arabs), It stands on the west coast of the southern peninsula of the island, near the southern extremity of the Macassar Strait, which separates Celebes from Borneo. Macassar consists of the Dutch town and port, known as Vlaardingen, and the Malay town which lies inland. Macassar's trade amounts to about £i,25o,oooannually, and consists mainly of coffee, trepang, copra, gums, spices and valuable timber.

For the Macassar people and for the Strait, see Celebes. " Macas- sar oil " is a trade name, not geographical : see Antimacassar.

MACAULAY, THOMAS BABINGTON MACAULAY, Baron (1800-1859), English historian, essayist and politician, was born at Rothley Temple, Leicestershire, on the 25th of October 1800. His father, Zachary Macaulay (1 768-1838), had been governor of Sierra Leone, and was in 1800 secretary to the chartered com- pany which had founded that colony; an ardent philanthropist, he did much to secure the abolition of the slave trade, and he edited the abolitionist organ, the Christian Observer, for many years. Happy in his home, the son at a very early age gave proof of a determined bent towards literature. Before he was eight years of age he had written a Compendium of Universal History, which gave a tolerably connected view of the leading events from the creation to 1800, and a romance in the style of Scott, in three cantos, called The Battle of Cheviot. A little later he composed a long poem on the history of Olaus Magnus, and a vast pile of blank verse entitled Fingal, a Poem in Twelve Books. After being at a private school, in October 1818 young Macaulay went to Trinity College, Cambridge, where he after- wards became a fellow. He gained in 1824 a college prize for an essay on the character of William III. He also won a prize for Latin declamation and a Craven scholarship, and wrote the prize poems of 1819 and 1821.

In 1826 Macaulay was called to the bar and joined the northern circuit. But he soon gave up even the pretence of reading law, and spent many more hours under the gallery of the house of commons than in the court. His first attempt at a public speech, made at an anti-slavery meeting in 1824, was described by the Edinburgh Review as "

a display of eloquence of rare

and matured excellence." His first considerable appearance in print was in No. 1 of Knight's Quarterly Magazine, a periodical which enjoyed a short but brilliant existence, and which was largely supported by Eton and Cambridge. In August 1825 began Macaulay's connexion with the periodical which was to prove the field of his literary reputation. The Edinburgh Review was at this time at the height of its power, not only as an organ of the growing opinion which, leant towards reform, but as a literary tribunal from which there was no appeal. His essay on Milton (Aug. 1825), so crude that the author afterwards said that " it contained scarcely a paragraph such as his matured judgment approved," created for him at once a literary reputation which suffered no diminution to the last, a reputation which he established and confirmed, but which it would have been hardly possible to make more conspicuous. The publisher John Murray declared that it would be worth the copyright of Childe Harold to have Macaulay on the staff of the Quarterly Review; and Robert Hall, the orator, writhing with pain, and wellnigh worn out with disease, was discovered lying on the floor employed in learning by aid of grammar and dictionary enough Italian to enable him to verify the parallel between Milton and Dante.

This sudden blaze of popularity, kindled by a single essay, is partly to be explained by the dearth of literary criticism in England at that epoch. For, though a higher note had already been sounded by Hazlitt and Coleridge, it had not yet taken hold of the public mind, which was still satisfied with the feeble appreciations of the Retrospective Review, or the dashing and damnatory improvisation of Wilson in Blackwood or Jeffrey in the Edinburgh. Still, allowance being made for the barbarous partisanship of the established critical tribunals of the period, it seems surprising that a social success so signal should have been the consequence of a single article. The explanation is that the writer of the article on Milton was, unlike most authors, also a brilliant conversationalist. There has never been a period when an amusing talker has not been in great demand at London tables; but when Macaulay- made his debut witty conversation was studied and cultivated as it has ceased to be in the more busy age which has succeeded. At the university Macaulay had been recognized as pre-eminent for inexhaustible talk and genial companionship among a circle of such brilliant young men as Charles Austin, Romilly, Praed and Villiers. He now dis- played these gifts on a wider theatre. Launched on the best that London had to give in the way of society,

Macaulay accepted and enjoyed with all the zest of youth and a vigorous nature the opportunities opened for him. He was courted and admired by the most distinguished personages of the day. He was admitted at Holland House, where Lady Holland listened to him with deference, and scolded him with a circumspection which was in itself a compliment. Samuel Rogers spoke of him with friend- liness and to him with affection. He was treated with almost fatherly kindness by " Conversation " Sharp.

Thus distinguished, and justifiably conscious of his great powers, Macaulay began to aspire to a political career. But the shadow of pecuniary trouble early began to fall upon his path. When he went to college his father believed himself to be worth £100,000. But commercial disaster overtook the house of Babington & Macaulay, and the son now saw himself com- pelled to work for his livelihood. His Trinity fellowship of £300 a year became of great consequence to him, but it expired in 1 831; he could make at most £200 a year by writing; and a commissionership of bankruptcy, which was given him by Lord Lyndhurst in 1828, and which brought him in about £400 a year, was swept away, without compensation, by the ministry which came into power in 1830. Macaulay was reduced to such straits that he had to sell his Cambridge gold medal.

In February 1830 the doors of the House of Commons were opened to him through what was then called a " pocket borough." Lord Lansdowne, who had been struck by two articles on James Mill and the Utilitarians, which appeared in the Edinburgh Review in 1829, offered the author the seat at Calne. The offer was accompanied by the express assurance that the patron

had no wish to interfere with Macaulay's freedom of voting. He thus entered parliament at one of the most exciting moments of English domestic history, when the compact phalanx of reac- tionary administration which for nearly fifty years had com- manded a crushing majority in the Commons was on the point of being broken by the growing strength of the party of reform. Macaulay made his maiden speech on the 5th of April 1830, on the second reading of the Bill for the Removal of Jewish Disabili- ties. In July the king died and parliament was dissolved; the revolution took place in Paris,

Macaulay, who was again returned for Calne, visited Paris, eagerly enjoying a first taste of foreign travel. On the 1st of March 1831 the Reform Bill was introduced, and on the second night of the debate Macaulay made the first of his reform speeches. Itwas,likeallhisspeeches, a success. Sir Robert Peel said of it that ” portions were as beautiful as anything I have ever heard or read.”

Encouraged by this first success, Macaulay now threw himself with ardour into the life of the House of Commons, while at the same time he continued to enjoy to the full the social opportuni- ties which his literary and political celebrity had placed within his reach. He dined out almost nightly, and spent many of his Sundays at the suburban villas of the Whig leaders, while he continued to supply the Edinburgh Review with articles. On the triumph of Earl Grey’s cabinet, and the passing of the Reform Act in June 1832, Macaulay, whose eloquence had signalized every stage of the conflict, became one of the commissioners of ‘, the board of control, and applied himself to the study of Indian affairs. Giving his days to India and his nights to the House of Commons, he could only devote a few hours to literary composi- tion by rising at five when the business of the house had allowed of his getting to bed in time on the previous evening. Between September 1831 and December 1833 he furnished the Review with eight important articles, besides writing his ballad on the Armada.

In the first Reform Parliament, January 1833, Macaulay took his seat as one of the two members for Leeds, which up to that date had been unrepresented in the House of Commons. He replied to O’Connell in the debate on the address, meeting the great agitator face to face, with high, but not intemperate, defiance. In July he defended the Government of India Bill in a speech of great power, and he was instrumental in getting the bill through committee without unnecessary friction. When the abolition of slavery came before the house as a practical question, Macaulay had the prospect of having to surrender office or to vote for a modified abolition, viz. twelve years’ apprenticeship, which was proposed by the ministry, but con- demned by the abolitionists. He was prepared to make the sacrifice of place rather than be unfaithful to the cause to which his father had devoted his life. He placed his resignation in Lord Althorp’s hands, and spoke against the ministerial proposal. But the sense of the house was so strongly expressed as unfavour- able that, finding they would be beaten if they persisted, the ministry gave way, and reduced apprenticeship to seven years, a compromise which the abolition party accepted- and, Macaulay remained at the board of control.

While he was thus growing in reputation, and advancing his public

credit, the fortunes of the family were sinking, and it became evident that his sisters would have no provision except such as their brother might be enabled to make for them. Macaulay had but two sources of income, both of them precari- ous — office and his pen. As to office, the Whigs could not have expected at that time to retain power for a whole generation; and, even while they did so, Macaulay's resolution that he would always give an independent vote made it possible that he might at any moment find himself in disagreement with his colleagues, and have to quit his place. As to literature, he wrote to Lord Lansdowne (1833), "it has been hitherto merely my relaxation; I have never considered it as the means of support. I have chosen my own topics, taken my own time, and dictated my own terms. The thought of becoming a bookseller's hack, of spurring a jaded fancy to reluctant exertion, of filling sheets with trash merely that sheets may be filled, of bearing from publishers

and editors what Dryden bore from Tonson and what Mackintosh bore from Lardner, is horrible to me." Macaulay was thus prepared to accept the offer of a seat in the supreme council of India, created by the new India Act. The salary of the office was fixed at £10,000, out of which he calculated to be able to save £30,000 in five years. His sister Hannah accepted his proposal to accompany him, and in February 1834 the brother and sister sailed for Calcutta.

Macaulay's appointment to India occurred at the critical moment when the government, of the company was being superseded by government by the Crown. His knowledge of India was, when he landed, but superficial. But at this juncture there was more need of statesmanship directed by general liberal principles than of a practical knowledge of the details of Indian administration. Macaulay's presence in the council was of great value; his minutes are models of good judgment and practical sagacity. The part he took in India has been described as " the application of sound liberal principles to a government which had till then been jealous, close and repres- sive." He vindicated the liberty of the press; he maintained the equality of Europeans and natives before the law; and as presi- dent of the committee of public instruction he inaugurated the system of national education.

A clause in the India Act 1833 occasioned the appointment of a commission to inquire into the jurisprudence of the Eastern dependency. Macaulay was appointed president of that com- mission. The draft of a penal code which he submitted became, after a revision of many years, and by the labour of many experienced lawyers, the Indian criminal code. Of this code Sir James Stephen said that " it reproduces in a concise and even beautiful form the spirit of the law of England, in a compass which by comparison with the original may be regarded as almost absurdly small. The Indian penal code is to the.English criminal law what a manufactured article ready for use is to the materials out of which it is made. It is to the French code penal, and to the German code of 1871, what a finished picture is to a sketch. It is simpler and better expressed than Livingston's code for Louisiana; and jts practical success has been complete,"

Macaulay's enlightened views and measures drew down on him, however, the abuse and ill-will of Anglo-Indian society. Fortunately for himself he was enabled to maintain a tranquil indifference to political detraction by withdrawing his thoughts into a sphere remote from the opposition and enmity by which he was surrounded. Even amid the excitement of his early parliamentary successes literature had balanced politics in his thoughts and interests. Now in his exile he began to feel more strongly each year the attraction of European letters and Euro- pean history. He wrote to his friend Ellis: " I have gone hack to Greek literature with a passion astonishing to myself. I have never felt anything like it. I was enraptured with Italian during the six months which I gave up to it; and I was little less pleased with Spanish. But when I went back to the Greek I felt as if I had never known before what intellectual enjoyment was." In thirteen months he

read through, some of them twice, a large part of the Greek and Latin classics. The fascination of these studies produced their inevitable effect upon his view of political life. He began to wonder what strange infatuation leads men who can do something better to squander their intel- lect, their health and energy, on such subjects as those which most statesmen are engaged in pursuing. He was already, he says, “more than hajf determined to abandon politics and give myself wholly to letters, to undertake some great historical work, which . may be at once the business and the amusement of my life, and to leave the pleasures of pestiferous rooms, sleepless nights, and diseased stomachs to Roebuck and to Praed.”

In 1838 Macaulay and his sister Hannah, who had married Charles Trevelyan in 1834, returned to England. He at once entered parliament as member for Edinburgh. In 1839 he became secretary at war, with a seat in the cabinet in Lord Mel. bourne’s ministry. His acceptance of office diverted him for a time from prosecuting the plan he had already formed of a great historical work. But in less than two years the Melbourne

ministry fell. In 1842 appeared his Lays of Ancient Rome, and in the next year he collected and published his Essays. He returned to office in 1846, in Lord John Russell’s administration, as paymaster-general. His duties were very light, and the con- tact with official life and the obligations of parliamentary attend- ance were even of benefit to him while he was engaged upon his History. In the sessions of 1 846-1 847 he spoke only five times, and at the general election of July 1847 he lost his seat for Edin- burgh. The balance of Macaulay’s faculties had now passed to the side of literature. At an earlier date he had relished crowds and the excitement of ever new faces; as years went forward, and absorption in the work of composition took off the edge of his spirits, he recoiled from publicity. He began to regard the prospect of business as worry, and had no longer the nerve to brace himself to the social efforts required of one who represents a large constituency.

Macaulay retired into private life, not only without regret, but with a sense of relief. He gradually withdrew from general society, feeling the bore of big dinners and country-house visits, but he still enjoyed close and constant intercourse with a circle of the most eminent men that London then contained. At that time social breakfasts were in vogue. Macaulay himself pre- ferred this to any other form of

entertainment. Of these brilliant reunions nothing has been preserved beyond the names of' the men who formed them — Rogers, Hallam, Sydney Smith, Lord Carlisle, Lord Stanhope, Nassau Senior, Charles Greville, Milman, Panizzi, G. C. Lewis, Van de Weyer. His biographer thus describes Macaulay's appearance and bearing in conversation: " Sitting bolt upright, his. hands resting on the arms of his chair, or folded over the handle of his walking-stick, knitting his eye- brows if the subject was one which had to be thought out as he went along, or brightening from the forehead downwards when a burst of humour was coming, his massive features and honest glance suited well with the manly sagacious sentiments which he set forth in his sonorous voice and in his racy and intelligible language. To get at his meaning people had never the need to think twice, and they certainly had seldom the time."

But, great as was his enjoyment of literary society and books, they only formed his recreation. In these years he was working with unflagging industry at the composition of his History. His composition was slow, his corrections both of matter and style endless; he spared no pains to ascertain the facts. He sacrificed to the prosecution of his task a political career, House of Commons fame, the allurements of society. The first two volumes of the History of England appeared in December 1848. The success was in every way complete beyond expectation. The sale of edition after edition, both in England and the United States, was enormous.

In 1852, when his party returned to office, he refused a seat in the cabinet, but he could not bring himself to decline the com- pliment of a voluntary amende which the city of Edinburgh paid him in returning him at the head of the poll at the general election in July of that year. He had hardly accepted the summons to return to parliamentary life before fatal weakness betrayed itself in deranged action of the heart; from this time forward till his death his strength continued steadily to sink. The process carried with it dejection of spirits as its inevitable attendant. The thought oppressed him that the great work to which he had devoted himself would remain a fragment. Once again, in June 1853, he spoke in parliament, and with effect, against the exclusion of the master of the rolls from the House of Commons, and at a later date in defence of competition for the Indian civil service. But he was aware that it was a grievous waste of his small stock of force, and that he made these efforts at the cost of more valuable work.

In November 1855 vols. iii. and iv. of the History appeared and obtained a vast circulation. Within a generation of its first appearance upwards of 140,000 copies of the History were printed and sold in the

United Kingdom alone; and in the United States the sales were on a correspondingly large scale. The History was translated into German, Polish, Danish, Swedish, Hungarian, Russian, Bohemian, Italian, French, Dutch and

Spanish. Flattering marks of respect were heaped upon the author by foreign academies. His pecuniary profits were (for that time) on a scale commensurate with the reputation of the book: the cheque he received for £20,000 has become a landmark in literary history.

In May 1856 he quitted the Albany, in which he had passed fifteen happy years, and went to live at Holly Lodge, Campden Hill, then, before it was enlarged, a tiny bachelor's dwelling, but with a lawn whose unbroken slope of verdure gave it the air of a considerable country house. In the following year (1857) he was raised to the peerage by the title of Baron Macaulay of Rothley. " It was," says Lady Trevelyan, " one of the few things that everybody approved; he enjoyed it himself, as he did everything, simply and cordially." It was a novelty in English life to see eminence which was neither that of territorial opulence nor of political or military services recognized and rewarded by elevation to the peerage.

But Macaulay's health, which had begun to give way in 1852, was every year visibly failing. In May 1858 he went to Cam- bridge for the purpose of being sworn in as high steward of the borough, to which office he had been elected on the death of Earl Fitzwilliam. When his health was given at a public breakfast in the town-hall he was obliged to excuse himself from speaking. In the upper house he never spoke. Absorbed in the prosecu- tion of his historical work, he had grown indifferent to the party politics of his own day. Gradually he had to acquiesce in the conviction that, though his intellectual powers remained unim- paired, his physical energies would not carry him through the reign of Anne; and, though he brought down the narrative to the death of William III., the last half-volume wants the finish and completeness of the earlier portions. The winter of 1859 told on him, and he died on the 28th of December. On the 9th of January i860 he was buried in Westminster Abbey, in Poets' Corner, near the statue of Addison.

Lord Macaulay never married. A man of warm domestic affections, he found their satisfaction in the attachment and close sympathy of his sister Hannah, the wife of Sir Charles Trevelyan. Her children were to him as his own. Macaulay was a steadfast friend, and no act inconsistent with the strictest honour and in- tegrity was ever imputed to him. When a poor man, and when salary was of consequence to

him, he twice resigned office rather than make compliances for which he would not have been severely blamed. In 1847, when his seat in parliament was at stake, he would not be persuaded to humour, to temporize, even to conciliate. He had a keen relish for the good things of life, and desired fortune as the means of obtaining them; but there was nothing mercenary or selfish in his nature. When he had raised himself to opulence, he gave away with an open hand, not seldom rashly. His very last act was to write a letter to a poor curate enclosing a cheque for £25. The purity of his morals was not associated with any tendency to cant.

The lives of men of letters are often records of sorrow or suffering. The life of Macaulay was eminently happy. Till the closing years (1857-1859), he enjoyed life with the full zest of healthy faculty, happy in social intercourse, happy in the solitude of his study, and equally divided between the two. For the last fifteen years of his life he lived for literature. His writings were remunerative to him far beyond the ordinary measure, yet he never wrote for money. He lived in his historical researches; his whole heart and interest were unreservedly given to the men and the times of whom he read and wrote. His command of literature was imperial. Beginning with a good classical foundation, be made himself familiar with the imaginative, and then with the historical, remains of Greece and Rome. He went on to add the literature of his own country, of France, of Italy, of Spain. He learnt Dutch enough for the purposes of his his- tory. He read German, but for the literature of the northern nations he had no taste, and of the erudite labours of the Germans he had little knowledge and formed an inadequate estimate. The range of his survey of human things had other , limitations more considerable still. All philosophical speculation was alien to his mind; nor did he seem aware of the degree in

which such speculation had influenced the progress of humanity. A large — the largest — part of ecclesiastical history lay outside his historical view. Of art he confessed himself ignorant, and even refused a request to furnish a critique on Swift's poetry to the Edinburgh Review. Lessing's Laocoon, or Goethe's criticism on Hamlet, " filled " him " with wonder and despair."

Of the marvellous discoveries of science which were succeeding each other day by day he took no note; his pages contain no reference to

them. It has been told already how he recoiled from the mathematical studies of his university. These de- ductions made, the circuit of his knowledge still remains very wide— as extensive perhaps as any human brain is competent to embrace. His literary outfit was as complete as has ever been possessed by any English writer; and, if it wants the illumination of philosophy, it has an equivalent resource in a practical acquaintance with affairs, with administration, with the interior of cabinets, and the humour of popular assemblies. Nor was the knowledge merely stored in his memory; it was always at his command. Whatever his subject, he pours over it his stream of illustration, drawn from the records of all ages and countries. His Essays are not merely instructive as history; they are, like Milton's blank verse, freighted with the spoils of all the ages. As an historian Macaulay has not escaped the charge of partisanship. He was a Whig; and in writing the history of the rise and triumph of Whig principles in the latter half of the 17th century he identified himself with the cause. But the charge of partiality, as urged against Macaulay, means more than that he wrote the history of the Whig revolution from the point of view of those who made it. When he is describing the merits of friends and the faults of enemies his pen knows no moderation. He has a constant tendency to glaring colours, to strong effects, and will always be striking violent blows. He is not merely exuberant but excessive. There is an overweening confidence about his tone; he expresses himself in trenchant phrases, which are like challenges to an opponent to stand up and deny them. His propositions have no qualifications. Uninstructed readers like this assurance, as they like a physician who has no doubt about their case. But a sense of distrust grows upon the more circumspect reader as he follows page after page of Macaulay's categorical affirmations about matters which our own experience of life teaches us to be of a contingent nature. We inevitably think of a saying attributed .to Lord Melbourne: " I wish I were as cocksure of any one thing as Macaulay is of everything." Macaulay's was the mind of the advocate, not of the philosopher; it was the mind of Bossuet, which admits no doubts or reserves itself and tolerates none in others, and as such was disqualified from that equitable balancing of evidence which is the primary function of the historian.

Macaulay, the historian no less than the politician, is, however, always on the side of justice, fairness for the weak against the strong, the oppressed against the oppressor. But though a Liberal in practical politics, he had not the reformer's tempera- ment. The world as it is was good enough for him. The glories of wealth, rank, honours, literary fame, the elements of vulgar happiness, made up his ideal of

life. A successful man himself, every personage and every cause is judged by its success. ” The brilliant Macaulay,” says Emerson, ” who expresses the tone of the English governing classes of the day, explicitly teaches that ‘ good ‘ means good to eat, good to wear, material commodity.” Macaulay is in accord with the average sentiment of orthodox and stereotyped humanity on the relative values of the objects and motives of human endeavour. And this commonplace materialism is one of the secrets of his popularity, and one of the qualities which guarantee that that popularity will be enduring. (M. P.)

Macaulay’s whole works were collected in 1866 by his sister, Lady Trevelyan, in 8 vols. The first four volumes are occupied by the History; the next three contain the Essays, and the Lives which he contributed to the Encyclopaedia Britannica. In vol. viii. are collected his Speeches, the Lays of Ancient Rome, and some mis- cellaneous pieces. The ” life ” by Dean Milman, printed in vol. viii. of the edition of 1858-1862, is prefixed to the ” People’s Edition ” (4 vols., 1863-1864). Messrs. Longmans, Green & Co. published a

complete edition, the “Albany,” in 12 vols., in 1898. There are numerous editions of the Critical and Historical Essays, separately and collectively; they were edited in 1903 by F. C. Montagu.

The Life and Letters of Lord Macaulay (2 vols., 1876), by his nephew, Sir George Otto Trevelyan, is one of the best biographies in the English language. The life (1882) in the ” English Men of Letters ” series was written by J. Cotter Morison. Far further criticism, see Hepworth Dixon, in his Life of Penn (1841) ; John Paget, The New Examen: Inquiry into Macaulay’s History (1861) and Paradoxes and Puzzles (1874); Walter Bagehot, in the National Review (Jan. 1856), reprinted in his Literary Studies (1879); James Spedding, Evenings with a Reviewer (1881), discussing his essay on Bacon; Sir L. Stephen, Hours in a Library, vol. ii. (1892) ; LordMorley, Critical Miscellanies (1877), vol. ii.; Lord Avebury, Essays and Addresses (1903) ; Thum, Anmerkungen zu Macaulay’s History of England (Heilbronn, 1882). A bibliography of German criticism of Macaulay is given in G. Korting’s Grd. der engl. Literatur (4th ed., Minister, 1905).

MACAW, or, as formerly spelt, Maccaw, the name given to some fifteen or more species of large, long-tailed birds of the parrot-family, natives of the neotropical region, and forming a very well-known and easily recognized genus Ara, and to the four species of Brazilian Hyacinthine macaws of the genera Anodorhynchus and Cyanopsiltacus. Most of the macaws are remarkable for their gaudy

plumage, which exhibits the brightest scarlet, yellow, blue and green in varying proportion and often in violent contrast, while a white visage often adds a very pecu- liar and expressive character. 1 With one exception the known species of Ara inhabit the mainland of America from Paraguay to Mexico, being especially abundant in Bolivia, where no fewer than seven of them (or nearly one half) have been found (Proc. Zool. Soc, 1879, p. 634). The single extra-continental species, A. tricolor, is one of the most brilliantly coloured, and is peculiar to Cuba, where, according to Gundlach (Ornitologia Cubana, p. 126), its numbers are rapidly decreasing so that there is every chance of its becoming extinct. 2

Of the best known species of the group, the blue-and-yellow macaw, A. ararauna, has an extensive range in South America from Guiana in the east to Colombia in the west, and southwards to Paraguay. Of large size, it is to be seen in almost every zoological garden, and it is very frequently kept alive in private houses, for its temper is pretty good, and it will become strongly attached to those who tend it. Its richly coloured plumage, sufficiently indicated by its common English name, supplies feathers eagerly sought by salmon-fishers for the making of artificial flies. The red-and-blue macaw, A . macao, is even larger and more gorgeously clothed, for, besides the colours expressed in its ordinary appellation, yellow and green enter into its adornment. It inhabits Central as well as South America as far as. Bolivia, and is also a common bird in captivity, though perhaps less often seen than the foregoing. The red-and- yellow species, A. chloroptera, ranging from Panama to Brazil, is smaller, or at least has a shorter tail, and is not quite so usually met with in menageries. The red-and-green, A. militaris, smaller again than the last, is not unfrequent in confinement, and presents the colours of the name it bears. This has the most northerly extension of habitat, occurring in Mexico and thence southwards to Bolivia. In A. manilata and A. nobilis the prevailing colour is green and blue. The Hyacinthine macaws A. hyacinthinus, A. leari, A. glaucus and Cyanopsiltacus spixi are almost entirely blue.

The macaws live well in captivity, either chained to a perch or kept in large aviaries in which their strong flight is noticeable. The note of these birds is harsh and screaming. The sexes are

1 This serves to separate the macaws from the long-tailed para- keets of the New World {Conurus), to which they are very nearly allied.

2 There is some reason to think that Jamaica may have formerly possessed a macaw (though no example is known to exist) , and if so it was most likely a peculiar species. Sloane {Voyage, ii. 297), after

describing what he calls the ” great maccaw ” (A. ararauna), which he had seen in captivity in that island, mentions the ” small maccaw ” as being very common in the woods there, and P. H. Gosse (Birds of Jamaica, p. 260) gives, on the authority of Robin- son, a local naturalist of the last century, the description of a bird which cannot be reconciled with any species now known, though it must have evidently been allied to the Cuban A . tricolor.

alike; tbe lustreless white eggs are laid in hollow trees, usually two at a time. The birds are gregarious but apparently monogamous. (A. N.)

MACBETH, king of Scotland (d. 1058), was the son of Find- laech, mormaer or hereditary ruler of Moreb (Moray and Ross), who had been murdered by his nephews in 1020. He probably became mormaer on the death of Malcolm, one of the murderers, in 1029, and he may have been one of the chiefs (the Maclbaethe of the Saxon Chronicle) who submitted to Canute in 103 1. Marianus records that in 1040 Duncan, the grandson and suc- cessor of Malcolm king of Scotland,was slain by Macbeth. Duncan had shortly before suffered a severe defeat at the hands of Thorfinn, the Norwegian earl of Orkney and Caithness, and it was perhaps this event which tempted Macbeth to seize the throne. As far as is known he had no claim to the crown except through his wife Gruach, who appears to have been a member of the royal family. Macbeth was apparently a generous benefactor to the Church, and is said to have made a pilgrimage to Rome in 1050. According to S. Berchan his reign was a time of pro- sperity for Scotland. The records of the period, however, are extremely meagre, and much obscurity prevails, especially as to his relations with the powerful earl Thorfinn. More than one attempt was made by members of the Scottish royal family to recover the throne; in 1045 by Crinan, the lay abbot of Dunkeld, son-in-law of Malcolm II., and in 1054 by Duncan’s son Malcolm with the assistance of Siward the powerful earl of Northumbria, himself a connexion of the ousted dynasty. Three years later in 1057 Malcolm and Siward again invaded Scotland and the campaign ended with the defeat and death of Macbeth, who was slain at Lumphanan. Macbeth is, of course, chiefly famous as the central figure of Shakespeare’s great tragedy.

See W. F. Skene, Chronicles of the Picts and Scots (1867) and Celtic Scotland (1876); Sir John Rhys, Celtic Britain (1904).

MACCABEES, the name (in the plural) of a distinguished Jewish family dominant in Jerusalem in the 2nd century B.C. According to 1 Mace. ii. 4, the name Maccabaeus (Gr. Mcu/ca- /3aios-? Heb. ‘jk 1) was originally the distinctive surname of Judas, third son of the Jewish priest Mattathias, who struck the first blow for religious liberty during the persecution under Antiochus IV. (Epiphanes). Subsequently, however, it obtained a wider significance, having been applied first to the kinsmen of Judas, then to his adherents, and ultimately to all champions of religion in the Greek period. Thus the mother of the seven brethren, whose martyrdom is related in 2 Mace, vi., vii., is called by early Christian writers ” the mother of the Maccabees.” The name is used still more loosely in the titles of the so-called Third, Fourth and Fifth Books of Maccabees. It is now customary to apply it only to the sons and descendants of Mattathias. As, however, according to Josephus (Ant. xii. 6. 1), this brave priest’s great- great-grandfather was called Ij.asmon {i.e. ” rich ” = magnate ; cf. Ps. lxviii. 31 [32]), the family is more correctly designated by the name of Hasmonaeans or Asmoneans (q.v.). This name Jewish authors naturally prefer to that of Maccabees; they also style 1 and 2 Mace. “Books of the Hasmonaeans.”

If Maccabee (maqqdbi) is the original form of the name, the most probable, derivation is from the Aramaic maqqaba (Heb. rqizo, Judg. iv. 21, &c.) = ” hammer.” The surname “hammerer” might have been applied to Judas either as a distinctive title pure and simple or symbolically as in the parallel case of Edward I., “Scotorum [malleus.” Even if maqqaba does denote the ordinary workman’s hammer, and not the great smith’s hammer which would more fitly symbolize the impetuosity of Judas, this is not a fatal objection. The doubled k of the Greek form is decisive against (1) the theory that the name Maccabee was made up of the initials of the opening words of Exod. xv. 11; (2) the derivation from ‘555 = “extin- guisher ” (cf. Isa. xliii. 17), based by Curtiss {The Name Machabee, Leipzig, 1876) on the Latin spelling Machabaeus = Ma.KKa.~f}aios, which Jerome probably adopted in accordance with the usage of the times.

The Maccabaean revolt was caused by the attempt of Antiochus IV. (Epiphanes), king of Syria (175-164 B.C.), to force Hellenism upon Judaea (see Seleucid Dynasty; Hellenism). Ever since the campaigns of Alexander the Great, Greek habits and ideas had been widely adopted in Palestine. Over the higher classes especially Hellenism had cast its spell. This called forth the organized opposition of the Hasldim (= ” the pious “), who constituted themselves champions of the Law. Joshua, who headed the Hellenistic faction, graecized his name into Jason, contrived to have the high-priesthood taken from his brother

Onias III., and conferred upon himself, and set up a gymnasium hard by the Temple. After three years' tenure of office Jason was supplanted by the Benjamite Menelaus, who disowned Judaism entirely. Antiochus punished an outburst of strife between the rivals by plundering the Temple and slaying many of the inhabitants (170 B.C.). Two years later Jerusalem was devastated by his general Apollonius, and a Syrian garrison occupied the citadel (Akra). The Jews were ordered under pain of death to substitute for their own observances the Pagan rites prescribed for the empire generally. In December 168 sacrifice was offered to Zeus upon an idol altar (" the abomination, of desolation," Dan. x. 27) erected over the great altar of burnt-offering. But Antiochus had miscalculated, and by his extreme measures unwittingly saved Judaism from its internal foes. Many hellenizers rallied round those who were minded to die rather than abjure their religion. The issue of an important edict ordaining the erection of heathen altars in every township of Palestine, and the appointment of officers to deal with recusants, brought matters to a crisis. At Modin, Mattathias, an aged priest, not only refused to offer the first sacrifice, but slew an apostate Jew who was about to step into the breach. He also killed the king's commissioner and pulled down the altar. Having thus given the signal for rebellion, he then with his five sons took to the mountains. In view of the ruthless slaughter of a thousand Sabbatarians in the wilderness, Mattathias and his friends decided to resist attack even on the sabbath. Many, including the Hasldim, thereupon flocked to his standard, and set themselves to revive Jewish rites and to uproot Paganism from the land. In 166 Mattathias died, after charging his sons to give their lives for their ancestral faith, and nominating Judas Maccabaeus as their leader in the holy campaign.

The military genius of Judas made this the most stirring chapter in Israelitish history. In quick succession he over- threw the Syrian generals Apollonius, Seron and Gorgias, and after the regent Lysias had shared the same fate at his hands he restored the Temple worship (165). These exploits dismayed his opponents and kindled the enthusiasm of his friends. When, however, Lysias returned in force to renew the contest, Judas had to fall back upon the Temple mount, and escaped defeat only because the Syrian leader was obliged to hasten back to Antioch in order to prevent a rival from seizing the regency. Under these circumstances Lysias un- expectedly guaranteed to the Jews their religious freedom (162). But though they had thus gained their end, the struggle did not cease; it merely assumed a new phase. The Hasldim indeed were satisfied, and declined to fight longer, but the Maccabees determined not to desist until their nation was

politically as well as religiously free. In 161 Judas defeated Nicanor at Adasa, but within a few weeks thereafter, in a heroic struggle against superior numbers under Bacchides at Elasa, he was himself cut off. Even this, however, did not prove fatal to the cause which Judas had espoused. If in his brother Jonathan it did not possess so brilliant a soldier, it had in him an astute diplomatist who knew how to exploit the internal troubles of Syria. In the contest between Demetrius I. and Alexander Balas for the throne, Jonathan supported the latter, who in 153 nominated him high priest, and conferred on him the order of " King's Friend," besides other honours. After the accession of Demetrius II. (145) Jonathan contrived to win his favour, and helped him to crush a rebellion in Antioch I on condition that the Syrian garrisons should be withdrawn

from Judaea. When, however, Demetrius failed to keep his word, Jonathan transferred his allegiance to Antiochus VI., whom Tryphon had crowned as king. After subjugating the territory between Jerusalem and Damascus, he routed the generals of Demetrius on the plain of Hazor. But as the Macca- bees had now in the name of the Syrians cleared the Syrians out of Palestine, Tryphon's jealousy was aroused, and he resolved to be rid of Jonathan, who, with all his cunning, walked into a trap at Ptolemais, was made prisoner and ultimately slain (143). The leadership now devolved upon Simon, the last survivor of the sons of Mattathias. He soon got the better of Tryphon, who vainly tried to reach Jerusalem. Allying himself to Demetrius, Simon succeeded in negotiating a treaty whereby the political independence of Judaea was at length secured. The garrison in the Akra having been starved into submission, Simon triumphantly entered that fortress in May 142. In the following year he was by popular decree invested with absolute powers, being appointed leader, high priest and ethnarch. As these offices were declared hereditary in his family, he became the founder of the Hasmonaean dynasty. The first year of his reign (Seleucid year 170 = 143-142 B.C.) was made the beginning of a new era, and the issue of a Jewish coinage betokened the independence of his sovereignty. Under Simon's administration the country enjoyed signal prosperity. Its internal resources were assiduously developed; trade, agriculture, civic justice and religion were fostered; while at no epoch in its post-exilic history did Israel enjoy an equal measure of social happiness (1 Mace. xiv. 4 seq.). Simon's beneficent activities came, however, to a sudden and tragic end. In 135 he and two of his sons were murdered by Ptolemy

his son-in-law, who had an eye to the supreme power. But Simon's third son, John Hyrcanus, warned in time, succeeded in asserting his rights as hereditary head of the state. All the sons of Mattathias had now died for the sake of " The Law "; and the result of their work, so valorously prosecuted for over thirty years, was a new-born enthusiasm in Israel for the ancestral faith. The Maccabaean struggle thus gave fresh life to the Jewish nation.

After the death of Antiochus VII. Sidetes in 128 left him a free hand, Hyrcanus (135-105) soon carved out for himself a large and prosperous kingdom, which, however) was rent by internal discord owing to the antagonism developed between the rival parties of the Pharisees and Sadducees. Hyrcanus was succeeded by his son Aristobulus, whose reign of but one year was followed by that of his brother, the warlike Alex- ander Jannaeus (104-78). The new king's Sadduoean pro- clivities rendered him odious to the populace, which rose in revolt, but only to bring upon itself a savage revenge. The accession of his widow Salome Alexandra (78-69) witnessed a complete reversal of the policy pursued by Jannaeus, for she chose to rule in accordance with the ideals of the Pharisees. Her elder son, Hyrcanus II., a pliable weakling, was appointed high priest; her younger son, the energetic Aristobulus, who chafed at his exclusion from office, seized some twenty strong- holds and with an army bore down upon Jerusalem. At this crisis Alexandra died, and Hyrcanus agreed to retire in favour of his masterful brother. A new and disturbing element now entered into Jewish politics in the person of the Idumaean Antipater, who for selfish ends deliberately made', mischief between the brothers. An appeal to M. Aernilius Scaurus, who in 65 came into Syria as the legate of Pompey, led to the interference of the Romans, the siege of Jerusalem by Pompey, and the vassalage of the Jews (g.v.). Hyrcanus II. was appointed high priest and ethnarch, without the title of king (63). Re- peated but fruitless attempts were made by the Hasmonaeans and their patriotic supporters to throw off the Roman yoke. In 47 Antipater, who curried favour with Rome, was made procurator of Judaea, and his sons Phasael and Herod governors of Jerusalem and Galilee respectively. Six years later the Idumaean brothers were appointed tetrarchs of Judaea. At length, in 40, the Parthians set up as king Antigonus, sole surviving son of Aristobulus. Thereupon Phasael committed

suicide in prison, but Herod effected his escape and with the help of the Romans seated himself on the throne of Judaea (37 B.C.). Through the execution of Antigonus by M. Antonius (Mark. Antony) the same year the Hasmonaean dynasty became extinct.

Literature. — r and 2 Mace, and Josephus are the main sources for the Maccabaean history. For references in classical authors see E. Schiirer, Geschichte des jiidischen Volkes (1901., p 106 seq.). Besides the numerous modern histories of Israel (e.g. those by Derenbourg, Ewald, Stanley, Stade, Renan, Schiirer, Kent, Well- hausen, Guthe), see also Madden, Coins of the Jews (1881), H. Weiss's Judas Makkabaeus (1897), and the articles in the Ency. Bib., Has- tings's Diet. Bible, the Jewish Encyclopedia. Among more popular sketches are Moss's From Malachi to Matthew (1893); Streanes' The Age of the Maccabees (1898) ; Morrison's The Jews under Roman Rule (" Story of the Nations " series) ; W. Fairweather's From the Exile to the Advent (1901); E. R. Bevan's Jerusalem under the High Priests (1904) ; F. Henderson's The Age of the Maccabees (1907) ; also, articles Jews; Seleucid Dynasty. (W. F.*)

MACCABEES, BOOKS OF, the name given to several Apocry- phal books of the Old Testament. The Vulgate contains two books of Maccabees which were declared canonical by the council of Trent (1546) and found a place among the Apocrypha of the English Bible. Three other books of this name are extant. Book iii. is included in the Septuagint but not in the Vulgate. Book iv. is embraced in the Alexandrian, Sinaitic, and other MSS. of the Septuagint, as well as in some MSS. of Josephus. A "Fifth" book is contained in the Ambrosian Peshitta, but it seems to be merely a Syriac reproduction of the sixth book of Josephus's history of the Jewish War. None of the books of Maccabees are contained in the Vatican (B) ; all of them are found in a Syriac recension.

1 Maccabees was originally written in Hebrew, but is pre- served only in a Greek translation. Origen gives a trans- literation of ' its semkic title," 1 and Jerome says distinctly: " The First Book of Maccabees I found in Hebrew." The frequent Hebraisms which mark the Greek translation, as well as the fact that some obscure passages in the Greek text are best accounted for as mistranslations from the Hebrew, afford internal evidence of the truth of this testimony. There are good reasons for regarding the book as a unity, although some scholars (Destinon, followed by Wellhausen) consider the concluding chapters (xiii.-xvi.) a later addition unknown to Josephus, who, however, seems to have already used the Greek. It probably dates from about the beginning of the first century B.C. 2 '

As it supplies a detailed and accurate record of the forty years from the accession of Antiochus Epiphanes to the death of Simon (175-135 B.C.), without doubt the most stirring chapter in Jewish history, the book is one of the most precious historical sources we possess. In its

careful chronology, based upon the Seleucid era, in the minuteness of its geographical knowledge, in the frankness with which it records defeat as well as victory, on the restraint with which it speaks of the enemies of the Jews, in its command of details, it bears on its face the stamp of genuineness. Not. that it is wholly free from error or exaggeration, but its mistakes are due merely to defective knowledge of the outside world, and its overstate- ments, virtually confined to the matter of numbers, proceed from a patriotic desire to magnify Jewish victories. While the author presumably had some written sources at his disposal, 3 his narrative is probably for the most part founded upon personal knowledge and recollection of the events recorded, and upon such first-hand information as, living in the second

1 Xap0ifi Eaffava.Lh'K (Sarbeth Sabanaiel). No satisfactory explanation of this title has yet been given from the Hebrew (see the commentaries). The book may, however, have been known to Origen only in an Aramaic translation, in which case, according to the happy conjecture of Dalman (Gramm. 6) the two words may have represented the Aramaic '(oidot! ,Y2 nso (" book of the Hasmonaean house").

2 If the book is a unity, ch. xvi. 23 implies that it was written after the death of Hyrcanus which occurred in 105 B.C. On the other hand the friendly references to Rome in ch. viii. show that it must have been written before the siege of Jerusalem by Pompey in 63 B.C.

3 Cf. ix. 22, xi. 37, xiv. 18, 27.

generation after, he would still be in a position to obtain. His sole aim is honestly to relate what he knew of the glorious struggles of his nation.

Although written in the style of the historical books of the old Testament, the work is characterized by a religious reticence which avoids even the use of the divine name, and by the virtual absence of the Messianic hope. The observance of the law is strongly urged, and the cessation of prophecy deplored (iv. 46; xiv. 41). There is no allusion either to the immortality of the soul or to the resurrection of the dead. The rewards to which the dying Mattathias points his sons are ajl for this life. Many scholars are of opinion that the unknown author was a Sadducee, 1 but all that can be said with certainty is that

he was a Palestinian Jew devotedly attached to the national cause.

Until the council of Trent 1 Maccabees had only ” ecclesiastical ” rank, and although not accepted as canonical by the Protestant churches, it has always been held in high estimation. Luther says ” it closely resembles the rest of the books of Holy Scripture, and would not be unworthy to be enumerated with them.”

2 Maccabees, the epitome of a larger work in five books by one Jason of Cyrene, deals with the same history as its pre- decessor, except that it begins at a point one year earlier (176 B.C.), and stops short at the death of Nicanor (161 B.C.), thus covering a period of only fifteen years. First of all 2 the writer describes the futile attempt of Heliodorus to rob the Temple, and the malicious intrigues of the Benjamite Simon against the worthy high priest Onias III. (iii. i-iv. 6). As throwing light upon the situation prior to the Maccabaean revolt this section of the book is of especial value. Chapters iv. 7-vii. 42 contain a more detailed narrative of the events recorded in 1 Mace. i. 10-64. The remainder of the book runs parallel to 1 Mace, iii.-vii.

Originally written in excellent Greek, from a pronouncedly Pharisaic standpoint, it was possibly directed against the Hasmonaean dynasty. It shows no sympathy with the priestly class. Both in trustworthiness and in style it is inferior to 1 Mace. Besides being highly coloured, the narrative does not observe strict chronological sequence. Instead of the sober annalistic style of the earlier historian we have a work marked by hyperbole, inflated rhetoric and homiletic reflection. Bitter invective is heaped upon the national enemies, and strong predilection is shown for the marvellous. The fullness and inaccuracy of detail which are a feature of the book suggest that Jason’s information was derived from the recollections of eye-witnesses orally communicated. In spite of its obvious defects, however, it forms a useful supplement to the first book.

The writer’s interests are religious rather than historical. In 1 Mace, there is a keen sense of the part to be played by the Jews themselves, of the necessity of employing their own skill and valour; here they are made to rely rather upon divine intervention. Fantastic apparitions of angelic and supernatural beings, gorgeously arrayed and mostly upon horseback, are frequently introduced. In general, the views reflected in the book are those of the Pharisees. The ungodly will be punished mercilessly, and in exact correspondence to their sins. 3 The chastisements of erring Jews are of short duration, and intended to recall them to duty. If the faithful suffer martyrdom, it is in order to serve as an example to others, and they shall be compensated by being

raised up ” unto an eternal renewal of life.” The eschatology of 2 Mace, is singu- larly advanced, for it combines the doctrine of a resurrection with that of immortality. It is worthy of note that the Roman Church finds support in this book for its teaching with

1 See especially Geiger, Urschrift und Uebersetzungen der Bibel, 206 seq.

- Prefixed to the book are two spurious letters from Palestinian Jews (i., ii. 18), having no real connexion with it, or even with one another, further than that they both urge Egyptian Jews to observe the Feast of the Dedication. Between these and the main narrative is inserted the writer’s own preface, in which he explains the source and aim of his work (ii. 19-32).

» iv. 38, 42; v.. 9 seq.; ix. 5-18.

reference to prayers for the dead and purgatory (xii. 43 seq.). Ah allusion to Jeremiah as “he who prayeth much for the people and the holy city ” (xv. 14) it likewise appeals to as favouring its views respecting the intercession of the saints.

Neither of Jason’s work, nor of the epitomizer’s, can the precise date be determined. The changed relations with Rome (viii. 10, 36) prove, however, that the latter was written later than 1 Mace; and it is equally clear that it was composed before the destruction of Jerusalem, a.d. 70.

The account given of the martyrs in chs. vi. and vii. led to frequent allusions to this book in early patristic literature. Only Augustine, however, was minded to give it the canonical rank to which it has been raised by the Roman Church. Luther judged of it as unfavour- ably as he judged of 1 Mace, favourably, and even ” wished it had never existed.”

3 Maccabees, although purporting to be an historical narra- tive, is really an animated, if somewhat vapid, piece of fiction written in Greek somewhere between 100 B.C. and a.d. 70, 4 and apparently preserved only in part. 5 It has no connexion with the Hasmonaeans, but is a story of the deliverance experienced by the Egyptian Jews from impending martyrdom at the hand” of Ptolemy IV. Philopator, who reigned in the century previous to the Maccabaean rising (222-205 B.C.). The title is of later origin, and rendered possible only by the generalization of the name Maccabee so as to embrace all who suffered for the ances- tral faith. Josephus refers the legend on which

it is based to the time of Ptolemy VII. Physcon (146-117 B.C.). Some scholars (Ewald, Reuss, Hausrath) think that what the story really points to is the persecution under Caligula, but in that case Ptolemy would naturally have been represented as claiming divine honours. No other source informs us of a visit to Jerusat lem, dr,of a persecution of the Jews, on the part of Philopator. Possibly, however, the story iriay be founded on some historical situation regarding which we have no definite knowledge. The purpose of the writer was evidently to cheer his Egyptian brethren during some persecution at Alexandria. Although the book was favourably regarded in the Syrian, it was appar- ently unknown to the Latin Church. Among the Jews it was virtually ignored.

Briefly, the tale is as follows: — After the battle of Raphia 8 (217 B.C.), Ptolemy IV. Philopator insisted on entering the sanctuary at Jerusalem, but was struck down by the Almighty in answer to the prayers of the horrified Jews. On his return to Egypt he revenged himself by curtailing the religious liberty of the Alexandrian Jews, and by depriving of their civic rights all who refused to worship Bacchus. Exasperated by their loyalty to their religion, the king ordered all the Jews in Egypt to be imprisoned in the hippodrome of Alexandria. Clerks were told off to prepare a list of the prisoners' names, but after forty days constant toil they had exhausted theif writing materials without finishing their task. Ptolemy further commanded that 500 elephants should be intoxicated and let loose upon the occupants of the racecourse. Only an accident prevented the carrying out of this design ; the king had slept until it was past the time for his principal meal. On the following day, in virtue of a divinely induced forgetfulness, Ptolemy recollected nothing but the loyalty of the Jews to his throne. The same evening, neverthe- less, he repeated his order for their destruction. Accordingly, on the morning of the third day, when the king attended to see his

' * The date of composition can be only approximately determined. As the writer is acquainted with the Greek additions to Daniel (vi. 6), the first century B.C. forms the superior limit; and as thebopkfound favour in the Eastern Church, the first century a.d. forms the inferior limit.

- Apart from its abrupt commencement, the references in i. 2 to " the plot " as something already specified, and in ii. 25 to the king's " before-mentioned " companions, of whom, however, nothing is said in the previous section of the book, point to the loss of at least an introductory chapter.

6 The statements with reference to the war between Antiochus the

Great and Ptolemy Philopator are in general agreement with those of the classical historians, and to this extent the tale may be said to have an historical setting. By Grimm (Einl. § 3), the observ- ance of the two yearly festivals (vi. 26; vii. 19), and the existence of' the synagogue at Ptolernais when the book was written, are viewed as the witness of tradition to the fact of some great deliverance. Fritzsche has well pointed out, however (art. " Makkabaer " in Schenkel's Bibel-Lexicon) that in the hands of Jewish writers of the period nearly every ' event of consequence has a festival attached to it.

commands executed, things had reached a crisis. The Jews prayed to the Lord for mercy, and two angels appeared from heaven, to the confusion of the royal troops, who were trampled down by the ele-

f)hants. Ptolemy now vented his wrath upon his counsellors, iberated the Jews, and feasted them for seven days. They deter- mined that these should be kept as festal days henceforth in com- memoration of their deliverance. The provincial governors were enjoined to take the Jews under their protection, and leave was given to the latter to slay those of their kinsmen who had deserted the faith. They further celebrated their deliverance at Ptolemais, where they built a synagogue, and they reached their various abodes to find themselves not only reinstated in their possessions, but raised in the esteem of the Egyptians.

4 Maccabees differs essentially "from the other books of this name. While it does not itself aim at being a history, it makes striking use of Jewish history for purposes of edification. It bears, moreover, a distinctly philosophical character, and takes the form of a " tractate " or discourse, addressed to Jews only, 1 upon " the supremacy of pious reason over the passions." 2 The material is well arranged and systematically handled. In the prologue (i. 1-12) the writer explains the aim and scope of his work. Then follows the first main division (i. 13-iii. 18), in which he treats philosophically the proposition that reason is the mistress of the passions, inquiring what is meant by " reason" and what by " passion," as well as how many kinds of passion there are, and whether reason rules them all. The conclusion reached is that with the exception of forgetfulness and ignorance all the affections are under the lordship of reason, or at all events of pious reason. To follow the dictates of pious reason in op- position to natural inclination is to have learned the secret of victory over the

passions. In the second part of the book (iii. 10-xviii. 5) the writer goes on to prove his thesis from Jewish history, dwelling in particular upon the noble stand made against the tyranny of Antiochus IV. Epiphanes by the priest Eleazar, the seven brothers and their mother — all of whom chose torture and. death rather than apostatize from the faith. Finally he appeals to his readers to emulate these acts of piety (xvii. 7- xviii. 24). In his gruesome descriptions of physical sufferings the author offends against good taste even more than the writer of 2 Mace, while both contrast very unfavourably in this respect with the sober reserve of the gospel narratives.

The book is written in a cultured, if somewhat rhetorical, Greek style, and is unmistakably coloured by the Stoic philosophy. The four cardinal virtues are represented as forms of wisdom, which again is inseparable from the Mosaic law. That the writer owes no slavish adherence to any philosophical system is plain from his independent treatment of the affections. Although influenced by Hellenism, he is a loyal Jew, earnestly desirous that all who profess the same faith should adhere to it in spite of either Greek allurements or barbaric persecution. It is not to reason as such, but only to pious reason {i.e. to reason enlightened and controlled by the divine law), that he attributes lordship over the passions. While in his zeal for legalism he virtually adopts the standpoint of Pharisaism, he is at one with Jewish Hellenism in substituting belief in the soul's immortality for the doctrine of a bodily resurrection.

The name of the author is unknown. He was, however, clearly a Hellenistic Jew, probably resident in Alexandria or Asia Minor. In the early Church the work was commonly ascribed to Josephus and incorporated with his writings. But apart from the fact that it is found also in several MSS. of the Septuagint, the language and style of the book are incompatible with his authorship. So also is the circumstance that 2 Mace, which forms the basis of 4 Mace, was unknown to Josephus. Moreover, several unhistorical statements (such as, e.g. that Seleucus was succeeded by his son Antiochus Epiphanes, iv. 1 5)

1 Even if with Freudenthal we regard the work as a homily actually delivered to a Jewish congregation — and there are difficulties in the way of this theory, particularly the absence of a Biblical text — it was clearly intended for publication. It is essentially a book in the form of a discourse, whether it was ever orally delivered or not. So Deissmann in Kautzsch, Die Apok. u. Pseudepigr. des A. T. ii. 151.

- Hence the title sometimes given to it : abroKpiropos Xoyict/joB (" On the supremacy of reason '). It is also styled MaKKafialuv

&’, iHaxKafia’U6v, els roh MokkojScUous.

militate against the view that Josephus was the author. The date of composition cannot be definitely fixed. It is, however, safe to say that the book must have been written later than 2 Mace, and (in view of the acceptance it met with in the Christian Church) prior to the destruction of Jerusalem. Most likely it is a product of the Herodian period.

5 Maccabees. Writing in 1566 Sixtus Senensis mentions having seen at Lyons a manuscript of a so-called ” Fifth Book of Maccabees ” in the library of Santas Pagninus, which was soon afterwards destroyed by fire. It began with the words: ” After the murder of Simon, John his son became high priest in his stead.” Sixtus conjectures that it may have been a Greek translation of the ” chronicles ” of John Hyrcanus, alluded to in j Mace xvi. 24. He acknowledges that it is a history of Hyrcanus practically on the lines of Josephus, but concludes from its Hebraistic style that it was not from that writer’s pen. The probability, however, is that it was ” simply a reproduction of Josephus, the style being changed perhaps for a purpose ” (Schiirer) .

The Arabic ” Book of Maccabees ” contained in the Paris and London Polyglotts, and purporting to be a history of the Jews from the affair of Heliodorus (186 B.C.) to the close of Herod’s reign, is historically worthless, being nothing but a compilation from 1 and 2 Mace and Josephus. In the one chapter (xii.) where the writer ventures to detach himself from these works he commits glaring historical blunders. The book was written in somewhat Hebraistic Greek subsequent to a.d. 70. In Cotton’s English translation of The Five Book* of Maccabees it is this book that is reckoned the ” Fifth.”

The best modern editions of the Greek text of the four books of Maccabees are those of O. F. Fritzsche (1871) and H. B. Swete (Cambridge Septuagint, vol. iii., 1894). C. J. Ball’s The Variorum Apocrypha will be found specially useful by those who cannot conveniently consult the Greek. The best modern commentary is that of C. L. W. Grimm (1853-1857). C.F. Kelt’s commentary on I and 2 Mace is very largely indebted to Grimm. More recently there have appeared commentaries by E. C. Bissell on 1, 2 and 3 Mace, in Lange- Schaff’s commentary, 1880 — the whole Apocrypha being embraced in one volume, and much of the material being transferred from Grimm; G. Rawlinson on 1 and 2 Mace in the Speaker’s Commentary 1888 (containing much useful matter, but marred by too frequent inaccuracy) ; O. Zockler, on I, 2 and 3 Mace, 1 89 1 (slight and unsatis- factory) ; W. Fairweather and J. S. Black on 1 Mace in the

Cam- bridge Bible for Schools (1897); E. Kautzsch on 1 and 3 Mace, A. Kamphausen on 2 Mace and A. Deissmann on 4 Mace in Die Apok. u. Pseudepigr. des Alt. Test., 1898 (a most serviceable work for the student of apocryphal literature). Brief but useful introductions to all the four books of Maccabees are given in E. Schiirer's Geschichte des Jiidischen Volkes im Zeitalter Jesu Christi (3rd ed., 1898-1901; Eng. tr. of earlier edition, 1886-1890). (W. F.*)

MacCARTHY, DENIS FLORENCE (1817-1882I, Irish poet, was born in Dublin on the 26th of May 1817, and educated there and at Maynooth. His earlier verses appeared in The Dublin Satirist, and in 1843 he became a regular contributor of political verse to the recently founded Nation. He also took an active part in the Irish political associations. In 1846 he edited The Poets and Dramatists of Ireland and the Book of Irish Ballads. His collected Ballads, Poems and Lyrics (1850), including trans- lations from nearly all the modern languages, took immensely with his countrymen on account of their patriotic ring. This was followed by The Bellfounder (1857), Under-glimpses and other poems (1857) and The Early Life of Shelley (1871). In 1853 he began a number of translations from the Spanish of Calderon's dramas, which won for him a medal from the Royal Spanish Academy. He had already been granted a civil list pension for his literary services. He died in Ireland on the 7th of April

1882.

M'CARTHY, JUSTIN (1830-), Irish politician, historian and novelist, was born in Cork on the 22nd of November 1830, and was educated at a school in that town. He began his career as a journalist, at the age of eighteen, in Cork. From 1853 to 1859 he was in Liverpool, on the staff of the Northern Daily Times, during which period he married (in March 1855) Miss Charlotte Allman. In i860 he removed to London, as parliamentary reporter to the Morning Star, of which he became editor in 1864.

He gave up his post in 1868, and, after a lecturing tour in the United States, joined the staff of the Daily News as leader-writer in 1870. In this capacity he became one of the most useful and respected upholders of the Liberal politics of the time. He lectured again in America in 1870-1871, and again in 1886-1887. He represented Co. Longford in Parliament as a Liberal and Home Ruler from 1879 to

1885; North Longford, 1885-1886; Londonderry, 1886-1892; and North Longford from 1892 to 1900. He was chairman of the Anti-Parnellites from the fall of C. S. Parnell in 1890 until January 1896; but his Nationalism was of a temperate and orderly kind, and though his personal distinc- tion singled him out for the chairmanship during the party dissensions of this period, he was in no active sense the political leader. His real bent was towards literature. His earliest publications were novels, some of which, such as A Fair Saxon (1873), Dear Lady Disdain (1875), Miss Misanthrope (1878), Donna Quixote (1879), attained considerable popularity. His most important work is his History of Our Own Times (vols, i.-iv., i879-i88o;vol. v., 1897), which treats of the period between Queen Victoria's accession and her diamond jubilee. Easily and de- lightfully written, and on the whole eminently sane and moderate, these volumes form a brilliant piece of narrative from a Liberal standpoint. He also began a History of the Four Georges (1884- 1901), of which the latter half was written by his son, Justin Huntly M'Carthy (b. i860), himself the author of various clever novels, plays, poetical pieces and short histories. Justin M'Carthy, amongst other works, wrote biographies of Sir Robert Peel (1891), Pope Leo XIII. (1896) and W. E. Gladstone (1898); Modern England (1898); The Reign of Queen Anne (1902) and Reminiscences (2 vols., 1899).

McCHEYNE, ROBERT MURRAY (1813-1843), Scottish divine, was born at Edinburgh on the 21st of May 1813, was educated at the University and at the Divinity Hall of his native city, .and held pastorates at Larbert, near Falkirk, and Dundee. A mission of inquiry among the Jews throughout Europe and in Palestine, and a religious revival at his church in Dundee, made him feel that he was being called to evangelistic rather than to pastoral work, but before he could carry out his plans he died, on the 25th of March 1843. McCheyne, though wielding remark- able influence in his lifetime, was still more powerful afterwards, through his Memoirs and Remains, edited by Andrew Bonar, which ran into far over a hundred English editions. Some of his hymns, e.g. " When this passing world is done," are well known.

See his Life, by J. C. Smith (1910).

McCLELLAN, GEORGE BRINTON (1826-1885), American soldier, was born in Philadelphia on the 3rd of December 1826. After passing two years (1840-1842) in the university of Penn- sylvania, he entered the United States military academy, from which he graduated with high honours in July 1846. Sent as a lieutenant of engineers to the Mexican War, he took part in the battles under General Scott, and by his

gallantry won the brevets of first-lieutenant at Contreras-Churubusco and captain at Chapultepec; he was afterwards detailed as assistant-instructor at West Point, and employed in explorations in the South-West and in Oregon. Promoted in 1855 captain of cavalry, he served on a military commission sent to Europe to study European armies and especially the war in the Crimea. On his return he furnished an able and interesting report, republished (1861) under the title of Armies of Europe. In 1856 hedesigned a saddle, which was afterwards well known as the McClellan. Resigning his commission in 1857, McClellan became successively chief engineer and vice-president of the Illinois Central railroad (1857- 1860), general superintendent of the Mississippi & Ohio railroad, and, a little later, president of the eastern branch of the same, with his residence in Cincinnati. When the Civil War broke out he was, in April 1861, made major-general of three months' militia by the governor of Ohio; but General Scott's favour at Washington promoted him rapidly (May 14) to the rank of major-general, U.S.A., in command of the department of the Ohio. Pursuant to orders, on the 26th of May, McClellan sent a small force across the Ohio river to Philippi, dispersed the Confederates there early in June, and immensely aided the Union

cause in that region by rapid and brilliant military successes, gained in the short space of eight days. These operations, though comparatively trivial as the Civil War developed, brought great results, in permanently dividing old Virginia by the creation of the state of West Virginia, and in presenting the first sharp, short and wholly successful campaign of the war.

Soon after the first Bull Run disaster he was summoned to Washington, and the Union hailed him as chieftain and preserver. Only thirty-four years old, and with military fame and promotion premature and quite in excess of positive experience, he reached the capital late in July and assumed command there. At first all was deference and compliance with his wishes. In November Scott retired that the young general might control the operations of the whole Union army. McClellan proved himself extra- ordinarily able as an organizer and trainer of soldiers. During the autumn, winter and spring he created the famous Army of the Potomac, which in victory and defeat retained to the end the impress of McClellan's work. But he soon showed petulance towards the civil authorities, from whom he came to differ con- cerning the political ends in view; and he now found severe critics, who doubted his capacity for directing an offensive war; but the government yielded to his plans for an oblique, instead of a direct, movement upon Richmond and the opposing army. At the . moment of starting he was relieved as general-in- chief. By the

5th of April a great army was safely transported to Fortress Monroe, and other troops were sent later, though a large force was (much against his will) retained to cover Wash- ington. McClellan laid slow siege to Yorktown, not breaking the thin line first opposed to him, but giving Johnston full time to reinforce and then evacuate the position. McClellan followed up the Confederate rearguard and approached Richmond, using White House on the Pamunkey as a base of supplies ; this entailed a division of his forces on either bank of the Chickahominy. At Fair Oaks (Seven Pines) was fought on the 31st of May a bloody battle, ending the following day in a Confederate repulse. Johnston being severely wounded, Lee came to command on the Southern side. After a pause in the operations McClellan felt himself ready to attack at the moment when Lee, leaving a bare handful of men in the Richmond lines, despatched two- thirds of his entire force to the north of the Chickahominy to strike McClellan's isolated right wing. McClellan himself made little progress, and the troops beyond the Chickahominy were defeated after a strenuous defence; whereupon McClellan planned, and during the celebrated Seven Days' Battle triumphantly executed, a change of base to the James river. But the result was strategically a failure, and General Halleck, who Was now general-in-chief, ordered the army to reinforce General Pope in central Virginia. The order was obeyed reluctantly.

Pope's disastrous defeats brought McClellan a new opportunity to retrieve his fame. Again in command of the Army of the Potomac, he was sent with all available forces to oppose Lee, who had crossed the Potomac into Maryland early in Sep- tember. McClellan advanced slowly and carefully, reorganizing his army as he went. The battle of South Mountain placed him in a position to attack Lee, and a few days later was fought the great battle of Antietam, in which Lee was worsted. But the Con- federates safely recrossed the Potomac, and McClellan showed his former faults in a tardy pursuit. On the eve of an aggressive movement, which he was at last about to make, he was super- seded by Burnside (Nov. 7). McClellan was never again ordered to active command, and the political elements opposed to the general policy of Lincoln's administration chose him as presidential candidate in 1864, on a platform which denounced the war as a failure and proposed negotiating with the South for peace. McClellan, while accepting his candidacy, repudiated the platform, like a soldier and patriot. At the polls on the 8th of November Lincoln was triumphantly re-elected president. McClellan had previously resigned his commission in the army, and soon afterwards went to Europe, where he remained until 1868. Upon his return he took up his residence in New York City, where (1868-1869) he was engaged in superintending

the construction of an experimental floating battery. In 1870-1872

he was engineer-in-chief of the city's department of docks. With Orange, N.J., as his next principal residence, he became governor of New Jersey (1878-1881). During his term he effected great reforms in the administration of the state and in the militia. He was offered, but declined, a second nomination. During his last years he made several tours of Europe, visited the East, and wrote much for the magazines. He also prepared monographs upon the Civil War, defending his own action. He died suddenly of heart-disease on the 29th of October 1885 at Orange.

McClellan was a clear and able writer and effective speaker; and his Own Story, edited by a friend and published soon after his death, discloses an honourable character, sensitive to reproach, and conscientious, even morbidly so, in his patriotism. He carried himself well in civil life and was of irreproachable private conduct. During the Civil War, however, he was promoted too early and rapidly for his own good, and the strong personal magnetism he inspired while so young developed qualities in- jurious to a full measure of success and usefulness, despite his great opportunities. The reasons for his final displacement in 1862 were both civil and military, and the president had been forbearing with him. As a soldier he possessed to an extra-ordinary degree the enthusiastic affection of his men. With the army that he had created the mere rumour of his presence was often a spur to the greatest exertions. That he was slow, and perhaps too tender-hearted, in handling armed masses for action may be admitted, and though admirable for defensive war and a safe strategist, he showed himself unfitted to take the highly essential initiative, both because of temperament and his habitual exaggeration of obstacles and opposing numbers. But he met and checked the armies of the Confederacy when they Were at their best and strongest, and his work laid the founda-tions of ultimate success.

His son, George Brinton McClellan (b. 1865), graduated in i88§ at Princeton (from which he received the degree of LL.D. in 1905), and became a newspaper reporter and editor in New York City. He identified himself with the Tammany Hall organizationˆ and in 1889-1892 was treasurer of the New York and Brooklyn Bridge under the city government. In 1892 he was admitted to the bar, and was elected to the board of aldermen, of which he was president in 1893

and 1894. In 1895-1903 he was a Democratic representative in Congress; in 1903 he was elected mayor of New York City on the Tammany ticket, defeating mayor Seth Low, the “Fusion” candidate; and in 1905 he was re-elected for a four-year term, defeating William M. Ivins (Republican) and William R. Hearst (Independence League). He published The Oligarchy of Venice (1904).

Besides the report mentioned above, General McClellart ‘wrote a Bayonet Exercise (1852); Report on Pacific Railroad Surveys (1854); Report on the Organization,. &c., of the Army of the Potomac (1864)* a government publication which he himself republished with the addition of a memoir of the West Virginian campaign. He also wrote a series of articles on the Russo-Turkish War for The North A merican Review. See memoir prefaced to McClellan’ s Own Story, and Michie, General McClellan (” Great Commanders ” series).

McCLERNAND, JOHN ALEXANDER (1812-1900), American soldier and lawyer, was born in Breckinridge county, Kentucky, on the 30th of May 1812. He was admitted to the bar in Shawneetown, Illinois, in 1832; in the same year served as a volunteer in the Black Hawk War, and in 1835 founded the Shawneetown Democrat, which he thereafter edited. As a Democrat he served in 1836 and in 1840-1843 in the Illinois House of Representatives, andin 1843-1851 and in 1859-1861 was a representative in Congress, where in his first term he vigorously opposed the Wilmot proviso, but in his second term was a strong Unionist and introduced the resolution of the 15th of July 1861, pledging money and men to the national government. He, resigned from congress, raised in Illinois the ” McClernand Brigade,” and was commissioned (May 17, 1861) brigadier- general of volunteers. He was second in command at the battle of Belmont (Missouri) in November 1861, and commanded the right wing at Fort Donelson. On the 21st of March he became a major-general of volunteers. At Shiloh he commanded a division, which was practically a reserve to Sherman’s. In October i£6r

Stanton, secretary of war, ordered him north to raise troops for the expedition against Vicksburg; and early in January 1864, at Milliken’s Bend, McClernand, who had been placed in command of one of the four corps of Grant’s army, superseded Sherman as the leader of the force that was to move down the Mississippi. On the nth of January he took Arkansas Post. On the 17th, Grant, after receiving the opinion of Admiral Foote and General Sherman that McClernand was unfit, united a part of his own troops with those of McClernand and assumed com- mand in person, and three days later ordered McClernand back to Milliken’s Bend. During the rest of this Vicksburg

campaign there was much friction between McClernand and his colleagues; he undoubtedly intrigued for the removal of Grant; it was Grant's opinion that at Champion's Hill (May 16) he was dilatory; and because a congratulatory order to his corps was published in the press (contrary to an order of the department and another of Grant) he was relieved of his command on the 18th of June, and was replaced by General E. O. C. Ord. Presi- dent Lincoln, who saw the importance of conciliating a leader of the Illinois War-Democrats, restored him to his command in : 1864, but McClernand resigned in November of that year. He was district judge of the Sangamon (Illinois) District in 1870-1873, and was president of the National Democratic Convention lin 1876. He died in Springfield, Illinois, on the 20th of Septem- ber 1900.

His son, Edward John McClernand (b. 1848), graduated at the U.S. Military Academy in 1870. He served on the frontier against the Indians, notably in the capture of Chief Joseph in October 1877, became lieutenant-colonel and assistant adjutant- general of volunteers in 1898, and served in Cuba in 1898-99. He was then ordered to the Philippines, where he commanded various districts, and from April 1900 to May 1901, when he was mustered out of the volunteer service, was acting military governor.

MACCLESFIELD, CHARLES GERARD, ist Earl or (c. 1618- : 1694), eldest son of Sir Charles Gerard, was a member of an old Lancashire family, his great-grandfather having been Sir Gilbert Gerard (d. 1593) of Ince, in that county, one of the most dis- tinguished judges in the reign of Elizabeth. His mother was Penelope Fitton of Gawsworth, Cheshire. Charles Gerard was educated abroad, and in the Low Countries learnt soldiering, in which he showed himself proficient when on the outbreak of the Civil War in England he raised a troop of horse for the king's ser- vice. Gerard commanded a brigade with distinction at Edgehill, and gained further honours at the first battle of Newbury and at Newark in 1644, f° r which service he was appointed to the chief command iri South Wales. Here his operations in 1644 and 1645 were completely successful in reducing the Parlia- mentarians to subjection; but the severity with which he ravaged the country made him personally so unpopular that when, after the defeat at Naseby in June 1645, the king endeavoured to raise fresh forces in Wales, he was compelled to remove Gerard from the local command. Gerard was, however, retained in command of the king's guard during Charles's march from Wales to Oxford, and thence to Hereford and Chester in August 1645; and having been severely wounded at Rowton Heath on the 23rd of Septem- ber, he reached Newark with Charles on the 4th of October. On the 8th of November 1645 he was created

Baron Gerard of Brandon in the county of Suffolk; but about the same time he appears to have forfeited Charles's favour by having attached himself to the party of Prince Rupert, with whom after the surrender of Oxford Gerard probably went abroad. He remained on the Continent throughout the whole period of the Common- wealth, sometimes in personal attendance on Charles II., at others serving in the wars under Turenne, and constantly en- gaged in plots and intrigues. For one of these, an alleged design on the life of Cromwell, his cousin Colonel John Gerard was executed in the Tower in July 1654. At the Restoration Gerard rode at the head of the king's life-guards in his triumphal entry into London; his forfeited estates were restored, and he received lucrative offices and pensions. In 1668 he retired from the command of the king's guard to make room for the duke of

Monmouth, receiving, according to Pepys, the sum of £12,000 as solatium. On the 23rd of July 1679 Gerard was created earl of Macclesfield and Viscount Brandon. A few months later he entered into relations with Monmouth, and co-operated with Shaftesbury in protesting against the rejection of the Exclusion Bill. In September 1685, a proclamation having been issued for his arrest, Macclesfield escaped abroad, and was outlawed. He returned with William of Orange in 1688, and commanded his body-guard in the march from Devonshire to London. By William he was made a privy councillor, and lord lieutenant of Wales and three western counties. Macclesfield died on the 7th of January 1694. By his French wife he left two sons and two daughters.

His eldest son Charles, 2nd earl of Macclesfield (c. 1659- 1701), was born in France and was naturalized in England by act of parliament in 1677. Like his father he was concerned in the intrigues of the duke of Monmouth; in 1685 he was sentenced to death for being a party to the Rye House plot, but was pardoned by the king. In 1689 he was elected member of parlia- ment for Lancashire, which he represented till 1694, when he succeeded to his father's peerage. Having become a major- general in the same year, Macclesfield saw some service abroad; and in 1701 he was selected first commissioner for the investiture of the elector of Hanover (afterwards King George I.) with the order of the Garter, on which occasion he also was charged to present a copy of the Act of Settlement to the dowager electress Sophia. He died on the 5th of November 1701, leaving no legitimate

children.

In March 1698 Macclesfield was divorced from his wife Anna, daughter of Sir Richard Mason of Sutton, by act of parliament, the first occasion on which a divorce was so granted without a previous decree of an ecclesiastical court. The countess was the mother of two children, who were known by the name of Savage, and whose reputed father was Richard Savage, 4th Earl Rivers (d. 1712). The poet Richard Savage (q.v.). claimed that he was the younger of these children. The divorced countess married Colonel Henry Brett about the year 1700, and died at the age of eighty-five in 1753- Her daughter Anna Margaretta Brett was a mistress of George I. The 2nd earl of Macclesfield '■ was succeeded by his brother Fitton Gerard, 3rd earl (c. 1665- 1702), on whose death without heirs the title became extinct in December 1702.

In 1721 the title of earl of Macclesfield was revived in favour of Thomas Parker (c. 1666-1732). The son of Thomas Parker, an attorney at Leek, young Parker was a student at Trinity College, Cambridge, and became a barrister in 1691. In 1705 he was elected member of parliament for Derby, and having gained some reputation in his profession, he took a leading part in the proceedings against Sacheverell in 17 10. In the same year he was appointed lord chief justice of the queen's bench, but he refused to become lord chancellor in the following year; however he accepted this office in 1718, two years after he had been made Baron Parker of Macclesfield by George L, who held him in high esteem. In 1721 he was created Viscount Parker and earl of Macclesfield, but when serious charges of corruption were brought against him he resigned his position as lord chan- cellor in 1725. In the same year Macclesfield was impeached, and although he made a very able defence he was found guilty by the House of Lords. His sentence was a fine of £30,000 and imprisonment until this was paid. He was confined in the Tower of London for six weeks, and after his release he took no further part in public affairs. The earl, who built a grammar school at Leek, died in London on the 28th of April 1732.

Macclesfield's only son, George, (c. 1697-1764) 2nd earl of Macclesfield of this line, was celebrated as an astronomer. As Viscount Parker he was member of parliament for Walling- ford from 1722 to 1727, but his interests were not in politics. In 1722 he became a fellow of the Royal Society, and he spent most of his time in astronomical observations at his Oxfordshire seat, Shirburn Castle, which had been bought by his father in 1716; here he built an observatory and a chemical laboratory. The earl was very prominent

in effecting the change from the old

to the new style of dates, which came into operation in 1752. His action in this matter, however, was somewhat unpopular, as the opinion was fairly general that he had robbed the people of eleven days. From 1752 until his death on the 17th of March 1764 Macclesfield was president of the Royal Society, and he made some observations on the great earthquake of 1755. His successor was his son Thomas (1723-1795), from whom the present earl is descended.

For the earls of the Gerard family see Lord Clarendon, History of the Rebellion, ed. by W. D. Macray; E. B. G. Warburton, Memoirs of Prince Rupert and the Cavaliers (3 vols., 1 849) ; State Papers of John Thurloe (7 vols., 1742); J. R. Phillips, Memoirs of the Civil War in Wales and the Marches, 1642-49 (2 vols., 1874) ; and the duke of Man- chester, Court and Society from Elizabeth to Anne (2 vols., 1864). For Lord Chancellor Macclesfield, see Lord C am pbell, Lives of the Lord Chancellors and Keepers of the Great Seal (1845-1869).

MACCLESFIELD, a market town and municipal borough in the Macclesfield parliamentary division of Cheshire, England, 166 m. N. W. by N. of London, on the London & Norths Western, North Staffordshire and Great Central railways. Pop. (1901), 34,624. It lies on and above the small river Bollin, the valley of which is flanked by high ground to east and west, the eastern hills rising sharply to heights above 1000 ft. The bleak upland country retains its ancient name of Macclesfield Forest. The church of St Michael, standing high, was founded by Eleanor, queen of Edward I., in 1278, and in 1740 was partly rebuilt and greatly enlarged. The lofty steeple by which its massive tower was formerly surmounted was battered down by the Parlia- mentary forces during the Civil War. Connected with the Church there are two chapels, one of which, Rivers Chapel, belonged to a college of secular priests founded in 1 501 by Thomas Savage/ afterwards archbishop of York. Both the church and chapels contain several ancient monuments. The free grammar sfhool, originally founded in 1502 by Sir John Percival, was refounded in 1552 by Edward VI., and a commercial school was erected in 1840 out of its funds. The county lunatic asylum is situated here. The town-hall is a handsome modern building with a Grecian frontage oti two sides. Originally the trade of Macclesfield was principally in twist and silk buttons, but this has developed into the manufacture of all kinds of silk. Besides this staple trade, there are various textile manufactures and extensive breweries; while stone and slate quarries, as well as coal-mines, are worked in the neighbourhood. Recreation grounds include Victoria Park and Peel Park, in which are preserved the old

market cross and stocks. Water communica- tion is provided by the Macclesfield canal. The borough is under a mayor, 12 aldermen and 36 councillors. Area, 3214 acres. The populous suburb of StjIton, extending S.S.E. of the town, is partly included in the borough.

Previous to the Conquest, Macclesfield (Makesfeld, Macker- feld, Macclesfeld, Meulefeld, Maxfield) was held by Edwin, earl of Mercia, and at the time of the Domesday Survey it formed a part of the lands of the earl of Chester. The entry speaks of seven hedged enclosures, and there is evidence of fortification in the 13th century, to which the names Jordangate, Chestergate and Wallgate still bear witness. In the 15th century Henry Stafford, duke of Buckingham, had a fortified manor-house here, traces of which remain. There is a tradition, supported by a reference on a plea roll, that Randle, earl of Chester (1181-1232) made Macclesfield a free borough, but the earliest charter extant is that granted by Edward, prince of Wales and earl of Chester, in 1261, constituting Macclesfield a free borough with a merchant gild, and according certain privileges in the royal forest of Mac- clesfield to the burgesses. This charter was confirmed by Edward III. in 1334, by Richard II. in 1389, by Edward IV. in 1466 and by Elizabeth in 1564. In 1595 Elizabeth issued a new charter to the town, confirmed by James I. in 1605 and Charles II. in 1666, laying down a formal borough constitution under a mayor, 2 aldermen, 24 capital burgesses and a high steward. In 1684 Charles II. issued a new charter, under which the borough was governed until the Municipal Reform Act 1835. The earliest mention of a market is in a grant by James I. to Charles, prince of Wales and earl of Chester, in ■1617. In the charter of 1666 a

market is included among the privileges confirmed to the borough as those which had been granted in 1605, or by any previous kings and queens of England. The charter of Elizabeth in 1595 granted an annual fair in June, and this was supplemented by Charles II. in 1684 by a grant of fairs in April and September. Except during the three winter months fairs are now held monthly, the chief being ” Barnaby ” in June, when the town keeps a week’s holiday. Macclesfield borough sent two members to parliament in 1832 for the first time. In 1880 it was dis- franchised for bribery, and in 1885 the borough was merged in the county division of Macclesfield. The manufacture of silk-covered buttons began in the 16th century, and flourished until the early 18th. The first silk mill was erected about 1755, and silk

manufacture on a large scale was introduced about 1790. The manufacture of cotton began in Macclesfield about 1785. See J. Corry, History of Macclesfield (18 1 7).

M'CLINTOCK, SIR FRANCIS LEOPOLD (1819-1907), British naval officer and Arctic explorer, was born at Dundalk, Ireland, on the 8th of July 1819, of a family of Scottish origin. In 183 1 he entered the royal navy, joining the " Samarang " frigate, Captain Charles Paget. In 1843 he passed his examination for lieutenancy and joined the " Gorgon " steamship, Captain Charles Hotham, which was driven ashore at Montevideo and salved, a feat of seamanship on the part of her captain and officers which attracted much attention. Hitherto, and until 1847, M'Clintock's service was almost wholly on the American coasts, but in 1848 he joined the Arctic expedition under Sir James Ross in search of Sir John Franklin's ships, as second lieutenant of the " Enterprise." In the second search expedition (1850) he was first lieutenant of the " Assistance," and in the third (1854) he commanded the " Intrepid." On all these expeditions M'Clintock carried out brilliant sleigh journeys, and gained recognition as one of the highest authorities on Arctic travel. The direction which the search should follow had at last been learnt from the Eskimo, and M'Clintock accepted the command of the expedition on board the " Fox," fitted out by Lady Franklin in 1857, which succeeded in its object in 1859 (see Franklin, Sin. John). For this expedition M'Clintock had obtained leave of absence, but the time occupied was afterwards counted in his service. He was knighted and received many other honours on his return. Active service now occupied him in various tasks, including the important one of sounding in the north Atlantic, in connexion with a scheme for a north Atlantic cable route, until 1868. In that year he became naval aide-de- camp to Queen Victoria. In 1865 he had been elected a fellow of the Royal Society. He unsuccessfully contested a seat in parliament for the borough of Drogheda, where he made the acquaintance of Annette Elizabeth, daughter of R. F. Dunlop of Monasterboice; he married her in 1870. He became vice- admiral in 1877, and commander-in-chief on the West Indian and North American station in 1879. In 1882 he was elected an Elder Brother of Trinity House, and served actively in that capacity. In 1891 he was created K.C.B. He was one of the principal advisers in the preparations for the Antarctic voyage of the "Discovery " under Captain Scott. His book, The Voyage of the " Fox " in the Arctic Seas, was first published in 1859, and passed through several editions. He died on the 17th of November 1907.

See Sir C. R. Markham, Life of Admiral Sir Leopold M'Clintock

(1909).

McCLINTOCK, JOHN (1814-1870), American Methodist Episcopal theologian and educationalist, was born in Phila- delphia on the 27th of October 18 14. He graduated at the university of Pennsylvania in 1835, and was assistant professor of mathematics (1836-1837), professor of mathematics (1837- 1840), and professor of Latin and Greek (1840-1848) in Dickinson College, Carlisle, Pennsylvania. He opposed the Mexican War and slavery, and in 1847 was arrested on the charge of instigating a riot, which resulted in the rescue of several fugitive slaves; his trial, in which he was acquitted, attracted wide attention. In 1848-1856 he edited The Methodist Quarterly Review (after

1885 The Methodist Review); from 1857 to i860 he was pastor of St Paul's (Methodist Episcopal) Church, New York City; and in 1860-1864 he had charge of the American chapel in Paris, and there and in London did much to turn public opinion in favour of the Northern States. In 1865-1866 he was chairman of the central committee for the celebration of the centenary of American Methodism. He retired from the regular ministry in 1865, but preached in New Brunswick, New Jersey, until the spring of 1867, and in that year, at the wish of its founder, Daniel Drew, became president of the newly established Drew theological seminary at Madison, New Jersey, where he died on the 4th of March 1870. A great preacher, orator and teacher, and a remarkably versatile scholar, McClintock by his editorial and educational work probably did more than any other man to raise the intellectual tone of American Methodism, and, par- ticularly, of the American Methodist clergy. He introduced to his denomination the scholarly methods of the new German theology of the day — not alone by his translation with Charles E. Blumenthal of Neander's Life of Christ (1847), and of Bungener's History of the Council of Trent (1855), but by his great project, McClintock and Strong's Cyclopaedia of Biblical, Theological and Ecclesiastical Literature (10 vols., 1867-1881; Supplement, 2 vols., 188 5-1887), in the editing of which he was associated with Dr James Strong (1822-1894), professor of exegetical theology in the Drew Theological Seminary from 1868 to 1893, and the sole editor of the last six volumes of the Cyclopaedia and of the supplement. With George Richard Crooks (1822-1897), his colleague at Dickinson College and in 1880-1897 professor of historical theology at Drew Seminary, McClintock edited several elementary textbooks in Latin and Greek (of which some were republished in Spanish), based on the pedagogical principle of " imitation and constant repetition." Among McClintock's other publications are: Sketches of Eminent Methodist Ministers

(1863); an edition of Richard Watson's Theological Institutes (1851); and The Life and Letters of Rev. Stephen Olin (1854).

See G. R. Crooks, Life and Letters of the Rev. Dr John McClintock (New York, 1876).

McCLOSKEY, JOHN (1810-1885), American cardinal, was born in Brooklyn, New York, on the 20th of March 1810. He graduated at Mt St Mary's College, Emmitsburg, Maryland, in 1827, studied theology there, was ordained a priest in 1834, and in 1837, after two years in the college of the Propaganda at Rome, became rector of St Joseph's, New York City, a charge to which he returned in 1842 after one year's presidency of St John's College (afterwards Fordham University), Fordham, New York, then just opened. In 1844 he was consecrated bishop of Axieren in partibus, and was made coadjutor to Bishop Hughes of New York with the right of succession; in 1847 he became bishop of the newly created see of Albany; and in 1864 he succeeded to the archdiocese of New York, then including New York, New Jersey, and New England. In April 1875 he was invested as a cardinal, with the title of Sancta Maria supra Minervam, being the first American citizen to receive this dignity. He attended the conclave of 1878, but was too late to vote for the new pope. In May 1879 he dedicated St Patrick's Cathedral in New York City, whose corner-stone had been laid by Archbishop Hughes in 1858. Archbishop Corrigan became his coadjutor in 1880 because of the failure of McCloskey's always delicate health. The fiftieth anniversary of his ordi- nation to the priesthood was celebrated in 1884. He died in New York City on the 10th of October 1885. He was a scholar, a preacher, and a man of affairs, temperamentally quiet and dignified; and his administration differed radically from that of Archbishop Hughes; he was conciliatory rather than polemic and controversial, and not only built up the Roman Catholic Church materially, but greatly changed the tone of public opinion in his diocese toward the Church.

M'CLURE, SIR ROBERT JOHN LE MESURIER (1807-1873), English Arctic explorer, born at Wexford, in Ireland, on the 28th of January 1807, was the posthumous son of one of Aber- crombie's captains and spent his childhood under the care of his godfather, General Le Mesurier, governor of Alderney, by

whom he was educated for the army. He entered the navy, however,

in 1824, and twelve years later gained his first experi- ence of Arctic exploration as mate of the ” Terror ” in the expedition (1836-1837) commanded by Captain (afterwards Sir) George Back. On his return he obtained his commission as lieutenant, and from 1838 to 1839 served on the Canadian lakes, being subsequently attached to the North American and West Indian naval stations, where he remained till 1846. Two years later he joined the Franklin search expedition (1848-1849) under Sir J. C. Ross as first lieutenant of the “Enterprise,” and on the return of this expedition was given the command of the ” Investigator ” in the new search expedition (1850-1854) which was sent out by way of Bering Strait to co-operate with another from the north-west. In the course of this voyage he achieved the distinction of completing (1850) the work connected with the discovery of a North-West Passage (see Polar Regions) . On his return to England, M’Clure was awarded gold medals by the English and French geographical societies, was knighted and promoted to post-rank, his commission being dated back four years in recognition of his special services. From 1856 to 1 86 1 he served in Eastern waters, commanding the division of the naval brigade before Canton in 1858, for which he received a C.B.in the following year. His latter years were spent in a quiet country life; he attained the rank of rear-admiral in 1867, and of vice-admiral in 1873.

See Admiral Sherard Osborn, The Discovery of a North-West Passage

(1856).

MacCOLL, MALCOLM (c. 1838-ˆ907), British clergyman and publicist, was the son of a Scottish farmer. He was educated at Trinity College, Glenalmond, for the Scotch Episcopal ministry, and after further study at the university of Naples was ordained in 1859, and entered on a succession of curacies in the Church of England, in London and at Addington, Bucks. He quickly became known as a political and ecclesiastical controversialist, wielding an active pen in support of W. E. Gladstone, who rewarded him with the living of St George’s, Botolph Lane, in 1 87 1, and with a canonry of Ripon in 1884. The living was practically a sinecure, and he devoted himself to political pamphleteering and newspaper correspondence, the result of extensive European travel, a wide acquaintance with the leading personages of the day, strong views on ecclesiastical sub- jects from a high-church standpoint, and particularly on the politics of the Eastern Question and Mahommedanism. He took a leading part in ventilating the Bulgarian and Armenian ” atrocities,” and his combative personality was constantly to the fore in support of the campaigns of Gladstonian Liberal- ism.- He died in London on the 5th of April 1907.

MCCOMBIE, WILLIAM (1805-1880), Scottish agriculturist, was born at Tillyfour, Aberdeenshire, where he founded the herd of black-polled cattle with which his name is associated. He was the first tenant farmer to represent a Scottish consti- tuency, and was returned to parliament, unopposed, as Liberal member for the western division of Aberdeen in 1868. He died unmarried in February 1880. His work Cattle and Cattle- breeders (1867) passed into a fourth edition in 1886.

MCCOOK, ALEXANDER MCDOWELL (1831-1903), American soldier, was born in Columbiana county, Ohio, on the 22nd of April 1831. He graduated at the U. S. military academy in 1852, served against the Apaches and Utes in New Mexico in 1853-57, was assistant instructor of infantry tactics at the military academy in 1858-1861, and in April 1861 became colonel of the 1 st Ohio Volunteers. He served in the first battle of Bull Run; commanded a brigade in Kentucky in the winter of 1861, a division in Tennessee and Mississippi early in 1862, and the 1st Corps in Kentucky in October of the same year; was in command of Nashville in November and December of that year ; and was then engaged in Tennessee until after the battle of Chickamauga, after which he saw no active service at the front during the Civil War. He was promoted to be brigadier- general of volunteers in September 1861, and to be major-general of volunteers in July 1862, earned the brevet of lieutenant-colonel in the regular army at the capture of Nashville, Tennessee,

that of colonel at Shiloh, and that of brigadier-general at Perryville, and in March 1865 was breveted major-general for his services during the war. In February-May 1865 he commanded the district of Eastern Arkansas. He resigned from the volunteer service in October 1865, was commissioned lieutenant-colonel of the 26th Infantry in March 1867, served in Texas, mostly in garrison duty, until 1874, and in 1886-1890 (except for brief terms of absence) commanded Fort Leaven- worth, Kansas, and the infantry and cavalry school there. He became a brigadier-general in 1890, and a major-general in 1894; retired in 1895; and in 1898-1899 served on a commission to investigate the United States department of war as administered during the war with Spain.

His father, Daniel McCook (1798-1863), killed at Buffing- ton's Island during General John H. Morgan's raid in Ohio, and seven of his eight brothers (three of whom were killed in battle) all served in the Civil War; this family and that of John McCook (1806-1865), Daniel's brother, a physician, who served as a volunteer surgeon in the Civil War, are known as the " fighting McCooks " — four of John's sons

served in the Union army and one in the Union navy.

John James McCook (b. 1845), the youngest brother of Alexander McDowell McCook, served in the West and after- wards in the army of the Potomac, was wounded at Shady Grove, Virginia, in 1864, and in 1865 was breveted lieutenant- colonel of volunteers; he graduated at Kenyon College in 1866, subsequently practised law in New York City, where he became head of the firm Alexander & Green; was a prominent member of the Presbyterian Church, and was a member of the prosecuting committee in the Briggs heresy trial in 1892-1893.

His cousin, Anson George McCook (b. 1835), a son of John, was admitted to the Ohio bar in 1861, served throughout the Civil War in the Union Army, and was breveted brigadier- general of volunteers; he was a Republican representative in Congress from New York in 1877-1883; and in 1884-1893 was secretary of the United States Senate.

Another son of John McCook, Edward Moody McCook (1 833-1 909), was an efficient cavalry officer in the Union army, was breveted brigadier-general in the regular army and major- general of volunteers in 1865, was United States minister to Hawaii in 1866-1869, and was governor of Colorado Territory in 1869-1873, and in 1874-1875.

His brother, Henry Christopher McCook (b. 1837), was first lieutenant and afterwards chaplain of the 41st Illinois, was long pastor of the Tabernacle Presbyterian Church in Phila- delphia, and was president of the American Presbyterian Historical Society, but is best known for his popular and excel- lent works on entomology, which include: The Mound-mcking Ants of the Alleghanies (1877); The Natural History of the Agricultural Ants of Texas (1879); Tenants of an Old Farm (1884) ; American Spiders and their Spinning-work (3 vols., 1889- 1893), Nature's Craftsmen (1907) and Ant Communities (1909). Another brother, John James McCook (b. 1843), a cousin of the lawyer of the same name, was a 2nd lieutenant of volun- teers in the Union army in 1861; graduated at Trinity College, Hartford, Connecticut, in 1863, and at the Berkeley divinity school in 1866; entered the Protestant Episcopal ministry in 1867, and in 1869 became rector of St John's, East Hartford, Connecticut; became professor of modern languages in Trinity College, Hartford, in 1883; in 1895-1897 was president of the board of directors of the Connecticut reformatory; and wrote on prison reform and kindred topics.

MACCORMAC, SIR WILLIAM, Bart. (1836-1901), Irish surgeon, was born at Belfast on the 17th of January 1836, being the son of Dr

Henry MacCormac. He studied medicine and surgery at Belfast, Dublin and Paris, and graduated in arts, medicine and surgery at the Queen's University of Ireland, in which he afterwards became an examiner in surgery. He began practice in Belfast, where he became surgeon to the General Hospital, but left it for London on his marriage in 1861 to Miss Katherine M. Charters. In the Franco-German War of 1870 he was surgeon-in-chief to the Anglo-American Ambulance,

and was present at iSedan; and he also went through the Turco-Servian War of 1876. He became in this way an authority on gun-shot wounds, and besides being highly successful as a surgeon Was very popular in society, his magnificent physique and Irish temperament making him a notable and attractive personality. In 1 88 1 he was appointed assistant-surgeon at St Thomas's Hospital, London, and for twenty years continued his work there as surgeon, lecturer and consulting surgeon. In 1881 he acted as honorary secretary-general of the International Medical Congress in London, and was knighted for his services. In 1883 he was elected member of the council of the College of Surgeons, and in 1887 a member of the court of examiners; in 1893 he delivered the Bradshaw lecture, and' in 1896 was ejected president, being re-elected to this office in 1897, 1898,1899, and 1900 (the centenary year of the college), an unprecedented record. In 1897 he was created a baronet, and appointed surgeon-in-ordinary to the prince of Wales. In 1899 he was Hunterian Orator. In the same year he volunteered to go out to South Africa as consulting surgeon to the forces, and from November 1899 to April 1900 he saw much active service both in Cape Colony and Natal, his assistance being cordially ac- knowledged on his return. In 1901 he was appointed honorary serjeant-surgeon to the king. But during 1898 he had suffered from a prolonged illness, and he had perhaps put too ihuch strain on his strength, for on the 4th of December 1901 he died somewhat suddenly at Bath. Besides treatises on Swgical Operations and Antiseptic Surgery, and numerous contributions to the medical journals, MacCormac was the author of Work under the Red Cross and of an interesting volume commemorat- ing the centenary of the Royal College of Surgeons in 1900. The latter contains biographical notices of all the masters and presidents up to that date.

MCCORMICK, CYRUS HALL (i 809-1 884), American inventor of grain-harvesting machinery, was born at Walnut Gr6ve, in what is now Roane county, W. Va.,U.S. A., on the 1 5th of February 1809. His

father was a farmer who had invented numerous labour-saving devices for farm work, but after repeated efforts had failed in his attempts to construct a successful grain-cutting machine. In 1831, Cyrus, then twenty-two years old, took up the problem, and after careful study constructed a machine which was successfully employed in the late harvest of 1831 and patented in 1834. The McCormick reaper after further im- provements proved a complete success; and in 1847 the inventor removed to Chicago, where he established large works for manu- facturing his agricultural machines. William H. Seward has said of McCormick's invention, that owing to it " the line of civilization moves westward thirty miles each year." Numerous prizes and medals were awarded for his reaper, and he was elected a corresponding member of the French Academy of Sciences, "as having done more for the cause of agriculture than any other living man." He died in Chicago on the 13th of May 1884.

See Herbert N. Casson, Cyrus Hall McCormick: his Life and Work (Chicago, 1909).

MeCOSH, JAMES (1811-1894), Scottish philosophical writer, was born of a Covenanting family in Ayrshire, on the 1st of April 181 1. He studied at Glasgow and Edinburgh, receiving at the latter university his M.A., at the suggestion of Sir William Hamilton, for an essay on the Stoic philosophy. He became a minister of the Established Church ofScotland, first at Arbroath and then at Brechin, and took part in the Free Church movement of 1843. In 1852 he was appointed professor of logic and meta- physics in Queen's College, Belfast; and in 1868 was chosen president and professor of philosophy of the college of New Jersey, at Princeton. He resigned the presidency in 1888, but continued as lecturer on philosophy till his death on the 1 6th of November 1894. He was most successful in college administration, a good lecturer and an effective preacher. His general philosophical attitude and method were Hamiltonian; he insisted on severing religious and philosophical data from merely physical, and though he added little to original thought, he clearly, restated and vigorously used the conclusions of

others. In his controversial writings he often failed to under- stand the real significance of the views which he attacked, and much of his criticism is superficial.

His chief works are : Method of Divine Government, Physical ana Moral (Edinburgh, 1850, 5th ed., 1856, and frequently republished in New York) ; The Typical Forms and Special Ends in Creation (Edinburgh, 1855; new editions, New York, 18671-1880); Intuitions of

the Mind inductively investigated (London and New York, i860; 3rd rev. ed., 1872); An Examination of Mr J. S. Mill's Philosophy (London and New York, 1866; enlarged 1871, several eds.); Philo- sophical Papers containing (1) " Examination of Sir W. Hamilton's Logic," (2) " Reply to Mr Mill's third edition," and (3) " Present State of Moral Philosophy in Britain;" Religious Aspects of Evolution (New York, 1888, 2nd ed., 1890). For a complete list of his writings see J. H. Dulles, McCosh Bibliography (Princeton, 1895).

McCOY, SIR FREDERICK (1823-1899), British palaeontolo- gist, the son of Dr Simon McCoy, was born in Dublin in 1823, and was educated in that city for the medical profession. His interests, however, became early centred in natural history, and especially in geology, and at the age of eighteen he published a Catalogue of Organic Remains compiled from specimens exhibited in the Rotunda at Dublin (1841). He assisted Sir R. J. Griffith (q.v.) by studying the fossils of the carboniferous and silurian rocks of Ireland, and they prepared a joint Synopsis of the. , Silurian Fossils of Ireland (1846). In 1846 Sedgwick secured his services, and for at least four years he devoted himself to the determination and arrangement of the fossils in the Woodwardian Museum at Cambridge. Sedgwick wrote of him as " an excellent naturalist, an incomparable and most philosophical palaeontologist, and one of the steadiest and quickest workmen that ever undertook the arrangement of a museum" (Life and Letters of Sedgwick, ii. 194). Together they prepared the important and now classic work entitled A Synopsis of the Classification of the British Palaeozoic Rocks, with a Systematic Description of the British Palaeozoic Fossils in the Geological Museum of the University of Cambridge (1855). Meanwhile McCoy in 1850 had been appointed pro- fessor of geology in Queen's College, Belfast, and in 1854 he accepted the newly founded professorship of natural science in the university of Melbourne. There he lectured for upwards of thirty years; he established the National Museum of Natural History and Geology in Melbourne, of which he was director; and becoming associated with the geological survey of Victoria as palaeontologist, he issued a series of decades entitled Pro- dromus of the Palaeontology of Victoria. He also issued the Prodromus of the Zoology of Victoria. To local societies he contributed many papers, and he continued his active scientific work for fifty-eight years — his last contribution, " Note on a new Australian Pterygotus," being printedin the Geological Magazine for May 1899, He was elected F.R.S. in 1880, and was one of the first to receive the Hon. D.Sc. from the university of : Cambridge. In 1886 he was made C.M.G., and in 1891 K.C.M.G. He died in Melbourne on the 16th of May 1899.

Obituary (with bibliography) in Geol. Mag. 1899, p. 283. M'CRIE, THOMAS (1772-1835), Scottish historian and divine, was born at Duns in Berwickshire in November 1772. He studied in Edinburgh University, and in 1796 he was ordained minister of the Second Associate Congregation, Edinburgh In i8o6j however, with some others M'Crie seceded from the "general associate synod," and formed the "constitutional associate presbytery," afterwards merged in the " original seceders." He was consequently deposed by the associate syno'd, and his congregation withdrew with him and built another place of worship in which he officiated until his death. M'Crie devoted himself to investigations into the history, constitution arid polity of the churches of the Reformation; and the first-fruits of his study were given to the public in November 181 1 as The Life of John Knox, containing Illustrations of the History of the Reformation in Scotland, which procured for the author the degree of D.D. from Edinburgh University, an honour conferred then for the first time upon a Scottish dissenting minister. This work, of great learning and value, exercised an important influence on public opinion at the time.

At the solicitation of his friend Andrew Thomson, M'Crie became a contributor to The Edinburgh Christian Instructor, and in 1817 he subjected some of Sir W. Scott's works to a criticism which took the form of a vindication of the Covenanters. Preserving the continuity of his historical studies, he followed up his first work with The Life of Andrew Melville (1819). In 1827 he published a History of the Progress and Suppression of the Reformation in Italy, and in 1829 a History of the Progress and Suppression of the Reformation in Spain.

His latest literary undertaking was a life of John Calvin. Only three chapters were completed when the writer died on the 5th of August 1835, leaving four sons and one daughter.

See Thomas M'Crie (1797-1875), Life of T. M'Crie (1840), and Hugh Miller, My Schools and Schoolmasters (1869);

MACCULLAGH, JAMES (1809-1847), Irish mathematician and physicist, was born in 1809, near Strabane, Ireland. After a brilliant career at Trinity College, Dublin, he was elected fellow in 1832. From 1832 to 1843 he held the chair of mathe- matics; and during his tenure of this post he improved in a most marked manner the position of his university as a mathe- matical centre. In 1843 he was

transferred to the chair of natural philosophy. Overwork, mainly on subjects beyond the natural range of his powers, induced mental disease; and he died by his own hand in October 1847.

His Works were published in 1880. Their distinguishing feature is the geometry — which has rarely been applied either to pure space problems or to known physical questions such as the rotation of a rigid solid or the properties of Fresnel's wave-surface with such singular elegance; in this respect his work takes rank with that of Louis Poinsot. One specially remarkable geometrical discovery of MacCullagh's is that of the "modular generation of surfaces of the second degree "; and a noteworthy contribution to physical optics is his " theorem of the polar plane." But his methods, which, in less known subjects, were almost entirely tentative, were altogether inadequate to the solution of the more profound physical problems to. which his attention was mainly devoted, such as the theory of double refraction, &c. See G. G. Stokes's " Report on Double Refraction " (B. A. Report, 1862).

MACCULLOCH, HORATIO (1805-1867), Scottish landscape painter, was born in Glasgow. He studied for a year under John Knox, a Glasgow landscapist of some repute, was then engaged at Cumnock, painting the ornamental lids of snuff- boxes, and afterwards employed in Edinburgh by Lizars, the engraver, to colour the illustrations in Selby's British Birds and similar works. Meanwhile he was working unweariedly from nature, greatly influenced in his early practice by the water- colours of H. W. Williams. Returning to Glasgow in some four or five years, he was employed on several large pictures for the decoration of a public hall in St George's Place, and he did a little as a theatrical scene-painter. About this time he was greatly impressed with a picture by Thomson of Duddingston. Gradually MacCulloch asserted his individuality, and formed his own style on a close study of nature; his works form an inter- esting link between the old world of Scottish landscape and the new. In 1829 MacCulloch first figured in the Royal Scottish Academy's exhibition, and year by year, till his death on the 24th of June 1867, he was a regular exhibitor. In 1838 he was elected a member of the Scottish Academy. The subjects of his numerous landscapes were taken almost exclusively from Scottish scenery.

Several works by MacCulloch were engraved by William Miller and William Forrest, and a volume of photographs from his landscapes, with an excellent biographical notice of the artist by Alexander Fraser, R.S.A., was published in Edinburgh in 1872.

McCULLOCH, HUGH (1808-1895), American financier, was born at Kennebunk, Maine, on the 7th of December 1808. He was educated at Bowdoin College, studied law in Boston, and in 1833 began practice at Fort Wayne, Indiana. He was cashier and manager of the Fort Wayne branch of the old state bank of Indiana from 1835 to 1857, and president of the new state bank from 1857 to 1863. Notwithstanding his opposition to the National Banking Act of 1862, he was selected by Secretary Chase as comptroller of the currency in 1S63 to put the new system into operation. His work was so successful that he was

appointed secretary of the treasury by President Lincoln in 1865, and was continued in office by President Johnson until the close of his administration in 1869. In his first annual report, issued on the 4th of December 1865, he strongly urged the retirement of the legal tenders or greenbacks as a preliminary to the resumption of specie payments. In accordance with this suggestion an act was passed, on the 12th of March 1866, author- izing the retirement of not more than $10,000,000 in six months and not more than $4,000,000 per month thereafter, but it met with strong opposition and was repealed on the 4th of February 1868, after only $48,000,000 had been retired. He was much disappointed by the decision of the United States Supreme Court upholding the constitutionality of the legal tenders (12 Wallace 457). Soon after the close of his term of office McCulloch went to England, and spent six years (1870-1876) as a member of the banking firm of Jay Cooke, McCulloch & Co. From October 1884 until the close of President Arthur's term of office in March 1885 he was again secretary of the treasury. He died at his home near Washington, D.C., on the 24th of May 1895.

The chief authority for the life of McCulloch is his own book, Men and Measures of Half a Century (New York, 1888).

M'CULLOCH, SIR JAMES (1819-1893), Australian statesman, was born in Glasgow. He entered the house of Dennistoun Brothers, became a partner, and went to Melbourne to open a branch. In 1854, shortly after his arrival in Victoria, he was appointed a nominee member of the Legislative Council, and in the first Legislative Assembly under the new constitution was returned for the electorate of the Wimmera. In 1857 he was appointed minister of trade and customs in the second ministry of Haines, which lasted till 1858, and subsequently he became treasurer in the Nicholson administration, which held office from October 1859 to November i860. In June 1862 the third O'Shanassy ministry was defeated by a combination between a section of its supporters led by M'Culloch and the opposition proper under Heales, and M'Culloch became premier and chief secretary. Hitherto

he had been regarded as a supporter of the landed, squatting and importing interests, but the coalition ministry introduced a number of measures which at the time were regarded by the propertied classes in the colony as revolu- tionary; In addition to passing a Land Bill, which extended the principle of free selection and deferred payments, the ministry announced their intention of reducing the duties on the export of gold and the import duties upon tea and sugar, and of supply- ing the deficiency by the imposition of duties ranging from 5 to 10% upon a number of articles which entered into competition with the local industries, thus introducing protection. The mercantile community took alarm at the proposal, and at the general election of 1864 the ministerial policy was warmly opposed. But a majority was returned in its favour, and a new tariff was carried through the popular branch of the legislature. There was no probability of its being assented to by the Council, which, under the constitution, had the power of rejecting, although it could not amend, any money Bill. The government therefore decided upon tacking the tariff to the Appropriation Bill, and compelling the Council either to agree to the new fiscal proposals or to refuse to pay the public creditors and the civil servants. The Council accepted the challenge, and rejected the Appropriation Bill. But M'Culloch and his colleagues would not give way. They continued to collect the new duties under the authority of the Assembly, and took advantage of a clause in the Audit Act which directed the governor to sign the necessary warrants for the payment of any sum awarded by verdicts in the supreme court in favour of persons who had sued the government. M'Culloch borrowed £40,000 from the London Chartered Bank, of which he was a director, to meet pressing payments, and the bank at his instigation sued the government for the amount of the advance. The attorney-general at once accepted judgment, and the governor, who had placed himself unreservedly in the hands of his ministers, signed the necessary warrant, and the Treasury repaid to the bank the amount of its advance, plus interest and costs. In the next session the tariff was again sent up to the Council, which promptly rejected it,

whereupon the ministry dissolved the assembly and appealed to the country. The result of the general election was to increase M'Culloch's majority, and the tariff was again sent to the Council, only to be again rejected. M'Culloch resigned, but no member of the opposition was willing to form a ministry, and he resumed office. Eventually a conference between the two houses was held, and the Council passed

the tariff, after a few modifications in it had been agreed to by the Assembly. Just at the moment that peace was restored, the governor, Sir Charles Darling, was recalled by the home government, on the ground that he had displayed partisanship by assisting M'Culloch's government and their majority in the Assembly to coerce the Council. In order to show their gratitude to the dis- missed governor, the Assembly decided to grant a sum of £20,000 to Lady Darling. The home government intimated that Sir Charles Darling must retire from the Colonial service if this gift were accepted by his wife, but M'Culloch included the money in the annual Appropriation Bill, with the result that it was' re- jected by the Council. The new governor, Viscount Canterbury, was less complaisant than his predecessor, but after an unsuc- cessful attempt to obtain other advisers, he agreed to recommend the Council to pass the Appropriation Bill with the £20,000 grant included. The Upper House declined to adopt this course, and again rejected the Bill. A long and bitter struggle between the two Chambers ended in another general election in 1868, which still further increased the ministerial majority; but Lord Canterbury, in obedience to instructions from the colonial office, declined to do anything to facilitate the passage of the Darling grant. M'Culloch resigned, and after protracted negotiations Sir Charles Sladen formed from the minority in the Assembly a ministry which only lasted two months. The deadlock seemed likely to become more stringent than ever, when a communica- tion was received from Sir Charles Darling, that neither he nor his wife could receive anything like a donation from the people of Victoria. The attempt to pass the grant was therefore aban- doned, and in July 1868 M'Culloch resumed office with different colleagues, but resigned in the following year, when he was knighted. He formed a third ministry in 1870. During this third administration he passed a measure through both Houses which secured a life annuity of £1000 per annum to Lady Darling. Additional taxation being necessary, Sir James M'Culloch was urged by his protectionist supporters to increase the import duties, but he refused, and proposed to provide for the deficit by levying a tax upon town, suburban and country property. This proposal was defeated in the Assembly; Sir James resigned in June 1871, and was appointed agent-general for Victoria in London. He held that appointment till 1873, was created K.C.M.G. in 1874, returned to the colony the same year, and in 1875 formed his fourth and last ministry, which kept power till May 1877, when his party was defeated at the general elec- tion. During his eighteen months of office he had to encounter a persistent opposition from Berry and his followers, who systematically obstructed the business of the Assembly, on the ground that the acting-governor, Sir William Stawell, had improperly refused a

dissolution. Sir. James M'Culloch, to counteract this obstruction, invented the closure, which was afterwards introduced with some modifications into the house of commons. After his defeat in 1877 Sir James retired from public life and returned to England, where he died on the 30th of January 1893 at Ewell, Surrey. He was twice married—first, in 1841, to Susan, daughter of the Rev. James Renwick, of Muirton, Scotland; secondly, in 1867, to Margaret, daughter of William Inglis, of Walflat, Dumbartonshire. He left the house of Dennistoun Brothers in 1862, and founded a new firm at Melbourne in conjunction with Leishman, Inglis & Co. of London, under the title of M'Culloch, Sellars & Co. He held several important commercial positions, and was president of the Melbourne Chamber of Commerce. (G C L)

MACCULLOCH, JOHN (1773-1835), Scottish geologist, de- scended from the Maccullochs of Nether Ardwell in Galloway, was born in Guernsey, on the 6th of October 1773, his mother being a native of that island. Having displayed remarkable

powers as a boy, he was sent to study medicine in the university of Edinburgh, where he qualified as M.D. in 1793, and then entered the army as assistant surgeon. Attaching himself to the artillery, he became chemist to the board of ordnance (1803). He still continued, however, to practise for a time as a physician, and during the years 1807-1811 he resided at Blackheath. In 181 1 he communicated his first papers to the Geological Society. They were devoted to an elucidation of the geological structure of Guernsey, of the Channel Islands, and of Heligoland. The evidence they afforded of his capacity, and the fact that he already had received a scientific appointment, probably led to his being selected in the same year to make some geological and mineralogical investigations in Scotland. He was asked to report upon stones adapted for use in powder-mills, upon the suitability of the chief Scottish mountains for a repetition of the pendulum experiments previously conducted by Maskelyne and Playfair at Schiehallion, and on the deviations of the plumb-line along the meridian of the Trigonometrical Survey. In the course of the explorations necessary for the purposes of these reports he made extensive observations on the geology and mineralogy of Scotland. He formed also a collection of the mineral productions and rocks of that country, which he presented to the Geological Society in 18 14. In that year he was appointed geologist to the Trigonometrical Survey; and in 1816-1817 he was president of the Geological Society. Comparatively little had been done in the investigation of Scottish geology, and finding the field so full of promise, he devoted himself to its cultivation with great ardour. One of his most important labours was

the examination of the whole range of islands along the west of Scotland, at that time not easily visited, and presenting many obstacles to a scientific explorer. The results of this survey appeared (18 19) in the form of his Description of the Western Islands of Scotland, including the Isle of Man (2 vols. 8vo, with an atlas of plates in 4to), which forms one of the classical treatises on British geology. He was elected F.R.S. in 1820. He continued to write papers, chiefly on the rocks and minerals of Scotland, and had at last gathered so large an amount of information that the government was pre- vailed upon in the year 1826 to employ him in the preparation of a geological map of Scotland. From that date up to the time of his death he returned each summer to Scotland and traversed every district of the kingdom, inserting the geological features upon Arrowsmith's map, the only one then available for his purpose. He completed the field-work in 1832, and in 1834 his map and memoir were ready for publication, but these were not issued until 1836, the year after he died. Among his other works the following may be mentioned: A Geological Classifi- cation of Rocks with Descriptive Synopses of the Species and Varieties, comprising the Elements of Practical Geology (182 1); The Highlands and Western Isles of Scotland, in a series of letters to Sir Walter Scott (4 vols. 1824); A System of Geology, with a Theory of the Earth and an Examination of its Connexion with the Sacred Records (2 vols. 1831). During a visit to Cornwall he was killed by being dragged along in the wheel of his carriage, on the 2 1 st of August 1835.

_ In penning an obituary notice, C. Lyell in 1836 (Proc. Geol. Soc. «• 357.) acknowledged " with gratitude " that he had " received more instruction from Macculloch's labours in geology than from those of any living writer."

M'CULLOCH, JOHN RAMSAY (1789-1864), British economist and statistician, was born on the 1st of March 1789 at Whithorn in Wigtownshire. His family belonged to the class of " states- men," or small landed proprietors. He was for some time employed at Edinburgh as a clerk in the office of a writer to the signet. But, the Scotsman newspaper having been estab- lished at the beginning of 1817, M'Culloch sent a contribution to the fourth number, the merit of which was at once recognized; he soon became connected with the management of the paper, and during 1818 and 18 19 acted as editor. Most of his articles related to questions of political economy, and he delivered lectures in Edinburgh on that science. He now also began to write on subjects of the same class in the Edinburgh Review,

his first contribution being an article on Ricardo's Principles of Political Economy in 1818. Within the next few years he gave both public lectures and private instruction in London on political economy. In 1823 he was chosen to fill the lecture- ship established by subscription in honour of the memory of Ricardo. A movement was set on foot in 1825 by Jeffrey and others to induce the government to found in the university of Edinburgh a chair of political economy, separate from that of moral philosophy, the intention being to obtain the appointment for M'Culloch. This project fell to the ground; but in 1828 he was made professor of political economy in London University. He then fixed his residence permanently in London, where he continued his literary work, being now one of the regular writers in the Edinburgh Review. In 1838 he was appointed comptroller of the stationery office; the duties of this position, which he held till his death, he discharged with conscientious fidelity, and introduced important reforms in the management of the department. Sir Robert Peel, in recognition of the services he had rendered to political science, conferred on him a literary pension of £200 per annum. He was elected a foreign associate of the Institute of France (Academie des sciences morales et politiques). He died in London, after a short illness, on the nth of November 1864, in the seventy-sixth year of his age. To his personal character and social qualities very favourable testimony was borne by those who knew him best. In general politics he always remained a Whig pure and simple; though he was in intimate relations with James Mill and his circle, he never shared the Radical opinions of that group.

M'Culloch cannot be regarded as an original thinker on political economy. He did not contribute any new ideas to that science, or introduce any noteworthy correction of the views, either as to method or doctrine, generally accepted by the dominant school of his day. But the work he did must be pronounced, in relation to the wants of his time, a very valuable one. His name will probably be less permanently associated with anything he has written on economic science, strictly so called, than with his great statistical and other compilations. His Dictionary of Commerce and Commercial Navigation (1832) and his Statistical Account of the British Empire (1837) remain imposing monuments of his extensive and varied knowledge and his indefatigable industry. Another useful work of reference, also the fruit of wide erudition and much labour, is his Literature of Political Economy (1845). Though weak on the side of the foreign literature of the science, it is very valuable as a critical and biographical guide to British writers.

McCULLOUGH, JOHN EDWARD (1837-1885), American actor, was born in Coleraine, Ireland, on the 2nd of November 1837. He went to America at the age of sixteen, and made his first appearance on the stage at the Arch Street Theatre, Phila- delphia, in 1857. In support of Edwin Forrest and Edwin Booth he played second roles in Shakespearian and other tragedies, and Forrest left him by will all his prompt books. Virginius was his greatest success, although even in this part and as Othello he was coldly received in England (1881). In 1884 he broke down physically and mentally, and he died in an asylum at Philadelphia on the 8th of November 1885.

MACCUNN, HAMISH (1868-), Scottish musical com- poser, was born at Greenock, the son of a shipowner, and was educated at the Royal College of Music. His first success was with the overture Land of the Mountain and Flood in 1887 at the Crystal Palace, and this was followed by other composi- tions, with a characteristic Scottish colouring. From 1888 to 1894 he was a professor at the Royal College of Music, and this latter year saw both his marriage to a daughter of John Pettie, R.A., and the production of his opera Jeanie Deans at Edin- burgh. He was for some years conductor to the Carl Rosa Opera company, and subsequently to other companies. His opera Diarmid was produced at Covent Garden in 1897, and his other music includes cantatas, overtures, part-songs, instru- mental pieces, and songs, all markedly Scottish in type.

MACDONALD, FLORA (17 22-1 790), Jacobite heroine, was the daughter of Ranald Macdonald of Milton in the island of South Uist in the Hebrides, and his wife Marion the daughter of Angus Macdonald, minister of South Uist. Her father died when she was a child, and her mother was abducted and

married by Hugh Macdonald of Armadale. She was brought up under the care of the chief of her clan, Macdonald of Clanranald, and was partly educated in Edinburgh. In June 1746 she was living in Benbecula in the Hebrides when Prince Charles Edward (q.v.) took refuge there after the battle of Culloden. The prince's companion, Captain O'Neill, sought her help. The island was held for the government by the local militia, but the secret sympathies of the Macdonalds were with the Jacobite cause. After some hesitation Flora promised to help. At a, later period she told the duke oi Cumberland, son of George III. and commander-in-chief in Scotland, that she acted from charity and would have helped him also if he had been defeated and in distress, a statement which need not be accepted as quite literally true. The commander of the militia in the island, a Macdonald, who was probably admitted into the secret, gave her a

pass to the main- land for herself, a manservant, an Irish spinning maid, Betty Burke, and a boat's crew of six rrfen. The prince was disguised as Betty Burke. After a first repulse at Waternish, the party landed at Portree. The prince was hidden in a cave while Flora Macdonald found help for him in the neighbourhood, and was finally able to escape. He had left Benbecula on the 27th of June. The talk of the boatmen brought suspicion on Flora Macdonald, and she was arrested and brought to London. After a short imprisonment in the Tower, she was allowed to live outside of it, under the guard of a " messenger " or gaoler. When the Act of Indemnity was passed in 1747 she was left at liberty. Her courage and loyalty had gained her general sympathy, which was increased by her good manners and gentle character. Dr Johnson, who saw her in 1773, describes her as " a woman of soft features, gentle manners and elegant pres- ence." In 1750 she married Allen Macdonald of Kingsburgh, and in 1773 they emigrated to America. In the War of Inde- pendence he served the British government and was taken prisoner. In 1779 his wife returned home in a merchant ship which was attacked by a privateer. She refused to leave the deck during the action, and was wounded in the arm. She died on the 5th of March 1790. There is a statue to her memory in Inverness. Flora Macdonald had a large family of sons, who mostly entered the army or navy, and two daughters.

See A. C. Ewald, Life and Times of Prince Charles Edward (1886). The so-called Autobiography of Flora Macdonald, published by her grand-daughter F. F. Walde (1870) is of small value.

MACDONALD, GEORGE (1824-1905), Scottish novelist and poet, was born at Huntly, Aberdeenshire. His father, a farmer, was one of the Macdonalds of Glencoe, and a direct descendant of one of the families that suffered in the massacre. Macdonald's youth was passed in his native town, under the immediate influence of the Congregational Church, and in' an atmosphere strongly impregnated with Calvinism. He took his degree at Aberdeen University, and migrated thence to London, studying at Highbury College for the Congregational ministry. In 1850 he was appointed pastor of Trinity Congre- gational Church, Arundel, and, after resigning, his cure there, was engaged in ministerial work in Manchester. His health, however, was unequal to the strain, and after a short sojourn in Algiers he settled in London and adopted the profession of literature. – In 1856 he published his first book, Within and Without, a dramatic poem; following it in 1857 with a volume of Poems, and in 1858 by the delightful " faerie romance " Phantasies. His first conspicuous success was achieved in 1862 with David Elginbrod, the forerunner of a number of popular novels, which include Alec Forbes of Howglen (1865), Annals of a

Quiet Neighbourhood (1866), Robert Falconer (1868), Malcolm (1875), The Marquis of Lossie (1877), and Donal Grant (1883). He was for a time editor of Good Words for the Young, and lec- tured successfully in Americain 1872-1873. He wrote admirable stories for the young, and published some volumes of sermons. In 1877 he was given a civil list pension. He died on the 1 8th of September 1905.

Both as preacher and as lecturer on literary topics George Macdonald's sincerity and moral enthusiasm exercised great

influence upon thoughtful minds. His verse is homely and direct, and marked by religious fervour and simplicity. As a portrayer of Scottish peasant-life in fiction he was the precursor of a large school, which has benefited by his example, and sur- passed its original leader in popularity. The religious tone of his novels is relieved by tolerance and a broad spirit of humour, and the simpler emotions of humble life are sympathetically treated.

MACDONALD, SIR HECTOR ARCHIBALD (1852-1903), British soldier, was born of humble parentage at Muirof Allan- Grange, Ross-shire, Scotland, in 1852. As a boy he was employed in a draper's shop at Dingwall, but in 1870 he enlisted in the 92nd (Gordon) Highlanders. He rose rapidly through the non- commissioned ranks, and had already been a colour-sergeant for some years when, in the Afghan War of 1879, he dis- tinguished himself in the presence of the enemy so much as to be promoted to commissioned rank, his advancement being equally acceptable to his brdther officers and popular with the rank and file. As a subaltern he served in the first Boer War of 1880-81, and at Majuba, where he was made prisoner, his bravery was so conspicuous that General Joubert gave him back his sword. In 1885 he served under Sir Evelyn Wood in the reorganization of the Egyptian army, and he took part in the Nile Expedition of that year. In 1888 he became a regimental captain in the British service, but continued to serve in the Egyptian army, being particularly occupied with the training of the Sudanese battalions. In 1889 he received the D.S.O. for his conduct at Toski and in 1891, after the action at Tokar, he was promoted substantive major. In 1896 he commanded a brigade of the Egyptian army in the Dongola Expedition, and during the following campaigns he distinguished himself in every engagement, above all in the final battle of Omdurman (1898) at the crisis of which Mac- donald's Sudanese brigade, manoeuvring as a unit with the coolness and precision of the parade ground, repulsed the most determined attack of the Mahdists. After this great service

Macdonald's name became famous in England and Scotland, the popular sobriquet of "Fighting Mac" testifying the interest aroused in the public mind by his career and his soldierly personality. He was promoted colonel in the army and ap- pointed an aide-de-camp to the queen, and in 1899 he was promoted major-general and appointed to a command in India. In December 1899 he was called to South Africa to command the Highland Brigade, which had just suffered very heavily and had lost its commander, Major-General A. G. Wauchope, in the battle of Magersfontein. He commanded the brigade through- out Lord Roberts's Paardeberg, Bloemfontein and Pretoria operations, and in 1901 he was made a K.C. B. In 1902 he was appointed to command the troops in Ceylon, but early in the following year (March 25, 1903) he committed suicide in Paris. A memorial to this brilliant soldier, in the form of a tower 100 ft. high, was erected at Dingwall and completed in 1907.

MACDONALD, JACQUES ETIENNE JOSEPH ALEXANDRE (1765-1840), duke of Taranto and marshal of France, was born at Sedan on the 17th of November 1765. His father came of an old Jacobite family, which had followed James II. to France, and was a near relative of the celebrated Flora Macdonald. In 1785 Macdonald joined the legion raised to support the revolutionary party in Holland against the Prussians, and after it was disbanded he received a commission in the regiment of Dillon. On the breaking out of the Revolution, the regiment of Dillon remained eminently loyal, with the exception of Macdonald, who was in love with Mile Jacob, whose father was enthusiastic for the doctrines of the Revolution. Directly after his marriage he was appointed aide-de-camp to General Dumouriez. He distinguished himself at Jemmapes, and was promoted colonel in 1793. He refused to desert to the Austrians with Dumouriez, and as a reward was made general of brigade, and appointed to command the leading brigade in Pichegru's invasion of Holland. His knowledge of the country proved most useful, and he was instrumental in the capture of the

Dutch fleet by French hussars. In 1797, having been made general of division, he served first in the army of the Rhine and then ifi that of Italy. When he reached Italy, the peace of Carnpo Formio had been signed, and Bonaparte had returned to France; but, under the direction of Berthier, Macdonald first occupied Rome, of which he was made governor, and then in conjunction with Championnet he defeated General Mack, and revolutionized the kingdom of Naples under the title of the Parthenopaean Republic. When Suvarov invaded northern Italy, and was winning back the conquests of Bonaparte, Macdonald collected all the troops in the peninsula and moved

northwards. With but 30,000 men he attacked, at the Trebbia, Suvarov with 50,600, and after three days' fighting, during which he held the Russians at, bay, and gave time for Moreau to come up, he retired in good order to Genoa. After this gallant behaviour he was made governor of Versailles, and acquiesced, if he did not co-operate, in the events of the 18th Brumaire. In 1800 he received the command of the army in Switzerland which was to maintain the communications between the armies of Germany and of Italy. He carried out his orders to the letter, and at last, in the winter of 1800-1, he was ordered to march over the Spliigen Pass. This achievement is fully described by Mathieu Dumas, who was chief of his staff, and is at least as noteworthy as Bonaparte's famous passage of the St Bernard before Marengo, though followed by no such successful battle. On his return to Paris Macdonald married the widow of General Joubert, arid was appointed French plenipotentiary in Denmark. Returning in 1805 he associated himself with Moreau and incurred the dislike of Napoleon, who did not include him in his first creation of marshals. Till 1809 he remained without employment, but in that year Napoleon gave him the command of a corps and the duties of military adviser to the young prince Eugene Beauharnais, viceroy of Italy. He led the army from Italy till its junction with Napoleon, and at Wagram commanded the celebrated column of attack which broke the Austrian centre and won the victory. Napoleon made him marshal of France on the field of battle, and presently created him duke of Taranto. In 1810 he served in Spain, and in 1812 he commanded the left wing of the grand army for the invasion of Russia. In 1813, after sharing in the battles of Liitzen and Bautzen, he was ordered to invade Silesia, where Bliicher defeated him with great loss at the Katzbach (see Napoleonic Campaigns). After the terrible battle of Leipzig he was ordered with Prince Ponia- towski to cover the evacuation of Leipzig; after the blowing up of the bridge, he managed to swim the Elster, while Ponia-towksi was drowned. During the defensive campaign of 1814 Macdonald again distinguished himself; he was one of the marshals sent by Napoleon to take his abdication in favour of his son to Paris. When all were deserting their old master, Macdonald remained faithful to him. He was directed by Napoleon to give in his adherence to the new regime, and was presented by him with the sabre of Murad Bey for his fidelity. At the Restoration he was made a peer of France and knight grand cross of the order of St Louis; he remained faithful to the new order of things during the Hundred Days. In 181 5 he became chancellor of the Legion of Honour (a post he held till 1831), in 1816 major-general of the royal bodyguard, and he took a great part in the discussions in the House of Peers, voting consistently as a moderate Liberal. In 1823 he married Mile de BourgOny, by whom he had a

son, Alexander, who succeeded on his death in 1840 as duke of Taranto.. From 1830 his life was spent in retirement at his country place Courcelles- le-Roi (Seine et Oise), where he died on the 7th of September

1840.

Macdonald had none of that military genius which dis- tinguished Davout, Massena and Lannes, nor of that military science conspicuous in Marmont and St Cyr, but nevertheless his campaign in Switzerland gives him a rank far superior to such mere generals of division as Oudinot and Dupont. This capacity for independent command made Napoleon, in spite of his defeats at the Trebbia and the Katzbach, trust him with large commands till the end of his career. As a man, his

character cannot be spoken of too highly; no stain of cruelty or faithlessness rests on him.

Macdonald was especially fortunate in the accounts of his military exploits, Mathieu Dumas and Segur having been on his staff in Switzerland. See Dumas, tenements militaires ; and Segur's rare tract, Lettre sur la campagne du General Macdonald dans les Grisons en 1800 et 1801 (1802), and Eloge (1842). His memoirs were pub- lished in 1892 (Eng. trans., Recollections of Marshal Macdonald), but are brief and wanting in balance.

MACDONALD, SIR JOHN ALEXANDER (1815-1891), first premier of the dominion of Canada, was born in Glasgow on the nth of January 181 5, the third child of Hugh Macdonald (d. 1841), a native of Sutherlandshire. The family emigrated to Canada in 1820, settling first at Kingston, Ontario. At the age of fifteen Macdonald entered a law office; he was called to the bar in 1836, and began practice in Kingston, with immediate success. Macdonald entered upon his active career at a critical period in the history of Canada, and the circumstances of the time were calculated to stimulate political thought. It was the year before the rebellion of 1837; the condition of the whole country was very unsettled ; and it seemed well-nigh impossible to recon- cile differences arising from racial and political antagonisms. During the rebellion young Macdonald volunteered for active service, but his military career never went farther than drilling and marching. The mission of Lord Durham; the publication of his

famous report; the union of the two Canadas; the ad- ministrations of Lord Sydenham, Sir Charles Bagot, and Sir Charles Metcalfe, filled the years immediately succeeding 1837 with intense political interest, and in their results have pro- foundly influenced the constitution of the British Empire.

Macdonald made his first acquaintance with public business as an alderman of Kingston. In 1844 Sir Charles Metcalfe, in his contest with the Reform party led by Baldwin and Lafontaine, appealed to the electors, and Macdonald was elected to the provincial assembly as Conservative member for Kingston. A sentence in his first address to the electors strikes the domi- nant note of his public career: ” I therefore need scarcely state my firm belief that the prosperity of Canada depends upon its permanent connexion with the mother country, and that I shall resist to the utmost any attempt (from whatever quarter it may come) which may tend to weaken that union.” He took his seat on the 28th of November as a supporter of the Draper government. During the first three or four years he spoke little, but devoted himself with assiduity to mastering parlia- mentary forms and the business of the house. His capacity soon attracted attention, and in 1847 he was made receiver- general with a seat in the executive council, an office soon exchanged for the more important one of commissioner of Crown-lands. Although the government of which he thus became a member held office for only ten months, being placed in a hopeless minority on making an appeal to the country, Macdonald from this time forward took a position of constantly increasing weight in his party.

One of the first acts of the Reform government which succeeded that of which Macdonald was a member was to pass the Rebellion Losses Bill, made famous in colonial history by the fact that it brought to a crucial test the principle of responsible government. The assent of Lord Elgin to the bill provoked in Montreal a riot which ended in the burning of the houses of parliament, and so great was the indignation of the hitherto ultra-loyal Conser- vative party that many of its most prominent members signed a document favouring annexation to the United States; Mac- donald on the other hand took steps, in conjunction with others, to form a British-American league, having for its object the confederation of all the provinces, the strengthening of the connexion with the mother country, and the adoption of a national commercial policy. He remained in opposition from 1848 till 1854, holding together under difficult circumstances an unpopular party with which he was not entirely in sympathy. The two great political issues of the time were the secularization of the clergy reserves in Ontario, and the abolition of seigniorial tenure in Quebec. Both of

these reforms Macdonald long opposed, but when successive elections had proved that they were sup-

ported by public opinion, he brought about a coalition of Conservatives and moderate reformers for the purpose of carrying them. Out of this coalition was gradually developed the Liberal- conservative party, of which until his death Macdonald con- tinued to be the most considerable figure, and which for more than forty years largely moulded the history of Canada. From 1854 to 1837 he was attorney-general of Upper Canada, and then, on the retirement of Colonel Tache, he became prime minister. This first coalition had now accomplished its tempo- rary purpose, but so closely were parties divided at this period, that the defeat and reinstatement of governments followed each other in rapid succession.

The experiment of applying responsible government on party lines to the two Canadian provinces at last seemed to have corne to a deadlock. Two general elections and the defeat of four ministries within three years had done nothing to solve the difficulties of the situation. At this critical period a proposal was made for a coalition of parties in order to carry out a broad scheme of British- American confederation. The im- mediate proposal is said to have come from George Brown; the large political idea had long been advocated by Macdonald and Alexander Gait in Upper Canada — by Joseph Howe and others in the maritime provinces. The close of the American Civil War, the Fenian raids across the American border, and the dangers incident to the international situation, gave a de- cisive impulse to the movement. Macdonald, at the head of a representative delegation from Ontario and Quebec, met the public men of the maritime provinces in conference at Charlotte- town in 1864, and the outline of confederation then agreed upon was filled out in detail at a conference held at Quebec soon afterwards. The actual framing of the British North America Act, into which the resolutions of these two conferences were consolidated, was carried out at the Westminster Palace Hotel in London, during December 1866 and January 1867, by dele- gates from all the provinces working in co-operation with the law officers of the Crown, under the presidency of Lord Carnarvon, then secretary of state for the colonies. Macdonald took the leading part in all these discussions, and he thus naturally became the first premier of the Dominion. He was made a K.C.B. in recognition of his services to the empire.

The difficulties of organizing the new Dominion, the questions arising from diverse claims and the various conditions of the country, called for infinite tact and resource on the part of the premier. Federal rights

were to be safeguarded against the provincial governments, always jealous of their privileges. The people of Nova Scotia in particular, dissatisfied with the way in which their province had been drawn into the Union, maintained a fierce opposition to the Ottawa government, until their leader, Joseph Howe, fearing an armed rising, came to an agreement with Macdonald and accepted a seat in his cabinet. The establishment of a supreme court also occupied the attention of Sir John, who had a strong sense of the necessity of maintaining the purity and dignity of the judicial office. The act creating this court was finally passed during the administration of Alexander Mackenzie. The pledge made at confederation with regard to the building of the Intercolonial railway to connect the maritime provinces with those of the St Lawrence was fulfilled. The North-West Territories were secured as a part of confederated Canada by the purchase of the rights of the Hudson's Bay Company, and the establishment of Manitoba as a province in 1870. Canada's interests were protected during the negotiations which ended in the treaty of Washington in 1871, and in which Sir John took a leading part as one of the British delegates. In this year British Columbia entered the confederation, one of the provisions of union being that a transcontinental railroad should be built within ten years. This was declared by the opposition to be impossible. It was possible only to a leader of indomitable will. Charges of bribery against the government in" connexion with the contract for the building of this line led to the resig- nation of the cabinet in 1874, and for four years Sir John was in opposition. But he was by no means inactive. During

the summer of 1876 he travelled through Ontario addressing the people on the subject of a commercial system looking to the protection of native industries. This was the celebrated " National Policy," which had been in his thoughts as long ago as the formation of the British-American League in 1850. The government of Alexander Mackenzie refused to consider a protection policy, and determined to adhere to Free Trade, with a tariff for revenue only. On these strongly defined issues the two parties appealed to the people in 1878. The Liberal party was almost swept away, and Sir John, on his return to power, put his policy into effect with a thoroughness that commanded the admiration even of his opponents, who, after long resistance, adopted it on their accession to office in 1896. He also undertook the immediate construction of the Canadian Pacific railway, which had been postponed by the former government. The line was begun late in

1880, and finished in November 1885 — an achievement which Sir John ranked among his greatest triumphs. ” The faith of Sir John,” says one of his biographers, ” did more to build the road than the money of Mount-Stephen.”

During the remaining years of his life his efforts at adminis- tration were directed mainly towards the organization and development of the great North-West. From 1878 until his death in 1891 Sir John retained his position as premier of Canada, and his history is practically that of Canada (q.v.). For forty-six years of a stormy political life he remained true to the cardinal policy that he had announced to the electors of Kingston in 1844. ” A British subject I was born; a British subject I will die,” says his last political manifesto to the people of the Dominion. At his advanced age the anxiety and excite- ment of the contested election of 1891 proved too great. On the 29th of May he suffered a stroke of paralysis, which caused his death eight days later (June 6).

.The career of Sir John Macdonald must be considered in connexion with the political history of Canada and the con- ditions of its government during the latter half of the 19th century. Trained in a school where the principles of responsible government were still in an embryonic state, where the adroit management of coalitions and cabals was essential to the life of a political party, and where plots and counterplots were looked upon as a regular part of the political game, he acquired a dexterity and skill in managing men that finally gave him an almost autocratic power among his political followers. But great personal qualities supplemented his political dexterity and sagacity. A strong will enabled him to overcome the passionate temper which marked his youth, and later in his career a habit of intemperance, which he at first shared with many public men of his time. He was a man of strong ambi- tions, but these were curbed by a shrewd foresight, which led him for a long time to submit to the nominal leadership of other and smaller men. Politics he made his business, and to this he devoted all his energies. He had the gift of living for the work in hand without feeling the distraction of other interests. He had a singular faculty for reading the minds and the motives of men, and to this insight he perhaps owed the power of adaptability (called by his opponents shiftiness) which characterized his whole career. To this power the successful guidance of the Dominion through its critical formative period must be ascribed.’ Few political leaders have ever had such a number of antagonistic elements to reconcile as presented themselves in the first Canadian parliament after confederation. The man who could manage to rule a congeries of jealous factions, including Irish Catholics and Orangemen, French and

English anti-federationists and agitators for independence, Conservatives and Reformers, careful economists and prodigal expansionists, was manifestly a man of unusual power, superior to small prejudices, and without strong bias towards any creed or section. Such a man Macdonald proved himself to be. His personality stands out at this period as the central power in which each faction chiefly reposed trust, and under which it could join hands with the others in the service of the state. His singleness of purpose, personal independence and indomit-

able energy enabled him to achieve triumphs that to others seemed impossible. His methods cannot always be defended, and were explained by himself only on grounds of necessity and the character of the electorate with which he had to deal. After the ” Pacific scandal ” of 1874 the leader of the opposite party declared that ” John A.” (as he was generally called) ” has fallen, never to rise again.” Yet he not only cleared his own character from the charges laid against him, but succeeded four years later in achieving his most signal party triumph. His natural urbanity allowed him to rule without seeming to rule. When baffled in minor objects he gave way with a good- natured flexibility which brought upon him at times charges. of inconsistency. Yet Canada has seen statesmen of more con- tracted view insist on such small points, fall, and drag down their party with them. He lived at a time when the exigencies of state seemed to require the peculiar talents which he possessed. Entering politics at the dreariest and least profitable stage in Canadian history, he took the foremost part in the movement which made of Canada a nation; he guided that nation through the nebulous stages of its existence, and left it united, strong and vigorous, a monument to his patriotic and far-sighted statesmanship. His statue adorns the squares of the principal Canadian towns. In the crypt of St Paul’s Cathedral a memo- rial has rightly been placed to him as a statesman, not merely of Canada, but of the empire. In unveiling that memorial Lord Rosebery fitly epitomized the meaning of his life and work when he said: ” We recognize only this, that Sir John Mac- donald had grasped the central idea that the British Empire is the greatest secular agency for good now known to mankind; that that was the secret of his success; and that he determined to die under it, and strove that Canada should live under it.” Macdonald became a member of the Imperial Privy Council in 1879, and in 1884 he received the Grand Cross of the Bath. His first wife was his cousin, Miss Isabella Clark, who died in 1858, leaving one surviving son, the Hon. Hugh John Mac- donald, at one time premier of the province of Manitoba. By his second marriage, to Miss Bernard in 1867, Macdonald left an only daughter. On his death in

1891 his widow was created Baroness Macdonald of Earnscliffe.

The authorized and fullest biography of Sir John A. Macdonald is one written by his private secretary, Joseph Pope. Others have been written by his nephew, Colonel J. Pennington Macpherson, and by J. E. Collins. A bright and amusing anecdotal life has been com- piled by E. D. Biggar. A condensed biography by G. R. Parkin forms one of the ” Makers of Canada ” series (Toronto, 1907; new ed., 1909). (G. R. P.)

MACDONALD, JOHN SANDFIELD (1812-1872), Canadian statesman, was born at St Raphael, Glengarry county, Ontario, on the 12 th of December 181 2. He was admitted to the bar in 1840, and settled in Cornwall. In the same year he married Miss Waggaman, the daughter of an American senator from Louisiana. In 1841 he was elected to ‘the Canadian parliament for Glengarry, which seat he held for sixteen years. In 1842 he joined the Reformers in the cry for constitutional government, and from 1852 to 1854 was Speaker of the house. He was always uncertain in his party allegiance, and often attacked George Brown, the Liberal leader. Indeed, he well described himself as ” the Ishmael of parliament.” In 1862 he was called on by Lord Monck, the governor-general, to form a ministry, which by manifold shifts held office till February 1864. In the debates on federation he opposed the measure, but on its passage was in 1867 entrusted by the Conservatives with the task of organizing the provincial government of Ontario. He ruled the province with economy and efficiency, but was defeated in December 187 1 by the Liberals, resigned the premier- ship, and died on the 1st of June 1872.

MACDONALD, LAWRENCE (1799-1878), British sculptor, was born at Findo-Gask, Perthshire, Scotland. In early life he served as a mason’s apprentice. Having shown an aptitude for stone carving, he became an art student at the Trustees’ Academy, Edinburgh. By the help of friends he was enabled to visit Rome, where together with other artists he helped to found the British Academy of Arts. He returned to Edinburgh

in 1826. In 1829 he was elected a member of the Scottish Academy. From 1832 until his death his home was in Rome. Among his ideal works may be mentioned ” Ulysses and his Dog Argos,” ” Andromeda chained to the Rock,” ” Eurydice,” ” Hyacinth,” a ” Siren,” and a ” Bacchante.”

MACDONELL, JAMES (1841-1879), British journalist, was born at Dyce, Aberdeenshire. In 1858, after his father's death, he became clerk in a merchant's office. He began writing in the Aberdeen Free Press; in 1862 he was appointed to the staff of the Daily Review at Edinburgh, and at twenty- two he became editor of the Northern Daily Express. In 1865 he went to London to accept a position on the staff of the Daily Telegraph, which he retained until 1875, being special correspondent in France in 1870 and 1871. In 1873 he became a leader-writer on The Times. He died in London on the 2nd of March 1879. His posthumous France since the First Empire, though incomplete, gave a clever and accurate account of the French politics of his time.

MACDONNELL (or Macdonell), ALESTAIR (i.e. Alexander) RUADH (c. 1725-1761), chief of Glengarry, a Scottish Jacobite who has been identified by Andrew Lang as the secret agent " Pickle," who acted as a spy on Prince Charles Edward after 1750. The family were a branch of the clan Macdonald, but spelt their name Macdonnell or Macdonell. His father was John, 1 2th chief of Glengarry, a violent and brutal man, who is said to have star/ed his first wife, Alestair's mother, to death on an island in the Hebrides. Alestair ran away to France while a mere boy in 1738, and there entered the Royal Scots, a regiment in the French service. In 1743 he commanded a company in it, and in 1744 was sent to Scotland as a Jaco- bite agent. In January 1745 he was sent back with messages, and was in France when Prince Charles Edward landed in Scotland. Late in 1745 he was captured at sea while bringing a picquet of the Royal Scots to help the prince. He remained a prisoner in the Tower for twenty-two months, and when released went abroad. In 1744 his father had made a transfer to him of the family estates, which were ruined. Alestair, who still affected to be a Jacobite, lived for a time in great poverty. In 1749 he was in- London, and there is good reason to believe that he then offered his services as a spy to the British government, with which he communicated under the name of Pickle. His information enabled British ministers to keep a close watch on the prince and on the Jacobite conspiracies. Though he was denounced by a Mrs Cameron, whose husband he betrayed to death in 1752, he never lost the confidence of the Jacobite leaders. On the death of his father, in 1754, he succeeded to the estates, and proved himself a greedy land- lord. He died on the 23rd of December 1761.

See Andrew Lang, Pickle the Spy (1897) and The Companions of Pickle (1898).

MACDONNELL, SORLET BOY (c. 1505-1590), Scoto-Irish chieftain, son of Alexander Macdonnell, lord of Islay and Kintyre (Cantire), was

born at Ballycastle, Co. Antrim. From an ancestor who about a hundred years earlier had married Margaret Bisset, heiress of the district on the Antrim coast known as the Glynns (or Glens), he inherited a claim to the lordship of that territory; and he was one of the most powerful of the Scottish settlers in Ulster whom the English government in the 16th century found difficulty in bringing into subjection. Many attempts were made to drive them out of Ireland, in one of which, about 1550, Sorley Boy Macdonnell was taken prisoner and conveyed to Dublin Castle, where, however, his confinement was brief. The chief rivals of the Macdonnells were the Mac Quillins who dominated the northern portion of Antrim, known as the Route, and whose stronghold was Dunluce Castle, near the mouth of the Bush. Sorley Boy Macdonnell took an active part in the tribal warfare between his own clan and the Mac Quillins; and in 1558, when the latter had been to a great extent overcome, his elder brother James committed to him the lordship of the Route, his hold on which he made good by decisively defeating the Mac Quillins in Glenshesk. Sorley Boy was now too powerful and turbulent

to be. neglected by Queen Elizabeth and her ministers,!, who were also being troubled by his great contemporary, Shane O'Neill; and the history of Ulster for the next twenty years consists for the most part of alternating conflict and alliance between Macdonnells and O'Neills, and attempts on the part of the English government to subdue them both. With this object Elizabeth aimed at fomenting the rivalry between the two clans; and she came to terms sometimes with the one and sometimes with the other. Sorley Boy's wife was an illegiti- mate half-sister of Shane O'Neill; but this did not deter him from leaguing himself with the government against the O'Neills, if by so doing he could obtain a formal recognition of his title to the lands of which he was in actual possession. In 1562 Shane O'Neill paid his celebrated visit to London, where he obtained recognition by Elizabeth of his claims as head of the O'Neills; and on his return to Ireland he attacked the Macdonnells, ostensibly in the English interest. He defeated Sorley Boy near Coleraine in the summer of 1564; in 1565 he invaded the Glynns, and at Ballycastle won a decisive victory, in which James Macdonnell and Sorley Boy were taken prisoners. James soon afterwards died, but Sorley Boy remained O'Neill's captive till 1567, when Shane was murdered by the Macdonnells at Cushendun (see O'Neill). Sorley Boy then went to Scotland to enlist support, and he spent the next few years in striving to frustrate the schemes of Sir Thomas Smith, and later of the earl of Essex, for colonizing Ulster with English settlers. Sorley Boy was willing to come to terms with the govern- ment provided his claims to his lands were allowed, but Essex

determined to reduce him to unconditional submission. John Norris was ordered to proceed by sea from Carrickfergus to Rathlin Island, where Sorley Boy's children and valuables, together with the families of his principal retainers, had been lodged for safety; and while the chieftain was himself at Bally- castle, within sight of the island, the women and children were massacred by the English. Sorley Boy retaliated by a success- ful raid on Carrickfergus and by re-establishing his power in the Glynns and the Route, which the Mac Quillins made ineffectual attempts to recover. Macdonnell's position was still further strengthened by an alliance with Turlough Luineach O'Neill, and by a formidable immigration of followers from the Scottish islands. In 1584 Sir John Perrot determined to make a further effort to subdue the turbulent chieftain. After another expedition to Scotland seeking help, Sorley Boy landed at Cushendun in January 1585, and his followers regained possession of Dunluce Castle. In these circumstances Sir John Perrot opened negotiations with Sorley Boy, who in the summer of 1586 repaired to Dublin and made submission to Elizabeth's representative. He obtained a grant to himself and his heirs of all the Route country between the rivers Bann and Bush, with certain other lands to the east, and was made constable of Dunluce Castle. For the rest of his life Sorley Boy gave no trouble to the English government. He died in 1590, and was buried in Bonamairgy Abbey, at Ballycastle. He is said to have married when over eighty years of age, as his second wife, a daughter of Turlough Luineach O'Neill, a kinswoman of his first wife; and two of his five daughters married members of the O'Neill family. Sorley Boy had several sons by his first marriage, one of whom, Randal, was created earl of Antrim (q.v.), and was ancestor of the present holder of that title..

See G. Hill, An Historical Account of the Macdonnells of Antrim (London, 1873); Richard Bagwell, Ireland under the Tudors (3 vols., London, 1885-1890); Calendar of State Papers: Carew MSS. i., ii., (6 vols., 1 867-1 873); Donald Gregory, History of the Western High- lands and Isles of Scotland 1493-1625 (London, 1881); Sir T. T. Gilbert, History of the Viceroys of Ireland (Dublin, 1865). (R. J. M.)

MACDONOUGH, THOMAS (1786-1825), American sailor, was born in the state of Delaware, his father being an officer of the Continental Army, and entered the United States navy in 1800. During his long service as a lieutenant he took part in the bombardment of Tripoli, and on a subsequent occasion- showed great firmness in resisting the seizure of a seaman as

an alleged deserter from the British navy, his ship at the time lying under the guns of Gibraltar. When war with England broke out, in 1812, he was ordered to cruise in the lakes between Canada and the United States, with his headquarters on lake Champlain. He was instrumental in saving New York and Vermont from invasion by his brilliant victory of lake Cham- plain gained, on the nth of September 1814, with a flotilla of 14 vessels carrying 86 guns, over Captain George Downie's 16 vessels and 92 guns. For this important achievement New York and Vermont granted him estates, whilst Congress gave him a gold medal.

MACDOWELL, EDWARD ALEXANDER (1861-1008), Ameri- can musical composer, was born in New York City on the 18th of December 1861. His father, an Irishman of Belfast, had emigrated to America shortly before the boy's birth. He had a varied education in music, first under Spanish-American teachers, and then in Europe, at Paris (Debussy being a fellow pupil), Stuttgart, Wiesbaden and Weimar, where he was chiefly influenced by Joachim, Raff and Liszt. From 1879 to 1887 he lived in Germany, teaching and studying, and also appearing as solo pianist at important concerts. In 1884 he married Marian Nevins, of New York. In 1888 he returned to America, and settled in Boston till in 1896 he was made professor of music at Columbia University, New York. He resigned this post in 1904, and in 1905 overwork and insomnia resulted in a complete cerebral collapse. He died on the 24th of Jaiiuary 1908. MacDowelPs work gives him perhaps the highest place among American composers. Deeply influenced by modern French models and by German romanticism, full of poetry and " atmosphere," and founded on the " programme, " idea of composition, it is essentially creative in the spirit of a searcher after delicate truths of artistic expression. His employment of touches of American folk-song, suggested by Indian themes, is. characteristic. This is notably the case with his orchestral Indian Suite (1896) and Woodland Sketches for the piano. His first concerto, in A minor, for piano and orchestra, and first pianoforte suite, were performed at Weimar in 1882. His works include orchestral suites and " poems," songs, choruses, and various pieces for pianoforte, his own instrument ; they are numbered from op. 9 to op. 62, his first eight numbered works being destroyed by him.

See Lawrence Gilman, Edward MacDowell (1906).

MCDOWELL, IRVIN (1818-1885), American soldier, was born in

Columbus, Ohio, on the 15th of October 1818. He was educated in France, and graduated at the U. S. military academy in 1838. From 1841 to 1845 he was instructor, and later adjutant, at West Point. He won the brevet of captain in the Mexican War, at the battle of Buena Vista, and served as adjutant-general, chiefly at Washington, until 1861, being pro- moted major in 1856. In 1858-1859 he visited Europe. Whilst occupied in mustering volunteers at the capital, he was made brigadier-general in May 1861, and placed in command during the premature Virginian campaign of July, which ended in the defeat at Bull Run. Under McClellan he became a corps commander and major-general of volunteers (March 1862). When the Peninsular campaign began McDowell's corps was detained against McClellan's wishes, sent away to join in the fruitless chase of " Stonewall " Jackson in the Shenandoah Valley, and eventually came under the command of General Pope, taking part in the disastrous campaign of Second Bull Run. Involved in Pope's disgrace, McDowell was relieved of duty in the field (Sept. 1862), and served on the Pacific coast 1864-68. He became, on Meade's death in November 1872, major-general of regulars (a rank which he already held by brevet), and com- manded successively the department of the east, the division of the south, and the division of the Pacific until his retirement in r882. The latter years of his life were spent in California, and he died at San Francisco on the 4th of May 1885. As a commander he was uniformly unfortunate. Undoubtedly he was a faithful, unselfish and energetic soldier, in patriotic sympathy with the administration, and capable of great achieve- ments. It was his misfortune to be associated with the first

great disaster to the Union cause, to play the part of D'Erlon at Quatre-Bras between the armies of Banks and McClellan, and finally to be involved in the catastrophe of Pope's campaign. That he was perhaps too ready to accept great risks at the instance of his superiors is the only just criticism to which his military character was open.

MACDUFF, a police burgh and seaport of Banffshire, Scot- land. Pop. (1901), 3431. It lies on the right bank of the mouth of the Deveron, 1 m. E. of Banff and 50J m. N.W; of Aberdeen by the Great North of Scotland railway. The site was originally occupied by the fishing village of Doune, but after its purchase by the 1st earl of Fife, about 1732, the name was altered to Macduff by the 2nd earl, whd also procured for it in 1783 a royal charter constituting it a burgh. In honour of the occasion he rebuilt the market cross, in front of the parish church. The harbour, safer and more accessible than' that of Banff, was constructed by the duke of Fife, and transferred to the burgh in 1898. The inhabitants are chiefly employed in the herring

fishery, but there is some boat-building, besides rope-and-sail making, manure works, saw-mills and' oilcake mills. A stone bridge across the Deveron communi- cates with Banff. Good bathing facilities, a bracing climate and a mineral well attract numerous visitors to Macduff every summer. The burgh unites with Banff, Cullen, Elgin, Inverurie, Kintore and Peterhead (the Elgin burghs) in returning one member to parliament.

MCDUFFIE, GEORGE (1788-1851), American political leader/ was born in Columbia county, Georgia. He Was admitted to the bar in 1814, and served in the South Carolina General Assembly in 1818-1821, and in the national House of Representatives in 1821-1834. In 1821 he published a pamphlet in which strict construction and states' rights were strongly denounced; yet in 1832 there were few more uncompromising nullificationists. The change seems to have been gradual, and to have been determined in part by the influence of John C. Calhoun. When, after 1824, the old Democratic-Republican party split into factions, he followed Andrew Jackson and Martin Van Buren in opposing the Panama Congress and the policy of making Federal appropriations for internal improvements. He did not hesitate, however, to differ from Jackson on the two chief issues of his administration: the Bank and nullification. In 1832 he was a prominent member of the South Carolina Nullifi- cation Convention, and drafted its address to the people of the United States. He served as governor in 1834-1836, during which time he helped to reorganize South Carolina College. From January 1843 until January 1846 he was a member of the United States Senate. The leading Democratic measures of those years all received his hearty support. McDuffie, like Calhoun, became an eloquent champion of state sovereignty; but while Calhoun emphasized state action as the only means of redressing a grievance, McDuffie paid more attention to the grievance itself * Influenced in large measure by Thomas Cooper, he made it his special work to convince the people of the South that the downfall of protection was essential to their material progress. His argument that it is the proˆ ducer who really pays the duty of imports has been called the economic basis of nullification. He died at Cherry Hill, Sumter district, South Carolina, on the nth of March 1851.

MACE (Fr. masse, O. Fr. mace, connected with Lat. mateola, a mallet), originally a weapon of offence, made of iron, steel Of latten, capable of breaking through the strongest armour. 1 The earliest ceremonial maces, as they afterwards became, though at first intended to protect the king's person, were those borne by the serjeants-at-arms, a royal body-guard established in France by Philip II., and in England probably by Richard I. By the 14th century a tendency towards a more

decorative Serjeant's mace, encased with precious metals, is noticeable. The history of the civic mace (carried by the serjeants-at-mace) begins about

1 The mace was carried in battle by medieval bishops (Qdo of

Bayeux is represented on the Bayeux tapestry as wielding one)

instead of the sword, so as to conform to the canonical rule Which

I forbade priests to shed blood. — [Ed.] .■.'••■

the middle of the 13th century, though no examples of that period are in existence to-day. Ornamented civic maces were considered an infringement of one of the privileges of the king's Serjeants, who, according to the Commons' petition in 1344, were (alone deemed worthy of having maces enriched with costly metals. This privilege was, however, granted to the Serjeants of London, and later to those of York (in 1396), Norwich (in 1403/4)

f€

From Jewitt and Hope's Corporation Plate and Insignia (1895), by permission of Bemrose & Co.

Fig. 1. — Group of War Maces of the 15th and 16th centuries.

and Chester (in 1506). Maces covered with silver are known to have been used at Exeter in 1387/8; two were bought at Norwich in 1435) an< 3 others for Launceston in 1467/8. Several other cities and towns had silver maces in the next century, and in the 16th they were almost universally used. Early in the 15th century the flanged end of the mace, i.e. the head of the war mace, was borne uppermost, and the small button with the royal arms in the base. By the beginning of the Tudor period, however, these blade-like flanges, originally made for offence, degenerated into mere ornaments, while the greater importance of the end with the royal arms (afterwards enriched with a cresting) resulted in the reversal of the position. The custom of carrying the flanged end upward did not die out at once: a few maces were made to carry both ways, such as the beautiful pair of Winch-combe silver maces, dating from the end of the 15th century. The Guildford mace is one of the finest of the fifteen specimens of the 1

5th century. The flanged ends of the maces of this period were often beautifully pierced and decorated. These flanges gradu- ally became smaller, and later (in the 16th and early 17th cen- turies) developed into pretty projecting scroll-brackets and other ornaments, which remained in vogue till about 1640. The next development in the embellishment of the shaft was the reappear- ance of these small scroll-brackets on the top, immediately under the head of the mace. They disappear altogether from the foot in the last half of the 17th century, and are found only under the heads, or, in rarer instances, on a knob on the shaft. The silver mace-heads were mostly plain, with a cresting of leaves or flowers

in the 15th and 16th centuries. In the reign of James I. they

began to be engraved and decorated with heraldic devices, &c.

As the custom of having Serjeants'

maces ceased (about 1650), the large

maces, borne before the mayor or

bailiffs, came into general use. Thomas

Maundy was the chief maker of maces

during the Commonwealth. He made

the mace for the House of Commons in

1649, which is the one at present in use

there, though without the original

head with the non-regal symbols, the

latter having been replaced by one

with regal symbols at the Restoration.

There are two maces in the House of

Lords, the earliest dating from the reign

of William III. The dates of the eight

large and massive silver-gilt maces of the

serjeants-at-arms, kept in the jewel-house

at the Tower of London, are as follows:

two of Charles II., two of James II.,

three of William and Mary, and one of

Queen Anne (the cypher of George I. was

subsequently added to the latter). All

the foregoing are of the type which was

almost universally adopted, with slight

differences, at the Restoration. The

civic maces of the 18th century follow

this type, with some modifications in

shape and ornamentation. The historic

English silver maces of the 18th century

include the one of 1753 at Norfolk,

Virginia, and that of 1756 of the state of South Carolina, both in the United

States of America; two, made in 1753

and 1787, at Jamaica; that of 1791

belonging to the colony of Grenada, and

the Speaker's mace at Barbados, dating

from 181 2; and the silver mace of the

old Irish House of Commons, 1765-1766,

now in the possession of Lord Massereene

and Ferrard.

Among other maces, more correctly

described as staves, in use at the present

time, are those carried before ecclesias- tical dignitaries and clergy in cathedrals

and parish churches and the maces of

the universities. At Oxford there are

three of the second half of the 16th

century and six of 17 23-1 7 24, while at

Cambridge there are three of 1626 and

one of 1628, but altered at the Common- wealth and again at the Restoration.

The silver mace with crystal globe of

the lord high treasurer of Scotland, at

Holyrood Palace, was made about 1690

by Francis Garthorne. The remarkable

mace or sceptre of the lord mayor of

London is of crystal and gold and

set with pearls; the head dates from

the 15th century, while the mounts of

the shaft are early medieval. A mace

of an unusual form is that of the Tower ward of London, which

has a head resembling the White Tower in the Tower of

London, and which was made in the reign of Charles II.

The beautiful mace of the Cork gilds, made by Robert Goble

of Cork in 1696 for the associated gilds, of which he had been

master, is in the Victoria and Albert Museum, where there is

also a large silver mace of the middle of the 18th century, with

the arms of Pope Benedict XIV., which is said to have been

used at the coronation of Napoleon as king of Italy at Milan

in 1805.

From Jewitt and Hope's Corporation Plate and In- signia (1895), by permission of Bemrose & Co.

Fig. 2. — Mace of the House of Commons.

Bibliography. — Jewitt and Hope, Corporation Plate and Insignia of Office, &c. (2 vols., 1895); J. R. Garstin, Irish State and Civic Maces, &c. (1898); J. Paton, Scottish History and Life (1902); J. H. Buck, Old Plate (1903), pp. 124-140; Cripps, Old English Plate (9th ed., 1906), pp. 394-404; E. Alfred Jones, Old Plate at the Tower of London (1908); ed., "Some Historic Silver Maces," Burlington Magazine (Dec. 1908). (E. A. J.)

MACEDO, JOSS AGOSTINHO DE (1761-1831), Portuguese poet and prose writer, was born at Beja of plebeian family, and studied Latin and rhetoric with the Oratorians in Lisbon. He became professed as an Augustinian in 1778, but owing to his turbulent character he spent a great part of his time in prison, and was constantly being transferred from one convent to an- other, finally giving up the monastic habit to live licentiously in the capital. In 1 792 he was unfrocked, but by the aid of powerful friends he obtained a papal brief which secularized him and per- mitted him to retain his ecclesiastical status. Taking to journal- ism and preaching he now made for himself a substantial living and a unique position. In a short time he was recognized as the leading pulpit orator of the day, and in 1802 he, became one of the royal preachers. Macedo was the first to introduce from abroad and to cultivate didactic and descriptive poetry, the best example of which is his notable transcendental poem Meditation (1813). His colossal egotism made him attempt to supersede Camoens as Portugal's greatest poet, and in 1814 he produced Oriente, an insipid epic notwithstanding its correct and vigorous verse, dealing with the same subject as the Lusiads — Gama's discovery of the sea route to India. This amended paraphrase met with a cold reception, whereupon Macedo published his Censura dos Lusiadas, containing a minute

examination and virulent indict- ment of Camoens. Macedo founded and wrote for a large number of journals, and the tone and temper of these and his political . pamphlets induced his leading biographer to name him the " chief libeller " of Portugal, though at the time his jocular and satirical style gained him popular favour. An extreme adherent of absolutism, he expended all his brilliant powers of invective against the Constitutionalists, and advocated a general massacre of the opponents of the Miguelite regime. Notwithstanding his priestly office and old age, he continued his aggressive journalistic campaign, until his own party, feeling that he was damaging the cause by his excesses, threatened him with proceedings, which caused him in 1829 to resign the post of censor of books for the Ordinary, to which he had been appointed in 1824. Though his ingratitude was proverbial, and his moral character of the worst, when he died in 183 1 he left behind him many friends, a host of admirers, and a great but ephemeral literary reputation. His ambition to rank as the king of letters led to his famous conflict with Bocage (q.v.), whose poem Pena de Talido was per- haps the hardest blow Macedo ever received. His malignity reached its height in a satirical poem in six cantos, Os Burros (1812-1814), in which he pilloried by name men and women of all grades of society, living and dead, with the utmost licence of expression. His translation of the Odes of Horace, and his dra- matic attempts, are only of value as evidence of the extraordinary versatility of the man, but his treatise, if his it be, A Demonstration of the Existence of God, at least proves his possession of very high mental powers. As a poet, his odes on Wellington and the emperor Alexander show true inspiration, and the poems of the same nature in his Lyra anacreontica, addressed to his mistress, have considerable merit.

See Memorias para la vida intima de Jose Agostinho de Macedo (ed. Th. Braga, 1 899) ; Cartas e opusculos (1900) ; Censuras a diversas obras (1901). (E. Pr.)

MACEDONIA, the name generally given to that portion of European Turkey which is bounded on the N. by the Kara- Dagh mountain range and the frontier of Bulgaria, on the E. by the river Mesta, on the S. by the Aegean Sea and the frontier of Greece, and on the W. by an ill-defined line coinciding with the mountain chains of Shar (ancient Scardus) Grammus and Pindus. The Macedonia of antiquity was originally confined to the inland region west of the Axius, between that river and the Scardus range, and did not include the northern portion, known as Paeonia, or the coast-land, which, with the eastern districts,

was inhabited by Thracian tribes; the people of the country were not

Hellenic. In modern Macedonia are included the vilayet of Salonica (Turk. Selanik) , the eastern and greater por- tion of the vilayet of Monastir (sanjaks of Monastir, Servia [Turk. Selfije], and part of that of Kortcha), and the south- eastern portion of the vilayet of Kossovo (sanjak of Usktib). The greater part of Macedonia is inhabited by a Slavonic population, mainly Bulgarian in its characteristics; the coast-line and the southern districts west of the Gulf of Salonica by Greeks, while Turkish, Vlach and Albanian settlements exist sporadically, or in groups, in many parts of the country.

Geographical Features.. — The coast-line is broken by the remarkable peninsula of Chalcidice, with its three promontories of Athos (ancient Acte), Longus (Sithonia) and Cassandra (Pallene). The country is divided into two almost equal portions by the river Vardar (Axius), the valley of which has always constituted the principal route from Central Europe to the Aegean. Rising in the Shar mountains near Gostivar (Bulgarian Kostovo), the Vardar, flowing to the N.E., drains the rich elevated plain of Tetovo (Turk. Kalkandelen) and, turning to the S.E. at the foot of Mt Liubotrn, traverses the town and plain of Uskub, leaving to the left the high plateau of Ovchepolye (" the sheep-plain ") ; then flowing through the town of Veles, it receives on its right, near the ruins of the ancient Stobi, the waters of its principal tributary, the Tcherna (Erigon), which drains the basin of Monastir and the mountainous region of Morichovo, and after passing through the picturesque gorge of Demir-Kapu (the Iron Gate) finds its way to the Gulf of Salonica through the alluvial tract known as the Campania, extending to the west of that town. The other important rivers are the Struma (Strymon) and Mesta (Nestus) to the east, running almost parallel to the Vardar, and the Bistritza in the south, all falling into the Aegean. (The Black Drin, issuing from Lake Ochrida and flowing N.W. to the Adriatic, is for the greater part of its course an Albanian river.) The Struma, which rises in Mt Vitosha in Bulgaria, runs through a narrow defile till, within a short distance of the sea, it expands into Lake Tachino, and falls into the Aegean near the site of the ancient Amphipolis. The Mesta, rising in the Rhodope range, drains the valley of Razlog and forms a delta at its entrance into the Aegean opposite the island of Thasos. The Bistritza, which has its source in the eastern slope of Mt Grammus, receives early in its course the outflow from Lake Castoria on the left; it flows to the S.E. towards the frontier of Greece, where its course is arrested by the Cambunian mountains; then turning sharply to the N.E., and passing through the districts of Serfije and Verria, it reaches the Campania and enters the Gulf of Salonica at a point a few miles to the S.W. of the mouth of the Vardar. The valleys of most of the rivers and their tributaries broaden

here and there into fertile upland basins, which were formerly lakes. Of these the extensive plateau of Monastir, the ancient plain of Pelagonia, about 1500 ft. above the sea, is the most remarkable; the basins of Tetovo, Uskub, Kotchane\ Strumnitza, Nevrokop, Melnik, Serres and Drama furnish' other examples. The principal lakes are Ochrida (Lychnitis) on the confines of Albania ; Prespa, separated from Ochrida by the Galinitza mountains, and supposed to be connected with it by a subterranean, channel; Castoria, to the S.E. of Prespa; Ostrovo, midway between Prespa and the Vardar; Tachino (Cercinitis) on the lower course of the Struma; Beshik (Bolbe), separating the Chalcidian peninsula from the mainland, and Doiran (probably Prasias), beneath the southern declivity of the Belasitza mountains; the smaller lakes of Amatovo and Yenije are in the alluvial plain on either side of the lower Vardar. Lake Ochrida (q.v.) finds egress into the Black Drin (Drilon) at Struga, where there are productive fisheries. The lacustrine habitations of the Paeonians on Lake Prasias described by Herodotus (v. 16) find a modern counterpart in the huts of the fishing population on Lake Doiran. The surface of the country is generally mountainous; the various mountain-groups present little uniformity in their geographical contour. The great chain oi Rhodope, continued to the N.W. by the Rilska and Osogovska Planina, forms a natural boundary on the north; the principal summit, Musalla (9031 ft.), is just over the Bulgarian frontier. The adjoining Dospat range culminates in Belmeken (8562 ft.), also just over the Bulgarian frontier. Between the upper courses of the Mesta and Struma is the Perim Dagh or Pirin Planina (Orbelos) with Elin (8794 ft.), continued to the south by the Bozo Dagh (6081 ft.); still further south, overlooking the bay of Kayala, are the Bunar Dagh and Mt Pangaeus, famous in antiquity for its gold and silver mines. Between the Struma and the Vardar are the Belasitza, Krusha and other ranges. West of the Vardar is the lofty Shar chain (Scardus) overlooking the plain of Tetovo and terminating at its eastern extremity in the pyramidal Liubotrn (according to some authorities, 10,007 ft., and consequently the highest mountain in the Peninsula; according to others 8989, 8856, or 8200 ft.). The Shar range, with the Kara Dagh to the east, forms the natural boundary of Macedonia on the N.W. ; this is prolonged on the west by the Yaina-Bistra and Yablanitza mountains with several summits exceeding 7000 ft. in height, the Odonishta Planina overlooking Lake Ochrida on the west,

the Morova Planina, the Grammus range, and Pindus with Smolika

(8546 ft.). The series of heights is broken by the valleys of the Black Drin and Devol, which flow to the Adriatic. Between the Vardar and the plain of Monastir the Nija range culminates in Kaimakchalan (8255 ft.); south-west of Monastir is Mt Peristeri (7720 ft.) overlooking Lake Prespa on the east; on the west is the Gahnitza range separating it from Lake Ochrida. Between Lake Ostrovo and the lower Bistritza are the Bermius and Kitarion ranges with Doxa (5240 ft.) and Turla (about 3280 ft.). South of the Bistritza are the Cambunian mountains forming the boundary of Thessaly and terminating to the east in the imposing mass of Elymbos, or Olympus (9794 ft.). Lastly, Mt Athos, at the ex- tremity of the peninsula of that name, reaches the height of 6350 ft. The general aspect of the country is bare and desolate, especially in the neighbourhood of the principal routes; the trees have been destroyed, and large tracts of land remain uncultivated. Magnificent forests, however, still clothe the slopes of Rhodope, Pirin and Pindus. The well- wooded and cultivated districts of Grevena and Castoria, which are mainly inhabited by a Vlach population, are remarkably beautiful, and the scenery around Lakes Ochrida and Prespa is exceedingly picturesque. For the principal geological formations see Balkan Peninsula.

The climate is severe ; the spring is often rainy, and the melted snows from the encircling mountains produce inundations in the plains. The natural products are in general similar to those of southern Bulgaria and Servia — the fig, olive and orange, however, appear on the shores of the Aegean and in the sheltered valleys of the southern region. The best tobacco in Europe is grown in the Drama and Kavala dis'tricts; rice and cotton are cultivated in the southern plains.

Population. — The population of Macedonia may perhaps be estimated at 2,200,000. About 1,300,000 are Christians of various churches and nationalities; more than 800,000 are Mahommedans, and about 75,000 are Jews. Of the Christians, the great majority profess the Eastern Orthodox faith, owning allegiance either to the Greek patriarchate or the Bulgarian exarchate. Among the Orthodox Christians are reckoned some 4000 Turks. The small Catholic minority is composed chiefly of Uniate Bulgarians (about 3600), occupying the districts of Kukush and Doiran; there are also some 2000 Bulgarian Protestants, principally inhabiting the valley of Razlog. The Mahommedan population is mainly composed of Turks (about 500,000). In addition to these there are some 130,000 Bulgars, 120,000 Albanians, 35,000 gipsies and 14,000 Greeks, together with a smaller number of Vlachs, Jews and Circassians, who profess the creed of Islam. The untrustworthy Turkish statistics take religion, not nationality, as the basis of classification. All Moslems are included in

the millet, or nation, of Islam. The Rum, or Roman (i.e. Greek) millet comprises all those who acknow- ledge the authority of the Oecumenical patriarch, and consequently includes, in addition to the Greeks, the Servians, the Vlachs, and a certain number of Bulgarians; the Bulgar millet comprises the Bulgarians who accept the rule of the exarchate; the other millets are the Katolik (Catholics), Ermeni (Gregorian Armenians), Musevi (Jews) and Prodesdan (Protestants). The population of Macedonia, at all times scanty, has undoubtedly diminished in recent years. There has been a continual outflow of the Christian population in the direction of Bulgaria, Servia and Greece, and a corresponding emigration of the Turkish peasantry to Asia Minor. Many of the smaller villages are being abandoned by their inhabitants, who migrate for safety to the more considerable towns — usually situated at some point where a mountain pass descends to the outskirts of the plains. In the agricultural districts the Christian peasants, or rayas, are either small proprietors or cultivate holdings on the estates of Turkish landowners. The upland districts are thinly inhabited by a nomad pastoral population.

Towns. — The principal towns are Salonica (pop. in 1910, about 130,000), Monastir (60,000), each the capital of a vilayet, and Uskiib (32,000), capital of the vilayet of Kossovo. In the Salonica vilayet are Serres (28,000), pleasantly situated in a fertile valley near Lake Tachino; Nevrokop (6200), Mehomia (5000), and Bansko (6500), in the valley of the Upper Mesta; Drama (9000), at the foot of the Bozo Dagh, with its port Kavala (9500); Djumaia (6440), Melnik (4300) and Demir Hissar (5840) in the valley of the Struma, with Strumnitza (10,160) and Petrich (7100) in the valley of its tributary, the Strumnitza; Veles (Turk. Koprulu) on the Vardar (19,700); Doiran (6780) and Kukush (7750); and, to the west of the Vardar, Verria (Slav. Ber, anc. Beroea, Turk. Karaferia, 10,500), Yenije-Vardar (9599) and Vodena (anc. Edessa, q.v., 11,000). In the portion of the Kossovo vilayet included in Macedonia are Kalkandelen (Slav. Tetovo, 19,200), Kumanovo (14,500) and Shtip (Turk. Istib, 21,000). In the Monastir vilayet are Prilep (24,000) at the northern end of the Pelagonian plain, Krushevo (9350), mainly inhabited by Vlachs, Resen (4450) north of Lake Prespa, Fiorina (Slav. Lerin, 9824); Ochrida (14,860), with a picturesque fortress of Tsar Samuel, and Struga (4570), both on the north shore of Lake Ochrida; Dibra (Slav. Debr) on the confines of Albania (I5.5 00). Castoria (Slav. Kostur), on the lake of that name (6190), and Kozhand (6100). (Dibra, Kavala, Monastir, Ochrida, Salonica, Serres, Uskiib and Vodena are described in separate articles.)

Races. — Macedonia is the principal theatre of the struggle of nationalities in Eastern Europe. All the races which dispute the

reversion of the Turkish possessions in Europe are represented within its borders. The Macedonian Tke T ‘ probably may therefore he described as the quintessence of the Near Eastern Question. The Turks, the ruling race, form less than a quarter of the entire population, and their numbers are steadily declining. The first Turkish immigration from Asia Minor took place under the Byzantine emperors before the con- quest of the country. The first purely Turkish town, Yenije-Vardar, was founded on the ruins of Vardar in 1362. After the capture of Salonica (1430), a strong Turkish population was set- tled in the city, and similar colonies were founded in Monastir, Ochrida, Serres, Drama and other important places. In many of these towns half or more of the population is still Turkish. A series of military colonies were subsequently established at various points of strategic importance along the principal lines of communication. Before 1360 large numbers of nomad shepherds, or Yuruks, from the district of Konia, in Asia Minor, had settled in the country; their descendants are still known as Konariotes. Further immigration from this region took place from time to time up to the middle of the 18th century. After the establishment of the feudal system in 1397 many of the Seljuk noble families came over from Asia Minor; their descen- dants may be recognized among the beys or Moslem landowners in southern Macedonia. At the beginning of the 18th century the Turkish population was very considerable, but since that time it has continuously decreased. A low birth-rate, the exhaustion of the male population by military service, and great mortality from epidemics, against which Moslem fatalism takes no pre- cautions, have brought about a decline which has latterly been hastened by emigration. On the other hand, there has been a considerable Moslem immigration from Bosnia, Servia, Bulgaria and Greece, but the newcomers, mohajirs, do not form a per- manent colonizing element. The Turkish rural population is found in three principal groups: the most easterly extends from the Mesta to Drama, Pravishta and Orfano, reaching the sea- coast on either side of Kavala, which is partly Turkish, partly Greek. The second, or central, group begins on the sea-coast, a little west of the mouth of the Strymon, where a Greek popula- tion intervenes, and extends to the north-west along the Kara- Dagh and Belasitza ranges in the direction of Strumnitza, Veles, Shtip and Radovisht. The third, or southern, group is centred around Kai’lar, an entirely Turkish town, and extends from Lake Ostrovo to Selfije (Servia). The second and third groups are mainly composed of Konariot shepherds. Besides these fairly compact settlements there are numerous isolated Turkish colonies in various parts of the country. The Turkish rural population is quiet, sober and orderly, presenting some of the best characteristics of the race. The urban population, on

the other hand, has become much demoralized, while the official classes, under the rule of Abdul Hamid II. and his predecessors, were corrupt and avaricious, and seemed to have parted with all scruple in their dealings with the Christian peasantry. The Turks, though still numerically and politically strong, fall behind the other nationalities in point of intellectual culture, and the contrast is daily becoming more marked owing to the educational activity of the Christians.

The Greek and Vlach populations are not always easily dis- tinguished, as a considerable proportion of the Vlachs have been hellenized. Both show a remarkable aptitude for commerce; the Greeks have maintained their

The Greeks and Vlachs.

language and religion, and the Vlachs their religion, with greater tenacity than any of the other races. From the date of the Ottoman conquest until comparatively recent times, the Greeks occupied an exceptional position in Macedonia, as else- where in the Turkish Empire, owing to the privileges conferred on the patriarchate of Constantinople, and the influence subse- quently acquired by the great Phanariot families. All the Christian population belonged to the Greek millet and called itself Greek ; the bishops and higher clergy were exclusively Greek; Greek was the language of the upper classes, of commerce, literature and

religion, and Greek alone was taught in the schools. Thesupremacy of the patriarchate was consummated by the suppression of the autocephalous Slavonic churches of Ipek in 1766 and Ochrida in 1767. In the latter half of the 18th century Greek ascendancy in Macedonia was at its zenith; its decline began with the War of Independence, the establishment of the Hellenic kingdom, and the extinction of the Phanariot power in Constantinople. The patriarchate, nevertheless, maintained its exclusive jurisdiction over all the Orthodox population till 1870, when the Bulgarian exarchate was established, and the Greek clergy continued to labour with undiminished zeal for the spread of Hellenism. Notwithstanding their venality and intolerance, their merits as the only diffusers of culture and enlightenment in the past should not be overlooked. The process of hellenization made greater progress in the towns than in the rural districts of the interior, where the non-Hellenic populations preserved their languages, which

alone saved the several nationalities from ex- tinction. The typical Greek, with his superior education, his love of politics and commerce, and his distaste for laborious occupations, has always been a dweller in cities. In Salonica, Serres, Kavala, Castoria, and other towns in southern Macedonia the Hellenic element is strong; in the northern towns it is insig- nificant, except at Melnik, which is almost exclusively Greek. The Greek rural population extends from the Thessalian fron- tier to Castoria and Verria (Beroea); it occupies the whole Chalcidian peninsula and both banks of the lower Strymon from Serres to the sea, and from Nigrita on the west to Pravishta on the east; there are also numerous Greek villages in the Kavala district. The Mahommedan Greeks, known as Valachides, occupy a considerable tract in the upper Bistritza valley near Grevena and Liapsista. The purely Greek population of Mace- donia may possibly be estimated at a quarter of a million. The Vlachs, or Rumans, who call themselves Aromuni or Aromani (i.e. Romans), are also known as Kutzovlachs and Tzintzars: the last two appellations are, in fact, nicknames, ” Kutzovlach ” meaning ” lame Vlach,” while ” Tzintzar ” denotes their in- ability to pronounce the Rumanian cincl (five). The Vlachs are styled by some writers ” Macedo-Rumans,” in contradistinction to the ” Daco-Rumans,” who inhabit the country north of the Danube. They are, in all probability, the descendants of the Thracian branch of the aboriginal Thraco-IUyrian population of the Balkan Peninsula, the Illyrians being represented by the Albanians. This early native population, which was apparently hellenized to some extent under the Macedonian empire, seems to have been latinized in the period succeeding the Roman conquest, and probably received a considerable infusion of Italian blood. The Vlachs are for the most part either highland shepherds or wandering owners of horses and mules. Their settlements are scattered all over the mountains of Macedonia: some of these consist of permanent dwellings, others of huts occupied only in the summer. The compactest groups are found in the Pindus and Agrapha mountains (extending into Albania and Thessaly), in the neighbourhood of Monastir, Grevena and Castoria, and in the district of Meglen. The Vlachs who settle in the lowland districts are excellent husbandmen. The urban population is considerable; the Vlachs of Salonica, Monastir, Serres and other large towns are, for the most part, descended from refugees from Moschopolis, once the principal centre of Macedonian commerce. The towns of Metzovo, on the confines of Albania, and Rlisura, in the Bistritza valley, are almost exclusively Vlach. The urban and most of the rural Vlachs are bilingual, speaking Greek as well as Rumanian; a great number of the former have been completely hellenized, partly in conse- quence of mixed marriages, and many of the wealthiest commer- cial families of

Vlach origin are now devoted to the Greek cause. The Vlachs of Macedonia possibly number 90,000, of whom only some 3000 are Mahommedans. The Macedonian dialect of the Rumanian language differs mainly from that spoken north of the Danube in its vocabulary and certain phonetic peculiarities; it contains a number of Greek works which are often replaced in the northern speech by Slavonic or Latin synonyms.

The Albanians, called by the Turks and Slavs Arnauts, by

the Greeks ‘ApPavlrai, and by themselves Shkyipetar, have always been the scourge of western Macedonia. After the first Turkish invasion of Albania many of the chiefs the or beys adopted Mahommedanism, but the conver- Albanians, sion of the great bulk of the people took place in the c,rcaSm 1 6th and 17th centuries. Professing the creed of ‘

the dominant power and entitled to bear arms, the Albanians were # enabled to push forward their limits at the expense of the defenceless population around them, and their encroachments have continued to the present day. They have not only advanced themselves, but have driven to the eastward numbers of their Christian compatriots and a great portion of the once- prosperous Vlach population of Albania. Albanian revolts and disturbances have been frequent along the western confines of Macedonia, especially in the neighbourhood of Dibra: the Slavonic peasants have been the principal sufferers from these troubles, while the Porte, in pursuance of the ” Islamic policy ” adopted by the sultan Abdul Hamid II., dealt tenderly with the recalcitrant believers. In southern Macedonia the Albanians of the Tosk race extend over the upper Bistritza valley as far west as Castoria, and reach the southern and western shores of Lakes Prespa and Ochrida: they are also numerous in the neigh- bourhood of Monastir. In northern Macedonia the Albanians are of the Gheg stock: they have advanced in large numbers over the districts of Dibra, Kalkandelen and Uskiib, driving the Slavonic population before them. The total number of Alba- nians in Macedonia may be estimated at about 120,000, of whom some 10,000 are Christians (chiefly orthodox Tosks). The Circassians, who occupy some villages in the neighbourhood of Serres, now scarcely number 3000: their predatory instincts may be compared with those of the Albanians. The Jews had colonies in Macedonia in the time of St Paul, but no trace remains of these early settlements. The Jews now found in the country descend from refugees who fled from Spain during the persecu- tions at the end of the 15th century: they speak a dialect of Spanish, which they write with Hebrew characters. They form a flourishing community at

Salonica, which numbers more than half the population: their colonies at Monastir, Serres and other towns are pbor. A small proportion of the Jews, known as Deunme by the Turks, have embraced Mahommedanism.

With the exception of the southern and western districts already specified, the principal towns, and certain isolated tracts, the whole of Macedonia is inhabited by a race or The races speaking a Slavonic dialect. If language is Slavonic adopted as a test, the great bulk of the rural popula- pu a on ” tion must be described as Slavonic. The Slavs first crossed the Danube at the beginning of the 3rd century, but their great immigration took place in the 6th and 7th centuries. They overran the entire peninsula, driving the Greeks to the shores of the Aegean, the Albanians into the Mirdite country, and the latinized population of Macedonia into the highland districts, such as Pindus, Agrapha and Olympus. The Slavs, a primitive agricultural and pastoral people, were often unsuccessful in their attacks on the fortified towns, which remained centres of Hellenism. In the outlying parts of the peninsula they were absorbed, or eventually driven back, by the original populations, but in the central region they probably assimilated a considerable proportion of the latinized races. The western portions of the peninsula were occupied by Serb and Slovene tribes: the Slavs of the eastern and central portions were conquered at the end of the 7th century by the Bulgarians, a Ugro-Finnish horde, who established a despotic political organization, but being less numerous than the subjected race were eventually absorbed by it. The Mongolian physical type, which prevails in the districts between the Balkans and the Danube, is also found in central Macedonia, and may be recognized as far west as Ochrida and Dibra. In general, however, the Macedonian Slavs differ some- what both in appearance and character from their neighbours beyond the Bulgarian and Servian frontiers: the peculiar type which they present is probably due to a considerable admixture of Vlach, Hellenic > Albanian and Turkish blood, and to the influence of the surrounding races. Almost all independent authorities,

however, agree that the bulk of the Slavonic population of Mace- donia is Bulgarian. The principal indication is furnished by the language, which, though resembling Servian in some respects (e.g. the case-endings, which are occasionally retained), presents most of the characteristic features of Bulgarian (see Bulgaria: Language). Among

these may be mentioned the suffix-article, the nasal vowels (retained in the neighbourhood of Salonica and Castoria, but modified elsewhere as in Bulgarian) , the retention of I (e.g. vulk ” wolf,” bel ” white “; Servian vuk, beo), and the loss of the infinitive. There are at least four Slavonic dialects in Macedonia, but the suffix-article, though varying in form, is a constant feature in all. The Slavs of western Macedonia are of a lively, enterprising character, and share the commercial aptitude of the Vlachs: those of the eastern and southern regions are a quiet, sober, hardworking agricultural race, more obviously homogeneous with the population of Bulgaria. In upper Mace- donia large family communities, resembling the Servian and Bulgarian zadruga, are commonly found: they sometimes number over 50 members. The whole Slavonic population of Macedonia may be estimated at about 1,150,000, of whom about 1,000,000 are Christians of the Orthodox faith. The majority of these own allegiance to the Bulgarian exarchate, but a certain minority still remains faithful to the Greek patriarchate. The Moslem Bulgarians form a considerable element: they are found prin- cipally in the valley of the upper Mesta and the Rhodope district, where they are known as Pomaks or ” helpers,” i.e. auxiliaries to the Turkish army.

The Racial Propaganda. — The embittered struggle of the rival nationalities in Macedonia dates from the middle of the 19th century. Until that period the Greeks, owing to their superior culture and their privileged position, exercised an exclusive in- fluence over the whole population professing the Orthodox faith. All Macedonia was either Moslem or Orthodox Christian, without distinction of nationalities, the Catholic or Protestant millets being inconsiderable. The first opposition to Greek ecclesiastical ascendancy came from the Bulgarians. The Bul- garian literary revival, which took place in the earlier part of the 19th century, was the precursor of the ecclesiastical and national movement which resulted in the establishment of the exarchate in 1870 (see Bulgaria). In the course of the struggle some of the Bulgarian leaders entered into negotiations with Rome; a Bulgarian Uniate church was recognized by the Porte, and the pope nominated a bishop, who, however, was mysteriously deported to Russia a few days after his consecration (1861). The first exarch, who was elected in 1871, was excommunicated with all his followers by the patriarch, and a considerable number of Bulgarians in Macedonia — the so-called ” Bulgarophone Greeks ” — fearing the reproach of schism, or influenced by other considerations, refrained from acknowledging the new spiritual power. Many of the recently converted uniates, on the other hand, offered their allegiance to the exarch. The firman of the 28th of February 1870 specified a number

of districts within the present boundaries of Bulgaria and Servia, as well as in Macedonia, to which Bulgarian bishops might be appointed; other districts might be subjected to the exarchate should two-thirds of the inhabitants so desire. In virtue of the latter provision the districts of Veles, Ochrida and Uskiib declared for the exarchate, but the Turkish government refrained from sanctioning the nomination of Bulgarian bishops to these dioceses. It was not till 1891 that the Porte, at the instance of Stamboloff, the Bul- garian prime minister, whose demands were supported by the Triple Alliance and Great Britain, issued the berat, or exequatur, for Bulgarian bishops at Ochrida and Uskub; the sees of Veles and Nevrokop received Bulgarian prelates in 1894, and those of Monastir, Strumnitza and Dibra in 1898. The Bulgarian posi- tion was further strengthened in the latter year by the establish- ment of ” commercial agents ” representing the principality at Salonica, Uskiib, Monastir and Serres. During this period (1891-1898) the Bulgarian propaganda, entirely controlled by the spiritual power and conducted within the bounds of legality, made rapid and surprising progress. Subsequently the inter- ference of the Macedonian committee at Sofia, in which ˆKe

advocates of physical force predominated, and the rivalry of fac- tions did much to injure the movement; the hostility of the Porte was provoked and the sympathy of the powers alienated by a series of assassinations and other crimes. According to the official figures, the Bulgarian schools, which in 1893 were 554, with 30,267 pupils’ and 853 teachers, in 1900 numbered 785 (including 5 gymnasia and 58 secondary schools), with 39,892 pupils and 1250 teachers. A great number of the schools were closed by the Turkish authorities after the insurrection of 1903 and many had not been reopened in 1909; the teachers were imprisoned or had fled into exile.

The Rumanian movement comes next to the Bulgarian in order of time. The Vlachs had shown greater susceptibility to Greek influence than any of the other non-Hellenic populations of Macedonia, and, though efforts to create a Rumanian propa- ganda were made as early as 1855, it was not till after the union of the principalities of Wallachia and Moldavia in 1861 that any indications of a national sentiment appeared amongst them. In 1886 the principal apostle of the Rumanian cause, a priest named Apostol Margaritis, founded a gymnasium at Monastir, and the movement, countenanced by the Porte, supported by the French Catholic missions, and to some extent encouraged by Austria, has made no inconsiderable progress since that time. There are now about forty Rumanian schools in Macedonia, including two gymnasia, arid large sums are devoted to their maintenance by the ministry of education at Bucharest, which also

provides qualified teachers. The Rumanian and Servian movements are at a disadvantage compared with the Bulgarian, owing to their want of a separate ecclesiastical organization, the orthodox Vlachs and Serbs in Turkey owning allegiance to the Greek patriarchate. The governments of Bucharest and Belgrade therefore endeavoured to obtain the recognition of Vlach and Servian millets, demanding respectively the establishment of a Rumanian bishopric at Monastir and the restoration of the patriarchate of Ipek with the appointment of a Servian metro- politan at Uskiib. The Vlach millet was recognized by the Porte by irade on the 23rd of May 1905, but the aims of the Servians, whose active interference in Macedonia is of compara- tively recent date, have not been realized. Previously to 1878 the hopes of the Servians were centred on Bosnia, Herzegovina and the vilayet of Kossovo; but when the Berlin Treaty assigned Bosnia and Herzegovina to Austria, the national aspirations were directed to Macedonia, the Slavonic population of which was declared to be Servian. The strained relations existing between Russia and Bulgaria from 1886 to 1895 were to the advantage of the Servian propaganda, which after 1890 made remarkable progress. Great expenditure has been incurred by the Servian government in the opening and maintenance of schools. At the beginning of 1899 there were stated to be 178 Servian schools in the vilayets of Uskiib, Salonica and Monastir (including fifteen gymnasia), with 321 teachers and 7200 pupils.

The Albanian movement is still in an inceptive stage; owing to the persistent prohibition of Albanian schools by the Turks, a literary propaganda, the usual precursor of a national revival, was rendered impossible till the outbreak of the Young Turk revolution in July 1908. 1 After that date numerous schools were founded and an Albanian committee, meeting in November 1908, fixed the national alphabet and decided on the adoption of the Latin character. The educational movement is most conspicuous among the Tosks, or southern Albanians. Notwith- standing the encroachments of their rivals, the impoverishment of the patriarchate, and the injury inflicted on their cause by the Greco-Turkish War of 1897, the Greeks still maintain a large number of schools; according to statistics prepared at Athens there were in 1901, 927 Greek schools in the vilayets of Salonica and Monastir (including five gymnasia), with 1397 teachers and 57,607 pupils. The great educational activity displayed by the proselytizing movements in Macedonia, while tending to the artificial creation of parties, daily widens the contrast between the progressive Christian and the backward Moslem populations.

Antiquities.— Macedonia, like the neighbouring Balkan countries, still awaited exploration at the beginning of the 20th century, and

little had been learned of the earlier development of civilization in these regions. The ancient indigenous population has left many traces of its presence in the tumuli which occur on the plains, and more especially along the valley of the Vardar. The unquiet state of the country went far to prevent any systematic investigation of these remains; excavations, however, were made by Korte and Franke at Niausta and near Salonica (see Kretschner,- Einleitung in die Geschichte der griechischen Sprache, pp. 176, 421), and fragments of primitive pottery, with peculiar characteristics, were found by Perdrizet at Tchepefje, on the left bank of Lake Tachino. The oldest archaeological monuments of Macedonia are its coins, for which the mines of Crenides (the later Philippi), at the foot of Mt Pangaeus, of Chalcidice, of the island of Thasos, and of the mountains between Lake Prasias and the ancient Macedonian kingdom (Herod, v. 17), furnished abundance of metal. From the reign of Alexander I., in the epoch of the Persian wars (502-479 B.C.), the Macedonian dynasty issued silver coins of a purely Greek style. The Thracian communities around Mt Pangaeus also produced a variety of coins, especially at the beginning of the 5th century. The great octo- drachms of this period were perhaps struck for the purpose of paying tribute to the Persians when the country between the Strymon and the Nestos was in their possession; most of the specimens have been found in Asia Minor. These large pieces present many charac- teristics of the Ionian style ; it is evident that the Thracians derived the arts of minting and engraving from the neighbouring Thasos, itself a colony from the Ionian Paros. The monarchs of Pella were enthusiastic admirers of Hellenic culture, and their court was doubtless frequented by Greek sculptors as well as men of letters, such as Herodotus and Euripides. At Pella has been found a funerary stele of the late 5th or early 4th century representing a Macedonian hetaerus — a beautiful specimen of the best Greek art, now preserved in the Imperial Ottoman Museum at Constantinople. To the Hellenic period belong the vaulted tombs under tumuli dis- covered at Pella, Pydna, Palatitza, and other places ; the dead were laid in marble couches ornamented with sculptures, like those of the so-called sarcophagus of Alexander at Constantinople. These tombs doubtless received the remains of the Macedonian nobles and hetaeri: in one of them a fresco representing a conflict between a horseman and a warrior on foot has been brought to light by Kinch. Similarly constructed places of sepulture have been found at Eretria and else- where in Greece. At Palatitza the ruins of a remarkable structure, perhaps a palace, have been laid bare by Heuzey and Daumet. Unlike

Greece, where each independent city had its acropolis, Mace- donia offers few remnants of ancient fortification ; most of the country towns appear to have been nothing more than open market-centres. The most interesting ruins in the country are those of the Roman and Byzantine epochs, especially those at Salonica (q.v.). The Byzan- tine fortifications and aqueduct of Kavala are also remarkable. At Verria (Beroea) may be seen some Christian remains, at Melnik a palace of the age of the Comneni, at Serres a fortress built by the Servian tsar Stephen Dushan (1336-1356). The remains at Filibejik (Philippi) are principally of the Roman and Byzantine periods; the numerous ex voto rock-tablets of the acropolis are especially interesting. The Roman inscriptions found in Macedonia are mainly funerary, but include several ephebic lists. The funerary tablets afford convincing proof of the persistence of the Thracian element, notwithstanding hellenization and latinization ; many of them, for instance, represent the well-known Thracian horseman hunting the wild boar. The monastic communities on the promontory of Athos (q.v.), with their treasures of Byzantine art and their rich collections of manuscripts, are of the highest antiquarian interest.

History. — For the history of ancient Macedonia see Mace- donian Empire. 1 After its subjugation by the Romans the country was divided into four districts separated by rigid political and social limitations. Before long it was constituted a province, which in the time of Augustus was assigned to the senate. Thenceforward it followed the fortunes of the Roman empire, and, after the partition of that dominion, of its eastern branch. Its Thraco-Illyrian inhabitants had already been largely latinized when Constantine the Great made Byzantium the imperial residence in a.d. 330; they called themselves Romans and spoke Latin. Towards the close of the 4th century the country was devastated by the Goths and Avars, whose incur- sions possessed no lasting significance. It was otherwise with the great Slavonic immigration, which took place at intervals from the 3rd to the 7th century. An important ethnographic change was brought about, and the greater part of Mace- donia was colonized by the invaders (see Balkan Peninsula).

The Slavs were in their turn conquered by the Bulgarians (see Bulgaria: History) whose chief Krum (“802-815) included central Macedonia in his dominions. The Byzantines retained the southern regions and Salonica, which temporarily fell into the hands of the Saracens in 904. With the exception of the 1 Also Alexander, Perdiccas, Philip, &c!

maritime districts, the whole of Macedonia formed a portion of the

empire of the Bulgarian tsar Simeon (893-927); the Bulgarian power declined after his death, but was Byzantine revived in western Macedonia under the Shishman ana dynasty at Ochrida; Tsar Samuel (976-1014), the third *”*JJˆ, a ruler of that family, included in his dominions Uskiib, Veles, Vodena and Melnik. After his defeat by the emperor Basil II. in 1014 Greek domination was established for a century and a half. The Byzantine emperors endeavoured to confirm their positions by Asiatic colonization; Turkish immigrants, afterwards known as Vardariotes, the first of their race who appeared in Macedonia, were settled in the neighbourhood of Salonica in the 9th century; colonies of Uzes, Petchenegs and Kumans were introduced at various periods from the nth to the 13th century. While Greeks and Bulgarians disputed the mas- tery of Macedonia the Vlachs, in the 10th century, established an independent state in the Pindus region, which, afterwards known as Great Walachia, continued to exist till the beginning of the 14th century. In 1185 southern Macedonia was exposed to a raid of the Normans under William of Sicily, who captured Salonica and massacred its inhabitants. After the taking of Constantinople in 1 204 by the Franks of the fourth crusade, the Latin empire of Romania was formed and the feudal kingdom of Thessalonica was bestowed on Boniface, marquis of Mont- ferrat; this was overthrown in 1222 by Theodore, despot of Epirus, a descendant of the imperial house of the Comneni, who styled himself emperor of Thessalonica and for some years ruled over all Macedonia. He was defeated and captured by the Bulgarians in 1230 and the remnant of his possessions, to which his son John succeeded, was absorbed in the empire of Nicaea in 1 234. Bulgarian rule was now once more established in Mace- donia under the powerful monarch Ivan Asen II. (1218-1241) whose dynasty, of Vlach origin, had been founded at Trnovo in 1 186 after a revolt of the Vlachs and Bulgars against the Greeks. A period of decadence followed the extinction of the Asen dynasty in 1257; the Bulgarian power was overthrown by the Servians at Velbuzhd (1330), and Macedonia was included in the realm of the great Servian tsar Dushan (1331-1355) who fixed his capital at Uskiib. Dushan’s empire fell to pieces after his death, and the anarchy which followed prepared the way for the advance of the Turks, to whom not only contending factions at Constantinople but Servian and Bulgarian princes alike made overtures.

Macedonia and Thrace were soon desolated by Turkish raids; when it was too late the Slavonic states combined against the invaders, but their forces, under the Servian tsar Lazar, were routed at Kossovo in 1389 by the sultan Hufe> Murad I. Salonica and Larissa were captured in T 39S by Murad’s son Bayezid, whose victory over

Sigismund of Hungary at Nicopolis in 1396 sealed the fate of the peninsula. The towns in the Struma valley were yielded to the Turks by John VII. Palaeologus in 1424; Salonica was taken for the last time in 1428 by Murad II. and its inhabi- tants were massacred. Large tracts of land were distributed among the Ottoman chiefs; a system of feudal tenure was developed by Mahommed II. (1451-1481), each fief furnishing a certain number of armed warriors. The Christian peasant owners remained on the lands assigned to the Moslem feudal lords, to whom they paid a tithe. The condition of the subject population was deplorable from the first, and became worse during the period of anarchy which coincided with the decadence of the central power in the 17th and 18th centuries; in the latter half of the 17th century efforts to improve it were made by the grand viziers Mehemet and Mustafa of the eminent house of Koprulii. The country was policed by the janissaries (q.v.). Numbers of the peasant proprietors were ultimately reduced to serfdom, working as labourers on the farms or tckifliks of the Moslem beys. Towards the end of the 18th century many of the local governors became practically independent; western Mace- donia fell under the sway of Ali Pasha of Iannina; at Serres Ismail Bey maintained an army of 10,000 men and exercised a beneficent despotism. For more than two centuries Albanian

incursions, often resulting in permanent settlements, added to the troubles of the Christian population. The reforms embodied in the Hatt-i-Sherif of Gulhane (1839) and in the Hatt-i-humayun (1856), in both of which the perfect equality of races and religions was proclaimed, remained a dead letter; the first ” Law of the Vilayets ” (1864), reforming the local administration, brought no relief, while depriving the Christian communities of certain rights which they had hitherto possessed.

In 1876 a conference of the powers at Constantinople proposed the reorganization of the Bulgarian provinces of Turkey in two vilayets under Christian governors-general aided by intenen- popular assemblies. The ” western ” vilayet, of Hon. which Sofia was to be the capital, included northern,

Treaties of central and western Macedonia, extending south as ana hernia” * ar as Castoria. The projet de reglement elaborated by the conference was rejected by the Turkish parliament convoked under the constitution proclaimed on the 23rd of December 1876; the

constitution, which was little more than a device for eluding European intervention, was shortly afterwards suspended. Under the treaty of San Stefano (March 3, 1878) the whole of Macedonia, except Salonica and the Chalcidic peninsula, was included in the newly formed principality of Bulgaria; this arrangement was reversed by the Treaty of Berlin (July 13) which left Macedonia under Turkish adminis- tration but provided (Art. xxiii.) for the introduction of reforms analogous to those of the Cretan Organic Statute of 1868. These reforms were to be drawn up by special commissions, on which the native element should be largely represented, and the opinion of the European commission for eastern Rumelia was to be taken before their promulgation. The Porte, however, prepared a project of its own, and the commission, taking this as a basis, drew up the elaborate ” Law of the Vilayets ” (Aug. 23, 1880). The law never received the sultan’s sanction, and European diplomacy proved unequal to the task of securing its adoption.

The Berlin Treaty, by its artificial division of the Bulgarian race, created the difficult and perplexing “Macedonian Question.” The The population handed back to Turkish rule never

y*facedon/an a cquiesced in its fate; its discontent was aggravated Question, ˆy tne deplorable misgovernment which characterized the reign of Abdul Hamid II., and its efforts to assert itself, stimulated by the sympathy of the enfranchised portion of the race, provoked rival movements on the part of the other Chris- tian nationalities, each receiving encouragement and material aid from the adjacent and kindred states. Some insignificant risings took place in Macedonia after the signature of the Berlin Treaty, but in the interval between 1878 and 1893 the population remained comparatively tranquil, awaiting the fulfilment of the promised reforms.

In 1893, however, a number of secret revolutionary societies (druzhesiva) were set on foot in Macedonia, and in 1894 similar Bulgarian bodies were organized as legal corporations in Bul- Conspira- garia. The fall of Stamboloff in that year and the cies. reconciliation of Bulgaria with Russia encouraged

the revolutionaries in the mistaken belief that Russia would take steps to revive the provisions of the San Stefano treaty. In 1895 the ” Supreme Macedo-Adrianopolitan Committee ” (Vrkhoven Makedoni-Odrinski Komitet) was formed at Sofia and forthwith despatched armed bands into northern Macedonia; the town of Melnik was occupied for a short time by the revolu- tionaries under Boris Sarafoff , but the enterprise ended in failure. Dispirited by this result, the ”

Vrkhovists," as the revolutionaries in Bulgaria were generally styled, refrained from any serious effort for the next five years; the movement was paralysed by dissensions among the chiefs, and rival parties were formed under Sarafoff and General Tzoncheff. Meanwhile the " Centralist " or local Macedonian societies were welded by two remarkable men, Damian Grueff and Gotze Delcheff , into a formidable power known as the " Internal Organization," founded in 1893, which maintained its own police, held its own tribunals, assessed and collected contributions, and otherwise exercised an imperium in imperio throughout the country, which was divided into rayons or districts, and subdivided into departments and communes,

each with its special staff of functionaries. The Internal Organ- ization, as a rule, avoided co-operation with the revolutionaries in Bulgaria; it aimed at the attainment of Macedonian autonomy, and at first endeavoured, but unsuccessfully, to enlist the sympathies of the Greeks and Servians for the programme of " Macedonia for the Macedonians."

The principle of autonomy was suspected at Athens and Belgrade as calculated to ensure Bulgarian predominance and to delay or preclude the ultimate partition of the Oreek country. At Athens, especially, the progress of the Action. Bulgarian movement was viewed with much alarm; it was feared that Macedonia would be lost to Hellenism, and in 1896 the Ethnike Hetaerea (see Greece and Crete) sent numerous bands into the southern districts of the country. The Hetaerea aimed at bringing about a war between Greece and Turkey, and the outbreak of trouble in Crete enabled it to accomplish its purpose. During the Greco-Turkish War (q.v.) Macedonia remained quiet, Bulgaria and Servia refraining from interference under pressure from Austria, Russia and the other great powers. The reverses of the Greeks were to the advantage of the Bul- garian movement, which continued to gain strength, but after the discovery of a hidden depot of arms at Vinitza in 1897 the Turkish authorities changed their attitude towards the Bulgarian element; extreme and often barbarous methods of repression were adopted, and arms were distributed among the Moslem population. The capture of an American missionary, Miss Stone, by a Bulgarian band under Sandansky in the autumn of 1 901 proved a windfall to the revolutionaries, who expended her ransom of £Ti 6,000 in the purchase of arms and ammunition.

In 1902 the Servians, after a prolonged conflict with the Greeks, succeeded with Russian aid in obtaining the nomination of Mgr. Firmilian, a Servian, to the archbishopric of Uskub. Troubles in Contemporaneously with a series of Russo-Bulgarian 1902: inter-

celebrations in the Shipka pass in September of that ff” ot year, an effort was made to provoke a rising in the Monastir district by Colonel Yankoff, the lieutenant of General Tzoncheff; in November a number of bands entered the Razlog district under the general’s personal direction. These movements, which were not supported by the Internal Organization, ended in failure, and merciless repression followed. The state of the country now became such as to necessitate the intervention of the powers, and the Austrian and Russian governments, which had acted in concert since April 1897, drew up an elaborate scheme of reforms. The Porte, as usual, endeavoured to fore- stall foreign interference by producing a project of its own, which was promulgated in November 1902, and Hilmi Pasha was appointed Inspector General of the Rumelian vilayets and charged with its application. The two powers, however, per- severed in their intention and on the 21st of February 1903 presented to the Porte an identic memorandum proposing a series of reforms in the administration, police and finance, including the employment of “foreign specialists” for the reorganization of the gendarmerie.

At the same time the Bulgarian government, under pressure from Russia, arrested the revolutionary leaders in the principality, suppressed the committees, and confiscated their Bulgarian funds. The Internal Organization, however, was be- insurrec- yond reach, and preparations for an insurrection went iloa to rapidly forward. In March a serious Albanian revolt ‘

complicated the situation. At the end of April a number of dynamite outrages took place at Salonica; public opinion in Europe turned against the revolutionaries and the Turks seized the opportunity to wreak a terrible vengeance on the Bulgarian population. On the 2nd of August, the feast of St Elias, a general insurrection broke out in the Monastir vilayet, followed by sporadic revolts in other districts. The insurgents achieved some temporary successes and occupied the towns of Krushevo, Klisura and Neveska, but by the end of September their resist- ance was overcome; more than 100 villages were burned by the troops and bashi-bazouks, 8400 houses were destroyed and 60,000 peasants remained homeless in the mountains at the approach of winter.

Pro gramme.

The Austrian and Russian governments then drew up a further series of reforms known as the ” Miirzsteg programme ” The (Oct. 9, 1903) to which the Porte assented in prin-

Murzsleg ciple, though many difficulties were raised over details. Two officials, an Austrian and a Russian, styled ” civil agents ” and charged with the super- vision of the local authorities in the application of reforms, were placed by the side of the inspector-general while the reorganization of the gendarmerie was entrusted to a foreign general in the Turkish service aided by a certain number of officers from the armies of the great powers. The latter task was entrusted to the Italian General de Giorgis (April 1904), the country being divided into sections under the supervision of the officers of each power. The reforms proved a failure, mainly owing to the tacit opposition of the Turkish authori- ties, the insufficient powers attributed to the European officials, the racial feuds and the deplorable financial situation. In 1905 the powers agreed on the establishment of a financial commission on which the representatives of Great Britain, France, Germany and Italy would sit as colleagues of the civil agents. The Porte offered an obstinate resistance to the project and only yielded (Dec. 5) when the fleets of the powers appeared near the Dardanelles. Some improvement was now effected in the financial administration, but the general state of the country continued to grow worse; large funds were collected abroad by the committees at Athens, which despatched numerous bands largely composed of Cretans into the southern districts, the Servians displayed renewed activity in the north, while the Bulgarians offered a dogged resistance to all their foes.

The Austro-Russian entente came to an end in the beginning of 1908 owing to the Austrian project of connecting the Bosnian The “Reval an< i Macedonian railway systems, and Great Britain Pro- and Russia now took the foremost place in the

gramme.” demand for reforms. After a meeting between King Edward VII. and the emperor Nicholas II. at Reval in the early summer of 1908 an Anglo-Russian scheme, known as the ” Reval programme,” was announced; the project aimed at more effective European supervision and dealt especially with the administra- tion of justice. Its appearance was almost immediately followed by the military revolt of the Young Turk or constitutional party, which began in the Monastir district under two junior officers, Enver Bey and Niazi Bey, in July. The restoration of the con- stitution of 1876 was proclaimed (July 24, 1908), and the powers, anticipating the spontaneous adoption of reforms on the part of regenerated Turkey, decided to suspend the

Reval programme and to withdraw their military officers from Macedonia.

See Lejean, Ethnographie de la Turquie d'Europe (Gotha, 1861); Hahn, Reise von Belgrad nach Salonik (Vienna, 1868); Yastreboff, Obichai i pesni turetskikh Serbov (St Petersburg, 1886); " Ofeicoff " (Shopoff), La Macedoine au point de vue ethnographique, historique et philologique (Philippopolis, 1888) ; Gopchevitch, Makedonien und Alt- Serbien (Vienna, 1889) ; Verkovitch, Topograficheskoethnographiche- skii ocherk Makedonii (St Petersburg, 1889); Burada, Cercetari despre scoalele Romanesci din Turcia (Bucharest, 1890) ; Tomaschek, Die heutigen Bewohner Macedoniens (Sonderabdruck aus den Verhandlungen des IX. D. Geographen-Tages in Wien, 1891) (Berlin, 1891) ; Die alien Thrdker (Vienna, 1893) ! Berard, La Turquie et I'Hellenisme contemporain, (Paris, 1893); La Macedoine (Paris, 1900) ; Shopoff, Iz zhivota i polozhenieto na Bulgarite v vilayetite (Philippopolis, 1894); Weigand, Die Aromunen (Leipzig, 1895); Die nalionalen Bestrebungen der Balkanvblker (Leipzig, 1898) ; Nikolaides, La Macedoine (Berlin, 1899); "Odysseus," Turkey in Europe (London, 1900) ; Kunchoff, Makedonia: etnografia i statistika (Sofia, 1900); La Macidoine et la Vilayet d'Andrinople (Sofia, 1904), anonymous; L. Villari, The Balkan Question (London, 1905); H. N. Brailsford, Macedonia: its Races and their Future (London, 1906); J. Cvijic, Grundlinien der Geographie und Geologie von Mazedonien und Allserbicn (Gotha, 1908). For the antiquities, see Texier and Pullan, Byzantine Architecture (London, 1864); Heuzeyand Daumet, Mission archeologique en Macedoine (Paris, 1865); Duchesne and Bayet, Mimoire sur une mission en Macedoine et au Mont Alhos (Paris, 1876) ; Barclay V. Head, Catalogue of Greek Coins; Macedonia (London, 1879) ; Kinch, V Arc de triomphe de Salonique (Paris, 1890) ; Beretnung om en archaeologisk Reise i Makedonien (Copenhagen, 1893); Mommsen, Suppl. to vol. iii. Corpus inscript. laiinarum (Berlin, 1893) ; Perdrizet, Articles on Macedonian archaeology and epigraphy in Bulletin de correspondance helUnique, since 1894.

(J. D. B.)

MACEDONIAN EMPIRE, the name generally given to the empire founded by Alexander the Great of Macedon in the countries now represented by Greece and European Turkey, Asia Minor, Egypt, Syria, Persia and eastwards as far as northern India. 1 The present article contains a general account of the empire in its various aspects. It falls naturally into two main divisions: — I. The reign of Alexander. II. The period of his successors, the " Diadochi " and their dynasties.

I. The Reign of Alexander. — At the beginning of the 4th century B.C. two types of political association confronted each other in the lands of the Eastern Mediterranean, — /. Greeks the Persian monarchy with its huge agglomeration aad of subject peoples, and the Greek city-state. Each ers sns ‘ had a different principle of strength. The Persian monarchy was strong in its size, in the mere amount of men and treasure it could dispose of under a single hand; the Greek state was strong in its morale, in the energy and discipline of its soldiery. But the smallness of the single city-states and their unwillingness to combine prevented this superiority in quality from telling destructively upon the bulk of the Persian empire. The future belonged to any power that could combine the advantages of both systems, could make a state larger than the Greek polls, and animated by a spirit equal to that of the Greek soldier. This was achieved by the kings of Macedonia. The work, begun by his predecessors, of consolidating the kingdom internally and makings its army a fighting-machine of high power was com- pleted by the genius of Philip II. (359-336 B.C.), who at the same time by war and diplomacy brought the Greek states of the Balkan peninsula generally to recognize his single predominance. At the synod of Corinth (338) Philip was solemnly declared the captain-general (arparriyds a.vroKpa.Twp) of the Hellenes against the Great King. The attack on Persia was delayed by the assassination of Philip in 336, and it needed some fighting before the young Alexander had made his position secure in Macedonia and Greece. The recognition as captain-general he had obtained at another synod in Corinth, by an imposing military demonstra- tion in Greece immediately upon his accession. Then came the invasion of the Persian empire by Alexander in 334 at the head of an army composed both of Macedonians and contingents from the allied Greek states. Before this force the Persian monarchy went down, and when Alexander died eleven years later (323) a Macedonian empire which covered all the territory of the old Persian empire, and even more, was a realized fact.

The empire outside of Macedonia itself consisted of 22 provinces. In Europe, (1) Thrace ; in Asia Minor, (2) Phrygia on the Hellespont, (3) Lydia, (4) Caria, (5) Lycia and Pamphyha,’(6) Great 2 Exteatof Phrygia, (7) Paphlagonia and Cappadocia; between /te Empire. the Taurus and Iran, (8) Cilicia, (9) Syria, (10) Mesopo- tamia, (11) Babylonia, (12) Susiana; in Africa, (13) Egypt; in Iran, (14) Persis, (15) Media, (16) Parthia and Hyrcania, (17) Bactria and Sogdiana, (18) Areia and Drangiana, (19) Carmania, (20) Arachosia and Gedrosia ; lastly Jfte Indian provinces, (21) the Paropanisidae (the Kabul valley), and (22) the province assigned to Pithon, the son of

Agenor, upon the Indus (J. Beloch, Griech. Gesch. III. [ii.], p. 236 seq. ; for the Indian provinces cf. B. Niese, Gesch. der griech. und maked. Staaten, I. p. 500 seq.). Hardly provinces proper, but rather client principalities, were the two native kingdoms to which Alexander had left the conquered land beyond the Indus — the kingdoms of Taxiles and Porus.

The conquered empire presented Alexander with a system of government ready-made, which it was natural for the new masters to take over. For the Asiatic provinces and Egypt, the old Persian name of satrapy (see Satrap) was still re- 3. System tained, but the governor seems to have been styled ofaovern- officially in Greek strategos, although the term satrap meat ‘ certainly continued current in common parlance. The gover- nors appointed by Alexander were, in the west of the empire, exclusively Macedonians; in the east, members of the Old Persian nobility were still among the satraps at Alexander’s death, Afropates in Media, Phrataphernes in Parthia and Hyrcania,

1 For the events which brought this empire into being see Alexander the Great. For the detailed accounts of the separate dynasties into which it was divided after Alexander’s death, see Seleocid Dynasty, Antigonus, Pergamum, &c, and for its effect on the spread of Hellenic culture see Hellenism.

and Alexander’s father-in-law Oxyartes in the Paropanisidae. Alexander had at first trusted Persian grandees more freely in this capacity; in Babylonia, Bactria, Carmania, Susiana he had set Persian governors, till the ingrained Oriental tradition of misgovernment so declared itself that to the three latter provinces certainly Macedonians had been appointed before his death. Otherwise the only eastern satrapy whose governor was not a Macedonian, was Areia, under Stasanor, a Cypriote Greek. In the case of certain provinces, possibly in the empire generally, Alexander established a double control. The financial admini- stration was entrusted to separate officials; we hear of such in Lydia (Arr. i. 17, 7), Babylonia (id. iii. 16, 4), and notably in Egypt (id. iii. 5, 4). Higher financial controllers seem to have been over groups of provinces (Philoxenus over Asia Minor, Arr. i. 17, 7; see Beloch, Gr. Gesch. III. [i] p. 14), and Harpalus over the whole financesof the empire, with his seat in Babylon. Again the garrisons in the chief cities, such as Sardis, Babylon, Memphis Pelusium and Susa, were under commands distinct from those of the provinces. The old

Greek cities of the motherland were not formally subjects of the empire, but sovereign states, which assembled at Corinth as members of a great alliance, in which the Macedonian king was included as a member and held the office of captain-general. The Greek cities of Asia Minor stood to him in a similar relation, though not included in the Corinthian alliance, but in federations of their own (Kaerst, Gesch. d. Hellenist. Zeilalt. i. 261 seq.). Their territory was not part of the king's country (Inscr. in the Brit. Mus. No. 400). Of course, in fact, the power of the king was so vastly superior that the Greek cities were in reality subject to his dictation, even in so intimate a matter as the readmission of their exiles, and might be obliged to receive his garrisons. Within the empire itself, the various communities were allowed, subject to the interference of the king or his officials, to manage their own affairs. Alexander is said to have granted the Lydians to be " free " and " to use the laws of the ancient Lydians," whatever exactly these expressions may mean (Arr. i. 17, 4). So too in Egypt, the native monarchs were left as the local authorities (Arr. iii. 5, 4). Especially to the gods of the conquered people Alexander showed respect. In Egypt and in Babylon he appeared as the restorer of the native religions to honour after the unsympathetic rule of the Persians. The temple of Marduk in Babylon which had fallen began to rise again at his command. It is possible that he offered sacrifice to Yahweh in Jerusalem. In Persia, the native aristocracy retained their power, and the Macedonian governor adopted Persian dress and manners (Diod. xix. 48, 5; Arr. vi. 30). A new factor introduced by Alexander was the foundation of Greek cities at all critical points of intercourse in the conquered lands. These, no doubt, possessed municipal autonomy with the ordinary organization of the Greek state ; to what extent they were formally and regularly controlled by the provincial authorities we do not know; Pithon, the satrap of the Indian province is specially described as sent "in colonias in Indis conditas" (Just. xiii. 4, 21). The empire included large tracts of mountain or desert, inhabited by tribes, which the Persian government had never subdued. The subjugation of such districts could only be by a system of effective military occupation and would be a work of time; but Alexander made a beginning by punitive expeditions, as occasion offered, calculated to reduce the free tribes to tempo- rary quiet ; we hear of such expeditions in the case of the Pisidians, the tribes of the Lebanon, the Uxii (in Khuzistan), the Tapyri (in the Elburz), the hill-peoples of Bajaor and Swat, the Cossaei (in Kurdistan); an expedition against the Arabs was in prepara- tion when Alexander died.

See A. Kohler, Reichsverwaltung u. Politik Alexanders des Grossen in Klio, v. 303 seq. (1905).

Alexander, who set out as king of the Macedonians and captain-general of the Hellenes, assumed after the death of Darius the c character of the Oriental great king. He adopted

the Persian garb (Plutarch, de fort. Al. i. 8) in- cluding a head-dress, the diadema, which was suggested by that of the Achaemenian king (Just. xii. 3, 8). We hear also of a sceptre as part of his insignia (Diod. xviii. 27, 1).

The pomps and ceremonies which were traditional in the East were to be continued. To the Greeks and Macedonians such a regime was abhorrent, and the opposition roused by Alexander's attempt to introduce among them the practice of praskynesis (prostration before the royal presence), was bitter and effectual. The title of chiliarch, by which the Greeks had described the great king's chief minister, in accordance with the Persian title which described him as " commander of a thousand," i.e. of the royal body-guard, was conferred by Alexander upon his friend Hephaestion. The Greek Chares held the position of chief usher (ei

Alexander, however, who impressed his contemporaries by his sexual continence, kept no harem of the old sort. The number of his wives did not go beyond two, and the second, the daughter of Darius, he did not take till a year before his death. In closest contact with the king's person were the seven, or latterly eight, body-guards, cru> ixclto 4>v\aKes, Macedonians of high rank, including Ptolemy and Lysimachus, the future kings of Egypt, and Thrace (Arr. vi. 28, 4). The institution, which the Macedonian court before Alexander had borrowed from Persia, of a corps of pages composed of the young sons of the nobility (iraioes fiaaiXuoi or fiaoiKiKol) continued to hold an important, place in the system of the court and in Alexander's campaigns (see Arr. iv. 13, 1; Curt. viii. 6, 6; Suid. j3a

See Spiecker, Der Hof und die Hofordnung Alex. d. Grossen (1904).

The army of Alexander was an instrument which he inherited from his father Philip. Its core was composed of the Macedonian peasantry who served on foot in heavy armour (" the g Army Foot-companions ")? refeTatpot). They formed the phalanx, and were divided into 6 brigades (rdireis), probably on the territorial system. Their distinctive arm was the great Macedonian pike (sarissa), some 14 ft. long, of further reach than the ordinary Greek spear. They were normally drawn up in more open order than the heavy Greek phalanx, and possessed thereby a mobility and elasticity in which the latter was fatally deficient. Reckoning 1 ,500 to- each brigade, we got a total for

the phalanx of 9,000 men. Of higher rank than the pezetaeri were the royal foot-guards (/Sao-iAwcoi brraairla-Tai), some 3,000 in number, more lightly armed, and distinguished (at any rate at the time of Alexander's death) by silver shields. Of these 1 ,000 constituted the royal corps (to ixyrjixa to fiaaikinbv) . The Mace- donian cavalry was recruited from a higher grade of society than the infantry, the petite noblesse of the nation. They bore by old custom the name of the king's Companions (ercupoi), and were distributed into 8 territorial squadrons (iXai) of probably some 250 men each, making a normal total of 2;ooo. In the cavalry also the most privileged squadron bore the name of the agema. The ruder peoples which were neighbors to the Macedonians (Paeonians, Agrianes, Thracians) furnished contingents of light cavalry and javelineers (tmovTuxral). From the Thessalians the Macedonian king, as overlord, drew some thousand excellent troopers. The rest of Alexander's army was composed of Greeks, not formally his subjects. These served partly as mercenaries, partly in contingents contributed by the states in virtue of their alliance. According to Diodorus (xvii. 17, 3) at the time of Alexander's passage into Asia, the mer- cenaries numbered 5,000, and the troops of the alliance 7,000 foot and 600 horse. All these numbers take no account of the troops left behind in Macedonia, 12,000 foot and 1,500 horse, according to Diodorus. When Alexander was lord of Asia, innovations followed in the army. Already in 330 at Persepolis, the command went forth that 30,000 young Asiatics were to be trained as Macedonian soldiers (the epigoni, Arr. vii., 6, 1). Contingents of the fine Bactrian cavalry followed Alexandc r into India. Persian nobles were admitted into the agema of the Macedonian cavalry. A far more radical re- modelling of the army was undertaken at Babylon in 323, by which the old phalanx system was to be given up for one in which the unit was to be composed of Macedonians with pikes and Asiatics with missile arms in combination — a change calculated to be momentous both from a military point of view in the coming wars, and from a political, in the close fusion of Europeans and Asiatics. The death of Alexan- der interrupted the scheme, and his successors reverted to the older system. In the wars of Alexander the phalanx was never the most active arm; Alexander delivered his telling attacks With his cavalry, whereas the slow-moving phalanx held rather the posi- tion of a reserve, and was brought up to complete a victory when the cavalry charges had already taken effect. Apart from the pitched battles, the warfare of Alexander was largely hill-fighting, in which the hypaspistae took the principal part, and the contingents of light-armed hillmen from the Balkan region did excellent service.

For Alexander's army and tactics, beside the regular histories (Droysen, Niese, Beloch, Kaerst), see D. G. Hogarth, Journal of Philol., xvii. i seq. (corrected at some points in his Philip and Alex- ander).

The modifications in the army system were closely connected with Alexander's general policy, in which the fusion of Greeks 6. Fusion of and Asiatics held so prominent a place. He had Greeks and himself, as we have seen, assumed to some extent Asiatics. j-jjg g U j se f a Persian king. The Macedonian Peucestas received special marks of his favour for adopting the Persian dress. The most striking declaration of his ideals was the marriage feast at Susa in 324, when a large number of the Macedonian nobles were induced to marry Persian princesses, and the rank and file were encouraged by special rewards to take Eastern wives. We are told that among the schemes registered in the state papers and disclosed after Alexander's death was one for transplanting large bodies of Asiatics into Europe and Europeans into Asia, for blending the peoples of the empire by intermarriage into a single whole (Diod. xviii. 4, 4). How far did Alexander intend that in such a fusion Hellenic culture should retain its pre-eminence? How far could it have done so, had the scheme been realized? It is not impossible that the question may yet be raised again whether the Eurasian after all is the heir of the ages.

High above all the medley of kindreds and tongues, un- trammelled by national traditions, for he had outgrown the compass of any one nation, invested with the Honours sl° rv °f achievements in which the old bounds of the possible seemed to fall away, stood in 324 the man Alexander. Was he a man? The question was explicitly suggested by the report that the Egyptian priest in the Oasis had hailed him in the god's name as the son of Ammon. The Egyptians had, of course, ascribed deity by old custom to their kings, and were ready enough to add Alexander to the list. The Persians, on the other hand, had a different conception of the godhead, and we have no proof that from them Alexander either required or received divine honours. From the Greeks he cer- tainly received such honours; the ambassadors from the Greek states came in 323 with the character of theori, as if approaching a deity (Arr. vii. 23, 2). It has been supposed that in offering such worship the Greeks showed the effect of " Oriental " influence, but indeed we have not to look outside the Greek circle of ideas to explain it. As early as Aeschylus (Supp. 991) the proffering of divine honours was a form of expression for intense feelings of reverence or gratitude towards men which naturally suggested itself — as a figure of speech in Aeschylus, but the figure had been

translated into action before Alexander not in the well- known case of Lysander only (cf. the case of Dion, Plut. Dio, 29). Among the educated Greeks rationalistic views of the old mythology had become so current that they could assimilate Alexander to Dionysus without supposing him to be super- natural, and to this temper the divine honours were a mere form, an elaborate sort of flattery. Did Alexander merely receive such honours? Or did he claim them himself? It would seem that he did. Many of the assertions as to his action in this line do not stand the light of criticism (see Hogarth, Eng. Hist. Rev. ii., 1887, p. 317 seq.; Niese, Historische Zeitschrift, lxxix., 1897, p. 1, seq.); even the explicit statement in Arrian as to Alexander and the Arabians is given as a mere report; but we have well- authenticated utterances of Attic orators when the question of the cult of Alexander came up for debate, which seem to prove that an intimation of the king's pleasure had been conveyed to Athens.

A new life entered the lands conquered by Alexander. Human intercourse was increased and quickened to a degree not before 8. later- known. Commercial enterprise now found open course and roads between the Aegean and India; the new Discovery. G ree k cities made stations in what had been for the earlier Greek traders unknown lands; an immense quantity of precious metal had been put into circulation which the Persian kings had kept locked up in their treasuries (cf. Athen. vi. 231 e). At the same time Alexander himself made it a principal concern to win fresh geographical knowledge, to

open new ways. The voyage of Nearchus from the Indus to the Euphrates was intended to link India by a waterway with the Mediterranean lands. So too Heraclides was sent to explore the Caspian; the survey, and possible circumnavigation, of the Arabian coasts was the last enterprise which occupied Alexander. The improvement of waterways in the interior of the empire was not neglected, the Babylonian canal system was repaired, the obstructions in the Tigris removed. A canal was attempted across the Mimas promontory (Plin. N.H. v. 116). The reports of the fir)jxo.Tt.crai, Baeton and Diognetus, who accompanied the march of Alexander's army, gave an exacter knowledge of the geographical conformation of the empire, and were accessible for later investigators (Susemihl, Gesch. d. griech. Lilt., I. p. 544). Greek natural science was enriched with a mass of new mate- rial from the observations of the philosophers who went with Alexander through the . strange lands (H. Bretzl, Botanische Forschungen d. Alexanderzuges, 1903); whilst on the other hand attempts were made to acclimatize the plants of the motherland in the foreign soil (Theophr., Hist. Plant, iv. 4, 1).

The accession of Alexander brought about a change in the mone- tary system of the kingdom. Philip's bimetallic system, which had attempted artificially to fix the value of silver in spite „ colnaea of the great depreciation of gold consequent upon the ‘ working of the Pangaean mines, was abandoned. Alexander's gold coinage, indeed (possibly not struck till after the invasion of Asia), follows in weight that of Philip's staters; but he seems at once to have adopted for his silver coins (of a smaller denomination than the tetradrachm) the Euboic-Attic standard, instead of the Phoenician, which had been Philip's. With the conquest of Asia, Alexander conceived the plan of issuing a uniform coinage for the empire. Gold had fallen still further from the diffusion of the Per- sian treasure, and Alexander struck in both metals on the Attic standard, leaving their relation to adjust itself by the state of the market. This imperial coinage was designed to break down the monetary predominance of Athens (Beloch, Gr. Gesch. iii. [i.], 42). None of the coins with Alexander's own image can be shown to have been issued during his reign; the traditional gods of the Greeks still admitted no living man to share their prerogative in this sphere. Athena and Nike alone figured upon Alexander's gold ; Heracles and Zeus upon his silver.

See L. Miiller, Numismatique d' Alexandre le Grand (1855); also Numismatics: § I. " Greek Coins, Macedonian."

II. After Alexander. — The external fortunes of the Macedonian Empire after Alexander's death must be briefly traced before its inner developments be touched upon. 1 There was, at /, History first, when Alexander suddenly died in 323, no overt of the disruption of the empire. The dispute between "Succes- the Macedonian infantry and the cavalry (i.e. the sors ‘ commonalty and the nobles) was as to the person who should be chosen to be the king, although it is true that either candidate, the half-witted son of Philip II., Philip Arrhidaeus, or the pos- thumous son of Alexander by Roxana, opened the prospect of a long regency exercised by one or more of the Macedonian lords. The compromise, by which both the candidates should be kings together, was, of course, succeeded by a struggle for power among those who wished to rule in their name. The resettle- ment of dignities made in Babylon in 323, while it left the eastern commands practically undisturbed as well as that of Antipater in Europe, placed Perdiccas (whether as regent or as chiliarch) in possession of the kings' persons, and this was a position which the other Macedonian lords could not suffer. Hence the first intestine war among the Macedonians, in which Antipater, Antigonus, the satrap of Phrygia, and Ptolemy, the satrap of Egypt, were allied against Perdiccas, who was ultimately mur- dered in 321 on the Egyptian frontier (see Perdiccas [4], Eumenes). A

second settlement, made at Triparadisus in Syria in 321, constituted Antipater regent and increased the power of Antigonus in Asia. When Antipater died, in 319, a second war broke out, the wrecks of the party of Perdiccas, led by Eumenes, combining with Polyperchon, the new regent, and later on (318) with the eastern satraps who were in arms against Pithon, the satrap of Media. Cassander, the son of Antipater, disappointed of the regency, had joined the party of Antigonus. In 316 Antigonus had defeated and killed Eumenes and made himself supreme from the Aegean to Iran, and Cassander had 1 For details see separate articles on the chief generals.

ousted Polyperchon from Macedonia. But now a third war began, the old associates of Antigonus, alarmed by his over- grown power, combining against him— Cassander, Ptolemy, Lysimachus, the governor of Thrace, and Seleucus, who had fled before Antigonus from his satrapy of Babylonia. From 315 to 3or the war of Antigonus against these four went on, with one short truce in 311. Antigonus never succeeded in reaching Macedonia, although his son Demetrius won Athens and Megara in 307 and again (304-302) wrested almost all Greece from Cassander; nor did Antigonus succeed in expelling Ptolemy from Egypt, although he led an army to its frontier in 306; and after the battle of Gaza in 3 12, in which Ptolemy and Seleucus defeated Demetrius, he had to see Seleucus not only recover Babylonia but bring all the eastern provinces under his authority as far as India. Meanwhile the struggle changed its character in an important respect. King Philip had been murdered by Olympias in 317; the young Alexander by Cassander in 310; Heracles, the illegitimate son of Alexander the Great, by Polyperchon in 309. Thus the old royal house became extinct in the male line, and in 306 Antigonus assumed the title of king. His four adversaries answered this challenge by immediately doing the same. Even in appearance the empire was no longer a unity. In 301 the coalition triumphed over Antigonus in the battle of Ipsus (in Phrygia) and he himself was slain. Of the four kings who now divided the Macedonian Empire amongst them, two were not destined to found durable dynasties, while the house of Antigonus, represented by Demetrius, was after all to do so. The house of Antipater came to an end in the male line in 294, when Demetrius killed the son of Cassander and established himself on the throne of Macedonia. He was however expelled by Lysimachus and Pyrrhus in 288 ; and in 285 Lysimachus took possession of all the European part of the Macedonian Empire. Except indeed for Egypt and Palestine

under Ptolemy, Lysimachus and Seleucus now divided the empire between them, with the Taurus in Asia Minor for their frontier. These two. survivors of the forty years' conflict soon entered upon the crowning fight, and in 281 Lysimachus fell in the battle of Corupedion (in Lydia), leaving Seleucus virtually master of the empire. Seleucus' assassination by Ptolemy Ceraunus in the same year brought back confusion.

Ptolemy Ceraunus (the son of the first Ptolemy, and half- brother of the reigning king of Egypt) seized the Macedonian throne, whilst Antiochus, the son of Seleucus, succeeded in hold- ing together the Asiatic dominions of his father. The confusion was aggravated by the incursion of the Gauls into the Balkan Peninsula in 279; Ptolemy Ceraunus perished, and a period of complete anarchy succeeded in Macedonia. In 276 Antigonus Gonatas, the son of Demetrius, after inflicting a crushing defeat on the Gauls near Lysimachia, at last won Macedonia definitively for his house. Three solid kingdoms had thus emerged from all the fighting since Alexander's death: the kingdom of the Antigonids in the original land of the race, the kingdom of the Ptolemies in Egypt, and that of the Seleucids, extending from the Aegean to India. For the next 100 years these are the three great powers of the eastern Mediterranean. But already parts of the empire of Alexander had passed from Macedonian rule altogether. In Asia Minor, Philetaerus a Greek of Tios (Tieium) in Paphlagonia, had established himself in a position of practical independence at Pergamum, and his nephew, Attalus, was the father of the line of kings who reigned in Pergamum till 133 — antagonistic to the Seleucid house, till in 189 they took over the Seleucid possessions west of the Taurus. In Bithynia a native dynasty assumed the style of kings in 297. In Cappadocia two Persian houses, relics of the old aristocracy of Achaemenian days had carved out principalities, one of which became the kingdom of Pontus and the other the kingdom of Cappadocia (in the narrower sense); the former regarding Mithradates (281-266) as its founder, the latter being the creation of the second Ariar- athes (?302-?28i). Armenia, never effectively conquered by the Macedonians, was left in the hands of native princes, tribu- tary only when the Seleucid court was strong enough to compel. In India, Seleucus had in 302 ceded large districts on the west of the Indus to Chandragupta, who had arisen to found a

native empire which annexed the Macedonian provinces in the Panjab.

Whilst the Antigonid kingdom remained practically whole till the Roman conquest ended it in 168 B.C., and the house of Ptolemy ruled in Egypt till the death of Cleopatra in 30 B.C., the Seleucid Empire perished by a slow process of disruption. The eastern provinces of Iran went in 240 or thereabouts, when the Greek Diodotus made himself an independent king in Bactria(#.t>.) and Sogdiana, and Tiridates, brother of Arsaces, a ” Scythian ” chieftain, conquered Parthia (so Arrian, but see Parthia). Armenia was finally lost in 190, when Artaxias founded a new native dynasty there. Native princes probably ruled in Persis before 166, though the district was at least nominally subject to Antiochus IV. Epiphanes till his death in 164 (see Persis). In southern Syria, which had been won by the house of Seleucus from the house of Ptolemy in 198, the independent Jewish principality was set up in 143. About the same time Media was totally relinquished to the Parthians. Babylonia was Parthian from 129. Before 88 the Parthians had conquered Mesopotamia. Commagene was independent under a king, MithradatesCallinicus, in the earlier part of the last century B.C. Syria itself in the last days of the Seleucid dynasty is seen to be breaking up into petty principalities, Greek or native. From 83 to 69 is the transient episode of Armenian conquest, and in 64 the last shadow of Seleucid rule vanished, when Syria was made a Roman province by Pompey. From this time Rome formally entered upon the heritage of Alexander as far as the Euphrates, but many of the dynasties which had arisen in the days of Mace- donian supremacy were allowed to go on for a time as client states. One of them, the royal house of Commagene, not deposed by the Romans till a.d. 72, had Seleucid blood in its: veins through the marriage of a Seleucid princess with Mithra- dates Callinicus, and regarded itself as being a continuation of the Seleucid dynasty. Its kings bore the name of Antiochus, and were as proud of their Macedonian, as of their Persian, descent (see the Inscription of Nimrud Dagh, Michel, No. 735).

The Macedonians of Alexander were not mistaken in seeing an essential transformation of their national monarchy when Alexander adopted the guise of an Oriental great 2 . ConstHa- king. Transplanted into this foreign soil, the tton of the monarchy became an absolute despotism, unchecked Macedonian by a proud territorial nobility and a hardy peasantry °* om ‘ on familiar terms with their king. The principle which Seleucus is reported to have enunciated, that the king’s command was the supreme law (App. Syr. 61), was literally the principle of the new Hellenistic monarchies in the East. But the rights belonging to the Macedonian army as Alexander inherited it did not al- together disappear. Like the old Roman people, the Macedonian people under arms had acted especially in the transference of the

royal authority, conferring or confirming the right of the new chief, and in cases of the capital trials of Macedonians. In the latter respect the army came regularly into function under Alexander, and in the wars which followed his death (Diod. xviii. 4> 3! 36, 7", 37,2, 39, 2; xix. 61, 3), and in Macedonia; although the power of life and death came de facto into the hands of the Antigonid king, the old right of the army to act as judge was not legally abrogated, and friction was sometimes caused by its assertion (Polyb. v. 27, 5). The right of the army to confer the royal power was still symbolized in the popular acclamation required on the accession of a new king, and at Alexandria in troubled times we hear of " the people " making its will effective in filling the throne, although it is here hard to distinguish mob- rule from the exercise of a legitimate function. Thus the people put Euergetes II. on the throne when Philometor was captured (Polyb. xxix. 23, 4); the people compelled Cleopatra III. to choose Soter II. as her associate (Just, xxxiv. 3, 2). In Syria, the usurper Tryphon bases his right upon an election by the " people " (Just, xxxvi. 1, 7) or" the army " (Jos. Ant. xiii. § 219). Where it is a case of delegating some part of the supreme au- thority, as when Seleucus I. made his son Antiochus king for the eastern provinces, we find the army convoked to ratify the appointment (App. Syr. 61). So too the people is spoken of as

appointing the guardians of a king during his minority (Just. xxxiv. 3, 6). Nor was the power of the army a fiction. The Hellenistic monarchies rested, as all government in the last resort' must, upon the loyalty of those who wielded the brute force of the state, and however unlimited the powers of the king might be in theory, he could not alienate the goodwill of the army with impunity. The right of primogeniture in suc- cession was recognized as a general principle; a woman, however, might succeed only so long as there were no male agnates. Illegitimate children had no rights of succession. In disturbed times, of course, right yielded to might or to practical necessities. The practice by which the king associated a son with himself, as secondary king, dates from the very beginning of the kingdoms of the Successors; Antigonus on assuming the diadem in 306 caused Demetrius also to bear the title of king. Some ten years later Seleucus appointed Antiochus as king for the eastern provinces. Thenceforth the practice is a common one. But the cases of it fall into two classes. Sometimes

the subordinate or joint kingship implies real functions. In the Seleucid king- dom the territorial expanse of the realm made the creation of a distinct subordinate government for part of it a [measure of practical convenience. Sometimes the joint-king is merely titular, an infant of tender years, as for instance Antiochus Eupator, the son of Antiochus Epiphanes, or Ptolemy Eupator, the son of Ptolemy Philometor. The object here is to secure the succession in the event of the supreme king's dying whilst his heir is an infant. The king's government was carried on by officials appointed by him and responsible to him alone. Government at the same time, as an Oriental despotism under- stands it, often has little in view but the gathering in of the tribute and compulsion of the subjects to personal service in the army or in royal works, and if satisfied in these respects will leave much independence to the local authorities. In the loosely-knit Seleucid realm it is plain that a great deal more independence was left to the various communities, — cities or native tribes, — than in Egypt, where the conditions made a bureaucratic system so easy to carry through. In their outlying possessions the Ptolemies may have suffered as much local independence as the Seleucids; the internal government of Jerusalem, for instance, was left to the high priests. In so far as the older Greek cities fell within their sphere of power, the successors of Alexander were forced to the same ambiguous policy as Alexander had been, between recognizing the cities' unabated claim to sovereign independence and the necessity of attaching them securely. In Asia Minor, the " enslavement " and liberation of cities alternated with the circumstances of the hour, while the kings all through professed themselves the champions of Hellenic freedom, and were ready on occasion 'to display munificence toward the city temples or in public works, such as might reconcile republicans to a position of dependence. Antiochus III. went so far as to write on one occasion to the subject Greek cities that if any royal mandate clashed with the civic laws it was to be disregarded (Plut. Imp. et due. apophth.). But it was the old cry of the " autonomy of the Hellenes," raised by Smyrna and Lampsacus, which ultimately brought Antiochus III. into collision with Rome. How anxious the Pergamene kings, with their ardent Hellenism, were to avoid offence is shown by the elaborate forms by which, in their own capital, they sought to give their real control the appearance of popular freedom (Cardinali, Regno di Pergamo,p. 2dseq.). A similar problem confronted the Antigonid dynasty in the cities of Greece itself, for to maintain a predomi- nant influence in Greece was a ground-principle of their policy. Demetrius had presented himself in 307 as the liberator, and driven the Macedonian garrison from the Peiraeus; but his own garrisons held Athens thirteen years later, when he was king of Macedonia, and the Antigonid

dynasty clung to the points of vantage in Greece, especially Chalcis and Corinth, till their garrisons were finally expelled by the Romans in the name of Hellenic liberty.

The new movement of commerce initiated by the conquest of Alexander continued under his successors, though the break- up of the Macedonian Empire in Asia in the 3rd century and the

distractions of the Seleucid court must have withheld many

advantages from the Greek merchants which a strong central

government might have afforded them. It was along , _

f, , . _ ,. . , „ ■ & 3. Commerce.

the great trade-routes between India and the West

that the main stream of riches flowed then as in later centuries. One of these routes was by sea to south-west Arabia (Yemen) , and thence up the Red Sea to Alexandria. This was the route con- trolled and developed by the Ptolemaic kings. Between Yemen and India the traffic till Roman times was mainly in the hands of Arabians or Indians; between Alexandria and Yemen it was carried by Greeks (Strabo ii. 118). The west coast of the Red Sea was dotted with commercial stations of royal foundation from Arsinoe north of Suez to Arsinoe in the south near the straits of Bab-el-Mandeb. From Berenice on the Red Sea a land-route struck across to the Nile at Coptos; this route the kings furnished with watering stations. That there might also be a waterway between Alexandria and the Red Sea, they cut a canal between the Delta and the northern Arsinoe. It was Alexandria into which this stream of traffic poured and made it the commercial metropolis of the world. We hear of direct diplomatic intercourse between the courts of Alexandria and, Pataliputra, i.e. Patna (Plin. vi. § 58). An alternative route went from the Indian ports to the Persian Gulf, and thence found the Mediterranean by caravan across Arabia from the country of Gerrha to Gaza; and to control it was no doubt a motive in the long struggle of the Ptolemaic and Seleucid houses for, Palestine, as well as in the attempt of Antiochus III. to subjugate the Gerrhaeans. Or from the Persian Gulf wares might be taken up the Euphrates and carried across to Antioch;. this route lay altogether in the Seleucid sphere. With Iran Antioch was connected most directly by the road which crossed the.Euphrates at the Zeugma and went through Edessa and Antioch-Nisibis to the Tigris. The trade from India which went down the Oxus and then to the Caspian does not seem to

have been consider- able (Tarn, J own. of Hell. Stud. xxi. 10 seq.). From Antioch to the Aegean the land high-road went across Asia Minor by the Cilician Gates and the Phrygian Apamea.

Of the financial organization of the Macedonian kingdoms we know practically nothing, except in the case of Egypt. Here the papyri and ostraca have put a large material „ at our disposal, but' the circumstances in Egypt 1 were too peculiar for us to generalize upon these data as to the Seleucid and Antigonid realms. That the Seleucid kings drew in a principal part of their revenues from tribute levied upon the various native races, distributed in their village communities as tillers of the soil goes without saying. 2 In districts left in the hands of native chiefs these chiefs would themselves exploit their villages and pay the Seleucid court and tribute. To exact tribute from Greek cities was invidious, but both Antigonid and Seleucid kings often did so (Antigonid, Diog. Laert. II., 140; Plut. Bern. 27; Seleucid, Michel, No. 37; Polyb. xxi. 43, 2). Sometimes, no doubt, this tribute was demanded under a fairer name, as the contribution of any ally (avvraˆis, not <£6pos), like the Taka.Ti.K6. levied by Antiochus I. (Michel, No. 37; cf. Polyb. xxii. 27, 2). The royal domains, again, and royal monopolies, such as salt-mines, were a source of revenue. 3 As to indirect taxes, like customs and harbour dues, while their existence is a matter of course (cf. Polyb. v. 89, 8), their scale, nature and amount is quite unknown to us. Whatever the financial system;

1 For Ptolemaic Egypt, see Ptolemies and Egypt.

2 A tenth of the produce is suggested to have been the normal tax by what the Romans found ODtaining in the Attalid kingdom. The references given by Beloch {Griech. Gesch. iii. [J.], p. 343) to prove it for the Seleucid kingdom are questionable. Beloch refers (I) to the letter of Demetrius II. to Lasthenes in which al S&tarai /cot rd t4X7) are mentioned, I Mace. 1 1 , 35 (Beloch, by an oversight, refers to the paraphrase of the documents in Joseph. Ant. xiii. 4, § 126 seq., in which the mention of the Sacarai is omitted!). The authenticity of this document is, however, very doubtful. He refers (2) to Dit- tenb. 171 (1st ed.), line 101 ; but here the tax seems to be, not an imperial one, but one paid to the city of Smyrna.

3 The salt monopoly is mentioned in 1 Mace. 10, 29; IT, 3$, a suspected source, but supported in this detail by the analogy of Ptolemaic Egypt and Rome. For domains in Antigonid, Attalid and Bithynian realms, see Gic. De leg. agr. ii. 19, 50.

of the Antigonid and Seleucid kingdoms may have been, it is clear that they were far from enjoying the affluence of the Ptolemaic. During the first Seleucid reigns indeed the revenues of Asia may have filled its treasuries (see Just. xvii. 2, 13), but Antiochus III. already at his accession found them depleted (Polyb. v. 50, 1), and from his reign financial embarrassment, coupled with extravagant expenditure, was here the usual condition of things. Perseus, the last of the Antigonid house, amassed a substantial treasure for the expenses of the supreme struggle with Rome (Polyb. xviii. 35, 4; Liv. xlv, 40), but it was by means of almost miserly economies.

Special officials were naturally attached to the service of the finances. Over the whole department in the Seleucid realm there presided a single chief (6 eirl tSiv TpoaoSiov, App. Syr. 45). How far the financial administration was removed from the competence of the provincial governors, as it seems to have been in Alexander's system, we cannot say. Seleucus at any rate, as satrap of Babylonia, controlled the finances of the province (Diod. x i x – 55. 3) > and so, in the Ptolemaic system, did the governor of Cyprus (Polyb. xxvii. 13). The fact that provincial officials eirl izCiv icpoobfxav (in Eriza, Bull. corr. hell. xv. 556) are found does not prove anything, since it leaves open the question of their being subordinate to the governor.

With the exception of Ptolemaic Egypt, the Macedonian kingdoms followed in their coinage that of Alexander. Money S. Colamee. was ˆ or a ' on 8 while largely struck with Alexander's own image and superscription; the gold and silver coined in the names of Antigonid and Seleucid kings and by the minor principalities of Asia, kept to the Attic standard which Alexander had established. Only in Egypt Ptolemy I. adopted, at first the Rhodian, and afterwards the Phoenician, standard, and on this latter standard the Ptolemaic money was struck during the subsequent centuries. Money was also struck in their own name by the cities in the several dynasties' spheres of power, but in most cases only bronze or small silver for local use. Corinth, however, was allowed to go on striking staters under Antigonus Gonatas; Ephesus, Cos and the greater cities of Phoenicia retained their right of coinage under Seleucid or Ptolemaic supremacy.

In language and manners the courts of Alexander's successors were Greek. Even the Macedonian dialect, which it was con- sidered proper for the kings to use on occasion, was often for- gotten (Plut. Ant. 27). The Oriental features which Alexander had introduced were not copied. There was no proskynesis (or certainly not in the case of

Greeks and Macedonians), and the king did not wear an Oriental dress. The symbol of royalty, it is true, the diadem, was suggested by the head-band of the old Persian kings (Just. xii. 3, 8); but, whereas, that had been an imposing erection, the Hellenistic diadem was a simple riband. The king's state dress was the same in principle as that worn by the Macedonian or Thessalian horsemen, as the uniform of his own cavalry officers. Its features were the broad- brimmed hat (kansia), the cloak (chlamys) and the high-laced boots (krepides) (Plut. Ant. 54; Frontinus, iii. 2, n). These, in the case of the king, would be of richer material, colour and adornment. The diadem could be worn round the kausia; the chlamys offered scope for gorgeous embroidery; and the boots might be crimson felt (see the description of Demetrius' chlamys and boots, Plut. Bern. 41). There were other traces in the Hellenistic courts of the old Macedonian tradition besides in dress. One was the honour given to prowess in the chase (Polyb. xxii. 3, 8; Diod. xxxiv. 34). Another was the fashion for the king to hold wassail with his courtiers, in which he unbent to an extent scandalous to the Greeks, dancing or indulging in routs and practical jokes. 1

The prominent part taken by the women of the royal house was a Macedonian characteristic. The history of these kingdoms furnishes a long list of queens and princesses who were ambitious

1 Antiochus Epiphanes was an extreme case. For the Antigonid court see Diog. Laert. vii. 13; Plut. Aral. 17; for the Seleucid, Athen. iv. 155b; v. 211a; for the Ptolemaic, Diog. L. vii. 177; Athen. vi. 246c; Plut. Cleom. 33; Just. xxx. 1.

and masterful politicians, of which the great Cleopatra is the last and the most famous. The kings after Alexander, with the exception of Demetrius Poliorcetes and Pyrrhus, are not found to have more than one legitimate wife at a time, although they show unstinted freedom in divorce and the number of their mistresses. The custom of marriages between brothers and sisters, agreeable to old Persian as to old Egyptian ethics, was instituted in Egypt by the second Ptolemy when he married his full sister Arsinoe Philadelphus.; It was henceforth common, though not invariable, among the Ptolemies. At the Seleucid "court there seems to be an instance of it in 195, when the heir- apparent, Antiochus, married his sister Laqdice. The style of " sister " was given in both courts to the queen, even when she was not the king's sister in reality (Strack, Dynastie, Nos. .38, 40, 43; Archiv. f. Papyr, i. 205). The "Friends" of the king are often mentioned. It is

usual for him to confer with a council (o-vviSpiov) of his ” Friends ” before important decisions, administrative, military or judicial (e.g. Polyb. v. 16, 5; 22, 8). They form a definite body about the king’s person (iplktav obvTCfyna., Polyb. xxxi. 3, 7; cf. 01 £Xoi in contrast with td Swafieis, id. v. 50, 9), admission into which depends upon his favour alone, and is accorded, not only to his subjects, but to aliens, such as the Greek refugee politicians (e.g. Hegesianax, Athen. iv. 155b; Hannibal and the Aetolian Thoas take part in the councils of Antiochus III). A similar body, with a title corresponding to <£iXqi, is found in ancient Egypt (Erman, Ancient Egypt, Eng. trans., p. 72) and in Persia (Spiegel. Eran. Alt. iii. 626); but some such support is so obviously required by the necessities of a despot's position that we need not suppose it derived from any particular precedent. The Friends (at any rate under the later Seleucid and Ptolemaic reighis) were distinguished by a special dress and badge of gold analogous to the stars and crosses of modern orders. The dress was of crimson (iropvpa) ; this and the badges were the king’s gift, and except by royal grant neither crimson nor gold might, apparently, be worn at court (1 Mace. 10, 20; 62; 89; 11, 58; Athen. v. 211b). The order of Friends was organized in a hierarchy of ranks, which were multiplied as time went on. In Egypt we find them classified as avyyevefc, djuoTi/MH roils avyytvkuiv, &pxu!u>P-a-To4>vha.K£S, irp&Toi <£ £Xoi, i\ot (in the nar- rower sense) , StASoxoi. For the Seleucid kingdom evyyevtls, Tcp&rqi 0tXoi and £Xoi are mentioned. These classes do not appear in Egypt before the 2nd century; Strack conjectures that they were created in imitation of the Seleucid court. We have no direct evidence as to the institutions of the Seleucid court in the 3rd century. Certain os or inronyrˆiaToy p&ˆoS/’- Seleucid, Polyb. xxxi, 3, 16; Ptolemaic, Strack, Jnschriften 103) and a minister of finance (6 ewi tS>v irpoaoSoiv in the Seleucid kingdom; App. Syr. 45; StolKrjrrjS in Egypt, Lumbroso, Econ. Pol. p. 339)- Under each of these great heads of departments was a host of lower officials, those, for instance, who held to the province a relation analogous to that of the head of the depart- ment of the realm. Such a provincial authority is described as «r£ tS>v irpoffoSuv in the inscription of Eriza (Bull. corr. hell.

xv. 556). Beside the officials concerned with the work of government we have those of the royal household: (1) the chief- physician, apxtarpos (for the Seleucid see App. Syr. 59; Polyb. v. 56, 1; Michel, No. 1158; for the Pontic, Bull. corr. hell. vii. 354 seq.); (2) the chief-

huntsman, Apxi-Kwr/yos (Dittenb. Orient. Graec. 99) ; (3) the maitre-d'hotel apxˆecwpos (Dittenb. Orient. Graec. 169) (4) the lord of the queen's bedchamber, 6 eirl rod koit&pos t))s fiaxjCKurorjs (Dittenb. Orient. Graec. 256). As in the older Oriental courts, the high positions were often filled by eunuchs (e.g. Craterus, in last mentioned inscription).

It was customary, as in Persia and in old Macedonia, for the great men of the realm to send their children to court to be brought up with the children of the royal house. Those who had been so brought up with the king were styled his cbvTpooi iralfiiaKai of the queen, Polyb. xv. 33, n; for the Pontic, Bull. corr. hell. v »- 355; for the Pergamene. Polyb. xxxii. 27, 10, &c; for the Herodian, Acts 13). It is perfectly gratuitous to suppose with Deissmann that ” the fundamental meaning had given place to the general meaning of intimate friend.” With this custom we may perhaps bring into connexion the office of rpoQete (Polyb. xxxi. 20, 3; Michel, No. 1158). As under Alexander, so under his successors, we find a corps of f3a

All the Hellenistic courts felt it a great part of prestige to be filled with the light of Hellenic culture. A distinguished philo-

- „ „ . sopher or man of letters would find them bidding 7. Hellenic c v , . , . , ., . 6

Culture. * or ms presence, and most of the great names are

associated with one or other of the contemporary kings. Antigonus Gonatas, bluff soldier-spirit that he was, heard the Stoic philosophers gladly, and, though he failed to induce Zeno to come to Macedonia, persuaded Zeno’s disciple, Persaeus of Citium, to enter his service. Nor was it philosophers only who made his court illustrious, but poets like Aratus. The Ptolemaic court, with the museum attached to it, is so pro- minent in the literary and scientific history of the age that it is unnecessary to give a list of the philosophers, the men of letters and science, who at one time or other ate at King Ptolemy’s table. One may notice that the first Ptolemy himself made a contribution of some value to historical literature in his account of Alexander’s campaigns; the fourth Ptolemy not only insti- tuted a cult of Homer but himself published tragedies; and even Ptolemy Euergetes II. issued a book of memoirs. The Pergamene court was in no degree behind the Ptolemaic in its b’terary and artistic zeal. The notable school of sculpture connected with it is treated elsewhere (see Greek Art) ; to its literary school we probably owe in great part the preservation of the masterpieces of Attic prose (Susemihl I., p. 4), and two of its kings (Eumenes I. and Attalus III.) were themselves authors. The Seleucid court did not rival either of the last named in brilliance of culture; and yet some names of distinction were associated with it. Under Antiochus I. Aratus carried out- a recension of the Odyssey, and Berossus composed a Baby- lonian history in Greek; under Antiochus III. Euphorion was made keeper of the library at Antioch. Antiochus

IV., of course, the enthusiastic Hellenist, filled Antioch with Greek artists and gave a royal welcome to Athenian philosophers. Even in the degenerate days of the dynasty, Antiochus Grypus, who had been brought up at Athens, aspired to shine as a poet. The values recognized in the great Hellenistic courts and the Greek world generally imposed their authority upon the dynasties of barbarian origin. The Cappadocian court admitted the full stream of Hellenistic culture under Ariarathes V. (Diod. xxxi. 19, 8). One of the kings called Nicomedes in Bithynia offered immense sums to acquire the Aphrodite of Praxiteles from the Cnidians (Plin. N.H. xxxvi. 21), and to a king Nicomedes the geographical poem of the Pseudo-Scymnus is dedicated. Even Iranian kings in the last century B.C. found pleasure in com- posing, or listening to, Greek tragedies, and Herod the Great

kept Greek men of letters beside him and had spasmodic ambitions to make his mark as an orator or author (Nicol. Dam. frag. 4; F.H.G. III. p. 350).

The offering of divine honours to the king, which we saw begin under Alexander, became stereotyped in the institutions of the succeeding Hellenistic kingdoms. Alexander himself was after his death the object of various HoBours. local cults, like that which centred in the shrine near Erythrae (Strabo, xiv. 644) . His successors in the first years after his death recognized him officially as a divinity, except Antipater (Suidas, s.v. AvtLtt arpos), and coins began to be issued with his image. At Alexandria the state cult of him seems to have been instituted by the second Ptolemy, when his body was laid in the Sema (Otto, Priester u. Tetnpel, i. 139 seq.). The successors themselves received divine honours. Such worship might be the spontaneous homage of a particular Gr2ek community, like that offered to Antigonus by Scepsis in 311 (Journ. of Hell. Stud. xix. 335 seq.), the Antigonus and Demetrius by Athens in 307, to Ptolemy I. by the Rhodians in 304, or by Cassandrea to Cassander, as the city's founder (Ditt. 2nd ed. 178); or it might be organized and maintained by royal authority. The first proved instance of a cult of the latter kind is that instituted at Alexandria by the second Ptolemy for his father soon after the latter's death in 283/2, in which, some time after, 279/8, he associated his mother Berenice also, the two being worshipped together as Otol awrrjpts (Theoc. xvii. 121 seq.). Antiochus I. followed the Ptolemaic precedent by instituting at Seleucia- in-Pieria a cult for his father as Seleucus Zeus Nicator. So far we can point to no instance of a cult of the living sovereign (though the cities might institute such locally) being estab lished by the court for the realm. This step was taken in Egypt after the death of Arsinoe Philadelphus (271) when she and her still-living brother-husband, Ptolemy II., began to be

worshipped together as deol &5eX < £oi. After this the cult of the reigning king and queen was regularly maintained in Greek Egypt, side by side with that of the dead Ptolemies. Under Antiochus II. (261-246) a document shows us a cult of the reigning king in full working for the Seleucid realm, with a high priest in each province, appointed by the king himself; the document declares that the Queen Laodice is now to be associated with the king. The official surname of Antiochus II., Theos, suggests that he himself had here been the innovator. Thenceforward, in the Hellenistic kingdoms of the East the worship of the living sovereign became the rule, although it appears to have been regarded as given in anticipation of an apotheosis which did not become actual till death. In the Pergamene kingdom at any rate, though the living king was worshipped with sacrifice, the title Oeos was only given to those who were dead (Cardinali, Regno di Pergamo, p. 153). The Antigonid dynasty, simpler and saner in its manners, had no official cult of this sort. The divine honours offered on occasion by the Greek cities were the independent acts of the cities.

See Plut. Aral. 45; Cleom. 16; Kornemann, ” Zur Gesch. d. antiken Herrscherkulte ” in Beitrdge z. alt. Gesch. i. 51 sqq.; Otto, Priester u. Tempel, pp. 138 seq.

There does not seem any clear proof that the surnames which the Hellenistic kings in Asia and Egypt bore were necessarily con- nected with the cult, even if they were used to describe g.Surnames. the various kings in religious ceremonies. Some had doubtless a religious colour, Theos, Epiphanes, Soter; others a dynastic, Philopator, Philometor, Philadelphus. Under what circum- stances, and by whose selection, the surname was attached to a king, is obscure. It is noteworthy that while modern books commonly speak of the surnames as assumed, the explanations given by our ancient authorities almost invariably suppose them to be given as marks of homage or gratitude (English Historical Review, xvi. 629 (1901). The official surnames must not, of course, be confused with the popular nicknames which were naturally not recognized by the court, e.g. Ceraunus (” Thunder “), Hierax (” Hawk “), Physcdh (” Pot-belly “), Lathyrus (” Chick-pea “).

The armies of Alexander’s successors were still in the main prin- ciples of their organization similar to the army with which Alexander had conquered Asia. During the years immediately t n. Armies. after Alexander the very Macedonians who had fought under Alexander were ranged against each other under the banners

of the several chiefs. The most noted corps of veterans, Argyr- aspides (i.e. the royal Hypaspistae) played a great part in the first wars of the successors, and covered themselves with infamy by their betrayal of Eumenes. As the soldiers of Alexander died off, fresh levies of home-born Macedonians could be raised only by the chief who held the motherland. The other chiefs had to supply themselves with Macedonians from the numerous colonies planted before the break-up of the empire in Asia or Egypt, and from such Macedonians they continued for the next two centuries to form their phalanx. The breed — at least if the statement which Livy puts into the mouth of a Roman general can be relied on — degenerated greatly under Asiatic and Egyptian skies (Liv. xxxviii. 17, 10); but still old names like that of pezetaeri attached to the phalangites (Plut. Tib 17) and they still wielded the national sarissa. The latter weapon in the interval between Alexander and the time of Polybius had been increased to a length of 21 ft. (Polyb. xviii. 12), a proportion incon- sistent with any degree of mobility; once more indeed the phalanx ot the 2nd century seems to have become a body effective by sheer weight only and disordered by unevenness of ground The Antigonid kings were never able from Macedonian levies to put in the held a phalanx of more than 20,000 at the utmost (Liv. xlii. 51) • Antigonus Doson takes with him to Greece (in 222) one of 10,000 only Ihe phalanx of Antiochus III. at Raphia numbered 20,000, and Ftolemy fhilopator was able at the same time to form one of 25,000 men (Polyb. v. 4; . As these phalangites are distinguished both from the Greek mercenaries and the native Egyptian levies, it looks (although such a fact would be staggering) as if more Macedonians cou d be raised for military service in' Egypt than in Macedonia itself (but see Beloch, p. 353). The royal foot-guards are still described in Macedonia in 171 as the agema (Polyb. v. 25, 1; 27, 3- Liv xlii Si), when they number 2000; at the Ptolemaic court in 217 the agema had numbered 3000 (Polyb. v. 65, 2); and a similar corps of hyp- aspistae is indicated in the Seleucid army (Polyb. vii. 16 2 ■ xvi 18 7) So too the old name of" Companions " was kept up in the Seleucid kingdom for the Macedonian cavalry (see Polyb. v. 53, 4 &c) and divisions of rank in it are still indicated by the terms agema' and royal squadron {PamXmi, X\ n , see Bevan, House of Seleucus, ii. 288). rhe Antigomd and Seleucid courts had much valuable material at hand for their armies in the barbarian races under their sway. The Balkan hill-peoples of Illyrian or Thracian stock, the hill-peoples of Asia Minor and Iran, the chivalry of Media and Bactria, the mounted bowmen of the Caspian steppes, the camel-riders of the Arabian desert, could all be turned to account. Iranian troops seem to have been employed on a large scale by the earlier Seleucids. At Kaphia, Antiochus III. had

10,000 men drawn from the provinces, armed and drilled as Macedonians, and another corps of Iranians num- bering 5000 under a native commander (Polyb. v. 79) The experi- ment of arming the native Egyptians on a large scale does not seem to have been made before the campaign of 217, when Ptolemy IV. formed corps of the Macedonian pattern from Egyptians and Libyans (cf. Polyb. v. 107 2 ; Ptolemy I. had employed Egyptians in the army, though chiefly as carriers, Diod. xix. 80, 4) From this time native rebellions in Egypt are recurrent. To the troops drawn from their own dominions the mercenaries which the kings procured from abroad were an important supplement. These were mainly the bands of Greek condottieri, and even for their home-born troops Greek officers of renown were often engaged. The other class of mercenaries were Gauls, and from the time of the Gallic in- vasion of Asia Minor in 279 Gauls or Galatians were a regular con- stituent in all armies. They were a weapon apt to be dangerous to the employer, but the terror they inspired was such that every potentate sought to get hold of them. The elephants which Alexan- der brought back from India were used in the armies of his successors, and in 302 : Seleucus ˆ procured a new supply. Thenceforward ele- phants, either brought fresh from India or bred in the royal stables at Apamea, regularly figured in the Seleucid armies. The Ptolemies supplied themselves with this arm from the southern coasts of the Red Sea, where they established stations for the capture and shipping of elephants, but the African variety was held inferior to the Indian. Scythed chariots such as had figured in the old Persian armies were still used by the Greek masters of Asia (Seleucus I., Diod. a.nw Molon Polyb. v 53, 10; Antiochus III., Liv. xxxvii. 41), at any rate till the battle of Magnesia The Hellenistic armies were distinguished by their external magnificence. They made a greater display of brilliant metal and gorgeous colour than the Roman armies, for instance. The description given by Justin of the army which Antio chus Sidetes took to the East in 130 B.C., boot-nails and bridles of gold, gives an idea of their standard of splendour (Just, xxxviii 10 I- cf. Polyb. xxxi. 3; Plut. Eum. 14; id. Aemil. 18; id. Sulla, 16)

During the 3rd century B.C. Egypt was the greatest sea power of the eastern Mediterranean, and maintained a large fleet (the figures in App. Prooem, 10 are not trustworthy, see Beloch III. [i.l, 364) Its control of the Aegean was, however, contested not without success by the Antigomds, who won the two great sea-fights of Cos (c. 256) ?£? P<- n f ° S – (227) A? "u Wr6Ste . d the overlordship of the Cyclades from the Ptolemies. Of the numbers and constitution of the Antigonid fleet we know nothing.' At the Seleucid court in 222 the admiral (vabapxos) appears as a person of high con sideration (Polyb. v. 43, 1)

;

1 For the Antigonid vabap X °s or admiral, see Polyb. xvi. 6.

in his war with Rome Antiochus III. had 107 decked battleships on the sea at one time. By the Peace of Apamea (188) the Seleucid navy was abolished; Antiochus undertook to keep no more than 10 ships of war.

Tvr?i? r ˆ Hellenistic armies and fleets see A. Bauer in L. von Muller s Handbuch, vol. iv.; Delbriick, Gesch. d. Kriegskunst (1900). To their native subjects the Seleucid and Ptolemaic kings were always foreigners. It was considered wonderful in the last Cleopatra that she learnt to speak Egyptian (Plut Anton. 27). Natives were employed, as we have “eltlT” seen, in the army, and Iranians are found under the Subject Seleucids holding high commands, e.g. Aspasianus the “ˆP**-Mede (Polyb. v. 79, 7), Aribazus, governor of Cilicia (Flinders Petrie, Papyri, II., No. 45), Aribazus, governor of Sardis (Polyb. vii. 17, 9), and Omanes (Michel, No. 19, 1. 104). Native cults the Hellenistic kings thought it good policy to patronize Antiochus I. began rebuilding the temple of Nebo at Borsippa {Keihnschr. Bibl. iii. 2, 136 seq.) Antiochus III. bestowed favours on the Temple at Jerusalem. Even if the documents in Joseph Arch. xn. §§ 138 seq. are spurious, their general view of the rela- tion of Antiochus III. and Jerusalem is probably true Even small local worships, like that of the village of Baetocaece might secure royal patronage {C.I.G. No. 4474). Of course’ financial straits might drive the kings to lay hands on temple-treasures, as Antiochus III. and Antiochus IV. did but that was a measure of emergency. ‘

The Macedonian kingdoms, strained by continual wars increasingly divided against themselves, falling often under the sway of prodigals and debauchees, were far,, from realizing the Hellenic idea of sound govern- *Lf£°/ ment as against the crude barbaric despotisms of Macedonian the older East. Yet, in spite of all corruption, ideas Ruh – of the intelligent development of the subject lands, visions of the Hellemc king, as the Greek thinkers had come to picture him, haunted the Macedonian rulers, and perhaps fitfully, in the intervals of war or carousal, prompted some degree of action Treatises ” Concerning Kingship ” were produced as a regular thing by philosophers, and kings who claimed the fine flower of Hellenism, could not but peruse them. Strabo regards the loss of the eastern provinces to the Parthians as their passage under a government of lower type, beyond the sphere of Hellenic bnfxyeia (Strabo xi. 509). In the organiza- tion of the

administrative machinery of these kingdoms, the higher power of the Hellene to adapt and combine had been operative; they were organisms of a richer, more complex type than the East had hitherto known. It was thus that when Rome became a world-empire, it found to some extent the forms of government ready made, and took over from the Hellenistic monarchies a tradition which it handed on to the later world.

Authorities.— For the general history of the Macedonian king- doms see Droysen, Histoire de VHellenisme (the French translation by A °Hnlt ff' e [Cq ' I f3- I88 5. represents the Wk in its fintl revis°o\i£ t,wt- i, mst °ryof, G J ee vol.™. (1894); B. Niese, Geschichte dir grifhischenundmakedomschenStcuiten(i8a 3 -iQoˆ-KiLf-rst Gesch de* Hellenist. ZeitaUers, vol. i. (190D. A masterly Conspectus ofthegeneral t%T% ° f ? e ™™ istic . kingdoms in their political, economk and Kir ?C V h f-ˆ lc and intellectual culture is given by Beloch Griech Gesch. 111 1.), 260-556; see also Kaerst, Stidien zur Entwickelung d. Monarchic; E. Breccia, II Diritto dinastico nelle monarchie dei successori d'Alessandro Magna (1903). PopX sketches of the history, enlightened by special knowledge and a w de outlook are given by T. P. Mahafty, Alexander'* Empire

LˆTonˆ N A tl0 ? S , Seri f } ; A°ˆ ess °f Hellenism in Alexander's Empire (1905) ; The Silver Age of the Greek World (1906). See also Hellenism; Ptolemies; Seleucid Dynasty. (E. rT B)

MACEDONIUS, (1) bishop of Constantinople in succession to Eusebius of Nicomedia, was elected by the Arian bishops in 341 while the orthodox party elected Paul, whom Eusebius had superseded. The partisans of the two rivals involved the city in a tumultuous broil, and were not quelled until the emperor Constantius II. banished Paul. Macedonius was recognized as patriarch in 342. CompeUed by the intervention of Constans in 348 to resign the patriarchate in favour of his former oppo- nent, he was reinstalled in 350. He then took vengeance on his opponents by a general persecution of the adherents of the

Nicene Creed. In 359, on the division of the Arian party into Acacians (or pure Arians) and semi-Arians or Homoiousians, Macedonius adhered to the latter, and in consequence was expelled from his see by the council of Constantinople in 360. He now became avowed leader

of the sect of Pneumatomachi, Macedonians or Marathonians, whose distinctive tenet was that the Holy Spirit is but a being similar to the angels, sub- ordinate to and in the service of the Father and the Son, the relation between whom did not admit of a third. He did not long survive his deposition.

See the Church Histories of Socrates and Sozomen; Art. in Diet. Chr. Biog. ; F. Loofs in Herzog-Hauck's Realencyk. ; H. M. Gwatkin, Arianism.

Macedonius, (2) bishop of Mopsuestia, was present at the councils of Nicaea and Philippopolis, and inclined to the reactionary party who thought the Athanasians had gone too far. '

Macedonius, (3) bishop of Constantinople (fl. 510), a strict Chalcedonian who vainly opposed the fanaticism of the monophysite Severus and was deposed in 513.

MACEI6 or Macay6, a city and port of Brazil and capital of the state of Alagoas, about 125 m. S.S.W. of Pernambuco, in lat. o° 39* 35″ S., long. 35° 44′ 36″ W. Pop. including a large rural district and several villages (1890), 31,498; (1908, estimate), 33,000. The city stands at the foot of low bluffs, about a mile from the shore line. The water-side village of Jaragua, the port of Maceio, is practically a suburb of the city. South of the port is the shallow entrance to the Lag6a do Norte, of Lagoa Mundahu, a salt-water lake extending inland for some miles. Macei6 is attractively situated in the midst of large plantations of coco-nut and dendi palms, though the broad sandy beach in front and the open sun-burned plain behind give a barren character to its surroundings. The heat is moderated by the S.E. trade winds, and the city is considered healthful. The public buildings are mostly constructed of broken stone and mortar, plastered outside and covered with red tiles, but the common dwellings are generally constructed of tapia — rough trellis-work walls filled in with mud. A light tramway connects the city and port, and a railway — the Alagoas Central — connects the two with various interior towns. The port is formed by a stone feef running parallel with and a half-mile from the shore line, within which vessels of light draft find a safe anchorage, except from southerly gales. Ocean-going steamers anchor outside the reef. The exports consist princi- pally of sugar, cotton, and rum (aguardiente). Macei6 dates from 1S15 when a small settlement there was created a " villa." In 1839 it became the provincial capital and was made a city by the provincial assembly.

McENTEE, JERVIS (1828-1891), American artist, was born at

Rondout, New York, on the 14th of July 1828, and was a pupil of Frederick E. Church. He was made an associate of the National Academy of Design, New York, in i860, and a full academician iff 1861. In 1869 he visited Europe, painting much in Italy. He was identified with the Hudson River School, and excelled in pictures of autumn scenery. He died at Rondout,N.Y., on the 27th of January 1891.

MACER, AEMILIUS, of Verona, Roman didactic poet, author Of two poems, one on birds (Ornithogonia) , the other on the anti- dotes against the poison of serpents (Theriaca), imitated from the Greek poet Nicander of Colophon. According to Jerome, he died in 16 B.C. It is possible that he wrote also a botanical work. The extant hexameter poem De viribus (or virtutibus) herbarum, ascribed to Macer, is a medieval production by Odo Magdunensis, a French physician. Aemilius Macer must be distinguished from the Macer called Iliacus in the Ovidian cata- logue of poets, the author of an epic poem on the events preceding the opening of the Iliad. The fact of his being addressed by Ovid in one of the epistles Ex Ponto shows that he was alive long after Aemilius Macer. He had been identified with the son or grandson of Theophanes of Mytilene, the intimate friend of Pompey.

See Ovid, Tristia,‘rv. 10, 43; Quintilian, Instil, x. 1, 56, 87; R. Unger, De Macro Nicandri imitatore (Friedlarid, 1845); C. P.

Schulze in Rheinisches Museum (1898), liii. p. 541 ; for Macer Iliacus see Ovid, Ex Porito, ii. 10, 13, iv. 16, 6; Amores, ii. 18.

MACERATA, a city of the Marches, Italy, the chief town of the province of Macerata and a bishop’s see, 44 m. by rail S. of Ancona. Pop. (1901), 6,176 (town), 22,473 (commune). Crown- ing a hill 919 ft. above sea-level, with a picturesque mass of buildings enclosed by walls and towers, Macerata looks out over the Adriatic. The cathedral is modern, but some of the churches and palaces are not without interest. Besides the university, agricultural school and industrial institute, Macerata has a communal library founded by Leo XII., containing a small but choice collection of early pictures, and in the municipal buildings, a collection of antiquities from Helvia Ricina. There is an enor- mous amphitheatre or sferisterio for pallone, a ball game which is very popular in the district. The industries comprise the making of bricks, matches, terra-cotta and chemicals.

Macerata, as well as Recanati, was founded by the inhabitants of Ricina after the destruction of their city by Alaric in 408. During the

Lombard period it was a flourishing town; but it was raised from comparative insignificance by Nicholas IV. to be the seat of the governors of the March. It was enclosed in the 13th century by a new line of walls more than 25 m. in circuit; and in the troubles of the next two hundred years it had frequent occasion to learn their value. For the most part it remained faithful to the popes, and in return it was rewarded by a multi- tude of privileges. Though in 1797 the inhabitants opened their gates to the French, two years afterwards, when the country people took refuge within the walls, the city was taken by storm and delivered to pillage. The bishopric of Macerata dates from the suppression of the see of Recanati (1320).

MACFARREN, SIR GEORGE ALEXANDER (1813-1887), English composer, was born in London on the 2nd of March 1 813, and entered the Royal Academy of Music in 1829. A symphony by him was played at an Academy concert in 1830; for the opening of the Queen's Theatre in Tottenham Street, under the management of his father, in 1831, he wrote an over- ture. His Chevy Chase overture, the orchestral work by which he is perhaps best known, was written as early as 1836, and in a single night. On leaving the Academy in 1836, Macfarren was for about a year a music teacher in the Isle of Man, and wrote two unsuccessful operas. In 1837 he was appointed a professor at the Academy, and wrote his Romeo and Juliet overture. In the following year he brought out The Devil's Opera, one of his best works. In 1845 he became conductor at Covent Garden, producing the Antigone with Mendelssohn's music; his opera on Bon Quixote was produced under Bunn at Drury Lane in 1846; his subsequent operas include Charles II. (1849), Robin Hood (i860), She Stoops to Conquer (1864), and Helvellyn (1864). A gradual failure of his eyesight, which had been defective from boyhood, resulted in total blindness in 1865, but he overcame the difficulties by employing an amanuensis in composition, and made hardly a break in the course of his work. He was made principal of the Royal Academy of Music in succession to Stern- dale Bennett in February 1875, and in March of the same year professor of music in Cambridge University. Shortly before this he had begun a series of oratorios: St John the Baptist (Bristol, 1873); Resurrection (Birmingham, 1876); Joseph (Leeds, 1877); and King David (Leeds, 1883). In spite of their solid workmanship, and the skill with which the ideas are treated, it is difficult to hear or read them through without smiling at some of the touches of quite unconscious humour often resulting from the way in which the Biblical narratives have been, as it were, dramatized. He delivered many lectures of great and lasting value, and his theoretical works, such as the Rudiments of Harmony, and the treatise on counterpoint, will probably be

remembered longer than many of his compositions. He was knighted in 1883, and died suddenly in London on the 31st of October 1887. An excellent memoir by H. C. Banister appeared in 1891. •

McGEE, THOMAS D'ARCY (1825-1868), Irish- Canadian politician and writer, second son o£ James McGee, a coast-guard,

was born at Carlingford, Co. Louth, on the 13th of April 1825. He early showed a remarkable aptitude for oratory. At the age of thirteen he delivered a speech at Wexford,. and when four years later he emigrated to America he quickly gained a reputa- tion as a writer and public speaker in the city of Boston. He thus attracted the attention of O'Connell, and before he was twenty years of age he returned to London to become parlia- mentary correspondent of the Freeman's Journal, and shortly afterwards London correspondent of the Nation, to which he also contributed a number of poems. He married in 1847 Mary Theresa Caffry, by whom he had two children. In 1846 he be- came one of the moving spirits in the " Young Ireland " party, and in promoting the objects of that organization he contributed two volumes to the " Library of Ireland." On the failure of the movement in 1848 McGee escaped in the disguise of a priest to the United States, where between 1848 and 1853 he established two newspapers, the New York Nation and the American Celt. His writings at first were exceedingly bitter and anti-English; but as years passed he realized that a greater measure of political freedom was possible under the British constitution than under the American. He had now become well-known as an author, and as a lecturer of unusual ability. In 1857 McGee, driven from the United States by the scurrilous attacks of the extreme Irish revolutionaries, took up his abode in Canada, and was admitted to the bar of the province of Lower Canada in 1861. : At the general election in 1858 he was returned to parliament as the member for Montreal, and for four years he was regarded as a powerful factor in the house. On the formation of the Sand- field-Macdonald-Sicotte administration in 1862 he accepted the office of president of the council. When the cabinet was recon- structed a year later the Irish were left without representation, and McGee sought re-election as a member of the opposite party. In 1864 he was appointed minister of agriculture in the adminis- tration of Sir E. P. Tache, and he served the country in that capacity until his death. He actively supported the policy of federation and was elected a member of the first Dominion parlia- ment in r867. On the 7th of April 1868, after having delivered

a notable speech in the house, he was shot by an assassin as he was about to enter his house at Ottawa. His utterances against the Fenian invasion are believed to have been the cause of the crime for which P. J. Whelan was executed. McGee's loss was keenly felt by all classes, and within a few weeks of his death parliament granted an annuity to his widow and children. McGee had great faith in the future of Canada as a part of the empire. Speaking at St John, N.B., in 1863, he said: " There are before the public men of British America at this moment but two courses: either to drift with the tide of democracy, or to seize the golden moment and fix for ever the monarchical character of our institutions. I invite every fellow colonist who agrees with me to unite our efforts that we may give our province the aspect of an empire, in order to exercise the influ- ence abroad and at home of a state, and to originate a history which the world will not willingly let die." Sir Charles Gavan Duffy considered that as a poet McGee was not inferior to Davis, and that as an orator he possessed powers rarer than those of T. F Meagher.

McGee's principal works are: A Popular History of Ireland (2 vols., New York, 1862; I vol., London, 1869); Irish Writers of the Seventeenth Century (Dublin, 1846); Historical Sketches of O'Connell and his Friends (Boston, 1844) ; Memoirs of the Life and Conquests of Art McMurrogh, King of Leinster (Dublin, 1847); Memoir of C. G. Duffy (Dublin, 1849) ; A History of the Irish Settlers in North America (Boston, 1 851); History of the Attempts to establish the Protestant Reformation in Ireland (Boston, 1853); Life of Edward Maginn, Coadjutor Bishop of Derry (New York, 1857); Catholic History of North America (Boston, 1854); Canadian Ballads and Occasional Pieces (New York, 1858); Notes on Federal Governments Past and Present (Montreal, 1865) ; Speeches and Addresses, chiefly on the Subject of the British American Union (London, 1865) ; Poems, edited by Mrs M. A. Sadleir with introductory memoir (New York, 1869). See Fennings Taylor, The Hon. Thomas D'Arcy McGee (Montreal, '867); J. K. Forah, Thomas D'Arcy McGee as an Empire Builder (Ottawa, 1904); H. J. O'C. French, A Sketch of the Life of the Hon. T. D. McGee (Montreal); Appleton's Cyclopaedia of American Biography., iv. 1 16; N. F. Dvin's Irishman in Canada (1887); C. G.

Duffy, Four Years of Irish History (1883) ; Alfred Webb, Compendium of Irish Biography (Dublin, 1878). (A. G. D.)

McGIFFERT, ARTHUR CUSHMAN (1861-), American theologian, was born in Sauquoit, New York, on the 4th of March 1861, the son of a Presbyterian clergyman of Scotch descent. He graduated at Western Reserve College in 1882 and at Union theological seminary in 1885,

studied in Germany (especially under Harnack) in 1885-1887, and in Italy and France in 1888, and in that year received the degree of doctor of philosophy at Marburg. He was instructor (1888-1890) and professor (1890- 1893) of church history at Lane theological seminary, and in 1893 became Washburn professor of church history in Union theologi- cal seminary, succeeding Dr Philip Sehaff . His published work, except occasional critical studies in philosophy, dealt with church history and the history of dogma. His best known publi- cation is a History of Christianity in the Apostolic Age (1897). This book, by its independent criticism and departures from traditionalism, aroused the opposition of the General Assembly of the Presbyterian Church; though the charges brought against McGiffert were dismissed by the Presbytery of New York, to which they had been referred, a trial for heresy seemed inevitable, and McGiffert, in 1900, retired from the Presbyterian ministry and entered the Congregational Church, although he retained his position in Union theological seminary. Among his other publications are: A Dialogue between a Christian and a Jew (1888); a translation (with introduction and notes) of Eusebius's Church History (1890); and The Apostles' Creed (1902), in which he attempted to prove that the old Roman creed was formulated as a protest against the dualism of Marcion and his denial of the reality of Jesus's life on earth.

McGILLlVRAY, ALEXANDER (c. 1730-1793), American Indian chief, was born near the site of the present Wetumpka, in Alabama. His father was a Scotch merchant and his mother the daughter of a French officer and an Indian "princess." Through his father's relatives in South Carolina, McGillivray received a good education, but at the age of seventeen, after a short experience as a merchant in Savannah and Pensacola, he returned to the Muscogee Indians, who elected him chief. He retained his connexion with business life as a member of the British firm of Panton, Forbes & Leslie of Pensacola. During the War of Independence, as a colonel in the British army, he incited his followers to attack the western frontiers of Georgia and the Carolinas. Georgia confiscated some of his property, and after the peace of 1783 McGillivray remained hostile. Though still retaining his British commission, he accepted one from Spain, and during the remainder of his life used his influ- ence to prevent American settlement in the south-west. So important was he considered that in 1790 President Washington sent an agent who induced him to visit New York. Here he was persuaded to make peace in consideration of a brigadier-general's commission and payment for the property confiscated by Georgia; and with the warriors who accompanied him he signed a formal treaty of peace and friendship on the 7th of August. He then

went back to the Indian country, and remained hostile to the Americans until his death. He was one of the ablest Indian leaders of America and at one time wielded great power — having 5000 to 10,000 armed followers. In order to serve Indian interests he played off British, Spanish and American interests against one another, but before he died he saw that he was fight- ing in a losing cause, and, changing his policy, endeavoured to provide for the training of the Muscogees in the white man's civilization. McGillivray was polished in manners, of cultivated intellect, was a shrewd merchant, and a successful speculator; but he had many savage traits, being noted for his treachery, craftiness and love of barbaric display. (W. L. F.)

MACGILLIVRAY, WILLIAM (1796-1852), Scottish naturalist, was born at Aberdeen on the 25th of January 1796. At King's College, Aberdeen, he graduated in 1815, and also studied medi- cine, but did not complete the latter course. In 1823 he became assistant to R. Jameson, professor of natural history in Edin- burgh University; and in 1831 he, was appointed curator of the museum of the Royal College of Surgeons in Edinburgh, a post

which he resigned in 1841 to become professor of natural history and lecturer on botany in Marischal College, Aberdeen. He died at Aberdeen on the 4th of September 1852. He possessed a wide and comprehensive knowledge of natural science, gained no less from personal observations in different parts of Scotland than from a study of collections and books. His industry and extensive knowledge are amply shown in his published works. He assisted J. J. Audubon in his classical works on the Birds of America, and edited W. Withering's British Plants. His larger works include biographies of A. von Humboldt, and of zoologists from Aristotle to Linnaeus, a History of British Quadrupeds, a History of the Molluscous Animals of Aberdeen, Banff and Kin- cardine, a Manual of British Ornithology, and a History of British Birds, in 5 vols. (1837-1852). The last work holds a high rank from the excellent descriptions of the structure, habits and haunts of birds, and from the use in classification of characters afforded by their anatomical structure. His Natural History of Deeside, posthumously published by command of Queen Victoria, was the result of a sojourn in the highlands of Aberdeenshire in 1850. He made large collections, alike for the instruction of his students and to illustrate the zoology, botany and geology of the parts of Scotland examined by him, especially around Aberdeen, and a number of his

original water-colour drawings are preserved in the British Museum (Natural History).

His eldest son, John Macgillivray (1822-1867), published an account of the voyage round the world of H.M.S. ” Rattlesnake,” on board of which he was naturalist. Another son, Paul, published an Aberdeen Flora in 1853.

MacGREGOR, JOHN [” Rob Roy “] (1825-1892), Scottish canoeist, traveller and philanthropist, son of General Sir Duncan MacGregor, K.C.B., was born at Gravesend on the 24th of January 1825. He combined a roving disposition with a natural taste for mechanics and for literature. In 1839 he went to Trinity College, Dublin, and in 1844 to Trinity, Cambridge, where he was a wrangler. He was called to the bar in 1851, but did not pursue his profession. He travelled a great deal in Europe, Egypt, Palestine, Russia, Algeria and America, and between 1853 and 1863 was largely occupied with researches into the history and methods of marine propulsion. He was the pioneer of British canoeing. In 1865 he started on a long canoeing cruise in his ” Rob Roy ” canoe, and in this way made a prolonged water tour through Europe, a record of which he published in 1866 as A Thousand Miles in the Rob Roy Canoe. This book made MacGregor and his canoe famous. He made similar voyages in later years in Norway, Sweden and Denmark, the North Sea and Palestine. Another voyage, in the English Channel and on French waters, was made in a yawl. He published accounts of all these journeys. He did not, however, confine his energies to travelling. He was active in charity and philanthropic work, being one of the founders of the Shoe-black Brigade. In 1870 and again in 1873 he was elected on the London school board. He died at Boscombe on the 1 6th of July 1892.

MACH, ERNST (1838-), Austrian physicist and psycholo- gist, was born on the 18th of February 1838 at Turas in Moravia, and studied at Vienna. He was professor of mathematics at Gratz (1864-1867), of physics at Prague (1867-1895), and of physics at Vienna (189 5-1 901). In 1879 and 1880 as Rector Magnificus he fought against the introduction of Czech instead of German in the Prague University. In 1901 he was made a member of the Austrian house of peers. In philosophy he began with a strong predilection for the physical side of psychology, and at an early age he came to the conclusion that all existence is sensation, and, after a lapse into noumenalism under the in- fluence of Fechner’s. Psychophysics, finally adopted a universal physical phenomenalism. The Ego he considers not an entity sharply distinguished from the Non-ego, but merely, as it were, a medium of continuity of sensory impressions. His whole theory appears to be

vitiated by the confusion of physics and psychology.

Works. — Kompendium der Physik fur Mediziner (Vienna, 1863); Einleitung in die Helmholtz'sche Musiktheorie (Gratz, 1866); Die

Gesch. u. d. Wurzel d. Satzes von d. Erhaltung d. Arbeit (Prague, 1872) ; Grundlinien d. Lehre v. d. Bewegungsempfindungen (Leipzig, 1875); Die Mechanik in ihrer Entwickelung (Leipzig, 1883; rev. ed., 1908; Eng. trans., T. J. McCormack, 1902); Beitrage zur Analyse d. Empfindungen (Jena, 1886), 5th ed., 1906, entitled Die Analyse d. Empfindungen; Leitfaden d. Physik fur Studierende (Prague, 1881, in collaboration) ; Populdrwissenschaftliche Vorlesungen (3rd ed., Leipzig, 1903); Die Prinzipien d. Warmelehre (2nd ed., 1900); Erkenntnis und Irrtum (Leipzig, 1905).

MACHAERODUS, or Machairodus, the typical genus of a group of long-tusked extinct cats, commonly known as sabre- tooths. Although best regarded as a sub-family (Machaerodon- tinae) of the Felidae, they are sometimes referred to a separate family under the name Nimravidae (see Carnivora). The later forms, as well as some of the earlier ones, are more specialized as regards dentition than the modern Felidae, although in several other respects they exhibit more primitive features. The general type of dentition is feline, but in some instances more premolars are retained, as well as a small tubercular molar behind the lower carnassial. The characteristic feature is, however, the great development of the upper canines, which in the more specialized types reach far below the margin of the lower jaw, despite the development of a flange-like expansion of the extremity of the latter for their protection. In these extreme forms it is quite evident that the jaws could not be used in the ordinary manner; and it seems probable that in attacking prey the lower jaw was dropped to a vertical position, and the huge upper tusks used as stabbing instruments. The group is believed to be derived from a creodont allied to the Eocene Palaeonictis (see Creodonta).

Nimravus, of the American Oligocene, with two premolars and two molars in the lower jaw, and comparatively short upper canines, seems to be the least specialized type; next to which comes Hoplophoneus, another North American Oligocene genus, in which the tubercular lower molar is lost, and the upper canine is longer. It is noteworthy, however, that this genus retains the third trochanter to the femur, which is lost in Nimravus. Machaerodus, in the wider sense, includes the larger and more typical forms. In the Pliocene of France and Italy it is repre- sented by M. megantereon, a species not larger than a leopard, and allied forms occur in the Pliocene of

Greece, Hungary, Samos, Persia, India and China, as well as in the Middle Mio- cene of France and Germany. Far larger is the Pleistocene M. cultridens of the caverns of Europe, with serrated upper tusks several inches in length. From Europe and Asia the sabre- toothed tigers may be traced into North and thence into South America, the home of M. (Smilodon) neogaeus, the largest of the whole tribe, whose remains occur in the Brazilian caves and the silt of the Argentine pampas. This animal was as large as a tiger, with tusks projecting seven inches from the jaw and very complex carnassials; the feet were very short, with only four toes to the hind-pair, and the humerus has lost the foramen at the lower end. Very noteworthy is the occurrence of an imper- fectly known specialized type — Eusmilus — in the Lower Oligo- cene of Europe and perhaps also North America. Unlike all other cats, it had only two pairs of lower incisors, and the large cheek-teeth were reduced to the carnassial and one premolar in advance of the same. (R. L.*)

MACHALE, JOHN (1791-1881), Irish divine, was born on the 15th of March 1791 at Tuber-na-Fian, Mayo, and was educated at Maynooth, where after graduating in 1814 he was ordained priest and appointed lecturer in theology, succeeding to the professoriate in 1820. In 1825 he became coadjutor bishop of Killala, and in July 1834 archbishop of Tuam and metropolitan. He visited Rome in 183 1, and was there again at the proclamation of the dogma of the Immaculate Conception of the Virgin (Dec. 1854) and in 1869-1870 at the Vatican council. Though he did not favour the dogma of Papal Infallibility he submitted as soon as it was defined. Machale was an intensely patriotic Irishman, who fought hard for Catholic Emancipation, for separate Roman Catholic schools, and against the Queen's Colleges. He trans- lated part of the Iliad (Dublin, 1861), and made an Irish version of some of Moore's melodies and of the Pentateuch. He died at Tuam on the 7th of November 1881.

MACHAULT D'ARNOUVILLE, JEAN BAPTISTE DE (1701- 1794), French statesman, was a son of Louis Charles Machault d'Arnouville, lieutenant of police. In 1721 he was counsel to the parlement of Paris, in 1728 maitre des requites, and ten years later was made president of the Great Council; although he had opposed the court in the Unigenitus dispute, he was appointed intendant of Hainaut in 1743. From this position, through the influence at court of his old friend Rene Louis, Marquis d'Argenson, he was called to succeed Orry de

Fulvy as controller- general of the finances in December 1745. He found, on taking office, that in the four years of the War of the Austrian Succession the economies of Cardinal Fleury had been exhausted, and he was forced to develop the system of borrowings which was bring- ing French finances to bankruptcy. He attempted in 1749 a reform in the levying of direct taxes, which, if carried out, would have done much to prevent the later Revolutionary movement. He proposed to abolish the old tax of a tenth, which was evaded by the clergy and most of the nobility, and substitute a tax of one-twentieth which should be levied on all without exception. The cry for exceptions, however, began at once. The clergy stood in a body by their historical privileges, and the outcry of the nobility was too great for the minister to make headway against. Still he managed to retain his office until July 1754, when he exchanged the controllership for the ministry of marine. Foreseeing the disastrous results of the alliance with Austria, he was drawn to oppose more decidedly the schemes of Mme de Pompadour, whose personal ill-will he had gained. Louis XV. acquiesced in her demand for his disgrace on the istof February 1757. Machault lived on his estate at Arnouville until the Revolution broke out, when, after a period of hiding, he was apprehended in 1794 at Rouen and brought to Paris as a suspect. He was imprisoned in the Madelonnettes, where he succumbed in a few weeks, at the age of ninety-three.

His son, Louis Charles Machault d'Arnouville (1737- 1820), was bishop of Amiens from 1774 until the Revolution. He was famous for his charity; but proved to be a most uncom- promising Conservative at the estates general of 1789, where he voted consistently against every reform. He emigrated in 1791, resigned his bishopric in 1801 to facilitate the concordat, and retired to the ancestral chateau of Arnouville, where he died in

1820.

MACHAUT, GUILLAUME DE (c. 1300-1377), French poet and musician, was born in the village of Machault near Rethel in Champagne. Machaut tells us that he served for thirty years the adventurous John of Luxembourg, king of Bohemia. He followed his master to Russia and Poland, and, though of peaceful tastes himself, saw twenty battles and a hundred tourneys. When John was killed at Cr6cy in 1346 Machaut was received at the court of Normandy, and on the accession of John the Good to the throne of France (1350) he received an office which enabled him to devote himself thenceforth to music and poetry. Machaut wrote about 1348 in honour of Charles III., king of Navarre, a long poem much admired by contemporaries,

Le Jugemenl du roi de Navarre. When Charles was thrown into prison by his father- in-law, King John, Machaut addressed him a Confort d'ami to console him for his enforced separation from his young wife, then aged fifteen. This was followed about 1370 by a poem of 9000 lines entitled La Prise d'Alexandrie, one of the last chro- nicles cast in this form. Its hero was Pierre de Lusignan, king of Cyprus. Machaut is best known for the strange book telling of the love affair of his old age with a young and noble lady long supposed to be Agnes of Navarre, sister of Charles the Bad; Paulin Paris in his edition of the Voir dit (Historie vraie) identi- fied her as Perronne d'Armentieres, a noble lady of Champagne. In 1362, when Machaut must have been at least sixty-two years of age, he received a rondeau from Perronne, who was then eighteen, expressing her devotion. She no doubt wished to play Laura to his Petrarch, and the Voir dit contains the corre- spondence and the poems which they exchanged. The romance, which ended with Perronne's marriage and Machaut's desire to remain her doux ami, has gleams of poetry, especially in Perronne's verses, but its subject and its length are both

deterrent to modern readers. But Machaut with Deschamps marks a distinct transition. The trouveres had been impersonal. It is difficult to gather any details of their personal history from their work. Machaut and Deschamps wrote of their own affairs, and the next step in development was to be the self- analysis of Villon. Machaut was also a musician. He com- posed a number of motets, songs and ballads, also a mass supposed to have been sung at the coronation of Charles V. This was translated into modern notation by Perne, who read a notice on it before the Institute of France in 181 7.

Machaut's Oeuvres choisies were edited by P. Tarbe 1 (Rheims and Paris, 1849); La Prise d'Alexandrie, by L. de Mas-Latrie (Geneva, 1877); and Le Livre du voir-dit, by Paulin Paris (1875). See also F. G. F6tis, Biog. universelle des musiciens. . .(Paris, 1862), and a notice on the Instruments de musique au xiv° siecle d'apres Guillaume de Machaut, by E. Travers (Paris, 1882).

MACHIAVELLI, NICCOLO (1469-1527), Italian statesman and writer, was born at Florence on the 3rd of May 1469. His ancestry claimed blood relationship with the lords of Montes- pertoli, a fief situated between Val di Pesa and Val d'Elsa, at no great distance from the city. Niccolo's father, Bernardo (b. 1428), followed the profession of a jurist. He held landed property worth something like £250 a year of our money. His son, though not wealthy, was never wholly dependent upon official income.

Of Niccolo's early years and education little is known. His works show wide reading in the Latin and Italian classics, but it is almost certain that he had not mastered the Greek language. To the defects of Machiavelli's education we may, in part at least, ascribe the peculiar vigour of his style and his speculative originality. He is free from the scholastic trifling and learned frivolity which tainted the rhetorical culture of his century. He made the world of men and things his study, learned to write his mother-tongue with idiomatic conciseness, and nourished his imagination on the masterpieces of the Romans.

The year of Charles VHP's invasion and of the Medici's expulsion from Florence (1494) saw Machiavelli's first entrance into public life. He was appointed clerk in the second chancery of the commune under his old master, the grammarian, Marcello Virgilio Adriani. Early in 1498 Adriani became chan- cellor of the republic, and Machiavelli received his vacated office with the rank of second chancellor and secretary. This post he retained till the year 151 2. The masters he had to serve were the died di liberld e pace, who, though subordinate to the signoria, exercised a separate control over the departments of war and the interior. They sent their own ambassadors to foreign powers, transacted business with the cities of the Florentine domain, and controlled the military establishment of the commonwealth. The next four- teen years of Machiavelli's life were fully occupied in the volumi- nous correspondence of his bureau, in diplomatic missions of varying importance, and in the organization of a Florentine militia. It would be tedious to follow him through all his em- bassies to petty courts of Italy, the first of which took place in 1499, when he was sent to negotiate the continuance of a loan to Catherine Sforza, countess of Forli and Imola. In 1500 Machiavelli travelled into France, to deal with Louis XII. about the affairs of Pisa. These embassies were the school in which Machiavelli formed his political opinions, and gathered views regarding the state of Europe and the relative strength of nations. They not only introduced him to the subtleties of Italian diplo- macy, but also extended his observation over races very different from the Italians. He thus, in the course of his official business, gradually acquired principles and settled ways of thinking which he afterwards expressed in writing.

In 1502 Machiavelli married Marietta Corsini, who bore him several children, with whom, in spite of his own infidelities, he lived on good terms, and who survived him twenty-six years. In the same year Piero Soderini was chosen gonfalonier for life, in accordance with certain changes in the constitution of the state, which were intended to bring Florence closer to the Venetian type of government. Machiavelli became intimately connected

with Soderini, assisted him in carrying out his policy, suggested important measures of military reform which Soderini adopted, and finally was involved in ruin by his fall.

The year 1502 was marked by yet another decisive incident in Machiavelli's life. In October he was sent, much against his will, as envoy to the camp of Cesare Borgia, duke of Valentinois. The duke was then in Romagna, and it was Machiavelli's duty to wait upon and watch him. He was able now to observe those intricate intrigues which culminated in Cesare's murder of his disaffected captains. From what remains of Machiavelli's official letters, and from his tract upon the Modo che tenne il duca Valentino per ammazzar Vitellozzo Vitelli, we are able to appreciate the actual relations which existed between the two men, and the growth in Machiavelli's mind of a political ideal based upon his study of the duke's character. Machiavelli conceived the strongest admiration for Cesare's combination of audacity with diplomatic prudence, for his adroit use of cruelty and fraud, for his self-reliance, avoidance of half-measures, employment of native troops, and firm administration in con- quered provinces. More than once, in letters to his friend Vettori, no less than in the pages of the Principe, Machiavelli afterwards expressed his belief that Cesare Borgia's behaviour in the conquest of provinces, the cementing of a new state out of scattered elements, and the dealing with false friends or doubtful allies, was worthy of all commendation and of scrupulous imita- tion. As he watched Cesare Borgia at this, the m -,&t brilliant period of his adventurous career, the man became idealized in his reflective but imaginative mind. Round him, as a hero, he allowed his own conceptions of the perfect prince to cluster. That Machiavelli separated the actual Cesare Borgia, whom he afterwards saw, ruined and contemptible, at Rome, from this radiant creature of his political fancy, is probable. That the Cesare of history does not exactly match the Duca Valentino of Machiavelli's writings is certain. Still the fact remains that henceforth Machiavelli cherished the ideal image of the statesman which he had modelled upon Cesare, and called thjs by the name of Valentino.

On his return to Florence early in January 1503, Machiavelli began to occupy himself with a project which his. recent atten- dance upon Cesare Borgia had strengthened jn his mind. The duties of his office obliged him to study the conditions of military service as they then existed in Italy. He was familiar with the disadvantages under which

republics laboured when they engaged professional captains of adventure and levied mercenary troops. The bad faith of the condottiere Paolo Vitelli (beheaded at Florence in 1499) had deeply impressed him. In the war with Pisa he had observed the insubordination and untrustworthiness of soldiers gathered from the dregs of different districts, serving under egotistical and irresponsible commanders. His reading in Livy taught him to admire the Roman system of employing armies raised from the body of the citizens; and Cesare Borgia's method of gradually substituting the troops of his own duchy for aliens and mercenaries showed him that this plan might be adopted with success by the Italians. He was now determined, if possible, to furnish Florence with a national militia. The gonfalonier Soderini entered into his views. But obstacles of no small magnitude arose. The question of money was immediately pressing. Early in 1503 Machiavelli drew up for Soderini a speech, Discorso sulla provisione del danaro, in which the duty and necessity of liberal expenditure for the protection of the state were expounded upon principles of sound political philosophy. Between this date and the last month of 1506 Machiavelli laboured at his favourite scheme, working out memorials on the subject for his office, and suggesting theoutlines of a new military organization. On the 6th of December 1506, his plan was approved by the signoria, and a special ministry, called the nove di ordinanza e milizia, was appointed. Machiavelli immediately became their secretary. The country districts of the Florentine dominion were now divided into departments, and levies of foot- soldiers were made in order to secure a standing militia. A commander-in-chief had to be chosen for the. new troops. Italian jealousy shrank from conferring this important office

on a Florentine, lest one member of the state should acquire a power dangerous to the whole. The choice of Soderini and Machiavelli fell, at this juncture, upon an extremely ineligible person, none other than Don Micheletto, Cesare Borgia's cut- throat and assassin. It is necessary to insist upon this point, since it serves to illustrate a radical infirmity in Machiavelli's genius. While forming and promoting his scheme, he was actuated by principles of political wisdom and by the purest patriotism. But he failed to perceive that such a ruffian as Micheletto could not inspire the troops of Florence with that devotion to tfieir country arid that healthy moral tone which should distinguish a patriot army. Here, as elsewhere, he re- vealed his insensibility to the ethical element in human nature. Meanwhile Italy had been the scene of memorable events, iii most of which Machiavelli took some part. Alexander VI. had died suddenly of fever. Julius II. had ascended the papal chair. Tie duke of Valentinois had been checked in mid-

career of conquest. The collapse of the Borgias threw Central Italy into confusion; and Machiavelli had, in 1505, to visit the Baglioni at Perugia and the Petrucci at Siena. In the following year he accompanied Julius upon his march through Perugia into the province of Emilia, where the fiery pope subdued in person the rebellious cities of the Church. Upon these enjbassies Machiavelli represented the Florentine died in quality of envoy. It was his duty to keep the ministry informed by means of frequent despatches and reports. All this while the war for the recovery of Pisa was slowly dragging on, with no success or honour to the Florentines. Machiavelli had to attend the camp and provide for levies amid his many other occupations. And yet he found time for private literary work. In. the autumn of 1504 he began his Decennali, or Annals of Italy, a poem composed in rough terza rima. About the same time he composed a comedy on the model of Aristophanes, which is unfortunately lost. It seems to have been called Le Maschere. Giuliano de' Ricci tells us it was marked by stringent satire upon great eccle- siastics and statesmen, no less than by a tendency to "ascribe all human things to natural causes or to fortune." That phrase accurately describes, the prevalent bias of its author's mind.

The greater part of 1506 and 1507 wasspent in organizing the new militia, corresponding on the subject, and scouring the coun- try on enlistment service. But at the end of the latter. year European affairs of no small moment diverted :M a chia,velli,from these humbler duties. Maximilian was planning a journey into Italy in order to be crowned emperor at Rome, and was levying subsidies from the imperial burghs for his expenses. The Florentines thought his demands excessive. Though they already had Francesco Vettori at his court, Soderini judged it advisable to send Machiavelli thither in December. He irar veiled by Geneva, all through Switzerland, to Botzen, where he found the emperor. This journey was an important moment in his life. It enabled him to study the Swiss and the Germans in their homes; and the report which he wrote on his return is among his most effective political studies. What is most remark? able in it is his concentrated effort to realize the exact political weight of the German nation, and to penetrate the causes of its strength and weakness. He attempts to grasp the national character as a whole, and thence to deduce practical conclusions. The same qualities are noticeable in his Ritratti delle cose di Francia, which he drew up after an embassy to Louis XH. at Blois in 1510. These notes upon the French race are more, scattered than the report, on German affairs. But they reveal no less acumen combined with imaginative penetration into the very essence of national existence.

Michiavelli returned from Germany in June 1508. The, rest of that year and a large part of 1509 were spent in the affairs of the militia and the war of Pisa. Chiefly through his exertions, the war was terminated by the surrender of Pisa in June 1509. Meanwhile the league of Cˆmbray had disturbed the peace of Italy, and Florence found herself in a perilous position between Spain and France. Soderini's government grew weaker. The; Medicean party lifted up its head. To the league of Cambray succeeded the Holy League. The battle of Ravenna was fought,

and the French retired from Italy. The Florentines had been spectators rather than actors in these great events. But they were now destined to feel the full effects of them. The cardinal Giovanni de' Medici, who was present at the battle of Ravenna, brought a Spanish army into Tuscany. Prato was sacked in the August of 1512. Florence, in extreme terror, deposed the gonfalonier, and opened her gates to the princes of the house of Medici.

The government on which Machiavelli depended had fallen, never to rise again. The national militia in which he placed unbounded confidence had proved inefficient to protect Florence in the hour of need. He was surrounded by political and per- sonal enemies, who regarded him with jealousy as the ex-gon- falonier's right-hand man. Yet at first it appears that he still hoped to retain his office. He showed no repugnance to a change of masters, and began to make overtures to the Medici. The nove della milizia were, however, dissolved; and on the 7th of November 1512 Machiavelli was deprived of his appointments. He was exiled from Florence and confined to the dominion for one year, and on the 17 th of November was futher prohibited from setting foot in the Palazzo Pubblico. Ruin stared him in the face; and, to make matters worse, he was implicated in the conspiracy of Pier Paolo Boscoli in February 1513. Machiavelli had taken no share in that feeble attempt against the Medici, but his name was found upon a memorandum dropped by Boscoli. This was enough to ensure his imprisonment. He was racked, and only released upon Giovanni de' Medici's election to the papacy in March 1 513. When he left his dungeon he retired to a farm near Sari Casciano, and faced the fact that his political career was at an end.

Machiavelli now entered upon a period of life to which weowe the great works that have rendered his name immortal: But it was one of

prolonged disappointment and annoyance, He had not accustomed himself to economical living; and, when the emoluments of his office were withdrawn, he had barely enough to support his family. The previous years of his manhood had been spent in continual activity. Much as he enjoyed the study of the Latin and Italian classics, literature \?as not his business; nor had he looked on writing as more than an occasional amusement. He was now driven in upon his books for the em- ployment of a restless temperament; and to this irksomeness of enforced leisure may be ascribed the production of the Principe, the Discord, the Arte della guerra, the comedies, and the Historie fiorenline. The uneasiness of Machiavelli's mind, in the first years of this retirement is brought before us by his private corre- spondence. The letters to Vettori paint a man of vigorous intellect and feverish activity, dividing his time between studies and vulgar dissipations, seeking at one time distraction, in low intrigues and wanton company, at another turning to the great minds of antiquity for solace. It is not easy to understand the spirit in which the author of the Principe sat down to exchange obscenities with the author of the Sommario della storia d'ltalia. At the same time this coarseness of taste did not blunt his intel- lectual sagacity. His letters on public affairs in Italy and Europe, especially those which he meant Vettori to communicate to the Medici at Rome, are marked by extraordinary fineness of percep- tion, combined, as usual in his case, with philosophical breadth. In retirement at his villa near Percussina, a hamlet of San Casciano, Machiavelli completed the Principe before the end of 1 5 13. This famous book is an analysis of the methods whereby an ambitious man may rise to sovereign power. It appears to have grown out of another scarcely less celebrated work, upon which Machiavelli had been engaged before he took the Principe in hand, and which he did not finish until some time afterwards. This second treatise is the Discorsi sopra la prima deca di. Tito Livio.

Cast in the form of comments on the history of Livy, the Discorsi are really an inquiry into the genesis and maintenance of states. The Principe is an offshoot from the main theme of the Discorsi, setting forth Machiavelli's views at large and in detail upon the nature of principalities, the method of cementing them, and the qualities of a successful autocrat. Being more limited in subject and more independent as a work of literary art, this essay detaches

itself from the main body of the Discorsi, and has attracted far more attention. We feel that the Principe is inspired with greater fervency, as though its author had more than a speculative aim in view, and brought it forth to serve a special crisis. The moment of its composition was indeed decisive. Machiavelli judged the case of Italy

so desperate that salvation could only be expected from the intervention of a powerful despot. The unification of Italy in a state protected by a national army was the cherished dream of his life; and the peroration of the Principe shows that he meant this treatise to have a direct bearing on the problem. We must be care- ful, however, not to fall into the error of supposing that he wrote it with the sole object of meeting an occasional emergency. Together with the Discorsi, the Principe contains the speculative fruits of his experience and observation combined with his deductions from Roman history. The two works form one coherent body of opinion, not Systematically expressed, it is true, but based on the same principles, involving the same conclusions, and directed to the same philosophical end. That end is the analysis of the conception of the state, studied under two main types, republican and monarchical. Up to the date of Machiavelli, modern political philosophy had always presupposed an ideal. Medieval speculation took the Church and the Empire for granted, as divinely appointed institutions, under which the nations of the earth must flourish for the space of man's probation on this planet. Thinkers differed only as Guelfs and Ghibellines, as leaning on the one side to papal, on the other to imperial supremacy. In the revival of learning, scholarship supplanted scholasticism, and the old ways of medieval thinking were forgotten. But no substantial philosophy of any kind emerged from humanism; the political lucubrations of the scholars were, like their ethical treatises, for the most part rhetorical. Still the humanists effected a delivery of the intellect from what had become the bondage of obsolete ideas, and created a new medium for the speculative faculty. Simultaneously with the revival, Italy had passed into that stage of her existence which has been called the age of despots. The yoke of the Empire had been shaken off. The Church had taken rank among Italian tyrannies. The peninsula was, roughly speaking, divided into principalities and sovereign cities, each of which claimed autocratic jurisdiction. These separate despotisms owned n6 common social tie, were founded on no common jus or fight, but were connected in a, network of conflicting interests and changeful diplomatic combinations. A keen and positive political intelligence emerged in the Italian race. The reports of Venetian and Florentine ambassadors at this epoch contain the first germs of an attempt to study politics from the point of view of science.

At this moment Machiavelli intervenes. He was conscious of the change which had come over Italy and Europe. He was aware that the old strongholds of medieval thought must be abandoned, and that the decaying ruins of medieval institutions furnished no basis for the erection of solid political edifices. He felt the corruption of his

cotmtry, and sought to bring, the world back to a lively sense of the necessity for reformation. His originality consists in having extended the positive intelligence of his century from the sphere of contemporary politics and special interests to man at large regarded as a political being. He founded the science of politics for the modern world, by concentrating thought upon its fundamental principles. He began to study men, not according to some precon- ception, but as he found_ them — men, not in the isolation of one century, but as a whole in history. He drew his conclusions frbm the nature of mankind itself, " ascribing all things to natural causes or to fortune." In this way be restored the right method of study, a method which had been neglected since the days of Aristotle. He formed a conception of the modern state, which marked the close of the middle ages, and anticipated the next phase of European development. His prince, abating those points which are purely Italian or strongly tinctured with the author's personal peculiarities, prefigured the monarchs of the 16th and 1 7th centuries, the monarphs whose motto was L'itat c' est moil His doctrine of a national militia foreshadowed the systemˆ which has given strength in arms to France and Germanyw His insight into the causes of Italian decadence was complete; and the remedies which he suggested, in the perora- tions pfthe Principe and the Arte della guerra, have since been applied in the unification of Italy. Lastly, when we once have' freed ourselves from the antipathy engendered by his severance of : ethics from the field of politics, when we have once made proper allowance for his peculiar use of phrases like frodi onorevoli or scelleratezze gloriose, nothing is left but admiration for his mental attitude. That is the attitude of a patriot, who saw with open eyes the ruin of his country, who burned above all things to save Italy and set her in her place among the powerful nations, who held the duty of self- sacrifice in the most absolute sense, whose very limitations and mistakes were due to an absorbing passion for the state he dreamed might be reconstituted. It was Machiavelli's intense preoccupation with this problem — what a state is arid how to found one in existing circumstances — which caused the many riddles of his speculative writings. Dazzled, as it were, with the brilliancy of his own dis- covery, concentrated in attention on the one necessity for organizing a powerful coherent nation, he forgot that men are more than political beings.' He neglected religion, or regarded it as part of

the state machinery. He was by no means indifferent to private virtue, which indeed he judged the basis of all healthy national ex- istence ;

but in the realm of politics he postponed morals to political expediency. He held that the people, as distinguished from the nobles and the clergy, were the pith and fibre of nations; yet this same people had to become wax in the hands of the politician — their commerce and their comforts, the arts which give a dignity to life and the pleasures which make life liveable, neglected — their very liberty subordinated to the one tyrannical conception. To this point the segregation of politics from every other factor which goes to constitute humanity had brought him; and this it is which makes us feel his world a wilderness, devoid of atmosphere and vegetation. Yet some such isolation of the subject matter of this science was demanded at the moment of its birth, just as political economy, when first started, had to make a rigid severance of wealth from other units. It is only by a gradual process that social science in its whole complexity can be evolved We have hardly yet dis- covered that political economy has unavoidable points of contact with ethics.

From the foregoing criticism it will be perceived that all the questions whether Machiavelli meant to corrupt or to instruct the world, to fortify the hands of tyrants or to lead them to their ruin, are now obsolete. He was a man of science — one who by the vigorous study of his subject matter sought from that subject- matter itself to deduce laws. The difficulty which remains in judging him is a difficulty of statement, valuation, allowance. How much shall we allow for his position in Renaissance Italy, for the corruption in the midst of which he lived, for his own personal temperament? How shall we state his point of departure from the middle ages, his sympathy with prevalent classical enthusiasms, his divination of a new period? How shall we estimate the per- manent worth of his method, the residuum of value in his maxims ?

After finishing the Principe, Machiavelli thought of dedicating it to one of the Medicean princes, with the avowed hope that he might thereby regain their favour and find public employment. He wrote to Vettori on the subject, and Giuliano de' Medici, duke of Nemours, seemed to him the proper person. The choice was reasonable. No sooner had Leo been made pope than he formed schemes for the aggrandizement of his family. Giuliano was offered and refused the duchy of Urbino. Later on, Leo designed for him a duchy in Emilia, to be cemented out of Parma, Piacenza, Reggio and Modena. Supported by the power of the papacy, with the goodwill of Florence to back him, Giuliano would have found himself in a position somewhat better than that of Cesare Borgia; and Borgia's creation of the duchy of Romagna might have served as his model. Machiavelli therefore was justi- fied in feeling that here was an opportunity for putting his cher-

ished schemes in practice, and that a prince with such alliances might even advance to the grand end of the unification of Italy. Giuliano, however, died in 1506. Then Machiavelli turned his thoughts towards Lorenzo, duke of Urbino. The choice of this man as a possible Italian liberator reminds us of the choice of Don Micheletto as general of the Florentine militia. To Lorenzo the Principe was dedicated, but without result. The Medici, as yet at all events, could not employ Machiavelli, and had not in themselves the stuff to found Italian kingdoms.

Machiavelli, meanwhile, was reading his Discorsi to a select audience in the Rucellai gardens, fanning that republican enthu- siasm which never lay long dormant among the Florentines. Towards the year 1519 both Leo X. and his cousin, the cardinal Giulio de' Medici, were much perplexed about the management of the republic. It seemed necessary, if possible, in the gradual extinction of their family to give the city at least a semblance of self-government. They applied to several celebrated politicians, among others to Machiavelli, for advice in the emergency. The result was a treatise in which he deduced practical conclusions from the past history and present temper of the city, blending these with his favourite principles of government in general. He earnestly admonished Leo, for his own sake and for Florence, to found a permanent and free state system for the republic, reminding him in terms of noble eloquence how splendid is the glory of the man who shall confer such benefits upon a people. The year 1520 saw the composition of the Arte della guerra and the Vita di Castruccio.

The first of these is a methodical treatise, setting forth Machiavelli's views on military matters, digestingˆ his theories respecting the superiority of national troops, the inefficiency of fortresses, the necessity of relying upon infantry in war, and the

comparative insignificance of artillery. It is strongly coloured with his enthusiasm for ancient Rome; and specially upon the topic of artillery it displays a want of insight into the actualities of modern warfare. We may regard it as a supplement or appendix to the Principe and the Discorsi, since Machiavelli held it for a fundamental axiom that states are powerless unless completely armed in perma- nence. The peroration contains a noble appeal to the Italian liberator of his dreams, and a parallel from Macedonian history, which, read by the light of this century, sounds like a prophecy of Piedmont.

The Vita di Castruccio was composed at Lucca, whither Machia- velli had been sent on a mission. This so-called biography of the medieval adventurer who raised himself by personal ability and military skill to the tyranny of several Tuscan cities must be regarded in the light of an

historical romance. Dealing freely with the outline of Castruccio's career, as he had previously dealt with Cesare Borgia, he sketched his own ideal of the successful prince. Cesare Borgia had entered into the Principe as a representative figure rather than an actual personage ; so now conversely the theories of the Principe assumed the outward form and semblance of Castruccio. In each case history is blent with speculation in nearly the same proportions. But Castruccio, being farther from the writer's own experience, bears weaker traits of personality.

In the same year, 1520, Machiavelli, at the instance of the cardinal Giulio de' Medici, received commission from the officers of the Studio pubblico to write a history of Florence. They agreed to pay him an annual allowance of 100 florins while engaged upon the work. The next six years were partly employed in its composition, and he left a portion of it finished, with a dedication to Clement VII., when he died in 1527. In the Historie fiorentine Machiavelli quitted the field of political speculation for that of history. But, having already written the Discorsi and the Principe, he carried with him to this new task of historiography the habit of mind proper to political philosophy. In his hands the history of Florence became a text on which at fitting seasons to deliver lessons in the science he ini- tiated. This gives the work its special character.. It is not so much a chronicle of Florentine affairs, from the commencement of modern history to the death of Lorenzo de' Medici in 1492, as a critique of that chronicle from the point of view adopted by Machiavelli in his former writings. Having condensed his doctrines in the Principe and the Discorsi, he applies their abstract principles to the example of the Florentine republic. But the History of Florence is not a mere political pamphlet. It is the first example in Italian literature of a national biography, the first attempt in anyˆliterature to trace the vicissitudes of a people's life in their logical sequence, deducing each successive phase from passions or necessities inherent in pre- ceding circumstances, reasoning upon them from general principles, and inferring corollaries for the conduct of the future. In point of form the Florentine History is modelled upon Livy. It contains speeches in the antique manner, which may be taken partly as embodying the author's commentary upon situations of importance, partly as expressing what he thought dramatically appropriate to prominent personages. The style of the whole book is nervous, vivid, free from artifice and rhetoric, obeying the writer's thought with absolute plasticity. Machiavelli had formed for himself a prose style, equalled by no one but by Guicciardini in his minor works, which was far removed from the emptiness of the latinizing humanists and the trivialities of the Italian purists. Words in his hands

have the substance, the self-evidence of things. It is an athlete's style, all bone and sinew, nude, without superfluous flesh or ornament.

It would seem that from the date of Machiavelli's discourse to Leo on the government of Florence the Medici had taken him into consideration. Writing to Vettori in 1513, he had expressed his eager wish to " roll stones " in their service; and this desire was now gratified In 1521 he was sent to Carpi to transact a petty matter with the chapter of the Franciscans, the chief known result of the embassy being a burlesque correspondence with Francesco Guicciardini. Four years later, in 1525, he received a rather more important mission to Venice. But Machiavelli's public career was virtually closed; and the interest of his bio- graphy still centres in his literary work. We have seen that already, in 1504, he had been engaged upon a comedy in the manner of Aristophanes, which is now unfortunately lost. A translation of the Andria and three original comedies from his pen are extant, the precise dates of which are uncertain, though the greatest of them was first printed at Rome in 1524. This is the Mandragola, which may be justly called the ripest and most powerful play in the Italian language.

The plot is both improbable and unpleasing. But literary criticism is merged in admiration of the wit, the humour, the vivacity, the satire of a piece which brings before us the old life of Florence in a succession of brilliant scenes. If Machiavelli had any moral object when he composed the Mandragola, it was to paint in glaring colours the corruption of Italian society. It shows how a

bold and plausible adventurer, aided by the profligacy, of a parasite, the avarice and hypocrisy of a confessor, and a mother's complaisant familiarity with vice, achieves the triumph of making a gulled husband bring his own unwilling but too yielding wife to shame. The whole comedy is a study of stupidity and baseness acted on by roguery. About the power with which this picture of domestic immorality is presented there can be no question. But the perusal of the piece obliges us to ask ourselves whether the author's radical conception of human nature was not false. The same suspicion is forced upon us by the Principe. Did not Machiavelli leave good habit, as an essential ingredient of character, out of account? Men are not such absolute fools as Nicia, nor such compliant catspaws as Ligurio and Timoteo; women are not such weak instruments as Sostrata and

Lucrezia. Somewhere, in actual life, the stress of craft and courage acting on the springs of human vice and weakness fails, unless the hero of the comedy or tragedy, Callimaco or Cesare, allows for the revolt of healthier instincts. Machiavelli does not seem to have calculated the force of this recoil. He speculates a world in which virtH, unscrupulous strength of character, shall deal successfully with frailty. This, we submit, was a deep-seated error in his theory of life, an error to which may be ascribed the numerous stumbling-blocks and rocks of offence in his more serious writings.

Some time after the Mandragola, he composed a second comedy, entitled Clizia, which is even homelier and closer to the life of Florence than its predecessor. It contains incomparable studies of the Florentine housewife and her husband, a grave business-like citizen, who falls into the senile folly of a base intrigue. There remains a short piece without title, the Commedia in prosa, which, if it be Machiavelli's, as internal evidence of style sufficiently argues, might be accepted as a study for both the Clizia and the Mandragola. It seems written to expose the corruption of domestic life in Florence, and especially to satirize the friars in their familar part of go-betweens, tame cats, confessors and adulterers.

Of Machiavelli's minor poems, sonnets, capitoli and carnival songs there is not much to say. Powerful as a comic playwright, he was not a poet in the proper sense of the term. The little novel of Belfagor claims a passing word, if only because of its celebrity. It is a good-humoured satire upon marriage, the devil being forced to admit that hell itself is preferable to his wife's company. That Machiavelli invented it to express the irritation of his own domestic life is a myth without foundation. The story has a medieval origin,, and it was almost simultaneously treated in Italian by Machiavelli, Straparola and Giovanni Brevio.

In the spring of 1526 Machiavelli was employed by Clement VII. to inspect the fortifications of Florence. He presented a report upon the subject, and in the summer of the same year received orders to attend Francesco Guicciar- dini, the pope's commissary of war in Lombardy. Guicciardini sent him in August to Cremona, to transact business with the Venetian provoedilori. Later on in the autumn we find him once more with Guicciardini at Bologna. Thus the two great Italian historians of the 16th century, who had been friends for several years, were brought into relations of close intimacy. After another visit to Guicciardini in the spring of 1527, Machiavelli was sent by him to Civita Vecchia. It seemed that he was destined to be associated in the papal service with Clement's viceroy, and that a new period of

diplomatic employment was opening for him. But soon after his return to Florence he fell ill. His son Piero said that he took medicine on the 20th of June which disagreed with him; and on the 22nd he died, having received the last offices of the Church.

There is no foundation for the legend that he expired with profane sarcasms upon his lips. Yet we need not run into the opposite extreme, and try to fancy that Machiavelli, who had professed Paganism in his life, proved himself a believing Christian on his deathbed. That he left an unfavourable opinion among his fellow citizens is very decidedly recorded by the historian Varchi. The Principe, it seems, had already begun to prejudice the world against him; and we can readily believe that Varchi sententiously observes, that " it would have been better for him if nature had given him either a less powerful intellect or a mind of a more genial temper." There is in truth a something crude, unsympathetic, cynical in his mental attitude toward human nature, for which, even after the lapse of more than three centuries, we find it difficult to make allowance. The force of his intellect renders this want of geniality repulsive. We cannot help objecting that one who was so powerful could have been kindlier and sounder if he willed. We therefore do him the injustice of mistaking his infirmity for perversity. He was colour-blind to commonplace

morality; and we are angry with him because he merged the hues of ethics in one grey monotone of politics.

In person Machiavelli was of middle height, black-haired, with rather a small head, very bright eyes and slightly aquiline nose. His thin, close lips often broke into a smile of sarcasm. His activity was almost feverish. When unemployed in work or study he was not averse to the society of boon companions, gave himself readily to transient amours, and corresponded in a tone of cynical bad taste. At the same time he lived on terms of intimacy with worthy men. Varchi says that " in his conversation he was pleasant, obliging to his intimates, the friend of virtuous persons." Those who care to understand the contradictions of which such a character was capable should study his correspondence with Vettori. It would be unfair to charge what is repulsive in their letters wholly on the habits of the times, for wide familiarity with the published corre- spondence of similar men at the same epoch brings one acquainted with little that is so disagreeable. (J. A. S.)

Among the many editions of Machiavelli's works the one in 8 vols., dated Italia, 1813, may be mentioned, and the more compre- hensive ones published by A. Parenti (Florence, 1843) and by A. Usigli (Florence 1857). P. Fanfani and L. Passerini began another, which

promised to be the most complete of all ; but only 6 vols, were published (Florence, 1 873-1 877) ; the work contains many new and important documents on Machiavelli's life. The best biography is the standard work of Pasquale Villari, La Storia di Niccolb Machiavelli e de' suoi tempi (Florence, 1877-1882; latest ed., 1895; Eng. trans, by Linda Villari, London, 1892) ; in vol. ii. there is an exhaustive criticism of the various authors who have written on Machiavelli. See also T. Mundt, Niccolb Machiavelli und das System der modernen Politik (3rd ed. , Berlin, 1 867) ; E. Feuerlein, " Zur Machiavelli- Frage " in H. von Sybel's Histor. Zeitschrift (Munich, 1868) ; P. S. Mancini, Prelezioni con un saggio sul Machia- velli; F. Nitti, Machiavelli nella vita e nelle opere (Naples, 1876); O. Tomasini, La Vita e gli scritli di Niccolb Machiavelli (Turin, 1883) ; L. A. Burd, // Principe, by Niccolb Machiavelli (Oxford, 1891); Lord Morley, Machiavelli (Romanes lecture, Oxford, 1897). The Cambridge Modern History, vol. i. (Cambridge, 1903), contains an essay on Machiavelli by L. A. Burd, with a very full biography.

MACHICOLATION (from Fr. machicoulis), an opening between a wall and a parapet, formed by corbelling out the latter, so that the defenders might throw down stones, melted lead, &c, upon assailants below.

MACHINE (through Fr. from Lat. form machina of Gr. Hrjxavq), any device or apparatus for the application or modification of force to a specific purpose. The term " simple machine " is applied to the six so-called mechanical powers— the lever, wedge, wheel and axle, pulley, screw, and inclined plane. For machine-tools see Tools. The word machine was formerly applied to vehicles, such as stage-coaches, &c, and is still applied to carriages in Scotland; a survival of this use is in the term " bathing machine." Figuratively, the word is used of persons whose actions seem to be regulated according to a rigid and unchanging system. In politics, especially in America, machine is synonymous with party organization. A stage device of the ancient Greek drama gave rise to the pro- verbial expression, " the god from the machine," Lat. deus ex machina, for the disentangling and conclusion of a plot by supernatural interference or by some accident extraneous to the natural development of the story. When a god had to be brought on the stage he was floated down from above by a yepavoi (crane) or other machine (firixavrf) . Euripides has been reproached with an excessive use of the device, but it has been pointed out (A.E. Haigh, Tragic Drama of the Greeks, p. 245 seq.) that only in two plays (Orestes and Hippolylus) is the god brought on for the solution of the plot. In the others the god comes to deliver a kind of epilogue, describing the future story of the characters, or to

introduce some account of a legend, institution, &c.

MACHINE-GUN, a weapon designed to deliver a large number of bullets or small shells, either by volleys 1 or in very quick

1 The French term mitrailleuse, made famous by the War of 1870, reappears in other Latin tongues (e.g. Spanish ametralladora). It signifies a weapon which delivers a shower of small projectiles nntraille — grape or case shot), and has no special reference to its mechanical (hand or automatic) action.

succession, at a high rate of fire. Formerly the mechanism of machine-guns was hand operated, but all modern weapons are automatic in action, the gas of the explosion or the force of recoil being utilized to lock and unlock the breech mechanism, to load the weapon and to eject the fired cartridge cases. The smaller types approximate to the ” automatic rifle,” which is expected to replace the magazine rifle as the arm of the infantry- man. The large types, generically called “pompoms,” fire a light artillery projectile, and are considered by many artillery experts as ” the gun of the future.” The medium type, which takes the ordinary rifle ammunition but is fired from various forms of carriage, is the ordinary machine-gun of to-day, and the present article deals mainly with this.

Historical Sketch

Machine-guns of a primitive kind are found in the early history of gunpowder artillery, in the form of a grouping or binding of several small-calibre guns for purposes of a volley or a rapid succession of shots. The earliest field artillery (q.v.) was indeed chiefly designed to serve the purpose of a modern machine-gun, i.e. for a mechanical concentration of musketry. Infantry fire (till the development of the Spanish arquebus, about 1520) was almost ineffective, and the disintegration of the masses of pikes, preparatory to the decisive cavalry charge, had to be effected by guns of one sort or another (see also Infantry). Hence the ” cart with gonnes,” although the prototype of the field gun of to-day was actually a primitive mitrailleuse.

Weapons of this sort were freely employed by the Hussites, who fought in laager formation (Wagenburg), but the fitting of two or more hand-guns or small culverins to a two-wheeled carriage garnished with spikes and scythe blades (like the ancient war-chariots)

was somewhat older, for in 1382 the men of Ghent put into the field 200 ” chars de canon ” and in 1411 the Bur- gundian army is said to have had 2000 ” ribaudequins ”’ (mean- ing probably the weapons, not the carts, in this case). These were of course hardly more than carts with hand-gun men; in fact most armies in those days moved about in a hollow square or lozenge of wagons, and it was natural to fill the carts with the available gunners or archers. The method of breaking the enemy’s ” battles ” with these carts was at first, in the, ancient manner, to drive into and disorder the hostile ranks with the scythes. But they contained at least the germ of galas. ”” ‘ ne modern machine-gun, for the tubes (cannes, canons) were connected by a train of powder and fired in volleys. As however field artillery improved (latter half of 1 5th century), and a cannon-ball could be fired from a mobile carriage, the ribaudequin ceased to exist, its name being transferred to heavy hand-guns used as rampart pieces. The idea of the machine- gun reappeared however in the 16th century. The weapons were now called ” organs ” (orgues), from the number of pipes or tubes that they contained. At first used (defensively) in the same way as the ribaudequins, i.e. as an effective addition to the military equipment of a war-cart, they were developed, in the early part of the 16th century, into a really formidable weapon for breaking the masses of the enemy, not by scythes and spikes but by fire. Fleurange’s memoirs assign the credit of this .to the famous gunner and engineer Pedro Navarro, who made two hundred weapons of a design of his own for Louis XII. These ” were not more than two feet long, and fired fifty shots at a round,” but nevertheless ” organs ” were relatively rare in the armies of the 1 6th century, for the field artillery, though it grew in size and lost in mobility, had discovered the efficacy of case shot (then called ” perdreaiix “) against uncovered animate targets, and for work that was not sufficiently serious for the guns heavy arquebuses were employed. Infantry fire, too, was growing in power and importance. In 1551 a French army contained 21 guns and 150 arquebuses d croc and one piece faˆon d’ofgue. By about 1 570 it had been found that when an ” organ ” “O an ” was neec ˆ e(i ˆ that was necessary was to mount some ‘ heavy arquebuses on a cart; and the organ, as a separate weapon, disappeared from the field, although tinder the name of ” mantelet ” (from the shield which protected the

gunners), it was still used for the defence of breaches in siege war- fare. Diego Ufand, who wrote in the early years of the 1 7th century, describes it as a weapon consisting of five or six barrels fired simul- taneously by a common lock, and mentions as a celebrated example the ” Triquetraque of Rome ” which had five barrels. Another writer, Hanzelet, describes amongst other devices a mitrailleuse of four

barrels which was fired from the back of an ass or pony. But such weapons as these were more curious than useful. For work in the open field the musket came more and more to the front, its bullet became at least as formidable as that of an “organ,” and when it was necessary to obtain a concentrated fire on a narrow front arquebuses d croc were mounted for the nonce in groups of four to six. The ” organ ” maintained a precarious existence, and is described by Montecucculi a century later, and one of twelve barrels figures in the list of military Stores at Hesdin in 1689. But its fatal defect was that it was neither powerful enough to engage nor mobile enough to evade the hostile artillery.

Enthusiastic inventors, of course, produced many models of machine-gun in the strict sense of the word— i.e. a gun firing many charges, in volleys or in rapid succession, by a mechanical arrangement of the lock. Wilhelm Calthoff, a German employed by Louis XIII. , produced arquebuses and muskets that fired six to eight shots per round, but his invention was a secret, and it seems to have been more of a magazine small arm than a machine-gun (1646). In 1701 a Lorrainer, Beaufort de Mire- court, proposed a machine-gun which had as its purpose the augmentation of infantry-fire power, so as to place an inferior army on an equality with a superior. At this time inventors were so numerous and so embarrassing that the French grand master of artillery, St Hilaire, in 1703 wrote that he would be glad to have done with ” ces sortes de gens a secrets,” some of whom demanded a grant of compensation even when their experiments had failed. The machine-gun of the 17th and 18th centuries in fact possessed no advantage over contemporary field artillery, and the battalion gun in particular, which possessed the long ranging and battering power that its rival lacked, and was, moreover more efficacious against living targets with its casershot or grape. As compared with infantry fire, too, it was less effective and slower than the muskets of a well-drilled company. Rapid fire was easily arranged, but the rapid loading which would have compensated for other defects was unobtainable in the then existing state of gun-making.

Thus a satisfactory machine-gun was not forthcoming until breech-loading had been, so to speak, rediscovered, that is until about i860. At that time the tactical conditions of armament were peculiar. As regards artillery, the new (muzzle-loading) long- range, rifle sufficed, in the hand of determined infantry, to keep guns out of case-shot range. This made the Napoleonic artillery attack an impossibility. At the same time the infantry rifle was a slow loader, and the augmentation of the volume of infantry fire; attracted the attention of several inventors.: The French, with their artillery traditions, regarded

the machine-gun there- fore as a method of restoring the lost superiority of the gunner, while the Americans, equally in accordance with traditions and local circumstances, regarded it as a musketry machine. The representative weapons evolved by each were the canon a balles, more commonly called mitrailleuse, and the Gatling gun.

The declared purpose of the canon a balles was to replace the old artillery case-shot attack. Shrapnel, owing to the defects of the time-fuzes then available, had proved disappointing in the Italian War of 1859, and the gun itself, of the existing model, was not considered satisfactory. Napoleon III., a keen student of artillery, maintained a private arsenal and workshop at the chateau of Meudon 1 and in 1866, in the alarm following upon

1 Meudon Ch&teau had long been used for military experiments. The peasantry credited it with mysterious and terrible secrets, asserting even that it contained a tannery of human skins, this tradition perhaps relating to the war balloon constructed there before the battle of Fleurus (1794). Reffye had also many non- military tasks, such as the reproduction Of a famous set of bas-reliefs, construction of aeroplanes, and the reconstruction of triremes and balistas. .■,■■■ ■

Koniggratz, he ordered Commandant Reffye (1821-1880), the artillery officer he had placed in charge of it, to produce a machine-gun. Reffye held that the work of a mitrailleuse should only begin where that of the infantry rifle ceased. The handbook to his gun issued to the French army in 1870 stated that it was

” to carry balls to distances that the infantry, and the The Canon ar tiHery firing case, could not reach.” The most 1866-1870. suitable range was given as 1500-2000 yards against

infantry in close order, 2000-2700 against artillery. As the French shrapnel (obus d balles) of these days was only used to give its peculiar case-shot effect between 550 and 1350 yards, and even so sparingly and without much confidence in its efficacy, it is clear that the canon a balles was intended to do the field-gun’s work, except at (what were then) extreme field artillery ranges (2800 and above), in which case the ordinary gun with common shell (time or percussion) alone was used.

Constructed to meet these conditions, the Reffye machine-gun in its

final form resembled outwardly an ordinary field gun, with wheeled carriage, limber and four-horse team. The gun barrel was in reality a casing for 25 rifle barrels disposed around a common axis (the idea of obtaining sweeping effect by disposing the barrels slightly fan-wise had been tried and abandoned). The barrels were held together at intervals by wrought-iron plates. They were entirely open at the breech, a removable false breech containing the firing mechanism (the cartridge cases were of brass, solid-drawn, like those of the American and unlike those of the British Gatlings). This false breech, held in the firing position by a strong screw — resembling roughly those of contemporary B.L. ordnance such as the Armstrong R. B. L. — consisted of a plate with 25 holes, which allowed the points of the strikers to pass through and reach the cartridges. The plate was turned by hand so that one striker was admitted at a time, the metal of the plate holding back the rest. To avoid any deflection of the bullet by the gases at an adjoin- ing muzzle the barrels were fired in an irregular order. Each gun was provided with four chambers, which were loaded with their 25 cartridges apiece by a charger, and fixed to the breech one after the other as quickly as the manipulation of the powerful retaining screw permitted. The rates of fire were ” slow,” 3 rounds or 75 shots a minute, and ” rapid,” 5 rounds or 125 shots per minute. One advan- tage as against artillery that was claimed for the new weapon was rapidity of ranging. Any ordinary target, such as a hostile gun, would, it was expected, be accurately ranged by the mitrailleuse before it was ready to open fire for effect. The ordinary rifle bullet was employed, but to enhance the case-shot effect a heavy bullet made up in three parts, which broke asunder on discharge, was introduced in 1870 in the proportion of one round in nine. The weapon was sighted to 3000 metres (3300 yds.). The initial .velocity was 1558 f.s. ; and the weight of the gun 350 kg. (6-45 cwt.), of the carriage 371 kg. (6-86 cwt.) ; total behind the team, 1,485 kg. (27-1 cwt.).

For an artillery effect, dispersion had to be combined with accuracy. The rifle-barrels when carefully set gave a very close grouping of shots on the target, and dispersion was obtained by traversing the gun during the firing of a round. When this was skilfully performed a front of 18 metres (about 20 yds.) at 1,000 metres range was thoroughly swept by the cone of bullets.

The design and manufacture of these mitrailleuses under the personal orders and at the expense of the emperor enabled the French authorities to keep their new weapon most secret. Even though, after a time, mitrailleuses were constructed by scores, and could therefore no longer be charged to a ” sundry ” or ” petty cash ” account in the

budget, secrecy was still main- tained. The pieces were taken about, muffled in tarpaulins, by by-ways and footpaths. In 1869, two years after the definitive adoption of the weapon, only a few artillery captains were in- structed in its mechanism; the non-commissioned officers who had to handle the gun in war were called up for practice in July 1870, when Major Reffye's energies were too much absorbed in turning out the material so urgently demanded to allow him to devote himself to their instruction. The natural consequence was that the mitrailleuses were taken into battle by officers and men of whom nine-tenths had never seen them fire one round of live cartridges. The purpose of this fatal secrecy was the maintenance of prestige. No details were given, but it was confidently announced that war would be revolutionized. One foreign officer only, Major Fosbery, R.A. (see R.U.S.I. Journal, v. xiii.), penetrated the secret, and he felt himself bound in honour to keep it to himself, not even communicating it to the War Office. But public attention was only too fully aroused by these mysterious prophecies. " The mitrailleuse paid dearly

for its fame." The Prussians, who had examined mitrailleuses of the Gatling or infantry type, were well aware that the artillery machine-gun was at the least a most formidable opponent. They therefore ostentatiously rejected the Gatling gun, taught their troops that the new weapons were in the nature of scientific toys, and secretly made up their minds to turn the whole weight of their guns on to the mitrailleuse whenever and wherever it appeared on the field, and so to overwhelm it at once. This policy they carried into effect in the War of 1870; and although on occasions the new weapon rendered excellent service, in general it cruelly disappointed the over-high hopes of its admirers. And thus, although the Gatling and similar types of gun were employed to a slight extent by both sides in the later stage of the war, machine-guns, as a class of armament for civilized warfare, practically disappeared.

As a good deal of criticism— after the event — has been levelled at the French for their " improper use of the machine-gun as a sub- stitute for artillery," it is necessary to give some summary of the ideas and rules which were inspired by the inventor or dictated by the authorities as to its tactical employment. The first prihciple laid down was that the gun should not be employed within the zone of the infantry fight. Officers commanding batteries were explicitly warned against infantry divisional generals who would certainly attempt to put the batteries, by sections, amongst the infantry. The second principle was that the mitrailleuses were to share the work of the guns, the latter battering obstacles with common shell, and the former being employed against troops in the open, and especially to cover

and support the infantry advance. This tendency to classify the r61esof the artillery and to tell off the batteries each in its special task has reappeared in the French, and to a more limited extent in the British, field artillery of to-day (the Germans alone resolutely opposing the idea of subdivision). The mitrailleuse of 1870 was, in fact, intended to do what the perfected Shrapnel of 1910 does, to transfer the case-shot attack to longer ranges. But, as we have seen, secrecy had prevented any general spread of know- ledge as to the uses to which the canon d, balles was to be put, and consequently, after a few weeks of the war, we find Reffye complain- ing that the machine-guns were being used by their battery comman- ders ” in a perfectly idiotic fashion. They are only good at a great distance and when used in masses, and they are being employed at close quarters like a rifle.” The officers in the field, however, held that it was foolish to pit the mitrailleuse against the gun; which had a longer range, and exerted themselves to use it as an infantry weapon, a concentrated company, for which, unlike the Gatlings of 1870 and the machine-guns of to-day, it was never designed. As to which was right in the controversy it is impossible to dogmatize and needless to argue.

Very different was the Gatling gun, the invention of Richard Jordan Gatling (1818-1903), which came into existence and was to a slight extent used in the field in the latter years of the American Civil War, 1 and also to a still slighter extent by the Bavarians and the French in the latter part .of the war of 1870. This was distinctively an infantry type weapon, a sort of revolv- ing rifle, the ten barrels of which were set around an axis, and fired in turn when brought into position by Qatimg the revolving mechanism. This weapon had a long Gl ” , • reign, and was used side by side with the latest automatic machine gun in the Spanish- American War of 1898. The follow- ing account of the old British service Gatling (fig. .i), as used in the Egyptian and Sudanese: campaigns, is condensed from that in the article ” Gun-making,” Ency. Brit. 9th ed.

A block of ten barrels is secured round an axis, which is fixed in a frame o a. On turning the handle h (fig. 2) the spindle g g causes the worm / to act on the pinion w, making the axis and barrels revolve. A drum T (figs. I and 4) is placed on the top at the breech end of the barrels oyer a hopper, through a slot in which the cart- ridges drop into the carrier (fig: 3). The construction of- the lock is shown in fig. 4. A A A A is a cam, sloping as in the drawing, which, it must be understood, represents the circular construction opened out and laid flat. As the barrels, carrier and locks revolve the slope of the cam forces the locks forward and backward alternately. At position I. the cartridge has just fallen into’ the xarrier, the lock and bolt are

completely withdrawn. At positions II., III., IV., the cam is forcing them forward, so that the bolt pushes the cart- ridge into the barrel. At IV. the cocking cam R begins to compress the spiral spring, releasing it at V. Position Vli shows the cartridge just after firing; the extractor is clutching the base of the cartridge

1 A machine-gun of the artillery or volley type, called tiie ” Requa battery,” which had its barrels disposed fan-wise, was also used in I the Civil War. .....

case, which is withdrawn as the locks retreat down the slope of the cam, till at X it falls through an aperture to the ground. The drum consists of a number of vertical channels radiating from the centre. The cartridges are arranged horizontally, one above the other, in

Fig. I. — Gatling Gun.

these channels, bullet ends inwards. The drum revolves on the pivot * (fig- 3)i an d the cartridges fall through the aperture B. When all the channels are emptied, a full drum is brought from the limber, and substituted for the empty one. Each barrel fires in turn as it comes to a certain position, so that by turning the handle quickly an almost continuous stream of bullets can be ejected.

Experimental Gatlings were constructed which could be made to fire nearly 1000 shots a minute, and an automatic traversing arrange- ment was also fitted.

As has been said, this weapon had a long reign. It was used with great effect in the Zulu War at Ulundi and in the Sudan.

Fig. 2.

But a grave disadvantage of the English pattern was that it had to be used with the Boxer coiled cartridge supplied for the Martini-Henry rifle, and until this was replaced by a solid-drawn cartridge case it was impossible to avoid frequent ” jams.” The modern, fully automatic, machine gun suffers from this to a considerable extent, and it was an even more serious defect with a hand-operated weapon, as the British troops found in

. WjMuci,*’

Fig. 4. — Lock of Gatling Gun.

their campaigns against the Mahdists. But the Gatling had many advantages over its newer rivals as regards simplicity and strength. Theodore Roosevelt, who commanded sections of both types in the Spanish-American War, speaks with enthusiasm of the old-fashioned weapon 1 while somewhat disparaging the Colt automatic.

The Gardner was another type which had a certain vogue 2 and was used by .the British in savage warfare. But, next to

‘ “Tl

In this weapon the barrels are placed horizontally, and have no movement. A box containing the locks, bolts, strikers and spiral springs, one of each corresponding to each barrel, moves Nor4eateldt straight backwards and forwards when worked by the Q un handle of the lever on the right. When the box is drawn back the cartridges fall from the holder on the top into the carriers simultaneously. When the box is pushed forward the bolts push the cartridges into the barrel, cocking-catches compress the spiral springs, the lever releases the catches one after the other at very minute intervals of time, and the cartridges are fired in rapid

1-10, Parts of frame ;

11, Breech plug;

12, Striker;

13, Extractor;

14, Cartridge receiver;

Fig. 5. — Nordenfeldt Machine-Gun.

15-18, 23-31, Lock and trigger parts; 19-22, Locking action ; 32-35, Loading action ; 36 _ 39 1 Cartridge receiver; 40, Cover;

41-44, Parts of hand-lever; 45-49, Traversing action; 5o-55, Elevating and trailing action; 56, 57, Hopper and slide.

the Gatling, the most important of the hand-operated machine guns

was the Nordenfeldt, which was principally designed for naval use about the time when torpedo-boats were beginning to be regarded as dangerous antagonists.

1 The U.S. pattern Gatling hardly differed except in details from the model, above described, of twenty years earlier. The drum had been set horizontally instead of vertically and improved in de- tails, and a ” gravity feed,” a tall vertical charger, was also used. The barrels were surrounded with a light casing. Tests made of the improved Gatling showed that the use of only one barrel at a time prevented overheating. On one trial 63,000 rounds were fired without a jam, and without stopping to clean the barrels. Smokeless powder and the modern cartridge case were of course used.

2 The following particulars may be given of the 2-barrelled Gardner and 3-barrelled Nordenfeldt (land service) converted to take the -303 cartridge: Weight, 92 and no lb respectively; parapet mounting in each case 168 lb; rate of fire of Gardner about 250 rounds per minute, of the Nordenfeldt about 350. A few of these guns are still used in fortresses and coast defences.

succession. In this piece, careful aim can be taken from a moving platform, and at the right moment the barrels can be fired at the object almost simultaneously.

Present Day Machine-guns

Hitherto we have been dealing with weapons worked by hand- power applied to a lever or winch-handle, the motion of this lever being translated by suitable mechanism into those by which the cartridges are loaded, fired, extracted and ejected — the cycle continuing as long as the lever is worked and there are cartridges in the ” hoppers ” which feed the gun. In the modern ” auto- matic ” machine-gun, moreover, the loading, firing, extracting and ejecting are all performed automatically by the gun itself, either by the recoil of its barrel, or by a small portion of the gases of explosion being allowed to escape through a minute hole in the barrel near the muzzle. The following details of the British Maxim, Hotchkiss and Colt types are reproduced from the article ” Machine-guns,” Ency. Brit. 10th ed.

The idea of using the recoil, or a portion of the gases of ex- i plosion, for the working of the breech mechahisin is by no means | new, the

latter system having been proposed and patented | (certainly in a very crude and probably unworkable form) by |

Fig. 6. — Maxim Gun on Wheeled Carriage (1900).

(Sir) Henry- Bessemer in 1854; but whatever might be dis- covered by a search in old patent and other records or in museums, there can be no doubt that (Sir) Hiram S. Maxim was the first to produce a finished automatic gun of practical value. His patents in connexion with this particular class of weapon date back to 1884, and his gun on the recoil system was, after extensive trials, adopted into the British army in 1889 and into the navy in 1892. It is very possible that Bessemer's idea did not bear fruit earlier because the fouling left by the old forms of " black " or smoky powders was apt to clog the moving parts and to chnke any small port. With modern smokeless powders thiˆs difficulty does not arise. _

The Maxim gun, 1 as will be seen from figs. 7 and 8, consists of two parts, the barrel casing (a) and breech casing (d), secured firmly „ . together. The former (a), whig}) is cylindrical in form,

maxim contains the barrel (6), and the water surrounding it

“”’ to keep down the very high temperature attained by

rapid fire, and the steam tube (e), which by the action of a sliding valve allows of the escape of steam but not of water. The barrel has asbestos packings at its front and rear bearings in the casing, which

Attached to the rear of the barrel (6) on either side axe two side

plates (ft), between which in guides O works the aggregation of parts*

D, F, J, K, L, P, T and V, which constitute the lock, and (in bearingsˆ

the crank axle E, crank E', and connecting rod I (see figs. 7 to 1 1).

The connecting rod I joins the lock and crank, being attached

to the side levers J of the former by means of the

interrupted screw U ; the latter enables the lock to

be detached and removed.

The crank axle E extends through both sides of the breech casing (d), slotsˆA, fig. 7), allowing it a longitudinal movement of about an inch.

To its left-hand end, outside the breech casing, is attached the fusee chain Y of the recoil spring X (see dotted lines in fig. 7), and to its right- hand end a bell trunk lever, B B'; the arm B, which terminates in a knob, being turned by the crank handle, the arm B' working against the buffer stop C.

In figs. 8, 9 and 11 the breech is shown closed, and it will be noticed that the crank pin I' is above the straight line joining the axis of the barrel, the striker T, and the crank axle E. As the crank is prevented from further movement upwards by the crank handle B taking against the check-lever G (fig. 7), it is clear that the pressure on discharge of the cartridge cannot cause the crank axle to rotate, and so open the breech as shown in figs. 10 and 12. The withdrawal of the lock and opening of the breech are effected as follows: The total travel in recoil of the barrel is about one inch, but on discharge the barrel, the side plates and lock all recoil together for about a quarter of an inch without any disturbance of the locking as explained above, and by the time this short travel is completed the bullet has left the muzzle. The arm B' of the crank handle then engages the buffer stop C and causes the crank axle E to rotate and the crank E' to jail and so draw back the lock from, and open, the breech. At the same time the fusee chain Y is wound up round the left-hand end of the crank axle E and the spring X extended. In the meantime the knob of the buffer handle B swings over, and just as the lock reaches its rearmost position (as in figs. 10 and 12) strikes the flat buffer spring H, and, rebounding, assists the crank in revolving in the reverse direction; the spring X also contracts, and, unwinding the fusee chain, draws back the lock again and closes the breech, a fresh cartridge having been placed in the barrel as explained beiow.

The gun is fired by means of the trigger F, which is actuated by the projection (I) on the trigger bar (S), the latter being drawn back when the button (m) on the push lever (») is pressed forwards. If, therefore, the button he kept permanently pressed, the projection (/) will always lie in the path of the trigger F just as the lock reaches its forward position and the breech is closed, and the gun will fire

Figs. 7 and 8. — Mechanism of Maxim Gun.

allow of its sliding in recoil without the escape of water. The breech casing {d) is a rectangular oblong box, and contains the lock and firing mechanism. At its rear end it has handles (e) by which the gun is directed, and the thumb-piece (m) by which the trigger is actuated. Its top is closed by a lid, hinged at (*). At its front is a recess holding the feed-block (J) through which the belt of cartridges (g) is fed to the

gun.

1 Modern improvements in mechanical details are only slight, as may be found by reference to the official handbooks of the gun, editions of 1903 and 1907.

automatically, and continue to do so as long as there are cartridges in the belt.

The loading, extraction and ejection of the cartridges are effected as follows: The left-hand side-plate is extended forwards a little beyond the breech, and communicates the reciprocating motion of the barrel to a lever on the feed-block, which causes the cartridges in the belt to be fed forward one by one by a ” step-by-step ” pawl action, the cartridge which is next to be taken from the belt being arrested exactly above the breech, the ejector-tube Q being below in the same vertical plane.

The extractor D (see figs. 9 to 12) which performs the operations

of inserting, extracting and ejecting the cartridges, travels vertically in guides on the face of the lock. Projecting outwards from each side of its top are horns N (figs. 9 and 10). These travel round the edges of the cams M (fig. 8) situated on each side of the breech casing, and in conjunction with the spring W (fig. 8), compel the top of the extractor to take the path shown by the dotted lines and arrows in figs. 9 to 12.

Fig. 9. — Maxim Gun Mechanism.

The extractor (figs, n and 12) is recessed to take a movable plate (») termed a ” gib,” behind which is a spring (v). In the face of the gib is a recess (w) into which the base of a cartridge can just enter. On either side of the gib the face of the extractor has under- cut flanges, open at the top and bottom, between which the base of a cartridge can fit the rim, being held in the undercuts (figs. 9 and 10).

It is clear from this arrangement that the base of the cartridge having been introduced between the flanges at the top of the extractor, can be pushed down, the spring (v) yielding, till arrested at the recess (w) ; and, as the lower edges of this recess are slightly sloped, further pressure will make it leave the recess (w) and slide over the face of the gib, leave it, and take up a position in front of the hole for the

point of the striker (x), being now only prevented from slipping out of the extractor by the extractor spring (y). If this last be clear of the extractor stop (z) it will yield to pressure and the cartridge will be free. This is the action in the gun except that the cartridge is held firm and the extractor pushed against it.

In fig. 10 the extractor holds a cartridge ® and a fired case (q) ready to be pushed into the empty breech and ejector-tube Q respectively. In the latter there is already a fired case (p), which will be driven by the fired case (q) beyond the ejector & “«&iiM

mechanism and the safety arrangement. The lock is cocked, after firing, by the arm of the ” tumbler ” K, being pressed down by the side lever J as it swings down when following the crank E’. Safety against firing before the breech is closed is provided by the projection on the safety lever V, which does not clear the striker T until lifted by the side lever J at the top of its travel, that is, when the crank E’ has passed the axial line as already explained.

The lock in its rearmost position is kept in place by the block Z on the under side of the cover of the breech casing. When in this position it is clear of the guides O on the side-plates, and if the cover be opened it can be turned up, un- screwed by a turn through an eighth of a circle (the screw-thread U being interrupted in four places) and removed. To prepare the gun for firing, the crank handle is pushed over by hand to the buffer-spring, thus withdrawing the ex- tractor, and held in this position ; the tongue on the end of a filled belt is then pushed through the feed-block from the left and pulled as far as it will go from the opposite side. This places a cartridge above the breech ready to be seized by the extractor. The crank handle is now released and the lock flies forwards. The crank handle is now again pushed over and let go, and the first cartridge thus taken from the belt and placed in the breech. The gun is ready to fire. To remove a partially filled belt, the crank handle must be pushed over, thus freeing the extractor from the belt, and the latter with- drawn after pressing a spring catch under the feed block which releases the pawls. The gun now has two live cartridges in it — both in the extractor. Letting go the crank handle, one of them is deposited in the ejector-tube, and again pushing over and letting go the crank handle does the same with the second.

Fig. 13 shows the feed-block and the cartridge belts. The greatest number usually carried in a belt is 250ˆ

Hotchklss Gun.

Fig. 10. — Maxim Gun Mechanism.

the position shown in fig. 11 is arrived at. It will thus be seen that each cartridge makes two complete journeys with the extractor; the first as a live cartridge from the belt to the breech, the second from the breech to the ejector-tube, the forward journey being always on a lower level than that of the backward one. The sections in figs. 11 and 12 clearly show the cocking and firing

Fig. 11. — Maxim Gun Mechanism.

The gun is sighted to 2,500 yds. and has a folding tangent sight as shown. Its weight varies from 50 to 60 lb, and it can fire about 450 rounds per minute.

[The diagrams have been made from drawings, by permission of Messrs. Vickers, Sons & Maxim.]

The Hotchkiss gun, figs. 14 to 16, which has been adopted by the French army and navy and elsewhere, depends for its action on the use of a small portion of the gases of the cartridge itself. The barrel A is firmly attached to the receiver or frame B, the latter containing the breech and firing mechanism. Under the barrel A, and communicating with it by a port © near the muzzle is a cylinder or tube C. When the gun is fired, and the bullet has passed the port ©, a portion of the gases of explosion passes into the cylinder C and drives back the piston F contained in it, a lug on the under part of the piston compressing the spring M, the – latter, when the trigger N is pulled, driving back the piston again. The reciprocating motion of the piston performs all the processes of loading and firing the gun, and the action is continuous as long as the trigger is kept pressed back.

The piston F, enlarged and suitably shaped at the rear, actuates the breech-block H and firing pin or striker J ; and, by suitable cam grooves (/) at about the centre of its length, works the larger feed-wheel U of the feed-box S ; the smaller wheel U on the same axis in turn imparting a step-by-step motion to the metal feed-strips, each containing 30 cartridges, so that fresh cartridges are placed one by one before the face of the breech block ready to be pushed into the breech when the fired cartridge has been extracted and ejected.

On the under surface of the piston F, in rear, is a recess or sear (/) in which the nose of the trigger N engages, holding back the

piston when it has been driven back by the gases. As already stated, a lug on the under surface just in rear of the cam (/) engages with the front of the mainspring.

Fig. 12. — Maxim Gun Mechanism.

Taking first the position shown in fig. 15 with the breech closed and locked and the cartridge fired, it will be seen that the breech

is locked by the upper cam (/'), on the end of the piston, F, having caused the movable locking-dog (h) to fall and bear against the recoil blocks Z (see fig. 14 also) on the walls of the receiver or frame B. Consequently the breech is not unlocked until the piston has moved sufficiently to the rear for the lower cam (/') to lift the locking-dog (h) clear of the recoil blocks Z. As the piston F is not actuated by the gases until the bullet has passed the port ©, and then has to move a short dis- tance before the locking-dog is raised, the bullet is clear of the muzzle before the breech is unlocked. As the piston continues to recoil it draws back the striker J and then -Maxim Feed-block, the breech-block H, and is then caught and retained by the engage- ment of the sear (/) with the trigger N, and the position assumed is that shown in fig. 14.

FlG. 13.-

I the object of the arrangement being to enable the under surface of

the breech-block to clear the clips which hold the cartridges in the

I feed-strips. The cartridge therefore, being extracted in the line of

the axis of the block, is ejected through an opening

above its plane of entry in the feed-strip.

Returning to the position shown in fig. 16, if the trigger be pulled, the compressed spring M reacts and drives the piston forwards, carrying the breech- block with it, the latter in turn driving a cartridge in front of it out of the feed-strip. When the block – and cartridge are home, and not till then, the piston completes its travel, the upper cam (/') locking the dog (k), and the firing-pin protrudes and fires the cartridge. Anything, therefore, which prevents the breech-block from being home against the breech, or the locking-dog from falling in front of the recoil blocks Z, renders firing of the cartridge impossible.

Clearly if the trigger be kept depressed the action becomes automatic.

A special feature of this gun is the absence of a separate spring to actuate the firing-pin ; the recoil spring M performing this function, in addition to that of driving the piston forwards.

The feed-strips have holes in them in which the teeth of the smaller feed-wheel U engage. The engagement of this feed with the piston F can be released by pulling out the feed arbor W, so that the strips can be removed at any time.

When the last shot in a feed-strip has been fired a stop (V) holds the piston and block ready for a fresh feed-strip to be inserted. As the stop V acts quite independently of the trigger, this action takes place even if the trigger be still depressed after the last cartridge in a strip has been fired.

To cock the gun, when in the locked position, a cocking handle G is provided. This has a long arm projecting to the front with a catch which takes against the front of the lug on the under side of the piston. To prepare the gun for action the gun is cocked, and a feed-strip is pushed into the feed-block.

The pressure of the gas on the piston is regulated by the regulator screw D, by means of which the space in the cylinder C in front of the piston F can be reduced or increased.

A safety lock R is furnished, which is a ” half round ” pin which can be turned so as to enter the semicircular slot just in front of the sear (/), and so hold back the piston when in the cocked position.

Radiation of the heat, generated in the barrel by rapid fire, is facilitated by the radiator (a), which consists of rings on the barrel close to the breech, which offer an increased surface to the air.

hotchkiss automatic machine gun

Longitudinal Section Breech open

4EEB

= =g^~

Figs. 14, 15, 16.— Hotchkiss Gun Mechanism.

From the head or nose-piece I of the breech-block projects the claw K

of a spring extractor which, as the cartridge is pushed home by the breech-block, seizes it, extracting the fired case when the breech-block is withdrawn. Ejection of the fired case is effected by means of the ejector L (fig. 16) which catches against the base of the case, on the opposite side to the extractor claw, and so throws it sideways through the oblong-pointed opening in the receiver just in rear of the breech (see fig. 14).

The platform on the top of the feed-box through which the teeth of the smaller feed-wheel U project, and on which the feed-strips rest, lies below the axial line of the breech-block H, so that the face or nose-piece I of the latter only engages a portion of the base of the cartridge in the feed-strip as it pushes the cartridge into the breech, the bullet of the cartridge being guided into the breech by the incline at the opening of the latter. This point should be specially noted,

_ The gun is sighted to 2000 yds., with the ordinary flap back- sight, weighs about 53 lb, and can fire from 500 to 600 rounds per minute.

[The diagrams have been made from drawings, by permission of the Hotchkiss Ordnance Company.]

The Colt automatic gun, which has been adopted by the American army and navy, and was used by the British in S. Africa, depends for its action, similarly to the Hotchkiss, on the escape .

of a small portion of the gases of explosion through a CoItaan ‘ portin the barrel a short distance from the muzzle. Figs. 17 and 18 give a plan, and side elevation with the left side plate removed, respectively. Into the recess in the barrel (92) just below the port fits the piston (35), capable of slight motion round the pivot (36). by which it is attached to the gas lever (29). The latter is a bell-crank lever pivoted at (34), its short arm being attached

at (46) by a pivot to a long link with a cross head, termed the retracting connexion (45). This link extends from a point close to the figures (44), where the arms of the cross head bear against the ends of two long spiral retracting springs, (37) and (38), contained in two tubes, (39) and (40), which are slotted for a few inches of their length to allow the cross head to follow up and compress the springs. (Only (38) and (40) are shown, (37) and (39) lying in the same plane of projection.)

When the gun fires, and the bullet has passed the port, the gases drive

the piston (35) and gas lever (29) downwards, and the momen- tum imparted causes them to swing back round the pivot (36), as shown by the dotted circle. The gas lever is brought up now by the bottom plate (91); and the retracting springs, compressed by the cross head of the long link (45) owing to the forward motion of the

c

e

3

O

S o

3 <

“3

U

-a c

1^.

short arm of the gas lever, react and drive the gas lever into its forward position again.

The rotary movement of the gas lever is converted into a recipro- cating movement of the slide (86) by means of the gas lever connexion rod (31) pivoted at (32) to the gas lever, and at (87) to the slide.

The slide (86) is a nearly flat bar, travelling in guides in the re- ceiver, extending from (14) to (87). It is slotted completely through longitudinally for nearly the whole of its length, this slot affording an opening through which work the cartridge extractor (82) and carrier (21). At its rear end it engages by means of a pin (14) in a cam slot (97) in the bottom rib of the bolt (13), and at (83) it bears the pivot of the cartridge extractor (82). Its rear end is enlarged below to form a cam lug (98), and on its right side are two projections (95) and (96), which work the feed lever (66).

The feed wheel (61), over which passes the belt containing the cartridges, is actuated by a pawl ” step-by-step ” gear by means of the feed lever (66).

The carrier (21) is a long trip lever pivoted at (22), and provided with a spring dog (23) pivoted at (24).

The bolt (13) is a cylinder with a guide rib extending from its under surface. It is actuated by the slide by means of the pin (14) and cam slot (97) as already stated, and is bored through to take the striker or firing pin (18). The rear end of the latter pro- jects slightly beyond the rear face of the bolt, being retained in this position by the spring (19). When this projecting end is pushed into the bolt, the point protrudes from the front of the bolt and fires the cartridge. The bolt, when the breech is locked, is held firm by two recoil blocks on the receiver (not shown), as is explained later. At the front of the bolt is an extractor (15) with a spring claw for extracting the fired case. (This is of course quite distinct from the cartridge extractor (82).) Ejection is effected by means of an ejector projecting into the path of the fired case.

The firing of the gun is performed by the cylindrical hammer (6) hollowed out in rear to contain the mainspring (7). When pushed back and cocked as shown in fig. 18, it is held during a portion of the operations of the mechanism by two detents working indepen- dently of each other — the sear (10) and the nose of the trigger (8). The former is automatically released by a trip lever (not shown) as soon as the breech is locked, leaving the hammer held by the trigger only. This is the position shown in fig. 18. The necessity for the two detents is explained later.

The hammer, when cocked, can also be permanently locked by the handle lock (2) actuated by a thumb-piece on the outside of the receiver. The air compressed in rear of the hammer, as the latter is driven back, passes through the tube (99) to the breech ; and a puff of air is therefore blown through the barrel after every shot, clearing out fouling and unconsumed powder, and assisting to an appreciable extent to keep down the temperature of the barrel.

Taking the position shown in fig. 18, the hammer is only held back by the trigger nose, the sear (10) having been released as stated above. A belt of cartridges (not shown) has been placed on the feed- wheel, and the cartridge next to be used after the one (not shown) now in the breech has its rim (or base with rimless cartridges) just above the hook on the extractor (82). If now the trigger be pulled, the hammer flies forwards, strikes the protruding end of the firing pin, and the

cartridge fires; the gases cause the gas lever to swing round and drive back the slide. The pin (14) working in the cam groove (97) causes the rear of the bolt to rise and clear itself from the recoil blocks (not shown) on the receiver, and then to move rearwards horizontally, driving the hammer “back until the latter is caught and held by the sear and trigger. In the meantime the extractor (82) has pulled a cartridge from the belt, and, assisted by two spring cartridge guides (80 and 81), of which only (80) is shown, deposits it on the carrier (21); the projection (95) strikes the feed-lever (66), and moves the feed mechanism so as to prepare to revolve the feed- wheel and place a fresh cartridge ready for the next round; and as the slide completes its travel backwards, the cam (98) strikes the dog (23) and slightly depresses it (the spring (25) yielding), the

carrier and cartridge on it consequently rising a little and falling again (this latter action is incidental only to the form of the parts, and is not a necessity).

The retracting springs now react and pull the slide forwards; the cam (98) strikes the dog (23), which, as the spring arrangement is of the ” non-return ” class, does not yield but is depressed, and the

Fig. 20. — Hotchkiss Gun mounted.

front of the carrier and the cartridge on it are therefore raised sharply, and the latter placed in the path of the bolt. The bolt being now pulled forwards, the cartridge is driven off the carrier into the breech, and the bolt locked by the pin (14), causing the bolt to drop in front of the recoil blocks; the carrier is pushed down flat by the advance of the cam lug (98), the trip releases the sear (10), and the projection (96) pushes back the feed lever, completing the action of feeding a fresh cartridge forward. The position shown in fig. 17 is now resumed.

It is clear that were the trigger kept permanently pulled the gun would fire immediately the bolt was locked and the sear (10) depressed, and the action would become automatic.

The object of two detents, though now probably obvious, may here be explained. The whole action of the gun depends upon the hammer after it is pushed back by the bolt being held back until the bolt has gone completely forwards and locked the breech. If only the trigger detent existed, and that were kept pressed down, the hammer, alter

being pushed back by the bolt, would immediately follow up the latter, and might fire the cartridge prematurely, or fail to fire it at all ; hence the use of the sear in addition to the trigger.

To cock the lock, or work the mechanism by hand, the gas lever is pulled round by the pin (30) provided for the purpose, and by this means the gun is prepared for firing. A brass tongue on the end of the belt is pushed through the opening above the feed-wheel and then pulled from the other side of the gun as far as it will go. This places a cartridge in front of the extractor, and if the gas lever be now pulled right back and let go, this cartridge is placed in the breech as already described, and the gun is ready for firing. If it be desired to remove a belt from the feed, a button (68) is pressed and the feed-wheel is then free to revolve backwards.

The gun is sighted with the ordinary rifle-pattern sights, up to 2000 yds. or more if required. It weighs about 40 ft, and can fire about 400 rounds per minute as usually adjusted, though this rate can be increased. There is no means of altering the gas pressure in the field as with the Hotchkiss.

[The diagrams have been made from drawings, by permission of the Colt Arms Company.]

Comparing the principle of employing a recoiling barrel with that of using a portion of the gas, the advantages of the former are that the recoil is made to do useful work instead of straining

the gun and mounting in its absorption; the latter system, however, has undoubtedly the advantage in simplicity of mechan- ism (the Hotchkiss is extraordinarily simple in construction for an automatic gun), and in the large margin of power for working the mechanism with certainty in all conditions of exposure to climate, dust, and dirt. While inferior in this respect, it is nevertheless the fact that the Maxim has proved itself in the field even in savage warfare in the roughest country to be a very efficient and powerful weapon.

The great difficulty which has to be met in all single-barrel machine guns is the heating t of the barrel. The 75 pints of water in the water-jacket of the Maxim gun are raised to boiling point by 600 rounds of rapid fire — i.e. in about 15 minutes — and if firing be continued, about \ pints of water are evaporated for every 1000 rounds. Assuming that the operation is con- tinuous, the rate of waste of energy due to heat expended on the water alone is equivalent to about 20 horse-power (294 foot tons per minute). The water-jacket acts well

in keeping down the temperature of the barrel; but apart from the complications

Fig. 21. — Tripod mountirg (Mark IV.), for British Maxim.

entailed by its use, the provision of water for this purpose is at times exceedingly troublesome on service. In the Hotchkiss and Colt guns, which have no water-jacket, an attempt is made to meet the heating, in the one by the radiator, and in the other by a very heavy barrel.

One of the most modern types of gun is the Schwarzlose, which is manufactured at Steyr in Austria, and was adopted by the Austrian army in 1907. This weapon is remarkable for its simplicity. There are only 10 main working parts, and any of these can be replaced in a few seconds. It is operated by the gases of the explosion, has a water-jacket that allows 3000 rounds to be fired without refilling. The ” life ” of the gun- barrel is stated to be 35,000 rounds without serious loss of accuracy. The weight ‘of the gun is 37-9 lb. It is a belt loader.

The Italian Perino gun, adopted in 1907, is a recoil-operated weapon, and is loaded by a metal clip. The Skoda gun, some of which type are used in Japan and China, is loaded by a hopper feed, and is gas-operated. The Bergmann gun is a belt loader, but the belt passes down a ” gravity feed ” an arrangement which saves a number of working parts.

One defect common to all is that it is by no means easy to proportion the fire to the target, as there are only two rates of fire, viz. rapid automatic and slow single shots. To fire a single shot requires practice, since the gun will fire some 7 shots

in one second, and to press the trigger and remove the finger or thumb instantly, and at the same time be ready to traverse to a fresh target, requires considerable skill. The result of these difficulties is that the target when struck is often riddled with bullets when one would have sufficed. The aiming of the gun, when rapid fire is taking place, may also be difficult even on firmly fixed mountings, owing to vibration. The greater delicacy of the modern machine gun has been alluded to above. 1 Nevertheless the advantages of safety, steadiness and lightness which the automatic weapon possesses, have ensured its victory over the older type of weapon, and although the simple strong and well-tried Catling still has its advocates, every civilized army has

adopted one or more of the automatic types.

Organization and Tactical Employment 2

Although machine-gun tactics are still somewhat indefinite, at least there are well-marked tendencies which have a close relation to the general tactical scheme or doctrine adopted by each of the various armies as suited to its own purposes and conditions. For many years before the South African and Manchurian wars, the machine-gun had been freely spoken of as ” a diabolical weapon before which nothing could live,” but this did not contribute much to the science of handling it. Most military powers, indeed, distrusted it — actuated perhaps by the remembrance of the vain hopes excited by the canon a balles. It was not until the second half of the war of 1904-05 that the Japanese, taught by the effective handling of the Russian machine-guns at Liao-Yang, introduced it into their field armies, and although Great Britain had provided every regular battalion with a Maxim-gun section some years before the Boer War, and a Volunteer corps, the Central London Rangers (now 12th bn. London Regiment) had maintained a (Nordenfeldt) gun section since 1882, instruction in the tactics of the weapon was confined practically to the simple phrase ” the machine-gun is a weapon of opportunity.” More than this, at any rate, is attempted in the drill-books of to-day.

One important point is that, whether the guns are used as an arm, in numbers, or as auxiliaries, in sections, they should be free to move without having to maintain their exact position relatively to some other unit. It was in following the infantry firing lines of their own battalion over the open that the British Maxims suffered most heavily in South Africa. Another of equal importance is that the machine guns must co-operate with other troops of their side in the closest possible way; more, in this regard, is demanded of them than of artillery, owing to their mobility and the relative ease of obtaining cover. A third factor, which has been the subject of numerous experi- ments, is the precise value of a machine-gun, stated in terms of infantry, i.e. how many rifles would be required to produce the fire-effect of a machine-gun. A fourth — and on this the teaching of military history is quite definite — is the need of concealment and of evading the enemy’s shrapnel. These points, once the datum of efficiency of fire has been settled, resolve themselves into two conclusions — the necessity for combining independence and co-operation, and the desirability of Mercury’s winged feet and cap of darkness for the weapon itself. It is on the former that opinions in Europe vary most. Some armies ensure co-operation by making the machine-gun section an integral part of the infantry regimental organization, but in this

case the officer commanding it must be taught and allowed to shake himself free from his comrades and immediate superiors when necessary. Others ensure co-operation of the machine- guns as an arm by using them, absolutely free of infantry control, on batteries; but this brings them face to face with the risks of showing, not one or two low-lying gun-barrels, but a number of carriages, limbers and gun teams, within range of the enemy's artillery.

1 At San-de-pu 1905 the Japanese machine-guns (Hotchkiss) sustained damage averaging, 1 extractor broken per gun, I jam in every 300 rounds. It should be mentioned, however, that the machine-gun companies were only formed shortly before the battle.

2 In field operations only. For siege warfare see Fortification

AND SlEGECRAFT.

French experiments are said to show that the fire-power of a machine-gun is equal to that of 150-200 rifles at exactly known range, and to 60-80 rifles at ranges judged by the French " instantaneous range-finder." The German drill-book gives it as equal approximately to that of 80 rifles on an average. The distinction of known and unknown ranges is due to the fact that the " cone of dispersion " of a large number of bullets in collective infantry fire is deeper than that of machine-gun fire. The latter therefore groups its bullets much more closely about the target if the latter is in the centre of the cone — viz. at known ranges — but if the distance Effect be misjudged not only the close central group of 50% of the shots, but even the outlying rounds may fall well away from the target. At 1500 yards range the " 50 per cent, zone " with the Maxim gun is only 34 yards deep as compared with the 60 yards of a half-company of rifles. 3 The accuracy of the gun is more marked when the breadth of the cone of dispersion is taken into account. The " 75 per cent." zone is in the case of the machine-gun about as broad at 2000 yards as that of collective rifle ■ fire at 500. At the School of Musketry, South Africa, a trial between 42 picked marksmen and a Maxim at an unknown range at service targets resulted in 408 rounds from the rifles inflicting a loss of 54% on the enemy's firing line represented by the targetsˆ and 228 rounds from the Maxim inflicting one of 64%. Another factor is rapidity of fire. It is doubtful if infantry can keep up a rate of 12 rounds a minute for more than two or three minutes at a time without exhaustion and consequent wild shooting. The machine-gun, with all its limitations in this respect, can probably, taking a period of twenty or thirty minutes, deliver a greater volume of fire than fifty rifles, and assuming that, by one device or another (ranging by observing the a

“2 n & strike of the bullets, the use of a telemeter, or the employment of “combined sights”) the 75% cone of bullets has been brought on to the target, that fire will be more effective. The serious limiting condition is the need of accurate ranging. If this is unsatisfactory the whole (and not, as with infantry, a part) of the fire effect may be lost, and if the safe expedient of ” combined sights ” 4 be too freely resorted to, the consumption of ammunition may be out of all proportion.

The vulnerability of machine-guns is quite as important as is their accuracy. At a minimum, that is when painted a ” service ” colour, manoeuvred with skill, and mounted on a low tripod — in several armies even the shield has been

Vulnera- bility.

rejected as tending to make guns more conspicuous — the vulnerability of one gun should be that of one skirmisher lying down. At a maximum, vulnerability is that of a small battery of guns and wagons limbered up.

Mobility comes next. The older patterns of hand-operated guns weighed about 90 lb at least, without carriage, the earlier patterns of Maxims (such as that described in detail above) about 60 lb. But the most modern Maxims ° y ‘ weigh no more than 35 lb. Now, such weapons with tripods can be easily carried to and fro by one or two men over ground that is impracticable for wheeled carriages. Nevertheless,

3 For practical purposes in the field, the ” effective ” beaten zone, containing 75 % of the bullets, is the basis of fire direction both for the machine-gun and the rifle. The depths of these ” effective ” zones are on an average : —

At

500 yds.

1,000 yds.

1,500 yds.

2,000 yds.

S.L.E. Rifle

220 yds.

120 yds.

100 yds.

—

Maxim Gun

150 yds.

70 yds.

60 yds.

50 yds.

4 ” Combined sights ” implies firing with the sights set for two different ranges, the usual difference being 50 yds. With grouped machine guns, ” progressive fire ” with elevations increasing by 25 yds. is used. This artificially disperses the fire, and therefore lessens the chance of losing the target through ranging errors. One ingeni- ous inventor has produced a two-barrelled automatic, in which the barrels are permanently set to give combined elevations. The British memorandum of August 1909 seems to regard the facility of employing combined sights as the principal advantage of the battery over the section.

wheeled carriages are often used for the ordinary transport of the gun and its equipment, especially with the heavier models. The simplest machine-gun has a number of accessories — tools, spare parts, &c. — that must be conveyed with it, and at the least a pack-animal is indispensable.

Reducing these conditions to a phrase— the fire effect that can be reasonably expected of machine-guns is that of fifty or sixty rifles, the space it takes up in the line can be made to equal that occupied by two men, and it possesses by turns the speed of a mounted man and the freedom of movement of an infantry- man.

The use of the machine-gun (apart from savage warfare) that first commended itself in Europe was its use as a mobile reserve Machine-

˚f fi re – Now, the greatest difficulty attending the

It is not merely in cavalry tactics that the question of ” section or battery ” arises. It deeply affects the machine-gun tactics in the battle of all arms, and it is therefore decided in each service by the use to which the guns are intended to be put. One powerful current of opinion is in favour of employing them as a mobile reserve of fire. This opinion was responsible for the creation of the German machine-gun batteries or ” detach- ments”; and in the drill regulations issued in 1902 for their guidance it was stated that the proper use of machine-guns required a comprehensive and accurate knowledge of the general situation, and that therefore only the superior leaders could employ them to advantage. Manoeuvre experience, as mentioned above, has caused considerable modification in this matter, and while the large machine-gun ” detachments ” are now definitely told off to the cavalry, new and smaller units have been formed, with the title ” companies ” to indicate their attachment to the infantry arm. A recent official pronouncement as to the r61e of the ” companies ” (Amendments to Exerzierreglement fur die Infanterie, 1909) is to the effect

that the companies are an integral part of the infantry, that their mission is to augment directly the fire of the infantry, and that their employment is in the hands of the infantry regi- mental commander, who keeps the guns at his own disposition or distributes them to the battalions as he sees fit. It must be remembered that the regiment is a large unit, 3000 strong, and the idea of a ” mobile reserve of fire ” is tacitly maintained, although it has been found necessary to depart from the extreme measure of massing the guns and holding them at the disposal of a general officer. The Japanese regulations state that in principle the machine-gun battery fights as a unit; that although it may be advantageously employed with the ad- Machine- vanced guard to assure the possession of support- Guns in ing points, its true function is to intervene with full Combined effect in the decisive attack, its use in the delaying action being ” a serious error.” In France, on the other hand, the system of independent sections is most rigidly maintained; when in barracks, the three sections belonging to an infantry regiment are combined for drill, but in the field they seem to be used exclusively as sections. They are not, however, restricted to the positions of their own battalions; taught probably by the experiences of the British in South Africa, they co-operate with instead of following the infantry. In Great Britain, Field Service Regulations, part i., 1909, lay down that ” machine- guns are best used in pairs 1 in support of the particular body of troops to which they belong ” (i.e. battalions). ” The guns of two or more units may, if required, 2 be

placed under a specially selected officer and employed as a special reserve of fire in the hands of a brigade commander ” (corresponding to German regimental commander), but ” if an overwhelming fire on a particular point is required, it can be obtained by con- centrating the fire of dispersed pairs of guns.” More explicitly still, ” the movements and fire action of these weapons should be regulated so as to enable them to open fire immediately a favour- able opportunity arises.”

Contrasting the German system with the French and English, we may observe that it is German tactics as a whole that impose a method of using machine-guns which the Germans themselves recognize as being in many respects disadvantageous. A German force in action possesses little depth, i.e. reserves, except on the flanks where the enveloping attack is intended to be made. Consequently, a German commander needs a reserve of fire in a mechanical, concentrated form more than a British or a French commander, and, further, as regards the decisive attack on the flanks, it is intended not merely to be sudden but even more to be powerful and overwhelming. These considerations tend to impose both the massing and the holding in reserve of machine-guns. The French and British doctrine (see Tactics) is fundamentally different. Here, whether the guns be massed or not, there is rarely any question of using the machine-guns as a special reserve. In the decisive attack, and especially at the culmination of the decisive attack, when concealment has ceased and power is everything, the machine-guns can render the greatest services when grouped and boldly handled. Above all, they must reach the captured crest in a few minutes, so as to crush the inevitable offensive return of the enemy’s reserves. The decisive attack, moreover, is not a prearranged affair, as in Germany, but the culmination, ” at a selected point, of gradually increasing pressure relentlessly applied to the enemy at all points ” (F. S. Regulations). The holding attack, as this ” pres- sure ” is called, is not a mere feint. It is launched and developed as a decisive attack, though not completed as such, as it lacks the necessary reserve strength. Here, then, the machine-

1 The use of single guns facilitates concealment, but this is out- weighed by the objection that when a jam or other breakdown occurs the fire ceases altogether. The use of guns in pairs not only obviates this, but admits of each gun in turn ceasing fire to economize ammunition, to cool down, &c. This is the old artillery principle — ” one gun is no gun.”

2 In the instructions issued in August 1909 one of the principal advantages of grouped sections is stated to be the neutralization of ranging errors at ranges over 1000 yards. At a less range, it is laid

down, grouped guns form too visible a target, unless the

I ground is very favourable.

gun is best employed in enabling relatively small forces to advance — not to assault — without undue loss, that is, in econo- mizing rifles along the non-decisive front. 1

Withal, there are certain principles, or rather details of principle, that find general acceptance. One of these is the employment of machine-guns with the advanced guard. In this case the value of the weapon lies in its enabling the advanced guard both to seize favourable ground and points of support without undue effort and to hold the positions gained against the enemy's counter-attack. This applies, further, to the preliminary stages of an action. 2 Another point is that as a rule the most favourable range for the machine-gun is " effective infantry," i.e. 600-1400 yards (which is, mutatis mutandis, the principle of Reffye's mitrailleuse). Its employ- ment at close infantry range depends entirely on conditions of ground and circumstances — even supposing that the handiest and most inconspicuous type of weapon is employed. Thirdly — and this has a considerable bearing on the other points — the machine-gun both concentrates many rifles on a narrow front, and concentrates the bullets of many rifles on a narrow front. The first clause implies that it can be used where there is no room (physically or tactically) for the fifty or eighty riflemen it represents (as, for instance, in some slight patch of cover whence the gun can give effective cross-fire in support of the infantry attack, or in front of an advanced post, or can watch an exposed flank), and, further, that it can be swung round laterally on to a fresh target far more easily than a line of excited and extended infantry can be made to change front. The second means that the exit of a defile, an exposed turn in a lane or on a bridge, can be beaten by closely grouped fire at greater distances and with greater accuracy than is attainable with riflemen.

Further, the waste of ammunition and the strain on the weapon caused by unnecessarily prolonged firing at the rate for which its mechanism is set — varying between 350 and 700 rounds a minute — have caused it to be laid down as an axiom in all armies that machine-guns shall deliver their fire by " bursts " and only on favourable targets.

Lastly, the reports, both of observers and combatants, are unanimous as to the immense moral effect produced on the combatants by the unmistakable drumming sound of the machine-guns, an effect comparable even at certain stages of the fight to the boom of the artillery itself.

Equipments in Use. — Practically all nations have abandoned the simple wheeled carriage for machine-guns, or rather have adopted the tripod or table mounting, reserving the wheeled vehicle for the mere transport of the equipment. Since the Russo-Japanese War the tendency has been to sacrifice the slight protection afforded by the shield in order to reduce visibility. The Japanese, who had unprotected field guns and protected machine-guns in the war, found it advisable to reverse this procedure, for reasons that can easily be guessed in the cases of both weapons.

Great Britain. — The service machine-gun is the Maxim 303 in., adjusted to a rate of 450 rounds per minute and sighted (except in a few weapons) to 2900 yards. The original patterns weighed 60 tb, and were mounted on wheeled carriages. In the latest pattern, however, the weight of the gun has been reduced to 36 lb. The old Mark I. cavalry Maxim carriage, complete with gun, ammu nition, &c, weighed 13 cwt. behind the traces, and the gun was 5 ft. above the ground. It had no limber. The Mark III. cavalry carriage is much lower (3′ 6″ from the ground to the gun), and the gun carriage and limber together only weigh 13 cwt. Of infantry carriages there were various marks, one of which is shown in fig. 6. Now, however, all mountings for infantry are of the tripod type, transported on wheels or on pack animals, but entirely detachable from the travelling mounting, and in action practically never used except on the tripod. The Mark IV. tripod mounting, of which a

1 The British instructions of August 1909 direct the grouping of guns in the decisive attack (if circumstances and ground favour this course) and their use by sections ” if the brigade is deployed on a wide front,” i.e. on the non-decisive front; further, that it is often advisable to disperse the sections of the leading battalions and to group those of units in reserve. In any case, while the 2, 4 or 8 guns must be ready to act independently as a special ” arm,” their normal work is to give the closest support to the neighbouring infantry (battalion in the holding, brigade in the decisive, attack).

2 In Germany, however, the tendency is not to make holding attacks but to keep the troops out of harm’s way (i.e. too far away for the enemy to counter-attack) until they can strike effectively.

sketch is given in fig. 21, weighs 48 lb. The total weight of the fighting equipment is thus 84 lb only — an important consideration now that in action the gun is man-carried. The gun can be adjusted to fire at heights varying from 2′ 6″ to 1′ 2 J” only from the ground; in its lowest position, then, it is a little lower than the head of a man firing lying. All the later infantry machine-gun equipments are for pack transport and have no shields.

The organization of the machine-gun arm is regimental. Each cavalry regiment and each infantry battalion has a section of 2 guns under an officer.

France. — The guns in use are the Puteaux and the Hotchkiss. The unit is the regimental 2-gun section. Four-horsed carriages with limbers are used with cavalry, tripods with the infantry sections. No shields. Weight of the Hotchkiss in use, 50 lb; of the tripod, 70 lb. The Puteaux was lightened and improved in

1909.

Germany. — As already mentioned the German machine-gun units are classed as cavalry ” detachments ” and infantry ” companies.” The ” detachment ” or battery consists of 6 guns and 4 wagons, the vehicles being of a light artillery pattern and drawn by four horses. The gun (Maxim) weighs 61 lb, and its fighting carriage 1 10 lb. The ” companies ” have also 6 guns and 4 wagons, but the equipment is lighter (two-horse), and is not constructed on artillery principles, nor are the guns fired from their carriages as are those of the ” detachments.” The weight of the gun is 38 lb, and that of the fighting carriage 75 (some accounts give 53 for the latter), the difference between these weights and those of the mounted equip- ments, affording a good illustration of the difference in the tactical requirements of the cavalry and of the infantry types of gun. The fighting carriage is a sort of sledge, which is provided with four legs for fire in the highest position, but can of course be placed on the ground; the height of the gun, therefore, can be varied from 3′ 6″ to 1′ 6”. The sledges can be dragged across country or carried by men stretcher fashion, and sometimes several sledges are coupled and drawn by a horse.

Japan. — The Japanese Hotchkiss, as modified since the war with Russia, is said to weigh 70 lb, and its tripod mounting 40. Each regiment of infantry has a six-gun battery and each cavalry brigade one of eight guns. Pack transport is used.

Russia. — Since the war eight-gun companies have been formed in the infantry regiments, and each cavalry regiment has been provided with two guns. The var organization is, however, un- known. Both wheel and pack transport are employed for travelling, but the guns are fought from tripods. Early and somewhat heavy patterns of Maxim (with shield) are chiefly used, but a great number of very light guns of the Madsen type have been issued.

The Austrian gun is the Schwarzlose, of which some details are given above. Pack transport is used, one mule taking the whole equipment with 1000 rounos. Weight of the gun 37-9 lb, of the tripod 41 lb. The height of the tripod can be varied from 9I in. to 2 ft. above the ground. It is proposed that each cavalry regiment should have four guns, and each infantry regiment two. Switzerland adopted the Maxim in 1902. It is used principally as a substitute for horse artillery. Denmark and other small states have adopted the Madsen or Rexer light-type guns in relatively large numbers, especially for cavalry. In the United States the British organization was after many trials adopted, and each infantry and cavalry regiment has a two-gun section of Maxims, with tripod mounting and pack transport.

See P. Azan, Les premieres mitrailleuses (" Revue d' Histoire de l'Arm6e," July 1907) ; Le Canon d. holies, 1870-1871 (" Revue d'Hist. de l'Armee, 1909) ; Lieut-Colonel E. Rogers in " Journal R. United Service Institution " of 1905; Capt. R. V. K. Applin, Machine-gun Tactics (London, 1910) and paper in " J. R. United Service Inst." (1910) ; War Office Handbook to the Maxim gun (1907) ; Capt. Cesbron Lavau, Mitrailleuses de cavalerie; Lieut. Buttin, L'emploi des mitrailleuses d'infanterie; Major J. Goots, Les Mitrailleuses (Brussels, 1908) ; and Merkatz, Unterrichtsbuch fur die Masch.-Gewehrabteilungen (Berlin, 1906) ; Korzen & Kuhn, Waffenlehre, &c.

(C. F. A.)

MACfAS [0 NAMORODO] (ft. 1360-1390), Galician trovador, held some position in the household of Enrique de Villena. He is represented by five poems in the Cancianero de Baena, and is the reputed author of sixteen others. Macias lives by virtue of the romantic legends which have accumulated round his name. The most popular version of his story is related by Hernan Nunez. According to this tradition, Madas was enamoured of a great lady, was imprisoned at Arjonilla, and was murdered by the jealous husband while singing the lady's praises. There may be some basis of fact for this narrative, which became a favourite subject with contemporary Spanish poets and later writers. Macias is mentioned in Rocaberti's Gloria de amor

as the Castilian equivalent of Cabestaah; he afforded a theme to Lope de Vega in Porfiar hasta morir; in the 19th century, at the outset of the romantic movement

in Spain, he inspired Larra (q.v.) in the play Marias and in the historical novel entitled El doncel de Don Enrique el doliente.

See H. A. Rennert, Marias, o namorado; a Galician trobador (Philadelphia, 1900); Theodore J. de Puymaigre, Les vieux auteurs castillans (1889-1890), i. 54-74; Cancioneiro Gallego-Castelhano (New York and London, 1902), ed. H. R. Lang; Christian F. Beller- mann, Die alien Liederbiicher der Portugiesen (Berlin, 1840).

MACINTOSH, CHARLES (1766-1843), Scottish chemist and inventor of waterproof fabrics, was born on the 29th of December 1766 at Glasgow, where he was first employed as a clerk. He devoted all his spare time to science, particularly chemistry, and before he was twenty resigned his clerkship to take up the manufacture of chemicals. In this he was highly successful, inventing various new processes. His ex- periments with one of the by-products of tar, naphtha, led to his invention of waterproof fabrics, the essence of his patent being the cementing of two thicknesses of india-rubber together, the india-rubber being made soluble by the action of the naphtha. For his various chemical discoveries he was, in 1823, elected F.R.S. He died on the 25th of July 1843.

See George Macintosh, Memoir of C. Macintosh (1847).

MACKAY, CHARLES (1814-1889), Scottish writer, was born at Perth, on the 27th of March 1814, and educated at the Caledonian Asylum, London, and in Brussels. In 1830, being then private secretary to a Belgian ironmaster, he began writing verses and articles for local newspapers. Returning to London, he devoted himself to literary and journalistic work, and was attached to the Morning Chronicle (1835-1844). He published Memoirs of Extraordinary Public Delusions (1841), and gradually made himself known as an industrious and prolific journalist. In 1844 he was made editor of the Glasgow Argus. His literary reputation was made by the publication in 1846 of a volume of verses, Voices from the Crowd, some of which were set to music by Henry Russell and became very popular. In 1848 Mackay returned to London and worked for the Illustrated London News, of

which he became editor in 1852. In it he published a number of songs, set to music by Sir Henry Bishop and Henry Russell, and in 1855 they were collected in a volume; they included the popular ” Cheer, Boys! Cheer! ” After his severance from the Illustrated London News, in 1859, Mackay started two unsuccessful period- icals, and acted as special correspondent for The Times in America during the Civil War. He edited A Thousand and One Gems of English Poetry (1867). Mackay died in London on the 24th of December 1889. Marie Corelli (q.v.) was his adopted daughter. His son, Eric Mackay (1851-1899), was known as a writer of verse, particularly by his Love Letters of a Violinist (1886).

MACKAY, HUGH (c. 1640-1692), Scottish general, was the son of Hugh Mackay of Scourie, Sutherlandshire, and was born there about 1640. He entered Douglas’s (Dumbarton’s) regiment of the English army (now the Royal Scots) in 1660, accompanied it to France when it was lent by Charles II. to Louis XIV., and though succeeding, through the death of his two elder brothers, to his father’s estates, continued to serve abroad. In 1669 he was in the Venetian service at Candia, and in 1672 he was back with his old regiment, Dumbarton’s, in the French army, taking part under Turenne in the invasion of Holland. In 1673 he married Clara de Bie of Bommel in Gelderland. Through her influence he became, as Burnet says, ” the most pious man that I ever knew in a military way,” and, convinced that he was fighting in an unjust cause, resigned his commission to take a captaincy in a Scottish regiment in the Dutch service. He had risen to the rank of major-general in 1685, when the Scots brigade was called to England to assist in the suppression of the Monmouth rebellion. Returning to Holland, Mackay was one of those officers who elected to stay with their men when James II., having again demanded the services of the Scots brigade, and having been met with a refusal, was permitted to invite the officers individually into his service. As major-general commanding the brigade, and also as a privy councillor of Scotland, Mackay was an

important and influential person, and James chose to attribute the decision of most of the officers to Mackay’s instigation. Soon after this event the Prince of Orange started on his expedition to England, Mackay’s division leading the invading corps, and in January 1688-89 Mackay was appointed major- general commanding in chief in Scotland. In this capacity he was called upon to deal with the formidable insurrection headed by Graham of Claverhouse, Viscount Dundee. In the battle of Killiecrankie Mackay was severely defeated, but Dundee was killed, and the English commander, displaying unexpected energy, subdued the Highlands in one summer. In 1690 he

founded Fort William at Inverlocby, in 1691 he distinguished himself in the brilliant victory of Aughrim, and in 1692, with the rank of lieutenant-general, he commanded the British division of the allied army in Flanders. At the great battle of Steinkirk Mackay's division bore the brunt of the day unsupported and the general himself was killed.

Mackay was the inventor of the ring bayonet which soon came into general use, the idea of this being suggested to him by the failure of the plug-bayonet to stop the rush of the Highlanders at Killiecrankie. Many of his despatches and papers were published by the Bannatyne Club in 1883.

See Life by John Mackay of Rockville (1836) ; and J. W. Fortescue, History of the British Army, vol. i.

MACKAY, JOHN WILLIAM (1831-1902), American capi- talist, was born in Dublin, Ireland, on the 28th of November 1 83 1. His parents brought him in 1840 to New York City, where he worked in a ship-yard. In 1851 he went to California and worked in placer gold-mines in Sierra county. In 1852 he went to Virginia City, Nevada, and there, after losing all he had made in California, he formed with James G. Fair, James C. Flood and William S. O'Brien the firm which in 1873 discovered the great Bonanza vein, more than 1200 ft. deep, in the Comstock lode (yielding in March of that year as much as $632 per ton, and in 1877 nearly $19,000,000 altogether); and this firm established the Bank of Nevada in San Fran- cisco. In 1884, with James Gordon Bennett, Mackay formed the Commercial Cable Company — largely to fight Jay Gould and the Western Union Telegraph Company— laid two transatlantic cables, and forced the toll-rate for trans- atlantic messages down to twenty-five cents a word. In connexion with the Commercial Cable Company he formed the Postal Telegraph Company. Mackay died on the 20th of July 1902 in London. He gave generously, especially to the charities of the Roman Catholic Church, and endowed the Roman Catholic orphan asylum in Virginia City, Nevada. In June 1908 a school of mines was presented to the University of Nevada, as a memorial to him, by his widow and his son, Clarence H. Mackay.

MACKAY, a seaport of Carlisle county, Queensland, Australia, on the Pioneer river, 625 m. direct N.N.W. Pop. (1901), 4091. The harbour is not good. Sugar, tobacco and coffee thrive in the district. There are several important sugar mills, one of which, the largest in Queensland, is capable of an annual output of 8000 tons. Rum is distilled, and there are a brewery and a factory for tinning butter for export.

Workable coal is found in the district. This is the port of the Mt Orange and Mt Gotthart copper mines, and the Mt Britten and Eungella gold-fields. It is a calling-station for the Queensland royal mail steamers. The town is named after Captain John Mackay, who discovered the harbour in i860.

MCKEESPORT, a city of Allegheny county, Pennsylvania, U.S.A., at the confluence of the Monongahela and Youghiogheny rivers (both of which are navigable), 14 m. S.E. of Pittsburg. Pop. (1890), 20,741; (1900), 34,227, of whom 9349 were foreign- born and 748 were negroes; (1910 census) 42,694. It is served by the Baltimore & Ohio, the Pittsburg & Lake Erie and the Pennsylvania railways. The city has a Carnegie library, a general hospital, and two business schools. Bituminous coal and natural gas abound in the vicinity, and iron, steel, and tin and terne plate are extensively manufactured in the city, the tin-plate plant being one of the most important in the United

States. The total value of the city's factory products was $36,058,447 in 1900 and $23,054,412 in 1905. The municipality owns and operates its water-works. The first white settler was David McKee, who established a ferry here in 1769. In 1795 his son John laid out the town, which was named in his honour, but its growth was very slow until after the discovery of coal in 1830. McKeesport was incorporated as a borough in 1842 and chartered as a city in 1890.

McKEES ROCKS, a borough of Allegheny county, Pennsyl- vania, U.S.A., on the Ohio river, about 3 m. N.W. of Pittsburg. Pop. (1890) 1687; (1900) 6352 (1264 foreign-born); (1910) 14,702. McKees Rocks is served by the Pittsburg & Lake Erie and the Pittsburg, Chartiers & Youghiogheny railways, the latter a short line extending (13 m.) to Beechmont. Bituminous coal and natural gas are found in the vicinity, and the borough ships coal and lumber, and has various important manufactures. There is an ancient Indian mound here. The first settlement was made in 1830, and the borough incorporated in 1892.

MACKENNAL, ALEXANDER (1835-1904), English Noncon- formist divine, was born at Truro in Cornwall, on the 14th of January 1835, the son of Patrick Mackennal, a Scot, who had settled in Cornwall. In 1848 the family removed to London, and at sixteen he went to Glasgow University. In 1854 he entered Hackney College to prepare for the Congregational ministry, and in 1857 he graduated B.A. at

London Univer- sity. After holding pastorates at Burton-on-Trent (1856- 1861), Surbiton (1862-1870), Leicester (1870-1876), he finally accepted the pastorate of the Congregational Church at Bowdon, Cheshire, in 1877, in which he remained till his death. In 1886 he was chairman of the Congregational Union, which he repre- sented in 1889 at the triannual national council of the American Congregational churches. The first international council of Congregationalists held in London in 1891 was partly cause, partly consequence, of his visit, and Mackennal acted as secre- tary. In 1892 he became definitely associated in the public mind with a movement for free church federation which grew out of a series of meetings held to discuss the question of home reunion. When the Lambeth articles put forward as a basis of union were discussed, it was evident that all the free churches were agreed in accepting the three articles dealing with the Bible, the Creed and the Sacraments as a basis of discussion, and were also agreed in rejecting the fourth article, which put the historic episcopate on the same level as the other three. Omitting the Anglicans, the representatives of the remaining churches resolved to develop Christian fellowship by united action and worship wherever possible. Out of this grew the Free Church Federation, which secures a measure of co-operation between the Protestant Evangelical churches throughout Eng- land. Mackennal's public action brought him into associa- tion with many well-known political and religious leaders. He was a lifelong advocate of international peace, and made a remarkable declaration as to the Christian standard of national action when the Free Church Federation met at Leeds during the South African War in 1900.

Besides a volume of sermons under the title Christ's Healing Touch, Mackennal published The Biblical Scheme of N ature and of Man, The Christian Testimony, the Letters to the Seven Churches of Asia, The Kingdom of the Lord Jesus and The Eternal God and the Human Sonship. These are contributions to exegetical study or to theological and progressive religious thought, and have elements of permanent value. He also made some useful contributions to religious history. In 1893 he published the Story of the English Separatists, and later the Homes and Haunts of the Pilgrim Fathers; he also wrote the life of Dr J. A. Macfadyen of Manchester. In 1901 he delivered a series of lectures at Hartford Theological Seminary, Connecticut, U.S.A., published under the title The Evolution of Congregation- alism. He died at Highgate on the 23rd of June 1904.

See D. Macfadyen, Life and Letters of Alexander Mackennal (1905).
(D. Mn.)

MACKENZIE, SIR ALEXANDER (c. 17 55-1820), Canadian explorer, was probably a native of Inverness. Emigrating to

North America at an early age, he was for several years engaged in the fur trade at Fort Chippewyan, at the head of Lake Atha- basca, and it was here that his schemes of travel were formed. His first journey, made in 1789, was from Fort Chippewyan along the Great Slave Lake, and down the river which now bears his name to the Arctic Ocean; and his second, made in 1792 and 1793, from Fort Chippewyan across the Rocky Mountains to the Pacific coast near Cape Menzies. He wrote an account of these journeys, Voyages on the River St Lawrence and through, the Continent of North America to the Frozen and Pacific Oceans (London, 1801), which is of considerable interest from the information it contains about the native tribes. It is prefaced by an historical dissertation on the Canadian fur trade. Amass- ing considerable wealth, Mackenzie was knighted in 1802, and later settled in Scotland. He died at Mulnain, near Dunkeld, on the nth of March 1820.

MACKENZIE, ALEXANDER (1822-1892), Canadian states- man, was born in Perthshire, Scotland, on the 28th of January, 1822. His father was a builder, and young Mackenzie emigrated to Canada in 1842, and worked in Ontario as a stone-mason, setting up for himself later as a builder and contractor at Sarnia with his brother. In 1852 his interest in questions of reform led to his becoming the editor of the Lambton Shield, a local Liberal paper. This brought him to the front, and in 1861 he became a member of the Canadian parliament, where he at once made his mark and was closely connected with the liberal leader, George Brown. He was elected for Lambton to the first Dominion house of commons in 1867, and soon became the leader of the liberal opposition; from 1871 to 1872 he also sat in the Ontario provincial assembly, and held the position of provincial treasurer. In 1873 the attack on Sir John Macdonald's ministry with regard to the Pacific Railway charter resulted in its defeat, and Mackenzie formed a new government, taking the portfolio of public works and becoming the first liberal premier of Canada. He remained in power till 1878, when industrial depression enabled Macdonald to return to office on a protectionist pro- gramme. In 1875 Mackenzie paid a visit to Great Britain, and was received at Windsor by Queen Victoria; he was offered a knighthood, but declined it. After his defeat he suffered from failing health, gradually resulting in almost total paralysis, but though in 1880 he resigned the leadership of the opposition, he retained a seat in parliament till his death at Toronto on the 17th of April 1892. While perhaps too cautious to be the ideal leader of a young and vigorous community, his grasp of detail, inde- fatigable industry, and

unbending integrity won him the respect even of his political opponents.

His Life and Times by William Buckingham and the Hon. George W. Ross (Toronto, 1892) contains documents of much interest. See also George Stewart, Canada under the Administration of the Earl of Dufferin (Toronto, 1878).

MACKENZIE, SIR ALEXANDER CAMPBELL (1847-), British composer, son of an eminent Edinburgh violinist and conductor, was born on the 22nd of August 1847. On the advice of a member of Gung'l's band who had taken up his residence in Edinburgh, Mackenzie was sent for his musical education to Sondershausen, where he entered the conservatorium under Ulrich and Stein, remaining there from 1857 to 1861, when he entered the ducal orchestra as a violinist. At this time he made Liszt's acquaintance. On his return home he won the King's Scholarship at the Royal Academy of Music, and remained the usual three years in the institution, after which he established himself as a teacher of the piano, &c, in Edinburgh. He appeared in public as a violinist, taking part in Chappell's quartette concerts, and starting a set of classical concerts. He was appointed precentor of St George's Church in 1870, and conductor of the Scottish vocal music association in 1873, at the same time getting through a prodigious amount of teaching. He kept in touch with his old friends by playing in the orchestra of the Birmingham Festivals from 1864 to 1873. The most important compositions of this period of Mackenzie's life were the Quartette in E flat for piano and strings, Op. n, and an

overture, Cervantes, which owed its first performance to the encouragement and help of von Biilow. On the advice of this great pianist, he gave up his Edinburgh appointments, which had quite worn him out, and settled in Florence in order to compose. The cantatas The Bride (Worcester, 1881) and Jason (Bristol, 1882) belong to this time, as well as his first opera. This was commissioned for the Carl Rosa Company, and was written to a version of Merimee's Colomba prepared by Franz Huefier. It was produced with great success in 1883, and was the first of a too short series of modern English operas; Mackenzie's second opera, The Troubadour, was produced by the same company in 1886; and his third dramatic work was His Majesty, an excellent comic opera (Savoy Theatre, 1897). In 1884 his Rose of Sharon was given with very great success at the Norwich Festival; in 1885 he was appointed conductor of Novello's oratorio concerts; The Story of Sayid came out at the Leeds Festival of

1886; and in 1888 he succeeded Macfarren as principal of the Royal Academy of Music. The Dream of Jubal was pro- duced at Liverpool in 1889, and in London very soon afterwards. A fine setting of the hymn ” Veni, Creator Spiritus ” was given at Birmingham in 180,1, and the oratorio Bethlehem in 1894. From 1892 to 1899 he conducted the Philharmonic Concerts, and was knighted in 1894. Besides the works mentioned he has written incidental music to plays, as, for instance, to Ravens- wood, The Little Minister, and Coriolanus; concertos and other works for violin and orchestra, much orchestral music, and many songs and violin pieces. The romantic side of music appeals to Mackenzie far more strongly than any other, and the cases in which he has conformed to the classical conventions are of the rarest. In the orchestral ballad, La Belle Dame sans Merci, he touches the note of weird pathos, and in the nautical overture Britannia his sense of humour stands revealed. In the two ” Scottish Rhapsodies ” for orchestra, in the music to The Little Minister, and in a beautiful fantasia for pianoforte and orchestra on Scottish themes, he has seized the essential, not the accidental features of his native music.

MACKENZIE, SIR GEORGE (1636-1691), of Rosehaugh, Scottish lawyer, was the grandson of Kenneth, first Lord Mac- kenzie of Kintail, and the nephew of Colin and George, first and second earls of Seaforth; his mother was a daughter of Andrew Bruce, principal of St Leonard’s College, St Andrews. He was born at Dundee in 1636, educated at the grammar school there and at Aberdeen, and afterwards at St Andrews, graduating at sixteen. He then engaged for three years in the study of the civil law at Bourges; on his return to Scotland he was called to the bar in 1659, and before the Restoration had risen into considerable practice. Immediately after the Restoration he was appointed a ” justice-depute,” and it is recorded that he and his colleagues in that office were ordained by the parliament in 1661 ” to repair, once in the week at least, to Musselburgh and Dalkeith, and to try and judge such persons as are there or thereabouts delate of witchcraft.” In the same year he acted as counsel for the marquis of Argyll; soon afterwards he was knighted, and he represented the county of Ross during the four sessions of the parliament which was called in 1669. He suc- ceeded Sir John Nisbet as king’s advocate in August 1677, and in the discharge of this office became implicated in all the worst acts of the Scottish administration of Charles II., earning for himself an unenviable distinction as ” the bloody Mackenzie.” His refusal to concur in the measures for dispensing with the penal laws against Catholics led to his removal from office in 1686, but he was reinstated in February 1688. At the Revolution, being a member of convention, he was one of the minority of five in the division on the

forfeiture of the crown. King William was urged to declare him incapacitated for holding any public office, but refused to accede to the proposal. When the death of Dundee (July 1689) had finally destroyed the hopes of his party in Scotland, Mackenzie betook himself to Oxford, where, admitted a student by a grace passed in 1690, he was allowed to spend the rest of his days in the enjoyment of the ample fortune he had acquired, and in the prosecution of his literary labours. One of his last acts before leaving Edin-

burgh had been to pronounce (March 15, 1689), as dean of the faculty of advocates, the inaugural oration at the founda- tion of the Advocates' library. He died at Westminster on the 8th of May 1691, and was buried in Greyfriars churchyard, Edinburgh.

While still a young man Sir George Mackenzie appears to have aspired to eminence in the domain of pure literature, his earliest publication having been Aretina, or a Serious Romance (anon., 1 661) ; it was followed, also anonymously, by Religio Stoici, a Short Discourse upon Several Divine and Moral Subjects (1663) ; A Moral Essay, preferring Solitude to Public Employment (1665) ; and one or two other disquisitions of a similar nature. His most important legal works are entitled A Discourse upon the Laws and Customs of Scotland in Matters Criminal (1674) ; Observations upon the Laws and Customs of Nations as to Precedency, with the Science of Heraldry (1680) ; Institutions of the Law of Scotland (1684) ; and Observations upon the Acts of Parliament (1686); of these the last-named is the most important, the Institutions being completely overshadowed by the similar work of his great contemporary Stair. In his Jus Regium: or the Just and Solid Foundations of Monarchy in general, and more especially of the Monarchy of Scotland, maintained (1684), Mackenzie appears as an uncompromising advocate of the highest doctrines of prerogative. His Vindication of the Government of Scotland during the reign of Charles II. (1691) is valuable as a piece of contemporary history. The collected Works were published at Edinburgh (2 vols, fol.) in 1716-1722; and Memoirs of the Affairs of Scotland from the Restoration of King Charles II., from previously unpublished MSS., in 1821.

See A. Lang, Sir George Mackenzie of Rosehaugh (1909).

MACKENZIE, HENRY (1745-1831), Scottish novelist and miscellaneous writer, was born at Edinburgh in August 1745. His father, Joshua Mackenzie, was a distinguished physician, and his mother, Margaret Rose, belonged to an old Nairnshire family. Mackenzie was educated at the high school and the university of

Edinburgh, and was then articled to George Inglis of Redhall, who was attorney for the crown in the management of exchequer business. In 1765 he was sent to London to prose- cute his legal studies, and on his return to Edinburgh became partner with Inglis, whom he afterwards succeeded as attorney for the crown. His first and most famous work, The Man of Feeling, was published anonymously in 1771, and met with instant success. The ” Man of Feeling ” is a weak creature, dominated by a futile benevolence, who goes up to London and falls into the hands of people who exploit his innocence. The sentimental key in which the book is written shows the author’s acquaintance with Sterne and Richardson, but he had neither the humour of Sterne nor the subtle insight into character of Richardson. One Eccles of Bath claimed the authorship of this book, bringing in support of his pretensions a MS. with many ingenious erasures. Mackenzie’s name was then officially an- nounced, but Eccles appears to have induced some people to believe in him. In 1773 Mackenzie published a second novel, The Man of the World, the hero of which was as consistently bad as the ” Man of Feeling ” had been ” constantly obedient to his moral sense,” as Sir Walter Scott says. Julia de Roubigni (1777), a story in letters, was preferred to his other novels by ” Chris- topher North,” who had a high opinion of Mackenzie (see Nodes Ambrosianae, vol. i. p. 15s, ed. 1866). The first of his dramatic pieces, The Prince of Tunis, was produced in Edinburgh in 1773 with a certain measure of success. The others were failures. At Edinburgh Mackenzie belonged to a literary club, at the meetings of which papers in the manner of the Spectator were read. This led to the establishment of a weekly periodical called the Mirror (January 23, 1779-May 27, 1780), of which Mackenzie was editor and chief contributor. It was followed in 1785 by a similar paper, the Lounger, which ran for nearly two years and had the distinction of containing one of the earliest tributes to the genius of Robert Burns. Mackenzie was an ardent Tory, and wrote many tracts intended to counteract the doctrines of the French Revolution. Most of these remained anonymous, but he acknowledged his Review of the Principal Proceedings of the Parliament of 1784, a defence of the policy of William Pitt, written at the desire of Henry Dundas. He was rewarded (1804) by the office of comptroller of the taxes for Scotland. In 1776 Mackenzie married Penuel, daughter of Sir Ludovick Grant of Grant. He was, in his later years, a notable figure in

Edinburgh society. He was nicknamed the ” man of feeling,” but he

was in reality a hard-headed man of affairs with a kindly heart. Some of his literary reminiscences were embodied in his Account of the Life and Writings of John Home, Esq. (1822). He also wrote a Life of Doctor Blacklock, prefixed to the 1793 edition of the poet's works. He died on the 14th of January

1831.

In 1807 The Works of Henry Mackenzie were published surreptitiously, and he then himself superintended the publication of his Works (8 vols., 1808). There is an admiring but discriminating criticism of his work in the Prefatory Memoir prefixed by Sir Walter Scott to an edition of his novels in Ballantyne's Novelist's Library (vol. v., 1823).

McKENZIE, SIR JOHN (1838-1001), New Zealand statesman, was born at Ard-Ross, Scotland, in 1838, the son of a crofter. He emigrated to Otago, New Zealand, in i860. Beginning as a shepherd, he rose to be farm manager at Puketapu near Palmer- ston South, and then to be a farmer in a substantial way in Shag Valley. In 1865 he was clerk to the local road board and school committee; in 1871 he entered the provincial council of Otago; and on the 1 ith of December 1881 was elected member of the House of Representatives, in which he sat till 1900. He was also for some years a member of the education board and of the land board of Otago, and always showed interest in the national elementary school system. In the House of Represen- tatives he soon made good his footing, becoming almost at once a recognized spokesman for the smaller sort of rural settlers and a person of influence in the lobbies. He acted as govern- ment whip for the coalition ministry of Sir Robert Stout and Sir Julius Vogel, 1884-1887, and, while still a private member, scored his first success as a land reformer by carrying the " McKenzie clause " in a land act limiting the area which a state tenant might thenceforth obtain on lease. He was still, however, comparatively unknown outside his own province when, in January 1891, his party took office and he aided John Ballance in forming a ministry, in which he himself held the portfolio of lands, immigration and agriculture. From the first he made his hand felt in every matter connected with land settlement and the administration of the vast public estate. Generally his aim was to break up and subdivide the great freehold and lease- hold properties which in his time covered four-sevenths of the occupied land of the colony. In his Land Act of 1892 he con- solidated, abolished or amended, fifty land acts and ordinances dealing with crown lands, and thereafter amended his own act four times. Though owning to a preference for state tenancy over freehold, he never stopped the

selling of crown land, and was satisfied to give would-be settlers the option of choosing freehold or leasehold under tempting terms as their form of tenure. As a compromise he introduced the lease in perpetuity or holding for 999 years at a quit rent fixed at 4%; theoretical objections have since led to its abolition, but for fifteen years much genuine settlement took place under its conditions. Broadly, however, McKenzie's exceptional success as lands minister was due rather to unflinching determination to stimu- late the occupation of the soil by working farmers than to the solution of the problems of agrarian controversy. His best- knowa experiment was in land repurchase. A voluntary law (1892) was displaced by a compulsory act (1894), under which between £5,000,000 and £6,000,000 had by 1910 been spent in buying and subdividing estates for closer settlements, with excellent results. McKenzie also founded and expanded an efficient department of agriculture, in the functions of which inspection, grading, teaching and example are successfully combined. It has aided the development of dairying, fruit- growing, poultry-farming, bee-keeping and flax-milling, and done not a little to keep up the standard of New Zealand pro- ducts. After 1897 McKenzie had to hold on in the face of failing health. An operation in London in 1899 only postponed the end. He died at his farm on the 6th of August 1901, soon after being called to the legislative council, and receiving a knight- hood.
MACKENZIE, SIR MORELL (1837-1892), British physician,

son of Stephen Mackenzie, surgeon (d. 1851), was born at Leyton-stone, Essex, on the 7th of July 1837. After going through the course at the London Hospital, and becoming M.R.C.S. in 1858, he studied abroad at Paris, Vienna and Pesth; and at Pesth he learnt the use of the newly in vented laryngoscope under J. N. Czermak. Returning to London in 1862, he worked at the London Hospital, and took his degree in medicine. In 1863 he won the Jacksonian prize at the Royal College of Surgeons for an essay on the " Pathology of the Larynx," and he then de voted himself to becoming a specialist in diseases of the throat. In 1863 the Throat Hospital in King Street, Golden Square, was founded, largely owing to his initiative, and by his work there and at the London Hospital (where he was one of the physicians from 1866 to 1873) Morell Mackenzie rapidly became recognized throughout Europe as a leading authority, and acquired an extensive practice. So great was his reputation that in May 1887, when the crown prince of Germany (afterwards the emperor Frederick III.) was attacked by the affection of the throat of which he ultimately died, Morell Mackenzie was specially summoned to attend him. The German physicians who had attended the prince since the beginning of March (Karl Gerhardt, and subse- quently Tobold, E. von Bergmann,

and others) had diagnosed his ailment on the 18th of May as cancer of the throat; but Morell Mackenzie insisted (basing his opinion on a microscopical ex- amination by R. Virchow of a portion of the tissue) that the disease was not demonstrably cancerous, that an operation for the extirpation of the larynx (planned for the 21st of May) was unjustifiable, and that the growth might well be a benign one and therefore curable by other treatment. The question was one not only of personal but of political importance, since it was doubted whether any one suffering from an incapacitating disease like cancer could, according to the family law of the Hohenzollerns, occupy the German throne; and there was talk of a renunciation of the succession by the crown prince. It was freely hinted, moreover, that some of the doctors themselves were influenced by political considerations. At any rate, Morell Mackenzie's opinion was followed: the crown prince went to England, under his treatment, and was present at the Jubilee celebrations in June. Morell Mackenzie was knighted in September 1887 for his services, and decorated with the Grand Cross of the Hohenzollern Order. In November, however, the German doctors were again called into consultation, and it was ultimately admitted that the disease really was cancer; though Mackenzie, with very question- able judgment, more than hinted that it had become malignant since his first examination, in consequence of the irritating effect of the treatment by the German doctors. The crown prince (see Frederick III.) became emperor on the 9th of March 1888, and died on the 15th of June. During all this period a violent quarrel raged between Sir Morell Mackenzie and the German medical world. The German doctors published an account of the illness, to which Mackenzie replied by a work entitled The Fatal Illness of Frederick the Noble (1888), the publication of which caused him to be censured by the Royal College of Surgeons. After this sensational episode in his career, the remainder of Sir Morell Mackenzie's life was uneventful, and he died somewhat suddenly in London, on the 3rd of February 1892. He published several books on laryngoscopy and diseases of the throat.

MACKENZIE, WILLIAM LYON (1795-1861), Canadian politi- cian, was born near Dundee, Scotland, on the 12th of March 1795. His father died before he was a month old, and the family were left in poverty. After some six years' work in a shop at Alyth, in April 1820 he emigrated with his mother to Canada. There he became a general merchant, first at York, then at Dundas, and later at Queenston . The discontented condition of Upper Canada drew him into politics, and on the 18th of May 1824 he published at Queenston the first number of the Colonial Advocate, in which the ruling oligarchy was attacked with great asperity. Most of the changes which he advocated were

wise and have since been adopted; but the violence of Mackenzie's attacks roused great anger among the social and political set at York (Toronto), I which was headed by John Beverley Robinson. In November

1824 Mackenzie removed to Toronto, but he had little capital; his paper appeared irregularly, and was on the point of suspending publication when his office was attacked and his type thrown into the bay by a number of the supporters of his opponents. In an action against the chief rioters he was awarded £625 and costs, was thus enabled to set up a much larger and more efficient plant, and the Colonial Advocate ran till the 4th of November

1834.

In 1828 he was elected member of parliament for York, but was expelled on the technical ground that he had published in his newspaper the proceedings of the house without authorization. Five times he was expelled and five times re-elected by his constituents, till at last the government refused to issue a writ, and for three years York was without one of its representatives. In May 1832 he visited England, where he was well received by the colonial office. Largely as the result of his representations, many important reforms were ordered by Lord Goderich, after- wards earl of Ripon, the colonial secretary. While in England, he published Sketches of Canada and the United States, in which, with some exaggeration, many of the Canadian grievances were exposed. On his return in March 1834 he was elected mayor of Toronto. During his year of office, the heroism with which he worked hand in hand with his old enemy, Bishop Strachan, in fighting an attack of cholera, did not prevent him from winning much unpopularity by his officiousness, and in 1835 he was not re-elected either as mayor or alderman. In October 1834 he was elected member of parliament for York, and took his seat in January 183 5, the Reformers being now in the majority. A com- mittee on grievances was appointed, as chairman of which Mac- kenzie presented the admirable Seventh Report on Grievances, largely written by himself, in which the case for the Reformers was presented with force and moderation, and the adoption of responsible government advocated as the remedy.

In the general election of June 1836 the Tory party won a complete

victory, Mackenzie and almost all the prominent Reformers being defeated at the polls. This totally unexpected defeat greatly embittered him. On the 4th of July 1836, the anniversary of the adoption of the American Declaration of Inde- pendence, he began the publication of the Constitution, which openly advocated a republican form of government. Later in the year he was appointed ” agent and corresponding secretary ” of the extreme wing of the Reform party, and more and more openly, in his speeches throughout the province, advocated armed revolt. He was also in correspondence with Papineau and the other leaders of the Reformers in Lower Canada, who were already planning a rising. Early in December 1837 Mackenzie gathered a mob of his followers, to the number of several hundred, at Gallows Hill, some miles to the north of Toronto, with the intention of seizing the lieutenant-governor and setting up a provisional government. Misunderstandings among the leaders led to the total failure of the revolt, and Mackenzie was forced to fly to the United States with a price on his head. In the town of Buffalo he collected a disorderly rabble, who seized and fortified Navy Island, in the river between the two countries, and for some weeks troubled the Canadian frontier. After the failure of this attempt he was put to the most pitiful shifts to make a living. In June 1839 he was tried in the United States for a breach of the neutrality laws, and sentenced to eighteen months' imprisonment, of which he served over eleven. While in gaol at Rochester he published the Caroline Almanac, the tone of which may be judged from its references to ” Victoria Guelph, the bloody queen of England,” and by the title given to the British cabinet of ” Victoria Melbourne's bloody divan.” He returned to Canada in consequence of the Amnesty Act 1849. A closer inspection had cured him of his love for republican institutions.

In 1 85 1 he was elected to parliament for Haldimand, defeating George Brown. He at once allied himself with the Radicals (the ” Clear Grits”) , and, on the leadership of that party being assumed by Brown, became one of his lieutenants. He was still miserably poor, but refused all offers to accept a government position. In 1858 he resigned his seat in the house, owing to

incipient softening of the brain, of which he died on the 29th of August 1 86 1.

Turbulent, ungovernable, vain, often the dupe of schemers, Mackenzie united with much that was laughable not a little that was heroic. He could neither be bribed, bullied, nor cajoled. Perhaps the best instance of this is that in 1832 he refused from Lord Goderich an offer of a position which would have given him great influence in Canada and

an income of £1,500. He was a born agitator, and as such tended to exaggeration and misrepresentation. But the evils against which he struggled were real and grave; the milder measures of the Constitutional Reformers might have taken long to achieve the results which were due to his hot-headed advocacy.

The Life and Times by his son-in-law, Charles Lindsey (Toronto, 2 vols., 1862), is moderate and fair, though tending to smooth over his anti-British gasconnade while in the United States. An abridg- ment of this work was edited by G. G. S. Lindsey for the ” Makers of Canada ” series (1909). In The Story of the Upper Canadian Rebellion by J. C. Dent (2 vols., Toronto, 1885), a bitter attack is made on him, which drew a savage reply from another son-in-law, John King, K.C., called The Other Side of the Story. The best short account of his career is given by J. C. Dent in The Canadian Portrait Gallery, vol. ii. (Toronto, 1881). (W. L. G.)

MACKENZIE, a river of the North- West Territories, Canada, discharging the waters of the Great Slave Lake into the Arctic Ocean. It was discovered and first navigated by Sir Alexander Mackenzie in 1789. It has an average width of 1 m., an average fall of 6 in. to the mile; an approximate discharge, at a medium stage, of 500,000 cub. ft. per second; and a total length, in- cluding its great tributary the Peace, of 2,350 m. The latter rises, under the name of the Finlay, in the mountains of British Columbia, and flows north-east and then south-east in the great intermontane valley that bounds the Rocky Mountains on the west, to its confluence with the Parsnip. From the confluence the waters of the combined rivers, now called the Peace, flow east through the Rocky Mountains, and then north-east to unite with the river which discharges the waters of Lake Athabasca; thence to Great Slave Lake it is known as Slave river. Excluding the rivers which enter these lakes, the principal tributaries of the Peace are: Omineca, Nation, Parsnip, Halfway, North Pine, South Pine, Smoky, Battle, and Loon rivers; those of the Mackenzie are the Liard (650 m. long), which rises near the sources of the Pelly, west of the Rocky Mountains, and breaks through that range on its way to join the parent stream, Great Bear river, which drains Great Bear Lake, Nahanni, Dahadinni, Arctic Red, and Peel rivers. The Mackenzie enters the Arctic Ocean near 135° W. and 68° 50′ W., after flowing for 70 to 80 m. through a flat delta, not yet fully surveyed. With its continuation, Slave river, it is navigable from the Arctic Ocean to Fort Smith, a distance of over 1 , 200 m . , and between the latter and the head of Lesser Slave Lake , a further distance of 625 m., there is only one obstruction to navigation, the Grand Rapids near Fort McMurray on the Athabasca river. The Peace is navigable from its junction with

Slave river for about 220 m. to Vermilion Falls. The Mackenzie is navigable from about the 10th of June to the 20th of October, and Great Slave Lake from about the 1st of July to the end of October. All the waters and lakes of this great system are abundantly stocked with fish, chiefly white fish and trout, the latter attaining to remarkable size.

MACKEREL, pelagic fishes, belonging to a small family, Scombridae, of which the tunny, bonito, albacore, and a few. other tropical genera are members. Although the species are fewer in number than in most other families of fishes, they are widely spread and extremely abundant, peopling by countless schools the oceans of the tropical and temperate zones, and approaching the coasts only accidentally, occasionally, or periodically.

The mackerel proper (genus Scomber) are readily recognized by their elegantly shaped, well-proportioned body, shining in iridescent colours. Small, thin, deciduous scales equally cover nearly the entire body. There are two dorsal fins, the anterior near the head, composed of 11-14 feeble spines, the second near

the tail with all the rays soft except the first, and behind the second dorsal five or six finlets. The ventral is immediately below the second dorsal, and is also followed by finlets. The caudal fin is crescent-shaped, strengthened at the base by two short ridges on each side. The mouth is wide, armed above and below with a row of very small fixed teeth.

No other fish shows finer proportions in the shape of its body. Every ” line ” of its build is designed and eminently adapted for rapid progression through the water; the muscles massed along the vertebral column are enormously developed, especially on the back and the sides of the tail, and impart to the body a certain rigidity which interferes with abruptly sideward motions of the fish. Therefore mackerel generally swim in a straightforward direction, deviating sidewards only when compelled, and rarely turning about in the same spot. They are in almost continuous motion, their power of endurance being equal to the rapidity of their motions. Mackerel, like all fishes of this family, have a firm flesh; that is, the muscles of the several segments are interlaced, and receive a greater supply of blood-vessels and nerves than in other fishes. Therefore the flesh, especially of the

larger kinds, is of a red colour; and the energy of their muscular action causes the temperature of their blood to be several degrees higher than in other fishes.

All fishes of the mackerel family are strictly carnivorous; they unceasingly pursue their prey, which consists principally of other fish and pelagic crustaceans. The fry of clupeoids, which like- wise swim in schools, are followed by the mackerel until they reach some shallow place, which their enemies dare not enter.

Mackerel are found in almost all tropical and temperate seas, with the exception of the Atlantic shores of temperate South America. European mackerel are of two kinds, of which one, the common mackerel, Scomber scomber, lacks, while the other pos- sesses, an air-bladder. The best-known species of the latter kind is S. colias, the "Spanish" mackerel; 1 a third, S. pneumato- phorus, is believed by some ichthyologists to be identical with 5. colias. Be this as it may, we have strong evidence that the Mediterranean is inhabited by other species different from S. scomber and 5. colias, and well characterized by their dentition and coloration. Also the species from St Helena is distinct. Of extra-Atlantic species the mackerel of the Japanese seas are the most nearly allied to the European, those of New Zealand and Australia, and still more those of the Indian Ocean, differ- ing in many conspicuous points. Two of these species occur in the British seas: 5. scomber, which is the most common there as well as in other parts of the North Atlantic, crossing the ocean to America, where it abounds; and the Spanish mackerel, 5. colias, which is distinguished by a somewhat different pattern of coloration, the transverse black bands of the common mackerel being in this species narrower, more irregular or partly broken up into spots, while the scales of the pectoral region are larger, and the snout is longer and more pointed. The Spanish mackerel is, as the name implies, a native of the seas of southern Europe, but single individuals or small schools frequently reach the shores of Great Britain and of the United States.

The home of the common mackerel (to which the following remarks refer) is the North Atlantic, from the Canary Islands to the Orkneys, and from the Mediterranean and the Black Sea and the coasts of Norway to the United States.

Towards the spring large schools approach the coasts. Two causes have been assigned of this migration: first, the instinct of finding a suitable locality for propagating their species; and, secondly, the search and pursuit of food, which in the warmer season is more abundant in the neighbourhood of land than in the open sea. It is

probable that the latter is the chief cause.

In the month of February, or in some years as early as the end of January, the first large schools appear at the entrance of the English Channel, and are met by the more adventurous of the drift- net fishers many miles west of the Scilly Islands. These early schools, which consist chiefly of one-year and two-year-old fishes, yield sometimes enormous catches, whilst in other years they escape the drift-nets altogether, passing them, for some hitherto unex- plained reason, at a greater depth than that to which the nets reach,

1 The term ” Spanish mackerel ” is applied in America to Cybium maculatum.

viz. 20 ft. As the season advances, the schools penetrate farther northwards into St George’s Channel or eastwards into the English Channel. The fishery then assumes proportions which render it next in importance to the herring and cod fisheries. In Plymouth alone a fleet of some two hundred boats assembles ; and on the French side of the Channel no less capital and labour are invested in it, the vessels employed being, though less in number, larger in size than on the English side. The chief centre, however, of the fishery in the west of England is at Newlyn, near Penzance, where the small local sailing boats are outnumbered by hundreds of large boats, both sail and steam, which come chiefly from Lowestoft for the season. Simultaneously with the drift-net the deep-sea-seine and shore-seine are used, which towards June almost entirely supersede the drift-net. Towards the end of May the old fish, become heavy with spawn and are in the highest condition for the table ; and the latter half of June or beginning of July may be regarded as the time at which the greater part of mackerel spawn. Considerable numbers of mackerel are taken off Norfolk and Suffolk in May and June, and also in September and October. There can be no doubt that they enter the North Sea from the English Channel, and return by the same route, but others travel round the north of Scotland and appear in rather small numbers off the east coast of that country. On the Norwegian coast mackerel fishing does not begin before May, whilst on the English coasts large catches are frequently made in March. Large cargoes are annually imported in ice from Norway to the English market.

After the spawning the schools break up into smaller companies which are much scattered, and offer for two or three months employ- ment to the hand-line fishermen. They now begin to disappear from the coasts and return to the open sea. Single individuals or small companies are found, however, on the coast all the year round; they

may have become detached from the main bodies, and be seeking for the larger schools which have long left on their return migration.

Although, on the whole, the course and time of the annual migra- tion of mackerel are marked with great regularity, their appearance and abundance at certain localities are subject to great variations. They may pass a spot at such a depth as to evade the nets, and reappear at the surface some days after farther eastwards; they may deviate from their direct line of migration, and even temporarily return westwards. In some years between 1852 and 1867 the old mackerel disappeared off Guernsey from the surface, and were accidentally discovered feeding at the bottom. Many were taken at 10 fathoms and deeper with the line, and all were of exceptionally large size, several measuring 18 in. and weighing nearly 3 lb; these are the largest mackerel on record.

The mackerel most esteemed as food is the common species, and individuals from 10 to 12 in. in length are considered the best flavoured. In more southern latitudes, however, this species seems to deteriorate, specimens from the coast of Portugal, and from the Mediterranean and Black Sea, being stated to be dry and resembling in flavour the Spanish mackerel (S. colias), which is not esteemed for the table. (A. C. G. ; J. T. C.)

MCKIM, CHARLES FOLLEN (1847-1909), American archi- tect, was born in Chester county, Pennsylvania, on the 24th of August 1847. His father, James Miller McKim (1810-1874), originally a Presbyterian minister, was a prominent abolitionist and one of the founders (1865) of the New York Nation. The son studied at Harvard (1866-1867) and at Paris in the Ecole des Beaux-Arts (1867-1870), and in 1872 became an architect in New York City, entering the office of H. H. Richard- son; in 1877 he formed a partnership with William Rutherford Mead (b. 1846), the firm becoming in 1879 McKim, Mead & White, when Stanford White (1853-1006) became a partner. McKim was one of the founders of the American Academy in Rome; received a gold medal at the Paris exposition of 1900; in 1903, for his services in the promotion of architecture, received the King's Medal of the Royal Institute of British Architects; and in 1907 became a National Academician. He died at St James, Long Island, N.Y., on the 14th of September 1909. McKim's name is especially associated with the University Club in New York, with the Columbia University buildings, with the additions to the White House (1906), and, more particularly, with the Boston Public Library, for which the library of Ste Genevieve in Paris furnished the suggestion.

MACKINAC ISLAND, a small island in the N.W. extremity of Lake Huron and a part of Mackinac county, Michigan, and a city and summer resort of the same name on the island. The city is on the S.E. shore, at the entrance of the Straits of Mackinac, about 7 m. N.E. of Mackinaw City and 6 m. E.S.E. of St Ignace. Pop. (1900), 665; (1904), 73°; (19 10), 714. During the summer season, when thousands of people come

here to enjoy the cool and pure air and the island's beautiful scenery, the city is served by the principal steamboat lines on the Great Lakes and by ferry to Mackinaw city (pop. in 1904, 696), which is served by the Michigan Central, the Grand Rapids & Indiana, and the Duluth, South Shore & Atlantic railways. The island is about 3 m. long by 2 m. wide. From the remarkably clear water of Lake Huron its shores rise for the most part in tall white limestone cliffs; inland there are strangely shaped rocks and forests of cedar, pine, fir, spruce, juniper, maple, oak, birch, and beech. Throughout the island there are numerous glens, ravines, and caverns, some of which are rich in associations with Indian legends. The city is an antiquated fishing and trading village with modern hotels, club-houses, and summer villas. Fort Mackinac and its grounds are included in a state reservation which embraces about one-half of the island.

The original name of the island was Michilimackinac (" place of the big lame person " or " place of the big wounded person ") ; the name was apparently derived from an Algonquian tribe, the Mishinimaki or Mishinimakinagog, now extinct. The island was long occupied by Chippewas, the Hurons had a village here for a short time after their expulsion from the East by the Iroquois, and subsequently there was an Ottawa village here. The first white settlement or station was established by the French in 1670 (abandoned in 1701) at Point Saint Ignace on the north side of the strait. In 1761 a fort on the south side (built in 171 2) was surrendered to the British. By the treaty of Paris (1783) the right of the United States to this district was acknowledged; but the fort was held by the British until 1796. In July 181 2 a British force surprised the garrison, which had not yet learned that war had been declared. In August 1814 an American force under Colonel George Croghan (1 791-1849) attempted to recapture the island but was repulsed with considerable loss. By the treaty of Ghent, however, the island was restored, in July 181 5, to the United States; Fort Mackinac was maintained by the Federal govern- ment until

1895, when it was ceded to the state. From 1820 to 1840 the village was one of the principal stations of the American Fur Company. A Congregational mission was established among the Chippewas on the island in 1827, but was discontinued before 1845. The city of Mackinac Island was chartered in 1899.

See VV. C. Richards, “The Fairy Isle of Mackinac,” in the Magazine of American History (July 1891); and R. G. Thwaites, ” The Story of Mackinac,” in vol. 14 of the Collections of the State Historical Society of Wisconsin (Madison, iC

MCKINLEY, WILLIAM (1843-1001), twenty-fifth president of the United States, was born in Niles, Trumbull county, Ohio, on the 29th of January 1843. His ancestors on the paternal side were Scotch-Irish who lived at Dervock, Co. Antrim, and spelled the family name ” McKinlay.” His great-great- grandfather settled in York county, Pennsylvania, about 1743, and from Chester county, Pennsylvania, his great-grandfather, David McKinley, who served as a private during the War of Independence, moved to Ohio in 1814. David’s son James had gone in 1809 to Columbiana county, Ohio. His son William McKinley (b. 1807), like his father an iron manufacturer, was married in 1829 to Nancy Campbell Allison, and to them were born nine children, of whom William, the president, was the seventh. In 1852 the family removed to Poland, Mahoning county, where the younger William was placed at school. At seventeen he entered the junior class of Allegheny College, at Meadville, Pennsylvania; but he studied beyond his strength, and returned to Poland, where for a time he taught in a neigh- bouring country school. When the Civil War broke out in 1 86 1 he promptly enlisted as a private in the 23rd Ohio Volunteer Infantry. He saw service in West Virginia, at South Mountain, where this regiment lost heavily, and at Antietam, where he brought up hot coffee and provisions to the fighting line; for this he was promoted second lieutenant on the 24th of September 1862. McKinley was promoted first lieutenant in February 1864, and for his services at Winchester

was promoted captain on the 25th of July 1864. He was on the staff of General George Crook at the battles of Opequan, Fisher’s Hill, and Cedar Creek in the Shenandoah valley, and on the 14th of March 1865 was brevetted major of volunteers for gallant and meritorious services. He also served on the staff of General Rutherford B. Hayes, who spoke highly of his soldierly qualities. He was mustered out with his regiment on the 26th of July 1865. Four years of army life had changed him from a pale and sickly lad into a man of superb figure and health.

After the war McKinley returned to Poland, and bent all his energy upon the study of law. He completed his prepara- tory reading at the Albany (N.Y.) law school, and was admitted to the bar at Warren, Ohio, in March 1867. On the advice of an elder sister, who had been for several years a teacher in Canton, Stark county, Ohio, he began his law practice in that place, which was to be his permanent home. He identified himself immediately with the Republican party, campaigned in the Democratic county of Stark in favour of negro suffrage in 1867, and took part in the campaign work on behalf of Grant's presidential candidature in 1868. In the following year he was elected prosecuting attorney on the Republican ticket; in 1871 he failed of re-election by 45 votes, and again devoted himself to his profession, while not relaxing his interest in politics.

In 1875 ne first became known as an able campaign speaker by his speeches favouring the resumption of specie payments, and in behalf of Rutherford B. Hayes, the Republican candidate for governor of Ohio. In 1876 he was elected by a majority of 3304 to the national House of Representatives. Conditions both in Ohio and in Congress had placed him, and were to keep him for twenty years, in an attitude of aggressive and uncompromising partisanship. His Congressional district was naturally Democratic, and its boundaries were changed two or three times by Democratic legislatures for the purpose of so grouping Democratic strongholds as to cause his defeat. But he overcame what had threatened to be adverse majorities on all occasions from 1876 to 1890, with the single exception of 1882, when, although he received a certificate of election showing that he had been re-elected by a majority of 8, and although he served nearly through the long session of 1883-1884, his seat was contested and taken (May 28, 1884) by his Demo- cratic opponent, Jonathan H. Wallace. McKinley reflected the strong sentiment of his manufacturing constituency in behalf of a high protective tariff, and he soon became known in Congress (where he particularly attracted the attention of James G. Blaine) as one of the most diligent students of indus- trial policy and question affecting national taxation. In 1878 he took part in the debates over the Wood Tariff Bill, proposing lower import duties; and in the same year he voted for the Bland- Allison Silver Bill. In December 1880 he was appointed a member of the Ways and Means committee, succeeding General James A. Garfield, who had been elected president in the preceding month, and to whose friendship, as to that of Rutherford B. Hayes, McKinley owed much in his earlier years in Congress. He was prominent in the debate which resulted in the defeat of the Democratic Morrison Tariff Bill in 1884, and, as minority leader of the Ways and Means committee, in the

defeat of the Mills Bill for the revision of the tariff in 1887-1888. In 1889 he became chairman of the Ways and Means committee and Republican leader in the House of Representatives, after having been defeated by Thomas B. Reed on the third ballot in the Republican caucus for speaker of the House. On the 16th of April 1890 he introduced from the Ways and Means committee the tariff measure known commonly as the McKinley Bill, which passed the House on the 21st of May, passed the Senate (in an amended form, with a reciprocity clause, which McKinley had not been able to get through the House) on the 10th of September, was passed as amended, by the House, and was approved by the president on the 1st of October 1890. The McKinley Bill reduced revenues by its high and in many cases almost prohibitive duties; it

put sugar on the free list with a discriminating duty of yVth of one cent a pound on sugar imported from countries giving a bounty for sugar exported, and it gave bounties to American sugar growers; it attempted to protect many ” infant ” industries such as the manufacture of tin-plate; under its provision for reciprocal trade agreements (a favourite project of James G. Blaine, who opposed many of the ” protective ” features of the Bill) reciprocity treaties were made with Germany, France, Italy, and Belgium, which secured a market in those countries for American pork. Abroad, where the Bill made McKinley’s name known everywhere, there was bitter opposition to it and reprisals were threatened by several European states. In the United States the McKinley Tariff Bill was one of the main causes of the Democratic victory in the Con- gressional elections of 1890, in which McKinley himself was defeated by an extraordinary Democratic gerrymander of his Congressional district. In November 1891 he was elected governor of Ohio with a plurality of more than 21,000 votes in a total of 795,000 votes cast. He was governor of Ohio in 1892-1895, being re-elected in 1893. His administration was marked by no important events, except that he had on several occasions in his second term to call out the militia of the state to preserve order; but it may be considered important because of the training it gave him in executive as distinguished from legislative work.

McKinley had been prominent in national politics even before the passage of the tariff measure bearing his name. In 1888 in the National Republican Convention in Chicago he was chairman of the committee on resolutions (i.e. the platform committee) and was leader

of the delegation from Ohio, which had been instructed for John Sherman; after James G. Blaine withdrew his name there was a movement, begun by Republican congressmen, to nominate McKinley, who .received 16 votes on the seventh ballot, but passionately refused to be a candidate, considering that his acquiescence would be a breach of faith toward Sherman. In 1892 McKinley was the permanent president of the National Republican Convention which met in Minneapolis and which renominated Benjamin Harrison on the first ballot, on which James G. Blaine received 182 f votes, and McKinley, in spite of his efforts to the contrary, received 182 votes. In 1894 he made an extended campaign tour before the Congressional elections, and spoke even in the South. In 1896 he seemed for many reasons the most ” available ” candidate of his party for the presidency: he had no personal enemies in the party; he had carried the crucial state of Ohio by a large majority in 1893; his attitude on the coinage question had never been so pro- nounced as to make him unpopular either with the radical silver wing or with the conservative ” gold-standard ” members of the party. The campaign for his nomination was conducted with the greatest adroitness by his friend, Marcus A. Hanna, and in the National Republican Convention held in St Louis in June he was nominated for the presidency on the first ballot by 661 5 out of a total of 906 votes. The convention adopted a tariff plank drafted by McKinley, and, of far greater im- mediate importance, a plank, which declared that the Republican party was ” opposed to the free coinage of silver, except by international agreement with the leading commercial nations of the world, which we pledge ourselves to promote, and until such agreement can be obtained the existing gold standard must be preserved.” This ” gold standard ” plank drove out of the Republican party the Silver Republicans of the West, headed by Senator Henry M. Teller of Colorado. The Republican convention nominated for the vice-presidency Garrett A. Hobart of New Jersey. The National Democratic Convention declared for the immediate opening of the mints to the free and unlimited coinage of silver at the ratio with gold of 16 to 1; and it nominated for the presidency William Jennings Bryan of Nebraska, who also received the nomination of the People’s party and of the National Silver party. There was a secession from the Democratic party of conservatives who called themselves the National Democratic party, who xvii. 9

were commonly called Gold Democrats, and who nominated John M. Palmer (1817-1900) of Illinois for president. In this re-alignment of parties McKinley, who had expected to make the campaign on the issue of a high protective tariff, was diverted to the defence of the gold standard as the main issue. While his opponent travelled

throughout the country making speeches, McKinley remained in Canton, where he was visited by and addressed many Republican delegations. The campaign was enthusiastic: the Republican candidate was called the ” advance agent of prosperity “; ” Bill McKinley and the McKinley Bill ” became a campaign cry; the panic of 1893 was charged to the repeal of the McKinley tariff measure; and ” business men ” throughout the states were enlisted in the cause of ” sound money ” to support McKinley, who was elected in November by a popular vote of 7,106,779 to 6,502,925 for Bryan, and by an electoral vote of 271 to 176.

McKinley was inaugurated president of the United States on the 4th of March 1897. The members of his cabinet were: secretary of state, John Sherman (whose appointment created a vacancy in the Senate to which Marcus A. Hanna was elected), who was succeeded in April 1898 by William R. Day, who in turn was followed in September 1898 by John Hay; secretary of the treasury, Lyman J. Gage, a Gold Democrat; secretary of war, Russell A. Alger, who was succeeded in 1899 by Elihu Root; secretary of the navy, John D. Long; attorney-general, Joseph McKenna, succeeded in January 1898 by John William Griggs; postmaster-general, James A. Gary, succeeded in April 1898 by Charles Emory Smith; secretary of the interior, Cornelius N. Bliss, succeeded in February 1899 by Ethan Allen Hitchcock; and secretary of agriculture, James Wilson. (For the political history of McKinley's administration see United States: History). Immediately after his inauguration the president summoned Congress to assemble in an extra session on the 15th of March. The Democratic tariff in 1893 had been enacted as part of the general revenue measure, which included an income-tax. The income-tax having been declared unconstitutional by the Supreme Court, the measure had failed to produce a sufficient revenue, and it had been necessary to increase the public debt. McKinley's message to the new Congress dwelt upon the necessity of an immediate reyision of the tariff and revenue system of the country, and the so-called Dingley Tariff Bill was accordingly passed through both houses, and was approved by the president on the 24th of July.

The regular session of Congress which opened in December was occupied chiefly with the situation in Cuba. President McKinley showed himself singularly patient and self-controlled in the midst of the popular excitement against Spain and the clamour for intervention by the United States in behalf of the Cubans; but finally, on the 23rd of March, he presented an ultimatum to the Spanish government, and on the 25th of- April, on his recommendation, Congress declared war upon Spain. During the war itself he devoted himself with great energy to the mastery of military details; but there was bitter criticism of the war department resulting in the resignation of the secretary of war, Russell A. Alger (q.v.). The signing of a peace protocol on the 12th of August was followed by the signature at Paris on the 10th of December of articles of peace between the United States and Spain. After a long discussion the peace treaty was ratified by the United States Senate on the 6th of February 1899; and in accordance with its terms Porto Rico, the Philippine Archipelago, and Guam were transferred by Spain to the United States, and Cuba came under American jurisdiction pending the establishment there of an

independent government. Two days before the ratification of the peace treaty, a conflict took place between armed Filipinos under the leadership of Emilio Aguinaldo and the American forces that were in possession of Manila. The six months that had elapsed between the signing of the peace protocol and the ratification of the treaty had constituted a virtual interregnum, Spain's authority having been practi- cally destroyed in the Philippines and that of the United States

not having begun. In this period a formidable native Filipino army had been organized and a provisional government created. The warfare waged by these Filipinos against the United States, while having for the most part a desultory and guerilla character, was of a very protracted and troublesome nature. Sovereignty over the Filipinos having been accepted by virtue of the ratifi- cation of the Paris treaty, President McKinley was not at liberty to do otherwise than assert the authority of the United States and use every endeavour to suppress. the insurrection. But there was bitter protest against this " imperialism," both within the party by such men as Senators George F. Hoar and Eugene Hale, and Thomas B. Reed and Carl Schurz. and, often for purely political reasons, from the leaders of the Demo- cratic party. In the foreign relations of the United States, as directed by President McKinley, the most significant change was the cordial understanding established with the British government, to which much was contributed by his secretary of state, John Hay, appointed to that portfolio when he was ambassador to the court of St James, and which was due to some extent to the friendliness of the British press and even more markedly of the British navy in the Pacific during the Spanish War. Other important foreign events during McKinley's administration were: the annexation of the Hawai- ian Islands (see Hawaii) in August 1898, and the formation of the Territory of Hawaii in April 1900; the cessation in 1899 of the tripartite (German, British, and French) government of the Samoan Islands, and the annexation by the United States of those of the islands east of 171°, including the harbour of Pago-Pago; the participation of American troops in the march of the allies on Pekin in August 1900, and the part played by McKinley's secretary of state, John Hay, in securing a guarantee of the integrity of the Chinese empire. In 1900 McKinley was unanimously renominated by the National Republican Convention which met in Philadelphia on the 19th of June, and which nominated Theodore

Roosevelt, governor of New York, for the vice-presidency. The Republi- can convention demanded the maintenance of the gold standard, and pointed to the fulfilment of some of the most important of the pledges given by the Republican party four years earlier. The intervening period had been one of very exceptional pros- perity in the United States, foreign commerce having reached an unprecedented volume, and agriculture and manufactures having made greater advancement than in any previous period of the country's history. The tendency towards the concen- tration of capital in great industrial corporations had been active to an extent previously undreamt of, with incidental consequences that had aroused much apprehension; and the Democrats accused President McKinley and the Republican party of having fostered the " trusts." But the campaign against McKinley and the Republican party was not only " anti-trust " but " anti-imperialistic." William Jennings Bryan, renominated by the Democratic party in July (and in May by the Fusion People's party) on a free silver platform, declared that imperialism was the " paramount issue " and made a second vigorous campaign; and the opposition to McKinley's re-election, whether based on opposition to his economic or to his foreign policy, was not entirely outside of his own party. -As the result of the polling in November, 292 Republican presidential electors were chosen, and 155 Democratic electors, elected in Colorado, Idaho, Montana, Nevada, and the Southern states, represented the final strength of the Bryan and Stevenson ticket. The Republican popular vote was 7,207,923, and the Democratic 6,358,133. Since 1872 no president had been re-elected for a second consecutive term.

In the term of Congress immediately following the presidential election it was found possible to reduce materially the war taxes which had been levied on the outbreak of the Spanish-American War. Arrangements were perfected for the termination of the American military occupation of Cuba and the inauguration of a Cuban Republic as a virtual protectorate of the United States, the American government having arranged with the

Cuban constitutional convention for the retention of certain naval stations on the Cuban coast. In the Philippines advanced steps had been taken in the substitution of civil government for military occupation, and a governor-general, Judge William H. Taft, had been appointed and sent to Manila. Prosperity at home was great, and foreign relations were free from compli- cations. The problems which had devolved upon McKinley's administration had been far advanced towards final settlement. He retained without change the cabinet of his first administra- tion. After an arduous and anxious term, the

president had reached a period that promised to give him comparative repose and freedom from care. He had secured, through the co—operation of Congress, the permanent reorganization of the army and a very considerable development of the navy. In these circumstances, President McKinley, accompanied by the greater part of his cabinet, set forth in the early summer on a tour to visit the Pacific coast, where he was to witness the launching of the battleship ” Ohio ” at San Francisco. The route chosen was through the Southern states, where many stops were made, and where the president delivered brief addresses. The heartiness of the welcome accorded him seemed to mark the disappearance of the last vestige of sectional feeling that had survived the Civil War, in which McKinley had participated as a young man. After his return he spent a month in a visit at his old home in Canton, Ohio, and at the end of this visit, by previous arrangement, he visited the city of Buffalo, New York, in order to attend the Pan-American exposition and deliver a public address. This address (Sept. 5, 1901) was a public utterance designed by McKinley to affect American opinion and public policy, and apparently to show that he had modified his views upon the tariff. It declared that henceforth the progress of the nations must be through harmony and co-operation, in view of the fast-changing conditions of communication and trade, and it maintained that the time had come for wide- reaching modifications in the tariff policy of the United States, the method preferred by McKinley being that of commercial reciprocity arrangements with various nations. On the following day, the 6th of September 1901, a great reception was held for President McKinley in one of the public buildings of the exposition, all sorts and conditions of men being welcome. Advantage of this opportunity was taken by a young man of Polish parentage, by name Leon Czolgosz, to shoot at the presi- dent with a revolver at close range. One of the two bullets fired penetrated the abdomen. After the world had been assured that the patient was doing well and would recover, he collapsed and died on the 14th. The assassin, who, it was for a time supposed, had been inflamed by the editorials and cartoons of the demagogic opposition press, but who professed to hold the views of that branch of anarchists who believe in the assassination of rulers and persons exercising political authority, was promptly seized, and was convicted and executed in October 1901. McKinley’s conduct and utterances in his last days revealed a loftiness of personal character that every- where-elicited admiration and praise. Immediately after his death Vice-President Roosevelt took the oath of office,’ announc- ing that it would be his purpose to continue McKinley’s policy, while also retaining the cabinet and the principal officers of the government. McKinley’s funeral took place at Canton, Ohio, on the 19th of September, the occasion being

remarkable for the public manifestations of mourning, not only in the United States, but in Great Britain and other countries; in Canton a memorial tomb has been erected.

Though he had not the personal magnetism of James G. Blaine, whom he succeeded as a leader of the Republican party and whose views of reciprocity he formally adopted in his last public address, McKinley had great personal suavity and dignity, and was thoroughly well liked by his party colleagues. As a politician he was always more the people's representative than their leader, and that he " kept his ear to the ground" was the source of much of his power and at the same time was his greatest weakness: his address at Buffalo the day before his assassination seems to voice his appreciation of the change

in popular sentiment regarding the tariff laws of the United States and is the more remarkable as coming from the foremost champion for years of a form of tariff legislation devised to stifle international competition. His apparently incon- sistent record on the coinage question becomes consistent if considered in the same way, as the expression of the gradually changing views of his constituency. And it may not be fanciful to suggest that the obvious growth of McKinley in breadth and power during his term as president was due to his being the representative of a larger constituency, less local and less narrow-minded. He was an able but far from brilliant campaign speaker. His greatest administrative gift was a fine intuition in choosing men to serve him. McKinley's private life was irreproachable; and very fine was his devotion to his wife, Ida Saxton (d. 1907), whom he had married in Canton in 1871, who was throughout his political career a confirmed invalid. He was from his early manhood a prominent member of the Methodist Episcopal Church.

His Speeches and Addresses were printed .in two volumes (New York, 1893 and 1901).

MCKINNEY, a city and the county-seat of Collin county, Texas, U.S.A., about 30 m. N. by E. of Dallas. Pop. (1890), 2489; (1900), 4342 (917 negroes); (1910) 4714. It is served by the Missouri, Kansas & Texas and the Houston & Texas Central railways, and by the Dallas & Sherman inter-urban (electric) line, the central power plant of which is immediately north of the city. McKinney is in a fine farming region; there are also manufactures. The municipal water supply is obtained

from artesian wells. The first settlement in Collin county was made about 10 m. north of what is now McKinney in 1841. McKinney was named, as was the county, in honour of Collin McKinney, a pioneer in the region and a signer of the Declara- tion of the Independence of Texas. It was settled in 1844, was laid out and became the county-seat in 1846, and was first chartered as a city in 1874.

MACKINTOSH, SIR JAMES (1765-1832), Scottish publicist, was born at Aldourie, 7 m. from Inverness, on the 24th of October 1765. He came of old Highland families on both sides. He went in 1780 to college at Aberdeen, where he made a friend of Robert Hall, afterwards the famous preacher. In 1784 he proceeded for the study of medicine to Edinburgh, where he participated to the full in the intellectual ferment, but did not quite neglect his medical studies, and took his degree in

1787.

In 1788 Mackintosh removed to London, then agitated by the trial of Warren Hastings and the king's first lapse into insanity. He was much more interested in these and other political events than in his professional prospects; and his attention was specially directed to the events and tendencies which caused or preceded the Revolution in France. In 1789 he married his first wife, Catherine Stuart, whose brother Daniel afterwards became editor of the Morning Post. His wife's prudence was a corrective to his own unpractical tem- perament, and his efforts in journalism became fairly profitable. Mackintosh was soon absorbed in the question of the time; and in April 1791, after long meditation, he published his Vindiciae Gallicac, a reply to Burke's Reflections on the French Revolution. It was the only worthy answer to Burke that appeared. It placed the author in the front rank of European publicists, and won him the friendship of some of the most distinguished men of the time, including Burke himself. The success of the Vindiciae finally decided him to give up the medical for the legal profession. He was called to the bar in 1795, and gained a considerable reputation there as well as a tolerable practice. In 1797 his wife died, and next year he married Catherine Allen, sister-in-law of Josiah and John Wedgwood, through whom he introduced Coleridge to the Morning Post. As a lawyer his greatest public efforts were his lectures (1790) at Lincoln's Inn on the law of nature and nations, of which the introductory discourse was published, and his eloquent defence (1803) .of Jean Gabriel Peltier, a French refugee, tried at the instance of the French government for a

libel against the first consul. In 1803 he was knighted, and received

the post of recorder at Bombay. The spoilt child of London society was not at home in India, and he was glad to return to England, where he arrived in 181 2.

He courteously declined the offer of Perceval to resume political life under the auspices of the dominant Tory party, though tempting prospects of office in connexion with India were opened up. He entered parliament in the Whig interest as member for Nairn. He sat for that county, and afterwards for Knaresborough, till his death. In London society, and in Paris during his occasional visits, he was a recognized favourite for his genial wisdom and his great conversational power. On Mme de Stael's visit to London he was the only Englishman capable of representing his country in talk with her. His parliamentary career was marked by the same wide and candid liberalism as his private life. He opposed the reactionary measures of the Tory government, supported and afterwards succeeded Romilly in his efforts for reforming the criminal code, and took a leading part both in Catholic emancipation and in the Reform Bill. But he was too little of a partisan, too widely sympathetic and candid, as well as too elaborate, to be a telling speaker in parliament, and was consequently surpassed by more practical men whose powers were incom- parably inferior. From 1818 to 1824 he was professor of law and general politics in the East India Company's College at Haileybury.

In the midst of the attractions of London society and of his parliamentary avocations Mackintosh felt that the real work of his life was being neglected. His great ambition was to write a history of England. His studies both in English and foreign speculation led him to cherish the design also of making some worthy contribution to philosophy. It was not till 1828 that he set about the first task of his literary ambition. This was the Dissertation on the Progress of Ethical Philosophy, pre- fixed to the seventh edition of the Encyclopaedia Britannica. The dissertation, written mostly in ill-health and in snatches of time taken from his parliamentary engagements, was pub- lished in 1 83 1. It was severely attacked in 1835 by James Mill in his Fragment on Mackintosh. About the same time he wrote for the Cabinet Cyclopaedia a " History of England from the Earliest Times to the Final Establishment of the Refor- mation." His more elaborate History of the Revolution, for which he had made great researches and collections, was not published till after his death. Already a privy councillor, Mackintosh was appointed commissioner for the affairs of India under the Whig administration of 1830. He died on the 30th of May 1832.

Mackintosh was undoubtedly one of the most cultured and catholic-

minded men of his time. His studies and sympathies embraced almost every human interest, except pure science. But the width of his intellectual sympathies, joined to a con- stitutional indecision and vis inertiae, prevented him from doing more enduring work. Vindiciae Gallicac was the verdict of a philosophic Liberal on the development of the French Revolu- tion up to the spring of 1791, and though the excesses of the revolutionists compelled him a few years after to express his entire agreement with the opinions of Burke, its defence of the ” rights of man ” is a valuable statement of the cultured Whig’s point of view at the time. The History of the Revolution in England, breaking off at the point where William of Orange is preparing to intervene in the affairs of England, is chiefly interesting because of Macaulay’s admiring essay on it and its author.

A Life, by his son R. J. Mackintosh, was published in 1836.

MACKLIN, CHARLES (c. 1699-1797), Irish actor and play- wright, whose real name was McLaughlin, was born in Ireland, and had an adventurous youth before coming to Bristol, where he made his first appearance on the stage as Richmond in Richard III. He was at Lincoln’s Inn Fields about 1725, and by 1733 was at Drury Lane, where the quarrel between the manager and the principal actors resulted in his getting better parts When the trouble was over and these were taken from

him, he went to the Haymarket, but he returned in 1734 to Drury Lane and acted there almost continuously until 1748. Then for two seasons he and his wife (d. c. 1758), an excellent actress, were in Dublin under Sheridan, then back in London at Covent Garden. He played a great number of characters, principally in comedy, although Shylock was his greatest part, and Iago and the Ghost in Hamlet were in his repertory. At the end of 1753 Macklin bade farewell to the stage to open a tavern, near the theatre, where he personally supervised the serving of dinner. He also delivered an evening lecture, followed by a debate, which was soon a hopeless subject of ridicule. The tavern failed, and Macklin returned to the stage, and played for a number of years in London and Dublin. His quick temper got him into constant trouble. In a foolish quarrel over a wig in 1735 he killed a fellow actor in the green-room at Drury Lane, and he was constantly at law over

his various contracts and quarrels. The bitterest of these arose on account of his appear- ing as Macbeth at Covent Garden in 1 7 7 2 . The part was usually played there by William Smith, and the public would not brook a change. A few nights later the audience refused to hear Macklin as Shylock, and shouted their wish, in response to the manager's question, to have him discharged. This was done in order to quell the riot. His lawsuit, well conducted by him- self, against the leaders of the disturbance resulted in an award of £600 and costs, but Macklin magnanimously elected instead that the defendants should take £100 in tickets at three benefits — for himself, his daughter and the management. He returned to Covent Garden, but his appearances thereafter were less frequent, ending in 1789, when as Shylock, at his benefit, he was only able to begin the play, apologize for his wandering memory, and retire. He lived until the nth of July 1797, and his last years were provided for by a subscription edition of two of his best plays, 1 The Man of the World and Love in a Maze. Macklin's daughter, Mary Macklin (c. 1734-1781), was a well-known actress in her day.

See Edward A. Parry, Charles Macklin (1891). MACK VON LEIBERICH, KARL, Freiherr (1752-1828), Austrian soldier, was born at Nenslingen, in Bavaria, on the 25th of August 1752. In 1770 he joined an Austrian cavalry regiment, in which his uncle, Leiberich, was a squadron com- mander, becoming an officer seven years later. During the brief war of the Bavarian Succession he was selected for service on the staff of Count Kinsky, under whom, and subsequently under the commander-in-chief Field Marshal Count Lacy, he did excellent work. He was promoted first lieutenant in 1778, and captain on the quartermaster-general's staff in 1783. Count Lacy, then the foremost soldier of the Austrian army, had the highest opinion of his young assistant. In 1785 Mack married Katherine Gabrieul, and was ennobled under the name of Mack von Leiberich. In the Turkish war he was employed on the headquarter staff, becoming in 1788 major and personal aide-de-camp to the emperor, and in 1789 lieutenant-colonel. He distinguished himself greatly in the storming of Belgrade. Shortly after this, disagreements between Mack and Loudon, now commander-in-chief, led to the former's demanding a court-martial and leaving the front. He was, however, given a colonelcy (1789) and the order of Maria Theresa, and in 1790 Loudon and Mack, having become reconciled, were again on the field together. During these campaigns Mack received a severe injury to his head, from which he never fully recovered. In 1793 he was made quartermaster-general (chief of staff) to Prince Josias of Saxe-Coburg, commanding in the Netherlands; and he enhanced his reputation by the ensuing

campaign. The young Archduke Charles, who won his own first laurels in the action of the 1st of March 1793, wrote after the battle, ” Above all we have to thank Colonel Mack for these successes.” Mack distinguished himself again on the field of Neerwinden; and had a leading part in the negotiations between Coburg and Dumouriez. He continued to serve as quartermaster-general, and was now made titular chief (Inhaber) of a cuirassier regiment. He received a wound at Famars, but in r794 was once more engaged, having at last been made a major-general. But the

failure of the allies, due though it was to political and military factors and ideas, over which Mack had no control, was ascribed to him, as their successes of March- April 1793 had been, and he fell into disfavour in consequence. In 1797 he was promoted lieutenant field marshal, and in the following year he accepted, at the personal request of the emperor, the command of the Neapolitan army. But with the unpromising material of his new command he could do nothing against the French revo- lutionary troops, and before long, being in actual danger of being murdered by his men, he took refuge in the French camp. He was promised a free pass to his own country, but Napoleon ordered that he should be sent to France as a prisoner of war. Two years later he escaped from Paris in disguise. The allega- tion that he broke his parole is false. He was not employed for some years, but in 1804, when the war party in the Austrian court needed a general to oppose the peace policy of the Arch- duke Charles, Mack was made quartermaster-general of the army, with instructions to prepare for a war with France. He did all that was possible within the available time to reform the army, and on the opening of the war of 1805 he was made quarter- master-general to the titular commander-in-chief in Germany, the Archduke Ferdinand. He was the real responsible com- mander of the army which opposed Napoleon in Bavaria, but his position was ill-defined and his authority treated with slight respect by the other general officers. For the events of the Ulm campaign and an estimate of Mack’s responsibility for the disaster, see Napoleonic Campaigns. After Austerlitz, Mack was tried by a court-martial, sitting from February 1806 to June 1807, and sentenced to be deprived of his rank, his regiment, and the order of Maria Theresa, and to be imprisoned for two years. He was released in 1808, and in 1819, when the ultimate victory of the allies had obliterated the memory of earlier disasters, he was, at the request of Prince Schwarzenberg, re- instated in the army as lieutenant field marshal and a member of the order of Maria Theresa. He died on the 22nd of October 1828 at S. Polten.

See Schweigerd, Oesterreichs Helden (Vienna, 1854); Wurzbach,

Biogr. Lexikon d. Kaiserthums Oesterr. (Vienna, 1867); Ritter von Rittersberg, Biogr. d. ausgezeichneten Feldherren d. oest. Armee (Prague, 1828); Raumer's Hist. Taschenbuch (1873) contains Mack's vindication. A short critical memoir will be found in Streffleur for January 1907.

McLANE, LOUIS (1786-1857), American political leader, was born in Smyrna, Delaware, on the 28th of May 1786, son of Allan McLane (1746-1829), a well-known Revolutionary soldier. He was admitted to the bar in 1807. He entered politics as a Democrat, and served in the Federal House of Representatives in 1817-1827 and in the Senate in 1827-1829. He was minister to England in 1829-1831, and secretary Of the treasury in Jackson's cabinet from 183 1 (when in his annual, report he argued for the United States Bank) until May 1833, when he was transferred to the state department. He retired from the cabinet in June 1834. He was president of the Balti- more & Ohio railway in 1837-1847, mmister to England in 1845-1846, and delegate to the Maryland constitutional conven- tion of 1850-1851. He died in Baltimore, Maryland, on the 7th of October 1857.

His son, Robert Mixligan McLane (18 15-1898), graduated at West Point in 1837, resigned from the army in 1843, and practised law in Baltimore. He was a Democratic represent- ative in Congress in 1847-1851 and again in 1879-1883, governor of Maryland in 1884-1885, U.S. commissioner to China in 1853-1854, and minister to Mexico in 1859-1860 and to France in 1885-1889.

See R. M. McLane 's Reminiscences, 1827-1897 (privately printed,

1897).

MACLAREN, CHARLES (1782-1866), Scottish editor, was born at Ormiston, Haddingtonshire, on the 7th of October 1782, the son of a farmer and cattle-dealer. He was almost entirely self-educated, and when a young man became a clerk in Edin- burgh. In 1817, with others, he established the Scotsman news- paper in Edinburgh and at first acte.d as its editor. Offered a post as clerk in the custom house, he resigned his editorial

position, resuming it in 1820, and resigning it again in 1845. In 1820 Maclaren was made editor of the sixth edition of the Encyclopaedia Britannica. From 1864-1866 he was president of the Geological

Society of Edinburgh, in which city he died on the 10th of September 1866.

MACLAREN, IAN, the pseudonym of John Watson (1850- 1907), Scottish author and divine. The son of John Watson, a civil servant, he was born at Manningtree, Essex, on the 3rd of November 1850, and was educated at Stirling and at Edin- burgh University, afterwards studying theology at New College, Edinburgh, and at Tubingen. In 1874 he entered the ministry of the Free Church of Scotland and became assistant minister of Barclay Church, Edinburgh. Subsequently he was minister at Logiealmond in Perthshire and at Glasgow, and in 1880 he became minister of Sefton Park Presbyterian church, Liverpool, from which he retired in 1905. In 1896 he was Lyman Beecher lecturer at Yale University, and in 1900 he was moderator of the synod of the English Presbyterian church. While travelling in America he died at Mount Pleasant, Iowa, on the 6th of May 1907. Ian Maclaren's first sketches of rural Scottish life, Beside the Bonnie Briar Bush (1894), achieved extraordinary popularity and were followed by other successful books, The Days of Auld Lang Syne (1895), Kate Carnegie and those Ministers (1896) and Afterwards and other Stories (1898). Under his own name Watson published several volumes of sermons, among them being The Upper Room (1895); The Mind of the Master (1896) and The Potter's Wheel (1897).

See Sir W. Robertson Nicoll, Ian Maclaren (1908). HACLAURIN, COLIN (1698-1746), Scottish mathematician, was the son of a clergyman, and born at Kilmodan, Argyllshire. In 1 709 he entered the university of Glasgow, where he exhibited a decided genius for mathematics, more especially for geometry; it is said that before the end of his sixteenth year he had dis- covered many of the theorems afterwards published in his GeoPietria organica. In 1717 he was elected professor of mathe- matics in Marischal College, Aberdeen, as the result of a com- petitive examination. Two years later he was admitted F.R.S. and made the acquaintance of Sir Isaac Newton. In 1719 he published his Geometria organica, sive descriptio linearum curvarum universalis. In it Maclaurin developed several theo- rems due to Newton, and introduced the method of generating conies which bears his name, and showed that many curves of the third and fourth degrees can be described by the inter- section of two movable angles. In 1721 he wrote a supplement to the Geometria organica, which he afterwards published, with extensions, in the Philosophical Transactions for 1735- This paper is principally based on the following general theorem, which is a remarkable extension of Pascal's hexagram: " If a polygon move so that each of its sides passes through a fixed point, and if all its summits except one describe curves of the

degrees w, n, p, &c, respectively, then the free summit moves on a curve of the degree 2mnp …. which reduces to mnp …. when the fixed points all lie on a right line.” In 1722 Maclaurin travelled as tutor and companion to the eldest son of Lord Polwarth, and after a short stay in Paris resided for some time in Lorraine, where he wrote an essay on the percussion of bodies, which obtained the prize of the French Academy of Sciences for the year 1724. The following year he was elected professor of mathematics in the university of Edinburgh on the urgent recommendation of Newton. After the death of Newton, in 1728, his nephew, John Conduitt, applied to Maclaurin for his assistance in publishing an. account of Newton’s life and dis- coveries. This Maclaurin gladly undertook, but the death of Conduitt put a stop to the project.

In 1740 Maclaurin divided with Leonhard Elder and Daniel Bernoulli the prize offered by the French Academy of Sciences for an essay on tides. His Treatise on Fluxions was published at Edinburgh in 1742, in two volumes. In the preface he states that the work was undertaken in consequence of the attack on the method of fluxions made by George Berkeley in 1734. Maclaurin’s object was to found the doctrine of fluxions on geometrical demonstration, and thus to answer all objections

to its method as being founded on false reasoning and full of mystery. The most valuable part of the work is that devoted to physical applications, in which he embodied his essay on the tides. In this he showed that a homogeneous fluid mass revolving uniformly round an axis under the action of gravity ought to assume the form of an ellipsoid of revo- lution. The importance of this investigation in connexion with the theory of the tides, the figure of the earth, and other kindred questions, has always caused it to be regarded as one of the great problems of mathematical physics. Maclaurin was the first to introduce into mechanics, in this discussion, the important conception of surfaces of level; namely, surfaces at each of whose points the total force acts in the normal direction. He also gave in his Fluxions, for the first time, the correct theory for distinguishing between maxima and minima in general, and pointed out the importance of the distinction in the theory of the multiple points of curves. In 1745, when the rebels were march- ing on Edinburgh, Maclaurin took a most prominent part in preparing trenches and barricades for its defence. The anxiety, fatigue and cold to which he was thus exposed, affecting a con- stitution naturally weak, laid the foundation of the disease to which he afterwards succumbed. As soon as the rebel army got possession of Edinburgh Maclaurin fled to England, to avoid making submission to the Pretender. He accepted the invita- tion of T.

Herring, then archbishop of York, with whom he re- mained until it was safe to return to Edinburgh. He died of dropsy on the 14th of June 1746, at Edinburgh. Maclaurin was married in 1733 to Anne, daughter of Walter Stewart, solicitor- general for Scotland. His eldest son John, born in 1734, was distinguished as an advocate, and appointed one of the judges of the Scottish court of session, with the title of Lord Dreghorn. He inherited an attachment to scientific discovery, and was one of the founders of the Royal Society of Edinburgh, in

1782.

After Maclaurin's death his account of Newton's philosophical discoveries was published by Patrick Murdoch, and also his algebra in 1748. As an appendix to the latter appeared his De linearum geometricarum'proprietatibus generalibus tractatus, a treatise of re- markable elegance. Of the more immediate successors of Newton in Great Britain Maclaurin is probably the only one who can be placed in competition with the great mathematicians of the continent of Europe at the time. (B. W.)

M'LENNAN, JOHN FERGUSON (1827-1881), Scottish ethnolo- gist, was born at Inverness on the 14th of October 1827. He studied at King's college, Aberdeen, where he graduated with distinction in 1849, thence proceeding to Cambridge, where he remained till 1855 without taking a degree. He was called to the Scottish bar in 1857, and in 1871 was appointed parlia- mentary draughtsman for Scotland. In 1865 he published Primitive Marriage, in which, arguing from the prevalence of the symbolical form of capture in the marriage ceremonies of primitive races, he developed an intelligible picture of the growth of the marriage relation and of systems of kinship (see Family) according to natural laws. In 1866 he wrote in the Fortnightly Review (April and May) an essay on " Kinship in Ancient Greece," in which he proposed to test by early Greek facts the theory of the history of kinship set forth in Primitive Marriage; and three years later appeared a series of essays on " Totemism " in the same periodical for 1 869-1 870 (the germ of which had been contained in the paper just named) , which mark the second great step in his systematic study of early society. A reprint of Primitive Marriage, with " Kinship in Ancient Greece " and some other essays not previously published, ap- peared in 1876, under the title of Studies in Ancient History. The new essays in this volume were mostly critical, but one of them, in which perhaps his guessing talent is seen at its best, " The Divisions of the Irish Family," is an elaborate discussion of a problem which has long puzzled both Celtic scholars and jurists; and in another, " On the

Classificatory System of Relationship," he propounded a new explanation of a series of facts which, he thought, might throw light upon the early history of society, at the same time putting to the test of those facts the theories he had set forth in Primitive Marriage. Papers

on " The Levirate and Polyandry," following up the line of his previous investigations (Fortnightly Review, 1877), were the last work he was able to publish. He died of consumption on the 14th of June 1881 at Hayes Common, Kent.

Besides the works already cited, M'Lennan wrote a Life of Thomas Driimmond (1867). The vast materials which he had accumulated on kinship were edited by his widow and A. Piatt, under the title Studies in Ancient History: Second Series (1896).

MACLEOD, HENRY DUNNING (1821-1902), .Scottish econo- mist, was born in Edinburgh, and educated at Eton, Edinburgh University, and Trinity College, Cambridge, where he graduated in 1843. He travelled in Europe, and in 1849 was called to the English bar. He was employed in Scotland on the work of poor-law reform, and devoted himself to the study of economics. In 1856 he published his Theory and Practice of Banking, in 1858 Elements of Political Economy, and in 1859 A Dictionary of Political Economy. In 1873 appeared his Principles of Economist Philosophy, and other books on economics and banking were published later. Between 1868 and 1870 he was employed by the government in digesting and codifying the law of bills of exchange.. He died on the 16th of July 1902. Macleod's principal contribution to the study of economics consists in his work on the theory of credit, to which he was the first to give due prominence.

For a judicious discussion of the value of Macleod's writings, see an article on " The Revolt against Orthodox Economics " in the Quarterly Review for October 1901 (No. 388).

MACLEOD, NORMAN (18 12-18 7 2), Scottish divine, son of Rev. Norman Macleod (1 783-1862), and grandson of Rev. Norman Macleod, minister of Morven, Argyllshire, was born at Campbeltown on the 3rd of June 1812. In 1827 he became a student at Glasgow University, and in 1831 went to Edinburgh to study divinity under Dr

Thomas Chalmers. On the 18th of March 1838 he became parish minister at Loudoun, Ayrshire. At this time the troubles in the Scottish Church were already gathering to a head (see Free Church of Scotland). Macleod, although he had no love for lay patronage, and wished the Church to be free to do its proper work, clung firmly to the idea of a national Established Church, and therefore remained in the Establishment when the disruption took place. He was one of those who took a middle course in the non-intrusion controversy, holding that the fitness of those who were presented to parishes should be judged by the presbyteries — the principle of Lord Aberdeen's Bill. On the secession of 1843 ne was offered many different parishes, and having finally settled at Dalkeith, devoted himself to parish work and to questions affect- ing the Church as a whole. He was largely instrumental in the work of strengthening the Church. In 1847 he became one of the founders of the Evangelical Alliance, and from 1849 edited the Christian Instructor (Edinburgh). In 1851 he was called to the Barony church, Glasgow, in which city the rest of his days were passed. There the more liberal theology rapidly made way among a people who judged it more by its fruits than its argu- ments, and Macleod won many adherents by his practical schemes for the social improvement of the people. He instituted temperance refreshment rooms, a congregational penny sav- ings bank, and held services specially for the poor. In i860 Macleod was appointed editor of the new monthly magazine Good Words. Under his control the magazine, which was mainly of a religious character, became widely poDular. His own literary work, nearly all of which originally appeared in its pages — sermons, stories, travels, poems — was only a by- product of a busy life. By far his best work was the spontaneous and delightful Reminiscences of a Highland Parish (1867). While Good Words made his name known, and helped the cause he had so deeply at heart, his relations with the queen and the royal family strengthened yet further his position in the country. Never since Principal Carstairs had any Scottish clergyman been on such terms with his sovereign. In 1865 he risked an encounter with Scottish Sabbatarian ideas. The presbytery of Glasgow issued a pastoral letter on the subject of Sunday trains and other infringements of the Sabbath. Macleod protested

against the grounds on which its strictures were based. F01 a time, owing partly to a misleading report of his statement, he became " the man in all Scotland most profoundly distrusted." But four years later the Church accorded him the highest honour in her power by choosing him as moderator of her general assembly. In 1867, along with Dr Archibald Watson, he was sent to India, to inquire into the state of the

missions. He undertook the journey in spite of failing health, and seems never to have recovered from its effects. He returned resolved to devote the rest of his days to rousing the Church to her duty in the sphere of foreign missions, but his health was now broken, and his old energy flagged. He died on the 16th of June 1872, and was buried at Campsie. He was one of the greatest of Scottish religious leaders, a man of wide sympathy and high ideals. His Glasgow church was named after him the ” Macleod Parish Church,” and the ” Macleod Missionary Institute ” was erected by the Barony church in Glasgow. Queen Victoria gave two memorial windows to Crathie church as a testimony of her admiration for his work.

See Memoir of Norman Macleod, by his brother, Donald Macleod

(1876).

MACLISE, DANIEL (1806-1870), Irish painter, was born at Cork, the son of a Highland soldier. His education was of the plainest kind, but he was eager for culture, fond of reading, and anxious to become an artist. His father, however, placed him, in 1820, in Newenham’s Bank, where he remained for two years, and then left to study in the Cork school of art. In 1825 it happened that Sir Walter Scott was travelling in Ireland, and young Maclise, having seen him in a bookseller’s shop, made a surreptitious sketch of the great man, which he afterwards lithographed. It was exceedingly popular, and the artist became celebrated enough to receive many commissions for portraits, which he executed, in pencil, with very careful treatment of detail and accessory. Various influential friends perceived the genius and promise of the lad, and were anxious to furnish him with the means of studying in the metropolis; but with rare independence he refused all aid, and by careful economy saved a sufficient sum to enable him to leave for London. There he made a lucky hit by a sketch of the younger Kean, which, like his portrait of Scott, was lithographed and published. He entered the Academy schools in 1828, and carried off the highest prizes open to the students. In 1829 he exhibited for the first time in the Royal Academy. Gradually he began to confine himself more exclusively to subject and historical pictures, varied occasionally by portraits of Campbell, Miss Landon, Dickens, and other of his literary friends. In 1833 he exhibited two pictures which greatly increased his reputation, and in 1835 the ” Chivalric Vow of the Ladies and the Peacock ” procured his election as associate of the Academy, of which he became full member in 1840. The years that followed were occupied with a long series of figure pictures, deriving their subjects from history and tradition and from the works of Shakespeare, Goldsmith and Le Sage. He also designed illustrations for

several of Dickens's Christmas books and other works. Between the years 1830 and 1836 he contributed to Fraser's Magazine, under the pseudonym of Alfred Croquis, a remarkable series of portraits of the literary and other celebrities of the time — character studies, etched or lithographed in outline, and touched more or less with the emphasis of the caricaturist, which were afterwards published as the Maclise Portrait Gallery (187 1). In 1858 Maclise commenced one of the two great monumental works of his life, the " Meeting of Wellington and Bliicher," on the walls of Westminster Palace. It was begun in fresco, a process which proved unmanageable. The artist wished to resign the task; but, encouraged by Prince Albert, he studied in Berlin the new method of " water-glass " painting, and carried out the subject and its companion, the "Death of Nelson," in that medium, completing the latter painting in 1864. The intense application which he gave to these great historic works, and various circumstances connected with the commission, had a serious effect on the artist's health. He began to shun the company in which he formerly delighted; his old buoyancy of

spirits was gone; and when, in 1865, the presidentship of the Academy was offered to him he declined the honour. He died of acute pneumonia on the 25th of April 1870. His works are distinguished by powerful intellectual and imaginative qualities, but most of them are marred by harsh and dull colouring, by metallic hardness of surface and texture, and by frequent touches of the theatrical in the action and attitudes of the figures. His fame rests most securely on his two greatest works at Westminster.

A memoir of Maclise, by his friend W. J. O'Driscoll, was published in 1871.

MACLURE, WILLIAM (1763-1840), American geologist, was born at Ayr in Scotland in 1763. After a brief visit to New York in 1782 he began active life as a partner in a London firm of American merchants. In 1796 business affairs took hinl to Virginia, U.S.A., which he thereafter made his home. In 1803 he visited France as one of the commissioners appointed to settle the claims of American citizens on the French govern- ment; and during the few years then spent in Europe he applied himself with enthusiasm to the study of geology. On his return home in 1807 he commenced the self-imposed task of making a geological survey of the United States. Almost every state in

the Union was traversed and mapped by him, the Alleghany Mountains being crossed and recrossed some fifty times. The results of his unaided labours were submitted to the American Philo- sophical Society in a memoir entitled Observations on the Geology of the United States explanatory of a Geological Map, and pub- lished in the Society's Transactions (vol. iv. 1809, p. 91) together with the first geological map of that country. This antedates William Smith's geological map of England by six years. In 18 1 7 Maclure brought before the same society a revised edition of his map, and his great geological memoir was issued sepa- rately, with some additional matter, under the title Observations on the Geology of the United Stales of America. Subsequent survey has corroborated the general accuracy of Maclure's obser vations. In 1819 he visited Spain, and attempted, unsuccess- fully, to establish an agricultural college near the city of Alicante. Returning to America in 1824, he settled for some years at New Harmony, Indiana, and sought to develop his scheme of the agricultural college. Failing health ultimately constrained him to relinquish the attempt, and to seek (in 1827) a more con- genial climate in Mexico. There, at San Angel, he died on the 23rd of March 1840.

See S. G. Morton, " Memoir of William Maclure," Amer. Journ. Sci., vol. xlvii. (1844), p. 1.

MACMAHON, MARIE EDME PATRICE MAURICE DE, duke of Magenta (1808-1893), French marshal and president of the French republic, was born on the 13th of July 1808 at the chateau of Sully, near Autun. He was descended from an Irish family which went into exile with James II. Educated at the military , school of St Cyr, in 1827 he entered the army, and soon saw active service in the first French campaign in Algeria, where his ability and bravery became conspicuous. Being recalled to France, he gained renewed distinction in the expedition to Antwerp in 1832. He became captain in 1833, and in that year returned to Algeria. He led daring cavalry raids across plains infested with Bedouin, and especially distinguished himself at the siege of Constantine in 1837. From then until 1855 he was almost constantly in Algeria, and rose to the rank of general of division. During the Crimean War MacMahon was given the command of a division, and in September 1855 he successfully conducted the assault upon the Malakoff works, which led to the fall of Sebastopol. After his return to France honours were showered upon him, and he was made a senator. Desiring a more active life, however, and declining the highest command in France, he was once more sent out, at his own request, to Algeria, where he completely defeated the Kabyles. After his return to France he voted as a senator against the unconstitutional

law for general safety, which was brought forward in consequence of Orsini's abortive attempt on the emperor's life. MacMahon greatly distinguished himself in the

Italian campaign of 1859. Partly by good luck and partly by his boldness and sagacity in pushing forward without orders at a critical moment at the battle of Magenta, he enabled the French to secure the victory. For his brilliant services Mac- Mahon received his marshal's baton and was created duke of Magenta. In 1861 he represented France at the coronation of William I. of Prussia, and in 1864 he was nominated governor- general of Algeria. MacMahon's action in this capacity formed the least successful episode of his career. Although he did institute some reforms in the colonies, complaints were so numerous that twice in the early part of 1870 he sent in his resignation to the emperor. When the ill-fated Ollivier cabinet was formed the emperor abandoned his Algerian schemes and MacMahon was recalled.

War being declared between France and Prussia in July 1870, MacMahon was appointed to the command of the Alsace army detachment (see Franco-German War). On the 6th of August MacMahon fought the battle of Worth (q.v.). His courage was always conspicuous on the field, but the two-to-one numerical superiority of the Germans triumphed. MacMahon was compelled to fall back upon Saverne, and thence to Toul. Though he suffered further losses in the course of his retreat, his movements were so ably conducted that the emperor confided to him the supreme command of the new levies which he was mustering at Chalons, and he was directed to effect a junction with Bazaine. This operation he undertook against his will. He had an army of 120,000 men, with 324 guns; but large numbers of the troops were disorganized and demoralized. Early on the 1st of September the decisive battle of Sedan began. MacMahon was dangerously wounded in the thigh, whereupon General Ducrot, and soon afterwards General de Wimpffen, took command. MacMahon shared the captivity of his comrades, and resided at Wiesbaden until the conclusion of peace.

In March 1.87 1 MacMahon was appointed by Thiers commander- in-chief of

The president was very popular in the rural districts of France, through which he made a successful tour shortly after the declaration of the Septennate. But in Paris and other large cities his policy soon caused great dissatisfaction, the Repub- lican party especially being alienated by press prosecutions and the attempted suppression of

Republican ideas. Matters were at a comparative deadlock in the National Assembly, until the accession of some Orleanists to the Moderate Republican party

in 1875 made it possible to pass various constitutional laws. In May 1877, however, the constitutional crisis became once more acute. A peremptory letter of censure from MacMahon to Jules Simon caused the latter to resign with his colleagues. The due de Broglie formed a ministry, but Gambetta carried a resolution in the Chamber of Deputies in favour of parlia- mentary government. The president declined to yield, and being supported by the Senate, he dissolved the Chamber, by decree, on the 25th of June. The prosecution of Gambetta followed for a speech at Lille, in which he had said ” the marshal must, if the elections be against him, se soumettre ou se dimettre.” In a manifesto respecting the elections, the president referred to his successful government and observed, ” I cannot obey the injunctions of the demagogy; I can neither become the instrument of Radicalism nor abandon the post in which the constitution has placed me.” His confidence in the result of the elections was misplaced. Notwithstanding the great pressure put upon the constituencies by the government, the elections in October resulted in the return of 335 Republicans and only 198 anti-Republicans, the latter including 30 MacMahonists, 89 Bonapartists, 41 Legitimists, and 38 Orleanists. The presi- dent endeavoured to ignore the significance of the elections, and continued his reactionary policy. As a last resort he called to power an extra-parliamentary cabinet under General Roche- bouet, but the Republican majority refused to vote supplies, and after a brief interval the president was compelled to yield, and 1.0 accept a new Republican ministry under Dufaure. The prolonged crisis terminated on the 14th of December 1877, and no further constitutional difficulties arose in 1878. But as the senatorial elections, held early in 1879, gave the Republicans an effective working majority in the Upper Chamber, they now called for the removal of the most conspicuous anti- Republicans among the generals and officials. The president refused to supersede them, and declined to sanction the law brought in with this object. Perceiving further resistance to* be useless, however, MacMahon resigned the presidency on the 30th of January 1879, and Jules Grevy was elected as his successor.

MacMahon now retired into private life. Relieved from the cares of

state, his simple and unostentatious mode of existence enabled him to pass many years of dignified repose. He died at Paris on the 17th of October 1893, in his eighty-sixth year. A fine, tall, soldierly man, of a thoroughly Irish type, in private life MacMahon was universally esteemed as generous and honourable; as a soldier he was brave and able, with- out decided military genius; as a politician he was patriotic and well-intentioned, but devoid of any real capacity for statecraft. (G.B.S.)

McMASTER, JOHN BACH (1852-), American historian,

was born in Brooklyn, New York, on the 29th of June 1852. He graduated from the college of the City of New York in 1872, worked as a civil engineer in 1873-1877, was instructor in civil engineering at Princeton University in 187 7-1 883, and in 1883 became professor of American history in the university of Pennsylvania. He is best known for his History of the People of the United States from the Revolution to the Civil War (1883 sqq.), a valuable supplement to the more purely political writings of Schouler, Von Hoist and Henry Adams.

MACMILLAN, the name of a family of English publishers. The founders of the firm were two Scotsmen, Daniel Macmillan (1813-1857) and his younger brother Alexander (1818-1896). Daniel was a native of the Isle of Arran, and Alexander was born in Irvine on the 3rd of October 1818. Daniel was for some time assistant to the bookseller Johnson at Cambridge, but entered the employ of Messrs Seeley in London in 1837 ; in 1843 he began business in Aldersgate Street, and in the same year the two brothers purchased the business of Newby in Cambridge. They did not confine themselves to bookselling, but published educa- tional works as early as 1844. In 1845 they became the pro- prietors of the more important business of Stevenson, in Cam- bridge, the firm being styled Macmillan, Barclay & Macmillan. In 1850 Barclay retired and the firm resumed the name of Mac- millan & Co. Daniel Macmillan died at Cambridge on the 27th

of June 1857. In that year an impetus was given to the business by the publication of Kingsley's Two Years Ago. A branch office was opened in 1858 in Henrietta Street, London, which led to a great extension of trade. These premises were surrendered for larger ones in Bedford Street, and in 1897 the buildings in St Martin's Street were opened. Alexander Macmillan died in January 1896. By his great energy and literary associations, and with the aid of his partners, there had been built up in little over half a century one of the most important publishing houses in the world. Besides the issue of many important series of educational and scientific works, they published the works of

Kingsley, Huxley, Maurice, Tennyson, Lightfoot, Westcott, J. R. Green, Lord Roberts.Lewis Carroll, and of many other well-known authors. In 1898 they took over the old-established publishing house of R. Bentley & Son, and with it the works of Mrs Henry Wood, Miss Rhoda Broughton, The Ingoldsby Legends, and also Temple Bar and the Argosy. In 1893 the firm was converted into a limited liability company, its chairman being Frederick Macmillan (b. 1851), who was knighted in 1909. The American firm of the Macmillan Company, of which he was also a director, is a separate business.

See Thomas Hughes, Memoir of Daniel Macmillan(l882) ; A Bibliographical Catalogue of Macmillan & Co's Publications from 1843 to 1889 (1891), with portraits of the brothers Daniel and Alexander after Lowes Dickinson and Hubert Herkomer; also articles in Le Lime (September 1886), Publishers' Circular (January 14, 1893), the Bookman (May 1901), &c.

MACMONNIES, FREDERICK WILLIAM (1863-), Ameri- can sculptor and painter, was born at Brooklyn, New York, on the 20th of September 1863. His mother was a niece of Benjamin West. At the age of sixteen MacMonnies was received as an apprentice in the studio of Augustus St Gaudens, the sculptor, where he remained for five years. In 1884 he went to Paris and thence to Munich, where he painted for some months. Returning to Paris next year he became the most prominent pupil of Fal- guiere. His " Diana " brought him a mention at the Salon of 1889. Three life-sized figures of angels for the church of St Paul, New York, were followed by his " Nathan Hale," in the City Hall Park, New York, and a portrait of James S. T, Stranahan, for Brooklyn. This last brought him a " second medal " in the Salon of 1 891 , the first time an American sculptor had been so honoured. In 1893 he was chosen to design and carry out the Columbian Fountain for the Chicago World's Fair, which placed him instantly in the front rank. His largest work is a decoration for the Memorial Arch to Soldiers and Sailors, in Prospect Park, Brook- lyn, consisting of three enormous groups in bronze. In Prospect Park, Brooklyn, MacMonnies has also a large " Horse Tamer," a work of much distinction. A " Winged Victory " at the U.S. military academy at West Point, New York, is of importance; and his " Bacchante," an extraordinary combination of real- ism and imagination, rejected by the Boston Public Library, is now at the Metropolitan Museum of Art, New York. He also became well known as a painter, mainly of portraits. In 1888 he married Mary Fairchild, a figure painter of distinction, but in 1909 they were divorced and she married Will H. Low.

MACNAGHTEN, SIR WILLIAM HAY, Bart. (1793-1841), Anglo-Indian

diplomatist, was the second son of Sir Francis Macnaghten, Bart., judge of the supreme courts of Madras and Calcutta. He was born in August 1 793 , and educated at Charter- house. He went out to Madras as a cadet in 1809, but was appointed in 1816 to the Bengal Civil Service. He early dis- played a great talent for languages, and also published several treatises on Hindu and Mahommedan law. His political career began in 1830 as secretary to Lord William Bentinck; and in 1837 he became one of the most trusted advisers of the governor- general, Lord Auckland, with whose policy of supporting Shah Shuja against Dost Mahommed, the reigning amir of Kabul, Macnaghten was closely identified. As political agent at Kabul he came into conflict with the military authorities and subse- quently with his subordinate Sir Alexander Burnes. Macnaghten attempted to placate the Afghan chiefs with heavy subsidies, but when the drain on the Indian exchequer became too great,

and the allowances were reduced, this policy led to an outbreak. Burnes was murdered on the 2nd of November 1841; and owing to the incapacity of the aged General Elphmstone the British army in Kabul degenerated into a leaderless mob. Macnaghten tried to save the situation by negotiating with the Afghan chiefs and, independently of them, with Dost Mahommed's son, Akbar Khan, by whom he was assassinated on the 23rd of December 1 841; the disastrous retreat from Kabul and the massacre of the British army in the Kurd Kabul pass followed. These events threw doubt on Macnaghten's capacity for dealing with the problems of Indian diplomacy, though his fearlessness and integrity were unquestioned. He had been created a baronet in 1840, and four months before his death was nominated to the governorship of Bombay.

MacNALLY, LEONARD (1752-1820), Irish informer, was born in Dublin, the son of a merchant. In 1776 he was called to the Irish, and in 1783 to the English bar. He supported himself for some time in London by writing plays and editing the Public Ledger. Returning to Dublin, he entered upon a systematic course of informing against the members of the revolutionary party, for whom his house had become the resort. He also betrayed to the government prosecutors political clients whom he defended eloquently in the courts. He made a fine defence for Robert Emmet and cheered him in his last hours, although before appearing in court he had sold, for £200, the contents of his brief to the lawyers for the Crown. After living a professed Protestant

all his life, he received absolution on his deathbed from a Roman Catholic priest. He died on the 13th of February

1820.

MACNEE, SIR DANIEL (1806-1882), Scottish portrait painter, was born at Fintry in Stirlingshire. At the age of thirteen he was apprenticed, along with Horatio Macculloch and Leitch the water-colour painter, to John Knox, a landscapist of some re- pute. He afterwards worked for a year as a lithographer, was employed by the Smiths of Cumnock to paint the ornamental lids of their planewood snuff-boxes, and, having studied in Edinburgh at the " Trustees' Academy," supporting himself meanwhile by designing and colouring book illustrations for Lizars the engraver, he established himself as an artist in Glasgow, where he became a fashionable portrait painter. He was in 1829 admitted a member of the Royal Scottish Academy; and on the death of Sir George Harvey in 1876 he was elected president, and received the honour of knighthood. From this period till his death, on the 18th of January 1882, he resided in Edinburgh, where his genial social qualities and his inimitable powers as a teller of humorous Scottish anecdote rendered him popular.

MACNEIL, HERMON ATKINS (1866-), American sculptor, was born at Chelsea, Massachusetts. He was an instructor in industrial art at Cornell University in 1886-1889, and was then a pupil of Henri M. Chapu and Falguiere in Paris. Returning to America, he aided Philip Martiny in the preparation of sketch models for the Columbian exposition, and in 1896 he won the Rinehart scholarship, passing four years (1896-1900) in Rome. In 1906 he became a National Academician. His first important work was " The Moqui Runner," which was followed by " A Primitive Chant," and " The Sun Vow," all figures of the North- American Indian. A " Fountain of Liberty," for the St Louis exposition, and other Indian themes came later; his " Agnese " and his " Beatrice," two fine busts of women, also deserve mention. His principal work is the sculpture for a large memorial arch, at Columbus, Ohio, in honour of President McKinley. In 1909 he won in competition a commission for a large soldiers'' and sailors' monument in Albany, New York. His wife, Carol Brooks MacNeil, also a sculptor of distinction, was a pupil of F. W. MacMonnies.

McNEILE, HUGH (1795-1879), Anglican divine, younger son of Alexander McNeile (or McNeill), was born at Ballycastle, Co. Antrim, on the 15th of July 1795. He graduated at Trinity College, Dublin, in 1810. His handsome presence, and his promise of exceptional gifts of oratory, led a wealthy uncle, Major-General Daniel McNeill, to adopt

him as his heir; and he

was destined for a parliamentary career. During a stay at Florence, Hugh McNeile became temporarily intimate with Lord Byron and Madame de Stael. On returning home, he determined to abandon the prospect of political distinction for the clerical profession, and was disinherited. In 1820 he was ordained, and after holding the curacy of Stranorlar, Co. Donegal, for two years, was appointed to the living of Albury, Surrey, by Henry Drummond.

Edward Irving endeavoured, not without success at first, to draw McNeile into agreement with his doctrine and aims. Irving's increasing extravagance, however, soon alienated McNeile. His preaching now attracted much attention; in London he frequently was heard by large congregations. In 1834 he accepted the incumbency of St Jude's, Liverpool, where for the next thirty years he wielded great political as well as ecclesiastical influence. He repudiated the notion that a clergyman should be debarred from politics, maintaining at a public meeting that " God when He made the minister did not unmake the citizen." In 1835 McNeile entered upon a long contest, in which he was eventually successful, with the Liverpool corporation, which had been captured by the Whigs, after the passing of the Municipal Reform Act. A proposal was carried that the elementary schools under the control of the corporation should be secularized by the introduction of what was known as the Irish National System. The threatened withdrawal of the Bible as the basis of denomi- national religious teaching was met by a fierce agitation led by McNeile, who so successfully enlisted public support that before the new system could be introduced every child was provided for in new Church of England schools established by public sub- scriptions. At the same time he conducted a campaign which gradually reduced J.he Whig element in the council, till in 1841 it almost entirely disappeared. To his influence was also attributed the defeat of the Liberal parliamentary candidates in the general election of 1837, followed by a long period of Conservative pre- dominance in Liverpool politics. McNeile had the Irish Protest- ant's horror of Romanism, which he constantly denounced in the pulpit and on the platform; and Macaulay, speaking in the House of Commons on the Maynooth endowment in April 1845, singled him out for attack as the most powerful representative of un- compromising Protestant opinion in the country. As the Tract- arian movement in the Church of England developed, he became one of its most zealous opponents and the most conspicuous leader of the evangelical party. In 1840 he published a volume of Lectures on the Church of England, and in 1846 (the year after Newman's secession to Rome) The Church and the Churches, in which he maintained with

much dialectical skill the evangelical doctrine of the ” invisible Church ” in opposition to the teaching of Newman and Pusey. Hugh McNeile was in close sympathy with the philanthropic work as well as the religious views of the 7th earl of Shaftesbury, who more than once tried to persuade Lord Palmerston to raise him to the episcopal bench. But although Palmerston usually followed the advice of Shaftesbury in the appointment of bishops, he would not consent to the eleva- tion to the House of Lords of so powerful a political opponent as McNeile, whom Lord John Russell had accused of frustrating for thirty years the education policy of the Liberal party. In i860 he was appointed a canon of Chester; and in 1868 Disraeli appointed him dean of Ripon. This preferment he resigned in 1875, and he lived in retirement at Bournemouth till his death on the 28th of January 1879. McNeile married, in 1822, Anne, daughter of William Magee, archbishop of Dublin, and aunt of William Connor Magee, archbishop of York, by whom he had a large family.

Although a vehement controversialist, Hugh McNeile was a man of simple and sincere piety of character. Sir Edward Russell, an opponent alike of his religious and his political opinions, bears witness to the deep spirituality of his teaching, and describes him as an absolutely unique personality. ” He made himself leader of the Liverpool people, and always led with calm and majesty in the most excited times. His eloquence was grave, flowing, emphatic — had a dignity in delivery, a perfection of elocu- tion, that only John Bright equalled in the latter half of the

19th century. Its fire was solemn force. McNeile’s voice was probably the finest organ ever heard in public oratory. His action was as graceful as it was expressive. He ruled an audience.”

See J. A. Picton, Memorials of Liverpool, vol. i. (1873) ; Sir Edward Russell, ” The Religious Life of Liverpool,” in the Sunday Maga- zine (June 1905) ; Charles Bullock, Hugh McNeile and Reformation Truth. (R. J. M.)

MACNEILL, HECTOR (1 746-1818), Scottish poet, was born near Roslin, Midlothian, on the 22nd of October 1746, the son of an impoverished army captain. He went to Bristol as a clerk at the age of fourteen, and soon afterwards was despatched to the West Indies. From 1780 to 1786 he acted as assistant secretary on board the

flagships of Admiral Geary and Sir Richard Bickerton (1727-1792). Most of his later life was spent in Scotland, and it was in the house of a friend at Stirling that he wrote most of his songs and his Scotland's Skaith, or the History of Will and Jean (1795), a narrative poem intended to show the deteriorating influences of whisky and pothouse politics. A sequel, The Waes of War, appeared next year. In 1800 he pub- lished The Memoirs of Charles Macphcrson, Esq., a novel under- stood to be a narrative of his own hardships and adventures. A complete edition of the poems he wished to own appeared in 181 2. His songs " Mary of Castlecary," " Come under my plaidy," " My boy Tammy," " O tell me how for to woo," " I lo'ed ne'er a lassie but ane," " The plaid amang the hether," and " Jeanie's black e'e," are notable for their sweetness and sim- plicity. He died at Edinburgh on the 15th of March 1818.

MACOMB, a city and the county-seat of McDonough county, Illinois, U.S.A., in the W. part of the state, about 60 m. S.W. of Peoria. Pop. (1890), 4052; (1900), 5375 (232 foreign-born); (1910), 5774. Macomb is served by the Chicago, Burlington & Quincy, and the Macomb & Western Illinois railways. The city is the seat of the Western Illinois state normal school (opened in 1902), and has a Carnegie library and a city park. Clay is found in the vicinity, and there are manufactures of pottery, bricks, &c. The city was founded in 1830 as the county-seat of McDonough county, and was called Washington by the settlers, but the charter of incorporation, also granted in 1830, gave it the present name in honour of General Alexander Macomb. Macomb was first chartered as a city in 1856.

MACOMER, a village of Sardinia in the province of Cagliari, from which it is 95 m. N.N.W. by rail, and the same distance S.W. of Golfo degli Aranci. Pop. (1901), 3488. It is situated 1800 ft. above sea-level on the southern ascent to the central plateau (the Campeda) of this part of Sardinia; and it is the junc- tion of narrow-gauge lines branching from the main line east- wards to Nuoro and westwards to Bosa. The old parish church of S. Pantaleone has three Roman mile- stones in front of it, belonging to the Roman high-road from Carales to Turris Libisonis. The modern high-road follows the ancient. The district, especially the Campeda, is well fitted for grazing and horse and cattle breeding, which is carried on to a consider- able extent. It is perhaps richer in nuraghi than any other part of Sardinia.

MACON, NATHANIEL (1758-1837), American political leader, was born at Macon Manor, Warren county, North Carolina, on the 17th of December 1758. He studied at the college of New Jersey (now Princeton University) from 1774 to 1776, when the institution was

closed on account of the outbreak of the War of Independence; served for a short time in a New Jersey militia company; studied law at Bute Court-house, North Carolina, in I 777 _I 78o, at the same time managing his tobacco plantation; was a member of a Warren county militia company in 1780- 1782, and served in the North Carolina Senate in 1781-1785. In 1786 he was elected to the Continental Congress, but declined to serve. In 1791-1815 he was a member of the national House of Representatives, and in 1815-1828 of the United States Senate. Macon's point of view was always local rather than national. He was essentially a North Carolinian first, and an American afterwards; and throughout his career he was an aggressive advocate of state sovereignty and an adherent of the doctrines of the " Old Republicans." He at first opposed the

adoption of the Federal constitution of 1787, as a member of the faction led by Willie Jones (1731-1801) of Halifax, North Carolina, but later withdrew his opposition. In Congress he denounced Hamilton's financial policy, opposed the Jay Treaty (1795) and the Alien and Sedition Acts, and advocated a con- tinuance of the French alliance of 1778. His party came into power in 1801, and he was Speaker of the house from December 1801 to October 1807. At first he was in accord with Jefferson's administration; he approved the Louisiana Purchase, and as early as 1803 advocated the purchase of Florida. For a number of years, however, he was politically allied with John Randolph. 1 As speaker, in spite of strong opposition, he kept Randolph at the head of the important committee on Ways and Means from 1801 to 1806; and in 1805-1808, with Randolph and Joseph H. Nicholson (1 770-181 7) of Maryland, he was a leader of the group of about ten independents, called the " Quids," who strongly criticized Jefferson and opposed the presidential candidature of Madison. By 1809, however, Macon was again in accord with his party, and during the next two years he was one of the most influential of its leaders. In December 1809 he introduced resolutions which combined the ideas of Peter Early (i773 _ i8i7) of Georgia, David R. Williams (1776-1830) of South Carolina, and Samuel W. Dana (1757-1S30) of Connecticut with his own. The resolutions recommended the complete exclusion of foreign war vessels from United States ports and the suppres- sion of illegal trade carried on by foreign merchants under the American flag. The substance of these resolutions was embodied in the " Macon Bill, No. 1," which passed the House but was defeated in the Senate. On the 7th of April 1810 Macon reported from committee the " Macon Bill, No. 2," which had been drawn by John Taylor (1770-1832) of South Carolina, and was not actively supported by him. This measure (amended) became law on the 1st of May, and provided for the repeal

of the Non- Intercourse Act of 1809, authorized the president, ” in case either Great Britain or France shall before the 3rd day of March next so revoke or modify her edicts as that they shall cease to violate the neutral commerce of the United States,” to revive non-intercourse against the other, and prohibited British and French vessels of war from entering American waters. In 181 2 Macon voted for the declaration of war against Great Britain, and later was chairman of the Congressional committee which made a report (July 1813) condemning Great Britain’s conduct of the war. He opposed the Bank Act of 1816, the ” internal improvements ” policy of Calhoun (in the early part of his career) and Clay, and the Missouri Compromise, his speech against the last being especially able. In 1824 Macon received the elec- toral vote of Virginia for the vice-presidency, and in 1826-1828 was president pro tempore of the Senate. He was president of the North Carolina constitutional convention in 1835, and was an elector on the Van Buren ticket in 1836. He died at his home, Buck Springs, Warren county, North Carolina, on the 29th of June 1837.

See William E. Dodd, The Life of Nathaniel Macon (Raleigh, N.C., 1903); E. M. Wilson, The Congressional Career of Nathaniel Macon (Chapel Hill, N.C., 1900).

MACON, a town of east-central France, capital of the depart- ment of Saone-et-Loire, 45 m. N. of Lyons on the Paris-Lyon railway. Pop. (1906), 16,151. Macon is situated on the right bank of the Saone facing the plain of the Bresse; a bridge of twelve arches connects it with the suburb of St Laurent on the opposite bank. The most prominent building is the modern Romanesque church of St Pierre, a large three-naved basilica, with two fine spires. Of the old cathedral of St Vincent (12th and 13th centuries), destroyed at the Revolution, nothing re- mains but the Romanesque narthex, now used as a chapel, the fagade and its two flanking towers. The hotel de ville contains a library, a theatre and picture-gallery. Opposite to it stands a statue of the poet Alphonse Lamartine, a native of the town. Macon is the seat of a prefecture, and has tribunals of first in- stance and of commerce, and a chamber of commerce. There are

1 Their names are associated in Randolph-Macon College, named in their honour in 1830.

lycees and training colleges. Copper-founding is an important

industry; manufactures include casks, mats, rope and utensils for the wine-trade. The town has a large trade in wine of the district, known as Macon. It is a railway centre of considerable importance, being the point at which the line from Paris to Marseilles is joined by that from Mont Cenis and Geneva, as well as by a branch from Moulins.

Macon (Malisco) was an important town of the Aedui, but under the Romans it was supplanted by Autun and Lyons. It suffered a succession of disasters at the hands of the Germans, Burgun- dians, Vandals, Huns, Hungarians and even of the Carolingian kings. In the feudal period it was an important countship which in 1228 was sold to the king of France, but more than once afterwards passed into the possession of the dukes of Burgundy, until the ownership of the French crown was established in the time of Louis XI. In the 16th century Macon became a strong- hold of the Huguenots, but afterwards fell into the hands of the League, and did not yield to Henry IV. until 1594. The bishopric, created by King Childebert, was suppressed in

1790.

MACON, a city and the county-seat of Bibb county, Georgia, U.S.A., in the central part of the state, on both sides of the Ocmulgee river (at the head of navigation), about 90 m. S.S.E. of Atlanta. Pop. (1900), 23,272, of whom 11,550 were negroes; (1910 census) 40,665. Macon is, next to Atlanta, the most im- portant railway centre in the state, being served by the Southern, the Central of Georgia, the Georgia, the Georgia Southern & Florida, the Macon Dublin & Savannah, and the Macon & Bir- mingham railways. It was formerly an important river port, especially for the shipment of cotton, but lost this commercial advantage when railway bridges made the river impassable. It is, however, partially regaining the river trade in consequence of the compulsory substitution of drawbridges for the stationary rail- way bridges. The city is the seat of the Wesleyan female college (1836), which claims to be the first college in the world chartered to grant academic degrees to women ; Mercer University (Baptist) , which was established in 1833 as Mercer Institute at Penfield, became a university in 1837, was removed to Macon in 1871, and controls Hearn Academy (1839) at Cave Spring and Gibson Mercer Academy (1903) at Bowman; the stat? academy for the blind (1852), St Stanislaus' College (Jesuit), and Mt de Sales Academy (Roman Catholic) for women. There are four orphan asylums for whites and two for negroes, supported chiefly by the Protestant Episcopal and Methodist Chuiches, and a public hospital. Immediately east of Macon are two large Indian mounds, and there is a third mound 9 m. south of

the city. Situated in the heart of the ” Cotton Belt,” Macon has a large and lucrative trade; it is one of the most important inland cotton markets of the United States, its annual receipts averaging about 250,000 bales. The city’s factory products in 1905 were valued at $7,297,347 (33-8% more than in 1900). In the vicinity are large beds of kaolin, 30 m. wide, reaching nearly across the state, and frequently 35 to 70 ft. in depth. Macon is near the fruit- growing region of Georgia, and large quantities of peaches and of garden products are annually shipped from the city.

Macon (named in honour of Nathaniel Macon) was surveyed in 1823 by order of the Georgia legislature for the county-seat of Bibb county, and received its first charter in 1824. It soon became the centre of trade for Middle Georgia; in 1833 a steam- boat line to Darien was opened, and in the following year 69,000 bales of cotton were shipped by this route. During the Civil War the city was a centre for Confederate commissary supplies and the seat of a Treasury depository. In July 1864 General George Stoneman (1822-1894) with 500 men was captured near the city by the Confederate general, Howell Cobb. Macon was finally occupied by Federal troops under General James H. Wilson (b. 1837) on the 20th of April 1865. In 1900-1910 the area of the city was increased by the annexation of several suburbs.

MACPHERSON, SIR DAVID LEWIS (1818-1896), Canadian financier and politician, was born at Castle Leathers, near Inver- ness, Scotland, on the T2th of September 1818. In 1835 he

emigrated to Canada, settling in Montreal, where he built up a large fortune by ” forwarding ” merchandise. In 1853 he re- moved to Toronto, and in the same year obtained the contract for building a line of railway from Toronto to Sarnia, a project from which sprang the Grand Trunk railway, in the construc- tion of which line he greatly increased his wealth. In 1864 he was elected to the Canadian parliament as member of the Legis- lative Council for Saugeen, and on the formation of the Dominion, in 1867, was nominated to the Senate. In the following years he published a number of pamphlets on economic subjects, of which the best-known is Banking and Currency (1869). In 1880 he was appointed Speaker of the Senate, and from October 1883 till 1885 was minister of the interior in the Conservative cabinet. In 1884 he was knighted by Queen Victoria. He died on the 16th of August 1896.

MACPHERSON, JAMES (1736-1796), Scottish ” translator ” of the Ossianic poems, was born at Ruthven in the parish of Kingussie,

Inverness, on the 27th of October 1736. He was sent in 1753 to King's College, Aberdeen, removing two years later to Marischal College. He also studied at Edinburgh, but took no degree. He is said to have written over 4000 lines of . verse while a student, but though some of this was published, notably The Highlander (1758), he afterwards tried to suppress it. On leaving college he taught in the school of his native place. At Moffat he met John Home, the author of Douglas, for whom he recited some Gaelic verses from memory. He also showed him MSS. of Gaelic poetry, supposed to have been picked up in the Highlands, and, encouraged by Home and others, he produced a number of pieces translated from the Gaelic, which he was induced to publish at Edinburgh in 1760 as Fragments of Ancient Poetry collected in the Highlands of Scotland. Dr Hugh Blair, who was a firm believer in the authenticity of the poems, got up a subscription to allow Macpherson to pursue his Gaelic researches. In the autumn he set out to visit western Inverness, the islands of Skye, North and South Uist and Benbecula. He obtained MSS. which he translated with the assistance of Captain Morrison and the Rev. A. Gallie. Later in the year he made an expedition to Mull, when he obtained other MSS. In 1 761 he announced the discovery of an epic on the subject of Fingal, and in December he published Fingal, an Ancient Epic Poem in Six Books, together with Several Other Poems composed by Ossian, the Son of Fingal, translated from the Gaelic Language, written in the musical measured prose of which he had made use in his earlier volume. Temora followed in 1763, and a collected edition; The Works of Ossian, in 1765.

The genuineness of these so-called translations from the works of a 3rd-century bard was immediately challenged in England, and Dr Johnson, after some local investigation, asserted (Journey to the Western Islands of Scotland, 1775) that Macpherson had only found fragments of ancient poems and stories, which he had woven into a romance of his own composition. Macpherson is said to have sent Johnson a challenge, to \vhich Johnson replied that he was not to be deterred from detecting what he thought a cheat by the menaces of a ruffian. Macpherson never produced his originals, which he refused to publish on the ground of the ex- pense. In 1764 he was made secretary to General Johnstone at Pensacola, West Florida, and when he returned, two years later, to England, after a quarrel with Johnstone, he was allowed to retain his salary as a pension. He occupied himself with writing several historical works, the most important of which was Original Papers, containing the Secret History of Great Britain from the Restoration to the Accession of the House of Hanover; to which are prefixed Extracts from the Life of James II., as written by

himself (1775). He enjoyed a salary for defending the policy of Lord North's government, and held the lucrative post of London agent to Mahommed Ali, nabob of Arcot. He entered parliament in 1780, and continued to sit until his death. In his later years he bought an estate, to which he gave the name of Belville, in his native county of Inverness, where he died on the 17th of February 1796.

After Macpherson's death, Malcolm Laing, in an appendix to his History of Scotland (1800), propounded the extreme view that

the so-called Ossianic poems were altogether modern in origin, and that Macpherson's authorities were practically non-existent. For a discussion of this question see Celt: Scottish Gaelic Litera- ture. Much of Macpherson's matter is clearly his own, and he confounds the stories belonging to different cycles. But apart from the doubtful morality of his transactions he must still be regarded as one of the great Scottish writers. The varied sources of his work and its worthlessness as a transcript of actual Celtic poems do not alter the fact that he produced a work of art which by its deep appreciation of natural beauty and the melancholy tenderness of its treatment of the ancient legend did more than any single work to bring about the romantic movement in European, and especially in German, literature. It was speedily translated into many European languages, and Herder and Goethe (in his earlier period) were among its profound admirers. Cesarotti's Italian translation was one of Napoleon's favourite books.

Authorities. — For Macpherson's life, see The Life and Letters of James Macpherson . . . (1894, new ed., 1906), by T. Bailey Saunders, who has laboured to redeem his character from the sus- picions generally current with English readers. The antiquity of the Ossianic poems was defended in the introduction by Archibald Clerk to his edition of the Poems of Ossian (1870). Materials for arriving at a decision by comparison with undoubtedly genuine fragments of the Ossianic legend are available in The Book of the Dean of Lismore, Gaelic verses, collected by J. McGregor, dean of Lismore, in the early 16th century (ed. T. McLauchlan, 1862) ; the Leabhar na Feinne (1871) of F. J. Campbell, who also discusses the subject in Popular Tales of the Western Highlands, iv. (1893). See also L. C. Stern, "Die ossianische Heldenlieder "in Zeitschnft fiir vergleichende Litteratur- geschichte (1895; Eng. trans, by J. L. Robertson in Trans. Gael. Soc. of Inverness, xxii., 1897-1898); Sir J. Sinclair, A Disser- tation on the

Authenticity of the Poems of Ossian (1806) ; Transactions of the Ossianic Society (Dublin, 1854-1861); Cours de litterature celtique, by Arbois de Jubainville, editor of the Revue celtique (1883, &c); A. Nutt, Ossian and the Ossianic Literature (1899), with a valuable bibliographical appendix; J. S. Smart, James Macpherson: an Episode in Literature (1905).

McPHERSON, JAMES BIRDSEYE (1828-1864), American soldier, was born at Sandusky, Ohio, on the 14th of November 1828. He entered West Point at the age of twenty-one, and graduated (1853) at the head of his class, which included Sheridan, Schofield and Hood. He was employed at the military academy as instructor of practical military engineering (1853). A year later he was sent to engineer duty at New York, and in 1857, after constructing Fort Delaware, he was sent as superintending engineer to San Francisco, becoming 1st lieutenant in 1858. He was promoted captain during the first year of the Civil War, and towards the close of 1861 became lieutenant-colonel and aide-de-camp to General Halleck, who in the spring of 1862 sent him to General Grant as chief engineer. He remained with Grant during the Shiloh campaign, and acted as engineer adviser to Halleck during the siege operations against Corinth in the summer of 1862. In October he distinguished himself in command of an infantry brigade at the battle of Corinth, and on the 8th of this month was made major-general of volunteers and commander of a division. In the second advance onVicksburg(i863)McPherson commanded the XVII. corps, fought at Port Gibson, Raymond and Jackson, and after the fall of Vicksburg was strongly recom- mended by Grant for the rank of brigadier-general in the regular army, to which he was promoted on the 1st of August 1863. He commanded at Vicksburg until the following spring. He was about to go on leave of absence in order to be married in Baltimore when he received his nomination to the command of the Army of the Tennessee, Grant's and Sherman's old army, which was to take part under Sherman's supreme command in the campaign against Atlanta (1864). This nomination was made by Sherman and entirely approved by Grant, who had the highest opinion of McPherson's military and personal qualities. He was in com- mand of his army at the actions of Resaca, D alias, Kenesaw Moun- tain and the battles about Atlanta. On the 22nd of July, when the Confederates under his old classmate Hood made a sudden and violent attack on the lines held by the Army of the Tennessee, McPherson rode up, in the woods, to the enemy's firing line and was killed. He was one of the most heroic figures of the American Civil War, and Grant is reported to have said when

he heard of McPherson's death, " The country has lost one of its best

soldiers, and I have lost my best friend.”

MACQUARIE, a British island in the South Pacific Ocean, in 54 49′ S. and 159° 49′ E. It is about 20 m. long, and covered with a grassy vegetation, with some trees or shrubs in the shel- tered places which afford food to a parrot of the genus Cyano- rhamphus, allied to those of the Auckland Islands. Although it has no settled population, Macquarie is constantly visited by sailors in quest of the seals which abound in its waters.

MACRAUCHENIA, a long-necked and long-limbed, three-toed South American ungulate mammal, typifying the suborder Litoplerna (q.v.).

MACREADY, WILLIAM CHARLES (1793-1873), English actor, was born in London on the 3rd of March 1793, and edu- cated at Rugby. It was his intention to go up to Oxford, but in 1809 the embarrassed affairs of his father, the lessee of several provincial theatres, called him to share the responsibilities of theatrical management. On the 7th of June 18 10 he made a successful first appearance as Romeo at Birmingham. Other Shakespearian parts followed, but a serious rupture between father and son resulted in the young man’s departure for Bath in 1814. Here he remained for two years, with occasional professional visits to other provincial towns. On the 16th of September 1816, Macready made his first London appear- ance at Covent (garden as Orestes in The Distressed Mother, a translation of Racine’s Andromaque by Ambrose Philips. Macready’s choice of characters was at first confined chiefly to the romantic drama. In 18 18 he won a permanent success in Isaac Pocock’s (1782-1835) adaptation of Scott’s Rob Roy. He showed his capacity for the highest tragedy when he played Richard III. at Covent Garden on the 25th of October 1819. Transferring his services to Drury Lane, he gradually rose in public favour, his most conspicuous suc- cess being in the title-role of Sheridan Knowles’s William Tell (May 11, 1825). Ini826hecompletedasuccessful engagementin America, and in 1828 his performances met with a very flattering reception in Paris. On the 15th of December 1830 he appeared at Drury Lane as Werner, one of his most powerful impersona- tions. In 1833 he played in Antony and Cleopatra, in Byron’s Sardanapalus, and in King Lear. Already Macready had done something to encourage the creation of a modern English drama, and after entering on the management of Covent Garden in 1837 he introduced Robert Browning’s Strafford, and in the following year Bulwer’s Lady of Lyons and Richelieu, the principal charac- ters in which were among his most effective parts. On the 10th of June 1838 he gave a memorable performance of Henry V., for which Stanfield prepared sketches, and the mounting was

superintended by Bulwer, Dickens, Forster, Maclise, W. J. Fox and other friends. The first production of Bulwer's Money took place under the artistic direction of Count d'Orsay on the 8th of December 1840, Macready winning unmistakable success in the character of Alfred Evelyn. Both in his management of Covent Garden, which he resigned in 1839, and of Drury Lane, which he held from 1841 to 1843, he found his designs for the elevation of the stage frustrated by the absence of adequate public sup- port. In 1 843-1 844 he made a prosperous tour in the United States, but his last visit to that country, in 1849, was marred by a riot at the Astor Opera House, New York, arising from the jealousy of the actor Edwin Forrest, and resulting in the death of seventeen persons, who were shot by the military called out to quell the disturbance. Macready took leave of the stage in a farewell performance of Macbeth at Drury Lane on the 26th of February 1851. The remainder of his life was spent in happy retirement, and he died at Cheltenham on the 27th of April 1873. He had married, in 1823, Catherine Frances Atkins (d. 1852). Of a numerous family of children only one son and one daughter survived. In i860 he married Cecile Louise Frederica Spencer (1827-1908), by whom he had a son.

Macready's performances always displayed fine artistic per- ceptions developed to a high degree of perfection by very comprehensive culture, and even his least successful persona- tions had the interest resulting from thorough intellectual

study. He belonged to the school of Kean rather than of Kemble; but, if his tastes were better disciplined and in some respects more refined than those of Kean, his natural tempera- ment did not permit him to give proper effect to the great tragic parts of Shakespeare, King Lear perhaps excepted, which afforded scope for his pathos and tenderness, the qualities in which he specially excelled. With the exception of a voice of good compass and capable of very varied expression, Macready had no especial physical gifts for acting, but the defects of his face and figure cannot be said to have materially affected his success.

See Macready' s Reminiscences, edited by Sir Frederick Pollock, 2 vols. (1875) ; William Charles Macready, by William Archer (1890).

MACROBIUS, AMBROSIUS THEODOSIUS, Roman gram- marian and

philosopher, flourished during the reigns of Honorius and Arcadius (395-423). He himself states that he was not a Roman, but there is no certain evidence whether he was of Greek or perhaps African descent. He is generally supposed to have been praetorian praefect in Spain (399), proconsul of Africa (410), and lord chamberlain (422). But the tenure of high office at that date was limited to Christians, and there is no evi- dence in the writings of Macrobius that he was a Christian. Hence the identification is more than doubtful, unless it be assumed that his conversion to Christianity was subsequent to the composition of his books. It is possible, but by no means certain, that he was the Theodosius to whom Avianus dedicates his fables.

The most important of his works is the Saturnalia, containing an account of the discussions held at the house of Vettius Praetextatus (c. 325-385) during the holiday of the Saturnalia. It was written by the author for the benefit of his son Eustathius (or Eustachius), and contains a great variety of curious historical, mythological, critical and grammatical disquisitions. There is but little attempt to give any dramatic character to the dia- logue ; in each book some one of the personages takes the leading part, and the remarks of the others serve only as occasions for calling forth fresh displays of erudition. The first book is devoted to an inquiry as to the origin of the Saturnalia and the festivals of Janus, which leads to a history and discussion of the Roman calendar, and to an attempt to derive all forms of worship from that of the sun. The second book begins with a collection of bons mots, to which all present make their contributions, many of them being ascribed to Cicero and Augustus; a discussion of various pleasures, especially of the senses, then seems to have taken place, but almost the whole of this is lost. The third, fourth, fifth and sixth books are devoted to Virgil, dwelling respectively on his learning in religious matters, his rhetorical skill, his debt to Homer (with a comparison of the art of the two) and to other Greek writers, and the nature and extent of his borrowings from the earlier Latin poets. The latter part of the third book is taken up with a dissertation upon luxury and the sumptuary laws intended to check it, which is probably a dis- located portion of the second book. The seventh book consists largely of the discussion of various physiological questions. The value of the work consists solely in the facts and opinions quoted from earlier writers, for it is purely a compilation, and has little in its literary form to recommend it. The form of the Saturnalia is copied from Plato's Symposium and Gellius's Nodes atlicac; the chief authorities (whose names, however, are not quoted) are Gellius, Seneca the philosopher, Plutarch (Quaestioncs conviviales) , Athenaeus and the commentaries of Servius (excluded by some) and others on Virgil. We have also two

books of a commentary on the Somnium Scipionis narrated by Cicero in his De republica. The nature of the dream, in which the elder Scipio appears to his (adopted) grandson, and describes the life of the good after death and the constitution of the universe from the Stoic point of view, gives occasion for Macrobius to discourse upon many points of physics in a series of essays interesting as showing the astronomical notions then current. The moral elevation of the fragment of Cicero thus preserved to us gave the work a popularity in the middle ages to which its own merits have little claim. Of a third work,

De differentiis et societatibus graeci latinique verbi, we only possess an abstract by a certain Johannes, identified with Johannes Scotus Erigena (9th century).

See editions by L. von Jan (1848-1852, with bibliog. of previous editions, and commentary) and F. Eyssenhardt (1893, Teubner text); on the sources of the Saturnalia see H. Linke (1880) and G. Wissowa (1880). The grammatical treatise will be found in Jan's edition and H. Keil's Grammatici latini, v. ; see also G. F. Schomann, Commentatio macrobiana (1871).

MACROOM, a market town in the western part of county Cork, Ireland, on the river Sullane, an affluent of the Lee, 24! m. W. of Cork by the Cork & Macroom railway, of which it is the ter- minus. Pop. (1901), 3016. Besides a fine Roman Catholic church, a court house and barracks, Macroom possesses a modernized castle, which is said to have been founded by King John, though it is more probably attributable to Norman invaders. It was besieged more than once in the 17 th century, and is said to have been the birthplace of Admiral Sir William Penn, whose more famous son founded Pennsylvania. Here some rebels of 1798 were executed and their heads exhibited on the spikes of the castle gate. Macroom has trade in corn-milling, leather-work and dairy produce, and is a good centre for salmon and trout fishing. It is governed by an urban district council.

MACUGNAGA, a village of Piedmont, Italy, in the province of Novara, 20 m. W.S.W. of Piedimulera, which is 7 m. S. of Domo- dossola by rail. Pop. (1901), 798. It is situated 4047 ft. above sea-level, and is 10 m. N.E. of the highest summit of Monte Rosa. It is frequented as a summer resort.

MACVEAGH, WAYNE (1833-), American lawyer and diplomatist, was born near Phoenixville, Chester county, Pa., on the 19th of April 1833. He graduated at Yale in 1853, was admitted to the bar in 1856, and was district attorney of Chester county in 1859-1864. He held

commands in militia forces raised to meet threatened Confederate invasions of Pennsylvania (1862-63). He became a leader in the Republican party, and was a prominent opponent of his father-in-law, Simon Cameron, in the fight within the party in 1871. MacVeagh was minister to Turkey in 1870-1871; was a member of the state constitutional convention of 1872-1873; was chairman of the " MacVeagh Com- mission," sent in 1877 by President Hayes to Louisiana, which secured the settlement of the contest between the two existing state governments and thus made possible the withdrawal of Federal troops from the state; and was attorney-general of the United States in 1881 under President Garfield, but resigned immediately after Garfield's death. In 1892 he supported Grover Cleveland, the Democratic nominee for the presidency, and from 1893 to 1897 was ambassador to Italy. He returned to the Republican party in 1896. In 1903 he was chief counsel of the United States before the Hague tribunal in the case regard- ing the claims of Germany, Great Britain and Italy against the republic of Venezuela.

MADACH, IMRE (1829-1864), Hungarian dramatist, was born at Also-Sztregova. He took part in the great revolution of 1848-49 and was imprisoned; on his return to his small estate in the county of Nograd, he found that his family life had meanwhile been completely wrecked. This only increased his natural tendency to melancholy, and he withdrew from public life till 1 86 1, devoting his time mainly to the composition of his chief work, Az ember tragoedidja (" The Tragedy of Man "). John Arany, then at the height of his fame as a poet, at once recognized the great merits of that peculiar drama, and Madach enjoyed a short spell of fame before his untimely death of heart-disease in 1864. In The Tragedy of Man Madach takes us from the hour when Adam and Eve were innocently walking in the Garden of Eden to the times of the Pharaohs; then to the Athens of Miltiades; to declining Rome; to the period of the crusades; into the study of the astronomer Kepler; thence into the horrors of the French Revolution; into greed- eaten and commerce-ridden modern London; nay, into the ultra-Socialist state of the future, when all the former ideals of man will by scientific formulae be shown up in their hollow- ness; still further, the poet shows the future of ice-clad earth, when man will be reduced to a degraded brute dragging on the

misery of his existence in a cave. In all these scenes, or rather anticipatory dreams, Adam, Eve and the arch-fiend Lucifer are the

chief and constantly recurring personae dramatis. In the end, Adam, despairing of his race, wants to commit suicide, when at the critical moment Eve tells him that she is going to be a mother. Adam then prostrates himself before God, who encourages him to hope and trust. The diction of the drama is elevated and pure, and although not meant for the stage, it has proved very effective at several public performances. Concerning Madach there is an ample literature, consisting mostly of elaborate articles by Charles Szasz (1862), Augustus Greguss (1872), B. Alexander (1871), M. Palagyi (1890), and others.

MADAGASCAR, an island in the Indian Ocean, and after New Guinea and Borneo the largest island in the world, about 260 m. distant, at the nearest point, from the S.E. coast of Africa, from which it is separated by the Mozambique Channel. Since 1896 Madagascar has been a French colony. It is 995 m. in length from N. to S., and about 250 m. in average breadth, although near the centre it is nearly 360 m. across; its area is about 228,000 sq. m., or not quite four times the extent of England and Wales. It lies mainly between 44° and 50° E. Its northernmost point, Cape Ambro, in 12 S., inclines 16 to the E. from the longitude of Cape St Mary, the southernmost point, in 25° 35′ S., so that the main axis of the island runs from N.N.E. to S.S.W. In its broad structure Madagascar consists of an elevated mountainous region, from 3000 to 5000 ft. in altitude, occupying from two-fifths to a half of the centre and the eastern side of the island, around which are extensive plains at a much less elevation above the sea, and most developed on the western and north-west sides. But this lower region is broken up by masses of hills, with several elevated plateaus, especially in the south-west and south.

Physical Features. — Madagascar has a very regular and compact form, with few indentations considering its great extent of shore-line. In general outline it has a strong resemblance to the impression of a human foot — the left side. Along two-thirds of its eastern side the coast is almost a straight line, without any inlet, Tamatave, the chief port on this side of the island, being only protected by coral reefs. North of this line, however, is Antongil Bay, a deep and wide inlet running northwards for about 50 m. ; farther north is Port Louquez, and at almost the extreme point of the island is Diego-Suarez Bay, one of the finest harbours in the world. But the north-western side of Madagascar is broken up by a number of inlets, some of them land-locked and of considerable size. South of Cape St Andrew, the north-west angle of the island, the coast-line is unbroken until the estuary of the river Onilahy, or St Augustine's Bay, is reached. Rounding the southern end of the island, there is no other inlet save the small bay

north of Fort Dauphin, at the southern end of the straight line of coast already mentioned.

The islands around Madagascar are few and unimportant. The largest are Ste Marie, near the eastern coast, a narrow island about 35 m. long, and Nossi-M (q.v.), larger and more compact in form, opposite Ampasindava Bay on the N.W. coast. Except the Minnow group, north of Nossi-be, the rest are merely rocky islets, chiefly of coral.

The shores of the greater portion of the southern half of the island are low and flat, but in the northern half the coast is often bold and precipitous, the high land occasionally approaching the sea. On the eastern side the plains vary from 10 to 50 m. in breadth, but on the western side they exceed in some localities 100 m. From these coast-plains the ground rises by successive ranges of hills to the high interior land. This elevated region is broken in all directions by mountains, from which the crystalline rocks show most frequently as huge bosses, and in certain regions present very varied and picturesque outlines, resembling Titanic castles.cathedrals, domes, pyramids and spires. The highest mountain mass is centrally situated as regards the length of the island, but more to. the eastern side. This is the ancient extinct volcano Ankaratra, three of the highest points varying in elevation from 7284 to 8635 ft. above the sea, and from 4000 to 5000 ft. above the general level of the surrounding country. The loftiest of these is named Tsi-afa-javona, i.e. ” That which the mists cannot climb.” It had been supposed that Ankaratra was the highest point in the island, but in 1903 it was found that Amboro, in the northern province of Antankarana, is about 9490 ft. in altitude. Besides these highest points there are a considerable number of mountains in the central provinces of Imerina and Bctsileo and the intervening and surrounding districts; and in the Bara country the Isalo range has been compared to the “Church Buttes” and other striking features of the scenery of Utah.- One of the finest of the Madagascar mountains is an isolated mass near the northern point of the island called Ambdhitra. This is 4460 ft. high, and

rising from land little above the sea-level, is well seen far out to sea.

In the elevated region of Madagascar are many fertile plains and valleys, the former being the dried-up beds of ancient lakes. Among these are Betsimitatatra in Imerina, and Tsienimparihy in Betsileo, supplying a large proportion of the rice required for the capitals of these two provinces. Still more spacious valleys are the Antsi- hanaka country and the Ankay district, between the two eastern lines of forest. The extensive coast plains on the western side of the island are

chiefly in Iboina (N.W.) and in Menabe (S. of the Tsiri- bihina River) ; those on the east are widest in the Taifasy country (S.E.). The water-parting for six-sevenths of the whole length of the island is much nearer the eastern than the western side, averag- ing from 80 to 90 m. from the sea. There are no arid districts, except in the extreme south-west and towards the southern point of the island. The general surface of the interior highland consists of bare rolling moor-like country, with a great amount of red clay- like soil, while the valleys have a rich humus of bluish-black alluvium.

The chief rivers flow to the west and north-west sides of the island. The eastern streams are all less in size, except the Mangoro, which flows parallel with the coast. Few of them therefore are of much service for navigation, except for the light-draught native canoes; and all of them are more or less closed at their outlets by sand-bars. Beginning at the south-eastern point and going northwards, the principal rivers are the Mananara, Manampatrana, Matitanana, Mananjary, Mangoro, with its great affluent Onive, Vohitra, Manin-gory, and the Antanambalana at the head of Antongil Bay. On the N.W. coast, going southwards, are the Sofia and Mahajamba, falling into Mahajamba Bay, the Betsiboka with the Ikopa — the great drains of the northern central provinces, forming unitedly the second largest river of the island and falling into Bembatoka Bay — the Mahavary, Manambolo, Tsiribihina or Onimainty, the third largest river, with its tributaries the Kitsamby, Mahajilo and Mania, the Morondava, Mangdky, probably the largest river in the country, with its important tributaries the Matsiatra, Manantanana and Ranomaitso, the Fiherenana and Onilahy. On the south coast are four considerable streams, the largest of which is the Menarandra. Of the western rivers the Betsiboka can be ascended by small steamers for about 100 m., and the Tsiribihina is also navigable for a considerable distance. The former is about 300 m. long ; the latter somewhat less, but by its affluents spreads over a greater extent of country, as also does the Mangoky. The rivers are all crossed fre- quently by rocky bars, which often form grand waterfalls. The eastern rivers cut their way through the ramparts of the high land by magnificent gorges amidst dense forest, and descend by a succes- sion of rapids and cataracts. The Matitanana, whose falls were first seen by the writer in 1876, descends at one plunge some 400 ft.; and on the Vohitra River, whose valley is followed by the railway, there are also many fine waterfalls.

On the eastern side of Madagascar the contest between the fresh water of the rivers and the sea has caused the formation of a chain of lagoons for nearly 300 m. In many places these look like a river following the coast-line, but frequently they spread out into exten-

sive sheets of water. By cutting about 30 m. of canal to connect them, a continuous waterway could be formed for 270 m. along the coast. This has already been done for about 55 m. between Ivdn- drona and Anddvoranto, a service of small steamers forming part of the communication between the coast and the capital. Besides these lagoons, there are few lakes of any size in Madagascar, although there were some very extensive lakes in a recent geological epoch. Of the largest of these, the Alaotra Lake in the Antsihanaka plain is the relic; it is about 25 m. long. Next comes Kinkony, neat Mardambitsy Bay (N.W. coast), about 16 m. long, and then Itasy, in western Imerina, about half as large. There is also a salt lake, Tsimanampetsotsa (S.W. coast), about as large as Alaotra.

There is now no active volcano in Madagascar, but a large number of extinct cones are found, some apparently of very recent formation. Some miles south of Diego-Suarez is a huge volcanic mountain, Ambohitra, with scores of subsidiary cones on its slopes and around its base. About 40 m. south-west of Antananarivo there is a still larger extinct volcano, Ankaratra, with an extensive lava field surrounding it; while near Lake Itasy are some 200 volcanic cones. Another group of extinct volcanoes is in the Vakinankaratra dis- trict, S.W. of Ankaratra. Many others exist in other parts of the island (see § Geology). Slight shocks of earthquake are felt every year, and hot springs occur at many places. Several of these are sulphurous and medicinal, and have been found efficacious in skin diseases and in internal complaints.

Geology. — Madagascar may be divided into two very distinct geological regions, viz. (I.) the Archean Region, which extends over the central and eastern portions of the island and occupies about two-thirds of its whole area, and is composed of crystalline schists; and (II.) the Western Region, of sedimentary rocks, including the re- maining third of the island, in the centre of which, however, is an isolated patch of Archean rocks, near Cape St Andrew. There are also found in both regions numerous masses of igneous rocks, both plutonic and volcanic, in some places of considerable extent, which pierce through and overflow the earlier formations.

MADAGASCAR

I. The Archean Region. 1 — This region, nearly coincident with the mountainous upper portion of the island, is chiefly composed of the lollowing crystalline rocks: gneiss, which is the most common of them all, quartzite and quartz-schist, with occasional beds of crystal- line limestone and mica-schist, although this latter rock is very rare The gneiss is mostly grey, but occasionally pinkish, its essential

constituents (felspar and quartz) being almost always associated with dark mica (biottte) and hornblende in variable quantity. The rock is therefore a hornblende-granitite-gneiss. Granite — more

44

MADAGASCAR

English Miles m 5° »fP igo

Railways. .

B

48

Aldabra /.£-” {Br.)

Assumption I.I tSr.t

,i*i’« ‘

‘. • CosmO’Cdo ts.tBr.i

c

A Long EUst of 44°GrecmvichQ

5 Lv* Reunion

IF,)

irequently gramtite— occurs in several places, as well as pyroxene-granuhte, serpentine, argillate, &c. ; and gold is found widely disseminated, as well as other metals, but these latter, as far as at present known, except iron, are not abundant. The general strike of the rocks is the same as that of the trend of the island itself (N.N.E.

1 In the apparent absence of any Cambrian formation~above them there is little doubt that these rocks are Archean, although this cannot be absolutely proved.

271

*? xi’fiˆ‘J’oVi 11 its western portion the strike is frequently from JN.JN.W. to S.S.E. In both cases the strike of the rocks is coincident with the direction of several large valleys, which mark huge faults in

the crystalline rocks. Almost the whole of this region is covered by a red soil, often of great thickness, which resembles and is often described as ” clay,” but is really decomposed rock, chiefly gneiss reddened with oxidized magnetite. ‘

II. The Sedimentary Region. — The sedimentary rocks extend continuously along the western side of Madagascar, following the coastline; in the north these series of strata are only from 20 to 30 m. across, but farther south they reach a breadth of nearly 100 m., while opposite the Betsileo province they extend nearly half across the island. A narrow band, of Cretaceous age, occurs also on the east coast, for about 120 m.,’ between Vˆtomandry and Mananjary. Thefollow- ing formations are»represented : —

1. Primary. It is thought that certain beds of slaty rocks, which have been recognized at different places, may belong to some of the Primary strata. Some siliceous schists of the Permian age were discovered in 1908 in the valley of the Sakameira, south of the Onilahy, or Augustine river. (S.W. coast). These contain reptilian remains, and also clear imprints of leaves of the Glossopteris indica, as well as other indications of an ancient vegeta- tion. In the same region conglomerates have been found containing enormous blocks, apparently brought by glacial action, and said to be identical in character with those described as existing in the Transvaal. True coal has also been obtained in the same district, the deposits varying from a third to half a metre in thickness.

2. Secondary. The lowest members of these rest directly upon the central mass of crystalline rocks, and consist of sandstones, conglomerates and shales, which have been supposed by some to belong to the Trias, without, however, the dis- covery of any fossil necessary to confirm this supposition, except some silicified trunks of trees. These beds are most probably lower members of the Jurassic series. Westward of and above these strata, the Middle and Upper Jurassic formations are found (Lias, Lower Oolite, Oxfordian, &c), with well-marked and numerous fossils (Ammo- nites, Nerinaea, Natica, Astarte, Rhynchonella, Echinodermata, &c.) ; then the Cretaceous rocks, both these and the Jurassic series being largely developed, the Cretaceous fossils including Nau- tilus, Belemnites, Ostrea, Gryphaea, &c, and some very large Ammonites (P achy discus). The Second- ary strata show generally a very slight dip westwards and are consequently almost horizontal. They do not seem to have been greatly disturbed, although faults occur here and there.

3. Tertiary. A small strip of coast of Eocene age is known near Tullear

(S.W. coast), and rocks of the same period occur in N6ssi-be, at Mahajamba Bay, and at Diego-Suarez, with Nummulites and other foramimfera. Near the latter locality, beds of Oligocene age have been noticed, consisting of coarse limestones.

4. Quaternary and Recent. A narrow band of these deposits extends along the west coast, from north of Cape St Andrew nearly to the extreme southern point of the island. But the most notice- able of these are those in the ancient bed of the Alaotra Lake, which formerly extended far south- wards along the valley of the Mangoro; also those in the marshes of Antsirabe and of Ifanja, in the Ikopa valley (the great rice plain west of the capital), and also in the plain of Tsienimparihy in Betsileo, and especially the recent deposits of Ampasambazimba, north-west of Lake Itasy, dis- covered in 1902. These beds, rich in sub-fossil remains, have yielded important additions to our knowledge of the extinct fauna of the island. (See § Palaeontology.)

Igneous Rocks. (1) Plutonic rocks. — The ancient or plutonic igneous rocks (including granite, syen- ite diorite, gabbro, porphyry, porphyrite, norite t j •, retinite) appear at various points of the two

previously described regions. In the Archean region the gneiss is very often found passing into granite, but certain granitic masses have a sufficiently distinct character. In the midst of the sedimen- tary region are two well-recognized masses of plutonic rocks, belonging to the syenites, sometimes quartziferous in structure. (2) Volcanic rocks— Recent volcanic eruptive rocks (including rhyolite, trachyte, phonohte, andesite and basalt) have been examined at a number of points throughout both the geological regions of the island. In

the Archean region these are very noticeable near Lake Itasy, in the massif of Ankaratra (an ancient volcano) and in Vakinankaratra (at Betafo, Antsirabe, &c.) ; while there are numerous outflows of doleritic rocks, probably from faults, along the eastern side of the island and almost parallel with the coast line. In the sedimentary region volcanic rocks are very numerous; the most extensive of these is a tract of country, more than 80 m. long, on the west coast, where the basalt has overflowed the Cretaceous strata. It must be

remembered that the geology of Madagascar is still only known in its broad features. 1

Minerals and Metals. — The country has considerable mineral wealth. Gold is found almost all over the region of crystalline rocks, except in and around the Antsihanaka province, the richest aurifer ous districts being a band of country parallel with the east coast arid spreading at its southern end into the interior; and another tract, whose centre is about 100 m. N. of the capital (see § Industries, &c). Silver has been detected in iSertain galenas, and also platinum; copper has been found in various localities, as well as zinc, lead, nickel, antimony and manganese, but none of these metals has yet been discovered in sufficient quantities for profitable working. Iron, on the contrary, especially magnetite, is found abundantly and has for long been worked by the Malagasy with the simple appliances brought by their ancestors from their original home in the Far East. The principal seats of the native industry are on the edge of the upper forest, where charcoal is easily procured. The following

Erecious stones are reported: corundum (rubies and sapphires), eryl, topaz, zircon, garnet, amazon-stone, tourmaline, often in large crystals, and variously coloured quartz, also often found in crystals of great size. Bitumen and petroleum have been found ; graphite is plentiful, and sulphur, salt, saltpetre and lime are also procured. On the north-west coast thin beds of lignite occur, and coal has been found in the valley of the Sakameira.

Palaeontology. — Researches in various parts of the island have revealed the existence, in a subfossil state, of the bones of numerous birds of the family Struthidae. These have been arranged in twelve species, belonging to two genera, Aepyornis and Mullerornis, which varied in size from that of a bustard to birds much exceeding an ostrich, and rivalling the recently extinct moa of New Zealand, the largest species being about 10 ft. in height. One species of these great wingless birds laid an egg which is the largest known, being 12 J in. by 9 J in. Associated with these remains there have been found those of many other birds, including a hawk, a duck, a darter, a spoonbill, a heron, a rail and a wild-goose, some of these being much larger than any now inhabiting Madagascar. In the same beds the remains of two, if not three, species of hippopotamus have been found, about two-thirds the size of the living South African species; also the bones and carapace, &c, of gigantic tortoises, and the bones of a crocodile, now extinct on the coast and rivers, but still living in the two chief lakes; also the remains of a river-hog, of a species of swine, and of a slender-legged form of zebu-ox. Near the south-west coast the skull of a large

lemuroid animal was dis- covered in 1893, much longer than that of any living lemur, the animal being probably three times the size of any previously known Madagascar lemuroid. Later still, in 1899 an d subsequently, the bones of two other creatures of the same suborder have been dis- covered, one of them indicating an animal much larger than a man. Many of these birds and animals were probably contem- poraneous with the earliest human inhabitants of Madagascar. The remains of two species of Edentata have been found, as well as those of several species of small Rodents, also of a Carnivore (Cryptoprocta), a larger variety of the species still living in the island.

In the deposits of a much more remote era than those already spoken of — the Jurassic— the bones of some enormous terrestrial lizards have been brought to light, belonging to Sauropodous Dinosaurs of the genera Bothriospondylus and Tttanosaurus, and to a Theropod of the genus Megalosaurus. In the beds of the Lower Oolite portions of the skull of a reptile resembling the gavial of the Ganges had been previously discovered, from which a new genus called Steneosaurus has been founded. Since the French occupation (1895) considerable additions have been made to our knowledge of the fossil fauna of Madagascar from researches made both on the west and south-west coast (at Belo and Ambolisatraha) and in the interior (at Antsirabe), especially in the rich deposits near Tsarazaza (Ampas- ambazimba), to the north-west of Lake Itasy. From these various localities the subfossil remains of thirteen or fourteen extinct species of lemuroid animals (including the gigantic species already men- tioned) have been obtained, and have been classified under five new genera: viz. Megaladapis (3 sp.), Palaeopropilhecus (3 sp.), Archaeo- lemur (2 sp.), Bradylemur (1 sp.) and Hadropithecus (1 sp.), together with three new species of lemur. Of these, the Archaeolemurs seem to have combined the characteristics of lemuroid animals with those of the monkeys, while Hadropithecus is pronounced to be the nearest known link with them. A list of all the fossils of the island known in 1895, but omitting the vertebrates above mentioned, included

1 For most of the information here given on the geology the writer is indebted to Captain Mouneyres, chef de services des mines, and the Rev. R. Baron, F.G.S., F.L.S.

140 species, 2 belonging to the Mollusca, Foraminifera, Echinodermata, Actinozoa and Plantae ; but the researches of French geologists made the total number of Madagascar fossils known in 1907 to be not fewer than 280 species.

Climate. — In the high interior the climate resembles that of the

temperate zones, although six-sevenths of the island are within the tropics; there is no intense heat, and it is quite cold, occasionally touching freezing point, during the nights of the cool season. These parts of the country are tolerably healthy for Europeans. But the coasts are much hotter, especially on the western side, as is also the interior west of the highland region; and from the large amount of marsh and lagoon on the coasts, malarial fever is common and frequently fatal, both to Europeans and to natives from the interior. Epidemics of influenza and fever have been very prevalent of late years in the central provinces. The seasons are two — the hot and rainy season from November to April, and the cool and dry season during the rest of the year; this remark applies chiefly to the interior, for rain falls throughout the year on the eastern coast, which is exposed to the vapour-laden south-east trade winds. The rainfall diminishes as one goes westward and especially south-westward, there being very little rain in the south-west corner of the island. No snow is known, even on the loftiest mountains, but thin ice is occasionally seen; and hail-showers, often very destructive, are frequent in the rainy season. Terrific thunderstorms are also common at that period ; waterspouts are sometimes seen ; and as the Indian Ocean cyclone region touches the eastern coast, hurricanes occur every few years, at rare intervals ascending into the interior highland. The yearly rainfall of the Imerina province (Antanan- arivo) averages about 54! in. ; accurate statistics as to that of other parts of the island are not available ; but on the east coast it appears to be about double that of the interior; in the south-east consider- ably more than that amount; while at Morondava (west coast) it is given as about 21 in. annually, and at Tullear (south-west coast) as only 10 in. At Tamatave (east coast) the mean annual temperature is given as 76-5°, while at the capital it is about 66°; the tempera- ture of Antananarivo resembles that of Naples or Palermo. 3 The following table gives the mean of two different sets of government returns of mean rainfall: Antananarivo, 1369 mm.; Tamatave, E. coast, 1863 mm.; Farafangana, S.E. coast, 2803 mm.; Diego- Suarez, N. end of island, 1196 mm. ; Morondava, W. coast, 543 mm. ; Tullear, S.W. coast, 273 mm.; Marovoay, W. interior, 1413 mm.

Fauna. — The fauna of Madagascar, while deficient in most of the characteristic tropical forms of life, is one of great interest to the naturalist from its remote affinities, much of its animal life having Asiatic rather than African relationships. The central portions of the island, from their generally bare and treeless character, are poor in living creatures; but the lower country, and especially the forests and coast plains, are fairly well stocked. But it is noticeable that many

species have a very limited range. Although a continental island, it possesses no large quadrupeds — none of the larger carni- vorous, ungulate, proboscoid or quadrumanous animals; but it is the headquarters of the Lemuroidea, no fewer than thirty-nine species of which are found in its forests and wooded plains. Some of these creatures are highly specialized, while the curious aye-aye (Chiromys madagascariensis) , an allied form, is one of the most remarkable animals known, forming a genus and family by itself. Its whole structure is strangely modified to enable it to procure the wood-boring larvae which form its food. Other peculiar animals are twenty-three species of the Cenletidae, a family of the Insectivora almost confined to Madagascar; while of the Carnivora there are several small creatures belonging to the civets (Viverridae) . The largest of these ferocious animals, also forming a genus and family by itself, is the Cryptoprocta ferox; it is a plantigrade animal, 3 ft. long, but very like an enormous weasel, and attacks other animals with the greatest ferocity. The island contains twenty-five species of bats, mostly of African, but some of Indian, affinities. African humped cattle were introduced several hundred years ago and now exist in large herds all over the country. The fat-tailed sheep, goats and swine have also been naturalized, as well as all kinds of domestic poultry.

The avi-fauna is much richer than the mammalian, and, although wanting the largest birds as well as the most brilliantly coloured, comprises two hundred and sixty species, half of which are endemic. Many of the birds are remarkable not so much for their shape or colouring as for their distant relationships; many belong to peculiar genera, and some are so isolated that new families have had to be formed for their reception. There is a large variety of perching birds, including several species of brilliant plumage — sun-birds, kingfishers, rollers and flycatchers, &c. ; kites, hawks and owls are numerous, and the lakes and marshes abound with water-fowl and herons, ibises, &c.

The island is free from deadly serpents, but contains two or three

2 See ” On a Collection of Fossils from Madagascar,” by R. B. Newton, Quart. Journ. Geol. Sec. (Feb. 1895).

3 The following are figures of mean temperature, kindly supplied by the Rev. E. Colin, S. J., director of the observatory: Diego- Suarez, N., 79°; Farafangana, S.E. coast, 75°; Marovoay, W. intr., 81 °; Morondava, W. coast, 77°; Tullear, S.W. coast, 78 s .

small species of boa ; crocodiles abound in the rivers and lakes ; and numerous species of lizard, chameleon and tree-frog inhabit the woods. Madagascar may be considered as one of the headquarters of the Chamaeleonidae , for of the fifty known species no fewer than twenty-five have already been described from the island. Many of these are of curious form, with remarkable developments of the plates of the head and projecting horns and spines. There are several peculiar tortoises, but the gigantic species are now found alive only on the little island of Aldabra, to the north. The insect life comprises many brilliantly-coloured beetles, butterflies (about eight hundred species of which are known), moths, locusts, spiders and flies, and also noxious spiders, with scorpions and centipedes. The river fishes belong chiefly to the family Chromididae ; many of them are of brilliant and bizarre appearance, with strongly con- trasted colours in bands and spots. Those found in the coast waters do not differ materially from the widely spread Indian Ocean species.

As a whole, the Madagascar fauna is marked by a strong individu- ality, which would appear to be the result of long isolation from the other zoological " regions." The Asiatic and Malayan affinities of many of its animals, as well as the physical conditions of the bed of the Indian Ocean, make it highly probable that Madagascar, while once forming part of Africa, is the chief relic of a considerable archipelago formerly connecting that continent with Asia, its other portions being shown by groups of small islands, and by coral atolls and shoals, which are gradually disappearing beneath the waves. These questions have been fully treated by Dr A. R. Wallace in his Geographical Distribution of Animals (vol. i. ch. ix., 1876) and Island Life, ch. xix. (1880).

Flora. — The flora of Madagascar is one of great interest. One of its most prominent features is the belt of forest round a large part of the island at no great distance from the sea, and generally following the coast-line. This forest is densest on the east side, and for about 120 m. forms a double line, the lower one being much the broader and averaging 30 m. across, but attaining a breadth of 60 or 70 m. on the north-east, near Antongil Bay. The vegetation on the western side of the island is much less dense, often appearing as scattered clumps of trees on savannah-like plains rather than continuous forest ; while in the south-west, where the rainfall is very scanty, the vegetation is largely of fleshy-leaved and spiny plants — aloes and cacti (the latter introduced), with several species of Euphorbia, as well as numerous lianas, one of which (Intisy) yields india-rubber. It is estimated that

there are about 30,000 sq. m. of forest-covered country in Madagascar, or about one-eighth of its whole surface. The vegetation of the forests, the abundant epiphytes, the tree- mosses, the filmy ferns and the viviparous character of many of the ferns, show clearly how abundant the rainfall is in the eastern forest region. This contains a large variety of hard-wooded and valuable timber trees, including species of Weinmannia (Lalbna ‘), Elaeocarpus (Voanana) , Dalbergia (Vba mbbana) , Nuxia (Valanirana) , Podocarpus, a pine, the sole species in the island (H’etatra) ,Tambourissa (Ambbra), Neobaronia (Harahara), Ocotea (Varbngy) and probably ebony, Diospyros sp,, &c. The following trees are characteristic of Mada- gascar vegetation, some of them being endemic, and others very prominent features in the landscape: the traveller’s-tree {Urania speciosa), with its graceful crown of plantain-like leaves growing like an enormous fan at the top of a tall trunk, and affording a supply of pure cool water, every part of the tree being of some service in building; the Raphia (rofia) palm (Sagus ruffia); the tall fir-like Casuarina equisetifolia or beefwood tree, very prominent on the eastern coast, as well as several species of screw-pine (Pandanus) ; the Madagascar spice {Ravintsara madagascariensis) , a large forest tree, with fragrant fruit, leaves and bark; a beautiful-leaved species of Calophyllum; and the Tangena (Tanghinia veneniflua), formerly employed as a poison ordeal. On the lagoons and lower reaches of the rivers the Viha (Typhonodorum lindleyanum) , an arum endemic to Madagascar, grows in great profusion to a height of 12 or 13 ft. and has a white spathe more than a foot in length; and on the western coast dense thickets of mangrove line the creeks and rivers. In the interior rivers is found the curious and beautiful lace-leaf plant (Ouvirandra fenestralis) , with an edible tuberous root. On the western side of the island the baobab, the tamarind, the rotra (Eugenia sp.), the rofia palm, and several species of fan-palm (Hyphaene) and of Ficus are prominent ; and the mango (introduced) grows to a large tree. In the generally bare interior highlands, large trees, species of Ficus (Ambntana, Aviavy, Nbnoka, Adabo, &c), often mark the position of the old towns; and some of these, as Ambohimanga, Vohilena, &c, are surrounded by remnants of the original forest, which formerly covered large portions of the interior. The most prominent tree in the central province is now the Cape- lilac (Melia azederach) introduced about 1825; and since the French conquest several species of eucalyptus have been planted in vast numbers by the road sides. These have given quite a new aspect to the vegetation, while bright colour is imparted by species of Bougainvillea and Poinsettia. In the eastern forests palms, bamboos, lianas and tree-ferns, as well as species of Dracaena, are found.

Although flowers growing on the ground or on shrubs are not conspicuous for number or beauty, there are many fine flowering trees, such as Poinciana regia, presenting a mass of scarlet flowers;

1 The words in parentheses are the native Malagasy names.

Colvillia racemosa, with yellow flowers; Astrapaea Wallichii, striking attention from its abundant flowers; and species of Cryptostegia, a purple-flowered creeper, and Strongylodon, another creeper with cream-coloured blossoms. Among attractive plants are species of Hibiscus, Euphorbia, Buddleia, Ixora, Kitchingia, Clematis, &c. On the east coast two orchids, species of Angraecum, with large white waxy flowers, one with an extraordinarily long spur or nectary, attract the attention of every traveller during June and July by their abundance and beauty. Some 320 species oMern have been collected, and there are large numbers of spiny and prickly plants, as well as numerous grasses, reeds and rushes, many of them of great service in the native manufactures of mats, hats, baskets, &c.

The Rev R. Baron divides the flora into three distinctly marked " regions," which run in a longitudinal direction, following approximately the longer axis of the island, and are termed respectively eastern, western and central. The central includes the elevated highland of the interior, while the eastern and western include the forest belts and most of the wooded country and coast plains. Of the 4100 known plants — of which about three-fourths are endemic — composing the Madagascar flora, there are 3492 Dicotyledons, 248 Monocotyledons and 360 Acotyledons. Of these, the orders most largely represented (together with their species) are: Leguminosae, 346; Filices, 318; Compositae, 281; Euphorbiaceae, 228; Orchideae, 170; Cyperaceae, 160; Rubiaceae, 147; Acanthaceae, 131; Gramineae, 130. The number of endemic genera now known is 148. Of the 3178 species of plants whose localities have been determined, 35% are peculiar to the eastern region, 27-5% to the central, and 22% to the western. One natural order, Chlaenaceae, is strictly confined to Madagascar. " A small proportion of the species are Asian, but not African ; and the flora of the mountains corresponds closely with that of the great ranges of the tropical zone of Africa." " The general plan of the flora follows thoroughly the same lines as that of the tropical regions of the Old World."

Among the food-giving plants are rice — the staff of life to the majority of the Malagasy — in many varieties, maize, millet, manioc, yams,[sweet-potatoes, arrowroot, which is largely used by the western tribes — as well as numerous vegetables, many of them of foreign

introduction. The fruits — the majority of which are introduced — are the banana, peach, loquat, pineapple, mango, melon, grape, quince, plum, apple, mulberry, orange, lemon, citron, guava, Chinese- guava, Cape-gooseberry, fig, raspberry, tomato, &c. Several spices are grown, including ginger, capsicum, &c. ; sugar-cane, coffee, indigo, vanilla, tobacco, cotton, hemp, gourds, dye-woods, gums, mulberry and other trees and plants for silk-culture, are also among the vege- table productions; gum-copal was formerly, and india-rubber is still, an important article of export.

Provinces and Towns. — The island may be divided into dis- tricts or provinces, which in the main indicate tribal divisions. Of these tribal territories the following may be distinguished, taking them in three main divisions, from north to south: (1) Eastern: Antankarana, occupying the northern peninsula; the country of the Betsimisaraka, who inhabit a long extent of the coast plains, about 500 m. in length; parallel with this for about a third of it, and between the two lines of forest, is the Bezanozano country. South again are the districts of the Taimbahdaka, the Taimoro, the Taifasy and the Taisaka; and at the south-eastern corner are the Tanosy. (2) Central: the districts of Tsimihety and the Sihanaka; Imerina, the Hova province; the Betsileo; the Tanala or foresters; the Bara; and the emigrant Tanosy. (3) Western: the people from almost the northern to the southern extremities of. the island are known as Sakalava, but consist of a number of distinct tribes — the Tiboina, the Mailaka, the Tamenabe, and the Fiherenana, &c. South of these last are the Mahafaly, with the Tandrdy at the extreme south. There are no distinctly marked boundaries between any of these tribal territories; and west of Imerina and Betsileo there is a considerable extent of country with hardly any population, a kind of ” no-man’s- land.” There are numerous subdivisions of most of the tribes.

The capital, Antananarivo (pop. 69,000), in the highlands of Imerina, and Tamatave (pop. 4600), on the east coast and the chief seaport, are separately described. Majunga (properly Mojanga, pop. 5300) on the north-west coast, just north of 16 S., and Diego-Suarez, are important ports for foreign trade, the latter being also a fortified naval and military station. Other ports and towns are Mahanoro, Mananjary (S.E. coast, pop. 4500), Tullear (S.W. coast), and Fianarantsoa (pop. 6200), the chief town of the Betsileo. There are very few places besides these with as many as 2000 people.

Inhabitants. — The population is somewhat under two and three-quarter millions, 1 including some 10,000 or 11,000 Euro- peans, and a smaller number of Indian, Arab, and other Asiatics, mostly small traders found in the seaports, the Chinese being found in every town of any size. The island, it will be seen, is very sparsely inhabited; the most densely peopled province is that of Imerina with (1905) 388,000 inhabitants. The natives, collectively known as Malagasy, are divided into a considerable number of tribes, each having its distinct customs. Although geographically an African island, the majority of its inhabitants are derived, the lighter portion of them from the Malayo-Polynesian stock, and the darker races from the Melanesian. This is inferred from their similarity to the peoples of the Indian and Pacific archipelagoes in their physical appearance, mental habits, customs, and, above all, in their language. Their traditions also point in the same direction. There is, however, an undoubted African mixture in the western and some other tribes. There is also an Arab element both on the north-west and south-east coasts; and it appears that most of the families of the ruling classes in all parts of the island are descended from Arabs, who married native women. It is believed that there are traces of an aboriginal people (the Vazimba), who occupied portions of the interior before the advent of the present inhabitants, and these appear to have been a somewhat dwarfish race, and lighter-coloured than the Malagasy generally. The Hova became the dominant tribe from the beginning of the 19th century; they appear to be the latest immigrants, and are the lightest in colour; and they are also the most intelligent and civilized of all the peoples inhabiting the island.

The most striking proof of the virtual unity of the inhabitants of Madagascar is that substantially but one language is spoken over the whole country. The Malay affinities of Malagasy were noted in the 16th century; indeed, the second and fifth books published upon the country (in 1603 and 1613) were comparative vocabularies of these two languages. Later investigations have confirmed the conclusions thus early arrived at; and Van der Tuuk, Marre de Marin and W. E. Cousins have shown con- clusively the close relationships between the language of the Malagasy and those of the Malayo-Polynesian regions; similar connexions exist, especially in grammatical construction, between the Malagasy and Melanesian languages. The Malagasy had never invented for themselves a written character, and had consequently no manuscripts, inscriptions or books, until their language was reduced to writing, and its orthography settled by English missionaries. Their speech nevertheless is very full in many of its verbal and other forms, while it also exhibits some curious deficiencies. It is very soft and musical, full of vowels and liquids, and

free from all harsh gutturals. Native oratory abounds in figures, metaphors and parables; and a large number of folk-tales, songs and legends, together with the very numerous proverbs, give ample evidence of the mental ability and imagin- ative powers of the Malagasy.

Native society in Im&rina among the Hova was formerly divided into three great classes : the Andriana, or nobles ; the Hova, freemen or commoners; and the Andevo, or slaves; but these last became free by a proclamation issued in 1896. The Andriana are, strictly speak- ing, royal clans, being descendants of petty kings who were conquered or otherwise lost their authority through the increasing power of the ancestors of the reigning family. Their descendants retained certain honours in virtue of their royal origin, such as special terms of saluta- tion, the use of the smaller scarlet umbrella (the larger one was the mark of royal rank), the right to build a particular kind of tomb, &c. ; they also enjoyed exemption from certain government service, and from some punishments for crime. The Hova 2 or commoners form the mass of the population of Imerina. They are composed of a large number of tribes, who usually intermarry strictly among them- selves, as indeed do families, so that property and land may be kept together. The third great division was the slave population, which since 1896 has become merged in the mass of the people. The

1 The census taken in 1905 gives 2,664,000 as the total population, but it is probably a little over that amount, as some localities are still imperfectly known.

- This is a special and restricted use of the word, Hova in its widest sense being a tribal name, including all ranks of people in ImSrina.

Mozambiques or African slaves, who .had been brought from the African coast by Arab dhows, were in 1877 formally set free by an agreement with the British government.

Royalty and chieftainship in Madagascar had many peculiar customs. It had a semi-sacred character; the chief was, in heathen tribes, while living, the high priest for his people, and after death, was worshipped as a god; in its modern development among the Hova sovereigns it gathered round it much state and ceremony. There were many curious examples of the taboo with regard to actions connected with royalty, and also in the words used which relate to Malagasy sovereigns and their surroundings. These were par- ticularly seen in everything having to do with the burial of a monarch. While the foregoing description of native society applied chiefly to the people of the

central province of Imerina, it is applicable, with local modifications, to most of the Malagasy tribes. But on the island becoming a French colony, in 1896, royalty was for- mally abolished; and little regard is paid to native rank by French officials.

The chief employment of the Malagasy is agriculture. In the cultivation of rice they show very great ingenuity, the ketsa grounds, where the rice is sown before transplanting, being formed either on the margins of the streams or in the hollows of the hills in a series of terraces, to which water is often conducted from a considerable distance. In this agricultural engineering no people surpass the Betsileo. No plough is used, all work being done by a long-handled spade ; and oxen are only employed to tread out the soft mud prepara- tory to transplanting. The rice is threshed by being beaten in bundles on stones set upright on the threshing-floor; and when beaten out the grain is stored by the Hdva in rice-pits dug in the hard red soil, but by the coast tribes in small timber houses raised on posts. In preparing the rice for use it is pounded in a wooden mortar to remove the husk, this work being almost always done by the women. The manioc root is also largely consumed, together with several other roots and vegetables; but little animal foods (save fish and freshwater Crustacea) is taken by the mass of the people except at festival times. Rice is used less by the western tribes than by those of the central and eastern provinces, and the former people are more nomadic in their habits than are the .others. Large herds of fine humped cattle are found almost all over the island.

The central and eastern peoples have considerable manual dex- terity. The women spin and weave, and with the rudest appliances manufacture a variety of strong and durable cloths of silk,cotton and hemp, and of rdfia palm, aloe and banana fibre, of elegant patterns, and often with much taste in colour. They also make from straw and papyrus peel strong and beautiful mats and baskets in great variety, some of much fineness and delicacy, and also hats resembling those of Panama. The people of the south and south-east make large use of soft rush matting for covering, and they also prepare a rough cloth of bark. Their non-employment of skins for clothing is a marked distinction between the Malagasy and the South African races, and their use of vegetable fibres an equally strong link be- tween them and the Polynesian peoples. The men wear a loin- cloth or salaka, the women a kitamby or apron folded round the body from waist to heel, to which a jacket or dress is usually added ; both sexes use over these the lamba, a large square of cloth folded round the body something like the Roman toga, and which is the characteristic native dress. The Malagasy are skilful in metal-work- ing; with a few rude-looking tools

they manufacture silver chains of great fineness, and filagree ornaments both of gold and silver. Their iron-work is of excellent quality, and in copper and brass they can produce copies of anything made by Europeans. They display considerable inventive power, and they are exceedingly quick to adopt new ideas from Europeans.

There is a considerable variety in the houses of the different Malagasy tribes. The majority of Hova houses were formerly built of layers of the hard red soil of the country, with high-pitched roofs thatched with grass or rush; while the chiefs and wealthy people had houses of framed timber, with massive upright planking, and lofty roofs covered with shingles or tiles. But the introduction of sun-dried and burnt bricks, and of roofing tiles in the central pro- vinces has led to the general use of these materials in the building of houses, large numbers of which are made in two storeys and in Euro- pean fashion. The forest and coast tribes make their dwellings chiefly of wood framing filled in with the leaf-stalks of the traveller's tree, with the leaves themselves forming the roof covering. The houses of the Betsileo and Sakalava are very small and dirty, but those of the coast peoples are more cleanly and roomy. Among the Hova and Betsileo the old villages were always built for security on the summits of lofty hills, around which were dug several deep fosses, one within the other. In other districts the villages and homesteads are enclosed within formidable defences of prickly-pear or thorny mimosa.

Apart from the modern influence of religious teaching, the people are very immoral and untruthful, disregardful of human life and suffering, and cruel in war. Until lately polygamy has been common among all the Malagasy tribes, and divorce effected in an absurdly easy fashion. At the same time the position of woman is much higher in Madagascar than in most heathen countries; and, the fact that for nearly seventy years there were (with a few months'

exception) only female sovereigns, helped to give women consider- ‘ able influence in native society. The southern and western peoples still practise infanticide as regards children born on several unlucky days in each month. This was formerly the general practice all over the island. The old laws among the Hova were very barbarous in their punishments, and death in various cruel forms was inflicted for very trifling offences. Drunkenness is very prevalent in many parts of the island ; and it can hardly be said of many of the Malagasy that they are very industrious. But they are courageous and loyal to their chiefs and tribe, and for short periods are capable of much strenuous exertion. They are affectionate and firm in their friend- ships, kind to their children and their aged and infirm relatives, very respectful to old age, most courteous and polite and very hospitable to strangers. Slavery had a patriarchal and family character, and was seldom exercised in a cruel or oppressive way.

The Malagasy have never had any organized religious system or forms of worship ; there are no temples, images or stated seasons of devotion, nor is there a priesthood, properly so-called. Yet they have, never been without some distinct recognition of a supreme being, whom they call Andriamanitra, ” The Fragrant One,” and Zd.nahd.ry, ” The Creator ” — words which are recognized all over the island. They have also retained many ancient sayings, proverbial in their style, which enforce many of the truths of natural religion as to the attributes of God. With all this, however, there has long existed a kind of idolatry, which in its origin is simply fetishism — the belief in charms — as having power to procure various benefits and protect from certain evils. Among the Hova in modern times four or five of these charms had acquired special sanctity and were each honoured as a kind of national deity, being called ” god,” and brought out on all public occasions. Together with this idolatry there is also a firm belief in the power of witchcraft and sorcery, in divina- tion, in lucky and unlucky days and times, in ancestor worship, especially that of the sovereign’s predecessors, and in several curious ordeals for the detection of crime. The chief of these was the cele- brated tangena poison ordeal, in which there was implicit belief, and by which, until its prohibition by an article in the Anglo- Malagasy treaty of 1865, thousands of persons perished every year, Sacrifices of fowls and sheep are made at many places at saered stones and altars, both in thanksgiving at times of harvest, &C, and as propitiatory offerings.

Blood and fat are used to anoint many of these stones, as well as the tombs of ancestors, and especially those of the Vazimba. In some of the southern districts it is said that human sacrifices were occasionally ‘off ered. The chief festival among the Hova, and almost confined to them, was that of the New Year, at which time a kind of sacrificial killing of oxen took place, and a ceremonial bathing, from which the festival took its name of Fandroana (the Bath). This festival is now merged in the French national fete of the 14th of July. Another great festival was at circumcision times. This rite was observed by royal command at intervals of a few years; these were occasions of great rejoicing, but also of much drunkenness and licentiousness. Since 1868 circum- cision has been observed by each family at any time convenient to itself. It is practised by all the Malagasy tribes. Funerals were also times of much feasting, and at the death of people of rank and wealth numbers of bullocks were and are still killed. Although there was no proper priesthood, the idol-keepers, the diviners, the day-declarers and some others formed a class of people closely connected with heathen customs and interested in their continued observance.

Industries and Commerce. — The rearing of cattle and the dressing of hides, the collection of rubber and bee culture are important industries. The chief food crops grown have been indicated (see Flora), and the gold-mining is separately noticed below. Other industries undertaken or developed by Europeans are silk and cotton weaving and raphia-fibre preparation, and ostrich farming. Sugar, rice, soap and other factories have been established. In 1904 the exportation of straw and other fibre hats began; these resemble those of Panama and promise to become an important item. Tanning bark, coffee and guano are also recent exports.

Since 1862, when the country was thrown open to foreign trade, the growth of over-sea commerce has been comparatively slow. In the early days cattle were the chief export. About 1870 india-rubber began to be exported in considerable quan- tities, and cattle, rubber and hides continue staple products. Other important exports are raphia fibre and beeswax. Since 1900 gold has become a leading export, the value of the gold sent out of the country in the five years 1901-1906 being £1,384,493. The imports consist chiefly of tissues (mostly cotton goods), breadstuffs and rice, liquors, metal-ware and coal. Better means of internal transport and increased pro- duction in the island have greatly reduced the import of rice, which came mostly from Saigon

Before the occupation of Madagascar by France the duty on imports

and exports was 10% ad valorem, and the foreign trade was very largely in the hands of British and American merchants. In July 1897 the French tariff was applied and increased rates levied on foreign goods, notably cottons. This practically killed the American trade and reduced the British trade to a very small proportion. In 1897 the British imports were valued at £179,000; the next year, with the new tariff in force, they had dropped to £42,000. The only export duties are: cattle 2s. per head and rubber 2d. per lb.

In 1880-1885 the entire foreign trade of Madagascar, imports and exports, was estimated to be about £1,000, coo; in 1900-1906 the volume of trade had increased to a little over £2,500,000 a year. But while from 1900 onwards imports had a tendency to decrease (they were £1,841,310 in 1901 and £1,247,936 in 1905), exports steadily increased, owing to the working of gold- mines. The total value of the exports rose from £359,019 in 1901 to £822,470 in 1906. 1 About 90% of the trade is with France or other French colonies. The remaining trade is nearly all British and German.

Banking business is in the hands of French companies. The legal currency is the French 5-franc piece and the smaller French coins. There was no native coinage, the French 5-franc piece or dollar being the standard, and all sums under that amount were obtained by cutting up those coins into all shapes and sizes, which were weighed with small weights and scales into halves, quarters, eighths, twelfths and twenty-fourths of a dollar, and even reckoned down to the seven hundred and twentieth fraction of the same amount.

Gold-mining. — Gold-mining has been carried on regularly since 1897, and by 1900 the value of the ore extracted exceeded £100,000. Reports of rich discoveries attracted considerable attention in South Africa and Europe during 1904-1906, but experts, sent from the Transvaal, came to the conclusion that Madagascar would not become one of the rich goldfields of the world. The chief mining districts have been already indicated (see under Geology). Rich finds were reported from the north of the island during 1907, in which year the export of gold was £320,000. The mines afford a lucrative occupation for some thousands of persons, and many of the claim-holders are British. Decrees of 1902 and 1905 regulate the conditions under which mining is carried on. By decree of the 23rd of May 1907, the radius of the circle within which claims may be pegged is 2 kilometres (ij m.), and a tax of 5% is levied on the value of the gold extracted.

Communications. — There is regular steamship communication between the chief ports and Marseilles, Zanzibar and India (via

Mauritius and Ceylon) ; and a submarine cable to Mozambique places the island in telegraphic connexion with the rest of the world. The French have built carriage roads from the interior to the principal ports as well as to connect the principal towns. On these roads large use is made of bullock wagons, as well as carts drawn by men, and women also. Tamatave and Antananarivo are joined by coast canals and lakes and by a railway service. Where other means are not available, goods are carried by canoes, or on the shoulders of bearers along the native footpaths.'

There is a well-organized postal service, and all the towns of note are linked by a telegraph system, which has a length of over 4000 miles.

Government, Revenue, b'c. — The colony is not represented in the French Chambers, nor has it self-government. At the head of the administration is a governor-general, who is assisted by a nominated council of administration which includes unofficial members. This council must be consulted on matters affecting the budget. In several towns there are chambres con- sultatives, composed of local merchants and planters. The island is divided into circles, placed under military officers, and provinces, presided over by a civilian. As far as possible in local affairs 4 each of the native races is granted autonomy, the dominion of the Hdva over the other tribes being abolished. Each province has its native governor and minor officials, the governor being generally selected by popular vote. Each village has an organization (the Fokon' blona) resembling that

1 "Exports:

1901

1906

Increase.

Rubber . . . Hides and skins . Gold

£26,679

3L548

131,987

£301,518

350,339 2-70,613

£274.839

218,791 138,626

of a commune; at its head is a chief or mpiadidy, who serves

for three years.

For Europeans and in suits between Europeans and natives the French judicial code is applicable; suits between natives are tried by native tribunals (established 1898) presided over by a European assisted by two native assessors. These tribunals judge according to native law and usages, except when such customs (e.g. polygamy and slavery) have been expressly abolished. Arbitration councils are available everywhere for the settlement of disputes between native workmen and their employers. The native laws respecting land tenure have been improved by the adoption of a method of registration based on the Torrens system.

Revenue is derived from land, house and capitation taxes, from customs, posts and telegraphs, ferries, licences and other indirect imposts. The excess of expenditure over revenue is made good by subventions from France. A considerable portion of the revenue is expended on public works. Revenue and expenditure in 1905 were each just beneath £1,000,000. This is exclusive of the sums spent by France in the island on the army, and for the naval base at Di6go-Suarez. There is a public debt amounting (1907) to £4,055,600. As stated in the French senate (February 1909), everything is taxed in the island ; and no sooner has any enterprise become fairly successful than it is so heavily taxed as to be no longer worth carrying on, and certain crops have therefore been destroyed by the colonists who had planted them. This has been the case with tobacco, sugar, rum, and also in butter-making, cattle-breeding and other things. Notwithstanding this taxation, from 1895 to 1908 £12,000,000 was required for Madagascar from the home government, and the demand is constantly increasing.

History. — From the earliest accounts given of the people of Madagascar by European travellers, as well as from what may be inferred from their present condition, they seem for many centuries to have been divided into a number of tribes, often separated from one another by a wide extent of uninhabited country. Each of these was

under its own chief, and was often at war with its neighbours. No one tribe seems to have gained any great ascendancy over the rest until about the middle of the 17th century, when a small but warlike people called Safcalava, in the south-west of Madagascar, advanced north-ward, conquered all the inhabitants of the western half of the island, as well as some northern and central tribes, and eventually founded two kingdoms which retained their supre- macy until the close of the 18th century. About that time, the Hova in the central province of Imerina began to assert their own position under two warlike and energetic chieftains, Andrianimpoina and his son Radama; they threw off the Sakalava authority, and after several wars obtained a nominal allegiance from them; they also conquered the surrounding tribes, and so made themselves virtual kings of Madagascar. From that time until 1895 Hova authority was retained over a large part of the central and eastern provinces, but it was only nominal over much of the western side of the island, while in the south-west the people were quite independent and governed by their own chiefs.

While European intercourse with Madagascar is comparatively recent, the connexion of the Arabs with the island dates from a Arab very remote epoch; and in very early times settle-

lotercourse ments were formed both on the north-west and south- am/ east coasts. In the latter locality there are still Influence, graces f their influence in the knowledge of Arabic possessed by a few of the people. But in these provinces they have become merged in the general mass of the people. Tt is different, however, in the north-west and west of the island. Here are several large Arab colonies, occupying the ports of Anorontsanga, Mojanga, Marovoay and Morondava, and re- taining their distinct nationality. There is also in these districts a Hindu element in the population, for intercourse has also been maintained for some centuries between India and northern Madagascar, and in some towns the Banyan Indian element is as prominent as the Arab element. In the early times of their intercourse with Madagascar, the Arabs had a very powerful influence upon the Malagasy. This is seen in the number of words derived from the Arabic in the native language. Among these are the names of the months and the days of the week, those used in astrology and divination, some forms of salutation, words for dress and bedding, money, musical instruments, books

and writings, together with a number of miscellaneous terms.

The island is mentioned by several of the early Arabic writers and geographers, but medieval maps show curious ignorance of its size

and position. Marco Polo has a chapter upon it, and terms it ” Madeigascar,” but his accounts are ^^ourse. confused with those of the mainland of Africa. The first European voyager who saw Madagascar was a Portuguese named Diogo Diaz, captain of one of the ships of a fleet com- manded by Pedro Cabral and bound for India. Separated from his companions by a storm near the Cape, he sighted the eastern coast of the island on the 10th of August 1500. That day being the feast of St Lawrence, Madagascar was named the ” Isle of St Lawrence,” and retained that name on all maps and charts for a hundred years. The Portuguese gave names to most of the capes, but made no persistent attempts at colonization. After them the Dutch endeavoured, but with little success, to form colonies; and in the time of Charles I. proposals were made to form an English ” plantation,” but these were never carried into effect, although for a short time there was a settlement formed on the south-west coast. In the latter part of the r 7th and during most of the 18th century the French attempted to establish military positions on the east coast. For some time they held the extreme south-east point of the island at Fort Dauphin; but several of their commandants were so incapable and tyrannical that they were frequently involved in war with the people, and more than once their stations were destroyed and the French were massacred. Early in the 19th century all their positions on the mainland were relinquished, and they retained nothing but the island of Ste Marie on the east coast. In 1811 Tamatave had been occupied by British troops, and the Treaty of Paris of 1814 recognized as British the ” French settlements in Madagascar,” but as a matter of fact France had then no settlements on the mainland. The then governor of Mauritius, Sir Robert Farquhar, endeavoured to prosecute British claims and obtained a cession of Diego-Suarez Bay. These claims were not backed up by the home government, and a little later the policy was adopted by Great Britain of supporting the Hova authority. The political history of Madagascar as a whole may be said to date from the reign of Radama I. (1810-1828). He was a man much in advance of his age — shrewd, enterprising, and „ gdg / undeterred by difficulty — a kind of Peter the Great of • his time. He saw that it was necessary for his people to be educated and civilized if the country was to progress: and making a treaty with the governor of Mauritius to abolish the export of slaves, he received every year in compensation a subsidy of arms, ammunition, and uniforms, as well as English training for his troops. He was thus enabled to establish his authority over a large portion of the island. For some years a British agent, Mr Hastie, resided at Radama’s court, and exercised a powerful influence over the king, doing much for the material advance of the country. At the same period (1820) Christian intmduc- teaching was commenced

in the capital by the tioo of London Missionary Society, and by its missionaries J? 1 **’ the language was reduced to a systematic written an y ‘ form, and the art of printing introduced; books were pre- pared, the Scriptures were translated, numerous schools were formed, and several Christian congregations were gathered together. The knowledge of many of the useful arts was also imparted, and many valuable natural productions were dis- covered. The power of superstition was greatly broken, a result partly due to the keen good sense of the king, but chiefly to the spread of knowledge and religious teaching.

The bright prospects thus opening up were clouded by the death of Radama at the age of thirty-six, and the seizure of the royal authority by one of his wives, the Princess RaBaYaloDa Ra.nava.lona. She looked with much suspicion upon ,_ the ideas then gaining power among many of her people, and determined to strike a decisive blow at the new teaching. In 1835 the profession of the Christian religion was declared illegal ; all worship was to cease, and all religious books were ordered to be given up. By the middle of 1836 all the English missionaries were obliged to leave the island, and for twenty-five years the most strenuous efforts were made by

the queen and her government to suppress all opposition to her commands. This, however, only served to show in a very remarkable manner the courage and faith of the Christian Malagasy, of whom about two hundred suffered death in various cruel forms, while many hundreds were punished more or less severely by fine, degradation, imprisonment and slavery. During the queen’s reign the political condition of the country was deplorable; there were frequent rebellions, many of the distant provinces were desolated by barbarous wars; and for some years all Europeans were excluded, and foreign commerce almost ceased. This last circumstance was partly owing to an ill-managed attack upon Tamatave in 1846 by a combined British and French force, made to redress the wrongs inflicted upon the foreign traders of that port. But for the leaven of Christianity and education which had been introduced into the country it would have reverted to a state of barbarism.

This reign of terror was brought to a close in 1861 by the death of the queen and the accession of her son Radama II. The R d all i s l an(i was reopened to European trade, and mis- ‘ sionary efforts were

recommenced. A determined attempt was made by some Frenchmen to gain for their country an overwhelming influence by means of a treaty which they induced the king to sign. But this act, as well as the vices and insane follies into which he was led by worthless foreign and native favourites, soon brought his reign and his life to an end. He was put to death in his palace (1863) and his wife was placed on the throne. The new sovereign and her government refused to ratify the agreement which had been illegally obtained, choosing rather to pay a million francs as compensation to the French company. During the five years' reign of Queen Rasoherina, quiet and steady advances were made in civilization and education, and treaties were concluded with the British, French and American governments.

At the death of Rasoherina in 1868, she was succeeded by her cousin, Ranavalona II. One of the first acts of the new queen was the public recognition of Christianity; and very 1 soon afterwards she and her husband, the prime minister, were baptized, and the erection of a chapel royal was commenced in the palace yard. These acts were followed in the succeeding year by the burning of the royal idols, and immediately afterwards by the destruction of the idols throughout the central provinces, the people generally putting themselves under Christian instruction. From that time educa- tion and enlightenment made great progress, chiefly through the labours of missionaries of various societies.

The native Malagasy government, though theoretically despotic, was limited in various ways. Radama I. and Rana- Native valona I. were much more absolute sovereigns than Oovera- those before or after them, but even they were m ' largely restrained by public opinion. New laws were

announced at large assemblies of the people, whose consent was asked, and always given through the headmen of the different divisions of native society; this custom was no doubt a survival from a time when the popular assent was not a merely formal act. The large disciplined army formed by Radama I. aided much in changing what was formerly a somewhat limited monarchy into an absolute one. The Hova queen's authority was maintained over the central and eastern portions of Mada- gascar, and at almost all the ports, by governors appointed by the queen, and supported by small garrisons of Hova troops. At the same time the chiefs of the various tribes were left in possession of a good deal of their former honours and influence. Ranavalona II., her predecessor and her successor were succes- sively married to the prime minister, Rainilaiarivony, a man of great ability and sagacity, who, by his position as husband and chief adviser of the

sovereign, became virtual ruler of the country. Chiefly owing to his influence, many measures tending to improve the administration were introduced. The Hova army was estimated at from 30,000 to 40,000 men, several English non-commissioned officers and, latterly, others of higher rank being engaged to train them in European methods. Revenue was derived from customs duties, firstfruits, fines and

Ranavalona , II.

confiscation of offenders' property, and a money offering called hdsina, presented on a great variety of occasions both to the sovereign in person and to her representatives; and these were supplemented by " benevolences " (in the medieval sense of the word) levied upon the people for occasional state necessities. The government also claimed the unpaid service of all classes of the community for every kind of public work.

The Hova government aspired to have Madagascar recognized as an independent civilized state, and consuls appointed by the British, French and American governments were accredited to the Malagasy sovereign, the queen /j e / a OBS . having a consul in England, and a consular agent at Mauritius. The treaty with Great Britain, concluded in 1865, gave the consuls of that nation jurisdiction over the British sub- jects in the island. At this period, on the initiative of the 4th earl of Clarendon, then foreign secretary, an understanding was come to between the British and French governments by which it was agreed that each power should respect the independence of Madagascar; and the future of the country appeared to be bound up in the gradual consolidation- of the central Hdva authority over the whole island. While this prospect would have satisfied the British interests in the island, it was other- wise with the French. The tradition of their former settlements in and influence over the island was strong; in 1840 they had taken under their protection the Sakalava ruler of the small island of Nossi-be, off the north-west coast, and in virtue of that act claimed a vague protectorate over the adjacent shores of the mainland. A treaty, concluded in 1868, while establishing French consular jurisdiction in Madagascar, recognized Rana- valona II. as queen of Madagascar, and under the Second Empire attempts to establish French political influence were dis- couraged, and even as late as 1872 the subsidy enjoyed by the Jesuit missionaries was withdrawn. In 1878 the French consul, Laborde, died, and a dispute arose as to the disposal of his pro- perty. This dispute was the occasion of further intervention on the part of the French, for the Paris government supported the claims of Laborde's heirs, and revived their claim to a protector- ate over the Sakalava of the north-west coast, as

based on their agreement with them in 1840, ceding Nossi-be to France. A policy of colonial expansion generally, and in Africa in particular at this time, was manifest in France, as in other Euro- pean countries, and the French claims on the Hova were pressed with vigour.

Towards the middle of 1882 the relations between the native government and that of France became much strained, and to settle, if possible, these causes of dispute, two Franco- Hova officers of high rank were sent to France as Malagasy ambassadors, but as they were not authorized to JJˆT ° f . concede any territory, their visit accomplished very little. Treaties had been concluded with Great Britain, Ger- many and America, giving improved facilities for trade with Madagascar, but before the return of the envoys matters had come to a crisis in the island. In May 1883 an ultimatum was sent to the Malagasy queen, requiring immediate compliance with the demands of France; and as these were refused by the Hova government, Tamatave was bombarded by a French squadron and then occupied by the marines. The war con- tinued in a desultory fashion for many months; but no serious attempt was made to invade the interior; and in 1885 terms of peace were agreed to. By a treaty signed on the 17th of December it was agreed that the foreign relations of Madagascar should be directed by France; that a resident should live at the capital, with a small guard of French soldiers; and that the Bay of Diego-Suarez, together with surrounding territory, should be ceded to France. The word “protectorate” was carefully excluded from the treaty, although doubtless the French envoys intended that this should be its practical issue. It was at the same time agreed that there should be no foreign interference with the internal government of the country, and that the queen should retain her former position, with all its honours and dignity. It should be here noticed that the queen, Ranavalona II., died just at the beginning of the war, on the

13th cf July 1883, and was succeeded by her niece, Princess Razafindrahety, under the title of Ranavalona III., who main- tained the same policy as her predecessor, and was much beloved Preach Pro-by ner people and respected by all. Several French tectorate, residents successively represented France at Antana- 1885-1894. nar ivo; but these found themselves unable to obtain that influence which the home authorities thought they had a right to demand. Although

the British government, in return for concessions in Zanzibar, had consented, in 1890, to recognize a French protectorate over Madagascar, the Malagasy prime minister, Rainilaiarivdny, was not disposed to give any advantage to France and continued to arm and train, by the help of British officers, a large body of native soldiers. This state of tension and irritation could not last, and at length, towards the close of 1894, the French government sent an ultimatum to the Malagasy sovereign, demanding such powers as would have made French authority supreme in the island. These demands were refused by the native government, and other conditions were offered; but the French envoy, together Preach la- with the resident's escort, left the capital, as also did vasioa and the French traders and others, including the large Conquest, Jesuit mission. As soon as these had left the island, the chief ports were occupied by French troops, and an expeditionary force under General Duchesne was afterwards landed on the north-west coast at Mdjanga — commonly, but in- correctly, written Majunga — with the object of breaking the Hova authority. Owing to the necessity of making a road for the passage of artillery and military stores, many months were spent on the march into the interior, and there was considerable loss of life by fever and other disease among the invading troops. But no effectual resistance was made by the Malagasy, and at length, on the 30th of September 1895, the French forces appeared on the heights north and east of Antananarivo, bom- barded the city, which surrendered in the afternoon, and on the evening of the same day the French entered the capital.

The result was that the protectorate of France was re-estab- lished in the central provinces, but the queen was allowed to retain her position. Early in 1896, however, a serious 1896, 'and" rebellion broke out in several parts of Imerina. This Gradual movement was not only anti-French and anti-foreign, Subjection but also distinctly anti-Christian. The French troops Malagasy gradually broke up the power of the rebellion in the central provinces, but as there appeared to be considerable unrest in many other parts of the island, General Gallieni, an officer with a reputation for vigour and ability in the Sudan and Tongking campaigns, was sent out to relieve the then resident-general.

General Gallieni had a difficult task in establishing the autho- rity of France throughout the island among numbers of tribes A<{ minis- wno had never submitted to any control from others. tration of Among the first steps he took were to put the country General under martial law, to abolish royalty and all semblance Gal eni. Q j jj ova government, and to declare Madagascar to be henceforth a colony of

France. Queen Ranavalona III. was exiled to Reunion, and subsequently to Algeria. Meanwhile carriage roads were commenced to connect all the chief centres, and the military posts were gradually extended so as to consoli- date French rule over all the outlying tribes. French residents and numerous other officials were placed at every important town, and various projects were started for the civilization of the Malagasy in accordance with French ideas. At the close of 1 899, General Gallieni was able to report that only portions of the west and south-west remained to be brought into submission. Not long afterwards the authority of France was recognized through- out the island. General Gallieni, whose firm and vigorous ad- ministration, and desire to treat the Malagasy justly and kindly, made him liked by the people, retired in 1905, and was succeeded in that office by M. Victor Augagneur, late mayor of Lyons. Since the French occupation th? Malagasy have conformed pretty readily to the new order of things, although many of the most intelligent Hova deeply regret that their country did not retain its independence. Justice is administered, on the whole,

with fairness and impartiality; but the taxation seems too heavy for the means of the people, indeed it is affirmed by trustworthy natives that the well-to-do classes are being gradually drained of their property. To an outsider it also appears that the staff of officials is very largely in excess of any real needs of administra- tion; ‘several monopolies, which interfere with the habits of the people, tend to produce discontent; and the taking of their land and houses for public works, roads, &c, while but a mere fraction of their real value is allowed as compensation, does not help to increase their acquiescence in foreign control. But the most serious cause for dislike to government action was the inter- ference by the governor-general, in 1907, with their religious customs, by the suppression of hundreds of their congregational schools, and the closing of numbers of their churches. In July 1910 M. Augagneur was replaced as governor-general by N. Picquie, a prominent official of the Colonial Department, who had previously served with acceptance as deputy governor- general of French Indo-China, and who had a reputation for tact and impartiality.

Christian Missions and Education. — -As already noticed, the Malagasy owe to missionaries of the London Missionary Society their first school system and their first literature, in 1820 and subsequent years ; 1 and for fifteen years all educational work was carried on by them, some 10,000 to 12,000 children having been instructed in their schools. On the reopening of the country to Europeans in 1862, the L.M.S. mission was resumed and was carried on with vigour for

several years, stations being formed in several parts of Imerina, in the Betsileo and Antsihanaka provinces, and at the ports of Tamatave, Majunga and Farafangana (south-east coast). In 1890 the number of their churches was I220; adherents, 248,000; and scholars, 68,000; so that for long the greater part of the educa- tional work was in their hands, carried on not only in primary schools, but also in high schools and colleges. In 1863 the Church of England began work in the island through the Society for the Propagation of the Gospel and the Church Missionary Society. After some time, however, the latter society withdrew, leaving the field to the S.P.G. A bishop is stationed in the capital, with a theological college in its neighbourhood, but the chief work of the Anglican mission is on the east coast. In 1866 the Norwegian Lutheran Society began work in Madagascar, and was joined in 1888 by an American Lutheran Society. With a representative church at the capital, the chief work of these missions is in the Vakinankaratra district (south-west of Imerina), in the Betsileo province, and on the south-east and south-west coasts; in these places they have a large number of converts and (until lately) schools. In 1867 a mission was begun by the Society of Friends, who gave great attention to education and literary work, and afterwards took up as their field of labour the western and south-western parts of Imerina, where they have a large and well-organized mission. Immediately after the island became a French possession the French Protestant Churches began (in 1896) to take part in the evangelizing of their new colony, and about half the area for long occupied by the London Missionary Society was transferred to the Paris Society. : The bulk of the Malagasy Christians are Protestants, probably three-fourths or four-fifths of those professing Christianity. A Roman Catholic (Jesuit) mission was begun in 1861, and a large force of priests with a bishop andlay brethren and sisters engaged in education, have been at work in the island since then, except during the two Franco- Malagasy wars. 2 Since the French conquest, the north of the island has been occupied by a mission of priests of the Saint Esprit, and the southern portion by the Lazarist mission, each with a bishop at its head. The following table gives the statistics of the various Protestant missions at the close of 1906: — –

Mission

Mission- aries

Churches

Adhe- rents

Mem- bers

Scho- lars

Lond. Miss. Soc. Soc. Prop. Gospel Norweg. Luth. Am. Luth. Soc. of Friends French Prot. Miss.

25 15 60

14 27 29

630 121

892

?

178 491

120,000 13,000 84,000

?

15,000 110,660

32,000

4,994

7i)5do

?

2,540 10,500

27,000

7-655

38,000

?

7,122

18,200

1 It is true that 200 years earlier than this, persistent efforts were

made for nineteen years (1600-1619) by Portuguese Roman Catholic missionaries to propagate their faith among the south-east coast tribes. But although much zeal and self-denial were shown by these men, their efforts were abortive, and the mission was at length abandoned, leaving no fruit cf their labours in a single church or convert. Half a dozen small books of devotion are all that remain to show their presence in Madagascar.

2 The work of the ” Freres chretiens ” was t however, almost broken up by the anti-clerical policy of the French government.

Since 1897 high schools, and medical and technical schools, and a few primary schools, have been formed by the French government; and all other schools have been placed under regulations issued by an educational department, the scholars being required to learn the French language; but until the end of 1906 the bulk of the educational work was carried on by the various missions. At that date the anti-clerical movement in France began to affect Madagascar. In all the missions the churches had, in the vast majority of cases, been used as school-houses, but in November 1906 it was strictly forbidden to use churches for educational purposes after two months from that date; and the effect of the decree, with other provisions, was to close hundreds of schools, probably three-fourths of the whole number.

For many years (1862-1896), all medical aid to the sick, the formation of hospitals and dispensaries, the training of native doctors, midwives and nurses, and the production of medical literature was entirely due to the Protestant missionaries, viz. the LondonMissionary Society, the Friends and the Norwegians. Numbers of young men received a full course of medical and surgical training, and were awarded diplomas after passing strict examinations. This work is now mostly in charge of a government department, and mission medical work is much restricted; but for thirty-five years the Mala- gasy owed all such help to the benevolence of European Christians. Besides care for the sick in ordinary diseases, asylums for lepers were for many years carried on; two by the London Missionary Society, one, a large one, with 800 or 900 inmates, by the Norwegian Society, and another by the Roman Catholic mission. This last, with one of those of the L.M.S., is now taken over by the government. Authorities. — As regards the scientific aspects of the country, almost everything of value in previous books and papers is included in the magnificent

work (1882 et seq.), in 28 4to vols., by Alfred Grandidier, entitled Histoire naturelle, physique, et politique de Madagascar. Many of the volumes consist of coloured lithograph plates illustrating the natural history of the country, as well as atlases of maps from the earliest period.

General : Etienne de Flacourt, Histoire de la grande isle Madagas- car (Paris, 1658); Madagascar, or Robert Drury's Journal during Fifteen Years' Captivity on that Island (London, 1729 ; new ed., 1890) ; Voyages et memoires de Maurice Auguste, comte de Benyowski (Paris, 1 791); Froberville, Histoire de Madagascar (Isle de France, 1809); Ellis, History of Madagascar (London, 1838); Guillain, Documents sur . . . la partie occidentale de Madagascar (Paris, 1845); Mac6 Descartes, Histoire et geographie de Madagascar (Paris, 1846); Ellis, Three Visits to Madagascar (London, 1859); J. Sibree, Madagascar and its People (London, 1870); Tantara ny Andriana eto Madagascar: Histoire des rois d'Imerina d'apres les manuscrits malgaches, (Antananarivo, 1875); Mullens, Twelve Months in Madagascar (London, 1875); Blanchard, L'lle de Madagascar (Paris, 1875); Dahle, Madagascar og dels Beboere (Christiania, 1876-1878); Sibree and Baron (eds.), The Antananarivo Annual, Nos. i-xxiv. (1875- 1900, pp. 31 15); Notes, reconnaissances, et explorations, revue men- suelle (Antananarivo, 5 vols., 1897-1899, pp. 30^1) ; Sibree, A Madagascar Bibliography (Antananarivo, 1885); Vaissiere, Histoire de Madagascar (Paris, 1884), Vingt ans d. Madagascar (Paris, 1885); Oliver, Madagascar: an Historical and Descriptive Account (2 vols., London, 1886); Cousins, Madagascar of To-day (London, 1895); Bulletin du comitc de Madagascar (monthly) (Paris, 1895, et seq.); Sibree, Madagascar before the Conquest (London, 1896) ; Catat, Voyage d Madagascar (Paris, 1895) ; Annuaire de Madagascar (Antananarivo, 1898, et seq.); J. S. Gallieni; Rapport d' ensemble sur la situation "enerale de Madagascar (2 vols., Paris, 1899); Revue de Madagascar, mensuelle, illustree (1895, et seq.) ; Guide de I'immigrant a Madagascar (3 vols., with atlas, Paris, 1899); Collection des anciens ouvrages relalifs a Madagascar, par les soins du comite de Madagascar (a collection and translation of all works relating to the island from 1500 to 1800, in 10 vols.), (Paris, 1899 et seq.) ; Bulletin trimestriel de I'academie de Malgache (quarterly) (Antananarivo, 1902 et seq.) ; G. Grandidier et autres, Madagascar au debut du xx e siecle (Paris, 1902); G. Grandidier, Bibliographie de Madagascar (2 vols., Paris, 1905 and 1907).

Political: Sibree, " What are ' French Claims ' on Madagascar?" Madagascar Tracts (1882) ; Oliver, True Story of the French Dispute in Madagascar (London, 1885) ; Shaw, Madagascar and France (London,

1885); Saillens, Nos droits sur Madagascar (Paris, 1885); K. Blind " The Fictitious French Claim to Madagascar," Contemp. Rev. (1894); Martineau, Etude de politique contemporaine. Madagascar (Paris, 1894) ; Rentier, Les droits de la France stir Madagascar (1895) ; Corlay, Notre campagne

Philology: Houtman, Spraak ende woord boek in de Maleische ende Madagaskarsche talen (Amsterdam, 1603); Voyage de C. van Ileems- kerk; vocabulaire de la langue parlee dans l'lle Saint-Laurent (Amster- dam, 1603) Megiser, Beschreibung der Mechtigen und Weitberhumbten Insul Madagascar, with dictionary and dialogues (Altenburg, 1609) ; Arthus, Colloquia latino-maleyica et madagascarica (Frankfort, 1613); Challand, Vocabulaire frangais-malgache et malgache-francais (lie de France, 1773); Froberville, Dictionnaire francais-madecasse (3 vols., lie de France, 1809) ; Freeman and Johns, Dictionary of the Malagasy

Language{Eng.-Mal. and Mal.-Eng.), (Antananarivo, 1835); Dalmond, Vocabulaire et grammaire pour les langues malgaches, Sakalava et Betsimisara (Bourbon, 1842); R. C. Missionaries' Dictionnaire francais-malgache (Reunion, 1853); and Dictionnaire malgache- francais (Reunion, 1855); Van der Tunk, " Outlines of a Grammat of the Malagasy Language," Jour. Roy. Asiat. Soc. (i860) ; Ailloud, Grammaire malgache-hbva (Antananarivo, 1872); W. E. Cousins, Concise Introduction to the Study of the Malagasy Language as spoken in Imerina (Antananarivo, 1873); Marre de Marin, Gram- maire malgache (Paris, 1876); id., Essai sur le malgache, ou Etude comparee des langues javanaise, malgache, et malayse (Paris, 1876); id., LeJardin des racines oceaniennes (Paris, 1876) ; Dahle, Specimens of Malagasy Folk-lore (Antananarivo, 1877); and W. E. Cousins, " The Malagasy Language," in Trans. Phil. Soc. (1878). Besides these there are several valuable papers by Dahle in the yearly num- bers of The Antananarivo Annual {ante) (1876-1877) ; Richardson, A New Malagasy-English Dictionary (Antananarivo, 1885); Cousins and Parrett, Malagasy Proverbs (Antananarivo, 1885); Causseque, Grammaire malgache (Antananarivo, 1886); Abinal et Malzac, Dic- tionnaire malgache-francais (Antananarivo, 1889); Brandstetter, " Die Beziehungen des Malagasy zum Malaiischen," Malaio-poly- nesische Forschungen, pt. 2 (Lucerne, 1893).

Missions and Religious History: Freeman and Johns, Narrative of the Persecutions of the Christians in Madagascar (London, 1840) ; Prout, Madagascar, its Missions and its Martyrs (London, 1863); Ellis, Madagascar Revisited (London, 1867); id., The Martyr Church (London, 1869); " Religion in Madagascar," Ch. Quar. Rev. (1878); Briggs, The Madagascar Mission (L.M.S. 1879); id., Ten Years' Review of Mission Work in Madagascar (L.M.S. 1870-1880, 1881); Johnson, Review of

Work of the Friends' Foreign Mission Association in Madagascar, 1867-1880 (Antananarivo, 1880); Vaissiere, Histoire de Madagascar, ses habitants et ses missionaires (Paris, 1884); The Church in Madagascar (S.P.G., 75 years' progress, 1874-1889, 1889); La Liberie religieuse a Madagascar (Paris, 1897); Matthews, Thirty Years in Madagascar (London, 1904); Sibree, The L.M.S. Mission in Madagascar (L.M.S. Mission Hand Books, London, 1907); id., " Christian Missions in Madagascar and French Colonial Policy," The East and the West (Jan. 1909) ; and General Gallieni's " Neuf ans a Madagascar, Journal of the African Society (April 1909). (J- Si.)*

MADAN, MARTIN (1726-1790), English writer, was educated at Westminster School, and at Christ Church, Oxford, where he graduated in 1746. In 1748 he was called to the bar, and for some time lived a very gay life, until he was persuaded to change his ways on hearing a sermon by John Wesley. He took holy orders, and was appointed chaplain to the Lock Hospital, London. He was closely connected with the Calvinistic Methodist move- ment supported by the countess of Huntingdon, and from time to time acted as an itinerant preacher. He was a first cousin of William Cowper, with whom he had some correspondence on religious matters. In 1767 much adverse comment was aroused by his support of his friend Thomas Haweis in a controversy arising out of the latter's possession of the living of Aldwinkle, Northamptonshire (see Monthly Review, xxxvii. 382, 390, 465). In 1780 Madan raised more serious storm of opposition by the publication of his Thelyphthora, or A Treatise on Female Ruin, in which he advocated polygamy as the remedy for the evils he deplored. The author was no doubt sincere in his arguments, which he based chiefly on scriptural authority; but his book called forth many angry replies. Nineteen attacks on it are catalogued by Falconer Madan in Did. Nat. Biog. Madan resigned his chaplainship and retired to Epsom, where he pro- duced, among other works, A New and Literal Translation of Juvenal and Persius (1789). He died on the 2nd of May 1790.

MADDALONI, a town of Campania, Italy, in the province of Caserta, about 35 m. S.E. of Caserta, with stations on the railways from Caserta to Benevento and from Caserta to Avellino, 200 ft. above sea-level. Pop. (1901), 19,778 (town); 21,270 (commune). It is prettily situated at the base of one of the Tifata hills, the towers of its medieval castle and the church of San Michele crown- ing the heights above. The fine old palace of the Caraffa family, once dukes of Maddaloni, the old college now named after Giordano Bruno, and the institute for the sons of soldiers are the chief points of interest. About 25 m. east of Valle di Madda- loni, the Ponte della Valle, an aqueduct built by the orders of Charles III. of Naples and his son to convey the water of the Tiburno to Caserta (19 m.), is carried across the valley between Monte Longano and Monte Gargano by a threefold series of

noble arches rising to a height of 210 ft. The work was

designed by Lodovico Vanvitelli, and constructed between 1753 and 1759.

MADDEN, SIR FREDERIC (1801-1873), English palaeographer, the son of an officer of Irish extraction, was born at Portsmouth on the 16th of February 1801. From his earliest years he dis- played a strong bent to linguistic and antiquarian studies. In 1826 he was engaged by the British Museum to assist in the pre- paration of the classified catalogue of printed books then contem- plated, and in 1828 he became assistant keeper of manuscripts. In 1833 he was knighted, and in 1837 succeeded Josiah Forshall as keeper of manuscripts. He was not entirely successful in this office, partly owing to want of harmony with his colleagues; he retired in 1866. He edited for the Roxburghe Club Havelok the Dane (1828), discovered by himself among the Laudian MSS. in the Bodleian, William and the Werwolf (1832) and the old English versions of the Gesta Romanorum (1838). In 1830 he edited the ancient metrical romances of Syr Gawayne for the Bannatyne Club, and in 1847 Layamon's Brut, with a prose translation, for the Society of Antiquaries. In 1850 the magnificent edition, in parallel columns, of what are known as the " Wycliffite " versions of the Bible, from the original MSS., upon which he and his coadjutor, Forshall, had been engaged for twenty years, was published by the university of Oxford. In 1866-1869 he edited the Historia Minor of Matthew Paris for the Rolls Series. In 1833 he wrote the text of Henry Shaw's Illuminated Ornaments of the Middle Ages; and in 1850 edited the English translation of Silvestre's PaUographie universelle. He died on the 8th of March 1873, bequeathing his journals and other private papers to the Bodleian Library, where they were to remain unopened until 1920.

Madden was perhaps the first palaeographer of his day. He was an acute as well as a laborious antiquary, but his ignorance of German prevented his ranking high as a philologist, although he paid much attention to the early dialectical forms of French and English. His minor contributions to antiquarian research were exceedingly numerous: the best known, perhaps, was his disser- tation on the orthography of Shakespeare's name, which, mainly on the strength of the Florio autograph, he contended should be " Shakspere."

MADDER, or Dyers' Madder, the root of Rubia tinctorum and perhaps also of R. peregrina, both European, R. cordifolia, a native of the hilly districts of India and of north-east Asia and Java, supplying the Indian madder or

manjit. Rubia is a genus of about thirty-five species of the tribe Galieae of the order Rubiaceae, and much resembles the familiar Galiums, e.g. lady's bedstraw (G. verum) and the cleavers (G. aparine) of English hedges, having similarly whorled leaves, but the parts of the flowers are in fives and not fours, while the fruit is somewhat fleshy. The only British species is R. peregrina, which is found in Wales, the south and west of England, and in east and south Ireland. The use of madder appears to have been known from the earliest times, as cloth dyed with it has been found on the Egyptian mummies. It was the kptvdtdavov used for dyeing the cloaks of the Libyan women in the days of Herodotus (Herod, iv. 189). It is the ipvdpodapov of Dioscorides, who speaks of its cul- tivation in Caria (iii. 160), and of Hippocrates (De morb. mul. i.), and the Rubia of Pliny (xix. 17). R. tinctorum, a native of western Europe, &c, has been extensively cultivated in south Europe, France, where it is called garance, and Holland, and to a small extent in the United States. Large quantities have been imported into England from Smyrna, Trieste, Leghorn, &c. The cultivation, however, decreased after alizarin, the red colouring principle of madder, was made artificially. Madder was employed medicinally by the ancients and in the middle ages. Gerard, in 1597, speaks of it as having been cultivated in many gardens in his day, and describes its supposed many virtues (Herball, p. 960) ; but any pharmacological or therapeutic action which madder may possess is unrecognizable. Its most remarkable physio- logical effect is that of colouring red the bones of animals fed upon it, as also the claws and beaks of birds. This appears to be due to the chemical affinity of phosphate of lime for the colouring matter (Pereira, Mat. med., vol. ii. pt. 2, p. 52). This property has been of much use in enabling physiologists to ascertain the

manner in which bones develop, and the functions of the various types of cells found in growing bone. R. chilensis has been used for dyeing red from time immemorial. The chay-root, which furnishes a red dye in Coromandel and other parts of India, is the root-bark of Oldenlandia umbellata, a low-growing plant of the same family as madder.

MADEC, RENH-MARIE (1 736-1 784)— called Medoc in Anglo- Indian writings — French adventurer in India, was born at Quimper in Brittany on the 7th of February 1736, of poor parents. He went out to India and served under Dupleix and Lally, but being taken prisoner by the British he enlisted in the Bengal army. Deserting with some of his companions shortly before the battle of Buxar (1764), he became military instructor to various native princes, organizing successively the forces of Shuja-ud-Dowlah, nawab of Oudh, and of the Jats and Rohillas. He took service under the emperor Shah Alam in 1772, and when that prince was defeated at Delhi by the Mahrattas, Madec rejoined his own countrymen in Pondicherry, where he took an active part in the defence of the town (1778). After the capitula-

tion of Pondicherry he returned to France with a considerable fortune, and died there in 1 784. At one time he formed a scheme for a French alliance with the Mogul emperor against the British, but the project came to nothing.

See £mile Barb6, Le Nabab Rene Madec (1894). MADEIRA, or The Madeiras, a group of islands in the North Atlantic Ocean, which belong to Portugal, and consist of two inhabited islands named Madeira and Porto Santo and two groups of uninhabited rocks named the Desertas and Selvagens. Pop. (1900), 150,574; area, 314 sq. m. Funchal, the capital of the archipelago, is on the south coast of Madeira Island, in 32 37′ 45″ N. and 16 54′ W. It is about 360 m. from the coast of Africa, 535 from Lisbon, 12 15 from Plymouth, 240 from Teneriffe, and 480 from Santa Maria, the nearest of the Azores.

Madeira (pop. 1900, 148,263), the largest island of the group, has a length of 30 m., an extreme breadth of 12 m., and a coast- line of 80 or 90 m. Its longer axis lies east and west, in which direction it is traversed by a mountain chain, the backbone of the island, having a mean altitude of 4000 ft., up to which many deep ravines penetrate from both coasts and render travel by land very difficult. Pico Ruivo, the highest summit, stands in the centre of the island, and has a height of 6056 ft., while some of the adjacent summits are very little lower. The depth and narrowness of the ravines, the loftiness of the rugged peaks, often covered with snow, that tower above them, the bold precipices of the coast, and the proximity of the sea, afford many scenes of picturesque beauty or striking grandeur. The greater part of the interior is uninhabited, though cultivated, for the towns, villages and scattered huts are usually built either at the mouths of ravines or upon the lower slopes that extend from the mountains to the coast. The ridges between the ravines usually terminate in lofty headlands, one of which, called Cabo Girao, has the height of 1920 ft., and much of the seaboard is bound by precipices of dark basalt. The north coast, having been more exposed to the erosion of the sea, is more precipitous than the south, and presents every- where a wilder aspect. On the south there is left very little of the indigenous forest which once clothed the whole island and gave it the name it bears (from the Portuguese madeira. Lat. materia, wood), but on the north some of the valleys still contain native trees of fine growth. A long, narrow and com- paratively low rocky promontory forms the eastern extremity of the island; and here is a tract of calcareous sand, known as the Fossil Bed, containing land shells and numerous bodies resem- bling the roots of trees, probably produced by infiltration.

Porto Santo is about 25 m. N.E. of Madeira. Pop. (1900), 231 1. It has a length of 6J m. and a width of 3 m. The capital is Porto Santo, called locally the villa or town. The island is very unproductive, water being

scarce and wood wholly absent. Around the little town there is a considerable tract of pretty level ground covered by calcareous sand containing fossil land-shells. At each end of the island are hills, of which Pico do Facho, the highest, reaches the altitude of 1663 ft. Barley,, but little else,

is grown here, the limited requirements of the inhabitants being supplied from Funchal.

The Desertas lie about n m. S.E. of Madeira, and consist of three islands, Ilheo Chao, Bugio and Deserta Grande, together with Sail Rock off the north end of Ilheo Chao. They present lofty precipices to the sea on all sides. Rabbits and goats abound on them. The archil weed grows on the rocks, and is gathered for exportation. The largest islet (Deserta Grande) is 6| m. long, and attains the height of 1610 ft. These rocks are conspicuous objects in the sea-views from Funchal.

MADEIRA ISLANDS

English Miles

k> .....

Madeira „.« v »??S;

Longitude West t? 'of Crcenwich

Deserta Grande

BoouTaO PI "Bugio jJrˆAgutha Pi

Emery W.Ike so*

The Selvagens or Salvages are a group of three islands, 156 m. from Madeira, and between Madeira and the Canary Islands. The largest island is the Great Piton, 3 m. long, and 1 m. broad. The inclusion of the Selvagens in the Madeira Archipelago is due to political rather than to geographical reasons.

Geology. — All the islands of the group are of volcanic origin. They are the summits of very lofty mountains which have their bases in an abyssal ocean. The greater part of what is now visible in Madeira is of subaerial formation, consisting of basaltic and trachytic lavas, beds of tuff and other

ejectamenta, the result of a long and complicated series of eruptions from innumerable vents. Besides this building up by the emission of matter from craters and clefts, a certain amount of upheaval in mass has taken place, for at a spot about 1200 ft. above the sea in the northern valley of Sao Vicente, and again at about the same height in Porto Santo, there have been found fragments of limestone accompanied by tuffs containing marine shells and echinoderms of the Miocene Tertiary epoch. We have here proof that during or since that epoch portions at least of these islands have been bodily uplifted more than 1000 ft. The fossils are sufficiently well preserved to admit of their genera, and in many instances even their species, being made out.

There were pauses of considerable duration whilst the island of Madeira was being increased in height. The leaf bed and the accompanying carbonaceous matter, frequently termed lignite, although it displays no trace of structure, which lie under 1200 ft. cf lavas in the valley of Sao Jorge, afford proof that there had been sufficient time for the growth of a vegetation of high order, many of the leaf impressions belonging to species of trees and shrubs which still exist on the island. Moreover, great alterations and dislocations had taken place in the rocks of various localities before other lavas and tuffs had been thrown upon them.

There are no data for determining when volcanic action began in this locality, but looking at the enormous depth of the surrounding sea it is clear that a vast period of time must have elapsed to allow of a great mountain reaching the surface and then rising several thousand feet. Again, considering the comparatively feeble agents for effecting the work of denudation (neither glaciers nor thick accumulations of alpine snow being found here), and then the enormous erosion that has actually taken place, the inference is inevitable that a very great lapse of time was required to excavate the deep and wide ravines that everywhere intersect the island. Nor is anything known as to the period of the cessation of volcanic action. At the present day there are no live craters or smoking crevices, as at the Canaries and Cape Verdes, nor any hot springs, as at the Azores.

In one of the northern ravines of Madeira by Porto da Cruz some masses of a coarsely crystalline Essexite are exposed to view; this rock is evidently the deep-seated representative of the Trachy- doleritic and Nepheline basalt lavas. Fragments of a sodalite-syenite have also been found at Soca in the same neighbourhood.

In the eastern part of the island several small crater rings are to be seen ; their rims are formed of spheroidal basalt, while within the craters themselves masses of bauxite are found accompanied by evidences of fumerolic action.

In the sections afforded by the ravines, which strike north and south from the central ridge of Madeira to the sea, the nucleus of the island is seen to consist of a confused mass of more or less stratified rock, upon which rest beds of tuff, scoriae and lava, in the shape of basalt, trap and trachyte, the whole traversed by dykes. These beds are thinnest near the central axis; as they approach the coast they become thicker and less intersected by dykes.

In various parts are elevated tracts of comparatively level ground. These are supposed to have been formed by the meeting of numerous streams of lava flowing from cones and points of eruption in close proximity, various ejectamenta assisting at the same time to fill up inequalities. Deep down in some of the lateral ravines may be seen ancient cones of eruption which have been overwhelmed by streams of melted matter issuing from the central region, and after- wards exposed to view by the same causes that excavated the ravines. These ravines may be regarded as having been formed at first by subterranean movements, both gradual and violent, which dislocated the rocks and cut clefts through which streams flowed to the sea. In course of time the waters, periodically swollen by melted snows and the copious rains of winter, would cut deeper and deeper into the heart of the mountains, and would undermine the lateral cliffs, until the valleys became as large as we now find them. Even the Curral, which from its rounded shape and its position in the centre of the island has been usually deemed the ruins of a crater, is thought to be nothing more than a valley scooped out in the way described. The rarity of crateriform cavities in Madeira is very remarkable. There exists, however, to the east of Funchal, on a tract 2000 ft. high, the Lagoa, a small but perfect crater, 500 ft. in diameter, and with a depth of 150 ft. ; and there is another, which is a double one, in the district known as Fanal, in the north- west of Madeira, nearly 5000 ft. above the sea. The basalt, of which much of the outer part of the island is composed, is of a dark colour and a tough texture, with small disseminated crystals of olivine and augite. It is sometimes full of vesicular cavities, formed by the expansion of imprisoned gases. A rudely columnar structure is very often seen in the basalt, but there is nothing so perfect as the columns of Staffa or the Giant's Causeway. The trachytic rocks are small in quantity compared with those of the basaltic class. The tufa is soft and friable, and generally of a yellow colour ; but where it has been overflowed by a hot stream of lava it has assumed a red colour. Black ashes and fragments of pumice are sometimes found in the tufaceous strata.

There are no metallic ores, nor has any sulphur been found ; but a little iron pyrites and specular iron are occasionally met with. The basalt yields an excellent .building-stone, various qualities of which are quarried near Camara de Lobos, five or six miles west of Funchal.

In Porto Santo the trachytic rocks bear a much greater proportion to the basaltic than in Madeira. An adjacent islet is formed of tuffs and calcareous rock, indicating a submarine origin, upon which supramarine lavas have been poured. The older series contains corals and shells (also of the Miocene Tertiary epoch), with water-worn pebbles, cemented together by carbonate of lime, the whole appearing to have been a coral reef near an ancient beach. The calcareous rock is taken in large quantities to Funchal, to be burnt into lime for building purposes.

Climate. — Observations taken at Funchal Observatory (80 ft. above sea-level) in the last twenty years of the 19th century showed that the mean annual temperature is about 65 F. The mean minimum for the coldest part of the year (October to May inclusive) does not fall below 55 , and the average daily variation of tempera- ture in the same period does not exceed lo°. Madeira thus has a remarkably mild climate, though it lies'only 10° north of the Tropic of Cancer. This mildness is due to the surrounding ocean, from which the atmosphere obtains a large supply of watery vapour. The mean humidity of the air is about 75 (saturation = 100). The prevalent winds are from the north or from a few points east or west of north, but these winds are much mitigated on the south coast by the central range of mountains. The west wind usually brings rain. That from the east is a dry wind. A hot and dry wind, the leste of the natives, occasionally blows from the east-south-east, the direction of the Sahara, and causes the hill region to be hotter than below; but even on the coast the thermometer under its influence sometimes indicates 93°. The leste is often accompanied by sandstorms. As the thermometer has never been known to fall as low as 46° at Funchal, frost and snow are there wholly unknown; but snow falls on the mountains once or twice during the winter, very seldom, however, below the altitude of 2000 ft. Thunderstorms are rare, and scarcely ever violent.

Madeira has long had a high reputation as a sanatory resort for persons suffering from diseases of the chest. Notwithstanding the ever-increasing competition of other winter resorts, a consider- able number of invalids, especially English and German, winter at Funchal.

Fauna. — No species of land mammal is indigenous to the Madeiras. Some of the early voyagers indeed speak of wild goats and swine, but these animals must have escaped from confinement. The rabbit, black rat, brown rat and mouse have been introduced. The first comers encountered seals, and this amphibious mammal {Mona- chus albiventer) still lingers at the

Desertas. Amongst the thirty species of birds which breed in these islands are the kestrel, buzzard and barn owl, the blackbird, robin, wagtail, goldfinch, ring sparrow, linnet, two swifts, three pigeons, the quail, red-legged partridge, woodcock, tern, herring gull, two petrels and three puffins. Only one species is endemic, and that is a wren (Regulus madeirensis) , but five other species are known elsewhere only at the Canaries. These are the green canary (Fringilla butyracea, the parent of the domesticated yellow variety), a chaffinch {Fringilla tintillon), a swift (Cypselus unicolor), a wood pigeon (Columba trocaz) and a petrel (Thalassidroma Bulwerii). There is also a local variety of the black- cap, distinguishable from the common kind by the extension in the male of the cap to the shoulder. About seventy other species have been seen from time to time in Madeira, chiefly stragglers from the African coast, many of them coming with the leste wind.

The only land reptile is a small lizard (Lacerta dugesii), which is abundant and is very destructive to the grape crop. The logger- head turtle (Caouana caretta, Gray) is frequently captured, and is cooked for the table, but the soup is much inferior to that made from the green turtle of the West Indies. A single variety of frog (Rana esculenta) has been introduced ; there are no other batrachians.

About 250 species of marine fishes taken at Madeira have been scientifically determined, the largest families being Scombridae with 35 species, the sharks with 24, the Sparidae with 15, the rays with 14, the Labridae with 13, the Gadidae with 12, the eels with 12, the Percidae with 11, and the Carangidae with 10. Many kinds, such as the mackerel, horse mackerel, groper, mullet, braise, &c, are caught in abundance, and afford a cheap article of diet to the people. Several species of tunny are taken plentifully in spring and summer, one of them sometimes attaining the weight of 300 ft. The only fresh- water fish is the common eel, which is found in one or two of the streams.

According to T. V. Wollaston (Testacea atlantica, 1878), there have been found 158 species of mollusca on the land, 6 inhabiting fresh water, and 7 littoral species, making a total of 171. A large majority of the land shells are considered to be peculiar. Many of the species are variable in form or colour, and some have an extra- ordinary number of varieties. Of the land mollusca 91 species are assigned to the genus Helix, 31 to the genus Pupa, and 15 to the genus Achatina (or Lovea). About 43 species are found both living and fossil in superficial deposits of calcareous sand in Madeira or Porto Santo. These deposits were assigned by Lyell to the Newer Pliocene period. Some 12 or 13 species have not 'been hitherto discovered alive. More than 100 species of Polyzoa (Bryozoa) have been col- lected, among them are some highly interesting forms.

The only order of insects which has been thoroughly examined is that of the Coleoptera. By the persevering researches of T. V. Wollaston the astonishing number of 695 species of beetles has been brought to light at the Madeiras. The proportion of endemic kinds is very large, and it is remarkable that 200 of them are either wingless or their wings are so poorly developed that they cannot fly, while 23 of the endemic genera have all their species in this condition. With regard to the Lepidoptera, 11 or 12 species of butterflies have been seen, all of which belong to European genera. Some of the species are geographical varieties of well-known types. Upward of 100 moths have been collected, the majority of them being of a European stamp, but probably a fourth of the total number are peculiar to the Madeiran group. Thirty-seven species of Neuroptera have been observed in Madeira, 12 of them being so far as is known peculiar.

The bristle-footed worms of the coast have been studied by Pro- fessor P. Langerhans, who has met with about 200 species, of which a large number were new to science. There are no modern coral reefs, but several species of stony and flexible corals have been collected, though none are of commercial value. There is, however, a white stony coral allied to the red coral of the Mediterranean which would be valuable as an article of trade if it could be obtained in sufficient quantity. Specimens of a rare and handsome red Para- gorgia are in the British Museum and Liverpool Museum.

Flora. — The vegetation is strongly impressed with a south-Euro- pean character. Many of the plants in the lower region undoubtedly were introduced and naturalized after the Portuguese coloniza- tion. A large number of the remainder are found at the Canaries and the Azores, or in one of these groups, but nowhere else. Lastly, there are about a hundred plants which are peculiarly Madeiran, either as distinct species or as strongly marked varieties. The flower- ing plants found truly wild belong to about 363 genera and 717 species, — the monocotyledons numbering 70 genera and 128 species, the dicotyledons 293 genera and 589 species. The three largest

orders are the Compositae, Leguminosae and Graminaceae. Forty-one species of ferns grow in Madeira, three of which are endemic species and six others belong to the peculiar flora of the North Atlantic islands. About 100 species of moss have been collected, and 47 species of Hepaticae. A connexion between the flora of Madeira and that of the West Indies and tropical America has been inferred from the presence in the former of six ferns found nowhere in Europe or North Africa, but existing on the islands of the east coast of America or on the Isthmus of Panama. A further relationship to that continent is to be traced by the presence in Madeira of the beautiful ericaceous tree Clethra arborea, belonging to a genus which is

otherwise wholly American, and of a Pe.rsea, a tree laurel, also an American genus. The dragon tree {Dracaena Draco) is almost extinct. Amongst the trees most worthy of note are four of the laurel order belonging to separate genera, an Ardisia, Piltosporum, Sideroxylon, Nolelaea, Rhamnus and Myrica, — a strange mixture of genera to be found on a small Atlantic island. Two heaths of arborescent growth and a whortleberry cover large tracts on the mountains. In some parts there is a belt of the Spanish chestnut about the height of 1500 ft. There is no indigenous pine tree as at the Canaries ; but large tracts on the hills have been planted with Pinus pinaster, from which the fuel of the inhabitants is mainly derived. A European juniper (/. Oxycedrus), growing to the height of 40 or 50 ft., was formerly abundant, but has been almost exter- minated, as its scented wood is prized by the cabinet-maker. Several of the native trees and shrubs now grow only in situations which are nearly inaccessible, and some of ths indigenous plants are of the greatest rarity. But some plants of foreign origin have spread in a remarkable manner. Among these is the common cactus or prickly pear {Opuntia Tuna), which in many spots on the coast is sufficiently abundant to give a character to the landscape. As to Algae, the coast is too rocky and the sea too unquiet for a luxuriant marine vegetation, consequently the species are few and poor.

Inhabitants. — The inhabitants are of Portuguese descent, with probably some intermixture of Moorish and negro blood amongst the lower classes. The dress of the peasantry, without being picturesque, is peculiar. Both men and women in the outlying country districts wear the carapUQa, a small cap made of blue cloth in shape something like a funnel, with the pipe standing upwards. The men have trousers of linen, drawn tight, and terminating at the knees; a coarse shirt enveloping the upper part of their person, covered by a short jacket, completes their attire, with the exception of a pair of rough yellow boots. The women's outer garments consist of a gaudily coloured gown, made from island material, with a small cape of coarse scarlet or blue woollen cloth.) The population tends to increase rapidly. In 1900 it amounted to 150,574, including 890 foreigners, of whom the majority were British. The number of females exceeds that of males by about 6000, partly because many of the able- bodied males emigrate to Brazil or the United States. The density of population (479-5 per sq. m.) is very great for a district containing no large town and chiefly dependent on agriculture and viticulture.

Agriculture. — A large portion of the land was formerly entailed in the families of the landlords (morgados), but entails have been abolished by the legislature, and the land is now absolutely free. The deficiency of water is a great obstacle to the proper cultiva- tion of the land, and the rocky nature or steeD inclination of the upper parts of the islands is an effectual

bar to all tillage. An incredible amount of labour has been expended upon the soil, partly in the erection of walls intended to prevent its being washed away by the rains, and to build up the plots of ground in the form of terraces. Watercourses have been constructed for purposes of irrigation, without which at regular intervals the island would not produce a hundredth part of its present yield. These watercourses originate high up in the ravines, are built of masonry or driven through the rock, and wind about for miles until they reach the cultivated land. Some of them are brought by tunnels from the north side of the island through the central crest of hill. Each occupier takes his turn at the running stream for so many hours in the day or night at a time notified to him beforehand. In this climate flowing water has a saleable value as well as land, which is useless without irrigation.

The agricultural implements employed are of the rudest kind, and the system of cultivation is extremely primitive. Very few of the occupiers own the land they cultivate ; but they almost invariably own the walls, cottages and trees standing thereon, the land alone belonging to the landlord. The tenant can sell his share of the pro- perty without the consent of the landlord, and if he does not so

dispose of it that share passes to his heirs. In this way the tenant practically enjoys fixity of tenure, for the landlord is seldom in a position to pay the price at which the tenant's share is valued. Money rents are rare, the metayer system regulating almost universally the relations between landlord and tenant ; that is, the tenant pays to the owner a certain portion of the produce, usually one half or one third. The holdings are as a rule rarely larger than one man can cultivate with a little occasional assistance. There are few meadows and pastures, the cattle being stall-fed when not feeding on the moun- tains. Horses are never employed for draught, all labour of that kind being done by oxen.

The two staple productions of the soil are wine and sugar. The vine was introduced from Cyprus or Crete soon after the discovery of the island by the Portuguese (1420), but it was not actively cultivated until the early part of the 16th century. The vines, after having been totally destroyed by the oidium disease, which made its first appearance in the island in 1852, were replanted, and in a few years wine was again made. The phylloxera

ne ' also made its way to the island, and every vineyard in

Madeira was more or less affected by it. The wine usually termed Madeira is made from a mixture of black and white grapes, which are also made separately into wines called Tinta and Verdelho, after the names of the grapes. Other high-class wines, known as Bual, Sercial and Malmsey, are made from varieties of grapes bearing the same names. (See also Wine.)

The sugar cane is said to have been brought from Sicily about 1452, and in course of time its produce became the sole staple of the island. The cultivation languished, however, as the more abundant produce of tropical countries came into the European market, and sugar had long ceased to be made when the destruction of the vines compelled the peasants to turn their attention to other things. Its cultivation was resumed and sugar machinery imported. A considerable quantity of spirit is made by the distillation

Sugar.

of the juice or of the molasses left after extracting the

sugar, and this is consumed on the island. The cane does not nourish here as luxuriantly aB within the tropics; but in localities below 1000 ft., where there is a good supply of water, it pays the cultivator well.

The grain produced on the island (principally wheat, barley and Indian corn) is not sufficient for the consumption of the people. The common potato, sweet potato and gourds of various kinds are extensively grown, as well as the Colocasia esculenta, the kalo of the Pacific islanders, the root of which yields an insipid food. Most of the common table vegetables of Europe are plentiful. Besides apples, pears and peaches, all of poor quality, oranges, lemons, guavas, mangoes, loquats, custard-apples, figs, bananas and pine- apples are produced, the last two forming articles of export. The date palm is occasionally grown, but its fruit is scarcely edible. On the hills large quantities of the Spanish chestnut afford an item in the food of the common people. A little tobacco is grown, and is made into cigars of inferior quality.

The total foreign trade of Madeira was valued at £628,000 in 1900. The principal exports are wine, sugar, embroidery, vegetables, fruits and wicker goods. Coal is imported for the ships calling at Funchal, which is the headquarters of Madeiran commerce and industry. Spirits, beer, olive oil, soap, butter, linen and woollen goods, straw hats and leather, are manufactured for home consumption, and there are important fisheries.

Chief Towns and Communications. — Funchal (pop. 20,850) is described in a separate article. The other chief towns are Camara de Lobos (7150), Machico (6128), Santa Cruz (5876) Ponta do Sol (5665), Sao Vicente

(4896), Calheta (3475), Sant' Anna (301 1) and Porto Santo (23 11). Each of these is the capital of a commune (concelho), to which it gives its name. Madeira is connected by regular lines of steamships with Great Britain, Germany, Portugal, Cape Colony, Brazil and the United States. There is no railway in the archipelago, and partly owing to the irregularities of the surface of the roads, of which there are some 580 m., are bad, except in the neighbourhood of Funchal. Wheel carriages are rare, and all heavy goods are transported either on the backs of mules or upon rude wooden sledges drawn by bullocks. When horses are not employed, locomotion is effected either by means of hammocks or by bullock cars. The ham- mock (rede) is a piece of stout canvas gathered up and secured at each end to a long pole carried by a couple of bearers. In place of cabs, curtained cars on sledges, made to hold four persons, and drawn by a pair of bullocks, are employed. They are convenient, but the rate of progress is very slow.

Administration. — The archipelago is officially styled the dis- trict of Funchal; it returns members to the Portuguese Cortes, and is regarded as an integral part of the kingdom. The district is subdivided into the eight communes already enumerated, and is administered in accordance with the same laws that

regulate local government on the mainland (see Portugal). Funchal is a Roman Catholic bishopric in the archiepiscopal province of Lisbon. Education is compulsory in name only, for less than 2 % of the population could read when the census of 1900 was taken. An infantry regiment and a battery of garrison artillery are permanently stationed in Madeira.

History. — It has been conjectured, but on insufficient evidence, that the Phoenicians discovered Madeira at a very early period. Pliny mentions certain Purple or Mauretanian Islands, the posi- tion of which with reference to the Fortunate Islands or Canaries might seem to indicate the Madeiras. There is a romantic story, to the effect that two lovers, Robert Machim, a Machin, or Macham, and Anna d'Arfet, fleeing from England to France (c. 1370) were driven out of their course by a violent storm and cast on the coast of Madeira at the place subsequently named Machico, in memory of one of them. Both perished here, but some of their crew escaped to the Barbary coast, and' were made slaves. Among them was the pilot Pedro Morales of Seville, who is said to have been ransomed and to have communicated his knowledge of Madeira to Joao Goncalvez Zarco (or Zargo) . How far this story is true cannot now be ascertained. It is, however, certain that Zarco first sighted Porto Santo in 1418, having been driven thither by a storm while he was exploring the coast of West Africa. Madeira itself was discovered in 1420. It is probable that the whole archipelago had been explored at an earlier date by Genoese adventurers,

and had been forgotten; for an Italian map dated 13 5 1 (the Laurentian portolano) shows the Madeiras quite clearly, and there is some reason to believe that they were known to the Genoese before 1339. When Zarco visited Madeira in 1420 the islands were uninhabited, but Prince Henry the Navigator at once began their colonization, aided by the knights of the Order of Christ. Sanctioned by the pope and by two charters which the king of Portugal granted in 1430 and 1433, the work proceeded apace; much land was deforested and brought into cultivation, and the Madeiran sugar trade soon became important. For the sixty years 1 580-1 640 Madeira, with Portugal itself, was united with Spain. Slavery was abolished in Madeira in 1775, by order of Pombal. In 1801 British troops, commanded by General Beresford, occupied the island for a few months, and it was again under the British flag from 1807 to 1814. It shared in the civil disturbances brought about by the accession of Dom Miguel (see Portugal: History), but after 1833 its history is a record of peaceful commercial development.

See A. S. Brown, Madeira, the Canary Islands and the Azores (1903), a comprehensive study of the three archipelagoes. The Land of the Wine, by A. J. D. Biddle (Philadelphia, 1901) is generally valuable, but its history cannot be trusted. See also P. Langerhaus, Handbuch filr Madeira (1884) and Vahl, Madeira's Vegetation (Copenhagen, 1904).

MADELENIAN, a term derived from La Madeleine, a cave in the Vezere, about midway between Moustier and Les Eyzies, France, and given by the French anthropologist Gabriel de Mortillet to the third stage of his system of cave-chronology, synchronous with the fourth or most recent division of the Quaternary Age. The Madelenian epoch was a long one, repre- sented by numerous stations, whose contents show progress in the arts and general culture. It was characterized by a cold and dry climate, the existence of man in association with the reindeer, and the extinction of the mammoth. The use of bone and ivory for various implements, already begun in the preceding Solutrian epoch, was much increased, and the period is essentially a Bone age. The bone instruments are very varied: spear-points, harpoon-heads, borers, hooks and needles. Most remarkable is the evidence La Madeleine affords of prehistoric art. Numbers of bones, reindeer antlers and animals' teeth were found, with rude pictures, carved or etched on them, of seals, fishes, reindeer, mammoths and other creatures. The best of these are a mammoth engraved on a fragment of its own ivory; a dagger of reindeer antler, with handle in form of a reindeer; a cave-bear cut on aflat piece of schist; a seal on a bear's tooth; a fish well drawn on a reindeer antler; and a complete picture, also on reindeer antler, showing horses, an aurochs, trees, and a snake biting a mail's leg. The man is naked, and this and the snake suggest a warm

climate, in spite of the presence of the reindeer. The fauna of the Madelenian epoch seems, indeed, to have included tigers and other tropical species side by side with reindeer, blue foxes, Arctic hares and other polar creatures. Madelenian man appears to have been of low stature, dolichocephalic, with low retreating forehead and prominent brow ridges. Besides La Madeleine the chief stations of the epoch are Les Eyzies, Laugerie Basse, and Gorge d'Enfer in Dordogne; Grotte du Placard in Charente and others in south-west France.

See G. de Mortillet, Le Prihistorique (1900); Edouard Lartet and Henry Christy, Reliquiae A quitanicae (1865-1875) ; Edouard Dupont, Le Temps prehistorique en Belgique (1872) ; Lord Avebury, Prehistoric Times (1900).

MADELEY, a market town in the municipal borough of Wen- lock, and the Wellington (Mid) parliamentary division of Shrop- shire, England, 159 m. N.W. from London, with stations on the London & North Western (Madeley Market) and Great Western railways (Madeley Court). Pop. of civil parish (1901), 8442. There are large ironworks, ironstone and coal are mined, and potter's clay is raised. The church of St Michael (1796) replaced a Norman building. The living was held from 1760 to 1783 by John William Fletcher or de la Flechere, a close friend of the Wesleys. The parish includes a portion of Coalbrookdale {q.v.), and the towns of Ironbridge and Coalport. Ironbridge, a town picturesquely situated on the steep left bank of the Severn, adjoins Madeley on the south-west. It takes its name from the iron bridge of one span crossing the river, erected in 1779. This bridge is a remarkable work considering its date; it was probably the first erected, at any rate on so large a scale, and attracted great attention. It is the work of Abraham Darby, the third of the name, one of the famous family of iron-workers in Coalbrook- dale. Here are brick and tile works and lime-kilns. There is a station (Ironbridge and Broseley) on the Great Western railway, across the river. Coalport lies also on the Severn, S. of Madeley and 2 m. S.E. of Ironbridge, with a station on the Great Western railway. It has large china works, founded at the close of the 1 8th century, which subsequently incorporated those of Caughley, across the Severn, and of Nantgarw in Glamorganshire. MADHAVA ACHARYA (fl. c. 1380), Hindu statesman and philosopher, lived at the court of Vijayanagar (the modern Humpi in the district of Bellary), the vigorous Southern Hindu kingdom that so long withstood Mahommedan influence and aggression. His younger brother Sayana (d. 1387) was associated with him in the administration and was a famous commentator

on the Rigveda. Sayana's commentaries were influenced by and dedicated to Madhava, who is best known as the author of the Sarvadarsana Samgraha {Compendium of Speculations). With remarkable mental detachment he places himself in the position of an adherent of sixteen distinct systems. Madhava also wrote a commentary on the Mimamsa Sutras. He died as abbot of the monastery of Sringeri.

MADI (A-Madi), a negro race of the Nile valley, occupying both banks of the Bahr-el-Jebel immediately north of Albert Nyanza. Tradition makes them immigrants from the north- west. They are remarkable for the consideration shown to their women, who choose their own husbands, are never ill-treated or hard-worked, and take part in tribal deliberations. The Madi build sepulchral monuments of an elaborate type, two huge narrow stones sloping towards each other with two smaller slabs covering the opening between them. They have been much harried by the Azandeh and Abarambo. They were visited by W. Junker in 1882-1883, and described by him in Petermann's Mittheilungen for May 1883.

MADISON, JAMES (1751-1836), fourth president of the United States, was born at Port Conway, in King George county, Virginia, on the 16th of March 1751. His first ancestor in America may possibly have been Captain Isaac Maddyson, a colonist of 1623 mentioned by John Smith as an excellent Indian fighter. His father, also named James Madison, was the owner of large estates in Orange county, Virginia. In 1769 the son entered the college of New Jersey (now Princeton University), where, in the same year, he founded the well-known literary club, "The

American Whig Society." ■ *He graduated in 1771, but remained for another year at Princeton studying, apparently for the ministry, under the direction of John Witherspoon (1722-1794). In 1772 he returned to Virginia, where he pursued his reading and studies, especially theology and Hebrew, and acted as a tutor to the younger children of the family. In 1 7 7 5 he became chairman of the committee of public safety for Orange county, and wrote its response to Patrick Henry's call for the arming of a colonial militia, and in the spring of 1776 he was chosen a delegate to the new Virginia convention, where he was on the committee which drafted the constitution for the state, and proposed an amend- ment (not adopted) which declared that " all men are equally entitled to the full and free exercise " of religion, and was more radical than the similar one offered by George Mason. In 1777, largely, it seems, because he refused to treat the electors with rum and punch, after the custom of the time, he was not re-elected, but in November of the same year he was chosen a member of the privy council or council of state, in which he acted as interpreter for a few months, as secretary prepared papers for the governor, and in general took a prominent part from the 14th of January 1778 until the end of 1779,*

when he was elected a delegate to the Continental Congress.

He was in Congress during the final stages of the War of Inde- pendence, and in 1780 drafted instructions to Jay, then repre- senting the United States at Madrid, that in negotiations with Spain he should insist upon the free navigation of the Mississippi and upon the principle that the United States succeeded to British rights affirmed by the treaty of Paris of 1763. When the confederation was almost in a state of collapse because of the failure of the states to respond to requisitions of Congress for supplies for the federal treasury, Madison was among the first to advocate the granting of additional powers to Congress, and urged that congress should forbid the states to issue more paper money. In 1781 he favoured an amendment 'of the Articles of Confederation giving Congress power to enforce its requisitions, and in 1783, in spite of the open opposition of the Virginia legislature, which considered the Virginian delegates wholly subject to its instructions, he advocated that the states should grant to Congress for twenty-five years authority to levy an import duty, and suggested a scheme to provide for the interest on the debt not raised by the import duty — apportioning it among the states on the basis of population, counting three-fifths of the slaves, a ratio suggested by Madison himself. Accompany- ing this plan was an address to the states drawn up by Madison, and one of the ablest of his state papers. In the same year, with Oliver Ellsworth of Connecticut, Nathaniel Gorham of Massachu- setts, Gunning Bedford of Delaware, and John Rutledge of South Carolina, he was a member of the committee which reported on the Virginia proposal as to the terms of cession to the Confedera- tion of the " back lands," or unoccupied Western territory, held by several of the states; the report was a skilful compromise made by Madison, which secured the approval of the rather exigent Virginia legislature.

In November 1783 Madison's term in Congress expired, and he returned to Virginia and took up the study of the law. In the following year he was elected to the House of Delegates. As a member of its committee on religion, he opposed the giving of special privileges to the Episcopal (or any other) church, and contended against a general assessment for the support of the churches of the state. His petition of remonstrance against the proposed assessment, drawn up at the suggestion of George Nicholas (c. 1755-1799), was widely circulated and procured its defeat. On the 26th of December 1785 Jeffer- son's Bill for establishing religious freedom in Virginia, which had been introduced by Madison, was passed. In the Viginia House of Delegates, as in the Continental Con- gress, he opposed the further issue of paper money; and he tried to induce the legislature to repeal the law con- fiscating British debts, but he did not lose sight of the interests of the Confederacy. The boundary between Virginia and Mary- land, according to the Baltimore grant, was the south shore of the

Potomac, a line to which Virginia had agreed on condition of free

navigation of the river and the Chesapeake Bay. Virginia now feared that too much had been given up, and desired joint regu- lation of the navigation and commerce of the river by Maryland and Virginia. On Madison's proposal commissioners from the two states met at Alexandria (q.v.) and at Mount Vernon in March 1785. The Maryland legislature approved the Mount Vernon agreement and proposed to invite Pennsylvania and Delaware to join in the arrangement. Madison, seeing an oppor- tunity for more general concert in regard to commerce and trade (and possibly for the increase of the power of Congress) , proposed that all the states should be invited to send commissioners to consider commercial questions, and a resolution to that effect was adopted (on Jan. 21, 1786) by the Virginia legislature. This led to the Annapolis convention of 1786, and that in turn led to the Philadelphia convention of 1787. In April 1787 Madison had written a paper, The Vices of the Political System of the United States, and from his study of confederacies, ancient and modern, later summed up in numbers 17, 18, and 19 of The Federalist, he had concluded that no confederacy could long endure if it acted upon states only and not directly upon individuals. As the time for the convention of 1787 approached he drew up an outline of a new system of government, the basis of the " Virginia plan " presented in the convention by Edmund Jennings Randolph. Madison's scheme, as expressed in a letter to Washington dated the 16th of April 1787, was that indi- vidual sovereignty of states was irreconcilable with aggregate sovereignty, but that the " consolidation of the whole into one simple republic would be as inexpedient as it is unattainable." He considered as a practical middle ground changing the basis of representation in Congress from states to population; giving the national government " positive and complete authority in all cases which require uniformity "; giving it a negative on all state laws, a power which might best be vested in the Senate, a comparatively permanent body; electing the lower house, and the more numerous, for a short term; providing for a national execu- tive, for extending the national supremacy over the judiciary and the militia, for a council to revise all laws, and for an express statement of the right of coercion; and finally, obtaining the ratification of a new constitutional instrument from the people, and not merely from the legislatures. The " Virginia plan " was the basis of the convention's deliberations which resulted in the constitution favourably voted on by the convention on the 17th of September 1787. Among the features of the plan which were not embodied in the constitution were the following: pro- portionate representation in the Senate and the election of

its members by the lower house " out of a proper number of persons nominated by the individual legislatures " ; the vesting in the national Congress of power to negative state acts; and the estab- lishment of a council of revision (the executive and a convenient number of national judges) with veto power over all laws passed by the national Congress. Madison, always an opponent of slavery, disapproved of the compromise (in Art. I. § 9 and Art.V.) postponing to 1808 (or later) the prohibition of the importation of slaves. He took a leading part in the debates of the convention, of which he kept full and careful notes, afterwards published by order of Congress (3 vols., Washington, 1843). Many minute and wise provisions are due to him, and he spoke before the con- vention more frequently than any delegate except James Wilson and Gouverneur Morris. In spite of the opposition to the consti- tution of the Virginia leaders George Mason and E. J. Randolph, Madison induced the state's delegation to stand by the consti- tution in the convention. His influence largely shaped the form of the final draft of the constitution, but the labour was not finished with this draft; that the constitution was accepted by the people was due in an eminent degree to the efforts of Madison, who, to place the new constitution before the public in its true light, and to meet the objections brought against it, joined Alexander Hamilton (q.v.) and John Jay in writing The Federal- ist, a series of eighty-five papers, out of which twenty certainly, and nine others probably, were written by him. In the Virginia convention for ratifying the constitution (June 1788), when eight states had ratified and it seemed that Virginia's vote would be

needed to make the necessary nine (New Hampshire's favourable vote was cast only shortly before that of Virginia), and it appeared that New York would vote against the constitution if Virginia did not ratify it, Madison was called upon to defend that instrument again, and he appeared at his best against its opponents, Patrick Henry, George Mason, James Monroe, Benja- min Harrison, William Grayson and John Tyler. He answered their objections in detail, calmly and with an intellectual power and earnestness that carried the convention. The result was a victory against an originally adverse public opinion and against the eloquence of the opponents of the constitution, for Madison and for his lieutenants, Edmund Pendleton, John Marshall, George Nicholas, Harry Innes and Henry Lee. At the same time Madison's labours in behalf of the constitution alienated from him valuable political support in Virginia. He was defeated by Richard Henry Lee and William Grayson in his candidacy for the United States Senate, but in his own district he was chosen a representative to Congress, defeating James "Monroe, who seems to have had the powerful support of Patrick Henry. Madison took his seat in the House of Representatives in April 1789, and assumed a leading part in the legislation neces- sary to the organization of the new government. He drafted a Tariff Bill giving certain notable

advantages to nations with which the United States had commercial treaties, hoping to force Great Britain into a similar treaty; but his policy of discrimi- nation against England was rejected by Congress. It was his belief that such a system of retaliation would remove the possi- bility of war arising from commercial quarrels. He introduced resolutions calling for the establishment of three executive departments, foreign affairs, treasury and war, the head of each removable by the president. Most important of all, he proposed nine amendments to the constitution, embodying suggestions made by a number of the ratifying states, especially those made by Virginia at the instance of George Mason; and the essential principles of Madison's proposed amendments were included in a Bill of Rights, adopted by the states in the form of ten amend- ments. The absence of a Bill of Rights from the constitution as first adopted had been the point on which the opposition had made common cause, and the ado'ption of this now greatly weakened the same opposition. Although a staunch friend of the constitution, Madison believed, however, that the instrument should be interpreted conservatively and not be made the means of introducing radical innovations. The tide of strict con- struction was setting in strongly in his state, and he was borne along with the flood. It is very probable that Jefferson's influence over Madison, which was greater than Hamilton's, contributed to this result. Madison now opposed Hamilton's measures for the funding of the debt, the assumption of state debts, and the establishment of a National Bank, and on other questions he sided more and more with the opposition, gradually assuming its leadership in the House of Representatives and labouring to confine the powers of the national government 'within the narrowest possible limits; his most important argu- ment against Hamilton's Bank was that the constitution did not provide for it explicitly, and could not properly be construed into permitting its creation. Madison, Jefferson and Randolph were consulted by Washington, and they advised him not to sign the bill providing for the Bank, but Hamilton's counter- argument was successful. On the same constitutional grounds Madison objected to the carrying out of the recommendations in Hamilton's famous report on manufactures (Dec. 5, 1791), which favoured a protective tariff. In the presidential cam- paign of 1:792 Madison seems to have lent his influence to the determined efforts of the Jeffersonians to defeat John Adams by electing George Clinton vice-president. In 1 793-1 796 he strongly criticized the administration for maintaining a neutral position between Great Britain and France, writing for the public press five papers (signed " Helvidius "), attacking the " monar- chical prerogative of the executive " as exercised in the proclama- tion of neutrality in 1793 and denying the president's right to recognize foreign states. He found in Washington's attitude — as in Hamilton's failure to pay an instalment of the moneys

due France — an " Anglified complexion," in direct opposition to the popular sympathy with France and French Republicanism. In 1 794 he tried again his commercial weapons, introducing in the House of Representatives resolutions based on Jefferson's report on commerce, advising retaliation against Great Britain and dis- crimination in commercial and navigation laws in favour of France; and he declared that the friends of Jay's treaty were " a British party systematically aiming at an exclusive connexion with the British government," and in 1796 strenuously but unsuccessfully opposed the appropriation of money to carry this treaty into effect. Still thinking that foreign nations could be coerced through their commercial interests, he scouted as visionary the idea that Great Britain would go to war on a refusal to carry Jay's treaty into effect, thinking it inconceivable that Great Britain " would wantonly make war " upon a country which was the best market she had in the world for her manu- factures, and one with which her export trade was so much larger than her import.

In 1797 Madison retired from Congress, but not to a life of inactivity. In 1798 he joined Jefferson in opposing the Alien and Sedition Laws, and Madison himself wrote the resolutions of the Virginia legislature declaring that it viewed " the powers of the Federal government as resulting from the compact to which the states are parties, as limited by the plain sense and intention of the instrument constituting that compact; as no further valid than they are authorized by the grants enumerated in that com- pact; and that, in case of a deliberate, palpable and dangerous exercise of other powers, not granted by the said compact, the states, who are parties thereto, have the right and are in duty bound to interpose for arresting the progress of the evil, and for maintaining within their respective limits, the authorities, rights and liberties appertaining to them." The Virginia resolutions and the Kentucky resolutions (the latter having been drafted by Jefferson) were met by dissenting resolutions from the New England states, from New York, and from Delaware. In answer to these, Madison, who had become a member of the Virginia legislature in the autumn of 1799, wrote for the committee to which they were referred a report elaborating and sustaining in every point the phraseology of the Virginia resolutions. 1

Upon the accession of the Republican party to power in 1801, Madison became secretary of state in Jefferson's cabinet, a position for which he was well fitted both because he possessed to a remarkable degree the gifts of careful thinking and discreet and able speaking, and of large constructive ability; and because he was well versed in constitutional and

international law and practised a fairness in discussion essential to a diplomat. During the eight years that he held the portfolio of state, he had con- tinually to defend the neutral rights of the United States against the encroachments of European belligerents; in 1806 he published An Examination of the British Doctrine which subjects to Capture a Neutral Trade not open in Time of Peace, a careful argument — with a minute examination of authorities on international law — against the rule of war of 1756 extended by Great Britain in 1793 and 1803.

1 Thirty years later Madison's arguments for the Virginia resolu- tions and the resolutions themselves were freely used by Calhoun and his followers in support of his doctrine of nullification. But Madison insisted that the Resolutions of 1798 did not involve the principles of nullification. Nearly all his arguments, especially where he attempts to interpret Jefferson's writings on the point, notably the Kentucky resolutions, are rather strained and specious, but it does seem that the Virginia resolutions were based on a different idea from Calhoun's doctrine of nullification. Madison's theory was that the legislature of Virginia, being one of the bodies which had chosen delegates to the constitutional convention, was legally capable of considering the question of the constitutionality of laws passed by the Federal government, and that the state of Virginia might invite other states to join her, but could not singly, as Calhoun argued, declare any law of the Federal legislature null and void. (It is to be noted the words "null and void " were in Madison's first draft of the Virginia resolutions, but that they were omitted by the Virginia legislature.) It is notable, besides, that Madison had always feared that the national congress would assume too great power, that he had approved of Supreme Court checks on the national legislature, and of veto power by a council of revision.

During Jefferson's presidency and whilst Madison was secretary of state, by the purchase of Louisiana, Madison's campaign begun in 1 780 for the free navigation of the Mississippi was brought to a successful close. The candidate in 1808 of the Republican party, although bitterly opposed in the party by John Randolph and George Clinton, Madison was elected president, defeating C. C. Pinckney, the Federalist candidate, by 1 2 2 votes to 47. Madison had no false hopes of placating the Federalist opposition, but as the preceding administration was one with which he was in har- mony, his position was different from that of Jefferson in 1801, and he had less occasion for removing Federalists from office. Jefferson's peace policy — or, more correctly, Madison's peace policy — of commercial restrictions to coerce Great Britain and France he continued to follow until 181 2, when he was forced to change these futile commercial weapons for a policy of war, which was very popular with the extreme French wing of his party. There is a charge, which has never been proved or disproved, that Madison's real desire was for peace, but that in order to

secure the renomination he yielded to that wing of his party which was resolved on war with Great Britain. The only certain fact is that Madison, whatever were his personal feelings in this matter, acted according to the wishes of a majority of the Republicans; but whether in doing so he was influenced by the desire of another nomination is largely a matter of conjecture. Madison was re- nominated on the 1 8th of May 181 2, issued his war message on the 1 st of June, and in the November elections he was re-elected, defeating De Witt Clinton by 128 votes to 89. His administration during the war was pitiably weak. His cabinet in great part had been dictated to him in 1809 by a senatorial clique, and it was hopelessly discordant; for two years he was to all intents and purposes his own secretary of state, Robert Smith being a mere figure-head of whom he gladly got rid in 181 1, giving Monroe the vacant place. Madison himself had attempted alternately to prevent war by his " commercial weapons " and to prepare the country for war, but he had met with no success, because of the tricky diplomacy of Great Britain and of France, and because of the general distrust of him coupled with the particular opposition to the war of the prosperous New England Federalists, who suggested with the utmost seriousness that his resignation should be demanded. In brief, Madison was too much the mere scholar to prove a strong leader in such a crisis. The supreme disgrace of the administration was the capture and partial destruction in August 1814 of the city of Washington — this was due, how- ever, to incompetence of the military and not to any lack of prudence on the cabinet's part. In general, Congress was more blamable than either the president or his official family, or the army officers. With the declaration of peace the president again gained a momentary popularity much like that he had won in 1809 by his apparent willingness at that time to fight France.

Retiring from the presidency in 1817, Madison returned to his home, Montpelier (in Orange county, Virginia) , which he left in no official capacity save in 1829, when he was a delegate to the state constitutional convention and served on several of its com- mittees. Montpelier, like Jefferson's Monticello and Monroe's Oak-Hill, was an expensive bit of " gentleman farming," which with his generous Virginia hospitality nearly ruined its owner financially. Madison's home was peculiarly a centre for literary travellers in his last years; when he was eighty- three he was visited by Harriet Martineau, who reported her conversations with him in her Retrospect of Western Travel (1838). He took a great interest in education — his library was left, to the university of Virginia, where it was burned in 1895 — i 11 emancipation, and in agricultural questions, to the very last. He died at Montpelier on the 28th of June 1836. Madison married, in 1794, Dorothy Payne Todd (1772-1849), widow of John Todd, a Philadelphia lawyer. She had great social charm, and upon Madison's

enter- ing Jefferson's cabinet became " first lady " in Washington society. Her plump beauty was often remarked — notably by Washington Irving — in contrast to her husband's delicate and feeble figure and wizened face — for even in his prime Madison was, as Henry Adams says, " a small man, quiet, somewhat pre- cise in manner, pleasant, fond of conversation, with a certain

mixture of ease and dignity in his address." Her son, spoiled by his mother and his step-father, became a wild young fellow, and added his debts to the heavy burden of Montpelier upon Madison.

Madison's portrait was painted by Gilbert Stuart and by Charles Willson Peale; Giuseppe Ceracchi made a marble bust of him in 1792 and John H. J. Browere another in 1827, now in possession of the Virginia Historical Society at Richmond. Though commonly dignified and a little stiff he seems to have had a strong sense of humour and he was fond of telling a good story. Henry Clay, con- trasting him with Jefferson, said that Jefferson had more genius, Madison more judgment and common sense; that Jefferson was a visionary and a theorist; Madison cool, dispassionate, practical, and safe. 1 The broadest and most accurate scholar among the " founders and fathers," he was particularly an expert in constitu- tional history and theory. In the great causes for which Madison fought in his earlier years — religious freedom and separation of church and state, the free navigation of the Mississippi, and the adoption of the constitution — he met with success. His greatest and truest fame is as the " father of the constitution." The " com- mercial weapons " with which he wished to prevent armed conflict proved less useful in his day than they have since been in inter- national disputes.

Authorities. — Madison's personality is perplexingly vague; the biographies of him arc little more than histories of the period, and the best history of the later period in which he was before the public, Henry Adams's History of the United States from 1801 to 1817 (1889- 1890), gives the clearest sketch and best criticism of him. The lives of Madison are: J. Q. Adams's (Boston, 1850); W. C. Rives's (Boston, 1859-1869, 3 vols.), covering the period previous to 1797; S. H. Gay's (Boston, 1884) in the" American Statesmen Series ";and Gaillard Hunt's (New York, 1902). Madison's Writings (7 vols., New York, 1900-1906) were edited by Hunt, who also edited The Journal of the Debates in the Convention which framed the Con- stitution of the United States, as Recorded by James Madison (2 vols., New York, 1908). See also Mrs Madison's Memoirs and Letters (Boston, 1887)

and Maud Wilder Goodwin, Dolly Madison (New York, 1897).

MADISON, a city and the county-seat of Jefferson county, Indiana, U.S.A., on the N. bank of the Ohio river, about 90 m. below Cincinnati, and 44 m. above Louisville, Kentucky. Pop. (1870), 10,709; (1890), 8936; (1900), 7835 (554 foreign- born and 570 negroes); (1910), 6934. Madison is served by the Pittsburg, Cincinnati, Chicago & St Louis railroad and by river steamboats. The city is picturesquely situated on bluffs above the river and has two public parks. In Madison are a King's Daughters' Hospital, a children's home, and the Drusilla home for old ladies, and immediately north of the city are the buildings of the Indiana South-eastern Insane Hospital. Madison is a trading centre of the surrounding farming region, whose principal products are burley tobacco, grain and fruits (peaches, apples, pears, plums and small fruits). The municipality owns and operates the waterworks. Madison was settled about the beginning of the 19th century; was incorporated as a town in 1824, and was first chartered as a city in 1836.

MADISON, a borough of Morris county, New Jersey, U.S.A., 27 m. (by rail) W. of New York City and 4 m. S.E. of Morris- town. Pop. (18905,2469; (1900), 3754, of whom 97s were foreign- born and 300 were negroes; (1905), 4115; (1910), 4658. It is served by the Morris & Essex division of the Delaware, Lacka- wanna & Western railroad. The borough is attractively situated among the hills of Northern New Jersey, is primarily a residential suburb of New York and Newark, and contains many fine residences. There are a public library and a beautiful public park, both given to the borough by Daniel Willis James (1832- 1907), a prominent metal manufacturer; the library is closely allied with the public schools. Madison is the seat of the well- known Drew theological seminary (Methodist Episcopal; founded in 1866 and opened in 1867), named in honour of Daniel Drew (1788-1879), who, having acquired great wealth from steamboat and railway enterprises, especially from trading in railway stocks, presented the large and beautiful grounds and most of the build- ings. The seminary's course covers three years; no fee is charged. In connexion with the seminary the Drew settlement in New York City — officially the department of applied Christianity — •

1 Clay's opinion is given in a report written by Mrs Samuel H. Smith of a conversation in 1829 between Clay and her husband, a prominent politician.

has for its object the " practical study of present-day problems in city evangelism, church organization, and work among the poor." In 1907-1908 the seminary had 9 instructors, 175 stu- dents, and a library of more than ico,ooo volumes, especially rich in works dealing with the

history of Methodism and in Greek New Testament manuscripts. About 2 m. N.W. of Madison is Convent Station, the seat of a convent of the Sisters of Charity, who here conduct the college of St Elizabeth, for girls, founded in 1859; also conducted by the Sisters of Charity is St Joseph's preparatory school for boys, founded in 1862. The cultivation of roses and chrysanthemums is practically the only industry of Madison. Madison owns and operates its waterworks and electric-lighting plant. Before 1844 when it took its present name (in honour of President Madison), Madison was called Bottle Hill; it is one of the older places of the state, and its first church (Presbyterian) was built about 1748. The borough was incorporated in 1889.

MADISON, the capital of Wisconsin, U.S.A., and the county- seat of Dane County, situated between Lakes Mendota and Monona in the south central part of the state, about 82 m. W. of Milwaukee and about 131 m. N.W. of Chicago. Pop. (1890), .13,426; (1900) 19,164, of whom 3362 were foreign-born and 69 were negroes; (1910 census) 25,531. Madison is served by the Chicago & North-Western, the Chicago, Milwaukee & St Paul, and the Illinois Central railways (being the northern terminus of the last), and by interurban electric lines, connecting with Janesville, Beloit and Chicago. It has a picturesque situation in what is known as " the Four-Lakes region "; this region takes its name from a chain of lakes, Kegonsa, Waubesa, Monona and Mendota, which, lying in the order named and connected with one another by the Yahara or Catfish River, form the head-waters of Rock river flowing southward through Illinois into the Mississippi. The city occupies a hilly isthmus about a mile wide between Lakes Mendota and Monona, bodies of water of great clearness and beauty, with bottoms of white sand and granite.

The state capitol is in a wooded park at the summit of a hill 85 ft. high in the centre of the city. From this park the streets and avenues radiate in all directions. The capitol, built in 1860-1867 (with an addition in 1883) on the site of the original capitol building (1837-1838), was partially destroyed by fire in 1904, and in 1909-1910 was replaced by a larger edifice. The principal business portion of the city is built about the capitol park and the university. Among the public buildings on or near the park are the federal building, housing the post office and the United States courts, the city hall, the Dane county court-house, the public library, the Fuller opera-house, the county gaol, and the high school. Running directly west from the capitol is State Street, at the western end of which lie the grounds of the university of Wisconsin (q.v.), occupying a hilly wooded tract of 300 acres, and extending for a mile along the south shore of Lake Mendota. University Hill, on which the main building of the university stands, is 125 ft. above the lake; at its foot stands the magnificent library building of the State Historical Society. In it, in addition to the inter- esting and valuable

historical museum and art gallery, are the Society's library of more than 350,000 books and pamphlets, the university library of 150,000 volumes, and the library of the Wisconsin academy of arts and sciences, 5000 volumes. Other libraries in the city include the state law library (45,000 volumes) in the capitol, the Madison public library (22,500 volumes), and the Woodman astronomical library (7500 volumes). The Madison public lihrary houses also the state library school maintained by the Wisconsin library commission. Connected with the university is the Washburn observatory. On the margin of the city lies the extensive experimental farm of the state college of agriculture. In addition to the state university, Madison is the seat of several Roman Catholic and Lutheran parochial schools, two business schools, and the Wisconsin academy, a non-sectarian preparatory school of high grade. On the banks of Lake Monona are the beautiful grounds of the Monona Lake assembly, a summer assepably

on the Chautauqua model. Near the city is one of the five fish-hatcheries maintained by the state; it is largely devoted to the propagation of trout and other small fish. North of the city, occupying a tract of 500 acres, on Lake Mendota, are the buildings and grounds of the state hospital for the insane, opened in i860.

The city's streets are broad and heavily shaded with a pro- fusion of elm, oak and maple trees. There are many fine stone residences dating from the middle of the 19th century. There are several parks of great beauty, and along the shores of Lake Mendota there is a broad boulevarded drive of 1 2 m. The municipality owns its waterworks, the water being obtained from eleven artesian wells, and being chemically similar to that of Waukesha Springs. The city and surrounding region are a summer resort, the lakes affording opportunities for fishing and for yachting and boating.

Madison is an important jobbing centre for central and south-western Wisconsin; it has an extensive trade in farm, garden and dairy products, poultry and tobacco; and there are various manufactures. In 1905 the value of the total factory product was $3,291,143, an increase of 22-4% over that in 1900.

At the time of the settlement by the whites the aboriginal inhabitants of the Four-Lakes region were the Winnebago. Prehistoric earthworks are to be seen in the neighbourhood, several animal-shaped mounds upon the shores of Lakes Men- dota, Monona and Waubesa being among the best examples. A regular trading post is known to have been established on Lake Mendota

as early as 1820. The title to the Indian lands was acquired by the United States by treaty in 1825. Colonel Ebenezer Brigham established himself at Blue Mounds, in the western part of Dane county, in 1827. In 1832 the "Four- Lakes " country was in the theatre of hostilities during the Black Hawk War; Colonel Henry Dodge held a conference with Winnebago chiefs on Lake Mendota, and there were several skirmishes in the neighbourhood between his troops and the followers of Black Hawk, one of which took place on the site of Madison. After Black Hawk's defeat on the Bad Axe he fled to the Wisconsin river Dalles, near the present Kilbourn, where he was betrayed by the Winnebago. In 1836 Stevens T. Mason, governor of Michigan, and James Duane Doty, then U.S. district judge, who had visited the region as early as 1829, recorded a tract of land, including most of the present site of Madison. Here they surveyed a " paper " city which they named in honour of James Madison. On the 3rd of December 1836 the territorial legislature in session at Belmont, after a protracted and acrimonious debate, determined, largely through Doty's influence, to make Madison the permanent capital. The construction of houses began in the early spring of 1837. The first constitutional convention met here in 1846, the second in 1847. Madison was chartered as a city in 1856. In 1862 a large number of Confederate prisoners were confined in Camp Randall, at Madison, and many of them died in hospital.

See D. S. Durrie, History of Madison, Wisconsin (Madison, 1874); Lyman C. Draper, Madisonthe Capitalof Wisconsin (Madison, 1857) ; J. D. Butler, " The Four Lakes Country" in Wisconsin Historical Society Collections, vol. 10 (1888), and R. G. Thwaites, " Madison " in Historic Towns of the Western States (New York, 1900), and his " Story of Madison " in The University of Wisconsin (Madison,

1900).

MADOU, JEAN BAPTISTE (1796-1877), Belgian painter and lithographer, was born at Brussels on the 3rd of February 1796. He studied at the Brussels Academy of Fine Arts and was a pupil of Francois. While draughtsman to the topo- graphical military division at Courtrai, he received a com- mission for lithographic work from a Brussels publisher. It was about 1820 that he began his artistic career. Between 1825 and 1827 he contributed to Les Vues pittoresques de la Belgique, to a Life of Napoleon, and to works on the costumes of the Netherlands, and later made a great reputation by his work in La Physionomie de la sociilS en Europe depuis 1400 iusqu' a nos jours (1836) and Les Scenes de la vie des peintres.

It was not until about 1840 that he began to paint in oils, and the success of his early efforts in this medium resulted in a long series of pictures

representing scenes of village and city life, including " The Fiddler," " The Jewel Merchant," " The Police Court," " The Drunkard," " The Ill-regulated Household," and " The Village Politicians." Among his numerous works mention may also be made of " The Feast at the Chateau " (1851), " The Unwelcome Guests " (1852, Brussels Gallery), generally regarded as his masterpiece, " The Rat Hunt" (acquired by Leopold II., king of the Belgians), " The Arquebusier " (i860), and "The Stirrup Cup." At the age of sixty-eight he decorated a hall in his house with a series of large paintings representing scenes from La Fon- taine's fables, and ten years later made for King Leopold a series of decorative paintings for the chateau of Ciergnon. Madou died at Brussels on the 31st of March 1877.

For a list of his paintings see the annual report of the Academy"of Belgium for 1879. (F. K.)*

MADOZ, PASCUAL (1806-1870), Spanish statistician, was born at Pampeluna on the 7th of May 1806. In early life he was settled in Barcelona, as a writer and journalist. He joined the Progresista party formed during the first Carlist war, 1833-40. He saw some service against the Carlists; was elected deputy to the Cortes of 1836; took part for Espartero, and then against him; was imprisoned in 1843; went into exile and returned; was governor of Barcelona in 1854, and minister of finance in 1855; had a large share in secularizing the Church lands; and after the revolution of 1868 was governor of Madrid. He had, however, no great influence as a leader and soon went abroad, dying at Genoa in 1870. Madoz was distinguished from most of the politicians of his generation by the fact that in middle life he compiled what is still a book of value — a geographical, statistical and historical dictionary of Spain and its possessions oversea, Diccionario geogrdfico, esladistico y historico de Espana, y sus posesiones de Ultramar (Madrid, 1848-1850).

MADRAS, a presidency of British India — officially styled Fort St George — occupying, with its dependencies, the entire south of the Indian peninsula. The north boundary is extremely irregular. On the extreme N.E. is the Bengal province of Orissa; then the wild highlands of the Central Provinces; next the dominions of the nizam of Hyderabad; and lastly, on the N.W., the Bombay districts of Dharwar and North Kanara. Geographically Mysore and Coorg lie within the bounds of Madras, and politically it includes the Laccadive Islands, off the Malabar coast, in the Indian Ocean. Its total area, including native states, is 151,695 sq. m., and its popula- tion in 1901 was 42,397,522, showing an increase of 7-7% in the decade. The seat of government is at Madras city

Physical Aspect. — The Madras presidency may be roughly divided into three tracts: (1) the long and broad east coast, (2) the shorter and

narrower west coast, and (3) the high interior table-land. These divisions are determined by the great mountain ranges of the Eastern and Western Ghats (q.v.). Between these two ranges lies the central table-land, with an elevation of 1000 to 3000 ft., which includes the whole of Mysore, and extends over about half a dozen districts of Madras. The Anaimudi mountain (8837 ft.) in Travan- core is the highest in southern India. The Nilgiri hills, which join the Ghats, culminate in Dodabetta (8760 ft.). There are besides many outlying spurs and tangled masses of hills, of which the She- varoys, Anamalais and Palnis are the most important. The Godavari, Kistna and Cauvery rivers, each having a large tributary system, all rise in the Western Ghats, and run across the peninsula in a south-east direction into the Bay of Bengal. In the upper parts of their course they drain rather than water the country through which they flow, and are comparatively valueless either for navigation or irrigation ; but before reaching the sea they spread over alluvial deltas. Smaller rivers of the same character are the Pennar arid South Pennar or Ponniar, Palar, Vaigai, Vellar and Tambraparni. The principal lake is that of Pulicat on the east coast, which is 37 m. long from north to south, and forms an important means of communication between Madras city and the northern districts. On the west coast are a remarkable series of backwaters or lagoons, fringing the sea- board of Kanara, Malabar and Travancore. The largest is the back- water of Cochin, which extends 120 m. from north to south.

Geology. — By far the greater part of Madras is occupied by granitic and gneissic rocks of very ancient date. Among them are the " charnockites," a series of associated eruptive rocks character- ized by the presence of rhombic pyroxenes. In Bellary and Ananta- pur districts, as well as in Mysore and Hyderabad, several long narrow strips of a later formation, known as the Dharwar system, are folded or faulted into the gneissic floor. They run from N.N.W. to S.S.E., and consist of conglomerates, lavas and schists. All the quartz reefs which contain gold in paying quantities are found within these Dharwar bands, those of the Kolar goldfield in Mysore being the most important. The gneissic and Dharwar rocks are overlaid unconformably by the sandstones, limestones, shales, &c, of the Cuddapah and Kurnool series. It is in the sandstones and shales of the Kurnool group that most of the diamonds of southern India are found ; but as these rocks are of sedimentary origin, it is probable that the diamonds were originally derived from some still unknown source. A strip of Gondwana beds follows approximately the course of the Godavari. In Hyderabad it includes the important Singareni coalfield, but in the Presidency no good coal seams have yet been found. Upper Gondwana beds also occur in small patches at

several other places near the east coast. Marine cretaceous deposits are found in three detached areas, near Trichinopoly, Viruddhachalam and Pondicherry. Some of the coastal sandstones may be of late Tertiary age, but Tertiary fossils have not been found except in a few small patches on the west coast, the most southerly being near Quilon in Travancore.

Climate. — The climate varies in accordance with the height of the mountain chain on the western coast. Where this chain is lofty, as between Malabar and Coimbatore, the rainclouds are intercepted and give a rainfall of 150 in. on the side of the sea, and only 20 in. on the landward side. Where the range is lower, the rainclouds pass over the hills and carry their moisture to the interior districts. The Nilgiri hills enjoy the climate of the temperate zone, with a mode- rate rainfall. The Malabar coast has a rainfall of 150 in., and the clouds on the Western Ghats sometimes obscure the sun for months at a time. Along the eastern coasts and central table-lands the rainfall is low and the heat excessive. At Madras city the aver-age rainfall is 50 in., but this is considerably above the mean of the east coast.

Minerals. — The mineral wealth of the province is undeveloped. Iron of excellent quality has been smelted by native smiths in many localities from time immemorial'; but attempts to work the beds after European methods have proved unsuccessful. Carboniferous sand- stone extends across the Godavari valley as far as Ellore, but the coal has been found to be of inferior quality. Among other minerals may be mentioned manganese in Vizagapatam, and mica in Nellore. Garnets are abundant in the sandstone of the Northern Circars, and diamonds of moderate value are found in the same region. Stone and gravel quarries are very numerous.

Forests. — The forest department of Madras was first organized in 1856, and it is estimated that forests cover a total area of more than 19,600 sq. m., the whole of which is under conservancy rules. An area of about 1500 sq. m. is strictly conserved. In the remaining forests, after supplying local wants, timber is either sold direct by the department or licences are granted to wood-cutters. The more valuable timber trees comprise teak, ebony, rosewood, sandal-wood and redwood. The trees artificially reared are teak, sandal-wood, Casuarina and eucalyptus. The finest teak plantation is near Beypur in Malabar. At Mudumalli there are plantations of both teak and sandal-wood ; and the eucalyptus or Australian gum-tree grows on the Nilgiris in magnificent clumps.

Fauna. — The wild animals include the elephant, bison, sambur and ibex of the Western Ghats and the Nilgiris. Bison are found also in the hill tracts of the Northern Circars. InTravancore state the black leopard is not uncommon. The elephant is protected by law from indiscriminate

destruction. The cattle are small, but in Nellore and along the Mysore frontier a superior breed is carefully kept up by the wealthier farmers. The best buffaloes are imported from the Bombay district of Dharwar.

Population. — The population in 1901 was divided into Hindus (37,026,471), Mahommedans (2,732,931), and Chris- tians (1,934,480). The Hindus may be subdivided into Siva- ites, Vishnuvites and Lingayats. The Sivaites are most numerous in the extreme south and on the west coast, while the Vishnuvites are chiefly found in the northern districts. The Lingayats, a sect of Sivaite puritans, derive their name from their practice of carrying about on their persons the linga 'or emblem of Siva. The Brahmans follow various pursuits, and some of them are recent immigrants, who came south in the train of the Mahratta armies. A peculiar caste of Brahmans, called Nambudri, is found in Malabar. The most numerous of the hill tribes are the Kondhs and Savaras, two cognate races who inhabit the mountainous tracts of the Eastern Ghats, attached to several of the large estates of Ganjam and Vizagapatam. On the Nilgiris the best known aboriginal

tribe is the Todas (q.v.). The Mahommedans are subdivided into Labbai, Moplah, Arab, Sheikh, Sayad, Pathan and Mogul. The Labbais are the descendants of Hindu converts, and are traders by hereditary occupation, although many now employ themselves as sailors and fishermen. The Moplahs are the descendants of Malayalam converts to Islam — the head of the tribe, the raja of Cannanore, being descended from a fisher family in Malabar. They are a hard-working, frugal people, but quite uneducated and fanatical, and under the influence of religious excitement have often disturbed the public peace. Christians are more numerous in Madras than in any other part of India. In Travancore and Cochin states the native Christians constitute as much as one-fourth of the popu- lation. The Roman Catholics, whose number throughout southern India is estimated at upwards of 650,000, owe their establishment to St Francis Xavier and the famous Jesuit mission of Madura; they are partly under the authority of the archbishop of Goa, and partly under twelve Jesuit vicar- iates. Protestant missions date from the beginning of the 1 8th century. The Danes were the pioneers; but their work was taken up by the Society for Promoting Christian Knowledge, under whom laboured the great Lutherans of the 18th century — Schultz, Sartorius, Fabricius and Schwartz. The Church Missionary Society entered the field in 1814; and subsequently an American mission joined in the work.

Languages. — Broadly speaking, the entire population of Madras belongs to the five linguistic offshoots of the great Dravidian stock, dominant throughout southern India. At an early period, before the dawn of history, these races appear to have accepted some form of the Brahmanical or Buddhist faiths. Many storms of conquest have since swept over the land,

and colonies of Mogul and Mahratta origin are to be found here and there. But the evidence of language proves that the ethnical character of the population has remained stable under all these influences, and that the Madras Hindu, Mahommedan, Jain and Christian are of the same stock. Of the five Dravidian languages in British territory Telugu is spoken by over 14,000,000 persons; Tamil by over 15,000,000 persons; Kanarese by over 1,500,000 persons; Malayalam by nearly 3,000,000 persons; and Tulu by about 500,000 persons. Oriya is the native tongue in the extreme north of Ganjam, bordering on Orissa; and various sub-dialects of Dravidian origin are used by the hill tribes of the Eastern Ghats, of whom the Kondhs may be taken as the type.

Agriculture. — Over the greater part of the area of Madras artificial irrigation is impossible, and cultivation is dependent upon the local rainfall, which rarely exceeds 40 in. a year, and is liable to fall irregularly. The Malabar coast is the only part where the rainfall brought by the south-west monsoon may be trusted both for its amount and regularity. Other districts, such as Bellary, are also dependent upon this monsoon ; but in their case the rainclouds have spent themselves in passing over the Western Ghats, and cultivation becomes a matter of hazard. Over the greater part of the presidency the rainy season is caused by the south-east monsoon, which breaks about the end of September. The deltas of the Godavari, Kistna and Cauvery rivers are the only spots on the east coast which artificial irrigation is able to save from the risk of occasional scarcity. The principal food staples are rice, cholam, cambu, ragi and varagu (four kinds of millet). The most common oil-seed is gingelly (sesamum). Garden crops comprise tobacco, sugar-cane, chillies, betel-leaf and plantains. Sugar is chiefly derived from the sap of palms. The fruit trees are coco-nut, areca-nut, palmyra palm, jack, tamarind and mango. Special crops include cotton, indigo, coffee, tea, cinchona. The best cotton is grown in Tinnevelly. The principal coffee tract stretches along the slopes of the Western Ghats from the north of Mysore almost down to Cape Comorin. The larger portion of this area lies within Mysore, Coorg and Travancore states, but the Wynaad and the Nilgiri hills are within Madras. The first coffee plantation was opened in the Wynaad in 1840. Many of the early clearings proved unprofitable, and the enterprise made little progress till about 1855. Coffee, which is much cultivated on the Nilgiris, covers about 100 sq. m., though the area fluctuates. The tea plant was also introduced into the Nilgiri hills about 1840, but was not taken up as a commer- cial speculation till 1865, and is still unimportant. The cinchona plant was successfully introduced into the Nilgiri hills by the govern- ment in i860, and there are now a few plantations belonging to private owners.

The greater part of the soil in Madras is held by the cultivators

direct from the government under the tenure known as ryotwari. Besides these lands in the hands of the government, there are also proprietary or zamindari estates in all parts of the country. These estates are either the remains of ancient principalities, which the holder cannot sell or encumber beyond his own life interest, or they are creations of British rule and subject to the usual Hindu custom of partition. The total area of the zamindari estates is about 26 million acres, more than one-fourth of the whole presidency. The peshkash or tribute payable to government in perpetuity amounts to about £330,000 a year. Jndms, revenue-free or quit-rent grants of lands made for religious endowments or for services rendered to the state, occupy an aggregate area of nearly 8 million acres.

Manufactures. — Madras possesses few staple manufactures. The chief industries of the presidency are cotton-ginning, coffee-curing, fish-curing, indigo-pressing, oil-pressing, printing, rice-curing, rope- making, sugar-refining, tanning, tile and brick-making, and tobacco- curing. Up to the close of the 18th century cotton goods constituted the main article of export. Masulipatam, where the first English factory on the Coromandel coast was established in 1620, enjoyed a special reputation for its chintzes, which were valued for the fresh- ness and permanency of their dyes. There is still a small demand for these articles in Burma, the Straits and the Persian Gulf; but Manchester goods have nearly beaten the Indian exporter out of the field. Native looms, however, still hold their own in the local market, in face of strenuous opposition. After weaving, working in metals appears to be the most widespread native industry. Among local specialities which have attracted European curiosity may be men- tioned the jewelry of Trichinopoly, ornaments of ivory and horn worked at Vizagapatam, and sandal-wood carving in Kanara.

Commerce and Trade. — The continuous seaboard of the Madras presidency, without any natural harbours of the first rank, has tended to create a widely diffused trade. Madras city conducts nearly one-half of the total sea-borne commerce ; next comes Malabar, containing the western railway terminus near Calicut ; then Godavari, with its cluster of ports along the fringe of the delta; Tinnevelly, with the harbour at Tuticorin, which has opened large dealings with Ceylon and Burma; Tanjore, South Kanara, Ganjam and Vizagapa- tam. As compared with the other provinces, the trade of Madras is broadly marked by the larger proportion assigned to coasting trade with other Indian ports and with Ceylon. The chief staples of the export trade are hides and skins, coffee and raw cotton.

Railways and Irrigation. — The presidency is well supplied with railways, which naturally have their centre in Madras city, the chief seaport. The broad-gauge line of the Madras & Southern Mahratta railway connects with Bombay and Bangalore, and also crosses the peninsula to Calicut on the western coast. The South Indian (narrow-gauge) serves the extreme south, with its terminus at Tuti- corin, and branches to Tinnevelly, Negapatam, Erade, Pondicherry and Nellore. The narrow-gauge line of the Madras & Southern Mahratta railway traverses the Deccan districts; and the East Coast line (broad-gauge), through the Northern Circars, has brought Madras into direct communication with Calcutta. The Madras system of irrigation has been most successful in. the case of the three great eastern rivers, the Godavari, Kistna and Cauvery. Each of these is intercepted by an anient or dam at the head of its delta, from which canals diverge on each side for navigation as well as irrigation. The scheme for diverting the waters of the Tungabhadra (a tributary of the Kistna) over the thirsty uplands of Kurnool proved a failure. The bold project of leading the Periyar river through a tunnel across the watershed of the Travancore hills on to the plain of Madura has been more successful.

Administration. — The Madras presidency is administered by a governor and a council, consisting of two members of the civil service, which number may be increased to four. There is also a board of revenue of three members. The number of districts is 24, each under the charge of a collector, with sub-collectors and assistants. The districts are not grouped into divisions or commissionerships, as in other provinces. For legislative purposes the council of the governor is augmented by additional members, numbering 45 in all, of whom not more than 17 may be nominated officials, while 19 are elected by various representative constituencies. Members of the legislative council enjoy the right of interpellation, of proposing resolutions on matters of public interest, and of discussing the annual financial statement. The principle of local devolu- tion is carried somewhat further in Madras than in other pro- vinces. At the bottom are union panchayats or village com- mittees, whose chief duty is to attend to sanitation. Above them come taluk or subdivisional boards. At the head of all are district boards, a portion of whose members are elected by the taluk boards.

Education. — The chief educational institutions are the Madras University, the Presidency College, Madras Christian

College, and Pachayyappa's College at Madras; the government arts colleges at Combaconum and Rajahmundry; the law college, medical college and engineering college at Madras; the college of agriculture at Coimbatore; the teachers' college at Saidapet; the school of arts at Madras; and the military ophan- age at Ootacamund, in memory of Sir Henry

Lawrence. In 1907, the total number of pupils at all institutions was 1,007,118, of whom 164,706 were females, and 132,857 were learning English.

History. — Until the British conquest the whole of southern India had never acknowledged a single ruler. The difficult nature of the hill passes and the warlike character of the highland tribes forbade the growth of great empires, such as succeeded one another on the plains of Hindustan. The Tamil country in the extreme south is traditionally divided between the three kingdoms of Pandya, Chola and Chera. The west coast supplied the nucleus of a monarchy which afterwards extended over the highlands of Mysore, and took its name from the Carnatic. On the north-east the kings of Kalinga at one time ruled over the entire line of seaboard from the Kistna to the Ganges. Hindu legend has preserved marvellous stories of these early dynasties, but our only authentic evidence consists in their inscriptions on stone and brass, and their noble archi- tecture (see India). The Mahommedan invader first estab- lished himself in the south in the beginning of the 14th century. Ala-ud-din, the second monarch of the Khilji dynasty at Delhi, and his general Malik Kafur conquered the Deccan, and over- threw the kingdoms of Karnataka and Telingana, which were then the most powerful in southern India. But after the withdrawal of the Mussulman armies the native monarchy of Vijayanagar arose out of the ruins. This dynasty gradually extended its dominions from sea to sea, and reached a pitch of prosperity before unknown. At last, in 1565, it was over- whelmed by a combination of the four Mahommedan princi- palities of the Deccan. At the close of the reign of Aurangzeb, although that emperor nominally extended his sovereignty as far as Cape Comorin, in reality South India had again fallen under a number of rulers who owned no regular allegiance. The nizam of the Deccan, himself an independent sovereign, represented the distant court of Delhi. The most powerful of his feudatories was the nawab of the Carnatic, with his capital at Arcot. In Tanjore, a descendant of Sivaji ruled; and on the central table-land a Hindu chieftain was gradually establishing his authority and founding the state of Mysore, destined soon to pass to a Mahommedan usurper.

Vasco da Gama cast anchor off Calicut on the 20th of May 1498, and for a century the Portuguese retained in their control the commerce of India. The Dutch began to establish them- selves on the ruin of the Portuguese at the beginning of the 17th century, and were quickly followed by the English, who established themselves at Calicut and Cranganore in 1616. Tellicherry became the principal English emporium on the west coast of Madras. The Portuguese eventually retired to Goa, and the Dutch to the Spice Islands. The first English settlement on the east coast was in 1611, at Masulipatam, even then celebrated for its fabrics. Farther south a fort, the nucleus of Madras city, was erected in 1640. Pondicherry was purchased

by the French in 1762. For many years the English and French traders lived peacefully side by side, and with no ambition for territorial aggrandisement. The war of the Austrian succession in Europe lit the first flame of hostility on the Coromandel coast. In 1746 Madras was forced to sur- render to La Bourdonnais, and Fort St David remained the only English possession in southern India. By the peace of Aixvla-Chapelle Madras was restored to the English; but from this time the rivalry of the two nations was keen, and found its opportunities in the disputed successions which always fill a large place in Oriental politics. English influence was generally able to secure the favour of the rulers of the Carnatic and Tanjore, while the French succeeded in placing their own nominee on the throne at Hyderabad. At last Dupleix rose to be the temporary arbiter of the fate of southern

India, but he was overthrown by Clive, whose defence of Arcot in 1751 forms the turning point in Indian history. In 1760 the crowning victory of Wandewash was won by Colonel (after- wards Sir Eyre) Coote, over Lally, and in the following year, despite help from Mysore, Pondicherry was captured.

Though the English had no longer any European rival, they had yet to deal with Mahommedan fanaticism and the warlike population of the highlands of Mysore. The dynasty founded by Hyder Ali, and terminating in his son Tippoo Sultan, proved itself in four several wars, which terminated only in 1799, the most formidable antagonist which the English had ever encountered (see Hyder Ali and India). Since the beginning of the 19th century Madras has known no regular war, but occasional disturbances have called for measures of repression. The palegars or local chieftains long clung to their independence after their country was ceded to the British. On the west coast, the feudal aristocracy of the Nairs, and the religious fanaticism of the Moplahs, have more than once led to rebellion and bloodshed. In the extreme north, the wild tribes occupying the hills of Ganjam and Vizagapatam have only lately learned the habit of subordination. In 1836 the zamind&H of Gumsur in this remote tract was attached by government for the rebel- lious conduct of its chief. An inquiry then instituted revealed the wide prevalence among the tribe of Kondhs of human sacrifice, under the name of mcriah. The practice has since been suppressed by a special agency. In 1879 the country round Rampa on the northern frontier was the scene of riots sufficiently serious to lead to the necessity of calling out troops. The same necessity arose three years later, when the Hindus and Mahommedans of Salem came into collision over a

question of religious ceremonial. A more serious disturbance was that known as the " Anti-Shanar riots " of 1899. The Maravans of Tinnevelly and parts of Madura, resenting the pretensions of the Shanans, a toddy-drawing caste, to a higher social and religious status, organized attacks on Shanan villages. The town of Sivakasi was looted and burnt by five thousand Maravans. Quiet was restored by the military, and a punitive police forcerwas stationed in the disturbed area.

The different territories comprising the Madras presidency were acquired by the British at various dates. In 1763 the tract encircling Madras city, then known as the Jagir now Chingleput district, was ceded by the nawab of Arcot. In 1765 the Northern Circars, out of which the French had recently been driven , were granted to the Company by the Mogul emperor, but at the price of an annual tribute of £90,000 to the nizam of Hyderabad. Full rights of dominion were not acquired till 1823, when the tribute was commuted for a lump payment. In 1792 Tippoo was compelled to cede the Baramahal (now part of Salem district), Malabar and Dindigul subdivision of Madura. In 1799, on the reconstruction of Mysore state after Tippoo's death, Coimbatore and Kanara were appropriated as the British share; and in the same year the Mahratta raja of Tanjore resigned the administration of his territory, though his descendant retained titular rank till 1855. In 1800 Bellary and Cuddapah were made over by the nizam of Hyderabad to defray the expense of an increased subsidiary force. In the following year the dominions of the nawab of the Carnatic, extending along the east coast almost continuously from Nellore to Tinnevelly, were resigned into the hands of the British by a puppet who had been put upon the throne for the purpose. The last titular nawab of the Carnatic died in 1855; but his representative still bears the title of prince of Arcot, and is recognized as the first native nobleman in Madras. In 1839 the nawab of Kurnool was deposed for misgovernment and suspicion of treason, and his territories annexed.

See Madras Manual of Administration, 3 vols. (Madras, 1885 and 1893); S. Ayyangar, Forty Years' Progress in Madras (Madras, l 8 93); J- P- Rees, Madras (Society of Arts, 1901); Madras Pro- vincial Gazetteer (2 vols., Calcutta, 1908).

MADRAS, the capital of Madras presidency, and the chief seaport on the eastern coast of India, is situated in 13 4′ N. and 8o° 17′ E. The city, with its suburbs, extends nine miles

along the sea and nearly four miles inland, intersected by the little river Cooum. Area, 27 sq. m.; pop. (1901), 509,346, showing an increase of 12-6% in the decade. Madras is the third city in India.

Although at first sight the city presents a disappointing appearance, and possesses not a single handsome street, it has several buildings of architectural pretensions, and many spots of historical interest. It is spread over a very wide area, and many parts of it are almost rural in character. Seen from the roadstead, the fort, a row of merchants' offices, a few spires and public buildings are all that strike the eye. Roughly speaking, the city consists of the following divisions. (1) George Town (formerly Black Town, but renamed after the visit of the Prince of Wales in 1906), an ill-built, densely-popu- lated block, about a mile square, is the business part of the town, containing the banks, custom house, high court, and all the mercantile offices. The last, for the most part handsome structures, lie along the beach. On the sea-face of George Town are the pier and the new harbour. Immediately south of George Town there is (2) an open space which contains Fort St George, the Marina, or fashionable drive and promenade by the seashore, Government House, and several handsome public buildings on the sea-face. (3) West and south of this lung of the city are crowded quarters known by native names — Chintadrapet, Turuvaleswarampet, Pudupak, Royapet, Kist- nampet and Mylapur, which bend to the sea again at the old town of Saint Thome. (4) To the west of George Town are the quarters of Veperi and Pudupet, chiefly inhabited by Eurasians, and the suburbs of Egmore, Nangambakanv and Perambur, adorned with handsome European mansions and their spacious " compounds " or parks, which make Madras a city of magnifi- cent distances. (5) South-west and south lie the European quarters of Tanampet and aristocratic Adyar. Among the most notable buildings are the cathedral, Scottish church, Government House, Pachayappa's Hall, senate house, Chepauk palace (now the revenue board), and the Central railway station.

Madras possesses no special industries. There are several cotton mills, large cement works, iron foundries and cigar factories. Large sums of money have from time to time been spent upon the harbour works, but without any great success. The port remains practically an open roadstead, protected by two breakwaters, and the P. & O. fteamers ceased to call in 1898. Passengers or cargo are landed or embarked in flat-bottomed masula boats. The sea bottom is unusually flat, reaching a depth of ten fathoms only at a mile from the shore. The harbour is not safe during a cyclone, and vessels have to put out to sea. Madras conducts about 56% of the foreign trade of the presidency, but a much smaller share of the coasting trade. As the capital of southern India, Madras is the centre on which all the great military roads converge. It is also the terminal station of two lines of railway, the Madras & Southern Mahratta line and the Madras & Tanjore section of the South Indian railway. The Buckingham canal, which passes through an outlying part of the city, connects South Arcot district

with Nellore and the Kistna and Godavari system of canal navigation. The municipal government of the city was framed by an act of the Madras legislature passed in 1884. The governing body consists of 32 commissioners, of whom 24 are elected by the ratepayers, together with a paid president. The Madras University was constituted in 1857, as an examining body, on the model of the university of London. The chief educational institutions in Madras city are the Presi- dency College; six missionary colleges and one native college; the medical college, the law college, the college of engineering, the teachers' college in the suburb of Saidapet, all maintained by government; and the government school of arts.

The foundation of Madras dates 'from 1640, when Francis Day, chief of the East India Company's settlement at Armagon, obtained a grant of the present site of the city from a native ruler. A fort — called Fort St George, presumably from having been finished on St George's Day (April 23) — was at once

constructed, and a gradually increasing population settled around its walls. In 1653 Madras, which had previously been subordinate to the settlement of Bantam in Java, was raised to the rank of an independent presidency. In 1702 Daud Khan, Aurangzeb's general, blockaded the town for a few weeks, and in 1741 the Mahrattas unsuccessfully attacked the place. In 1746 La Bourdonnais bombarded and captured Madras. The settlement was restored to the English two years later by the Treaty of Aix-la-Chapelle, but the govern- ment of the presidency did not return to Madras till 1762. In 1758 the French under Lally occupied the Black Town and invested the fort. The siege was conducted on both sides with great skill and vigour. After two months the arrival of an English fleet relieved the garrison, and the besiegers retired with some precipitancy. With the exception of the threatening approach of Hyder Ali's horsemen in 1769, and again in 1780, Madras has since the French siege been free from external attack. The town of Saint Thome, now part of Madras city, was founded and fortified by the Portuguese in 1504, and was held by the French from 1672 to 1674.

See Mrs F. Penny, Fort St George (1900); W. Foster, Founding of Fort St George (1902).

MADRAZO Y KUNT, DON FEDERICO DE (1815-1894), Spanish painter, was born in Rome on the 12th of February 1815. He was the son of the

painter Madrazo y Agudo (1781- 1859), and received his first instruction from his father. While still attending the classes at the Academy of San Fernando he painted his first picture, " The Resurrection of Christ " (1829), which was purchased by Queen Christina. Not long afterwards he painted " Achilles in his Tent," and subsequently presented to the Academy " The Continence of Scipio," which secured him admission as a member " for merit." While decorating the palace of Vista Alegre he took up portraiture. In. 1852 he went to Paris, where he studied under Winterhalter, and painted portraits of Baron Taylor and of Ingres. In 1837 he was commissioned to produce a picture for the gallery at Versailles, and painted " Godfrey de Bouillon proclaimed King of Jerusalem." The artist then went to Rome, where he worked at various subjects, sacred and profane. Then he painted " Maria Christina in the Dress of a Nun by the bedside of Ferdinand III." (1843), " Queen Isabella," " The Duchess of Medina-Coeli," and " The Countess de Vilches " (1845-1847), besides a number of portraits of the Spanish aristo- cracy, some of which were sent to the exhibition of 1855. He received the Legion of Honour in 1846. He was made a corre- sponding member of the Paris Academy of Fine Arts on the 10th of December 1853, and in 1873, on the death of Schnorr, the painter, he was chosen foreign member. After his father's death he succeeded him as director of the Prado Gallery and president of the Academy of San Fernando. He originated in Spain the production of art reviews and journals, such as _ El Artista, El Renacimiento and El Semanario pintoresco. He died at Madrid on the nth of June 1894. .His brother, Don Louis De Madrazo, was also known as a painter, chiefly by his " Burial of Saint Cecilia " (1855). Don Federico's best- known pupil was his son, Don Raimundo De Madrazo (b. 1841). MADRID, a province of central Spain, formed in 1833 of districts previously included in New Castile, and bounded on the W. and N. by Avila and Segovia, E. by Guadalajara, S.E. by Cuenca and S. by Toledo. Pop. (1900), 775,034, of whom 539,835 inhabit the city of Madrid; area, 3084 sq. m. Madrid belongs to the basin of the Tagus, being separated from th it of the Douro by the Sierra de Guadarrama on the N.W. and N., and by the Sierra de Gredos on the S.W. The Tagus is the southern boundary for some distance, its chief tributary being the Jarama, which rises in the Somosierra in the north and terminates at Aranjuez. The Jarama, in turn, is joined by the Hehares and Tajufia on the left, and by the Lozoya and Manzanares on the right. The Guadarrama, another tributary of the Tagus, has its upper course within the province. Like the rest of Castile, Madrid is chiefly of Tertiary formation; the soil is mostly clayey, but there are

tracts of sandy soil. Agriculture is somewhat backward; the rainfall is deficient, and the rivers are not utilized as they might be for irrigation. The south-eastern districts are the best watered, and produce in abundance

fruit, vegetables, wheat, olives, esparto grass and excellent wine. Gardening and viticulture are carried on to some extent near the capital, though the markets of Madrid receive their most liberal supply of fruits and vegetables from Valencia. Sheep, goats and horned cattle are reared, and fish are found in the Jarama and other rivers. Much timber is extracted from the forests of the northern and north-eastern parts of the province for building purposes and for firewood and charcoal. The royal domains of the Escorial, Aranjuez and El Pardo, and the pre- serves of the nobility, are all well wooded and contain much game. Efforts have also been made by the local authorities to cover the large stretches of waste ground and commons with pines and other trees.

The Sierra de Guadarrama has quarries of granite, lime and gypsum, and is known to contain iron, copper and argenti- ferous lead; but these resources are undeveloped. Other in- dustries are chiefly confined to the capital; but cloth, leather, paper, earthenware, porcelain, glass, bricks and tiles, ironware, soap, candles, chocolate and lace are also manufactured on a small scale beyond its boundaries. There is very little commerce except for the supply of the capital with necessaries.

Besides the local lines, all the great railways in the kingdom converge in this province, and it contains in all 221 m. of line. Besides Madrid, the towns of Aranjuez (12,670) and Alcala de Henares (11,206) and the Escorial are described in separate articles. The other towns with more than 5000 inhabitants are Vallecas (10,128), Colmenar de Oreja (6182), Colmenar Viejo (5255) and Carabanchel Bajo (5862).

MADRID, the capital of Spain and of the province of Madrid, on the left bank of the river Manzanares, a right-hand tributary of the Jarama, which flows south into the Tagus. Pop. (1877),

397,816; (1887), 472,228; (1897), 512.150; (1900), 539,835.

Madrid was the largest city in Spain in 1900; it is the see of an archbishop, the focus of the principal Spanish railways, the headquarters of an army corps, the seat of a university, the meeting-place of parliament, and the chief residence of the king, the court, and the captain-general of New Castile. It is, however, surpassed in ecclesiastical importance by Toledo and in commerce by Barcelona.

Situation and Climate. — Madrid is built on an elevated and undula- ting plateau of sand and clay, which is bounded on the north by the Sierra Guadarrama and merges on all other sides into the barren and treeless table-land of New Castile. Numerous water-courses (arroyos), dry except at rare intervals, furrow the surface of the plateau ; these as they pass

through the'city have in certain cases been converted into roads — e.g. the Paseo de Recoletos and Prado, which are still so liable to be flooded after prolonged rain that special channels have been constructed to carry away the water. The highest point in Madrid is 2372 ft. above sea-level. The city is close to the geo- graphical centre of the peninsula, nearly equidistant from the Bay of Biscay, the Mediterranean and the Atlantic. Owing to its high altitude and open situation it is liable to sudden and frequent variations of climate, and the daily range of temperature sometimes exceeds 50° F. In summer the heat is rendered doubly oppressive by the fiery, dust-laden winds which sweep across the Castilian table- land; at this season a temperature of 109 has been registered in the shade. In winter the northerly gales from the Sierra Guadarrama bring intense cold; snow falls frequently, and skating is carried on in the Buen Retiro park. A Spanish proverb describes the wind of Madrid as so deadly and subtle that " it will kill a man when it will not blow out a candle " ; but, though pulmonary diseases are not uncommon, the climate appears to be exceptionally healthy. In 1901 the death-rate was 22-07 per 1000, or lower than that of any other town on the Spanish mainland. The Sierra Guadarrama renders the atmosphere unusually dry and clear by intercepting the moisture of the north-western winds which prevail in summer; hence the average daily number of deaths decreases from 80 in winter to about 25 in summer. The sanitation of the older quarters is defective, and overcrowding is common, partly owing to the royal decrees which formerly prohibited the extension of the city; but much has been done in modern times to remove or mitigate these evils.

The Inner City. — The form of Madrid proper (exclusive of the modern suburbs) is almost that of a square with the corners

rounded off; from east to west it measures rather less than from north to south. It was formerly surrounded by a poor wall, partly of brick, partly of earth, some 20 ft. in height, and pierced by five principal gates (puertas) and eleven doorways (portillos) . Of these only three, the Puerta de Alcala on the east, the Puerta de Toledo on the south and the Portillo de San Vicente on the west, actually exist; the first and the third were erected in the time of Charles III. (1759-1788), and the second in honour of the restoration of Ferdinand VII. (1827). The Manzanares — or rather its bed, for the stream is at most seasons of the year quite insignificant — is spanned by six bridges, the Puente de Toledo and Puente de Segovia being the chief.

The Puerta del Sol is the centre of Madrid, the largest of its many plazas, and the place of most traffic. It derived its name from the former east gate of the city, which stood here until 1570, and had on its front a representation of the sun. On its south side stands the Palacio de la Gobernacion, or ministry of the interior, a heavy square building by a French architect, J. Marquet, dating from 1768. From the Puerta del Sol diverge, immediately or mediately, ten of the principal streets of Madrid ■ — eastward by north, the Calle de Alcala, terminating beyond the Buen Retiro park; eastward, the Carrera de San Jeronimo, terminating by the Plaza de las Cortes in the Prado; southward, the Calle de Carretas; westward, the Calle Mayor, which leads to the council chamber and to the palace, and the Calle del Arenal, terminating in the Plaza de Isabel II. and the royal opera house; north-westward, the Calles de Preciados and Del Carmen; and northward, the Calle de la Montera, which after- wards divides into the Calle de Fuencarral to the left and the Calle de Hortaleza to the right. The contract for another wide street through central Madrid, to be called the Gran Via, was given to an English firm in 1905.

The Calle de Alcala is bordered on both sides with acacias, and contains the Real Academia de Bellas Artes, founded in 1752 as an academy of art and music; its collection of paintings by Spanish masters includes some of the best-known works of Murillo. The handsome Bank of Spain (i884-l89l)stands where the Calle de Alcala meets the Prado; in the oval Plaza de Madrid, at the same point, is a fine 18th-century fountain with a marble group representing the goddess Cybele drawn in a chariot by two lions. The Calle de Alcala is continued eastward past the Buen Retiro gardens and park, and through the Plaza de Independencia, in the middle of which is the Puerta de Alcala. The Plaza de las Cortes is so called from the Congreso de los Diputados, or House of Commons, on its north side. The square contains a bronze statue of Cervantes, by Antonio Sola, erected in 1835. The Calle de Carretas, on the west side of which is the General Post Office, ranks with the Carrera de San Jeronimo and Calle de la Montera for the excellence of its shops. From the Calle Mayor is entered the PlazaMayor,a rectangle of about 430 ft. by 330 ft., formerly the scene of tournaments, bull fights, autos de 16, acts of canonization (including that of Ignatius Loyola in 1622) and similar exhibitions, which used to be viewed by the royal family from the balcony of one of the houses called the Panaderia (belonging to the guild of bakers). The square, which was built under Philip III. in 1619, is surrounded by an arcade; the houses are uniform in height and decoration. In the centre stands a bronze equestrian statue of Philip III., designed by Giovanni da Bologna, after a painting by Pantoja de la Cruz, and finished by Pietro Tacca. From the south- east angle of the Plaza Mayor the Calle de Atocha, one of the principal thoroughfares of Madrid, leads to the outskirts of the inner city; it contains

two large hospitals and part of the university buildings (faculty of medicine). The house occupied by Cervantes from 1606 until his death in 1616 stands at the point where it meets the Calle de Leon ; in this street is the Real Academia de la Historia, with a valuable library and collections of MSS. and plate. From the south- west angle of the Plaza Mayor begins the Calle de Toledo, the chief mart for the various woollen and silken fabrics from which the pictu- resque costumes peculiar to the peninsula are made. In the Plaza de Isabel II., at the western extremity of the Calle del Arenal, stands the royal opera-house, the principal front of which faces the Plaza del Oriente and the royal palace. In the centre of the plaza is a fine bronze equestrian statueof Philip IV.(i62i-i66s) ; it was designed by Velazquez and cast by Tacca, while Galileo is said to have suggested the means by which the balance is preserved. The gift of the grand duke of Tuscany in 1640, it stood in the Buen Retiro gardens until

1844.

Modern Development of the City. — The north and east of the city — the new suburbs — have developed past the Retiro Park as far as the Bull-ring, and have covered all the vast space included between the Retiro, the Bull-ring, the long Castellana

Drive to the race-course and the exhibition building. On the slopes of the other side of the Castellana, and along what were the northern limits of Madrid in 1875, the modern suburbs have extended to the vicinity of the fine cellular prison that was built at the close of the reign of King Alphonso XII. to replace the gloomy building known as El Saladero.

The new parts of the capital, with their broad streets and squares, and their villas sometimes surrounded with gardens, their boulevards lined by rather stunted trees, and their modern public buildings, all resemble the similar features of other Euro- pean capitals, and contrast with the old Madrid that has pre- served so many of its traits in architecture, popular life and habits. Some of the streets have been slightly widened, and in many thoroughfares new houses are being built among the ugly, irregular dwelling-places of the 18th and earlier centuries. This contrast is to be seen especially in and about the Calle Mayor, the Plaza Mayor, the Calle de Toledo, the Rastro, and the heart of the city.

Few capitals have more extensively developed their electric and horse tramways, gas and electric light installations and telephones. Much was done to improve the sanitary conditions of the city in the last twenty years of the 19th century. The streets are deluged three times a day with fire-hose, but even that has little effect upon the dust. Unfortunately the water supply, which used to be famed for its abundance and purity, became

wholly insufficient owing to the growth of the city. The old reservoir of the Lozoya canal, a cutting 32 m. long, and the additional reservoir opened in 1883, are quite inadequate for the requirements of modern Madrid, and were formerly kept in such an unsatisfactory state that for several months in 1898 and 1899 the water not only was on the point of giving out, but at times was of such inferior quality that the people had recourse to the many wells and fountains available. The construction of new waterworks was delayed by a terrible accident, which occurred on the 8th of April 1905 ; the whole structure collapsed, and nearly 400 persons lost their lives in the flooded ruins. A decided improve- ment has been made in the burial customs of Madrid. No bodies are allowed to be interred in the churches and convents. Some of the older burial grounds in the northern suburbs have been closed altogether, and in those which remain open few coffins are placed in the niche vaults in the depth of the thick walls, as was once the practice. A large modern necropolis has been established a few miles to the north-east.

Principal Buildings. — As compared with other capitals Madrid has very few buildings of much architectural interest. The Basilica de Nuestra Sefiora de Atocha, on the Paseo de Atocha, a continuation of the Calle de Atocha, was originally founded in 1523. After being almost destroyed by the French, it was restored by Ferdinand VII., and rebuilt after 1896. The modern church is Romanesque in style; it contains a much venerated statue of the Virgin, attributed to St Luke. The collegiate church of San Isidro el Real, in the Calle de Toledo, dates from 1651; it has no architectural merit, but contains one or two valuable pictures and other works of art. It was originally owned by the Jesuits, but after their expulsion in 1769 it was reconsecrated, and dedicated to St Isidore the Labourer (d. n 70), the patron saint of Madrid, whose remains were entombed here. When the diocese of Madrid was separated from that of Toledo San Isidro was chosen as the cathedral. The modern Gothic church of San Jeronimo el Real occupies a conspicuous site eastward of the town. The church of San Francisco el Grande, which contains many interesting monu- ments, is also known as the National Pantheon. An act was passed in 1837 declaring that the remains of all the most dis- tinguished Spaniards should be buried here; but no attempt to enforce the act systematically was made until 1869, and even then the attempt failed. Towards the close of the 19th century the church was splendidly restored at the expense of the state. Its interior was decorated with paintings and statuary by most of the leading Spanish artists of the time. Of secular buildings unquestionably the most important is the royal palace (Palacio Real), on the west side of the town, on rising ground overhanging the Manzanares. It occupies the site of the ancient Moorish alcazar (citadel) , where a hunting seat was built by Henry IV. ; this was enlarged and improved by Charles V. when he first made Madrid

his residence in 1532; was further developed by Phillip II., but ultimately was destroyed by fire in 1734. The

present edifice was begun under Philip V. in 1737 by Sacchetti of Turin, and was finished in 1764. It is in the Tuscan style, and is 470 ft. square and 100 ft. in height, the material being white Colmenar granite, resembling marble. To the north of the palace are the royal stables and coach-houses, remarkable for their extent; to the south is the armoury (Museo de la Real Armeria), containing what is possibly the best collection of the kind in existence. After the Palacio Real may be mentioned the royal picture gallery (Real Museo de Pinturas), adjoining the Salon del Prado; it was built about 1785 for Charles III. by Juan de Villanueva as a museum of natural history and academy of sciences. It contains the collections of Charles V., Philip II. and Philip IV., and the pictures number upwards of two thousand. The specimens of Titian, Raphael, Tintoretto, Velazquez, Van- dyck, Rubens and Teniers give it a claim to be considered the finest picture gallery in the world. The Biblioteca Nacional, in the Paseo de Recoletos, was founded in 1866, and completed in 1892. Not only the national library, with its important collec- tions of MSS. and documents, but the archaeological museum, the museums of modern painting and sculpture, and the fine arts academy of San Fernando, are within its walls. The two houses of the Cortes meet in separate buildings. The deputies have a handsome building with a very valuable library in the Carrera San Jeronimo; the senators have an old Augustinian convent which contains some fine pictures. A large and hand- some building near the Retiro Park contains the offices of the ministers of public works, agriculture and commerce, and of fine arts and education; nearly opposite stands the new station of the Southern Railway Company. The Great Northern and the Spain to Portugal Railway Companies have also replaced their old stations by very spacious, handsome structures, much resem- bling those of Paris. In 1896 the Royal Exchange was installed in a large monumental building with a fine colonnade facing the Dos de Mayo monument, not far from the museum of paintings. Of the promenades and open places of public resort the most fashionable and most frequented is the Prado (Paseo del Prado, Salon del Prado) on the east side of the town, with its northward continuation — the Paseo de Recoletos. To the south of the town is the Paseo de las Delicias, and on the west, below the royal palace, and skirting the Manzanares, is the Paseo de la Virgen del Puerto, used chiefly by the poorer classes. Eastward from the Prado are the Buen Retiro Gardens, with ponds and pavilions, and a menagerie. The gardens were formerly the grounds surrounding a royal hunting seat, on the site of which a palace

was built for Philip IV. in 1633; it was destroyed during the French occupation.

Education, Religion and Charity. — Madrid University developed gradually out of the college of Dona Maria de Aragon, established in 1 590 by Alphonso Orozco. Schools of mathematics and natural science were added in the 16th and 17 th centuries, and in 1786 the medical and surgical college of San Carlos was opened. In 1836-1837 the university of Alcala de Henares (q.v.) was transferred to the capital and the older foundations incorporated with it. The university of Madrid thenceforth became the headquarters of education in central Spain. It has an observatory, and a library containing more than 2,000,000 printed books and about 550° MSS. It gives instruction, chiefly in law and medicine, but also in literature, philosophy, mathe- matics and physics, to about 5000 students. Associated with the university is the preparatory school of San Isidro, founded by Philip IV. (1621-1665), and reorganized by Charles III. in

1770.

There are upwards of 100 official primary schools and a large number of private ones, among which the schools conducted by the Jesuits and the Scolapian fathers claim special mention. Madrid also has schools of agriculture, architecture, civil and mining engi- neering, the fine arts, veterinary science and music. The school of military engineering is at Guadalajara. Besides these special schools there are a .self-supporting institute for preparing girls for the higher degrees and for certificates as primary teachers, and an institute for secondary education, conducted chiefly by ecclesiastics. Among the educational institutions may be reckoned the botanical garden, dating from 1781, the libraries of the palace, the university, and San Isidro, and the museum of natural science, exceedingly rich

in the mineralogical department. The principal learned society is the royal Spanish Academy, founded in 1713 for the cultivation and improvement of the Spanish tongue. The Academy of History possesses a good library, rich in MSS. and incunabula, as well as a fine collection of coins and medals. In addition to the academies of fine arts, the exact sciences, moral and political science, medicine and surgery, and jurisprudence and legislation, all of which possess i: braries, there are also anthropological, economic and geographical societies, and a scientific and literary athenaeum. Madrid has a British cemetery opened in 1853, when the older Protestant cemetery in the Paseo de Recoletos was closed. The town also contains a British embassy chapel, a German chapel, and several Spanish Protestant chapels, attended by over 1200 native Protestants, while the Protestant schools, chiefly supported by British, German and American contributions, are

attended by more than 2500 children. The first Protestant bishop of Madrid was consecrated in 1895 by Archbishop Plunkett of Dublin. The charitable institutions were greatly improved between 1885 and 1905. The Princess Hospital was completely restored on modern methods, and can accommodate several hundred patients. The old contagious diseases hospital of San Juan de Dios was pulled down and a fine new hospital built in the suburbs beyond the Retiro Park, to hold 700 patients. The military hospital was demolished and a very good one built in the suburbs. There are in all twenty hospitals in Madrid, and a lunatic asylum on the outskirts of the capital, founded by one of the most eminent of Spanish surgeons, and admirably conducted. New buildings have been provided for the orphanages, and for the asylums for the blind, deaf and dumb, incurables and aged paupers. There are hospitals supported by the French, Italian and Belgian colonies; these are old and well-endowed foundations. Public charity gener- ally is very active. In Madrid, as in the rest of Spain, there has been an unprecedented increase in convents, monasteries and religious institutions, societies and Roman Catholic workmen's clubs and classes.

Apart from private institutions for such purposes, the state maintains in the capital a savings bank for the poorer classes, and acts as pawnbroker for their benefit. The mercantile and industrial classes are organized in gilds, which themselves collect the lump sum of taxation exacted by the exchequer and the municipality from each gremio or class of taxpayers. The working classes also have com- mercial and industrial circulos or clubs that are obeyed by the gilds with great esprit de corps, a chamber of commerce and industries, and " associations of productions " for the defence of economic interests.

Industries. — The industries of the capital have developed extraordinarily since 1890. In the town, and within the muni- cipal boundaries in the suburbs, many manufactories have been established, giving employment to more than 30,000 hands, besides the 4000 women and girls of the Tobacco Monopoly Company's factory. Among the most important factories are those which make every article in leather, especially cigar and card cases, purses and pocket-books. Next come the manu- factures of fans, umbrellas, sunshades, chemicals, varnishes, buttons, wax candles, beds, cardboard, porcelain, coarse pottery, matches, baskets, sweets and preserves, gloves, guitars, biscuits, furniture, carpets, corks, cards, carriages, jewelry, drinks of all kinds, plate and plated goods. There are also tanneries, saw and flour mills, glass and porcelain works, soap works, brickfields, paper mills, zinc, bronze, copper and iron foundries. The working classes are strongly imbued with socialistic ideas. Strikes and May Day demonstrations have often been trouble- some. Order is kept by a garrison of 1 2,500 men in the barracks of the town and cantonments around, and by a strong force of civil guards or gendarmes quartered in the

town itself. The civil and municipal authorities can employ beside the gendarmes the police, about 1400 strong, and what is called the guardias urbanos, another police force whose special duty it is to regulate the street traffic and prevent breaches of the municipal regula- tions. There is not, on the average, more crime in Madrid than in the provinces.

History. — Spanish archaeologists have frequently claimed for Madrid a very high antiquity, but the earliest authentic historical mention of the town (Majrit, Majoritum) occurs in the Arab chronicle, and does not take us farther back than to the first half of the 10th century. The place was finally taken from the Moors by Alphonso VI. (1083), and was made a hunting-seat by Henry IV., but first rose into importance when Charles V., benefiting by its keen air, made it his occasional residence. Philip II. created it his capital and " only court " (Unica corte) in 1560: It is, however, only classed as a town {villa), having

never received the title of city {ciudad). Fruitless attempts were made by Philip III. and Charles III. respectively to transfer the seat of government to Valladolid and to Seville. (See also Spain: History).

See J. Amador de los Rios, Historia de la villa y corte de Madrid (Madrid, 1 86 1- 1 864); Valverdey Alvarez, LaCapitaldeEspaha(Ma.drid, 1883) ; E. Sepiilveda, La Vida en Madrid en 1886 (Madrid, 1887) ; H. Penasco, Las Calles de Madrid (Madrid, 1889); C. Perez Pastor, Bibliografia madrilena, siglo XVI. (Madrid, 1891) ; F. X. de Palacio y Garcia, count of las Almenas, La Municipalidad de Madrid (Madrid, 1896); E. Sepiilveda, El Madrid de los recuerdos: coleccion de articulos (Madrid, 1897); P. Hauser, Madrid bajo el punto de vista medico-social (Madrid, 1902) ; L. Williams, Toledo and Madrid, their Records and Romances (London, 1903).

MADRIGAL (Ital. madrigale), the name of a form of verse, the exact nature of which has never been decided in English, and of a form of vocal music.

(1) In Verse. — The definition given in the New English Dictionary, " a short lyrical poem of amatory character," offers no distinctive formula; some madrigals are long, and many have nothing whatever to do with love. The most important English collection of madrigals, not set to music, was published by William Drummond of Hawthornden (1 585-1649) in his Poems of 1616. Perhaps the best way of ascertaining what was looked

upon in the 17th century as a madrigal is to quote' one of Drummond's: —

The beauty and the life

Of life's and beauty's fairest paragon,

O tears! O grief! hung at a feeble thread,

To which pale Atropos had set her knife ;

The soul with many a groan

Had left each outward part,

And now did take his last leave of the heart;

Nought else did want, save death, even to be dead;

When the afflicted band about her bed,

Seeing so fair him come in lips, cheeks, eyes,

Cried ah! and can death enter Paradise?

This may be taken as a type of Drummond's madrigals, of which he has left us about eighty. They are serious, brief, irregular lyrics, in which neither the amatory nor the complimentary tone is by any means obligatory. Some of these pieces contain as few as six lines, one as many as fourteen, but they average from nine to eleven. In the majority of examples the little poem opens with a line of six syllables, and no line extends beyond ten syllables. The madrigal appears to be a short canzone of the Tuscan type, but less rigidly constructed. In French the madrigal has not this Italian character. It is simply a short piece of verse, ingenious in its turn and of a gallant tendency. The idea of compliment is essential. J. F. Guichard (1730-1811) writes: —

Orgon, poete marital,

A Venus compare sa femme;

C'est pour la belle un madrigal,

C'est pour Venus une epigramme.

This quatrain emphasizes the fact that in French a madrigal is a trifling piece of erotic compliment, neatly turned but not seriously meant. The credit of inventing the old French verse- form of madrigal belongs to

Clement Marot, and one of his may be quoted in contrast to that of Drummond: — Un doux nenni avec un doux sourire

Est tant honneste, il le vous faut apprendre; Quant est de oui, si veniez a le dire,

D'avoir trop dit je voudrois vous reprendre; Non que je sois ennuye d'entreprendre D'avoir le fruit dont le dˆsir me point;

Mais je voudrois qu'en ne le laissant prendre, Vous me disiez: vous ne l'aurez point.

In English, when the word first occurred — it has not been traced farther back than 1588 (in the preface to Nicholas Yonge's Musica transalpineˆ) — it was identified with the chief form of secular vocal music in the 16th century. In 1741 John Immyns (d. 1764) founded the Madrigal Society, which met in an ale-house in Bride Lane, Fleet Street; this association still exists, and is the oldest musical society in Europe.

The word " madrigal " is frequently also used to designate a sentimental or trifling expression in a half-contemptuous sense. (E. G.)

(2) In Music. — As a definite musical art-form, the madriga! was known in the Netherlands by the middle of the 15th century; like the motet, it obviously originated in the treatment of counter- point on a canto fermo, some early examples even combining an ecclesiastical canto fermo in the tenor with secular counter- point in the other parts. Thus Josquin's Deploration de Jehan Okenheim (see Music) might equally well be called a madrigal or motet, if the word " madrigal " were used for compositions to French texts at all. But by the middle of the 16th century the Italian supremacy in music had developed the madrigal into the greatest of secular musical forms, and made it independent of the form of the words; and thus when Lasso sets Marot's madrigals to appropriately witty and tuneful music he calls the result a "chanson"; while when Palestrina composes Petrarca's Sonnets to the Virgin in memory of Laura, the result appears as a volume of Madrigali spirituali. Elegiac madrigals, whether spiritual or secular, were thus as common as any other kind; so that when the Musica transalpina brought the word " madrigal " to England it brought a precedent for the poet Drummond's melancholy type of madrigal poetry.

Italian madrigals, however, are by no means always elegiac; but the term always means a highly organized and flowing polyphonic piece, often as developed as the motet, though, in the mature classical period, distinct in style. Yet masses were often founded on the themes of madrigals, just as they were on the themes of motets (see Mass; Motet) ; and it is interesting,

in such beautiful cases as Palestrina's Missa gia fu chi m'ebbe car a, to detect the slight strain the mildly scandalous origin of the themes puts upon the ecclesiastical style.

The breaking strain was put on the madrigal style at the end of the 16th century, in one way by the new discords of Monte- verde and (with more musical invention) Schutz; and in another way by the brilliant musical character-drawing of Vecchi, whose Amfipamasso is a veritable comic opera in the form of a set of fourteen madrigals, all riotously witty in the purest and most masterly polyphonic style. It was probably meant, or at least made use of, to laugh down the earliest pioneers of opera {q.v.); but it is the beginning of the end for the madrigal as a living art. Long afterwards we occasionally meet with the word again, when a 17th or 18th century composer sets to some kind of accompanied singing a poem of madrigalesque character. But this does not indicate any continuation of the true musical history of the madrigal. The strict meaning of the word in its musical sense is, then, a musical setting of an Italian or English non-ecclesiastical poem (typically a canzone) for unaccompanied chorus, in a 16th-century style less ecclesiastical than the motet, but as like it in organization as the form and sentiment of the words admit. The greatest classics in the madrigal style are those of Italy; and but little, if at all, below them cqme the English. The form, though not the name, of course, exists in the 16th-century music of other languages whenever the poetry is not too light for it.

It is important but easy to distinguish the madrigal from the Lighter 16th-century forms, such as the Italian villanella and the English ballet, these being very homophonic and distinguished by the strong lilt of their rhythm.

The madrigal has been very successfully revived in modern English music with a more or less strict adherence to the 16th century principles; the compositions of De Pearsall being of high artistic merit, while the Madrigale spirituale in Stanford's oratorio Eden is a movement of rare beauty. (D. F. T.)

MADURA (Dutch Madoera), an island of the Dutch East Indies, separated by the shallow Strait of Madura from the N.E. coast of Java. Pop. (1897), 1,652,580, of whom 1,646,071 were natives, 4252 Chinese and 558 Europeans. It extends from about 112° 32′ to 114° 7′ E., and is divided into two nearly equal portions by the parallel of 7° S.; the area is estimated at 1725 sq. m. It is a plateau-like prolongation of the limestone range of northern Java, with hills (1300 to 1600 ft. high) and dales. The formation of the coast and plains is Tertiary and recent alluvium. Hot springs are not infrequent; and in the valley between Gunong Geger and Banjar lies the mud volcano oi

Banju Ening. The coasts are clothed with tropical vegetation; but the soil is better fitted for pastoral than agricultural purposes. Fishing and cattle-rearing are the chief means of subsistence. Besides rice and maize, Madura yields coco-nut oil and jati. The manufacture of salt, for the government, abolished in other places, continues in Madura. Hence perhaps the name is derived (Sansk. mandura, salt). Petroleum is found in small quantities.

The principal town is Sumenep; and there are populous Malay, Arab and Chinese villages between the town and the European settlement of Maringan. On a hill in the neighbourhood lies Asta, the burial-place of the Sumenep princes. Pamekasan is the seat of government. Bangkalang is a large town with the old palace of the sultan of Madura and the residences of the princes of the blood; the mosque is adorned with the first three suras of the Koran, thus differing from nearly all the mosques in Java and Madura, though resembling those of western Islam. In the vicinity once stood the Erfprins fort. Arisbaya (less correctly Arosbaya) is the place where the first mosque was built in Madura, and where the Dutch sailors first made acquaintance with the natives. The once excellent harbour is now silted up. Sampang is the seat of an important market. The Kangean and Sapudi islands, belonging to Madura, yield timber, trepang, turtle, pisang and other products.

Madura formerly consisted of three native states — Madura or Bangkalang, Pamekasan and Sumenep. The whole island was considered part of the Java residency- of Surabaya. The separate residency of Madura was constituted in 1857; it now consists of four " departments " — Pamekasan, Madura, Sumenep and Sampang.

See P. J. Veth, Java, vol. iii. ; Kielstra, " Het Eiland Madoera," : n De Gids (1890); H. van Lennep, " De Madoereezen," in De Indische Gids (1895), with detailed bibliography.

MADURA, a city and district of British India, in the Madras Presidency. The city is situated on the right bank of the river Vaigai, and has a station on the South Indian railway 345 m. S.E. of Madras. Pop. (1901), 105,984. The city was the capital of the old Pandyan dynasty, which ruled over this parˆ of India from the 5th century B.C. to the end of the nth century a.d. Its great temple forms a parallelogram about 847 ft. by 729 ft., and is surrounded by nine gopuras, of which the largest is 152 ft. high. These ornamental pyramids begin with door- posts of single stones 60 ft. in height, and rise course upon course, carved with rows of gods and

goddesses, peacocks, bulls, elephants, horses, lions, and a bewildering entanglement of sym- bolical ornament all coloured and gilded, diminishing with dis- tance until the stone trisul at the top looks like the finest jeweller's work. The temple, which contains some of the finest carving in southern India, is said to have been built in the reign of Viswanath, first ruler of the Nayak dynasty. Its chief feature is the sculptured " Hall of a Thousand Pillars." The palace of Tirumala Nayak is the most perfect relic of secular architecture in Madras. This palace, which covers a large area of ground, has been restored, and is utilized for public offices. The Vasanta, a hall 333 ft. long, probably dedicated to the god Sundareswara, and the Tamakam, a pleasure-palace, now the residence of the collector, are the other principal buildings of this period.

The last of the old Pandyan kings is said to have extermi- nated the Jains and conquered the neighbouring kingdom of Chola ; but he was in his turn overthrown by an invader from the north, conjectured to have been a Mahommedan. In 1324 a Moslem army under Malik Kafur occupied Madura, and the Hindus were held in subjection for a period of fifty years. Sub- sequently Madura became a province of the Hindu Empire of Vijayanagar. In the middle of the 16th century the governor Viswanath established the Nayak dynasty, which lasted for a century. The greatest of the line was Tirumala Nayak (reigned 1623-1659), whose military exploits are recorded in the contem- porary letters of the Jesuit missionaries. He adorned Madura with many public buildings, and extended his empire over the adjoining districts of Tinnevelly, Travancore, Coimbatore, Salem and Trichinopoly. His repudiation of the nominal allegiance paid to the raja of Vijayanagar brought him into

collision with the sultan of Bijapur, and after a lapse of three centuries Mahommedans again invaded Madura and compelled him to pay them tribute. After the death of Tirumala the king- dom of Madura gradually fell to pieces, being invaded by both Mahommedans and Mahrattas. About 1736 the district fell into the hands of the nawab of the Carnatic, and the line of the Nayaks was extinguished. About 1764 British officers took charge of Madura in trust for Mahommed Ali (Wallah Jah) , the last independent nawab of the Carnatic, whose son finally ceded his rights of sovereignty to the East India Company in 1801.

The District of Madura has an area of 8701 sq. m. Pop. (1901), 2,831,280, an increase of 8-5% in the decade. It con- sists of a section of the plain stretching from the mountains east to the sea, coinciding with the basin of the Vaigai river, and grad- ually sloping to the S.E. The plain is broken by the outlying spurs of the Ghats, and by a few isolated hills and masses of rock scattered over the country. The most important spur of the Ghats is known as the Palni hills, which project E.N.E. across the district

for a distance of about 54 m. Their highest peaks are more than 8000 ft. above sea-level, and they enclose a plateau of about 100 sq. m., with an average height of 7000 ft. On this plateau is situated the sanatorium of Kodaikanal, and coffee-planting is successfully carried on. The other principal crops of the district are millets, rice, other food-grains, oil-seeds and cotton. Tobacco is grown chiefly in the neighbourhood of Dindigul, whence it is exported to Trichinopoly, to be made into cigars. There are several cigar factories and a number of salt- petre refineries. The only other large industry is that of coffee- cleaning. Madura is traversed by the main line of the South Indian railway. It has four small seaports, whose trade is chiefly carried on with Ceylon. The most important irrigation work, known as the Periyar project, consists of a tunnel through the Travancore hills, to convey the rainfall across the watershed.

See Madura District Gazetteer (Madras, 1906).

MADVIG, JOHAN NICOLAI (1804-1886), Danish philologist, was born on the island of Bornholm, on the 7th of August 1804. He was educated at the classical school of Frederiksborg and the university of Copenhagen. In 1828 he became reader, and in 1829 professor, of Latin language and literature at Copenhagen, and in 1832 was appointed university librarian. In 1848 Madvig entered parliament as a member of what was called the " Eider-Danish " party, because they desired the Eider to be the boundary of the country. When this party came into power Madvig became minister of education. In 1852 be became direc- tor of public instruction. Some years later, from 1856 to 1863, Madvig was president of the Danish parliament and leader of the National Liberal party. With these brief interruptions the greater part of his life was devoted to the study and teaching of Latin and the improvement of the classical schools, of which he was chief inspector. As a critic he was distinguished for learn- ing and acumen. He devoted much attention to Cicero, and revolutionized the study of his philosophical writings by an edition of De Finibus (1839; 3rd ed., 1876). Perhaps his most widely known works are those on Latin grammar and Greek syntax, especially his Latin grammar for schools (Eng. trans, by G. Woods). In 1874 his sight began to fail, and he was forced to give up much of his work. He still, however, con- tinued to lecture, and in 1879 he was chosen rector for the sixth time. In 1880 he resigned his professorship, but went on with his work on the Roman constitution, which was completed and published before his death. In this book Madvig takes a strongly conservative standpoint and attacks Mommsen's views on Caesar's programme of reforms. It is a clear ex- position, though rather too dogmatic and without sufficient regard for the views of other scholars. His last work was his autobiography, Livserindringer (published 1887). Madvig died at Copenhagen on the 12th of December 1886.

See J. E. Sandys, History of Classical Scholarship (1908), iii., 3I9-324-

MAECENAS, GAIUS (Cilnitjs), Roman patron of letters, was probably born between 74 and 64 B.C., perhaps at Arretium. Expressions in Propertius (ii. 1, 25-30) seem to imply that he

had taken some part in the campaigns of Mutina, Philippi and Perusia. He prided himself on his ancient Etruscan lineage, and claimed descent from the princely house of the Cilnii, who excited the jealousy of their townsmen by their preponderating wealth and influence at Arretium in the 4th century B.C. (Livy x. 3). The Gaius Maecenas mentioned in Cicero {Pro Cluentio, 56) as an influential member of the equestrian order in 91 B.C. may have been his grandfather, or even his father. The testimony of Horace {Odes iii. 8, 5) and Maecenas's own literary tastes imply that he had profited by the highest education of his time. His great wealth may have been in part hereditary, but he owed his position and influence to his close connexion with the emperor Augustus. He first appears in history in 40 B.C., when he was employed by Octavian in arranging his marriage with Scribonia, and after- wards in assisting to negotiate the peace of Brundusium and the reconciliation with Antony. It was in 39 B.C. that Horace was introduced to Maecenas, who had before this received Varius and Virgil into his intimacy. In the " Journey to Brundusium," (Horace, Satires, i. 5) in 37, Maecenas and Cocceius Nerva are described as having been sent on an important mission, and they were successful in patching up, by the Treaty of Tarentum, a reconciliation between the two claimants for supreme power. During the Sicilian war against Sextus Pompeius in 36, Maecenas was sent back to Rome, and was entrusted with supreme administrative control in the city and in Italy. He was vice- gerent of Octavian during the campaign of Actium, when, with great promptness and secrecy, he crushed the conspiracy of the younger Lepidus; and during the subsequent absences of his chief in the provinces he again held the same position. During the latter years of his life he fell somewhat out of favour with his master. Suetonius {Augustus, 66) attributes the loss of the imperial favour to Maecenas having indiscreetly revealed to Terentia, his wife, the discovery of the conspiracy in which her Brother Murena was implicated. But according to Dio Cassius (liv. 19) it was due to the emperor's relations with Terentia. Maecenas died in 8 B.C., leaving, the emperor heir to his wealth.

Opinions were much divided in ancient times as to the personal character of Maecenas; but the testimony as to his administrative and diplomatic

ability was unanimous. He enjoyed the credit of sharing largely in the establishment of the new order of things, of reconciling parties, and of carrying the new empire safely through many dangers. To his influence especially was attributed the humaner policy of Octavian after his first alliance with Antony and Lepidus. The best summary of his character as a man and a statesman is that of Velleius Paterculus (ii. 88), who describes him as "of sleepless vigilance in critical emergencies, far-seeing and knowing how to act, but in his relaxation from business more luxurious and effeminate than a woman."

Expressions in the Odes of Horace (ii. 17. 1) seem to imply that Maecenas was deficient in the robustness of fibre characteristic of the average Roman. His character as a munificent patron of literature — which has made his name a household word — is gratefully acknowledged by the recipients of it and attested by the regrets of the men of letters of a later age, expressed by Martial and Juvenal. His patronage was exercised, not from vanity or a mere dilettante love of letters, but with a view to the higher interest of the state. He recognized in the genius of the poets of that time, not only the truest ornament of the court, but a power of reconciling men's minds to the new order of things, and of investing the actual state of affairs with an ideal glory and majesty. The change in seriousness of purpose between the Eclogues and the Georgics of Virgil was in a great measure the result of the direction given by the statesman to the poet's genius. A similar change between the earlier odes of Horace, in which he declares his epicurean indifference to affairs of state, and the great national odes of the third book is to be ascribed to the same guidance. Maecenas endeavoured also to divert the less masculine genius of Propertius from harping continually on his love to themes of public interest. But

if the motive of his patronage had been merely politic it never could have inspired the affection which it did in its recipients. The great charm of Maecenas in his relation to the men of genius who formed his circle was his simplicity, cordiality and sincerity. Although not particular in the choice of some of the associates of his pleasures, he admitted none but men of worth to his intimacy, and when once admitted they were treated like equals. Much of the wisdom of Maecenas probably lives in the Satires and Epistles of Horace. It has fallen to the lot of no other patron of literature to have his name associated with works of such lasting interest as the Georgics of Virgil, the first three books of Horace's Odes, and the first book of his Epistles.

Maecenas himself wrote in both prose and verse. The few fragments that remain show that he was less successful as an author than as a judge and patron of literature. His prose works on various subjects — Prometheus, Symposium (a banquet at which Virgil, Horace and Messalla were

present), De cultu suo (on his manner of life) — were ridiculed by Augustus, Seneca and Quintilian for their strange style, the use of rare words and awkward transpositions. According to Dio Cassius, Maecenas was the inventor of a system of shorthand.

There is no good modern biography of Maecenas. The best known is that by P. S. Frandsen (1843). See " Horace et Mecene " by J. Girard, in La Revue politique et litteraire (Dec. 27, 1873); V. Gardthausen, Augustus und seine Zeit, i. 762 seq.; ii. 432 seq. The chief ancient authorities for his life are Horace {Odes with Scholia), Dio Cassius, Tacitus {Annals), Suetonius {Augustus). The frag- ments have been collected and edited by F. Harder (1889).

MAECIANUS, LUCIUS VOLUSIUS (2nd cent.) Roman jurist, was the tutor in law of the emperor Marcus Aurelius. When governor of Alexandria he was slain by the soldiers, as having participated in the rebellion of Avidius Cassius (17 s). Maecianus was the author of works on trusts {Fideicommissa) , on the Judicia publica, and of a collection of the Rhodian laws relating to maritime affairs. His treatise on numerical divisions, weights and measures {Distributio) is extant, with the exception of the concluding portion.

See Capitolinus, Antoninus, 3; Vulcacius Gallicanus, Avidius Cassius, 7 ; edition of the metrological work by F. Hultsch in Metrolo- gicorum scriptorum reliquiae, ii. (1866) ;Mommsen inAbhandlungen der sdchsischen Gesellschaft der Wissenschaften, iii. (1853).

MAELDUIN (or Maeldune), VOYAGE OF {Imram Maeleduin), an early Irish romance. The text exists in an nth-century redaction, by a certain Aed the Fair, described as the " chief sage of Ireland," but it may be gathered from internal evidence that the tale itself dates back to the 8th century. It belongs to the group of Irish romance, the Navigations {Imrama), the common type of which was probably imitated from the classical tales of the wanderings of Jason, of Ulysses and of Aeneas. Maelduin, the foster-son of an Irish queen, learnt on reaching manhood that he was the son of a nun, and that his father, Ailill of the edge of battle, had been slain by a marauder from Leix. He set sail to seek his father's murderer, taking with him, in accordance with the instructions of a sorcerer, seventeen men. His three foster-brothers swam after him, and were taken on board. This increase of the fateful number caused Maelduin 's vengeance to be deferred for three years and seven months, until the last of the intruders had perished. The travellers visited many strange islands, and met with a long series of adventures, some of which are familiar from other sources. The Voyage of St Brendan {q.v.) has very close similarities with the Maelduin, of which it is possibly a clerical imitation, with the important addition of

the whale-island episode, which it has in common with " Sindbad the Sailor."

Imram Curaig Mailduin is preserved, in each case imperfectly, in the Lebor na h Uidre, a MS. in the Royal Irish Academy, Dublin; and in the Yellow Book of Lecan, MS. H. 216 in the Trinity College Library, Dublin; fragments are in Harleian MS. 5280 and Egerton MS. 1782 in the British Museum. There are translations by Patrick Joyce, Old Celtic Romances (1879), by Whitley Stokes (a more critical version, printed together with the text) in Revue celtique, vols. ix. and x. (1888-1889). See H. Zimmer, " Brendan's Meer-

fahrt " in Zeitschrift fur deutsches Altertum, vol. xxxiii. (1889). Tennyson's Voyage of Maeldune, suggested by the Irish romance, borrows little more than its framework.

HAELIUS, SPURIUS (d. 439 B.C.), a wealthy Roman plebeian, who during a severe famine bought up a large amount of corn and sold it at a low price to the people. Lucius (or Gaius) Minucius, the patrician ' praefectus annonae (president of the market), thereupon accused him of courting popularity with a view to making himself king. The cry was taken up. Maelius, summoned before the aged Cincinnatus (specially appointed dictator), refused to appear, and was slain by Gaius Servilius Ahala; his house was razed to the ground, his corn distributed amongst the people, and his property confiscated. The open space called Aequimaelium, on which his house had stood, preserved the memory of his death. Cicero calls Ahala's deed a glorious one, but, whether Maelius entertained any ambitious projects or not, his summary execution was an act of murder, since by the Valerio-Horatian laws the dictator was bound to allow the right of appeal.

SeeNiebuhr'siKstory of Rome, ii. 418 (Eng. trans., i8gi);G. Corne- wall Lewis, Credibility of early Roman History, ii. ; Livy, iv. 13; Cicero, De senectute 16, De amicitia 8, De republica, ii. 27; Florus, i. 26; Dion. Halic. xii. 1.

MAELSTROM (whirlpool), a term originally applied to a strong current running past the south end of the island of Moskenaes, a member of the group of Lofoten Islands on the west coast of Norway. It is known also as the Moskenstrom. Though dangerous in certain states of wind and tide, the tales of ships being swallowed in this whirlpool are fables. The word is

probably of Dutch origin, from malen, to grind or whirl, and strom or stroom, a stream or current. It appears on Mercator's Alias of 1595.

MAENADS (Gr. McuvaSts, frenzied women), the female attendants of Dionysus. They are known by other names — Bacchae, Thyiades, Clodones and Mimallones (the last two probably of Thracian origin) — all more or less synonymous.

See the exhaustive articles by A. Legrand in Daremberg and Saglio's Dictionnaire des antiquites and A. Rapp in Roscher's Lexikon der Mythologie; also editions of Euripides, Bacchae {e.g. J. E. Sandys).

MAENIUS, GAIUS, Roman statesman and general. Having completed (when consul in 338 B.C.) the subjugation of Latium, which with Campania had revolted against Rome, he was honoured by a triumph, and a column was erected to him in the Forum. When censor in 318, in order that the spectators might have more room for seeing the games that were celebrated in the Forum, he provided the buildings in the neighbourhood with balconies, which were called after him macniana.

See Festus, s.v. Maeniana; Livy viii. 13, ix. 34; Pliny, Nat. Hist. xxxiv. n (5).

MAERLANT, JACOB VAN (c. 1235-c 1300), Flemish poet, was born in the Franc de Burges (tradition says at Damme) between 1230 and 1240. He was sacristan of Maerlant, in the island of Ost-Voorne, and afterwards clerk to the magistrates at Damme. His early works are translations of French romances. Maerlant's most serious work in the field of romance was his Ystorien van Troyen (c. 1264), a poem of some forty thousand lines, translated and amplified from the Roman de Troie of Benoit de Sainte-More. From this time Maerlant rejected romance as idle, and devoted himself to writing scientific and historical works for the education and , enlightenment of the Flemish people. His Heimelicheit der Heimelicheden (c. 1266) is a translation of the Secreta secretorum, a manual for the education of princes, ascribed throughout the middle ages to Aristotle. Van der Naturen Bloeme is a free translation of De natura rerum, a natural history in twenty books by a native of Brabant, Thomas de Cantimpre; and his Rijmbijbel is taken, with many omissions and additions, from the Historia scholastica of Petrus Comestor. He supplemented this metrical paraphrase of Scripture history by Die Wrake van Jherusalem (1271) from Josephus. Although Maerlant was an orthodox Catholic, he is said to have been called to account by the priests for translating the Bible into the vulgar tongue. In 1284 he began his magnum opus, the Spiegel historiael, a history of the world, derived chiefly from the third part of the Speculum majus of Vincent de

Beauvais. This work was completed by two other writers, Philipp Utenbroeke and Lodowijk van Velthem. Maerlant died in the closing years of the 13th century, his last poem, Van den lande van oversee, dating from 1291. The greater part of his work consists of translations, but he also produced poems which prove him to have had real original poetic faculty. Among these are Die Clausule van der Bible, Der Kerken Clage, imitated from the Complaintes of Rutebeuf, and the three dialogues entitled Martijn, in which the fundamental questions of theology and ethics were discussed. In spite of his orthodoxy, Maerlant was a keen satirist of the corruptions of the clergy. He was one of the most learned men of his age, and for two centuries was the most celebrated of Flemish poets.

See monographs by J. van Beers (Ghent, i860); C. A. Serrure (Ghent, 1861); K. Versnaeyen (Ghent, 1861); J. te Winkel (Leiden, 1877, 2nd ed., Ghent, 1892); and editions of Torec (Leiden, 1875) by J. te Winkel; of Naturen Bloeme, by Eelco Verwijs; of Alexanders Geesten (Groningen, 1882), by J.Franck; Merlijn (Leiden, 1880-1882), by J. van Bloten; Heimelicheit der Heimelicheden (Dordrecht, 1838), by Clarisse; Der Naturen Bloeme (Groningen, 1878), by Verwijs; of Rijmbijbel (Brussels, 1858-1869), by David; Spiegel historiael (Leiden 1857-1863), by Verwijs and de Vries; selections from the Ystorien van Troyen (1873), by J. Verdam.

MAES, NICOLAS (1632-1693), Dutch painter, was born at Dordrecht, and went about 1650 to Amsterdam, where he entered Rembrandt's studio. Before his return to Dordrecht in 1654 Maes painted a few Rembrandtesque genre pictures, with life-size figures and in a deep glowing scheme of colour, like the " Reverie " at the Ryks Museum in Amsterdam, the " Card Players " at the National Gallery, and the " Children with a Goat Carriage," belonging to Baroness N. de Rothschild. So closely did his early style resemble that of Rembrandt, that the last-named picture, and other canvases in the Leipzig and Budapest galleries and in the collection of Lord Radnor, were or are still ascribed to Rembrandt. In his best period, from 1655 to 1665, Maes devoted himself to domestic genre on a smaller scale, retaining to a great extent the magic of colour he had learnt from Rembrandt. Only on rare occasions did he treat scriptural subjects, as in the earl of Denbigh's " Hagar's Departure," which has been ascribed to Rembrandt. His favourite subjects were women spinning, or reading the Bible, or preparing a meal. In 1665 he went to Antwerp, where he remained till 1678, in which year he probably returned to Amsterdam. His Antwerp period coincides with a complete change in style and subject. He devoted himself almost exclusively to portraiture, and abandoned the intimacy and glowing colour harmonies of his earlier work for a careless elegance which suggests the influence of Van Dyck. So great indeed was the change, that it gave rise to the theory of the existence of another Maes, of

Brussels. Maes is well represented at the National Gallery by five paintings: " The Cradle," " The Dutch Housewife," " The Idle Servant," " The Card Players," and a man's portrait. At Amsterdam, besides the splendid examples to be found at the Ryks Museum, is the " Inquisitive Servant " of the Six collection. At Buckingham Palace is " The Listening Girl " (repetitions exist), and at Apsley House " Selling Milk " and " The Listener." Other notable examples are at the Berlin, Brussels, St Petersburg, the Hague, Frankfort, Hanover and Munich galleries.

MAESTRO, a north-westerly wind observed in the Adriatic and surrounding regions, chiefly during summer. The maestro is a " fine weather " wind, and is the counterpart of the sirocco.

MAETERLINCK, MAURICE (1862-), Belgian-French dramatist and poet, of Flemish extraction, was born at Ghent on the 29th of August 1862. He was educated at the College Sainte-Barbe, and then at the university of his native city, where, at the age of twenty-four, he was enrolled as a barrister. In 1887 he settled in Paris, where he immediately became acquainted with Villiers de ITsle-Adam and the leaders of the symbolist school of French poetry. At the death of his father, Maeterlinck returned to Belgium, where he thenceforth mainly resided: in the winter at Ghent, in the summer on an

estate at Oostacker. He had by this time determined to devote his whole life to poetry, a dedication which his fortune permitted. His career as an author began in 1889, when he published a volume of verse, Serves chaudes, and a play, La Princesse Maleine, the latter originally composed in metre, but afterwards carefully rewritten in prose, the vehicle which the author continued to use for his dramatic work. Maeterlinck was at this time totally unknown, but he became famous through an article by Octave Mirbeau, prominently published in the Paris Figaro, entitled " A Belgian Shakespeare." The enthusiasm of this review and the excellence of the passages quoted combined to make Maeterlinck the talk of the town. Maeterlinck, among his Belgian roses, continued to work with extreme deliberation. In 1890 he published, in Brussels, two more plays, L'Intruse and Les Aveugles; followed in 1891 by Les Sept princesses. His strong leaning to mysticism was now explained, or defined, by a trans- lation of the Flemish, medieval visionary, the Admirable Ruysbroeck, which Maeterlinck brought out in 1891. In 1892 appeared what has been perhaps the most successful of all his plays on the stage, Pelleas et Melisande, followed in 1894 by those very curious and powerful little dramas written to be performed by marionettes: Alladine et Palomides, Interieur and La

Mori de Tinlagiles. In 1895 Maeterlinck brought out, under the title of Annabella, a translation of Ford's 'Tis Pity She's a Whore, with a preface. Two philosophical works followed, a study on Novalis (1895) and Le Tresor des humbles (1896). In 1896 he returned to drama with Aglavaine et Sely^ette and to lyric verse with Dome chansons. A monograph on the ethics of mysticism, entitled La Sagesse et la deslinie, was issued, as a kind of commentary on his own dramas, in 1898; and in 1901 Maeterlinck produced a fascinating volume of prose, founded upon observations made in his apiaries at Oostacker, in which philosophy, fancy and natural history were surprisingly mingled — La Vie des abeilles. In 1902 he published Le Temple enscvcli and Monna Vanna; in 1903 Joyzelle. In 1901 he began to issue, in Brussels, an edition of his complete dramatic works.

The nature of Maeterlinck's writings, whether in prose or verse, has been strictly homogeneous. Few poets have kept so rigorously to a certain defined direction in the practice of their art. Whether in philosophy, or drama, or lyric, Maeterlinck is exclusively occupied in revealing, or indicating, the mystery which lies, only just out of sight, beneath the surface of ordinary life. In order to produce this effect of the mysterious he 'aims at an extreme simplicity of diction, and a symbolism so realistic as to be almost bare. He allows life itself to astonish us by its strangeness, by its inexplicable elements. Many of his plays are really highly pathetic records of unseen emotion; they are occupied with the spiritual adventures of souls, and the ordinary facts of time and space have no influence upon the movements of the characters. We know not who these orphan princesses, these blind persons, these pale Arthurian knights, these aged guardians of desolate castles, may be; we are not informed whence they come, nor whither they go; there is nothing concrete or circumstantial about them. Their life is intense and consis- tent, but it is wholly of a spiritual character; they are mysterious with the mystery of the movements of a soul. These character- istics, which make the dramatic work of Maeterlinck so curious and unique, are familiar to most readers in Pelleas et Melisande, but are carried, perhaps, to their farthest intensity in Aglavaine et Selysette, which seems to be written for a phantom stage and to be acted by disembodied spirits. In spite of the violence of his early admirers, and of the fact that the form of his dramas easily lent itself to the cheap ridicule of parodists, the talent of Maeterlinck has hardly met with opposition from the criticism of his time. It has been universally felt that his spirit is one of grave and disinterested attachment to the highest moral beauty, and his seriousness, his serenity and his extreme originality have impressed even those who are bewildered by his diaphanous graces and offended at his nebulous mysticism. While the crude enthusiasm which compared him with Shakespeare has been shown to be ridiculous, the best judges combine with Camille

Mauclair when he says: " Maurice Maeterlinck est un homme de gebie authentique, un tres grand phenomene de puissance mentale a, la fin du xix e siecle." In spite of the shadowy action of Maeterlinck's plays, which indeed require some special conditions and contrivances for their performance, they are frequently produced with remarkable success before audiences who cannot be suspected of mysticism, in most of the countries of Europe. In his philosophical writings Maeterlinck shows himself a disciple of Novalis, of Emerson, of Hello, of the Flemish Catholic mystics, and he evolves from the teachings of those thinkers a system of aesthetics applicable to the theatre as he conceives it. (E. G.)

MAFEKING, a town in the British Bechuanaland division of the Cape, 870 m. N.E. of Cape Town and 492 m. S.S.W. of Bulawayo by rail, and 162 m. in a direct line W. by N. of Johannesburg. (Pop. 1904), 2713. It is built on the open veld, at an elevation of 4194 ft., by the banks of the Upper Molopo, is 9 m. W. of the western frontier of the Transvaal and 15 m. S. of the southern boundary of the Bechuanaland protectorate. The Madibi goldfields are some 10 m. south of the town. Mafeking is thus an important trading and distributing centre for Bechuanaland and the western Transvaal. Here are, too, the chief railway workshops between Kimberley and Bulawayo. The headquarters of the administration for the Bechuanaland protectorate are in the town. The chief build- ings are the town-hall, Anglican church, Masonic temple, and hospital.

Mafeking was originally the headquarters of the Barolong tribe of Bechuana and is still their largest station, the native location (pop. 2860) being about a mile distant from the town. It was from Pitsani Pothiugo (or Potlogo), 24 m. north of Mafe- king, that Dr Jameson started, on the 29th of December 1895, on his raid, into the Transvaal. On the outbreak of the Anglo-Boer war in 1899 Mafeking was invested by a Boer force. Colonel R. S. S. Baden-Powell was in command of the defence, which was stubbornly maintained for 217 days (Oct. 12 to May 17), when a relief column arrived and the Boers dispersed (see Transvaal: History). The fate of the town had excited the liveliest sympathy in England, and the exuberant rejoicings in London on the news of its relief led to the coining of the word mafficking to describe the behaviour of crowds on occasions of extravagant demonstrations of a national kind. In Sep- tember 1904 Lord Roberts unveiled at Mafeking an obelisk bearing the names of those who fell in defence of the town.

R.. S. S. Baden- Powell's Sketches in Mafeking and East Africa (1907) and Lady Sarah Wilson's South African Memories (1909) deal largely with the siege of Mafeking.

MAFFEI, FRANCESCO SCIPIONE, Marchese di (1675- J 755) > Italian

archaeologist and man of letters, was born at Verona on the 1st of June 1675. He studied for five years in Parma, at the Jesuit College, and afterwards from 1698 at Rome; and in 1 703-1 704 he took part as a volunteer in the war of succession, fighting on the Bavarian side at Donauwerth In 1709 he began at Padua along with Apostolo Zeno and Valisnieri the Giornale dei letterati d'ltalia, a literary periodical which had but a short career; and subsequently an acquaintance with the actor Riccoboni led him to exert himself for the improvement of dramatic art in Italy. His Merope, a tragedy, appeared in 1 7 13; Teatro italiano, a small collection of works for presentation on the stage, in 1723-1725; and Le Ceremonie, an original comedy, in 1728. From 1718 he became specially interested in the archaeology of his native town, and his investigations resulted in. the valuable Verona illustrala (1731-1732). Maffei afterwards devoted four years to travel in France, England, Holland and Germany. He died at Verona on the nth of February 1755.

A complete edition of his works appeared at Venice (28 vols., 8vo) in 1790.

MAFIA (Maffia), a secret society of Sicily. Its organization and purposes much resemble those of the Camorra (q.v.).

Various derivations are found for the name. Some hold it to be I a Tuscan synonym for miseria; others, a corruption of Fr. mauvais

3°o

MAFRA— MAGAZINE

(bad). Others connect it with the name of an alleged Arab tribe, Ma-afir, once settled at Palermo. Giuseppe Pitre asserts that the word is peculiar to western Sicily and that, with its derivatives, it formerly meant, in II Borgo, a district of Palermo, beauty or excel- lence. Thus, a handsome woman showily dressed was said " to have mafia," or to be mafiusa. Often in Palermo the street merchants call arance-mafiuse (fine oranges). Thus, Pitr6 argues, mafia, applied to a man to express manly carriage and bravery, would naturally become the title of a society the members of which were all " bravos." A less credible explanation of the term is connected with Mazzini, who is said to have formed a secret society the mem- bers of which were called Mafiusi, from Mafia, a word composed of the initial letters of five Italian words, Mazzini autorizzafurti, incendi, avoelenamenti, " Mazzini authorizes theft, arson and poisoning." This theory suggests that the word was unknown before 1859 or i860.

The Mafia, however named, existed long before Mazzini's day. In its

crudest form it was co-operative brigandage, blended with the Vendetta (q.v.). The more strictly organized Mafia was the result of the disorders consequent upon the expulsion of the king of Naples by Napoleon. When the Bourbon court took refuge in Sicily there were a large number of armed retainers in the service of the Sicilian feudal nobility. Ferdinand IV., at the bidding of England, granted a constitution to the island in 181 2, and with the destruction of feudalism most of the feudal troops became brigands. Powerless to suppress them, Ferdinand organized the bandits into a rural gendarmerie, and they soon established a reign of terror. The abject poverty of the poorer classes, unable to eke out existence by work in the sulphur mines or on the fields, fostered the growth of two classes of mafiusi — the vast majority of the inhabitants who were glad to put themselves as passive members under the protection of the Mafia, while the active members shared in the plunder. The Mafia thus became a loosely organized society under an unwritten code of laws or ethics known as Omerla, i.e., manliness (from Sicil. omu, Ital. uomo, a man), which embodied the rules of the Vendetta. Candidates were admitted after trial by duel, and were sworn to resist law and defeat justice. Like the Camorra, the Mafia was soon powerful in all classes, and even the commander of the royal troops acted in collusion with it. The real home of Mafia was in and around Palermo, where no traveller was safe from robbery and the knife. In an organized form the Mafia survives only in isolated districts. Generally speaking, it is to-day not a compact criminal association but a complex social phenomenon, the consequence of centuries of misgovernment. The Mafiuso is governed by a sentiment akin to arrogance which imposes a special line of conduct upon him. He considers it dishonourable to have recourse to lawful authority to obtain redress for a wrong or a crime committed against him. He therefore hides' the identity of the offender from the police, reserving vengeance to himself or to his friends and dependants. This sentiment, still widely diffused among the lower classes of many districts, and not entirely unknown to the upper classes, renders difficult legal proof of culpability for acts of violence, and multiplies sanguinary private reprisals. In September 1892 about 150 Mafiusi were arrested at Catania, but all repressive measures proved useless. The only result was to drive some of the members abroad, with disastrous results to other countries. In October 1890 David Hennessy, chief of police in New Orleans, was murdered. Subsequent legal inquiry proved the crime to be the work of the Mafia, which had been introduced into the United States thirty years before. In May 1890 a band of Italians living in New Orleans had ambushed another gang of their fellow-countrymen belonging to a society called Stoppaghera. The severe police measures taken brought the vengeance of the society upon Hennessy. Eleven Italians were indicted on suspicion of being implicated in his murder; but the jury was terrorized and acquitted six. On the 14th of March 1891 a mob led by well-known New

Orleans citizens broke into the gaol where nineteen Italians were imprisoned and lynched eleven of them.

See W. Agnew Paton, Picturesque Sicily (1898) ; C. W. Heckethorn, Secret Societies of all Ages (1897); Alongi, La Maffia (Turin, 1887); Le Faure, La Maffia (Paris, 1892).

MAFRA, a town of Portugal, in the district of Lisbon (formerly in the province of Estremadura) ; near the Atlantic coast and the right bank of the river Lizandro, and 20 m. N.W. of Lisbon. Pop. (1900), 4769. Mafra is remarkable for its monastery, church, and palace, built by John V. in 1717-1732, in conse- quence of a vow made during a dangerous illness to build a convent for the poorest friary of the kingdom — which proved to be a small Franciscan settlement here. The architects, Johann Friedrich Ludwig of Regensburg, and his son Johann Peter, took the Escurial for their model; but the imitation is less successful than the original, though the cost exceeded £4,000,000. The building is in the form of a parallelogram measuring upwards of 800 ft. from north to south and 700 ft. from east to west; it is said to contain 866 rooms, and to be lighted by no fewer than 5200 windows. The centre is occupied by the church, sumptuously built of marble, and richly adorned with statues and other objects of art. In each of the twin towers there is a chime of 57 bells. Part of the palace, originally designed as barracks, is used as a military academy. Adjoining the palace are fine gardens and a royal model farm.

MAGADHA, an ancient kingdom of India, mentioned in both the 'Ramayana and the Mahdbharala. It comprised that portion of Behar lying S. of the Ganges, with its capital at Pataliputra or Patna. As the scene of many incidents in the life of Gautama Buddha, it was a holy land. It was also the seat of the Maurya Empire, founded by Chandragupta, which extended over all India under Asoka; and, later, of the powerful Gupta dynasty.

MAGALDAN, a town in the northern part of the province of Pangasinan, Luzon, Philippine Islands, about 2 m. from the shore of the Gulf of Lingayen. Pop. (1903), 15,841. In 1903 the adjacent municipality of Mapandan (pop. in 1903, 4198) was annexed to Magaldan. Most of its inhabitants are engaged in rice culture. The principal language is Pangasinan; Ilocano is also spoken.

MAGALLANES (Spanish form of Magellan), a territory of southern Chile extending from 47 S. to Cape Horn and including the mainland from the Argentine frontier to the Pacific coast, the islands extending along that coast, the Fuegian archipelago, and the western half of Tierra del Fuego. Area, about 71,127 sq. m.; pop. (1895), 5170. It is one of the most

inhospitable regions of the world, being exposed to cold westerly storms for most of the year. The islands are barren, but the mainland is covered with forests, practically inaccessible to exploitation because of the inclement climate and the wet spongy soil. The coast is indented with bays and fjords and affords remarkable scenery. There is little animal life on land, but the coast is frequented by the seal and sea-otter and the sheltered waters by count- less sea-fowl. The only permanent settlements are at Punta Arenas, the capital, on the Straits of Magellan, Palomares on Otway Water, Mina Marta on Skyring Water, and Ultima Esperanza (Last Hope) on the east shore of Worsley Sound. All are east of the Andean ranges and partially sheltered from the westerly storms. In this sheltered region there are open plains where sheep are grazed. A few sheep ranges have been established on Tierra del Fuego. Some nomadic tribes of Indians inhabit Tierra del Fuego and the extreme southern end of the mainland, but their numbers are small. Coal has been found in the vicinity of Punta Arenas, and gold occurs.

See The Voyage of the Adventure and Beagle (1839).

MAGAZINE, primarily a warehouse for goods or merchandise (Arab, makhzan, a storehouse, from khazana, to store up). In Morocco makhzan (or maghzen) has come to be used as the name of the government. The Spaniards adopted the Arabic in the form magacen, and the English form comes through the older French magazin, modern magasin. The meaning of a storehouse or large shop, common in French, is rare in English except in the military use of the term for a building for the storage of explosives and ammunition. It is applied to the chamber of a repeating rifle or machine-gun containing the supply of cartridges. The name as applied to a periodical publication

containing articles on various subjects was first used in the Gentleman's Magazine (1731), described as " a monthly collec- tion, to treasure up as in a magazine " articles on the subjects with which it was proposed to deal.

MAGDALA (more correctly Makdala), a natural stronghold in the country of the Wollo Gallas, Abyssinia, about 250 m. W. of Jibuti on the Gulf of Aden, in n° 22′ N., 39 25′ E. The basaltic plateau of which it consists rises 91 10 ft. above the sea. It is about three-quarters of a mile in length by less than half a mile in breadth, and lies more than a thousand feet higher than the neighbouring plain of Arogie. Chosen about i860 by the emperor Theodore of Abyssinia as his principal stronghold in the south, Magdala

owes its celebrity to the fact that, as the place of imprisonment of the English captives, it became the goal of the great English Expedition of 1868. At the time of its capture it contained huts for a population of about three thousand. The whole rock was burned bare by order of the commander of the British force, Sir Robert Napier, who, on being raised to the peerage for his services on this occasion, eook the title of Lord Napier of Magdala. The plateau was subsequently refortified by the Abyssinians.

See Clements Markham, History of the Abyssinian Expedition (1869); and H. Rassam, British Mission to Theodore (1869).

MAGDEBURG, a city of Germany, capital of the Prussian province of Saxony, a fortress of the first rank and one of the principal commercial towns of the German Empire. It lies in a broad and fertile plain, mainly on the left bank of the Elbe, 88 m. S.W. from Berlin and at the junction of main lines to Leipzig, Brunswick, Casseland Hamburg. Pop. (1885), 159,520; (1890), 202,234; (1905), 240,661. It consists of the town proper, and of the five suburbs of Friedrichstadt, Wilhelmstadt, Neu- stadt, Sudenburg and Buckau; the last four are separated from the town by the ramparts and glacis, but are all included within the new line of advanced bastions, while Friedrichstadt lies on the right bank of the river. In the Elbe, between the old town and the Friedrichstadt, lies an island whereon stands the citadel; this is united with both banks by bridges. With the exception of the Breite Weg, a handsome thoroughfare running from north to south, the streets of the town proper are narrow and crooked. Along the Elbe, however, extend fine promenades, the Fiirstenwall and the Fiirsten Ufer. To the south of the inner town is the Friedrich Wilhelms Garten, a beautiful park laid out on the site of the celebrated convent of Berge, which was founded in 968 and suppressed in 1809. By far the most important building in Magdeburg is the cathedral, dedicated to SS Maurice and Catherine, a handsome and massive structure of the 14th century, exhibiting an interesting blending of Romanesque and Gothic architecture. The two fine western towers were completed about 1520. The interior contains the tombs of the emperor Otto the Great and his wife Edith, an English princess, and the fine monument of Archbishop Ernest (d. 1513), executed in 1495 by Peter Vischer of Nuremberg. The Liebfrauenkirche, the oldest church in Magdeburg, is an interesting Romanesque edifice of the 12th and 13th centuries, which was restored in 1890-1891. The chief secular buildings are the town-hall (Rathaus), built in 1691 and enlarged in 1866, the government offices, the palace of justice, the central railway station and the exchange. The Breite Weg and the old market contain numerous fine gable-ended private houses in the style of the Renaissance. In front of the town-hall stands an eques- trian statue of Otto the Great, erected about 1290. The modern streets are spacious, and the houses well-built though monoto- nous. There are two theatres, an agricultural college,

an art school, several gymnasia, a commercial and other schools, an observatory, and two fine hospitals. The first place amongst the industries is taken by the ironworks (one being a branch of the Krupp firm, the Grusonwerke, employing about 4000 hands), which produce naval armour and munitions of war. Of almost equal importance are the sugar refineries and chicory factories. Then come establishments for making tobacco, gloves, chocolate, artificial manure, cement, varnish, chemicals and pottery. There are also distilleries and breweries, and factories for the

manufacture of cotton and silk goods. Magdeburg is the central market in Germany for sugar and chicory, but trades extensively also in cereals, fruit, vegetables, groceries, cattle, horses, wool, cloth, yarn, leather, coal and books. A new winter harbour, made at a cost of £400,000, facilitates the river traffic along the Elbe. Three million tons of merchandise pass Magdeburg, going upstream, and nearly 1 million tons, going downstream, annually. Magdeburg is the headquarters of the IV. corps of the German army and the seat of the provincial court of appeal and admini- strative offices, and of a Lutheran consistory.

History. — Magdeburg, which was in existence as a small trading settlement at the beginning of the 9th century, owes its early prosperity chiefly to the emperor Otto the Great, who established a convent here about 937. In 968 it became the seat of an archbishop, who exercised sway over an extensive territory. Although it was burnt down in 1188, Magdeburg became a flourishing commercial town during the 13th century, and was soon an important member of the Hanseatic League. Its bench of jurats {Schoppenstuhl) became celebrated, and " Magdeburg law " (Magdeburger Recht), securing the adminis- trative independence of municipalities, was adopted in many parts of Germany, Poland and Bohemia. During the middle ages the citizens were almost constantly at variance with the archbishops, and by the end of the 15th century had become nearly independent of them. It should, however, be noted that Magdeburg never became a free city of the Empire. The town embraced the Reformation in 1524, and was thenceforth governed by Protestant titular archbishops (see Bishop). On the refusal of the citizens to accept the " Interim," issued by the emperor Charles V., Magdeburg was besieged by Maurice of Saxony in 1550, and capitulated on favourable terms in November 1551. During the Thirty Years' War it was twice besieged, and suffered terribly. It successfully resisted Wallenstein for seven months in 1629, but was stormed and sacked by Tilly in May 1631. The whole town, with the exception of the cathedral, and about 140 houses, was burned to the ground, and the greater part of its 36,000 inhabitants were butchered without regard to age or sex, but it recovered from this deadly blow with wonderful rapidity. By the peace of Westphalia (1648) the archbishopric was converted into a secular duchy, to fall to Brandenburg on the death of

the last administrator, which happened in 1680. In 1806 Magdeburg was taken by the French and annexed to the kingdom of Westphalia, but it was restored to Prussia in 1814, on the downfall of Napoleon. Otto von Guericke (1602-1686), 'the inventor of the air-pump, was burgomaster of Magdeburg. Count Lazare Carnot died here in exile, and was buried in the cemetery, but his remains were exhumed in 1889 and conveyed to Paris. Luther was at school here, and sang in the streets for bread with other poor choristers.

See W. Kawerau, Aus Magdeburgs Vergangenheit (Halle, 1886) O. von Guericke, Geschichte der Belagerung, Eroberung und Zer- storung von Magdeburg (Magdeburg, 1887) ; M. Dittmar, Beitrage zur Geschichie der Stadt Magdeburg (Halle, 1885); F. W. Hoffmann, Geschichte der Stadt Magdeburg (Magdeburg, 1 885-1 886); F. Hulsse, Die Einfilhrung der Reformation in der Stadt Magdeburg (Magdeburg, 1883); R. Volkholz, Die Zerstorung Magdeburgs 1631 (Magdeburg, 1892); W. Leinung and R. Stumvoll, Aus Magdeburgs Sage und Geschichte (Magdeburg, 1894) ; and the Urkundenbuch der Stadt Magdeburg (1892).

The Archbishopric of Magdeburg was carved out of the bishopric of Halberstadt when it was founded in 968, and its history is largely bound up with that of the city and of the prelates who have ruled the see. The first archbishop was Adalbert, and he and his successors had six or seven suffragan bishops. Several of the archbishops took very prominent parts in German politics. Early in the 15th century their residence was fixed at Halle, and about the same time it became the custom to select them from one of the reigning families of Germany, most often from the house of Brandenburg. The doctrines of the reformers made their appearance in the diocese early in the 16th century, and soon Archbishop Sigismund, a son of Joachim II., elector of Brandenburg, openly avowed his adherence to Lutheranism. After the issue of the edict of

restitution by the emperor Ferdinand II. in 1629, there were three rival candidates for the see, and their struggles added to the confusion caused by the Thirty Years' War. By the peace of Prague, however, in 1635, the archbishopric was given to Augustus, prince of Saxe-Weissenfels, who retained it until his death in 1680. In 1773 the area of the see was over 2000 sq. m. It included 29 towns and over 400 villages and contained about 250,000 inhabitants.

See the Regesta archiepiscopatus magdeburgensis, ■ edited by G. A. von

Mulverstedt (Magdeburg, 1876-1899) ; and K. Uhlirz, Geschichte des Erzbistums Magdeburg unter den Kaisern aus sdchsischem Hause (Magdeburg, 1887).

Distinct both from the archbishopric and from the city was the Burgraviate of Magdeburg. The office of burgraye dates from the time of Charlemagne, although its holder was not at first called by this name, and it soon became one of great impor- tance. The burgrave was the king's representative; he was charged with the administration of the royal estates in a given district, and in general with watching the royal interests therein. The burgraviate of Magdeburg was held by several country families in turn until 1269, when it was purchased by Archbishop Conrad II., who, however, soon sold it. In 1294 it was again united with the archbishopric and the prelates retained it until 1538; then in 1579 Augustus, elector of Saxony, made an arrange- ment which again gave the office to the archbishops, who held it until the secularization of the see.

The Magdeburg Centuries (Magdeburger Zenturien) is the name given to the first general history of the Christian Church written from a Protestant point of view. It was compiled in Magdeburg, and the history is divided into periods of one hundred years each. It was written in Latin in 1562, its principal author being the reformer Matthias Flacius, who was assisted by other Lutheran theologians. The cost of the undertaking was borne by' some of the German Protestant princes. As the Historic ecclesiae Christi it was first published at Basel in seven volumes (1559-1574)- It deals with the history of the Church down to 1400, and considering the time at which it was written it is a remarkable monument to the scholarship of its authors. The earlier part of it has been translated into German (Jena,

1560-1565).

See E. Schaumkell, Beitrag zur Entstehungsgeschichte der Magde- burger Zenturien (Ludwigslust, 1898).

MAGEE, WILLIAM (1766-1831), archbishop of Dublin, was born at Enniskillen, Co. Fermanagh, and educated at Trinity College, Dublin, where he was elected fellow in 1788. He was ordained in 1790. Two sermons, preached in the college chapel in 1798 and 1799, form the basis of his Discourses on the Scrip- tural Doctrines of Atonement and Sacrifice (1801), a polemic against Unitarian theology which was answered by Lant Car- penter. Magee was appointed professor of mathematics and senior fellow of Trinity in 1800, but in 181 2 he resigned, and undertook the charge of the livings of Cappagh, Co. Tyrone, and Killeleagh, Co. Down. Next year he became dean of Cork. He was well known as a preacher and promoter of the Irish refor- mation, and in 1819 he was consecrated bishop

of Raphoe. In 1822 the archbishop of Dublin was translated to Armagh, and Magee succeeded him at Dublin. Though in most respects a tolerant man, he steadily opposed the movement for Catholic Emancipation. He died on the 18th of August' 1831.

A memoir of his life is included with the Works of the Most Reverend William Magee, D.D. (1842), by. A. H. Kenney.

MAGEE, WILLIAM CONNOR (1821-1891), Anglican divine, archbishop of York, was born at Cork in 1821. His father was curate of the parish attached to the Protestant cathedral in that city; his grandfather was archbishop of Dublin. Young Magee entered Trinity College, Dublin, with a scholarship at thirteen. He was ordained to the curacy of St Thomas's, Dublin, but, being threatened with consumption, went after two years to Malaga. On his return he took a curacy at Bath, and was speedily appointed to the Octagon Chapel, where his fame both as preacher and platform speaker continued to spread. Some years afterwards he was made prebendary of Wells Cathedral. In i860 the delicate state of his health

caused him to accept the living of Enniskillen. In 1864 he was made dean of Cork and chaplain 10 the lord lieutenant. Here he manifested those great gifts which ultimately raised him to high office; a powerful grasp of mental, moral and political problems, combined with eloquence of a high order, and illuminated with brilliant flashes of wit. In 1868 the question of the disestablishment of the Irish Church came to the front, and Magee threw himself into the task of its defence with his usual energy and vivacity. The success of his orations caused Disraeli to offer him the bishopric of Peterborough. He justified his appointment by his magnificent speech when the Disestablishment Bill reached the House of Lords in 1869, and then plunged into diocesan and general work in England. He preached three remarkable sermons on Christian Evidence in Norwich Cathedral in 1871. He took up the temperance question, and declared in the House of Lords that he would rather see " England free than England compulsorily sober," an utterance which the extreme advocates of total abstinence misquoted and attacked. He was also a supporter of the movement for abolishing the recitation of the Athanasian Creed in the public services of the Church of England, believing, as he said, that the " presence " of the damnatory clauses, " as they stand and where they stand, is a real peril to the Church and to Christianity itself," and that those clauses " are no essential part " of the ■ creed. The project was laid aside in consequence of the hostility of a large body of the clergy, reinforced by the threat of Dr Pusey and Canon Liddon to abandon their offices if it were carried. Magee took a prominent part in the Ritual controversy, opposing what he conceived to be romanizing excess in ritual, as well as the endeavour of the opposite party to " put down Ritualism," as Disraeli expressed it, by the

operation of the civil law. His incisive way of putting things earned for him the title of the "Militant Bishop," but, as he himself remarked in. relation to this title; his efforts were ever for peace. Unfortunately for the Church, he was not elevated to the see of York until his energies were exhausted. He died on the 5th of May 1891, about four months after his appointment. Magee's manifold activities, his capability as an administrator, his sound judgment, and his remarkable insight into the ecclesiastical problems of his time, rank him among the most distinguished of English prelates. See Life and Letters, by Canon MacDonnell (2 vols. 1896),

MAGELLAN, FERDINAND (in Sp. Fernando Magallanes, in Port. Fernao de Magalhaes) (c. 1480-1521), the first circumnavigator of the globe, was born at Sabrosa in the Villa Real district of the Traz-os-Montes province of Portugal. He was a son of Pedro de Magalhaes, and belonged to the fourth order of Portuguese nobility (fidalgos de cota de armas) . He was brought up as one of the pages of Queen Leonor, consort of King John (Joao) II " the Perfect." In 1495 he entered the service of Manuel " the Fortunate," John's successor, and in 1 504 enlisted as a volunteer for the Indian voyage of the first Portuguese viceroy in the East, Francisco d'Almeida. He sailed on the 25th of March 1505; was wounded at Cannanore on the 16th of March 1506; was then sent with Nuno Vaz Pereira to Sofala to build a Portuguese fortress at that place; returned to India early in 1508; and was again wounded at the battle of Diu on the 3rd of February 1509. At Cochin (Aug. 19, 1509) he joined Diogo Lopes de Sequeira on his famous voyage intended for the Spice Islands, when the Portuguese almost fell victims to Malay treachery at Malacca. In this crisis he fought bravely and skilfully (though it is not true, as often asserted, that he discovered the Malay plot); and before tke 10th of October 15 10 he had been rewarded for his many services with the rank of captain. He again distinguished himself at the taking of Malacca by Albuquerque (July-Aug., 1511), and was then sent on by the viceroy with Antonio d'Abreu to explore the Spice Islands (Moluccas). Leaving Malacca at the end of December 1511, this squadron sailed along the north of Java, passed between Java and Madura, left Celebes on their left, coasted by the Gunong Api volcano, touched at Bura, and so reached Amboyna and Banda. At the last-named they found

such abundance of spices that they came straight back to Malacca without visiting Ternate, as had been intended.

Magellan returned to Portugal in 151 2. On the 14th of July of that year

he was raised to the rank of fidalgo escudeiro; and in 1513 he accompanied a Portuguese expedition against Azamor in Morocco. The city was taken on the 28th-2t)th of August 1513; but Magellan was subsequently wounded, and lamed for life, in a sortie; he was also accused of trading with the Moors. The accusation was subsequently dropped, but Magellan fell into disfavour with King. Manuel, who let him understand that he would have no further employment in his country's service (after the 15th of May 1514). Magellan formally renounced his nationality, and went to offer his services to the court of Spain. He reached Seville on the 20th of October 1 51 7, and thence went to Valladolid to see Charles V. With the help of Juan de Aranda, one of the three chief officials of the India House at Seville, and of other friends, especially Diogo Barbosa, a Portuguese like himself, naturalized as a Spaniard, who had acquired great influence in Seville, and whose daughter he now married, he gained the ear of Charles and of the powerful minister, Juan Rodriguez de Fonseca, bishop of Burgos, the persistent enemy of Columbus, the steady supporter of his great successor. Magellan proposed to reach the Spice Islands of the East Indies by the west; for that purpose he hoped to discover a strait at the extreme south of South America, and is said to have declared himself ready to sail southwards to 75° to realize his project. Ruy Faleiro the astronomer, another Portuguese exile, aided him in the working out of his plan, and he found an invaluable financial ally in Christopher de Haro, a member of a great Antwerp firm, who owed a grudge to the king of Portugal. On the 22nd of March 1518, Magellan and Faleiro, as joint captains-general, signed an agreement with Charles V., by which one-twentieth of the clear profits were to fall to them; further, the government of any lands discovered was vested in them and their heirs, with the title of Adelantados. On the 10th of August 1519, the fleet of five vessels, under Magellan's command, left Seville and dropped down the Guadal- quivir to S. Lucar de Barrameda, at the mouth of the river, where they remained more than five weeks. On the 20th of September the armada put to sea. Of the vessels which com- posed it, the " Trinidad " was the flagship, and the " Vittoria " the only one which accomplished the circumnavigation. The crew, officers, volunteers, &c, numbered about 270-280, of whom the names of 268 are preserved; 237 of these received pay; at least 37 were Portuguese, 30 or more Italians (mostly Genoese), 19 French, 1 English, 1 German. Only 31 returned in the " Vittoria "; 4 survivors of the crew of the " Trinidad " reappeared later. Antonio Pigafetta of Vicenza, an Italian gentleman who has left the best history of the voyage, went as a volunteer in Magellan's suite. Faleiro stayed behind, having cast his horoscope and found that the venture would be fatal to him. The fleet was well armed, and the total cost of equipment was 8,751,000 maravedis, or £5032 (equal to over £50,000 in present value). Three-quarters were defrayed by the Spanish Crown, one-quarter by Christopher Haro and his friends. Before starting, Magellan

made his will and addressed a memorandum to Charles V., assigning geographical positions connected with the controversy he was intending to settle: viz., the proper drawing of a demarcation-line between the spheres of Spain and Portugal in the East Indies, and the in- clusion of the Moluccas within the Spanish sphere.

Steering south-west and calling at Teneriffe (Sept. 26-Oct.3), Magellan sighted South America at Cape St Augustine, near Pernambuco on the 29th of November; thence he followed the east coast of the New World down to the La Plata estuary, which he examined in the hope of finding a passage at this point (Jan. 11-Feb. 6, 1520). On the 31st of March following, he arrived at Port St Julian (in 49° 20′ S.) where he wintered. Here he crushed a formidable mutiny (April 1-2), and made acquaintance with the natives, whom he called Patagortians (" Big Feet "), whose great size and lofty stature are magnified by Pigafetta to gigantic proportions.

Leaving Port St Julian on the 24th of August 1520, he discovered on the 21st of October the cape of the Eleven Thousand Virgins, the eastern entrance of the long-sought passage. Through this strait, 360 m. long, often narrow and very tortuous, fringed by snow-clad mountains, he guided his armada for thirty-eight days, weakened by the desertion of one vessel (the " S. Antonio "). On the 21st of November a council of pilots and captains was held to consider the continuation of the voyage, and on the 28th of November the fleet rounded Cabo Deseado, the " desired " western terminus of the strait, variously called by the first discoverers, " Victoria Strait," " Strait of the Patagonians," "of all Saints," "of the Eleven Thousand Virgins," or " of Magellan," now only known by the last of these names. To the south of the passage lay the forbidding land " stark with eternal cold," which from the many fires here observed Magellan named "Tierra del Fuego." The expedition now entered the "Great South Sea," first sighted by Vasco Nunez de Balboa (q.v.), which, from the steady and gentle winds that drove the fleet across the immeasurable expanse, was by Magellan called "Pacific." For ninety-eight days Magellan crossed this sea, almost beyond the grasp of man's mind for vastness (as Maximilian of Transylvania puts it), from Cabo Deseado to the Ladrones. On the whole transit he discovered only two islands, sterile and uninhabited, which he called "St Paul's" (Jan, 24, 1521) and "Shark Island " (Feb. 3). The first of these has been identified with Puka Puka in the Tuamotu Archipelago, the second with Flint Island in the Manihiki group; neither identification seems convincing. For most of these ninety-eight days the explorers had no fresh provisions, little water (and that bad), and putrid biscuit; the ravages of scurvy became terrible. The worst anticipations of Magellan ("he would push on, if they had to eat the leather of the rigging") were realized; ox-hides, sawdust, and rats became coveted food. At last, on the 6th of March 1521, the Ladrones (so named by Magellan from the thievish habits of the

natives) came in sight, Guam being probably the first port of call. Here the fleet rested, watered, revictualled and refitted; on the 9th of March they started again westward; and on the 16th of March sighted the southern point of Samar Island in the archipelago, since 1542 called the Philippines, but named by Magellan, its first dis- coverer, after St Lazarus. On the 7th of April the squadron arrived at Cebu, south-west of Samar, in the heart of the Philip- pines; here Magellan contracted a close friendship and alliance with the treacherous native sovereign, who professed Christianity the better to please and utilize his Catholic friends. Undertaking an expedition to conquer, for the Catholic faith and the king of Cebu, the neighbouring island of Mactan, Magellan was killed there in a fight with the islanders (April 27, 1521). The king of Cebu after this got into his power several of the leading personages of the squadron, including Juan Serrano, one of the two admirals elected to replace Magellan, and murdered them. The survivors, burning one . of the three remaining vessels, left the Philippines, and made their way to the Moluccas (Nov. 6), visiting Borneo on the way (July 9-Sept. 27, 1 521). At Tidor a heavy cargo of cloves was taken in; the "Trinidad," becoming leaky, stayed behind with her crew; and the " Vittoria," under Juan Sebastian del Cano, proceeded to Europe alone (Dec. 21, 1521). To double the Cape of Good Hope the " Vittoria " reached between 40° and 41° S. (April 7-16, 1522) and suffered from contrary winds, heavy seas, scurvy and starvation. In the Cape Verde Islands (July 9-15, 1522) thirteen of the crew were detained prisoners by the Portuguese. Only thirty-one men returned with del Cano to Seville in the first vessel that had ever made the tour of the earth. Though Magellan had not quite reached the Spice Islands when he fell at Mactan, his task had then been accomplished. He had already reached and passed the longitude of the Moluccas, where he had already been; the way home from the Philippines by the Indian Ocean and the Cape of Good Hope was perfectly known to the Portuguese, himself included. Magellan's name has never received its due recognition in

general history. It ranks with those of Columbus, Marco Polo, and Henry the Navigator. The circumnavigation of the globe is as great an event as the discovery of America. Magellan achieved what Columbus planned — the linking of west Europe with east Asia by direct transit over the western ocean. Had America not intervened, the project of 1492 must have failed; by 1519 European pioneers had formed a more adequate notion of the task and its magnitude.

Magellan's Straits, the Magellanic clouds (not first observed by him), and

Magellan's Land — a name long given to Patagonia and that hypothetical southern continent of which Tierra del Fuego was considered only a portion, and now again bestowed by Chile on her territory in the extreme south — preserve the memory of the first circumnavigator. The largest of the oceans has also kept the flattering name given to it by the man who first crossed it.

No record of his exploits was left by Magellan himself; and contemporary accounts are less detailed and consistent than could be wished. The best is that of Antonio Pigafetta, a volunteer in the fleet. It is printed in Ramusio, and exists in four early MS. copies, one in Italian and three in French. The latter was perhaps the original language of this work, which was addressed by Pigafetta, as a knight of Rhodes, to the Frenchman Villiers de l'lsle Adam, grand master of the order of the Hospital of St John. But this view is rejected by J. A. Robertson (see below), who believes the Ambrosian MS. to be the ultimate text. See the Primo viaggio intorno al mondo, otherwise the Navigation et descouvrement de la Indie super ieure faicte par moi Anthoyne Pigapheta, Vincentin, chevallier de Rhodes, probably published in 1524 (in August of that year Pigafetta obtained leave to print his book in Venice). Of the three French MSS., two are in the BibliothSque Nationale, Paris (5650 and 24,224 Fr.), the latter is wrongly supposed by Thomassy, followed by Lord Stanley of Alderley, to have been the copy pre- sented by Pigafetta to the regent of France, Marie Louise of Savoy, mother of Francis I. The third French MS., often called the MS. of Nancy, first noticed by Thomassy in 1 841 , was bought by Sir Thomas Phillipps at Libri's sale, and became MS. Phillipps 16,405. The Italian MS. is in the Ambrosian library at Milan. From this Carlo Anioretti, prefect of the Ambrosiana. published his Italian edition of Pigafetta in 1800; a French translation of this, by Amoretti himself, was issued by H. J. Jansen, 1801. An English version of Pigafetta was made by Richard Eden in his Decades of the Newe Worlde (London, 1555). The earliest printed edition, apparently a summary of the Italian MS., was issued in French by Simon de Colines of Paris about 1525. The earliest Italian edition is of 1534 (or 1536).

Other authorities are: (1) The narrative of an unknown Portu- guese in Ramusio's Navigationi et viaggi; (2) the Derrotero or Log- Book in the Seville Archives, supposed to be the work of Francisco Albo, contramaestre of Magellan's flagship, the "Trinidad": this consists mainly of nautical observations; (3) the narrative of the so-called Genoese pilot, written in excellent Portuguese, and printed in vol. iv. of the Collecao de noticias of the Lisbon Academy ; (4) various informaciones and other papers in the Seville Archives, especially bearing on the mutiny; (5) the letter of Maximilian of Transylvania, under-secretary to Charles V., to the cardinal of Salzburg; (6) the references in Correa and Herrera, often based on good information, and adding points of interest to other records. Of these (l)-

(3), (5), and an instance of (6) are translated in the Hakluyt Society's volume. Magellan's two wills (i) executed at Belem on the 17th of December 1504, on the eve of his departure with Almeida, (ii) executed at Seville on the 24th of August, 1519, just before starting on his voyage round the world, are both of some value for his life.

See also Lord Stanley of Alderley, The First Voyage round the World by Magellan, translated from . . . Pigafetta, &c, Hakluyt Society (London, 1874); Diego de Barros Arana, Vida e viagems de Fernao de Magalhaes, a trans, of the Spanish life by Fernando de Magalhaes Villas Boas (Lisbon, 1881); F. H. H. Guillemard, Life of Magellan (London, 1890); Magellan . . . the original text of the Ambrosian MS. (of Pigafetta), with English translation, notes, bibliography, &c, by J. A. Robertson (Cleveland, U.S.A., 1906). Before the appear- ance of this indispensable work, the best edition of Pigafetta had been in vol. iii. part 5 of the Raccolta di documenti e studi pubblicati nella r. commissione colombiana, edited by Andrea da Mosto (Rome, Ministry of Public Instruction, 1894). (C. R. B.)

MAGELLANIC CLOUDS (named after Ferdinand Magellan), two cloud-like condensations of stars in the southern constella- tion of Mensa about 69 S. Dec. and between 5° and 5° 40′ of R. A. They are remarkable in the resemblance of their stars as regards spectra and physical constitution to the stars of the Milky Way, though entirely detached from that object.

MAGENTA, a town of Lombardy, Italy, in the province of Milan, 16 m. by rail W. of Milan city, 364 ft. about sea-level

situated in the midst of rice-fields. Pop. (1901), 8012. It manufactures silks and matches, and is famous for the battle (1859) in which the allied French and Piedmontese defeated the Austrians (see Italian Wars). A memorial chapel and a monument were erected on the battle-field in 1862. A crimson- purple aniline dye, discovered about the time of the battle, was given from it the name of " magenta,"

MAGGIORE, LAGO (Lacus Verbanus of the Romans; Fr. Lac Majeur; Ger. Langensee), the most extensive of the lakes that extend along the foot of the Alps in Lombardy, N. Italy. Its area is about 83 sq. m., its length 37 m., its greatest width Sj m., and its greatest depth 1198 ft., while its surface is 646 ft. about sea-level. It is mainly formed by the Ticino (Tessin) River, flowing in at the north and out at the south end, on its way to join the Po, but on the west the lake receives a very important tributary, the Toce or Tosa River, which flows down through the Val d'Ossola from the mountains around the Simplon Pass. Other important affluents are the Maggia (N. W.) and the Tresa (E.). The upper end of the lake (about 16 sq. m.) is in the Swiss canton of Ticino (Tessin). Locarno, at the northern

or Swiss end, is 14 m. by rail S.W. of Bellinzona on the St Gotthard line. There is a railway along the south- eastern shore, from Magadino (io| m. S.W. of Bellinzona) to Sesto Calende (365m.), at the southern end of the lake and 20 m. by rail from Novara. The east shore of the lake is reached at Luino by a steam tramway from Ponte Tresa on the lake of Lugano (8 m.), while the direct Simplon line runs along the west shore of the lake for 155 m. from near Pallanza past Baveno and Stresa to Arona, which is 23 m. by rail from Novara. On the east shore are Luino (Ital. Luvino) and Laveno. On the west shore are (reckoning from N. to S.) Cannobio, Pallanza, Baveno, Stresa and Arona. Opposite (S.E.) Baveno are the famous Borromean Islands, on the largest of which (Isola Bella) are very remarkable gardens (formed about 161 7), wherein many tropical plants flourish abundantly, while south-west of Baveno rises the glorious view-point of the Monte Mottarone (4892 ft.) between Lago Maggiore and the northern end of the Lake of Orta. In the morning the tramontana wind blows from the north down the lake, while in the afternoon the inverna, blowing from the south, prevails. The first steamer was placed on the lake in 1826. _ (W. A. B. C.)

MAGIC 1 (i.e. "art magic"; Lat. ars magica), the general term for the practice and power of wonder-working, as depend- ing on the employment of supposed supernatural agencies. Etymologically the Gr. nayela meant the science and religion of the magi, or priests of Zoroaster, as known among the Greeks; in this sense it was opposed to yoriTeia (? necromancy) and

I. — Nature of Magic

Theories of Magic. — Existing theories of magic may be classified as objective or subjective. The objective school regards magic as a thing by itself, entirely distinct from religion, recognizable by certain characteristics, and traceable to a definite psychological origin. Magic, on this view, is a system of savage science based on imaginary laws supposed to operate with the regularity ascribed to natural laws by the science of to-day. If practices prima facie magical form part of the recognized ritual of religion, it is because the older ideas have persisted and at most assumed a veneer of religion. For the subjective school, on the other hand, only those rites are magical which their practitioners qualify with the name of magic; there is no inherent quality which makes a rite magical; practices based on a belief in the law of sympathy may be religious as well as magical; rites may pass from the category of religion to that of magic when public recognition is withdrawn from them.

1 For what is often called " magic," but is really trick-perform- ance, see Conjuring.

a. For E. B. Tylor the distinguishing characteristic of magic is its unreality ; it is a confused mass of beliefs and practices, and their unity consists in the absence of the ordinary nexus of natural cause and effect. Under the general head of magic he distinguishes (i) a spiritual and (ii) a non-spiritual element, (i) The former is made up of such rites as involve the intervention of spiritual beings, ghosts of the dead, demons or gods; hence, in Tylor's view, this form of magic is merely an inferior branch of religion, (ii) The non- spiritual part, but for which the category of magic would be unneces- sary, depends on imagined powers and correspondences in nature; it is merely imperfect reasoning, the mistaking of an ideal connexion for a real one. When the American Indian medicine man draws the picture of a deer on a piece of bark and expects that shooting at it will cause him to kill a real deer the next day, he mistakes a connexion which exists only in the mind of the sorcerer for a real bond independent of the human mind.

b. In J. G. Frazer's view all magic is based on the law of sympathy — i.e. the assumption that things act on one another at a distance through a secret link, due either to the fact that there is some similarity between them or to the fact that they have at one time been in contact, or that one has formed part of the other. These two branches of " sympathetic magic " Frazer denominates "homoeo- pathic magic" and "contagious magic." Homoeopathic or imita- tive (mimetic) magic may be practised by itself, but contagious magic generally involves the application of the imitative principle, (i) One of the most familiar applications of the former is the belief that an enemy may be destroyed or injured by destroying or injuring an image of him. (ii) Under the head of contagious magic are included such beliefs as that which causes the peasant to anoint the weapon with which he has been injured, which, according to Frazer, is founded on the supposition that the blood on the weapon continues to feel with the blood in the body, (iii) Implicitly Frazer seems to distinguish a third kind of magic; "the rain-charm," he says, " operates partly or wholly through the dead … in Halmahera there is a practice of throwing stones on a grave, in order that the ghost may fall into a passion and avenge the disturbance, as he imagines, by sending heavy rain." Here there is no assumption of an invariable course of nature set in motion by magical rites; save that it is coercive and not propitiatory, the practice does not differ from ordinary religious rites.

In his theory of the origin of magic Frazer follows the association- ist school. But, as R. R. Marett has pointed out in a criticism of the associationist position, it is proved beyond question that even in the

individual mind association by similarity, contiguity or contrast, is but the passive condition, the important element being interest and attention. Frazer assumes that magic has everywhere preceded religion : man tried to control nature by using what he conceived to be immutable laws; failing in this he came to believe in the existence of higher powers whom he could propitiate but not coerce ; with this transformation religion appeared on the scene; the priest supplanted the magician, at least in part, and the first blows were struck in the perennial warfare of magic and religion. Frazer recognizes, how- ever, that magical and religious rites are at the present day, and have been in historical times, frequently intermingled ; it should be noted that for him religion means propitiation and that he does not recognize the existence of anything beyond magic among the aborigines of Australia. His theory is based on a selection of facts, and not on the whole body of beliefs and rites recognized as magical, among which are many wherein spirits figure. Frazer's position appears to be that such rites are relatively late and may be neglected in framing a definition of magic. It may be perfectly true that the idea of magic has been progressively extended ; but belief in transformation is also for Dr Frazer magical; this belief is certainly primitive; yet sympathy will not explain it, as it should if Frazer's theory is correct.

c. L. Marillier distinguished three classes of magic: (i) the magic of the word or act; (ii) the magic of the human being, indepen- dent of rite or formula, &c. ; (iii) the magic which demands at once a human being of special powers (or in a special state) and the use of certain forms, (i) Under the first head he included such rites as mimetic dances, rain-making, disease-making, and sympathetic magic generally. Some of these rites are conceived to affect the course of nature directly, as by influencing winds or the sun, others do so through the intermediary of a god or spirit, who controls the course of nature, and is himself coerced by man with magical acts and incantations, (ii) Other rites cannot be performed by all and sundry : ceremonial purity, initiation or other conditions may be needed to make the charm effective, (iii) Individuals are found who are invested with magical power {mana), whose will rules the universe, whose simple words bring rain or sunshine, and whose presence gives fertility to the fields. Sometimes this power is an attribute of the individual, sometimes it is bound up with the office which he fills. In many cases the magical powers of both men and other objects, animate and inanimate, are put down to the fact that a god resides in them.

d. Hubert and Mauss have made the most complete and sys- tematic study of magic which has yet appeared. They hold that, implicitly at any rate, magic is everywhere distinguished from other systems of social facts ; in order to be magical an act or belief must

be common to the whole of a society ; the acts which the whole of a group does not regard as efficacious are not, for this school of thought, magical: consequently the practices of gamesters, &c, do not come under the head of magic. Magic is essentially traditional; a dis- tinguishing characteristic of primitive thought is that the individual mind is markedly unoriginal; and this feature is as prominent, if not more so, in magic as in technology or any other important ele- ment in human life. The correspondence between magic and tech- nology can be traced far; for the gestures of the craftsman are as strictly prescribed as the ritual acts of the magician or priest : but in magic the results of the gestures are not of the same order as the results of the craftsman's movements, and herein lies the distinction between magic and technic. The distinction between magic and religion is to be sought not in the sympathetic character of the former, nor in any supposed necessary sequence of cause and effect, nor yet in its maleficent character. Religion is prescribed, official, an organized cult. Magic is prohibited, secret; at most it is per- mitted, without being prescribed. Three important laws may be traced in the machinery of magical operations — magical power flows along channels determined by the contiguity, similarity or contrast of the object of the act and the object to be affected; but these laws do not suffice to explain magic: equally insufficient are the demonological theory and the theory of properties inherent in the objects used in magical operations. The underlying idea of magic is dynamical; to this power may be given the name of mana (see below), of which sanctity is a special development. This mana operates in a milieu different from the ordinary material world; distance is no obstacle to contact ; wishes are immediately realized ; but law reigns in the milieu in question, necessary relations are con- ceived as existing. The notion of time as it is found in the world of magic is even more alien from European ideas; the notion of sanctity enters into it, but time in magic and religion is qualitative rather than quantitative. The homogeneity of periods of time not depending on their duration, conventional numbers are employed; successive periods of time apparently equal are not so for the primi- tive consciousness ; and both in magic and religion periods are homo- geneous by reason of occupying the same position in the calendar.

e. For A. Lehmann magic is the practice of superstitions, and his explanation of magic is purely psychological. Relying mainly on modern spiritualism for his examples, he traces magic back to illusions, prejudices and false precepts due to strained attention. This is ultimately also the view of Hubert and Mauss, who hold that " at the root of magic are states of consciousness which generate illusions; and that these states are not individual but collective and arise from the amalgamation of the ideas of a given person with those current in the society of which he forms a part." The reunion of a group supplies a soil in which illusions flourish readily,

and it is impor- tant to note that in magic and religion attention is above all necessary for the success of a rite, witness the frequent rule imposing silence; but this concentration of attention is precisely calculated to favour illusions; it is indeed the ordinary condition of successful hypnotism; even in civilized countries collective hallucinations without verbal suggestion are not unknown.

/. R. R. Marett regards religion and magic as two forms of a social phenomenon originally one and indivisible; primitive man had an institution which dealt with the supernatural, and in this institu- tion were the germs of both magic and religion, which were gradually differentiated; magic and religion differ in respectability; religion is always the higher, the accepted cult ; but between what is definitely religious and what is definitely magical lies a mass of indeterminate elements, such as " white-magic," which do not attain to the public recognition of religion, nor suffer the condemnation meted out to the indisputably magical. For primitive man the abnormal was the supernormal, and the supernormal was the supernatural, the object of fear; this is especially evident when we consider the case of taboo ; it may be regarded as a public scare for which no particular individual is responsible, which becomes traditional along fairly constant lines, growing as it goes. Mana was attributed to taboo objects, among which were men in any way abnormal, whether as geniuses or idiots; and such men were expected to exercise their powers for the good of society; hence came into existence the pro- fessional medicine man ; man originally argued from cause to effect . and not vice versa. Priest and magician were originally one; but the former, learning humility in the face of might greater than his own, discarded the spell for the prayer and prostrated himself before a higher power. .'.

Definition of Magic. — To arrive at a definition of magic we may either follow the a priori road mapped out by Frazer and decline to recognize the distinction actually drawn by various societies between magical and religious practices; or we may ask what magic and corresponding terms actually connote. Frazer's method ignores the fact that magic, like religion, is an institution, i.e. a product of society, not of any single indi- vidual; there is no more reason to suppose that a child reared in isolation would develop any kind of magical practices than that it would invent for itself a religion; but if this is the case,

the associationist account of magic cannot be true. It is there- fore by an analysis of actually existing practices that we must define and limit the

term magic. There is, however, a serious difficulty in the way of determining the attitude of non-European peoples towards religio-magical practices; general terms are things of slow growth; it is therefore prima facie improbable that peoples in the lower stages of culture will have anything corresponding to our terms " religion " and " magic "; more- over, if we are right in assuming the fundamental unity of the two, it is by no means certain that they have even the con- sciousness of any distinction. Even when this consciousness is present, it by no means follows that the whole of the field is mapped out according to our categories; there will be a large indeterminate area which is neither magical nor religious. This suggests that the consciousness of the educated Occidental, for which the spheres of magic and religion in civilized society are sharply defined and contrasted, should be the ultimate arbiter; but here again we are confronted by a difficulty, for, to the educated man, the characteristic of magic is its unreality, and this does not help us to distinguish primitive magic and religion.

We must, it appears, determine the relation of magic to religion by an analysis of the conceptions of those who believe in both ; but in so doing we must consider that, like all other institutions, magic has a history. Even if we go back to the 1 6th century and take the view of magic then held by the average European, it is still a complex idea. When we ask what the most primitive races now on the earth regard as magic, we are applying to their ideas a touchstone made for a very different age and culture; as well might we ask what their theory of knowledge is. If, however, we reverse the process and ask what elements of primitive institutions correspond most nearly to later conceptions of magic, we can at once say that the forbidden and private arts are the prototypes of the magic of later times. Magic is therefore the practice of maleficent arts which involve the use of religio-magical power, with perhaps a secondary idea of the use of private arts, which are to benefit, not the community as a whole, but a single individual. Religion in the lower stages of culture is essentially the tribal creed which all practise and in which all believe; if therefore an individual has a cult of his own, even if otherwise indistinguishable from a public cult, it is for this very reason on a lower plane, and probably corresponds in a degree to what is later regarded as magic. But our information as to the attitude of the uncivilized towards magico-religious rites in general is seldom sufficiently clear; our terminology is influenced by the prepossession of alien observers whose accounts cannot be assumed to correspond to the native view of the case.

Magico-religious Force. — The mere fact that we cannot draw an exact line between magic and religion suggests that they may have some fundamental feature in common. Both terms have greatly changed their connotation in the course of their ex- istence; religio seems to have meant

originally KaTa.bevy.bs (magical spell), and Pliny says that nayda is a deceptive art compounded of medicine, religion and astrology. Among the Greeks, on the other hand, iiayda occupied a respectable position. More important is the fact that taboo (q.v.) is both religious and magical. There is a universal tendency to regard as magical the religions of alien races, as well as'national religions which have been superseded; Leland tells us that witchcraft in Italy is known as la vecchia religione. An examination of the ideas of primitive peoples shows that there is a widely found notion of a power which manifests itself both in religion and magic. Observers have often been content to describe cere- monies without attempting to penetrate to the fundamental ideas which underlie them; this is particularly the case with magic, and only recently have anthropologists realized that in many primitive societies exists a fairly well-defined idea of magico-religious power, to which the generic name of mana, from the Melanesian word, has been given.

a. Mana in Melanesia is a force, a being, an action, a quality, or a state ; it is transmissible and contagious, and is hence associated with

taboo ; it may be regarded as material and seen in the form of flames or heard ; it is the power which is inherent in certain spirits, among which are included such of the dead as are denominated tindalos; it may also be a force inherent in some inanimate object, such as a stone which causes the yams to grow, but it is a spiritual force and does not act mechanically ; it is the power of the magician and of the rite; the magic formula is itself mana. There seem to be a variety of manas, but probably the underlying idea is essentially one, though it does not follow that the Melanesians have arrived at the conscious- ness of this unity. Hubert and Mauss go even further and regard all force as mana; it is a quality added to objects without prejudice to their other qualities, one which supplements without destroying their mechanical action.

b. Similar ideas are found in other areas, (i) The continental Malays have a word Kramdt (hrni), which means sacred or magical; in Indo-China the Bahnars use the word deng; in Madagascar hasina seems to embody in part the same notion, (ii) In Africa the ide» is less apparent; perhaps the ngai of the Tanganika tribes comes nearest to the notion of mana; on the Congo nkici has a similar but more restricted sense, (iii) In Australia there are two, or perhaps three, kinds of magical power distinguished by the aborigines; all over the continent we find the maleficent power, boolya in West Australia, arungquiltha in the central tribes, koochie in New South Wales; the central tribes have certain objects termed churinga, to which magical power (which we may term churinga) is attributed ; the power of magicians is held to reside in certain stones, called atnongara, and in this we must, provisionally at any rate, see a third kind of magical power :

churinga is beneficent and seems to originate with the mythical ancestors, whereas arungquiltha is of immediate origin, created by means of incantations or acquired by contact with certain objects; the power of the magicians seems to proceed from the ancestors in like manner, (iv) In America these ideas are widely found; the orenda of the Hurons has been elaborately described by J. N. B. Hewitt; everything in nature, and particularly all animate objects, have their orenda; so have gods and spirits; and natural phenomena are the product of the orenda of their spirits. Orenda is distinct from the things to which it is attached ; the cry of birds, the rustle of the trees, the soughing of the wind, are expres- sions of their orenda ; the voice of the magician . is orenda, so are the prayer and the spell, and in fact all rites ; orenda is above all the power of the medicine man. Among the Algonquins we find the word manitu, among the Sioux wakanda, mahowa, &c. , among the Shoshones pokunt ; all of which seem to carry, at least in part, the same signifi- cation. In Central America, according to Hubert and Mauss, naual or nagual is the corresponding term, (v) Traces of similar ideas may be found in more advanced nations; the Hindu brahman is identified by Hubert and Mauss as the correlative of mana ; in Greece 4 > i

Origin of Magic. — The associationist theory of magic sets out with the assumption that primitive man began with general conceptions; he started with certain means at his disposal — the law of sympathy — by which he could, in his own belief, influence the outer world. But it is more probable that he argued from concrete instances and arrived little by little at abstract ideas of magical power.

a. Death and disease are universally regarded by uncivilized people as due to so-called " magic," i.e. to non-natural causes. Primitive man was familiar with the wounds and bruises caused by physical means ; he would naturally attribute any pain not so caused to the operation of analogous but invisible weapons, and eventually attempt to discover how he himself could apply on his own behalf the forces thus used against him. Similarly he may have asked himself to what causes were to be attributed the superiority of one man over another; he may have decided the problem by referring it to the superior power of the one, and then inquired in what way this power could in individual instances be increased. In fact we may say generally that man probably explained the already existing and happening by reference to the supernormal, and then endeavoured to guide the supernormal for his own benefit, direct or indirect.

b. Ritual, however (the primitive magico-religious plasm), is negative as well as positive. The corpse is uncanny, and man's dread of the corpse may well have been an early development ; this dread, become traditional, with accretions of various sorts, crystal- lized into taboo, the magico-religious

prohibition. The notion of the uncanny, once arrived at, may have been exploited positively; psychical abnormalities are present among savage races in very different degrees; but if they were developed at an early stage in human history they doubtless suggested the possibility that man might exploit them for the collective advantage. But it by no means follows that beneficent rites were originally regarded as magical; and it should be noted that the initiator of the so-called magician in Australia is often the god of the tribe or nation. The limits of magic or its correlatives in the lower stages of culture are thus far undecided.

c. Magic as it represents itself to the Occidental mind of the pre- sent day, and perhaps to the great part of the inhabitants of the world.

seems to be a thing of gradual growth, (i) In the earlier stages there was probably no animistic feature about magic; it was essentially " the prohibited." (ii) Then with the rise of animistic beliefs and practices came the association of the magician with demons — the spirits of the dead, or of animals, or unattached spirits — upon whose co-operation the powers of the magician are often now held to depend. These spirits were not in the position of gods; such recognition, worship, or cult as they received was often not a social institution, but the work of individuals, liable to fall into desuetude at the death of the individual, if not earlier, (iii) Again, the magical tends to be the less important and eventually the less respectable; therefore ancient cults which are conquered, like the religion of Rome by Christianity, come to be reckoned as within the sphere of magic and witchcraft, (iv) All non-animistic practices tend to become ipso facto magical ; many ritual prohibitions fall under the head of negative magic. Religion is predominantly animistic, and with the rise of gods magic and religion become antagonistic. Thus rites of a neutral character, such as leechcraft, and perhaps agricultural ceremonies which are not absorbed by religion, tend to acquire the reputation of being magical, as also do all amulets and talismans, and, in fact, everything not directly associated with religion. We therefore arrive at a period when magic is distinguished as white, i.e. the laudable, or at least permitted form, and black, i.e. the prohibited form.

Magic and Demonology. — Primitive psychology tends to anthropomorphize and personify; it is in many of its stages inclined to an animistic philosophy. To this is due in part the difficulty of distinguishing magic from religion. In many rites there is no obvious indication that a spirit or personal being is concerned. A portion of the ceremonies in which

the spirits of the dead are concerned falls under the head of religion (see Ancestor Worship), but in the very name " necromancy " (veKpos, corpse) lies an implication of magic; and dealings with the departed are viewed in this light in many parts of the world, sometimes concurrently with a cult of ancestors. Side by side with the human souls we find demons (see Demonology); but on the whole only a small proportion of the world of spirits is recognized as powerful in magic; others, such as disease- spirits, are objects, not sources, of magical influence. Magic is sometimes made to depend upon the activity of demons and spirits, and it is true that the magician usually if not invariably has a spirit helper, often an animal; but there is no evidence that magical power had ever been confined to those who are thus aided. It is not easy to define the relation of fetishism (q.v.) to magic, Magic and Science. — It is a commonplace that the sciences have developed from non-scientific beginnings; the root of astronomy is to be sought in astrology (q.v.), of chemistry in alchemy (q.v.), of leechcraft in the practices of the savage magi- cian, who depends for much of his success on suggestion, conscious or unconscious, but also relies on a pharmacopeia of no mean extent. The dynamical theory of magic and religion brings primitive man from one point of view far nearer to the modern • man of science than was previously suspected, we may fairly say that the Australians have an idea not unlike that of the trans- formation and conservation of energy, that this energy they store in accumulators, transmit by means of conductors, and so on. The discovery of these complicated ideas only serves to show how far the present-day peoples in the lower stages of culture have travelled from the primitive man who knew neither magic nor religion. But it is perhaps less in respect of abstract ideas than by its concrete investigations into properties, experiment and otherwise that magic has been the forerunner of science.

Magic and Divination. — Magic is an attempt to influence the course of events, divination (q.v.) to foresee them; but divination is frequently regarded as magical. It is certain that a large part of divination is religious, and the knowledge is explained as a message from the god6; but necromancy, the practice of dis- covering the future by consulting the dead, is in many respects essentially magical. Perhaps the magical character of divina- tion may be in part explained, when we regard it as a group of practices in many varieties of which animism plays no part; for non-animistic ceremonies tend to be regarded as magical (cf. rain-making). Thus, heteroscopic divination seems to involve the idea of what may be termed a return current of magico- religious force; the event is not influenced, but itself determines the issue of the diviner's experiment.

II. — Laws and Ritual or Magic

The practice of magic involves the belief in the operation of certain laws,

and demands certain conditions. The number of positive rites is not unlimited; a certain rite tends to become stable and is finally used for all sorts of purposes; and each magician tends to specialize in this respect. Just as there are well-marked schools of magic, and the rain-maker is not the same as the fetish-man, so within the school there are various groups, differentiated not by the purposes at which they aim nor by the powers they claim to possess, but by the ceremonies which they practise. Chief among the laws lying at the base of magical practice is that of sympathy.

Sympathy. — That the law of sympathy is an essential element of magic is admitted equally by the associationist school and by its critics. Under the head of sympathy are embraced the laws of contiguity or contagion, of similarity or homoeopathy, and of contrariety or antipathy.

a. In its simplest form the law of contiguity asserts that whatever has once formed part of a body continues to form part of it or to represent it for magical purposes; thus, by obtaining possession of the parings of a person's nails, or the clippings of his hair, and by working magic upon them, it is held to be possible to produce on the actual human body the effects which are in reality produced on the object of the magical rite. As is clear by the well-known case of the "life index," the current of magical power may pass in either direc- tion ; if the life of a man is supposed to be bound up with the life of a tree, so that any injury to the tree reacts on the man, it is equally believed that the death of the man will not fail to be manifest by the state of the tree. In particular this sympathetic relation is predicated of wizards or witches and their animal familiars; it is then known by the name of " repercussion." It is not only upon parts of the body that contagious magic can be worked; anything which has been in contact with the body, such as clothes, anything which has been in part assimilated by the body, such as the remains of food, and even representations of the body or of parts of it such as footprints, &c, may be used as objects of magical rites, in order to transmit to the human being some influence, maleficent or other- wise. The contact demanded may be actual, or mediate, for in Australia it suffices to connect the magician and his patient by a thread in order that the disease may be removed, (i) The use of clothes for magical purposes gives us perhaps the clue to the wide- spread custom of " rag-trees "; in nearly every part of the world it is the practice to suspend wool or rags to trees associated with some spirit, or, in Christian countries, with some saint, in order to reap a benefit; similarly nails are driven into trees or images; pins are dropped into wells, stones are cast upon cairns, and missiles aimed at various holy objects; but it cannot be assumed that the same ex- planation lies at the root of the whole group of practices, (ii) This law may perhaps be taken as the explanation of the " couvade "; in many parts of the world relatives, and in particular the father of a new-born child, are compelled to practise various abstinences, in order that the health

of the child may not be affected , member- ship of the same family therefore establishes a sympathetic relation, (iii) In this direct transference of qualities ir exemplified another magical process, which may also be referred to the operation of the law of sympathy; it is a world-wide belief that the assimilation of food involves the transference to the eater of the qualities, or of some of them, inherent in the source of the food ; a South African warrior, for example, may not eat hedgehog, because the animal is held to be cowardly and the eater would himself become a coward ; on the other hand, the flesh of lions is fit meat for brave men, because they at the same time transfer its courage to themselves.

6. The law of homoeopathy takes two forms, (i) The magician may proceed on the assumption that like produces like ; he may, for example, take an image of wax or wood, and subject it to heat or othe^influences under the belief that it represents the human being against whom his malefice is directed, and that without any contact, real or pretended ; so that any results produced on the image, which may be replaced by an animal or a portion of one, are equally pro- duced in the human being. There need not even be any resemblance between the representation and the person or thing represented; a pot may serve to represent a village ; hence step by step we pass from the representation to the symbol, (ii) The law of homoeopathy also manifests itself in the formula similia similibus curantur ; the Brah- man in India treated dropsy with ablutions, not in order to add to, but to subtract from, the quantity of liquid in the patient's body. So, too, the yellow turmeric was held to be a specific for jaundice._

c. Here we approach the third class of sympathetic rites; it is clear that a remedy produces the contrary, when it cures the like; conversely, like by producing like expels its contrary.

Some statements of the law of sympathy suggest that it is absolute in its application^ It is true that the current of magical power is sometimes held to be transmitted along lines indicated

by the law of sympathy, without the intervention of any volition, human or otherwise; thus, the crow which carries stray hairs away to weave them into the structure of its nest is nowhere supposed to be engaged in a magical process ; but it is commonly held that the person whose hair is thus used will suffer from head- ache or other maladies; this seems to indicate that the law of sympathy operates mechanically in certain directions, though the belief may also be explained as a secondary growth. In general

the operation of these laws is limited in the extreme. For example, the medieval doctrine known as the Law of Signa- tures asserted that the effects of remedies were correlated to their external qualities; bear's grease is good for baldness, because the bear is a hairy animal. But the transference was held to terminate with the acquisition by the man of this single quality ; in some magical books powdered mummy is recommended as a means of prolonging life, but it is simply the age of the remedy which is to benefit the patient; the magician who removes a patient's pains or diseases does not transfer them to himself; the child whose parents eat forbidden foods is held to be affected by their transgression, while they themselves come off unharmed. The magical effects are limited by exclusive attention and ab- straction; and this is true not only of the kind of effect produced but also as to the direction in which it is held to be produced.

The Magic of Names. — For primitive peoples the name is as much a part of the person as a limb; consequently the magical use of names is in some of its aspects assimilable to the "processes dependent on the law of sympathy. In some cases the name must be withheld from any one who is likely to make a wrong use of it, and in some parts of the world people have secret names which are never used. Elsewhere the name must not be told by the bearer of it, but any other person may communicate it without giving an opening for the magical use of it. Not only human beings but also spirits can be coerced by the use of their names; hence the names of the dead are forbidden, lest the men- tion of them act as an evocation, unintentional though it be. Even among more advanced nations it has been the practice to conceal the real name of supreme gods; we may probably explain this as due to the fear that an enemy might by the use of them turn the gods away from those to whom they originally belonged. For the same reason ancient Rome had a secret name.

Magical Rites. — The magic of names leads us up to the magic of the spoken word in general. The spell or incantation and the magical act together make up the rite, (a) The manual acts are very frequently symbolic or sympathetic in their nature ; sometimes they are mere reversals of a religious rite; such is the marching against the sun (known as widdershins or deisul) ; sometimes they are purificatory ; and magic has its sacrifices just as much as religion. (b) There are many types of oral rites; some of the most curious consist in simply reciting the effect intended to be produced, describ- ing the manual act, or, especially in Europe, telling a mythical narrative in which Christ or the apostles figure, and in which they are represented as producing a similar effect to the one desired; in other cases the " origin " of the disease or maleficent being is recited. Oral rites, which are termed spells or incantations, correspond in many cases to the oral rites of religion ; they, like the manual rites, are a heterogeneous mass and hardly lend themselves to classifica- tion. Some formulae may be

termed sympathetic; it suffices to name the result to be produced in order to produce it ; but often an incantation is employed, not to produce a result directly, but to coerce a god or other being and compel him to fulfil the magician's will. The language of the incantations often differs from that of daily life; it may be a survival of archaic forms or may be a special creation for magical purposes. In many languages the word used to express the idea of magic means an act, a deed; and it may be assumed that few if any magical ceremonies consist of formulae only ; on the other hand, it is certain that no manual act in magic stands absolutely alone without oral rite; if there is no spoken formula, there is at least an unspoken thought. It is in many cases difficult to discover the relative proportions and importance of manual and oral acts. _ Not only the words but also the tone are of importance in magic; in fact, the tone may be the more important. Rhythm and repetition are no less necessary in oral than in manual acts, (c) As preliminaries, more seldom as necessary sequels to the central feature of the rite, manual or oral, we usually find a certain number of accessory observances prescribed, which find their parallel in the sacrificial ritual. For example, it is laid down at what time of year, at what period of the month or week, at what hour of the day a rite must be performed ; the waxing or waning of the moon must be noted ; and certain days must be avoided altogether. Similarly, certain

places may be prescribed for the performance of the ritual ; often the altar of the god serves magical purposes also ; but elsewhere it is precisely the impure sites which are devoted to magical operations — the cemeteries and the cross roads. The instruments of magic are in like manner often the remains of a sacrifice, or otherwise consecrated by .religion; sometimes, especially when they belong to the animal or vegetable world, they must be sought at certain seasons, May Day, St George's Day, Midsummer Day, &c. The magician and his client must undergo rites of preparation. ?r>d the exit may be marked by similar ceremonies.

Magicians. — Most peoples know the professional worker of magic, or what is regarded as magic, (a) In most if not all societies magic, or certain sorts of it, may be performed by any one, so far as we can see, who has mastered the necessary ritual ; in other cases the magician is a specialist who owes his position to an accident of birth (seventh son of a seventh son) ; to simple inheritance (families of magicians in modern India, rain-makers in New Caledonia) ; to revelation from the gods or the spirits of the dead (Malays), showing itself in the phenomena of possession ; or to initiation by other magicians. (b) From a psychical point of view it may probably be said that the initiation of a magician corresponds to the " development " of the modern spiritualistic medium ; that is to say, that it resolves itself into exercises and rites which have for their object the creation or evolution of a secondary personality. From this point of view it is important to notice that

certain things are forbidden to magicians under pain of loss of their powers ; thus, hot tea is taboo to the Arunta medicine man; and if this seems unlikely to cause the secondary

f>ersonaIity to disappear, it must be remembered that to the physio- ogical effects, if any, must be added the effects of suggestion. Of this duplication of personality various explanations are given ; in Siberia the soul of the shaman is said to wander into the other world, and this is a widely spread theory ; where the magician is supposed to remain on earth, his soul is again believed to wander, but there is an alternative explanation which gives him two or more bodies. Here we reach a point at which the familiar makes its appearance; this is at times a secondary form of the magician, but more often is a sort of life index or animal helper (see Lycanthropy) ; in fact, the magician's power is sometimes held to depend on the presence — that is, the independence — of his animal auxiliary. Concurrent with this theory is the view that the magician must first enter into a trance before the animal makes its appearance, and this makes it a double of the magician, or, from the psychological point of view, a phase of secondary personality, (c) In many parts of the world magical powers are associated with the membership of secret societies, and elsewhere the magicians form a sort of corporation ; in Siberia, for example, they are held to be united by a certain tie of kinship ; where this is not the case, they are believed, as in Africa at the present day or in medieval Europe, to hold assemblies, so-called witches' Sabbaths ; in Europe the meetings of heretics seem to be responsible for the prominence of the idea if not for its origin (see Witchcraft). The magician is often regarded as possessed (see Possession) either by an animal or by a human or super-human spirit. The relations of priest and magician are for various reasons complex; where the initiation of the magician is regarded as the work of the gods, the magician is for obvious reasons likely to develop into a priest, but he may at the same time remain a magician; where a religion has been superseded, the priests of the old cult are, for those who super- sede them, one and all magicians; in the medieval church, priests were regarded as especially exposed to the assaults of demons, and were consequently often charged with working magic. The great magicians who are gods rather than men — e.g. kings of Fire and Water in Cambodia — enjoy a reverence and receive a cult which separates them from the common herd, and assimilates them to priests rather than to magicians. The function of the so-called magician is often said to be beneficent; in Africa the witch-doctor's business is to counteract evil magic; in Australia the magician has to protect his own tribe against the assaults of hostile magicians of other tribes; and in Europe " white magic " is the correlative of this beneficent power; but it may be questioned how far the beneficent virtue is regarded as magical outside Europe.

Talismans and Amulets. — Inanimate objects as well as living beings are

credited with stores of • magical force ; when they are regarded as bringing good, i.e. are positive in their action, they may be termed "talismans"; "amulets" are protective or negative in their action, and their function is to avert evil; a single object may serve both purposes. Broadly speaking, the fetish, whose " magical " properties are due to association with a spirit, tends to become a talisman or amulet. The " medicine " of the Red Indian, originally carried as means of union between him and his manito, is perhaps the prototype of many European charms. In other cases it is some specific quality of the object or animal which is desired; the boar's tusk is worn on the Papuan Gulf as a means of imparting courage to the wearer; the Lukungen Indians of Vancouver Island rub the ashes of wasps on the faces of their warriors, in order that they may be pugnacious. Some Bechuanas wear a ferret as a charm, in the belief that it will make them difficult to kill, the animal being very tenacious of life. Among amulets may be mentioned horns and crescents, eyes or their representations, and grotesque figures, all of which are supposed to be powerful against the Evil Eye {q.v.).

Tylor has shown that the brass objects so often seen on harness were originally amuletic in purpose, and can be traced back to Roman times. Some amulets are supposed to protect from the evil eye simply by attracting the glance from the wearer to themselves, but, as a rule, magical power is ascribed to them.

Evil Magic. — The object of " black " magic is to inflict injury, disease, or death on an enemy, and the various methods employed illustrate the general principles dealt with above and emphasize the conclusion that magic is not simply a matter of sympathetic rites, but involves a conception of magical force, (a) It has been men- tioned that contagious magic makes use of portions of a person's body ; the Cherokee magician follows his victim till he spits on the ground ; collecting the spittle mingled with dust on the end of a stick, the magician puts it into a tube made of a poisonous plant together with seven earth worms, beaten into a paste, and splinters of a tree blasted by lightning ; the whole is buried with seven yellow stones at the foot of a tree struck by lightning, and a fire is built over the spot ; the magician fasts till the ceremony is over. Probably the worms are supposed to feed on the victim's soul, which is said to become " blue " when the charm works; the yellow stones are the emblem of trouble, and lightning-struck trees are reputed powerful in magic. If the charm does not work, the victim survives the critical seven days, and the magician and his employer are themselves in danger, for a charm gone wrong returns upon the head of

him who sent it forth, (b) In homoeopathic magic the victim is represented by an image or other object. In the Malay Peninsula the magician makes an image like a corpse, a footstep long. " If you want to cause sickness, you pierce the eye and blindness results ; or you pierce the waist and the stomach gets sick. If you want to cause death, you transfix the head with a palm twig; then you enshroud the image as you would a corpse and you pray over it as if you were praying over the dead ; then you bury it in the middle of the path which leads to the place of the person whom you wish to charm, so that he may step over it." Sometimes the wizard repeats a form of words signifying that not he but the Archangel Gabriel is burying the victim ; sometimes he exclaims, " It is not wax I slay but the liver, heart and spleen of So-and-so. ' ' Finally, the image is buried in front of the victim's doors, (c) Very widespread is the idea that a magician can influence his victim by charming a bone, stick or other object, and then projecting the magical influence from it. It is perhaps the commonest form of evil magic in Australia; in the Arunta tribe a man desirous of using one of these pointing sticks or bones goes away by himself into the bush, puts the bone on the ground and crouches over it, muttering a charm: " May your heart be rent asunder." After a time he brings the irna back to the camp and hides it; then one evening after dark he takes it and creeps near enough to see the features of his victim; he stoops down with the irna in his hand and repeatedly jerks it over his shoulder, muttering curses all the time. The evil magic, arungquiltka, is said to go straight to the victim, who sickens and dies without apparent cause, unless some medicine-man can discover what is wrong and save him by removing the evil magic. The irna is concealed after the cere- mony, for the magician would at once be killed if it were known that he had used it. (d) Magicians are often said to be able to assume animal form or to have an animal familiar. They are said to suck the victim's blood or send a messenger to do so; sometimes they are said to steal his soul, thus causing sickness and eventually death. These beliefs bring the magician into close relation with the werwolf (see Lycanthropy).

Rain-making. — In the lower stages of culture rain- making assumes rather the appearance of a religious ceremony, and even in higher stages the magical character is by no means invariably felt. It will, however, be well to notice some of the methods here, (a) Among the Dieri of Central Australia the whole tribe takes part in the ceremony ; a hole is dug, and over this a hut is built, large enough for the old men ; the women are called to look at it and then retire some five hundred yards. Two wizards have their arms bound at the shoulder, the old men huddle in the hut, and the principal wizard bleeds the two men selected by cutting them inside the arm below the elbow. The blood is made to flow on the old men, and the two men throw handfuls of down into the air. The blood symbolizes the rain ;

the down is the clouds. Then two large stones are placed in the middle of the hut ; these two represent gathering clouds. The women are again summoned, and then the stones are placed high in a tree; other men pound gypsum and throw it into a water-hole; the ancestral spirits are supposed to see this and to. send rain. Then the hut is knocked down, the men butting at it with their heads; this symbolizes the breaking of the clouds, and the fall of the hut is the rain. If no rain comes they say that another tribe has stopped their power or that the Mura-mura (ancestors) are angry with them. (b) Rain-making ceremonies are far from uncommon in Europe. Sometimes water is poured on a stone; a row of stepping-stones runs into one of the tarns on Snowdon, and it is said that water thrown upon the last one will cause rain to fall before night. Sometimes the images of saints are carried to a river or a fountain and ducked or sprinkled with water in the belief that rain will follow; sometimes rain is said to ensue when the water of certain springs is troubled ; perhaps the idea is that the rain-god is disturbed in his haunts. But perhaps the commonest method is to duck or drench a human figure

or puppet, who represents in many instances the vegetation demon. The gipsies of Transylvania celebrate the festival of " Green George ' at Easter or on St George's Day ; a boy dressed up in leaves and blossoms is the principal figure ; he throws grass to the cattle of the tribe, and after various other ceremonies a pretence is made of throw- ing him into the water; but in fact only a puppet is ducked in the stream.*

■*ive Magic. — There is also a negative side to magic, •which, together with ritual prohibitions of a religious nature, is often embraced under the name of taboo (q.v.) ; this extension of meaning is not justified, for taboo is only concerned with sacred things, and the mark of it is that its violation causes the taboo to be transmitted. All taboos are ritual prohibitions, but all ritual prohibitions are not taboos; they include also (a) inter- dictions of which the sanction is the wrath of a god; these may be termed religious interdictions; (b) interdictions, the violation of which will automatically cause some undesired magico-religious effect; to these the term negative magic should be restricted, and they might conveniently be called " bans "; they correspond in the main to positive rites and are largely based on the same principles.*

(a) Certain prohibitions, such as those imposed on totem kins, seem to occupy an intermediate place ; they depend on the sanctity of the totem animal without being taboos in the strict sense ; to them no positive magical rites correspond, for the totemic prohibition is clearly religious, not magical.

{b) Among cases of negative magic may be mentioned (i.) the couvade,

and prohibitions observed by parents and relatives gener- ally ; this is most common in the case of young children, but a sym- pathetic relation is held to exist in other cases also. In Madagascar a son may not eat fallen bananas, for the result would be to cause the death of his own father; the sympathy between father and son establishes a sympathy between the father and objects touched or eaten by the son, and, in addition, the fall of the bananas is equated with the death of a human being. Again, the wife of a Malagasy warrior may not be faithless to him when he is absent ; if she is, he will be killed or wounded. Ownership, too, may create a sym- pathetic relation of this kind, for it is believed fn parts of Europe that if a man kills a swallow his cows will give bloody milk. In some cases it is even harder to see how the sympathetic bond is established; some Indians of Brazil always hamstring animals before bringing them home, in the belief that by so doing they make it easier for themselves and their children to run down their enemies, who are then magically deprived of the use of their legs. These are all examples of negative magic with regard to persons, but things may be equally affected ; thus in Borneo men who search for camphor abstain from washing their plates for fear the camphor, which is found crystallized in the crevices of trees, should dissolve and dis- appear, (ii.) Rules which regulate diet exist not only for the benefit of others but also for that of the eater. Some animals, such as the hare, are forbidden, just as others, like the lion, are prescribed; the one produces cowardice, while the other makes a man's heart bold, (iii.) Words may not be used; Scottish fishermen will not mention the pig at sea ; the real names of certain animals, like the bear, may not be used ; the names of the dead may not be mentioned ; a sacred language must be used, e.g. camphor language in the Malay peninsula, or only words ! of good omen (cf. Gr. euˆrjˆcTre) ; or absolute silence must be preserved. Personal names are concealed ; a man may not mention the names of certain relatives, &c. There are customs of avoidance not only as to (iv.) the names of relatives, but as to the persons themselves; the mother-in-law must avoid the son-in-law, and vice versa; sometimes they may converse at a distance, or in low tones, sometimes not at all, and sometimes they may not even meet, (v.) In addition to these few classes selected at random, we have prohibitions relating to numbers (cf. unlucky thirteen, which is, however, of recent date), the calendar (Friday as an unlucky day, May as an unlucky month for marriage), places, persons, orientation, &c ; but it is impossible to enumerate even the main classes. The individual origin of such beliefs, which with us form the superstitions of daily life but in a savage or semi-civilized community play a large part in regulating conduct, is often shrouded in darkness ; the meaning of the positive rite is easily forgotten ; the negative rite persists, but it is observed merely to avoid some unknown misfortune. Sometimes we can, however, guess at the meaning of our civilized notions of ill luck; it is perhaps as a survival of the savage belief

that stepping over a person is injurious to him that many people regard going under a ladder as unlucky; in the one case the luck is taken away by the person stepping over, in the other left behind by the person passing under.

History of Magic. — The subject is too vast and our data are too slight to make a general sketch of magic possible. Our knowledge of Assyrian magic, for example, hardly extends beyond the rites of exorcism; the magic of Africa is most inade- quately known, and only in recent years have we well-analysed

repertories of magical rituals from any part of the world. For certain departments of ancient magic, however, like the Pytha- gorean philosophy, there is no lack of illustrative material; it depended on mystical speculations based on numbers or analo- gous principles. The importance of numbers is recognized in the magic of America and other areas, but the science of the Mediterranean area, combined with the art of writing, was needed to develop such mystical ideas to their full extent. Among the neo-Platonists there was a strong tendency to magical specula- tion, and they sought to impress into their service the demons with which they peopled the universe. Alexandria was the home of many systems of theurgic magic, and gnostic gems afford evidence of the nature of their symbols. In the middle ages the respectable branches of magic, such as astrology and alchemy, included much of the real science of the period; the rise of Christianity introduced a new element, for the Church regarded all the religions of the heathen as dealings with demons and therefore magical (see Witchcraft). In our own day the occult sciences still find devotees among the educated; certain elements have acquired a new interest, in so far as they are the subject matter of psychical research (q.v.) and spiritualism (q.v.). But it is only among what are regarded as the lower classes, and in England especially the rural population, that belief in its efficacy still prevails to any large extent.

Psychology of Magic. — The same causes which operated to produce a belief in witchcraft (q.v.) aided the creed of magic in general. Fortuitous coincidences attract attention; the failures are disregarded or explained away. Probably the magician is never wholly an impostor, and frequently has a whole-hearted belief in himself; in this connexion may be noted the fact that juggling tricks have in all ages been passed off as magical; the name of " conjuring " (q.v.) survives in our own day, though the conjurer no longer claims that his mysterious results are produced by demons. It is

interesting to note that magical leechcraft depended for its success on the power of suggestion (q.v.), which is to-day a recognized element in medicine; perhaps other ele- ments may have been instrumental in producing a cure, for there are cases on record in which European patients have been cured by the apparently meaningless performances of medicine-men, but an adequate study of savage medicine is still a desideratum.

Bibliography. — For a general discussion of magic with a list of selected works see Hubert and Mauss in Annee sociologique, vii. 1-146; also A. Lehmann, Aberglaube und Zauberei; the article " Religion " in La Grande encyclopedic; K. T. Preuss in Globus, vols. 86, 87; Mauss, L'Origine des pouvoirs magiques, and Hubert, La Representation du temps (Reports of Ecole pratique des hautes etudes, Paris). For general bibliographies see Hauck, Realencyklopddie, s.v. " Magie "; A. C. Haddon, Magic and Fetish-ism. J. G. T. Graesse's Bibliotheca magica is an exhaustive list of early works dealing with magic and superstition. For Australia see Spencer and Gillen's works, and A. W. Howitt, Native Tribes. For America see Reports of Bureau of Ethnology, vii. xvii. For India see W. Caland, Altindisches Zauber-ritual ; and W. Crooke, Popular Religion; also V. Henry, La Magie. For the Malays see W. W. Skeat, Malay Magic. For Babylonia and Assyria see L. W. King's works. For magic in Greece and Rome see Daremberg and Saglio, s.v. " Magia," " Amuletum," &o. For medieval magic see A. Maury, La Magie. For illustrations of magic see J. G. Frazer, The Golden Bough; E. S. Hartland, Legend of Perseus; E. B. Tylor, Primitive Culture; W. G. Black, Folkmedicine. For negative magic see the works of Frazer and Skeat cited above; also Journ. Anthrop. Inst, xxxvi. 92-103; Zeitschrift fur Ethnologie (Verhandlungen) (1905), 153-162; Bulletin trimestriel de I'academie malgache, iii. 105-159. See also bibliography to Taboo and Witchcraft.

(N. W. T.)

MAGIC SQUARE, a square divided into, equal squares, like a chess-board, in each of which is placed one of a series of con- secutive numbers from 1 up to the square of the number of cells in a side, in such a manner that the sum of the numbers in each row or column and in each diagonal is constant.

From a very early period these squares engaged the attention of mathematicians, especially such as possessed a love of the marvellous, or sought to win for themselves a superstitious regard. They were then supposed to possess magical properties, and were worn, as in India at the present day, engraven in metal or stone, as amulets or talismans. According to the old astro-

logers, relations subsisted between these squares and the planets. In later times such squares ranked only as mathematical curiosi- ties; till at last their mode of construction was systematically investigated. The earliest known writer on the subject was Emanuel Moscopulus, a Greek (4th or 5th century). Bernard Frenicle de Bessy constructed magic squares such that if one or more of the encircling bands of numbers be taken away the remaining central squares are still magical. Subsequently Poignard constructed squares with numbers in arithmetical pro-

200

“7

232

349

8

35

40

57

73

89

104

X2X

‘3«

•53

168

185

S«

39

36

7

350

231

3X8

199

186

167

‘54

‘35

X23

103

90

7′

198

“9

33°

=5′

6

**7*

38

59

70

9′

X02

123

‘34

‘S5

166

■87

60

37

28

5

352

339

220

‘97

188

*S

“5«

»33

“4

XOX

9*

«9

201

3×6

»33

348

9

34

41

5«

73

88

«°5

X30

‘37

‘53

269

184

55

4a

**3*

xo

»47

**34*

aiS

303

•83

170

‘5’

X 3 8

119

X06

87

74

203

2×4

335

246

XX

22

43

54

75

86

107

1×8

‘39

150

•7′

182

S3

44

2X

X3

245

236

213

204

181

172

149

X40

“7

108

85

76

»5

212

»37

**44*

»3

20

45

S»

77

84

109

116

141

X48

«73

180

S»

4«

‘9

«4

243

338

3.1X

306

‘79

‘74

«47

143

“5

xxo

83.

78

307

2IO

339

243

«5

x8

47

50

79

82

XXI

“4

143 •

x 4 6

‘75

‘78

49

48

‘7

16

241

240

209

3o3

‘77

176

“45

‘44

“3

XX2

81

80

196

221

3l8

353

4

**9*

3«

61

68

93

xoo

‘35

‘33

‘57

164

189

63

35

3″

3

354

337

222

‘95

190

‘63

‘S8

‘3′

136

99

94

67

>94

223

226

»5S

2

3>

34

63

66

95

98

137

130

‘59

162

‘9»

«4

33

*3**

«

256

«S

234

‘93

192

161

160

139

128

97

96

«S

Fig. 1.

gression, having the magical summations. The later researches of Phillipe de la Hire, recorded in the Mimoires de V Academie Royale in 1705, are

interesting as giving general methods of construction. He has there collected the results of the labours of earlier pioneers; but the subject has now been fully systema- tized, and extended to cubes.

Two interesting magical arrangements are said to have been given by Benjamin Franklin; these have been termed the " magic square of squares " and the " magic circle of circles." The first (%. 1) is a square divided into 256 squares, i.e. 16 squares along a s»de, in

Fig. 2.

which are placed the numbers from 1 to 256. The chief properties of this square are (1) the sum of the 16 numbers in any row or column is 2056 ; (2) the sum of the 8 numbers in half of any row or column is 1028, i.e. one half of 2056; (3) the sum of the numbers in two half- diagonals equals 2056; (4) the sum of the four corner numbers of the great square and the four central numbers equals 1028; (5) the sum of the numbers in any 16 cells of the large square which them- selves are disposed in a square is 2056. This square has other curious

properties. The " magic circle of circles " (fig. 2) consists of eight annular rings and a central circle, each ring being divided into eight cells by radii drawn from the centre; there are therefore 65 cells. The number 12 is placed in the centre, and the consecutive numbers 13 to 75 are placed in the other cells. The properties of this figure include the following: (1) the sum of the eight numbers in any ring together with the central number 12 is 360, the number of degrees in a circle; (2) the sum of the eight numbers in any set of radial cells together with the central number is 360; (3) the sum of the numbers in any four adjoining cells, either annular, radial, or both radial and two annular, together with half the central number, is 180.

Construction of Magic Squares. — A square of 5 (fig. 3) has adjoining it one of the eight equal squares by which any square

may be conceived to be surrounded, each of which has two sides resting on adjoining squares, while four have sides resting on the surrounded square, P and four meet it only

‘ 3′ at its four angles. 1,2,

3 are placed along the path of a knight in chess; 4, along the same path, would fall in a cell of the outer square, and is placed instead in the

corresponding cell of the original square; 5 then falls within the square, a, b, c, d are placed diagonally in the square; but e enters the outer square, and is removed thence to the same cell of the square it had left, a, j3, 7, 5, « pursue another regular course; and the diagram shows how that course is recorded in the square they have twice left. Whichever of the eight surrounding squares may be entered, the corresponding cell of the central square is taken instead. The 1, 2, 3, ..., a, b, c, ..., a, /3, y, ... are said to lie in "paths."

Squares whose Roots are Odd. — Figs 4, 5, and 6 exhibit one of the earliest methods of constructing magic squares. Here the

a

c

5

e

«

6

S

4

t

y

c

3

y

a

p

d

a

e

1

4

a

S

3

a

4

6

3

1

XI

**4*

a

ao

8

4

»

s

3

1

1

a

4

3

xa

»S

3

16

•

s

3

1

4

3

s

a

4

“7

ro

>3

ax

4

5

3

‘

4

a

3

t

a

4

5

x8

6

•4

aa

3

1

4

a

S

♦

3

1

a

23

X

‘9

7

‘S

Fig. 4.

Fig. 5.

Fig. 6.

3's in fig. 4 and 2's in fig. 5 are placed in opposite diagonals to secure the two diagonal summations; then each number in fig. 5 is multiplied by 5 and added to that in the corresponding square in fig. 4, which gives the square of fig. 6. Figs. 7, 8 and 9 give De la Hire's method; the squares of figs. 7 and 8, being combined, give the magic square of fig. 9. C. G. Bachet arranged the num- bers as in fig. 10, where there are three numbers in each of four surrounding squares; these being placed in the corresponding cells of the central square, the square of fig. 1 1 is formed. He also con-

a

X

5

3

4

«5

s

ao

10

•7

6

S

a3

X4

3

4

a

X

5

ao

XO

IS

s

3

a4

13

iS

xo

X

5

3

4

a

xo

XS

S

ao

11

ao

8

4

aa

4

a

1

5

3

S

ao

xo

‘5

9

a

ax

»5

18

5

3

4

t

X

20

xo

«S

S

as

«3

«9

7

X

Fig. 7.

Fig. 8.

Fig. 9.

structed squares such that if one or more outer bands of numbers are removed the remaining central squares are magical. His method of forming them may be understood from a square of 5. Here each summation is 5X13; if therefore 13 is subtracted from each number, the summations will be zero, and the twenty-five cells will contain the series == 1, * 2, ± 3, ... =t 12, the odd cell having o. The central square of 3 is formed with four of the twelve numbers with + and — signs and zero in the middle; the band is filled up with the rest, as in fig. 12; then, 13 beingadded in each cell, the magic square of fig. 13 is obtained.*

Squares whose Roots are Even. — These were constructed in various ways, similar to that of 4 in figs. 14, 15 and 16. The num- bers in fig. 15 being multiplied by 4, and the squares of figs. 14 and 15 being superimposed, give fig. 16. The application of

6

»

XX

7

3

xS

xa

8

‘7

‘3

9

32

18

•4

23

»9

*S

XX

H

7

ao

3

4

xa

*S

8

16

«7

S

13

ax

9

xo

18

X

14

aa

**3*

6

19

2

IS

aS

Fig. 10.

Fig. 11.

this method to squares the half of whose roots are odd requires a complicated adjustment. Squares whose half root is a multiple of 4, and in which there are summations along all the diagonal

-9

xa

5

-3

-6

4

as

18

XX

7

X

7

-XX

4

-X

«4

30

3

17

xa

-8

-3

3

8

5

XO

•3

x6

ax

xo

-4

XX

1

-XO

23

9

24

6

3

6

-xa

-5

a

9

»9

X

8

“S

22

Fig. 12.

Fig. 13.

paths, may be formed, by observing, as when the root is 4, that the series 1 to 16 may be changed into the series 15, 13, ... 3, 1,-1,-3, • • • —13,-15, by multiplying each number by 2

X

3

3

4

e

3

3

X

IS

14

4

4

X

3

t

•

X

X

s

*X**

6

7

9

4

9

3

Xa.

X

a

■

X

8

xo

XX

S

1

3

2

4

3

3

**3*

3

3

16

Fig. 14.

Fig. 16.

Fig. 15.

and subtracting 17; and, vice versa, by adding 17 to each of the latter, and dividing by 2. The diagonal summations of a square, filled as in fig. 17, make zero; and, to obtain the same in the rows

A

A

«,

°,

X

-3

tx

-9

9

7

14

4

A

A

«3

«.

-S

7

-IS

13

6

xa

X

«S

-o,

“°2

-A

-A

-XX

9

-X

3

3

13

8

xo

-«a

-°«

-A

-A

IS

-«3

5

-7

16

a

IS

S

Fig. 17.

Fig. 18.

Fig. 19.

and columns, we must assign such values to the p's and q's as

satisfy the equations pi + pi +

pi + p3 — ai—as = o, and pz-- pi — a

which is 'readily obtained by inspection, as in fig. 18; this leads

to the square, fig. 19. When

the root is 8, the upper four

subsidiary rows may at once

be written, as in fig, 20; then,

if 65 be added to each, and

the sums halved, the square

is completed. In such squares

as these, the two opposite

squares about the same diagonal (except that of 4) may be

turned through any number of right angles, in the same

direction, without altering the summations.

Nasik Squares. — Squares that have many more summations than in rows, columns and diagonals were investigated by A. H. Frost (Cambridge Math. Jour., 1857), and called Nasik squares, from the town in India where he resided; and he extended the method to cubes, various sections of which have the same singular properties In order to understand their construction it will be necessary to

-X

3

S

-7

-33

3S

37

-39

9

-IX

-13

IS

4«

-43

-4S

47

«7

-19

•2X

23

49

-Si

-S3

5S

*-*S*

‘7

29

-31

-57

S9

61

-«3

Fig. 20.

3i2

MAGIC SQUARE

consider carefully fig. 21, which shows that, when the root is a prime, and not composite, number, as 7, eight letters a,b, ...h may proceed from any, the same, cell, suppose that marked o, each letter being repeated in the cells along different paths. These eight paths are called " normal paths," their number being one more than the root Observe here that, excepting the cells from which any two letters start, they do not occupy again the same cell, and that two letters, starting from any two different cells along differ- ent paths, will appear together in one and only one cell. Hence, if />, be placed in the cells of one of the »-f 1 normal paths, each of the remaining « normal paths will contain one, and only one, of these pˆs. If now we fill each row with p 2 , p 3 , . . . p„ in the same order, commencing from the pi in that row, the p 2 'S, p 3 'S and p„'S will lie each in a path similar to that of p x , and each of the n normal paths will contain one, and only one, of the letters p„ p 2 , . . . p n , whose sum will be ~Zp. Similarly, if qi be placed along any of the normal paths, different from that of the p's, and each row filled as above with the letters q 2 , q 3 , . . . g„, the sum of the g's along any normal path different from that of the gi will be 2g. The n-cells of the square will now be found to contain all the combinations of the p's and g's; and if the g's be multiplied by n, the p's made equal to 1, 2, . . . n, and the g's to o, I, 2,. . .(« — 1) in any order, the Nasik square of n will be obtained, and the summations along all the normal paths, except those traversed by the p's and g's, will be the constant 2reg + Xp. When the root is an odd composite number, as 9, 15, &c, it will be found that in some paths, different from the two along which the pi and gi were placed, instead of having each of the p's and g's, some will be wanting, while some are repeated. Thus, in the case of 9, the triplets, pip t p 7 , p 2 P r ,p s , P 3 p 6 P

a

g

f

e

d

c

b

a

d

g

c

f

b

e

a

c

e

g

b

d

f

a

f

d

b

3

e

c

a

e

b

f

c

g

d

a

b

c

d

e

f

g

h

h

h

h

h

h

Fig. 21.

and 2r 36. But if we make p v p 2 , ■ the r u r 2 , . . .r„ = 0, 2, 5, 4, 3, 6, 8, 7

63

88

74

“3

8

24

S3

48

34

II

9

25

*5**

49

35

6x

89

75

*5**

47

3«

62

«7

76

12

7

26

68

84

73

18

4

23

58

44

33

‘9

S

-XX

59

45

3’

69

85

7>

57

46

*3**

«7

86

*7**

»7

6

22

64

83

78

X4

3

28

54

43

38

»S

X

29

55

4«

39

65

81

79

56

*4**

37

66

8z

77

16

2

27

Fig. 22.

£9. = 1.3. 6. 5. 4, 7, 9. 8, 2, and I, thrice each of the above sets of triplets will equal Xp and 2g respectively. If now the g's are multiplied by 9, and added to the p's in their several cells, we shall have a Nasik square, with a constant summation along eight of its ten normal paths. In fig. 22 the numbers are in the nonary scale; that in the centre is the middle one of 1 to 9 2 , and the sum of pair of numbers equidistant from and opposite to the central 45 is twice 45; and the sum of any number and the 8 numbers 3 from it, diagonally, and in its row and column, is the constant Nasi- cal summation, e.g. 72 and The numbers in fig. 22 being kept

A dot is here placed on three faces of a cubelet at the corner, showing that this cubelet belongs to each of the faces AOB, BOC, COA, of the cube. Dots are placed on the cubelets of some path of AOB (here the knight's path), beginning from O, also on the cubelets of a knight's path in BOC. Dots are now placed in the cubelets of similar paths to that on BOC in the other six sections parallel to BOC, starting from their dots in AOB. Forty-nine of the three hundred and forty-three cubelets will now contain a dot; and it will be observed that the dots in sections perpendicular to BO have arranged themselves in similar paths. In this manner, £,, g,, r 1 being placed in the corner cubelet O, these letters are severally placed in the cubelets of three different paths of AOB, and again along any similar paths in the seven sections perpendicular to AO, start- ing from the letters' position in AOB Next, p 2 q 2 r 2 , p 3 q 3 r 3 , . . . p 7 q 7 r 7 are placed in the other cube- lets ot the edge AO, and dispersed in the same manner as piqiri. Every cubelet will then be found to contain a different combination of the p's, g's and r's. If therefore the p's are made equal to I, 2, ... 7, and the g's and r's to o, I, 2,. . .6, in any order, and the g's multiplied by_ 7, and the r's by 7 2 , then, as in the case of the squares, the 7 s cubelets will contain the numbers from 1 to 7 3 , and the Nasical summations will be S7 2 r +S7g + p. If 2, 4, 5 be values of r,p,q, the number for that cubelet is written 245 in the septenary scale, and if all the cubelet numbers are kept thus, the paths along which summations are found can be seen without

adding, as the seven numbers would contain 1, 2, 3,. . . 7 in the unit place, and o, 1, 2, ... 6 in each of the other places. In all Nasik cubes, if such values are given to the letters on the central cubelet that the number is the middle one of the series 1 to re 3 , the sum of all the pairs of numbers opposite

Aft

*/a?**

A?l

A?2

/>3?1

A?2

Aft

A?4

?2?3

A?4

A?1

Pill

A?l

.As??

A?3

Atf»

>5

xo

3

6

4

5

16

9

14

XI

2

7

X

8

«3

X2

Fig. 23. giving Xp and 2g.

Fig. 24. g 4 be 1,2, 4,

Fig. 25 — Nasik Cube.

X

8

29

28

XX

«4

‘3

l8

30

»7

2

7

XX

20

9

x6

4

5

*3**

**5*

xo

IS

22

19

3i

26

3

6

24

«7

»

«3

32, 22, 76, 77, 26, 37, 36, 27. .

in the nonary scale, it is not necessary to add any mne ot them together in order to test the Nasical surftmation; for, taking the first column, the

figures in the place of units are seen at once to form the series, 1, 2, 3,. . . .9, and those in the other place three triplets of 6, 1, 5. For the squares of 15 the p's and g's may be respectively 1, 2, 10, 8, 6, 14, 15, 11, 4, 13, 9, 7, 3, 12, 5, and o, I, 9, 7, 5, 13, 14, 10, 3, 12, 8, 6, 2, 11, 4, where five times the sum of every third number and three times the sum of every fifth number makes Xp and 2g; then, if the g's are multiplied by 15, and added to the p's, the Nasik square of 15 is obtained. When the root is the multiple of 4, the same process gives us, for the square of 4, fig. 23. Here the columns give Xp, but alternately 2g t , 2g 3 , and 2g 2 , 2g 4 ; and the rows give 2g, but alternately 2pi, 2p 3 , and 2p 2 , 2p t ; the diagonals

_ . .- If Pi, P2, Pv Pa. and q v q 2 . „ .

and o, 1 , 3, 2, we have the Nasik square of fig. 24. A square like this is engraved in the Sanskrit character on the gate of the fort of Gwalior, in India. The squares of higher multiples of 4 are readily obtained by a similar adjustment.

Nasik Cubes. — A Nasik cube is composed of n s small equal cubes, here called cubelets, in the centres of which the natural numbers from 1 to n z are so placed that every section of the cube by planes perpendicular to an edge has the properties of a Nasik square ; also sections by planes perpendicular to a face, and passing through the cubelet centres of any path of Nasical summation in that face. Fig. 25 shows by dots the way in which these cubes are constructed.

Fig. 26.

to and equidistant from the middle number is the double of it. Also, if around a Nasik cube the twenty-six surrounding equal cubes be placed with their cells filled with the same numbers, and their corresponding faces looking the same way, — and if the surrounding space be conceived thus filled with similar cubes, and a straight line of unlimited length be drawn through any two cubelet centres, one in each of any two cubes, — the numbers along that line will be found to recur in groups of seven, which (except in the three cases where the same p, q or r recur in the group) together make the Nasical summation of the cube. Further, if we take n similarly filled Nasik cubes of n, n new letters, s v s 2 , . . .s n , can be so placed, one in each of the n cubelets of this group of n cubes, thateach shall contain a different combination of the p's, g's, r's and i's. This is done by placing s x on each of the « 2 cubelets of. the first cube that*

'3

XI

6

25

xo

5

»4

»7

12

‘9

22

‘3

4

7

«4

9

2

21

16

X

20

«5

S

3

3″

2X

6

‘5

28

“9

7

l6

29

20

5

14

22

31

8

35

18

27

9

36

‘7

26

13

4

3«

23

2

11

34

25

X

xo

33

=4

3

12

.

Fig. 27.

Fig. 28.

contain pi, and on the » 2 cubelets 01 the 2d, 3d, ... and «th cube that contain p 2 , p 3 , ... p n respectively. This process is repeated with S2, beginning with the cube at which we ended, and so on with the other s's; the » 4 cubelets, after multiplying the g's, r's, and s's by n, n 2 , and n l respectively, will now be filled with the numbers from 1 to » 4 , and the constant summation will be 2» 3 .s + 2w 2 r + 2reg + Xp. This process may be carried on without limit ; for, if the n cubes are placed in a row with their faces resting on each other, and the corres- ponding faces looking the same way, n such parallelepipeds might be put side by side, and the re 5 cubelets of this solid square be Nasically filled by the introduction of a new letter t; while, by introducing another letter, the re 6 cubelets of the compound cube of n 3 NasiK

MAGINN— MAGISTRATE

3i3

cubes might be filled by the numbers from 1 to n", and so ad infinitum. When the root is an odd composite number the values of the three groups of

letters have to be adjusted as in squares, also in cubes of an even root. A similar process enables us to piace successive numbers in the cells of several equal squares in which the Nasical summations are the same in each, as in fig. 26.

Among the many ingenious squares given by various writers, this article may justly close with two by L. Euler, in the Histoire de I'academie royale des sciences (Berlin, 1759). In fig. 27 the natural numbers show the path of a knight that moves within an odd square in such a manner that the sum of pairs of numbers opposite to and equidistant from the middle figure is its double. In fig. 28 the knight returns to its starting cell in a square of 6, and the difference between the pairs of numbers opposite to and equidistant from the middle point is 18.

A model consisting of seven Nasik cubes, constructed by A. H. Frost, is in the SouthKensington Museum. The centres of the cubes are placed at equal distances in a straight line, the similar faces look- ing the same way in a plane parallel to that line. Each of the cubes has seven parallel glass plates, to which, on one side, the seven numbers in the septenary scale are fixed, and behind each, on the other side, its value in the common scale. 1201, the middle number from I to 7 4 , occupies the central cubelet of the middle cube. Besides each cube having separately the same Nasical summation, this is also obtained by adding the numbers in any seven similarly situated cubelets, one in each cube. Also, the sum of all pairs of numbers, in a straight line, through the central cube of the system, equidistant from it, in whatever cubes they are, is twice 1201. (A. H. F.)

Fennell's Magic Ring. — It has been noticed that the numbers of magic squares, of which the extension by repeating the rows and columns of n numbers so as to form a square of 2»-i sides yields n 2 magic squares of n sides, are arranged as if they were all inscribed round a cylinder and also all inscribed on another cylinder at right angles to the first. C. A. M. Fennell explains this apparent anomaly by describing such magic squares as Mercator's projections, so to say, of " magic rings. "

The surface of these magic rings is symmetrically divided into n 2 quadrangular compartments or cells by n equidistant zonal circles, parallel to the circular axis of the ring and by n transverse circles which divide each of the n zones between any two neighbour- ing zonal circles into n equal quadrangular cells, while the zonal circles divide the sectionsbetween two neighbouring transverse circles into n unequal quadrangular cells. The diagonals of cells which follow each other passing once only through each zone and section, form similar and equal closed curves passing once quite round the circular axis of the ring and once quite round the centre of the ring. The position of each number is regarded as the intersection of two

diagonals of its cell. The numbers are most easily seen if the smallest circle on the surface of the ring, which circle is concentric with the axis, be one of the zonal circles. In a perfect magic ring the sum of the numbers of the cells whose diagonals form any one of the 2« diagonal curves aforesaid is |»(» 2 + 1) with or without increment, i.e. is the same sum as that of the numbers in each zone and each transverse section. But if n be 3 or a multiple of 3, only from 2 tow of the diagonal curves carry the sum in question, so that the magic rings are imperfect ; and any set of numbers which can be arranged to make a perfect magic ring or magic square can also make an imperfect magic ring, e.g. the set I to 16 if the numbers

I, 6, 11, 16 lie thus on a diagonal curve instead of in the order 1, 6, 16

II. From a perfect magic ring of n 1 cells containing one number each, rf distinct magic squares can be read off; as the four numbers round each intersection of a zonal circle and a transverse circle constitute corner numbers of a magic square. The shape of a magic ring gives it the function of an indefinite extension in all directions of each of the aforesaid « 2 magic squares. (C. A. M. F.)

SeeF. E. A. Lucas, Recreations mathematiques (1 891-1894) ; W.W.R. Ball, Mathematical Recreations (1892); W. E. M. G. Ahrens, Mathematische Unterhaltungen und Spiele (1901); H. C. H. Schubert, Mathematische Mussestunden (1900). A very detailed work is B. Violle, Traite complet des carres magiques (3 vols., 1837-1838). The theory of " path nasiks " is dealt with in a pamphlet by C. Planck (1906).

MAGINN, WILLIAM (1793-1842), Irish poet and journalist, was born at Cork on the 10th of July 1793. The son of a schoolmaster, he graduated at Trinity College, Dublin, in 181 1, and after his father's death in 1813 succeeded him in the school. In 18 19 he began to contribute to the Literary Gazette and to Blackwood's Magazine, writing as " R. T. Scott " and " Morgan O'Doherty." He first made his mark as a parodist and a writer of humorous Latin verse. In 1821 he visited Edinburgh, where he made acquaintance with the Blackwood circle. He is credited with having originated the idea of the Nodes ambrosianae, of which some of the most brilliant chapters were his. His

connexion with Blackwood lasted, with a short interval, almost to the end of his life. His best story was " Bob Burke's Duel with Ensign Brady." In 1823 he removed to London. He was employed by John Murray on the short-lived Representative, and was for a short time joint-editor of the Standard. But his intemperate habits and his imperfect journalistic morality pre- vented any permanent success. In connexion with Hugh Fraser he established Fraser's Magazine (1830), in which ap- peared his " Homeric

Ballads." Maginn was the original of Captain Shandon in Pendennis. In spite of his inexhaustible wit and brilliant scholarship, most of his friends were eventually alienated by his obvious failings, and his persistent insolvency. He died at Walton-on-Thames on the 21st of August 1842.

His Miscellanies were edited (5 vols., New York, 1 855-1 857) by R. Shelton Mackenzie and (2 vols., London, 1885) by R. W. Montagu [Johnson].

MAGISTRATE (Lat. magistratus, from magister, master, properly a public office, hence the person holding such an office) , in general, one vested with authority to administer the law or one possessing large judicial or executive authority. In this broad sense the word is used in such phrases as " the first magis- trate" of a king in a monarchy or "the chief magistrate" of the president of the United States. But it is more generally applied to minor or subordinate judicial officers, whether unpaid, as justices of the peace, or paid, as stipendiary magistrates. A stipendiary magistrate is appointed in London under the Metro- politan Police Courts Act 1839, in municipal boroughs under the Municipal Corporations Act 1882, and in particular districts under the Stipendiary Magistrates Act 1863 and special acts. In London and municipal boroughs a stipendiary magistrate must be a barrister of at least seven years' standing, while under the Stipendiary Magistrates Act 1863 he may be of five years' standing. A stipendiary magistrate may do alone all acts authorized to be done by two justices of the peace.

The term magistratus in ancient Rome originally implied the office of magister (master) of the Roman people, but was subsequently applied also to the holder of the office, thus becoming identical in sense with magister, and supplanting it in reference to any kind of public office. The fundamental conception of Roman magistracy is tenure of the imperium, the sovereignty which resides with the Roman people, but is by it conferred either upon a single ruler for life, as in the later monarchy, or upon a college of magistrates for a fixed term, as in the Republican period. The Roman theory of magis- tracy underwent little change when two consuls were substituted for the king; but the subdivision of magisterial powers which characterized the first centuries of the Republic, and resulted in the establishment of twenty annually elected magistrates of the people, implied some modification of this principle of the investiture of magistrates with supreme authority. For when the magistracies were multiplied a distinction was drawn be- tween magistrates with imperium, namely consuls, praetors and occasionally dictators, and the remaining magistrates, who, although exercising independent magisterial authority and in no sense agents of the higher magistrates, were invested merely with an authority (poteslas) to assist in the administration of the state. At the same time the actual

authority of every magistrate was weakened not only by his colleagues' power of veto, but by the power possessed by any magistrate of quashing the act of an inferior, and by the tribune's right of putting his veto on the act of any magistrate except a dictator; and the subdivision of authority, which placed a great deal of business in the hands of young and inexperienced magistrates, further tended to in- crease the actual power as well as the influence of the senate at the expense of the magistracy.

In the developed Republic magistracies weredivided into two classes: (a) magistrates of the whole people (populi Romani) and (b) magistrates of the plebs. The former class is again divided into two sections: (a) curule and (0) non-curule, a dis- tinction which rests mainly on dignity rather than on actual power, for it cuts across the division of magistrates according to their tenure or non-tenure of imperium.

a. The magistrates of the people — also known as patrician magis- trates, probably because the older and more important of these magistracies could originally be held only by patricians (q.v.) — were : (a) Dictator, master of the horse (see Dictator), consuls, praetors, curule, aediles and censors (curule) ; and (/3) Quaestors, and the body of minor magistrates known as xxvi. viri (non-curule). The dictator- ship and consulship were as old as the Republic. The first praetor was appointed in 366 B.C., a second was added in 242 B.C., and the number was gradually increased for provincial government until Sulla brought it up to eight, and under the early principate it grew to eighteen. Censors were first instituted in 443 B.C., and the office continued unchanged until its abolition by Sulla, after which, though restored, it rapidly fell into abeyance. Curule aediles were instituted at the same time as the praetorship, and continued throughout the Republic. The quaestorship was at least as old as the Republic, but the number rose during the Republic from two to twenty. All these offices except the censorship continued for administrative purposes during the principate, though shorn of all important powers.

b. The plebeian magistrates had their origin in the secession of the plebs to Mons Sacer in 494 B.C. (see Rome: History). In that year tribunes of the plebs were instituted, and two aediles were given them as subordinate officials, who were afterwards known as plebeian aediles, to distinguish them from the curule magistrates of the same name. Both these offices were abolished during the decemvirate, but were restored in 449 B.C., and survived into the principate.

The powers possessed by all magistrates alike were two: — that of enforcing their enactments (coercitio) by the exercise of any punishment short of capital, and that of veto(intercessio) of any act of a colleague or minor magistrate. The right of summoning and presiding over an assembly of that body of citizens with whose powers the magistrate was invested lay with the higher magistrates only in each class, with the consuls and praetors, and with the tribunes of the plebs. Civil jurisdiction was always a magisterial prerogative at Rome, and criminal jurisdiction also, except in capital cases, the decision of which was vested in the people at least as early as the first year of the Republic, was wielded by magistrates until the establishment of the various quaestiones perpetuae during the last century of the Republic. But in civil cases the magistrate, though controlling the trial and deciding matters of law, was quite distinct from the judge or body of judges who decided the question of fact; and the quaestiones perpetuae, which reduced the magistrate in criminal cases to a mere president of the court, gave him a posi- tion inferior to that of the praetor, who tried civil cases, only in so far as the praetor controlled the trial in some degree by his formula, under which the judges decided the question of fact.

Tenure of magistracy was always held to depend upon election by the body whose powers the magistrate wielded. Thus the magistrates of the plebs were elected by the plebeian council, those of the people in the Comitia {q.v.). In every case the out- going magistrate, as presiding officer of the elective assembly, exercised the important right of nominating his successor for election.

See A. H. J. Greenidge, Roman Public Life, 152 seq., 363 seq. (London, 1901) ; T. Mommsen, Romisches Staatsrecht, I. 11. i. (1887).

(A. M. Cl.)

MAGLIABECHI, ANTONIO DA MARCO (1633-1714), Italian bibliophile, was born at Florence on the 28th of October 1633. He followed the trade of a goldsmith until 1673, when he received the appointment of librarian to the grand-duke of Tuscany, a post for which he had qualified himself by his vast stores of self- acquired learning. He died on the 4th of July 1714, bequeathing his large private library to the grand-duke, who in turn handed it over to the city.

MAGLIANI, AGOSTINO (1824-1891), Italian financier, was a native of Lanzino, near Salerno. He studied at Naples, and a book on the philosophy of law based on Liberal principles won for him a post in the Neapolitan treasury. He entered the Italian Senate in 1871, and had already secured a reputation as a financial expert before his Questione monetaria appeared in 1874. In December 1877 he became minister of finance in the

reconstructed Depretis ministry, and he subsequently held the same office in three other Liberal cabinets. In his second tenure he carried through (1880) the abolition of the grist tax, to take effect in 1884. Having to face an increased expenditure without offending the Radical electorate by unpopular taxes, he had

recourse to unsound methods of finance, which seriously embar- rassed Italian credit for some years after he finally laid down office in 1888. He died in Rome on the 22nd of February 1801. He was one of the founders of the anti-socialistic " Adam Smith Society " at Florence.

MAGNA CARTA, or the Great Charter, the name of the famous charter of liberties granted at Runnimede in June 1215 by King John to the English people. Although in later ages its importance was enormously magnified, it differs only in degree, not in kind, from other charters granted by the Norman and early Plantagenet kings. Its greater length, however, still more the exceptional circumstances attending its birth, gave to it a position absolutely unique in the minds of later generations of Englishmen. This feeling was fostered by its many confirmations, and in sub- sequent ages, especially during the time of the struggle between the Stuart kings and the parliament, it was regarded as some- thing sacrosanct, embodying the very ideal of English liberties, which to some extent had been lost, but which must be regained. Its provisions, real and imaginary, formed the standard towards which Englishmen must strive.

The causes which led to the grant of Magna Carta are described in the article on English History. B riefly, they are to be found in the conditions of the time; the increasing insularity of the English barons, now no longer the holders of estates in Normandy; the substitution of an unpopular for a popular king, an active spur to the rising forces of discontent; and the unprecedented de- mands for money — demands followed, not by honour, but by dishonour, to the arms of England abroad. So much for the general causes. The actual crisis may be said to begin with the quarrel between John and Pope Innocent III. regarding the appointment of a new archbishop to the see of Canterbury. This was settled in May 12 13, and in the new prelate, the papal nominee, Stephen Langton, who landed in England and absolved the king in the following July, the baronial party found an able and powerful ally. But before this event John had instituted a great inquiry, the inquest of service of June 121 2, for the purpose of finding out how much he could exact from each of his vassals, a measure which naturally excited some alarm; and then, fearing a baronial rising, he had abandoned his proposed expedition into Wales, had taken hostages from the most prominent of his foes, and had sought safety in London.

His absolution followed, and then he took courage. Turning once more his

attention to the recovery of Normandy, he asked the barons for assistance for this undertaking; in reply they, or a section of them, refused, and instead of crossing the seas the king marched northwards with the intention of taking vengeance on his disobedient vassals, who were chiefly barons of the north of England. Langton followed his sovereign to Northampton and persuaded him, at least for the present, to refrain from any serious measures of revenge. Before this interview a national council had met at St Albans at the beginning of August 1213, and this was followed by another council, held in St Paul's church, London, later in the same month; it was doubtless summoned by the archbishop, and was attended by many of the higher clergy and a certain number of the barons. Addressing the gathering, Langton referred to the laws of Edward the Confessor as " good laws," which the king ought to observe, and then mentioned the charter granted by Henry I. on his accession as a standard of good government. This event has such an important bearing on the issue of Magna Carta that it is not inappropriate to quote the actual words used by Matthew Paris in describing the incident. The chronicler represents the archbishop as saying " Inventa est quoque nunc carta quaedam Henrici primi regis Angliae per quam, si volueritis, libertates diu amissas poteritis ad statum pristinum revocare." Those present decided to contend to the death for their " long-lost liberties," and with this the meeting came to an end. Nothing, however, was done during the re- mainder of the year, and John, feeling his position had grown stronger, went abroad early in 12 14, and remained for some months in France. With his mercenaries behind him he met with some small successes in his fight for Normandy, but on the 27 th of July he and his ally, the emperor Otto IV., met with a crushing

defeat at Bouvines at the hands of Philip Augustus, and even the king himself was compelled to recognise that his hopes of recover- ing Normandy were at an end.

Meanwhile in England, which was ruled by Peter des Roches as justiciar, the discontent had been increasing rather than diminishing, and its volume became much larger owing to an event of May 1214. Greatly needing money for his campaign, John ordered another scutage to be taken from his tenants; this, moreover, was to be at the unprecedented rate of three marks on the knight's fee, not as on previous occasions of two marks, although this latter sum had hitherto been regarded as a very high rate. The northern barons refused to pay, and the gathering forces of resistance received a powerful stimulus when a little later came the news of the king's humiliation at Bouvines. Then in October the beaten monarch returned to

England, no course open to him but to bow before the storm. In November he met some of his nobles at Bury St Edmunds, but as they still refused to pay the scutage no agreement was reached. At once they took another step towards the goal. With due solemnity (super majus altare) they swore to withdraw their allegiance from the king and to make war upon him, unless within a stated time he restored to them their rightful laws and liberties. While they were collecting troops in order to enforce their threats, John on his part tried to divide his enemies by a concession to the clerical section. By a charter, dated the 21st of November 1214, he granted freedom of election to the church. However, this did not prevent the pre- lates from continuing to act to some extent with the barons, and early in January 121 5 the malcontents asked the king to confirm the laws of Edward the Confessor and the other liberties of the kingdom. He evaded the request and secured a truce until Easter was passed. Energetically making use of this period of respite, he again issued the charter to the church, ordered his subjects to take a fresh oath of allegiance to him, and sent to the pope for aid; but neither these precautions, nor his expedient of taking the cross, deterred the barons from returning to the attack. In April they met in arms at Stamford, and as soon as the truce had expired they marched to Brackley, where they met the royal ministers and again presented their demands. These were carried to the king at Oxford, but angrily he refused to consider them. Then the storm burst. On the 5th of May the barons formally renounced their allegiance to John, and appointed Robert Fitzwalter as their leader. They marched towards London, while John made another attempt to delay the crisis, or to divide his foes, by granting a charter to the citizens of London (May 9, 1 215), and then by offering to submit the quarrel to a court of arbitrators under the presidency of the pope. But neither the one nor the other expedient availed him. Arbitration under such conditions was contemptuously rejected, and after the king had ordered the sheriffs to seize the lands and goods of the revolting nobles, London opened its gates and peacefully wel- comed the baronial army. Other towns showed also that their sympathies were with the insurgents, and John was forced to his knees. Promising to assent to their demands, he agreed to meet the barons, and the gathering was fixed for the 15th of June, and was to take place in a meadow between Staines and Windsor, called Runnimede.

At the famous conference, which lasted from Monday the 15th to Tuesday the 23rd of June, the hostile barons were present in large numbers; on the other hand John, who rode over each day from Windsor, was only attended by a few followers. At once the malcontents presented their demands in a document known popularly as the Articles of the Barons, more strictly as Capitula quae barones petunl el dominus rex concedit. Doubtless this had been drawn up beforehand, and was brought by the

baronial leaders to Runnimede; possibly it was identical with the document presented to the royal ministers at Brackley a few weeks before. John accepted the Articles on the same day and at once the great seal was affixed to them. They are forty-eight in number, and on them Magna Carta was based, the work of converting them into a charter, which was regarded as a much more binding form of engagement, being taken in hand immediately. This duty occupied three days, negotiations between the two parties taking

place over several disputed points, and it was completed by Friday the 19th, when several copies of the charter were sealed. All then took an oath to keep its terms, and orders were sent to the sheriffs to publish it, and to see that its provisions were observed, two or three days being taken up with making and sending out copies for this purpose. It should be mentioned that, although the charter was evidently not sealed until the 19th, the four existing copies of it are dated the 15th, the day on which John accepted the articles.

The days between Friday the 19th and the following Tuesday, when the conference came to an end, were occupied in pro- viding, as far as possible, for the due execution of the reforms promised by the king in Magna Carta. The document itself provided for an elected committee of twenty-five barons, whose duty was to compel John, by force if necessary, to keep his promises; but this was evidently regarded as insufficient, and the matter was dealt with in a supplementary treaty (Conventio facta inter regem Angliae et barones ejusdum regni). As a guarantee of his good faith the king surrendered the city of London to his foes, while the Tower was entrusted to the neutral keeping of the archbishop of Canterbury. John then asked the barons for a charter that they on their part would keep the peace. This was refused, and although some of the bishops entered a mild protest, the question was allowed to drop. Regarding another matter also, the extent of the royal forests, the prelates made a protest. John and his friends feared lest the inquiry promised into the extent of the hated forest areas would be carried out too rigor- ously, and that these would be seriously curtailed, if not abolished altogether. Consequently, the two archbishops and their colleagues declared that the articles in the charter which pro- vided for this inquiry, and for a remedy against abuses of the forest laws by the king, must not be interpreted in too harsh a spirit. The customs necessary for the preservation of the forests must remain in force.

No securities, however, could bind John. Even before Magna Carta was signed he had set to work to destroy it, and he now turned to this task with renewed vigour. He appealed to the pope, and hoped to crush his enemies by the aid of foreign troops, while the barons prepared for war, and the prelates strove to keep the peace. Help came first from the spiritual arm.

On the 24th of August 1215 Innocent III. published a bull which declared Magna Carta null and void. It had been extorted from the king by force (per vim et metum), and in the words of the bull the pope said " compositionem hujusmodi reprobamus penitus et damna- mus." He followed this up by excommunicating the barons who had obtained it, and in the autumn of 1215 the inevitable war began. Capturing Rochester castle, John met with some other successes, and the disheartened barons invited Louis, son of Philip Augustus of France and afterwards king as Louis VIII., to take the English crown. In spite of the veto of the pope Louis accepted the invitation, landed in England in May 12 16, and occupied London and Winchester, the fortune of war having in the meantime turned against John. The " ablest and most ruthless of the Angevins," as J. R. Green calls this king, had not, however, given up the struggle, and he was still in the field when he was taken ill, dying in Newark castle on the 19th of October

1216.

In its original form the text of Magna Carta was not divided into chapters, but in later times . a division of this kind was adopted. This has since been retained by all commentators, the number of chapters being 63.

The preamble states that the king has granted the charter on the advice of various prelates and barons, some of whom, in- cluding the archbishop of Canterbury, the papal legate Pandulf, and William Marshal, earl of Pembroke, are mentioned by name.

Chapter I. declares that the English church shall be free and shall enjoy freedom of election. This follows the precedent set in the accession charter of Henry I and in other early charters, although it had no place in the Articles of the Barons. On the present occa- sion it was evidently regarded as quite a formal and introductory matter, and the same remark applies to the general grant of liberties ■ to all freemen and their heirs, with which the chapter concludes.

Then follows a series of chapters intended to restrain the king from raising money by the harsh and arbitrary methods adopted in the past. These chapters, however, only afforded protection to the tenants-in-chief of the crown, and it is clear from their prominent position that the framers of the charter regarded them as of paramount importance.

Chapter II. fixes the amount of the relief to be paid to the king by the heir

of any of his vassals. Previously John, disregarding the custom of the past, had taken as much as he could extort. Hence- forward he who inherits a barony must pay £100, he who inherits a knight's fee ioo shillings or less, and for smaller holdings less "accord- ing to the ancient custom of fiefs."

Chapters III. to VI. deal with the abuses of the king's privilege of acting as guardian of minors and their lands. Money must not be extorted from a ward when he receives his inheritance. The guardian or his servant must not take from the ward's property more than a reasonable amount for his expenses and the like; on the contrary he must maintain the houses, estates and other belongings in a proper state of efficiency. A ward must be allowed a reasonable liberty in the matter of marriage. He or she must not, as had been so often the case in the past, be forced to marry some royal favourite, or some one who had paid a sum of money for the privilege.

Chapters VII. and VIII. are for the protection of the widows of tenants-in-chief. On the death of her husband a widow must receive her rightful inheritance, without delay or hindrance. More- over she must not be compelled to marry, a proceeding sometimes adopted to get her lands into the possession of a royal minion.

Chapter IX. is intended to prevent the king from collecting the money owing to him in an oppressive manner.

Now for a short time the document leaves the great questions at issue between the king and the barons, and two chapters are devoted to protecting the people generally against the exactions of the Jews.

Chapter X. declares that money borrowed from the Jews shall not bear interest during a minority.

Chapter XI. provides for the repayment of borrowed money to the Jews, and also to other creditors. This, however, is only to be done after certain liabilities have been met out of the estate, including the services due to the lord of the land.

Having thus disposed of this matter, the grievances of the barons are again considered, the vexed question of scutage being dealt with.

Chapter XII. says that in future no scutage or aid, beyond the three recognized feudal aids, shall be levied except by the consent of the general council of the nation {commune concilium regni nostri), while the three recognized aids shall only be levied at a reasonable rate. In dealing with this matter the Articles of the Barons had declared that aids and tallages must not be taken from the citizens of London and of other places without the consent of the council. This provision was omitted from Magna Carta,

except so far as it related to aids from the citizens of London. This chapter does not give the people the right to control taxation. It gives to the men interested a certain control over one form of taxation, and protects one class only from arbitrary exactions, and that class the most powerful and the most wealthy.

Chapter XIII. gives to the citizens of London all their ancient liberties and free customs.

Chapter XIV. provides for the assembly of the council when its consent is necessary for raising an aid or a scutage. Individual summonses must be sent to the prelates and greater barons, while the lesser barons will be called together through the sheriffs and bailiffs. At least forty days' notice of the meeting must be given, and the cause thereof specified. No chapter corresponding to this is found in the Articles and none was inserted in the reissues of Magna Carta. It is very interesting, but it does not constitute any marked advance in the history of parliament, as it merely expresses the customary method of summoning a council. It does not, as has been sometimes asserted, in any way establish a representative system, as this is understood to-day.

Chapter XV. extends the concessions obtained by the greater barons for themselves to the lesser landholders, the tenants of the tenants-in-chief.

Chapter XVI. declares that those who owe military service for their lands shall not be called upon to perform more than the due amount of such service.

We now come to an important series of articles which deal with abuses in the administration of justice. Henry II. made the royal courts of law a lucrative source of revenue, but he gave protection to suitors. Under his sons justice was equally, perhaps more, costly, while adequate protection was much harder to obtain. Here were many grievances, and the barons set to work to redress them.

Chapter XVII. declares that common pleas must henceforward be heard in a fixed place. This had already been to some extent the practice when this class of cases was heard ; it was now made the rule. From this time suitors in this court were not put to the expense and inconvenience of following the king from place to place.

Chapters XVIII. and XIX. deal with the three petty assizes, three kinds of cases regarding disputes about the possession of land. These must be heard in the county courts before two visiting justices and four knights of the shire. The hardship of attendance at the county courts was to some extent

obviated.

Chapters XX. to XXII. regulate the amount of fines imposed for offences against the law. Property necessary for one's livelihood must not be taken. The fines must only be imposed by the oath of honest men of the neighbourhood. In the same way earls and barons must only be fined by their peers, and a similar privilege is extended to the clergy, who, moreover, were not to be fined in accord- ance with the value of their benefices, but Only of their other property. It should be noticed that trial by one's peers, as understood in Magna Carta, is not confined to the nobility; in every class of society an accused man is punished in accordance with the verdict of his peers, or equals.

Chapter XXIII. asserts that persons shall not be compelled to make bridges, unless they are bound to do so by ancient custom. John had oppressed his subjects in this way before he visited a dis- trict for purposes of sport, and the hardship was a real one.

Chapter XXIV. declared that the sheriffs and other officers of the king must not hold the pleas of the crown. This was intended to remove an old and serious evil, as the sheriffs had earned a very bad reputation by their methods of administering justice.

Chapter XXV. also concerns the sheriffs. It prevents the king from increasing by their agency the amount of money annually due to him from the various counties and hundreds. The custom was for the king to get a fixed sum from the sheriff of each county, this being called the firma comitatus, and for the sheriff to collect this as best he could. Henceforward this amount must not be raised.

Chapters XXVI. and XXVII. were intended to protect the property of deceased persons, and also to secure the full payment of debts due therefrom to the crown. Other creditors were also protected, and the property of an intestate must be distributed to his heirs under the supervision of the church.

Chapter XXVIII. strikes a blow at the custom of purveyance. Royal officials must pay for the corn and provisions which they take on behalf of the king.

Chapter XXIX. says knights must not be compelled to give money instead of performing castle-guard, if they are willing to perform this service. Castle-guard was the liability incumbent on the holders of some estates to serve in the garrison of the royal castles. The constables of these castles had adopted the custom of compelling these landholders to give money and not service, mercenaries being then hired to perform this.

Chapters XXX. and XXXI. forbid the royal officials to seize the horses or carts of freemen for transport duty, or to take wood for the king's buildings.

Chapter XXXII. says that the lands of convicted felons shall be handed over to the lords of such lands and not kept by the king beyond a year and a day. In cases of treason the king had a right to the forfeited lands, but he was not allowed to establish a similar right in cases of felony.

Chapter XXXIII. provided for the removal of kydells, or weirsˆ from all English rivers. This was intended to give greater freedom to inland navigation, the rivers being the main highways of trade. Chapter XXXIV. limits the use of the writ known as Praecipe. This writ was one transferring cases concerning the ownership of property from the courts of the feudal lords to those of the king. This custom, which owes its origin to Henry II., meant a loss of revenue to the lords, whose victory in this matter, however, was a step backwards. It checked temporarily the process of centralizing the administration of justice.

Chapter XXXV. provides for the uniformity of weights and measures throughout the kingdom.

Chapter XXXVI. promises that in future writs of inquisition shall be granted freely without payment of any kind. This kind of writ allowed a man to refer the question of his guilt or innocence to the verdict of his neighbours instead of proving his innocence by the duel. Chapter XXXVII. prevents the king from administering certain kinds of land when these fall into the possession of minors. In the past John had evidently stretched his authority and seized lands over which others had really the right of wardship.

Chapter XXXVIII. prevents a bailiff from compelling an accused man to submit to the ordeal without the approval of credible wit- nesses.

Chapter XXXIX. is more important and the English rendering of it may be given in full. " No freeman shall be arrested, or detained in prison, or deprived of his freehold, or outlawed, or banished, or in any way molested ; and we will not set forth against him, nor send against him, unless by the lawful judgment of his peers and by the law of the land." The object of this was clearly to restrain John from arbitrary proceedings against his free subjects. The principle

of judgment by one's peers is asserted, and is obviously the privilege of every class of freemen, not of the greater lords alone.

Chapter XL. simply says, " To no one will we sell, to no one will we refuse or delay, right or justice."

Chapters XLI. and XLII. give permission to merchants, both English and foreign, to enter and leave the kingdom, except in time of war. They are not to pay " evil tolls." The privilege is extended to all travellers, except the prisoner and the outlaw, and natives of a country with which England is at war.

Chapter XLIII. is intended to compel the king to refrain from exacting greater dues from an escheated barony than were pre- viously due from such barony.

Chapter XLIV. deals with the hated and oppressive forest laws. In future attendance at the forest courts is only obligatory on those who have business thereat.

Chapter XLV. says that the royal officials must know something of the law and must be desirous of keeping it.

Chapter XLVI. gives to the founders of religious houses the right of acting as guardians of such houses when they are without heads.

Chapters XLVII. and XLVIII. deal again with the great grievance of the royal forests. John undertakes to disforest all forests which have been made in his time, and also to give up such river banks as he has seized for his own use when engaged in sport. Twelve knights in each county are to make a thorough inquiry into all evil customs connected with the forests, and these are to be utterly abolished.

Chapter XLIX. provides for the restoration of hostages. John had been in the habit of taking the children of powerful subjects as pledges for the good behaviour of their parents.

Chapter L. says that certain royal minions, who are mentioned by name, are to be removed from their offices.

Chapter LI. says that as soon as peace is made all foreign mercen- aries are to be banished.

Chapters LII. and LIII. are those in which the king promises to make amends for the injuries he has done to his barons in the past. He will restore lands and castles to those who have been deprived of them without the judgment of their peers; he will do the same concerning property unlawfully seized by Henry II. or Richard I. and now in his hands. In the latter case, however, he was allowed a respite until he returned from the projected crusade. He promises also to do right concerning forests, abbeys and the wardship of lands which belong lawfully to others.

Chapter LIV. prevents any one from being arrested on the appeal of a woman, except on a charge of causing the death of her husband. As a woman could not prove her case in the judicial combat, it was felt that the earlier practice gave her an unfair advantage.

Chapter LV. provides for the remission of unjust fines. The deci- sion on these matters is to rest with the archbishop of Canterbury and the twenty-five barons appointed to see that the terms of the charter are carried out.

Chapters LVI. and LVII. deal with the grievances of Welshmen. Restoration of property is promised to them practically in the same way as to Englishmen. Welsh law is to be used in Wales, and in the marches the law of the marches is to be employed.

Chapter LVIII. promises that his hostages and his charters shall be restored to Llewellyn, prince of Wales.

Chapter LIX. promises a restoration of hostages to Alexander I. king of Scotland. Right is also to be done to him concerning the lands which he holds in England.

Chapter LX. is a general statement that the aforesaid customs and liberties are to be observed by all classes.

Chapter LXI. provides for the execution of the royal promises. A committee is to be formed of twenty-five barons. Then if the king or any of his servants do wrong and complaint is made to four of the twenty-five, they are to ask for redress. In the event of this not being granted within forty days the matter is to be referred to the twenty-five, who are empowered to seize the lands and pro- perty of the king, or to obtain justice in any other way possible. They must, however, spare the persons of the king, the queen and their children. Vacancies in the committee are to be filled by the barons themselves. The twenty-five barons were duly appointed, their names being given by Matthew Paris. This chronicler also reports that another committee of thirty-eight members was ap- pointed to assist and control the twenty-five. S. R. Gardiner calls the scheme ' ' a permanent organization for making war against the king. ' ' Chapter LXII. is an expression of general forgiveness. Chapter LXIII. repeats the promise of freedom to the English church and of their rights and liberties to all.

Magna Carta is an elaboration of the accession charter of Henry I., and is based upon the Articles of the Barons. It is, however, very much longer than the former charter and somewhat longer than the Articles. Moreover, it differs in several particu- lars from the Articles, these differences being doubtless the out- come of deliberation and of compromise. For instance, the pro- visions in Magna Carta concerning the freedom of the church find no place in tb«e Articles, while a comparison between the two documents suggests that in other ways also influences favourable

to the church and the clergy were at work while the famous charter was being framed. When one reflects how active and prominent Langton and other prelates were at Runnimede the change is not surprising. Another difference between the two documents concerns the towns and the trading classes. Certain privileges granted to them in the Articles are not found in Magna Carta, although, it must be noted, this document bestows exceptionally favoured treatment on the citizens of London. The conclusion is that the friends of the towns and the traders were less in evidence at Runnimede than they were at the earlier meetings of the barons, but that the neighbouring Londoners were strong enough to secure a good price for their support.

Magna Carta throws much light on the condition of England in the early

13th century. By denouncing the evil deeds of John and the innovations practised by him, it shows what these were and how they were hated; how money had been raised, how forest areas had been extended, how minors and widows had been cheated and oppressed. By declaring, as it does, what were the laws and customs of a past age wherein justice prevailed, it shows what was the ideal of good government formed by John's prelates and barons. Magna Carta can hardly be said to have introduced any new ideas. As Pollock and Maitland {History of English Law) say " on the whole the charter contains little that is absolutely new. It is restorative." But although mature study has established the truth of this proposition it was not always so. Statesmen and commentators alike professed to find in Magna Carta a number of political ideas which belonged to a later age, and which had no place in the minds of its framers. It was regarded as having conferred upon the nation nothing less than the English constitution in its perfect and completed form. Sir Edward Coke finds in Magna Carta a full and proper legal answer to every exaction of the Stuart kings, and a remedy for every evil suffered at the time. Sir William Blackstone is almost equally admiring. Edmund Burke says " Magna Carta, if it did not give us originally the House of Commons, gave us at least a House of Commons of weight and consequence." Lord Chatham used words equally superlative. " Magna Carta, the Petition of Rights and the Bill of Rights form that code, which I call the Bible of the English Constitution." Modern historians, although less rhetorical, speak in the highest terms of the importance of Magna Carta, the view of most of them being summed up in the words of Dr Stubbs: " The whole of the constitutional history of England is a commentary on this charter."

Many regard Magna Carta as giving equal rights to all English- men. J. R. Green says " The rights which the barons claimed for themselves they claimed for the nation at large." As a matter of fact this statement is only true with large limitations. The villains, who formed the majority of the population, got very little from it; in fact the only clauses which protect them do so because they are property — the property of their lords — and therefore valuable. They get neither political nor civil rights under Magna Carta. The traders, too, get little, while preferen- tial treatment is meted out to the clergy and the barons. Its benefits are confined to freemen, and of the benefits the lion's share fell to the larger landholders; the smaller landholders getting, it is true, some crumbs from the table. It did not establish freedom from arbitrary arrest, or the right of the representatives of the people to control taxation, or trial by jury, or other conceptions of a later generation.

The story of Magna Carta after the death of John is soon told. On the 1 2th of November 12 16 the regent William Marshal, earl of Pembroke, reissued the charter in the name of the young king Henry III. But important

alterations were made. War was being waged against Louis of France, and the executive must not be hampered in the work of raising money; moreover the personal equation had disappeared, the barons did not need to protect themselves against John. Consequently the chapter limiting the power of the crown to raise scutages and aids without the consent of the council vanished, and with it the complemen- tary one which determined the method of calling a council. Other provisions, the object of which had been to restrain John from demanding more money from various classes of his subjects,

were also deleted, and the same fate befell such chapters as dealt with mere temporary matters. The most important of these was Chapter LXL, which provided for the appointment of 25 executors to compel John to observe the charter. The next year peace was made at Lambeth (Sept. n, 1217) between Henry III. and Louis and another reissue of the charter was promised. This promise was carried out, but two charters appeared, one being a revised issue of Magna Carta proper, and the other a separate charter dealing with the forests, all references to which were omitted from the more important document. The date of this issue appears to have been the 6th of November 1 21 7. The issue of a separate forest charter at this time led subsequently to some confusion. Roger of Wendover asserts that John issued a separate charter of this kind when Magna Carta appeared. This statement was believed by subsequent writers until the time of Blackstone, who was the first to discover the mistake.

As issued in I2r7 Magna Carta consists of 47 chapters only. It declares that henceforward scutages shall be taken according to the precedents of Henry II. 's reign. New provisions were introduced for the preservation of the peace — unlawful castles were to be destroyed — while others were directed towards making the administration of justice by the visiting justices less burdensome. With regard to the land and the services due therefrom a beginning was made of the policy which culminated in the statutes of Mortmain and of Quia Emptores. The sheriffs were ordered to publish the revised charter on the 22nd of Feb- ruary 1218. Then in February 1225 Henry III. again issued the two charters with only two slight alterations, and this is the final form taken by Magna Carta, this text being the one referred to by Coke and the other early commentators. Subsequently the charters were confirmed several times by Henry III. and by Edward I., the most important occasion being their confirmation by Edward at Ghent in November 1297. On this occasion some supplementary articles were added to the charter; these were intended to limit the taxing power of the crown.

There are at present in existence four copies of Magna Carta, sealed with the great seal of King John, and several unsealed copies. Of the four two are in the British Museum. Both came into the possession of the Museum with the valuable collection of papers which had belonged to Sir Robert Cotton, who had obtained posses- sion of both. One was found in Dover castle about 1630. This was damaged by fire in 1 731; the other is undamaged. The two other sealed copies belong to the cathedrals of Lincoln and of Salisbury. Both were written evidently in a less hurried fashion than those in the British Museum, and the one at Lincoln was regarded as the most perfect by the commissioners who were responsible for the appearance of the Statutes of the Realm in 1810. The British Museum also contains the original parchment of the Articles of the Barons. Magna Carta was first printed by Richard Pynson in 1499. This, however, was not the original text, which was neglected until the time of Blackstone, who printed the various issues of the charter in his book The Great Charter and the Charter of the Forest (1759). The earliest commentator of note was Sir Edward Coke, who published his Second Institute, which deals with Magna Carta, by order of the Long Parliament in 1642. Modern commentators, who also print the various texts of the charter, are Richard Thomson, An Historical Essay on the Magna Carta of King John (1829) ; C. B6mont, in his Charles des liberies anglaises (1892); and W. Stubbs in his Select Charters (1895). A more recent book and one embodying the results of the latest research is W. S. McKechnie, Magna Carta (1905). The text of Magna Carta is also printed in the Statutes of the Realm (1810-1828), and in T. Rymer's Foedera (1816-1869). In addition to Blackstone, Coke and these later writers, the following works may also be consulted: John Reeves, History of English Law (1 783-1 784); L. O. Pike, A Constitutional History of the House of Lords (1894); W. Stubbs, Constitutional History of England (1897); Sir F. Pollock and F. W. Maitland, The History of English. Law (1895); W. S. Holdsworth, A History of English Law (1903), and Kate Norgate, John Lackland (1902). (A. W. H.)*

MAGNA GRAECIA (17 fiey&h) 'EXXds), the name given (first, apparently, in the 6th century B.C.) to the group of Greek cities along the coast of the " toe " of South Italy (or more strictly those only from Tarentum to Locri, along the east coast), while the people were called Italiotes ('ItciXk£t(h). The interior, which the Greeks never subdued, continued to be in the hands of the Bruttii, the native mountaineers, from whom the district was named in Roman times (Bperrta also in Greek writers').

The Greek colonies were established first as trading stations, which grew into independent cities. At an early time a trade in copper was carried on between Greece and Temesa (Homer, Od. i. 181). 1 The trade for a long time was chiefly in the hands of the Euboeans; and Cyme (Cumae) in

Campania was founded in the 8th century B.C., when the Euboean Cyme was still a great city. After this the energy of Chalcis went onward to Sicily, and the states of the Corinthian Gulf carried out the colonization of Italy, Rhegium having been founded, it is true, by Chalcis, but after Messana (Zancle), and at the request of the inhabitants of the latter. Sybaris (721) and Crotona (703) were Achaean settle- ments; Locri Epizephyrii (about 710) was settled by Ozolian Locrians, so that, had it not been for the Dorian colony of Taren- tum, the southern coast of Italy would have been entirely occupied by a group of Achaean cities. Tarentum (whether or no founded by pre-Dorian Greeks-»-its founders bore the unexplained name of Partheniae) became a Laconian colony at some unknown date, whence a legend grew up connecting the Partheniae with Sparta, and 707 B.C. was assigned as its traditional date. Tarentum is remarkable as the only foreign settlement made by the Spartans. It was industrial, depending largely on the purple and pottery trade. Ionian Greeks fleeing from foreign invasion founded Siris about 650 B.C., and, much later, Elea (540).

The Italian colonies were planted among friendly, almost kindred, races, and grew much more rapidly than the Sicilian Greek states, which had to contend against the power of Carthage. After the Achaean cities had combined to destroy the Ionic Siris, and had founded Metapontum as a counterpoise to the Dorian Tarentum, there seems to have been little strife among the Italiotes. An amphictyonic league, meeting in common rites at the temple of Hera on the Lacinian promontory, fostered a feeling of unity among them. The Pythagorean and Eleatic systems of philosophy had their chief seat in Magna Graecia. Other depart- ments of literature do not seem to have been so much cultivated among them. The poet Ibycus, though a native of Rhegium, led a very wandering life. They sent competitors to the Olympic games (among them the famous Milo of Croton) ; and the physi- cians of Croton early in the 6th century (especially in the person of Democedes) were reputed the best in Greece; but politically they appear to have generally kept themselves separate. One ship of Croton, however, fought at Salamis, though it is not recorded that Greece asked the Italiotes for help when it sent ambassadors to Gelon of Syracuse. Mutual discord first sapped the prosperity of Magna Graecia. In 5 1 o Croton , having defeated the Sybarites in a great battle, totally destroyed their city. Croton maintained alone the leading position which had belonged jointly to the Achaean cities (Diod. xiv. 103) ; but from that time Magna Graecia steadily declined. In the war between Athens and Syracuse Magna Graecia took comparatively little part; Locri was strongly anti- Athenian, but Rhegium, though it was the headquarters of the Athenians in 427, remained neutral in 415. Foreign enemies pressed heavily on it. The Lucanians and Bruttians on the north captured one town after another. Dionysius of Syracuse attacked them from the south; and after he defeated

the Croton- iate league and destroyed Caulonia (389 B.C.), Tarentum remained the only powerful city. Henceforth the history of Magna Graecia is only a record of the vicissitudes of Tarentum (q.v.). Repeated expeditions from Sparta and Epirus tried in vain to prop up the decaying Greek states against the Lucanians and Bruttians; and when in 282 the Romans appeared in the Tarentine Gulf the end was close at hand. The aid which Pyrrhus brought did little good to the Tarentines, and his final departure in 274 left them defenceless. During these constant wars the Greek cities had been steadily decaying; and in the second Punic war, when most of them seized the opportunity of revolting from Rome, their very existence was in some cases annihilated. Malaria increased in strength as the population diminished. We are told by Cicero (De am. 4), Magna Graecia nunc quidem deleta est. Many of the cities completely disappeared, and hardly any of them were of great importance under the Roman empire; some, like Tarentum,

1 This passage should perhaps be referred to the 8th century B.C. It is the first mention of an Italian place in a literary record.

maintained their existence into modern times, and in these only (except at Locri) iave archaeological investigations of any importance been carried on; so that there still remains a consider- able field for investigation. (T. As.)

MAGNATE (Late Lat. magnas, a great man), a noble, a man in high position, by birth, wealth or other qualities. The term is specifically applied to the members of the Upper House in Hungary, the Forendihaz or House of Magnates (see Hungary).

MAGNES (c. 460 B.C.), Athenian writer of the Old Comedy, a native of the deme of Icaria in Attica. His death is alluded to by Aristophanes (Equites, 518-523, which was brought out in 424 B.C.) , who states that in his old age Magnes had lost the popularity which he had formerly enjoyed. The few titles of his plays that remain, such as the Frogs, the Birds, the Gall-flies, indicate that he anticipated Aristophanes in introducing grotesque costumes for the chorus.

See T. Kock, Comicorum atticorum fragmenta, i. (1880); G. H. Bode, Geschichte der hellenischen Dichtkunst, iii. pt. 2 (1840).

MAGNESIA, in ancient geography the name of two cities in Asia Minor and of a district in eastern Thessaly, lying between the Vale of Tempe and

the Pagasaean Gulf.

(1) Magnesia ad Maeandrum, a city of Ionia, situated on a small stream flowing into the Maeander, 15 Roman miles from Miletus and rather less from Ephesus. According to tradition, reinforced by the similarity of names, it was founded by colonists from the Thessalian tribe of the Magnetes, with whom were associated, according to Strabo, some Cretan settlers (Magnesia retained a connexion with Crete, as inscriptions found there attest). It was thus not properly an Ionic city, and for this reason, apparently, was not included in the Ionian league, though superior in wealth and prosperity to most of the members except Ephesus and Miletus. It was destroyed by the Cimmerii in their irruption into Asia Minor, but was soon after rebuilt, and gradually recovered its former prosperity. It was one of the towns assigned by Artaxerxes to Themistocles for support in his exile, and there the latter ended his days. His statue stood in its market-place. Thibron, the Spartan, persuaded the Magnesians to leave their indefensible and mutinous city in 309 B.C. and build afresh at Leucophrys, an hour distant, noted for its temple of Artemis Leucophryne, which, according to Strabo, surpassed that at Ephesus in the beauty of its architecture, though inferior in size and wealth. Its ruins were excavated by Dr K. Humann for the Constantinople Museum in 1 891-1893; but most of the frieze of the temple of Artemis Leucophryne, representing an Amazon battle, had already been carried off by Texier (1843) to the Louvre. It was an octostyle, pseudo-dipteral temple of highly ornate Ionic order, built on older foundations by Hermo- genes of Alabanda at the end of the 3rd century B.C. The plat- form has been greatly overgrown since the excavation, but many bases, capitals, and other architectural members are visible. In front of the west fagade stood a great altar. An immense peribolus wall is still standing (20 ft. high) , but its Doric colonnade has vanished. The railway runs right through the precinct, and much of Magnesia has gone into its bridges and embankments. South and west of the temple are many other remains of the Roman city, including a fairly perfect theatre excavated by Hiller von Gartringen, and the shell of a large gymnasium. Part of the Agora was laid open to Humann, but his trenches have fallen in. The site is so unhealthy that even the Circas- sians who settled there twenty years ago have almost all died off or emigrated. Magnesia continued under the kings of Pergamum to be one of the most flourishing cities in this part of Asia; it resisted Mithradates in 87 B.C., and was rewarded with civic freedom by Sulla; but it appears to have greatly declined under the Roman empire, and its name disappears from history, though on coins of the time of Gordian it still claimed to be the seventh city of Asia.

See K. Haumann, Magnesia am Maeander (1904).

(2) Magnesia ad Sipylum (mod. Manisa, q.v.), a city of Lydia about 40 m. N.E. of Smyrna on the river Hermus at the foot of Mt Sipylus. No mention of the town is found till 190 B.C., when Antiochus the Great was defeated under its walls by the

Roman consul L. Scipio Asiaticus. It became a city of impor- tance under the Roman dominion and, though nearly destroyed by an earthquake in the reign of Tiberius, was restored by that emperor and flourished through the Roman empire. It was one of the few towns in this part of Asia Minor which remained pros- perous under the Turkish rule. The most famous relic of antiquity is the " Niobe of Sipylus" (Suratlu Task) on the lowest slopes of the mountain about 4 m. east of the town. This is a colossal seated image cut in a niche of the rock, of "Hittite" origin, and perhaps that called by Pausanias the " very ancient statue of the Mother of the Gods," carved by Broteas, son of Tantalus, and sung by Homer. Near it lie many remains of a primitive city, and about half a mile east is the rock-seat conjecturally identified with Pausanias' " Throne of Pelops." There are also hot springs and a sacred grotto of Apollo. The whole site seems to be that of the early " Tantalus " city. (D. G. H.)

MAGNESITE, a mineral consisting of magnesium carbonate, MgC0 3 , and belonging to the calcite group of rhombohedral carbonates. It is rarely found in crystals or crystalline masses, being usually compact or earthy and intermixed with more or less hydrous magnesium silicate (meerschaum). The compact material has the appearance of unglazed porcelain, and the earthy that of chalk. In colour it is usually dead white, some- times yellowish. The hardness of the crystallized mineral is 4; sp. gr. 3-1. The name magnesite as originally applied by J. C. Delametherie in 1797 included several minerals contain- ing magnesium, and at the present day it is used by French writers for meerschaum. The mineral has also been called baudisserite from the locality Baudissero near Ivrea in Pied- mont. Breunnerite is a ferriferous variety.*

Magnesite is a product of alteration of magnesium silicates, and occurs as veins and patches in serpentine, talc-schist or dolomite- rock. It is extensively mined in the island of Euboea in the Grecian Archipelago, near Salem in Madras, and in California, U.S.A. It is principally used for the manufacture of highly refractory fire- bricks for lining steel furnaces and electric furnaces ; also for making plaster, tiles and artificial stone; for the preparation of magnesium salts (Epsom salts, &c.) ; for whitening; paper- pulp and wool ; and as a paint.

MAGNESIUM {symbol Mg, atomic weight 24-32 (0= 16)], a metallic chemical element. The sulphate or " Epsom salts " (q.v.) was isolated in 1695 by N. Grew, while in 1707 M. B. Valentin prepared magnesia alba

from the mother liquors obtained in the manufacture of nitre. Magnesia was con- founded with lime until 1755, when J. Black showed that the two substances were entirely different; and in 1808 Davy pointed out that it was the oxide of a metal, which, however, he was not able to isolate. Magnesium is found widely dis- tributed in nature, chiefly in the forms of silicate, carbonate and chloride, and occurring in the minerals olivine, hornblende, talc, asbestos, meerschaum, augite, dolomite, magnesite, car- nallite, kieserite and kainite. The metal was prepared (in a state approximating to purity) by A. A. B. Bussy (Jour, de pharm. 1829, 15, p. 30; 1830, 16, p. 142), who fused the an- hydrous chloride with potassium; H. Sainte Claire Deville's process, which used to be employed commercially, was essentially the same, except that sodium was substituted for potassium (Comptes rendus, 1857, 44, p. 394), the product being further purified by redistillation. It may also be prepared by heating a mixture of carbon, oxide of iron and magnesite to bright redness; and by heating a mixture of magnesium ferrocyanide and sodium carbonate, the double cyanide formed being then decomposed by heating it with metallic zinc. Electrolytic methods have entirely superseded the older methods. The problem of magnesium reduction is in many respects similar to that of aluminium extraction, but the lightness of the metal as compared, bulk for bulk, with its fused salts, and the readiness with which it burns when exposed to air at high temperatures, render the problem somewhat more difficult.

Moissan found that the oxide resisted reduction by carbon in the electric furnace, so that electrolysis of a fusible salt of the metal must be resorted to. Bunsen, in 1852, electrolysed fused magnesium chloride in a porcelain crucible. In later processes, carnallite (a

natural double chloride of magnesium and potassium) has commonly, after careful dehydration, been substituted for the single chloride. Graetzel's process, which was at one time employed, consisted in electrolysing the chloride in a metal crucible heated externally, the crucible itself forming the cathode, and the magnesium being de- posited upon its inner surface. W. Borchers also used an externally heated metal vessel as the cathode ; it is provided with a supporting collar or flange a little below the top, so that the upper part of the vessel is exposed to the cooling influence of the air, in order that a crust of solidified salt may there be formed, and so prevent the creeping of the electrolyte over the top. The carbon anode passes through the cover of a porcelain cylinder, open at the bottom, and provided with a side-tube at the top to remove the chlorine formed during electrolysis. The

operation is conducted at a dull red heat (about 760 C. or 1400° F.), the current density being about 0-64 amperes per sq. in. of cathode surface, and the pressure about 7 volts. The fusing-point of the metal is about 730° C. (1350° F.), and the magnesium is therefore reduced in the form of melted globules which gradually accumulate. At intervals the current is interrupted, the cover removed, and the temperature of the vessel raised considerably above the melting-point of magnesium. The metal is then removed from the walls with the aid of an iron scraper, and the whole mass poured into a sheet-iron tray, where it solidifies. The solidified chloride is then broken up, the shots and fused masses of magnesium are picked out, run together in a plumbago crucible without flux, and poured into a suitable mould. Smaller pieces are thrown into a bath of melted carnallite and pressed together with an iron rod, the bath being then heated until the globules of metal float to the top, when they may be removed in perforated iron ladles, through the holes in which the fused chloride can drain away, but through which the melted magnes- ium cannot pass by reason of its high surface tension. The globules are then re-melted. F. Oettel (Zeit. f. Elektrochem., 1895, 2, p. 394) recommends the electrolytic preparation from carnallite ; the mineral should be freed from water and sulphates.

Magnesium is a silvery white metal possessing a high lustre. It is malleable and ductile. Sp. gr. 1-75. It preserves its lustre in dry air, but in moist air it becomes tarnished by the formation of a film of oxide. It melts at 632-7° C. (C. T. Hey- cock and F. H. Neville), and boils at about iioo°C. Magnesium and- its salts are diamagnetic. It burns brilliantly when heated in air or oxygen, or even in carbon dioxide, emitting a brilliant white light and leaving a residue of magnesia, MgO. The light is rich in the violet and ultra-violet rays, and consequently is employed in photography. The metal is also used in pyro- techny. It also burns when heated in a current of steam, which it decomposes with the liberation of hydrogen and the formation of magnesia. At high temperatures it acts as a reducing agent, reducing silica to silicon, boric acid to boron, &c. (H. Moissan, Comptes rendus, 1892, 114, p. 392). It combines directly with nitrogen, when heated in the gas, to form the nitride Mg 3 N 2 (see Argon). It is rapidly dissolved by dilute acids, with the evolu- tion of hydrogen and the formation of magnesium salts. It precipitates many metals from solutions of their salts.

Magnesium Oxide, magnesia, MgO, occurs native as the mineral periclase, and is formed when magnesium burns in air; it may also be prepared by the gentle ignition of the hydroxide or carbonate. It is a non-volatile and almost infusible white powder, which slowly absorbs moisture and carbon dioxide from air, and is readily soluble in dilute acids. On account of its refractory nature, it is employed in the manufacture of crucibles, furnace

linings, &c. It is also used in making hydraulic cements. A crystalline form was obtained by M. Houdard (Abst. J. C. S., 1907, ii. p. 621) by fusing the oxide and sulphide in the electric furnace. Magnesium hydroxide Mg(OH) 2 , occurs native as the minerals brucite and nˆmalite, and is prepared by precipitating solutions of magnesium salts by means of caustic soda or potash. An artificial brucite was prepared by A. de Schulten (Comptes rendus, 1885, 101, p. 72) by boiling magnes- ium chloride with caustic potash and allowing the solution to cool. Magnesium hydroxide is a white amorphous solid which is only slightly soluble in water; the solubility is, however, greatly in- creased by ammonium salts. It possesses an alkaline reaction and absorbs carbon dioxide. It is employed in the manufacture of cements.

When magnesium is heated in fluorine or chlorine or in the vapour of bromine or iodine there is a violent reaction, and the corresponding halide compounds are formed. With the exception of the fluoride, these substances are readily soluble in water and are deliquescent. The fluoride is found native as sellaite, and the bromide and iodide occur in sea water and in many mineral springs. The most im- portant of the halide salts is the chloride which, in the hydrated form, has the formula Mg0 2 -6H 2 0. It may be prepared by dissolving the metal, its oxide, hydroxide, or carbonate in dilute hydrochloric acid, or by mixing concentrated solutions of magnesium sulphate and common salt, and cooling the mixture rapidly, when the less soluble

sodium sulphate separates first. It is also formed as a by-product in the manufacture' of potassium chloride from carnallite. The hydrated salt loses water on heating, and partfally decomposes into hydrochloric acid and magnesium oxychlorides. To obtain the anhydrous salt, the double magnesium ammonium chloride, MgClr NH4C1-6H 2 0, is prepared by adding ammonium chloride to a solution of magnesium chloride. The solution is evaporated, and the residue strongly heated, when water and ammonium chloride are expelled, and anhydrous magnesium chloride remains. Magnesium chloride readily forms double salts with the alkaline chlorides. A strong solution of the chloride made into a thick paste with calcined mag- nesia sets in a few hours to a hard, stone-like mass, which contains an oxychloride of varying composition. Magnesium oxychloride when heated to redness in a current of air evolves a mixture of hydro- chloric acid and chlorine and leaves a residue of magnesia, a reaction which is employed in the Weldon-Pechiney and Mond processes for the manufacture of chlorine.

Magnesium Carbonate, MgC0 3 . — The normal salt is found native as the mineral magnesite, and in combination with calcium carbonate as dolomite, whilst hydromagnesite is a basic carbonate. It is not possible to

prepare the normal carbonate by precipitating magnesium salts with sodium carbonate. C. Marignac has prepared it by the action of calcium carbonate on magnesium chloride. A salt MgCO s -3H 2 or Mg(C0 3 H)(0H)-2H 2 may be prepared from the carbonate by dissolving it in water charged with carbon dioxide, and then reducing the pressure (W. A. Davis, Jour. Soc. Chem. Ind. 1906, 2 5> P- 7.88). The carbonate is not easily soluble in dilute acids, but is readily soluble in water containing carbon dioxide. Magnesia alba, a white bulky precipitate obtained by adding sodium carbonate to Epsom salts.is a mixture of Mg(C0 3 H) (OH)-2H 2 0,Mg(C0 3 H) (OH) and Mg(OH) 2 . It is almost insoluble in water, but readily dissolves in ammonium salts.

Magnesium Phosphates. — By:adding sodium phosphate to mag- nesium sulphate and allowing the mixture to stand, hexagonal needles of MgHP0 4 7H 2 are deposited. The normal phosphate, Mg 3 P 2 8 , is found in some guanos, and as the mineral wagnerite. It may be prepared by adding normal sodium phosphate to a mag nesium salt and boiling the precipitate with a solution of magnesium sulphate. It is a white amorphous powder, readily soluble in acids. Magnesium ammonium phosphate, MgNH 4 P04-6H 2 0, is found as the mineral struvite and in some guanos ; it occurs also in urinary calculi and is formed in the putrefaction of urine. It is prepared by adding sodium phosphate to magnesium sulphate in the presence of ammonia and ammonium chloride. When heated to 100 ° C., 'it loses five molecules of water of crystallization, and at a higher temperature loses the remainder of the water and also ammonia, leaving a residue of magnesium pyrophosphate,. Mg 2 P 2 7 . Magnesium Nitrate, Mg(N0 3) 2 6H 2 0, is a colourless, deliquescent, crystalline solid ob tained by dissolving magnesium or its carbonate in nitric acid, and concentrating the solution. The crystals melt at 90 C. Magnesium Nitride, Mg 3 N 2 , is obtained as a greenish-yellow amorphous mass by passing a current of nitrogen or ammonia over heated magnesium (F. Briegleb and A. Geuther, Ann., 1862, 123, p. 228; see also W. Eidmann and L. Moeser, Ber., 1901, 34, p. 390). When heated in dry oxygen it becomes incandescent, forming magnesia. Water decomposes it with liberation of ammonia and formation of mag- nesium hydroxide. The chlorides of nickel, cobalt, chromium, iron and mercury are converted into nitrides when heated with it, whilst the chlorides of. copper and platinum are reduced to.the metals (A. Smits, Rec. Pays Bas, 1896, 15, p. 135). Magnesium sulphide, MgS, may be obtained, mixed with some unaltered metal and some magnesia, as a hard brown mass by heating magnesia, in sulphur vapour. It slowly decomposes in moist air. Magnesium sulphate, MgS0 4 , occurs (with IH 2 0) as Kieserite. A hexahydrate is also known. The salt may be obtained from Kieserite: formerly it was prepared by treating magnesite or dolomite with sulphuric acid.

Organic Compounds. — By heating magnesium filings with methyl and ethyl iodides A. Cahours (Ann. chim. phys., i860, 58, pp. 5, 19) obtained magnesium methyl, Mg(CH 3) 2 , and magnesium ethyl, Mg(C 2 H 6)2, as colourless, strongly smelling, mobile liquids, which are spontaneously inflammable and are readily decomposed by water. The compounds formed by the action of magnesium on alkyl iodides in the cold have been largely used in synthetic organic QHvnard chemistry since V. Grignard (Comptes rendus, 1900 et p e f„ en t seq.) observed that magnesium and alkyl or aryl. halides ‘

combined together in presence of anhydrous ether at ordinary temperatures (with the appearance of brisk boiling) to form com- pounds of the type RMgX(R = an alkyl or aryl group and X = halo- gen). These compounds are insoluble in ether, are non-inflammable and exceedingly reactive. A. V. Baeyer (Ber., 1902, 35, p. 1201) regards them as oxonium salts containing tetravalent oxygen (C 2 H 6) 2 :0:(MgR) (X), whilst W. Tschelinzeff (Ber., 1906, 39, p. 773) considers that they contain two molecules of ether. In preparing the Grignard reagent the commencement of the reaction is acceler- ated by a trace of iodine. W. Tschelinzeff (Ber., 1904, 37, p. 4534) showed that the ether may be replaced by benzene containing a small quantity of ether or anisole, or a few drops of a tertiary amine. With unsaturated alkyl halides the products are only slightly soluble in ether, and two molecules of the alkyl compound are brought into

the reaction. They are very unstable, and do not react in the normal manner. (V. Grignard and L. Tissier, Comptesrendus, 1901,

132, P- 558)-

The products formed by the action of the Grignard reagent with the various types of organic compounds are usually thrown out of solution in the form of crystalline precipitates or as thick oils, and are then decomposed by ice-cold dilute sulphuric or acetic acids, the magnesium being removed as a basic halide salt.

A pplications. — For the formation of primary and secondary alcohols see Aldehydes and Ketones. Formaldehyde behaves abnormally with magnesium benzyl bromide (M. Tiffeneau, Comptes renins, !9°3. 137. P- 573). forming ortho-tolylcarbinol, CHs-CeHrCHjOH, and not benzylcarbinol, C 6 H 5 CH 2 CH 2 OH (cf. the reaction of form aldehyde on phenols: O. Manasse, Ber. 1894, 27, p. 2904). Acid esters yield

carbinols, many of which are unstable and readily pass over into unsaturated compounds, especially when warmed with acetic anhydride: R-C0 2 R'(R") 2 -R;C-OMgX->(R")2R:C-OH.

Formic ester yields a secondary alcohol under similar conditions. Acid chlorides behave in an analogous manner to esters (Grignard and Tissier, Comptes rendus, 1901, 132, p. 683). Nitriles yield ketones (the nitrogen being eliminated as ammonia), the best yields being given by the aromatic nitriles (E. Blaise, ibid., 1901, 133, p. 1217) : R-CN-ˆRR':C:NMgIˆR-CO-R'. Acid amides also react to form ketones (C. Beis, ibid., 1903, 137, 575):

R-CONH 2 ->RR':C(OMgX)-NHMgX+R'H-»R-CO-R'; the yield increases with the complexity of the organic residue of the acid amide. On passing a current of dry carbon dioxide over the reagent, the gas is absorbed and the resulting compound, when decomposed by dilute acids, yields an organic acid, and similarly with carbon oxysulphide a thio-acid is obtained: RMgX-ˆR-C0 2 MgX->R-C0 2 H;COS->CS(OMgX)R->R-CSOH. A Klages (Ber., 1902, 35, pp. 2633 et seq.) has shown that if one uses an excess of magnesium and of an alkyl halide with a ketone, an ethylene derivative is formed. The reaction appears to be per- fectly general unless the ketone contains two ortho-substituent groups. Organo-metallic compounds can also be prepared, for example

SnBn +4MgBrC,H 6 = 4MgBr 2 +Sn(C 6 H 6) 4 . For a summary see A. McKenzie, B. A. Rep. 1907.

Detection. — The magnesium salts may be detected by the white precipitate formed by adding sodium phosphate (in the presence of ammonia and ammonium chloride) to their solutions. The same reaction is made use of in the quantitative determination of magnes- ium, the white precipitate of magnesium ammonium phosphate being converted by ignition into magnesium pyrophosphate and weighed as such. The atomic weight of magnesium has been determined by many observers. J. Berzelius [Ann. chim. phys., 1820, 14, p. 375), n y converting the oxide into the sulphate, obtained the value 12-62 for the equivalent. R. F. Marchand and T. Scheerer (Jour, prakt. Chzm., 1850, 50, p. 358), by ignition of the carbonate, obtained the value 24-00 for the atomic weight, whilst C. Marignac, by con- verting the oxide into the sulphate, obtained the value 24-37. T. VV. Richards and H. G. Parker (Zeit. anorg. Chem., 1897, 13, p. 81) have obtained the value 24-365 (0 = i6).

Medicine. — These salts of magnesium may be regarded as the typical saline purgatives. Their aperient action is dependent upon the minimum of irritation of the bowel, and is exercised by their abstraction from the blood

of water, which passes into the bowel to act as a diluent of the salt. The stronger the solution administered, the greater is the quantity of water that passes into the bowel, a fact to be borne in mind when the salt is administered for the purpose of draining superfluous fluid from the system, as in dropsy. The oxide and carbonate of magnesium are also invaluable as antidotes, since they form insoluble compounds with oxalic acid and salts of mercury, arsenic, and copper. The result is to prevent the local corrosive action of the poison and to prevent absorption of the metals. As alkaloids are insoluble in alkaline solutions, the oxide and carbonate — especially the former — may be given in alkaloidal poisoning. The compounds of magnesium are not absorbed into the blood in any appreciable quantity, and therefore exert no remote actions upon other functions. This is fortunate, as the result of injecting a solution of a magnesium salt into a vein is rapid poisoning. Hence it is of the utmost importance to avoid the use of salts of this metal whenever it is necessary — as in diabetic coma — to increase the alkalinity of the blood rapidly. The usual doses of the oxide and carbonate of mag- nesium are from half a drachm to a drachm.

MAGNETISM. The present article is a digest, mainly from an experimental standpoint, of the leading facts and principles of magnetic science. It is divided into the following sections: XVII. 11

1. General Phenomena.

2. Terminology and Elementary Principles.

3. Magnetic Measurements.

4. Magnetization in Strong Fields, g. Magnetization in Weak Fields.

6. Changes of Dimensions attending Magnetization.

7. Effects of Mechanical Stress on Magnetization.

8. Effects of Temperature on Magnetism.

9. Magnetic Properties of Alloys and Compounds of Iron.

10. Miscellaneous Effects of Magnetization: —

Electric Conductivity — Hall Effect — Electro-Thermal Rela- tions — Thermoelectric Quality — Elasticity — Chemical and Voltaic Effects.

11. Feebly Susceptible Substances.

12. Molecular Theory of Magnetism.

13. Historical and Chronological Notes.

Of these thirteen sections, the first contains a simple descrip- tion of the more prominent phenomena, without mathematical symbols or numerical data. The second includes definitions of technical terms in common use, together with so much of the elementary theory as is necessary for understanding the experi- mental work described in subsequent portions of the article; a number of formulae and results are given for purposes of refer- ence, but the mathematical reasoning by which they are obtained is not generally detailed, authorities being cited whenever the demonstrations are not likely to be found in ordinary textbooks. The subjects discussed in the remaining sections are sufficiently indicated by their respective headings. (See also Electro- magnetism, Terrestrial Magnetism, Magneto-Optics and Units.)

1. General Phenomena

Pieces of a certain highly esteemed iron ore, which consists mainly of the oxide Fe 3 04, are sometimes found to possess the power of attracting small fragments of iron or steel. Ore endowed with this curious property was well known to the ancient Greeks and Romans, who, because it occurred plentifully in the district of Magnesia near the Aegean coast, gave it the name of magnes, or the Magnesian stone. In English- speaking countries the ore is commonly known as magnetite, and pieces which exhibit attraction as magnets; the cause to which the attractive property is attributed is called magnetism, a name also applied to the important branch of science which has been evolved from the study of phenomena associated with the magnet.

If a magnet is dipped into a mass of iron filings and with- drawn, filings cling to certain parts of the stone in moss-like tufts, other parts remaining bare. There are generally two regions where the tufts are thickest, and the attraction therefore greatest, and between them is a zone in which no attraction is evidenced. The regions of greatest attraction have received the name of poles, and the line joining them is called the axis of the magnet; the space around a magnet in which magnetic effects are exhibited is called the field of magnetic force, or the magnetic field.

Up to the end of the 15th century only two magnetic phe- nomena of importance, besides that of attraction, had been observed. Upon one of these is based the principle of the mariner's compass, which is said to have been known to the Chinese as early as 1100 B.C., though it was not introduced into Europe until more than 2000 years later; a magnet supported so that its axis is free to turn in a horizontal plane will come to rest with its poles pointing approximately north and south. The other phenomenon is mentioned by Greek and Roman writers of the 1st century:

a piece of iron, when brought into contact with a magnet, or even held near one, itself becomes " inductively " magnetized, and acquires the power of lifting iron. If the iron is soft and fairly pure, it loses its attractive property when removed from the neighbourhood of the magnet; if it is hard, some of the induced magnetism is permanently retained, and the piece becomes an artificial magnet. Steel is much more retentive of magnetism than any ordinary iron, and some form of steel is now always used foi making artificial magnets. Magnetism may be imparted to a bar of hardened steel by stroking it several times from end to

end, always in the same direction, with one of the poles of a magnet. Until 1820 all the artificial magnets in practical use derived their virtue, directly or indirectly, from the natural magnets found in the earth: it is now recognized that the source of all magnetism, not excepting that of the magnetic ore itself, is electricity, and it is usual to have direct recourse to electricity for producing magnetization, without the inter- mediary of the magnetic ore. A wire carrying an electric current is surrounded by a magnetic field, and if the wire is bent into the form of an elongated coil or spiral, a field having certain very useful qualities is generated in the interior. A bar of soft iron introduced into the coil is at once magnetized, the magnetism, however, disappearing almost completely as soon as the current ceases to flow. Such a combination constitutes an electromagnet, a valuable device by means of which a magnet can be instantly made and unmade at will. With suitable arrangements of iron and coil and a sufficiently strong current, the intensity of the temporary magnetization may be very high, and electromagnets capable of lifting weights of several tons are in daily use in engineering works (see Electromagnetism). If the bar inserted into the coil is of hardened steel instead of iron, the magnetism will be less intense, but a larger proportion of it will be retained after the current has been cut off. Steel magnets of great strength and of any convenient form may be prepared either in this manner or by treatment with an electro- magnet; hence the natural magnet, or lodestone as it is commonly called, is no longer of any interest except as a scientific curiosity.

Some of the principal phenomena of magnetism may be demonstrated with very little apparatus; much may be done with a small bar-magnet, a pocket

compass and a few ounces of iron filings. Steel articles, such as knitting or sewing needles and pieces of flat spring, may be readily magnetized by stroking them with the bar-magnet; after having produced magnetism in any number of other bodies, the magnet will have lost nothing of its own virtue. The compass needle is a little steel magnet balanced upon a pivot; one end of the needle, which always bears a distinguishing mark, points approximately, but not in general exactly, to the north, 1 the vertical plane through the direction of the needle being termed the magnetic meridian. The bar-magnet, if suspended horizontally in a paper stirrup by a thread of unspun silk, will also come to rest in the magnetic meridian with its marked end pointing northwards. The north-seeking end of a magnet is in English-speaking countries called the north pole and the other end the south pole; in France the names are interchanged. If one pole of the bar-magnet is brought near the compass, it will attract the opposite pole of the compass-needle; and the magnetic action will not be sensibly affected by the interposition between the bar and the compass of any substance whatever except iron or other mag- netizable metal. The poles of a piece of magnetized steel may be at once distinguished if the two ends are successively pre- sented to the compass; that end which attracts the south pole of the compass needle (and is therefore north) may be marked for easy identification.

Similar magnetic poles are not merely indifferent to each other, but exhibit actual repulsion. This can be more easily shown if the compass is replaced by a magnetized knitting needle, supported horizontally by a thread. The north pole of the bar-magnet will repel the north pole of the suspended needle, and there will likewise be repulsion between the two south poles. Such experiments as these demonstrate the fundamental law that like poles repel each other; unlike poles attract. It follows that between two neighbouring magnets, the poles of which are regarded as centres of force, there must always be four forces in action. Denoting the two pairs of magnetic poles by N, S and N', S', there is attraction between N and S', and between S and N'; repulsion between N and N', and between S and S'. Hence it is not very easy to determine experimentally the law of magnetic force between poles. The

1 In London in 1910 the needle pointed about 16 W. of the geographical north. (See Terrestrial Magnetism.)

difficulty was overcome by C. A. Coulomb, who by using very long and thin magnets, so arranged that the action of their distant poles was negligible, succeeded in establishing the law, which has since been confirmed by more accurate methods, that the force of attraction or repulsion exerted between two magnetic poles varies inversely as the square of the distance between them. Since the poles of different magnets differ in strength, it is important

to agree upon a definite unit or standard of reference in terms of which the strength of a pole may be numerically specified. According to the recognized convention, the unit pole is that which acts upon an equal pole at unit distance with unit force: a north pole is reckoned as positive (+) and a south pole as negative (—). Other conditions remaining unchanged, the force between two poles is proportional to the product of their strengths; it is repulsive or attractive according as the signs of the poles are like or unlike.

If a wire of soft iron is substituted for the suspended magnetic needle, either pole of the bar-magnet will attract either end of the wire indifferently. The wire will in fact become temporarily magnetized by induction, that end of it which is nearest to the pole of the magnet acquiring opposite polarity, and behaving as if it were the pole of a permanent magnet. Even a permanent magnet is susceptible of induction, its polarity becoming thereby strengthened, weakened, or possibly reversed. If one pole of a strong magnet is presented to the like pole of a weaker one, there will be repulsion so long as the two are separated by a certain minimum distance. At shorter distances the magnetism induced in the weaker magnet will be stronger than its permanent magnetism, and there will be attraction; two magnets with their like poles in actual contact will always cling together unless the like poles are of exactly equal strength. Induction is an effect of the field of force associated with a magnet. Magnetic force has not merely the property of acting upon magnetic poles, it has the additional property of producing a phenomenon known as magnetic induction, or magnetic flux, a physical con- dition which is of the nature of a flow continuously circulating through the magnet and the space outside it. Inside the magnet the course of the flow is from the south pole to the north pole; thence it diverges through the' surrounding space, and again converging, re-enters the magnet at the south pole. When the magnetic induction flows through a piece of iron or other mag- netizable substance placed near the magnet, a south pole is developed where the flux enters and a north pole where it leaves the substance. Outside the magnet the direction of the magnetic induction is generally the same as that of the magnetic force. A map indicating the direction of the force in different parts of the field due to a magnet may be constructed in a very simple manner. A sheet of cardboard is placed above the magnet, and some iron filings are sifted thinly and evenly over the surface: if the cardboard is gently tapped, the filings will arrange themselves in a series of curves, as shown in fig. 1. This experiment suggested to Faraday the conception of " lines of force," of which the curves formed by the filings afford a rough indication; Faraday's lines are however not confined to the plane of the cardboard, but occur in the whole of the space around the magnet. A line of force may be defined as an imaginary line so drawn that its direction at every point of its course

coincides with the direction of Fig. i.

the magnetic force at that

point. Through any point in the field one such line can be drawn, but not more than one, for the force obviously cannot have more than one direction; the lines therefore never intersect. A line of force is regarded as proceeding from the north pole towards the south pole of the magnet, its direction [being that in which an isolated north pole would be urged along

it. A south pole would be urged oppositely to the conventional ” direction ” of the line; hence it follows that a very small magnetic needle, if placed in the field, would tend to set itself along or tangentially to the line of force passing through its centre, as may be approximately verified if the compass be placed among the filings on the cardboard. In the internal field of a long coil of wire carrying an electric current, the lines of force are, except near the ends, parallel to the axis of the coil, and it is chiefly for this reason that the field due to a coil is particularly well adapted for inductively magnetizing iron and steel. The older operation of magnetizing a steel bar by drawing a magnetic pole along it merely consists in exposing successive portions of the bar to the action of the strong field near the pole.

Faraday’s lines not only show the direction of the magnetic force, but also serve to indicate its magnitude or strength in different parts of the field. Where the lines are crowded to- gether, as in the neighbourhood of the poles, the force is greater (or the field is stronger) than where they are more widely separated; hence the strength of a field at any point can be accurately specified by reference to the concentration of the lines. The lines presented to the eye by the scattered filings are too vague and ill-defined to give a satisfactory indication of the field-strength (see Faraday, Experimental Researches, § 3237) though they show its direction clearly enough. It is however easy to demonstrate by means of the compass that the force is much greater in some parts of the field than in others. Lay the compass upon the cardboard, and observe the rate at which its needle vibrates after being displaced from its position of equilibrium; this will vary greatly in different regions. When the compass is far from the magnet, the vibra- tions will be comparatively slow; when it is near a pole, they will be exceedingly rapid, the frequency of the vibrations varying as the square root of the magnetic force at the spot. In a refined form this method is often

employed for measuring the intensity of a magnetic field at a given place, just as the intensity of gravity at different parts of the earth is deduced from observations of the rate at which a pendulum of known length vibrates.

It is to the non-uniformity of the field surrounding a magnet that the apparent attraction between a magnet and a magnetiz- able body such as iron is ultimately due. This was pointed out by W. Thomson (afterwards Lord Kelvin) in 1847, as the result of a mathematical investigation undertaken to explain Faraday's experimental observations. If the inductively magnetized body lies in a part of the field which happens to be uniform there will be no resulting force tending to move the body, and it will not be " attracted." If however there is a small variation of the force in the space occupied by the body, it can be shown that the body will be urged, not necessarily towards a magnetic pole, but towards places of stronger magnetic force. It will not in general move along a line of force, as would an isolated pole, but will follow the direction in which the magnetic force increases most rapidly, and in so doing it may cross the lines of force obliquely or even at right angles.

If a magnetized needle were supported so that it could move freely about its centre of gravity it would not generally settle with its axis in a horizontal position, but would come to rest with its north-seeking pole either higher or lower than its centre. For the practical observation of this phenomenon it is usual to employ a needle which can turn freely in the plane of the magnetic meridian upon a horizontal axis passing through the centre of gravity of the needle. The angle which the magnetic axis makes with the plane of the horizon is called the inclination or dip. Along an irregular line encircling the earth in the neigh- bourhood of the geographical equator the needle takes up a horizontal position, and the dip is zero. At places north of this line, which is called the magnetic equator, the north end of the needle points downwards, the inclination generally becoming greater with increased distance from the equator. Within a certain small area in the Arctic Circle (about 97 W. long., 70 N. lat.) the north pole of the needle points vertically downwards,

the dip being 90 . South of the magnetic equator the south end of the needle is always inclined downwards, and there is a spot within the Antarctic Circle (148° E. long., 74° S. lat.) where the needle again stands vertically, but with its north end directed upwards. All these observations may be accounted for by the fact first recognized by W. Gilbert in 1600, that the earth itself is a great magnet, having its poles at the two places where the dipping needle is vertical. To be consistent with the terminology adopted in Britain, it is necessary to regard the pole which is geographically north as being the south pole of the terrestrial magnet, and that which is

geographically south as the north pole; in practice however the names assigned to the terrestrial magnetic poles correspond with their geographical situations. Within a limited space, such as that contained in a room, the field due .to the earth's magnetism is sensibly uniform, the lines of force being parallel straight lines inclined to the horizon at the angle of dip, which at Greenwich in 1910 was about 67°. It is by the horizontal component of the earth's total force that the compass-needle is directed.

The magnets hitherto considered have been assumed to have each two poles, the one north and the other south. It is possible that there may be more than two. If, for example, a knitting needle is stroked with the south pole of a magnet, the strokes being directed from the middle of the needle towards the two extremities alternately, the needle will acquire a north pole at each end and a south pole in the middle. By suitably modifying the manipulation a further number of consequent poles, as they are called, may be developed. It is also possible that a magnet may have no poles at all. Let a magnetic pole be drawn several times around a uniform steel ring, so that every part of the ring may be successively subjected to the magnetic force. If the operation has been skilfully performed the ring will have no poles and will not attract iron filings. Yet it will be mag- netized; for if it is cut through and the cut ends are drawn apart, each end will be found to exhibit polarity. Again, a steel wire through which an electric current has been passed will be magnetized, but so long as it is free from stress it will give no evidence of magnetization; if, however, the wire is twisted, poles will be developed at the two ends, for reasons which will be explained later. A wire or rod in this condition is said to be circularly magnetized; it may be regarded as con- sisting of an indefinite number of elementary ring-magnets, having their axes coincident with the axis of the wire and their planes at right angles to it. But no magnet can have a single pole; if there is one, there must also be at least a second, of the opposite sign and of exactly equal strength. Let a mag- netized knitting needle, having north and south poles at the two ends respectively, be broken in the middle; each half will be found to possess a north and a south pole, the appropriate supplementary poles appearing at the broken ends. One of the fragments may again be broken, and again two bipolar magnets will be produced; and the operation may be repeated, at least in imagination, till we arrive at molecular magnitudes and can go no farther. This experiment proves that the con- dition of magnetization is not confined to those parts where polar phenomena are exhibited, but exists throughout the whole body of the magnet; it also suggests the idea of molecular magnetism, upon which the accepted theory of magnetization is based. According to this theory the molecules of any mag- netizable substance are little permanent magnets the axes of which are, under ordinary conditions, disposed in all possible directions indifferently. The process of magnetization consists in turning

round the molecules by the application of magnetic force, so that their north poles n»ay all point more or less ap- proximately in the direction of the force; thus the body as a whole becomes a magnet which is merely the resultant of an immense number of molecular magnets.

In every magnet the strength of the south pole is exactly equal to that of the north pole, the action of the same magnetic force upon the two poles being equal and oppositely directed. This may be shown by means of the uniform field of force due to the earth's magnetism. A magnet attached to a cork and

floated upon water will set itself with its axis in the magnetic meridian, but it will be drawn neither northward nor southward; the forces acting upon the two poles have therefore no horizontal resultant. And again if a piece of steel is weighed in a delicate balance before and after magnetization, no change whatever in its weight can be detected; there is consequently no upward or downward resultant force due to magnetization; the contrary parallel forces acting upon the poles of the magnet are equal, constituting a couple, which may tend to turn the body, but not to propel it.

Iron and its alloys, including the various kinds of steel, though exhibiting magnetic phenomena in a pre-eminent degree, are not the only substances capable of magnetization. Nickel and cobalt are also strongly magnetic, and in 1903 the interesting discovery was made by F. Heusler that an alloy consisting of copper, aluminium and manganese (Heusler's alloy), possesses magnetic qualities comparable with those of iron. Practically the metals iron, nickel and cobalt, and some of their alloys and compounds constitute a class by themselves and are called ferromagnetic substances. But it was discovered by Faraday in 1845 that all substances, including even gases, are either attracted or repelled by a sufficiently powerful magnetic pole. Those substances which are attracted, or rather which tend, like iron, to move from weaker to stronger parts of the magnetic field, are termed paramagnetic; those which are repelled, or tend to move from stronger to weaker parts of the field, are termed diamagnetic. Between the ferromagnetics and the para- magnetics there is an enormous gap. The maximum magnetic susceptibility of iron is half a million times greater than that of liquid oxygen, one of the strongest paramagnetic substances known. Bismuth, the strongest of the diamagnetics, has a negative susceptibility which is numerically 20 times less than that of liquid oxygen.

Many of the physical properties of a metal are affected by magnetization. The dimensions of a piece of iron, for example, its elasticity, its thermo-electric power and its electric conduc- tivity are all changed under the influence of magnetism. On the other hand, the magnetic properties of a substance are affected by such causes as mechanical stress and changes of temperature. An account of some of these effects will be found in another section. 1

2. Terminology and Elementary Principles

In what follows the C.G.S. electromagnetic system of units will be generally adopted, and, unless otherwise stated, magnetic substances will be assumed to be isotropic, or to have the same physical properties in all directions.

Vectors. — Physical quantities such as magnetic force, magnetic induction and magnetization, which have direction as well as magni- tude, are termed vectors; they are compounded and resolved in the same manner as mechanical force, which is itself a vector. When the direction of any vector quantity denoted by a symbol is to be attended to, it is usual to employ for the symbol either a block letter, as H, I, B, or a German capital, as §>, Q, S3. 2

Magnetic Poles and Magnetic Axis. — A unit magnetic pole is that which acts on an equal pole at a distance of one centimetre with a force of one dyne. A pole which points north is reckoned positive, one which points south negative. The action between any two magnetic poles is mutual. If mi and nh are the strengths of two poles, d the distance between them expressed in centimetres, and / the force in dynes,

f=m 1 m2/d? _ (1).

The force is one of attraction or repulsion, according as the sign of the product mitrh is negative or positive. The poles at the ends of an infinitely thin uniform magnet, or magnetic filament, would act as definite centres of force. An actual magnet may generally be regarded as a bundle of magnetic filaments, and those portions of the surface of the magnet whefe the filaments terminate, and so- called " free magnetism " appears, may be conveniently called poles or polar regions. A more precise definition is the following: When the magnet is placed in a uniform field, the parallel forces acting on the positive poles of the constituent filaments, whether the filaments

1 For the relations between magnetism and light see Magneto- Optics.

2 Clerk Maxwell employed German capitals to denote vector quantities. J. A. Fleming first recommended the use of blockletters as being more

convenient both to printers and readers.

terminate outside the magnet or inside, have a resultant, equal to the sum of the forces and parallel to their direction, acting at a certain point N. The point N, which is the centre of the parallel forces, is called the north or positive pole of the magnet. Similarly, the forces acting in the opposite direction on the negative poles of the filaments have a resultant at another point S, which is called the south or negative pole. The opposite and parallel forces acting on the poles are always equal, a fact which is sometimes expressed by the statement that the total magnetism of a magnet is zero. The line joining the two poles is called the axis of the magnet.

Magnetic Field. — Any space at every point of which thenj is a finite magnetic force is called a field of magnetic force, or a magnetic field. The strength or intensity of a magnetic field at any point is measured by the force in dynes which a unit pole will experience when placed at that point, the direction of the field being the direction in which a positive pole is urged. The field-strength at any point is also called the magnetic force at that point ; it is denoted by H , or, when it is desired to draw attention to the fact that it is a vector quantity, by the block letter H, or the German character §. Mag- netic force is sometimes, and perhaps more suitably, termed magnetic intensity; it corresponds to the intensity of gravity g in the theory of heavy bodies (see Maxwell, Electricity and Magnetism, § 12 and § 68, footnote). A line of force is a line drawn through a magnetic field in the, direction of the force at each point through which it passes. A uniform magnetic field is one in which H has everywhere the same value and the same direction, the lines of force being, therefore, straight and parallel. A magnetic field is generally due either to a conductor carrying an electric current or to the poles of a magnet. The magnetic field due to a long straight wire in which a current of electricity is flowing is at every point at right angles to the plane passing through it and through the wire; its strength at any point distant r centimetres from the wire is

H = 2/r, (2)*

i being the current in C.G.S. units. 3 The lines of force are evidently circles concentric with the wire and at right angles to it ; their direc- tion is related to that of the current in the same manner as the rotation of a corkscrew is related to its thrust. The field at the centre of a circular conductor of radius r through which current is passing is

H = 27ri/V, (3)

the direction of the force being along the axis and related to the direction of the current as the thrust of a corkscrew to its rotation. The field strength

in the interior of a long uniformly wound coil containing n turns of wire and having a length of / centimetres is (except near the ends)

H=4Trin/l. (4)

In the middle portion of the coil the strength of the field is very nearly uniform, but towards the end it diminishes, and at the ends is reduced to one-half. The direction of the force is parallel to the axis of the coil, and related to the direction of the current as the thrust of a corkscrew to its rotation. If the coil has the form of a ring of mean radius r, the length will be 2irr, and the field inside the coil may be expressed as

H=2Ju/r. (5)

The uniformity of the field is not in this case disturbed by the in- fluence of ends, but its strength at any point varies inversely as the distance from the axis of the ring. When therefore sensible uni- formity is desired, the radius of the ring should be large in relation to that of the convolutions, or the ring should have the form of a short cylinder with thin walls. The strongest magnetic fields em- ployed for experimental purposes are obtained by the use of electro- magnets. For many experiments the field due to the earth's magnetism is sufficient ; this is practically quite uniform throughout considerable spaces, but its total intensity is less than half a unit.

Magnetic Moment and Magnetization. — -The moment, M, M or 931, of a uniformly and longitudinally magnetized bar-magnet is the product of its length into the strength of one of its poles; it is the moment of the couple acting on the magnet when placed in a field of unit intensity with its axis perpendicular to the direction of the field. If / is the length of the magnet, M = ml. The action of a magnet at a distance which is great compared with the length of the magnet depends solely upon its moment; so also does the action which the magnet experiences when placed in a uniform field. The moment of a small magnet may be resolved like a force. The in- tensity of magnetization, or, more shortly, the magnetization of a uniformly magnetized body is defined as the magnetic moment per unit of volume, and is denoted by I, 1, or 3. Hence

I = M/v = ml/v = m[a, v being the volume and a the sectional area. If the magnet is not uni- form, the magnetization at any point is the ratio of the moment of an element of volume at that point to the volume itself, or I = m.ds/dv. where ds is the length of the element. The direction of the magnetiza- tion is that of the magnetic axis of the element ;'in isotropic substances it coincides with the direction of the magnetic force at the point. If the direction of the magnetization at the surface of a magnet makes*

‘ The C.G.S. unit of current = 10 amperes.

an angle e with the normal, the normal component of the magnetiza- tion, I cos e, is called the surface density of the magnetism, and is generallv denoted by

Potential and Magnetic Force. — The magnetic potential at any point in a magnetic field is the work which would be done against the magnetic forces in bringing a unit pole to that point from the boundary of the field. The line through the given point along which the poten- tial decreases most rapidly is the direction of the resultant magnetic force, and the rate of decrease of the potential in any direction is equal to the component of the force in that direction. If V denote the potential, F the resultant force, X, Y, Z, its components parallel to the co-ordinate axes and n the line along which the force is directed, then

SV : = Z. (6)

bn ‘

Sz

Surfaces for which the potential is constant are called equipotential surfaces. The resultant magnetic force at every point of such a surface is in the direction of the normal (n) to the surface ; every line of force therefore cuts the equipotential surfaces at right angles. The potential due to a single pole of strength m at the distance r from the pole is

V=mlr, _ (7)

the equipotential surfaces being spheres of which the pole is the centre and the lines of force radii. The potential due to a thin magnet at a point whose distance from the two poles respectively is r and r’ is

V = m(Z/r = ;/r’). (8)

When V is constant, this equation represents an equipotential surface.

The equipotential surfaces are two series of ovoids surrounding the two poles respectively, and separated by a plane at zero potential passing perpendicularly through the middle of the axis. If r and r’ make angles and

0′ with the axis, it is easily shown that the equa- tion to a line of force is

cos — cos 0′ = constant. (9)

At the point where a line of force intersects the perpendicular bisector of the axis r = r'=r , say, and cos — cos 6′ obviously —l/r ol l being

Fig. 2. Fig. 3.

the distance between the poles ; l/r _ is therefore the value of the constant in (9) for the line in question. Fig. 2 shows the lines of force and the plane sections of the equipotential surfaces for a thin magnet with poles concentrated at its ends. The potential due to a small magnet of moment M, at a point whose distance from the centre of the magnet is r, is

V = M cos0/r 2 , (10)

where 8 is the angle between r and the axis of the magnet. Denoting the force at P (see fig. 3) by F, and its components parallel to the co-ordinate axes by X and Y, we have

^-^T^cos'0-i),

7= —^=^(3 sinfl cos 8.

If F, is the force along r and F (that along t at right angles to r,

M F r = Xcos0+Ksin9 = -3 2 cos 9,

•M Ft=— .X'stn0- r -Fcos0=-3 sm0.

For the resultant force at P,

M

F = VF, 2 +F t 3 = ^ V3 cos 2 + 1.

Fig. 4.

(12) (13)

(H)

The direction of F is given by the following construction : Trisect OP at C, so that OC =OP/3 ; draw CD at right angles to OP, to cut the axis produced in D; then DP will be the direction of the force at P. For a point in the axis OX, = ; therefore cos = 1, and the point D coincides with C ;

the magnitude of the force is, from (14),

F.-iM/H, _ (15)

its direction being along the axis OX. For a point in the line OY

bisecting the magnet perpendicularly, 9 = ir/2 therefore cos = 0, and the point D is at an infinite distance. The magnitude of the force is in this case

F„ = M/r 3 , (16)

and its direction is parallel to the axis of the magnet. Although the above useful formulae, (10) to (15), are true only for an infinitely small magnet, they may be practically applied whenever the dis- tance r is considerable compared with the length of the magnet.

Couples and Forces between Magnets. — If a small magnet of moment M is placed in the sensibly uniform field H due to a distant magnet, the couple tending to turn the small magnet upon an axis at right angles to the magnet and to the force is

MHsin0, (17)

where is the angle between the axis of the

magnet and the direction of the force. In

fig. 4 S'N' is a small magnet of moment M',

and SN a distant fixed magnet of moment

M ; the axes of SN and S'N' make angles of

and respectively with the line through their middle points. It

can be deduced from (17), (12) and (13) that the couple on S'N' due

to SN, and tending to increase , is

MM' (sin cos 0-2 sin ˆ cos 0)/H. (18)

This vanishes if sin cos = 2 sin tjj cos 9, i.e. if tan = i tan 0, S'N' being then along a line of force, a result which explains the construction given above for finding the direction of the force F in (14). If the axis of SN produced passes through the centre of S'N', = 0, and the couple becomes

2MM'sin#/f 3 , (19)

tending to diminish ; this is called the " end on " position. If the centre of S'N' is on the perpendicular bisector of SN, = |tt, and the couple will be

MM'cos

tending to increase <£; this is the " broadside on " position. These two positions are sometimes called the first and second (or A and B) principal positions of Gauss. The components X, Y, parallel and perpendicular to r, of the force between the two magnets SN and S'N' are

•X" = 3MM'(sin 8 sin — 2 cos cos tf/r, (21)*

F=3MM'(sin 8 cos +sin 4> cos 0)/V 4 . (22)

It will be seen that, whereas the couple varies inversely as the cube of the distance, the force varies inversely as the fourth power.

*Distributions of Magnetism. — A magnet may be regarded as con- sisting of an infinite number of elementary magnets, each having a pair of poles and a definite magnetic moment. If a series of such elements, all equally and longitudinally magnetized, were placed end to end with their unlike poles in contact, the external action of the filament thus formed would be reduced to that of the two extreme poles. The same would be the case if the magnetization of the fila- ment varied inversely as the area of its cross-section a in different parts. Such a filament is called a simple magnetic solenoid, and the product a\ is called the strength of the solenoid. A magnet which consists entirely of such solenoids, having their ends either upon the surface or closed upon themselves, is called a solenoidal magnet, and the magnetism is said to be distributed solenoidally ; there is no free magnetism in its interior. If the constituent solenoids are parallel and of equal strength, the magnet is also uniformly magnetized. A thin sheet of magnetic matter magnetized normally to its surface in such a manner that the magnetization at any place is inversely proportional to the thickness h of the sheet at that place is called a magnetic shell; the constant product hi is the strength of the shell and is generally denoted by * or . The potential at any point due to a magnetic shell is the product of its strength into the solid angle 01 subtended by its edge at the given point, or V = *w. For a given strength, therefore, the potential depends solely upon the boundary of the shell, and the potential outside a closed shell is everywhere zero. A magnet which can be divided into simple magnetic shells, either closed or having their edges on the surface of the magnet, is called a lamellar magnet, and the magnetism is said to be distributed lamellarly. A magnet consisting of a series of plane shells of equal strength arranged at right angles to the direction of magnetization will be uniformly magnetized.*

It can be shown that uniform magnetization is possible only when the form of the body is ellipsoidal. (Maxwell, Electricity and Magnetism, II., § 437). The cases of greatest practical importance are those of a sphere (which is an ellipsoid with three equal axes) and an ovoid or prolate ellipsoid of revolution. The potential due to a uniformly magnetized sphere of radius a for an external point at a distance r from the centre is

V = jira s lcos0/f 2 , (23)

being the inclination of r to the magnetic axis. Since £jra 3 I is the moment of the sphere (= volume X magnetization), it appears from (10) that the magnetized sphere produces the same external effect as a very small magnet of equal moment placed at its centre and magnetized in the same direction; the resultant force therefore is the same as in (14). The force in the interior is uniform, opposite

to the direction of magnetization, and equal to f7rl. When it is desired to have a uniform magnet with definitely situated poles, it it usual to employ one having the form of an ovoid, or elongated ellipsoid of revolution, instead of a rectangular or cylindrical bar. If the magnetization is parallel to the major axis, and the lengths of the major and minor axes are 2a and 2c, the poles are situated at a distance equal to fa from the centre, and the magnet will behave externally like a simple solenoid of length fa. The internal force F is opposite to the direction of the magnetization, and equal to Nl, where N is a coefficient depending only on the ratio of the axes. The moment = iwacH = – |irac 2 FN.

The distribution of magnetism and the position of the poles in magnets of other shapes, such as cylindrical or rectangular bars, cannot be specified by any general statement, though approximate determinations may be obtained experimentally in individual cases. 1 According to F. W. G. Kohlrausch 2 the distance between the poles of a cylindrical magnet the length of which is from 10 to 30 times the diameter, is sensibly equal to five-sixths of the length of the bar. This statement, however, is only approximately correct, the distance between the poles depending upon the intensity of the magnetiza- tion. 3 In general, the greater the ratio of length to section, the more nearly will the poles approach the end of the bar, and the more nearly uniform will be the magnetization. For most practical purpose a knowledge of the exact position of the poles is of no im-

portance; the magnetic moment, and therefore the mean magnetiza- tion, can always be determined with accuracy.

Magnetic Induction or Magnetic Flux.— When magnetic force acts on any medium, whether magnetic, diamagnetic or neutral, it pro- duces within it a phenomenon of the nature of a flux or flow called magnetic induction (Maxwell, loc. cit., § 428). Magnetic induction, like other fluxes such as electrical, thermal or fluid currents, is defined with reference to an area ; it satisfies the same conditions of continuity as the electric current does, and in isotropic media it depends on the magnetic force just as the electric current depends on the electro- motive force. The magnitude of the flux produced by a given magnetic force differs in different media. In a uniform magnetic field of unit intensity formed in empty space the induction or magnetic flux across an area of I square centimetre normal to the direction of the field is arbitrarily taken as the unit of induction. Hence if the induction per square centimetre at any point is denoted by B, then in empty space B is numerically equal to H ; moreover in isotropic media both have the same direction, and for these reasons it is often said that in empty space (and practically in air and other non- magnetic substances) B and H are identical. Inside a magnetized body, B is the force that would be exerted on a unit pole if placed in a narrow crevasse cut in the body, the walls of the crevasse being perpendicular to the direction of the magnetization (Maxwell, § § 399, 604) ; and its numerical value, being partly due to the free magnetism on the walls, is generally very different from that of H. In the case of a straight uniformly magnetized bar the direction of the magnetic force due to the poles of the magnet is from the north to the south pole outside the magnet, and from the south to the north inside. The magnetic flux per square centimetre at any point (B, B, or S3) is briefly called the induction, or, especially by electrical engineers, the flux-density. The direction of magnetic induction may be indicated by lines of induction; a line of induction is always a closed curve, though it may possibly extend to and return from infinity. Lines of induction drawn through every point in the contour of a small surface form a re-entrant tube bounded by lines of induction; such a tube is called a lube of induction. The cross- section of a tube of induction may vary in different parts, but the total induction across any section is everywhere the same. A special meaning has been assigned to the term " lines of induction." Sup- pose the whole space in which induction exists to be divided up into unit tubes, such that the surface integral of the induction over any cross-section of a tube is equal to unity, and along the axis of each tube let a line of induction be drawn. These axial lines constitute the system of lines of induction which are so often referred to in the specification of a field. Where the induction is high the lines will be crowded together; where it is weak they will be widely separated, the number per square centimetre crossing a normal

surface at any point being always equal to the numerical value of B. The induction may therefore be specified as B lines per square centimetre. The direction of the induction is also of course indicated by the direction of the lines, which thus serve to map out space in a convenient manner. Lines of induction are frequently but inaccurately spoken of as lines of force.

When induction or magnetic flux takes place in a ferromagnetic metal, the metal becomes magnetized, but the magnetization at any point is proportional not to B, but to B— H. The factor of proportionality will be 1-4T, so that

1 The principal theoretical investigations are summarized in Mascart and Joubert's Electricity and Magnetism, i. 391-398 and ii. 646-657. The case of a long iron bar has been experi- mentally studied with great care by C. G. Lamb, Proc. Phys. Soc,

1899. 16, 509.

1 Wied. Ann., 1884, 22, 411.

8 See C. G. Lamb, loc. cit. p. 518.

I = (B-H)/ 4 x, B = H+4irI.

(24) (25)

Unless the path of the induction is entirely inside the metal, free magnetic poles are developed at those parts of the metal where induction enters and leaves, the polarity being south at the entry and north at the exit of the flux. These free poles produce a magnetic field which is superposed upon that arising from other sources. The resultant magnetic field, therefore, is compounded of two fields, the one being due to the poles, and the other to the external causes which would be operative in the absence of the magnetized metal. The intensity (at any point) of the field due to the magnetization may be denoted by Hi, that of the external field by H , and that of the re- sultant field by H. In certain cases, as, for instance, in an iron ring wrapped uniformly round with a coil of wire through which a current is passing, the induction is entirely within the metal; there are,, consequently, no free poles, and the ring, though magnetized, con-' stitutes a poleless magnet. Magnetization is usually regarded as the direct effect of the resultant magnetic force, which is therefore often termed the magnetizing force.

Permeability and Susceptibility. — The ratio B/H is called the permeability of the medium in which the induction is taking place, and is denoted by ft. The ratio I/H is called the susceptibility of the magnetized substance, and is

denoted by k. Hence

(26)

(27)

Also and

*B = M H and I = *H. B H+411-I ‘ J = H = — H — = I +4 7rK >*

47T

(28)

*Since in empty space B has been assumed to be numerically equal to H, it follows that the permeability of a vacuum is equal to 1. The permeability of most material substances differs very slightly from unity, being a little greater than 1 in paramagnetic and a little less in diamagnetic substa nces. I n the case of the ferromagnetic metals and some of their alloys and compounds, the permeability has generally a much higher value. Moreover, it is not constant, being an apparently arbitrary function of H or of B ; in the same specimen its value may, under different conditions, vary from less than 2 to upwards of 5000. The magnetic susceptibility k expresses the numerical relation of the magnetization to the magnetizing force. From the equation * = (/* — i)/4tt, it follows that the magnetic susceptibility of a vacuum (where m = i) is o, that of a diamagnetic substance (where it < I) has a negative value, while the susceptibility of paramagnetic and ferromagnetic substances (for which ft>i) is positive. _ No substance has yet been discovered having a negative susceptibility sufficiently great to render the permeability (= 1 +4™) negative.*

Magnetic Circuit. — The circulation of magnetic induction or flux through magnetic and non-magnetic substances, such as iron and air, is in many respects analogous to that of an electric current through good and bad conductors. Just as the lines of flow of an electric current all pass in closed curves through the battery or other generator, so do all the lines of induction pass in closed curves through the magnet or magnetizing coil. The total magnetic induction or flux corresponds to the current of electricity (practically measured in amperes) ; the induction or flux density B to the density of the current (number of amperes to the square centimetre of section); the magnetic permeability to the specific electric conductivity ; and the line integral of the magnetic force, sometimes called the magneto-motive force, to the electro-motive force in the circuit. The princi- pal points of difference are that (1) the magnetic permeability, unlike the electric conductivity, which is independent of the strength of the current, is not in general constant; (2) there is no perfect insulator for magnetic

induction, which will pass more or less freely through all known substances. Nevertheless, many important problems relating to the distribution of magnetic induction may be solved by methods similar to those employed for the solution of analogous problems in electricity. For the elementary theory of the magnetic circuit see Electro-Magnetism.

Hysteresis, Coercive Force, Retentiveness. — It is found that when a piece of ferromagnetic metal, such as.iron, is subjected toa magnetic field of changing intensity, the changes which take place in the in- duced magnetization of the iron exhibit a tendency to lag behind those which occur in the intensity of the field — a phenomenon to which J. A. Ewing (Phil. Trans, clxxvi. 524) has given the name of hysteresis (Gr. iarepko), to lag behind) . Thus it happens that there is no definite relation between the magnetization of a piece of metal which has been previously magnetized and the strength of the field in which it is placed. Much depends upon its antecedent magnetic condition, and indeed upon its whole magnetic history. A well-known example of hysteresis is presented by the case of permanent magnets. If a bar of hard steel is placed in a strong magnetic field, a certain in- tensity of magnetization is induced in the bar; but when the strength of the field is afterwards reduced to zero, the magnetization does not entirely disappear. That portion which is permanently retained, and which may amount to considerably more than one-half, is called the residual magnetization. The ratio of the residual magnetization to its previous maximum value measures the retentiveness, or

retentivity, of the metal. 1 Steel, which is well suited for the construc- tion of permanent magnets, is said to possess great " coercive force." To this term, which had long been used in a loose and indefinite manner, J. Hopkinson supplied a precise meaning {Phil. Trans. clxxvi. 460). The coercive force, or coercivity, of a material is that reversed magnetic force which, while it is acting, just suffices to reduce the residual induction to nothing after the material has been temporarily submitted to any great magnetizing force. A metal which has great retentiveness may at the same time have small coercive force, and it is the latter quality which is of chief im- portance in permanent magnets.

Demagnetizing Force. — It has already been mentioned that when a ferromagnetic body is placed in a magnetic field, the resultant magnetic

force H, at a point within the body, is compounded of the force H , due to the external field, and of another force, Hi, arising from the induced magnetization of the body. Since H, generally tends to oppose the external force, thus making H less than H , it may be called the demagnetizing force. Except in the few special cases when a uniform external field produces uniform magnetization, the value of the demagnetizing force cannot be calcu- lated, and an exact determination of the actual magnetic force within the body is therefore impossible. An important instance in which the calculation can be made is that of an elongated ellipsoid of revolution placed in a uniform field H„, with its axis of revolution parallel to the lines of force. The magnetization at any point inside the ellipsoid will then be

where

n-ˆM&oiSH,

(29)

e being the eccentricity (see Maxwell's Treatise, § 438). Since I =kH, we have

«H+«NI=kH , (30)

or H = H -NI,

NI being the demagnetizing force H,-. N may be called, after H. du Bois (Magnetic Circuit, p. 33), the demagnetizing factor, and the ratio of the length of the ellipsoid 2c to its equatorial diameter 2a (=c/a), the dimensional ratio, denoted by the symbol lit.

Since

the above expression for N may be written

*4**

2Vm 2 – m

■)

m – Vm 2 – – log (m + Vm 2 – 1) – 1 I ,

m 1 -! L Vitf

from which the value of N for a given dimensional ratio can be calculated. When the ellipsoid is so much elongated that I is negligible in relation to lit

2 , the expression approximates to the simpler form

N=g(log 2 m-i). (31)

In the case of a sphere, e = and N = §7r; therefore from (29)

“Ho 3« TT

Ho,

I=«H =

i+It 3+4t**

Whence

and

H =

3+4 T

Ho

B=mH =

3M M+2

M+2 Ho.

H»

(32) (33) (34)

Equations (33) and (34) show that when, as is generally the case with ferromagnetic substances, the value of n is considerable, the resultant magnetic force is only a small fraction of the external force, while the numerical value of the induction is approximately three times that of the external force, and nearly independent of the permeability. The demagnetizing force inside a cylindrical rod placed longitudinally in a uniform field Ho is not uniform, being greatest at the ends and least in the middle part. Denoting its mean value by Hi, and that of the demagnetizing factor by N, we have

H = Ho-Hi=H„-NI. (35)

Du Bois has shown that when the dimensional ratio tit (= length/

diameter) exceeds 100, Nm 2 = constant = 45, and hence for long thin rods

N=45/nt 2 . (36)

From an analysis of a number of experiments made with rods of different dimensions H. du Bois has deduced the corresponding mean demagnetizing factors. These, together with values of ltt 2 N for cylindrical rods, and of N and m 2 N for ellipsoids of revolution, are given in the following useful table {loc. cit. p. 41) : —

1 Hopkinson specified the retentiveness by the numerical value of the " residual induction " (= 4tI).

Demagnetizing Factors.

nt.

Cylinder.

Ellipsoid.

N.

m 2 N.

N.

m 2 N.

12-5664

12-5664

o-5

—

—

6-5864

—

i

—

—

4-1888

—

5

—

—

0-7015

—

10

0-2I60

21-6

0-2549

25-5

15

0-1206

27-1

0-135°

30-5

20

0-0775

31-0

0-0848

34-0

25

0-0533

33-4

0-0579

36-2

30

0-0393

35‘4

0-0432

38-8

40

0-0238

38-7

0-0266

42-5

50

0-0162

40-5

0-0181

45-3

60

0-0118

42-4

0-0132

47-5

70

0-0089

43-7

O-OIOI

49-5

80

0-0069

44.4

0-0080

51-2

90

0-0055

44-8

0-0065

52-5

100

0-0045

45-0

0-0054

54-0

150

0-0020

45-o

0-0026

58-3

200

O-OOII

45-0

0.0016

64-0

300

0-00050

45-0

0-00075

67-5

400

0-00028

45-o

0-00045

72-0

500

0-00018

45-o

0-00030

75-0

1000

0-00005

45-o

In the middle part of a rod which has a length of 400 or 500 dia- meters the effect of the ends is insensible ; but for many experiments the condition of endlessness may be best secured by giving the metal the shape of a ring of uniform section, the magnetic field being pro- duced by an electric current through a coil of wire evenly wound round the ring. In such cases H; =0 and H = H .

The residual magnetization l r retained by a bar of ferromagnetic metal after it has been removed from the influence of an external field produces a demagnetizing force NI ri which is greater the smaller the dimensional ratio. Hence the difficulty of imparting any con- siderable permanent magnetization to a short thick bar not possessed of great coercive force. The magnetization retained by a long thin rod, even when its coercive force is small, is sometimes little less than that which was produced by the direct action of the field.

Demagnetization by Reversals. — In the course of an experiment it is often desired to eliminate the effects of previous magnetization, and, as far as possible, wipe out the magnetic history of a specimen. In order to attain this result it was formerly the practice to raise the metal to a bright red heat, and allow it to cool while carefully guarded from magnetic influence. This operation, besides being very trouble- some, was open to the objection that it was almost sure to produce a material but uncertain change in the physical constitution of the metal, so that, in fact, the results of experiments made before and after the treatment were not comparable. Ewing introduced the method (Phil. Trans, clxxvi. 539) of demagnetizing a specimen by subjecting it to a succession of magnetic forces which alternated in direction and gradually diminished in strength from a high value to zero. By means of a simple arrangement, which will be described farther on, this process can be Carried out in a few seconds, and the metal can be brought as often as desired to a definite condition, which, if not quite identical with the virgin state, at least closely approximates to it.

Forces acting on a Small Body in the Magnetic Field. — If a small magnet of length ds and pole-strength m is brought into a magnetic field such that the values of the magnetic potential at the negative and positive poles respectively are Vi and V2, the work done upon the magnet, and therefore its potential energy, will be

W=w(V 2 -Vi)=m(fV, which may be written

W = mds

dV

ds ”

■■*2-*

MHo = – »IHo,

where M is the moment of the niagnet, v the volume, I the magnetiza- tion, and H the magnetic force along ds. The small magnet may be a sphere rigidly magnetized in the direction of H ; if this is replaced by an isotropic sphere inductively magnetized by the field, then, for a displacement so small that the magnetization of the sphere may be regarded as unchanged, we shall have

dVJ = -bMHo= -v

whence

I+|m

HodHo ‘,

W =

:.HV

(37)

2 1 +§™

The mechanical force acting on the sphere in the direction of dis- placement x is

dx~ v l + UK dx ” «»)

F=-

3 28

MAGNETISM

[MAGNETIC MEASUREMENTS

If H is constant, the force will be zero; if H is variable, the sphere will tend to move in the direction in which H varies most rapidly. The coefficient k/

(i+|itk) is positive for ferromagnetic and para- magnetic substances, which will therefore tend to move from weaker to stronger parts of the field ; for all known diamagnetic substances it is negative, and these will tend to move from stronger to weaker parts. For small bodies other than spheres the coefficient will be different, but its sign will always be negative for diamagnetic sub- stances and positive for others; 1 hence the forces acting on any small body will be in the same directions as in the case of a sphere. 2

Directing Couple acting on an Elongated Body. — In a non-uniform field every volume-element of the body tends to move towards regions of greater or less force according as the substance is paramagnetic or diamagnetic, and the behaviour of the whole mass will be deter- mined chiefly by the tendency of its constituent elements. For this reason a thin bar suspended at its centre of gravity between a pair of magnetic poles will, if paramagnetic, set itself along the line joining the poles, where the field is strongest, and if diamagnetic, transversely to the line. These are the " axial " and " equatorial " positions of Faraday. It can be shown 3 that in a uniform field an elongated piece of any non-crystalline material is in stable equi- librium only when its length is parallel to the lines of force; for diamagnetic substances, however, the directing couple is exceedingly small, and it would hardly be possible to obtain a uniform field of sufficient strength to show the effect experimentally.

Relative Magnetization. — A substance of which the real suscepti- bility is k will, when surrounded by a medium having the sus- ceptibility k', behave towards a magnet as if its susceptibility were Ka = (K-K')l{l+4TTK'). Since 14-4™' can never be negative, the apparent susceptibility k„ will be positive or negative according as k is greater or less than «'. Thus, for example, a tube containing a weak solution of an iron salt will appear to be diamagnetic if it is immersed in a stronger solution of iron, though in air it is para- magnetic. 4

*Circular Magnetization. — An electric current * flowing uniformly through a cylindrical wire whose radius is a produces inside the wire a magnetic field of which the lines of force are concentric circles around the axis of the wire. At a point whose distance from the axis of the wire is r the tangential magnetic force is*

H=2i>/o 2 • (39)

it therefore varies directly as the distance from the axis, where it is zero.. 6 If the wire consists of a ferromagnetic metal, it will become " circularly " magnetized by the field, the lines of magnetization being, like the lines of force, concentric circles. So long as the wire (supposed isotropic) is free

from torsional stress, there will be no external evidence of magnetism.

Magnetic Shielding. — The action of a hollow magnetized shell on a point inside it is always opposed to that of the external magnetizing force, 6 the resultant interior field being therefore weaker than the field outside. Hence any apparatus, such as a galvanometer, may be partially shielded from extraneous magnetic action by enclosing it in an iron case. If a hollow sphere 7 of which the outer radius is R and the inner radius r is placed in a uniform field H , the field inside will also be uniform and in the same direction as Ho, and its value will be approximately

H< = ¥°- TFT" (40)

*i+ *o.-»)(.-£)*

For a cylinder placed with its axis at right angles to the lines of force,

Hi = — ^ 3,- (41)

I + KM-2)

(-«

These expressions show that the thicker the screen and the greater its permeability n, the more effectual will be the shielding action. Since 11 can never be infinite, complete shielding is not possible.

Magneto- Cry stallic Phenomenon. — In anisotropic bodies, such as crystals, the direction of the magnetization does not in general coincide with that of the magnetic force. There are, however, always three principal axes at right angles to one another along which the magnetization and the force have the same direction. If each of these axes successively is placed parallel to the lines of force in a uniform field H, we shall have

Il=/ClH, I2=K2H, I 3 =K3H,

the three susceptibilities k being in general unequal, though in some cases two of them may have the same value. For crystalline bodies the value of k (+ or —) is nearly always small and constant, the magnetization being therefore independent of the form of the body and proportional to the force. Hence, whatever the position of the body, if the field be resolved into three components parallel to the

1 For all except ferromagnetic substances the coefficient is sensibly equal to k.

2 See W. Thomson's Reprint, §§ 615, 634-651. » Ibid. §§ 646, 684.

4 Faraday, Exp. Res. xxi.

' J. J. Thomson, Electricity and Magnetism, § 205. • Maxwell, Electricity and Magnetism, § 431. 7 H. du Bois, Electrician, 1898, 40, 317.

principal axes of the crystal, the actual magnetization will be the resultant of the three magnetizations along the axes. The body (or each element of it) will tend to set itself with its axis of greatest susceptibility parallel to the lines of force, while, if the field is not uniform, each volume-element will also tend to move towards places of greater or smaller force (according as the substance is para- magnetic or diamagnetic), the tendency being a maximum when the axis of greatest susceptibility is parallel to the field, and a minimum when it is perpendicular to it. The phenomena may therefore be exceedingly complicated. 8

3. Magnetic Measurements Magnetic Moment. — The moment M of a magnet may be determined in many ways, 9 the most accurate being that of C. F. Gauss, which gives the value not only of M, but also that of H, the horizontal component of the earth's force. The product MH is first determined by suspending the magnet horizontally, and causing it to vibrate in small arcs. If A is the moment of inertia of the magnet, and t the time of a complete vibration, MH = 4× 2 A// 2 (torsion being neglected). The ratio M/H is then found by one of the magnetometric methods which in their simplest forms are described below. Equation (44) shows that as a first approximation.

M/H = (d 2 -/ 2) tan0/2

M 2 = MHXM/H=2*- 2 A((Z 2 -Z 2) 2 tan0/ftf (42)

H 2 = MH XH/M = %i?Adl{P(# -Pf tan 8} (43)

When a high degree of accuracy is required, the experiments and calculations are less simple, and various corrections are applied. The moment of a magnet may also be deduced from a measure- ment of the couple exerted on the magnet by a uniform field H. Thus if the magnet is suspended horizontally by a fine wire, which, when the magnetic axis points north and south, is free from torsion, and if 6 is the angle through which the upper end of the wire must be twisted to make the magnet point east and west, then MH = CO, or M = C0/H, where C is the torsional couple for i°. A bifilar suspension is sometimes used instead of a single wire. If P is the weight of the magnet, / the length of each of the two threads, 2a the distance between their upper points of attachment, and 2 J that between the lower points, then, approxi- mately, MB. = P(ab/f) sin 6.

It is often sufficient to find the ratio of the moment of one magnet to that of another. If two magnets having moments M, M' are arranged at right angles to each other upon a horizontal support which is free to rotate, their resultant R will set itself in the magnetic meridian. Let 6 be the angle which the standard magnet M makes with the meridian, then M'/R= sin0, and M/R = cos 6, whence M' = M tan 6.

A convenient and rapid method of estimating a magnetic moment has been devised by H. Armagnat. 10 The magnet is laid on a table with its north pole pointing northwards, A compass having a very short needle is placed on the line which bisects the axis of the magnet at right angles, and is moved until a neutral point is found where the force due to the earth's field H is balanced by that due to the magnet. If 2I is the distance between the poles m and— m, d the distance from either pole to a point P on the line AB (fig. 5), we have for the resultant force at P

R= -2cos6Xm/d 2 = -2lm/d 3 = -M/d.*

When P is the neutral point, H is equal and opposite to R; therefore M = Hd s , or the moment is numerically equal to the cube of the distance from the neutral point to a pole, multiplied by the

8 M. Faraday, Exp. Res. xxii., xxiii. ; W. Thomson, Reprint, § 604; J. C. Maxwell, Treatise, § 435; E. Mascart and J. Joubert, Electricity and Magnetism, §§ 384, 396, 1226; A. Winkelmann, Physik, v. 287.

9 See A. Winkelmann, Physik, v. 69-94; Mascart and Joubert. Electricity and Magnetism, ii. 617.

10 Sci. Abs. A, 1906, 9, 225.

Fig. 5.

horizontal intensity of the earth's force. The distance between the poles may with sufficient accuracy for a rough determination be assumed to be equal to five-sixths of the length of the magnet.

Measurement of Magnetization and Induction. — The magnetic condition assumed by a piece of ferromagnetic metal in different circumstances is determinable by various modes of experiment which may be classed as

magnetometric, ballistic, and traction methods. When either the magnetization I or the induction B corresponding to a given magnetizing force H is known, the other may be found by means of the formula B = 471T + H.

Magnetometric Methods. — Intensity of magnetization is most directly measured by observing the action which a magnetized body, generally a long straight rod, exerts upon a small magnetic needle placed near it. The magnetic needle may be cemented horizontally across the back of a little plane or concave mirror, about I or I in. in diameter, which is suspended by a single fibre of unspun silk; this arrangement, when enclosed in a case with a glazed front to protect it from currents of air, constitutes a simple but efficient magnetometer. Deflections of the suspended needle are indicated by the movement of a narrow beam of light which the mirror reflects from a lamp and focusses upon a gradu- ated cardboard scale placed at a distance of a few feet; the angu- lar deflection of the beam of light is, of course, twice that of the needle. The suspended needle is, in the absence of disturbing causes, directed solely by the horizontal component of the earth's field of magnetic force H E , and therefore sets itself approximately north and south. The magnetized body which is to be tested should be placed in such a position that the force H P due to its poles may, at the spot occupied by the suspended needle, act in a direction at right angles to that due to the earth — that is, east and west. The direction of the resultant field of force will then make, with that of H E , an angle 6, such that H P /H E = tan 6, and the suspended needle will be deflected through the same angle. We have therefore

H P = H E tan0.

The angle 6 is indicated by the position of the spot of light upon the scale, and the horizontal intensity of the earth's field H K is known; thus we can at once determine the value of H P , from which the magnetization I of the body under test may be calculated.

In order to fulfil the requirement that the field which a mag- netized rod produces at the magnetometer shall be at right angles to that of the earth, the rod may be conveniently placed in any one of three different positions with regard to the suspended needle.

(1) The rod is set in a horizontal position level with the suspended needle, its axis being in a line which is perpendicular to the magnetic meridian, and which passes

through the centre of suspen- _ m n

sion of the needle. This is 1 ■ 1 –

called the " end-on " position, c

*and is indicated in fig. 6. AB Pl G 6_*

is the rod and C the middle

point of its axis; NS is the magnetometer needle; AM bisects the undeflected needle NS at right angles. Let 2/ = the length of the rod (or, more accurately, the distance between its poles), z/ = its volume, m and — m the strength of its poles, and let d= the distance CM. For most ordinary purposes the length of the needle mav be assumed to be negligible in comparison with the distance between the needle and the rod. We then have approximately for the field at M due to the rod

4dl

H P =

Therefore 2ml = M =

{d-iy (d+l) 1 ~'"(d i -P) s (

2d

2d

And

i=M = (^-fH

!l 2dv

(44) (45)

whence we can find the values of I which correspond to different angles of deflection.

(2) The rod may be placed horizontally east and west in such a posi- tion that the direction of the undeflected suspended needle bisects it at right angles. This is known as the " broadside-on " position, and is represented in fig. 7. Let the distance of each pole of the rod AB from the centre of the magnetometer needle = d. Then, since H P ,

the force at M due to m and — m, is the resultant of 32 and— -p> we have

Hj.

m

2I

~ d

H P

2ml

~ d> •

direction being parallel

to AB

1 1 =

d 3 H P _

V

d 3 H B

V

tan0.

(46)

(3) In the third position the test rod is placed vertically with one of its poles at the level of the magnetometer needle, and in the line

Fig. 8.

drawn perpendicularly to the undeflected needle from its centre of suspension. The arrangement is shown in fig. 8, where AB is the vertical rod and M indicates the position of the magnetometer needle, which is supposed to be perpendicular to the plane of the paper. Denoting the distance AM by d it BM by d\, and AB by I, we have for the force at M due to the magnetism of the rod

H P =j-,- horizontal component of -j%

= m \d?d?) H P d, J H K

Therefore

and

1

dx*

1 =

di

/di'H,

-©

; tan 0,

•!-©'(

tan 0.

(47)

This last method of arrangement is called by Ewing the " one-pole " method, because the magnetometer deflection is mainly caused by the upper pole of the rod {Magnetic Induction, p. 40). For experi- ments with long thin rods or wires it has an advantage over the other arrangements in that the position of the poles need not be known with great accuracy, a small upward or downward displace- ment having little effect upon the magnetometer deflection. On the other hand, a vertically placed rod is subject to the inconveni- ence that it is influenced by the earth's magnetic field, which is not the case when the rod is horizontal and at right angles to the mag- netic meridian. This extraneous influence may, however, be elimi- nated by surrounding the rod with a coil of wire carrying a current such as will produce in the interior a magnetic field equal and opposite to the vertical component of the earth's field.

If the cardboard scale upon which the beam of light is reflected by the magnetometer mirror is a flat one, the deflections as indicated by the movement of the spot of light are related to the actual deflec- tions of the needle in the ratio of tan 2d to 0. Since is always small, sufficiently accurate results may generally be obtained if we assume that tan 20 = 2 tan 0. If the distance of the mirror from the scale is equal to n scale divisions, and if a deflection of the needle causes the reflected spot of light

to move over s scale divisions, we shall have

s/« = tan 26 exactly, s/2n = tan approximately. We may therefore generally substitute s/2n for tan 6 in the various expressions which have been given for I.

Of the three methods which have been described, the first two are generally the most suitable for determining the moment or, tne magnetization of a permanent magnet, and the last for studying the changes which occur in the magnetization of a long rod or wire when subjected to various external magnetic forces, or, in other words, for determining the relation of I to H. A plan of the apparatus as arranged by Ewing for the latter purpose is shown diagrammatic- ally in fig. 9. The cardboard scale SS is placed above a wooden screen, having in it a narrow vertical slit which permits a beam of light from the lamp L to reach the mirror of the magnetometer M, whence it is reflected upon the scale. A is the upper end of a glass tube, half a metre or so in length, which is clamped in a vertical position behind the magnetometer. The tube is wound over its whole length with two separate coils of insulated wire, the one being outside the other. The inner coil is supplied, through the intervening appar- atus, with current from the battery of secondary cells Bi; this produces the desired magnetic field inside the tube. The outer coil derives current, through an adjustable resistance R, from a

L

constant cell B 2 ; its object is to produce inside the tube a magnetic field equal and opposite to that due to the earth's magnetism. C is a " compensating coil " consisting of a few turns of wire through which the magnetizing current passes; it serves to neutralize the effect produced upon the magnetometer by the magnetizing coil, and its

distance from the mag- netometer is so adjusted that when the circuit is closed, no ferromagnetic metal being inside the magnetizing coil, the B ' magnetometer needle undergoes no deflection. K is a commutator for reversing the direction of the magnetizing cur- rent, and G a galvano- meter for measuring it. The strength of the magnetizing current is regulated by adjusting the position of the sliding contact E upon the resistance DF. The current increases to a maximum as E approaches F, and diminishes to almost nothing when E is brought up to D ; it can be completely interrupted

by means of the switch H.

The specimen upon which an experiment is to be made generally consists of a wire having a " dimensional ratio " of at least 300 or 400; its length should be rather less than that of the magnetizing coil, in order that the field Ho, to which it is subjected, may be approximately uniform from end to end. The wire is supported inside the glass tube A with its upper pole at the same height as the magnetometer needle. Various currents are then passed through the magnetizing coil, the galvanometer readings and the simultane- ous magnetometer deflections being noted. From the former we deduce Ho, and from the latter the corresponding value of I, using the formulae Ho = ˆirin/l and

*I = f HB /ˆ3, X *, (48)*

2nirr 2

!-(0'i

where $ is the deflection in scale-divisions, n che distance in scale- divisions between the scale and the mirror, and r the radius of the wire.

The curve, fig. 10, shows the result of a typical experiment made upon a piece of soft iron (Ewing, Phil. Trans, vol. clxxvi. Plate 59), the magnetizing field H being first gradually increased and then dimin- ished to zero. When the length of the wire exceeds 400 diameters, or thereabouts, H may generally be considered as equivalent to H.

4

J

A

9 I

$!

S 3

3

i 4

4i

MagnetU ritld H„

Fig. 10.

the actual strength of the field as modified by the magnetization, of the wire; but if greater accuracy is desired, the value of Hi (= NI) may be found by the help of du Bois's_table and subtracted from Ho. For a dimensional ratio of 400, N =0-00028, and therefore H = Ho — 0-00028 I. This correction may be indicated in the diagram by a straight line drawn from O through the point at which the line of I = 1000 intersects that of H = 0-28 (Rayleigh, Phil. Mag. xxii. 175), the true value of H for any point on the curve being that measured from the sloping line instead of from the vertical axis. The effect of the ends of the wire is, as Ewing remarks, to shear the diagram in the horizontal direction through the angle which the sloping line makes with the vertical.

Since the induction B is equal to H f 4irl, it is easy from the results of experiments such as that just described to deduce the relation between B and H ; a curve indicating such relation is called a curve of induction. The general character of curves of magnetiza- tion and of induction will be discussed later. A notable feature in both classes of curves is that, owing to hysteresis, the ascending and descending limbs do not coincide, but follow very different courses. If it is desired to annihilate the hysteretic effects of previous mag- netization and restore the metal to its original condition, it may be demagnetized by reversals. This is effected by slowly moving the sliding contact E (fig. 9) from F to D, while at the same time the commutator K is rapidly worked, a series of alternating currents of gradually diminishing strength being thus caused to pass through the magnetizing coil.

The magnetometric method, except when employed in con- nexion with ellipsoids, for which the demagnetizing factors are

accurately known, is generally less satisfactory for the exact determination of induction or magnetization than the ballistic method. But for much important experimental work it is better adapted than any other, and is indeed sometimes the only method possible. 1

Ballistic Methods. — The so-called " ballistic " method of measuring induction is based upon the fact that a change of the induction through a closed linear conductor sets up in the con- ductor an electromotive force which is proportional to the rate of change. If the conductor consists of a coil of wire the ends of which are connected with a suitable galvanometer, the integral electromotive force due to a sudden increase or decrease of the induction through the coil displaces in the circuit a quantity of electricity

Q = 5B»5 R, where 5B is the increment or decrement of induction per square centimetre, s is the area of the coil, n the number of turns of wire, and R the resistance of the circuit. Under the influence of the transient current, the galvanometer needle undergoes a momentary deflection, or " throw," which is proportional to Q, and therefore to 5B, and thus, if we know the deflection produced by the discharge through the galvanometer of a given quantity of electricity, we have the means of determin- ing the value of SB.

The galvanometer which is used for ballistic observations should have a somewhat heavy needle with a period of vibration of not less than five seconds, so that the transient current may have ceased before the swing has well begun; an instrument of the d'Arsonyal form is recommended, not only because it is unaffected by outside magnetic influence, but also because the moving part can be in- stantly brought to rest by means of a short-circuit key, thus effecting a great saving of time when a series of observations is being made. In practice it is usual to standardize or " calibrate " the galvano- meter by causing a known change of induction to take place within a standard coil connected with it, and noting the corresponding deflection on the galvanometer scale. Let s be the area of a single turn of the standard coil, n the number of its turns, and r the resist- ance of the circuit of which the coil forms part; and let S, N and R be the corresponding constants for a coil which is to be used in an experiment. Then if a known change of induction 5B„ inside the standard coil is found to cause a throw of d scale-divisions, any change of induction 5B through the experimental coil will be numeri- cally equal to the corresponding throw D multiplied by snRBJSNrd. For a series of experiments made with the same coil this fraction is constant, and we may write SB = kD. Rowland and others have used an earth coil for calibrating the galvanometer, a known change of induction through the coil being produced by turning it over in the earth's magnetic field, but for several reasons it is preferable to employ an electric current as the source of a known induction. A primary coil of length I, having n turns, is wound upon a cylinder made of non-conducting and non-magnetic material, and upon the middle of the primary a secondary or induction coil is closely fitted. When a current of strength i is suddenly interrupted in the primary, the increment of induction through the secondary is sensibly equal to 4«tt/Z units. All the data required for standardizing the galvano- meter can in this way be determined with accuracy.

The ballistic method is largely employed for determining the relation of induction to magnetizing force in samples of the iron and steel used in the manufacture of electrical machinery, and especially for the observation of hysteresis effects. The sample may have the form of a closed ring, upon which are wound the induction coil and another coil for taking the mag-

netizing current; or it may consist of a long straight rod or wire which can be slipped into a magnetizing coil such as is used in magnetometric experiments, the induction coil being wound upon the middle of the wire. With these arrangements there is no demagnetizing force to be considered, for the ring has not any ends to produce one, and the force due to the ends of a rod 400 or 500 diameters in length is quite insensible at the middle portion; H therefore is equal to H .

E. Grassot has devised a galvanometer, or " fluxmeter," which greatly alleviates the tedious operation of taking ballistic readings. 2 The instrument is of the d' Arsonval type ; its coil turns in a strong uniform field, and is suspended in such a manner that torsion is practically negligible, the swings of the coil being limited by damping influences, chiefly electromagnetic. The index therefore remains almost stationary at the limit of its deflection, and the deflection is approximately the same whether the change of induction occurs suddenly or gradually.

1 See C. G. Lamb, Proc. Phys. Soc, 1899, 16, 517. ! Soc. Franc. Phys. Seances, 1904, I, 27.

MAGNETIC MEASUREMENTS]

MAGNETISM

33i

Fig

Induction and Hysteresis Curves. — Some typical induction curves, copied from a paper by Ewing {Proc. Inst. C.E. vol. cxxvi.), are given in figs, n, 12 and 13. Fig. 11 shows the rela- tion of B to H in a specimen which has never before been mag- netized. The experiment may be made in two different ways: (1) the magnetizing current is increased by a series of sudden steps, each of which produces a ballistic throw, the value of B after any one throw being proportional to the sum of that and

all the previous throws; (2) the magnetizing current having been brought to any desired value, is suddenly re- versed, and the observed throw taken as measur- ing twice the actual in- duction. Fig. 12 shows the nature of the course taken by the curve when the magnetizing current, after having been raised to the value corresponding to the point a, is diminished by steps until it is nothing, and then gradually increased in the reverse direction. The downward course of the curve is, owing to hysteresis, strik- ingly different from its upward course, and when the magnetizing force has been reduced to zero, there is still remaining an induc- tion of 7500 units. If the operation is again reversed, the up- ward course will be nearly, but not

exactly, of the form shown by the line d e a, fig. 13. After a few repetitions of the reversal, the process becomes strictly cyclic, the upward and downward curves always following with precision the paths indicated in the figure. In order to establish the cyclic condition, it is sufficient to apply alternately the greatest positive and negative forces employed in the test (greatest H = about ±5 C.G.S. units in the case illustrated in the figure), an operation which is performed by simply reversing the direction of the maximum magnetizing current a few times.

The closed figure a c d e a is variously called a hysteresis curve or diagram or loop. The area J HrfB enclosed by it represents the work done in carrying a cubic centimetre of the iron through the corresponding magnetic cycle; expressed in ergs this work is

— (1MB. 1 To quote an example given by J. A. Fleming, it

requires about 18 foot-pounds of work to make a complete mag- netic cycle in a cubic foot of wrought iron, strongly magnetized first one way and then the other, the work so expended taking the form of heat in the mass.

Fig. 14 shows diagrammatically a convenient arrangement de- scribed by Ewing (see Proc. Inst. C.E. vol. cxxvi., and PhU. Trans., 1893A, p. 987) for carrying out ballistic tests by which either the simple B-H curve (fig. 11) or the hysteresis curve (figs.12 and 1.3) can be determined. The sample under test is prepared in the form of a ring A, upon which are wound the induction and the magnetizing coils ; the latter should be wound evenly over the whole ring, though for the sake of clearness only part of the winding is indicated in the diagram. The magnetizing current, which is derived from the stor- age battery B, is regulated by the adjustable resistance R and measured by the galvanometer G. The current passes through the rocking key K, which, when thrown over to the right, places a in contact with c and b with

1 E. G. Warburg, Wied. Ann. 1881, 13, 141 ; Ewing, Phil. Trans., 1885, 176, 549; Hopkinson, Phil. Trans. 1885, 176, 466. For a simple proof, see Ewing, Magnetic Induction (1900), p. 99. Hopkin- son pointed out that the greatest dissipation of energy which can be caused by a to-and-fro reversal is approximately represented by Coercive force X maximum induction /t.

meter Gs. By means of the three-way switch C the battery current may be sent either into the primary of E, for the purpose of calibrat- ing the galvanometer, or into the magnetizing coil of the ring under test. When it is desired to obtain a simple curve of induction, such as that in fig. 11, S is kept permanently closed, and correspond- ing values of H and B are determined by one of the two methods already described, the strength of

the battery-current being varied by means of the adjustable resistance R. When a hysteresis curve is to be obtained, the procedure is as follows: The current is first adjusted by means of R to such a strength as will fit it to produce the greatest j and — values of the magnetizing force which it is intended to apply in the course of the cycle ; then it is reversed several times, and when the range of the galvanometer throws has become constant, half the extent of an excursion indicates the induction corresponding to the extreme value of H, and gives the point a in the curve fig. 12. The revers- ing key K having been put over to the left side, the short-circuit key S is suddenly opened ; this inserts the resistance R, which has been suitably adjusted before- hand, and thus reduces the current and therefore the magnetizing force to a known value. The gal- vanometer throw which results from the change of current mea- sures the amount by which the ■induction is reduced, and thus a second point on the curve is found. In a similar manner, by giving different values to the resistance R, any desired number of points between a and c in the curve can be determined. To continue the process, the key K is turned over to the right-hand side, and then, while S is open, is turned back, thereby not only reversing the direc- tion of the current, but diminishing its strength by an amount depending upon the previous adjustment of R2. In this way points can be found lying anywhere between c and d of fig. 12, and the determination of the downward limb of the curve is therefore com- pleted. As the return curve, shown in fig. 13, is merely an inverted copy of the other, no separate determination of it is necessary.

In fig. 15 (J. A. Fleming, Magnets and Electric Currents, p. 193) are shown three very different types of hysteresis curves, charac- teristic of the special qualities of the metals from which they were respectively obtained. The distinguishing feature of the first is the steepness of its outlines; this indicates that the induction increases rapidly in relation

to the magnetic force, and hence the metal is well suited for the construction of dy- namo magnets. The second has a very small area, show- ing that the work done in reversing the magnetiza- tion is small; the metal is therefore adapted for use in alternating current trans-

n

Fig. 15.

formers. On the other hand, the form of the third curve, with its large intercepts on the axes of H and B, denotes that the specimen to which it relates possesses both retentiveness and coercive force in a high degree; such a metal would be chosen for making good permanent magnets.

Several arrangements have been devised for determining hysteresis more easily and expeditiously than is possible by the ballistic method. The best known is J. A. Ewing's hysteresis-tester, 2 which is specially intended for testing the sheet iron used in transformers. The sample, arranged as a bundle of rectangular strips, is caused to rotate about a central horizontal axis between the poles of an up- right C-shaped magnet, which is supported near its middle upon knife-edges in such a manner that it can oscillate about an axis in a line with that about which the specimen rotates ; the lower side of the magnet is weighted, to give it some stability. When the speci- men rotates, the magnet is deflected from its upright position by an amount which depends upon the work done in a single complete rotation, and therefore upon the hysteresis. The deflection is indi- cated by a pointer upon a graduated scale, the readings being interpreted by comparison with two standard specimens supplied with the instrument. G. F. Searle and T. G. Bedford • have

2 Magnetic Induction, 1900, 378.

3 PhU. Trans., 1902, 198, 33.

introduced the method of measuring hysteresis by means of an elec- tro-dynamometer used ballistically. The fixed and suspended coils of the dynamometer are respectively connected in series with the magnetizing solenoid and with a secondary wound upon the speci- men. When the magnetizing current is twice reversed, so as to complete a cycle, the sum of the two deflections, multiplied by a fac- toi depending upon the sectional area of the specimen and upon the constants of the apparatus, gives the hysteresis for a complete cycle in ergs per cubic centimetre. For specimens of large sectional area it is necessary to apply corrections in respect of the energy dissipated by eddy currents and in heating the secondary circuit. The method has been employed by the authors themselves in studying the effects of tension, torsion and circular magnetization, while R. L. Wills ' has made successful use of it in a research on the effects of tempera- ture, a matter of great industrial importance.

C.P. Ste'mmetz (Electrician, 1891,26, p. 261 ; 1892, 28, pp. 384,408, 425) has called attention to a simple relation which appears to exist between the amount of energy dissipated in carrying a piece of iron or steel through a magnetic cycle and the limiting value of the induction reached in

the cycle. Denoting by W the work in ergs done upon a cubic centimetre of the metal

(=— J HdB or I Hdl) , he finds W=ijB 1,6 approximately, where jj

is a number, called the hysteretic constant, depending upon the metal, and B is the maximum induction. The value of the constant 7] ranges in different metals from about o-ooi to 0-04; in soft iron and steel it is said to be generally not far from 0-002. Steinmetz's formula may be tested by taking a series of hysteresis curves between different limits of B, measuring their areas by a planimeter, and plotting the logarithms of these divided by 4x as ordinates against logarithms of the corresponding maximum values of B as abscissae. The curve thus constructed should be a straight line inclined to the horizontal axis at an angle 6, the tangent of which is 1-6. Ewing and H. G. Klaassen (Phil. Trans., 1893, 184, 1017) have in this manner examined how nearly and within what range a formula of the type W=7)B e may be taken to represent the facts. The results of an example which they quote in detail may be briefly summarized as follows : —

. Limits of B.

Hysteretic

Constant.

V

Index. e(= tan9)

Degrees.

e

200 to 500

500 to 1,000

1,000 to 2,000

2,000 to 8,000

8,000 to 14,000

O.OI

0-00134

19

1-68

i-55

1-475

1-70

62-25 59-25 57-25 55-75

59-5°

It is remarked by the experimenters that the value of the index t is by no means constant, but changes in correspondence with the successive well-marked stages in the process of magnetization. But though a formula of this type has no physical significance, and cannot be accepted as an equation to the actual curve of W and B, it is, nevertheless, the case that by making the index e = l-6, and assigning a suitable value to 77, a formula may be obtained giving an approximation to the truth which is sufficiently close for the ordinary purposes of electricai engineers, especially when the limiting value of B is neither very great nor very small. Alex- ander Siemens (Journ. Inst. Eng., 1894, 23, 229) states that in the hundreds of comparisons of test pieces which have been made at the works of his firm, Steinmetz's law has been found to be practically correct. 2 An interesting collection of W-B curves embodying the results of actual experiments by Ewing and Klaassen on different specimens of metal is given in fig. 16. It has been shown by Kennelly (Electrician, 1892, 28, 666) that Stein- metz's formula gives approximately correct results in the case of nickel. Working with two different specimens, he found that the hysteresis loss in ergs per cubic centimetre (W) was fairly represented by o-ooi25B 1 – 6 and o-ooioiB 1-6 respectively, the maximum induction ranging from about 300 to 3000. The applicability of the law to cobalt has been investigated by Fleming (Phil. Mag., 1899, 48, 271), who used a ring of cast cobalt containing about 96% of the pure metal. The logarithmic curves which accompany his paper demon- strate that within wide ranges of maximum induction W = o-oiB 1 – 6 = o-527l'- 62 very nearly. Fleming rightly regards it as not a little curious that for materials differing so much as this cast cobalt and soft annealed iron the hysteretic exponent should in both cases be so near to 1-6. After pointing out that, since the magnetization of the metal is the quantity really concerned, W is more appropriately expressed in terms of I, the magnetic moment per unit of volume, than of B, he suggests an experiment to determine whether the mechanical work required to effect the complete magnetic reversal

1 Phil. Mag., 1903, 5, 117.

2 Some experiments by F. G. Baily showed that hysteresis ceased to increase when B was carried beyond 23,000. This value of B corresponds to I = 1640, the saturation point for soft iron. — Brit. Assoc. Rep., 1895, p. 636.

of a crowd of small compass needles (representative of magnetic molecules) is proportional to the I 6th power of the aggregate maxi mum magnetic moment before or after completion of the cycle.

loom

ispoo

apoo

1G000

a, Fine steel wire 0-257 mm – diam.

b, Fine iron wire 0-34 mm. diam.

c, Fine iron wire 0-2475 mm. diam.

d, Thin sheet iron 0-47 mm. thick.

e, Iron wire 0-602 mm. diam. /, Iron wire 0-975 mm – diam. g, Sheet iron 1-95 mm. thick.

h, Thin sheet iron 0-367 mm. thick. i, Very soft iron wire. The experiments of K. Honda and S. Shimizu 3 indicate that Steinmetz's formula holds for nickel and annealed cobalt up to B =3000, for cast cobalt and tungsten steel up to B =8000, and for Swedish iron up to B = 18,000, the range being in all cases extended at the temperature of liquid air.

The diagram, fig. 17, contains examples of ascending induction curves characteristic of wrought iron, cast iron, cobalt and nickel.

- so Fig. 17.

These are to be regarded merely as typical specimens, for the details of a curve depend largely upon the physical condition and purity of the material; but they show at a glance how far the several metals differ from and resemble one another as regards their magnetic properties. Curves of magnetization (which express the relation of I to H) have a close resemblance to those of induction; and, indeed, since B = H+4ttI, and

47rl (except in extreme fields) greatly exceeds H in numerical value, we may generally, without serious error, put I = B/47T, and trans- form curves of induction into curves of magnetization by merely altering the scale to which the ordinates are referred. A scale for- the approximate transformation for the curves in fig. 1 2 is given 3 Tokyo Phys.-Math. Soc, 1904, 2, No. 14.

at the right-hand side of the diagram, the greatest error intro- duced by neglecting H/47T not exceeding o-6%. A study of such curves as these reveals the fact that there are three distinct stages in the process of magnetization. During the first stage, when the magnetizing force is small, the magnetization (or the induction) increases rather slowly with increasing force; this is well shown by the nickel curve in the diagram, but the effect would be no less conspicuous in the iron curve if the abscissae were plotted to a larger scale. During the second stage small increments of magnetizing force are attended by relatively large increments of magnetization, as is indicated by the steep ascent of the curve. Then the curve bends over, forming what is often called a " knee," and a third stage is entered upon, during which a considerable increase of magnetizing force has little further effect upon the magnetization. When in this condition the metal is popularly said to be " saturated." Under increasing magnetizing forces,_. greatly exceeding those comprised within the limits of the diagram, the magnetization does practically reach a limit, the maximum value being attained with a magnet- izing force of less than 2000 for wrought iron and nickel, and less than 4000 for cast iron and cobalt. The induction, however, continues to increase indefinitely, though very slowly. These observations have an important bearing upon the molecular theory of magnetism, which will be referred to later.

The magnetic quality of a sample of iron depends very largely upon the purity and physical condition of the metal. The presence of ordinary impurities usually tends to diminish the permeability, though, as will appear later, the addition of small quantities of certain other substances is sometimes advantageous. A very pure form of iron, which from the method of its manufac- ture is called " steel," is now extensively used for the construc- tion of dynamo magnets; this metal sometimes contains not more than 0-3% of foreign substances, including carbon, and is mag- netically superior to the best commercial wrought iron. The results of some comparative tests published by Ewing (Proc. Inst. C.E., 1896) are given in

the accompanying table. Those in the second column are quoted from a paper by F. Lydall and A. W. Pocklington {Proc. Roy. Soc, 1892, 52, 228) and relate to an exceptional specimen containing nearly 99-9% of the pure metal.

Magnetic

Induction.

Magnetic Force.

Pure |

Low Moor

Steel

Steel

Iron.

Iron.

Forging.

Casting.

5

12,700

10,900

12,300

9,600

10

14,980

13,120

14,920

13,050

15

15,800

14,010

15,800

14,600

20

16,300

14,580

16,280

l5,3io

3°

16,950

15,280

16,810

16,000

40

I7.350

i5,76o

17,190

16,510

50

16,060

17,500

16,900

60

16,340

17,750

17,180

70

16,580

17,970

17,400

80

16,800

18,180

17,620

90

17,000

18,390

17,830

100

17,200

18,600

18,030

Low hysteresis is the chief requisite for iron which is to be used for transformer cores, and it does not necessarily accom- pany high permeability. In response to the demand, manufac- turers have succeeded in producing transformer plate in which the loss of energy due to hysteresis is exceedingly small. Tests of a sample supplied by Messrs. Sankey were found by Ewing to give the following results, which, however, are regarded as being unusually favourable. In a valuable collection of magnetic

To secure the highest possible permeability it is essential that the iron should be softened by careful annealing. When it is mechanically hardened

by hammering, rolling or wire-drawing its permeability may be greatly diminished, especially under a moderate magnetizing force. An experiment by Ewing showed that by the operation of stretching an annealed iron wire beyond the limits of elasticity the permeability under a magnetizing force of about 3 units was reduced by as much as 75%. Ewing has also studied the effect of vibration in conferring upon iron an apparent or spurious permeability of high value; this effort also is most conspicuous when the magnetizing force is weak. The permeability of a soft iron wire, which was tapped while subjected to a very small magnetizing force, rose to the enormous value of about 80,000 {Magnetic Induction, § 85). It follows that in' testing iron for magnetic quality the greatest care must be exercised to guard the specimen against any accidental vibration.

Limits of Induction.

Ergs per c.cra. per cycle.

Watts per lb. Frequency, 100.

2000

220

0-129

3000 4000 5000 6000

410

640

910

1200

0-242 0-376

o-535

0-710

7000 8000 9000

1520 1900 2310

0-890

data {Proc. Inst. C.E., cxxvi.) H. F. Parshall quotes tests of six samples of iron, described as of good quality, which showed an average hysteresis loss of 3070 ergs per c.cm. per cycle at an induction of 8000, being i-6 times the loss shown by Ewing's specimen at the same induction.

The standard induction in reference to deterrriinations of hysteresis is generally taken as 2500, while the loss is expressed in watts per lb at a frequency of 100 double reversals, or cycles, per second. In many experiments, however, different inductions and frequencies are employed, and the hysteresis-loss is often expressed as ergs per cubic centimetre per cycle and sometimes as horse-power per ton. In order to save arithmetical labour it is convenient to be provided with conversion factors for reduc- ing variously expressed results to the standard form. The rate at which energy is lost being proportional to the frequency, it is obvious that the loss at frequency 100 may be deduced from that at any other frequency n by simply multiplying by 100 n. Taking the density of iron to be 7-7, the factor for reducing the loss in ergs per c.cm. to watts per lb with a frequency of 100 is 0-000589 (Ewing). Since 1 horse-power =746 watts, and 1 ton =2240 lb, the factor for reducing horse-power per ton to watts per lb is 746/2240, or just 1/3. The loss for any induc- tion B within the range for which Steinmetz's law holds may be converted into that for the standard induction 2500 by dividing it by B 1 ' 6 /2 5oo 1 " 6 . The values of this ratio for different values of B, as given by Fleming {Phil. Mag., 1897), are contained in the second column of the annexed table. The third column shows the relative amount of hysteresis deduced by Ewing as a general mean from actual tests of many samples {Journ. Inst. Elec. Eng., 1895). Incidentally, these two columns furnish an undesigned test of the accuracy of Steinmetz's law: the greatest difference is little more than 1 %.

Induction

B l-6

Observed relative

B.

2500 1 ' 6 '

Hysteresis.

2000

0-700

0-702

2500

I- OOO

I -000

3000

1-338

1-340

4000

2-II8

2-128

5000

3-031

3-000

6000

4-058

4-022

7000

5-193

5-129

8000

6-430

6-384

Curves of Permeability and Susceptibility. — The relations of fi (= B/H) to B, and of k (= I/H) to I may be instructively exhibited by means of curves, a method first employed by H. A. Rowland. 1 The dotted curve for fx and B in fig. 18 is copied from Rowland's paper. The actual experiment

to which it relates was carried only as the point marked X, corresponding to a magnetizing force of 65, and an induction of nearly 17,000. Rowland, believing that the curve would continue to fall in a straight line meeting the horizontal axis, inferred that the induc- tion corresponding to the point B — about 17,500 — was the highest 1 Phil. Mag., 1873, 46, 140.

that could be produced by any magnetizing force, however great. It has, however, been shown that, if the magnetizing force is carried far enough, the curve always becomes convex to the axis instead of meeting it. The full line shows the result of an experi- ment in which the magnetizing force was carried up to 585, 1

2,000

woo

20000

n

Fig. 18. but though the force was thus increased ninefold, the induction only reached 19,800, and the ultimate value of the permeability was still as much as 33-9.

Ballistic Method with Yoke. — J. Hopkinson {Phil. Trans., 1885, 176, 455) introduced a modification of the usual ballistic arrangement which presents the following advantages: (1) very considerable magnetizing forces can be applied with ordi- nary means; (2) the samples to be tested, having the form of cylindrical bars, are more easily prepared than rings or wires; (3) the actual induction at any time can be measured, and not

only changes of in- duction. On the other hand, a very high degree of ac- curacy is not claimed for the results. Fig. 19 shows the appa- ratus by which the FlG – x 9- ends of the bar are

prevented from exerting any material demagnetizing force, while the permeance of the magnetic circuit is at the same time increased. A A, called the " yoke," is a block of annealed wrought iron about 18 in. long, 63 in. wide and 2 in. thick, through which is cut a rectangular opening to receive the two magnetizing coils B B. The test bar C C, which slides

through holes bored in the yoke, is divided near the middle into two parts, the ends which come into contact being faced true and square. Between the magnetizing coils is a small induction coil D, which is connected with a ballistic galvanometer. The induction coil is carried upon the end of one portion of the test bar, and when this portion is suddenly drawn back the coil slips off and is pulled out of the field by an india-rubber spring. This causes a ballistic throw propor- tional to the induction through the bar at the moment when the two portions were separated. With such an arrangement it is possible to submit the sample to any series of magnetic forces, and to measure its magnetic state at the end. The uncertainty with which the results are affected depends chiefly upon the im- perfect contact between the bar and the yoke and also between the ends of the divided bar. It is probable that Hopkinson did not attach sufficient importance to the demagnetizing action of the cut (cf. Ewing, Phil. Mag., Sept. 1888, p. 274), and that the values which he assigned to H are consequently somewhat too high. He applied his method with good effect, however, in testing a large number of commercial specimens of iron and steel, the magnetic constants of which are given in a table accompany- ing his paper. When it is not required to determine the residual magnetization there is no necessity to divide the sample bar, and ballistic tests may be made in the ordinary way — by steps 1 S. Bidwell, Proc. Roy. Soc, 1886, 40, 495.

or by reversals — the source of error due to the transverse cut thus being avoided. Ewing (Magnetic Induction, § 194) has de- vised an arrangement in which two similar test bars are placed side by side; each bar is surrounded by a magnetizing coil, the two coils being connected to give opposite directions of magneti- zation, and each pair of ends is connected by a short massive block of soft iron having holes bored through it to fit the bars, which are clamped in position by set-screws. Induction coils are wound on the middle parts of both bars, and are connected in series. With this arrangement it is possible to find the actual value of the magnetizing force, corrected for the effects of joints and other sources of error. Two sets of observations are taken, one when the blocks are fixed at the ends of the bars, and another when they are nearer together, the clear length of the bars between them and of the magnetizing coils being reduced to

n /I one-half. If Hi and H2 be the values of qirin/l and 4Tri'~ / — for the

2/ 2

same induction B, it can be shown that the true magnetizing

force is H = Hi — (H2 — Hi). The method, though tedious

in operation, is very accurate, and is largely employed for

determining the magnetic quality of bars intended to serve as standards.

Traction Methods. — The induction of the magnetization may be measured by observing the force required to draw apart the two portions of a divided rod or ring when held together by their mutual attraction. If a transverse cut is made through a bar whose magnetization is I and the two ends are placed in contact, it can be shown that this force is 2x I 2 dynes per unit of area (Mascart and Joubert, Electricity and Magnetism, § 322; and if the magnetization of the bar is due to an external field H produced by a magnetizing coil or otherwise, there is an additional force equal to HI. Thus the whole force, when the two portions of the bar are surrounded by a loosely-fitting magnetizing coil, is

$F = 2ttI\ 2\ + HI$

expressed as dynes per square centimetre. If each portion of the bar has an independent magnetizing coil wound tightly upon it, we have further to take into account the force due to the mutual action of the two magnetizing coils, which assists the forces already considered. This is equal to H 2 8t per unit of sectional area. In the case supposed therefore the total force per square centimetre is

$F = \ 2l\ rP + HI + S?$

OTT

$(4 \times 1\ + H)\ 2$

8-*

- 8tt'

The equation F = B 2 /8t is often said to express " Maxwell's law of magnetic traction " (Maxwell, Electricity and Magnetism, §§ 642-646). It is, of course, true for permanent magnets, where H = o, since then F = 2xl 2 ; but if the magnetization is due to electric currents, the formula is only applicable in the special case when the mutual action of the two magnets upon one another is supplemented by the electromagnetic attraction between separate magnetizing coils rigidly attached to them. 2

The traction method was first employed by S. Bidwell (Proc. Roy. Soc, 1886, 40, 486), who in 1886 published an account of some experiments in which the relation of magnetization to magnetic field was deduced from observations of the force in grammes weight which just sufficed to tear asunder the two halves of a divided ring electro-magnet when known currents were passing through the coils. He made use of the expression

F = Wg = 27rP + HI,

where W is the weight in grammes per square centimetre of sectional area, and g is the intensity of gravity which was taken as 981. The term for the attraction between the coils was omitted as negligibly small (see Phil. Mag., 1890, 29, 440). The values assigned to H were calculated from H=2ni/r, and ranged from 3-9 to 585, but inasmuch as no account was taken of any 2 Since in most practicable experiments H 2 is negligible in com- parison with B 2 , the force may be taken as B 2 /8ir without sensible error.

demagnetizing action which might be due to the two transverse cuts, it is probable that they are somewhat too high. The results, nevertheless, agree very well with those for annealed wrought iron obtained by other methods. Below is given a selection from Bidwell's tables, showing corresponding values of magnetizing force, weight supported, magnetization, induction, susceptibility and permeability: —

H.

w.

I.

B.

K.

M-

3-9

2,210

587

7.390

I5I-0

1889-1

5-7

346o

735

9,240

128-9

1621-3

io-3

540O

918

n.550

89-I

II2I-4

22-2

8,440

1 147

H,450

51-7

650-9

4

9,680

1226

15,460

30-7

386-4

“5

12,170

1370

17.330

u-9

150-7

208

13,810

H52

18,470

7-0

88-8

362

H,740

1489

19,080

4-1

52-7

465

15.275

1508

19,420

3-2

41-8

585

15.905

1530

19,820

2-6

33-9

A few months later R. H. M. Bosanquet {Phil. Mag., 1886, 2 > 53 5) experimented on the relation of tractive force to magnetic induction. Instead of a divided ring he employed a divided straight bar, each half of which was provided with a magnetizing coil. The joint was surrounded by an induction coil connected with a ballistic galvanometer, an arrangement which enabled him to make an independent measurement of the induction at the moment when the two portions of the bar were separated. He showed that there _was, on the whole, a fair agreement between the values determined bal listic-

Fig. 20.

ally and those given by the formula B = ˆ8xF The greatest weight supported in the experiments was 14,600 grammes per square cm., and the cor- responding induction 18,500 units. Taylor Jones subsequently found a good agreement between the theoretical and the observed values of the tractive force in fields ranging up to very high intensities {Phil. Mag., 1895, 39, 254, and 1896, 41, 153).

Permeameters. — Several instruments in which the traction method is applied have been devised for the rapid measurement of induction or of magnetization in commercial samples of iron and steel. The earliest of these is S. P. Thompson's permeameter {Journ. Set. Arts, 1890, 38, 885), which consists of a rectangular block of iron shaped like Hopkinson's yoke, and slotted out in the same way to receive a magnetizing coil (fig. 20) ; the block is bored through at the upper end only, and its inner face opposite the hole is made quite flat and smooth. The sample has the form of a thin rod, one end of which is faced true ; it is slipped into the magnetizing coil from above, and when the current is turned on its smooth end adheres tightly to the surface of the yoke. The force required to detach it is measured by a registering spring balance, which is clamped to the upper end of the rod, and thence the induction or the magnetization is deduced by- applying the formula

(B-H)V8T = 2irP = Pg/S, where P is the pull in grammes weight, S the sectional area of the rod in square cm., and 5=981. If the pull is measured in pounds and the area in square inches, the formula may be written B = i3i7XVP/S+H. The instrument exhibited by Thompson would, without undue heating, take a current of 30 amperes, which was sufficient to produce a magnetizing force of 1000 units. A testing apparatus of a similar type devised by Gisbert Kapp {Journ. Inst. Elec. Eng. xxiii. 199) differs only in a few details from Thompson's permeameter. Ewing has described an arrangement in which the test bar has a soft-iron pole piece clamped to each of its ends; the pole pieces are joined by a long well-fitting block of iron, which is placed upon them (like the " keeper " of a magnet), and the induction is measured by the force required to detach the block. In all such measurements a correction should be made in respect of the demagnetizing force due to the joint, and unless the fit is very accurate the demagnetizing action will be variable. In the magnetic balance of du Bois {Magnetic Circuit, p. 346) the uncertainty arising from the presence of a joint is avoided, the force measured being that exerted between two pieces of iron separated from each other by a narrow air-gap of known width. The instrument is represented diagrammatically in fig. 2t. The test-piece A, surrounded by a magnetizing coil, is clamped between two soft-iron blocks B, B'. Y Y' is a soft iron yoke, which rocks upon knife-edges K and constitutes the beam of the balance. The yoke has two projecting pieces

C, C at unequal distances from the

knife-edges, and separated from the blocks B, B' by narrow air-gaps.

The play of the beam is limited by a stop S and a screw R, the latter

being so adjusted that when the end Y of the beam is held down the

two air-gaps are of equal

width. W is a weight

capable of sliding from end

to end of the yoke along

a graduated scale. When

there is no magnetization,

the yoke is in equilibrium ;

but as soon as the current

is turned on the block C is

drawn downwards as far as

the screw R will allow, for,

though the attractive forces F between B and C and between B' and C are equal, the former has a greater moment. The

weight W is moved along the scale until the yoke just tilts over

upon the stop S ; the distance of W from its zero position is then, as

can easily be shown, proportional to F, and therefore to B 2 , and approximately to P. The scale is graduated in such a manner that

by multiplying the reading by a simple factor (generally 10 or 2) the absolute value of the magnetization is obtained. The actual magnetizing force H is of course less than that due to the coil ; the corrections required are effected automatically by the use of a set of demagnetization lines drawn on a sheet of celluloid which is supplied with the instrument. The celluloid sheet is laid upon the squared paper, and in plotting a curve horizontal distances are reckoned from the proper demagnetization line

instead of from the vertical axis. An improved but somewhat more complex form of the instru- ment is described in Ann. d. Phys., 1900, 2, 317.

In Ewing's magnetic balance {Journ. Inst. Elec. Eng. 1898, 27, 526), the value of the magnetic induction corresponding to a single stated magnetizing force is directly read off on a divided scale. The speci- men, which has the form of a turned rod, 4 in. long and } in. in dia- meter, is laid across the poles of a horseshoe electromagnet, excited by a current of such strength as to produce in the rod a magnetizing force H =20. One pole has a V-shaped notch for the rod to rest in; the surface of the other is slightly rounded, forming a portion of a cylinder, the axis of which is perpendicular to the direction of the length of the rod. The rod touches this pole at a single point, and is pulled away from it by the action of a lever, the long arm of which is graduated and carries a sliding weight. The position of the weight at the moment when contact is broken indicates the induc- tion in the rod. The standard force H=20 was selected as being sufficiently low to distinguish between good and bad specimens, and at the same time sufficiently high to make the order of merit the same as it would be under stronger forces.

Permeability Bridges. — Several pieces of apparatus have been invented for comparing the magnetic quality of a sample with that of a standard iron rod by a zero method, such as is employed in the comparison of electrical resistances by the Wheatstone bridge. An excellent instrument of the class is Ewing's permeability bridge. The standard rod and the test specimen, which must be of the same dimensions, are placed side by side within two magnetizing coils, and each pair of adjacent ends is joined by a short rectangular block yoke" of soft iron. An iron bar shaped like an inverted

of

projects upwards from each of the yokes, the horizontal portions 1 the bars being parallel to the rods, and nearly meeting at a height of about 8 in. above them (thus [" 1). A compass needle placed in the gap serves to detect any flow of induction that may exist between the bent bars. For simplicity of calculation, the clear length of each rod between the yokes is made 12-56 (= 4?r) centimetres, while the coil surrounding the standard bar contains 100 turns; hence the magnetizing force due to a current of n amperes will be io» C.G.S. units. The effective number of turns in the coil sur- rounding the test rod can be varied by means of three dial switches (for hundreds, tens and units), which also introduce compensating resistances as the number of effective turns in the coil is reduced, thus keeping the total resistance of the circuit constant. The two coils are connected in series, the same current passing through both. Suppose the switches to be adjusted so that the effective number of turns in the variable

coil is 100; the magnetizing forces in the two coils will then be equal, and if the test rod is of the same quality as the standard, the flow of induction will be confined entirely to the iron circuit, the two yokes will be at the same magnetic potential, and the compass needle will not be affected. If, however, the per- meability of the test rod differs from that of the standard, the number of lines of induction flowing in opposite directions through the two rods will differ, and the excess will flow from one yoke to the other, partly through the air, and partly along the path provided by the bent bars, deflecting the compass needle. But a balance may still be obtained by altering the effective number of turns in the test coil, and thus increasing or decreasing the magnetizing force acting on the test rod, till the induction in the two rods is the same, a condition which is fulfilled when reversal of the current has no effect on the compass needle. Let m be the number of turns in use, and Hi and H 2 the magnetizing forces which produce the same induction B in the test and the standard rods respectively; then Hi = H2X«/ioo. The value of B which corresponds to H 2 m/ioo can be found from the

(B, H) curve for the standard, which is assumed to have been deter- mined; and this same value corresponds to the force H in the case of the test bar. Thus any desired number of corresponding values of H and B can be easily and quickly found.

Measurement of Field Strength. Exploring Coil. — Since in air B = H, the ballistic method of measuring induction described above is also available for determining the strength of a magnetic field, and is more often employed than any other. A small coil of fine wire, connected in series with a ballistic galvanometer, is placed in the field, with its windings perpendicular to the lines of force, and then suddenly reversed or withdrawn from the field, the integral electromotive force being twice as great in the first case as in the second. The strength of the field is proportional to the swing of the galvano- meter-needle, and, when the galvanometer is calibrated, can be expressed in C.G.S. units. Convenient arrangements have been introduced whereby the coil is reversed or withdrawn from the field by the action of a spring.

Bismuth Resistance. — The fact, which will be referred to later, that the electrical resistance of bismuth is very greatly affected by a magnetic field has been applied in the construction of apparatus for measuring field

intensity. A little instrument, supplied by Hartmann and Braun, contains a short length of fine bismuth wire wound into a flat double spiral, half an inch or thereabouts in diameter, and attached to a long ebonite handle. Unfortunately the effects of magnetization upon the specific resistance of bismuth vary enormously with changes of temperature; it is therefore necessary to take two readings of the resistance, one when the spiral is in the magnetic field, the other when it is outside.

Electric Circuit. — If a coil of insulated wire is suspended so that it is in stable equilibrium when its plane is parallel to the direction of a magnetic field, the transmission of a known electric current through the coil will cause it to be deflected through an angle which is a function of the field intensity.

One of the neatest applications of this principle is that described by Edser and Stansfield (Phil. Mag., 1893, 34, 186), and used by them to test the stray fields of dynamos. An oblong coil about an inch in length is suspended from each end by thin strips of rolled German silver wire, one of which is connected with a spiral spring for regulat- ing the tension, the other being attached to a torsion-head. Inside the torsion-head is a commutator for automatically reversing the current, so that readings may be taken on each side of zero, and the arrangement is such that when the torsion-head is exactly at zero the current is interrupted. To take a reading the torsion-head is turned until an aluminium pointer attached to the coil is brought to the zero position on a small scale ; the strength of the field is then proportional to the angular torsion. The small current required is supplied to the coil from a single dry cell. The advantages of portability, very considerable range (from H = l upwards), and fair accuracy are claimed for the instrument.

Polarized Light. — The intensity of a field may be measured by the rotation of the plane of polarization of light passing in the direction of the magnetic force through a transparent substance. If the field is uniform, 'R —djoid, where is the rotation, d the thickness of the substance arranged as a plate at right angles to the direction of the field, and w Verdet's constant for the substance.

For the practical measurement of field intensity du Bois has used plates of the densest Jena flint glass. These are preferably made slightly wedge-shape, to avoid the inconvenience resulting from multiple internal reflections, and they must necessarily be rather thin, so that double refractions due to internal strain may not exert a disturbing influence. Since Verdet's constant is somewhat un- certain for different batches of glass even of the same quality, each plate should be standardized in a field of known intensity. As the source of monochromatic light a bright sodium

burner is used, and the rotation, which is exactly proportional to H, is measured by an accurate polarimeter. Such a plate about I mm. in thickness is said to be adapted for measuring fields of the order of 1000 units. A part of one surface of the plate may be silvered, so that the polarized ray, after having once traversed the glass, is reflected back again ; the rotation is thus doubled, and moreover, the arrangement is, for certain experiments, more convenient than the other.

4. Magnetization in Strong Fields

Fields due to Coils. — The most generally convenient arrange ment for producing such magnetic fields as are required for

experimental purposes is undoubtedly a coil of wire through which an electric current can be caused to flow. The field due to a coil can be made as nearly uniform as we please through- out a considerable space; its intensity, when the constants of the coil are known, can be calculated with ease and certainty and may be varied at will through wide ranges, while the appara- tus required is of the simplest character and can be readily constructed to suit special purposes. But when exceptionally strong fields are desired, the use of a coil is limited by the heat- ing effect of the magnetizing current, the quantity of heat generated per unit of time in a coil of given dimensions increasing as the square of the magnetic field produced in its interior. In experiments on magnetic strains carried out by H. Nagaoka and K. Honda (Phil. Mag., 1900, 49, 329) the intensity of the highest field reached in the interior of a coil was 2200 units; this is probably the strongest field produced by a coil which has hitherto been employed in experimental work. In 1890 some experiments in which a coil was used were made by du Bois (Phil. Mag., 1890, 29, 253, 293) on the magnetiza- tion of iron, nickel, and 1 cobalt under forces im ranging from about 100 to 1250 units. Since the demagnetizing factor was 0-052, the strongest

field due to the coil was

Fig. 22.

heating. Du Bois's results, which, as given in his papers, show the relation of H to the magnetic moment per unit of mass, have been reduced by Ewing to the usual form, and are indi- cated in fig. 22, the earlier portions of the curves being sketched in from other data.

Fields due to Electromagnets. — The problem of determining the magnetization of iron and other metals in the strong fields formed between the poles of an electromagnet was first attacked by J. A. Ewing and W.

Low. An account of their preliminary experiments by what they call the isthmus method was pub- lished in 1887 (Proc. Roy. Soc. 42, 200), and in the following year they described a more complete and perfect series (Phil. Trans., 1889, 180, 221).

The sample to be inserted between the magnet poles was prepared in the form of a bobbin resembling an ordinary cotton reel, with a short narrow neck (constituting the " isthmus ") and conical ends. Upon the central neck was wound a coil consisting of one or two layers of very fine wire, which was connected with a ballistic galvano- meter for measuring the induction in the iron ; outside this coil, and separated from it by a small and accurately determined distance, a second coil was wound, serving to measure the induction in the iron, together with that in a small space surrounding it. The difference of the ballastic throws taken with the two coils measured the inten- sity of the field in the space around the iron, and it also enabled a correction to be made for the non- ferrous space between the iron neck and the centre of the thickness ofthe inner coil. The pole pieces of the electromagnet (see fig. 23) were fur- nished with a pair of truncated cones 6 b, of soft iron forming an extension of the conical ends of the bobbin c. The most suitable form for the pole faces is investigated in the paper, and the conclusion arrived at is that to pro- duce the greatest concentration of force upon the central neck, the cones should have a common vertex in the middle of the neck with a semi-vertical angle of 54 44', while the con- dition for a uniform field is satisfied when the cones have a semi- vertical angle of 39 14' ; in the latter case the magnetic force in the air just outside is sensibly equal to that within the neck. A pair of cones having a semi- vertical angle of 45 ° were considered to combine high concentrative power with a sufficient approximation to uni- formity of field. In most of the experiments the measurements were made by suddenly withdrawing the bobbin from its place

h

\ A

/

1

\ 1

1 •

V

!

?.

rHr

51.

A

3

ft.

/

V \|

\

)

Fig. 23.

MAGNETIZATION: WEAK FIELDS]

between the pole pieces. Two groups of observations were recorded, one giving the induction in the inner coil and the other that in the outer coil. The value of the residual induction which persisted when the bobbin was drawn out was added to that of the induction measured, and thus the total induction in the iron was determined. The highest induction reached in these experiments was 45,350 units, more than twice the value of any previously recorded. The cor- responding intensity of the outside field was 24,500, but, owing to the wide angle of the cones used (about 2X63°), this was probably greater than the value of the magnetic force within the metal. The following table shows some results of other experiments in which H was believed to have sensibly the same value inside as outside the metal. Values of I are derived from (B — H)/47r and of p from B/H.

Metal.

H

B

I

M

Swedish Iron

1,490

6,070

8,600

19.450

19,880

22,650 27,130 30,270 40,820 41,140

1680 1680 1720 1700 1700

15-20

4-47 3-52

2-IO

2-07

Cast Iron

4.56o

13,460 16,200 16,900

20,070 28,710 30,920 31.760

1230 1210 1 1 70 1 180

4.4O

2-13 1-91

1-88

“^ f

in

_, –

H

6,210

9.970

12,170

14,660

15,530

25,480 29,650 31,620

34,55o

35.820

1530 1570 1550 1580 1610

4-10 2-97

2-6o

2-36 2-31

Hard Nickel

2,220

4.440

7,940

14,660

16,000

7,100

9,210

12,970

19,640

21,070

390 380 400 400 400

3-20 2-09

1-63

1-34 1-32

3 f

1.350

4,040

8,930

14,990

16,000

18,870

-23,890

30,210

1260 1280 1290 1310

12-73 4-98

2-82

2-IO

These results are of extreme interest, for they show that under sufficiently strong magnetizing forces the intensity of magnetization I reaches a maximum value, as required by W. E. Weber's theory of molecular magnetism. There appears to be no definite limit to the value to which the induction B may be raised, but the magnetization I attains a true saturation value under magnetizing forces which are in most cases com- paratively moderate. Thus the magnetization which the sample of Swedish iron received in a field of 1490 was not increased (beyond the limits of experimental error) when the intensity of the field was multiplied more than thirteen-fold, though the induction was nearly doubled. When the saturation value of I has been reached, the relation of magnetic induction

to magnetic force may be expressed by

B = H -(-constant.

The annexed table gives the saturation values of I for the par- ticular metals examined by Ewing and Low: —

Saturation Value of I

Wrought iron 1,700

Cast iron 1,240

Nickel (0-75% iron) 515

(0-56% „) 400

Cobalt (1-66% „) 1,300

It is shown in the paper that the greatest possible force which the isthmus method can apply at a point in the axis of the bobbin is

F = 11-137 I, logic £/a,

I,, being the saturation value of the magnet pores, a the radius of the neck on which the cones converge, and b the radius of the bases of the cones.

Some experiments made by H. du Bois (Phil. Mag., 1890, 29, 293) with an electromagnet specially designed for the production of strong fields, confirm Ewing's results for iron, nickel and cobalt. The method employed did not admit of the production of such high magnetizing forces, but was of special interest in that both B and I were measured optically — B by means of the rotation of a polarized ray inside a glass plate, as before described, and I by the rotation of a polarized ray reflected from the polished surface of the magnet-

ized metal (see " Kerr's constant," Magneto-Optics). H(= B— 4^-1) was calculated from corresponding values of I and B. Taylor Jones (Wied. Ann., 1896,57, 258, and Phil. Mag., 1896,41, 153), working with du Bois's electromagnet and using a modification of the isthmus method, succeeded in pushing the induction B up to 74,200 with H =51,600, the corresponding value of I being 1798, and of 11 only 1-44. The diameter of the isthmus was 0-241 mm., and the electro- magnet was excited by a current of 40 amperes.

Tractive Force of a Magnet. — Closely connected with the results just discussed is the question what is the greatest tractive force that can be

exerted by a magnet. In the year 1852 J. P. Joule {Phil. Mag., 1852, 3, 32) expressed the opinion that no " force of current could give an attraction equal to 200 lb per sq. in.," or 14,000 grms. per square centimetre, and a similar view prevailed among high authorities more than twenty years later. For the greatest possible " lifting power " of permanent magnets this estimate is probably not very far from the truth, but it is now clearly understood that the force which can be exerted by an electromagnet, or by a pair of electromagnets with opposite poles in contact, is only limited by the greatest value to which it is practically possible to raise the magnetizing force H. This is at once evident when the tractive force due to magnetization is ex- pressed as 27rI 2 +HI. For fields of moderate intensity the first term of the expression is the more important, but when the value of H exceeds 12,000 or thereabouts, the second pre- ponderates, and with the highest values that have been actually obtained, HI is several times greater than 27rF. If H could be increased without limit, so also could the tractive force. The following table shows the greatest " lifting powers " experi- mentally reached at the dates mentioned : —

Observer.

Kilos per sq. cm.

ft) per sq. in.

Date.

Joule Bidwell . Wilde T. Jones .

12-3

15-9

26-8

1 14-9

175 226

38l

1634

1852 1886 1891 1896

5. Magnetization in Very Weak Fields

Some interesting observations have been made of the effects produced by

very small magnetic forces. It was first pointed out by C. Baur (Wied. Ann., 1880, 11, 399) thatinweak fields the relation of the magnetization I to the magnetizing force H is approximately expressed by an equation of the form

$$I = aH + 6H\ !\ ,\ or\ .\ K = I/H = a + 6H,$$

whence it appears that within the limits of Baur's experiments the magnetization curve is a parabola, and the susceptibility curve an inclined straight line, k being therefore a known function of H. If these equations could be assumed to hold when H is indefinitely small, it would follow that k has a finite initial value, from which there would be no appreciable deviation in fields so weak that 6H was negligibly small in comparison with a. Such an assumption could not, however, without dangerous extrapolation, be founded upon the results of Baur's experiments, which did not go far enough to justify it. In some experiments carried out in 1887, Lord Rayleigh (Phil. Mag., 1887, 23, 225) approached very much more nearly than Baur to the zero of magnetic force. iJsing an unannealed Swedish iron wire, he found that when H was gradually dimin- ished from 0-04 to 0-00004 C.G.S. unit, the ratio of magnet- ization to magnetizing force remained sensibly constant at 6-4, wihch may therefore with great probability be assumed to represent the initial value of k for the specimen in question. Experiments with annealed iron gave less satisfactory results, on account of the slowness with which the metal settled down into a new magnetic state, thus causing a " drift " of the magnet- ometer needle, which sometimes persisted for several seconds. Apart from this complication, it appeared that I was pro- portional to H when the value of H was less than 0-02.

The observations of Baur and Rayleigh have been confirmed and discussed by (amongst others) W. Schmidt (Wied. Ann., 1895, 54,655), who found the limiting values of k to be 7-5 to 9-5 for iron, and 11 -2 to 13-5 for steel, remaining constant up to H = -o6; by P. Culmann (Elekt. Zeit., 1893, 14, 345; Wied. Ann., 1895, 56, 602); and by L. Holborn (Bed. Ber., 1897, p. 95, and Wied. Ann., 1897, 61, 281). The latter gives values of the constants a and b for different samples of iron and steel, some of which are shown in the following table : — K = a + fcH Metal. a b

English tungsten steel . 8-90 0-264

Tungsten steel, hardened 2-23 0-032

Silver steel . . . 8-66 0-384

Tool steel …. 8-30 0-400

Refined steel . . . 11-28 1-92

Cast iron …. 3-16 0236

Soft iron …. 16-6 186

Hard drawn iron . . 5-88 1-76

For most samples of steel the straight-line law was found to hold approximately up to H = 3; in the case of iron and of soft steel the approximation was less close.

The behaviour of nickel in weak fields has been observed by Ewing (Phil. Trans., 1888, 179A, 325), who found that the initial value of k was 1-7, and that it remained sensibly constant until H had reached a value of about five units. While there- fore the initial susceptibility of nickel is less than that of iron and steel, the range of magnetic force within which it is approxi- mately constant is about one hundred times greater. Ewing has also made a careful study (Proc. Roy. Soc, 1889, 46, 269) of " magnetic viscosity " under small forces — the cause of the magnetometer " drift " referred to by Rayleigh. On the application of a small magnetizing force to a bar of soft annealed iron, a certain intensity of magnetization is instantly produced; this, however, does not remain constant, but slowly increases for some seconds or even minutes, and may ultimately attain a value nearly twice as great as that observed immediately after the force was applied. 1 When the magnetizing current is "broken, the magnetization at once undergoes considerable diminution, then gradually falls to zero, and a similar sudden change followed by a slow one is observed when a feeble current is reversed. Ewing draws attention to a curious consequence of this time-lag. By the alternate application and withdrawal of a small magnetizing force a cyclic condition may be estab- lished in an iron rod. If now the alternations are performed so rapidly that time is not allowed for more than the first sudden change in the magnetization, there will be no hysteresis loss, the magnetization exactly following the magnetizing force. Further, if the alternations take place so slowly that the full maximum and minimum" values of the magnetization are reached in the intervals between the reversals, there will again be no dissipation of energy. But at any intermediate fre- quency the ascending and descending curves of magnetization will enclose a space, and energy will be dissipated. It is remarkable that the phenomena of magnetic viscosity are much more

evident in a thick rod than in a thin wire, or even in a large bundle of thin wires. In hardened iron and steel the effect can scarcely be detected, and in weak fields these metals exhibit no magnetic hysteresis of any kind.

6. Changes oe Dimensions attending Magnetization

It is well known that the form of a piece of ferromagnetic metal is in general slightly changed by magnetization. The phenomenon was first noticed by J. P. Joule, who in 1842 arid 1847 described some experiments which he had made upon bars of iron and steel. His observations, were for the most part confirmed by a number of subsequent workers, notably by A. M. Mayer; but with the single exception of the discovery by W. F. Barrett in 1882 that a nickel bar contracts when magnetized, nothing of importance was added by Joule's results for nearly forty years. Later researches have however thrown much new light upon a class of phenomena which cannot fail to have an important bearing upon the complete theory of

1 The same phenomenon is exhibited in a less marked degree when soft iron is magnetized in stronger fields (Ewing, Phil. Trans., 1885,

176. 569)-

molecular magnetism. 2 According to Joule's observations, the length of a bar of iron or soft steel was increased by magnet- ization, the elongation being proportional up to a certain point to the square of the intensity of magnetization; but when the " saturation point " was approached the elongation was less than this law would require, and a stage was finally reached at which further increase of the magnetizing force produced little or no effect upon the length. From data contained in Joule's paper it may be calculated that the strongest external field H produced by his coil was about 126 C.G.S. units, but since the dimensional ratio of his bars was com- paratively small, the actual magnetizing force H must have been materially below that value. In 1885 it was shown by Bidwell, in the first of a series of papers on the subject, that if the magnetizing force is pushed beyond the point at which Joule discontinued his experiments, the extension of the bar does not remain unchanged, but becomes gradually less and less, until the bar, after first returning to its original length, ultimately becomes actually shorter than when in the unmagnetized condition. The elongation is generally found to reach a maximum under a magnetizing force of 50 to 120 units, and to vanish under a force of 200 to 400, retraction occurring when still higher forces are applied. In order to meet the objection that the phenomenon might be due to electromagnetic action between the coil and the rod, Bidwell made some experiments with iron rings, and found that the length of their diameters varied under

magnetization in pre- cisely the same manner as the length of a straight rod. Experi- ments were afterwards made with rods of iron, nickel, and cobalt, the external field being carried up to the high value of 1500 units. The results are indicated in Fig. 24. It appears that the contraction – m which followed the initial extension of the iron reached a limit in fields of 1.000 or 1 100. Nickel exhibited retraction from the very beginning (as observed by Barrett), its greatest change of length considerably exceeding that undergone by iron; in a field of 800 the original length was diminished by as much as 1/40,000 part, but stronger forces failed to produce any further effect. The curve for cobalt is a very remarkable one. • Little or no change of length was observed until the strength of the field H reached about 50; then the rod began to contract, and after passing a minimum at Ho = 400, recovered its original length at H =75o; beyond this point there was extension, the amount of which was still increasing fast when the experiment was stopped at H =i4oo. Similar results were obtained with three different samples of the metal. Roughly speaking, therefore, cobalt behaves oppositely to iron.

2 Principal publications: J. P. Joule, Scientific Papers, pp. 46, 235; A. M. Meyer, Phil. Mag., 1873, 46, 177; W. F. Barrett, Nature, 1882, 26, 585; S. Bidwell, Phil. Trans., 1888, 179A, 205; Proc. Roy. Soc, 1886, 40, 109 and 257; 1888, 43, 406; 1890, 47, 469; 1892, 51, 495; 1894,55,228; 1894,56,94; 1904,74,60; Nature, 1899, 6o, 222; M. Cantone, Mem. d. Ace. d. Lincei, 1889, 6, 487; Rend. d. Ace. d. Lincei, 1890, 6, 252; A. Berget, C.R., 1892, 115, 722; S. J. Lochner, Phil. Mag., 1893, 36, 498; H. Nagaoka, Phil. Mag., 1894, 37, 131; Wied. Ann., 1894, 53, 487; C. G. Knott, Proc. Roy. Soc. Ed., 1891, 18, 315; Phil. Mag., 1894, 37, 141; Trans. Roy. Soc. Ed., 1896, 38, 527; 1898, 39, 457; C. G. Knott and A. Shand, Proc. Roy. Soc. Ed., 1892, 19, 85 and 249; 1894,20,295; L.T. More, Phil. Mag., 1895,40, 345; G. Klingenberg, Rostock Univ. Thesis, Berlin, 1897; E. T. Jones, Phil. Trans., 1897, 189A, 189; B. B. Brackett, Phys. Rev.,

1897, 5, 257; H. Nagaoka and K. Honda, Phil. Mag., 1898, 46, 261 ; 1900, 49, 329; Journ. Coll. Sci. Tokyo, 1900, 13, 57; 1903, 19, art. 11; J. S. Stevens, Phys. Rev., 1898, 7, 19; E. Rhoads, Phys. Rev.,

1898, 7, 5; Phil. Mag., 1901, 2, 463; G. A. Shakespear, Phil. Mag.,

1899, 17, 539; K. Honda, Journ. Coll. Sci. Tokyo, 1900, 13, 77; L. W. Austin, Phys. Rev., 1900, 10, 180; Deutsch. Phys. Gesell. Verh.,

1904, 6, 4, 211 ; K. Honda and S. Shimizu, Phil. Mag., 1902, 4, 338;

1905, 10, 548.

Fig. 24.

Joule and others experimented with hardened steel, but failed to find a key to the results they obtained, which are rather complex, and have been thought to be inconsistent. The truth appears to be that a hardened steel rod generally behaves like one of iron or soft steel in first undergoing extension under increasing magnetizing force, and recovering its original length when the force has reached a certain critical value, beyond which there is contraction. But this " critical value " of the force is found to depend in an unexpected manner upon the hardness of the steel; the critical value diminishes as the hardness becomes greater up to a certain point, corresponding to a yellow temper, after which it increases and with the hardest steel becomes very high. For steel which has been made red- hot, suddenly cooled, and then let down to a yellow temper, the critical value of the magnetizing force is smaller than for steel which is either softer or harder; it is indeed so small that the metal contracts like nickel even under weak magnetizing forces, without undergoing any preliminary extension that can be detected.

Joule also made experiments upon iron wires under tension, and drew the erroneous inference (which has been often quoted as if it were a demonstrated fact) that under a certain critical tension (differing for different specimens of iron but independent

of the magnetizing force) magnetization would produce no effect whatever upon the dimensions of the wire. What actually happens when an iron wire is loaded with various weights is clearly shown in Fig. """• 25. Increased tension Fig. 25. merely has the effect

of diminishing the maximum elongation and hastening the contraction; with the two greatest loads used in the experiment there was indeed no preliminary extension at all. 1 The effects of tension upon the behaviour of a nickel wire are of a less simple character. In weak fields the magnetic contraction is always diminished by pulling stress; in strong fields the contraction increases under a small load and diminishes under a heavy one. Cobalt, curiously enough, was found to be quite unaffected by tensile stress.

Certain experiments by C. G. Knott on magnetic twist, which will be referred to later, led him to form the conclusion that in an iron wire carrying an electric current the magnetic elongation would be increased.

This forecast was shown by Bidwell to be well founded. The effect produced by a current is exactly opposite to that of tension, raising the elongation curve instead of depressing it. In the case of a wire 0-75 mm. in diameter the maximum elongation was nearly doubled when a current of two amperes was passing through the iron, while the " critical value " of the field was increased from 130 to 200. Yet notwithstanding this enormous effect in iron, the action of a current upon nickel and cobalt turned out to be almost inappreciable.

Some experiments were next undertaken with the view of ascertaining how far magnetic changes of length in iron were dependent upon the hardness of the metal, and the un- expected result was arrived at that softening produces the same effect as tensile stress; it depresses the elongation curve, diminishing the maximum extension, and reducing the " critical value " of the magnetizing force. A thoroughly well annealed ring of soft iron indeed showed no extension at all, beginning to contract, like nickel, under the smallest magnetizing forces. The experiments were not sufficiently numerous to indicate whether, as is possible, there is a critical degree of hardness for which the height of the elongation curve is a maximum. Finally, experiments were made to ascertain the effect of

1 The loads were successively applied in decreasing order of magni- tude. They are indicated in fig. 25 as kilos per sq. cm.

magnetization upon the dimensions of iron rings in directions perpendicular to the magnetization, and upon the volume of the rings. 2 It was found that the curve showing the relation of transverse changes of dimensions to magnetizing force was similar in general character to the familiar elongation curves, but the signs were reversed; the curve was inverted, indicating at first retraction, which, after passing a maximum and vanish- ing in a critical field, was succeeded by elongation. The curve showing the circumferential (or longitudinal) changes was also plotted, and from the two curves thus obtained it was easy, on the assumption that the metal was isotropic in direc- tions at right angles to the magnetization, to calculate changes of volume; for if circumferential elongation be denoted by k, and transverse elongation by 4, then the cubical dilatation (+ or-) = /i + 2/2 approximately. If l x were exactly equal to – 2I2 for all values of the magnetizing force, it is clear that the volume of the ring would be unaffected by magnetization. In the case of the ring in question, the circumferential changes were in weak fields less than twice as great as the transverse ones, while in strong fields they were more than twice as great; under increasing magnetic force therefore the volume of the ring was first diminished, then it regained its original value (for H = 9o), and ultimately increased. It was also shown that annealing, which has such a large effect upon circum- ferential (or longitudinal) changes, has almost none upon

transverse ones. Hence the changes of volume undergone by a given sample of wrought iron under increasing magnetization must depend largely upon the state of the metal as regards hardness; there may be always contraction, or always expan- sion, or first one and then the other.

Most of the experiments described above have been repeated and the results confirmed by other workers, some of whom have added fresh observations. The complicated hysteresis effects which attend magnetic elongation and retraction have been studied by H. Nagaoka, who also, in conjunction with K. Honda, measured the changes of length of various metals shaped in the form of ovoids instead of cylindrical rods, and determined the magnetization curves for the same specimens; a higher degree of accuracy was thus attained, and satis- factory data were provided for testing theories. Among other things, it was found that the behaviour of cast cobalt was entirely changed by annealing; the sinuous curve shown in Fig. 24 was converted into an almost perfectly straight line passing through the origin, and lying below the horizontal axis; while the permeability of the metal was greatly dimin- ished by the operation. They also tested several varieties of nickel-steel in the form of both ovoids and wires. With a sample containing 25% of nickel no appreciable change was detected; others containing larger percentages, and tested in fields up to 2000, all exhibited elongation, which tended to an asymptotic value as the field was increased. The influence of temperature varying between wide limits has formed the subject of a research by K. Honda and S. Shimizu. For soft iron, tungsten-steel and nickel little difference appeared to result from lowering the temperature down to – 186 C. (the temperature of liquid air); at sufficiently high temperatures, 6oo° to 1000 or more, it was remarked that the changes of length in iron, steel and cobalt tended in every case to become proportional to the magnetic force, the curves being nearly straight lines entirely above the axis. The retraction of nickel was diminished by rising temperature, and at 400 had almost vanished. The influence of high temperature on cobalt was very remarkable, completely altering the character of the change of length: the curves for annealed cobalt show that at 450 this metal behaves just like iron at ordinary tempera- tures, lengthening in fields up to about 300 and contracting in stronger ones. The same physicists have made some addi- tional experiments upon the effect of tension on magnetic change of length. Bidwell's results for iron and nickel were confirmed, and it was further shown that the elongation of nickel-steel was very greatly diminished by tension; whet 2 Joule believed that the volume was unchanged.

magnetized under very heavy loads, the wire was indeed found to undergo slight contraction. Honda subjected tubes of iron, steel and nickel to the simultaneous action of circular and longitudinal fields, and observed the changes of length when one of the fields was varied while the other remained constant at different successive values from zero upwards. The experimental results agreed in sign though not in magnitude with those calculated from the changes produced by simple longitudinal magnetization, discrepancies being partly accounted for by the fact that the metals employed were not actually isotropic. Heusler's alloy has been tested for change of length by L. Austin, who found continuous elongation with increasing fields, the curves obtained bearing some resemblance to curves of magnetization.

As regards the effect of magnetization upon volume there are some discrepancies. Nagaoka and Honda, who employed a fluid dilatometer, found that the volume of several specimens of iron, steel and nickel was always slightly increased, no diminution being indicated in low fields; cobalt, on the other hand, was diminished in volume, and the amount of the change, though still very small, was greater than that shown by the other metals. Various nickel-steels all expanded under magnet- ization, the increase being generally considerable and propor- tional to the field; in the case of an alloy containing 29% of nickel the change was nearly 40 times greater than in soft iron. C. G. Knott, who made an exhaustive series of experiments upon various metals in the form of tubes, concluded that in iron there was always a slight increase of volume, and in nickel and cobalt a slight decrease. It is uncertain how far these various results are dependent upon the physical condition of the metals.

Attempts have been made to explain magnetic deformation by various theories of magnetic stress, 1 notably that elaborated by G. R. Kirchhoff (Wied. Ann., 1885, 24, 52, and 1885, 25, 601), but so far with imperfect success. E. Taylor Jones showed in 1897 that only a small proportion of the contraction exhibited by a nickel wire when magnetized could be accounted for on Kirchhoff's theory from the observed effects of pulling stress upon magnetiza tion; and in a more extended series of observations Nagaoka and Honda found wide quantitative divergences between the results of experiment and calculation, though in nearly all cases there was agreement as to quality. They consider, however, that Kirchhoff's theory, which assumes change of magnetization to be simply pro- portional to strain, is still in its infancy, the present stage of its evolution being perhaps comparable with that reached by the theory of magnetization at the time when the ratio I/H was supposed to be constant. In the light of future researches further development may reasonably be expected.

It has been suggested 2 that an iron rod under magnetization may be in the same condition as if under a mechanically applied longitu- dinal stress tending to shorten the iron. If a long magnetized rod is divided transversely and the cut ends placed nearly in contact, the magnetic force inside the narrow air gap will be B = H+4xI. The force acting on the magnetism of one of the faces, and urging this face towards the other, will be less than B by 27rl, the part of the total force due to the first face itself; hence the force per unit of area with which the faces would press against each other if in contact is

P = (B -2tI)I =27rP+HI = (B 2 -H 2) =/8tt. The width of the gap may be diminished until it is no greater than the distance between two neighbouring molecules, when it will cease to be distinguishable, but, assuming the molecular theory of magnetism to be true, the above statement will still hold good for the intermolecular gap. The same pressure P will be exerted across any imaginary section of a magnetized rod, the stress being sustained by the intermolecular springs, whatever their physical nature may be, to which the elasticity of the metal is due. The whole of the rod will therefore be subject to a compressive longitudinal stress P, the associated contraction R, expressed as a fraction of the original length, being

R = P/M = (B 2 -H 2)/8ttM, where M is Young's modulus. This was found to be insufficient to account for the whole of the retraction exhibited by iron in strong fields, but it was pointed out by L. T. More 3 that R ought to be

1 For a discussion of theories of magnetic stress, with copious references, see Nagaoka, Rap. du Congres International de Physique (Paris, 1900), ii. 545. Also Nagaoka and Jones, Phil. Mag., 1896, 41,

454-

2 S. Bidwell, Phil. Trans., 1888, 179a, 321. 3 Phil. Mag., 1895, 40, 345.

regarded as a " correction " to be applied to the results of experi- ments on magnetic change of length, the magnetic stress being no less an extraneous effect than a stress applied mechanically. Those who support this view generally speak of the stress as " Maxwell's stress," and assume its value to be B 2 /8x. The stress in question seems, however, to be quite unconnected with the " stress in the medium " contemplated by Maxwell, and its value is not exactly B 2 /8x except in the particular case of a permanent ring magnet, when H = 0. Further, Maxwell's stress is a tension along the lines of force, and is equal to B 2 /87r only when B = H, and there is no magnetization. 4 Some writers have indeed contended that the stress in

magnetized iron is not compressive, but tensile, even when, as in the case of a ring-magnet, there are no free ends. The point at issue has an important bearing upon the possible correlation of magnetic phenomena, but, though it has given rise to much dis- cussion, no accepted conclusion has yet been reached. 3

7. Effects of Mechanical Stress upon Magnetization

The effects of traction, compression and torsion in relation to magnetism have formed the subject of much patient investi- gation, especially at the hands of J. A. Ewing, C. G. Knott and the indefatigable physicists of Tokyo University. The results of their experiments embrace a multiplicity of details of which it is impossible to give an adequate summary. Only a few of the most important can be mentioned here; the reader who wishes for fuller information should consult the original papers. 6

It was first discovered by E. Villari in 1868 that the magnetic susceptibility of an iron wire was increased by stretching when the magnetization was below a certain value, but diminished when that value was exceeded; this phenomenon has been termed by Lord Kelvin, who discovered it independently, the " Villari reversal," the value of the magnetization for which stretching by a given load produces no effect being known as the " Villari critical point " for that load. The Villari critical point for a given sample of iron is reached with a smaller magnetizing force when the stretching load is great than when it is small; the reversal also occurs with smaller loads and with weaker fields when the iron is soft than when it is hard. The following table shows the values of I and H corresponding to the Villari critical point in some of Ewing's experiments: — –

Soft Iron.

Hard Iron.

Kilos per sq. mm.

I.

H.

Kilos per sq. mm.

I.

H.

4-3

8-6

I2‘9

1220

1040

840

690

7-3 4-3 3-4 3-05

27-6 32-2 37-3 42-5

1 180 1150

mo

1020

34 32 29

25

The effects of pulling stress may be observed either when the wire is stretched by a constant load while the magnetizing force is varied, or when the magnetizing force is kept constant while the load is varied. In the latter case the first appli- cation of stress is always attended by an increase — often a very great one — of the magnetization, whether the field is weak or strong, but after a load has been put on and taken off several times the changes of magnetization become cyclic. From experiments of both classes it appears that for a given field there is a certain value of the load for which the magnet- ization is a maximum, the maximum occuring at a smaller load the stronger the field. In very strong fields the maximum may even disappear altogether, the effect of the smallest stress

4 J. C. Maxwell, Treatise, § 643.

6 See correspondence in Nature, 1896, 53, pp. 269, 316, 365, 462,533 ; 1906, 74, pp. 317, 539; B. B. Brackett, loc. cit., quotes the opinion of H. A. Rowland in support of compressive stress.

6 J. A. Ewing, Phil. Trans., 1885, 176, 580; 1888, 179, 333; Mag- netic

Induction, 1900, ch. ix. ; J. A. Ewing and G. C. Cowan, Phil. Trans., 1888, 1793,325; C. G. Knott, Trans. Roy. Soc. Ed., 1882-1883, 32, 193; 1889, 35, 377; 1891, 36, 485; Proc. Roy. Soc. Ed., 1899, 586; H. Nagaoka, Phil. Mag., 1889, 27, 117; 1890, 29,123; H. Nagaoka and K. Honda, Journ. Coll. Sci. Tokyo, 1900, 13, 263; 1902, 16, art. 8 ; Phil. Mag., 1898, 46, 261 ; 1902, 4, 45; K. Honda and S. Shimizu, Ann. d. Phys., 1904, 14, 791; Tokyo Physico-Math. Soc. Rep., 1904, 2, No. 13; K. Honda and T. Terada, Journ. Coll. Sci. Tokyo, 1906, 21, art. 4.

being to diminish the magnetization; on the other hand, with very weak fields the maximum may not have been reached with the greatest load that the wire can support without per- manent deformation. When the load on a hardened wire is gradually increased, the maximum value of I is found to correspond with a greater stress than when the load is gradually diminished, this being an effect of hysteresis. Analogous changes are observed in the residual magnetization which remains after the wire has been subjected to fields of different strength. The effects of longitudinal pressure are opposite to those of traction; when the cyclic condition has been reached, pressure reduces the magnetization of iron in weak fields and increases it in strong fields (Ewing, Magnetic Induction, 1900, 223).

The influence of traction in diminishing the susceptibility of nickel was first noticed by Kelvin (W. Thomson), and was subsequently investigated by Ewing and Cowan. The latter found the effect to be enormous, not only upon the induced magnetization, but in a still greater degree upon the residual. Even under so ” moderate ” a load as 33 kilogrammes per square mm., the induced magnetization of a hard-drawn nickel wire in a field of 60 fell from 386 to 72 units, while the residual was reduced from about 280 to 10. Ewing has also examined the effects produced by longitudinal compression upon the susceptibility and retentiveness of nickel, and found, as was to be expected, that both were greatly increased by pressure. The maximum susceptibility of one of his bars rose from 5-6 to 29 under a stress of 19-8 kilos per square mm. There were reasons for believing that no Villari reversal would be found in nickel. Ewing and Cowan looked carefully for it, especially in weak fields, but failed to discover anything of the kind. 1 Some experiments by A. Heydweiller, 2 which appeared to indicate a reversal in weak fields (corresponding to 1 = 5; or thereabouts), have been shown by Honda and Shimizu to be vitiated by the fact that his specimen was not initially in a magnetically neutral state; they found that

when the applied field had the same direction as that of the permanent magnet- ization, Heydweiller's fallacious results were easily obtained; but if the field were applied in the direction opposite to that of the permanent magnetization, or if, as should rightly be the case, there were no permanent magnetization at all, then there was no indication of any Villari reversal. Thus a very important question, which has given rise to some controversy, appears to be now definitely settled.

The effects of longitudinal pressure upon the magnetization of cast cobalt have been examined by C. Chree, 3 and also by J. A. Ewing. 4 Chree's experiments were undertaken at the suggestion of J. J. Thomson, who, from the results of Bidwell's observations on the magnetic deformation of cobalt, was led to expect that that metal would exhibit a reversal opposite in character to the effect observed in iron. The anticipated reversal was duly found by Chree, the critical point corresponding, under the moderate stress employed, to a field of about 120 units. Ewing's independent experiments showed that the magnetization curve for a cobalt rod under a load of 16-2 kilogrammes per square mm. crossed the curve for the same rod when not loaded at $H = 53$. *Both observers noticed analogous effects in the residual magnetization. The effect of tension was subsequently studied by Nagaoka and Honda, who in 1902 confirmed, mutatis mutandis, the results obtained by Chree and Ewing for cast cobalt, while for annealed cobalt it turned out that tension always caused diminution of magnet- ization, the diminution increasing with increasing fields. They also investigated the magnetic behaviour of various nickel- steels under tension, and found that there was always increase of magnetization. Thus it has been proved that in annealed cobalt and in nickel-steel there is no Villari reversal.*

1 H. Tomlinson found a critical point in the " temporary magnet- ization " of nickel (Proc. Phys. Soc, 1890, 10, 367, 445), but this does not correspond to a Villari reversal. Its nature is made clear by Ewing and Cowan's curves (Phil. Trans., 1888, 179, plates 15, 16).

2 Wied. Ann., 1894, 52, 462; Electrician, 1894, 34, 143. 'Phil. Trans., 1890, 131, 329.

- *Magnetic Induction, 1900, 222.*

It has been pointed out by J. J. Thomson (Applications oj Dynamics to Physics and Chemistry, 47) that on dynamical principles there must be a reciprocal relation between the changes of dimensions produced by magnetization and the changes of magnetization attending mechanical strain. Since, for example, stretching diminishes the magnetization of nickel, it follows from theory that the length of a nickel rod should be diminished by magnetization and conversely. So, too, the Villari reversals

in iron and cobalt might have been predicted — as indeed that in cobalt actually was — from a knowledge of the changes of length which those metals exhibit when magnetized.

The complete reciprocity of the effects of magnetization upon length and of stretching upon magnetization is shown by the following parallel statements: —

Iron. Magnetization produces in- Tension produces increase of crease of length in weak fields, magnetization in weak fields, decrease in strong fields. decrease in strong fields.

Cast Cobalt. Magnetization produces de- Tension produces decrease of

crease of length in weak fields, magnetization in weak fields, increase in strong fields. increase in strong fields.

Nickel and Annealed Cobalt. Magnetization produces de- Tension produces decrease of

crease of length in all fields. magnetization in all fields.

Nickel-Steel. Magnetization produces in- Tension produces increase of

crease of length in all fields. magnetization in all fields.

Nagaoka and Honda (Phil. Mag., 1898, 46, 261) have investigated the effects of hydrostatic pressure upon magnetization, using the same pieces of iron and nickel as were employed in their experiments upon magnetic change of volume. In the iron cylinder and ovoid, which expanded when magnetized, compression caused a diminution of magnetization ; in the nickel rod, which contracted when magnet- ized, pressure was attended by an increase of magnetization. The amount of the change was in both cases exceedingly small, that in iron being less than o-l C.G.S. unit with a pressure of 250 atmo- spheres and $H = 54$. It would hardly be safe to generalize from these observations; the effects may possibly be dependent upon the physical condition of the metals. In the same paper Nagaoka and Honda describe an important experiment on the effect of transverse stress. An iron tube, having its ends closed by brass caps, was placed inside a compressing vessel into which water was forced until the pressure upon the outer surface of the tube reached 250 atmospheres. The experiment was the reverse of one made by Kelvin with a gun- barrel subjected to internal hydrostatic pressure (Phil. Trans., 1878, 152, 64), and the results were also the reverse. Under increasing magnetizing force the magnetization first increased, reached a maxi- mum, and then diminished until its value ultimately became less than when the iron was in the unstrained condition.

Experiments on the effect of external hydrostatic pressure upon the magnetization of iron rings have also been made by F. Frisbie, 5 who found that for the magnetizing forces used by Nagaoka and Honda pressure produced a small increase of magnetization, a result which appears to be in accord with theory.

The relations of torsion to magnetization were first carefully studied by G. Wiedemann, whose researches are described in his Elefctricitat, iii. 671. The most interesting of his dis- coveries, now generally known as the " Wiedemann effect," is the following: If we magnetize longitudinally a straight wire which is fixed at one end and free at the other, and then pass an electric current through the wire (or first pass the current and then magnetize), the free end of the wire will twist in a certain direction depending upon circumstances: if the wire is of iron, and is magnetized (with a moderate force) so that its free end has north polarity, while the current through it passes from the fixed to the free end, then the free end as seen from the fixed end will twist in the direction of the hands of a watch; if either the magnetization or the current is reversed, the direc- tion of the twist will be reversed. To this mechanical pheno- menon there is a magnetic reciprocal. If we twist the free end of a ferromagnetic wire while a current is passing through it, the wire becomes longitudinally magnetized, the direction of the magnetization depending upon circumstances: if the wire is of iron and is twisted so that its free end as seen from the fixed end turns in the direction of the hands of a watch, while 6 Phys. Rev., 1904, 18, 432.

the current passes from the fixed to the free end, then the direc- tion of the resulting magnetization will be such as to make the free end a north pole. The twist effect exhibited by iron under moderate longitudinal magnetization has been called by Knott a positive Wiedemann effect; if the twist were reversed, the other conditions remaining the same, the sign of the Wiedemann effect would be negative. An explanation of the twist has been given by Maxwell {Electricity and Magnetism, § 448). The wire is subject to two superposed magnetizations, the one longitudinal, the other circular, due to the current traversing the wire; the resultant magnetization is consequently in the direction of a screw or spiral round the wire, which will be right-handed or left-handed according as the relation between the two magnet- izations is right-handed or left-handed; the magnetic expansion or contraction of the metal along the spiral lines of magnetization produces the Wiedemann twist. Iron (moderately magnetized) expands along the lines of magnetization, and therefore for a right-handed spiral exhibits a

right-handed twist. This explana- tion was not accepted by Wiedemann, 1 who thought that the effect was accounted for by molecular friction. Now nickel contracts instead of lengthening when it is magnetized, and an experiment by Knott showed, as he expected, that caeteris paribus a nickel wire twists in a sense opposite to that in which iron twists. The Wiedemann effect being positive for iron is negative for nickel. Further, although iron lengthens in fields of moderate strength, it contracts in strong ones; and if the wire is stretched, contraction occurs with smaller magnetizing forces than if it is unstretched. Bidwell 2 accordingly found upon trial that the Wiedemann twist of an iron wire vanished when the magnetizing force reached a certain high value, and was reversed when that value was exceeded; he also found that the vanishing point was reached with lower values of the magnet- izing force when the wire was stretched by a weight. These observations have been verified and extended by Knott, whose researches have brought to light a large number of additional facts, all of which are in perfect harmony with Maxwell's explanation of the twist.

Maxwell has also given an explanation of the converse effect, namely, the production of longitudinal magnetization by twisting a wire when circularly magnetized by a current passing through it. When the wire is free from twist, the magnetization at any point P is in the tangential direction PB (see fig. 26). Suppose the wire to be fixed at the top and twisted at the bottom in the direction of the arrow-head T; then the element of the wire at P will be stretched in the direction Pe and compressed in the direction Pr. But tension and compression produce opposite changes in the magnetic susceptibility; if the metal is iron and its magnetization is below the Villari critical point, its susceptibility will be greater along Pe than along Pr; the direction of the magnetiza- tion therefore tends to approach Pe and to recede from Pr, changing, in consequence of the twist, from PB to some such direction as PB', which has a vertical component downwards; hence the lower and upper ends will respectively acquire north and south polarity, which will dis- appear when the wire is untwisted. This effect has never been actually reversed in iron, probably, as suggested by Ewing, because the strongest practicable circular fields fail to raise the components of the magnetization along Pe and Pr up to the Villari critical value. Nagaoka and Honda have approached very closely to a reversal, and consider that it would occur if a sufficiently strong current could be applied without undue heating.

One other effect of torsion remains to be noticed. If a longi- tudinally magnetized wire is twisted, circular magnetization is developed; this is evidenced by the transient electromotive force induced in the iron, generating a current which will deflect a galvanometer connected with the two ends of the wire. The explanation given of the last described phenomenon will with the necessary modification apply also to this; it is a

consequence 1 Phil. Mag., 1886. 22, 50. 2 Ibid. 251.

Fig. 26.

of the aeolotropy produced by the twist. There are then three remarkable effects of torsion:

A A wire magnetized longitudinally and circularly becomes twisted.

B. Twisting a circularly magnetized wire produces longi-

tudinal magnetization.

C. Twisting a longitudinally magnetized wire produces circu-

lar magnetization. And it has been shown earlier that —

D. Magnetization produces change of length.

E. Longitudinal stress produces change of magnetization. Each of these five effects may occur in two opposite senses. Thus in A the twist may be right-handed or left-handed; in B the polarity of a given end may become north or south; in C the circular magnetization may be clockwise or counter-clockwise; in D the length may be increased or diminished ; in E the mag-netization may become stronger or weaker. And, other condi- tions remaining unchanged, the " sense " of any effect depends upon the nature of the metal under test, and (sometimes) upon the intensity of its magnetization. Let each of the effects A, B, C, D and E be called positive when it is such as is exhibited by moderately magnetized iron, and negative when its sense is opposite. Then the results of a large number of investigations may be briefly summarized as follows:

(S) = strongly magnetized. Sign.

+

(W) = weakly magnetized. Metal. Effects.

Iron (W) .... A, B, C, D, E

Unannealed Cobalt (S) Nickel-Steel (W) . – Nickel .... Annealed Cobalt . Iron(S) . . . . Unannealed Cobalt .

A, D, E +,

A, D, E +

A, B, C, D, E –

D, E –

A, C, D, E . A, D, E

Several gaps remain to be filled, but the results so far recorded can leave no doubt that the five effects, varied as they may at first sight appear, are intimately connected with one another. For each of the metals tabulated in the first column all the effects hitherto observed have the same sign; there is no single instance in which some are positive and others negative. Until the mysteries of molecular constitution have been more fully ex- plored, perhaps D may be most properly regarded as the funda- mental phenomenon from which the others follow. Nagaoka and Honda have succeeded in showing that the observed relations between twist and magnetization are in qualitative agreement with an extension of Kirchhoff's theory of magneto- striction.

The effects of magnetization upon the torsion of a previously twisted wire, which were first noticed by Wiedemann, have been further studied by F. J. Smith 3 and by G. Moreau. 4 Nagaoka 6 has described the remarkable influence of combined torsion and tension upon the magnetic susceptibility of nickel, and has made the extra- ordinary observation that, under certain conditions of stress, the magnetization of a nickel wire may have a direction opposite to that of the magnetizing force.

8. Effects of Temperature upon Magnetism

High Temperature. — It has long been known that iron, when raised to a certain " critical temperature " corresponding to dull red heat, loses its susceptibility and becomes magnetically indifferent, or, more accurately, is transformed from a ferro- magnetic into a paramagnetic body. Recent researches have shown that other imporant changes in its properties occur at the same critical temperature. Abrupt alterations take place in its density, specific heat, thermo-electric quality, electrical conductivity, temperature-coefficient of electrical resistance, and in some at least of its mechanical properties. Ordinary magnet- izable iron is in many respects an essentially different substance from the non-magnetizable metal into which it is transformed when its temperature is raised above a certain point (see Brit. Assoc. Report, 1890, 145). The first exact experiments demon- strating the changes which occur in the permeability of iron,

3 Phil. Mag., 1891, 32, 383.

4 C.R., 1896, 122, 1 192; 1898, 126, 463. 6 Phil. Mag., 1889, 27, 117.

steel and nickel when heated up to high temperatures were those of J. Hopkinson {Phil. Trans., 1889, 180, 443; Proc. Roy. Soc, 1888, 44, 317). The metal to be tested was prepared in the form of a ring, upon which were wound primary and secondary coils of copper wire insulated with asbestos. The primary coil carried the magnetizing current; the secondary, which was wound inside the other, could be connected either with a ballistic galvanometer for determining the induction, or with a Wheatstone's bridge for measuring the resistance, whence the temperature was calculated. The ring thus prepared was placed in a cast-iron box and heated in a gas furnace. The following are the chief results of Hopkinson's experiments: For small magnetizing forces the magnetization of iron steadily increases with rise of temperature till the critical temperature is approached, when the rate of increase becomes very high, the permeability in some cases attaining a value of about 11,000; the magnetization then with remarkable suddenness almost entirely disappears, the permeability falling to about 1-14. For strong magnetizing forces (which in these experiments did not exceed 11 = 48-9) the permeability remains almost constant at its initial value (about 400), until the temperature is within nearly ioo° of the critical point; then the permeability diminishes more and more rapidly until the critical point is reached and the magnetization vanishes. Steel behaves in a similar manner, but the maximum permeability is not so high as in iron, and the fall, when the critical point is approached, is less abrupt. The critical temperature for various samples of iron and steel ranges from 690 C. to 870 C; it is the temperature at which Barrett's " recalescence " occurs. The critical temperature for the specimen of nickel examined (which contained nearly 5% of impurities) was 310° C. F. Lydall and A. W. Pocklington found that the critical temperature of nearly pure iron was 874 C. {Proc. Roy. Soc, 1893, 52, 228).

An exhaustive research into the effects of heating on the magnetic properties of iron has been carried out by D. K. Morris {Proc. Phys. Soc, 1897, 15, 134; and Phil. Mag., 1897, 44, 213), the results being embodied in a paper containing twelve pages of tables and upwards of 120 curves. As in Hopkinson's experi- ments, ring magnets were employed; these were wound with pri- mary and secondary coils of insulated platinum wire, which would bear a much higher temperature than copper without oxidation or fusion. A third platinum coil, wound non-inductively between the primary and the secondary, served to carry the current by which the ring was heated; a current of 4-6 amperes, with 16 volts across the terminals, was found sufficient to maintain the ring at a temperature of 1 1 50° C. In the ring itself was embedded a platinum-thermometer wire, from

the resistance of which the temperature was determined. The whole was wrapped in several coverings of asbestos and placed in a glass vessel from which the air was partially exhausted, additional precautions being taken to guard against oxidation of the iron.

Some preliminary experiments showed the striking difference in the effects of annealing at a red heat (840° C.) and at a low white

heat (1150° C). After one of the rings had been annealed at 840 , its maximum permea- bility at ordinary tem- peratures was 4000 for H = l-84; when it had been subsequently an- nealed at 1150 , the maximum permea- bility rose to 4680 for H = l-48, while the hysteresis loss for B= =4000 was under 500 ergs per c.cm. As H regards the effects of p,_ _ temperature, Morris's

'" _ results are in general

agreement with those of Hopkinson, though no doubt they indicate details with greater clearness and accuracy. Specimens of curves show- ing the relation of induction to magnetic field at various temperatures, and of permeability to temperature with fields of different intensities, are given in figs. 27 and 28. The most striking feature presented by these is the enormous value, 12,660, which, with H =0-153, ls

HOOO

12000

22112-

WOO

B

Wt'i

4000

//

7»"

tooo

y-

—

767’S

> 1

.

i

1

1

t .

‘

) 1

‘

attained by the permeability at 765 C, followed by a drop so pre- cipitous that when the temperature is only 15° higher, the value of the permeability has become quite insignificant. The critical temperatures for three different specimens of iron were 795°, 780 , and 770 respectively. Above these temperatures the little permeability that remained was found to be independent of the magnetizing force, but it ˆ appeared to vary a little 1*000 with the temperature, one specimen showing a permeability of 100 at wo 820°, 2-3 at 950°, and 17 at 1050°. These last observations are, how- ””> ever, regarded as uncer- tain. The effects of tem- perature upon hysteresis *

Fig.

000′ 28.

10OO’

Hysteresis Loss in Ergs per c.cm. Max. H. = =fc6-83.

Temp. C.°

Ergs.

Temp. C.°

Ergs

764-5

120

457

2025

748

328

352

2565

730

426

249

3130

695

797

137-5

3500

634

IOIO

24

3660

554

1345

A paper by H. Nagaoka and S. Kusakabe 1 generally confirms Morris's results for iron, and gives some additional observations for steel, nickel and cobalt. The magnetometric method was employed, and the metals, in the form of ovoids, were heated by a specially designed burner, fed with gas

and air under pressure, which directed 90 fine jets of flame upon the asbestos covering the ovoid. The temperature was determined by a platinum-rhodium and platinum thermo-j unction in contact with the metal. Experiments were made at several constant temperatures with varying magnetic fields, and also at constant fields with rising and falling temperatures. For ordinary steel the critical temperature, at which magnetization practically disappeared, was found to be about 830 , and the curious fact was revealed that, on cooling, magnetization did not begin to reappear until the temperature had fallen 40 below the critical value. This retardation was still more pronounced in the case of tungsten-steel, which lost its magnetism at 910 and remained non- magnetic till it was cooled to 570°, a difference of 240 . For nearly pure nickel the corresponding temperature-difference was about 100°. This phenomenon is of the same nature as that first dis- covered by J. Hopkinson for nickel-steel. The paper contains tables and curves showing details of the magnetic changes, sometimes very complex, at different temperatures and with different fields. The behaviour of cobalt is particularly noticeable; its permeability increased with rising temperature up to a maximum at 500°, when it was about twice as great as at ordinary temperatures, while at 1600 , corresponding to white heat, there was still some magnetization remaining.

Further contributions to the subject have been made by K. Honda and S. Shimizu, 2 who experimented at temperatures ranging from — l86 c to 1200°. As regards the higher temperatures, the chief point of interest is the observation that the curve of magnetization for annealed cobalt shows a small depression at about 450 , the tempera- ture at which they had found the sign of the length-change to be reversed for all fields. In the case of all the metals tested a small but measurable trace of magnetization remained after the so-called critical temperature had been exceeded ; this decreased very slightly up to the highest temperature reached (1200) without undergoing any such variation as had been suspected by Morris. When the curve after its steep descent, has almost reached the axis, it bends aside sharply and becomes a nearly horizontal straight line; the authors suggest that the critical temperature should be defined as that corresponding to the point of maximum curvature. As thus defined the critical temperatures for iron, nickel and cobalt were

1 Journ. Coll. Sci. Tokyo, 1904, 19, art. 9.

2 Phil. Mag., 1905, 10, 548; Tokyo Phys.-Math. Soc. Rep., 1904, 2, No. 14; Journ. Coll. Sci. Tokyo, 1905, 20, art. 6.

found to be 780 , 360° and 1090° respectively, but these values are not quite independent of the magnetizing force.

Experiments on the effect of high temperatures have also been made by M. P. Ledeboer, 1 H. Tomlinson, 2 P. Curie, 3 and W. Kunz, 4 R. L. Wills, 6 J. R. Ashworth 6 and E. P. Harrison. 7

Low Temperature. — J. A. Fleming and J. Dewar (Proc. Roy. Soc, 1896, 60, 81) were the first to experiment on the permeability and hysteresis of iron at low temperatures down to that of liquid air (-186 C). Induction curves of an annealed soft-iron ring were taken first at a temperature of 15 C, and afterwards when the ring was immersed in liquid air, the magnetizing force ranging from about o‘8 to 22. After this operation had been repeated a few times the iron was found to have acquired a stable condition, and the curves corresponding to the two temperatures became perfectly definite. They showed that the permeability of this sample of iron was considerably dimin- ished at the lower temperature. The maximum permeability (for H = 2) was 3400 at 15 and only 2700 at -186 , a reduction of more than 20%; but the percentage reduction became less as the magnetizing force departed from the value corresponding to maximum permeability. Observations were also made of the changes of permeability which took place as the temperature of the sample slowly rose from -186 to 15 , the magnetizing force being kept constant throughout an experiment. The values of the permeability corresponding to the highest and lowest temperatures are given in the following table. Most of the permeability-temperature curves were more or less convex

Sample of Iron.

H.

M at 15°.

M at— 186°.

Annealed Swedish Unannealed ,, .

i-77

1-78

2835 917

2332 1272

Hardened ,, .

979 2-66

1210 56

1293 132

Steel wire

4-92 11-16 127-7

7-50 20-39

106-5

447-5 109 86

36i

502 823 124

64-5 144

magnetized metals when cooled to the temperature of liquid air. The metals, which were prepared in the form of small rods, were magnetized between the poles of an electromagnet and tested with a magnetometer at temperatures of -186° and 15 . The first immersion into liquid air generally produced a permanent decrease of magnetic moment, and there was sometimes a further decrease when the metal was warmed up again; but after a few alternations of temperature the changes of moment became definite and cyclic. When the permanent magnetic condition had been thus established, it was found that in the case of all the metals, except the two alloys containing large percentages of nickel, the magnetic moment was temporarily increased by cooling to -186 . The following table shows the principal results. It is suggested that a permanent magnet might conveniently be " aged " (or brought into a constant condition) by dipping it several times into liquid air.

towards the axis of temperature, and in all the experiments, except those with annealed iron and steel wire, the permeability was greatest at the lowest temperature. 8 The hysteresis of the soft annealed iron turned out to be sensibly the same for equal values of the induction at -186 as at 15°, the loss in ergs per c.cm. per cycle being approximately represented by 0-002 B 1 ' 56 when the maximum limits of B were + 9000. Experiments with the sample of unannealed iron failed to give satisfactory results, owing to the

fact that no constant magnetic condition could be obtained.

Honda and Shimizu have made similar experiments at the tempera- ture of liquid air, employing a much wider range of magnetizing forces (up to about 700 C.G.S.) and testing a greater variety of metals. They found that the permeability of Swedish iron, tungsten-steel and nickel, when the metals were cooled to — l86 c , was diminished in weak fields but increased in strong ones, the field in which the effect of cooling changed its sign being 115 for iron and steel and 580 for nickel. The permeability of cobalt, both annealed and unannealed, was always diminished at the low temperature. The hysteresis-loss in Swedish iron was decreased for inductions below about 9000 and increased for higher inductions; in tungsten-steel, nickel and cobalt the hysteresis-loss was always increased by cooling. The range of + B within which Steinmetz's formula is applicable becomes notably increased at low temperature. It may be remarked that, whereas Fleming and Dewar empjoyed the ballistic method, their specimens having the form of rings, Honda and Shimizu worked magnetometrically with metals shaped as ovoids.

Permanent Magnets. — Fleming and Dewar (loc. cil. p. 57) also investigated the changes which occurred in permanently

1 C.R., 1888, 106, 129.

2 Proc. Phys. Soc, 1888, 9, 181.

3 C.R., 1892, 115, 805; 1894, 118, 796 and 859.

4 Elekt. Zeits., 1894, 15, 194. 6 Phil. Mag., 1900, 50, 1.

6 Phil. Trans., 1903, 201, 1.

1 Phil. Mag., 1904, 8, 179.

8 A. M. Thiessen {Phys., 1899, 8, 65) and G. Claude (C. R., 1899, 129, 409) found that for considerable inductions (B = 15,000) the permeability and hysteresis-loss remained nearly constant down to — 186 ; for weak inductions both notably diminished with tempera- ture.

Metal.

Percentage Gain or Loss of Moment at — 186 C.

First Effect.

Cyclic Effect.

Carbon steel, hard

,, ,, medium

,, ,, annealed

Chromium steels (four samples) . Aluminium steels (three samples) Nickel steels, up to 7-65 % . . .

, 19-64% • • ■

„ · „ „ 29% ....

Iron, soft

Tungsten steel, 15%

■ ■ 7-5%

„ „ 1%

-6

Decrease

-33

Increase

— 2 Small

-50

— 20 Decrease

None

Decrease

11

+ 12 +22

+33 + 12 + 10

+ 10

-25

— 10

+3 +4 +2-5 + 10 +6 + 10 + 12

Other experiments relating to the effect of temperature upon permanent magnets have been carried out by J. R. Ashworth, 9 who showed that the temperature coefficient of permanent magnets might be reduced to zero (for moderate ranges of temperature) by suitable adjustment of temper and dimension ratio; also by R. Pictet, 10 A. Durward 11 and J. Trowbridge. 12

Alloys of Nickel and Iron. — A most remarkable effect of tem- perature was discovered by Hopkinson (Proc. Roy. Soc, 1890, 47, 23; 1891, 48, 1) in 1889. An alloy containing about 3 parts of iron and 1 of nickel — both strongly magnetic metals — is under ordinary conditions practically non-magnetizable (yu=i‘4 for any value of H). If, however, this non-magnetic substance is cooled to a temperature a few degrees below freezing-point, it becomes as strongly magnetic as average cast-iron Gu = 62 for H = 4o), and retains its magnetic properties indefinitely at ordi- nary temperatures. But if the alloy is heated up to 580° C. it loses its susceptibility — rather suddenly when H is weak, more gradu- ally when H is strong — and remains non-magnetizable till it is once more cooled down below the freezing-point. This material can therefore exist in either of two perfectly stable conditions, in one of which it is magnetizable, while in the other it is not. • When magnetizable it is a hard steel, having a specific electrical resistance of 0-000052 ; when non-magnetizable it is an extremely soft, mild steel, and its specific resistance is 0-000072. Alloys containing different proportions of nickel were found to exhibit the phenomenon, but the two critical temperatures were less widely separated. The following approximate figures for small magnetizing forces are deduced from Hopkinson’s curves : — Percentage of Susceptibility lost Susceptibility gained Nickel. at temp. C. at temp. C.

0-97 890 —

4-7 820 660

4-7 780 600

24-5 680 -10

30-0 140 125

33-0 207 193

73-0 202 202

9 Proc. Roy. Soc, 1898, 62, 210.

10 C.R., 1895, 120, 263.

11 Amer. Journ. Sci., 1898, 5, 245.

12 Phys. Rev., 1901, 14, 181.

Honda and Shimizu (loc. cit.) have determined the two critical temperatures for eleven nickel-steel ovoids, containing from 24-04 to 70-32 % of nickel, under a magnetizing force of 400, and illustrated by an interesting series of curves, the gradual transformation of the magnetic properties as the percentage of nickel was decreased. They found that the hysteresis-loss, which at ordinary temperatures is very small, was increased in liquid air, the increase for the alloys containing less than 30% of nickel being enormous. Steinmetz's formula applies only for very weak inductions when the alloys are at the ordinary temperature, but at the temperature of liquid air it becomes applicable through a wide range of inductions. Accord- ing to C. E. Guillaume 1 the temperature at which the magnetic susceptibility of nickel-steel is recovered is lowered by the presence of chromium; a certain alloy containing chromium was not rendered magnetic even by immersion in liquid air. Experiments on the subject have also been made by E. Dumont 2 and F. Osmond. 3

9. Alloys and Compounds of Iron

In 1885 Hopkinson {Phil. Trans., 1885, 176, 455) employed his yoke method to test the magnetic properties of thirty-five samples of iron and steel, among which were steels containing substantial proportions of manganese, silicon, chromium and tungsten. The results, together with the chemical analysis of each sample, are given in a table contained in this paper, some of them being also represented graphically. The most striking phenomenon which they bring into prominence is the effect of any considerable quantity of manganese in annihilating the magnetic property of iron. A sample of Hadfield's manufacture, containing 12-36% of manganese, differed hardly at all from a non-magnetic substance, its permeability being only 1-27. According to Hopkinson's calculation, this sample behaved as if 91 % of the iron contained in it had completely lost its mag- netic property. 4 Another point to which attention is directed is the exceptionally great effect which hardening has upon the magnetic

properties of chrome steel; one specimen had a coercive force of 9 when annealed, and of no less than 38 when oil- hardened. The effect of the addition of tungsten in increasing the coercive force is very clearly shown; in two specimens containing respectively 3-44 and 2-35% of tungsten the coercive force was 64-5 and 70-7. These high values render hardened tungsten-steel particularly suitable for the manufacture of per- manent magnets. Hopkinson {Proc Roy. Soc, 1890, 48, 1) also noticed some peculiarities of an unexpected nature in the magnetic properties of the nickel-steel alloys already referred to. The permeability of the alloys containing from 1 to 4-7% of nickel, though less than that of good soft iron for magnetizing forces up to about 20 or 30, was greater for higher forces, the induction reached in a field of 240 being nearly 21,700. The induction for considerable forces was found to be greater in a steel containing 73% of nickel than in one with only 33%, though the permeability of pure nickel is much less than that of iron.

The magnetic qualities of various alloys of iron have been submitted to a very complete examination by W. F. Barrett, \V. Brown and R. A. Hadfield {Trans. Roy. Dub. Soc, 1900, 7, 67; Journ. Inst. Elec. Eng., 1902, 31, 674). 5 More than fifty different specimens were tested, most of which contained a known proportion of manganese, nickel, tungsten, aluminium, chromium, copper or silicon; in some samples two of the sub- stances named – were present. Of the very numerous results published, a few of the most characteristic are collected in the following table. The first column contains the symbols of the various elements which were added to the iron, and the second the percentage proportion in which each element was present; the sample containing 0-03% of carbon was a specimen of the best commercial iron, the values obtained for it being given for comparison. All the metals were annealed.

A few among several interesting points should be specially noticed. The addition of 15-2% of manganese produced an enormous effect

1 C.R., 1897, 124, 176 and 1515 ; 1897, 125, 235; 1898, 126, 738.

2 Ibid., 1898, 126, 741.

3 Ibid., 1899, 128, 304 and 1395.

4 See also J. Hopkinson, Journ. Inst. Elect. Eng., 1890, 19, 20, and J. A. Ewing, Phil. Trans., 1889, 180, 239.

6 Many of the figures which, through an error, were inaccurately stated in the first paper are corrected in the second.

upon the magnetism of iron, while the presence of only 2-25 % was

comparatively unimportant. When nickel was added to the iron in increasing quantities the coercive force increased until the proportion of nickel reached 20%; then it diminished, and when the propor- tion of nickel was 32 % the coercive force had fallen to the exceed- ingly low value of 0-5. In'thecaseof iron containing 7-5% of tungsten

Element.

Per cent.

B

for H =45.

B

residual.

for H = 8.

Coercive Force.

C

0-03

16800

9770

1625

1-66

Cu

2-5

14300

10410

5-4

Mn

2-25

14720

10460

1080

6-o

Mn

15-2

Ni

3-82

16190

9320

1375

2-76

Ni

19-64

7770

4770

90

20-0

Ni

3i-4

4460

1720

357

o-5

W

7-5

15230

13280

500

9-02

Al

2-25

16900

10500

1700

1-0

Cr

3-25

12-25

Si

2-5

16420

4080

1680

09

Si

5-5

15980

3430

1630

0-85

(W), the residual induction had a remarkably high value ; the coercive force, however, was not very great. The addition of silicon in small quantities considerably diminished permeability and increased coer- cive force; but when the proportion amounted to 2-5 % the maximum permeability (ji = 5100 for H =2) was greater than that of the nearly pure iron used for comparison, while the coercive force was only 0-9. 6 A small percentage of aluminium produced still higher per- meability Gi = 6ooo for H = 2), the induction in fields up to 60 being greater than in any other known substance, and the hysteresis-loss for moderate Limits of B far less than in the purest commercial iron. Certain non-magnetizable alloys of nickel, chromium-nickel and chromium-manganese were rendered magnetizable by annealing.

Later papers 7 give the results of a more minute examination of those specimens which were remarkable for very low and very high permeabilities, and were therefore likely to be of commercial im- portance. The following table gives the exact composition of some alloys which were found to be non-magnetizable, or nearly so, in a field of 320.

An. = Annealed. Un. = Unannealed.

State.

Percentage Composition.

I, for H=320.

Un. An. An. Un. Un. An.

Fe, 85-77; C, 1-23; Mn, 13.

Fe, 84-64; C, 0-15; Mn, 15-2

Fe, 80-16; C,o-8;Mn, 5-04; Ni, 14-55.

Ditto

Fe, 75-36; C, 0-6; Mn, 5-04; Ni, 19.

Fe, 86-6i;C, l-o8;Mn, 10-2; W, 2-n.

A very small difference in the constitution often produces a remark- able effect upon the magnetic quality, and it unfortunately happens that those alloys which are hardest magnetically are generally also hardest mechanically and extremely difficult to work; they might however be used rolled or as castings. The specimens distinguished by unusually high permeability were constituted as follows : —

Silicon-iron. — Fe, 97-3; C, 0-2; Si, 2-5.

Aluminium-iron. — Fe, 97-33; C, 0-18; Al, 2-25. The silicon-iron had, in fields up to about 10, a greater permeability than a sample of the best Swedish charcoal-iron, and its hysteresis- loss for max. B = 9000, at a frequency of 100 per second, was only 0-254 watt per pound, as compared with 0-382 for the Swedish iron. The aluminium-iron attained its greatest permeability in a field of 0-5, about that of the earth's force, when its value was 9000, this being more than twice the maximum permeability of the Swedish iron. Its hysteresis-loss for B = 9000 was 0-236 per pound. It was, however, found that the behaviour of this alloy was in part due to a layer of pure iron (" ferrite ") averaging o-l mm. in thickness, which occurred on the outside of the specimen, and the exceptional magnetic quality which has been claimed for aluminium-iron cannot yet be regarded as established.

A number of iron alloys have been examined by Mme. Curie {Bull. Soc. a" Encouragement, 1898, pp. 36-76), chiefly with the object of determining their suitability for the construction of permanent magnets. Her tests appear to show that molybdenum is even more effective than tungsten in augmenting the coercive force, the highest values observed being 70 to 74 for tungsten- steel, and 80 to 85 for steel containing 3-5 to 4% of molybdenum. For additional information regarding the composition and qualities of permanent magnet steels reference may be made

6 The marked effect of silicon in increasing the permeability of cast iron has also been noticed by F. C. Caldwell, Elect. World, 1898,

32, 619.

7 Trans. Roy. Dub. Soc, 1902-4, 8, 1 and 123.

to the publications cited below. 1 Useful instructions have been furnished by Carl Barus (Terrestrial Magnetism, 1897, 2, n) for the preparation of magnets calculated to withstand the effects of time, percussion and ordinary temperature varia- tions. The metal, having first been uniformly tempered glass- hard, should be annealed in steam at ioo° C. for twenty or thirty hours; it should then be magnetized to saturation, and finally " aged " by a second immersion in steam for about five hours.

Magnetic Alloys of Non-Magnetic Metals. — The interesting discovery was made by F. Heusler 2 in 1903 that certain alloys of the non-magnetic metal manganese with other non-magnetic substances were strongly magnetizable, their susceptibility being in some cases equal to that of cast iron. The metals used in different combinations included tin, aluminium, arsenic, antimony, bismuth and boron; each of these, when united in certain proportions with manganese, together with a larger quantity of copper (which appears to serve merely as a men- struum), constituted a magnetizable alloy. So far, the best results have been attained with aluminium, and the permeability was greatest when the percentages of manganese and aluminium were approximately proportional to the atomic weights of the two metals. Thus in an alloy containing 26-5% of manganese and 14-6% of aluminium, the rest being copper, the induction for H = 20 was 4500, and for H=i5o, 5550. When the proportion of aluminium to manganese was made a little greater or smaller, the permeability was diminished. Next to aluminium, tin was found to be the most effective of the metals enumerated above. In all such magnetizable alloys the presence of manganese appears to be essential, and there can be little doubt that the magnetic quality of the mixtures is derived solely from this component. Manganese, though belong- ing (with chromium) to the iron group of metals, is commonly classed as a paramagnetic, its susceptibility being very small in comparison with that of the recognized ferromagnetics; but it is remarkable that its atomic susceptibility in solutions of its salts is even greater than that of iron. Now iron, nickel and cobalt all lose their magnetic quality when heated above certain critical temperatures which vary greatly for the three metals, and it was suspected by Faraday 3 as early as 1845 that manganese might really be a ferromagnetic metal having a critical tempera- ture much below the ordinary temperature of the air. He therefore cooled a piece of the metal to — 105 C, the lowest temperature then attainable, but failed to produce any change in its magnetic quality. The critical temperature (if there is one) was not reached in Faraday's experiment; possibly even the temperature of 250 C, which by the use of liquid hydrogen has now become accessible, might still be too high. 4 But it has been shown that the critical temperatures of iron and nickel may be changed by the addition of certain other substances. Generally they are lowered, sometimes, however, they are

raised 6 ; and C. E. Guillaume 6 explains the ferromagnetism of Heusler's alloy by supposing that the naturally low critical temperature of the manganese contained in it is greatly raised by the admixture of another appropriate metal, such as aluminium or tin; thus the alloy as a whole becomes magnetizable at the ordinary temperature. If this view is correct, it may also be possible to prepare magnetic alloys of chromium, the only other para magnetic metals of the iron group.

J. A. Fleming and R. A. Hadfield 7 have made very careful experi- ments on an alloy containing 22-42 % of manganese, 11-65% of

1 J. Trowbridge and S. Sheldon, Phil. Mag., 1890, 29, 136; W. H. Preece, Journ. Inst. Elec. Eng., 1890, 19, 62; Electrician, 1890, 25, 546; I. Klemencig, Wien. Ber., 1896, 105, Ila, 635; B. O. Peirce, Am. Journ. Set., 1896, 2, 347; A. Abt, Wied. Ann., 1898, 66, 116; F. Osmond, C. R., 1899, 128, 1513.

- *Deutsch. phys. Gesell. Verh., 1903, 5, 220 and 224. 3 Exp. Res., iii. 440.*
- *No record can be found of experiments with manganese at the temperature of liquid air or hydrogen; probably, however, negative results would not be published.*
- *The critical temperature of iron, for instance, is raised more than loo c by the addition of a little carbon and tungsten.*

6 Bull. Soc. Int. des Ulectriciens, 1906, 6, 301.

7 Proc. Roy. Soc, 1905, 76A, 271.

aluminium and 60-49 % of copper. The magnetization curve was found to be of the same general form as that of a paramagnetic metal, and gave indications that with a sufficient force magnetic saturation would probably be attained. There was considerable hysteresis, the energy-loss per cycle being fairly represented by W = o-0O05495B 2 ' 238 . The hysteretic exponent is therefore much higher than in the case of iron, nickel and cobalt, for which its value is approximately 1-6.

10. Miscellaneous Effects of Magnetization Electrical Conductivity. — The specific resistance of many electric conductors is known to be temporarily changed by the action of a magnetic field, but except in the case of bismuth the effect is very small.

A. Gray and E. Taylor Jones (Proc. Roy. Soc, 1900, 67, 208) found that the resistance of a soft iron wire was increased by about 1/700 in a field

of 320 C.G.S. units. The effect appeared to be closely connected with the intensity of magnetization, being approximately proportional to I. G. Barlow (Proc. Roy. Soc, 1903, 71, 30), experi- menting with wires of iron, steel and nickel, showed that in weak fields the change of resistance was proportional to a function al 2 --bl 4 +cV, where o, b and c are constants for each specimen. W. E. Williams (Phil. Mag., 1902, 4, 430) found that for nickel the curves showing changes of resistance in relation to magnetizing force were strikingly similar in form to those showing changes of length. H. Tomlinson (Phil. Trans., 1883, Part I., 153) discovered in 1881 that the resistance of a bismuth rod was slightly increased when the rod was subjected to longitudinal magnetic force, and a year or two later A. Righi (Atti R. A. Lincei, 1 883-1 884, 19, 545) showed that a more considerable alteration was produced when the magnetic force was applied trans- versely to the bismuth conductor; he also noticed that the effect was largely dependent upon temperature (see also P. Lenard, Wied. Ann., 1890, 39, 619). Among the most important experiments on the influence of magnetic force at different temperatures are those of J. B. Henderson and of Dewar and Fleming. Henderson (Phil. Mag., 1894, 38, 488) used a little spiral of the pure electrolytic bismuth wire prepared by Hartmann and Braun; this was placed between the pole-pieces of an electromagnet and subjected to fields of various strengths up to nearly 39,000 units. At constant tempera- ture the resistance increased with the field ; the changes in the resist- ance of the spiral when the temperature was 18° C. are indicated in the annexed table, from which it will be seen that in the strongest H. R. h. R.

o i-ooo 27450 2-540

6310 1-253 32730 2-846

12500 1-630 38900 3-334

2O45O 2- 160

transverse field reached the resistance was increased more than threefold. Other experiments showed the relation of resistance to temperature (from o ° to about 90°) in different constant fields. It appears that as the temperature rises the resistance decreases to a minimum and then increases, the minimum point occurring at a higher temperature the stronger the field. For H = 11,500 the temperature of minimum resistance was about 50 ; for much lower or higher values of H the actual minimum did not occur within the range of temperature dealt with. Dewar and Fleming (Proc. Roy. Soc, 1897, 60, 425) worked with a similar specimen of bismuth, and their results for a constant temperature of 19 agree well with those of Henderson. They also experimented with constant tem-

peratures of —79°, —185° and — 203°, and found that at these low temperatures the effect of magnetization was enormously increased. The following table gives some of their results, the specific resistance of the bismuth being expressed in C.G.S. units.

Field Strength.

Temp. 19° C.

Temp.-i85° C.

Spec. Res.

Comp. Res.

Spec. Res.

Comp. Res.

1375

2750

8800

141S0

21800

1 16200 1 18200 123000 149200 186200 257000

i- 000

1-017 1-059 1-284 1-602

2-212

41000

103306

191500

738000

1730000

6190000

I-OO

252 4-67 18-0

42-2 151

At the temperature of liquid air (— 185°) the application of a field of 21,800 multiplied the resistance of the bismuth no less than 150 times. Fig. 29 shows the variations of resistance in relation to temperature for fields of different constant values. It will be seen that for H = 2450 and H = 55oo the minimum resistance occurs at temperatures of about —80° and —7° respectively.

Hall Effect. — If an electric current is passed along a strip of thin metal, and the two points at opposite ends of an equi- potential line are connected with a galvanometer, its needle will of course not be deflected. But the application of a magnetic field at right angles to the plane of the metal causes the equi- potential lines to rotate through a small angle, and the points at

which the galvanometer is connected being no longer at the same potential, a current is indicated by the galvanometer. 1

Fig. 29. The tranverse electromotive force is equal to KCH/D, where C is the current, H the strength of the field, D the thickness of the metal, and K a constant which has been termed the rotatory power or rotational coefficient. (See Hopkinson, Phil. Mag., 1880, 10, 430). The following values of K for different metals are given by E. H. Hall, the positive sign indicating that the electromotive force is in the same direction as the mechanical force acting upon the conductor. A. von Ettinghausen and

Metal.

KXio 15

Metal.

KXio 16

Antimony

+ 1 14000

Copper

-520

Steel

+12060

Gold

-660

Iron

+7850 •

Nickel

-14740

• Cobalt

+2460

Bismuth 2

—8580000

Zinc

+820

w.

Nernst (Wien.

Ber., 1886,

94, 560) have

found that

the

rotational coefficient of tellurium is more than fifty times greater than that of bismuth, its sign being positive. Several experi- menters have endeavoured to find a Hall effect in liquids, but such results as have been hitherto obtained are by no means free from doubt. E. A. Marx (Ann. d.

Phys., 1900, 2, 798) observed a well-defined Hall effect in incandescent gases. A large effect, proportional to the field, has been found by H. A. Wilson (Cam. Phil. Soc. Proc, 1902, n, pp. 249, 391) in oxygen, hydrogen and air at low pressures, and by C. D. Child (Phys. Rev., 1904, 18, 370) in the electric arc.

Electro-Thermal Relations. — The Hall electromotive force is only one of several so-called " galvano-magnetic. effects " which are observed when a magnetic field acts normally upon a thin plate of metal traversed by an electric current. It is remarkable that if a flow of heat be substituted for a current of electricity a closely allied group of " thermo-magnetic effects " is presented. The two classes of phenomena have been collated by M. G. Lloyd (Am. Journ. Sci., 1901, 12, 57), as follows:— Galvano- Magnetic Effects.

1. A transverse difference of electric potential (Hall effect).

2. A transverse difference of temperature(Ettinghausen effect)

3. Longitudinal change of electric conductivity.

4. Longitudinal difference of temperature.

Thermo- Magnetic Effects.

i. A transverse difference of electric potential (Nernst effect).

ii. A transverse difference of temperature (Leduc effect).

iii. Longitudinal change of thermal conductivity.

iv. Longitudinal difference of electric potential. 3

If in the annexed diagram ABCD represents the metallic plate through which the current of electricity or heat flows in the

'E. H. Hall, Phil. Mag., 1880, 9, 225; 1880, io, 301; 1881, 12,

157; 1883, 15, 341; 1885, 19, 419.

2 The large Hall effect in bismuth was discovered by Righi, Journ. de Phys., 1884, 3, 127.

3 References.— (2) A. von Ettinghausen, Wied. Ann., 1887, 31, 737-— (4) H. W. Nernst, ibid., 784.— (i.) and (iv.) ; A. von Etting- hausen and H. W. Nernst, Wied. Ann., 1886, 29, 343. — (ii.) and (Hi.); A. Righi, Rend. Ace. Line, 1887, 3 II, 6 and I, 481; and A. Leduc, Journ. de Phys.,

1 887, 6, 78. Additional authorities are quoted by Lloyd, loc. cit.

direction AB, then effects (1), (2), (i.) and (ii.) are exhibited at C and D, effects (4) and (iv.) at A and B, and effects (3) and (iii.) along AB. The transverse effects are reversed in direction when either the magnetic field or the primary current (electric or thermal) is reversed, but the longitudinal effects are inde- pendent of the direction of the field. It has been shown by G. Moreau (C. R., 1900, 130, pp. 122, 412, 562) that if K is the coefficient of the Hall effect (1) and K' the analogous coefficient of the Nernst effect (i.) (which is constant for small values of H), then K' = K(r/ p, a being the coefficient of the Thomson effect for the metal and p its specific resistance. He considers that Hall's is the fundamental phenomenon, and that the Nernst effect is essentially identical with it, the primary electromotive force in the case of the latter being that of the Thomson effect in the unequally heated metal, while in the Hall experiment it is derived from an external source.

Attempts have been made to explain these various effects by the electron theory. 4

Thermo-electric Quality. — The earliest observations of the effect of magnetization upon thermo-electric power were those of W. Thomson (Lord Kelvin), who in 1856 announced that magnetization rendered iron and steel positive to the unmagnet- ized metals. 5 It has been found by Chassagny, 6 L. Houllevigue' and others that when the magnetizing force is increased, this effect passes a maximum, while J. A. Ewing 8 has shown that it is diminished and may even be reversed by tensile stress. Nickel was believed by Thomson to behave oppositely to iron, becoming negative when magnetized; but though his conclusion was accepted for nearly fifty years, it has recently been shown to be an erroneous one, based, no doubt, upon the result of an experiment with an impure specimen. Nickel when magnetized is always positive to the unmagnetized metal. So also is cobalt, as was found by H. Tomlinson. 9 The curves given by Houllevigue for the relation of thermo-electric force to magnetic field are of the same general form as those showing the relation of change of length to field. E. Rhoads 10 obtained a cyclic curve for iron which indicated thermo-electric hysteresis of the kind exhibited by Nagaoka's curves for magnetic strain. He also experimented with nickel and again found a resemblance to the strain curve. The subject was further investigated by S. Bidwell, 11 who, adopting special precautions against sources of error by which former work was probably affected, measured the changes of thermo-electric force for iron, steel, nickel and cobalt produced by magnetic fields up to 1500 units. In the case of iron and nickel it was found that, when correction was made for mechanical stress due to magnetization, magnetic change of thermo-electric force was, within the limits of experi- mental error, proportional to

magnetic change of length. Further, it was shown that the thermo-electric curves were modified both by tensile stress and by annealing in the same manner as were the change-of-length curves, the modification being sometimes of a complex nature. Thus a close connexion between the two sets of phenomena seems to be established. In the case of cobalt no such relation could be traced; it appeared that the thermo-electric power of the unmagnetized with respect to the magnetized cobalt was proportional to the square of the magnetic induction or of the magnetization. Of nickel six 4 P. Drude, Ann. d. Phys., 1900, 1, 566; 1900, 3, 369; 1902, 7, 687. See also E. van Everdingen, Arch. Neerlandaises, 1901, 4, 371; G. Barlow, Ann. d. Phys., 1903, 12, 897; H. Zahn, ibid. 1904, 14, 886;

1905, 16, 148.

6 Phil. Trans. , 1 856, p. 722 . According to the nomenclature adopted by the best modern authorities, a metal A is said to be thermo-elec- trically positive to another metal B when the thermo-current passes from A to B through the cold junction, and from B to A through the hot (see Thermoelectricity).

6 C.R., 1893, 116, 997.

7 Journ. de Phys., 1896, 5, 53.

8 Phil. Trans., 1887, 177, 373.

9 Proc. Roy. Soc, 1885, 39, 513.

10 Phys. Rev., 1902, 15, 321. The sign of the thermo-electric effect for nickel, as given by Rhoads, is incorrect.

11 Pro!. Roy. Soc, 1904, 73, 413.

different specimens were tested, all of which became, like iron, thermo-electrically positive to the unmagnetized metals.

As to what effect, if any, is produced upon the thermo-electric quality of bismuth by a magnetic field there is still some doubt. E. van Aubel ‘ believes that in pure bismuth the thermo-electric force is increased by the field ; impurities may neutralize this effect, and in sufficient quantities reverse it.

Elasticity. — The results of experiments as to the effect of magnetization were for long discordant and inconclusive, sufficient care not having been taken to avoid sources of error, while the effects of hysteresis were altogether disregarded. The subject, which is of importance in connexion with theories of magnetostriction, has been investigated by K. Honda and T. Terada in a research remarkable for its completeness and the ingenuity of the experimental methods employed. 2 The results are too numerous to discuss in detail; some of those to which special attention is directed are the following: In Swedish iron and tungsten-steel the change of elastic constants (Young's modulus and rigidity) is generally positive, but its amount is less than 0-5%; changes of Young's modulus and of rigidity are almost identical. In nickel the maximum change of the elastic constants is remarkably large, amounting to about 15% for Young's modulus and 7 % for rigidity; with increasing fields the elastic constants first decrease and then increase. In nickel-steels containing about 50 and 70 % of nickel the maximum increase of the constants is as much as 7 or 8%. In a 29% nickel-steel, magnetization increases the constants by a small amount. Changes of elas- ticity are in all cases dependent, not only upon the field, but also upon the tension applied; and, owing to hysteresis, the results are not in general the same when the magnetization follows as when it precedes the application of stress; the latter is held to be the right order.

Chemical and Voltaic Effects. — If two iron plates, one of which is magnetized, are immersed in an electrolyte, a current will generally be indicated by a galvanometer connected with the plates.

As to whether the magnetized plate becomes positive or negative to the other, different experimenters are not in agreement. It has, however, been shown by Dragomir Hurmuzescu (Rap. du Congres Int. de Phys., Paris, 1900, p. 561) that the true effect of magnetization is liable to be disguised by secondary or parasitic phenomena, arising chiefly from polarization of the electrodes and from local variations in the concentration and magnetic condition of the electrolyte; these may be avoided by working with weak solutions, exposing only a small surface in a non-polar region of the metal, and sub- stituting a capillary electrometer for the galvanometer generally used. When such precautions are adopted it is found that the "electromotive force of magnetization" is, for a given specimen, perfectly definite both in direction and in magnitude; it is indepen- dent of the nature of the corrosive solution, and is a function of the field-strength alone, the curves showing the relation of electromotive force to field-intensity bearing a rough resemblance to the familiar I-H curves. The value of the E.M.F. when $H = 2000$ is of the order of 1/100 volt for iron, 1/1000 volt for nickel and 1/10,000 for bismuth. When the two electrodes are ferro-magnetic, the direction of the cur- rent through the liquid is from the unmagnetized to the magnetized electrode, the latter being least attacked;

with diamagnetic elec- trodes the reverse is the case. Hurmuzescu shows that these results are in accord with theory. Applying the principle of the conserva- tion of internal energy, he demonstrates that for iron in a field of 1000 units and upwards the E.M.F. of magnetization is

I I 2

E =

6 2K

approximately,

/ being the electrochemical equivalent and 5 the density of the metal. Owing to the difficulty of determining the magnetization I and the susceptibility k with accuracy, it has not yet been possible to submit this formula to a quantitative test, but it is said to afford an indica- tion of the results given by actual experiment. It has been discovered by E. L. Nichols and W. S. Franklin (Am. Journ. Sci., 1887, 34, 419; 1888, 35, 290) that the transition from the " passive " to the active state of iron immersed in strong nitric acid is facilitated by magnetiz- ation, the temperature of transition being lowered. This is attri- buted to the action of local currents set up between unequally magnetized portions of the iron. Similar results have been obtained by T. Andrews (Proc. Roy. Soc, 1890, 48, 116).

1 C.R., 1903, 136, 1 131.

2 Journ. Coll. Sci. Tokyo, 1906, 21, art. 4. 40 tables and 85 figures.

The paper contains

11. Feebly Susceptible Substances Water. — The following are recent determinations of the

magnetic susceptibility of water: —

Observer. «Xio 6 . Publication.

G. Quincke —0-797 a t 18° C. Wied. Ann., 1885, 24,

387-

H. du Bois —0-837(1— O' 002 5 1 — 15°) Wied. Ann., 1888, 35,

137-

P. Curie -0-790 at 4 C. C. R., 1893, 116, 136.

J. Townsend —0-77 Phil. Trans., 1896, 187,

544-

J. A. Fleming —0-74 Proc. Roy. Soc, 1898,

and J. Dewar 63, 311.

G. Jager and —0-689(1—0-0016/) Wied. Ann., 1899, 67,

S. Meyer 707.

J. Koenigsberger —0-781 at 22° C. Ann. d. Phys., 1901, 6,

506.

H. D. Stearns —0-733 at 22 C. Phys. Rev., 1903, 16, 1.

A. P. Wills -0-720 at 18° C. Phys. Rev., 1905, 20, 188.

Wills found that the suceptibility was constant in fields ranging from 4200 to 15,000.

Oxygen and Air. — The best modern determinations of the value of k for gaseous oxygen agree very fairly well with that given by Faraday in 1853 (Exp. Res. Ill, 502). Assuming that for water k= — o-8Xio~ 6 , his value of k for oxygen at 1 5° C. reduces to o-isXip 6 . Important experiments on the susceptibility of oxygen at different pressures and temperatures were carried out by P. Curie (C.R. 1892, 115, 805; 1893, 116, 136). Journ. de Phys., 1895, 4, 204. He found that the susceptibility for unit of mass, K, was independent of both pressure and mag netizing force, but varied inversely as the absolute temperature, 8, so that io 6 K = 33 700/0. Since the mass of 1 cub. cm. of oxygen at o° C. and 760 mm. pressure is o'ooi4i grm., the mass at any absolute temperature 6 is by Charles's law 0-00141X2736 = . 0-3849/6 grm.; hence the susceptibility per unit of volume at 760 mm. will be

k = 10-ˆX0-3849 X337OO/0 2 ˆ = io" 6 Xi297o/e 2 .

At 15° C. 6 = 273 + iS = 288, and therefore k = 0-156 X io~ 6 , nearly the same as the value found by Faraday. At o° C, /c = o-174X10". For air Curie calculated that the sus- ceptibility per unit mass was io 6 K= 7830/6; or, taking the mass of 1 c.c. of air at o° C. and 760 mm. as 0-001291 grm., k — 10 ~ 6 X 276O/0 2 for air at standard atmospheric pressure. It is pointed out that this formula may be used as a tem- perature correction in magnetic determinations carried out in air.*

Fleming and Dewar determined the susceptibility of liquid oxygen (Proc. Roy. Soc, 1896, 60, 283; 1898, 63, 311) by two different methods. In the first experiments it was calculated from observations of the mutual induction of two conducting circuits in air and in the liquid; the results for oxygen at — 182 C. were

*/i = 1*00287, k = 228 X io 6 . In the second series, to which greater importance is attached, measurements were made of the force exerted in a divergent field upon small balls of copper, silver and other substances, first when the balls were in air and afterwards when they were immersed in liquid oxygen. If V is the volume of a ball, H the strength of the field at its centre, and k' its apparent suscepti bility, the force in the direction x is /= k'VH X dH/dx; and if k a and k'° are the apparent susceptibilities of the same ball in air and in liquid oxygen, k a — K is equal to the difference between the susceptibilities of the two media. The susceptibility of air being known — practically it was negligible in these experiments — that of liquid oxygen can at once be found. The mean of 36 experiments with 7 balls gave*

11 = 1-00407, k = 324 X io -6 . A small but decided tendency to a decrease of susceptibility in very strong fields was observed. It appears, therefore, that liquid oxygen is by far the most strongly paramagnetic liquid known, its susceptibility being more than four times greater than that of a saturated solution of ferric chloride. On the other hand, its susceptibility is about fifty times less than that of Hadfield's 12% manganese steel, which is commonly spoken of as non-magnetizable.

FEEBLY SUSCEPTIBLE SUBSTANCES]

MAGNETISM

349

Bismuth. — Bismuth is of special interest, as being the most strongly diamagnetic substance known, the mean value of the best determinations of its susceptibility being about — 14X10 -6 (see G. Meslin, C. R., 1905, 140, 449). The magnetic properties of the metal at different temperatures and in fields up to 1350 units have been studied by P. Curie (loc. cit.), who found that its " specific susceptibility " (K) was independent of the strength of the field, but decreased with rise of temperature up to the melting-point, 273° C. His results appear to show the relation

-KXio 6 = 1-381 -0-00155/°. Assuming the density of Bi to be 9-8, and neglecting corrections for heat dilatation, his value for the susceptibility at 20° C. is equivalent to k= — i3-23Xio -6 . As the temperature was raised

up to 273°, k gradually fell to— 9-38Xio -6 , rising suddenly when fusion occurred to — o-37Xio -6 , at which value it remained constant when the fluid metal was further heated. Fleming and Dewar give for the susceptibility the values— i3-7XicT 6 at 15 C. and — is-9Xio~ 6 at — 182 , the latter being approximately equivalent to KXio 6 =— 1-62. Putting t° = — 182 in the equation given above for Curie's results, we get KXio 6 =— 1-66, a value sufficiently near that obtained by Fleming and Dewar to suggest the probability that the diamagnetic susceptibility varies inversely as the tempera- ture between — 182° and the melting-point.

Other Diamagnetics. — The following table gives Curie's determinations {Journ. de Phys., 1895, 4, 204) of the specific susceptibility K of other diamagnetic substances at different temperatures. It should be noted that K = K/density.

Substance.

Water

Rock salt

Potassium chloride

,, sulphate

,, nitrate (fusion 350°)

Quartz

Temp. °C. -KXio 8 .

15-189 16-455

• 18-465 17—460 18—420

« 18-430

Sulphur, solid or fused 18—225

0-790 0-580 0-550 0-430 0-330 0-441 0-510 0-320 0-307 0-311 0-410

o-385

0-920 0-730

o-68o

0-470 1-350

Q‘957

0-038

Selenium, solid or fused

,, fused 240 — 415

Tellurium 20 — 305

Bromine 20

Iodine, solid or fused 18 — 164

Phosphorus, solid or fused . . . . 19 — 71

,, amorphous 20 — 275

Antimony, electrolytic ‘ 20

- 540

Bismuth, solid 20

273

„ fused 273—405

For all diamagnetic substances, except antimony and bismuth, the value of K was found to be independent of the temperature.

Paramagnetic Substances. — Experiments by J. S. Townsend {Phil. Trans., 1896, 187, 533) show that the susceptibility of solutions of salts of iron is independent of the magnetizing force, and depends only on the quantity of iron contained in unit volume of the liquid. If W is the weight of iron present per c.c. at about io° C, then for ferric salts

io 6 k = 266W— 077 and for ferrous salts

io 6 k=2o6W— 077,

the quantity —077 arising from the diamagnetism of the water

of solution. Annexed are values of io 6 /c for the different salts

examined, w being the weight of the salt per c.c. of the solution.

Salt. 10V+077

Fe 2 Cl 6 …. 9i”6a>

Fe 2 (S0 4) 3 . . • 74‘5 W

Fe 2 (N0 3) 6 . . . 61 “5W

Susceptibility was found to diminish greatly with rise of tempera- ture. According to G. Jager and S. Meyer (Wien. Akad. Sitz., 1897, 106, II. a, p. 623, and 1898, 107, II. a, p. 5) the atomic susceptibilities k of the metals nickel, chromium, iron, cobalt and manganese in solutions of their salts are as follows: —

Salt.

io 6 /c+o”77

FeCl 2 . .

90 – 8w

FeSQ 4 . .

• • 74‘9W

Metal.

feXio 6 .

Metal.

£Xio s .

Ni Cr Fe(i) .

• 4-95 = 2-5X2

. 6-25=2‘5X2-5

• 7‘5 =2-5X3

Co . .

Fe(2) . Mn. .

10-0 = 2-5X4 125=2-5X5 15-0 = 2-5X6

Fe(i) is iron contained in FeCl2 and Fe(2) iron contained in Fe 2 (N0 3) 6 .

Curie has shown, for many paramagnetic bodies, that the specific susceptibility K is inversely proportional to the absolute temperature 6. Du Bois believes this to be an important general law, applicable to the case of every paramagnetic substance, and suggests that the product K0 should be known as " Curie's constant " for the substance.

Elementary Bodies and Atomic Susceptibility. — Among a large number of substances the susceptibilities of which have been determined by J. Koenigsberger (Wied. Ann., 1898, 66, 698) are the following elements: —

Element

kXio 6 .

Element.

kXio 6 .

Copper.

. . -0-82

Tellurium .

— 2'10

Silver .

-1-51

Graphite .

+ 2

Gold .

-3'07

Aluminium

+ i-8o

Zinc

— 0-90

Platinum .

+22

Tin .

+0-46

Palladium.

+50 to 60

Lead . ‘

— no

Tungsten .

+ 14

Thallium

—4-61

Magnesium

+ 4

Sulphur

-o-86

Sodium

+ 2 – 2

Selenium (

red)

-0-50

Potassium .

+ 36

In a table accompanying Koenigsberger’s paper the elements are arranged upon the periodic system and the atomic suscep- tibility (product of specific

susceptibility into atomic weight) is given for each. It appears that the elements at about the middle of each row are the most strongly paramagnetic ; towards the ends of a row the susceptibility decreases, and ultimately becomes negative. Thus a relation between susceptibility and atomic weight is clearly indicated. Tables similarly arranged, but much more complete, have been published by S. Meyer (Wied. Ann., 1899, 68, 325 and 1899, 69, 236), whose researches have filled up many previously existing gaps. The values assigned to the atomic susceptibilities of most of the known elements are appended. According to the notation adopted by Meyer the atomic susceptibility k = KX atomic-weight/ (density X 1000).

Meyer thinks that the susceptibilities of the metals praseodymium, neodymium, ytterbium, samarium, gadolinium, and erbium, when obtained in a pure form, will be found to equal or even exceed those of the well-known ferromagnetic metals. Many of their compounds are very strongly magnetic erbium, for example, in Er 2 3 being four times as strong as iron in the familiar magnetite or lodestone, Fe 2 3 . The susceptibilities of some hundreds of inorganic compounds have also been determined by the same investigator (loc. cit.). Among other researches relating to atomic and molecular magnetism are those of O. Liebknecht and A. P. Wills {Ann. d. Phys., 1900, 1, 178), H. du Bois and O. Liebknecht (ibid. p. 189), and Meyer (ibid. p. 668). An excellent summary regarding the magnetic properties of matter, with many tables and references, has been compiled by du Bois {Report to the Congres Int. de Phys., Paris, 1900, ii. 460).

Element

I0 6 &

Element

I0 6 A

Element

io 6 £

Be

+072

Cu

—0006

Cs

- 0-03 1

B

+0-05

Zn

—0010

Ba

— 0-02 1

C

-005

Ga

—

La

+ 130

N

?

Ge

—

Ce

+34'o

+

As

?

Pr

+ 1 M

F

— o-oi 1

Se

-0025

Nd

+ l§

Br

-0-033

+ f 2

Na Mg Al

— o-oos 1

+0-014

+

Gd

+Jc/i

Rb

Sr

— 0-02 1

— C02 1

Er

+41 -8(?)

Si

+C002

Y

+3-2(?) —0-014

P

— 0-007

Zr

Yb

4- (?)

S

— O'OII

Nb

+o-49(?)

Ta

+ I-02(?)

CI

— 002 1

Mo

+0'024

W.

+ o-i

Ru

+

Os

+ 0-074

+

K

— o-ooi 1

Rh

+

Ir

Ca

— 0-003'

Pd

+0-55

Pt

+ 0'227

Sc

?

Ag

— 0-016

Au

- OO3I

Ti

+0-09

Cd

-0-015

Hg

— CO3O

V

+0-17

In

— o-oi 1

Tl

- 0-93

Cr

+ -I

Sn

+0-004 1

Pb

— 0-025

Mn

+ %

Sb

—0069

Bi

— 0023

Fe

+ lo

Te

-0039

— 0-040

Co

+ h

I

Th

+ i6-o(?)

Ni

+) m

U

+ 0‘2I

1 Calculated.

35°

MAGNETISM

[MOLECULAR THEORY

12. Molecular Theory of Magnetism According to W. E. Weber’s theory, the molecules of a ferro- magnetic metal are small permanent magnets, the axes of which under ordinary conditions are turned indifferently in every direction, so that no magnetic polarity is exhibited by the metal as a whole; a magnetic force acting upon the metal tends to turn the axes of the little magnets in one direction, and thus the entire piece acquires the properties of a magnet. If, however, the molecules could turn with perfect freedom, it is clear that the smallest magnetizing force would be sufficient to develop the highest possible degree of magnetization, which is of course not the case. Weber therefore supposed each molecule to be acted on by a force tending to preserve it in its original direction, the position actually assumed by the axis being in the direction of the resultant of this hypothetical force and the applied magnetizing force. Maxwell {Electricity and Magnetism, § 444), recognizing that the theory in this form gave no account of residual magnetization, made the further assumption that if the deflection of the axis of the molecule exceeded a certain angle, the axis would not return to its original position when the deflecting force was removed, but would retain a permanent set. Although the amended theory as worked out by Maxwell is in rough agreement with certain leading phenomena of magnetization, it fails to account for many others, and is in some cases at variance with observed facts.

J. A. Ewing (Proc. Roy. Soc, 1890, 48, 342) has demonstrated that it is quite unnecessary to assume either the directive force of Weber, the permanent set of Maxwell, or any kind of frictional resistance, the forces by which the molecular magnets are con- strained being simply those due to their own mutual attractions and repulsions. The effect of these is beautifully illustrated by a model consisting of a number of little compass needles pivoted on sharp points and grouped near to one another upon a board, which is placed inside a large magnetizing coil. When no current is passing through the coil and the magnetic field is of zero strength, the needles arrange themselves in positions of stable equilibrium under their mutual forces, pointing in many different directions, so that there is no resultant magnetic moment. This represents the condition of the molecules in unmagnetized iron. If now a gradually increasing magnetizing force is applied, the needles at first undergo a stable deflection, giving to the group a small resultant moment which increases uniformly with the force; and if the current is interrupted while the force is still weak, the needles merely return to their initial positions. This illustrates the first stage in the process of magnetization, when the moment is proportional to the field and there is no hysteresis or residual magnetism (see ante). A somewhat stronger field will deflect many of the needles beyond the limits of stability, causing them to turn round and form new stable combinations, in which the direction assumed by most of them approximates to that of the field. The re-arrangement is completed within a comparatively small range of magnetizing force, a rapid increase of the resultant moment being thus brought about. When the field is removed, many of the newly formed combinations are but slightly disturbed, and the group may consequently retain a considerable resultant moment. This corresponds to the second stage of magnetiza- tion, in which the susceptibility is large and permanent magneti- zation is set up. A still stronger magnetizing force has little effect except in causing the direction of the needles to approach still more nearly to that of the field; if the force were infinite, every member of the group would have exactly the same direction and the greatest possible resultant moment would be reached; this illustrates " magnetic saturation " — the condition approached in the third stage of magnetization. When the strong magnetiz- ing field is gradually diminished to zero and then reversed, the needles pass from one stable position of rest to another through a condition of instability; and if the field is once more reversed, so that the cycle is completed, the needles again pass through a condition of instability before a position of stable equilibrium is regained. Now the unstable movements of the needles are of a mechanically irreversible character; the energy expended

in dissociating the members of a combination and placing them in unstable positions assumes the kinetic form when the needles turn over, and is

ultimately frittered down into heat. Hence in performing a cycle there is a waste of energy corresponding to what has been termed hysteresis-loss.

Supposing Ewing's hypothesis to be correct, it is clear that if the magnetization of a piece of iron were reversed by a strong rotating field instead of by a field alternating through zero, the loss of energy by hysteresis should be little or nothing, for the molecules would rotate with the field and no unstable movements would be possible. 1 Some experiments by F. G. Baily (Phil. Trans., 1896, 187, 715) show that this is actually the case. With small magnetizing forces the hysteresis was indeed somewhat larger than that obtained in an alternating field, probably on account of the molecular changes being forced to take place in one direction only; but at an induction of about 16,000 units in soft iron and 15,000 in hard steel the hysteresis reached a maximum and afterwards rapidly diminished. In one case the hysteresis loss per cubic centimetre per cycle was 16,100 ergs for B = 15,900, and only 1200 ergs for B = 20,200, the highest induction obtained in the experiment; possibly it would have vanished before B had reached 2i,ooo. 2 These experiments prove that actual friction must be almost entirely absent, and, as Baily remarks, the agreement of the results with the pre- viously suggested deduction affords a strong verification of Ewing's form of the molecular theory. Ewing has himself also shown how satisfactorily this theory accords with many other obscure and complicated phenomena, such as those presented by coercive force, differences of magnetic quality, and the effects of vibration, temperature and stress; while as regards simplicity and freedom from arbitrary assumptions it leaves little to be desired.

*The fact being established that magnetism is essentially a molecular phenomenon, the next step is to inquire what is the constitution of a magnetic molecule, and why it is that some molecules are ferromagnetic, others paramagnetic, and others again diamagnetic. The best known of the explanations that have been proposed depend upon the magnetic action of an electric current. It can be shown that if a current i circulates in a small plane circuit of area S, the magnetic action of the circuit for distant points is equivalent to that of a short magnet whose axis is perpendicular to the plane of the circuit and whose moment is *S, the direction of the magnetization being related to that of the circulating current as the thrust of a right-handed screw to its rotation. Ferromagnetism was explained by Am- pere on the hypothesis that the magnetization of the molecule is due to an electric current constantly circulating within it. The theory now most in favour is merely a development of Ampere's hypothesis, and applies not only to ferromagnetics, but to paramagnetics as well. To account for diamagnetism, Weber supposed that there exist within the molecules of dia- magnetic substances certain channels around which an electric current can circulate without any resistance. The creation of an external magnetic field*

H will, in accordance with Lenz's law, induce in the molecule an electric current so directed that the magnetization of the equivalent magnet is opposed to the direction of the field. The strength of the induced current is -HScos0/L, where 6 is the inclination of the axis of the circuit to the direction of the field, and L the coefficient of self-induction; the resolved part of the magnetic moment in the direction of the field is equal to HS 2 cos 2 0/L, and if there are n molecules in a unit of volume, their axes being distributed indifferently in all directions, the magnetization of the substance will be^HS 2 /L, and its susceptibility £S 2 /L (Maxwell, Electricity and Magnetism, § 838). The susceptibility is there fore constant and independent of the field, while its negative sign indicates that the substance is diamagnetic. There being no resistance, the induced current will continue to circulate

1 This deduction from Ewing's theory appears to have been first suggested by J. Swinburne. See Industries, 1890, 289.

2 R. Beattie (Phil. Mag., 1901, 1, 642) has found similar effects in nickel and cobalt.

round the molecule until the field is withdrawn, when it will be stopped by the action of an electro-motive force tending to induce an exactly equal current in the opposite direction. The principle of Weber's theory, with the modification necessitated by lately acquired knowledge, is the basis of the best modern explanation of diamagnetic phenomena.

There are strong reasons for believing that magnetism is a phenomenon involving rotation, and as early as 1876 Rowland, carrying out an experiment which had been proposed by Maxwell, showed that a revolving electric charge produced the same magnetic effects as a current. Since that date it has more than once been suggested that the molecular currents producing magnetism might be due to the revolution of one or more of the charged atoms or " ions " constituting the molecule. None of the detailed hypotheses which were based on this idea stood the test of criticism, but towards the end of the 19th century the researches of J. J. Thomson and others once more brought the conception of moving electric charges into prominence. Thomson has demonstrated the existence under many different conditions of particles more minute than anything previously known to science. The mass of each is about -pj'jnyth part of that of a hydrogen

atom, and with each is indissolubly associated a charge of negative electricity equal to about 3-1 Xio 10 C.G.S. electro static unit. These particles, which were termed by their dis- coverer corpuscles, are more commonly spoken of as electrons, 1 the particle thus being identified with the charge which it carries. An electrically neutral atom is believed to be constituted in part, or perhaps entirely, of a definite number of electrons in rapid motion within a " sphere of uniform positive electrification " not yet explained. One or more of the electrons may be detached from the system by a finite force, the number so detachable depending on the valency of the atom; if the atom loses an electron, it becomes positively electrified; if it receives additional electrons, it is negatively electrified. The process of electric con- duction in metals consists in the movement of detached electrons, and many other phenomena, both electrical and thermal, can be more or less completely explained by their agency. It has been supposed that certain electrons revolve like satellites in orbits around the atoms with which they are associated, a view which receives strong support from the phenomena of the Zeeman effect, and on this assumption a theory has been worked out by P. Langevin, 2 which accounts for many of the observed facts of magnetism. As a consequence of the structure of the molecule, which is an aggregation of atoms, the planes of the orbits around the latter may be oriented in various positions, and the direction of revolution may be right-handed or left-handed with respect to the direction of any applied magnetic field. For those orbits whose projection upon a plane perpendicular to the field is right- handed, the period of revolution will be accelerated by the field (since the electron current is negative), and the magnetic moment consequently increased; for those which are left-handed, the period will be retarded and the moment diminished. The effect of the field upon the speed of the revolving electrons, and therefore upon the moments of the equivalent magnets, is necessarily a very small one. If S is the area of the orbit described in time t by an electron of charge e, the moment of the equivalent magnet is M = eSr; and the change in the value of M due to an external field H is shown to be AM = — He 2 S/4jrw, tn being the mass of the electron. Whence

AM _ Ht e M — 4ir m

1 The charge associated with a corpuscle is. the same as that carried by a hydrogen atom. G. J. Stoney in 1881 (Phil. Mag., 1881, II, 387) pointed out that this latter constituted the indivisible " atom of electricity " or natural unit charge. Later he proposed (Trans. Roy. Dub. Soc, 1891, 4, 583) that such unit charge should be called an " electron." The application of this term to Thomson's corpuscle implies, rightly or wrongly, that notwithstanding its apparent mass, the corpuscle is in fact nothing more than an atom of electricity. The question whether a corpuscle actually has a material gravitating nucleus is undecided, but there are strong reasons for

believing that its mass is entirely due to the electric charge.

- *Jour, de Phys., 1905, 4, 678; translated in Electrician, 1905, 56, 108 and 141.*

According to the best determinations the value of e/m does not exceed i-8Xio 7 , and r is of the order of io -16 second, the period of luminous vibrations; hence AM/M must always be less than io^H, and therefore the strongest fields yet reached experimentally, which fall considerably short of io 6 , could not change the magnetic moment M by as much as a ten-thousandth part. If the structure of the molecule is so perfectly symmetrical that, in the absence of any external field, the resultant magnetic moment of the circulating electrons is zero, then the application of a field, by accelerating the right-handed (negative) revolutions, and retarding those which are left-handed, will induce in the substance a resultant magnetization opposite in direction to the field itself; a body composed of such symmetrical molecules is therefore diamagnetic. If however the structure of the mole- cule is such that the electrons revolving around its atoms do not exactly cancel one another's effects, the molecule constitutes a little magnet, which under the influence of an external field will tend to set itself with its axis parallel to the field. Ordinarily a substance composed of asymmetrical mole- cules is paramagnetic, but if the elementary magnets are so conditioned by their strength and concentration that mutual action between them is possible, then the substance is ferro- magnetic. In all cases however it is the diamagnetic condition that is initially set up — even iron is diamagnetic — though the diamagnetism may be completely masked by the superposed paramagnetic or ferromagnetic condition. Diamagnetism, in short, is an atomic phenomenon; paramagnetism and ferro- magnetism are molecular phenomena. Hence may be deduced an explanation of the fact that, while the susceptibility of all known diamagnetics (except bismuth and antimony) is inde- pendent of the temperature, that of paramagnetics varies inversely as the absolute temperature, in accordance with the law of Curie.

13. Historical and Chronological Notes

The most conspicuous property of the lodestone, its attraction for iron, appears to have been familiar to the Greeks at least as early as 800 B.C., and is mentioned by Homer, Plato, Aristotle, Theophrastus and others. A passage in De rerum natura (vi. 910-915) by the Roman poet, Lucretius (96-55 B.C.), in which it is stated that the stone can support a chain of little rings, each adhering to the one above it, indicates that in his time the pheno- menon of magnetization by induction had also been observed. The property of orientation, in virtue of which a freely suspended magnet points approximately to the geographical north and south, is not referred to by

any European writer before the 12th century, though it is said to have been known to the Chinese at a much earlier period. The application of this property to the construction of the mariner's compass is obvious, and it is in connexion with navigation that the first references to it occur (see Compass). The needles of the primitive compasses, being made of iron, would require frequent re-magnetization, and a " stone " for the purpose of " touching the needle " was therefore generally included in the navigator's outfit. With the constant practice of this operation it is hardly possible that the repulsion acting between like poles should have entirely escaped recogni- tion; but though it appears to have been noticed that the lode-stone sometimes repelled iron instead of attracting it, no clear statement of the fundamental law that unlike poles attract while like poles repel was recorded before the publication in 1581 of the New Attractive by Robert Norman, a pioneer in accurate magnetic work. The same book contains an account of Norman's dis- covery and correct measurement of the dip (1576). The down- ward tendency of the north pole of a magnet pivoted in the usual way had been observed by G. Hartmann of Nuremberg in 1544, but his observation was not published till much later.

The foundations of the modern science of magnetism were laid by William Gilbert (q.v.). His De magnete magneticisque corporibus et de magno magnete tellure physiologia nova (1600), contains many references to the expositions of earlier writers from Plato down to those of the author's own age. These show that the very few facts known with certainty were freely supplemented

by a number of ill-founded conjectures, and sometimes even by " figments and falsehoods, which in the earliest times, no less than nowadays, used to be put forth by raw smatterers and copyists to be swallowed of men." 1 Thus it was taught that " if a lodestone be anointed with garlic, or if a diamond be near, it does not attract iron," and that " if pickled in the salt of a sucking fish, there is power to pick up gold which has fallen into the deepest wells." There were said to be " various kinds of magnets, some of which attract gold, others silver, brass, lead; even some which attract flesh, water, fishes;" and stories were told about " mountains in the north of such great powers of attraction that ships are built with wooden pegs, lest the iron nails should be drawn from the timber." Certain occult powers were also attributed to the stone. It was "of use to thieves by its fume and sheen, being a stone born, as it were, to aid theft," and even opening bars and

locks; it was effective as a love potion, and possessed " the power to reconcile husbands to their wives, and to recall brides to their husbands." And much more of the same kind, which, as Gilbert says, had come down " even to [his] own day through the writings of a host of men, who, to fill out their volumes to a proper bulk, write and copy out pages upon pages on this, that and the other subject, of which they know almost nothing for certain of their own experience." Gilbert himself absolutely disregarded authority, and accepted nothing at second-hand. His title to be honoured as the " Father of Magnetic Philosophy " is based even more largely upon the scientific method which he was the first to inculcate and practise than upon the importance of his actual discoveries. Careful experiment and observation, not the inner consciousness, are, he insists, the only foundations of true science. Nothing has been set down in his book " which hath not been explored and many times performed and repeated " by himself. " It is very easy for men of acute intellect, apart from experiment and practice, to slip and err." The greatest of Gilbert's discoveries was that the globe of the earth was magnetic and a magnet; the evidence by which he supported this view was derived chiefly from ingenious experiments made with a spherical lodestone or terrella, as he termed it, and from his original observation that an iron bar could be magnetized by the earth's force. He also carried out some new experiments on the effects of heat, and of screen- ing by magnetic substances, and investigated the influence of shape upon the magnetization of iron. But the bulk of his work consisted in imparting scientific definiteness to what was already vaguely known, and in demolishing the errors of his predecessors.

No material advance upon the knowledge recorded in Gilbert's book was made until the establishment by Coulomb in 1785 of the law of magnetic action. The difficulties attending the ex- perimental investigation of the forces acting between magnetic poles have already been referred to, and indeed a rigorously exact determination of the mutual action could only be made under conditions which are in practice unattainable. Coulomb, 2 how- ever, by using long and thin steel rods, symmetrically magnetized, and so arranged that disturbing influences became negligibly small, was enabled to deduce from his experiments with reason- able certainty the law that the force of attraction or repulsion between two poles varies inversely as the square of the distance between them. Several previous attempts had been made to discover the law of force, with various results, some of which correctly indicated the inverse square; in particular the German astronomer, J. Tobias Mayer (Gott. Anzeiger, 1760), and the Alsatian mathematician, J. Heinrich Lambert (Hist, de I' Acad. Roy. Berlin, 1766, p. 22), may fairly be credited with having anticipated the law which was afterwards more satisfactorily established by Coulomb. The accuracy of this law was in 1832 confirmed by Gauss, 3 who employed an indirect but

more perfect method than that of Coulomb, and also, as Maxwell remarks,

1 The quotations are from the translation published by the Gilbert Club, London, 1900.

2 C. A. Coulomb, Mem. Acad. Roy. Paris, 1785, p. 578.

3 Intensitas vis magneticae, § 21, C. F. Gauss's Werke, 5, 79. See also J. J. Thomson, Electricity and Magnetism, § 132.

by all observers in magnetic observatories, who are every day making measurements of magnetic quantities, and who obtain results which would be inconsistent with each other if the law of force had been erroneously assumed.

Coulomb's researches provided data for the development of a mathematical theory of magnetism, which was indeed initiated by himself, but was first treated in a complete form by Poisson in a series of memoirs published in 182 1 and later. 4 Poisson assumed the existence of two dissimilar magnetic fluids, any element of which acted upon any other distant element in accord- ance with Coulomb's law of the inverse square, like repelling and unlike attracting one another. A magnetizable substance was supposed to consist of an indefinite number of spherical particles, each containing equivalent quantities of the two fluids, which could move freely within a particle, but could never pass from one particle to another. When the fluids inside a particle were mixed together, the particle was neutral; when they were more or less completely separated, the particle became magnetized to an intensity depending upon the magnetic force applied; the whole body therefore consisted of a number of little spheres having north and south poles, each of which exerted an elementary action at a distance. On this hypothesis Poisson investigated the forces due to bodies magnetized in any manner, and also originated the mathematical theory of magnetic induction. The general confirmation by experiment of Poisson's theoretical results created a tendency to regard his hypothetical magnetic fluids as having a real existence; but it was pointed out by W. Thomson (afterwards Lord Kelvin) in 1849 that while no physical evidence could be adduced in support of the hypothesis, certain discoveries, especially in electromagnetism, rendered it extremely improbable (Reprint, p. 344) . Regarding it as impor- tant that all reasoning with reference to magnetism should be conducted without any uncertain assumptions, he worked out a mathematical theory upon the sole foundation of a few well- known facts and principles. The results were substantially the same as those given by Poisson's theory, so far as the latter went, the principal additions including a fuller investigation of magnetic distribution, and the theory of magnetic induction in aeolotropic or crystalline substances. The mathematical theory

which was constructed by Poisson, and extended and freed from doubtful hypotheses by Kelvin, has been elaborated by other investigators, notably F. E. Neumann, G. R. Kirchhoff, and Maxwell. The valuable work of Gauss on magnetic theory and measurements, especially in relation to terrestrial magnetism, was published in his Intensitas vis magneticae terrestris, 1833, and in memoirs communicated to the Resultate aus den Beobacht- ungen des magnetischen Vereins, 1838 and 1839, which, with others, are contained in vol. 5 of the collected Werke. Weber's molecular theory, which has already been referred to, appeared in 1852. 6

An event of the first importance was the discovery made in 1819 by H. C. Oersted 6 that a magnet placed near a wire carrying an electric current tended to set itself at right angles to the wire, a phenomenon which indicated that the current was surrounded by a magnetic field. This discovery constituted the foundation of electromagnetism, and its publication in 1820 was immediately followed by A. M. Ampere's experimental and theoretical inves- tigation of the mutual action of electric currents, 7 and of the equivalence of a closed circuit to a polar magnet, the latter suggesting his celebrated hypothesis that molecular currents were the cause of magnetism. In the same year D. F. Arago 8 suc- ceeded in magnetizing a piece of iron by the electric current, and in 1825 W. Sturgeon 9 publicly exhibited an apparatus "acting

4 S. D. Poisson, Mem. de Vlnslitut, 1821 and 1822, 5, 247, 488;

1823, 6, 441 ; 1838, 16, 479.

6 For outlines of the mathematical theory of magnetism and references see H. du Bois, Magnetic Circuit, chs. iii. and iv.

6 Gilbert's Ann. d. phys., 1820, 6, 295.

7 Ann. de chim. et de phys., 1820, 15, 59, 170; Recueil d' observa- tions electrodynamiques, 1822; Theories des pMnomenes Uectr(h dynamiques, 1826.

8 Ann. de chim. et de phys., 1820, 15, 93.

9 Trans. Soc. Arts, 1825, 43, 38.

on the principle of powerful magnetism and feeble galvanism " which is believed to have constituted the first actual electro- magnet. Michael

Faraday's researches were begun in 183 1 and continued for more than twenty years. Among the most splendid of his achievements was the discovery of the phenomena and laws of magneto-electric induction, the subject of two papers com- municated to the Royal Society in 1831 and 1832. Another was the magnetic rotation of the plane of polarization of light, which was effected in 1845, an d for the first time established a relation between light and magnetism. This was followed at the close of the same year by the discovery of the magnetic condition of all matter, a discovery which initiated a prolonged and fruitful study of paramagnetic and diamagnetic phenomena, including magnecrystallic action and " magnetic conducting power," now known as permeability. Throughout his researches Faraday paid special regard to the medium as the true seat of magnetic action, being to a large extent guided by his pregnant conception of " lines of force," or of induction, which he considered to be " closed curves passing in one part of the course through the magnet to which they belong, and in the other part through space," always tending to shorten themselves, and repelling one another when they were side by side {Exp. Res. §§ 3266-8, 3271). In 1873 James Clerk Maxwell published his classical Treatise on Electricity and Magnetism, in which Faraday's ideas were translated into a mathematical form. Maxwell explained electric and magnetic forces, not by the action at a distance assumed by the earlier mathematicians, but by stresses in a medium filling all space, and possessing qualities like those attributed to the old luminiferous ether. In particular, he found that the calculated velocity with which it transmitted electro- magnetic disturbances was equal to the observed velocity of light; hence he was led to believe, not only that his medium and the ether were one and the same, but, further, that light itself was an electromagnetic phenomenon. Since the experimental confir- mation of Maxwell's views by H. R. Hertz in 1888 (Weid. Ann., 1888, 34, 155, 551, 609; and later vols.) they have commanded universal assent, and his methods are adopted in all modern work on electricity and magnetism.

The practice of measuring magnetic induction and perme- ability with scientific accuracy was introduced in 1873 by H. A. Rowland, 1 whose careful experiments led to general recognition of the fact previously ignored by nearly all investigators, that magnetic susceptibility and permeability are by no means constants (at least in the case of the ferromagnetic metals) but functions of the magnetizing force. New light was thrown upon many important details of magnetic science by J. A. Ewing's Experimental Researches of 1885; throughout the whole of his work special attention was directed to that curious lagging action to which the author applied the now familiar term "hysteresis." 2 His well-known modification 3 of Weber's molecular theory, published in 1890, presented for the first time a simple and suffi- cient explanation of hysteresis and many other complexities of

magnetic quality. The amazing discoveries made by J. J. Thomson in 1897 and 1898 4 resulted in the establishment of the electron theory, which has already effected developments of an almost revolutionary character in more than one branch of science. The application of the theory by P. Langevin to the case of molecular magnetism has been noticed above, and there can be little doubt that in the near future it will contribute to the solution of other problems which are still obscure.

See W. Gilbert, De magnete (London, 1600; trans, by P. F. Motte- lay, New York, 1893, and for the Gilbert Club, London, 1900); M. Faraday, Experimental Researches in Electricity, 3 vols. (London, 1839, 1844 and 1855) ; W. Thomson (Lord Kelvin), Reprint of Papers on Electrostatics and Magnetism (London, 1884, containing papers on magnetic theory originally published between 1844 and 1855, with additions) ; J. C. Maxwell, Treatise on Electricity and Magnetism (3rd ed., Oxford, 1892); E. Mascart and J. Joubert, Lecons sur V electricity et le magnetisme (2nd ed., Paris, 1896-1897 ; trans., not free from errors, by E. Atkinson, London, 1883); J. A. Ewing, Magnetic

1 Phil. Mag., 1873, 46, 140; 1874, 48, 321.

2 Phil. Trans., 1885, 176, 523; Magnetic Induction, 1900.

3 Proc. Roy. Soc, 1890, 48, 342.

- *Phil. Mag., 1897, 44, 293; 1898, 46, 528.*

Induction in Iron and other Metals (3rd ed., London, 1900); J. J. Thomson, Recent Researches in Electricity and Magnetism (Oxford, 1893) ; Elements of Mathematical Theory of Electricity and Magnetism 3rd ed., Cambridge, 1904); H. du Bois, The Magnetic Circuit (trans, by E. Atkinson, London, 1896) ; A. Gray, Treatise on Magnetism and Electricity, vol. i. (London, 1898) ; J. A. Fleming, Magnets and Electric Currents (London, 1898); C. Maurain, Le magnetisme du fer (Paris, 1899; a lucid summary of the principal facts and laws, with special regard to their practical application) ; Rapports presentes au Congres international de physique, vol. ii. (Paris, 1900) ; G. C. Foster and A. W. Porter, Treatise on Electricity and Magnetism (London, 1903) ; A. Winkelmann, Handbuch der Physik, vol. v. part i. (2nd ed., Leipzig, 1905 ; the most exhaustive compendium of magnetic science yet published, containing references to all important works and papers on every branch of the subject). (S. Bl.)

MAGNETISM, TERRESTRIAL, the science which has for its province the study of the magnetic phenomena of the earth.

§ 1. Terrestrial magnetism has a long history. Its early growth was slow,

*and considerable uncertainty prevails as to its earliest developments. The properties of the magnet ffljri . (see Magnetism) were to some small extent known to the Greeks and Romans before the Christian era, and compasses (see Compass) of an elementary character seem to have been employed in Europe at least as early as the 12 th century. In China and Japan compasses of a kind seem to have existed at a much earlier date, and it is even claimed that the Chinese were aware of the declination of the compass needle from the true north before the end of the nth century. Early scientific know- ledge was usually, however, a mixture of facts, very imperfectly ascertained, with philosophical imaginings. When an early writer makes a statement which to a modern reader suggests a knowledge of the declination of the compass, he may have had no such definite idea in his mind. So far as Western civilization is concerned, Columbus is usually credited with the discovery — in 1492 during his first voyage to America — that the pointing of the compass needle to the true north represents an exceptional state of matters, and that a declination in general exists, varying from place to place. The credit of these discoveries is not, how- ever, universally conceded to Columbus. G. Hellmann 6 * con- siders it almost certain that the departure of the needle from the true north was known in Europe before the time of Columbus. There is indirect evidence that the declination of the compass was not known in Europe in the early part of the 1 5th century, through the peculiarities shown by early maps believed to have been drawn solely by regard to the compass. Whether Columbus was the first to observe the declination or not, his date is at least approximately that of its discovery.*

The next fundamental discovery is usually ascribed to Robert Norman, an English instrument maker. In The Newe Attractive (1581) Norman describes his discovery made some years before of the inclination or dip. The discovery was made more or less by accident, through Norman's noticing that compass needles which were truly balanced so as to be horizontal when unmagnet- ized, ceased to be so after being stroked with a magnet. Norman devised a form of dip-circle, and found a value for the inclination in London which was at least not very wide of the mark.

Another fundamental discovery, that of the secular change of the declination, was made in England by Henry Gellibrand, professor of mathematics at Gresham College, who described it in his Discourse Mathematical on the Variation of the Magneticail Needle together with its Admirable Diminution lately discovered (1635). The history of this discovery affords a curious example of knowledge long delayed. William Borough, in his Discourse on the Variation of the Compas or Magneticatl Needle (1581), gave for the declination at Limehouse in October 1580 the value n°j E. approximately. Observations were repeated at Lime- house, Gellibrand tells us, in 1622 by his colleague Edmund Gunter, professor of

astronomy at Gresham College, who found the much smaller value 6° 13'. The difference seems to have been ascribed at first to error on Borough's part, and no suspicion of the truth seems to have been felt until 1633, when some rough observations gave a value still lower than that found by Gunter,

- *For explanation of these numbers, see end of article.*

It was not until midsummer 1634 that Gellibrand felt sure of his facts, and yet the change of declination since 1580 exceeded 7 . The delay probably arose from the strength of the preconceived idea, apparently universally held, that the declination was absolutely fixed. This idea, it would appear, derived some of its strength from the positive assertion made on the point by Gilbert of Colchester in his De magnete (1600).

A third fundamental discovery, that of the diurnal change in the declination, is usually credited to George Graham (1675- 1751), a London instrument maker. Previous observers, e.g. Gellibrand, had obtained slightly different values for the de- clination at different hours of the day, but it was natural to assign them to instrumental uncertainties. In those days the usual declination instrument was the compass with pivoted needles, and Graham himself at first assigned the differences he observed to friction. The observations on which he based his conclusions were made in 1722; an account of them was com- municated to the Royal Society and published in the Philosophical Transactions for 1724.

The movements of the compass needle throughout the average day represent partly a regular diurnal variation, and partly irregular changes in the declination. The distinction, however, was not at first very clearly realized. Between 1756 and 1759 J. Canton observed the declination-changes on some 600 days, and was thus able to deduce their general character. He found that the most prominent part of the regular diurnal change in England consisted of a westerly movement of the north- pointing pole from 8 or 9 a.m. to 1 or 2 p.m., followed by a more leisurely return movement to the east. He also found that the amplitude of the movement was considerably larger in summer than in winter. Canton further observed that in a few days the movements were conspicuously irregular, and that aurora was then visible. This association of magnetic disturbance and aurora had, however, been observed somewhat before this time, a de- scription of one conspicuous instance being contributed to the Royal Society in 1 7 50 by Pehr Vilhelm Wargentin (1717-1783), a Swede.

Another landmark in the history of terrestrial magnetism was the discovery towards the end of the 18th century that the inten- sity of the resultant magnetic force varies at different parts of the earth. The first observations clearly showing this seem to be those of a Frenchman, Paul de Lamanon, who observed in 1785- 1787 at Teneriffe and Macao, but his results were not published at the time. The first published observations seem to be those made by the great traveller Humboldt in tropical America be- tween 1798 and 1803. The delay in this discovery may again be attributed to instrumental imperfections. The method first devised for comparing the force at different places consisted in taking the time of oscillation of the dipping needle, and even with modern circles this is hardly a method of high precision. Another discovery worth chronicling was made by Arago in 1827. From observations made at Paris he found that the inclination of the dipping needle and the intensity of the horizontal component of the magnetic force both possessed a diurnal variation.

§ 2. Whilst Italy, England and France claim most of the early observational discoveries, Germany deserves a large share of credit for the great improvement in instruments and methods during the first half of the 19th century. Measure- ments of the intensity of the magnetic force were somewhat crude until Gauss showed how absolute results could be obtained, and not merely relative data based on observations with some particular needle. Gauss also devised the bifilar magnetometer, which is still largely represented in instruments measuring changes of the horizontal force; but much of the practical success attending the application of his ideas to instruments seems due to Johann von Lamont (1805-1879), a Jesuit of Scottish origin resident in Germany.

The institution of special observatories for magnetic work is largely due to Humboldt and Gauss. The latter's observatory at Gottingen, where regular observations began in 1834, was the centre of the Magnetic Union founded by Gauss and Weber for the carrying out of simultaneous magnetic observations

and it was long customary to employ Gottingen time in schemes of international co-operation.

In the next decade, mainly through the influence of Sir Edward Sabine (1788-1883), afterwards president of the Royal Society, several magnetic observatories were established in the British colonies, at St Helena, Cape of Good Hope, Hobarton (now Hobart) and Toronto. These, with the exception of Toronto, continued in full action for only a few years; but their records — from their widely distributed positions — threw much fresh light on the differences between magnetic phenomena in different regions of the globe. The introduction of regular magnetic observatories led ere long to

the discovery that there are notable differences between the amplitudes of the regular daily changes and the frequency of magnetic disturbances in different years. The discovery that magnetic phenomena have a period closely similar to, if not absolutely identical with, the " eleven year " period in sunspots, was made independently and nearly simultaneously about the middle of 'the 19th century by Lamont, Sabine and R. Wolf.

The last half of the 19th century showed a large increase in the number of observatories taking magnetic observations. After 1890 there was an increased interest in magnetic work. One of the contributory causes was the magnetic survey of the British Isles made by Sir A. Riicker and Sir T. E. Thorpe, which served as a stimulus to similar work elsewhere; another was the institution by L. A. Bauer of a magazine, Terrestrial Magnetism, specially devoted to the subject. This increased activity added largely to the stock of information, sometimes in forms of marked practical utility; it was also manifested in the publication of a number of papers of a speculative character. For historical details the writer is largely indebted to the works of E. Walker 1 and L. A. Bauer. 3

§ 3. All the more important magnetic observatories are provided with instruments of two kinds. Those of the first kind give the absolute value of the magnetic elements at the time of Observa- observation. The unifilar magnetometer (q.v.), for tional instance, givestheabsolutevalues of the declination and Methods and horizontal [force, whilst the inclinometer (q.v.) or dip Records. circle gives the inclination of the dipping needle. Instruments of the second kind, termed magnetographs (q.v.), are differential and self-recording, and show the changes constantly taking place in the magnetic elements. The ordinary form of magnetograph records photographically. Light reflected from a fixed mirror gives a base line answering to a constant value of the element in question; the light is cut off every hour or second hour so that the base line also serves to make the time. Light reflected from a mirror carried by a magnet gives a curved line answering to the changes in position of the magnet. The length of the ordinate or perpendicular drawn from any point of the curved line on to the base line is proportional to the extent of departure of the magnet from a standard position. If then we know the absolute value of the element which corresponds to the base line, and the equivalent of I cm. of ordinate, we can deduce the absolute value of the element answering to any given instant of time. In the case of the declination the value of I cm. of ordinate is usually dependent almost entirely on the distance of the mirror carried by the magnet from the photographic paper, and so remains invariable or very nearly so. In the case of the horizontal force and vertical force magnetographs — these being the two force components usually recorded — the value of 1 cm. of ordinate alters with the strength of the magnet. It has thus to be determined from time to time by observing the deflection

shown on the photographic paper when an auxiliary magnet of known moment, at a measured distance, deflects the magnetograph magnet. Means are provided for altering the sensitiveness, for instance, by changing the effective distance in the bifilar suspension of the horizontal force magnet, and by altering the height of a small weight carried by the vertical force magnet. It is customary to aim at keeping the sensitiveness as constant as possible. A very common standard is to have I cm. of ordinate corresponding to 10′ of arc in the declination and to 507 (17 = 0-00001 C.G.S.) in the horizontal and vertical force magneto- graphs.

As an example of how the curves are standardized, suppose that absolute observations of declination are taken four times a month, and that in a given month the mean of the observed values is 16° 34'-6 W. The curves are measured at the places which correspond to the times of the four observations, and the mean length of the four ordinates is, let us say, 2-52 cms. If 1 cm. answers to 10', then 2-52 cms. represents 25'-2, and thus the value of the base line — i.e. the value which the declination would have if the curve came down to the base line — is for the month in question 16° 34'-6 less 25'-2 or

16° 9′ 4. If now we wish to know the declination at any instant in this particular month all we have to do is to measure the correspond- ing ordinate and add its value, at the rate of 10′ per cm., to the base value 16° o/-4 just found. Matters are a little more complicated in the case of the horizontal and vertical force magnetographs. Both instruments usually possess a sensible temperature coefficient, i.e. the position of the magnet is dependent to some extent on the temperature it happens to possess, and allowance has thus to be made for the difference from a standard temperature. In the case of the vertical force an " observed " value is derived by combining the observed value of the inclination with the simultaneous value of the horizontal force derived from the horizontal force magneto- graph after the base value of the latter has been determined. In themselves the results of the absolute observations are of minor interest. Their main importance is that they provide the means of fixing the value of the base line in the curves. Unless they are made carefully and sufficiently often the information de- rivable from the curves suffers in accuracy, especially that relating to the secular change. It is from the curves that informa- tion is derived as to the regular diurnal variation and irregular changes. In some observatories it is customary to publish a com- plete record of the values of the magnetic elements at every hour for each day of the year. A useful and not unusual addition to this is a

statement of the absolutely largest and smallest values of each element recorded during each day, with the precise times of their occurrence. On days of large disturbance even hourly readings give but a very imperfect idea of the phenomena, and it is customary at some observatories, e.g. Greenwich, to reproduce the more disturbed curves in the annual volume. In calculating the regular diurnal variation it is usual to consider each month separately. So far as is known at present, it is entirely or almost entirely a matter of accident at what precise hours specially high or low values of an element may present themselves during an individual highly dis- turbed day ; whilst the range of the element on such a day may be 5, 10 or even 20 times as large as on the average undisturbed day of the month. It is thus customary when calculating diurnal in- equalities to omit the days of largest disturbance, as their inclusion would introduce too large an element of uncertainty. Highly disturbed days are more than usually common in some years, and in some months of the year, thus their omission may produce effects other than that intended. Even on days of lesser disturbance difficulties present themselves. There may be to and fro move- merits of considerable amplitude occupying under an hour, and the hour may come exactly at the crest or at the very lowest part of the trough. Thus, if the reading represents in every case the ordinate at the precise hour a considerable element of chance may be intro- duced. If one is dealing with a mean from several hundred days such " accidents " can be trusted to practically neutralize one another, but this is much less fully the case when the period is as short as a month. To meet this difficulty it is customary at some observatories to derive hourly values from a freehand curve of continuous curvature, drawn so as to smooth out the apparently irregular movements. Instead of drawing a freehand curve it has been proposed to use a planimeter, and to accept as the hourly value of the ordinate the mean derived from a consideration of the area included between the curve, the base line and ordinates at the thirty minutes before and after each hour.

§ 4. Partly on account of the uncertainties due to disturbances, and partly with a view to economy of labour, it has been the practice at some observatories to derive diurnal inequalities from a com- paratively small number of undisturbed or quiet days. Beginning with 1890, five days a month were selected at Greenwich by the astronomer royal as conspicuously quiet. In the selection regard was paid to the desirability that the arithmetic mean of the five dates should answer to near the middle of the month. In some of the other English observatories the routine measurement of the curves was limited to these selected quiet days. At Greenwich itself diurnal inequalities were derived regularly from the quiet days alone and also from all the days of the month, excluding those of large disturbance. If a quiet day differed from an ordinary day only in that

the diurnal variation in the latter was partly obscured by irregular disturbances, then supposing enough days taken to smooth out irregularities, one would get the same diurnal inequality from ordinary and from quiet days. It was found, however, that this was hardly ever the case (see §§ 29 and 30). The quiet day scheme thus failed to secure exactly what was originally aimed at ; on the other hand, it led to the discovery of a number of interesting results calculated to throw valuable sidelights on the phenomena of terrestrial magnetism.

The idea of selecting quiet days seems due originally to H. Wild. His selected quiet days for St Petersburg and Pavlovsk were very few in number, in some months not even a single day reaching his standard of freedom from disturbance. In later years the International Magnetic Committee requested the authorities of each observatory to arrange the days of each month in three groups representing the quiet, the moderately disturbed and the highly disturbed. The statistics are collected and published on behalf of the committee, the first to undertake the duty being M. Snellen. The days are in all cases counted from Greenwich mid- night, so that the results are strictly synchronous. The results promise to be of much interest.

§ 5. The intensity and direction of the resultant magnetic force at a spot — i.e. the force experienced by a unit magnetic pole — are known if we know the three components of force parallel to any set of orthogonal axes. It is usual to take for these axes the vertical at the spot and two perpendicular axes in the horizontal plane ; the latter are usually taken in and perpendicular to the geographical meridian. The usual notation in mathematical work is X to the north, Y to the west or east, and Z vertically downwards. The international magnetic committee have recommended that Y be taken positive to the east, but the fact that the declination is westerly over most of Europe has often led to the opposite procedure, and writers are not always as careful as they should be in stating their choice. Apart from mathematical calculations, the more usual course is to define the force by its horizontal and vertical components — usually termed Hand V — and by the declination or angle which the horizontal component makes with the astronomical meridian. The declination is sometimes counted from 0° to 360 , 0° answering to the case when the so-called north pole (or north seeking pole) is directed towards geographical north, 90 to the case whemt is directed to the east, and so on. It is more usual, however, to reckon declina- tion only from 0° to 180°, characterizing it as easterly or westerly according as the north pole points to the east or to the west of the geographical meridian. The force is also completely defined by H or V, together with D the declination, and I the inclination to the horizon of the dipping needle. Instead of H and D some writers make use of N the northerly component, and W the westerly (or E the easterly). The resultant

force itself is denoted sometimes by R, sometimes by T (total force). The following relationships exist between the symbols

$X = N,\ Y = W$ *or* $E,\ Z = V,\ R = T,$

$H = V(X^2 + Y^2),\ R = \sqrt{(X^2 + Y^2 + Z^2)},\ \tan D = Y/X,\ \tan I = V/H.$

The term magnetic element is applied to R or any of the components, and even to the angles D and I.

§ 6. Declination is the element concerning which our know- ledge is most complete, and most reliable. With a good unifilar magnetometer, at a fixed observatory distant charts from the magnetic poles, having a fixed mark of known azimuth, the observational uncertainty in a single observation should not exceed o'-5 or at most i'o. It cannot be taken for granted that different unifilars, even by the best makers, will give absolutely identical values for the declination, but as a matter of fact the differences observed are usually very trifling. The chief source of uncertainty in the observation lies in the torsion of the suspension fibre, usually of silk or more rarely of phosphor bronze or other metal. A very stout suspension must be avoided at all cost, but the fibre must not be so thin as to have a considerable risk of breaking even in skilled hands. Near a magnetic pole the directive force on the declination magnet is reduced, and the effects of torsion are correspondingly increased. On the other hand, the regular and irregular changes of declina tion are much enhanced. If an observation consisting of four readings of declination occupies twelve minutes, the chances are that in this time the range at an English station will not exceed 1', whereas at an arctic or. antarctic station it will frequently exceed 10'. Much greater uncertainty thus attaches to declina- tion results in the Arctic and Antarctic than to those in temperate latitudes. In the case of secular change data one important consideration is that the observations should be taken at an absolutely fixed spot, free from any artificial source of disturb- ance. In the case of many of the older observations of which records exist, the precise spot cannot be very exactly fixed, and not infrequently the site has become unsuitable through the erection of buildings not free from iron. Apart from buildings, much depends on whether the neighbourhood is free from basal- tic and other magnetic rocks. If there are no local disturbances of this sort, a few yards difference is usually without appreciable influence, and even a few miles difference is of minor importance when one is calculating the mean secular change for a long period of years. When, however, local disturbances exist, even a few feet difference in the site may be important, and in the absence of positive knowledge to the contrary it is only prudent to act as if the site were disturbed. Near a magnetic pole the declination naturally changes very rapidly when one travels in the direction perpendicular to the lines of equal declination, so that the exact position of

the site of observation is there of special importance.

35&

MAGNETISM, TERRESTRIAL

The usual method of conveying information as to the value of the declination at different parts of the earth's surface is to draw curves on a map — the so-called isogonals — such that at all points on any one curve the declination at a given specified epoch has the same value. The information being of special use to sailors, the pre- paration of magnetic charts has been largely the work of naval authorities — more especially of the hydrographic department of the British admiralty. The object of the admiralty world charts — four of which are reproduced here, on a reduced scale, by the kind per- mission of the Hydrographer — is rather to show the general features boldly than to indicate minute details. Apart from the immediate necessities of the case, this is a counsel of prudence. The observa- tions used have mostly been taken at dates considerably anterior to that to which the chart is intended to apply. What the sailor wants is the declination now or for the next few years, not what it was five, ten or twenty years ago. Reliable secular change data, for reasons already indicated, are mainly obtainable from fixed observ- atories, and there are enormous areas outside of Europe where no such observatories exist. Again, as we shall see presently, the rate of the secular change sometimes alters greatly in the course of a compara- tively few years. Thus, even when the observations themselves are thoroughly reliable, the prognostication made for a future date by even the most experienced of chart makers may be occasionally somewhat wide of the mark. Fig. I is a reduced copy of the British admiralty declination chart for the epoch 1907. It shows the iso- gonals between 70° N. and 65° S. latitude. Beyond the limits of this chart, the number of exact measurements of declination is

whose centre is the pole. At all points on the circle the positions of the needle will be parallel ; but whereas the north pole of the magnet will point exactly towards the centre of the circle at one of the points where the straight line drawn on the ground cuts the circumference, it will at the opposite end of the diameter point exactly away from the centre. The former part is clearly on the isogonal where the declination is 0°, the latter on the isogonal where it is 180 . Iso- gonals will thus radiate out from the north geographical pole (and similarly of course from the south geographical pole) in all directions. If we travel along an isogonal, starting from the north magnetic pole, our course will generally take us, often very circuitously, to the north geographical pole. If, for example, we select the isogonal of io° E., we at first travel nearly south, but then more and more westerly, then north-westerly across the north-east of Asia ; the direction

then gets less northerly, and makes a dip to the south before finally making for the north geographical pole. It is possible, however, according to the chart, to travel direct from the north magnetic to the south geographical pole, provided we select an isogonal answering to a small westerly or easterly declination (from about 10° W. to

7° E).

Special interest attaches to the isogonals answering to declination 0°. These are termed agonic lines, but sailors often call them lines of no variation, the term variation having at one time been in common use in the sense of declination. If we start from the north magnetic pole the agonic line takes us across Canada, the United States and South America in a fairly straight course to the south geographical pole. A curve continuous with this can be drawn from the south

„ AUSTRALIA'. .—" ..

\\~s}-±z^~z?PS~"'

**—J _3_°-5-*

— r—r^-i — : — ■ '. 'i . 1 1 r-i — I I I I I I ' I 1 t — I II . .

140 E. 1S0E. 180" J60W 140 W laoW. loo W. 80 W. 60 W. 40 W. 20 W.

20 E. 40 E. 60 E. 80 E. ioo°E. i2o°E. I40°E. :6o E. ?.%o*

fcedueeo tnttu ■ duet, ky eonrloeioaof the lord CejRjuUeloMT- of tlte Admiralty The portion over the Britieli lei** »"d France lu» been loecUllT dto*

, Emery WeJIte *&,*

'Fig. 1. — Isogonals, or lines of equal magnetic declination.

somewhat limited, but the general nature of the phenomena is easily inferred. The geographical and the magnetic poles — where the dipping needle is vertical — are fundamental points. The north magnetic pole is situated in North America near the edge of the chart. We have no reason to suppose that the magnetic pole is really a fixed point, but for our present purpose we may regard it as such. Let us draw an imaginary circle round it, and let us travel round the circle in the direction, west, north, east, south, starting from a point where the north pole of a magnet (i.e. the pole which in Europe or the United States points to the north) is directed exactly

towards the astronomical north. The point we start from is to the geographical south of the magnetic pole. As we go round the circle the needle keeps directed to the magnetic pole, and so points "first slightly to the east of geographical north, thqn more and more to the east, then directly east, then to south of east, then to due south, to west of south, to west, to north-west, and finally when we get round to our original position due north once more. Thus, during our course round the circle the needle will have pointed in all possible directions. In other words, isogonals answering to all possible values of the declination have their origin in the north magnetic pole. The same remark applies of course to the south magnetic pole.

Now, suppose ourselves at the north geographical pole of the earth. Neglecting as before diurnal variation and similar temporary changes, and assuming no abnormal local disturbance, the compass needle at and very close to this pole will occupy a fixed direction relative to the ground underneath. Let us draw on the ground through the pole a straight line parallel to the direction taken there by the com- pass needle, and let us carry a compass needle round a small circle

geographical to the south magnetic pole at every point of which the needle points in the geographical meridian; but here the north pole of the needle is pointing south, not north, so that this portion of curve is really an isogonal of 180°. In continuation of this there emanates from the south magnetic pole a second isogonal of o°, or agonic line, which traverses Australia, Arabia and Russia, and takes us to the north geographical pole. Finally, we have an isogonal of l8o°, continuous with this second isogonal of 0° which takes us to the north magnetic pole, from which we started. Throughout the whole area included within these isogonals of 0° and l8o c — excluding locally disturbed areas — the declination is westerly; outside this area the declination is in general easterly. There is, however, as shown in the chart, an isogonal of 0° enclosing an area in eastern Asia inside which the declination is westerly though small.

§ 7. Fig. 2 is a reduced copy of the admiralty chart of inclina- tion or dip for the epoch 1907. The places where the dip has the same value lie on curves called isoclinals. The dip is northerly (north pole dips) or southerly (south pole dips) according as the place is north or south of the isoclinal of 0°. At places actually on this isoclinal the dipping needle is horizontal. The isoclinal of 0° is nowhere very far from the geographical equator, but lies to the north of it in Asia and Africa, and to the south of it in South America. As we travel north from the isoclinal of 0° along the meridian containing the magnetic pole the dipping needle's north pole dips more and more, until when we reach the magnetic pole the needle is vertical. Going still farther north, we have the dip dimin- ishing. The northerly inclination is

considerably less in Europe than in the same latitudes of North America; and correspondingly

the southerly inclination is less in South America than in the same latitudes of Africa.

Fig. 3 is a reduced copy of the admiralty horizontal force chart for 1907. The curves, called isomagnetics, connect the places where

force. The total force is least in equatorial regions, where values slightly under 0-4 C.G.S. are encountered. In the northern hemis- phere there are two distinct maxima of total force. One of these so-called foci is in Canada, the other in the north-east of Siberia, the

*■. -< ■. . ■;' 4-J**

, m%, c

ao"E- «&?£.

ttiW. 140W. isSW. u»W. BoVf.

■Hilli n g IfU • vb*Tt>f |i.inuiU«ion«ft ~# tfc* Adiuiralljr*

Fig. 2 — Isoclinals, or lines of equal magnetic dip.

Emery walker sc

the horizontal force has the same value; the force is expressed in C.G.S. units. The horizontal force vanishes of course at the magnetic poles. The chart shows a maximum value of between 0-39 and 0-40 in an oval including the south of Siam and the China Sea. The horizontal force is smaller in North America than in corresponding latitudes in Europe.

Charts are sometimes drawn for other magnetic elements, especi- ally vertical force (fig. 4) and total force. The isomagnetic of zero vertical force coincides necessarily with that of zero dip, and there is in general considerable resemblance between the forms of lines of equal vertical force and those of equal dip. The highest values of the vertical force occur in areas surrounding the magnetic poles, and are fully 50% larger than the largest values of the horizontal

former having the higher value of the force. There are, however, higher values of the total force than at either of these foci throughout a considerable area to the south of Australia. In the northern hemisphere the lines of equal total force — called isodynamic lines — • form two sets more or less distinct, consisting of closed ovals, one set surrounding the Canadian the other the Siberian focus.

§ 8. As already explained, magnetic charts for the world or for large areas give only a general idea of the values of the elements. If the region is undisturbed, very fairly approximate values are derivable from the charts, but when the highest accuracy is necessary the only thing to do is to observe at the precise spot. In disturbed areas local values often depart somewhat widely from what one would infer from the chart, and occasionally there are large differences

*80° 60 40° 2o**

20° 40 60 8< > I0O 120 I40* l60* l8o° l6o" 14O* I20° 10O°*

?\V. 6o°\V. 40W. :o'\V.

«3 J E. 4o°E. 6o"E. 8o°E. itxfE. i2o"E. i4o"E. 160'E. 180 160W. 140'W. iwfW. ioo"w. 8o°W.

Knlucitt fr^M a clM.t.by jwrmi

Emery ytilu r K.

Fig. 3. — Isomagnetics, lines of equal horizontal force.

between places only a few miles apart. Magnetic observatories usually publish the mean value for the year of their magnetic elements. It has been customary for many years to collect and publish these results in the annual report of the Kew Observatory (Observatory Department of the. National Physical Laboratory). The data in Tables I. and II. are mainly derived from this source. The observatories are arranged in order of and their geographical co-ordinates are given in Table II., longitude being reckoned from Greenwich. Table I. gives the mean values of the declination, inclination and horizontal force for January I, 1901 ; they are in the main arithmetic means of the mean annual values for the two years 1900 and 1901. The mean annual secular changes given in this table are derived from a short period of years — usually 1898 to 1903 — the centre of

which fell

Magnetic Elements and their Secular Change.

latitude,

east all over Europe, and the rate at which it is moving seems not to vary much throughout the continent. The needle is also moving to the east throughout the western parts of Asia, the north and east of Africa, and the east of North America. It is moving to the west in the west of North America, in South America, and in the south' and east of Asia, including Japan, south-east Siberia, eastern China and most of India.

§ 9. The information in figs. I, 2, 3 and 4 and in Tables I. and II. applies only to recent years. Owing to secular change, recent charts differ widely from the earliest ones constructed. The first charts believed to have been constructed were those of Edmund Halley the astronomer. According to L. A. Bauer, 7 who has made a special study of the subject, Halley issued two declination charts for the epoch 1700; one, published in 1701, was practically confined to the Atlantic Ocean, whilst the second, published in 1702, contained

&f 60 40°

ao' 40 . 6o* 80* ioo* 120 140 8 160″ 180″ 160 140* 12c? 100™*

j\V. 6o"W. 4o"W. jrfW.

*mfE. 4< >°E. 6o*E. 8o°E. ioo'E. TXfE, Mo'E. !6o°E. 180° i6o°W. uo'W. J2C?W. ioo'W. 8o°W.*

*gmlunl fn Mwl 4 hT *.by fanutMton «1 tlw Lorda ■• nUrtwm it U*

tmcry Wtlfcef we.

Fig. 4. — Isomagnetics, lines of equal vertical force.

at the beginning of 1901. Table II. is similar to Table I., but in- cludes vertical force results; it is more extensive and contains more recent data. In it the number of years is specified from which the mean secular change is derived ; in all cases the last year of the period employed was that to which the absolute values assigned to the ele- ment belong. The great majority of the stations have declination west and inclination north; it has thus been convenient to attach the + sign to increasing westerly (or decreasing easterly) declination and to increasing northerly (or decreasing southerly) inclination. In other words, in the case of the declination + means that the

north end of the needle is moving to the west, while in the case of the inclination + means that the north end (whether the dipping end or not) is moving towards the nadir. In the case, however, of the vertical force f means simply numerical increase, irrespective of whether the north or the south pole dips. The unit employed in the horizontal and vertical force secular changes is 17, i.e. o-ooooi C.G.S. Even in the declination, at the very best observatories, it is hardly safe to assume that the apparent change from one year to the next is absolutely truthful to nature. This is especially the case if there has been any change of instrument or observer, or if any alteration has been made to buildings in the immediate vicinity. A change of instrument is a much greater source of uncertainty in the case of horizontal force or dip than in the case of declination, and dip circles and needles are more liable to deterioration than magnetometers. Thus, secular change data for inclination and vertical force are the least reliable. The uncertainties, of course, are much less, from a purely mathematical standpoint, for secular changes representing a mean from five or ten years than for those derived from successive years' values of the elements. The longer, however, the period of years, the greater is the chance that one of the elements may in the course of it have passed through a maximum or minimum value. This possibility should always be borne in mind in cases where a mean secular change appears exceptionally small.

As Tables I. and II. show, the declination needle is moving to the

also data for the Indian Ocean and part of the Pacific. These charts showed the isogonic lines, but only over the ocean areas. Though the charts for 1700 were the first published, there are others which apply to earlier epochs. W. van Bemmelen 8 has published charts for the epochs 1500, 1550, 1600, 1650 and 1700, whilst H. Fritsche' has more recently published charts of declination, inclination and horizontal force for 1600, 1700, 1780, 1842 and 1915. A number of early declination charts were given in Hansteen's Atlas and in G. Hermann's reprints, Die Altesten Karten der Isogonen, Isoklinen, Isoiynamen (Berlin, 1895). The data for the earlier epochs, especi- ally those prior to 1700, are meagre, and in many cases probably of indifferent accuracy, so that the reliability of the charts for these epochs is somewhat open to doubt.

If we take either Hansteen's or Fritsche's declination chart for 1600 we notice a profound difference from fig. 1. In 1600 the agonic line starting from the north magnetic pole, after finding its way south to the Gulf of Mexico, doubled back to the north-east, and passed across or near Iceland. After getting well to the north of Iceland it doubled again to the south, passing to the east of the Baltic. The second agonic line which now lies to the west of St Petersburg appears in 1600 to have continued, after traversing Australia, in a nearly northerly direction through the extreme

east of China. The nature of the changes in declination in western Europe will be under- stood from Table III., the data from which, though derived from a variety of places in the south-east of England, 10 may be regarded as approximately true of London. The earliest result is that obtained by Borough at Limehouse. Those made in the 16th century are due to Gunter, Gellibrand, Henry Bond and Halley. The observations from 1787 to 1805 were due to George Gilpin, who published particulars of his own and the earlier observations in the Phil. Trans, for 1806. The data for 1817 and 1820 were obtained by Col. Mark Beaufoy, at Bushey, Herts. They seem to come pre- cisely at the time when the needle, which had been continuously moving to the west since the earliest observations, began to retrace its steps. The data from i860 onwards apply to Kew.

Table I. — Magnetic Elements and their Rate of Secular Change

for

January I, 1901.

Place.

Absolute values.

Secular change.

D.

I.

H.

D.

I.

H.

Pavlovsk

1

39-8E

O /

70 36-8N

•16553

- 4-1

-0-8

7

+ 7

Ekatarinburg .

10 6.3E

70 40-5N

•17783

- 4.6

+0-5

-13

Copenhagen

10 IO-4W

68 3 8- 5 N

•17525

Stonyhurst .

18 io-3W

68 48-oN

•17330

- 4-0

+22

Wilhelmshaven .

12 26-oW

67 397N

•18108

- 4-1

— 2-1

+20

Potsdam

9 54-2W

66 24-5N

•18852

- 4-2

-1-6

+ 16

Irkutsk .

2 i-oE

70 I5-8N

•20122

+ 0-5

+ i-6

— 14

de Bilt . . .

13 4»-3W

66 55-5N

•18516

- 4-4

— 2-2

+ 14

Kew.

16 50- 8W

67 IO-6N

•18440

- 4-2

— 2-2

+25

Greenwich .

16 27-5W

67 7- 3 N

•18465

- 4-0

— 2-2

+23

Uccle

14 ii-oW

66 8-8N

•18954

- 4-2

— 2-1

+23

Falmouth .

18 27-3W

66 44-oN

•18705

- 3-8

-2-7

+26

Prague .

9 4-4W

•19956

- 4-4

+20

St Helier . .

16 58-iW

65 44-iN

— 3‘5

— 2-7

Pare St Maur .

14 43-4W

64 52-3N

•19755 I •19670 5

+23

Val Joyeux.

15 I3-7W

65 o-oN

- 4-0

*— 2*2*

Munich.

10 25-8W

63 i8-iN

•20629

- 4-8

-2-7

+21

O'Gyalla . .

7 26-iW

•21164

- 4-8

+ 13

Pola. . . .

9 22-7W

60 I4-5N

■22216

- 4-0

+23

Toulouse

14 i6-4\V

60 55-9N

•21945

- 3-9

-2-5

+25

Perpignan .

13 34″ 7 W

59 57-6N

•22453

Capo di Monte .

9 8-oW

56 22-3N

- 5-2

-2-3

Madrid .

15 39-oW

Coimbra

17 18-1W

59 22 -oN

•22786

- 3-7

-4-3

+34

Lisbon .

17 I5-7W

57 53-oN

•23548

Athens .

5 38-2W

52 7-5N

•26076

San Fernando .

15 57-5W

55 8-8N

•24648

Tokyo

4 34-9W

49 °-3N

•29932

Zi-ka-wei

2 23-5W

45 43-5N

•32875

+ 1-5

-1-5

+37

Helwan .

3 39-7W

40 30-8N

•30136

- 7-0

-o-4

— 7

Hong-Kong.

17.5E

31 22-8N

•36753

+ i-8

-4‘3

+45

Kolaba .

O 23-2E

21 26-5N

•37436

f 2-2

+7-0

— 9

Manila .

52-2E

16 I3-5N

•38064

+ O-I

-5-3

+47

Batavia .

1 7-3E

30 35-5S

■*36724*

+ 3-o

-7-3

— 11

Mauritius .

9 25-2W

54 9-4S

•*23820*

- 4-7

+4-6

-39

Rio de Janeiro.

8 2-9W

13 20-lS

•*2501*

4-10-4

-2-3

Melbourne .

8 25-6E

67 24-6S

•23295

The rate of movement of the needle to the east at London — and throughout Europe generally — fell off markedly subsequent to 1880. The change of declination in fact between 1880 and 1895 was only about 75% of that between 1865 and 1880, and the mean annual change from 1895 to 1900 was less than 75% of the mean annual change of the preceding fifteen years. Thus in 1902 it was at least open to doubt whether a change in the sign of the secular change were not in immediate prospect. Subsequent, however, to that date there was little further decline in the rate of secular change, and since 1905 there has been very distinct acceleration. Thus, if we derive a mean value from the eighteen European stations for which declination secular changes are given in Tables I. and II. we find

mean value from table I.

4 18

-5-2i

The epoch to which the data in Table II. refer is somewhat variable, but is in all cases more recent than the epoch, January 1, 1901, for Table I., the mean difference being about 5 years.

§ 10. At Paris there seems to have been a maximum of easterly declination (about 9) about 1580; the needle pointed to true north about 1662, and reached its extreme westerly position between 181 2 and 1814. The phenomena at Rome resembled those at Paris and London, but the extreme westerly position is believed to have been attained earlier. The rate of change near the turning point seems to have been very slow, and as no fixed observatories existed in those days, the precise time of its occurrence is open to some doubt.

Perhaps the most complete observations extant as to the declina- tion phenomena near a turning point relate to Kolaba observatory at Bombay ; they were given originally by N. A. F. Moos, 1 '- the director of the observatory. Some of the more interesting details are given in Table IV. ; here W denotes movement to be west, and so answers to a numerical diminution in the declination, which is easterly.

Prior to 1880 the secular change at Kolaba was unmistakably to the east, and subsequent to 1883 it was clearly to the west; but be- tween these dates opinions will probably differ as to what actually happened. The fluctuations then apparent in the sign of the annual change may be real,

but it is at least conceivable that they are of

movement to the west. Thus, in this case the rate of secular change has increased fairly steadily since the turning point was reached.

Table V. contains some data for St Helena and the Cape of Good Hope, 12 both places having a long magnetic history. The remarkable feature at St Helena is the uniformity in the rate of secular change. The figures for the Cape show a reversal in the direction of the secular change about 1840, but after a few years the arrested movement to the west again became visible. According, however, to J. C. Beattie's Magnetic Survey of South Africa the movement to the west ceased shortly _ after 1870. A persistent movement to the east then set in, the mean annual change increasing from i'-8 between 1873 and 1890 to 3'-8 between 1890 and

1900.

§ II. Secular changes of declination have been par- ticularly interesting in the United States, an area about which information is unusually complete, thanks to the labours and publications of the United States Coast and Geodetic Survey. 13 At present the agonic line passes in a south-easterly direction from Lake Superior to South Carolina. To the east of the agonic line the declination is westerly, and to the west it is easterly. In 1905 the declination varied from about 21 ° W. in the extreme north- east to about 24° E. in the extreme north-west. At present the motion of the agonic line seems to be towards the west, but it is very slow. To the east of the agonic line westerly declination is increasing, and to the west of the line, with the exception of a narrow strip immediately adjacent to it, easterly declination is increasing. The phenomena in short suggest a motion southwards in the north magnetic pole. Since 1750 declination has always been westerly in the extreme east of the States, and always easterly in the extreme west, but the position of the agonic line has altered a good deal. It was to the west of Richmond, Virginia, from 1 750 to about 1772, then to the east of it until about 1838 when it once more passed to the west; since that time it has travelled farther to the west. Table VI. is intended to show the nature of the secular change throughout the whole country. As before, + denotes that the north pole of the magnet is moving to the west, —that it is moving to the east.

The data in Table VI. represent the mean change of declination per annum, derived from the period (ten years, except for 1900-1905) which ended in the year put at the top of the column. The stations are arranged in four groups, the first group representing the extreme eastern, the last group the extreme western states, the other two groups being intermediate. In each group the stations are arranged, at least approximately, in order of

latitude. The data are derived from the values of the declination given in the Geodetic Survey's Report for 1906, appendix 4, and Magnetic Tables and Magnetic Charts by L. A. Bauer, 1908. The values seem, in most cases, based to some extent on calculation, and very probably the secular change was not in reality quite so regular as the figures suggest. For the Western States the earliest data are comparatively recent, but for some of the eastern states data earlier than any in the table appear in the Report of the Coast and Geodetic Survey for 1902. These data indicate that the easterly movement of the magnet, visible in all the earlier figures for the Eastern States in Table VI., existed in all of them at least as far back as 1700. There is not very much evidence as to the secular change between 1700 and 1650, the earliest date to which the Coast and Geodetic Survey's figures refer. The figures show a maximum of westerly declination about 1670 in New Jersey and about 1675 in Maryland. They suggest that this maximum was experienced all along the Atlantic border some time in the 17th century, but earlier in the extreme north-east than in New York or Maryland.

Examination of Table VI. shows that the needle continued to move to the east for some time after 1750 even in the Eastern States. But the rate of movement was clearly diminishing, and about 1765 the extreme easterly position was – reached in Eastport, Maine, the needle then beginning to retrace its steps to the west. The phenomena visible at Maine are seen repeating themselves at places more and more to the west, in Boston about 1785, in Albany about 1800, in Washington, D.C., about 1805, in Columbus (Ohio) about 1815, in Montgomery (Alabama) about 1825, in Bloomington (111.) about 1830, in Des Moines (Iowa) about 1840, in Santa Rosa (New Mexico) about i860 and in Salt Lake about 1870. In 1885 the needle was moving to the west over the whole United States with the exception of a comparatively narrow strip along the Pacific coast. Even an acute observer would have been tempted to prophesy in 1885 that at no distant date the secular change would be pronoun- cedly westerly right up to the Pacific. But in a few years a complete change took place. The movement to the east, which had become exceedingly small, if existent, in the Pacific states, began to ac- celerate; the movement to the west continued in the central, as in the eastern states, but perceptibly slackened. In 1905 the area throughout which the movement to the west still continued had greatly contracted and lay to the east of a line drawn from the west end of Lake Superior to the west of Georgia. If we take a station like Little Rock (Arkansas), we have the secular change to the

Table II.— Recent Values of the Magnetic Elements and their Rate of Secular Change.

Place.

Pavlovsk Sitka (Alaska) Ekatarinburg Rude Skov

(Copenhagen) Stonyhurst Hamburg Wilhelmshaven . Potsdam. Irkutsk . de Bilt . Valencia . Kew . . Greenwich Uccle Falmouth Prague . Cracow . St Helier Val Joyeux Vienna . Munich . O'Gyalla Odessa .

Pola

Agincourt (Toronto)

Nice .

Toulouse

Perpignan

Tiflis. .

Capo di Monte.

Madrid .

Coimbra . .

Baldwin (Kansas)

Cheltenham

(Maryland) Lisbon . Athens . San Fernando Tokyo Zi-ka-wei Dehra Dun . Helwan . Havana . Barrackpore Hong-Kong. Honolulu Kolaba .

Alibagh …. Vieques (Porto Rice) Manila . Kodaikanal . Batavia . Dar es Salaam . Mauritius Rio de Janeiro . Santiago (Chile) Melbourne . Christchurch, N.Z.

Geographical position.

Latitude.

59 4iN 57 3N 5649N

55 5IN 53 5iN 53 33N 53 32N 52 23N 52 16N 52 5N 5i 56N 51 28N 51 28N 50 48N 50 9N 50 5N 50 4N 49 12N 48 49N 48 15N 48 9N 47 53

N 4626N 44 52N 43 47N 43 43N 43 37N

42 42 N 41 43N 40 52 N 40 25N 40 12N 3847N

3844N 3843N 37 58N 3628N 35 4iN 31 12N 30 19N 29 52N 23 8N 22 46N 22 18N

21 19N 1854N 1839N 18 9 N I4 35N 10 14N

6 11S

649S

20 6S

22 55S 33 27S 37 50S

43 32S

Longitude

30 29E 135 20W

6038E

12 27E 2 28W 9 59E

8 9E

13 4E 104 16E

5 HE

10 15W o 19W

o

4 2IE

5 5W 1425E I9 58E

2 5W

2 iE

16 21E

11 37E 18 12E 3046E I5 5IE 79 16W

7 16E

1 28E

2 53E 4448E

14 15E

3 40W 825W

95 10W

7650W

9 9W 21 23E

6 12W 139 45E 121 26E

78 3E

31 21E 82 25W 88 22E

114 10E

158 4W

7249E

72 52 E

6526W

120 59E

77 28E

106 49E

39 18E

57 33E

43 11W

70 42W

144 58E

172 37E

Absolute Values of Elements.

Year.

906 906 906

908 909

903 909 909

905 907 909 909 909 908 909 908 909 907 909 898 906 909 899 908 906 899 905 907

905 906 901 908 906

906 900 908 908 901 906 907 909

905 907 908 906 905 909 906 904 907 906

903 908 906 906 901 903

D.

1 4-2E 30 3-3E

10 31 -oE

9 43-3W 17 28-6W

11 IO-2W

11 46-8W 9 io-6W

1 58-iE 13 ig-oW 20 50-3W

16 io-8W

15 47 -6W

13 367W

17 48-4W 8 20-9W

5 35-iW

16 27-4W

14 32-9W

8 24-iW

9 59′ 5W

6 43-gW

4 36-7W 8 43-2W

5 45-3W

12 4-oW

13 56-3W

13 4‘4W

2 4I-6E 8 40-3W

15 35-6W

16 46-2W

8 30-iE

5 22-oW

17 i8-oW 4 52-9W

15 25-6W 4 36-iW 2 32 oW 2 3 8 3 E 2 49-2W 2 25-oE 1 9-gE o 3-9E

9 217E

14-oE

1 o- 3 E 1 33-2W o 5i- 4 E o 40- 7W 54-iE

7 35-2W 9 I4-3W

8 55-3W

14 187E 8 26-7E

16 I8-4E

70 36-6N 74 4I-7N 70 49-5N

6845N 68 42-8N

67 23-5N

66 20-oN 70 25-oN 66 49-9N

68 15-iN 66 597N 66 53-9N 66 i-6N

66 30-6N

64 18N

65 34-5N 64 43-9N

63 io-oN

62 I8-2N 60 6-8N 74 35-6N 60 ii-7N 60 49- 1 N

56 2-8N

56 I3-5N

58 57-3N 68 45- 1 N

70 27- 3 N

57 54-8N 52 117N 54 48-4N 49 o-oN 45 35-3N 43 36- 1 N 40 40-4N

52 57-4N

30 30-2N

31 2-5N 40 i-8N 21 58-5N 23 29-oN 49 47-7N

16 0-2N

3 27-2N 30 48-5S

53 44-9S 13 57- iS 30 H-8S

67 25-oS 67 42-3S

H.

•16528 •15502 •17664

•17406 •17424 •18126 •18129 •18834 •2001 1 ■18559 •17877 •18506 •18526 •19061 •18802

•19727

•20657 •21094 ■21869 •22207 •16397 •22390 •22025

•25451

22946 21807

20035 23516 26197 24829

29954 33040

33324 30031

30531 37288

37047 29220 37382

36845 28927 38215

37431 36708

23415 24772

23305 22657

V.

west lasting for about sixty years. Further west the period shortens. At Pueblo (Colorado) it is about forty years, at Salt Lake under thirty years, at Prescott (Arizona) about twenty years. Considering how fast the area throughout which the secular change is easterly has extended to the east since 1885, one would be tempted to infer that at no distant date it will include the whole of the United States. In the extreme north-east, however, the movement of the needle to the west, which had slackened perceptibly after i860 or 1870, is once more accelerating. Thus the auspices do not all point one way, and the future is as uncertain as it is interesting.

§ 12. Table VII. gives particulars of the secular change of hori- zontal force and northerly inclination at London. Prior to the middle of the 19th century information as to the value of H is of uncertain value. The earlier inclination data 14 are due to Norman, Gilbert, Bond, Graham, Heberden and Gilpin. The data from 1857 onwards, both for H and I, refer to Kew. " London " is rather a vague term, but the differences between the values of H and I at Kew and Greenwich — in the extreme west and east — are almost nil . For some time after its discovery by Robert Norman inclination at London increased. The earlier observations are not

46963 56646 50796

44759 44722

43527

42971 56250 43368 44812 43588 43432 42867 43266

•41792

•40835

•41660 •38640 •59502 •39087 •39439

•37799

38120 56081

56436 37484 33613 35206

34459 33726 31736 25804 40452 21967 22292

24545 15084 16008 34224 10960 02259 21889

31932 06164

56024 55259

Secular change (mean per annum).

Interval

in years.

5 5 5 5 5 5 5 4 5 5 3 5 5

5 5

5 4

5 7 7 5

5 4

D.

-4-5

-3-o

-4-5

-5-9

-5 +3

-4

-4 -5 -5

-4

— 1

-5

-4

+ 1 +0 -5

+4 + 1

— o

+2 + 1 +7 +0

+4 +2

— o

+9 +6

I.

+0-1

-1-6

+ 1-7

+o-i

+2-0

-0-6

— 1-2

— I-I

-o-7 -o-8

-1-4

-1-2

-1-7 -1-3

-0-6 +0-9

-i-5

+ 17

-i-5

-2-9

+ 1-8

+ 1-2

-2-8

-i-3

+5-5

+ i-2

+3-4 -1-8 -3-2 +7-2 +6-8 +6-8 -3-9 +5-5 -7-7

+2-9 -6-8 +9-9

H.

- 6

+ 18 -23

+ 6

- 7

- 9

-24 + 2

+ 1

+ 4

— 10

- 4 -23

+ 2

-26

+ 17 -36

-38

+26

+30 -26

— 6

+21

+43 -19

— 11

— 10

-49 +47 + 16

— 2

-53 -42

sufficient to admit of the date of the maximum inclination or its absolute value being determined with precision. Probably the date was near 1723. This view is supported by the fact that at Paris the inclination fell from 72 15′ in 1754 to 71 ° 48′ in 1780. The

Table III. — Declination at London.

Date.

Declination.

Date.

Declination.

Date.

Decli

nation.

1580

11

/

I5E

1773

21

9W

i860

21

38- 9 W

1622

6

1787

23

19

1865

20

58-7

1634

4

6

1795

23

57

1870

20

18-3

1657

1802

24

6

1875

19

35-6

1665

1

22W

1805

24

8

1880

18

52-1

1672

2

30

1817

24

36

1885

18

19-2

1692

6

1818

24

38

1890

17

50-6

1723

14

17

1819

24

36

1895

17

16-8

1748

17

40

1820

24

34

1900 1905

16 16

52-7 32-9

earlier observations in London were probably of no very high accuracy, and the rates of secular change deducible from them are correspondingly uncertain. It is not improbable that the average annual change o'-8 derived from the thirteen years 1 773-1 786 is too small, and the value 6'2 derived from the fifteen years 1786 1801 too large. There is, however, other evidence of unusually

Table IV. — Declination at Kolaba (Bombay).

Year.

Declina- tion East.

Change since previous year.

Year.

Declina- tion East.

Change since previous year.

•1876

1877 1878 1879 1880

/ it

55 58

56 39

57 6 57 30 57 9

037 E 41 E 27 E 24 E 21 W

1881 1882 1883 1884 1885

O / H

57 12 5 6 50

57 2 55 39 55 3

3 E 22 W

12 E

1 23 W 036 W

rapid secular change of inclination towards the end of the 1 8th century in western Europe; for observations in Paris show a fall of 56′ between 1780 and 1791, and of 90′ between 1791 and 1806. Between 1801 and 1901 inclination in London diminished by 3° 26’-5, or on the average by 2’-l per annum, while between 1857 and 1900 H increased on the average by 227 a year. These values differ but little from the secular changes given in Table I. as applying at Kew for the epoch Jan. 1, 1901. Since the beginning, however, of the 20th century a notable change has set in, which seems shared by the whole of western Europe. This is shown in a striking fashion by contrasting the data from European stations in Tables I. and II. There are fifteen of these stations which give secular change data for H in both tables, while thirteen give secular data for I. The mean values of the secular changes derived from these stations are as follows : —

I H

From Table I. — 2’-35 +21-07

From Table II. — I-I2 +1-67

The difference in epoch between the two sets of results is only about 5 years, and yet in that short time the mean rate of annual increase in H fell to a thirteenth of its original value. During 1908- 1909 H diminished throughout all Europe except in the extreme west. Whether we have to do with merely a temporary phase, or whether a general and persistent diminution in the value of H is about to set in over Europe it is yet hardly possible to say.

§ 13. It is often convenient to obtain a formula to express the mean annual change of an element during a given period throughout an area of some size. The usual method is to assume that the change at a place whose latitude is / and longitude X is given by

an expression of the type c + a(l— l a)--b(\ — X), where a, b, c are constants, l and X denoting some fixed latitude and longitude which it is convenient to take as point of departure. Supposing observational data available from a series of stations throughout the area, a, b and c can be determined by least squares.' As an 'example, we may take the following slightly modified formula given by Ad. Schmidt 1S as applicable to Northern Europe for the period 1890 to 1900. AD, Al and AH represent the mean annual changes during this period in westerly declination, in inclination and in horizontal force : —

AD = -5-24-o-o7i(/-5o) + o-o33(X-io), Al = — i-58 + o-oio(/ — 5o) + o-036(X — 10), AH = +23-5-0-59 (/-5o)-o-35 (X-10).

Longitude X is here counted positive to the east. The central position assumed here (lat. 50 , long. 10° E.) falls in the north of

Table V. — Declination at St Helena and Cape of Good Hope.

St Helena.

Cape of Good Hope.

Date.

Declination.

Date.

Declination.

1610

/

7 13 E

1605

/

30 E

1677

4 °,,,

1609

12 W

1691

1 W

1675

8 14

1724

7 3°

1691

11

1775

12 18

1775

21 14

1789

15 30

1792

24 31

1796

15 48

1818

26 31

1806

17 18

1839

29 9

1839

22 17

1842

29 6

1840

22 53

1846

29 9

1846

23 11

1850

29 19

1890

23 57

1857

29 34

1874

30 4

1890

29 32

1903

28 44

Bavaria. In the case of the horizontal force unity represents 17. Schmidt found the above formulae to give results in very close agreement with the data at the eight stations which he had employed in determining the constants. These stations ranged from Pavlovsk to Perpignan, and from Stonyhurst to Ekaterin- burg in Siberia. Formulae involving the second as well as the first powers of l—l B and X — X have also been used, e.g., by A. Tanakadate in the Magnetic Survey of Japan.

Table VI. — Secular Change of Declination in the United States (+ to the West).

Place.

Epoch

1760

70

80

90

1800

20

30

40

50

60

70

80

90

I900

50

Eastport, Maine .

Boston, Mass. .

Albany, New York.

Philadelphia, Penn.

Baltimore, Maryland .

Richmond, Virginia

Columbia, S. Carolina .

Macon, Georgia

Tampa, Florida

Marquette, Michigan .

Columbus, Ohio . _

Bloomington, Illinois .

Lexington, Kentucky .

Chattanooga, Tennessee

Little Rock, Arkansas

Montgomery, Alabama .Alexandria, Louisiana

“Northome, Minnesota

Jamestown, N. Dakota Des Moines, Iowa. Douglas, Wyoming Emporia, Kansas . Pueblo, Colorado . Okmulgee, Oklahoma . Santa Rosa, New Mexico San Antonio, Texas Seattle, Washington Wilson Creek, Washing

ton …. Detroit, Oregon Salt Lake, Utah . Prescott, Arizona . San Jose\ California Los Angeles, „

1-2

-2-7 -4-2 -4-6

-3-9 -3-6

-3-7 -3-7 -3-0

-3-6

o-o

-1-9

-3.6 -4-2 -3-4 -3-2 -3-4 -3-6

-2-5

-3-5

+ 1-2

— 1-0

-2-7 -3-5 -2-7

-2-5 -2-9 -3-2

-2-0

-3-1

+2-1

o-o -i-6

-2-3

— 2-0

-1-8

— 2-2

-2-5

— I-I

+3-2

+I-I

-o-6

-i-3 -o-9 -o-9

-i-3 -i-8

-0-4

-3-3

-2-6

-3-4

+4-0 + 1-9

+o-6

+0-1

o-o

0-0

-o-5

-0-9

-r-o-4

-09 -2-4 -09

-o-9

-2-3

-i-5

-2-1

+4-5 +2-7

-t-i-6

+ 1-3

+o-9

+0-9 +0-5

o-o

+I-I

0-0

-i-5 o-o o-o

-i-5 -o-8

-1-6

-3-5

-29 -3-4

-37

3

-2-9 -3-5

-3-7

-3-9

+4‘9 +3-5 +2-7 +2-5

+2-0

+ 1-8

+ i-3 -r-o-9

+2-0

o-o

+0-9

-o-4

+0-9 +0-9

-o-9 4-o-i -o-8

-1-7

-i-5

-3-5

+5″ +4- +3- +3-. +2-

+2-

+2-

hi

+2-,

+ I-

+2-

+0: + 1- + 1- +0- +0-,

4-0-

— 0-1

-o-6

— i-i

-3-3

-3-9 -37

-2-9 -2-7

-3-2 1 -3-Q

-2-5

-2-7

-fo-6

•0

+.V<

•2

+4-‘

•6

+4”<

•4

+4-.

•7

+.V<

■5

+.V

•2

+2-(

•8

+2-

•5

+ .V

•4

+2-

■0

+2-

•4

+ 1-

•8

+2-

•8

+2-

)-l

-l-o-

•8

+ i-

)-i

+o-

)-6

+0-

-o-5

-3-0

-3-4

-2-3

-2-1

+4-5 +4-0 +4-6 +4-2 +3-9 +3‘6 +3-4 +3‘2

+ 3‘2

+37 +3-4 +2-4 +3-2 +3-2 + 1-7

+ 2-2

+ i-6

+ i-7

+ 1-0

+i-5 -o-8 +o-6

-0-3 4-0-9

-o-4

-0-5

-2-6

+3-0 +3‘3 +3-9 +4-6 +4-0

+3‘9 +3-8 +3-6 +3-5 +4-7 +3-6

+ 2-8

+3-6 +3-6

+ 2-0 + 2-8 + 2-2 + 2-8 + 1-9 + 2-5 0-0

-r-i-6 -r-o-4

+ i-5

+0-4

+ I-I

— 2-1

+ 2-1

+3-i

+47 +4-4 +3-9 +3-8 +3-8 +3-9 +37 +5-1 +3-7 +4-2 +3-8
+4-0 +3‘6 +3-8 +3-6 +4-2

+3’i

+3-8

+ 1-2

+2-7

+ i‘5

+2-7

+ i-4

+ 1-8

-i-3

2-1

-i-5

-0-4

— 1-0

2-9

-2-5

-i-8

-o-8

I-I

-o-4

+ 1-0

+ 1-0

1-4

-o-7

-r-o-4

4-0-4

2-0

-i-5

-0-8

-0-4

1-6

— i-i

-o-9

-0-3

+ 1-0

+3-o

+2-3 +3-4 +3-6 +3-7 +3-8 +3-5

+ 2-8

+4-9 +3-9 +3-9 +3-8 +3‘5 +3-7 +3-9 +3-3 +4-4 +4-8 +4-5
+2-3 +3-8 +3-1 +3-9

+ 2-6

+2-7

-i-9

+ 1-8 +3-2 +3-4 +3-5 +3-5 +3-4 +3-6

+3-i

+2-9 +3-8 4-4-0 +2-9 +3-4

+3-i

+2-3

+ 2-6

-i-2-0

+3-5

-I-I-9

+2-7 +0-5

+ i-7 +o-7

4-1-4 4-0-4 4-0-9

— 2-0

-i-6

-1-8

-o-8

— 1-2

-i-9

-1-6

4-2-4 +3-4 +3-6 +3-4 +3-2 +3-2 4-1-8

4-1-2

+ 1-6 42-4 4-2-4 4-1-0 4-1-8 4-1-6

— 1-2

+0-2

-i-4

0-0

— 2-2

-0-6

-1-6

-i-8

2-2

2-4 -2-4 -2-4 -3-2

-3-2 -3.8

-2-8

-3-2 -3.8 -3-6

Formulae are also wanted to show how the value of an element, or the rate of change of an element, at a particular place has varied throughout a long period. For comparatively short periods it is best to use formulae of the type K = a + bt + cP, where E denotes the value of an element t years subsequent to some convenient epoch; a, b, c are constants to be determined from the observational data. For longer periods formulae of the type E = o + fc sin (mt + n), where a, b, m and n are constants, have been used by Schott 16 and others with considerable success. The following examples, due to G. W. Littlehales, n for the Cape of Good Hope, will suffice for illustration :

Declination (West) = i4°-63 + i5°-oo sin {o-6i(«-l85o) + 77°-8)
Inclination (South) = 49 °- 11 4- 8°-75 sin (o-8 (-i85o) + 34°-3).*

Here / denotes the date. It is perhaps hardly necessary to point out that the extension of any of these empirical formulae — whether to places outside the surveyed area, or to times not included in the period of observation — is fraught with danger, which increases rapidly the further the extrapolation is pushed.

Table V.II. — Inclination (northerly) and Horizontal Force

described in the clockwise direction. This, according to Bauer's M own investigation, is the normal mode of description. Schott and Littlehales have found, however, a considerable number of cases where it is difficult to say whether the motion is clockwise or not, while in some stations on both the east and west shores of the Pacific it was clearly anti-clockwise. Fritsche 19 dealing with the secular changes from 1600 to 1885 — as given by his calculated values of the magnetic elements — at 204 points of intersection of equidistant lines of latitude and longitude, found only sixty-three cases in which the motion was unmistakably clockwise, while in twenty-one cases

it was clearly the opposite.

§ 14. All the magnetic elements at any ordinary station show a regular variation in the solar day. To separate this from the irregular changes, means of the hourly readings must be formed making use of a number of days. The amplitude of the diurnal change usually varies considerably with the rj "ff. season of the year. Thus a diurnal inequality derived varaloas – from all the days of the year combined, or from a smaller number of days selected equally from all the months of the

at London.

Date.

I.

Date.

I.

Date.

I.

H.

Date.

I.

H.

1576

/

71 50

1801

/ 70 36-0

I8.S7

/ 68 24-9

•17474

1891

O /

67 33-2

■*18193*

1600

72

1821

7o 3-4

i860

69 19-8

•*i755o*

1895

67 25-4

•*18278*

1676

73 30

1830

69 38-0

1865

68 8-7

■*17662*

1900

67 n-8

•*18428*

1723

74 42

1838

69 17-3

1870

67 58-6

•17791

1905

67 3-8

•18510

1773

72 19

1854

68 31-1

1874

67 50-0

•17903

1908

67 0-9

•18515

1786

72 9

Bauer has employed a convenient graphical method of illustrating secular change. Radii are drawn from the centre of a sphere

parallel to the direction of the freely dipping needle, and are produced to

in- ° e tersect the tangent plane drawn at the point which answers to the mean posi- tion of the needle during the epoch under consider- ation. The curve formed by the points of intersec- tion shows the character of the secular change. Fig. 5 (slightly modified from Nature, vol. 57, p. 181) applies to London. The curve is being

Fig. 5.

year, can give only the average effect through- out the year. Also unless the hours of maxima and minima at a given station are but slightly variable with the season, the result obtained by combining data from all the months of the year may be a hybrid which does not very closely resemble the phenomena in the majority of individual months. This remark applies in particular to the declination at places within the tropics. One consequence is obviously to make the range of a diurnal inequality which answers to the year as a whole less than the arithmetic mean of the twelve ranges obtained for the constituent months. At stations in tem- perate latitudes, whilst minor differences of type do exist between the diurnal inequalities for different months of the year, the difference is mainly one of amplitude, and the mean diurnal inequality from all the months of the year gives a very fair idea of the nature of the phenomena in any individual month.

Tables VIII. to XI. give mean diurnal inequalities derived from' all the months of the year combined, the figures representing the algebraic excess of the hourly value over the mean for the twenty- four hours. The 4- sign denotes in Table VIII. that the north end of the needle is to the west of its mean position for the day; in Tables IX. to XL it denotes that the element — the dip being the north or south as indicated — is numerically in excess of the twenty- four hour mean. The letter " a " denotes that all days have been included except, as a rule, those characterized by specially large disturbances. The letter " q " denotes that the results are derived from a limited number of days selected as being specially quiet,

Table VIII. — Diurnal Inequality of Declination, mean from whole year (+ to West).

Station.

Jan Mayen.

St Petersburg and Pavlovsk.

Greenwich.

Kew.

Pare St Maur.

Tiflis.

Kolaba.

Batavia.

Vlauritius.

South Vic- toria Land.

Latitude.

71 o'N.

59 41′ N.

5i°28'N.

5i°28'N.

48 49′ N.

41 43′ N.

18° 54′ N.

6° n'S.

20° 6'S.

77°5i'S.

Longitude.

8° 28′ W.

30 29′ E.

0° 0'.

o° 19'W.

2° 29′ E.

44° 48'E.

72°49'E.

106° 49'E.

57°33'E.

166 45′ E.

Period.

1882-1883.

1873-1885.

1 890- 1 900.

1 890- 1 900.

1 883-1897.

1888-1898.

1 894-1901.

1 883-1894.

1876-1890.

1902-1903.

a.

q-

a.

q-

a.

a.

q-

a.

a.

q-

a.

a.

a.

q-

Hour.

‘

‘

/

1

/

‘

/

/

/

/

1

i

‘

/

1

-6-6

-4-2

-i-3

-0-7

-1-4

-1-5

-0-9

-1-4

-0-7

— 0-2

4-0-1

4-o-i

4-2-0

4-0-9

2

-io-5

-6-4

— 1-2

-0-8

-1-3

-i-4

-o-9

— 1-2

-0-6

— O-I

— O-I

+0-1

— 2-1

-1-8

3

-15-2

-7-8

— 1-2

— 1-0

-1-3

-i-5

— I-O

— 1-2

-0-6

— O-I

— O-I

4-0-1

-5-2

-4-5

4

— 16-9

-8-4

-1-4

-1-3

-1-4

-1-7

-i-3

— 1-2

-o-5

— O-I

o-o

4-o-2

-9-4

-6-8

5

-170

-8-1

-1-7

-1-8

-1-7

— 2-1

-i-8

-1-6

-0-7

— O-I

0-0

+0-3

— 12-2

-9-0

6

-13-7

-7-0

-1-9

-2-3

— 2-1

-2-4

-2-3

-1-9

— 1-2

-o-6

4-0-1

+0-4

-15-3

-U-7

7

-9‘3

-5-i

— 2-2

-2-8

-2-4

-2-7

-2-8

-2-4

-1-9

— I-O

4-0-5

+o-6

-17-2

-15-0

8

-6-8

-3-2

-25

-3-2

-2-5

-2-8

-31

-2-7

-2-4

-1-2

4-1-3

+ i-i

-21-5

-17-3

9

-3-7.

-o-6

-2-3

-3-0

-1-9

— 2-1

-2-5

-2-3 •

-2-3

-0-7

+ 1-7

+ I-8

-23-5

-181

10

-2-4

+ 2-1

— 1-0

-i-7

— 0-2

-o-3

-o-7

-o-5

-0-9

o-o

+ 1-5

4-1-9

— 21-2

-15-8

11

-0-5

+4‘6

4-1-0

+0-4

+ 2-1

+ 2-2

+ 1-7

4-2-0

4-1-0

4-0-9

+0-9

+ 1-3

-15-3

-9-2

Noon

+ 2-5

+6-5

+.VI

+2-7

+4-2

+4-3

+3-9

+4-2

+2-6

4-1-4

4-0-1

o-o

-9-8

-4.9

1

+3-7

+7-3

+4-6

+4-3

+5-1

+5-3

+4-8

4-5-3

+3-3

+ I-2

-0-6

— i-i

-3-2

— O-I

2

+6-4

+7”i

+4-9

4-4-S

+4-7 ■

+4-9.

+4-4

+4-9

+3-1

+o-6

— i-i

— 2-0

+3-8

+5-9

3

+7-4

+.V9

+4-1

+3-6

+3-6

+37

+3-1

+3-7

4-2-3

+0-1

-1-3

-2-3

4-n-i

+9-5

4

+8-5

+4-3

+2-7

+2-3

+2-2

+2-4

+ 1-8

+2-3

+ 1-3

— 0-2

— 1-2

-1-8

+ i6-6

4-12-9

5

4-10-6

+3-o

+ i-5

+ i-3

+ 1-1

+ 1-2

+0-7

+ I-I

4-o-6

— 0-1

-0-9

-0-9

+ 19-9

+ 14-6

6

+ 14-2

+ 2-3

+o-6

+o-7

+0-3

+0-4

+0-2

+0-2

+0-2

o-o

-0-6

— O-I

4-22-0

+ 15-5

7

+ 15-2

+ 2-2

0-0

+0-4

-o-3

— 0-2

— O-I

-o-4

+o-i

+o-i

-o-4

4-0-1

+22-0

+ 1S-9

8

415-8

+ 2-6

-o-4

-)-0-2

-o-9

-o-6

-o-3

-o-9

— 0-1

+0-2

— 0-2

+0-1

4-19-9

+ 14-6

9

+ 13-2

+2-6

— 1-0

o-o

— 1-2-

— I-O

-0-5

-i-3

-0-4

+o- 1

O-O

4-o-i

+ i6-o

4-10-6

10

+ 7-4

+2-0

-1-4

— 0-2

-i-5

-i-3

-0-7

-i-5

-o-6

o-o

+0-1

4-o-i

+ II-6

+7-2

11

+ I-I

+o-5

-1-6

-o-4

-1-6

-1-4

-o-8

-1-6

-0-7

o-o

+0-1

+0-1

+7-6

+4-2

12

-3-6

-1-8

-1-5

-0-6

-1-6

-i-5

-0-9

-1-6

-o-8

— 0-1

+ 0-1

+0-1

+3-3

+ 1-9

J Range

32-8

15-7

7-4 | 7-7

7-6

8-1

7.9

8-0

5-7

2-6

3-0

4-2

| 45-5

34-0

MAGNETISM, TERRESTRIAL

3 6 3

Table IX-

-Diurnal Inequality

of Horizontal Force, mean from whole year (Unit

i7 = -ooooi C.G.S.)

Station.

JanMayen.

St Petersburg and Pavlovsk.

Greenwich.

Kew!

Pare St Maur.

Tiflis.

Kolaba.

Batavia.

Mauritius.

S. Victoria Land.

Period.

1882-1883.

1 873-1885.

1 890- 1 900.

1890-1900.

1 883-1 897.

1888-1898.

1894-1901.

1 883-1 894.

1 883-1 890.

1902-1003.

a.

q-

a.

q-

a.

q-

a.

a.

q-

a.

a.

a.

Hour.

I

-57

—22

+ 4

+ 5

+ 4

+ 4

+ 5

+ 3

— 10

— 11

- 3

— 12

2

-64

-24

+ 4

+ 4

+ 3

+ 4

+ 5

+ 3

- 9

— IO

— 1

-13

3

-74

-25

+ 4

+ 4

+ 3

+ 4

+ 5

+ 3

- 9

- 8

+ 1

-14

4

-69

-24

+ 4

+ 4

+ 3

+ 4

+ 5

+ 4

- 9

- 7

+ 2

-15

5

-60

—22

+ 5

+ 4

+ 3

+ 4

+ 6

+ 4

- 9

- 5

+ 3

-15

6

-37

-19

+ 4

+ 4

+ 1

+ 2

+ 4

+ 4

- 7

— 1

+ 4

— 12

7

-15

-15

+ 2

+ 2

- 3

— 1

+ 1

+ 2

— 1

+ 5

+ 7

- 9

8

— 1

-13

- 3

- 4

- 9

- 7

- 5

- 3

+ 8

+ 14

+ 9

- 7

9

+ 8

— 12

— 10

— 10

-16

-13

— 12

- 8

+ 19

+24

+ 9

— 3

IO

+ 17

— 12

-16

-16

-20

-18

-17

-10

+26

+31

+ 9

+ 3

ii

+32

— 10

-19

-20

-19

-18

-16

- 7

+30

+35

+ 9

+ 7

Noon

+49

- 4

-17

-18

-13

— 12

— 12

— 1

+26

+3i

+ 8

+ 12

I

+65

+ 8

— 12

-13

- 7

- 7

- 7

+ 4

+ 19

+22

+ 7

+ 18

2

+7»

+22

- 6

- 6

— 1

— 2

- 4

+ s

+ 10

+ 10

+ 2

+20

3

+89

+37

+ 2

+ 1

— 1

+ 3

+ 2

— 1

— 2

+ 19

4

+83

+43

+ 3

+ 3

+ 5

+ 3

— 1

- 3

- 9

- 6

+ 18

5

+68

+49

+ 5

+ 5

+ 7

+ 5

+ 2

- 4

- 7

-!3

- 7

+ 15

6

+37

+43

+ 6

+ 6

+ 9

+ 7

+ 4

- 6

- 8

-14

- 7

+ 11

7

+ 13

+30

+ 7

+ 7

+10

+ 8

+ 6

- 4

- 9

-15

- 7

+ 5

8

— 11

+ 15

‘+ 8

+ 8

+ 10

+ 8

+ 7

— 1

— IO

-16

- 8

+

9

-33

+ 1

+ 9

+ 9

+ 8

+ 7

+ 7

+ 1

-11

-16

- 8

~ 4

IO

-*>

— 10

+ 8

+ 9

+ 7

+ 6

+ 6

+ 2

— 11

-16

- 8

- 7

ii

-40

-16

+ 7

+ 8

+ 6

+ 6

+ 6

+ 3

— IO

-15

- 7

- 9

12

-51

— 20

+ 6

+ 6

+ 5

+ 5

+ 6

+ 3

— IO

-13

- 5

— 11

Range

163

74

28

29

30

26

24

15

41

5i

17

35

i.e. free from disturbance. In all cases the aperiodic or non-cyclic element — indicated by a difference between the values found for the first and second midnights of the day — has been eliminated in the usual way, i.e. by treating it as accumulating at a uniform rate throughout the twenty-four hours. The years from which the data were derived are indicated. The algebraically greatest and least of the hourly values are printed in heavy type; the range thence derived is given at the foot of the tables.

When comparing results from different stations, it must be remembered that the disturbing forces required to cause a change of 1′ in declination and in dip vary directly, the former as the horizontal force, the latter as the total force. Near a magnetic pole the horizontal force is relatively very small, and this accounts,

at least partly, for the difference between the declination phenomena et Jan Mayen and South Victoria Land on the one hand and at Kolaba, Batavia and Mauritius on the other. There is, however, another cause, already alluded to, viz. the variability in the type of the diurnalinequality in tropical stations. With a view to illustrating this point Table XII. gives diurnal inequalities of declination for June and December for a number of stations lying between 45° N. and 45° S. latitude. Some of the results are

represented graphically in fig. 6, plus ordinates representing westerly deflection. At the northmbst station, Toronto, the difference between the two months is mainly a matter of amplitude, the range being much larger at midsummer than at midwinter. The conspicuous phenomenon at both seasons is the rapid swing to the west from 8 or a.m. to

Table X.-

—Diurnal Inequality of Vertical Force,

mean from whole year (U

nit 17).

St Petersburg

Pare St

Station.

JanMayen.

and Pavlovsk.

Greenwich.

Kew.

Maur.

Tiflis.

Kolaba.

Batavia.

Mauritius.

toria Land.

Period.

1882-1883.

1873-1885.

1 890-1900.

1891-1900.

1883-1897.

1888-1898.

1894-1901.

1 883-1 894.

1884-1890.

1902-1903.

a.

q-

a.

q-

a.

q-

a.

a.

q-

a.

a.

*< *.*

Hour

1

+65

+ 3

- 7

— 1

- 3

+ 1

+ 2

+ 4

+ 7

+ 2

+ 13

2

+65

+ 2

- 7

— 1

- 4

+ 1

+ 2

+ 4

+ 5

+ 2

+ 12

3

+56

— 1

- 7

— 1

- 4

— 1

+ 1

+ 3

+ 4

+ 2

+ 10

4

+37

- 5

- 6

- 3

+ 1

+ 3

+ 3

+ 2

+ 8

5

+ 16

- 7

- 5

— 2

+ 1

+ 2

+ 5

+ 2

+ 2

+ 3

6

- 7

- 8

- 4

— 1

+ 1

+ 1

+ 3

+ 7

+ 1

+ 2

7

-17

- 6

- 3

+ 1

+ 3

+ 6

+ 3

8

-14

- 4

— 2

— 1

+ 3

- 3

+ 4

— 2

9

- 9

- 3

— 1

- 3

- 4

- 4

— 1

- 8

— 11

+ 5

- 6

10

- 6

+ 5

— 2

— 2

- 6

- 8

- 8

- 7

-14

— 20

+ 3

-13

11

- 6

+ 10

- 3

- 4

- 9

— 11

— 12

— 11

-15

-26

-17

Noon

— 10

+ 16

- 3

- 5

-10

-11

-12

-11

— IO

-27

— 4

-20

1

-13

+21

— 1

- 4

- 6

- 8

- 9

- 9

- 3

— 21

- 7

— 20

2

-24

+23

+ 2

— 1

- 3

- 3

- 5

+ 1

-13

- 9

-16

3

-31

+20

+ 8

+ 2

+ 5

+ 2

+ 2

— 1

+ 4

- 4

- 8

— 12

4

-40

+ 13

+ 9

+ 3

+ 8

+ 5

+ 6

+ 1

+ 3

+ 4

- 5

- 6

5

-48

+ 2

+10

+ 3

+ 9

+ 6

+ 7

+ 3

+ 10

- 3

— 1

6

-53

- 9

+ 10

+ 3

+10

+ 7

+ 8

+ 4

+ 13

+ 3

7

-47

-18

+ 9

+ 3

+ 9

+ 6

+ 7

+ 3

+ 14

+ 6

8

-36

-20

+ 8

+ 3

+ 7

+ 5

+ 6

+ 3

+ 1

+ 14

+ 1

+ 9

9

- 7

-19

+ 6

+ 2

+ 5

■ *+ 5*

+ 5

+ 3

+ 2

+ 14

+ 2

+ 11

IO

+ 18

-13

+ 3

+ 2

+ 3

+ 4

+ 3

+ 3

+ 3

+ 13

+ 2

+ 12

11

+42

- 5

— 2

+ 3

+ 2

+ 3

+ 3

+ 11

+ 2

+ 12

12

+54

- 5

— 1

— 2

+ 2

+ I

+ 2

+ 3

+ 9

+ 2

+ 13

Range

118

43

17

8

20

18

20

15

22

41

14

33 .

3 6 4

MAGNETISM, TERRESTRIAL

Table XL—

Diurnal Inequality of Inclination mean from whole year.

Station.

JanMayen.

St. Petersburg and Pavlovsk.

Greenwich.

Kew.

Pare St Maur.

Tiflis.

Kolaba.

Batavia.

Mauritius.

South Vic- toria Land.

End Dipping.

North.

North.

North.

North.

North.

North.

North.

South.

South.

South.

Period.

1882-1883.

1873-1885.

1 890-1 900.

1891-1900.

1883-1897.

1888-1898.

1 894-1901.

1883-1894.

1 884-1890.

1 902-1903.

a.

q.

a.

q-

a.

q-

a.

a.

q-

a.

a.

a. 1

Hour

/

‘

/

t

/

/

1

/

/

/

‘

t

I

+4-6

+ 1-5

-0-5

-o-3

-0-4

-o-3

-o-3

— 0-1

4-0-6

-fo-9

+0-3

4-0-6

2

+.S-o

+ 1-6

-o-5

-0-3

-o-3

— 0-2

-o-3.

— 0-1

4-0-6

4-0-8

+0-2

4-0-7

3

+5-6

+ 1-6

-o-s

-o-3

-o-3

— 0-2

-o-3

— 0-1

+o-5

4-0-6

0-0

-fo-7

4

+.VO

+ i-5

-o-4

-o-3

-o-3

— 0-2

-0-4

— 0-2

+0-5

+0-5

o-o

+0-7

5

+4-2

+ 1-4

-o-5

-o-3

— 0-2

— 0-2

•-o-4

— 0-2

+o-7

+0-3

— O-I

4-0-7

6

+2-4

+ 1-2

-o-4

-0-3

— O-I

— 0-1

-o-3

— O-I

4-0-8

4-0-1

— 0-2

+o-5

7

+0-7

+0-9

— 0-2

— O-I

+0-2

4-0-1

o-o

0-0

4-0-5

— 0-2

-o-3

4-0-4

8

— 0-1

+o-8

+o-i

+0-3

+0-6

+0-4

+0-4

+0-3

— 0-2

-o-8

-0-4

+o-3

9

-07

+o-8

+o-6

+0-6

+ l-o

+o-8

-fo-7

+0-5

— 1-2

-1-7

-o-4

+0-1

IO

— 1-2

+0-9

+ 1-0

+ i-o

+11

4-10

4-0-9

+o-3

-1-9

-2-7

-0-5

— 0-2

II

— 2-2

+o-8

+ 1-2

+ 1-2

+ 1-0

4-0-9

-fo-7

0-0

-21

-3-3

-o-6

-o-4

Noon

-3-4

+0-4

+ I-I

+ I-I

+0-6

+o-6

4-o-4

-o-5

-1-6

-3-i

-0-7

-o-7

i

-4-5

— 0-2

+07

4-0-7

+0-3

+0-2

+0-2

-0-6

-0-8

-2-4

-0-8

-o-9

2

-5-6

— 1-2

4-0-4

+0-4

+o-i

4-0-1

+0-2

-o-5

— 0-2

-i-3

-o-6

-10

3

-6-3

— 2-2

+0-2

4-0-1

0-0

0-0

+0-2

-o-3

+0-3

— 0-2

-0-3

— 1-0

4

-6-i

-2-9

00

— 0-1

— 0-1

— O-I

4-0-2

+0-1

+o-3

+o-7

4-0-1

-o-9

5

-5-i

-3-2

— O-I

-o-3

— 0-2

— 0-2

+0-1

-f-o-4

+0-2

+ i-3

4-0-4

-o-7

6

-3-i

-2-9

— 0-2

-0-3

-o-3

-o-3

o-o

4-OS

+0-2

+ i-5

+0-5

-o-5

7

-1-7

— 2-2

-o-3

-0-4

-o-4

-0-4

— 0-2

4-0-4

+0-3

+ i-6

+o-5

— 0-2

8

+0-3

-i-3

-o-3

-o-5

-0-4

-0-4

-0-3

+0-2

-fo-4

4-1-6

4-0-6

0-0

9

+2-0

-o-3

-o-4

-o-6

-0-4

-o-4

-o-3

+o-i

+0-5

4-1-6

4-0-6

+0-2

IO

+ 2-5

+o-,S

-o-5

-0-6

-o-4

-0-3

-o-3

0-0

4-0-6

+ i-5

4-0-6

+0-4

ii

+3-o

+ 1-0

-o-5

-o-6

-o-4

-o-3

-o-3

o-o

4-0-6

4-1-4

+o-5

+o-5

12

+4-0

+ 1-3

-o-5

-o-4

-0-4

-0-3

-o-3

— O-I

4-0-6

4-1-2

4-0-4

+o-6

Range

n-9

4-8

1-7

1-8

i-5

1-4

!-3

I-I

29

4-9

1-4

i-7

1 or 2 p.m. At the extreme southern station, Hobart — at nearly equal latitude — the rapid diurnal movement is to the east, and so in (he opposite direction to that in the northern hemisphere, but it again takes place at nearly the same hours in June (midwinter) as in December. If, however, we take a tropical station such as Trivandrum or Kolaba, the phenomena in June and December are widely different in type. At Trivandrum — situated near the magnetic equator in India — we have in June the conspicuous forenoon swing to the west seen at Toronto, occurring it is true slightly earlier in the day; but in December at the corresponding hours the needle is actually swinging to the east, just as it is doing at Hobart. In June the diurnal inequality of declination at tropical stations — whether to the north of the equator like Trivandrum, or to the south of it like Batavia — is on the whole of the general type characteristic of temperate regions in the northern*

hemisphere; whereas in December the inequality at these stations resembles that of temperate regions in the southern hemisphere. Comparing the

inequalities for June in Table XII. amongst them- selves, and those for December amongst themselves, one can trace a gradual transformation from the phenomena seen at Toronto to those seen at Hobart. At a tropical station the change from the June to the December type is probably in all cases more or less gradual, but at some stations the transition seems pretty rapid.

§ 15. In the case of the horizontal force there are, as Table IX. shows, two markedly different types of diurnal inequality. In the one type, exemplified by Pavlovsk or Greenwich, the force is below its mean value in the middle of the day; it has a principal minimum about 10 or 11 a.m., and morning and evening maxima, the latter usually the largest. In the other type, exemplified by Kolaba or Batavia, the horizontal force is above its mean in the middle of the

Table XII. — Diurnal Inequality of Declination (+ to West).

Station.

Toronto.

Kolaba.

Trivandrum.

Batavia.

St Helena.

Mauritius.

Cape.

Hobart.

Month.

June.

Dec.

June.

Dec.

June.

Dec.

June.

Dec.

June.

Dec.

June.

Dec.

June.

Dec.

June.

Dec.

Hour

r

/

/

‘

r

‘

/

t

/

/

/

/

‘

/

/

/

1

-o-4

— O-I

-o-3

0-0

-o-3

— O-I

40-1

4o-i

— o-i

-o-4

0-0

4o-i

-0-4

-0-7

4o-8

4i-i

2

— 0-2

40-4

-o-3

4o-i

-0-4

4o-i

— O-I

4o-i

— 0-2

— 0-1

— 0-2

+0-2

-o-5

-0-4

4o-3

4i-i

3

— 0-2

— 0-1

-o-3

4o-i

-o-4

4o-3

— 0-2

40-2

— 0-2

4o-i

— 0-2

4o-4

-0-7

— O-I

— O-I

4i-o

4

— 1-2

-o-4

-o-3

4o-3

-0-5

4o-5

-0-3

4o-3

-0-3

4o-3

— 0-2

4o-7

-0-6

4o-3

— O-I

4i-i

5

-2-9

-o-6

-o-7

40-4

-o-7

4o-7

-o-3

4o-5

-o-5

4o-6

-0-3

+ i-o

-o-7

+ i-o

O-O

4i-7

6

-5-2

-o-6

-1-6

+o-S

-i-6

4i-i

-o-5

4i-2

— 1-0

40-9

-0-4

4i-7

— 1-0

42-2

O-O

42-7

7

-6-2

-0-9

-2-2

40-7

-1-7

41-4

-11

42-0

-2-2

4i-9

— I-I

42-6

-1-6

43-3

— O-I

44-4

8

-6-o

— 1-2

— 2-1

-j-O-2

— i-i

4o-9

-o-4

42-3

-1-5

42-2

— 1-0

42-4

-o-8

43-6

4o-i

45-6

9

-4-4-

-1-8

— I-I

— O-I

— 0-2

4o-5

4o-5

42-0

-o-3

4i-3

40-2

42-0

4o-7

43-i

4o-6

45-6

10

-i-5

— i-i

0-0

— 0-2

4o-6

4o-3

4o-9

4i-3

4o-3

40-2

41-2

H-i-i

41-6

+ i-6

4i-2

43-6

11

42-1

4o-6

41-2

O-O

41-2

4o-i

410

4o-4

4o-5

— 1-0

41-4

0-0

+ i-5

4o-i

+ 1-0

4o-7

Noon

44-8

42-2

42-1

O-O

41-4

-o-4

40-7

-o-6

4o-3

-1-4

4i-o

-1-4

4o-8

— 1-0

— O-I

-2-6

1

46-i

43-2

42-0

— 0-2

4i-i

-o-8

4o-3

-1-4

4o-3

— 1-2

4o-i

— 2-2

4o-3

-1-8

-i-4

-5-i

2

461

43-2

4i-6

-o-3

4o-7

-0-9

— 0-2

-1-8

40-2

-o-4

-0-9

-2-5

-o-3

-1-9

— 2-2

-6-2

3

45-2

42-4

4o-9

-o-3

4o-3

-0-9

-o-7

-1-9

40-2

4o-4

-1-5

— 2-2

-03

-i-4

-2-4

-5-8

4

43-6

4i-S

4o-2

-0-3

4o-i

-o-8

-o-8

-1-6

4o-7

4o-6

-i-3

-1-6

4o-2

-o-8

-1-6

-4-8

5

+ i-8

4o-5

o-o

— 0-2

O-O

-o-4

-o-5

— 1-2

411

-fo-4

-o-3

— I-O

4o-5

-o-8

-0-7

-3-3

6

4o-7

— O-I

4o-i

— 0-2

40-2

-o-4

— O-I

-0-7

4i-o

4o-i

4o-5

-o-5

4o-5

-0-6

-0-4

-19

7

o-o

-o-8

4o-3

— 0-2

4o-. s

-o-4

4o-i

-o-6

4o-6

-o-4

4o-7

-0-3

4o-4

-o-8

O-O

— 1-0

8

o-o

— 1-2

4o-4

— 0-1

4o-5

-0-3

40-2

-0-5

4o-5

-0-7

4o-7

-o-3

4o-3

-o-9

4o- 5

-o-3

9

-o-5

-i-4

4o-3

— O-I

4o-4

— 0-2

40-4

-o-3

4o-4

-o-9

4o-6

— 0-2

40-2

-o-9

4i-i

o-o

10

-o-5

-1-7

4o-i

O-O

4o-2

— O-I

4o-4

— 0-1

4o-2

— 1-0

4o-4

— O-I

4o-i

— 1-0

4i-3

4o-6

11

-o-7

— i-i

— 0-1

— O-I

O-O

— O-I

4o-3

0-0

4o-i

-o-8

4o-3

O-O

o-o

— 1-0

4-1-3

4o-9

”

-o-6

-o-7

— 0-2

— O-I

— 0-2

— O-I

+0-2

4o-i

— O-I

-o-6

4o-i

4o-i

— 0-2

— 1-0

4i-i

41-2

1 Range

12-3

5-0

4-3

1-0

3-i 1 2-3

2-1

4-2

3-3

3-6

2-9

5-i

3-2

. 5:5

3-7

1 n-8

day, and has a maximum about n a.m. The second type may be regarded as the tropical type. At tropical stations, such as Kolaba, Batavia, Manila and St Helena, the type is practically the same in summer as in winter, and is the same whether the station is north or south of the equator. Similarly,

what we may call the temperate type is seen — with comparatively slight modifications — both in summer and winter at stations such as Greenwich or Pavlovsk. In winter, it is true, the pronounced daily minimum is a little later and the early morning maximum is relatively more important than in summer. There is not, as in the case of the declination, any essential difference between the phenomena at temperate stations in the northern and southern hemispheres.

.JUNE

DECEMBER

Midi 6 Noon 6 .Midi. Mult.. .6 Noon 6 Midt.

Fig. 6.

With diminishing latitude, there is a gradual transition from the temperate to the tropical type of horizontal force diurnal variation, and at stations whose latitude is under 45 there is a very appreciable variation in type with the season. The mean diurnal variation for the year at Tiflis in Table IX. really represents a struggle between the two types, in which on the whole the temperate type prevails. If we take the diurnal variations at Tiflis for midsummer and mid- winter, we find the former essentially of the temperate, the latter essentially of the tropical type. A similar conflict may be seen in the mean diurnal inequality for the year at the Cape of Good Hope, but there the tropical type on the whole predominates, and it prevails more at midwinter than at midsummer. Toronto and Hobart, though similar in latitude to Tiflis, show a closer approach to the temperate type. Still at both stations the hours during which the force is below its mean value tend to extend back towards midnight, especially at midsummer. The amplitude of the hori- zontal force range appears less at intermediate stations, such as

Tiflis, than at stations in either higher or lower latitudes. There is a very great difference in this respect between the north and \he south of India.

§ 16. In the case of the vertical force in higher temperate latitudes — at Pavlovsk for instance — the diurnal inequalities from " all " and from " quiet " days differ somewhat widely in amplitude and slightly even in type. In mean latitudes, e.g. at Tiflis, there is often a well marked double period in the mean diurnal inequality for the whole year; but even at Tiflis this is hardly, if at all, ap- parent in the winter months. In the summer months the double period is distinctly seen at Kew and Greenwich, though the evening maximum is always pre-eminent. Speaking generally, the time of the minimum, or principal minimum, varies much less with the season than

that of the maximum. At Kew, for instance, on quiet days the minimum falls between 11 a.m. and noon in almost all the months of the year, but the time of the maximum varies from about 4 p.m. in December to 7 p.m. in June. At Kolaba the time of the minimum is nearly independent of the season; but the changes from positive to negative in the forenoon and from negative to positive in the afternoon are some hours later in winter than in summer. At Batavia the diurnal inequality varies very little in type with the season, and there is little evidence of more than one maximum and minimum in the day. At Batavia, as at Kolaba, negative values occur near noon ; but it must be remembered that while at Kolaba and more northern stations vertical force urges the north pole of a magnet downwards, the reverse is true of Batavia, as the dip is southerly. At St Helena vertical force is below its mean value in the forenoon, but the change from — to + occurs at noon, or but little later, both in winter and summer. At the Cape of Good Hope the phenomena at midsummer are similar to those at Kolaba, the force being below its mean value from about 9 a.m. to 3 p.m. and above it throughout the rest of the day; but at mid- winter there is a conspicuous double period, the force being below its mean from I a.m. to 7 a.m. as well as from II a.m. to 3 p.m., and thus resembling the all-day annual results at Greenwich. At Hobart vertical force is below its mean value from 1 a.m. to 9 a.m. at midsummer, and from 4 a.m. to noon at midwinter; while the force is above its mean persistently throughout the afternoon both in summer and winter, there is at midwinter a well marked secondary minimum about 6 p.m., almost the same hour as that at which the maximum for the day is observed in summer.

§ 17. Variations of inclination are connected with those of hori- zontal and vertical force by the relation

SI =i sin 2IIV- 1 5V-H- 1 5Hj.

Thus in temperate latitudes where V is considerably in excess of H, whilst diurnal changes in V are usually less than those in H, it is the latter which chiefly dominate the diurnal changes in inclination. When the H influence prevails, I has its highest values at hours when H is least. This explains why the dip is above its mean value near midday at stations in Table XI. from Pavlovsk to Pare St Maur. Near the magnetic equator the vertical force has the greater influence. This alone would tend to make a minimum dip in the late forenoon, and this minimum is accentuated owing to the altered type of the horizontal force diurnal variation, whose maximum now coincides closely with the minimum in the vertical force. This accounts for the prominence of the minimum in the diurnal varia- tion of the inclination at Kolaba and Batavia, and the large ampli- tude of the range. Tiflis shows an intermediate type of diurnal variation; there is a minimum near noon, as in tropical stations, but inclination is also below its mean for some hours near

midnight. The type really varies at Tiflis according to the season of the year. In June— as in the mean equality from the whole year — there is a well marked double period; there is a principal minimum at 2 p.m. and a secondary one about 4 a.m.; a principal maximum about 9 a.m. and a secondary one about 6 p.m. In December, however, only a single period is recognizable, with a minimum about 8 a.m. and a maximum about 7 p.m. The type of diurnal inequality seen

Table XIII. — Range of the Diurnal Inequality of Declination.

Place.

Period.

Jan.

Feb.

March.

April.

May.

June.

July.

Aug.

Sept.

Oct.

Nov.

Dec.

Pavlovsk

1 890-1900 a

4-93

6-15

8-58

10-93

12-18

12-27

11-82

11-38

8-70

6-87

5-54

4-63

q

2-96

4-20

8-73

11-28

12-89

13-28

12-31

11-70

9-37

6-91

3-95

2-66

Ekatarinburg

1 890-1900 a

3-33

4-32

7-63

11-19

11-82

11-58

11-09

10-45

8-13

5-60

373

3-14

Greenwich

1 865-1 896 a

5-87

7-07

9.40

11-42

io-55

10-90

10-82

10-93

9-66

8-15

6-41

5-15

Kew

1 890- 1 900 a

4-92

6-o6

9-08

i°-95

10-66

10-92

10-59

II-OI

9.49

773

5-37

4.46

,,

q

4-07

4-76

8-82

io-57

10-92

10-62

10-18

II-OI

976

7-5i

4-75

3-34

Toronto

1 842- 1 848 a

5-96

6-05

9-18

9-94

“•55

12-34

12-21

13-14

10-76

6-96

6-32

4-97

Manila

1890-1900 a

1-79

1-09

2-13

3-02

3-84

3-94

4-21

4-89

4-53

1-83

0-85

i-33

Trivandrum

1 853-1 864 a

2-06

1-48

0-79

1-67

2-90

3-06

3-06

3-64

3-31

1-27

2-14

2-33

Batavia

1 884-1 899 a

4-18

4.64

3-57

2-93

2-38

2-03

2-31

3-16

3-8o

4-5i

4-50

4-19

St Helena

1 842-1 847 a

372

5-19

4-93

3-30

2-64

3-24

3-42

3-59

2-40

4-43

4-05

3-54

Mauritius

1876-18903

5-2

6-i

6-3

4-7

4-1

2-9

3-4

4.9

5-o

5-5

5-6

5-1

Cape .

1841-18463

5-14

8-21

7-27

5-00

3-91

3-21

3-54

4-98

4-33

5-96

6-36

5-47

Hobart . . .

1841-18483

n-66

1 1 -8o

9-50

7-26

4-56

3-7°

4-61

5-89

8-24

II-OI

12-05

ii-8i

3 66

MAGNETISM, TERRESTRIAL

at the Cape of Good Hope does not differ much from that seen at Batavia. Only a single period is clearly shown. The maximum occurs about 8 or 9 p.m. throughout the year. The time of the minimum is more variable; at midsummer it occurs about II a.m., but at midwinter three or four hours later. At Hobart the type varies considerably with the season. In June (midwinter) a double period is visible. The principal minimum occurs about 8 a.m., as at the Cape. But, corresponding to the evening maximum seen at the Cape, there is now only a secondary maximum, the principal maximum occurring about 1 p.m. At midsummer the principal maximum is found — as at Kew or Greenwich — about 10 or 11 a.m., the principal minimum about 4 p.m.

§ 18. Even at tropical stations a considerable seasonal change is usually seen in the amplitude of the diurnal inequality in at least one of the magnetic elements. At stations in Europe, and generally in temperate latitudes, the amplitude varies notably in all the elements. Table XIII. gives particulars of the inequality range of declination derived from hourly readings at selected stations, arranged in order of latitude from north to south. The letters " a " and " q " are used in the same sense as before. At temperate stations in either hemisphere — e.g. Pavlovsk, Greenwich or Hobart — the range is conspicuously larger in summer than in winter. In northern temperate stations a decided minimum is usually apparent in December. There is, on the other hand, comparatively little variation in the range from April to August. Sometimes, as at Kew and Greenwich, there is at least a suggestion of a secondary minimum at midsummer. Manila and Trivandrum show a transition from the December minimum, characteristic of the •northern stations, to the June minimum characteristic of the southern, there being two conspicuous minima in February or March and in November or October. At St Helena there are two similar minima in May and September, while a third apparently exists in December. It will be noticed that at both Pavlovsk and Kew the annual variation in the range is specially prominent in the quiet day results.

Table XIV. gives a smaller number of data analogous to those of Table XIII., comprising inequality ranges for horizontal force, vertical force and inclination. In some cases the number of years from which the data were derived seems hardly sufficient to give a smooth annual variation. It should also be noticed that unless the same group of years is employed the data from two stations are not strictly comparable. The difference between the all and quiet day vertical force data at Pavlovsk is remarkably pronounced. The general tendency in all the elements is to show a reduced range at midwinter; but in some cases there is also a distinct reduction in the range at midsummer. This double annual period is particularly well marked at Batavia.

§ 19. When discussing diurnal inequalities it is sometimes con- venient to consider the components of the horizontal force in and perpendicular to the astronomical meridian, rather than the hori- zontal force and declination. If N and W be the components of H to astronomical north and west, and D the westerly declination,

N = H cos D, W = H sin D. Thus corresponding small variations in N, W, H and D are connected by the relations: —

8N= cosDSH-H sinDaD, SW= sinDsH+H cosDSD.

If SH and SD denote the departures of H and D at any hour of the day from their mean values, then SN and 5W represent the corresponding departures of N and W from their mean values. In this way diurnal inequalities may be calculated for N and W when those for H and D are known. The formulae suppose 8D to be expressed in absolute measure, i.e. 1′ of arc has to be replaced by 0-0002909. If we take as an example a station at which H is •185 then HSD = -oooo538(number of minutes in 5D). In other words, employing 17 as unit of force, one replaces USD by 5‘385D, where 6D represents declination change expressed as usual in minutes of arc. In calculating diurnal inequalities for N and W, one ought, strictly speaking, to assign to H and D the exact mean values belonging to these elements for the month or the year being dealt with. For practical purposes, however, a slight departure from the true mean values is immaterial, and one can make use of a constant value for several successive years without sensible error. As an example, Table XV. gives the mean diurnal inequality for the whole year in N and W at Falmouth, as calculated from the 12 years 1891 to 1902. The unit employed is 17.

The data in Table XV. are closely similar to corresponding Kew data, and are presumably fairly applicable to the whole south of England for the epoch considered. At Falmouth there is com- paratively little seasonal variation in the type of the diurnal varia- tion in either N or W. The amplitude of the diurnal range varies, however, largely with the season, as will appear from Table XVI., which is based on the same 12 years as Table XV.

Diurnal inequalities in N and W lend themselves readily to the construction of what are known as vector diagrams. These are curves showing the direction and intensity at each hour of the. day of the horizontal component of the disturbing force to which the diurnal inequality may be regarded as due. Figs. 7 and 8, taken from the Phil. Trans, vol. 204A, will serve as examples. They refer to the mean diurnal inequalities for the months stated at Kew (1890 to 1900) and Falmouth (1891 to 1902), thick lines relating to Kew, thin to Falmouth. NS and EW represent the

geographical north-south and east- west directions; their intersection answers to the origin (thick lines for Kew, thin for Falmouth). The line from the origin to M represents the magnetic meridian. The line from the origin to any cross — the number indicating the corresponding hour counted from midnight as o — represents the magnitude and direction at that hour of the horizontal component of the disturb- ing force to which the diurnal inequality may be assigned. The cross marks the point whose rectangular co-ordinates are the values of SN and 8W derived from the diurnal inequalities of these elements. In figs. 7 and 8 the distances of the points N, E, S, W from their corresponding origin represents 1 07. The tendency to form a loop near midnight, seen in the November and December

Table XIV. — Ranges in the Diurnal Inequalities.

Jan.

Feb.

March.

April.

i —

May.

June.

July.

Aug.

Sept.

Oct.

Nov.

Dec.

H (unit 1 7)

Pavlovsk . . 1890-1900

a

12

20

32

46

47

49

49

44

39

32

17

11

,» .... ,,

q

12

17

31

42

45

45

42

40

37

31

17

10

Ekatarinburg . . ,,

a

11

15

29

37

40

40

39

36

33

27

13

9

Kew „

q

15

17

26

36

38

39

38

38

35

27

20

11

Toronto . . . 1 843-1 848

a

23

21

24

28

29

29

26

28

4i

25

21

20

Batavia …. 1883-1898

a

49

47

54

60

51

48

50

53

58

52

43

40

St Helena . . 1 843-1 847

a

43

41

48

53

46

40

40

45

41

40

40

32

Mauritius . . 1883-1890

a

21

15

21

23

20

21

20

22

20

21

21

20

Cape of Good Hope 1841-1846

a

13

10

13

13

15

16

14

18

21

14

17

20

Hobart …. 1 842-1 848

a

42

43

34

28

19

17

22

23

23

35

39

42

V (unit 17)

Pavlovsk . . . 1 890- 1 900

a

15

27

29

24

26

20

23

19

23

20

18

14

,, ... ,,

q

4

5

9

13

13

12

13

10

9

7

5

4

Ekatarinburg . . ,,

a

10

15

17

21

22

19

20

16

14

13

11

9

Kew 1891-1900

q

7

10

20

25

31

27

28

23

20

15

9

6

Toronto . . . 1843-1848

a

12

14

17

23

26

14

27

32

34

25

19

18

Batavia …. 1 883-1 898

a

42

48

48

45

31

31

32

29

41

5°

40

33

St Helena . 1843-1847

a

16

13

12

14

13

11

17

11

17

11

15

18

Mauritius . 1884-1890

a

12

16

18

15

H

13

15

21

20

16

13

11

Cape of Good Hope 1 841-1 846

a

29

47

41

38

21

12

H

19

19

35

33

28

Hobart …. 1 842-1 848

a

25

27

22

23

24

21

22

28

26

22

23

27

Inclination

‘

/

/

/

• *t*

/

/

‘

/

/

/

>

Pavlovsk . . 1 890-1900

a

0-97

1-24

2-07

279

272

2-88

2-85

2‘64

2-52

2-l8

I “20

0-89

Ekatarinburg . . ,,

a

P79

0-94

170

2-08

2‘25

2 – I9

2-18

2‘08

2 – 0O

170

o-88

0ˆ69

Kew …. ,,

q

0-98

roi

i-38

r86

2-05

2 “02

2 “05

2-15

1-98

i-57

1 ‘27

0-63

Toronto . . . 1 843- 1848

a

i”i5

0-94

1-19

1-2,3

i‘3i

1 ‘37

i’i3

1 ‘26

1-87

116

1 “09

1-05

Batavia …. 1 883-1 898

a

4-88

5”22

5-56

5-62

4‘2I

4”°5

4‘24

4”i7

5 – i3

5-58

4‘5i

3-85

CapeofGoodHope 1842-1846

a

i-55

2”29

2-23

223

i”6o

1-41

1 “54

170

i-86

2-03

i‘55

2 ‘04

Hobart …. 1842-1848

a

1 “95

2”l6

172

1 ‘62

1 ‘23

ri6

1-28

1-42

1 ‘39

175

2‘04

2 – I0

MAGNETISM, TERRESTRIAL

367

Table XV. — Diurnal Inequalities in N. and W. at Falmouth (unit it)

Hour.

1

2

3

4

5

6

7

8

9

10

11

12

M (a.m.

ˆ•; P .m.

W>ni (p.m.

+ 6 -17

— 2

+20

+ 5

— 12

— 2

+22

+ 5

- 6

- 3

+ 17

+ 5

— 1

- 4 + 11

+ 6 + 3

- 6 + 6

+ 6

+ 6

- 9

+ 4

+ 5 + 9

-13

+ 2

+ 1 + 9

-17 + 1

- 6 + 9

-19

-14 + 8

-13

— 1

— 20

+ 7

— 3

— 2

— 20

+ 7

+ 11

— 2

curves, is characteristic of the winter months at Kew and Falmouth. The shape is less variable in summer than in winter; but even in summer the portion answering to the hours 6 p.m. to 6 a.m. varies a good deal. The object of presenting the Kew and Falmouth curves side by side is to emphasize the close resemblance between the magnetic phenomena at places in similar latitudes, though over 200 miles apart and exhibiting widely different ranges for their meteorological elements. With considerable change of lati- tude however the shape of vector diagrams changes largely.

§ 20. Any diurnal inequality can be analysed into a series of Fourier harmonic terms whose periods are 24 hours and sub- Series multiples thereof. The series may be expressed in either of the equivalent forms : —

Oi cos t+bi sin t--a 2 cos 2t+b 2 sin 2/+ ... (i)

£1 sin (t+ai)+Ci sin (2t + a 2) + ... (ii)

Table XV

I. — Ranges

in Diurnal Inequalities at Falmouth (unit

[7).

Jan.

Feb.

Mar.

April.

May.

June.

July.

Aug.

Sept.

Oct.

Nov.

Dec.

N. W.

-

21 20

23 24

3°

46

39

54

39

55

37

55

37 54

39 56

36 51

32 39

24 24

15 15

In both forms / denotes time, counted usually from midnight, one hour of time being interpreted as 15 of angle. Form (i) is that utilized in actually calculating the constants a,b, .. . Once the a. b, . . . constants are known, the c, a, . . . constants are at once derivable from the formulae : —

tan a„ = a n /6ni c n = o n /sin a„ = 6„/cos a„ = V(on 2 +&» 2).

The a, b, c, a constants are called sometimes Fourier, sometimes Bessel coefficients.

By taking a sufficient number of terms a series can always be obtained which will represent any set of diurnal inequality figures; but unless one can obtain a close approach to the observational

June.

months of one year, or for all the Januarys of a series of years, we have only to take their arithmetic means to obtain the corresponding constants for the mean diurnal inequality of the year, or for the diurnal in- equality of the average January of the series of years. This, however, is obviously not true of the c or a con- stants, unless the phase angle is absolutely unchanged throughout the contributory months or years. This is a point requiring careful attention, because when giving values of c and a for the whole year some authorities give the arithmetic mean of the c's and a's calculated from the diurnal inequalities of the individual months of the year, others give the values obtained for c and a from the inean diurnal inequality of the whole year. The former method inevitably supplies a

larger value for c than the latter, supposing a to vary with the season. At some observatories, e.g. Greenwich and Batavia, it has long been customary to publish every year values of the Fourier coefficients for each month, and to include other elements besides the declination. For a thoroughly satisfactory comparison of different stations, it is necessary to have data from one and the same epoch; and preferably that epoch should include at least one 1 1 year period. There are, however, few stations which can supply the data required for such a comparison and we have to make the best of what is available. Information is naturally most copious for the declination. For this element E. Engelenburg 20 gives values of c\, c 2 , Cz, Ci, and of 01, a 2 , as, 04 for each month of the year for about 50 stations, ranging from Fort Rae (62° 6′ N. lat.) to Cape Horn (55 5′ S. lat.). From the results for individual sta tions, Engelenburg derives a series of means which he regards as representative of 1 1 differ- ent zones of latitude. His data for individual stations refer to different epochs, and some are based on only one year's observations. The original observations also differ in reliability; thus the results are of somewhat unequal value. The mean results for Engelenburg's zones must naturally have some of the sources of uncertainty reduced ; but then the fundamental idea represented by the arrangement in zones is open to question. The majority of the data in Table XVII. are taken from Engelenburg, but the phase angles have been altered so as to apply to westerly declination. The stations are arranged in order of latitude from north to south; in a few instances results are given for quiet days. The figures represent in all cases arithmetic means derived from the 12 monthly values. In the table, so far as is known, the local mean time of the observatory has been employed. This is a point requiring attention, because most observatories

July.

(From Phil. Trans.)

Fig. 7.

figures from the terms possessing the periods 24, 12, 8 and 6 hours the physical significance and general utility of the analysis is some- what problematical. In the case of the magnetic elements, the 24 and 12 hour terms are usually much the more important; the 24-hour term is generally, but by no means always, the larger of the two. The c constants give the amplitudes of the harmonic terms or waves, the a constants the phase angles. An advance of 1 hour in the time of occurrence of the first (and subsequent, if any) maximum and minimum answers to an increase of 15° in m of 30 in o 2 , of 45″ in a 3 , of 60° in a 4 and so on. In the case of magnetic elements the phase angles not infrequently possess a somewhat large annual variation. It is thus essential for a minute study of the

phenomena at any station to carry out the analysis for the different seasons of the year, and preferably for the individual months. If the a and b constants are known for all the individual

employ Greenwich time, or time based on Greenwich or some other national observatory, and any departure from local time enters into the values of the constants. The data for Victoria Land refer to the " Discovery's " 1902-1903 winter quarters, where the declination, taken westerly, was about 207°-5.

As an example of the significance of the phase angles in Table XVII., take the ordinary day data for Kew. The times of occur- rence of the maxima are given by t +234° =450° for the 24-hour term, 2J+39°-7 = 9o° or =450° for the 12-hour term, and so on, taking an hour in / as equivalent to 15 .

Thus the times of the maxima are : —

24-hour term, 2 h. 24 m. p.m.; 12-hour term, I h. 41 m. a.m. and p.m.

8-hour term, 4 h. 41 m. a.m., o h. 41 m. p.m., and 8 h. 41 m. p.m.

6-hour term, o h. 33 m. a.m. and p.m., and 6 h. 33 m. a.m. and p.m.

The minima, or extreme easterly positions in the waves, lie midway between successive maxima. All four terms, it will be seen, have maxima at some hour between oh. 30m. and 2h. 30m. p.m. They thus reinforce one another strongly from 1 to 2 p.m., accounting for the prominence of the maximum in the «arly afternoon.

November. M\ N

December. N

midsummer, in addition to one near midwinter. On the other hand, the phase angle phenomena vary much for the different elements. The 24-hour term, for instance, has its maximum earlier in wintet than in summer in the case of the declination and vertical force, but the exact reverse holds for the inclination and the horizontal force.

Table XVIII. — Kew Declination: Amplitudes and Phase Angles (local mean time).

Month.

Ci. c 2 .

c 3 .

Ci.

01.

a 2 .

a 8 .

a 4 .

-

/

/

1

January .

1-79

o-86

0-41

0-27

251-2

29-8

254

64

February

2-41

I-ii

o-57

0-30

242-0

27-7

235

39

March . .

3-05

1-98

i-ii

o-45

233-2

36-1

223

49

April . . .

3-35

2-48

1-17

o-39

224-8

39-2

228

61

May . . .

3-57

2-38

0-87

0-17

221-3

50-8

245

89

June . . .

,V«3

2-39

0-74

0-05

212-6

46-7

239

72

July . . .

3-72

2-30

0-77

O-II

2I4-6

48-1

233

8

August

3-64

2-43

1-05

0-18

228-2

57-2

244

51

September

3-35

2-02

1-04

o-35

236-9

55-3

245

70

October .

2-69

I-69

0-92

0-48

240-I

35-6

235

65

November

1-94

1-06

0-51

0-32

248-3

28-3

247

61

December

i-6i

o-8i

o-35

0-20

255-1

22-0

243

56

(From Phil. Trans.) FlG. 8. ˆ

The utility of a Fourier analysis depends largely on whether the several terms have a definite physical significance. If the 24-hour and 12-hour terms, for instance, represent the action of forces whose distribution over the earth or whose seasonal variation is essen- tially different, then the analysis helps to distinguish these forces, and may assist in their being tracked to their ultimate source. Suppose, for example, one had reason to think the magnetic diurnal variation due to some meteorological phenomenon, e.g. heating of the earth's atmosphere, then a comparison of Fourier coefficients, if such existed, for the two sets of phenomena would be a powerful method of investigation.

Table XVII. — Amplitudes and Phase Angles for Diurnal Inequality of

Declination.

Place.

Epoch.

Cl.

c 2 .

c 3 .

C 4 .

«i.

U2.

a 3 .

04.

Fort Rae (all) . .

1882-1883

1

18-49

8-22

t i-99

f

2-07

I56-5

4 I-9

308

O

104

,, (quiet)

,,

9-09

4-5i

1-32

o-73

166-5

37-5

225

350

Ekatarinburg

1841-1862

2-57

1-81

o-73

0-22

223-3

7-4

204

351

Potsdam

1 890-1 899

2-81

1-90

0-83

0-31

239-9

32-6

237

49

Kew (ordinary)

1 890- 1 900

2-91

i-79

o-79

0-27

234-0

39-7

239

57

Kew (quiet)

2-37

1-82

0-90

0-30

227-3

42-1

240

5b

Falmouth (quiet) .

1891-1902

2-18

1-82

0-91

0-29

226-2

4°-5

238

56

Pare St Maur .

1 883-1 899

2-70

1-87

0-85

0-30

238-6

32-5

235

95

Toronto

1 842-1 848

2-65

2-34

I-OO

o-33

213-7

34-9

238

35o

Washington

1 840-1 842

2-38

1-86

0-65

o-33

223-0

26-6

223

53-

Manila ….

1 890- 1 900

o-53

0-58

o-43

0-17

266-3

50-7

226

89

Trivandrum

1 853-1 864

o-54

0-46

0-29

O-IO

289-0

49-6

114

Batavia ….

1 883-1 899

o-8o

0-88

o-43

0-13

332-o

163-2

5

236

St. Helena .

1 842-1 847

o-68

o-6i

0-63

o-34

275-8

171-4

27

244

Mauritius

1876- 1890

o-86

i-ii

0-76

0-22

21-6

172-7

350

161

C. of G. Hope .

1 841-1846

I-I5

1 -13

o-8o

o-35

287-7

156-0

35i

193

Melbourne .

1 858-1 863

2-52

2-45

1-23

o-35

27-4

176-7

9

193

Hobart . . . .

1841-1848

2-29

2-15

0-87

0-32

33-6

170-8

349

i»5

S. Georgia .

1882-1883

2-13

1-28

0-76

0-31

30-3

185-3

7

180

Victoria Land (all).

1 902- 1 903

20-51

4-8i

I-2I

1-32

i5«-7

306-9

292

303

,, (quieter).

,,

15-34

4-05

1-24

i-i8

163-8

312-9

261

I 2 1 . Fourier coefficients of course often vary much with the season of the year. In the case of the declination this is especially true of the phase angles at tropical stations. To enter on details for a number of stations would unduly occupy space. A fair idea of the variability in the case of declination in temperate latitudes may be derived from Table XVIII., which gives monthly values for Kew derived from ordinary days of an 11-year period 1890ˆ-1900.

Fourier analysis has been applied to the diurnal inequalities of the other magnetic elements, but more sparingly. Such results are illustrated by Table XIX., which contains data derived from quiet days at Kew from 1890 to 1900. Winter includes November to February, Summer May to August, and Equinox the remaining four months. In this case the data are derived from mean diurnal inequalities for the season specified. In the case of the c or ampli- tude coefficients the unit is 1′ for I (inclination), and it for H and V (horizontal and vertical force). At Kew the seasonal variation in the amplitude is fairly similar for all the elements. The 24-hour and 12-hour terms tend to be largest near midsummer, and least near midwinter ; but the 8-hour and 6-hour terms have two well-marked maxima near the equinoxes, and a clearly marked minimum near

*§ 22. If secular change proceeded uniformly throughout the year, the value E„ of any element at the middle of the wth month of the year would be connected with E, the mean value for the A . whole year, by the formula E„ = E + (2»-i3)s/24, ,™ U * alit where s is the secular change per annum. For the pre- sent purpose, difference in the lengths of the months may be neglected. If one applies toE„ — E the correction — (2» — 13)5/24 one eliminates a regularly progressive secular change; what remains is known as the annual inequality. If only a short period of years is dealt with, irregularities in the secular change from year to year, or errors of observation, may obviously simulate the effect of a real annual in- equality. Even when a long series of years is included, there is always a possibility of a spurious inequality arising from annual variation in the instruments, or from annual change in the conditions of observation. J. Liznar, 21 from a study of data from a number of stations, arrived at certain meait results for the annual inequalities in declination and incli- nation in the northern and southern hemispheres, and J. Hann 22 has more recently dealt with Liznar's and newer results. Table XX. gives a variety of data, includ- ing the mean results given by Liznar and Hann. In the case of declination + denotes westerly position; in the case of inclination it denotes a larger dip (whether the inclination be north or south). According to Liznar declination in summer is to the west of the normal posi- tion in both hemispheres. The phenomena, however, at Pare St Maur are, it will be seen, the exact opposite of what Liznar regards as normal ; and whilst the Potsdam results resemble his mean in type, the range of the in- equality there, as at Pare St Maur, is relatively small. Of the three sets of data given for Kew the first two are derived in a similar way to those for other stations ; the first set are based on quiet days only, the second on all but highly disturbed days. Both these sets of results are fairly similar in type to the Pare St Maur results, but give larger ranges; they are thus even more opposed to Liznar's normal type. The last set of data for Kew is of a special kind. During the II years 1890 to 1900 the Kew declination magnetograph showed to within 1′ the exact secular change as derived from the absolute observations; also, if any annual variation existed in the position of the base lines of the curves it was exceedingly small. Thus the accumulation of the daily non-cyclic changes shown by the curves should closely represent the combined*

Table XIX. — Kew Diurnal Inequality: Amplitudes and Phase Angles (local mean time).

Ci.

c 2 .

c 3 .

Ci.

01.

*< *2.*

a 3 .

04.

f Winter .

I -! Equinox

[Summer

0-240

o-6oi o-8oi

0-222 0-290 0-322

0-104 0-213 0-172

0-076 0-127 0-070

250-0 290-3 312-5

91-8 135-5 155-5

344

4

39

194 207 238

("Winter .

H-l Equinox

(Summer

3-62 10-97 14-85

3-86

5-87 6-23

i-8l

3-32 2-35

I-I3

1-84

o-95

82-9 109-6 130-3

277-3 303-5

3i6-5

154 167 199

6

16 41

(“Winter .

V-< Equinox

|_ Summer

2-46

6-15 8-63

1-67 4-70 6-45

0-86 2-51 2-24

0-42 0-94 0-55

153-9 117-2

122-0

300-8 272-3 272-4

108

99 100

280 289 285)

MAGNETISM, TERRESTRIAL

369

effects of secular change and annual inequality. Eliminating the secular change, we arrive at an annual inequality, based on all days of the year including the highly disturbed. It is this annual in- equality which appears under the heading 5. It is certainly very unlike the annual inequality derived in the usual way. Whether the difference is to be wholly assigned to the fact that highly disturbed days contribute in the one case, but not in the other, is a question for future research.

In the case of the inclination, Liznar found that in both hemispheres the dip (north in the northern, south in the southern hemisphere) was larger than the normal when the sun was in perihelion, correspond- ing to an enhanced value of the horizontal force in summer in the northern hemisphere.

In the case of annual inequalities, at least that of the declination,

also in the case of the horizontal force — at least in the case of the annual term — both at Kew and Falmouth. The phenomena at the two stations show a remarkably close parallelism. At both, and this is true also of the absolute ranges, the maximum of the annual term falls in all cases near midsummer, the minimum near mid- winter. The maxima of the 6-month terms fall near the equinoxes. § 24. Allusion has already been made in § 14 to one point which requires fuller discussion. If we take a European station such as Kew, the general character of, say, the declination does not vary very much with the season, but still it does vary. The principal minimum of the day, for instance, occurs from one to two hours earlier in summer than in winter. Let us suppose for a moment that all the days of a month are exactly alike, the difference in type between successive months coming in per

Absolute Range,

Table XX-

-Annual

nequality.

Declination.

Inclination.

Liznar, N. Hemi-

Potsdam,

1891-1906.

Pare St Maur,

Kew (1890-1900).

Batavia,

1 883- 1 893.

Mauritius.

Liznar & Hann's

Potsdam.

Pare St. Maur.

Kew.

sphere.

1888-1897.

§•

0.

s.

mean.

January

-0-25

+0-04

+0-01

+o-o8

1 +0-03

+0-32

+0-23

+0-06

+0-49

/ +0-32

+0-44

/ -0-03

February

-0-54

— O-II

o-oo

+0-48

+0-25

— 0-20

+0-I9

+0-29

+0-39

+0-56

+0-29

—0-07

March

—0-27

+0-04

+0-17

+0-03

+0-05

— 1-02

— 0-12

+0-27

+0-20

+0-38

+0-13

+0-53

April

-0-03

+0-IO

+0-12

-0-31

—0-14

— O-90

— O-II

+0-30

-0-08

— 0-02

-0-13

+0-18

May

+0-19

+0-07

— O-II

-0-39

-0-28

+ 0-29

-0-30

+0-08

-o-43

— 0-29

-0-37

-0-15

June

+0-46

+0-13

— 0-14

-o-47

-o-39

+0-78

-0-13

—0-19

—0-70

-o-77

-o-59

-o-35

July

+0-48

+0-14

-0-17

-0-30

-013

+0-44

-0-08

-o-44

—0-72

—0-67

—0-27

-0-13

August

-fo-47

+0-II

+0-01

-f-o-oS

+0-05

+0-52

-0-18

-0-38

-o-47

-0-23

-0-05

—0-19

September

+0-31

+0-0I

o-oo

+0-29

+0-24

— 0-02

+0-06

— 0-06

— 0-06

+0-16

+0-OI

+0-20

October

—0-07

— O-II

+0-09

+0-06

+0-01

— 0-26

40-03

—0-04

+0-3I

+0-27

+0-19

O-OO

November

-0-30

-0-28

-0-05

+0-17

+0-II

— 0-02

+0-08

— O-OI

+0-51

+0-30

+o-43

4-0-18

December

-0-36

—0-14

+0-05

+0-26

+0-23

+0-05

+o-35

4-0-06

+0-55

+0-19

+0-24

—0-29

Range

1-02

0-42

o-34

o-95

0-64

I- 80

0-65

0-74

1-27

i-33

1-03

0-88

Annual Variation Fourier Co efficients.

it is a somewhat suggestive fact that the range seems to become less as we pass from older to more recent results, or from shorter to longer periods of years. Thus for Paris from 182 1 to 1830 Arago deduced a range of 2′ 9”. Quiet days at Kew from 1890 to 1894 gave a range of 1 ‘-2, while at Potsdam Ludeling got a range 30% larger than that in Table XX. when considering the shorter period 1891-1899. Up to the present, few

individual results, if any, can claim a very high degree of certainty. With improved instruments and methods it may be different in the future.

§ 23. The inequalities in Table XX. may be analysed — as has in fact been done by Hann — in a series of Fourier terms, whose periods are the year and its submultiples. Fourier series can also be formed representing the annual variation in the amplitudes of the regular diurnal inequality, and its component 24-hour, 12-hour, &c. waves, or of the amplitude of the'absolute daily range (§ 24). To secure the highest theoretical accuracy, it would be necessary in calculating the Fourier coefficients to allow for the fact that the " months " from which the observational data are derived are not of uniform length. The mid-times, however, of most months of the year are but slightly displaced from the position they would occupy if the 12 months were exactly equal, and these displacements are usually neglected. The loss of accuracy cannot be but trifling, and the simplification is considerable.

*The Fourier series may be represented by Pi sin (/40i)4P 2 sin (2*402)4 where t is time counted from the beginning of the year, one month being taken as the equivalent of 30 , Pi, P 2 represent the amplitudes, and 0i, 02 the phase angles of the first two terms, whose periods are respectively 12 and 6 months. Table XXI. gives the values of these coefficients in the case of the range of the regular diurnal inequality for certain specified elements and periods at Kew 23 and Falmouth. 23a In the case of Pi and P2 the unit is 1′ for D and I, and 17 for H and V. M denotes the mean value of the range for the 12 months. The letters q and represent quiet and ordinary day results. S max. means the years 1892-1895, with a mean sun spot frequency of 75-0. S min. for Kew means the years 1890, 1899 and 1900 with a mean sun spot frequency of 9-6; for Falmouth it means the years 1899-1902 with a mean sun spot frequency of 7-25.*

Increase in t or 02 means an earlier occurrence of the maximum or maxima, 1° answering roughly to one day in the case of the 12- month term, and to half a day in the case of the 6-month term. Pi.'M and P 2 /M both increase decidedly as we pass from years of many to years of few sun spots; i.e. relatively considered the range of the regular diurnal inequality is more variable throughout the year when sun spots are few than when they are many.

The tendency to an earlier occurrence of the maximum as we pass from quiet days to ordinary days, or from years of sun spot minimum to years of sun spot maximum, which appears in the table, appears

saltum. Suppose further that having formed twelve diurnal inequal- ities from the days of the individual months of the year, we deduce a mean

diurnal inequality for the whole year by combining these twelve inequalities and taking the mean. The hours of maximum and minimum being different for the twelve constituents, it is obvious that the resulting maximum will normally be less than the arithmetic mean of the twelve maxima, and the resulting minimum (arithmetically) less than the arithmetic mean of the twelve minima. The range — or algebraic excess of the maximum over the minimum — ■ in the mean diurnal inequality for the year is thus normally less than the arithmetic mean of the twelve ranges from diurnal inequalities for the individual months. Further, as we shall see later, there are differences in type not merely between the different months of the year, but even between the same months in different years. Thus the range of the mean diurnal inequality for, say, January based on the combined observations of, say, eleven Januarys may be and generally will be slightly less than the arithmetic mean of the ranges obtained from the Januarys separately. At Kew, for instance, taking the ordinary days of the 11 years 1890-1900, the arithmetic mean of the diurnal inequality ranges of declination from the 132 months treated independently was 8'-52, the mean range from the 12 months of the year (the eleven Januarys being combined into one,

Table XXI.

-Annual Variation of Diurnal Inequality Range. Fourier Coefficients.

Pi.

P 2 –

0i.

02-

Pi/M

P2/M.

Kew

1 890- 1 900

D„

I, H s

3-36

3-8i

0-67 13-6

u-7

0-94

1-22

0-16

3-o

2-2

279° 275°

264 269

282 °

280

273°

269 261

242°

0-40 0-47 0-42 0-48 0-63

O-II

0-15

O-IO O-II

0-12

S max. D 5

Kew Falmouth

4-5°

4-10

1-26 1-40

277 277

282°

286

0-47

o-43

0-13

0-15

S min.

Kew Falmouth

3-35 3-19

I-IO

1-14

274° 275°

269

277°

0-49 0-49

0-16 0-17

and so on) was 8'-44, but the mean range from the whole 4,000 odd days superposed was only 8'-03. Another consideration is this: a diurnal inequality is usually based on hourly readings, and the range deduced is thus an under-estimate unless the absolute maximum and minimum both happen to come exactly at an hour. These considerations would alone suffice to show that the absolute range in individual days, i.e. the difference between the alge- braically largest and least values of the element found any time during the 24 hours, must on the average exceed the

37°

range in the mean diurnal inequality for the year, however this latter is formed. Other causes, moreover, are at work tending in the same direction.

Even in central Europe, the magnetic curves for individual days of an ordinary month often differ widely amongst themselves, and show maxima and minima at different times of the day. In high latitudes, the variation from day to day is sometimes so great that mere eye inspection of magnetograph curves may leave one with but little idea as to the probable shape of the resultant diurnal curve for the month. Table XXII. gives the arithmetic mean of the absolute daily ranges from a few stations. The values which it assigns to the year are the arithmetic

MAGNETISM, TERRESTRIAL

§ 25. The variability of the absolute daily range of declination is illustrated by Table XXIII., which contains data for Kew 24 derived from all days of the 11-year period 1890-1900. It gives the total number of times during the II years when the absolute range lay within the limits specified at the heads of the first nine columns of figures. The two remaining columns give the arithmetic means of the five largest and the five least absolute ranges encountered each month. The mean of the twelve monthly diurnal inequality ranges from ordinary days was only 8'-44, but the absolute range during the 11 years exceeded 20′ on 492 days, 15′ on 1196 days, and 10′ on 2784 days, i.e. on 69 days out of every 100.

Table XXII. — Mean Absolute Daily Ranges (Units 1′ for Declination, ly for H and V).

Declination.

Pavlovsk …. Ekatarinburg . . . Kew. All days

,, Ordinary days .

,, Quiet „

Zi-ka-wei …. Mauritius ….

Horizontal force.

Pavlovsk …. Ekatarinburg Mauritius ….

Vertical force.

Pavlovsk …. Ekatarinburg Mauritius ….

Jan.

13-42

7-33

11-16

10-14

6-12

3-88 6-93

52-4 33-2 37-9

27-0 17-4 17-1

Feb.

17-20

9-54 13-69 11-87 7-57 3-25 7-79

74-5 43-1 35-0

5°-4

266

19-5

Mar.

April.

18-22 11-90

15-93 14-19 10-59

6-22

7-n

79-1 48-4 36-2

54-7 29-2

20-1

17-25 12-89 15-00 14-24 11-84

7-04 5-75

8o-i 5i-7

37-6

43-2 30-1 17-3

May.

17-76

13-63 14-90

13-85 12-09

7-15 4-87

86-2 56-2 35-0

45-3 29-6 16-5

June.

I5-9I

13-03

I3-65

13-26

n-95

7-40

4-03

79-0 54-1 34-1

34-8 27-6

15-5

July.

16-89 12-78 14-13 13-47

n-6o

7-77 4-36

86-7 56-7 33-8

42-1 29-6 17-1

Aug.

16-57

12-21

I4-22 I3-67

1 1 -93

8-o6 6-oo

77-6 51-7 34-5

35-5 26-1

22-0

Sept.

16-75 11-23

H-57 I3-7I io-86

6-73 6-28

76-7

49-3 36-6

42-5 25-2 22-7

Oct.

15-70 9.44 14-07 13-10 9-16 4-68 6-71

67-3 44-1

37-4

37-5

22-1

19-4

Nov.

1387

7-86

11-71

10-40

6-54 2-91

6-99

55-7 34-1 37-8

33-5 19-6 16-7

Dec.

12-37 6-85 9-80 9-00

5-o8

2-52 6-78

45-9 29-3 35-3

25-5 16-4 15-2

Year.

15-99 10-72

13-57

12-58

9-61

5-63

6-13

71-8 46-0 35-9

39-3 24-9 18-2

means of the 12 monthly values. The Mauritius data are for differ- ent periods, viz. declination 1875, 1880 and 1883 to 1890, horizontal force 1883 to 1890, vertical force 1884 to 1890. The other data are all for the, period 1890 to 1900.

A comparison of the absolute ranges in Table XXII. with the inequality ranges for the same stations derivable from Tables VIII. to X. is most instructive. At Mauritius the ratio of the absolute to the inequality range is for D 1-38, for H 1-76, and for V 1-19. At Pavlovsk the corresponding ratios are much larger, viz. 2-16 for D, 2-43 for H, and 2-05 for V. The declination data for Kew in Table XXII. illustrate other points. The first set of data are derived from all days of the year. The second omit the highly disturbed days. The third answer to the 5 days a month selected as typically quiet. The yearly mean absolute range from ordinary days at Kew in Table XXI I . is 1 49 times the mean inequality range in Table VI 1 1. ; comparing individual months the ratio of the absolute to the in equality range varies from 2-06 in January to I-2I in June. Even confining ourselves to the quiet days at Kew, which are free from any but the most trifling disturbances, we find that the mean absolute range for the year is 1 -20 times the arithmetic mean of the inequality ranges for the individual months of the year, and 1-22 times the range from the mean diurnal inequality for the year. In this case the ratio of the absolute to the inequality range varies from 1-55 in December to only 1 -09 in May.

§ 26. Magnetic phenomena, both regular and irregular, at any station vary from year to year. The extent of this variation is illustrated in Tables XXIV. and XXV., both relating to the period 1890 to 1900. 26 Table XXIV. gives the amplitudes f #””<"»«« > the regular diurnal inequality in the elements stated at p”” sp the head of the columns. The ordinary day declination 9”eacy. data (D„) for Kew represent arithmetic means from the twelve months of the year; the other data all answer to the mean diurnal inequality for the whole year. Table XXV. gives the arithmetic means for each year of the absolute daily range, of the monthly range (or difference between the highest and lowest values in the month), and of the yearly range (or difference between the highest and lowest values of the year). The numerals attached to the years in these tables indicate their order as regards sun-spot frequency according to Wolf and Wolfer (see Aurora Polaris), 1893 being the year of largest frequency, and 1890 that of least. The differ- ence in sun-spot frequency between 1897 and 1898 was*

microscopic; the differences between 1890, 1900 and 1899 were small, and those between 1893, 1894 and 1892 were not very large.

The years 1 892-1 895 represent high sun-spot frequency, while 1890, 1899 a "d 1900 represent low frequency. Table XXIV. shows that 1892 to 1895 were in all cases distinguished by the large size of the inequality ranges, and 1890, 1899 and 1900 by the small size. The range in 1893 is usually the largest, and though the H and V

Table XXIII. — Absolute Daily Range of Declination at Kew.

Means from the 5 largest

Number of occasions during 11 years when absolute range was:—

and 5 least ranges of the month on the average of 11 years.

0′ to 5′.

5′ to 10′.

10′ to 15′.

15′ to 20′.

20′ to 25′.

25′ to 30′.

30′ to 35′.

35′ to 40′.

over 40′.

5 largest.

5 least.

January ….

51

H5

69

37

24

7

4

3

1

/ 22-90

5-07

February

26

99

84

51

26

10

4

2

8

27-21

6-55

March .

1

72

138

61

32

21

8

1

7

29-87

8-93

April

43

167

73

27

10

6

3

1

23-69

10-31

May

.

57

157

85

20

12

3

7

25-36

9-5°

June

56

185

67

15

1

3

1

2

19-92

9-89

July .

59

185

70

14

5

2

2

. 4

22-49

996

August

37

202

75

22

1

2

2

21-27

10-05

September

1

68

153

71

19

5

4

5

4

24-55

9-52

October

3

103

in

67

34

10

11

2

23-92

8-oi

November .

42

140

81

28

14

9

8

5

3

23-58

5-64

December . . . -.

64

166

56

29

H

7

1

1

3

20-43

4-36

Totals ….

188

1045

1588

7H

261

98

56

25

42

ranges at Ekaterinburg are larger in 1892 than in 1893, the excess is trifling. The phenomena apparent in Table XXIV. are fairly representative;

other stations and other periods associate large inequality ranges with high sun-spot frequency. The diurnal inequality range it should be noticed is comparatively little influenced by irregular disturbances. Coming to Table XXV., we have ranges of a different character. The absolute range at Kew on quiet days is almost as little influenced by irregularities as is the range of the diurnal inequality, and in its case the phenomena are very similar to those observed in Table XXIV. As we pass from left to right in Table XXV., the influence of disturbance increases. Simul- taneously with this, the parallelism with sun-spot frequency is less close. The entries relating to 1892 and 1894 become more and more

Table XXIV

. — Ranges of Diurnal Inequalities.

Pavlovsk.

Ekatarinburg.

Kew.

D.

I.

H.

D.

I.

H.

V.

D q .

I.*

H,.

Do.

/

r

7

/

‘

7

7

1

r

7

/

189011

632

1-33

22

5-83

1 -05

18

9

690

20

7‘32

I89U

7-31

1-79

30

6-«5

1-38

25

14

8-04

1-52

28

8-48

18923

8-75

2-21

37

7-74

1-72

32

19

9-5o

1-66

31

9-«5

18931

9.64

2-24

38

8-83

i-8o

31

17

10-06

1-96

35

10-74

18942

8-58

2-17

38

7-8o

1-73

30

17

9-32

1-94

34

9-80

18954

8-22

2-08

33

7-29

1 64

28

1.5

8-59

1-66

3°

9-54

1 896 J

7-39

177

29

6-50

1-38

25

15

7-77

1 -3 1

25

8-50

1897.

679

1-59

26

6-oi

116

21

12

6-71

1-14

22

7-76

18987

6-25

1-56

26

5-76

1-19

21

II

6-85

1-07

21

7-59

1899,

6-02

1-44

24

5-33

I-I2

20

II

669

I-OI

21

7-30

I900 w

6-20

1-28

22

5-88

o-93

17

8

6-52

1-06

21

6-83

prominent compared to those for 1893. The yearly range may de- pend on but a single magnetic storm, the largest disturbance of the year possibly far outstripping any other. But taking even the monthly ranges the values for 1893 are, speaking roughly, only half those for 1892 and 1894, and very similar to those of 1898, though the sun-spot frequency in the latter year was less than a third of that in 1893. Ekatarinburg data exactly analogous to those for Pav- lovsk show a similar prominence in 1892 and 1894 as compared to

Table XXV

. — Absolute Ranges

Kew Declina- tion. Daily.

Pavlovsk.

Daily.

Monthly.

Yearly.

3-

0.

a.

D.

H.

V.

D.

H.

V.

D.

H.

V.

‘

‘

1

1

7

7

‘

7

7

/

7

7

i890„

8-3

io-5

107

I2-I

49

21

28-2

118

80

42-1

169

179

18916

io-o

12-8

i.V7

16-0

70

39

46-3

218

233

92-3

550

614

18923

12-3

15-4

17-7

21-0

in

73

93-6

698

575

194-0

2416

1385

18931

u-8

I.V2

15-6

17-8

79

41

48-3

241

210

8 7 -i

5H

457

18942

1 1 -3

14-7

16-5

20-4

97

62

84-1

493

493

1 45 -6

1227

878

18954

io-6

14-8

i.S-6

18-1

80

46

47-4

220

223

73-9

395

534

18965

9-5

12-9

H-5

17-5

74

43

52-4

232

236

88-7

574

608

1897s

8-2

1 1 -5

I2-I

14-6

61

30

43-8

201

170

low

449

480

1898;

8-2

II-2

12-3

147

67

35

46-6

276

242

118-9

1 136

888

18999

7-9

io-5

1 1 -3

13- 1

58

27

38-3

178

150

63-8

382

527

190010

7-4

89

92

105

44

16

32-8

134

89

94-2

457

365

[Means

9-6

12-6

136

16-0

72

39|5fl

274

246

100-2

752

629

1893. The retirement of 1893 from first place, seen in the absolute ranges at Kew, Pavlovsk and Ekatarinburg, is not confined to the northern hemisphere. It is visible, for instance, in the amplitudes of the Batavia disturbance results. Thus though the variation from year to year in the amplitude of the absolute ranges is relatively not less but greater than that of the inequality ranges, and though the general tendency is for all ranges to be larger in years of many than in years of few sun-spots, still the parallelism between the changes in sun-spot frequency and in magnetic range is not so close for the absolute ranges and for disturbances as for the inequality ranges.

§ 27. The relationship between magnetic ranges and sun-spot frequency has been investigated in several ways. W. Ellis 28 has employed a graphical method which has advantages, especially for tracing the general features of the resemblance, and is besides inde- pendent of any theoretical hypothesis. Taking time for the axis of abscissae, Ellis drew two curves, one having for its ordinates the sun-spot frequency, the other the inequality range of declination or of horizontal force at Greenwich. The value assigned in the magnetic curve to the ordinate for any particular month represents a mean from 12 months of which it forms a central month, the object being to eliminate the regular annual variation in the diurnal in- equality. The sun-spot data derived from Wolf and Wolfer were similarly treated. Ellis originally dealt with the period 1841 to 1877, but subsequently with the period 1878101896, andhissecond

paper gives curves representing the phenomena over the whole 56 years. This period covered five complete sun-spot periods, and the approximate synchronism of the maxima and minima, and the general parallelism of the magnetic and sun-spot changes is patent to the eye. Ellis 27 has also applied an analogous method to investi- gate the relationship between sun-spot frequency and the number of days of magnetic disturbance at Greenwich. A decline in the num- ber of the larger magnetic storms near sun-spot minimum is recog- nizable, but the application of the method is less successful than in the case of the inequality range. Another method, initiated by Professor Wolf of Zurich, lends itself more readily to the investigation of numerical relationships. He started by supposing an exact proportionality between corresponding changes in sun-spot frequency and magnetic range. This is expressed mathematically by the formula

$$R = a + bS = a\{i + (b/a)S],$$

where R denotes the magnetic range, S the corresponding sun-spot frequency, while o and b are constants. The constant a represents the range for zero sun-spot frequency, while bja is the proportional increase in the range accompanying unit rise in sun-spot frequency. Assuming the formula to be true, one obtains from the observed values of R and S numerical values for a and b, and can thus investi- gate whether or not the sun-spot influence is the same for the different magnetic elements and for different places. Of course, the useful- ness of Wolf's formula depends largely on the accuracy with which it represents the facts. That it must be at least a rough approxima- tion to the truth in the case of the diurnal inequality at Greenwich might be inferred from Ellis's curves. Several possibilities should be noticed. The formula may apply with high accuracy, a and b having assigned values, for one or two sun-spot cycles, and yet not be applicable to

more remote periods. There are only three or four stations which have continuous magnetic records extending even 50 years back, and, owing to temperature correction uncertainties, there is perhaps no single one of these whose earlier records of horizontal and vertical force are above criticism. Declination is less exposed to uncertainty, and there are results of eye observations of declination before the era of photographic curves. A change, however, of i' in declination has a significance which alters with the intensity of the horizontal force. During the period 1850-1900 horizontal force in England increased about 5%, so that the force requisite to produce a declination change of 19′ in 1900 would in 1850 have produced a deflection of 20'. It must also be re- membered that secular changes of declination must alter the angle between the needle and any disturbing force acting in a fixed direction. Thus secular alteration in a and b is rather to be anticipated, especially in the case of the declina- tion. Wolf's formula has been applied by Rajna 28 to the yearly mean diurnal declination ranges at Milan based on readings taken twice daily from 1836 to 1894, treating the whole period together, and then the period 1871 to 1894 separately. During two sub-periods, 1837-1850 and 1854- 1867, Rajna's calculated values for the range differ very persistently in one ' direction from those observed ; Wolf's formula was applied by C. Chree 25 to these two periods separately. He also applied it to Greenwich inequality ranges for the years 1841 to 1896 as published by Ellis, treating the whole period and the last 32 years of it separ- ately, and finally to all (a) and quiet (g) day Greenwich ranges from 1889 to 1896. The results of these applications of Wolf's formula appear in Table XXVI.

The Milan results are suggestive rather of heterogeneity in the material than of any decided secular change in a or b. The Greenwich data are suggestive of a gradual fall in a, and rise in b, at least in the case of the declination.

Table XXVII. gives values of a, b and bja in Wolf's formula calculated by Chree 26 for a number of stations. There are two sets of data, the first set relating to the range from the mean diurnal inequality for the year, the second to the arithmetic mean of the ranges in the mean diurnal inequalities for the twelve months. It is specified whether the results were derived from all or from quiet days.

Table XXVI.— Values of a and 6 in Wolf's Formula.

Milan.

Greenwich.

Epoch.

Declination (unit l').

Epoch.

Declination (unit 1').

Horizontal Force (unit 17).

a.

b.

0.

b.

a.

b.

1836-94 1871-94 1837-50 1854-67

5-3i

5-39 6-43 4-62

•047 •047 •041 •047

1841-96 1865-96 1889-96(0) 1889-96(0)

7-29

7-07

6-71

1 6-36

•0377 ■0396 •0418 •0415

264 23-6

23-7 25-0

•190 •215 ■218 ■213

As explained above, a would represent the range in a year of no sun-spots, while 100 b would represent the excess over this shown by the range in a

year when Wolfer's sun-spot frequency is 100. Thus

Table XXVII. — Values of a and b in Wolf's Formula.

Declination (unit i').

Inclination (unit i').

Horizontal Force (unit 17).

Vertical Force (unit 17).

Diurnal Inequality for the Year.

Pavlovsk, 1890-1900 all

Pavlovsk, 1890-1900 quiet

Ekatarinburg, 1 890-1900 . . . .all Irkutsk „ „ . . . all

Kew ,, quiet

Falmouth, 1891-1902 quiet

Kolaba, 1 894-1901 quiet

Batavia, 1887-1898 all

,, v . (1875-1880) „

Mauntlus li883-l8 9 o [■ ‘ ■ – a ”

Mean from individual months : —

Pavlovsk, 1890-1900 all

,, „ ,, quiet

Ekatarinburg, 1 890-1 900 . . .all Greenwich, 1865-1896 . . . .all

Kew, 1890-1900 all

,,...'.... quiet Falmouth, 1891-1902 quiet

b. 100 b/a.

1006/0.

“• 100 b/a.

a.

_ 100 b/a.

5-74 6-17 5-29 4-82

6-IO

5-90 2-37 2-47

4-06

0400 0424 0342 0358 0433 0451 0066 0179

0164

•70 •69 •65 •74 •71

.76

•28 •72

•40

1-24

o-93 o-97

0-87

3-60

•0126

•0105 •0087 •0125

•0218

1 -01

fi3

0-90

1-45

o-6i

20-7 20-6 16-8 18-2 18-1

20-1

31-6 38-7

15-0

•211

•195 •182 •190 •194

•233 •281

•274 •096

6-8i

6-52

6-i8

7-07 6-65 6-49

6-i6

•0446 •0442

■*0355 •0396 •0428 •0410 •0450*

•66 •68 •58 •56 •64 •63 •73

1-44 -0151 1-05

1-06

17

•0130

22-8 22-2 19-2

23-6

21-5 20-9

•243 •208

•195 •215

•191 •236

1-02

o-95

1-09 1-04 1-07 1-16 0-89 0-71

0-64

8-i

5-9 8-6

6-5

H-3

19-4 30-1

n-9

•265 ■027 •117 •071 •081

•072 •156

•069

1-07 0-94

I-OI

0-91

0-89

i-i3

9-7 7-0 9-2

16-0

•287 •044 •156

•072

3-26 0-46

1-37 1-09 0-56

o-37

0-52

0-58

2-97 0-63 1-70

o-45

b/a seems the most natural measure of sun-spot influence. Accept- ing it, we see that sun-spot influence appears larger at most places for inclination and horizontal force than for declination. In the case of vertical force there is at Pavlovsk, and probably in a less measure at other northern stations, a large difference between all and quiet days, which is not shown in the other elements. The difference between the values of b/a at different stations is also exceptionally large for vertical force. Whether this last result is wholly free from observational uncertainties is, however, open to some doubt, as the agreement between Wolf's formula and observa- tion is in general somewhat inferior for vertical force. In the case of the declination, the mean numerical difference between the observed values and those derived from Wolf's formula, employing the values of a and b given in Table XXVII., represented on the aver- age about 4 % of the mean value of the element for the period con- sidered, the probable error representing about 6% of the difference between the highest and lowest values observed. The agreement was nearly, if not quite, as good as this for inclination and horizontal force, but for vertical force the corresponding percentages were nearly twice as large.

Applying Wolf's formula to the diurnal ranges for different months of the year, Chree found, as was to be anticipated, that the constant) o had an annual period, with a conspicuous minimum at midwinter; but whilst b also varied, it did so to a much less extent, the conse- quence being that b/a showed a minimum at midsummer. The annual variation in b/a alters with the place, with the element, and with the type of day from which the magnetic data are derived. Thus, in the case of Pavlovsk declination, whilst

the mean value of 100 b/a for the 12 months is, as shown in Table XXVII., 0-66 for all and o-68 for quiet days — values practically identical — if we take the four midwinter and the four midsummer months separately, we have 100 b/a, varying from o-8l in winter to 0-52 in summer on all days, but from 1-39 in winter to 0-52 in summer on quiet days. In the case of horizontal force at Pavlovsk the corresponding figures to these are for all days — winter 1-77, summer 0-98, but for quiet days — winter 1-83, summer 0-71.

Wolf's formula has also been applied to the absolute daily ranges, to monthly ranges, and to various measures of disturbance. In these cases the values found for b/a are usually larger than those found for diurnal inequality ranges, but the accordance between observed values and those calculated from Wolf's formula is less good. If instead of the range of the diurnal inequality we take the sum of the 24-hourly differences from the mean for the day — or, what comes to the same thing, the average departure throughout the 24 hours from the mean value for the day — we find that the resulting Wolf's formula gives at least as good an agreement with observation as in the case of the inequality range itself. The formulae obtained in the case of the 24 differences, at places as wide apart as Kew and Batavia, agreed in giving a decidedly larger value for b/a than that obtained from the ranges. This indicates that the inequality curve is relatively less peaked in years of many than in years of few sun- spots.

§ 28. The applications of Ellis's and Wolf's methods relate directly only to the amplitude of the diurnal changes. There is, however, a change not merely in amplitude but in type. This is clearly seen when we compare the values found in years of many and of few sun- spots for the Fourier coefficients in the diurnal inequality. _ Such a comparison is carried out in Table XXVIII. for the declination on ordinary days at Kew. Local mean time is used. The heading S max. (sun-spot maximum) denotes mean average results from the four years 1 892-1 895, having a mean sun-spot frequency of 75-0, whilst

S min. (sun-spot minimum) applies similarly to the years 1890, 1899 and 1900, having a mean sun-spot frequency of only 9-6. The data relate to the mean diurnal inequality for the whole year or for the season stated. It will be seen that the difference between the c, or amplitude, coefficients in the S max. and S min. years is greater for the 24-hour term than for the 12-hour term, greater for the 12- hour than for the 8-hour term, and hardly apparent in the 6-hour term. Also, relatively considered, the difference between the ampli- tudes in S max. and S min. years is greatest in winter and least in summer. Except in the case of the 6-hour term, where the differences are uncertain, the phase angle is larger, i.e. maxima and minima occur earlier in the day, in years of S min. than in years of S max.

Taking the results for the whole year in Table XXVIII., this advance of phase in the S min. years represents in time 15-6 minutes for the 24-hour term, 9-4 minutes for the 12-hour term, and 14-7 minutes for the 8-hour term. The difference in the phase angles, as in the amplitudes, is greatest in winter. Similar phenomena are shown by the horizontal force, and at Falmouth 2i as well as Kew.

Table XXVIII. — Fourier Coefficients in Years of many and few

Sun-spots.

Year.

Winter.

Equinox.

Summer.

Smax.

Smin.

S max.

Smin.

Smax.

Smin.

S max.

S min.

C

3-47

/

2-21

r

2-41

1-43

3-76

/ 2-41

4-38

,2-98

Cl

2-04

1 -5 1

i-I5

0-78

2-33

1-71

2-73

2-06

c%

0-89

0-72

o-55

0-42

1-16

0-97

0-97

0-77

Ci

0-28

0-27

0-30

0-27

0-42

0-42

O-II

O-II

O

ai

228-5

232-4

243-0

256-0

231-3

233-7

218-2

220-3

a.2

417

46-6

23-5

36-9

40-6

43-9

50-6

52-5

a-s

232-6

243-6

234-0

257-6

228-4

236-2

236-8

245-4

58-0

57-3

52-3

6o-8

62-0

5«-2

57-4

45-2

§ 29. There have already been references to quiet days, for instance in the tables of diurnal inequalities. It seems to have been originally supposed that quiet days differed from other days only _ . _ in the absence of irregular disturbances, and that mean _7 „_£_. annual values, or secular change data, or diurnal inequal- eD ities, derived from them might be regarded as truly normal or repre- sentative of the station. It was found, however, by P. A. Muller s that mean annual values of the magnetic elements at St Petersburg and Pavlovsk from 1873 to 1885 derived from quiet days alone differed in a systematic fashion from those derived from all days, and

*analogous results were obtained by Ellis *° at Greenwich for the period 1 889-1 896. The average excesses for the quiet-day over the all-day means in these two cases were as follows : —*

Westerly Declination.

Inclination.

Horizontal Force.

Vertical Force.

St Petersburg Greenwich

+0-24 +0-08

-0-23

+3-27

+3-3T

-0-87 -007

The sign of the difference in the case of D, I and H was the same in each year examined by Muller, and the same was true of H at Green- wich. In the case of V, and of D at Greenwich, the differences are

small and might be accidental. In the case of D at Greenwich 1 891 differed from the other years, and of two more recent years examined by Ellis 31 one, 1904, agreed with 1891. At Kew, on the average of the 1 1 years 1890 to 1900, the quiet-day mean annual value of declina- tion exceeded the ordinary day value, but the apparent excess o'-02 is too small to possess much significance.

Another property more recently discovered in quiet days is the non-cyclic change. The nature of this phenomenon will be readily understood from the following data from the 11-year Noa-cycllc ne T – lo ˆ ,390 to 1900 at Kew 32 . The mean daily change Change. f or a [] c j ays ; s ca l cu l a ted from the observed annual change.

D.

I.

H.

V.

Mean annual change Mean daily change, all days Mean daily change, quiet days

/

-579

— 0-016

+0-044

/

-2-38

— 0-007

-0-245

+25-97 +0-077

+3-34T

—22-67 —0-067 —0-847

Thus the changes during the representative quiet day differed from those of the average day. Before accepting such a phenomenon as natural, instrumental peculiarities must be carefully considered. The secular change is really based on the absolute instruments, the diurnal changes on the magnetographs, and the first idea likely to occur to a critical mind is that the apparent abnormal change on quiet days represents in reality change of zero in the magnetographs. If, however, the phenomenon were instrumental, it should appear equally on days other than quiet days, and we should thus have a shift of zero amounting in a year to over 1,2007 in H, and to about 90′ in I. Under such circumstances the curve would be continually drifting off the sheet. In the case of the Kew magnetographs, a careful investigation showed that if any instrumental change occurred in the declination magnetograph during the 1 1 years it did not exceed a few tenths of a minute. In the case of the H and V magnetographs at Kew there is a slight drift, of instrumental origin, due to weaken- ing of the magnets, but it is exceedingly small, and in the case of H is in the opposite direction

to the non-cyctic change on quiet days. It only remains to add that the hypothesis of instrumental origin was positively disproved by measurement of the curves on ordinary days.

It must not be supposed that every quiet day agrees with the aver- age quiet day in the order of magnitude, or even in the sign, of the non-cyclic change. In fact, in not a few months the sign of the non- cyclic change on the mean of the quiet days differs from that obtained for the average quiet day of a period of years. At Kew, between 1890 and 1900, the number of months during which the mean non-cyclic change for the five quiet days selected by the astronomer royal (Sir W. H. M. Christie) was plus, zero, or minus, was as follows : —

the data for Jan Mayen in these tables. Figs. 9 and 10 are vector diagrams for this station, for all and for quiet days during May, June and July 1883, according to data got out by Liideling. As shown by the arrows, fig. 10 (quiet days) is in the main described in the normal or clockwise direction, but fig. 9 (all days) is described in the opposite direction. Ludeling found this peculiar difference

Element.

D.

I.

H.

■ ‘ ”

V.

Number + „

—

63

H

55

13 16

IOI

112

n

9

47 9

74

The + sign denotes westerly movement in the declination, and in- creasing dip of the north end of the needle. In the case of I and H the excess in the number of months showing the normal sign is overwhelming. The following mean non-cyclic changes on quiet days are from other sources : —

Element.

Greenwich

(1890-1895).

Falmouth

(1898-1902).

Kolaba

(1 894-1901).

D H

+ 0-03 + 4-37

+ 0-05 + 3-07

r

+ 0-07 + 3-97

1 \ \ °’

V \ \ c 15\ \20\ I

Quiet Days

\ \ \ ‘

u\ \f S3—

East

8 «—

V

\

M,

Fig. 9.

Fig. 10.

The results are in the same direction as at Kew, + meaning in the case of D movement to the west. At Falmouth 32 , as at Kew, the non-cyclic change showed a tendency to be small in years of few sun-spots.

§ 30. In calculating diurnal inequalities from quiet days the non- cyclic effect must be eliminated, otherwise the result would depend on the hour at which the " day " is supposed to commence. If the value recorded at the second midnight of the average day exceeds that at the first midnight by N, the elimination is effected by apply- ing to each hourly value the correction N(i2-»)/24, where n is the hour counted from the first midnight (o hours). This assumes the change to progress uniformly throughout the 24 hours. Unless this is practically the case — a matter difficult either to prove or disprove — the correction may not secure exactly what is aimed at. This method has been employed in the previous tables. The fact that differences do exist between diurnal inequalities derived from quiet days and all ordinary days was stated explicitly in § 4, and is obvious in Tables VIII. to XI. An extreme case is represented by

between all and quiet days at all the north polar stations occupied in 1882-1883 except Kingua Fjord, where both diagrams were described clockwise.

In temperate latitudes the differences of type are much less, but still they exist. A good idea of their ordinary size and character in the case of declination may be derived from Table XXIX., con- taining data for Kew, Greenwich and Pare St MajLir.

The data for Greenwich are due to W. Ellis 30 , those for Pare St Maur to T. Moureaux 33 . The quantity tabulated is the algebraic excess of the all or ordinary day mean hourly value over the corre- sponding quiet day value in the mean diurnal inequality for the year. At Greenwich and Kew days of extreme disturbance have been excluded from the ordinary days,

but apparently not at Pare St Maur. The number of highly disturbed days at the three stations is, however, small, and their influence is not great. The differences disclosed by Table XXIX. are obviously of a systematic character, which would not tend to disappear however long a period was utilized. In short, while the diurnal inequality from quiet days may be that most truly representative of undisturbed conditions, it does not represent the average state of conditions at the station. To go into full details respecting the differences between all and quiet days would occupy undue space, so the following brief summary of the differences observed in declination at Kew must suffice. While the inequality range is but little different for the two types of days, the mean of the hourly differences from the mean for the day is considerably reduced in the quiet days. The 24-hour term in the Fourier analysis is of smaller amplitude in the quiet days, and its phase angle is on the average about 6°-75 smaller than on ordinary days, implying a retardation of about 27 minutes in the time of maximum. The diurnal inequality range is more variable throughout the year in quiet days than on ordinary days, and the same is true of the absolute ranges. The tendency to a secondary minimum in the range at midsummer is considerably more decided on ordinary than on quiet days. When the variation throughout the year in the diurnal inequality range is expressed in Fourier series, whose periods are the year and its submultiples, the 6-month term is notably larger for ordinary than for quiet days. Also the date of the maximum in the 12-month term is about three days earlier for ordinary than for quiet days. The exact size of the differences between ordinary and quiet day phenomena must depend to some extent on the criteria employed in selecting quiet days and in excluding disturbed days. This raises difficulties when it comes to comparing results at different stations. For stations near together the difficulty is trifling. The astronomer royal's quiet days have been used for instance at Pare St. Maur, Val Joyeux, Falmouth and Kew, as well as at Greenwich. But when stations are wide apart there are two obvious difficulties : first, the difference of local time; secondly, the fact that a day may be typically quiet at one station but appreciably disturbed at the other.

If the typical quiet day were simply the antithesis of a disturbed day, it would be natural to regard the non-cyclic change on quiet days as a species of recoil from some effect of disturbance. This view derives support from the fact, pointed out long ago by Sabine 34 , that the horizontal force usually, though by no means always, is lowered by magnetic disturbances. Dr van Bemmelen 35 who has examined non-cyclic phenomena at a number of stations, seems disposed to regard this as a sufficient explanation. There are, however, difficulties in accepting this view. Thus, whilst the non- cyclic effect in horizontal force and inclination at Kew and Falmouth appeared on the whole enhanced in years of sun-spot maximum,

the difference between years such as 1892 and 1894 on the one hand, and 1890 and 1900 on the other, was by no means proportional to the excess of disturbance in the former years. Again, when the average non-cyclic change of declination was calculated at Kew for 207 days, selected as those of most marked irregular disturbance between 1890 and 1900, the sign actually proved to be the same as fot the average quiet day of the period.

Table XXIX. — All or Ordinary, less Quiet

Day Hourly Values (+

to the West).

Hour.

Forenoon.

Afternoon.

Kew

Greenwich

Pare St Maur

Kew

Greenwich

Pare St Maur

1890-1900.

1 890-1894.

1883-1897.

1890-1900.

1 890-1 894.

1893-1897.

I

>

-0-58

-059

-0-63

+0-42

1 +0-44

+0-40

2

-o-54

-0-47

-o-47

+0-52

+o-45

+0-50

3

-051

-0-31

-0-32

+o-57

+0-52

+o-59

4

— 0-41

-0-23

— 0-16

+0-60

+0-51

+0-S5

5

-0-28

— o-io

— 0-01

+0-46

+0-34

+0-38

6

-0-08

+0-12

+o-i8

+0-21

+0-04

+0-07

7

+0-13

+0-30

+o-34

— 0-06

—0-24

-0-25

8

+0-29

+0-48

+0-47

—0-27

-050

-0-54

9

+0-40

+0-56

+o-53

-o-47

-o-68

-074

IO

+0-44

+0-58

+051

— o-6i

-078

-o-79

ii

*+o- 4 8

+0-50

-t-o-44

—062

-o-77

-079

12

+o-45

+o-44

+0-38

-o-54

— o-6i

—0-67

§ 31. A satisfactory definition of magnetic disturbance is about as difficult to lay down as one of heterodoxy. The idea in its generality seems to present no difficulty, but it is a very Magnetic different matter when one comes to details. Amongst Disturb- thg chie £ disturbances recorded since 1890 are those of ances. February 13-14 and August 12, 1892; July 20 and

August 20, 1894; March 15-16, and September 9, 1898; October 31, 1903; February 9-10, 1907; September 11-12, 1908 and Sep- tember 25, 1909. On such days as these the oscillations shown by the magnetic curves are large and rapid, aurora is nearly always visible in temperate latitudes, earth currents are prominent, and there is interruption — sometimes very serious — in the transmission of telegraph messages both in overhead and underground wires. At the other end of the scale are days on which the magnetic curves show practically no movement beyond the slow regular progression of the regular diurnal inequality. But between these two extremes there are an infinite variety of intermediate cases. The first serious attempt at a precise definition of disturbance seems due to General Sabine 35 °. His method had once an extensive vogue, and still continues to be applied at some important observatories. Sabine regarded a particular observation as disturbed when it differed from the mean of the observations

at that hour for the whole month by not less than a certain limiting value. His definition takes account only of the extent of the departure from the mean, whether the curve is smooth at the time or violently oscillating makes no difference. In dealing with a particular station Sabine laid down separate limiting values for each element. These limits were the same, irrespective of the season of the year or of the sun-spot frequency. A departure, for example, of 3'-3 at Kew from the mean value of declination for the hour constituted a disturbance, whether it occurred in December in a year of sun-spot minimum, or in June in a year of sun-spot maximum, though the regular diurnal inequality range might be four times as large in the second case as in the first. The limiting values varied from station to station, the size depending apparently on several considerations not very clearly defined. Sabine subdivided the disturbances in each element into two classes: the one tending to increase the element, the other tending to diminish it. He investigated how the numbers of the two classes varied throughout the day and from month to month. He also took account of the aggregate value of the disturbances of one sign, and traced the diurnal and annual variations in these aggregate values. He thus got two sets of diurnal variations and two sets of annual variations of disturbance, the one set depending only on the number of the disturbed hours, the other set considering only the aggregate value of the disturbances. Generally the two species of disturbance variations were on the whole fairly similar. The aggregates of the + and — disturbances for a particular hour of the day were seldom equal, and thus after the removal of the disturbed values the mean value of the element for that hour was generally altered. Sabine's complete scheme supposed that after the criterion was first applied, the hourly means would be recalculated from the undisturbed values and the criterion applied again, and that this process would be repeated until the disturbed observations all differed by not less than the accepted limiting value from the final mean based on undisturbed values alone. If the disturbance limit were so small that the disturbed readings formed a considerable fraction of the whole number, the complete execution of Sabine's scheme would be exceedingly laborious. As a matter of fact, his disturbed readings were usually of the order of 5 % of the total number, and unless in the case of exceptionally large magnetic storms it is of little conse- quence whether the first choice of disturbed readings is accepted as final or is reconsidered in the light of the recalculated hourly means.

Sabine applied his method to the data obtained during the decade 1840 to 1850 at Toronto, St Helena, Cape of Good Hope and Hobart, also to data for Pekin, Nertchinsk, Point Barrow, Port Kennedy and Kew. C. Chambers » applied it to data from Bombay. The yearly publication of the Batavia observatory gives corresponding

results for that station, and Th. Moureaux ' has published similar data for*

Pare St Maur. Tables XXX. to XXXII. are based on a selection of these data. Tables XXX. and XXXI. show the annual variation in Sabine's disturbances, the monthly values being expressed as percentages of the arith- metic mean value for the 12 months. The Pare St Maur and Batavia data, owing to the long periods included, are especially noteworthy. Table XXX. deals with the east (E) and west (W) disturbances of declination separately. Table XXXI., dealing with disturbances in horizontal and vertical force, combines the + and —disturbances, treated numeri- cally. At Pare St Maur the limits required to qualify for disturbance were 3'-o in D, 207 in H, and 127 in V; the corresponding limits for Batavia were i'-3, 117 and 117. The limits for D at Toronto, Bombay and Hobart were respectively 3'-6, l'-4 and 2'4

At Pare St Maur the disturbance data from all three elements give distinct maxima near the .equinoxes; a minimum at midwinter is clearly shown, and also one at midsummer, at least in D and H. A decline in disturbance at midwinter is visible at all the stations, but at Batavia the equinoctial values for D and V are inferior to those at midsummer.

Table XXXII. shows in some cases a most conspicuous diurnal variation in Sabine's disturbances. The data are percentages of

Table XXX. — Annual Variation of Disturbances (Sabine's numbers).

Pare St Maur

Toronto

Bombay

Batavia

Hobart

1883-97.

1841-48.

I859-65-

1883-99.

1843-48.

Month.

E.

W.

E.

W.

E.

W.

E.

W.

E.

W.

January

78

60

55

66

89

89

180

223

165

182

February

116

92

75

86

94

67

138

144

121

116

March

126

107

92

94

129

97

102

87

114

104

April .

105

“3

115

114

106

129

67

73

no

102

May .

101

118

101

101

63

99

72

71

62

53

June .

77

89

95

72

78

81

45

27

32

37

July .

82

104

140

126

121

173

62

46

^6

49

August

88

113

137

133

154

131

69

69

78

Septembe

t 134

137

103

139

III

108

135

144

135

114

October

119

“5

101

in

140

128

95

88

124

123

Novembe

r 99

94

73

85

43

43

106

91

79

in

Decembe

r 75

5«

5i

72

72

55

124

137

123

130

the totals for the whole 24 hours. But whilst at Batavia the easterly and westerly disturbances in D vary similarly, at Pare St Maur they follow opposite laws, the easterly showing a prominent maximum near noon, the westerly a still more prominent maximum near mid- night. The figures in the second last line of the table, if divided by 0-24, will give the percentage of hours which show the species of disturbance indicated. For instance, at Pare St Maur, out of 100 hours, 3 show disturbances to the west and 3-7 to the east; or in all 6-7 show disturbances of declination. The last line

gives the average size of a disturbance of each type, the unit being 1′ in D and 17 in H and V.

At Batavia disturbances increasing and decreasing the element are about equally numerous, but this is exceptional. Easterly disturb- ances of declination predominated at Toronto, Point Barrow, Fort Kennedy, Kew, Pare St Maur, Bombay and the Falkland Islands whilst the reverse was true of St Helena, Cape of Good Hope, Pekin and Hobart. At Kew and Pare St Maur the ratios borne by the

Table XXXI. — Annual Variation of Disturbances.

Pare St Maur.

Toronto.

Batavia.

Month.

Numbers.

Aggregates.

Numbers.

Aggregates.

January . February

H.

V.

H.

V.

H.

V.

H.

V.

5i

58

56

96

151

89

154

96

133

94

74

105

123

no

125

March . .

126

118

94

108

116

105

117

103

April . . .

94

in

150

149

104

76

105

73

May . . .

108

133

90

112

101

92

105

95

June . . .

90

85

36

50

82

69

79

66

July . . .

99

128

61

71

90

8.3

95

81

August .

113

92

75

108

91

91

98

91

September .

119

122

171

160

113

in

114

US

October .

101

94

148

129

114

89

104

86

November .

104

81

98

75

99

102

100

101

December

70

5i

128

100

89

108

84

no

MAGNETISM, TERRESTRIAL

375

Table XXXII. — Diurnal Variation of Disturbances

ˆSabine's nun

ibers).

Hour.

Pare St Maur.

Batavia.

D.

H.

V.

D.

H.

V.

E.

W.

+

-

+

-

E.

W.

+

-

+

-

o-3

IO-I

20-3

9-0

8-3

5-7

9-2

i-i

5-8

I3-I

6-6

4-0

7-4

3-6

12-3

8-2

8-4

8-0

6-4

10-4

7-6

7-3

14-2

4-8

6-3

IO-O

6-9

157

3-8

14-1

12-5

7-2

9-0

24-9

16-8

I2-I

9.9

21-2

21-7

9 — noon

16-2

5-i

18-0

15-6

12-9

15-4

38-5

33-0

8-6

15-8

I9'8

16-4

noon — 3

19-3

67

15-3

16-5

l8-2

18-3

18-8

24-7

16-8

2I-I

23-5

22-1

3-6

14-8

9-7

12-5

15-4

22-9

21-8

b-4

5-4

13-3

16-9

12-6

12-7

6-9

5-7

21-2

n-4

13-2

18-9

II-2

2-3

3-4

9.9

13-6

7-1

4-i

9 — 12

5-9

25-0

1 1 -2

10-5

7-«

47

0-4

3”8

12-0

n-i

5-6

5-4

*Mean number) per day . *

o-88

0-72

i-i5

1-56

1-04

0-96

0-46

0-44

1-62

l-6i

1-19

1-13

Mean size

1-72

1-69

18-0

19-5

107

15-5

eastern to the western disturbances were 1-19 and 1-23 respectively, and so not much in excess of unity ; but the preponderance of easterly

disturbances at the North American 37 stations was considerably larger than this.

§ 32. From the point of view of the surveyor there is a good deal to be said for Sabine's definition of disturbance, but it is less satis- factory from other standpoints. One objection has been already indicated, viz. the arbitrariness of applying the same limiting value at a station irrespective of the size of the normal diurnal range at the time. Similarly it is arbitrary to apply the same limit between 10 a.m. and noon, when the regular diurnal variation is most rapid, as between 10 p.m. and midnight, when it is hardly appreciable. There seems a distinct difference of phase between the diurnal inequalities on different types of days at the same season; also the phase angles in the Fourier terms vary continuously throughout the year, and much more rapidly at some stations and at some seasons than at others. Thus there may be a variety of phenomena which one would hesitate to regard as disturbances which contribute to the annual and diurnal variations in Tables XXX. to XXXII.

Sabine, as we have seen, confined his attention to the departure of the hourly reading from the mean for that hour. Another and equally natural criterion is the apparent character of the magneto- graph curve. At Potsdam curves are regarded as " 1 " quiet, " 2 " moderately disturbed, or " 3 " highly disturbed. Any hourly value to which the numeral 3 is attached is treated as disturbed, and the annual Potsdam publication contains tables giving the annual and diurnal variations in the number of such disturbed hours for D, H and V. According to this point of view, the extent to which the hourly value departs from the mean for that hour is immaterial to the results. It is the greater or less sinuosity and irregularity of the curve that counts. Tables XXXIII. and XXXIV. give an abstract of the mean Potsdam results from 1892 to 1901. The data are per- centages: in Table XXXIII. of the mean monthly total, in Table XXXIV. of the total for the day. So far as the annual variation is concerned, the results in Table XXXIII. are fairly similar to those in Table XXX. for Pare St Maur. There are pronounced maxima near the equinoxes, especially the spring equinox. The diurnal

Table XXXIII. — Annual Variation of Potsdam Disturbances.

Element.

Jan.

Feb.

Mar.

April.

May.

June.

July.

Aug.

Sept.

Oct.

Nov.

Dec.

D H

V

129 109 106

170 133 171

149

131 170

90 102 108

86 109 121

57 82

56

62 94 64

64 91

74

99 89 93

118 101

87

94

75 78

82 84

7°

Mean

115

158

150

100

105

65

73

76

94

102

82

79

Table XXXIV. — Diurnal Variation of Potsdam Disturbances

Hours.

1-3-

4-6.

7-9-

10-noon.

1-3-

4-6.

7-9-

IO-I2.

D H

V

14-9 105 13-5

ii-i

8-4 9-7

80

8-o

5-7

5-2 8-5- 4-7

57

n-3

8-5

I3-I

17-6 17-2

22-5 19-2 21-5

i9‘5

16-5 19-2

Mean

13-0

9-7

7-2

6-1

8-5

16-0

2I-I

i8-4

variations, however, in Tables XXXII. and XXXIV. are dissimilar. Thus in the case of H the largest disturbance numbers at Pare St Maur occurred between 6 a.m. and 6 p.m., whereas in Table XXXIV. they occur between 4 p.m. and midnight. Considering the comparative proximity of Pare St Maur and Potsdam, one must conclude that the apparent differences between the results for these two stations are due almost entirely to the difference in the definition of disturbance.

One difficulty in the Potsdam pro- cedure is the maintenance of a uniform standard. Unless very frequent refer- ence is made to the curves of some standard year there must be a ten- dency to enter under " 3 " in quiet years a number of hours which would be entered under " 2 " in a highly disturbed year. Still, such a source of uncertainty is unlikely to have much influence on the diurnal, or even on the annual, variation.

§ 33. A third method of investigating a diurnal period in disturb- ances is to form a diurnal inequality from disturbed days alone, and compare it with the corresponding inequalities from ordinary or from quiet days. Table XXXV. gives some declination data for Kew, the quantity tabulated being the algebraic excess of the disturbed day hourly value over that for the ordinary day in the mean diurnal inequality for the year, as based on the 11 years 1890 to 1900.

The disturbed day inequality was corrected for non-cyclic change in the usual way. Fig. 1 1 shows the results of Table XXXV. graphi- cally. The irregularities are pre- sumably due to the limited number, 209, of disturbed days employed ; to get a smooth curve would require probably a considerably longer period of years. The differences between disturbed and ordinary days at Kew are of the same general character as those between ordinary and quiet days in Table XXIX.; they are, however, very much larger, the range in Table XXXV. being fully $i times that in Table XXIX. If quiet days had replaced ordinary days in Table XXXV., the algebraic excess of the disturbed day would have varied from -r-2'7 at 2 p.m. to —4' 1 at 11 p. m., or a range of 6'-8.

§ 34. When the mean diurnal inequality in declination for the year at Kew is analysed into Fourier waves, the chief difference, it will be remembered, between ordinary and quiet days was that the ampli- tude of the 24-hour term was enhanced in the ordinary days, whilst its phase angle indicated an earlier occurrence of the maximum. Similarly, the chief difference between the Fourier waves for the disturbed and ordinary day inequalities at Kew is the increase in the amplitude of the 24-hour term in the former by over 70%, and the earlier occurrence of its maximum by about 1 hour 50 minutes. It is clear from these results for Kew, and it is also a neces- sary inference from the differences ob- tained by Sabine's method between east and west or + and — disturbances, that there is present during disturbances some influence which affects the diurnal inequality in a regular systematic way, tending to make the value of the element higher during some hours and lower during others than it is on days relatively free from disturbance. At Kew the consequence is a notable in- crease in the range of the regular diurnal inequality on disturbed days; but whether this is the general rule or merely a local peculiarity is a subject for further research.

§ 35. There are still other ways of attack- ing the problem of disturbances. W. Ellis CT made a complete list of disturbed days at Greenwich from 1848 onwards, arranging them in classes according to the amplitude of the disturbance shown on the curves.

Table XXXV. — Disturbed Day less ordinary Day Inequality (Unit I'. + to West).

Hour.

1

2

3

4

5

6

7

8

9

10

II

12

a.m. p.m.

-3-4 + 1-8

-2-6

+ 2-2

— 2-0

+ 2-1

-0-3 + 1-7

+ 1-6

+ 1-4

+ 1-9

0-0

+2-3 -1-3

+ 2-0 -2-8

+2-1

-3-5

+2-0 -2-6

+ 1-6

-3-5

+ 1-8 -2-4

Of the 18,000 days which he considered, Ellis regarded 2,119, or only about 12%, as undisturbed. On 11,898 days, ot 66 , the disturbance movement in de- clination was under 10'; on 3614, or 20, the disturbance, though exceeding 10', was under 30'; on 294 days it lay

between 30′ and 60′ ; while on 75 days it exceeded 60′. Taking each class of disturbances separately, Ellis found, except in the case of his ” minor ” disturbances — those under 10′ — a distinct double annual period, with maxima towards the equinoxes. Subsequently C. W. Maunder, 38 making use of these same data, and of subsequent data up to 1902, put at his disposal by Ellis, came to similar conclu- sions. Taking all the days with disturbances of declination over 10′, and dealing with 15-day periods, he found the maxima of fre- quency to occur the one a little before the spring equinox, the other apparently after the autumnal equinox; the two minima were found to occur early in June and in January. When the year is divided into three seasons — winter (November to February), summer (May to August), and equinox — Maunder’s figures lead to the results assigned to Greenwich disturbed days in Table XXXVI. The frequency in winter, it will be noticed, though less than at equinox, is con- siderably greater than in summer. This greater frequency in winter is only slightly apparent in the disturbances over 60′, but their number is so small that this may be accidental. The next figures in Table XXXVI. relate to highly disturbed days at Kew. The larger relative frequency at Kew in winter as compared to summer probably indicates no real difference from Greenwich, but is simply a matter of definition. The chief criterion at Kew for classifying the days was not so much the mere amplitude of the largest move- ment, as the general character of the day’s curve and its departure from the normal form. The data in Table XXXVI. as to magnetic storms at Greenwich are based on the lists given by Maunder 39 in the Monthly Notices, R.A.S. A storm may last for any time from a few hours to several days, and during part of its duration the disturbance may not be very large; thus it does not necessarily follow that the frequencies of magnetic storms and of disturbed days will follow the same laws. The table shows, however, that so far as Greenwich is concerned the annual variations in the two cases are closely alike. In addition to mean data for the whole 56 years, 1848 to 1903, Table

XXXVI. contains separate data for the 14 years of that period which represented the highest sun-spot frequency, and the 15 years which represented lowest sun-spot frequency. It will be seen that rela- tively considered the seasonal frequencies of disturbance are more nearly equal in the years of many than in those of few sun-spots. Storms are more numerous as a whole in the years of many sun-spots, and this preponderance is especially true of storms of the largest size. This requires to be borne in mind in any comparisons between larger and smaller storms selected promiscuously from a long period. An “unduly large proportion of

the larger storms will probably come from years of large sun-spot frequency, and there is thus a risk of assigning to differences between the laws obeyed by large and small storms phenomena that are due in whole or in part to differences between the laws followed in years of many and of few sun-spots. The last data in Table XXXVI. are based on statistics for Batavia given by W. van Bemmelen, 40 who considers separately the storms which commence suddenly and those which do not. These sudden movements are recorded over large areas, sometimes probably all over the earth, if not absolutely simultaneously, at least too nearly so for differences in the time of occurrence to be shown by ordinary magnetographs. It is ordinarily supposed that these sudden move- ments, and the storms to which they serve as precursors, arise from some source extraneous to the earth, and that the commencement of the movement intimates the arrival, probably in the upper atmo- sphere, of some form of energy transmitted through space. In the storms which commence gradually the existence of a source external to the earth is not so prominently suggested, and it has been some- times supposed that there is a fundamental difference between the two classes of storms. Table XXXVI. shows, however, no certain difference in the annual variation at Batavia. At the same time, this possesses much less significance than it would have if Batavia were a station like Greenwich, where the annual variation in magnetic storms is conspicuous.

Besides the annual period, there seems to be also a well-marked diurnal period in magnetic disturbances. This is apparent in Tables

XXXVII. and XXXVIII., which contain some statistics for Batavia due to van Bemmelen, and some for Greenwich derived from the data in Maunder's. papers referred to above. Table XXXVII. gives the relative frequency of occurrence for two hour intervals, starting with midnight, treating separately the storms of gradual (g) and sudden (s) commencement. In Table XXXVIII. the day is subdivided into three equal parts. Batavia and Greenwich agree in showing maximum frequency of beginnings about the time of minimum frequency of endings and conversely; but the hours at which the respective maxima and minima occur at the two places differ rather notably.

§ 36. There are peculiarities in the sudden movements ushering in magnetic storms which deserve fuller mention. According to van Bemmelen the impulse consists usually at some stations of a sudden slight jerk of the magnet in one direction, followed by a larger decided movement in the opposite direction, the former being often indistinctly shown. Often we have at the very com- mencement but a faint outline, and thereafter a continuous movement which is only sometimes distinctly indicated, resulting after some minutes in the displacement of the trace by a finite amount from the position it occupied on the paper before the disturbance

began.

Table XXXVI. — Disturbances, and their Annual Distribution.

Total

Percentages.

Number.

Winter.

Equinox.

Summer.

Greenwich disturbed days,

all, 1848-1902 .

4,214

33 – 9

39-2

26-9

Greenwich disturbed davs,

range 10′ to 30’, 1848-

3. 8 3°

33‘9

39-0

27-1

Greenwich disturbed days,

range 30′ to 60’, 1848-

3°7

34-5

41-0

24-4

Greenwich disturbed days,

range over 60', 1848-

r !902

77

29-9

41-6

28-6

Kew highly disturbed days,

1890-1900 ....

209

38-3

41-6

20-I

Greenwich magnetic

storms, all, 1848-1903 .

726

32-1

42-3

25-6

Greenwich magnetic

storms, range 20′ to 30',

1 848-1 903 ....

392

30-1

43-6

26-3

Greenwich magnetic

storms, range over 30',

1848-1903 ….

334

34-4

40-7

24-9

Greenwich magnetic

storms, all, 14 years of

258

35-3

38-0

26-7

Greenwich magnetic

storms, all, 15 years of

127

28-4

48-0

23-6

Batavia magnetic storms,

all, 1 883-1 899 . . .

1,008

32-9

34-9

3 2-2

Batavia magnetic storms

of gradual commence-

679

32-4

34-8

32-8

Batavia magnetic storms

of sudden commence-

1 329

33-7

35-3

31-0

This may mean, as van Bemmelen supposes, a small preliminary movement in the opposite direction to the clearly shown displace- mentˆ but it may only mean that the magnet is initially set in vibration, swinging on both sides of the position of equilibrium, the real displacement of the equilibrium position being all the time in the direction of the displacement apparent after a few minutes. To prevent misconception, the direction of the dis- placement apparent after a few minutes has been termed the direc-

Table XXXVII.— Batavia Magnetic Storms, Diurnal Distribution (percentages).

Hour.

2

4

6

8

10

12

14

16

18

20

22

Beginning \ |

5

7

5 5

5

7

6 10

20 10

16 11

7 10

5 8

6

8

9 9

8 8

8

7

Maximum] ˆ

12

10

6

5

4

9

9

6

6

6

12

15

H

V

,S

2

2

9

9

S

8

10

IS

lb

End all

15

16,

19

13

5

3

6

5

4

5

4

5

tion of the first decided movement in Table XXXIX., which contains some data as to the direction given by Ellis 4l and van Bemmelen. 40 The + sign means an increase, the — sign a decrease of the element. The sign is not invariably the same, it will be understood, but there are in all cases a marked preponderance of changes in the direction shown in the table. The fact that all the stations indicated an increase in horizontal force is of special significance.

Table XXXVIII. — Greenwich Magnetic Storms, Diurnal Distribution.

Epoch.

Class.

Total Number.

Percentages.

1-8 p.m.

9 p. m.~ 4 a.m.

5 a.m.- noon.

Beein- { l8 48-ioo3

• gm] 1882-190?

ning I '

(1 848-1903

End j 1 882-1903

all sudden

all sudden

721

276

77

720 276

77

6o-i

58-0 45-4

9.4

7-2

n-7

21-9 18-8 27-3

44-6 41-7

35-i

18-0 23-2 27-3

46-0

5i-i

53-2

§ 37. That large magnetic disturbances occur simultaneously over large areas was known in the time of Gauss, on whose initiative observations were taken at 5-minute intervals at a number of stations

on prearranged term days. During March 1879 and August 1880 some large magnetic storms occurred, and the magnetic curve? showing these at a number of stations fitted with Kew pattern magnetographs were compared by W. G. Adams. 42 He found the more characteristic movements to be, so far as could be judged, simultaneous at all the stations. At comparatively near stations

Table XXXIX. — Direction of First Decided Movement.

Place.

Declination.

Horizontal Force.

Vertical Force.

Pavlovsk

West

+

+

Potsdam

West

+

Greenwich

West

+

+

Zi-ka-wei

East

+

Kolaba

East

+

—

Batavia

West

+

—

Mauritius .

East

+

+

Cape Horn

West

+

such as Stonyhurst and Kew, or Coimbra and Lisbon, the curves were in general almost duplicates. At Kew and St Petersburg there were usually considerable differences in detail, and the move- ments were occasionally in opposite directions. The differences between Toronto, Melbourne or Zi-

ka-wei and the European stations were still more pronounced. In 1&96, on the initiative of M. Eschenhagen, 43 eye observations of declination and horizontal force were taken at 5-second intervals during prearranged hours at Batavia, Manila, Melbourne and nine European stations. The data from one of these occasions when appreciable disturbance prevailed were published by Eschenhagen, and were subsequently analysed by Ad. Schmidt. 44 Taking the stations in western Europe, Schmidt drew several series of lines, each series representing the disturbing forces at one instant of time as deduced from the departure of the elements at the several stations from their undisturbed value. The lines answering to any one instant had a general sameness of direction with more or less divergence or convergence, but their general trend varied in a way which suggested to Schmidt the passage of a species of vortex with large but finite velocity.

The conclusion that magnetic disturbances tend to follow one another at nearly equal intervals of time has been reached by several independent observers. J. A. Broun 45 pronounced for a period of about 26 days, and expressed a belief that a certain zone, or zones, of the sun's surface might exert a prepotent influence on the earth's magnetism during several solar rotations. Very similar views were advanced in 1904 by E. W. Maunder, 39 who was wholly unaware of Broun's work. Maunder concluded that the period was 27-28 days, coinciding with the sun's rotation period relative to an observer on the earth. Taking magnetic storms at Greenwich from 1882 to 1903, he found the interval between the commencement of successive storms to approach closely to the above period in a considerably larger number of instances than one would have expected from mere chance. He found several successions of three or four storms, and in one instance of as many as six storms, showing his interval. In a later paper Maunder reached similar results for magnetic storms at Greenwich from 1848 to 1881. Somewhat earlier than Maunder, Arthur Harvey 46 deduced a period of 27-246 days from a consideration of magnetic disturbances at Toronto. A. Schuster, 4 ' examining Maunder's data mathematically, concluded that they afforded rather strong evidence of a period of about § (27-28) or 13-6 days. Maunder regarded his results as demon- strating that magnetic disturbances originate in the sun. He regarded the solar action as arising from active areas of limited extent on the sun's surface, and as propagated along narrow, well defined streams. The active areas he believed to be also the seats of the formation of sun-spots, but believed that their activity might precede and outlive the visible existence of the sun-spot.

Maunder did not discuss the physical nature of the phenomenon, but his views are at least analogous to those propounded somewhat earlier by Svante Arrhenius, 48 who suggested that small negatively charged particles are driven from the sun by the repulsion of light and reach the earth's atmosphere, setting up electrical currents, manifest in aurora and magnetic

disturbances. Arrhenius's cal- culations, for the size of particle which he regarded as most probable, make the time of transmission to the earth slightly under two days. Amongst other theories which ascribe magnetic storms to direct solar action may be mentioned that of Kr. Birkeland, 49 who believes the vehicle to be cathode rays. Ch. Nordmann 60 similarly has suggested Rontgen rays. Supposing the sun the ultimate source, it would be easier to discriminate between the theories if the exact time of the originating occurrence could be fixed. For instance, a disturbance that is propagated with the velocity of light may be due to Rontgen rays, but not to Arrhenius's particles. In support of his theory, Nordmann mentions several cases when conspicuous visual phenomena on the sun have synchronized with magnetic movements on the earth — the best known instance being the ap- parent coincidence in time of a magnetic disturbance at Kew on the 1st of September 1859 with a remarkable solar outburst seen by R. C. Carrington. Presumably any electrical phenomenon on the sun will set up waves in the aether, so transmission of electric

and magnetic disturbances from the sun to the earth with the velocity of light is a certainty rather than a hypothesis; but it by no means follows that the energy thus transmitted can give rise to sensible magnetic disturbances. Also, when considering Nordmann's coincidences, it must be remembered that magnetic movements are so numerous that it would be singular if no apparent coincidences had been noticed. Another consideration is that the movements shown by ordinary magnetographs are seldom very rapid. During some, storms, especially those accompanied by unusually bright and rapidly varying auroral displays, large to and fro movements follow one another in close succession, the changes being sometimes too quick to be registered distinctly on the photographic paper. This, however, is exceptional, even in polar regions where disturbances are largest and most numerous. As a rule, even when the change in the direction of movement in the declination needle seems quite sudden, the movement in one direction usually lasts for several minutes, often for 10, 15 or 30 minutes. Thus the cause to which magnetic disturbances are due seems in many cases to be persistent in one direction for a considerable time.

§ 38. Attempts have been made to discriminate between the theories as to magnetic storms by a critical examination of the phenomena. A general connexion between sun-spot frequency and the amplitude of magnetic movements, regular and irregular, is generally admitted. If it is a case of cause and effect, and the interval between the solar and terrestrial phenomena does not exceed a few hours, then there should be a sensible connexion between corresponding daily values of the sun-spot frequency and the magnetic range. Even if only some sun-spots are effective, we should expect when we select from a series of years two groups of days, the one containing the days of most sun-spots, the other the days of least, that

a prominent difference will exist between the mean values of the absolute daily magnetic ranges for the two groups. Conversely, if we take out the days of small and the days of large magnetic range, or the days that are conspicuously quiet and those that are highly disturbed, we should expect a prominent difference between the corresponding mean sun-spot areas. An application of this principle was made by Chree 23 to the five quiet days a month selected by the astronomer royal between 1890 and 1900. These days are very quiet relative to the average day and possess a much smaller absolute range. One would thus have expected on Birkeland's or Nordmann's theory the mean sun-spot frequency derived from Wolfer's provisional values for these days to be much below his mean value, 41-22, for the eleven years. It proved, however, to be 41-28. This practical identity was as visible in 1892 to 1895, the years of sun-spot maximum, as it was in the years of sun-spot minimum. Use was next made of the Greenwich projected sun-spot areas, which are the result of exact measurement. The days of each month were divided into three groups, the first and third — each normally of ten days — containing respectively the days of largest and the days of least sun-spot area. The mean sun-spot area from group I was on the average about five times that for group 3. It was then investigated how the astronomer royal's quiet days from 1890 to 1900, and how the most disturbed days of the period selected from the Kew 24 magnetic records, dis- tributed themselves among the three groups of days. Nineteen months were excluded, as containing more than ten days with no sun-spots. The remaining 113 months contained 565 quiet and 191 highly disturbed days, whose distribution was as follows:

Quiet days Disturbed days

Group 1.

Group 2.

Group 3.

179 68

195

65

191

58

The group of days of largest sun-spot area thus contained slightly under their share of quiet days and slightly over their share of disturbed days.

The differences, however, are not large, and in three years, viz. 1895, 1897 and 1899, the largest number of dis- turbed days actually occurred in group 3, while in 1895, 1896 and 1899 there were fewer quiet days in group 3 than in group I. Taking the same distribution of days, the mean value of the absolute daily range of declination at Kew was calculated for the group 1 and the group 3 days of each month. The mean range from the group I days was the larger in 57 % of the individual months as against 43 % in which it was the smaller. When the days of each month were divided into groups according to the absolute declination range at Kew, the mean sun-spot area for the group I days (those of largest range) exceeded that for the group 3 days (those of least range) in 55% of the individual months, as against 45% of cases in which it was the smaller.

Taking next the five days of largest and the five days of least range in each month, sun-spot areas were got out not merely for these days themselves, but also for the next subsequent day and the four immediately preceding days in each case. On Arrhenius's theory we should expect the magnetic range to vary with the sun-spot area, not on the actual day but two days previously. The following figures give the percentage excess or deficiency of the mean sun-spot area for the respective groups of days, relative to the average value for the whole epoch dealt with, n denotes the day to which the magnetic range belongs, n+i the day after, n-i the day before, and

so on. Results are given for 1894 and 1895, the years which were on the whole the most favourable and the least favourable for Arrhenius's hypothesis, as well as for the whole eleven years.

Table XL.

Day.

re — 4

n-3

n— 2

re — 1

re

n+i

Five days of 1 1895 largest range J 1 1 yrs .

Five days of 1ˆ94 least range Lj 9 ˆ

+ 12 -16 + 9 -15 + 17 – 4

+ 9 -17 + 8 -17 + 10

- 4

+ 11 -15 + 8 -19 + 1 – 7′

+ 12

— 12

+ 7

—21

— 2

— 7

+ 11

— H

+ 5

—21

— 2

— 7

+6

- 10 + 0-5 -19

- 4

- 6

Taking the 11-year-means we have the sun-spot area practically normal on the day subsequent to the representative day of large magnetic range, but sensibly above its mean on that day and still more so on the four previous days. This suggests an emission from the sun taking a highly variable time

to travel to the earth. The 1 1 -year mean data for the five days of least range seem at first sight to point to the same conclusion, but the fact that the deficiency in sun-spot area is practically as prominent on the day after the representative day of small magnetic range as on that day itself, or the previous days, shows that the phenomenon is probably a secondary one. On the whole, taking into account the extraordinary differences between the results from individual years, we seem unable to come to any very positive conclusion, except that in the present state of our knowledge little if any clue is afforded by the extent of the sun's spotted area on any particular day as to the magnetic conditions on the earth on that or any individual subsequent day. Possibly some more definite information might be extracted by considering the extent of spotted area on different zones of the sun. On theories such as those of Arrhenius or Maunder, effective bombardment of the earth would be more or less confined to spotted areas in the zones nearest the centre of the visible hemisphere, whilst all spots on this hemisphere contribute to the total spotted area. Still the projected area of a spot rapidly diminishes as it approaches the edge of the visible hemisphere, i.e. as it recedes from the most effective position, so that the method employed above gives a preponderating weight to the central zones. One rather noteworthy feature in Table XL. is the tendency to a sequence in the figures in any one row. This seems to be due, at least in large part, to the fact that days of large and days of small sun- spot area tend to occur in groups. The same is true to a certain extent of days of large and days of small magnetic range, but it is unusual for the range to be much above the average for more than 3 or 4 successive days.

§ 39. The records from ordinary magnetographs, even when run at the usual rate and with normal sensitiveness, not infrequently show Pulsations. a repet'" 011 °f regular or nearly regular small rhythmic ' movements, lasting sometimes for hours. The amplitude and period on different occasions both vary widely. Periods of 2 to 4 minutes are the most common. W. van Bemmelen 61 has made a minute examination of these movements from several years' traces at Batavia, comparing the results with corresponding statistics sent him from Zi-ka-wei and Kew. Table XLI. shows the diurnal variation in the frequency of occurrence of these small movements — called pulsations by van Bemmelen — at these three stations. The Batavia results are from the years 1885 and 1892 to 1898. Of the two sets of data for Zi-ka- wei (i) answers to the years 1897, 1898 and 1900, as given by van Bemmelen, while (ii) answers to the period 1900-1905, as given in the Zi-ka-wei Bulletin for 1905. The Kew data are for 1897. The results are expressed as percentages of the total for the 24 hours. There is a remarkable contrast be- tween Batavia and Zi-ka-wei on the one hand and Kew on the other, pulsations being much more numerous by night than by day at the two former stations, whereas at Kew the exact

reverse holds. Van Bemmelen decided that almost all the occasions of pulsation at Zi-ka-wei were also occasions of pulsations at Batavia. The hours of commence- ment at the two places usually differed a little, oc- casionally by as much as 20 minutes; but this he ascribed to the fact that the earliest oscillations were too small at one or other of the stations to be visible on the trace. Remarkable coincidence between pulsations at Potsdam and in the north of Norway has been noted by Kr. Birkeland. 49

With magnetographs of greater sensitiveness and more open time scales, waves of shorter period be- come visible. In 1882 F. Kohlrausch 62 detected waves with a period of about 12 seconds. Eschen- hagen 53 observed a great variety of short period waves, 30 seconds being amongst the most common. Some of the records he obtained suggest the superposition of regular sine waves of different periods. Employing a very sensitive galvanometer to

record changes of magnetic induction through a coil traversed by the earth's lines of force, H. Ebert 64 has observed vibrations whose periods are but a small fraction of a second Til's observations of Kohlrausch and Eschenhagen preceded the recent great develop- ment of applications of electrical power, while longer period waves are shown in the Kew curves of 50 years ago, so that the existence of natural waves with periods of from a few seconds uc to several minutes can hardly be doubted. Whether the much shorter period waves of Ebert are also natural is more open to doubt, as it is becoming exceedingly difficult in civilized countries to escape artificial disturbances.

Table XLI. — Diurnal Distribution of Pulsations.

Hours.

0-3-

3-6-

6-9.

9-Noon.

Noon-3.

3-6-

6-9.

,9-12.

Batavia Zi-ka-wei (i) ,, (ii) Kew

28 33 23

4

9

5 6 8

2

2

8

19

6

7 11

14

8

4

7

22

6

4

5

18

13 10

14

111

28

35 26

4

*§ 40. The fact that the moon exerts a small but sensible effect on the earth's magnetism seems to have been first discovered in 1841 by C. Kreil. Subsequently Sabine 65 investigated the nature of the lunar diurnal variation in declination *- unar at Kew, Toronto, Pekin, St Helena, Cape of Good Hope ’”“‘ence. and Hobart. The data in Table XLII. are mostly due to Sabine. They represent the mean lunar diurnal inequality in declination for the whole year. The unit employed is o'-ooi, and as in our previous tables + denotes movement to the west. By ” mean departure ” is meant the arithmetic mean of the 24 hourly departures from the mean value for the lunar day; the range is the difference between the algebraically greatest and least of the hourly values. Not infrequently the mean departure gives the better idea of the importance of an inequality, especially when as in the present case two maxima and minima occur in the day. This double daily period is unusually prominent in the case of the lunar diurnal inequality, and is seen in the other elements as well as in the declination.*

Lunar action has been specially studied in connexion with observations from India and Java. Broun 66 at Trivandrum and C. Chambers 67 at Kolaba investigated lunar action from a variety of aspects. At Batavia van der Stok 58 and more recently S. Figee 69 have carried out investigations involving an enormous amount of computation. Table XLIII. gives a summary of Figee's results for the mean lunar diurnal inequality at Batavia, for the two half- yearly periods April to September (Winter or W.), and October to March (S.). The + sign denotes movement to the west in the case of declination, but numerical increase in the case of the other elements. In the case of H and T (total force) the results for the two seasons present comparatively small differences, but in the case of D, I and V the amplitude and phase both differ widely. Consequently a mean lunar diurnal variation derived from all the months of the year gives at Batavia, and presumably at other

Table XLII. — Lunar Diurnal Inequality of Declination (unit o'-ooi).

Lunar

Kew.

Toronto.

Batavia.

St Helena.

Cape.

Hobart.

Hour.

1858-1862.

1 843-1848.

1883-1899.

1 843-1 847.

1 842-1 846.

1 841-1848.

+ 103

+315

-70

- 43

-148

- 98

1

+ 160

+275

-63

- 5

-107

-138

2

+ 140

+ 158

-39

+ 37

- 35

-142

3

+ 33

+ 2

- 8

+ 70

+ 43

— 107

4

+ 10

-153

+38

+ 85

+ 108

- 45

5

- 67

-265

+63

+ 77

+ 140

+ 27

6

-150

-302

+87

+ 48

+ 132

+ 88

7

-188

-255

+77

+ 5

+ 82

+ 122

8

— 160

-137

+40

- 43

+ 5

+ 120

9

- 78

+ 7

- 4

- 82

- 78

+ 82

10

+ 2

+ 178

-45

— 102

-143

+ 17

11

+ 92

+288

-80

- 98

-177

- 57

12

+ 160

+323

-87

- 73

-165

— 120

13

+ 188

+272

-68

- 32

— 112

-152

H

+ 158

+ 148

-43

+ 13

- 30

-147

15

+ 9°

- 17

- 8

+ 52

+ 58

-105

16

+ 10

-180

+30

+ 73

+ 132

- 35

17

- 85

-297

+62

+ 73

+ 172

+ 45

18

— 142

-337

+72

+ 52

+ 168

+ 112

19

-163

— 290

+68

+ 17

+ 122

+ 152

20

-147

— 170

+52

- 25

+ 45

+ 152

21

-123

- 7

+ 8

- 58

- 40

+ 113

22

- 40

+ 155

-28

- 73

— 112

+ 47

23

+ 27

+265

-56

- 68

-153

- 30

Mean De-) parture)

105

200

50

54

104

93

Range

376

660

174

187

1 349

304

MAGNETISM, TERRESTRIAL

Table XLIII.—

Lunar Diurna

Inequality at

Batavia in Winter and Summer.

Declination

Inclinationˆ.

H.

V.

T.

(unit C

•001).

(unite

‘•001).

(unit (

)-0I T).

(unit

3-017).

(unit 0-017).

Lunar Hour.

W.

S.

W.

S.

W.

S.

W.

S.

W.

S.

o

+3°

— 170

— 1

+25

-15

- 56

- 9

+ 4

- 17

-47

I

+21

-147

-23

+49

-40

- 87

-54

+20

- 61

-67

2

+ 5

- 83

-49

+69

-25

-107

-82

+37

- 62

-76

3

- 5

— 12

-51

+47

— 21

- 76

-83

$+24$

-59

-55

4

$+i$

$+76$

-37

$+43$

-13

-59

-58

$+18$

-39

-38

5

-8

$+134$

-23

$+12$

$+10$

-9

-27

$+11$

-4

- 3

6

- 7

+ 181

— 2

— 21

+21

+ 43

+ 9

- 6

+ 23

+35

7

— 10

+ 164

+3°

— 12

+23

+ 45

+55

+ 8

+ 47

+43

8

- 7

+ 86

+36

—21

+38

+ 52

+7i

— 1

+ 68

+45

9

- 8

+28

-23

+46

+ 30

+64

-16

+ 71

+ 19

IO

- 5

- 85

+34

— 20

+ 13

+ 13

+54

— 21

+ 38

+ 1

ii

-15

-144

+27

— 11

— 12

- 6

+3i

-19

+ 5

-15

12

- 9

— 164

+ 19

- 5

-47

- 23

-19

- 4i

-29

13

+ i

-136

- 3

+ 17

-59

- 46

-36

— 2

- 69

-41

H

- 7

- 79

-13

+27

-66

- 44

-55

+ 14

- 84

-32

15

- 8

- 8

-32

+25

-53

- 37

-74

+ 14

- 82

-26

16

— 12

+ 72

-37

+25

-34

- 17

-70

+26

- 64

— 2

17

-13

+ 137

-33

+ 4

— 1

+ 28

-47

+21

- 24

+35

18

— 21

+ 165

— 2

— 10

+20

+ 47

+ 8

+ 12

+ 21

+47

19

— 12

$+147$

$+21$

-42

$+44$

$+81$

$+53$

-14

$+64$

$+64$

20

$+10$

$+95$

$+21$

-62

$+75$

$+107$

$+7i$

-28

$+100$

$+80$

21

$+13$

$+4$

$+26$

-70

+65

+ 98

+72

-44

+ 92

+65

22

+ 25

- 82

+35

-41

+35

+ 35

+68

-38

+ 64

+ 12

23

+36

-147

+34

- 4

- 7

- 14

+44

-13

+ 15

-19

MeanDe- i parture \

12

150

26

29

33

48

50

18

51

37

Range

57

35i

87

139

141

214

155

tropical stations, an inadequate idea of the importance of the lunar influence. In January Figee finds for the range of the lunar diurnal inequality 0-62 in D, 3-17 in H and 3-57 in V, whereas the corresponding ranges in June are only o'-i3, 1-17 and 2-27 respectively. The difference between summer and winter is essen- tially due to solar action, thus the lunar influence on terrestrial magnetism is clearly a somewhat complex phenomenon. From a study of Trivandrum data, Broun concluded that the action of the moon is largely dependent on the solar hour at the time, being on the average about twice as great for a day hour as for a night hour. Figee's investigations at Batavia point to a similar conclusion. Following a method suggested by Van der Stole, Figee arrives at a numerical estimate of the " lunar activity " for each hour of the solar day, expressed in terms of that at noon taken as 100. In summer, for instance, in the case of D he finds the " activity " varying from 114 at 10 a.m. to only 8 at 9 p.m.; the corresponding extremes in the case of H are 139 at 10 a.m. and 54 at 6 a.m.

The question whether lunar influence increases with sun-spot frequency is obviously of considerable theoretical interest. Balfour Stewart in the 9th edition of this encyclopaedia gave some data indicating an appreciably enhanced lunar influence at Trivandrum during years of sun-spot maximum, but he hesitated to accept the result as finally proved. Figee recently investigated this point at Batavia, but with inconclusive results. Attempts have also been made to ascertain how lunar influence depends on the moon's declination and phase, and on her distance from the earth. The difficulty in these investigations is that we are dealing with a small effect, and a very long series of data would be required satisfactorily to eliminate other periodic influences.

§ 41. From an analysis of seventeen years data at St Petersburg and Pavlovsk, Leyst 60 concluded that all the principal planets Planetary sensibly influence the earth's magnetism. According to Influence his n S ures > a11 the planets except Mercury — whose in- fluence he found opposite to that of the others — when nearest the earth tended to deflect the declination magnet at St Petersburg to the west, and also increased the range of the diurnal inequality of declination, the latter effect being the more con- spicuous. Schuster, 61 who has considered the evidence advanced by Leyst from the mathematical standpoint, considers it to be inconclusive.

§ 42. The best way of carrying out a magnetic survey depends on where it has to be made and on the object in view. The object that Magnetic Pˆably still comes first in importance is a knowledge Surveys. ? f tne declination, of sufficient accuracy for navigation ia all navigable waters. One might thus infer that magnetic surveys consist mainly of observations at sea. This cannot however be said to be true of the past, whatever it may be of the future, and this for several reasons. Observations at sea entail the use of a ship, specially constructed so as to be free from

disturbing influence, and so are inherently costly; they are also apt to be of inferior accuracy. It might be possible in quiet weather, in a large vessel free from vibration, to observe with instruments of the highest precision such as a unifilar magneto- meter, but in the ordinary surveying ship apparatus of less sensitiveness has to be employed. The declination is usually determined with some form of compass. The other elements most usually found directly at sea are the inclination and the total force, the instrument employed being a special form of inclinometer, such as the Fox circle, which was largely used by Ross in the Antarctic, or in recent years the Lloyd-Creak. This latter instru- ment differs from the ordinary dip-circle fitted for total force observations after H. Lloyd's method mainly in that the needles rest in pivots instead of on agate edges. To overcome friction a pro- jecting pin on the framework is scratched with a roughened ivory plate.

The most notable recent example of observations at sea is afforded by the cruises of the surveying ships" Galilee "and" Carnegie " under the auspices of the Carnegie Institution of Washington, which includes in its magnetic programme a general survey. To see where the ordinary land survey assists navigation, let us take the case of a country with a long sea-board. If observations were taken every few miles along the coast results might be obtained adequate for the ordinary wants of coast- ing steamers, but it would be difficult to infer what the declination would be 50 or even 20 miles off shore at any particular place. If, however, the land area itself is carefully surveyed, one knows the trend of the lines of equal declination, and can usually extend them with considerable accuracy many miles out to sea. One also can tell what places if any on the coast suffer from local disturb- ances, and thus decide on the necessity of special observations. This is by no means the only imme- diately useful purpose which is or may be served by magnetic surveys on land. In Scandinavia use has been made of magnetic observations in prospecting for iron ore. There are also various geological and geodetic problems to whose solution magnetic surveys may afford valuable guidance. Among the most important recent surveys may be mentioned those of the British Isles by A. Rticker and T. E. Thorpe, 62 of

France and Algeria by Moureaux, 63 of Italy by Chistoni and Palazzo, 64 of the Netherlands by Van Ryckevorsel, 66 of South Sweden by Carlheim Gyllenskiold, 66 of Austria-Hungary by Liznar, 67 of Japan by Tanakadate, 68 of the East Indies by Van Bemmelen, and South Africa by J. C. Beattie. A survey of the United States has been proceeding for a good many years, and many results have appeared in the publications of the U.S. Coast and Geodetic Survey, especially Bauer's Magnetic Tables and Magnetic Charts, 1908. Additions to our knowledge may also be expected from surveys of India, Egypt and New Zealand.

For the satisfactory execution of a land survey, the observers must have absolute instruments such as the unifilar magnetometer and dip circle, suitable for the accurate determination of the magnetic elements, and they must be able to fix the exact positions of the spots where observations are taken. If, as usual, the survey occupies several years, what is wanted is the value of the elements not at the actual time of observation, but at some fixed epoch, possibly some years earlier or later. At a magnetic observatory, with standardized records, the difference between the values of a magnetic element at any two specified instants can be derived from the magnetic curves. But at an ordinary survey station, at a distance from an observatory, the information is not immediately available. Ordinarily the reduc- tion to a fixed epoch is done in at least two stages, a correction being applied for secular change, and a second for the departure from the mean value for the day due to the regular diurnal inequality and to disturbance.

The reduction to a fixed epoch is at once more easy and more accur- ate if the area surveyed contains, or has close to its borders, a well distributed series of magnetic observatories, whose records are com' parable and trustworthy. Throughout an area of the size of France or Germany, the secular change between any two specified dates can ordinarily be expressed with sufficient accuracy by a formula of the type

$$5 = So + o(/-W + i(X-Xo)$$

(0.

where i denotes secular change, / latitude and X longitude, the letters with suffix relating to some convenient central position. The constants 5 , a, b are to be determined from the observed secular changes at the fixed observatories whose geographical co-ordinates are accurately known. Unfortunately, as a rule, fixed observatories are few in number and not well distributed for survey purposes; thus the secular change over part at least of the area has usually to be found by repeating the observations after some years at several of the field stations. The success attending this

depends on the

exactitude with which the sites can be recovered, on the accuracy of the observations, and on the success with which allowance is made for diurnal changes, regular and irregular. 1 1 is thus desirable that the observations at repeat stations should be taken at hours when the regular diurnal changes are slow, and that they should not be accepted unless taken on days that prove to be magnetically quiet. Unless the secular change is exceptionally rapid, it will usually be most convenient in practice to calculate it from or to the middle of the month, and then to allow for the difference between the mean value for the month and the value at the actual hour of observation. There is here a difficulty, inasmuch as the latter part of the correction depends on the diurnal inequality, and so on the local time of the station. No altogether satisfactory method of surmounting this difficulty has yet been proposed. Rucker and Thorpe in their British survey assumed that the divergence from the mean value at any hour at any station might be regarded as made up of a regular diurnal inequality, identical with that at Kew when both were referred to local time, and of a disturbance element identical with that existing at the same absolute time at Kew. Suppose, for instance, that at hour h G.M.T. the departure at Kew from the mean value for the month is d, then the corresponding departure from the mean at a station X degrees west of Kew is d — e, where e is the in- crease in the element at Kew due to the regular diurnal inequality between hour h — X/15 and hour h. This procedure is simple, but is exposed to various criticisms. If we define a diurnal inequality as the result obtained by combining hourly readings from all the days of a month, we can assign a definite meaning to the diurnal inequality for a particular month of a particular year, and after the curves have been measured we can give exact numerical figures answering to this definition. But the diurnal inequality thus obtained differs, a9 has been pointed out, from that derived from a limited number of the quietest days of the month, not merely in amplitude but in phase, and the view that the diurnal changes on any individual day can be regarded as made up of a regular diurnal inequality of definite char- acter and of a disturbance element is an hypothesis which is likely at times to be considerably wide of the mark. The extent of the error involved in assuming the regular diurnal inequality the same in the north of Scotland, or the west of Ireland, as in the south-east of England remains to be ascertained. As to the disturbance element, even if the disturbing force were of given magnitude and direction all over the British Isles — which we now know is often very far from the case — its effects would necessarily vary very sensibly owing to the considerable variation in the direction and

intensity of the local undisturbed force. If observations were confined to hours at which the regular diurnal changes are slow, and only those taken on days of little or no disturbance were utilized, corrections combining the effects of regular and irregular diurnal changes could be derived from the records of fixed observations, supposed suitably situated, combined in formulae of the same type as (i).

§ 43. The field results having been reduced to a fixed epoch, it remains tc combine them in ways likely to be useful. In most cases the results are embodied in charts, usually of at least two kinds, one set showing only general features, the other the chief local peculiar- ities. Charts of the first kind resemble the world charts (figs. I to 4) in being free from sharp twistings and convolutions. In these the declination for instance at a fixed geographical position on a particular isogonal is to be regarded as really a mean from a considerable surrounding area.

Various ways have been utilized for arriving at these terrestrial isomagnetics — as Rucker and Thorpe call them — of which an elabor- ate discussion has been made by E. Mathias. 69 From a theoretical standpoint the simplest method is perhaps that employed by Liznar for Austria-Hungary. Let / and X represent latitude and longitude relative to a certain central station in the area. Then assume that throughout the area the value E of any particular magnetic element is given by a formula

E = E a/&X4-c? ! 4-dX 2 4-e/X,

where Eo, a, b t c, d, e are absolute constants to be determined from the observations. When determining the constants, we write for E in the equation the observed value of the element (corrected for secular change, &c.) at each station, and for / and X the latitude and longitude of the station relative to the central station. Thus each station contributes an equation to assist in determining the six con- stants. They can thus be found by least squares or some simpler method. In Liznar's case there were 195 stations, so that the labour of applying least squares would be considerable. This is one objec- tion to the method. A second is that it may allow undesirably large weight to a few highly disturbed stations. In the case of the British Isles, Rucker and Thorpe employed a different method. The area was split up into districts. For each district a mean was formed of the observed values of each element, and the mean was assigned to an imaginary central station, whose geographical co-ordinates represented the mean of the geographical co-ordinates of the actual stations. Want of uniformity in the distribution of the stations may be allowed for by weighting the results. Supposing E the value of the element found for the central station of a district, it was assumed that the value E at any actual station whose latitude and longitude exceeded those of the central station

by / and X was given by E = E«-fa/-l-6X, with a and b constants throughout the

district. Having found E , a and b, Rucker and Thorpe calculated values of the element for points defined by whole degrees of longitude (from Greenwich) and half degrees of latitude. Near the common border of two districts there would be two calculated values, of which the arithmetic mean was accepted.

The next step was to determine by interpolation where isogonals — or other isomagnetic lines — cut successive lines of latitude. The curves formed by joining these successive points of intersection were called district lines or curves. Rucker and Thorpe's next step was to obtain formulae by trial, giving smooth curves of continuous curva- ture — terrestrial isomagnetics — approximating as closely as possible to the district lines. The curves thus obtained had somewhat complicated formulae. For instance, the isogonals south of 54° 4 5 latitude were given for the epoch Jan. 1, 1891 by

D = i8° 37′ + i8'-5(-49-5)-3'-5 cos l45°(-49-5)} + t26'-3 + i'-5(/-49-5)K-4)+o'-oi(X-4)H/-54-5) 2 ,*

where D denotes the westerly declination. Supposing, what is at least approximately true, that the secular change in Great Britain since 1891 has been uniform south of lat. 54°-5, corresponding formulae for the epochs Jan. 1, 1901, and Jan. 1, 1906, could be obtained by substituting for 18° 37′ the values 17° 44′ and 17 24′ respectively. In their very laborious and important memoir E. Mathias and B. Baillaud 69 have applied to Rucker and Thorpe's, observations a method which is a combination of Rucker and Thorpe's and of Liznar's. Taking Rucker and Thorpe's nine districts, and the magnetic data found for the nine imaginary central stations, they employed these to determine the six constants of Liznar's formula. This is an immense simplification in arithmetic. The declination formula thus obtained for the epoch Jan. 1 , 1 89 1 , was D =20° 45'-89-h53474X-f—347i6Z-|-oooo2iX 2 + -00O343/X — -000239/2,

where / + (53° 3o'-5) represents the latitude, and (X+5° 35'2) the west longitude of the station. From this and the corresponding formulae for the other elements, values were calculated for each of Rucker and Thorpe's 882 stations, and these were compared with the observed values. A complete record is given of the differences between the observed and calculated values, and of the corresponding differences obtained by Rucker and Thorpe from their own formulae. The mean numerical (calculated ~ observed) differences from the two different methods are almost exactly the

same — being approxi mately 10′ for declination, 5’j for inclination, and 707 for horizontal force. The applications by Mathias 69 of his method to the survey data of France obtained by Moureaux, and those of the Netherlands obtained by van Ri’jckevorsel, appear equally successful. The method dispenses entirely with district curves, and the parabolic formulae are perfectly straightforward both to calculate and to apply ; they thus appear to possess marked advantages. Whether the method could be applied equally satisfactorily to an area of the size of India or the United States actual trial alone would show.

§ 44. Rucker and Thorpe regarded their terrestrial isomagnetics and the corresponding formulae as representing the normal field that would exist in the absence of disturbances /n

*peculiar to the neighbourhood. Subtracting the forces *< "" u,s " derived from the formulae from those observed, we woances. obtain forces which may be ascribed to regional disturbance.*

When the vertical disturbing force is downwards, or the observed vertical component larger than the calculated, Rucker and Thorpe regard it as positive, and the loci where the largest positive values occur they termed ridge lines. The corresponding loci where the largest negative values occur were called valley lines. In the British Isles Rucker and Thorpe found that almost without exception, in the neighbourhood of a ridge line, the horizontal component of the disturbing force pointed towards it, throughout a considerable area on both sides. The phenomena are similar to what would occur if ridge lines indicated the position of the summits of under-ground masses of magnetic material, magnetized so as to attract the north-seeking pole of a magnet. Rucker and Thorpe were inclined to believe in the real existence of these subterranean mag- netic mountains, and inferred that they must be of considerable extent, as theory and observation alike indicate that thin basaltic sheets or dykes, or limited masses of trap rock, produce no measur- able magnetic effect except in their immediate vicinity. In support of their conclusions, Rucker and Thorpe dwell on the fact that in the United Kingdom large masses of basalt such as occur in Skye, Mull, Antrim, North Wales or the Scottish coalfield, are according to their survey invariably centres of attraction for the north-seeking pole of a magnet. Various cases of repulsion have, however, been described by other observers in the northern hemisphere.

§ 45. Rucker and Thorpe did not make a very minute examination of disturbed areas, so that purely local disturbances larger than any noticed by them may exist in the United Kingdom. But any that exist are unlikely to rival some that have been observed elsewhere, notably those in the province of Kursk in Russia described by Moureaux n and by E. Leyst. 71

In Kursk Leyst observed declina- tions varying from 0° to 360 , inclinations varying from 39°- 1 to 90 ° ; he obtained values of the horizontal force varying from o to 0-856 C.G.S., and values of the vertical force varying from 0-371 to 1-836. Another highly disturbed Russian district Krivoi Rog

(48 ° N. lat. 33° E. long.) was elaborately surveyed by Paul Passalsky P The extreme values observed by him differed, the declination by 282 ° 40', the inclination by 41° 53', horizontal force by 0-658, and vertical force by 1 358. At one spot a difference of I l6°j was observed between the declinations at two positions only 42 metres apart. In cases such as the last mentioned, the source of disturbance comes presumably very near the surface. It is improbable that any such enormously rapid changes of declination can be experienced anywhere at the surface of a deep ocean. But in shallow water disturbances of a not very inferior order of magnitude have been met with. Possibly the most outstanding case known is that of an area, about 3 m. long by ij m. at its widest, near Port Walcott, off the N.W. Australian coast. The results of a minute survey made here by H.M.S. " Penguin " have been discussed by Captain E. W. Creak. 73 Within the narrow area specified, declination varied from 26 W. to 56 E., and inclination from 50 to nearly 8o°, the observa tions being taken some 80 ft. above sea bottom. Another note- worthy case, though hardly comparable with the above, is that of East Loch Roag at Lewis in the Hebrides. A survey by H.M.S. " Research " in water about 100 ft. deep — discussed by Admiral A. M. Field 74 — showed a range of u° in declination. The largest observed disturbances in horizontal and vertical force were of the order 0-02 and 0-05 C.G.S. respectively. An interesting feature in this case was that vertical force was reduced, there being a well-marked valley line.

In some instances regional magnetic disturbances have been found to be associated with geodetic anomalies. This is true of an elon- gated area including Moscow, where observations were taken by Fritsche. 75 Again, Eschenhagen 76 detected magnetic anomalies in an area including the Harz Mountains in Germany, where deflections of the plumb line from the normal had been observed. He found a magnetic ridge line running approximately parallel to the line of no deflection of the plumb line.

§ 46. A question of interest, about which however not very much is known, is the effect of local disturbance on secular change and on the diurnal inequality. The determination of secular change in a highly disturbed locality is difficult, because an unintentional slight change in the spot where

the observations are made may wholly falsify the conclusions drawn. When the disturbed area is very limited in extent, the magnetic field may reasonably be regarded as composed of the normal field that would have existed in the absence of local disturbance, plus a disturbance field arising from magnetic material which approaches nearly if not quite to the surface. Even if no sensible change takes place in the disturbance field, one would hardly expect the secular change to be wholly normal. The changes in the rect- angular components of the force may possibly be the same as at a neighbouring undisturbed station, but this will not give the same change in declination and inclination. In the case of the diurnal in- equality, the presumption is that at least the de- clination and inclination changes will be influenced by local disturbance. If, for example, we suppose the diurnal inequality to be due to the direct in- fluence of electric currents in the upper atmo- sphere, the declination change will represent the action of the component of a force of given magnitude which is perpendicular to the position of the compass needle. But when Focal disturbance exists, the direction of the needle and the intensity of the controlling field are both altered by the local disturbance, so it would appear natural for the declination changes to be in- fluenced also. This conclusion seems borne out by observations made by Passalsky 72 at Krivoi Rog, which showed diurnal inequal- ities differing notably from those experienced at the same time at Odessa, the nearest magnetic observatory. One station where the horizontal force was abnormally low gave a diurnal range of declination four times that at Odessa ; on the other hand, the range of the horizontal force was apparently reduced. It would be unsafe to draw general conclusions from observations at two or three stations, and much completer information is wanted, but it is obviously desirable to avoid local disturbance when selecting a site for a magnetic observatory, assuming one's object is to obtain data reasonably applicable to a large area. In the case of the older observatories this consideration seems sometimes to have been lost sight of. At Mauritius, for instance, inside of a circle of only 56 ft. radius, having for centre the declination pillar of the absolute magnetic hut of the Royal Alfred Observatory, T. F. Claxton" found that the declination varied from 4 56′ to 13° 45′ W., the in- clination from 50 21′ to 58 34′ S., and the horizontal force from 0-197 to 0-244 C.G.S. At one spot he found an alteration of i°\ in the declination when the magnet was lowered from 4 ft. above the ground to 2. Disturbances of this order could hardly escape even a rough investigation of the site.

§ 47. If we assume the magnetic force on the earth's surface derivable from a potential V, we can express V as the sum of two Gaussian series of solid spherical harmonics, one containing nega- Potentlal tive, the other positive integral powers of the radius and Coo- vector r from the earth's centre. Let X denote east slants. longitude from Greenwich, and let ix = cos{\t—1),

where / is latitude ; and also let

H (i-M[ˆ" m – (w ˆr l "; i V " w ' 2 + . . .],

where re and m denote any positive integers, m being not greater than n. Then denoting the earth's radius by R, we have

V/R = Z(R/r)" I [H"(g™cos»jX/Csinw\)]

+2(r/R)"[H;r(£™ cosmX+fc-™ sinmX)],

where 2 denotes summation of m from o to re, followed by summa- tion of re from o to do. In this equation g™, &c. are constants, those with positive suffixes being what are generally termed Gaussian constants. The series with negative powers of r answers to forces with a source internal to the earth, the series with positive powers to forces with an external source. Gauss found that forces of the latter class, if existent, were very small, and they are usually left out of account. There are three Gaussian constants of the first order, gi°, gi\ hi 1 , five of the second order, seven of the third, and so on. The coefficient of a Gaussian constant of the re th order is a spherical harmonic of the n lh degree. If R be taken as unit length, as is not infrequent, the first order terms are given by

Vi = r"[gi ° sin I + fe 1 cos X +hi l sin X) cos l\ .*

The earth is in reality a spheroid, and in his elaborate work on the subject J. C. Adams 7S develops the treatment appropriate to this case. Here we shall as usual treat it as spherical. We then have for the components of the force at the surface

X = — R _1 (l — ˆ 2)5 (dV/dn) towards the astronomical north, Y=-R-1 (l-n i)-KdV/d\) „ „ „ west,

Z = —dV/dr vertically downwards.

Supposing the Gaussian constants known, the above formulae would give the force all over the earth's surface. To determine the Gaus- sian constants we proceed of course in the reverse direction, equating the observed values of the force components to the theoretical values involving g, &c. If we knew the values of the component forces at regularly distributed stations all over the earth's surface, we could determine each Gaussian constant independently of the others. Our knowledge however of large regions, especially in the Arctic and Antarctic, is very scanty, and in practice recourse is had to methods in which the constants are not determined independently. The consequence is unfortunately that the values found for some of the constants, even amongst the lower orders, depend very sensibly*

on how large a portion of the polar regions is omitted from the

Table XLIV. — Gaussian Constants of the First Order.

1829

Erman- Petersen.

1830

Gauss.

1845

Adams.

1880

Adams.

1885

Neumayer.

1885

Schmidt.

1885

Fritsche.

gl 1

h 1

+ •32007 + •02835 — •0601 1

+ •32348 + •03111 — •06246

+•32187 + •02778

-•05783

+ •31684 + •02427 — •06030

+ •31572 + •02481 — -06026

+•31735 + •02356 -•05984

+ •31635 + •02414 -•05914

calculations, and on the number of the constants of the higner orders which are retained.

Table XLIV. gives the values obtained for the Gaussian constants of the first order in some of the best-known computations, as collected by W. G. Adams. 79

§ 48. Allowance must be made for the difference in the epochs, and for the fact that the number of constants assumed to be worth retaining was different in each case. Gauss, for instance, assumed 24 constants sufficient, whilst in obtaining the results given in the table J. C. Adams retained 48. Some idea of the uncertainty thus arising may be derived from the fact that when Adams assumed 24 constants sufficient, he got instead of the values in the table the following : —

gi° gi 1 h 1

1 842-1 845 +-32173 +-02833 —05820

1880 +-31611 +-02470 —-06071

Some of the higher constants were relatively much more affected. Thus, on the hypotheses of 48 and of 24 constants respectively, the values obtained for g 2 ° in 1842-1845 were —'00127 and —-00057, and those obtained for hs 1 in 1880 were +-00748 and +-00573. It must also be remembered that these values assume that the series in positive powers of r, with coefficients having negative suffixes, is absolutely non-existent. If this be not assumed, then in any equation deter- ming X or Y, g™ must be replaced by g^+gH^, and in any equation determining Z by g™ — jre/(re + i)) g™; similar remarks apply to h™ and h^. It is thus theoretically possible to check the truth of the assumption that the positive power series is non-existent by comparing the values obtained for g™ and h™ from the X and Y or from the Z equations, when g™„ and fc^are assumed zero. If the values so found differ, values can be found for g!^, and fcJJ which will harmonize the two sets of equations. Adams gives the values obtained from the X, Y and the Z equations separately for the

3»2

MAGNETISM, TERRESTRIAL

Gaussian constants. The following are examples of the values thence

deducible for the coefficients of the positive power series: —

g-i

*g-**

g-5

g-i

1842-1845 +0018 — – ooo2 — '0014 +"0064 +'0072 +"0124 1880 —'0002 — – ooi2 +'0015 —'0043 —'0021 —"0013

Compared to gt°, gs° and gc° the values here found for g- 4 °, g-5 and g-6° are far from insignificant, and there would be no excuse for neglecting them if the observational data were sufficient and reliable. But two outstanding features claim attention, first the smallness of g-i°, g-1 1 and A-! 1 , the coefficients least likely to be affected by obser- vational deficiencies, and secondly the striking dissimilarity between the values obtained for the two epochs. The conclusion to which these and other facts point is that observational deficiencies, even up to the present date, are such that no certain conclusion can be drawn as to the existence or non-existence of the positive power series. It is also to be feared that considerable uncertainties enter into the values of most of the Gaussian constants, at least those of the higher orders. The introduction of the positive power series' neces- sarily improves the agreement between observed and calculated values of the force, but it is more likely than not to be disadvan- tageous physically, if the differences between observed values and those calculated from the negative power series alone arise in large measure from observational deficiencies.

Table XLV. — Axis and Moment of First Order Gaussian Coefficients.

Epoch.

Authority for

North

West

M/R 3 in

Constants.

Latitude.

Longitude.

G.C.S. units.

1650

H. Fritsche .

/ 82 50

/ 42 55

•3260

1836

”

78 27

63 35

•3262

1845

J. C. Adams .

78 44

64 20

•3282

1880

”

78 24

68 4

■3234

1885

Neumayer- Petersen and Bauer .

78 3

67 3

■*3224*

1885

Neumayer, Schmidt

78 34

68 31

•*3230*

§ 49. The first order Gaussian constants have a simple physical meaning. The terms containing them represent the potential arising from the uniform magnetization of a sphere parallel to a fixed axis,- the moment M of the spherical magnet being given by

M=R 3 ((g 1 °)'+(gi 1) 2 +W) 2 !3, where R is the earth's radius. The position of the north end of the axis of this uniform magnetization and the values of M/R 3 , derived from the more important determinations of the Gaussian constants, are given in Table XLV. The data for 1650 are of some- what doubtful value. If they were as reliable as the others, one would feel greater confidence in the reality of the apparent move- ment of the north end of the axis from east to west. The table also suggests a slight diminution in M since 1845, but it is open to doubt whether the apparent change exceeds the probable error in the calculated values. It should be carefully noticed that the data in the table apply only to the first order Gaussian terms, and so only to a portion of the earth's magnetization, and that the Gaussian constants have been calculated on the assumption that the negative power series alone exists. The field answering to the first order terms — or what Bauer has called the normal field — constitutes much the most important part of the whole magnetization. Still what remains is very far from negligible, save for rough calculations. It is in fact one of the weak points in the Gaussian analysis that when one wishes to represent the observed facts with high accuracy one is obliged to retain so many terms that calculation becomes burden- some.

§ 50. The possible existence of a positive power series is not the only theoretical uncertainty in the Gaussian analysis. There is _ . . the further possibility that part of the earth's magnetic C mts ˆ e '^ may not answer t0 a potential at all. Schmidt 80 " " ' in his calculation of Gaussian constants regarded this as a possible contingency, and the results he reached implied

that as much as 2 or 3 % of the entire field had no potential. If the magnetic force F on the earth's surface comes from a potential, then the line

integraiy"FJi taken round any closed circuit s should vanish. If the

integral does not vanish, it equals 471-I, where I is the total electric current traversing the area bounded by s. A + sign in the result of the integration means that the current is downwards (i.e. from air to earth) or upwards, according as the direction of integration round the circuit, as viewed by an observer above ground, has been clock- wise or anti-clockwise. In applications of the formula by W. von Bezold 81 and Bauer K the integral has been taken along parallels of latitude in the direction west to east. In this case a + sign indicates a resultant upward current over the area between the parallel of latitude traversed and the north geographical pole. The difference between the results of integration round two parallels of latitude gives the total vertical current over the zone between them. Schmidt's final estimate of the average intensity of the earth-air current, irrespective of sign, for the epoch 1885 was 0-17 ampere per

square kilometre. Bauer employing the same observational data as Schmidt, reached somewhat similar conclusions from the differ- ences between integrals taken round parallels of latitude at 5° intervals from 60° N. to 6o° S. H. Fritsche 83 treating the problem similarly, but for two epochs, 1842 and 1885, got conspicuously different results for the two epochs, Bauer 84 has more recently repeated his calculations, and for three epochs, 1842-1845 (Sabine's charts), 1880 (Creak's charts), and 1885 (Neumayer's charts), obtain- ing the mean value of the current per sq. km. for 5 zones. Table XLVI. is based on Bauer's figures, the unit being O'ooi ampere, and + denoting an upwardly directed current.

Table XLVI. — Earth-air Currents, after Bauer.

Latitude.

Northern Hemisphere.

Southern Hemisphere.

1842-5.

1880.

1885.

1842-5.

1880.

1885.

o°to 15°

<" 3°! 30° „ 45° 45°., 6o°

— 1

-70 + 3 -31

-32 -59

+ H —21

-34 -68

—22

+78

+66

+ 2 +26

+ 5

+ 30

- 62

— 11

+276

+ 36

- 63

- 14 +213

In considering the significance of the data in Table XLVI., it should be remembered that the currents must be regarded as mean values derived from all hours of the day, and all months of the year. Currents which were upwards during certain hours of the day, and downwards during others, would affect the diurnal inequality; while currents which were upwards during certain months, and down- wards during others, would cause an

annual inequality in the absolute values. Thus, if the figures be accepted as real, we must suppose that between 15° N. and 30° N. there are preponderatingly down- ward currents, and between 0° S. and 15° S. preponderatingly upward currents. Such currents might arise from meteorological conditions characteristic of particular latitudes, or be due to the relative dis- tribution of land and sea ; but, whatever their cause, any considerable real change in their values between 1842 and 1885 seems very im- probable. The most natural cause to which to attribute the differ- ence between the results for different epochs in Table XLVI. is unquestionably observational deficiencies. Bauer himself regards the results for latitudes higher than 45 as very uncertain, but he seems inclined to accept the reality of currents of the average intensity of 1/30 ampere per sq. km. between 45° N. and 45° S.

Currents of the size originally deduced by Schmidt, or even those of Bauer's latest calculations, seem difficult to reconcile with the results of atmospheric electricity (q.v.).

§ 51. There is no single parallel of latitude along the whole of which magnetic elements are known with high precision. Thus, results of greater certainty might be hoped for from the application of the line integral to well surveyed countries. Such applications have been made, e.g. to Great Britain by Rticker, 86 and to Austria by Liznar, 86 but with negative results. The question has also been considered in detail by Tanakadate 68 in discussing the magnetic survey of Japan. He makes the criticism that the taking of a line integral round the boundary of a surveyed area amounts to utilizing the values of the magnetic elements where least accurately known, and he thus considers it preferable to replace the line integral by the surface integral.

*4*1 =ff(dY/dx-dX/dy)dxdy.*

He applied this formula not merely to his own data for Japan, but also to British and Austrian data of Rticker and Thorpe and of Liznar. The values he ascribes to X and Y are those given by the formulae calculated to fit the observations. The result reached was " a line of no current through the middle of the country; in Japan the current is upward on the Pacific side and downward on the Siberian side ; in Austria it is upward in the north and downward in the south ; in Great Britain upward in the east and downward in the west." The results obtained for Great Britain differed con- siderably according as use was made of Riicker and Thorpe's own district equations or of a series of general equations of the type subse- quently utilized by Mathias. Tanakadate points out that the fact that his investigations give in each case a line of no current passing through the middle of the surveyed area, is calculated to throw doubt on the reality of

the supposed earth-air currents, and he recom- mends a suspension of judgment.

§ 52. A question of interest, and bearing a relationship to the Gaussian analysis, is the law of variation of the magnetic elements with height above sea-level. If F represent the value at sea-level, and F+3F that at height h, of any component of force answering to Gaussian constants of the n tb order, then 1 +5F/F = (1 +ft/R)-"- 2 , where R is the earth's radius. Thus at heights of only a few miles we have very approximately SF/F= — («+2)/j/R. As we have seen, the constants of the first order are much the most important, thus we should expect as a first approximation i5X/X = 5Y/Y = SZ/Z=— 3&/R. This equation gives the same rate of decrease in all three components, and so no change in declination or inclination. Liznar 86 (°) compared this equation with the observed results of his Austrian survey, subdividing his stations into three groups according

to altitude. He considered the agreement not satisfactory. It must be remembered that the Gaussian analysis, especially _ when only lower order terms are retained, applies only to the earth's field freed from local disturbances. Now observations at individual high level stations may be seriously influenced not merely by regional disturbances common to low level stations, but by magnetic material in the mountain itself. A method of arriving at the vertical change in the elements, which theoretically seems less open to criticism, has been employed by A. Tanakadate. 68 If we assume that a potential exists, or if admitting the possibility of earth-air currents we assume their effort negligible, we have dX/dz = dZ/dx, dY/dz = dZ/dy. Thus from the observed rates of change of the vertical component of force along the parallels of latitude and longitude, we can deduce the rate of change in the vertical direction of the two rectangular components of horizontal force, and thence the rates of change of the hori- zontal force and the declination. Also we have dZ/dz = ˆirp — (dX/dx +dY/dy), where p represents the density of free magnetism at the spot. The spot being above ground we may neglect p, and thus deduce the variation in the vertical direction of the vertical component from the observed variations of the two horizontal com- ponents in their own directions. Tanakadate makes a comparison of the vertical variations of the magnetic elements calculated in the two ways, not merely for Japan, but also for Austria-Hungary and Great Britain. In each country he took five representative points, those for Great Britain being the central stations of five of Rucker and Thorpe's districts. TableXLVII. gives the mean of the five values obtained. By method (i.) is meant the formula involving 3/1/R, by

method (ii.) Tanakadate's method as explained above. H, V, D, and I are used as defined in § 5. In the case of H and V unity represents 17.

Table XLVII. — Change per Kilometre of Height.

Great Britain.

Austria-Hungary.

Japan.

Method.

(i.)

(ii.)

(i-)

(ii.)

(i.)

(ii.)

H . .

V . . D (west) I . .

- 8-1

— 21-2

- 6-7 -19.4

- 0-04

- o'-os

— IO-I

— 19-0

- 87

-I8-I + o'-io

- o'-o6

-13-9 -17-1

— 14-0

-17.4

— o'-27

— o'-oi

Schuster's Oluroal Variation Potential.

constants ;

The — sign in Table XLVII. denotes a decrease in the numerical values of H, V and I, and a diminution in westerly declination. If we except the case of the westerly component of force — not shown In the table — the accordance between the results from the two .nethods in the case of Japan is extraordinarily close, and there is no very marked tendency for the one method to give larger values than the other. In the case of Great Britain and Austria the differ- ences between the two sets of calculated values though not large are systematic, the 3&/R formula invariably showing the larger reduction with altitude in both H and V. Tanakadate was so satisfied with the accordance of the two methods in Japan, that he employed his method to reduce all observed Japanese values to sea- level. At a few of the highest Japanese stations the correction thus introduced into the value of H was of some importance, but at the great majority of the stations the corrections were all insignificant. § 53. Schuster m has calculated a potential analogous to the Gaussian potential, from which the regular diurnal changes of the magnetic elements all over the earth may be derived. From the mean summer and winter diurnal variations of the northerly and easterly components of force during 1870 at St Petersburg, Greenwich, Lisbon and Bombay, he found the values of 8 constants analogous to Gaussian and from considerations as to the hours of occur- rence of the maxima and minima of vertical force, he concluded that the potential, unlike the Gaussian, must proceed in positive powers of r, and so answer to forces external to the earth. Schuster found, however, that the calculated

amplitudes of the diurnal vertical force inequality did not accord well with observa- tion ; and his conclusion was that while the original cause of the diurnal variation is external, and consists probably of electric currents in the atmosphere, there are induced currents inside the aarth, which increase the horizontal components of the diurnal inequality while diminishing the vertical. The problem has also been dealt with by H. Fritsche, 88 who concludes, in opposition to Schuster, that the forces are partly internal and partly external, the two sets being of fairly similar magnitude. Fritsche repeats the criticism (already made in the last edition of this encyclopaedia) that Schuster's four stations were too few, and contrasts their number with the 27 from which his own data were derived. On the other hand, Schuster's data referred to one and the same year, whereas Fritsche's are from epochs varying from 1841 to 1896, and represent in some cases a single year's observations, in other cases means from several years. It is clearly desirable that a fresh calculation should be made, using synchronous data from a considerable number of well dis- tributed stations; and it should be done for at least two epochs, one representing large, the other small sun-spot frequency. The year 1870 selected by Schuster had, as it happened, a sun-spot

frequency which has been exceeded only once since 1750; so that the magnetic data which he employed were far from representative of average conditions.

§ 54. It was discovered by Folgheraiter 89 that old vases from Etruscan and other sources are magnetic, and from combined ob- servation and experiment he concluded that they acquired „ . their magnetization when cooling after being baked, and iz . tlon ' of retained it unaltered. From experiments, he derived y ases &Cm formulae connecting the magnetization shown by new clay '

*vases with their orientation when cooling in a magnetic field, and applying these formulae to the phenomena observed in the old vases he calculated the magnetic dip at the time and place of manufacture. His observations led him to infer that in Central Italy inclination was actually southerly for some centuries prior to 600 B.C., when it changed sign. In 400 B.C. it was about 20° N. ; since 100 B.C. the change has been relatively small. L. Mercanton *> similarly investigated the magnet- ization of baked clay vases from the lake dwellings of Neuchatel, whose epoch is supposed to be from 600 to 800 B.C. The results he obtained were, however, closely similar to those observed in recent vases made where the inclination was about 63 °N., and he concluded in direct opposition to Folgheraiter that inclination in southern Europe has not undergone any very large change during the last 2500 years. Folgheraiter's methods have been extended to natural rocks. Thus B. Brunhes 91 found several cases of clay metamor-*

phosed by adjacent lava flows and transformed into a species of natural brick. In these cases the clay has a determinate direction of magnetization agreeing with that of the volcanic rock, so it is natural to assume that this direction coincided with that of the dip when the lava flow occurred. In drawing inferences, allowance must of course be made for any tilting of the strata since the volcanic outburst. From one case in France in the district of St Flour, where the volcanic action is assigned to the Miocene Age, Brunhes inferred a southerly dip of some 75°. Until a variety of cases have been critically dealt with, a suspension of judgment is advisable, but if the method should establish its claims to reliability it obviously may prove of importance to geology as well as to terrestrial magnetism.

§ 55. Magnetic phenomena in the polar regions have received considerable attention of late years, and the observed results are of so exceptional a character as to merit separate consideration. One feature, the large amplitude of the regular diurnal pojg-pug, inequality, is already illustrated by the data for Jan _„_„_ Mayen and South Victoria Land in Tables VIII. to XL aomena – In the case, however, of declination allowance must be made for the small size of H. If a force F perpendicular to the magnetic meridian causes a change AD in D then AD = F/H. Thus at the " Dis- covery's " winter quarters in South Victoria Land, where the value of H is only about 0-36 of that at Kew, a change of 45′ in D would be produced by a force which at Kew would produce a change of only 16'. Another feature, which, however, may not be equally general, is illustrated by the data for Fort Rae and South Victoria Land in Table XVII. It will be noticed that it is the 24-hour term in the Fourier analysis of the regular diurnal inequality which is specially enhanced. The station in South Victoria Land— the winter quarters of the " Discovery " in 1902-1904 — was at 77° 51′ S. lat.; thus the sun did not set from November to February (mid- summer), nor rise from May to July (midwinter). It might not thus have been surprising if there had been an outstandingly large seasonal variation in the type of the diurnal inequality. As a matter of fact, however, the type of the inequality showed exceptionally small variation with the season, and the amplitude remained large through- out the whole year. Thus, forming diurnal inequalities for the three midsummer months and for the three midwinter months, we obtain the following amplitudes for the range of the several elements 92 : — D. H. V. I.

Midsummer 64'- 1 577 587 2'-87 Midwinter 26'-8 257 187 l'-23

The most outstanding phenomenon in high latitudes is the fre- quency and large size of the disturbances. At Kew, as we saw in § 25, the absolute range in D exceeds 20′ on only 12 % of the total number of days. But at the " Discovery's " winter quarters, about sun-spot minimum, the range exceeded 1° on 70%, 2° on 37%, and 3 on fully 15% of the total number

of days. One day in 25 had a range exceeding 4°. During the three midsummer months, only one day out of in had a range under 1°, and even at midwinter only one day in eight had a range as small as 30'. The H range at the " Discovery's" station exceeded 1007 on 40% of the days, and the V range exceeded 1 007 on 32 % of the days.

The special tendency to disturbance seen in equinoctial months in temperate latitudes did not appear in the " Discovery's " records in the Antarctic. D ranges exceeding 3° occurred on 11 % of equi- noctial days, but on 40 % of midsummer days. The preponderance of large movements at midsummer was equally apparent in the other elements. Thus the percentage of days having a V range over 2007 was 21 at midsummer, as against 3 in the four equinoctial months.

At the " Discovery's " station small oscillations of a few minutes' duration were hardly ever absent, but the character of the larger disturbances showed a marked variation throughout the 24 hours.

Those of a very rapid oscillatory character were especially numerous in the morning between 4 and 9 a.m. In the late afternoon and evening disturbances of a more regular type became prominent, especially in the winter months. In particular there were numerous occurrences of a remarkably regular type of disturbance, half the total number of cases taking place between 7 and 9 p.m. This " special type of disturbance " was divisible into two phases, each lasting on the average about 20 minutes. During the first phase all the elements diminished in value, during the second phase they increased. In the case of D and H the rise and fall were about equal, but the rise in V was about 3j times the preceding fall. The dis- turbing force — on the north pole — to which the first phase might be attributed was inclined on the average about 5 °i below the horizon, the horizontal projection of its line of action being inclined about 41 °i to the north of east. The amplitude and duration of the dis- turbances of the " special type " varied a good deal ; in several cases the disturbing force considerably exceeded 2007. A somewhat similar type of disturbance was observed by Kr. Birkeland 93 at Arctic stations also in 1902-1903, and was called by him the " polar elementary " storm. Birkeland's record of disturbances extends only from October 1902 to March 1903, so it is uncertain whether " polar elementary " storms occur during the Arctic summer. Their usual time of occurrence seems to be the evening. During their occurrence Birkeland found that there was often a great difference in amplitude and character between the disturbances observed at places so

comparatively near together as Iceland, Nova Zembla and Spitzbergen. This led him to assign the cause to electric currents in the Arctic, at heights not exceeding a few hundred kilometres, and he inferred from the way in which the phenomena developed that the seat of the disturbances often moved westward, as if related in some way to the sun's position. Contemporaneously with the " elementary polar " storms in the Arctic Birkeland found smaller but distinct movements at stations all over Europe; these could generally be traced as far as Bombay and Batavia, and sometimes as far as Christchurch, New Zealand. Chree, 92 on the other hand, working up the 1902-1904 Antarctic records, discovered that.during the larger disturbances of the " special type " corresponding but much smaller movements were visible at Christchurch, Mauritius, Kolaba, and even at Kew. He also found that in the great majority of cases the Antarctic curves were specially disturbed during the times of Birkeland's " elementary polar " storms, the disturbances in the Arctic and Antarctic being of the same order of magnitude, though apparently of considerably different type.

Examining the more prominent of the sudden commencements of magnetic disturbances in 1902-1903 visible simultaneously in the curves from Kew, Kolaba, Mauritius and Christchurch, Chree found that these were all represented in the Antarctic curves by movements of a considerably larger size and of an oscillatory char- acter. In a number of cases Birkeland observed small simultaneous movements in the curves of his co-operating stations, which appeared to be at least sometimes decidedly larger in the equatorial than the northern temperate stations. These he described as " equatorial " perturbations, ascribing them to electric currents in or near the plane of the earth's magnetic equator, at heights of the order of the earth's radius. It was found, however, by Chree that in many, if not all, of these cases there were synchronous movements in the Antarctic, similar in type to those which occurred simultaneously with the sudden commencements of magnetic storms, and that these Antarctic movements were considerably larger than those described by Birke- land at the equatorial stations. This result tends of course to suggest a somewhat different explanation from Birkeland's. But until our knowledge of facts has received considerable additions all explana- tions must be of a somewhat hypothetical character.

In 1831 Sir James Ross 94 observed a dip of 89 59′ at 70° 5′ N., 96° 46′ W., and this has been accepted as practically the position of the north magnetic pole at the time. The position of Magnetic tne gout h magnetic pole in 1840 as deduced from the Antarctic observations made by the " Erebus " and " Terror " expedition is shown in Sabine's chart as about 73 30′ S., 147° 3°' E. In the more recent chart in J. C. Adams's Collected Papers, vol. 2, the position is shown as about 73° 40′ S., 147 7′ E. Of late years positions have been obtained for the south magnetic pole by the " Southern Cross " expedition of 1898-1900 (A), by the " Discovery " in

1902-1904 (B), and by Sir E. Shackleton's expedition 1908-1909 ©. These are as follow:

(A) 72 40′ S., 152 30′ E.

(B) 72 5 r' S., 156″ 25′ E.

(C) 7 2°2 5 'S., 155'16'E.

Unless the diurnal inequality vanishes in its neighbourhood, a some- what improbable contingency considering the large range at the " Discovery's " winter quarters, the position of the south magnetic pole has probably a diurnal oscillation, with an average amplitude of several miles, and there is not unlikely a larger annual oscillation. Thus even apart from secular change, no single spot of the earth's surface can probably claim to be a magnetic pole in the sense popu- larly ascribed to the term. If the diurnal motion were absolutely regular, and carried the point where the needle is vertical round a closed curve, the centroid of that curve — though a spot where the needle is never absolutely vertical — would seem to have the best

claim to the title. It should also be remembered that when the dip is nearly 90° there are special observational difficulties. There are thus various reasons for allowing a considerable uncertainty in positions assigned to the magnetic poles. Conclusions as to change of position of the south magnetic pole during the last ten years based on the more recent results(A), (B) and © would, for instance, possess a very doubtful value. The difference, however, between these re- cent positions and that deduced from the observations of 1840-1841 is more substantial, and there is at least a moderate probability that a considerable movement towards the north-east has taken place during the last seventy years.

See publications of individual magnetic observatories, ■ more especially the Russian (Annates de V Observatoire Physique Central), the French (Annates du Bureau Central Miteorologique de France), and those of Kew, Greenwich, Falmouth, Stonyhurst, Potsdam, Wilhelmshaven, de Bilt, Uccle, O'Gyalla, Prague, Pola, Coimbra, San Fernando, Capo di Monte, Tiflis, Kolaba, Zi-ka-wei, Hong-Kong, Manila, Batavia, Mauritius, Agincourt (Toronto), the observatories of the U.S. Coast and Geodetic Survey, Rio de Janeiro, Melbourne.

In the references below the following abbreviations are used: B.A. = British Association Reports; Batavia = Observations made at the Royal . . . Observatory at Batavia; M.Z. — Meteorologische Zeitschrift, edited by J. Hann and G. Hellman; P.R S. = Proceedings of the Royal Society of London; P T. = Philosophical Transactions; R. = Repertorium fur

Meteorologie, St Petersburg; T M . = Terrestrial Magnetism, edited by L. A. Bauer; R.A.S. Notices = Monthly Notices of the Royal Astronomical Society. Treatises are referred to by the numbers attached to them; e.g. (1) p. 100 means p. 100 of Walker's Terrestrial Magnetism.

*1 E. Walker, Terrestrial and Cosmical Magnetism (Cambridge and London, 1866). la H. Lloyd, A Treatise on Magnetism General and Terrestrial (London, 1874). 2 E. Mascart, Traite de magnitisme terrestre (Paris, 1900). 3 L. A. Bauer, United States Magnetic Declination Tables and Isogonic Charts, and Principal Facts relating to the Earth's Magnetism (Washington, 1902). 4 Balfour Stewart, " Terrestrial Magnetism " (under " Meteorology "), Ency. brit. 9th ed. 6 C. Chree, " Magnetism, Terrestrial," Ency. brit. 10th ed. 6 M.Z. 1906, 23, p. 145. '(3) p. 62. *K. Akad. van Weten- schappen (Amsterdam, 1895; Batavia, 1899, &c). "Atlas des Erdmagnetismus (Riga, 1903). 10 (1) p. 16, &c. u Kolaba (Colaba) Magnetical and Meteorological Observations, 1896, Appendix Table II. 12 (1) p. 21. u Report for 1906, App. 4, see also (3) p. 102. 14 (1) p. 166. 16 Ergebnisse der mag. Beobachtungen in Potsdam, 1901, p. xxxvi. 16 U.S. Coast and Geodetic Survey Report for 1895, App. 1, &c. " T.M. 1, pp. 62, 89, and 2, p. 68. « (3) p. 45. 19 Die Elemente des Erdmagnetismus, pp. 104-108. *> Zur taglichen Variation der mag. Deklination (aus Heft II. des Archivs des Erd- magnetismus) (Potsdam, 1906). 21 M.Z. 1888, 5, p. 225. ffl M.Z. 1904, 21, p. 129. 23 P.T. 202 A, p. 335. 23 » Camb. Phil. Soc. Trans. 20, p. 165. 2i P.T. 208 A, p. 205. 25 P.r. 203 A, p. 151. W P.T. 171, p. 541; P.R.S. 63, p. 64. *>R.A.S. Notices 60, p. 142. 28 Rendiconti del R. 1st. Lomb. 1902, Series II. vol. 35. M R. 1889, vol. 12, no. 8. ^>B.A. Report, 1898, p. 80. 31 P.R.S. (A) 79, p. 151. 32 P.T. 204 A, p. 373. 33 Ann. du Bureau Central Meteoro- logique, annee 1897, i Mem. p. B65. 3i P.T. 161, p. 307. 35 M.Z. 1895, 12, p. 321. 36 "P.T. 1851, p. 123; and 1852, p. 103, see also (4) § 38. "P.T. 159, P- 363. 37 (1) p. 92. ™R.A.S. Notices 65, p. 666. 39 R.A.S. Notices, 65, pp. 2 and 538. 40 K. Akad. van Wetenschappen (Amsterdam, 1906) p. 266. 41 i?.^1.5. Notices 65, p. 520. a B.A. Reports, 1880, p. 201 and 1881, p. 463. *> Anhang Ergebnisse der mag. Beob. in Potsdam, 1896. 44 M.Z. 1899, 16, p. 385. 46 P.T. 166, p. 387. « Trans. Can. Inst. 1 898-1 899, p. 345, and Proc. Roy. Ast. Soc. of Canada, 1902-1903, p. 74, 1904, p. xiv., &c. 47 R.A.S. Notices 65, p. 186. ^ T.M. 10, p. 1. « Expedition norvegienne de 189Q-1Q00 (Christiania, 1901). 60 Theses prisentees <£ la Faculte des Sciences (Paris, 1903). 61 Nat. Tijdschrift voor Nederlandsch-Indie, 1902, p. 71. 62 Wied. Ann. 1882, p. 336.*

63 Sitz. der k. preuss. Akad. der Wiss., 24th June 1897, &c.

64 T.M. 12, p. 1. 66 P.T. 143, p. 549 ; St Helena Observations, vol. ii., p. cxlvi., &c, (1) § 62. M Trans. R.S.E. 24, p. 669. "P.T. 178 A, p. 1. M

Batavia, vol. 16, &c. 69 Batavia, Appendix to vol. 26. 60 R. vol. 17, no. 1. "T.M. 3, p. 13, &c. ™ P.T. 181 A, p. 53 and 188 A. 63 Ann. du Bureau Central Met. vol. i. for years 1884 and 1887 to 1895. 64 Ann. dell' Uff. Centrale Met. e Geod. vol. 14, pt. i. p. 57. 66 A Magnetic Survey of the Netherlands for the Epoch 1st Jan. 1891 (Rotterdam, 1895). m Kg. Svenska Vet. Akad. Hand- lingar, 1895, vol. 27, no. 7. 67 Denkschriften der math, naturwiss. Classe der k. Akad. des Wiss. (Wien), vols. 62 and 67. 68 Journal of the College of Science, Tokyo, 1904, vol. 14. 89 Ann. de V observatoire . . . de Toulouse, 1907, vol. 7. 7 ° Ann. du Bureau Central Met.

1897, I. p. B36. n T.M. 7, p. 74. ™Bull. Imp. Univ. Odessa 85, p. 1, and T.M. 7, p. 67. ™ P.T. 187 A, p. 345. 74 P.R.S. 76 A, p. 181. 75 Bull. Soc. Imp. des Naturalistes de Moskau, 1893, no. 4, p. 381, and T.M. 1, p. 50. 76 Forsch. zur deut. Landes- u. Volkskunde,

1898, Bd. xi, 1, and T.M. 3, p. 77. " P.R.S. 76 A, p. 507. 78 Adams, Scientific Papers, II. p. 446. ™ B.A. Report for 1898, p. 109. 80 Abhand. der bayer. Akad. der Wiss., 1895, vol.19. sl Sitz. k. Akad. der Wiss. (Berlin), 1897, no. xviii., also T.M. 3, p. 191. 82 T.M. 2, p. 1 1. S3 Die Elemente des Erdmagnetismus (St Petersburg,

Fig. 1.

1899), p. 103. » T.M. 9, p. 113. " T.M. 1, p. 77, and Nature, 57, pp. 160 and 180. «• M.Z. 15, p. 175. »• Sitz. der k. k. Akud. der Wiss. Wien, math. nat. Classe, 1898, Bd. cvii., Abth. ii. ■" P.T. (A) 180, p. 467. » Die Tdgliche Periode der erdmagnetischen Ele- mente (St Petersburg, 1902). **> R. Accad. Lincei Atti, viii. 1899, pp. 69, 121, 176, 269 and previous volumes, see also Seances de la Soc. Franc, de Physique, 1899, p. 118. •" Bull. Soc. Vaud., Sc. Nat. 1906, 42, p. 225. 91 Comptes rendus, 1905, 141, p. 567. w National Antarctic Expedition 1001-1004, " Magnetic Observations." 93 The Norwegian Aurora Polaris Expedition 1002-1903, vol. i. 94 (1) P- 163. (C. Ch.)*

*MAGNETITE, a mineral forming the natural *nagnet (see Magnetism), and important also as an iron-ore. it is an iron- black, opaque mineral, with metallic lustre; hardness about 6, sp. gr. 4-9 to 5-2. When scratched, it yields a blade streak. It is an oxide of iron having the formula Fe 3 0.i, corresponding with 724% of metal, whence its great value as an ore. It may be regarded as a ferroso-ferric oxide, FeO.Fe 2 3 , or as iron ferrate,*

Fe"Fe 2 '"04. Titanium is often present, and occasionally the mineral contains magnesium, nickel, &c. It is always strongly magnetic. Magnetite crystallizes in the cubic system, usually in octahedra, less commonly in rhombic dodecahedra, and not infrequently in twinsof the" spinel type " (fig. 1). The rhombic faces of the dodecahedron are often striated parallel to the longer diagonal. There is no distinct cleav- age, but imperfect parting may be obtained along octahedral planes.

Magnetite is a mineral of wide dis- tribution, occurring as grains in many massive and volcanic rocks, like granite, diorite and dolerite. It ap- pears to have crystallized from the magma at a very early period of con- solidation. Its presence contributes to the dark colour of many basalts and other basic rocks, and may cause them to disturb the compass. Large ore-bodies of granular and compact magnetite occur as beds and lenticular masses in Archean gneiss and crystalline schists, in various parts of Norway, Sweden, Finland and the Urals; as also in the states of New York, New Jersey, Pennsylvania and Michigan, as well as in Canada. In some cases it appears to have segregated from a basic eruptive magma, and in other cases to have resulted from metamorphic action. Certain deposits appear to have been formed, directly or indirectly, by wet processes. Iron rust sometimes contains magnetite. An interesting deposit of oolitic magnetic ore occurs in the Dogger (Inferior Oolite) of Rosedale Abbey, in Yorkshire; and a somewhat similar pisolitic ore, of Jurassic age, is known on the continent as chamoisite, having been named from Chamoison (or Chamoson) in the Valais, Switzerland. Grains of magnetite occur in serpentine, as an alteration-product of the olivine. In emery, magnetite in a granular form is largely associated with the corundum; and in certain kinds of mica magnetite occurs as thin dendritic enclosures. Haematite is sometimes magnetic, and A. Liversidge has shown that magnetite is probably present. By deoxidation, haematite may be converted into magnetite, as proved by certain pseudomorphs; but on the other hand magnetite is sometimes altered to haematite. On weathering, magnetite commonly passes into limonite, the ferrous oxide having probably been removed by carbonated waters. Closely related to magnetite is the rare volcanic mineral from Vesuvius, called magnoferrite, or magnesioferrite, with the formula MgFe 2 4 ; and with this may be mentioned a mineral from Jakobsberg, in Vermland, Sweden, called jakobsite, containing MnFe 2 4 . (F. W. R.)*

MAGNETOGRAPH, an instrument for continuously recording the values of the magnetic elements, the three universally chosen being the declination, the horizontal component and the vertical component (see Terrestrial Magnetism). In each case the magnetograph only records the variation of the element, the absolute values .being determined by making observations in the neighbourhood with the unifilar magnetometer {q.v.) and inclinometer (q.v.). xvii. 13

Declination.— "The changes in declination are obtained by means of a magnet which is suspended by a long fibre and carries a mirror, immediately below which a fixed mirror is attached to the base of the instrument. Both mirrors are usually concave ; if plane, a concave lens is placed immediately before them. Light passing through a vertical slit falls upon the mirrors, from which it is reflected, and two images cf the slit are produced, one by the movable mirror attached to the magnet and the other by the fixed mirror. These images would be short lines of light ; but a piano-cylindrical lens is placed with its axis horizontal just in front of the recording surface. In this way a spot of light is obtained from each mirror. The record- ing surface is a sheet of photographic paper wrapped round a drum which is rotated at a constant speed by clockwork about a horizontal axis. The light reflected from the fixed mirror traces a straight line on the paper, serving as a base line from which the variations in declination are measured. As the declination changes the spot of light reflected from the magnet mirror moves parallel to the axis of the recording drum, and hence the distance between the line traced by this spot and the base line gives, for any instant, on an arbitrary scale the difference between the declination and a constant angle, namely, the declination corresponding to the base line. The value of this constant angle is obtained by comparing the record with the value for the declination as measured with a magnetometer. The value in terms of arc of the scale of the record can be obtained by measuring the distance between the magnet mirror and the recording drum, and in most observations it is such that a millimetre on the record represents one minute of arc. The time scale ordinarily employed is 15 mm. per hour, but in modern instruments provision is generally made for the time scale to be increased at will to 180 mm. per hour, so that the more rapid variations of the declination can be followed. The advantages of using small magnets, so that their moment of inertia may be small and hence they may be able to respond to rapid changes in the earth's field, were first insisted upon by E. Mascart, 1 while M. Eschenhagen 2 first designed a set of magnetographs in which this idea of small moment of inertia was carried to its useful limit, the magnets only weighing 1-5 gram each, and the suspension consisting of a very fine quartz fibre.

Horizontal Force. — The variation of the horizontal force is obtained by the motion of a magnet which is carried either by a bifilar sus- pension or by a fairly stiff metal wire or quartz fibre. The upper end of the suspension is turned. till the axis of the magnet is at right angles to the magnetic meridian. In this position the magnet is in equilibrium under the action of the torsion of the suspension and the couple exerted by the horizontal component, H, of the earth's field, this couple depending on the product of H into the magnetic moment, M, of the magnet. Hence if H varies the magnet will rotate in such a way that the couple due to torsion is equal to

the new value of H multiplied by M. Since the movements of the magnet are always small, the rotation of the magnet is propor- tional to the change in H, so long as M and the couple, 9, correspond- ing to unit twist of the suspension system remain constant. When the temperature changes, however, both M and 6 in general change. With rise of temperature M decreases, and this alone will produce the same effect as would a decrease in H. To allow for this effect of temperature a compensating system of metal bars is attached to the upper end of the bifilar suspension, so arranged that with rise of temperature the fibres are brought nearer together and hence the value of 6 decreases. Since such a decrease in 8 would by itself cause the magnet to turn in the same direction as if H had increased, it is possible in a great measure to neutralize the effects of temperature on the reading of the instrument. In the case of the unifilar suspension, the provision of a temperature compensation is not so easy, so that what is generally done is to protect the in- strument fromtemperature variation as much as possible and then to correct the indications so as to allow for the residual changes, a continuous record of the temperature being kept by a recording thermograph attached to the instrument. In the Eschenhagen pattern^ instrument, in which a single quartz fibre is used for the suspension, two magnets are placed in the vicinity of the suspended magnet and are so arranged that their field partly neutralizes the earth's field ; thus the torsion required to hold the magnet with its axis perpendicular to the earth's field is reduced, and the arrange- ment permits of the sensitiveness being altered by changing the position of the deflecting magnets. Further, by suitably choosing the positions of the deflectors and the coefficient of torsion of the fibre, it is possible to make the temperature coefficient vanish. (See Adolf Schmidt, Zeits. fur Instrumentenkunde, 1907, 27, 145.) The method of recording the variations in H is exactly the same as that adopted in the case of the declination, and the sensitiveness generally adopted is such that I mm. on the record represents a change in H of -00005 C.G.S., the time scale being the same as that employed in the case of the declination.

Vertical Component. — To record the variations of the vertical component use is made of a magnet mounted on knife edges so that it can turn freely about a horizontal axis at right angles to its

1 Report British Association, Bristol, 1898, p. 741.

2 Verhandlungen der deutschen physikalischen Gesellschaft, 1899, 1, 147; or Terrestrial Magnetism, 1900, 5, 59.

length (H. Lloyd, Proc. Roy. Irish Acad., 1839, 1, 334). The magnet is so weighted that its axis is approximately horizontal, and any change in the inclination of the axis is observed by means of an attached mirror, a second mirror fixed to the stand serving to give a base line for the records, which are obtained in the same way as in the case of the declination. The magnet is in equilibrium under the influence of the couple VM due to the vertical component V, and the couple due to the fact that the centre of gravity is slightly on one side of the knife-edge. Hence when, say, V decreases the couple VM decreases, and hence the north end of the balanced magnet rises, and vice versa. The chief difficulty with this form of instrument is that it is very sensitive to changes of temperature, for such changes not only alter M but also in general cause the centre of gravity of the system to be displaced with reference to the knife-edge. To reduce these effects the magnet is fitted with compensating bars, generally of zinc, so adjusted by trial that as far as possible they neutralize the effect of changes of temperature. In the Eschenhagen form of vertical force balance two deflecting magnets are used to partly neutralize the vertical component, so that the centre of gravity is almost exactly over the support. By varying the positions of these deflecting magnets it is possible to compensate for the effects of changes of temperature (A. Schmidt, loc. cit.). In order to eliminate the irregularity which is apt to be introduced by dust, &c, interfering with the working of the knife- edge, W. Watson (Phil. Mag., 1904 [6], 7, 393) designed a form of vertical force balance in which the magnet with its mirror is attached to the mid point of a horizontal stretched quartz fibre. The tem- perature compensation is obtained by attaching a small weight to the magnet, and then bringing it back to the horizontal position by twisting the fibre.

The scale values of the records given by the horizontal and vertical force magnetographs are determined by deflecting the respective needles, either by means of a magnet placed at a known distance or by passing an electric current through circular coils of large diameter surrounding the instruments.

The width of the photographic sheet which receives the spot of light reflected from the mirrors in the above instruments is generally so great that in the case of ordinary changes the curve does not go off the paper. Occasionally, however, during a disturbance such is not the case, and hence a portion of the trace would be lost. To overcome this difficulty Eschenhagen in his earlier type of instru- ments attached to each magnet "two mirrors, their planes being inclined at a small angle so that when the spot reflected from one mirror goes off the paper, that corresponding to the other comes on. In the later pattern a third mirror is added of which the

plane is inclined at about 30 to the horizontal. The light from the slit is reflected on to this mirror by an inclined fixed mirror, and after reflection at the movable mirror is again reflected at the fixed mirror and so reaches the recording drum. By this arrangement the angu- lar rotation of the reflected beam is less than that of the magnet, and hence the spot of light reflected from this mirror yields a trace on a much smaller scale than that given by the ordinary mirror and serves to give a complete record of even the most energetic disturbance.

See also Balfour Stewart, Report of the British Association, Aber- deen, 1859, 200, a description of the type of instrument used in the older observatories; E. Mascart, Traite de magnetisme terrestre, p. 191; W. Watson, Terrestrial Magnetism, 1901, 6, 187, describing magnetographs used in India; M. Eschenhagen, Verhandlungen der deutschen physikalischen Gesellschaft, 1899, 1, 147; Terrestrial Magnetism, 1900, 5, 59; and 1901, 6, 59; Zeits. fiir Instrumenten- kunde, 1907, 27, 137; W. G. Cady, Terrestrial Magnetism, 1904, 9, 69, describing a declination magnetograph in which the record is obtained by means of a pen acting on a moving strip of paper, so that the curve can be consulted at all times to see whether a disturbance is in progress.

The effects of temperature being so marked on the readings of the horizontal and vertical force magnetographs, it is usual to place the instruments either in an underground room or in a room which, by means of double walls and similar devices, is protected as much as possible from temperature changes. For descriptions of the arrangements adopted in some observatories see the following: U.S. observatories, Terrestrial Magnetism, 1903, 8, II; Utrecht, Terrestrial Magnetism, 1900, 5, 49; St Maur, Terrestrial Magnetism, 1898, 3, 1 ; Potsdam, Veroffentlichungen des k. preuss. meteor ol. Instituts, " Ergebnisse der magnetischen Beobachtungen in Potsdam in den Jahren 1890 und 1891 ;" Pavlovsk, " Das Konstantinow'sche meteorologische und magnetische Observatorium in Pavlovsk," Ausgabe der kaiserl. Akad. der Wissenschaften zu St Petersburg, 1895. (W. Wn.)

MAGNETOMETER, a name, in its most general sense, for any instrument used to measure the strength of any magnetic field; it is, however, often used in the restricted sense of an instrument for measuring a particular magnetic field, namely, that due to the earth's magnetism, and in this article the instru- ments used for measuring the value of the earth's magnetic field will alone be considered.

The elements which are actually measured when determining the value of the earth's field are usually the declination, the dip and the horizontal component (see Magnetism, Terrestrial). For the instruments and methods

used in measuring the dip see Inclinometer. It remains to consider the measurement of the declination and the horizontal component, these two ele- ments being generally measured with the same instrument, which is called a unifilar magnetometer.

Measurement of Declination. — The measurement of the decli- nation involves two separate observations, namely, the determi- nation of (a) the magnetic meridian and (b) the geographical meri- dian, the angle between the two being the declination. In order to determine the magnetic meridian the orientation of the magnetic

Fig. 1. — Unifilar Magnetometer, arranged to indicate declination.

axis of a freely suspended magnet is observed ; while, in the absence of a distant mark of which the azimuth is known, the geographical meridian is obtained from observations of the transit of the sun or a star. The geometrical axis of the magnet is sometimes defined by means of a mirror rigidly attached to the magnet and having the normal to the mirror as nearly as may be parallel to the magnetic axis. This arrangement is not very convenient, as it is difficult to protect the mirror from accidental displacement, so that the angle between the geometrical and magnetic axes may vary. For this reason the end of the magnet is sometimes polished and acts as the mirror, in which case no displacement of the reflecting surface with reference to the magnet is possible. A different arrangement, used in the instrument described below, consists in having the magnet hollow, with a small scale engraved on glass firmly attached at one end, while to the other end is attached a lens, so chosen that the scale is at its principal focus. In this case the geometrical axis is the line joining the central division of the scale to the optical centre of the lens. The position of the magnet is observed by means of a small telescope, and since the scale is at the principal focus of the lens, the scale will be in focus when the telescope is adjusted to observe a distant object. Thus no alteration in the focus of the telescope is necessary whether we are observing the magnet, a distant fixed mark, or the sun.

The Kew Observatory pattern unifilar magnetometer is shown in figs. I and 2. The magnet consists of a hollow steel cylinder fitted with a scale and lens as described above, and is suspended by a long thread of unspun silk, which is attached at the upper end to the torsion head H. The magnet is protected from" draughts by the box A, which is closed at the sides by two shutters when an observa- tion is being taken. The telescope B serves to observe the scale

attached to the magnet when determining the magnetic meridian, and to observe the sun or star when determining the geographical meridian.

When making a determination of declination a brass plummet having the same weight as the magnet is first suspended in its place, and the torsion of the fibre is taken out. The magnet having been attached, the instrument is rotated about its vertical axis till the centre division of the scale appears to coincide with the vertical cross-wire of the telescope. The two verniers on the azimuth circle having been read, the magnet is then inverted, i.e. turned through 180 about its axis, and the setting is repeated. A second setting with the magnet inverted is generally made, and then another setting with the magnet in its original position. The mean of all the readings of the verniers gives the reading on the azimuth circle corresponding to the magnetic meridian. To obtain the geographical meridian the box A is removed, and an image of the sun or a star is reflected into the telescope B by means of a small transit mirror N. This mirror can rotate about a horizontal axis which is at right

Fig 2. — Unifilar Magnetometer, arranged to show deflexion.

angles to the line of collimation of the telescope, and is parallel to the surface of the mirror. The time of transit of the sun or star across the vertical wire of the telescope having been observed by means of a chronometer of which the error is known, it is possible to calculate the azimuth of the sun or star, if the latitude and longitude of the place of observation are given. Hence if the readings of the verniers on the azimuth circle are made when the transit is observed we can deduce the reading corresponding to the geographical meridian.

The above method of determining the geographical meridian has the serious objection that it is necessary to know the error of the chronometer with very considerable accuracy, a matter of some difficulty when observing at any distance from a fixed observatory. If, however, a theodolite, fitted with a telescope which can rotate about a horizontal axis and having an altitude circle, is employed, so that when observing a transit the altitude of the sun or star can be read off, then the time need only be known to within a minute or so. Hence in more recent patterns of magnetometer it is usual to do away with the transit mirror method of observing and either to use a separate theodolite to observe the azimuth of some distant object, which will then act as a fixed mark when making the declina- tion observations, or to attach to the magnetometer an altitude telescope and circle for use when determining the geographical meridian.

The chief uncertainty in declination observations, at any rate at a fixed observatory, lies in the variable torsion of the silk suspension, as it is found that, although the fibre may be entirely freed from torsion before beginning the declination observations, yet at the conclusion of these observations a considerable amount of torsion may have appeared. Soaking the fibre with glycerine, so that the moisture it absorbs does not change so much with the hygrometric state of the air, is of some advantage, but does not entirely remove the difficulty. For this reason some observers use a thin strip of phosphor bronze to suspend the magnet, considering that the absence of a variable torsion more than compensates for the increased difficulty in handling the more fragile metallic suspension.

Measurement of the Horizontal Component of the Earth's Field. — The method of measuring the horizontal component which is

almost exclusively used, both in fixed observatories and in the field, consists in observing the period of a freely suspended magnet, and then obtaining the angle through which an auxiliary suspended magnet is deflected by the magnet used in the first part of the experiment. By the vibration experiment we obtain the value of the product of the magnetic moment (M) of the magnet into the horizontal component (H), while by the deflexion experi- ment we can deduce the value of the ratio of M to H, and hence the two combined give both M and H.

In the case of the Kew pattern unifilar the same magnet that is used for the declination is usually employed for determining H, and for the purposes of the vibration experiment it is mounted as for the observation of the magnetic meridian. The time of vibra- tion is obtained by means of a chronometer, using the eye-and-ear method. The temperature of the magnet must also be observed, for which purpose a thermometer C (fig. 1) is attached to the box A. When making the deflection experiment the magnetometer is arranged as shown in fig. 2. The auxiliary magnet has a plane

mirror attached, the plane of which is at right angles to the axis of the magnet. An image of the ivory scale B is observed after reflection in the magnet mirror by the telescope A. The magnet K used in the vibration experiment is supported on a carriage L which can slide along the graduated bar D. The axis of the magnet is horizontal and at the same level as the mirror magnet, while when the central division of the scale B appears to coincide with the vertical cross-wire of the telescope the axes of the two magnets are at right angles. During the ex- periment the mirror magnet is protected from draughts by two wooden doors which slide in grooves. What is known as the method of sines is used, for since the axes of the two magnets are always at right angles when the mirror magnet is in its

zero posi- tion, the ratio M/H is propor- tional to the sine of the angle between the magnetic axis of the mirror magnet and the magnetic meridian. When conducting a deflexion experiment the de- flecting magnet K is placed with its centre at 30 cm. from the mirror magnet and to the east of the latter, and the whole instrument is turned till the centre division of the scale B coincides with the cross-wire of the telescope, when the readings of the verniers on the azimuth circle are noted. The magnet K is then reversed in the support, and a new setting taken. The difference between the two sets of readings gives twice the angle which the magnetic axis of the mirror magnet makes with the magnetic meridian. In order to eliminate any error due to the zero of the scale D not being exactly below the mirror magnet, the support L is then removed to the west side of the instrument, and the settings are repeated. Further, to allow of a correction being applied for the finite length of the magnets the whole series of settings is repeated with the centre of the deflecting magnet at 40 cm. from the mirror magnet. Omitting correction terms depending on the temperature and on the inductive effect of the earth's magnetism on the moment of the deflecting magnet, if 6 is the angle which the axis of the de- flected magnet makes with the meridian when the centre of the deflecting magnet is at a distance r, then

r J r sin0 = i + ^ + y + &c,

in which P and Q are constants depending on the dimensions and magnetic states of the two magnets. The value of the constants P and Q can be obtained by making deflexion experiments at three distances. It is, however, possible by suitably choosing the pro- portions of the two magnets to cause either P or Q to be very small. Thus it is usual, if the magnets are of similar shape, to make the deflected magnet 0-467 of the length of the deflecting magnet, in which case Q is negligible, and thus by means of deflexion experi- ments at two distances the value of P can be obtained. (See C. Borgen, Terrestrial Magnetism, 1896, i. p. 176, and C. Chree, Phil. Mag., 1904 [6], 7, P- "3-) . ,

In the case of the vibration experiment correction terms have to be introduced to allow for the temperature of the magnet, for the inductive effect of the earth's field, which slightly increases the magnetic moment of the magnet, and for the torsion of the suspension fibre, as well as the rate of the chronometer. If the temperature of the magnet were always exactly the same in both the vibration and

deflexion experiment, then no correction on account of the effect of temperature in the magnetic moment would be necessary in either experiment. The fact that the moment of inertia of the magnet varies with the temperature must, however, be taken into account. In the deflexion experiment, in addition to the induction correction, and that for the effect of temperature on the magnetic moment, a correction has to be applied for the effect of temperature on the length of the bar which supports the deflexion magnet.

See also Stewart and Gee, Practical Physics, vol. 2, containing a description of the Kew pattern unifilar magnetometer and detailed instructions for performing the experiments; C. Chree, Phil. Mag., 1901 (6), 2, p. 613, and Proc. Roy. Soc, 1899, 65, p. 375, containing a discussion of the errors to which the Kew unifilar instrument is subject; E. Mascart, Traite de magnetisme terrestre, containing a description of the instruments used in the French magnetic survey, which are interesting on account of their small size and consequent easy portability; H. E. D. Fraser, Terrestrial Magnetism, 1901, 6, p. 65, containing a description of a modified Kew pattern unifilar as used in the Indian survey; H. Wild, Mem. Acad. imp. sc. St Petersbourg, 1896 (viti.), vol. 3, No. 7, containing a description of a most elaborate unifilar magnetometer with which it is claimed results can be obtained of a very high order of accuracy ; K. Haufs- mann, Zeits. fiir Instrumentenkunde, 1906, 26, p. 2, containing a description of a magnetometer for field use, designed by M. Eschen- hagen, which has many advantages.

Measurements of the Magnetic Elements at Sea. — Owing to the fact that the proportion of the earth's surface covered by sea is so much greater than the dry land, the determinaton of the magnetic elements on board ship is a matter of very considerable importance. The movements of a ship entirely preclude the employment of any instrument in which a magnet suspended by a fibre has any part, so that the unifilar is unsuited for such observations. In order to obtain the declination a pivoted magnet is used to obtain the magnetic meridian, the geographical meridian being obtained by observations on the sun or stars. A carefully made ship's compass is usually employed, though in some cases the compass card, with its attached magnets, is made reversible, so that the inclination to the zero of the card of the magnetic axis of the system of magnets attached to the card can be eliminated by reversal. In the absence of such a reversible card the index correction must be determined by com- parison with a unifilar magnetometer, simultaneous observations being made on shore, and these observations repeated as often as occasion permits. To determine the dip a Fox's dip circle x is used. This consists of an ordinary dip circle (see Inclinometer) in which the ends of the axle of the needle are pointed and rest in jewelled holes, so that the movements of the ship do not displace the

needle. The instrument is, of course, supported on a gimballed table, while the ship during the observations is kept on a fixed course. To obtain the strength of the field the method usually adopted is that known as Lloyd's method. 2 To carry out a determination of the total force by this method the Fox dip circle has been slightly modified by E. W. Creak, and has been found to give satisfactory results on board ship. The circle is provided with two needles in addition to those used for deter- mining the dip, one (a) an ordinary dip needle, and the other (b) a needle which has been loaded at one end by means of a small peg which fits into one of two symmetrically placed holes in the needle. The magnetism of these two needles is never reversed, and they are as much as possible protected from shock and from approach to other magnets, so that their magnetic state may re- main as constant as possible. Attached to the cross-arm which carries the microscopes used to observe the ends of the dipping needle is a clamp, which will hold the needle b in such a way that its plane is parallel to the vertical circle and its axis is at right angles to the line joining the two microscopes. Hence, when the microscopes are adjusted so as to coincide with the points of the dipping needle a, the axes of the two needles must be at right angles. The needle a being suspended between the jewels, and the needle b being held in the clamp, the cross-arm carrying the reading microscopes and the needle b is rotated till the ends of the needle a coincide with the cross-wires of the microscopes. The verniers having been read, the cross-arm is rotated so as to deflect the needle a in the opposite direction, and a new setting is taken. Half the difference between the two readings gives

1 Annals of Electricity, 1839, 3, p. 288.

2 Humphrey Lloyd, Proc. Roy. Irish Acad., 1848, 4, p. 57.

the angle through which the needle a has been deflected under the action of the needle b. This angle depends on the ratio of the magnetic moment of the needle b to the total force of the earth's field. It also involves, of course, the distance between the needles and the distribution of the magnetism of the needles: but this factor is determined by comparing the value given by the instrument, at a shore station, with that given by an ordi- nary magnetometer. Hence the above observation gives us a means of obtaining the ratio of the magnetic moment of the needle b to the value of the earth's total force. The needle b is then substituted for a, there being now no needle in the clamp attached to the microscope arm, and the difference between the reading now obtained and the dip, together with the weight added to the needle, gives the product of the moment of the needle b into the earth's total force. Hence, from the two observations the value of the earth's total force can be deduced. In an actual observation the deflecting needle would be reversed, as well as the deflected one, while different

weights would be used to deflect the needle b. For a description of the method of using the Fox circle for obser- vations at sea consult the Admiralty Manual of Scientific Inquiry, p. 116, while a description of the most recent form of the circle, known as the Lloyd-Creak pattern, will be found in Terrestrial Magnetism, 1901, 6, p. 119. An attachment to the ordinary ship's compass, by means of which satisfactory measurements of the horizontal component have been made on board ship, is described by L. A. Bauer in Terrestrial Magnetism, 1906, 11, p. 78. The principle of the method consists in deflecting the compass needle by means of a horizontal magnet supported vertically over the compass card, the axis of the deflecting magnet being always perpendicular to the axis of the magnet attached to the card. The method is not strictly an absolute one, since it presupposes a know- ledge of the magnetic moment of the deflecting magnet. In practice it is found that a magnet can be prepared which, when suitably pro- tected from shock, &c, retains its magnetic moment sufficiently constant to enable observations of H to be made comparable in accuracy with that of the other elements obtained by the instruments ordinarily employed at sea. (W. Wn.)

MAGNETO-OPTICS. The first relation between magnetism and light was discovered by Faraday, 1 who proved that the plane of polarization of a ray of light was rotated when the ray travelled through certain substances parallel to the lines of mag- netic force. This power of rotating the plane of polarization in a magnetic field has been shown to be possessed by all refracting substances, whether they are in the solid, liquid or gaseous state. The rotation by gases was established independently by H. Becquerel, 2 and Kundt and Rontgen, 3 while Kundt 4 found that films of the magnetic metals, iron, cobalt, nickel, thin enough to be transparent, produced enormous rotations, these being in iron and cobalt magnetized to saturation at the rate of 200,000° per cm. of thickness, and in nickel about 89,000°. The direction of rotation is not the same in all bodies. If we call the rotation positive when it is related to the direction of the magnetic force, like rotation and translation in a right-handed screw, or, what is equivalent, when it is in the direction of the electric currents which would produce a magnetic field in the same direction as that which produces the rotation, then most substances produce positive rotation. Among those that produce negative rotation are ferrous and ferric salts, ferricyanide of potassium, the salts of lanthanum, cerium and didymium, and chloride of titanium. 5

The magnetic metals iron, nickel, cobalt, the salts of nickel and cobalt, and oxygen (the most magnetic gas) produce positive rotation.

For slightly magnetizable substances the amount of rotation in a space PQ is proportional to the difference between the magnetic potential at P and Q;

or if 6 is the rotation in PQ, S2 P , £2q, the magnetic potential at P and Q, then = R(Q P — Qq), where R is a constant, called Verdet's constant, which depends upon the refract- ing substance, the wave length of the light, and the temperature. The following are the values of R (when the rotation is expressed in circular measure) for the D line and a temperature of 18 C. : — Substance. RX10 5 . Observer.

222 Lord Rayleigh 6 and Kopsel. 7

225 Rodger and Watson. 8

(-377 Arons. 9

/ -3808 Rodger and Watson. 8 Alcohol .... -330 Du Bois. 10

Ether . . . . -315 Du Bois. 10

Oxygen (at I atmosphere) -000179 Kundt and Rontgen (loc.cit.) ' Faraday's heavy glass . l – 738

Carbon bisulphide Water

? 1-2

MAGNETO-OPTICS

389

The variation of Verdet's constant with temperature has been determined for carbon bisulphide and water by Rodger and Watson {loc. cit.). They find if R (, R are the values of Verdet's constant at t"C. and o°C. respectively, then for carbon bisulphide Rj = Ro (1 —-0016961), and for water R (= R (1 — -0000305^ — -0000030s/ 2).

For the magnetic metals Kundt found that the rotation did not increase so rapidly as the magnetic force, but that as this force was increased the rotation reached a maximum value. This suggests that the rotation is proportional to the intensity of magnetization, and not to the magnetic force.

The amount of rotation in a given field depends greatly upon the wave length of the light; the shorter the wave length the greater the rotation, the rotation varying a little more rapidly than the inverse square of the wave length. Verdet 11 has compared in the cases of carbon bisulphide and creosote the rotation given by the formula

with those actually observed; in this formula 6 is the angular rotation of

the plane of polarization, m a constant depending on the medium, X the wave length of the light in air, and i its index of refraction in the medium. Verdet found that, though the agree- ment is fair, the differences are greater than can be explained by errors of experiment.

Verdet 12 has shown that the rotation of a salt solution is the sum of the rotations due to the salt and the solvent; thus, by mixing a salt which produces negative rotation with water which produces positive rotation, it is possible to get a solution which does not exhibit any rotation. Such solutions are not in general magnetically neutral. By mixing diamagnetic and paramag- netic substances we can get magnetically neutral solutions, which, however, produce a finite rotation of the plane of polari- zation. The relation of the magnetic rotation to chemical tonsitution has been studied in great detail by Perkin, 3 Wachs- muth, 4 Jahn 5 and Schonrock. 6

The rotation of the plane of polarization may conveniently be regarded as denoting that the velocity of propagation of circular-polarized light travelling along the lines of magnetic force depends upon the direction of rotation of the ray, the velocity when the rotation is related to the direction of the magnetic force, like rotation and translation on a right-handed screw being different from that for a left-handed rotation. A plane- polarized ray may be regarded as compounded of two oppositely circularly-polarized rays, and as these travel along the lines of magnetic force with different velocities, the one will gain or lose in phase on the other, so that when they are again com- pounded they will correspond to a plane-polarized ray, but in consequence of the change of phase the plane of polarization will not coincide with its original position.

Reflection from a Magnet. — Kerr 17 in 1877 found that when plane-polarized light is incident on the pole of an electromagnet, polished so as to act like a mirror, the plane of polarization of the reflected light is rotated by the magnet. Further experi- ments on this phenomenon have been made by Righi, 18 Kundt, 19 Du Bois, 20 Sissingh, 21 Hall,- 2 Hurion, 23 Kaz 24 and Zeeman. 25 The simplest case is when the incident plane-polarized light falls normally on the pole of an electromagnet. When the magnet is not excited the reflected ray is plane-polarized; when the magnet is excited the plane of polarization is rotated through a small angle, the direction of rotation being opposite to that of the currents exciting the pole. Righi found that the reflected light was slightly elliptically polarized, the axes of the ellipse being of very unequal magnitude. A piece of gold-leaf placed over the pole entirely stops the rotation, showing that it is not produced in the air near the pole. Rotation takes place from magnetized nickel and cobalt as well as from iron, and is in the same direction (Hall). Righi has shown that the rotation at reflection is greater for long waves than for short,*

whereas, as we have seen, the Faraday rotation is greater for short waves than for long. The rotation for different coloured light from iron, nickel, cobalt and magnetite has been measured by Du Bois; in magnetite the direction of rotation is opposite to that of the other metals. When the light is incident obliquely and not nor- mally on the polished pole of an electromagnet, it is elliptically polarized after reflection, even when the plane of polarization is parallel or at right angles to the plane of incidence.

According to Righi, the amount of rotation when the plane of polarization of the incident light is perpendicular to the plane of incidence reaches a maximum when the angle of incidence is between 44° and 68°, while when the light is polar- ized in the plane of incidence the rotation steadily decreases as the angle of incidence is increased. The rotation when the light is polarized in the plane of incidence is always less than when it is polarized at right angles to that plane, except when the incidence is normal, when the two rotations are of course equal.

Reflection from Tangentially Magnetized Iron. — In this case Kerr 26 found: (1) When the plane of incidence is perpendicular to the lines of magnetic force, no rotation of the reflected light is produced by magnetization: (2) no rotation is produced when the light is incident normally; (3) when the incidence is oblique, the lines of magnetic force being in the plane of incidence, the reflected light is ellipticalby polarized after reflection, and the axes of the ellipse are not in and at right angles to the plane of inci- dence. When the light is polarized in the plane of incidence, the rotation is at all angles of incidence in the opposite direction to that of the currents which would produce a magnetic field of the same sign as the magnet. When the light is polarized at right angles to the plane of incidence, the rotation is in the same direc- tion as these currents when the angle of incidence is between o° and 75° according to Kerr, between 0° and 8o° according to Kundt, and between o° and 78° 54′ according to Righi. When the incidence is more oblique than this, the rotation of the plane of polarization is in the opposite direction to the electric currents which would produce a magnetic field of the same sign.

The theory of the phenomena just described has been dealt with by Airy, 27 C. Neumann, 28 Maxwell, 29 Fitzgerald, 30 Rowland, 31 H. A. Lorentz, 32 Voight, 33 Ketteler, 34 van Loghem, 35 Potier, 36 Basset, 37 Goldhammer, 38 Drude, 39 J. J. Thomson, 40 and Leatham ; 41 for a critical discussion of many of these theories we refer the reader to Larmor's a British Association Report. Most of these theories have proceeded on the plan of adding to the expression for the electromotive force terms indicating a force similar in character to that discovered by Hall (see Magnetism) in metallic conductors carrying a current in a magnetic field, i.e. an electro-motive force at right angles to the plane containing the magnetic force and

the electric current, and proportional to the sine of the angle between these vectors. The introduction of a term of this kind gives rotation of the plane of polarization by trans- mission through all refracting substance, and by reflection from magnetized metals, and shows a fair agreement between the theoretical and experimental results. The simplest way of treating the questions seems, however, to be to go to the equa- tions which represent the propagation of a wave travelling through a medium containing ions. A moving ion in a magnetic field will be acted upon by a mechanical force which is at right angles to its direction of motion, and also to the magnetic force, and is equal per unit charge to the product of these two vectors and the sine of the angle between them. For the sake of brevity we will take the special case of a wave travelling parallel to the magnetic force in the direction of the axis of z.

Then supposing that all the ions are of the same kind, and that there are n of these each with mass m and charge e per unit volume, the equations representing the field are (see Electric Waves) : —

”

K.- 3r +4ir«e a j = 35 .

dXo_ dz

d§.

‘ dt’

., dYo , dri da

dt

dz

‘dt’

‘dt

d 2 v ,t> dv.

+R 1 § + a{ = (Xo + ‘fne^e + He

l te

dt

■(y. + ^«,

-He

d-q “dt

dt’

where H is the external magnetic field, X , Y the components of the part of the electric force in the wave not due to the charges on the atoms, o and fi the components of the magnetic force, £ and v

39°

MAGNETO-OPTICS

the co-ordinates of an ion, Ri the coefficient of resistance to the motion of the ions, and a the force at unit distance tending to bring the ion back to its position of equilibrium, Ko the specific inductive capacity of a vacuum. If the variables are proportional to eˆ 1 ” -5 *’ we find by substitution that q is given by the equation

q – 1S.0P —pt _ H2g2£2 – Xpa _ HV£ 2

where P = (a — fane 2) + Rup — mp 2 ,

or, by neglecting R, P = m(s 2 — p 2), where s is the period of the free ions. If, q\, q\ are the roots of this equation, then corre- sponding to 2i we have X = iY and to q% Xo = — iYo. We thus get two oppositely circular-polarized rays travelling with the velocities p/qi and p/q? respectively. Hence if »i, i> 2 are these velocities, and v the velocity when there is no magnetic field, we obtain, if we neglect terms in H 2 ,

i i . 4.wne 3 Hp

vi t ~ˆ + m\s i -p a) i ‘

ii 4wne 3 lfp

v 2 2 ~v 2 m 2 (i 2 — p*y

The rotation r of the plane of polarization per unit length

(i i \ 2irne 3 \lp 2 v ~ˆ\v~vj~m 2 {s 2 -p 2) 2 ‘

Since l/tˆ = K 4-4ir»e 2 /“i(ˆ — P 2)< w e have if m is the refractive index for light of frequency p, and v the velocity of light in vacuo.

ˆ-i=4«¥o/«(s ! -p !) (i)

So that we may put

r = (ji 2 -l) 2 pmls^nev 3 (2)

Becquerel (Comptes rendus, 125, p. 683) gives for r the expression

,_e_H dp

**m i'o d' where X is the wave length. This is equivalent to (2) if n is given by (1). He has shown that this expression is in good agreement with experiment. The sign of r depends on the sign of e, hence the rotation due to negative ions would be opposite to that for positive. For the great majority of substances the direction of rotation is that corresponding to the negation ion. We see from the equations that the rotation is very large for such a value of p as makes P = o: this value corresponds to a free period of the ions, so that the rotation ought to be very large in the neighbourhood of an absorp- tion band. This has been verified for sodium vapour by Macaluso and Corbino."*

*If plane-polarized light falls normally on a plane face of the medium containing the ions, then if the electric force in the incident wave is parallel to x and is equal to the real part of At ,('"~ v \ if the reflected beam in which the electric force is parallel to x is represented by Be' (p ' +58) and the reflected beam in which the electric force is parallel to the axis of y by Ce !(! " +5 *) , then the conditions that the magnetic force parallel to the surface is con tinuous, and that the electric forces parallel to the surface in the air are continuous with Y , Xo in the medium, give*

A _ B _ cC

(8+81) (8+82) (2 2 -?i22) 2(82-81) or approximately, since 51 and 22 are nearly equal, tC_ g(g2-gi) _ Qi»-i)ftH B g a -2i 1 4x^n«Vo J

Thus in transparent bodies for which n is real, C and B differ in phase by ir/2, and the reflected light is elliptically polarized, the major axis of the ellipse being in the plane of polarization of the incident light, so that in this case there is no rotation, but only elliptic polarization; when there is strong absorption so that n contains an imaginary term, C/B will contain a real part so that the reflected light will be elliptically polarized, but the major axis is no longer in the plane of polarization of the incident light; we should thus have a rotation of the plane of polarization superposed on the elliptic polarization.

Zeeman's Effect. — Faraday, after discovering the effect of a magnetic field on the plane of polarization of light, made numer- ous experiments to see if such a field influenced the nature of the light emitted by a luminous body,

but without success. In 1885 Fievez, 44 a Belgian physicist, noticed that the spectrum of a sodium flame was changed slightly in appearance by a magnetic field; but his observation does not seem to have attracted much attention, and was probably ascribed to secondary effects. In 1896 Zeeman 45 saw a distinct broadening of the lines of lithium and sodium when the flames containing salts of these metals were between the poles of a powerful electromagnet; following up this observation, he obtained some exceedingly

remarkable and interesting results, of which those observed with the blue-green cadmium line may be taken as typical. He found that in a strong magnetic field, when the lines of force are parallel to the direction of propagation of the light, the line is split up into a doublet, the constituents of which are on opposite sides of the undisturbed position of the line, and that the light in the constituents of this doublet is circularly polarized, the rotation in the two lines being in opposite directions. When the magnetic force is at right angles to the direction of propagation of the light, the line is resolved into a triplet, of which the middle line occupies the same position as the undisturbed line; all the constituents of this triplet are plane-polarized, the plane of polarization of the middle line being at right angles to the magnetic force, while the outside lines are polarized on a plane parallel to the lines of magnetic force. A great deal of light is thrown on this pheno- menon by the following considerations due to H. A. Lorentz. 46

Let us consider an ion attracted to a centre of force by a force proportional to the distance, and acted on by a magnetic force parallel to the axis of z: then if m is the mass of the particle and e its charge, the equations of motion are

*d*x . m~ia+ax= ■*

■ dP dQ

dx.

de+°-y = ne di-

d 2 z

m 3F+ az=0 –

The solution of these equations is

- *= Acos(£ l «-r-/3) + Bcos (pit+0i)*

y = A sin (j>il+fl-B sin (p4+Pi)

z = C cos (pt+y)

where a — mpi i = —Hepi

a — mpt = Hep?*

p 2 — ajm,

, , ,He ,. ,He

*or approximately pi = *p+$—,p% = p-?—'*

Thus the motion of the ion on the xy plane may be regarded as made up of two circular motions in opposite directions described with frequencies pi and pi respectively, while the motion along z has the period p, which is the frequency for all the vibrations when H = o. Now suppose that the cadmium line is due to the motion of such an ion; then if the magnetic force is along the direction of propagation, the vibration in this direction has its period unaltered, but since the direction of vibration is perpendicular to the wave front, it does not give rise to light. Thus we are left with the two circular motions in the wave front with fre- quencies pi and pi giving the circularly polarized constituents of the doublet. Now suppose the magnetic force is at right angles to the direction of propagation of the light; then the vibration parallel to the magnetic force being in the wave front produces luminous effects and gives rise to a plane-polarized ray of undisturbed period (the middle line of the triplet), the plane of polariza- tion being at right angles to the magnetic force. The components in the wave-front of the circular orbits at right angles to the magnetic force will be rectilinear motions of frequency pi and pi at right angles to the magnetic force — so that they will produce plane- polarized light, the plane of polarization being parallel to the magnetic force ; these are the outer lines of the triplet. ,

If Zeeman's observations are interpreted from this point of view, the directions of rotation of the circularly-polarized light in the doublet observed along the lines of magnetic force show that the ions which produce the luminous vibrations are nega- tively electrified, while the measurement of the charge of fre- quency due to the magnetic field shows that ejm is of the order io 7 . This result is of great interest, as this is the order of the value of elm in the negatively electrified particles which constitute the Cathode Rays (see Conduction, Electric III. Through Gases). Thus we infer that the " cathode particles " are found in bodies, even where not subject to the action of intense electrical fields, and are in fact an ordinary constituent of the molecule. Similar particles are found near an incandescent wire, and also near a metal plate illuminated by ultra-violet

light. The value of ejm deduced from the Zeeman effect ranges from io 7 to 3-4 X io 7 , the value of e/m for the particle in the cathode rays is 1-7- X io 7 . The majority of the determinations of e/m from the Zeeman effect give numbers larger than this, the maximum being about twice this value.

MAGNOLIA

39 1

A more extended study of the behaviour of the spectroscopic lines has afforded examples in which the effects produced by a magnet are more complicated than those we have described, indeed the simple cases are much less numerous than the more complex. Thus Preston 47 and Cornu 48 have shown that under the action of a transverse magnetic field one of the D lines splits up into four, and the other into six lines; Preston has given many other examples of these quartets and sextets, and has shown that the change in the frequency, which, according to the simple theory indicated, should be the same for all lines, actually varies considerably from one line to another, many lines showing no appreciable displacement. The splitting up of a single line into a quartet or sextet indicates, from the point of view of the ion theory, that the line must have its origin in a system consisting of more than one ion. A single ion having only three degrees of freedom can only have three periods. When there is no magnetic force acting on the ion these periods are equal, but though under the action of a magnetic force they are separated, their number cannot be increased. When there- fore we get four or more lines, the inference is that the system giving the lines must have at least four degrees of freedom, and therefore must consist of more than one ion. The theory of a system of ions mutually influencing each other shows, as we should expect, that the effects are more complex than in the case of a single ion, and that the change in the frequency is not necessarily the same for all systems (see J. J. Thomson, Proc. Camb. Phil. Soc. 13, p. 39). Preston 49 and Runge and Paschen have proved that, in some cases at any rate, the change in the frequency of the different lines is of such a character that they can be grouped into series such that each line in the series has the same change in frequency for the same magnetic force, and, moreover, that homologous lines in the spectra of different metals belonging to the same group have the same change in frequency.

A very remarkable case of the Zeeman effect has been dis- covered by H. Becquerel and Deslandres (Comptes rendus, 127, p. 18). They found lines in iron when the most deflected com- ponents are those polarized in the plane at right angles to the magnetic force. On the simple theory the light polarized in this way is not affected. Thus the behaviour of the spectrum in the magnetic field promises to throw great light on the nature of radiation, and perhaps on the constitution of the elements. The study of these effects

has been greatly facilitated by the invention by Michelson w of the echelon spectroscope.

There are some interesting phenomena connected with the Zeeman effect which are more easily observed than the effect itself. Thus Cotton 61 found that if we have two Bunsen flames, A and B, coloured by the same salt, the absorption of the light of one by the other is diminished if either is placed between the poles of a magnet : this is at once explained by the Zeeman effect, for the times of vibration of the molecules of the flame in the magnetic field are not the same as those of the other flame, and thus the absorption is diminished. Similar considerations explain the phenomenon observed by Egoroff and Georgiewsky, 62 that the light emitted from a flame in a transverse field is par- tially polarized in a plane parallel to the magnetic force; and also Righi's M observation that if a sodium flame is placed in a longi- tudinal field between two crossed Nicols, and a ray of white light sent through one of the Nicols, then through the flame, and then through the second Nicol, the amount of light passing through the second Nicol is greater when the field is on than when it is off. Voight and Wiechert (Wied. Ann. 67, p. 345) detected the double refraction produced when light travels through a substance exposed to a magnetic field at right angles to the path of the light ; this result had been predicted by Voight from theoretical considerations. Jean Becquerel has made some very interesting experiments on the effect of a magnetic field on the fine absorp- tion bands produced by xenotime, a phosphate of yttrium and erbium, and tysonite, a fluoride of cerium, lanthanum and didymium, and has obtained effects which he ascribes to the presence of positive electrons. A very complete account of magneto- and electro-optics is coritained in Voight's Magneto- and Elektro-optik.

1 Experimental Researches, Series 19. 2 Comptes rendus, 88, p. 709. 3 Wied. Ann. 6, p. 332; 8, p. 278; 10, p. 257. 4 Wied. Ann. 23, p. 228; 27, p. 191. i Wied. Ann. 31, p. 941. 6 Phil. Trans^ A. 1885, Pt. 11, p. 343. 7 Wied. Ann. 26, p. 456. 8 Phil. Trans., A. 1895, Pt. 17, p. 621. 9 Wied. Ann. 24, p. 161. 10 Wied. Ann. 31, p. 970. u Comptes rendus, 57, p. 670. 12 Comptes rendus, 43, p. 529; 44, p. 1209. 13 Journ. Chem. Soc. 1884, p. 421; 1886, p. 177; 1887, pp. 362 and 808; 1888, p. 561; 1889, pp. 680 and 750; 1891, p. 981; 1892, p. 800; 1893, pp. 75, 99 and 488. " Wied. Ann. 44, p. 377. 15 Wied. Ann. 43, p. 280. 16 Zeitschrift f. physikal. Chem. II, p. 753. " Phil. Mag. [5] 3, p. 321. K Ann. de chim. et de phys. [6] 4, p. 433; 9, p. 65; 10, p. 200. 19 Wied. Ann. 23, p. 228; 27, p. 191. 20 Wied. Ann. 39, p. 25. 21 Wied. Ann. 42, p. 115. 22 Phil. Mag. [5] 12, p. 171. n Journ. de Phys. 1884, p. 360. 24 Beiblcitter zu Wied. Ann. 1885, p. 275. 25 Messungen iiber d. Kerr'sche Erscheinung. Inaugural Dissert. Leiden, 1893. 26 Phil. Mag. [5] 5, p. 161. » Phil. Mag. [3] 28, p. 469. 2S Die magn. Dre- hung d. Polarisationsebene des Lichts,

*Halle, 1863. a Electricity and Magnetism, chap. xxi. ® Phil. Trans. 1880 (2), p. 691. n Phil. Mag. (5) 11, p. 254, 1 88 1. 32 Arch. Neerl. 19, p. 123. 33 Wied. Ann. 23> P- 493; 67, P- 345- " Wied. Ann. 24, p. 119. 35 Wied. Bei- bldtter, 8, p. 869. 36 Comptes rendus, 108, p. 510. "Phil. Trans. 182, A. p. 371, 1892; Physical Optics, p. 393. M Wied. Ann. 46, p. 71 ; 47, p. 345; 48, p. 740; 50, p. 722. 39 Wied. Ann. 46, p. 353; 48, p. 122; 49, p. 690. *° Recent Researches, p. 489 et sea. "Phil. Trans., A. 1897, p. 89. a Brit. Assoc. Report, 1893. "Comptes rendus, 127, p. 548. " Bull, de I'Acad. des Sciences Belg. (3) 9, pp. 327, 381, 1885; 12 p. 30, 1886. 45 Communications from the Physical Laboratory, Leiden, No. 33, 1896; Phil. Mag. 43, p. 226; 44, pp. 55 and 255; and 45, p. 197. * Arch. Neerl. 25, p. 190. n Phil. Mag. 45, p. 325; 47, p. 165. 4S Comptes rendus, 126, p. 181. 49 Phil. Mag. 46, p. 187. m Phil. Mag. 45, p. 348. 61 Comptes ren dus, 125, p. 865. 62 Comptes rendus, pp. 748 and 949, 1897. 63 Comptes rendus, 127, p. 216; 128, p. 45. (J. J. T.)*

MAGNOLIA, the typical genus of the botanical order Magno- liaceae, named after Pierre Magnol (1638-1715), professor of medicine and botany at Montpellier. It contains about twenty species, distributed in Japan, China and the Himalayas, as well as in North America.

Magnolias are trees or shrubs with deciduous or rarely evergreen foliage. They bear conspicuous and often large, fragrant, white, rose or purple flowers. The sepals are three in number, the petals six to twelve, in two to four series of three in each, the stamens and carpels being numerous. The fruit consists of a number of follicles which are borne on a more or less conical receptacle, and dehisce along the outer edge to allow the scarlet or brown seeds to escape ; the seeds however remain suspended by a long slender thread (the funicle). Of the old-world species, the earliest in cultivation appears to have been M . Yulan (or M . conspicua) of China, of which the buds were preserved, as well as used medici- nally and to season rice; together with the greenhouse species, M. fuscata, it was transported to Europe in 1789, and thence to North America, and is now cultivated in the Middle States. There are many fine forms of M. conspicua, the best being Soulangeana, white tinted with purple, Lennt and stricta. Of the Japanese magnolias, M. Kobus and the purple-flowered M. obovata were met with by Kaempfer in 1690, and were introduced into England in 1709 and 1804 respectively. M. pumila, the dwarf magnolia, from the mountains of Amboyna, is nearly evergreen, and bears deliriously scented flowers; it was intro- duced in 1786. The Indian species are three in number, M. globosa, allied to M. conspicua of Japan, M. sphenocarpa, and, the most magnificent of all magnolias, M. Campbellii, which forms a conspicuous feature in the scenery and vegetation of Darjeeling. It was discovered by Dr Griffith in Bhutan, and is a large forest tree, abounding on the outer ranges of Sikkim, 80 to 150 ft. high, and from 6 to 12 ft. in girth. The flowers are

6 to 10 in. across, appearing before the leaves, and vary from white to a deep rose colour.

The first of the American species brought to Europe (in 1688 by John Banister) was M. glauca, a beautiful evergreen specier about 15 ft. high with obtuse leathery leaves, blue-green above, silvery underneath, and globular flowers varying from creamy white to" pale yellow with age. It is found in low situations near the sea from Massachusetts to Louisiana — more especially in New Jersey and the Carolinas. M . acuminata, the so-called " cucumber tree," from the resemblance of the young fruits to small cucumbers, ranges from Pennsylvania to Carolina. The

wood is yellow, and used for bowls; the flowers, 3 to 4 in. across, are glaucous green tinted with yellow. It was introduced into England from Virginia about 1736. M. tripetala (or M. um- brella), is known as the " umbrella tree " from the arrangement of the leaves at the ends of the branches resembling somewhat that of the ribs of an umbrella. The flowers, 5 to 8 in. across, are white and have a strong but not disagreeable scent. It was brought to England in 1752. M. Fraseri (or M. auriculata) ,.

Magnolia grandiflora, shoot with flower; rather less than 3 nat. size.

1. Flower after removal of the sepals and petals, showing the in-

definite stamens, s, and carpels, c.

2. Fruit — the ripe carpels are splitting, exposing the seeds, some of

which are suspended by the long funicle.

3. Floral diagram, b, bract.

discovered by John Bartram in 1773, is a native of the western parts of the Carolinas and Georgia, extending southward to western Florida and southern Alabama. It grows 30 to 50 ft. high, has leaves a foot or more long, heart-shaped and bluntly auricled at the base, and fragrant pale yellowish- white flowers, 3 to 4 in. across. The most beautiful species of North America is M . grandiflora, the " laurel magnolia," a native of the south-eastern States, and introduced into England in 1 734. It grows a straight trunk, 2 ft. in diameter and upwards of 70 ft. high, bearing a profusion of large, powerfully lemon-scented creamy-white flowers. It is an evergreen tree, easily recognized by its glossy green oval oblong leaves with

a rusty-brown under surface. In England it is customary to train it against a wall in the colder parts, but it does well as a bush tree; and the original species is surpassed by the Exmouth varieties, which originated as seedlings at Exeter from the tree first raised in England by Sir John Colliton, and which flower much more freely than the parent plant. Other fine magnolias now to be met with in gardens are M . cordata, a North American deciduous tree 40 to 50 ft. high, with heart-shaped leaves, woolly beneath, and yellow flowers lined with purple; M. hypoleuca, a fine Japanese tree 60 ft. high or more, with leaves a foot or more long, 6 to 7 in. broad, the under surface covered with hairs; M. macrophylla, a handsome deciduous North American tree, with smooth whitish bark, and very large beautiful green leaves, 1 to 3 ft. long, 8 to 10 in. broad, oblong-obovate and heart-shaped at the base; the open sweet-scented bell-shaped flowers 8 to 10 in. across, are white with a purple blotch at the base of the petals; M. stellata or Haileana, a charming deciduous Japanese shrub remarkable for producing its pure

white starry flowers as early as February and March on the leafless stems; and M . Walsoni, another fine deciduous Japanese bush or small tree with very fragrant pure white flowers 5 to 6 in. across.

The tulip tree, Liriodendron tulipifera, a native of North America, frequently cultivated in England, is also a member of the same family. It reaches a height of over 100 ft. in a native condition, and as much as 60 to 80 ft. in England. It resembles the plane tree somewhat in appearance, but is readily recognized by lobed leaves having the apical lobe truncated, and by its soft green and yellow tulip-like flowers — which however are rarely borne on trees under twenty years of age.

For a description of the principal species of magnolia under cultivation see J. Weathers, Practical Guide to Garden Plants, pp. 174 seq., and for a detailed account of the American species see C. S. Sargent, Silva of North America, vol. i.

MAGNUS, HEINRICH GUSTAV (1802-1870), German chemist and physicist, was born at Berlin on the 2nd of May 1802. His father was a wealthy merchant; and of his five brothers one, Eduard (1799-1872), became a celebrated painter. After study- ing at Berlin, he went to Stockholm to work under Berzelius, and later to Paris, where he studied for a while under Gay-Lussac and Thenard. In 1 83 1 he returned to Berlin as lecturer on technology and physics at the university. As a teacher his success was rapid and extraordinary. His lucid style and the perfection of his experimental demonstrations drew to his lectures a crowd of enthusiastic scholars, on whom he impressed the importance of applied science by conducting them round the factories and work- shops of the city;

and he further found time to hold weekly " colloquies " on physical questions at his house with a small circle of young students. From 1827 to 1833 he was occupied mainly with chemical researches, which resulted in the discovery of the first of the platino-ammonium compounds (" Magnus's green salt " is Ptlk, 2NH3), of sulphovinic, ethionic and isethionic acids and their salts, and, in conjunction with C. F. Ammermuller, of periodic acid. Among other subjects at which he subsequently worked were the absorption of gases in blood (1837-1845), the expansion of gases by heat (1841-1844), the vapour pressures of water and various solutions (1844-18 54), thermo-electricity (1851), electrolysis (1856), induction of currents (1858-1861), conduction of heat in gases (i860), and polarization of heat (1866- 1868). From 1 86 1 onwards he devoted much attention to the question of diathermancy in gases and vapours, especially to the behaviour in this respect of dry and moist air, and to the thermal effects produced by the condensation of moisture on solid surfaces.

In 1834 Magnus was elected extraordinary, and in 1845 ordinary professor at Berlin. He was. three times elected dean of the faculty, in 1847, 1858 and 1863; and in 1861, rector magnificus. His great reputation led to his being entrusted by the government with several missions; in 1865 he represented Prussia in the conference called at Frankfort to introduce a uniform metric system of weights and measures into Germany. For forty-five years his labour was incessant ; his first memoir was published in 1825 when he was yet a student; his last appeared shortly after his death on the 4th of April 1870. He married in 1840 Bertha Humblot, of a French Huguenot family settled in Berlin, by whom he left a son and two daughters.

See Allgemeine deutsche Biog. The Royal Society's Catalogue enumerates 84 papers by Magnus, most of which originally appeared in Poggendorff's Annalen.

MAGNY, CLAUDE DRIGON, Marquis de (1707-1879), French heraldic writer, was born in Paris. After being employed for some time in the postal service, he devoted himself to the study of heraldry and genealogy, his work in this direction being rewarded by Pope Gregory XVI. with a marquisate. He founded a French college of heraldry, and wrote several works on heraldry and genealogy, of which the most important were Archives nobiliaires universelles (1843) and Livre d' or de la noblesse de France (1844-1852). His two sons, Edouard Drigon and Achille Ludovice Drigon, respectively comte and vicomte de Magny, also wrote several works on heraldry.

MAGO, the name of several Carthaginians, (i) The reputed founder of the military power of Carthage, fl. 550-500 B.C. (Justin xviii. 7, xix. 1). (2) The youngest of the three sons of Hamilcar Barca. He accompanied Hannibal into Italy, and held important commands in the great victories of the first three years. After the battleof Cannae (216 B.C.) he sailed to Carthage to report the successes gained. He was about to return to Italy with strong reinforcements for Hannibal, when the government ordered him to go to the aid of his other brother, Hasdrubal, who was hard pressed in Spain. He carried on the war there with varying success in concert with the two Hasdrubals until, in 209, his brother marched into Italy to help Hannibal. Mago remained in Spain with Hasdrubal, the son of Gisco. In 207 he was defeated by M. Junius Silanus, and in 206 the combined forces of Mago and Hasdrubal were scattered by Scipio Africanus in the decisive battle of Silpia. Mago maintained himself for some time in Gades, but afterwards received orders to carry the war into Liguria. He wintered in the Balearic Isles, where the harbour Portus Magonis (Port Mahon) still bears his name. Early in 204 he landed in Liguria, where he maintained a desultory warfare till in 203 he was defeated in Cisalpine Gaul by the Roman forces. Shortly afterwards he was ordered to return to Carthage, but on the voyage home he died of wounds received in battle.

See Polybius iii.; Livy xxi.-xxiii. ; xxviii., chs. 23-37; x xix., xxx. ; Appian, Hispanica, 25-37; T. Friedrich, Biographie des Barkiden Mago; H. Lehmann, Der Angriff der drei Barkiden auf Italien (Leipzig, 1905) ; and further J. P. Mahaffy, in Hermathena, vii.

29-36 (1890).

(3) The name of Mago is also attached to a great work on agriculture which was brought to Rome and translated by order of the senate after the destruction of Carthage. The book was regarded as a standard authority, and is often referred to by later writers.

See Pliny, Nat. Hist, xviii. 5 ; Columella, i. 1 ; Cicero, De oratore, i. 58.

MAGPIE, or simply Pie (Fr. pie), the prefix being the abbrevi- ated form of a human name (Margaret 1), a bird once common throughout Great Britain, though now nearly everywhere scarce. Its pilfering habits have led to this result, yet the injuries it causes are exaggerated by common report; and in many countries of Europe it is still the tolerated or even the cherished neighbour of every farmer, as it formerly was in England if not in Scotland also. It did not exist in Ireland in 161 7, when Fynes Morison wrote his Itinerary, but it had appeared there within a hundred years later,

when Swift mentions its occurrences in his Journal to Stella, 9th July 171 1. It is now common enough in that country, and there is a widespread but unfounded belief that it was intro- duced by the English out of spite. It is a species that when not molested is extending its range, as J. Wolley ascertained in Lapland, where within the last century it has been gradually pushing its way along the coast and into the interior from one fishing-station or settler's house to the next, as the country has been peopled.

Since the persecution to which the pie has been subjected in Great Britain, its habits have altered greatly. It is no longer the merry, saucy hanger-on of the homestead, but is become the suspicious thief, shunning the gaze of man, and knowing that danger may lurk in every bush. Hence opportunities of observ- ing it fall to the lot of few, and most persons know it only as a curtailed captive in a wicker cage, where its vivacity and natural beauty are lessened or wholly lost. At large few European birds possess greater beauty, the pure white of its scapulars and inner web of the flight-feathers contrasting vividly with the deep glossy black on the rest of its body and wings, while its long tail is lustrous with green, bronze, and purple reflections. The pie's nest is a wonderfully ingenious structure, placed either in high trees or low bushes, and so massively built that it will stand for years. Its foundation consists of stout sticks, turf and clay,

1 " Magot " and " Madge," with the same origin, are names, frequently given in England to the pie; while in France it is com- monly known as Margot, if not termed, as it is in some districts, Jaquette.

wrought into a deep, hollow cup, plastered with earth, and lined with fibres; but around this is erected a firmly interwoven, basket-like outwork of thorny sticks, forming a dome over the nest, and leaving but a single hole in the side for entrance and exit, so that the whole structure is rendered almost impregnable. Herein are laid from six to nine eggs, of a pale bluish-green freckled with brown and blotched with ash-colour. Superstition as to the appearance of the pie still survives even among many educated persons, and there are several versions of a rhyming adage as to the various turns of luck which its presenting itself, either alone or in company with others, is supposed to betoken, though all agree that the sight of a single pie presages sorrow.

The pie belongs to the same family of birds as the crow, and is the Corvus pica of Linnaeus, the Pica caudata, P. melanoleuca, or P. rustica of modern ornithologists, who have recognized it as forming a distinct genus, but the number of species thereto belonging has been a fruitful source of discussion. Examples from the south of Spain differ slightly from those inhabiting the rest of Europe, and in some points more resemble the P. mauri- tanica of north-western Africa; but that species has a patch of bare

skin of a fine blue colour behind the eye, and much shorter wings. No fewer than five species have been discriminated from various parts of Asia, extending to Japan; but only one of them, the P. leucoptera of Turkestan and Tibet, has of late been admitted as valid. In the west of North America, and in some of its islands, a pie is found which extends to the upper valleys of the Missouri and the Yellowstone, and has long been thought entitled to specific distinction as P. hudsonia; but its claim thereto is now disallowed by some of the best ornithologists of the United States, and it can hardly be deemed even a geographical variety of the Old-World form. In California, however, there is a permanent race if not a good species, P. nuttalli, easily distinguishable by its yellow bill and the bare yellow skin round its eyes; on two occasions in the year 1867 a bird apparently similar was observed in Great Britain (Zoologist, ser. 2, pp. 706, 1016. (A. N.)

MAGWE, a district in the Minbu division of Upper Burma. Area, 2913 sq. m.; pop. (1901), 246,708, showing an increase of 12-38% in the decade. Magwe may be divided into two portions: the low, flat country in the Taungdwingyi subdivision, and the undulating high ground extending over the rest of the district. In Taungdwingyi the soil is rich, loamy, and extremely fertile. The plain is about 45 m. from north to south. At its southern extremity it is about ˆo m. wide, and lessens in width to the north till it ends in a point at Natmauk. On the east are the Pegu Yomas, which at some points reach a height of 1500 ft. A number of streams run westwards to the Irrawaddy, of which the Yin and the Pin, which form the northern boundary, are the chief. The only perennial stream is the Yanpe. Rice is the staple product, and considerable quantities are exported. Sesamum of very high quality, maize, and millet are also cultivated, as well as cotton in patches here and there over the whole district.

In this district are included the well-known Yenangyaung petro- leum wells. The state wells have been leased to the Burma Oil Company. The amount of oil-bearing lands is estimated at 80 sq. m. and the portion not leased to the company has been demarcated into blocks of 1 sq. m. and offered on lease. The remaining land belongs to hereditary Burmese owners called twinsa, who dig wells and extract their oil by the rope and pulley system as they have always done. Lacquered wood trays, bowls and platters, and cart- wheels, are the only manufactures of any note in the district.

The annual rainfall averages about 27 inches. The maximum temperature rises to a little over 100 in the hot season, and falls to an average minimum of 53° and 54° in the cold season.

The town of Magwe is the headquarters of the district; pop. (1901), 6232. It is diagonally opposite Minbu, the headquarters of the division, on the

right bank of the Irrawaddy.

MAGYARS, the name of the dominant race in Hungary, or Hungarians proper. Though they have become physically assimilated to the western peoples, they belong in origin and language to the Finno-Ugrian (q.v.) division of the Ural-Altaic race. They form barely half of the population of Hungary, but are by far the largest and most compact of all its racial groups.

Magyar is the official language of Hungary, the official name of which (Magyarorzdg, or " country of the Magyars") enshrines the Magyar claim to predominance. While all Magyars are properly Hungarians, all Hungarians are not necessarily Mag- yars. " Hungarian " may be used as a generic term covering all the various races of Hungary, while " Magyar " is strictly specific to a single group. The Magyars themselves, indeed, sometimes apply the name Magyarorzdg to Hungary " proper, " excluding Croatia-Slavonia, the whole kingdom being called Magyarbirodalom, the Magyar monarchy or realm. See Hungary.

MAHABALESHWAR, or Malcolmpeth, a hill station in Satara district, and the principal sanatorium in the Bombay presidency, India. Pop. (iooi), 5299. It is reached by carriage from Wathar railway station (39 m.) or by motor car from Poona (119 m.). Mahabaleshwar occupies the summit of a ridge of the Western Ghats, with a general elevation of 4500 ft. above sea-level. It was established in 1828 by Sir John Malcolm, governor of Bombay, who obtained the site from the raja of Satara in exchange for another patch of territory. The superior elevation of Mahabaleshwar renders it much cooler than Matheran (2460 ft.), a sanatorium about 50 m. E. of Bombay, but its heavy rainfall (292 in. annual average) makes it almost uninhabitable during the rainy season. The mean annual temperature is 67° F. In the hottest season (March- April) an extreme of a little over 90 is reached during the day. Mahabaleshwar forms the retreat usually during spring, and occasionally in autumn, of the governor of Bombay, and the chief officers of his establishment, and has the usual public buildings of a first-class sanatorium.

MAHAFFY, JOHN PENTLAND (1839-), Irish classical scholar, was born in Switzerland on the 12th of July 1839. He received his early education in Switzerland and Germany, and later at Trinity College, Dublin, where he held the professorship of ancient history. Mahaffy, a man of great versatility, published numerous works, some of which, especially those dealing with what may be called the Silver age of Greece, became standard authorities. The following deserve mention: History of Classical Greek Literature (4th ed., 1903 seq.); Social Life in Greece from Homer to Menander (4th ed., 1903); The Silver Age of the Greek World (1906) ; The Empire of the Ptolemies (1896) ; Greek Life and Thought from Alexander to the Roman Conquest (2nd ed., 1896); The Greek World under Roman Sway from Polybius to Plutarch (1890). His translation of Kuno Fischer's Commentary on Kant (1866) and his own exhaustive analysis, with elucidations, of Kant's critical philosophy are of great value. He also edited the Petrie papyri in the Cunningham Memoirs (3 vols.

1891-1905).

MAHALLAT, a province of central Persia, situated between Kashan and Irak. Pop. about 20,000; yearly revenue about £2500. Until 1890 it was one of the five " central provinces " (the other four being Irak, Ferahan, Kezzaz, and Savah), which were under a governor appointed by the shah; since then it has formed part of the Isfahan government. It is traversed by the Anarbar or Kum River, and comprises the city of Mahallat, divided into upper and lower, or Rivkan and Zanjirvan, and twenty-two flourishing villages. It Was known in former times as Anar, the Anarus of Peutinger's tables. The city, capital of the province, is situated at an elevation of 5850 ft. in 33 51′ N., 50° 30′ E.; pop. about 9000.

MAHAN, ALFRED THAYER (1840-), American naval officer and historian, was born on the 27th of September 1840 at West Point, New York. His father, Dennis Hart Mahan (1 802-1871) was a professor in the military academy, and the author of textbooks on civil and military engineering. The son graduated at the naval academy in 1859, became lieutenant in 1861, served on the " Congress," and on the " Pocahontas," " Seminole," and " James Adger " during the Civil War, and was instructor at the naval academy for ayear. In 1865 he was made Ueut.commander, commander in 1872, captain in 1885. Mean while he saw service in the Gulf of Mexico, the South Atlantic, the Pacific, and Asia, and did shore duty at Boston, New York and Annapolis. In 1 886-89 he was president of the naval war college at

Newport, Rhode Island. Between 1889 and 1892 he was engaged in special service for the bureau of navigation, and in 1893 was made commander of the " Chicago," of the European squadron. In 1896 he retired from active service, but was a member of the naval board of strategy during the war between the United States and Spain. He was a member of the peace congress at the Hague in 1899. This long and varied service gave him extensive opportunities for observation, which he sup- plemented by constant study of naval authorities and reflection on the interpretation of the problems of maritime history. His first book was a modest and compact story of the affairs in The Gulf and Inland Waters (1883), in a series of volumes by various writers, entitled The Navy in the Civil War; in 1890 he suddenly acquired fame by the appearance of his masterly work entitled The Influence of Sea Power upon History, i66o-ij8j. Having been impressed by the failure of historians to allow for the in- fluence of sea power in struggles between nations, he was led to make prolonged investigations of this general theme (see Sea Power). The reception accorded the volume was instant and hearty; in England, in particular, it was deemed almost an epoch- making work, and was studied by naval specialists, cabinet ministers and journalists, as well as by a large part of the general public. It

was followed by The Influence of Sea Power upon the French Revolution and Empire (2 vols. 1892); The Life of Nelson, the Embodiment of the Sea Power of Great Britain (1897) ; and Sea Power in its Relations to the War of 1812 (1905). The author's general aim in these works — some of which have been translated into French, German and Japanese — was to make the consider- ation of maritime matters paramount to that of military, political or economic movements, without, however, as he himself says " divorcing them from their surroundings of cause and effect in general history, but seeking to show how they modified the latter, and were modified by them." He selected the year 1660 as the beginning of his narrative, as being the date when the " sailing- ship era, with its distinctive features, had fairly begun." The series as a whole has been accepted as finally authoritative, sup- planting its predecessors of similar aim, and almost — in the words of Theodore Roosevelt — founding a new school of naval historical writing.

Other works by Mahan are a Life of Admiral Farragut (1892); The Interest of America in Sea Power (1897) ; Lessons of the War with Spain (1899) ; The Story of the War with South Africa and The Problem of Asia (1900) ; Types of Naval Officers drawn from the History of the British Navy (1901); Retrospect and Prospect, studies of international relations (1902).

MAHANADI, or Mahanuddy (" The Great River "), a river of India. It rises in 20 10′ N., 82 E., 25 m. S. of Raipur town, in the wild mountains of Bastar in the Central Provinces. At first an insignificant stream, taking a northerly direction, it drains the eastern portion of the Chhattisgarh plain, then a little above Seorinarayan it receives the waters which its first great affluent, the Seonath, has collected from the western portion of the plain; thence flowing for some distance due E., its stream is augmented by the drainage of the hills of Uprora, Korba, and the ranges that separate Sambalpur from Chota Nagpur. At Padampur it turns towards the south, and struggling through masses of rock, flows past the town of Sambalpur to Sonpur. From Sonpur it pursues a tortuous course among ridges and rocky crags towards the range of the Eastern Ghats. This mountain line it pierces by a gorge about 40 m. in length, overlooked by forest-clad hills. Since the opening of the Bengal-Nagpur railway, the Mahanadi is little used for navigation. It pours down upon the Orissa delta at Naraj, about 7 m. west of Cuttack town; and after traversing Cuttack district from west to east, and throwing off numerous branches (the Katjori, Paika, Biropa, Chitartala, &c.) it falls into the Bay of Bengal at False Point by several channels.

The Mahanadi has an estimated drainage area of 43,800 sq. m., and its rapid flow renders its maximum discharge in time of flood second to that of no other river in India. During unusually high floods 1,500,000 cub. ft. of

water pour every second through the Naraj gorge, one-half of which, uncontrolled by the elaborate

embankments, and heavily laden with silt, pours over the delta, filling the swamps, inundating the rice-fields, and converting the plains into a sea. In the dry weather the discharge of the Mahanadi dwindles to 1 125 cub. ft. per second. Efforts have been made to husband and utilize the vast water supply thrown upon the Orissa delta during seasons of flood. Each of the three branches into which the parent stream splits at the delta head is regulated by a weir. Of the four canals which form the Orissa irrigation system, two take off from the Biropa weir, and one, with its branch, from the Mahanadi weir. On the 31st of December 1868 the government took over the whole canal works from the East Indian Irrigation Company, at a cost of £941,368. The canals thus taken over and since completed, are the high-level canal, the Kendrapara canal, the Taldanda canal and the Machgaon canal, irrigating 275,000 acres.

MAHANOY CITY, a borough of Schuylkill county, Pennsyl- vania, U.S.A., 56 m. N.E. of Harrisburg. Pop. (1890), 11,286; (1900), 13,504, of whom 3877 were foreign-born, mostly Slavs; (1910 census) 15,936. It is served by branches of the Lehigh Valley and the Philadelphia & Reading railways. The borough is situated in the valley of Mahanoy Creek, and has an elevation of 1240 ft. above the sea; Broad Mountain (1795 ft.), a ridge extending through Schuylkill county, overlooks it on the S.E. The valley is a part of the anthracite coal region of Pennsyl- vania, fire clay abounds in the vicinity, and the borough's principal industries are the mining and shipping of coal, and the manufacture of shirts and foundry products. Mahanoy City, originally a part of Mahanoy township (pop. in 1910, 6256), was incorporated as a borough in 1863.

MAHAR, the name of a servile caste in the Deccan, India. Their special function, apart from that of scavenger, is to act as village watchman, as guardian of the village boundaries, and as public messenger. In some parts they are also weavers of coarse cotton cloth. In 1901 their total number in all India was just under three millions.

MAHARAJPUR, a village in Gwalior state, Central India. Pop. (1901), 366. It was the scene of a battle (Dec. 29, 1843) in which Sir Hugh Gough, accompanied by the governor- general, Lord Ellenborough, defeated the insurgent army of the Gwalior state.

MAHAVAMSA, the Great Chronicle, a history of Ceylon from the 5th century B.C. to the middle of the 5th century a.d., written in Pali verse by Mahanama of the Dighasanda Hermitage, shortly after the close of the period with which it deals. In point of historical value it compares well with early European chronicles. In India proper the decipher- ment of early Indian inscriptions was facilitated to a very great extent by the data found only in the Mahavamsa. It was composed on the basis of earlier works written in Sinhalese, which are now lost, having been supplanted by the chronicles and commentaries in which their contents were restated in Pali in the course of the 5th century. The particular one on which our Mahavamsa was mainly based was also called the Mahavamsa, and was written in Sinhalese prose with Pali memorial verse interspersed. The extant Pali work gives legends of the Buddha and the genealogy of his family; a sketch of the history of India down to Asoka; an account of Buddhism in India down to the same date; a description of the sending out of missionaries after Asoka's council, and especially of the mission of Mahinda to Ceylon; a sketch of the previous history of Ceylon; a long account of the reign of Devanam-piya Tissa, the king of Ceylon who received Mahinda, and estab- lished Buddhism in the island; short accounts of the kings succeeding him down to Duttha Gamrin (Dadagamana or Dutegemunu); then a long account, amounting to an epic poem, of the adventures and reign of that prince, a popular hero, born in adversity, who roused the people, and drove the Tamil invaders out of the island. Finally we have short notices of the subsequent kings down to the author's time. The Mahavamsa was the first Pali book made known to Europe. It was edited in 1837, with English translation and an elaborate introduction, by George Tumour, then colonial secretary in Ceylon. Its vocabulary was an important part of the material utilized in Childer's Pali Dictionary. Its relation to the sources from which it drew has been carefully discussed by various

scholars and in especial detail by Geiger. It is agreed that it gives a reasonably fair and correct presentation of the tradi- tion preserved in the lost Sinhalese Mahavamsa; that, except in the earliest period, its list of kings, with the years of each reign, is complete and trustworthy; and that it gives throughout the view, as to events in Ceylon, of a resident in the Great Minster at Anuradhapura.

See The Mahavamsa, ed. by Geo. Tumour (Colombo, 1837); ed. by W. Geiger (London, 1908) ; H. Oldenberg, in the introduction to his edition of the Dipavamsa (London, 1879) ; O. Franke, in Wiener Zeitschrift fur die Kunde des Morgenlandes (1907) ; W Geiger, Dipavamsa und Mahavamsa (Leipzig, 1905, trans, by Ethel M. Coomaraswamy, Colombo, 1908). (T. W. R. D.)

MAHAYANA (" Great Vehicle "), the name given to the later Buddhism, the popular religion which embraced all the people and had its pantheon of Buddhas and Bodhisatvas, with attendant deities and demons, spacious temples and images, pompous ceremonial and noisy festivals. It was thus contrasted with the Hinayana (" Little Vehicle ") of the primitive Buddhism which had been only for the select few. (See Buddhism.)

MAHDI (Arab. " he who is guided aright "), a title assumed by the third Abbasid caliph (see Caliphate: Abbasids, § 3). According to Moslem traditionists Mahomet declared that one of his descendants, the imam of God, who would fill the earth with equity and justice, would bear the name of al-mahdi. The Sunnis hold that this mahdi has not yet appeared. The name of mahdi is also given by the Shi'ite Mahommedans to the last of the imams of the house of 'Ali. It was under the name of al-mahdi that Mokhtar proclaimed 'Ali's son Mahommed as the opponent of the caliph Abdalmalik, and, according to Shahrastani, the doctrine of the mahdi, the hidden deliverer who is one day to appear and fill the oppressed world with righteousness, first arose in connexion with a belief that this Mahommed had not died but lived concealed at Mount Radwa., near Mecca, guarded by a lion and a panther. The hidden imam of the common Shi'ites is, however, the twelfth imam, Mahommed Abu'l-Qasim, who disappeared mysteriously in 879. The belief in the appearance of the mahdi readily lent itself to imposture. Of the many pretenders to this dignity known in all periods of Moslem history the most famous was the first caliph of the Fatimite dynasty in North Africa, 'Obaid- allah al-Mahdi, who reigned 909-933. After him was named the first capital of the dynasty, the once important city of Mahdia (q.v.). Another great historical movement, headed by a leader who proclaimed himself the mahdi (Mahommed ibn Abdallah ibn Tumart), was that of the Almohades (q.v.). In 1881 Mahommed Ahmed ibn Seyyid Abdullah (q.v.), a Dongolese, proclaimed himself al-mahdi and founded in the eastern Sudan the short-lived empire overthrown by an Anglo- Egyptian force at the battle of Omdurman in 1898. Con- currently with the claim of Mahommed Ahmed to be the mahdi the same title was claimed by, or for, the head of the Senussites, a confraternity powerful in many regions of North Africa.

MAHDIA (also spelt Mehdia, Mehedia, &c), a town of Tunisia, on the coast between the gulfs of Hammamet and Gabes, 47 m. by rail S.S.E. of Susa. Pop. about 8000. Mahdia is built on a rocky peninsula which projects eastward about a mile beyond the normal coast line, and is not more than a quarter of a mile wide. The extremity of the peninsula is called Ras Mahdia or Cape Africa — Africa being the name by which Mahdia was designated by Froissart and other European historians during the middle ages and the Renaissance. In the centre of the peninsula and occupying its highest point is a citadel (16th century); another castle

farther west is now used as a prison and is in the centre of the native town. The European quarter and the new port are on the south-west side of the peninsula. The port is available for small boats only; steamers anchor in the roadstead about a quarter of a mile from the shore. On the south-east, cut out of the rock, is the ancient harbour, or cothon, measuring about 480 ft by 240 ft., the entrance being 42 ft. wide. There are manufactories of olive

oil, but the chief industry is sardine fishing, largely in the hands of Italians.

Mahdia occupies the site of a Phoenician settlement and by some authorities is identified with the town called Turris Hannibalis by the Romans. Hannibal is said to have embarked here on his exile from Carthage. After the Arab conquest of North Africa the town fell into decay. It was refounded in 912 by the first Fatimite caliph, 'Obaidallah-al-Mahdi, after whom it was named. It became the port of Kairawan and was for centuries a city of considerable importance, largely owing to its great natural strength, and its position on the Mediterranean. It carried on an active trade with Egypt, Syria and Spain. The town was occupied by the Normans of Sicily in the 12th century, but after holding it for about twelve years they were driven out in n 59 by the Almohades. In 1390 a joint English and French force vainly besieged Mahdia for sixty-one days. In the early part of the 16th century the corsair Dragut seized the town and made it his capital, but in 1550 the place was captured by the Spaniards, who held it until 1574. Before evacuating the town the Spaniards dismantled the fortifications. Under the rule of the Turks and, later, the beys of Tunis Mahdia became a place of little importance. It was occupied by the French in 1881 without opposition, and regained some of its former commercial import- ance.

During 1908 numbers of bronzes and other works of art were recovered from a vessel wrecked off Mahdia in the 5th century A.D. (see Classical Review, June 1909).

MAH6, a French settlement in the Malabar district of Madras, India, situated in n° 43′ N. and 75 33′ E., at the mouth of a river of the same name. Area, 26 sq. m.; pop. (1901), 10,298. It is the only French possession on the west coast of India, and is in charge of a chef de service, subordinate to the governor- general at Pondicherry. It is now a decaying place.

MAHESHWAR, a town in Indore state, Central India, on the N. bank of the Narbada (Nerbudda). Pop. (1901), 7042. Though of great antiquity and also of religious sanctity, it is chiefly noted as the residence of Ahalya Bai, the reigning queen of the Holkar dynasty during the last half of the 18th century, whose ability and munificence are famous throughout India. Close by her cenotaph stands the family temple of the Holkars.

MAHI, a river of western India, which rises in Central India and, after flowing through south Rajputana, enters Gujarat and falls into the sea by a wide estuary near Cambay; total length, 300 m.; estimated drainage area, 16,000 sq. m. It has given its name to the Mahi Kantha agency of Bombay, and also to the mehwasis, marauding highlanders often mentioned in Mahommedan chronicles.

MAHI KANTHA, a political agency or collection of native states in India, within the Gujarat division of Bombay. Over half the territory is covered by the native state of Idar. There are eleven other chiefships, and a large number of estates belong- ing to Rajput or Koli thakurs, formerly feudatories of Baroda. Several of the states are under British administration. Total area, 3125 sq. m.; pop. (1901), 361,345, showing a decrease of 38%in the decade, due to famine; estimated revenue, £76,000; tribute (mostly to the gaekwar of Baroda), £9000. Many of the inhabitants belong to the wild tribes of Bhils and Kolis. In 1897 a metre-gauge railway was opened from Ahmedabad through Parantij to Ahmednagar. At Sadra is the Scott College for the education of the sons of chiefs on the lines of an English public school. There are also Anglo-vernacular schools at Sadra, Idar and Mansa. The famine of 1899-1900 was severely felt in this tract.

MAHMUD I. (1696-17 54), sultan of Turkey, was the son of Mustafa II., and succeeded his uncle Ahmed III. in 1730. After the suppression of a military revolt the war with Persia was continued with varying success, and terminated in 1736 by a treaty of peace restoring the status quo ante helium. The next enemy whom Turkey was called upon to face was kussia, later joined by Austria. War went on for four years; the

successes gained by Russia were outweighed by Austria's various reverses, terminating by the defeat of Wallis at Krotzka, and the peace concluded at Belgrade was a triumph for Turkish diplomacy. The sultan, throughout desirous for peace, is said to have been much under the influence of the chief eunuch, Haji Beshir Aga. In 1754 Mahmud died of heart-disease when returning from the Friday service at the mosque. He had a passion for building, to which are due numberless kiosques, where nocturnal orgies were carried on by him and his boon companions. In this reign the system of appoint- ing Phanariote Greeks to the principalities of Moldavia and Wallachia was instituted. (See Phanariotes.)

MAHMUD II. (1785-1839), sultan of Turkey, was the son of Abu-ul-Hamid I., and succeeded his brother, Mustafa IV., in 1808. He had shared the captivity of his ill-fated cousin, the ex-sultan, Selim III., whose efforts at reform had ended in his deposition by the janissaries. Mahmud was thus early impressed with the necessity for dissembling his intention to institute reforms until he should be powerful enough to carry them through. The reforming efforts of the grand vizier Bairakdar, to whom he had owed his life and his accession, broke on the opposition of the janissaries; and Mahmud had to wait for more favourable times. Meanwhile the empire seemed in danger of breaking up. Not till 181 2 was the war with Russia closed by the treaty of Bucharest, which restored Moldavia and the greater part of Wallachia to the Ottoman government. But though the war was ended, the terms of the treaty left a number of burning questions, both internal and external, unsettled. This was notably the case with the claim of Russia to Poti and the valley of the Rion (Phasis), which was still outstanding at the time of the congress of Vienna (1814- 181 5) and prevented the question of a European guarantee of the integrity of Turkey from being considered.

Meanwhile, within the empire, ambitious valis were one by one attempting to carve out dominions for themselves at the expense of the central power. The ambitions of Mehemet Ali of Egypt were not yet fully revealed; but Ali (q.v.) of Jannina, who had marched to the aid of the sultan against the rebellious pasha Pasvan Oglu of Widdin, soon began to show his hand, and it needed the concentration of all the forces of the Turkish empire to effect his overthrow and death (1822). The pre- occupation of the sultan with Ali gave their opportunity to the Greeks whose disaffection had long been organized in the great secret society of the Hetaeria Philike, against which Metternich had in vain warned the Ottoman government. In 1821 occurred the abortive raid of Alexander Ypsilanti into the Danubian principalities, and in May of the same year the revolt of the Greeks of the Morea began the war of Greek Independence (see Greece: History). The rising in the north was easily crushed; but in the south the Ottoman power was hampered by the defection of the sea-faring Greeks, by whom the Turkish navy had hitherto been manned. After three abortive campaigns Mahmud was compelled, infinitely against his will, to summon to his assistance the already too powerful pasha of Egypt, Mehemet Ali, whom he had already employed to suppress the rebellious Wahhabis in Arabia. The disciplined Egyptian army, supported by a well organized fleet, rapidly accomplished what the Turks had failed to do; and by 1826 the Greeks were practically subdued on land, and Ibrahim was preparing to turn his attention to the islands. But for the intervention of the powers and the battle of Navarino Mahmud's authority would have been restored in Greece. The news of Navarino betrayed Mahmud into one of those paroxysmsof rage to which

he was liable, and which on critical occasions were apt fatally to cloud his usual good sense. After in vain attempting to obtain an apology for " the unparalleled outrage against a friendly power " he issued on the 20th of December a solemn hatti sheriff summoning the faithful to a holy war. This, together with certain outstanding grievances and the pretext of enforcing the settlement of the Greek Ques- tion approved by the powers, gave Russia the excuse for declar- ing war against Turkey. After two hardly fought campaigns

(1828, 1829) Mahmud was at length, on the 14th of September 1829, compelled to sign the peace of Adrianople. From this moment until his death Mahmud was, to all intents and purposes, the " vassal of Russia," though not without occasional desperate efforts to break his chains. (For the political events of the period between the first revolt of Mehemet Ali (Sept. 1832) and the death of Mahmud see Mehemet Ali.) The personal attitude of the sultan, which alone concerns us here, was determined throughout by his overmastering hatred of the upstart pasha, of whom he had stooped to ask aid, and who now defied his will; and the importance of this attitude lies in the fact that, as the result of the success of his centralizing policy, and notably of the destruction of the janissaries (q.v.), the supreme authority, hitherto limited by the practical power of the ministers of the Porte and by the turbulence of the privileged military caste, had become concentrated in his own person. It was no longer the Porte that decided, but the Seraglio, and the sultan's private secretary had more influence on the policy of the Otto- man empire than the grand vizier.

This omnipotence of the sultan in deciding the policy of the government was in striking contrast with his impotence in enforcing his views on his subjects and in his relations with foreign powers. Mahmud, in spite of — or rather because of — his well-meant efforts at reform, was hated by his Mussulman subjects and stigmatized as an " infidel " and a traitor to Islam. He was, in fact, a victim to those " half- measures " which Machiavelli condemns as fatal to success. Ibrahim, the conqueror of Syria, scoffed at the sultan's idea " that reform consisted in putting his soldiers into tight trousers and epaulettes." The criticism is not entirely un- just. Mahmud's policy was the converse of that recommended by Machiavelli, viz. in making a revolution to change the substance while preserving the semblance of the old order. Metternich's advice to Mahmud to " remain a Turk " was sound enough. His failure to do so — in externals — left him isolated in his empire: r ayahs and true believers alike dis- trusted and hated him. Of this hatred he was fully conscious; he knew that his subjects,

even many of his own ministers, regarded Mehemet Ali as the champion of Islam against the " infidel sultan;" he suspected the pasha, already master of the sacred cities, of an intention to proclaim himself caliph in his stead. This, together with the weakness due to military reforms but recently begun, drove him to rely on foreign aid; which, in the actual conditions of Europe, meant the aid of Russia. The long tradition of French friendship for Turkey had been broken, in 1830, by the conquest of Algiers. Austria was, for the time, but the faithful ally of the tsar. On the 9th of August 1832 Mahmud made, through Stratford Canning, a formal proposal for an alliance with Great Britain, which Palmerston refused to consider for fear of offending France. Mahmud bitterly contrasted the fair professions of England with the offers of effective help from Russia. His old ally having deserted him, he accepted the aid of his hereditary foe. The Russian expedition to the Bosporus, the convention of Kutaiah, and the treaty of Unkiar Skelessi (July 8, 1833) followed. Mahmud was under no illusion as to the position in which the latter placed him towards Russia; but his fear of Mehemet Ali and his desire to be revenged upon him out- weighed all other considerations. He resented the action of France and England in forcing the settlement of Kutaiah upon him, and remained shut up in his palace, inaccessible to all save his favourites and the representative of Russia. With his single aim in view he busied himself with the creation of a national militia, with the aid of Moltke and other German officers. In 1834 the revolt of Syria against Ibrahim seemed to give him his opportunity. He pleaded the duty of a sultan to go to the aid of his subjects when oppressed by one of his servants; but the powers were obdurate, even Russia, much occupied in affairs nearer home, leaving him in the lurch. He was astute enough to take advantage of the offence given to the powers by Mehemet Ali's system of monopolies, and in 1838 signed with Great Britain, and afterwards with others,

a commercial treaty which cut at the root of the pasha's system. A few months later his passionate impatience overcame his policy and his fears. The hand of death was upon him, and he felt that he must strike now or never. In vain the powers, now united in their views, warned him of the probable con- sequences of any aggressive action on his part. He would rather die, he exclaimed, or become the slave of Russia, than not destroy his rebellious vassal. On his sole initiative, without consulting his ministers or the council of the empire, he sent instructions to Hafiz Pasha, commanding the Ottoman troops concentrated at Bir on the Euphrates, to advance into Syria. The fatal outcome of the campaign that followed he did not live to hear. When the news of Ibrahim's overwhelming victory at Nessib (June 24, 1839) reached Constantinople, Mahmud lay dying and unconscious. Early in the morning of the 1st of July his proud and passionate spirit passed away.

Mahmud II. cannot be reckoned among the great sultans, neither had he any of the calculating statecraft which character- ized Abd-ul-Hamid II.; but his qualities of mind and heart, none the less, raised him far above the mass of his predecessors and successors. He was well versed in state affairs and loyal to those who advised and served him, personally brave, humane and kindly when not maddened by passion, active and energetic, and always a man of his word. Unhappily, however, the taint of the immemorial corruption of Byzantium had fallen upon him too, and the avenue to his favour and to political power lay too often through unspeakable paths. In view of the vast difficulty of the task before him at his succession it is less surprising that he failed to carry out his ideas than that he accomplished so much. When he came to the throne the empire was breaking up from within; one by one he freed the provinces from the tyrannical rulers who, like Ali of Jannina, were carving out independent, or quasi-independent, empires within the empire. If he failed in his wider schemes of reform, this was only one more illustration of a truth of which other " enlightened " sovereigns besides himself had experienced the force, namely, that it is impossible to impose any system, however admirable, from above on a people whose deepest convictions and prejudices it offends.

There is a great deal of valuable material for the history of Mahmud and his policy in the unpublished F.O. records (1832- !839), volumes of correspondence marked Turkey. — From Sir Stratford Canning. — From Mr. Mandevitte. — From Lord Ponsonby. See further works mentioned under Turkey : History ; and Mehemet Ali. (W. A. P.)

MAHMUD NEDIM PASHA (c. 1818-1883), Turkish statesman, was the son of Nejib Pasha, ex-governor-general of Bagdad. After occupying various subordinate posts at the Porte he became successively under-secretary of state for foreign affairs, governor- general of Syria and Smyrna, minister of commerce, and gover- nor-general of Tripoli; minister successively of justice and of marine (1869); grand vizier from 1871 to 1872 and from 1875 to 1876. He was high in favour with Sultan Abd-ul-Aziz and fell much under the influence of General Ignatiev, the forceful Russian ambassador before the war of 1877-78, his subserviency to Russia earning for him the nickname of " Mahmudoff." His administration was most unsuccessful from every point of view, and he was largely responsible for the issue of the decree suspending the interest on the Turkish funds. He was minister of the interior from 1879 to 1883.

MAHMUD 1 OF GHAZNI (971-1030), son of Sabuktagln, Afghan conqueror, was born on the 2nd of October 971. His fame rests chiefly on his successful wars, in particular his numerous invasions of India. His military capacity, inherited from his father, Nasir-ud-din Sabuktagln, was

strengthened by youthful experience in the field. Sabuktagln, a Turki slave of Alptagln, governor of Khorasan under Abdalmalik I. b. Nuh of the Samanid dynasty of Bokhara, early brought himself to notice (see Samanids). He was raised to high office in the state by Alptagln 's successor, Abu Ishak, and in a.h. 366 (a.d. 977), by the choice of the nobles of Ghazni, he became their ruler. He soon began to make conquests in the neighbouring countries, 1 The name is strictly Mahmud.

and in these wars he was accompanied by his young son Mahmud. Before he had reached the age of fourteen he encountered in two expeditions under his father the Indian forces 01 Jaipal, raja of Lahore, whom Sabuktagin defeated on the Punjab frontier.

In 994 Mahmud was made governor of Khorasan, with the title of Saif addaula (ud-daula) (" Sword of the State ") by the Samanid Nuh II. Two years later, his father Sabuktagin died in the neighbourhood of Balkh, having declared his second son, Ismail, who was then with him, to be his successor. As soon as Ismail had assumed the sovereignty at Balkh, Mahmud, who was at Nishapur, addressed him in friendly terms, proposing a divi- sion of the territories held by their father at his death. Ismail rejected the proposal, and was immediately attacked by Mahmud and defeated. Retreating to Ghazni, he there yielded, and was imprisoned, and Mahmud obtained undisputed power as sovereign of Khorasan and Ghazni (997).

The Ghaznevid dynasty is sometimes reckoned by native historians to commence with Sabuktagln's conquest of Bost and Kosdar (978). But Sabuktagin, throughout his reign at Ghazni, continued to acknowledge the Samanid suzerainty, as did Mahmud also, until the time, soon after succeeding to his father's dominions, when he received from Qadir, caliph of Bagdad (see Caliphate, C. § 25), a khUat (robe of honour), with a letter recognizing his sovereignty, and conferring on him the titles Yamin-addaula (" Right hand of the State "), and Amin-ul- Millat (" Guardian of the Faith "). From this time it is the name of the caliph that is inscribed on Mahmud's coins, together with his own new titles. Previously the name of the Samanid sovereign, Mansur II. b. Ntih is given along with his own former title, Saif addaula Mahmud. The earliest of those of the new form gives his name Mahmud bin Sabuktagin. Thereafter his father's name does not appear on his coins, but it is inscribed again on his tomb.

The new honours received from the caliph gave fresh impulse to Mahmud's

zeal on behalf of Islam, and he resolved on an annual expedition against the idolaters of India. He could not quite carry out this intention, but a great part of his reign was occupied with his Indian campaigns. In 1000 he started on the first of these expeditions, but it does not appear that he went farther than the hill country near Peshawar. The hostile attitude of Khalaf ibn Ahmad, governor of Seistan, called Mahmud to that province for a short time. He was appeased by Khalaf's speedy submission, together with the gift of a large sum of money, and further, it is said, by his subdued opponent addressing him as sultan, a title new at that time, and by which Mahmud continued to be called, though he did not formally adopt it, or stamp it on his coins. Four years later Khalaf, incurring Mahmud's displeasure again, was im- prisoned, and his property confiscated.

Mahmud's army first crossed the Indus in 1001, opposed by Jaipal, raja of Lahore. Jaipal was defeated, and Mahmud, after his return from this expedition, is said to have taken the distinctive appellation of Ghdzi (" Valiant for the Faith "), but he is rarely so-called. On the next occasion (1005) Mahmud advanced, as far as Bhera on the Jhelum, when his adversary Anang-pal, son and successor of Jaipal, fled to Kashmir. The following year saw Mahmud at Multan. When he was in the Punjab at this time, he heard of the invasion of Khorasan by the Ilek Khan Nasr I. ruler of Transoxiana whose daughter Mahmud had married. After a rapid march back from India, Mahmud repelled the invaders. The Ilek Khan, having re- treated across the Oxus, returned with reinforcements, and took up a position a few miles from Balkh, where he was signally defeated by Mahmud.

Mahmud again entered the Punjab in 1008, this time for the express purpose of chastising Sewah Pal, who, having become a Mussulman, and been left by Mahmud in charge of Multan, had relapsed to Hinduism. The Indian campaign of 1009 was notable. Near the Indus Mahmud was opposed again by Anarig- pal, supported by powerful rajas from other parts of India. After a severe fight, Anang-pal's elephants were so terror-struck by the fire-missiles flung amongst them by the invaders that they

turned and fled, the whole army retreating in confusion and leaving Mahmud master of the field. Mahmud, after this victory, pushed on through the Punjab to Nagar-kot (Kangra), and car- ried off much spoil from the Hindu temples to enrich his treasury at. Ghazni. In ion Mahmud, after a short campaign against the Afghans under Mahommed ibn Sur in the hill country of Ghur, marched again into the Punjab. The next time (1014) he advanced to Thanesar, another noted stronghold of Hinduism, between the Sutlej and the Jumna. Having now found his way across all the Punjab rivers, he was induced on two subsequent occasions to go still farther. But first he designed an invasion of Kashmir (1015), which was

not carried out, as his progress was checked at Loh-kot, a strong hill fort in the north-west of the Punjab. Then before undertaking his longer inroad into Hindustan he had to march north into Khwarizm (Khiva) against his brother-in-law MamOn, who had refused to acknow- ledge Mahmud's supremacy. The result was as usual, and Mah- mud, having committed Khwarizm to a new ruler, one of Mamiin's chief officers, returned to his capital. Then in 1018, with a very large force, he proceeded to India again, extending his inroad this time to the great Hindu cities of Mathra on the Jumna and Kanauj on the Ganges. He reduced the one, received the sub- mission of the other, and carried back great stores of plunder. Three years later he went into India again, marching over nearly the same ground, to the support, this time, of the raja of Kanauj, who, having made friendship with the Mahommedan invader on his last visit, had been attacked by the raja of Kalinjar. But Mahmud found he had not yet sufficiently subdued the idolaters nearer his own border, between Kabul and the Indus, and the campaign of 1022 was directed against them, and reached no farther than Peshawar. Another march into India the following year was made direct to Gwalior.

The next expedition (1025) is the most famous of all. The point to which it was directed was the temple of Somnath on the coast of the Gujarat peninsula. After an arduous journey by Multan, and through part of Rajputana, he reached Somnath, and met with a very vigorous but fruitless resistance on the part of the Hindus of Gujarat. Moslem feet soon trod the courts of the great temple. The chief object of worship it contained was broken up, and the fragments kept to be carried off to Ghazni. The story is often told of the hollow figure, cleft by Mahmud's battle-axe, pouring out great store of costly jewels and gold. But the idol in this Sivite temple was only a tall block or pillar of hewn stone, of a familiar kind. The popular legend is a very natural one. Mahmud, it was well known, made Hindu temples yield up their most precious things. He was a determined idol-breaker. And the stone block in this temple was enriched with a crown of jewels, the gifts of wealthy worshippers. These data readily give the Somnath exploit its more dramatic form. For the more recent story of the Somnath gates see Somnath.

After the successes at Somnath, Mahmud remained some months in India before returning to Ghazni. Then in 1026 he crossed the Indus once more into the Punjab. His brilliant military career closed with an expedition to Persia, in the third year after this, his last, visit to India. The Indian campaigns of Mahmud and his father were almost, but not altogether, unvarying successes. The Moslem historians touch lightly on reverses. And, although the annals of Rajputana tell how Sabuktagin was defeated by one raja of Ajmere and Mahmud by his successor, the course of events which followed shows how little these and other reverses affected the invader's

progress. Mahmud's failure at Ajmere, when the brave raja Bisal-deo obliged him to raise the siege but was himself slain, was when the Moslem army was on its way to Somnath. Yet Mahmud's Indian conquests, striking and important in themselves, were, after all, in great measure barren, except to the Ghazni treasury. Mahmud retained no possessions in India under his own direct rule. But after the repeated defeats, by his father and himself, of two successive rajas of Lahore, the conqueror assumed the right of nominating the governors of the Punjab as a dependency of Ghazni, a right which continued to be exercised by seven of his successors. And for a time, in the reign of Masa'ud II.

(1098-1114), Lahore was the place of residence of the Ghaz- nevid sovereign.

Mahmud died at Ghazni in 1030, the year following his ex- pedition to Persia. He is conspicuous for his military ardour, his ambition, strong will, perseverance, watchfulness and energy, combined with great courage and unbounded self- reliance. But his tastes were not exclusively military. His love of literature brought men of learning to Ghazni, and his acquaintance with Moslem theology was recognized by the learned doctors.

The principal histories of Mahmud's reign are — Kitab-i-Yaminl (Utbi) ; Tarikh-us-Subuktigin (Baihaki) ; Tabakat i Nasiri (Minhaj el-Siraj) ; Rauzat-us-Safa (Mir Khond) ; Habib-us-Sivar (Khon- damir). See Elliot, History of India; Elphinstone, History of India; and Roos-Keppel's translation of the Tarlkh-i- Sultan Mahmud-i-Ghaznavi (1901).

MAHOBA, an ancient town in India, in Hamirpur district of the United Provinces. Pop. (1001), 10,074. As the capital of the Chandel dynasty, who ruled over Bundelkhand from the 9th to the 13th century, the neighbourhood is covered with archi- tectural antiquities, prominent among which are artificial lakes, formed by banking up valleys with masonry dams. The largest of these is more than 4 m. in circuit.

MAHOGANY, a dark-coloured wood largely used for household furniture, the product of a large tree indigenous to Central America and the West Indies. It was originally received from Jamaica; 521,300 ft. were exported from that island in 1753. It is known botanically as Swietenia Mahogani, and is a member of the order Meliaceae. It bears compound leaves, resembling those of the ash, and clusters of small flowers, with five sepals and petals and ten stamens which are united into a tube. The fruit is a

pear-shaped woody capsule, and contains many winged seeds. The dark-coloured bark has been considered a febrifuge, and the seeds were used by the ancient Aztecs with oil for a cos- metic, but the most valuable product is the timber, first noticed by the carpenter on board Sir Walter Raleigh's ship in 1595 for its great beauty, hardness and durability. Dr Gibbons brought it into notice as well adapted for furniture in the early part of the 1 8th century, and its use as a cabinet wood was first practi- cally established by a cabinet-maker named Wollaston, who was employed by Gibbons to work up some mahogany brought to England by his brother. It was introduced into India in 1795, and is now cultivated in Bengal and as far north as Saharunpur.

1 The timber of species of Cedrela and Melia, other members of the order Meliaceae, are used as Mahogany, and the product of the West African Khaya senegalensis is known as African mahogany. There is some confusion between the product of these various trees. Herbert Stone (The Timbers of Commerce, 1904) says: " The various species of mahogany and cedar are so confusing that it is difficult to make precise statements as to their structure or origin. I know of no convincing proof that any of the American kinds met with on the English market are the wood of Swietenia Mahogani, nor that those shipped from Africa are the wood of Khaya senegalensis. These two genera are very nearly allied to Cedrela and Melia, and it is difficult to separate any of the four from the rest by the characters of the wood. After giving the most careful attention to every detail, I lean to the view that most if not all of the mahoganies commonly met with are Cedrelas."

Kiggelaria Dregeana (natural order Bixineae), a native of South Africa, is known as Natal mahogany. "~

MAHOMET (strictly Muhammad, commonly also Mohammed), founder of the religious system called in Europe after him Mahommedanism, and by himself Islam or Hanifism. He died, according to the ordinary synchronism, on the 7th of June 632 (12 Rabia, a.h. ii), and his birthday was exactly sixty-three or sixty-five years earlier, the latter number being evidently an interpretation in lunar years of a number thought to refer to solar years. The lunar system was introduced into Arabia by Mahomet himself quite at the close of his career; that which existed before was certainly solar, as it involved a process of intercalation — which, however, seems to have been arbitrarily manipulated by priests, whence certain synchronisms cannot be got for the events in the Prophet's career. The number 63 for the years of his life may rest on tradition, though it is unlikely that such matters were accurately noted; it can also be accounted

His Country.

for by a priori combination. A Meccan, it is said, became a full citizen at the age of 40; this then would be the age at which the mission might be started. The Medina period (of which count was kept) lasted ten to eleven years; for the Meccan period ten years would seem a likely length. Finally it was known that for some years— about three — the mission had been conducted secretly. The only event in contemporary history to which the Koran alludes in its earlier parts is the Persian conquest of Palestine in 616. Clearly Mahomet had begun to prophesy at that date.

Before the rise of Islam, Mahomet's native place, Mecca, appears to figure nowhere in historical records, unless there be a reference to it in the " valley of Baca " (Psalm lxxxiv. 6). Its sacred, and therefore archaic, name is Bakkah; hence the identification of the name with that of the sanctuary Makoraba, known to the Greek geo- graphers, is not philologically tenable; although so eminent a linguist as Dozy evolved a theory of the origin of the city from this name, which appears to be South Arabian for " sanc- tuary," and has no connexion with Hebrew (as Dozy supposed). In the 3rd century of Islam the mythology of Mecca was collected and published in book form, but we learn little more from it than names of tribes and places; it is clear that there was no record of tˆhe mode in which the community inhabiting the place had got there, and that little was remembered with accuracy of the events which preceded the rise of its prophet. The city had a sanctuary, called the Cube (ka'ba), of which the nucleus was the " Black Stone," probably to be identified with Allah, the god of the community; both still exist, or rather their legitimate substitutes, as the Ka'ba has been repeatedly reconstructed, and the original Black Stone was stolen by the Car- mathians in the 4th century of Islam; they afterwards returned one, but it may or may not have been the same as that which they removed. At some time in the 6th century — said to have been the birth-year of the Prophet, but really much earlier — an Abyssinian invader raided Mecca with the view of abolishing this sanctuary; but for some reason had to desist. This expedi- tion, known as the " Raid of the Elephant," one of these animals being employed in it, seems to be of great importance for ex- plaining the rise of Islam; for a sanctuary which can repel an invader acquires tremendous reputation. Some verses in the Koran which are perhaps not genuine, record the miracle whereby Allah repelled the " People of the Elephant." The sanctuary was apparently in the possession of the tribe Koreish (Quraish), the origin of whose name is unknown, said to have come origi- nally from Cutha in Mesopotamia. They were known (we are told) as the people of Allah, and, by wearing a badge, were sacrosanct throughout Arabia. If this be true, it was probably a privilege earned by the miraculous defence of the Ka'ba, and is sufficient to account for the rise of Meccan commerce of which we hear much in the biography of the Prophet, and to which some verses of the earliest part of the Koran allude; for

merchants who were safe from attacks by bandits would have an enormous advantage. The records seem, however, to be inconsistent with this assertion; and the growth of the Meccan commerce is sufficiently accounted for by the fact that after the Abyssinian invasion pilgrimage to the Ka'ba became the practice of numerous Arab tribes, and for four months in the year (selected by Meccan priests) raiding was forbidden, in order to enable the pilgrimage to be safely made. In addition to this it would seem that all Mecca counted as sanctuary — i.e. no blood might under any circumstances be shed there. The community lived by purveying to pilgrims and the carrying trade; and both these operations led to the immigration of strangers.

There seems to be no doubt that Mahomet was himself a mem- ber of the tribe Koreish, and indeed too many of his relatives figure in history to permit of his parentage being questioned. His cousin 'Ali, fourth caliph, was the son of Abu PamUy . Talib, whose name attests the historical character of the kindred name 'Abd al-Mottalib, Mahomet's grandfather: for the fact that this name is in part enigmatical is certainly no argument against its genuineness. In the 3rd century of Islam

a document was shown in which a man of San'a in Yemen acknowledged that he had borrowed from 'Abd al-Mottalib 1000 silver dirhems of the Hudaida standard, and Allah with the two " angels " (probably a euphemism for the goddesses Al-lat and al-'Uzza) served as witness; it is difficult to see why such a document should have been forged. The name Hashim (for 'Abd al-Mottalib's father) may or may not be historical; here, as in the ascending line throughout, we have subjects without predicates. The name of 'Abd al-Mottalib's son, who was Mahomet's father, is given as 'Abdallah; the correctness of this has been questioned, because " Servant of Allah " would seem to be too appropriate, and the name was often given by the Prophet to converts as a substitute for some pagan appellation. This, however, is hypercritical, as the name of the father could not easily be altered, when relatives abounded, and it would seem that at one time the Prophet made no theological use of the name Allah, for which he intended to substitute Rahman. The name of his mother is given as Aminah, and with this one of his own titles, Amln, agrees; although the Arabs do not appear to bring the two into connexion. Her father's name is given as Wahb, and she is brought into relation with a Medinese tribe called the Banu 'Adi b. al-Najjar, to whom she is said to have brought her son in his early infancy. The circumstances may have been suggested by his later connexion with that .place; yet in what seems a historical narrative her

grave is mentioned as known to be at Abwa, midway between the two cities, whence this early bond between the Prophet and his future home may have really existed.

His own name is given in the Koran in the forms Ahmad and the familiar Muhammad; in contemporary poetry we also find the form Mahmud. Similar variation between derivatives from the same root is found in proper names which occur in early poetry; the meaning of all would be " the praised," if the root be given its Arabic signification — " the desired " if interpreted from the Hebrew.

The form Muhammad (ordinarily transliterated Mohammed; Mahomet, Mehmet, &c, represent the Turkish pronunciation) is found in a pre-Islamic inscription, and appears to have been fairly common in Arabia. In Hag. ii. 7 a derivative of the Hebrew equivalent root occurs in the prophecy " and the desired of all nations shall come," and this passage has suggested the idea that the name may have been taken by the Prophet as the equivalent of " Messiah," while the Moslems themselves find its equivalent in the Paraclete of the Fourth Gospel, though this identification re- quires more ingenuity. His kunyah {i.e. the Arab title of respect, in which a man is called after his son) is Abu'l-Qasim; other names by which he is called are titles of honour, e.g. Mustafa " chosen." (See further the genealogical table, ad fin.)

In the Koran, Allah says that He found the Prophet an orphan, poor and astray; it is possible that all these expressions Early Life, should be understood figuratively, like the " poor, naked, blind " of Christian hymns; the Arabs, how- ever, take them literally, and Mahomet is said to have been a posthumous child, whose mother died a few months or years after his birth, and who was brought up first by his grandfather, and then by his uncle Abu Talib, one of the poorer members of the family; in the controversy between the Alid and Abbasid pre- tenders of the 2nd century of Islam the Abbasid Mansur claims that his ancestor fed the ancestor of 'AH, i.e. Abu Talib, other- wise he would have had to beg. There was evidently an apparent inconsistency between Mahomet's being a poor orphan and the favourite grandchild of the eminent and wealthy 'Abd al-Mottalib ; and it was solved in this way. There was a tradition that in his early years he was sent into the desert to acquire the habits and the language of the Bedouins; and this seems to have been attested by the Prophet himself. In a tribal fight he is said to have acted as armour-bearer to one of his uncles, Zubair. There seems no doubt that he often accompanied Meccan caravans to the countries with which the Meccans had trade relations; such especially were Syria and south Arabia, and perhaps Egypt and Mesopotamia. It is conceivable that he may have visited Abyssinia by sea. For though accurate knowledge is nowhere to be found in

the Koran, it exhibits a large amount of miscellaneous information, such as a trader might well pick up.

His career as a caravan-conductor appears to have terminated with his marriage to Khadlja, daughter of Khuwailid, represented by the tradition as a wealthy widow, fifteen years his senior and forty years of age at the time of the union. As she became the mother of a numerous family, a special rule was discovered by Moslem physiologists extending the child-bearing period of Korashite women beyond that of others. Since it is claimed for Mahomet that he first gave Arab women the right to inherit property, the difficulty noticed is not the only one connected with this marriage; and Robertson Smith has called attention to some others, unconnected with his theory of " marriage and kinship in early Arabia." After his marriage Mahomet appears to have been partner in a shop in Mecca; where he apparently sold agricultural produce. His style is strongly marked by phrases and metaphors drawn from trade, though as a statesman he never displayed any financial ability.

Writing in the monumental script of South Arabia had been known for centuries in the peninsula ; and shortly before the rise of Islam a cursive script — the parent of the ordinary c rfucaUon Arabic character — had been started in the Christian state of Hira, with which the beginnings of modern Arabic literature are connected. A modification of this had been intro- duced into Mecca, and was probably used for contracts and similar documents. The word ummt, literally ■" popular " or " plebeian " (according to one etymology) , applied to Mahomet in the Koran, is said to mean " one who can neither read nor write," and the most generally accepted view is that he could do neither, a supposition which enters into the doctrine of the miraculous nature of the Koran. According to another interpretation the word means " Meccan," i.e. native of " the Mother of the Villages " (Umm al-Qurd); and the most probable theory is that he could do both, but unskilfully. Indeed on one historic occasion he erased certain words in a document; and where in the Koran he rebuts the charge of " taking notes," he does not employ the obvious retort that he could not write, but gives a far less convincing answer. For poetry, which seems to have been cultivated in Arabia long before his time, he possessed no ear; but we have little reason for supposing that either writing or versification had yet entered into Arabian education. The former would be acquired by those who needed it, the latter was regarded as a natural gift. There is reason for thinking the language of the Koran incorrect and ungrammatical in parts, but as it afterwards became the ultimate standard of classical Arabic, this point is not easy to prove. On the whole then his early life seems to have been such as was normal in the case of a man belonging to one of the more important families in a com- munity which had not long been started on a career of prosperity. Of the organization of that

community we unfortunately know very little, though we hear of a council-chamber, and, as has been seen, of an age-qualification for admission to it. It is, however, certain that the theory of decision by majority was absolutely unknown to Mahomet's second successor, whence we learn little from this tradition (even if it be authentic) of the mode whereby the tribes who together formed the Meccan population managed their common concerns, whether commercial or political. The form of government seems to have been a rudimentary oligarchy, directed by some masterful individual; before the Flight we read of various prominent personages, after the Flight and the battle of Badr (a.h. 2) one chieftain, Abu Sofian (see Caliphate, ad init.), appears to take the lead whether in war or in policy. It would seem, however, that the right of independent action belonged to the individual tribes, even to the extent of refusing to take part in a campaign. For the settlement of ordinary disputes recourse was had (it appears) rather to soothsayers, near or dis- tant, than to any regularly constituted authority or tribunal. On the other hand we are furnished with a list of officials who were concerned with different parts of the festal performances and the ordinary worship. Of these we may mention the Custodian of the Ka'ba, and the, official whose duty was siqdyah (" watering "), said to mean furnishing the pilgrims with water,

but more ingeniously interpreted in recent times as " rain-bring- ing," a function which even in the 2nd century of Islam the governor in some places was supposed to exercise.

Of Arabian paganism we possess no trustworthy or complete account ; since we hear of no theological literature belonging to it, Beginnings probably no such account could have been given. of the There were doubtless a variety of practices, many of

Mission. which have been continued to this day in the cere- monies of the pilgrimage, and offerings of different sorts to vari- ous deities, interpreted variously by the worshippers in accordance with their spiritual, intellectual and moral levels; e.g. as actual stones, or as men (or more often women) residing in the stones or otherwise connected with them, or bearing a similar relation to trees, or stars, &c. In general every tribe had its patron of the kind, and where there were aggregations of tribes, connexions were established between these deities, and affiliation-theories excogitated; hence the theory attributed in the Koran to the Meccans that the goddesses

al-'Uzza, &c. were the daughters of Allah, may well represent the outcome of such speculation. These, however, were known to few, whereas the practices were familiar to all. Some of these were harmless, others barbarous; many offensive, but not very reprehensible, superstitions.

Before Mahomet's time Arabian paganism had already been attacked both from the outside and from the inside. On the one hand the northern tribes had gradually been influences, christianized, owing to the influence of the Byzantine empire; on the other hand south Arabia had fallen successively under Jewish, Abyssinian and Persian influence; and the last, though little is known of Persian rule, is un- likely to have favoured pagan cults. Christianity had also some important representation in Najran far south of Mecca, while Jewish settlements were prospering north of Mecca in the Prophet's future home Yathrib and its neigh- bourhood. Power, civilization and learning were thus asso- ciated with monotheism (Judaism), dualism (Mazdaism) and tritheism (as the Arabs interpreted Christianity); paganism was the religion of ignorance (jdhiliyyah, interpreted by Goldziher as " barbarism," but the difference is not very considerable). Mecca itself and the neighbouring and allied Taif are said to have produced some monotheists or Christians, who identified the Allah of Mecca with the Allaha or God of the Syrian Christians, called by the Abyssinian Christians " Lord of the Regions," and by the Jews " the Merciful " (Rahmdna) ; one such is said to have been a cousin of Khadija, Mahomet's wife; his name is given as Waraqah, son of Naufal, and he is credited with copying or translating a Gospel. We even hear of flagellant monks and persons vowed to total abstinence among the precursors of Islam.

With these persons Mahomet had little in common, since they do not appear to have claimed to enforce their views upon others, or to have interfered with politics. He appears mainly to have been struck by the personality of the founders of the systems dominant in the civilized world, and to have aspired from the first to occupy the place of legislator or mouthpiece of the Deity; and that he was this was and is the main proposition of the Mahom- medan creed. The " Prophet " or " Apostle " (at different times he employed both the Jewish and the Christian phrase) was the divinely appointed dictator of his community; if he were not obeyed, divine vengeance would overtake the disobedient. At this proposition Mahomet arrived by induction from the re- cords of the Biblical prophets, as well as others who seem to have figured in Arabian mythology, e.g. the destruction of the tribe Thamud (mentioned by Pliny, and therefore historical) for their disobedience to their prophet Salih, and of 'Ad (probably mythi- cal) for their similar treatment of Hud. The character of the message did not affect the necessity for obedience; at times it was condemnation of some moral offence, at others a trivial order. Divine vengeance overtook those who disobeyed either.

This is the theory of the prophetic office which pervades the Koran, wherein the doctrine is formulated that every nation had its divine j?uide and that Mecca before Mahomet's time had none. This/ˆplace, then, Mahomet felt a divine call to fill.

But we are never likely to ascertain what first put the idea into his mind. The fables which his biographers tell on this subject are not worth repeating; his own system, in The which he is brought into direct communication with Prophet's the Deity, though at a later period the angel Gabriel Ca/t appears to have acted as intermediary, naturally leaves no room for such speculations; and since his dispensation was thought to be absolutely new, and to make a tabula rasa of the pagan past, his first followers, having broken with that past, left no intelligible account of the state of affairs which preceded their master's call. Some generations therefore elapsed before that past was studied with any sort of sympathy, and details could not then be recovered, any more than they can now be supplied by conjecture.

So far as Mahomet may be said from the first to have formu- lated a definite notion of his work, we should probably be right in thinking it to be the restoration of the religion of Abraham, or (as the Koran calls him) Ibrahim. Though we have no reason for supposing the name of Abraham or Ishmael to have been known in Mecca generally before Mahomet's time, the Biblical ethnology was not apparently questioned by those who were told of it, and there are stories, not necessarily apocryphal, of precursors of Mahomet going abroad in search of the " religion of Abraham." One feature of that system, associated in the Bible with the name of Ishmael as well, was circumcision, which was actually observed by the Meccan tribes, though it would appear with technical differences from the Jewish method; the association of monotheism with it would seem reasonable enough, in view of Jewish traditions, such as Mahomet may have heard on his travels; why the doctrine of the future life should be coupled with it is less obvious. That the Meccan temple and its rites had been founded by these two patriarchs appears to have been deduced by Mahomet himself, but perhaps at a later stage of his career. That these rites, so far as they were idolatrous, were in flagrant defiance of the religion of Abraham must have struck any one who accepted the accounts of it which were current among Jews and Christians. The precursors, however, appear to have felt no call to reform their fellow-citizens; whereas it is evident that Mahomet regarded himself as charged with a message, which he was bound to deliver, and which his God would in some way render effective.

As it was obvious that the claim to be God's mouthpiece was to claim autocracy, Mahomet employed the utmost caution in his mode of asserting this claim; on the question of his sin- cerity there have been different

opinions held, and it is not necessary to take any view on this matter. For three years his followers were a secret society; and this period appears to have been preceded by one of private preparation, the first revelation being received when the Prophet was in religious retirement — a ceremony called tahannutk, of which the mean- ing is uncertain, but which can have no connexion with the Hebrew tehinnoth ("supplications ") — on Mount IJira, near Mecca.

If the traditional dates assigned to the suras (chapters) of the Koran (q.v.) are correct, the earliest revelations took the form of pages or rolls which the Prophet was to read by the " grace of God," as Joseph Smith, the founder of the Mormon community, said of the power given him to read the "Egyptian" i ne jcorim characters on the gold plates which he had found. The command to read is accompanied by the statement that "his most generous Lord had taught man by the pen (calamus) that which he did not know." Waraqah, to whom the event is said to have been communicated by Khadija, called these communi- cations " the Greater Law (nomos)." The Prophet was directed to communicate his mission at the first only to his nearest relatives. The utterances were from the first in a sort of rhyme, such as is said to have been employed for solemn matter in general, e.g. oracles or prayers. At an early period the produc- tion of a written communication was abandoned for oral com- munications, delivered by the Prophet in trance; their delivery was preceded by copious perspiration, for which the Prophet prepared (in accordance with instructions found in the Koran)

by wrapping himself in a blanket. Trusty followers were in- structed to take these utterances down, but the phenomena which accompanied their delivery at least in one case suggested im- posture to the scribe, who apostatized in consequence. It is extraordinary that there is no reason to suppose that any official record was ever kept of these revelations; the Prophet treated them somewhat as the Sibyl did her leaves. This carelessness is equally astounding whether the Prophet was sincere or insincere.

If the matter afterwards collected in the Koran be genuine, the early revelations must have been miscellaneous in content, magical, historical and homiletic. To some strange oaths are prefixed. Apparently the purpose to be compassed was to convince the audience of their miraculous origin. The formula- tion of doctrines belongs to a later period and that of jurispru- dence to the latest of all. In that last period also, when Mahomet

was despot of Medina, the Koran served as an official chronicle, well compared by Sprenger to the leading articles on current events in a ministerial organ. Where the continuous para- graph is substituted for the ejaculation, the divine author apologizes for the style.

Certain doctrines and practices (e.g. washing of the person and the garments) must have been enjoined from the first, but our authorities scarcely give us any clear notion what they were. The doctrines to which the Prophet himself throughout assigned most value seem to have been the unity of God and the future life, or resurrection of the body. The former necessitated the abandonment of the idolatrous worship which formed part of the daily life of Mecca, and in which Mahomet and Khadija had been accustomed to take their part. • Yet it seems to have been due to the initiative of the proselytes themselves rather than to the Prophet's orders that the Meccan worship was actually flouted by them; for the anecdote which represents the Prophet and his young cousin attempting to pull down the images in or about the Ka'ba appears to be apocryphal. The first Moslem ceremony would appear to have been the religious meeting for the purpose of hearing the delivery of revelations, of which after the Prophet's death the sermon (khutbah) took the place. After various provisional meeting-places, the house of one al- Arqam on Mt. Safa was adopted for this purpose; and here proselytes were initiated.

The names which the new community received from its founder are both philological puzzles; for the natural sense of Growth of Moslem (Muslim) appear to be " traitors," and to the Early this a contemporary war-song of Mahomet's enemies CbnjmuiiW^.aiiucles; while ffanif (especially applied in the Koran to Abraham) seems to be the Hebrew word for " hypocrite." The former is explained in the Koran to mean " one who hands over his face or person to God," and is said to have been invented by Abraham ; of the latter no explanation is given, but it seems to signify from the context " devotee." Since the divine name Rahman was at one time favoured by Mahomet, and this was connected with one Maslama of the tribe Hanlfa, who figures in politics at the end of Mahomet's career but must have been a religious leader far earlier, it has been suggested that the names originally belonged to Maslama's community. The honour of having been Mahomet's first convert is claimed for three persons: his wife Khadija, his cousin Ali, who must have been a lad at the commencement of the mission, and Abu Bekr, son of Abu Quhafah, afterwards Mahomet's first successor. This last person became Mahomet's alter ego, and is usually known as the Siddiq (Heb. word signifying " the saint," but to the Arabs meaning " faithful friend)". His loyalty from first to last was absolutely unswerving; he was selected to accompany Mahomet on the most critical occasion of his life, the Flight from Mecca; Mahomet is said to have declared that had he ever made a confidant of any one, that person would have been Abu Bekr;

implying that there were things which were not confided even to him. The success of the Prophet's enterprise seems to have been very largely due to the part played by this adherent, who pos- sessed a variety of attainments which he put at Mahomet's service ; who when an intermediary was required was always ready to

represent him, and who placed the commendation of the Prophet above every other consideration, private or public. The two appear to have regularly laid siege to those persons in Mecca whose adherence was desirable; and the ability which many of the earlier converts afterwards displayed, whether as states- men or generals, is a remarkable testimony to their power of gauging men. It seems clear that the growth of wealth in Mecca had led to the accentuation of the difference between persons of different station, and that many were discontented with the olig' archy which governed the city. Converts could, therefore, be won without serious difficulty among the aliens and in general those who suffered under various disqualifications. Some members of the Jewish community seem also to have joined; and some relics of the Abyssinian expedition (i.e. descendants of the invaders). Among the most important converts of the Meccan period were Mahomet's uncle Hamza, afterwards for his valour called " the Lion of God "; 'Abd al-Rabman (Abdar- rahman) son of 'Auf; Othman, son of 'Affan, who married two of the Prophet's daughters successively, and was Mahomet's third successor; and, more important than any save Abu Bekr, Omar, son of al-Khattab, a man of extraordinary force of charac- ter, to whom siege seems to have been laid with extraordinary skill. At some time he received the honourable title Far&q (" Deliverer "); he is represented as regularly favouring force, where Abu Bekr favoured gentle methods; unlike Abu Bekr, his loyalty was not always above suspicion. His adherence is ascribed to the period of publicity.

The secrecy which marked its early years was of the greatest value for the eventual success of the mission; for when Mahomet came forward publicly he was already the head of a band of united followers. His own family appear to have been either firm adherents, or violent enemies, or lukewarm and temporizing — this is the best which can be said for 'Abbas, eponymus of the Abbasid dynasty; or finally espousers of his cause, on family grounds, but not as believers.

Rejecting accounts of Mahomet's first appearance as a public preacher, which are evidently comments on a text of the Koran, we have reason for supposing that his hand was forced First by ardent followers, who many times in his career Period ot compelled him to advance. The astute rulers of Publicity. the community perceived that the claim made by Mahomet was to be dictator or autocrat; and while this was naturally ridiculed by them, some appear to have been devoted adherents of the gods or goddesses

whom he attacked. The absence of dated documents for the period between this open proclamation (which in any case commenced before 616) and the Flight to Medina in 622 renders the course of events somewhat conjectural, though certain details appear to be well established. Apparently there was a war of words, followed by a resort to diplomacy and then to force; and then a period in which Mahomet's attention was directed to foreign conversions, resulting in his being offered and accepting the dictatorship of Yathrib.

Of the war of words we have an imperfect record in the Meccan suras of the Koran, which occasionally state the objections urged by the opponents. In the course of the debate the theological position of both parties seems to have shifted, and the knowledge of both was probably increased in various ways. The miracle of the Koran, which at first consisted in its mode of production, was transformed into a marvel connected with its contents; first by Mahomet's claiming to tell historical narratives which had previously been unknown to him; afterwards by the assertion that the united efforts of mankind and Jinn would be unable to match the smallest passage of the Koran in sublimity. Probably the first of these claims could not be long maintained, though A. J. Davis, " the Seer of Poughkeepsie," in our own time brought a similar one in regard to his Principles of Nature. Indeed both parties evidently resorted to external aid. To those who under- took to name the man who dictated stories of the ancients to Mahomet day and night, he replied that the individual whom they had in mind was a foreigner, whereas the Koran was in pure Arabic. This was obviously a quibble, for it was scarcely asserted that he delivered the matter dictated to him without

alteration. The purity of the Arabic also appears to have been very questionable; for several expressions appear to be Ethiopic rather than Arabic, and the person whom the Meccans had in mind is likely to have been an Abyssinian Christian, since the Christian technicalities of the Koran are mainly derived from the Ethiopic Gospels and Acts. On one occasion when some questions suggested by learned foreigners had been propounded to the Prophet he required a fortnight's delay before the revela- tion which solved them came; the matter contained in his reply was certainly such as required research. His sources of informa- tion seem at all times to have been legendary rather than canoni- cal; and the community which seemed to his opponents to agree best with his views was that of the Sabians or Mandaeans (qq.v.). It has been suggested that Mahomet first threatened the Meccans with temporal punishment, and only when this

threat failed to take effect resorted to the terrors of the Day of Judgment and the tortures of Hell; it seems however a mistake to distinguish between the two. These threats provided the Prophet with his most powerful sermons. The boasts of incomparable eloquence which the Koran contains are evidence that his oratorical power was effective with his audiences, since the more successful among the Arabic poets talk of their compositions somewhat in the same way. These discourses certainly led to occasional conversions, perhaps more frequently among women than men.

The diplomatic war seems to have been due to the Prophet's increasing success, which led to serious persecution of Mahomet's less influential followers, though, as has been seen, no la Axam. blood could be shed in Mecca. Abu Talib, moreover, prevented him from being exiled, though he probably had to endure many personal insults. Something however had to be done for the persecuted Moslems, and (perhaps at the sugges- tion of his Abyssinian helper) Mahomet endeavoured to find a refuge for them in the realm of Axum. Abyssinia was doubtless conhected in every Meccan mind with the " Expedition of the Elephant "; and such an alliance secured by Mahomet was a menace to the existence of the Meccan community. A deputation was therefore sent by the Meccan leaders to demand extradition of the exiles; and as chief of this expedition the future conqueror of Egypt, 'Amr b. al-'As (see 'Amr ibn el-Ass), first figures in history. To frustrate his efforts Mahomet sent his cousin Ja'far armed with an exposition of the Prophet's beliefs and doctrines afterwards embodied in the Koran as the Sura of Mary (No. XIX . ; though with the addition of some anti-Christian matter). The original document contained an account of the Nativity of Christ with various miracles not known to either the canonical or even the apocryphal gospels which have been preserved, but which would be found edifying rather than unorthodox by a church one of whose most popular books is The Miracles of the Virgin Mary. To this there were added certain notices of Old Testament prophets. The Abyssinian king and his ecclesiastical advisers took the side of Mahomet and his followers, whom they appear to have regarded as persecuted Christians; and an attempt made probably by the astute 'Amr to embroil them with the Abys- sinians on the difficult question of the Natures of Christ failed completely. There seems reason for thinking that the Abyssinian king contemplated bringing back the exiles by force, but was diverted from this purpose by frontier wars; meanwhile they were safely harboured, though they seem to have suffered from extreme poverty. The want of an Abyssinian chronicle for this period is a serious disadvantage for the study of Islamic origins. The sequel shows that regular correspondence went on between the exiles and those who remained in Mecca, whence the former were retained within the fold of Islam, with occasional though rare apostasies' to Christianity.

Mahomet's diplomatic victory roused the Meccan leaders to fury, and they

decided on the most vigorous measures to which they could rise; Abu Talib, Mahomet's protector, and the clan which acknowledged him as sheikh, including the Prophet and his family, were blockaded in the quarter which they occupied; as in other sanctuaries, though blood might not be shed, a culprit might be starved to death. That this did not occur, though the siege appears to have lasted some months at least, was due to the

weak good nature of the Meccans, but doubtless also to the fact that there were enlisted on Mahomet's side many men of great physical strength and courage (as their subsequent careers proved), who could with impunity defy the Meccan embargo. After a time however the besieged found the situation intolerable, and any assistance which they might have expected from the king of Axum failed to come. The course adopted by Mahomet was retractation of those of his utterances which had most offended the Meccans, involving something like a return to paganism. A revelation came acknowledging the effectiveness of the Meccan goddesses as well as Allah, and the Meccans raised the siege. News of the reconciliation reached the Abyssinian exiles and they proceeded to return.

By the time they reached the Arabian coast the dispute had recommenced. The revelation was discovered to be a fabrication of the Devil, who, it appears, regularly interpolates in prophetic revelations; such at least is the apology preserved in the Koran, whence the fabricated verses have been expunged. Since our knowledge of this episode (regarded as the most disgraceful in the Prophet's career) is fragmentary, we can only guess that the Prophet's hand had once more been forced by the more earnest of his followers, for whom any compromise with paganism was impossible. The exiles went back to Abyssinia; and about this time both Abu Talib and Khadija died, leaving the Prophet unprotected.

He fled to the neighbouring oasis of Taif, where wealthy Meccans had possessions, and where the goddess al-'Uzza was worshipped with special zeal — where she is said still to exist in the form of a block of stone. He had but little success there in proselytizing, and indeed had to cease preaching; but he opened negotiations with various Meccan magnates for a promise of protection in case of his return. This was at last obtained with difficulty from one Mot'im b. 'Adi. It would appear that his efforts were now confined to preaching to the strangers who assembled at or near Mecca for the ceremonies connected with the feasts. He received in consequence some invitations to come and expound his views away from Mecca, but had to wait some time before one came of a sort which he could wisely accept.

The situation which led to Mahomet's Flight {hijra, anglicized incorrectly hejira, q.v.) was singularly favourable to Mahomet's enterprise, and

utilized by him with extraordinary caution and skill. At the palm plantation called ™Yathrtb. Yathrib, afterwards known as al-Medina, Medina, " the City" {i.e. of the Prophet), there were various tribes, the two most important, called Aus and Khazraj, being pagan, and engaged in an internecine feud, while under their protection there were certain Jewish tribes, whose names have come down to us as Qainuqa, Nadir and Quraiza — implying that the Israelites, as might be expected, imitated the totem nomenclature of their neighbours. The memory of these Israelites is exclusively preserved by the Moslem records; the main stream of Jewish history flowed elsewhere. In the series of combats between the Aus and Khazraj the former had generally been worsted; the Jews, as usual, had avoided taking any active part in the fray. Finally, owing to an act of gross perfidy, they were compelled to fight in aid of the Aus; and in the so-called battle of Bu'ath the Aus aided by the Jews had won a victory, doubtless attributed to the God of the Jews. As has been seen, the divine name employed by Mahomet {Rahman) was one familiar to the Jews; and the Yathribites who visited Mecca at feast-time were naturally attracted by a professed representative of al-Rahman. The first Yathribite converts appear to have been Khazrajites, and one As'ad, son of Zurarah, is the most prominent figure. Their idea may have been in the first place to secure the aid of the Israelitish Deity in their next battle with the Aus, and indeed the primary object of their visit to Mecca is said to have been to re- quest assistance for their war. For this the plan was substituted of inviting the Prophet to come to Mecca as dictator, to heal the feud and restore order, a procedure to which Greek antiquity offers parallels. The new converts were told to carry on secret propaganda in Yathrib with this end in view. At the next feast

some of the rival faction embraced Islam. A trusty follower of Mahomet, Mus'ab b.'Umair, who resembled Mahomet in personal appearance, was sent to Yathrib to assist in the work. The correspondence between this person and the Prophet would, if we possessed it, be of the greatest value for the study of Islamic antiquity. We first hear at this time of the conditions of Islam, i.e. a series of undertakings into which the convert entered: namely, to abstain from adultery, theft, infanticide and lying, and to obey Mahomet in Ileitis et honestis. The wholesale conversion of Yathrib was determined by that of two chieftains, Usaid b. Huraith and Sa'd b. Mu'adh, both Ausites. The example of these was quickly followed, and iconoclasm became rife in the place. At the next Meccan feast a deputation

of seventy Yathrib- ites brought Mahomet a formal invitation, which he accepted, after imposing certain conditions. The interviews between Mahomet and the Yathribites are known as the 'Aqabah (prob- ably with reference to a text of the Koran). The attitude of the Jews towards the project appears to have been favourable.

Among the conditions imposed by Mahomet on his new ad- herents appears to have been the protection and harbouring of the older proselytes, whom Mahomet most wisely determined to send before him to Yathrib, where, in the event of the Yathribite loyalty wavering, they could be counted on with certainty. The welcome given these refugees (muhdjirun), as they were from this time known in contra- distinction to the helpers (ansar) or allies from Yathrib, is said to have been of the warmest; a Helper with two wives would hand one over to a wifeless Refugee. A yet more important condition which preceded the Flight was readiness to fight men of all colours in defence of the faith.

Although the transactions with the people of Yathrib had been carried on with profound secrecy, the nature of Mahomet's contract with his new adherents was somewhat divulged to the Meccan magnates, and the danger of allowing an implacable enemy to establish himself on the high-road of their north-bound caravans flashed upon them. The rule which forbade bloodshed in the sacred city had at last to be suspended; but elaborate pre- cautions were to be taken whereby every tribe (except Mahomet's own clan) should have their share in the guilt, which would thus be spread over the whole community fairly. When the com- mittee appointed to perpetrate the crime reached Mahomet's house, they found that it was too late; Mahomet had already departed, leaving Ali in his bed.

The actual Flight from Mecca to Yathrib has naturally been a favourite subject for romance, and indeed appears to have been executed with the greatest cunning. Accompanied by Abu Bekr only, Mahomet took refuge in a cave of Mt Thaur, in the opposite direction to that which he intended to take finally, and there remained for three days; provision had been made of every requisite, food, powerful camels, a trusty and competent guide. ' The date at which he reached Kuba, on the outskirts of Yathrib, where there was already some sort of Moslem oratory, is given as 8 Rabia I., of the year a.h. i; the fact that he arrived there on the Jewish Day of Atonement gives us the date September 20, 622. The Meccans, who had employed professional trackers to hunt down the fugitives, proceeded to confiscate the houses and goods of Mahomet and of his followers who had fled.

The safe arrival of Mahomet at his destination marks the turning-point in his career, which now became one of almost Mahomet as unbroken

success; his intellectual superiority over Despot of both friends and enemies enabling him to profit by yathrib. defeat little less than by victory. His policy appears to have been to bind his followers to himself and them to each other by every possible tie; he instituted brotherhoods between the Refugees and Helpers, which were to count as relationships for legal purposes, and having himself no sons, he contracted numerous marriages partly with the same end in view; e.g. with the infant daughter 6i Abu Bekr, Ayesha ("A'ishah), whose ability he appears to have discerned; and the unamiable H a f?a, daughter of Omar. Of his own daughters three were given to faithful allies, the one by whom his line is supposed to have been continued to our time, Fatima, was reserved for his cousin

Ali. Owing to his efforts the alliance between the Refugees and Helpers resisted numerous attempts on the part of enemies to break it up, and only towards the end of the Prophet's life, when he appeared to favour Meccans unduly, do we hear of any bitterness between the two communities.

The population of Yathrib, or, as it may now be called, Medina, soon divided into three groups: Mahomet's united followers; the Jews; and a party known as the " Hypocrites," i.e. professing Moslems, who were lukewarm, or dis- community. affected, among whom the most prominent is 'Abdallah b. Ubayy, a Khaziajite chieftain, who is said to have himself aspired to be despot of Yathrib, and who till nearly the end of Mahomet's career figures somewhat as a leader of the opposition; of his importance there is no question, but the reason for it and the mode whereby he made it felt are often obscure. It would seem that the pagans remaining in Yathrib speedily adopted Islam after the Prophet's arrival, whence we hear little of serious opposition on their part. Coming in the capacity of prophet of the Israelitish God, Mahomet at first seems to have courted alliance with the Jews, and to have been ready to adopt their system with very slight modifications — similar to those which, according to his opinion, Jesus had come to introduce. The Jews met these advances by submitting him to examination in the intricacies of the Torah, and, finding him very poorly equipped, proceeded to denounce him as an imposter; one of his examiners is said to have even translated the Torah into Arabic with a view of convicting him of ignorance and imposture. They are' further charged with exercising their magical arts on the Prophet and his followers, and to have succeeded thereby in producing barrenness among the Moslem women. Their conduct must not of course be judged by the statement of their enemies; it is however clear that Mahomet soon found that there was no possibility of compromising with them on religious questions, or of obtaining their loyal support; meanwhile he discovered that they were incapable of united and persistent action, and useless as warriors except against each other. He therefore resolved on their extermination. His ruthlessness in their case compared with his patience and forbearance in

the case of the " Hypocrites" was consistent with his principle (always faith- fully observed) that no inquiry was permissible into the motives of conversion, and with his division of mankind into the two antagonistic factions Believers and Unbelievers. The latter principle, as will be seen, was somewhat modified before the end of his life.

Mahomet's failure to effect a compromise with the Jews caused a reaction in his mind towards paganism, and after about a year's residence at Medina the direction of prayer, which had till then been towards Jerusalem, was Jtˆsiumˆ" turned southward to the pagan temple at Mecca. With this change we may perhaps couple the adoption of the name Allah for the Diety; in the Moslem formula "in the Name of Allah the Rahman the Merciful," the translation attached to the word Rahman, and the prefixing to it of the name Allah furnish clear evidence of theological transition, though the stages are not recorded; we know, however, that the Meccans approved of the name Allah, but objected to the name Rahman. Prayer (saldt), said to have been prescribed on the occasion of the Prophet's ascent into heaven after a miraculous journey from Mecca to Jerusalem, began to assume a stereotyped form in the place of assembly built by Mahomet immediately after his arrival; the attitudes of prayer in use among many communities (e.g. the Jewish standing, the prostration of some Christian sects) were combined. In general it was Mahomet's principle, while taking over a practice from some other sect, to modify it so as to render the Moslem method absolutely distinct; thus when a summons to prayer became requisite, a new mode (by the voice of a crier called muaddhin or muezzin) was preferred to the Christian hammer; a new sacred day was adopted, in lieu of the Jewish Saturday and the Christian Sunday, in the weekday on which he had safely reached Kuba, Friday; but the sanctity was reduced to the actual time occupied by public worship. On the subject of food he was satisfied with the regulations of the Council of

Jerusalem, recorded in Acts xv.; which were observed by few if any Christian sects. The prohibition of wine, which was enacted in a.h. 3, is said to have been occasioned by the riotous conduct of one of his followers when under the influence of liquor; Palgrave saw in it (perhaps with justice) a deliberate attempt to prevent harmony between Moslems and Christians, in whose most sacred rite wine is used. The Fast of Ramadan, in which food both liquid and solid is forbidden from sunrise to sunset, is said to be a pagan or semi-pagan institution; its importance for military training and discipline is not likely to have been over- looked by the Prophet. When the direction of prayer was altered, it is probable that Mahomet already

intended to intro- duce into his system the whole of the pagan pilgrimage with its antique ceremonial (with, of course, a new interpretation); before this he is supposed to have aimed at the abolition of the Ka'ba and all that appertained to it.

The difference between religious and civil law has never been recognized by Islamic jurists, whose manuals deal equally with the law of contract and the amount of the body to be washed before prayer; the Prophet's ordinances on both subjects were suggested by the occasion in each case, and it would seem that the opinions of trusted advisers were regularly heard before a revela- tion was issued. Even when this had been done the ordinance might be cancelled by an abrogating revelation; it being " easy for Allah " to substitute for a text already revealed another that was better or at least as good.

As Islam began to spread outside the limits of Medina both conversion to Islam and persistence therein were reduced to simple tests; the pronunciation of the double formula of belief in Allah and Mahomet was sufficient to indicate conversion, whilst payment of an income-tax, called by the Jewish names for alms (zakdt and sadaqah) , was evidence of loyalty. This income- tax, of which the definite assessment perhaps belongs to a later period, was for the support of necessitous converts — an element in the community whose presence accounts for the mode in which the development of the Islamic state proceeded.

The industries in which the Meccan Refugees had been engaged were not of a sort which they could exercise at Medina, where the First palm took the place of the camel as the basis of

campaigns society. Moreover the Prophet seems to have given of Mahomet. some disastrous advice on the subject of palmiculture, and thereby to have accentuated the poverty of the place. He had, therefore, to find some fresh source of revenue in order to deal with this difficulty, and one of the Helpers is said to have suggested the plan which he adopted, viz. of attacking the Meccan caravans. With this view he organized a series of expeditions, taking the lead himself sometimes, while at others he gave it to one of his veteran followers; and at first only Refugees took part in them. The leaders of the caravans, how- ever, were expert in evading attacks of this sort, which were doubtless regularly attempted by the desert tribes; and in the first year of his despotism Mahomet did not score a single success of the kind intended. The attempts were not wholly fruitless; for while on the one hand he accustomed his followers to campaign- ing, on the other he made a series of agreements with the chief- tains of the tribes through whose territory the caravans ordinarily passed. Finding continued failure intolerable, he resolved to take advantage of his power to bind and to loose

by sending an expedition of seven men under his cousin 'Abdallah b. Jahsh to attack a caravan at the beginning of the sacred month Rajab, when, as raiding during such a season was unknown, success was practically certain. The commander on this, the Nakhlah raid, was given sealed orders, to be opened after two days' march; the men were then to be given the option of retiring, if they dis- approved. Of this no one seems definitely to have availed him- self, and the raid ended successfully, for considerable booty was captured, while of the four persons who escorted the caravan two were made prisoners, one escaped, and one, 'Amr b. al-Hadrami, was killed; he was the first person slain fighting against an Islamic force. The violation of the sacred month seems to have caused considerable scandal in Arabia, but led to no serious con- sequence; on the other hand the shedding of blood created a feud

between the people of Mecca and the Refugees, with whom the Meccans long declined to identify the people of Medina. The fact that the man who had been killed was a client, not a citizen, made no difference. The circumstance that booty had been actually acquired appears to have helped the Prophet's cause very considerably.

Both these consequences, the Meccan desire to avenge the blood that had been shed and the anxiety of the Medinese to take part in a successful raid, manifested themselves a few Attack months later, when an expedition was organized by on Meccan Mahomet to attack a caravan returning from Syria, Caravatt – which had escaped him the previous year. Many desired to take part in the raid, and finally some 300 persons were selected, including a large number of " Helpers." The leader of the caravan learned somehow that an attack was being organized by Mahomet on a large scale, and sent to Mecca for aid, while hurry- ing home by forced marches. This is the first historical appear- ance of Abu. Sofian (the leader of the caravan), who now for some years played the part of president in the Meccan opposition to Mahomet, and whose son was destined to found the second Mahommedan dynasty (see Caliphate, B). The day before the battle to be fought at Badr, near the point where the northern road leaves the coast to turn eastwards to Mecca, the Moslem army learned that the Meccan succour (some 1000 strong) was near, but that the caravan had escaped. The Meccans, it is asserted, would have returned home now that their object was secured, but the patrons of the man who had been killed in the former raid were compelled to strike for vengeance.

The battle (Ramadan 19, a.h. 2, usually made to synchronize with March 17, 624) ended in a complete victory for Mahomet, whose followers killed seventy of the enemy and took seventy prisoners — if we may trust what seem to be round numbers; it was attributed by him to divine co-operation, taking the form of an illusion wrought on the enemy, and the despatch of a

regiment of angels to the assistance of the Believers, while on the other hand the treachery of the Devil did mischief to the Meccans. The popular tradition attributed it to the prowess of some of Mahomet's followers, especially his uncle Hamza and his cousin Ali. In the narratives which have come down and which seem to be authentic the result is amply accounted for by the excellence of the Moslem discipline and the complete absence of any on the Meccan side. Mahomet himself is said to have fainted at the first sight of blood, and to have remained during the battle in a hut built for him to which swift camels were tied, to be used in case of a defeat; yet these accounts make him responsible for the tactics, whilst assigning the credit for the strategy to one Hobab b. al-Mondhir. Several of Mahomet's old enemies and friends of Meccan days perished on this occasion; notably one Abu Jahl, his uncle, but represented as an implacable enemy; another hostile uncle, Abu Lahab, who is cursed in the Koran, was not present but died shortly after the battle.

The day is called in the Koran by a Syriac expression the " Day of Deliverance," and both for internal and external politics it was of incalculable advantage to Islam. The booty and the ransoms of the prisoners provided the means for dealing with distress; the story of supernatural aid soothed the feelings of the defeated Meccans and had a tendency to disarm resistance else- where; whilst Mahomet in the popularity acquired by his victory was able to strike forcibly at his enemies in Medina. One of the sequels to the victory was a series of assassinations whereby critics of his actions were removed.

The defeat at Badr naturally led to efforts on the part of the Meccans to avenge their dead and besides to secure the commerce, by which they lived, from an enemy who was gradu- ally getting all the seaboard that lay between Jeddah otˆeccaˆ and Yanbo within his sphere of influence; and the year after Badr (a.h. 3) Abu Sofian was able to lead a force said to be three times as great as that which had been defeated, and so numbering some 3000 men, against Medina itself; part of it was under Khalid b. al-Walid, one of the greatest of Arab captains, afterwards conqueror of Syria. It is said that Maho- met's plan was to remain in Medina itself, and leave it to the

Meccan commander to discover some way of taking the place; but that his hand was forced by his more ardent followers. Others, however, assign this advice to Abdallah b. Ubayy, and make the Prophet anxious to fight from the first. A battle was in consequence fought under Mt Uhud (or Ohod),

north-west of Medina, wherein Khalid succeeded in inflicting a severe defeat on Mahomet's forces; his uncle Hamza, hero of Badr, was killed on this occasion. Fortunately for the Moslems, the Meccans considered that they had finished their task when they discovered that they had killed a number of the former equal to those who had fallen at Badr on their own side; instead therefore of pursuing their victory they went home. The immediate effect on Arabia appears to have been to dissipate the illusion that the Prophet could count on supernatural assistance in his wars; and we hear of some blows being dealt him from outside. Meanwhile his relations towards the Medinese Jews had grown more and more hostile, and these are credited with doing their best to rouse the Meccans to a sense of the danger which threatened them in the continu- ance of the Prophet's power, and in general to stir up hostility against him in Arabia. Whether this part was played by them or not, in the fifth year of the Prophet's stay at Medina a fresh invasion of the territory took place by a vast confederate force of Meccans with their allies, the tribes Fazarah, Asad, Murrah, &c, to the number, it is said, of 10,000. This time t£e intention of the leaders was undoubtedly to stamp out Islam. For the first time in Arab warfare Mahomet resorted to the expedient of defending his city by a trench, called by a Persian name, and suggested by a Persian convert. But he also employed agents to sow dissension among the confederates, and succeeded with this no less than with the other expedient. After a brief stay, and scarcely striking a blow, the confederacy dispersed, leaving the Jews who still remained in Medina to the summary vengeance of the Prophet. The want of records written from the Meccan standpoint renders the abortiveness of this last attempt at storming the Prophet's stronghold scarcely intelligible.

From this time, however, the road towards the eventual taking of Mecca became easy, and we are told that such" was the impor- tance attached to that city throughout Arabia that its acquisition meant for the Prophet the acquisition of the whole peninsula. The next year (a.h. 6) he deemed it advisable to make a truce with the Meccans (the Truce of Hodaibiyah), whereby he secured for his followers the right of performing the pilgrimage in the following year; on this occasion he even consented to forgo his title " Prophet of Allah," when the Meccans refused to sign a deed in which it was employed, greatly to the scandal of his more earnest followers, including Omar; they were however too deeply committed to Islam to be able to defy the Prophet. When the pilgrimage was performed (a.h. 7), Mahomet not only won important converts in the persons of Khalid and the no less able 'Amr b. al-'As, but in general impressed the population with the idea that his was the winning side. An excuse was easily found for invading Mecca itself in the following year, when Abu Sofian took the opportunity of embracing Islam before it was too late. Very little resistance was now made

by the Meccans, whose chiefs were already in Mahomet's camp, and Mahomet used his victory with great moderation; his proscription list was finally reduced to two. The theory that all offences were cancelled by conversion was loyally observed. Moreover the Prophet incurred the displeasure of his Medinese friends by the anxiety which he displayed to soothe the feelings of his former enemies and antagonists. The Medinese, however, prevailed upon him to maintain their city as his political capital, while making Mecca the religious centre of his system; and this arrangement accounts perhaps more than anything else for the persistence of the system amid so many dynastic changes.

In the main he appears to have introduced little alteration into the government of Mecca, and it is said that he even declined to retaliate on those who had confiscated the possessions of the Refugees. Even the Ka'ba was left in the keeping of its former custodian, though of course its interior as well as its precincts were cleansed of all that could offend monotheists. In the

following year the pilgrimage was for the first time conducted by a Moslem official, AbQ Bekr. A proclamation was made on that occasion, forbidding idolaters in future to take part in the pil- grimage, and giving all Arabs who were not as yet converted four months' grace before force was to be brought to bear upon them. In the following year Mahomet conducted the Pilgrimage himself. This solemn occasion (the " Farewell Pilgrimage ") was also employed for the delivery of an important proclamation, wherein the Prophet declared that God had completed their religion. The principle whereon he specially insisted was the brotherhood of Islam; but there is some difficulty in enucleating the original sermon from later additions.

It would seem that Mahomet's enterprise originally comprised the conversion of Mecca only, and that he thought of himself as sent to his fellow-citizens only, as had been the case with earlier prophets, whose message was for a f Arabia. their " brethren." His views took a somewhat different direction after his brief exile to Taif, and the conquest of Arabia was in a way forced upon him in the course of his struggle with the Meccans. It is not indeed perfectly clear by what process he arrived at the resolution to exclude paganism from Arabia; at first he appears to have tolerated it at Medina, and in some of his earlier contracts with neighbouring tribes he is represented as allowing it, though some of our texts make him reserve to himself the right of enforcing Islam if he chose; only the Meccans were at first, according to the most authentic documents, excluded from all truce or treaty. At the battle of Badr he appears to have formulated the rule that no one might fight on his side who had not embraced Islam; and when once he had won fame as a successful campaigner, those who wished to share his adventures had to pass the

Islamic test. After the battle of Uhud (Ohod) we hear of a tribe demanding missionaries to instruct them in Islamic principles; and though in the case recorded the demand was treacherous, the idea of sending mis- sionaries appears not to have been unfamiliar even then, albeit the number sent (70), if rightly recorded, implies that the Prophet suspected the good faith of the applicants. After the taking of Mecca, whereby the chief sanctuary at any rate of north Arabia had been cleared of all idolatrous associations, and consecrated to monotheism, paganism in general was conscious of being attacked; and the city had scarcely been brought under the new regime before the Prophet had to face a confederation of tribes called Hawazin and Thaqif. The battle which ensued, known as the Day of Honain, was near ending disastrously for Islam; some of Mahomet's sturdiest followers fled; but the terrible danger of a defeat in the neighbourhood of recently conquered Mecca roused the Prophet and Ali to heroism, and they saved the day. Emissaries were now sent far and wide demand- ing the destruction of idols, and only Taif appears to have made any considerable resistance; against this place for the first time the Prophet made use of siege artillery, such as was employed by the Byzantines; though compelled by the bravery of the inhabi- tants to raise the siege, he was afterwards able to take the city by capitulation. It has been observed that here only do we read of much attachment to the old deities; in most places they were discarded with few regrets when once their impotence had been found out. After the taking of Mecca and the victory of Honain there appears to have been a general desire, extending even to the extreme south of Arabia, to make the best terms with the conqueror so soon as possible; iconoclasm became general. Flatterers of various kinds, including poets, came to seek the favour of the sovereign; and a mock war of words appears to have been substituted by some tribes for more serious fighting, to terminate in surrender. For warfare of his sort Mahomet had a powerful helper in the poet Hassan b. Thabit, for whose effusions a pulpit was erected in the Medina mosque, and whose verses were said to be inspired by the Holy Spirit; though, as has been seen, Mahomet was not himself able to judge of their artistic merit. It was not, however, found easy to enforce the payment of the alms on these new converts; and this taxation caused an almost general revolt so soon as Mahomet's death had been ascertained.

Although the central portions of the peninsula in Mahomet's time were practically independent, large portions of the north- Plaa of west and south-east were provinces of the Byzantine World- and Persian empires respectively, whence any scheme conquest. £ Qr ˆe conquest of Arabia would necessarily involve the conqueror in war with these great powers.

The conquest of Persia is said to have been contemplated by the Prophet as early as a.h. 5, when the famous Trench was being dug; but it was not till the year a.h. 7, on the eve of the taking of Mecca, that the Prophet conceived the idea of sending missives to all known sovereigns and potentates, promising them safety if, but only if, they embraced Islam. The text of these letters, which only varied in the name of the person addressed, is preserved (doubt- less faithfully) by the Moslem Oral Tradition; in the middle of the last century a French explorer professed to discover in Egypt the original of one of them — addressed to the mysterious person- age called the Muqauqis(Mukaukis)of Egypt — and this,it appears, is still preserved amid other supposed relics of the Prophet in Constantinople, though there is little reason for believing it to be genuine. The anecdotes dealing with the reception of these letters by their addressees are all fabulous in character. Two appear to have sent favourable replies: the king of Axum, who now could send the exiles whom he had so long harboured to their successful master; and the Egyptian governor, who sent Mahomet a valuable present, including two Coptic women for his harem. The emperor Heraclius is claimed as a secret convert to Islam, on whom pressure had to be put by his advisers to conceal his convictions. The Persian king is said to have sent orders to have Mahomet arrested; his messengers arrived in Medina, but were unable to carry out the commands of their master, who died while they were there. Two of the letters are said to have had important results. One was addressed to the Himyarite chiefs (called by the south Arabian appellation qail) in Yemen, and effected their conversion; another to the governor of Bostra in Roman Arabia, who put the bearer of this insolent message to death; a force was despatched by Mahomet imme- diately afterwards (beginning of a.h. 8) to avenge this outrage; and though the Moslems were defeated in their first encounter with the Byzantine forces at Mutah, they appear to have given a good account of themselves; it was here that Ja'far, cousin of the Prophet, met his death. In A. h. 9 a successful expedition was led by the Prophet himself northward, in which, though no Byzantine force was encountered, a considerable region was withdrawn from the Byzantine sphere of influence, and made either Islamic or tributary to Islam. At the time of his death (of fever, after a short illness) he was organizing an expedition for the conquest of Syria.

*The Prophet claimed throughout that his revelation confirmed the Jewish and Christian Scriptures, and this claim is on the Jewish and whole reasonable, though his acquaintance with both Christian was in the highest degree vague and inaccurate. Com muni- Still he reproduced the Old Testament as faithfully es * as he could, and though he patriotically endeavours*

to shed some lustre on his supposed ancestor Ishmael, he does not appear to have questioned the Biblical theory according to which the founder of

the north Arabian nations was the son of a slave girl. On neither the truth of the Biblical history and miracles nor the validity of the Mosaic legislation does he appear to have cast any doubt. He even allows that Israel was the chosen people. The Gospel was known to him chiefly through apocryphal and heretical sources, which cannot certainly be identified; but he accepted the doctrine of the Virgin-birth, the miracles of healing the sick and raising the dead, and the ascension; the crucifixion and resurrection were clearly denied by the sect from whom he had received his information, and rejected by him, though certainly not because of any miracle which the latter involved. His quarrel with the Jews at Medina appears to have been by no means of his own seeking, but to have arisen unavoidably, owing to his particular view of his office being such as they could not accept; and his attempt to discredit, not the Mosaic Law, but the form in which they presented it, was an expedient to which he resorted in self-defence. An attempt was made shortly after

his arrival at Medina to settle the relations between the two communities by a treaty, according to which, while their equality was guaranteed there should be little interference between the two; this, however, was found unworkable, and each victory of Mahomet over the Meccans was followed by violent measures against the Medinese Israelites. When experience had shown him their military incompetence he appears to have been unable to resist the temptation to appropriate their goods for the benefit of his followers; and his attack on the flourishing Jewish settle- ment of Khaibar, after the affair of Hodaibiyah, appears to have been practically unprovoked, and designed to satisfy his discon- tented adherents by an accession of plunder. Yet the conscious- ness that this process was economically wasteful suggested to him an idea which Islamic states are only now abandoning, viz. that of a tolerated caste, who should till the soil and provide sustenance for the Believers who were to be the fighting caste. Whereas then his former plan in dealing with Israelites had been to banish or massacre, he now left the former owners of Khaibar (who had survived the capture of the place) in possession of the soil, of whose produce they were to pay a fixed proportion to the Islamic state. The same principle was adopted in the case of later conquests of Jewish settlements.

Disputes with Christians occur somewhat later in the Prophet's career than those with Jews, for neither at Mecca nor Medina were the former to be found in any numbers; individuals are likely to have been found in both cities, and we hear of one Medinese "Abu" Amir the Monk," who after Mahomet's arrival at Medina branded him as an impostor, and, going himself into exile, made many an abortive attempt to discredit and injure Mahomet's cause. The notices of him are meagre and obscure. Mahomet's manifesto to the world, about the time of the taking of Khaibar, appears to represent his definite breach with Christianity; and when in the " year of

the embassies " the Christians of Najran sent a deputation to him, they found that the breach between the two systems was not to be healed. Of the three alternatives open to them — conversion, internecine war, and tribute, they chose the last. The Christian tribes of north Arabia showed greater - inclination towards the first. The Prophet's policy was to give Christians lighter terms than Jews, and though the Koran reflects the gradual adoption by the Prophet of an attitude of extreme hostility to both systems, its tone is on the whole far more friendly to the former than to the latter. Some other communities are mentioned in the Koran, but merely in casual allusions: thus we know that Mahomet's sympathy was with the Byzantines in their struggle with Persia, but in his most tolerant utterance the Magians or Mazdians as well as the Sabians (with whom his followers were identified by the Meccans) are mentioned with respect.

The financial requirements of Mahomet's state were of the simplest kind, for there is no trace of any form of governmental department having been instituted by him, even Mahomet's when he was master of the peninsula; nor can we Administra- name ahy permanent officials in his employ except °"' his muaddhin Bilal, and perhaps his court-poet Hassan. A staff of scribes was finally required both to take down his revelations and to conduct correspondence; but although he encouraged the acquisition of penmanship (indeed some of the prisoners at Badr are said to have been allowed to ransom themselves by teaching it to the Medinese), we know of no regular secretaries in his employ. As despot of Medina he combined the functions of legislator, administrator, general and judge; his duties in the last three capacities were occasionally delegated to others, as when he appointed a governor of Medina during his absence, or leaders for expeditions, with provision for successors in case of their falling, but we hear of no permanent or regular dele- gation of them. Till near the end of his career at Medina he maintained the principle that migration to that city was a con- dition of conversion; but when, owing to the extension of his power, this was no longer practicable, his plan was in the main to leave the newly converted communities to manage their in- ternal affairs as before, only sending occasional envoys to dis- charge special duties, especially instruction in the Koran and

the principles of Islam, and to collect the Alms; quite towards the end of his life he appears to have sent persons to the provinces to act as judges, with instructions to judge according to the Koran, and where that failed, the practice (sunna), i.e. the practice of the community, for which a later generation substituted the practice of the Prophet. There were, therefore, no

regular payments to permanent officials; and the taxation called Alms, which developed into an income-tax, but was at first a demand for voluntary contributions, was wholly for the support of the poor Moslems; it might not be used for the maintenance of the state, i.e. Mahomet and 'his family. For them, and for public business, e.g. the purchase of war material and gratuities to visitors, provisio: was made out of the booty, of which Mahomet claimed one-fifth (the chieftain's share had previously, we are told, been one-fourth), while the remainder — or at least the bulk of it — was distributed among the fighting men; the Prophet appears to have prided himself on the justice of his distribu- tion on these occasions, and doubtless won popularity thereby, though we hear occasionally of grumbling; for difficulties occurred when a defeated tribe embraced Islam, and so could claim equal- ity with their conquerors, or when portions of the spoil were irregularly employed by Mahomet to allay resentment: the persons whose allegiance was thus purchased were euphemisti- cally termed " those whose hearts were united." What after- wards proved the main source of revenue in Islamic states dates from the taking of Khaibar; for the rent paid to the state by tolerated communities for the right to work their land developed long after Mahomet's time into a poll-tax for Unbe- lievers (see Caliphate, e.g. B. § 8 and Mahommedan Institu- tions), and a land-tax for all owners of land. Immediately after the taking of Khaibar certain communities, of which the most notable was Fadak, sent tribute before they had been attacked and reduced; their land was regarded by Mahomet as his private domain, but after his death it was withdrawn from his heirs' by his successor Abu Bekr, in virtue of a maxim that Prophets left no inheritance, which in the opinion of Fatima was contrary to Koranic doctrine, and invented by Ayesha's father expressly for the purpose of excluding her and her husband from their rights; and this is likely to have been the case.

As a military organizer Mahomet, as has been seen, was anxious to adopt the most advanced of contemporary methods, and more than once is said to have scandalized the Arabs by foreign innovations, as at a later time the Moslem chiefs who first used gunpowder scandalized their co-religionists. The unit in his armies seems to have been, as of old, the tribe, under its natural leader; that he introduced no more scientific division, and nothing like a hierarchy of officers was perhaps due to the difficulty of reconciling such a system with the equality of all Moslems.

As has been seen, the Koran only assumed the character of a civil code as the need for one arose; and for some time after Mahomet's arrival at Medina old-fashioned methods of settling disputes continued in use, and doubtless in accordance with precedent where such was known. For difficult cases, even in Arab opinion, divine inspiration was required; and since Mahomet naturally claimed to be in sole enjoyment of this, his utterances soon became the unique source of law, though he did not at first

think of organizing a code. Such a plan is said to have occurred to him, and he even wished to dictate a code upon his death- bed; but his friends supposed or professed to suppose him to be delirious. A table regulating the " Alms " was left by him, it is said, in the possession of Abu Bekr; but other traditions assign another origin to this document.

Just as there were no regular officials for the arrangement of business, so there were none for its execution; when punishment was to be administered, any follower of Mahomet might be called upon to administer it. In the case of the massacre of the Banu Qurai?ah care was taken to see that some of the heads were struck off by their former allies, in order that the latter might be unable at any time to bring a demand for vengeance. The Prophet hoped by the mere terror of his name to make complete security reign throughout Arabia, and there is no

evidence that any system of policing either it or even Medina occurred to him.

Until the death of Khadija the Prophet's private life seems to have been normal and happy, for though the loss of his sons in infancy is said to have earned him a contemptuous epithet, he was fortunate in his adoption of Zaidb. Harithah, apparently Domestic a prisoner ransomed by Khadija or one of her relatives, who appears as dutiful almost to excess and competent in affairs. The marriages of his daughters seem all to have been happy, with, curiously, the exception of that between Fatima and Ali. His domestic troubles, to which an unreasonable amount of space seems to be devoted, even in the Koran, began after the Migration, when, probably in the main for political reasons, he instituted a royai harem. One of these political motives was the principle which long survived, that the conquest of a state was consummated by posses- sion of the former monarch's wife, or daughter; another, as has been seen, the desire to obtain the securest possible hold on his ministers. In his marriage with the daughter of his arch-enemy Abu Sofian, before the latter's conversion, we can see a combination of the two. Few, therefore, of these marriages occasioned scandal; yet public morality seemed to be violated when the Prophet took to himself the wife of his adopted son Zaid, whose name has in consequence the honour of mention in the Koran in the revelation which was delivered in defence of this act. Its purpose was, according to this, to establish the difference between adoptive and real filiation. Serious trouble was occasioned by a charge of adultery brought against the youthful favourite Ayesha, and this had to be refuted by a special revelation ; the charge, which was backed up apparently by Ali, seems to have been connected with some deeper scheme for causing dissension between the Prophet and his friends. Yet an- other revelation is concerned with a mutiny in the harem organized by Omar's daughter Hafsa, owing to undue favour shown to a

Coptic concubine (Mary, mother of a son called Ibrahim, who died in infancy ; his death was marked by an eclipse, January 27, 632) ; and various details of factions within the harem are told us by Mahomet's biographers.

Of the members of this harem the only prominent one is Ayesha, married to the Prophet shortly after the Flight, when she had scarcely passed the period of infancy, but who appears to have been gifted with astuteness and ambition that were quite beyond her years, and who maintained her ascendancy over the Prophet in spite of the fact that many carping criticisms of his revelations are attributed to her. Some of this may have been due to the obligations (including pecuni- ary obligations) under which her father had laid Mahomet ; but her reputation seems to have been greatly enhanced by the sending down of a revelation to exonerate her (a.h. 6), for which she thanked God and not the Prophet. Each accession to the harem rendered the building of a house or room necessary for the newcomer's accom- modation; a fact in which Robertson Smith perhaps rightly saw a relic of the older system whereby the tent was the property of women. The trouble noticed above seems to have arisen from the want of a similar arrangement in the case of slave girls, with whom Mahomet's system permits cohabitation. When Mahomet, whether in conse- quence of the fatigue incurred by the " Farewell Pilgrimage," or, as others thought, by the working of some poison put into his food some years before by a Jewess of Khaibar, was attacked by the illness which proved fatal, it was to the house of Ayesha that he was trans- ferred (from that of another wife) to be nursed ; and he apparently died in the arms of the favourite, on whose statements we have to rely for what we know of his last hours.

The traditional description of Mahomet is " of middle height, greyish, with hair that was neither straight nor curly; with a large head, large eyes, heavy eyelashes, reddish tint in the aeaeTa i eyes, thick-bearded, broad-shouldered, with thick hands character- and feet "; he was in the habit of giving violent expres- y sWcs sion to the emotions of anger and mirth. The supposi- tion that he at any time suffered from physical weakness seems absolutely refuted by his career as a leader of difficult, dangerous and wearisome expeditions, from his migration to Medina until his death ; indeed, during his last years he exhibited a capacity for both physical and intellectual activity which implies a high degree of both health and strength; and without these the previous struggle at Mecca could scarcely have been carried on. The supposition that he was liable to fits (epileptic or cataleptic) was intended to account for certain of the phenomena supposed to accompany the delivery of revelations; some of these however rest on very questionable authority : and the greater number of the revelations give evidence of careful preparation rather than spontaneity.

The literary matter ascribed to the Prophet consists of (1) the Koran (q.v.) ; (2) certain contracts, letters and rescripts preserved by his biographers; (3) a number of sayings on a vast variety of topics, collected by traditionalists. The references in the Koran to a form of literature called " Wisdom " (hikmah) suggest that even in the Prophet's time some attempts had been made to collect or at least preserve some of the last ; the general uncertainty of oral tradi- tion and the length of time which elapsed before any critical treatment of it was attempted, and the variety of causes, creditable and dis- creditable, which led to the wilful fabrication of prophetic utterances,

render the use to which No. 3 can be put very limited. Thus the lengthy description of the journey to heaven which Sprenger was inclined to accept as genuine is regarded by most critics as a later fabrication. It is very much to be regretted that the number of pieces justificative (No. 2) quoted by the biographers is so small, and that for these oral tradition was preferred to a search for the actual documents, some of which may well have been in existence when the earliest biographies were written. Their style appears to have been plain and straightforward, though the allusions which they contain are not always intelligible.*

In his personal relations with men Mahomet appears to have been able to charm and impress in an extraordinary degree, whence we find him able to control persons like Omar and Khalid, who appear to have been self-willed and masterful, and a single interview seems to have been sufficient to turn many an enemy into a devoted adherent. Cases (perhaps legendary) are quoted of his being able by a look or a word to disarm intending assassins.

Although the titles which he took were religious in character, and his office might not be described as sovereignty, his interests appear to have lain far more in the building up and maintenance of empire than in ecclesiastical matters. Thus only can we account for the violent and sudden changes which he introduced into his system, for his temporary lapse into paganism, and for his ultimate adoption of the cult of the Black Stone, which, it is said, gave offence to some of his sincere adherents {e.g. Omar), and seems hard to reconcile with his tirades against fetish-worship. The same is indicated by his remarkable doctrine that the utterance of the creed constituted a Moslem and not its cordial acceptance, and his practice of at times buying adhesion. Even an historian so favourable to the Prophet as Prince Caetani recognizes that ultimately what he regarded as most important was that his subjects should pay their taxes. And in general his

system was not favourable to fanaticism (al-ghulu fi'l-din) ; he repeatedly gave permission for concealment of faith when the profession of it was dangerous; he took care to avoid institutions which, like the Jewish Sabbath, interfered seriously with military expeditions and the conduct of business, and permitted considerable irregularity in the matters of prayer and fasting when circumstances rendered it desirable. In his theory that Koranic texts could be abrogated he made wise provision against the danger of hasty legisla- tion, though some of its usefulness was frustrated by his failure to provide for such abrogation after his death.

As has been seen, Mahomet claimed to introduce a wholly new dispensation, and a maxim of his law is that Islam cancels all

that preceded it, except, indeed, pecuniary debts; it is Reforms. not certain that even this exception always held good.

Hence his system swept away a number of practices (chiefly connected with the camel) that were associated with pagan superstitions. The most celebrated of these is the arrow- game, a form of gambling for shares in slaughtered camels, to which poetic allusions are very frequent. More important than this was his attitude towards the blood-feud, or system of tribal responsibility for homicide (whether intentional or accidental), whereby one death regularly led to protracted wars, it being considered dishonourable to take blood-money (usually in the form of camels) or to be satisfied with one death in exchange. This system he endeavoured to break down, chiefly by sinking all earlier tribal distinctions in the new brotherhood of Islam; but also by limiting the vengeance to be demanded to such as was no more than the equivalent of the offence committed, and by urging the acceptance of money-compensation instead, or complete forgiveness of the offence. The remembrance of pre- Islamic quarrels was visited by him with condign punishment on those who had embraced Islam; and though it was long before the tribal system quite broke down, even in the great cities which rose in the new provinces, and the old state of things seems to have quickly been resumed in the desert, his legislation on this subject rendered orderly government among Arabs possible.

Next in importance to this is the abolition of infanticide, which is condemned even in early Suras of the Koran. The scanty notices which we have of the practice are not altogether consistent; at times we are told that it was confined to certain tribes, and consisted in the burying alive of infant daughters; at other times it is extended to a wider area, and said to have been carried out on males as well as females. After the taking of Mecca this prohibition was included among the conditions of Islam.

In the laws relating to women it seems likely that he regulated current

practice rather than introduced much that was actually new, though, as has been seen, he is credited with giving them the right to inherit property; the most precise legislation in the Koran deals with this subject, of which the main principle is that the

share of the male equals that of two females. Our ignorance of the precise nature of the marriage customs prevalent in Arabia at the rise of Islam renders it difficult to estimate the extent to which his laws on this subject were an improvement on what had been before. The pre-Islamic family, unless our records are wholly misleading, did not differ materially from the Islamic; in both polygamy and concubinage were recognized and normal; and it is uncertain that the text which is supposed to limit the number of wives to four was intended to have that meaning. The " condition of Islam " whereby adultery was forbidden is said to have been ridiculed at the time, on the ground that this practice had never been approved. Yet it would seem that certain forms of promiscuity had been tolerated, though the subject is obscure. Against these services we must set the abrogation of some valuable practices. His unfortunate essay in astronomy, whereby a calendar of twelve lunar months, bearing no relation to the seasons, was introduced, was in any case a retrograde step; but it appears to have been connected with the abrogation of the sanctity of the four months during which raiding had been forbidden in Arabia, which, as has been seen, he was the first to violate. He also, as has been noticed, permitted himself a slight amount of bloodshed in Mecca itself, and that city perhaps never quite recovered its sacrosanct character. Of more serious consequences for the development of the community was his encouragement of the shedding of kindred blood in the cause of Islam; the consequences of the abrogation of this taboo seem to have been felt for a great length of time. His assassinations of enemies were afterwards quoted as precedents in books of Tradition. No less unfortunate was the recognition of the principle whereby atonement could be made for oaths. On the question how far the seclusion of women was enjoined or countenanced by him different views have been held.

Besides the contemporary documents enumerated above (Koranic texts, rescripts and authentic traditions) many of the events were celebrated by poets, whose verses were ostensibly in- Sources corporated in the standard biography of Ibn Ishaq; in the abridgment of that biography which we possess many of these are obelized as spurious, and, indeed, what we know of the procedure of those who professed to collect early poetry gives us little confidence in the genuineness of such odes. A few, however, seem to stand criticism, and the diwan (or collection of poems) attributed to Hassan b. Thabit is ordinarily regarded as his. Though they rarely give detailed descriptions of events, their attestation is at times of value, e. g. for the story that the bodies of the slain at Badr were cast by the Prophet into a

pit. Besides this, the narratives of eyewitnesses of important events, or of those who had actually taken part in them, were eagerly sought by the second generation, and some of these were committed to writing well before the end of the 1st century. The practice instituted by the second Caliph, of assigning pensions proportioned to the length of time in which the recipient had been a member of the Islamic community, led to the compilation of certain rolls, and to the accurate preservation of the main sequence of events from the commencement of the mission, and for the detailed sequence after the Flight, which presently became an era (beginning with the first month of the year in which the Flight took place). The pro- cedure whereby the original dates of the events (so far as they were remembered) were translated into the Moslem calendar — for some- thing of this sort must have been done — is unknown, and is unlikely to have been scientific.

Mahomet's conduct being made the standard of right and wrong, there was little temptation to " whitewash " him, although the original biography by Ibn Ishaq appears to have contained details which the author of the abridgment omitted as scandalous. The preservation of so much that was historical left little room for the introduction of miraculous narrations; these therefore either belong to the obscure period of his life or can be easily eliminated ; thus the narratives of the Meccan council at which the assassination of Mahomet was decided, of the battles of Badr, Uhud and Ilonain, and the death of Sa'd b. Mu 'adh, would lose nothing by the omission of the angels and the devil, though a certain part is assigned the one or the other on all these occasions. We should have expected biographies which were published when the 'Abbasids were reigning to have falsified history for the purpose of glorifying 'Abbas, their progenitor ; the very small extent to which this expectation is justified is a remarkable testimony to their general trustworthiness. Relatives of the Prophet 1

*I. Family of ' Abd al-Mottalib, Mahomet's maternal grandfather: — *' Abbas (d. a.h. 32 or 34), *rlamza (d. a.h. 3) , 'Abdallah, father of the*

*1 * is prefixed to names which figure on occasions which seem to be historical. Female names are in italics.*

*Prophet, *Abu Talib (said to be named 'Abd Manaf), ? *Zubair, rjarith, Hajal, Moqawwam, Dirar, *Abu Lahab (said to be named 'Abd al-'Uzza, d. A.H. 2), *Safiyyah (d. A.H. 20), Umm Hakim, al- Baida, 'Atikah, Umaimah, Arwa, Barrah.*

*2. Family of Abu Talib :— *'Aqil (d. after A.H. 40), *Ja'far (d. A.H. 8), Talib, Tulaiq, ' All, the caliph, Umm Hani', Jumanah, Raifah.*

*3. Family of Mahomet. Wives: — *Khadija (Children: — Qasim; ? 'Abd Manaf (Tahir, Tayyib); *Zainab m. Abu'l-'As b. Rabi", d. A.H. 7; *Ruqayyah, m. 'Othman b. 'Affan, d. A.H. 2; *UmmKulthum m. 'Othman b. 'Affan; d. A.H. 9; *Fatimah, m. 'All, d. A.H. 11): *Saudah bint Zam'ah,? d. A.H. 54, *'A'ishah (Ayesha) bint Abl Bekr (d. A.H. 56), *Hafsa bint 'Omar (A. A.H. 45 or 47), *Zainab bint Khu- zaimah, d. before A.H. ii, *Zainab bint Jahsh, d. A.H. 20, *Umm Salimah, d. A.H. 59, *Maimunah, d. A.H. 38, *Juwairiyah, d. A.H. 56, *Umm Habibah Ramlah bint Abi Sofian, d. A.H. 44.*

*Concubines: — *Safiyyah bint Huyyay, d. A.H. 36, *Raihanah bint Zaid, *Mariyah the Copt, d. a.h. 15 or 16, mother of Ibrahim. (Other names given by Ibn Sa'd, vol. viii.)*

Chronological Table of Chief Events in the Life of Mahomet. 1 ? 570 Birth.

? 595 Marriage with Khadija. ? 610 Commencement of call. ? 613 Public appearance.

616 Persian conquest of the nearer East. ? 617 Flight of his followers to Abyssinia.

? 618-619 Siege in Mecca. Retractation and subsequent repudia- tion. Death of Abu Talib and Khadija. ? 620 Flight to Taif . 622 July 16. Beginning of the Moslem era.

Sept. 20. Arrival at Kuba after the Flight. 632 Jan. 27. Death of his son Ibrahim. 632 June 7. Death of Mahomet. The following dates are given by the Arabic historians according to their own calendar. For the reasons which have been seen it is impossible to obtain certain synchronisms.

a.h. 2. Rajab 1. Raid of 'Abdallah b. Jahsh to Nakhlah. Ramadan 19. Battle of Badr. Shawwal 15. Attack on the Banu Qainuqa.

3. Rabia I. 14. Assassination of Ka'b b. al-Ashraf. Shawwal 7. Battle of Uhud.

4. Saphar. Massacre of Mahomet's 70 missionaries at Bi'r

Ma'unah. Rabia I. Attack on the Banu Nadir. Dhu'l-Qa'da. Abortive raid called " the lesser Badr."

5. Shaaban 2. Attack on the Banu'l-Mustaliq (according

to Waqidi). Dhu'l-Qa'da. Battle of the Trench.

Massacre of the Banu Quraizah.

6. Jornada i. Capture of a caravan by Zaid b. rjarithah. Futile attempt to assassinate Abu Sofian. Dhu'l-Qa'da. Affair of Hodaibiyah.

7. Jornada i. Taking of Khaibar. Mission extended to

the world. Dhu'l-Qa'da. Pilgrimage to Mecca (called 'umrat al- qadiyyah) 8 Jomadai. Expedition to Mutah. Ramadan 20. Taking of Mecca. Shawwal. Battle of Honain. Attack on Ta'if. 9. Muharram. Tax-gatherers sent over Arabia. Rajab. Expedition to Tabuk.

Rival Mosque built at Kuba, destroyed on Mahomet's return to Medina. Dhu'l-rjijja. Pilgrimage conducted by Abu Bekr. Abolition of idolatry in Arabia.

10. Ramadan. Expedition of 'All to Yemen. Dhu'l-Qa'da. " Farewell Pilgrimage."

11. Saphar. Expedition ordered against the Byzantines.

■ *Companions of the Prophet. The sah&bah, as they are called, are the subject of a vast literature, and the biographical dictionaries devoted to them, of which the best known are the Usd ul-ghaba of the historian Ibn Athir and the Isabah of Ibn Hajar al-'Asqalani, enumerate many thousands. The follow- ing two lists are of special groups.*

(a) Naqibs, i.e. leaders selected by Mahomet from the Medinese tribes: i. Khazrajites :— As'ad b. Zurarah, Sa'd b. al-Rabi', •Abdallah b._ Rawabah, al-Bara' b. Ma'rur, 'Abdallah b. 'Amr b. Haram, 'Ubadah b. al-Samit, Sa'd b. 'Ubadah, al-Mondhir b. 'Amr; 11. Ausites: Usaid b. Hutfair, Sa'd b. Khaithamah, Rifa'ah b. 'Abd al-Mondhir.

(b) Commanders of Expeditions : names occurring in (a) are not repeated: 'Abdallah b. Jahsh, 'Abd ar- Rahman b. 'Auf, Abu Bekr, Abu Qatadah, Abu 'Ubaidah b. al-Jarrah, 'AH, 'Alqamah b. Mujaz- ziz, 'Amr b. al-'As (ibn el-Ass), Bashir b. Sa'd, Dahhak b. Sofian, Ghahb b. 'Abdallah, Ibn Abi'1-Auja, Ka'b b. 'Umair, Khalid b. al- Wahd, Kurz b. Jabir, Mart had b. Abi Marthad, Muhammad b.

1 Dates are given a.d.

Maslamah, Qutbah b. 'Amir, Sa'd b. Abi Waqqas, Sa'd d. Zaid, Sa ama b. 'Abd al-Asad, Shuja' b. Wahb, 'Ubaidah b. al-Harith, 'Ukkashah b.

Mihsan, 'Umar b. al-Khattab, Usamah b.' Zaid, 'Uyainah b. Hisn, Zaid b. rjarithah.

Authorities.— The biography of Ibn Ishaq was before the world long before the two chief causes for the falsification of tradition had begun to have serious effects; these were the need for legal pre- cedents, and the concept of saintliness, combining those of asceticism and thaumaturgy. These gave rise to the classical works on the Evidences of Mohammed's Mission by Abu Nu'aim (d. a.d. 1012-1013) and BaihaqI (d. a.d. 1066).

Lives of the Prophet (j indicates that the work is lost) ; fUrwah b. Zubair (d. 712-713) ■ tMusa b. 'Ukbah (d. 758-759) ; fMohammed b. Ishaq (d. 768); Mohammed b. Hisham (d. 828-829), ed. Wustenfeld (Gottingen, i860) ; reprinted in Egypt by Zubair Pasha, a series of excerpts from the last; Mohammed b. Omar al- Waqidi (d. 823) portion published by Kremer (Calcutta, 1855), abridged trans, of a fuller copy by Wellhausen, Muhammad in Medina (Berlin, 1882); Mohammed b. Sa'd (d. 844-845), an encyclopaedic work on the history ot Mahomet and his followers, called Tabaqat, ed. Sachau and others (Berlin, foil.) ; Mohammed b. Jarir al-Tabari (see Tabari). Many more writers on this subject are enumerated in the Fihrist, cf Sprenger's Leben Muhammads, iii. 54-76.

Among the most popular compilers of later times are: Ibn al- Athir (q.v.) al Jazari, the historian (d. 1233) ; Ahmad b. Ali al Kasta- lani (d. a.d. 1517), whose al-Mawahib al-Laduniyyah was published with commentary (Cairo, 1278) ; rjosain b. Mohammed al Diyarbakri (d. 1574) whose work Ta'rikh al-Khamis was published in Cairo a.h. 1382; 'Ali b. Burhan al-din al-rjalabl (d. a.d. 1634), whose biography called Insan al-'uyun was published in Cairo, a.h. 1292. I o these must be added all the collections of Tradition.

Modern Authorities.— The critical study of the Life of Mahomet be- gins in Europe with the publication by Th. Gagnier in 1723 of the Life by Abulfeda (q.v.). Presently there appeared an apologetic biography b Y.™" n Cmte. de Boulainvilliers (2nd ed., Amsterdam, 1731), to which Gagnier replied in 1732 (LaVie de Mahomet, traduite, &c. ibid.). I he next considerable advance in the treatment of the subject is marked by the biography of G. Weil (Muhammed der Prophet, Stuttgart 1843), which is wholly without religious bias; the popular life by Washington Irving (London, 1849) is based on this. That by J . L. Merrick (the Life and Religion of Mohammed, Boston, U.S.A., 1850) rests on Shi'ite sources. The search for MSS. in India con- ducted by A Sprenger led to the discovery of fresh material, which was utilized by Sprenger himself in his unfinished Life of Mohammad (ft. 1, Allahabad, 1851), and his more elaborate Das Leben und die Lehre des Mohammad (Berlin, 1861-1865), and by Sir William

Muir in his Life of Mahomet, London, 1858-1861) 4 vols.: afterwards abridged in one volume and reprinted. These are still the standard treatises on the subject ; the pro-Christian bias of Muir is very marked, while Sprenger has hazarded numerous conjectures on subjects with which he had little familiarity. The biography by S. W. Koelle, Mohammed and Mohammedanism (London, 1889), is pro- Chnstian, the popular work of Syed Ameer Ali The Spirit of Islam, (London, 1896) an apology for Mahommedanism. Later treatises, resting on original authorities, are those by H. Grimme Mohamed, (Munster, 1892, and Munich, 1904), F. Buhl, Mohameds Liv (Copen- hagen, 1903— Danish : since translated into German), D. S. Margoli- outh Mohammed and the Rise of Islam (N.Y., 1905, &c), and Prince Caetani Annah del Islam, i. ii. (Milan, 1 905-1907). For the direction of public opinion in Mahomet's favour the Lecture on The Hero as Prophet in Carlyle's Heroes and Hero-worship (London, 1846) was singularly effective; his views were enforced by R. Bosworth Smith Mohammed and Mohammedanism, (London, 1873, &c.) A some- what similar line was taken in France by J. Barthelemy Saint-Hilaire, Mahomet et le Coran, (Paris, 1865), while the Vie de Mahomet d apres la Tradition of E. Lamairesse and G. Dujarric (Paris 1897) is written entirely from the Moslem standpoint.

See further Caliphate, ad init.; Mahommedan Institutions- Mahommedan Law; MXhommedan Religion. (D. S. M.) '*

MAHOMMED AHMED IBN SEYYID ABDULLAH (1848-1885), Sudanese tyrant, known as " the Mahdi," was born in Dongola. His family, known as excellent boat-builders, claimed to be Ashraf (or Sherifs), i.e. descendants of Mahomet. His father was a fiki or religious teacher, and Mahommed Ahmed devoted himself early to religious studies. When about twenty years old he went to live on Abba Island on the White Nile about 150 m. above Khartum. He first acquired fame by a quarrel with the head of the brotherhood which he had joined, Mahommed asser- ting that his master condoned transgression of the divine law. After this incident many dervishes ' (religious mendicants) gathered round the young sheikh, whose reputation for sanctity speedily grew. He travelled secretly through Kordofan, where (with ample justification) he denounced to the villagers the extor- tion of the tax-gatherer and told of the coming of the mahdi who should deliver them from the oppressor. He also wrote a

pamphlet summoning true believers to purify their religion from the defilements of the " Turks " i.e. the Egyptian officials and all non-native

inhabitants of the Sudan. The influence he gained at length aroused the anxiety of the authorities, and in May 1 88 1 a certain Abu Saud, a notorious scoundrel, was sent to Abba Island to bring the sheikh to Khartum. Abu Saud's mission failed, and Mahommed Ahmed no longer hesitated to call himself al-Mahdi al Montasir, " The Expected Guide." In August he defeated another force sent to Abba Island to arrest him, but thereafter deemed it prudent to retire to Jebel Gedir, in the Nuba country south of Kordofan, where he was soon at the head of a powerful force; and 6000 Egyptian troops under Yusef' Pasha, advancing from Fashoda, were nearly annihilated in June 1882. By the end of 1882 the whole of the Sudan south of Khartum was in rebellion, with the exception of the Bahr-el- Ghazal and the Equatorial Provinces. In January 1883 El Obeid, the capital of Kordofan, was captured. In the November following Hicks Pasha's force of 10,000 men was destroyed at Kashgil, and in the same year the mahdi's lieutenant, Osman Digna, raised the tribes in the eastern Sudan, and besieged Sinkat and Tokar, near Suakin, routing General Valentine Baker's force of 2500 men at El Teb in February 1884. The operations undertaken by Great Britain in face of this state of affairs are narrated under Egypt: Military Operations. It need only be added that General Gordon (q.v.) was besieged at Khartum by the mahdi and was killed there when the town was captured by the mahdists on the 25th-26th of January 1885. The mahdi himself died at Omdurman a few months later (June 22, 1885), and was succeeded in power by his khalifa Abdullah.

When he announced his divine mission Mahommed Ahmed adopted the Shi'ite traditions concerning the mahdi, and thus put himself in opposition to the sultan of Turkey as the only true commander of the faithful. To emphasize his position the mahdi struck coins in his own name and set himself to suppress all customs introduced by the " Turks." His social and religious reforms are contained in various proclamations, one of which is drawn up in the form of ten commandments. They concern, chiefly, such matters as ritual, prayers, soberness in food and raiment, the cost of marriage and the behaviour of women. How far the mahdi was the controller of the movement which he started cannot be known, but from the outset of his public career his right-hand man was a Baggara tribesman named Abdullah (the khalifa), who became his successor, and after his flight to Jebel Gedir the mahdi was largely dependent for his support on Baggara sheikhs, who gratified one of his leading tastes by giving him numbers of their young women. In the few months between the fall of Khartum and his death the mahdi, relieved from the incessant strain of toil, copied in his private life all the vices of Oriental despots while maintaining in public the austerity he demanded of his followers. His death is variously attributed to disease and to poisoning by a woman of his harem. On

the occupation of Omdurman by the British (Sept. 1808) the mahdi's tomb was destroyed, his body burnt and the ashes thrown into the Nile (see Sudan: Anglo- Egyptian).

See Mahdiism and the Egyptian Sudan by F. R. Wingate (1891); Ten Years' Captivity in the Mahdi's Camp (1882-1892) from the MS. of Father Joseph Ohrwalder by F. R. Wingate (1892) and Fire and Sword in the Sudan (1879-1895) by Slatin Pasha (trans. F. R. Wingate, 1896). Both Ohrwalder and Slatin were personally acquainted with the mahdi, and their narratives contain much first-hand information. Wingate prints many translations of the proclamations and correspondence of the mahdi.

MAHOMMEDAN INSTITUTIONS. Of all the institutions of Islam the caliphate is the oldest, the most fundamental, and in essence the most enduring. For its history see Caliphate; the present subject is its origin and nature. Mahomet enjoyed absolute rule over his people as a divinely inspired and guided prophet. He led the public prayers; he acted as judge; he ruled. If he consulted with others or paid attention to public feeling or local usage, it was as a matter of policy; the ultimate decision lay with himself. He was the state. On his death a leader was put in his place of similar authority, though without

the divine prophetic guidance. He was called the " successor " {khalifa, caliph) of the Prophet, later also the amir-al-mu'minin, commander of the faithful, and was elected by the The Call- Moslems, just as the Arab tribes had always elected pbate. their chiefs. He was thus an absolute ruler, but was democrati- cally elected; and such is the essence of the caliphate among Sunnite Moslems to this day. For them it has been a matter of agreement (see Mahommedan Law) from the earliest times that the Moslem community must appoint such a leader (see Imam). The Shi'ites, on the other hand, hold that the appoint- ment lies with God, and that God always has appointed, though his appointment may not always have been known and accepted. Their position may be called a legitimist one. Some few hereti- cal sects have held that the necessity of a leader was based on reason, not on the agreement of the community. But, for all, the rule of the leader thus appointed is absolute, and all authority ■ is delegated from him and, in theory, can be resumed by him at any time. Just as God can require unreasoning obedience from his creatures (his " slaves " in Arabic), so can the caliph, his representative on earth.

But Abu Bekr, the first caliph, nominated his successor, Omar, and that nomination was accepted and confirmed by the people. So a second precedent was fixed, which was again carried a step farther, when Moawiya I., the first Omayyad caliph, nominated his son, Yazid I., as his successor, and caused an oath of allegiance to be taken to him. The hereditary principle was thus introduced, though some relics of the form of election persisted and still persist. The true election possible in the early days of the small community at Medina became first a formal acceptance by the populace of the capital; then an assertion, by the palace guard, of their power; and now, in the investiture of the sultans of the Ottoman Turks, who claim the caliphate, a formal ceremony by the 'ulema (q.v.) of Constanti- nople. The Ottoman claim is based on an asserted nomination by the last Abbasid, who died in exile in Egypt in 1538, of the Ottoman sultan, Suleiman the Great, as his successor. Such a nomination in itself was a perfectly legal act, but in this case had a fatal flaw. It is an absolute condition, laid down in tradition, that the caliph must be of the tribe of Koreish (Quraish), that of the Prophet.

The duties of this democratically elected autocrat are, in theory, generally stated as follows. He shall enforce legal decisions and maintain the divinely revealed restrictive ordi- nances; guard the frontiers and equip armies; receive the alms; put down robberies, thieving, highwaymen; maintain the Friday services and the festivals; decide disputes and receive evidence bearing on legal claims; marry minors, male and female, who have no guardians; divide booty. He must be a free, male, adult Moslem; must have administrative ability; must be an effective governor and do justice to the wronged. So long as he fulfils these conditions he is to be absolutely obeyed; private immorality or even tyranny are not grounds for deposing him. This is a position reached by Islam practically. But a caliph who openly denied the faith would be as impossible as an un- believing pope. The caliph, therefore, is the highest executive officer of a system assumed to be definite and fixed. He, in a word, administers Islam ; and the content of Islam is determined by the agreement of the Moslem people, expressed immediately through the 'ulema, and ultimately, if indirectly and half-consciously, by the people. To depose him a fatwa (see Mufti) would be required — in Turkey from the Sheikh-ul-Islam — that he had violated some essential of the Moslem faith, and no longer fulfilled the conditions of a caliph.

But it was impossible for the caliph personally to administer the affairs of the empire, and by degrees the supreme office was gradually put into commission, until the caliph himself _. became a mere figurehead, and vanished into the sacred DJwSns seclusion of his palace. The history of the creation of government bureaus (diwdns; see Divan) must therefore now be

sketched. The first need which appeared was that of a means of regulating and administering the system of taxation and the revenues of the state. Immense sums flowed into Medina from the Arab conquests; the surplus, after the require- ments of the state were met, was distributed among the believers.

All Moslems had a right to a certain share of this? which was regarded as booty. Omar, the second caliph, regulated this dis- tribution and also the system of taxation, and the result was the first divan and the constitution of Omar, looked back to now by all Sunnite Moslems as an ideal. The sources of revenue were (i) the poor-rate (zakat), a tithe paid by every Moslem; (ii) the fifth of all booty; (iii) the poll-tax (jizya) on non-Moslems; and (iv) the land- tax (khardj) also on non-Moslems. Thus the constitution determined the position of all non-Moslems in a Moslem state. The ideal was that the Moslems should be kept apart as a superior, fighting caste, and that the non-Moslems should support them (cf. Caliphate, B. § 8, on the reign of Omar II.). The Moslems, therefore, were for- bidden to acquire land in conquered countries. The non-Moslems must retain their lands, cultivate them and pay the land-tax (the Arabic word is also used of revenue from the work of a slave) and the poll-tax (the Arabic word means also " ransom "), and give contributions in kind to support the local Moslem garrisons which were massed in great camp-cities at strategic points. If a non- Moslem embraced Islam he entered the ruling caste; his land was distributed among his non-Moslem fellows, and he no longer paid the land-tax but rather received support from the public funds. The amount of these pensions varied with the standing of the pensioner from 10,000 dirhems (a dirhem equalled about a franc) to the widows and relations of the Prophet down to 300. This bureau had, therefore, not only to keep the books of the state, but also to maintain a list of all Moslems, classified genealogically and socially. Its registers were kept by Greeks, Copts and Persians; the Arabs, it may be said in general, adopted the method of ad- ministration which they found in the captured countries and drew upon the trained services of their inhabitants.

Such a system led naturally to wholesale conversions to Islam ; and the consequent decline in revenue, combined with large dona- tions of lands by Othman, the third caliph, to his own family, gradually broke it down. The first patriarchal period of conquest, unearned wealth and the simple life — called by Moslems the period of the " four rightly guided caliphs," and very happily by Sachau, ein mbnchisches Imperium — passed rapidly into the genuinely Arab empire of the Omayyads, with whom came an immediate

develop- ment of organization in the state. The constructive genius in this was Moawiya, the first Omayyad caliph. Under him the old sim- plicity vanished. A splendid and ceremonious court was maintained at Damascus. A chamberlain kept the door; a bodyguard sur- rounded the caliph, and even in the mosque the caliph, warned by the-murder of Othman and of Ali, prayed in a railed-off enclosure. The beginning of the seclusion of the caliph had come, and he no longer walked familiarly among his fellow Moslems. This seclusion increased still further when the administration of the state passed by delegation into other hands, and the caliph himself became a sacro- sanct figure-head, as in the case of the later Abbasids; when theories of semi-divine nature and of theocratic rule appeared, as in the case of the Fatimites ; and finally when all the elaborate court ritual of Byzantium was inherited by the Ottoman sultans.

But Moawiya I. was still a very direct and personal ruler. He developed a post-system for the carrying of government despatches by relays, and thus received secret information from and kept control of the most distant provinces. He established a sealing- bureau by which state papers were secured against change. He dealt arbitrarily with the revenues of the state and the pensions of the Moslems. Governors of provinces were given a much freer hand, and were required to turn over to the central treasury their surplus revenue only. As they were either conquerors or direct successors of conquerors they had an essentially military govern- ment, and were really semi-independent rulers, unhampered except by direct action of the caliph, acting on information sent by the post- master, who was his local spy. Being thus the heads of armies of occupation, they were not necessarily charged with the control of religious ritual and of justice. These, like every other function, inhered in the office of the caliph and he generally appointed in each province independent cadis over the courts and imams to be in charge of religious services. Yet the governor was sometimes per- mitted to hold these two other offices (see Cadi ; Imam).

Further administrative developments came with the Abbasids. They created a new city, Bagdad, between the Tigris and the Euphrates, where the three races, Syrian, Arab and Persian, met and sought with Bagdad as a capital to consolidate the empire. The Arab empire, it is true, had passed away with the Omayyads; yet there might be a chance to create a world-empire of all the Moslem peoples. But not even the genius and administrative skill of the early Abbasids could hold together that unwieldy mass. The semi-independent provinces soon became fully independent, or at most acknowledged the caliph as a spiritual head and paid a nominal tribute. His name might stand on the coinage and prayers be offered for him in the Friday service, the two signs of sovereignty to this day in Islam. With this crumbling of the empire went a more elaborate organization;

bureaus took the place of principles and of the energy of indi- vidual rulers. As the system of Moslem law was built on that of the Roman codes, so was the machinery of administration on that of Persia. And with the Abbasids the chance of the Persians had come. Abu '1-Abbas, the first Abbasid caliph, was the first to appoint a vizier (wazir, " helper," so Aaron is The wazir to Moses in the Koran), a confidential minister vizierate. to advise him and come between him and the people. Advisers the caliphs had had before; but not a definite adviser with this name. He must, we are told, have a strain of the ruler in him and a strain of the people to be able to work with both. He must know how to be acceptable; fidelity and truthfulness are his capital; sagacity, firmness, generosity, clemency, dignity, effec- tiveness of speech are essential. It is plain that the vizier became as important as the caliph. But Abu '1-Abbas was fortunate in early securing as his vizier the grandfather of the house of the Barmecides (q.v.). On this Persian family the fortunes of the Abbasids hung, and it secured for them and for Islam a short golden age, like that of the Antonines, until the jealous madness of Harun al-Rashld cast them down. Thereafter the vizierate had many vicissitudes. Technically a vizier could be either limited or unlimited. The limited vizier had no initiative; he carried out the commands of the caliph. The unlimited vizier, often afterwards called the grand vizier, exercised full authority and was the alter ego of the caliph, to whom he was required only to report. Naturally the formal distinction is a later theorizing of history; for a weak ruler his vizier became absolute, for a strong ruler his vizier remained subordinate. Here, as with regard to all Moslem institutions, a marked distinction must be made between the historic facts and the speculative edifices raised by constitutional theorizers. Compare especially Mahommedan Law. Until the time of Radi (934-940) the vizierate thus fluctuated in importance. In that caliphate the vizier lost all authority, and in his place came the amir al-omara — equivalent to the major domus of the Franks — the head of the Turkish bodyguard, in terror of whom the caliph now stood. When in 945 the Buyids captured Bagdad and the caliph became a purely spiritual sovereign, they took the title " vizier " for their own chief minister, and the caliphs retained only a secre- tary (see Caliphate, C. § 22). Under the Seljuks, however, they regained their viziers and some real authority. Elsewhere, also the vizierate had its vicissitudes. Under the Mamelukes the vizier fell to be merely the court purveyor. Under the Omayyads of Spain the title was given to several responsible officers of the state, but their chief was called hdjib, chamberlain. Under the Almohades the chamberlain was called vizier. In the modern Turkish empire the grand vizier (called generally sadr A\am) is the sultan's representative in secular matters, and nominally stands between the sovereign, and all the other offi- cials. He is the president of the council of ministers, but Abd-ul Hamid II. deprived the office of almost all its importance.

*Under the early Abbasids the four most important ministers were the chief cadi, the chief of police or head of the life guards, the minister of finance and the postmaster, who was the head of the system of information and espionage which ott * er covered the empire. But at different times the different Jttialsters – bureaus varied greatly. Under Motawakkil we find the bureau of taxes and finance; bureau of the crown estates; bureau of state book-keeping; bureau of war, i.e. of hired troops; bureau which kept reckoning and control of the pensions of the clients and slaves of the ruling family; bureau of the post system; bureau of expenditures. But in spite of this elaborate system, no Moslem government has, except sporadically, been highly centralized. Pro- vided the taxes are paid, a large measure of local autonomy has always been enjoyed by the country districts. Under the Abbasids almost the only exception was the necessarily centralized control of the irrigation system of the Tigris and Euphrates. And similarly elsewhere.*

In the case of all these offices, we have delegation by the caliph, under necessity, of his too heavy burdens. But one duty of an Oriental ruler he could not so easily lay aside. It had always to be possible for the oppressed to come into his presence and claim justice ; he must sit in the gate and judge. Therefore, when the caliph found it necessary to delegate the ordinary administration of justice, he found it also necessary to set up a special court of oppressions, which developed, to a certain extent, into a court of appeals. The first to establish such a separate court was Abdal-malik the Omayyad

(685-705), and his example was followed by the more vigorous of the caliphs up to the time of Mohtadi the Abbasid (869-870). If any other than the caliph presided over this court it had to be a man whose dignity, independence and authority commanded respect. He was not bound by strict rules of evidence, method and literal appli- cation of law as was the cadi. Rather, he applied a system of equity suited to the absolute source of authority which he represented.

As the chief of police, mentioned above, was rather the head of the caliph's bodyguard, there was also a police system after our ideas, but more thoroughgoing. The muhtasib had charge in the broadest sense of public order and morals in the streets, and had oversight as to weights, measures and adulterations; but had no right to interfere privately or enter houses save in the clearest and most necessary cases. He had a summary jurisdiction in all minor cases where no trial was necessary ; but where

witnesses and oaths entered the case must go to the cadi. Slaves and beasts of burden were under his guardian- ship ; he prevented public scandals, such as the sale of wine ; he regu- lated the public conduct of Jews and Christians. In the interest of public morals he had to find suitable husbands for widows and see that they did not marry before the legal time; questions of paternity also he had to investigate. The outdoor costume of the people he could regulate. It should, of course, be remembered that the canon law of Islam covers minutely all sides of life (see Mahom- medan Law).

It is impossible in Islam to separate logically from the mass of institutions those which we should call religious, as Islam on all sides is for the Moslem equally religious. But perhaps the following may practically be separated under that rubric. Islam, runs a tradition, is built on five things: testimony that there is no god save Allah, and that Mahomet is the apostle of Allah; prayer; the poor-rate; pilgrimage; fasting. For these see Mahommedan Religion.

The law and usage of religious foundations in perpetuity (waqf, mortmain) became as important in Islam as monastic endowments in medieval Europe, and such foundations tended similarly to absorb the greater part of the national wealth. It was the only safe way of providing for posterity. A pious foundation could be erected in such a way that cither so much from its funds would be paid yearly in perpetuity to the descendants of the erector, or those descendants would be employed as officials of the foundation.

When it became impossible for the caliph to lead the people personally in prayer in the mosque, he delegated that part of his The Imam duties to another, hence called imam (q.v.). Naturally, ‘ then, the appointment of the imam would lie with the supreme ruler. This holds of the daily prayers in the principal mosque (al-masjid al-jami’) supported by the ruler where the Friday service is held, but in the separate smaller mosques built by each community the community chooses its own imam. With regard to the Friday service, the schools of law disagree as to the necessity of the presence of an imam appointed by the chief ruler. But the imam should certainly make mention of the ruler in his sermon and pray for him. At the occasional prayers, such as those for rain, &c, the presence of an imam appointed by the ruler is not necessary. The imam appoints the muaddhin, the announcer of the hour of prayer from the minaret, and both have a claim on the state treasury.

Another office exercised when possible by the caliph, but very frequently delegated to some high dignitary, such as the heir to the caliphate or a prince, was the leadership of the pilgrimage caravan to Mecca and back. Sometimes this official, called amlr-al-jiajj , was appointed imam as well. He then led all the pilgrimage ceremonies at Mecca. When outside of towns

where there was a cadi he exercised also over the caravan the rights of a judge.

Mahommedan law (q.v.) is treated separately. Here, again, as judging is a duty of the caliph, a cadi is the delegate, or, when ap- The Cadi P omte d by a vizier or governor, a delegate of his delegate. He examines into disputes brought before him and enforces his judgments, he names administrators of the estates of minors, the insane, &c; he supervises the waqf property of mosques and schools in his district and inspects highways and public buildings ; he watches over the execution of wills; he inflicts the due legal penalties for apostasy, neglect of religious duties, refusal to pay taxes, theft, adultery, outrages, murder; he can inflict the penalties of imprisonment, fine, corporal punishment, death ; if there is no imam, he can perform his duty, as in fact can anyone who has the requisite knowledge. But it should be noticed that all this holds only of the un-europeanized Moslem state.

For the existence of an army in Islam, there are two grounds, the holy war (jihad, q.v.) against unbelievers without the state and the suppression of rebellion within. Under the ordinance of Omar the entire community was pre- served and used as a weapon for the subduing of the world to Islam, and every able-bodied male Moslem was theoretically a fighting man, part of the national militia. This army was divided into corps situated in the conquered lands, as armies of occupation, where they eventually came to form military

The Army.

colonies in great camp-cities. The occupied countries had to support them, and they were bound to render military service at any time. But as the ideal of Omar broke down before facts the use of mercenary and slave troops finally increased; although there has always continued in Moslem armies acting against unbelievers a proportion of volunteers not paid a fixed wage but subsidized by the state from the poor-rate and alms funds. The generals were appointed by the caliph, and had either unlimited authority to act as his representatives, concluding peace, acting as cadi and imam, distributing booty; or were restricted within limits, e.g. to simple leading of the troops and carrying on military operations. They, in turn, appointed their subordinates; this principle of giving a head full powers and full responsibility was very generally applied in Islam. It was controlled of course by the espionage of the postal system. As war by a Moslem power is essentially sacred war, the regulations of jihad must be considered here. Unbelievers must first be invited to embrace Islam and, if they follow a sacred book and are not idol-worshippers, are given a choice between (a) becoming Moslems; or (b) submitting to the Moslems and entering on a

treaty with them of protection and tribute; or © fighting. If they accept Islam, their lives, families and property are secure, and they form henceforth part of the Moslem community. The ability of Islam to create a common feeling between highly different races is one of its most striking features. If they submit and enter on treaty relations, they pay a poll-tax, for which their personal safety is assured, and assume a definitely inferior status, having no technical citizenship in the state, only the condition of protected clients (dhimmis). If they elect to fight, the door of repentance is open, even when the armies are face to face. But after defeat their lives are forfeit, their families are liable to slavery, and all their goods to seizure. It is open to the sovereign either to put them to death; or to enslave them; or to give them their liberty; or to exchange them for ransom or against Moslem prisoners. The sovereign will choose that which is best for Islam. As for their families and wealth, the sovereign can release them only with consent of the army that has captured them. Apostates must be put to death. Four- fifths of the booty after a battle goes to the conquering army. The technical art of war seems to have been little studied among Moslems; they have treatises on archery but very little upon tactics. Their writers recognize, however, the essential difference between the European and Persian methods of charging in solid lines and holding the ground stubbornly, and the Arab and Berber method of flying attacks and retreats by clouds of cavalry. Therefore, one explained, the custom grew of using a mass of European mercenaries as a fixed nucleus and rallying- point. The early Moslem armies, too, had used the solid, unyielding charge, which may have been the secret of their success. For one of the greatest puzzles of history is the cause which changed the erratic, untrustworthy swarms of Arab horsemen with their childish strategy into the ever-victorious legions of the first caliphs. They certainly learned rapidly. Byzantium and Persia taught them the use of military engines and the entrenched camp. Before that they had been, at the best, single knights with mail-shirt, helmet, sword and lance. Bowmen, too, they used, but the principal use of the bow seems to have come with the Turks.

The glory of Moslem education was its university system, which fed the higher learning and did not serve every-day needs. Its primary system was very poor, almost non-existent; g. .. and technical education has never been recognized in uca Islam. Primary teachers were despised as ignorant and foolish. Apparently, if we may trust the many stories of how ignorant men set up for themselves, there was no control of them by the state. Their pupils were young only; they taught the rudiments of reading, Koran, catechism, prayer, writing and arithmetic, but very little of the latter. Technical education was given by the gilds through their apprentice system, teaching mechanical arts and crafts. This was genuine instruction, but was not so regarded; it was looked upon rather as are the mysteries and secrets

of operative masonry. It produced artisans of independent character, but not artists. Thus there was no distinction between architect and builder ; there was no sculpture; and painting, so far as it went, was like carving, a craft. All Moslem university education, like all Moslem

science, revolved round theology. There were, apparently, only two outstanding exceptions to this rule, the academy of Maraun (813- 833) at Bagdad, and the hall of wisdom of the Fatimites at Cairo (1004-1171); both of these are explained by their environment. From the earliest times, independent scholars instructed classes in mosques — the common places of meeting .for the community — and gave their pupils personal certificates. Their subjects were the reading and interpretation of the Koran; the body of tradi- tions from the Prophet ; the thence deduced system of theology ; the canon law. But the interpretation of the Koran involved grammatical and lexicographical studies of early Arabic, and hence of the early Arabic literature. Theology came to involve meta- physical and logical studies. Canon law required arithmetic and mensuration, practical astronomy, &c. But these last were strictly ancillary; the object of the instruction was primarily to give know- ledge of value for the life of the next world, and, secondarily, to turn out theologians and lawyers. Medicine was in Jewish and Christian hands; engineering, architecture, &c, with their mathematical bases, were crafts. Then this instruction was gradually subsidized and organized by the state, or endowed by individuals. How early this took place is uncertain. But the individual teacher, with his certificate, remained the object of the student; there was nothing corresponding to our general degrees. Thirdly, educational institu- tions came to be equipped with scholarships of money or in kind for the students. The first instance of this is generally ascribed to Nishapur (Naisabur) in 1066; but it soon became general in the system and afforded a means of control and centralization. A final, and most important, characteristic was the wide journeying of the students " in search of knowledge." Aided by Arabic as the univer- sal language of learning, students journeyed from teacher to teacher, and from Samarkand to the Atlantic, gathering on their way hundreds of personal certificates. Scholars were thus kept in touch all over the Moslem world, and intellectual unity was maintained.

To the democratic equality of Islam, in which the slave of to-day may be the prime minister of to-morrow, there is one outstanding exception. The

descendants of the Prophet and of his relatives (the family of Hashim) formed and form a special class, held in social reverence, and guarded from contamination and injury. These are the sayyids (lords), and genealogical registers of them are carefully preserved. They are of all degrees of wealth and poverty, but are guarded legally from mesalliances with persons of ignoble origin or equivocal occupation. Their influence is very great, and in some parts of the Moslem world they have the standing and reverence of saints.

See Von Kremer, Culturgeschichte des Orients, based largely on Mawardi's Ahkam, trans, in part by Ostrorog; McG. de Slane's trans, of Ibn Khaldun, Prolegomenes; Lane, Manners and Customs of the Modern Egyptians; R. F. Burton, Pilgrimage to Mekka; Snouck Hurgronje, Mekka; Hughes, Dictionary of Islarm; Juynboll, De Mohammedaansche Wet; Macdonald, Development of Muslim Theology, &c. For women in Islam, see Harem. (D. B. Ma.)

MAHOMMEDAN LAW. The legal situation in the Moslem world is of the highest complexity, and can be made intelligible only by tracing its historical development. First came the system (fiqh, sharia) which takes the place in Islam of canon law in Roman Christendom. It begins with Mahomet sitting as judge over the primitive Moslem community at Medina. He was the Prophet of God, and judged, as he ruled, absolutely; any decision of his was valid. But he found it, in general, advisable and fitting to follow the local law or usage of Medina when the new faith did not require a change. It thus came about that his decisions followed, at one time, the usage of the Arab tribes of Medina; at another, the law respected by the Jewish tribes there— a rabbinic development of the law of Moses, deeply affected by Roman law; at another, the more developed commercial law of Mecca, known to his followers who had fled thence with him; or, finally, his own personal judgment, stated it might be as his own sense of right or as the decision of Allah and even incorporated in the Koran. In his use of these he was an eclectic opportunist, and evidently, except as regards such frequently recurring subjects as inheritance, marriage, &c, had no thought of building up a system or code. At his death he left behind only a few specific prescriptions in the Koran and a mass of recorded decisions of cases that had come before him. He had used himself, in our terms, common law, equity, legisla- tion; to guide his followers he left his legislative enactments and the record of his use of common law. Since his death there has been no new legislation in orthodox Islam.

With the death of Mahomet began the development and codification of Moslem law. It was at first entirely practical. Cases had to be decided, and to decide them there was, first, the Koran; secondly, if nothing ad rem was found in the Koran, there were the decisions of the Prophet; thirdly, if these

failed, there was the common law of Medina; and, fourthly, if it, in turn, failed, the common sense of the judge, or equity. A knowledge of the decisions of Mahomet came thus to be of great importance, and records of such decisions were eagerly sought and preserved. But this was simply a part of a much wider movement and tendency. As among primitive peoples in general, custom and usage have always been potent among the Arabs. The ways of the fathers, the old paths, they love to tread. Very early there arose a special reverence for the path and usage {sunna) of Mahomet. Whatever he did or said, or left unsaid or undone, and how he did it, has become of the first importance to the pious Moslem, who would act in every way as did the Prophet. There is evidence that for this purpose the immediate companions of Mahomet took notes, either in memory or in writing, of his table talk and wise sayings, just as they took down or learned by heart for their private use the separate fragments of the Koran. His sayings and doings, manners and customs, his answers to questions on religious life and faith, above all his decisions in legal disputes, came to be recorded on odd sheets in private notebooks. This was the beginning of the enormous literature of traditions ihadith) in Islam. The collecting and preserving of these, which was at first private, for personal guidance and edification, finally became one of the most powerful weapons of political and theological propaganda, and coloured the whole method and fabric of Moslem thought. All knowledge tended to be expressed in that form, and each element of it to be traced back to, and given in the words of, some master or other through a chain of transmitters. Above all there grew up an enormous mass of evidently forged sayings put into the mouth of Mahomet. At every important political or theological crisis each party would invent and put into circu- lation a tradition from him, supporting its view. By a study of these flatly opposed " sayings " it is possible to reconstruct the different controversies of Islam in the past, and to discover what each party regarded as the essence of its position.

The first collecting of traditions was for private purposes, and the first publication dealing with them was legal. This was the Muwaffa' of Malik ibn Anas (d. 795), a corpus juris based partly on traditions, and a protest in its methods against the too speculative character of the books of canon law which preceded it. Thereafter came collec- tions of two different types. The earlier kind was arranged accord- ing to the companions of Mahomet, on whose authority the traditions were transmitted ; after each companion came the traditions going back to him. The best known example of this kind is the Musnad of Ahmad ibn Hanbal. The other kind, called Musannaf (classified), contains traditions arranged in chapters according to their subject matter. That of Bukhari is the most famous, and is arranged to give a traditional basis for a complete system of canon law; its rubrics are those of such a system. Another is that of Muslim ibn al-Hajjaj,

who paid less atteption to legal aspects and more to minute accuracy. There are many others of more or less acceptance and canonicity. Bukhara's book enjoys a reverence only second to that of the Koran. But in all these publications the primary object was to purify the mass of traditions of forged accretions and to give to the believer a sound basis for his knowledge of the usages of the Prophet, whether for his personal or for public use. These two kinds were a natural development. In the Moslem community there were from the first students of tradition proper whose interest lay in col- lecting, testing and transmitting, not in combining, systematizing and elucidating; whose preference was to take a single statement from the Prophet and apply it to a case, without reasonings or questionings. And there were students of canon law who were interested rather in the system and results, and who, while they used traditions, used them only to an end and insisted on the free applica- tion of speculative principles. The conflict of the future was to be between these traditionalists, on the one hand, and rationalists, on the other ; and the result was to be a compromise.

With the wide sweep of Moslem conquest another element came into the development. This was Roman law, which the Moslem jurist found at work in the conquered Roman provinces and in the law courts of which they went to school. It is to be remembered that the Arab armies were not devastating hordes; they recognized the need of law and order wherever

tney went, and it was the policy of their leaders to take over the administrative systems of the countries which they seized. Even the Arabic legal nomenclature shows evident signs of literal translation from Latin, and many Moslem principles can be traced to the Roman codes. One important development was plainly influenced by the liberty involved in the Responsa prudentium of Roman lawyers, and by the broad conception of the law of nature in the Edict of the Praetor. In its earliest stages Moslem law recognized in the judge a liberty of opinion (ra'y) which went beyond even that of the Responsa and became plain equity, in the English sense, and one school (the Hanifite) established as a basis the right of preference (islihsdn) even when the analogy of the code dictated otherwise; while another (the Malikite) used the term istisldh, "a seeking of (general) benefit" to the community, in a similar situation. But these develop- ments were bitterly contested, and the liberty of opinion was in the end narrowed down to a principle of analogy (qiyds), the nearest approach to which in Western law is legal fiction.

It is necessary now to return to the first successors of Mahomet. " For thirty years after my death," he is said to have declared, " my people will tread in my path (sunna); thereafter will come kings and princes." This tradition crystallizes the later feeling of Islam. The first thirty years were a golden age; the centre of the state was the Prophet's own city of Medina; the conditions of the state continued in close conformity to those of his own time. The study of tradition, i.e. of his usage, went hand in hand with the study of law. They were vital functions of the state, and it encouraged both.

Then came the great debdcle. The ancien rSgime, a semi- monkish, theocratic empire, went down, and the Omayyad dynasty, kings and princes of the old Arab type, took its place (see Caliphate, B). The public life of the state was no longer deeply religious; the pious said that it was godless. Under these .conditions law was indeed still needed; but it had to be opportunist. Its development went on, but became speculative. The study of tradition was now private, and its students were more and more the personally pious. There were, thus, two results. On the one hand, the framers of systems of canon law — as it now was — no longer lived in contact with reality; hypothetical and ideal structures were reared which could never stand the touch of the practical law-court. And on another, traditions and law, even this hypothetical law, came to take separate roads. The interest of the students of tradition became the gathering of traditions for their own sake, going no farther than a striving to regulate each detail of life by some specific, concrete, prophetic dictum. They had no use for systems that went beyond the mere registering of these dicta. The feeling also became widespread that any system of government which did not simply reproduce the patriarchal form of Medina was of the world and the devil — a thing with which no religious man could have aught to do. At every turn he would have to peril his soul.

Here we must place the transition of this law with which we have hitherto dealt from being the law of the land to being in essence a variety of canon law. It was always broader than any western secular law. It regulated all the aspects of life — duty to God, to one's neighbour, to one's self. It was really a system of duties, ethical, legal, religious. It did not limit itself to defining the forbidden (hardm) ; but designated actions also as required (fard, wdjib), recommended (mandub, mustahabb), indifferent (jd'iz, mubdh), disliked (makruh). It played the part of, or rendered necessary, a religious director quite as much as a lawyer. And for a time at Medina it was really the law of the land. But from the Omayyad period on it has held the position of the canon law of the Roman Church in countries that will not recognize it and yet dare not utterly reject it. It governs, in one or other of its four schools, the private lives of all pious Moslems, it regulates some semi-public relationships — e.g. marriage, divorce, inheritance; it compels

respect, if not acceptance, from the state; and by its ideal standard the world, filled with righteousness by the Mahdi, will be ruled in the Moslem millennium.

The rise of the Abbasids brought a change, but not a great one. They had promised a return to the old religious attitudes, and the promise was formally kept. But in substance they were as much as the Omay)'ads, and though the state was outwardly on a pious footing, and the religious sentiment of the people was respected, the old, absolute canon law was not restored. It was made possible for more theologians and lawyers to work with the state, but an irreconcilable party still remained, and the situation was fixed as it is to this day. It is true that the struggle to adapt such a single and detailed system to all the varying conditions, climates and times of the great empire was impossible; but the failure marked the great rent in the supposed unity of Islam between the church and the world, religion and law.

Yet the Abbasids did, in their way, encourage legal studies, and under them processes and results, long pursued in private, became public. Almost within the first century of their dynasty the four legal schools, or rites, were formed and the principles established which survive to this day.

The first school to take definite form was the Hanifite, founded by Abu Hanifa (d. 767), who left behind him a definite system and many enthusiastic pupils. He was a man of means, in touch with commercial, but not with practical legal life, a speculative or philo- sophical jurist. Being of non-Arab origin, the usage of Medina had small interest for him. He therefore used few traditions, and pre- ferred to go back to the Koran, and extract from it by reasoning the rulings which fitted his ideas. This he called the use of analogy (qiyds) ; but, in his hands, it became practically legal fiction, the application of a law in some sense undreamed by its first imposer. But he had another, and still freer instrument. The effect of differ- ences in local conditions had been early observed and admitted in general terms. Abu Hanifa reduced it to a subjective formula. Under such conditions he claimed the right of preference (istifisan) of a ruling suited to the local needs, even when the strict analogy in- dicated otherwise. This met and meets with vehement protect when formally stated, but the usage of Islam has practically accepted it. His system, finally, was not developed through the exigencies of actual cases, but was worked out as a system of casuistry, though in a good sense. He tried, that is, to construct a system of rules to answer any conceivable question. After his death his pupils elaborated it still further, and accepted public office. The 'Abbasids adopted his school, and threw their influence on its side; its philo- sophic breadth and casuistic possibilities evidently commended it to them. Later, the Ottoman Turks also adopted it, and it may be said to hold now a

leadership among the four legal rites. Its influence has undoubtedly tended to broaden and humanize Moslem law.

Twenty-eight years after Abu Hanifa, Malik ibn Anas, the founder of the Malikite school, died at Medina. In many points his situation was precisely opposite to that of Abu Hanifa, and yet his results were very similar. He was a working jurist, in practical touch with actual life ; he was in the centre of the tradition of the usage of the Prophet, in the line, one might say, of the apostolic succession. He, therefore, used traditions much more generally than did Abu Hanifa, and when he, under pressure, took refuge in opinion, he certainly felt that he, under his conditions, had a better right to do so than any outsider. But two of his principles marked a distinct advance and showed that he was no mere traditionalist. For one, he laid down the conception of public advantage (istislafi) ; when a rule founded on even a valid analogy would work a general injury it was to be set aside; justice must not be overcome by logic. And, for the other, he laid stress on the conception of the agreement (ijmd'), an idea which was to have indefinite importance in the future. When the surviving companions of the Prophet, after his death, agreed upon any point as belonging to their store of tradition and experience, their agreement was accepted as final. In the first instance they agreed that such had been the statement of the Prophet. That easily passed over into an agreement that such was the true Moslem view, and finally into an acceptance of the principle that the Moslem Church, when unanimous, could formulate truth — practic- ally as in the canon of Vincent of L6rins, Quod semper, quod ubique, quod ab omnibus. But such a broadly catholic position was still in the future, and for Malik, juristic agreement meant the agreement of Medina, though there are signs that he permitted the same latitude to other places also. It was a way of allowing for local conditions rather than of reaching the voice of the Church. His law book, the Muwatta' , the earliest in our possession written by the founder of a school, has already been mentioned. It is a collection of about seventeen hundred traditions of juristic importance, arranged according to subject, with appended remarks on the usage of Medina and on his own view of each matter.

So far opinion and local usage had fully held their own, and the philosophical jurist had been free to work out his system. The difference between the istihsan of Abu Hanifa and the istislafr of

Malik was not great; students attended the lectures of both and combined their systems. But a reaction now began, and the tradi- tionalist party

finally made itself felt. We have the inevitable rivalry between the historical-empirical and the speculative-philo- sophical schools of jurisprudence, rendered all the more bitter in that the historical lawyers believed, in this case, that they were defending a divine institution. There resulted, first, one of the most important schools, the Shafi'ite; secondly, an extremely literal school for which ash-Sha.fi 'I did not go far enough, and which has now vanished; and thirdly, the Hanbalite school, still surviving in small numbers, more moderately traditional than the last.

The school founded by ash-Shafi'i (d. 820), a pupil of Malik, came first in order of time. The others were really revolts against the mildness of his compromise. His characteristics were a broad- minded, steady grasp of means and ends, a perception of what could and what could not be done, a willingness to admit all the tried principles in due balance, and, at one point especially, the insight of genius as to the possibilities of these principles. He laid great stress on tradition ; a clear, authentic tradition he regarded as no less valid than the Koran itself. If the tradition was chronologically later than a Koranic passage and corrected that passage, he followed the tradition. But in this he was only regulating a fixed tendency. The Koran may be regarded theoretically as the first of all the sources of law and- theology ; practically its clear statements have been over-ridden in many cases. Most important of all, the principle of agreement (ijmd') came finally with him to its full rights. The agreement of the Moslem peoples was to be the voice of God. " My people," said a tradition from Mahomet, " will never agree in an error." And so, over traditions and over the Koran itself, the agreement tacitly or explicitly ruled and rules. It stamps as authoritative that which the other principles lay down. At the head of each section of a Shafi'ite law book we read, " The basis of this, before the agreement, is such and such." But with the aid of a principle of this breadth it was easy to reject the opinion which was so objectionable to the traditionalist party. In its place he took analogy (qiyds), which, discreetly used, could serve almost the same purpose. The Koranic passage or the tradition with which an analogy was suggested should, he taught, be examined to see if there was a reason clearly stated for the command. If so, that reason would give a basis for the analogy. Analogy based on the mechanical or external could not hold.

The four bases thus laid down by ash-Shafi'i — Koran; prophetic usage as expressed in traditions; analogy; agreement — have come to be accepted by all existing schools. This applies to all spheres of life, ethical, social, theological, legal, and it should never be for- gotten that the Koran is only one of the sources for Moslem faith and conduct.

Few words are needed for the other, reactionary schools. One, now long extinct, was founded by a certain D&'ud u?Zahiri, " David the Literalist,"

born three or four years before the death of ash Shafi'i, and so called because he insisted upon an absolutely literal interpretation of his texts — Koran or tradition — without account of context or metaphor. In consequence he had to reject analogy, and limited agreement to that of the companions of Mahomet ; the Church of Islam was to have no constructive authority. In one point he showed great sanity of judgment, namely in his rejection of the principle jurare in verba magistri, otherwise regnant in Islam. His school had long and interesting consequences, mostly theological, but is now extinct, and never took rank with the others. The Moslem world found his positions too impossible, and now no one swears to his words. The other, the Hanbalite school, was founded by the scholars of Ahmad ibn Hanbal after his death in 885. He himself would never have revolted against his master, ash-Shafi'i, but it was soon felt that his system, so far as he had any, was in essential opposition. He had been no lawyer, but a theologian and a collector and student of traditions. All his life had been a protest against speculation in divine things. Where the Koran and traditions were silent, he, too, had been silent. For this agnostic principle he had witnessed and suffered, and his standing with the people was that of a saint. Naturally, then, the last still existent school of tradi- tionalist protest was launched in his name. It minimizes agreement and analogy, is literal in its interpretations, and is now by far the smallest of the four surviving schools. Its external history is that of a testifying and violent minority.

Other men, such as Tabari, the historian and commentator, have had dreams that they, too, might join the Four Imams (see Imam) as founders of legal rites, but none has succeeded. The Four remain the ultimate exponents of this canon law, and under the banner of one or other of them every Moslem must range himself. As there is a principle of unity in Islam, expressed in the alleged prophetic saying, " My people will never agree in an error," so there is a principle of variety, also expressed in an alleged prophetic saying, " The dis- agreement of my people is a mercy from God." The four rites may differ upon many points, yet the adherents of one never dream of regarding the adherents of the others as outside the Church of Islam; they are not " dissenters " in the English sense. God is merciful to his creatures, and gives them so much liberty of choice. Yet in practice this liberty is not great. The principle of swearing to the words of the master is a dead hand laid upon Islam. A man's legal

rite is generally settled by the place and other conditions of his birth, and after he has once accepted a rite, he must, if good and pious, follow it in all its details. Only the avowed sceptic or the recognized eccentric can be an eclectic.

The geographical distribution of the rites is roughly as follows: Moslems in Central Asia and northern India and the Turks every- where are Hanifites;

in Lower Egypt, Syria, southern India and the Malay Archipelago they are Shafi'ites; in Upper Egypt and in north Africa, west of Egypt, they are Malikites; only the Wahhabis (q.v.) in central Arabia are Hanbalites. But the will of the sovereign has also had a powerful influence and has frequently dictated the legal, as well as the theological, affiliations of his subjects. The Turks, for example, have thrown their weight almost everywhere on the Hanifite side. Their policy is to appoint only Hanifite judges (see Cadi), although for private and personal questions they appoint and pay Muftis {q.v.) of the other rites. In other cases, with a popu- lation of mixed legal adherence, the government has been known to appoint judges of different rites.

The Shi'ite canon law is dealt with separately, but some mention of two outstanding sects is here in place. The Ibadites (see Mahom- medan Religion : Sects) have a system of canon law which in essen- tials is of older codification than that of any of the orthodox schools, going back to Abdallah ibn Iljad himself, of the first century of the Hijra (Hejira). Its basis is above all the Koran, then a sparing use of traditions, natural to their early origin, and finally the agreement of their own learned men, again natural to an extreme dissenting sect, and it still rules the Ib&dite communities at Oman, Zanzibar and the Mzab in southern Algeria. At all these places they, the last descendants of the Kharijites, hold severely apart, while the other Moslems shrink from them as heretics of the worst. Not nearly so far from ordinary Islam, but still of an extreme self-conscious Puritanism are the Wahhabis. They are really H an balites, but apply the rules of that school with uncompromising, reforming energy. The doctrine of the agreement of the Church of Islam they reject; only that of the immediate companions of Mahomet is valid. The people of Mahomet can err and has erred ; each man must, on his own responsibility, draw his doctrine from the Koran and the traditions. Here they follow the Zahirites.

All these schools of law administer a scheme of duties, which, as has already been remarked, comes nearest to the canon law of the Roman Church, and which for centuries has had only a partial connexion with the real legal systems of the Moslem peoples. Among the Wahhabis and Ibadites alone is it the whole of law. Elsewhere, since the Omayyad period, its courts have been in great part pushed aside by others, and its scheme has come to be regarded as an expression of impossible theory, to be realized at best with the coming of the millennium. The causes and methods of this change call now for detailed notice.

As Islam spread beyond the desert and the conditions in which the life of Mahomet and his companions had been cast, it came to regions, climates, customs, where the Arabian usages no longer held. Not only were the prescripts of Medina ill adapted to the new conditions; the new people had

legal usages of their own to which they clung and which nothing could make them abandon. It was rather the Moslem leaders who were compelled to abandon their ideas and for the sake of the spread of Islam to accept and incorporate much that was diametrically opposed to the original legislation either of the Koran or of Mahomet's recorded decisons. As in religion the faiths of the conquered peoples were thinly veneered with Moslem phrases, so in law there grew up a customary code ('ddat) for each country, differing from every other, which often completely obscured and annulled the prescriptions of the canon law. The one was an ideal system, studied and praised by the pious learned; the other was the actual working of law in the courts.

But besides the obstinate adherence of various peoples to their old paths, the will of individual rulers was a determining factor. When these ceased to be saints and students of divine things, and came to be worldly statesmen and opportunists, followers of their own objects and pleasures, no system could hold which set a limit to their authority. The Oriental ruler must rule and judge on his own initiative, and the schools of canon law tended to reduce everything to an academic fixedness. There thus arose a new and specific statute law, emanating from the sovereign. At first he judged in the gate as seemed good in his eyes and as was his right and duty (cf. " court of oppres- sions"; see Mahommedan Institutions); later, his will was codified as in the Turkish statute law (qawanin) derived from various European codes. Thus there has grown up in almost

every Moslem country at least two systems of courts, the one administering this canon law, and taking cognisance of private and family affairs, such as marriage, divorce, inheritance, its officials also giving rulings on purely personal religious questions, such as details of the ritual law, the law of oaths and vows, &c; the other, the true law courts of the land, administering codes based on local custom and the decrees of the local rulers.

A rift almost as important entered the legal life of the Moslem lands on another side. Non-Moslem communities, settled in Moslem territory, have been uniformly permitted to administer and judge themselves according to their own customs and laws. Save when they come into direct contact and conflict with Moslems, they are left to themselves with a contemptuous tolerance. The origin of this attitude in Islam appears to be threefold: (i) The Islam of theory cannot conceive of a mixed state; it takes account, only, of a state containing none but Moslems, and its ideal is that the whole

world will, in the end, form such a state. In practice, then, Moslems try to shut their eyes to the existence of non-Moslems in their midst and make no provision for them until compelled. That a non-Moslem should have the same civil position as a Moslem is unthinkable, (ii) This, of course, produces an attitude of extreme contempt. The only citizens are Moslems and all others are to be looked down upon and left to themselves. What they do or think among themselves does not matter; they are outside the ring-fence of Islam, (iii) A different, but equally important, cause is the Moslem indolence. When the Arabs conquered, they knew that they must administer the conquered lands, and they, very wisely, sought help from the machinery which they found in operation. But besides the ordinary organization of the state, they found also various ecclesiastical organizations, Christian and Jewish, and to these they gave over the administration of the non-Moslem sections of the community, making their rabbis and bishops their responsible heads and the links of contact, with' the Moslem rulers. They, unquestionably, found the same method in use by the Byzantine government; but in Moslem hands it went so far as to make a number of little states (millet, milal) within the state and effectually toprcclude the possibility of ever welding all the inhabitants of the land into one corporate life.

But this indolence, when applied to resident aliens, had conse- quences still more serious, because external as well as internal. Following the same method of leaving the unbeliever to settle his affairs for himself, the European merchant, living and trading in the East, was put first by usage and finally by treaty under the jurisdiction and control of his own consul. Thus there grew up the extra-territorial law of the capitulations and con- ventions, by which the sanctity of the person and household of an ambassador is extended to every European. And this in turn, has reacted on the status of the non-Moslem subject races, and has come to be the indirect but chief support on which they lean. Through it, an element has developed which makes it practically impossible for a Moslem state to introduce legal changes even remotely affecting its non-Moslem population, alien or subject, without the consent of the European embassies. Any change may be upset by their refusal to accept it as incom- patible with the capitulations and conventions. The embassies have thus, as interpreters of a part, at least, of the constitution, come to hold a position remarkably, if absurdly, like that of the Supreme Court of the United States (see Young, Corps de droit Ottoman, passim).

There may be said, then, in short, to be three elements in the legal life of a Moslem state: the sacred and fixed canon law of Islam; the civil law, based on the usages of the different peoples, Moslem and non-Moslem, and on statutes going back to the will of rulers; the international law of the capitulations, with a contractual sanction of its own. The hope for the

future in Islam, there can be little doubt, lies in the principle of the agreement of the Moslem people, with its conception of catholic unity, and its ability, through that unity, to make and abrogate laws. As the Moslem peoples advance, their law can, thus, advance with them, and the grasp of the dead hand of the canon law be gradually and legally released, xvii. 14

See I. Goldziher, Muhammedanische Studien, I. and II. (Halle a.S., 1889-1890); Zahiriten (Leipzig, 1884); E. Sachau, Zur altesten Geschichte des muhammedanischen Rechts (Vienna Akad., 1870) and Muhammedanisches Recht (Stuttgart and Berlin, 1897); Snouck Hurgronje, review of preceding in Z.D.M.G. liii. 125 seq. and " Le droit musulman " (Rev. de Vhist. des religions, xxxvii. 1 seq. and 174 seq.); Juynboll, Handleiding tot de Kennis von de mohammedaansche Wet (Leiden, 1903); Von Kremer, Cultut ■geschichte des Orients unter den Chalifen, i. 470 seq. (Vienna, 1875-1877) ; Hughes, Dictionary of Islam, pp. 285 seq. (London, 1896) ; D. B. Macdonald, Development of Muslim Theology, &c, pp. 65 seq. (New York, 1903) ; Bukhari, Les Traditions islamiques traduites . . . par O. Hondas et W. Marcel (Paris, 1906) ; N. B. E. Bailie, Digest of Moohummadan Law (2 vols., London, 1875-1887). A good bibliography appeared in the Bulletin of the New York Public Library for January 1907. (D. B. Ma.)

MAHOMMEDAN RELIGION. The Mahommedan religion is generally known as Islam — the name given to it by Mahomet himself — and meaning the resigning or submitting oneself to God. The participle of the same Arabic verb, Muslim (in English usually spelt Moslem), is used for one who professes this religion. The expression " Mahommedan religion " has arisen in the West probably from analogy with " Christian religion," but is not recognized as a proper one by Moslem writers. Islam claims to be a divinely revealed religion given to the world by Mahomet, who was the last of a succession of inspired prophets. Its doctrine and practices are to be found in (1) the Book of God — the Koran — which was sent down from the highest heaven to Gabriel in the lowest, who in turn revealed it in sections to Mahomet; (2) the collections of tradition (hadith) containing the sayings and manner of liTe (sunna) of the Prophet; (3) the use of analogy (qiyds) as applied to (1) and (2) ; and (4) the universal consent (ijma') of the believers. The worship of Islam consists in (1) the recital of the creed; (2) the recital of the ordained prayers; (3) the fast during the month of Ramadhan; (4) alms- giving; (5) the hajj, the pilgrimage to Mecca. The theology of Islam finds its first public expression among the orthodox in the teaching of al- Ash'ari (d. after 932), but had its real beginning among the sects that arose soon after the death of Mahomet.

Islam is the latest of the so-called world-religions, and as several of the others were practised in Arabia at the time of Mahomet, and the Prophet

undoubtedly borrowed some of his doctrines and some of his practices from these, it is necessary to enumerate them and to indicate the extent to which they prevailed in the Arabian world.

Relations with Other Religions. — The religions practised in Arabia at the time of Mahomet were heathenism, Judaism, Christianity, and Zoroastrianism.

1. Heathenism was the religion of the majority of the Arabs. In the cities of south Arabia it was a survival from the forms represented in the Sabaean, Minaean and Himyaritic inscriptions of south Arabia (see Arabia: Antiquities). The more popular form current among the nomads is known very imperfectly from the remains of pre- Islamic poetry and such works as the Kitab ul-Asnam contained in Yaqut's geography, from Shahrastanl's work on the sects, and from the few references in classical writers. From these we have mostly names of local deities (cf. J. Wellhausen, Reste arabischen Heidentums, 2nd ed., Berlin, 1897) and ancient religious customs, which remained in part after the introduction of Islam (cf. W. Robertson Smith, The Religion of the Semites, Edinburgh, 1889, and Kinship and Marriage in Early Arabia, Cambridge, 1885). From these sources we learn that Arabian religion was a nature-worship associated with fetishism. Sun, moon and stars were worshipped, some tribes being devoted to the worship of special constellations. Certain stones, wells and trees were regarded as sacred and as con- taining a deity. Many (perhaps most) tribes had their own idols. Hobal was the chief god of the Ka'ba in Mecca with its sacred stone, but round him were grouped a number of other tribal idols. It was against this association (shirk) of gods that Mahomet inveighed in his attempt to unify the religion and polity of the Arabs. But there were features in this heathenism favourable to unity, and these Mahomet either simply took over into Islam or adapted for his purpose. The popularity of the Ka'ba in Mecca as a place of resort for worshippers from all parts of Arabia led Mahomet not only to institute the hajj as a duty, but also to take over the customs con- nected with the heathen worship of these visits, and later to make Mecca the qibla, i.e. the place to which his followers turned when they prayed. The name of Allah, who seems to have been the god of the Koreish (cf. D. S. Margoliouth, Mohammed, p. 19, London, 1905), was accepted by Mahomet as the name of the one God, though he abandoned the corresponding female deity Al-lat.

2. Judaism had long been known in Arabia at the time of the Prophet. Whether Hebrews settled in Arabia as early as the time of David (cf. R. Dozy, Die Israeliten zu Mecca, Leipzig, 1864), or not, is of little importance here as Judaism cannot be said to have existed until the end of the 5th century B.C. The Seleucid persecu- tions and the political troubles that ended with the fall of Jerusalem (a.d. 70) probably sent many Jews to Arabia. In the 5th and 6th centuries the history of south Arabia and of Nejran is largely that of the strife between Jews and Christians. In the north-west the Jews possessed Tenia, Khaibar, Yathrib (Medina), Fadak, and other smaller settlements. In these they lived as self-contained com- munities, not seeking to proselytize but working at their trades, especially concerned with money and jewelry. Mahomet seems to have expected their help in his proclamation of monotheism, and his first qibla was Jerusalem. It was only when they refused to accept him as prophet that he turned in anger against them. They had, however, supplied him with much material from the Old Testament, and the stories of creation, the patriarchs and early kings and pro- phets occur continually in the Koran, told evidently as they were recited by the common people and with many mistakes caused by his own misunderstanding.

3. Christianity, though later than Judaism, had a sure footing in Arabia. It had suffered persecution in Nejran and had been supported in the south by the Abyssinian invasions. The kingdom of Hira was largely Christian; the same is true of the north Arabian tribes of Bakr and Taghlib, and east of the Jordan and on the Syrian boundary as well as in Yemama Christianity had made progress. Pre-Islamic literature contains many allusions to the teaching and practices of Christianity. Of the time of its introduction little is known; little also of the form in which it was taught, save that it came from the Eastern Church and probably to a large extent through Monophysite and Nestorian sects. Tradition says that Mahomet heard Christian preaching at the fair of Ukaz, and he probably heard more when he conducted the caravans of Khadija. Gospel stories derived apparently from uncanonical works, such as the Gospel of the Nativity, occur in the Koran. The asceticism of the monks attracted his admiration. A mistaken notion of the Trinity was sharply attacked by him. It is curious that his followers in the earliest times were called by the heathen Arabs, Sabians (q.v.), this being the name of a semi-Christian sect. In the time of the Omayyads Christianity led to some of the earliest theological sects of Islam (see below).

4. Zoroastrianism was known to the Arab tribes in the north-east, but does not seem to have exercised any influence in Mecca or Medina except indirectly through Judaism in its angelology. As soon, however, as the armies of Islam conquered Mesopotamia it began to penetrate the thought and practices of Islam (see below).

Sources of Authority. — Islam, as we have said, is founded on: (1) the Koran; (2) the tradition or rather the sunna (manner of life of Mahomet) contained in the tradition (Hadith); (3) ijma; the universal agreement; (4) qiyds (analogy).

1. The Koran 1 (properly Qur'dn from qara'a to collect, or to read, recite) is the copy of an uncreated original preserved by God (see below), sent down from the seventh heaven to Gabriel in the first heaven, and revealed to Mahomet in sections as occasion required. These revelations were recited by the Prophet and in many cases written down at once, though from ii. 100 it would seem that this was not always the case. • God is the speaker throughout the revelations. It seems probable that the whole Koran was written in Mahomet's lifetime, but not brought together as a whole or arranged in order.

As it exists now the Koran consists of 114 chapters called suras (from sura, a row of bricks in a wall, a degree or step). The first is the Fatiha (opening), which occupies the place of the Lord's Prayer in Christianity. The others are arranged generally in order of length, the longest coming first, the shortest (often the earliest in date) coming at the end. Certain groups, however, indicated by initial unvowelled letters, seem to have been kept together from the time of the Prophet. At the head of each sura is a title, the place of its origin (Mecca or Medina) and the number of its verses (aydt) together with the formula, " In the name of God the Merciful, the Compassionate " (except in sura 9). For liturgical purposes the whole book is divided into 60 sections (ahzab) or into 30 divisions (ajzd), each subdivided into a number of prostrations (ruk'a or sajda). The origin of the collected and written Koran is due to Omar, who in the caliphate of Abu Bekr pointed out that many possessors of suras were being slain in the battles of Islam and their property lost, that there was a danger in this way that much of the revelation might disappear, and that men were uncertain what was to be accepted as genuine revelation. Accordingly Zaid ibn Thabit who had been secretary to Mahomet, was commissioned to collect all he could find of the revelation. His work seems to have been simply that of a collector. He seems to have done his work thor- oughly and made a copy of the whole for Abu Bekr. The collection

1 See also Koran.

was thus chiefly a private matter, and this copy passed after Abu Bekr's death into the hands of Omar, and after his death to Hafsa, daughter of Omar, a widow of Mahomet. In the caliphate of Othman it was discovered that there were serious differences between the readings of the Koran possessed by the Syrian troops and those of the Eastern soldiers, and Othman was urged to have a copy prepared which should be authoritative

for the Moslem world. He appointed Zaid ibn Thabit and three members of the tribe of Koreish (Quraish) to do the work. Each of these made a copy of Abu Bekr's collection^ carefully preserving Koreishite forms of words. How far the text was amended by the help of other copies is doubtful ; in any case the mode of procedure was undoubtedly very conservative. The four similar manuscripts were sent, one each to Medina, Cufa (Kufa), Basra and Damascus, and an order was issued that all differing copies should be destroyed. In spite of the personal unpopularity of Othman this recension was adopted by the Moslem world and remains the only standard text. A few variant readings and differ- ences of order of the suras in the collections of Ubay ibn Ka'b and of Ibn Mas'ud were, however, known to later commentators. The only variants after the time of Othman were owing to different possible ways of pronouncing the consonantal text. These are usually of little importance for the meaning. As the text is now always vowelled, variations are found in the vowels of different copies, and the opinions of seven leading " readers " are regarded as worthy of respect by commentators (see Th. Noldeke, Geschichte des Qorans, pp. 279 seq., Gottingen, i860). Various characteristics enable one to establish with more or less certainty the relative chronological order of the suras in the Koran, at any rate so far as to place them in the first or second Meccan period or that of Medina. The form of the sentences is a guide, for the earliest parts are usually written in the saj' form (see Arabia: Literature). The expressions used also help; thus the " O ye people " of the Meccan period is replaced in the Medina suras by " O ye who believe." The oaths in the first Meccan period are longer, in the second shorter, and are absent in the Medinan. In the earliest period the style is more ele- vated and passionate. Occasionally the time of origin is determined by reference to historical events. In accordance with such principles of criticism two leading scholars, Noldeke (loc. cit.) and H. Grimme (in his Mohammed Zweiter Teil. Einleitung in den Koran. System der koranischen Theologie, Miinster, 1895), have arranged the suras as follows: —

Order of Suras in Koran. Noldeke.

Mecca. 1st to 5th yr. (a). 96. 74. III. 106. 108. 104. 107. 102. 105. 92. 90.

94. 93. 97. 86. 91. 80. 68. 87. 95. 103. 85. 73. 101.99. 82. 81. 53. 84. 100. 79.77.78. 88. 89. 75- 83. 69. 51. 52. 56. 70. 55. 112. 109. 113. 114. 1.

5th and 6th yr. (6). 54. 37. 71. 76. 44. 50. 20. 26. 15. 19. 38. 36. 43.

72. 67. 23. 21. 25. 17. 27. 18.

7th yr. to Flight ©. 32. 41. 45. 16. 30. 11. 14. 12. 40. 28. 39. 29. 31.

42. 10. 34. 35. 7. 46. 6. 13.

Medina. 2. 98. 64. 62. 8. 47. 3. 61.57. 4-65- 59- 33-63- 24.

58. 22. 48. 66. 60. 1 10. 49. 9. 5.

Grimme.

Mecca. (1). 1 In old saj' form: 111. 107. 106. 105. 104. 103.

102. 101. 100. 99. 108. 96. 95. 94. 93. 92. 91.

90. 89. 88._8j. 86. 85. 84. 83. 82. 81. 80. 79. 7_8.

77- 76. 75- 7J- 21- 7°- 69. 68. 1 14. 1 13. 56. 55.

54- 53_- 52. 51- 50. 15- 22. 14.

(2). In loosened saj' form : 46. 72. 45. 44. 41. 97. 40.

39- 38. 37- 36. 35- 34- 32- 31 • 6 7- 3°- 2£- 28.

27. 26. 71. 25. 20. 23. 43. 21. 19. 1. 42. 18. 17.

Medina. 16. 13. 12. 11. io.ˆ 6. 98. (112. 109).

From the Flight to 2ˆ62. 515-88-108-120. 47 and some interpolations

Badr. in Meccan suras.

From Badr to Ohod 8. 24. 59. From Ohod to cap- 3. 291-12- 4- 57- 64. 61. 60. 58. 65. 33. 63. 49.

ture of Mecca. no. 48. 5i_h- 66. 91-24.

After capture of Mecca. 925-124-

On the supposition that the arrangements given above are at any rate approximately correct, it is possible to trace a certain development in the teaching of the Koran on some of the chief dogmas. It must, however, be borne in mind that orthodox Islam recognizes the Koran as the work not of Mahomet but of God. Yet Moslem theologians recognize that some revelations are inconsistent with others, and so have developed the doctrine of nasikh and mansukh (" abrogating " and " abrogated "), whereby it is taught that in certain definite cases a later revelation supersedes an earlier.

A critical study of the Koran shows in the earlier revelations the marks of a reflective mind trained under the influence of Arabian education 1 Underlined = with interpolations.

Theology.

Spirits.

and stirred by an acquaintance (somewhat imperfect) with Judaism and Christianity. The later revelations seem to be influenced by the now dominant position of the Prophet and a desire after the capture of Mecca to incorporate such heathen religious ceremonies as are national. God is one and universal from the beginning. His unity is emphasized as against the mistaken conception of the Christian Trinity. At first his might is taught by the name Rabb (Lord) which is generally used with an attribute as " the highest Lord," " Lord of the worlds," " Lord of men," " Lord of heaven and earth," " Lord of the East and West," or " our Lord." Then he is identified with the god Allah (see above) and the first part of the later Moslem creed is announced — la ilaha illa-llaha, " there is no god but Allah." But every act of creation is a proof not only of God's power but also of his beneficence (xiv. 37), and so he becomes known as ar-Rahmdn, " the Compassionate." The attributes of God may all be arranged in the three classes of his power, unity and goodness. They are expressed by the ninety-nine " beautiful names " applied to him in the Koran (see E. H. Palmer, The Quran in " Sacred Books of the East," vol. vi., Lntrod. pp. 67-68, Oxford, 1880). In the Medina period of Mahomet's life the nature of God is not so clear, and the description of it varies according to the moods of the Prophet.

Beside God are two other uncreated beings: (1) the original of the Koran, the " mother of the Book " (xliii. 3) on a " preserved tablet " (lauh mahfiiz) (lxxxv. 22), in accordance with which God acts, and (2) the throne (kursi) (ii. 256). When the heavens are created, God sits on his throne in the seventh heaven; around him are angels, pure, sexless beings, some of whom bear the throne, while some are engaged in praising him continually. They are also his messengers and are sent to fight with the believers against the heathen. Some are the guardian angels of men, others are the watchmen of hell. Mediate beings between God and man are the " word " {ami) and from it the " spirit " (ruh) or " holy spirit " (ruh ul-qudus). Another manifestation of God to the believers only is the " glory " (sakina).

God created the world in six days according to the plan of the Book. Each new life was created by God's breathing into it a C molo sou ˆ ˆˆ e duality ˚f sou l an d body is maintained. ' In each man is a good and a bad impulse. The bad impulse which was latent in Adam was roused to action by Satan (Iblis) . Adam by his fall lost the grace of God, which was restored to him solely by the gracious choice of God. Between men and angels in their nature are the genii (jinn) male and female, in- habitants of desert places, created from smokeless fire. They had been accustomed to spy round heaven, but in Mahomet's time could learn no more of its secrets. Some of them were converted by the Prophet's teaching. Lowest of creation in his estate is Satan (Shaitdn) , who was an angel but was expelled from heaven because he refused to worship Adam at his Lord's com- mand. God has revealed himself to man by (1) writing (kitdb), and (2) prophets. As he had given to the Jews the Law (Taurat) and to the Christians the Gospel (Injil) so he revealed to Mahomet the Koran (Qur'an, known also by other names, e.g. al-Furqan, at- Tafsil, &c), each single revelation being called an ay a. With his revelation God has also sent an apostle or prophet to each people. Several of these are mentioned in the Koran, Moses the prophet of the Jews, Jesus (Isd) that of the Christians. Mahomet is not only the apostle of the Moslems but the " seal of the prophets," i.e. the final member of the class. His mission at first was to warn men of imminent judgment. Later he became more of a teacher. At first he seems to have relied for the salvation of men on his natural faculties, but later announced the doctrine of God's election. The ethics of the Koran are based on belief (imdn) and good works, the latter alone occurring in the early Meccan suras. Fear of the judgment of God was a motive of action; this is followed by repentance and turning to God. A complete surrender to God's will (islam) is the necessary condition of religious life and is expressed in the phrase so com- mon in everyday speech among the Moslems — inshallah, " if God will." God has full power to overlook evil deeds if he will.

Ethics.

Unbelievers can acquire no merit, however moral their actions. A short account of the chief ethical requirements of the Koran is given in xvii. 23-40: — ■

" Put not God with other gods, or thou wilt sit despised and forsaken. Thy Lord has decreed that ye shall not serve other than Him; and kindness to one's parents, whether one or both of them reach old age with thee, and say not to them, ' Fie, 1 and do not grumble at them, but speak to them a generous speech. And lower to them the wing of humility out of compassion, and say, ' O Lord! have compassion on them as they brought me up when I was little! ' Your Lord knows best what is in your souls if ye

be righteous, and, verily, He is forgiving unto those who come back penitent.

" And give thy kinsman his due and the poor and the son of the road; and waste not wastefully, for the wasteful were ever the devil's brothers, and the devil is ever ungrateful to his Lord.

" But if thou dost turn away from them to seek after mercy from thy Lord, which thou hopest for, then speak to them an easy speech.

" Make not thy hand fettered to thy neck, nor yet spread it out quite open, lest thou shouldest have to sit down blamed and straightened in means. Verily, thy Lord spreads out provision to whomsoever He will or He doles it out. Verily, He is everj well aware of and sees His servants.

" And slay not your children for fear of poverty; we will provide for them ; beware ! for to slay them is ever a great sin.

" And draw not near to fornication; verily, it is ever an abomina- tion, and evil is the way thereof.

" And slay not the soul that God has forbidden you, except for just cause; for he who is slain unjustly we have given his next of kin authority ; yet let him not exceed in slaying ; verily, he is ever helped.

" And draw not near to the wealth of the orphan, save to improve it, until he reaches the age of puberty, and fulfil your compacts; verily, a compact is ever enquired of.

" And give full measure when ye measure out, and weigh with a right balance; that is better and a fairer determination.

" And do not pursue that of which thou hast no knowledge ; verily, the hearing, the sight and the heart, all of these shall be enquired of.

" And walk not on the earth proudly ; verily, thou canst not cleave the earth, and thou shalt not reach the mountains in height.

" All this is ever evil in the sight of your Lord and abhorred."

(E. H. Palmer's translation.)

The eschatology of the Koran is especially prominent in its earlier parts. The resurrection, last judgment, paradise and hell are all described. At death the body again becomes Esc u at . „, earth, while the soul sinks into a state of sleep or unconsciousness. At a time decreed, known as " the hour "

(as-Sa'a), " the day of resurrection " (yaum ul-qiyydma) , " day of judgment " (yaum-ud-din) , &c, an angel will call or will sound a trumpet, the earth will be broken up, and the soul will rejoin the body. God will appear on his throne with angels. The great book will be opened, and a list of his deeds will be given to every man, to the good in his right hand, to the evil in his left (sura 60). A balance will be used to weigh the deeds. The jinn will testify against the idolaters. The righteous will then obtain eternal peace and joy in the garden (al-janna) and the wicked will be cast into the fiery ditch (Jahannam), where pains of body and of soul are united.

2. The Tradition. — The revelation of God is twofold — in a writing and by a prophet. The former was contained in the Koran, the latter was known from the actions of Mahomet in the different circumstances of life. The manner of life of the Prophet (sunna) was contained in the tradition (al-hadith). The infor- mation required was at first naturally obtained by word of mouth from the companions and helpers of Mahomet. These in turn bequeathed their information to their younger companions, who quoted traditions and gave decisions in their names.

For long these traditions circulated orally, the authority of each depending on the person who first gave it and the reliability of the chain (isnad) of men who had passed it on from him. At first this tradition was regarded as explanatory of, or at the most supple- mentary to, the teaching of the Koran. Early Moslem teachers pointed to the Jews as having two law-books — -the Taurat and the Mishna — while Islam had only one — the Koran. But opinion changed, the value of tradition as an independent revelation came to be more highly esteemed until at last it was seriously discussed whether a tradition might not abrogate a passage of the Koran with which it was at variance. The writing of traditions was at first strongly discouraged, and for more than a century the stories of the Prophet's conduct passed from mouth to mouth. Had all the narrators been pious men, this might have been tolerable, but this was not the case. The Omayyad dynasty was not a pious one. Men who were not religious but wished to appear so invented

traditions to justify their manner of life. The sectarians did not hesitate to adopt the same means of spreading their own teaching. Many Moslem writers testify to the fact that forged traditions were circulated, and that religious opinion was confused thereby. The need for some sort of authoritative collection seems to have been felt by the one pious Omayyad caliph, Omar II. (717-720), who is said to have ordered Ibn Shihab uz-

Zuhri to make such a collection. Of this work, if it was carried out, we know nothing further. It was, however, by a man born during this reign that the first systematic collection of traditions was made — the Muwatta' of Malik ibn Anas (q.v.). Yet this work is not a book of tradition in the religious sense. It is really a corpus juris and not a complete one. The object of Malik was simply to record every tradition that had been used to give effect to a legal decision. The work of sifting the vast mass of traditions and arranging them according to their relation to the different parts of religious life and practice was first undertaken in the 3rd century of Islam (a.d. 815-912). In this century all the six collections afterwards regarded as canonical by the Sunnites (ortho- dox) were made. By this time an immense number of traditions was in circulation. Bukhari in the course of sixteen years' journey- ing through Moslem lands collected 600,000, and of these included 7275 (or, allowing for repetitions, 4000) in his work. The six collec- tions of tradition received by the Sunnites as authoritative are: (i) The Kitab ul-jami' us-Safith of Bukhari (q.v.) (810-870). This is the most respected throughout the Moslem world and most carefully compiled (ed. L. Krehl and T. W. Juynboll, Leiden, 1862— and frequently in the East; also with many commentaries. French translation by 0. Houdas and W. Marcais, Paris, 1903 sqq.). (ii) The Salfih of Muslim (817-875) with an introduction on the science of tradition (ed. Calcutta, 1849, &c). (iii) The Kitab us-Sunan of Abu Da'ud (817-888) (ed. Cairo, 1863, Lucknow, 1888, Delhi, 1890). (iv) The J ami' us-Saij.il} of Tirmidhl (q.v.). (v) The Kitab us-Sunan of Nasa' 1 (830-915) (ed. Cairo, 1894). (vi) The Kitab us-Sunan of Ibn Maja (824-866) (ed. Delhi, 1865 and 1889). The last four are not held in the same repute as the first two.

3. Ijma is the universal consent which is held to justify practices or beliefs, although they are not warranted by the Koran or tradition, and may be inconsistent with the apparent teaching of one or both of these. These beliefs and practices, which had often come from the pre-Islamic customs of those who' had become believers, seem to have escaped notice until the Abbasid period. They were too deeply rooted in the lives of men to be abolished. It became necessary either to find a tradition to abrogate the earlier forbidding one, or to acknowledge that ijma is higher than the tradition. The former expedient was resorted to by some later theologians (e.g. Nawawl) by a fiction that such a tradition existed though it was not found now in writing. But in earlier times some (as Ibn Qutaiba) had adopted the latter alternative, saying that the truth can be derived much earlier from the ijma than from the tradition, because it is not open to the same chances of corruption in its transmission as the latter. Tradition itself was found to confirm this view, for the Prophet is related to have said, " My people does not agree to an error."

But ijma' itself has been used in different senses: (i) The ijma of Medina

was used to indicate the authority coming from the prac- tices of the people of Medina (see below), (ii) The ijma' pi the whole community of Moslems is that most commonly recognized. It was used to support fealty to the Abbasid dynasty. By it the six books of tradition mentioned above are recognized as authoritative, and it is the justification of the conception of Mahomet as superhuman, (iii) Some of the more thoughtful theologians recognize only the ijma' of the doctors or the teachers of Islam (the mujtahidun), these being restricted by the orthodox to the first few generations after Mahomet, while the Shi'ites allow the existence of such up to the present time.

4. The fourth basis of Islam is qiyds, i.e. analogy. It is that process by which a belief or practice is justified on the ground of something similar but not identical in the Koran, the tradition or ijma. Originally it seems to have been instituted as a check upon the use of private opinion (ra'y) in the teaching of doctrine. The extent to which it may be used is a subject of much discussion among theologians. Some would apply it only to a " material similarity," others to similarity of motive or cause as well.

Worship and Ritual. — The acts of worship required by Islam are five in number: (i) the recital of the creed; (ii.) observance of the five daily prayers; (iii) the fast in the month of Rama- dhan; (iv) giving of the legal alms; (v) the pilgrimage to Mecca.

i. The creed is belief — " la ilaha illa-llahu, Muhammad rasiil allahi," "there is no god but God (Allah), Mahomet is the apostle of God." It is required that this shall be recited at least creed once in a lifetime aloud, correctly, with full understand- ing of its meaning and with heartfelt belief in its truth. It is to be professed without hesitation at any time until death.

ii. Every man who professes Islam is required in ordinary life to pray five times in each day. In the Koran these prayers are commanded, though four only are mentioned. " Where- praver fore glorify God, when the evening overtaketh you, and when ye rise in the morning, and unto Him be praise in Heaven and earth; and in the evening and when ye rest at noon " (xxx. 16-17), but commentators say the " evening " includes the sunset and after sunset. The five times therefore are : (1) Dawn or just before sunrise, (2) just after noon, (3) before sunset, (4) just after sunset, and (5) just after the day has closed. Tradition decides within what limits the recitals may be delayed without impairing their validity. Prayer is preceded by the lesser ablution (wadu) consisting in the washing of face, hands (to the elbows) and feet in prescribed manner. Com- plete washing of the body (ghusl) is required only after legal pollu- tion. In prayer the worshipper faces the qibla (direction of prayer), which was at first Jerusalem, but was changed by the Prophet to Mecca. In a mosque the qibla is indicated by a niche

(mih-rab) in one of the walls. The prayers consist of prescribed ejaculations, petitions, and the recital of parts of the Koran, always including the first sura, accompanied by prostrations of the body. Detailed physical positions are prescribed for each part of the worship ; these vary slightly in the four orthodox schools (see below). On a journey, in time of war or in other special circumstances, the set form of prayers may be modified in accordance with appointed rules. Besides these private prayers, there is the prayer of the assembly, which is observed on a Friday (yaum ul-jam'a, " the day of assembly") in a mosque, and is usually accompanied by an address or declamation (hhutba) delivered from a step of the pulpit (minbar). Special prayers are also prescribed for certain occasions, as on the eclipse of the sun or the moon, &c. Among the Sufis special attention is given to informal prayer, consisting chiefly in the continual repetition of the name of God (dhikr) (see Sufi'ism). This is still a character- istic of some of the dervish (q.v.) communities.

*iii. The command to fast begins with the words, " O ye who believe! There is prescribed for you the fast, as it was prescribed for those before you." The expression " those before p ,, you " has been taken to refer to the Jews, who fasted on as *" the day of atonement, but more probably refers to the long fast of thirty-six days observed by the Eastern Christians. In the passage of the Koran referred to (ii. 179-181) Moslems are required to fast during the month of Ramadhan, " wherein the Koran was revealed," but if one is on a journey or sick he may fast " another number of days," and if he is able to fast and does not, " he may redeem it by feeding a poor man," but " if ye fast, it is better for you." This fast was probably instituted in the second year at Medina. At that time the corrected lunar year was in use and Ramadhan, the ninth month, was always in the winter. A few years later Mahomet decreed the use of the uncorrected lunar year, which remains the standard of time for the Moslem world, so that the month of fasting now occurs at all seasons of the year in turn. The fast is severe, and means entire abstinence from food and drink from sunrise to sunset each day of the month. The fast is associated with the statement that in this month God sent down the Koran from the seventh heaven to Gabriel in the lowest that it might be revealed to the Prophet, iv. Alms are of two kinds: (1) the legal and determined (zakdt), and (2) voluntary (sadaqat). The former were given in cattle, grain, fruit, merchandise and money once a year ..*

after a year's possession. For cattle a somewhat ""

elaborate scale is adopted. Of grain and fruit a tenth is given if watered by rain, a twentieth if the result of irrigation. Of the value of merchandise and of money a fortieth is prescribed. In the early days of Islam the alms were collected by officials and used for the building of mosques and similar

religious purposes. At the present time the carrying of these prescriptions is left to the conscience of the believers, who pay the alms to any needy fellow- Moslem. A good example of a sadaqa is found in a gift to an un-believer (see C. M, Doughty, Arabia deserta, i. 446, ii. 278, Cambridge,

1888).

v. The fifth religious duty of the Moslem is the pilgrimage (hajj) to Mecca, which should be performed once by every Moslem " if he is able," that is if he can provide or obtain the means to support himself on pilgrimage and his family during his p "Z" ma X e – absence, and if he is physically capable. The pilgrimage is made at one time of the (Moslem) year, namely, from the 7th to the 10th of the month Dhu'l-Hijja. For the arrangements for the journey from various countries to Mecca see Caravan. When the pilgrim arrives within five or six miles of the holy city he puts off his ordinary dress after ablution and prayer, and puts on the two seamless wrap- pers which form the dress of the pilgrim (the ihram), who goes with-out head-covering or boots or shoes. He must not shave at all, or trim the nails or anoint the head during the ceremonial period. The chief parts of the ceremonial are the visit to the sacred mosque masjid ul-fiaram), the kissing of the black stone, the compassing of

the Ka'ba (the Tawaf) seven times, three times running, four times slowly, the visit to the Maqam Ibrahim, the ascent of Mount Safa and running from it to Mount Marwa seven times, the run to Mount 'Arafat, hearing a sermon, and going to Muzdalifa, where he stays the night, the throwing of stones at the three pillars in Mina on the great feast day, and the offering of sacrifice there (for the localities see Mecca). After the accomplishment of these ceremonies the ordinary dress is resumed, the pilgrimage is finished, but the pilgrim usually remains another three days in Mecca, then visits Medina to pay his respects to the tomb of Mahomet. Beside the hajj (great pilgrimage) Islam also recognizes the merit of the 'utnra (or lesser pilgrimage), i.e. a religious visit to Mecca at any time accompanied by most of the ceremonies of the hajj.

The ceremonies of the hajj have been described by several European travellers who have witnessed them, such as J. L. Burckhardt in 1814, Sir Richard Burton in 1853 (see bibliography to Mecca). A concise account of them is given in T. P. Hughes, Notes on Muham- madanism (3rd ed., London, 1894). Details in vol. i. of Bukhari's traditions (Houdas and Marcais's French translation, i. 493-567).

The Development of Islam. — The battle of Siffln (657) between 'Ali and Moawiya was the occasion of the first breach in the unity of Islam, and the results remain to this day. The occasion was in the first case political, but politics were at that time too intimately connected with religion to be considered apart from it. After the battle (see Caliphate) 'All was practically compelled to submit his claims to arbitration, whereupon a number of his supporters broke away from him, saying that there should have been no appeal save to the Book of God. These men were for the most part country Arabs, and, inspired by the free spirit of the desert, were democratic, claiming that the caliph should be elected by the whole community from any family (and not from the Koreish alone), and that the caliph might be deposed for sin. A few extremists were republicans and would do without a caliph altogether. The whole party was known as the Kharijites (Kharijiyya or Khawarij). The Moslems who disagreed with them were regarded by them as renegades and were to be put to death. They were soon divided into extremists and moderates. The former put to death the children of unbelievers and refused to hold intercourse in daily life with unbelievers. The moderates, who came to be known as Ibadites (from their leader 'Abdallah ibn Tbad), would allow the children of unbelievers to grow up, and would then deal with them according to their choice. In ordinary life they would mix with all men, but marriage with other Moslems outside their own ranks was forbidden. These still remain in Oman, parts of Algeria and East Africa.

Another party, consisting mainly of city Arabs infected with Persian ideas as to the divinity of the ruler, clung to 'All with inconvenient affection. They regarded 'All and his descendants as the only legitimate caliphs, and came to be known as Shi'ites (q.v.). They remain to-day the largest part of Islam outside orthodoxy. During the Omayyad caliphate (661-750) there were three centres of religious thought and influence; students and teachers often passed from one to the other, thus making universal the teachings which in their origin were due to local circumstances. These centres were Damascus (the seat of the caliphate), Medina and the East (Irak, &c). In Damascus the' court was worldly and indifferent to the interests of Islam. The early Omayyads were distinguished for their striving after dominion (mulk). Instead of attempting to propagate Islam, they tolerated other religions and favoured Christians who were distinguished as poets (e.g. Akhtal) or officials (John of Damascus), or men likely to be of use to them in any way. The doctrines of Christianity began to influence even serious Moslems and to affect their way of stating Moslem belief. John of Damascus (d. before 767), the Greek theologian, and his pupil, Theodorus Abucara (d. 826), have written controversial works on Islam, from which it seems probable that disputations on subjects per- taining to religion were held between Christians and Moslems. Two schools of heretical Moslem

sects arose under these influ- ences — that of the Murjiites and that of the Qadarites. The Murjiites (" postponers ") were so called because they postponed the judgment of human actions until the Day of Judgment. In politics they accepted the Omayyads as de facto rulers, since they were Moslems, and left the judgment of their actions to God. As theologians they taught that religion consists in belief (iman) in

the unity of God and in his apostle, and in that aione, csase- quently no one who held this faith would perish eternally, though he had been a sinner. This was opposed to the Kharijite doctrine that the unrepentant sinner would perish eternally, even though he had professed Islam.

The Qadarites were concerned with the doctrine of pre- destination and free-will. So long as Moslems were fighting the battles of Islam they naturally paid most attention to those revelations which laid stress on the absolute determination of a man's destiny by God. They fought with great bravery because they believed that God had foreordained their death or life and they could not escape His will. In the quieter realm of town and court life and in their disputations with Christians they were called upon to reconcile this belief with the appeals made in the Koran to man's own self-determination to good, to courage, &c. Mahomet was not a systematic theologian and had done nothing to help them. The Qadarites declared that man had power over his own actions. But the teaching of predestination had gained too great a hold on Moslems to be thus displaced. The teaching of the Qadarites was held to be heresy, and one of its first pro- fessors, Ma'bad ul-Juham, was put to death in 699. l During this period Medina was the home of tradition. Those who had been in closest relation with the Prophet dwelt there. The very people of the city derived a certain splendour and authority from the fact that Mahomet had lived and was buried there. Free thought in religion had little chance of arising, less of ex- pressing itself, in the holy city. But the Koran was diligently studied, traditions were collected (and invented) though not yet written in books, and innovation (bid'a) was resolutely avoided. At the same time it really did contribute a new element to religious practice, for the custom (ijmcC , see above) of Medina gained a certain authority even in Syria and the East.

In the East, on the other hand, there was more mental activity, and the religious teachers who came from Medina had to be pre- pared to meet with many questions. The wits of the Moslems were sharpened by daily contact with Christians, Buddhists, Manichaeans and Zoroastrians. Hasan ul-Basrl (q.v.), who has been claimed as one of the first mystics, also as one of the first systematic theologians of Islam, was remarkable alike for his personal piety and his orthodoxy. Yet it was among his pupils that the great rationalist movement originated. Its founder was Wasil ibn 'Ata, who separated himself (whence his followers were called Motazilites, strictly

Mu'tazilites, " Separatists ") from his teacher and founded a school which became numerous and influential. The Mu'tazilites objected to the attributes of God being considered in any way as entities beside God; they explained away the anthropomorphisms used in speaking of the deity; they regarded the Koran as created and as a product of Mahomet writing under the divine influence. Briefly, they asserted the supremacy of reason ('aql) as distinct from faith received by tradition (naqT). They also called themselves " the people of justice and unity " (Akl ul-'adl wat-tauhid). Such a faith as this naturally found favour rather with the thinking

**sses than with the uneducated multitude, and so went through ny vicissitudes. At the time of its appearance and until the reign of Ma'mun its adherents were persecuted as heretics. After discussions among the theologians Ma'mun took the decided step of proclaiming that the Koran was created, and that a belief in this dogma was necessary. Other Mu'tazilite doctrines were proclaimed later. Mu'tazilites were appointed to official posts, and an inquisition (mihna) was appointed to enforce belief in their doctrines. This movement was strongly opposed by the orthodox and especially by Ahmad ibn Hanbal (q.v.) . By him the founding of theology on reason was rejected, and he suffered persecution for his faith (see W. N. Patton, Ahmed ibn Hanbal and the Mihna, Leiden, 1897). Mu'tazilism retained its sway until 849, when the caliph Motawakkil again declared the Koran uncreate and restored orthodoxy. It was during the early years of the Abbasid*

1 For the doctrines of these two sects see Shahrastani's Book of Sects, and for the Qadarites, A. de Vlieger's Kitab ul-Qadr, materiaux pour servir a I 'etude de la doctrine de la predestination dans la theologie musulmane (Leiden, 1903).

rule that the four legal schools of Abu Hanlfa (d. 767), Malik ibn Anas (d. 795), ash-Shafi'I (d. 819) and Ibn Hanbal (d. 855) came into existence (see Mahommedan Law). As the bases of religion and law were the same, so the methods applied in the treatment of the one affected the other. Abu Hanlfa depended little on tradition, but referred back to the Koran, making use of indi- vidual opinion (ray) as controlled by analogy (qlyds) with a written ordinance. Malik Ibn Anas supplemented the Koran and Sunna by customary law founded largely on the custom (ijma') of Medina, and by what he conceived to be for the public good (istisldh) . Shafi'I recognized tradition as equal to the Koran, and even as being able to supersede its ordinances, while he also recognized the universal custom (ijma') of the

Moslem world as divine and binding. His four bases of religion — Koran, sunna, qiyas and ijma' — have been generally accepted in Islam (see above) . Ibn Hanbal's position has been already mentioned . All these four schools are reckoned orthodox, and all orthodox Moslems belong to one or another of them. Another teacher of this time, who founded a school which did not succeed in being recognized as orthodox, was Da'Qd uz-Zahiri. Trained as a Shafi'ite, he became too strict for this school, rejected analogy, restricted ijma' to the agreement or custom of the companions of Mahomet, and accepted the whole of the Koran and tradition in the most literal and external sense. His followers were called Zahirites (i.e. externalists). After Ash'ari's time these principles were applied to theology by Ibn Hazm (g.v.) see I. Goldziher, Die Zahiriten, ihr Lehr system und ihre Geschichte (Leipzig, 1884). Before turning to the reform of Ash'ari and the introduction into orthodox theology of scholastic philosophy it is necessary to notice another phase of religious life which became the common property of orthodox and heretics. This was the introduction of asceticism in religious practice and of mysticism in religious thought. Sufi'ism (q.v.), which combined these two, is rightly not counted among the sects of Islam. Asceticism seems to have won a certain amount of approval from Mahomet himself, who much respected the Christian monks. The attention paid in early Islam to the joys and punishments of. the future life led to self- denial and simple living in this world. An Arabian writer, speak- ing of the simplicity of manners of the first four caliphs, says that their affairs were conducted with more consideration of the future life than of this world. Many Moslems went even farther than these caliphs, and gave up all concern as far as possible with the affairs of this world and lived in poverty, in wanderings or in retirement (see Dervish). For the historical development of this movement, with its accompanying mysticism, see Sufi'ism. Ash'ari (d. before 942) was for forty years a Mu'tazilite, then became orthodox (see Ash'ari), and at once applied rational methods for the support and interpretation of the orthodox- faith. Before him, reason had not been allowed any scope in orthodox theology. He was not the first to use it; some teachers (as al-Junaid) had employed it in teaching, but only in secret and for the few. The methods of scholastic philosophy were now introduced into Moslem theology. The chief characteristic of his religious teaching was the adoption of the via media between materialistic grossness and the ideas of pure speculative philo- sophy. Thus he taught, as to the attributes of God, that they exist, but are not to be compared with human attributes; as to His visibility, that He can be seen but without the limitations of human sight. As to the great question of freewill, hedeniedman's power but asserted his responsibility. So he passed in review the doctrines of God, faith, the Koran, sin, intercession, &c, and for the first time in the history of Islam produced a systematic theology. The teaching of Ash'ari was taken up and propagated by the Buyids soon after

his death, and was developed and perfected by Abu Bekr ul-Baqilanl, the Cadi (d. 1012), but up to the middle of the 5th century of Islam (c. a.d. 1058) was suspected elsewhere and confounded with Mu'tazilism. The Ash'arite al-Juwaini (known as Imam ul-Haramain) was perse- cuted under Toghrul Beg (c. 1053) and exiled, but was restored under Alp Arslan by the vizier Nizam ul-Mulk, who founded an Ash'arite college (the Nizamiyya) . In the West, Ibn Hazm (q.v.) fiercely opposed the system, but Ghazall established its orthodoxy

in the East, and it spread from Persia to Syria and Egypt under the Ayyubites and Mamelukes and thence to the Almohades in Africa under Ibn Tumart (1130). It remains the predominating influence to the present day, its only serious rival being the theological system of al-Mataridl, a Hanifite (d. 945), whose creed as represented in that of an-Nasafl is still used largely by the Turks. Since the 12th century no great theological movement has been made in Islam. The quiet of religious life has twice been broken, once by Wahhabism (q.v.) in Arabia, once by Babism (q.v.) in Persia.

The Sects

According to an early tradition Mahomet said that Islam would be divided into seventy-three parties (sects), 1 of which seventy-two would perish and one would be saved. The orthodox Arabian writers on heretical sects of Islam feel compelled by this tradition to make up their number to seventy-two, and, as different writers adopt different divisions or are familiar with different parties, the names of sects amount to some hundreds. Each writer, however, adopts certain main classes under which he attempts to group the others. Abu Mutf Makhul at the beginning of the 10th century in his " Refutation " (MS. in Bodleian Library) has six such chief classes: Harurites (i.e. Kharijites), Rafidites (i.e. Shi'ites), Qadarites, Jabarites, Jahmites and Murjiites. Ibn Hazm {q.v.) adopts four classes: Mu'tazilites (Motazilites), Murjiites, Shi'ites and Kharijites. ShahrastanI (q.v.) complains of the want of system in earlier writers, and suggests as bases of classification the position of parties with regard to the doctrines as to (1) the divine attributes, (2) predestination and free-will (3) promises and threats, faith and error, (4) revelation, reason, the imamate. In one part of his preface he gives as the chief parties the Qadarites, Sifatites, Kharijites and Shi'ites, proposing to divide these classes accord- ing to leaders who agreed with the main doctrines of their class but differed in some points. In another place he mentions four opposite pairs of sects: (1) the Qadarites with their doctrine of free-will, and the Jabarites, who are necessitarians; (2) the Sifatites, who maintain the eternal nature of the attributes of God, and the Mu'tazilites, who deny it; (3) the Murjiites, who postpone judgment of actions until the Last Day, and the Wa'idites, who condemn in this life; (4)

the Kharijites, who consider the caliphate a human institution, and the Shi'ites, who deify their ruler. In his detailed treatment of the sects Shahrastanl arranged them under the headings: Mu'tazilites, Jabarites, Sifatites, Kharijites, Murjiites and Shi'ites. About the same time as ShahrastanI two other Arabian writers wrote on the sects — Tahir ul-Isfarainl (d. 1078), whose MS. is in the Berlin library, and 'Abd ul-Qadir ul-JIlanl (1078-1166) in his Kitab ul-Ghanlyya li-Talibi Tariq il-Haqqi (Cairo, 1871). Both adopt as main classes Rafidites (or Shi'ites), Qadarites (or Mu'tazilites), Khari- jites, Murjiites, Najjarites, Dirarites, Jahmites, Mushabbiha, to which Tahir adds Bakrites, Karramites, and a class including those sects which are not reckoned as Moslem though they have sprung from Islam. Jllani adds to the eight the Kilabites.

The following list is not a complete list of names of sects but is founded on that of ShahrastanI. 2

Aftahiles. — Shi'ites of the Imamite class, who ascribe the imamate to 'Abdallah ul-Aftahi, the son of Sadiq.

Ajarida. — Kharijites, followers of Ibn 'Ajarrad, who agreed for the most part with the Najadat (below), considered grave sins as equivalent to unbelief, but remained friendly with those who pro- fessed Islam but did not fight for it. They rejected sura 7 as a fable. ShahrastanI enumerates seven divisions of this sect.

1 For the origin and significance of this number see M. Steinschnei- der, " Die kanonische Zahl der muhammedanischen Secten und die Symbolik der Zahl, 70-73," in Zeitschr. d. deutschen morgenl. Gesellschaft, iv., 145-170 (1850); and I. Goldziher, " Le Denombre- ment des sectes mohametanes " in Revue de I' hist, des religions, xxvi. 129-137 (1892).

2 The names are given throughout in the anglicized form on the analogy of Shi'ites, which is recognized in common usage. The strict termination according to the scheme of transliteration adopted in this work is iyya, or iya, e.g. Hishamiyya for Hishamites. For information regarding the important sects see separate articles and the preceding portion of this article.

Akhnasites. — A section of the Tha'aliba not so strict in treatment of those who fear to fight for Islam.

Ash'arites. — Followers of Ash'arl (q.v.) who are counted by Shah- rastani

among the Sifatites.

Afrdfites. — A division of the 'Ajarida who agree with the yamzites except that they excuse the lower classes for inaction when they are ignorant of the law.

Azraqites. — Kharijites who followed al-Azraq in the days of Ibn Zubair. They held 'Ali to be an unbeliever; those who did not fight were unbelievers; the children of unbelievers were to be put to death and went to hell. Sin is unbelief.

Bahshamites. — Mu'tazilites akin to the Jubba'ites. Baihasites. — Kharijites, followers of Abu Baihas ul-Haitham, who was put to death by the caliph Walid. They asserted the necessity of knowledge for religion.

Baqirites. — Shi'ites who followed Abu Ja'far ul-Baqir, the fifth imam, and looked for his return.

Batinites. — Isma'ilites, so called because they believe that every external has an internal (bdtin), and every passage in the Koran has an allegoric meaning.

BisArrtes.— Mu'tazilites, followers of Bishr ibn Mu'tamir, one of the most learned men of his party. His teaching was philosophical and was distinguished by his doctrine of " origination " (tawallud). Bundnites. — Kaisanites, followers of Bunan ibn Sim'an un-Nahdi, who claimed that the imamate passed from Abu Hashim to himself and that he had also acquired the divine element of 'Ali.

Butrites. — Zaidites, followers of Kathir un-Nawa ul-Abtar, who agreed with the Suleimanites (Sulaimanites) except that he suspended judgment as to whether Othman was a believer or not.

Dirdrites. — Jabarites who empty God of his attributes, and assert that man has a sixth sense by which he will see God on the day of resurrection. The actions of man are " created " and acquired by him. A caliph need not be chosen from the Koreish.

Ghaliites (Ghula) are the extreme Shi'ites (q.v.) in ascribing deity to the imams. Their heresies are said to be four in number: (1) Making God resemble man, (2) ascribing change of mind to God, (3) looking for the return of the imam, (4) metempsychosis. They are divided by Shahrastani into ten classes.

Ghassdnites. — Murjiites, followers of Ghassan ibn ul-Kufi, who say that faith consists of knowledge of God, his apostle, and the Koran in general

not in detail, and that faith increases but is not diminished. Habitites = Hayitites (below).

Hadathites (Hudabites) are Mu'tazilites, followers of Fadl ibn ul-Hadathi, who agreed with the Hayitites (below).

Hafsites. — Ibadites, followers of Hafs ibn abl-l-Miqdam, who distinguished between idolatry (shirk) and unbelief (kufr).

Ilamzites. — 'Ajarida, followers of Hamza ibn Adrak in Sijistan. They agree with the Maimunites, but condemn the children of unbelievers to hell.

Hdrithites. — Ibadites who differ from others in holding the Mu'taz- ilitc doctrine of free-will.

Hariirites. — A name given to the first Kharijites, who rebelled against 'Ali, and met in Harura near Kufa.

Hdshimites. — Shi'ites who supported Abu Hashim, son of Mahom- med ibn ul-Hanafiyya, although they held that his father had gone astray.

Hashwiites. — A party who asserted the eternity even of the letters of the Koran. They are not mentioned as a separate sect by Shah- rastani; cf. van Vloten, " Les Hachwia et Nabita," in the Acts of the nth Oriental Congress (Paris, 1899), pt. iii., pp. 99 sqq.

Hayitites. — Mu'tazilites who agreed with the Nazzamites, but added three heresies of their own: (1) the divinity of the Messiah, {2) metempsychosis, (3) the interpretation of all references to the vision of God as referring to the "first Reason" or "creative Reason."

Hishdmites. — A name given to two sects: (1) Mu'tazilites, strong in their assertion of man's free-will, even opposing the statement of the Koran. (2) Shi'ites of the extreme kind, who attributed to God a body with quantities (measurements) and qualities. Hudabites. — See Hadathites.

Hudhailites (Hodhailites). — Mu'tazilites, followers of Abu-1 Hud- hail Hamdan, who was a leading teacher of his party and developed the philosophical side of its teaching. Ten of his main doctrines are given by Shahrastani.

Ibadites. — Kharijites of moderate tendencies (see above). Ilbdites. — Ghaliites who put 'All above Mahomet and blamed the latter because he called men to himself instead of to 'All. Imdmites. — One of the chief divisions of the Shi'ites (q.v.). Ishdqites. — Ghaliites agreeing with the Nusairites except that they incline to speak of the imams' participation in

the prophetic office rather than of their divinity.

Isma'ilites. — This name is applied to all who consider Isma'il ibn Ja'far the last imam, some believing that he did not die but will return, others, that at his death his son Mahommed became imam (see Assassins) ; it is also used as equivalent to the Batinites.

Ithna'asharites. — Imamites who accept the twelve imams (see Shi'ites).

Jabarites. — Those who deny all actions and power to act to man and ascribe all to God (see above).

Ja'fariles. — Imamites who carry the imamate no farther than Ja'far us-Sadlq.

Jdhizites. — Mu'tazilites, followers of the celebrated writer Jahiz (q.v.), who indulged in philosophical speculations, believed in the eternity of matter, and was regarded as a naturalist (faba'l) rather than a theist (allahl).

Jahmites. — Jabarites, followers of Jahm ibn Safwan, who was put to death at Merv toward the close of the Omayyad period. He was extreme in his denial of the attributes of God.

Jdrudites. — Zaidites who held that Mahomet designated 'AH as imam, not by name but by his attributes, and that the Moslem sinned by not taking sufficient trouble to recognize these attributes.

Jubbd'itcs.ˆ — Mu'tazilites who followed the philosophical teaching of Abu 'Ali Mahommed ul-Jubba'i of Basra. Kaisanites.— A main class of the Shi'ites (q.v.). Kamilites. — Ghaliites, followers of Abu Kamil, who condemned the companions (Ansar) because they did not do allegiance to 'Ali, and 'All because he surrendered his claims.

Karrdmites. — Sifatites, followers of Ibn Karram, who went so far as to ascribe a body to God, and assimilated his nature to human nature.

Kayydlites. — Ghaliites, followers of Ahmad ibn Kayyal, who, after supporting a propaganda for an Aliite, claimed to be the imam himself on the ground of his power over the spheres.

Khalafites. — '"Ajarida of Kerman and Multan, who believed that God wills good and evil, but condemned the children of unbelievers to hell.

Kharijites.— -One of the earliest sects of Islam (see above). Khdrimites. — 'Ajarida, agreeing mostly with the Shu'aibites and teaching that the relation

of God to a man depends on what he professes at the end of his life.

Khaftabites. — Ghaliites, followers of Abu-1 Khattab, who was put to death by Ibn Musa at Kufa. He was a violent supporter of Ja'far us-Sadiq, who however disowned him.

Khayyatites. — Mu'tazilites, followers of Abu-1 Hosain ul-Khayyat, a teacher in Bagdad, part of whose philosophical teaching was that the non-existent is a thing.

Ma'badites. — Tha'labites who differed from the Akhnasites on the question of the marriage of believing women and from Tha'lab on the question of taking alms from slaves.

Maimunites. — 'Ajarida, followers of Maimun ibn Khalid, who believed that God wills good only and that man determines his actions.

Majhulites. — Tha'labites, agreeing generally with the Kharimites, but teaching that he who knows some names and attributes of God and is ignorant of some knows God.

Ma'lumites. — Tha'labites agreeing generally with the Kharimites but alleging that a believer must know all the names and attributes of God.

Mansurites. — Ghaliites, followers of Abu Mansur ul-'Ijli, who at first supported al-Baqir, but, rejected by him, claimed the imamate for himself. He was crucified by the caliph Hisham ibn 'Abd ul- Malik (Abdalmalik).

Mu'ammarites. 1 — Mu'tazilites who strongly denied the pre- destination of God, and affirmed that God created bodies only, and that the accidents spring naturally from them. Mufaddalites . l — The same as the Mfisaites (q.v.). Mughlrites. 1 — Ghaliites, followers of Mughira ibn Sa'id ul-'Ijli, who claimed the imamate and prophetic office and held extremely gross views of God.

Muhakkima 1 (the first). — Another name for the Hariirites (above), Mukarramites. 1 — Tha'labites who taught that sin consists in ignorance of God.

Mukhtdrites. 1 — Kaisanites, followers of al-Mukhtar ibn 'Ubaid, who held to Mahommed ibn ul-Hanafiyya but was disowned by him. He allowed the possibility of change of mind on the part of God.

Murjiites. — Those who postponed judgment of actions until the Day of Judgment. See above.

Musaites. — Imamites who held to the imamate of Musa ibn Ja'far, who was imprisoned by Harun al-Rashid and poisoned.

Mushabbiha. 1 — Sifatites who compared God's actions with human actions. They said that the Koran was eternal with all its letters, accents and written signs.

Mu'tazilites. 1 — The rationalists of Islam. See above, cf. also H. Steiner, Die Mu'taziliten oder die Freidenker im Islam (Leipzig,

1865). _ ,

Muzddrites.' — Mu'tazilites, followers of al-Muzdar, a pupil of Bishr (cf. Bishrites) whose teaching he developed further. He taught that God has power to do evil, but, if he acted thus, would be an evil God ; also that man can produce the equal of the Koran.

Najadat (also known as 'Adhirites). — Kharijites, who followed Najda ibn 'Amir of Yemama as he went to join the Azraqites but withdrew from these, being more orthodox than they. He held that fear of fighting was not sin.

Nawisites take their name from a person or a place. They are Ja'farites who believe in Sadiq as the mahdi.

1 All these names are alternatively spelt Mo- instead of Mu-.

Nazzdmites. — Mu'tazilites, followers of Ibrahim ibn Sayyar un-Nazzam, who was an extremist in his teaching of man's free-will and other philosophical doctrines.

Nu'manites. 1 — Ghaliites agreeing in some points with Hishamites, but holding that God is a light in the form of a man, yet not a body.

Nusairites. 1 — Ghaliites who agree with the Ishaqites except that they lay more stress on the incorporation of the deity.

Qadarites. — The upholders of free-will (see above).

Qata'ites. — MOsaites who regard the rank of the imams as closed with the death of Musa.

R&fidites. — A term used by some writers to denote the Shi'ites as a whole; by dthers given to a class of the Shi'ites who forsook Zaid ibn 'All because he forbade them to abuse the Companions.

Rashidites. — Tha'labites, followers of Rashid ut-Tusi, sometimes called 'Ushrites (" thhers ") because they differed from others on the question of tithing the produce of land watered by rivers and canals.

Rizamites. — Kaisanites of Khorasan at the time of Abu Muslim, to whom they ascribed the imamate and the Spirit of God. They also believed in metempsychosis.

Saba'ites. — Ghaliites, who followed 'Abdallah ibn Saba (see Shi'ites).

Salihites. — (a) Zaidites, followers of al-Hasan ibn S&lih, who agreed with the teachings of the Butrites (above) ; (b) Murjiites, followers of Salih ibn Amr, who united with the doctrines of their own party those of the Qadarites.

Saltites. — Ajarida who had nothing to do with the children of believers until they had grown up and professed Islam.

Shaibanites. — Tha'labites, followers of Shaiban ibn Salama, who was killed in the time of Abu Muslim (Moslem). They arose chiefly in Jorjan and Armenia and agreed in doctrine with the Jahmites.

Shamitites. — Ja'farites, followers of Yahya ibn Abu Shamlt.

Shi'ites. — See separate article.

Shu'aibites. — 'Ajarida who said that God creates the actions of men, and men appropriate them.

Sifalites are those who ascribe eternity to all the attributes of God, whether they denote essence or action, or are of the class called descriptive attributes.

Sifrites, the same as Ziyadites (below).

Sulaimanites (Suleimanites). — Zaidites, followers of Suleiman ibn Jarir, who held that the appointment to the imamate was a matter of consultation and that the imamates of Abu Bekr and Omar were legal although 'All had a better claim.

Tha'labites. — A party of the Kharijites, followers of Tha'lab ibn Amir, who agreed with the 'Ajarida except that he was friendly with children until they actually denied the faith. He also took alms from slaves when they were rich, and gave alms to poor slaves.

Thaubanites. — Murjiites who said that faith consists in the know- ledge

and confession of God and His apostle, and what the intellect is not capable of doing. What the intellect can do (or leave) is not of faith.

Thumamiies. — Mu'tazilites, followers of Thumama ibn Ashras in the days of Mamun, who taught that all non-Moslems would become dust on the day of resurrection.

Tumanites. — Murjiites who taught that faith depends on obedience rather to the principles than to the commands of Islam.

'Ubaidites. — Murjiites who believed that anything but idolatry might be forgiven, and that if a man died professing the unity of God his sins would not hurt him.

Wa'idites. — Those who, opposed to the Murjiites, pronounced judgment in this life; they are not counted as a separate sect by Shahrastani (see above).

Wasilites. — A name given to those who followed Wasil ibn 'Ata, the founder of Mu'tazilitism, who denied the attributes of God, asserted the power of man over his own actions, taught the existence of a middle place between heaven and hell, and despised the parties of Othman and All alike.

Yazldites. — Ibadites who said that they followed the religion of the Sabians in the Koran, and believed that God would send an apostle from the Persians.

Yunusites. — Murjiites who taught that faith consists in know- ledge of God, subjection to Him, abandonment of pride before Him, and love in the heart. Obedience apart from knowledge is not of faith. Zaidites. — The moderate Shi'ites (see Shi'ites). Ziyadites. — Kharijites, followers of Ziyad ibn ul-Asfar, who did not regard those who abstained from fighting for Islam as unbelievers, and did not kill the children of idolaters or condemn them to hell.

Authorities. — For the philosophy and theology of Ash'ari see M. A. F. Mehren, Expose de la reforme de I'lslamisme par Abou-'l Hasan AH el-Ash'ari (Leiden, 1878); W. Spitta, Zur Geschichte Abu-l Hasan al-Ash'arls (Leipzig, 1876); M. Schreiner, Zur Geschichte des Ash'aritenthums (Leiden, 1891); D. B. Macdonald, Development of Muslim Theology, Jurisprudence and Constitutional Theory (London, 1903). The last work contains translations of the creeds of Ash'ari and Nasafi (Mataridite). A further biblio- graphy of works on the faith and outlook of Islam will be found in D. B. Macdonald's Muslim Theology.

1 These names are alternatively spelt No- instead of Nu-.

The text of the Koran has been edited by G. Fltigel, Leipzig, various dates; and by G. M. Redslob, Paris, 1868 and 1880. There are also hundreds of Eastern editions. Concordances have been published by G. Fliigel, Leipzig, 1842 (several times reprinted), also in Egypt, Palestine and India. A dictionary and glossary were published by J. Penrice, London, 1873. English translations have been made by G. Sale, London, 1734 (the fullest edition is that with notes by E. M. Wherry, 4 vols., London, 1882-1886) ; by J. M. Rodwell with notes, London, 1861 and 1876; and by E. H. Palmer in vols, vi. and ix. of the " Sacred Books of the East," Oxford, 1880-1882. Among the best or best-known Arabic commentaries are those of Tabarf (q.v.), Zamakhshari (q.v.), Baidhawi (q.v.), the Jalalain (see Suyuti), and such later ones as the Mafatih ul-Ghaib of ar-Razi (d. 12 10). The composition and theology of the Koran are treated in the works of Noldeke and Grimme referred to above.

On the eschatology of Islam see M. Wolff, Muhammedanische Eschatologie (Leipzig, 1872) ; and on the doctrine of revelation, Otto Pautz, Muhammeds Lehre von der Offenbarung (Leipzig, 1898).

(G. W. T.)

MAHONY, FRANCIS SYLVESTER (1804-1866), known as " Father Prout," Irish priest and author, son of a woollen manu- facturer, was born in Cork in 1804. His classical education was chiefly obtained at a Jesuit college at Amiens, and after studying in Paris he entered the Jesuit college at Rome and was admitted into the Society of Jesus. He served in' Switzerland and at Clongoweswood, Ireland, where he was prefect of studies and subsequently master of rhetoric. Here he was involved in scandals that led to his resignation. On going to Italy he was told at Florence that he was expelled from the Society. He succeeded, however, in obtaining priest's orders at Rome in 1832, and returned to Ireland, but subsequently went to London, officiating for some time in the chapel of the Bavarian Legation. While there he fell in with William Maginn, and about 1834 began to contribute his celebrated " Prout Papers " to Fraser's Magazine. These consist of episodes in the life of the parish priest " Father Prout," and dialogues after the model of " Chris- topher North," varied by translations of well-known English songs into Latin, Greek, French and Italian verse, which he humorously represents as being the true originals from which the English authors had merely plagiarized them. Mahony's trans- lations have been universally admired for the extraordinary command which they display of the various languages into which his renderings are made, and for their spirit and freedom both of thought and expression. His original verse tends chiefly to show that with all his sarcastic and cynical wit his genius had also its tender, serious and sentimental side. His " Bells of Shandon " has always been greatly

admired. In 1846 Mahony became correspondent at Rome to the Daily News, and his letters from that capital gave very vivid pictures of the first years of the reign of Pius IX. The last twelve or fifteen years of his life were spent in Paris, whence he supplied the Globe with a series of piquant letters on the incidents of the day. He died in Paris on the 18th of May 1866.

The Reliques of Father Prout were collected from Fraser's Magazine and published in two volumes in 1836; The Final Reliques of Father Prout, chiefly extracted from the Daily News and the Globe, were edited by Blanchard Jerrold in 1876, and an edition of his works, edited by Charles Kent, was published in 188 1.

MAHOUT (Hind, mahawat) , an elephant-driver. The mahout sits on the elephant's neck and directs him by voice and by the use of a goad called ankus.

MAHRATTAS, a people of India, inhabiting the district known by the ancient name of Maharashtra (Sans. " great kingdom or region"). This large tract, extending from the Arabian Sea on the west to the Satpura mountains in the north, comprises a good part of western and central India, including the modern provinces of the Konkan, Khandesh, Berar, the British Deccan, part of Nagpur, and about half the nizam's Deccan.

The etymology of the word Mahratta (Marathd) is uncertain. The name does not indicate a social caste, of a religious sect; it is not even tribal. Strictly, it is confined to the upper class from whom Sivaji's generals were mostly drawn, and who some- times claim a Rajput origin. In a wider sense it may be ex- tended to include all who inhabit Maharashtra and speak Mahratti as their mother-tongue. In 1901 the total number of speakers of Mahratti in all India exceeded 18 millions.

MAHRATTAS

The Mahrattas have always been a separate nation or people, and still regard themselves as such, though nowadays they are almost all under British or Mahommedan jurisdiction; that is, they belong either to British India or to the nizam's domi- nions. There are indeed still three large native states nominally Mahratta: that of Sindhia near the borders of Hindustan in the north, that of Holkar in Malwa in the heart of the Indian con- tinent, and that of the gaekwar in Gujarat on the western coast. But in these states the prince, his relatives and some of his ministers or officials only are Mahrattas; the mass of the people belong to other sections of the Hindu race. These states then are not to be included in the Mahratta nation, though they have a share in Mahratta history.

In general terms the Mahrattas, in the wider sense, may be described under two main heads: first the Brahmans, and secondly the low-caste men. The Mahratta Brahmans possess, in an intense degree, the qualities of that famous caste, physical, intellectual and moral. They have generally the lofty brow, the regular features, the spare upright figure, and the calm aspect which might be expected in a race maintained in great purity yet upon a broad basis. In modern times they have proved themselves the most able and ambitious of all the Brahmans in the Indian Empire. They are notably divided into two sections: the Konkanast, coming from the Konkan or littoral tract on the west coast below the Western Ghat mountains; and the Deshast, coming from the uplands or Deccan, on the east of the mountains. Though there have been many distinguished Deshasts, yet the most remarkable of all have been Konkanasts. For instance, the peshwas, or heads of the Mahratta confederation which at one time dominated nearly all India, were Konkanast Brahmans. The birthplaces of these persons are still known, and to this day there are sequestered villages, nestling near the western base of the Ghats, which are pointed to as being the ancestral homes of men who two centuries ago had political control over half India.

Apart from the ' Brahmans, the Mahrattas may be generally designated as Sudras, the humblest of the four great castes into which the Hindu race is theoretically divided. But the upper classes claim to be Kshattriyas or Rajputs. They probably are aborigines fundamentally, with a mixture of what are now called the Scythian tribes, which at a very early time overran India. The ordinary Mahrattas, who form the backbone of the nation, have plain features, an uncouth manner, short stature, a small but wiry frame. Though not powerful physically as compared with the northern races of the Punjab and Oudh, they have much activity and an unsurpassed endurance. Born and bred in or near the Western Ghat mountains and the numerous tributary ranges, they have all the qualities of mountaineers. In recent times they enter military service less and less, betaking themselves mainly to culti- vation and to the carrying business connected with agriculture. As husbandmen they are not remarkable; but as graziers, as cart- men, as labourers, they are excellent. As artisans they have seldom signalized themselves, save as armourers and clothweavers.

In the Konkan there are some superior proprietors termed Khots. With this and perhaps some other exceptions, there are not in the Mahratta country many large landlords, nor many of the superior tenure-holders whose position relatively to that of the peasantry has caused much discussion iu other parts of India. There are indeed many Mahratta chiefs still resident in the country, members of the aristocracy which formerly enjoyed much wealth and power. They are sometimes in the position of landlords, but often they are the assignees of the land revenue, which they are entitled

under special grants to collect for themselves instead of for government, paying merely a small sum to Government by way of quit-rent. Under them the cultivators are by British arrangements placed in the position of peasant proprietors. The village community has always existed as the social unit in the Mahratta territories, though with less cohesion among its members than in the village com- munities of Hindustan and the Punjab. Theancient offices pertaining to the village, as those of the headmen (patel), the village accountant, &c, are in working order throughout the Mahratta country.

The Mahratta peasantry possess manly fortitude under suffering and misfortune. Though patient and good-tempered in the main, they have a latent warmth of temper, and if oppressed beyond a certain limit they would fiercely turn upon their tormentors. As a rule they are orderly and law-abiding, but traditions of plunder have been handed down to them from early times, and many of them retain the predatory instincts of their forefathers. The neighbourhood of dense forests, steep hill-sides, and fastnesses hard of access offers extraordinary facilities to plunderers for screening themselves and their booty. Thus gang robbery is apt to break out, gains head with rapidity, and is suppressed with difficulty. In times of peace it is kept under, but during war, or whenever the bands of civil order are loosened, it becomes a cause of anxiety and a source of danger. The women have frankness and strength of character; they work hard in the fields, and as a rule evince domestic virtue.

425

The peasantry preserve a grave and quiet demeanour, but they have their humble, ideas of gaiety, and hold their gatherings on occasions of births or marriages. They frequently beguile their toil with carols. They like the gossiping and bartering at the rural markets and in the larger fairs, which are sometimes held in strikingly picturesque localities. They are superstitious, and worship with hearty veneration any being or thing whose destructive agency they fear. They even speak of the tiger with honorific titles. They are Hindus, but their Hinduism is held to be of a non-Aryan type. They are sincerely devout in religion, and feel an awe regarding " the holy Brahmans," holding the life and the person of a Brahman sacred, even though he be a criminal of the deepest dye. They of course regard the cow as equally sacred. There are two principal sects among modern Hindus — those who follow Vishnu, and those who follow Siva. The Mahrattas generally follow Siva and his wife, a dread goddess known under many names. The Mahratta war-cry, " Har, Har, Mahadeo," referred to Siva. All classes high and low are fond of the religious festivals, the principal of which, the Dasahra, occurs in October, when the first harvest of the year has been secured and the second crops sewn. This has always been held with the utmost pomp and magnificence at every centre of Mahratta wealth

and power. The people frequently assemble in bowers and arbours constructed of leafy boughs to hear kathas recited. These recitations are partly religious, partly also romantic and quasi-historical. After them national resolves of just- resistance or of aggressive ambition have often been formed.

Apart from the Mahratta Brahmans, as already mentioned, the Mahratta nobles and princes are not generally fine-looking men. There is general truth in what was once said by a high authority to the effect that, while there will be something dignified in the humblest Rajput, there will be something mean in the highest Mahratta. Bluff good-nature, a certain jocoseness, a humour pungent and ready, though somewhat coarse, a hot or even violent disposition, are characteristics of Mahratta chieftains. They usually show little aptitude for business or for sedentary pursuits; but, on the other hand, they are born equestriansand sportsmen. Mahratta ladies and princesses have often taken a prominent part, for good or evil, in public affairs and dynastic intrigues.

Though they have produced some poetry, the Mahrattas have never done much for literature. Nor have they been distinguished in industrial art. Their architecture in wood, however, was excellent ; and the teak forests of their country afforded the finest timber for building and for carving. They had also much skill in the con- struction of works for the supply of drinking water on a large scale and for irrigation.

The range of the Western Ghats enabled the Mahrattas to rise against their Mahommedan conquerors, to reassert their Hindu nationality against the whole power of the Mogul Empire, and to establish in its place an empire of their own. It is often stated that in India British conquest or annexation succeeded Mahommedan rule; and to a considerable extent this was the case. But, on the other hand, the principal power, the widest sovereignty, which the British overthrew in India was that of the Mahrattas.

During the earlier Moslem invasions in 1 100 and in subsequent years, the Mahrattas do not seem to have made much resistance. They submitted to several Mahommedan kings under the chang- ing circumstances of those times. It was against the Mahom- medan king of Bijapur in the Deccan that Sivaji, the hero of Mahratta history, first rebelled in 1657. Sivaji and his fighting officers were Mahrattas of humble caste, but his ministers were Brahmans. When the Mogul Empire absorbed the Bijapur kingdom he defied the emperor. He imparted a self-reliant enthusiasm to his countrymen, formed them into an army, and organized them as a political community; his mountaineer infantry, though limited in numbers, proved desperately cour- ageous; his cavalry was daring and ubiquitous. The Moslems, having once overcome the Hindus in almost all parts of India,

had not for centuries met with any noteworthy uprising. Sivaji, however, planned their expulsion, and before the end of his rest- less life made much progress in the execution of that design. The new state which he founded was maintained under various vicissitudes after his death. Mahratta resistance, once aroused by him, was never extinguished, and the imperial resources were worn out by ceaseless though vain efforts to quell it. The great Mogul emperor's impoverished and enfeebled successor was fain to recognize the Mahratta state by a formal instrument. The Mahratta king, a descendant of Sivaji, had become a roi faineant, and the arrangement was negotiated by his Brahman minister, whose official designation was the peshwa. The office of peshwa then became hereditary in the minister's family,

and grew in importance as the Mahratta kingdom rose, while the king sunk into the condition of a puppet. Thus the Mahratta power was consolidated throughout nearly the whole of Maha- rashtra under the Brahman peshwa as virtual sovereign, with his capital at Poona, while the titular Mahratta raja or king had his court at the neighbouring city of Satara. Despite his politi- cal importance, however, the raja was still venerated as the descendant of Sivaji.

Then several chiefs carved out principalities of their own from among the ruins of the Mogul Empire. Thus Raghoji Bhonsla established himself in the tracts lying underneath the southern base of the Satpura range (namely, Nagpur and Berar), overran Orissa and entered Bengal. Damaji Gaekwar descended from the Western Ghats upon the alluvial plains of Gujarat around Baroda; Tukoji Holkar subdued the uplands of Malwa beyond the Vindhya range on the north bank of the Nerbudda; and Mahadji Sindhia obtained possession of large tracts immediately south of Agra and Delhi, marched into Hindustan and became virtually the master of the Mogul emperor himself (see Gwalior). Sivaji's own father had founded a dominion at Tanjore in the extreme south, which, however, never had relations with the central power at Poona. The same may be said of the state of Kolhapur, allotted to a younger branch of Sivaji's family.

But these principalities, though independent respecting internal administration, and making war or peace with their neighbours according to opportunity, owned allegiance to the peshwa at Poona as the head of the Mahratta race. On state occasions heads of principalities would visit Poona by way of acknowledging the superior position of the peshwa. On the other hand, the peshwa was careful to obtain the sanction of his nominal

sovereign at Satara to every important act of state. Thus a confederation was formed of which the Brahman peshwa or head was at Poona, governing the adjacent territories, while the members, belonging to the lower castes, were scattered throughout the continent of India. Such was the Mahratta Empire which supplanted the Mogul Empire. The Mahratta power grew and prospered till it embraced all western and most of central India. Its culminating point was reached about 1750, or about a century after Sivaji first rebelled against his Mahommedan sovereign.

Its armies drew soldiers from all parts of India. The infantry was not of good quality; but its cavalry was really an enormous force, numbering fully a hundred thousand in all. The horsemen were splendidly audacious in riding for long distances into the heart of a hostile country, without support, striking some terrific blows, and then returning rapidly beyond reach of pursuit. They could truly boast of having watered their horses in every Indian river from the Cauvery to the Indus. If attacked, however, in a competent manner, they would not stand; and afterwards, in conflict with the British, whole masses of them behaved in a dastardly manner. As their ambition grew the chiefs began to organize their troops after the system learnt from the English and French. In this way several Frenchmen — Benoit de Boigne, Perron and others — rose in the Mahratta service to a position dangerous to the British. But the new system was unsuited to the Mahratta genius; it hampered the meteoric movements of the cavalry, which was obliged to manoeuvre in combination with the new artillery and the disciplined battalions. Mahratta elders hence uttered predictions of military disaster which were in the end more than fulfilled.

The rapid and amazing success of the Mahratta confederation rendered it the largest Hindu power that ever existed in India. But it lacked the elements of true greatness. It was founded by plundering expeditions, and its subsequent existence was tainted by the baseness of this predatory origin. With the exception of the peshwas, its chiefs were little more than free- booting warriors, for the most part rude, violent and unlettered. Their custom was to offer their neighbours or victims the alter- native of paying chouth, that is, one-fourth of the revenue, or being plundered and ravaged. Thus the Mahratta chouth came to have an ominous significance in Indian history. Desultory efforts were made to establish a civil government, but in the

main there was no administration formed on statesmanlike principles. The peshwas, on the other hand, as Brahmans, were men of the highest education then possible in India. But they were absorbed by the direction of military and political com- binations, and by intrigues for the preservation of their own power; and, even allowing for all this, they failed to evince the civil capacity which might have been anticipated. While several displayed

commanding abilities, and some possessed many virtues, one alone attempted to conduct an administration in an enlightened manner, and he died prematurely.

There were at the same time powers existing in India to keep the Mahrattas in check, and some parts of India were excepted from their depredations. The English power was rising at Calcutta, Madras and Bombay. The nascent Sikh power prevented Mahratta incursions from being permanently success- ful in the Punjab. As the Mogul Empire broke up, some separate Mahommedan powers rose upon its ruins. The nizam of the Deccan established himself at Hyderabad, comparatively near the headquarters of the peshwa. Hyder Ali was proclaimed sultan of Mysore in the south. Ahmed Shah Abdali burst upon India from Afghanistan. The Mahrattas bravely encountered him at Panipat near Delhi in 1761, and were decisively defeated. The defeat, however, did not essentially shake the Mahratta confederation. It was collision with the English that broke that wonderful fabric to pieces.

The first collision with the English occurred in 177s, arising from a disputed succession to the peshwaship. The English government at Bombay supported one of the claimants, and the affair became critical for the English as well as for the Mahrattas. It was at this conjuncture that Warren Hastings displayed his political genius and rendered signal service to his country, by succouring from Bengal the defeated Bombay army and nego- tiating a peace (in 1782) that restored the status quo.

The next collision happened in 1803. The peshwa had fallen into grave difficulties with some of the principal members of the Mahratta confederation. He therefore placed himself under British protection, and this led to the great Mahratta War, in which the Marquis Wellesley displayed those talents for military and political combination which rendered him illustrious. It was during the campaigns which ensued that General Arthur Wellesley defeated Sindhia and the Bhonsla raja at Assaye, and General Lake won the victories of Farrukhabad, Dig and Las- wari over Sindhia and Holkar. The three confederates, Sindhia, Holkar and the Bhonsla, concluded peace with the ‘ British government, after making large sacrifices of territory in favour of the victor, and submitting to British control politically. It was during these events that the British won the province of Orissa, the old Hindustan afterwards part of the North-Western Provinces, and a part of the western coast in Gujarat.

The third collision came to pass between 1816 and 1818, through the conduct, not only of the confederates, but also of the peshwa (B aji Bao) himself. During the previous war the peshwa had been the protege and ally of the B ritish ; and since the war he had fallen more completely than

before under British protection — British political officers and British troops being stationed at his capital, lie apparently felt encouraged by circumstances to rebel. Holkar and the Bhonsla committed hostile acts. The predatory Pindaris offered a formidable resistance to the British troops. So the peshwa ventured to take part in the combination against the British power, which even yet the Mahrattas did not despair of overthrowing. After long-protracted menaces, he attacked the British at Kirkee, but failed utterly, and fled a ruined man. Ultimately he surrendered to Sir John Malcolm, and was sent as a state pensioner to Bithur, near Cawnpore. The British, how- ever, released the raja of Satara from the captivity in which he had been kept during the peshwa's time, and reinstated him on the throne, with a limited territory. Owing to these events the British government became possessed of the Konkan and of the greater part of the Deccan.

It remains to mention briefly the fortunes of each remaining member of the once imperial confederation. The principality of Satara was held to have lapsed in 1848 by the death of the

raja without lineal heirs, and was annexed by the British govern- ment. The Bhonsla raja of Nagpur died without lineal heirs in 1853, and his territory was likewise annexed. The house of Holkar remained faithful to its engagements with the British government, and its position as a feudatory of the empire was maintained. In Sindhia's territory, by reason of internal feuds, the British had to undertake measures which were successfully terminated after the battles of Maharajpur and Panniar in 1843. But on the whole the house of Sindhia remained faithful. Sindhia himself was actively loyal during the Mutiny. The gaek- war gradually fell under British control towards the close of the 18th century, and his house never engaged in hostilities with the British government. The ex-peshwa lived to old age at Bithur, and died in 1857. His adopted son grew up to be the Nana Sahib, of infamous memory, who took a leading part in the Mutiny.

See J. Grant Duff, History of the Mahrattas (3 vols., 1826) ; T. D. Broughton, Letters written in a Mahratta Camp (1813); M. G. Ranade, Rise of the Maratha Power (Bombay, 1900).

(R.T.; J.S.Co.)

MAHSEER, or Mahaseer (Barbus mosal), a kind of barbel, abundant in the rivers of India, especially in pools of the upper and more rapid streams

where they issue from the mountainous part of the country. It is one of the largest species of the Cyprinid family, attaining to a length of 3 to 5 ft., and sometimes exceeding a weight of 70 lb. Its body is well-proportioned, rather elongate, and somewhat like that of the European barbel, but covered with very large scales, of which there are only twenty- five or twenty-seven placed along the lateral line; the dorsal fin is armed with a long and strong spine, and the mouth provided with four slender and short barbels. The lips are sometimes produced into fleshy lobes. To the fisherman in India the mahseer affords the same kind of sport as the salmon in the British Isles, and it rivals that fish as regards size, strength and activity. Its flesh is likewise much esteemed.

MAI, ANGELO (1782-1854), Italian cardinal and philologist, was born of humble parents at Schilpario in the province of Ber- gamo, Lombardy, on the 7th of March 1782. In 1799 he entered the Society of Jesus, and in 1804 he became a teacher of classics in the college of Naples. After completing his studies at the Collegium Romanum, he lived for some time at Orvieto, where he was engaged in teaching and palaeographical studies. The political events of 1808 necessitated his withdrawal from Rome (to which he had meanwhile returned) to Milan, where in 1813 he was made custodian of the Ambrosian library. He now threw himself with characteristic energy and zeal into the task of examining the numerous MSS. committed to his charge, and in the course of the next six years was able to restore to the world a considerable number of long-lost works. Having withdrawn from the Society of Jesus, he was invited to Rome in 1819 as chief keeper of the Vatican library. In 1833 he was transferred to the office of secretary of the congregation of the Propaganda; on the 1 2th of February 1838 he was raised to the dignity of cardinal. He died at Castelgandolfo, near Albano, on the 8th of September 1854.

It is on his skill as a reader of palimpsests that Mai's fame chiefly rests. To the period of his residence at Milan belong: Fragments of Cicero's Pro Scauro, Pro Tullio, Pro Flacco, In Clodium el Curionem, De aere alieno Milonis, De rege (Alexandrino (1814); M. Corn. Frontonis opera inedita, cum epistolis item inedilis, Antonini Pit, Marci Aurelii, Lucii Veri et Appiani (1815; newed., 1823, with mors than 100 additional letters found in the Vatican library) ; portions of eight speeches of Quintus Aurelius Symmachus; fragments of Plautus; theorationof Isaeus De hereditate Cleonymi; the last nine books of the Antiquities of Dionysius of Halicarnassus, and a number of other works. M. Tullii Ciceronis de republica quae supersunt appeared at Rome in 1822; Scriptorum veterum nova collectio, e valicanis codicibus edita in 1825-1838; Classici scriptores e valicanis codicibus editi in 1828-1838; Spicilegium romanum in 1839-1844; and Patrum nova bibliotheca in 1845-1853. His edition of the celebrated Codex vaticanus, completed in 1838, but not published

(ostensibly

on the ground of inaccuracies) till four years after his death (1858), is the least satisfactory of his labours and was superseded by the edition of Vercellone and Cozza (1868), which itself leaves much to be desired. Although Mai was not as successful in textual criticism as in the decipherment of manuscripts, he will always be remembered as a laborious and persevering pioneer, by whose efforts many ancient writings have been rescued from oblivion.

See B. Prina, Biografia del cardinale Angelo Mai (Bergamo, 1882), a scientific work, which gives a full and, at the same time, a just appreciation of his work; Cozza-Luzi, Epistolario del card. Angelo Mai (Bergamo, 1883); life by G. Poletto (Siena, 1887).

MAIA, in Greek mythology, the eldest of the Pleiades, the seven daughters of Atlas and the Oceanid Pleiione. She and her sisters, born on Mt Cyllene in Arcadia, are sometimes called mountain goddesses. In a cave of Cyllene Maia became by Zeus the mother of the god Hermes. The story is told in the Hymn to Hermes attributed to Homer. She was identified by the Romans with Maia Majesta, an old Italian goddess of spring, to whom a sacrifice was offered on the 1st of May by the priest of Vulcan.

MAIDA, a town of Calabria, Italy, in the province of Catanzaro, from which it is 30 m. W.S.W. direct, and 12 m. N.N.E. of Pizzo by rail (the station is 8 m. W. of the town). Pop. (1901), 510°- The town gives its name to the plain of Maida, where in 1806 British troops under Sir John Stuart defeated the French under Regnier. The names Maida Hill and Maida Vale in London are derived from this battle.

MAIDAN, an Indian term for any open plain. The Maidan is the name of the park in Calcutta, surrounding Fort William, where society people drive in the afternoon. The name is also applied to one of the valleys in the Afridi country of Tirah, and to the plateau portion of the state of Mysore.

MAIDEN, or Maid, a young unmarried girl. " Maid" is a shortened form of " maiden," O. Eng. maegden, which represents a diminutive of a Teutonic word meaning " young person," of either sex. An old English word " may," meaning a kinsman or kinswoman, and also a virgin or girl, represents the original. In early usage " maiden " as meaning " virgin " is frequently applied to the male sex, thus, in Malory's Morte d' Arthur, Sir Percyvale is called a " parfyte clene megden." Apart from the direct applications of the word to the unmarried state, such as " maiden name," "maiden lady," &c, the word is used adjec- tivally, implying the preservation of the first state of an object, or indicating a first effort of any kind. Probably a " maiden "

fortress is one which has never fallen, though the New English Dictionary suggests that the various " maiden castles " in Eng- land, usually ancient earthworks, may have been so called from being so strong that they could be defended by maidens, and points out that Edinburgh Castle, called " maiden-castle " by William Drummond of Hawthornden {Speech for Edinburgh to the King), is styled Castrum puellarum, the " castle of the maidens," in Geoffrey of Monmouth. A " maiden " assize, circuit or session is one at which there are no prisoners for trial; a " maiden over " or " maiden " in cricket is an over from which no runs are scored. A " maiden speech " is the first speech made by a member of parliament in the house. In the Annual Register for 1794 (quoted in N.E.D.) the expression, with refer- ence to Canning's first speech, is said to be " according to the technical language of the house." " Maiden " is applied to several objects, to a movable framework or horse for drying and airing of linen, to a washerwoman's " dolly " or wooden beater, to the " kirnbaby " formed of the last sheaf of corn reaped which formerly figured in the Scottish harvest homes, and to the beheading instrument, known as the " Scottish maiden " (see below). " Maid," apart from its primary sense of an unmarried woman, is chiefly used for a domestic female servant, usually with a qualifying word prefixed, such as " housemaid," " parlour- maid," &c.

The title of "Maid of Honour" is given to an unmarried lady attached to the personal suite of a queen. The custom of sending young girls of noble or good birth to the court of a

prince or feudal superior, for the purpose, primarily, of educa- tion, goes back to early feudal times, and is parallel with the sending of boys to act as pages and squires to the feudal castles. The regular establishment of maids of honour (filles d'honneur) appears first in the royal court of France. This has usually been attributed to Anne of Brittany, wife of Charles VIII.; she had a group of unmarried girls of high rank at her court as part of her household, in whom she took a lively and parental interest, educating them and bestowing a dowry upon them on their marriage. A slightly earlier instance, however, has been found. When the young Margaret of Austria came to France on her espousal to Charles VIII., broken by his marriage to Anne of Brittany, there were in her train several filles d'honneur, whose names appear in the Comptes d'argenterie de la reine Marguerite d'Autriche, from 1484-1485 and 1488-1489 {Archives del'empire K.K. 80 and 81 quoted by A. Jal, Dictionnaire critique de biographie et d'histoire). It is from the days of Francis I. that the chroniques scandaleuses begin which circle round the maids of honour of the French court. The maids of

Catherine de Medici, celebrated as the " flying squadron," I'escadron volant, are familiar from the pages of Pierre de l'Estoite (1 574-161 1) and Brantome. Among those whose beauty Catherine used in her political intrigues, the most famous were Isabelle de Limeuil, Mile de Montmorency-Fosseux, known as la belle Fosseuse, and Charlotte de Baune. The filles d' honneur, as an institution, were suppressed in the reign of Louis XIV., at the instigation of Mrr.e de Montespan — who had been one of them — and their place was taken by the dames de palais. In the English court, this custom of attaching " maids of honour " to the queen's person was no doubt adopted from France. At the present day a queen regnant has eight maids of honour, a queen consort four. They take precedence next after the daughters of barons, and where they have not by right or courtesy a title of their own, they are styled " Honourable."

The Scottish Maiden was an instrument of capital punishment formerly in use in Scotland. It is said to have been invented by the earl of Morton, who is also said to have been its first victim. This, however, could not have been the case, as the maiden was first used at the execution of the inferior agents in the assassination of Rizzio (1561) and Morton was not beheaded till 1581. The maiden was practically an early form of guillotine. A loaded blade or axe moving in grooves was fixed in a frame about ten feet high. The axe was raised to the full height of the frame and then released, severing the victim's head from his body. At least 120ˆ suffered death by the maiden, including the regent Morton, Sir John Gordon of Haddo, President Spottiswood, the marquis and earl of Argyll. In 1 7 10 it ceased to be used; it is now preserved in the museum of the Society of Antiquaries of Scotland, in Edinburgh.

MAIDENHAIR, in botany, the common name for a fern, Adiantum Capillus-Veneris, characterized by the spreading hair- like branches of the frond, the ultimate pinnules of which are 5 to 1 in. long with a rounded crenate outer edge and repeatedly forked veins; the sori (or masses of spore-capsules) are in the crenatures of the pinnules, and are protected by a kidney-shaped involucre. The plant is widely distributed in temperate and tropical regions, and is occasionally found in the western counties of England, the Isle of Man, and west Ireland, growing on damp rocks or walls especially near the sea. The genus Adiantum is a large one containing many handsome species both tropical and temperate, well known in greenhouse and hothouse cultivation.

Maidenhair-tree is a popular name for Ginkgo Triloba, a remark- able and handsome gymnospermous tree, the fan-shaped leaves of which with their forked veins recall those of the maidenhair (see Gymnosperms).

MAIDENHEAD, a market town and municipal borough in the Wokingham

parliamentary division of Berkshire, England; 245 m. W. of London by the Great Western railway. Pop. (looi), 12,980. Area, 2125 acres. It is pleasantly situated on and above the west (right) bank of the Thames, and is much in favour as a residential town and a resort of boating parties. Though of high antiquity it is wholly modern in appearance, and a large number of handsome houses have been built in its vicinity. A beautiful timbered house of the 15th century, how-

ever, survives in Ockwells, a short distance south of the town. The stone bridge carrying the London road over the Thames dates from 1772; but the crossing is of ancient importance. Maidenhead has trade in malt and grain. The borough is under a mayor, 4 aldermen and 1 2 councillors.

The history of Maidenhead (Maydenhutt, Maydenhith) is bound up with that of the ancient bridge. It is not mentioned in Domesday. Edward I. (1297) gave a grant of pontage in aid of the bridge, which was almost broken down; similar grants to the " bailiffs and good men of Maydenhithe " were made by succeeding sovereigns. In 1451 Henry VI. incorporated the gild of the Brethren and Sisters of Maydenhith to provide certain necessaries for the celebration of Mass and to keep the bridge in order: the gild, dissolved at the Reformation, was revived by Elizabeth, who, however, later (1581) substituted for it a corporation consisting of a warden, bridgemaster, burgesses and commonalty: the governing charter until the 19th century was that of James I. (1685) incorporating the town under the title of the mayor, bridgemaster and burgesses. In 1400 Thomas Holand, earl of Kent, held the bridge in the interests of the deposed Richard II., but was eventually forced to retire. In 1643 a meeting took place in the town between Charles I. and three of his children. In the 18th century a considerable trade was done in carrying malt, meal and timber in barges to London: at that time three fairs were held which have now practically disappeared. The Wednesday market is held under a charter of Elizabeth (1582).

MAID MARIAN, a personage incorporated in the English legend of Robin Hood. There is no evidence that she had originally any connexion with the Robin Hood cycle. She seems to have been an essential feature of the morris dance, and in the may-game was paired sometimes with Robin-Hood, but oftener with Friar Tuck. The well-known pastoral play of Adam de la Hale, Jeu de Robin et Marion, and the many French songs on the subject, account for the association of the names. In the ballads on Robin Hood her name is twice casually men- tioned, but there is a late ballad, by a certain S. G. (F. J. Child, English and Scottish Ballads, i. 219), which tells how Maid Marian sought Robin in the forest disguised as a page, and fought with him for an hour before she recognized him by his voice. S. G. was perhaps acquainted with the two plays, written in 1598, of The

Downfall and The Death of Robert Earl of Huntingdon, by Anthony Munday and Harry Chettle. In The Downfall Matilda Fitz Walter escapes from the persecution of King John by following her lover to Sherwood Forest, where they took the names of Robin Hood and Maid Marian, and lived apart until they could be legally united. Perhaps this tale has some connexion with the romance of the outlaw Fulk Fitz Warin. Matilda or Mahaud, widow of Theobald Walter, escaped from John's solicitations by marrying the outlawed Fulk and following him to the forest. There were in semi-historical legends three Matildas pursued by King John, of whom particu- lars are given by H. L. D. Ward in his Catalogue of Romances (i. 502). Their several histories were fused by the Elizabethan dramatists, and associated with the Maid Marian of the morris dance, who up to that time had probably only a vague connexion with Robin Hood.

MAIDSTONE, a market town and municipal and parliamentary borough, and the county town of Kent, England, 41 m. E.S.E. o£ London by the South Eastern & Chatham railway. Pop. (1901), 33,516; area, 4008 acres. It lies principally on the eastern bank of the river Medway, the modern part spreading over the western slopes of a picturesque valley, which is intersected and environed by orchards and hop gardens, this being the richest agricultural district of Kent. The hop grounds form the so- called middle growth of Kent, and the town has the principal grain market in the county. Archbishop Boniface in 1260 established a hospital here (Newark hospital) for poor pilgrims, the chapel of which, with modern additions, is now St Peter's Church. The parish church of St Mary, which had existed from Norman times, was demolished in 1395 by Archbishop Courtenay. who erected on the site the present church of All

Saints. This fine Perpendicular building contains, besides many excellent monuments, the richly carved sedilia and the twenty-eight oak seats used by the collegiate priests. Courtenay also founded a college of secular canons, the ruins of which are an interesting specimen of 14th-century architecture. From the reign of John until the Reformation the archbishops had a residence here, at which Stafford and Courtenay died. This Perpendicular building, with its Elizabethan east front, was acquired by the corporation as a memorial of Queen Victoria's Jubilee in 1887, and houses the school of science and art. The rectory, with the manor, passed into lay hands at the Reforma- tion; and, having been a perpetual curacy for three hundred and twenty years, the living became a vicarage in 1866. The grammar school was founded in 1549, and endowed with the estates of the local Corpus Christi fraternity, then dissolved; the hall in which the gild

assembled remains, but the school is established in modern buildings on a new site. There are oil-mills, rope, sacking and twine factories, and cement, lime, and brick works. There is a considerable carrying trade on the Medway. A museum, with public library, was opened in 1858, in an interesting building of the early part of the 16th century. This is the headquarters of the Kent Archaeological Society, founded by the Rev. L. B. Larking in 1858. In 1890 an art gallery was added. The West Kent and General hospital, the county ophthalmic hospital, county gaol and barracks may be mentioned among other institutions. From Saxon times down to 1830 condemned malefactors were executed, and all the great county meetings were held, on Penenden Heath, a common situated about a mile north-east of the town, and enclosed by the corporation as a public recreation ground. The parliamentary borough of Maidstone returns one member. The town is governed by a mayor, 6 aldermen and 18 councillors.

There is evidence of a Roman settlement at Maidstone. The name Maidstone (Medwegestun, Meddestane, Maydestan), probably meaning Medway Town, is presumably of Saxon origin. At the time of the Domesday Survey it belonged to the archbishop of Canterbury, and from the reign of John the archbishops had a residence there. Its position in the centre of Kent gave it an early importance; the shire-moot was held on Penenden Heath in the nth century, and Maidstone was an assize town in the reign of Edward I. In 1537 Cranmer ex- changed the manor of Maidstone with the king, and it was granted by Edward VI. to Sir Thomas Wyatt. Edward also incorporated the town by the title of the mayor, jurats and commonalty; it had formerly been governed by a portreve and 12 " brethren." This charter was forfeited through Wyatt's rebellion; a second charter was granted by Elizabeth in 1559 and confirmed by subsequent sovereigns. A new charter constituting a governing body of a mayor, 12 jurats and 40 common councilmen was given at the petition of the inhabitants by George II. in 1747, and remained the governing charter until 1835. Four fairs were granted by the charter of 1559; these are now held on the 13th of February, the 12th of May, the 20th of June and the 17th of October. A Thursday market was granted by Henry III. to Archbishop Boniface, and a market every second Tuesday in the month by charter of George II. A corn market on Tues- day and a cattle market on Thursday are still held. The manu- facture of linen and woollen goods was introduced by Walloons, who settled here in 1567. This was succeeded by paper-making, now the chief industry of the town. The cultivation of hops has been carried on since the 17th century.

Maidstone has been associated with various incidents of general history. Wat Tyler broke into the prison, liberated John Ball the rebel preacher, and committed various depreda- tions. Several of the leading inhabitants joined Jack Cade's rising. The rising of the Kentish Royalists in 1648 collapsed at

Maidstone, where on the 1st of June Fairfax, after five hours' obstinate fighting, captured the town at midnight.

See Victoria County History, Kent; I. M. Russell, History of Maidstone (1881).

MAIHAR, a native state of Central India, in the Baghelkhand agency. Area, 407 sq. m.; pop. (1901), 63,702; estimated revenue, £4700. The state, which is watered by the Tons river, consists mainly of alluvial soil covering sandstone, and is fertile except in the hilly district of the south. A large area is under forest, the produce of which provides a small export trade. The chief, whose title is raja, claims descent from the Kachwaha Rajput clan. The state suffered severely from famine in 1896- 1897. The town of Maihar (pop. 6802) is on the East Indian railway, 97 m. N. of Jubbulpore. Extensive ruins of shrines and other buildings in its neighbourhood indicate a former much greater extent of the place.

MAIL. (1) (Through Fr. maille, from Lat. macula, a spot or hole, the mesh of a net), properly a metal ring or link which, joined closely with other links, formed the fabric of body and other armour in the middle ages, till it was superseded by plate- armour. The word " mail," properly applied to this form of chain-armour, is also used of armour generally, whether plate or chain, and is also transferred to the horny defensive coverings of animals, such as the tortoise, crab, &c. (see Arms and Armour). (2) (O. Eng. tndl, speech; probably the same as O. Saxon mahal, assembly; in meaning connected with O.Norse male, stipulation), a Scots law term meaning rent, tax. " Mails and duties " are the rents, whether in kind or money, of an estate. In English the word only survives in "blackmail" (g.v.). (3) (Through O. Fr. male, mod. matte, a Teutonic word surviving in Dutch maal), properly a bag, especially one used in travelling; this word, which appears in Chaucer, is now applied chiefly to the despatch and delivery of postal matter. In this sense " mail " is properly the bag in which such matter is conveyed, and hence is applied to the contents of the mail, postal matter collectively, and to the train, carts, or other means used in the despatch and delivery of the same. In general usage " mail " is confined to the " foreign " as opposed to the " inland " despatch of letters, &c, and to which the word " post " is chiefly applied; in official language, the word refers to the inland despatch. The word appears also in " mail-coach," a coach used for conveying the mails, and in " mail-cart," a cart similarly employed. This word is also applied to a light low vehicle propelled or drawn by hand, suitable for young children. The " mail phaeton " is a type of phaeton with high seat for two persons and drawn by a pair of horses.

MAILLY, LOUISE JULIE, Comtesse de (1710-1751), mistress of Louis XV. of France, was the daughter of Louis, marquis de Nesle. She was the eldest

of three sisters who succeeded one another as favourites of the king. In 1726 she married her cousin, Louis Alexandre de Mailly. Although Louis XV. had paid her attentions from 1732, she did not become titular mistress until 1738. She did not use her position either to enrich herself or to interfere in politics. She was supplanted by her sister, the duchess of Chateauroux, and obliged to leave court in 1742.

See E. and J. de Goncourt, La Duchesse -de Chateauroux et ses sceurs (1879); Toussaint, Anecdotes curieuses de … Louis XV. (2 vols., 1905) ; J. B. H. R. Capefigue, Mesdemoiselles de Nesle et la jeunesse de Louis XV. (1864).

MAIMANA, a town and khanate of Afghan Turkestan. The town is situated 100 m. S.W. of Balkh, and only some 25 m. from the frontier of Russian Turkestan. It is about two-thirds the size of Herat, square built and surrounded by a ruined wall and moat. The khanate was for long in dispute between Bokhara and Kabul, but in 1868 Abdur Rahman laid siege to the town, and it was compelled to come to terms. Its political status as an Afghan province was definitely fixed by the Russo-Afghan boundary commission of 1885. The inhabi- tants are chiefly Uzbegs.

MAIMAND, a town in the province of Fars, Persia, a few miles east of Firuzabad and about 70 m. from Shiraz. It has a population of about 5000, almost wholly occupied with the manufacture and sale of rose-water, which is largely exported to many parts of Persia as well as to Arabia, India and Java. The district also produces great quantities of almonds. The

rose gardens cover several square miles. In 1349 a great part of Maimand and of three little villages belonging to it became wakf (pious endowment) of the shrine at Shiraz of Mir Ahmed, surnamed Shah Chiragh, a son of Musa Kazim, the seventh imam of the Shiahs, and the remainder of the Maimand grounds was given to the shrine by Mir Habbib Ullah Sharifi and by Shah Ismail in 1504; the administration of the Maimand property as well as the guardianship of the shrine is still with the descendants of Mir Habbib Ullah.

MAIMBOURG, LOUIS (1610-1686), French Jesuit and historian, was born at Nancy. He entered the Society of Jesus at the age of sixteen, and after studying at Rome became a classical master in the Jesuit college at Rouen. He afterwards devoted himself to preaching, but with only

moderate success. After having taken some part in minor controversies he threw himself with energy into the dispute which had arisen as to the Gallican liberties; for his Traiti historique sur les prerogatives de I'Uglise de Rome (1682) he was by command of Innocent XI. expelled from the Society, but rewarded by Louis XIV. with a residence at the abbey of St Victor, Paris, and a pension. He died on the 13th of August 1686. His numerous works include histories of Arianism, the iconoclastic controversy, the Greek schism, Lutheranism, Calvinism, and of the pontificates of Leo I. and Gregory I.; they are mere compilations, written indeed in a very lively and attractive style, but inaccurate and untrustworthy.

The History of Arianism was published in English (1 728-1 729) by William Webster, with an appendix on the English writers in the Socinian and Arian controversies.

MAIMING, mutilation, a physical injury which involves the loss of, or incapacity to use, a bodily member. The verb " to maim," in M. E. maynhe, mahayme, mayme, &c. was adopted from O. Fr. mahaignier: cf. It. magagnars, Med. Lat. mahemiare, mafiennare, &c. (see Du Cange, Gloss., s.v. " Mahamium "). Maiming or mutilation is and has been practised by many races with various ethnical and religious significances, and was a customary form of punishment on the principle of an " eye for an eye " (see Mutilation). In law " maiming " is a criminal offence; the old law term for a special case of maiming of persons was " mayhem " (q.v.), an Anglo-French variant form of the word. Maiming of animals by others than their owners is a particular form of the offences generally grouped as " malicious damage." For the purpose of the law as to this offence animals are divided into cattle, which includes horses, pigs and asses, and other animals which are either subjects of larceny at common law or are usually kept in confinement or for domestic purposes. The punishment for maiming of cattle is three to fourteen years' penal servitude. Malicious injury to other animals is a misdemeanour punishable on summary conviction. For a second offence the penalty is imprisonment with hard labour for over twelve months. (Malicious Damage Act 1861.) Maiming of animals by their owner falls under the Cruelty to Animals Acts.

MAIMON, SALOMON (1754-1800), German philosopher, was born of Jewish parentage in Polish Lithuania, and died at Nieder-Siegersdorf on the 22nd of November 1800. He married at the age of twelve, and studied medicine in Berlin. In 1770 he severed "his connexion with his orthodox co-religionists by his critical commentary on the Moreh Nebuhim of Maimonides, and devoted himself to the study of philosophy on the lines of Wolff and Moses Mendelssohn. After many vicissitudes he found a peaceful residence in the house of Count Kalkreuth at Nieder-Siegersdorf in 1790. During the ensuing ten years he published the works which have made his

reputation as a critical philosopher. Hitherto his life had been a long struggle against difficulties of all kinds. From his autobiography, it is clear that his keen critical faculty was developed in great measure by the slender means of culture at his disposal. It was not till 1788 that he made the acquaintance of the Kantian philosophy, which was to form the basis of his lifework, and as early as 1790 he published the Versuch ilber die Transcendental- philosophie, in which he formulates his objections to the system.

He seizes upon the fundamental incompatibility of a conscious- ness which can apprehend, and yet is separated from, the " thing-in-itself." That which is object of tho ught cannot be outside consciousness; just as in mathematics V — 1 is an un- real quantity, so " things-in-themselves " are ex hypothesi outside consciousness, i.e. are unthinkable. The Kantian paradox he explains as the result of an attempt to explain the origin of the " given " in consciousness. The form of things is admittedly subjective; the mind endeavours to explain the material of the given in the same terms, an attempt which is not only impossible but involves a denial of the elementary laws of thought. Know- ledge of the given is, therefore, essentially incomplete. Complete or perfect knowledge is confined to the domain of pure thought, to logic and mathematics. Thus the problem of the " thing-in-itself " is dismissed from the inquiry, and philosophy is limited to the sphere of pure thought. The Kantian categories are, indeed, demonstrable and true, but their application to the given is meaningless and unthinkable. By this critical scepticism Maimon takes up a position intermediate between Kant and Hume. Hume's attitude to the empirical is entirely supported by Maimon. The casual concept, as given by experience, expresses not a necessary objective order of things, but an ordered scheme of perception; it is subjective and cannot be postulated as a concrete law apart from consciousness. The main argument of the Transcendentalphilosophie not only drew from Kant, who saw it in MS., the remark that Maimon alone of his all critics had mastered the true meaning of his philosophy, but also directed the path of most subsequent criticism.

Maimon's chief works, in addition to the above quoted, are Philos. Worterbuch (1791) ; Streifereien im Gebiete der Philos. (1793) ; t)ber die Progresse der Philos. (1793); Die Kategorien des Aristoteles mit Anmerkungen erlautert (1794); Versuch einer neuen Logik (1794 and 1798) ; Kritische Untersuchungen uber den menschl. Geist (1797). See S. Maimons Lebensgeschichte von ihm selbst beschrieben (1792, ed. K. P. Moritz; Eng. trans, by J. C. Murray, 1888); Wolff, Maimoniana (1813); Witte, S. Maimon (1876).

MAIMONIDES, the common name of Rabbi Moses ben Maimon (1135-1204), also known from the initials of these last words as Rambam,

Jewish philosopher. His life falls into three epochs, which may be typified by the towns in which they were passed, viz. Cordova, Fez and Cairo. He was born in Cordova on the 20th of March 113 5, the eve of Passover; he had a brother, David, and one sister. His early years were spent in his native town, which had then just passed the zenith of its glory. The Arab rulers had fostered the development of science, art, medicine, philosophy, literature and learning. All these influences played their part in the education of Maimo- nides, whose father, besides training him in all branches of Hebrew and Jewish scholarship, implanted in the youth a sound knowledge of these secular studies as well. In 1148 Cordova was taken from the last Fatimite caliph by the victorious Almohades, who had spread over Spain from N. Africa. These militant revivalists strove to re-establish Islam in what they considered its primitive simplicity. They laid great stress on the unity of God, and tolerated neither schism within the faith nor dissent without. The position of the orthodox Spanish Jews became intolerable, and Maimon, after ten years of hard- ships, wanderings and escapes, decided to take his family out of the country. He settled in Fez. The years which Maimonides spent there (1160-1165) were memorable for his friendship with Abdul Arab Ibn Muisha — a Moslem poet and theologian — and for the commencement of his literary activity. His energies were diverted towards stimulating the religious feelings of his brethren and combating assimilation. In consequence he became alarmed for his own safety, and in 1165 left for Egypt, where he settled after a passing visit to the Holy Land. Cordova taught him the humanities; Fez humanity. Cairo, besides giving him prominence at court and in the Jewish community, was the centre of the almost world-wide influence which he exercised over Jewry by his monumental writings and dominant person-ality. By 1 1 77 Maimonides was the recognized chief of the Cairene congregation and consulted on important matters by communities far and wide. Here he was joined by his most

famous disciple, Joseph Aknin. But his early life in Egypt was fraught with deep sorrow. His father died soon after their arrival, and Maimonides himself suffered severely from prostration and sickness. His brother David, jointly with whom he carried on a trade in gems, was shipwrecked in the Indian Ocean. With him perished the entire fortune of the family. Forced to earn a livelihood, Maimonides turned to medicine. The fame of his skill eventually brought him the appointment of body physician to Saladin, to whom, it is said, he was so attached that when Richard I. wrote from Ascalon, offering him a similar post at the English court, Maimonides refused. He married the sister of Ibn al Mali, one of the royal secretaries.

In 1186, his son Abraham was born. His remaining years were spent in ceaseless activity and in controversy, which he sought to avoid. He died amidst universal sorrow and veneration.

The works of Maimonides fall into three periods: (a) To the Spanish period belong his commentary on the whole Talmud (not fully carried out), a treatise on the calendar {Maamar ha-ibbur), a treatise on logic (Milloth Higgayon), and his commentary on the Mishnah (this was called Siraj or Maor, i.e. " Light ": begun 1 158, completed 1168 in Egypt). (6) While he was in Fez, he wrote an essay on the Sanctification of the Name of God (Maamar Kiddush Hashem, Iggereth Hashemad). (c) The works written in Egypt were: Letter to the Yemenites (Iggereth Teman or Pethah Tiqvah) ; Responsa on questions of law; Biblical and Rabbinical Code (Misnheh Tor ah or Yad Hahazaka, completed 1180); Sepher hamitzvoth, an ab- breviated handbook of the preceding; and his great philosophical work Moreh Nebufrim or "the guide of the perplexed" (1190). To these must be added certain portions of the Mishnah commentary, such as the " Eight Chapters," the discussion on reward and punish- ment and immortality, the Jewish Creed, which have acquired fame as independent works.

The influence of Moses ben Maimon is incalculable. " From Moses unto Moses there arose not one like Moses," is the verdict of posterity. Maimonides was the great exponent of reason in faith and toleration in theology. One of the main services to European thought of the "Guide" was its independent criticism of some of Aristotle's principles. His codification of the Talmud was equally appreciated in the study of the scholar and in practical life. Christian Europe owed much to Maimo- nides. Not only did his " Guide " influence scholasticism in general, but it was from his Code that the Church derived its medieval knowledge of the Synagogue.

A complete bibliography will be found in Maimonides, by David Yellin and Israel Abrahams (London, 1903); the final chapter of that work gives a summary of the influence of Maimonides on Christian philosophers such as Aquinas, and Jewish such as Spinoza. The " Guide " has been translated into English by M. Friedlander (1881-1885; new ed., 1905). See also Jewish Encyclopedia, articles s.v., and the volumes edited by Guttmann, Moses ben Maimon (Leipzig, 1908, &c). (H. Le.)

MAIN (Lat. Moenus), a river of Germany, and the most important right-bank tributary of the Rhine. It has two sources, the Weisse Main (White Main), which rises in the Fichtelgebirge on the east side of the Ochsenkopf, and the Rote Main (Red Main), which, rising on the eastern slope of the Prankish Jura, flows past Bayreuth. They unite 3 m. below Kulmbach, 920 ft. above the sea. Hence the river, already of considerable size, pursues a north-westerly direction, skirting the spurs of the Frankish Jura in a

pleasant valley. At Lich- tenfels the river takes a south-westerly course, which it retains until entering the fertile basin of Bamberg. Here it receives from the south-east the waters of its chief tributary, the Regnitz, and enters upon its middle course. Its direction is now again north-west, and meandering through pleasant vales and pastures it passes Hassfurt and reaches Schweinfurt. Its course is now almost due south to Ochsenfurt, when it again proceeds north-west. Continuing in this direction amid vine-clad hills, it washes the walls of the university city of Wurzburg, and thence, dividing the forest-clad ranges of the Spessart and the Odenwald, reaches Gemiinden. Here it is joined from the right by the Frankish Saale and, turning abruptly south, receives at Wertheim the beautiful Tauber. Feudal castles and medieval towns now crown its banks, notably, Freudenberg and Miltenberg. From the latter it proceeds due north to Aschaffenburg, whence passing Frankfort it pours its yellow

waters into the green waters of the Rhine just above Mainz. The Main has a total length of 310 m. and drains a basin of approximately 11,000 sq. m. It is navigable from the con- fluence of the Regnitz, 240 m. from its mouth, for barges and other small craft, and through the Ludwig Canal is connected with the Danube.

See Ulrici, Das Maingebiet in seiner naturlichen Beschaffenheit (Kassel, 1885); E. Faber, Zur Hydrographie des Maingebieis (Munich, 1895), and Lill, Mainthal, Main und Mainschiffahrt (Berlin, 1904).

MAIN (from the Aryan root which appears in " may " and " might," and Lat. magnus, great), a word meaning properly power or strength, especially physical. This use chiefly survives in the expression " with might and main." The word is more common as a substantival elliptical use of the adjective, which usually has the sense of principal or chief in size, strength, importance, &c. Thus " the main," the high open sea, is for " main sea," cf. " mainland," the principal part of a terri- tory excluding islands and sometimes far-projecting penin- sulas. The expression " the Spanish main " properly meant that part of the main land of the N.E. coast of South America stretching from the Orinoco to the Isthmus of Panama, and the former Spanish possessions in Central America bordering on the Caribbean Sea, but it is often loosely used, especially in connexion with the buccaneers, of the Caribbean Sea itself. The term " main " is also thus used of a principal pipe or cable for conducting gas, water, electricity, &c. The elliptical use does not appear, however, in such expressions as main road, line, stream. Another use of the word " main " has a somewhat obscure history. It appears as a term in the game of hazard, and also in cock-fighting. In the last it is used for a match, and for 'the cocks engaged in a match. In hazard it is the number called by the " caster " before the dice are thrown; this may be any number from five to nine inclusive. The usual

derivation is from the French main, a hand, but according to the New English Dictionary there is no evidence for this, and the more probable explanation is that it is an adaptation of " main " meaning principal or chief. From this use of the word in hazard the expression " main chance " is derived. " Main," a shortened form of domain or demesne, only now survives in Scotland, usually in the plural " mains " for a home farm.

MAINA (or Mani) and MAINOTES, a district and people of the Peloponnesus, the modern Morea. Maina is the country occupied by the mountain range of Taygetus from Sparta to Cape Matapan, the ancient Taenarum. It is now divided between the modern districts Oetylos and Gythion. Before the organization of the present kingdom of Greece, Maina was subdivided into "E£a) Man), Outer Maina, from the frontier of Kalamata, on the Gulf of Messenia, to Vitylo (Oetylos) and inland to[the summit of Taygetus ; KarwMdj^;, Lower Maina, from Vitylo to Cape Matapan; and Meoa Mdeij, or Inner Maina, on the east, and on the Gulf of Laconia as far as the plain of Elos. It contained over a hundred villages. The country is mountainous and inaccessible, a formation to which it owes its historical importance. The Mainotes claim to descend from the Spartans, and probably represent the Eleuthero, or free, Laconians who were delivered by Rome from the power of Sparta, as is suggested by the traces of ancient Greek in their dialect and by their physical type. Their country being a natural fortress, they were able to defend themselves against the Byzantine emperors, the barbarians who broke into the empire, the Latin princes of Achaea of the house of Villehardouin, and the Turks. As their country is also poor and maritime, they were early tempted to take to piratical adventure. Gibbon says that " in the time of Constantine Porphyrogenitus they had acquired the name of Mainotes, under which they dis- honour the claim of liberty by the inhuman pillage of all that is shipwrecked on their rocky shore." Their neighbours gave their country the name of " Kakaboulia " — the land of wicked counsels. The passes of their mountains were elaborately fortified and their villages were full of fortified towers

(pyrgoi) from which they formed their own favourite epithet, Maina Polypyrgos — many-towered Maina. On the western side it also contains the remains of feudal keeps, erected by William II. de Villehardouin (1245-1278) and other Latin princes of Achaea. The Mainotes did not become Christians till the 9th century. From the 15th till the 17th century they recognized a family which claimed to belong to the Comneni of Trebizond as head chiefs. But the real power was in the hands of the chiefs

of the different families and villages, who formed a turbulent and martial aristocracy. Enduring and ferocious feuds were common among them. In the course of the 18th century the family of. Mavromicheli (Black Michael), which belonged to lower Maina, established a general headship over the Mainotes after much strife and many murders. When Russia endeavoured to promote a rising against the Turks in the Morea in 1770 the Mainotes acted with her, and the strength of their country enabled them to escape the vengeance of the Turks when the Christians were cynically deserted by the Russians. In 1777 their prac- tical independence was recognized by the sultan's officers. During the Greek war of independence the Mainotes were chiefly led by Petros (Petro Bey) Mavromicheli, known to his countrymen as the king of Maina, who undoubtedly cher- ished the hope of establishing a principality for himself. The freedom of Greece, for which he had fought in his own way, proved the ruin of his ambition. He found the new order less compatible with his schemes than the Turkish dominion. Petro Bey was imprisoned by the Greek president Capodistrias (see Capo d'Istria, Count), who was in revenge murdered by the Mavromichelis. The family were finally content to become courtiers and officials in the reign of King Otto I. In the 19th century Maina was but little affected by civilization, except in so far as the efficiency of modern navies debarred the Mainotes from their old resource of piracy.

See W. Martin Leake, Travels in the Morea (1830) ; M. E. Yemeniz, "La Maina," in Revue des deux mondes (March 1, 1865); and Philipson, " Zur Ethnographie des Peloponnes," in Petermanns Miilheilungen, vol. 36 (Gotha).

MAINE, ANNE LOUISE BENEDICTE DE BOURBON, Duch- esse du (1676-1753), daughter of Henri Jules de Bourbon, prince de Conde and Anne of Bavaria, was born on the 8th of November 1676. On the 19th of March 1692 she married Louis Auguste de Bourbon, due du Maine, son of Louis XIV. and Mme de Montespan. The duchesse du Maine held a little court at Sceaux, where she gave brilliant entertainments and immersed herself in political intrigues. Displeased with the action of the regent Orleans in degrading the illegitimate children of Louis XIV. from their precedence above the peers of France, she induced her husband to join in the Cellamare conspiracy for the transference of the regency to the king of Spain. The plot, however, was discovered, and she was im- prisoned in 1 7 19. The following year she returned to Sceaux, where she resumed her salon and gathered round her a brilliant company of wits and poets. She died in Paris on the 23rd of January 1753.

See General de Piepape, La Duchesse du Maine (19 10).

MAINE, SIR HENRY JAMES SUMNER (1822-1888), English comparative

jurist and historian, son of Dr James Maine, of Kelso, Roxburghshire, was born on the 15th of August 1822. He was at school at Christ's Hospital, and thence went up to Pembroke College, Cambridge, in 1840. At Cambridge he was one of the most brilliant classical scholars of his time. He won a Craven scholarship and graduated as senior classic in 1844, being also senior chancellor's medallist in classics. Shortly afterwards he accepted a tutorship at Trinity Hall. In 1847 he was appointed regius professor of civil law, and he was called to the bar three years later; he held this chair till 1854. Even the rudiments of Roman law were not then in- cluded in the ordinary training of English lawyers; it was assumed at the universities that any good Latin scholar could qualify himself at short notice for keeping up such tradition of civilian studies as survived. Maine cannot have known

much Roman law in 1847, but in 1856 he contributed to the Cambridge Essays the essay on Roman law and legal education, republished in the later editions of Village Communities, which was the first characteristic evidence of his genius. Meanwhile he had become one of the readers appointed by the Inns of Court, in the first of their many half-hearted attempts at legal edu- cation, in 1852. Lectures delivered by Maine in this capacity were the groundwork of Ancient Law (1861), the book by which his reputation was made at one stroke. Its object, as modestly stated in the preface, was " to indicate some of the earliest ideas of mankind, as they are reflected in ancient law, and to point out the relation of those ideas to modern thought." Within a year of its publication the post of legal member of council in India was offered to Maine, then a junior member of the bar with little practice, few advantages of con nexion, and no political or official claims. He declined once, on grounds of health; the very next year the office was again vacant. This time Maine was persuaded to accept, not that his health had improved, but that he thought India might not make it much worse. It turned out that India suited him much better than Cambridge or London. His work, like most of the work done by Englishmen in India in time of peace, was not of a showy kind — its value is shown by the fact that he was asked to prolong his services beyond the regular term of five years, and returned to England only in 1869. The subjects on which it was his duty to advise the government of India were as much political as legal. They ranged from such problems as the land settlement of the Punjab, or the introduction of civil marriage to provide for the needs of unorthodox Hindus, to the question how far the study of Persian should be required or encouraged among European civil servants. On the civil marriage question in particular, and some years earlier on the still more troublesome one of allowing the remarriage of native converts to Christianity, his guidance, being not only learned but statesmanlike, was of the greatest value. Plans of codification, moreover, were prepared, and

largely shaped, under Maine's direction, which were carried into effect by his successors, Sir J. Fitzjames Stephen and Dr Whitley Stokes. The results are open to criticism in details, but form on the whole a remarkable achieve- ment in the conversion of unwritten and highly technical law into a body of written law sufficiently clear to be adminis- tered by officers to many of whom its ideas and language are foreign. All this was in addition to the routine of legislative and consulting work and the establishment of the legislative department of the government of India on substantially its present footing.

Maine's power of swiftly assimilating new ideas and appre- ciating modes of thought and conduct remote from modern Western life came into contact with the facts of Indian society at exactly the right time, and his colleagues and other competent observers expressed the highest opinion of his work. In return Maine brought back from his Indian office a store of knowledge which enriched all his later writings, though he took India by name for his theme only once. This essay on India was his contribution to the composite work entitled The Reign of Queen Victoria (ed. T. H. Ward, 1887). Not having been separately published, it is perhaps the least known of Maine's writings; but its combination of just perception and large grasp with command of detail is not easily matched outside W. Stubbs's prefaces to some of the chronicles in the Rolls series, and (more lately) F. W. Maitland's monographs. As vice-chancellor of the university of Calcutta, Maine commented, with his usual pregnant ingenuity, on the results produced by the contact of Eastern and Western thought. Three of these addresses were published, wholly or in part, in the later editions of Village Communities; the substance of others is understood to be embodied in the Cambridge Rede lecture of 1875, which is to be found in the same volume. The practi- cal side of Maine's experience was not long lost to India; he became a member of the secretary of state's council in 1871, and remained so for the rest of his life. In the same year

he was gazetted a K. C.S.I. In 1869 Maine was appointed to the chair of historical and comparative jurisprudence newly founded in the university of Oxford by Corpus Christi College. Residence at Oxford was not required, and the election amounted to an invitation to the new professor to resume and continue in his own way the work he had begun in Ancient Law. During the succeeding years he published the principal matters of his lectures in a carefully revised literary form: Village Com- munities in the East and the West (1871) ; Early History of Institu- tions (1875); Early Law and Custom (1883). In all these works the phenomena of societies in

an archaic stage, whether still capable of observation or surviving in a fragmentary manner among more modern surroundings or preserved in contemporary records, are brought into line, often with singular felicity, to establish and illustrate the normal process of development in legal and political ideas.

In 1877 the mastership of Trinity Hall, Cambridge, where Maine had formerly been tutor, became vacant. There were two strong candidates whose claims were so nearly equal that it was difficult to elect either; the difficulty was solved by a unanimous invitation to Maine to accept the post. His accep- tance entailed the resignation of the Oxford chair, though not continuous residence at Cambridge. Ten years later con- siderations of a somewhat similar kind led to his election to succeed Sir William Harcourt as Whewell professor of inter- national law at Cambridge. His all too short performance in this office is represented by a posthumous volume which had not received his own final revision, International Law (1888).

Meanwhile Maine had published in 1885 his one work of speculative politics, a volume of essays on Popular Government, designed to show that democracy is not in itself more stable than any other form of government, and that there is no neces- sary connexion between democracy and progress. The book was deliberately unpopular in tone; it excited much contro- versial comment and some serious and useful discussion.

In 1886 there appeared in the Quarterly Review (clxii. 181) an article on the posthumous work of J. F. M'Lennan, edited and completed by his brother, entitled " The Patriarchal Theory." The article, though necessarily unsigned (in accor- dance with the rule of the Quarterly as it then stood) , was Maine's reply to the M'Lennan brothers' attack on the historical recon- struction of the Indo-European family system put forward in Ancient Law and supplemented in Early Law and Custom. Maine was generally averse from controversy, but showed on this occasion that it was not for want of controversial power. He carried the war back into the invader's country, and charged J. F. M'Lennan's theory of primitive society with owing its plausible appearance of universal validity to general neglect of the Indo-European evidence and misapprehension of such portions of it as M'Lennan did attempt to handle.

Maine's health, which had never been strong, gave way towards the end of 1887. He went to the Riviera under medical advice, and died at Cannes on the 3rd of February 1888. He left a wife and two sons, of whom the elder died soon after- wards.

An excellent summary of Maine's principal writings may be seen in Sir Mountstuart Grant Duff's memoir. The prompt and full recognition of

Maine's genius by continental publicists must not pass unmentioned even in the briefest notice. France, Germany, Italy, Russia have all contributed to do him honour; this is the more remarkable as one or two English publicists of an older school signally failed to appreciate him. Maine warned his countrymen against the insularity which results from ignorance of all law and institutions save one's own; his example has shown the benefit of the contrary habit. His prominent use of Roman law and the wide range of his obser- vation have made his works as intelligible abroad as at home, and thereby much valuable information — for example, concern- ing the nature of British supremacy in India, and the position of native institutions there — has been made the property of the world of letters instead of the peculiar and obscure pos- session of a limited class of British public servants. Foreign

readers of Maine have perhaps understood even better than English ones that he is not the propounder of a system but the pioneer of a method, and that detailed criticism, profitable as it may be and necessary as in time it must be, will not leave the method itself less valid or diminish the worth of the master's lessons in its use. The rather small bulk of Maine's published and avowed work may be explained partly by a fine literary sense which would let nothing go out under his name unfinished, partly by the drawbacks incident to precarious health. Maine's temperament was averse from the labour of minute criticism, and his avoidance of it was no less a matter of prudence. But it has to be remembered that Maine also wrote much which was never publicly acknowledged. Before he went to India he was one of the original contributors to the Saturday Review, founded in 1855, and the inventor of its name. Like his inti- mate friend Fitzjames Stephen, he was an accomplished jour- nalist, enjoyed occasional article-writing as a diversion from official duties, and never quite abandoned it. The practice of such writing probably counted for something in the freedom and clearness of Maine's style and the effectiveness of his dialectic. His books are a model of scientific exposition which never ceases to be literature.

See Sir A. Lyall and others, in Law Quart. Rev. iv. 129 seq. (1888) ; Sir F. Pollock, " Sir Henry Maine and his Work," in Oxford Lectures, &c. (1890); "Sir H. Maine as a Jurist," Edin. Rev. (July 1893); Introduction and Notes to new ed. of Ancient Law (1906); Sir M. E. Grant Duff, Sir Henry Maine: a brief Memoir of his Life, &c. (1892); Notes from a Diary, passim; L. Stephen, "Maine" in Diet. Nat. Biop. (1893); Paul Vinogradoff, The Teaching of Sir Henry Maine (1904). (F. Po.)

MAINE, an old French province, bounded N. by Normandy, E. by Orleanais, S. by Touraine and Anjou, and W. by Brittany. Before the Roman Conquest the region occupied by this pro- vince was inhabited by

the Aulerci Cenomanni and the Aulerci Diablintes; under the Roman empire it consisted of two civitates comprised in the Provincia Lugdunensis Tertia — the Civitas Cenomannorum and the Civitas Diablintum, whose chief towns were Le Mans and Jublains. These two civitates were united during the barbarian period and formed a single bishopric, that of Le Mans, suffragan to the metropolitan see of Tours. Under the Merovingians and Carolingians the diocese of Le' Mans corresponded to the Pagus Cenomanensis, and in the feudal period to the county of Maine. In the 16th century the county of Maine, with the addition of Perche, formed a military government— the province of Maine. Since 1790 this province has been represented approximately by the departments of Sarthe and Mayenne, the respective capitals of which are Le Mans and Laval. In 1855 the bishopric of Laval was separated from that of Le Mans. Maine was evange- lized in the 3rd century by St Julian. After forming part of the kingdom of Syagrius, it was conquered by Clovis at the end of the 5th century. Owing to the scarcity of documents the history of Maine until the end of the 9th century is merged in the history of the bishops of Le Mans, which has come down to us in the Actus pontificum Cenomannis in urbe degentium (ed. Busson-Ledru, Le Mans, 1901), composed under the direction of Bishop Aldric (832-857). Roger (c. 892-c. 898) was perhaps the first hereditary count of Maine; the counts whose existence is certain are Hugh I. (c. 939-before 992), Hugh II. (before 992-1015), Herbert I. (1015-1032 to 1036), Hugh III. (1032 to 1036-1051), Herbert II. (1051-1062), William the Bastard (1063-1087), Robert Curthose (1087-1091), Hugh IV. (1091-1092) and Helias (1092-1110). Maine, which was in the vassalage of Anjou as early as the 9th century, was united to Anjou in n 10 by the marriage of Count Helias's daughter to Fulk V., count of Anjou, and passed to the English crown in 1154, when Henry Plantagenet (who was born at Le Mans) became king of England. In 1204, after the con- fiscation of the estates of John of England, Maine was united to France; in 1246 it was separated from France by Louis IX., who handed it over to his brother Charles, count of Provence. Again united to France in 1328, it was given in 1356 as an I apanage to Louis, second son of King John II., and did not

definitely return to the French crown until 1481, after the death of Charles II., count of Maine. During the Hundred Years' War Maine was taken in 1425 by the English, who lost it in 1448.

See Histoire de I'Sglise du Mans, by Dom Piolin (Paris, 1851-1858), which is useful but out of date; Revue historique et archeologique du Maine

(1876); La Province du Maine (1893); B. Haureau, Histoire lilteraire du Maine (1870-1877).

MAINE, a North Atlantic state of the United States of America, the most north-easterly state in the Union, and the largest of the New England group. It lies between 43° 4′ and 47° 27′ 33″ N., and between 66° 56′ 48″ and 71 6′ 41″ W. It is bounded N.W. by the Canadian province of Quebec; N. and E. by the Canadian province of New Brunswick, from which it is separated in part by the natural barriers of the Saint John River, the Grand (or Schoodic) Lakes, the Saint Croix River, and Passamaquoddy Bay; S.S.E. by the Atlantic Ocean; and W. by New Hampshire, the Piscataqua and Salmon Falls rivers being the natural boundary lines at the S.W. The area of the state is 33,040 sq. m., 3145 sq. m. being water surface.

Maine attracts more summer visitors than any other state in the Union. This is due to the cool and refreshing summer climate; the picturesque coast and its many islands, which are favourite grounds for camps and summer cottages; the moun- tains, and the beautiful lakes and rivers, many of which afford opportunities for good fishing and canoeing. Among the more widely known resorts are Mount Desert Island, on which is Bar Harbor, a fashionable summer place of great beauty; Long Island, Orr's and other islands in Casco Bay; Old Orchard, with a gently sloping white sand sea-beach 9 m. long, Rangeley and Moosehead Lakes, favourite resorts of fishermen and hunters; Mt Katahdin, in the heart of the moose country; and Poland Springs (38 m. by rail from Portland) in Androscoggin county, near lake Anasigunticook.' About 1870, camps, summer cot- tages, summer hotels and boarding houses began to multiply throughout the state. The needs of this summer population gave a new impulse and a new turn to agriculture; and the ■demand for souvenirs revived among the Indians basket- weaving, moccasin-making, and such crafts.

Physical Features. — The surface is a gently rolling upland, form- ing a part of the " New England uplands," above which rise isolated mountain peaks and clusters of peaks, and below which are cut numerous river valleys. 1 The highest peak is Mt Katahdin (5200 ft.), a little N.E. of the centre of the state in Piscataquis county, which rises from a comparatively level upland. South-west of Katahdin, in Franklin county, are most of the other high peaks of the state: Saddleback Mountain (4000 ft.), Mt Abraham (3388 ft.), Mt Bigelow (3600 ft.), and Mt Blue (3200 ft.). A little N. of this line of mountain peaks is the water-parting which divides the state into a north slope and a south slope. The north slope descends gently both to the N. and to the E. ; although quite hilly in the middle and western portions it is so poorly drained that swamps abound in all sections. The south slope which contains nearly all the mountains and is generally more hilly, has a mean descent toward the sea of about 7 ft. to the mile,

the fall being greater in the W., where the mountains are high at the N. and the shore low at the S., and less to the E., where the water-parting is lower and the shore high and rocky.

After the uplift which caused the rivers to cut below the general " uplands," and develop well marked valleys for themselves, came the period of the great continental glaciation. The glacier or ice sheet overran all Maine, irregularly scouring out the bed rock to produce rock basins, damming up many river valleys with glacial deposits and completely disarranging the drainage lines. When the ice melted, the rock basins and the dammed-up valleys filled with water to produce lakes. This is the origin of the numerous lakes of Maine, which give it some of its most beautiful scenery, and help to make it a holiday resort in summer. These lakes are about 1600 in number, are scattered in all parts of the state, are especially numerous at high elevations, and have an aggregate area of more than 2000 sq. m. Few other regions have so many large lakes so variously

1 This condition results from the fact that Maine and the adjacent region were worn down nearly to sea-level by stream erosion, except certain peaks and ridges inland; then the region was elevated and numerous river valleys were cut down below the general erosion surface formed before. Thus we have a general " upland surface," above which the mountain remnants tower, and below which the rivers have been entrenched.

situated, and with such beauty of aspect and surroundings. They contribute largely to a constant supply of water power for which the course of the rivers of S.W. Maine are exceptionally well adapted', many of them abound in trout, salmon, togue, black bass and

Eickerel; and near them there is still much game. Moosehead ake (about 120 sq. m.; 35 m. long and from 2 m. to 10 m. wide), on the boundary between Piscataquis and Somerset counties, is the largest in Maine and the largest inland body of water wholly in New England; the Kennebec River is its principal outlet and Mt Kineo rises abruptly to about 1760 ft. above the sea (about 700 ft. above the lake) on its eastern shore. Other lakes, such as the Rangeley Lakes, 2 Chesuncook and Twin Lakes on the Penobscot, and the Grand or Schoodic Lakes, in the western boundary at the head waters of the Saint Croix River, equal or surpass Moosehead in picturesqueness. The glacier or ice sheet, above referred to, de- posited till or boulder clay, which was compacted under the enormous pressure of the ice sheet to form the " hard-pan " referred to later. The glaciation is also responsible for the poor soil of most of the state, for, although the rocks are the same crystallines which give good soils further south in unglaciated regions, all the decayed portions of the Maine rocks have been removed by glacial erosion, revealing fresh, barren rock over great areas, or depositing

the rather sterile hard-pan as a thin coating in other places.

After the uplift came a period of subsidence, during which this region sank one or more thousand feet, allowing the sea to encroach on the land and run far inland into the previously made river valleys. This depression probably occurred during the glacial period, perhaps toward its close, and is responsible for the second most important feature of Maine physiography, the embayed coast. To this subsidence are due the picturesque coastal scenery, the numerous islands and bays, the good harbours and the peculiar coast-line.

The shortest distance between the N.E. and the S.W. extremities of the coast is only 225 m. ; but, on account of projections and indentations, the coast-line measures not less than 2500 m. The headlands, the deep indentations and the numerous islands in the bays and beyond produce a beautiful mingling of land and sea and give to the whole ocean front the appearance of a fringed and tasselled border; west of the mouth of the Kennebec River are a marshy shore and many low grassy islands; but east of this river the shore becomes more and more bold, rising in the precipitous cliffs and rounded summits of Mt Desert and Quoddy Head, 1527 and 1000 ft. high respectively. All along the coast-line there are capacious and well-protected harbours, Casco, Penobscot, Frenchman's, Machias and Passamaquoddy bays being especially noteworthy.

After the subsidence came another period of uplift, possibly still in progress. This uplift has brought up submarine deposits of sand, &c, to form little coastal plains at some points along the coast, providing good land for settlement and clay for brick and pottery. Further evidence of this uplift is found in old beach lines now well above sea-level.

The principal river systems of Maine are the Saint John on the north slope, and the Penobscot, the Kennebec, the Androscoggin, and the Saco on the south slope. The mean height of the basin of the St John is exceeded only by that of the Androscoggin, but the fall of the St John River through the greater part of its course in Maine is only sufficient to give a sluggish or a gentle current. The Penobscot, Kennebec, Androscoggin and Saco have numerous falls and rapids.

Fauna. — The animal life of Maine shows a mixture of northern and southern forms, and very little that is peculiar as compared with surrounding regions. The state has moose, caribou and deer, especially in the northern part. The black bear, wolf, catamount, wolverine, wild cat, fox, beaver, racoon, marten, sable, woodchuck, skunk, otter, mink, rabbit and squirrel are also found. Geese, ducks and other water fowl frequent the lakes and bays in the migratory season, and eagles, gulls, hawks,

kingfishers, owls, plover, woodcock, ” partridge ” (ruffed grouse), robins, orioles, bobolinks, blue birds, swallows, sparrows, and many other insectivorous birds are common. In the inland waters salmon, trout, togue {Sahelinus nama’ycush), pickerel and bass abound; along the shore there are lobsters, clams and scallops (Pecten irradians) ; and off the shore are herring, alewives, mackerel, cod, halibut, haddock, smelts, hake, menhaden, porgies and porpoises. The game in the North Woods attracts large numbers of sportsmen during the autumn season.

Flora. — -Maine was formerly covered with forests, principally of white pine and spruce, but mixed with these were some hemlock, tamarack, cedar, and, on the south slope, birch, poplar, oak, maple and beech. Chestnut and walnut are rare and are found only near

2 This name is applied to a chain of lakes (the Rangeley, or Oquossoc, the Cupsuptic, the Mooselookmeguntic, the Molechunka- munk or Upper Richardson, the Welokenebacook or Lower Richardson, and the Umbagog) in Franklin and Oxford counties, in the western part of the state; the Umbagog extends into New Hampshire and its outlet helps to form the Androscoggin River. These lakes are connected by straits, have a total area of between 80 and 90 sq. m., and are from 1200 to 1500 ft. above the sea. They are sometimes called the Androscoggin Lakes.

MAINE

Scale, 1:1,330,000

English Miles

County Sedts „. e

County Boundaries

*Railways „ *—~*

G

Longitude West 69 of Greenwich

D-

B

e 7 y

Emery Walker sc.

the south-west border. In igoo about 21 % of the state's area was cleared, and much besides had once been cleared, but not being suited to agriculture had become reforested. Of fruit trees the chief is the apple. The plum, cherry and pear also thrive. The peach grows well only in the south-west near the border. Species of grape, gooseberry and currant are native, and others are cultivated with advantage. The blackberry, raspberry, blueberry and strawberry grow wild in profusion throughout the state.

Climate. — The climate of the state is moist and, for its latitude, cold. Extremes of temperature are not so great as farther inland in the same latitude; for the summer heats are tempered by the sea and the cool north winds, and the winter cold is so constant as to be less severely felt than the changing temperature of more southern districts. The summers are short, there being only about 4i months between frosts even in the southern sections, and the mean summer temperature is about 62 ° F. The mean winter temperature is approximately 20 F., and the mean annual temperature for the entire state is 42° F., that for the north slope being about 5 ° F. less than that for the south slope. Although the temperature remains pretty steadily below the freezing point for at least three months of the year, many of the harbours remain unobstructed ; for the tides and the prevailing off-shore winds break up and drive off the ice. The precipitation is about 42 in. annually, and is distributed very evenly throughout the year, 10-11 in. of rain or its equivalent in snow falling each season. During 4J months about 44 % of the precipitation is in the form of snow; but the snow-fall varies from about 60 in. on the coast to more than 100 in. on the north slope. The winds are variable; at no season of the year is it usual for them to blow from the same direction for many days in succession. But, with the exception of those from the west, they are maritime and consequently moisture-bearing. In summer, especially in the latter part of it, the cool and moist N. or N.E. winds often cause a con- siderable part of the state to be enveloped in fog for several days in succession.

Agriculture. — The soil is for the most part glacial drift, containing a large mixture of clay with sand or gravel, and the sub-soil is mostly " hard-pan," i.e. mingled clay and boulders which have been so much compressed by glacial action as to make the mixture hard and ledge-like. Except in the valley of the Aroostook and along the Kennebec, the Penobscot, and some other rivers, the soil is generally unfit for cultivation, there being too little alluvium mixed with it to make it fertile. In the Arroostook valley, however, is the largest undivided area of good arable land in all New England, the soil being a deep, porous, yellow loam well adapted to the

growth of cereals and to market gardening. The most sterile regions are on the mountains and along the coast. Because of the cold climate, the large areas in which there is little or no good arable land, the growing demand for timber land, and the large and constant supply of water- power afforded by the principal rivers, agriculture in Maine, as in all the other New England states except Vermont, is a smaller industry than manufacturing; in 1900 there were 87,932 people engaged in manufacturing and only 76,932 engaged in agriculture. Only 32-9% of the state's land area was in that year included in farms, only 37-9% of this farm land was improved, and only 16-3% of the improved land was in crops other than hay and forage. Nevertheless, as indicated by the unusually large proportion of farmers who either own their farms or pay cash rent for them, farming usually is profitable. The number of farms in 1900 was 59,299; of these 18,644 contained between 50 and 100 acres and 17,191 contained between 100 and 175 acres, the average size being 106-2 acres; 54,263 (or 91-5) were operated by their owners, 775 were operated by part owners, 2030 by cash tenants, and only 745 by share tenants. Beginning with the middle of the 19th century, the increasing competition of the more pro- ductive soils of the West, the growth of urban population in the state, and the number of summer visitors effected the reforesting of much poor land and the more intensive cultivation of the better arable land. The cultivation of cereals, for example, has given way to a marked extent in nearly all the farming districts except in Aroostook county to market gardening, dairying, and egg and poultry production. The number of dairy cows increased from 157,240 in 1890 to 183,000 in 1908, and the annual production of milk increased from 57,969,791 gallons in 1890 to 99,586,188 gallons in 1900. The number of other neat cattle (180,878 in 1900; 151,000 in 1908) decreased during every decade from i860 to 1900; the number of sheep in 1900 was 427,209 (31-9 less than in 1890), and in 1908 it was 267,000; but the number of horses in 1890 and 1900 was about the same (140,310 in 1900, but only 116,000 in 1908). Hay is still by far the largest crop, the acreage of it and of forage in 1899 being 1,270,254 acres, or 76-5% of that of all crops, and the yield was 1,133,932 tons; in 1907 the acreage was 1,400,000 acres, and the crop was 2,100,000 tons. The acreage of cereals decreased from 187,013 in 1880, when agriculture in Aroostook county was little developed, to 166,896 in 1899, when the cereal acreage in Aroostook county alone was 82,069. Maine potatoes are of a superior quality, and the acreage of this crop increased from 49,617 in 1889 to 118,000 in 1907. Sweet Indian corn, cabbages, turnips, cucumbers and tomatoes are grown in Urge quantities. The fruit crop consists very largely of apples and strawberries (1,421,773 bushels of apples and 1,066,860

quarts of strawberries in 1899). The output of eggs increased from

9.369,534 dozen in 1889 to 13,304,150 dozen in 1899. The most productive dairy section of the state is a belt extending from the south-west corner N.E. entirely across the state and embracing the whole or parts of the counties of York, Oxford, Cumberland, Androscoggin, Kennebec, Penobscot and Aroostook.

Lumber Industry. — Except in the remote parts, the valuable white pine, for which Maine was long noted, has been cut; but the wood- land of the state was estimated in 1900 at 23,700 sq. m. or 79% of its area. The tendency is for this area to increase, for the establishment between 1890 and 1900 of large paper and pulp mills on some of the principal rivers of the south slope greatly increased the value of forests, especially those of spruce and poplar. The state makes large appropriations for preventing and extinguish- ing forest fires, and in 1903 established a department of forestry in the university of Maine. Good spruce, which is by far the most valuable timber in the state and is used most largely for the manu- facture of paper and pulp, stands in large quantities in the St John, Penobscot, Androscoggin and Kennebec basins. Poplar, also used for the manufacture of paper, abounds in several sections of the south slope, but is most abundant in the basin of the Kennebec. White birch, used largely for the manufacture of spools, is found throughout a wide belt extending across the middle of the state. There is much cedar on the north slope. Oak, maple and beech are rather scarce. A new growth of white pine and other 1 timber is gradually becoming valuable. The value of the timber product increased from $11,849,654 in 1890 to $13,489,401 in 1900, and to $17,937,683 in 1905.

Fisheries. — Fishing has always been an important industry in Maine. From 1901 to 1904 inclusive, the average annual catch amounted to 195,335,646 lb, and its average value was $5,557,083. In 1908, according to state reports, the catch was 185,476,343 lb, valued at $3,849,900. Herrings are caught in largest quantities (in 1908, according to state reports, 68,210,800 lb, valued at $450,665), and Maine is noted for the canning of the smaller her- rings under the name of " sardines." In 1908, according to state reports, the take Of lobsters was 17,635,980 lb, valued at $1,558,252. Maine markets more clams than any other state in the Union, and the catches of cod, hake, haddock, smelt, mackerel, swordfish, shad, pollock, cusk, salmon, alewives, eels and halibut are of importance. The scallop fishery is becoming more and more valuable. For the protection and promotion of the lobster fishery : the United States government has established a lobster hatchery at Boothbay Harbor; and the state legislature enacted a law in 1895 prohibiting the taking of lobsters less than io| in. in length (one effect of this law being to drive the lobster-canning industry from the state) and another law in 1903 for the protection of lobsters with eggs attached. This latter law directs the state

fish commis- sioner to purchase such lobsters whenever caught and either to liberate them or to sell them to the United States for keeping in a fish hatchery.

Minerals. — The principal mineral products are granite, limestone, slate, clay products and mineral waters. In 1905 Maine held first rank among the states of the Union as a producer of granite, the value of the output being $2,713,795. In 1907 Maine's granite was valued at $2,146,420, that of Massachusetts at $2,328,777, and that of Vermont at $2,693,889. The stone is of superior quality, and the largest part of it is used for building purposes; much of it is used as paving blocks and some for monuments. It abounds all along the coast east of the Kennebec and on the adjacent islands, and is found farther inland, especially about the Rangeley lakes in Franklin and Oxford counties, and, near Mt Katahdin, in Penobscot and Piscataquis counties. The principal quarries, however, are situated in positions most convenient for shipment by water, in the Vicinity of Penobscot bay and in Kennebec county, and these have supplied the bulk of the material used in the con- struction of many prominent buildings and monuments in the United States. The Fox Island granite comes from the quarries on Vinalhaven Island and the surrounding islands, and on Vinalhaven were quarried monolithic columns 51-5 to 54 ft. long and 6 ft. in diameter for the Cathedral of St John the Divine in New York City. _ Black granite was quarried in 1907 at 12 quarries, in York, Lincoln, Waldo, Penobscot and Washington counties. Limestone abounds, especially in the south-east part of the state, but it is quarried chiefly in Knox county. As its colour — blue and blue-black streaked with white-^-renders it un- desirable for building purposes, nearly all of it is burned into lime, which has become a very important article of manu- facture in the city of Rockland; the industry dates back to 1733 in Knox county. In 1907 the quantity of lime burned in Maine was 159,494 t° n s and its value was $747,947. Slate is quarried chiefly in Piscataquis county, most of it being used for roofing, but some for blackboards; in 1907 the amount quarried in Maine was valued at $236,106. About 1896 some remarkably white and pure feldspar began to be quarried in Androscoggin, Oxford and Sagadahoc counties, but afterwards the spar mined in Maine was of less excellent quality; in 1907 the production in Maine was valued at $157,334, the total for the entire country being $499,069. Clay is obtained in various places, and in 1905 the total I value of the clay products was $619,294. In Oxford county

tourmaline, spodumene (or kunzite) and beryl occur, the tourmaline

crystals being notably large and beautiful. Mineral water occurs in many localities, particularly in Androscoggin, York, Cumberland and Oxford counties; the most famous springs are the Poland Springs in Androscoggin county. Most of the mineral waters bottled in the state are chalybeate and slightly alkaline — saline; their average temperature is about 43°. In 1908 27 springs were reported, their aggregate sales amounting to 1,182,322 gallons. Copper, gold alloyed with platinum, iron ore, barytes, graphite and lead occur in small quantities in the state. In 1908 the total mineral product of the state was valued at $7,044,678.

Manufactures. — Although Maine has no coal and only a very small amount of iron ore within her borders for the encouragement of manufacturing, yet the abundance of fine timber and the numerous coves, bays and navigable streams along or near the coast pro- moted ship-building from the first, and this was the leading industry of the state until about the middle of the 19th century, when wooden ships began to be supplanted by those of iron and steel. Until about the same time, when the Maine liquor law was passed, the manufacture of rum from molasses, received in exchange for lumber and fish in the West Indies, was also an important industry. It was not until early in the 19th century that the large and constant supply of water power afforded by the rivers began to be used to any considerable extent. The first cotton mill was built at Bruns- wick on the Androscoggin about 1809, and from 1830 the develop- ment of cotton manufacturing was rapid; woollen mills followed, and late in the 19th century were erected some of the largest paper and pulp mills in the country, which are run by water power from the rivers, and use the spruce and poplar timber in the river basins. The total value of the manufactures of the state increased from $95,689,500 in 1890 to $127,361,485 in 1900; and in 1905 the value of factory- made products alone was $144,020,197, or 27-5 % greater than their value in 1900. 1 Measured by the value of the output, paper and wood pulp rose from fifth among the state's manufactures in 1890 to third in 1900 and to first in 1905; from $3,281,051 in 1890 to $13,223,275 in 1900, an increase of 303% within the decade, and to $22,951,124 in 1905, a further in- crease of 73-6 % in this period. Lumber and timber products ranked second (1905) — $11,849,654 in 1890, $13,489,401 in 1900, and $17,937,683 in 1905. Cotton goods ranked third (1905) in value — $15,316,909 in 1890, $14,631,086 in 1900, and $15,404,823 in 1905. Woollen goods ranked fourth (1905) — $8,737,653 in 1890, $13,744,126 in 1900, an increase of 57-3% within the decade; and the value of the factory-made product alone in 1905 was $13,969,600, or 20-1 % greater than in 1900. Boots and shoes ranked fifth (1905) — $12,295,847 in 1900, and $12,351,293 in 1905. Fish, canned and preserved, followed next, $1,660,881 in 1890 and $4,779,773 in 1900, an increase within the decade of 187-8%, most*

of which was in one branch — the canning of small herring under the name "sardines"; from 1900 to 1905 the increase was slight, only $275,358, or 5-8 / . In the value of its manufactures as compared with those of the other states of the Union, in wooden ships and boats, Maine in 1900 and in 1905 was outranked by New York only; in canned and preserved fish by Washington only (the value of fish canned and preserved in Maine in 1900 was 21-7% of the total for the United States, and in 1905 19-2) ; in the output of woollen mills by Massachusetts and Pennsylvania only; in the output of paper mills by New York and Massachusetts only. It ranked ninth in 1900 and tenth in 1905 in the value of its cotton goods. Portland, Lewiston, Biddeford, and Auburn are the leading manufacturing cities, and in 1905 the total value of their manu- factures was 21-5 of those of the entire state. But from 1900 to 1905 the value of manufactures grew most rapidly in Rock- land (especially noted for lime), the increase being from $1,243,881 to $1,822,591 (46-5%), and in Waterville, where the increase was from $2,283,536 to $3,069,309 (34-4%). Among the largest paper mills are those at Millinocket, in Penobscot county, at Madison on the Kennebec river, and at Rumford Falls on the Androscoggin river. Lewiston leads in the manufacture of cotton goods; Auburn, Bangor and Augusta, in the manufacture of boots and shoes; Bath, in ship and boat building; Eastport and Lubec, in canning " sardines."

Transportation and Commerce. — The south-western part of the state, including the manufacturing, the quarrying, and much of the older agricultural district, early had fairly satisfactory means of trans- portation either by water or by rail ; for the coast has many excel- lent harbours, the Kennebec river is navigable for coast vessels to Augusta, the Penobscot to Bangor, and railway service was soon supplied for the villages of the south-west, but it was not until the last decade of the 19th century that the forests, the farming lands, and the summer resorts of Aroostook county were reached by a railway, the Bangor & Aroostook. The first railway in the state, from Bangor to Old Town, was completed in 1836, and the state's railway mileage increased from 12 m. in that year to 245 m. in 1850, to 1377-47 m. in 1890, and to 2210-79 in January 1909.

1 The census of 1905 was taken under the direction of the United States census bureau, but the statistics for hand trades were omitted.

The principal railway systems are the Maine Central, which enters every county but one, the Boston & Maine, the Bangor & Aroostook, the Grand Trunk and the Canadian Pacific. Lines of steamboats ply regularly between the largest cities of the state and Boston, between Portland and New York, and between Portland and several Canadian ports.

The foreign trade, especially that with the West Indies and with Great Britain, decreased after 1875, an d yet much trade from the West that goes to Montreal during the warmer months passes through Portland during the winter season. The chief exports to foreign countries are textile fabrics, Indian corn, meat, dairy products, apples, paraffin, boards and shooks; the chief imports from foreign countries are sugar, molasses and wool., Fish, canned goods, potatoes, granite, lime, paper, and boots and shoes are also exported to foreign countries to some extent, but they are shipped in larger quantities to other states of the Union, from which Maine receives in return cotton, coal, iron, oil, &c. The ports of entry in Maine are Bangor, Bath, Belfast, Castine, Eastport, Ellsworth, Houlton, Kennebunk, Machias, Portland, Wiscasset and York.

Population. — The population in 1880 was 648,936; in 1890, 661,086; in 1900, 694,466; and in 1910, 742,37i. 2 From 1880 to 1900 there was an increase of only 7%, a percentage which was exceeded in every other state in the Union except Nevada and Vermont. Of the total population of 1900, 599,291, or 86-3%, were native whites, 93,330 were foreign-born, 1,319 were negroes, 798 were Indians, 119 were Chinese, and 4 were Japanese. Of the inhabitants born in the United States, 588,211, or 97-8%, were natives of New England and 560,506 were natives of Maine, and of the foreign-born 67,077, or 71-8%, were natives of Canada (36,169 English and 30,908 French), and 10,159, or 10- 8 %, were natives of Ireland. Of the total popu- lation, 199,734 were of foreign parentage — i.e. either one or both parents were foreign-born — and 89,857 were of Canadian parent- age, both on the father's and on the mother's side (41,355 English and 48,502 French). The French-speaking inhabitants probably number considerably more than 50,000. They are of two quite distinct classes. One, numbering about 15,000, includes those who became citizens by the establishment of the northern boundary in 1842 and their descendants. They are largely of Acadian stock. The state has established among them a well-appointed training school for teachers, conducted in the English language, the graduates of which render excellent service in the common schools. The other class is of French- Canadian immigrants, who find profitable employment in the manufacturing centres. The colony of Swedes established by the state near its north-eastern border in 1870 has proved in every way successful. The Indians are remnants of the Penobscot and Passamaquoddy tribes, the Passamaquoddies being a little the more numerous. The Penobscots' chief gathering places are on the islands of the Penobscot river north of Old Town; the Passamaquoddies', on the shores of Passama- quoddy Bay and the banks of the Saint Croix river.

Roman Catholics are more numerous than all the Protestant sects taken together, having in 1906 a membership of 113,419 out of a total of 212,988 in all denominations. In the last decade of the 19th century the

urban population (i.e. popu- lation of places having 4,000 inhabitants or more) increased from 226,268 to 251,685, or 11-2%; the semi-urban population (i.e. population of incorporated places, or the approximate equivalent, having less than 4,000 inhabitants) increased from 14,221 to 26,674, or 87”5%; while the rural population (i.e. popu- lation outside of incorporated places) decreased from 420,597 to 416,134, or 1%. The principal cities of the state are: Portland, pop. (1910), 58,571; Lewiston, 26,247; Bangor, 2 4, 8 °3; Biddeford, 17,079; Auburn, 15,064; Augusta (the capital), 13,211; Water- ville, 11,458; Bath, 9,396; Westbrook, 8,281; and Rockland, 8,174. Administration. — Maine has had but one state constitution; this was ratified in December 1819, about three months before the admission of the state into the Union. It admits of amend- ment by a two-thirds vote of both houses of the legislature followed by a majority vote of the electorate at the next

2 According to previous censuses the population was as follows:

(1790) 96,540; (1800) 151,719; (1810) 228,705; (1820) 298,335;

(1830) 399.455; (1840) 50!.793; (1850) 583,169; (1860I 628,279:

(1870) 626,915.

September election; or, as provided by. an amendment adopted in 1875, the legislature may by a two-thirds vote of each house summon a constitutional convention. From 1819 to 1875 twelve amendments were adopted; in 1875, after nine more were added, the twenty-one were incorporated in the text; and between 1875 and 1899 nine more were adopted. Suffrage is conferred by the constitution on all male citizens of the United States who are at least twenty-one years of age and have, for some other reason than because of being in the military, naval or marine service of the United States, or of being students at college, lived in the state for three months next preceding any election; the following classes, however, are excepted: paupers, persons under guardianship, Indians not taxed, and, as provided by an amendment adopted in 1892, persons intellectually in- capable of reading the state constitution in the English language or of writing their names. State elections were annual until 1897 when they were made biennial; they are held on the second Monday in September in even numbered years, Maine being one of the few states in the Union in which they are not held in November.

The governor is the only executive officer of the state elected by popular

vote. There is no lieutenant-governor, the president of the Senate succeeding to the office of governor in case of a vacancy, but there is a council of seven members elected by the legislature (not more than one from any one senatorial district), whose sole function is to advise the governor. The governor's term of office is two years (before 1879 it was one year) ; and the constitution further directs that he shall be at least thirty years of age at the beginning of his term, that he shall be a native-born citizen of the United States, that when elected he shall have been a resident of the state for five years, and that he shall reside in the state while in office. His power of appointment is unusually extensive and the advice and consent of the council (instead of that of the Senate as in other states) are required for his appointments. He appoints all judges, coroners and notaries public, besides all other civil and military officers for whose appointment neither the constitution nor the laws provide otherwise. The governor is commander-in-chief of the state militia. Any bill of which he disapproves he can within five days after its passage prevent from becoming a law unless it is passed over his veto by a two-thirds vote of each house of the legislature. He and the council examine and pass upon election returns; he may summon extra sessions of the legislature, and he may grant pardons, re- prieves, and commutations in all cases except impeachment, but the manner of hearing applications for pardon is in a measure pre-scribed by statute, and he must present to the legislature an account of each case in which he grants a pardon. His salary is $2,000 a year. The seven members of the council, the secretary of state, the treasurer, the attorney general and the commissioner of agri- culture are elected biennially by a joint ballot of the two houses of the legislature, which also elects, one every two years, the three state assessors, whose term is six years.

The legislature meets biennially at Augusta, the capital, and is composed of a Senate of thirty-one members and a House of Re- presentatives of one hundred and fifty-one members. Members of each house are elected for a term of two years: one senator from each senatorial district and one to seven representatives (one for a population of 1,500, and seven for a population of 26,250) from each township, or, where the township or plantation has less than 1,500 inhabitants, from each representative district, according to its population. There is a new reapportionment every ten years, counting from 1821. Every senator and every representative must at the beginning of his term have been for five years a citizen of the United States, for one year a resident of the state, and for three months next preceding his election, as well as during his term of office, a resident of the township or district which he represents; and every senator must be at least twenty-five years of age. AH revenue bills must originate in the House of Representatives, but to such bills the Senate may propose

amendments provided they relate solely to raising revenue. Other bills may originate in either house. In September 1908 a constitutional amendment was adopted providing for referendum and initiative by the people. Any bill pr6posed in the legislature or passed by it must be referred to popular vote before becoming law, if there is a referendum petition therefor signed by 10,000 voters; and a petition signed by 12,000 voters initiates new legislation.

At the head of the department of justice is the supreme judicial court, which consists of a chief justice and seven associate justices appointed by the governor and council for a term of seven years. When it sits as a law court, at least five of its justices must be present, and it holds three such sessions annually: one at Augusta, one at Bangor, and one at Portland. But only one of its justices is re- quired for a trial court, and trial courts are held two or three times a year in each county for the trial of both civil and criminal cases

which come before it in .the first instance or upon appeal. In Cumberland and Kennebec counties there is a superior court pre- sided over by one justice and having extensive civil and criminal jurisdiction; and in each of the counties there are a probate court for the settlement of the estates of deceased persons and courts of the trial justice and the justice of the peace for the trial of petty offences and of civil cases in which the debt or damage involved does not exceed $20.

The principal forms of local government are the town (or town- ship), the plantation, the county and the city. As in other parts of New England, the town is the most important of these. At the regular town meeting held in March the electorate of the town assembles, decides what shall be done for the town during the ensuing year, elects officers to execute its decisions with limited discretion, and votes money to meet the expenses. The principal officers are the selectmen (usually three), town clerk, assessors, collector, treasurer, school committee and road commissioner. A populous section of a town, in order to promote certain financial ends, is commonly incorporated as a village without however becoming a governing organization distinct from the town. Maine is the only state in the Union that retains what is known as the organized plantation. This is a governmental unit organized from an unincorporated township having at least 200 inhabitants, 1 and its principal officers are the moderator, clerk, three assessors, treasurer, collector, constable and school committee. The county is a sort of intermediate organization between the state and the towns to assist chiefly in the administration of justice, especially in the custody of offenders, and in the making and care of roads. Its officers are three commissioners, a treasurer, a register of deeds, a judge and a register of probate, and a sheriff. They are all elected: the commissioners for a term

of six years, one retiring every two years, the register of deeds and the judge and the register of probate for a term of four years, and the others for two years. Among other duties the commissioners care for county property, manage county business and take charge of county roads. Maine has no general law under which cities are chartered, and does not even set a mini- mum population. A town may, therefore, be incorporated as a city whenever it can obtain from the legislature a city charter which a majority of its electorate prefers to a continuance under its town government ; consequently there is much variety in the government of the various cities of the state.

By the laws of Maine the property rights of a wife are approxi- mately equal to those of a husband. A woman does not lose nor a man acquire right to property by marriage, and a wife may manage, sell, or will her property without the assent of her husband. She may even receive as her own the wages of her personal labour which was not performed for her own family. In the absence of a will, bar or release, there is no legal distinc- tion between the rights of a widower in the estate of his deceased wife and those of a widow in the estate of her deceased husband. The grounds for divorce in the state are adultery, impotence, extreme cruelty, desertion for three consecutive years next preceding the application, gross and confirmed habits of intoxi- cation, cruel and abusive treatment, or a husband's gross or wanton refusal or neglect to provide a suitable maintenance for his wife.

Under the laws of Maine a householder owning and occupying a house and lot may hold the same, or such part of it as does not exceed $500 in value, as a homestead exempt from attachment, except for the satisfaction of liens for labour or material, by filing in the registry of deeds a certificate stating his desire for such an exemption, provided he is not the owner of an exempted lot purchased from the state; and the exemption may be con- tinued during the widowhood of his widow or the minority of his children. A considerable amount of personal property, including apparel, household furniture not exceeding $100 in value, a library not exceeding $150 in value, interest in a pew in a meeting-house, and a specified amount of fuel, provisions, tools or farming implements, and domestic animals, and one fishing boat, is also exempt from attachment.

Maine was the first state in the Union to enact a law for prohibiting the sale of intoxicating liquors. An act for restricting the sale of such liquors was passed in 1846; the first prohibitory act was passed, largely through the influence of Neal Dow, in 1 851; this was frequently amended; and in 1884 an amendment

1 An unincorporated township containing less than 200 inhabitants may,

on the application of three resident voters, be organized as a plantation, but does not pay state or county taxes unless by special legislative order. Other unincorporated districts, especially islands along the coast, are called " grants," " surpluses," "gores " or " tracts."

to the constitution was adopted which declares the manufacture of intoxicating liquors and their sale, except " for medicinal and mechanical purposes and the arts," forever prohibited. By the law enacted for enforcing this prohibition the governor and council appoint a state liquor commissioner from whom alone the selectmen of a town, the mayor or aldermen of a city, are authorized to receive the liquors which may be sold within the exceptions named in the amendment, and the selectmen, mayor or aldermen appoint an agent who alone is authorized to sell any of these liquors within their jurisdiction and who is forbidden to sell any whatever to minors, Indians, soldiers and drunkards. But the law labours under the disadvantage of all laws not vigorously sustained by general public sentiment, and is grossly violated. For the most part it is executed to the degree demanded by local sentiment in the several muni- cipalities, thus operating in practice much the same as a " local option " law. The law looks to checking the demand by pre- venting the supply; and since habitual reliance on the stringency of law tends to the neglect of other influences for the removal of evils from the community, the citizens seem to absolve them- selves from personal responsibility, both for the execution of the law and for the existence of the evil itself. There has been a strong movement for the repeal of the law, and the question of prohibition has long been an important one in state politics. The death penalty was abolished in Maine in 1876, restored in 1883, and again abolished in 1887.

Penal and Charitable Institutions. — The state penal and reforma- tory institutions consist of the state prison at Thomaston, the state (reform) school for boys at South Portland, and a state industrial school for girls at Hallowell, established in 1875 and taken over by the state in 1899. The two schools are not places of punishment, but reformatory schools for delinquent boys (from 8 to 16 years of age) and girls (from 6 to 16 years), who have been committed by the courts for violations of law, and, in the case of girls, who, by force of circumstances or associations, are " in manifest danger of be- coming outcasts of society." The prison is in charge of a board of three inspectors and a warden, and each of the other two institu- tions is in charge of a board of trustees ; the inspectors, warden, and trustees are all appointed by the governor and council. Convicts in the prison are usually employed in the manufacture Of articles that are not extensively made elsewhere in the state, such as carri- ages, harness, furniture and brooms. The inmates of the state school for boys receive instruction in farming, carpentry, tailoring, laundry work, and various other trades and occupations; and the girls in the state industrial school are

trained in housework, launder- ing, dressmaking, &c. Paupers are cared for chiefly by the towns and cities, those wholly dependent being placed in almshouses and those only partially dependent receiving aid at their homes. The chari- table institutions maintained by the state are: the military and naval orphan asylum at Bath, the Maine institution for the blind at Portland, the Maine school for the deaf (established in 1876, and taken over by the state in 1897) at Portland, the Maine insane hospital at Augusta, the Eastern Maine insane hospital at Bangor, and a school for the feeble-minded (established in 1907) at West Pownal, each of which is governed by trustees appointed by the governor and council, with the exception of a part of those of the orphan asylum, who are appointed by the corporation. Besides the strictly state institutions, there are a number of private charitable institutions which are assisted by state funds; among these are the eye and ear infirmary at Portland, the Maine state sanatorium at Hebron for the treatment of tuberculosis, and various hospitals, orphanages, &c. The national government has a branch of the national home for disabled volunteer soldiers at Togus, and a marine hospital at Portland.

Education. — The school-district system was established' in 1800 while Maine was still a part of Massachusetts and was maintained by the first school law passed, in 1821, by the state legislature; but, beginning in the next year, one town after another received the privilege of abolishing its districts, and in 1893 the system was abolished by act of the legislature. A state board of education, composed of one member from each county, was established in 1846, but for this was substituted, in 1852, a commissioner of schools for each county, appointed by the governor, and two years later a state superintendent of schools was substituted for the county commissioners. County supervision by county supervisors was tried in 1869-1872. Since these several changes the common school system has been administered by towns and cities subject to an increasing amount of control through enactments of the state legislature and the general supervision of the state superintendent. The town officers are a superintending school committee of three members and a superintendent. The members of the committee are elected for a term of three years, one retiring every year, and women as well as men are eligible for the office. The superintendent

may be elected by the town or appointed by the committee, or towns having not less than twenty or more than fifty schools may unite in employing a superintendent. In cities the committee is usually larger than in towns and is commonly elected by wards. Since 1889 each town and city has been required to furnish text books, apparatus and supplies, without cost to the pupils. The minimum length of the school year is fixed by a statute of 1893 at twenty weeks; the average length is about twenty-eight weeks; A

compulsory education law, enacted in 1901, requires the attend- ance at some public or approved private school of each child between the ages of seven and fifteen during all the time that school is in session, except that necessary absences may be excused. For the maintenance of the common schools each town is required (since 1905) to raise annually at least fifty-five cents per capita, exclusive of what may be received from other sources, and to this is added the proceeds of a state tax of one and a half mills on a dollar, one- half the proceeds of the tax on savings banks, a 6 % income from the permanent school fund (derived mainly from the sale of school lands), and state appropriations for the payment in part of the superintendence in towns that have united for that purpose. Any section of a town may establish and maintain a high school pro- vided there be not more than two such schools in one town, and the state makes appropriations for the support of such schools equal to one-half the cost of instruction, but the maximum grant to any one such school is $250.

The state maintains five normal schools: that at Farmington (established 1864), that at Castine (1866), that at Gorham (1879); that at Presque isle (the Aroostook state normal school, 1903), and the Madawaska training school at Fort Kent, each of which is under the direction of a board of trustees consisting of the governor, the state superintendent of schools, and five other members ap- pointed by the governor and council for not more than three years. At the head of the public school sj'stem is the university of Maine, near the village of Orono in Orono township (pop. in 1900, 3257). Penobscot county. This institution was founded in 1865 as the state college of agriculture and the mechanic arts ; in 1897 the present name was adopted. It embraces a college of arts and sciences, a college of agriculture, a college of technology (including a depart- ment of forestry), a college of law (at Bangor), and a college of pharmacy. The most conspicuous of its twenty-five buildings is the library, built with funds contributed by Andrew Carnegie. In 1908-1909 the university had 104 instructors and 884 students, of whom 113 were in the college of law at Bangor and 420 in the college of technology. The university is maintained with the proceeds of an endowment fund derived chiefly from public lands given by the national government in accordance with the land grant, or Morrill, Act of 1862 (seeMoRRiLL, Justin S.) and from the bequest ($100,000) of Abner Coburn (1 803-1 885) ; by appropriations of Congress under the second Morrill Act (1890), and under the Nelson Amendment of 1907, by appropriations of the state legislature, and by fees paid by the students. Connected with the university is an agricultural experiment station, established and maintained under the Hatch Act (1887) and the Adams Act (1906) of the national Congress. The government of the university is entrusted, subject to inspection of the governor and council, to a board of eight trustees. Among the important

institutions of learning which have no official con- nexion with the state are Bowdoin College (opened in 1802), at Brunswick; Colby College (Baptist, opened in 1818), at Waterville; and Bates College (originally Free Baptist but now unsectarian; opened in 1863), at Lewiston. In 1900 5-1% of the state's in- habitants ten years of age and over were illiterate (i.e-. could neither read nor write, or could read but not write) ; of the native whites within this age limit 2-4% were illiterate, of the foreign whites, 19-4%. Of the foreign-born whites 15-7 % were unable to speak English.

Finance. — The chief sources of the state's revenue are a general property tax and taxes on the franchises of corporations, especially those of railway and insurance companies and savings banks; among the smaller sources are licences or fees, a poll tax, and a collateral inheritance tax. The general property tax for state and local purposes is assessed by local assessors, but their work is re- viewed for the purpose of equalization among the several towns and counties by a board of state assessors, which also assesses the corporations. This board of three members (not more than two of whom may be of the same political party) is elected by a joint ballot of the two houses of the legislature for a term of six years, one member retiring every two years. The state is prohibited by the constitution from creating a debt exceeding $300,000 except for the suppression of a rebellion, for repelling an invasion, or for war purposes; and every city and town is forbidden by an amend- ment adopted in 1877 from creating one exceeding 5%_ of the assessed value of its property. But the state was authorized by an amendment adopted in 1868 to issue bonds for the reimburse- ment of the expenses incurred by its cities, towns, and plantations on account of the Civil War, and these bonds, with those issued by the state itself during the Civil War, constituted the largest part of the state's bonded indebtedness. The bonded debt, however, is rapidly being paid; in January 1901 it was $2,103,000, and in January. 1909 only $698,000.

History. — During the 16th century and the early part of the 17th, the coast of Maine attracted various explorers, among them Giovanni da Verrazano (1524), Esteban Gomez (1525), Bartholomew Gosnold (1602), Martin Pring (1603), Pierre du Guast, Sieur De Monts (1604), George Weymouth (1605), and John Smith (1614), who explored and mapped the coast and gave to the country the name New England; but no permanent English settlement was established within what are now the borders of the state until some time between 1623 and 1629. In 1603 De Monts received from Henry IV. of France a charter for all the region between 40 and 46 N. under the name of Acadie, or Acadia, and in 1604

he built a fort on Neutral Island at the mouth of the Saint Croix river. This he abandoned in 1605, but some of his followers were in the vicinity a few years later. In the same year George Weymouth explored the south- west coast, kidnapped five Indians, and carried them to England, where three of them lived for a time in the family of Sir Fer- dinando Gorges, who soon became the leader in founding Maine. In 1607 the Plymouth Company, of which he was an influential member and which had received a grant of this region from James I. of England in the preceding year, sent out a colony numbering 120 under George Popham (c. 1550-1608), brother of Sir John Popham, and Raleigh Gilbert, son of Sir Humphrey Gilbert. The colony established itself at the mouth of the Kennebec river in August, but, finding its supplies insufficient, about three-fifths of its number returned to England in December; a severe winter followed and Popham died; then Gilbert, who succeeded to the presidency of the council for the colony, became especially interested in his claim to the territory under his father's charter, 1 and in 1608 the colony was abandoned. In 1609 the French Jesuits Biard and Masse established a fortified mission station on the island of Mount Desert, and although this as well as the remnant of De Monts' settlement at the mouth of the Saint Croix was taken in 1613 by Sir Samuel Argall (d. 1626), acting under the instructions of the English at Jamestown, Virginia, some of these colonists returned later. In 1620 the Council for New England, the successor of the Plymouth Company, obtained a grant of the country between latitude 40° and 48° N. extending from sea to sea, and two years later Gorges and John Mason (1586-1635) received from the Council a grant of the territory between the Merrimac and the Kennebec rivers for 60 m. inland under the name of the Province of Maine. In 1629 they divided their possession, Gorges taking the portion between the Piscataqua and the Kennebec. Numerous grants of land in this vicinity followed within a few years; and in the meantime permanent settlements at York, Saco, Bidde- ford, Port Elizabeth, Falmouth (now Portland) and Scarborough were established in rapid succession. The Council for New England surrendered its charter in 1635. In the division of its territory Gorges retained the portion previously granted to him, and the region between the Kennebec and the Saint Croix north to the Saint Lawrence, though still claimed by the French as part of Acadia, was conveyed to Sir William Alexander (1567?- 1640); later, in 1664, this was conveyed to the duke of York, afterwards James II. of England.

Gorges named his tract the County of New Somersetshire, and immediately began the administration of government, set- ting up in 1635 or 1636 a court at Saco under the direction of his kinsman William Gorges. In 1639 he procured for his province a royal charter modelled after that of Maryland, which invested him with the feudal tenure of a county palatine and vice-regal powers of government. He called into existence a formidably

large number of officers to govern it, but his charter was in conflict with the other (mutually conflicting) grants of the Council for New England, east of the Piscataqua; and Gorges and his agents met with a determined opposition under the leadership of George Cleeve, the deputy-president of the Lygonia, or " Plough " Patent, which extended along the coast from

1 By this charter, issued in 1578, Sir Humphrey Gilbert was entitled to all territory lying within two hundred leagues of any colony that he might plant within six years; although it had long since lapsed, Raleigh Gilbert seems not to have been aware of it.

Cape Porpoise to Casco, and in issuing which the Council for New England had granted governmental as well as territorial rights. Moreover, Puritan Massachusetts, which was naturally hostile to the Anglicanism of Gorges and his followers, inter- preted her charter so as to make her northern boundary run east and west from a point 3 m. north of the source of the Merri- mac river, and on this basis laid claim to practically the whole of Maine then settled. The factional quarrels there, together with the Commonwealth government in England, made it easy for Massachusetts to enforce this claim at the time, and between 1652 and 1658 Maine was gradually annexed to Massachusetts. In 1672 Massachusetts extended her boundary eastward as far as Penobscot Bay. Ferdinando Gorges, a grandson of the original proprietor, brought before parliament his claim to Maine and in 1664 a committee of that body decided in his favour; but Massachusetts successfully resisted until 1677, when the king in council decided against her. She then quietly purchased the Gorges claim for £1,250 and held the province as a proprietor until 1691, when by the new Massachusetts charter Maine was extended to the Saint Croix river, and was made an integral part of Massachusetts.

The French still claimed all territory east of the Penobscot, and not only was Maine an exposed frontier and battleground during the long struggle of the English against the Indians and the French, but its citizens bore a conspicuous part in the expeditions beyond its borders. Port Royal was taken in May 1690 by Sir William Phipps and Louisburg in June 1745 by Sir William Pepperell, both these commanders being from Maine. These expeditions were such a drain on Maine's population that Massachusetts was called upon to send men to garrison the little forts that protected the homes left defenceless by men who had gone to the front. During the War of Independence, the town of Falmouth (now Portland), which had ardently resisted the claims of the British, was bombarded and burned, in 1775; in the same year Benedict Arnold followed the course of the Kenne- bec and Dead rivers on his expedition to Quebec; and from 1779 to 1783 a British force was established at Castine. The embargo and non-intercourse laws from 1807 to 181 2 were a severe blow to Maine's shipping, and in

the War of 1812 Eastport, Castine, Hampden, Bangor and Machias fell into the hands of the British.

Maine was in general well governed as a part of Massachusetts, but a geographical separation, a desire to be rid of the burden of a large state debt, and a difference of economic interests as well as of politics (Maine was largely Democratic and Massachusetts was largely Federalist) created a desire for an independent commonwealth. This was felt before the close of the War of Independence and in 1785-1787 conventions were held at Falmouth (Portland) to consider the matter, but the opposition prevailed. The want of protection during the War of 1812 revived the question, and in 1816 the General Court in response to a great number of petitions submitted to a vote in the towns and plantations of the District the question: " Shall the legis- lature be requested to give its consent to the separation of the District of Maine from Massachusetts, and the erection of said District into a separate state? " The returns showed 10,393 yeas to 6501 nays, but they also showed that less than one-half the full vote had been cast. Acting upon these returns the legislature passed a bill prescribing the terms of separation, and directed another vote of the towns and plantations upon the question of separation and the election of delegates to a con- vention at Brunswick which should proceed to frame a constitu- tion in case the second popular vote gave a majority of five to four for separation; but as that vote was only 11,969 yeas to 10,347 nays the advocates of separation were unsuccessful. But a large source of opposition to separation was removed in 1819 when Congress, dividing the east coast of the United States into two great districts, did away with the regulation which, making each state a district for entering and clearing vessels, would have required coasting vessels from the ports of Maine as a separate state to enter and clear on every trip te or from I Boston; as a consequence, the separation measures were carried

by large majorities this year, a constitution was framed by a convention which met at Portland in October, this was ratified by town meetings in December, and Maine applied for admis- sion into the Union. Owing to the peculiar situation at the time in Congress, arising from the contest over the admission of Missouri, the question of the admission of Maine became an important one in national politics. By an Act of the 3rd of March 1820, however, Maine was finally admitted into the Union as a separate state, her admission being a part of the Missouri compromise (q.v.).

The boundary on the north had not yet been ascertained, and it had long

been a subject of dispute between the United States and Great Britain. The treaty of 1783 (Article II.) had defined the north-east boundary of the United States as extend- ing along the middle of the river St Croix " from its mouth in the bay of Fundy to its source " and " due north from the source of St Croix river to the highlands; along the said highlands which divide those rivers that empty themselves into the river St Lawrence from those which fall into the Atlantic Ocean, to the north- westernmost head of Connecticut river; thence down along the middle of that river to the forty-fifth degree of north latitude." Great Britain claimed that the due north line was 40 m. long and ran to Mars Hill in Aroostook county, and that the highlands ran thence westerly 115 m. to the source of the Chaudiere; the United States, on the other hand, claimed that the northerly line was 140 m. long, running to highlands dividing the Ristigouche and the tributaries of the Metis; and there was a further disagreement with regard to the side of the highlands on which the boundary should be, and as to what stream was the " north-westernmost head of Connecticut river." The fifth article of the Jay treaty of 1794 provided for a commission to decide what the St Croix river actually was, and this com- mission in 1798 defined the St Croix, saying that its mouth was in Passamaquoddy bay and that the boundary ran up this river and the Cheputnatecook to a marked monument. The treaty of Ghent in 1814 (Article IV.) referred the question of the ownership of the islands in Passamaquoddy bay to a com- mission which gave Moose, Dudley and Frederick islands to the United States; and the same treaty by Article V. provided for the survey (which was made in 1817-1818) of a part of the disputed territory, and for a general commission. The general commissioners met at St Andrews, N.B., in 1816, and in New York City in 1822, only to disagree; and when the king of the Netherlands, chosen as arbitrator in 1829 (under the Convention of 1827) rendered in 1831 a decision against which the state of Maine protested, the Federal Senate withheld its assent to his decision. In 1838-1839 the territory in dispute between New Brunswick and Maine became the scene of a border " war," known as the " Aroostook disturbance "; Maine erected forts along the line she claimed, Congress authorized the president to resist any attempt of Great Britain to enforce exclusive jurisdiction over the disputed territory, and an armed conflict seemed imminent. General Winfield Scott was sent to take command on the Maine frontier, and on the 21st of March 1839 he arranged a truce and a joint occupancy of the territory in dispute until a satisfactory settlement should be reached by the United States and Great Britain. The Webster-Ashburton treaty of 1842 was a compromise, which allowed Maine about 5500 sq. m. less than she had claimed and allowed Great Britain about as much less than her claim; all grants of land previously made by either party within the limits of the territory which by this treaty fell within the dominions of the other party were to be " held valid, ratified and confirmed to the persons in possession under such

grants, to the same extent as if such territory had . . . fallen within the dominions of the party by whom such grants were made "; and the government of the United States agreed to pay to Maine and Massachusetts 1 "in 1 An article in the Act relating to the separation of Maine from Massachusetts stipulated that the lands within the District of Maine which prior to the separation had belonged to Massachusetts should after the separation belong one-half to Maine and one-half to Mas- sachusetts. In 1826 the wild lands of Maine were surveyed and divided between the two states; and in 1853 Maine acquired from

equal moieties " the sum of $300,000 as compensation for the lands which they had claimed and which under the treaty they were called upon to surrender. The long controversy, which is known in American history as " The North-East boundary dispute," was not finally settled however until 1910.

It was the Democratic majority in the district of Maine that effected the separation from Massachusetts, and from the date of that separation until 1853 Maine was classed as a Democratic state, although it elected a Whig governor in 1838 and in 1840, and cast its electoral vote for John Quincy Adams in 1824 and 1828 and for W. H. Harrison in 1840. As a result of the slavery question, there was a party disintegration between 1850 and 1855, followed by the supremacy of the Republican party from 1856 to 1878. In 1878, of the 126,169 votes cast in the election for governor, Selden Connor (b. 1839), re-nominated by the Republicans, received 56,554; Joseph L. Smith (" National " or "Greenback"), 41,371; Alonzo Garcelon (1813-1906) (Demo- cratic), 28,218; as no candidate received a majority of the votes, the election was left to the legislature. 2 The vote of the House eliminated Connor, and Garcelon was chosen in the Senate by a Democratic-National fusion. Again there was no election by popular vote in 1879, and Garcelon and his council, to secure the election of a fusion government, counted-in a fusion majority in the legislature by evident falsification of the returns. On the 3rd of January 1880 the Supreme Court declared the governor and council in error in counting in a fusion majority, but on the 7th the governor swore in a legislature with 78 fusion and only two Republican members, and, the governor's term having expired, the president of the Senate, James D. Lamson, became governor, ex-officio. On the 12th the legislative chambers were seized by the Republicans, whose organized legislature was declared legal by the Supreme Court, and who chose as governor Daniel Franklin Davis (1843-1897); where- upon, on the 17th, Joshua L. Chamberlain, to whom the peaceful solution of the difficulty had largely been due, retired from the task assigned him by Garcelon on the 5th of January " to protect the public property and institutions of the state " until Garcelon's successor should be duly qualified. In 1880 the Democrats and Greenbacks united and elected their

candidate, but after 1883 Maine was strongly Republican until 1910.

The governors of the state have been William King

William Durkee Williamson (act

Benjamin Ames (acting)

Albion Keith Parris

Enoch Lincoln .

Nathan Cutler (acting)

Jonathan G. Hunton

Samuel Emerson Smith

Robert Pinckney Dunlap

Edward Kent

John Fairfield

Edward Kent

John Fairfield

Edward Kavanagh (acting)

Hugh J. Anderson .

John Winchester Dana .

John Hubbard .

William George Crosby

Anson Peaslee Morrill .

Samuel Wells

Hannibal Hamlin .

Joseph H, Williams (acting)

Lot Myrick Morrill .

Israel Washburn

Abner Coburn .

ng)

as follows: —

Democrat

1820

”

1821

tl

1821

”

1822

1827

1829

”

1830

”

1831

”

1834

Whig

1838

Democrat

1839

Whig

1841

Democrat

1842

”

1843

”

1844

1847

”

1850

Whig and Free Soil

1853

Republican

1855

Democrat

1856

Republican

1857

1857

1 858

1861

”

1863

Massachusetts, for $362,500, all of this land still remaining in posses- sion of the latter state.

2 According to Art. V. of the constitution a majority of the total number of votes cast was required for election ; in case no candidate should receive a majority, it was prescribed that the " House of Representatives shall, by ballot, from the persons having the four highest numbers of votes on the lists, if so many there be, elect two persons and make returns of their names to the Senate, of whom the Senate shall, by ballot, elect one, who shall be declared the governor." An amendment, which became a part of the constitution on the 9th of November 1880, provided that a plurality of the total numbet of votes cast should be sufficient for election.

MAINE DE BIRAN

Samuel Cony Republican 1864

Joshua Lawrence Chamberlain . . „ 1867

Sidney Perham n 1871

Nelson Dingley „ !8 7 4

Selden Connor tt 1876

Alonzo Garcelon Democrat 1879

Daniel F. Davis Republican 1880

Harris Merrill Plaisted Democrat-Greenback 1881

Frederick Robie Republican 1883

Joseph R. Bodwell „ 1887

Sebastian S. Marble (acting) ... „ 1887

Edwin C. Burleigh ,, 1889

Henry B. Cleaves v T893

Llewellyn Powers 1F ˆ97

John Fremont Hill fl iqoi

William T. Cobb „ 1905

Bert M. Fernald „ joog

Frederick W. Plaisted Democrat 191 1

See S. L. Boardman, Climate, &c, of Maine (Washington, 1884); Walton Wells, The Water Power of Maine (Augusta, 1869); G. H. Hitchcock, General Report on the Geology of Maine (Augusta, 1861); G. H. Stone, The Glacial Gravels of Maine and their Associated Deposits (Washington, 1899); T. Nelson Dale, The Granites of Maine (Washington, 1907), being Bulletin 313 of the U. S. Geological Survey ; B. F. De Costa, Sketches of the Coast of Maine and Isle of Shoals (New York, 1869) ; H. D. Thoreau, The Maine Woods (Boston, 1881); L. L. Hubbard, Woods and Lakes of Maine (Boston, 1883); T. S. Steele, Canoe and Camera, a Two Hundred Mile Tour through the Maine Forests (New York, 1882); William MacDonald, The Government of Maine, Its History and Administration (New York, 1902); Maine Historical Society Collections (Portland, 1831-); W. D. Williamson, History of the State of Maine (Hallowell, 1832); J. P. Baxter, Sir Ferdinando Gorges and his Province of Maine (Boston, 1890) and George Cleeve of Casco Bay (Portland, 1885); George Folsom, History of Saco and Biddeford, with notices of other Early Settlements and of the Proprietary Governments in Maine (Saco, 1830); J. L. Chamberlain, Maine, Her Place in History (Augusta, !877) ; E. S.Whitin, Factory Legislation in Maine (New York, 1908).

MAINE DE BIRAN, FRAN50IS-PIERRE-G0NTHIER (1766- 1824). French philosopher, was born at Bergerac, on the 29th of November, 1766. The name Maine he assumed (some time before 1787) from an estate called Le Maine, near Mouleydier. After studying with distinction under the doctrinaires of Peri- gueux, he entered the life-guards of Louis XVI., and was present at Versailles on the memorable 5th and 6th of October 1789. On the breaking up of the gardes du corps Biran retired to his patrimonial inheritance of Grateloup, near Bergerac, where his retired life preserved him from the horrors of the Revolution. It was at this period that, to use his own words, he ” passed per saltum from frivolity to philosophy.” He began with psychology, which he made the study of his life. After the Reign of Terror Maine de Biran took part in political affairs. Having been excluded from the council of the Five Hundred on suspicion of royalism, he took part with his friend Laine in the commission of 1813, which gave expression for the first time to direct opposition to the will of the emperor. After the Restoration he held the office of treasurer to the chamber of deputies, and habitually retired during the autumn recess to his native district to pursue his favourite study. He died on the 20th (16th, or 23rd, according to others) of July 1824.

Maine de Biran’s philosophical reputation has suffered from two causes—

his obscure and laboured style, and the fact that only a few, and these the least characteristic, of his writings appeared during his lifetime. These consisted of the essay on habit (Sur V influence de l' habitude, 1803), a critical review of P. Laromiguiere's lectures (181 7), and the philosophical portion of the article "Leibnitz" in the Biographie universelle (1819). A treatise on the analysis of thought (Sur la decomposition de la pensee), although sent to press, was never printed. In 1834 these writings, together with the essay entitled Nouvelles con- siderations sur les rapports du physique et du moral de I'homme, were published by Victor Cousin, who in 1841 added three volumes, under the title (Euvres philosophiques de Maine de Biran. But the publication (in 1859) by E. Naville (from MSS. placed at his father's disposal by Biran's son) of the (Euvres inedites de Maine de Biran, in three volumes, first rendered possible a connected view of his philosophical development. At first a sensualist, like Condillac and Locke, next an intel- lectualist, he finally shows himself a mystical theosophist. The

-MAINE-ET-LOIRE

44i

Essai sur les fondements de la psychologie represents the second or completest stage of his philosophy, the fragments of the Nouveaux essais d'anthropologie the third.

Maine de Biran's first essays in philosophy were written avowedly from the point of view of Locke and Condillac, but even in them he was brought to signalize the essential fact on which his later specu- lation turns. Dealing with the formation of habits, he is compelled to note that passive impressions, however transformed, do not furnish a complete or adequate explanation. With Laromiguiere he distinguishes attention as an active effort, of no less importance than the passive receptivity of sense, and with Butler distinguishes passively formed customs from active habits. He finally arrived at the conclusion that Condillac's notion of passive receptivity as the one source of conscious experience was not only an error in fact but an error of method— in short, that the mechanical mode of viewing consciousness as formed by external influence was fallacious and deceptive. For it he proposed to substitute the genetic method, whereby human conscious experience might be exhibited as growing or developing from its essential basis in connexion with external conditions. The essential basis he finds in the real consciousness, of self as an active striving power, and the stages of its development, corresponding to what one may call the relative importance of the external conditions and the reflective clearness of self-consciousness he designates as the affective, the perceptive and the reflective. In connexion with this Biran treats most of the obscure problems

which arise in dealing with conscious experience, such as the mode by which the organism is cognized, the mode by which the organism is distinguished from extra-organic things, and the nature of those general ideas by which the relations of things are known to us — cause, power, force, &c.

In the latest stage of his speculation Biran distinguishes the animal existence from the human, under which the three forms above noted are classed, and both from the life of the spirit, in which human thought is brought into relation with the supersensible, divine system of things. This stage is left imperfect. Altogether Biran's work presents a very remarkable specimen of deep meta- physical thinking directed by preference to the psychological aspect of experience.

The (Euvres inedites of Maine de Biran by E. Naville contain an introductory study; in 1887 appeared Science et psychologie: nouvel- les osuvres inedites, with introduction by A. Bertrand. See also O. Merton, Etude critique sur Maine de Biran (1865); E. Naville, Maine de Biran, sa vie et ses pensees (1874); J. Gerard, Maine de Biran, essai sur sa philosophie (1876) ; Mayonade, Pensees et pages inedites de Maine de Biran (Perigueux, 1896) ; G. Allievo, " Maine de Biran e la sua dottrina antropologica " (Turin, 1896, in Memorie dell' accademia delle scienze, 2nd ser., xlv, pt. 2); A. Lang, Maine de Biran und die neuere Philosophie (Cologne, 1901); monographs by A. Kuhtmann (Bremen, 1901) and M. Couailhac (1905); N. E. Truman in Cornell Studies in Philosophy, No. 5 (1904) on Maine de Biran's Philosophy of Will.

MAINE-ET-LOIRE, a department of western France, formed in 1790 for the most part out of the southern portion of the former province of Anjou, and bounded N. by the departments of Mayenne and Sarthe, E.ˆ by Indre-et-Loire, S.E. by Vienne, S. by Deux-Sevres and Vendee, W. by Loire-Inferieure, and N.W. by Ille-et-Vilaine. Area, 2786 sq. m. Pop. (1906), 513,490. Maine-et-Loire is made up of two distinct regions, the line of demarcation running roughly from north to south along the valley of the Sarthe, then turning south-west and passing Brissac and Doue; that to the west consists of granites, felspars, and a continuation of the geological formations of Brittany and Vendee; to the east, schists, limestone and chalk prevail. The department is traversed from east to west by the majestic valley of the Loire, with its rich orchards, nurseries and market- gardens. The highest altitudes are found in the south-west, where north-east of Cholet one eminence reaches 689 ft. Else- where the surface is low and undulating in character. The department belongs entirely to the basin of the Loire, the bed of which is wide but shallow, and full of islands, the depth of the water in summer being at some places little more than 2 ft. Floods are sudden and destructive. The chief affluent of the Loire within the

department is the Maine, formed a little above Angers by the junction of the Mayenne and the Sarthe, the latter having previously received the waters of the Loire. All three are navigable. Other tributaries of the Loire are the Thouet (with its tributary the Dive), the Layon, the Evre, and the Divatte on the left, and the Authion on the right. The Mayenne is joined on the right by the Oudon, which can be navigated below Segre. The Erdre, which joins the Loire at Nantes, and the Moine, a tributary of the Sevre-Nantaise, both rise

within this department. The climate is very mild. The mean annual temperature of Angers is about 53 , slightly exceeding that of Paris; the rainfall (between 23 and 24 in. annually) is distinctly lower than that of the rest of France. Notwith- standing this deficiency, the frequent fogs, combined with the peculiar nature of the soil in the south-east of the department, produce a degree of moisture which is highly favourable to meadow growths. The winter colds are never severe, and readily permit the cultivation of certain trees which cannot be reared in the adjoining departments.

The agriculture of the department is very prosperous. The produce of cereals, chiefly wheat, oats and barley, is in excess of its needs, and potatoes and mangels also give good returns. Extensive areas in the valley of the Loire are under hemp, and the vegetables, melons and other fruits of that region are of the finest quality. Good wine is produced at Serrant and other places near Angers, and on the right bank of the Layon and near Saumur, the sparkling white wine of which is a rival of the cheaper brands of champagne. Cider is also produced, and the cultivation of fruit is general. Forests and woodland in which oak and beech are the chief trees cover large tracts. The fattening of cattle is an important industry round Cholet, and horses much used for light cavalry are reared. Several thousand workmen are employed in the slate quarries in the vicinity of Angers, tufa is worked in the river valleys, and freestone and other stone, mispickel, iron and coal are also found. Cholet, the chief industrial town, and its district manufacture pocket-handkerchiefs, as well as linen cloths, flannels, cotton goods, and hempen and other coarse fabrics, and similar indus- tries are carried on at Angers, which also manufactures liqueurs, rope, boots and shoes and parasols. Saumur, besides its pro- duction of wine, makes beads and enamels. The commerce of Maine-et-Loire comprises the exportation of live stock and of the various, products of its soil and industries, and the importation of hemp, cotton, and other raw materials. The department is served by the railways of the state and the

Orleans and Western companies. The Mayenne, the Sarthe and the Loir, together with some of the lesser rivers, provide about 130 m. of navigable waterway. In the south-east the canal of the Dive covers some 10 m. in the department.

There are five arrondissements — Angers, Bauge, Cholet, Saumur and Segre, with 34 cantons and 381 communes. Maine- et-Loire belongs to the academie (educational division) of Rennes, to the region of the VIII. army corps, and to the ecclesi- astical province of Tours. Angers (q.v.), the capital, is the seat of a bishopric and of a court of appeal. Other principal places are Cholet, Saumur, and Fontevrault, which receive separate treatment. For architectural interest there may also be men- tioned the chateaux of Brissac (17th century), Serrant (15th and 16th centuries), Montreuil-Bellay (14th and 15th centuries), and Ecuille (15th century), and the churches of Puy-Notre-Dame (13th century) and St Florent-le-Vieil (13th, 17th, and 19th centuries), the last containing the fine monument to Charles Bonchamps, the Vendean leader, by David dAngers. Gennes has remains of a theatre and other ruins of the Roman period, as well as two churches dating in part from the 10th century. Ponts-de-Ce, an interesting old town built partly on islands in the Loire, is historically important, because till the Revolution its bridges formed the only way across the Loire between Saumur and Nantes.

MAINPURI, or Mynpooree, a town and district of British India, in the Agra division of the United Provinces. The town has a station on a branch of the East Indian railway recently opened from Shikohabad. Pop. (1001), 19,000. It consists of two separate portions, Mainpuri proper and Mukhamganj. Holkar plundered and burned part of the town in 1804, but was repulsed by the local militia. Since the British occupation the population has rapidly increased and many improvements have been carried out. The Agra branch of the Grand Trunk road runs through the town, forming a wide street lined on both sides by shops, which constitute the principal bazaar. Mainpuri has a speciality in the production of carved wooden articles inlaid

with brass wire. The American Presbyterian mission manages a high school.

The District of Mainpuri lies in the central Doab. Area, 1675 sq. m. Pop. (1901), 829,357, an increase of 8-8% in the decade. It consists of an almost unbroken plain, intersected by small rivers, with a few undulating sand ridges. It is wooded throughout with mango groves, and isolated clumps of bdbul trees occasionally relieve the bareness of its saline usar plains. On the south-western boundary the Jumna flows in a deep alluvial bed, sometimes sweeping close to the high banks which overhang its valley, and elsewhere leaving room for a narrow strip of fertile soil between the

river and the upland plain. From the low- lying lands thus formed a belt of ravines stretches inland for some 2 m., often covered with jungle, but affording good pasturage for cattle. The district is watered by two branches of the Ganges canal, and is traversed by the main line of the East Indian railway.

Mainpuri anciently formed part of the great kingdom of Kanauj, and after the fall of that famous state it was divided into a number of petty principalities, of which Rapri and Bhongaori were the chief. In 1 194 Rapri was made the seat of a Moslem governor. Mainpuri fell to the Moguls on Baber's invasion in 1526, and, although tempor- arily wrested from them by_ the short-lived Afghan dynasty of Shere Shah, was again occupied by them on the reinstatement of Humayun after the victory of Panipat. Like the rest of the lower Doab, Mainpuri passed, towards the end of the 18th century, into the power of the Mahrattas, and finally became a portion of the province of Oudh. When this part of the country was ceded to the British, in 1801, Mainpuri town became the headquarters of the extensive district of Etawah, which was in 1856 reduced by the formation of Etah and Mainpuri into separate collectorates. On the outbreak of the Mutiny in 1857 the regiment stationed at Main- puri revolted and attacked the town, which was successfully defended by the few Europeans of the station for a week, until the arrival of the Jhansi mutineers made it necessary to abandon the district.

MAINTENANCE (Fr. maintenance, from maintenir, to main- tain, support, Lat. manu tenere, to hold in the hand). The action of giving support, supplying means of subsistence, keeping efficient or in working order. In English law maintenance is an officious intermeddling in an action that in no way belongs to one by maintaining or assisting either party, with money or otherwise, to prosecute or defend it. It is an indictable offence, both at common law and by statute, and punishable by fine and imprison- ment. It invalidates all contracts involving it. It is also actionable. There are, however, certain cases in which mainten- ance is justifiable, e.g. any one who has an interest, even if it be only contingent, in the matter at variance can maintain another in an action concerning the matter; or several parties who have a common interest in the same thing may maintain one another in a suit concerning the same. Neither is it reckoned maintenance to assist another in his suit on charitable grounds, or for a master to assist his servant, or a parent his son, or a husband his wife. The law with regard to the subject is con- sidered at length in Bradlaugh v. Newdegate, 1883, 11 Q.B.D, 1. See also Champerty. For the practice of " livery and mainten- ance " see English History, §§ v. and vi.

A cap of maintenance, i.e. a cap of crimson velvet turned up with ermine, is borne, as one of the insignia of the British sovereign, immediately before

him at his coronation or on such state occasions as the opening of parliament. It is carried by the hereditary bearer, the marquess of Winchester, upon a white wand. A similar cap is also borne before the lord mayor of London. The origin of this symbol of dignity is obscure. It is stated in the New English Dictionary that it was granted by the pope to Henry VII. and Henry VIII. It is probably connected with the " cap of estate " or " dignity," sometimes also styled " cap of maintenance," similar to the royal symbol with two peaks or horns behind, which is borne as a heraldic charge by certain families. It seems originally to have been a privilege of dukes. Where it is used the crest is placed upon it, instead of on the usual wreath.

MAINTENON, FRANCOISE D'AUBIGNfc Marquise de (1635-1719), the second wife of Louis XIV., was born in a prison at Niort, on the 27th of November 1635. Her father, Constant d'Aubigne, was the son of Agrippa d'Aubign6, the famous friend and general of Henry IV., and had been imprisoned as a Huguenot malcontent, but her mother, a fervent Catholic, had the child

*baptized in her religion, her sponsors being the due de la Roche- foucauld, father of the author of the Maxims, and the comtesse de Neuillant. In 1639 Constant d'Aubigne was released from prison and took all his family with him to Martinique, where he died in 1645, after having lost what fortune remained to him at cards. Mme d'Aubigne returned to France, and from sheer poverty unwillingly yielded her daughter to her sister-in-law, Mme de Villette, who made the child very happy, but converted or pretended to convert her to Protestantism. When this was known an order of state was issued that she should be entrusted to Mme de Neuillant, her godmother. Every me*ns was now used to convert her back to Catholicism, but at the last she only yielded on the condition that she need not believe that the soul of Mme de Villette was lost. Once reconverted, she was neglected and sent home to live with her mother, who had only a small pension of 200 livres a year, which ceased on her death in 1650. The chevalier de Mere, a man of some literary distinction, who had made her acquaintance at Mme de Neuillant's, discovered her penniless condition, and introduced his " young Indian," as he called her, to Scarron, the famous wit and comic writer, at whose house all the literary society of the day assembled. Scarron took a fancy to the friendless girl, and offered either to pay for her admission to a convent, or, though he was deformed and an invalid, to marry her himself. She accepted his offer of marriage, and became Mme S'carron in 1651. For nine years she was not only his most faithful nurse, but an attraction to*

his house, where she tried to bridle the licence of the conversation of the time. On the death of Scarron, in 1660, Anne of Austria con- tinued his pension to his widow, and even increased it to 2000 livres a year, which enabled her to entertain and frequent the literary society her husband had made her acquainted with; but on the queen-mother's death in 1666 the king refused to continue her pension, and she prepared to leave Paris for Lisbon as lady attendant to the queen of Portugal. But before she started she met Mme de Montespan, who was already, though not avowedly, the king's mistress, and who took such a fancy to her that she obtained the continuance of her pension, which put off for ever the question of going to Portugal. Mme de Montespan did yet more for her, for when, in 1669, her first child by the king was born, Mme Scarron was established with a large income and a large staff of servants at Vaugirard to bring up the king's children in secrecy as they were born. In 1674 the king deter- mined to have his children at court, and their governess, who had now made sufficient fortune to buy the estate of Maintenon, accompanied them. The king had now many opportunities of seeing Mme Scarron, and, though at first he was prejudiced against her, her even temper contrasted so advantageously with the storms of passion and jealousy exhibited by Mme de Monte- span, that she grew steadily in his favour, and had in 1678 the gratification of having her estate at Maintenon raised to a marqui- sate and herself entitled Mme de Maintenon by the king. Such favours brought down the fury of Mme de Montespan's jealousy, and Mme de Maintenon's position was almost unendurable, until, in 1680, the king severed their connexion by making the latter second lady in waiting to the dauphiness, and soon after Mme de Montespan left the court. The new amie used her influence on the side of decency, and the queen openly declared she had never been so well treated as at this time, and eventually died in Mme de Maintenon's arms in 1683. The queen's death opened the way to yet greater advancement; in 1684 Mme de Maintenon was made first lady in waiting to the dauphiness, and in the winter of 1685-1686 she was privately married to the king by Harlay, archbishop of Paris, in the presence, it is believed, of Pere la Chaise, the king's confessor, the marquis de Montchevreuil, the chevalier de Forbin, and Bontemps. No written proof of the marriage is extant, but that it took place is nevertheless certain. Her life during the next thirty years can be fully studied in her letters, of which many authentic examples are extant. As a wife she was wholly admirable; she had to entertain a man who would not be amused, and had to submit to that terribly strict court etiquette of absolute obedience to the king's inclination, which Saint-Simon so vividly describes, and yet be always cheerful

and never complain of weariness or ill-health. Her political influence has probably been exaggerated, but it was supreme in matters of detail. The

ministers of the day used to discuss and arrange all the business to be done with the king beforehand with her, and it was all done in her cabinet and in her presence, but the king in more important matters often chose not to consult her. Such mistakes as, for instance, the replacing of Catinat by Villeroi may be attributed to her, but not whole policies — notably, according to Saint-Simon, not the policy with regard to the Spanish succession. Even the revocation of the edict of Nantes and the dragonnades have been laid to her charge, but recent investigations have tended to show that in spite of ardent Catholicism, she at least opposed, if not very vigorously, the cruelties of the dragonnades, although she was pleased with the conversions they procured. She was apparently afraid to imperil her great reputation for devotion, which had in 1692 obtained for her from Innocent XII. the right of visitation over all the con- vents in France. , Where she deserves blame is in her use of her power for personal patronage, as in compassing the promotions of Chamillart and Villeroi, and the frequent assistance given to her brother Comte Charles d'Aubigne. Her influence was on the whole a moderating and prudent force. Her social influence was not as great as it might have been, owing to her holding no recognized position at court, but it was always exercised on the side of decency and morality, and it must not be forgotten that from her former life she was intimate with the literary people of the day. Side by side with this public life, which wearied her with its shadowy power, occasionally crossed by a desire to be recognised as queen, she passed a nobler and sweeter private existence as the foundress of St Cyr. Mme de Maintenon was a born teacher; she had so won the hearts of her first pupils that they preferred her to their own mother, and was similarly successful later with the young and impetuous duchess of Bur- gundy, and she had always wished to establish a home for poor girls of good family placed in such straits as she herself had ex- perienced. As soon as her fortunes began to mend she started a small home for poor girls at Ruel, which she afterwards moved to Noisy, and which was the nucleus of the splendid institution of St Cyr, which the king endowed in 1686, at her request, out of the funds of the Abbey of St Denis. She was in her element there. She herself drew up the rules of the institution; she examined every minute detail; she befriended her pupils in every way; and her heart often turned from the weariness of Versailles or of Marly to her " little girls " at St Cyr. It was for them that Racine wrote his Esther and his Athalie, and it was because he managed the affairs of St Cyr well that Michel Chamillart became controller-general of the finances. The later years of her power were marked by the promotion of her old pupils, the children of the king and Mme de Montespan, to high dignity between the blood royal and the peers of the realm, and it was doubtless under the influence of her dislike for the duke of Orleans that the king drew up his will, leaving the personal care of his successor to the duke of Maine, and hampering the duke of Orleans by

a council of regency. On or even before her husband's death she retired to St Cyr, and had the chagrin of seeing all her plans for the advancement of the duke of Maine overthrown by means of the parliament of Paris. However, the regent Orleans in no way molested her, but, on the contrary, visited her at St Cyr and continued her pension of 48,000 livres. She spent her last years at St Cyr in perfect seclusion, but an object of great interest to all visitors to France, who, however, with the exception of Peter the Great, found it impossible to get an audience with her. On the 15th of April 1719 she died, and was buried in the choir at St Cyr, bequeathing her estate at Maintenon to her niece, the only daughter of her brother Charles and wife of the mar6chal de Noailles, to whose family it still belongs.

L. A. la Beaumelle published the Lettres de Madame de Maintenon, but much garbled, in 2 vols, in 1752, and on a larger scale in 9 vols, in 1756. He also, in 1755, published Memoires de Madame de Main- tenon, in 6 vols., which caused him to be imprisoned in the Bastille. All earlier biographies were superseded by Theophile Lavage's Histoire de St Cyr, reviewed in Causeries du lundi, vol. viii., and by his edition of her Lettres historiques et edifiantes, &c , in 7 vols.

and of her Correspondance generate, in 4 vols. (1888), which latter must, however, be read with the knowledge of many forged letters, noticed in P. Grimblot's Faux autographes de Madame de Main- tenon. Saint-Simon's fine but biased account of the court in her day and of her career is contained in the twelfth volume of Cheruel and Regnier's edition of his Memoires. See also Mademoiselle d'Aumale's Souvenirs sur Madame de Maintenon, published by the Comte d'Haussonville and G. Hanotaux (Paris, 3 vols., 1902- 1904) ; an excellent account by A. Geffroy, Madame de Maintenon d'apres sa correspondance authentique (Paris, 2 vols., 1887); P._ de Noailles, Histoire de Madame de Maintenon et des principaux evene- ments du regne de Louis XIV. (4 vols., 184.8-1858); A. de Boislisle, Paul Scarron et Francoise d'Aubigne d'apres des documents nouveaux (1894) ; fi. Pilastre, Vie et caractere de Madame de Maintenon d'apres les ceuvres du due de Saint-Simon et des documents anciens ou recents (1907); A. Rosset, Madame de Maintenon et la revocation de I'edit de Nantes (1897). (H. M. S.)

MAINZ (Fr. Mayence) a city, episcopal see and fortress of Germany, situated on the left bank of the Rhine, almost opposite the influx of the Main, at the junction of the important main lines of railway from Cologne to Mannheim and Frankfort-on- Main, 25 m. W. of the latter. Pop.

(1905), 91,124 (including a garrison of 7500 men), of whom two-thirds are Roman Catholic. The Rhine, which here attains the greatest breadth of its upper course, is crossed by a magnificent bridge of five arches, leading to the opposite town of Castel and by two railway bridges. The old fortifications have recently been pushed farther back, and their place occupied by pleasant boulevards. The river front has been converted into a fine promenade, commanding extensive views of the Taunus range of mountains, and the " Rheingau," the most favoured wine district of Germany. Alongside the quay are the landing-places of the steamboats navigating the Rhine. The railway, which formerly incommoded the bank, has been diverted, and now, following the ceinture of the new line of inner fortifications, runs into a central station lying to the south of the city. The interior of the old town consists chiefly of narrow and irregular streets, with many quaint and picturesque houses. The principal street of the new town is the Kaiserstrasse, leading from the railway station to the river.

The first object of historical and architectural interest in Mainz is the grand old cathedral, an imposing Romanesque edifice with numerous Gothic additions and details (for plan, &c. see Architecture: Romanesque and Gothic in Germany). It was originally erected between 975 and 1009, but has since been repeatedly burned down and rebuilt, and in its present form dates chiefly from the 12th, 13th and 14th centuries. The largest of its six towers is 300 ft. high. The whole building was restored by order of Napoleon in 1814, and another thorough renovation was made more recently. The interior contains the tombs of Boniface, the first archbishop of Mainz, of Frauenlob, the Minne- singer, and of many of the electors. Mainz possesses nine other Roman Catholic churches, the most noteworthy of which are those of St Ignatius, with a finely painted ceiling, of St Stephen, built 1257-1328, and restored after an explosion in 1857, and of St Peter. The old electoral palace (1627-1678), a large build- ing of red sandstone, now contains a valuable collection of Roman and Germanic antiquities, a picture gallery, a natural history museum, the Gutenberg Museum, and a library of 220,000 volumes. Among the other principal buildings are the palace of the grand duke of Hesse, built in 173T-1739 as a lodge of the Teutonic order, the theatre, the arsenal, and the government buildings. A handsome statue of Gutenberg, by Thorwaldsen, was erected at Mainz in 1837. Mainz still retains many relics of the Roman period, the most important of which is the Eigelstein, a monument believed to have been erected by the Roman legions in honour of Drusus. It stands within the citadel, which occupies the site of the Roman castrum. A little to the south-west of the town are the remains of a large Roman aqueduct, of which upwards of sixty pillars are still standing. The educational and scientific institutions of Mainz include an episcopal seminary, two gymnasia and other schools, a society for literature and art, a musical society, and an

antiquarian society. The university, founded in 1477, was suppressed by the French in 1798.

The site of Mainz would seem to mark it out naturally as a great centre of trade, but the illiberal rule of the archbishops and its military importance seriously hampered its commercial and industrial development, and prevented it from rivalling its neigh- bour Frankfort. It is now, however, the chief emporium of the Rhenish wine traffic, and also carries on an extensive transit trade in grain, timber, flour, petroleum, paper and vegetables. The natural facilities for carriage by water are supplemented by the extensive railway system. Large new harbours to the north of the city were opened in 1887. The principal manufactures are leather goods, furniture, carriages, chemicals, musical instru- ments and carpets, for the first two of which the city has attained a wide reputation. Other industries include brewing and print- ing. Mainz is the seat of the administrative and judicial authorities of the province of Rhein-Hessen, and also of a Roman Catholic bishop.

History. — Mainz, one of the oldest cities in Germany, was originally a Celtic settlement. Its strategic importance was early recognized by the Romans, and about 13 B.C. Drusus, the son-in-law of Augustus, erected a fortified camp here, to which the castellum Matliacorum (the modern Castel) on the opposite bank was afterwards added, the two being connected with a bridge at the opening of the Christian era. The Celtic name be- came latinized as Maguntiacum, or Mogunliacum, and a town gradually arose around the camp, which became the capital of Germania Superior. During the Volkerwanderung Mainz suffered severely, being destroyed on different occasions by the Alamanni, the Vandals and the Huns. Christianity seems to have been intro- duced into the town at a very early period, and in the 6th century a new Mainz was founded by Bishop Sidonius. In the middle of the 8th century under Boniface it became an archbishopric, and to this the primacy of Germany was soon annexed. Charle- magne, who had a palace in the neighbourhood, gave privileges to Mainz, which rose rapidly in wealth and importance, becoming a free city in 1 1 18. During the later middle ages it was the seat of several diets, that of 1184 being of unusual size and splendour. In 1 160 the citizens revolted against Archbishop Arnold, and in 1 1 63 the walls of the city were pulled down by order of the emperor Frederick I. But these events did not retard its pro- gress. In 1244 certain rights of self-government were given to the citizens; and in 1254 Mainz was the centre and mainspring of a powerful league of Rhenish towns. Owing to its commercial prosperity it was known as goldene Mainz, and its population is believed to have been as great as it is at the present day. But soon a decline set in. In 1462 there was warfare between two rival archbishops, Diether or Dietrich II. of Isenburg (d. 1463) and Adolph II. of Nassau (d. 1475). The citizens espoused the cause of

Diether, but their city was captured by Adolph ; it was then deprived of its privileges and was made subject to the arch- bishop. Many of the inhabitants were driven into exile, and these carried into other lands a knowledge of the art of printing, which had been invented at Mainz by Johann Gutenberg in 1450. During the Thirty Years' War Mainz was occupied by the Swedes in 1 63 1 and by the French in 1644, the fortifications being strengthened by the former under Gustavus Adolphus; in 1688 it was captured again by the French, but they were driven out in the following year. In 1792 the citizens welcomed the ideas of the French Revolution; they expelled their archbishop, Friedrich Karl Joseph d'Erthal, and opened their gates to the French troops. Taken and retaken several times during the next few years, Mainz was ceded to France by the treaty of Campo Formio in 1797, and again by the Treaty of Luneville in 1801. In 1814 it was restored to Germany and in 181 6 it was handed over to the grand duke of Hesse; it remained, however, a fortress of the German confederation and was garrisoned by Prussian and Austrian troops. Since 1871 it has been a fortress of the German Empire. There were disturbances in the city in 1848.

See Briihl, Mainz, geschichtlick, topographisch und malerisch (Mainz, 1829); C. A. Schaab, Geschichte der Stadt Mainz (Mainz, 1841-1845); K. Klein, Mainz und seine Umgebungen (1868); C. G. Bockenheimer, Beitrdge zur Geschichte der Stadt Mainz (1874); Neeb, Fuhrer durch Mainz und Umgebung (Stuttgart, 1903); and O. Beck, Mainz und sein Handel (Mainz, 1881).

The Archbishopric of Mainz, one of the seven electorates of the Holy Roman Empire, became a powerful state during the middle ages and retained some of its importance until the dis- solution of the empire in 1806. Its archbishop was president of the electoral college, arch-chancellor of the empire and primate of Germany. Its origin dates back to 747, when the city of Mainz was made the seat of an archbishop, and a succession of able and ambitious prelates, obtaining lands and privileges from emperors and others, made of the district under their rule a strong and vigorous state. Among these men were Hatto I. (d. 913), Siegfried III. of Eppstein (d. 1240), Gerhard of Eppstein (d. 1305), and Albert of Brandenburg (d. 1545), all of whom played impertant parts in the history of Germany. There were several violent contests between rivals anxious to secure so splendid a position as the electorate, and the pretensions of the archbishops occasionally moved the citizens of Mainz to revolt. The lands of the electorate lay around Mainz, and were on both banks of the Rhine; their

area at the time of the French Revo- lution was about 3200 sq. m. The last elector was Karl Theodor von Dalberg. The archbishopric was secularized in 1803, two years after the lands on the left bank of the Rhine had been seized by France. Some of those on the right bank of the river were given to Prussia and to Hesse; others were formed into a grand duchy for Dalberg. The archbishopric itself was trans- ferred to Regensburg.

For the history of the electorate see the Scriptores rerum mogun- tiacarum, edited by G. C. Joannis (Frankfort, 1722-1727); Schunk, Beitrdge zur Mainzer Geschichte (Frankfort, 1788-1791); Hennes, Die Erzbischofe von Mainz (Mainz, 1879); Ph. Jaffe, Monumenta moguntina (Berlin, 1866), and J. F. Bohmer and C. Will, Regesta archiepiscoporum moguntinensium (Innsbruck, 1877-1886).

MAIRET, JEAN DE (1604-1686), French dramatist, was born at Besahcon, and baptized on the 10th of May 1604. His own statement that he was born in 1610 has been disproved. He went to Paris to study at the College des Grassins about 1625, in which year he produced his first piece Chriseide et Arimand, followed in 1626 by Sylvie, a " pastoral tragi-comedy." In 1634 appeared his masterpiece, Sophonisbe, which marks, in its obser- vance of the rules, the beginning of the " regular " tragedies. Mairet was one of the bitterest assailants of Corneille in the con- troversy over The Cid. It was perhaps his jealousy of Corneille that made him give up writing for the stage. He was appointed in 1648 official representative of the Franche-Comte in Paris, but in 1653 he was banished by Mazarin. He was subsequently allowed to return, but in 1668 he retired to Besancon, where he died on the 31st of January 1686. His other plays include Silvanire ou la Morte-vive, published in 1631 with an elaborate preface on the observance of the unities, Les Galanteries du due d'Orsonne (1632), Virginie (1633), Marc-Antoine (1635), and Le Grand et dernier Solyman (1637).

See G. Bizos, Etude sur la vie et les oeuvres de Jean de Mairet (1877). Sophonisbe was edited by K. Vollmoller (Heilbronn, 1888), and Silvanire by R. Otto (Bamberg, 1890).

MAISTRE, JOSEPH DE (1754-1821), French diplomatist and polemical writer, was born at Chambery on the 1st of April 1754. His family was an ancient and noble one, enjoying the title of count, and is said to have been of Languedocian extraction. The father of Joseph was president of the senate of Savoy, and held other important offices. Joseph himself, after studying at Turin, received various appointments in the civil service of Savoy, finally becoming a member of the senate. In 1786 he married Francoise de Morand. The invasion and annexation of Savoy by the French Republicans made him an exile. He did not take refuge in that part of the

king of Sardinia's domains which was for the time spared, but betook himself to the as yet neutral territory of Lausanne. There, in 1796, he published his first important work (he had previously written certain discourses, pamphlets, letters, &c), Considerations sur la France. In this he developed his views, which were those of a Legitimist, but a Legitimist entirely from the religious and Roman Catholic point of view. The philosophism of the 18th century was Joseph de Maistre's lifelong object of assault.

After the still further losses which, in the year of the publica- tion of this book, the French Revolution inflicted on Sardinia. Charles Emmanuel summoned Joseph de Maistre to Turin, and he remained there for the brief space during which the king retained a remnant of territory on the mainland. Then he went to the island of Sardinia, and held office at Cagliari. In 1802 he was appointed envoy extraordinary and minister plenipotentiary at St Petersburg, and journeyed thither the next year. Although his post was no sinecure, its duties were naturally less engrossing than the official life, with intervals of uneasy exile and travelling, which he had hitherto known, and his literary activity was great. He only published a single treatise, on the Principe generateur des Constitutions; but he wrote his best and most famous works, Du Pape, De L'eglise gallicane and the Soirees de St PUersbourg, the last of which was never finished. Du Pape, which the second- named book completes, is a treatise in regular form, dealing with the relations of the sovereign pontiff to the Church, to temporal sovereigns, to civilization generally, and to schismatics, especially Anglicans and the Greek Church. It is written from the highest possible standpoint of papal absolutism. The SoirSes de St PUersbourg, so far as it is anything (for the arrangement is some- what desultory), is a kind of theodicee, dealing with the fortunes of virtue and vice in this world. It contains two of De Maistre's most famous pieces, his panegyric on the executioner as the foundation of social order, and his acrimonious, and in part unfair, but also in part very damaging, attack on Locke. The Du Pape is dated May 181 7; on the Soirees the author was still engaged at his death. Besides these works he wrote an examination of the philosophy of Bacon, some letters on the Inquisition (an institution which, as may be guessed from the remarks just noticed about the executioner, was no stumbling-block to him), and, earlier than any of these, a translation of Plutarch's " Essay on the Delay of Divine Justice," with somewhat copious notes. After 181 5 he returned to Savoy, and was appointed to high office, while his Du Pape made a great sensation. But the world to which he had returned was not altogether in accordance with his desires. He had domestic troubles; and chagrin of one sort and another is said to have had not a little to do with his death by paralysis on the 26th of February 182 1 at Turin. Most of the works mentioned were not published till after his

death, and it was not till 1851 that a collection of Lettres et opuscules appeared, while even since that time fresh matter has been published.

Joseph de Maistre was one of the most powerful, and by far the ablest, of the leaders of the neo-Catholic and anti-revolution- ary movement. The most remarkable thing about his stand- point is that, layman as he was, it was entirely ecclesiastical. Unlike his contemporary Bonald, Joseph de Maistre regarded the temporal monarchy as an institution of altogether inferior importance to the spiritual primacy of the pope. He was by no means a political absolutist, except in so far as he regarded obedience as the first of political virtues, and he seldom loses an opportunity of stipulating for a tempered monarchy. But the pope's power is not to be tempered at all, either by councils or by the temporal power or by national churches, least of all by private judgment. The peculiarity of Joseph de Maistre is that he supports his conclusions, or if it be preferred his paradoxes, by the hardest and heaviest argument. Although a great master of rhetoric, he never makes rhetoric do duty for logic. Every now and then it is possible to detect fallacies in him, but for the most part he has succeeded in carrying matters back to those fundamental differences of opinion which hardly admit of argument, and on which men take sides in consequence chiefly of natural bent, and of predilection for one state of things rather than for another. The absolute necessity of order may be said to have been the first principle of this thinker, who, in more ways than one, will invite comparison with Hobbes. He could not conceive such order without a single visible authority, reference to which should settle all dispute. He saw that there could be no such temporal head, and in the pope he thought that he saw a spiritual substitute. The anarchic tendencies of the Revolution I in politics and religion were what offended him. It ought to be

added that he was profoundly and accurately learned in history and philosophy, and that the superficial blunders of the 18th- century philosophes irritated him as much as their doctrines. To Voltaire in particular he shows no mercy.

Of the two works named as his masterpieces, Du Pape and the Soirees de St Petersbourg, editions are extremely numerous. No complete edition of his works appeared till 1 884-1 887, when one was published at Lyons in 14 volumes. This had been preceded, and has been followed, by numerous biographies and discussions: C. Barthelemy, L'Esprit de Joseph de Maistre (1859); R. de Sezeval, Joseph de Maistre (1865), and J. C. Glaser, Graf Joseph Maistre (same year); L. I. Moreau, Joseph de Maistre (1879); F.

Paulhan, Joseph de Maistre et sa philosophic (1893); L. Cogordan, " Joseph de Maistre " in the Grands ecrivains francais (1894); F. Descostes, Joseph de Maistre avant la revolution (1896), and other works by the same writer; J. Mandoul, Un Homme d'etat italien : Joseph de Maistre et la politique de la maison de Savoie (1900) ; and E. Grasset, Joseph de Maistre (1901). (G. Sa.)

MAISTRE, XAVIER DE (1763-18 5 2), younger brother of Joseph de Maistre, was born at Chambery in October 1763. He served when young in the Piedmontese army, and wrote his delightful fantasy, Voyage autour de ma chambre (published 1794) when he was under arrest at Turin in consequence of a duel. Xavier shared the politics and the loyalty of his brother, and on the annexation of Savoy to France, he left the service, and took a commission in the Russian army. He served under Suvarov in his victorious Austro-Russian campaign and accompanied the marshal to Russia. He shared the disgrace of his general, and supported himself for some time in St Petersburg by miniature painting. But on his brother's arrival in St Petersburg he was introduced to the minister of marine. He was appointed to several posts in the capital, but also saw active service, was wounded in the Caucasus, and attained the rank of major-general. He married a Russian lady and established himself in his adopted country, even after the overthrow of Napoleon, and the con- sequent restoration of the Piedmontese dynasty. For a time, however, he lived at Naples, but he returned to St Petersburg and died there on the 12th of June 1852. He was only once in Paris (in 1839), when Sainte-Beuve, who has left some pleasant reminiscences of him, met him. Besides the Voyage already mentioned, Xavier de Maistre's works (all of which are of very modest dimensions) are Le Lepreux de la cite d'Aoste (1811), a touching little story of human misfortune; Les Prisonniers du Caucase, a powerful sketch of Russian character, La Jeune SibSrienne, and the Expedition nocturne, a sequel to the Voyage autour de ma chambre (1825). His style is of remarkable ease and purity.

His works, with the exception of some brief chemical tractates, are included in the collections of Charpentier, Gamier, &c. See Sainte-Beuve's Portraits contemporains, vol. iii.

MAITLAND, EDWARD (1824-1897), English humanitarian writer, was born at Ipswich on the 27th of October 1824, and was educated at Caius College, Cambridge. The son of Charles David Maitland, perpetual curate of St James's Chapel, Brighton, he was intended for the Church, but his religious views did not permit him to take holy orders. For some years he lived abroad, first in California and then as a commissioner of Crown-lands in Australia. After his return to England in 1857 he took up an advanced humanitarian position, and claimed to have acquired a new

sense by which he was able to discern the spiritual condition of other people. He was associated with Mrs Anna Kingsford (1846-1888), the lady-doctor and supporter of vegetarianism and anti-vivisectionism, who, besides being one of the pioneers of higher education for women, had become a devotee of mystical theosophy; with her he brought out Keys of the Creeds (1875), The Perfect Way: or the Finding of Christ (1882), and founded the Hermetic Society in 1884. After her death he founded the Esoteric Christian Union in 1 89 1, and wrote her Life and Letters (1896). He died on the 2nd of October 1897.

MAITLAND, FREDERIC WILLIAM (1850-1906), English jurist and historian, son of John Gorham Maitland, was born on the 28th of May 1850, and educated at Eton and Trinity, Cambridge, being bracketed at the head of the moral sciences

tripos of 1872, and winning a Whewell scholarship for inter- national law. – He was called to the bar (Lincoln's Inn) in 1876, and made himself a thoroughly competent equity lawyer and conveyancer, but finally devoted himself to comparative jurisprudence and especially the history of English law. In 1884 he was appointed reader in English law at Cambridge, and in 1888 became Downing professor of the laws of England. Though handicapped in his later years by delicate health, his intellectual grasp and wide knowledge and research gradually made him famous as a jurist and historian. He edited numerous volumes for the Selden Society, including Select Pleas for the Crown, I200-I22 5, Select Pleas in Manorial Courts and The Court Baron; and among his principal works were Gloucester Pleas (1884), Justice and Police (1885), Bracton's Note-Book (1887), History of English Law (with Sir F. Pollock, 1895; new ed. 1898; see also his article English Law in this encyclo- paedia), Domesday Book and Beyond (1897), Township and Borough (1898), Canon Law in England (1898), English Law and the Renaissance (1901), the Life of Leslie Stephen (1906), besides important contributions to the Cambridge Modern History, the English Historical Review, the Law Quarterly Review, Harvard Law Review and other publications. His writings are marked by vigour and vitality of style, as well as by the highest qualities of the historian who recreates the past from the original sources; he had no sympathy with either legal or historical pedantry; and his death at Grand Canary on the 19th of December 1906 deprived English law and letters of one of their most scholarly and most inspiring repre- sentatives, notable alike for sweetness of character, acuteness in criticism, and wisdom in counsel. 1

See P. Vinogradoff's article on Maitland in the English Historical Review (1907); Sir F. Pollock's in the Quarterly Review (1907); G. T. Lapsley's in The Green Bag (Boston, Mass., 1907) ; A. L. Smith, F. W. Maitland (1908) ; H. A. L. Fisher, F. W. Maitland (1910).

MAITLAND, SIR RICHARD (Lord Lethington) (1496- 1586), Scottish lawyer, poet, and collector of Scottish verse, was born in 1496. His father, Sir William Maitland of Lethington and Thirlestane, fell at Flodden; his mother was a daughter of George, Lord Seton. He studied law at the university of St Andrews, and afterwards in Paris. His castle at Lethington was burnt by the English in 1549. He was in 1552 one of the commissioners to settle matters with the English about the debateable lands. About 1561 he seems to have lost his sight, but this did not render him incapable of attending to public business, as he was the same year admitted an ordinary lord of session with the title of Lord Lethington, and a member of the privy council; and in 1562 he was appointed keeper of the Great Seal. He resigned this last office in 1567, in favour of John, prior of Coldingham, his second son, but he sat on the bench till he attained his eighty-eighth year. He died on the 20th of March 1586. His eldest son, by his wife Mary Cranstoun of Crosbie, was William Maitland (q.v.): his second son, John (c. 1545-1595), was a lord of session, and was made a lord of parliament in 1590, with the title of Lord Maitland of Thirlestane, in which he was succeeded by his son John, also for some time a lord of session, who was created earl of Lauderdale in 1624. One of Sir Richard's daughters, Margaret, assisted her father in preparing his collection of old Scots verse.

The poems of Sir Richard Maitland, none of them lengthy, are for the most part satirical, and are principally directed against the social and political abuses of his time. He is chiefly remembered as the industrial collector and preserver of many pieces of Scots poetry. These were copied into two large volumes, one in folio and another in quarto, the former written by himself, and the latter by his daughter. After being in the possession of his descendant the duke of Lauderdale, these volumes were purchased at the sale of the duke's library by Samuel Pepys, and have since been preserved in the Pepysian Library, Magdalene College, Cambridge. They lay there un-noticed for many years till Bishop Percy published one of the poems in his Reliques of English Poetry. Several of the

prices were then transcribed by John Pinkerton, who after- wards published them under the title of Ancient Scottish Poems (2 vols., 1786.)

For an account of the Maitland Folio MS. see Gregory Smith's Specimens of Middle Scots, 1902 (p. lxxiii.). The Scottish Text Society has undertaken an edition of the entire manuscript. Maitland's own poems were reprinted by Sibbald in his Chronicle of Scottish Poetry (1802), and

in 1830 by the Maitland Club, named after him, and founded for the purpose of continuing his efforts to preserve the remains of early Scots literature. Sir Richard left in manuscript a history of the family of Seton, and a volume of legal decisions collected by him between the years 1550 and 1565. Both are preserved in the Advocates' Library, Edinburgh ; the former was published by the Maitland Club, in 1829.

MAITLAND (Maitland of Lethington), WILLIAM (<;. 1528-1573), Scottish statesman, eldest son of the preceding, was educated at St Andrews. At an early age he entered public life and began in various ways to serve the regent, Mary of Lorraine, becoming her secretary of state in 1558. In 1559, however, he deserted her and threw in his lot with the lords of the congregation, to whom his knowledge of foreign, and especially of English, politics and his general ability were assets of the highest value. The lords sent him to England to ask for assistance from Elizabeth, and his constant aim throughout his political career was to bring about a union between the two crowns. He appears to have feared the return of Mary Queen of Scots to Scotland, but after her arrival in 1561 he was appointed secretary of state, and for about six years he directed the policy of Scotland and enjoyed the confidence of the queen. His principal antagonist was John Knox; there were several tussles between them, the most famous, perhaps, being the one in the general assembly of 1564, and on the whole Maitland held his own against the preachers. He was doubtless concerned in the conspiracy against David Rizzio, and after the favourite's murder he was. obliged to leave the court and was himself in danger of assassination. In 1567, however, he was again at Mary's side. He was a consenting party to the murder of Darnley, although he had favoured his marriage with Mary, but the enmity between Bothwell and himself was one of the reasons which drove him into the arms of the queen's enemies, among whom he figured at Langside. He was one of the Scots who met Elizabeth's representatives at York in 1568; here he showed a desire to exculpate Mary and to marry her to the duke of Norfolk, a course of action probably dictated by a desire to avoid all revelations about the Darnley murder. But this did not prevent him from being arrested in September 1569 on account of his share in the crime. He was, however, delivered from his captors by a ruse on the part of his friend, Sir William Kirkcaldy of Grange, and was brought into Edinburgh Castle, while his trial was put off because the city was thronged with his adherents. Maitland now became the leader of the remnant which stood by the cause of the imprisoned queen. Already a physical wreck, he was borne into Edinburgh Castle in April 1 57 1 and with Kirkcaldy he held this fortress against the regent Morton and his English auxiliaries. The castle sur- rendered in May 1573 and on the 7th or the 9th of June follow- ing Maitland died at Leith, there being very little evidence for the theory that he poisoned himself. " Secretary Maitland "

was a man of great learning with a ready wit and a caustic tongue. He was reputed to be the most versatile and accom- plished statesman of his age, and almost alone among his Scottish contemporaries he placed his country above the claims of either the Roman Catholic or the Protestant religions. Among the testimonies to his great abilities are those of Queen Elizabeth, of William Cecil and of Knox. By his second wife, Mary Fleming, one of Queen Mary's ladies, whom he married in 1367, he had a son and daughter. His son James died without issue about 1620.

See John Skelton, Maitland of Lethington (1894) ! A. Lang, History of Scotland, vol. ii. (1902).

MAITLAND, EAST and WEST, adjoining municipalities in Northumberland county, New South Wales, Australia, 120 m. by rail N. of Sydney. Pop. (1901), West Maitland,

6798; East Maitland, 3287. These towns are situated in a valley on the Hunter River, which is liable to sudden floods, to guard against which the river is protected by stone embank- ments at West Maitland, while there are flood-gates at East Maitland. Maitland is the centre of the rich agricultural district of the Hunter Valley, which produces maize, wheat and other cereals, lucerne, tobacco, fruit and wine; excellent coal also is worked in the vicinity. East Maitland is the see of a Roman Catholic bishop, whose cathedral (St John's), however, is situated in the larger town. Besides this, West Maitland contains several handsome public and commercial buildings.

MAITREYA, the name of the future Buddha. In one of the works included in the Pali canon, the Dlgha Nikaya, a prophecy is put into the Buddha's mouth that after the decay of the religion another Buddha, named Metteyya, will arise who will have thousands of followers instead of the hundreds that the historical Buddha had. This is the only mention of the future Buddha in the canon. For some centuries we hear nothing more about him. But when, in the period just before and after the Christian era, some Buddhists began to write in Sanskrit instead of Pali, they composed new works in which Maitreya (the Sanskrit form of Metteyya) is more often mentioned, and details are given as to his birthplace and history. These are entirely devised in imitation of the details of the life of the historical Buddha, and have no inde- pendent value. Only the names differ. The document in which the original prophecy occurs was put together at some date during the 1st century after the Buddha's death (see Nikaya). It is impossible to say whether tradition was, at that time, correct in attributing it to the Buddha. But whoever chose the name (it is a patronymic or family, not a personal name), had no doubt regard to the etymological connexion with the word for " love," which is Metta, in Pali.

This would only be one of those punning allusions so frequent in Indian literature.

Long afterwards, probably in the 6th or 7th century, a reformer in south India, at a time when the incoming flood of ritualism and superstition threatened to overwhelm the simple teaching of the earlier Buddhism, wrote a Pali poem, entitled the Anagala Vamsa. In this he described the golden age of the future when, in the time of Metteyya, kings, ministers and people would vie one with the other in the maintenance of the original simple doctrine, and in the restoration of the good times of old. The other side also claimed the authority of the future Buddha for their innovations. Statues of Maitreya are found in Buddhist temples, of all sects, at the present day; and the belief in his future advent is universal among Buddhists.

Authorities. — Dlgha Nikaya, vol. iii., edited by J. E. Carpenter, (London, 1908) ; " Anagata Vamsa," edited by J. Minayeff in Journal of the Pali Text Society (1886); Walters on Yuan Chwang, edited by Rhys Davids and S. W. Bushell (London, 1904-1905).

(T. W. R. D.)

MAIWAND, a village of Afghanistan, 50 m. N.W. of Kanda- har. It is chiefly notable for the defeat inflicted on a British brigade under General Burrows by Ayub Khan on the 27th of July 1880 during the second Afghan War (see Afghanistan). Ayub Khan, Shere Ali's younger son, who had been holding Herat during the British operations at Kabul and Kandahar, set out towards Kandahar with a small army in June 1880, and a brigade under General Burrows was detached from Kandahar to oppose him. Burrows advanced to the Helmund, opposite Girishk, to oppose Ayub Khan, but was there deserted by the troops of Shere AH, the wali of Kandahar, and forced to retreat to Kushk-i-Nakhud, half way to Kandahar. In order to prevent Ayub passing to Ghazni, Burrows advanced to Maiwand on the 27th of July, and attacked Ayub, who had already seized that place. The Afghans, who numbered 25,000, out- flanked the British, the artillery expended their ammunition, and the native portion of the Brigade got out of hand and pressed back on the few British infantry. The British were

completely routed, and had to thank the apathy of the Afghans for escaping total annihilation. Of the 2476 British troops engaged, 934 were killed and 175 wounded or missing. This defeat necessitated Sir Frederick Roberts' famous march from Kabul to Kandahar.

See Lord Roberts, Forty-one Years in India (1896). MAIZE, or Indian Corn, Zea Mays (from fed or feid, which appears to have been " spelt," Triticum spelta, accord- ing to the description of Theophrastus) , a plant of the tribe Maydeae of the order Gramineae or grasses (see fig. 1). It is

unknown in the native state, but is most probably indi- genous to tropical America. Small grains of an unknown variety have been found in the ancient tombs of Peru, and Darwin found heads of maize embedded on the shore in Peru at 85 ft. above the present sea-level. Bonafous, however (Histoire naturelle du mais), quotes authorities (Bock, 1532, Ruel and Fuchs) • as believing that it came from Asia, and maize was said by Santa Rosa de Viterbo to have been brought by the Arabs into Spain in the 13th century. A drawing of maize is also given by Bonafous from a Chinese work on natural history, Li-chi-tchin, dated 1562, a little over sixty years after the discovery of the New World. It is not figured on Egyptian monuments, nor was any mention made of it by

. , . _ °' I ' . , Eastern travellers in Africa or

Maize — Zea Mays — unripe cob. «„• •„_ t „ .1 .-.i „

The membranous spathes have Asla P™ r 1 t0 1J the , 1 ˆ T been cut and drawn aside, revealing tury. Humboldt, Aiphonse de the spike of fruit which bears the Candolle and others, however, long silky styles. One-third nat. do not hesitate to say that it size- originated solely in America,

where it had been long and extensively cultivated at the period of the discovery of the New World; and that is the generally accepted modern view. Some hold the view that maize originated from a common Mexican fodder grass, Euchlaena mexicana, known as Teosinte, a closely allied plant which when crossed with maize yields a maize-like hybrid.

The plant is monoecious, producing the staminate (male) flowers in a large feathery panicle at the summit, and the (female) dense spikes of flowers, or "cobs," in the axils of the leaves below, the long pink styles hanging out like a silken tassel. They are invested by the sheaths of leaves, much used in packing oranges in south Europe, and the more delicate ones for cigarettes in South America. Fig. 2 shows a branch of the terminal male inflorescence. Fig. 3 is a single spikelet of the same, containing two florets, with the three stamens of one only protruded. Fig. 4 is a spike of the female inflores- cence", protected by the sheaths of leaves— the blades being also present. Usually the sheaths terminate in a point, the blades being arrested. Fig. 5 is a spikelet of the female inflores- cence, consisting of two outer glumes, the lower one ciliated, which enclose two florets — one (a) barren (sometimes fertile), consisting of a flowering glume and pale only, and the

other (6) fertile, containing the pistil with elongated style. The mass of styles from the whole spike is pendulous from the summit of the sheaths, as in fig. 4. Fig. 6 shows the fruit or grain. More than three hundred varieties are known, which differ more among themselves than those of any other cereal. Some come to maturity in two months, others require seven months; some are as many feet high as others are inches; some have

kernels eleven times larger than others. They vary similarly in shape and size of ears, colour of the grain, which may be white, yellow, purple, striped, &c, and also in physical char- acters and chemical composition. Dr E. Lewis Sturtevant, who has made an extended study of the forms and varieties, classes into seven groups those grown primarily for the grain,

Fig. 2.— Spike of Male Flowers.

Fig. 3. — Male Spikelet.

the distinguishing characters of which are based on the grains or kernels; there are, in addition, forms of horticultural interest grown for ornament. Pod corn (var. tunicata) is characterized by having each kernel enclosed in a husk. Pop corn (var. everta) has a very large proportion of the " endosperm " — the nutritious matter which with the small embryo makes up the grain — of a horny consistency, which causes the grain to pop when heated, that is to say, the kernel becomes turned inside out by the explosion of the contained moisture. It is also characterized by the small size of the grain and ear. Flint

Fig. 4. — Female Spike.

corn (var. indurata) has a starchy endosperm enclosed in a horny layer of varying thickness in the different varieties. The colour of the grain is white, yellow, red, blue or variegated. It is commonly cultivated in Canada and northern United States, where the seasons are too short for Dent corn, and has been grown as far north as 50 N. lat. Dent or field corn (var. indentata) has the starchy endosperm extending to the summit of the grain, with horny endosperm at the sides. The top of the grain becomes indented, owing to the drying and shrinkage of the starchy matter; the character of the indented surface varies with the height and thickness of the horny endosperm. This is the form commonly grown in the United States; the varieties differ widely in the size of the plants and the appear- ance of the ear.

The colour of the grain varies greatly, being generally white, yellow, mottled red, or less commonly red. Soft corn (var. amylacea) has no horny endosperm, and hence the grains shrink uniformly. It is cultivated only to a limited extent in the United States, but seems to have been commonly grown by the Indians in many localities in North and South America. Sweet corn (var. saccharata) is characterized by the translucent horny appearance of the grains and their more or less wrinkled condition. It is pre-eminently a garden veget- able, the ear being used before the grain hardens, when it is well filled but soft and milky. It is often cooked and served in the cob; when canned it is cut from the cob. Canned sweet corn is an important article of do- mestic commerce in Canada and the Fig. 5—— Female Spikelet. United States In starcny sweet corn

(var. amylea-saccharata) the grain has the external appearance of sweet corn, but examination shows the lower half to be starchy, the upper horny and translucent. A form of flint corn, with variegated leaves, is grown for ornament under the name Zea japonica or Japanese striped corn.

Chemical analysis, like common experience, shows that Indian corn is a very nutritious article of food, being richer in albuminoids than any other cereals when ripe (calculated in the dry weight). It can be grown in the tropics from the level of the sea to a height equal to that of the Pyrenees and in the south and middle of Europe, but it cannot be grown in England with any chance of profit, except perhaps as fodder. Frost kills the plant in all its stages and all its varieties; and the crop does not flourish well if the nights are cool, no matter how favourable the other conditions. Consequently it is the first crop to disappear as one ascends into the moun- tain regions, and comparatively little is grown west of the great plains of North America. In Brittany, where it scarcely ripens the grain, it furnishes a strong crop in the autumn upon sandy soil where clover and lucerne will yield but a poor produce. It prefers a deep, rich, warm, dry and mellow soil, and hence the rich bottoms and fertile prairies of the Mississippi basin constitute the region of its greatest production. It is extensively grown throughout India, both for the ripe grain and for use of the unripe cob as a green vegetable. It is the most common crop throughout South Africa, where it is known as mealies, being the staple food of the natives. It is also largely used for fodder and is an important article of export.

As an article of food maize is one of the most extensively used grains in the world. Although rich in nitrogenous matter and fat, it does not make good bread. A mixture of rye and corn meal, however, makes an excellent coarse bread, formerly much used in the Atlantic states, and a similar bread is now the chief coarse bread of Portugal and some parts of Spain. It is either baked into cakes, called tortilla by the Indians of Yucatan, or made into a kind of porridge, as in Ireland. When deprived of the gluten it

constitutes oswego, maizena or corn flour. Maize contains more oil than any other cereal, ranging from 3-5 to 9-5% in the commercial grain. This is one of the factors in its value for fattening purposes. In distilling and some other processes this oil is separated and forms an article of commerce. When maize is sown, broadcast or closely planted in drills the ears may not develop at all, but the stalk is richer in sugar and sweeter; and this is the basis of growing " corn-fodder." The amount of forage that may be produced in this way is enormous; 50,000 to 80,000 lb of green fodder are grown per acre, which makes 8000 to 12,000 fb as field-cured. Sugar and molasses have from time to time been manufactured from the corn stalks.

See articles on corn and Zea Mays in L. H. Bailey's Cyclopaedia of American Horticulture (1900-1902); and for cultivation in India, Watt's Dictionary of the Economic Products of India, vi. (1893).

xvn. 15

Fig. 6. — Grain.

MAJESTY (Fr. majestS; Lat. majeslas, grandeur, greatness, from the base mag-, as in magnus, great, major, greater, &c), dignity, greatness, a term especially used to express the dignity and power of a sovereign. This application is to be traced to the use of majestas in Latin to express the supreme sovereign dignity of the Roman state, the majestas reipublicae or populi Romani, hence majestatem laedere or minuere, was to commit high treason, crimen majestatis. (For the modern law and usage of laesa majestas, lese majeste, Majestatsbeleidigung, see Treason.) From the republic majestas was transferred to the emperors, and the majestas populi Romani became the majestas imperii, and augustalis majestas is used as a term to express the sovereign person of the emperor. Honorius and Theodosius speak of themselves in the first person as nostra majestas. The term " majesty " was strictly confined in the middle ages to the successors of the Roman emperors in the West, and at the treaty of Cambrai (1529) it is reserved for the emperor Charles V. Later the word is used of kings also, and the distinction is made between imperial majesty (caesareana majestas) and kingly or royal majesty. From the 16th century dates the application of " Most Christian and Catholic Majesty" to the kings of France, of " Catholic Majesty " to the kings of Spain, of " Most Faithful Majesty " to the kings of Portugal, and " Apostolic Majesty " to the kings of Hungary. In England the use is generally assigned to the reign of Henry VIII. , but it is found, though not in general usage, earlier; thus the New English Dictionary quotes from an Address of the Kings Clerks to Henry II. in 1171 (Materials for the History of Archbishop Becket, vii. 471, Rolls Series, 1885), where thf king is styled vestra majestas, and Selden {Titles

of Honour, part i. ch. 7, p. 98, ed. 1672) finds many early uses in letters to Edward I., in charters of creation of peers,, &c. The fullest form in English usage is " His Most Gracious'Majesty " ; another form is " The King's Most- Excellent Majesty," as in the English Prayer-book. " His Sacred Majesty" was common in the 17th century; and of this form Selden says: " It is true, I think, that in our memory or the memory of our fathers, the use of it first began in England." " His Majesty," abbreviated H.M., is now the universal Euro- pean use in speaking of any reigning king, and " His Imperial Majesty," H.I.M., of any reigning emperor.

From the particular and very early use of " majesty " for the glory and splendour of God, the term has been used in ecclesiastical art of the representation of God the Father enthroned in glory, sometimes with the other persons of the Trinity, and of the Saviour alone, enthroned with an aureole. • MAJLATH, JANOS, or John, Count (1786-1853), Hungarian historian and poet, was born at Pest on the 5th of October 1786. First educated at home, he subsequently studied philosophy at Eger (Erlau) and law at Gyor (Raab), his father, Count Joseph Majlath, an Austrian minister of state, eventually obtaining for him an appointment in the public service. Majlath devoted himself to historical research and the translation into German of Magyar folk-tales, and of selections from the works of the best of his country's native poets. Moreover, as an original lyrical writer, and as an editor and adapter of old German poems, Majlath showed considerable talent. During the greater part of his life he resided either at Pest or Vienna, but a few years before his death he removed to Munich, where he fell into a state of destitution and extreme despondency. Seized at last by a terrible infatuation, he and his daughter Henriette, who had long been his constant companion and amanuensis, drowned themselves in the Lake of Starnberg, a few miles south-west of Munich, on the 3rd of January 1855.

Of his historical works the most important are the Geschichte der Magyaren (Vienna, 1828-1831, 5 vols. ; 2nded., Ratisbon, 1852-1853) and his Geschichte des osterreichischen Kaiser staats (Hamburg, 1834—1850, 5 vols.). Specially noteworthy among his metrical translations from the Hungarian are the Magyarische Gedichte (Stuttgart and Tubingen, 1825); and Himfy's auserlesene Liebeslieder (Pest, 1829; 2nd ed., 1831). A valuable contribution to folk-lore appeared in the Magyarische Sagen, Marchen und Erzahlungen (Briinn, 1825; 2nd ed., Stuttgart and Tubingen, 1837, 2, vols.).

MAJOLICA, a name properly applied to a species of Italian ware in which the body is coated with a tin-enamel, on which is laid and fired a painted decoration. It is also applied to similar wares made in imitation of the Italian ware in other countries. The word in Italian is maiolica. Du Cange (Gloss, s.v. "Majorica") quotes from a chronicle of Verona of 1368, in which the form majolica occurs for the more usual Latin form majorica. It has usually been supposed that this type of pottery was first made in the island of Majorca, but it is more probable that the name was given by the Italians to the lustred Spanish ware imported by ships hailing from the Balearic Islands. (See Ceramics: Medieval and Later Italian.)

MAJOR (or Mair), JOHN (1470-1550), Scottish theological and historical writer, was born at the village of Gleghornie, near North Berwick, Scotland, in the year 1470. He was edu- cated at the school of Haddington, where John Knox was later a pupil. After a short period spent at Cambridge (at God's House, afterwards Christ's College) he entered the university of Paris in 1493, studying successively at the colleges of St Barbe, Montaigu and Navarre, and graduating as master of arts in 1496. Promoted to the doctorate in 1505, he lectured on philosophy at Montaigu College and on theology at Navarre. He visited Scotland in 1515 and returned in 1518, when he was appointed principal regent in the university of Glasgow, John Knox being among the number of those who attended his lectures there. In 1522 he removed to St Andrew's University, where in 1525 George Buchanan was one of his pupils. He returned to the college of Montaigu in 1525, but was once more at St Andrew's in 1 53 1, where he was head of St Salvator's College from 1534 until his death.

Major's voluminous writings may be grouped under (a) logic and philosophy, (b) Scripture commentary, and © history. All are in Latin, all appeared between 1503 and 1530, and all were printed at Paris. The first group includes his Exponabilia (1503), his commentary on Petrus Hispanus (1505-1506), his Jnclitarum artium libri (1506, &c), his commentary on Joannes Dorp (1504, &c), his Insolubilia (1516, &c), his introduction to Aristotle's logic (1521, &c), his commentary on the ethics (r53o), and, chief of all, his commentary on Peter Lombard's Sentences (1509, &c); the second consists of a commentary on Matthew (1518) and another on the Four Gospels (1529); the last is represented by his famous Historia Majoris Britanniae tarn Angliae quant Scotiae per J. M. (1521). r In political philosophy he maintained the Scotist position, that civil authority was derived from the popular will, but in theology he was a scholastic conservative, though he never failed to show his approbation of Gallicanism and its plea for the reform of ecclesiastical abuses. He has left on record that it was his aim and hope to reconcile realism and nominalism in the interests of theological peace. He had a world-wide reputation as a teacher and writer. Buchanan's severe epigram, perhaps the only unfriendly words in the flood of contemporary praise, may be explained as a protest against the compromise which Major appeared to offer rather than as a personal attack on his teacher. Major takes a more independent attitude in his History, which is a remark- able example of historical accuracy and insight. He claims that the historian's chief duty is to write truthfully, and he is careful to show that a theologian may fulfil this condition.

The History, on which his fame now rests, was reprinted by Free- bairn (Edinburgh, 1740), and was translated in 1892 by Archibald Constable for the Scottish History Society. The latter volume contains a full account of the author by Aeneas J. G. Mackay and a bibliography by Thomas Graves Law.

MAJOR (Lat. for " greater "), a word used, both as a sub- stantive and adjective, for that which is greater than another in size, quality, degree, importance, &c, often opposed correlatively to that to which " minor " is applied in the same connotation. In the categorical syllogism in logic, the major term is the term which forms the predicate of the conclusion, the major premise is that which contains the major term. (For the distinction between major and minor intervals, and other applications in music, see Music and Harmony.)

The use of Major as part of an official title in Med. Lat. has given the Span, mayor, Fr. maire, and Eng. " mayor " (q.v.). In English the unadapted form "major" is the title of a military officer now ranking between a captain and a lieutenant- colonel. Originally the word was used

adjectivally in the title " sergeant-major," an officer of high rank (third in command of an army) who performed the same duties of administration, drill and encampments on the staff of the chief commander as the sergeant in a company performs as assistant to the captain. This was in the latter half of the 16th century, and very soon after wards the " sergeant-major " became known as the " sergeant- major-general " — hence the modern title of major-general. By the time of the English Civil War " majors " had been introduced in each regiment of foot, who- corresponded in a lesser sphere to the " major-general " of the whole army. The major's sphere of duties, precedence and title have since varied but little, though he has, in the British service, taken the place of the lieutenant-colonel as second in command — the latter officer exercising the command of the cavalry regiment, infantry battalion or artillery brigade, and the colonel being, save for certain administrative functions, little more than the titular chief of his regiment. Junior majors command companies of infantry; squadrons of cavalry and batteries of artillery are also commanded by majors. In most European armies, however, and of late years in the army of the United States also, the major has become a battalion commander under the orders of a regimental commander (colonel or lieutenant-colonel) . The word appears also in the British service in " brigade-major " (the adjutant or staff officer of a brigade). " Town-majors " (garrison staff officers) are now no longer appointed. In the French service up to 1871 the " major-general " was the chief of the general staff of a field army, and thus preserved the tradition of the former " sergeant-major " or " sergeant-major- general."

MAJORCA (Mallorca), the largest of the group of Spanish islands in the Mediterranean Sea known as the Balearic Islands (q.v.). Pop. (1900), 248,191; area, 430 sq. m. Majorca has the shape of a trapezoid, with the angles directed to the cardinal points; and its diagonal, from Cape Grozer in the west to Cape Pera in the east, is about 60 m. On the north-west the coast is precipitous, but on the other sides it is low and sloping. On the north-east there are several considerable bays, of which the chief are those of Alcudia and Pollensa; while on the south- west is the still more important bay of Palma. No fewer than twelve ports or harbours are enumerated round the island, of which may be mentioned Andraitx and Soller. In the north- west Majorca is traversed by a chain of mountains running parallel with the coast, and attaining its highest elevation in Silla de Torrellas (5154 ft.). Towards the south and east the surface is comparatively level, though broken by isolated peaks of considerable height. The northern mountains afford great protection to the rest of the island from the violent gales to which it would otherwise be exposed, and render the climate remarkably mild and pleasant. The scenery of Majorca has all the pictur- esqueness of outline that usually belongs to a limestone

formation. Some of the valleys, such as those of Valdemosa and Soller, with their luxuriant vegetation, are delightful resorts. There are quarries of marble of various grains and colours — those near Santafiy, in the district of Manacor, being especially celebrated; while lead, iron and cinnabar have also been obtained. Coal of a jet-like character is found at Benisalem, where it was first worked in 1836; at Selva, where it has been mined since 1851; near Santa Maria and elsewhere. It is used in the industrial establishments of Palma, and in the manufacture of lime, plaster and bricks near the mines. A considerable quantity is also exported to Barcelona.

The inhabitants are principally devoted to agriculture, and most of the arable land is cultivated. The mountains are ter- raced; and the old pine woods have in many places given way to the olive, the vine and the almond tree, to fields of wheat and flax, or to orchards of figs and oranges. For the last-mentioned I fruit's the Valley of Soller is one of the most important districts,

the produce being largely transmitted to France. The yield of oil is very considerable, and Inca is the centre of the oil dis- trict. The wines are light but excellent, especially the Muscadel and Montona. During the summer there is often great scarcity of water; but, according to a system handed down by the Moors, the rains of autumn and winter are collected in enormous reservoirs, which contain sufficient water to last through the dry season; and on the payment of a certain rate, each land- holder has his fields flooded at certain intervals. Mules are used in the agriculture and traffic of the island. The cattle are small, but the sheep are large and well fleeced. Pigs are reared for export to Barcelona, and there is abundance of poultry and small game. Brandy is made and exported in large quantities. Excellent woollen and linen cloths are woven; the silk- worm is reared and its produce manufactured; and canvas, rope and cord are largely made, from both native and foreign materials.

The roads are excellent, the four principal being those from Alcudia, Manacor, Soller and Andraitx to the capital. Forty- eight miles of railway were open at the beginning of the 20th century. The main line runs from Palma to Manacor and Alcudia. The telegraphic system is fairly complete, and there is regular steam communication with Barcelona and Alicante. The principal towns include — besides Palma (63,937), Felanitx (n,294)and Manacor (12,408), which are described in separate articles — Andraitx (6516), Inca (7579), Llummayor (8859), Pollensa (8308), Santany (6692) and Soller (8026).

MAJORIAN (Julius Valerius Majorianus), emperor of the West from 457 to 461. He had distinguished himself as a general by victories over the Franks and Alemanni, and six months after the deposition of Avitus he was declared emperor by the regent Ricimer. After repelling an attack by the Vandals upon Campania (458) he prepared a large force, composed chiefly of barbarians, to invade Africa, which he previously visited in disguise. Having during his stay in Gaul defeated and concluded an alliance with Theodoric the Visigoth, at the beginning of 460 he crossed the Pyrenees for the purpose of joining the powerful fleet which he had collected at Carthagena. The Vandal king Genseric, however, after all overtures of peace had been rejected, succeeded through the treachery of certain officers in surprising the Roman fleet, most of the ships being either taken or destroyed. Majorian thereupon made peace with Genseric. But his ill-success had destroyed his military reputation; his efforts to pat down abuses and improve the condition of the people had roused the hatred of the officials; and Ricimer, jealous of his fame and influence, stirred up the foreign troops against him. A mutiny broke out in Lombardy, and on the 2nd of August 461 Majorian was forced to resign. He died five days afterwards, either of dysentery or by violence. Majorian was the author of a number of remarkable laws, contained in the Theodosian Code. He remitted all arrears of taxes, the collection of which was for the future placed in the hands of the local officials. He revived the institution of defensores, defenders of cities, whose duty it was to protect the poor and inform the emperor of abuses committed in his name. The practice of pulling down the ancient monuments to be used as building material, which was connived at by venal officials, was strictly prohibited. He also passed laws against compulsory ordination and premature vows of celibacy.

See Sidonius Apollinaris, Panegyric of Majorian; Gibbon, Decline and Fall, ch. xxxvi. (where an outline of the " novels " of Majorian is given); J. B. Bury, Later Roman Empire, bk.- iii.

MAJORITY (Fr. majorile; Med. Lat. majbritas; Lat. major, greater), a term signifying the greater number. In legislative and deliberative assemblies it is usual to decide questions by a majority of those present at a meeting and voting. In law, majority is the state of being of full age, which in the United Kingdom is twenty-one years of age. A person attains his majority at twelve o'clock at night of the day preceding his twenty-first birthday (see Infant; Age).

MAJUBA (properly Amajuba, Zulu for "the hill of doves"), a mountain in northern Natal, part of the Drakensberg range,

rising about 7000 ft. above the sea and over 2000 ft. above the level of the surrounding country. It overlooks the pass through the Drakensberg known

as Laing's Nek, is 8 m. S. of the Trans- vaal border and 18 m. N. of the town of Newcastle. The railway from Durban to Johannesburg skirts the base of the mountain. During the Boer War of 1880-81 Majuba was occupied on the night of the 26th of February 1881 by some 600 British troops under Sir George Pomeroy Colley. On the following morning the hill was stormed by the Boers under Piet Joubert and the British routed, Colley being among the slain.

MAKALAKA, a general designation used by the Bechuana, Matabele and kindred peoples, for conquered or slave tribes. Thus many of the tribes subjugated by the Makololo chief, Sebituane, about 1830 were called Makalaka (see David Living- stone's Missionary Travels and Researches in South Africa, London, 1857). By early writers on south-central Africa certain of the inhabitants of Barotseland were styled Makalaka; the name is more frequently used to designate the Makalanga, one of the tribes now classed as Mashonas (q.v.), who were brought into subjection by the Matabele.

MAKARAKA, or Iddio (" Cannibals "), a negroid people of Central Africa, closely related to the powerful Azandeh or Niam- Niam race, occupying the Bahr-el-Ghazal west of Lado. They came originally from the country of the Kibas, north of the Welle. Dr W. Junker described them as among the most trust- worthy, industrious and intelligent people of the Bahr-el-Ghazal. They are a reddish-black, with nose less flat and cheek-bones less prominent than the ordinary negroes, and, unlike the latter, do not extract the incisors. Their long silky hair is built up in the most fantastic form by means of vegetable substances. They are well-known for strength and staying power.

See W. Junker, Travels in Africa (1890-1892).

MAKART, HANS (1840-1884), Austrian painter, born at Salzburg, was the son of an inspector of the imperial castle. He has been aptly called the first German painter of the 19th century. When he, as a youth, entered the Vienna Academy German art was under the rule of Cornelius's cold classicism. It was entirely intellectual and academic. Clear and precise drawing, sculpturesque modelling, and pictorial erudition were the qualities most esteemed; and it is not surprising that Makart, poor draughtsman to the very last, with a passionate and sensual love of colour, and ever impatient to escape the routine of art- school drawing, was found to be "devoid of all talent" and forced to leave the Vienna Academy. He went to Munich, and after two years of independent study attracted the attention of Piloty, under whose guidance he made rapid and astonishing progress. The first picture he painted under Piloty, " Lavoisier in Prison," though timid and conventional, attracted attention by its sense of colour. In the next, "

The Knight and the Water Nymphs," he first displayed the decorative qualities to which he afterwards sacrificed everything else in his work. With the " Cupids " and " The Plague in Florence " of the next year his fame became firmly established. " Romeo and Juliet " was soon after bought by the Austrian emperor for the Vienna Museum, and Makart was invited to come to Vienna, where a large studio was placed at his disposal. In Vienna Makart became the acknowledged leader of the artistic life of the city, which in the 'seventies passed through a period of feverish activity, the chief results of which are the sumptuously decorated public buildings of the Ringstrasse.

The enthusiasm of the time, the splendour of the fetes over which Makart presided, and the very obvious appeal of his huge compositions in their glowing richness of colour, in which he tried to emulate Rubens, made him appear a very giant to his contem- poraries in Vienna, and indeed in all Austria and Germany. The appearance of each of his ambitious historical and allegorical paintings was hailed with enthusiasm — the " Catherina Cor- naro," "Diana's Hunt," " The Entry of Charles V. into Antwerp," " Abundantia," " Spring," " Summer," " The Death of Cleo- patra " and the " Five Senses." He reached the zenith of his fame when, in 1879, he designed, single-handed, the costumes, scenic setting, and triumphal cars of the grand pageant with

which the citizens of Vienna celebrated the silver wedding of their rulers. Some 15,000 people participated in the pageant, all dressed in the costumes of the Rubens and Rembrandt period. Makart died in Vienna in October 1884.

Unfortunately Makart was in the habit of using such villainous pigments and mediums that in the few decades which have passed since his death, the vast majority of his large paintings have prac- tically perished. The blues have turned into green ; the bitumen has eaten away the rich glow of the colour harmonies ; the thickly applied paint has cracked and in some instances crumbled away. And this loss of their chief quality has accentuated the weaknesses of these pictures — the faulty drawing, careless and hasty execution, lack of deeper significance and prevalence of glaring anachronisms. Impor- tant examples of his work are to be found at the galleries of Vienna, Berlin, Hamburg and Stuttgart. For the Vienna Museum he also executed a series of decorative lunettes.

MAKING-UP PRICE, a term used in the London and other British Stock

Exchanges, to denote the price at which specula- tive bargains are carried over from one account to the next. The carrying over of a "bull" position in Eries, for example, implies a sale for cash and a simultaneous repurchase for the new account, both bargains being done at the making-up price. This is fixed at noon on carry-over day, in accordance with the market price then current (see Account; Stock Exchange). The term is also used in New York, where the making-up prices are fixed at the end of a day's business, in accordance with the American system of daily settlements.

HAK6, a town of Hungary, capital of the county of Csanad 13S m. S.E. of Budapest by rail. Pop. (1900), 33,701. It is situated near the right bank of the Maros, and is a typical Hungarian town of the Alfold. The most noteworthy building is the palace of the bishop of Csanad, whose usual residence is in TemesVar. The town possesses numerous mills, and the surrounding country is fertile. The communal lands are exten- sive; they afford excellent pasturage for horses and sheep and also for large herds of horned cattle, for the size and quality of which Mako has obtained a high repute.

MAKRAN, or Mekran, a province of Baluchistan, fringing the Arabian Sea from Persia almost to Sind for about 200 m. It is subject to the khan of Kalat under British political supervision. Estimated area, 26,000 sq. m.; estimated pop. (1903), 78,000. The long lateral valley of Kej is usually associated with Makran in early geographical records. The Kej-Macoran of Marco Polo is the Makran of to-day.

The long stretch of sandy foreshore is broken on the coast- line by the magnificent cliffs of Malan, the hammer-shaped headlands of Ormarah and Gwadar, and the precipitous cliffs of Jebel Zarain, near Pasni. Within them lies the usual frontier band of parallel ridges, alternating with narrow valleys. Amongst them the ranges called Talana and Talur are conspicuous by their height and regular configuration. The normal conformation of the Baluchistan frontier is somewhat emphasized in Makran. Here the volcanic action, which preceded the general upheaval of recent strata and the folding of the edges of the interior highlands, is still in evidence in occasional boiling mud volcanoes on the coast-line. It is repeated in the blazing summit of the Kuh-i-taftan (the burning mountain of the Persian frontier) which is the highest active volcano in Asia (13,000 ft.), and probably the farthest inland. Evidence of extinct mud volcanoes exists through a very wide.area in Baluchistan and Seistan. Probably the miri, or fort, at Quetta represents one of them. The coast is indented by several harbours. Ormarah, Khor Kalmat, Pasni and Gwadar are all somewhat difficult of approach by reason of a sand-bar which appears to extend along the whole coast- line, and which is very possibly the last evidence of a submerged ridge; anoVthey are all subject to a very lively surf under

certain conditions of wind. Of these the port of Gwadar (which belongs to Muscat and is therefore foreign territory) is the most important. They all are (or were) stations of the Indo-Persian telegraph system which unites Karachi with Bushire. With the exception of the Kej valley, and that of the Bolida, which is an affluent of the Kej, there are no considerable spaces of cultivation in Makran. These two valleys seem to concentrate the whole agricultural wealth of the country. They are picturesque, with

thick groves of date palms at intervals, and are filled with crops and orchards. They are indeed exceedingly beautiful; and yet the surrounding waste of hills is chiefly a barren repetition of sun-cracked crags and ridges with parched and withered valleys intersecting them, where a trickle of salt water leaves a white and leprous streak amongst the faded tamarisk or the yellow stalks of last season's grass. Makran is the home of remnants of an in- numerable company of mj.ˆed people gathered from the four corners of Asia and eastern Africa. The ancient Dravidians, of whom the Brahui is typical, still exist in many of the districts which are assigned to them in Herodotus. Amongst them there is always a prominent Arab element, for the Arabs held Makran even before they conquered Sind and made the Kej valley their trade highway to India. There are negroes on the coast, bred from imported slaves. The Meds of the Indus valley still form the greater part of the fishing population, representing the Ichthyophagi of Arrian. The old Tajik element of Persia is not so evident in Makran as it is farther north; and the Karak pirates whose depredations led to the invasion of India and the conquest of Sind, seem to have disappeared altogether. The fourth section includes the valleys formed by the Rakshan and Mashkel, which, sweeping downwards from the Kalat highlands and the Persian border east and west, unite to break through the intervening chain of hills northward to form the Mashkel swamps, and define the northern limits of Makran. In these valleys are narrow strips of very advanced cultivation, the dates of Panjgur being generally reckoned superior even to those of the Euphrates. The great Mashkel swamp and the Kharan desert to the east of it, mark the flat phase of southern Baluchi- stan topography. It is geologically part of an ancient inland lake or sea which included the present swamp regions of the Helmund, but not the central depression of the Lora. The latter is buttressed against hills at a much higher elevation than the Kharan desert, which is separated from the great expanse of the Helmund desert within the borders of Afghanistan by a trans- verse band of serrated hills forming a distinct watershed from Nushki to Seistan. Here and there these jagged peaks appear as if half overwhelmed by an advancing sea of sand. They are treeless and barren, and water is but rarely found at the edges of their foot-hills. The Koh-i-Sultan, at the western extremity of the northern group of these irregular hills, is over 6000 ft. above sea-level, but the general level of the surrounding deserts is

only about 2000 ft., sinking to 1500 ft. in the Mashkel Hamun and the Gaod-i-Zirreh.

The whole of this country has been surveyed by Indian sur- veyors and the boundary between Persian and British Baluchis- tan was demarcated by a commission in 1895-1896. In 1898 a column of British troops under Colonel Mayne was despatched to Makran by sea, owing to a rebellion against the authority of the khan of Kalat, and an attack made by some Makran chiefs on a British survey party. The campaign was short and terminated with the capture of the Kej citadel. Another similar expedition was required in 1901 to storm the fort at Nodiz. The headquarters of the native governor, under the khan of Kalat, are at Turbat, with deputies at Tump, Kolwa, Pasni and Panjgur. A levy corps, with two British officers, is stationed along the western frontier. The port of Gwadur forms an enclave belonging to the sultan of Muscat.

Baluchistan District Gazetteer, vol. vii. (Bombay, 1907).

■■ *(T. H. H.*)*

MAKSOORA, the term in Mahommedan architecture given to the sanctuary or praying-chamber in a mosque, which was sometimes enclosed with a screen of lattice- work ; the word is occasionally used for a similar enclosure round a tomb.

MALABAR, a district of British India, in the Madras Presi- dency. Geographically the name is sometimes extended to the entire western coast of the peninsula. Properly it should apply to the strip below the Ghats, which is inhabited by people speaking the Malayalam language, a branch of the Dravidian stock, who form a peculiar race, with castes, customs and traditions of their own. It would thus be coextensive with the old kingdom of Chera, including the modern states of

Travancore and Cochin, and part of Kanara. In 1901 the total number of persons speaking Malayalam in all India was

6,029,304.

The district of Malabar extends for 145 m. along the coast, running inland to the Ghats with a breadth varying from 70 to 25 m. The administrative headquarters are at Calicut. Area, 5795 sq. m. Malabar is singularly diversified in its configuration; from the eastward, the great range of the

Western Ghats, only interrupted by the Palghat gap, looks down on a country broken by long spurs, extensive ravines, dense forests and tangled jungle. To the westward, gentler slopes and downs, and gradually widening valleys closely cultivated, succeed the forest uplands, till, nearer the seaboard, the low laterite table- lands shelve into rice plains and backwaters fringed with coco- nut palms. The coast runs in a south-easterly direction, and forms a few headlands and small bays, with a natural harbour in the south at Cochin. In the south there is considerable extent of table-land. The mountains of the Western Ghats run almost parallel to the coast, and vary from 3000 to 7000 ft. in height. One of the most characteristic features of Malabar is an all but continuous chain of lagoons or backwaters lying parallel to the coast, which have been formed by the action of the waves and shore currents in obstructing the waters of the rivers. Connected by artificial canals, they form a cheap means of transit ; and a large local trade is carried on by inland navigation. Fishing and fishcuring is an important industry. The forests are extensive and of great value, but they are almost entirely private property. The few tracts which are conserved have come into government hands by escheat or by contract. Wild animals include the elephant, tiger, panther, bison, sambhar, spotted deer, Nllgiri ibex, and bear. The population in 1901 was 2,800,555, showing an increase of 5-6% in the decade.

The staple crop is rice, the next most important product being coco-nuts. Coffee is grown chiefly in the upland tract known as the Wynaad, where there are also a few acres under tea. The Madras railway crosses the district and has been extended from Calicut to Cannanore along the coast. There are eleven seaports, of which the principal are Calicut, Telli- cherry, Cannanore and Cochin. The principal exports are coffee, coco-nut products and timber. There are factories for cleaning coffee, pressing coir and making matting, making tiles, sawing timber and weaving cotton.

See Malabar District Gazetteer (Madras, 1908). MALABARI, BEHRAMJI (1853-), Indian journalist and social reformer, was born in 1853 at Baroda, the son of a poor Parsi in the employment of the state, who died shortly after his birth. His mother took him to Surat, where he was educated in a mission school, but he never succeeded in gaining an academical degree. Coming to Bombay, he fell under the influence of Dr John Wilson, principal of the Scottish College. As early as 1875 he published a volume of poems in Gujarati, followed in 1877 by The Indian Muse in English Garb, which attracted attention in England, notably from Tennyson, Max Miiller, and Florence Nightingale. His life work began in 1880 when he acquired the Indian Spectator, which he edited for twenty years until it was merged in the Voice of India. In r9oi he became editor of East and West. Always holding aloof from politics, he was an ardent and indefatigable advocate of social reform in India, especially as regards child

marriage and the remarriage of widows. It was largely by his efforts, both in the press and in tours through the country, that the Age of Consent Act was passed in 1891. His account of his visits to England, entitled The Indian Eye on English Life (1893), passed through three editions, and an earlier book of a somewhat satirical nature, Gujarat and the Gujaratis (1883), was equally popular.

See R. P. Karkaria, India, Forty Years of Progress and Reform, (London, 1896).

MALABON, a town of the province of Rizal, Luzon, Philippine Islands, 1 m. inland from the shore of Manila Bay and 3 m. N. of the city of Manila, with which it is connected by an electric

tramway. Pop. (1903), 20,136. The leading industries are the refining of sugar, fishing, trade, the weaving of jusi cloth, the making of cigars, and the cultivation of ilang-ilang-trees (Cananga odorata) for their flowers, from which a fine perfume is distilled; ilang-ilang is one of the principal exports, mostly to France. Tagalog and Spanish are the principal languages. Malabon was formerly known as Tambobong.

MALACCA, a town on the west coast of the Malay Peninsula, in 2° 14′ N., 102° 1 2′ E., which, with the territory lying immediately around and behind it forms one of the Straits Settlements, and gives its name to the Straits which divide Sumatra from the Malay Peninsula. Its name, which is more correctly transliter- ated mSlaka, is that of a species of jungle fruit, and is also borne by the small river on the right bank of which the old Dutch town stands. The Dutch town is connected by a bridge with the business quarter on the left bank, which is inhabited almost exclusively by Chinese, Eurasians and Malays.

Malacca, now a somnolent little town, a favourite resort of rich Chinese who have retired from business, is visited by few ships and is the least important of the three British settlements on the Straits which give their name to the colony. It has, however, a remarkable history. The precise date of its foundation cannot be ascertained, but there is strong reason to believe that this event took place at the earliest in the 14th century. The Roman youth Ludovigo Barthema is believed to have been the first European to visit it, some time before ˆ03; and in 1509 Diogo Lopez de Siqueira sailed from Portugal for the express purpose of exploiting Malacca. At first he was hospitably received, but disagreements with the natives ensued and word was brought to Siqueira by Magellan, who was one of his company, that a treacherous attack was about to be made upon his ships. Siqueira then sent a native man and woman ashore ” with an arrow passed through their skulls ” to the sultan, ” who was thus informed,” says de Barros, ”

through his subjects that unless he kept a good watch the treason which he had perpetrated would be punished with fire and sword." The sultan retaliated by arresting Ruy de Araujo, the factor, and twenty other men who were ashore with him collecting cargo for the ships. Siqueira immediately burned one of his vessels and sailed direct for Portugal. In 1510 Mendez de Vasconcellos with a fleet of four ships set out from Portugal " to go and conquer Malacca," but d'Alboquerque detained him at Goa, and it was not until 1 5 1 1 that d'Alboquerque himself found time to visit Malacca and seek to rescue the Portuguese prisoners who all this time had remained in the hands of the sultan. An attack was delivered by d'Alboquerque on the 25th of July 1 51 1, but it was only partially successful, and it was not until the 4th of August, when the assault was repeated, that the place finally fell. Since that time Malacca has continued to be the possession of one or another of the European Powers. It was a Portuguese possession for 130 years, and was the head- quarters of their trade and the base of their commercial explora- tions in south-eastern Asia while they enjoyed, and later while they sought to hold, their monopoly in the East. It was from Malacca, immediately after its conquest, that d'Alboquerque sent d'Abreu on his voyage of discovery to the Moluccas, or Spice Islands, which later were the objective of Magellan's voyage of circumnavigation. During the Portuguese tenure of Malacca the place was attacked at least twice by the Achinese; its shipping was harried by Lancaster in 1592, when the first British fleet made its way into these seas; it was besieged by the Dutch in 1606, and finally fell to a joint attack of the Dutch and the Achinese in 1641. It was under the Portuguese govern- ment that St Francis Xavier started a mission in Malacca, the first Christian mission in Malayan lands.

The Dutch held Malacca till 1795, when it was taken from them by Great Britain, and the Dutch system of monopoly in the straits was forthwith abolished. The colony was restored to the Dutch, however, in 1818, but six years later it came finally into the hands of Great Britain, being exchanged by a treaty with Holland for the East India Company's settlement of Benkulen and a few other unimportant places on the western

coast of Sumatra. By this treaty the Dutch were precluded from interference in the affairs of the Malay Peninsula, and Great Britain from similar action in regard to the States of Sumatra, with the sole exception of Achin, the right to protect that state being maintained by Great Britain until 1872 when it was finally abandoned by a treaty concluded with Holland in that year. The Dutch took advantage of this immediately to

invade Achin, and the strife begun in 1873 still continues and is now a mere war of extermination. It was not until 1833 that the whole territory lying at the back of Malacca was finally brought under British control, and as late as 1887 the Negri Sembilan, or Nine States, which adjoin Malacca territory on the east and north-east, were completely independent. They to-day form part of the Federated Malay States, which are under the protection of Great Britain, and are governed with the assistance and by the advice of British officers.

Malacca, in common with the rest of the Straits Settlements, was administered by the government of India until 1867, when it became a crown colony under the control of the Colonial Office. It is to-day administered by a resident councillor, who is responsible to the governor of the Straits Settlements, and by a number of district officers and other officials under his direction. The population of the town and territory of Malacca in 1901 was 94,487, of whom 74 were Europeans and Americans, 1598 were Eurasians, the rest being Asiatics (chiefly Malays with a considerable sprinkling of Chinese). The popula- tion in 1891 was 92,170, and the estimated population for 1905 was 97,000. The birth-rate is about 35 per thousand, and the death-rate about 29 per thousand. The trade of this once flourishing port has declined, most of the vessels being merely coasting craft, and no large line of steamers holding any com-munication with the place. This is due partly to the shallowness of the harbour, and partly to the fact that the ports of Penang and Singapore, at either entrance to the straits, draw all the trade and shipping to themselves. The total area of. the settlement is about 700 sq. m. The colony is wholly agricultural, and the land is almost entirely in the hands of the natives. About 50,000 acres are under tapioca, and about 9000 acres are under rubber (hevea). This cultivation is rapidly extending. There are still considerable areas unoccupied which are suitable for rubber and for coco-nuts. The settlement is well opened up by roads; and a railway, which is part of the Federated Malay States railway system, has been constructed from the town of Malacca to Tampin in the Negri Sembilan. There is a good rest-house at Malacca and a comfortable seaside bungalow at Tanjong Kling, seven miles from the town. Malacca is 118 m. by sea from Singa- pore and 50 m. by rail from Seremban, the capital of the Negri Sembilan. There is excellent snipe-shooting to be had in the vicinity of Malacca.

See The Commentaries of a" Alboquerque (Hakluyt Society) ; The Voyages and Adventures of Fernand Mendez Finto (London, 1653); An Account of the East Indies, by Captain Alexander Hamilton (Edinburgh. 1727); Valentyn's History of Malacca, translated by Dudley Hervey; Journal of the Straits Branch of the Royal Asiatic Society, " Our Tropical Possessions in Malayan India," by the same author, ibid. ; Further India, by Hugh

Clifford (London, 1904); British Malaya, by Sir Frank Swettenham (London, 1906).

(H. Cl.)

MALACHI, the name assigned to the last book of the Old Testament in English (the last of the " prophets " in the Hebrew Bible), which according to the title (Mai. i. 1) contains the " word of Yahweh to Israel by the hand of Malachi." In form the word means " my messenger." It could be explained as a contraction of Malachiah, " messenger of Yahweh "; but the Septuagint is probably right in not regarding it as a proper name (" by the hand of His messenger "). Not only do we know nothing from internal or external evidence of the existence of a prophet of this name, 1 but the occurrence of the word in the title is naturally explained as derived from iii. 1: " Behold, I send my messenger " (cf. ii. 7). The prophecy must, therefore, be regarded as anonymous; the title was added by the compiler

1 A Hebrew tradition given in the Targum of Jonathan, and approved by Jerome, identifies Malachi with Ezra the priest and scribe.

who wrote similar editorial titles to the anonymous prophecies beginning Zech. ix. 1, xii. 1.

The contents of the prophecy fall into a series of clearly marked sections, as in the paragraph division of the Revised Version. These apply, in various ways, the truth emphasized at the outset: Yahweh's love for Israel in contrast with his treatment of Edom (i. 2-5). Israel's response should be a proper regard for the ritual of His worship; yet any offering, however imperfect, is thought good enough for Yahweh's altar (i. 6-14). Let the priests, who are responsible, take warning, and return to their ancient ideals (ii. 1-9). Again, the common Fatherhood of God should inspire a right relation among fellow Israelites, not such conduct as the divorce of Israelite wives in order to marry non-Israelite women (ii. 10-16). 2 The prevalence of wrong- doing has provoked scepticism as to righteous judgment; but the messenger of Yahweh is at hand to purge away indifferentism from worship and immorality from conduct (ii. 17— iii. 6). The payment of tithes now withheld will be followed by the return of prosperity (iii. 7-12). Religion may seem useless, but Yahweh remembers His own, and will soon in open judgment distinguish them from the irreligious (iii. 13-iv. 3). The book closes with an appeal to observe the law of Moses, and with a promise that Elijah shall come before the threatened judgment. 3

The topics noticed clearly relate the prophecy to the period of Ezra and Nehemiah, when the Temple had been rebuilt (i. 10; iii. 1, 10), the

province of Judah was under a Persian governor (i. 8), and there had been time enough for the loss of earlier enthusiasm. The majority of modern scholars are agreed that the prophet prepares for the work of those reformers (Ezra, 458; Nehemiah, 444, 432 B.C.). The abuses of which he parti- cularly complains are such as were found rampant by Ezra and Nehemiah — marriage with foreign women (ii. n; cf. Ezra ix. ; Neh. xiii. 23 seq. ; Deut. vii. 3) and failure in payment of sacred dues (iii. 8 seq.; cf. Neh. x. 34 seq.; xiii. ioseq:;Deut.xxvi. 12 seq.). The priests have fallen into contempt (ii. 9) and have neglected what is still one of their chief trusts, the oral law (ii. 6 seq.). The priestly code of written law was not promulgated until 444 B.C. (Neh. viii.-x.) ; " Malachi " writes under the influence of the earlier Code of Deuteronomy only, 4 and must therefore belong to a date prior to 444. The independent character of the attack on current abuses also suggests priority to the work of Ezra in 458. The prophecy affords an interesting and valuable glimpse of the post-exilic community, with its various currents of thought and life. The completion of the second Temple (516 B.C.) has been followed by disillusionment as to the anticipated prosperity, by indifference to worship, scepticism as to providence, and moral laxity. 5 In view of these conditions, the prophet's message is to reassert the true relation of Israel to Yahweh, and to call for a corresponding holiness, especially in regard to questions of ritual and of marriage. He saw that " the disobedience of

2 Torrey (Ency. Bib. c. 2908) holds that the reference here is purely figurative; " Judah has dealt falsely with the wife of his youth, the covenant religion, and is wedding a strange cult." But he assigns the book to the 4th century.

3 This closing prophecy may possibly be a later addition (so Marti) rounding off the prophetic canon by reference to the two great names of Moses and Elijah, and their characteristic activities. In this case, " Elijah " will represent an early interpretation (cf. Ecclus. xlviii. 10) of the " messenger," originally conceived as a purely ideal figure. The only other passage in the book whose originality is not generally accepted is that referring to mixed marriages (ii. II, 12).

4 It is the Deuteronomic law that is most familiar to him, as appears from his use of the name Horeb for the mountain of the law, and the Deuteronomic phrase " statutes and judgments " (iv. 4), from his language as to tithes and offerings (iii. 8, 10; cf. Deut. xii. 1 1 ; xxvi. 12), and especially from his conception of the priesthood as resting on a covenant with Levi (ii. 4 seq.). Malachi indeed assumes that the " whole tithe " — the Deuteronomic phrase for the tithe in which the Levites shared — is not stored in each township, but brought into the treasury at the Temple. But this was a modifi- cation of the Deuteronomic law naturally called for

under the cir- cumstances of the return from Babylon, and Neh. x. and xiii. produce the impression that it was not introduced for the first time by Ezra and Nehemiah, though the collection of the tithe was enforced by them. See further, W.R.S. in O.T.J.C. ii. 425-427.

6 Cf. Stade's reconstruction, G.V.I, ii. 128-138.

his time was the outcome of a lowered morality, not of a clearer spiritual vision." 1 A strong sense of the unique privileges of the children of Jacob, the objects of electing love (i. 2), the children of the Divine Father (ii. 10), is combined with an equally strong assurance of Yahweh's righteousness notwithstanding the many miseries that pressed on the unhappy inhabitants of Judaea. At an earlier date the prophet Haggai had taught that the people could not expect Yahweh's blessing while the Temple lay in ruins. In Malachi's time the Temple was built (i. 10) and the priests waited in their office, but still a curse seemed to rest on the nation's labours (iii. 9). To Malachi the reason of this is plain. The " law of Moses " was forgotten (iv. 4 [iii. 22]); let the people return to Yahweh, and He will return to them. It was in vain to complain, saying, " Every one that doeth evil is good in the eyes of Yahweh," or " Where is the God of judgment?" — vain to ask "Wherein shall we return?" Obedience to the law is the sure path to blessing (ii. 17-iii. 12).

He calls the people to repentance, and he enforces the call by proclaiming the approach of Yahweh in judgment against the sorcerers, the adulterers, the false swearers, the oppressors of the poor, the orphan and the stranger. Then it shall be seen that He is indeed a God of righteous judgment, distinguishing between those that serve Him and those that serve Him not. The Sun of Righteousness shall shine forth on those that fear Yahweh's name; they shall go forth with joy, and tread the wicked under foot. The conception of the day of final decision, when Yahweh shall come suddenly to His temple (iii. 1) and confound those who think the presumptuous godless happy tfii. 15), is taken from earlier prophets, but is applied wholly within the Jewish nation. The day of Yahweh would be a curse, not a blessing, if it found the nation in its present state: the priests listlessly performing a fraudulent service (i. 7 — il. 9), the people bound by marriage to heathen women, while the tears of the daughters of Israel, thrust aside to make way for strangers, cover the altar (ii. n-16), all faith in divine justice gone (ii. 17; iii. 14 seq.), sorcery, uncleanness, falsehood and oppression rampant (iii. 5), the house of God deprived of its dues (iii. 8), and the true fearers of God a little flock gathered together in private

exercises of religion (perhaps the germ of the later synagogue) in the midst of a godless nation (iii. 16). That the day of Yahweh is delayed in such a state of things is but a new proof of His unchanging love (iii. 6), which refuses to consume the sons of Jacob. Meantime He is about to send His messenger to prepare His way before Him. The prophet Elijah must reappear to bring back the hearts of fathers and children before the great and terrible day of Yahweh come. Elijah was the advocate of national decision in the great concerns of Israel's religion; and it is such decision, a clear recognition of what the service of Yahweh means, a purging of His professed worshippers from hypocritical and half-hearted service (iii. 3) that Malachi with his intense religious earnestness sees to be the only salvation of the nation. In thus looking to the return of the ancient prophet to do the work for which later prophecy is too weak, Malachi unconsciously signalizes the decay of the order of which he was one of the last representatives; and the somewhat mechanical measure which he applies to the people's sins, as for example when he teaches that if the sacred dues were rightly paid prosperous seasons would at once return (iii. 10), heralds the advent of that system of formal legalism which thought that all religious duty could be reduced to a system of set rules. Yet Malachi himself is no mere formalist. To him, as to the Deuteronomic legislation, the forms of legal observance are of value only as the fitting expression of Israel's peculiar sonship and service, and he shows himself a true prophet when he contrasts the worthless ministry of unwilling priests with the pure offering of prayer and praise that rises from the implicit monotheism of even Gentile worship 2 (i. n), or when he asserts

1 Welch in D.B. iii. 220.

2 This remarkable utterance is sometimes (as by W.R.S.) inter- preted of the worship of Jews scattered in the Dispersion: reasons for the above view are given by Driver.

the brotherhood of all Israelites under their one Father (ii. 10), not merely as a ground of separation from the heathen, but as inconsistent with the selfish and cruel freedom of divorce current in his time. 3 The book is a significant landmark in the religious history of Israel. Its emphasis on the observance of ritual finds fullest development in the Priestly Code, subsequently promulgated; its protest against foreign marriages is made effective through the reforms of Ezra and Nehemiah; 4 the influence of its closing words on later expectation is familiar to every reader of the new Testament. 5

The style of Malachi, like his argument, corresponds in its generally prosaic character to that transformation or decay of prophecy which began with Ezekiel; and Ewald rightly called attention to the fact that the conduct of

the argument already shows traces of the dialectic manner of the schools. Yet there is a simple dignity in the manner not unworthy of a prophet, and rising from time to time to poetical rhythm.

Literature. — Nowack, Die kleinen Propheten (1897; 2nd ed., 1904); Wellhausen, id. (iii. 1898); G. A Smith, The Book of the Twelve (ii. 1898) ; A. C. Welch, art. " Malachi " in Hastings's Diet, of the Bible, iii. 218-222 (1900); C. C.Torrey, id. in Ency. Bib. iii. c.2907- 2910 (1902); Marti, Dodekapropheton (1904); Stade, Biblische Theologie des Alten Test. § 141 (1905) ; Driver, The Minor Prophets, ii. (Century Bible, 1906). (W. R. S. ; H. W. R.)*

MALACHITE, a copper-ore of fine green colour, sometimes polished as an ornamental stone. The name is derived from Gr. fiaXaxv, the mallow, in allusion to the colour of the mineral being rather like that of the mallow-leaf. Malachite was perhaps one of the green minerals described by Theophrastus under the general name of o-/j.apay5os; and according to the late Rev. C. W. King it was probably the smaragdus medicus of Pliny, whilst his molochites seems to have been a different stone from our malachite and may have been a green jasper. It is suggested by J. L. Myres (Ency. Bib.) that malachite may have been the Heb. soham, of the high priest's breastplate.

Malachite is a basic cupric carbonate, represented by the formula CuC03Cu(HO)2, and has usually been formed by the action of meteoric agencies on other copper-minerals; hence it is found in the upper part of ore-deposits, often as an incrus- tation, and occasionally as a pseudomorph after cuprite, chalco- cite, &c. When formed, as commonly happens, by the alteration of copper-pyrites the iron of this mineral usually takes the form of limonite, which may remain associated with the malachite. Occasionally, though but rarely, malachite occurs in small dark- green prismatic crystals of the monoclinic system. Its usual mode of occurrence is in nodular or stalagmitic forms, with a mammillated, reniform or botryoidal surface, whilst in other cases it forms fibrous, compact or even earthy masses. The nodules, though commonly dull on the outside, may display on fracture a beautiful zonary structure, the successive layers often succeeding each other as curved deposits of light and dark tints. The colours include various shades of apple-green, grass-green, emerald-green and verdigris-green. Certain varieties exhibit a finely fibrous structure, producing on the fractured surface a soft silky sheen.

Whilst malachite is found in greater or less quantity in most copper-mines, the finer varieties useful for ornamental purposes are of very limited occurrence, and the lapidary has generally drawn his supply from Russia and Australia. The principal source in recent years has been the Medno-

Rudiansk mine near Nizhne Tagilsk, on the Siberian side of the Urals, but it was formerly obtained from mines near Bogoslovsk to the north and Gumishev to the south of this locality. A mass from Gumishev, preserved in the museum of the Mining Institute of St Petersburg weighs 3240 ft, and still larger masses have been found near Nizhne Tagilsk. The mineral is prized in

3 In ii. 16 the Targum renders " If thou hatest her put her away." It is characteristic of later Judaism that an arbitrary exegesis trans- formed the above anticipation of the doctrine of marriage laid down in the gospel into an express sanction of the right of the husband to put away his wife at will.

4 " The permanence of Judaism depended on the religious separate- ness of the Jews " (Ryle, Ezra and Nehemiah, p. 143).-

5 Matt. xvii. 3, 4, 10-13; xxvii. 47, 49; John i. 21, 25.

Russia for use in mosaic-work, and for the manufacture of vases, snuff-boxes and various ornamental objects. Even folding doors, mantelpieces, table-tops and other articles of furniture have been executed in malachite, the objects being veneered with thin slabs cleverly fitted together so as to preserve the pattern, and having the interspaces filled up with fragments and powder of malachite applied with a cement. The malachite is sawn into slabs, ground with emery and polished with tripoli. Its hardness is less than 4, but it takes a good polish like marble: it is rather denser than marble, having a specific gravity of 3-7 to 4, but it is more difficult to work, in consequence of a tendency to break along the curved planes of deposition. Exceptionally fine examples of the application of malachite are seen in some of the columns of St Isaac's Cathedral in St Petersburg, which are hollow iron columns encrusted with malachite. Large masses of ornamental malachite have been found in Australia, especially at the old Burra Burra copper- mine in South Australia. The Copper Queen and other mines in Arizona have yielded fine specimens of malachite associated with azurite, and polished slabs of the mixed minerals some- times show the vivid green and the deep blue carbonate in very striking contrast. This natural association, cut as an ornamental stone, has been named, by Dr G. F. Kunz, azur- malachite. Malachite is occasionally used for cameo-work, and some fine antique examples are known. It was formerly worn as an amulet to preserve the wearer from lightning, contagion and witchcraft.

The mineral, when ground, has been used as a pigment under the name of

" mountain green." The coarser masses are extensively used, with other minerals, as ores of copper, malachite containing about 57 % of metal. " Blue malachite ' is a name sometimes given to azurite (q.v.), whilst " siliceous malachite " is a term inappro- priately applied to chrysocolla (q.v.). (F. W. R.)

MALACHOWSKI, STANISLA.W (1736-1809), Polish states- man, the younger son of Stanislaw Malachowski, palatine of Posen, the companion in arms of Sobieski. From his youth Malachowski laboured zealously for the good of his country, and as president of the royal court of justice won the honourable title of the " Polish Aristides." He was first elected a deputy to the Coronation Diet of 1764, and the great Four Years' Diet unanimously elected him its speaker at the beginning of its session in 1788. Accurately gauging the situation, Malachowski speedily gathered round him all those who were striving to uphold the falling republic and warmly supported every promis- ing project of reform. He was one of the framers of the consti- tution of the 3rd of May 1791, exceeding in liberality all his colleagues and advocating the extension of the franchise to the towns and the emancipation of the serfs. He was the first to enter his name as a citizen of Warsaw in the civic register and to open negotiations with his own peasantry for their complete liberation. Disappointed in his hopes by the overthrow of the constitution, he resigned office and left the country in 1792, going first to Italy and subsequently to his estates in Galicia, where he was imprisoned for a time on a false suspicion of con- spiracy. In 1807 Malachowski was placed at the head of the executive committee appointed at Warsaw after its evacuation by the Prussians, and when the grand duchy of Warsaw was created Malachowski became president of the senate under King Frederick Augustus of Saxony. In the negotiations with the Austrian government concerning the Galician salt-mines Malachowski came to the assistance of the depleted treasury by hypothecating all his estates as an additional guarantee. In 1809 he died at Warsaw. His death was regarded as a public calamity, and multitudes followed his remains to their last resting-place in the Church of the Holy Cross. In all the other towns of the grand duchy funeral services were held simultaneously as a tribute of the respect and gratitude of the Polish nation.

See August Sokolowski, Illustrated History of Poland (Pol.), vol. iv. (Vienna, 1900) ; Life and Memoirs of S. Malachowski, edited by Lucyan Siemienski (Pol; Cracow, 1853). (R. N. B.)

MALACHY, ST (c. 1094-1148), otherwise known as Maol- Maodhog (or Maelmaedhog) Ua Morgair, archbishop of Armagh

and papal legate in Ireland, was born at Armagh. His father, an Irish clergyman, the Fearleighlinn, or lector, at the university, was said to have

been of noble family. Having been ordained to the priesthood, he for some time acted as vicar of Archbishop Celsus or Ceallach of Armagh, and carried out many reforms tending to increase conformity with the usage of the Church of Rome. In order to improve his knowledge of the Roman ritual he spent four years with Malchus, bishop of Lismore (in Munster), a strong advocate of Romanism. Here he became acquainted with Cormac MacCarthy, king of Desmond, who had sought refuge with Malchus, and, when he subsequently regained his kingdom, rendered great services to Malachy. On his return from Lismore, Malachy undertook the government of the decayed monastery of Bangor (in Co. Down), but very soon afterwards he was elected bishop of Connor (now a small village near Ballymena). After the sack of that place by the king of Ulster he withdrew into Munster; here he was kindly received by Cormac MacCarthy, with whose assistance he built the monastery of Ibrach (in Kerry). Meanwhile he had been designated by Celsus (in whose family the see of Armagh had been hereditary for many years) to succeed him in the arch- bishopric; in the interests of reform he reluctantly accepted the dignity, and thus became involved for some years in a struggle with the so-called heirs. Having finally settled the diocese, he was permitted, as had been previously stipulated by himself, to return to his former diocese, or rather to the smaller and poorer portion of it, the bishopric of Down. Although the Roman party had by this time obtained a firm hold in the north of Ire- land, the organization of the Church had not yet received the sanction of the pope. Accordingly, in 1 139, Malachy set out from Ireland with the purpose of soliciting from the pope the pallium (the token of archiepiscopal subjection to Rome) for the arch- bishop of Armagh. On his way to Rome he visited Clairvaux, and thus began a lifelong friendship with St Bernard. Malachy was received by Innocent II. with great honour, and made papal legate in Ireland, though the pope refused to grant the pallium until it had been unanimously applied for " by a general council of the bishops, clergy and nobles." On his way home Malachy revisited Clairvaux, and took with him from there four members of the Cistercian order, by whom the abbey of Mellifont (in the county of Louth) was afterwards founded in 1141. For the next eight years after his return from Rome Malachy was active in the discharge of his legatine duties, and in 1148, at a synod of bishops and clergy held at Inis-Patrick (St Patrick's Island, near Skerries, Co. Dublin), he was commissioned to return to Rome and make fresh application for the pallium; he did not, however, get beyond Clairvaux, where he died in the arms of St Bernard on the 2nd of November 1148. The object of his life was realized four years afterwards, in 1152, during the legateship of his suc- cessor. Malachy was canonized by Clement III. in 1190.

The influence of Malachy in Irish ecclesiastical affairs has been compared with that of Boniface in Germany. He reformed and reorganized the Irish

Church and brought it into subjection to Rome; like Boniface, he was a zealous reformer and a promoter of monasticism. But perhaps his chief claim to distinction is that of having opened the first Cistercian monastery in Ireland, five more being soon afterwards established. Several works are attributed to him, but are all probably spurious. The most curious of these is a Prophecy concerning the Future Roman Pontiffs, which has produced an extensive literature. It is now generally attributed to the year 1590, and is supposed to have been forged to support the election of Cardinal Simoncelli to the papal chair.

St Bernard's Life of Malachy, and two sermons on his death will be found in J. P. Migne, Patrologia Lalina, clxxxii., clxxxiii. ; see also Annals of the Kingdom of Ireland by the Four Masters, ed. J. O'Donovan (Dublin, 185.1); G. Germano, Vita, gesti e pre- dittioni del padre san Malachia (Naples, 1670) ; the ecclesiastical histories of Ireland by J. Lanigan (1829) and W. D. Killen (1875); A. Bellesheim, Geschichte der katholischen Kirche in Irland, Bd. I. (Mainz, 1890); G. T. Stokes, Ireland and the Celtic Church (6th ed., 1907); J- O'Hanlon, Life of Saint Malachy (Dublin, 1S59) ; articles in Dictionary of National Biography and Herzog-Hauck's Real- encyklopddie fiir protestantische Theologie. On the Prophecy, see the

treatise by C. F. MenStrier (Paris, 1689) ; Marquis of Bute in Dublin Review (1885); A. Harnack in Zeitschrift fur Kirchengeschichte, Bd. III.

MALACOSTRACA. Under this zoological title are included several groups of Crustacea (q.v.), united by characters which attest their common origin, though some, and probably all of them, were already separated in distant geological ages, and some have now attained a peculiar isolation. Throughout the whole, the researches made since i860 have not only added a great throng of new species, genera and families, but have thrown a flood of light upon questions of their phylogeny, systematic arrangement, horizontal and bathymetric distribution, organiza- tion, habits of life and economic importance. There are at least seven orders: the stalk-eyed Brachyura, Macrura, Schizo- poda, Stomatopoda, and the sessile-eyed Sympoda, Isopoda, Amphipoda. An ocular segment claimed by the former division is not present or in no case demonstrable in the latter. In neither does the terminal segment or telson, whether large or obsolescent, whether articulated or coalescent, carry appendages, unless occasionally in fusion with itself. Between the eyes and the tail-piece in all the orders nineteen segments are counted, the proof of a segment's existence depending on its

separateness, complete or partial, or on a sutural indication, or else on the pair of appendages known to belong to it. All these marks may fail, and then the species must be proved to be Malacostracan by other evidence than the number of its segments; but if some exceptions exhibit fewer, none of the Malacostraca exhibits more than 19 (+ 1 or + 2) segments, unless the Nebaliidae be included. Of the corresponding pairs of appendages thirteen belong to the head and trunk, two pairs of antennae, one pair of mandibles, two pairs of maxillae, followed by three which may be all maxillipeds or may help to swell the number of trunk-legs to which the next five pairs belong. The abdomen or pleon carries the remaining six pairs, of which from three to five are called pleopods and the remainder uropods. Underlying the diversity of names and functions and countless varieties of shape, there is a common standard to which the appendages in general can be referred. In the maxillipeds and the trunk-legs it is common to find or otherwise easy to trace a seven-jointed stem, the endo- pod, from which may spring two branches, the epipod from the first joint, the exopod from the second. 1 The first antennae are exceptional in branching, if at all, at the third joint. In the mandibles and maxillae some of the terminal joints of the stem are invariably wanting. In the rest of the appendages they may either be wanting or indistinguishable. The latter obscurity results either from coalescence, to which all joints and segments are liable, or from subdivision, which occasionally affects joints even in the trunk-legs. The carapace, formerly referred only to the antennar-mandibular segments, may perhaps in fact contain elements from any number of other segments of head and trunk, Huxley, Alcock, Bouvier giving support to this opinion by the sutural or other divisional lines in Potamobius, Nephrops, Thalassina, and various fossil genera. Not all ques- tions of classification internal to this division are yet finally settled. Between the Brachyura and Macrura some authors uphold an order Anomura, though in a much restricted sense, the labours of Huxley, Boas, Alcock and conjointly Alphonse Milne-Edwards and Bouvier, having resulted in restoring the Dromiidea and Raninidae to the Brachyura, among which de Haan long ago placed them. The French authors argue that from the macruran lobsters {Nephropsidae) anciently diverged two lines: one leading through the Dromiidea to the genuine Brachyura; or crabs, the other independently to the Anomura proper, which may conveniently be named and classed as Macrura anomala. Spence Bate maintained that the Schizopoda ought not to form a separate order, but to be ranged as a macru- ran tribe, " more nearly allied to the degraded forms of the Penaeidea than to those of any other group " (" Challenger " Reports, " Macrura," p. 472, 1888). According to Sars, the

1 In Huxley's terminology the first two or three joints of the stem constitute a " protopodite," from which spring the "endo- podite " and " exopodite."

Sympoda (or Cumaceans), in spite of their sessile eyes, have closer affinities with the stalk-eyed orders. H. J. Hansen and others form a distinct order Tanaidea for the decidedly anoma- lous group called by Sars Isopoda chelijera.

1. Brachyura.— For the present, as of old, the true Brachyura are divided into four tribes: Cyclometopa, with arched front as in the common eatable crab ; Catometopa, with front bent down as in the land-crabs and the little oyster-crab; Oxyrhyncha, with sharp- ened beak-like front as in the various spider-crabs; Oxystomata, including the Raninidce, and named not from the character of the front but from that of the buccal frame which is usually narrowed forwards. In these tribes the bold and active habits, the striking colours, or the fantastic diversities of structure, have so long attracted remark that recent investigations, while adding a multitude of new species and supplying the specialist with an infinity of new details, have not materially altered the scientific standpoint. New light, however, has been thrown upon the " intellectual " capacity of Crustacea by the proof that the spider-crabs deliberately use changes of raiment to harmonize with their surroundings, donning and doffing various natural objects as we do our manufactured clothes. Others have the power of producing sounds, one use to which they put this faculty being apparently to signal from their burrow in the sand that they are " not at home " to an inopportune visitor. Deep-sea exploration has shown that some species have an immensely extended range, and still more, that species of the same genus, and genera of the same family, though separated by great intervals of space, may be closely allied in character. A curious effect of parasitism, well illustrated in crabs, though not confined to them, has been expounded by Professor Giard, namely, that it tends to obliterate the secondary sexual characters. Modern research has discovered no crab to surpass Macrocheira kdmpferi, De Haan, that can span between three and four yards with the tips of its toes, but at the other end of the scale it has yielded Collodes malabaricus, Alcock, " of which the carapace, in an adult and egg-laden female, is less than one-sixth of an inch in its greatest diameter." The most abyssal of all crabs yet known is Ethusina abyssicola, Smith, or what is perhaps only a variety of it, E. chattengeri, Miers. Of the latter the " Albatross " obtained a specimen from a depth of 2232 fathoms (Faxon, 1895), of the former from 2221 fathoms, and of this S. I. Smith remarks that it has " distinctly faceted black eyes," although in them " there are only a very few visual elements at the tips of the immobile eye-stalks."

The Brachyura anomala, or Dromiidea, " have preserved the exter- nal characters and probably also the organization of the Brachyura of the Secondary epoch " (Milne-Edwards and Bouvier, 1 901). They agree with the true crabs in not having appendages (uropods) to the sixth segment of

the pleon, the atrophy being complete in the Homolidae and Homolodromiidae, whereas in the Dromiidae and Dynomenidae a pair of small plates appear to be vestiges of these organs. In the family Homolidae stands the strange genus Latreillia, Roux, with long slender limbs and triangular carapace after the fashion of oxyrhynch spider-crabs. In Homola the carapace is quadrilateral. Between these two a very interesting link was discovered by the " Challenger" in the species Latreillopsis bispinosa. Henderson. Bouvier (1896) has shown that Palaeinachus longipes, Woodward, from the Forest Marble of Wiltshire, is in close relation- ship, not to the oxyrhynch Inachidae, but to the genera Homolo- dromia and "Dicranodromia of the Homolodromiidae, and that the Jurassic crabs in general, of the family Prosoponidae (Meyer), are Dromiidea.

2. Macrura. — The Macrura anomala, or Anomura in restricted sense, are popularly known through the hermit-crabs alone. These only partially represent one of the three main divisions, Paguridea, Galatheidea, Hippidea. The first of these is subdivided into Paguri- nea, Lithodinea, Lomisinea, each with a literature of its own. Among the Pagurinea is the Birgus latro, or robber-crab, whose expertness in climbing the coco-nut palm need no longer be doubted, since in recent years it has been noted and photographed by trustworthy naturalists in the very act. Alcock " observed one of these crabs drinking from a runnel of rain-water, by dipping the fingers of one of its chelipeds into the water and then carrying the wet fingers to its mouth." Hermits of the genus Coenobita he found feeding voraciously on nestling sea-terns. That pagurids must have the usually soft pleon or abdomen protected by the shell of a mollusc is now known to be subject to a multitude of exceptions. Birgus dispenses with a covering; Coenobita can make shift with half the shell of a coco-nut; Chlaenopagurus wraps itself up in a blanket of colonial polyps; Cancellus tanneri, Faxon, was found in a piece of dead coral rock; Xylopagurus rectus, A. Milne-Edwards, lodges in tubes of timber or bits of hollow reed. The last-named species has a straight symmetrical abdomen, with the penultimate segment expanded and strongly calcified to form a back-door to the very unconventional habitation. This it enters head-foremost from the rear, while " hermits " in general are forced to go backwards into their spiral or tapering shelters by the front. Some of the species can live in the ocean at a depth of two or three miles. Some can range inland up to a considerable height on mountains. The advantage that this group has derived from the adoption of mollusc

shells as houses or fortresses, ready built and light enough for easy,

transport, is obviously discounted by a twofold inconvenience. There is nothing to ensure that the supply will be equal to the demand, and Nature has not arranged that the borrowed tenement shall continue to grow with the growth of its new tenant. To meet these defects it is found that numerous species encourage or demand the companionship of various zoophytes, simple or colonial. These sometimes completely absorb the shell on which they are settled, but then act as a substitute for it, and in any case by their out- growth they extend the limits of the dwelling, so that the inmate can grow in comfort without having to hunt or fight for a larger abode. Among the Lithodinea, or stone crabs, besides important readjustments of classification (Bouvier, 1895, 1896), should be

dealing with the order at large; " British Schizopoda," by Norman Ann. Nat. Hist, (1892); " Decapoden und Schizopoden," Plankton- Expedition (Ortmann, 1893); " Euphausiidae," by Stebbing, Proc. Zool. Soc. (London, 1900) ; Mysidae of the Russian Empire, by Czerniavski (1 882-1 883) ; and Mysidae of the Caspian, by Sars

(1 893-1 895- 1 897).

4. Stomatopoda. — This order, at one time a medley of hetero- geneous forms, is now confined to the singularly compact group of the Squillidae. Here the articulation of the ocular segment is un- usually distinct, and here two characters quite foreign to all the preceding groups come into view. The second maxillipeds are developed into powerful prehensile organs, and the branchiae, instead of being connected with the appendages of head and trunk, are developed on the pleopods, appendages of the abdomen. At least three segments of. the trunk are left uncovered by the carapace. The developing eggs are not carried about by the mother, but deposited in her subaqueous burrow, " where they are aerated by the currents of water produced by the abdominal feet of the parent." An excellent synopsis of the genera and species is provided by R. P. Bigelow (Proc. U.S. Mus. vol. xvii., 1894). For the habits and peculiarities of these and many other Crustaceans, A. E. Verrill and S. I. Smith on the Invertebrates of Vineyard Sound should be con- sulted (1874). The general subject has been illuminated by the labours of Claus, Miers, Brooks (" Challenger " Report, 1886), and the latest word on the relationship between the various larvae and their respective genera has been spoken by H. J. Hansen (Plankton-Expedition Report, 1895). The striking forms of Alima and Erich- thus, at one time regarded as distinct genera, are now with more or less certainty affiliated to their several squillid parents.

5. Sympoda. — This order of sessile-eyed decapods was absolutely unknown to science till 1 779. A species certainly belonging to it was described hy Lepekhin }n 1780, but the obscure Gammarus esca, " food

Gammarus " beloved of herrings, described by J. C. Fabricius in the preceding year, may also be one of its members. Nutritious possibilities are implied m Diastylis rathkii, Kroyer, one of the largest forms, which, though slender and rarely an inch long, in its favourite Arctic waters is found " in incalculable masses, in thousands of specimens " (Stuxberg, 1880). Far on in the 19th century

Fig. I. — Neolithodes grimaldii, A. Milne- Edwards and Bouvier.

noticed the evidence of their cosmopolitan range, and the species Neolithodes agassizii (Smith) and N. grimaldii, Milne-Edwards and Bouvier, which carry to an extreme the spinosity characteristic of the group (fig. 1). S. I. Smith's investigations on the early stages of Hippa talpoida, Say, were published in 1877.

With regard to the accessions to knowledge in the enormous group of the genuine Macrura, reference need only be made to the extensive reports in which Spence Bate, S. I. Smith, Faxon, Wood- Mason, Alcock, and others have made known the results of celebrated explorations. Various larval stages have been successfully investi- gated by Sars. Alcock (1901) describes from his own observation the newly hatched Phyllosoma larva of Thenus orientalis, Fabricius. An admirable discrimination of the larval and adult characters of the genus Sergestes has been given by H. J. Hansen (Proc. Zool. Soc, London, 1896). Singularity excites our wonder in Thaumastocheles zaleucus, v. Willemoes Suhm, which makes up for its vanished eyes by its extraordinarily elongate and dentated claws; in Psalidopus huxleyi, Wood-Mason and Alcock (1892), bristling with spikes from head to tail; in the Nematocarcinidae, with their long thread-like limbs and longer antennae ; in species of A ristaeopsis reported by Chun from deep water off the east coast of Africa, bright red prawns nearly a foot long, with antennae about five times the length of the body. That certain species, particularly many from deep water, have disproportionately large eggs, is explained by the supposition that the young derive the advantage of being hatched in an advanced stage of development.

3. Schizopoda. — This order of animals for the most part delicately beautiful, has for the moment five families — Lopho- gastndae, Eucopiidae, Euphausiidae, Mysidae and Anaspididae. In the Euphausiidae the digitiform-arbor- escent branchiae, as if conscious of their own extreme elegance, remain wholly uncovered. In the two pre- reding families they are partially covered. In theMysidae the branchiae are wanting, and some would form this family into a separate order, Mysidacea. In Anaspides, a pecu- liar fresh-water genus discovered in 1892 by G. M. Thomson on Mount Wellington, in Tasmania, the gills are not arborescent, and there are seven segments of the trunk free of the carapace (fig. 2). A membrana-

ceous carapace separates the Euco- piidae from the more solidly invested Lophogastridae. Among many papers that the student will find it necessary to consult may be mentioned the " Challenger " Report on Schizopoda, by Sars, 1885,

Fig. 2. — Anaspides tasmaniae, Thomson.

Fig. 3. — Pseudocuma pectinatum, Sowinsky.

eminent naturalists were still debating whether in this group there were eyes or no eyes, whether the eyes were stalked or sessile, whether the animals observed were larval or adult. The American T. Say in 181S gave a good description of a new species and founded the pre- mier genus Diastylis, but other investigators derived little credit from the subject till more than sixty years after its introduction by the Russian Lepekhin. Then Goodsir, Kroyer, Lilljeborg, Spence Bate and one or two others made considerable advances, and in 1865 a memorable paper by G. O. Sars led the way to the great series of researches which he has continued to the present day. The name Cumacea, however, which he uses cannot be retained, being founded on the preoccupied name Cuma (Milne-Edwards, 1828). The more recent name Sympoda (see Willey, Results, pt. v. p., 609, 1900) alludes to the huddling together of the legs, which is con- spicuous in most of the species. Ten families are now distinguished — Diastylidae, Lampropidae, Platyaspidae, Pseudocumidae, all with ah articulated telson; without one, the Bodotriida'e (formerly called Cumidae), Vaunthompsoniidae, Leuconidae, Nannastacidae, Campyl- aspidae, Procampylaspidae. All the Leuconidae and Procampyl- aspidae are blind, and some species in most of the other families. Usually the sides of the carapace are strangely produced into a mock rostrum in front of the ocular lobe, be it oculiferous or not. The last four or five segments of the trunk are free from the carapace. The slender pleon has always six distinct segments, the sixth carrying two-branched uropods, the preceding five armed with no pleopods in the female, whereas in the male the number of pairs varies from five to none. The resemblance of these creatures to miniature Macrura is alluded to in the generic name Nannastacus, meaning dwarf-lobster. In this genus alone of the known Sympoda the eyes sometimes form a pair, in accordance with the custom of all other malacostracan orders except this and of this order itself in the embryo (Sars, 1900). The most but not the only remarkable char- acter lies in the first maxillipeds. These, with the main stem more of less pediform, have the epipod and exopod modified for respiratory purposes. The backward-directed epipods usually carry branchial vesicles. The forward-directed exopods either act as valves or form a tube (rarely two tubes), protensile and retractile, for regulat- ing egress of water from the branchial regions. This mechanism as a whole is unique, although, as Sars observes, the epipod of the first maxillipeds has a respiratory function also

in the Lophogastridae and Mysidae and in the cheliferous isopods. As a rule armature of

the carapace is much more developed in the comparatively sedentary female than in the usually more active male. Only in the male do the second antennae attain considerable length, with strong resemblance to what is found in some of the Amphipoda. About 150 species distributed among thirty-four genera are now known, many from shallow water and from between tide-marks, some from very great depths. H. J. Hansen concludes that " they are all typically ground animals, and as yet no species has been taken under such conditions that it could be reckoned to the pelagic plankton." As they have been found in all zones and chiefly by a very few observers, it is probable that a great many more species remain to be discovered. In recent years thirteen species, all belonging to the same genus Pseudocuma (fig. 3), have been recorded by Sars from the Caspian Sea. A bibliography of the order is given in that author's Crustacea of Norway, vol. iii. (1899-1900).

6. Isopoda. — This vast and populous order can be traced far back in geological time. It is now represented in all seas and lands, in fresh-water lakes and streams, and even in warm springs. It adapts itself to parasitic life not only in fishes, but in its own class Crustacea, and that in species of every order, its own included. In this process changes of structure are apt to occur, and sometimes unimaginable sacrifices of the normal appearance. The order has been divided into seven tribes, of which a fuller summary than can here be given will be found in Stebbing, History of Crustacea (1893). The first tribe, called Chelifera, from the usually chelate or claw-bearing first limbs, may be regarded as Isopoda anomala, of which some authors would form a separate order, Tanaidea. Like the genuine isopods, they have seven pairs of trunk-legs, but instead of having seven segments of the middle body (or peraeon)

Fig. 4. — Rhabdosoma piratum, Stebbing.

normally free, they have the first one or two of its segments coalesced, with the head. Instead of the breathing organs being furnished by the appendages of the pleon with the heart in their vicinity, the respiration is controlled by the maxillipeds, with the heart in the peraeon (see Delage, Arch. Zool. exper. et gen., vol. ix., 1881). There are two families, Tanaidae and Apseudidae. Occasionally the ocular lobes are articulated.

The genuine Isopoda are divided among the Flabellifera, in which the terminal segment and uropods form a flabellum or swimming fan ; the Epicartdea, parasitic on Crustaceans; the Valvifera, in which the uropods fold valve-like over the branchial pleopods; the Asellota, in which the first pair of pleopods of the female are usually trans- formed into a single opercular plate; the Phreatoicidea, a fresh- water tribe, known as yet only from subterranean waters in New Zealand and an Australian swamp nearly 6000 ft. above sea-level ; and lastly, the Oniscidea, which are terrestrial. Only the last of these, under the contemptuous designation of wood-lice, has established a feeble claim to popular recognition. Few persons hear without surprise that England itself possesses more than a score of species in this air- breathing tribe. Those known from the world at large number hundreds of species, distributed among dozens of genera in six families. That a wood-louse and a land-crab are alike Malacostra- cans, and that they have by different paths alike become adapted to terrestrial life, are facts which even a philosopher might con- descend to notice. Of the other tribes which are aquatic there is not space to give even the barest outline. Their swarming multi- tudes are of enormous importance in the economy of the sea. If in their relation to fish it must be admitted that many of them plague the living and devour the dead, in return the fish feed rapaciously upon them. Among the most curious of recent discoveries is that relating to some of the parasitic Cymothoidae, as to which Bullar has shown that the same individual can be developed first as a male and then as a female. Of lately discovered species the most striking is one of the deep-sea Cirolanidae, Bathynomus giganteus, A. M. Edwards (1879), which is unique in having supplementary ramified branchiae developed at the bases of the pleopods. Its eyes are said to contain nearly 4000 facets. The animal attains what in this order is the monstrous size of 9 in. by 4. A general uniformity of the trunk-limbs in Isopoda justifies the ordinal name, but the valviferous Astacillidae, and among the Asellota the Munnopsidae, offer some remarkable exceptions to this characteristic. Among

many essential works on this group may be named the Monogr. Cymothoarum of Schiodte and Meinert (1879-1883); " Challenger " Report, Beddard (1884-1886); Cirolanidae, H. J. Hansen (1890); Isopoda Terreslria, Budde-Lund (1885); Bopyridae, Bonnier (1900); Crustacea of Norway, vol. ii. (Isopoda), Sars (1896-1899), while their multitude precludes specification of important contributions by Benedict, Bovallius, Chilton, Dohrn, Dollfus, Fraisse, Giard and Bonnier, Harger, Haswell, Kossmann, Miers, M'Murrich, Norman, Harriet Richardson, Ohlin, Studer, G. M. Thomson, A. O. Walker, Max Weber and many others.

7. Amphipoda. — As in the genuine Isopoda, the eyes of Amphi- poda are always sessile, and generally paired, and, in contrast to crabs and lobsters, these two groups have only four pairs of mouth- organs instead of six, but

seven pairs of trunk-legs instead of five. From the above-named isopods the present order is strongly differ- entiated by having heart and breathing organs not in the pleon, but in the peraeon, or middle body, the more or less simple branchial vesicles being attached to some or all of the last six pairs of trunk- legs. Normally the pleon carries six pairs of two^branched append- ages, of which the first three are much articulated flexible swimming feet, the last three few-jointed comparatively indurated uropods. There are three tribes, Gammaridea, Caprellidea, Hyperiidea. The middle one contains but two families, the cylindrical and often thread-like skeleton shrimps, Caprellidae, and their near cousins, the broad, flattened, so-called whale-lice, Cyamidae. This tribe has the pleon dwindled into insignificance, whereas in the other two tribes it is powerfully developed. The Hyperiidea are distinguished by having their maxillipeds never more than three-jointed. In the companion tribes these appendages have normally seven joints, and always more than three. The order thus sharply divided is united by an intimate interlacing of characters, and forms a compact whole at present defying intrusion from any other crustacean group. Since 1775, when J. C. Fabricius instituted the genus Gammarus for five species, of which only three were amphipods, while he left five other amphipods in the genus Oniscus, from this total of eight science has developed the order, at first very slowly, but of late by great leaps and bounds, so that now the Gammaridea alone comprise more than 1300 species, distributed among some 300 genera and 39 families. They burrow in the sands of every shore; they throng the weeds between tide-marks; they ascend all streams; they are found in deep wells, in caverns, in lakes ; in Arctic waters they swarm in numbers beyond computation ; they find lodgings on crabs, on turtles, on weed-grown buoys; they descend into depths of the ocean down to hundreds or thousands of fathoms; they are found in moun- tain streams as far above sea-level as some of their congeners live below it. The Talitridae, better known as sandhoppers,- can forgo the briny shore and content themselves with the damp foliage of inland forests or casual humidity in the crater of an extinct volcano. Over the ocean surface, as well as at various depths, float and swim innumerable Hyperiidea — the wonderful Phronima, glass-like in its glassy barrel hollowed out of some Tunicate ; the Cystisoma, 4 or 5 in. long, with its eye-covered head; the Rhabdosoma, like a thin rod of glass, with needle-like head and tail, large eyes, but limbs and mouth-organs all in miniature, and the second antennae of the male folding up like a carpenter's rule (fig. 4). On jelly-fishes are to be found species of Hyperia and their kindred, so fat and wholesome that they have been commended to shipwrecked men in open boats as an easily procurable resource against starvation. Many of the Amphipoda are extremely voracious. Some of them are even cannibals. The Cyamidae afflict the giant whale by nibbling away its skin; the Chelura terebrans is destructive to submerged timber. But, on the other hand, they largely help to clear the sea

and other waters of refuse and carrion, and for fishes, seals and whales they are food desirable and often astoundingly copious. From the little flea-like species, scarcely a tenth of an inch long, up to the great and rare but cosmopolitan Eurythenes gryllus, Lichtenstein, and the still larger Alicella gigantea, Chevreux, nearly half a foot long, cap- tured by the prince of Monaco from a depth of 2936 fathoms, not one of these ubiquitous, uncountable hordes has ever been accused of assailing man. For the naturalist they have the recommendation that many are easy to obtain, that most, apart from the very minute, are easy to handle, and that all, except as to the fleeting colours, are easy to preserve.

A nearly complete bibliography of the order down to 1888 will be found in the " Challenger " Reports, vol. xxviii., and supplementary notices in Delia Valle's Monograph of the Gammarini (1893), the scope of his work, however, not covering the Hyperiidea and Oxycephalidae of Bovallius (1889, 1890) ; but since these dates very numerous additions to the literature have been made by Birula, Bonnier, Norman, Walker and others, especially the Crustacea of Norway, vol. i. (Amphipoda) , Sars (1890-1895), demanding attention, and the quite recent Amphipoda of the Hirondelle, Chevreux (1900), and Hyperiidea of the Plankton-Expedition, Vosseler (1901). (T. R. R. S.)

MALAGA, a maritime province of southern Spain, one of the eight modern subdivisions of Andalusia; bounded on the W. by Cadiz, N. by Seville and Cordova, E. by Granada, and S. by the Mediterranean Sea. Pop. (1900), 511,989; area, 281.2 sq. m. The northern : half of Malaga belongs to the great

Andalusian plain watered by the Guadalquivir, the southern is mountainous, and rises steeply from the coast. Of the numerous sierras may be mentioned that of Alhama, separating the province from Granada, and at one point rising above 7000 ft. ; its west- ward continuation in the Sierra de Abdalajis and the Axarquia between Antequera and Malaga; and not far from the Cadiz boundary the Sierras de Ronda, de Mijas, de Tolox and Bermeja, converging and culminating in a summit of nearly 6500 ft. The rivers which rise in the watershed formed by all these ranges reach the sea after a short and precipitous descent, and in rainy seasons are very liable to overflow their banks. In 1907 great loss of life and destruction of property were caused in this manner. The principal river is the Guadalhorce, which rises in the Sierra de Alhama, and, after a westerly course past the vicinity of Ante- quera, bends southward through the wild

defile of Penarrubia and the beautiful vega or vale of Malaga, falling into the sea near that city. The only other considerable stream is the Guadiaro, which has the greater part of its course within the province and flows past Ronda. There is an extensive salt lagoon near the northern boundary. The mountains are rich in minerals, lead, and (in the neighbourhood of Marbella) iron, being obtained in large quantities. There are warm sulphurous springs and baths at Carratraca. Though the methods of agriculture are for the most part rude, the yield of wheat in good seasons is considerably in excess of the local demand; and large quantities of grapes and raisins, oranges and lemons, figs and almonds, are annually exported. The oil and wines of Malaga are also highly esteemed, and after 1870 the manufacture of beet and cane sugar developed into an important industry. In 1905 there were about 500 flour mills and 230 oil factories beside 95 stills and 100 wine-presses in the province. Malaga has suffered severely from the agricultural depression prevalent throughout southern Spain, but its manufacturing industries tend to expand. The fisheries are important; a fleet of about 300 boats brings in 18,060,000 lb annually, of which 25% is exported. The internal communications are in many parts defective, owing to the broken nature of the surface; but the province is traversed from north to south by the Cordova-Malaga railway, which sends off branches from Bobadilla to Granada and Algeciras. A branch line along the coast from Malaga to Velez Malaga was opened in

1908.

Malaga, the capital (pop. 130,109), Antequera (31,609), Wlez Malaga (23,586), Ronda (20,995), Coin (12,326), and Alora (10,325), are described in separate articles. Other towns with more than 7000 inhabitants are Marbella (9629), Estepona (9310), Archidona (8880) and Nerja (71 12). The population of the province tends gradually to decrease, as many families emigrate to South America, Algeria and Hawaii.

MALAGA, the capital of the province of Malaga, an episcopal see, and, next to Barcelona, the most important seaport of Spain, finely situated on the Mediterranean coast, at the southern base of the Axarquia hills and at the eastern extremity of the fertile vega (plain) of Malaga in 36 43′ N. and 4° 25′ W. Pop. (1900), 130,109. From the clearness of its sky, and the beautiful sweep of its bay, Malaga has sometimes been compared with Naples. The climate is one of the mildest and most equable in Europe, the mean annual temperature being 66-7° Fahr. The principal railway inland gives access through Bobadilla to all parts of Spain, and a branch line along the coast to V61ez-Malaga was opened in 1 908. Malaga lies principally on the left bank of a mountain torrent, the Guadalmedina (" river of the city "); the streets near the sea are spacious and comparatively modern, but those in the older part of the town, where the buildings are

huddled around the ancient citadel, are narrow, winding and often dilapidated. Well-built suburbs have also spread on all sides into the rich and pleasant country which surrounds Malaga, and several acres of land reclaimed from the sea have been con- verted into a public park. There are various squares or plazas and public promenades; of the former the most important are the Plaza de Riego (containing the monument to General Jose Maria Torrijos, who, with forty-eight others, was executed in Malaga on the nth of December 1831, for promoting an insurrection in favour of the constitution) and the Plaza de la Constitucion ;

adjoining the quays is the fine Paseo de la Alameda. The city has no public buildings of commanding architectural or historical importance. The cathedral, on the site of an ancient mosque, was begun about 1528; after its construction had been twice interrupted, it was completed to its present state in the 18th century, and is in consequence an obtrusive record of the degeneration of Spanish architecture. The woodwork of the choir, however, is worthy of attention. The church of El Cristo de la Victoria contains some relics of the siege- of 1487. There are an English church and an English cemetery, which dates from 1830; up to that year all Protestants who died in Malaga were buried on the foreshore, where their bodies were frequently exposed by the action of wind and sea. Of the old Moorish arsenal only a single horse-shoe gateway remains, the rest of the site being chiefly occupied by an iron structure used as a market; the Alcazaba, or citadel, has almost disappeared. The castle of Gibralfaro, on a bold eminence to the north- east dates from the 13th century, and is still in fairly good preservation.

During the 19th century so much silt accumulated in the har- bour that vessels were obliged to lie in the roads outside, and receive and discharge cargo by means of lighters; but new harbour works were undertaken in 1880, and large ships can now again load or discharge at the quays, which are connected with the main railway system by a branch line. About 2150 ships of 1,750,000 tons enter at Malaga every year. Iron, lead, wine, olive oil, almonds, fresh and dried fruit, palmetto hats and canary seed are exported in large quantities, while the imports include grain, codfish, fuel, chemicals, iron and steel, machinery, manures and staves for casks. Although trade was impeded during the early years of the 20th century by a succession of bad harvests and by the disastrous floods of September 1907, the number of indus- tries carried on in and near Malaga tends steadily to increase. There are large cotton mills, iron foundries, smelting works and engineering works. Pottery, mosaic, artificial stone and tiles are produced chiefly for the home market, though smaller quantities are sent abroad. There is a chromo-lithographic establishment, and the other industries include tanning, distilling and the manufacture of sugar, chocolate, soap, candles, artificial ice, chemical products, white lead and

pianos. Foreign capital has played a prominent part in the development of Malaga; a French syndicate owns the gas-works, and the electric lighting of the streets is controlled by British and German companies.

Malaga is the MaXaKa of Strabo (iii. 156) and Ptolemy (ii. 4, 7) and the Malaca joederalorum of Pliny (iii. 3). The place seems to have been of some importance even during the Cartha- ginian period; under the Romans it became a municipium, and under the Visigoths an episcopal see. In 711 it passed into the possession of the Moors, and soon came to be regarded as one of the most important cities of Andalusia. It was attached to the caliphate of Cordova, but on the fall of the Omayyad dynasty it became for a short time the capital of an independent kingdom; afterwards it was dependent on Granada. In 1487 it was taken and treated with great harshness by Ferdinand and Isabella after a protracted siege. In 1810 it was sacked by the French under General Sebastiani. The citizens of Malaga are noted for their opposition to the Madrid government; they took a prominent part in the movements against Espartero (1843), against Queen Isabella (1868) and in favour of a republic (1873). MALAKAND PASS, a mountain pass in the North-West Province of India, connecting the British district of Peshawar with the Swat Valley. It is now a military post and the head- quarters of a political agency. It came into prominence for the first time in 1895 during the Chitral campaign, when 7000 Pathans held it against Sir Robert Low's advance, but were easily routed. After the campaign was over a fortified camp was formed on the Malakand to guard the road to Chitral. During the frontier risings of 1897 the Swatis made a determined attack on the Malakand, where 700 were killed, and on the adjacent post of Chakdara, where 2000 were killed. This was the origin of the Malakand Expedition of the same year. (See Swat.)

MALALAS (or Malelas) (Syriac for " orator "), JOHN (c. 491- 578), Byzantine chronicler, was born at Antioch. He wrote a Xpovoypacjjla in 18 books, the beginning and the end of which are lost. In its present state it begins with the mythical history of Egypt and ends with the expedition to Africa under Marcianus, the nephew of Justinian. Except for the history of Justinian and his immediate predecessors, it possesses little historical value; it is written without any idea of proportion and contains astonishing blunders. The writer is a supporter of Church and State, an upholder of monarchical principles. The work is rather a chronicle written round Antioch, which he regarded as the centre of the world, and (in the later books) round Constanti- nople. It is, however, important as the first specimen of a chronicle written not for the learned but for the instruction

of the monks and the common people, in the language of the vulgar, with an admixture of Latin and Oriental words. It obtained great popularity, and was conscientiously exploited by various writers until the nth century, being translated even into the Slavonic languages. It is preserved in an abridged form in a single MS. now at Oxford.

For the authorities consulted by Malalas, the influence of his work on Slavonic and Oriental literature, the state of the text, the original form and extent of the work, the date of its composition, the relation of the concluding part to the whole, and the literature of the subject, see C. Krumbacher's Geschichte der byzantinischen Litteratur (1897). See also the editio princeps, by E. Chilmead (Oxford, 1691), containing an essay by Humphrey Hody and Bentley's well-known letter to Mill; other editions in the Bonn Corpus scriptorum hist, byz., by L. Dindorf (1831), and in J. P. Migne Patrologia graeca, xcvii.

MALAN, SOLOMON CAESAR (1812-1894), British divine and orientalist, was by birth a Swiss descended from an exiled French family, and was born at Geneva on the 22nd of April 181 2, where his father, Dr Henry Abraham Caesar Malan (1787-1864) enjoyed a great reputation as a Protestant divine. From his earliest youth he manifested a remarkable faculty for the study of languages, and when he came to Scotland as tutor in the marquis of Tweeddale's family at the age of 18 he had already made progress in Sanskrit, Arabic and Hebrew. In 1833 he matriculated at St Edmund Hall, Oxford; and English being almost an unknown tongue to him, he petitioned the examiners to allow him to do his paper work of the examination in French, German, Spanish, Italian, Latin or Greek, rather than in English. But his request was not granted. After gaining the Boden and the Pusey and Ellerton scholarships, he graduated 2nd class in Lit. hum. in 1837. He then proceeded to India as classical lecturer at Bishop's College, Calcutta, to which post he added the duties of secretary to the Bengal branch of the Royal Asiatic Society; and although compelled by illness to return in 1840, laid the foundation of a knowledge of Tibetan and Chinese. After serving various curacies, he was presented in 1845 to the living of Broadwindsor, Dorset, which he held until 1886. During this entire period he continued to augment his linguistic knowledge, which he carried so far as to be able to preach in that most difficult language, Georgian, on a visit which he paid to Nineveh in 1872. His translations from the Armenian, Georgian and Coptic were numerous. He applied his Chinese learning to the determination of important points connected with Chinese religion, and published a vast number of parallel passages illustrative of the Book of Proverbs. In 1880 the university of Edinburgh conferred upon him the honorary degree of D.D. No modern scholar, perhaps, has so nearly approached the linguistic omniscience of Mezzofanti; but, like Mezzofanti, Dr Malan was more of a linguist than a

critic. He made himself con- spicuous by the vehemence of his opposition to Westcott and Hort's text of the New Testament, and to the transliteration of Oriental languages, on neither of which points did he in general obtain the suffrages of scholars. His extensive and valuable library, some special collections excepted, was presented by him in his lifetime to the Indian Institute at Oxford. He died at Bournemouth on the 25th of November 1894. His life has been written by his son.

MALAR, a lake of Sweden, extending 73 m. westward from

Stockholm, which lies at its junction with the Saltsjo, an arm of the Baltic Sea. The height of the lake is normally only from 1 1 in. to 2 ft. above sea-level, and its outflow is sometimes reversed. The area is 449 sq. m. The bottom consists of a series of basins separate by ridges from which rise numerous islands. The deepest sounding is 210 ft. The outline is very irregular, the mean breadth being about 15 m., but an arm extends northward for 30 m. nearly to the city of Upsala with many ramifications. The area of the drainage basin is 8789 sq. m., of which 1124 are occupied by lakes. The navigable connexions with the lake are — (1) with lake Hjelmar to the south-west by the Arboga river and the Hjelmar canal; and by the Eskilstuna river and the Thorsha.Ua canal; (2) with the Baltic southward through the Sodertelge canal, the route followed by the Gota canal steamers; (3) with the Baltic by two channels at Stockholm. The more important towns, besides Stockholm, are Vesteras on the north, Sodertelge and Eskilstuna near the south shore. The lake offers a field for recreation fully appreciated by the inhabitants of the capital, and many of those whose business lies at Stockholm have their residences on the shores of Malar. On Drottningholm (Queen's Island, named from Catherine, wife of John III.) is a palace with a fine park and formal gardens. John III. built a palace at the close of the 16th century, but the existing building, by Nicodemus Tessin and his son Nicodemus, dates from the second half of the 17 th century. At Mariefred on the south shore there is the castle of Gripsholm (1537), built by Gustavus Vasa, a picturesque erection with four towers, richly adorned within, and containing a large collection of portraits. Strengnas, on the same shore, became an episcopal see in 1291, when the fine cathedral, much altered since, was consecrated. In the episcopal palace, a building of the 15th century now used as a school, Gustavus Vasa was elected to the throne of Sweden in 1523. On the northward arm of the lake is the palace of Rosenberg, used as a school of gunnery, in a well- wooded park. On a branch of the same arm is Sigtuna, a village whose ruined churches are a memorial of its rank among the principal towns of Sweden after its foundation in the nth cen- tury. Remains prove that on Bjorko, an island in the eastern part of the lake, there was a large settlement of earlier importance than Sigtuna. Here a cross commemorates the preaching of Christianity by St Ansgar in 829.

Finally, on the northern arm about 10 m. south of Upsala, there is the chateau of Skokloster, occupying the site of a monastery, and presented by Gustavus Adolphus to Marshal Herman Wrangel, whose son Charles Gustavus Wrangel stored it with a remarkable collection of trophies from Germany, taken during the Thirty Years' War; including a library, an armoury, and a great accumulation of curios.

MALARIA, an Italian colloquial word (from mala, bad, and aria, air), introduced into English medical literature by Macculloch (1827) as a substitute for the more restricted terms " marsh miasm " or " paludal poison." It is generally applied to the definite unhealthy condition of body known by a variety of names, such as ague, intermittent (and remittent) fever, marsh fever, jungle fever, hill fever, " fever of the country " and " fever and ague." A single paroxysm of simple ague may come upon the patient in the midst of good health or it may be preceded by some malaise. The ague-fit begins with chills proceeding as if from the lower part of the back, and gradually extending until the coldness overtakes the whole body. Tremors of the muscles more or less violent accompany the cold sensations, beginning with the muscles of the lower jaw (chattering of the teeth), and extending to the extremities and trunk. The expression has meanwhile changed: the face is pale or livid; there are dark rings under the eyes; the features are pinched and sharp, and the whole skin shrunken; the fingers are dead white, the nails blue.

All those symptoms are referable to spasmodic constriction of the small surface arteries, the pulse at the wrist being itself small, hard and quick. In the interior organs there are indica- tions of a compensating accumulation of blood, such as swelling of the spleen, engorgement (very rarely rupture) of the heart,

with a feeling of oppression in the chest, and a copious flow of clear and watery urine from the congested kidneys. The body temperature will have risen suddenly from the normal to 103 or higher. This first or cold stage of the paroxysm varies much in length; in temperate climates it lasts from one to two hours, while in tropical and subtropical countries it may be shortened. It is followed by the stage of dry heat, which will be prolonged in proportion as the previous stage is curtailed. The feeling of heat is at first an internal one, but it spreads outwards to the surface and to the extremities; the skin becomes warm and red, but remains dry; the pulse becomes softer and more full, but still quick; and the throbbings occur in exposed arteries, such as the temporal. The spleen continues to enlarge; the

urine is now scanty and high-coloured; the body temperature is high, but the highest temperatures occur during the chill; there is consider- able thirst; and there is the usual intellectual unfitness, and it may be confusion, of the feverish state. This period of dry heat, having lasted three or four hours or longer, comes to an end in perspiration, at first a mere moistness of the skin, passing into sweating that may be profuse and even drenching. Sleep may overtake the patient in the midst of the sweating stage, and he awakes, not without some feeling of what he has passed through, but on the whole well, with the temperature fallen almost or altogether to the normal, or it may be even below the normal; the pulse moderate and full; the spleen again of its ordinary size; the urine that is passed after the paroxysm deposits a thick brick-red sediment of urates. The three stages together will probably have lasted six to twelve hours. The paroxysm is followed by a definite interval in which there is not only no fever, but even a fair degree of bodily comfort and fitness; this is the intermission of the fever. Another paroxysm begins at or near the same hour next day (quotidian ague), which results from a double tertian infection, or the interval may be forty-eight hours (tertian ague), or seventy-two hours (quartan ague). It is the general rule, with frequent exceptions, that the quotidian paroxysm comes on in the morning, the tertian about noon, and the quartan in the afternoon. Another rule is that the quartan has the longest cold stage, while its paroxysm is shortest as a whole; the quotidian has the shortest cold stage and a long hot stage, while its paroxysm is longest as a whole. The point common to the various forms of ague is that the paroxysm ceases about midnight or early morning. Quotidian intermittent is on the whole more common than tertian in hot countries; elsewhere the tertian is the usual type, and quartan is only occasional.

If the first paroxysm should not cease within the twenty-four hours, the fever is not reckoned as an intermittent, but as a remittent.

Remittent is a not unusual form of the malarial process in tropical and subtropical countries, and in some localities or in some seasons ‘ it is more common than intermittent. It may be said to arise out of that type of intermittent in which the cold stage is shortened while the hot stage tends to be prolonged. A certain abatement or re- mission of the fever takes place, with or without sweating, but there is no true intermission or interval of absolute apyrexia. The periodicity shows itself in the form of an exacerbation of the still continuing fever, and that exacerbation may take place twenty- four hours after the first onset, or the interval may be only half that period, or it may be double. A fever that is to be remittent will usually declare itself from the outset: it begins with chills, but without the shivering and shaking fit of the intermittent; the hot stage soon follows, presenting the same characters as the prolonged hot stage of the quotidian, with the frequent addition of bilious symptoms, and it may be even of

jaundice and of tenderness over the stomach and liver. Towards morning the fever abates; the pulse falls in frequency, but does not come down to the normal ; headache and aching in the loins and limbs become less, but do not cease altogether ; the body temperature falls, but does not touch the level of apyrexia. The remission or abatement lasts generally throughout the morning; and about noon there is an exacerbation, seldom ushered in by chills, which continues till the early morning following, when it remits or abates as before. A patient with remittent may get well in a week under treatment, but the fever may go on for several weeks ; the return to health is often announced by the fever assuming the intermittent type, or, in other words, by the remissions touching the level of absolute apyrexia. Remittent fevers (as well as intermittents) vary considerably in intensity; some cases are intense from the outset, or pernicious, with aggrava-

tion of all the symptoms — leading to stupor, delirium, collapse, intense jaundice, blood in the stools, blood and albumen in the urine, and, it may be, suppression of urine followed by convulsions. The severe forms of intermittent are most apt to occur in the verv young, or in the aged, or in debilitated persons generally. Milder cases of malarial fever are apt to become dangerous from the complications of dysentery, bronchitis or pneumonia. Severe remittents (pernicious or bilious remittents) approximate to the type of yellow fever (q-V.), which is conventiohally limited to epi- demic outbreaks in western longitudes and on the west coast of Africa.

Of the mortality due to malarial disease a small part only is referable to the direct attack of intermittent, and chiefly to the fever in its pernicious form. Remittent fever is much more fatal in its direct attack. But probably the greater part of the enormous total of deaths set down to malaria is due to the malarial cachexia. The dwellers in a malarious region like the Terai (at the foot of the Himalayas) are miserable, listless and ugly, with large heads and particularly prominent ears, flat noses, tumid bellies, slender limbs and sallow com- plexions; the children are impregnated with malaria from their birth, and their growth is attended with aberrations from the normal which practically amount to the disease of rickets. The malarial cachexia that follows definite attacks of ague consists in a state of ill-defined suffering, associated with a sallow skin, enlarged spleen and liver, and sometimes with dropsy.

Causation. — From the time of Hippocrates onwards the malarial or periodical fevers have engaged the attention of innumerable observers, who have suggested various theories of causation, and have sometimes anticipated — vaguely, indeed, but with surprising accuracy — the results of modern research; but the true nature of the disease remained in doubt until the closing years of the 19th century. It has now been demonstrated

by a series of accurate investigations, contributed by many workers, that malaria is caused by a microscopic parasite in the blood, into which it is introduced by the bites of certain species of mosquito. (See Parasitic Diseases and Mosquitoes.)

The successive steps by which the present position has been reached form an interesting chapter in the history of scientific progress. The first substantial link in the actual chain of discovery was contributed in 1880 by Discovery. Laveran, a French army surgeon serving in Algeria. On the 6th of November in that year he plainly saw the living parasites under the microscope in the blood of a malarial patient, and he shortly afterwards communicated his observations to the Paris Academie de Medecine. They were confirmed, but met with little acceptance in the scientific world, which was preoccupied with the claims of a subsequently discredited Bacillus malariae. In 1885 the Italian pathologists came round to Laveran's views, and began to work out the life history of his parasites. The subject has a special interest for Italy, which is devastated by malaria, and Italian science has contributed materially to the solution of the problem. The labours of Golgi, Marchiafava, Celli and others established the nature of the parasite and its behaviour in the blood; they proved the fact, guessed by Rasori so far back as 1846, that the periodical febrile paroxysm corresponds with the development of the organisms; and they showed that the different forms of malarial fever have their distinct parasites, and consequently fall into distinct groups, defined on an etiological as well as a clinical basis — namely, the mild or spring group, which includes tertian and quartan ague, and the malignant or " aestivo-autumnal " group, which includes a tertian or a semi-tertian and the true quotidian type. Three distinct parasites, corresponding with the tertian, quartan and malignant types of fever, have been described by Italian observers, and the classification is generally accepted; intermediate types are ascribed to mixed and multiple infections. So far, however, only half the problem, and from the practical point of view the less important half, had been solved. The origin of the parasite and its mode of introduction into the blood remained to be discovered. An old popular belief current in different countries, and derived from common

observation, connected mosquitoes with malaria, and from time to time this theory found support in more scientific quarters on general grounds, but it lacked demonstration and attracted little attention. In 1894, however, Sir Patrick Manson, arguing with greater precision by analogy from his own discovery of the cause of filariasis and the part played by mosquitoes,

suggested that the malarial parasite had a similar intermediate host outside the human body, and that a suctorial insect, which would probably be found to be a particular mosquito, was required for its development. Following up this line of investigation, Major Ronald Ross in 1895 found that if a mosquito sucked blood containing the parasites they soon began to throw out flagellae, which broke away and became free; and in 1897 he discovered peculiar pigmented cells, which afterwards turned out to be the parasites of aestivo-autumnal malaria in an early stage of development, within the stomach- wall of mosquitoes which had been fed on malarial blood. He further found that only mosquitoes of the genus Anopheles had these cells, and that they did not get them when fed on healthy blood. Then, turning his attention to the malaria of birds, he worked out the life-history of these cells within the body of the mosquito. " He saw that they increased in size, divided, and became full of filiform spores, then ruptured and poured out their multitudinous progeny into the body- cavity of their insect host. Finally, he saw the spores accumu- late within the cells of the salivary glands, and discovered that they actually passed down the salivary ducts and along the grooved hypopharynx into the seat of puncture, thus causing infection in a fresh vertebrate host " (Sambon). To apply these discoveries to the malaria of man was an obvious step. In working out the details the Italian school have again taken a prominent part.

Thus we get a complete scientific demonstration of the causation of malaria in three stages: (1) the discovery of the parasite by Laveran; (2) its life-history in the human host and connexion with the fever demonstrated by the Italian observers; (3) its life-history in the alternate host, and the identification of the latter with a particular species of mosquito by Ross and Manson. The conclusions derived from the microscopical laboratory were confirmed by actual experiment. In 1898 . it was conclusively shown in Italy that if a mosquito

xpe ' of the Anopheles variety bites a person suffering

from malaria, and is kept long enough for the parasite to develop in the salivary gland, and is then allowed to bite a healthy person, the latter will in due time develop malaria. The con- verse proposition, that persons efficiently protected from mosquito bites escape malaria, has been made the subject of several remarkable experiments. One of the most interesting was carried out in 1900 for the London School of Tropical Medicine by Dr Sambon and Dr Low, who went to reside in one of the most malarious districts in the Roman Campagna during the most dangerous season. Together with Signor Terzi and two Italian servants, they lived from the beginning of July until the 19th of October in a specially protected hut, erected near Ostia. The sole precaution taken was to confine themselves between sunset and sunrise to their mosquito- proof dwelling. All escaped

malaria, which was rife in the immediate neighbourhood. Mosquitoes caught by the experi- menters, and sent to London, produced malaria in persons who submitted themselves to the bites of these insects at the London School of Tropical Medicine. Experiments in pro- tection on a larger scale, and under more ordinary conditions, have been carried out with equal success by Professor Celli and other Italian authorities. The first of these was in 1899, and the subjects were the railwaymen employed on certain lines running through highly malarious districts. Of 24 pro- tected persons, all escaped but four, and these had to be out at night or otherwise neglected precautions; of 38 unprotected persons, all contracted malaria except two, who had apparently acquired immunity. In 1900 further experiments gave still better results. Of 52 protected persons on one line, all escaped except two, who were careless; of 52 protected on another

line, all escaped; while of 51 unprotected persons, living in alternate houses, all suffered except seven. Out of a total of 207 persons protected in these railway experiments, 197 escaped. In two peasants' cottages in the Campagna, protected with wire netting by Professor Celli, all the inmates — 10 in number — escaped, while the neighbours suffered severely; and three out of four persons living in a third hut, from which protection was removed owing to the indifference of the inmates, con- tracted malaria. In the malarious islet of Asinara a pond of stagnant water was treated with petroleum and all windows were protected with gauze. The result was that the houses were free from mosquitoes and no malaria occurred throughout the entire season, though there had been 40 cases in the pre- vious year. Eight Red Cross ambulances, each with a doctor and attendant, were sent into the most malarious parts of the Campagna in 1900. By living in protected houses and wearing gloves and veils at night all the staff escaped malaria except one or two attendants. These and other experiments, de- scribed by Dr Manson in the Practitioner for March 1900, con- firming the laboratory evidence as they do, leave no doubt whatever of the correctness of the mosquito-parasitic theory of malaria.

It is possible, though not probable, that malaria may also be contracted in some other way than by mosquito bite, but there are no well-authenticated facts which require any other theory for their explanation. The alleged occurrence of the disease in localities free from mosquitoes or without their agency is not well attested; its absence from other localities where they abound is accounted for by their being of an innocent species, or — as in England — free from the parasite. The old theory of paludism or of a noxious miasma exhaled from the ground is no longer necessary. The broad facts on which it is based are sufficiently accounted for by the habits of mosquitoes. For instance, the swampy character of malarial areas is explained by their breeding in stagnant water; the effect of drainage, and the general immunity of high-lying, dry localities, by the lack of breeding

facilities; the danger of the night air, by their nocturnal habits; the comparative immunity of the upper storeys of houses, by the fact that they fly low; the confinement of malaria to well-marked areas and the diminution of danger with distance, by their habit of clinging to the breeding-grounds and not flying far. Similarly, the subsidence of malaria during cold weather and its seasonal prevalence find an adequate explanation in the conditions governing insect life. At the same time it should be remembered that many points await elucidation, and it is unwise to assume conclusions in advance of the evidence.

With regard to the parasites, which are the actual cause of malaria in man, an account of them is given under the heading of Parasitic Diseases, and little need be said about p^^fes them here. They belong to the group of Protozoa, and, as already explained, have a double cycle of existence: (1) a sexual cycle in the body of the mosquito, (2) an asexual cycle in the blood of human beings. They occupy and destroy the red corpuscles, converting the haemoglobin into melanin; they multiply in the blood by sporulation, and produce acces- sions of fever by the liberation of a toxin at the time of sporula- tion (Ross). The number in the blood in an acute attack is reckoned by Ross to be not less than 250 millions. A more general and practical interest attaches to the insects which act. as their intermediate hosts. These mosquitoes or gnats — the terms are synonymous — belong to the family Culicidae and the genus Anopheles, which was first classified by Meigen in 1818. It has a wide geographical distribution, being found in Europe (including England), Asia Minor, Burma, Straits Settlements, Java, China, Formosa, Egypt; west, south and Central Africa; Australia, South America, West Indies, United States and Canada, but is generally confined to local centres in those countries. About fifty species are recognized at present. It is believed that all of them may serve as hosts of the parasite. The species best known in connexion with malaria are A. maculipennis (Europe and America), A.funestus

and A . costales (Africa) . In colour A nopheles is usually brownish or slaty, but sometimes buff, and the thorax frequently has a dark stripe on each side. The wings in nearly all species have a dappled or speckled appearance, owing to the occurrence of blotches on the front margin and to the arrangement of the scales covering the veins in alternating light and dark patches (Austen). The genus with which Anopheles is most likely to be confounded is Culex, which is the commonest of all mosquitoes, has a world-wide distribution, and is generally a greedy blood-sucker. A distinctive feature is the position assumed in resting; Culex has a

humpbacked attitude, while in Anopheles the proboscis, head and body are in a straight line, and in many species inclined at an angle to the wall, the tail sticking outwards. In the female of Culex the palpi are much shorter than the proboscis; in Anopheles they are of the same length. The wings in Culex have not the same dappled appearance. Anopheles is also a more slender insect, with a smaller head, narrower body and thinner legs. There are further differences in the other stages of life. Mosquitoes go through four phases: (1) ovum, (2) larva, (3) nympha, (4) complete insect. The ova of Anopheles are tiny black rod- shaped objects, which are deposited on the water of natural puddles, ponds, or slowly moving streams, by preference those which are well supplied with vegetation; they float, singly or attached to other objects or clustered together in patterns. They can live in brackish and even in sea water. The larva has no breathing-tube, and floats horizontally at the surface, except when feeding; it does not frequent sewage or foul water. The ova of Culex, on the other hand, are deposited in any stagnant water, including cesspools, drains, cisterns, or water collected in any vessel; they float in boat-shaped masses on the surface. The larva has a breathing-tube, and floats head downwards; when disturbed it wriggles to the bottom (Christy). Some observers maintain that Anopheles does not " sing," like the common mosquito, and its bite is much less irritating. Only the females suck blood; the act is believed to be neces- sary for fertilization and reproduction. Anopheles rarely bites by day, and then only in dark places. In the daytime " the gorged females rest motionless on the walls and ceilings of rooms, choosing always the darkest situations for this purpose " (Austen). In temperate climates the impregnated females hibernate during the winter in houses, cellars, stables, the trunks of trees, &c, coming out to lay their eggs in the spring. The four phases are passed in thirty days in a favourable season, and consequently there are ordinarily four or five generations from April to September (Celli).

The most important question raised by the mosquito- parasitic theory of malaria is that of prevention. This may be considered under two heads: (1) individual prophylaxis; (2) administrative prevention on a large scale.

(1) In the first place, common sense suggests the avoidance, in malarious countries, of unhealthy situations, and particu- larly the neighbourhood of stagnant water. Among elements of unhealthiness is next to be reckoned the proximity of native villages, the inhabitants of which are infected. In the tropics " no European house should be located nearer to a native village than half a mile " (Manson), and, since children are almost universally infected, " the presence of young natives in the house should be abso- lutely interdicted " (Manson). When unhealthy situations cannot be avoided, they may be rendered more healthy by destroying the breeding-grounds of mosquitoes in the neigh- bourhood. All puddles and collections of water should be rilled in or drained; as a temporary expedient they may be

treated with petroleum, which prevents the development of the larvae. When a place cannot be kept free from mos- quitoes the house may be protected, as in the experiments in Italy, by wire gauze at the doors and windows. The arrange- ment used for the entrance is a wire cage with double doors. Failing such protection mosquito curtains should be used. Mosquitoes in the house may be destroyed by the fumes of burning sulphur or tobacco smoke. According to the experi-

Pro- phylaxis.

ments of Celli and Casagrandi, these are the most effective culicides; when used in sufficient quantity they kill mosquitoes in one minute. The same authorities recommend a powder, composed of larvicide (an aniline substance), chrysanthemum flowers, and valerian root, to be burnt in bedrooms. Anoint- ing the skin with strong-smelling substances is of little use in the open air, but more effective in the house; turpentine appears to be the best. Exposure at night should be avoided. All these prophylactic measures are directed against mos- quitoes. There remains the question of protection against the parasite. Chills are recognized as predisposing both to primary infection and to relapses, and malnutrition is also believed to increase susceptibility; both should therefore be avoided. Then a certain amount of immunity may be acquired by the systematic use of quinine. Manson recommends five to ten grains once or twice a week; Ross recommends the same quantity every day before breakfast. There is some evidence that arsenic has a prophylactic effect. An experiment made on the railway staff at Bovino, a highly malarious district on the Adriatic, gave a striking result. The number of persons was 78, and they were divided into two equal groups of 39 each. One group was treated with arsenic, and of these 36 escaped altogether, while three had mild attacks; the remaining 39 who were not treated, all had fever. In a more extended experiment on 657 railway-men 402 escaped. This was in 1889; but in spite of the encouraging results the use of arsenic does not appear to have made any further progress. Experi- ments in immunizing by sero-therapeutic methods have not as yet met with success.

(2) Much attention has been directed in scientific circles to the possibility of " stamping out " epidemic malaria by administrative measures. The problem is one Adminis- of great practical importance, especially to the trative British Empire. There are no data for estimating Measures – the damage inflicted by malaria in the British colonies. It is, indeed, quite incalculable. In Italy the annual mor- tality from this cause averages 15,000, which is estimated to represent two million cases of sickness and a consequent loss of several million francs. In British tropical possessions the bill is incomparably heavier. There is not only the heavy toll in life and health exacted from Europeans, but the virtual closing of enormous tracts

of productive country which would otherwise afford scope for British enterprise. The " deadly " climates, to which so much dread attaches, generally mean malaria, and the mastery of this disease would be equivalent to the addition of vast and valuable areas to the empire. The problem, therefore, is eminently one for the statesman and administrator. A solution may be sought in several directions, suggested by the facts already explained. The existence of the parasite is maintained by a vicious interchange between its alternate hosts, mosquitoes and man, each infecting the other. If the cycle be broken at any point the parasite must die out, assuming that it has no other origin or mode of existence. The most effective step would obviously be the extermination of the Anopheles mosquito. A great deal may be done towards this end by suppressing their breed- ing-places, which means the drying of the ground. It is a question for the engineer, and may require different methods in different circumstances. Put comprehensively, it involves the control of the subsoil and surface waters by drainage, the regulation of rivers and floods, suitable agriculture, the clearing of forests or jungles, which tend to increase the rainfall and keep the ground swampy.

The city of Rome is an example of what can be done by drainage; situated in the midst of malaria, it is itself quite healthy. Recent reports also show us how much may be done in infected districts. At Ismailia malaria was reduced from 1551 cases in 1902 to 37 cases in 1905. The cost of operations amounted to an initial expenditure of 6-25 francs, and an annual expenditure of about 2-3 francs per head of the population. " The results are due to mosquito reduction together with cinchonization." The following is a tabulated

list of the cases. The population of Ismailia is about 6000.

1 Year

1900

1901

1902 1

1903

1904

1905

Cases of Malaria.

2250

1990

1548

214

90

37 2

Klang and Port Swettenham are contiguous towns in the Federated Malay States, having a population of 4000 and a rainfall of 100 in. a year. At Klang the expenditure has been £3100, with an annual expenditure of £270, devoted to clearing and draining 332 acres. At Port Swettenham £7000, with an annual upkeep of £240, has been devoted to treating no acres. In Hong-Kong similar measures were carried out, with the result that the hospital admissions for malaria dimin- ished from 1294 in 1901, the year when operations were begun, to 419 in 1905.

Klang and Port Swettenham.

Year

1900

1901 ‘

1902

1903

1904

1905

Cases of Malaria.

‘510

610

199

A systematic campaign for the destruction of breeding- places has been inaugurated in the British West African colonies, with encouraging results. The planting of eucalyptus trees is out of favour at present, but it appears to have been successful in Portugal, not from any prophylactic virtues in the plant, but through the great absorption of moisture by its deep roots, which tends to dry the subsoil. Treating the breeding-ponds with petroleum or similar preparations seems to be hardly applicable on a large scale, and in any case can only be a tempo- rary expedient. H. Ziemann advocates the destruction of mosquito larvae by the growing of such plants as the water-pest (Anacharis alsinatrum) which covers the surface of the water and suffocates larvae and nymphae. Short of suppress- ing mosquitoes, the parasitic cycle may theoretically be broken by preventing them from giving the infection to man or taking it from him. The means of accomplishing the former have been already pointed out, but they are obviously difficult to carry out on a large scale, particularly in native communities. It is one thing to protect individuals from mosquito bites, another to prevent the propagation of the parasite in a whole community. Perhaps the converse is more feasible in some circumstances — that is to say, preventing mosquitoes from having access to malarial persons, and so propagating the parasite in themselves. It could be carried out where the infected persons are few, by isolating and protecting them, but not where many are infected, as in native villages. Koch has suggested that the disinfection of malarial persons by quinine would have the desired effect, but other authorities of greater experience do not consider it practicable. In spite of the difficulties, however, there is no doubt that a great deal can be done to reduce, if not stamp out, malaria by the methods indicated, which should be applied according to circumstances. An encouraging example is afforded by the remarkable fact that malaria, which was once rife in certain districts of England, has now died out, although the Anopheles maculipennis mosquito still exists there. The parasitic cycle has been broken, and the insect is no longer infected. The suggested causes are (1) reduction of insects by drainage, (2) reduced population, (3) the use of quinine. Sir Patrick Manson has suggested that the problem of stamping out malaria may be assisted by the discovery of some at present unknown factors. He has pointed out that certain areas and certain islands are entirely free from the disease, while neighbouring areas and islands are devastated. This immunity is apparently not due to the absence of favourable conditions, but rather to the presence of some inimical factor which prevents the develop- ment of the parasite. If this factor could be discovered it might be applied

to the suppression of the disease in malarious localities.

1 Drainage works begun.

- *Nearly all were relapses of previous infection.*

A few other points may be noted. The pathological changes in malaria are due to the deposition of melanin and the detritus of red corpuscles and haemoglobin, and to the congregation of parasites in certain sites (Ross). In chronic cases the eventual effects are anaemia, melanosis, enlargement of the spleen and liver, and general cachexia. Apparently the parasites may remain quiescent in the blood for years and may cause relapses by fresh sporulation. Recent discoveries have done little or nothing for treatment. Quinine still remains the one specific. In serious cases it should not be given in solid form, but in solution by the stomach, rectum, or — better — hypodermically (Manson). According to Ross, it should be given promptly, in sufficient doses (up to 30 grains), and should be continued for months. Euquinine is by some preferred to quinine, but it is more expensive. Nucleogen and Aristochin have also been recommended instead of quinine. The nature of immunity is not known. Some persons are naturally absolutely immune (Celli), but this is rare; immunity is also some- times acquired by infection, but as a rule persons once infected are more predisposed than others. Races inhabiting malarious districts acquire a certain degree of resistance, no doubt through natural selection. Children are much more susceptible than adults.

Malaria in the Lower Vertebrates. — Birds are subject to malaria, which is caused by blood parasites akin to those in man and having a similar life-history. Two species, affecting different kinds of birds, have been identified. Their alternate hosts are mosquitoes of the Culex genus. Oxen, sheep, dogs, monkeys, bats, and probably horses also suffer from similar parasitic diseases. In the case of oxen the alternate host of the parasite is a special tick (Smith and Kilborne). In the other animals several parasites have been described by dif- ferent observers, but the alternate hosts are not known.

Authorities. — Celli, Malaria; Christy, Mosquitoes and Malaria; Manson, Tropical Diseases; Allbutt's System of Medicine; Ross, " Malaria," Quain's Dictionary of Medicine, 3rded. ; The Practitioner, March, 1901 (Malaria Number) ; Lancet (Sept. 29, 1907) ; British Medical Journal (Oct. 19, 1907) ; Indian Medical Gazette (February 1908). (A. Sl.; H. L. H.)

MALATIA (Malatieh or Aspuzu) the chief town of a 'sanjak of the same name in the Mamuret el-Aziz vilayet of Asia Minor, and a military station on the Samsun-Sivas-Diarbekr road, altitude 2900 ft., situated about 10 m. S.W. of the junction of the Tokhma Su (med. Kubaklb) with the Euphrates,

near the south end of a fertile plain, and at the northern foot of the Taurus. Pop. about 30,000, including, besides many Armenian Christians, bodies of Kurds and " Kizilbash." It is a wholly modern place, rebuilt since the earthquake of 1893, contains fine public buildings, and is noted for its fruit orchards. There are Protestant (American) and Roman Catholic missions, and an Armenian Catholic archbishop has his seat here. Eski-shehr or Old Malatia (Melitene), 5 m. N.E. and 3 m. from the great medieval bridge (Kirkgeuz) over the Tokhma Su, is said to owe its present desolation largely to its occupation by Hafiz Pasha as his headquarters in 1838 before his advance to fight the disastrous battle of Nizib with the Egyptian, Ibrahim. But it has still many inhabitants and large gardens and many ruinous mosques, baths, &c, relics of Mansur's city. It was the residence of von Moltke for some months, while attached to Hafiz's army. The earliest site was possibly Arslan Tepe about 2 m. south of Eskishehr were two " Hittite " stelae, representing hunting scenes, now in the Constantinople and Paris museums, were found in 1894.

In the time of Strabo (xii. 537) there was no town in the district of Melitene, which was reckoned part of Cappadocia. Under Titus the place became the permanent station of the 12th (" Thundering ") legion ; Trajan raised it to a city. Lying in a very fertile country at the crossing point of important routes, including the Persian " Royal Road, and two imperial military highways from Caesarea and along the Euphrates bank, it grew in size and importance, and was the capital of Armenia Minor or Secunda. Justinian, who completed the walls commenced by Anastasius, made it the capital of Armenia Tertia ; it was then a very great place (Procop., De aed., iii. 4). The town was burnt by Chosroes on his retreat after his

great defeat there in 577. Taken by the Saracens, retaken and destroyed by Constantine Copronymus, it was presently recovered to Islam, and rebuilt under Mansur (a.d. 756). It again changed hands more than once, being reckoned among the frontier towns of Syria (Istakhry, pp. 55, 62). At length the Greeks recovered it in 934, and Nicephorus II., finding the district much wasted, encouraged the Jacobites to settle in it, which they did in great numbers. A convent of the Virgin, and the great church which bears his name, were erected by the bishop Ignatius (Isaac the Runner). From this time Malatia continued to be a great seat of the Jacobites, and it was the birthplace of their famous maphrian Barhebraeus (or Abulfaragius). At the commencement of the nth century the population was said to number 60,000 fighting men (Assem., Bib. Or., ii. 149; cf. Barheb., Chr. Eccl., i. 411, 423). At the time of the first crusade, the city, being

hard pressed by the Turks under Ibn Danishmend, was relieved by Baldwin, after Bohemund had failed and lost his liberty in the attempt. But the Jacobites had no cause to love Byzantium, and the Greek governor Gabriel was so cruel and faithless that the townsmen were soon glad to open their gates to Ibn Danishmend (1102), and the city subsequently became part of the realm of Kilij Arslan, sultan of Iconium.

See H. C. B. v. Moltke, Briefe iiber Zustande, &c. in der Tiirkei (1835-1839)- (D- G. H.)

MALAYALAM, a language of the Dravidian family, spoken on the west coast of southern India. It is believed to have developed out of Tamil as recently as the 9th century. It possesses a large literature, in which words borrowed from Sanskrit are conspicuous. In 1901 the total number of speakers of Malayalam in all India was just about six millions.

MALAY ARCHIPELAGO 1 (variously called Malaysia, the Indian Archipelago, the East Indies, Indonesia, Insulinde), the largest group of islands in the world, lying south-east of Asia and north and north-west of Australia. It includes the Sunda Islands, the Moluccas, New Guinea, and the Philippine Islands, but excludes the Andaman-Nicobar group. The equator passes through the middle of the archipelago; it successively cuts Sumatra, Borneo, Celebes and Halmahera, four of the most important islands. A. R. Wallace (who includes the Solomon Islands as well as New Guinea in the group) points out that the archipelago "includes two islands larger than Great Britain; and in one of them, Borneo, the whole of the British Isles might be set down, and would be surrounded by a sea of forests. Sumatra is about equal in extent to Great Britain; Java, Luzon, and Celebes are each about the size of Ireland. Eighteen more islands are on the average as large as Jamaica; and more than a hundred are as large as the Isle of Wight."

Area.

Estimated Population.

Sunda Islands …. Moluccas, with Celebes New Guinea …. Philippine Islands .

459.578

1 15.334 312,329 115,026

32,632,400

3,000,000

800,000

7,635,400

The islands of the archipelago nearly all present bold and picturesque profiles against the horizon, and at the same time the character of the scenery varies from island to island and even from district to district. The mountains are arranged for the most part in lines running either from north-west to south-east or from west to east. In Sumatra and in the islands between Sumatra and Borneo the former direction is distinctly marked, and the latter is equally noticeable in Java and the other southern islands. The mountains of Borneo, however, rise rather in short ridges and clusters. Nothing in the general physiognomy of the islands is more remarkable than the number and distribution of the volcanoes, active or extinct. Running south-east through Sumatra, east through Java and the southern islands to Timor, curving north through the Moluccas, and again north, from the end of Celebes through the whole line of the Philippines, they follow a line roughly resembling a horseshoe narrowed towards the point. The loftiest mountain in the archipelago would appear to be Kinabalu in Borneo (13,698 ft.). An important fact in the physical geography of the archipelago is that Java, Bali, Sumatra and Borneo, and the lesser islands between them

1 For more detailed information respecting the several islands and groups of the archipelago, see the separate articles Borneo; Java; Philippine Islands; Sumatra, &c.

and the Asiatic mainland, all rest on a great submerged bank, nowhere more than 100 fathoms below sea-level, which may be considered a continuation of the continent ; while to the east the depth of the sea has been found at various places to be from 1000 to 2500 fathoms. As the value of this fact was particularly emphasized by Wallace, the limit of the shallow water, which is found in the narrow but deep channel between Bali and Lombok, and strikes north to the east of Borneo, has received the name of " Wallace's Line." The Philippines on the other hand, " are almost surrounded by deep sea, but are connected with Borneo by means of two narrow submarine banks " (A. R. Wallace, Island Life). The archipelago,

in effect, is divided between two great regions, the Asiatic and the Australian, and the fact is evident in various branches of its geography — zoological, botanical, and even human. It is believed that there was a land-connexion between Asia and Australia in the later part of the Secondary epoch, and that the Australian continent, when separated, became divided into islands before the south-eastern part of the Asiatic did so.

The most notable fact in the geological history of the archipelago is the discovery in Java of the fossil remains of Pithecanthropus erectus, a form intermediate between the higher apes and man. In its structure and cranial capacity it is entitled to a higher place in the zoological scale than any anthropoid, for it almost certainly walked erect; and, on the other hand, in its intellectual powers it must have been much below the lowest of the human race at present known. The strata in which it was found belong to the Miocene or Upper Pliocene. Among the rocks of economic importance may be mentioned granite of numerous kinds, syenite, serpentine, porphyry, marble, sandstones and marls. Coal is worked in Sumatra, Borneo and Labuan. Diamonds are obtained in Borneo, garnets in Sumatra, Bachian and Timor, and topazes in Bachian, antimony in Borneo and the Philippines; lead in Sumatra, Borneo and the Philippines; copper and malachite in the Philippines, Timor, Borneo and Sumatra; and, most important of all, tin in Banka, Billiton and Singkep. Iron is pretty frequent in various forms. Gold is not uncommon in the older ranges of Sumatra, Banka, Celebes, Bachian, Timor and Borneo. Manganese could be readily worked in Timor, where it lies in the Carboniferous Lime- stone. Platinum is found in Landak and other parts of Borneo. Petroleum is a valuable product of Sumatra and Java, and is also found in Borneo.

Climate, Flora, Fauna. — The most striking general fact as regards climate in the archipelago is that wherever that part of the south-east monsoon which has passed over Australia strikes, the climate is comparatively dry, and the vegetation is less luxuriant. The east end of Java, e.g. has a less rainfall than the west; the distribution of the rain on the north coast is quite different from that on the south, and a similar difference is observed between the east and the west of Celebes. The north- west monsoon, beginning in October and lasting till March, brings the principal rainy season in the archipelago.

Most of the islands of the archipelago belong to the great equatorial forest-belt. In its economical aspect the vegetation, whether natural or cultivated, is of prime interest. The list of fruits is very extensive, though few of them are widely known. These, how- ever, include the orange, mango, mangosteen, shaddock, guava and the durian. The variety of food-plants is equally notable. Not only are rice and maize, sugar and coffee, among the widely cultivated crops, but the coco-nut, the bread-fruit, the banana and

plantain, the sugar-palm, the tea-plant, the sago-palm, the coco-tree, the ground-nut, the yam, the cassava, and others besides, are of practical importance. The cultivation of sugar and coffee owes its development mainly to the Dutch ; and to them also is due the introduction of tea. They have greatly encouraged the cultiva- tion of the coco-nut among the natives, and it flourishes, especially in the coast districts, in almost every island in their territory. The oil is largely employed in native cookery. Pepper, nutmegs and cloves were long the objects of the most important branch of Dutch commerce; and gutta-percha, camphor, dammar, benzoin and other forest products have a place among the exports.

To the naturalist the Malay Archipelago is a region of the highest interest ; and from an early period it has attracted the attention of explorers of the first rank. The physical division between the Asiatic and Australian regions is clearly reflected in the botany and zoology. The flora of the Asiatic islands (thus distinguished) " is a special development of that prevailing from the Himalayas to the Malay Peninsula and south China. Farther east this flora intermingles with that of Australia " (F. H. H. Guillemard, Australasia). Similarly, in the Asiatic islands are found the great mammals of the continent — the elephant, tiger, rhinoceros,

anthropoid ape, &c, which are wanting in the Australian region, with which the eastern part of the archipelago is associated. (For details concerning flora and fauna, see separate articles, especially Java.)

Inhabitants. — The majority of the native inhabitants of the Malay Archipelago belong to two races, the Malays and the Melanesians (Papuans). As regards the present racial distribu- tion, the view accepted by many anthropologists, following A. H. Keane, is that the Negritos, still found in the Philippines, are the true aborigines of Indo-China and western Malaysia, while the Melanesians, probably their kinsmen, were the earliest occupants of eastern Malaysia and western Polynesia. At some date long anterior to history it is supposed that Indo-China was occupied first by a fair Caucasian people and later by a yellow Mongolian race. From these two have come all the peoples — other than Negrito or Papuan — found to-day from the Malay Peninsula to the farthest islands of Polynesia. The Malay Archipelago was thus first invaded by the Caucasians, who eventually passed eastward and are to-day represented in the Malay Archipelago only by the Mentawi islanders. They were followed by an immigration of Mongol- Caucasic peoples with a preponderance of Caucasic blood — the Indonesians of some, the pre-Malays of other writers

— who are to-day represented in the archipelago by such peoples as theDyaksof Borneo and the Battas of Sumatra. At a far later date, probably almost within historic times, the true Malay race, a combination of Mongol and Caucasic elements, came into existence and overran the archipelago, in time becoming the dominant race. A Hindu strain is evident in Java and others of the western islands; Moors and Arabs (that is, as the names are used in the archipelago, Mahommedans from various countries between Arabia and India) are found more or less amalgamated with many of the Malay peoples; and the' Chinese form, from an economical point of view, one of the most important sections of the community in many of the more civilized districts. Chinese have been established in the archi- pelago from a very early date: the first Dutch invaders found them settled at Jacatra; and many of them, as, for instance, the colony of Ternate, have taken so kindly to their new home that they have acquired Malay to the disuse of their native tongue. Chinese tombs are among the objects that strike the traveller's attention at Amboyna and other ancient settlements.

There is a vast field for philological explorations in the archi- pelago. Of the great number of distinct languages known to exist, few have been studied scientifically. The most widely distributed is the Malay, which has not only been diffused by the Malays themselves throughout the coast regions of the various islands, but, owing partly to the readiness with which it can be learned, has become the common medium between the Europeans and the natives. The most cultivated of the. native tongues is the Javanese, and it is spoken by a greater number of people than any of the others. To it Sundanese stands in the relation that Low German holds to High German, and the Madurese in the relation of a strongly individualized dialect. Among the other languages which have been reduced to writing and grammatically analysed are the Balinese, closely connected with the Javanese, the Batta (with its dialect the Toba), the Dyak and the Macassarese. Alfurese, a vague term meaning in the mouths of the natives little else than non-Mahommedan, has been more particularly applied by Dutch philologists to the native speech of certain tribes in Celebes. The commercial activity of the Buginese causes their language to be fairly widely spoken — little, however, by Europeans.

Political Division. — Politically the whole of the archipelago, except British North Borneo, &c. (see Borneo), part of Timor (Portuguese), New Guinea east of the 141st meridian (British and German), and the Philippine Islands, belongs to the Nether- lands. The Philippine Islands which had been for several centuries a Spanish possession, passed in 1898 by conquest to the United States of America. For these several political units see the separate articles; a general view, however, is here given of the government, economic conditions, &c, of the Dutch possessions, which the Dutch call Nederlandsch-Indie.

Administration. — The Dutch possessions in Asia He between 6° N. and n° S. and 95 E. and 141 ° E. Politically they are divided into lands under the direct government of the Netherlands

vassal lands and confederated lands. Administratively they are further divided into residencies, divisions, regencies, districts, and dessas or villages. In the principal towns and villages there are parish councils, and in some provinces county councils have been established. Natives, Chinese and Arabs, are given seats, and in certain instances some of the members are elected, but more gener- ally they are appointed by government. The islands are often described as of two groups, Java and Madura forming one, and the other consisting of Sumatra, Borneo, Riouw-Lingga Archipelago, Banka, Billiton, Celebes, Molucca Archipelago, the small Sunda Islands, and a part of New Guinea — the Outposts as they are collec- tively named. The Outposts are divided into 20 provinces. A governor-general holds the superior administrative and executive authority, and is assisted by a council of five members, partly of a legislative and partly of an advisory character, but with no share in the executive work of the government. In 1907 a Bill was introduced to addˆfour extraordinary members to the council, but no immediate action was taken. The governor-general not only has supreme executive authority, but can of his own accord pass laws and regulations, except in so far as these, from their nature, belong of right to the home government, and as he is bound by the constitutional principles on which, according to the Regulations for the Government of Netherlands India, passed by the king and States- General in 1854, the Dutch East Indies must be governed. There are nine departments, each under a director: namely, justice; interior; instruction, public worship and industry; agriculture (created in 1905); civil public works; government works (created in 1908); finance; war; marine. The administration of the larger territorial divisions {gouvernement, residentie) is in the hands of Dutch governors, residents, assistant residents and controleurs. In local government a wide use is made of natives, in the appoint- ment of whom a primary consideration is that if possible the people should be under their own chieftains. In Surakarta and Jokjakarta in Java, and in many parts of the Outposts, native princes preserve their positions as vassals ; they have limited power, and act generally under the supervision of a Dutch official. In -concluding treaties with the vassal princes since 1905, the Dutch have kept in view the necessity of compelling them properly to administer the revenues of their states, which some of them formerly squandered in their personal uses. Provincial banks have been established which defray the cost of public works.

Population.— -The following table gives the area and population of Java

(including Madura) and of the Outposts: —

Area:

Pod.

English sq. m.

1900.

1905.

Java and Madura ….

50,970

28,746,688

30,098,008

rSumatra, West Coast

31.649

1,527,297

Sumatra, East Coast

35.312

421,090

Sumatra-

Benkulen Lampong Districts

9.399 1 1 ,284

162,396 142,426

-4,029,505

Palembang .

53,497

804,299

LAchin ….

20,471

110,804

J

Riouw-Lingga Archipelago

16,301

86,186

112,216

Banka

4,446

106,305

115,189

Billiton

1,863

43,386

36,858

Borneo, West Coast

55,825

413.067

1 . .

Borneo, South and East

j-1,233,655

Districts

156,912

716,822

Celebes \ Celebes …. Celebes j Menado …

49,390

454.368

415. 499

22,080

429.773

436,406

Molucca Islands ….

43,864

410,190

407,419

Timor Archipelago …

17,698

119,239

308,600

Bali and Lombok ….

4,065

1,041,696

523.535

New Guinea to 141 ° E.

151,789

200,000

Total ….

736,815

36,000,000

37.7i7.377 1

In no case are the above figures for population more than fairly accurate, and in some instances they are purely conjectural. The population is legally divided into Europeans and persons assimilated to them, and natives and persons assimilated to them. The first class includes half-castes (who are numerous, for the Dutch are in closer relationship with the natives than is the case with most colonizing peoples), and also Armenians, Japanese, &c. The total number of this class in 1900 was 75,833 ; 72,019 of these were called Dutch, but 61,022 of them were born in Netherlands India; there were also 1382 Germans, 441 British and 350 Belgians. Among the natives and persons assimilated to them were about 537,000 Chinese and 27,000 Arabs. In the decade 1890-1900 the increase of the European population was 30-9%, of the Arabs 26-6%, and of the Chinese 16-5 %. A large proportion of the Europeans are government officials, or retired officials, for many of the Dutch, once established in the colonies, settle there for life. The remaining Europeans are mostly planters and heads of industrial establish-

1 Including 487 in Merauke, the capital of Dutch New Guinea.

ments; the Arabs are nearly all traders, as are some of the Chinese, but a large number of the latter are labourers in the Sumatra tobacco plantations and the tin mines of Banka, Billiton, &c. The bulk of the natives are agriculturists.

Religion and Instruction. — Entire liberty is granted to the members of all religious confessions. The Reformed Church has about 40 ministers and 30 assistants, the Roman Catholic 35 curates and 20 priests, not salaried out of the public funds. There are about 170 Christian missionaries, and the progress of their work may be illustrated by showing that the number of Christians among the natives and foreign Orientals was: — ■

In 1873.

In 1896.

In 1903.

In Java and Madura

In the Outposts ….

5.673 148,672

19.193 290,065

About 34,000 „ 390,000

About 10,000 natives go annually to Mecca on pilgrimage.

Both the government and private enterprise maintain vernacular schools. Large sums have been voted in Holland for the establish- ment of primary and secondary schools, and the government has undertaken to assist in the establishment of parochial schools, the object being that every village, at least in Java, should possess one. There are schools for higher education at Batavia, Surabaya and Semarang; at the first two of these towns are government schools for mechanical engineering, and at Batavia a crafts school and a medical school for natives. There are five colleges for native schoolmasters and four for sons of native officials. Government schools for the European education of Chinese children are estab- lished in the principal towns. Private mechanical and crafts schools are established at Jokjakarta, Surabaya and Semarang, and there is an agricultural school at Buitenzorg.

Justice. — As regards the administration of justice, the distinction is maintained between (1) Europeans and persons assimilated with them (who include Christians and Japanese), and (2) natives, together with Chinese, Arabs, &c. The former are subject to laws closely resembling those of the mother country, while the customs and institutions of natives are respected in connexion with the administration of justice to the latter. In 1906 a bill was passed somewhat modifying the existing status of the classes above men- tioned, and especially directing new ordinances with regard to the judicial treatment of Christian natives. A general judicial revision being also in contemplation, this bill did not immediately come into force. Justice for Europeans is administered by European judges, but, as with administration at large so in judicial matters, native chiefs have extensive powers in native affairs. For European justice the High Court of Justice is established at Batavia; there are councils of justice at Batavia, Semarang and Surabaya, with authority not only over Java but over parts of the Outposts; there is a resident court of justice in each residency. For native justice there are courts in the districts and regencies; residents act as police judges; provincial councils have judicial powers, and there are councils of priests with powers in matrimonial disputes, questions of

succession, &c.

As regards pauperism, the government subsidizes Protestant and Catholic orphan nouses.

Finance. — The revenue of Netherlands India has been derived mainly from customs, excise, ground-tax, licences, poll-tax, &c, from monopolies — opium, salt and pawn-shops (the management of which began to be taken over by the government in 1903, in place of the previous system of farming-out), coffee, &c, railways, tin mines and forests, and from agricultural and other concessions. But attempts have been made, and have been largely successful, to make the revenue dependent to a less extent on monopolies and the products (especially agricultural) of the land; and to abolish licences and substitute direct taxes. There is a progressive income-tax for Europeans, and the system has also been applied in the case of natives.

The following table affords comparisons in the revenue and expenditure: —

Year.

Revenue.

Expenditure.

1880 1890 1900 1905

£12,236,500

11,482,457 11,832,417 12,951.497

£12,244,666

10,644,728 12,313,854 13,844,173

The monetary system is similar to that of Holland (the unit being the guilder), but there are also certain silver and copper coins of small value bearing Malay or Javanese inscriptions. The Java Bank, established in 1828, with headquarters at Batavia, is the only bank issuing notes, two-fifths of the amount of which must be covered by specie or bullion. The government has a control over the administration of this bank.

Defence. — The army is purely colonial, i.e. distinct from that of the Netherlands. Its strength is a little under 40,000, about one-third being Europeans of various nationalities and two-thirds natives of various races. No portion of the regular army of the

Netherlands is allowed to be sent on colonial service, but individual soldiers are at liberty to enlist, by permission of their commanding officers, in the army of Netherlands India, and they form its nucleus. Native and European soldiers are generally mixed together in the same battalions, though in separate companies. The officers were all Dutch till 1908, when a trial was made of native officers from noble Javanese families. The artillery is composed of European gunners, with native riders, while the cavalry are Europeans and natives. A military academy is established at Meester Cornells, near Batavia. Schools for soldiers are attached to every battalion. There are certain local forces outside the regular army — militia in some of the large towns, native infantry in Madura, and guards of some of the vassal princes. Unlike the army, which is purely colonial, the navy in Netherlands India is partly colonial, partly belonging to the royal navy of the Netherlands, and its expenses are therefore borne partly by the mother country and partly by the colony. About six ironclads and twenty smaller vessels of the royal navy are stationed in colonial waters ; the vessels of the colonial marine number about twenty-four, and undertake police supervision, prevention of slave trading, &c.

Trade and Industries. — The principal articles of export are sugar, tobacco, copra, forest products (various gums, &c), coffee, petroleum, tea, cinchona, tin, rice, pepper, spices and gambler. The average annual value of exports during 1900-1905 was £22,496,468, and of imports £17,050,338. A great proportion of the exports goes to the mother country, though a considerable quantity of rice is exported to China. An indication of the mineral products has already been given; as regards the export trade, tin is the most important of these, but the Ombilin coalfields of Sumatra, connected by a railway with the coast, call for mention here also. Agricultural labour is very carefully regulated by law, in the enforcement of which the residents and lower officials have wide powers. One day's gratuitous labour out of seven or more can be demanded of labourers either on private or on government estates; but in 1882 this form of labour was for the most part abolished as far as govern- ment estates were concerned, each labourer so exempted paying one guilder per year. The principal private agricultural estates are in the west of Java, in which island the greater part of the soil is government property. Such estates have increased greatly in number and extent, not only in Java but elsewhere, since the agrarian law of 1870, under which it became possible for settlers to obtain waste lands on hereditary lease for 75 years. In 1899 the total acreage of land ceded was 1,002,766 acres; in 1903 it was 1,077,295. The government ceased to cultivate sugar in 1891, but coffee, and to some extent cinchona, are cultivated on government plantations, though not in equal quantity to that grown on land held oh emphyteusis. The average annual yield of sugar in 1900- 1905 was 852,400 tons, but it increased

steadily during that period. The average annual yield of coffee during the same period was 101,971,132 lb; it fluctuates greatly. The average annual pro- duction of tobacco is about fifty million pounds from each of the islands of Java and Sumatra. The total annual yield of the tin mines is about 1 5,000 tons, and of the coal mines 240,000 tons. The average output of petroleum annually in 1900-1905 was 120,000,000 gallons; this, again, has fluctuated greatly. There are upwards of 3000 miles of railways and steam tramways in Netherlands India, but these are almost entirely in Java; elsewhere only Sumatra has a few short lines. The principal steamship company in the archi- pelago is the Royal Packet {Koninklyke Paketvaart) Company.

*Bibliography. — See Aardrijkskundig en stalistisch Woordenhoek van Nederl. Indie (Amsterdam, 1869), to which P. J. Veth and other specialists were contributors. A general survey of the people, administration and resources of the Dutch colony is provided in Twentieth Century Impressions of Netherlands India, ed. by Arnold Wright (London, 1910). See also A. R. Wallace, Malay Archipelago (London, 1869, and later editions, notably for zoological distribu- tion) and Island Life (London, 1880, notably for ornithology). H. O. Forbes, A Naturalist's Wanderings in the Eastern Archipelago (London, 1885); P. van der Lith, Nederlandsch Oostindie (2nd ed., Leiden, 1893-1895); F. H. H. Guillemard, Australasia, vol. ii., in Stamford's Compendium (London, 1 894) ; Encyclopaedic van Neder- landsch-Indie (the Hague, 1895-1904); Guide & travers la section des Indes nierlandaises, Paris Exhibition (the Hague, 1900); A. R. Colquhoun, The Mastery of the Pacific (London, 1902); M. Weber, Der indo-australische Archipel und die Geschichte seiner Tierwelt (Jena, 1902) ; G. Karsten and H. Schenck, Vegetationsbilder, vol. ii. (Jena, 1903) ; J. van Bemmelen and G. B. Hooyer, Guide through Netherlands India (London, 1903) ; D. Bezemer, Neder- landsch Oostindie (the Hague, 1904); H. Blink, Nederlandsch Oost- en Weit-Indie, geographisch, ethnologisch, en economisch beschreven (Leiden, 1904, sqq.). Among Dutch official publications may be mentioned Jaarcijfers door het Centraal Bureau voor de Statistiek; Jaarboek van het Mijnwezen in Nederlandsch Oost-Indie (Amsterdam) ; Koloniale-Economische • Bijdragen (the Hague) ; Koloniaal Verslag (the Hague) ; Regeerings-Almanak voor Nedcrlandsch-Indie (Batavia). A number of important periodicals (Tijdschrift) of various institu- tions are issued at Batavia, &c. Languages: P. J. Veth in De Gids (1864); R. N. Cus*t, Sketch of the Modern Languages of the East Indies (London, 1878); and for bibliography, Boele van Neus- broek, De Beoefening der oostersche talen . . . (Leiden, 1875).*

History

Portuguese and Spanish Ascendancy, 1511-1ˆ5. — Ptolemy and other ancient geographers describe the Malay Archipelago, or part of it, in vague and inaccurate terms, and the traditions they preserved were supplemented in the middle ages by the narratives of a few famous travellers, such as Ibn Batuta, Marco Polo, Odoric of Pordenone and Niccolo Conti. Malay and Chinese records also furnish material for the early history of individual islands, but the known history of the archipelago as a whole begins in the 16th century. At this period a civilization, largely of Hindu origin, had flourished and decayed in Java, where, as in all the more important islands, Mahommedanism had afterwards become the dominant creed. But the smaller islands and the remoter districts, even of Java and Sumatra, remained in a condition of complete savagery.

The Portuguese were the first Europeans to colonize any part of the archipelago. A Portuguese squadron under Diogo Lopes de Sequeira arrived off Sumatra in 1509, explored the north coast for some distance, and noted that the inhabitants of the interior were cannibals, while those of the littoral were civilized and possessed a gold coinage. The main object of the Portuguese was to obtain a share in the lucrative spice trade carried on by the Malays, Chinese and Japanese; the trade-routes of the archi- pelago converged upon Malacca, which was the point of departure for spice merchants trading with every country on the shores of the Indian Ocean and Arabian Sea. In 1511 the Portuguese under Alphonso d' Albuquerque occupied Malacca, and in November of that year an expedition under Antonio de Abreu was despatched to find a route to the Moluccas and Banda Islands, then famous for their cloves and nutmegs. The ex- plorers reached Amboyna and Ternate, after gaining some know- ledge of Java, Madura, Sumbawa and other islands, possibly including New Guinea. During the return voyage the second-in- command, Francisco Serrao, was shipwrecked, but succeeded in making his way in a native boat to Mindanao. Thus the Philip- pines were discovered: In 1514 a second Portuguese fleet arrived at Ternate, which during the next five years became the centre of Portuguese enterprise in the archipelago; regular traffic with Malacca and Cochin was established, and the native raja became a vassal of Portugal.

Meanwhile the Spanish government was considering whether the Moluccas did not fall within the Spanish sphere of influence as defined by the Treaty of Tordesillas in 1494; and in August 1 519 an expedition commanded by Ferdinand Magellan (q.v.) sailed from Seville to seek a westward passage to the archipelago. After losing the commander in the Philippines and discovering Borneo, the two surviving ships reached the Moluccas late in 1520. One vessel returned to Seville by the Cape route, thus completing the

first voyage round the world; the other attempted to return by the Pacific, but was driven back to Tidore and there welcomed by the natives as a useful ally against the Portuguese. Reinforcements from Spain arrived in 1525 and 1528; but in 1529 a treaty was concluded between the emperor Charles V. and John III. of Portugal, by which, in return for 350,000 gold ducats, the Spanish claim to the Moluccas was withdrawn. The boundary between the Spanish and Portuguese spheres was fixed at 17° E. of the Moluccas, but by a geographical fiction the Philippines were included within the Spanish sphere. Further disputes occurred from time to time, and in 1542 a Spanish fleet came into conflict with the Portuguese off Amboyna; but after 1529 the supremacy of each power in its own sphere was never seriously endangered. Though the Portuguese traders frequented the coast of Java, they annexed no territory either there or in Sumatra; but farther east they founded numerous forts and factories, notably in Amboyna, the Banda Island, Celebes and Halmahera. Ternate remained the seat of the governor of the Moluccas, who was the highest official in the archipelago, though subordinate to the vice- roy or governor of Portuguese India. The first attempt to enter into relations with the states of Borneo was made by D. Jorge de Menezes, who visited Brunei in 1526, and in 1528 sent an envoy to its raja. The embassy failed in a curious manner.

Among the gifts sent by Menezes was a piece of tapestry repre- senting the marriage of Catherine of Aragon to Arthur, prince of Wales. The raja was persuaded that these mysterious figures were demons under a spell, which might come to life and kill him as he slept. The envoy was therefore dismissed.

In 1536, after a period of war and anarchy caused by the tyrannical rule of Menezes, Antonio Galvao, the historian, was appointed governor of the Moluccas. He crushed the rebellion and won the affection of the natives by his just and enlightened administration, which had no parallel in the annals of Portuguese rule in the archipelago. He returned to Europe in 1540 (see Portugal: Literature), after inaugurating an active missionary movement, which was revived in 1 546-1 547 by Francis Xavier (q.v.). At this period the Portuguese power in the East was already beginning to wane; in the archipelago it was weakened by administrative corruption and by incessant war with native states, notably Bintang and Achin; bitter hostility was aroused by the attempts which the Portuguese made to establish a com- mercial monopoly and to force Christianity upon their native subjects and allies (see Portugal: History). From 1580 to 1640 Portugal was itself united to Spain — a union which differed from annexation in little but name.

The English and Dutch, 1595-1674. — Pirates from Dieppe visited the archipelago between 1527 and 1539. It is possible that they reached

Australia 1 — more than sixty years before the first voyage thither of which there is any clear record; but their cruise had no political significance, and the Spaniards and Portuguese remained without European competitors until the appearance of Sir Francis Drake in 1579. An English squadron under Sir James Lancaster came into conflict with the Portuguese • in 1 591, and an expedition under Sir Henry Middleton traded in the archipelago in 1604. But the English were simple traders or explorers; far more formidable were the Dutch, who came to the East partly to avenge the injuries inflicted on their country by the Spaniards, partly to break the commercial monopoly of the peninsular states. As middlemen they already possessed a large interest in the spice trade, for the Portuguese, having no direct access to the principal European markets, had made a practice of sending cargo to the Netherlands for distribution by way of the Scheldt and Rhine. The Dutch now sought to monopolize not only the distribution but the production of spices — an enter- prise facilitated by the co-operation of many exiled Portuguese Jews who had settled in Holland.

The first Dutch fleet sailed from Texel, under the command of Cornelis Houtman, on the 2nd of April 1 595 and reached Sumatra on the 1st of January 1596. It visited Madura, and came into conflict with the Portuguese at Bantam in Java, returning to Holland in 1597. Though not a commercial success, the ex- pedition had demonstrated the weakness of the Portuguese. In 1602 the Dutch East India Company (q.v.) was incorporated, and for nearly two centuries this organization played the chief part in the history of the archipelago. By 1604 the Dutch could already claim to be the stronger power at sea. They had attacked the Portuguese in Ceylon (1601), established friendly relations with Achin (1602), and defeated a powerful fleet off Banda (1602). In 1606 they concluded a treaty of alliance with the sultan of Johor, and in 1608 they forced the Portuguese to assent to an armistice for twelve years. On the 29th of November 1609 Pieter Both was chosen by the states-general, on the nomination of the Dutch East India Company, as first governor-general of Netherlands India. In 161 1 the headquarters of the Dutch was changed from Bantam to Jakatra, which in 1619 was renamed Batavia, and was thenceforward the Dutch capital. Meanwhile the English East India Company, chartered in 1600, had also extended its operations to the archipelago. After 161 1 the commercial rivalry between the Dutch and British became acute, and in 1613, 1615 and 1 61 8 commissioners met in London to discuss the matters in dispute. The result of their deliberations was the Treaty of Defence, signed on the 2nd of June 1619 and modified on the 24th of January 1620, which arranged for co-operation between the Dutch and British companies, and especially for the maintenance 1 See The Geographical Journal, ix. 80 seq. (London, 1897).

of a joint fleet. But neither company could restrain its agents in the East from aggressive action, and many fresh causes of dispute arose, the chief being the failure of the British to provide the naval forces required for service against the Portuguese, and the so-called " massacre of Amboyna " (q.v.) in 1623. The Treaty of Defence lapsed in 1637, but as early as 1634 the British made peace with Portugal. Even without allies, however, the Dutch continued to extend their trade and to annex fresh territory, for the British were weakened by civil war at home, while, after 1640, the Portuguese were struggling to maintain their independence against Spain. The Dutch company opened up a profitable trade with Japan and China, and prosecuted the war against Portugal with great vigour, invading Portuguese India and capturing Point de Galle in 1640, Malacca in 1641, Cochin and Cannanore in 1663. The war with England in 1652-54 and the renewal of the Anglo-Portuguese alliance by the marriage of Charles II. to Catherine of Braganza in 1661 were unable to check the growth of Dutch power; more serious was the resistance offered by some of the native states. Rebellions in Java (1629) and the Moluccas (1650) were suppressed with great severity, but in 1662 the company suffered a heavy reverse in Formosa, all its colonists being expelled from the island. A new war between Great Britain and Holland broke out in 1672 and was terminated by the Treaty of Westminster (February 17, 1674), by which the points at issue between the two companies were referred first to commissioners and finally to an arbitrator. The full details of the settlement are unknown, but thenceforward the British company devoted its energies chiefly to the develop- ment of its Indian possessions, while the Dutch were left supreme in the archipelago. In 1684 the British even evacuated Bantam, their chief settlement, and retired to Benkulen in Sumatra, which remained for more than a century their sole territorial possession in the archipelago.

Dutch Ascendancy, 1674-174Q.— The weakness of Spain and Portugal and the withdrawal of the British left the Dutch com- pany free to develop its vast colonial and commercial interests. In 1627 the so-called Dutch " colonial system " had been in- augurated by the fourth governor-general, Jan Pieterszoon Coen (q.v.). Under this system, which was intended to provide Netherlands India with a fixed population of European descent, Dutch girls were sent to the archipelago to be married to white settlers, and subsequently marriages between Dutchmen and captive native women were encouraged. As early as 1624 vast fortunes had been acquired by trade: two members of the company who died in that year were stated to possess seven and eight tons of gold respectively, an amount approximately equivalent, in the aggregate, to £2,000,600. The use of slave labour, and the application of the corvSe system to natives who were nominally free, enabled the company to lower the cost of production, while the absence of

competition enabled it to raise prices. The hardship inflicted on the native races provoked an insurrection throughout Java, in which the Chinese settlers participated; but the Dutch maintained naval and military forces strong enough to crush all resistance, and a treaty between the company and the Susuhunan in November 1749 made them practically supreme throughout the island.

Decline of Dutch Power, 1749-1811. — In the second half of the 17th century the monopoly system and the employment of slaves and forced labour gave rise to many abuses, and there was a rapid decline in the revenue from sugar, coffee and opium, while the competition of the British East India Company, which now exported spices, indigo, &c. from India to Europe, was severely felt. The administration was corrupt, largely because of the vast powers given to officials, who were invariably underpaid; and the financial methods of the company precipitated its ruin, large dividends being paid out of borrowed money. The burden of defence could no longer be sustained; piracy and smuggling became so common that the company was compelled to appeal to the states-general for aid. In 1798 it was abolished and its authority vested in a " Council of the Asiatic Possessions." In 1803 a commission met to consider the state of,the Dutch colonies, and advocated drastic administrative and commercial reforms,

notably freedom of trade in all commodities except firearms, opium, rice and wood — with coffee, pepper and spices, which were state monopolies. Some of these reforms were carried out by H. W. Daendels (1808-1811), who was sent out as governor- general by Louis Bonaparte, after the French conquest of Hol- land. Daendels, however, maintained the existing restrictions upon trade and even made rice a state monopoly. His harsh rule aroused great antagonism; in 181 1 he was recalled and J. W. Janssens became governor-general.

British Occupation, 1811-1816. — Netherlands India was at this time regarded as a part of the Napoleonic Empire, with which Great Britain was at war. A British naval squadron arrived in the Moluccas in February 1810 and captured Amboyna, Banda, Ternate and other islands. In 181 1 a strong fleet was equipped by Lord Minto, then governor-general of India, for the conquest of Java; a British force was landed on the 4th of August; Batavia was captured on the 26th, and on the 18th of September Janssens and the remnant of his army sur- rendered. Lord Minto had issued a proclamation establishing British rule. on the nth of September, and Thomas (afterwards Sir Thomas) Stamford Raffles was appointed lieutenant-governor. Raffles (q.v.) held office until March 1816, and introduced many important changes in the departments of revenue, commerce and judicature. He was succeeded by John Fendall, who in 1816 carried out the retrocession of Netherlands India to the Dutch, in

accordance with the Treaty of Vienna (1814). '

Restoration and Reform of Dutch Power, 1816-1910. — Various disputes between Great Britain and the Netherlands, arising chiefly out of the transfer of power in Java and the British occupation of Singapore (1819), were settled by treaty between the two powers in 1824. By this treaty the Dutch were given almost entire freedom of action in Sumatra, while the Malay Peninsula was recognized as within the British sphere of influ- ence. In 1825-30 a serious rebellion in Java involved the despatch of a large military force from the Netherlands, and was with difficulty suppressed. An outbreak of Mahommedan fanaticism in Sumatra also gave much trouble.

The reform movement inaugurated by the commission of 1803 was resumed in 1830, when Governor-General Johannes van den Bosch endeavoured to improve the conditions of land-tenure and agriculture by introducing the so-called " culture system." The native cultivators were to be exempted from the ground-tax, but were to cultivate one-fifth of their land as the govern- ment might direct, the government taking the produce. This culture-system worked fairly during Van den Bosch's tenure of office, but gave rise to many abuses between 1833 and 1844, involving, as it did, a combination of the metayer and corvie systems.

In 1848 the Grondwet, or fundamental law of the Netherlands, recognized for the first time the responsibility of the Dutch nation for its colonial dependencies. The Grondwet involved certain important changes, which were embodied in an act passed in 1854 and commonly known as the Regulations for the Government of Netherlands India. The Regulations substituted statute law for administrative and military despotism, and made the governor- general in council responsible to the minister of the colonies at the Hague. They reformed the judicature,introduced elementary education for the natives, and abolished slavery in Java as from the 1st of January i860. They also prepared the way for further legislation tending towards the gradual emancipation of the natives from the culture system, and from semi-feudal servitude to their native rulers. That servitude existed in many forms all over the archipelago, but among the most curious must be reckoned the pandelingschap or " pledgedom," which originated in Borneo, and according to which a man had the power to make his debtors his serfs until their debts were paid.

The reform movement was aided by the publication in i860 of Max Havelaar, a romance by E. Douwes Dekker (q.v.), which contained a scathing indictment of the colonial system. Many important financial and agrarian measures were carried between i860 and 1890. In 1863 Fransen van de Putte, minister for the colonies, introduced the first of the annual colonial budgets for

which the Regulations had provided, thus enabling the states- general to control the revenue and expenditure of Netherlands India; in 1865 he reduced and in 1872 abolished the differentia- tion of customs dues in favour of goods imported from Holland, substituting a uniform import duty of 6% and establishing a number of free ports throughout the archipelago. The import duty was considered so moderate that an increase required for revenue purposes was readily conceded in 1886. In 1876 the practice of paying a yearly surplus (batig slot) from the revenues of Netherlands India to the treasury at the Hague was discon- tinued. The chief reforms in the land system were those intro- duced by De Waal, then minister for the colonies, in 1870. The cultivation of pepper, cochineal, cinnamon and indigo for the government had already ceased ; De Waal restricted the area of the sugar plantations (carried on by forced native labour) as from 1878, and provided for their abolition after 1890. He also enabled natives to secure proprietary rights over the land they cultivated, and legalized the leasing of Crown forest-lands to Europeans.

The extension of Dutch political power — notably in Java, Sumatra, Celebes, the Moluccas, Borneo, the Sunda Islands and New Guinea — proceeded simultaneously with the reform move- ment, and from time to time involved war with various native states. A large expedition was sent to Lombok in 1894, and almost the whole of that island was incorporated in the Dutch dominions. The long and costly war with Achin (q.v.) began in 1873 and reached its climax in the military occupation of the country after 1905, when the native sultan surrendered and was deported. A guerrilla war was still carried on by his subjects, but their principal leader, the chief Panglima Polim, was captured in 1907; in 1 908-1910 the condition of Achin under the military rule of General Swart was one of almost unbroken peace, and taxes were regularly paid.

While the Dutch were thus consolidating their authority, other countries were acquiring new commercial or colonial interests in the archipelago. Immigration from China and Japan steadily increased, especially towards the end of the period 1816-1910. The enterprise of Sir James Brooke (q.v.) led, after 1838, to the establishment of British sovereignty in North Borneo; in 1895 New Guinea was divided between Great Britain, Germany and the Netherlands; and the Spanish-American War of 1898 resulted in the cession of the Philippines, Sulu Island and the largest of the Mariana Islands to the United States, and the sale of the Caroline group to Germany. Australian and Japanese trade in the archi- pelago was stimulated by the establishment of the Australian Commonwealth (1901)

and the Russo-Japanese War (1904-5). In 1910 the nations most directly interested in the future of the archipelago were the Netherlands, Great Britain, the United States, Germany, Japan, China and Portugal.

Bibliography. — For the period 1511-1595, the chief Portuguese authorities are the chronicles of Barros, Corr&a, Castanheda and Couto (see Portugal: History), with the letters of Xavier (g.u.), and the Tratado of A. Galvao (Lisbon, 1563 and 1731), of which a translation entitled Discoveries of the World was made for Richard Hakluyt and reprinted by the Hakluyt Society (London, 1862). See also M. F. de Navarette, Coleccion de los viages (vols. 4 and 5, Madrid, 1837). For later history see John Crawfurd, History of the Indian Archipelago (Edinburgh, 1820), which quotes from native as well as European records, and Twentieth-Century Impressions of Netherlands India (ed. A. Wright, London, 1910), which gives references to the principal English and Dutch authorities. Further bibliography will be found in J. A. van der Chijs, Proeve eener neder- landsch-indische Bibliografie, 1659-1870 (Batavia, 1875).

MALAYIR, a small province of Persia, situated between Hamadan and Burujird. It has a population of about 70,000, and, together with the district Tusirkhan, pays a yearly revenue of about £13,000. It produces much corn and fruit; a great quantity of the latter, dried, is exported. Its capital and seat of government is Doletabad (Dowletabad) , a thriving little city, with a population of about 5000, situated at an elevation of 5680 ft., 38 m. from Hamadan and 32 m. from Burujird. It has post and telegraph offices.

MALAY PENINSULA (called by the Malays Tanah Malayu, i.e. the Malay Land), a lozenge-shaped strip of land projecting

into the China Sea, and forming the most southerly portion of the continent of Asia. Geographically, the peninsula begins at the isthmus of Kra, io° N., at which point it is only between 60 and 70 m. in width, and the distance from sea to sea is further diminished by a large irregular salt-water inlet. Politically and anthropologically, however, this upper portion must be regarded as a continuation of the kingdom of Siam rather than as a section of Malaya. From the isthmus of Kra the peninsula extends south with a general inclination towards the east, the most southerly point being Tanjong Bulus in i° i6|' N. A line drawn diagonally down the centre from the isthmus of Kra to Cape Romania (Ramunya) gives the extreme length at about 750 miles. The breadth at the widest point, from Tanjong Pen-unjut in Trengganu to Tanjong Hantu in the Dindings territory, is about 200 m. The area is estimated at about 70,000 sq. m. The peninsula is bounded on the N. by Siam, on the S. by the island and strait of Singapore, on the E. by the China Sea, and on the W. by the Strait of Malacca.

Physical Characteristics. — A range of granite mountains forms a backbone which divides the peninsula into two unequal portions, the larger of which lies to the east and the smaller to the west of the chain. Smaller ranges run parallel to the main mountain chain in many places, and there are numerous isolated spurs which have no connexion with either. The country is covered with limestone in many parts, and large isolated bluffs of this formation stand up in the plains both on the eastern and the western slopes. The descent from the summits of the range into the plain is somewhat less abrupt on the western than it is on the eastern side, and between the foot of the mountains and the Strait of Malacca the largest known alluvial deposits of tin are situated. On the eastern side of the range, after a steep descent, the granite formation speedily gives place to slates of vast depth, intersected here and thereby fissures of quartz contain- ing gold, and in many places covered by limestone which has been superimposed upon the slates. The highest known peak in the main range is that of Gunong Korbu, 7217 ft. above sea-level. The highest mountain is believed to be Gunong Tahan, which forms part of an isolated range on the eastern side, between Pahang and Kelantan, and is estimated at about 8000 ft. The west coast throughout its whole length is covered to a depth of some miles with mangrove swamps, with only a few isolated stretches of sandy beach, the dim foliage of the mangroves and the hideous mud flats presenting a depressing spectacle. On the east coast the force of the north-east monsoon, which beats upon the shores of the China Sea annually from November to February, has kept the land for the most part free from mangroves, and the sands, broken here and there by rocky headlands thickly wooded, and fringed by casuarina trees, stretch for miles without interruption. The islands on each coast present the features of the shore to which they are adjacent. On both the east and the west coast the islands are thickly wooded, but whereas the former are surrounded by beautiful sands and beaches, the latter are fringed by mangrove-swamps. The whole peninsula may be described as one vast forest, inter- sected in every direction by countless streams and rivers which together form the most lavish water-system in the world. Only an insignificant fraction of these forests has ever been visited by human beings, the Malays and even the aboriginal tribe having their homes on the banks of the rivers, and never, even when travel- ling from one part of the country to another, leaving the banks of a stream except for a short time when passing from one river-system to another. The bulk of the jungle, therefore, which lies between stream and stream, has never been trodden by the foot of man. The principal rivers on the west coast are the Perak, the Bernam and the Muar. The first-named is far finer than its fellows, and is navigable for steamers for about 40 m. from its mouth, and for native craft for over 250 m. It is exceedingly shallow, however, and is not of much importance as a waterway. The Bernam runs through flat swampy country for the greater part of its course, and steam-

launches can penetrate to a distance of over 100 m. from its mouth, and it is therefore probably the deepest river. The country which it waters, however, is not of any value, and it is not much used. The Muar waters a very fertile valley, and is navigable fdr native boats for over 150 m. On the east coast the principal streams are the Petani, Telubin, Kelantan, Besut, Trengganu, Dungun, Kmamun, Kuantan, Pahang, Rompin, Endau and Sedeli, all guarded by difficult bars at their mouths, and dangerous during the continuance of the north-east monsoon. The deepest rivers are the Kuantan and Rompin; the largest are the Kelantan and the Pahang, both of which are navigable for native boats for a distance of over 250 m. The Trengganu river is obstructed by impassable rapids at a distance of about 30 m. from its mouth. The rivers on the east coast are practically the only highways, the Malays always travelling by boat in preference to walking, but they serve their purpose very indifferently, and their great beauty is their chief claim to distinction. Magnificent caves are found on both slopes of the peninsula, those at Batu in Selangor being the

finest on the west coast, while those of Chadu and Koto Glanggi in Pahang are the most extensive yet visited by Europeans on the east coast. They are all of limestone formation. So far as is known, the Malay Peninsula consists of an axial zone of crystalline rocks; flanked on each side by an incomplete band of sedimentary deposits. Granite is the most widely spread of the crystalline rocks; but dikes of various kinds occur, and gneiss, schist and marble are also met with. These rocks form the greater part of the central range, and they are often — especially thegranite — decomposed and rotten to a considerable depth. The sedimentary deposits include slate, limestone and sandstone. Impure coal has also been recorded. The limestone has yielded Proetus, Chonetes and other fossils, and is believed to be of Carboniferous age. In the sandstone Myophoria and other Triassic fossils have been found, and it appears to belong to the Rhaetic or Upper Trias. 1 The minerals produced are tin, gold, iron, galena and others, in insignificant quantities.

The tin occurs in the form of cassiterite, and is found chiefly in or near the crystalline rocks, especially the granite. As stream tin it occurs abundantly in some of the alluvial deposits derived from the crystalline area, especially on the west coast. Only two tin lodes are worked, however, and both are situated on the east coast, the one at Kuantan in Pahang, the other at Bandi in Trengganu territory. On the west coast no true lode has yet been discovered, though the vast alluvial deposits of tin found there seem to make such a discovery probable in the future. Since 1890 the tin produced

from these alluvial beds has supplied between 50% and 75% of the tin of the world. Gold is worked with success in Pahang, and has been exploited from time immemorial by the natives of that state and of Kelantan. Small quantities have also been found on the western slope in Perak.

Climate, &c. — It was formerly the custom to speak of the Malay Peninsula as an unhealthy climate, and even to compare it with the west coast of Africa. It is now generally admitted, however, that, though hot, it compares favourably with that of Burma. The chief complaint which Europeans make concerning it is the extreme humidity, which causes the heat to be more oppressive than is the case where the air is dry. On the other hand, the thermometer, even at Singapore on the southern coast, which is the hottest portion of the peninsula, seldom rises above 98 in the shade, whereas the mean for the year at that place is generally below 80 °. On the main- land, and more especially on the eastern slope, the temperature is cooler, the thermometer seldom rising above 93 ° in the shade, and 'falling at night below 70 . On an average day in this part of the peninsula the temperature in a European house ranged from 88° to 68°. The number of rainy days throughout the peninsula varies from 160 to over 200 in each year, but violent gusts of wind, called " Sumatras," accompanied by a heavy downpour of short duration, are more common than persistent rain. The rainfall on the west coast varies from 75 to 120 in. per annum, and that of the east coast, where the north-east monsoon breaks with all its fury, is usually about 155 in. per annum. Malarial fevers make their appearance in places where the forest has been recently felled, or where the sur- face earth has been disturbed. It is noticed that labourers employed in deep mines worked by shafts suffer less from fever than do those who are .engaged in stripping the alluvial deposits. This, of course, means that a new station, where clearing, digging, and building are in progress, is often unhealthy for a time, and to this must be attributed the evil reputation which the peninsula formerly enjoyed. To Europeans the climate is found to be relaxing and enervating, but if, in spite of some disinclination for exertion, regular exercise is taken from the beginning, and ordinary precautions against chills, more especially to the stomach, are adopted, a European has almost as good a chance of remaining in good health in the peninsula as in Europe. A change of climate, however, is imperatively necessary every five or six years, and the children of European parents should not be kept in the peninsula after they have attained the age of four or five years. The Chinese immigrants suffer chiefly from fever of a malarial type, from beri-beri, a species of tropical dropsy, and from dysentery. The Malays formerly suffered severely from small- pox epidemics, but in the portion of the peninsula under British rule vaccination has been introduced, and the ravages of the disease no longer assume serious dimensions. Occasional outbreaks of cholera occur from time to

time, and in the independent states these cause terrible loss of life, as the natives fly from the disease and spread the infection in every direction. As a whole, the Malays are, however, a remarkably healthy people, and deformity and heredi- tary diseases are rare among them. There is little leprosy in the peninsula, but there is a leper hospital near Penang on Pula Deraja and another on an island on the west coast for the reception of lepers from the Federated Malay States.

Flora and Fauna. — The soil of the peninsula is remarkably fertile both in the plains and on the mountain slopes. In the vast forests the decay of vegetable matter during countless ages has enriched

1 See R. B. Newton, " Notes on Literature bearing upon the Geology of the Malay Peninsula; with an Account of a Neolithic Implement from that Country " (Geol. Mag., 1901, pp. 128-134). See also the various reports by J. B. Scrivenor in Suppl. Perak Got. Gazette, 1905.

the soil to the depth of many feet, and from it springs the most marvellous tangle of huge trees, shrubs, bushes, underwood, creepers, climbing plants and trailing vines, the whole hung with ferns, mosses, and parasitic growths, and bound together by rattans and huge rope-like trailers. In most places the jungle is so dense that it is impossible to force a way through it without the aid of a wood-knife, and even the wild beasts use well-worn game-tracks through the forest. In the interior brakes of bamboos are found, many of which spread for miles along the river banks. Good hard-wood timber is found in plenty, the best being the merabau, penak, rasok and chengal. Orchids of countless varieties abound. The principal fruit trees are the duri-an, mangosteen, custard-apple, pomegranate, rambut-an, pulas-an, langsat, ram6az',,jack-fruit, coco-nut, areca-nut, sugar-palm, and banana. Coffee, tobacco, sugar-cane, rice, pepper, gambier, cotton and sago are cultivated with success. Great developments have been made of recent years in the cultivation of rubber in British Malaya. The principal jungle products are gutta and rubber of several varieties, and many kinds of rattan. The man- grove grows on the shores of the west coast in profusion. Agila- wood, the camphor tree, and ebony are also found in smaller quantities.

The fauna of the peninsula is varied and no less profuse than is the vegetable life. The Asiatic elephant; the seladang, a bison of a larger type than the Indian gaur; two varieties of rhinoceros ; the honey bear (bruang), the tapir, the sambhur (rusa) ; the speckled deer (kijang), three varieties of mouse-deer (napoh, plandok and kanchil) ; the gibbon (ungka or wawa'), the siamang, another species of anthropoid ape, the brok or coco-nut monkey, so called because it is trained by the Malays to gather the nuts from the coco^nut trees, the lotong, kra, and at least twenty other kinds of

monkey; the binturong {arctictis binturong), the lemur; the Asiatic tiger, the black panther, the leopard, the large wild cat (harimau akar), several varieties of jungle cat; the wild boar, the wild dog; the flying squirrel, the flying fox; the python, the cobra, and many other varieties of snake, including the hamadryad; the alligator, the otter and the gavial, as well as countless kinds of squirrel, rat, &c, are found throughout the jungles of the peninsula in great numbers. On the east coast peafowl are found, and throughout the interior the argus pheasant, the firebacked pheasant, the blue partridge, the adjutant- bird, several kinds of heron and crane, duck, teal, cotton-teal, snipe, wood-pigeon, green-pigeon of several varieties, swifts, swallows pied-robins, hornbills, parakeets, fly-catchers, nightjars, and many other kinds of bird are met with frequently. A few specimens of solitary goose have been procured, but the bird is rarely met with. The forests literally swarm with insects of all kinds, from qcadae to beautiful butterflies, and from stick- and leaf-insects to endless varieties of ants. The scorpion and the centipede are both common. The study of the insect life of the peninsula opens a splendid field for scientific research, and the profusion and variety of insects found in these forests probably surpass those to be met with anywhere else in the world.

Political Divisions and Population. — Politically the Malay Peninsula is divided into four sections: the colony of the Straits Settlements and the Federated Malay States; the independent Malay State of Johor, which is within the British sphere of in- fluence; the non-federated states under British protection; and the groups of states to the north of Perak and Pahang which are now recognized as lying within the sphere of influence of Siam. The colony of the Straits Settlements consists of the islands of Singapore, Penang and the Dindings, the territory of Province Wellesley, on the mainland opposite to Penang, the insignificant territory of the Dindings, and the town and territory of Malacca. The Federated Malay States under British protection consist of the sultanates of Perak, Selangor and the'Negri Sambilan on the west coast, and the sultanate of Pahang on the east coast. Johor is the only Malay state in the southern portion of the peninsula, the whole of which is within the British sphere, which has been suffered to remain under native rule. The non-federated states under British protection (since 1909) are Kelantan, Trengganu, Kedah and Perlis (Palit). The population of the peninsula num- bers about 2,000,000, of whom about 600,000 inhabit the colony of the Straits Settlements, about 900,000 the Federated Malay States, about 200,000 the Malay State of Johor, and about 250,000 to 300,000 the remainder of the peninsula. The popula- tion of the peninsula includes about 850,000 Chinese, mostly immigrants or descendants of immigrants from the southern provinces of China, of whom about 300,000 reside in the colony of the Straits Settlements, 365,000 in the Federated Malay States, 150,000 in Johor, and the

remainder in smaller communities or as isolated traders scattered throughout the villages and small towns of the peninsula. The Malay population of the peninsula, including immigrants from the eastern archipelago, number

some 750,000 to 800,000, while the Tamils and other natives of India number about 100,000, the aboriginal natives of the pen- insula perhaps 20,000, Europeans and Americans about 6500, and Eurasians about 9000. The colony of the Straits Settlements, and to a lesser extent the towns of the Federated Malay States, carry a considerable heterogenous population, in which most of the races of Asia find their representatives.

Races of the Peninsula. — Excluding the Tai, or Siamese, who are undoubtedly recent intruders from the north, there are three races which for an extended period of time have had their home in the Malay Peninsula. These are the Semang or Pangan, the Sakai or Jakun, and the Malays. The Semang, as they are most usually called by the Malays, are Negritos — a small, very dark people, with features of the negroid type, very prognathous, and with short, woolly hair clinging to the scalp in tiny crisp curls. These people belong to the race which would seem to be the true aboriginal stock of southern Asia. Representatives of it are found scattered about the islands from the Andaman group southwards. The state of civilization to which they ha,ve attained is very low. They neither plant nor have they any manufactures except their rude bamboo and rattan vessels, the fish and game traps which they set with much skill, and the bows, blow-pipes and bamboo spears with which they

are armed. They are skilful hunters, however, catch fish by in- geniously constructed traps, and live almost entirely on jungle-roots and the produce of their hunting and fishing. The most civilized of these people is found in Upper Perak, and the members of this clan have acquired some knowledge of the art of planting, &c. They cannot, however, be taken as typical of their race, and other specimens of this people are seldom seen even by the Sakai. From time to time they have been raided by the latter, and many Negritos are to be found in captivity in some of the Malayan villages on the eastern side of the peninsula. The mistake of speaking of the Sakai tribes as practically identical with the Semang or Pangan has very frequently been made, but as a matter of fact the two races are absolutely distinct from one another. It has also been customary to include the Sakai in the category of Malayan races, but this too is un- doubtedly incorrect. The Sakai still inhabit in greatest numbers the country which forms the interior of Pahang,

the Plus and Kinta districts of Perak, and the valley of Nenggiri in Kelantan. Representatives of their race are also found scattered among the Malayan villages through- out the country, and also along the coast, but these have intermixed so much with the Malays, and have acquired so many customs, &c, from their more civilized neighbours, that they can no longer be regarded as typical of the race to which they belong. The pure Sakai in the interior have a good knowledge of planting rice, tapioca, &c, fashion pretty vessels from bamboos, which they decorate with patterns traced by the aid of fire, make loin-cloths (their only garment) from the bark of the trap and ipoh trees; are very musical, using a rude lute of bamboo, and a nose- flute of a very sweet tone, and singing in chorus very melodiously; and altogether have attained in their primitive state to a higher degree of civilization than have the Semang. They are about as tall as the average Malay, are slimly built, light of colour, and have wavy fine hair. In their own language they usually have only three numerals, viz. na-nun, one; nar, two; and ne', three, or variants of these ; all higher arithmetical ideas being expressed by the word kerpn, which means " many." A few cases have been re- corded, however, of tribes who can count in their own tongue up to four and five. Among the more civilized, however, the Malay numerals up to ten are adopted by the Sakai. An examina- tion of their language seems to indicate that it belongs to the Mon-Khmer group of languages, and the anthropological information forthcoming concerning the Sakai points to the conclusion that they show a greater affinity to the people of the Mon-Khmer races than to the Malayan stock. ■ Though they now use metal tools imported by the Malays, it is noticeable that the names which they give to those weapons which most closely resemble in character the stone imple- ments found in such numbers all over the penin- sula are native names wholly unconnected with their Malay equivalents. On account of this, it has been suggested that in a forgotten past the Sakai were themselves the fashioners of the stone implements, and certain it is that all tools which have no representatives among the stone kelts are known to the Sakai by obvious corrup- tions of their Malayan names. The presence of the Sakai, a people of the Mon-Khmer stock, in the interior of the peninsula has also been con- sidered as one of many proofs that the Malays intruded from the south and approached the peninsula by means of a sea-route, since had they swept down from the north, being driven thence by the people of a stronger breed, it might be expected that the fringe of country dividing the two contending races would be inhabited by men of the more feeble stock. Instead, we find the Sakai occupying this position, thus indicating that they have been driven northward by the Malays, and that the latter people has not been expelled by the Mon-Khmer races from the countries now represented by Burma, Siam and French Indo-China. The Sakai population is dying out, and must even- tually disappear. (With regard to the Malay, see Malays.)

Archaeology. — The only ancient remains found in the peninsula are the stone implements, of which mention has already been made, and some remarkable ancient mines, which are situated in the Jelai valley in Pahang. The stone implements are generally of one or two types : a long rectangular adze or wedge rudely pointed at one end, and used in conjunction with a mallet or flat stone, and a roughly triangular axe-head, which has evidently been fixed in the

cleft of a split stick. A few stones, which might perhaps be arrow- heads, have been found, but they are very rare. The mines, which have been constructed for the purpose of working quartz lodes containing gold, are very extensive, and argue a high stage of civiliza- tion possessed by the ancient miners. They consist of a number of circular or rectangular pits sunk from the cap of a hill, and going down to a depth of in some cases as much as 120 ft., until in fact the miners have been stopped by being unable to cope with the quantity of water made when the level of the valley was reached. The shafts are placed so close together that in many instances they are divided by only a couple of feet of solid ground, but at their bases a considerable amount of gallery work has been excavated, though it is possible that this was done by miners who came after the people who originally sank the shafts. Native tradition attributes these mines to the Siamese, but no importance can be attached to this, as it is very general for the Malays to give this explanation for any- thing which is obviously not the work of their own ancestors. A theory, which seems to have some probability in its favour, is that these mines were worked by the Khmer people during the period of power, energy and prosperity which found its most lofty expression in the now ruined and deserted city of Angkor Thom ; while another attributes these works to the natives of India whose Hindu remains are found in Java and elsewhere, whose influence was at one time widespread throughout Malayan lands, and of whose religious teaching remnants still linger in the superstitions of the Malays and are preserved in some purity in Lombok and Bali. In the absence, however, of any relics of a kind which might lead to the identification of the ancient miners, their nationality and origin are matters which must continue to be mere questions of speculation and conjecture.

History. — The first hint to reach Europe concerning the exist- ence of habitable lands to the eastward of the Ganges is to be found in the writings of Pomponius Mela (a.d. 43) which speak of Chryse, or the Golden Isle, as lying off Cape Tamus — supposed to be the most easterly point in Asia — and over against the estuary of the Ganges. Thereafter there occur vague

references to Chryse in the Periplus of the Erythrean Sea, &c., but the earliest trace of anything resembling first-hand knowledge concerning the peninsula of Indo-China and Malaya is revealed in the writings of Ptolemy, whose views were mainly derived from those of his predecessor Marinus of Tyre, who in his turn drew his deductions from information supplied to him by the mariner Alexander who, there is every reason to think, had himself voyaged to the Malay Peninsula and beyond. In the light of present knowledge concerning the trade-routes of Asia, which had been in existence for thousands of years ere ever Europeans attempted to make use of them, it is safe to identify Ptolemy's Sinus Perimulicus with the Gulf of Siam, the Sinus Sabaricus with the Straits of Malacca from their southern portals to the Gulf of Martaban, the Aurea Chersonesus with the Malay Penin- sula, and the island of Iabadius or Sabadius — the reading of the name is doubtful — with Sumatra, not as has often been mis- takenly attempted with Java. Although the first definite endeavour to locate the Golden Chersonese thus dates from the middle of the 2nd century of pur era, the name was apparently well known to the learned of Europe at a somewhat earlier period, and in his Antiquities of the Jews, written during the latter half of the 1st century, Josephus says that Solomon gave to the pilots furnished to him by Hiram of Tyre commands " that they should go along with his stewards to the land that of old was called Ophir, but now the Aurea Chersonesus, which belongs to India, to fetch gold." After the time of Ptolemy no advance in know- ledge concerning the geography of south-eastern Asia was made until Cosmas Indicopleustes, a monk and an Alexandrian Greek, wrote from personal knowledge between a.d. 530 and 550. His primary object was to prove that the world was built after the same shape and fashion as the Ark made by the Children of Israel in the desert; but he was able to show that the Malay Peninsula had to be rounded and thereafter a course steered in a northerly direction if China was to be reached. Meanwhile inter-Asiatic intercourse by means of sea-routes had been steadily on the increase since the discovery of the way to utilize the monsoons and to sail directly to and fro across the Indian Ocean (attributed to the Greek pilot Hippalus) had been made. After the decline of the power of Rome, the dominant force in Asiatic commerce and navigation was Persia, and from that time onward, until the arrival of the Portuguese upon the scene early in the 16th century the spice trade, whose chief emporia were in or near the Malay

Peninsula, was in Persian or Arab hands. There is considerable reason to think, however, that the more frequent ports of call in the Straits of Malacca were situated in Sumatra, rather than on the shores of the Malay Peninsula, and two famous medieval travellers, Marco Polo and Ibn Batuta, both called and wintered at the former, and make scant mention of the latter.

The importance of the Malay Peninsula, as has been noted, consisted in the privilege which its locality conferred upon it of being the distributing centre of the spices brought thither from the Moluccas en route for India and Europe. As early as the 3rd century B.C. Megasthenes makes mention of spices brought to the shores of the Ganges from " the southern parts of India," and the trade in question was probably one of the most ancient in the world. So long, however, as India held the monopoly of the clove, the Malay Peninsula was ignored,'the Hindus spread- ing their influence through the islands of the archipelago and leaving traces thereof even to this day. The Mahommedan traders from Persia and Arabia, following the routes which had been prepared for them by their forebears, broke down the Hindu monopoly and ousted the earlier exploiters so effectually that by the beginning of the 16th century the spice trade was almost exclusively in their hands. These traders were also missionaries of their religion, as indeed is every Mahommedan, and to them is due the conversion of the Malays from rude pantheism, some- what tinctured by Hindu mythology, to the Mahommedan creed. The desire to obtain the monopoly of the spice trade has been a potent force in the fashioning of Asiatic history. The Moluccas were, from the first, the objective of the Portuguese invaders, and no sooner had the white men found their way round the Cape of Good Hope and established themselves successively upon the coast of East Africa, in the neighbourhood of the Gulf of Aden and the Malabar coast, than Malacca, then the chief trading centre of the Malayan Archipelago, became the object of their desire. The first Portuguese expedition sent out to capture Malacca was under the command of Diogo Lopez de Siqueira and sailed from Portugal in 1508. At Cochin Siqueira took on board certain adherents of Alphonso d'Alboquerque who were in bad odour with his rival d'Almeida, among them being Magellan, the future circumnavigator of the world, and Francisco Serrao, the first European who ever lived in the Spice Islands. Siqueira's expedition ended in failure, owing partly to the aggressive attitude of the Portuguese, partly to the very justifi- able suspicions of the Malays, and he was presently forced to destroy one of his vessels, to leave a number of his men in cap- tivity, and to sail direct for Portugal. In 1510 a second expedi- tion against Malacca was sent out from Portugal under the command of Diogo Mendez de Vasconcellos, but d'Alboquerque retained it at Cochin to aid him in the retaking of Goa, and it was not until 1511 that the great viceroy could spare time to turn his attention to the scene of Siqueira's failure. After some futile negotiations, which had for their object the recovery of the Portuguese captives before hostilities should begin, an assault was delivered upon Malacca, and though the first attempt to take the city failed after some hard fighting, a second assault made some days later succeeded, and Malacca passed for ever into European hands. The Portuguese were satisfied with the possession of Malacca itself and did not seek further to extend their empire

in Malaya. Instead they used every endeavour to establish friendly relations with the rulers of all the neighbour- ing kingdoms, and before d'Alboquerque returned to India he despatched embassies to China, Siam, and several kingdoms of Sumatra, and sent a small fleet, with orders to assume a highly conciliatory attitude toward all natives, in search of the Moluccas. Very soon the spice trade had become a Portuguese monopoly, and Malacca was the great headquarters of the trade. It should moreover be noted that Magellan's famous expedition had for its object not the barren feat of circumnavigation but the break- ing down of this monopoly, without violating the terms of the papal bull which gave to Spain the conquest of the West, to Portugal the possession of the East., In 1528 a French expedi- tion sailed from Dieppe, penetrated as far as Achih in Sumatra, but returned without reaching the Malay Peninsula. It was,

however, the first attempt ever made to defy the papal bull. In 1 59 1, three years after the defeat of the Armada, Raymond and Lancaster rounded the Cape, and after cruising off Penang, decided to winter in Achin. They subsequently hid among the Pulau Sambilan near the mouth of the Perak river, and thence captured a large Portuguese vessel which was sailing from Malacca in company with two Burmese ships. In 1595 the first Dutch expedition sailed from the Texel, but it took a more southerly course than its predecessors and confined its operations to Java and the neighbouring islands. During this period Achin developed a determined enmity to the Portuguese, and more than one attempt was made to drive the strangers from Malacca. Eventually, in 1641, a joint attack was made by the Achinese and the Dutch, but the latter, not the people of the sturdy little Sumatran kingdom, became the owners of the coveted port. Malacca was taken from the Dutch by the British in 1 795 ; was restored to the latter in 1818; but in 1824 was exchanged for Benkulen and a few more unimportant places in Sumatra. The first British factory in the peninsula was established in the native state of Patani on the east coast in 1613, the place having been used by the Portuguese in the 16th century for a similar purpose; but the enterprise came to an untimely end in 1620 when Captain Jourdain, the first president, was killed in a naval engagement in Patani Roads by the Dutch. Penang was purchased from Kedah in 1786, and Singapore from the then sultan of Johor in 1819. The Straits Settlements — Singapore, Malacca and Penang — were ruled from India until 1867, when they were erected into a crown colony under the charge of the Colonial Office. In 1874 the Malay state of Perak was placed under British protection by a treaty entered into with its sultan; and this eventually led to the inclusion in a British protectorate of the neighbouring Malay States of

Selangor, Sungei Ujong, the cluster of small states called the Negri Sembilan and Pahang, which now form the Federated Malay States. By a treaty made between Great Britain and Siam in 1902 the northern Malay states of the penin- sula were admitted to lie within the Siamese sphere of influence, but by a treaty of 1909 Siam ceded her suzerain rights over the states of Kelantan, Trengganu, Kedah and Perlis to Britain.

Singapore is the political, commercial and administrative headquarters of the colony of the Straits Settlements, and the governor for the time being is ex officio high commissioner of the Federated Malay States, British North Borneo, Sarawak, the Cocos-Keeling and Christmas Islands, and governor of Labuan.

See Sir F. Swettenham, British Malaya (1906); H. Clifford, Further India (1904); Journal of the Malay Archipelago, Logan (Singapore) ; Journal of the Straits Branch of the Royal Asiatic Society (Singapore) ; Weld, Maxwell, Swettenham and Clifford in the Journal of the Royal Colonial Institute (London) ; Clifford in the Journal of the Royal Geographical Society (London). (H. Cl.)

MALAYS, the name given by Europeans to the people calling themselves Orang Malayu, i.e. Malayan folk, who are the domi- nant race of the Malay Peninsula and of the Malay Archipelago. Broadly speaking, all the brown races which inhabit the portion of Asia south of Siam and Indo-China, and the islands from the Philippines to Java, and from Sumatra to Timor, may be described as belonging to the Malayan family, if the aboriginal tribes, such as the Sakai and Semang in the Malay Peninsula, the Bataks in Sumatra, and the Muruts in Borneo, be excepted. For the purposes of this article, however, only those among these races which bear the name of Orang Malayu, speak the Malayan language, and represent the dominant people of the land, can be included under the title of Malays. These people inhabit the whole of the Malayan Peninsula to the borders of lower Siam, the islands in the vicinity of the mainland, the shores of Sumatra and some portions of the interior of that island, Sarawak and Brunei in Borneo, and some parts of Dutch Borneo, Batavia and certain districts in Java, and some of the smaller islands of the archipelago. Though in these lands they have for npt less than a thousand years enjoyed the position of the dominant race, they all possess a tradition that they are not indigenous, and that their first rulers " came out of the sea," with a large band of Malayan warriors in their train. In the peninsula

especially, where the presence of the Malays is more recent than elsewhere, many traditions exist which point to a comparatively recent occupation of the country. It has been remarked that there is evidence that the Malays had attained to a certain stage of civilization before ever they set foot in

Malaya. For instance, the names which they give to certain fruits, such as the duri-an, the rambul-an and the pulas-an, which are indigenous in the Malayan countries, and are not found elsewhere, are all com- pound words meaning respectively the thorny, the hairy and the twisted fruit. These words are formed by the addition of the substantial affix " -an," the use of which is one of the recognized methods by which the Malays turn primitive words into terms of more complex meaning. This may be taken to indicate that when first the Malays became acquainted with the fruits which are indigenous in Malayan lands they already possessed a language in which most primary words were represented, and also that their tongue had attained to a stage of development which provided for the formation of compound words by a system sanctioned by custom and the same linguistic instinct which causes a Malay to-day to form similar compounds from European and other foreign roots. For any aboriginal race inhabiting these countries, such important articles of diet as the duri-an, &c, could not fail to be among the first natural objects to receive a name, and thus we find primary terms in use among the Sakai and Semang, the aborigines of the Peninsula, to de- scribe these fruits. The use by the Malays of artificially con- structed terms to denote these things may certainly be taken to strengthen the opinion that the Malays arrived in the lands they now inhabit at a comparatively late period in their history, and at a time when they had developed considerably from the original state of primitive man.

In the Malay Peninsula itself there is abundant evidence, ethnological and philological, of at least two distinct immigra- tions of people of the Malayan stock, the earlier incursions, it is probable, taking place from the eastern archipelago to the south, the later invasion spreading across the Straits of Malacca from Sumatra at a comparatively recent date. The fact that the semi-wild tribes, which are ethnoiogically Malayan and distinct from the aboriginal Semang and Sakai, are met with almost invariably in the neighbourhood of the coast would seem to indicate that they reached the peninsula by a sea, not by a land route, a supposition which is strengthened by their almost amphibious habits. Many of these tribes have retained their pristine paganism, but many others it is certain have adopted the Mahommedan religion and have been assimilated by the subsequent and stronger wave of Sumatran immigrants. A study of the local dialects to be met with in some of the districts of the far interior, e.g. the Tembeling valley in Pahang, whose people are now Mahommedans and in many respects indis- tinguishable from the ordinary Malays of the peninsula, reveals the fact that words, current in the archipelago to the south but incomprehensible to the average peninsula Malays, by whom these more ancient populations are now completely surrounded, have been preserved as local words, whereas they really belong to an older dialect once spoken widely in the peninsula, as to-day it is spoken in the Malayan islands. This

would seem to show that in some instances the earlier Malay immigrants fell or were driven by the later invaders back from the coast and sought refuge in the far interior.

Until recently many eminent scientists held the theory that the Malayan peoples were merely an offspring of the Mongol stock, and that their advance into the lands they now in- habit had taken place from the cradle of the Mon- 0r /„ /n golian race — that is to say, from the north. In the fifth edition of his Malay Archipelago, A. R. Wallace notes the resemblance which he traced between the Malays and the Mongolians, and others have recorded similar observations as to the physical appearance of the two races. To-day, however, fuller data are available than when Wallace wrote, and the more generally accepted theory is that the Malayan race is distinct, and came from the south, until it was stayed by the Mongolian races living on the mainland of southern Asia. The cranial

measurements of the Malays and an examination of their hair sections seem to bear out the theory that they are distinct from the Mongolian races. Their language, which is neither mono- syllabic nor tonic, has nothing in common with that of the Mon- Annam group. It has, moreover, been pointed out that had the Malays been driven southwards by the stronger races of the mainland of Asia, it might be expected that the people inhabiting the country nearest to the border between Siam and Malaya would belong to the Malayan and not to the Mon-Annam or Mon-Khmer stock. As a matter of fact the Sakai of the interior of the peninsula belong to the latter race. It might also be anticipated, were the theory of a southward immigration to be sustained, that the Malays would be new-comers in the islands of the archipelago, and have their oldest settlements on the Malayan Peninsula. The facts, however, are in exact contradic- tion to this; and accordingly the theory now most generally held by those who have studied the question is that the Malays form a distinct race, and had their original home in the south. Where this home lay it is not easy to say, but the facts recorded by many writers as to the resemblance between the Polynesian and the Malayan races, and the strong Malayan element found in the languages of the former (see Tregear's Maori and Comparative Polynesian Dictionary, London, 1801), have led some students to think that the two races may have had a common origin. John Crawfurd, in the Dissertation to his Dictionary of the Malay Language, published in 1840, noted the prevalence of Malayan terms in the Polynesian languages, and attributed the fact to the casting away of ships manned by Malays upon the islands of the Polynesian Archipelago. The appearance of the same

Malayan words in localities so widely separated from each other, however, cannot be satisfactorily accounted for by any such explanation, and the theory is now more generally held that the two races are probably allied and may at some remote period of history have shared a common home. It has been suggested that their separation did not take place until after the continent which once existed in the north Pacific had become submerged, and that the Malays wandered northward, while the Polynesian race spread itself over the islands of the southern archipelago. All this, however, must necessarily be of the nature of the purest speculation, and the only facts which we are able to deduce in the present state of our knowledge of the subject may be summed up as follows: (a) That the Malays ethnologically belong to a race which is allied to the Polynesians; (b) that the theory formerly current to the effect that the Sakai and other similar races of the peninsula and archipelago belonged to the Malayan stock cannot be maintained, since recent investigations tend to identify them with the Mon-Annam or Mon-Khmer family of races; (c) that the Malays are, comparatively speaking, new- comers in the lands which they now inhabit; (d) that it is almost certain that their emigration took place from the south; (e) and that, at some remote period of their history, they came into close contact with the Polynesian race, probably before its dispersion over the extensive area which it now occupies.

The Malays to-day are Sunni Mahommedans of the school of Shafi'i, and they habitually use the terms Orang Malayu, i.e. a Malay, and Orang Islam, i.e. a Mahommedan, as synonymous Religion expressions. Their conversion from paganism took and Super- p i ace during the 13th, 14th and 15th centuries of our era. stltlons. qˆe raja of Achin, in northern Sumatra, is said to have been converted as early as 1206, while the Bugis people in Celebes are supposed not to have become Mahommedans until 1495. Mahommedanism undoubtedly spread to the Malays of the peninsula from Sumatra, but their conversion was slow and gradual, and may even now in some respects be regarded as imperfect. Upon the bulk of the Malayan peoples their religion sits but lightly. Few are found to observe the law concerning the Five Hours of Prayer, and many fail to put in an appearance at the Friday congregational services in the mosques. The Fast of Ramadhan, however, is generally ob- served with some faithfulness. Compared with other Mahommedan peoples, the Malays are not fanatical, though occasionally an out- break against those of a different creed is glorified by them into a holy war. The reason of such outbreaks, however, is usually to be found in political and social rather than in religious grievances. Prior to their conversion to Mahommedanism the Malays were subjected to a considerable Hindu influence, which reached them by means of the traders who visited the archipelago from India. In

the islands of Bali and Lombok the people still profess a form of Hinduism,

and Hindu remains are to be found in many other parts of the archipelago, though their traces do not extend to the peninsula. Throughout, however, the superstitions of the Malays show indi- cations of this Hindu influence, and many of the demons whom their medicine-men invoke in their magic practices are clearly borrowed from the pantheon of India. For the rest, a substratum of superstitious beliefs, which survives from the days when the Malays professed only their natural religion, is to be found firmly rooted in the minds of the people, and the influence of Mahommedanism, which regards such things with horror, has been powerless to eradi- cate this. Mr W. W. Skeat's Malay Magic (London, 1900) is a compilation of all the writings on the subject of Malay superstitions by the best authorities and contains considerable original matter.

The Malays of the coast are a maritime people, and were long famous for the daring character of their acts of piracy. They are now peaceable fisher-folk, who show considerable . .

*ingenuity in their calling. Inland the Malays live by *° . preference on the banks of rivers, building houses on e ' c "*

piles some feet from the ground, and planting groves of coco-nut, betel-nut, sugar-palm and fruit-trees around their dwellings. Behind their villages the rice-fields usually spread, and rice, which is the staple food of the people, is the principal article of agriculture among them. Sugar-cane, maize, tapioca and other similar products are grown, however, in smaller quantities. In planting nee three methods are in use: the cultivation of swamp-rice in irrigated fields; the planting of ploughed areas; and the planting of hill-rice by sowing each grain separately in holes bored for the purpose. In the irrigated fields the rice plants are first grown in nurseries, and are subsequently transplanted when they have reached a cer- tain stage of development. The Malays also work jungle produce, of which the most important are gutta, rattans, agila wood, camphor wood, and the beautiful kamuning wood which is used by the natives for the hilts of their weapons. The principal manufactures of the Malays are cotton and silk cloths, earthenware and silver vessels, mats and native weapons. The best cotton cloths are those manu- factured by the Bugis people in Celebes, and the batek cloths which come from Java and are stamped with patterns. The best silks are produced by the natives of Pahang, Kelantan and Johor in the Malay Peninsula. Lord Leighton pronounced the silver ware from Malaya to be the most artistic of any exhibited at the Colonial Exhibition held in London in 1886. The pottery of the Malays is rude but curious. When the first Europeans visited the Malay Archipelago the Malays had already acquired the art of manufac- turing gunpowder and forging canon. The art of writing also appears to have been independently invented by the Malayan races, since numerous alphabets are in use among the peoples of

the archipelago, although for the writing of Malay itself the Arabic character has been adopted for some hundreds of years. The Malays are excellent boat-builders.

While the Malays were famous almost exclusively for their piratical expeditions they naturally bore an evil reputation among Europeans, but now that we have come into closer ch d contact with them, and have learned to understand – ” r ‘ them better, the old opinions concerning them have been greatly modified. They used to be described as the most cruel and treacherous people in the world, and they certainly are callous of the pain suffered by others, and regard any strategy of which their enemies are the victims with open admiration. In ordinary circumstances, however, the Malay is not treacherous, and there are many instances recorded in which men of this race have risked their own lives on behalf of Europeans who chanced to be their friends. As a race they are exceedingly courteous and self-respecting. Their own code of manners is minute and strict, and they observe its provisions faithfully. Unlike many Orientals, the Malays can be treated with a friendly familiarity without such treatment breeding lack of respect or leading to liberties being taken with the superior. The Malays are indolent, pleasure-loving, improvident beyond belief, fond of bright clothing, of comfort, of ease, and they dislike toil exceedingly. They have no idea of the value of money, and little notion of honesty where money is concerned. They would always borrow rather than earn money, and they feel no shame in adopting the former course. They will frequently refuse to work for a wage when they most stand in need of cash, and yet at the invitation of one who is their friend they will toil unremittingly without any thought of reward. They are much addicted to gamb- ling, and formerly were much given to fighting, though they never display that passion for war in the abstract which is characteristic of some of the white races, and their courage on the whole is not high if judged by European standards. It is notorious, however, on the coasts that a Malay gang on board a ship invariably gets the better of any fight which may arise between it and the Chinese crew. The sexual morality of the Malays is very lax, but prostitution is not common in consequence. Polygamy, though allowed by their religion, is practised for the most part among the wealthy classes only. The Malays are an intensely aristocratic people, and show a marvellous loyalty to their rajas and chiefs. Their respect for rank is not marred by any vulgarity or snobbery. The ruling classes among them display all the vices of the lower classes, and few of the

virtues except that of courtesy. They are for the most part, when left to

their own resources, cruel, unjust, selfish and improvident.

Much has been written concerning the acts of homicidal mania called amuck (amok), which word in the vernacular means to attack. It was formerly believed that these outbursts were to be attributed to madness pur et simple, and some cases of amok can certainly be traced to this source. These are not, however, in any sense typical, and might equally have been perpetrated by men of another race. The typical amok is usually the result of circumstances which render a Malay desperate. The motive is often inadequate from the point of view of a European, but to the Malay it is sufficient to make him weary of life and anxious to court death. Briefly, where a man of another race might not improbably commit suicide, a Malay runs amok, killing all whom he may meet until he himself is slain.

The nervous affliction called latah, to which many Malays are subject, is also a curious trait of the people. The victims of this affliction lose for the time all self-control and all sense of their own identity, imitating the actions of any person who chances to rivet their attention. Accounts of these manifestations will be found in Swettenham's Malay Sketches (London, 1895) and Clifford's Studies in Brown Humanity (London, 1897).

The Malays wear a loose coat and trousers, and a cap or head- kerchief, but the characteristic item of their costume is the sarong. Costume a s '^ or c °tton cloth about two yards long by a yard W a n's anc ' a Q uarter wide, the ends of which are sewn together, – ' forming a kind of skirt. This is worn round the waist

ft folded in a knot, the women allowing it to fall to the

ankle, the men, when properly dressed in accordance with ancient custom, folding it over the hilt of their waist-weapon, and draping it around them so that it reaches nearly to the knee. In the hall of a raja on state occasions a head-kerchief twisted into a peak is worn, and the coat is furnished with a high collar extending round the back of the neck only. This coat is open in front, leaving the chest bare. The trousers are short and of a peculiar cut and material, being coloured many hues in parallel horizontal lines. The sarong is of Celebes manufacture and made of cotton, to the surface of which a high polish is imparted by friction with a shell. The typical fighting costume of the Malay is a sleeveless jacket with texts from the Koran written upon it, short tight drawers reaching to the middle of the thigh, and the sarong is then bound tightly around the waist, leaving the hilt of the dagger worn in the girdle exposed to view. The principal weapon of the Malays is the kris, a short dagger with a small wooden or ivory handle, of which there are many varieties. The blade of a kris may either be wavy or straight, but if wavy the number of waves must always be uneven in

number. The kris most prized by the Malays are those of Bugis (Celebes) manufacture, and of these the kind called tuasek are of the greatest value. Besides the short kris, the Malays use long straight kris with very narrow blades, shorter straight kris of the same form, short broad swords called sundang, long swords of ordinary pattern called pedang, somewhat shorter swords curved like scimitars with curiously carved handles called chenangkas, and short stabbing daggers called tumbok lada. The principal tools of the Malays are the parang or golok, a heavy knife used in the jungle, without which no peasant ever stirs abroad from his house, the beliong or native axe, and the pisau rant, which is used for scraping rattan. Their implements are very primitive, consisting of a plough fashioned from a fork of a tree, and a rude harrow. Reaping is usually performed by the aid of a curious little knife which severs each ear of grain separately. The fisherfolk use many kinds of nets, which they manufacture themselves. Sails, paddles, oars and punting-poles are all in use.

Malay Language, and Literature The Malay language is a member of the Malayan section of the Malayo-Polynesian class of languages, but it is by no means a representative type of the section which has taken its name from it. The area over which it is spoken comprises the peninsula of Malacca with the adjacent islands (the Rhio-Lingga Archipelago), the greater part of the coast districts of Sumatra and Borneo, the seaports of Java, the Sunda and Banda Islands, It is the general medium of communication throughout the archipelago from Sumatra to the Philippine Islands, and it was so upwards of three hundred and fifty years ago when the Portuguese first appeared in those parts.

There are no Malay manuscripts extant, no monumental records with inscriptions in Malay, dating from before the spreading of Islam in the archipelago, about the end of the 13th century. By some it has been argued from this fact that the Malays possessed no kind of writing prior to the introduction of the Arabic alphabet (W. Robinson, J. J. de Hollander); whereas others have maintained, with greater show of probability, that the Malays were in possession of an ancient alphabet, and that it was the same as the Rechang (Marsden, Friederich), as the Kawi (Van der Tuuk), or most like the Lampong (Kern) — all of which alphabets, with the Battak, Bugi and Macassar, are ultimately traceable to the ancient Cambojan characters. With the Mahommedan conquest the Perso-Arabic alphabet was introduced among the Malays; it has continued ever since to be in use for literary, religious and business purposes. Where Javanese is the principal language, Malay is sometimes found written with Javanese characters; and in Palembang, in the MSnangkabo

country of Middle Sumatra, the Rechang or Renchong characters are in general use, so called from the sharp and pointed knife with which they are

cut on the smooth side of bamboo staves. It is only since the Dutch have established their supremacy in the archipelago that the Roman character has come to be largely used in writing and printing Malay. This is also the case in the Straits Settlements. By the simplicity of its phonetic elements, the regularity of its grammatical structure, and the copiousness of its nautical vocabu- lary, the Malay language is singularly well fitted to be the lingua franca throughout the Indian archipelago. It possesses the five vowels a, i, u, e, 0, both short and long, and one pure diphthong, au. Its consonants are k, g, ng, ch, j, n, t, d, n, p, b, m, y, r, I, w, s, h. Long vowels can only occur in open syllables. The only possible consonantal nexus in purely Malay words is that of a nasal and mute, a liquid and mute and vice versa, and a liquid and nasal. Final k and h are all but suppressed in the utterance. Purely Arabic letters are only used in Arabic words, a great number of which have been received into the Malay vocabulary. But the Arabic charac- ter is even less suited to Malay than to the other Eastern languages on which it has been foisted. As the short vowels are not marked, one would, in seeing, e.g. the word bntng, think first of bintang, a star; but the word might also mean a large scar, to throw down, to spread, rigid, mutilated, enceinte, a kind of cucumber, a redoubt, according as it is pronounced, bantang, banting, bentang, buntang, buntung, bunting, bonteng, benteng.

Malay is essentially, with few exceptions, a dissyllabic language, and the syllabic accent rests on the penultimate unless that syllable is open and short; e.g. datang, namafia, besar, diumpatkanflalah. Nothing in the form of a root word indicates the grammatical category to which it belongs; thus, kasih, kindness, affectionate, to love; ganli, a proxy, to exchange, instead of. It is only in deriva- tive words that this vagueness is avoided. Derivation is effected by infixes, prefixes, affixes and reduplication. Infixes occur more rarely in Malay than in the cognate tongues. Examples are — guruh, a rumbling noise, gumuruh, to make such a noise; tunjuk, to point, telunjuk, the forefinger; chilchuk, to pierce, cheruchuk, a stockade. The import of the prefixes — me (meng, men, men, mem), pe (peng, pen, pen, pern), ber (bel), per, pel, ka, di, ter, — and affixes — an, kan, i, lah — will best appear from the following examples — root word ajar, to teach, to learn ; mengajar, to instruct (expresses an action) ; belajar, to study (state or condition) ; mengajari, to in- struct (some one, trans.) ; mengajarkan, to instruct (in something, causative) ; pengajar, the instructor; pelajar, the learner; pengajdran, the lesson taught, also the school; pelajdran, the lesson learnt; diajar, to be learnt; tbrajar, learnt; terdjarkan, taught; terajari, instructed; [perdja (from raja, prince), to recognize as prince; perajdkan, to crown as prince; karajaan, royalty]; djarkanlah, teach! Examples Of reduplication are — ajar-ajar, a sainted person; djar-berdjar (or belajar), to be learning and teaching by turns; similarly there are forms like djar-

mengdjar, berdjdr-ajdran, djar-ajdri, memperajar, memperdjarkan, memperajdri, terbclajarkan, perbelajarkan, &c. Altogether there are upwards of a hundred possible derivative forms, in the idiomatic use of which the Malays exhibit much skill. See especially H. von Dewall, De vormveranderingen der Maleische taal (Batavia, 1864) and J. Pijnappel, Maleisch-IIollandsch Woordenboek (Amsterdam, 1875), " Inleiding." In every other respect the lan- guage is characterized by great simplicity and indefiniteness. There is no inflexion to distinguish number, gender or case. Number is never indicated when the sense is obvious or can be gathered from the context; otherwise plurality is expressed by adjectives such as sagdla, all, and bdnak, many; more rarely by the repetition of the noun, and the indefinite singular by sa or sdtu, one, with a class-word. Gender may, if necessary, be distinguished by the words laki-ldki, male, and perampiian, female, in the case of persons, and of jantan and betlna in the case of animals. The genitive case is generally indicated by the position of the word after its governing noun. Also adjectives and demonstrative pronouns have their places after the noun. Comparison is effected by the use of particles. Instead of the personal pronouns, both in their full and abbreviated forms, conventional nouns are in frequent use to indicate the social position or relation of the respective interlocutors, as, e.g. hamba tuan, the master's slave, i.e. I. These nouns vary according to the different localities. Another peculiarity of Malay (and likewise of Chinese, Shan, Talaing, Burmese and Siamese) is the use of certain class- words or coefficients with numerals, such as orang (man), when speak- ing of persons, ekor (tail) of animals, keping (piece) of flat things, bxji (seed) of roundish things; e.g. lima biji, telor, five eggs. The number of these class-words is considerable. Malay verbs have neither person or number nor mood or tense. The last two are sometimes indicated by particles or auxiliary verbs; but these are generally dispensed with if the meaning is sufficiently plain without them. The Malays avoid the building up of long sentences. The two main rules by which the order of the words in a sentence is regulated are — subject, verb, object; and qualifying words follow those which they qualify. This is quite the reverse of what is the rule in Burmese. The history of the Malays amply accounts for the number and variety of foreign ingredients in their language. Hindus appear to have settled in Sumatra and Java as early as the 4th century of our era, and to have continued to exercise sway over the native

populations for many centuries. These received from them into their language a very large number of Sanskrit terms, from which we can infer the nature of the civilizing influence imparted by the Hindu rulers. Not only

in words concerning commerce and agriculture, but also in terms connected with social, religious and administra- tive matters that influence is traceable in Malay. See W. E. Maxwell, Manual of the Malay Language (1882), pp. 5-34, where this subject is treated more fully than by previous writers. This Sanskrit element forms such an integral part of the Malay vocabu- lary that in spite of the subsequent infusion of Arabic and Persian words adopted in the usual course of Mahommedan conquest it has retained its ancient citizenship in the language. The number of Portuguese, English, Dutch and Chinese words in Malay is not con- siderable; their presence is easily accounted for by political or commercial contact.

The Malay language abounds in idiomatic expressions, which con- stitute the chief difficulty in its acquisition. It is sparing in the use of personal pronouns, and prefers impersonal and elliptical diction. As it is rich in specific expressions for the various aspects of certain ideas, it is requisite to employ always the most appropriate term suited to the particular aspect. In Maxwell's Manual, pp. 120 seq., no less than sixteen terms are given to express the different kinds of striking, as many for the different kinds of speaking, eighteen for the various modes of carrying, &c. An unnecessary distinction has been made between High Malay and Low Malay. The latter is no separate dialect at all, but a mere brogue or jargon, the medium of intercourse between illiterate natives and Europeans too indolent to apply themselves to the acquisition of the language of the people; its vocabulary is made up of Malay words, with a conventional admixture of words from other languages; and it varies, not only in different localities, but also in proportion to the individual speaker's acquaintance with Malay proper. A few words are used, however, only in speaking with persons of royal rank — e.g. santap, to eat (of a raja) instead of makan; beradu, to sleep, instead of tuior; gring, unwell, instead of sdkit; mangkat, to die, instead of matt, &c. The use is different as regards the term Jdwl as applied to the Malay language. This has its origin in the names Great Java and Lesser Java, by which the medieval Java and Sumatra were called, and it accordingly means the language spoken along the coasts of the two great islands.

The Malays cannot, strictly speaking, be said to possess a litera- ture, for none of their writings can boast any literary beauty or value. 1lf . . Their most characteristic literature is to be found, not Literature. j n t jj e ; r wr jtings, but in the folk-tales which are trans- mitted orally from generation to generation, and repeated by the wandering minstrels called by the people Peng-lipor Lara, i. e. " Soothers of Care." Some specimens of these are to be found in the Journal of the Straits Branch of the Asiatic Society (Singapore). The collections of Malay Proberbs made by Klinkert, Maxwell and Clifford also give a good idea of the literary methods of the Malays. Their verse is of a very primitive description, and is chiefly used for purposes of love-making. There are numerous rhymed fairy tales, which are much liked by the people, but they are of no literary merit. The best Malay books are the Hikayat Hang Tuak, Bestamam and the Hikdyat Abdullah. The latter is a diary of events kept during Sir Stamford Raffle's administration by his Malay scribe.

Authorities. — Hugh Clifford, In Court and Kampong (London, 1897); Studies in Brown Humanity (London, 1898); In a Corner of Asia (London, 1899); Bush-whacking (London 1901); Clifford and Swettenham, Dictionary of the Malay Language, parts i. to v. A-G. Taiping (Perak, 1

894-1 898); John Crawfurd, History of the Indian Archipelago (3 vols., Edinburgh, 1820); Grammar and Dictionary of the Malay Language (2 vols., London, 1852) ; A Descriptive Dictionary of the Indian Islands and Adjacent Countries (London, 1856) ; Journal of the Indian Archipelago (12 vols., Singapore, 1 847-1862) ; Journal of the Straits Branch of the Royal Asiatic Society, 33 Nos. (Singapore, 1878-1900) ; H. C. Klinkert, Nieuw Maleisch-Nederlandisch Woorden boek (Leiden, 1893); John Leyden, Malay Annals (London, 1821); William Marsden, The History of Sumatra (London, 181 1); Malay Dictionary (London, 1824); Sir William Maxwell, A Manual of the Malay Language (London, 1888); T. J. Newbold, Political and Statistical A ccount of. the British Settlements in the Straits of Malacca; W. W. Skeat, Malay Magic (London, 1900) ; Skeat and Blagden, Pagan Races of the Malay Peninsula (London, 1906) ; Sir Frank Swettenham, Malay Sketches (London, 1895); The Real Malay (London, 1899); British Malaya (London, 1906); H. von de Wall, edited by H. N. van der Tuuk, Maleisch-Nederlandisch Woorden- boek (Batavia, 1877-1880); Malay Dictionary (Singaoore, 1903), Wilkinson. ' (H. Cl.)

MALAY STATES (British). The native states of the Malay Peninsula under British protection are divided into two groups: (1) federated, and (2) non-federated.

I. — Federated States The federated states, under the protection of Great Britain, but not British possessions, are Perak, Selangor and the con-federation of small states known as the Negri Sembilan (i.e. Nine

States) on the west coast, and the state of Pahang on the east coast. Each state is under the rule of a sultan, who is assisted in his legislative duties by a state council, upon which the resident, and in some cases the secretary to the resident, has a seat, and which is composed of native chiefs and one or more Chinese members nominated by the sultan with the advice and consent of the resident. The council, in addition to legislative and other duties, revises all sentences of capital punishment. The adminis- trative work of each state is carried on by the resident and his staff of European officials, whose ranks are recruited by success- ful candidates in the competitive examinations held annually by the Civil Service commissioners. The sultan of each state is bound by treaty with the British government to accept the advice of the resident, who is thus practically paramount; but great deference is paid to the opinions and wishes of the sultans and their chiefs, and the British officials are pledged not to interfere with the religious affairs of the Mahommedan com- munity. In the actual administration of the Malay population great use is made of the native aristocratic system, the peasants being governed largely by their own chiefs, headmen and village elders, under the close supervision of British district officers. The result is a benevolent autocracy admirably adapted to local

conditions and to the character and traditions of the people. A recognition of the fact that the welfare of the Malays, who are the people of the land and whose sultans have never ceded their territories to the British, must be regarded as the first considera- tion has been the guiding principle of the administration of the Malay States, and this has resulted in an extraordinary ameliora- tion of the condition of the natives, which has proceeded con- currently with a notable development of the country and its resources, mineral and agricultural. To the work of develop- ment, however, the Malays have themselves contributed little, sound administration having been secured by the British officials, enterprise and capital having been supplied mainly by the Chinese, and the labour employed being almost entirely Chinese or Tamil. Meanwhile the Malays have improved their ancestral holdings, have enjoyed a peace and a security to which their past history furnishes no parallel, have obtained easy access to new and important markets for their agricultural produce, and for the rest have been suffered to lead the lives best suited to their – characters and their desires. Each principal department of the administration has its federal head, and all' the residents correspond with and are controlled by the resident-general, who, in his turn, is responsible to the high commissioner, the governor of the Straits Settlements for the time being.

The estimated aggregate area of the Federated Malay States is 28,000 sq. m., and the estimated population in 1905 was 860,000, as against 678,595 in 1901. Of these only about 230,000 are Malays. The revenue "of the federation in 1905 was $23,964,593 (about (£2,795,ooo), and the expenditure was $20,750,395 (about £2,460,000). The imports for the same year were valued at $50,575,455 (about £5,900,000), and the exports at $80,057,654 (about £9,340,000), making a total trade of nearly 15 J millions sterling. The principal sources of revenue are an export duty on tin, the rents paid for the revenue farms of the right to collect import duties on opium, wine and spirits, and to k«ep licensed gambling-houses for the exclusive use of the Chinese population, railway receipts, land and forest revenue and postal revenue. The tin is won from large alluvial deposits found in the states of the western seaboard, and the mines are worked almost exclusively by Chinese capital and labour. Since 1889 the Federated Malay States have produced considerably more than half the tin of the world. Recently there has been a great development in agricultural enterprise, especially with regard to rubber, which is now grown in large quantities, the estates being mainly in the hands of Europeans, and the labour mostly Tamil. The states are opened up by over 2500 m. of some of the best metalled cart-roads in the world, and by a railway system, 350 m. of which, extending from the mainland opposite Penang to the ancient town of Malacca, are open to traffic. Another 150

m. of railway is under construction. The government offices at Kuala Lumpor, the federal capital of the states, are among the finest buildings of the kind in Asia. The whole of this extraordinary development, it should be noted, has been effected by careful, sound and wise administration coupled with a courageous and energetic policy of expenditure upon public works. Throughout, not one penny of debt has been incurred, the roads, railways, &c, being constructed entirely from current balances. This of course has only been rendered possible by the extraordinary mineral wealth which the states on the western seaboard have

developed in the hands of Chinese miners amid the peace and security which British rule has brought to these once lawless lands. The value of the tin output for the year 1905 amounted to $69,460,993 (£8,104,199). Although agricultural enterprise in the Malay States is assuming considerable proportions and a growing importance, the total value of the principal agricultural products, including timber, for the year 1905 only aggregated $2,435,513 (£289,143).

The whole of the Malay Peninsula is one vast forest, through which flow countless streams that form one of the most lavish water- systems in the world. The rivers, though many of them are of imposing appearance and of considerable length, are uniformly shallow, only a few on the west coast being navigable by ships for a distance of some 40 m. from their mouths. In spite of the notable development above referred to, only a very small fraction of the entire area of the states has as yet been touched either by mining or agricultural enterprise. It is not too much to assert that the larger half of the forest-lands has never been trodden by the foot of man. (For information concerning the botany, geology, &c, of the Malay States see Malay Peninsula. For the ethnology see Malays.)

Perak is situated between the parallels 3 37′ and 6° 5′ N. and 100° 3′ to 101 51′ E. on the western side of the Malay Peninsula. It is bounded on the N. by the British possession of Province Wellesley and the Malay state of Kedah; on the S. by the protected native state of Selangor; on the E. by the protected native state of Pahang and the independent states of Kelantan and Petani; and on the W. by the Straits of Malacca. The coast-line is about 90 m. in length. The extreme distance from the most northerly to the most southerly portions of the state is about 172 m., and the greatest breadth from east to west is about 100 m. The total area of the country is estimated at about 10,000 sq. m.

The Perak river, which runs in a southerly direction almost parallel with the coast for nearly 150 m. of its course, is navigable for small steamers for about 40 m. from its mouth, and by native trading boats for nearly 200 m. The Plus, Batang, Padang and Kinta rivers are its principal tributaries, all of them falling into the Perak on its left bank. The other principal rivers of the state are the Krian, Kurau, Larut and Bruas to the north of the mouth of the Perak, and the Bernam to the south. None of these rivers is of any great importance as a waterway, although the Bernam River is navigable for small steamers for nearly 100 m. of its course. The mountain ranges, which cover a considerable area, run from the north-east to the south-west. The highest altitudes attained by them do not exceed 7500 ft., but they average about 2500 ft. They are all thickly covered with jungle. The ranges are two, running parallel to one another, with the valley of the Perak between them. The larger is a portion of the main chain, which runs down the peninsula from north to south. The lesser is situated in the district of Larut. There are several hill sanatoria in the state at heights which vary from 2500 to 4700 ft. above sea-level, but the extreme humidity of the atmosphere renders the coolness thus obtainable the reverse of enjoyable.

Mr Leonard Wray, curator of the Perak museum, writes as follows on the subject of the geological formation of the state: "There _ . are really only four formations represented — firstly,

Ueology. t j je g ran ; t ; c rocks; secondly, a large series of beds of gneiss, quartzite, schist and sandstone, overlaid in many places by thick beds of crystalline limestone; thirdly, small sheets of trap rock; and fourthly, river-gravels and other Quaternary deposits. The granites are of many varieties, and also, in all probability, of several different geological periods. The series of quartzites, schists, and limestone are of great age, but as no fossils have ever been found in any of them, nothing definite can be stated as to their exact chronological position. Their lithological characteristics and the total absence of all organic remains point to the Archaean period. The failure to discover signs of life in them is, of course, merely negative evidence, and the finding of a single fossil would at once upset it. However, until this happens they may be conveniently classed as Laurentian. It is at present impossible to form anything approaching an accurate estimate of the thickness of this extensive series, but it is probable that it is somewhere between 4000 and 5000 ft. Unconformability has been noticed between the limestones and the beds beneath, but whether this is sufficient to separate them or not is a matter for future investigation. . . . The taller hills are exclusively composed of granite, as also are some of the lower ones. . . . The ores of the following metals have been found in the formations named: Granite— tin, lead, iron, arsenic, tungsten and titanium; Laurentian — tin, gold, lead, silver, iron, arsenic, copper, zinc, tungsten, manganese and bismuth; Quaternary — tin, gold, copper, tungsten, iron and titanium. This

is not to be con- sidered a complete list, as small quantitiesof other metals have also been found."

The early history of Perak is obscure, the only information on the subject being obtained from native traditions, which are altogether untrustworthy. According to these authorities, however, a settle-

ment was first made by Malays in Perak at Bruas, and the capital was later moved to the banks of the Perak River, the site chosen being a little village called Temong, which lies some miles up stream from Kuala Kangsar, the present residence History. of the sultan. When the Malacca sultanate fell, owing to the invasion of the Portuguese in 1511, a member of that royal house is said to have migrated to Perak, and the present dynasty claims to have been descended from him. As this boast is also made by almost every ruling family in the peninsula, the tradition is not worthy of any special attention. What is more certain is the tradition that Perak was twice invaded by the Achinese, and its rulers carried off into captivity, one of them, Sultan Mansur Shah, subsequently becoming the ruler of Achin. The first European settlement in Perak was made by the Dutch in 1650, under a treaty entered into with the Achinese, but the natives of the country rose against the Dutch again and again, and it was abandoned in 1 783, though it was afterwards reoccupied, the Dutch being finally ejected by the British in 1795. In 1818 the Siamese conquered Perak, but its independence was secured by a treaty between the British and Siamese governments in 1824. From that date until 1874 Perak was ruled by its own sultans, but in that year, owing to internal strife, Sultan Abdullah applied to the then governor of the Straits Settlements, Sir Andrew Clarke, for the assistance of a British Resident. The treaty of Pangkor was concluded on the 20th of January 1874, and the first resident, Mr J. W. W. Birch, was murdered on the 2nd of November 1875. A punitive expedition became necessary; sultan Abdullah and the other chiefs concerned in the murder were banished, the actual murderers were hanged, and Raja Muda Jusuf was declared regent. He died in 1888, and was succeeded by the sultan Raja Idris, K.C.M.G., a most enlightened ruler, who was from the first a strong and intelligent advocate of British methods of administration. Sir Hugh Low was appointed resident, a position which he held until 1889, when he was succeeded by Sir Frank Swettenham. Since then the history of Perak has been' one of continuous peace and growing prosperity and wealth. Although the federal capital is Kuala Lumpor in Selangor, Perak still enjoys the honour of being the senior and leading state of the federation.

By the census taken on the 5th of April 1891 the population of Perak was shown to be as follows: Europeans, 366; Eurasians, Jews and Armenians, 293; Malays, 96,719; Chinese,™ . ,. 94,345; Tamils, 13,086; aborigines,

5779; other nation- p ‘

alities, 3666; thus making a grand total of 214,254, of whom 156,408 were males and 57,846 were females. The estimated population in 1905 was 400,000, of whom 200,000 were Chinese and 160,000 were Malays, but owing to the disparity of the proportions between the sexes the deaths in each year largely outnumber the births, and the increase in the population is accounted for solely by the number of immigrants, chiefly from the mainland of China, and to a lesser extent from India also.

The revenue of Perak in 1874 amounted to $226,333. That for 1905 amounted to $12,242,897. Of this latter sum $4,876,400 was derived from duty on exported tin, $2,489,300 from railway receipts, $505,300 from land revenue and $142,800 from postal and telegraphic revenue. The remainder is mainly derived from the revenue farms, which are leased to Chinese capitalists for a short term of years, conveying to the lessee the right to collect import duties upon opium, wine and spirits, to keep pawnbroking shops, and to keep public licensed gambling-houses for the use of Chinese only. The expenditure for 1905 amounted to $10,141,980. Of this sum $4,236,000 was expended upon railway upkeep and construction and $2,176,100 upon public works. The value of the imports into Perak during 1905 was over $20,000,000, and that of the ex- ports exceeded $40,000,000, making a total of over $60,000,000, equivalent to about seven million sterling. The output of tin from Perak ranged between 18,960 tons, valued at $23,099,506 in 1899, and 26,600 tons, valued at $35,500,000, in 1905. The fluctuating character of the output is due, not to any exhaustion of the mineral deposits of the state — that is not to be anticipated for many years yet to come — but to the uncertainty of the labour supply. The mining population is recruited exclusively from the districts of southern China, and during certain years an increased demand for labourers in China itself, in French Indo-China, in the Dutch colonies, and in South Africa temporarily and adversely affected immigra- tion to the Straits of Malacca. The output has, moreover, been affected from time to time by the price of tin, which was $32.20 per pikul in 1896, rose to $42.96 in 1898, to $74.15 in 1900, and averaged $80.60 in 1905. Exclusive of tin, the principal exports were $108,000 worth of Para rubber, $181,000 of copra, $54,000 of hides, $48,000 of patchouli, and considerable quantities of timber, rattans and other jungle produce. The agricultural development of the state is still in its infancy, but rubber is cultivated in rapidly increas- ing areas, and the known fertility of the soil, the steady and regular rainfall, the excellent means of communication, and the natural and artificial conditions of the country, justify the expectation that the future of Perak as an agricultural country will be prosperous.

Although so much has been done to develop the resources of Perak, by far

the greater portion of the state is still covered by dense and virgin forest. In 1898 it was calculated that only 330,249 acres of land were occupied or cultivated out of a total acreage of 6,400,000.

The area of agricultural holdings has notably increased, but a considerable period must yet elapse before it will amount to even one- _ . tenth of the whole. A line of railway connects the port

eaer ‘ of Teluk Anson with the great mining district of Kinta, whence the line runs, crossing the Perak River at Enggor, to Kuala Kangsar, the residence of the sultan, thence to Taiping, the admini- strative capital of the state, and via Krian to a point opposite to the island of Penang. A second line runs south from Perak and connects with the railway system of Selangor, which in its turn connects with the Negri Sembilan and Malacca line, thus giving through railway communication between the last-named town and Penang. Perak also possesses some 600 miles of excellent metalled cart-road, and the length of completed road is annually increasing.

For administrative purposes the state is divided into six districts: Upper Perak, Kuala Kangsar and Lower Perak, on the Perak River; Kinta ; Batany Padang and Larut and Krian. Of these, Larut and Kinta are the principal mining centres, while Krian is the most prosperous agricultural district. The districts on the Perak River are mostly peopled by Malays. The administrative capital is Taiping, the chief town of Larut. Kuala Kangsar is chiefly memor- able as. having been the scene of the first federal meeting of native chiefs, who, with the British Residents from each state, met together in 1897 for friendly discussion of their common interests for the first time in history, under the auspices of the high commissioner, Sir Charles H. B. Mitchell. This, in the eyes of those who are acquainted with the character of the Malays and of the relations which formerly subsisted between the rulers of the various states, is perhaps the most signal token of the changes which British influence has wrought in the peninsula.

Selangor is situated between the parallels 2° 32′ and 3 37′ N. and ioo° 38′ and 102 E., on the western side of the Malay Peninsula. It is bounded on the N. by the protected native state of Perak, on the S. by the protected states of the Negri Sembilan, on the E. by Pahang and the Negri Sembilan, and on the W. by the Straits of Malacca. The coast-line is about 100 m. in length, greatest length about 104 m., and greatest breadth about 48 m., total area estimated at about 3000 sq. m.

The state consists of a narrow strip of land between the mountain range which forms the backbone of the peninsula and the Straits of Malacca. Compared with other states in the peninsula, Selangor is poorly watered. The principal rivers are the Selangor, the Klang and the Langat. The principal port of the state is Port Swettenham, situated at the mouth of the Klang River, and is connected with the capital, Kuala Lumpor, by a railway. The geology of the state closely resembles that of Perak. The state is possessed of most valuable deposits of alluvial tin, and mining for this metal is the chief industry of the population. Kuala Lumpor is also the federal capital of the Malay States.

According to native tradition, the ruling house of Selangor is descended from a Bugis raja, who, with two of his brothers, settled in the state in 17 1 8, the son of the youngest brother Istory. eventually becoming ruler of the country. In 1783 the then sultan of Selangor joined with the Iang-di-per-Tuan Muda of Riau in an unsuccessful attack upon the Dutch who then held Malacca. In retaliation the Dutch, under Admiral Van Braam, invaded Selangor and drove the sultan out of his country. In 1785, aided by the Bendahara of Pahang, Sultan Ibrahim of Selangor reconquered his state; but the Dutch blockaded his ports, and even- tually forced him to enter into a treaty whereby he consented to acknowledge their sovereignty. The earliest British political communication with Selangor began in 1818, when a commercial treaty was concluded with the governor of Penang. In 1867 Sultan Abdul Samad of Selangor appointed his son-in-law, Tungku Dia Udin, to be viceroy; and this gave rise to a civil war which lasted almost without intermission till 1873, when the enemies of Tungku Dia Udin were finally vanquished, largely by the agency of the Bendahara of Pahang, who, at the invitation of the governor of the Straits Settlements, sent a warlike expedition to the assistance of the viceroy. In 1874 the occurrence of an atrocious act of piracy off the mouth of the Langat River led to the governor, Sir Andrew Clarke, appointing, at the request of the sultan, a British Resident to aid him in the administration of his kingdom. Since that date there has been no further breach of the peace, and the prosperity of Selangor has increased annually.

By the census taken on the 5th of April 1891 the population of Selangor was given at 81,592 souls, of whom 67,051 were males and only 14,541 were females. The census taken on the 5th of April 1901 gave a total population of 168,789 souls, of whom 136,823 were males and 31,966 females. Of these 108,768 were Chinese, 33,997 were Malays, 16,748 were Tamils, and only 487 were Europeans. The returns deal with nearly a score of different nationalities. Since 1 90 1 the population has been much increased and now certainly exceeds 200,000 souls. Now, however, that instead of a single port of entry there exist easy means of access to the state by rail both from the north and the south, it is no longer possible to

estimate

the annual increase by immigration with any approach to accuracy. It will be noted that the inhabitants of this erstwhile Malayan state were, even at the time of the census of 1901, over 64% Chinese, while the Malays were little more than 20 % of the population. In Selangor, as elsewhere in the Malay Peninsula, the deaths annually far outnumber the births recorded (e.g. in 1905 births 8293, deaths 12,500). The disproportion of the female to the male sections of the population is greater in Selangor than in any other part of the colony or Malay States. The development of planting enterprise in Selan- gor, and more especially the cultivation of rubber, has led during recent years to the immigration of a considerable number of Tamil coolies, but the Tamil population is still insignificant as compared with the Chinese.

The revenue of Selangor in 1875 amounted to only $115,656; in 1905 it had increased to $8,857,793. Of this latter sum $3,195,318 was derived from duty on tin exported, $1,972,628 from _. federal receipts, and $340,360 from land revenue. The jyadfic balance [is chiefly derived from the revenue farms, '

which include the right to collect import duty on opium and spirits. The expenditure for 1905 amounted to $7,186,146, of which sum $3,717,238 was on account of federal charges and $1,850,711 for public works. The value of the imports in 1905 was $24,643,619 and that of the exports was $26,683,316, making a total of $51,326,935, equivalent to £5,988,000. Tin is the principal export. The amount exported in 1905 was 17,254 tons. The total area of alienated mining land at the end of 1905 amounted to 65,573 acres, and it was estimated that over 60,000 Chinese were employed in the mines.

The main trunk line of the Federated Malay States railways passes through Selangor. It enters the state at Tanjong Malim on the Perak boundary, runs southward through Kuala Lumpor and so into the Negri Sembilan. It runs for 81 m. in Selangor territory. A branch line 27 m. long connects Kuala Lumpor with Port Swetten- ham on the Klang Straits where extensive wharves, capable of accommodating ocean-going vessels, have been constructed. A second branch line, measuring rather more than 4 m. in length, has been opened to traffic. It connects the caves at Batu with Kuala Lumpor. Frequent communication is maintained by steamer between Port Swettenham and Singapore, and by coasting vessels between the former port and those on the shores of the Straits of Malacca. All the principal places in the state are con- nected with one another by telegraph.

For administrative purposes Selangor is divided into six dis- tricts: Kuala

Lumpor, in which the capital and the principal tin- fields are situated ; Ulu Selangor, which is also a prosperous mining district ; Kuala Selangor, which is agricultural, and poorly populated by Malays; Ulu Langat, mining and agricultural; Kuala Langat, the residence of the late sultan Abdul Samad, agricultural; and Klang, the only prosperous port of the state. Much money has been expended upon the capital, Kuala Lumpor, which possesses some fine public buildings, waterworks, &c, and where the principal residence of the Resident-General is situated. In some sort Kuala Lumpor is the capital not only of Selangor, but also of the whole federation. Its scenery is very attractive.

Negri Sembilan (the Nine States) is a federation of small native states which is now treated as a single entity, being under the control of a British Resident, and is situated between parallels 2 28′ and 3 18′ N. and 101 45′ and 102 45′ E., on the western side of the Malay Peninsula. It is bounded on the N. by the protected state of Pahang, on the S. by the territory of Malacca, on the E. by Pahang and the independent state of Johor, and on the W. by the Straits of Malacca. The coast-line is about 28 m. in length, and the extreme distance from north to south is 55 m., and that from east to west about 65 m. The estimated area is about 3000 sq. m. Port Dickson, or Arang-Arang, is the only port on the coast. It is connected with the capital, Seremban, by a railway 24 m. in length. Most of the states comprising the federation depend largely for their prosperity upon agriculture, but in some of the districts tin is being worked in considerable quantities, with good results.

As is the case with the history of most Malayan states, much rests upon no surer ground than tradition, in so far as the records of the Negri Sembilan are concerned. At the same time History the native story that the states which now form the v ‘

federation of the Negri Sembilan were originally peopled by tribes of Sakai, or aborigines of the peninsula, who descended from the mountains of the interior and peopled the valleys, is supported by much corroborative evidence. Not only does the Malay’s contempt for the Sakai make it exceedingly unlikely that the tradition, which is hardly a matter for pride, should have been preserved if it were not true, but also many of the laws and customs in force in these states are wholly foreign to those of the Malays, and can plainly be traced to the aborigines. As an instance, the custom of inheriting rank and property through the mother instead of through the father may be mentioned. Tradition further relates that towards the end of the

18th century a raja of the royal house of Menangkabu came from Sumatra to rule over the federation of small states, each of which continued to be governed in all its local affairs by its own chief and by the village and other councils sanctioned by ancient custom. The Sumatran raja took the title of Iang-di-per-Tuan of Sri Menanti. Although they bore the name of the " Nine States," only six seem to have belonged to the federation during the time of which history speaks. These are Sri Menanti, Johol, Tampin, Rembau, Jelebu, and Sungei Ujong. Later the two latter separated themselves from the confederation. Ancient tradition says that the names of the nine states were originally Klang, Jelebu, Sungei Ujong, Johol, Segamat, Pasir Besar, Naning, Rembau and Jelai. Of these Klang was annexed by Selangor, Segamat and Pasir Besar by Johor, and Naning by Malacca. During the last years of the 18th century the Iang-di-per-Tuan appointed an Iang-di-per-Tuan Muda to rule Rembau, and the state of Tampin was created to provide for the family of the new chief. In 1887 the governor of the Straits Settle- ments sent Mr Martin Lister to the Negri Sembilan, which had become disintegrated, and by his influence the ancient federal system was revived under the control of a Resident appointed by the governor. The states which formed this new confederation were Johol, Ulu Muar, Jempol.Terachi, Inas, Gunong Pasir, Rembau, Tampin and Gemencheh. Prior to this, in 1873, owing to a civil war in Sungei Ujong, Sir Andrew Clarke sent a military force to that state, put an end to the disturbances, and placed the country under the control of a British Resident. Jelebu was taken under British protection in 1886, and was thenceforth managed by a magis- trate under the orders of the Resident of Sungei Ujong. In 1896, when the federation of all the Malayan states under British control was effected, Sungei Ujong and Jelebu were reunited to the con- federation of small states from which they had so long been separated and the whole, under the old name of the Negri Sembilan, or Nine States, was placed under one Resident.

The population of the Negri Sembilan, which according to the census taken in April 1891 was only 70,730, had increased to 96,028 by 1901, and was estimated at 119,454 in 1905. Of these 46,500 are Chinese, 65,000 Malays, 6700 Tamils, and 900 Europeans and Eurasians. The births registered slightly exceed the deaths in number, there being a large Malay population in the Negri Sembilan among whom the proportion of women to men is fair, a condition of things not found in localities where the inhabitants are mostly Chinese immigrants.

The revenue of the Negri Sembilan amounted to only $223,435 in 1 888. I n 1 898 it had increased to $701 ,334, in 1900 to $1 ,25 1 ,366, Finance and . in I9 ° 5 . to # 2 >335.534- The revenue for 1905 was and Trade

derived mainly as follows: — customs $1,268,602, land revenue $145,475, l an d sales $21,407, while the revenue farms contributed $584,459. The expenditure in 1905 amounted to $2,214,093, of which $1,125,555 was expended upon public works. The trade returns for 1905, which are not, however, complete, show an aggregate value of about $13,000,000. The value of the tin exported during 1905 exceeded $6,900,000, and the value of the agricultural produce, of which gambier represented $211,000 and damar $80,000, amounted to $407,990.

Seremban, the administrative capital of the Negri Sembilan, is connected with Port Dickson by a railway line, owned by the General Sungei Ujong Railway Company, which is 24J m. in length. It is also situated on the trunk line of the Federated Malay States, and is thus joined by rail to Selangor on the north and to Malacca on the south. Frequent steam communication is maintained between Port Dickson and the ports on the Straits of Malacca and with Singapore.

For administrative purposes the Negri Sembilan is divided into five districts, viz. the Seremban District, the Coast District, Jelebu, Kuala Pilah and Tampin. Each of these is under the charge of a European district officer, who is responsible to the Resident. The Iang-di-per-Tuan lives at Kuala Pilah, but the capital of the federation is at Seremban in Sungei Ujong, where the Resident is stationed. The hereditary chiefs of the various states aid in the government of their districts, and have seats upon the state council, over which the Iang-di-per-Tuan presides. The watering-place of Magnolia Bay, where. excellent sea-bathing is obtainable, is one of the pleasure resorts of this part of the peninsula.

Pahang, on the east coast of the peninsula, is situated between parallels 2° 28′ and 3° 45′ N. and 101° 30′ and 103° 30′ E. It is bounded on the N. by the independent native states of Kelantan and Trengganu; on the S. by the Negri Sembilan and Johor; on the E. by the China Sea; and on the W. by the protected states of Perak and Selangor. The coast-line is about 1 1 2 m. in length ; the greatest length is about 210 m., and greatest breadth about 130 m. The state is the largest in the peninsula, its area being estimated at 1 5,000 sq. m. The ports on the coast are the mouths of the Endau, Rompin, Pahang and Kuantan rivers, but during the north-east monsoon the coast is not easy of approach, and the rivers, all of which are guarded by difficult bars, are impossible of access except at high tides.

xvii. 16

The principal river of the state is the Pahang, from which it takes its name. At a distance of 180 m. from the coast this river is formed by two others named respectively the Jelai and the Tembeling. The former is joined 20 m.

farther up stream by the Lipis, which has its rise in the mountains which form the boundary with Perak. The Jelai itself has its rise also in a more northerly portion of this range, while its two principal tributaries above the mouth of the Lipis, the Telom and the Serau, rise, the one in the plateau which divides Perak from Pahang, the other in the hills which separate Pahang from Kelantan. The Tembeling has its rise in the hills which divide Pahang from Kelantan, but some of its tributaries rise on the Trengganu frontier, while the largest of its confluents comes from the hills in which the Kuantan River takes its rise. The Pahang is navigable for large boats as far as Kuala Lipis, 200 m. from the mouth, and light-draught launches can also get up to that point. Smaller boats can be taken some 80 m. higher up the Jelai and Telom. The river, however, as a waterway is of little use, since it is uniformly shallow. The Rompin and Kuantan rivers are somewhat more easily navigated for the first 30 m. of their course, but taken as a whole the waterways of Pahang are of little value. The interior of Pahang is chiefly noted for its auriferous deposits. Gunong Tahan is situated on the boundary between Pahang and Kelantan. Its height is estimated at 8000 ft. above sea-level, but it has never yet been ascended. Pahang, like the states on the west coast, is covered almost entirely by one vast forest, but in the Lipis valley, which formerly was thickly populated, there is a considerable expanse of open grass plain unlike anything to be seen on the western sea-board. The coast is for the most part a sandy beach fringed with casuarina trees and there are only a few patches of mangrove-swamp throughout its entire length.

The ancient name of Pahang was Indrapura. It is mentioned in the history of Hang Tuah, the great Malacca brave, who flourished in the 16th century, and succeeded in abducting a daughter History. of the then ruling house of Pahang for his master, the sultan of Malacca. Prior to this, Pahang had been ruled by the Siamese. When Malacca fell into the hands of the Portuguese in 151 1 the sultan, Muhammad Shah, fled to Pahang, and the present ruling house claims to have been descended from him. The title of the ruler of Pahang was Bendahara until 1882, when the present (1902) ruler, Wan Ahmad, assumed the title of sultan, taking the name of Sultan Ahmad Maatham Shah. Up to that time the Benda- hara had been installed on his accession by the sultan of Riau, and held his office by virtue of that chief's letter of authority. About !855 the father of the present sultan died at Pekan, and his son Bendahara Korish, who succeeded him, drove Wan Ahmad from the country. After making three unsuccessful attempts to conquer the land and to dethrone his elder brother, Wan Ahmad at last succeeded in 1865 in invading the state and wresting the throne from his nephew, who had succeeded his father some years earlier. From that time, in spite of two attempts to shake his power by invasions from Selangor which were undertaken by his nephews Wan

Aman and Wan Da, Bendahara Ahmad ruled his country with a rod of iron. In 1887 he consented to enter into a treaty with the governor of the Straits by which he accepted a consular agent at his court. This treaty was finally signed on the 8th of October 1887. In February of the following year a Chinese British subject was murdered at Pekan in circumstances which pointed to the respon- sibility of the sultan for the crime, and in October 1888 a Resident was appointed to assist the sultan in the administration of his country, that being, in the opinion of the British government, the only guarantee for the safety of the life and property of British subjects which it could accept. In December 1891 disturbances broke out in Pahang, the nominal leaders of which were certain of the sultan's most trusted chiefs. The sultan himself took no part in the out- break, but it undoubtedly had his sympathy, even if it was not caused by his direct commands. The rebels were driven to seek safety in flight in November 1892, but in June 1894 they gathered strength for a second disturbance, and raided Pahang from Kelantan, in which state they had been given shelter by the Mahommedan rulers. This event, added to the occurrence of other raids from across the border, led to an kregular expedition being led into Trengganu and Kelantan by the Resident of Pahang (Mr Hugh Clifford) in 1895, and this had the desired result. The rebel chiefs were banished to Siam, and no further breach of the peace has troubled the tran- quillity of Pahang since that time. Pahang joined the Federated Malay States by a treaty signed in 1895, a "d the sultan and his principal chiefs were present at the federal durbar held at Kuala Kangsar in Perak in 1897.

The cerisus taken in April 1901 gave the total population of Pahang at 84,113, of whom 73,462 were Malays, 8695 Chinese, 1227 Tamils and other natives of India, 180 Europeans and Eurasians, pnoaiatlon and 549 people of other nationalities. The population in 1905 was estimated at 100,000, the increase being due to immigra- tion mainly from the states on the western seaboard. In former days Pahang was far more thickly populated than in modern times, but the long succession of civil wars which racked the land after the death of Bendahara Ali caused thousands of Pahang Malays to fly the country. To-day the valley of the Lebir River in Kelantan and the upper portions of several rivers near the Perak and Selangor

boundaries are inhabited by Pahang Malays, the descendants of these

fugitives. The Pahang natives are almost all engaged in agriculture. The work of the mines, &c, is performed by Chinese and foreign Malays. In the Lipis valley the descendants of the Rawa Malays, who at one time possessed the whole of the interior in defiance of the Pahang rajas, still outnumber the people of the land.

*The revenue of Pahang in 1899 amounted to only $62,077; in 1900 to $419,150. In 1905 it was $528,368. The expenditure in 1905 amounted to $1,208,176. Of this sum $736,886 was expended Finance on P u k" c works. Pahang is still a source of expense and Trade *° tne federation, its progress having been retarded by the disturbances which lasted from December 1 89 1 until 1895, with short intervals of peace, but the revenue is now steadily increasing, and the ultimate financial success of the state is considered to be secure. Pahang owes something over $3,966,500 to Selangor and $1,175,000 to Perak, which have financed it now for some years out of surplus revenue. The value of the imports in 1905 was $1,344,346, that of the exports was $3,838,928, thus making a total trade value of $5,183,274. The most valuable export is tin, the value of which in 1905 amounted to $2,820,745. The value of the gutta exported exceeded $140,000, that of dried and salted fish amounted to nearly $70,000, and that of timber to $325,000.*

The geological formation of the states lying to the eastward of the main range of mountains which splits the peninsula in twain Qeaeral differs materially from that of the western states. At a distance of about a dozen miles from the summits of the mountains the granite formation is replaced by slates, which in many places are intersected by fissures of quartz, and in others are overlaid by vast thicknesses of limestone. Those of the quartz fissures which have been exploited are found to be auriferous, and several mining companies have attempted to work the deposits. Their efforts, however, have not hitherto been successful. A magnifi- cent road over the mountains, with a ruling grade of I in 30, joins Kuala Lipis, the administrative capital of Pahang, to Kuala Kubu, the nearest railway station in Selangor. The road measures 82 m. in length. Pekan, where the sultan has his residence, was the capital of Pahang until the middle of 1898, when the administrative head- quarters were transferred to the interior as being more central. None of these towns is of any size or importance. In the Kuantan valley, which lies parallel to the Pahang River, a European company is working tin lodes with considerable success. These lodes are the only mines of the kind being worked in the Federated Malay States. Pahang is fertile and well suited for agriculture of many kinds. The rainfall is heavy and regular. The climate is cooler than that of the west coast, and the full force of the monsoon is felt from October to February in each year. For administrative purposes Pahang is divided into four districts — Ulu Pahang, in which the present capital is situated; Temerloh, which

includes 80 odd miles of the Pahang valley and the Semantan River; Pekan, which includes the coast rivers down to Endau ; and Kuantan. Each of these is under the charge of a district officer, who is responsible to the resident. The boundary with Johor and the Negri Sembilan was rectified by a commission which sat in London in 1897-1898.

Authorities. — Journal of the Eastern Archipelago (Singapore) ; Journal of the Straits Branch of the Royal Asiatic Society (Singapore) ; Maxwell, Proceedings of the Royal Colonial Institute, vol. xxiii. ; Swet- tenham, ibid. vol. xxvii; Clifford, ibid. vol. xxx. (London, 1892, 1895, 1899); Swettenham, About Perak (Singapore, 1893); Malay Sketches (London, 1895); The Real Malay (London, 1899); British Malaya (London, 1906) ; Clifford, In Court and Kampong (London, 1897); Studies in Brown Humanity (London, 1898); In a Corner of Asia (London, 1899); Bush-whacking (London, 1901); Further India (London, 1904) ; De la Croix, Les Mines d'etins de Perak (Paris, 1882); Bluebook, C. 9524 (London, 1899); The Straits Directory (Singapore, 1906) ; Skeat, Malay Magic (London, 1900) ; Skeat and Blagden, Pagan Races of the Malay Peninsula (London, 1906). (H. Cl.)

II. — Non-Federated States In 1909 a treaty- was made between Great Britain and Siam, one provision of which was the cession to the former of the suzerain rights enjoyed by the latter over certain territories in the Malay Peninsula. These territories consisted of the four Siamese Malay States: Kelantan, Trengganu, Kedah and Perlis, very ancient dependencies of Siam, all of which except Trengganu, were in a flourishing condition and had been administered by British officers in the service of Siam for some years prior to their transference. Though the four states were loyal to Siam and wished to retain their former allegiance, the change was effected without disturbance of any kind, the British government on assuming the rights of suzerainty placing an adviser at the court of each raja and guaranteeing the continuance of the administra- tion on the lines already laid down by Siam so far as might be compatible with justice and fair treatment for all. The four

states lie to the north of the Federated Malay States, two on thfe east and two on the west side of the peninsula.

Kelantan. — This state on the east coast, bounded N. and N.E. by the China Sea, E. by Trengganu, S. by Pahang and W. by Perak and Ra-nge, lies between 4° 48′ and 6° 20′ N. and 101° 33′ and 102 45′ E. The greatest length from north to south is 115 m.and the greatest breadth from east to west 60 m. The area is about 5000 sq. m. The northern part of the state is flat and fertile, but the southern district which comprises more than half the total area, is mountainous and uncultivated.

Next to the Pahang, the Kelantan River is the largest oil the east coast. It is 120 miles long and is navigable for shallow-draft launches and big country boats for about 80 miles, and for vessels of 8 ft. draft for about six miles. Its principal tributaries are the Galas, Pergau and Lebir. The Golok and Semarak rivers water the west and east parts of the state, falling into the sea a few miles on either side of the mouth of the Kelantan River. The climate of Kelantan is mild and singularly healthy in the open cultivated regions. The population is about 300,000 of which 10,000 are aboriginal tribes (Sakeisand Jakuns), 10,000 Siamese and Chinese and the rest Malays. The Chinese are increasing and natives of different parts of India are resorting to the state for purposes of trade. Kota Bharu (pop. 10,000) is the only town in the state. It lies on the right bank of the river, about six miles from the sea. Since 1904 it has been laid out with metalled roads and many public and private buildings have been erected. The town is the commercial as well as the admini- strative centre of the state. Tumpat and Tabar on the coast, with population 4000 and 3000 respectively, are the places next in im- portance after Kota Bharu. A network of creeks render communica- tion easy in the northern districts, the river and its tributaries afford means of access to all parts of the south ; 20 miles of road have been made in the neighbourhood of Kota Bharu. Kelantan is connected by telegraph with Bangkok and Singapore, and maintains regular postal communication with those places. Rice cultivation is the principal industry and is increasing rapidly. Coco-nut and betel-nut growing are also largely practised. Much livestock is raised. About 400,000 acres of land are under cultivation. Though reputed rich in minerals, past misrule prevented mining enterprise in Kelantan until, in 1900, a large concession was given to an Englishman and the country was opened to foreigners. In 1909 three mining syn- dicates were at work, and several others were in process of formation. Gold, tin and galena have been found in several localities and during the years 1006-1909 28,000 ounces of gold were dredged from the Kelantan River. The Kelantanese are expert fishermen, some 30,000 finding employment in fishing and fish-drying. Silk- weaving is a growing industry. Foreign trade, which in 1909 reached the value of two and a half million dollars, is chiefly with Singapore. Principal exports are copra, rice, fish, cattle and gold; chief imports are cotton goods, hardware and specie. The currency is the Straits Settlements dollar and small silver coin, supplemented by a locally made tin coin of low value.

By virtue of a mutual agreement made in 1902 Siam appointed a resident commissioner to Kelantan and consented, so long as the advice of that officer should be followed, to leave internal affairs to be conducted locally. Under this arrangement a, council of state was appointed, departments of government were organized, penal, civil and revenue laws were passed and enforced, courts were estab- lished and a police force was raised. Though

formerly of an evil reputation, the people were found to be naturally peaceful and law- abiding, and serious crime is rare. The state revenue, which was practically nothing in 1902, amounted to $320,000 in 1907. Islam- ism was adopted about 300 years ago but the old animistic superstitions are still strong. The state is divided into mukim or parishes, but the imam no longer exercise temporal authority. There are three schools at Kota Bharu, education in the interior being in the hands of the imam assisted with government grants.

No historical records of Kelantan exist, and the state was not noticed by the European merchants of the 16th and 17th centuries. Consequently little is known of its early history beyond what is to be gathered from brief references in the Malay annals and the old chronicles of Siam. The sites of ancient towns and the remains of former gold diggings are visible here and there, but all knowledge of the men who made these marks has been lost. The present ruling family dates from about 1790. Siam was frequently called upon to maintain internal peace and in 1892 a royal prince was sent to reside in Kelantan as commissioner. Complications brought about by the incapacity of the ruler led to the making of the agreement of 1902 above mentioned, to the fixing of a regular tribute in money to Siam, and ultimately to the merging of the state from chaotic lawlessness into the path of reform. On the 15th of July 1909 the state came under British suzerainty and the commissioner of Siam was replaced by a British adviser, from which date the liability to payment of tribute ceased, though in all other respects the administrative arrangements of Siam remained unaltered.

Trengganu. — This state on the east coast, bounded N. and N.E. by the China Sea, S. by Pahang and W. by Pahang and

Kelantan, ties between parallels 4° 4′ and 4 46′ N. and 102° 30′ and 103 26′ E. The greatest length from north to south is 120 m., and the greatest breadth from east to west 50 m. It has a coast-line of 130 m. and an estimated area of about 5000 sq. m. There are several islands off the coast, some of which are inhabited. The surface is generally mountainous.

Principal rivers are the Besut, Stiu, Trengganu, Dungun and Kmamun, none of which is navigable for any distance. The climate is mild and fairly healthy. The population numbers about 180,000, almost all Malays, and mostly clusters round the mouths and lower reaches of the rivers. The capital, which is situated at the mouth of the Trengganu River, contains, with its suburbs, not less than 30,000 people. Difficulty of access by river

and by land render the interior districts almost uninhabitable. Communication is main- tained by boat along the coast. There are no roads and no postal ir telegraphic communications.

The majority of the people are sailors and fishermen. Rice is grown, but not in sufficient quantities to supply local needs. Much pepper and gambier were at one time grown and exported, but about the year 1903 agriculture began to fall off owing to prevailing in- security of life and property. Not much livestock is raised, the few head of cattle exported from Besut being mostly stolen from across the neighbouring Kelantan border. A successful tin mine under European control exists in the Kmamun district, but as everything possible was done in the past to discourage all foreign enterprise, the probable mineral wealth of the country is still practically untouched. Silk- weaving, carried on entirely by the women, is a considerable industry. The silk is imported raw and is re-exported in the form of Malay clothing {sarongs) of patterns and quality which are widely celebrated. The manufacture of native weapons and of brassware was at one time brisk but is declining. The trade of Trengganu is not increasing. It is valued roughly at about one and a half million dollars a year, is chiefly with Singapore, and is to a great extent carried in Trengganu-built ships, which latter also do some carrying trade for other states on the east coast.

The Trengganu sultanate is one of the most ancient in the peninsula and ranks with that of Riau. The state was feudatory to Malacca in the 13th century and during the 14th, 15th and 16th centuries its possession was frequently disputed between Malacca and Siam. The present sultan is the descendant of an ancient family, the members of which have quarrelled and fought with each other for the succession from time immemorial. The last serious disturbance was in 1837 when the grandfather of the present sultan stole the throne from his nephew. Until the acquisition of the state by Great Britain a triennial tribute of gold flowers was paid to Siam, and this with occasional letters of instructions and advice, constituted almost the only tangible evidence of Siamese suzerainty. Of government there was practically none. The sultan, having alienated most of his powers and prerogatives to his relatives, passed his life in religious seclusion and was ruler in no more than name. The revenues were devoured bythe relatives, a small part of those accruing from the capital sufficing for the sultan's needs. There were no written laws, no courts and no police. All manner of crime was rampant, the peasantry was mercilessly downtrodden, but the land was full of holy men and the cries of the miserable were drowned in the noise of ostentatious prayer. In fine, Trengganu presented in the beginning of the year 1909 the type of untrammelled Malay rule which had fortunately disappeared from every other state in the peninsula. In July of that year, however, the first British adviser or agent arrived in the state, which was shortly afterwards visited by the governor of the Straits

Settlements, who discussed with the sultan the changed conditions consequent upon the Anglo-Siamese treaty and laid the foundations of future reform.

Kedah. — This state, on the west coast of the peninsula, lies between parallels 5° 20′ and 6° 42′ N., and is bounded, N. by Palit and Songkla, E. by Songkla and Raman, S. by Province Wellesley and Perak, and W. by the sea. The coast-line is 65 m. long, the greatest distance from north to south is 115 m. and the greatest breadth 46 m. Off the coast lies a group of islands, the largest of which is Langkawi, well peopled and forming a district of the state.

The total area of Kedah is about 4000 sq. m. The land is low- lying and swampy near the coast except towards the south where the height known as Kedah Hill rises from the shore opposite Penang, flat and fertile farther inland, and mountainous towards the eastern border. The rivers are small, the Sungei Kedah, navigable for a few miles for vessels of 50 tons, and the S.M uda, which forms the boundary with Province Wellesley, being the only streams worthy of notice. The plains are formed of marine deposit, and in the mountains lime- stone and granite preponderate. The population is estimated at 220,000, of whom about 100,000 are Malays, 50,000 Siamese and Samsams and 70,000 Chinese and Madrassis (Klings). There are three towns of importance. Alor Star, the capital, on the Kedah river, 10 miles from the sea, in a flat, unhealthy, but fertile locality, is a well laid out town with good streets, many handsome public and

private buildings, and good whartage for smafi vessels. The popula- tion is about 20,000, of whom more than half are Chinese, and the remainder government servants and retainers of the local aristocracy. Kuala M uda (pop. 10,000) and Kulim (pop. 8000) situated in the south, are unimposing collections of small birch houses and thatched bamboo huts; the latter is the centre of the Kedah tin mining industry. The bulk of the population is scattered over the plains in small villages. A good road runs north from Alor Star to the border of the state, a distance of 40 miles, and other roads are being constructed. The state has 185 miles of telegraph line and 75 miles of telephone line. Mails are closed daily at Alor Star for Penang and there is a good internal postal service. The chief industry is rice cultivation. Coco-nut, betel-nut and fruit plantations are many, and the cultivation of rubber has recently been taken up with prospects of success. The estimated area under cultivation is about 300,000 acres. There are rice-mills at Alor Star and at Kuala Muda. The principal exports are rice, cattle and tin. The chief imports are cotton goods, provisions, hardware and raw silk. Accurate trade statistics are not available. The ruler holds the rank of sultan and is assisted in the government by a council and by the British adviser who since the state passed from Siamese to British

protection in 1909, has replaced the officer formerly appointed by Siam. The sultan comes of a family long recognized by Siam as having hereditary right to the rulership. The penal and civil laws are administered in accordance with the precepts of Islamism, the official religion of the state. Though much has been done to improve the courts, justice is not easily obtain- able. A land registration system is in force but is in a state of confusion, though a land law passed in 1905 gives security of tenure over lands newly acquired. The mining laws are similar to those of Siam. In 1905 the Siamese government advanced two and a half million dollars to Kedah, to pay the debts of the state, which sum was refunded by the British Government on assuming the posi- tion of protector. The annual revenue is $1,000,000 and the ex- penditure about the same. Chief heads of revenue are opium and land tax. Many revenue monopolies, created in the past, have not yet expired; but for this the revenue would be greater than it is. There is no army. In 1906 the police service was reorganized under British officers, resulting in great improvement to this department. The state is divided into a number of administrative districts under Malay officials. Each district comprises several mukim or parishes, the imam of which exercise both spiritual and temporal control. There are schools in the chief towns, but education has not yet Deen seriously undertaken.

Kedah was founded by colonists from India in a.d. 1200, about which time the Siamese had subdued Nakhon Sri Tammarat and claimed the whole Malay Peninsula. When the rise of Malacca shook Siamese authority in the peninsula, Kedah oscillated between them, and on the conquest of Malacca by the Portuguese, fell to Siam, though the capital was raided and burnt by the Europeans. The ruler and his people were converted to Islam in the 15th century. In 1768, the Siamese kingdom being disorganized, the sultan of Kedah entered into direct political relations with the Hon. East India Company, leasing the island of Penang to the latter. Further treaties followed in 1791 and 1802, but in 1821 Siam reasserted her control, expelling the rebellious sultan after a sanguinary war. The sultan made several fruitless efforts to recover the state, and at length made full submission, when he was reinstated. In 1868 an agreement between Great Britain and Siam was substituted for the treaties of the East India Company with the sultan. The present sultan succeeded in 1881, and for 14 years governed well, but in 1895 he began to contract debts and to leave the government to his minions. The result was chaos, and in 1905 the Siamese government had to intervene to avert a condition of bankruptcy, adjusting the finances and reorganizing the general administration to such effect that when, four years later, the state became a British dependency, a government was found established on a sound basis and requiring nothing but the presence of a firm and experienced officer as adviser to maintain its efficiency and assist its further advance.

Perlis {Palit). — This small state, consisting of the left bank drainage area of the Perlis River, lies between Setul and Kedah, which bound it on the N. and W. and on the E. respectively. It touches the sea only round the mouth of the river.

The population is about 10,000, Malays and Chinese. The chief town, Perlis, is situated about 12 m. up the river. A good deal of tin is worked, and rice and pepper are grown and exported. In the early part of the 19th century Perlis was a district of Kedah, but during a period of disturbance in the latter state it established itself as a separate chief dom. In 1897 Siam restored the nominal authority of Kedah, but the measure was not productive of good. In 1905 the Siamese government advanced a loan of $200,000 to Perlis, and appointed an English adviser to assist in the general administration. This money was refunded to Siam and the adviser relieved by a British officer when the state became British in July 1909. The condition of the state has improved, but the revenue, $80,000, is not sufficient for the immediate needs of government.

Authorities. — Norman, The Far East (London, 1895); H. Clifford, in the Geographical Journal (London, 1896) ; Carter, The

Kingdom of Siam (London, 1904); Graham, Reports on Kelantan (Bangkok, 1905-1909) ; Skeat and Blagden, Pagan Races of the Malay Peninsula (London, 1906) ; Hart, Reports on Kedah (Calcutta, 1907-1909) ; Graham, Kelantan, a Handbook (Glasgow, 1907).

(W. A. G.)

MALAY STATES (Siamese) . The authority of Siam, which at one time covered the whole of the Malay peninsula, now extends southward to an irregular line drawn across the Peninsula at about 6° 30′ N. Between that line and the Isthmus of Kra, usually accepted as the northernmost point of the Malay Penin- sula, there lie some 20,000 sq. m. of territory inhabited by a mixed population of Siamese and Malays with here and there a few remnants of the aboriginal inhabitants clinging to the wilder districts, and with a few Chinese settlers engaged in com- merce. Formerly this tract was divided into a number of states, each of which was ruled by a chief (Siamese, Chao Muang; Malay, raja), who held his title from the king of Siam, but, subject to a few restrictions, conducted the affairs of his state in accordance with his own desires; the office of chief, moreover, was hereditary, subject always to the approval of the suzerain. The states

formed two groups: a northern, including Langsuan, Chaya, Nakhon Sri Tammarat, Songkla, Renawng, Takoapa, Pang Nga, Tongka and Trang, in which the Siamese element pre- dominated and of which the chiefs were usually Siamese or Chinese; and a southern, including Palean, Satun (Setul), Patani, Raman, Jering, Sai (Teloban), Re Nge (Legeh), Yala (Jalor) and Nong Chik, in which the population was principally Malay and the ruler also Malay . Four other states of the south- ern group, Kelantan, Trengganu, Kedah and Perlis, of which the population is entirely Malay, passed from Siamese to British protection in 1909.

With the gradual consolidation of the Siamese kingdom all the states of the northern group have been incorporated as ordinary provinces of Siam (q.v.), the hereditary Chao Muang haying died or been pensioned and replaced by officials of the Siamese Civil Service, while the states themselves now con- stitute provinces of the administrative divisions of Chumpon, Nakhon Sri Tammarat and Puket. The states of the southern group, however, retain their hereditary rulers, each of whom presides over a council and governs with the aid of a Siamese assistant commissioner and with a staff of Siamese district officials, subject to the general control of high commissioners under whom the states are grouped. This southern group, with a total area of about 7000 sq. m. and a population of 375,000, constitutes the Siamese Malay States. A British consul with headquarters at Puket, and a vice-consul who resides at Songkla, watch over the interests of British subjects in the states of the west and east sides of the peninsula respectively. Other foreign powers are unrepresented.

Palean. — This small state on the west coast, bounded N. by the province of Trang, E. by the Songkla division, S. by the state of Setul, and W. by the sea, is about 900 sq. m. in area, and has a population of about 20,000. It is attached for administrative purposes to the province of Trang, and its people are chiefly engaged in the cultivation of pepper, of which about 150 tons are annually exported. A few tin mines are also worked.

Satun (Setul). — This small state, bounded N. by Palean, E. by Songkla, S. by Perlis, and W. by the sea, contains about 1000 sq. m. area with a population of about 25,000, Malays, Siamese and a few Chinese. The principal production is pepper, which is exported in junks and in the small Penang steamers which ply on the west coast of the peninsula. In 1897 Setul was placed under the control of Kedah, then a Siamese dependency, but the arrangement was not a success, and in 1907 the Siamese government was forced, owing to prevailing corruption and misrule, to restrict the powers of the chief and, cancelling the authority of Kedah, to place him to some extent under the orders of the. high commissioner of Songkla. By the terms of the Anglo- Siamese treaty of 1909 about half of the state of Perlis was added to Satun, an arrangement by which the

importance of the latter was considerably increased.

Patani. — The seven Malay states of Nawng Chik, Patani, Jering, Yala (Jalor), Sai (Teloban), Raman and Ra-nge' (Legeh) were con- stituted from the old state of Patani at the beginning of the 19th century. In 1906 they were reunited to form the Patani admini- strative division of Siam, but each state retains its Malay ruler, who governs jointly with a Siamese officer under the direction of the Siamese high commissioner, and many of the ancient privileges and customs of Malay government are preserved. The group of

states is situated between 5° 34′ and 6° 52′ N. and 100° 54′ and 101 58′ E. It is bounded N. by the China Sea, E. by the China Sea and Kelantan, S. by Perak, and W. by Kedah. The total area is about 5000 sq. m. The country is mountainous except close to the coast. The principal rivers are the Patani and tie Teloban, long, winding and shallow, and navigable for small boats only. The population is about 335,000, of whom the great majority are Malays. Each state has its capital, but Patani (the headquarters of the high com- missioner) is the only town of importance. Communications are poor and are chiefly by river, but roads are under construction. Patani and Sai are in telegraphic communication with Bangkok and Singapore, and regular weekly mails are despatched to those places. The area under cultivation is small except round about Patani and in Nawng Chik, where much rice is grown. Tin mining is a growing industry ; many Chinese own mines and several European syndicates are at work in Raman, Ra-nge and Patani, prospecting for, or mining, this metal. Fishing and salt-evaporation occupy a large proportion of the population. The annual export of tin is about 400 tons, and dried fish, salt, cattle and elephants are other exports. Steamers up to 300 tons maintain frequent communication with Bangkok and Singapore, and the Patani roads afford good anchorage at all seasons. Mahommedan law is followed in the settlement of inherited property disputes and of matrimonial affairs; otherwise the laws of Siam obtain. Efficient law courts have been established in each state, and there is a serviceable force of gendarmerie recruited from amongst Malays and Siamese alike. The revenue amounts to about 600,000 ticals, or £45,000 a year, one-third being payable to the rulers as private income for themselves and their relatives, one-third expended on the administration, and one-third reserved for special purposes, but it is usually found necessary to devote the last- mentioned third to the expenses of administration. Patani has been subject to Siam from the remotest times. It is said that the old state adopted Islamism in the 16th century, the chief, a relative of the kings of Siam, embracing that religion and at the same time revolting to Malacca. It has several times been necessary to send punitive expeditions to recall the state to its allegiance. The present rulers are mostly descended from the ruling families

of the neighbouring state of Kelantan, but the chief of Patani itself is a member of the family which ruled there in the days of its greatness. Throughout the 17th century Patani was resorted to by Portuguese, Dutch and English merchants, who had factories ashore and used the place as an emporium for trade with Siam. In 162 1 an engagement took place in the Patani roads between three Dutch and two British ships, the latter being taken after the president of the British merchants, John Jourdain, had been killed. In 1899 the border between the state of Perak and Raman was fixed by an agreement between England and Siam, a dispute of old standing being thereby settled, but the question was reopened in the negotiations which preceded the Anglo-Siamese treaty of 1909, when a new border line was fixed between British and Siamese possessions in the Peninsula.

(W. A. G.) MALCHIN, a town of Germany, in the grand-duchy of Mecklenburg-Schwerin, on the river Peene, between lakes Malchin and Kummerow, 28 m. by rail N.W. of Neu-Brandenburg. Pop. (1900), 7449. It is, alternately with Sternberg, the place of assembly of the Diet of Mecklenburg. Here are the chateaux of Remplin, Basedow and Schlitz; a church dating from the 14th century, and a fine town-hall. The well-wooded and undulating country, environing the shores of Lake Malchin, is known as the " Mecklenburg Switzerland," and is increasing in favour as a summer resort. A canal unites Lake Kummerow with the Peene. The industries of the town include the manufacture of sugar and bricks, and brewing and malting. Malchin became a town in 1236.

MALCOLM, the name of four kings of the Scots, two of whom, MALCOLMl.,kingfrom 943 10954, and Malcolm II. ,kingfrom 1005 to 1034, are shadowy and unimportant personages.

Malcolm III. (d. 1093), called Canmore or the " large- headed," was a son of King Duncan I., and became king after the defeat of the usurper Macbeth in July 1054, being crowned at Scone in April 1057. Having married as his second wife, (St) Margaret (q.v.) , a sister of Edgar ˆEtheling, who was a fugitive at his court, he invaded England in 1070 to support the claim of Edgar to the English throne, returning to Scotland with many captives after harrying Northumbria. William the Conqueror answered this attack by marching into Scotland in 1072, where- upon Malcolm made peace with the English king at Abemethy and " was his man." However, in spite of this promise he ravaged the north of England again and again, until in 1091 William Rufus invaded Scotland and received his submission. Then in 1092 a fresh dispute arose between the two kings, and William summoned Malcolm to his court at Gloucester. The

Scot obeyed, and calling at Durham on his southward journey was present at the foundation of Durham Cathedral. When he reached Gloucester Rufus refused to receive him unless he did homage for his kingdom; he declined and returned home in high dudgeon. Almost at once he invaded Northumbria, and was killed at a place afterwards called Malcolm's Cross, near Alnwick, on the 13th of November 1093. Four of Malcolm's sons, Duncan II., Edgar, Alexander I., and David I., became kings of Scotland; and one of his daughters, Matilda, became the wife of Henry I. of England, a marriage which united the Saxon and the Norman royal houses.

Malcolm IV. (c. 1141-1165) was the eldest son of Henry, earl of Huntingdon (d. 1 1 5 2) , son of King David I. , and succeeded his grandfather David as king of Scotland in 1153. He is called the " Maiden," and died unmarried on the 9th of December

1165.

See E. A. Freeman, The Norman Conquest, vols. iv. and v. (1867- 1879), and The Reign of William Rufus (1882); W. F. Skene, Celtic Scotland (1876-1880); E. W. Robertson, Scotland under her Early Kings (1862); and A. Lang, History of Scotland, vol. i. (1900).

MALCOLM, SIR JOHN (1769-1833), Anglo-Indian soldier, diplomatist, administrator and author, was born at Burnfoot on the Esk, near Langholm, Dumfriesshire, Scotland, on the 2nd of May 1769. His father was a humble farmer, but three of his sons attained the honour of knighthood. At the age of twelve he received a cadetship in the Indian army, and in April 1 783 he landed at Madras, shortly afterwards joining his regiment at Vellore. In 1792, having for some time devoted himself to the study of Persian, he was appointed to the staff of Lord Cornwallis as Persian interpreter, but two years afterwards was compelled by ill health to leave for England. On his return to India in 1 796 he became military secretary to Sir Alured Clarke, commander-in-chief at Madras, and afterwards to his successor General Harris; and in 1798 he was appointed by Lord Wellesley assistant to the resident at Hyderabad. In the last-mentioned capacity he highly distinguished himself by the manner in which he gave effect to the difficult measure of disbanding the French corps in the pay of the nizam. In 1799, under the walls of Seringapatam, began his intimacy with Colonel ArthurWellesley, which in a short time ripened into a life-long friendship. In the course of the same year he acted as first secretary to the commis- sion appointed to settle the Mysore government, and before its close he was appointed by Lord Wellesley to proceed as envoy to the court of Persia for the purpose of counteracting the policy of

the French by inducing that country to form a British alliance. Arriving at Teheran in. December 1800, he was successful in negotiating favourable treaties, both political and commercial, and returned to Bombay by way of Bagdad in May 1801. He now for some time held the interim post of private secretary to Lord Wellesley, and in 1803 was appointed to the Mysore residency. At the close of the Mahratta War, in 1804, and again in 1805, he negotiated important treaties with Sindhia and Holkar, and in 1806, besides seeing the arrangements arising out of these alliances carried out, he directed the difficult work of reducing the immense body of irregular native troops. In 1808 he was again sent on a mission to Persia, but circumstances prevented him from getting beyond Bushire; on his reappoint- ment in 1810, he was successful indeed in procuring a favourable reception at court, but otherwise his embassy, if the information which he afterwards incorporated in his works on Persia be left out of account, was (through no fault of his) without any sub- stantial result. He sailed for England in 181 1, and shortly after his arrival in the following year was knighted. His intervals of leisure he devoted to literary work, and especially to the com- position of a History of Persia, which was published in two quarto volumes in 181 5. On his return to India in 181 7 he was appointed by Lord Moira his political agent in the Deccan, with eligibility for military command; as brigadier-general under Sir T. Hislop he took a distinguished part in the victory of Mehidpur (December 21, 1817), as also in the subsequent work of following up the fugitives, determining the conditions of peace and settling the country. In 1821 he returned once

more to England, where he remained until 1827, when he was appointed governor of Bombay. His influence in this office was directed to the promotion of various economical reforms and use- ful administrative measures. Leaving India for the last time in 1830, he shortly after his arrival in England entered parliament as member for Launceston, and was an active opponent of the Reform Bill. He died of paralysis on the 30th of May 1833.

Besides the work mentioned above, Sir John Malcolm published Sketch of the Political History of India since . . . 1784 (in 181 1 and 1826) ; Sketch of the Sikhs (1812) ; Observations on the Disturbances in the Madras Army in 180Q (1812) ; Persia, a Poem, anonymous (1814) ; A Memoir of Central India (2 vols., 1823); and Sketches of Persia, anonymous (1827). A posthumous work, Life of Robert, Lord Clive, appeared in 1836. See Life and Correspondence of Sir John Malcolm, by J. W. Kaye (2 vols., 1856).

MALDA, a district of British India, in the Rajshahi division of Eastern Bengal and Assam. Area, 1899 sq. m.; pop. (1901), 884,030, showing an increase of 8- sin the decade. The adminis- trative headquarters are at English Bazar (pop. 13,667) near the town of Old Malda. The district is

divided into two almost equal parts by the Mahananda river, flowing from north to south. The western tract between the Mahananda and the main stream of the Ganges is an alluvial plain of sandy soil and great fertility. The eastern half is an elevated region broken by the deep valleys of the Tangan and Purnabhaba rivers and their small tributary streams. The soil here is a hard red clay; and the whole is overgrown with thorny tree jungle known as the katdl. Agri- cultural prosperity centres on the Mahananda, where mango orchards and high raised plots of mulberry land extend continu- ously along both banks of the river. The Ganges nowhere intersects the district, but skirts it from its north-western corner to the extreme south. The Mahananda flows in a deep well- defined channel through the centre, and joins the Ganges at the southern corner. Its tributaries are the Kalindri on the right, and the Tangan and Purnabhaba on the left bank. The two principal industries are the production of indigo and silk. The first has declined, and so has the second as far as concerns the weaving of piece goods, but the rearing of silkworms and the export of raw silk and silk thread are carried on upon a large scale. No railway touches the district, but the communications by water are good.

Malda supplied two great capitals to the early Mahommedan kings of Bengal ; and the sites of Gaur and Pandua exhibit the most inter- esting remains to be found in the lower valley of the Ganges. (See Gaur.) The connexion of the East India Company with Malda dates from a very early period. As far back as 1676 there was a factory there. In 1770 English Bazar was fixed upon for a commercial residency, the buildings of which at the present day form both the public offices and private residence of the collector.

MALDEN, a city, including several villages, of Middlesex county, Massachusetts, U.S.A., on the Maiden river, about S m. N. of Boston. Pop. (1890), 23,031, (1900), 33,664, of whom 9513 were foreign-born, 3673 being English Canadians, 870 English, and 617 Swedes; (1910 census) 44,404. Maiden had in 1906 a land area of 4-78 sq. m. It is served by the Boston & Maine railroad, and by inter-urban electric railways. Although it is largely a residential suburb of Boston — its post office is a Boston sub-station — it has important manufacturing industries. The most valuable manufactured product is rubber boots and shoes. The capital invested in manufacturing in 1905 was $5,553>43 2 ; and the value of the factory product, $11,235,635, was 70.2% greater than the value of the factory product in 1900. Among Maiden's institutions are the public library (endowed by Elisha S. Converse), the Maiden hospital, the Maiden day nursery, a Young Men's Christian Association, and a home for the aged. A fine system of parks is maintained; the best known is possibly Pine Banks. To the north and west is the Middlesex Fells, a state reservation; about 60 acres of this and about 20 acres of the Middlesex Fells Parkway lie within

Maiden. Maiden, when first settled about 1640, was part of Charlestown, and was known for some years as Mystic Side. It was incorporated as a town under the name of " Mauldon " in 1649, and was chartered as a city in 1881. The north part of Maiden was set off in 1850 to form Melrose, and the south part

in 1870 to form the'town of Everett. Maiden was the birthplace of Adoniram Judson, the " apostle to Burma." Michael Wigglesworth was pastor here from 1656 until 1705.

See D. P. Corey, History of Maiden (Maiden, 1899) ; and Maiden, Past and Present (Maiden, 1899).

MALDIVE ISLANDS, an archipelago of coral islets in the Indian Ocean, forming a chain between 7 6′ N. and 0° 42′ S. It consists of seventeen atolls with an immense number of islands, of which some three hundred are inhabited. In the extreme south are the isolated atolls of Addu and Fua-Mulaku, separated from Suvadiva by the Equatorial Channel, which is itself separated from the main chain of atolls by One-and-a- half-degree Channel. 1 Following the chain northward from this channel we have Haddumati and Kolumadulu, after which the chain becomes double: to the east the chief atolls are Mulaku, Felidu, South Male, North Male, Kardiva (where the channel of the same name, 35 m. broad, partly breaks the chain), and Fadiffolu. To the west are South Nilandu, North Nilandu, Ari, South Mahlos, North Mahlos and Miladumadulu. To the north again are Tiladumati and Ihavandifulu. Finally, to the north of Eight-degree Channel is Minikoi, 71m. from the nearest point of the Maldives, and no m. from that of the Laccadives to the north. The main part of the archipelago, north of One-and- a-half-degree Channel, consists of a series of banks either sur-rounded or studded all over with reefs (see J. S. Gardiner, " For- mation of the Maldives," in Geographical Journ. xix. 277 seq.). Mr Gardiner regarded these banks as plateaus rising to different elevations beneath the surface of the sea from a main plateau rising steeply from the great depths of the Indian Ocean.

After the Portuguese, from about 1518 onwards, had at- tempted many times to establish themselves on the islands by force, and after the Maldivians had endured frequent raids by the Mopla pirates of the Malabar coast, they began to send tokens of homage and claims of protection (the first recorded being in 1645) to the rulers of Ceylon, and their association with this island has continued practically ever since. The

hereditary sultan of the archipelago is tributary to the British government of Ceylon. The population of the Maldives is estimated at 30,000. All are Mahommedans. By Messrs. Gardiner and Cooper they are classed in four ethnological divisions. (1) Those of the atolls north of the Kardiva Channel. Here the reefs are generally less perfect than elsewhere, seldom forming complete central lagoons, and as they were formerly exposed to the constant attacks of the Mopla pirates from India, the people are hardier and more vigorous than their less warlike southern neighbours. They annually visited the coasts of India or Ceylon, and often married Indian wives, thus acquiring distinct racial characters of an approximately Dravidian type. (2) Those of the central division, comprising the atolls between North Male and Haddumati, who are under the direct rule of the sultan, and have been more exposed to Arab influences. They formerly traded with Arabia and Malaysia, and many Arabs settled amongst them, so that they betray a strong strain of Semitic blood in their features. (3 and 4) The natives of Suvadiva, Addu, Mulaku and the other southern clusters, who have had little communication with the Central Male people, and probably preserve more of the primitive type, approximat- ing in appearance to the Sinhalese villagers of Ceylon. They are an intelligent and industrious people, growing their own crops, manufacturing their own cloth and mats, and building their own boats, while many read Arabic more or less fluently, although still believers in magic and witchcraft. The language is a dialect of Sinhalese, but indicating a separation of ancient date and more or less mahommedanized.

The sultan's residence and the capital of the archipelago is the island of Male. From the earliest notices the production of coir, the collection of cowries, and the weaving of excellent textures on these islands have been noted. The chief exports of the islands besides coir and cowries (a decreasing trade) are coco-nuts, copra, tortoise-shell and dried bonito-fish.

1 These and other channels in the locality are named from their position under parallels of latitude.

Minikoi atoll, with the numerous wrecks on its reefs, its light- house, and its position on the track of all eastward-bound vessels, is a familiar sight to seafarers in these waters. The atoll, which is pear-shaped and disposed in the direction from S.W. to N.E. is 5 m. long, with an extreme breadth of nearly 3 m., with a large but shallow lagoon approached from the north by a passage two fathoms deep. The atoll is growing out- wards on every side, and at one place rises 10 ft. above sea-level. The population, which numbers about 3000, is sharply divided into five castes, of which the three highest are pure Maldivians, the lower two the same as in the Laccadives. All are centred in a small village opposite Mou Rambu Point on the west or lagoon side; but most of the men are generally absent, many being

employed with the Lascar crews on board the large liners plying in the eastern seas.

In 1899-1900 Messrs. J. Stanley Gardiner and C. Forster Cooper carried out an expedition to the Maldives and Laccadives, for the important results of which see The Fauna and Geography of the Maldive and Laccadive Archipelagoes, ed. J. S. Gardiner (Cambridge, 1901-1905), also Proceedings of the Cambridge Philosophical Society, vol. xi. pt. I (1900), and the Geographical Journ., loc. cit., &c. A French adventurer, Francois Pyrard de la Val, was wrecked in the Maldives in 1602 and detained there five years; he wrote an interest- ing account of the archipelago, Voyage de F. P. de la Val (Paris, 1679; previous editions 161 1, &c). See also A. Agassiz, "An Ex- pedition to the Maldives "jnAmer. Journ. Science, vol. xiii. (1902).

MALDON, a market town, municipal borough and port, in the Maldon parliamentary borough of Essex, England, on an acclivity rising from the south side of the Blackwater, 43 m. E.N.E. from London by a branch from Witham of the Great Eastern railway. Pop. (1901), 5565. There are east and west railway stations. The church of All Saints, dating from 1056, but, as it stands, Early English and later, consists of chancel, nave and aisles, with a triangular Early English tower (a unique form) at the west end surmounted by a hexagonal spire. The tower of St Mary's Church shows Norman work with Roman materials. The other public buildings are the grammar school, founded in 1547; the town-hall, formerly D'Arcy's tower, built in the reign of Henry VI.; and the public hall. There are manu- factures of crystallized salt, breweries, an oyster fishery and some shipping. On Osea Island, in the Blackwater estuary, there is a farm colony for the unemployed. A mile west of Maldon are re- mains of Beeleigh Abbey, a Premonstratensian foundation of the 1 2th century. They consist of the chapter-house and another chamber, and are of fine Early English work. The borough is under a mayor, 4 aldermen and 12 councillors. Area, 3028 acres.

At Maldon (Maelduna, Melduna, Mealdon or Meaudori) palaeolithic, neolithic and Roman remains that have been found seem to indicate an early settlement. It is not, however, an important Roman site. An earthwork, of which traces exist, may be Saxon or Danish. The Anglo-Saxon Chronicle relates that Edward the Elder established a " burh " there about 921, and that Ealdorman Brihtnoth was killed there by the Danes in 991. The position of Maldon may have given it some commer- cial importance, but the fortress is the point emphasized by the Chronicle. Maldon remained a royal town up to the reign of Henry I., and thus is entered as on terra regis in Domesday. Henry II. granted the burgesses their first charter, probably in 1 1 55, giving them the land of the borough and

suburb with sac and soc and other judicial rights, also freedom from county and forest jurisdiction, danegeld, scutage, tallage and all tolls, by the service of one ship a year for forty days. This charter was confirmed by Edward I. in 1290, by Edward III. in 1344, and by Richard II. in 1378. In 1403 the bishop of London granted further judicial and financial rights, and Henry V. con- firmed the charters in 1417, Henry VI. in 1443, and Henry VIII. in 1525. Maldon was incorporated by Philip and Mary in 1554, and received confirmatory charters from Elizabeth in 1563 and 1592, from Charles I. in 1631, Charles II. and James II. In 1 768 the incorporation charter was regranted, with modifications in 1810.

MALEBRANCHE, NICOLAS (1638-1715), French philo- sopher Of the Cartesian school, the youngest child of Nicolas

Malebranche, secretary to Louis XIII., and Catherine de Lauzon, sister of a viceroy of Canada, was born at Paris on the 6th of August 1638. Deformed and constitutionally feeble, he received his elementary education from a tutor, and left home only when sufficiently advanced to enter upon a course of philosophy at the College de la Marche, and subsequently to study theology at the Sorbonne. He had resolved to take holy orders, but his studious disposition led him to decline a stall in Notre Dame, and in 1660 he joined the congregation of the Oratory: He was first advised by Pere Lecointe to devote himself to ecclesias- tical history, and laboriously studied Eusebius, Socrates, Sozo- men and Theodoret, but " the facts refused to arrange themselves in his mind, and mutually effaced one another." Richard Simon undertook to teach him Hebrew and Biblical criticism with no better success. At last in 1664 he chanced to read Descartes's Traite de V homme {de homine) , which moved him so deeply that (it is said) he was repeatedly compelled by palpita- tions of the heart to lay aside his reading. Malebranche was from that hour consecrated to philosophy, and after ten years' study of the works of Descartes he produced the famous De la recherche de la verile, followed at intervals by other works, both speculative and controversial. Like most of the great meta- physicians of the 17th century, Malebranche interested himself also in questions of mathematics and natural philosophy, and in 1699 was admitted an honorary member of the Academy of Sciences. During his later years his society was much courted, and he received many visits from foreigners of distinction. He died on the 13th of October 1715; his end was said to have been hastened by a metaphysical argument into which he had been drawn in the course of an interview with Bishop Berkeley. For a critical account of Malebranche's place in the history of philosophy, see

Cartesianism.

Works. — De La recherche de la verite (1674; 6th ed., 1712; ed. Bouillier, 1880; Latin trans, by J. Lenfant at Geneva in 1685; English trans, by R. Sault, 1694; and T. Taylor, 1694, 1712); Conversations chreti- ennes (1677, and frequently; Eng. trans., London, 1695); Traite de la nature el de la grace (1680; Eng. trans., London, 1695) ; Meditations chretiennes et metaphysiques (1683); Traiti de morale (1684; separate ed. by H. Joly, 1882; Eng. trans, by Sir J. Shipton, 1699); several polemical works against Arnauld from 1684 to 1688; Entretiens sur la metaphysique et sur la religion (1688) ; Traite de I'amour de Dieu (1697); Entretiens d'un philosophe chretien et d'un philosophe chinois sur I 'existence et la nature de Dieu (1708) ; Reflexions sur la promotion physique (1715).

A convenient edition of his works in two volumes, with an intro- duction, was published by Jules Simon in 1842. A full account by Mrs Norman Smith of his theory of vision, in which he unquestion- ably anticipated and in some respects surpassed the subsequent work of Berkeley, will be found in the British Journal of Psychology (Jan. 1905). For recent criticism see H. Joly, in the series Les Grands philosophes (Paris, 1901); L. Olle-Laprune, La Philosophic de Malebranche (1870); M. Novaro, Die Philosophic des Nicolaus Malebranche (1893).

MALER KOTLA, a native state of India, within the Punjab. It ranks as one of the Cis-Sutlej states, which came under British influence in 1809. The territory lies south of Ludhiana. Area, 167 sq. m. Pop. (1901), 77,506, showing an increase of 2%-in the decade. Estimated gross revenue, £30,100. The military force numbers 280. men; and there is no tribute. The town Maler Kotla is 30 m. S. of Ludhiana; pop. (1901), 21,122. The nawab or chief is of Afghan descent ; his family originally came from Kabul, and occupied positions of trust in Sirhind under the Mogul emperors. They gradually became independent as the Mogul Empire sank into decay in the course of the 18th century. In General Lake's campaign against Holkar in 1805 the nawab of Maler Kotla sided with the British. After the subjugation and flight of Holkar, the English government succeeded to the power of the Mahrattas in the districts between the Sutlej and the Jumna; and in 1809 its protection was formally extended to Maler Kotla, as to the other Cis-Sutlej states, against the for- midable encroachments of Ranjit Singh. In the campaigns of 1806, 1807 and 1808 Ranjit Singh had made considerable conquests across the Sutlej; in 1808 he marched on Maler Kotla and demanded a radsom of £10,000 from the nawab. This led to the interference of the British, who addressed an ultimatum

to Ranjit Singh, declaring the Cis-Sutlej states to be under British

protection. Finally the raja of Lahore submitted, and the nawab was reinstated in February 1809. Owing to the mental incapacity of nawab Ibrahim Ali Khan, the state was administered in recent years for some time by the chief of Loharu; but his son, Ahmed Ali Khan, was made regent in February 1905.

See Maler Kotla State Gazetteer (Lahore, 1908).

MALESHERBES, CHRETIEN GUILLAUME DE LAMOIGNON

DE (1721-1794), commonly known as Lamoignon-Malesherbes, French statesman, minister, and afterwards counsel for the defence of Louis XVI., came of a famous legal family. He was born at Paris on the 6th of December 1721, and was educated for the legal profession. The young lawyer soon proved his intellec- tual capacity, when he was appointed president of the cour des aides in the parlement of Paris in 175° on the promotion of his father, Guillaume de Lamoignon, to be chancellor. One of the chancellor's duties was to control the press, and this duty was entrusted to Malesherbes by his father during his eighteen years of office, and brought him into connexion with the public far more than his judicial functions. To carry it out efficiently he kept in communication with the literary leaders of Paris, and especially with Diderot, and Grimm even goes so far as to say that " without the assistance of Malesherbes the EncyclopSdie would probably never have been published." In 1771 he was called upon to mix in politics; the parlements of France had been dissolved, and a new method of administering justice devised by Maupeou, which was in itself commendable as tending to the better and quicker administration of justice, but pernicious as exhibiting a tendency to over-centralization, and as abolishing the hereditary " nobility of the robe," which, with ali its faults, had from its nature preserved some independence, and been a check on the royal power. Malesherbes presented a strong remonstrance against the new system, and was at once banished to his country seat at St Lucie, to be recalled, however, with the old parlement on the accession of Louis XVI., and to be made minister of the maison du roi in 1775. He only- held office nine months, during which, however, he directed his attention to the police of the kingdom, which came under his department, and did much to check the odious practice of issuing lettres de cachet. The protest of the cour des aides in 1775]S one of the rnost important documents of the old regime in France. It gives a complete survey of the corrupt and inefficient administration, and presented the king with most outspoken criticism. On retiring from the ministry with Turgot in 1 776, he betook himself entirely to a happy country and domestic life and travelled through Switzerland, Germany and Holland. An essay on Protestant marriages (1787) did much to procure for them the civil recognition in France. He had always been an enthusiastic botanist; his avenue at St Lucie was world famous; he had

written against Buffon on behalf of the botanists whom Buffon had attacked, and had been elected a member of the Acad&mie des sciences as far back as 1750. He was now elected a member of the Academie francaise, and everything seemed to promise a quiet and peaceful old age spent in the bosom of his family and occupied with scientific and literary pursuits, when the king in his difficulties wished for the support of his name, and summoned him back to the ministry in 1787. Lamoignon-Malesherbes held office but a short time, but returned to his country life this time with a feeling of insecurity and disquiet, and, as the troubles increased, retired to Switzerland. Nevertheless, in December 1792, in spite of the fair excuse his old age and long retirement would have given him, he voluntarily left his asylum and under- took with Tronchet and Deseze the defence of the king before the Convention, and it was his painful task to break the news of his condemnation to the king. After this effort he returned once more to the country, but in December 1793 he was arrested with his daughter, his son-in-law M. de RosambS, and his grand- children, and on the 23rd of April 1794 he was guillotined, after having seen all whom he loved in the world executed before his eyes for their relationship to him. Malesherbes is one of the

sweetest characters of the 18th century; though no man of action, hardly a man of the world, by his charity and unfeigned goodness he became one of the most popular men in France, and it was an act of truest self-devotion in him to sacrifice himself for a king who had done little or nothing for him.

There are in print several scientific works of Malesherbes of varying value, of which the most interesting is his Observations sur Buffo-n- et Daubenton, written when he was very young, and published with a notice by Abeille in 1798. There exist also his Memoire pour Louis XVI., his Memoire sur la liberie de la presse (published 1809) and extracts from his remonstrances, published as CEuvres choisies de Malesherbes in 1809. For his life should be read the Notice historique (3rd ed., 1806) of Dubois, the Eloge historique (1805) of Gaillard, and the interesting Essai sur la vie, les ecrits et les opinions de M. de Malesherbes (in 2 vols., 1818), of F. A. de Boissy d'Anglas. There are also many eloges on him in print, of which the best-known is that of M. Dupin, which was delivered at the Academy in 1841, and was reviewed with much light on Malesherbes's control of the press by Sainte-Beuve in the 2nd volume of the Causeries du lundi. The protest of the cour des aides has been published with translation by G. Robinson in the Translations and Reprints of the University of Pennsylvania (1900). For his defence of Louis XVI. see Marquis tie Beaucourt, Captivite et

derniers moments de Louis XVI. (2 vols., 1892, Soc. d'hist. contemp.), and A. Tuetey, Repertoire general des sources manuscrites de I'hist. de Paris pendant la Rev. fr., vol. viii.

(1908).

MALET, LUCAS, the pen-name of Mary St Leger Harrison (1852-), English novelist. She was the eldest daughter of Charles Kingsley, and was born at Eversley on the 4th of June 1852. She studied at the Slade school and at University College, London, and married in 1876 William Harrison, rector of Clovelly. After her husband's death in 1897 she eventually settled in London. She had already written several books — Mrs Lorimer (1882), Colonel Enderby's Wife (1885), Little Peter (1887), A Counsel of Perfection (1888) — when she published her powerful story, The Wages of Sin (1891), which attracted great attention. Her History of Sir Richard Calmady (1901) had an even greater success. Her other novels include The Carissima (1896), The Gateless Barrier (1900), On the Far Horizon (1906).

MALHERBE, FRANCOIS DE (1555-1628), French poet, critic and translator, was born at Caen in 1555. His family was of some position, though it seems not to have been able to establish to the satisfaction of heralds the claims which it made to nobility older than the 16th century. The poet was the eldest son of another Francois de Malherbe, conseiller du rot in the magistracy of Caen. He himself was elaborately educated at Caen, at Paris, at Heidelberg and at Basel. At the age of twenty-one, preferring arms to the gown, he entered the house- hold of Henri d'Angouleme, grand prior of France, the natural son of Henry II. He served this prince as secretary in Provence, and married there in 158 1. It seems that he wrote verses at this period, but, to judge from a quotation of Tallemant des Reaux, they must have been very bad ones. His patron died when Malherbe was on a visit in his native province, and for a time he had no particular employment, though by some servile verses he obtained a considerable gift of money from Henry III., whom he afterwards libelled. He lived partly in Provence and partly in Normandy for many years after this event; but very little is known of his life during this period. His Larmes de Saint Pierre, imitated from Luigi Tansillo, appeared in 1587.

It was in the year parting the two centuries (1600) that he presented to Marie de' Medici an ode of welcome, the first of his remarkable poems. But four or five years more passed before his fortune, which had hitherto been indifferent, turned. He was presented by his countryman, the Cardinal Du Perron, to Henry IV.; and, though that economical prince did not at first show any great eagerness to entertain the poet, he was at last summoned to court and endowed after one fashion or another. It is said that the pension

promised him was not paid till the next reign. His father died in 1606, and he came into his inheritance. From this time forward he lived at court, corresponding affectionately with his wife, but seeing her only twice in some twenty years. His old age was saddened by a great misfortune. His son, Marc Antoine, a young man of

promise, fell in a duel in 1626. His father used his utmost influence to have the guilty parties (for more than one were concerned, and there are grounds for thinking that it was not a fair duel) brought to justice. But he died before the suit was decided (it is said in consequence of disease caught at the camp of La Rochelle, whither he had gone to petition the king) , in Paris, on the 16th of October, 1628, at the age of seventy- three.

The personal character of Malherbe was far from amiable, but he exercised, or at least indicated the exercise of, a great and enduring effect upon French literature, though by no means a wholly beneficial one. The lines of Boileau beginning Enfin Malherbe tint are rendered only partially applicable by the extraordinary ignorance of older French poetry which distin- guished that peremptory critic. But the good as well as bad side of Malherbe's theory and practice is excellently described by his contemporary and superior Regnier, who was animated against him, not merely by reason of his own devotion to Ronsard but because of Malherbe's discourtesy towards Regnier's uncle P. Desportes, whom the Norman poet had at first distinctly copied. These are the lines: —

" Cependant leur savoir ne s'fitend nullement Qu'a r6gratter un mot douteuse au jugement, Prendre garde qu'un qui ne heurte une diphthongue, Epier si des vers la rime est breve ou longue, Ou bien si la voyelle a l'autre s'unissant Ne rend point a l'oreille un vers trop languissant.

C'est proser de la rime et rimer de la prose." This is perfectly true, and from the time of Malherbe dates that great and deplorable falling off of French poetry in its more poetic qualities, which was not made good till 1830. Never- theless the critical and restraining tendency of Malherbe was not ill in place after the luxuriant importation and innovation of the Pleiade; and if he had confined himself to preaching greater technical perfection, and especially greater simplicity and purity in vocabulary and versification, instead of super- ciliously striking his pen through the great works of his prede- cessors, he would have deserved wholly well. As it was, his reforms helped to elaborate the kind of verse necessary for the classical tragedy, and that is the most that can be said for him. His own poetical work is scanty in amount, and for the most part frigid and devoid of inspiration. The beautiful Consolation a Duperier, in which occurs the famous line —

Et, rose, elle a v&u ce que vivent les roses — the odes to Marie de' Medici and to Louis XIII., and a few other pieces comprise all that is really worth remembering of him. His prose work is much more abundant, not less remarkable for care as to style and expression, and of greater positive value. It consists of some translations of Livy and Seneca, and of a very large number of interesting and admirably written letters, many of which are addressed to Peiresc, the man of science of whom Gassendi has left a delightful Latin life. It contains also a most curious commentary on Desportes, in which Malherbe's minute and carping style of verbal criticism is displayed on the great scale.

The chief authorities for the biography of Malherbe are the Vie de Malherbe by his friend and pupil Racan, and the long Historiette which Tallemant des Reaux has devoted to him. The standard edition is the admirable one of Ludovic Lalanne (5 vols., Paris, 1862-1869). Of the poems only, there is an excellent and handsome little issue in the Nouvelle collection Jannet (Paris, 1874). Of modern works devoted to him, La Doctrine de Malherbe, by G. Brunot (1891), is not only the most important but a work altogether capital in regard to the study of French language and literature. Others are A. Gast6, La Jeunesse de Malherbe (1890) ; V. Bourrienne, Points obscurs dans la vie normande de Malherbe (1895); and the due de Broglie's " Malherbe " in Les Grands ecrivains francais. On his position in French and general critical history, G. Saintsbury's History of Criticism, vol. ii., may be consulted. (G. Sa.)

MALIBRAN, MARIE FELICITY (1808-1836), operatic singer, daughter of Manoel Garcia, was born in Paris on the 24th of March 1808. Her father was then a member of the company of the Theatre des Italiens, and she accompanied him to Italy and London. She possessed a soprano voice of unusual beauty and

phenomenal compass, which was carefully cultivated by her father. She was only seventeen when, in consequence of an indisposition of Madame Pasta, she was suddenly asked to take her place in The Barber of Seville at Covent Garden. She was forthwith engaged for the remaining six weeks of the season, and then followed her father to New York, where she appeared in Othello, The Barber of Seville, Don Juan, Romeo and Juliet, Tancred. Her gifts as an actress were on a par with her magnifi- cent voice, and her gaiety made her irresistible in light opera, although her great triumphs were obtained chiefly in tragic parts. She married a French banker of New York, named Malibran, who was much older than herself. The marriage was an

unhappy one, and Mme Malibran returned alone to Europe in 1828, when she began the series of representations at the Theatre des Italiens, which excited an enthusiasm in Paris only exceeded by the reception she received in the principal towns of Italy. She was formally divorced from Malibran in 1835, and married the Belgian violinist, Charles de Beriot; but she died of fever on the 23rd of September 1836.

See Memoirs of Mme Malibran by the comlesse de Merlin and other intimate friends, with a selection from her correspondence (2 vols., 1840) ; and M. Teneo, La Malibran, d'aprhs des documents inedits, in Sammelbdnde der internationalen Musik-Gesellschaft (Leipzig, 1906).

MALIC ACID (Hydroxyethylene Succinic Acid), C 4 H60 5 , an organic acid found abundantly in the juices of many plants, particularly in mountain-ash berries, in unripe apples and in grapes. The acid potassium salt is also found in the leaves and stalks of rhubarb. Since the acid contains an asymmetric carbon atom, it can exist in three forms, a dextro-rotatory, a laevo-rotatory and an inactive form; the acid obtained in the various synthetical processes is the inactive form. It may be prepared by heating racemic acid (see Tartaric Acid) with fuming hydriodic acid; by heating fumaric acid (q.v.) with water at 1 50-200° C; by the action of nitrous acid on inactive aspartic acid; and by the action of moist silver oxide on monobrom- succinic acid. It forms deliquescent crystals, which are readily soluble in alcohol and melt at ioo° C. When heated for some time at 130° C. it yields fumaric acid (q.v.), and on rapid heating at 180° C. gives maleic anhydride and fumaric acid. It yields coumarins when warmed with sulphuric acid and phenols (H. v. Pechmann, Ber., 1884, 17, 929, 1649 et seq.). Potassium bichromate oxidizes it to malonic acid; nitric acid oxidizes it to oxalic acid; and hydriodic acid reduces it to succinic acid. The inactive variety may be split into the component active forms by means cf its cinchonine salt (G. J. W. Bremer, Ber., 1880, 13,352)-

MALIGNANT (Lat. malignus, evil-disposed, from maligenus), wicked, of a malicious or wilfully evil disposition. The word was early applied by the Protestants to the Romanists, with an allusion to the " congregation of evil doers " (Vulgate Ecclesiam malignantium) of Psalm xxvi. 5. In English history, during the Great Rebellion, the name was given to the Royalists by the Parliamentary party. In the Great Remonstrance of 1641 occur the words "the malignant partie, wherof the Archbishop (Laud) and the earl of Strafford being heads." The name throughout the period had special reference to the religious differences between the parties. In medical science, the term " malignant " is applied to a particularly virulent or dangerous form which a disease may take, or to a tumour or growth of rapid growth, extension to the lymphatic glands, and recurrence after

operation.

MALIK IBN ANAS (c. 718-795), the founder of the Malikite school of canon law, was born at Medina about a.d. 718: the precise date is not certain. He studied and passed his life there, and came to be regarded as the greatest local authority in theology and law. (For his legal system and its history see Mahommedan Law.) His life was one of extreme honour and dignity, but uneventful, being given to study, lecturing on law and acting as mufti and judge. Only two episodes stand out in his biography. When Mahommed ibn 'Abdallah, the 'Alid, rose in a.d. 762 at Medina against the 'Abbasids, Malik gave a fatwa, or legal opinion, that the oath of allegiance to the

'Abbasids was invalid, as extorted by force. For this inde- pendence he was severely scourged by the 'Abbasid governor, who, apparently, did not dare to go beyond scourging with a man of his standing with the people. The second episode gave equal proof of independence. In 795 Harun al-Rashid made the pilgrimage, came with two of his sons to Medina, and sat at the feet of Malik as he lectured in the mosque. The story, legendary or historical, adds that Malik had refused to go to the caliph, saying that it was for the student to come to "his teacher. Late in life he seems to have turned to asceticism and contemplation. It is said that he retired from all active, public life and even neglected plain, public duties, replying to re- proaches, " Not every one can speak in his own excuse " (Ibn Qutaiba, Ma 'drif, 250). He is also entered among the early ascetic Sufis (cf. Fihrist, 183). He died in Medina, a.d. 795.

For a description of his principal book, the Muwatta' , see Gold- ziher's Muhammedanische Studien, ii. 213 sqq. He wrote also a Koran commentary, now apparently lost, and a hortatory epistle to Harun al-Rashid. See further, de Slane's trans, of Ibn Khallikan, ii. 545 sqq.; von Kremer, Culturgeschichte, i. 477 sqq. ; Brockel- mann, Gesch. der afab. Litt., i. 175 sqq.; Macdonald, Muslim Theology, &c, 99 sqq. and index; Fihrist, 198 seq.; Nawawi, 530 sqq. (D. B. Ma.)

MALINES (Flemish, Mechelen, called in the middle ages by the Latin name Mechlinia, whence the spelling Mechlin), an ancient and important city of Belgium, and the seat since 1559 of the only archbishopric in that country. Pop. (1904), 58,101. The name is supposed to be derived from maris linea, and to indicate that originally the sea came up to it. It is now situated on the Dyle, and is in the province of Antwerp, lying about half-way between Antwerp and Brussels. The chief importance of Malines is derived from the fact that it is in a sense the religious capital of Belgium — the archbishop being the primate of the Catholic Church in that country. The archbishop's palace is in a picturesque situation, and dates from the

creation of the dignity. The principal building in the city is the exceedingly fine cathedral dedicated to St Rombaut. This cathedral was begun in the 12th and finished early in the 14th century, and although modified in the 15th after a fire, it remains one of the most remarkable specimens of Gothic architecture in Europe. The massive tower of over 300 ft., which is described as unfinished because the original intention was to carry it to 500 ft., is its most striking external feature. The people of Malines gained in the old distich — " gaudet Mechlinia stultis "—the reputation of being " fools," because one of the citizens on seeing the moon through the dormer windows of St Rombaut called out that the place was on fire, and his fellow-citizens, following his example, endeavoured to put out the conflagration until they realized the truth. The cathedral contains a fine altar-piece by Van Dyck, and the pulpit is in carved oak of the 17th century. Another old palace is that of Margaret of Austria, regent for Charles V., which has been carefully preserved and is now used as a court of justice. In the church of Notre Dame (16th century) is Rubens' masterpiece " the miraculous draught of fishes," and in that of St John is a fine triptych by the same master. Malines, although no longer famous for its lace, carries on a large trade in linen, needles, furniture and oil, while as a junction for the line from Ghent to Louvain and Liege, as well as for that from Antwerp to Brussels and the south, its station is one of the busiest in Belgium, and this fact has contributed to the general prosperity of the city.

The lordship of Malines was conferred as a separate fief by Pippin the Short on his kinsman Count Adon in 754. In the 9th century Charles the Bald bestowed the fief on the bishop of Liege, and after being shared between Brabant and Flanders it passed into the hands of Philip the Bold, founder of the house of Burgundy, in 1384. During the religious troubles of the 16th century Malines suffered greatly, and in 1572 it was sacked by Alva's troops during three days. In the wars of the 17th and 1 8th centuries it was besieged many times and captured by the French, Dutch and English on several occasions: The French finally removed the fortifications in 1804, since which year it has been an open town.

49°

MALLANWAN— MALLESON

MALLANWAN, a town in Hardoi district, the United Pro- vinces, India. Pop. (1901), 11,158. Under native rule the town possessed considerable political importance, and upon the British annexation of Oudh it was selected as the headquarters of the district, but was abandoned in favour of Hardoi after the Mutiny. Saltpetre and brass utensils are manufactured.

MALLARMfi, FRANCOIS REN6 AUGUSTE (1755-1835), French Revolutionist, the son of a lawyer, was born at Nancy on the 25th of February 1755. He was brought up in his father's profession, and was appointed procureur-syndic of the district of Pont-a-Mousson. During the Revolution he was elected by the department of Meurthe deputy to the Legislative Assembly and the Convention, where he attached himself to the Mountain and voted for the death of Louis XVI. He was elected president of the Convention on the 30th of May 1793, and by his weakness during the crisis of the following day contributed much to the success of the insurrection against the Girondists. He took an active part in the levee-en-masse, and in November 1703 was given the task of establishing the revolutionary government in the departments of Meuse and Moselle, where he gained an unenviable notoriety by ordering the execution of the sentence of death decreed by the revolutionary tribunal on some young girls at Verdun who had offered flowers to the Prussians when they entered the town. After the fall of Robespierre he joined the group of " Thermidorians " and was sent on mission to the south of France, where he closed the Jacobin club at Toulouse and set free a number of imprisoned " suspects." On the 1st of June 1795 he was denounced and arrested, but was soon set at liberty. In 1796 he was appointed by the Directory commis- sioner for the organization of the departments of Dyle and Mont-Tonnerre. Under the empire he was receiver of the droits reunis at Nancy, and lost his money in 1814 in raising a levy of volunteers. Appointed sub-prefect of Avesnes during the Hun- dred Days, he was imprisoned by the Prussians in revenge for the death of the maidens of Verdun, and lived in exile during the Restoration. He returned to France after the revolution of 1830, and died at Richemont (Seine-Inferieure) on the 25th of July 1835.

MALLARME, STEPHANE (1842-1898), French poet and theorist, was born at Paris, on the 18th of March 1842. His life was simple and without event. His small income as pro- fessor of English in a French college was sufficient for his needs, and, with his wife and daughter, he divided the year between a fourth-floor flat in Paris and a cottage on the banks of the Seine. His Tuesday evening receptions, which did so much to form the thought of the more interesting of the younger French men of letters, were almost as important a part of his career as the few carefully elaborated books which he produced at long intervals. L' Apres-midi d'un faune (1876) and other fragments of his verse and prose had been known to a few people long before the publication of the Poesies completes of 1887, in a facsimile of his clear and elegant handwriting, and of the Pages of 1 89 1 and the Vers et prose of 1893. His remarkable transla- tion of poems of Poe appeared in 1888, " The Raven " having been published as early as 1875, with illustrations by Manet. Divagations, his own final edition of his prose, was published in 1897, and a more or less complete edition of the

Poesies, post- humously, in 1899. He died at Valvins, Fontainebleau, on the 9th of September 1898. All his life Mallarme was in search of a new aesthetics, and his discoveries by the way were often admirable. But he was too critical ever to create freely, and too limited ever to create abundantly. His great achieve- ment remains unfinished, and all that he left towards it is not of equal value. There are a few poems and a few pieces of imaginative prose which have the haunting quality of Gustave Moreau's pictures, with the same jewelled magnificence, myste- rious and yet definite. His later work became more and more obscure, as he seemed to himself to have abolished limit after limit which holds back speech from the expression of the absolute. Finally, he abandoned punctuation in verse, and invented a new punctuation, along with a new construc- tion, for prose. Patience in the study of so difficult an author

has its reward. No one in our time has vindicated with mpre pride the self-sufficiency of the artist in his struggle with the material world. To those who knew him only by his writings his conversation was startling in its clearness; it was always, like all his work, at the service of a few dignified and misunder- stood ideas.

See also Paul Verlaine, Les Poetes maudits (1884); J. Lemaltre, Les Contemporains (5th series, 1891); Albert Moekel, Stephane Mallarme, un heros (1899) ; E. W. Gosse, French Profiles (1905) and A. Symons, The Symbolist Movement in Literature (1900). A com- plete bibliography is given in the Poetes d'aujourd'hui (1880-1900, nthed., 1905) of MM. A. van Bever and P. Leautaud. (A. Sy.)

MALLECO, a province of southern Chile, once a part of the Indian territory of Araucania (?.»«),. lying between the provinces of Bio-Bio on the N. and E., Cautin on the S. and Arauco on the W. Area, 2973 sq. m. Pop. (1895), 98,032.. It belongs to the rainy, forested region of southern Chile, and is thinly populated, a considerable part of its population being Araucanian Indians, who occupy districts in the Andean foothills. Gold placer mining has attracted some attention, but the output is, small. The principal industries are cattle and wheat raising and timber- cutting. The capital is Angol (pop., 7056 in 1895; estimated at 7638 in 1902), a small town in the northern part of the province, on the Malleco river, and a station on the Traiguen branch of' the state railway. Traiguen (pop., 5732 in 1895; estimated at 7099 in 1902) in the southern part of the province is the second town in importance, and Victoria (pop., 6989 in 1895; estimated at 10,002 in 1902), about 20 m. E. of the last-named town, was for a time the terminal station of the main line of the railway.

MALLEMUCK, from the German rendering of the Dutch

Mallemugge (which originally meant small flies or midges that madly whirl round a light), a name given by the early Dutch Arctic voyagers to the Fulmar (q.v.)., of which the English form is nowadays most commonly applied by our sailors to the smaller albatrosses, of about the size of a goose, met with in the Southern Ocean — corrupted into " molly mawk," or " mollymauk." A number of species have been identified. Diomedea irrorala of West Peru is sooty-brown with white mottlings and a white head; D. migripes of the North Pacific is similar in colour but with white only near the eye and at the base of the tail and bill; D. immutabilis of Japan is darker but has a white head. D. melanophrys of the southern oceans has been found in summer both in California, in England, and as far north as the Faeroes, Acˆ cording to J. Gould the latter is the commonest species of albatross inhabiting the Southern Ocean, and its gregarious habits and familiar disposition make it well known to every voyager to or from Australia, for it is equally common in the Atlantic as Well as the Pacific. The back, wings and tail are of a blackish-grey, but all the rest of the plumage is white, except a dusky supers ciliary streak, whence its name of black-browed albatross, as also its scientific epithet, are taken. The bill of the adult is of an ochreous-yellow, while that of the young is dark. This species breeds on the Falkland Islands. D. bulleri of the New Zealand seas is greyish-brown, with white underparts and rump and ashy

head. Diomedea (or Thalassogeron) culminata and chlororhyncha of the southern seas, D. (or T.) cauta of Tasmania, salvini of New Zealand and layardi of the Cape resemble D. bulleri, but have a strip of naked skin between the plates of the maxilla towards its base. H. N. Moseley {Notes of a Naturalist, 130) describes D. culminata as making a cylindrical nest of grass, sedge and clay, with a shallow basin atop and an overhanging rim — the whole being about 14 in. in diameter and 10 in height. The bird lays a single white egg, which is held in a sort of pouch, formed by the skin of the abdomen, while she is incubating. The feet of D. bulleri are red, of D. chlororhyncha flesh-coloured, of the others yellow. (A. N.)

MALLESON, GEORGE BRUCE (1825-1898), Indian officer and author, was born at Wimbledon, on the 8th of May 1825. Educated at Winchester, he obtained a cadetship in the Bengal infantry in 1842, and served through the second Burmese War. His subsequent appointments were in the civil line, the last being that of guardian to the young maharaja of Mysore. He retired

with the rank of colonel in 1877, having been created C.S.I, in 1872. He died at Kensington, on the 1st of March 1898. He was a voluminous writer, his first work to attract attention being the famous " Red Pamphlet," published at Calcutta in 1857, when the Mutiny was at its height. He continued, and considerably rewrote the History of the Indian Mutiny (6 vols., 1878-1880), which was begun but left unfinished by Sir John Kaye. Among his other books the most valuable are History of the French in India (2nd ed., 1893) and The Decisive Battles of India (3rd ed., 1888).

MALLET (or Malloch), DAVID (?i70s-i76s), Scottish poet and dramatist, the son of a Perthshire farmer, was born in that county, probably in 1705.

In 1717 he went to the high school at Edinburgh, and some three years later to the university, where he made the friendship of James Thomson, author of The Seasons. As early as 1720 he began to publish short poems in the manner of the period, a number of which appeared during the next few years in collections such as the Edinburgh Miscellany and Allan Ramsay's Tea Table Miscellany, in which his ballad "William and Margaret" was published in 1724. For some years from 1723 he was private tutor to the duke of Montrose's sons, with whom he travelled on the Continent in 1727. His real name was Malloch; but this he changed to Mallet in 1724. In 1 73 5 he took the M.A. degree at Oxford. He had already made the friendship of Pope, whose vanity he flattered in a poem on Verbal Criticism, in 1733; and through Pope he became acquainted with Bolingbroke and other Tory politicians, especially those attached to the party of the prince of Wales, who in 1742 ap- pointed Mallet to be his paid secretary. After Pope's death, in 1744, Mallet, at the instigation of Bolingbroke and forgetful of past favours and friendship, vilified the poet's memory, thereby incurring the resentment of Pope's friends. For his services as a party pamphleteer, in which character he published an attack on Admiral Byng, Mallet received from Lord Bute a lucrative sinecure in 1760. He died on the 21st of April 1765. Mallet was a small man, in his younger days something of a dandy and inordinately vain. He was twice married; by his first wife he had a daughter, Dorothy, who married Pietro Paolo Celesia, a Genoese gentleman, and was the author of several poems and plays, notably Almida, produced by Garrick at Drury Lane in

1771.

Mallet's own worksincluded several plays, some of which were produced by Garrick, who was Mallet's personal friend. Eury- dice, a tragedy, with prologue and epilogue by Aaron Hill, was produced at Drury Lane in 1731; Mustapha, also a tragedy, had considerable success at the same theatre in 1739; in 1740, in collaboration with Thomson, he produced the masque Alfred, of which he published a new version in 1751, after Thomson's death, claiming it to be almost entirely his own work. This masque is notable as containing the well-known patriotic song, " Rule Britannia," the authorship of which has been attributed to Mallet, although he allowed it to appear without protest in his lifetime with Thomson's name attached. His other writings include Poems on Several Occasions (1743) ; Amyntor and Theodora, or the Hermit (1747) ; another volume of Poems (1762).

In r 759 a collected edition of Mallet's Works was published in three volumes; and in 1857 his Ballads and Songs were edited by F. Dinsdale with notes, and a biographical memoir of the author.

MALLET, PAUL HENRI (1 730-1 807), Swiss writer, was born on the

20th of August 1730, in Geneva. After having been educated there, he became tutor in the family of the count of Calenberg in Saxony. In 1752 he was appointed professor of belles lettres to the academy at Copenhagen. He was naturally attracted to the study of the ancient literature and history of his adopted country, and in 1755 he published the first fruits of his researches, under the title Introduction a I'histoire du Dane- marck oil Von traite de la religion, des mceurs, des lois, el des usages des anciens Danois. A second part, more particularly relating to the ancient literature of the country, Monuments de la mytho- logie et de la poesie des Celtes, et parliculierement des anciens Scandinaves, was issued in 1756, and was also translated into Danish. A translation into English, with notes and preface, by

Bishop Percy, was issued in 1770 under the title of Northern Antiquities (republished with additions in 1847). The book had a wide circulation, and attracted much attention on account of its being the first (though a very defective) translation into French of the Edda. The king of Denmark showed his apprecia- tion by choosing Mallet to be preceptor of the crown prince. In 1760 he returned to Geneva, and became professor of history in his native city. While there he was requested by the czarina to undertake the education of the heir-apparent of Russia (after- wards the czar Paul I.), but declined the honour. An invitation more congenial to his tastes led to his accompanying Lord Mountstuart in his travels through Italy and thence to England, where he was presented at court and commissioned to write the history of the house of Brunswick. He had previously received a similar commission from the landgrave of Hesse-Cassel for the preparation of a history of the house of Hesse, and both works were completed in 1785. The quietude of a literary life was rudely broken by the shock of the Revolution, to which he was openly hostile. His leanings to the unpopular side were so obnoxious to his fellow-citizens that he was obliged to quit his native country in 1792, and remained in exile till 1801. He died at Geneva, on the 8th of February 1807.

A memoir of his life and writings, by Sismondi, was published at Geneva in 1807. Besides the Introduction to the History of Denmark, his principal works are : Histoire du Danemarck (3 vols. , Copenhagen, 1758-1777); Histoire de la maison de Hesse (4 vols., 1767-1785); Histoire de la maison de Brunswick (4 vols., 1767-1785) ; Histoire de la maison et des etats du Mecklenbourg (1796) ; Histoire des Suisses ou Helvetiens (4 vols., Geneva, 1803) (mainly an abridgment of J. von Miiller's great history) ; Histoire de la ligue hanseatigue (1805).

MALLET, ROBERT (1810-1881), Irish engineer, physicist and geologist, was born in Dublin, on the 3rd of June 1810. He was educated at Trinity College in that city, and graduated B.A. in 1830. Trained as an engineer,

he was elected M.Inst. C.E. in 1842; he built in 1848-1849 the Fastnet Rock lighthouse, south- west of Cape Clear, and was engaged in other important works. Devoting much attention to pure science, he became especially distinguished for his researches on earthquakes, and from 1852-1858 he was engaged (with his son John William Mallet) in the preparation of his great work, The Earthquake Catalogue of the British Association (1858). In 1862 he published two volumes, dealing with the Great Neapolitan Earthquake of 1857 and The First Principles of Observational Seismology. He then brought forward evidence to show that the depth below the earth's surface, whence came the impulse of the Neapolitan earthquake, was about 8 or 9 geographical miles. One of his most important essays was that communicated to the Royal Society (Phil. Trans. clxiii. 147; 1874), entitled Volcanic Energy; an Attempt to develop Us True Origin and Cosmical Relations. He sought to show that volcanic heat may be attributed to the effects of crushing, con- tortion and other disturbances in the crust of the earth; the disturbances leading to the formation of lines of fracture, more or less vertical, down which water would find its way, and if the temperature generated be sufficient volcanic eruptions of steam or lava would follow. He was elected F.R.S. in 1854, and he was awarded the Wollaston medal by the Geological Society of London in 1877. He died at Clapham, London, on the 5th of November 1881.

MALLET DU PAN, JACQUES (1749-1800), French journalist, of an old Huguenot family, was born near Geneva in 1749, the son of a Protestant minister. He was educated at Geneva, and through the influence of Voltaire obtained a professorship at Cassel. He soon, however, resigned this post, and going to London joined H.S.N. Linguet in the production of his Annates politiques (1778-1780). During Linguet's imprisonment in the Bastille Mallet du Pan continued the Annates by himself (1781- 1783); but Linguet resented this on his release, and Mallet du Pan changed the title of his own publication to MSmoires hisio- riques (1783). From 1783 he incoporated this work with the Mercure de France in Paris, the political direction of which had been placed in his hands. On the outbreak of the French Revolution he sided with the Royalists, and was sent on a mission (1791-1792) by Louis XVI. to Frankfort to try and secure the

sympathy and intervention of the German princes. From Germany he travelled to Switzerland and from Switzerland to Brussels in the Royalist interest. He published a number of anti-revolutionary pamphlets, and a violent attack on Bonaparte and the Directory resulted in his being exiled

in 1797 to Berne. In 1798 he came to London, where he founded the Mercure britannique. He died at Richmond, Surrey, on the 10th of May 1800, his widow being pensioned by the English government. Mallet du Pan has a place in history as a pioneer of modern political journalism. His son John Lewis Mallet (1775-1861) spent a useful life in the English civil service, becoming secretary of the Board of Audit; and J. L. Mallet's second son, Sir Louis Mallet (1823-1890) also entered the civil service in the Board of Trade and rose to be a distinguished economist and a member of the Council of India.

Mallet du Pan's Memoires et correspondance was edited by A. Sayous (Paris, 1851). See Mallet du Pan and the French Revolution (1902), by Bernard Mallet, son of Sir Louis Mallet, author also of a biography of his father (1900).

MALLING, EAST and WEST, two populous villages in the Medway parliamentary division of Kent, England, respectively 5 and 6 m. W. by N. of Maidstone, with a station on the South- Eastern and Chatham railway. Pop. (1901), East Mailing, 2391 ; West Mailing, 2312. They are situated in a rich agricultural district on the western slope of the valley of the Medway, and East Mailing has large paper mills. At West Mailing are remains of Mailing Abbey, a Benedictine nunnery founded in 1090 by Gundulf, bishop of Rochester. The remains, which are partly incorporated in a modern building, include the Norman west front of the church, the Early English cloisters, the chapter- house, gate-house (the chapel of which is restored to use), and other portions. About Addington near West Mailing are con- siderable prehistoric remains, including mounds, single stones, stone circles and pits in the chalk hills; while at Leybourne are the gateway and other fragments of the castle held by the Leybourne family from the 12th to the 14th century.

MALLOCK, WILLIAM HURRELL (1849-), English author, was born at Cockington Court, Devonshire. He was educated privately, and at Balliol College, Oxford. He won the Newdigate prize in 1872, and took a second class in the final classical schools in 1874. He attracted considerable attention by his satirical story The New Republic (2 vols., 1877), in which he introduced characters easily recognized as prominent living men, Mark Pattison, Matthew Arnold, W.K. Clifford and others. His keen logic and gift for acute exposition and criticism were displayed in later years both in fiction and in controversial works. In a series of books dealing with religious questions he insisted on dogma as the basis of religion and on the impossibility of founding religion on purely scientific data. In Is Life Worth Living? (1879) and The New Paul and Virginia (1878) he attacked Positivist theories, and in a volume on the intellectual position of the Church of England, Doctrine and Doctrinal Dis- ruption (1900), he

advocated the necessity of a strictly defined creed. Later volumes on similar topics were Religion as a Credible Doctrine (1903) and The Reconstruction of Belief (1905). He published several brilliant works on economics, directed against Radical and Socialist theories: Social Equality (1882), Property and Progress (1884), Labour and the Popular Welfare (1893), Classes and Masses (1896) and Aristocracy and Evolution (1898); and among his anti-socialist works should be classed his novel, The Old Order Changes (1886). His other novels include A Romance of the Nineteenth Century (1881), A Human Document (1892), The Heart of Life (1895) and The Veilofthe Temple (1904). He published a volume of Poems in 1880, and in 1900 Lucretius on Life and Death in verse.

MALLOW, a market town and watering place of Co. Cork, Ireland, on the Blackwater, 144J m. S.W. from Dublin, and 21 N. from Cork by the Great Southern and Western railway. Pop. (1901), 4542. It is a junction for lines westward to Killarney and Co. Kerry, and eastward to Lismore and Co. Waterford. The town owes its prosperity to its beautiful situation in a fine valley surrounded by mountains, and possesses a tepid

mineral spring, considered efficacious in cases of general debility and for scorbutic and consumptive complaints. A spa-house with pump-room and baths was erected in 1828. The parish church dates from 1818, but there are remains of an earlier building adjoining it. There are manufactures of mineral water and condensed milk, corn-mills and tanneries. Mallow received a charter of incorporation from James I. Its name was originally Magh Alio, that is, Plain of the Alio (the old name used by Spenser for this part of the river), and the ford was defended by a castle, built by the Desmonds, the ruins of which remain. A bridge connects the town with the suburb of Ballydaheen. Mallow is a centre for the fine salmon fishing on the Blackwater. The climate is very mild. The town was a parliamentary borough till 1885. It is governed by an urban district council. MALLOW> botanically Malva, the typical genus of the natural order Malvaceae, embracing about sixteen species of annual and perennial herbaceous plants, widely distributed throughout the northern hemisphere. The mallows possess the reniform one-

Mallow (Malva sylvestris).

Flower in section.

Stamens showing the union of the filaments into a common tube (monadel-phous) .

Fruit with persistent calyx. 1, 2 and 5 enlarged.

4. Same seen from the back

showing the 3-leaved epi- calyx.

5. Seed.

celled anthers which specially characterize the Malvaceae (q.v.). The petals also are united by their base to the tube formed by the coalesced filaments of the stamens. The special characters which separate the genus Malva from others most nearly allied to it are the involucre, consisting of a row of three separate bracts attached to the lower part of the true calyx, and the numerous single-seeded carpels disposed in a circle around a central axis,

from which they become detached when ripe. The flowers are

mostly white or pinkish, never yellow, the leaves radiate-veined, and more or less lobed or cut. Three species are natives of Britain. The musk mallow (Malva moschcta) is a perennial herb with five-partite, deeply-cut leaves, and large rose-coloured flowers clustered together at the ends of the branched stems, and is found growing along hedges and borders of fields, blossoming in July and August. It owes its name to a slight musky odour diffused by the plant in warm dry weather when it is kept in a confined situation. The round-leaved dwarf mallow {Malva rolundifolia) is a creeping perennial, growing in waste sandy places, with roundish serrate leaves and small pinkish-white flowers produced in the axils of the leaves from June to Septem- ber. It is common throughout Europe and the north of Africa, extending to western and northern Asia. The common mallow (Malva sylvestris), the mauve of the French, is an erect biennial or perennial plant with long-stalked roundish-angular serrate leaves, and conspicuous axillary reddish-purple flowers, blossom- ing from May to September. Like most plants of the order it abounds in mucilage, and hence forms a favourite domestic remedy for colds and sore throats. The aniline dye called mauve derives its name from its resemblance to the colour of this plant.

The marsh mallow (Althaea officinalis), the guimauve of the French, belongs to another genus having an involucre of numerous bracts. It is a native of marshy ground near the sea or in the neighbourhood of saline springs. It is an erect perennial herb, with somewhat woody stems, velvety, ovate, acute, unequally serrate leaves, and delicate pink showy flowers blooming from July to September. The flowers are said to yield a good deal of honey to bees. The marsh mallow is remarkable for containing asparagin, C4H 8 N 2 03,H 2 0, which, if the root be long kept in a damp place, disappears, butyric acid being developed. The root also contains about 25 % of starch and the same quantity of mucilage, which differs from that of gum arabic in containing one molecule less of water and in being precipitated by neutral acetate of lead. It is used in pdte de guimauve lozenges. Althaea rosea is the hollyhock (q.v.).

The mallow of Scripture, Job xxx. 4, has been sometimes identified with Jew's mallow (Corchorus olitorius), a member of the closely allied order Tiliaceae, but more plausibly (the word nfe implying a saline plant) with Atriplex Halimus, or sea orache. In Syria the Halimus was still known by_ the name Malluh in the time of Ibn Beitar. See Bochart, Hieroz. iii. 16.

MALMEDY, a town of Germany, in the Prussian Rhine Province, lying in a wild and deep basin, on the Warche, 20 m. S. of Aix-la-Chapelle by rail via Eupen. It contains two Roman Catholic churches, a modern town-hall and a classical school. Its industries include tanning, dyeing and paper-making. Pop. (1900), 4680. Malmedy was famous for its Benedictine abbey, founded about 675, which was united with that of Stablo, the abbot of the joint house being a prince of the empire. In 1802 the lands of the abbey passed to France, and in 1815 they were divided between Prussia and Netherlands.

See Kellen, Malmedy und die preussische Wallonie (Essen, 1897).

MALMESBURY, JAMES HARRIS, ist Earl of (1746-1820), English diplomatist, was born at Salisbury on the 21st of April 1746, being the son of James Harris (q.v.), the author of Hermes. Educated at Winchester, Oxford and Leiden, young Harris became secretary in 1768 to the British embassy at Madrid, and was left as charge d'affaires at that court on the departure of Sir James Grey until the arrival of George Pitt, afterwards Lord Rivers. This interval gave him his opportunity; he discovered the intention of Spain to attack the Falkland Islands, and was instrumental in thwarting it by putting on a bold countenance. As a reward he was appointed minister ad interim at Madrid, and in January 1772 minister plenipotentiary to the court of Prussia. His success was marked, and in 1777 he was transferred to the court of Russia. At St Petersburg he made his reputation, for he managed to get on with Catherine in spite of her predilec- tions for France, and steered adroitly through the accumulated difficulties of the first Armed Neutrality. He was made a knight of the Bath at the end of 1778, but in 1782 he returned home owing to ill-health, and was appointed by his friend Fox to be minister at the Hague, an appointment confirmed after some delay by Pitt (1784). He did very great service in furthering Pitt's policy of maintaining England's influence on the Continent by the arms of her allies, and held the threads of the diplomacy

which ended in the king of Prussia's overthrowing the republican party in Holland, which was inclined to France, and re-establish- ing the prince of Orange. In recognition of his services he was created Baron Malmesbury of Malmesbury (Sept. 1788), and permitted by the king of Prussia to bear the Prussian eagle on his arms, and by the prince of Orange to use his motto " Je maintiendrai." He returned to England, and took an anxious interest in politics, which ended in his seceding from the Whig party with the duke of Portland in 1793 ; and in that year he was sent by Pitt, but in vain, to try to keep Prussia true to the first coalition against France. In 1794 he was sent to Brunswick to solicit the hand of the unfortunate Princess Caroline for the prince of Wales, to marry her as proxy, and conduct her to her husband in England. In 1796 and 1797 he was at Paris and Lille vainly

negotiating with the French Directory. After 1797 he became partially deaf, and quitted diplomacy altogether; but for his long and eminent services he was in 1800 created earl of Malmesbury, and Viscount Fitzharris, of Heron Court in the county of Hants. He now became a sort of political Nestor, consulted on foreign policy by successive foreign ministers, trusted by men of the most different ideas in political crises, and above all the confidant, and for a short time after Pitt's death almost the political director, of Canning. Younger men were also wont to go to him for advice, and Lord Palmerston particu- larly, who was his ward, was tenderly attached to him, and owed many of his ideas on foreign policy directly to his teaching. His later years were free from politics, and till his death on the 21st of November 1820 he lived very quietly and almost forgotten. As a statesman, Malmesbury had an influence among his con- temporaries which is scarcely to be understood from his writings, but which must have owed much to personal charm of manner and persuasiveness of tongue; as a diplomatist, he seems to have deserved his reputation, and shares with Macartney, Auckland and Whitworth the credit of raising diplomacy from a pro- fession in which only great nobles won the prizes to a career opening the path of honour to ability. He was succeeded as 2nd earl by his son James Edward (1 778-1841), under-secretary for foreign affairs under Canning; from whom the title passed to James Howard, 3rd earl of Malmesbury (q.v.).

Malmesbury did not publish anything himself, except an account of the Dutch revolution,- and an edition of his father's works, but his important Diaries (1844) and Letters (1870) were edited by his grandson.

MALMESBURY, JAMES HOWARD HARRIS, 3RD Earl of (1807-1889), English statesman, son of the 2nd earl, was born on the 25th of March 1S07, and educated at Eton and Oriel College, Oxford. He led a life of travel for several years, making acquaintance with famous people; and in 1841 he had only just been elected to the House of Commons as a Conservative, when his father died and he succeeded to the peerage. His political career, though not one which made any permanent impression on history, attracted a good deal of contemporary attention, partly from his being foreign secretary in 1852 and again in 1858-1859 (he was also lord privy seal in 1866-1868 and in 1874-1876), and partly from his influential position as an active Tory of the old school in the House of Lords at a time when Lord Derby and Mr Disraeli were, in their different ways, moulding the Conservatism of the period. Moreover his long life — he survived till the 17th of May 1889 — and the publication of his Memoirs of an Ex-Minister in 1884, contributed to the reputa- tion he enjoyed. These Memoirs, charmingly written, full of anecdote, and containing much interesting material for the history of the time, remain his chief title to remembrance. Lord Malmesbury also edited his grandfather's

Diaries and Correspondence (1844), and in 1870 published The First Lord Malmesbury and His Friends: Letters from 1745 to 1820. He was succeeded as 4th earl by his nephew, Edward James (1842-1899), whose son, James Edward (b. 1872) became the 5th earl in 1899.

MALMESBURY, a market town and municipal borough in the Chippenham parliamentary division of Wiltshire, England, 945 m. W. of London by the Great Western railway. Pop. (1901),

2854. It lies on a ridge surrounded on all sides except the north- west by the river Avon and a small tributary. The church of St Mary and St Aldhelm, standing high, is a majestic fragment consisting of the greater part of the nave (with aisles) of a Benedictine abbey church. The ruined skeleton of the great tower arches now terminates the building eastward. The nave is transitional Norman, with a Decorated superstructure including the clerestory. The south porch is one of the finest Norman examples extant, both the outer and the inner doorways (especially the first) exhibiting the typical ornament of the period in remarkable exuberance. With the exception of a crypt, the monastic buildings have disappeared. In the market square stands a fine market cross of the 16th century, borne upon an octagonal battlemented basement. Early English fragments of a hospital of St John of Jerusalem appear in the corpora- tion almshouse. Malmesbury has an agricultural trade, with breweries, tanneries and manufactures of silk and pillow lace. It is governed by a mayor, 4 aldermen and 12 councillors. Area, 178 acres.

Maildulphus, a Scottish or Irish monk, who came into England about 635, built a hermitage near the site of the modern Malmes- bury (Maildulphi- urbs, Maldelmesburh, Malmesbiri) and gathered disciples round him, thus forming the nucleus of the later abbey of which Aldhelm his pupil became the first abbot. ˆEthelstan, who was buried here (though his tomb in the church only dates from the 16th century), rebuilt and endowed the monastery. Round the abbey the town of Malmesbury grew up, and by the time of the Domesday Survey it had become one of the only two Wiltshire boroughs. The first charter, said to be a forgery, purports to have been given by ˆEthelstan. It granted to the burgesses all privileges and free customs such as they held in the time of Edward the Elder, with many additional exemptions, in return for help rendered against the Danes. The castle built at Malmesbury during the reign of Henry I. gave a further impetus to the growth of the town during the 12th and 13th centuries. It was not incorporated, however, until 1645, when it was made a free

borough under the title of " aldermen and burgesses of the borough of Malmesbury, County Wilts." By this charter it was governed until 1885. The borough returned two members to parliament from 1295 to 1832 when the number was reduced to one. Finally in 1885 its representation was merged in that of the county. A grant of a yearly fair on the 31st of March, the feast of St Aldhelm, was obtained from William II., and another for three days from the 25th of July from John. In 1792 fairs were held on the 28th of March, the 28th of April and the 29th of June, but in 1891 they had ceased entirely. John also granted a weekly market on Thursday. In the 16th and 18th centuries it was held on Saturday, and in 1891 on the third Wednesday in each month. In the middle ages Malmesbury possessed a considerable cloth manufacture, and at the Dissolution the abbey was bought by a rich clothier and fitted with looms for weaving. The trade in wool still flourished in 1751.

See Victoria County History: Wiltshire; and Registrum malmes- buriense (1879-1880).

MALMO, a seaport of Sweden, chief town of the district (Ian) of Malmohus, on a small bay of the Sound, 384 m. S.S.W. of Stockholm by rail. Pop. (1800), 38,054; (1900), 60,857. It is connected with Copenhagen, 17! m. W. by N., by steam-ferry, the Sound being kept open in winter by an ice-breaker. It is also the first important station in Sweden on the Berlin-Stockholm route, which crosses the sea between Sassnitz in Rugen and Trelleborg, 20 m. S.E. of Malmo. The town, which stands upon a level plain, formerly had strong fortifications, of which only the citadel (Malmohus) remains; in it the earl of Bothwell was imprisoned by Frederick II. of Denmark for some time after his departure from Scotland in 1567. The town-hall (1546, largely restored in 1864) contains a handsome chamber, the Knutssal, formerly used by the council of the gild of Canute. The hall fronts the central square (Stortorg) which is planted with trees and contains a colossal statue of Charles X. by Johan Helenus Borjeson (b. 1835) erected in 1896. The most notable

church is that of St. Peter (Peterkyrka) , dating in part from 1319. Malmo is second to Stockholm as an industrial centre. There are breweries and large works for the manufacture of machinery, among which may be mentioned the Kockum mechanical works, with yards for the construction of vessels of war, and others; of cotton and woollen goods, gloves, chocolate, sweetmeats and tobacco. A large export trade is carried on in butter and other agricultural produce, and matches. Coal is the chief import. The harborage includes an outer harbour of 22 ft. depth, and two inner basins admitting vessels of 21 ft. draught, with dry dock and patent slip. Malmo returns four members to the second chamber of the Riksdag (parliament) .

Malmo (Malmhauge, Malmey, Malmoye, Malmoughe), some- times called Ancona Scanorum or Ellenbogen, first appears in history about the middle of the 13th century. During the Hanseatic period it was the most important commercial town on the Sound, but in the 16th and 17th centuries greatly lost ground owing to the decay of its herring fisheries and the rise of its rival, Copenhagen. Its modern prosperity is largely due to the enterprise of Frans Snell, one of its merchants in the second half of the 18th century, who first constructed the harbour.

MALMSEY, a strong sweet wine, originally made at Monem- vasia (Gr. Moeeju/Stxcria), Napoli di Malvasia, in the Morea, Greece. The name of the place was corrupted in Med. Lat. into malmasia, whence the English form of the word. The corruption malvasia gives the O. Fr. malvesie, from which comes the alternative English form " malvoisie." The wine is now made not only in Greece but also in Spain, Madeira and the Azores.

MALOCELLO, LANCILOTO (" Lanzarote, the 'Lancelot Maloisiel ' of the French "), leader of the first of modern Euro- pean oceanic enterprises. This was a Genoese expedition, which about 1270 seems to have sailed into the Alantic, re-discovered the " Fortunate Islands " or Canaries, and made something of a conquest and settlement in one of the most northerly isles of this archipelago, still known (after the Italian captain) as Lanzarote. According to a Spanish authority of about 1345, the anonymous Franciscan's ConosQimiento de todos los reinos, "Lancarote" was killed by the Canarian natives; but the castle built by him was standing in 140 2- 1404, when it was utilized for the storage of grain by the French conquerors under Gadifer de la Salle. To Malocello's enterprise, moreover, it is probable that Petrarch (born 1304) alludes when he tells how, within the memory of his parents, an armed fleet of Genoese penetrated to the " Fortunatae "; this passage some would refer, without sufficient authority, to the expedition of 1291. Malocello's name and nationality are certainly preserved by those early Portolani or scientific charts (such as the " Dulcert " of 1339 and the " Laurentian Portolano " of 1351), in which the African islands appear, for the first time in history, in clear and recogniz- able form. Thus Dulcert reads Insula de Lanzarotus and Marocelus, the Laurentian map /. de Lanzarote, against Lanzarote Island, which is well depicted on both designs, and marked with the cross of Genoa. The ConosQimiento (as noticed above) explicitly derives the island-name from the Genoese commander who perished here. Malocello's enterprise not only marks the beginning of the oversea expansion of western Europe in explora- tion, conquest and colonization (after the age of Scandinavian world- roving had passed) ; it is also probably not unconnected with the great Genoese venture of 1291 (in search of a waterway to India, which soon follows), with which this attempt at Canarian discovery and dominion has been by some unjustifiably identified.

See the Conoscimiento, p. 100, as edited by Marcos Jimenez de la Espada in the Boletin de la sociedad geogrdfica de Madrid, February 1877) ; Le Canarien in P. Margry, Conquete des . . . Canaries, p. 177; M. A. P. d'Avezac in vol. vi., part ii., of L'Univers, pp. 1-41 (lies africaines de V ocean atlanlique) ; C. R. Beazley, Dawn of Modern Geography, iii. 411-413, 449, 451.

MALOLOS, a town and the capital of the province of Bulacan, island of Luzon, Philippine Islands, on a branch of the Pampanga

Grande river. Pop. (1903), after the annexation of Barasoain and Santa Isabel, 27,025. There are thirty-eight villages, or barrios, of which eight had, in 1903,1000 inhabitants or more. The principal language is Tagalog, but Spanish is spoken to some extent. Malolos is served by the Manila & Dagupan railway, and is a trade centre of considerable importance. The cultivation of rice is an important industry. In 1898-99, during the Filipino revolt, Malolos was the seat of the rebel government, but it was captured and reduced to desolation in March 1899. In 1904 a new municipal school building, a municipal market and a provincial building were erected.

MALONE, EDMOND (1741-1812), Irish Shakespearian scholar and editor, was born in Dublin, on the 4th of October 1741, the son of a barrister and a member of the Irish House of Commons. He was educated at Trinity College, Dublin, and was called to the Irish bar in 1767. The death of his father in 1774 assured him a competency, and he went to London, where he frequented literary and artistic circles. He frequently visited Dr Johnson and was of great assistance to Boswell in revising and proof- reading his Life, four of the later editions of which he annotated. He was intimate with Sir Joshua Reynolds, to whom he sat for a portrait now in the National Portrait Gallery. He was one of Reynolds' executors, and published a posthumous collection of his works (1798) with a memoir. Horace Walpole, Burke, Canning, Lord Charlemont, and, at first, George Steevens, were among Malone's friends. Encouraged by the two last he devoted himself to the study of Shakespearian chronology, and the results of his " Attempt to ascertain the Order in which the Plays of Shakespeare were written" (1778) are still largely accepted. This was followed in 1780 by two supplementary volumes to Steevens's version of Dr Johnson's Shakespeare, partly consisting of observations on the history of the Elizabethan stage, and of the text of doubtful plays; and this again, in 1783, by an appendix volume. His refusal to alter some of his notes to Isaac Reed's edition of 1785, which disagreed with Steevens's, resulted in a

quarrel with the latter. The next seven years were devoted to Malone's own edition of Shakespeare in eleven volumes, of which his essays on the history of the stage, his biography of Shakespeare, and his attack on the genuineness of the three parts of Henry VI., were especially valuable. ' His editorial work was lauded by Burke, criticized by Walpole and damned by Joseph Ritson. It certainly showed indefatig- able research and proper respect for the text of the earlier editions. Malone published a denial of the claim to antiquity of the Rowley poems (see Chatterton), and in this (1782) as in his branding (1796) of the Ireland MSS. (see Ireland, William Henry) as forgeries, he was among the first to guess and state the truth. His elaborate edition of Dryden's works (1800), with a memoir, was another monument to his industry, accuracy and scholarly care. In 1801 the university of Dublin made him an LL.D. At the time of his death, on the 25th of April 1 8 1 2 , Malone was at work on a new octavo edition of Shakespeare, and he left his material to James Boswell the younger; the result was the edition of 1821 — generally known as the Third Variorum edition — in twenty-one volumes. Lord Sunderlin (1738-1816), his elder brother and executor, presented the larger part of Malone's splendid collection of books, including dramatic varieties, to the Bodleian Library, which afterwards bought many of his MS. notes and his literary correspondence. The British Museum also owns some of his letters and his annotated copy of Johnson's Dictionary.

A memoir of Malone by James Boswell is included in the Prolego- mena tc the edition of 1821. See also Sir J. Prior's Life of Edmond Malone (i860).

MALONE, a village and the county-seat of Franklin county, in the township of Malone, in the N.E. part of New York, U.S.A., about 60 m. E.N.E. of Ogdensburg. Pop. (1890), 4986; (1900), 5935 (9 10 foreign-born); (1905, state census), 6478; (1910),, 6467. It is served by the New York Central & Hudson River and the Rutland (N.Y. Central Lines) railways. The village has a Memorial Park, Arsenal Green, on the site of an arsenal and parade-ground sold by the state in 1850, a state armoury,

the Northern New York Institute for Deaf Mutes, Franklin Academy, St Joseph's Ursuline Academy, and a detention-house for Chinamen entering the state from Canada. From Malone tourists visit the Great North Woods, in the Adirondack foot- hills, about 15 m. distant. Iron ore and Potsdam sandstone are found near Malone. In the surrounding region hops, potatoes, &c., are grown, and there are dairying and livestock interests. The village is a centre for the collection of hides and pelts. It manufactures woollen goods, paper and pulp, &c, and has foundry and machine shops and car repair shops. Malone, being on the line of communication between lakes Champlain and Ontario, was of strategic importance in the war of 181 2, and later was twice the rendezvous of Fenians for attacks on

Canada. The township of Malone was settled and erected from Chateaugay in 1805. The village was first known as Harison, was named Ezraville, in honour of Ezra L'Hommedieu in 1808, received its present name in 181 2, and was incorporated in 1853.

MALONIC ACID, C3H4O4 or CH 2 (COOH) 2 , occurs in the form of its calcium salt in the sugar beet. It was first prepared in 1858 by V. Dessaignes, who obtained it by oxidizing malic acid (Ann., 1858, 107, p. 251). It may also be obtained by oxidiz- ing allylene and propylene with cold potassium permanganate solution, by the hydrolysis of barbituric acid (malonyl urea) with alkalis (A. Baeyer, Ann., 1864, 130, p. 143) ; by the hydrolysis of cyanacetic acid (H. Kolbe, Ann., 1864, 131, p. 349; H. Muller, Ann., 1864, 131, p. 352), and by the action of silver oxide on /3-di-chloracrylic ester at 125° C. (O. Wallach, Ann., 1878, 193,

P- 25)

CCl 2 :CH-COOC 2 H 5 + Ag 2 + H 2 = 2AgCl + HOOC-CH 2 -COOC 2 H s .

It crystallizes in monoclinic tables, and is readily soluble in water, alcohol and ether. The acid melts at 132 C, and at a higher temperature it rapidly decomposes into acetic acid and carbon dioxide. When heated with bromine and water to ioo° C. it forms tribromacetic acid, some bromoform being produced at the same time. Malonic acid, as well as its esters, is characterized by the large number of condensation products it can form. In the presence of a dehydrating agent (such as acetic anhydride), it combines with aldehydes to form com- pounds of the type R- CH: C(COOH) 2 , or their decomposition products (formed by loss of C0 2) R • CH : CH • COOH.

Many salts of the acid are known and, with the exception of those of the alkali metals, they are difficultly soluble in water. Many esters of malonic acid have been prepared, the most important being the diethyl ester (malonic ester), CH 2 (COOC 2 H 6) 2 , which is obtained by dissolving monochloracetic acid in water, neutralizing the solution with potassium carbonate, and then adding potassium cyanide and warming the mixture until the reaction begins. When the reaction has finished, the whole is evaporated and heated to about I30 c -i40° C. and then allowed to cool. The mass is then covered with two-thirds of its weight of alcohol, and saturated with hydro- chloric acid gas. The whole is then poured into ice-cold water, extracted by ether and the ethereal solution distilled (L. Claisen, Ann., 1883, 218, p. 131). It is a colourless liquid boiling at l97°-7 -i98°-2 C. (W. H. Perkin). It is a most important synthetic reagent; with sodium or sodium ethylate it forms sodio-malonic ester, which reacts

readily with alkyl halides, forming alkyl malonic esters, which are again capable of formingvsodium derivatives, that by further treatment with alkyl halides yield the di-alkyl malonic esters. These esters are readily hydrolysed and yield the mono- and di-alkyl malonic acids which, on heating, are readily decomposed, with evolution of carbon dioxide and the formation of mono- and di-alkyl acetic acids. The scheme of reactions is shown thus :

R'l CH 2 (COOR) 2 -> CHNa(COOR) 2 -> CHR'(COOR) 2

4NaOH C0 2 + CH 2 R'COOH « CHR'(COOH) 2

R"I [CHR'(COOH) 2 NaOH -^CNaR'(COOR) 2 -> CR'R"(COOR) 4

I NaOH C0 2 + CHR'R"-C00H4-CR'R"(C00H)j

When sodio-malonic ester is heated to 145° C, it undergoes con- densation, with elimination of alcohol and formation of the benzene derivative, phloroglucin tricarboxylic ester. The addition of urea to an alcoholic solution of sodio-malonic ester results in the formation of barbituric acid (A. Michael, Jour. pr. Chem., 1887 [2], 35, p. 456)

The half nitrile of malonic acid is cyanacetic acid, CN-CH-2 COOH, which, in the form of its ester, may be obtained by the action of a solution of potassium cyanide on monochloracetic acid. The solu- tion obtained is neutralized, concentrated on the water-bath, acidi- fied by sulphuric acid and extracted with ether. It is then converted into the lead salt, which is decomposed by sulphuretted hydrogen and the solution is carefully concentrated (Th. Meves, Ann., 1867, 143, p. 201). It melts at 70° C.and at higher temperatures decomposes, with evolution of carbon dioxide and formation of aceto-nitrile, CHj-CN. The true nitrile of malonic acid is methylene cyanide, CH 2 (CN) 2 , which is obtained by distilling a mixture of cyanaceta- mide and phosphorus pentoxide. It is a crystalline solid, which melts at 29 -30 6 C. and boils at 2i8 -2io,° C, and is readily soluble in alcohol and ether.

MALORY, SIR THOMAS, translator and compiler of the famous English classic, the Morte a" Arthur. Previous to the publication of Professor Kittredge's monograph, Who was Sir Thomas Malory? the identity of this writer remained an unsolved problem. Mr. Sidney Lee, in the Dictionary of National Bio- graphy, was compelled to admit that he could find no one of that name fulfilling the necessary conditions. Of direct evidence we have

very little; in the concluding passage of the book the author asks the prayers of the reader for " Syr Thomas Maleore knyght," and states that the book was ended " the ix. yere of the reygne of Kyng Edward the fourth." Caxton, in his preface, says that he printed the book " after a copye unto me delivered whyche copye Syr Thomas Malorye dyd take oute of certeyn bookes of frensshe and reduced it in to Englysshe " ; in his colophon he repeats this statement, adding that he himself is responsible for the division of the work into books and chapters, and that it was printed in 1485. It will be noted that Caxton does not say that he received the book from Malory, only that he had received a copy made by Malory; from this Professor Kittredge draws the conclusion that the compiler was no longer living. The problem then is to find a Thomas Malory who was (a) a knight, (b) alive in the ninth year of King Edward IV. (Mar. 4, 1469-Mar. 3, 1470), and © who was no longer living in July (or June) 1485.

All these conditions Professor Kittredge finds fulfilled in the life of Sir Thomas Malory, knight, of Newbold Revell (or Fenny Newbold), M.P. for Warwickshire in 1445. The date of Sir Thomas's birth is uncertain, but he succeeded his father, Sir John, in 1433 or 1434. Previously to this he had served in France, in the retinue of the earl of Warwick, most probably during the time that that nobleman held the office of captain of Calais. It seems probable that he is also to be identified with a " Thomas Malorie, miles," who in 1468 was, on account of the part played by him in the Wars of the Roses, excluded with several others from the operation of a pardon issued by Edward IV. As, however, on the death of Sir Thomas on the 14th of March 1470, there was no difficulty as to inheritance, his estates passing to his grandson, he must, if this identification be correct, have come under the general amnesty of 1469. It will be seen, therefore, that so far as it is in our power to state the question this Sir Thomas Malory fulfils all the necessary conditions.

It is interesting to note that the career of the earl of Warwick in France was marked by certain picturesque and chivalric features which might well impress the imagination of a young retainer. John Rous, in his Life of Richard Earl of Warwick, tells us that at a certain tourney held near Calais at Christmas- tide, Earl Richard appeared three days running in different armour, overthrowing his adversary on each occasion — an exploit obviously imitated from the chivalric romances of the period.

The work with which Malory's name is connected is an abridged compilation of the great body of Arthurian romance in its latest form. The Merlin (Vulgate and Suite), Tristan, Lance- lot, Queste and Mori Arlus are all represented, the only branch omitted is that dealing with the " early history " of the Grail, the Joseph of Arimathea and Grand S. Graal. Thanks mainly to the labours of Dr Oskar Sommer, we can now assign the

majority of the books to their separate sources, although certain stories, such as the adventures of Sir Gareth under the pseudonym of Beaumains, the handling of Sir Urre of Hungary, and the

details of the abduction of Guenevere by Meleagaunt, still remain unidentified. But we do not yet know whether Malory himself was responsible for this selection, or whether he found it ready to hand in a MS., the " Frensshe Booke " to which he often refers. To make such a compilation at first hand, con- sidering the extent of the ground covered, would involve an enormous amount of study and selection, and the access to a very large library — conditions which scarcely seem to fit in with the social position and activities of Sir Thomas. On the other hand it is undeniable that the medieval copyists, at the instance of their patrons, did make compilations from the various romances within their reach, such as e.g. the enormous codex 112 (fonds FranQ.) of the Bibliotheque Nationale, which includes large sections of the Tristan, the Lancelot, and the Merlin Suite. Taking into consideration alike what Malory retains and what he omits, it seems most probable that he was in possession, not of complete copies of the romances, but of one or more volumes of compilations from these sources.

From the point of view of matter it must be admitted that the Morte d' Arthur does not represent the Arthurian cycle at its best, but rather in the period of its decadence; nor does Malory in any way endeavour to overcome the difficulties caused by the juxtaposition of a number of independent (and often con- tradictory) versions. This is especially noticeable in his treat- ment of Gawain; in the section derived from the Lancelot and Mort Artus he is a good and valiant knight, " a ful noble knyghte as ever was borne/' in those derived from the Tristan and the Queste, he is treacherous, dissolute, and a murderer of good knights.

The great charm of Malory's work lies in his style; stately, earnest and dignified, it has lent to the relations between Lancelot and Guenevere a character of truth and vitality in which the French original is wholly lacking. Malory achieved a remark- able feat — he took the Arthurian story in its worst and weakest form and he imparted to it a moral force and elevation which the cycle, even in its earlier and finer stage, had, save in the unique case of Von Eschenbach's Parzival, never possessed. While genuine lovers of the Arthurian cycle must regret that the romances should only be known to the great majority of English readers through the versions of Malory and Tennyson, it is impossible to withhold from the Morte d' Arthur the admiration due to an imperishable monument of English language and literature.

See Who was Sir Thomas Malory? G. L. Kittredge {Harvard Studies and

Notes, vol. v., 1896); Morte d' Arthur, ed. by Dr Oskar Sommer (an exact reproduction of the original text in 2 vols.) — vol. iii. a study on " The Sources of Malory." The sections on Lancelot and Queste are unfortunately very inadequate; for these cf. The Legend of Sir Lancelot, Grimm Library, vol. xii. (J.L. W.)

MALOT, HECTOR HENRI (1830-1907), French novelist and man of letters, the son of a notary, was born at La Bouille (Seine Inferieure) on the 20th of May 1830. He studied law at Rouen and Paris, but literature early absorbed his attention. He collaborated in the Biographie genSrale of Didot, became literary critic of L'Opinion Nationale, and dramatic critic of the Lloyd franqais. He is the author of a long series of popular novels dealing with contemporary life, including: a trilogy of domestic novels entitled Victimes d'amour (1859, 1865, 1866) ; Un Beaufrere (1869) ; Madame Obernin (1870) ; Le Docteur Claude (1879); Justice (1889). Les Aventures de Romain Kalbris (1869) and Sans famille (1888) are excellent stories for children. A complete edition of Hector Malot's works appeared in 1 894-1 897. He died at Vincennes in July 1907.

MALOU, JULES EDOUARD XAVIER (1810-1886), Belgian statesman, one of the leaders of the clerical party, was born at Ypres on the 19th of October 1810. He was a civil servant in the department of justice when he was elected to the Chamber of Deputies by his native constituency in 1841, and was for some time governor of the province of Antwerp. He was minister of finance in the coalition ministry of J. B. Nothomb in 1844, and formed with B. T. de Theux a Catholic cabinet in 1846, which was overthrown in the Liberal victory of 1847. Malou

then became a member of the senate, and his party only regained ascendancy in 1870. The extreme clerical ministry of Baron d'Anethan retired in December 1871 after serious rioting in Brussels, and Malou was the real, though not the nominal,head of the more moderate clerical administrations of de Theux and Aspremont-Lynden (1870-1878). He was wise enough to disavow the noisy sympathy of Belgian Ultramontane politicians with the German victims of the Kulturkampf, and, retaining in his own hands the portfolio of finance, he subordinated his clerical policy to a useful administration in commercial matters, including a development of the railway system. It was only after the fall of the ministry in 1878 that he adopted a frankly clerical policy, and when he became chief of a new government in June 1884 he proceeded to undo the educational compromise of his pre- decessors in the Frere-Orban ministry. His

legislation in favour of the Catholic schools caused rioting in Brussels, and in October the king demanded the retirement of MM. Jacobs and Woeste, the members of the cabinet against whom popular indignation was chiefly directed. Malou followed them into retirement, and died at Woluwe Saint Lambert, in Brabant, on the nth of July 1886. He was a financier of great knowledge and experience, and his works (of which a long list is given in Koninck's Bibliographic nationale de Belgique) include three series (1874-1880) of memoirs on financial questions, edited by him for the Chamber of Deputies, besides pamphlets on railroad proposals, mining and other practical questions. His brother Jean Baptiste Malou (1809-1864) was a well-known divine.

MALOUET, PIERRE VICTOR, Baron (1740-1814), French publicist and politician, was born at Riom (Puy-de-D6me) on the nth of February 1740, the son of a lawyer. He entered the civil service and was employed successively at the French em- bassy in Lisbon, in the administrative department of the due de Broglie's army, as commissary in San Domingo from 1 767-1 774, and, after his return to France, as commissary-general of the marine. In 1776 he was entrusted to carry out plans of coloniza- tion in French Guiana, but was superseded in 1779. On his return to France he was well received at court, and the execution of his plans in Guiana was assured. He became intendant of the port of Toulon, and in 1789 was returned to the states- general, where he soon became well known as a defender of the monarchical principle. He emigrated to England in September, 1792, but shortly afterwards sought in vain permission to return to assist in the defence of Louis XVI. His name was erased from the list of emigrants in 1801 by Napoleon, who restored him to his position in the service and sent him to Antwerp as com- missioner-general and maritime prefect to superintend the erection of defence works, and the creation of a fleet. He entered the council of state in 1810, but, having offended the emperor by his plainness of speech, he was disgraced in 181 2. At the Restoration, Louis XVIII. made him minister of marine; and he died on the 7th of September 1814.

The most important documents for his domestic and colonial policy are a Collection de ses opinions a I'Assemblee Nationale (3 vols., 1 79 1 -1 792); and Collection de memoires et correspondances officielles sur V administration des colonies et notammenl sur la Guiane francaise et hollandaise (5 vols. 1802).

MALPIGHI, MARCELLO (1628-1694), Italian physiologist, was born at Crevalcuore near Bologna, on the 10th of March 1628. At the age of seventeen he began the study of philosophy; it appears that he was also in the habit of amusing himself with the microscope. In 1649 he started to study medicine; after four years at Bologna he graduated there as doctor.

He at once applied to be admitted to lecture in the university, but it was not till after three years (1656) that his request was granted. A few months later he was appointed to the chair of theoretical medicine at Pisa, where he enjoyed the friendship and counte- nance of G. A. Borelli. At the end of four years he left Pisa, on the ground of ill-health, and returned to Bologna. A call to be professor primarius at Messina (procured for him through Borelli, who had in the meantime become professor there) induced him to leave Bologna in 1662. His engagement at

Messina was for a term of four years, at an annual stipend of 1000 scudi. An attempt was made to retain him at Messina beyond that period, but his services were secured for his native university, and he spent the next twenty-five years there. In 1691, being then in his sixty-fourth year, and in failing health, he removed to Rome to become private physician to Pope Innocent XII., and he died there of apoplexy three years later, on the 30th of November 1694. Shortly before his death, he drew up a long account of his academical and scientific labours, correspondence and controversies, and committed it to the charge of the Royal Society of London, a body with which he had been in intimate relations for more than twenty years. The auto- biography, along with some other posthumous writings, was published in London in 1696, at the cost of the Society. The personal details left by Malpighi are few and dry. His narrative is mainly occupied with a summary of his scientific contributions and an account of his relations to contemporary anatomists, and is entirely without graces of style or elements of ordinary human interest.

Malpighi was one of the first to apply the microscope to the study of animal and vegetable structure ; and his discoveries were so impor- tant that he may be considered to be the founder of microscopic anatomy. It was his practice to open animals alive, and some of his most striking discoveries were made in those circumstances. Although Harvey had correctly inferred the existence of the capillary circulation, he had never seen it ; it was reserved for Malpighi in 1661 (four years after Harvey's death) to see for the first time the mar- vellous spectacle of the blood coursing through a network of small tubes on the surface of the lung and of the distended urinary bladder of the frog. We are enabled to measure the difficulties of micro- scopic observation at the time by the fact that it took Malpighi four years longer to reach a clear understanding of the corpuscles in the frog's blood, although they are the parts of the blood by which its movement in the capillaries is made visible. His discovery of the capillary circulation was given to the world in the form of two letters De Pulmonibus, addressed to Borelli, published at Bologna in 1 66 1 and reprinted at Leiden and other places in the years follow- ing; these letters contained also the first account of the vesicular structure of the human lung, and they made a theory of respiration for the first time possible. The achievement that comes next both

in importance and in order of time was a demonstration of the plan of structure of secreting glands ; against the current opinion Revived by F. Ruysch forty years later) that the glandular structure was essentially that of a closed vascular coil from which the secretion exuded, he maintained that the secretion was formed in terminal acini standing in open communication with the ducts. The name of Malpighi is still associated with his discovery of the soft or mucous character of the lower stratum of the epidermis, of the vascular coils in the cortex of the kidney, and of the follicular bodies in the spleen. He was the first to attempt the finer anatomy of the brain, and his descriptions of the distribution of grey matter and of the fibre- tracts in the cord, with their extensions to the cerebrum and cerebellum, are distinguished by accuracy; but his microscopic study of the grey matter conducted him to the opinion that it was of glandular structure and that it secreted the " vital spirits." At an early period he applied himself to vegetable histology as an introduction to the more difficult study of the animal tissues, and he was ac- quainted with the spiral vessels of plants in 1662. It was not till 1 67 1 that he wrote his Anatome plantarum and sent it to the Royal Society, who published it in the following year. An English work under a similar title {Anatomy of Vegetables) had been pub- lished in London a few months earlier, by Nehemiah Grew; so that Malpighi's priority as a vegetable histologist is not so incontestable as it is in animal histology. The Anatome plantarum contained an appendix, Observations de ovo incubato, which gave an account (with good plates) of the development of the chick (especially of the later stages) in many points more complete than that of Harvey, although the observations were needlessly lessened in value by being joined to the metaphysical notion of " praedelineation " in the undeveloped ovum.

He also wrote Epistolae anatotnicae Marc. Malpighii et Car. Fracassati (Amsterdam, 1662) (on the tongue, brain, skin, omentum, &c.) ; De viscerum structura: exercitatio anatomica (London, 1669) ; De structura glandularum conglobatarum (London, 1689); Opera posthuma, et vita a seipso scripta (London, 1697; another edition, with preface and additions, was published at Amsterdam in 1700.) An edition containing all his works except the last two was pub- lished in London in 1687, in 2 vols, folio, with portrait and plates.

MALPLAQUET, a village of France in the department of the Nord, close to the Belgian frontier and about 10 miles S. by E. of Mons, famous as the scene of the battle, September 1709, between the Allies under the duke of Marlborough and Prince

Eugene and the French commanded by Marshal Villars, in which the former were victorious. The country to the west and south of Mons is enclosed by a semicircular wall of woods and broken ground, through which there are only two important gaps — that of Jemappes (famous in 1792) to the west, and that of Aulnois, in which stands the village of Malplaquet, to the south. In the latter gap and the woods on either side Villars took up his position facing north-eastwards, on August 29/ September 9. The forces in presence, over 90,000 on each side, were exceptionally large, and the French army in particular represented the spirit of its nation to a degree unusual in the armies of that time. Villars was the best general in the service of Louis XIV. and the veteran Marshal Boufflers, though senior to him, had volunteered to serve as his second in command. Marlborough and Eug&ne lay with their army between Mons and the French camps, which were almost within cannon shot. Marlborough's own wish was for an immediate battle, but he was opposed by the Dutch deputies at his headquarters, and even by Eugene, so that it was only on August 31/Septem- ber 11 that the attack actually took place. Villars had made full use of his respite. The French right stood at the fringe of the wood of Laniere, the left was strongly posted in the midst of the wood of Taisniere, and across the two and a half miles of open ground between the woods the position was en- trenched with several successive lines of works. The troops were almost equally distributed along the whole line as usual, and the cavalry was massed in rear of the infantry. In the Allied army the mounted troops were also kept back, but for the most part distributed to the various infantry commands.

The intention of Marlborough and Eugene, when on the morning of the battle they examined this formidable position, was to deliver the main attack upon the French left wing, combining the assaults of several columns on its front and flanks. In this quarter the French not only held the interior of the wood but also were thrown forward so as to occupy the edges of its north-eastern salient, and upon the two faces of this t salient Count Lottum (1650-1719) with the Prussians, and Count von der Schulenburg (1661-1747) with the Austrian infantry were to deliver a double attack, while farther to the Allied right a column under the English General Withers was detached, to make a wide turning movement through the woods. Marlborough took command on the right, Eugene on the left. The centre, which was intended only to observe the enemy until the decision had been forced at the wood of Taisniere, consisted of Lord Orkney's British corps and the prince of Orange's Dutch contingent. These extended across the Trouee d 'Aulnois as soon as the combined attack of Lottum and Schulenburg opened. The general advance was covered by a heavy cannonade, and the salient of the Taisniere wood was duly attacked on its two faces by the Prussians and Austrians about 9 a.m. They encountered a

sterner resistance than in any of the battles and combats of the past seven campaigns, for on this field the defenders were fighting, not as hitherto for the interests of their king, but to defend their country, and the regiments of Picardie and Champagne which held the salient were the oldest and most famous of the French line. Lottum attacked the works on the eastern edge, again and again without success, until three British battalions had to be sent to reinforce him, and Marlborough placed himself with a corps of cavalry in close support. At last the entrench- ments were stormed. Schulenburg, with the Austrians, had by this time fought his way through the woods and under- growth, and the united force pressed back the French farther and farther into the wood. Still, so stubborn was the defence and so dense the wood that the impetus of the assault died away and the troops on both sides broke up into small dis- connected bodies, fighting too fiercely to be amenable to superior control.

But the French were not reinforced from their right wing as Villars expected. The prince of Orange, far from merely observing the hostile right as he had been ordered to do,

committed his corps, very early in the battle, to a serious assault upon it, which Boufflers repulsed with enormous loss. The Dutch infantry never recovered from its casualties on this day, and the memory of Malplaquet was strong even at Fontenoy nearly forty years afterwards. Some Hanoverian troops which took part in this futile attack suffered equally heavily. The only advantage to the Allies — an advantage which, as it happened, counted for much — was that Boufflers did not dare to send reinforcements to the hard-pressed left wing. Thanks to this the Austrians and Prussians, with the English detached to their aid, made steady progress in the wood of Taisniere. Villars launched the " Irish brigade " to check the advance of the Allies, and this famous corps charged into the forest. Villars, Eugene and Marlborough personally led their troops in the encounter which followed. Eugene was wounded, but refused to quit the field. Villars was more seriously hurt, and after trying in vain to direct the fighting from a chair was carried insensible from the field. At this crisis General Withers, who commanded the force that had

Sketch plan of MALPLAQUET

Scale of.i Mile

French..

Allies. .

After Hon. J. W. Fortescue, History of the British Army, by permission of

been ordered to turn the French extreme left, and had fought his way through the forest, appeared on the scene. The British 1 8th regiment (Royal Irish), encountering the French Royal Irlandais, put it to the rout, and Villars's counterstroke was at an end. The French maintained themselves on this side only by the aid of troops drawn from the centre and right, and this gave the Allied centre the opportunity which the prince of Orange had so rashly anticipated. The great attack over the open was carried out, in spite of the previous repulse, with the greatest determination. Preceded by forty guns, the corps of the prince of Orange and Lord Orkney swiftly carried the first line of works. The Allied cavalry then pushed out to the front, and horse, foot and artillery were combined in the last advance. Boufflers's cavalry masses, coming into play for the first time, fought hard, and the struggle fluctuated with the arrival of successive reserves on either side, but in the end, shortly before 3 p.m., Boufflers (who had been in command since Villars's fall) decided to retreat. The Allies had no troops left intact for the pursuit, and those engaged had expended their last efforts. Moreover Boufflers, experienced soldier as he was, drew off his men before they had lost their order and discipline.

Thus this " very murdering battle " as Marlborough called it — the last and greatest pitched battle of the war — was almost barren of results. The Allies lost not less than twenty thousand men, or nearly a quarter of the whole force, the thirty battalions of the Dutch infantry losing half their numbers. On the French side there were some twelve thousand casualties. If further evidence were necessary to prove that the French fought their hardest, it could be found in the fact that whereas in almost every other battle, from 1660 to 1792, there were deserters and prisoners by the thousand, at Malplaquet only 500 of the French fell into the hands of the victors unwounded.

MALSTATT-BURBACH, a town of Germany, in the Prussian Rhine province on the right bank of the Saar (Sarre), which separates it from Saarbrucken. Pop. (1900), 31,195. It lies in the midst of an important coal-mining and industrial district, and is itself little more than a long and narrow row of manu- factories and workmen's houses. The largest factories are engaged in the production of iron, steel and cement. There is a large wharf on the river for the export of coal.

Malstatt received municipal rights in 1321. These, however, were

afterwards resigned to the newer town of Saarbrucken, and in 1818 Malstatt and Burbach were two small villages with a joint population of only about 800. About the middle of the century the population began to increase rapidly, in consequence of the development of the mining industry of the district and the extension of the railway system, and in 1874 the two villages were united to form a town.

MALT (O. Eng., mealt; O. Sax., malt; 0. Teut., maltos; Mod. Ger., Malz; Scand., mall; probably derived from the Sanskrit mrdu, soft, thus having reference to the fact that malt is raw grain rendered soft or tender), the name given to grain in which germination has been caused to proceed to a certain stage and has then been arrested by the removal of water and the appli- cation of heat. During this limited germination enzymes are developed (see Fermentation), and the constituents of the grain modified so that the finished malt, when ground and submitted to the mashing process (see Brewing), differs from the original raw grain in that the greater portion dissolves. This solubility is, however, a direct one to a slight extent only; it is due for the most part to the action of the malt enzymes, diastase, &c. on the constituents of the grain, the main portion of which are of themselves insoluble. Thus starch, the main constituent of all graminaceous seeds, probably exists in the same condition in raw grain and in malt. When however the malt is mashed, the starch is attacked by the enzyme diastase, and converted by the process of hydrolysis into a mixture of soluble compounds, e.g. the crystalline sugar, maltose, and a number of gummy substances known as maltodextrins. But to a certain extent starch and other carbohydrate substances are rendered directly soluble and diffusible during the malting process, some of the products serving the respiratory needs of the growing germ, others being assimilated by the plantlet and reconverted into reserve carbohydrates in the tissues of the germ and rootlets, whilst the remaining portions are retained as such in the finished malt. Similarly certain of the nitrogenous constituents of the grain, the proteins, are broken down and rendered soluble by proteolytic enzymes, the products being assimilated to a certain extent by the germ and rootlets, by the cells of which they are again built up into complex proteins, whilst others remain in their simplified form. It is now known that pro- teolytic enzymes exist in finished malt, and that, when the mashing process is conducted under certain conditions, these are able to degrade and render soluble some of the higher proteins present in the malt. When germination is allowed to proceed as it does when the grain is planted in the soil, the whole of the contents are rendered soluble by degrees and in turn assimi- lated by the growing plantlet. By the limited germination which constitutes the malting process, however, the balance of soluble compounds left in the finished malt is from 15 to 25% of the total weight of the corn.

Although other seeds of the natural order GramineAe are occasionally

malted, the greater portion of malt is made from the various species of Hordeum, known by the name of barley

(q.v.), bigg, or bere. Indeed ordinary beer derives its character- istic flavour to the greatest extent from barley malt. A small proportion of malted oats or malted wheat is sometimes used in conjunction with barley malt for certain kinds of beer, whilst rye, maize, and even rice are occasionally malted. Barley is, however, the grain best adapted for making malt intended for brewing beer, and accordingly some space will be devoted to a description of those varieties of this grain which are used by the brewer.

Barley belongs to the genus Hordeum, of which there are numerous species and varieties. Linnaeus and the earlier botanists recognized six species of cultivated barleys, but modern botanists usually consider all cultivated barleys as belonging to . one species to which the name H. sativum has been given. Kornicke regards H. spontaneum, a very long thin-grained two-rowed barley (see below) which grows in the East, as being the parent form; but E. S. Beaven inclines to the view that wild species of more than one form were originally used as food and subsequently cultivated. The last-named author has drawn up a scheme of classification for the varieties and races of cultivated barleys.

Fig. 4.

Fig. 1. Fig. 2. Fig. 3.

Fig. i. — H. hexastichum.

a. Three spikelets in situ on the rachis, showing short internodes.

b. Spike. Median spikelets uppermost, and with lower awns removed.

Six-rowed J c. Spike. Lateral spikelets uppermost, and with barleys. | lower awns removed.

Fig. 2. — H. vulgare.

a. Three spikelets in situ on the rachis, showing long internodes.

b. Spike. Median spikelets uppermost.

c. Spike. • Lateral spikelets uppermost. Fig. 3. — H. zeocriton.

a, d. Spikelets. Rachis edgewise, showing short internodes.

b. Var. zeocrithum (fan barley). Spike converging. Two-rowed J c – Var. erectum (Goldthorpe). Spike parallel.

barleys. 1 Fig. 4. — H. distichum.

a. d. Spikelets. Rachis edgewise, showing long internodes.

b. Var. nutans (Chevallier).

c. Ouchak barley.

Figures 1-4 redrawn from a paper by E. S. Beaven in Journ. Fed. Inst. Brewing (1902), 8.-542.

In an ear of barley the primary axis or rachis is divided into internodes of which there may be any number up to forty. Each internode bears three single-flowered spikelets arranged alternately on either side of the rachis. In the six-rowed varieties the whole of these spikelets attain maturity, whilst in the two-rowed varieties only one on each side of the rachis, viz. the median, develops. British beer is brewed principally from the malt made from home-grown two-rowed barleys. Of late years, however, it has been found advantageous to employ a proportion of malt made from the thinner and more husky foreign barleys, mostly six-rowed varieties. The corns of two-rowed barleys are as a rule plumper than those of six- rowed barleys.

The most favourite barley for malting purposes grown in the United Kingdom is the narrow-eared two-rowed H. distichum, .commonly known as Chevallier, from the name of the original cul- tivator, the R.ev. John ChevalHer. Of late years the quantity of

barley of the so-called Goldthorpe type (H. zeocriton), used for malt- ing, has increased. The paleae or outer coverings of the corns of this variety are somewhat "greasy" in appearance, and do not adhere so closely to the corn as in the Chevallier. The corns of Goldthorpe barley possess a small dimple or transverse furrow near the basal end. Further the basal bristle or rachilla (the prolongation of the axis or point from which the corn was originally developed) is invariably covered with long hairs, whilst in the case of Chevallier it has generally very short hairs. In the variety of Chevallier known as Archer, however, the rachilla has somewhat long hairs. Further the corns of Chevallier barley lie nearly vertical, that is almost parallel to the rachis, whereas in Goldthorpe they are spread out at a greater angle, hence the name fan or peacock barley given to that variety commonly known as sprat. It is believed by some brewers that Goldthorpe barleys never yield malt of so high a quality as do Chevallier barleys. On the other hand, when well matured. Goldthorpes work evenly and freely on the

malting floors ; and from an agricultural point of view they have the advantage of standing up better against unfavourable weather conditions on account of their stouter straws. Numerous fresh varieties of barley are con- tinually being introduced as a result of artificial cross-fertilization, but cross-fertilization rarely if ever occurs naturally.

Hungarian two-rowed barleys are excellent as regards quality, and command a high price. The so-called Californian Chevallier and Chilean Chevallier contain a certain admixture of the six-rowed H. vulgare.

Of the imported thin barleys may be mentioned Brewing Cali- fornian, Brewing Chilean, Danubian and Smyrna (Yerli), all for the most part six-rowed varieties; also Ouchak, consisting principally of a two-rowed variety. For the manufacture of grain spirit a malt of high diastatic activity is required, and this is largely made from a very thin barley shipped from Odessa.

In the common six-rowed English barley or Scottish bere (H. vulgare), the two lateral rows of spikelets springing from one side of the rachis, either partially or entirely intersect and overlap the alter- nate lateral spikelets which spring from the opposite side of the rachis. This has given rise to the term " four-rowed barley." Figs. 1-4 show some typical barleys in the ear.

The production of new varieties by cross-fertilization has of late years attained a degree of almost mathematical precision by the application of the law of inheritance first discovered by Gregor Mendel in 1865, and brought to light in 1901 independently by de Vries, Correns and Tschermak.

Constitution of Barley. — A grain of barley is shuttle-shaped; the end containing the germ which was originally attached to the rachis is known as the proximal end, whilst the opposite end of the corn is called the distal end. A deep furrow runs down the more convex side, which is accordingly denoted the ventral side, the opposite side being distinguished as the dorsal side. Within the ventral furrow at the proximal end is the rachilla already referred to. The skin or husk of a barleycorn consists of two paleae, one adhering to the dorsal side (the palea inferior) and the other to the ventral side (the palea superior) ; the former overlaps the edges of the latter. The awn or beard is merely an elongation of the palea inferior. If the two paleae are removed from a barleycorn after soaking it in water, it will be seen that there are other skins completely enveloping the embryo and endosperm. These are the true skins, and are known as the pericarp and the testa respectively. It may here be mentioned that A. J. Brown has shown recently that the embryo and endosperm of a barleycorn are enclosed in a semi-permeable membrane, i.e. one which allows the passage

of water to the interior of the corn, but not of certain salts and acids. This property appears to be associated with one of the layers of- the testa. Next to these skins will be seen the triple layer of thick-walled square-shaped aleurone cells.

The histology of the barleycorn is best studied by the exami- nation of sections under the microscope. The grain consists of two main portions, the embryo or germ, and the endo- sperm, the storehouse of reserve materials for the growing plant.

The accompanying illustrations show portions of longitudinal sections of a barleycorn magnified to different degrees.

On examining fig. 5, which represents a section of the germ end of a grain of barley cut through the ventral furrow, it will be noticed that the rudimentary leaves, stem and roots are distinguishable. The embryo lies embedded in a mass of cells, the part dividing it from the endosperm being known as the scutellum. Special note should be taken of the elongated cells known as the absorptive epithelial layer, which has certain very important functions to fulfil during the process of germination, notably in feeding the embryo

when it begins to develop into a young plant. Next to this, actually between the scutellum and the endosperm, will be seen a layer of empty cells. These at one time in the history and the development of the corn contained starch granules, but this starch was absorbed during its later development by the embryo. It will be observed further that the endosperm is filled with a network of thin-walled cells closely packed with starch granules, and smaller granules of protein matter (fig. 6). Nearest the skin will be seen the triple layer of aleurone cells already referred to (fig. 7).

Fig. 5. — Median longitudinal section of a barleycorn showing the germ and its appendages.

Rudimentary leaves or plu- mules ; Rudimentary stem ;

Rudimentary root; Empty starch cells of the endosperm ;

Absorptive epithelial layer; Compressed layer of empty

*cells * Starch 'cells (filled).*

Fig. 6. — Section showing absorptive epithelial layer more highly magnified.

d, Walls of starch cells; g, Cells filled with starch gra-

e, Epithelial layer; nules;

/, Compressed layer of empty h, Cells of the scutellum. cells ;

Germination. — The barleycorn in its resting stage is in a state which may be described as one of dormant vitality; it

respires very slowly and thus loses weight during storage. The best and driest barleys are said to lose 1-3% of their weight in the first year, 0-9% in the second, and 0-5% in the third. The loss is considerably more with coarse and damp samples. When the grain is steeped this dormant vitality gives place to that complicated series of processes comprised under the general term germination. When germination begins, enzymes are secreted, and these act on the reserve materials, starch and proteins of the endosperm, converting them into simpler compounds, capable of diffusing to various parts of the growing germ. Following this, starch and proteins are re-formed, the former being deposited in the tissues of the germ and in the

SSwiIffJSBB©

-SM

Fig. 7. — Section showing the aleurone layer.

g, Starch cells ; k, Layers which collectively con-

7, Aleurone layer; stitute the husk.

(Figs. 5-7 from Sykes & Ling, Principles and Practice of Brewing (1907), Charles Griffin & Co., Ltd.]

cells of the scutellum, which previously were almost free from starch; the protein matter deposited in the latter disappears to a "considerable extent, and the protoplasmic content of the cells assumes a very granular appearance. The pointed mass of cells constituting the root-sheath is pushed forward by the root which protrudes through the base of the grain. It is at this stage that the barley is said by the maltster to " chit." After the first rootlet has broken through the ends of the sheath, it is followed by others. The cotyledonary sheath begins to elongate on the third or fourth day of germination and ruptures the true covering of the seed; it then grows upwards between this and the husk and forms the acrospire or " spire " of

the maltster.

According to Brown and Morris, when the first rootlet is breaking through the sheath, starch begins to appear in the tissues of the grain, also in the protoplasm of those cells which are nearest the epithelial layer, and it gradually invades the deeper-seated cells. Further the cellulose walls of the endosperm, situated immediately above the secretory layer, are partially dissolved, the dissolved matter passing into the scutellum, there to be transformed into starch. Brown and Morris state that this process gradually extends to the cellulose walls of the endosperm, and until these are affected there is no evidence of any solvent action on the starch granules themselves. Thus according to these authors the first enzyme to be formed is one which dissolves cell walls, and it was consequently termed by them a " cytohydrolyst." They assert further that the so-called mealy or modified condition, which the maltster desires to bring about to the fullest degree, depends on the extent to which the cell walls have been affected, and they enter into a minute description of the entire dis- appearance of these during the malting process. On the other hand, J. Grtiss has pointed out that the action which takes place on the cell walls of the endosperm during germination does not consist in their complete solution. Schulze has shown that these cell walls consist of two carbohydrates, an araban and a xylan. Griiss states that the araban is completely dissolved, whilst the xylan is more or less un- attacked. The cell walls become, however, transparent so that they can only be seen in sections which have been stained; Brown and Morris examined unstained sections. The writer (A. R. Ling) has proved that the cell wall is present in the most friable and well modified finished malt.

Condition. — Barley is bought in the open market solely on the evidence of certain external signs, and judgment can only be acquired by long experience. The corns should be plump, even in size, and the colour should be uniform from

end to end. The sample should have a sweet odour, and it should be dry to the touch. The presence of light or weevilled corns may be detected by the fact that they float in water. Careless threshing or dressing is responsible for much damage done to barley. In this way many of the corns may be broken, have the paleae partly stripped off or portions removed along with the awn. All broken and dead corns are prone to become mouldy on the malting floors, the contagion thus presented becoming general. E. R. Moritz drew attention in 1895 to the ill effects of close dressing, and more recently (1905) the matter has been brought before the Highland and Agricul- tural Society, chiefly through Montagu Baird, who with C. H. Babington was instrumental in inducing the Board of Agri- culture to publish a leaflet recommending more careful methods of threshing barley. Close dressing

was at one time practised as a means of raising the bushel weight, and thus giving a fictitious value to the barley. Immature barley feels cold to the hand, has a greenish-yellow colour, and, when dry, a starved wrinkled appearance. Over-ripeness in barley is distinguished by a white dead appearance of the corn. Mature or dry grains slip through the fingers more readily than unripe or damp ones. The contents of the endosperm should present a white friable or mealy appearance when the corns are bitten or cut in two with a penknife. The condition of the grain may be determined by means of a mechanical cutter, which cuts a certain number of corns (fifty or more) at one time. Some cutters are constructed to cut the corns transversely, others to cut them longitudinally. The so-called transparency test may be used for the same purpose. It is carried out in an apparatus known as the diaphanoscope, which consists of a box fitted with a sliding tray, furnished with a certain number of shuttle-shaped holes (usually 500), each of such a size as just to hold a barleycorn longitudinally. Into the portion of the box below this tray an electric lamp is placed, and the corns are looked at from above. Thoroughly mealy corns are opaque, whilst steely corns are transparent. When certain portions of a corn are steely, these present the appear- ance of lakes. By this means the percentage of mealy, steely, or half steely corns in a sample may readily be estimated.

E. Prior points out that steeliness of barley is of two kinds, one of which disappears after the grain has been steeped and dried, and therefore does not necessarily influence the malting value of the sample, and the other which is permanent, and therefore retards the modification of the corn. He proposed to determine what he called the coefficient of mellowness of a sample of barley by means of the formula: —

■ _, (Mi-M) 100 , M

A ioo-M +M ‘

in which A is the degree of mellowness, M is the percentage of mealy corns in the original barley, and Mi is the percentage of mealy corns after steeping and drying the barley. Prior points out that, generally speaking, the degree of mellowness varies inversely as the protein content.

The physical differences between steely and mealy grains were first investigated by Johansen, who arrived at the conclusion that mealiness is always accompanied by the presence of air spaces in the endosperm. Munro and Beaven confirmed and extended this. Their conclusions are as follow: ” Mealy grains have a lower specific gravity than steely grains, and contain a larger amount of interstitial air. The total nitrogen content of mealy grains is less than that of steely grains. Steely grains contain a

relatively high pro- portion of nitrogenous substances soluble (a) in 5 % salt solution, and (6) in alcohol of specific gravity 0-9. Mealy barley modifies better than steely during germination. The process of drying damp and under-matured barley intact at 100° F. produced an apparent mellowing or maturation. Other things being equal, maturation, which is physiologically a post-ripening process, is correlated with the mealy appearance of the endosperm." H. T. Brown and his collaborators point out that thin sections of steely corns when examined under the microscope no longer exhibit a translucent appear ance, but show the mealy properties as completely as if they had been cut from a mealy grain, and they suggest that in a steely corn the whole of the endosperm is under a state of tensile stress which cannot .be maintained in the thin sections. If, however, a thin section of a steely barley be cemented to a slide with Canada balsam and then pared away with a razor, steeliness and translucency may be pre- served even in the thinnest sections. The mealy appearance in the endosperm of barley is assumed to be a direct consequence of the formation of interspaces around the cell-contents and within the*

cell walls. Under ordinary conditions it is conjectured that these interspaces are filled with air, but it is pointed out that they can also be produced under circumstances which suggest that they are at times vacuous or partly so. According to the last- mentioned authors they appear to originate from a system of stresses and strains induced within the endosperm by its gradual loss of water, a break of continuity taking place which gives rise to these interspaces when the cohesive power of the heterogeneous cell-contents falls below a certain point. It is further suggested by them that the most important factor in producing the stresses and strains is probably the shrinkage of the starch granules as their water content is reduced from, say, 40 to about 15 %. It is pointed out, however, that actual discontinuity in the cell-contents can only take place when the tensile strength of the protoplasmic matrix in which the starch granules are embedded has been surpassed, and this being so it might be anticipated that those cells which contain the larger amount of protein material would probably best resist the internal stresses and strains, a deduction in close agreement with observed facts, steely grains being as a rule richer in protein than mealy grains. Brown and his co-workers determine the coefficient of mealiness of a barley as follows: Five hundred corns are cut transversely in a corn cutter and the percentage of mealy, half mealy and steely corns is noted. The number 100 is taken to represent complete mealiness, I complete steeliness, and 50 the intermediate class. If the per- centage of each class be multiplied by its special value, and the sum of the products divided by 100,

the result is the coefficient of mealiness. By steeping and drying a very steely Scottish barley, the coefficient of mealiness was raised from 29-7 to 87-1, whilst concurrently the specific gravity fell from 1-417 to 1-289.

Barley even of the same kind varies widely in its chemical composition, but on an average the proximate constituents of British malting barleys lie within the following limits: —

Moisture *18 — 12 per cent.*

Nitrogenous matters expressed as proteins *8 -15*

Fat *2 — 2-5*

Starch *60 —65*

Sugars *1-5— 2-0 1-7 — 2-0*

Gums *5—7 2 — 2-5*

Fibre (cellulose)

Ash

“Any sample of barley which contains more than 20 % of moisture would be considered damp. The late Professor Lintner expressed the view several years ago that a good malting barley should not contain more than 10 % of protein, but R. Wahl asserts that in America six-rowed barleys containing a far higher percentage of protein are used successfully, indeed

preferably, for malting purposes. The only precise knowledge

we possess of the protein compounds of barley is due to the

researches of T. B. Osborne. According to this observer,

barley contains the under-mentioned compounds of this class

in the following proportions: —

„ , , . . ˆ (Leucosin (albumin)) „ „„ ±

Soluble in water j Proteose \ ■ ■ °-3« per cent.

Soluble in salt solution : Edestin (globulin) . 1-95 „

<- 1 li • . 0/ 1 1. 1 \ Horde'in …. 4-00 „

*Soluble in 75% alcohol j Insoluble protem . * 50 „*

Total 10-75 .1

It should be pointed out here that the above are only average values for the particular samples of barley investigated. Un- doubtedly the nitrogenous constituents of different barleys vary widely in nature as well as in amount.

Raw barley contains enzymes, thus diastase of translocation, so called by Horace T. Brown and G. H. Morris, and catalase (H. van Laer). Proteolytic enzymes appear only to arise with the beginning of germination; but it has been asserted that raw barley contains proenzymes (zymogens), which can be rendered active by treatment with dilute lactic acid at an appropriate temperature. The action of the diastase of raw barley on starch has been studied by Julian L. Baker.

Barley should not be cut until it is properly ripe, but over- ripeness is much more to be guarded against by the maltster than premature cutting, as it is accompanied by a loss in germi- native power. Moreover, unripe corn may to a certain extent be matured in stack, whilst a great improvement in germinative capacity is frequently produced by sweating. Very wet seasons are prejudicial to the ripening of the grain, and when the latter is stacked in too moist a condition it is apt to become what is known as mow burnt. Especially is this the case with barleys

containing large percentages of nitrogen and of high enzymatic activities. Such barleys are denoted ” warm ” by M. Delbriick from their tendency to heat when stored in a moist condition. The effect of this heating is exhibited in the corns becoming black and discoloured at the tips; they are

then said to be magpied. Even in an otherwise dry season a large amount of rain during harvest causes the corns to become " weathered," whilst some of them begin germinating and rot. At the same time heavy dews at night whilst the barley lies cut in the field, or even a sprinkling of rain, assists in mellowing the grain, which often in consequence works the more freely on the malting floors. Properly harvested barley is all the better for remaining in stack for two or three months, as was the practice in former years; if, however, it has been stacked too wet the sooner it is broken down the better.

It is difficult to give any specific test for ripeness, but a series of observations has been made by H. T. Brown and F. Escombe. Samples of barley were taken from the field on the 20th, 24th and 29th of July, and on the 2nd, 6th and 10th of August, and preserved in spirit so that they remained in the same state as when they were gathered. Sections were then cut of these corns, when it was found that the progress of maturation is attended by deformation and ultimate disintegration of the cell nuclei. The change which is denoted by the term nuclear senescence is said to begin in the starch- containing cells, near the periphery of the corn, immediately under- lying the layer next to the aleurone layer. This deformation is followed by complete disintegration of the nucleus, and at the end of seven or eight days nearly the whole of the endosperm has been involved. Brown and Escombe state that when this nuclear test is properly applied it stamps as immature those corns in a sample which are manifestly unripe owing to premature desiccation as well as those in which the ratio of nitrogen to carbohydrate is unduly high, owing to an excess of nitrogenous manure in the soil, or to sparser sowing with its consequent reduction of root competition. This method, interesting though it be, is not fitted for practical use, and the agriculturist must rely as heretofore upon empirical methods for deciding whether or not the grain has attained ripeness or maturity.

The bushel weight is a useful criterion in arriving at an opinion regarding the value of a sample of barley; but in basing judgment upon this factor regard must be paid to the fact already mentioned that if the grains be dressed closely the bushel weight is increased. The reason of this is that with the removal of the awns the corns pack more closely together. The best British malting barleys should weigh 52-56 lb per bushel, the standard weight for malting barleys being 56 lb.

During the storage of barley access of air is necessary, otherwise the grain dies from asphyxiation. Sound barley after being kiln-dried retains its vitality for a number of years; but the statement that the corns found in the Egyptian mummy cases, in which they had remained for several thousands of years, were still capable of germination, is contrary to modern experience. Moisture must also be carefully excluded, as it initiates

germination in a few cells only of the endosperm and causes heating. A constant repetition of wetting such as may take place on account of alterations of the atmospheric tem- perature, which causes moisture to be deposited, in the form of dew, may ultimately destroy the vitality and foster the growth and development of mould fungi which usually grow on broken and damaged corns. In this connexion the advantage of screening and sweating of barley before storing it will be apparent (see below).

An immense amount of damage is caused to the grain, during storage, by various insects, one of the most destructive of these being the common weevil {Calandra granatin). When fully developed this insect measures |th to 5th of an inch in length, and is of a bright chestnut colour. The larvae are fleshy legless grubs, shorter than the perfect insect, with a series of tubercles along each side of the body ; the head is round with strong jaws. The pupa is white, clear and transparent, showing the form of the future weevil. The female bores a hole in the grain with her snout and deposits an egg. The larva when hatched lives on the contents of the grain and under- goes its changes therein. Windisch asserts that only barley which has ripened in the granary is attacked by weevil. Grain which is only slightly attacked should be kilned at a temperature of 122° F., which destroys the weevil in all stages of development. To detect weevil in a sample of barley, the grain should be spread out on a sheet of white paper in bright sunlight. If weevils are present they soon appear, and betake themselves to a position outside the sunlight, to which they are averse. Treatment of the grain with carbon

bisulphide has been suggested as a means of destroying weevil; even if efficacious, however, such a process could not be recom- mended on account of its danger, carbon bisulphide being highly inflammable. The only practical means of ridding a granary or shop of weevil is to clear out all the grain and leave it empty for a year or more.

The vitality of barley may be determined by causing a sample to germinate in any of the well-known forms of apparatus devised for that purpose, and counting the percentage of germi- nating and idle corns. The germinative capacity of a sample of barley may frequently be raised by sweating (see below), which, as already mentioned, brings about a kind of artificial maturation.

Malting. — There are two systems of malting used in England: floor malting and pneumatic or drum malting. These systems will be described

separately.

A floor malting consists of a rectangular building of several storeys, having the cisterns at one end and the kilns at the other. The uppermost floor is devoted to barley.

The capacity of a malting is described by the number of quarters which are put through it every four days. A fifty quarter malting does not merely mean that the cisterns have a capacity of fifty quarters, but that this quantity of barley goes through the house every four days. The average time the germinating barley is on the floors is twelve days, and, as a rule, kilning occupies four days. If, as sometimes happens, the malt has to be kept on the floors thirteen, fourteen, fifteen days, or even longer, the malting is not being worked at the capacity under which it is described, and the kilns may remain unused for a day or more. Conversely, when the malt is loaded at less than twelve days, a day or two has to be missed in steeping. In the former case when the kilns are not being used for drying and curing malt, advantage may be taken to utilize them for sweating barley.

Steeping cisterns were formerly rectangular vessels, of slate, brick or cement, from which the barley had to be discharged by shovelling it out. The forms approved most at the present

Fig. 8.— Longitudinal section of 200 quarter malting at Mortlake. (Julian L. Baker, architect.)

Figure 8 shows a longitudinal section of Messrs Watney, Combe, Reid & Co.'s 200 quarter malting at Mortlake. The barley is carried to the top of the building by the elevator A, where the screening and dressing machinery is situated. After leaving these machines the grain is conveyed on bands to the barley floors B and C. The floor C contains also the steeping cisterns. The six working floors are D, E, F, G, H, K. The floors are ventilated by louvres, N, N, N. The cisterns are connected to the floors by means of plugs. The " pieces," as they are termed, of germinating barley are gradually worked along the floors to the kilns M, M, on to which they are loaded by rotary bands. The fire-places O, O, are arranged so that the draught may be easily controlled. The hot air and products of combustion pass up the shafts P, P, to the hot-air chamber R, R, where they strike the baffle plates S, S. These plates disperse the hot air and gases evenly beneath the kiln floors T, T, through the green malt. After drying and curing, the malt is allowed to cool and is then carried by bands to the floor U, where by suitable machinery the coombs or rootlets are removed. The finished malt is stored in the bins V, V, V.

On arrival at the malting the barley has to be put through the following

operations seriatim: receiving, hoisting and weighing, rough screening, drying and sweating, storing until required for use, screening, grading and removing broken corns, steeping, couching, flooring, withering, drying and curing, dressing and polishing, storing, weighing, sacking and dis- charging the finished malt.

In sweating barley the temperature should not be allowed to rise above 120 F.; it is usually conducted at ioo° F.; and subsequently the barley should be stored for some weeks before it is steeped.

day are conical and constructed of iron; they have arrangements at the apex of the cone, the lower portion, for discharging the grain by gravitation. The steeping period ranges from 48 to 70 hours; it varies according to the kind of barley, and the time of the year. In some of the older maltings there are no arrangements for heating the steep water, and in the winter steeping has occasionally to be performed with water at a temperature near its freezing-point. Steeping should be carried out at a temperature as near as possible to 55 and not higher than 60° F. The usual practice is to fill the cistern up to a certain height with water and throw the barley into it, stirring it until it is about level; the heavy corns will then sink directly to the bottom, whilst the light corns and refuse float on the surface and may be skimmed off. During the time the barley remains in the cistern it is usual to change the steep water two or three times, generally at intervals of twelve hours or tides. The advantage of this is not merely to keep the grain fresh and sweet, but to bring it into contact with the air during the time it is taking up water. Aeration of the steep has long been recognized in Germany as promoting germi- nation, and several arrangements are on the market enabling air to be passed through the grain while it is in the cistern. It has been recommended by Graham, Stopes, Moritz and Morris, and experimental evidence as to its beneficial effects has been published by Windisch, Bleisch, Will, and Baker and Dick. When the corn is steep ripe it contains some 60% of water. Steeping does not consist, however, merely in the

imbibition of a certain amount of water; in order to bring about germination this water must remain within the corn a certain length of time. Thus, although it is quite possible to force the necessary amount of water into the grain in less than the 48-70 hours usually taken up by the steeping process, the grain is not steep-ripe until certain changes initiated by the water have taken place, and these require time for their completion. The following average data are useful to remember in connexion with the

steeping process: —

Amount of water in steep-ripe barley (about) 60%.

Matter removed from barley during steeping (about) 1-5 %.

Increase in volume of barley due to water absorption (about)

18-20 %.

There has been much discussion as to the influence of saline matters in water on the steeping process. The late Professor Lintner stated that common salt in water tended to extract the nitrogenous con- stituents of the grain, but impeded its germination. Mills and Pettigrew found that waters containing calcium salts extracted a minimum of nitrogenous compounds from the barley; they also came to the conclusion that the esteem in which the Lichfield water is held for steeping purposes is due to the presence of nitrates which, they assert, have a stimulating effect on the subsequent germination of the grain. The writer has added lime-water to the extent of one- third of the total volume of water at the first change, believing it to promote regularity of germination. Bearing in mind, however, the observations of Adrian J. Brown, that the barleycorn is enclosed in a membrane permeable to water but impermeable to most salts, it is difficult to see how the saline constituents of water can have any effect except in removing matter from the external portions of the grain and on those corns which are broken. The apparent beneficial effect of lime-water in the steep is probably entirely due to the removal of matters from the husks or paleae.

Malting floors may be constructed of cement, tiles or slate, the two former being preferable to the latter. Ford, in 1849, recommended 200 sq. ft. per quarter of barley steeped as the area of the working floors, and he was quite convinced of the necessity of allowing ample floor room, so that the grain could be worked on the slow, cool system. Subsequently, however, maltsters reduced their floor area, and put the grain rapidly through the malting, thus producing what is termed ” forced ” malt. This kind of malt was, however, condemned by practical brewers, and a chemical test whereby forcing could be detected having been devised by E. R. Moritz and G. H. Morris, maltsters have been compelled again to increase the area of their work- ing floors. At the present time the approved area may be placed at 175-200 sq. ft. per quarter of barley steeped. The area is, however, largely ruled by the kind of barley to be malted.

After the barley has been thrown out of the cistern it is made up in a rectangular heap 16-20 in. deep, called the ” couch “; the object of this is to enable it to gather heat and so start ger- minating. It usually remains in

couch for 1 2-24 hours, until in fact the interior portion of the heap registers a temperature of about 6o° F. During the days of the malt tax the exciseman gauged the quantity of the barley while it was in the couch. After couching the barley is spread thinly and evenly on the floor, forming what is known as the young floor or No. 1 piece. The first visible sign of germination is the sprouting of the rootlet, termed " chitting," and this occurs either while the grain is on the couch or on the young floor. As already mentioned, it may be quickened by aerating the grain in the cistern. From the time the barley is first cast out of the cistern up to the stage of the young floor, or No. 1 piece, it has a pleasant ethereal odour resembling apples. Drs Thomson, Hope and Coventry stated in the earlier part of the 19th century that they distilled " spirits " from germinating barley at this stage. In the light of our present knowledge it would not be surprising if alcoholic fermentation were proved to occur within the grain at this stage, since intramolecular or anaerobic respiration in certain vegetables has been found to be due to alcoholic fermentation.

The thickness at which the young floor is spread depends upon the outside temperature and the nature of the barley. If the weather be warm, or if there be a tendency for the barley to heat, the piece must be spread all the thinner. At this stage the grain loses its external wet appearance. When spread too thickly

the grain will begin to sweat, and the rootlets Will be thrown out suddenly and unevenly. As a rule, under these circum- stances, the rootlets will be long and thin, when they are said to be " wild." A piece which has been allowed to get into this condition must at once be spread thinner. If the sweating has not continued long, the harm done may be confined to increased loss by respiration. The young floor is usually turned with a plough twice during twelve hours, and it may be forked between whiles, but no hard and fast rule can be laid down as to when this is necessary; it must be left to the maltster's judgment, as it depends entirely on what is going on within the grain. The object of turning is in the first place to aerate the grain and freshen it, secondly to check excessive rise of temperature, and thirdly to promote evenness of growth. Too frequent turning is not to be advised. After remaining four days on the young floor three or four rootlets should have appeared, and the acro- spire should have begun to grow up the back of the corn. The apple-like odour of the piece then gives place to one resembling that of the common rush, and this should continue the whole time that the malt remains on the floor. On the fifth day the piece is next moved to No. 2 position, a stage nearer the kiln. It is here that sprinkling is resorted to when necessary. The amount of sprinkling and the time it is given cannot be exactly prescribed. The amount may vary from two to five gallons per quarter, and it should only be given when the rootlets, which ought to be short and curly, and five or more in number,

show signs of losing their freshness. If an excessive amount of sprink- ling be given forced growth ensues. It is preferable not to add the whole of the water at one time, but to divide it over two lots; and immediately after the piece has been sprinkled it should be thoroughly and carefully mixed, otherwise some of the grain will receive an undue proportion of water. When all the sprink- ling water has been given to the piece, which as a rule should not be done later than at the sixth or seventh day of flooring, the temperature should be kept down to about 55° F. by turning. Too frequent turning may, however, detach the rootlet, and it may cause the grain to lose its vitality prematurely, so that growth of the acrospire stops.

By about the eighth day of flooring the acrospire should be about three-quarters up the corn. After this the germinating corn is moved forward to No. 3 piece, which is at first spread as thinly on the floors as in the previous pieces. Here it gradually dries and incipient withering of the rootlets sets in. The only treatment which is now given to the grain is to heap it up thicker and thicker by degrees until it is ready for loading on the kiln. This increase in thickness of the piece (now called the old piece) should not be too sudden, especially if the grain be fresh in appearance and contain a large quantity of water. When the piece is thickened up to say 10 in. in depth, while it is in a very moist condi- tion, heating and sweating take place, with additional growth of acrospire and rootlet. Under such forcing conditions a large production of sugar and degradation of the proteins will take place. When, however, the moisture has been gradu- ally reduced before thickening up, the rootlet dies off; and al- though increase of temperature may occur, this is accompanied by little or no further growth of the acrospire, action being con- fined to the mellowing of the grain by the enzymes. When the malt is ready for loading on the kiln it should be possible to break down the contents of each corn between the thumb and finger. Opinions differ as to what the final temperature on the withering floor should be. If the moisture content of the malt be about 50 %, the piece must be kept thin to avoid sweating. But under these conditions mellowing does not occur, hence the necessity of reducing the moisture content gradually after the last sprinkling water has been given. When the process has been conducted properly the temperature of the old piece may be allowed to rise as high as 70 F. during the six hours previous to loading. The moisture content of the green malt when loaded should not be much above 40 %.

The endosperm of green malt which is ready for the kiln should be soft and mealy, and should not exude moisture when

pressed between the thumb-nails, but should crumble and dis- integrate to a chalky mass having little or no adhesiveness.

The foregoing observations are not to be regarded as hard and fast rules, but they are simply intended to give some indications of the malting process when it proceeds on normal lines ; it may be that on account of the presence of damaged corns the piece begins to develop mould by about the tenth day, and it then has to be kept thin and sometimes even loaded on kiln prematurely.

The malt made for grain distillers, in which a high diastatic activity is required, is manufactured on quite different lines from those above indicated. It is often sprinkled late, and loaded on kiln often in a sodden condition. In some cases sprinkling on kiln is resorted to, but it is doubtful if this leadsto the desired object. Other things being equal, the smaller the corns — i.e the greater number of embryos in a given weight — the higher the diastatic activity of the malt. In selecting a barley for the pro- duction of highly diastatic malt, the diastatic power of the original raw grain is a factor of great importance.

Kilning. — When loaded on kiln, malt intended for brewing ale and stout is, if properly withered, in a moribund condition; nevertheless, during the first stages of the kilning process a certain amount of vital activity is manifested, and the malt undergoes mellowing by the action of enzymes on the contents of the endosperm. If the malt be loaded while the rootlets appear fresh on account of the presence of too much moisture, rapid growth of the acrospire ensues, giving rise to overshot corns, known in Germany as " hussars." To check this the moisture must be rapidly removed by the passage of large volumes of air through the malt. But under such circumstances mellowing does not occur. The ideal conditions of kilning are when the malt has been properly withered on the floors before loading, and, assuming that drying and curing occupy four days, that 25-30 % of the moisture be removed very gradually, this occupying the first three days, at the end of which the malt is said to be hand-dry. The thickness at which the malt is spread on the kiln should not exceed 7-8 in., and until hand-dry (that is to say, reduced to a moisture content of 12-15%) it should not be turned; if moved at all (and that only is necessary when reek occurs), it should only be lightly forked. The rate at which the temperature is raised depends largely on the kind of malt to be made and the construction of the kiln. If high flavour and colour are required, these are produced by keeping the malt for several hours near a temperature of 160 F. while it still con- tains 12-15% of moisture. If more than this amount of mois- ture be present when the temperature reaches the limit just mentioned, the conditions known as stewing would obtain, with the result that " forced " malt would be produced. A certain amount of

colour is produced at the final temperature to which the malt is raised; but when such means are relied upon for the production of the greater part of the colour, reduction of extract and deficiency of flavour follow, the colour being then almost exclusively the result of caramelization of the carbohydrates.

The so-called curing stage constitutes the last part of the kilning process, and the malt must then be turned frequently to ensure uniformity of action. Mechanical turners are exceedingly useful for this purpose. Curing in a drum, as in the so-called pneu- matic malting process (see below), also effects satisfactory curing.

The following table -will give an idea of the kilning temperatures usually employed for the three kinds of malt mentioned, but it must be remembered that these temperatures are largely regulated by the construction of the kiln and the amount of draught available. In this connexion it may be mentioned that the final curing temperature is not necessarily a criterion of the tint of the malt. A malt may have been finished off at a very high temperature and still be a pale malt, provided the moisture percentage has been sufficiently reduced in the initial stages of kilning.

Running

Pale Malt. Ale Malt.

Amber Malt.

1st day temp. 90-100 F. 90-100 F.

90-100 F.

2nd ,, ,, 100-120 100-120

100-130

3rd „

, 120-130(10 hrs.) 120-130(6 hrs

>.) I30-I50

3rd „

I30-i8o(8 ,,) 130-150(12 ,

) 150-160(12 „)

3rd ,,

i8o-igo(6 ,,) i50-i8o(6 ,

) i6o-i8o(6 ,,)

4th ,,

, drop to 170(12 ,,) 180-190(12 ,

) 180-200(12 ,,)

4th „

i90-20o(6 ,,

) 200-220(6 „)

4th „

drop to i8o(6 „

) drop to I90

The average laboratory values obtained from malts of the descrip- tions after about two months' storage should be as follows : —

Running Pale Malt. Ale Malt. Amber Malt. Extract per standard quarter of

336 lb 95-98 lb 94-96 lb 94-96 lb

Moisture about 2-o% in each case

Diastatic activity (Lintner) . . 30-35 20-30 8-10

Tint (Lovibond 52 series neutral) . 3-5 6-8 20-25

Metabolic Changes. — All through the malting process metabolic changes are proceeding, in which both carbohydrates and proteins are concerned. In its resting stage the embryo of a barley- corn is generally free from starch; as soon as germination sets in, however, starch appears in the scutellum, while the amount of sucrose there present increases, these being apparently formed from maltose originating from the action of diastase on the starch of the endosperm. Sucrose also augments in the aleurone layer, but starch is never formed in the aleurone cells. These changes occur when the malt is first loaded on kiln; indeed, at no part of the malting process is there greater physiological activity.

Kilning has been specially studied by J. Griiss, who divides the process into four stages, the first being that at which the tempera- ture limit is 1 13 F. It is characterized by a continuation of the living processes, especially growth of the acrospire, which, as already stated, proceeds too far if the malt be loaded too wet. In any case the rootlet dies away. The metabolism of the carbo- hydrates already mentioned is accompanied by that of the nitro- genous constituents, the reserve protein of the sub-aleurone layer being attacked by proteolytic enzymes and broken down into simpler compounds. This is a most important matter from the point of view of the brewing value of barley, for the degradation products of the proteins are necessary constituents of wort as yeast food. Moreover, unless proper modification of these protein bodies occurs it is impossible to produce tender malt. A barley which contains a high percentage of reserve protein is as a rule unfitted for malting purposes, and indeed, the higher the protein content the greater the difficulty the maltster experiences in dealing with it. Protein hydrolysis requires the presence of a certain amount of moisture, and if this be removed too rapidly by a forced draught at the early stages of kilning the proteolytic enzymes cannot perform their function. If, on the other hand, the grain be loaded in too moist a condition, and the temperature be raised too quickly, the proteolytic enzymes lose their activity and the proteins remain for the most part unattacked. When germination is allowed to proceed on the kiln too great degradation of the protein occurs, and the malt is liable to produce fretty beers, on account of the presence of an. excessive amount of nitrogenous nutritive matter, which leads to the development of disease organisms.

The second stage of the kilning process, according to Griiss, is that at which the temperatures range from 113 to 167 F. The life of the corn is now suspended, but enzymatic processes continue. The starch is further saccharified, and the dividing line of the aleurone layer at the furrow is attacked, as are also the cell walls of the endosperm, which are still intact, these being partially converted into gummy substances. This change, however, also requires the presence of a certain amount of mois- ture. If too much air be passed through the malt at this stage the above-named dividing partition of the cell walls is not attacked. The air may expand the grain to some extent and produce malt of a low bushel weight, which, however, is not properly modified and cannot give satisfactory results in practice.

During the third stage of kilning, an enzyme; which Griiss claims to have recognized, and which he denotes spermoxidase, is said to exert its activity.

Schbnfeld has confirmed the discoveries of Griiss by practical experiments.

Fuel. — The fuel used for drying and curing malt is either anthra- cite or

coke, and the greatest care is necessary in selecting it oh account of its liability to contain arsenic, which is to a greater or less extent an invariable constituent of all coal. The fuel used for malting purposes should not contain more arsenic than 5 Vth grain per lb. Gas coke should on no account be used, unless it has been

proved to be sufficiently free from arsenic; but the best oven coke frequently contains so little arsenic that it may be employed with perfect safety, especially if it be mixed with a proportion (e.g. 5 %) of milk of lime, which retains the arsenic as calcium arsenate. In Germany malt is, as a rule, dried and cured with hot air, whilst in Great Britain the products of combustion are passed through the malt, as it is believed that they exert a beneficial influence on the flavour. The proportion of fuel used for drying and curing malt varies according to the quality of the fuel and the construction of the kiln, but on an average it may be placed at 50-80 lb per quarter.

Storing. — After the malt has passed through the curing stage it is generally heaped up for a few hours. This is believed to increase its flavour. The malt is then stripped from the kiln, and the rootlets, technically known as the coombs, are removed. Formerly this was effected by workmen treading the malt, who wore heavy boots for the purpose. At the present time, however, the rootlets are usually removed by machinery, special forms of which have been devised

the green malt is loaded on an ordinary kiln and the initial stages of kilning (see above) conducted in the usual way; the curing, however, may be carried out successfully in a special form of drum.

Yield and Weight. — The malting process is attended with a certain amount of loss of dry substance of the barley, as follows: —

Inthesteep … 1-5 to 2-o%

By respiration on floors and on kilns . 3-0 ,, 5-0% Coombs 30,, 40%

Total

7-5 .. u-0%

In addition to this, barley, as already mentioned, contains from 15 to 20 % of moisture, whereas finished malt contains 1 to 2 . The total loss in weight

which barley undergoes in the malting process may be put down at from 17 to 28. Since, however, malt is lighter than barley (and the quantity of both was in former years

[From Sykes & Ling, Principles and Practice 0/ Brewing (1907), Charles Griffin & Co., Ltd.]

Fig. 9. — Diagrammatic view of pneumatic malting, showing pneumatic washing and steeping cisterns.

for this as well as for dressing and polishing the malt. It is the custom of some maltsters to store malt with the rootlets still attached ; but this is an objectionable practice, since malt coombs attract moisture, and the presence of more than 3% of moisture in malt produces the condition known as " slackness." When the malt is packed in bin it is often covered with a layer of coombs, which then prevent access of atmospheric moisture. Malt, to preserve its good qualities intact, should be stored in bins made as nearly as possible air-tight, and it should never be placed in bin until it is quite cool. It is probably wrong to store malt in bins adjacent to the kilns, where it is kept at a higher temperature than that of the surrounding atmosphere. During storage of the malt a kind of mellowing occurs, the mechanism of which is not understood. It is, however, known by practical brewers that the best results cannot be obtained when new ma.lt is used.

Premature Malting. — Several years ago Galland suggested ger- minating barley in a drum, his idea being to do away with handling of the grain, and also to be independent of changes of atmospheric temperature. The latest development of this system, the so-called Galland-Henning process of pneumatic malting, has been improved by Mr R. Blair Robertson, and a diagrammatic view of the interior of one of these makings, showing the drums and conical steeping cisterns, is shown in fig. 9.

The drums are provided with a perforated channel for the passage of air through the malt, which is packed in the annular space between this channel and outside wall of the drum. Each drum is capable of revolving on its axis, and there are arrangements for passing either moist, saturated or dry air through the malt. The system as now improved is capable of producing some of the best malt, especially if, after germination has been completed in the drums,

measured exclusively by volume), it frequently happens that a given number of quarters of barley yields a larger number of quarters of finished malt. When this happens it is usual to speak of an increase having been obtained. At the present time weight replaces measure for both barley and malt, and although it is usual to speak of the quantity of grain in terms of

quarters, what is meant is not the measured quarter, but so many weighed standard quarters. The standard quarter for English malting barley is 448 lb and for malt 336 lb. From this it will be seen that when a given number of weighed quarters of barley yields the same number of quarters of finished malt, the actual yield is 75 , and there is then said to be neither increase nor decrease. As a rule, in practical working the yield of malt varies from a 4 decrease to a 10% increase, corre- sponding to an actual yield on the original barley of 72 to 82-5 %.

J. Baverstock, an old writer, says that finished malt should weigh one-fifth less than the barley from which it is produced. This corre- sponds to a malting increase of about 7%, which is a high yield. As a rule, foreign barley will give a greater malting increase than English barley, because, on the one hand, the former usually contains less moisture than the latter, and, further, because there is less loss on the floors by respiration and rootlet growth.

The yield of malt from barley may be determined in the laboratory in an extremely simple manner. Since every grain of barley must yield a grain of malt, if we know the respective weights of a definite number of barley and malt grains, provided that this number is large enough to represent the average, then obviously this gives the data requisite for calculating the yield of malt from barley. The number of corns the weight of which is determined for this purpose is usually 1000, and if the weight of this number be determined on several different 1000 corns, the average will closely approximate

to the truth. Instead of counting the corns by hand, an instrument may be used for this purpose.

If 1000 corns of a barley were found to weigh 42 grammes, and 1000 corns of a finished malt from the same bailey 32 grammes, then the yield of malt is 3 2 X 100 _ ^ 6 ^ ^^ corres p 0n(ji n g to a

42

1 % increase. Assuming that the moisture content of the barley was 15% and that of the finished malt 2%, 100 grammes of malt will contain 2 grammes of moisture, and 76- 1 grammes will contain

76-1 ^C 2

‘ — = I- 5 grammes moisture; therefore 76-1 grammes of malt

contain 76-1 — 1-5 = 74-6 grammes of dry matter. This was obtained from 100 — 15 =? 85 grammes of barley dry substance.

Hence 100 parts of barley dry substance will yield Z4 — ˆ = 87-7

corresponding with a loss of dry substance equal to 12-5 % of the dry substance of the barley, or with a loss of 10-7% on the barley containing 15% of moisture.

The results obtained by this method of laboratory control when it is accurately carried out agree very closely with those deduced from the practical results of weighing the barley, malt and coombs in the malting.

Special Malts. — In addition to the kinds of malt considered in what precedes, there are others mostly used for imparting specific flavours and colour to beers and stout. These are crystal malt, imperial malt, brown or blown malt, and black or roasted malt. Crystal malt is grown for a shortened period on the floors, and then placed in a wire cylinder, which is rotated over a fire so that it is dried at a very high temperature. The weight per quarter is from 250 to 280 lb. Imperial malt is dried off on an ordinary kiln at a final temperature of 240-270 F., but it is not allowed the usual length of time on the withering floor. It is placed on the drying kiln in a layer not exceeding one inch and a half in thickness. A moderate heat from burnt wood is first applied until the bulk of the moisture has been driven off, when the temperature is suddenly raised so that the grains swell some 25 % and the malt takes up a strong empy- reumatic flavour from the products of combustion. This kind of malt weighs 270-300 lb per quarter. Black or roasted malt is pre- pared by roasting malt in a cylinder. Ford states that perfectly malted corn gives a colour of less intensity and permanence than does partially malted corn, and this has been confirmed by other observers. A certain quantity of the so-called black malt is actually made from raw barley, but this gives a product of inferior flavour. The weight per quarter of black malt varies as much as from 215 to 290 lb.

Valuation. — For the valuation of malt the following determina- tions are usually carried out : Extract per standard quarter, moisture, diastatic activity by the Lintner process, tint, and matters soluble in cold water. The physical examination of malt is also a matter of importance, inasmuch as direct evidence is obtained thereby of the modification of the malt. Among the methods adopted for this purpose may be mentioned counting the percentage of corns in which the acrospire has grown up to one-half, two-thirds and three- fourths the entire length of the corn. In properly made

malt the modification of the endosperm should proceed pari passu with the growth of the acrospire. The sinker test is also useful when carried out in an intelligent manner. Those corns which sink in water and lie flat are improperly modified. Normal malt has a specific gravity less than water and the corns have equal density throughout ; consequently they float horizontally in water. In forced samples the proximal ends are frequently lighter than the distal ends, and the corns float horizontally in water, with the germ directed upwards. The latter, however, may in some cases fill with water, and the corns lie flat or sink. This is a characteristic of over-modified malt. It will be seen from these remarks that it is essential to carry out the sinker test under standard conditions. The modification of the malt may also be determined by means of the diaphanoscope already referred to under Barley.

Bibliography. — M. M. W. Baird, Journ. Inst. Brewing (1905), 11, 431; J. L. Baker, Journ. Chem. Soc. Trans. (1902), 81, 1177; The Brewing Industry; J. L. Baker and W. D. Dick, Journ. Inst. Brewing (1905), 11, 380; J. Baverstock, Treatise on Brewing and Malting (1824); E. S. Beaven, Journ. Fed. Inst. Brewing (1902), 8, 542; R. H. Biffen, Journ. Inst. Brewing (1906), 12, 366; Board of Agriculture and Fisheries (Leaflet 149); A. J. Brown, Annals of Botany (1907), 21, 79; H. T. Brown and G. H. Morris, Journ. Chem. Soc. Trans. (1890), 57, 458 ; H. T. Brown and others, Trans. Guinness Research Lab. (1903), vol. — pt. I. (1906), pt. II. ; M. Delbruck, Journ. Inst. Brewing (1906), 12, 642; Ford, A Treatise on Malting (1849); C. Graham, Cantor Lectures, Society of Arts (1874); J. Grilss, Wochenschrift fiir Brauerei (1895), 12, 1257; (1896), 13, 729; 1897), 14, 321, 409; (1898), IS, 81, 269; (1899), 16, 519, 621 ; (1902), 19, 243; \V. Johannsen, Resume. Comptes rendus trav. lab. Carlsberg (1884), 2, 60; A. R. Ling, Brewers' Journal (1904), 40, 741 ; E. J. Mills and J. B. Pettigrew, Journ. Chem. Soc. Trans. (1882), 41, 38; E. R. Moritz, Journ. Fed. Inst. Brewing (1895), 1, 228; E. R. Moritz and G. H. Morris, A Textbook of the Science of Brewing (1891); J. M. H. Munro and E. S. Beaven, Journ. Roy. Agric. Soc. (1900), 11, pt. II., 5; T. B. Osborne, Report of Connecticut Agricultural Experiment Station (1894) ; H. Stopes, Malt and Malting (1895) '< W. J. Sykes and

A. R. Ling, Principles and Practice of Brewing (1907); H. Van Laer Bull, de la soc. chim. de Belgique (1905), 337 ; R. Wahl, Amer. Brewers' Rev. (1904), 18, 89. (A. R. L.)*

MALTA, the largest of the Maltese Islands, situated between Europe and Africa, in the central channel which connects the eastern and western basins of the Mediterranean Sea. The group belongs to the British Empire. It extends over 29 m., and consists of Malta, 91 sq. m., Gozo (

Malta is about 17I m. long by 8| broad; Gozo is 8f by 4! m. This chain of islands stretches from N.E. to S.E. On the S.W. the declivities towards the sea are steep, and in places rise abruptly some 400 ft. from deep water. The general slope of these ridges is towards the N.W., facing Sicily and snow-capped Etna, the source of cool evening breezes. The Bingemma range, rising 726 ft., is nearly at right angles to the axis of the main island. The geological " Great Fault " stretches from sea to sea at the foot of these hills. There are good anchorages in the channels between Gozo and Comino, and between Comino and Malta. In addition to the harbours of Valletta, there are in Malta, facing N.W., the bays called Mellieha and St Paul's, the inlets of the Salina, of Madalena, of St Julian and St Thomas; on the S.E. there is the large bay of Marsa Scirocco. There are landing places on the S.W. at Fomh-il-rih and Miggiarro. Mount Sceberras (on which Valletta is built) is a precipitous promontory about 1 m. long, pointing N.E. It rises out of deep water; well-sheltered creeks indent the opposite shores on both sides. The waters on the S.E. form the " Grand Harbour," having a narrow entrance between Ricasoli Point and Fort St Elmo. The series of bays to the N.W., approached between the points of Tigne and St Elmo, is known as the Marsamuscetto (or Quarantine) Harbour.

Mighty fortifications and harbour works have assisted to make this ideal situation an emporium of Mediterranean trade. During the Napoleonic wars and the Crimean campaign the Grand Harbour was frequently overcrowded with shipping. The gradual supplanting of sail by steamships has made Malta a coaling station of primary importance. But the tendency to great length and size in modern vessels caused those responsible for the civil administration towards the end of the 19th century to realize that the harbour accommodation was becoming inade- quate for modern fleets and first-class liners. A breakwater was therefore planned on the Monarch shoal, to double the available anchorage area and increase the frontage of deep-water wharves available in all weathers.

The Maltese Islands consist largely of Tertiary Limestone, with somewhat variable beds of Crystalline Sandstone, Greensand and Marl or Blue Clay. The series appears to be in line with Qeology similar formations at Tripoli in Africa, Cagliari in and \y a t er Sardinia, and to the east of Marseilles. To the south- supply. east of the Great Fault (already mentioned) the beds are more regular, comprising, in descending order, (a) Upper Coralline Limestone; (6) Yellow, Black or Greensand; (c) Marl or Blue Clay ; (d) White, Grey and Pale Yellow Sandstone ; (e) Choco:- late-coloured nodules with shells, &c. ; (/) Yellow Sandstone ; (g) Lower Crystalline Limestone. The Lower Limestone probably belongs to the Tongarian stage of the Oligocene series, and the Upper Coralline Limestone to the Tortonian stage of the Miocene. The beds are not folded. The general dip of the strata is

from W.S.W. to E.N.E. North of the Great Fault and at Comino the level of the beds is about 400 ft. lower, bringing ©, the Marl, in juxtaposition with (g), the semi-crystalline Limestone. There is a system of lesser faults, parallel to the Great Fault, dividing the area into a number of blocks, some of which have fallen more than others. There are also indications of another series of faults roughly parallel to the south-east coast, which point to the islands being fragments of a former extensive plateau. The mammalian remains found in Pleistocene deposits are of exceptional interest. Among the more remarkable forms are a species of hippopotamus, the elephant (including a pigmy variety), and a gigantic dormouse.

5 o8

MALTA

In the Coralline Limestone the following fossils have been noted :— Spondylus, Ostrea, Pecten, Cytherea, Area, Terebratula, Orthis, Clavagella, Echinus, Cidaris, Nucleolites. Brissus, Spatangus; in the Marl the Nautilus zigzag ; in the Yellow, Black and Greensand shells of Lenticulites complanatus, teeth and vertebrae of Squalidae and Cetacea; in the Sandstone Vaginula depressa. Crystallaria, Nodosaria, Brissus, Nucleolites, Pecten burdigallensis, Scalaria, Scutella subrotunda, Spatangus, Nautilus, Ostrea navicularis and Pecten cristatus (see Captain Spratt's work and papers by Lord Ducie and Dr Adams).

The Blue Clay forms, at the higher levels, a stratum impervious to water, and holds up the rainfall, which soaks through the spongy mass of the superimposed coralline formations. Hence arise the springs which run perennially, several of which have been collected into the gravitation water supplies of the Vignacourt and Fawara aqueducts. The larger part of the water supply, however, is now derived by pumping from strata at about sea-level. These strata are generally impregnated with salt water, and are practically impenetrable to the rain-water of less weight. The honeycomb of rock, and capillary action, retard the lighter fresh-water from sinking to the sea; the soakage from rain has therefore to move horizontally, over the strata about sea-level, seeking outlets. At this stage the rain-water is intercepted by wells, and by galleries hewn for miles in the water-bearing rock. Large reservoirs assist to store this water after it is raised, and to equalize its distribution.

The climate is, for the greater part of the year, temperate and healthy; the thermometer records an annual mean of 67° F. Cll ate and Between June and September the temperature ranges

Hygiene.

Malta has several species of zoophytes, sponges, mollusca and Crustacea. Insect life is represented by plant-bugs, locusts, crickets, grasshoppers, cockroaches, dragon-flies, butterflies, numerous varie- ties of moths, bees and mosquitoes.

Among the fish may be mentioned the tunny, dolphin, mackerel, sardine, sea-bream, dentice and pagnell; wrasse, of exquisite rain- bow hue and good for food ; members of the herring family, sardines, anchovies, flying-fish, sea-pike; a few representatives of the cod family, and some flat fish ; soles (very rare) ; Cernus which grows to large size ; several species of grey and red mullet ; eleven species of Triglidae, including the beautiful flying gurnard whose colours rival the angel-fish of the West Indies; and eighteen species of mackerel, all migratory.

The real population of Malta, viz. of the country districts, is to be differentiated from the cosmopolitan fringe of the cities. There is continuous historical evidence that Malta Population remains to-day what Diodorus Siculus described it in and the 1st century, "a colony of the Phoenicians "; L ˆ a « ua f! e – this branch of the Caucasian race came down the great rivers to the Persian Gulf and thence to Palestine. It carried the art

from 75° to 90 ; the mean for December, January and February is 56 ; March, May and November are mild. Pleasant north-east winds blow for an average of 150 days a year, cool northerly winds for 31 days, east winds 70 days, west for 34 days. The north-west " Gregale " (Euroclydon of Acts xxvii. 14) blows about the equinox, and occasionally, in the winter months, with almost hurricane force for three days together; it is recorded to have caused the drowning of 600 persons in the harbour in 1555. This wind has been a constant menace to shipping at anchor; the new breakwater on the Monarch Shoal was designed to resist its ravages. The regular tides are hardly perceptible, but, under the influence of barometric pressure and wind, the sea-level occasionally varies as much as 2 ft. The average rainfall is 2 1 in. ; it is, however, uncertain; periods of drought have extended over three years. Snow is seen once or twice in a generation; violent hailstorms occilr. On the 19th of October 1898, exceptionally large hailstones fell — one, over 4 in. in length, being brought to the governor, Sir Arthur Fremantle, for inspection. Mediterranean (sometimes called " Malta ") fever has been traced by Colonel David Bruce to a Micrococcus melitensis. The supply of water under pressure is widely distributed and excellent. There is a modern system of drainage for the towns, and all sewerage has been intercepted from the Grand Harbour. There are efficient hospitals and asylums, a system of sanitary inspection, and modernized quarantine stations. It is hardly possible to differentiate between imported and indigenous plants. Among the marine flora may be mentioned

*Porphyra laciniata, the edible laver; Codium tomentosum, r *' a coarse species; Padina pavonia, common in shallow*

water; Viva latissima; Haliseris polypodioides ; Sargassum bacci- ferum; the well-known gulf weed, probably transported from the Atlantic; Zostera marina, forming dense beds in muddy bays ; the roots are cast up by storms and are valuable to dress the fields. Among the land plants may be noted the blue anemone; the ranunculus along the road-sides, with a strong perfume of violets; the Malta heath, which flowers at all seasons; Cynomorium coccineum, the curious " Malta fungus," formerly so valued' for medicinal purposes that a guard was set for its preservation under the rule of the Knights; the pheasant's-eye; three species of mallow and geranium ; Oxalis cernua, a very troublesome imported weed ; Lotus edulis; Scorpiurus subvillosa, wild and cultivated as forage; two species of the horseshoe- vetch ; the opium poppy; the yellow and claret-coloured poppy; wild rose; Crataegus azarolus, of which the fruit is delicious preserved ; the ice- plant; squirting cucumber; many species of Umbelliferae; Labiatae, to which the spicy flavour of the honey (equal to that of Mt Hymettus) is ascribed ; snap- dragons; broom-rape; glass- wort; Salsola soda, which produces when burnt a considerable amount of alkali ; there are fifteen species of orchids ; the gladiolus and iris are also found ; Urginia scilla, the medicinal squill, abounds with its large bulbous roots near the sea; seventeen species of sedges and seventy-seven grasses have been recorded.

*There are four species of lizard and three snakes, none of which is venomous; a land tortoise, a turtle and a frog. Of birds very Fauna * ew are indigenous; the jackdaw, blue solitary thrush,*

spectacled warbler, the robin, kestrel and the herring-gull. A bird known locally as Hangi, not met elsewhere in Europe, nests at Filfla. Flights of quail and turtle doves, as well as teal and ducks, stay long enough to afford sport. Of migratory birds over two hundred species have been enumerated. The only wild mammalia in the island are the hedgehogs, two species of weasel, the Norway rat, and the domestic mouse. The Maltese dog was never wild and has ceased to exist as a breed.

MALTA

Res «/ Kavi

MALTA

and adjacent Islands

6 Miles

Railway..

Aqugdvcti

BtttryWalkcr tc

of navigation through the Mediterranean, along the Atlantic seaboard as far as Great Britain, leaving colonies along its path. In prehistoric times one of these colonies displaced previous inhabitants of Libyan origin. The similarity of the megalithic temples of Malta and of Stonehenge connect along the shores of western Europe the earliest evidence of Phoenician civilization. Philology proves that, though called " Canaanites " from having sojourned in that land, the Phoenicians have no racial connexion with the African descendants of Ham. No subsequent invader of Malta attempted to displace the Phoenician race in the country districts. The Carthaginians governed settlements of kindred races with a light hand; the Romans took over the Maltese as " dedititii," not as a conquered race. Their conversion by St Paul added difference of religion to the causes which prevented mixture of race. The Arabs from Sicily came to eject the Byzan- tine garrison; they treated the Maltese as friends, and were not sufficiently numerous to colonize. The Normans came as fellow- Christians and deliverers; they found very few Arabs in Malta. The fallacy that Maltese is a dialect of Arabia has been lumi- nously disproved by A. E. Caruana, SulV origine delta lingua Maltese.

The upper classes h?ve Norman, Spanish and Italian origin. The knights of St John of Jerusalem, commonly called " of Malta," were drawn from the nobility of Catholic Europe. They took vows of celibacy, but they frequently gave refuge in Malta to relatives driven to seek asylum from feudal wars and dis- turbances in their own lands. At the British occupation there were about two dozen families bearing titles of nobility granted,

or recognized by the Grand Masters, and descending by primo- geniture. These " privileges " were guaranteed, together with the rights and religion of the islanders, when they became British subjects, but no government has ever recognized papal titles in Malta. High and low, all speak among themselves the Phoenician Maltese, altogether different from the Italian language; Italian was only spoken by 13-24 % in 1901. Such Italian as is spoken by the lingering minority has marked di- vergences of pronunciation and inflexion from the language of Rome and Florence. In 1901, in addition to visitors and the naval and military forces, 18,922 Maltese

spoke English, and the number has been rapidly increasing.

In appearance the Maltese are a handsome, well-formed race, about the middle height, and well set up; they have escaped the negroid contamination noticeable in Sicily, and their features are less dark than the southern Italians. The women are gener- ally smaller than the men, with black eyes, fine hair and grace- ful carriage. They are a thrifty and industrious people, prolific and devoted to their offspring, good-humoured, quick-tempered and impressionable. The food of the working classes is princi- pally bread, with oil, olives, cheese and fruit, sometimes fish, but seldom meat ; common wine is largely imported from southern Europe. The Maltese are strict adherents to the Roman Catholic religion, and enthusiastic observers of festivals, fasts and ceremonials.

In 1906 the birth-rate was 40-68 per thousand, and the excess of births over deaths 2637. In April 1907 the estimated popu- lation was 206,690 of whom 21,911 were in Gozo. This pheno- menal congestion of population gives interest to records of its growth; in the 10th century there were 16,767 inhabitants in Malta and 4514 in Gozo; the total population in 1514 was 22,000. Estimates made at the arrival of the knights (1530) varied from 15,000 to 25,000: it was then necessary to import annually 10,000 quarters of grain from Sicily. The population in 1551 was, Malta 24,000, Gozo 7000. In 1582, 20,000 quarters of imported grain were required to avert famine. A census of 1590 makes the population 30,500; in that year 3000 died of want. The numbers rose in 1601 to 33,000; in 1614 to 41,084; in 1632 to 50,113; in 1667 to 55,155; In 1667 11,000 are said to have died of plague out of the total population. At the end of the rule of the knights (1798) the population was estimated at 100,000; sickness, famine and emigration during the blockade of the French in Valletta probably reduced the inhabitants to 80,000. In 1829 the population was ri4,236; in 1836, 119,878 (inclusive of the garrison); in 1873, 145,605; at the census in 1901 the civil population was 184,742. Sanitation decreases the death-rate, religion keeps up the birth-rate. Nothing is done to promote emigration or to introduce manufactures.

Towns and Villages. — The capital is named after its founder, the Grand Master de la Valette, but from its foundation it has been called Valletta (pop. 1901, 24,685); it contains the palace of the Grand Masters, the magnificent Auberges of the several " Langues " of the Order, the unique cathedral of St John with the tombs of the Knights and magnificent tapestries and marble work; a fine opera house and hospital are conspicuous. Between the inner fortifications of Valletta and the outer works, across the neck of the peninsula, is the suburb of Floriana (pop. 7278). To the south- east of Valletta, at the other side of the Grand Harbour, are the cities of Senglea (pop. 8093), Vittoriosa (pop. 8993);

and Cospicua (pop. 12,184); this group is often spoken of as " The Three Cities." The old capital, near the centre of the island is variously called Notabile, Citta Vecchia (q.v.), and Medina, with its suburb Rabat, its population in 1901 was 7515; here are the catacombs and the ancient cathedral of Malta. Across the Marsamuscetto Harbour of Valletta is a considerable modern town called Sliema. The villages of Malta are Mellieha, StPaul's Bay, Musta, Birchircara, Lia, Atterd, Balzan, Naxaro, Gargur, Misida, S. Julian's, S. Giuseppe, Dingli. Zebbug, Siggieui, Curmi, Luca, Tarxein, Zurrico, Crendi, Micabbiba, Circop, Zabbar, Asciak, Zeitun, Gudia and Marsa Scirocco. The chief town of Gozo is called Victoria, and there are several small villages.

Industry and Trade. — The area under cultivation in 1906 was 41,534 acres. As a rule the tillers of the soil live away from their lands, in some neighbouring village. The fields are small and composed of terraces by which the soil has been walled up along the contours of the hills, with enormous labour, to save it from

being washed away. Viewed from the sea, the top of one wall just appearing above the next produces a barren effect; but the aspect of the land from a hill in early spring is a beautiful con- trast of luxuriant verdure. It is estimated that there are about 10,000 small holdings averaging about four acres and intensely cultivated. The grain crops are maize, wheat and barley; the two latter are frequently sown together. In 1906, 13,000 acres produced 17,975 quarters of wheat and 12,000 quarters of barley. The principal fodder crops are green barley and a tall clover called " sulla " (Hedysarum coronarum), having a beautiful purple blossom. Vegetables of all sorts are easily grown, ancl a rotation of these is raised on land irrigated from wells and springs. Potatoes and onions are grown for exportation at seasons when they are scarce in northern Europe. The rent of average land is about £2 an acre, of very good land over £3; favoured spots, irrigated from running springs, are worth up to £12 an acre. Two, and often three, crops are raised in the year; on irrigated land more than twice as many croppings are possible. The presence of phosphates accounts for the fertility of a shallow soil. There is a considerable area under vines, but it is generally more profitable to sell the fruit as grapes than to convert it into wine. Some of the best oranges in the world are grown, and exported; but sufficient care is not taken to keep down insect pests, and to replace old trees. Figs, apricots, nectarines and peaches grow to perfection. Some cotton is raised as a rotation crop, but no care is taken to improve the quality. The caroub tree and the prickly pear are extensively cultivated. There are exceptionally fine breeds of cattle, asses and goats; cows of a large and very powerful build are used for ploughing. The supply of butchers' meat has to be kept up by constant importa- tions. More than two-thirds of the wheat comes from abroad; fish,

vegetables and fruit are also imported from Sicily in con- siderable quantities. Excellent honey is produced in Malta; at certain seasons tunny-fish and young dolphin (lampuca) are abundant; other varieties of fish are caught all the year round.

About 5000 women and children are engaged in producing Maltese lace. The weaving of cotton by hand-looms survives as a languishing industry. Pottery is manufactured on a small scale; ornamental carvings are made in Maltese stone and exported to a limited extent. The principal resources of Malta are derived from its being an important military station and the headquarters of the Mediterranean fleet. There are great naval docks, refitting yards, magazines and stores on the south-east side of the Grand Harbour; small vessels of war have also been built here. Steamers of several lines call regularly, and there is a daily mail to Syracuse. The shipping cleared in 1905-1906 was 3524 vessels of 3,718,168 tons. Internal communications include a railway about eight miles long from Valletta to Nota- bile; there are electric tramways and motor omnibus services in several directions. The currency is English. Local weights and measures include the cantar, 175 lb; salm, one imperial quarter; cafiso, 45 gallons; canna, 6 ft. io| in.; the tumolo (256 sq. ca.), about a third of an acre.

The principal exports of local produce are potatoes, cumin seed, vegetables, oranges, goats and sheep, cotton goods and stone.

To keep alive, in a fair standard of comfort, the population of 206,690, food supplies have to be imported for nine and a half months in the year. The annual value of exports would be set off against imported food for about one month and a half. The Maltese have to pay for food imports by imperial wages, earned in connexion with naval and military services, by commercial services to passing steamers and visitors, by earnings which emigrants send home from northern Africa and elsewhere, and by interest on investments of Maltese capital abroad. A long absence of the Mediterranean fleet, and withdrawals of imperial forces, produce immediate distress.

Finance.— -The financial position in 1906-1907 is indicated by the following: Public revenue £513,594 (including £51,039 carried to revenue from capital) ; expenditure £446,849 ; imports (actual), £1,219,819; imports in transit, £5,876,981 ; exports (actual), £123,510; exports in transit £6,127,277; imports from the United Kingdom (actual), £218,461. In March 1907 there were 8159 depositors in the government savings bank, with £569,731 to their credit.

Government. — Malta is a crown colony, within the jurisdiction of a high commissioner and a commander-in-chief, to whom im- portant questions of policy are reserved; in other matters the administration is under a military governor (£3000), assisted by a civil lieutenant-governor or chief secretary. There is an executive council, now comprising eleven members with the governor as president. The legislative council, under letters patent of the 3rd of June 1903, is composed of the governor (presi- dent), ten official members, and eight elected members. There are eight electoral districts with a total of about 10,000 electors. A voter is qualified on an income from property of £6, or by paying rent to the same amount, or having the qualifications required to serve as a common juror. There are no municipal institutions. Letters patent, orders in council, and local ordi- nances have the force of law. The laws of Justinian are still the basis of the common law, the Code of Rohan is not altogether abrogated, and considerable weight is still given to the Roman Canon Law. The principal provisions of the Napoleonic Code and some English enactments have been copied in a series of ordinances forming the Statute Law. Latin was the language of the courts till 1784, and was not completely supplanted by Italian till 1815. The partial use of English (with illogical limitations to the detriment of the Maltese-born British subjects who speak English) was introduced by local ordinances and orders in council at the end of the 19th century. The Maltese, of whom 86% cannot understand Italian, are still liable to be tried, even for their lives, in Italian, to them a foreign language. The endeavour to restrict juries to those who understand Italian reveals glaring incongruities.

Education. — -There were, in 1906, 98 elementary day schools, and 33 night schools. The attendance on the 1st of September 1905 was 16,530, the percentage on those enrolled 84-6; the total enrol- ment was 18,719. The average cost per pupil in these schools was 35s. 1 id. a year on daily attendance. There is a secondary school for girls in Valletta, and one for boys in Gozo. A lyceum in Malta had an average attendance of 464. The number of students at the university was about 150. The average cost per student in the lyceum was £8, os. lid.; in the university £26, 10s. id. The fees in these institutions are almost nominal, the middle-classes are thus educated at the expense of the masses. In the 18th century the government of the Knights and of the Inquisition did not favour the education of the people, after 1800 British governors were slow to make any substantial change. About the middle of the 19th century it began to be recognized that the education of the people was more conducive to the safety of the fortress than to leave in ignorance congested masses of southern race liable to be swayed spasmodically by prejudice. At first an attempt was made to make Maltese a literary language by adapting the Arabic characters to record it

in print. This failed for several reasons, the foremost being that the language was not Arabic but Phoenician, and because professors and teachers, whose personal ascendancy was based on the official prominence of Italian, did not realize that educational institutions existed for the rising generation rather than to provide salaries for alien teachers and men behind the times. Various educational schemes were proposed, but they were easier to propose than to carry into effect : no one, except Mr Savona, had the ability to urge English as the basis of instruction, and he agitated and was installed as director of education and made a member of the Execu- tive. The obstruction which he encountered alarmed him, and he compromised by adopting a mixed system of both English and Italian, pari passu, as the basis of Maltese education; he resigned after a brief effort. Mr Savona's attempt to teach the Maltese children simultaneously two foreign languageˆ (of which they were quite ignorant, and their teachers only partially conversant) without first teaching how to read and write the native Maltese systemati- cally was continued for some years under an eminent archaeologist, Dr A. A. Caruana, who became Director of Education. He began to give some preference to English indirectly. On his resignation Sir G. Strickland established a new system of education based on the principle of beginning from the bottom, by teaching to read and write in Maltese as the medium for assimilating, at a Further stage, either English or Italian, one at a time, and aiming at imparting general knowledge in colloquial English. A series of school books, in the Maltese language printed in Roman characters, with transla- tions in English interlined in different type, was produced at the government printing office and sold at cost price. The parents and guardians were called upon to select whether each child should learn English or Italian next after learning reading, writing and arithmetic in Maltese. About 89% recorded their preference in favour of English at the outset ; then, as a result of violent political agitation, this percentage was considerably lowered, but soon crept up again. Teachers and professors who were weak in English,

lawyers, newspaper men and others, combined to deprive these reforms of their legitimate consequence, viz. that after a number of years English should be the language of the courts as well as of education, and to protect those belonging to the old order of know- ledge from the competition of young Maltese better educated than themselves, whose rapid rise everywhere would be assured by knowing English thoroughly. An order in council was enacted in 1899 providing that no Maltese (except students of theology) should thenceforth suffer any detriment through inability to pass examina- tions in Italian, in either the schools or university, but the fraction of the Maltese who claim to speak Italian (13-24%) still command sufficient influence to hamper the full enjoyment of this emancipation by the majority. In the university most of the textbooks used are English,

nevertheless many of the lectures are still delivered in Italian — for the convenience of some professors or to please the politicians, rather than for the benefit of the students. The number of students who enter the university without passing any examina- tion in Italian is rapidly increasing; the longer the period of transi- tion, the greater the detriment to the rising generation.

History and Antiquities. — The earliest inhabitants of Malta (Melita) and Gozo (Gaulos) belonged to a culture-circle which included the whole of the western Mediterranean, and to a race which perhaps originated from North Africa; and it is they, and not the Phoenicians, who were the builders of the remarkable megalithic monuments which these islands contain, the Gigantia in Gozo, Hagiar Kim and Mnaidra near Crendi, the rock-cut hypogeum of Halsaflieni, 1 and the megalithic buildings on the hill of Corradino in Malta, being the most noteworthy. The contemporaneity of these structures has been demonstrated by the identity of the pottery and other objects discovered in them, including some remarkable steatopygic figures in stone, and it is clear that they belong to the neolithic period, numerous flints, but no metal, having been found. Those that have been mentioned seem to have been sanctuaries (some of them in part dwelling-places), but Halsaflieni was an enormous ossuary, of which others may have existed in other parts of the island; for the numerous rock-cut tombs which are everywhere to be seen belong to the Phoenician and Roman periods. In these buildings there is a great preference for apsidal terminations to the internal chambers, and the facades are as a rule slightly curved. The numerous niches, generally containing sacrificial (?) tables, 2 are often approached by window-like openings hewn out of one of the flat slabs by which they are enclosed. The surface of the stones in the interior is often pitted, as a form of ornamentation. Even the barren islet of Comino, between Malta and Gozo, was inhabited in prehistoric times.

To the Phoenician period, besides the tombs already mentioned, belong some remains of houses and cisterns, and (probably) a few round towers which are scattered about the island, while the important Roman house at Cittavecchia is the finest monument of this period in the islands.

The Carthaginians came to Malta in the 6th century B.C., not as conquerors, but as friends of a sister Phoenician colony (Freeman, Hist. Sicily, i. 255): Carthage jn her struggle with Rome was at last driven to levy oppressive tribute, where- upon the Maltese gave up the Punic garrison to Titus Sempro- nius under circumstances described by Livy (xxi. 51). The Romans did not treat the Maltese as conquered enemies, and at once gave them the privileges of a municipium; Cicero {in Verrem) refers to the Maltese as " Socii." Nothing was to be gained by displacing the Phoenician inhabitants in a country from which any race less thrifty would find life

impossible by agriculture. On the strength of a monument bearing his name, it has been sur- mised that Hannibal was born in Malta, while his father was governor-general of Sicily; he certainly did not die in Malta. There is evidence from Cicero {in Verrem) that a very high stage of manufacturing and commercial prosperity, attained in

1 See T. Zammit, The Halsaflieni prehistoric hypogeum at Casal Paula, Malta (Malta, 1910).

2 Sometimes the pillar which represents the baetylus, which seems to have been the object of worship (see A. J. Evans in Journal of Hellenic Studies, xxi., 1901) stands free sometimes it serves as support to the table stone which covers the niche, and sometimes again monolithic tables occur. Conical stones (possibly themselves baetyli) are also found.

Carthaginian times, continued in Malta under the Romans. The Phoenician temple of Juno, which stood on the site of Fort St Angelo, is also mentioned by Valerius Maximus. An inscription records the restoration of the temple of Proserpine by Cheriston, a freed-man of Augustus and procurator of Malta. Diodorus Siculus (L. V., c. 4) speaks of the im- portance and ornamentation of Maltese dwellings, and to this day remains of palaces and dwellings of the Roman period indicate a high degree of civilization and wealth. When forced to select a place of exile, Cicero was at first (ad Att. III. 4, X. i. 8, 9) attracted to Malta, over which he had ruled as quaes- tor 75 b.c. Among his Maltese friends were Aulus Licinius and Diodorus. Lucius Castricius is mentioned as a Roman governor under Augustus. Publius was " chief of the island " when St Paul was shipwrecked (Acts xxvii. 7) ; and is said to have become the first Christian bishop of Malta. The site where the cathedral at Notabile now stands is reputed to have been the residence of Publius and to have been converted by him into the first Chris- tian place of worship, which was rebuilt in 1090 by Count Roger, the Norman conqueror of Malta. The Maltese cata- combs are strikingly similar to those of Rome, and were likewise used as places of burial and of refuge in time of persecution. They contain clear indication of the interment of martyrs. St Paul's Bay was the site of shipwreck of the apostle in a.d. 58; the " topon diathalasson " referred to in Acts is the strait be- tween Malta and the islet of Selmun. The claim that St Paul was shipwrecked at Meleda off the Dalmatian coast, and not at Malta, has been clearly set at rest, on nautical grounds, by Mr Smith of Jordanhill (Voyage and Shipwreck of St Paul, London, 1848). According to tradition and to St Chrysostom (Horn. 54) the stay of the apostle resulted in the conversion of

the Maltese to Christianity. The description of the islanders in Acts as " barbaroi " confirms the testimony of Diodorus Siculus that they were Phoenicians, neither hellenized nor romanized. The bishopric of Malta is referred to by Rocco Pirro (Sicilia sacra), and by Gregory the Great (Epist. 2, 44; 9, 63; 10, r). It appears that Malta was not materially affected by the Greek schism, and remained subject to Rome.

On the final division of the Roman dominions in A. d. 395 Malta was assigned to the empire of Constantinople. On the third Arab invasion, a. d. 870, the Maltese joined forces against the Byzantine garrison, and 3000 Greeks were massacred. Unable to garrison the island with a large force, the Arabs cleared a zone between the central stronghold, Medina, and the suburb called Rabat, to restrict the fortified area. Many Arab coins, some Kufic inscriptions and several burial-places were left by the Arabs; but they did not establish their religion or leave a permanent impression on the Phoenician inhabitants, or deprive the Maltese language of the characteristics which differentiate it from Arabic. There is no historical evidence that the domi- nation of the Goths and Vandals in the Mediterranean ever ex- tended to Malta: there are fine Gothic arches in two old palaces at Notabile, but these were built after the Norman conquest of Malta. In 1090 Count Roger the Norman (son of Tancred de Hauteville), then master of Sicily, came to Malta with a small retinue; the Arab garrison was unable to offer effective opposi- tion, and the Maltese were willing and able to welcome the Normans as deliverers and to hold the island after the immediate withdrawal of Count Roger. A bishop of Malta was witness to a document in 1090. The Phoenician population had continued Christian during the mild Arab rule. Under the Normans the power of the Roman Church quickly augmented, tithes were granted, and ecclesiastical buildings erected and endowed. The Normans, like the Arabs, were not numerically strong; the rule of both, in Sicily as well as Malta, was based on a recognition of municipal institutions under local officials; the Normans, how- ever, exterminated the Mahommedans. Gradually feudal customs asserted themselves. In 1193 Margarito Brundusio received Malta as a fief with the title of count; he was Grand Admiral of Sicily. Constance, wife of the emperor Henry IV. of Germany became, in 1194, heiress of Sicily and Malta; she was the last of the Norman dynasty. The Grand Admiral of Sicily

in 1223 was Henry, count of Malta. He had led 300 Maltese at the capture of two forts in Tripoli by the Genoese. In 1265 Pope Alexander IV. conferred the crown of Sicily on Charles of Anjou to the detriment of Manfred, from whom the French won the kingdom at the battle of Benevento. Under the will of Corradino a representative of the blood of Roger the Norman, Peter of Aragon claimed the succession, and it came to him by the revolution known as " the Sicilian Vespers " when 28,000

French were exterminated in Sicily. Charles held Malta for two years longer, when the Aragonese fleet met the French off Malta, and finally crushed them in the Grand Harbour. In 1427 the Turks raided Malta and Gozo, they carried many of the inhabitants into captivity, but gained no foothold. The Maltese joined the Spaniards in a disastrous raid against Gerbi on the African coast in 1432. In 1492 the Aragonese expelled the Jews. Dissatis- faction arose under Aragonese rule from the periodical grants of Malta, as a marquisate or countship, to great officers of state or illegitimate descendants of the sovereign. Exemption was obtained from these incidences of feudalism by large payments to the Crown in return for charters covenanting that Malta should for ever be administered under the royal exchequer without the intervention of intermediary feudal lords. This compact was twice broken, and in 1428 the Maltese paid King Alfonso 30,000 florins for a confirmation of privileges, with a proviso that entitled them to resist by force of arms any intermediate lord that his successors, might attempt to impose. Under the Aragonese, Malta, as regards local affairs, was administered by a Universita or municipal commonwealth with wide and indefinite powers, including the election of its officers, Capitan di Verga, Jurats, &c. The minutes of the " Consiglio Popolare " of this period are preserved, showing it had no legislative power; this was vested in the king, and was exercised despotically in the interests of the Crown. The knights of St John having been driven from Rhodes by the Turks, obtained the grant of Malta, Gozo and Tripoli in 1530 from the emperor Charles V., subject to a reversion in favour of the emperor's successor in the kingdom of Aragon should the knights, leave Malta, and to the annual tribute of a falcon in acknowledgment that Malta was under the suzerainty of Spain. The Maltese, at first, challenged the grant as a breach of the charter of King Alfonso, but eventually welcomed the knights. The Grand Master de ITsle Adam, on entering the ancient capital of Notabile, swore for himself and his successors to maintain the rights and liberties of the Maltese. The Order of St John took up its abode on the promontory guarded by the castle of St Angelo on the southern shore of the Grand Harbour, and, in expectation of attacks from the Turks, commenced to fortify the neighbouring town called the Borgo. The knights lived apart from the Maltese, and derived their principal revenues from estates of the Order in the richest countries of Europe. They accumulated wealth by war, or by privateering against the Turks and their allies. The African Arabs under Selim Pasha in 1551 ravaged Gozo, after an unsuccessful attempt on Malta, repulsed by cavalry under Upton, an English knight. The Order of St John and the Christian Maltese now realized that an attempt to exterminate them would soon be made by Soliman II., and careful preparations were made to meet the attack.

The great siege of Malta which made the island and its knights famous, and

checked the advance of Mahommedan power in southern and western Europe, began in May 1565. The fighting men of the defenders are variously recorded between 6100 and 9121; the roll comprises one English knight, Oliver Starkey. The Mahommedan forces were estimated from 29,000 to 38,500. Jehan Parisot de la Valette had participated in the defence of Rhodes, and in many naval engagements. He had been taken prisoner by Dragut, who made him row for a year as a galley slave till ransomed. This Grand Master had gained the con- fidence of Philip of Spain, the friendship of the viceroy of Sicily, of the pope and of the Genoese admiral, Doria. The Sultan placed his troops under the veteran Mustapha, and his galleys under his youthful relative Piali, he hesitated to make either supreme and ordered them to await the arrival of Dragut with

his Algerian allies, before deciding on their final plans. Mean- while, against Mustapha's better judgment, Piali induced the council of war to attack St Elmo, in order to open the way for his fleet to an anchorage, safe in all weathers, in Marsamuscetto harbour. This strategical blunder was turned to the best advantage by La Valette, who so prolonged the most heroic defence of St Elmo that the Turks lost 7000 killed and as many wounded before exterminating the 1200 defenders, who fell at their post. In the interval Dragut was mortally wounded, the attack on Notabile was neglected, valuable time lost, and the main objective (the Borgo) and St Angelo left intact. The subsequent siege of St Angelo, and its supporting fortifications, was marked by the greatest bravery on both sides. The knights and their Maltese troops fought for death or victory, without asking or giving quarter. The Grand Master proved as wise a leader as he was brave. By September food and ammunition were getting scarce, a large_ relieving force was expected from Sicily, and Piali became restive, on the approach of the equinox, for the safety of his galleys. At last the viceroy of Sicily, who had the Spanish and allied fleets at his disposal, was spurred to action by his council. He timidly landed about 6000 or 8000 troops at the north-west of Malta and withdrew. The Turks began a hurried embarcation and allowed the Christians to join forces at Notabile; then, hearing less alarming particulars of the relieving force, Mustapha relanded his reluctant troops, faced his enemies in the open, and was driven in confusion to his ships on the 8th of September.

The Order thus reached the highest pinnacle of its fame, and new knights flocked to be enrolled therein from the flower of the nobility of Europe; La Valette refused a cardinal';, Iiat, deter- mined not to impair his independence. He made his name immortal by founding on Mt Sceberras ”

a city built by gentle- men for gentlemen " and making Valletta a magnificent example of fortification, unrivalled in the world. The pope and other sovereigns donated vast sums for this new bulwark of Chris- tianity, but, as its ramparts grew in strength, the knights were slow to seek the enemy in his own waters, and became false to their traditional strategy as a naval power. Nevertheless, they harassed Turkish commerce and made booty in minor engage- ments throughout the 16th and 18th centuries, and they took part as an allied Christian power in the great victory of Lepanto. With the growth of wealth and security the martial spirit of the Order began to wane, and so also did its friendly relations with the Maltese. The field for recruiting its members, as well as its landed estates, became restricted by the Reformation in England and Germany, and the French knights gradually gained a pre- ponderance which upset the international equilibrium of the Order. The election of elderly Grand Masters became prevalent, the turmoil and chances of frequent elections being acceptable to younger members. The civil government became neglected and disorganized, licentiousness increased, and riots began to be threatening. Expenditure on costly buildings was almost ceaseless, and kept the people alive. In 1614 the Vignacourt aqueduct was constructed. The Jesuits established a university, but they were expelled and their property confiscated in 1768. British ships of war visited Malta in 1675, and in 1688 a fleet under the duke of Grafton came to Valletta. The fortifications of the " Three Cities " were greatly strengthened under the Grand Master Cotoner.

In 1722 the Turkish prisoners and slaves, then very numerous, formed a conspiracy to rise and seize the island. Premature dis- covery was followed by prompt suppression. Castle St Angelo and the fort of St James were, in 1775, surprised by rebels, clamouring against bad government; this rising is known as the Rebellion of the Priests, from its leader, Mannarino. The last but one of the Grand Masters who reigned in Malta, de Rohan, restored good government, abated abuses and promulgated a code of laws; but the ascendancy acquired by the Inquisition over the Order, the confiscation of the property of the knights in France on the outbreak of the Revolution, and the intrigues of the French made the task of regenerating the Order evidently hope- less in the changed conditions of Christendom. On the death of

Rohan the French knights disagreed as to the selection of his successor, and a minority were able to elect, in 1797, a German of weak character, Ferdinand Hompesch, as the last Grand Master to rule in Malta. Bonaparte had arranged to obtain Malta by treachery, and he took possession without resistance in June 1798; after a stay of six days he proceeded with the bulk of his forces to Egypt, leaving General Vaubois with 6000 troops to hold Valletta. The exiled knights made an attempt to reconstruct themselves

under the emperor Paul of Russia, but finally the Catholic parent stem of the Order settled in Rome and continues there under papal auspices. It still comprises members who take vows of celibacy and prove the requisite number of quarterings.

Towards the close of the rule of the knights in Malta feudal institutions had been shaken to their foundations, but the transition to republican rule was too sudden and extreme for the people to accept it. The French plundered the churches, abolished monks, nuns and nobles, and set up forthwith the ways and doings of the French Revolution. Among other laws Bonaparte enacted that French should at once be the official language, that 30 young men should every year be sent to France for their education; that all foreign monks be ex- pelled, that no new priests be ordained before employment could be found for those existing; that ecclesiastical jurisdiction should cease; that neither the bishop nor the priests could charge fees for sacramental ministrations, &c. Stoppage of trade, absence of work (in a population of which more than half had been living on foreign revenues of the knights), and famine, followed the defeat of Bonaparte at the Nile, and the failure of his plans to make Malta a centre of French trade. An attempt to seize church valuables at Notabile was forcibly resisted by the Maltese, and general discontent broke out into open rebellion on the 2nd of September 1798. The French soon discovered to their dismay that, from behind the rubble walls of every field, the agile Maltese were unassailable. The prospect of an English blockade of Malta encouraged the revolt, of which Canon Caruana became the leader. Nelson was appealed to, and with the aid of Portuguese allies he established a blockade and deputed Captain Ball, R. N. (afterwards the first governor) to assume, on the 9th of February 1799, the provisional adminis tration of Malta and to superintend operations on land. Nelson recognized the movement in Malta as a successful revolution against the French, and upheld the contention that the king of Sicily (as successor to Charles V. in that part of the former king- dom of Aragon) was the legitimate sovereign of Malta. British troops were landed to assist in the siege ; few lives were lost in actual combat, nevertheless famine and sickness killed thousands of the inhabitants, and finally forced the French to surrender to the allies. Canon Caruana and other leaders of the Maltese aspired to obtain for Malta the freedom of the Roman Catholic religion guaranteed by England in Canada and other depen- dencies, and promoted a petition in order that Malta should come under the strong power of England rather than revert to the kingdom of the two Sicilies.

The Treaty of Amiens (1802) provided forthe restoration of the island to the Order of St John; against this the Maltese strongly protested, realizing that it would be followed by the re-establish- ment of French influence. The English flag was flown side by side with the Neapolitan, and England

actually renewed war with France sooner than give up Malta. The Treaty of Paris (1814), with the acclamations of the Maltese, confirmed Great Britain in the aggregation of Malta to the empire.

A period elapsed before the government of Malta again became self-supporting, during which over £600,000 was contributed by the British exchequer in aid of revenue, and for the importation of food-stuffs. The restoration of Church property, the re-estab- lishment of law and administration on lines to which the people were accustomed before the French invasion, and the claiming for the Crown of the vast landed property of the knights, were the first cares of British civil rule. As successor to the Order, the Crown claimed and eventually established (by the negotiations in Rome of Sir Frederick Hankey, Sir Gerald Strickland and

Sir Lintorn Simmons) with regard to the presentation of the bishopric (worth about £4000 a year) the right to veto the ap- pointment of distasteful candidates. This right was exercised to secure the nomination of Canon Caruana and later of Monsignor Pace. When the pledge, given by the Treaty of Amiens, to restore the Order of St John with a national Maltese " langue," could not be fulfilled, political leaders began demanding instead the re-estab- lishment of the " Consiglio Popolare " of Norman times (without reflecting that it never had legislative power); but by degrees popular aspirations developed in favour of a free constitution on English lines. The British authorities steadily maintained that, at least until the mass of the people became educated, representa- tive institutions would merely screen irresponsible oligarchies. After the Treaty of Paris stability of government developed, and many important reforms were introduced under the strong government of the masterful Sir Thomas Maitland; he acted promptly, without seeking popularity or fearing the reverse, and he ultimately gained more real respect than any other governor, not excepting the marquess of Hastings, who was a brilliant and sympathetic administrator. Trial by jury for criminal cases was established in 1829. A council of government, of which the members were nominated, was constituted by letters patent in 1835, but this measure only increased the agitation for a repre- sentative legislature. Freedom of the press and many salutary innovations were brought about on a report of John Austin and G. C. Lewis, royal commissioners, appointed in 1836. The basis of taxation was widened, sinecures abolished, schools opened in the country districts, legal procedure simplified, and Police established on an English footing. Queen Adelaide vistied Malta in 1838 and founded the Anglican collegiate

church of St Paul. Sir F. Hankey as chief secretary was for many years the principal official of the civil administration. In 1847 Mr R. Moore O'Ferrall was appointed civil governor. In June 1849 the constitution of the council was altered to comprise ten nominated and eight elected members.

The revolutions in Italy caused about this time many, in- cluding Crispi and some of the most intellectual Italians, to take refuge in Malta. These foreigners introduced new life into politics and the press, and made it fashionable for educated Maltese to delude themselves with the idea that the Maltese were Italians, because a few of them could speak the language of the peninsula. A clerical reaction followed against new progressive ideas ind English methods of development. After much unreasoning vituperation the Irish Catholic civil governor, who had arrived amidst the acclamations of all, left his post in disgust. His successor as civil governor was Sir W. Reid, who had formerly held military command. His determined attempts to promote education met with intense opposition and little success. At this period the Crimean War brought great wealth and com- mercial prosperity to Malta. Under Sir G. Le Marchant, in 1858, the nominal rule of military governors was re-established, but the civil administration was largely confided to Sir Victor Houlton as chief secretary, whilst the real power began to be concentrated in the hands of Sir A. Dingli, the Crown advocate, who was the interpreter of the law, and largely its maker, as well as the principal depository of local knowledge, able to prevent the preferment of rivals, and to countenance the barrier which difference of language created between governors and governed. The civil service gravitated into the hands of a clique. At this period much money was spent on the Marsa extension of the Grand Harbour, but the rapid increase in the size of steamships made the scheme inadequate, and limited its value prematurely. The military defences were entirely remodelled under Sir G. Le Marchant, and considerable municipal improvements and embellishments were completed. But this governor was ob- structed and misrepresented by local politicians as vehemently as his predecessors and his successors. Ministers at home have often appeared to be inclined to the policy of pleasing by avoid- ing the reforming of what might be left as it was found. Sir A. Dingli adapted a considerable portion of the Napoleonic Code in a series of Malta Ordinances, but stopped short at points likely to cause agitation. Sir P. Julyan was appointed royal commis- xvu. 17

sioner on the civil establishments, and Sir P. Keenan on education; their work revived the reform movement in 1881. Mr Savona led an agitation for a more sincere system of education on English lines: Fierce opposition ensued, and the pari passu compromise was adopted to which reference is made in the section on Education above; Mr Savona was an able organizer, and began the real emancipation of the Maltese masses from educational ignorance; but he succumbed to agitation before accomplishing substantial

results.

An executive council was established in 1881, and the franchise was extended in 1883. A quarter of a century of Sir Victor Houlton 's policy of laissez-faire was changed in 1883 by the appointment of Sir Walter Hely-Hutchinson as chief secretary. An attempt was made to utilize fully the abilities of this eminent administrator by creating him civil lieutenant-governor, in whom to concentrate both the real and the nominal power of detailed administration; but the military authorities objected to his corresponding directly with the Colonial Office; and a political deadlock began to develop. Sir A. Dingli was transferred from an administrative office to that of chief justice. With the con- tinuance of military power over details, the public could not understand where responsibility really rested. The elected mejnbers under the leadership of Dr Mizzi clamoured for more power, opposed reforms and protested against the carrying of government measures by the casting vote of a military governor as president of the council. To force a crisis, abstention of elected members from the council was resorted to, together with the election of notoriously unfit candidates. Under these circum- stances a constitution of a more severe type was recommended by those responsible for the government of Malta and was about to be adopted, as the only alternative to a deadlock, by the imperial authorities.

A regulation excluding Maltese from the navy (because of their speaking on board a language that their officers did not under- stand) provoked from Trinity College, Cambridge, the Strickland correspondence in The Times on the constitutional rights of the Maltese, and a leading article induced the Colonial Office to try an experiment known as the Strickland-Mizzi Constitution of 1887. This constitution (abolished in 1903) ended a period of government by presidential casting votes and official ascendancy. For the first time the elected members were placed in a majority; they were given three seats in the executive council; in local questions the government had to make every effort to carry the majority by persuasion. When persuasion failed and imperial interests, or the rights of unrepresented minorities, were involved the power of the Crown to legislate by order in council could be (and was) freely used. This system had the merit of counter- acting any abuse of power by the bureaucracy. It brought to bear on officials effective criticism, which made them alert and hard-working. Governor Simmons eventually gave his support to the new constitution, which was received with acclamation. Strickland, who had been elected while an undergraduate on the cry of equality of rights for Maltese and English, and Mizzi, the leader of the anti-English agitation, were, as soon as elected, given seats in the executive council to co-operate with the govern- ment; but their aims were irreconcilable. Mizzi wanted to undo the educational forms of Mr Savona, to ensure the pre- dominance of the

Italian language and to work the council as a caucus. Strickland desired to replace bureaucratic government by a system more in touch with the independent gentlemen of the country, and to introduce English ideas and precedents. Friction soon arose. Mizzi cared little for a constitution that did not make him complete master of the situation, and resigned his post in the government.

Sir Walter Hely-Hutchinson left Malta in March 1889, and was succeeded by Sir Gerald Strickland (Count Delia Catena), who lost no time in pushing, and carrying with a rapidity that was considered hasty, reforms that had been retarded for years. The majorities behind the government began to dwindle and agita- tion to grow. Meanwhile the Royal Malta Militia was estab- lished as a link between the Maltese and the garrison. The police were reorganized with proper pay, criminal laws were rigorously

enforced. A naval officer was placed over the police to diminish difficulties with the naval authorities and sailors. A marine force was raised to stop smuggling; and the subtraction of coal during coaling operations was stopped by drastic legislation. The civil service was reorganized so as to reward merit and work by promotion. Tenders were strictly enforced in letting govern- ment property and contracts; a largely increased revenue was applied on water supply, drainage and other works. Lepers were segregated by law.

The Malta marriage question evoked widespread agitation; Sir A. Dingli had refrained from making any provision in his code as to marrying. The Maltese relied on the Roman Canon Law, the English on the common law of England, Scots or Irish had nothing but the English law to fall back upon. Maltese authorities were ignorant of the disabilities of British Noncon- formists at common law, and they had not perceived that persons with a British domicile could not evade their own laws by marry- ing in Malta, e.g. that an English girl up to the age of 21 required the father's or guardian's consent from which a Maltese was legally exempt at 18. Sir G. Strickland preferred legislation to the covering up of difficulties by governors' licences and appeals to incongruous precedents. Sir Lintorn Simmons was appointed envoy to the Holy See, to ascertain how far legislation might be pushed in the direction of civil marriage without justifying clerical agitation and obstruction in the council. He succeeded in coming to an agreement with Rome. Nevertheless Sir A. Dingli and

ecclesiastics of all denominations, for conflicting reasons, swelled the opposition against the liberal concessions obtained from Leo XIII. The legal necessity for legislation in accordance with the agreement was, nevertheless, on a special reference, submitted to the privy council, whose decision affirmed the advisibility of legislation and the need for validating retro- spectively marriages not supported by either Maltese or English common law. Agitation in the imperial parliament stopped government action, but the publicity of the finding of the privy council warned all concerned against the risk of neglecting the common law of the empire whenever they were not prepared to follow the lex loci contractus.

Since the British occupation it was disputed whether the military authorities had the right to alienate for the benefit of the imperial exchequer fortress sites no longer required for defence. The reversion of such property was claimed for the local civil government, and the principles governing these rights were ulti- mately laid down by an order in council, which also determined military rights to restrict buildings within the range of forts. The co-operation of naval and military authorities was obtained for the construction, at imperial expense, of the breakwater designed to save Malta from being abandoned by long and deep draft modern vessels. British-born subjects were given the right to be tried in English. The new system of education (already described) was set up, and many new schools were built with funds provided by order in council against the wishes of the elected majority.

An order in council (1899) making English the language of the courts after fifteen years (by which the Maltese would have obtained the right to be tried in English) was promulgated at a time when the system of taxation was also being revised; hence- forth agitation in favour of Italian and against taxation attained proportions unpleasant for those who preferred popularity to reform and progress. The elected members demanded the recall of Sir G. Strickland on his refusing to change his policy. The military governor gave way, as regards making English the language of the courts on a fixed date, but educational reforms and the imposition of new taxes (those in Malta being 27s. 6d. per head, against 93s. in England) were enacted by an order in council notwithstanding the agitation. Mr Mereweather was appointed chief secretary and civil lieutenant-governor in 1902, and Sir Gerald Strickland became governor and commander-in-chief of the Leeward Islands. Governor Sir F. Grenfell was created a peer. Strenuous efforts were made to placate the Italian party in the administration of the educational reforms; but, as these ■vere not repealed, elected members refused supply, and kept away

from the council. Persistence in this course led to the repeal by letters-patent of 1903 of the Strickland-Mizzi Constitution of 1887. In place of

occasional orders in council for important matters in urgent cases, bureaucratic government with an official majority was again, with its drawbacks, fully re-established for all local affairs great and small. The representatives of the people were repeatedly re-elected, only to resign again and again as a protest against a restricted constitution.

Authorities. — Kenrick'sPhoenicia(i85$) ; A.A.Caruana's Reports on Phoenician and Roman Antiquities in Malta (1881 and 1882); Albert Mayr, Die Insel Malta im Altertum (1909); James Smith, Voyage and Shipwreck of St Paul (1866); R. Pirro, Sicilia sacra; T. Fazello, Storia di Sicilia (1833); C. de Bazincourt, Histoire de la Sidle (1846); G. F. Abela, Malta illustrata (1772); J. Quintin, Insulae Melitae descriptio (1536); G. W. von Streitburg, Reyse nach der Inselmalta (1632) ; R. Gregoria, Considerazioni sopra la storia di Sicilia (1839); F. C. A. Davalos, Tableau historique de Malte (1802); Houel, Voyage pittoresque (vol. iv., 1787); G. P. Badger, Description of Malta and Gozo (1858); G. N. Goodwin, Guide to and Natural History of Maltese Islands (1800); Whitworth Porter, History of Knights of Malta (1858) ; A. Bigelow, Travels in Malta and Sicily (1831) ; M. Miege, Histoire de Malte (1840) ; Parliamentary Papers, reports by Mr Rownell on Taxation and Expenditure in Malta (1878), by Sir F. Jutyan on Civil Establishments (1880) ; and Mr Keenan on the Educational System (1880), (the last two deal with the language question) ; F. Vella, Maltese Grammar for the Use of the English (1831); Malta Penny Magazine (1839-1841); J. T. Mifsud, Biblioteca Maltese (1764); C. M. de Piro, Squarci di storia; Michele Acciardi, Mustafa bascia di Rodi schiavo in Malta (1761); A. F. Freiherr, Reise nach Malta in 1830 (Vienna, 1837); B. Nider- stedt, Malta vetus ,et nova, 1660 ; F. Panzavecchia, Storia dell' isola di Malta; N. W. Senior, Conversations on Egypt and Malta (1882); G. A. Vassallo, Storia di Malta (1890); H. Felsch, Reisebeschreibung (1858); W. Hardman, Malta, 1798-1815 (1909); A. Nieuterberg, Malta (1879); Terrinoni, La Presa di Malta (i860); Azzopardi, Presa di Malta (1864); Castagna, Storia di Malta (1900); Boisredon, Ransi-' jat, Blocus et siege de Malte (1802); Buchon, Nouvelles recherches histo- riques; C. Samminniateli, Zabarella, V Assedio di Malta del 1565 (1902); Professor G. B. Mifsud, Guida al corso di Procedura Penale Maltese (1907); P. de Bono Debono, Storia delta legislazione in Malta (1897) ; Monsignor A. Mifsud, L'Origine della sovranitd delta Grand Brettagna su Malta (1907); A. A. Caruana, Frammento critico della storia di Malta (1899); Ancient Pagan Tombs and Christian Cemeteries in the Island of Malta, Explored and Surveyed from 188 1 to 1897; Strickland, Remarks and Correspondence on the Constitution of Malta (1887); A. Mayr, Die vorgeschichtlichen Denkmdler von Malta (1901); A. E. Caruana, Suit' origine della lingua Maltese (1896); J. C. Grech, Flora melitensis (1853); Furse, Medagliere

Gerosolimitano; Pisani, Medagliere; Galizia, Church of St John; J. Murray, " The Maltese Islands, with special reference to their Geological Structure," Scottish Geog. Mag. (vol. vi., 1890); J. W. Gregory, " The Maltese Fossil Echinoidea and their evidence on the correlation of the Maltese Rocks," Trans. Roy. Soc. Edin. (vol. xxxvi., 1892); J. H. Cook, The Har Dalam Cavern, Malta, Evidences of Prehistoric Man in Malta ; Collegamento geodetico dette isole maltesi con la Sicilia (1902) ; A. Zeri, I porti delle isole del gruppo di Malta (1906); G. F. Bonamico, Delle glossipietre di Malta (1688). Brydone, Teonge, John Dryden jun., W. Tallack, Rev. H. Seddall, Boisgolin, Rev. W. K. Bedford, W. H. Bartlett, St Priest. Msgr. Bres, M. G. Borch, Oliver Drapper, John Davy, G. M. Letard, Taafe, Busuttil, T. MacGill, J. Quintana, have also written on Malta. For natural science see the works of Dr A. L. Adams, Professor E. Forbes, Captain Spratt, Dr G. Gulia, C. A. Wright and Wood's Tourist Flora.

For the language question, see Mr Chamberlain's speech in the House of Commons, on the 28th of January 1902. Also parliamentary papers for Grievances of the Maltese Nobility, and Constitutional Changes. -•

MALTA (or Mediterranean) FEVER, a disease long prevalent of Malta and formerly at Gibraltar, as well as other Mediterra- nean centres, characterized by prolonged high temperature, with anaemia, pain and swelling in the joints, and neuritis, lasting on an average four months but extending even to two or three years. Its pathology was long obscure, but owing to conclusive research on the part of Colonel (afterwards Sir) David Bruce, to which contributions were made by various officers of the R.A.M.C. and others, this problem had now been solved. A specific micro-organism, the Micrococcus melitensis, was discovered in 1887, and it was traced to the milk of the Maltese goats. A commission was sent out to Malta in 1904 to investigate the question, and after three years' work its conclusions were embodied in a report by Colonel Bruce in 1907. It was shown that the disappearance of the disease from Gibraltar had synchronized with the

non-importation of goats from Malta; and preventive measures adopted in Malta in 1906, by banishing goats' milk from the military and naval dietary, put a stop to the occurrence of cases. In the treatment of Malta fever a vaccine has been used with considerable success.

MALTE-BRUN, CONRAD (1755-1826), French geographer, was born on the 12th of August 1755 at Thisted in Denmark, and died at Paris on the

14th of December 1826. His original name was Malte Conrad Bruun. While a student at Copenhagen he made himself famous partly by his verses.but more by the violence of his political pamphleteering; and at length, in 1800, the legal actions which the government authorities had from time to time instituted against him culminated in a sentence of banishment. The principles which he had advocated were those of the French Revolution, and after first seeking asylum in Sweden he found his way to Paris. There he looked forward to a political career; but, when Napoleon's personal ambition began to unfold itself, Malte- Brun was bold enough to protest, and to turn elsewhere for em- ployment and advancement. He was associated with Edme Mentelle (1730-1815) in the compilation/ˆ the G&ographie mathe- maiique . . . de toutes les parties du monde (Paris, 1803-1807, 16 vols.), and he became recognized as one of the best geo- graphers of France. He is remembered, not only as the author of six volumes of the learned Pricis de la geographie universelle (Paris, 1810-1829), continued by other hands after his death, but also as the originator of the Annates des voyages (1808), and one of the founders of the Geographical Society of Paris. His second son, Victor Adolphe Malte-Bsun (1816-1889), followed his father's career of geographer, and was a voluminous author. MALTHUS, THOMAS ROBERT (1 766-1 834), English econo- mist, was born in 1766 at the Rookery, near Guildford, Surrey, a small estate owned by his father, Daniel Malthus, a gentleman of good family and independent fortune, of considerable culture, the. friend and correspondent of Rousseau and one of his exe- cutors. Young Malthus was never sent to a public school, but received his education from private tutors. In 1784 he was sent to Cambridge, where he was ninth wrangler, and became fellow of his college (Jesus) in 1797. The same year he received orders, and undertook the charge of a small parish in Surrey. In the following year he published the first edition of his great work, An Essay on the Principle of Population as it affects the Future Improvement of Society, with Remarks on the Speculations of Mr Godwin, M. Condorcet, and other Writers. The work excited a good deal of surprise as well as attention; and with characteristic thoroughness and love of truth the author went abroad to collect materials for the verification and more exhaustive treatment of his views. As Britain was then at war with France, only the northern countries of Europe were quite open to his research at that time; but during the brief Peace of Amiens Malthus con- tinued his investigations in France and Switzerland. The result of these labours appeared in the greatly enlarged and more mature edition of his work published in 1803. In 1805 Malthus married happily, and not long after was appointed professor of modern history and political economy in the East India Company's College at Haileybury. This post he retained till his death suddenly from heart disease on the 23rd of December 1834. Malthus was one of the most amiable, candid and cultured of men. In all his private relations he was not

only without reproach, but distinguished for the beauty of his character. He bore popular abuse and misrepresentation without the slightest murmur or sourness of temper. The aim of his inquiries was to promote the happiness of mankind, which could be better accomplished by pointing out the real possibilities of progress than by indulging in vague dreams of perfectibility apart from the actual facts which condition human life.

Malthus's Essay on Population grew out of some discussions which he had with his father respecting the perfectibility of society. His father shared the theories on that subject of Con- dorcet and Godwin; and his son combated them on the ground that the realization of a happy society will always be hindered by the miseries consequent on the tendency of population to increase faster than the means of subsistence. His father was

struck by the weight and originality of his views, asked him to put them in writing, and then recommended the publication of the manuscript. It was in this way the Essay saw the light. Thus it will be seen that both historically and philosophically the doctrine of Malthus was a corrective reaction against the superficial optimism diffused by the school of Rousseau. It was the same optimism, with its easy methods of regenerating society and its fatal blindness to the real conditions that circumscribe human life, that was responsible for the wild theories of the French Revolution and many of its consequent excesses.

The project of a formal and detailed treatise on population was an afterthought of Malthus. The essay in which he had studied a hypothetic future led him to examine the effects of . the principle he had put forward on the past and present state of society; and he undertook an historical examination of these effects, and sought to draw such inferences in relation to the actual state of things as experience seemed to warrant. In its original form he had spoken of no checks to population but those which came under the head either of vice or of misery. In the 1803 edition he introduced the new element of the preventive check supplied by what he calls "moral restraint," and is thus enabled to " soften some of the harshest conclusions " at which he had before arrived. The treatise passed through six editions in his lifetime, and in all of them he introduced various additions and corrections. That of 1816 is the last he revised, and supplies the final text from which it has since been reprinted.

Notwithstanding the great development which he gave to his work and the almost unprecedented amount of discussion to which it gave rise, it remains a matter of some difficulty to dis- cover what solid contribution he has made to our knowledge, nor is it easy to ascertain precisely what practical precepts, not already familiar, he founded on his theoretic principles. This twofold vagueness is well brought out in his celebrated corre- spondence

with Nassau Senior, in the course of which it seems to be made apparent that his doctrine is new not so much in its essence as in the phraseology in which it is couched. He himself tells us that when, after the publication of the original essay, the main argument of which he had deduced from David Hume, Robert Wallace, Adam Smith and Richard Price, he began to inquire more closely into the subject, he found that " much more had been done " upon it " than he had been aware of." It had " been treated in such a manner by some of the French economists, occasionally by Montesquieu, and, among English writers, by Dr Franklin, Sir James Steuart, Arthur Young and Rev. J. Townsend, as to create a natural surprise that it had not excited more of the public attention." " Much, however," he thought, " remained yet to be done. The com- parison between the increase of population and food had not, perhaps, been stated with sufficient force and precision," and " few inquiries had been made into the various modes by which the level " between population and the means of subsistence " is effected." The first desideratum here mentioned — the want, namely, of an accurate statement of the relation between the increase of population and food — Malthus doubtless supposed to have been supplied by the celebrated proposition that " popu- lation increases in a geometrical, food in an arithmetical ratio." This proposition, however, has been conclusively shown to be erroneous, there being no such difference of law between the increase of man and that of the organic beings which form his food. When the formula cited is not used, other somewhat nebulous expressions are sometimes employed., as, for example, that " population has a tendency to increase faster than food," a sentence in which both are treated as if they were spontaneous growths, and which, on account of the ambiguity of the word " tendency," is admittedly consistent with the fact asserted by Senior, that food tends to increase faster than population. It must always have been perfectly well known that population will probably (though not necessarily) increase with every augmentation of the supply of subsistence, and. may, in some instances, inconveniently press upon, or even for a certain time exceed, the number properly corresponding to that supply. Nor could it ever have been doubted that war, disease, poverty —

the last two often the consequences of vice — are causes which keep population down. In fact, the way in which abundance, increase of numbers, want, increase of deaths, succeed each other in the natural economy, when reason does not intervene, had been fully explained by Joseph Townsend in his Dissertation on the Poor Laws (1786) which was known to Malthus. Again, it is surely plain enough that the apprehension by individuals of the evils of poverty, or a sense of duty to their possible

offspring, may retard the increase of population, and has in all civilized communities operated to a certain extent in that way. It is only when such obvious truths are clothed in the technical terminology of " positive" and " preventive checks " that they appear novel and profound; and yet they appear to contain the whole message of Malthus to mankind. The laborious apparatus of historical and statistical facts respecting the several countries of the globe, adduced in the altered form of the essay, though it contains a good deal that is curious and interesting, establishes no general result which was not previously well known. It would seem, then, that what has been ambitiously called Malthus's theory of population, instead of being a great discovery as some have represented it, or a poisonous novelty, as others have considered it, is no more than a formal enunciation of obvious, though sometimes neglected, facts. The pretentious language often applied to it by economists is objectionable, as being apt to make us forget that the whole subject with which it deals is as yet very imperfectly understood — the causes which modify the force of the sexual instinct, and those which lead to variations in fecundity, still awaiting a complete investigation.

It is the law of diminishing returns from land, involving as it does — though only hypothetically — the prospect of a continu- ously increasing difficulty in obtaining the necessary sustenance for all the members of a society, that gives the principal impor- tance to population as an economic factor. It is, in fact, the confluence of the Malthusian ideas with the theories of Ricardo, especially with the corollaries which the latter deduced from the doctrine of rent (though these were not accepted by Malthus), that has led to the introduction of population as an element in the discussion of so many economic questions in modern times.

Malthus had undoubtedly the great merit of having called public attention in a striking and impressive way to a subject which had neither theoretically nor practically been sufficiently considered. But he and his followers appear to have greatly exaggerated both the magnitude and the urgency of the dangers to which they pointed. 1 In their conceptions a single social imperfection assumed such portentous dimensions that it seemed to overcloud the whole heaven and threaten the world with ruin. This doubtless arose from his having at first omitted altogether from his view of the question the great counteracting agency of moral restraint. Because a force exists, capable, if unchecked, of producing certain results, it does not follow that those results are imminent or even possible in the sphere of experience. A body thrown from the hand would, under the single impulse of projection, move for ever in a straight line; but it would not be reasonable to take special action for the preven- tion of this result, ignoring the fact that it will be sufficiently counteracted by the other forces which will come into play. And such other .forces exist in the case we are considering. If the inherent energy of the principle of population (supposed

every- where the same) is measured by the rate at which numbers in- crease under the most favourable circumstances, surely the force of less favourable circumstances, acting through prudential or altruistic motives, is measured by the great difference between this maximum rate and those which are observed to prevail in most European countries. Under a rational system of institu- tions, the adaptation of numbers to the means available for their support is effected by the felt or anticipated pressure of circum- stances and the fear of social degradation, within a tolerable degree of approximation to what is desirable. To bring the result nearer to the just standard, a higher measure of popular

1 Malthus himself said, " It is probable that, having found the bow bent too much one way, I was induced to bend it too much the other in order to make it straight."

enlightenment and more serious habits of moral reflection ought indeed to be encouraged. But it is the duty of the individual to his possible offspring, and not any vague notions as to the pressure of the national population on subsistence, that will be adequate to influence conduct.

It can scarcely be doubted that the favour which was at once accorded to the views of Malthus in certain circles was due in part to an impression, very welcome to the higher ranks of society, that they tended to relieve the rich and powerful of responsibility for the condition of the working classes, by showing that the latter had chiefly themselves to blame, and not either the negli- gence of their superiors or the institutions of the country. The application of his doctrines, too, made by some of his successors had the effect of discouraging all active effort for social improve- ment. Thus Chalmers " reviews seriatim and gravely sets aside all the schemes usually proposed for the amelioration of the economic condition of the people " on the ground that an increase of comfort will lead to an increase of numbers, and so the last state of things will be worse than the first.

Malthus has in more modern times derived a certain degree oi reflected lustre from the rise and wide acceptance of the Dar- winian hypothesis. Its author himself, in tracing its filiation, points to the phrase " struggle for existence " used by Malthus in relation to the social competition. Darwin believed that man advanced to his present high condition through such a struggle, consequent on his rapid multiplication. He regarded, it is true, the agency of this cause for the improvement of the race as largely superseded by moral influences in the more advanced social stages. Yet he considered it, even in these stages, of so much importance towards that end that, notwithstanding the individual suffering arising from the struggle for life, he depre- cated any great reduction in the natural, by which he seems to mean the ordinary, rate of increase.

Besides his great work, Malthus wrote Observations on the Effect of the Corn Laws ; A n Inquiry into the Nature and Progress of Rent ; Principles of Political Economy ; and Definitions in Political Economy. His views on rent were of real importance.

For his life see Memoir by his friend Dr Otter, bishop of Chichester (prefixed to 2nd ed., 1836, of the Principles of Political Economy), and Malthus and his Work, by J. Bonar (London, 1885). Practically every treatise on economics deals with Malthus and his essay, but the following special works may be referred to : Soetbeer, Die Stellung der Sozialisten zur Malthusschen Bevolkerungslehre (Berlin, 1886); G. de Molinari, Malthus, essai sur le principe de population (Paris, 1889); Cossa, // Principio di popolazione di T. R. Malthus (Milan, 1895) ; and Ricardo, Letters to Malthus, ed. J. Bonar (1887).

MALTON, a market town in the Thirsk and Malton parlia- mentary division of Yorkshire, England, 21m. N.E. of York by a branch of the North Eastern railway. The town comprises Old Malton and New Malton in the North Riding, and Norton on the opposite side of the river Derwent, in the East Riding. Fop. of urban district of Malton (ick>i),4758; of urban district of Norton 3842. The situation, on the wooded hills rising from the narrow valley, is very picturesque. The church of St Michael is a fine late Norman building with perpendicular tower; the church of St Leonard, of mixed architecture, with square tower and spire, has three Norman arches and a Norman font. The church of St Mary at Old Malton was attached to a Gilbertine priory founded in 11 50; it is transitional Norman and Early English, with later insertions. Remains of the priory are scanty, but include a crypt under a modern house. In the neighbourhood of Malton are the slight but beautiful fragments of Kirkham Abbey, an Early English Augustinian foundation of Walter l'Espec (1131); and the fine mansion of Castle Howard, a massive building by Vanbrugh, the seat of the earls of Carlisle, containing a noteworthy collection of pictures. Malton possesses a town- hall, a corn exchange, a museum, and a grammar-school founded in 1547. There are iron and brass foundries, agricultural imple- ment works, corn mills, tanneries and breweries. In the neighbourhood are lime and whinstone quarries.

Traces of a Romano-British village exist on the east side of the town, but there appears to be no history of Malton before the Norman Conquest. The greater part of Malton belonged to the crown in 1086 and was evidently retained until Henry I.

gave the castle and its appurtenances to Eustace son of John, whose descendants took the name of Vescy. Eustace meditated the deliverance of Malton Castle to King David of Scotland in 1 138, but his plans were altered owing to the battle of the Standard. The " burgh " of Malton is mentioned in 1187, and in 1295 the town returned two members to parliament. It was not represented again, however, until 1640, when an act was passed to restore its ancient privileges. In 1867 the number of members was reduced to one, and in 1885 the town was dis- franchised. Until the 17 th century the burgesses had all the privileges of a borough by prescriptive right, and were governed by two bailiffs and two under-bailiffs, but these liberties were taken from them in 1684 and have never been revived. From that time a bailiff and two constables were appointed at the court leet of the lord of the manor until a local board was formed in 1854. In the 13th century Agnes de Vescy, then lady of the manor, held a market in Malton by prescription, and Camden writing about 1 586 says that the lord of the manor then held two weekly markets, on Tuesday and Saturday, the last being the best cattle market in the county. The markets are now held on Saturdays and alternate Tuesdays, and still belong to the lord of the manor.

MALTZAN, HEINRICH VON, Baron ztj Wartenbueg und Penzlin (1826-1874), German traveller, was born on the 6th of September 1826 near Dresden. He studied law at Heidel- berg, but on account of ill health spent much of his time from 1850 in travel. Succeeding to his father's property in 1852, he extended the range of his journeys to Morocco and other parts of Barbary, and before his return home in 1854 had also visited Egypt, Palestine and other countries of the Levant. In 1856-1857 he was again in Algeria; in 1858 he reached the city of Morocco ; and in i860 he succeeded in performing the pilgrimage to Mecca, which he afterwards described in Meine Wallfahrt nach Mecca (Leipzig, 1865), but had to flee for his life to Jidda without visiting Medina. He then visited Aden and Bombay, and after some two years of study in Europe again began to wander through the coasts and islands of the Mediterranean, repeatedly visiting Algeria. His first book of travel, Drei Jahre im N ordwesten von Afrika (Leipzig), appeared in 1863, and was followed by a variety of works and essays, popular and scientific. Maltzan's last book, Reise nach Siid- arabien (Brunswick, 1873), is chiefly valuable as a digest of much information about little-known parts of south Arabia collected from natives during a residence at Aden in 1870-1871. Among his other services to science must be noticed his collection of Punic inscriptions (Reise in Tunis und Tripolis, Leipzig, 1870), and the editing of Adolph von Wrede's remarkable journey in Hadramut (Reise in Hadramaut, &c, Brunswick, 1870). After long suffering from neuralgia, Maltzan died by his own hand at Pisa on the 23rd of February 1874.

MALUS, ETIENNE LOUIS (1775-1812), French physicist, was born at Paris on the 23rd of June 1775. He entered the military engineering school at Mezieres; but, being regarded as a suspected person, he was dismissed without receiving a commission, and obliged to enter the army as a private soldier. Being employed upon the fortifications of Dunkirk, he attracted the notice of the director of the works, and was selected as a member of the Ecole polytechnique then to be established under G. Monge. After three years at the Ecole he was admitted into the corps of engineers, and served in the army of the Sambre and Meuse; he was present at the passage of the Rhine in 1707, and at the affairs of Ukratz and Altenkirch. In 1 798 he joined the Egyptian expedition and remained in the East till 1801. On his return he held official posts successively at Antwerp, Strassburg and Paris, and devoted himself to optical research. A paper published in 1809 (" Sur une propriete de la lumiere reflechie par les corps diaphanes ") contained the discovery of the polarization of light by reflection, which is specially associated with his name, and in the following year he won a prize from the Institute with his memoir, " Theorie de la double refraction de la lumiere dans les substances cristallines." He died of phthisis in Paris on the 23rd of February 181 2.

Fig. 1. — Floral Diagram of Hollyhock (Althaea rosea). Stamens. 6, Bract.

Pistil of carpels. Epicalyx, formed from an in- volucre of bracteoles.

s, Sepals.

The large

MALVACEAE, in botany, an order of Dicotyledons belonging to the series Columniferae, to which belong also the orders Tili- aceae (containing Tilia, the lime-tree), Bombaceae (containing Adansonia, the baobab), Sterculiaceae (containing Theobroma, cocoa, and Colo, cola-nut). It contains 39 genera with about 300 species, and occurs in all regions except the coldest, the number of species increasing as we approach the tropics. It is repre- sented in Britain by three genera: Malva, mallow; Althaea, marsh-mallow; and Lavatera, tree-mallow. The plants are herbs, as in the British mallows, or, in the warmer parts of the earth, shrubs or trees. The leaves are alternate and often palmately lobed or divided; the stipules generally fall early. The leaves and young shoots often bear stellate hairs and the tissues contain mucilage-sacs. The regular, hermaphrodite, often showy flowers are borne in the leaf-axils, soli- tary or in fasicles, or form more or less complicated cymose arrangements. An epicalyx (see Mallow, figs. 3, 4), formed by a whorl of three or more bracteoles is generally present just beneath the calyx; sometimes, as in Abutilon, it is absent. The parts of the flowers are typically a in fives (fig. 1); the five sepals, g, which have a

valvate aestivation, i, are succeeded by five often large p showy petals which are twisted p ‘ in the bud; they are free to the base, where they are attached to the staminal tube and fall with it when the flower withers. The very numerous stamens are regarded as arising from the branching of a whorl of five opposite the petals ; they are united into a tube at the base, and bear kidney-shaped one-celled anthers which open by a slit across the top (fig. 2). spherical pollen-grains are cov- ered with spines. The carpels are one to numerous; when five in number, as in Abutilon, they are opposite the petals, or, as in Hibiscus, opposite the sepals. In the British genera and many others they are numerous, , forming a whorl round the top of the axis in the centre of the flower, the united styles rising from the centre and bearing a corresponding number of stig- matic branches. In Malope the numerous carpels are arranged one above the other in vertical rows. One or more anatropous ovules are attached to the inner angle of each carpel; they are generally ascending but sometimes pendulous or horizontal; the position may vary, as in Abutilon, in one and the same carpel.

The flowers are proterandrous; when the flower opens the unripe stigmas are hidden in the staminal tube and the anthers occupy the centre of the flower; as the anthers dehisce the fila- ments bend backwards and finally the ripe stigmas spread in the centre. Pollination is effected by insects which visit the flower for the honey, which is secreted in pits one between the base of each petal and is protected from rain by hairs on the lower margin of the petals. In small pale-flowered forms, like Malva rotundifolia, which attract few insects, self-pollination has been observed, the style-arms twisting to bring the stigmatic surfaces into contact with the anthers.

Except in Malvaviscus which has a berry, the fruits are dry. In Malva (see Mallow) and allied genera they form one-seeded schizocarps separating from the persistent central column and from each other. In Hibiscus and Gossypium (cotton-plant, q.v.), the fruit is a capsule splitting loculicidally. Distribution of the seeds is sometimes aided by hooked outgrowths on the wall of the schizocarp, or by a hairy covering on the seed, an extreme case of which is the cotton-plant where the seed is buried

B Fig. 2.

1, Anther.

2, Pollen grain of (Althaea rosea) The pollen grain bears numerous spines, the dark spots indicate thin places in the extine.

Hollyhock enlarged.

in a mass of long tangled hairs — the cotton. The embryo is generally large with much-folded cotyledons and a small amount of endosperm.

The largest genus, Hibiscus, contains 150 species, which are widely distributed chiefly in the tropics; H. rosasinensis is a well- known greenhouse plant. Abutilon (q.v.) contains 80 species, mainly tropical ; Lavatera, with 20 species, is chiefly Mediterranean ; Althaea has about 15 species in temperate and warm regions, A. rosea being the hollyhock (q.v.); Malva has about 30 species in the north-temperate zone. Several genera are largely or exclusively American.

MALVASIA (Gr. Monemvasia, i.e. the " city of the single approach or entrance "; Ital. Napoli di Malvasia; Turk. Mengeshe or Beneshe), one of the principal fortresses and com- mercial centres of the Levant during the middle ages, still represented by a considerable mass of ruins and a town of about 550 inhabitants. It stood on the east coast of the Morea, con- tiguous to the site of the ancient Epidaurus Limera, of which it took the place. So extensive was its trade in wine that the name of the place became familiar throughout Europe as the distinctive appellation of a special kind — Ital. Malvasia; Span. Malvagia; Fr. Malvoisie; Eng. Malvesie or Malmsey. The wine was not of local growth, but came for the most part from Tenos and others of the Cyclades. *

As a fortress Malvasia played an important part in the struggles between Byzantium, Venice and Turkey. The Byzantine emperors considered it one of their most valuable posts in the Morea, and rewarded its inhabitants for their fidelity by unusual privileges. Phrantzes (Lib. IV. cap. xvi.) tells how the emperor Maurice made the city (previously dependent in ecclesiastical matters on Corinth) a metropolis or archbishop's see, and how Alexius Comnenus, and more especially Andronicus II. (Palaeologus) gave the Monembasiotes freedom from all sorts of exactions throughout the empire. It was captured after a three years' siege by Guillaume de Villehardouin in 1248, but the citizens retained their liberties and privileges, and the town was restored to the Byzantine emperors in 1262. After many changes, it placed itself under Venice from 1463 to 1540, when it was ceded to the Turks. In 1689 it Was the only town of the "Morea which held out against Morosini.and Cornaro his successor only succeeded in reducing it by famine. In 1715 it capitulated to the Turks, and on the failure of the insurrection of 1770 the leading families were scattered abroad. As the first fortress which fell into the hands of the Greeks in 182 1, it became in the following year the seat of the first national assembly.

See Curtius, Peloponnesos, ii. 293 and 328; Castellan, Lettres sur la Moree (1808), for a plan; Valiero, Hist, della guerra di Candia (Venice, 1679), for details as to the fortress; W. Miller in Journal of Hellenic Studies (1907).

MALVERN, an inland watering-place in the Bewdley parlia- mentary division of Worcestershire, England, 128.n1. W.N.W. from London by the Great Western railway, served also by a branch of the Midland railway from Ashchurch on the Bristol- Birmingham line. Pop. of urban districted), 16,449. It > s beautifully situated on the eastern slopes of the Malvern Hills, which rise abruptly from the flat valley of the Severn to a height of 1395 ft. in the Worcestershire Beacon. The district still bears the name of Malvern Chase, originally a Crown-land and forest, though it was granted to the earldom of Gloucester by Edward I. A ditch along the summit of the hills determined the ancient boundary. Becoming a notorious haunt of criminals, the tract was disafforested by Charles I., with the exception of a portion known as the King's Chase, part of which is included in the present common-land formed under the Malvern Hills Act of 1884. – ._

Malvern was in early times an important ecclesiastical settle- ment, but its modern fame rests on its fine situation, pure air, and chalybeate and bituminous springs. The open-air cure for consumptive patients is here extensively practised.

The name Malvern is collectively applied to a line of small towns and villages, extending along the foot of the hills for 5 m. The principal is Great Malvern, lying beneath the Worcester- shire Beacon. It has a joint station of the Great Western and Midland railways. Here was the Benedictine priory which arose in 1083 out of a hermitage endowed by Edward the Confessor. The priory church of SS. Mary and Michael is a fine cruciform Perpendicular building, with an ornate central tower, embodying the original Norman nave, and containing much early glass and

carved choir-stalls. The abbey gate and the refectory also remain. There are here several hydropathic establishments, and beautiful pleasure gardens. Malvern College, founded in 1862, is an important English public school. A museum is attached to it. Mineral waters are manufactured. At Malvern Wells, 2% m. S., are the principal medicinal springs, also the celebrated Holy Well, the water of which is of perfect purity. There are extensive fishponds and hatcheries; and golf-links. The Great Western railway has a station, and the Midland one at Hanley Road. Little Malvern lies at the foot of the Here- fordshire Beacon, which is crowned by a British camp, 15 m. S. of Malvern Wells. There was a Benedictine priory here, of which traces remain in the church. Malvern Link, i m. N.E. of Great

Malvern, of which it forms a suburb, has a station on the Great Western railway. West Malvern and North Malvern, named from their position relative to Great Malvern, are pleasant residential quarters on the higher slopes of the hills.

MALWA, an historic province of India, which has given its name to one of the political agencies into which Central India is divided. Strictly, the name is confined to the hilly table-land, bounded S. by the Vindhyan range, which drains N. into the river Chambal; but it has been extended to include the Nerbudda valley farther south. Its derivation is from the ancient tribe of Malavas about whom very little is known, except that they founded the Vikrama Samvat, an era dating from 57 B.C., which is popularly associated with a mythical king Vikramaditya. The earliest name of the tract seems to have been Avanti, from its capital the modern Ujjain. The position of the Malwa or Moholo mentioned by Hsuan Tsang (7th century) is plausibly assigned to Gujarat. The first records of a local dynasty are those of the Paramaras, a famous Rajput clan, who ruled for about four centuries(8oo-i2oo), with their capital at Ujjain and after- wards at Dhar. The Mahommedans invaded Malwa in 1235; and in 1401 Dilawar Khan Ghori founded an independent king- dom, which lasted till 1531. The greatest ruler of this dynasty was Hoshang Shah (1405-1435) , who made Mandu (q.v.) his capital and embellished it with magnificent buildings. In 1562 Malwa was annexed to the Mogul empire by Akbar. On the break-up of that empire, Malwa was one of the first provinces to be con- quered by the Mahrattas. About 1743 the Mahratta peshwa obtained from Delhi the title of governor, and deputed his authority to three of his generals — Sindhia of Gwalior, Holkar of Indore, and the Ponwar of Dhar who claims descent from the ancient Paramaras. At the end of the 18th century Malwa became a cockpit for fighting between the rival Mahratta powers, and the headquarters of the Pindaris or irregular plunderers. The Pindaris were extirpated by the campaign of Lord Hastings in 1 81 7, and the country was reduced to order by the energetic rule of Sir John Malcolm. Malwa is traditionally the land of plenty, in which sufferers from famine in the neighbouring tracts always take refuge. But in 1899-1900 it was itself visited by a severe drought, which seriously diminished the population, and has since been followed by plague. The most valuable product is opium.

The Malwa agency has an area of 8919 sq. m. with a popula- tion (1901) of 1,054,753. It comprises the states of Dewas (senior and junior branch), Jaora, Ratlam, Sitamau and Sailana, to- gether with a large portion of Gwalior, parts of Indore and Tonk, and about 35 petty estates and holdings. The headquarters of the political agent are at Nimach.

Malwa is also the name of a large tract in the Punjab, south of the river Sutlej, which is one of the two chief homes of the Sikhs, the other being

known as Manjha. It includes the British districts of Ferozpore and Ludhiana, together with the native states of Patiala, Jind, Nabha and Maler Kotla.

See J. Malcolm, Central India (1823) ; C. E. Luard, Bibliography of Central India (1908), and The Paramars of Dhar and Malwa (1908).

MAMARONECK, a township of Westchester county, New York, U.S.A., on Long Island Sound, about 20 m. N.E. of New York City and a short distance N.E. of New Rochelle. Pop. (1890), 2385; (1900) 3849; (1905) 5655; (1910)

5602. Mamaroneck is served by the New York, New Haven & Hartford railway. The township includes the village of Larchmont (pop. in 1010, 1958), incorporated in 1891, and part of the village of Mamaroneck (pop. in 1910, including the part in Rye township, 5699), incorporated in 1895. Larchmont is the headquarters of the Larchmont Yacht Club. The site of Mamaroneck township was bought in 1660 from the Indians by John Richbell, an Englishman, who obtained an English patent to the tract in 1668. The first settlement was made by relatives of his on the site of Mamaroneck village in 1676, and the township was erected in 1788. On the 28th of August 1776, near Mamaro- neck, a force of American militiamen under Capt. John Flood attacked a body of Loyalist recruits under William Lounsbury, killing the latter and taking several prisoners. Soon afterwards Mamaroneck was occupied by the Queen's Rangers under Colonel Robert Rogers. On the night of the 21st of October an attempt of a force of Americans under Colonel John Haslet to surprise the Rangers failed, and the Americans, after a hand- to-hand fight, withdrew with 36 prisoners. Mamaroneck was the home of John Peter DeLancey (1753-1828), a Loyalist soldier in the War of Independence, and was the birthplace of his son William Heathcote DeLancey (1797-1865), a well-known Protestant Episcopal clergyman, provost of the University of Pennsylvania in 182 7-1 83 2 and bishop of western New York from 1839 until his death. James Fenimore Cooper, the novelist, married (1811) a daughter of John Peter DeLancey; lived in Mamaroneck for several years, and here wrote his first novel, Precaution, and planned The Spy.

MAMELI, GOFFREDO (1827-1849), Italian poet and patriot, was born at Genoa of a noble Sardinian family. He received a sound classical education at the Scolopi College, and later studied law and philosophy at the university of Genoa. When nineteen years old he corresponded with

Mazzini, to whom he became whole-heartedly devoted; among other patriotic poems he wrote a hymn to the Bandiera brothers, and in the autumn of 1847 a song called " Fratelli d'ltalia," which as Carducci wrote, " resounded through every district and on every battlefield of the peninsula in 1848 and 1849." Mameli served in the National Guard at Genoa, and then joined the volunteers in the Lombard campaign of 1848, but after the collapse of the movement in Lombardy he went to Rome, where the jrepublic was proclaimed and whence he sent the famous despatch to Mazzini: "Roma! Repubblica! Venite! " At first he wrote political articles in the newspapers, but when the French army approached the city with hostile intentions he joined the fighting ranks and soon won Garibaldi's esteem by his bravery. Although wounded in the engagement of the 30th of April, he at once resumed his place in the ranks, but on the 3rd of June he was again wounded much more severely, and died in the Pellegrini hospital on the 6th of July 1849. Besides the poems mentioned above, he wrote hymns to Dante, to the Apostles, " Dio e popolo," &c. The chief merit of his work lies in the spontaneity and enthusiasm for the Italian cause which rendered it famous, in spite of certain technical imperfections, and he well deserved the epithet of " The Tyrtaeus of the Italian revolution."

See A. G. Barrili, " G. Mameli nella vita e nell' arte," in Nuova Antologia (June I, 1902); the same writer's edition of the Scritti edili ed inediti di G. Mameli (Genoa, 1902); Countess Martinengo Cesaresco, Italian Characters (London, 1901); A. Luzio, Profili Biografici (Milan, 1906); G. Trevelyan, Garibaldi's Defence of the Roman Republic (London, 1907).

MAMELUKE (anglicized through the French, from the Arabic mamluk, a slave), the name given to a series of Egyptian sultans, originating (1250) in the usurpation of supreme power by the bodyguard of Turkish slaves first formed in Egypt under the successors of Saladin. See Egypt: History (Moslem period).

MAMERTINI, or " children of Mars," the name taken by a band of Campanian (or Samnite) freebooters who about 289 B.C. seized the Greek colony of Messana at the north- east corner of Sicily, after having been hired by Agathocles to defend it (Polyb. 1. 7. 2). The adventure is explained by tradition (e.g. Festus 158, Miiller) as. the outcome of a ver sacrum; the members of the expedition are said to have

been the male children born in a particular spring of which the produce had been vowed to Apollo (cf. Samnites), and to have settled first in Sicily near Tauromenium. An inscription survives (R. S. Conway, Italic Dialects, 1) which shows that they took with them the Oscan language as it was spoken in Capua or Nola at that date, and the constitution usual in Italic towns of a free community (touta=) governed by two annual magistrates

(meddices). The inscription dedicated some large building (possibly a fortification) to Apollo, which so far confirms the tradition just noticed. Though in the Oscan language, the inscription is written in the Greek alphabet common to south Italy from the 4th century B.C. onwards, viz. the Tarentine Ionic, and so are the legends of two coins of much the same date as the inscription (Conway, ib. 4). From 282 onwards (B. V. Head, Historia numorum, 136) the legend itself is Graecized (MAMEPTINON, instead of MAAMEPTINOTM) which shows how quickly here, as everywhere, " Graecia capta ferum victorem cepit." On the Roman conquest of Sicily the town secured an independence under treaty (Cicero, Verr. 3. 6. 13). The inhabitants were still called Mamertines in the time of Strabo (vi. 2. 3).

See further Mommsen, C.I.L. x. sub loc, and the references already given. (R. S. C.)

MAMERTINUS, CLAUDIUS (4th century a.d.), one of the Latin panegyrists. After the death of Julian, by whom he was evidently regarded with special favour, he was praefect of Italy (36s) under Valens and Valentinian, but was subsequently (368) deprived of his office for embezzlement. He was the author of an extant speech of thanks to Julian for raising him to the consulship, delivered on the 1st of January 362 at Constan- tinople. Two panegyrical addresses (also extant) to Maximian (emperor a.d. 286-305) are attributed to an older magister Mamertinus, but it is probable that the corrupt MS. super- scription contains the word memoriae, and that they are by an unknown magister memoriae (an official whose duty consisted in communicating imperial rescripts and decisions to the public). The first of these was delivered on the birthday of Rome (April 21, 289), probably at Maximian's palace at Augusta Trevirorum (Treves), the second in 290 or 291, on the birthday of the emperor. By some they are attributed to Eumenius (q.v.) who was a magister memoriae and the author of at least one (if not more) panegyrics.

The three speeches will be found in E. Bahrens, Panegyrici latini (1874); see also Teuffel-Schwabe, Hist, of Roman Literature (Eng trans.), § 417, 7.

MAMIANI DELLA ROVERE, TERENZIO, Count (1802- 1885), Italian writer and statesman, was born at Pesaro in 1799. Taking part in the outbreaks at Bologna arising out of the accession of Pope Gregory XVI., he was elected deputy for Pesaro to the assembly, and subsequently appointed minister of the interior; but on the collapse of the revolutionary move- ment he was exiled. He returned to Italy after the amnesty of 1846, and in 1848 he was entrusted with the task of forming a ministry. He remained prime minister, how- ever, only for a few months, his political views being anything but in harmony with those of the pope. He subsequently retired to

Genoa where he worked for Italian unity, was elected deputy in 1856, and in i860 became minister of education under Cavour. In 1863 he was made minister to Greece, and in 1865 to Switzerland, and later senator and councillor of state. Meanwhile, he had founded at Genoa in 1849 the Academy of Philosophy, and in 1855 had been appointed professor of the history of philosophy at Turin; and he published several volumes, not only on philosophical and social subjects, but of poetry, among them Rinnovamente delta filosofia antica italiana (1836), Teoria delta Religione e dello stato (1869), Kant e t'ontologia (1879), Religione dell' avenire (1880), Di un nuovo diritto europeo (1843, 1857). He died at Rome on fhe 21st of May, 1885.

See Indice delle opere di Terenzio Mamiani (Pesaro, 1887); Gaspare, Vita di Terenzio Mamiani (Ancona, 1887); Barzellotti, Studii e ritratti (Bologna, 1893).

MAMMALIA (from Lat. mamma, a teat or breast), the name proposed by the Swedish naturalist Linnaeus for one of the classes, or primary divisions, of vertebrated animals, the members of which are collectively characterized by the presence in the females of special glands secreting milk for the nourishment of the young. With the exception of the lowest group, such glands always communicate with the exterior by means of the teats, nipples or mammae, from which the class derives its name. The class-name (modified by the French into Mammi- feres, and replaced in German by the practically equivalent term Sdugethiere) has been anglicized into " Mammals " (mam- mal, in the singular). Of recent years, and more especially in America, it has become a custom to designate the study of mammals by the term " mammalogy." Etymologically, how- ever, that designation cannot be justified; for it is of hybrid (Latin and Greek) origin, and is equivalent to " mastology," the science which deals with the mammary gland (Gr. jucwtos, woman's breast), a totally different signification. As regards existing forms of life, the limitations of the class are perfectly well defined and easy of recognition; for although certain groups (not, by the way, whales, which, although excluded in popular estimation from the class, are in all essential respects typical mammals) are exceedingly aberrant, and present structural features connecting them with the lower vertebrate classes, yet they are by common consent retained in the class to which they are obviously most nearly affiliated by their preponderating characteristics. There is thus at the present day a great interval, unbridged by any connecting links, between mammals and the other classes of vertebrates.

Not so, however, when the extinct forms of vertebrate life are taken into consideration, for there is a group of reptiles from the early part of the Secondary, or Mesozoic period, some of whose members must have been so intimately related to mammals that, were the whole group fully known, it would clearly be impossible to draw a distinction between Mammalia on the one hand and Reptilia on the other. Indeed, as it is, we are already partially acquainted with one of these early intermediate creatures (Tritylodon) , which forms a kind of zoological shuttle- cock, being, so to speak, hit from one group to another, and back again, by the various zoologists by whom its scanty remains have been studied. Considered collectively, mammals, which did not make their appearance on the earth for some time after reptiles had existed, are certainly the highest group of the whole vertebrate sub-kingdom. This expression must not, however, be considered in too restricted a sense. In mammals, as in other classes, there are low as well as high forms; but by any tests that can be applied, especially those based on the state of development of the central nervous system, it will be seen that the average exceeds that of any other class, that many species of this class far excel those of any other in perfection of structure, and that it contains one form which is unques- tionably the culminating point amongst organized beings.

Mammals, then, are vertebrated animals, possessing the normal characteristics of the members of that primary division of the animal kingdom. They are separated from fishes and batrachians (Pisces and Batrachians) on the one hand, and agree with reptiles, and birds (Reptilia and Aves) on the other, in the possession during intra-uterine life of the membranous vascular structures respectively known as the amnion and the allantois, and likewise in the absence at this or any other period of external gills. A four-chambered heart, with a complete double circu- lation, and warm blood (less markedly so in the lowest group than in the rest of the class) , distinguish mammals from existing reptiles, although not from birds. From both birds and reptiles the class is distinguished, so far at any rate as existing forms are concerned, by the following features: the absence of a nucleus in the red corpuscles of the blood, which are nearly always circular in outline; the free suspension of the lungs in a thoracic cavity, separated from the abdominal cavity by a muscular partition, or diaphragm, which is the chief agent in inflating the lungs in respiration; the aorta, or main artery, forming but a single arch after leaving the heart, which curves over the left

terminal division of the windpipe, or bronchus; the presence of more or fewer hairs on the skin and the absence of feathers; the greater development of the bridge, or commissure, connecting the two halves of the brain, which usually forms a complete corpus callosum, or displays an unusually large size of its anterior portion; the presence of a fully

developed larynx at the upper end of the trachea or windpipe, accompanied by the absence of a syrinx, or expansion, near the lower end of the same; the circumstance that each half of the lower jaw (except perhaps at a very early stage of development) consists of a single piece articulating posteriorly with the squamosal element of the skull without the intervention of a separate quadrate bone; the absence of prefrontal bones in the skull; the presence of a pair of lateral knobs, or condyles (in place of a single median one), on the occipital aspect of the skull for articulation with the first vertebra; and, lastly, the very obvious character of the female being provided with milk-glands, by the secretion of which the young (produced, except in the very lowest group, alive and not by means of externally hatched eggs) are nourished for some time after birth.

In the majority of mammals both pairs of limbs are well developed and adapted for walking or running. The fore-lirribs may, however, be modified, as in moles, for burrowing, or, as in bats, for flight, or finally, as in whales and dolphins, for swim- ming, with the assumption in this latter instance of a flipper-like form and the complete disappearance of the hind-limbs. Special ‘ adaptations for climbing are exhibited by both pairs of limbs in opossums, and for hanging to boughs in sloths. In no instance are the fore-limbs wanting.

In the great majority of mammals the hind extremity of the axis of the body is prolonged into a tail. Very generally the tail has distinctly the appearance of an appendage, but in some of the lower mammals, such as the thylacine among marsupials, and the aard-vark or ant-bear among the edentates, it is much thickened at the root, and passes insensibly into the body, after the fashion common among reptiles. As regards function, the tail may be a mere pendent appendage, or may be adapted to grasp boughs in climbing, or even to collect food or materials for a nest or sleeping place, as in the spider-monkeys, opossums and rat-kangaroos. Among jumping animals it may serve as a balance, as in the case of jerboas and kangaroos, while in the latter it is also used as a support when resting; among many hoofed mammals it is used as a fly-whisk; and in whales and dolphins, as well as in the African Potamogale and the North American musquash, it plays an important part in swimming. Its supposed use as a trowel by the beaver is, however, not supported by the actual facts of the case.

As already indicated, the limbs of different mammals are specially modified for various modes of life; and in many cases analogous modifications occur, in greater or less degree, through- out the entire body. Those modifications most noticeable in the case of cursorial types may be briefly mentioned as examples. In this case, as might be expected, the greatest modifications occur in the limbs, but correlated with this is also an elongation of the head and neck in long-legged types. Adaptation for speed

is further exhibited in the moulding of the shape of the body so as to present the minimum amount of resistance to the air, as well as in increase in heart and lung capacity to meet the extra expenditure of energy. Finally, in the jumping forms we meet with an increase in the length and weight of the tail, which has to act as a counterpoise. As regards the feet, a reduction in the number of digits from the typical five is a frequent feature, more especially among the hoofed mammals, where the culmination in this respect is attained by the existing members of the horse tribe and certain representatives of the extinct South American Proterotheriidae, both of which are monodactyle. Brief reference may also be made to the morphological importance of extraordinary length or shortness in the skulls of mammals — dolichocephalism and brachycephalism; both these features being apparently characteristic of specialized types, the former condition being (as in the horse) often, although not invariably, connected with length of limb and neck, and

adaptation to speed, while brachycephalism 'may be correlated with short limbs and an abbreviated neck. Exceptions to this rule, as exemplified by the cats, are due to special adaptive causes. In point of bodily size mammals present a greater range of variation than is exhibited by any other living terrestrial animals, the extremes in this respect being displayed by the African elephant on the one hand and certain species of shrew- mice (whose .head and body scarcely exceed an inch and a half in length) on the other. When the aquatic members of the class are taken into consideration, the maximum dimensions are vastly greater, Sibbald's rorqual attaining a length of fully 80 ft., and being probably the bulkiest and heaviest animal that has ever existed. Within the limits of individual groups, it may be accepted as a general rule that increase in bulk or stature implies increased specialization; and, further, that the largest representatives of any particular group are also approxi- mately the latest. The latter dictum must not, however, be pushed to an extreme, since the African elephant, which is the largest living land mammal, attaining in exceptional cases a height approaching 12 ft., was largely exceeded in this respect by an extinct Indian species, whose height has been estimated at between 15 and 16 ft.

In regard to sense-organs, ophthalmoscopic observations on the eyes of living mammals (other than man) have revealed the existence of great variation in the arrangement of the blood- vessels, as well as in the colour of the retina; blue and violet seem to be unknown, while red, yellow and green form the predominating shades. In the main, the various types of

minute ocular structure correspond very closely to the different groups into which mammals are divided, this correspondence affording important testimony in the favour of the general correctness of the classification. Among the exceptions are the South American squirrel-monkeys, whose eyes approximate in structure to those of the lemurs. Man and monkeys alone possess parallel and convergent vision of the two eyes, while a divergent, and consequently a very widely extended, vision is a prerogative of the lower mammals; squirrels, for instance, and probably also hares and rabbits, being able to see an object approaching them directly from behind without turning their heads.

An osteological question which has been much discussed is the fate of the reptilian quadrate bone in the mammalian skull. In the opinion of F. W. Thyng, who has carefully reviewed all the other theories, the balance of evidence tends to show that the quadrate has been taken up into the inner ear, where it is represented among the auditory ossicles by the incus.

Although the present article does not discuss mammalian osteology in general (for which see Vertebrata), it is interesting to notice in this connexion that the primitive condition of the mammalian tympanum apparently consisted merely of a small and incomplete bony ring, with, at most, an imperfect ventral wall to the tympanic cavity, and that a close approximation to this original condition still persists in the monotremes, especially Ornithorhynchus. The tympano-hyal is the characteristic mammalian element in this region; but the entotympanic likewise appears to be peculiar to the class, and to be unrepresented among the lower vertebrates. The tympanum itself has been regarded as representing one of the elements — probably the supra-angular — of the compound reptilian lower jaw. The presence of only seven vertebrae in the neck is a very constant feature among mammals; the exceptions being very few.

Two other points in connexion with mammalian osteology may be noticed. A large number of mammals possess a per- foration, or foramen, on the inner side of the lower end of the humerus, and also a projection on the shaft of the femur known as the third trochanter. From its occurrence in so many of the lower vertebrates, the entepicondylar foramen of the humerus, as it is called, is regarded by Dr E. Stromer as a primitive structure, of which the original object was to protect certain nerves and bloodvessels. It is remarkable that it should persist in the spectacled bear of the Andes, although it has disappeared in all other living members of the group. The third trochanter

of the femur, on the other hand, can scarcely be regarded as primitive, seeing that it is absent in several of the lower groups of mammals. Neither can its presence be attributed, as Professor A. Gaudry suggests, to the

reduction in the number of the toes, as otherwise it should not be found in the rhinoceros. Its general absence in man forbids the idea of its having any con- nexion with the upright posture.

Hair. — In the greater number of mammals the skin is more or less densely clothed with a peculiarly modified form of epidermis known as hair. This consists of hard, elongated, slender, cylindrical or tapering, thread-like masses of epidermic tissue, each of which grows, without branching, from a short prominence, or papilla, sunk at the bottom of a pit, or follicle, in the true skin, or dermis. Such hairs, either upon different parts of the skin of the same species, or in different species, assume very diverse forms and are of various sizes and degrees of rigidity — as seen in the fur of the mole, the bristles of the pig, and the spines of the hedgehog and porcupine, which are all modifications of the same structures. These differ- ences arise mainly from the different arrangement of the constituent elements into which the epidermal cells are modified. Each hair is composed usually of a cellular pithy internal portion, containing much air, and a denser or more horny external or cortical part. In some mammals, as deer, the substance of the hair is almost entirely composed of the central medullary or cellular substance, and is consequently very easily broken; in others the horny part prevails almost exclusively, as in the bristles of the wild boar. In the three-toed sloth (Bradypus) the hairs have a central horny axis and a pithy exterior. Though generally nearly smooth, or but slightly scaly, the surface of some hairs is imbricated ; that is to say, shows projecting scale-like processes, as in some bats, while in the two- toed sloth (Choloepus) they are longitudinally grooved or fluted. Though usually more or less cylindrical or circular in section, hairs are often elliptical or flattened, as in the curly-haired races of men, the terminal portion of the hair of moles and shrews, and conspicu- ously in the spines of the spiny squirrels of the genus Xerus and those of the mouse-like Plalacanthomys. Hair having a property of mutual cohesion or " felting," which depends upon a roughened scaly surface and a tendency to curl, as in domestic sheep, is called " wool."

It has been shown by J. C. H. de Meijere that the insertion of the individual hairs in the skin displays a definite arrangement, constant for each species, but varying in different groups. In jerboas, for example, a bunch of twelve or thirteen hairs springs from the same point, while in the polar bear a single stout hair and several slender ones arise together, and in the marmosets three equal-sized hairs form regular groups. These tufts or groups like- wise display an orderly and definite grouping in different mammals, which suggests the origin of such groups from the existence in primi- tive mammals of a scaly coat comparable to that of reptiles, and indeed directly inherited therefrom.

In a large proportion of mammals there exist hairs of two distinct types: the

one long, stiff, and alone appearing on the surface, and the other shorter, finer and softer, constituting the under-fur, which may be compared to the down of birds. A well-known example is furnished by the fur-bearing seals, in which the outer fur is removed in the manufacture of commercial " seal-skin," leaving only the soft and fine under-fur.

Remarkable differences in the direction or slope of the hair are noticeable on different parts. of the body and limbs of many mammals, especially in certain apes, where the hair of the fore-limbs is inclined towards the elbow from above and from below. More remarkable still is the fact that the direction of the slope often differs in closely allied groups, as, for instance, in African and Asiatic buffaloes, in which the hair of the middle line of the back has opposite directions. Whorls of hair, as on the face of the horse and the South American deer known as brockets, occur where the different hair-slopes meet. In this connexion reference may be made to patches or lines of long and generally white hairs situated on the back of certain ruminants, which are capable of erection during periods of excitement, and serve, apparently, as " flags " to guide the members of a herd in flight. Such are the white chrysanthemum-like patches on the rump of the Japanese deer and of the American prong-buck (Antilo- capra), and the line of hairs situated in a groove on. the loins of the African spring-buck. The white under-side of the tail of the rabbit and the yellow rump-patch of many deer are analogous.

The eye-lashes, or ciliae, are familiar examples of a special local development of hair. Special tufts of stout stiff hairs, sometimes termed vibrissae, and connected with nerves, and in certain cases with glands, occur in various regions. They are most common on the head, while they constitute the " whiskers," or " feelers," of the cats and many rodents. In other instances, notably in the lemurs, but also in certain carnivora, rodents and marsupials, they occupy a position on the fore-arm near the wrist, in connexion with glands, and receive sensory powers from the radial nerve. In some mammals the hairy covering is partial and limited to particular regions; in others, as the hippopotamus and the sea-cows, or Sirenia, though scattered over the whole surface, it is extremely short and scanty;

but in none is it reduced to so great an extent as in the Cetacea, in which it is limited to a few small bristles confined to the neighbour- hood of the lips and nostrils, and often present only in the young, or even the foetal condition.

Some kinds of hairs, as those of the mane and tail of the horse, persist throughout life, but more generally, as in the case of the body-hair of the same animal, they are shed and renewed periodi- cally, generally annually. Many mammals have a longer hairy coat in winter, which is shed as summer conies on; and some few, which inhabit countries covered in winter with snow, as the Arctic fox, variable hare and ermine, undergo a complete change of colour in the two seasons, being white in winter and grey or brown in summer. There has been much discussion as to whether this winter whitening is due to a change in the colour of the individual hairs or to a change of coat. It has, however, been demonstrated that the senile whitening of human hair is due to the presence of phagocytes, which devour the pigment-bodies; and from microscopic observations recently made by the French naturalist Dr E. Trouessart, it appears that much the same kind of action takes place in the hairs of mammals that turn white in winter. Cold, by some means or other, causes the pigment-bodies to shift from the normal positions, and to transfer themselves to other layers of the hair, where they are attacked and devoured by phagocytes. The winter whitening of mammals is, therefore, precisely similar to the senile bleaching of human hair, no shift of the coat taking place. Under the influ- ence of exposure to intense cold a small mammal has been observed to turn white in a single night, just as the human hair has been known to blanch suddenly under the influence of intense emotion, and in both cases extreme activity of the phagocytes is apparently the inducing cause. The African golden-moles (Chrysochloris), the desmans or water-moles (Myogale), and the West African Potamogale velox, are remarkable as being the only mammals whose hair reflects those iridescent tints so common in the feathers of tropical birds.

The principal and most obvious purpose of the hairy covering is to protect the skin. Its function in the hairless Cetacea is dis- charged by the specially modified and thickened layer of fatty tissue beneath the skin known as " blubber."

Scales, &c. — True scales, or flat imbricated plates of horny material, covering the greater part of the body, are found in one family only of mammals, the pangolins or Manidae; but these are also, associated with hairs growing from the intervals between the scales or on the parts of the skin not covered by them. Similarly imbricated epidermic productions form the covering of the under- surl'ace of the tail of the African flying rodents of the family Anoma- luridae ; and flat scutes, with the edges in apposition, and not over- laid, clothe both surfaces of the tail of the beaver, rats and certain other members of the rodent order, and also of some insectivora and marsupials. Armadillos alone possess an external bony skeleton, composed of plates of bony tissue, developed in the skin and covered with scutes of horny epidermis.' Other epidermic appendages are the horns of

ruminants and rhinoceroses — the former being elongated, tapering, hollow caps of hardened epidermis of fibrous structure, fitting on and growing from conical projections of the frontal bones and always arranged in pairs, while the latter are of similar structure, but without any internal bony support, and situated in the middle line. Callosities, or bare patches covered with hardened and thickened epidermis, are found on the buttocks of many apes, the breast of camels, the inner side of the limbs of Equidae, the grasping under-surface of the tail of prehensile-tailed monkeys, opossums, &c. The greater part of the skin of the one- horned Asiatic rhinoceros is immensely thickened and stiffened by an increase of the tissue of both the skin and epidermis, constituting the well-known jointed " armour-plated " hide of those animals.

Nails, Claws and Hoofs. — With few exceptions, the terminal extremities of the digits of both limbs of mammals are more or less protected or armed by epidermic plates or sheaths, constituting the various forms of nails, claws or hoofs. These are absent in the Cetacea alone. A perforated spur, with a special secreting gland in connexion with it, is found attached to each hind-leg of the males of the existing species of Monotremata.

Scent-glands, &c. — Besides the universally distributed sweat- glands connected with the hair-system, most mammals have special glands in modified portions of the skin, often involuted to form a shallow recess or a deep sac with a narrow opening, situated in various parts of the surface of the body, and secreting odorous substances, by the aid of which individuals recognize one another. These probably afford the principal means by which wild animals are able to become aware of the presence of other members of the species, even at great distances.

To this group of structures belong the suborbital face-gland, " larmier," or " crumen," of antelopes and deer, the. frontal gland of the muntjak and of bats of the genus Phyllorhina, the chin- gland of the chevrotains and of Taphozous and certain other bats, the glandular patch behind the ear of the chamois and the reed- buck, the glands on the lower parts of the legs of most deer and a few antelopes (the position of which is indicated by tufts of long and often specially coloured hair), the interdigital foot-glands of goats, sheep, and many other ruminants, the temporal gland of elephants, the lateral glands of the musk-shrew, the gland on the

back of the hyrax and the peccary (from the presence of which the latter animal takes the name Dicotyles), the gland on the tails of the members of the dog-tribe, the preputial glands of the musk- deer and beaver (both well known for the use made of their power- fully odorous secretion in perfumery), and also of the swine and hare, the anal glands of Carnivora, the perineal gland of the civet (also of commercial value), the caudal

glands of the fox and goat, the gland on the wing-membrane of bats of the genus Saccopteryx, the post-digital gland of the rhinoceros, &c. Very generally these glands are common to both sexes, and it is in such cases that their function as a means of mutual recognition is most evident. It has been suggested that the above-mentioned callosities or " chestnuts " on the limbs of horses are vestigial scent-glands ; and it is note- worthy that scrapings or shavings from their surface have a powerful attraction for other horses, and are also used by poachers and burglars to keep dogs silent. The position of such glands on the lower portions of the limbs is plainly favourable to a recognition- taint being left in the tracks of terrestrial animals; and antelopes have been observed deliberately to rub the secretion from their face-glands on tree-trunks. When glands are confined to the male, their function is no doubt sexual ; the secretion forming part of the attraction, or stimulus, to the other sex.

Dentition. — In the great majority of mammals the teeth form a definite series, of which the hinder elements are of a more or less complex type, while those in front are simpler. With the exception of the marsupials, a set of deciduous, or milk, teeth is developed in

Fig. i.— Upper and Lower Teeth of one side of the Mouth of a Dolphin (Lagenorhync'hus) , as an example of the homoeodont type of dentition. The bone covering the outer side of the roots of the teeth has been removed to show their simple character.

most mammals with a complicated type of dentition; these milk- teeth being shed at a comparatively early period (occasionally even in liter o), when they are succeeded by the larger permanent series, which is the only other ever developed. This double series of teeth thus forms a very characteristic feature of mammals generally. Both the milk and the permanent dentition display the aforesaid complexity of the hinder teeth as compared with those in front, and since the number of milk-teeth is always considerably less than that of the permanent set, it follows that the hinder milk- teeth are usually more complex than the teeth of which they are the predecessors in the permanent series, and represent functionally, not their immediate successors, but those more posterior permanent teeth which have no direct predecessors. This character is clearly seen in those animals in which the various members of the lateral or cheek series are well differentiated from each other in form, as the Carnivora, and also in man.

In mammals with two sets of teeth the number of those of the permanent series preceded by milk-teeth varies greatly, being sometimes, as in marsupials and some rodents, as few as one on each side of each jaw, and in other cases including the larger portion of the series. As a rule, the teeth of the two sides of the jaws are alike in number and character, except in

cases of accidental or abnormal variation, and in the tusks of the narwhal, in which the left is of immense size, and the right rudimentary. In mammals, such as dolphins and some armadillos, which have a large series of similar teeth, not always constant in number in different individuals, there may indeed be differences in the two sides; but, apart from these in describing the dentition of any mammal, it is generally sufficient to give the number and characters of the teeth of one side only. As the teeth of the upper and the lower jaws work against each other in masticating, there is a general correspondence or harmony between them, the projections of one series, when the' mouth is closed, fitting into corresponding depressions of the other. There is also a general resemblance in the number, characters and mode of succession of both series; so that, although _ individual teeth of the upper and lower jaws may not be in the strict sense of the term homologous parts, there is a great convenience in applying the same descriptive terms to the one which are used for the other.

The simplest dentition is that of many species of dolphin (fig. i), in which the crowns are single-pointed, slightly curved cones, and the roots also single and tapering ; so that all the teeth are alike in form from the anterior to the posterior end of the series, though it may be with some slight difference in size, those at the two ex- tremities being rather smaller than the others. Such a dentition is called " homoeodont " (Gr. Sfioios, like, 65obs, tooth), and in the case cited, as the teeth are never changed, it is also monophyodont (Gr. fiivoi, alone, single, <$>vav, to generate, 68ofc, tooth). Such teeth are adapted only for catching slippery living prey, like fish.

In a very large number of mammals the teeth of different parts of the series are more or less differentiated in character; and, accord- ingly, have different functions to perform. The front teeth are simple and one-rooted, and are adapted for cutting and seizing. They are called " incisors." The back, lateral or cheek teeth, on the other hand, have broader and more complex crowns, tuber- culated or ridged, and supported on two or more roots. They crush or grind the food, and are hence called " molars." Many mammals have, between these two sets, a tooth at each corner of the mouth, longer and more pointed than the others, adapted for tearing or stabbing, or for fixing struggling prey. From the con- spicuous development of such teeth in the Carnivora, especially the dogs, they have received the name of " canines." A dentition with its component parts so differently formed that these distinctive terms are applicable to them is called heterodont (Gr. irtpos, different). In most cases, though by no means

invariably, mammals with a heterodont dentition are also diphyodont (Gr. Sivf)s, of double form).

This general arrangement is obvious in a considerable number of mammals; and examination shows that, under great modifications in detail, there is a remarkable uniformity of essential characters in the dentition of a large number of members of the class belonging to different orders and not otherwise closely allied, so much that it

e I

*4LL y *M f*

da

vutnA

.

JL

M|.».3

dm.\ elms. 3/m.s

/>■' p. >3 >.* Mmi mZ m3*

'TO.1

Fig. 2. — Milk and Permanent Dentitions of Upper (I.) and Lower (II.) Jaws of the Dog (Canis), with the symbols by which the different teeth are designated. The third upper molar {m 3) is the only tooth wanting to complete the typical heterodont mammalian dentition.

is possible to formulate a common plan of dentition from which the others have been derived by the alteration of some and the suppres- sion of other members of the series, and occasionally, but very rarely, by addition. In this generalized form of mammalian dentition the total number of teeth present is 44, or 11 above and 1 1 below on each side. Those of each jaw are placed in continuous series without intervals between them; and, although the anterior teeth are simple and single-rooted, and the posterior teeth complex and with several roots, the transition between the two kinds is gradual.

In dividing and grouping such teeth for the purpose of description and comparison more definite characters are required than those derived merely from form or function. The first step towards a classification rests

on the fact that the upper jaw is composed of two bones, the premaxilla and the maxilla, and that the division or suture between these bones separates the three front teeth from the rest. These three teeth, which are implanted in the premaxilla, form a distinct group, to which the name of " incisor " is applied. This distinction is, however, not so important as it appears at first sight, for their connexion with the bone is only of a secondary nature, and, although it happens conveniently that in the great majority of cases the division between the bones coincides with the inter-space between the third and fourth tooth of the series, still, when it does not, as in the mole, too much weight must not be given to this fact, if it contravenes other reasons for determining the homo- logies of the teeth. The eight remaining teeth of the upper jaw offer a natural division, inasmuch as the three hindmost never have milk-predecessors; and, although some of the anterior teeth may be in the same case, the particular one preceding these three always has such a predecessor. These three, then, are grouped as the '" molars." Of the five teeth between the incisors and molars the

most anterior, or the one usually situated close behind the pre- maxillary suture, very generally assumes a lengthened and pointed form, and constitutes the " canine " of the Carnivora, the tusk of the boar, &c. It is customary, therefore, to call this tooth, what- ever its size or form, the " canine." The remaining four are the " premolars." This system has been objected to as artificial, and in many cases not descriptive, the distinction between premolars and canine especially being sometimes not obvious ; but the terms are now in such general use, and also so convenient, that it is not likely they will be superseded. It is frequently convenient to refer to all the teeth behind the canine as the " cheek-teeth."

With regard to the lower teeth the difficulties are greater, owing to the absence of any suture corresponding to that which defines the incisors above ; but since the number of the teeth is the same, since the corresponding teeth are preceded by milk-teeth, and since in the large majority of cases it is the fourth tooth of the series which is modified in the same way as the canine (or fourth tooth) of the upper jaw, it is reasonable to adopt the same divisions as with the upper series, and to call the first three, which are implanted in the part of the mandible opposite to the premaxilla, the incisors, the next the canine, the next four the premolars, and the last three the molars.

It may be observed that when the mouth is closed, especially when the opposed surfaces of the teeth present an irregular outline, the corresponding upper and lower teeth are not exactly opposite, otherwise the two series could not fit into one another, but as a rule the points of the lower teeth shut into the interspaces in front of the corresponding teeth of the upper

jaw. This is very distinct in the canine teeth of the Carnivora, and is a useful guide in determining the homologies of the teeth of the two jaws.

For the sake of brevity the complete dentition is described by the following formula, the numbers above the line representing the teeth of the upper, those below the line those of the lower jaw: incisors

jt|, canines ˆ, premolars jEj, molars, i~ = lirjlj; total 44. As,

however, initial letters may be substituted for the names of each group, and it is unnecessary to give more than the numbers of the teeth on one side of the mouth, the formula may be abbreviated into : il,c{,pi,m§; total 44. The individual teeth of each group are enumerated from before backwards, and by such a formula as the following : —

i 1, i 2, i 3, c, p 1, p 2, p 3, p 4, m 1, m 2, m 3 i 1, i 2, i 3, c, p 1, p 2, p 3, p 4, m 1, m 2, m 3 a special numerical designation is given by which each one can be indicated. In mentioning any single tooth, such a sign as ˆ} will mean the first upper molar, ˆ1 the first lower molar, and so on. When, as is the case among nearly all existing mammals with the exception of the members of the genera Sus (pigs), Gymnura (rat- shrew), Talpa (moles) and Myogale (desmans) the number of teeth is reduced below the typical forty-four, it appears to be an almost universal rule that if one of the incisors is missing it is the second, or middle one, while the premolars commence to disappear from the front end of the series and the molars from the hinder end.

The milk-dentition is expressed by a similar formula, d for decidu- ous, being added before the letter expressive of the nature of the tooth. As the three molars and (almost invariably) the first pre- molar of the permanent series have no predecessors, the typical milk-dentition would be expressed as follows: di J, dc {, dm f =28. The teeth which precede the premolars of the permanent series are called either milk-molar or milk-premolar. When there is a marked difference between the premolars and molars of the permanent dentition, the first milk-molar resembles a premolar, while the last has the characters of the posterior molar. It is sometimes convenient to refer to all the seven cheek-teeth as members of a single continuous series (which they undoubtedly are), and for this purpose the follow- ing nomenclature has been proposed : —

Upper Jaw. Lower Jaw. Cheek-tooth I Protus. Protid.

,, 2 Deuterus. Deuterid.

,, 3 Tritus. Tritid.

,, 4 Tetartus. Tetartid.

,, 5 Pemptus. Pemptid.

,, 6 Hectus. Hectid.

,, 7 …. Hebdomus. Hebdomid.

With the exception of the Cetacea, most of the Edentata, and the Sirenia, in which the teeth, when present, have been specialized in a retrograde or aberrant manner, the placental mammals as a whole have a dentition conforming more or less closely to the foregoing type.

With the marsupials the case is, however, somewhat different; the whole number not being limited to 44, owing largely to the fact that the number of upper incisors may exceed three pairs, reaching indeed in some instances to as many as five. Moreover, with the exception of the wombats, the number of pairs of incisors in the upper always exceeds those in the lower. When fully developed, the number of cheek-teeth is, however, seven ; and it is probable that, as in placentals, the first four of these are premolars and the remaining three molars, although it was long held that these numbers should

be transposed. The most remarkable feature about the marsupial dentition is that, at most, only a single pair of teeth is replaced in each jaw ; this pair, on the assumption that there are four premolars, representing the third of that series. With the exception of this replacing pair of teeth in each jaw, it is considered by many authori- ties that the marsupial dentition corresponds to the deciduous, or milk, dentition of placentals. If this be really the case, the rudi- ments of an earlier set of teeth which have been detected in the jaws of some members of the order, represent, not the milk-series, but a prelacteal dentition. On the assumption that these functional teeth correspond to the milk-series of placentals, marsupials in this respect agree exactly with modern elephants, in which the same peculiarity exists.

In very few mammals are teeth entirely absent. Even in the whalebone whales their germs are formed in the same manner and at the same period of life as in other mammals, and even become partially calcified, although they never rise above the gums, and com- pletely disappear before birth. In the American anteaters and the pangolins among the Edentata no traces of teeth have been found at any age. Adult monotremes are in like case,

although the duck- billed platypus (Ornithorhynchus) has teeth when young on the sides of the jaws. The northern sea-cow (Rhytina), now extinct, appears to have been toothless throughout life.

In different groups of mammals the dentition is variously special- ized in accordance with the nature of the food on which the members of these groups subsist. From this point of view the various adap- tive modifications of mammalian dentition may be roughly grouped under the headings of piscivorous, carnivorous, insectivorous, omnivorous and herbivorous.

The fish-eating, or piscivorous, type of dentition is exemplified under two phases in the dolphins and in the seals (being in the latter instance a kind of retrograde modification from the carnivorous type). In the dolphins, and in a somewhat less marked degree among the seals, this type of dentition consists of an extensive series of conical, nearly equal-sized, sharp-pointed teeth, implanted in an elongated, and rather narrow mouth (fig. i), and adapted to seize slippery prey without either tearing or masticating. In the dolphins the teeth form simple cones, but in the seals they are often trident-like; while in the otters the dentition differs but little from the ordinary carnivorous type.

This carnivorous adaptation, in which the function is to hold and kill struggling animals, often of large size, attains its highest develop- ment in the cats (Felidae). The canines are in consequence greatly developed, of a cutting and piercing type, and from their wide separa- tion in the mouth give a firm hold; the jaws being as short as is consistent with the free action of the canines, or tusks, so that no power is lost. The incisors are small, so as not to interfere with the penetrating action of the tusks ; and the crowns of some of the teeth of the cheek-series are modified into scissor-like blades, in order to rasp off the flesh from the bones, or to crack the bones themselves, while the later teeth of this series tend to disappear.

In the insectivorous type, as exemplified in moles and shrew-mice, the middle pair of incisors in each jaw are long and pointed so as to have a forceps-like action for seizing insects, the hard coats of which are broken up by the numerous sharp cusps surmounting the cheek-teeth.

In the omnivorous type, as exemplified in man and monkeys, and to a less specialized degree in swine, the incisors are of moderate and nearly equal size ; the canines, if enlarged, serve for other pur- poses than holding prey, and such enlargement is usually confined to those of the males; while the cheek-teeth have broad flattened crowns surmounted by rounded bosses, or tubercles.

In the herbivorous modification, as seen in three distinct phases in the

horse, the kangaroo, and in ruminants, the incisors are gener- ally well developed in one or both jaws, and have a nipping action, either against one another or against a toothless hard pad in the upper jaw; while the canines are usually small or absent, at least in the upper jaw, but in the lower jaw may be approximated and assimilated to the incisors. The cheek-teeth are large, with broad flattened crowns surmounted either by simple transverse ridges, or complicated by elevations and infoldings. In the specialized forms the premolars tend to become more or less completely like the molars ; and, contrary to what obtains among the Carnivora, the whole series of cheek-teeth (with the occasional exception of the first) is very strongly developed.

Opinions differ as to the mode in which the more complicated cheek-teeth of mammals have been evolved from a simpler type of tooth. According to one theory, this has been brought about by the fusion of two or more teeth of a simple conical type to form a compound tooth. A more generally accepted view — especially among palaeontologists — is the tritubercular theory, according to which the most generalized type of tooth consists of three cusps arranged in a triangle, with the apex pointing inwards in the teeth of the upper jaw. Additions of extra cusps form teeth of a more complicated type. Each cusp of the primitive triangle has received a separate name, both in the teeth of the upper and of the lower jaw, while names have also been assigned to super-added cusps. Molar teeth of the simple tritubercular type persist in the golden moles (Chrysochloris) among the Insectivora and also in the marsupial mole {Netoryctes) among the marsupials. The type is, moreover,

common among the mammals of the early Eocene, and still more so in those of the Jurassic epoch; this forming one of the strongest arguments in favoui of the tritubercular theory. (See Professor H. F. Osborn, " Palaeontological Evidence for the Original Tri- tubercular Theory," in vol. xvii. (new series) of the American. Jov., nal of Science, 1904.)

Digestive System. — As already mentioned, mammals are specially characterized by the division of the body-cavity into two main chambers, by means of the horizontal muscular partition known as the diaphragm, which is perforated by the great blood-vessels and the alimentary tube. The mouth of the great majority of mammals is peculiar for being guarded by thick fleshy lips, which are, however, absent in the Cetacea; their principal function being to seize the food, for which purpose they are endowed, as a rule, with more or less strongly marked prehensile power. The roof of the mouth is formed by the palate, terminating behind by a muscular, contractile arch, having in man and a few other species a median projection called the uvula, beneath which the mouth communicates with the pharynx. The anterior part of the palate is composed of mucous

membrane tightly stretched over the flat or slightly concave bony layer which separates the mouth from the nasal passages, and is generally raised into a series of transverse ridges, which sometimes, as in ruminants, attain a considerable development. In the floor of the mouth, between the two branches of the lower jaw, and supported behind by the hyoid apparatus, lies the tongue, an organ the free surface of which, especially in its posterior part, is devoted to the sense of taste, but which by reason of its great mobility (being composed almost entirely of muscular fibres) performs important mechanical functions connected with masticating and procuring food. Its modifications of form in different mammals are numerous. Between the long, extensile, worm-like tongue of the anteaters, essential to the peculiar mode of feeding of those animals, and the short, immovable and almost functionless tongue of the porpoise, every intermediate condition is found. Whatever the form, the upper surface is, however, covered with numerous fine papillae, in which the terminal filaments of the taste-nerve are distributed. In some mammals, notably lemurs, occurs a hard structure known as the sublingua, which may terminate in a free horny tip. If, as has been suggested, this organ represents the tongue of reptiles, the mammalian tongue will obviously be a superadded organ distinctive of the class.

Salivary glands, of which the most constant are the parotid and the submaxillary, are always present in terrestrial mammals. Next in constancy are the " sublingual," closely associated with the last-named, at all events in the locality in which the secretion is poured out ; and the " zygomatic," found only in some mam- mals in the cheek, just under cover of the anterior part of the zygomatic arch, the duct entering the mouth-cavity near that of the parotid.

The alimentary ,or intestinal, canal varies greatly in relative length and capacity in different mammals, and also offers manifold peculiarities of form, being sometimes a simple cylindrical tube of nearly uniform calibre throughout, but more often subject to alterations of form and capacity in different portions of its course — the most characteristic and constant being the division into an upper and narrower and a lower and wider portion, called respectively the small and the large intestine; the former being arbitrarily divided into duodenum, jejunum and ileum, and the latter into colon and rectum. One of the most striking peculiarities of this part of the canal is the frequent presence of a blind pouch, " caecum," situated at the junction of the large and the small intestine. Their structure presents an immense variety of development, from the smallest bulging of a portion of the side-wall of the tube to a huge and complex sac, greatly exceeding in capacity the remainder of the alimentary canal. It is only in herbivorous mammals that the caecum is developed to this great extent, and among these there is a com- plementary relationship between the size and

complexity of the organ and that of the stomach. Where the latter is simple the caecum is generally the largest, and vice versa. In vol. xvii. (1905) of the Transactions of the Zoological Society of London, Dr P. Chalmers Mitchell has identified the paired caeca, or blind appendages, of the intestine of birds with the usually single caecum of mammals. These caeca occur, in birds (as in mammals) at the junction of the small with the large intestine; and while in ordinary perching-birds they are reduced to small nipple- like buds of no functional importance, in many other birds — owls for instance — they form quite long receptacles. Among mammals,

Fig. 3. — Diagrammatic Plan of the general arrangement of the Alimentary Canal in a typical Mammal.

0, oesophagus ;

st, stomach;

p, pylorus ;

ss, small intestine (ab- breviated) ;

c, caecum;

II, large intestine or colon, ending in

r, the rectum.

the horse and the dog may be cited as instances where the single caecum is of large size, this being especially the case of the former where it is of enormous dimensions; in human beings, on the other hand, the caecum is rudimentary, and best known in connexion with " appendicitis." The existence of paired caeca was previously known in a few armadillos and anteaters, but Dr Mitchell has shown that they are common in these groups, while he has also recorded their occurrence in the hyrax and the manati. With the aid of these instances of paired caeca, coupled with .the frequent existence of a rudiment of its missing fellow when only one is functional, the author has been enabled to demonstrate conclusively that these double organs in birds correspond in relations with their normally single representative in mammals.

In mammals both caecum and colon are often sacculated, a disposi- tion caused by the arrangement of the longitudinal bands of muscular tissue in

their walls; but the small intestine is always smooth and simple-walled externally, though its lining membrane often exhibits contrivances for increasing the absorbing surface without adding to the general bulk of the organ, such as the numerous small tags, or " villi," by which it is everywhere beset, and the more obvious transverse, longitudinal, or reticulating folds projecting into the interior, met with in many animals, of which the " valvulae conni- ventes " of man form well-known examples. Besides the crypts of Lieberkuhn found throughout the intestinal canal, and the glands of Brunner confined to the duodenum, there are other structures in the mucous membrane, about the nature of which there is still much uncertainty, called " solitary " and " agminated " glands, the latter more commonly known by the name of " Peyer's patches." Of the liver little need be said, except that in all living mammals it has been divided into a number of distinct lobes, which have received separate names. It has, indeed, been suggested that in the earlier mammals the liver was a simple undivided organ. This, however, is denied by G. Ruge (vol. xxix. of Gegenbaur's Morphologisches Jahrbuch).

Origin of Mammals. — That mammals have become differenti- ated from a lower type of vertebrates at least as early as the commencement of the Jurassic period is abundantly testified by the occurrence of the remains of small species in strata of that epoch, some of which are mentioned in the articles Marsupialia and Monotremata (q.v.). Possibly mammalian remains also occur in the antecedent Triassic epoch, some palaeontologists regarding the South African Tritylodon as a mammal, while others consider that it was probably a reptile. Whatever may be the true state of the case with regard to that animal probably also holds good in the case of the approximately contemporaneous European Microlestes. Of the European Jurassic (or Oolitic) mammals our knowledge is unfortunately very imperfect; and from the scarcity of their remains it is quite probable that they are merely stragglers from the region (possibly Africa) where the class was first differentiated. It is not till the early Eocene that mammals become a dominant type in the northern hemisphere.

It is now practically certain that mammals are descended from reptiles. Dr H. Gadow, in a paper on the origin of mammals contributed to the Zeitschrift fur Morphologie, sums up as follows: " Mammals are descendants of reptiles as surely as they [the latter] have been evolved from Amphibia. This does not mean that any of the living groups of reptiles can claim their honour of ancestry, but it means that the mammals have branched where the principal reptilian groups meet, and that is a long way back. The Theromorpha, especially small Theriodontia, alone show us what these creatures were like." It may be explained that the Theromorpha, or Anomodontia, are those extinct reptiles so common in the early Secondary (Triassic)' deposits of South Africa, some of which present a remarkable

resemblance in their dentition and skeleton to mammals, while others come equally near amphibians. A difficulty naturally arises with regard to the fact that in reptiles the occipital condyle by which the skull articulates with the vertebral column is single, although composed of three elements, whereas in am- phibians and mammals the articulation is formed by a pair of condyles. Nevertheless, according to Professor H. F. Osborn, the tripartite reptilian condyle, by the loss of its median element, has given rise to the paired mammalian condyles; so that this difficulty disappears. The fate of the reptilian quadrate bone (which is reduced to very small dimensions in the Anomodontia) has been referred to in an earlier section of the present article, where some mention has also been made of the disappearance in

mammals of the hinder elements of the reptilian lower jaw, so as to leave the single bone (dentary) of each half of this part of the skeleton in mammals.

Most of the earliest known mammals appear to be related to the Marsupialia and Insectivora. Others however (inclusive of Tritylodon and Microlestes, if they be really mammals), seem nearer to the Monotremata; and the question has yet to be decided whether placentals and marsupials on the one hand, and monotremes on the other are not independently derived from reptilian ancestors.

With regard to the evolution of marsupials and placentals, it has been pointed out that the majority of modern marsupials exhibit in the structure of their feet traces of the former opposa- bility of the thumb and great toe to the other digits; and it has accordingly been argued that all marsupials are descended from arboreal ancestors. This doctrine is now receiving wide-spread acceptation among anatomical naturalists; and in the American Naturalist for 1904, Dr W. D. Matthew, an American palaeontologist, considers himself provisionally justified in so extending it as to include all mammals. That is to say, he believes that, with the exception of the duckbill and the echidna, the mammalian class as a whole can lay claim to descent from small arboreal forms. This view is, of course, almost entirely based upon palaeontological considerations; and these, in the author's opinion, admit of the conclusion that all modern placental and marsupial mammals are descended from a common ancestral stock, of which the members were small in bodily size. These ancestral mammals, in addition to their small size, were characterized by the presence of five toes to each foot, of which the first was more or less completely opposable to the other four. The evidence in favour of this primitive opposability is consider- able. In all the groups which are at present arboreal, the palaeontological evidence goes to show that their ancestors were likewise so; while since, in the case of modern terrestrial forms, the structure of the wrist and ankle

joints tends to approximate to the arboreal type, as we recede in time, the available evidence, so far as it goes, is in favour of Dr Matthew's contention.

The same author also discusses the proposition from another standpoint, namely, the condition of the earth's surface in Cretaceous times. His theory is that in the early Cretaceous epoch the animals of the world were mostly aerial, amphibious, aquatic or arboreal; the flora of the land being undeveloped as compared with its present state. On the other hand, towards the close of the Cretaceous epoch (when the Chalk was in course of deposition), the spread of a great upland flora vastly extended the territory available for mammalian life. Accordingly, it was at this epoch that the small ancestral insectivorous mammals first forsook their arboreal habitat to try a life on the open plains, where their descendants developed on the one hand into the carnivorous and other groups, in which the toes are armed with nails or claws, and on the other into the hoofed group, inclusive of such monsters as the elephant and the giraffe. The hypothesis is not free from certain difficulties, one of which will be noticed later.

Classification. — Existing mammals may be primarily divided into three main groups, or subclasses, of which the second and third are much' more closely related to one another than is either of them to the first. These three classes are the Monotremata (or Prototheria) , the Marsupialia (Didelphia, or Metatheria),. and the Placentalia (Monodelphia, or Eutheria) ; the distinctive characters of each being given in separate articles (see Mono-tremata, Marsupialia and Monodelphia.)

The existing monotremes and marsupials are each represented only by a single order; but the placentals are divided into the follow- ing ordinal and subordinal groups, those which are extinct being marked with an asterisk (*) : —

1. Insectivora (Moles, Hedgehogs, &c).

2. Chiroptera (Bats).

3. Dermoptera (Colugo, or Flying Lemur).

4. Edentata: — –

a. Xenarthra (Anteaters, Sloths and Armadillos).

b: Pholidota (Pangolins).

c. Tubulidentata (Ant-bears, or Aard-varks).

5. Rodentia (Gnawing Mammals) : —

a. Duplicidentata (Hares and Picas).

b. Simplicidentata (Rats, Beavers, &c).

6. Tillodontia (Tillotherium).

7. Carnivora: —

a. Fissipedia (Cats, Dogs, Bears, &c).

b. Pinmpedia (Seals and Walruses). c.*Creodonta (Hyaenodon, &c).

8. Cetacea (Whales and Dolphins) : —

a. *Archaeoceti (Zeuglodon, &c.).

b. Odontoceti (Spermwhales and Dolphins).

c. Mystacoceti (Whalebone Whales).

9. Sirenia (Dugongs and Manatis).

10. Ungulata (Hoofed Mammals) : —

a. Proboscidea (Elephants and Mastodons).

b. Hyracoidea (Hyraxes). c.*Barypoda {Arsinoitherium). (Z.Toxodontia (Toxodon, &c). e.*Amblypoda (Uintatherium, &c.). /.*Litopterna (Macrauchenia, &c.). g.*Ancylopoda {Chalicotherium, &c). A.*Condylarthra (Phenacodus, &c).

i. Perissodactyla (Tapirs, Horses, &c). j. Artiodactyla (Ruminants, Swine, &c).

11. Primates: —

a. Prosimiae (Lemurs and Galagos).

b. Anthropoidea (Monkeys, Apes and Man).

Separate articles are devoted to each of these orders, where refer- ences will be found to other articles dealing with some of the minor groups and a

number of the more representative species.

Relationships of the Groups. — As we recede in time we find the extinct representatives of many of these orders approximating more and mere closely to a common generalized type, so that in a large number of early Eocene forms it is often difficult to decide to which group they should be assigned.

The Insectivora are certainly the lowest group of existing placental mammals, and exhibit many signs of affinity with marsupials; they may even be a more generalized group than the latter. From the Insectivora the bats, or Chiroptera, are evidently a specialized lateral offshoot; while the Dermoptera may be another branch from the same stock. As to the Edentata, it is still a matter of uncertainty whether the pangolins (Pholidota) and the ant-bears (Tubulidentata) are rightly referred to an order typically represented by the sloths, anteaters, and armadillos of South and Central America, or whether the two first-named groups have any close relationship with one another. Much uncertainty prevails with regard to the ancestry of the group as a whole, although some of the earlier South American forms have a comparatively full series of teeth, which are also of a less degenerate type than those of their modern representatives.

An almost equal degree of doubt obtains with regard to the ancestry of that very compact and well-defined group the Rodentia. If, however, the so-called Proglires of the lower Eocene are really ancestral rodents, the order is brought into comparatively close connexion with the early generalized types of clawed, or unguiculate mammals. Whether the extinct Tillodontia are most nearly allied to the Rodentia, the Carnivora or the Ungulata, and whether they are really entitled to constitute an ordinal group by themselves, must remain for the present open questions.

The Carnivora, as represented by the (mainly) Eocene Creodonta, are evidently an ancient and generalized type. As regards the num- ber and form of their permanent teeth, at any rate, creodonts present such a marked similarity to carnivorous marsupials, that it is difficult to believe the two groups are not allied, although the nature of the relationship is not yet understood, and the minute internal structure of the teeth is unlike that of marsupials and similar to that of modern Carnivora. There is the further possibility that creodonts may be directly descended from the carnivorous reptiles ; a descent which if proved might introduce some difficulty with regard to the above- mentioned theory as to the arboreal ancestry of mammals generally. Be this as it may, there can be little doubt that the creodonts are related to the Insectivora, which, as stated above, show decided signs of kinship with the marsupials.

A much more interesting relationship of the creodont carnivora has, however, been established on the evidence of recent discoveries in Egypt. From remains of Eocene age in that country Dr E. Fraas, of Stuttgart, has demonstrated the derivation of the whale-like Zeuglodon from the creodonts. Dr C. E. Andrews has, moreover, not only brought forward additional evidence in favour of this most remarkable line of descent, but is confident — which Professor Fraas was not — that Zeuglodon itself is an ancestral cetacean, and consequently that whales are the highly modified descendants of creodonts. It must be admitted, however, that the links between Zeuglodon and typical cetaceans are at present unknown; but it may be hoped that these will be eventually brought to light from the deposits of the Mokattam Range, near Cairo. Whales and dolphins being thus demonstrated to be nothing more than highly modified Carnivora, might almost be included in the same ordinal group.

An analogous statement may be made with regard to the sea-cows, or Sirenia, which appear to be derivates from the great herbivorous order of Ungulata, and might consequently be included in that

group, as indeed has been already done in Dr Max Weber's classifica- tion. It is with the proboscidean suborder of the Ungulata to which the Sirenia are most nearly related; the nature of this relationship being described by Dr Andrews as follows : —

" In the first place, the occurrence of the most primitive Sirenians with which we are acquainted in the same region as the most general- ized proboscidean, Moeritherium, is in favour of such a view, and this is further supported by the similarity of the brain-structure and, to some extent, of the pelvis in the earliest-known members of the two groups. Moreover, in the anatomy of the soft-parts of the recent forms there are a number of remarkable points of resemblance. Among the common characters may be noted the possession of: (1) pectoral mammae; (2) abdominal testes; (3) a bifid apex of the heart ; (4) bilophodont molars with a tendency to the formation of an additional lobe from the posterior part of the cingulum. The peculiar mode of displacement of the teeth from behind forwards in some members of both groups may perhaps indicate a relationship, although in the case of the Sirenia the replacement takes place by means of a succession of similar molars, while in the Proboscidea the molars remain the same numerically, but increase greatly in size and number of transverse ridges."

These and certain other facts referred to by the same author point to the conclusion that not only are the Sirenia and the Proboscidea derived from a single ancestral stock, but that the Hyracoidea — and so Arsinoitherium — are also derivatives from the same stock, which must necessarily have

been Ethiopian.

Of the other suborders of ungulates, the Toxodontia and Lito- pterna are exclusively South American, and while the former may possibly be related to the Hyracoidea and Barypoda, the latter is perhaps more nearly akin to the Perissodactyla. The Amblypoda, on the other hand, are perhaps not far removed from the ancestral Proboscidea, which depart comparatively little from the generalized ungulate type. The latter is represented by the Eocene Condylar- thra, which undoubtedly gave rise to the Perissodactyla and Artio- dactyla, and probably to most, if not all, of the other groups. The Condylarthra, in their turn, approximate closely to the ancestral Carnivora, as they also do in some degree to the ancestral Primates. As regards the latter order, although we are at present unacquainted with all the connecting links between the lemurs and the monkeys, there is little doubt that the ancestors of the former represent the stock from which the latter have originated. C. D. Earle, in the American Naturalist for 1897, observes that " so far as the palaeon- tological evidence goes it is decidedly in favour of the view that apes and lemurs are closely related. Beginning with the earliest known lemur, Anaptomorphus, this genus shows tendencies towards the anthropoids, and, when we pass up into the Oligocene of the Old World, Adapis is a decidedly mixed type, and probably not far from the common stem-form which gave origin to both suborders of the Primates. In regard to Tarsius, it is evidently a type nearly between the lemurs and apes, but with many essential characters belonging to the former group."

Distribution. — For an account of the "realms" and "regions" into which the surface of the globe has been divided by those who have made a special study of the geographical distribution of animals, see Zoological Distribution. For the purposes of such zoo-geographical divisions, mammals are much better adapted than birds, owing to their much more limited powers of dispersal; most of them (exclusive of the purely aquatic forms, such as seals, whales, dolphins and sea-cows) being unable to cross anything more than a very narrow arm of the sea. Consequently, the presence of nearly allied groups of mammals in areas now separated by considerable stretches of sea proves that at no very distant date such tracts must have had a land- connexion. In the case of the southern continents the difficulty is, however, to determine whether allied groups of mammals (and other animals) have reached their present isolated habitats by dispersal from the north along widely sundered longitudinal lines, or whether such a distribution implies the former existence of equatorial land connexions. It may be added that even bats are unable to cross large tracts of sea; and the fact that fruit- bats of the genus Pleropus are found in Madagascar and the Seychelles, as well as in India, while they are absent from Africa, is held to be an important link in the chain of evidence demon- strating a former land-connexion between Madagascar and India.

There is another point of view from which mammals are of especial importance in regard to geographical distribution, namely their comparatively late rise and dispersal, or " radia- tion," as compared with reptiles.

As regards terrestrial mammals (with which alone we are at present concerned), one of the most striking features in their distribution is their practical absence from oceanic islands; the

only species found in such localities being either small forms which might have been carried on floating timber, or such as have been introduced by human agency. This absence of mam- malian life in oceanic islands extends even to New Zealand, where the indigenous mammals comprise only two peculiar species of bats, the so-called Maori rat having been introduced by man.

One of the leading features in mammalian distribution is the fact that the Monotremata, or egg-laying mammals, are exclusively confined to Australia and Papua, with the adjacent islands. The marsupials also attain their maximum development in Australia (" Notogaea " of the distributionists), extending, however, as far west as Celebes and the Moluccas, although in these islands they form an insignificant minority among an extensive placental fauna, being represented only by the cuscuses (Phalanger),a. group unknown in either Papua or Australia. Very different, on the other hand, is the condition of things in Australia and Papua, where marsupials (and monotremes) are the dominant forms of mammalian life, the placentals being represented (apart from bats, which are mainly of an Asiatic type) only by a number of more or less aberrant rodents belonging to the mouse-tribe, and in Australia by the dingo, or native dog, and in New Guinea by a wild pig. The dingo was, however, almost certainly brought from Asia by the ancestors of the modern natives; while the Papuan pig is also in all probability a human introduction, very likely of much later date. The origin of the Australasian fauna is a question pertaining to the article Zoological Distribution. The remaining marsupials (namely the families Didelphyidae and Epanorthidae) are American, and mainly South and Central American at the present day ; although during the early part of the Tertiary period representatives of the first-named family ranged all over the northern hemisphere.

The Insectivora (except a few shrews which have entered from the north) are absent from South America, and appear to have been mainly an Old

World group, the only forms which have entered North America being the shrew-mice (Soricidae) and moles (Talpidae). The occurrence of one aberrant group (Solenodon) in the West Indies is, however, noteworthy. The family with the widest dis- tribution is the Soricidae, the Talpidae being unknown in Africa. The tree-shrews (Tupaiidae) are exclusively Asiatic, whereas the jumping-shrews (Macroscelididae) are equally characteristic of the African continent. Madagascar is the sole habitat of the tenrecs (Centetidae), as is Southern Africa of the golden moles (Chryso- chloridae). It is, however, important to mention that an extinct South American insectivore, Necrolestes, has been referred to the family last mentioned ; and even if this reference should not be confirmed in the future, the occurrence of a representative of the order in Patagonia is a fact of considerable importance in distribution.

The Rodentia have a wider geographical range than any other order of terrestrial mammals, being, as already mentioned, repre- sented by numerous members of the mouse-tribe (Muridae) even in Australasia. With the remarkable exception of Madagascar, where it is represented by the Nesomyidae, that family has thus a cosmopolitan distribution. Very noteworthy is the fact that, with the exception of Madagascar (and of course Australia) the squirrel family (Sciuridae) is also found in all parts of the world. Precisely the same may be said of the hares, which, however, become scarce in South America. On the other hand, the scaly-tailed squirrels (Anomaluridae) , the jumping-hares (Pedetidae), and the strand-moles (Bathyergidae) are exclusively African; while the sewellels (Haplodontidae) and the pocket-gophers (Geomyidae) are as character- istically North American, although a few members of the latter have reached Central America. The beavers (Castoridae) are re- stricted to the northern hemisphere, whereas the dormice (Gliridae) and the mole-rats (Spalacidae) are exclusively Old World forms, the latter only entering the north of Africa, in which continent the former are largely developed. The jerboa group (Dipodidae, or Jaculidae) is also mainly an Old World type, although its aberrant representatives the jumping-mice (Zapus) have effected an entrance into Arctic North America. Porcupines enjoy a very wide range, being repre- sented throughout the warmer parts of the Old World, with the excep- tion of Madagascar (and of course Australasia), by the Hystricidae, and in the New World by the Erethizontidae. Of the remaining families of the Simplicidentata, all are southern, the cavies (Caviidae), chinchillas (Chinchillidae) , and degus (Octodontidae) being Central and South American, while the Capromyidae are common to southern America and Africa, and the Cienodactylidae are exclusively African. The near alliance of all these southern families, and the absence of so many Old World families from Madagascar form two of the most striking features in the distribution of the order. Lastly, among the

Duplicidentata, the picas (Ochotonidae or Lagomyidae) form a group confined to the colder or mountainous regions of the northern hemisphere.

Among the existing land Carnivora (of which no representatives except the introduced dingo are found in Australasia) the cat-tribe (Felidae) has now an almost cosmopolitan range, although it only reached South America at a comparatively recent date. Its original home was probably in the northern hemisphere; and it has no

representatives in Madagascar. The civet-tribe (Viverridae), on the other hand, which is exclusively an Old World group, is abundant in Madagascar, where it is represented by peculiar and aberrant types. The hyenas (Hyaenidae), at any rate at the present day, to which consideration is mainly limited, are likewise Old World. The dog- tribe (Canidae), on the other hand, are, with the exception of Mada- gascar, an almost cosmopolitan group. Their place of origin was, however, almost entirely in the northern hemisphere, and not im-

Crobably in some part of the Old World, where they gave rise to the ears (Ursidae). The latter are abundant throughout the northern hemisphere, and have even succeeded in penetrating into South America, but, with the exception of the Mediterranean zone, have never succeeded in entering Africa, and are therefore of course unknown in Madagascar. The raccoon group (Procyonidae) is mainly American, being represented in the Old World only by the pandas (Aelurus and Aeluropus), of which the latter apparently exhibits some affinity to the bears. The birthplace of the group was evidently in the northern hemisphere — possibly in east Central Asia. The weasel-tribe (Mustelidae) is clearly a northern group, which has, however, succeeded in penetrating into South America and Africa, although it has never reached Madagascar.

The extinct creodonts, especially if they be the direct descendants of the anomodont reptiles, may have originated in Africa, although they are at present known in that continent only from the Fayum district. Elsewhere they occur in South America and throughout a large part of the northern hemisphere, where they appear to have survived in India to the later Oligocene or Miocene.

In the case of the great order, or assemblage, of Ungulata it is necessary to pay somewhat more attention to fossil forms, since a considerable number of groups are either altogether extinct or largely on the wane.

So far as is at present known, the earliest and most primitive group, the Condylarthra, is a northern one, but whether first devel- oped in the eastern or the western hemisphere there is no sufficient evidence. The more

or less specialized Litopterna and Toxodontia, as severally typified by the macrauchenia and the toxodon, are, on the other hand, exclusively South American. With the primitive five-toed Amblypoda, as represented by the coryphodon, we again reach a northern group, common to the two hemispheres; but there is not improbably some connexion between this group and the much more specialized Barypoda, as represented by Arsinoitherium, of Africa. The Ancylopoda, again, typified by Chalicotherium, and characterized by the claw-like character of the digits, are probably another northern group, common to the eastern and western hemi- spheres.

Recent discoveries have demonstrated the African origin of the elephants (Proboscidea) and hyraxes (Hyracoidea), the latter group being still indeed mainly African, and in past times also limited to Africa and the Mediterranean countries. As regards the elephants (now restricted to Africa and tropical Asia), there appears to be evidence that the ancestral mastodons, after having developed from African forms probably not very far removed from the Amblypoda, migrated into Asia, where they gave rise to the true elephants. Thence both elephants and mastodons reached North America by the Bering Sea route ; while the former, which arrived earlier than the latter, eventually penetrated into South America.

The now waning group of Perissodactyla would appear to have originally been a northern one, as all the three existing families, rhinoceroses (Rhinocerotidae) , tapirs (Tapiridae), and horses (Equidae), are well represented in the Tertiaries of both halves of the northern hemisphere. If eastern Central Asia were tentatively given as the centre of radiation of the group, this might perhaps best accord with the nature of the case. Rhinoceroses disappeared comparatively early from the New World, and never reached South America. In Siberia and northern Europe species of an African type survived till a comparatively late epoch, so that the present relegation of the group to tropical Asia and Africa may be regarded as a modern feature in distribution. Horses, now unknown in a wild state in the New World, although still widely spread in the Old, attained a more extensive range in past times, having suc- cessfully invaded South America. On the other hand, in common with the rest of the Perissodactyla, they never reached Madagascar. In addition to the occurrence of their fossil remains almost through- out the world, the former wide range of the tapirs is attested by the fact of their living representatives being confined to such widely sundered areas as Malaysia and tropical America.

The Artiodactyla are the only group of ungulates known to have been represented in Madagascar; but since both these Malagasy forms — namely two hippopotamuses (now extinct) and a river-hog — are capable of swimming, it is most probable that they reached the island by crossing the

Mozambique Channel. As regards the deer-family (Cervidae), which is unknown in Africa south of the Sahara, it is quite evident that it originated in the northern half of the Old World, whence it reached North America by the Bering Sea route, and eventually travelled into South America. More light is required with regard to the past history of the giraffe-family (Giraffidae), which includes the African okapi and the extinct Indian Siyatherium, and is unknown in the New World. Possibly, however, its birthplace may prove to be Africa ; if so, we shall have a case analogous to that of the African elephant, namely that while

giraffes flourished during the Pliocene in Asia (where they may have originated), they survive only in Africa. An African origin has also been suggested for the hollow-horned ruminants (Bovidae); and if this were substantiated it would explain the abundance of that family in Africa and the absence from the heart of that continent of the deer-tribe. Some confirmation of this theory is afforded by the fact that whereas we can recognize ancestral deer in the Tertiaries of Europe we cannot point with certainty to the forerunners of the Bovidae. Whether its birthplace was in Africa or to the north, it is, however, clear that the hollow-horned ruminants are essentially an Old World group, which only effected an entrance into North America at a comparatively recent date, and never succeeded in reaching South America. So far as it goes, this fact is also in favour of the African ancestry of the group.

The Antilocapridae (prongbuck), whose relationships appear to be rather with the Cervidae than with the Bovidae, are on the other hand apparently a North American group. The chevrotains (Tragulidae), now surviving only in West and Central Africa and tropical Asia, are conversely a purely Old World group.

The camels (Tylopoda) certainly originated in the northern hemisphere, but although their birthplace has been confidently claimed for North America, an equal, if not stronger, claim may be made on the part of Central Asia. From the latter area, where wild camels still exist, the group may be assumed to have made its way at an early period into North America; whence, at a much later date, it finally penetrated into South America. In the Old World it seems to have reached the fringe of the African continent, where its wanderings in a wild state were stayed.

The pigs (Suidae) and the hippopotamuses (Hippopotamidae) are essentially Old World groups, the former of which has alone succeeded in

reaching America, where it is represented by the col- lateral branch of the peccaries (Dicotylinae) . An African origin would well explain the present distribution of both groups, but fur- ther evidence on this point is required before anything decisive can be affirmed, although it is noteworthy that the earliest known pig (Geniokyus) is African. The Suinae are at present spread all over the Old World, although the African forms (other than the one from the north) are markedly distinct from those inhabiting Europe and Asia. Hippopotamuses, on the contrary, are now exclusively African, although they were represented in tropical Asia during the Pliocene and over the greater part of Europe at a later epoch.

A brief notice with regard to the distribution of the Primates must suffice, as their past history is too imperfectly known to admit of generalizations being drawn. The main facts at the present day are, firstly, the restriction of the Prosimiae, or lemurs, to the warmer parts of the Old World, and their special abundance in Madagascar (where other Primates are wanting); and, secondly, the wide structural distinction between the monkeys of tropical America (Platyrrhina), and the Old World monkeys and apes, or Catarrhina. It is, however, noteworthy that extinct lemurs occur in the Tertiary deposits of both halves of the northern hemisphere— a fact which has induced Dr J. L. Wortman to suggest a polar origin for the entire group — a view we are not yet prepared to endorse. For the distri- bution of the various families and genera the reader may be referred to the article Primates; and it will suffice to mention here that while chimpanzees and baboons are now restricted to Africa and (in the case of the latter group) Arabia, they formerly occurred in India.

As regards aquatic mammals, the greater number of the Cetacea, or whales and dolphins, have, as might- be expected, a very wide distribution in the ocean. A few, on the other hand, have a very restricted range, the Greenland right whale (Balaena mysticetus) being, for instance, limited to the zone of the northern circumpolar ice, while no corresponding species occurs in the southern hemisphere. In this case, not only temperature, but also the peculiar mode of feeding, may be the cause. The narwhal and the beluga have a very similar distribution, though the latter occasionally ranges farther south. The bottle-noses (Hyperoodon) are restricted to the North Atlantic, never entering, so far as known, the tropical seas. Other species are exclusively tropical or austral in their range. The pigmy whale (Neobalaena marginata), for instance, has only been met with in the seas round Australia, New Zealand and South America, while a beaked whale (Berardius arnouxi) appears to be confined to the New Zealand seas.

The Cetacea, however, are by no means limited to the ocean, or even to salt water, some entering large rivers for considerable dis- tances, and others being exclusively fluviatile. The susu (Platanista) is, for instance,

extensively distributed throughout nearly the whole of the river systems of the Ganges, Brahmaputra and Indus, ascend- ing as high as there is water enough to swim in, but apparently never passing out to sea. The individuals inhabiting the Indus and the Ganges must therefore have been for long ages isolated without developing any distinctive anatomical characters, those by which P. indt was separated from P. gangetica having been shown to be of no constant value. Orcella fluminalis, again, appears to be limited to the Irrawaddy ; and at least two distinct species of dolphin, belonging to different genera, are found in the Amazon. It is remarkable that none of the great lakes or inland seas of the world is inhabited by cetaceans.

The great difference in the manner of life of the sea-cows or Sirema, as compared with that of the Cetacea, causes a corresponding

difference in their geographical distribution. Slow in their move- ments, and feeding on vegetable substances, they are confined to the neighbourhood of rivers, estuaries or coasts, although there is a possibility of accidental transport by currents across considerable distances. Of the three genera existing within historic times, one (Manatus) is exclusively confined to the shores of the tropical Atlan- tic and the rivers entering into it, individuals scarcely specifically distinguishable being found both on the American and the African. The dugong (Halicore) is distributed in different colonies, at present isolated, throughout the Indian Ocean from Arabia to North Aus- tralia; while the Rhytina or northern sea-cow was, for some time before its extinction, limited to a single island in the extreme north of the Pacific Ocean.

The seals (Pinnipedia) although capable of traversing long reaches of ocean, are less truly aquatic than the last two groups, always resorting to the land or to ice-floes for breeding. The geographical range of each species is generally more or less restricted, usually according to climate, as they are mostly inhabitants either of the Arctic or Antarctic seas and adjacent temperate regions, few being found within the tropics. For this reason the northern and the southern species are for the most part quite distinct. In fact, the only known exception is the case of a colony of elephant-seals (Macrorhinus leoninus), whose general range is in the southern hemisphere, inhabiting the coast of California. In this case a different specific name has been given to the northern form, but the characters by which it is distinguished are of little importance, and probably, except for the abnormal geographical distribution, would never have been discovered. The most remarkable circumstance connected with the distribution of seals is the presence of members of the order in the three isolated great lakes or inland seas of Central Asia— the Caspian, Aral and Baikal — which, notwithstanding their long isolation, have varied but slightly from species now inhabiting the Polar Ocean.

Authorities. — The above article is partly based on that of Sir W. H. Flower in the 9th edition of this work. The literature con- nected with mammals is so extensive that all that can be attempted here is to refer the reader to a few textbooks, with the aid of which, combined with that of the annual volumes of the Zoological Record, he may obtain such information on the subject as he may require: F. E. Beddard, " Mammals," The Cambridge Natural History, vol. x. (1902); W. H. Flower and R. Lydekker, The Study of Mammals (London, 1891); Max Weber, Die Sdugethiere (Jena, 1904); W. T. Blanford, The Fauna of British India — Mammalia (1888 1891); D. G. Elliot, Synopsis of the Mammals of North America (Chicago, 1901) and The Mammals of Middle America and the West Indies (Chicago, 1904) ; W. L. Sclater, The Fauna of South Africa — Mammals (Cape Town, 1901-1902); W. K. Parker Mammalian Descent (London, 1885); E. Trouessart, Catalogus mammalium, tarn viventium quam fossilium (Paris, 1898-1899); and supplement, 1904-1905 ; T. S. Palmer, Index generum mamma- hum (Washington, 1904); W. L. and P. L. Sclater, The Geography of Mammals (London, 1899); R. Lydekker, A Geographical History of Mammals (Cambridge, 1896). (W. H. F. ; R. L.)

MAMMARY GLAND (Lat. mamma), or female breast, the organ by means of which the young are suckled, and the pos- session of which, in some region of the trunk, entitles the animal bearing it to a place in the order of Mammalia.

Anatomy. — In the human female the gland extends vertically from the second to the sixth rib, and transversely from the edge of the sternum to the mid axillary line; it is embedded in the fat superficial to the pectoralis major muscle, and a process which extends toward the armpit is sometimes called the axillary tail. A little below the centre of the glandular swelling is the nipple, surrounding which is a pigmented circular patch called the areola; this is studded with slight nodules, which are the openings of areolar glands secreting an oily fluid to protect the skin during suckling. During the second or third month of pregnancy the areola becomes more or less deeply pigmented, but this to a large extent passes off after lactation ceases. In structure the gland consists of some fifteen to twenty lobules, each of which has a lactiferous duct opening at the summit of the nipple, and branching in the substance of the gland to form secondary lobules, the walls of which are lined by cubical epithelium in which the milk is secreted. These secondary lobules project into the surrounding fat, so that it is difficult to dissect out the gland cleanly. Before opening at the nipple each lactiferous duct has a fusiform dilatation called the ampulla.

After the child-bearing period of life the breasts atrophy and tend to become pendulous, while in some African races they are pendulous throughout life. Variations in the mammary glands are common; often the

left breast is larger than the right, and in those rare cases in which one breast is suppressed it is usually the right, though suppres- sion of the breast does not necessarily include absence of the nipple

Supernumerary nipples and glands are not uncommon, and, when they occur, are usually situated in the mammary line which extends from the anterior axillary fold to the spine of the pubis; hence, when an extra nipple appears above the normal one, it is external to it, but, when below, it is nearer the middle line. The condition of extra breasts is known as polymasty, that of extra nipples as poly- thely, and it is interesting to notice that the latter is commoner in males than in females. O. Amnion (quoted by Wiedersheim)

Ampulla

(From A. F. Dixon, Cunningham's Text Book of Anatomy.)

Fig. 1. — Dissection of the Mammary Gland.

records the case of a German soldier who had four nipples on each side. These nipples in the human subject are seldom found below the costal margin. In normal males the breast structure is present, but rudimentary, though it is not very rare to find instances of boys about puberty in whom a small amount of milk is secreted, and one case at least is recorded of a man who suckled a child. A functional condition of the mammary glands in men is known as gynaekomasty. (For further details see The Structure of Man, by R. Wiedersheim, translated by H. and M. Bernard, and edited by G. B. Howes, London, 1895.)

Embryology. — There is every probability that the mammary glands are modified and hy pertrophied sebaceous glands, and transitional stages are seen in the areolar glands, which sometimes secrete milk. At an early stage of foetal life a raised patch of ectoderm is seen, which later on becomes a saucer-like depression ; from the bottom of this fifteen or twenty solid processes of cells, each presumably representing a sebaceous gland, grow into the mesoderm which forms the connective-tissue stroma of the mamma. Later on these pro- cesses branch. The last stage is that the centre of the mammary pit or saucer-like depression once more grows up to form the nipple, and at birth the processes become tubular, thus forming lactiferous ducts. The glands grow little until the age of puberty, but their full development is not reached until the birth of the first child.

Comparative Anatomy. — In the lower Mammals the mammary line, already mentioned, appears in the embryo as a ridge, and in those which have many young at a birth patches of this develop in the thoracic and abdominal regions to form the mammae, while the intervening parts of the ridge disappear. The number of mammae is not constant in animals of the same species; as an instance of this it will be found that in the dog the number of nipples varies from seven to ten, though animals with many nipples are more liable to variation than those with few. When only a few young are pro- duced at a time the mammae are few, and it seems to depend on the convenience of suckling in which part of the mammary line the glands are developed. In the pouched Mammals (Monotremes and Marsupials) inguinal mammae are found, and so they are in most Ungulates as well as in the Cetacea. In the elephants, Sirenia, Chiroptera and most of the Primates, on the other hand, they are confined to the pectoral region, and this is also the case in some Rodents, e.g. the jumping hare (Pedetes eager). In the mono- tremes the mammary pit remains throughout life, and the milk is conducted along the hairs to the young, but in other Mammals nipples are formed in one of two ways. One is that already described in Man, which is common to the Marsupials and Primates, while in the other the margin or vallum of the mammary pit grows up, and so forms a nipple with a very deep pit, into the bottom of which the lactiferous ducts open. The latter is regarded as the primary arrangement. In the monotremes the mammae are looked upon, not as modified sebaceous glands, as in other Mammals, but as altered sweat glands. It is further of interest to notice that in these primi- tive Mammals the glands are equally developed in both sexes, and it is thought that among the bats the male often assists in suckling the young (see G. Dobson, Brit. Museum Cat. of the Chiroptera, London, 1878). These facts, together with the occasional occurrence of gynaekomasty in man, make it probable that the ancestral Mammal

was an animal in which both sexes helped in the process of lactation.

For further details and literature up to 1906 see Comparative

Anatomy of Vertebrates, by R. Wiedersheim, adapted by W. N.

Parker (1907), and Bronn's Classen und Ordnungen des Thierreichs.

(F. G. P.) Diseases of the Mammary Gland. — Inflammation of the breast (mastitis) is apt to occur in a woman who is suckling, and is due to the presence of septic micro-organisms, which, as a rule, have found their way into the milk-ducts, the lymphatics or the veins, through a crack, or other wound, in a nipple which has been made sore by the infant's vigorous attempts to obtain food. Especially is this septic inflammation apt to occur

if the nipple is depressed, or so badly formed that the infant has difficulty in feeding from it. The inflamed breast is enlarged, tender and painful, and the skyj over it is hot, and perhaps too reddened. The woman feels ill and feverish, and she may shiver, or have a definite rigor— which suggests that the inflammation is running on to the formation of an abscess. The abscess may be superficial to, or beneath, the breast, but it is usually within the breast itself. The infant should at once be weaned, the milk-tension being relieved by the breast-pump. Fomentations should be applied under waterproof jaconette, and the breast should be evenly supported by a bandage or by the corsets. Belladonna and glycerine should be smeared over the breast, with the view of checking the secretion of milk, as well as of easing pain. But before this is done six or eight leeches may be applied. On the first indication that matter is collecting, an incision should be made, for if the matter is allowed to remain locked up in the breast tissue the abscess will rapidly increase in size, and the whole of the breast may become infected and destroyed. Supposing that, in making the incision, no pus is discovered, the relief to the vascular tension thus afforded will be nevertheless highly beneficial. The operation had better be done under a general anaesthetic, so that the surgeon can introduce a probe, or his finger, into the wound, breaking down the partitions which are likely to exist between separate abscesses, and thus enable them to be drained through the one opening. As the discharge begins to cease, the tenderness subsides, and gentle massage, or firm strapping of the breast, will prove useful. The general treatment will consist in the administration of an aperient, and, the tongue being clean, in prescribing such drugs as quinine, strychnia and iron. The diet should be liberal, but not carried to such excess that the power of digestion and absorption is overtaxed. During the early acute stage of the disease small doses of morphia may be necessary. When the tongue has cleaned, a little wine may be given with advantage.

Chronic Eczema around the nipple of a woman late in life, with, perhaps, localized ulceration, is known as Paget' s Disease. The im- portance of it is that cancerous infiltration is apt to pass from it along the milk-ducts and to involve the breast in malignant disease. Hence, when eczema about the nipple refuses to clear up under the influence of soothing treatment, it is well to insist on the removal of the entire breast. Sometimes this eczema is malignant from the beginning, being associated with the active prolifization of the epithelial cells of the milk-ducts, and with their escape into the surrounding tissues. The nipple is retracted in most of these cases, which, however, are not often met with.

Chronic Mastitis is of frequent occurrence in women who are past middle age. The part of the breast involved is enlarged, hard, and more or less tender and painful. It is sometimes impossible clinically to distinguish this disease from cancer. True, the tumour is not so definite or so hard as a

cancer, nor is it attached to the skin, nor to the muscles of the chest wall, and if there are any glands second- arily enlarged in the arm-pit they are not so hard as they may be in cancer. ‘ But all these are questions of degree. It is, of course, highly inadvisable to leave it to time to clear up the diagnosis, for a chronic mastitis, innocent at first, may eventually become cancerous. If in any case the difficulty of distinguishing a chronic mastitis from a malignant tumour of the breast is insuperable, the safest course is to remove the breast and have it examined by the microscope. The suggestion, sometimes made, as to the preliminary removal of a small piece of the tumour for examination is not to be recommended.

A simple glandular tumour, fibro-adenoma, is apt to be found in the breasts of youngish women, who may possibly give an account of some blow or other injury; there may, however, be no history of injury. The tumour is smooth, rounded or oval, and lies loose in the midst of the breast; as a rule it is not tender. It is not asso- ciated with enlarged glands in the arm-pit. The tumour had best be removed, though there is no urgency about the operation, as the growth is absolutely innocent. There is, however, no telling as to what course an innocent tumour of the breast may take as middle age comes on.

Cysts of the Breast. — A galactocele is a tumour due to the locking up of milk in a greatly dilated duct. Other forms of cystic disease may be due to serous or hydatid fluid, or to thin pus, being surrounded by fibrous walls. Such cysts are best treated by free incision, and by passing a gauze dressing into their depths. If the tissue is occupied by many cysts, the whole breast had better be removed.

Cancer of the Breast may be met with in men as well as in women-, in men, howevwr, it is very rare. It is commonest in women between

the ages of forty and fifty. It is sometimes met with in women of twenty; and the younger the individual the more malignant is the disease. Married life seems to have no effect as regards the incidence of the disease, but it often happens that a breast which gave trouble during the period of suckling becomes later the subject of cancer; in other cases there is a clear history of the attack having followed an injury. It is, thus, as if inflammatory changes in the breast were the direct cause of a later cancerous invasion. Though it is impossible to affirm that heredity has a great influence in the incidence of cancer, it is, nevertheless, remarkable that the members of certain families are unusually prone to the disease.

The chief feature of a cancerous tumour of the breast is its great hardness. The technical name for the growth is scirrhus (Gr. dicipos, o»

The cells of a cancerous breast are apt to be carried by the lym- phatics to the lymphatic glands in the arm-pit, and by the blood- stream to the spinal column and to other parts of the skeleton, and sometimes to the liver, which thus becomes large and hard, or to the other breast.

As the fibrous tissue around the tumour becomes uivaded by the new growth it undergoes contraction (much as a string becomes shorter when it is wetted), and as this shortening of the fibrous bands increases the nipple may be retracted, and the breast may be closely bound down to the chest-wall; and, further, the skin over- lying the tumour may be drawn in towards the tumour so as to form a conspicuous dimple. Later, the nutrition of this patch of skin may be so interfered with that it mortifies or breaks down, and thus a cancerous ulcer is produced. This ulcer slowly spreads, and its floor is covered with a discharge in which septic micro-organisms undergo cultivation; in this way the ulcer becomes highly offensive. By the use of antiseptic lotions and a frequent change of dressings, however, all unpleasant smell can be checked or prevented. As the ulcer extends it is apt to implicate large blood-vessels, so that serious, and. sometimes alarming, haemorrhages take place. And if the breast had previously been in pain, the bleeding is likely to give great relief. But repeated haemorrhages bring on increasing exhaustion, and thus materially hasten the end.

There is at present only one trustworthy treatment for cancer, and that is its free removal by operation. The entire breast and the nipple must be sacrificed. At the present day the operation itself is not a " dreadful " one. To be successful it must be very thorough, and it must be done early. The patient, being under an anaesthetic, feels nothing, and the subsequent dressings of the wound are attended with scarcely any pain. There need be but a couple of days of con- finement to bed, and when the wound has soundly healed the patient may be encouraged to use her arm. Should there be recurrence of cancerous nodules in or about the wound, their removal should be promptly and widely effected. The writer has records of one case in which between the first operation and the last report there was a space of over twenty-nine years, and another of. fifteen years. Each of these patients had one extensive operation, and four or five smaller operations for dealing with recurrences. Each of them, how- ever, might be considered unlikely subjects for further return.

For a superficial cancer the X-rays may be of service, but many applications of the rays are likely to be needed, and the case may possibly refuse to yield to their influence, and, after loss of valuable time, the disease may have eventually to be removed by the knife. The great

advantage which the treatment by the knife offers over every other method is that the growth can be cleanly, efficiently and promptly removed, and, with it, all the affected lymph-spaces, and the lymphatic glands which are secondarily implicated.

*As regards the value of radium in the treatment of cancer of the breast, the high expectations which were somewhat widely associated with this newly-found element early in 1909 must be said to have been unjustified by any precise results. Injections of radium salts have been made into the substance of a cancer, and tubes of aluminium containing the salt have been introduced into the growth, but no deep cancer has thereby been cured. Radium has also been exposed again and again on the surface of the affected breast, but similarly with no great result. Unfortunately, whilst one is experimenting in the treatment of an operable cancer, the epithelial cells of the growth may be making their way towards distant parts, where no rays or emanations could possibly reach them. Whatever may be the future of radium as a therapeutic agent in the treatment of cancer of the breast, it is certain that, on the facts as known at the beginning of 1910, the only safe course is to remove the breast by direct operation, together with the associated lymph-spaces and lymphatic glands. And if this is done promptly and thoroughly cancer of the breast will come more and more into the class of curable diseases. (E. O. *)*

MAMMEE APPLE, South American or St Domingo Apricot, the fruit of Mammea americana (natural order Clusiaceae), a large tree with opposite leathery gland-dotted leaves, white, sweet-scented, short-stalked, solitary or clustered axillary flowers and yellow fruit 3 to 6 in. in diameter. The bitter rind encloses a sweet aromatic flesh, which is eaten raw or steeped in wine or with sugar, and is also used for preserves. There are one to four large rough seeds, which are bitter and resinous, and used as anthelmintics. An' aromatic liqueur distilled from the flowers is known as eau de Creole in the West Indies, and the acrid resinous gum is used to destroy the chigoes which attack the naked feet of the negroes. The wood is durable and well adapted for building purposes; it is beautifully grained and used for fancy work.

MAMMOK, a word of Aramaic origin meaning " riches." The etymology is doubtful; connexions with a word meaning " en- trusted," or with the Hebrew matmon, treasure, have been suggested. " Mammon," Gr. naˆvas (see Professor Eb. Nestle in Ency. Bib. s.v.), occurs in the Sermon on the Mount (Matt, vi. 24) and the parable of the Unjust Steward (Luke xvi. 9-13). The Authorized Version keeps the Syriac word. Wycliffe uses " richessis." The New English Dictionary quotes Piers Plowman as containing the earliest personification of the name. Nicho- laus de Lyra (commenting on the passage in Luke) says that Mammon est nomen daemonis. There is

no trace, however, of any Syriac god of such a name, and the common identification of the name with a god of covetousness or avarice is chiefly due to Milton {Paradise Lost, i. 678).

MAMMOTH (0. Russ. mammot, mod. mamanl; the Tatar word mama, earth, from which it is supposed to be derived, is not known to exist), a name given to an extinct elephant, Elephas primigenius of Blumenbach. Probably no extinct animal has left such abundant evidence of its former existence; immense numbers of bones, teeth, and more or less entire car- cases, or " mummies," as they may be called, having been dis- covered, with the flesh, skin and hair in situ, in the frozen soil of the tundra of northern Siberia.

The'general characteristics of the order Proboscidea, to which the mammoth belongs, are given under that heading. The mammoth pertains to the most highly specialized section of the group of elephants, which also contains the modern Asiatic species. Of the whole group it is in many respects, as in the size and form of the tusks and the characters of the molar teeth, the farthest removed from the mastodon type, while its nearest surviving relative, the Asiatic elephant {E. maximus), has retained the slightly more generalized characters of the mam- moth's contemporaries of more southern climes, E. columbi of America and E. armeniacus of the Old World. The tusks, or upper incisor teeth, which were probably smaller in the female, in the adult males attained the length of from 9 to 10 ft. measured along the outer curve. Upon leaving the head they [were directed at first downwards, and outwards, then upwards and finally inwards at the tips, and generally with a tendency to a spiral form not seen in other elephants.

It is chiefly by the characters of the molar teeth that the various extinct modifications of the elephant type are distinguished. Those of the mammoth (fig. 2) differ from the corresponding organs of allied species in great breadth of the crown as compared with the length, the narrowness and crowding or close approximation of the ridges, the thinness of the enamel, and its straightness, parallelism and absence of " crimping," as seen on the worn surface or in a horizontal section of the tooth. The molars, as in other elephants, are six in number on each side above and below, succeeding each other from before backwards. Of these Dr Falconer gave the pre- vailing " ridge-formula "(or number of complete ridges in each tooth) as 4, 8, 12, 12, 16, 24, as in E. maximus. Dr Leith-Adams, working from more abundant materials, has shown that the number of ridges of each tooth, especially those at the posterior end of the series, is subject to individual variation, ranging in each tooth of the series within the following limits: 3 to 4, 6 to 9, 9 to 12, 9 to 15, 14 to 16, 18 to 27—excluding the small plates, called " talons," at each end. Besides these

variations in the number of ridges or plates of which each tooth is composed, the thickness of the enamel varies so much as to have given rise to a distinction between a " thick-plated " and a " thin-plated " variety — the latter being most prevalent among specimens from the Arctic regions. From the specimens with

thick enamel plates the transition to the other species mentioned above, including E. maximus, is almost imperceptible.

The bones of the skeleton generally more resemble those of the Indian elephant than of any other species, but the skull differs in the narrower summit, narrower temporal fossae, and more prolonged incisive sheaths, supporting the roots of the enormous tusks. Among the external characters by which the mammoth was distinguished from either of the existing species of elephant was the dense clothing, not only of long, coarse outer hair, but also of close under woolly hair of a reddish-brown colour, evidently in adaptation to the cold climate it inhabited. This character is represented in rude but graphic drawings of prehistoric age found in caverns in the south of France. It should be added that young Asiatic elephancs often show considerable traces of the woolly coat of the mammoth. The average height does not appear to have exceeded that of either of the existing species of elephant.

The geographical range of the mammoth was very extensive. There is scarcely a county in England in which its remains have not been found in alluvial gravel or in caverns, and numbers of its teeth are dredged in the North Sea. In Scotland and Ireland its remains are less abundant, and in Scandinavia and Finland they appear to be unknown; but they have been found in vast numbers at various localities throughout the greater part of central Europe (as far south as Santander and Rome), northern Asia, and the northern part of the American continent.

The mammoth belongs to the post-Tertiary or Pleistocene epoch and was contemporaneous with man. There is evidence to show that it existed in Britain before, during and after the glacial period. It is in northern Siberia that its remains have

erect position, with the soft parts and hairy covering entire, have been brought to light.

(From Tilesius.) . .

Fig. 1. — Skeleton of Mammoth (Elephas primigenius) , with portions of the skin

been found in the greatest abundance and in exceptional preser- vation. For a long period there has been from that region an export of mammoth-ivory, fit for commercial purposes, to China and to Europe. In the middle of the 10th century trade was carried on at Khiva in fossil ivory. Middendorff estimated the number of tusks which have yearly come into the market during the last two centuries at at least a hundred pairs, but Norden- skiold considers this estimate too low. Tusks are found along the whole shore-line between the mouth of the Obi and Bering Strait, and the farther north the more numerous they become, the islands of New Siberia being one of the favourite collecting localities. The remains are found not only round the mouths of the great rivers, but embedded in the frozen soil in such circum- stances as to indicate that the animals lived not far from the localities in which they are found; and they are exposed either by the melting of the ice in warm summers or the washing away of the sea r cliffs or river-banks. In this way the bodies of more or less nearly perfect animals, often standing in the

(From Owen.)

Fig. 2. — Grinding surface of Upper Molar Tooth of the Mammoth (Elephas primigenius) . c, cement; d, dentine; e, enamel.

For geographical distribution and anatomical characters see Falconer's Palaeontological Memoirs, vol. ii. (1868); B. Dawkins, " Elephas Primigenius, its Range in Space and Time," Quart. Journ, Geol. Soc, xxxv. 138 (1879); and A. Leith Adams, "Monograph of British Fossil Elephants," part ii., Palaeontographical Society (1879). (W. H. F.; R.L.)*

MAMMOTH CAVE, a cave in Edmondson county, Kentucky, U.S.A., 37 14′ N. lat. and 86° 12′ W. long., by rail 85 m. S.S.W. of Louisville. Steamboats run from the mouth of the Green river, near Evansville, Indiana, to the Mammoth Cave landing, The cave is usually said to have been discovered, in 1809, by a hunter named Hutchins; but the county records, as early as 1797, fixed its entrance as the landmark for a piece of real estate. Its mouth is in a forest ravine, 194 ft. above Green river and 600 ft. above the sea. This aperture is not the original mouth, the latter being a chasm a quarter of a mile north of it, and leading into what is known as Dixon's cave. The two portions are not now connected, though persons in one can make themselves heard by those in the other.

The cavernous limestone of Kentucky covers an area of 8000 sq. m., is massive and homogeneous, and belongs to the Subcarboniferous period. It

shows few traces of dynamic disturbance, but has been carved, mainly by erosion since the Miocene epoch, into many caverns, of which the Mammoth Cave is the largest.

The natural arch that admits one to Mammoth Cave has a span of 70 ft., and from a ledge above it a cascade leaps 59 ft. to the rocks below, where it disappears. A flight of stone steps leads the way down to a narrow passage, through which the air rushes with vio- lence, outward in summer and inward in winter. The temperature of the cave is uniformly 54 F. through- out the year, and the atmosphere is both chemically and optically of singular purity. While the lower levels are moist from the large pools and rivers that have secret connexion with Green river, the upper galleries are extremely dry. These conditions led at one time to the erection of thirteen cottages at a point about 1 m. underground, for the use of invalids, especially consumptives. The experiment failed, and only two cottages now remain as curiosities.

The Main Cave, from 40 to 300 ft. wide and from 35 to 125 ft. high, has several vast rooms, e.g. the Rotunda, where are the ruins of the old saltpetre works; the Star Chamber, where the protrusion of white crystals through a coating of the black oxide of manganese creates an optical illusion of great beauty; the Chief City, where an area of 2 acres is covered by a vault 125 ft. high, and the floor is strewn with rocky fragments, among which are found numerous half-burnt torches made of canes, and other signs of prehistoric occupancy. Two skeletons were exhumed near the

Rotunda; but few other bones of any description have been found. The so-called Mammoth Cave ” mummies ” (i.e. bodies kept by being inhumed in nitrous earth), with accompanying utensils, ornaments, braided sandals and other relics, were found in Short and Salt Caves near by, and removed to Mammoth Cave for exhibition. The Main Cave, which abruptly ends 4 m. from the entrance, is joined by winding passages, with spacious galleries on different levels; and, although the diameter of the area of the whole cavern is less than 10 m., the conbined length of all accessible avenues is supposed to be about 1 50 m.

The chief points of interest are arranged along two lines of exploration, besides which there are certain side excursions.

and was formerly regarded as the finest room in the cavern. Others admire more the Mammoth Dome, at the termination of Spark’s Avenue, where a

cataract falls from a height of 150 ft. amid walls wonderfully draped with stalactitic tapestry. The Egyptian Temple, which is a continuation of the Mammoth Dome,' contains six massive columns, two of them quite perfect and 80 ft. high and 25 ft. in diameter. The combined length of these contiguous chambers is 400 ft. By a crevice above they are connected with an arm of Audubon's Avenue. Lucy's Dome, one of the group of Jessup Domes, is supposed to be the loftiest of all these vertical shafts. A pit called the " Maelstrom," in Croghan's Hall, is the spot most remote from the mouth of

Qerta's Grotto^ Cretghton's Dome ft

*-"x F »**lpiil>l,***

INDEX

■■ *7** Iron Gate*

***-Angatlcaf* Crofttv*

Ho«'s Catttedral©^^*

*%. Hutching Harrow**

4)- Scotchman's Tram

|. Kentucky Cliffs; and Urn

44- Fat Man's miter.*

Corkscrew

41- Bandit Hall

*83 a c^si&i^^ss**^™*

4. The Church

46. Briog's Auemio. '

r

-

*j. Booth- » Amphitheatre * Standing Rocks ? Grand Arch*

17. Chariot's Dome 48. WiiatVa Dome 49 Balanced jfadk*

>

^

)

*|. Giant s Coffin; and Darite***

jo- The Dead Sea

*H*ll^ (Ss^ ^1/ ^^. ffls.*

Gateway

51. Charon' Casoad**

V

*»» r *«> l „, -*y Melsoo^s Come* 1MB*

*ft Acute Angle and Cottage**

D- Janirfs landing

to- Proctor's Arcade

ja- Cascade Mail

ii. Wright's Rotunda

JJ. Serpent Hall

*!== * := ^ e ^" . t ^^^. Edna's Dome*

1 1. The Cataract 1 j fairy Grotto*

*54- Valley- mag Side-en 5j. The Great Wester**

'

GftUawfcy's

_^^&r5&^^^j-

-^9^ WUh/lUlj*

."?■ |J|Tot«c«oUJMI*

14- St. Catherine City “J- Symmaa’PH

*16. Van of Flowers j j. The Jessup Dome**

Dome

Elisabeth’s Dome/

16- Mummy’s Make

j8 0I« Bull’s Concert Hail’

*‘ Bi>lioti’»Piir£*i*

€L^ a k fi Table of approximate distances

■ *7- Register Hall ii. Tha Bridal Altar 19. The Arm Chair*

J9. H» Chamber to. Shetp Shelter At. Corrinne’s Dome,’

*/iui ff ^ C ^fe s ?s=S5t? ! K (l l) To the Kentucky Cliffs o*oi*t,. j8o yd*.*

J j^UM(n« <^\N^^'R>^^’^^^\ /?^ •* Standing Rocks ….647 ..*

so. tooar‘9 taap

H- Black Hole of Calcutta

**li*

*(itihxtiXhff TbKla a^^^* J^iC^^^ >C ** Giant’s Coffin.! „ 87i . ..*

>i Elbow Creoiee

«j. Parrish’s Path .

*// JmW^ 910 **

U_^>fe[jK^f 1 sj^Sff ” Vltinta Thule 1…4300 ••

*J^^i.(l5^Vi^\ fi' < gL y/ // // « ** ■ I'mitathn HHi «•-..' 1840 ,.*

M Mepoleon’e Oorna

‘ 64- Crypt of Jewels %

**//*

*% Wilson's Way

6j. Washington Hall

*fe*L

*^^^&$/2fav\ 1 £\?&'/jr M Xk *» Angelica's Grotto ,,...1957 „

U- take Purity

U. Snow Ball Room

.Dome «S|HKt"\«

#*"9y>^ Va***"""^ tC ^^ 9 « Mammoth Dome ,,...1870.,,

>J. Annette Dome

67. Flora) Cross

s^^

jdpil \C y&s&eyAnY^^s. /?? „ Echo Rwer fAj ajao ..

$3l II }) C^^^SS^xl r ^*v " End of Echo Rioerfest) jooo ■.

\^ ^\S^1\ \iL ?*» " nlary' a Vineyard..... 6000 „

■*• Lao's Cisterns 17 Wooden Bowl Room **8. Tha lott Way fattnj «9 Way to Pits and Oume**

66 Orpha's Garden- / *9- Wisdom's Path j(70- Paradise if 7i- Zoe's Grotto If

4f

/cMnney

\#

«Jl\ 'Sir iPit* C§V«!v Zff ■ " Hooey's Cathedral

10. Sid* Saddle Pit

7». Flora's Garden \|

)s

Sli

Chlefigll Jf CityJ» iˆ>

*It Bottom!*** Pit 13. Cowered Pit*

7) C«/« o/OifmowfJt 74- «#/•«'« Hail ˆk

]8

tfc '

*it. Scyll**

7J. Chorion's Grotto

«

£

ˆT ■/(*

U Charybdis

JI Putnam's Cabinet

76. Serena's Arbor 1 77- Dismal Hollow 1

9

c

V

5>v

iˆyˆCT

)6 Darnall's Way

*78 Clark's Avenue **

\5

X& jrf/

6«

ˆ1

*ˆ «v r o’j^^ˆiˆ-Ji

J7. Ariadne’s Grotto

79. riarlnn’s Avenue

ˆifiC U

^^LV l(M^^r

18 Short cut from Bottomless’

80. hicholson’s Avenue

a

IC

ˆ

• ˆsJm

ˆ1 .A ‘^1(P» ¥ ft

Pit to Goring’* Oome

Bt. Boone i4venw« ,

*5

lftc»

ˆJy

•/ 5W\

\> ,oˆ?&= *~3ˆ\ J)’ — ˆ

19 Reveller’s Mall

Bi- Pinson’s Pass 1

a

\ˆ

If imf-,/

^^2

4^U*

so. Grand Crossing

S> Hawk-n's Way A

vs.

/is\ '3(r

*yft_*

41- Pineapple Bush

*VjStarChunber ^^*

^TKy

fttfj ^?/Wi

13S _, 8 /^uj

VjasSs"

*J?»n5S\f ^^ Jf'K Y**

, £ nl (JS&a&?T

0^!

BPlt J

t flL Conn's fflJ

!»£. t^Ttr!" \L°

*1 *V*

^Neptune'sVk >C \v >

S^ Dome"£a

ISr&Sw \fr

rt « •>

So

«. ^^— «-^f

fl- '■mTp\ /)~

*.Plln^^*

*A **

^Slr ups J ^t=^V

**^\^ X River ^*

*&sf5Sri\ fo^*

**9*

xf

*bWk^-^z^*

*“-. flˆvM tfˆx Call’s Jˆ (= *Xroghan!!i*

3

7?pgip-‘»cˆ

TM i-

t Hilt £¥ Hˆ 1&i

W&-

Sr

Rnrert

all

ft

3 ˆ11

oV off

*§hv **

ˆ» S> “v?;

MP

*// I**

H

p.IallWiolfjj

™9”«ˆ

MAMMOTH CAVE ‘•ˆ KENTUCKY

Entrance

ˆ<

ˆ

Dome Route ‘&#» Copyright 1907 by Horace C.Hovey*

Olive's Bowwry^i

Emery Walker sc

The "short route" requires about four hours, and the "long route " nine. Audubon's Avenue, the one nearest the entrance, is occupied in winter by myriads of bats, that hang from the walls in clusters like swarms of bees. The Gothic Avenue contains numerous large stalactites and stalagmites, and an interesting place called the Chapel, and ends in a double dome and cascade. Among the most surprising features of cave scenery are the vertical shafts that pierce through all levels, from the uppermost galleries, or even from the sink-holes, down to the lowest floor. These are styled pits or domes, according to the position occupied by the observer. A crevice behind a block of stone, 40 ft. long by 20 ft. wide, called the Giant's Coffin, admits the explorer to a place where six pits, varying in depth from 65 ft. to 200 ft., exist in an area of 600 yds. This includes Gorin's Dome, which is viewed from a point midway in its side, and also from its top,

the cave. There are some fine stalactites near this pit, and others in the Fairy Grotto and in Pensico Avenue; but, consider- ing the magnitude of Mammoth Cave, its poverty of stalactitic ornamentation is remarkable. The wealth of crystals is, how- ever, surprising, and these are of endless variety and fantastic beauty.

Cleveland's Cabinet and Marion's Avenue, each a mile long, are adorned by myriads of gypsum rosettes and curiously twisted crystals, called " oulopholites." These cave flowers are unfolded by pressure, as if a sheaf were forced through a tight binding, or the crystal fibres curl outward from the centre of the group. Thus spotless arches of 50 ft. span are embellished by floral clusters and garlands, hiding nearly every foot of the grey limestone. The botryoidal formations hanging by thousands in Mary's Vineyard resemble mimic clusters of grapes,

as the oulopholites resemble loses. Again, there are chambers with drifts of snowy crystals of the sulphate of magnesia, the ceilings so thickly covered with their efflorescence that a loud concussion will cause them to fall like flakes of snow.

Many small rooms and tortuous paths, where nothing of special interest can be found, are avoided as much as possible on the regular routes; but certain disagreeable experiences are inevitable. There is peril also in the vicinity of the deep pits. The one known as the Bottomless Pit was for many

years a barrier to all further exploration, but it is now crossed by a wooden bridge. Long before the shaft had been cut as deep as now the water flowed away by a channel gradually contracting to a serpentine way, so extremely narrow as to be called the Fat Man's Misery. The walls, only 18 in. apart, change direction eight times in 105 yds., while the distance from the sandy path to the ledge overhead is but 5 ft. The rocky sides are finely marked with waves and ripples, as if running water had suddenly been petrified. This winding way conducts one to River Hall, beyond which lie the crystalline gardens that have been described. It used to be said that, if this narrow passage were blocked up, escape would be impossible; but an intricate web of fissures, called the Corkscrew, has been discovered, by means of which a good climber, ascending only a few hundred feet, lands 1000 yds. from the mouth of the cave, and cuts off one or two miles.

The waters, entering through numerous domes and pits, and falling, during the rainy season, in cascades of great volume, are finally collected in River Hall, where they form several extensive lakes, or rivers, whose connexion with Green River is known to be in deep springs appearing under arches on its margin. When- ever there is a freshet in Green River the streams in the cave are joined in a continuous body of water, the rise sometimes being 60 ft. above the low-water mark. The subsidence within is less rapid than the rise; and the streams are impassable for about seven months in each year. They are navigable from May to October, and furnish interesting features of cave scenery. The first approach is called the Dead Sea, embraced by cliffs 60 ft. high and 100 ft. long, above which a path has been made, whence a stair- way leads down to the banks of the river Styx, a body of water 40 ft. long, crossed by a natural bridge. Lake Lethe comes next — a broad basin enclosed by walls 90 ft. high, below which a narrow path leads to a pontoon at the neck of the lake. A beach of the finest yellow sand extends for 500 yds. to Echo River, the largest of all being from 20 to 200 ft. wide, 10 to 40 ft. deep and about three-quarters of a mile long. It is crossed by boats. The arched passage-way is very symmetrical, varying in height from 19 to 35 ft., and famous for its musical reverberations — not a distinct echo, but an harmonious prolongation of sound for from 10 to 30 seconds after the original tone is produced. The long vault has a certain keynote of its own, which, when firmly struck, excites harmonics, including tones of incredible depth and sweetness.

There are several other streams here besides those in River Hall. On one of them F. J. Stevenson of London is said to have floated for seven hours without finding its end. A glance at the accompanying map will show that there is a labyrinth of avenues and chasms seldom visited and never fully explored. New dis- coveries are frequently made. An exploring party in 1904 found a curious complex of upper and lower galleries accessible from the most eastern portion of the cave; beyond which another party, in 1905,

discovered several large domes previously un- known. H. C. Hovey, in 1907, was led by expert guides into still wilder recesses, where a series of five domes were found, that opened into each other by tall gateways; each dome being 60 ft. in diameter and 175 ft. high. This magnificent group has since beennamed "Hovey's Cathedral Domes." No instrumental survey of the Mammoth Cave has ever been allowed by the management. The best map possible is therefore only the result of estimates and partial measurements. The depths of the most noted pits have easily been ascertained by line and plummet and the height of several large domes has been found by the use of small balloons. While making a survey exclusively for the cave-owners in 1908, Max Kaemper of Berlin, Germany,

forced an opening from the main cave into a remarkable region to which the general name of " Violet City " was given, in honour of Mrs Violet Blair Janin, who owned a third of the Mammoth Cave estate. Special features are Kaemper Hall, Blair Castle, the Marble Temple and Walhalla. There are eleven enormous pits, many large fine stalactites and stalagmites and surprisingly beautiful mural decorations. Dr Hovey made and published (1909) a new handbook embodying all known discoveries of importance, with four sketch-maps of the routes of usual exhibition.

Thefaunaof Mammoth Cavehas been classifiedbyF. W.Putnam, A. S. Packard and E. D. Cope, who have catalogued twenty- eight species truly subterraneous, besides those that may be re- garded as stragglers from the surface. They are distributed thus : Verlebrata, 8 species; Insecta, 17; Arachnida, 12; Myriapoda, 2; Crustacea, 5; Vermes, 3; Mollusca, 1. Ehrenberg adds a list of 8 Polygastric Infusoria, 1 fossil infusorian, 5 Phytolitharia and several microscopic fungi. A bed of Agaricus was found by the writer near the river Styx; and upon this hint an attempt has been made to propagate edible fungi in this locality. All the known forms of plant-life are either fungi or allied to them, and many are only microscopic. The most interesting inhabitants of Mammoth Cave are the blind, wingless grasshoppers, with extremely long antennae; blind, colourless crayfish (Cambarus pellucidus, Telk.); and the blind fish, Amblyopsis spelaeus, colourless and viviparous, from 1 in. to 6 in. long. The Cambarus and Amblyopsis have wide distribution, being found in many other caves, and also in deep wells, in Kentucky and Indiana. Fish not blind are occasionally caught, which are apparently identical with species existing in streams outside. The true subterranean fauna may be regarded as chiefly of Pleistocene origin; yet certain forms are possibly remnants of Tertiary life.

Bibliography. — Plan and Description of the Great and Wonderful Cave in Kentucky, by Dr Nahum Ward (1816) ; Notes on the Mammoth Cave, with a Map, by Edmund F. Lee, C.E. (1835); Rambles in the Mammoth Cave in 1844, by Alexander Bullitt, with map by Stephen Bishop; guide-

books by Wright (1858), Binkerd (1869), Forwood (1875), Proctor (1878), Hovey (1882), &c, and Hovey and Call (1897); Hovey's Celebrated American Caverns (1882, &c.) ; and The Mammoth Cave and its Inhabitants, by Packard and F. W. Putnam (1879). (H. C. H.)

MAMOR£, a large river of Bolivia which unites with the Beni in io° 20′ S. to form the Madeira, one of the largest tributaries of the Amazon. It rises on the northern slope of the Sierra de Cochabamba east of the city of Cochabamba, and is known as the Chimore down to its junction with the Chapare, or Chapari. Its larger tributaries are the Chapare, Secure, Apere and Yacuma from the west, and the Ichila, Guapay or Grande, Ivari and Guapore from the east. Taking into account its length only, the Guapay should be considered the upper part of the Mamore; but it is shallow and obstructed, and carries a much smaller volume of water. The Guapore, or Itenez, also rivals the Mamor6 in length and volume, having its source in the Serra dos Parecis, Matto Grosso, Brazil, a few miles from streams flowing north- ward to the Tapajos and Amazon, and southward to the Paraguay and Parana. The Mamore is interrupted by rapids a few miles above its junction with the Beni, but a railway 180 m. long has been undertaken from below the rapids of the Madeira. Above the rapids the river is navigable to Chimor6, at the foot of the sierra, and most of its tributaries are navigable for long distances. Franz Keller (in The Amazon and Madeira Rivers; New York, 1874) gives the outflow of the Mamore at mean water level, and not including the Guapore, as 2530 cub. in. per second, and the area of its drainage basin, also not including the Guapore, as 9382 sq. m.

See Edward D. Mathews, Up the Amazon and Madeira Rivers (London, 1879).

MAMUN (c. 786-833), originally Abdallah, surnamed Al- Ma'mCn ("in whom men trust "), the seventh of the Abbasid caliphs of Bagdad, was born about a.d. 786, and was the second son of Harun al-Rashld. By Harun's will he was successor-

designate to his brother Amin, during whose reign he was to be governor of the eastern part of the empire. On Harun's death (809) Amin succeeded and Mamun acquiesced. Irritated, how- ever, by the treatment he received from Amin, and supported by a portion of the army, Mamun speedily rebelled. A five years' struggle between the two brothers ended in the death of Amin and the proclamation of Mamun as caliph at Bagdad (Sept. 813).

Various factions and revolts, which disturbed the first years of his reign, were readily quelled by his prudent and energetic measures. But a much more serious rebellion, stirred up by his counten- ancing the heretical sect of Ali and adopting their colours, soon after threatened his throne. His crown was actually on the head of his uncle Ibrahim b. Mahdi (surnamed Mobarek) for a short time (Barbier de Meynard, in Journal Asiatique, March-April 1869). This inaugurated a period of tranquillity, which Mamun employed in fostering literature and science. He had already, while governor of Khorasan, founded a college there, and attracted to it the most eminent men of the day, and Bagdad became the seat of academical instruction. At his own expense he caused to be translated into Arabic many valuable books from the Greek, Persian, Chaldean and Coptic languages; and he was himself an ardent student of mathematics and astronomy. The first Arabic translation of Euclid was dedicated to him in 813. Mamun founded observatories at Bagdad and Kassiun (near Damascus), and succeeded in determining the inclination of the ecliptic. He also caused a degree of the meri- dian to be measured on the plain of Shinar; and he constructed astronomical tables, which are said to be wonderfully accurate. In 827 he was converted to the heterodox faith of the Mo'tazil- ites, who asserted the free-will of man and denied the eternity of the Koran. The later years (820-830) of his reign were dis- tracted by hostilities with the Greek emperor Theophilus, while a series of revolts in different parts of the Arabian empire be- tokened the decline of the military glory of the caliphs. Spain and part of Africa had already asserted their independence, and Egypt and Syria were now inclined to follow. In 833, after quelling Egypt, at least nominally, Mamun marched into Cilicia to prosecute the war with the Greeks, but died near Tarsus, leaving his crown to a younger brother, Motasim. The death of Mamun ended an important epoch in the history of science and letters and the period of Arabian prosperity which his father's reign had begun.

See further under Caliphate, sect. C, §§ 5, 6, 7.

MAMUND, a Pathan tribe and valley on the Peshawar border of the North- West Frontier Province of India. The Mamunds live partly in Bajour and partly in Afghan territory, due north of the Mohmands, a much larger tribe, with whom they must not be confounded. They are one of the clans of the Tarkanis (q.v.), and number 6000 fighting men; they gave much trouble during the Chitral Campaign in 1895, and again during the Mohmand Expedition in 1897 they inflicted severe losses upon General Jeffrey's brigade. (See Mohmand.)

MAN, the word common to Teutonic languages for a single person of the human race, of either sex, the Lat. homo, and Gr. avdfxinros; also for the human race collectively, and for a full- grown adult male .human being.

Teutonic languages, other than English, have usually adopted a derivative in the first sense, e.g. German Mensch. Philologists are not in agreement as to whether the Sanskrit manu is the direct source, or whether both are to be traced to a common root. Doubt also is thrown on the theory that the word is to be referred to the Indo-Germanic root, men, meaning " to think," seen in " mind," man being essentially the thinking or intelligent animal. (See Anthro- pology.)

MAN, ISLE OF (anc. Mom), a dominion of the crown of England, in the Irish Sea. (For map, see England, section I.) It is about 33 m. long by about 1 2 broad in the broadest part. Its general form resembles that of an heraldic lozenge, though its out- line is very irregular, being indented with numerous bays and narrow creeks. Its chief physical characteristic is the close juxtaposition of mountain, glen and sea, which has produced a

variety and beauty of scenery unsurpassed in any area of equal size elsewhere.

The greater part of its surface is hilly. The hills, which reach their culminating point in Snaefell (2034 ft.), have a definite tendency to trend in the direction of the longer axis, but throw out many radiating spurs, which frequently extend to the coast-line. They are, for the most part, smooth and rounded in outline, the rocks being such as do not favour the form- ation of crags, though, owing to the rapidity of their descent, streams have frequently rent steep-walled craggy gulleys in their sides. The strength of the prevalent westerly winds has caused them to be treeless, except in some of the lower slopes, but they are clad with verdure to their summits. Rising almost directly from the sea, they appear higher than they really are, and therefore present a much more imposing appearance than many hills of greater altitude. On the south-west, where they descend precipitously into the sea, they unite with the cliffs to the north and south of them to produce the most striking part of the coast scenery for which the isle is remarkable. But, indeed, the whole coast from Peel round by the Calf, past Castleˆ town and Douglas to Maughold Head, near Ramsey, is distin- guished by rugged grandeur. From Ramsey round by the Point of Ayre to within a few miles of Peel extend low sandy cliffs, bordered by flat sandy shores, which surround the northern plain. This plain is relieved only by a low range of hills, the highest of which attains an elevation of 270 ft. The drainage of the island radiates from the neighbourhood of Snaefell, from which moun- tain and its spurs streams have on all sides found their way to the sea. The most important of these are the Sulby, falling into the sea at Ramsey; the Awin-glass (bright river) and the Awin- dhoo (dark river), which unite their waters near Douglas; the Neb, at the mouth of which Peel is situated; and the Awin-argid (silver river, now called the Silverburn), which joins the sea at Castletown. There are no lakes. The narrow, winding glens thus

formed, which are studded with clumps of fir, syca- more and mountain ash, interspersed with patches of gorse, heather and fern, afford a striking and beautiful contrast to the bare mountain tops. Traces of an older system of drainage than that which now exists are noticeable in many places, the most remarkable being the central depression between Douglas and Peel. The chief bays are; on the east coast, Ramsey, with an excellent anchorage, Laxey, Douglas, Derbyhaven, Castletown and Port St Mary; and, on the west coast, Port Erin and Peel. Geology. — The predominant feature in the stratigraphy of the Isle of Man is, in the words of G. W. Lamplough, 1 " the central ridge of slate and greywacke, which seems to have constituted an insulated tract at as early a date as the beginning of the Carbon- iferous period. This prototype of the present island appears after- wards to have been enfolded and obliterated by the sediments of later times; but with the progress of denudation the old ridge has once more emerged from beneath this mantle." This mass of ancient rocks, the Manx Slate Series, has been divided locally into the Barrule slates, the Agneesh and other grit beds ; and the Lonan and Niarbyl Flags. The whole series strikes N.E.S.W., while structurally the strata form part of a synclinorium, the higher beds being on the N.W. and S.E. sides of the islands,, the lower beds in the interior; although the subordinate dips appear to indicate an anticlinal structure. These rocks have been greatly crumpled; and in places, notably in Sully Glen, thrusting has developed a well marked crush-breccia. So much has this folding and compression toughened the soft argillaceous rocks that the Barrule Slate, for example, is almost everywhere found occupying the highest points, while the hard but more joined grits and flags occupy the lower ground on the mountain flanks. The Manx Series is penetrated and altered by large masses of granite at Dhoon, Foxdale and one or two other spots; and dykes, more or less directly associated with these masses, are numerous. No satisfactory fossils have yet been obtained from these rocks, but they are regarded, provisionally, as of Upper Cambrian age. Carboniferous rocks, including a basal conglomerate, white limestone with abundant fossils, and the black " Posidonomya Beds " (some of which are polished as a black marble) occur about Castletown, Poolvash Bay and Langness; and the base- ment beds appear again on the west coast at Peel. The cliffs and foreshore at Scarlet Point exhibit contemporaneous Carboniferous tuffs, agglomerates and basalts, as well as later dolerite dykes, in a most striking manner. Here too may be seen some curious effects

1 G. W. Lamplough, The. Geology of the Isle of Manˆ Mem. G?ol. Survey (1903).

of thrusting in the limestones. At the northern end of the island the Manx Slates end abruptly in an ancient sea-cliff which crosses between Ramsey and Ballaugh. The low-lying country beyond is formed of a thick mass of glacial sands, gravels and boulder clay. In the Bride Hills are to be seen glacial mounds rising 150 ft. above the level of the plain. The depressions known as the Curragh, now drained but still peaty in places, probably represent the sites of late glacial lakes. Glacial deposits are found also in all parts of the island. Beneath the thick drift of the plain, Carboniferous, Permian and Trassic rocks have been proved to lie at some depth below the

C resent sea-level. On the coast near the Point of Ayr is a raised each. Silver-bearing lead ore, zinc and copper are the principal minerals found in the Isle of Man; the most important mining centres being at Foxdale and Laxey.

Climate. — The island is liable to heavy gales from the south-west. Of this the trend of the branches of the trees to the north-east is a striking testimony. But it is equally subject to the influence of the warm drift from the Atlantic, so that its winters are mild, and, in- fluenced by the less changeable temperature of the sea, its summers cool. The mean annual temperature is49°-o F., the temperature of the coldest month (January) being 41 °-5, and the warmest (August) 58°- 5, giving an extreme annual range of temperature of 17°- 1 only, while the average temperature in spring is 46°-o, in summer 57°-2, in autumn 50°-9 and in winter 42°-o. Further evidence of the mildness of the climate is afforded by the fact that fuchsias, hydrangeas, myrtles and escallonias grow luxuriantly in the open air. Its rainfall, placed as it is between mountain districts in England, Ireland, Scotland and Wales, is naturally rather wet than dry. Statistics, however, reveal remark- able divergencies in the amounts of rain in the different parts of the island, varying from 61 in. at Snaefell to 25 in. at the Calf of Man. In the more populous districts it varies from 46 in. at Ramsey, and 45 in. at Douglas, to 38 in. at Peel and 34 in. at Castletown. Of sunshine the Isle of Man has a larger share than any portion of the United Kingdom except the south and south-east coasts and the Channel Islands. Briefly, then, the climate of the island may be pronounced to be equable and sunny, and, though humid, decidedly invigorating; its rainfall, though it varies greatly, is excessive in the populous districts; and its winds are strong and frequent, and usually mild and damp.

Fauna. — Like Ireland, the Isle of Man is exempt from snakes and toads, a circumstance traditionally attributed to the agency of St Patrick, the patron saint of both islands. Frogs, however, have been introduced from Ireland, and both the sand lizard and the com- mon lizard are found. Badgers, moles, squirrels and voles are absent and foxes are extinct. Fossil bones of the Irish elk are frequently found, and a complete skeleton of this animal is

to be seen at Castle Rushen. The red deer, which is referred to in the ancient laws and pictured on the runic crosses, became extinct by the beginning of the 1 8th century. Hares are less plentiful than formerly, and rabbits are not very numerous. Snipe are fairly common, and there are a few partridges and grouse. The latter, which had become extinct, were reintroduced in 1880. Woodcock, wild geese, wild ducks, plover, widgeon, teal, heron, bittern, kingfishers and the Manx shearwater (Puffinus anglorum) visit the island, but do not breed there. The puffin (Fratercula artica) is still numerous on the Calf islet in the summer time. The peregrine falcon, which breeds on the rocky coast, and the chough have become very scarce. The legal protection of sea-birds (local act of 1867) has led to an enormous increase in the number of gulls. A variety of the domestic cat, remarkable for the absence or stunted condition of the tail, is peculiar to the island.

Flora. — Like the fauna, the flora is chiefly remarkable for its meagreness. It contains at most 450 species as compared with 690 in Jersey. Alpine forms are absent. But what it lacks in variety it makes up in beauty and quantity. For the profusion of the gorse- bloom and the abundance of spring flowers, especially of primroses, and of ferns, the Isle of Man is probably unrivalled.

People. — The Manx people of the present day are mainly of Scandio-Celtic origin, with some slight traces of earlier races. They have large and broad heads, usually broader than those of their brother Celts (Coidels) in Ireland and Scotland, with very broad, but not specially prominent cheek-bones. Their faces are usually either scutiform, like those of the Northmen, or oval, which is the usual Celtic type, and their noses are almost always of good length, and straighter than is general among Celtic races. Light eyes and fair complexion, with rather dark hair, are the more usual combinations. They are usually rather tall and heavily built, their average height (males) being 5 ft. 7ˆ in., and average weight (naked) 155 lb. The tendency of the population to increase is balanced by emigration. It reached its maximum in 1891. Since then it has slightly declined. A noticeable feature is its greater proportionate growth in the towns, especially in Douglas, than in the country. The country population reached its maximum in 1851. Since then it has been shrinking rapidly, especially in the northern district.

Sheadings, Parishes and Towns.

3

Pi

•a.

T3

6&[

o

<

S.3-

Malew (P.) . , Castletown (T.) Arbory (P.) . . Rushen (P.) Santon (P.) . Braddan (P.) , Douglas (T.) Onchan (P.) Marown (P.) German (P.) Peel (T.) Patrick (P.) . Lonan (P.) . Maughold (P.) Ramsey (T.) Lezayre (P.) Bride (P.) . Andreas (P.) Jurby(P.) . Ballaugh (P.) Michael (P.)

Total

1726.

890

785 661

813 376 780 810 370 499

5io

475 745 547 529 460

1.309 612 967

483 806

643

1821.

14,070

2,649 2,036

1.455

2,568

800

1.754 6,054

1.457 1,201 1,849 1,909 2,031 1,846

I.5H

1.523 2,209 1,001 2,229 1,108 1,467 1,427

40,087

1871.

2,466 2,318

i.35o

3,665 628 2,215 13,846 1 ,620 1,121 1,762 3,496 2,888 3,741 1,433

3,86i

1,620 880

1,757 788

1,077 1,231

1901.

53,763

2. 113

1,963

802

3,277 468

2J77-

I9,H9

3,942

973 1,230 3,306 1.925 2,513

887 4,672 1,389

539 1,144

504 712 928

54,6i3

Chief Political Divisions and Towns. — The island is divided into six sheadings (so named from the Scandinavian ske'Sa-ping, or ship-district), called Glenfaba, Middle, Rushen, Garff, Ayre and Michael, each of which has its officer, the coroner, whose functions are similar to those of a sheriff; and there are seventeen parishes. For the towns see Castletown, Douglas, Peel and Ramsey. The principal villages are Ballasalla, Ballaugh, Foxdale, Laxey, Michael, Onchan, Port Erin and Port St Mary.

Communications. — There is communication by steamer with Liverpool, Glasgow, Greenock, Belfast, Silloth, Whitehaven, Belfast and Dublin throughout the year and, during the summer season, there are also steamers plying to Androssan, Heysham, Fleetwood and Blackpool. A daily mail was established in 1879. The internal communications are excellent. The roads are under the management of a board appointed by the Tynwald Court, a surveyor-general, and parochial surveyors. They are maintained by a system of licences on public-houses, carriages, carts and dogs, and a rate on real property. There are railways between Douglas, Ramsey, Peel, Castletown, Port Erin and Port St Mary, the line between Douglas and Ramsey being via St John's and Michael. Electric tramways run from Douglas to Ramsey via Laxey, from Douglas to Port Soderick, and from Laxey to the summit of Snaefell.

Industries, (a) Agriculture. — The position of the Manx farmers, though they generally pay higher rents than their compeers in those countries do, is, except in the remote parts of the island, more favourable than that of the English or Scottish farmers. The best land is in the north and south. The farms are principally held on lease and small holdings have almost entirely disappeared. The cultivated area is about 93,000 acres, or 65 % of the whole. The commons and uncultivated lands on the mountains are also utilized for pasturage. Oats occupy about three-fourths of the area under corn crops, barley about one-sixth. The amount of wheat and other corn crops is very trifling. Neither Manx wheat nor barley is as good on an average as English ; but oats is, on the whole, fully equal to what is grown on the mainland. Turnips, which are an excellent crop, are largely exported, and the dry and sandy soil of the north of the island is very favourable for the^'growth of potatoes. The white and red clover and the common grasses grow luxuriantly, and the pasturage is, generally speaking, good. Some of the low- lying land, especially in the north, is much in need of systematic drainage. The livestock, largely in consequence of the

premiums given by the insular government and the local agricultural society to bulls, heavy and light stallions and cart mares, now approximates very closely in quality to the stock in the north of England. Dairy- ing, owing to the large number of summer visitors, is the most profit- able department of agricultural industry. Apples, pears and wall fruit do not succeed very well, but the soil is favourable for the cultivation of strawberries, raspberries, gooseberries, currants and vegetables. Both agricultural and market-garden produce are quite insufficient to supply the demand in the summer.

{b) Fishing. — The important place which the fishing industry anciently held in the social organization of the Isle of Man is quaintly reflected in the wording of the oath formerly taken by the deemsters, who promised to execute the laws between the sovereign and his subjects, and " betwixt party and party, as indifferently as the herring backbone doth lie in the midst of the fish." The statutes and records abound in evidence of the great extent to which both the people and their rulers were dependent on the produce of the sea. The most numerous fish are herrings, cod, mackerel, ling, haddock, plaice, sole, fluke, turbot and brett. The industry is, however, in a decaying condition, especially the herring fishery, which, for reasons which have not been satisfactorily ascertained, fails periodically. The amount of fish caught, except herrings, is not sufficient to supply

the local demand in the summer, though some of the fish named are exported during the rest of the year. About 250 vessels, aggre- gating 4260 tons, with crews numbering 4250, are employed in this industry. A fish hatchery has been established at Port Erin by the insular government.

(c) Mining. — There is no doubt that, in proportion to its area, the metalliferous wealth of the Isle of Man has been very consider- able. Two ef its mines, Laxey and Foxdale, have stood for a long se.ries of years in the first rank in the British Islands for productive- ness of zinc and silver lead respectively. These metals have con- stituted its principal riches, but copper pyrites and hematite iron have also been raised in marketable quantities, while only very small amounts of the ores of nickel and antimony have been found. The mines are rented from the Crown as lord of the manor. The value of the ore produced is about £40,000 annually. Other economic products are clay, granite, limestone, sandstone, slate (of an inferior quality) and salt, which has been discovered near the Point of Ayre.

(d) Textiles, &c. — Since labour has become scarcer and dearer textile

industries have been declining, being unable to compete with larger and more completely organized, manufactories elsewhere. The principal manufactured articles are woollen cloths and blankets, hemp ropes and cotton, and herring nets. A few fishing vessels are built, and brewing is a prosperous industry. But, apart from agriculture, the most important industry (for so it may be called) is that of the provision for summer visitors, nearly half a million of whom come to the island annually.

Commerce. — The chief exports are lead, zinc, turnips, ropes, cotton nets and salt. The imports consist chiefly of timber, pro- visions, live-stock, poultry, flour, fruit, vegetables and eggs. In 1906 the tonnage of vessels (other than fishing or wind-bound vessels) cleared for traffic was 720,790. The number of vessels (other than fishing vessels) registered as belonging to the island in 1906 was 79.

Government. — The government of the island is vested in a lieutenant-governor, appointed by the Crown; in a Council, which is the upper branch of the legislature; in the House of Keys, which is the lower branch; and in the Tynwald Court. The Council and Keys sit separately as legislative bodies, but they sit in the Tynwald Court as distinct bodies with co-ordinate powers to transact executive business and to sign Bills. The Tynwald Court controls the surplus revenue, after the payment of the cost of government and of a fixed contribu- tion of £10,000 to the imperial exchequer, subject to the super- vision of the Treasury and the veto of the lieutenant-governor, and it appoints boards to manage the harbours, highways, educa- tion, local government, and lunatic and poor asylums. The Imperial government, after intimating its intention to Tynwald, fixes the rates of the customs duties, but Tynwald can by resolu- tion "impose, abolish or vary" the customs duties subject to the approval of parliament or the Treasury, such change to take effect immediately and to continue for six months, and, if parlia- ment be then sitting, to the end of the session, provided that the same be not in the meantime annulled by the passing of an act of parliament, or a Treasury minute. The approval of the sovereign of the United Kingdom in Council is essential to every legislative enactment. Acts of the imperial parliament do not affect the island except it be specially named in them. The lieutenant-governor, who is the representative of the sovereign, presides in the Council, in the Tynwald Court, in the High Court of Justice (Staff of Government division) and in the Court of General Gaol Delivery. He is the supreme executive author- ity, and he shares the control of the legislative and administra- tive functions, including the management of the revenue and the control of its surplus, with the Tynwald Court; he has also the power of veto as regards the disposal of surplus revenue and the nature of proposed harbour works, and his signature is necessary to the validity of all acts. It has been the practice for him to act as chancellor of the exchequer and to initiate all questions concerning the raising or

expenditure of public funds. The Council consists of the lieutenant-governor, the lord-bishop of the diocese, the clerk of the rolls, the two deemsters, the attorney-general, the archdeacon (all of whom are appointed by the Crown) and the vicar-general, who is appointed by the bishop. No act of the governor and Council is valid unless it is the act of the governor and at least two members of the Council. The House of Keys (for origin of the name see Key) is one of the most ancient legislative assemblies in the world. It consists of twenty-four members, elected by male and female owners or

occupiers of property. Each of the six sheadings elects three members; the towns of Castletown, Peel and Ramsey one each, and Douglas five. There is no property qualification required of the members, and the house sits for five years unless previously dissolved by the lieutenant-governor.

Law. — The High Court of Justice, of which the lieutenant-governor is president, contains three divisions: viz. the Chancery Division, in which the clerk of the rolls sits as judge, the Common Law Divi- sion, of which the deemsters are the judges, the Staff of Government Division, in which the governor and three judges sit together. The jurisdiction of the Chancery and Common Law Division is in the main similar to that of the corresponding divisions in the English Courts. The Staff of Government exercises appellate jurisdiction, similar to that of the Appeal' Courts in England. The Common Law Courts for the southern division of the island are held at Douglas and Castletown alternately and those for the nor- thern division at Ramsey, once in three months. Actions in these courts are heard by a deemster and a special or common jury. The Chancery Court sits once a fortnight at Douglas. The deem- sters also have summary jurisdiction in matters of debt, actions for liquidated damages under £50, suits for possession of real or personal property, petitions for probate, &c. These courts, called Deem- sters' Courts, are held weekly v alternately at Douglas and Castletown, by the deemster for the southern division of the island, and at Ram- sey and Peel by the deemster for the northern division. Criminal cases are heard by the magistrates or a high-bailiff and are (with the exception of minor cases which may be dealt with summarily) sent on by them for trial by a deemster and a jury of six, who hear the evidence and determine whether there is sufficient ground for sending the case for trial before the Court of General Gaol Delivery, thus discharging the functions of the Grand Jury in England. The Court of General Gaol Delivery is the Supreme Criminal Court and is presided over by the lieutenant-governor, who is assisted by the clerk of the rolls and the two deemsters. The high-bailiffs hold weekly courts in the four towns for the recovery of debts under forty shillings and for the trial of cases usually brought before a stipendiary magis- trate in England. The magistrates (J.P.'s) also hold regular courts in the towns for the trial of breaches of the peace and minor offences. There is a coroner in

each of the six sheadings. These officers are appointed annually by the lieutenant-governor and perform duties similar to those of a sheriff's officer in England. Inquests of death are held by a high-bailiff and jury. The Manx Bar is distinct from that of England. Its members, called " Advocates," combine the functions of barrister and solicitor. The laws relating to real pro- perty still retain much of their ancient peculiarity, but other branches of law have of late years by various acts of Tynwald been made practically identical with English law.

As regards real property the general tenure is a customary freehold devolving from each possessor to his next heir-at-law. The descent of land follows the same rules as the descent of the crown of England. The right of primogeniture extends to females in default of males in the direct line. The interest of a widow or widower, being the first wife or husband of a person deceased, is a life estate in one-half of the lands which have descended hereditarily, and is forfeited by a second marriage; a second husband or second wife is only entitled to a life interest in one-fourth, if there be issue of the first marriage. Of the land purchased by the husband the wife surviving him is entitled to a life interest in one moiety. By a statute of the year 1777 proprietors of land are empowered to grant leases for any term not exceeding twenty-one years in possession without the consent of the wife.

Church. — It is not known by whom Christianity was introduced into Man, but from the large proportion of names of Irish ecclesiastics surviving in the appellations of the old Manx keeills, or cells, which are of similar type to the Irish oratories of the 6th and 7th centuries, and in the dedications of the parish churches, which are usually on ancient sites, it may be reasonably conjectured that Manxmen were, for the most part, Christianized by Irish missionaries. During the incursions of the pagan Vikings Christianity was almost certainly extirpated and it was probably not reintroduced before the begin- ning of the nth century. The two most important events in the history of the medieval Manx Church were the formation of the diocese of Sodor (q.v.) and the foundation of the abbey of Rushen, a branch of the Cistercian abbey of Furness, in 1134. This latter event was important because the Cistercians were exempted from all episcopal visitation and control, by charter granted by the pope, and were, therefore, only subject to his rule and that of the abbots of their own order. From this time till the Reformation we find that there was an almost continuous struggle between the laity and the spiritual barons and monks, who had obtained great power and much property in the island. In 1458 the diocese was placed under York. The dissolution of the religious houses in Man was not brought about by the English Act of 1539, which did not apply to the island, but by the arbitrary action of Henry VIII. From such evidence as is available it would seem that the Reformation was a very

slow process. When Isaac Barrow (uncle of his well-known namesake) became bishop in 1663 the condition of the Church was deplorable, but under him and his able and saintly successors, Thomas

Wilson (1698-1755) and Mark Hildesley (I755-I773). it attained to a very much higher level than the English Church during the same period. After Hildesley's time it was again neglected, and successful missions by John Wesley and others resulted in the establishment and rapid increase of Nonconformity. It was not till the second decade of the 19th century that the condition of the Church began to im- prove again, and this improvement has steadily continued. In 1878 a Sodor and Man theological school was established for the training of candidates for holy orders. This school has been affiliated to Durham University. In 1880 four rural deaneries were established, and commissioners were constituted as trustees of endowments for Church purposes. In 1895 a cathedral chapter, with four canons, was constituted under the name of the " Dean and Chapter of Man," the bishop being the dean of the cathedral church. A ChurchSus- tentation Fund was established by Bishop Straton in 1894, with a view to supplementing the incomes of the clergy, which had been greatly reduced on account of the low price of corn. There have been several acts giving Nonconformists equal rights with Church- men. Among these are the Burials Acts of 1881 and 1895, which permit burials to take place in churchyards without the rites of the Church of England, and allow any burial service, provided it be Christian, in mortuary chapels. At the present day Nonconformists, chiefly Wesleyan Methodists, probably outnumber Churchmen, and there is a small number of Roman Catholics and Presbyterians. The bishop, who has a seat, but not a vote, in the House of Lords, is assisted by an archdeacon, a vicar-general, a registrar and a sumner-general. The jurisdiction of the only remaining ecclesiastical court, which is presided over by the vicar-general, as representing the bishop, is mainly in connexion with affiliation questions, the swearing-in of churchwardens and the granting of faculties. The power of the Manx Convocation to make canons, though not exer- cised since 1704, has never been abrogated, and so far affords a token that the Manx Church is a separate national Church governed by its own laws, which, however, must be approved by the insular Legis- lature.

Education. — It was not till 1872, when the insular Legislature passed the Public Elementary Education Act, that the Manx State undertook any direct responsibility for education. This act differed from the English Act of 1870 in three important particulars: (1) it at once constituted every town

and parish a school district under a school board; (2) the attendance of children was made compulsory; and (3) every elementary school, those in connexion with the Church of Rome excepted, was obliged to provide for non-sectarian instruc- tion in religious subjects, and for the reading of the Bible accom- panied by suitable explanation. Since the date of this act education has made extraordinary strides. It became free in 1892, and a higher-grade school was established in Douglas in 1894. The public elementary schools, which are nearly all managed by School Boards, are subject to the control of a local " Council of Education " appointed by the Tynwald Court; but, as the Manx Act of 1872 re- quires that, in order to obtain a government grant, the schools shall fulfil the conditions contained in the minutes of the education department at Whitehall, they are examined by English inspectors and compelled to attain the same standard of efficiency as the English and Welsh schools. In 1907 an act establishing a system of secon- dary education was passed by the Legislature. The total number of public elementary schools in 1906 was 47, 42 being board and 5 denominational. Besides King William's College, opened in 1833, which provided a similar education to that obtainable at the English public schools, there are grammar schools in Douglas, Ramsey and Castletown.

The Manx language (see Celt : Language) still lingers, the census of 1901 showing that there were about 4400 people who understood something of it. There is now no one who does not speak English. Economics. — Municipal government was established in i860, and in 1876 vaccination was made compulsory, as also was the registra- tion of births, marriages and deaths in 1878. It was not till 1884 that the sanitation of the towns was seriously taken in hand ; but ten years more elapsed before the sanitary condition of the island was dealt with by the passing of an act which constituted parish and village districts, with commissioners elected by the people, who had, in conjunction with a board elected by the Tynwald Court and an inspector appointed by it, to attend to all questions relating to sani- tation and infectious diseases. As a result of these measures the death-rate has been greatly reduced. In 1888 a permissive poor law was established; it has been adopted by all the towns except Peel and by seven of the seventeen country parishes. Before this date the poor had been dependent on voluntary relief, which broke down owing to the growth of a temporarily employed class occupied in administering to the wants of the summer visitors. The total number of persons in receipt of poor relief averages about 920, and that of lunatics about 212. The average number of births during the five years 1902-1906 was 21-6, of marriages 6-1, and of deaths 17-6 per thousand. The rateable annual value of the parishes, towns and villages is about £400,000. The revenue for the year ending the 31st of March 1907 was £86,365, and the expenditure £75,728. Thelargest revenue raised was £9 1 , 1 93 in 1 90 1 , and the debt reached

its maximum amount, £219,531, in 1894.

History. — The history of the Isle of Man falls naturally into

three periods. In the first of these the island was inhabited by a Celtic people. The next is marked by the Viking invasions and the establishment of Scandinavian rule. The third period is that of the English dominion. The secular history of the Isle of Man during the Celtic period is an absolute blank, there being no trustworthy record of any event whatever before the incursions of the Northmen, since the exploits attributed to Baetan MacCairill, king of Ulster, at the end of the 6th century, which were formally supposed to have been performed in the Isle of Man, really occurred in the country between the Firths of Clyde and Forth. And it is clear that, even if the supposed conquest of the Menavian islands — Man and Anglesey — by Edwin of Northumbrian in 616, did take place, it could not have led to any permanent results; for, when the English were driven from the coasts of Cumberland and Lancashire soon afterwards, they could not well have retained their hold on the island to the west of these coasts. It is, however, possible that in 684, when Ecfrid laid Ireland waste from Dublin to Drogheda, he temporarily occupied Man. During the period of Scandi- navian domination there are two main epochs — one before the conquest of Man by Godred Crovan in 1079, and the other after it. The earlier epoch is characterized by warfare and unsettled rule, the later is comparatively peaceful. Between about a.d. 800 and 815 the Vikings came to Man chiefly for plunder; between about 850 and 990, when they settled in it, the island fell under the rule of the Scandinavian kings of Dublin; and between 990 and 1079, it was subject to the powerful earls of Orkney. The conqueror Godred Crovan was evidently a remarkable man, though little information about him is attain- able. According to the Chronicon Manniae he " subdued Dublin, and a great part of Leinster, and held the Scots in such subjection that no one who built a vessel dared to insert more than three bolts." The memory of such a ruler would be likely to survive in tradition, and it seems probable therefore that he is the person commemorated in Manx legend under the name of King Gorse or Orry. The islands which were under his rule were called the Sutir-eyjar (Sudreys or the south isles, in contra- distinction to the nor'Sr-eyjar, or the north isles, i.e. the Orkneys and Shetlands, and they consisted of the Hebrides, and of all the smaller western islands of Scotland, with Man. At a later date his succ.essors took the title of Rex Manniae et Insularum. Olaf, Godred's son, was a powerful monarch, who, according to the Chronicle, maintained " such close alliance with the kings of Ireland and Scotland that no one ventured to disturb the Isles during his time" (1113-1152). His son, Godred, who for a short period ruled over Dublin also, as a result of a quarrel with Somerled, the ruler of Argyll, in n 56, lost the smaller islands off the coast of Argyll. An independent sovereignty was thus interposed

between the two divisions of his kingdom. Early in the 13th century, when Reginald of Man did homage to King John, we hear for the first time of English intervention in the affairs of Man. But it was into the hands of Scotland that the islands were ultimately to fall. During the whole of the Scandinavian period the isles were nominally under the suzerainty of the kings of Norway, but they only occasionally asserted it with any vigour. The first to do so was Harold Haarfager about 885, then came Magnus Barfod about 1100, both of whom conquered the isles. From the middle of the 12 th century till 1 2 1 7 the suzerainty, owing to the fact that Norway was a prey to civil dissensions, had been of a very shadowy character. But after that date it became a reality and Norway consequently came into collision with the growing power of Scotland. Finally, in 1 261, Alexander III. of Scotland sent envoys to Norway to negotiate for the cession of the isles, but their efforts led to no result. He therefore initiated hostilities which terminated in the complete defeat of the Norwegian fleet at Largs in 1 263. Magnus, king of Man and the Isles, who had fought on the Norwegian side, was compelled to surrender all the islands over which he had ruled, except Man, for which he did homage. Two years later Magnus died and in 1266 the king of Norway, in considera- tion of the sum of 4000 marks, ceded the islands, including Man, to Scotland. But Scotland's rule over Man was not firmly

established till 1275, when the Manx were defeated in a decisive battle at Ronaldsway, near Castletown. In 1290 we find Edward I. of England in possession of Man, and it remained in English hands till 1313, when it was taken by Robert Bruce after besieging Castle Rushen for five weeks. Then, till 1346, when the battle of Neville's Cross decided the long struggle between England and Scotland in England's favour, there followed a confused period when Man was sometimes under English and sometimes under Scottish rule. About 1333 it had been granted by King Edward III. to William de Montacute, 1st earl of Salisbury, as his absolute posses- sion, without reserving any service to be rendered to him. In 1392 his son sold the island " with the crowne " to Sir William Le Scroope. In 1399 Henry IV. caused Le Scroope, who had taken Richard's side, to be beheaded. The island then came into the possession of the crown and was granted to Henry de Percy, earl of Northumberland, but, he having been attainted, Henry IV., in 1406, made a grant of it, with the patron- age of the bishopric, to Sir John Stanley, his heirs and assigns, on the service of rendering two falcons on paying homage and two falcons to all future kings of England on their coronation.

With the accession of the Stanleys to the throne there begins a better epoch in Manx history. Though the island's new rulers rarely visited its shores they placed it under responsible governors, who, in the main, seem to have treated it with justice. Of the thirteen members of the family who ruled in Man, the second Sir John Stanley (1414-1432), James, the 7th earl (1627- 1651), and the 10th earl of the same name (1702-1736) had the most important influence on it. The first curbed the power of the spiritual barons, introduced trial by jury, instead of trial by battle, and ordered the laws to be written. The second, known as the Great Stanley, and his wife, Charlotte de la Tremoille (or Tremouille), are probably the most striking figures in Manx history. In 1643 Charles I. ordered him to go to Man, where the people, who were no doubt influenced by what was taking place in England, threatened to revolt. But his arrival, with English soldiers, soon put a stop to anything of this kind. He conciliated the people by his affability, brought in Englishmen to teach various handicrafts and tried to help the farmers by improving the breed of Manx horses, and, at the same time, he restricted the exactions of the Church. But the Manx people never had less liberty than under his rule. They were heavily taxed; troops were quartered upon them; and they also had the more lasting grievance of being compelled to accept leases for three lives instead of holding their land by the " straw " tenure which they considered to be equivalent to a customary inheritance. Six months after the death of the king Stanley received a summons from General Ireton to surrender the island, which he haughtily declined. In August 1651 he went to England with some of his troops, among whom were 300 Manx- men, to join King Charles II., and he and they shared in the decisive defeat of the Royalists at Worcester. He was captured and confined in Chester Castle, and, after being tried by court martial, was executed at Wigan. Soon after his death the Manx Militia, under the command of William Christian, rose against the Countess and captured all the insular forts except Rushen and Peel. They were then joined by a parliamentary force under Colonel Duckenfield, to whom the Countess surren- dered after a'brief resistance. Fairfax had been appointed " Lord of Man and the Isles " in September, so that Man continued under a monarchical government and remained in the same relation to England as before. The restoration of Stanley government in 1660 therefore caused as little friction and alteration as its temporary cessation had. One of the first acts of the new lord, Charles (the 8th earl), was to order Christian to be tried. He was found guilty and executed. Of the other persons implicated in the rebellion only three were excepted from the general amnesty. But by order in Council they were pardoned, and the judges responsible for the sentence on Christian were punished. His next act was to dispute the permanency of the tenants' holdings, which they had not at first regarded as being affected by the acceptance of leases, a

proceeding which led to an almost open rebellion against his authority and to the neglect of agriculture. In lieu of it the people devoted themselves to the fisheries and to contraband trade. The agrarian question was not settled till 1204, when James, Charles's brother and successor, largely through the influence of Bishop Wilson, entered into a compact with his tenants, which was embodied in an act, called the " Act of Settlement." Their compact secured the tenants in the posses- sion of their estates in perpetuity on condition of a fixed rent, and 'a small fine on succession or alienation. From the great importance of this act to the Manx people it has been called their Magna Carta. As time went on, and the value of the estates increased, the rent payable to the lord became so small in proportion as to be almost nominal. James died in 1736 and the sovereignty of the isle passed to James Murray, 2nd duke of Atholl. In 1 764 he was succeeded by his only surviving child Charlotte, Baroness Strange, and her husband, John Murray, who, in right of his wife, became Lord of Man. About 1720 the contraband trade greatly increased. In 1726 it was, for a time, somewhat checked by the interposition of parliament, but during the last ten years of the Atholl regime (1756-1765) it assumed such proportions that, in the interests of the imperial revenue, it became necessary to suppress it. With a view to so doing an Act of Parliament, called the "Revesting Act," was passed in 1765, under which the sovereign rights of the Atholls and the customs revenues of the island were purchased for the sum of £70,000, and an annuity of £2000 was granted to the duke and duchess. The Atholls still retained their manorial rights, the patronage of the See, and certain other perquisites, which were finally purchased for the excessive sum of £417,144 in 1828. Up to the time of the Revestment the Tynwald Court passed laws concerning the government of the island in all respects and had control over its finances, subject to the approval of the lord. After the Revestment, or rather after the passage of the " Mischief Act " in the same year, Imperial Parliament legislated with respect to customs, harbours and merchant shipping, and, in measures of a general character, it occasionally inserted clauses by which penalties in contravention of the acts of which they formed part might be enforced in the island. It also assumed the control of the insular customs duties. Such were the changes which, rather than the transference of the sovereignty from the lord to the king of Great Britain and Ireland, modified the Constitution of the Isle of Man. Its ancient laws and tenures were not interfered with, but in many ways the Revestment adversely affected it. The hereditary lords were far from being model rulers, but most of them had taken some per- sonal share in its government, and had interested themselves in the well-being of its inhabitants. But now the whole direction of its affairs was handed over to officials, who regarded the island as a pestilent nest of smugglers, from which it was their duty to extract as much revenue as possible. Some alleviation of this state of things was experienced between 1793 and 1826

when the 4th duke of Atholl was appointed governor, since, though he quarrelled with the Keys and was unduly solicitous for his pecuniary interests, he did occasionally exert himself to promote the welfare of the island. After his departure the English officials resumed their sway. But they were more considerate than before. Moreover, since smuggling, which had only been checked, not suppressed, by the Revesting Act, had by that time almost disappeared, and the Manx revenue was producing a large and increasing surplus, the Isle of Man came to be regarded more favourably, and, thanks to this fact and to the representa- tions of the Manx people to English ministers in 1837, 1844 and 1853, it obtained a somewhat less stringent customs tariff and an occasional dole towards erecting its much neglected public works. Since 1866, when the Isle of Man obtained a measure of at least nominal " Home Rule," the Manx people have made remarkable progress, and at the present day form a prosperous community.

Monuments. — The prehistoric monuments in Man are numer- ous. There are earth entrenchments, seemingly of the earliest I period; fragments of stone circles and alignments; burial cairns

with stone cists of several successive periods; urn mounds and crannoges or lake dwellings. The monuments belonging to the historic period begin with the round tower on Peel islet, the humble Celtic keeills and the sculptured crosses in which the island is especially rich. Of these crosses about one-fourth have inscriptions in the old Norse language. The origin and history of the early buildings remaining on the island are obscure. The castles of Rushen and Peel are the only important buildings of a military character which survive, but the remains of ecclesiastical buildings are numerous and interesting, though, with the exception of St German's Cathedral on Peel islet, now in ruins, they are only small and simple structures.

Arms. — There has been much controversy about the origin of the arms of the island— the " three-legs " found on a beautiful pillar cross near Maughhold churchyard belonging to the latter part of the 14th century. It was probably originally a sun symbol and was brought from Sicily by the Vikings. The motto quocunque jeceris stabit is of comparatively recent origin. Bibliography. — History and Law: The Manx Society's pub- lications, vols, i.-xxxii., notably the Chronicon Manniae (vols, xxii. and xxiii., edited by Munch); Sir Spencer Walpole, K.C.B., The Land of Home Rule, an essay on the history and constitution of the Isle of Man (London, Longmans, Green & Co., 1893); A. W. Moore, M.A., C.V.O., The Diocese of Sodor and Man, S.P.C.K.'s series of Diocesan Histories (1893) ; and A

History of the Isle of Man, (2 vols., London, T. Fisher Unwin, 1900); The Statutes of the Isle of Man from 1817 to 1895, Gill's edition, 6 vols. (vol. i. 1883 to vol. vi. 1897, London, Eyre & Spottiswoode) ; Richard Sherward (Deemster), Manx Lata Tenures, a short treatise on the law relating to real estate in the Isle of Man (Douglas Robinson Bros., 1899). Archaeology and Folklore: P. M. C. Kermode, F.S.A. Scot., Manx Crosses (London, Bemrose & Sons, 1907) ; E. Alfred Jones, The Old Church Plate of the Isle of Man (Bemrose & Sons, 1907) ; A. W. Moore, C.V.O., M.A., The Folklore of the Isle of Man (London, D. Nutt, 189 1). Language and Philology: A Dictionary of the Manx Language (Manx-English), by Archibald Cregeen (1835) ; A Practical Grammar of the Antient Gaelic, or Language of the Isle of Man, usually called Manks, by Rev. John Kelly, LL.D.; Manx Society's publica- tions, vol. ii. (1859, reprint of edition of 1804) ; The Manx Dictionary in two parts (Manx-English, English-Manx), by Rev. John Kelly, William Gill and John Clarke; Manx Society's publications, vol. xiii. (1866); The Book of Common Prayer in Manx Gaelic, being translations made by Bishop Phillips in 1610 and by the Manx clergy in 1765, edited by A. W. Moore, C.V.O., M.A., and John Rhys, M.A., LL.D.; Outlines of the Phonology of Manx Gaelic, by John Rhys (Oxford University Press, 2 vols., 1893-1894); First Lessons in Manx, by Edmund Goodwin (Dublin, Celtic Association, 1 901) ; Manx National Songs, with English words, from the MS. collection of the Deemster Gill, Dr J. Clague and W. H. Gill, and arranged by W. H. Gill (London, Boosey & Co., 1896) ; Manx Ballads and Music, edited by A. W. Moore (Douglas, G. and R. Johnson, 1896); A. W. Moore s The Surnames and Place Names of the Isle of Man (London, Elliot Stock, 1906, 3rd ed.). Natural History: P. G. Ralfe, The Birds of the Isle of Man (Edinburgh, David Douglas, 1905).

Hall Caine's novels, The Deemster, The Manxman, &c, have no doubt tended to popularize the island. The most truthful descrip- tion of the social life of the people is to be found in a novel entitled The Captain of the Parish, by John Quine. Bibliotheca Monensis (Manx Society, vol. xxiv.) contains a good list of MSS. and books relating to the island up to 1 876, and A. W. Moore's History of the Isle of Man has a list of the most important MSS. and books up to 1900. (A. W. M.)

MANAAR, GULF OF, a portion of the Indian Ocean lying between the coast of Madras and Ceylon. Its northern limit is the line of rocks . and islands called Adam's Bridge. Its extreme width from Cape Comorin to Point de Galle is about 200 miles.

MANACOR, a town of Spain in the island of Majorca, 40 m. by rail E. of Palma. Pop. (1900), 12,408. Manacor has a small trade in grain, fruit, wine, oil and live stock. In the neighbourhood are the cave of Drach,

containing several under- ground lakes, and the caves of Arta, one of the largest and finest groups of stalactite caverns in western Europe.

MANAGE, to control, direct, or be in a position or have the capacity to do anything (from Ital. maneggiare, to train horses, literally to handle; Lat. manus, hand). The word was first used of the " management " of a horse. Its meanings have been much influenced by the French manager, to direct a household or mSnage (from late Lat. mansio, house); hence to economize, to husband resources, &c. The French menage, act

of guiding or leading, from mener, to lead, seems also to have influenced the meaning.

MANAGUA, the capital of Nicaragua, and of the department of Managua; on the southern shore of Lake Managua, and on the railway from Diriamba to El Viejo, 65 m. by rail S.E. of the Pacific port of Corinto. Pop. (1905), about 30,000. Managua is a modern city, with many flourishing industries and a rapidly growing population. Its chief buildings are those erected after 1855, when it was chosen as the capital to put an end to the rivalry between the then more important cities of Leon and Granada. They include the Palacio Nacional or govern- ment buildings, Corinthian in style, the national library and museum, an ornate Renaissance structure, the barracks and the general post office. Owing to its position on the lake, and its excellent communications by rail and steamer, Managua obtained after 1855 an important export trade in coffee, sugar, cocoa and cotton, although in 1876 it was temporarily ruined by a great inundation.

MANAKIN, from the Dutch word Manneken, applied to certain small birds, a name apparently introduced into English by G. Edwards (Nat. Hist. Birds, i. 21) in or about 1743, since which time it has been accepted generally, and is now used for those which form the family Pipridae. The manakina are peculiar to the Neotropical Region and have many of the habits of the titmouse family (Paridae), living in deep forests, associating in small bands, and keeping continually in motion, but feeding almost wholly on the large soft berries of the different kinds of Melastoma. The Pipridae, however, have no close affinity with the Paridae,' 1 but belong to another great division of the order Passeres, the Clamatores group of the Anisomyodae. The manakins are nearly all birds of gay appearance, generally exhibiting rich tints of blue, crimson, scarlet, orange or yellow in combination with chestnut, deep black, black and white, or olive green; and among their most obvious characteristics are their short bill and feeble feet, of which the outer toe is united to the middle toe for a good part of its length. The tail, in most species very short, has in others the middle feathers much elongated, and in one of the outer rectrices are attenuated and produced into threads. They have been divided (Brit. Mus. Cat. Birds,

vol. xiv.) into nineteen genera with about seventy species, of which eighteen are included under Pipra itself. P. leucilla, one of the best known, has a wide distribution from the isthmus of Panama to Guiana and the valley of the Amazon; but it is one of the most plainly coloured of the family, being black with a white head. The genus Machaeropterus, consisting of four species, is very remarkable for the extraordinary form of some of the secondary wing- feathers in the males, in which the shaft is thickened and the webs changed in shape, as described and illustrated by P. L. Sclater (Proc. Zool. Society, i860, p. 90; Ibis, 1862, p. 17s 2) in the case of the beautiful M. deliciosus, and it has been observed that the wing-bones of these birds are also much thickened, no doubt in correlation with this abnormal structure. A like deviation from the ordinary character is found in the allied genus Chiromachaeris, comprehending seven species, and Sclater is of the opinion that it enables them to make the singular ' noise for which they have long been noted, described by O. Salvin (lb is, i860, p. 37) in the case of one of them, M. candaei,&& beginning " with a sharp note not unlike the crack of a whip," which is " followed by a rattling sound not unlike the call of a landrail"; and it is a similar habit that has obtained for another species, M. edwardsi, the name in Cayenne, according to Buffon (Hist. Nat. Oiseaux, iv. 413), of Cassenoisette.

(A. N.) MANAOAG, a town in the north central part of the province of Pangasinan, Luzon, Philippine Islands, on the Angalacan river, 21 m. N.E. of Lingayen. Pop. (1903), 16,793. The

1 Though Edwards called the species he figured (ut supra) a titmouse, he properly remarked that there was no genus of European birds to which he could liken it.

2 The figures are repeated by Darwin (Descent of Man, &c, ii. 66).

inhabitants devote themselves especially to rice-culture, though tobacco, Indian corn, sugar-cane, fruit and vegetables are also raised. A statue of the Virgin Mary here is visited annually (especially during May) by thousands from Pangasinan and adjoining provinces. The inhabitants are mostly Ilocanos. Manaoag includes the town proper and eighteen barrios.

MANAOS, a city and port of Brazil and capital of the state of Amazonas, on the left bank of the Rio Negro 12 m. above its junction with the Solimoes, or Amazon, and 908 m. (Wappaus) above the mouth of the latter, in lat. 3° 8′ 4″ S., long. 60° W. Pop. (1908), about 40,000,

including a large percentage of Indians, negroes and mixed-bloods; the city is growing rapidly. Manaos stands on a slight eminence overlooking the river, 106 ft. above sea-level, traversed by several " igarapes " (canoe paths) or side channels, and beautified by the luxuriant vegetation of the Amazon valley. The climate is agreeable and healthful, the average temperature for the year (1902) being 84 , the number of rainy days 130, and the total rainfall 66-4 in. Up to the begin- ning of the 20th century the only noteworthy public edifices were the church of N.S. da Conceicao, the St Sebastiao asylum and, possibly, a Misericordia hospital; but a government building, a custom-house, a municipal hall, courts of justice, a market- place and a handsome theatre were subsequently erected, and a modern water-supply system, electric light and electric tramways were provided. The " igarapes " are spanned by a number of bridges. Higher education is provided by a lyceum or high school, besides which there is a noteworthy school (bearing the name of Benjamin Constant) for poor orphan girls. Manaos has a famous botanical garden, an interesting museum, a public library, and a meteorological observatory. The port of Manaos, which is the commercial centre of the whole upper Amazon region, was nothing but a river anchorage before 1902. In that year a foreign corporation began improvements, which include a stone river-wall or quay, storehouses for merchandise, and floating wharves or landing stages connected with the quay by floating bridges or roadways. The floating wharves and bridges are made necessary by the rise and fall of the river, the difference between the maximum and minimum levels being about 33 ft.

The principal exports are rubber, nuts, cacao, dried fish, hides and piassava fibre. The markets of Manaos receive their supplies of beef from the national stock ranges on the Rio Branco, and it is from this region that hides and horns are received for export. The shipping movement of the port has become large and important, the total arrivals in 1907, including small trading boats, being 1589, of which 133 were ocean-going steamers from Europe and the United States, 75 from south Brazilian ports, and 227 river steamers from Para. This rapid growth in its direct trade is due to a provincial law of 1878 which authorized an abatement of 3% in the export duties on direct shipments, and a state law of 1900 which made it compulsory to land and ship all products of the state from the Manaos custom-house.

The first European settlement on the site of Manaos was made in 1660, when a small fort was built here by Francisco da Motta Falcao, and was named Sao Jose de Rio Negro. The mission and village which followed was called Villa de Barra, or Barra do Rio Negro (the name " Barra " being derived from the " bar " in the current of the river, occasioned by the set-back caused by its encounter with the Amazon). It succeeded Barcellos as

the capital of the old capitania of Rio Negro in 1809, and became the capital of Amazonas when that province was created in 1850, its name being then changed to Manaos, the name of the principal tribe of Indians living on the Rio Negro at the time of its discovery. In 1892 Manaos became the see of the new bishopric of Amazonas.

MANASSAS, a district of Prince William county, Virginia, and a town of the district, about 30 m. W.S.W. of Washing- ton, D.C. Pop. (1910) of the district, 3381; of the town, 1217. The village of Manassas (in the town), known also as Manassas Junction, is served by the Chesapeake & Ohio and the Southern railways. North of the junction is Bull Run,

a small stream which empties into the Occoquan, an arm of the

Potomac. In this neighbourhood two important battles of the American Civil War, the first and second battles of Bull Run, were fought on the 21st of July 1861 and on the 29th-3oth of August 1862 respectively; by Southern historians these battles are called the battles of Manassas. At Manassas is the Manassas Industrial School for Coloured Youth (non-sectarian; privately supported), which was founded in 1892 and opened in 1894; in 1908-1909 it had nine teachers (all negroes) and 121 pupils, all in elementary grades.

MANASSEH (7th cent. B.C.), son of Hezekiah, and king of Judah (2 Kings xxi. 1-18). His reign of fifty-five years was marked by a reaction against the reforming policy of his father, and his persistent idolatry and bloodshed were subsequently regarded as the cause of the destruction of Jerusalem and of the dispersion of the people (2 Kings xxiii. 26 seq.; Jer. xv. 4). As a vassal of Assyria he was contemporary with Sennacherib, Esar-haddon (681-668 B.C.) and Assur-bani-pal (668-626 B.C.), and his name (Me-na-si-e) appears among the tributaries of the two latter. Little is known of his history. The chronicler, however, relates that the Assyrian army took him in chains to Babylon, and that after his repentance he returned, and dis- tinguished himself by his piety, by building operations in Jerusalem and by military organization (2 Chron, xxxiii. 10 sqq.). The story of his penitence referred to in xxxiii. 22, is untrust- worthy, but the historical foundation may have been some share in the revolt of the Babylonian Samas-sum-ukin (648 B.C.), on which occasion he may have been summoned before Assur- bani-pal with other rebels and subsequently reinstated. See further Driver, in Hogarth, Authority and Archaeology, pp. 114 sqq. Manasseh was succeeded by his son Amon, who after a brief reign of two years perished in a conspiracy, his place being taken by Amon's son (orbrother) Josiah (q.v.). A lament formerly ascribed to Manasseh (cf. 2 Chron. xxxiii. 18) is preserved in the Apocrypha (see Manasses, Prayer of; and Apocryphal Literature). On Judg. xviii. 30

(marg.), see Jonathan.

MANASSEH (apparently Hebrew for " he who causes to for- get," but see H. W. Hogg, Encyc. Bib., s.v.); in the Bible, a tribe of Israel, the elder but less important of the "sons" of Joseph. Its seat lay to the north of Ephraim, but its boundaries can scarcely be defined. It merged itself with its " brother " in the south and with Issachar, Zebulun and other tribes in the north (Josh. xvii. 7 sqq.). From the latter it was separated for a time by a line of Canaanite cities extending from Dor to Bethshean, which apparently were not all subdued till the days of David or Solomon (Judg. i. 27; 1 Sam. xxxi. 10; 1 Kings ix. 15). Besides its western settlement in the fertile glades of northern Samaria, running out into the great plain, there were territories east of the Jordan reckoned to Manasseh. Gilead and Bashan were said to have been taken by Machir, and a number of places of uncertain identification were occupied by Nobah and Jair (Num. xxxii. 41 ; Judg. x. 3-5) . It seems most natural to suppose that these districts were held before the Israelites crossed over to the west (cf. the tradition Num. xxi., Deut. iii.). On the other hand, in Judg. v. 14, Machir may conceivably belong to the west, and it is possible that, according to another tradition, these movements were the result of the complaint of the Joseph tribes that their original territory was too restricted. 1 In the genealogical lists, Machir, perhaps originally an independent branch, is the eldest son of Manasseh (Josh. xvii. 1 b, 2); but according to later schemes he is Manasseh's only son (Num. xxvi. 28-34). Intermixture with Aramaeans is indicated in the view that he was the son of Manasseh and an Aramean concubine (1 Chron. vii. 14), and this is supported by the statement that the Arameans of Geshur and Maacah (cf. 2 Sam. x. 6; Gen. xxii. 24) dwelt among the Israelites of eastern Jordan (Josh. xiii. 13). Subsequently, at an unknown period of history, sixty cities were lost (1 Chron. ii. 23). The story of the daughters of the Manassite Zelophehad is of interest for the Hebrew law of inheritance (Num. xxvii. 1-11, xxxvi.).

1 So Budde (Richter u. Samuel), who recovers certain old fragments and arranges Josh. xvii. 14-18 (v. 18 read " hill-country of Gilead ") ; Num. xxxii. 39, 41 seq.; Josh. xiii. 13.

Some details of the history of this twofold branch of the Israelites are contained in the stories of Gideon (W. Manasseh) and Jephthah (E. Manasseh). The relations between Saul and Jabesh-Gilead point to the close bond uniting the two districts, but the details have been variously interpreted : Winckler, for example, suggesting that Saul himself was

originally from E. Manasseh and that he followed in the steps of Jephthah (Keilinschr. u. d. alte Test., pp. 216 seq. 227). Generally speaking, its position in the west made it share the fortunes of Ephraim, whilst on the east the proximity of Ammonites and Moabites controlled its history; see also the articles on its southern neighbours, Gad and Reuben, and the articles Genealogy (Biblical); and Jews: History. ‘ (S. A. C.)

MANASSES, CONSTANTINE, Byzantine chronicler, flourished in the 12th century during the reign of Manuel I. (Comnenus) (1143-1180). He was the author of a Chronicle or historical synopsis of events from the creation of the world to the end of the reign of Nicephorus Botaniates (1081), written by direction of Irene, the emperor’s sister-in-law. It consists of about 7000 lines in the so-called ” political ” metre. 1 There is little to be said of it, except that it is rather more poetical than the iambic chronicle of Ephraim (about 150 years later). It obtained great popu- larity and appeared in a free prose translation; it was also trans- lated into Slavonic. The poetical romance of the Loves of Aristander and Callithea, also in ” political ” verse, is only known from the fragments preserved in the “PoSoivia (rose-garden) of Macarius Chrysocephalus (14th century). Manasses also wrote a short biography of Oppian, and some descriptive pieces (all except one unpublished) on artistic and other subjects.

Editions. — Chronicle in Bonn, Corpus scriptorum hist. Byz., 1st ed. Bekker (1837) and in J. P. Migne, Patrologia graeca, exxvii. ; Arist- ander and Callithea in R. Hercher’s Scriplores erolici graeci, ii. (1859) ; ” Life of Oppian ” in A. Westermann, Vitarum scriplores graeci minores (1845). A long didactic poem in ” political ” verse (edited by E. Miller in Annuaire de I’assoc. pour V encouragement des Uudes grecques en France, ix. 1875) is attributed to Manasses or one of his imitators. See also P. Hirsch, Byzantinische Studien (1876); C. Krumbacher, Geschichte der byzantinischen Litleratur (1897).

MANASSES, PRAYER OF, an apocryphal book of the Old Testament. This writing, which since the Council of Trent has been relegated by the Church of Rome to the position of an appendix to the Vulgate, was placed by Luther and the translators of the English Bible among the apocryphal books. In some MSS. of the Septuagint it is the eighth among the canticles appended to the Psalter, though in many Greek psalters, which include the canticles, it is not found at all. In Swete’s Old Testament in Greek, iii. 802 sqq., A is printed with the variants of T (Psalterium turicense) ? From the statements in 2 Chron. xxxiii. 12, 13, 18, 19, it follows that the Old Testament chronicler found a prayer attributed to Manasseh in his Hebrew sources, The History of the Kings of Israel and The History of the Seers. Naturally the question arose, had the existing Prayer of Manasses any direct connexion with the prayer referred to by the chronicler ? Ewald was

of opinion that the Greek was an actual translation of the lost Hebrew; but Ball more wisely takes it as a free rendering of a lost Haggadic narrative founded on the older document from which the chronicler drew his information. This view he supports by showing that there was once a considerable literature in circulation regarding Manasseh's later history. On the other hand most scholars take the Prayer to have been written in Greek, e.g. Fritzsche, Schiirer and Ryssel (Kautzsch, Apok. u. -Pseud, i. 165-168).

1 " Political " verse or metre is the name given to a kind of verse found as early as the 6th century in proverbs, and characteristic of Byzantine and modern Greek poetry. It takes no account of the quantity of syllables; the scansion depends on accent, and there is always an accent on the last syllable but one. It is specially used of an iambic verse with fifteen syllables, i.e. seven feet and an un- accented syllable over. Byron compares (" A captain bold of Halifax who lived in country quarters." Such facile metres are called "political," in the sense of "commonplace," "of the city." Cf. Gibbon's Decline and Fall (ed. Bury, 1898), vi. 108; Du Cange, Gloss, med. et infin. lat. (vi. 395), who has an interesting quotation from Leo Allatius. Leo explains " political " as implying that the verses are " scorta et meretrices, quod omnibus sunt obsequiosae et peculiares, et servitutem publicam serviunt."

2 Nestle {Septuaginta Studien III.) contends that the text of A and T is derived from the Apost. Const, ii. 22, or from its original, and not from a MS. of the Septuagint.

This fine penitential prayer seems to have been modelled after the penitential psalms. It exhibits considerable unity of thought, and the style is, in the main, dignified and simple.

As regards the date, Fritzsche, Ball and Ryssel agree in assigning this psalm to the Maccabean period. Its eschatology and doctrine of " divine forgiveness " may point to an earlier date.

The best short account of the book is given by Ball (Speaker's Apocrypha, ii. 361-371); see also Porter in Hastings's Diet. Bible, iii. 232-233. (R. H. C.)

MANATI (often anglicized as "manatee"), the name, adapted from the Carib manattoui, given by the Spanish colonists of the West Indies to the American representative of a small group of herbivorous aquatic mammals, constituting, with their allies the dugong and the now extinct Rhytina, the order Sirenia. The name, though possibly of Mandingo origin (see Mandingo), was latinized as manatus, furnished with hands, thus referring

the etymology to the somewhat hand-like form, or hand-like use, of the fore-flippers, which alone serve these creatures for limbs. Manatis, as shown in the illustration in the article Sirenia, are somewhat whale-like in shape, having a similar horizontally expanded tail-fin; but here the resemblance to the Cetacea ceases, the whole organization of these animals being constructed on entirely different lines. The American manati, Manatus (or, as some would have it, Trichechus latirostris) , inhabits the rivers of Florida, Mexico, Central America and the West Indies, and

(From Murie.) Front view of head of American Manati, showing the eyes, nostrils, and mouth. A, with the lobes of the upper lip divaricated; B, with the lip contracted.

measures from 9 to 13 feet in length. The body is somewhat fish- like, but depressed and ending posteriorly in a broad, flat, shovel- like horizontal tail, with rounded edges. The head is of moderate size, oblong, with a blunt, truncated muzzle, and divided from the body by a slight constriction or neck. The fore limbs are flattened oval paddles, placed rather low on the sides of the body, and showing externally no signs of division into fingers, but with three diminutive flat nails near their extremities. No traces of hind limbs are discernible either externally or internally; and there is no dorsal fin. The mouth is peculiar, the tumid upper lip being cleft in the middle line into two lobes, each of which is separately movable. The nostrils are two semilunar valve-like slits at the apex of the muzzle. The eyes are very minute, placed at the sides of the head, and with a nearly circular aperture with wrinkled margins; and external ears are wanting. The skin generally is of a dark greyish colour, not smooth or glistening like that of whale or dolphin, but finely wrinkled. At a little distance it appears naked, but close inspection, at all events in young animals, shows a scanty covering of delicate hairs, and both upper and under lips are supplied with short, stiff bristles.

Manatis have a number — as many as 20 pairs in each jaw— of two-ridged teeth, of which, however, but comparatively few are in use at once. They lack the large tusks of the male dugong, and the fore part of the skull is not so much bent down as in that animal. In life the palate has a horny plate, with a similar one in the lower jaw. The skeleton is described under Sirenia.

Manatis pass their life in the water, inhabiting bays, lagoons, estuaries and large rivers, but the open sea is unsuited to their peculiar mode of life. As a rule they prefer shallow water, in which, when not feeding, they lie near the bottom. In deeper water they often float, with the body much arched, the rounded

back close to the surface, and the head, limbs and tail hanging downwards. The air in the lungs assists them to maintain this position. Their food consists exclusively of aquatic plants, on which they feed beneath the water. They are slow in their movements, and perfectly harmless, but are subject to persecu- tion for the sake of their oil, skin and flesh. Frequent attempts have been made to keep specimens alive in captivity, and sometimes with considerable success, one having lived in the Brighton Aquarium for upwards of sixteen months. From such captive specimens certain observations on the mode of life of these animals have been made. We learn, for instance, that from the shoulder-joint the flippers can be moved in all directions, and the elbow and wrist permit of free extension and flexion. In feeding, manatis push the food towards their mouths by means of one of the hands, or both used simultaneously, and any one who has seen these members thus employed can believe the stories of their carrying their young under their arms. Still more interesting is the action of the peculiar lateral pads formed by the divided upper lip, thus described by Professor A. Garrod: " These pads ha ve the power of transversely approaching towards and receding from one another simultaneously (see fig.). When the animal is on the point of seizing (say) a leaf of lettuce, the pads are diverged transversely in such a way as to make a median gap of considerable breadth. Directly the leaf is within grasp the lip pads are approximated, the leaf is firmly seized between their contiguous bristly surfaces, and then drawn inwards by a back- wa rd movement of the lower margin of the lip as a whole." The animal is thus enabled by the unaided means of the upper lip to introduce food placed before it without the assistance of the comparatively insignificant lower lip, the action recalling that of the mouth of the silkworm and other caterpillars in which the mandibles diverge and converge laterally during mastication. All trustworthy observations indicate that the manati has not the power of voluntarily leaving the water. None of the speci- mens in confinement has been observed to emit any sound.

The Amazonian manati (M. inunguis) is a much smaller species, not exceeding 7 or 8 ft. in length, and without nails to the flippers. It ascends most of the tributaries of the Amazon until stopped by rapids. From a specimen which lived a short timejn London it appears that the lip-pads are less developed than in the northern species. The third species is the West African M. senegalensis , which extends a distance of about ten degrees .south and sixteen north of the equator, and ranges into the heart of the continent as far as Lake Tchad. From 8 to 10 ft. appears to be the normal length; the weight of a specimen was 590 lb. The colour is bluish black,

with a tinge of olive-green above and yellow below. (R. L.)*

MANBHUM, a district of British India, in the Chota Nagpur division of Bengal. The administrative headquarters are at Purulia. Area, 4147 sq. m.; pop. (1901), 1,301,364, showing an increase of 9-1% since 1891. Manbhum district forms the first step of a gradual descent from the table-land of Chota Nagpur to the delta of lower Bengal. In the northern and eastern portions the country is open, and consists of a series of rolling downs dotted here and there with isolated conical hills. In the western and southern tracts the country is more broken and the scenery much more picturesque. The principal hills are Dalma (3407 ft.), the crowning peak of a range of the same name; Gangabari or Gajboro (2220 ft.), the highest peak of the Baghmundi range, about 20 m. south-west of Purulia; and Panchkot or Panchet (1600 ft.), on which stands the old fort of the rajas of Panchet. The hills are covered with dense jungle. The chief river is the Kasai, which flows through the district from north-west to south-east into Midnapore, and on which a considerable floating trade in sal timber is carried on. The most numerous aboriginal tribe are the Sontals; but the Bhumij Kols are the characteristic race. In Manbhum they inhabit the country lying on both sides of the Subanrekha. They are pure Mundas, but their compatriots to the east have dropped the title of Munda and the use of their distinctive language, have adopted Hindu customs, and are fast becoming Hindus in religion. The Bhumij Kols of the Jungle Mahals

were once the terror of the surrounding districts; they are now more peaceful.

Three principal crops of rice are grown, one sown broadcast early in May on table-lands and the tops of ridges, an autumn crop, and a winter crop, the last forming the chief harvest of the district. Other crops are wheat, barley, Indian corn, pulses, oilseeds, linseeds, jute, hemp, sugar-cane, indigo, pan and tobacco. Owing to the completeness of the natural drainage, floods are unknown, but the country is liable to droughts caused by deficient rainfall. The principal articles of export are oilseeds, pulses, ghi, lac, indigo, tussur silk (manufactured near Raghunathpur), timber, resin, coal, and (in good seasons) rice. The chief imports are salt, piece goods, brass utensils and unwrought iron. Cotton hand-loom weaving is carried on all over the district. Manbhum contains the Jherria coalfield, in the Damodar valley, where a large number of mines have been opened since 1894. The United Free Church of Scotland has a mission at Pakheria, with a printing press that issues a monthly journal in Sonthali; and a German Lutheran mission has been established since 1864. The district is traversed by the Bengal-Nagpur railway, while two branches of the East Indian railway serve the coalfield.

MANCHA, LA (Arabic, Al Mansha, " the dry land " or " wilder- ness "), a name which when employed in its widest sense denotes the bare and monotonous elevated plateau of central Spain that stretches between the mountains of Toledo and the western spurs of the hills of Cuenca, being bounded on the S. by the Sierra Morena and on the N. by the Alcarria region. It thus comprises portions of the modern provinces of Toledo, Albacete and Cuenca, and the greater part of Ciudad Real. Down to the 1 6th century the eastern portion was known as La Mancha de Montearagon or de Aragon, and the western simply as La Mancha ; afterwards the north-eastern and south-western sections respectively were distinguished by the epithets Alta and Baja (upper and lower). La Mancha is famous as the scene of Cer- vantes' novel Don Quixote; in appearance, with its multitude of windmills and vast tracts of arid land, it remains almost exactly as Cervantes described it. Many villages, such as El Toboso and Argamasilla de Alba, both near Alcazar de San Juan, are connected by tradition with episodes in Don Quixote.

MANCHE, a department of north-western France, made up chiefly of the Cotentin and the Avranchin districts of Normandy, and bounded W., N. and N.E. by the English Channel (Fr. La Manche), from which it derives its name, E. by the depart- ment of Calvados, S.E. by Orne, S. by Mayenne and Ille-et- Vilaine. Pop. (1906), 487,443. Area, 2475 sq. m.

The department is traversed from south to north by a range of hills, in many parts picturesque, and connected in the south with those of Maine and Brittany. In the country round Mortain, which has been called the Switzerland of Normandy, they rise to a height of 1200 ft. The coast-line, running northward along the bay of the Seine from the rocks of Grand Camp to Cape Barfleur, thence westward to Cape la Hague, and finally south- ward to the Bay of Mont St Michel, has a length of 200 miles. The Vire and the Taute (which near the small port of Carentan receives the Ouve as a tributary on the left) fall into the sea at the Calvados border, and are united by a canal some miles above their mouths. From the mouth of the Taute a low beach runs to the port of St Vaast-la-Hougue, where the coast becomes rocky, with sandbanks. Off St Vaast lies the fortified island of Tatihow, with the laboratory of marine zoology of the Natural History Museum of Paris. Between Cape Barfleur and Cape la Hague lie the roads of Cherbourg, protected by the famous breakwater. The whole western coast is inhospitable; its small havens, lying behind formidable barriers and reefs, are almost dry at low tide. Great cliffs, such as the points of Jobourg (420 ft. high) and Flamanville, alternate with long strands, such as that which extends for 30 m. from Cape Carteret to Granville. Between this coast and the Channel Islands the tide, pent up between numerous sandbanks, flows with a terrific force that has given these passages such ill-omened names as Passage de la Deroute and the like. The only important

harbours are Granville and the haven of refuge of Dielette between Granville and Cherbourg. Carteret carries on a passenger traffic with the Channel Islands. The chief stream is the Sienne, with its tributary the Soulle flowing by Coutances. South of Granville the samds of St Pair are the commencement of the great bay of Mont Saint Michel,

whose area of 6o,ooq acres was covered with forest till the terrible tide of the year 709. The equinoctial tides reach a vertical height of nearly 50 ft. In the bay the picturesque walls of the abbey rise from the summit of a rock 400 ft. high. The See; which waters Avranches, and the Couesnon (separating Manche from Ille-et-Vilaine) disembogue in the bay.

The climate of Manche is mild and humid, from its propinquity to the sea. Frosts are neVer severe ; myrtles and fuchsias flourish in the open air. Excessive heat is also unusual; the predominant winds are south-west.

The characteristic industry of the department is the rearing of horses and cattle, carried on especially in the rich meadow of the eastern Cotentin; sheep are raised in the western arron- dissement of Coutances. Wheat, buckwheat, barley and oats are the chief cereals cultivated. Manche is one of the foremost departments for the production of cider-apples and pears; plums and figs are also largely grown. Butter is an important source of profit, as also are poultry and eggs. Flourishing market- gardens are found in the west. The department contains valuable granite quarries in the Cherbourg arrondissement and the Chausey islands; building and other stone is quarried.

Villedieu manufactures copper-ware and Sourdeval iron and other metal-ware; and there are wool-spinning mills, paper- works and leather-works, but the department as a whole is industrially unimportant. There are oyster-beds on the coast (St Vaast, &c.) , and the maritime population, besides fishing for herring, mackerel, lobsters or sole, collect seaweed for agricultural use. Coutances is the seat of a bishopric of the province of Rouen. The depart- ment forms part of the region of the X. army corps and of the circumscriptions of the academie (educational division) and appeal-court of Caen. Cherbourg (q.v.), with its. important port, arsenal and shipbuilding yards, is the chief centre of population. St L6 (q.v.) is the capital; there are six arrondissements (St L6, Avranches, Cherbourg, Coutances, Mortain, Valognes), with 48 cantons and 647 communes. Avranches, Mortain, Coutances, Granville and Mont Saint Michel receive separate treatment. At Lessay and St Sauveur-le-Vicomte there are the

remains of ancient Benedictine abbeys, and Torigni-sur-Vire and Tourlaville (close to Cherbourg) have interesting chateaux of the 16th century. Valognes, which in the 17th and 18th centuries posed as a provincial centre of culture, has a church (15th, 16th and 17th centuries) remarkable for its dome, the only one of Gothic archi- tecture in France.

MANCHESTER, EARLS AND DUKES OF. The Manchester title, in the English peerage, belongs to a branch of the family of Montagu (q.v.). The first earl was Sir Henry Montagu (c. 1563-1642), grandson of Sir Edward Montagu, chief justice of the king's bench 1 539-1 545, who was named by King Henry VIII. one of the executors of his will, and governor to his son, Edward VI. Sir Henry Montagu, who was born at Boughton, North- amptonshire, about 1563, was educated at Christ's College, Cambridge, and, having been called to the bar, was elected recorder of London in 1603, and in 1616 was made chief justice of the king's bench, in which office it fell to him to pass sentence on Sir Walter Raleigh in October 1618. In 1620 he was appointed lord high treasurer, being raised to the peerage as Baron Montagu of Kimbolton, Huntingdonshire, and Viscount Mandeville. He became president of the council in 162 1, in which office he was continued by Charles I., who created him earl of Manchester 1 in 1626. In 1628 he became lord privy seal, and in 1635 a com- missioner of the treasury. Although from the beginning of his public life in i6or, when he first entered parliament, Manchester had inclined to the popular side in politics, he managed to retain to the end the favour of the king. He was a judge of the Star Chamber, and one of the most trusted councillors of Charles I. His loyalty, ability and honesty were warmly praised by Clarendon. In conjunction with Coventry, the lord keeper, he pro- nounced an opinion in favour of the legality of ship-money in 1634. He died on the 7th of November 1642. Manchester was

1 The title was derived, not from Manchester in Lancashire, but from Manchester (or Godmanchester) in Huntingdonshire, where the Montagu family estates were.

married three times. One of his sons by his third wife was father of Charles Montagu, created earl of Halifax in 1699.

Edward Montagu, 2nd earl of Manchester (1602-1671), eldest son of the 1st earl by his first wife, Catherine Spencer, grand- daughter of Sir John Spencer of Althorpe, was born in 1602, and was educated at Sidney Sussex College, Cambridge. He was member of parliament for Huntingdonshire 1623-1626, and in the latter year was raised to the peerage in his father's lifetime as Baron Montagu of Kimbolton, but was known generally by his courtesy title of Viscount Mandeville. His first wife, who was related to the duke of Buckingham, having died in 1625 after two years of marriage,

Mandeville married in 1626 Anne, daughter of the 2nd earl of Warwick. The influence of his father-in-law, who was afterwards admiral on the side of the parliament, drew Mandeville to the popular side in the questions in dispute with the crown, and at the beginning of the Long Parliament he was one of the recognized leaders of the popular party in the upper House, his name being joined with those of the five members of the House of Commons impeached by the king in 1642. At the outbreak of the Civil War, having succeeded his father in the earldom in November 1642, Manchester commanded a regiment in the army of the earl of Essex, and in August 1643 he was appointed major-general of the parliamentary forces in the eastern counties, with Cromwell as his second in command. Having become a member of the " committee of both kingdoms " in 1644, he was in supreme command at Marston Moor (July 1, 1644) ; but in the subsequent operations his lack of energy brought him into disagreement with Cromwell, and in November 1644 he strongly expressed his disapproval of continuing the war (see Cromwell, Oliver). Cromwell brought the shortcomings of Manchester before parliament in the autumn of 1644; and early in the following year, anticipating the self-denying ordinance, Manchester resigned his command. He took a leading part in the frequent negotiations for an arrangement with Charles, was cus- todian with Lenthall of the great seal 1646-1648, and frequently presided in the House of Lords. He opposed the trial of the king, and retired from public life during the Commonwealth; but after the Restoration, which he actively assisted, he was loaded with honours by Charles II. In 1667 he was made a general, and he died on the 5th of May 1671. Manchester was madea K.G. in 1661, and became F.R.S. in 1667. Men of such divergent sympathies as Baxter, Burnet and Clarendon agreed in describing Manchester as a lovable and virtuous man, who loved peace and moderation both in politics and religion. He was five times married, leaving children by two of his wives, and was succeeded in the title by his eldest son, Robert, 3rd earl of Manchester (1634-1683).

See Lord Clarendon, History of the Rebellion and Civil Wars in England (7 vols., Oxford, 1839) and Life of Clarendon (Oxford, 1827) ; S. R. Gardiner, History of the Great Civil War, 1642-1649 . (4 vols., London, 1 886-1 891) ; The Quarrel between Manchester and Cromwell, Camden Soc., N.S. 12 (London, 1875) ! Sir Philip Warwick, Memoirs of the Reign of Charles I. (London, 1701).

Charles Montagu, 1st duke of Manchester (c. 1656-1722), son of Robert, 3rd earl of Manchester, was educated at Trinity College, Cambridge, and succeeded to his father's earldom in 1683. Warmly sympathizing with the Whig revolution of 1688, he attended William and Mary at their coronation, fought under William at the Boyne, became a privy councillor in 1698, and held various important diplomatic posts between that date'

and 1 7 14, when he received an appointment in the household of George I., by whom on the 28th of April 1719 he was created duke of Manchester. He died on the 20th of January 1722, and was succeeded successively in the dukedom by his two sons, William 2nd duke of Manchester (1 700-1 739), and Robert 3rd duke (c. 1710-1762), who was vice-chamberlain to Queen Caroline, wife of George II.

George Montagu, 4th duke of Manchester (1737-1788), was the son of Robert, the 3rd duke. He was a supporter of Lord Rockingham, and an active opponent in the House of Lords of Lord North's American policy. In the Rockingham ministry of 1782 Manchester became lord chamberlain. He died in September 1788.

William Montagu, 5th duke of Manchester (1768-1843), second son of the preceding, was educated at Harrow, and having become a colonel in the army in 1794, was appointed governor of Jamaica in 1808. Here he remained, except for a visit to England (1811-1813) till 1827, administering the colony with ability in a period of considerable difficulty, and doing much to prepare the way for emancipation of the slaves. From 1827 to 1830 he was postmaster-general in the cabinet of the duke of Wellington, and died in Rome on the 18th of March 1843. His wife was Susan, daughter of the 4th duke of Gordon. He was suc- ceeded by his son George, 6th duke (1700-1855), a captain in the navy; whose son William Drogo, 7th duke (1 823-1 890), married Louise, daughter of the Comte d'Alten of Hanover, who after his death married Spencer Cavendish, 8th duke of Devonshire. William was succeeded by his son George Victor Drogo, 8th duke of Manchester (1853-1892), on whose death the title devolved on his son, William Angus Drogo, 9th duke of Manchester (b.1877). (R.J.M.)

MANCHESTER, a township of Hartford county, Connecticut, U.S.A., about 9 m. E. of Hartford. Pop. (1890), 8222; (1900), 10,601, of whom 3771 were foreign-born; (1910 census) 13,641. Manchester is served by the New York, New Haven & Hartford railway and by electric line connecting with Hartford, Rockville and Stafford Springs. The township covers an area of about 28 sq. m., and includes the villages of Manchester, South Manchester, Buckland, Manchester Green and Highland Park. The Hockanum River provides a good water power, and Manchester has various manufactures. At South Manchester, an attractive industrial village, a silk mill was built in 1838; the silk mills of one firm (Cheney Brothers) here cover about 12 acres; the company has done much for its

em- ployees, whose homes are almost all detached cottages in attrac- tive grounds. Manchester was originally a part of the township of Hartford, and later a part of the township of East Hartford. The first settlement within its present limits was made about 1672; the land was bought from the Indians in 1676; and the township was separated from East Hartford and incorporated in

1823.

See also Meakin's Model Factories and Villages (1905).

MANCHESTER, a city and county of a city, municipal, county and parliamentary borough of Lancashire, England, 189 m. N.W. by N. of London, and 31 m. E. by N. of Liverpool. It stands for the most part on a level plain, the rising ground being chiefly on the north side. The rivers are the Irwell, the Medlock, the Irk, and the Tib, the last entirely overarched and covered by streets and warehouses. The Irwell, which separates Manchester from Salford, is crossed by a series of bridges and discharges itself into the Mersey, which is about 10 m. distant. The chief part of the district, before it was covered with the superficial drift of sand, gravel and clay, consisted of upper New Red Sandstone with slight portions of lower New Red Sandstone, magnesian marls and upper red marls, hard sandstone and limestone rock, and cold clays and shales of contiguous coal-fields. The city, as its thousands of brick-built houses show, has been for the most part dug out of its own clay-fields. The parliamentary and municipal boroughs of Manchester are not conterminous. The city boundaries, which- in 1841 enclosed 4293 acres, have been successively enlarged and now enclose 19,914 acres.

There are four large stations for the Lancashire & Yorkshire, London & North-Western, the Midland, Cheshire lines, Great Northern, and Great Central railways, and many subsidiary stations for local traffic. Tramways, as well as railways, run from Manchester to Oldham, Ashton, Eccles, Stockport, &c, with which places the city is connected by continuous lines of street. The length of the streets in the city of Man- chester is 758 m. (exclusive of those in the district of Withing- ton, which joined the city in 1905). The tramway lines within the city boundaries extend to in m., and in addition there are 58 m. leased to the corporation by adjacent local authorities. As a matter of fact, the whole of south-east Lancashire and some portions of Cheshire are linked to Manchester by

railways and tramways so as to form one great urban area, and the traveller passes from one town to another by lines of street which, for the most part, are continuous. Facility of communication is essential to the commercial prosperity of Manchester, and its need was recognized by the

duke of Bridge- water, whose canal, constructed in 1761, has now been absorbed by the Manchester Ship Canal (q.v.). The making of this early waterway was an event only less important than the apening of the Manchester & Liverpool railway in 1830.

The township of Manchester, which forms the nucleus of the city, is comparatively small, and outlying hamlets having been added, its size has increased without regularity of plan. Roughly speaking, the city forms a square, with Market Street as its central thoroughfare. The tendency of recent develop- ment is to reduce the irregularities so that the other main streets may either run parallel to or intersect Market Street. Deansgate, which formerly ended in a narrow tangle of buildings, is now a broad road with many handsome buildings, and the same process of widening, enlarging and rebuilding is going on, more or less, all over Manchester. Market Street, which has not been widened since 1820, has been termed, and with some reason, "the most congested street in Europe"; but relief is anticipated from some of the other street improve- ments. The centre of the city is occupied by business premises; the factories and workshops are mainly on the eastern side. The most important of the public buildings are in the centre and the south. The latter is also the most favoured residential district, and at its extremity is semi-rural in character. Large masses of the population live beyond the city boundary and come to their daily avocations by train and tram. Such a population is rarely homogeneous and Manchester attracts citizens from every part of the globe; there are considerable numbers of German, Armenian and Jewish residents. The houses are for the most part of brick, the public buildings of stone, which is speedily blackened by the smoky atmosphere. Many of the warehouses are of considerable architectural merit, and in recent years the use of terra-cotta has become more common. It is only in the suburbs that gardens are possible; the air is laden with black dust, and the rivers, in spite of all efforts, are in the central part of the city mere dirty ditches. It is impossible to describe Manchester in general terms, for within the city boundaries the conditions vary from the most squalid of slums to suburban and almost rural beauty.

Churches. — Manchester is the seat of an Anglican bishopric, and the chief ecclesiastical building is the cathedral, which, however, was built simply as a parish church, and, although a fine specimen of the Perpendicular period, is by no means what might be expected as the cathedral of an important and wealthy diocese. In the course of restoration a piece of Saxon sculpture came to light. This " Angel stone " represents a winged figure with a scroll inscribed In manus tuas Domine in characters of the 8th century. The bulk of the building belongs to the early part of the 15th century. The first warden was John Huntington, rector of Ashton, who built the choir. The building, which was noticed for its hard stone by Leland when he visited the town, did not stand time and weather well, and by 1845 some portions of it were rapidly decaying. This led to its restoration by James P. Holden. By 1868 the tower was almost completely renovated in a more durable stone. Further restoration was carried out by J. S. Crowther, and the addition of a porch and vestries was executed by Basil Champneys. The total length is 220 ft. and the breadth 112 ft. There are several stained-glass windows, including one to the memory of " Chinese Gordon." The recumbent statues of Bishop James Fraser and of Hugh Birley, M.P., should also be named. In the Ely chapel is the altar tomb of Bishop James Stanley. In the stalls there are some curious miserere carvings. The tower is 139 ft. high, and contains a peal of ten bells, chiefly from the foundry of the Rudhalls. There are two organs, one by Father Smith, and a modern one in an oak case designed by Sir G. Scott. The parish church was made collegiate in 1422, and when in 1847 the bishopric 6f

Manchester was created the warden and fellows became dean and canons and the parish church became the cathedral. The first bishop was James Prince Lee, who died in 1869; the second was James Fraser, who died in 1885; the third was James Moorhouse, who resigned in 1903 and was succeeded by Edmund Arbuthnott Knox. The church endowments are considerable and have been the subject of a special act of parliament, known as the Manchester Rectory Division Act of 1845, which provides £1500 per annum for the dean and £600 to each of the four canons, and divides the residue among the incumbents of the new churches formed out of the old parish.

gallery. The art gallery already existing in 1909 was founded as the Royal Institution, but in 1882 passed under the control of the city council. The building was designed by Sir Charles Barry. The collection contains some fine paintings by Etty, Millais, Leighton and other artists. The sculpture

includes casts of the Elgin marbles and a statue of Dr John Dalton by Chantrey. The most striking of the public buildings is the town hall, probably the largest municipal building in the country, but no longer entirely adequate to the increasing business of the city council. It was completed in 1877 from designs by Alfred Waterhouse, who selected as the style of

Railuiaua i"i Canals..

1. Excnange Station ick Frat Trada Hall

a. Victoria Station it. Post Offlea

i, Lontton Road Station 13. Polio Court**

4. Control Station t J. Grammar Sehool

J. Cathedral 14. Victoria Unjoanlty

6. Toutn Halt lOwans CollogtJ

7. Hoyal Exohanaa ij. Fro Llbniry*

8. Aselc Court it. Tocnrucat School* ■ .9. Art Gallery 17. Blind Asylum*

18. Theatro Royal

and Athtnanim

Mlo»»r (fca CuAtiolltf »f H.M .SIMiinw/ Qltiti.

Of the Roman Catholic churches that of the Holy Name, which belongs to the Jesuits, is remarkable for its costly decora- tion. The Greek Church and most of the Nonconformist bodies have places of worship. There are twelve Jewish synagogues. The meeting-house of the Society of Friends is said to be the largest of the kind in the kingdom and will seat 1200 persons.

Public Buildings. — The Royal Infirmary, founded in 1752, having become inadequate for its purposes, a new building has been erected on the south side of the city near the university, from designs by Edwin T. Hall and John Brooke; it was opened in 1009 by king Edward VII. The central site in Piccadilly thus became available for other purposes, and the corporation gave instructions for plans to be made for a new library and art xvn. 18

Enury Walker M

architecture a form of Gothic, but treated it very freely as purposes of

utility required. The edifice covers 8000 sq. yds., and includes more than two hundred and fifty rooms. The building consists of continuous lines of corridors surrounding a central courtyard and connected by bridges. The principal tower is 286 ft. high to the top of the ball, and affords a view which extends over a large part of south Lancashire and Cheshire and is bounded only by the hills of Derbyshire. The tower contains a remarkable peal of bells by Taylor of Loughborough, forming an almost perfect chromatic scale of twenty-one bells; each bell has on it a line from canto 105 of Tennyson's In Memoriam. The great hall is 100 ft. long and 50 ft. wide, and contains a magnificent organ built by Cavaille-Coll ot Paris. The twelve panels of this room are filled with paintings

by Ford Madox Brown, illustrating the history and progress of the city. The royal exchange is a fine specimen of Italian architecture and was erected in 1869; the great meeting-hall is one of the largest rooms in England, the ceiling having a clear area, without supports, of 120 ft. in width. The exchange is seen at its best on market days (Tuesday and Friday). The assize courts were built in 1864 from designs by Waterhouse. The style is a mixture of Early English and Decorative, and a large amount of decorative art has been expended on the building. The branch Bank of England is a Doric building designed by C. R. Cockerell. There are separate town-halls for the townships of Ardwick, Chorlton, Hulme, Cheetham, Broughton and Pendleton. The Free Trade hall is a fine structure in the Lombardo-Venetian style, and its great hall will accommodate about five thousand people. It is used for public meetings, concerts, &c, and was built by Edward Walters. The Athenaeum, designed by Barry, was founded by Richard Cobden and others associated with him for " the advancement and diffusion of knowledge." The institution has, perhaps, not developed exactly on the lines contemplated by its promoters, but it has been very useful. The advantages enjoyed by members of social clubs, with the addition of facili- ties for educational classes and the use of an excellent news- room and a well-selected library, are offered in return for a payment which does not amount to a penny a day. The mechanics' institution has developed into the school of Tech- nology, which now forms a part of the university. The Portico is a good specimen of the older proprietary libraries and news- rooms. It dates from 1806, and has a library. The Memorial Hall was built to commemorate the memory of the ejected ministers of 1662; it is used for meetings, scientific, educational, musical and religious. The Whitworth Institute is governed by a corporate body originating from the liberal bequests of Sir Joseph Whitworth. The Institute contains a valuable collection of works of art and stands in the centre of a wood- land

park. In the park, which has been transferred to the corporation, is a sculpture group of " Christ and the Children," executed by George Tinworth from the designs of R. D. Darbi- shire, by whom it was presented. The assize courts, built from designs by Waterhouse (1864), the post office (1887), and the police courts (1871) should also be named. Many fine structures suffer from being hemmed in by streets which prevent the proportions from being seen to advantage.

Monuments. — In Piccadilly are bronze statues of Wellington, Watt, Dalton, Peel and Queen Victoria. Another statue of the Queen, by the Princess Louise, is placed on the new porch of the cathedral. A bronze statue of Cobden occupies a prom- inent position in St Ann's Square. There also is the South African War Memorial of the Manchester Regiment. The marble statue of the Prince Consort, covered by a Gothic canopy of stone, is in front of the town hall, which dwarfs what would otherwise be a striking monument. In Albert Square there are also statues of Bishop Fraser, John Bright, Oliver Heywood and W. E. Gladstone. A statue of J. P. Joule is in the town hall, which also contains memorials of other worthies. The Queen's Park has a statue of Benjamin Brierley, a well-known writer in the Lancashire dialect. The most picturesque is Matthew Noble's bronze statue of Cromwell, placed on a huge block of rough granite as pedestal. It stands at the junction of Deansgate and Victoria Street, near the cathedral, and was presented to the town by Mrs E. S. Heywood.

Education. — There are many educational facilities. The oldest institution is the grammar school, which was founded in 1 519 by Hugh Oldham, bishop of Exeter, a native of the town. The master and usher appointed by the bishop were to teach freely every child and scholar coming to the school, " without any money or reward taken "; and the bishop forbade the appointment of any member of the religious orders as head master. Some corn mills were devised for the main- tenance of the school, which was further endowed at both the universities by Sarah, duchess of Somerset, in 1692. The school has now two hundred and fifty free scholars, whilst

other pupils are received on payment of fees. Among those educated at the grammar school were Thomas De Quincey, Harrison Ainsworth and Samuel Bamford the Radical. After the grammar school the oldest educational foundation is that of Humphrey Chetham, whose bluecoat school, founded in 1653, is housed in the building formerly occupied by the college of clergy. This also contains the public library founded by Chetham, and is the most interesting relic of antiquity in the city. The educational charity of William Hulme (1631-1691) is administered under a scheme drawn up in 1881. Its income is nearly £10,000 a year, and it supports a grammar school and aids education in other ways. There are three high schools for girls. The Nicholls hospital was founded in 1881 for the

education of orphan boys. Manchester was one of the first places to adopt the powers given by Forster's Act of 1870, and on the abolition of school boards the educational super- vision was transferred to a committee of the corporation strength- ened by co-opted members. In addition to the elementary schools, the municipality provides a large and well-equipped school of technology, and a school of art to which is attached an arts and crafts museum. There are a pupil teachers' college, a school of domestic economy, special schools for feeble-minded children, and a Royal College of Music. The schools for the deaf and dumb are situated at Old Trafford, in a contiguous building of the same Gothic design as the blind asylum, to which Thomas Henshaw left a bequest of £20,000. There is also an adult deaf and dumb institution, containing a news-room, lecture hall, chapel, &c, for the use of deaf mutes.

The Victoria University of Manchester has developed from the college founded by John Owens, who in 1846 bequeathed nearly £100,000 to trustees for an institution in which should be taught " such branches of learning and science as were then or might be hereafter usually taught in English univer- sities." It was opened in 1851 in a house which had formerly been the residence of Cobden. In 1872 a new college building was erected on the south side of the town from designs by Waterhouse. In 1880 a university charter was granted, exclu- ding the faculties of theology and medicine, and providing for the incorporation of University College, Liverpool, and the College of Science, Leeds. The federal institution thus created lasted until 1903, when the desire of Liverpool for a separate university of its own led to a reconstruction. Manchester University consists of one college — Owens College — in its greatly enlarged form. The buildings include the Whitworth Hall (the gift of the legatees of Sir Joseph Whitworth), the Manchester Museum and the Christie Library, which is a building for the university library given by R. C. Christie; who also bequeathed his own collection. Dr Lee, the first bishop of Manchester, left his library to Owens College, and the legatees of Sir Joseph Whitworth bought and presented E. A. Freeman's books. The library has received other import- ant special collections. The benefactions to the university of Thomas Ashton are estimated at £80,000. There are in Manchester a number of denominational colleges, Wesleyan, Primitive Methodist, Unitarian, Baptist, &c, and many of the students preparing for the ministry receive their arts training at the university, the theological degrees of which are open to students irrespective of creed.

Libraries, Museums and Societies. — Manchester is well provided with libraries. The Chetham library, already named, contains some rare manuscripts, the gem of the collection being a copy of the historical compilation of Matthew Paris, with corrections in the author's handwriting. There is a large collection of matter relating to the history and archaeology

of Lancashire and Cheshire, including the transcripts of Lancashire MSS. bequeathed by Canon F.'R. Raines. The collections of broadsides formed by Mr J. O. Halliwell- Phillipps, and the library of John Byrom, rich in mystics and short- hand writers, should also be named. The Manchester Free Libraries 1 were founded by Sir John Potter in 1852. There is now a reference library containing about 170,000 volumes, including an extensive series of English historical works, a remarkable collection of books of political economy and trade, and special collections relating; to local history, Dr Thomas Fuller, shorthand and the gipsies. The

Henry Watson Music Library, and the Thomas Greenwood Library for librarians were presented to the reference library, and the Foreign Library was purchased. Affiliated to the reference library there are nineteen libraries, each of which includes a lending department and reading rooms. The municipal libraries contain in the aggregate over 366,000 vols. There are also libraries in connexion with the Athen- aeum, the School of Technology, the Portico, and many other in- stitutions. The most remarkable of the Manchester libraries is that founded by Mrs Enriqueta Rylands, and named the John Rylands Library in memory of her husband. The beautiful building was designed by Basil Champneys; the library includes the famous Althorp collection, which was bought from Earl Spencer. Mrs Rylands died in 1908, and by her will increased the endowment of the library so that it has an income of £13,000 yearly. She also bequeathed her own library.

Manchester possesses numerous literary and scientific associations. The oldest of these, the Literary and Philosophical Society, founded in 1 781, has a high reputation, and has numbered among its work- ing members John Dalton, Eaton Hodgkinson, William Fairbairn, J. P. Joule, H. E. Roscoe and many other famous men of science. It has published a series of memoirs and proceedings. The Manchester Statistical Society was the first society of the kind established in the kingdom, and has issued Transactions containing many important papers. The Field Naturalists' and Archaeologists' Society, the Microscopical Society, the Botanists' Association, and the Geological Society may also be named. Manchester is the headquarters of the Lancashire and Cheshire Antiquarian Society and of several printing clubs, the Chetham, the Record, the Lancashire Parish Registers societies. Seven daily papers are published, and various weekly and other periodicals. The journalism of Manchester takes high rank, the Manchester Guardian (Liberal) being one of the best news- papers in the country, while the Manchester Courier (Unionist) has an important local

influence. The Manchester Quarterly is issued by the Manchester Literary Club, which was founded in 1862. The success of the Art Treasures Exhibition in 1857 was repeated in the Jubilee Exhibition of 1887. The Manchester Academy of Fine Arts is a society of artists, and holds an annual exhibition in the city art gallery.

Parks and Open Spaces. — There are fifty-three parks and open spaces. The Queen's Park, at Harpurhey, is pleasantly situated, though surrounded by cottages and manufactories. Philips Park is also attractive, in spite of its close proximity to some of the most densely populated portions of the town. The Alexandra Park has very good ornamental grounds and a fine cactus house with a remark- able collection presented by Charles Darrah. Some of the open spaces are small ; Boggart Hole Clough, where great efforts have been made to preserve the natural features, is 76 acres in extent, and was the largest until 1902, when Heaton Park, containing 692 acres, was purchased. It was formerly the seat of the earls of Wilton, and includes Heaton House, one of Wyatt's structures. In the Queen's Park there is a museum, and periodical exhibitions of works of art are held. The total area of the city parks is 1 146 acres. The corporation are also responsible for four cemeteries, having a total area of 228 acres.

Recreation. — There are nine theatres, mostly large, and eight music halls. The Theatre Royal was established as a patent theatre. When the bill for it was before the House of Lords in 1775 it was advocated as an antidote to Methodism. The Bellevue Zoological Gardens is a favourite holiday place for working people. The Ancoats Recreation Committee have since 1882 had Sunday lectures, and occasional exhibitions of pictures, window gardening, &c. The Ancoats Art Museum was founded to carry out the educational influences of art and culture generally. In addition to works of art, there are concerts, lectures, reading circles, &c. The museum is worked in connexion with a university settlement. The German element in the population has largely influenced the taste for music by which Manchester is distinguished, and the orchestral concerts (notably under Charles Halle) are famous.

Population. — From a census taken in 1773 it appears that there were then in the township of Manchester and its out- townships 36,267 persons. The first decennial census, 1801, showed the population to be 75,275; in 1851 it was 303,382; in 1901, 606,824. It is not easy to make an exact comparison between different periods, because there have been successive enlargements of the boundaries. The population has over- flowed into the surrounding districts, and if all that belongs to the urban area, of which it is the centre, were included, greater Manchester would probably rival London in the number of its inhabitants.

Manufactures and Commerce. — Manchester is the centre of the English cotton industry (for details see Cotton and Cotton Manufacture), but owing to the enhanced value of land many mills and workshops have been removed to the outskirts and to neighbouring villages and towns, so that the Statre of Manchester and an. e.ve.r-widening circle around are

now chiefly devoted not so much to production as to the various offices of distribution. It would be a mistake, however, to regard Manchester as solely dependent upon the industries connected with cotton. There are other important manu- factures which in another community would be described as gigantic. Wool and silk are manufactured on a considerable scale, though the latter industry has for some years been on the decline. The miscellaneous articles grouped under the designation of small-wares occupy many hands. Machinery and tools are made in vast quantities; the chemical industries of the city are also on a large scale. In short, there are but few important manufactures thati are wholly unrepresented. The proximity of Manchester to the rich coal-fields of Lan- cashire has had a marked influence upon its prosperity; but for this, indeed, the rapid expansion of its industries would have been impossible.

The Manchester Bankers' Clearing House returns show an almost unbroken yearly increase. The amount in 1872 was £72,805,510; in 1907 it was £320,296,332; by the severe de- pression of 1908 it was reduced to £288,555,307. Another test of prosperity is the increase in rateable value. In 1839 it was £669,994; in 1871, £1,703,627; in 1881, £2,301,225; in 1891, £2,798,005; in 1901, £3,394,879; in 1907, £4,i9i,˚39; in 1909, £4,234,129.

The commercial institutions of Manchester are too numerous for detailed description; its chamber of commerce has for more than sixty years exercised much influence on the trade of the district and of the nation. Manchester is the headquarters of the Co-operative Wholesale Societv, and indeed of the co- operative movement generally.

The most important event in the modern history of the district is the creation of the Manchester Ship Canal (q.v.), by which Manchester and Salford have a direct communi- cation with the sea at Eastham, near Liverpool. The canal was opened for traffic in January 1 894. The official opening cere- mony was on the 21st of May 1894, when Queen Victoria visited Manchester. The total expenditure on capital account has been £16,567,881. The original share capital of £8,000,000 and £1,812,000, raised by debentures, having been exhausted, the corporation of Manchester advanced on loan a further sum of £5,000,000.

Municipality. — Manchester received a municipal charter in 1838,

received the title of city in 1853, and became a county borough in 1889. The city is divided into 30 wards, and the corporation consists of 31 aldermen and 93 councillors. The mayor received the title of lord mayor in 1893. Unlike some of the municipalities, that of Manchester makes no pecuniary allowance to its lord mayor, and the office is a costly one.

The water supply is controlled by the corporation. The works at Longdendale, begun in 1848, were completed, with extensions in 1884, at a cost of £3,147,893- The area supplied by Manchester waterworks was about 85 square miles, inhabited by a million people. The increase of trade and population led to the obtaining of a further supply from Lake Thirlmere, at the foot of Helvellyn and 96 miles from Manchester. The watershed is about 11,000 acres. The daily consumption is over 38 million gallons. Manchester supplies in bulk to many local authorities in the district between Thirlmere and the city. The corporation have also established works for the supply of hydraulic and electric power.

The gas lighting of Manchester has been in the hands of the corporation for many years, as also the supply of electricity both for lighting and energy. When the works are complete the electricity committee will supply an area of 45 sq. m.

Sanitary Condition. — Dr John Tatham constructed a Manchester life-table based on the vital statistics of the decennium 1881-1890, from which it appeared that, while in England and Wales of 1000 men aged 2$ nearly 800 survived to be 45 and of 1000 aged 45, 569 survived to be 65, in Manchester the survivors were only 732 and 414 respectively. The expectation of life, at 25, was, for England and Wales 36-12 years, and for Manchester 30-69 years. But the death- rate has since rapidly decreased; in 1891 it was 26-0 per thousand living; in 1901 it was 21-6; in 1906 it was 19-0; in 1907 it was 17-9. The deaths of infants under one year old amounted to 169 per 1000

The reports of the medical officer show that whilst the density of the population, the impurity of the atmosphere, and the pollution of the streams are difficult elements in the sanitary problem, great efforts have been made towards improving the health of the people. The birth-rate in 1907 was 28-4, but the population is augmented by immigration as well as by natural increase. The number of persons to the acre is 33.

Administration of Justice. — The city has a stipendiary magistrate who, in

conjunction with lay magistrates, tries cases of summary jurisdiction in the police courts. There are also quarter sessions, presided over by a recorder. Separate sessions are held for the Salford hundred. Certain sittings of the Court of Chancery for the duchy of Lancaster are held in Manchester. In addition to the county court, there is an ancient civil court known as the Salford Hundred Court of Record. Assizes have been held since 1866.

Parliamentary Representation. — By the first Reform Bill Man- chester received in 1832 two representatives. In 1868 this was in- creased to three, but each voter had only two votes. In 1885 the city was divided into six divisions, each returning one member. Owing to the extension of the city boundaries there are Manchester voters in the Stretford, Prestwich and Gorton parliamentary divisions.

History. — Very little is known with certainty of the early history of Manchester. 1 A Roman station of some importance existed at Castlefield, and a fragment of the wall still exists. Another, perhaps earlier, was at Hunt's Bank. In the 18th century considerable evidences of Roman occupation were still visible; and from time to time, in the course of excavation (especially during the making of the Bridgewater Canal), Roman remains have been found. The coins were chiefly those of Vespasian, Antoninus Pius, Trajan, Hadrian, Nero, Domitian, Vitellius and Constantine. Investigations by the Lancashire and Cheshire Antiquarian Society and the Classical Association have brought to light many relics, chiefly of pottery. The period succeeding the Roman occupation is for some time legendary. As late as the 17th century there was a tra- dition that Tarquin, an enemy of King Arthur, kept the castle of Manchester, and was killed by Lancelot of the Lake. The references to the town in authentic annals are very few. It was probably one of the scenes of the missionary preaching of Paulinus; and it is said (though by a chronicler of com- paratively late date) to have been the residence of Ina, king of Wessex, and his queen Ethelberga, after he had defeated Ivor, somewhere about the year 689. Almost the only point of certainty in its history before the Conquest is that it suffered greatly from the devastations of the Danes, and that in 923 Edward, who was then at Thelwall, near Warrington, sent a number of his Mercian troops to repair and garrison it. In Domesday Book Manchester, Salford, Rochdale and Radcliffe are the only places named in south-east Lancashire, a district now covered by populous towns. Large portions of it were then forest, wood and waste lands. Twenty-one thanes held the manor or hundred of Salford among them. The church of St Mary and the church of St Michael in Manchester are both named in Domesday, and some difficulty has arisen as to their proper identification. Some antiquaries consider that the passage refers to the town only, whilst others think it relates to the parish, and that, while St Mary's is the present cathedral, St Michael's would be the present parish church of Ashton-under-Lyne. In

1301 Manchester received a charter of manorial liberties and privileges from its baron, Thomas Gresley, a descendant of one to whom the manor had been given by Roger of Poictou, who was created by William the Conqueror lord of all the land between the rivers Mersey and Ribble. The Gresleys were succeeded by the De la Warrs, the last of whom was educated for the priesthood, and became rector of the town. To avoid the evil of a non-resident clergy, he made considerable additions to the lands of the church, in order that it might be endowed as a collegiate institution. A college of clergy was thus formed, whose fellows were bound to perform the necessary services at the parish church, and to whom the old baronial hall was granted as a place of residence. The manorial rights passed to Sir Reginald West, a descendant of

1 In the Antonine Itinerary the name Mancunium (q.v.) or Mamu- cium is given. This is the origin of the modern name, and has supplied the adjective " Mancunian " (cf." Old Mancunians " applied to old boys of Manchester Grammar School).

Joan Gresley, who was summoned to parliament as Baron de la Warre. The West family, in 1579, sold the manorial rights for £3000 to John Lacy, who, in 1596, resold them to Sir Nicholas Mosley, whose descendants enjoyed the emoluments derived from them until 1845, when they were purchased by the municipality of Manchester for a sum of £200,000. The lord of the manor had the right to tax and toll all articles brought for sale into the market of the town. But, though the inhabitants were thus to a large extent taxed for the benefit of one individual, they had a far greater amount of local self- government than might have been supposed, and the court leet, which was then the governing body of the town, had, though in a rudimentary form, nearly all the powers now possessed by municipal corporations. This court had not only control over the watching and warding of the town, the regulation of the water supply, and the cleaning of the streets, but also had power, which at times was used freely, of interfering with the private liberty of their fellow-citizens. Thus, no single woman was allowed to be a householder; no person might employ other than the town musicians; and the amount to be spent at wedding feasts and other festivities was carefully settled. Under the protection of the barons the town appears to have steadily increased in prosperity, and it early became an important seat of the textile manufactures. Fulling mills were at work in the district in the 13th century; and documen- tary evidence exists to show that woollen manufactures were carried on in Ancoats at that period. In 1538 Leland described it as " the fairest, best-builded, quickest, and most populous town in Lancashire." The right of sanctuary granted to the town in 1540 was found so detrimental to its industrial pursuits that after very brief experience the privilege was taken away. The college of Manchester was dissolved in 1547, but was

refounded in Mary's reign. Under her successor the town became the headquarters of the commission for establishing the Reformed religion. In 1641 we hear of the Manchester people purchasing linen yarn from the Irish, weaving it, and returning it for sale in a finished state. They also brought cotton wool from Smyrna to work into fustians and dimities. An act passed in the reign of Edward VI. regulates the length of cottons called Manchester, Lancashire and Cheshire cottons. These, notwithstanding their name, were probably all woollen textures. It is thought that some of the Flemish weavers who were intro- duced into England by Queen Philippa of Hainault were settled at Manchester; and Fuller has given an exceedingly quaint and picturesque description of the manner in which these artisans were welcomed by the inhabitants of the country they were about to enrich with a new industry. The Flemish weavers were in all probability reinforced by religious refugees from the Low Countries.

In the civil wars, the town was besieged by the Royalists under Lord Strange (better known as earl of Derby — "the great Stanley ") ; but was successfully defended by the in- habitants under the command of a German soldier of fortune, Colonel Rosworm, who complained with some bitterness of their ingratitude to him. An earlier affray between the Puritans and some of Lord Strange's followers is said to have occasioned the shedding of the first blood in the struggle between the king and parliament. The year 1694 witnessed the trial of those concerned in the so-called Lancashire plot, which ended in the triumphant acquittal of the supposed Jacobites. That the district really contained many ardent sympathizers with the Stuarts was, however, shown in the rising of 1715, when the clergy ranged themselves to a large extent on the side of the Pretender; and was still more clearly shown in the rebellion of 1745, when the town was occupied by Prince Charles Edward Stuart, and a regiment, known afterwards as the Manchester regiment, was formed and placed under the command of Colonel Francis Townley. In the fatal retreat of the Stuart troops the Manchester contingent was left to garrison Carlisle, and surrendered to the duke of Cumberland. The officers were taken to London, where they were tried for high treason and beheaded on Kennington Common.

The variations of political action in Manchester had been exceedingly marked. In the 16th century, although it pro- duced both Roman Catholic and Protestant martyrs, it was earnestly in favour of the Reformed faith, and in the succeeding century it became indeed a stronghold of Puritanism. Yet the successors of the Roundheads who defeated the army of Charles I. were Jacobite in their sympathies, and by the latter half of the 18th

century had become imbued with the aggressive form of patriotic sentiment known as anti-Jacobinism, which showed itself chiefly in dislike of reform and reformers of every description. A change, however, was imminent. The distress caused by war and taxation, towards the end of the 18th and the beginning of the 19th century, led to bitter discontent, and the anomalies existing in the parliamentary system of representation afforded only too fair an object of attack. While single individuals in some portions of the country had the power to return members of parliament for their pocket boroughs, great towns like Manchester were entirely without representation. The popular discontent was met by a policy of repression, culminating in the affair of Peterloo, which may be regarded as the starting-point of the modern reform agitation. This was in 1819, when an immense crowd assembled on St Peter's Fields (now covered by the Free Trade Hall and warehouses) to petition parliament for a redress of their grievances. The Riot Act was read by a clerical magistrate; but in such a manner as to be quite unheard by the mass of the people; and drunken yeomanry cavalry were then turned loose upon the unresisting mass of spectators. The yeomanry appear to have used their sabres freely; several people killed and many more injured; and, although the magistrates received the thanks of the prince regent and the ministry, their conduct excited the deepest indignation throughout the entire country. Those who' had organized the meeting, including " Orator " Hunt with Samuel Bamfo.rd and other working men, were imprisoned.

Naturally enough, the Manchester politicians took an impor- tant part in the Reform agitation; when the Act of 1832 was passed, the town sent as its representatives the Right Hon. C. P. Thomson, vice-president of the board of trade, and Mark Philips. With one notable exception, this was the first time that Manchester had been represented in parliament since its barons had seats in the House of Peers in the earlier centuries. In 1654 Charles Worsley and R. Radcliffe were nominated to represent it in Cromwell's parliament. Worsley was a man of great ability, and has a place in his.tory as the man who carried out the injunction of the Protector to " remove that bauble," the mace of the House of Commons. The agitation for the repeal of the corn laws had its headquarters at Manchester, and the success which attended it, not less than the active interest taken by its inhabitants in public questions, has made the city the home of other projects of reform. The " United Kingdom Alliance for the Suppression of the Liquor Traffic " was founded there in 1853, and during the continuance of the American War the adherents both of the North and of the South deemed it desirable to have organizations in Man- chester to influence public opinion in favour of their respective causes. A charter of incorporation was granted in 1838; a bishop was appointed in 1847; and the town became a city in 1853. The Lancashire cotton famine, caused by

the Civil War in America, produced much distress in the Manchester district, and led to a national movement to help the starving operatives. The more recent annals of Manchester are a record of industrial and commercial developments, and of increase in educational opportunities of all kinds. Politically Man- chester was Liberal, of one or other shade, under the first Reform Act; a Conservative member was first elected in 1868, and in 1874 two. Under household suffrage in 1885 that party secured five out of six members; in 1886 and 1892, three out of six. In 1895 and 1900 five Unionists were elected, but in 1906 six Liberals were returned, one of whom (Mr Winston Churchill) was defeated at a by-election in 1908. In 1910 three Liberals, two Labour members and one Conservative were elected.

Authorities. — Although several excellent books have been written on subjects connected with the town, there is no adequate, modern history. The History of Manchester, by the Rev. John Whitaker, appeared in 1 77 1 ; it is a mere fragment, and, though containing much important matter, requires to be very discreetly used. The follow- ing may be recommended: John Reilly, History of Manchester, (1861) ; R. W. Procter, Manchester in Holiday Dress (1866), Memorials of Manchester Streets (1874), Memorials of Byegone Manchester (1880); Richard Buxton, Botanical Guide to Manchester, &c. (2nd ed., 1859); Leo Grindon, Manchester Flora (1859); Edward Baines, History of Lancashire, edited by Croston (1 886-1 893), 5 vols.; W. A. Shaw, Manchester, Old and Neiv (1894) ; W. E. A. Axon, Annals of Manchester (1885), Cobden as a Citizen (1906); Harry Rawson, Historical Record of some Recent Enterprises of the Corporation of Manchester (1894) ; Official Manual of Manchester and Salford (1909) ; J. P. Earwaker, Court Leet Records of Manchester, 1552-1686, 1731- 1846 (1884-1890), 12 vols.; Constable's Accounts, 1612-1647, 1743- 1776 (1891-1892), 3 vols.; Manchester Municipal Code (1894-1899), 5 vols. ; George Samtsbury, Manchester (1887) ; Thomas Swindells, Manchester Streets and Manchester Men (1906-1907), 3 vols.; James Tait, Medieval Manchester (1904); Charles Roeder, • Roman Manchester (1900) ; Sir Bosdin Leech, History of the Manchester Ship Canal (1907), 2 vols. (W. E. A. A.)

MANCHESTER (popularly Manchester-by-the-Sea) , a township of Essex county, Massachusetts, U.S.A., about 25 m. N.E. of Boston, on Massachusetts Bay. Pop. (1900), 2522; (1905, state census), 2618; (1910), 2673. Area, 7-64sq. m. It is served by the Boston & Maine railroad, and is connected with neigh- bouring towns and cities by electric lines. The township, heavily wooded in parts, and with picturesque shores alternat- ing between rocky headlands and sandy beaches, stretches for several miles along the coast between Beverly on the west and Gloucester on the east. It is one of the most beautiful watering- places in America, and

is the favourite summer residence of many of the foreign diplomats at Washington. The " singing beach " is a stretch of white sand, which, when trodden upon, emits a curious musical sound. Manchester, originally a part of Salem, was settled about 1630 and was at first known as Jeffrey's Creek. It was incorporated separately under its present name in 1645.

See Manchester Town Records (2 vols., Salem, i889-l8gi), and D. F. Lamson, History of the Town of Manchester, 1645-1895 (Manchester, 1895).*

MANCHESTER, the largest city of New Hampshire, U.S.A., and one of the county-seats of Hillsboro county, on the Merrimac river, at the mouth of the Piscataquog river, (by rail) 18 m. S. of Concord and 57 m. N.N.W. of Boston. Pop. (1890), 44,126; (1900), 56,987; (1910 U.S. census) 70,063. Of the total popula- tion in 1900, 24,257 were foreign-born, including 13,429 French- Canadians; and 37,530 were of foreign parentage (both parents foreign-born), including 18,839 OI French-Canadian parentage. Manchester is served by the Southern, the Western, the White Mountains, and the Worcester Nashua & Portland divisions of the Boston & Maine railroad, and by inter-urban electric lines. It is situated on a plain about 90 ft. above the Merrimac river (which is spanned here by three bridges), commands extensive views of the beautiful Merrimac valley, and covers a land area of about 33 sq. m. On the east side of the city are two connected lakes known as Lake Massabesic (30 m. in circumference). Manchester is known for the attractive appearance of the resid- ence districts in which the factory operatives live, detached homes and " corporation boarding-houses," instead of tenement houses, being the rule. The Institute of Arts and Sciences (incorporated in 1898) provides lecture courses and classes in science, art and music. Among the other public buildings and institutions are the United States Government building, the city-hall, the county-court-house, the city library (1854; the outgrowth of the Manchester Athenaeum, established in 1844), St Anselm's College (R.C.), a Roman Catholic cathedral, four Roman Catholic convents, the Elliot hospital, the Sacred Heart hospital and the hospital of Notre Dame de Lourdes, the State industrial school, the State house of correction, the Gale home for aged women, an old ladies' home (R.C.), St Martha's home for working girls, the Manchester children's home and four orphan asylums. In the largest of five public squares is a soldiers' monument, consisting of a granite column 50 ft. high,

surmounted by a statue of Victory. The city has two parks, and in one of

them, overlooking the Merrimac, is a monument to the memory of General John Stark, who was born and was buried here. The water-supply is obtained from Lake Massa- besic. Amoskeag Falls in the Merrimac are 55 ft. in height, and by means of hydraulic canals Manchester is provided with a fine water-power. Steam power is also used, and the city is by far the most important manufacturing centre in the state. It is extensively engaged in the manufacture of cotton goods, boots and shoes, worsted goods, hosiery and other knit goods, and locomotives; among the other manufactures are linen goods, steam fire-engines, paper, edge tools, soap, leather, carriages and beer. The value of the city's factory products increased from $24,628,345 in 1900 to $30,696,926 in i9°5, or 24-6%. In 1905 Manchester produced 24-8% of the total factory product of the state. Manchester ranks fifth among the cities of the United States in cotton manufacturing, and ninth among the cities of the country in the manufacture of boots and shoes.

On account of the abundance of fish in the river here, Amoskeag Falls and vicinity were a favourite resort of the Penacook Indians, and it is said that John Eliot, the " Apostle to the Indians," preached to them here in the summer of 1651. The first white settlement within the present limits of Manchester was made in 1722 by Scottish-Irish immigrants at Goffe's Falls, 5 m. below Amoskeag Falls. In 1723 a cabin was built by some of these immigrants at the greater falls, and gradually a small settlement grew up there. In 173 s Massachusetts granted to a body of men known as " Tyng's Snow-Shoe Scouts " and their descendants a tract of land 3 m. wide along the east bank of the Merrimac, designated as " Tyng's Township." The Scottish-Irish claimed this tract as part of their grant from New Hampshire, and there arose between the rival claimants a bitter controversy which lasted until May 1741, when the courts decided against the Massachusetts claimants. In 1 7 5 1 the territory formerly known as " Tyng's Township," and sometimes called " Harrytown," with portions of Chester and Londonderry, was incorporated as a township under the name Derryfield; in 1810 the name was changed to Manchester, the change having been suggested by the town's manufacturing possibilities; and in 1846 Manchester was chartered as a city. The first sawmill was erected as early as 1736, and during the years from 1794 to 1807 a canal was constructed around the Amoskeag Falls through which to carry lumber. As late as 1830 the town had a population of only 877, but in 1 83 1 the Amoskeag Manufacturing Company was incorpo- rated, the construction of hydraulic canals and the erection of cotton mills followed, the villages of Piscataquog and Amoskeag were annexed in 1853, and the population increased to 3235 in 1840, to 8841 in 1860, and to 33,592 in 1880.

Consult M. D. Clarke, Manchester, A Brief Record of its Past and a Picture of its Present (Manchester, 1875).

MANCHESTER, a former city of Chesterfield county, Virginia, U.S.A., (on the S. side of the James river), since 1910 a part of Richmond. Pop. (1900), 9715, of whom 3338 were negroes; (1906 estimate), 9997. It is served by the Atlantic Coast Line, the Seaboard Air Line, and the Southern railways, by electric lines to Richmond and Petersburg, and by numerous river boats. It is finely situated in a bend of the river, with about 2 m. of water front ; on the heights above is Forest Hill park, a pleasure resort, and adjacent to it Woodland Heights, a beautiful resid- ential district. From the surrounding country come much agricultural produce, coal, lumber, bricks and granite. There is a good harbour and excellent water power. Am»ng the manufactures are paper, flour, cotton goods, leather,brick,railway supplies, &c. The value of the city's factory products increased from $1,621,358 in 1900 to $3,226,268 in 1905, or 99%.

MANCHESTER SHIP CANAL. The advantage of a waterway for the conveyance of goods between eastern Lancashire and the sea is so obvious that so far back as the year 17 21 Thomas Steers designed a plan for continuing to Manchester the barge naviga- tion which then existed between Liverpool and Warrington. Parliamentary powers were then obtained to improve the rivers Mersey and Irwell from Warrington to Manchester by means of

locks and weirs. This work was successfully carried out, and proved of great benefit to the trade of the district. The duke of Bridgewater, who had made a canal from his collieries at Worsley to Manchester, afterwards continued the canal to the Mersey at Runcorn; this extension was opened in 1722 and com- peted with the Mersey and Irwell navigation, both routes being navigated by barges carrying about fifty tons of cargo. The Liverpool & Manchester railway at a later date afforded further facilities for conveyance of goods, but the high rates of carriage, added to heavy charges at the Liverpool docks, prejudiced trade, and the question was mooted of a ship canal to bring cotton, timber, grain and other goods direct to Manchester without transshipment. The first plan was made by William Chapman in 1825, and was followed by one designed by Henry Palmer in 1840, but it was not until the year 1882 that the movement was originated that culminated in the opening of the Manchester Ship Canal by Queen Victoria en the 21st of May 1894.

In determining the plan of the canal the main point which arose was whether it should be made with locks or whether it should be on the sea-level throughout, and therefore tidal. The advantage of a still waterway in navigating large steamers, and the facilities afforded by one constant water-level for works on the banks and the quick discharge cf goods at the terminal docks at Manchester, secured the adoption of the plans for a canal with locks as designed by Sir E. Leader Williams. The fresh-water

portion of the canal extended between Manchester and Runcorn, while from the latter place to Gar- ston it was proposed to improve the upper Mersey estuary by con- structing training walls and dredging to form a deep central channel. Parliamentary powers to construct the canal were sought in the session of 1883, when the bill passed the committee of the House of Commons but was rejected by the committee of the House of Lords. Brought forward again the next year, it was passed by the Lords but thrown out by the Commons. The opposition from Liverpool and the railway companies was very strong ; to meet to some extent that of the former, a continuation of the canal was proposed from Runcorn to Eastham along the Cheshire side of the Mersey, instead of a trained channel in the estuary, and in this form the bill was again introduced in the session of 1885, and, notwithstanding strong opposition, was passed by both houses of parliament. The cost of this contest to promoters and opponents exceeded £400,000, the various committees on the bill having sat over 175 days. Owing to difficulties in raising the capital the works were not begun until November 1887.

The total length of the canal is 35J m. and it may be regarded as divided into three sections. From Eastham to Runcorn it is near or through the Mersey estuary for 12! m., and thence to Latchford near Warrington, 8J m., it is inland; both these sections have the same water-level, which is raised by high tides. At Latch- ford the locks stop tidal action, and the canal is fed by the waters of the rivers Mersey and Irwell from that point to Manchester, 14I m. from Latchford. The canal begins on the Cheshire side of the Mersey at Eastham, about 6 m. above Liverpool. The entrance is well sheltered and adjoins a good low-water channel communicat- ing with the Sloyne deep at Liverpool. Three entrance locks have been provided close to and parallel with each other, their length and width being 600 by 80, 350 by 50, and 150 by 30 ft. These locks maintain the water-level in the canal nearly to mean high -water level (14 ft. 2 in. above the Liverpool datum) ; when the tide rises above that height the lock gates are opened and the tide flows up to Latchford, giving on high spring tides an additional depth of water of about 7 ft. On the ebb tide this water is returned to the Mersey through large sluices at Randies Creek and at the junction of the river Weaver with the canal, the level of the canal thus being reduced to its normal height. The canal throughout to Manchester has a minimum depth of 28 ft. ; the depth originally was 26 ft., but the lock sills were placed 2 ft. lower to allow of the channel being dredged to 28 ft. when necessary. The minimum width at bottom is 120 ft., allowing large vessels to pass each other at any point on the canal ; this width is considerably increased at the locks and other parts. The slopes are generally about 1 5 to 1 , but are flatter through some portions; in rock-cutting the sides are nearly vertical. From Eastham to Runcorn the canal is alternately inland and on the

foreshore of the estuary, on which embankments were constructed to act as dams and keep out the tide during the excavation of the canal, and afterwards to maintain the water-level at low water in the estuary; both sides are faced with heavy coursed stone. The material for the embankments was principally clay excavated from the cuttings. In some places, where the foundation was of a porous nature, sheeting piles of timber had to be used. At Ellesmere Port, where the embankment is 6200 ft. long on sand, 13,000 whole timber sheeting piles 35 ft. long were driven, to secure the base of the embankment on each side; water jets under pressure through ij in. wrought-iron pipes were used at the foot of each pile to assist the sinking, which was found most difficult by ordinary means. At the river Weaver ten Stoney roller sluices are built, each 30 ft. span, with heavy stone and concrete piers and foundations; at Runcorn,

where the river Mersey is narrow, a concrete sea-wall 4300 ft. long was substituted for the embankment. At various points under the canal cast-iron siphon pipes were laid to carry off any land drainage which was at a lower level than the canal ; the largest of these siphons were constructed to allow the tidal and fresh water of the river Gowy to pass under the canal at Stanlow Point, between Eastham and Ellesmere Port. Two 12-ft. siphons are there placed close together, built of cast-iron segments; they are each 400 ft. long, and were laid on concrete 4 ft. below the bottom of the canal. From Runcorn to Latchford the canal is nearly straight, the depth of cutting varying from 35 to 70 ft., partly in rock, but generally in alluvial deposit. The whole length of the canal passes through the New Red Sandstone formation, with its overlying beds of gravel, clay, sand and silt, which gave much trouble during the progress of the work; retaining walls of stone and brickwork had to be built in these places to maintain the sides of the canal from slips and injury from the wash of steamers.

The canal from Latchford to Manchester is in heavy cutting through the valleys of the rivers Mersey and Irwell. As these rivers are circuitous in course, only very small portions could be utilized in forming the canal ; a line as nearly straight as possible was there- fore adopted, and involved many crossings of the river channels. During the whole progress of the work these had to be kept open for the discharge of floods and land water, and in some places temporary cuts of considerable length had to be made for the same object. In November 1890 and December 189 1 high winter floods covered the whole of the river valleys, filling many miles of the unfinished canal and causing great damage to the slopes. Altogether 23 m. of canal had to be pumped out to enable the work to be completed. After

the cuttings between the river channels were finished, the end dams were removed, and the rivers Irwell and Mersey were turned into the new channel now forming the upper portion of the ship canal. The total rise to the level of the docks atManchester from the ordinary level of the water in the tidal portion of the canal below Latchford locks is 60 ft. 6 in. ; this is obtained by an average rise of about 15 ft. at each of the sets of locks at Latchford, Irlam (7I m. nearer Manchester), Barton (2 m. farther) and Mode Wheel (3 J m. above Barton locks at the entrance to the Manchester docks). For the greater part of this last length the canal is widened at bottom from 120 ft., its normal width, to 170 ft., to enable vessels to lie at timber and other wharves without interfering with the passage of large vessels to or from the docks. The locks are in duplicate, one being 600 ft. long by 65 ft. wide, the other 350 ft. long by 45 ft. wide, with Stoney's sluices adjacent. They are filled or emptied in five minutes by large culverts on each side with side openings into the lock. Concrete with facings of blue Staffordshire brick is largely used, and the copings, sills, hollow quoins and fender courses are of Cornish granite. The lock gates are constructed of greenheart timber. The sluices near the locks take the place of the weirs used in the old Mersey and Irwell navigation; they are 30 ft. span each, four being generally used at each set of locks. In ordinary seasons any water not used for lockage purposes passes over the tops of the sluices, which are kept closed ; in flood times the sluices are raised to a height which will pass off floods with a comparatively small rise in the canal. There are eight hydraulic installations on the canal, each having duplicate steam-engines and boilers; the mains exceed 7 m. in length, the pressure being 700 lb to the inch. They work the cranes, lifts and capstans at the docks, lock gates and culvert sluices, coal tips, swing bridges and aqueduct.

At Barton, near Manchester, the Bridgewater canal crosses the river Irwell on the first navigable aqueduct constructed in England. It was the work of James Brindley, and since it was built at only sufficient height to allow of barges passing under it, means had to be found to allow of this important canal being maintained, and yet to permit steamers to use the ship canal below it. Brindley's canal is on one level throughout its whole length, and as its water supply is only sufficient for the flight of locks by which it descends at Run- corn to the Mersey, locks down to the ship canal would have involved the waste of a lock of water on each side and caused serious delay to the traffic. Sir E. Leader Williams surmounted the difficulty by means of a swing aqueduct for the Bridgewater canal, which when closed enables the traffic to pass as before, while it is opened to allow of ships crossing it on the lower level of the ship canal. The water in the swing portions of the aqueduct when opened is retained by closing gates at each end, similar gates being shut at the same time across the fixed portion of the aqueduct. The swing portion is a large steel trough carried by side

girders, 234 ft. long and 33 ft. high in the centre, tapering 4 ft. to the ends; the waterway is 19 ft. wide and 6 ft. deep. The whole works on a central pier with similar arrangements to the largest swing bridges on the canal; it has two spans over the ship canal of 90 ft. each. It is somewhat singular that the first fixed canal aqueduct in England should, after the lapse of 136 years, be replaced by the first swing aqueduct ever constructed. The swing aqueduct is moved by hydraulic power, and has never given any trouble in working, even in times of severe frost. The weight of the movable portion, including the water, is 1600 tons.

The manner of dealing with the five lines of railways that were cut through by the canal was one of importance, both in the interests of the travelling public and the trade on the canal ; they are all lines with a heavy traffic, including the main line of the London & North

Western railway near Warrington, with its important route to Scotland. Swing bridges, although in use on some lines to cross navigations, are dangerous and inconvenient, and high-level devia- tion lines were adopted for each railway crossing the canal. No such alteration of a railway had been previously sanctioned by parlia- ment, and it was only the importance of a ship canal to Manchester that secured the requisite powers against the strong opposition of the railway companies. Embankments were made close to and parallel with the old lines, beginning about a mile and a quarter from the canal on each side, the canal itself being crossed by viaducts which give a clear headway of 75 ft. at ordinary water- level. Vessels with high masts trading on the canal are pro- vided with telescopic or sliding top-masts. The gradients on the railways rising up to the viaducts are 1 in 135. The span of the viaducts is so arranged as to maintain the full width of the canal for navigation ; and as the railways generally cross the canal on the skew, this necessitated girders in some cases of 300 ft. span. There are nine main roads requiring swing bridges across the canal ; all below Barton have a span giving a clear water-way of 120 ft. The width of these bridges varies with the importance of the roads from 20 to 36 ft., and they are constructed of steel, their weight ranging from 500 to 1000 tons each. They work on a live ring of conical cast-iron rollers and are moved by hydraulic power supplied by steam, gas or oil engines. The Trafford Road bridge at the docks at Manchester is the heaviest swing bridge on the canal; being of extra width, it weighs 1800 tons.

The canal being virtually one long dock, wharves at various points have been erected to enable chemical or manufacturing works to be carried on, widenings being provided where necessary. At Ellesmere Port coal tips and sheds have been erected, and the canal is in direct communication with the docks there as well as at Weston Point and Runcorn, where a large trade is carried on with the Staffordshire Potteries and the Cheshire salt districts. At

Partington branches from the railways connect the canal with the Yorkshire and Lancashire coal-fields, and the canal is widened out 65 ft. on each side for six hydraulic coal tips. At Mode Wheel there are extensive abattoirs and lairages, erected by the Manchester Corpora- tion ; also large petroleum oil tanks, graving dock and pontoons, cold- air meat stores and other accommodation for traffic. At Manchester the area of the docks is 104 acres, with 152 acres of quay space, having over 5 m. of frontage to the docks, which are provided with a number of three-storey transit sheds, thirteen seven-storey and seven four-storey warehouses, and a large grain silo. The London & North Western and Lancashire & Yorkshire railway companies and the Cheshire Lines Committee have made branch lines to the docks, the railways and sidings at which are over 30 miles in length. Much traffic is also carted, or dealt with by inland canals in direct com- munication with- the docks. The substitution of a wide and deep canal, nearly straight, for comparatively shallow and narrow winding rivers, and the use of large sluices in place of fixed weirs to cany off the river water, have been of great advantage to the district in greatly reducing the height of floods.

The total amount of excavation in the canal, docks and subsidiary work amounted to over 54 million cub. yds., nearly one-fourth of which was sandstone rock; the excavated material was used in forming the railway deviation embankments, filling up the old beds of the rivers and raising low lands near the canal. As many men were employed on the works as could be obtained, but the number never exceeded 17,000, and the greater part of the excavation was done by about eighty steam navvies and land dredgers. For the conveyance of excavation and materials, 228 miles of temporary railway lines were laid, and 173 locomotives, 6300 wagons and trucks, and 316 fixed and portable steam-engines and cranes were employed, the total cost of the plant being nearly £1,000,000. The expenditure on the works, including plant and equipment, to the 1st of January 1900, was £10,327,666. The purchase of the Mersey and Irwell and Bridgewater navigations (£1,786,651), land and compensation (£1,223,809), interest on capital during construc- tions (£1,170,733), and parliamentary, superintendence and general expenses brought up the total amount to £15,248,437.

The traffic on the canal gradually increased from 925,659 tons in 1894 to 2,778,108 tons in 1899 and 5,210,759 tons in 1907. After its opening considerable reductions were made in the railway rates of carriage and the charges at the Liverpool docks in order to meet the lower cost of conveyance by shipping passing up it. The result has been of great advantage to the trade of Lancashire and the sur- rounding districts, and the saving in the cost of carriage, estimated at £700,000 a year, assists manufacturers to meet the competition of their foreign opponents who have

the advantage of low rates of carriage on the improved waterways of America, Germany, France and Belgium. Before the construction of the canal, large manu- facturers had left Manchester to establish their works at ports like Glasgow, where they could save the cost of inland carriage. Since its opening, new industries have been started at Manchester and along its banks, warehouses and mills that were formerly empty are now occupied, while nearly 10,000 new houses have been built for the accommodation of the workpeople required to meet the enlarged trade of the city.

For further details see Sir Bosdin Leech, History of the Manchester Ship Canal (Manchester, 1907). (E. L. W.)

MANCHURIA, the name by which the territory in the east of Asia occupied by the Manchus is known in Europe. By the Chinese it is called the country of the Manchus, an epithet meaning " pure," chosen by the founder of the dynasty which now rules over Manchuria and China as an appropriate designa- tion for his family. Manchuria lies in a north-westerly and south-easterly direction between 39° and 53 N. and between 116° and 1 3 4° E., and is wedged in between China and Mongolia on the west and north-west, and Korea and the Russian territory on the Amur on the east and north. More definitely, it is bounded N. by the Amur, E. by the Usuri, S. by the Gulf of Liao-tung, the Yellow Sea and Korea, and W. by Chih-h and Mongolia. The territory thus defined is about 800 m. in length and 500 m. in width, and contains about 390,000 sq. m. It is divided into three provinces, viz. Hei-lung-kiang or Northern Manchuria, Kirin or Central Manchuria, and Sheng-king or Southern Man- churia. Physically the country is divided into two regions, the one a series of mountain ranges occupying the northern and eastern portions of the kingdom, and the other a plain which stretches southwards from Mukden, the capital, to the Gulf of Liao-tung.

A system of parallel ranges of mountains, culminating in the Chinese Ch'ang pai Shan, " the long white mountains," on the Korean frontier, runs in a north-easterly direction from the shores of the Gulf of Liao-tung. In its course through Eastern Manchuria it forms the watershed of the Sungari, Usuri and other rivers, and in the south that of the Ya-lu and many smaller streams. It also forms the eastern boundary of the great plain of Liao-tung. The mountains of this system reach their greatest height on the south-east of Kirin, where their snow-capped peaks rise to the elevation of 8000 ft. The scenery among them is justly celebrated, more especially in the neighbourhood of Haich'eng, Siu-yen and the Korean Gate.

• *The three principal rivers of Manchuria are the Sungari, Mutan- kiang and Usuri already mentioned. Of these the Sungari, which is the largest, rises on the northern slopes of the Ch'ang pai Shan range, and runs in a north-westerly direction to its junction with the Nonni, from which point it turns north-east until it empties itself into the Amur. It is navigable by native junks above Kirin, which city may also be reached by steamer. In its long course it varies greatly both in depth and width, in some parts being only a few feet deep and spreading out to a width of more than a mile, while in other and mountainous portions of its course its channel is narrowed to 300 or 400 ft., and its depth is increased in inverse ratio. The Usuri rises in about 44° N. and 131° E., and after running a north-easterly course for nearly 500 m. it also joins the Amur. The Mutan-kiang takes its rise, like the Sungari, on the northern slopes of the Ch'ang pai Shan range, and not far from the sources of that river. It takes a north-easterly course as far as the city of Ninguta, at which point it turns northward, and so continues until it joins the Sungari at San-sing. It is navigable by junks between that city and Ninguta, though the torrents in its course make the voyage backwards and forwards one of considerable difficulty. Next in importance to these rivers are the Liao and Ya-lu, the former of which rises in Mongolia, and after running in an easterly direc- tion for abput 400 m. enters Manchuria in about 43 N., and turning southward empties itself into the Gulf of Liao-tung. The Ya-lu rises in Korea, and is the frontier river of that country.*

Provinces and Towns. — Mukden, or as it is called by the Chinese Sheng-king, the capital city of Manchuria, is situated in the province of Sheng-king, occupies a fine position on the river Hun-ho, an affluent of the Liao, and is a city of considerable pre- tensions. Liao-yang, which was once the capital of the country, is also in the province of Sheng-king. The other cities in the province are Kin-chow-fu on the west of the Gulf of Liao-tung; Kin-chow, on the western extremity of the Liao-tung peninsula; Kai-ping, on the north-western shore of the same peninsula; Hai-cheng, on the road from Niu-chwang to Mukden; Ki-yuen, a populous and prosperous city in the north of the province; and Sing-king, east of Mukden, the original seat of the founders of

the present dynasty. The most important commercial place, however, is the treaty port of Niu-chwang, at the head of the Gulf of Liao-tung. According to the custom-house returns the value of the foreign imports and exports in the year 1880 was £691,954 and £1, 117, 790 respectively, besides a large native trade carried on in junks. In 1904 the value of foreign imports had risen to £2,757,962, but the exports amounted to £1,742,859 only, the comparatively low figure being accounted for by the Russo-Japanese war.

The province of Kirin, or Central Manchuria, is bounded on the N. and N.W. by the Sungari, on the S. by Sheng-king and Korea, on the W. by Mongolia, and on the E. by the Usuri and the maritime Russian province. It contains an area of about 90,000 sq. m., and is entirely mountainous with the exception of a stretch of plain country in its north-western corner. This plain produces large quantities of indigo and opium, and is physically remark- able for the number of isolated conical hills which dot its surface. These sometimes occur in a direct line at intervals of 15 or 20 m., and elsewhere are scattered about " like dish-covers on a table." Kirin, the capital of the province, occupies a magnificent position, being surrounded on the north, west and south by a semicircular range of mountains with the broad stream of the Sungari flowing across the front. The local trade is considerable. A-She-ho, on the Ashe, with a population of 60,000; Petuna (Chinese, Sing- chung), on the Sungari, population 30,000; San-sing, near the junction of the Sungari and Mutan-kiang; La-lin, 120 m. to the north of Kirin, population 20,000; Harbin or Kharbin and Ninguta are the other principal cities in the province.

Hei-lung-kiang, or Northern Manchuria, which contains about 195,000 sq. m., is bounded on the N. and N.E. by the Amur, on the S. by the Sungari, and on the W. by the Nonni and Mongolia. It is traversed by the Great and Lesser Khingan mountains and their offshoots. This province is thinly populated, and is cultivated only along the lines of its rivers. The only towns of any importance are Tsitsihar and Mergen, both situated on the Nonni and Khailar in the west.

Climate, Flora, Fauna. — The climate over the greater part of the country varies between extremes of heat and cold, the thermometer ranging between 90 F. in the summer and 10° below zero in the winter. As in the north of China, the rivers are frozen up during the four winter months. After a short spring the heat of summer succeeds, which in its turn is followed by an autumn of six weeks' duration. The great plain in Sheng-king is in many parts swampy, and in the neighbourhood of the sea, where the soil emits a saline exudation such as is also common in the north of China, it is perfectly sterile. In other parts fine crops of millet and various kinds of grain are grown, and on it trees flourish abundantly. The trees and plants are much the same as those common in England, and severe as the weather is in winter the less elevated mountains are covered to their summits with trees. The wild animals also are those known in Europe, with the addition of tigers and panthers. Bears, wild boars, hares, wolves, foxes and wild cats are very common, and in the north sables are found in great numbers. One of the most noticeable of the birds is the Mongolian lark (Melanocorypha mongolicd), which is found in a wild state both in Manchuria and in the desert of Mongolia. This bird is exported in large numbers to northern China, where it is much prized on account of its

extraordinary power of imitation. The Manchurian crane is common, as also are eagles, cuckoos, laughing doves, &c. Insects abound, owing to the swampy nature of much of the country. The rivers are well stocked with fish, especially with salmon, which forms a common article of food. In such immense shoals do these fish appear in some of the smaller streams that numbers are squeezed out on to the banks and there perish.

Products and Industries. — In minerals Manchuria is very rich: coal, gold, iron (as well as magnetic iron ore), and precious stones are found in large quantities. Gold mines are worked at several places in the northern part of Manchuria, of which the principal are on the Muho river, an affluent of the Amur, and near the Russian frontier. Mines are also worked at Kwanyin-shan, opposite the Russian frontier town of Radevska, and at Chia-pi-kou, on an affluent of the upper Sungari. Indigo and opium are the most lucrative crops. The indigo plant is grown in large quantities in the plain country to the north of Mukden, and is transported thence to the coast in carts, each of which carries rather more than a ton weight of the dye. The poppy is cultivated wherever it will grow, the crop being far more profitable than that of any other product. Cotton, tobacco, pulse, millet, wheat and barley are also grown.

Population. — The population is estimated as follows for each of the three divisions : —

Province of Sheng-king (Feng T'ien) 4,000,000

„ „ Kirin …. 6,500,000 „ „ Hei-lung-kiang . . 2,000,000

Total . . . 12,500,000

Communications. — Four principal highways traverse Manchuria. The first runs from Peking to Kirin via Mukden, where it sends off a branch to Korea. At Kirin it bifurcates, one branch going to San-sing, the extreme north-eastern town of the province of Kirin, and the other to Possiet Bay on the coast via Ninguta. The second road runs from the treaty port of Niu-chwang through Mukden to Petuna in the north-western corner of the Kirin province, and thence to Tsitsihar, Mergen and the Amur. The third also starts from

the main line continues in the same general direction to the eastern frontier

of Manchuria, and so to Vladivostok. In 1 898 Russia obtained a lease of the Liao-tung peninsula, and a clause of this contract empowered her to connect Port Arthur and Dalny (now Tairen) with the main Manchurian railway by a branch southward from Harbin. In spite of interruption caused by the Boxer outbreak, through communication was established in 1901. Under the Russo- Japanese treaty of August 1905, after the war, supplemented by a convention between Japan and China concluded in December of the same year, Japan took over the line from Port Arthur as far as Kwang-cheng-tsze, now known as the Southern Manchurian railway (508 m.). Branches were promoted (a) from Mukden to Antung on the Yalu, to connect with the Korean system, and (b) from Kwang-cheng-tsze to Kirin. The rest of the original Manchurian system (1088 miles) remains under Russian control. In the south- west of Manchuria a line of the imperial railways of Northern China

gives connexion from Peking, and branches at Kou-pang-tsze to Sin- min-ting and to Niu-chwang, and the link between Sin-min-ting and Mukden is also under Chinese control. The lines now under Russian control were laid down, and remain, on the 5 ft. gauge which is the Russian standard ; but after the Russian con- trol of the southern lines was lost the gauge was altered from that standard.

Niu-chwang, and strikes southward to Kin-chow at the extremity of the Liao-tung peninsula. The fourth connects Niu-chwang with the Gate of Korea.

The original Manchurian railway was constructed under an agree- ment made in 1896 between the Chinese government and the Russo- „ . . Chinese bank, an institution founded in 1895 to develop Railways Russian interests in the East. The Chinese Eastern ” Railway Company was formed by the bank under this agreement, to construct and work the line, and surveys were made in 1897, the town of Harbin being founded as headquarters for the work. The line, which affords through communication from Europe by way of the Trans-Siberian system, enters Manchuria near a station of that name in the north-west corner of the country, passes Khailar, and runs south-east, near Tsitsihar, to Harbin. Thence

History. — Manchu, as has been said, is not the name of the country but of the people who inhabit it. The name was adopted by a ruler who rose to power in the begin- ning of the 13th century. Before that time the Manchus were more or less a shifting population, and, being broken up into a number of tribes, they went mainly under the distinctive name of those clans which exercised lordship over them. Thus under the Chow dynasty (1122-225 B – c -) they were known as Sewshin, and at subsequent periods as Yih-low, Wuh-keih, Moh-hoh, Pohai, Niichih and ac- cording to

the Chinese historians also as Khitan. Throughout their history they appear as a rude people, the tribute they brought to the Chinese court consisting of stone arrow-heads, hawks, gold, and latterly ginseng. Assuming that, as the Chinese say, the Khitans were Manchus, the first appearance of the Manchus, as a people, in China dates from the beginning of the 10th century, when the Khitans, having first conquered the kingdom of Pohai, crossed the frontier into China and established the Liao or Iron dynasty in the northern portion of the empire. These invaders were in their turn overthrown two centuries later by another invasion from Manchuria. These new con- querors were Niichihs, and therefore direct ancestors of the Manchus. On assuming the imperial yellow in China their chief adopted the title of Kin or " Golden " for his dynasty. "Iron" (Liao), he said, "rusts, but gold always keeps its purity and colour, therefore my dynasty shall be called Kin." In a little more than a century, however, the Kins were driven out of China by the Mongols under Jenghiz Khan. But before the close of their rule a miraculous event occurred on the Chang-pai-Shan mountains which is popularly believed to have laid the seeds of the greatness of the present rulers of the empire. Three heaven-born maidens, so runs the

legend, were bathing one day in a lake under the Chang-pai-Shan mountains when a passing magpie dropped a ripe red fruit into the lap of one of them. The maiden ate the fruit, and in due course a child was born to her, whom she named Aisin Gioro, or the Golden. When quite a lad Aisin Gioro was elected chief over three contending clans, and established his capital at Otoli near the Chang-pai-Shan mountains. His reign, however, was brief, for his subjects rose and murdered him, with all his sons except the youngest, Fancha, who, like the infant Haitu in Mongolian history, was miraculously saved. Nothing is re- corded of the facts of Aisin Gioro 's reign except that he named the people over whom he reigned Manchu, or " Pure." His descendants, through the rescued Fancha, fell into complete obscurity until about the middle of the 16th century, when one of them, Nurhachu by name, a chieftain of a small tribe, rose to power. Nurhachu played with skill and daring the role which had been played by Jenghiz Khan more than three centuries before in Mongolia. With even greater success than his Mon- golian counterpart, Nurhachu drew tribe after tribe under his sway, and after numerous wars with Korea and Mongolia he established his rule over the whole of Manchuria. Being thus the sovereign of an empire, he, again like Jenghiz Khan, adopted for himself the title of Ying-ming, " Brave and Illustrious," and took for his

reign the title of T'ien-ming. Thirteen years later, in 1617, after numerous border fights with the Chinese, Nurhachu drew up a list of " seven hates," or indictments, against his southern neighbours, and, not getting the satisfaction he de- manded, declared war against them. The progress of this war, the peace hastily patched up, the equally hasty alliance and its consequences, being matters of Chinese history, are treated in the article China.

Manchuria was claimed by Russia as her particular sphere 6t interest towards the close of the 10th century, and in the course of the disturbances of 1900 Russian troops occupied various parts of the country. Eventually a Manchurian convention was arranged between China and Russia, by which Russia was to evacuate the province; but no actual ratification of this con- vention was made by Russia. The Anglo-German agreement of October 1900, to which Japan also became a party, and by which it was agreed to " maintain undiminished the territorial condition of the Chinese empire," was considered by Great Britain and Japan not to exclude Manchuria; but Germany, on the other hand, declared that Manchuria was of no interest to her. The Anglo- Japanese treaty of 1902, however, was osten- sibly directed towards the preservation of Manchuria in Chinese hands. British capital has been invested in the extension of the Chinese Northern railway to Niu-chwang, and the fact was officially recognized by an agreement between Great Britain and Russia in 1899. One result of the Russo-Japanese War was the evacuation of Manchuria by the Russians, which, after the con- clusion of peace in 1903, was handed over by Japan to China.

See H. E. M. James, The Long White Mountain (London, 1888); D. Christie, Ten Years in Manchuria (Paisley, 1895); F. E. Young- husband, The Heart of a Continent: a Narrative of Travels in Man- churia (London, 1896); P. H. Kent, Railway Enterprise in China (London, 1907). (R. K. D.)

MANCINI, PASQUALE STANISLAO (181 7-1888), Italian jurist and statesman, was born at Castel Baronia, in the province of Avellino, on the 17th of March 1817. At Naples, where he studied law and displayed great literary activity, he rapidly acquired a prominent position, and in 1848 was instrumental in persuading Ferdinand II. to participate in the war against Austria. Twice he declined the offer of a portfolio in the Neapoli- tan cabinet, and upon the triumph of the reactionary party undertook the defence of the Liberal political prisoners. Threat- ened with imprisonment in his turn, he fled to Piedmont, where he obtained a university professorship and became preceptor of the crown prince Humbert. In i860 he prepared the legisla- tive unification of Italy, opposed the idea of an alliance between Piedmont and Naples, and, after the fall of the Bourbons,

was sent to Naples as administrator of justice, in which capacity he suppressed the religious orders, revoked the Concordat, pro- claimed the right of the state to Church property, and unified

civil and commercial jurisprudence. In 1862 he became minister of public instruction in the Rattazzi cabinet, and induced the Chamber to abolish capital punishment. Thereafter, for fourteen years, he devoted himself chiefly to questions of international law and arbitration, but in 1876, upon the advent of the Left to power, became minister of justice in the Depretis cabinet. His Liberalism found expression in the extension of press freedom, the repeal of imprisonment for debt, and the abolition of ecclesi- astical tithes. During the Conclave of 1878 he succeeded, by negotiations with Cardinal Pecci (afterwards Leo XIII.), in inducing the Sacred College to remain in Rome, and, after the election of the new pope, arranged for his temporary absence from the Vatican for the purpose of settling private business. Resigning office in March 1878, he resumed the practice of law, and secured the annulment of Garibaldi's marriage. The fall of Cairoli led to Mancini's appointment (1881) to the ministry of foreign affairs in the Depretis administration. The growing desire in Italy for alliance with Austria and Germany did not at first secure his approval; nevertheless he accompanied King Humbert to Vienna and conducted the negotiations which led to the informal acceptance of the Triple Alliance. His desire to retain French confidence was the chief motive of his refusal in July 1882 to share in the British expedition to Egypt, but, finding his efforts fruitless when the existence of the Triple Alliance came to be known, he veered to the English interest and obtained assent in London to the Italian expedition to Massawa. An indiscreet announcement of the limitations of the Triple Alliance contributed to his fall in June 1885, when he was succeeded by Count di Robilant. He died in Rome on the 26th of December 1888.

MANCIPLE, the official title of the caterer at a college, an inn of court, or other institution. Sometimes also the chief cook. The medieval Latin manceps, formed from mancipium, acquisi- tion by purchase (see Roman Law), meant a purchaser of stores, and mancipium became used of his office. It is from the latter word that the 0. Fr. manciple is taken.

MANCUNIUM, the name often (though perhaps incorrectly) given as the Romano-British name of Manchester. Here, close to the Medlock, in the district still called Castlefield near Knott Mill, stood in Roman days a fort garrisoned by a cohort of Roman auxiliary soldiers. The site is now obscured by houses, railways and the Rochdale canal, but vestiges of Roman ramparts can still be seen, and other remains were found in 1907 and previous years. Traces of Romano-British inhabitation have been noted elsewhere in Manchester, especially near the cathedral. But there was no town here; we can trace nothing more than a fort guarding the roads

running north through Lancashire and east into Yorkshire, and the dwellings of women-folk and traders which would naturally spring up outside such a fort. The ancient name is unknown. Our Roman authorities give both Mancunium and Mamucium, but it is not clear that either form is correct.

See W. T. Watkin's Roman Lancashire; C. Roeder's Roman Manchester, and the account edited by F. Bruton of the excavations in 1907. (F. J. H.)

MANDAEANS, also known as Sabians, Nasoraeans, or St John's Christians, 1 an Oriental sect of great antiquity, interesting to the theologian as almost the only surviving example of a

1 The first of these names (not Mendaeans or Mandaites) is that given by themselves, and means yvaxrTiKol, followers of Gnosis (K"st-nNO, from n-hnd, Hebr. jh?). The Gnosis of which they profess themselves adherents is a personification, the aeon and mediator " knowledge of life " (see below). The title Nasoraeans (Nasoraye), according to Petermann, they give only to those among themselves who are most distinguished for knowledge and character. Like the Arabic Nasara, it is originally identical with the name of the half heathen half Jewish-Christian Nafwpatoi, and indicates an early connexion with that sect. The inappropriate designation of St John s Christians arises from the early and imperfect acquaintance of Christian missionaries, who had regard merely to the reverence in which the name of the Baptist is held among them, and their frequent baptisms. In their dealings with members of other communions the designation they take is Sabians, in Arabic Sabi'Qna, from k?¥ = Vjs, to baptize, thus claiming the toleration extended by the Koran (Sur. 5, 73; 22, 17; 2, 59) to those of that name.

religion compounded of Christian, heathen and Jewish elements on a type which is essentially that of ancient Gnosticism.

The Mandaeans are found in the marshy lands of South Baby- lonia (al-bataih), particularly in the neighbourhood of Basra (or Bussorah), and in Khuzistan (Disful, Shuster). 1 They speak the languages of the localities in which they are settled (Arabic or Persian) , but the language of their sacred books is an Aramaic dialect, which has its closest affinities with that of the Babylonian Talmud, written in a peculiar character suggestive of the old Palmyrene. 2 The existence of the Mandaeans has been known since the middle of the 17th century, when the first Christian missionaries, Ignatius a

*Jesu * and Angelus a Sancto, began to labour among them at Basra; further information was gathered at a somewhat later date by Pietro della Valle 4 and Jean de Thevenot 5 (1633-1667), and in the following century by Engel- brecht Kaempfer (1651-1716), Jean Chardin (1643-1713) and Carsten Niebuhr. In recent times they have been visited by A. H. Petermann 6 and Albrecht Socin, and Siouffi 7 published in 1880 a full and accurate account of their manners and customs, taken from the lips of a converted Mandaean. For our know- ledge of their doctrinal system, however, we still depend chiefly upon the sacred books already mentioned, consisting of frag- ments of very various antiquity derived from an older literature. 8 Of these the largest and most important is the Sidra rabbd (" Great Book "), known also as Ginzd (" Treasure "), consisting of two unequal parts, of which the larger is called yamina (to the right hand) and the smaller s'mala (to the left hand), because of the manner in which they are bound together. The former is intended for the living; the latter consists chiefly of prayers to be read at the burial of priests. As regards doctrine, the work is exhaustive; but it is diffuse, obscure, and occasionally self- contradictory, as might be expected in a work which consists of a number of unconnected paragraphs of various authorship and date. The last section of the " right-hand " part (the " Book of Kings ") is one of the older portions, and from its allusion to " the Persian and Arabian kings " may be dated somewhere between a.d. 700 and 000. Many of the doctrinal portions may in substance well be still older, and date from the time of the Sassanids. None of the MSS., however, is older than the 16th century. 9*

The following sketch represents, as far as can be gathered from these heterogeneous sources, the principal features of the Man- daean system. The ground and origin of all things is Pird, or more correctly Pera rabbd (" the great abyss," or from iys, " to split," cf. the Gnostic fivdos, or more probably cf. Heb. peri, " the great fruit "), associated with whom, and forming a triad with him, are the primal aeons Ayar zlvd rabbd, " the great shining aether," and Mdnd rabbd d'ekdrd, " the great spirit of glory," usually called simply Mdnd rabbd. The last-named, the most prominent of the three, is the king of light properly so called, from whom the development of all things begins. From him emanates Yardind rabbd, " the great Jordan," which, as the higher-world

1 In 1882 they were said to have shrunk to 200 families, and to be seeking a new settlement on the Tigris, to escape the persecutions to which they are exposed.

2 See T. Noldeke's admirable Manddische Grammatik (Halle, 1875).

3 Narratio originis, rituum, et errorum Christianorum S. Joannis (Rome, 1652).

4 Reisebeschreibung, part iv. (Geneva, 1674). 6 Voyage au Levant (Paris, 1664).

6 Reisen im Orient, ii. 447 seq.

7 M. M. Siouffi, Ittudes sur la religion . . . des Soubbas (Paris, 1880).

8 Mandaean MSS. occur in the British Museum, the Bodleian Library, the Biblioth&que Nationale of France, and also in Rome, Weimar and Berlin. A number of Mandaean inscriptions relating to popular beliefs and superstitions have been published by H. Pognon, Inscriptions mandaites (2 vols., Paris, 1898-1899), also by M. Lidzbarski in his Ephemeris (Giessen, 1900 seq.).

9 The first printed edition and translation of the Sidra rabba, by Matth. Norberg (Codex Nazaraeus, liber Adami appellatus, 3 vols., Copenhagen, 1815-1816, followed by a lexicon in 1816, and an onomasticon in 1817), is so defective as to be quite useless; even the name Book of Adam is unknown to the Mandaeans. Petermann's Thesaurus s. Liber magnus, vulgo " Liber Adami " appellatus, opus Mandaeorum summi ponderis (2 vols., , Berlin and Leipzig, 1867), is an excellent metallographic reproduction of the Paris MS. A German

soul, permeates the whole aether, the domain of Ayar. Along- side of Mdnd rabbd frequent mention is made of D'muthd, his " image," as a female power; the name " image of the father " arises out of the same conception as that which gives rise to the name of tvvoia among the Greek Gnostics. Mdnd rabbd called into being the highest of the aeons properly so called, Hayye gadmaye, " Primal Life," and then withdrew into deepest secrecy, visible indeed to the highest but not to the lowest aeons (cf. "Zo

translation of about a quarter of this work has been published in W. Brandt's Mandaische Schriften, with notes (Gottingen, 1893). A critical edition still remains a desideratum. Next in importance to the Sidra rabba is the Sidra d' Yahya, or " Book of John," otherwise known as the D'rdsche d' Malke, " Discourses of the Kings," which has not as yet been printed as a whole, although portions have been published by Lorsbach and Tychsen (see Museum}, bibl. u. orient. Lit. (1807), and Staudlin's Beitr. z. Phil. u. Gesch. d. Relig. u. Sittenlehre 1796 seq.). The Kolasta (Ar. Khulasa, " Quintessence "), or accord- ing to its fuller title ' Enyane uderashe d' masbutha umassefctha (" Songs and Discourses of Baptism and the Ascent," viz. of the soul after death), has been admirably lithographed by Euting (Stuttgart, 1867). It is also known as Sidra d'neshmatha, " Book of Souls," and besides hymns and doctrinal discourses contains prayers to be offered by the priests at sacrifice and at meals, as well as other liturgical

matter. The Mandaean marriage service occurs both in Paris and in Oxford as an independent MS. The Diwan, hitherto unpublished, contains the ritual for atonement. The Asfar malwdshe, or " Book of the Zodiac," is astrological. Of smaller pieces many are magical and used as amulets.

10 The use of the word " life " in a personal sense is usual in Gnosti- cism; compare the Zaii) of Valentin and el-frayat el-muattama, " the dark life," of Mani in the Fihrist.

like the mysterious Trpeafivrris rplros or senex tertius of Mani, whose becoming visible will betoken the end of the world. Abathur sits on the farthest verge of the world of light that lies towards the lower regions, and weighs in his balance the deeds of the departed spirits who ascend to him. Beneath him was originally nothing but a huge void with muddy black water at the bottom, in which his image was reflected, becoming ulti- mately solidified into P'tahll, his son, who now partakes of the nature of matter. The demiurge of the Mandaeans, and corre- sponding to the Ialdabaoth of the Ophites, he at the instance of his father frames the earth and men — according to some passages in conjunction with the seven bad planetary spirits. He created Adam and Eve, but was unable to make them stand upright, whereupon Hibil, Shithil and Anosh were sent by the First Life to infuse into their forms spirit from Mdnd rabbd himself. Hibil, at the instance of the supreme God, also taught men about the world of light and the aeons, and especially gave them to know that not P'tahll but another was their creator and supreme God, who as " the great king of light, without number, without limit," stands far above him. At the same time he enjoined the pair to marry and people the world. P'tahll had now lost his power over men, and was driven by his father out of the world of light into a place beneath it, whence he shall at the day of judgment be raised, and after receiving baptism be made king of the 'Uthre with divine honours.

The underworld is made up of four vestibules and three hells properly so called. The vestibules have each two rulers, Zartay and Zartanay, Hag and Mag, Gaf and Gafan, Anatan and Kin. In the highest hell rules alone the grisly king Sh'dum, " the warrior "; in the storey immediately beneath is Giv, " the great "; and in the lowest is Kriin or Karkum, the oldest and most powerful of all, commonly called " the great mountain of flesh " (Turd rabbd d'besrd), but also " the first-born of darkness." In.the vestibules dirty water is still to be met with, but the hells are full of scorching consuming fire, except Krun's domain, where is nought but dust, ashes and vacancy. Into these regions descended Hibil the brilliant, in the power of

Mdnd rabbd, just as in the Manichaean mythology the " primal man," armed with the elements of the king of light, descends to a contest with the primal devil. Hibil lingers, gradually unfolding his power, in each of the vestibules, and finally passing from hell to hell reaches Karkum. Hibil allows himself to be half swallowed by the monster, but is unhurt, and compels his antagonist to recognize the superiority of Mdnd rabbd, the God of light, and to divulge his profoundest secret, the hidden name of darkness. Armed with this he returns through the successive hells, compelling the disclosure of every secret, depriving the rulers of their power, and barring the doors of the several regions. From the fourth vestibule he brought the female devil Ruha, daughter of Kin, and set her over the whole four. This Ruha, the mother of false- hood and lies, of poisoning and fornication is an anti-Christian parody of the Ruha d'Qudsha (Holy Spirit) of the Syriac Church. She is the mother of Ur, the personified fire of hell, who in anger and pride made a violent onset on the world of light (compare the similar occurrence in the Manichaean mythology), but was mastered by Hibil and thrown in chains down to the " black water," and imprisoned within seven iron and seven golden walls. By Ur, Ruha, while P'tahll was engaged in his work of creation, became mother of three sets of seven, twelve and five sons respectively; all were translated by P'tahll to the heavenly firma- ment (like the Archons of Mani), the first group forming the planets and the next the signs of the zodiac, while the third is as yet undetermined. Of the names of the planets Estera (Ishtar Venus, also called Ruha d'Qudsha, " holy spirit "), Enba (Nebo, Mercury), Sin (moon), Kewan (Saturn), Bll (Jupiter), and Nirig (Nirgal, Mars) reveal their Babylonian origin; II or II II, the sun, is also known as Kadtish and AdHnay (the Adonai of the Old Testament); as lord of the planetary spirits his place is in the midst of them; they are the source of all temptation and evil amongst men. The houses of the planets, as well as the earth and a second world immediately to the north of it, rest upon anvils laid by Hibil on the belly of Ur.

In the Mandaean representation the sky is an ocean of water, pure and clear, but of more than adamantine solidity, upon which the stars and planets sail. Its transparency allows us to see even to the pole star, who is the central sun around whom all the heavenly bodies move. Wearing a jewelled crown, he stands before Abathur's door at the gate of the world of light; the Mandaeans accordingly invariably pray with their faces turned northward. The earth is conceived of as a round disk, slightly sloping towards the south, surrounded on three sides by the sea, but on the north by a high mountain of tur- quoises; behind this is the abode of the blest, a sort of inferior paradise, inhabited by the Egyptians who were saved from drowning with Pharaoh in the Red Sea, and whom the Man- daeans look upon as their ancestors, Pharaoh himself having been their first high priest

and king. The total duration of the earth they fix at four hundred and eighty thousand years, divided into seven epochs, in each of which one of the planets rules. The Sidrd Rabbd knows of three total destructions of the human race by fire and water, pestilence and sword, a single pair alone sur- viving in each case. In the Mandaean view the Old Testament saints are false prophets; such as Abraham, who arose six thousand years after Nu (Noah) during the reign of the sun, Mlsha (Moses), in whose time the true religion was professed by the Egyptians, and Shllmun (Solomon) bar Davith, the lord of the demons. Another false prophet and magician was Yishu M'shiha, who was in fact a manifestation of the planet Mercury. Forty-two years before his day, under King Pontius Pilate, there had appeared the true prophet Yahya. or John son of Zechariah, an incarnation of Hibil, of whose birth and childhood fantastic stories are told. Yahya by a mistake gave baptism to the false Messiah, who had feigned humility; on the completion of his mission, after under- going a seeming execution, he returned clothed with light into the kingdom of light. As a contemporary of Yahya and the false Messiah Hibil's younger brother Anosh 'Uthra came down from heaven, caused himself to be baptized by Yahya, wrought miracles of healing and of raising the dead, and brought about the crucifixion of the false Messiah. He preached the true religion, destroyed Jerusalem (" Urashlam," i.e. " the devil finished it "), which had been built by Adunay, dispersed over the world the Jews who had put Yahya to death, and previous to his return into the worlds of light sent forth three hundred and sixty prophets for the diffusion of the true religion. All this speaks of intense hatred alike of Jews and Christians; the fasts, celibacy and monastic and anchoret life of the latter are peculiarly objectionable to the Mandaeans. Two hundred and forty years after the appearing of the false Messiah there came to the world sixty thousand saints out of Pharaoh's world to take the place of the Mandaeans, who had been completely extirpated; their high priest had his residence in Damascus. The last false prophet was M'hammad or Ahmat bar Bisbat (Mahomet), but Anosh, who remained close beside him and his immediate successors, prevented hostilities against the true believers, who claim to have had in Babylonia, under the Abbasids, four hundred places of worship. Subsequent per secutions compelled their withdrawal to 'Ammara in the neighbourhood of Wasit, and ultimately to Khuzistan. At the end of the world the devil Ur will swallow up the earth and the other intermediate higher worlds, and thereupon will burst and fall into the abyss of darkness where, along with all the worlds and powers of darkness, he will ultimately cease to be, so that thenceforward the universe will consist of but one ever- lasting world of light.

The chief depositaries of these Mandaean mysteries are the priests, who enjoy a high degree of power and social regard. The priest- hood has three

grades: (i) the Sh'kanda or deacon is generally chosen from episcopal or priestly families, and must be without bodily blemish. The candidate for orders must be at least nineteen years old and have undergone twelve years' preparation ; he is then qualified to assist the priesthood in the ceremonies of religion. (2) The Tarmlda (i.e. " Talmlda," " initiated ") or priest is ordained by a bishop and two priests or by four priests after a long and extremely painful period of preparation. (3) The Ganzivra (" treasurer ") or bishop, the highest dignitary, is chosen from the whole body of the Tarmidas after a variety of tests, and

possesses unlimited authority over the clergy. A supreme priestly rank, that of Risk 'amma, or " head of the people." is recog- nized, but only in theory; since the time of Pharaoh this sovereign pontificate has only once been filled. Women are admitted to priestly offices as well as men. The priestly dress, which is all white, consists of drawers, an upper garment, and a girdle with the so-called taga (" crown ") ; in all ceremonies the celebrants must be barefoot. By far the most frequent and important of the religious ceremonies is that of baptism (masbuiha) , which is called for in a great variety of cases, not only for children but for adults, where consecration or purification is required, as for example on all Sundays and feast days, after contact with a dead body, after return from abroad, after neglect of any formality on the part of a priest in the discharge of his functions. In all these cases baptism is performed by total immersion in running water, but during the five days' baptismal festival the rite is observed wholesale by mere sprinkling of large masses of the faithful at once. The Mandaeans observe also with the elements of bread (pehta) and wine {mambuha, lit. " fountain ") a sort of eucharist, which has a special sanctifying efficacy, and is usually dispensed at festivals, but only to baptized persons of good repute who have never willingly denied the Mandaean faith. In receiving it the communicant must not touch the host with his finger; otherwise it loses its virtue. The hosts are made by the priests from unleavened fine flour. The Mandaean places of worship, being designed only for the priests and their assistants (the wor- shippers remaining in the forecourt), are excessively small, and very simply furnished ; two windows, a door that opens towards the south so that those who enter have their faces turned towards the pole star, a few boards in the corner, and a gabled roof complete the whole structure; there is neither altar nor decoration of any kind. The neighbourhood of running water (for baptisms) is essential. At the consecration of a church the sacrifice af a dove (the bird of Ishtar) has place among the ceremonies. Besides Sundays there are six great feasts : (i) that of the New Year (Nauruz rabba), on the first day of the first month of

winter; (2) Dehwa h' nina, the anniversary of the happy return of Hibil Ziva from the kingdom of darkness into that of light, lasting five days, beginning with the 18th of the first month of spring ; (3) the Marwana, in commemoration of the drowned Egyptians, on the first day of the second month of spring; (4) the great five days' baptismal festival (pantsha), the chief feast, kept on the five intercalary days at the end of the second month of sum- mer — during its continuance every Mandaean, male and female, must .dress in white and bathe thrice daily; (5) Dehwa d'daimdnd, in honour of one of the three hundred and sixty 'Uthras, on the first day of the second month of autumn ; (6) Kanshe Zahla, the prepara- tion feast, held on the last day of the year. There are also fast days called m'battal (Arab.), on which it is forbidden to kill any living thing or eat flesh. These, however, are really " rest-days," as fasting is forbidden in Mandaeism. The year is solar, and has twelve months of thirty days each, with five intercalary days between the eighth and the ninth month. Of the seven days of the week, next to Sunday (habshaba) Thursday has a special sacredness as the day of Hibil Ziva. As regards secular occupation, the present Mandaeans are goldsmiths, ironworkers, and house and ship carpen- ters. The Sidra Rabba lays great stress upon the duty of procreation, and marriage is a duty. In the 17th century, according to the old travellers, they numbered about 20,000 families, but at the present day they hardly number more than 1200 souls. In external appear- ance the Mandaean is distinguished from the Moslem only by a brown coat and a parti-coloured headcloth with a cord twisted round it. They have some peculiar deathbed rites: a deacon with some atten- dants waits upon the dying, and as death approaches administers a bath first of warm and afterwards of cold water; a holy_ dress, consisting of seven pieces (rasta), is then put on; the feet are directed towards the north and the head turned to the south, so that the body faces the pole star. After the burial a funeral feast is held in the house of mourning.

The Mandaeans are strictly reticent about their theological dogmas in the presence of strangers; and the knowledge they actually possess of these is extremely small. The foundation of the system is obviously to be sought in Gnosticism, and more particularly in the older type of that doctrine (known from the serpent symbol as Ophite or Naassene) which obtained in Mesopotamia and Further Asia generally. But it is equally plain that the Ophite nucleus has from time to time received very numerous and often curiously per- verted accretions from Babylonian Judaism, Oriental Christianity and Parsism, exhibiting a striking example of religious syncretism. In the Gnostic basis itself it is not difficult to recognize the general features of the religion of ancient Babylonia, and thus we are brought nearer a solution of the problem as to the origin of Gnosticism in

feneral. It is certain that Babylonia, the seat of the present landaeans, must

be regarded also as the cradle in which their system was reared ; it is impossible to think of them as coming from Palestine, or to attribute to their doctrines a Jewish or Christian origin. They do not spring historically from the disciples of John the Baptist (Acts xviii. 25 ; xix. 3 seq. ; Reccg. Clem. i. 54) ; the tradi- tion in which he and the Jordan figure so largely is not original, and is therefore worthless; at the same time it is true that their baptismal praxis and its interpretation place them in the same religious group with the Hemerobaptists of Eusebius {.H. E. iv. 22)

and Epiphanius (Haer., xvii.), or with the sect of disciples of John who remained apart from Christianity. Their reverence for John is of a piece with their whole syncretizing attitude towards the New Testament. Indeed, as has been seen, they appropriate the entire personale of the Bible from Adam, Seth, Abel, Enos and Pharaoh to Jesus and John, a phenomenon which bears witness to the close relations of the Mandaean doctrine both with Judaism and Christi- anity — not the less close because they were relations of hostility. The history of religion presents other examples of the degradation of holy to demonic figures on occasion of religious schism. The use of the word " Jordan," even in the plural, for " sacred water-," is precisely similar to that by the Naassenes described in the Philoso- phumena (v. 7) ; there 6 peyas 'lopSavr/t denotes the spiritualizing sanctifying fluid which pervades the world of light. The notions of the Egyptians and the Red Sea, according to the same work (v. 16), are used by the Peratae much as by the M andaeans. And the posi- tion assigned by the Sethians (ZrfOtavoi) to Seth is precisely similar to that given by the Mandaeans to Abel. Both alike are merely old Babylonian divinities in a new Biblical garb. The genesis of Man- daeism and the older gnosis from the old and elaborate Babylonio- Chaldaean religion is clearly seen also in the fact that the names of the old pantheon (as for example those of the planetary divinities) are retained, but their holders degraded to the position of demons — a conclusion confirmed by the fact that the Mandaeans, like the allied Ophites, Peratae and Manichaeans, certainly have their original seat in Mesopotamia and Babylonia. It seems clear that the trinity of Anu, Bel, and Ea in the old Babylonian religion has its counterpart in the Mandaean Pira, Ayar, and Mana, rabba. The D'mutha of Mana is the Damkina, the wife of Ea, mentioned by Damascius as Aaixri, wife of 'A6s. Manda d'hayye and his image Hibil Ziva with his incarnations clearly correspond to the old Babylonian Marduk, Merodach, the " first-born " son of Ea, with his incarnations, the chief divinity of the city of Babylon, the mediator and redeemer in the old religion. Hibil's contest with darkness has its prototype in Marduk's battle with chaos, the dragon Tiamat, which (another striking parallel) partially swallows Marduk, just as is related of Hibil and the Manichaean primal man. Other features are borrowed by the Mandaean mythology under this head from the well-known epos of Istar's

descensus ad inferos. The sanctity with which water is invested by the Mandaeans is to be explained by the fact that Ea has his seat " in the depths of the world sea." Cf. K. Kessler's article, " Mandaer," in Herzog-Hauck's Real- encyklopddie, and the same author's paper, " Ueber Gnosis u. altbabylonische Religion," in the Abhandh. d. fiinften internationalen Orientalisten-congresses zu Berlin (Berlin, 1882); also W., Brandt's Manddische Religion (Leipzig, 1889), and M. N. Siouffi's Etudes sur la religion des Soubbas (Paris, 1880). (K. K. ; G. W. T.)

MANDALAY, formerly the capital of independent Burma, now the headquarters of the Mandalay division and district, as well as the chief town in Upper Burma, stands on the left bank of the Irrawaddy, in 21 59′ N. and 06 8′ E. Its height above mean sea-level is 315 ft. Mandalay was built in 1856-1857 by King Mindon. It is now divided into the municipal area and the cantonment. The town covers an area of 6 m. from north to south and 3 from east to west, and has well-metalled roads lined with avenues of trees and regularly lighted and watered. The cantonment consists of the area inside the old city walls, and is now called Fort Dufferin. In the centre stands the palace, a group of wooden buildings, many of them highly carved and gilt, resting on a brick platform 900 ft. by 500 ft., and 6 ft. high. The greater part of it is now utilized for military and other offices. The garrison consists of a brigade belonging to the Burma command of the Indian army. There are many fine pagodas and monastic buildings in the town. The population in 1901 was 183,816, showing a decrease of 3% in the decade. The population is very mixed. Besides Burmese there are Zerbadis (the offspring of a Mahommedan with a Burman wife), Mahommedans, Hindus, Jews, Chinese, Shans and Manipuris (called Kathe) , Kachins and Palaungs. Trains run from Mandalay to Rangoon, Myit-kyina, and up the Mandalay-Kunlong rail- way. The steamers of the Irrawaddy Flotilla Company also ply in all directions. There are twenty bazaars, the chief of which, the Zegyo, was burnt in 1897, and again in 1906, but rebuilt.

The Mandalay District has an area of 2 1 1 7 sq. m. and a popu- lation (1 901) of 366, 507, giving a density of 1 7 7 inhabitants to the square mile. About 600 sq. m. along the Irrawaddy river are flat land, nearly all cultivated. In the north and east there are some 1500 sq m. of high hills and table-lands, forming geogra- phically a portion of the Shan table-land. Here the fall to the plains averages 3000 to 4000 ft. in a distance of 10 m. This part of the district is well wooded and watered. The Maymyo

subdivision has very fine plateaus of 3000 to 3600 ft. in height. The highest peaks are between 4000 and 5000 ft. above sea- level. The Irrawaddy, the Myit-nge and the Madaya are the chief rivers. The last two come from the Shan States, and are navigable for between 20 and 30 m. There are many canals, most of which have fallen greatly into disrepair, and the Aungbinle, Nanda and Shwepyi lakes also supply water for cultivation. A systematic irrigation scheme has been under- taken by the government. The Sagyin hills near Madaya are noted for their alabaster; rubies are also found in small quantities. There are 335 sq. m. of forest reserves in the district, but there is little teak. The climate is dry and healthy. During May and June and till August strong winds prevail. The thermometer rises to about' 107° in the shade in the hot weather, and the minimum in the month of December is about 55 . The rainfall is light, the average being under 30 in.

The Division includes the districts of Mandalay, Bhamo, Myitkyina, Katha and Ruby Mines, with a total area of 29,373 sq. m., and a population (1901) of 777,338, giving an average density of 30 inhabitants to the square mile. (J. G. Sc.)

MANDAMUS, WRIT OF, in English law, a high prerogative writ issuing from the High Court of Justice (named from the first word in the Latin form of the writ) containing a command in the name of the king, directed to inferior courts, corporations, or individuals, ordering them to do a specific act within the duty of their office, or which they are bound by statute to do, and per- formance whereof the applicant for the writ has a specific legal right to enforce. Direct orders from the sovereign to subjects commanding the performance of particular acts were common in early times, and to this class of orders mandamus originally belonged. It became customary for the court of king's bench, in cases where a legal duty was established but no sufficient means existed for enforcing it, to order performance by this writ. Under the Judicature Acts and the Crown Office Rules, 1906 (r: 49), the powers of the court of king's bench as to the grant of the prerogative writ of mandamus are exercisable only in the king's bench division of the High Court.

The writ though of right is not of course: i.e. the applicant cannot have it merely for the asking, but must satisfy the High Court that circumstances exist calling for its issue. The pro- cedure regulating the grant and enforcement of the writ is determined by the Crown Office Rules, 1906 (rr. 49-68, 125).

Mandamus has always been regarded as an exceptional remedy to supplement the deficiencies of the common law, or defects of justice. Where another legal or equitable remedy exists, equally appropriate, convenient,

speedy, beneficial and effectual, the writ will as a rule be refused. It is occasionally granted even when a remedy by indictment is available: but is not issued unless the exist- ence of the duty and refusal to perform it are clearly established, nor where performance in fact has become impossible. The writ is used to compel inferior courts to hear and determine according to law cases within their jurisdiction, e.g. where a county court or justices in petty or quarter sessions refuse to assume a jurisdiction which they possess to deal with a matter brought before them. It has in recent years been employed to compel municipal bodies to discharge their duties as to providing proper sewerage for their districts and to compel anti-vaccinationist guardians of the poor to appoint officers for the execution of the Vaccination Acts; and it is also employed to compel the promoters of railway and similar undertakings to discharge duties imposed upon them towards the public by their special acts, e.g. with reference to highways, &c, affected by their railways or other undertakings. The courts do not prescribe the specific manner in which the duty is to be dis- charged, but do not stay their hands until substantial compliance is established.

Besides the prerogative common-law writ there are a number of orders, made by the High Court under statutory authority, and de- scribed as or as being in the nature of mandamus, e.g. mandamus to proceed to the election of a corporate officer of a municipal corpora- tion (Municipal Corporations Act 1882, s. 225) ; orders in the nature of mandamus to justices to hear and determine a matter within their jurisdiction, or to state and sign a case under the enactments relating to special cases.

At common law mandamus lies only for the performance of acts of a public or official character. The enforcement of merely private obligations, such as those arising from contracts, is not within its scope. By s. 68 of the Common Law Procedure Act 1854, the plain- tiff in any action other than replevin and ejectment was empowered to claim a writ of mandamus to compel the defendant to fulfil any

duty in the fulfilment of which the plaintiff was personally interested. By s. 25 (8) of the Judicature Act 1873 a mandamus may be granted by an interlocutory order of the High Court in all cases in which it shall appear to the court just or convenient that such an order should be made. This enactment does not deal with the prerogative man- damus but empowers the king's bench and the chancery divisions to grant an interlocutory mandamus in any pending cause or matter by an order other than the final judgment and even by an order made after the j udgment. S. 68 of the act of 1 854 has been repealed and re- placed by Order LIII. of the Rules of the Supreme Court. The remedy thus created is an attempt to engraft upon the old common law remedy by damages a right in the nature of specific performance of the duty in question. It is not limited to cases in which the

preroga- tive writ would be granted ; but mandamus is not granted when the result desired can be obtained by some remedy equally convenient, beneficial and effective, or a particular and different remedy is provided by statute. An action for mandamus does not lie against j udicial officers such as j ustices. The mandamus issued in the action is no longer a writ of mandamus, but a judgment or order having effect equivalent to the writ formerly used.

Mandatory Injunction. — The High Court has a jurisdiction derived from the court of chancery to grant injunctions at the suit of the attorney-general or of private persons. Ordinarily these injunctions are in the form of prohibition or restraint and not of command. But occasionally mandatory injunctions are granted in the form of a direct command by the court.

Specific Performance. — The jurisdiction of the High Court, derived from the court of chancery, to decree specific performance of con- tracts has some resemblance to mandamus in the domains of public or quasi-public law.

Ireland. — The law of Ireland as to mandamus is derived from that of England, and differs therefrom only in minor details.

British Possessions. — In a British possession the power to issue the prerogative writ is usually vested in the Supreme Court by its charter or by local legislation.

United States. — The writ has passed into the law of the United States. " There is in the federal judiciary an employment of the writ substantially as the old prerogative writ in the king's bench practice, also as a mode of exercising appellate jurisdiction, also as a proceeding ancillary to a judgment previously rendered, in exercise of original jurisdiction, as when a circuit court having rendered a judgment against a county issues a mandamus requiring its officers to levy a tax to provide for the payment of the judgment." And in the various states mandamus is used under varying regulations, mandate being in some cases substituted as the name of the proceeding.

MANDAN, a tribe of North American Indians of Siouan stock. When first met they were living on the Missouri at the mouth of the Heart river. At the beginning of the 19th cen- tury they were driven up the Missouri by the Sioux. In 1845 they joined the Gros Ventres and later the Arikaras, and settled in their present position at Fort Berthold reservation, North Dakota. The Mandans have always been agricultural; they are noted for their ceremonies, and from the tattooing on face and breast were described in the sign language as " the tattooed people."

MANDARIN, the common name for all public officials in China, the Chinese name for whom is kwan or kwitn. The word comes through the Portuguese from Malay mantri, a counsellor or minister of state. The ultimate origin of this word is the Sanskrit root man-, meaning to " think," seen in " man," " mind," &c. The term " mandarin " is not, in its western usage, applied indiscriminately to all civil and military officials, but only to those who are entitled to wear a " button," which is a spherical knob, about an inch in diameter, affixed to the top of the official cap or hat. These officials, civil and military alike, are divided into nine grades or classes, each grade being distinguished by a button of a particular colour. The grade to which an official belongs is not necessarily related to the office he holds. The button which distinguishes the first grade is a transparent red stone; the second grade, a red coral button; the third, a sapphire; the fourth, a blue opaque stone; the fifth, a crystal button; the sixth, an opaque white shell button; the seventh, a plain gold button; the eighth, a worked gold button; and the ninth, a worked silver button. The mandarins also wear certain insignia embroidered on their official robes, and have girdle clasps of different material. The first grade have, for civilians an embroidered Manchurian crane on the breast and back, for the military an embroidered unicorn with a girdle clasp of jade set in rubies. The second grade, for civilians an embroidered golden pheasant, for the military a lion with a girdle

clasp of gold set in rubies. The third grade, for civilians a pea- cock, for the military a leopard with a clasp of worked gold. The fourth grade, for civilians a wild goose, for the military a tiger, and a clasp of worked gold with a silver button. The fifth grade, for civilians a silver pheasant, for the military a bear and a clasp of plain gold with a silver button. The sixth grade, for civilians an egret, for the military a tiger-cat with a mother-of-pearl clasp. The seventh grade, for civilians a mandarin duck, for the military a mottled bear with a silver clasp. The eighth grade, for civilians a quail, for the military a seal with a clear horn clasp. The ninth grade, for civilians a long-tailed jay, for the military a rhinoceros with a buffalo-horn clasp.

The " mandarin language " is the Chinese, which is spoken in official and legal circles; it is also spoken over a considerable portion of the country, particularly the northern and central parts, though not perhaps with the same purity. Mandarin duck (anas galericulata) and Mandarin orange (citrus nobilis) possibly derive their names, by analogy, from the sense of superiority implied in the title " mandarin."

See Society in China, by Sir R. K. Douglas ; L' Empire du milieu, by E. and O. Reclus.

MANDASOR, or Mandsaur, a town of Central India, in the native state of Gwalior, on the Rajputana railway, 31 m. S. of Neemuch. Pop. (1901), 20,936. It gave its name to the treaty with Holkar, which concluded the Mahratta-Pindari War in 18 18. It is a centre of the Malwa opium trade.

Mandasor and its neighbourhood are full of archaeological interest. An inscription discovered near the town indicated the erection of a temple of the sun in 437, and at Sondani are two gteat monolith pillars recording a victory of Yasodharma, king of Malwa, in 528. The fort dates from the 14th and 15th centuries. Hindu and Jain remains are numerous, though the town is now entirely Mahommedan.

MANDATE (Mandatum), a contract in Roman law constituted by one person (the mandatarius) promising to do something gratuitously at the request of another (the mandator) , who under- takes to indemnify him against loss. The jurist distinguished the different cases of mandatum according as the object of the contract was the benefit of the mandator or a third person singly, or the mandator and a third person, the mandator and the mandatarius, or the mandatarius and a third person together. When the benefit was that of the mandatarius alone, the obligations of the contract were held not to arise, although the form of the contract might exist, the commission being held to be merely advice tendered to the mandatarius, and acted on by him at his own risk. Mandatum was classified as one of the contracts established by consent of the parties alone; but, as there was really no obligation of any kind until the man- datarius had acted on the mandate, it has with more propriety been referred to the contracts created by the supply of some fact (re). The obligations of the mandatarius under the con- tract were, briefly, to do what he had promised according to his instructions, observing ordinary diligence in taking care of any property entrusted to him, and handing over to his principal the results of his action, including the right to sue in his name. On the other hand, the principal was bound to recoup him his expenses and indemnify him against loss through obligations he might have incurred.

The essentials and the terminology of the contract are preserved in most modern systems of law. But in English law mandate, under that name, can hardly be said to exist as a separate form of contract. To some extent the law of mandatum corresponds partly to the law of principal and agent, partly to that of principal and surety." Mandate " is retained to signify the contract more gener- ally known as gratuitous bailment. It is restricted to personal property, and it implies the delivery of something to the bailee, both of which conditions are unknown in the mandatum of the civil law

(see Bailment). #

MANDAUE, a town of the province of Cebu, island of Cebu, Philippine Islands, on the E. coast and E. coast road, about 4 m. N.E. of the town of Cebu, the capital. Pop. (1903), 11,078; in the same year the town of Consolation (pop. 5511) was merged with Mandaue. Its climate is very hot, but healthy. The

principal industries are the raising of Indian corn and sugar-cane and the manufacture of salt from sea-water. Cebu-Visayan is the language.

MANDELIC ACID (Phenylglycollic Acid), C 8 H 8 3 or C 6 H 5 -CH(OH)-COOH, an isomer of the cresotinic and the oxymethylbenzoic acids. Since the molecule contains an asymmetric carbon atom, the acid exists in three forms, one being an inactive " racemic " mixture, and the other two being optically active forms. The inactive variety is known as paramandelic acid. It may be prepared by the action of hydro- chloric acid on the addition compound of benzaldehyde and hydrocyanic acid: — •

C 6 H 5 CHO-r-HCN+HCl+2H 2 = QHj-CHOH-COOH+NILCl, (F. L. Winckler, Ann., 1836, i8,3io),byboilingphenylchloracetic acid with alkalis (A. Spiegel, Ber., 1881, 14, 239), by heating benzoylformaldehyde with alkalis (H. v. Pechmann, Ber., 1887, 20, 2903), and by the action of dilute alkalies on w-dibrom- acetophenone (C. Engler, Ber., 1887, 20, 2202): — C 6 H 6 COCHBr 2 + 3KHO = 2KBr + H 2 + C 6 H 6 -CHOH-C0 2 K.

It crystallizes from water in large rhombic crystals, which melt at 1 1 8° C. Oxidizing agents convert it into benzaldehyde. When heated with hydriodic acid and phosphorus it forms phenylacetic acid; whilst concentrated hydrobromic acid and hydrochloric acid at moderate temperatures convert it into phenylbrom- and phenylchlor-acetic acids. The inactive mix- ture may be resolved into its active components by fractional crystallization of the cinchonine salt, when the salt of the dextro modification separates first; or the ammonium salt may be fermented by Penicittium glaucum, when the laevo form is destroyed and the dextro form remains untouched; on the other hand, Saccharomyces ellipsoideus destroys the dextro form, but does not touch the laevo form. A mixture of the two forms in equivalent quantities produces the inactive variety, which is also obtained when either form is heated for some hours to 160° C.

MANDER, CAREL VAN (1548-1606), Dutch painter, poet and biographer, was born of a noble family at Meulebeke. He studied under Lucas de Heere at Ghent, and in 1 568-1 569 under Pieter Vlerick at Kortryck. The next five years he devoted to the writing of religious plays for which he also

painted the scenery. Then followed three years in Rome (1574-1577), where he is said to have been the first to discover the catacombs. On his return journey he passed through Vienna, where, together with the sculptor Hans Mont, he made the triumphal arch for the entry of the emperor Rudolph. After many vicissitudes caused by war, loss of fortune and plague, he settled at Haarlem where, in conjunction with Goltzius and Cornelisz, he founded a success- ful academy of painting. His fame is, however, principally based upon a voluminous biographical work on the paintings of various epochs — a book that has become for the northern countries what Vasari's Lives of the Painters became for Italy. It was completed in 1603 and published in 1604, in which year Van Mander removed to Amsterdam, where he died in 1606.

MANDEVILLE, BERNARD DE (1670-1733), English philo- sopher and satirist, was born at Dordrecht, where his father practised as a physician. On leaving the Erasmus school at Rotterdam he gave proof of his ability by an Oralio scholastica de medicina (1685), and at Leiden University in 1689 he main- tained a thesis De brutorum operationibus, in which he advocated the Cartesian theory of automatism among animals. In 1691 he took his medical degree, pronouncing an "inaugural disputation," De chylosi vitiata. Afterwards he came to England " to learn the language," and succeeded so remarkably that many refused to believe he was a foreigner. As a physician he seems to have done little, and lived poorly on a pension given him by some Dutch merchants and money which he earned from distillers for advocating the use of spirits. His conversational abilities won him the friendship of Lord Macclesfield (chief justice 1710- 17 1 8) who introduced him to Addison, described by Mandeville as " a parson in a tye-wig." He died in January (19th or 21st) 1 733/4 a t Hackney.

The work by which he is known is the Fable of the Bees, pub- lished first in 1705 under the title of The Grumbling Hive, or Knaves Turn'd Honest (two hundred doggerel couplets) . In 1 7 14 it was republished anonymously with Remarks and An Enquiry into the Origin of Moral Virtue. In 1723 a later edition appeared, including An Essay on Charity and Charity Schools, and A Search into the Nature of Society. The book was primarily written as a political satire on the state of England in 1705, when the Tories were accusing Marlborough and the ministry of advocating the Trench War for personal reasons. The edition of 1723 was presented as a nuisance by the Grand Jury of Middlesex, was denounced in the London Journal by " Theophilus Philo- Britannus," and attacked by many writers, notably by Archibald Campbell (1691-1756) in his Aretelogia (published as his own by Alexander Innes in 1728; afterwards by Campbell, under his own name, in 1733, as Enquiry into the Original of Moral Virtue). The Fable was

reprinted in 1729, a ninth edition appeared in 1755, and it has often been reprinted in more recent times. Berkeley attacked it in the second dialogue of the Alciphron (1732) and John Brown criticized him in his Essay upon Shaftesbury's Characteristics (17 51).

Mandeville's philosophy gave great offence at the time, and has always been stigmatized as false, cynical and degrading. His main thesis is that the actions of men cannot be divided into lower and higher. The higher life of man is merely a fiction introduced by philosophers and rulers to simplify government and the relations of society. In fact, virtue (which he defined as " every performance by which man, contrary to the impulse of nature, should endeavour the benefit of others, or the conquest of his own passions, out of a rational ambition of being good ") is actually detrimental to the state in its commercial and intel- lectual progress, for it is the vices (i.e. the self-regarding actions of men) which alone, by means of inventions and the circulation of capital in connexion with luxurious living, stimulate society into action and progress. In the Fable he shows a society possessed of all the virtues " blest with content and honesty," falling into apathy and utterly paralyzed. The absence of self- love (cf. Hobbes) is the death of progress. The so-called higher virtues are mere hypocrisy, and arise from the selfish desire to be superior to the brutes. " The moral virtues are the political offspring which flattery begot upon pride." Similarly he arrives at the great paradox that " private vices are public benefits." But his best work and that in which he approximates most nearly to modern views is his account of the origin of society. His a priori theories should be compared with Maine's historical inquiries (Ancient Law, c. V.). He endeavours to show that all social laws are the crystallized results of selfish aggrandizement and protective alliances among the weak. Denying any form of moral sense or conscience, he regards all the social virtues as evolved from the instinct for self-preservation, the give-and-take arrangements between the partners in a defensive and offensive alliance, and the feelings of pride and vanity artificially fed by politicians, as an antidote to dissension and chaos. Mandeville's ironical paradoxes are interesting mainly as a criticism of the " amiable " idealism of Shaftesbury, and in comparison with the serious egoistic systems of Hobbes and Helvetius. It is mere prejudice to deny that Mandeville had considerable philosophic insight; at the same time he was mainly negative or critical, and, as he himself said, he was writing for " the entertainment of people of knowledge and education." He may be said to have cleared the ground for the coming utilitarianism.

Works. — Typhon: a Burlesque Poem (1704); Aesop Dress'd, or a Collection of Fables writ in Familiar Verse (1704); The Planter's Charity (1704); The Virgin Unmasked (1709, 1724, 1731, 1742), a work in which, the coarser side of his nature is prominent ; Treatise of the

Hypochondriack and Hysterick Passions (1711, 1715, 1730) admired by Johnson (Mandeville here protests against merely speculative therapeutics, and advances fanciful theories of his own about animal spirits in connexion with " stomachic ferment ": he shows a know- ledge of Locke's methods, and an admiration for Sydenham) ; Free Thoughts on Religion (1720); A Conference about Whoring (1725); An Enquiry into the Causes of the Frequent Executions at Tyburn (1725); The Origin of Honour and the Usefulness of Christi- anity in War (1732). Other works attributed, wrongly, to him are

A Modest Defence of Public Stews (1724); The World Unmasked (1736) and Zoologia medicinalis hibernica (1744).

See Hill's Boswell, iii. 291-293 ; L. Stephen's English Thought in the Eighteenth Century ; A. Bain's Moral Science (593-598) ; Windel- band's History of Ethics (Eng. trans. Tufts); J. M. Robertson, Pioneer Humanists (1907); P. Sakmann, Bernard de Mandeville und die Bienenfabel-Controverse (Freiburg i/Br., 1897), and compare articles Ethics, Shaftesbury, Hobbes. (J. M. M.).

MANDEVILLE, GEOFFREY DE (d. 1144), earl of Essex, succeeded his father, William, as constable of the Tower of London in or shortly before 1130. Though a great Essex land- owner, he played no conspicuous part in history till 1 140, when Stephen created him earl of Essex in reward for his services against the empress Matilda. After the defeat and capture of Stephen at Lincoln (1141) the earl deserted to Matilda, but before the end of the year, learning that Stephen's release was imminent, returned to his original allegiance. In 1142 he was again in- triguing with the empress; but before he could openly join her cause he was detected and deprived of his castles by the king. In 1143-1144 Geoffrey maintained himself as a rebel and a bandit in the fen-country, using the Isle of Ely and Ramsey Abbey as his headquarters. He was besieged by Stephen in the fens, and met his death in September 1 144 in consequence of a wound received in a skirmish. His career is interesting for two reasons. The charters which he extorted from Stephen and Matilda illustrate the peculiar form taken by the ambitions of English feudatories. The most important concessions are grants of offices and jurisdictions which had the effect of making Mande- ville a viceroy with full powers in Essex, Middlesex and London, and Hertfordshire. His career as an outlaw exemplifies the worst excesses of the anarchy which prevailed in some parts of England during the civil wars of 1140-1147, and it is probable that the deeds of Mandeville inspired the rhetorical description, in the Peterborough Chronicle of this period, when " men said openly that Christ and his saints were asleep."

See J. H. Round, Geoffrey de Mandeville, a Study of the Anarchy (London,

1892). (H. W. C. D.)

MANDEVILLE, JEHAN DE ("Sir John Mandeville"), the name claimed by the compiler of a singular book of travels, written in French, and published between 1357 and 1371. By aid of translations into many other languages it acquired extraordinary popularity, while a few interpolated words in a particular edition of an English version gained for Mandeville in modern times the spurious credit of being " the father of English prose."

In his preface the compiler calls himself a knight, and states that he was born and bred in England, of the town of St Albans; had crossed the sea on Michaelmas Day 1322; had travelled by way of Turkey (Asia Minor), Armenia the little (Cilicia) and the great, Tartary, Persia, Syria, Arabia, Egypt upper and lower, Libya, great part of Ethiopia, Chaldaea, Amazonia, India the less, the greater and the middle, and many countries about India; had often been to Jerusalem, and had written in Romance as more generally understood than Latin. In the body of the work we hear that he had been at Paris and Constantinople; had served the sultan of Egypt a long time in his wars against the Bedawin, had been vainly offered by him a princely marriage and a great estate on condition of renouncing Christianity, and had left Egypt under sultan Melech Madabron, i.e. Muzaffar or Mudhaffar 1 (who reigned in 1346-1347); had been at Mount Sinai, and had visited the Holy Land with letters under the great seal of the sultan, which gave him extraordinary facilities; had been in Russia, Livonia, Cracow, Lithuania, " en roialme dare- sten " (? de Daresten or Silistria), and many other parts near Tartary, but not in Tartary itself; had drunk of the well of youth at Polombe (Quilon on the Malabar coast), and still seemed to feel the better; had taken astronomical observations on the way to Lamory (Sumatra), as well as in Brabant, Germany, Bohemia and still farther north; had been at an isle caned Pathen in the Indian Ocean; had been at Cansay (Hangchow-fu) in China, and had served the emperor of China fifteen months

1 The on in Madabron apparently represents the Arabic nunation, though its use in such a case is very odd.

against the king of Manzi; had been among rocks of adamant in the Indian Ocean; had been through a haunted valley, which he places near " Milstorak " (i.e. Malasgird in Armenia); had been driven home against his will in 1357 by arthritic gout; and had written his book as a consolation for his " wretched rest." The paragraph which states that he had had his

book con- firmed at Rome by the pope is an interpolation of the English version.

Part at least of the personal history of Mandeville is mere invention. Nor is any contemporary corroboration of the exist- ence of such a Jehan de Mandeville known. Some French MSS., not contemporary, give a Latin letter of presentation from him to Edward III., but so vague that it might have been penned by any writer on any subject. It is in fact beyond reasonable doubt that the travels were in large part compiled by a Liege physician, known as Johains a le Barbe or Jehan a la Barbe, otherwise Jehan de Bourgogne.

The evidence of this is in a modernized extract quoted by the Liege herald, Louis Abry 1 (1 643- 1720), from the lost fourth book of the Myreur des Hystors of Johans des Preis, styled d'Oultre- mouse. In this " Jean de Bourgogne, dit a la Barbe," is said to have revealed himself on his deathbed to d'Oultremouse, whom he made his executor, and to have described himself in his will as " messire Jean de Mandeville, chevalier, comte de Montfort en Angleterre et seigneur de l'isle de Campdi et du chateau Perouse." It is added that, having had the misfortune to kill an unnamed count in his own country, he engaged himself to travel through the three parts of the world, arrived at Liege in 1343, was a great naturalist, profound philosopher and astrologer, and had a remarkable knowledge of physic. And the identifica- tion is confirmed by the fact that in the now destroyed church of the Guillelmins was a tombstone of Mandeville, with a Latin inscription stating that he was otherwise named " ad Barbam," was a professor of medicine, and died at Liege on the 17th of November 1372: this inscription is quoted as far back as

1462.

Even before his death the Liege physician seems to have con- fessed to a share in the composition of the work. In the common Latin abridged version of it, at the end of c. vii., the author says that when stopping in the sultan's court at Cairo he met a venerable and expert physician of " our " parts, that they rarely came into conversation because their duties were of a different kind, but that long afterwards at Liege he composed this treatise at the exhortation and with the help (hortatu et adiutorio) of the same venerable man, as he will narrate at the end of it. And in the last chapter he says that in 1355, in returning home, he came to Liege, and being laid up with old age and arthritic gout in the street called Bassesauenyr, i.e. Basse Savenir, con- sulted the physicians. That one came in who was more venerable than the others by reason of his age and white hairs, was evidently expert in his art, and was commonly called Magister Iohannes ad Barbam. That a chance remark of the latter caused the re- newal of their

old Cairo acquaintance, and that Ad Barbam, after showing his medical skill on Mandeville, urgently begged him to write his travels; " and so at length, by his advice and help, monitu et adiutorio, was composed this treatise, of which I had certainly proposed to write nothing until at least I had reached my own parts in England." He goes on to speak of himself as being now lodged in Liege, " which is only two days distant from the sea of England "; and it is stated in the colophon (and in the MSS.) that the book was first published in French by Mandeville, its author, in 1355, at Liege, and soon after in the same city translated into ")Kk said " Latin form. Moreover, a MS. of the French text extant at Liege about i860 2 contained a similar

1 Quoted again from him by the contemporary Li6ge herald, Lefort, and from Lefort in 1866 by Dr S. Bormans. Dr J. Vogels communicated it in 1884 to Mr E. W. B. Nicholson, who wrote on it in the Academy of April 12, 1884.

2 See Dr G. F. Warner's edition (Roxburghe Club), p. 38. In the Bull, de I'Institut archeologique Liegeois, iv. (i860), p. 171, M. Ferd. Henaux quotes the passage from " MSS. de la Bibliotheque publique de Liege, a l'Universit6, no. 360, fol. 118," but the MS. is not in the 1875 printed catalogue of the University Library, which has no Old

statement, and added that the author lodged at a hostel called " al hoste Henkin Levo ": this MS. gave the physician's name as " Johains de Bourgogne dit ale barbe," which doubtless conveys its local form.

There is no contemporary English mention of any English knight named Jehan de Mandeville, nor are the arms said to have been on the Liege tomb like any known Mandeville arms. But Dr G. F. Warner has ingeniously suggested that de Bourgogne may be a certain Johan de Bourgoyne, who was pardoned by parliament on the 20th of August 13 21 for having taken part in the attack on the Despensers, but whose pardon was revoked in May 1322, the year in which " Mandeville " professes to have left England. And it should now be added that among the persons similarly pardoned on the recommendation of the same nobleman was a Joh a n Mangevilayn, whose name appears closely related to that of "de Mandeville" 3 — which is merely a later form of "de Magneville."

Mangeuilain occurs in Yorkshire as early as 16 Hen. I. {Pipe Roll Soc., xv. 40), but is very rare, and (failing evidence of any place named Mangeville) seems to be merely a variant spelling of Magnevillain. The meaning may be simply " of Magneville," de Magneville; but the family of a 14th century bishop of Nevers were called both " Mandevilain " and " de Mandevilain " — where Mandevilain seems a derivative place-name, meaning the

Magneville or Mandeville district. In any case it is clear that the name '"de Mandeville " might be suggested to de Bourgogne by that of his fellow-culprit Mangevilayn, and it is even possible that the two fled to England together, were in Egypt together, met again at Liege, and shared in the compilation of the Travels.

Whether after the appearance of the Travels either de Bour- gogne or " Mangevilayn " visited England is very doubtful. St Albans Abbey had a sapphire ring, and Canterbury a crystal orb, said to have been given by Mandeville; but these might have been sent from Liege, and it will appear later that the Liege physician possessed and wrote about precious stones. St Albans also had a legend that a ruined marble tomb of Mandeville (represented cross-legged and in armour, with sword and shield) once stood in the abbey; this may be true of " Mangevilayn " or it may be a mere myth.

It is a little curious that the name preceding Mangevilayn in the list of persons pardoned is " Johan le Barber." Did this suggest to de Bourgogne the alias " a le Barbe," or was that only a Liege nickname? Note also that the arms on Mandeville's tomb were borne by the Tyrrells of Hertfordshire (the county in which St Albans lies); for of course the crescent on the lion's breast is only the " difference " indicating a second son.

Leaving this question, there remains the equally complex one whether the book contains any facts and knowledge acquired by actual travels and residence in the East. Possibly it may, but only as a small portion of the section which treats of the Holy Land and the ways of getting thither, of Egypt, and in general of the Levant. The prologue, indeed, points almost exclusively to the Holy Land as the subject of the work. The mention of more distant regions comes in only towards the end of this prologue, and (in a manner) as an afterthought.

By far the greater part of these more distant travels, extending in fact from Trebizond to Hormuz, India, the Malay Archipelago, and China, and back again to western Asia" has been appropriated from the narrative of Friar Odoric (written in 1330). These passages, as served up by Mandeville, are almost always, indeed, swollen with interpolated particulars, usually of an extravagant kind, whilst in no few cases the writer has failed to understand the passages which he adopts from Odoric and professes to give as his own experiences. Thus (p. 209) , 4 where Odoric has given a most

French MS. of Mandeville at present. It was probably lent out and not returned.

3 The de Mandevilles, earls of Essex, were originally styled de Magneville,

and Leland, in his Comm. de Script. Britt. (CDV), calls our Mandeville himself " Joannes Magnovillanus, alias Mandeville."

4 Page indications like this refer to passages in the 1866 reissue of Halliwell's edition, as being probably the most ready of access.

curious and veracious account of the Chinese custom of employ- ing tame cormorants to catch fish, the cormorants are converted by Mandeville into " little beasts called loyres (layre, B), which are taught to go into the water " (the word loyre being apparently used here for "otter," lutra, for which the Provencal is luria or loiria).

At a very early date the coincidence of Mandeville's stories with those of Odoric was recognized, insomuch that a MS. of Odoric which is or was in the chapter library at Mainz begins with the words: Incipit Ilinerarius fidelis jratris Odorici socii Militis Mendavil per Indian; licet hie [read ille) prius et alter poslerius peregrinationem suam descripsit. At a later day Sir T. Herbert calls Odoric " travelling companion of our Sir John "; and Purchas, with most perverse injustice, whilst calling Mande- ville, next to Polo, " if next . . . the greatest Asian traveller that ever the world had," insinuates that Odoric's story was stolen from Mandeville's. Mandeville himself is crafty enough, at least in one passage, to anticipate criticism by suggesting the probability of his having travelled with Odoric (see p. 282 and below).

Much, again, of Mandeville's matter, particularly in Asiatic geography and history, is taken bodily from the Historiae Orientis of Hetoum, an Armenian of princely family, whobecame a monk of the Praemonstrant order, and in 1307 dictated this work on the East, in the French tongue at Poitiers, out of his own extraordinary acquaintance with Asia and its history in his own time.

It is curious that no passage in Mandeville can be plausibly traced to Marco Polo, with one exception. This is (p. 163) where he states that at Hormuz the people during the great heat lie in water — a circumstance mentioned by Polo, though not by Odoric. We should suppose it most likely that this fact had been interpolated in the copy of Odoric used by Mandeville; for if he had borrowed it direct from Polo he would have borrowed more.*

A good deal about the manners and customs of the Tatars is demonstrably derived from the famous work of the Franciscan Ioannes de Piano Carpini, who went as the pope's ambassador to the Tatars in 1 245-1 247; but Dr Warner considers that the immediate source for Mandeville was the Speculum historiale of Vincent de Beauvais. Though the passages in question are all to be found in Piano Carpini more or less exactly, the expression is condensed and the order changed. For examples compare Mandeville, p. 250, on the tasks done by Tatar women, with Piano Carpini, p. 643 ; Mandeville. p. 250, on Tatar habits of eating, with Piano Carpini, pp. 639-640; Mandeville, p. 231, on the titles borne on the*

seals of the Great Khan, with Piano Carpini, p. 715, &c.

The account of Prester John is taken from the famous Epistle of that imaginary potentate, which was so widely diffused in the 13th century, and created that renown which made it incumbent on every traveller in Asia to find some new tale to tell of him. Many fabulous stories, again, of monsters, such as Cyclopes, sciapodes, hippopodes, monoscelides, anthropophagi, and men whose heads did grow beneath their shoulders, of the phoenix and the weeping crocodile, such as Pliny has collected, are introduced here and there, derived no doubt from him, Solinus, the bestiaries, or the Speculum naturale of Vincent de Beauvais. And interspersed, especially in the chapters about the Levant, are the stories and legends that were retailed to every pilgrim, such as the legend of Seth and the grains of paradise from which grew the wood of the cross, that of the shooting of old Cain by Lamech, that of the castle of the sparrow-hawk (which appears in the tale of Melusina), those of the origin of the balsam plants at Matanya, of the dragon of Cos, of the river Sabbation, &c.

But all these passages have also been verified as substantially occurring in Barrois's French MS. Nouv. Acq. Frang. 4515 in the Bibliotheque Nationale, Paris, mentioned below (of A.D. 1371), cited B, and in that numbered xxxix. of the Grenville collection (British Museum), which dates probably from the early part of the 15th century, cited G.

1 Viz. in D'Avezac's ed. in torn. iv. of Rec. de voyages et de memoires pub. by the Soc. de Geog., 1839.

Even in that part of the book which might be supposed to represent some genuine experience there are the plainest traces that another work has been made use of, more or less — we might almost say as a framework to fill up. This is the itinerary of the German knight Wilhelm von Boldensele, written in 1336 at the desire of Cardinal Talleyrand de Perigord. 2 A cursory com- parison of this with Mandeville leaves no doubt that the latter has followed its thread, though digressing on every side, and too often eliminating the singular good sense of the German traveller. We may indicate as examples Boldensele's account of Cyprus (Mandeville, p. 28 and p. 10), of Tyre and the coast of Palestine (Mandeville, 29, 30, 33, 34), of the journey from Gaza to Egypt (34), passages about Babylon of Egypt (40), about Mecca (42), the general account of Egypt (45), the pyramids (52), some of the wonders of Cairo, such as the slave-market, the chicken-hatching stoves, and the apples of paradise, i.e. plantains (49), the Red Sea (57), the convent on Sinai (58, 60), the account of the church of the Holy Sepulchre (74-76), &c. There is, indeed, only a small residuum of the book to which genuine character, as containing the experiences of the author, can possibly be attributed. Yet, as has been intimated, the

borrowed stories are frequently claimed as such experiences. In addition to those already mentioned, he alleges that he had witnessed the curious exhibi- tion of the garden of transmigrated souls (described by Odoric) at Cansay, i.e. Hangchow-fu (211). He and his fellows with their valets had remained fifteen months in service with the emperor of Cathay in his wars against the king of Manzi — Manzi, or Southern China, having ceased to be a separate kingdom some seventy years before the time referred to. But the most notable of these false statements occurs in his adoption from Odoric of the story of the Valley Perilous (282). This is, in its original form, apparently founded on real experiences of Odoric viewed through a haze of excitement and superstition. Mandeville, whilst swelling the wonders of the tale with a variety of extravagant touches, appears to safeguard himself from the reader's possible discovery that it was stolen by the interpolation: " And some of our fellows accorded to enter, and some not. So there were with us two worthy men, Friars Minor, that were of Lombardy, who said that if any man would enter they would go in with us. And when they had said so, upon the gracious trust of God and of them, we caused mass to be sung, and made every man to be shriven and houselled; and then we entered, fourteen persons; but at our going out we were but nine," &c.

In referring to this passage it is only fair to recognize that the description (though the suggestion of the greatest part exists in Odoric) displays a good deal of imaginative power; and there is much in the account of Christian's passage through the Valley of the Shadow of Death, in Bunyan's famous allegory, which indicates a possibility that John Bunyan may have read and remembered this episode either in Mandeville or in Hakluyt's Odoric.

Nor does it follow that the whole work is borrowed or fictitious. Even the great Moorish traveller Ibn Batuta, accurate and vera- cious in the main, seems — in one part at least of his narrative — to invent experiences; and in such works as those of Jan van Hees and Arnold von Harff we have examples of pilgrims to the Holy Land whose narratives begin apparently in sober truth, and gradually pass into flourishes of fiction and extravagance. So in Mandeville also we find particulars not yet traced to other writers, and which may therefore be provisionally assigned either to the writer's own experience or to knowledge acquired by colloquial intercourse in the East.

It is difficult to decide on the character of his statements as to recent Egyptian history. In his account of that country (pp. 37, 38) though the series of the Comanian (i.e. of the Bahri Mame- luke) sultans is borrowed from Hetoum down to the accession of Melechnasser, i.e. Malik al-Nasir (Nasir ud-din Mahommed), who came first to the throne in 1293, Mandeville appears to speak from his own knowledge when he adds that

this " Melechnasser reigned long and governed wisely." In fact, though twice

8 It is found in the Thesaurus of Canisius (1604), v. pt. ii. p. 95, and in the ed. of the same by Basnage (1725), iv. 337.

displaced in the early part of his life, Malik Nasir reigned till 1341, a duration unparalleled in Mahommedan Egypt, whilst we are told that during the last thirty years of his reign Egypt rose to a high pitch of wealth and prosperity. Mandeville, however, then goes on to say that his eldest son, Melechemader, was chosen to succeed; but this prince was caused privily to be slain by his brother, who took the kingdom under the name of Melechmada- bron. " And he was Soldan when I departed from those coun- tries." Now Malik Nasir Mahommed was followed in succession by no less than eight of his sons in thirteen years, the first three of whom reigned in aggregate only a few months. The names mentioned by Mandeville appear to represent those of the fourth and sixth of the eight, viz. Salih 'Imad ud-din Isma'Il, and Mozaffar (Saif ud-din IJajjl); and these the statements of Mandeville do not fit.

On several occasions Arabic words are given, but are not always recognizable, owing perhaps to the carelessness of copyists in such matters. Thus, we find (p. 50) the names (not satis- factorily identified) of the wood, fruit and sap of the balsam plant; (p. 99) of bitumen, " alkatran " (al-Kdtrdn); (p. 168) of the three different kinds of pepper (long pepper, black pepper and white pepper) as sorbolin, fulful and bano or bauo (fulful is the common Arabic word for pepper; the others have not been satis- factorily explained). But these, and the particulars of his narra- tive for which no literary sources have yet been found, are too few to constitute a proof of personal experience.

Mandeville, again, in some passages shows a correct idea of the form of the earth, and of position in latitude ascertained by observation of the pole star; he knows that there are antipodes, and that if ships were sent on voyages of discovery they might sail round the world. And he tells a curious story, which he had heard in his youth, how a worthy man did travel ever east- ward until he came to his own country again (p. 183). But he repeatedly asserts the old belief that Jerusalem was in the centre of the world (79, 183), and maintains in proof of this that at the equinox a spear planted erect in Jerusalem casts no shadow at noon, which, if true, would equally consist with the sphericity of the earth, provided that the city were

on the equator.

The sources of the book, which include various authors besides those whom we have specified, have been laboriously investigated by Dr Albert Bovenschen 1 and Dr G. F. Warner, 2 and to them the reader must be referred for more detailed information on the subject.

The oldest known MS. of the original — once Barrois's, afterwards the earl of Ashburnham's, now Nouv. Acq. Franc;. 4515 in the Bibliotheque Nationale, Paris — is dated 1371, but is nevertheless very inaccurate in proper names. An early printed Latin transla- tion made from the French has been already quoted, but four others, unprinted, have been discovered by Dr J. Vogels. 3 They exist in eight MSS., of which seven are in Great Britain, while the eighth was copied by a monk of Abingdon ; probably, therefore, all these unprinted translations were executed in this country. From one of them, according to Dr Vogels, 4 an English version was made which has never been printed and is now extant only in free abbre- viations, contained in two 15th century MSS. in the Bodleian Library, Oxford — MS. e Museo 116, and MS. Rawlinson D. 99: the former, which is the better, is in Midland dialect, and may possibly have belonged to the Augustinian priory of St Osyth in Essex, while the latter is in Southern dialect.

The first English translation direct from the French was made (at least as early as the beginning of the 15th century) from a MS. of which many pages were lost. 5 Writing of the name Califfes

1 Die Quellen fiir die Reisebeschreibung des Johann von Mandeville, Inaugural-Dissertation . . . Leipzig (Berlin, 1888). This was revised and enlarged as " Untersuchungen tiber Johann von Mandeville und die Quellen seiner Reisebeschreibung," in the Zeitschrift der Gesellschaft fiir Erdkunde zu Berlin, Bd. 23, Heft 3 u. 4 (No. 135, 136).

2 In his edition (Roxburghe Club).

' Die ungedruckten lateinischen Versionen Mandeville' s (Crefeld,

1886). .

- *Handschriftliche Untersuchungen tiber die englische Version Mandeville's (Crefeld, 1891), p. 46.*

6 Dr Vogels controverts these positions, arguing that the first English version from the French was the complete Cotton text, and that the defective English copies were made from a defective English MS. His supposed evidences of the priority of the Cotton text equally consist with its

being a later revision, and for Roys lis

(Khalif), the author says (Roxburghe Club ed.,p.iS) that it'is tant a dire come rot {s). II y soleit auoir v. soudans — " as much as to say king. There used to be 5 sultans." In the defective French MS. a page ended with II y so; then came a gap, and the next page went on with part of the description of Mount Sinai, Et est celle vallee mult froide (ibid. p. 32). Consequently the corresponding English version has " That ys to say amonge hem Roys lis and this vale ys ful colde " ! All English printed texts before 1725, and Ashton's 1887 edition, follow these defective copies, and in only two known MSS. has the lacuna been detected and filled up.

One of them is the British Museum MS. Egerton 1982 (Northern dialect, about 1410-1420?), in which, according to Dr Vogels, the corresponding portion has been borrowed from that English version which had already been made from the Latin. The other is in the British Museum MS. Cotton Titus C. xvi. (Midland dialect, about 1410-14:20?), representing a' text completed, and revised throughout, from the French, though not by a competent hand. The Egerton text, edited by Dr G. F. Warner, has been printed by the Roxburghe Club, while the Cotton text, first printed in 1725 and 1727, is in modern reprints the current English version.

That none of the forms of the English version can be from the same hand which wrote the original is made patent by their glaring errors of translation, but the Cotton text asserts in the preface that it was made by Mandeville himself, and this assertion was till lately taken on trust by almost all modern historians of English literature. The words of the original " je eusse cest livret mis en latin . . . mais . . . je l'ay mis. en romant " were mistranslated as if " je eusse " meant " I had " instead of " I should have," and then (whether of fraudulent intent or by the error of a copyist thinking to supply an accidental omission) the words were added " and translated it a3en out of Frensche into Englyssche." Matzner (Altenglische Sprachproben, I., ii., 154-155) seems to have been the first to show that the current English text cannot possibly have been made by Mandeville himself. Of the original French there is no satisfactory edition, but Dr Vogels has undertaken a critical text, and Dr Warner has added to his Egerton English text the French of a British Museum MS. with variants from three others.

It remains to mention certain other works bearing the name of Mandeville or de Bourgogne.

MS. Add. C. 280 in the Bodleian appends to the " Travels " a short French life of St Alban of Germany, the author of which calls himself John Mandivill[e], knight, formerly of the town of St Alban, and says he writes

to correct an impression prevalent among his countrymen that there was no other saint of the name: this life is followed by part of a French herbal.

To Mandeville (by whom de Bourgogne is clearly meant) d'Oultre- mouse 6 ascribes a Latin " lappidaire selon l'oppinion des Indois," from which he quotes twelve passages, stating that the author (whom he calls knight, lord of Montfort, of Castelperouse, and of the isle of Campdi) had been " baillez en Alexandrie " seven years, and had been presented by a Saracen friend with some fine jewels which had passed into d'Oultremouse's own possession: of this Lapidaire, a French version, which seems to have been completed after 1479, has been several times printed. 7 A MS. of Mandeville's travels offered for sale in 1862 8 is said to have been divided into five books: (1) the travels, (2) de Id, forme de la terre et comment el par quelle maniere elle fut faite, (3) de la forme del del, (4) des herbes selon les yndois et les philosophes par de Id, and (5) ly lapidaire — while the cataloguer supposed Mandeville to have been the author of a con- cluding piece entitled La Venianche de nostre Signeur Ihesu-Crist fayte par Vespasian fil del empereur de Romme et comment Iozeph daramathye fu deliures de la prizon. From the treatise on herbs a passage is quoted asserting it to have been composed in 1357 in honour of the author's natural lord, Edward, king of England. This date is corroborated by the title of king of Scotland given to Edward, who had received from Baliol the surrender of the crown and kingly dignity on the 20th of January 1356, but on the 3rd of October 1357 released King David and made peace with Scotland: unfortunately we are not told whether the treatise contains the author's name, and, if so, what name. Tanner (Bibliotheca) alleges that Mandeville wrote several books on medicine, and among the Ashmolean MSS. in the Bodleian are a medical receipt by John de Magna Villa (No. 1479), an alchemical receipt by him (No. 1407), and another alchemical receipt by Johannes de Villa Magna (No. 1441).

in the defective English MSS. he has only offered a laboured and improbable explanation.

6 Stanislas Bormans, Introduction to d'Oultremouse's Chronicle, pp. lxxxix., xc. ; see also Warner's edition of the Travels, p. xxxv. The ascription is on ff. 5 and 6 of Le Tresorier de philosophie naturele des pierres precieuses, an unprinted work by d'Oultremouse in MS. Fonds francais 12326 of the Bibliotheque Nationale, Paris. The passage about Alexandria is on f. 81.

7 See L. Pannier, Les Lapidaires francais , pp. 189-204 : not knowing d'Oultremouse's evidence, he has discredited the attribution to Man- deville and doubted the existence of a Latin original.

8 Description . . . d'une collection . . . d'anciens manuscrits . . . r&unis par les soins de M. J. Techener, pt. i. (Paris, 1862), p. 159 (referred to by Pannier, pp. 193-194).

Finally, de Bourgogne wrote under his own name a treatise on the plague, 1 extant in Latin, French and English texts, and in Latin and English abridgments. Herein he describes himself as Johannes de Burgundia, otherwise called cum Barba, citizen of Liege and professor of the art of medicine; says that he had practised forty years and had been in Liege in the plague of 1365; and adds that he had previously written a treatise on the cause of the plague, according to the indications of astrology (beginning Deus deorum), and another on distinguishing pestilential diseases (beginning Cum nimium propter inslans tempus epidimiale). " Burgundia " is sometimes corrupted into " Burdegalia," and in English translations of the abridgment almost always appears as " Burdews " (Bordeaux) or the like. MS. Rawlinson D. 251 (15th century) in the Bodleian also contains a large number of English medical receipts, headed " Practica phisicalia Magistri Johawnis de Burgundia."

See further Dr G. F. Warner's article in the Dictionary of National Biography for a comprehensive account, and for bibliographical references; Ulysse Chevalier's Repertoire des sources historiques du moyen age for references generally ; and the Zeitschr. f. celt. Philologie II., i. 126, for an edition and translation, by Dr Whitley Stokes, of Fingin O'Mahony's Irish version of the Travels.

(E. W. B. N.; H. Y.) MANDHATA, a village with temples in India, in Nimar district of the Central Provinces, on the south bank of the Narbada. Pop. (1901), 832. It is a famous place of Hindu pilgrimage, as containing one of the twelve great lingas of Siva; and as late as the beginning of the 19th century it was the scene of the self- immolation of devotees who threw themselves from the cliffs into the river.

MANDI, a native state of India, within the Punjab. It ranks as the most important of the hill states to which British influence extended in 1846 after the first Sikh War. The territory lies among the lower ranges of the Himalaya, between Kangra and Kulu. The country is mountainous, being intersected by two great parallel ranges, reaching to an average height of 5000 to 7000 ft. above sea-level. The valleys between the hill ranges are fertile, and produce all the ordinary grains, besides more valuable crops of rice, maize, sugar-cane, poppy and tobacco. Iron is found in places, and

also gold in small quantities. Area, 1200 sq. in.; pop. (1901), 174,045; estimated revenue, £28,000; tribute, £6666. The chief, whose title is raja, is a Rajput of old family. Considerable sums have been expended on roads and bridges. An important product of the state is salt, which is mined in two places.

The town of Mandi is on the Beas, which is here a mountain torrent, crossed by a fine iron bridge; 2991 ft. above sea-level; 88 m. from Simla. Pop. (1901), 8144. It was founded in 1527, and contains a palace of the 17 th century and other buildings of interest. It is a mart for transfrontier trade with Tibet and Yarkand. See Mandi State Gazetteer (Lahore, 1908).

MANDINGO, the name currently given to a very important division of negro peoples in West Africa. It is seemingly a cor- ruption of a term applied to an important section of this group, the Mande-nka or Mande-nga. The present writer has usually heard this word pronounced by the Mandingo themselves " Mandifia," or even " Madifia." It seems to be derived from the racial name Mande, coupled with the suffix nka or nke, meaning " people," the people of Mande. Then again this word Mande seems to take the varying forms of Male, Meli, Mane, Modi, and, accord- ing to such authorities as Binger, Delafosse and Desplagnes, it is connected with a word Mali, which means " hippopotamus " or else " manati " — probably the latter. According to Des- plagnes, the word is further divisible into ma, which would have meant " fish," and nde, a syllable to which he ascribes the mean- ing of " father." In no Mandingo dialect known to the present writer (or in any other known African language) does the vocable ma apply to " fish," and in only one very doubtful far eastern Mandingo dialect is the root nde or any other similar sound applied to " father." This etymology must be abandoned, probably in favour of Mani, Mali, Madi, Mande, meaning " hippopotamus," and in some cases the other big water mammal, the manati. 2

1 Respecting this, see David Murray, The Black Book of Paisley, &c. (1885), and John de Burdeus, &c. (1891).

2 Indeed it is possible that the European name for this Sirenian — manati — derived from the West Indies, is the corruption of a West

The West African tribes speaking Mandingo languages vary very much in outward appearance. Some of them may be West African negroes of the forest type with little or no intermixture with the Caucasian; others, such as the typical Mandingos or the Susus, obviously contain a non-negro element in their physique. This last type resembles very strongly the Swahilis of the Zanzi- bar littoral or other crosses between the Arab and the negro; and though nearly always black-skinned, often has a well-shaped nose and a

fairly full beard. The tribes dwelling in the West African forest, but speaking languages of Mandingo type, do not perhaps exhibit the very prognathous, short-limbed, " ugly " de- velopment of West African negro, but are of rather a refined type, and some of them are lighter in skin colour than the more Arab- looking Mandingos of the north. But in these forest Mandingos the beard is scanty. Occasionally the Mandingo physical type appears in eastern Liberia and on the Ivory Coast amongst people speaking Kru languages. In other cases it is associated with the Senufo speech-family.

Delafosse divides the Mandingo group linguistically into three main sections: (1) the Mande-tamu, (2) the Mande-fu, and (3) the Mande-td, according as they use for the numeral 10 the root tamu, la ot/u. Of the first group are the important tribes of the Soni-nke (called Sarakulle by the Fula, and Sarakole by the French) ; the Swaninki people of Azer, and the oases of Tishitt, Wadan and Walata in the south-west Sahara; and the Bozo, who are the fishermen along the banks of the Upper Niger and the Bani from Jenne to Timbuktu. The Soni-nke are also known as Marka, and they include (according to Binger) the Samogho and even the Kurtei along the banks of the Niger east of Timbuktu as far as Say.

The group of Mande-ta would include the Bamana (incorrectly called Bambara) of the upper Senegal and of Segu on the Upper Niger, the Toronke, the Mandenga, the Numu of the district west of the Black Volta, the Vai of south-western Liberia, and the Dyula or Gyula of the region at the back of the Ivory Coast.

The group of the Mande-fu includes a great many different languages and dialects, chiefly in the forest region of Sierra Leone and Liberia, and also the dialects of the celebrated Susu or Soso tribe, and the Mandingo tribes of Futa Jallon, of the Grand Scarcies River and of the interior of the Ivory Coast, and of the regions between the eastern affluents of the Upper Niger and the Black Volta. To this group Delafosse joins the Boko dialect spoken by people dwelling to the west of the Lower Niger at Bussa — between Bussa and Borgu. If this hypothesis be correct it gives a curious eastern extension to the range of the Mandingo family at the present day; or it may be a vestige left by the Man- dingo invasion which, according to legend, came in prehistoric times from the Hausa countries across the Niger to Senegambia. It is remarkable that this Boko dialect as recorded by the missionary Koelle most resembles certain dialects in central Liberia and in the Ivory Coast hinterland.

The Mandingos, coming from the East and riding on horses (according to tradition), seem to have invaded western Nigeria about a.d. 1000 (if not earlier), and to have gradually displaced and absorbed the Songhai or Fula

(in other words, Negroid, " White ") rulers of the countries in the basin of the Upper Niger or along its navigable course as far as the Bussa Rapids and the forest region. On the ruins of these Songhai, Berber, or Fula kingdoms rose the empire of Mali (Melle). Considerable sections of the Mandingo invaders had adopted Mahommedanism, and extended a great Mahommedan empire of western Nigeria far northwards into the Sahara Desert. In the 16th century the Songhai regained supreme power. See infra, § The Melle Empire. Although the Mandingos, and especially the Susu section, may have come as conquerors, they devoted themselves through the succeeding centuries more and more to commerce. They became to the extreme west of Africa what the Hausa are in the west- central regions. Some of the Mandingo invasions, especially in

African word manti, applied very naturally to the animal by the West African slaves, who at once recognized it as similar to the creature found on the West African coast in their own rivers, and also on the I Upper Niger.

the forest region, left little more than the imposition of their language; but where there was any element of Caucasian blood (for the original Mandingo invaders were evidently dashed with the Caucasian by intermingling with some of the negroid races of north-central Africa), they imposed a degree of civilization which excluded cannibalism (still rampant in much of the forest region of West Africa), introduced working in leather and in metals, and was everywhere signalized by a passionate love of music, a characteristic of all true Mandingo tribes at the present day. It is noteworthy that many of the instruments affected by the Mandingos are found again in the more civilized regions of Bantu Africa, as well as in the central Sudan. Many of these types of musical instruments can also be traced originally to ancient Egypt. The Mandingos also seem to have brought with them in their westward march the Egyptian type of ox, with the long, erect horns. It would almost seem as if this breed had been preceded by the zebu or humped ox; though these two types are evidently of common origin so far as derivation from one wild species is concerned. The Mandingos maintain the system of totems or clans, and each section or tribe identifies itself with a symbol, which is usually an animal or a plant. The Mandenga are supposed to have either the manati or the hippopotamus as tanna (totem). (Binger states that the manati was the totem of the Mande group, to which perhaps belonged originally the Susu and the Dyula.) The Bamana are the people of the crocodile; the Samanke are the people of the elephant; the Samokho of the snake. Other totems or symbols

of special families or castes are the dog, the calabash or gourd, the lion, the green monkey, the leopard, the monitor lizard, a certain spice called bandugu, certain rats, the python, the puff-adder, &c. Authorities. — The bibliography dealing with the Mandingo peoples is very extensive, but only the following works need be cited : Captain L. G. Binger, Du Niger au Golfe de Guinie, &c. (1892); Maurice Delafosse, Vocabulaires comparatifs de plus de 60 langues et dialectes paries a la Cote d'lvoire, &c. (1904) ; Lieut, Desplagnes, Le Plateau central nigerien (1907) ; Lady Lugard, A Tropical Depen- dency (1905) ; Sir Harry Johnston, Liberia (1906). Most of these works contain extensive bibliographies. (H. H. J.)

The Melle Empire. — The tradition which ascribes the arrival of the Mandingo in the western Sudan to the 10th or 1 ith century is referred to in the previous section. It is not known by whom the Melle (Mali) state was founded. Neither is there certainty as to the site of the capital, also called Melle. Idrisi in the 12th century describes the Wangara (a Hausa name for the Mandingo) as a powerful people, and El Bakri writes in similar terms. But the first king whose name is preserved was Baramindana, believed to have reigned from 1213 to 1235. His territory lay south of that of Jenne, partly within the bend of the Niger and partly west of that river. The people were already Moslem, and the capital was a rendezvous for merchants from all parts of the western Sudan and the Barbary States. Mari Jatah (or Diara), Baramindana's successor, about the middle of the 13th century conquered the Susu, then masters of Ghanata (Ghana). Early in the 14th century Mansa, i.e. Sultan, Kunkur Musa, extended the empire, known as the Mellistine, to its greatest limits, making himself master of Timbuktu, Gao and all the Songhoi dominions. His authority extended northward over the Sahara to the Tuat oases. Mansa Suleiman was on the throne when in 1352-1353 Melle was visited by Ibn Batuta. By this monarch the empire was divided into three great provinces, ruled by viceroys. For a century afterwards Mefle appears to have been the dominant Sudan state west of the Lower Niger, but it had to meet the hostility of the growing power of the pagan Mossi, of the Tuareg in the north and of the Songhoi, who under Sunni Ali (c. 1325) had already regained a measure of independence. Cadamosto nevertheless describes Melle in 1454 as being still the most powerful of the negro-land kingdoms and the most important for its traffic in gold and slaves. The Songhoi sovereign Askia is said to have completed the conquest of Melle at the beginning of the 16th century. It nevertheless retained some sort of national existence — though with the advent of the Moors in the Niger countries (end of the 16th century) native civilization suffered a blow from which it never recovered. Civil war is

said to have finally wrought the ruin of Melle about the middle of the 17th century. 1 The Portuguese, from their first appear- ance on the Senegal and Gambia, entered into friendly relations with the rulers of Melle. Barros

relates (Da Asia, Decade I.) that John II. of Portugal sent embassies to the court of Melle by way of the Gambia (end of the 15th century). At that time the authority of Melle was said to extend westward to the coast. The kirig, pressed by the Mossi, the Songhoi and the Fula, solicited the help of his " friends and allies " the Portuguese — with what result does not appear; but in 1534 Barros himself despatched an ambassador to the king of Melle concerning the trade of the Gambia. By way of that river the Portuguese themselves penetrated as far as Bambuk, a country conquered by the Mandingo in the 12th century. By Barros the name of the Melle ruler is given as Mandi Mansa, which may be the native form for " Sultan of the Mandi " (Mandingo).

See further Timbuktu and the authorities there cited; cf. also L. Marc, Le Pays Mossi (Paris, 1909). Lists of Mandingo sovereigns are given in Stokvis, Manuel d'histoire, vol. i. (Leiden, 1888).

(F. R. C.)

MANDLA, a town and district of British India, in the Jubbul- pore division of the Central Provinces. The town is on the river Nerbudda, 1787 ft. above the sea. It has a manufacture of bell-metal vessels. Pop. (1901), 5054. The district of Mandla, among the Satpura hills, has an area of 5054 sq. m. It consists of a wild highland region, broken up by the valleys of numerous rivers and streams. The Nerbudda flows through the centre of the district, receiving several tributaries which take their rise in the Maikal hills, a range densely clothed with sal forest, and forming part of the great watershed between eastern and western India. The loftiest mountain is Chauradadar, about 3400 ft. high. Tigers abound, and the proportion of deaths caused by wild animals is greater than in any other district of the Central Provinces. The magnificent sal forests which formerly clothed the highlands have suffered greatly from the nomadic system of cultivation practised by the hill tribes, who burned the wood and sowed their crops in the ashes; but measures have been taken to prevent further damage. The population in 1901 was 318,400, showing a decrease of 6-5% in the decade, due to famine. The aboriginal or hill tribes are more numerous in Mandla than in any other district of the Central Provinces, particularly the Gonds. The principal crops are rice, wheat, other food grains, pulse and oil-seeds. There is a little manu- facture of country cloth. A branch of the Bengal-Nagpur railway touches the south-western border of the district. Mandla suffered most severely from the famine of 1896-1897, partly owing to its inaccessibility, and partly from the shy habits of the aboriginal tribes. The registered death-rate in 1907 was as high as 96 per thousand.

MANDOLINE (Fr. mandoline; Ger. Mandoline; It. mandolina), thf treble member of the lute family, and therefore a stringed in< =:rument of great

antiquity. The mandoline is classified am ngst the stringed instruments having a vaulted back, which is more accentuated than even that of the lute. The mandoline is strung with steel and brass wire strings. There are two varieties of mandolines, both Italian: (1) the Neapolitan, 2 ft. long, which is the best known, and has four courses of pairs of unisons tuned like the violin in fifths; (2) the Milanese, which is slightly larger and has five or six courses of pairs of unisons. The neck is covered by a finger-board, on which are distributed the twelve or more frets which form nuts at the correct points under the strings on which the fingers must press to obtain the chromatic semitones of the scale. The strings are twanged by means of a plectrum or pick, held between the thumb and first finger of the right hand. In order to strike a string the pick is given a gliding motion over the string combined with a down or an up movement, respectively indicated by signs over the notes. In order to sustain notes on the mandoline the effect known as tremolo is employed; it is produced by means of a double movement of the pick up and down over a pair of strings.

'On the ruins of the old Melle dominions arose five smaller kingdoms, representing different sections of the Mandingo peoples.

The mandoline is a derivative of the mandola or mandore, which was smaller than the lute but larger than either of the mandolines described above. It had from four to eight courses of strings, the chanterelle or melody string being single and the others in pairs of unisons. The mandore is mentioned in Robert de Calenson (12th cent.), and elsewhere; it may be identified with the pandura.

The Neapolitan mandoline was scored for by Mozart as an accompaniment to the celebrated serenade in Don Juan. Beethoven wrote for it a Sonatina per il mandolino, dedicated to his friend Krumpholz. Gretry and Paisiello also introduced it into their operas as an accompaniment to serenades.

The earliest method for the mandoline was published by Fouchette in Paris in 1770. The earliest mention of the instrument in England, in 1707, is quoted in Ashton's Social Life in the Reign of Queen Anne: "Signior Conti will play …. on the mandoline, an instrument not known yet." (K. S.)

MANDRAKE (Mandragora officinarum), a plant of the potato family, order Solanaceae, a native of the Mediterranean region. It has a short stem bearing a tuft of ovate leaves, with a thick fleshy and often forked root.

*The flowers are solitary, with a purple bell-shaped corolla; the fruit is a fleshy orange-coloured berry. The mandrake has been long known for its poisonous properties and supposed virtues. It acts as an emetic, purgative and narcotic, and was much esteemed in old times; but, except in Africa and the East, where it is used as a narcotic and anti- spasmodic, it has fallen into well-earned disrepute. In ancient times, according to Isidorus and Serapion, it was used as a narcotic to diminish sensibility under surgical operations, and the same use is mentioned by Kazwlnl, i. 297, s.v. " Luffah." Shakespeare more than once alludes to this plant, as in Antony and Cleopatra: " Give me to drink mandragora." The notion that the plant shrieked when touched is alluded to in Romeo and Juliet: " And shrieks like mandrakes torn out of the earth, that living mortals, hearing them, run mad." The mandrake, often growing like the lower limbs of a man, was supposed to have other virtues, and was much used for love philtres, while the fruit was supposed, and in the East is still supposed, to facili- tate pregnancy (Aug., C. Faust, xxii. 56; cf. Gen. xxx. 14, where the Hebrew cii-*n is undoubtedly the mandrake). Like the mallow, the mandrake was potent in all kinds of enchantment (see Maimonides in Chwolson, Ssabier, ii. 459). Dioscorides identifies it with the Kipnaia, the root named after the enchantress Circe. To it appears to apply the fable of the magical herb Baaras, which cured demoniacs, and was procured at great risk or by the death of a dog employed to drag it up, in Josephus (B. J. vii. 6, § 3). The German name of the plant (Alraune; O. H. G. Alnlna) indicates the prophetic power supposed to be in little images (homunculi, Goldmannchen, Galgenmannchen) made of this root which were cherished as oracles. The possession of such roots was thought to ensure prosperity. (See Du Cange, s.vv. "Mandragora" and Littre.)*

Gerard in 1597 (Herball, p. 280) described male and female mandrakes, and Dioscorides also recognizes two such plants corre- sponding to the spring and autumn species (M. vernalis anˆ M. officinarum respectively), differing in the colour of the foliage cˆ shape of fruit.

MANDRILL (a name formed by the prefix " man " to the word " drill," which was used in ancient literature to denote an ape, and is probably of West African origin), the common title of the most hideous and most brilliantly coloured of all the African monkeys collectively denominated baboons and constituting the genus Papio. Together with the drill (q.v.), the mandrill, Papio maimon, constitutes the subgenus Maimon, which is exclusively West African in distribution, and character- ized, among other peculiarities, by the extreme shortness of the tail, and the great development of the longitudinal bony swellings, covered during life with naked skin, on the sides of the muzzle. As a whole, the mandrill is characterized by heavi- ness of body, stoutness and strength of limb, and exceeding shortness of tail, which is a mere stump, not 2 in. long, and

usually carried erect. It is, moreover, remarkable for the prominence of its brow-ridges, beneath which the small and closely approximated eyes are deeply sunk; the immense size of the canine teeth; and more especially for the extraordinarily

vivid colouring of some parts of the skin. The body generally is covered with soft hair — light olive-brown above and silvery grey beneath — and the chin is furnished underneath with a small pointed yellow beard. The hair of the forehead and temples is directed upwards so as to meet in a point on the crown, which gives the head a triangular appearance. The ears are naked, and bluish black. The hands and feet are naked, and black. A large space around the greatly developed callosities on the buttocks, as well as the upper part of the insides of the thighs, is naked and of a crimson colour, shading off on the sides to lilac or blue, which, depending upon injection of the superficial blood-vessels, varies in intensity according to the condition of the animal — increasing under excitement, fading during sickness, and disappearing after death. It is, however, in the face that the most remarkable disposition of vivid hues occurs, more re- sembling those of a brilliantly coloured flower than what might be expected in a mammal. The cheek-prominences are of an intense blue, the effect of which is heightened by deeply sunk longitudinal furrows of a darker tint, while the central line and termination of the nose are bright scarlet. It is only to fully adult males that this description applies. The female is of much smaller size, and more slender; and, though the general tone of the hairy parts of the body is the same, the prominences, furrows, and colouring of the face are much less marked. The young males have black faces.

Old males are remarkable for the ferocity of their disposition, as well as for other disagreeable qualities; but when young they can easily be tamed. Like baboons, mandrills appear to be indiscriminate eaters, feeding on fruit, roots, reptiles, insects, scorpions, &c, and inhabit open rocky ground rather than forests. Not much is known of the mandrill's habits in the wild state, nor of the exact limits of its geographical distribution; the specimens brought to Europe coming from the west coast of tropical Africa, from Guinea to the Gaboon. (See also Primates.) (W. H. F.; R. L.)*

MANDU, or Mandogarh, a ruined city in the Dhar state of Central India, the ancient capital of the Mahommedan kingdom of Malwa. The city is situated at an elevation of 2079 ft. and extends for 8 m. along the crest of the Vindhyan mountains. It reached its greatest splendour in the 15th century under Hoshang Shah (1405-1434). The circuit of the battlemented wall is nearly 23 m., enclosing a large number of palaces, mosques and other buildings. The oldest mosque dates from 1405; the finest is the Jama Masjid or great mosque, a notable example of Pathan architecture, founded by Hoshang Shah. The marble- domed tomb of this ruler is also

magnificent.

For a description and history of Mandu, see Sir James Campbell's Gazetteer of Bombay, vol. i. part ii. (1896), and Journal of the Bombay Asiatic Society (vol. xxi.).

MANDURIA, a city of Apulia, Italy, in the province of Lecce, from which it is 27 m. W. by road (22 m..E. of Taranto), 270 ft. above sea-level, and 8 m. N. of the coast. Pop. (1901), 12,199 (town) ; 13,190 (commune). It is close to the site of the ancient Manduria, considerable remains of the defences of which can still be seen; they consisted of a double line of wall built of rectangular blocks of stone, without mortar, and with a broad ditch in front. Some tombs with gold ornaments were found in 1886 (L. Viola in Notizie degli Scavi, 1886, 100). It was an important stronghold of the Messapii against Tarentum, and Archidamus III., king of Sparta, fell beneath its walls in 338 B.C., while leading the army of the latter (Plut., Agis, 3, calls the place Mandonion: see s.v. Archidamus). It revolted to Hannibal, but was stormed by the Romans in 209 B.C. Pliny mentions a spring here which never changed its level, and may still be seen. The town was destroyed by the Saracens in the 10th century; the inhabitants settled themselves on the site of the present town, at first called Casalnuovo, which resumed the old name in 1700. (T. As.)

MANDVI, a seaport of India, in the native state of Cutch, within the Gujarat province of Bombay, 36 m. from Bhuj, and 182 m. by sea from Karachi. Pop. (1901), 24,683. It is a weekly port of call for steamers of the British India line, vessels

of 70 tons cannot come nearer than 500 yards. The pilots and sailors of Mandvi have a high reputation.

MANES, in Roman mythology, the disembodied and immortal spirits of the dead. The word is an old adjective — manis, manus, meaning " good," the opposite of which is itnmanis; hence the Manes, clearly a euphemistic term, are the " good people." They were looked upon as gods; hence the dedication, of great an- tiquity and frequent occurrence, Divis or Dis Manibus in sepul- chral inscriptions, used even in Christian times. When a body was consumed on the funeral pyre, relations and friends invoked the deceased as a divinity, and the law of the Twelve Tables prescribed that the rights of the divine Manes should be respected, and that each man should regard the dead members of his family as gods. Their home was in the

bowels of the earth, from which they only emerged at certain times. It was an old Italian custom — especially at the foundation of cities — to dig a pit in the form of an inverted sky (hence called mundus), the lower part of which was supposed to be sacred to the gods of the underworld, including the Manes. Such a pit existed on the Palatine at Rome. It was covered by a stone called lapis manalis, representing the entrance to the lower world, which was removed three times in the year (Aug. 24, Oct. 5, Nov. 8). The Manes were then believed to issue forth, and these days were regarded as religiosi — that is, all important business in public and private life was suspended. Offerings were made to propitiate the dead: libations of water, wine, warm milk, honey, oil, and the blood of sacrificial victims — black sheep, pigs and oxen {suovetaurilia) — was poured upon the graves; ointment and incense were offered, lamps were lighted, and the grave was adorned with garlands of flowers, especially roses and violets. Beans, eggs, lentils, salt, bread and wine, placed on the grave, formed the chief part of a meal partaken of by the mourners. There was also a public state festival in honour of the dead, called Paren- talia, held from the 13th to the 21st of February, the last month of the old Roman year, the last day of the festival being called Feralia. During its continuance all the temples were shut, marriages were forbidden, and the magistrates had to appear without the insignia of their office.

There was considerable analogy between the Manes and the received idea of " souls " — and there was a corresponding idea that they could be conjured up and appear as ghosts. They were also supposed to have the power of sending dreams. It is to be noticed that, unlike the Lares, the Manes are never spoken of singly.

For authorities, see Lares and Penates.

MANET, EDOUARD (1832-1883), French painter, regarded as the most important master of Impressionism (q.v.), was born in Paris on the 23rd of January 1832. After spending some time under the tuition of the Abbe Poiloup, he entered the College Rollin, where his passion for drawing led him to neglect all his other lessons. His studies finished in 1848, he was placed on board the ship Guadeloupe, voyaging to Rio de Janeiro. On his return he first studied in Couture's studio (1851), where his independence often infuriated his master. For six years he was an intermittent visitor to the studio, constantly taking leave to travel, and going first to Cassel, Dresden, Vienna and Munich, and afterwards to Florence, Rome and Venice, where he made some stay. Some important drawings date from this period, and one picture, "A Nymph Surprised." Then, after imitating Couture, more or less, in " The Absinthe-drinker " (1866), and Courbet in " The Old Musician," he devoted himself almost exclusively to the study of the Spanish masters in the Louvre. A group was already gathering round

him — Whistler, Legros, and Fantin-Latour haunted his studio in the Rue Guyot. His " Spaniard playing the Guitar," in the Salon of i86r, excited much animadversion. Delacroix alone defended Manet, but, this notwithstanding, his " Fifer of the Guard " and " Breakfast on the Grass " were refused by the jury. Then the " Exhibition of the Rejected" was opened, and round Manet a group was formed, including Bracquemond, Legros, Jongkind, Whistler, Harpignies and Fantin-Latour, the writers Zola, Duranty and

Duret, and Astruc the sculptor. In 1863, when an amateur, M. Martinet, lent an exhibition-room to Manet, the painter exhibited fourteen pictures; and then, in 1864, contributed again to the Salon " The Angels at the Tomb " and " A Bull- fight." Of this picture he afterwards kept nothing but the toreador in the foreground, and it is now known as " The Dead Man." In 1865 he sent to the Salon " Christ reviled by the Soldiers " and the famous " Olympia," which was hailed with mockery and laughter. It represents a nude woman reclining on a couch, behind which is seen the head of a negress who carries a bunch of flowers. A black cat at her feet emphasizes the whiteness of the sheet on which the woman lies. This work (now in the Louvre) was presented to the Luxembourg by a subscription started by Claude Monet (1890). It was hung in 1897 among the Caillebotte collection, which included the " Balcony," and a study of a female head called " Angelina." This production, of a highly independent individuality, secured Manet's exclusion from the Salon of 1866, so thathe determined to exhibit his pictures in a place apart during the Great Exhibition of 1867. In a large gallery in the Avenue de I'Alma, half of which was occupied by Courbet, he hung no fewer than fifty paintings. Only one important picture was absent, "The Execution of the Emperor Maximilian"; its exhibition was prohibited by the authorities. From that time, in spite of the fierce hostility of some adversaries, Manet's energy and that of his supporters began to gain the day. His " Young Girl " (Salon of 1868) was justly appreciated, as well as the portrait of Lola; but the " Balcony " and the " Breakfast " (1869) were as severely handled as the " Olympia " had been. In 1870 he exhibited " The Music Lesson " and a portrait of Mile E. Gonzales. Not long before the Franco- Prussian War, Manet, finding himself in the country, with a friend, for the first time discovered the true value of open air to the effects of painting in his picture " The Garden," which gave rise to the " open air " or plein air school. After fighting as a gunner, he returned to his family in the Pyrenees, where he painted " The Battle of the Kearsarge and the Alabama." His "Bon Bock" (1873) created a furore. But in 1875, as in 1869, there was a fresh outburst of abuse, this time of the " Railroad," " Polichinelle," and " Argenteuil," and the jury excluded the artist, who for the second time arranged an exhibition in his studio. In 1877 his " Hamlet " was admitted to the Salon, but " Nana "

was rejected. The following works were exhibited at the Salon of 1881: "In the Conservatory," "In a Boat," and the portraits of Rochefort and Proust; and the Cross of the Legion of Honour was conferred on the painter on the 31st of December in that year. Manet died in Paris on the 20th of April 1883. He left, besides his pictures, a number of pastels and engravings. He illustrated Les Chats by Champfleury, and Edgar Allan Poe's The Raven.

See Zola, Manet (Paris, 1867); E. Bazire, Manet (Paris, 1884); G. Geffroy, La Vie artistique (1893). (H. Fr.)

MANETENERIS, a tribe of South American Indians of the upper Purus river, and between it and the Jurua, north-western Brazil. They manufacture cotton cloth, and have iron axes and fish hooks. The men wear long ponchos, the women sacks open at the bottom. The Maneteneris are essentially a waterside people. Their cedarwood canoes are very long and beautifully made.

MANETHO (Mavidcov in an inscription of Carthage; MaveOois in a papyrus), Egyptian priest and annalist, was a native of Sebennytus in the Delta. The name which he bears has a good Egyptian appearance, and has been found on a contem- porary papyrus probably referring to the man himself. The evidence of Plutarch and other indications connect him with the reigns of Ptolemy I. and II. His most important work was an Egyptian history in Greek, for which he translated the native records. It is now only known by some fragments of narrative in Josephus's treatise Against Apion, and by tables of dynasties and kings with lengths of reigns, divided into three books, in the works of Christian chronographers. The earliest and best of the latter is Julius Africanus, besides whom EusebiUs and

some falsifying apologists offer the same materials; the chief text is that preserved in the Chronographia of Georgius Syncellus. It is difficult to judge the value of the original from these ex- tracts: it is clear from the different versions of the lists that they have been corrupted. Manetho's work was probably based on native lists like that of the Turin Papyrus of Kings: even his division into dynasties may have been derived from such. The fragments of narrative give a very confused idea of Egyptian history in the time of the Hyksos and the XVIIIth Dynasty. The royal lists, too, are crowded with errors of detail, both in the names and order of the kings, and in the lengths attributed to the reigns. The brief notes attached to some of the names may be derived from Manetho's narrative, but they are chiefly references to kings mentioned by Herodotus or to marvels that were

supposed to have occurred: they certainly possess little historical value. A puzzling annotation to the name of Bocchoris, " in whose time a lamb spake 990 years," has been well explained by Krall's reading of a demotic story written in the twenty-third year of Augustus. According to this a lamb prophesied that after Bocchoris's reign Egypt should be in the hands of the oppressor 000 years; in Africanus's day it was necessary to lengthen the period in order to keep up the spirits of the patriots after the stated term had expired. This is evidently not from the pure text of Manetho. Notwithstanding all their defects, the fragments of Manetho have provided the accepted scheme of Egyptian dynastieˆ and have been of great service to scholars ever since the first months of Champollion's decipherment.

See C. Muller, Fragmenta historicorum graecorum, ii. 511-616; A. Wiedemann, Aegyptische Geschichte (Gotha, 1884), pp. 121 et sqq. ; J. Krall in Festgaben fur Budinger (Innsbruck, 1898); Grenfell and Hunt, El Hibeh Papyri, i. 223; also the section on chron- ology in Egypt, and generally books on Egyptian history and chronology. (F. Ll. G.)

MANFRED (c. 1232-1266), king of Sicily, was a natural son of the emperor Frederick II. by Bianca Lancia, or Lanzia, who is reported on somewhat slender evidence to have been married to the emperor just before his death. Frederick himself appears to have regarded Manfred as legitimate, and by his will named him as prince of Tarentum and appointed him as the represen- tative in Italy of his half-brother, the German king, Conrad IV. Although only about eighteen years of age Manfred acted loyally and with vigour in the execution of his trust, and when Conrad appeared in southern Italy in 1252 his authority was quickly and generally acknowledged. When in May 1254 the German king died, Manfred, after refusing to surrender Sicily to Pope Innocent IV., accepted the regency on behalf of Conradin, the infant son of Conrad. But the strength of the papal party in the Sicilian kingdom rendered the position of the regent so precarious that he decided to open negotiations with Innocent. By a treaty made in September 1254, Apulia passed under the authority of the pope, who was personally conducted by Manfred into his new possession. But Manfred's suspicions being aroused by the demeanour of the papal retinue, he fled to the Saracens at Lucera. Aided by Saracen allies, he defeated the papal troops at Foggia on the 2nd of December 1254, and soon estab- lished his authority over Sicily and the Sicilian possessions on the mainland.

Taking advantage in 1258 of a rumour that Conradin was dead, Manfred was crowned king of Sicily at Palermo on the 10th of August in that year. The falsehood of this report was soon manifest; but the new king, supported by the popular voice, declined to abdicate, and pointed out to Conradin's envoys the necessity for a strong native ruler. But the pope, to whom the

Saracen alliance was a serious offence, declared Manfred's coronation void and pronounced sentence of excommunication. Undeterred by this sentence Manfred sought to obtain power in central and northern Italy, and in conjunction with the Ghibellines his forces defeated the Guelphs at Monte Aperto on the 4th of September 1 260. He was then recognized as protector of Tuscany by the citizens of Florence, who did homage to his representative, and he was chosen senator of the Romans by a

faction in the city. Terrified by these proceedings, Pope Urban IV. implored aid from France, and persuaded Charles count of Anjou, a brother of King Louis IX., to accept the investiture of the kingdom of Sicily at his hands. Hearing of the approach of Charles, Manfred issued a manifesto to the Romans, in which he not only defended his rule over Italy but even claimed the imperial crown. The rival armies met near Benevento on the 26th of February 1266, where, although the Germans fought with undaunted courage, the cowardice of the Italians quickly brought destruction on Manfred's army. The king himself, refusing to fly, rushed into the midst of his enemies and was killed. Over his body, which was buried on the battlefield, a huge heap of stones was placed, but afterwards with the consent of the pope the remains were unearthed, cast out of the papal territory, and interred on the banks of the Liris. Manfred was twice married. His first wife was Beatrice, daughter of Amadeus IV. count of Savoy, by whom he had a daughter, Constance, who became the wife of Peter III. king of Aragon; and his second wife, who died in prison in 1271, was Helena, daughter of Michael II. despot of Epirus. Contemporaries praise the noble and magnanimous character of Manfred, who was renowned for his physical beauty and intellectual attainments.

Manfred forms the subject of dramas by E. B. S. Raupach, O. Marbach and F. W. Roggee. Three letters written by Manfred are published by J. B. Carusius in Bibliotheca hislorica regni Siciliae (Palermo, 1732). See Cesare, Storia di Manfredi (Naples, 1837); Miinch, Kdnig Manfred (Stuttgart, 1 840) ; Riccio, Alcuni studii storici intorno a Manfredi e Conradino (Naples, 1850) ; F. W. Schirrmacher, Die letzten Hohenstaufen (Gottingen, 1871); Capesso, Historia diplomatica regni Siciliae (Naples, 1874); A. Karst, Geschichte Manfredsvom Tode Friedrichs II. bis zu seiner Kronung (Berlin, 1897); and K. Hampe, Urban IV. und Manfred (Heidelberg, 1905).

MANFREDONIA, a town and archiepiscopal see (with Viesti) of Apulia, Italy, in the province of Foggia, from which it is 225 m. N.E. by rail, situated on the coast, facing E., 13 ft. above sea-level, to- the south of Monte Gargano, and giving its name to the gulf to the east of it. Pop. (1901), 11,549. It was founded by Manfred in 1263, and destroyed by the Turks in 1620; but the medieval castle of the Angevins and parts of the

town walls are well preserved. In the church of S. Domenico, the chapel of the Maddalena contains old paintings of the 14th century. Two miles to the south-west is the fine cathedral of S. Maria Maggiore di Siponto, built in 1117 in the Romanesque style, with a dome and crypt. S. Leonardo, nearer Foggia, belonging to the Teutonic order, is of the same date. This marks the site of the ancient Sipontum, the harbour of Arpi, which became a Roman colony in 194 B.C., and was not deserted in favour of Manfredonia until the 13th century, having become unhealthy owing to the stagnation of the water in the lagoons.

See A. Beltramelli, II Gargano (Bergamo, 1907). (T. As.)

MANGABEY, a name (probably of French origin) applied to the West African monkeys of the genus Cercocebus, the more typical representatives of which are characterized by their bare, flesh-coloured upper eye-lids, and the uniformly coloured hairs of the fur. (See Primates.)

MANGALIA, a town in the department of Constantza Rumania, situated on the Black Sea, and at the mouth of a small stream, the Mangalia, 10 m. N. of the Bulgarian frontier. Pop. (1900), 1459. The inhabitants, among whom are many Turks and Bulgarians, are mostly fisherfolk. Mangalia is to be identified with the Thracian Kallatis or Acervetis, a colony of Miletus which continued to be a flourishing place to the close of the Roman period. In the 14th century it had 30,000 inhabitants, and a large trade with Genoa.

MANGALORE, a seaport of British India, administrative headquarters of the South Kanara district of Madras, and ter- minus of the west coast line of the Madras railway. Pop. (1901), 44,108. The harbour is formed by the backwater of two small rivers. Vessels ride in 24 to 30 ft. of water, and load from and unload into lighters; The chief exports are coffee, coco-nut products, timber, rice and spices. Mangalore clears and exports all the coffee of Coorg, and trades directly with Arabia and the

Persian Gulf. There is a small shipbuilding industry. The town has a large Roman Catholic population, with a European bishop, several churches, a convent and a college. It is the headquarters of the Basel Lutheran mission, which possesses one of the most active printing presses in southern India, and has also successfully introduced the industries of weaving and the manufacture of tiles. Two colleges (Government and St Aloysius) are situated here. Mangalore was gallantly defended by Colonel John Campbell

of the 42nd regiment from May 6, 1783, to January 30, 1784, with a garrison of 1850 men, of whom 412 were English, against Tippoo Sultan's whole army. MANGAN, JAMES CLARENCE (1803-1849), Irish poet, was born in Dublin on the 1st of May 1803. His baptismal name was James, the " Clarence " being his own addition. His father, a grocer, who boasted of the terror with which he inspired his children, had ruined himself by imprudent speculation and extravagant hospitality. The burden of supporting the family fell on James, who entered a scrivener's office, at the age of fifteen, and drudged as a copying clerk for ten years. He was employed for some time in the library of Trinity College, and in 1833 he found a place in the Irish Ordnance Survey. He suffered a disappointment in love, and continued ill health drove him to the use of opium. He was habitually the victim of hallucinations which at times threatened his reason. For Charles Maturin, the eccentric author of Melmoth, he cherished a deep admiration, the results of which are evident in his prose stories. He belonged to the Comet Club, a group of youthful enthusiasts who carried on war in their paper, the Comet, against the levying of tithes on behalf of the Protestant clergy. Contributions to the Dublin Penny Journal followed; and to the Dublin University Magazine he sent translations from the German poets. The mystical tendency of German poetry had a special appeal for him. He chose poems that were attuned to his own melancholy temperament, and did much that was excellent in this field. He also wrote versions of old Irish poems, though his knowledge of the language, at any rate at the beginning of his career, was but slight. Some of his best-known Irish poems, however, O'Hussey's Ode to the Maguire, for instance, follow the originals very closely. Besides these were " translations " from Arabic, Turkish and Persian. How much of these languages he knew is uncertain, but he had read widely in Oriental subjects, and some of the poems are exquisite though the original authors whom he cites are frequently mythical. He took a mischievous pleasure in mystifying his readers, and in practising extraordinary metres. For the Nation he wrote from the beginning (1842) of its career, and much of his best work appeared in it. He afterwards con- tributed to the United Irishman. On the 20th of June 1849 he died at Meath Hospital, Dublin, of cholera. It was alleged at the time that starvation was the real cause. This statement was untrue, but there is no doubt that his wretched poverty made him ill able to withstand disease.

Mangan holds a high place among Irish poets, but his fame was deferred by the inequality and mass of his work, much of which lay buried in inaccessible newspaper files under his many pseudonyms, " Vacuus," " Terrae Filius," " Clarence," &c. Of his genius, morbid though it sometimes is, as in his tragic autobiographical ballad of The Nameless One, there can be no question. He expressed with rare sincerity the tragedy of Irish hopes

and aspirations, and he furnished abundant proof of his versatility in his excellent nonsense verses, which are in strange contrast with the general trend of his work. '

An autobiography which appeared in the Irish Monthly (1882) does not reproduce the real facts of his career with any fidelity. For some time after his death there was no adequate edition of his works, but German Anthology (1845), and The Poets and Poetry of Munster (1849) had appeared during his lifetime. In 1850 Hercules Ellis included thirty of his ballads in his Romances and Ballads of Ireland. Other selections appeared subsequently, notably one (1897), by Miss L. I. Guiney. The Poems of James Clarence Magan (1903), and the Prose Writings (1904), were both edited by D. J. O'Donoghue, who wrote in 1897 a complete account of the Life and Writings of the poet.

MANGANESE [symbol Mn; atomic weight, 54-93 (0=i6)], a metallic chemical element. Its dioxide (pyrolusite) has been

known from very early times, and was, at first mistaken for a magnetic oxide of iron. In 1740 J. H. Pott showed that it did not contain iron and that it yielded a definite series of salts, whilst in 1774 C. Scheele proved that it was the oxide of a dis- tinctive metal. Manganese is found widely distributed in nature, being generally found to a greater or less extent associated with the carbonates and silicates of iron, calcium and magnesium, and also as the minerals braunite, hausmannite, psilomelane, manganite, manganese spar and hauerite. It has also been recognized in the atmosphere of the sun (A. Cornu, Comples rendus, 1878, 86, pp. 315, 530), in sea water, and in many mineral waters.

The metal was isolated by J. G. Gahn in 1774, and in 1807 J. F. John (Gehlen's Jour. chem. phys., 1807, 3, p. 452) obtained an impure metal by reducing the carbonate at a high temperature with charcoal, mixed with a small quantity of oil. R. Bunsen prepared the metal by electrolysing manganese chloride in a porous cell surrounded by a carbon crucible containing hydro- chloric acid. Various reduction methods have been employed for the isolation of the metal. C. Brunner (Pogg. Ann., 1857, 101, p. 264) reduced the fluoride by metallic sodium, and E. Glatzel (Ber., 1889, 22, p. 2857) the chloride by magnesium, H. Moissan (Ann. Chim. Phys., 1896 (7) 9, p. 286) reduced the oxide with carbon in the electric furnace; and H. Goldschmidt has prepared the metal from the oxide by means of his " ther- mite " process (see Chromium). W. H. Green and W. H. Wahl [German patent 70773 (1893)] prepare a 97% manganese from pyrolusite by heating it with 30% sulphuric acid, the product being then converted into manganous oxide by heating in a cur- rent of reducing gas at a dull red heat, cooled in a reducing atmosphere, and finally reduced by

heating with granulated aluminium in a magnesia crucible with lime and fluorspar as a flux. A purer metal -is obtained by reducing manganese amalgam by hydrogen (O. Prelinger, Monats., 1894, 14,

P-3S3)-

Prelinger's manganese has a specific gravity of 7-42, and the variety obtained by distilling pure manganese amalgam in vacuo is pyrophoric (A. Guntz, Bull. Soc. [3], 7, 275), and burns when heated in a current of sulphur dioxide. The pure metal readily evolves hydrogen when acted upon by sulphuric and hydrochloric acids, and is readily attacked by dilute nitric acid. It precipitates many metals from solutions of their salts. It is employed commercially in the manufacture of special steels. (See Iron and Steel.)

Compounds

Manganese forms several oxides, the most important of which are manganous oxide, MnO, trimanganese tetroxide, MnsOj, man- ganese sesquioxide, Mn 2 3 , manganese dioxide, Mn0 2 , manganese trioxide, Mn0 3 , and manganese heptoxide, Mn 2 7 .

Manganous oxide, MnO, is obtained by heating a mixture of anhy- drous manganese chloride and sodium carbonate with a small quantity of ammonium chloride (J. v. Liebig and F. Wohler, Pogg. Ann., 1830, 21, p. 584); or by reducing the higher oxides with hydrogen or carbon monoxide. It is a dark coloured powder of specific gravity 5-09. Manganous hydroxide, Mn(OH) 2 , is obtained as a white precipi- tate on adding a solution of a caustic alkali to a manganous salt. For the preparation of the crystalline variety identical with the mineral pyrochroite (see A. de Scnulten, Comptes rendus, 1887, 105, p. 1265). It rapidly oxidizes on exposure to air and turns brown, going ulti- mately to the sesquioxide. Trimanganese tetroxide, Mn 3 U4, is pro- duced more or less pure when the other oxides are heated. It may be obtained crystalline by heating manganese sulphate and potas- sium sulphate to a bright red heat (H. Debray, Comptes rendus, 1861, 52, p. 985). It is a reddish-brown powder, which when heated with hydrochloric acid yields chlorine. Manganese sesquioxide, MnjOj, found native as the mineral braunite, may be obtained by igniting the other oxides in a mixture of nitrogen and oxygen, containing not more than 26 % of the latter gas (W. Dittmar, Jour. Chem. Soc, 1864, 17, p. 294). The hydrated form, found native as the mineral manganite, is produced by the spontaneous oxidation of manganous hydroxide. In the hydrated condition it is a dark brown powder which readily loses water at above 100 C, it dissolves in hot nitric acid, giving manganous nitrate and manganese dioxide: 2MnO(OH) + 2HNO3 = Mn(N0 3) 2 + Mn0 2 +

2H 2 0. Manganese dioxide, or pyrolusite (q.v.), Mn0 2 , the most important oxide, may be prepared by heating crystallized manganous nitrate until red fumes are given off, decanting the clear liquid, and heating to 150 to 160 C for 40 to 60 hours (A. Gorgen, Bull. Soc, 1890 [3], 4, p. 16),

or by heating manganese carbonate to 260 C. in the presence of air and washing the residue with very dilute cold hydrochloric acid. It is a hard black solid which readily loses oxygen when strongly heated, leaving a residue of MnjO^. When heated with concentrated hydrochloric acid it yields chlorine, and with concen- trated sulphuric acid it yields oxygen. It is reduced to the monoxide when heated in a current of hydrogen. It is a strong oxidizing agent. It dissolves in cold concentrated hydrochloric acid, forming a dark brown solution which probably contains manganic chloride (see R. J. Meyer, Zeit. anorg. Chem., 1899, 22, p. 169; G. Neumann, Monats., 1894, 15, p. 489). It is almost impossible to prepare a pure hydrated manganese dioxide owing to the readiness with which it loses oxygen, leaving residues of the type xMnO-yMnOj. Such mix- tures are obtained by the action of alkaline hypochlorites on manga- nous salts, or by suspending manganous carbonate in water and pass- ing chlorine through the mixture. The solid matter is filtered off, washed with water, and warmed with 10% nitric acid (A. Gorgen). It is a dark brown powder, which reddens litmus. Manganese dioxide combines with other basic oxides to form manganites, and on this property is based the Weldon process for the recovery of manganese from the waste liquors of the chlorine stills (see Chlorine). The manganites are amorphous brown solids, insoluble in water, and decomposed by hydrochloric acid with the evolution of chlorine. Manganese Irioxide, MnOj, is obtained in small quantity as an un- stable deliquescent red solid by dropping a solution of potassium permanganate in sulphuric acid on to dry sodium carbonate (B. Franke, Jour. prak. Chem., 1887 [2], 36, p. 31). Above 50° C. it decomposes into the dioxide and oxygen. It dissolves in water forming manganic acid, H2MnC>4. Manganese heptoxide, Mn 2 0-, pre- pared by adding pure potassium permanganate to well cooled, concentrated sulphuric acid, when the oxide separates as a dark oii (H. Aschoff, Pogg. Ann., i860, m, p. 217), is very unstable, con- tinually giving off oxygen. It decomposes violently on heating, and explodes in contact with hydrogen, sulphur, phosphorus, &c. It dissolves in water to form a deep red solution which contains permanganic acid, HMnO<. This acid is also formed by decomposing barium or lead permanganate with dilute sulphuric acid. It is only known in aqueous solution. This solution is of a deep violet- red colour, and is somewhat

fluorescent; it decomposes on exposure to light, or when heated. It is a monobasic acid, and a very power- ful oxidizing agent (M. M. P. Muir, Jour. Chem. Soc, 1907, 91, p. -1485).

Manganous Salts. — The anhydrous chloride, MnCl 2 , is obtained as a rose-red crystalline solid by passing hydrochloric acid gas over manganese carbonate, first in the cold and! afterwards at a moder- ate red heat. The hydrated chloride, MnCl 2 -4H 2 0, is obtained in rose-red crystals by dissolving the metal or its carbonate in aqueous hydrochloric acid and concentrating the solution. It may be obtained in at least two different forms, one isomorphous with NaCl-2H 2 0, by concentrating the solution between l5°C.and 20°C; the other, isomorphous with FeCl 2 -4H 2 0, by slow evaporation of the mother liquors from the former. It forms double salts with the chlorides of the alkali metals. The bromide MnBr 2 -4H 2 0, iodide, M'nlj, and fluoride, MnF 2 , are known.

Manganous Sulphate, MnSO%, is prepared by strongly heating a paste of pyrolusite and concentrated sulphuric acid until acid fumes cease to be evolved. The ferric and aluminium sulphates present are thus converted into insoluble basic salts, and the residue yields manganous sulphate when extracted with water. The salt crystal- lizes with varying quantities of water, according to the temperature at which crystallization is effected: between — 4 C. and +6° C. with 7H 2 0, between 15 C. and 20 C. with 5H2O, and between.25 C. and 31 ° C, with 4H2O. It crystallizes in large pink crystals, the colour of which is probably due to the presence of a small quantity of manganic sulphate or of a cobalt sulphate. It combines with the sulphates of the alkali metals to form double salts.

Manganous Nitrate, •Mn(N0 3) 2 -6H 2 0, obtained by dissolving the carbonate in nitric acid and concentrating the solution, crystallizes from nitric acid solutions in long colourless needles, which melt at 25-8° C. and boil at 129-5° C. with some decomposition.

Manganous Carbonate, MnC0 3 , found native as manganese spar, may be prepared as an amorphous powder by heating manganese chloride with sodium carbonate in a sealed tube to 150° C, or in the hydrated form as a white flocculent precipitate by adding sodium carbonate to a manganous salt. In the moist condition it rapidly turns brown on exposure to air.

Manganous Sulphide, MnS, found native as manganese glance, may be obtained by heating the monoxide or carbonate in a porcelain tube in a current of carbon bisulphide vapour. R. Schneider (Pogg. Ann., 1874, 151, 449) obtained a crystalline variety by melting sulphur with anhydrous manganous sulphate and dry potassium carbonate, extracting the residue and drying it in a current of hydrogen. Four sulphides are known ; the red

and green are anhydrous, a grey variety contains much water, whilst the pink is a mixture of the grey and red (J. C. Olsen and VV. S. Rapalje, Jour. Amer. Chem. Soc, 1904, 26, p. 1615). Ammonium sulphide alone gives incomplete precipitation of the sulphide. In the presence of ammonium salts the precipitate is dirty white in colour, whilst in the presence of free ammonia it is a buff colour. This

form of the sulphide is readily oxidized when exposed in the moist condition, and is easily decomposed by dilute mineral acids.

Manganese Disulphide, MnS 2 , found native as hauerite, is formed as a red coloured powder by heating manganous sulphate with

eotassium polysulphide in a sealed tube at i6o°-i70° C. (H. v. enarmont, Jour. prak. Chem., 1850, 51, p. 385).

Manganic Salts. — The sulphate, Mn 2 (S04)3, is prepared by gradu- ally heating at 138° C. a mixture of concentrated sulphuric and manganese dioxide until the whole becomes of a dark green colour. The excess of acid is removed by spreading the mass on a porous plate, the residue stirred for some hours with nitric acid, again spread on a porous plate, and finally dried quickly at about 130° C. It is a dark green deliquescent powder which decomposes on heating or on exposure to moist air. It is readily decomposed by dilute acids. With potassium sulphate in the presence of sulphuric acid it forms potassium manganese alum, K 2 S04-Mn 2 (S0 4)3-24H 2 0. A. Piccini (Zeit. anorg. Chem. 1898, 17, p. 355) has also obtained a manganese caesium alum. Manganic Fluoride, MnF3, a solid obtained by the action of fluorine on manganous chloride, is decom- posed by heat into manganous fluoride and fluorine. By suspending the dioxide in carbon tetrachloride and passing in hydrochloric acid gas, W. B. Holmes (Abst. J.C.S., 1907, ii., p. 873) obtained a black trichloride and a reddish-brown tetrachloride.

Manganese Carbide, MnsC, is prepared by heating manganous oxide with sugar charcoal in an electric furnace, or by fusing manganese chloride and calcium carbide. Water decomposes it, giving methane and hydrogen (H. Moissan); Mn3C+6H 2 = 3 Mn(OH) 2 -fCH 4 +H 2 .

Manganates. — These salts are derived from manganic acid H 2 Mn04- Those of the alkali metals are prepared by fusing manga- nese dioxide with sodium or potassium hydroxide in the presence of air or of some oxidizing agent (nitre, potassium chlorate, &c.) ; Mn0 2 +2KHO+0 = K 2 Mnq 4 +H 2 0. In the absence of air the reaction proceeds slightly differently, some manganese sesquioxide being formed ; 3Mn0 2 -t-2KHO = K 2 Mn04 + Mn 2 03 + H 2 0. The fused mass has a dark olive-green colour,

and dissolves in a small quantity of cold water to a green solution, which is, however, only stable in the presence of an excess of alkali. The green solution is readily converted into a pink one of permanganate by a large dilution with water, or by passing carbon dioxide through it: 3K 2 Mn0 4 +2C0 2 = 2K 2 C0 3 +2KMn04 + Mn0 2 .

Permanganates are the salts of permanganic acid, HMnOj. The potassium salt, KMn04, may be prepared by passing chlorine or carbon dioxide through an aqueous solution of potassium manganate, or by the electrolytic oxidation of the manganate at the anode [German patent 101710 (1898)]. It crystallizes in dark purple-red prisms, isomorphous with potassium perchlorate. It acts as a powerful oxidizing agent, both in acid and alkaline solution; in the first case two molecules yield five atoms of available oxygen and in the second, three atoms:

2KMn0 4 +3H 2 S04 = K 2 S04-|-2MnS04-r-3H 2 OH-50;
2KMn04+3H 2 =2Mn0 2 -H 2 0+2KHO+30.

It completely decomposes hydrogen peroxide in sulphuric acid solution —
2KMn0 4 +5H 2 2 +3H 2 S04 = K 2 S04+2MnS0 4 -|-8H 2 0-|-50 2 .

It decomposes when heated to

200°-240°C: 2KMn0 4 = K 2 Mn0 4 +Mn0 2 +0 2 ; and when warmed with hydrochloric acid it yields chlorine: 2KMn0 4 + i6HCl = 2KCl +2MnCl 2 +8H 2 0+5Cl 2 .

Sodium Permanganate, NaMn0 4 -3H 2 (?), may be prepared in a similar manner, or by precipitating the silver salt with sodium chloride. It crystallizes with great difficulty. Asolutionof thecrude salt is used as a disinfectant under the name of " Condy's fluid."

Ammonium Permanganate, NH 4 Mn04, explodes violently on rubbing, and its aqueous solution decomposes on boiling (W. Muth mann, Ber., 1893, 26, p. 1018); NH4-Mn04 = Mn0 2 + N 2 +2H 2 0.

Barium Permanganate, BaMn 2 Og, crystallizes in almost black needles, and is formed by passing carbon dioxide through water containing suspended barium manganate.

Detection. — Manganese salts can be detected by the amethyst colour they impart to a borax-bead when heated in the Bunsen flame, and by the green mass formed when they are fused with a mixture of sodium carbonate and potassium nitrate. Manganese may be estimated quantitatively by precipitation as carbonate, this salt being then converted into the oxide, Mn30 4 by ignition; or by precipitation as hydrated dioxide by means of

ammonia and bromine water, followed by ignition to Mn 3 C>4. The valuation of

Cyrolusite is generally carried out by means of a distillation with ydrochloric acid, the liberated chlorine passing through a solution of potassium iodide, and the amount of iodine liberated being ascertained by means of a standard solution of sodium thiosulphate. The atomic weight of manganese has been frequently determined. . Berzelius, by analysis of the chloride, obtained the value 54-86; v. Hauer (Sitzb. Akad. Wien., 1857, 25, p. 132), by conversion of the sulphate into sulphide, obtained the value 54-78; J. Dewar and A. Scott (Chem. News, 1883, 47, p. 98), by analysis of silver permanganate, obtained the value 55-038; J. M. Weeren (Stahl. u.

k:

MANGANITE— MANG LON

57i

dri »

i

Eisen, 1893, 13, p. 559), by conversion of manganous oxide into the sulphate obtained the value 54-883, and of the sulphate into sulphide the value 54-876 (H = 1), and finally G. P. Baxter and Hines (Jour. Amer. Chem. Soc, 1906, 28, p. 1360), by analyses of the chloride and bromide, obtained 54-96 (0 = 16).

MANGANITE, a mineral consisting of hydrated manganese sesquioxide, Mn203-H 2 0, crystallizing in the orthorhombic system and isomorphous with diaspore and gothite. Crystals are pris- matic and deeply striated parallel to their length; they are often grouped together in bundles. The colour is dark steel-grey to iron-black, and the lustre brilliant and submetallic: the streak is dark reddish-brown. The hardness is 4, and the specific gravity 4-3. There is a perfect cleavage parallel to the brachypinacoid, and less perfect cleavage parallel to the prism faces m. Twinned crystals are not infrequent. The mineral contains 89-7% of manganese sesquioxide; it dissolves in hydrochloric acid with evolution of chlorine. The best crystallized specimens are those from Ilfeld in the Harz, where the mineral occurs with calcite and barytes in veins traversing porphyry. Crystals have also been found at Ilmenau in Thuringia, Neukirch near Schlett- stadt in Alsace (" newkirki.te "), Granam near Towie in Aber- deenshire, Upton Pyne near Exeter and Negaunee in Michigan. As an ore of manganese it is much less abundant than pyrolusite or psilomelane.

*The name manganite was given by W. Haidinger in 1827: French authors adopt F. S. Beudant's name " acerdese," (Gr. d*cep5i)s, unprofitable) because the mineral is of little value for bleaching purposes as compared with pyrolusite.*

(L.J.S.) MANGBETTU {Monbultu), a negroid people of Central Africa living to the south of the Niam-Niam in the Welle district of Belgian Congo. They number about a million. Their country is a table-land at an altitude of 2500 to 2800 ft. Despite its abundant animal life, luxuriant vegetation and rich crops of plantain and oil-palm, the Mangbettu have been some of the most inveterate cannibals in Africa; but since the Congo State established posts in the country (c. 1895) considerable efforts have been made to stamp out cannibalism. Physically the Mangbettu differ greatly from their negro neighbours. They are not so black and their faces are less negroid, many having quite aquiline noses. The beard, too, is fuller than in most negroes. They appear to have imposed their language and customs on the surrounding tribes, the Mundu, Abisanga, &c. Once a consider- able power, they have practically disappeared as far as the original stock is concerned; their language and culture, however, remain, maintained by their subjects, with whom they have to a large extent intermixed. The men wear bark cloth, the art of weaving being unknown, the women a simple loin cloth, often not that. Both sexes paint the body in elaborate designs. As potters, sculptors, boatbuilders and masons the Mangbettu have had few rivals in Africa. Their huts, with pointed roofs, were not only larger and better built, but were cleaner than those of their neighbours, and some of their more important buildings were of great size and exhibited some skill in architecture.

See G. A. Schweinfurth, Heart of Africa (1874); W. Junker, Travels in Africa (1890); G. Casati, Ten Years in Equatoria (1891).

MANGEL-WURZEL, or field-beet, a variety of the common beet, known botanically as Beta vulgaris, var. macrorhiza. The name is German and means literally " root of scarcity." R. C. A. Prior (Popular Names of British Plants) says it was originally mangold, a word of doubtful meaning. The so-called root con- sists of the much thickened primary root together with the " hypocotyl," i.e. the original stem between the root and the seed-leaves. A transverse section of the root shows a similar structure to the beet, namely a series of concentric rings of firmer " woody " tissue alternating with rings of soft thin-walled parenchymatous " bast-tissue " which often has a crimson or yellowish tint. The root is a store of carbohydrate food-stuff in the form of sugar, which is formed in the first year of growth vhen the stem remains short and bears a rosette of large leaves.

If the plant be allowed to remain in the ground till the following year strong leafy angular aerial stems are developed, 3 ft. or more in height, which branch and bear the inflorescences. The flowers are arranged in dense sessile clusters subtended by a small bract, and resemble those of the true beet. The so-called seeds are clusters of spurious fruits. After fertilization the fleshy receptacle and the base of the perianth of each flower enlarge and the flowers in a cluster become united; the fleshy parts with the ovaries, each of which contains one seed, become hard and woody. Hence several seeds are present in one " seed " of commerce, which necessitates the careful thinning of a young crop, as several seedlings may spring from one " seed."

This plant is very susceptible of injury from frost, and hence in the short summer of Scotland it can neither be sown so early nor left in the ground so late as would be requisite for its mature growth. But it is peculiarly adapted for those southern parts of England where the climate is too hot and dry for the successful cultivation of the turnip. In feeding quality it rivals the swede; it is much relished by livestock — pigs especially doing remarkably well upon it ; and it keeps in good condition till midsummer if required. The valuable constituent of mangel is dry matter which averages about 12% as against 11% in swedes. Of this two-thirds may be sugar, which only develops fully during storage. Indeed, it is only after it has been some months in the store heap that mangel becomes a palatable and safe food for cattle. It is, moreover, exempt from the attacks of the turnip beetle. On all these accounts, therefore, it . is peculiarly valuable in those parts of Great Britain where the summer is usually hot and dry.

Up to the act of depositing the seed, the processes of prepara- tion for mangel are similar to those described for the turnip; winter dunging being even more appropriate for the former than for the latter. The common drilling machines are easily fitted for sowing its large rough seeds, which should be sown from the beginning of April to the middle of May and may be deposited either on ridges or on the flat. The after culture is like that of the turnip. The plants are thinned out at distances of not Jess than 15 in. apart. Transplanting can be used for filling up of gaps with more certainty of success than in the case of swedes, but it is much more economical to avoid such gaps by sowing a little swede seed along with the mangel. Several varieties of the plant are cultivated- — those in best repute being the, long red, the yellow globe and the tankard, intermediate in shape. This crop requires a heavier dressing of manure than the turnip to grow it in perfection, and is much benefited by having salt mixed with the manure at the rate of 2 or 3 cwt. per acre. Nitro- genous manures are of more marked value than phosphatic manures. The crop requires to be secured in store heaps as early in autumn as possible, as it is easily injured by frost.

MANGLE. (1) A machine for pressing and smoothing clothes after washing (see Laundry). The word was adopted from the Dutch; mangel-stok means a rolling pin, and linnen-mangelen, to press linen by rolling; similarly in O. Ital. mangano nieant, according to Florio, "a presse to press buckrom," &c. The origin of the word is to be found in the medieval Latin name, manganum, mangonus or mangdna, for an engine of war, the " mangonel," for hurling stones and other missiles (see Cata- pult). The Latin word was adapted from the Greek iibyyayov, a trick or device, cognate with urixa-vq, a machine. (2) To cut in pieces, to damage or disfigure; to mutilate. This word is of obscure origin. According to the New English Dictionary it presents an Anglo-French mahangler, a form of mahaigner from which the English " maim " is derived, cf. the old form " mayhem," surviving in legal phraseology. Skeat connects the word with the Latin mancus, maimed, with which " maim " is not cognate.

MANG LON, a state in the northern Shan states of Burma. It is the chief state of the Wa or Vti tribes, some of whom are head-hunters, and Mang Lon is the only one which as yet has direct relations with the British government. Estimated area, 3000 sq. m.; estimated population, 40,000. The state extends from about 21° 30′ to 23° N., or for 100 m. along the river

Salween. Its width varies greatly, from a mile or even less on either side of the river to perhaps 40 m. at its broadest part near Takiit, the capital. It is divided into East and West Mang Lon, the boundary being the Salween. There are no Wa in West Mang Lon. Shans form the chief population, but there are Palaungs, Chinese and Yanglam, besides Lahu. The bulk of the population in East Mang Lon is Wa, but there are many Shans and Lahu. Both portions are very hilly; the only flat land is along the banks of streams in the valleys, and here the Shans are settled. There are prosperous settlements and bazaars at Nawng Hkam and Mong Kao in West Mang Lon. The Wa of Mang Lon have given up head-hunting, and many profess Buddhism. The capital, Takiit, is perched on a hill-top 6000 ft. above sea-level. The sawbwa is a Wa, and has control over two sub-states, Mot Hai to the north and Maw Hpa to the south.

MANGNALL, RICHMAL (1 769-1820), English schoolmistress, was born, probably at Manchester, on the 7th of March 1769. She was a pupil and finally mistress of a school at Crofton Hall, near Wakefield, Yorkshire, which she conducted most success- fully until her death there on the 1st of May 1820. She was the author of Historical and Miscellaneous Questions

for the Use of Young People (1800), generally known as " Mangnall's Questions," which was prominent in the education of English girls in the first half of the 19th century.

MANGO. The mango-tree (Mangifera indica, natural order Anacardiaceae) is a native of tropical Asia, but is now exten- sively cultivated in the tropical and subtropical regions of the New as well as the Old World. It is indigenous in India at the base of the Himalayas, and in Further India and the Andaman Islands (see A. de Candolle, Origin of Cultivated Plants). The cultivation of the fruit must have spread at an early age over the Indian Peninsula, and it now grows everywhere in the plains. It grows rapidly to a height of 30 to 40 ft., and its dense, spreading and glossy foliage would secure its cultivation for the sake of its shade and beauty alone. Its fruit, a drupe, though in the wild variety (not to be confused with that of Spondias mangifera, belonging to the same order, also called wild mango in India) stringy and sour, from its containing much gallic acid, and with a disagreeable flavour of turpentine, has become sweet and luscious through culture and selection, to which we owe many varieties, differing not only in flavour but also in size, from that of a plum to that of an apple. When unripe, they are used to make pickles, tarts and preserves; ripe, they form a wholesome and very agreeable dessert. In times of scarcity the kernels also are eaten. The timber, although soft and liable to decay, serves for common purposes, and, mixed with sandal-wood, is employed in cremation by the Hindus. It is usually propagated by grafts, or by layering or inarching, rather than by seed.

See G. Watt, Dictionary of the Economic Products of India (1891).

MANGOSTEEN (Garcinia Mangostana), a tree belonging to the order Guttiferae. It is a native of the Malay Peninsula, and is extensively cultivated in southern Tenasserim, and in some places in the Madras presidency. Poor results have followed the attempt to introduce it to other countries; and A. de Candolle refers to it as one of the most local among cultivated plants both in its origin, habitation and cultivation. It belongs to a family in which the mean area of the species is very restricted. It is an evergreen about 20 ft. high, and is somewhat fir-like in general form, but the leaves are large, oval, entire, leathery and glistening. Its fruit, the much- valued mangosteen, is about the size and shape of an orange, and is somewhat similarly partitioned, but is of a reddish-brown to chestnut colour. Its thick rind yields a very astringent juice, rich in tannin, and containing a gamboge-like resin. The soft and juicy pulp is snow-white or rose-coloured, and of delicious flavour and perfume. It is wholesome, and may be administered in fever.

The genus Garcinia is. a genus of trees containing about fifty species in the

tropics of the Old World, and usually yielding a yellow gum-resin (gamboge). G. Morella, a native of India, yields the true gamboge.

MANGROVE. The remarkable " mangrove forests " which fringe tidal estuaries, overrun salt marshes, and line muddy coasts in the tropics of both Old and New Worlds, are composed of trees and shrubs belonging mainly to the Rhizophoraceae, but including, especially in the eastern mangrove formations of Further India and the Malay Archipelago, members of other orders of Dicotyledons, such as Lythraceae (Sonneratia), Ver- benaceae (Avicennia), and the acaulescent Nipa-palm. Their trunks and branches constantly emit adventitious roots, which, descending in arched fashion, strike at some distance from the parent stem, and send up new trunks, the forest thus spreading like a banyan grove. An advantage in dispersal, very charac- teristic of the order, is afforded by the seeds, which have a striking peculiarity of germination. While the fruit is still attached to the parent branch the long radicle emerges from the seed and descends rapidly towards the mud, where it may even establish itself before falling off. Owing to its clubbed shape, this is always in the right position; the plumule then makes its appear- ance. An interesting feature of the mangrove is the air-roots, erect or kneed branches of the roots, which project above the mud, and are provided with minute openings (stomata or lenticels), into which the air passes and is then carried by means of passages in the soft spongy tissue to the roots which spread beneath the mud. The wood of some species is hard and durable, and the astringent bark is used in tanning. The fruit of the common mangrove, Rhizophora Mangle, is sweet and wholesome, and yields a light wine.

MANICHAEISM. Towards the close of the 3rd century two great religions stood opposed to one another in western Europe, one wholly Iranian, namely Mithraism, the other of Jewish origin, but not without Iranian elements, part and parcel prob- ably of the Judaism which gave it birth, namely Christianity. Professor Franz Cumont has traced the progress of Mithraism all over the Balkan Peninsula, Italy, the Rhine-lands, Britain, Spain and Latin Africa. It was peculiarly the religion of the Roman garrisons, and was carried by the legionaries wherever they went. It was an austere religion, inculcating self-restraint, courage and honesty; it secured peace of conscience through for- giveness of sins, and abated for those who were initiated in its mysteries the superstitious terrors of death and the world to come. In these respects it resembled Christianity. Soldiers may have espoused it rather than the rival faith, because in the primitive age Christian discipline denied them the sacraments, on the ground that they were professional shedders of blood. The cumbrous mythology and cosmogony of Mithraism at last weakened its hold upon men's minds, and it disappeared during the 4th century before a victorious Catholicism, yet not until another faith, equally Iranian in its mythology and cosmological

beliefs, had taken its place. This new faith was that of Mani, which spread with a rapidity only to be explained by supposing that Mithraism had prepared men's minds for its reception.

Mani professed to blend the teachings of Christ with the old Persian Magism. Kessler, the latest historian of Manichaeism, opines that Mani's own declaration on this point is not to be relied upon, and has tried to prove that it was rather of Semitic or Chaldaic origin. He certainly shows that the old Assyrian mythology influenced Mani, but not that this element did not reach him through Persian channels. In genuine Manichaean documents we only find the name Mani, but Manes, Mapr/s, Manichaeus, meet us in 4th-century Greek and Latin documents. In the Acta Archelai his first name is said to have been Cubricus, which Kessler explains as a corruption of Shuravik, a name common among the Arabs of the Syrian desert.

Life of Mani. — According to the Mahommedan tradition, which is more trustworthy than the account contained in these Acta, Mani was a high-born Persian of Ecbatana. The year of his birth is uncertain, but Kessler accepts as reliable the state- ment made by Biruni, that Mani was born in the year 527 of the astronomers of Babylon (a.d. 215-216). He received a careful education at Ctesip'hon from his father Fatak, Babak or Patak (IlareKios) . As the father connected himself at a later period with the confession of the Moghtasilah, or " Baptists," in

southern Babylonia, the son also was brought up in the religious doctrines and exercises of this sect. These Baptists (see the Fihrist) were apparently connected with the Elkesaites and the Hemerobaptists, and certainly with the Mandaeans. It is prob- able that this Babylonian sect had absorbed Christian elements. Thus the boy early became acquainted with very different forms of religion. If even a small part of the stories about his father is founded on fact, it was he who first introduced Mani to that medley of religions out of which his system arose. Mani- chaean tradition relates that Mani received revelations while yet a boy, and assumed a critical attitude towards the religious instruction that was being imparted to him. This is the more incredible since the same tradition informs us that the boy was as yet prohibited from making public use of his new religious views. It was only when Mani had reached the age of twenty-five or thirty years that he began to proclaim his new religion. This he did at the court of the Persian king, Shapur I., and, according to the story, on the coronation day of that monarch (241/2). A Persian tradition says that he had

previously been a Christian presbyter, but this is certainly incorrect. Mani did not remain long in Persia, but undertook long journeys for the purpose of spreading his religion, and also sent forth disciples. According to the Acta Archelai, his missionary activity extended west- wards into the territory of the Christian church; but from Oriental sources it is certain that Mani rather went into Trans- oxiana, western China, and southwards as far as India. His labours there as well as in Persia were not without result. Like Mahomet after him and the founder of the Elkesaites before him, he gave himself out for the last and highest prophet, who was to surpass all previous divine revelation, which only possessed a relative value, and to set up the perfect religion. In the closing years of the reign of Shapur I. (c. 270) Mani returned to the Persian capital, and gained adherents even at court. But the dominant priestly caste of the Magians, on whose support the king was dependent, were naturally hostile to him, and after some successes Mani was made a prisoner, and had then to flee. The successor of Shapur, Hormizd (272-273), appears to have been favourably disposed towards him, but Bahram I. abandoned him to the fanaticism of the Magians, and caused him to be crucified in the capital in the year 276/7. The corpse was flayed, and Mani's adherents Xwere cruelly persecuted by the king.

Mani's Writings. — Mani himself composed a large number of works and epistles, which were in great part still known to the Mahommedan historians, but are now mostly lost. The later heads of the Manichaean churches also wrote religious treatises, so that the ancient Manichaean literature must have been very ex- tensive. According to the Fihrist, Mani made use of the Persian and Syriac languages; but, like the Oriental Marcionites before him, he invented an alphabet of his own, which the Fihrist has handed down to us. In this alphabet the sacred books of the Manichaeans were written, even at a later period. The Fihrist reckons seven principal works of Mani, six being in the Syriac and one in the Persian language; regarding some of these we also have information in Epiphanius, Augustine, Titus of Bostra, and Photius, as well as in the formula of abjuration (Cotelerius, PP. Apost. Opp. '• 543) and in the Acta Archelai. They are (1) The Book of Secrets (see Acta Archel.), containing discussions bearing on the Christian sects spread throughout the East, especially the Marcionites and Bardesanites, and dealing also with their conception of the Old and New Testaments; (2) The Book of the Giants (Demons?); (3) The Book of Precepts for Hearers (probably identical with the Epistola Fundamenti of Augustine and with the Book of Chapters of Epipha- nius and the Acta Archelai; this was the most widely spread and most popular Manichaean work, having been translated into Greek and Latin; it contained a short summary of all the doctrines of fundamental authority); (4) The Book Shahpurakan (Fltigel was unable to explain this

name; according to Kessler it signifies epistle to King Shapur "; the treatise was of an eschatological character); (5) The Book of Quickening (Kessler identifies this work with the "Thesaurus [vitae] '" of the Acta Archelai, Epiphanius, Photius and Augustine, and if this be correct it also must have been in use among the Latin Manichaeans) ; (6) The Book irpayttarela (of un- known contents) ; (7) a book in the Persian language, the title of which is not given in our present text of the Fihrist, but which is in all probability identical with the " holy gospel " of the Manichaeans (mentioned in the Acta Archel. and many other authorities). It was this work which the Manichaeans set up in opposition to the Gospels. Be»ides these principal works, Mani also wrote a large

*number of smaller treatises and epistles. The practice of writing epistles was continued by his successors. These Manichaean dis- sertations also became known in the Graeco-Roman Empire, and existed in collections. 1 There also existed a Manichaean book of memorabilia, and of prayers, in Greek, as well as many others," all of which were destroyed by the Christian bishops acting in con- junction with the authorities. A Manichaean epistle, addressed to one Marcellus, has, however, been preserved for us in the Acta Archelai.**

Manichaean System. — Though the leading features of Mani- chaean doctrine can be exhibited clearly even at the present day, and though it is undoubted that Mani himself drew up a complete system, many details are nevertheless uncertain, since they are differently described in different sources, and it often remains doubtful which of the accounts that have been transmitted to us represents the original teaching of the founder.

The Manichaean system is one of consistent, uncompro- mising dualism, in the form of a fantastic philosophy of nature. The physical and the ethical are not distinguished, and in this respect the character of the system is thoroughly material- istic; for when Mani co-ordinates good with light, and evil with darkness, this is no mere figure of speech, but light is actually good and darkness evil. From this it follows that religious knowledge involves the knowledge of nature and her elements, and that redemption consists in a physical process of freeing the element of light from the darkness. Under such circumstances ethics becomes a doctrine of abstinence in regard to all elements which have their source within the sphere of darkness.

The self-contradictory character of the present world forms the point of departure for Mani's speculations. This contra- diction presents itself to his mind primarily as elemental, and only in the second instance as ethical, inasmuch as he considers the sensual nature of man to be the outflow of the evil elements in nature. From the contradictory character of the world

he concludes the existence of two beings, originally quite separate from each other — light and darkness. Each is to be thought of according to the analogy of a kingdom. Light presents itself to us as the good primal spirit (God, radiant with the ten [twelve] virtues of love, faith, fidelity, high-mindedness, wisdom, meekness, knowledge, understanding, mystery and insight), and then further as the heavens of light and the earth of light, with their guardians the glorious aeons. Darkness is likewise a spiritual kingdom (more correctly, it also is con- ceived of as a spiritual and feminine personification), but it has no " God " at its head. It embraces an " earth of darkness." As the earth of light has five tokens (the mild zephyr, cooling wind, bright light, quickening fire, and clear water), so has the earth of darkness also five (mist, heat, the sirocco, darkness and vapour). Satan with his demons was born from the kingdom of darkness. These two kingdoms stood opposed to each other from all eternity, touching each other on one side, but remaining unmingled. Then Satan began to rage, and made an incursion into the kingdom of light, into the earth of light. The God of light, with his syzygy, " the spirit of his right hand," now begot the primal man, and sent him, equipped with the five pure elements, to fight against Satan. But the latter proved himself the stronger, and the primal man was for a moment vanquished. And although the God of light himself now took to the field, and with the help of new aeons (the spirit of life, &c.) inflicted total defeat upon Satan, and set the

1 A 0if3\iov hwioTo\S>v is spoken of in the formula of abjuration, and an Epistola ad virginetn Menoch by Augustine. Fabncius has collected the " Greek Fragments of Manichaean Epistles " in .his Bibliotheca Graeca (vii. 311 seq.).

2 The Canticum amalorium is cited by Augustine.

3 Zittwitz assumes that this epistle was in its original form of much larger extent, and that the author of the Acts took out of it the matter for the speeches which he makes Mani deliver during his disputation with Bishop Archelaus. The same scholar traces back the account by Turbo in the Acts, and the historical data given in the fourth section, to the writings of Turbo, a Mesopotamian, who is assumed to have been a Manichaean renegade and a Christian. But as to this difference of opinion is at least allowable.

primal man free; the latter had already been robbed of part of his light by the darkness, and the five dark elements had already mingled themselves with the generations of light. It only remained now for the primal man to

descend into the abyss and prevent the further increase of the generations of darkness by cutting off their roots; but he could not imme- diately separate again the elements that had once mingled. These mixed elements are the elements of the present visible world, which was formed from them at the command of the God of light. The forming of the world is in itself the beginning of the deliverance of the imprisoned elements of light. The world is represented as an orderly structure of various heavens and various earths, which is borne and supported by the aeons, the angels of light. It possesses in the sun and moon, which are in their nature almost quite pure, large reservoirs, in which the portions of light that have been rescued are stored up. In the sun dwells the primal man himself, as well as the glorious spirits which carry on the work of redemption; in the moon the mother of life is enthroned. The twelve constellations of the zodiac form an ingenious machine, a great wheel with buckets, which pour into the sun and moon, those shining ships that sail continually through space, the portions of light set free from the world. Here they are purified anew, and attain finally to the kingdom of pure light and to God Himself. The later Western Manichaeans termed those por- tions of light which are scattered throughout the world — in its elements and organisms — awaiting their deliverance, the Jesus palibilis.

It is significant of the materialistic and pessimistic character of the system that, while the formation of the world is con- sidered as a work of the good spirits, the creation of man is referred to the princes of darkness. The first man, Adam, was engendered by Satan in conjunction with " sin," " cupid- ity," " desire." But the spirit of darkness drove into him all the portions of light he had stolen, in order to be able to dominate them the more securely. Hence Adam is a discordant being, created in the image of Satan, but carrying within him the stronger spark of light. Eve is given him by Satan as his companion. She is seductive sensuousness, though also having in her a small spark of light. But if the first human beings thus stood entirely under the dominion of the devil, the glorious spirits took them under their care from the very outset, sending aeons down to them (including Jesus), who instructed them regarding their nature, and in particular warned Adam against sensuality. But this first man fell under the temptation of sexual desire. Cain and Abel indeed are not sons of Adam, but of Satan and Eve; Seth, however, who is full of light, is the offspring of Adam by Eve. Thus did mankind come into existence, its various members possessing very different shares of light, but the men having uniformly a larger measure. of it than the women. In the course of history the demons sought to bind men to themselves by means of sensuality, error arid false religions (among which is to be reckoned above all the religion of Moses and the prophets), while the spirits of light carried on their process of distillation with the view of gaining the pure light which exists in the world. But these

good spirits can only save men by imparting to them the true gnosis concerning nature and her forces, and by calling them away from the service of darkness and sensuality. To this end prophets, preachers of true knowledge, have been sent into the world. Mani, following the example of the gnostic Jewish Christians, appears to have held Adam, Noah, Abraham (perhaps Zoroaster and Buddha) to be such prophets. Probably Jesus was also accounted a prophet who had descended from the world of light — not, however, the historical Jesus, the devilish Messiah of the Jews, but a contemporaneous phantom Jesus, who neither suffered nor died (Jesus itnpatibilis) . According to the teaching of some Manichaeans, it was the primal man who disseminated the true gnosis in the character of Christ. But at all events Mani himself, on his own claim, is to be reckoned the last and greatest prophet, who took up the work of Jesus impatibilis and of Paul (for he too finds recognition), and first

brought full knowledge. He is the "leader," the "ambassa- dor of the light," the " Paraclete." It is only through his agency and that of his imitators, " the elect," that the separation of the light from the darkness can be completed. The system contains very fantastic descriptions of the processes by which the portions of light when once set free finally ascend even to the God of light. He who during his lifetime did not become one of the elect, who did not completely redeem himself, has to go through a severe process of purification on the other side of the grave, till he too is gathered to the blessedness of the light. It is erroneous, however, to ascribe, as has been done, a doctrine of transmigration to the Manichaeans. Of course men's bodies as well as the souls of the unsaved, who according to the oldest conception have in them no light whatever, fall under the sway of the powers of darkness. A later view, adapted to the Christian, one, represents the portions of light in the unsaved as actually becoming lost. When the elements of light have at last been completely, or as far as possible, delivered from the world, the end of all things comes. All glorious spirits assemble, the God of light himself appears, accompanied by the aeons and the perfected just ones. The angels supporting the world withdraw themselves from their burden, and everything falls in ruins. A tremendous con- flagration consumes the world; the perfect separation of the two powers takes place once more; high above is the kingdom of light, again brought into a condition of completeness, and deep below is the (? now powerless) darkness.

Ethics, Social Polity and Worship of the Manichaeans. — On the basis of such a cosmical philosophy, ethics can only have a dualistic ascetic character. Manichaean ethics is not merely negative, how- ever, since it is necessary to cherish, strengthen and purify the elements of light, as well as free oneself from the elements of dark- ness. The aim is not self-destruction, but self-preservation; and yet the ethics of Manichaeism appears in point of

fact as thoroughly ascetic. The Manichaean had, above all, to refrain from sensual enjoyment, shutting himself up against it by three seals— the signaculum oris, manus and sinus. The signaculum oris forbids all eating of unclean food (which included all bodies of animals, wine, &c— vegetable diet being allowed because plants contained more light, though the killing of plants, or even plucking their fruit and breaking their twigs, was not permitted), as well as all impure speech. The signaculum manus prohibits all traffic with things generally, in so far as they carry in them elements of darkness. Finally, by the signaculum sinus every gratification of sexual desire, and hence also marriage, are forbidden. Besides all this, life was further regulated by an exceedingly rigorous system of fasts. Certain astronomical conjunctions determined the selection of the fast-days, which in their total number amounted to nearly a quarter of the year. Sunday was regularly solemnized as one, and the practice was also generally observed on Monday. Hours of prayer were determined with equal exactness. The Manichaean had to pray four times a day, each prayer being preceded by ablutions. The worshipper turned towards the sun, or the moon, or the north, as the seat of light; but it is erroneous to conclude from this, as has been done, that in Manichaeism the sun and moon were themselves objects of worship. Forms of prayer used by the Manichaeans have been preserved to us in the Fihrist. The prayers are addressed to the God of light, to the whole kingdom of light, to the glorious angels, and to Mani himself, who is apostrophized in them as " the great tree, which is all salvation." According to Kessler, these prayers are closely related to the Mandaean and the ancient Baby- lonian hymns. An asceticism so strict and painful as that demanded by Manichaeism could only be practised by few ; hence the religion must have abandoned all attempts at an extensive propaganda had it not conceded the principle of a twofold morality. A distinction was made in the community between the electi (perfecti), the perfect Manichaeans, and the catechumeni (auditores), the secular Manichaeans. Only the former submitted themselves to all the demands made by their religion; for the latter the stringency of the precepts was relaxed. They had to avoid idolatry, sorcery, avarice, falsehood, fornication, &c. ; above all, they were not allowed to kill any living being (the ten commandments of Mani). They had also to free themselves as much as possible from the world ; but in truth they lived very much as their non-Manichaean fellow-citizens. We have here essentially the same condition of things as in the Catholic Church, where a twofold morality was also in force, that of the religious orders and that of secular Christians — only that the position of the electi in Manichaeism was a more distinguished one than that of the monks in Catholicism. For, after all, the Christian monks never quite forgot that salvation is given by God through Christ, whereas the Manichaean electi were actually themselves redeemers. Hence it was the duty of the auditores to pay the greatest respect and most

assiduous attention to the

electi. These " perfect ones," wasting away under their asceticism, were objects of admiration and of the most elaborate solicitude. 1 Food was presented to them in abundance, and by their eating it the electi set free the portions of light from the vegetables. They prayed for the auditores, they blessed them and interceded for them, thereby shortening the process of purification the latter had to pass through after death. It was only the electi, too, who possessed full knowledge of religious truths, a point of distinction from Catholicism.

The distinction between electi and auditores, however, does not exhaust the conception of the Manichaean Church ; on the contrary, the latter possessed a hierarchy of three ranks, so that there were altogether five gradations in the community. These were regarded as a copy of the ranks of the kingdom of light. At the head stood the teachers (" the sons of meekness," Mani himself and his succes- sors) ; then follow the administrators (" the sons of knowledge," the bishops); then the elders ("the sons of understanding," the presbyters); the electi ("the sons of mystery"); and finally the auditores (" the sons of insight "). The number of the electi must always have been small. According to Augustine the teachers were twelve and the bishops seventy-two in number. One of the teachers appears to have occupied the position of superior at the head of the whole Manichaean Church. At least Augustine speaks of such a personage, and the Fihrist also has knowledge of a chief of all Manichaeans. The constitution, therefore, had a monarchic head.

The worship of the Manichaeans must have been very simple, and must have essentially consisted of prayers, hymns and cere- monies of adoration. This simple service promoted the secret dissemination of their doctrines. The Manichaeans too, at least in the West, appear to have adapted themselves to the Church's system of festivals. The electi celebrated special feasts; but the principal festival with all classes was the Bema (/3ijjua), the feast of the " teacher's chair," held in commemoration of the death of Mani in the month of March. The faithful prostrated themselves before an adorned but empty chair, which was raised upon a podium of five steps. Long fasts accompanied the feasts. The Christian and Mahommedan historians could learn little of the Manichaean mysteries and " sacraments," and hence the former charged them with obscene rites and abominable usages. It may be held as undoubted that the later Manichaeans celebrated mysteries ana- logous to Christian baptism and the

Lord's Supper, which may have rested upon ancient consecration rites and other ceremonies instituted by Mani himself and having their origin in nature worship.

Recent Discoveries. — F. Cumont (Revue d'histoire et de Httera- ture religieuse, t. xii., 1907, No. 2) showed that one at least of the fundamental myths of Mani was borrowed from the Avesta, namely, that which recounts how through the mani- festation of the virgin of light and of the messenger of salvation to the libidinous princes of darkness the vital substance or light held captive in their limbs was liberated and recovered for the realm of light. The legend of the Omophorus and Splenditeneus, rival giants who sustain earth and luminous heavens on their respective shoulders, even if it already figures in the cuneiform texts of Assyria, is yet to be traced in Mithraic bas-reliefs. It also may therefore have come to Mani through Magian channels.

When, however, we turn to the numerous fragments of authen- tic Manichaean liturgies and hymns lately discovered in Turfan in East Turkestan, Mani's direct indebtedness to the cycle of Magian legends rather than to Chaldaic sources (as Kessler argued) is clearly exhibited.

In fr. 472, taken from the Shapiirakan, as part of a description of the sun-god in his ship or reservoir the sun, we have a mention of Az and Ahriman and the devas (demons), the Pairikas. Az in the Avestan mythology was the demon serpent who murders Gayomert in the old Persian legend, and an ally of Ahriman, as also are the Pairikas or Peris. In the same fragment we read of the ruin of Azidahaka Mazainya, which name Darmesteter interprets in the Persian sources as the demon serpent, the sorcerer (Ormazd et Ahriman, Paris, 1877, p. 157). In fr. 470, .descriptive of the conflagration of the world, we read of how, after Az and the demons have been struck down, the pious man is purified and led up to sun and moon and to the being of Ahura Mazda, the Divine.

In another fragment (388) of a hymn Mani describes himself as " the first stranger " (cf. Matt. xxv. 43), the son of the god Zarvan, the Ruler-Child. In the orthodox literature of fire-worship Zarvan was Time or Destiny. Later on Zarvan was elevated to the position of supreme principle, creator of Ormazd and Ahriman, and, long

1 Analogous to this is the veneration in which the Catholic monks and the Neoplatonic " philosophers" were held; but the prestige of the Manichaean electi was greater than that of the monks and the philosophers.

before Mani, Zarvan accompanied Mithras in all his westward migrations.

In fr. 20, in an enumeration of angels, we hear of Narsus, who may be the Neryosang (Armenian Nerses or Narsai) of the Avesta. The other angels are Jacob, the mighty angel and leader of angels, the Lord Bar Simus, Qaftinus the mighty, Raphael, Gabriel, Michael, Sarael and Nastikus — a truly Catholic list.

In fr. 4 a rubric enjoins the recital of the hymn of the Frasegerd. Here we recognize a technical term of the Avesta — namely, the " Frasho-kereti," that is the reanimation of the world or resurrec- tion of the dead' (Darmesteter, op. cit., p. 239). In this hymn we read how the gods shall release us from this sinful time, from the oppression of this world. In fr. 4, under the rubric Bar Simus, we find the god Mihir (Mihryazd), the liberator, the compassionate, invoked along with Fredon, the good ; and later on we read as follows : " with his mighty glance may the god of pure name, Predon, the king and Jacob Nareman, protect religion and us the sons." Mihr or Mithras and Feridoun or Thraetaona, the slayer of Ajis (or Azi) Dahaka, also Nariman, spelled Nairimanau, are familiar figures in the old Persian pantheon. In the same prayer the votary begs that " new blessing may come, new victory from the god Zarvan over the glories and angels, the spirits of this world, to the end that he accept our holy religion, become a watcher within and without, helper and protector," and the prayer ends thus: " I invoke the angels, the strong ones, the mighty, Raphael, Michael, Gabriel, Sarael, who shall protect us from all adversity, and free us from the wicked Ahriman."

In fr. 176 Jesus is invoked: " Jesus, of the gods first new moon, thou art God. . . . Jesus, O Lord, of waxing fame full moon, O Jesus. Lord . . . light, our hearts' prayer. Jesus, God and Vahman. Sheen God! We will praise the God Naresaf. Mar Mani will we bless. O new moon and spring. Lord, we will bless. The angels, the gods . . . New sun, Mihr."

In the above Vahman is Vohu Mano, the good thought or inspira- tion of the Zoroastrian religion. Mihr is Mithras. The god Naresaf is also invoked in other fragments.

In fr. 74_is invoked, together with Jesus and Mani, the " strong mighty Zrosch, the redeemer of souls." In the Avesta Sraosha is the angel that guards the world at night from demons, and is styled " the righteous " or " the strong."

Fr. 38 is as follows: " Mithras (MS. Mitra) great . . . messenger of the gods, mediator (or interpreter) of religion, of the elect one Jesus — virgin of light. Mar Mani, Jesus — virgin of light, Mar Mani. Do thou in me make peace, O light-bringer, mayest thou redeem my soul from this born-dead (existence)."

Fr. 543 runs thus: "... and ladder of the Mazdean faith. Thou, new teacher of Chorasan (of the East), and promoter of those that have the good faith. For thou wast born under a glittering star in the family of the rulers. Elect are these — Jesus and Vahman."

The above examples bear out Mani's own declaration, as reported by the Fihrist, that his faith was a blend of the old Magian cult with Christianity. Whether the Hebrew names of angels came to him direct from the Jews or not we cannot tell, but they were, as the Greek magical papyri prove, widely diffused among the Gentiles long before his age. The Armenian writer Eznik (c. 425) also attests that Mani's teaching was merely that of the Magi, plus an ascetic morality, for which they hated and slew him.

Just as the background of Christianity was formed by the Hebrew scriptures, and just as the Hebrew legends of the creation became the basis of its scheme of human redemption from evil, so the Avesta, with its quaint cosmogony and myths, formed the background of Mani's new faith. He seems to have quarrelled with the later Magism because it was not dualistic enough, for in fr. 28 we have such a passage as the following: " They also that adore the fire, the burning, by this they them- selves recognize that their end shall be in fire. And they say that Ormuzd and Ahriman are brothers, and in consequence of this saying they shall come to annihilation." In the same fragment the Christians are condemned as worshippers of idols, unless indeed the writer has genuine pagans in view. There is a mention of Marcion in the same context, but it is unintelligible. There can be no doubt that in the form in which Mani became acquainted with it Christianity had been disengaged and liberated from the womb of Judaism which gave it birth. This presentation of it as an ethical system of universal import was the joint work of Paul and Marcion.

It remains to add that in these newly found fragments Mani styles himself " the apostle (Hi. the sent forth) of Jesus the friend in the love of the Father, of God." He uses the formula:

" Praise and laud to the Father and the Son and the Holy Spirit." In fr. 4 he attests that he was sprung from the land Babel; in fr. 566 that he was a physician from the land Babel. Fr. 3 recounts his interview with King Shapur I. The Gospel of Peter seems to have been in use, for one lengthy citation is taken from it in fr. 18. The Manichaeans of Chinese Turkestan also used a version of the Shepherd of Hermas. Several of the hymns (e.g. in fr. 7 and 32) reproduce the ideas and almost the phases of the Syriac "

Hymn of the Soul," so confirming the hypothesis that Mani was influenced by Bardesanes.

With the exception of a few fragments written in a Pehlevi dialect, all this recovered Manichaean literature is in the Ouigour or Vigur dialect of Tatar. The alphabet used is the one adapted by Mani himself from the Syriac estrangelo. The fragments are 800 in number, both on paper and vellum, written and adorned with the pious care and good taste which the Manichaeans are known to have bestowed on their manuscripts. They were brought back by Professor Grünwedel and Dr Huth from Turfan in East Turkestan, and were partly translated by Dr F. W. K. Miiller in the Abhandlungen der k. preuss. Akademie der Wissenschaften (Berlin, 1904). Much of this literature is still left in Turfan, where the natives use the sheets of Vigur and Chinese vellum MSS. as window- panes in their huts. The Russian and German governments have sent out fresh expeditions to rescue what is left before it is too late. We may thus hope to recover some priceless monuments of early Christianity, hymns and treatises perhaps of Marcionand Bardesanes, the Gospel of Peter, and even the Diatessaron. Muller's translations includes a long extract of Mani's book called Schapurakan, parts of his Evangelium, and epistles, with liturgies, hymns and prayers, for Tatar Khans who espoused the faith in Khorasan.

Manichaeism and Christianity. — It is very difficult to deter- mine what was the extent of Mani's knowledge of Christianity, how much he himself borrowed from it, and through what channels it reached him. It is certain that Manichaeism, in those districts where it was brought much into contact with Christianity, became additionally influenced by the latter at "a very early period. The Western Manichaeans of the 4th and 5th centuries are much more like Christians than their Eastern brethren. In this respect Manichaeism ex- perienced the same kind of development as Neo-Platonism. As regards Mani himself, it is safest to assume that he held both Judaism and Catholic Christianity to be entirely false religions. It is indeed true that he not only described himself as the promised Paraclete — for this designation probably originated with himself — but also conceded a high place in his system to " Jesus "; we can only conclude from this, how- ever, that he distinguished between Christianity and Christi- anity. The religion which had proceeded from the historical Jesus he repudiated together with its founder, and Catholicism as well as Judaism he looked upon as a religion of the devil. But he distinguished between the Jesus of darkness and the Jesus of light who had lived and acted contemporaneously with the former. This distinction agrees with that made by the gnostic Basilides no less strikingly than the Manichaean criticism of the Old Testament does with that propounded by the Marcionites (see the Acta Archclai, in which Mani is made to utter the antitheses of Marcion). Finally, the Manichaean doctrines exhibit points of similarity to those of the Christian Elkesaites.

The historical relation of Mani to Christianity is then as follows. From Catholicism, which he very prob- ably had no detailed knowledge of, he borrowed nothing, rejecting it as devilish error. On the other hand, he looked upon what he considered to be Christianity proper— that is, Christianity as it had been developed among the sects of Basili- dians, Marcionites, and perhaps Bardesanites, as a compara- tively valuable and sound religion. He took from it the moral teaching of the Sermon on the Mount, and a criticism of the Old Testament and of Judaism so far as he required it. Indi- cations of the influence of Marcionitism are found in the high estimation in which Mani held the apostle Paul, and in the fact that he explicitly rejects the Book of Acts. Mani appears to have given recognition to a portion of the historical matter of the Gospels, and to have interpreted it in accordance with his own doctrine.

Manichaeism and Buddhism. — It remains to be asked whether Buddhistic elements can also be detected in Manichaeism. Most modern scholars since F. C. Baur have answered this question in the affirmative. According to Kessler, Mani made use of the teaching of Buddha, at least as far as ethics was concerned. It cannot be doubted that Mani, who undertook long journeys as far as India, knew of Buddhism. The name Buddha (Buddas) which occurs in the legendary account of Mani, and perhaps in the latter's own writings, indicates further that he had occupied his attention with Buddhism when engaged in the work of founding his new religion. But his borrowings from this source must have been quite insignificant. A detailed comparison shows the difference between Buddhism and Mani- chaeism in all their principal doctrines to be very great, while it becomes evident that the points of resemblance are almost everywhere accidental. This is also true of the ethics and the asceticism of the two systems. There is not a single point in Manichaeism which demands for its explanation an appeal to Buddhism. Such being the case, the relationship between the two religions remains a mere possibility, a possibility which the inquiry of Geyler (Das System des Manichaeismus und sein Verhdltniss zum Buddhismus, Jena, 1875) has not been able to elevate into a probability.

The Secret of Manichaeism. — How are we to explain the rapid spread of Manichaeism, and the fact that it really became one of the great religions? What gave it strength was that it united an ancient mythology and a thorough-going material- istic dualism with an exceedingly simple spiritual worship and a strict morality. On comparing it with the Semitic religions of nature we perceive that it was free from their sensuous cultus, substituting instead a spiritual Worship as well as a strict morality. Manichaeism was thus able to satisfy the new wants of an old world. It offered revelation, redemp- tion, moral virtue and immortality, spiritual benefits on the basis of the religion of nature. A further source of strength lay in the simple yet firm social organization which was given by Mani himself to his new

institution. The wise man and the ignorant, the enthusiast and the man of the world, could all find acceptance here, and there was laid on no one more than he was able and willing to bear. Each one, however, was attached and led onward by the prospect of a higher rank to be attained, while the intellectually gifted had an additional inducement in the assurance that they did not require to submit themselves to any authority, but would be led to God by pure reason. Thus adapted from the first to individual require- ments, this religion also showed itself able to appropriate from time to time foreign elements. Originally furnished from fragments of various religions, it could increase or diminish this possession without rupturing its own elastic framework. And, after all, great adaptability is just as necessary for a universal religion as a divine founder in whom the highest revelation of God may be seen and reverenced. Manichaeism indeed, though it applies the title " redeemer " to Mani, has really no knowledge of a redeemer, but only of a physical and gnostic process of redemption; on the other hand, it possesses in Mani the supreme prophet of God. If we consider in con- clusion that Manichaeism gave a simple, apparently profound, and yet convenient solution of the problem of good and evil, a problem that had become peculiarly oppressive to the human race in the 2nd and 3rd centuries, we shall have named the most important factors which account for the rapid spread of the system.

Sketch of the History of Manichaeism. — Manichaeism first gained a firm footing in the East, i.e. in Persia, Mesopotamia and Transoxiana. The persecutions it had to endure did not hinder its extension. The seat of the Manichaean pope was for centuries in Babylon, at a later period in Samarkand. Even after the conquests of Islam the Manichaean Church continued to maintain itself, indeed it seems to have become still more widely diffused by the victorious campaigns of the Mahommedans, and it frequently gained secret adherents among the latter themselves. Its doctrine and discipline underwent little change

in the East; in particular, it drew no nearer to the Christian religion. More than once, however, Manichaeism experienced attempts at reformation; for of course the auditores very easily became worldly in character, and movements of reformation led temporarily to divisions and the formation of sects. Towards the close of the ioth century, at the time the Fihirst was written, the Manichaeans in Mesopotamia and Persia had already been in large measure ousted from the towns, and had withdrawn to the villages. But in Turkestan, and as far as the Chinese frontier, there existed numerous Manichaean communities and even whole tribes that had

adopted the name of Mani. Probably it was the great migrations of the Mongolian race that first put an end to Manichaeism in Central Asia. But even in the 15th century there were Manichaeans living beside the Thomas-Christians on the coast of Malabar in India (see Ger- mann, Die Thomas-Christen, 1875). Manichaeism first penetrated the Greek-Roman Empire about the year 280, in the time of the emperor Probus (see the Chronicon of Eusebius). If we may take the edict of Diocletian against the Manichaeans as genuine, the system must have gained a firm footing in the West by the beginning of the 4th century, but we know that as late as about the year 325 Eusebius had not any accurate knowledge of the sect. It was only subsequent to about 330 that Manichaeism spread rapidly in the Roman Empire. Its adherents were recruited on the one hand from the old gnostic sects (especially from the Marcionites — Manichaeism exerted besides this a strong influence on the development of the Mar- cionite churches of the 4th century), on the other hand from the large number of the " cultured," who were striving after a " rational " and yet in some manner Christian religion. Its polemics and its criticism of the Catholic Church now became the strong side of Manichaeism, especially in the West. It admitted the stumbling-blocks which the Old Testament offers to every intelligent reader, and gave itself out as a Chris- tianity without the Old Testament. Instead of the subtle Catholic theories concerning divine predestination and human freedom, and instead of a difficult theodicaea, it offered an exceedingly simple conception of sin and goodness. The doc- trine of the incarnation of God, which was especially objection- able to those who were going over to the new universal religion from the old cults, was not proclaimed by Manichaeism. In its rejection of this doctrine Manichaeism agreed with Neo-Platon- ism; but, while the latter, notwithstanding all its attempts to conform itself to Christianity, could find no formula by which to inaugurate within its own limits the special veneration of Christ, the Western Manichaeans succeeded in giving their teaching a Christian tinge. The only part of the Manichaean mythology that became popular was the crude, physical dualism. The barbaric elements were judiciously screened from view as a " mystery "; they were, indeed, here – and there explicitly disavowed even by the initiated; The farther Manichaeism advanced into the West the more Christian and philosophic did it become. In Syria it maintained itself in com- parative purity. In North Africa it found its most numerous adherents, gaining secret' support even among the clergy. Augustine was an auditor for nine years, while Faustus was at that time the most esteemed Manichaean teacher in the West. Augustine in his later writings against the Manichaeans deals chiefly with the following problems: (1) the relation between knowledge and faith, and between reason and autho- rity; (2) the nature of good and evil, and the origin of the latter; (3) the existence of free will, and its relation to the divine omnipotence; (4) the relation of the evil in the world to the divine

government.

The Christian Byzantine and Roman emperors, from Valens onwards, enacted strict laws against the Manichaeans. But at first these bore little fruit. The auditores were difficult to trace out, and besides they really gave little occasion for per- secution. In Rome itself between 370 and 440 Manichaeism gained a large amount of support, especially among the scholars and public teachers. It also made its way into the life of the people by means of a popular literature in which the apostles xvii. 19

were made to play a prominent part {Apocryphal Acts of the Apostles). Manichaeism in the West had also some experience of attempts at reformation from the ascetic side, but of these we know little. In Rome Leo the Great was the first who took energetic measures, along with the state authorities, against the system. Valentinian III. decreed banishment against its adherents, Justinian the punishment of death. In North Africa Manichaeism appears to have been extinguished by the persecution of the Vandals. But it still continued to exist elsewhere, both in the Byzantine Empire and in the West, and in the earlier part of the middle ages it gave an impulse to the formation of new sects, which remained related to it. And if it has not been quite proved that so early as the 4th century the Priscillianists of Spain were influenced by Manichaeism, it is at least undoubted that the Paulicians and Bogomiles, as well as the Catharists and the Albigenses, are to be traced back to Manichaeism (and Marcionitism) . Thus the system, not indeed of Mani the Persian, but of Manichaeism as modified by Christian influences, accompanied the Catholic Church until the 13th century.

Sources. — (a) Oriental. Among the sources for a history of Manichaeism the most important are the Oriental. Of these the Mahommedan, though of comparatively late date, are distinguished by the excellent manner in which they have been transmitted to us, as well as by their impartiality. They must be named first, because ancient Manichaean writings have been used in their con- struction. At the head of all stands En-Nedim, Fihrist (c. 980), ed. by Fliigel (1871-1872); cf. the latter's work Mani, seine Lehre u. seine Schriften (1862). See also Shahrastam, Kitab al-milal wan- nujtal (12th cent.), ed. by Cureton (1846) and translated into German by Haarbrucker (1851), and individual notes and excerpts by Tabari (ioth cent.), Al-BIruni (nth cent.), and other Arabian and Persian historians. Next come the Turfan fragments described in the body of this article. See also W. Brandt, Schriften aus der Genza oder Sidva Rabba (Gottingen, 1893).

Of the Christian Orientals those that afford most information are Ephraem Syrus (d. 373), in various writings; the Armenian Esnik (German translation by J. M. Schmid, Vienna, 1900, see also Zeitsch.f. hist. Theol., 1840, ii. ; Langlois, Collection, ii. 375 seq.), who wrote in the 5th century against Marcion and Mani; and the Alex- andrian patriarch Eutychius d. 916), Annates, ed. Pococke (1628). There are, besides, scattered pieces of information in Aphraates (4th cent.), Barhebraeus (13th cent.) and others. The newly found Syriac Book of Scholia, of Theodor bar Khouni (see Pognon, Les Coupes de Kouabir, Paris, 1898) gives many details about Mani's teaching (also ed. without translation by Dr M. Lewin, Berlin, 1905). (b) Greek and Latin. The earliest mention of the Manichaeans in the Graeco-Roman Empire is to be found in an edict of Diocletian (see Hanel, Cod. Gregor., tit. xv.), which is held by some to be spurious, while others assign it to one or other of the years 287, 290, 296, 308 (so Mason, The Persec. of Diocl., pp. 275 seq.). Eusebius gives a short account of the sect (H. E., vii. 31). It was the Acta Archelai, however, that became the principal source on the subject of Manichaeism for Greek and Roman writers. These Acta are not indeed what they give themselves out for, viz. an account of a dis- putation held between Mani and the bishop Archelaus of Cascar, in Mesopotamia ; but they nevertheless contain much that is trust- worthy, especially regarding the doctrine of Mani, and they also include Manichaean documents. They consist of various distinct pieces, and originated in the beginning of the 4th century, probably at Edessa. They were translated as early as the first half of the same century from the Syriac (as is maintained by Jerome, De vir. illust., 72; though this is doubted by modern scholars) into Greek, and soon afterwards into Latin. It is only this secondary Latin version that we possess (ed. by C. H. Beeson, Leipzig, 1906, under title Hegemonius acta Archelai); earlier editions, Zacagni (1698); Routh, Reliquiae sac, vol. v. (1848); translated in Clark's Ante- Nicene Library, vol. xx.) ; small fragments of the Greek version have been preserved. Regarding the Acta Archelai, see Zittwitz in Zeitschr. f. d. histor. Theol. (1873) and Oblasinski, Acta disp. Arch, et Manetis (1874). In the form in which we now possess them, they are a compilation after the pattern of the Clementine Homilies, and have been subjected to manifold redactions. These Acta were used by Cyril of Jerusalem (Catech. 6), Epiphanius {Haer. 66), and a great number of other writers. All the Greek and Latin heresiologists have included the Manichaeans in their catalogues; but they seldom adduce any independent information regarding them (see Theodoret, Haer. fab. i. 26). Important matter is to be found in the resolutions of the councils from the 4th century onwards (see Mansi, Acta concil., and Hefele, Conciliengeschichte, vols, i.iii.), and also in the controversial writings of Titus of Bostra (6th century) , Upis Ma»ixaious (ed. Lagarde, 1859), and of Alexander of Lycopolis A670S rpbs tcis

Mavixniou 56£a5 (ed. Combefis; transl. in Ante Nic. Lib., vol. xiv.). Of the Byzantines, the most worthy of mention

are John of Damascus (De haeres. and Dialog.) and Photius (cod. 179 Biblioth.). The struggle with the Paulicians and the Bogomiles, who were often simply identified with the Manichaeans, again directed attention to the latter. In the West the works of Augustine are the great repertory for information on the subject of Mani- chaeism {Contra epistolam Manichaei, quam vocant fundamenti; Contra Faustum Manichaeum; Contra Fortunatum; Contra Adiman- tutn ; Contra Secundinum ; De actis cum Felice Manichaeo ; De genesi c. Manichaeos ; De natura boni ; De duabus animabus ; De uttlitate credendi ; De moribus eccl. cathol. el de moribus Manichaeorum ; De haeres.). The more complete the picture, however, which may here be obtained of Manichaeism, the more cautious must we be in making generalizations from it, for it is beyond doubt that Western Manichaeism adopted Christian elements which are want- ing in the original and in the Oriental Manichaeism. The " Dispute of Paul the Persian with a Manichaean " in Migne P.G., 88, col. 529-578 (first ed. by A. Mai) is shown by G. Mercati, Studi e testi (Rome, 1901) to be the proces verbal of an actual discussion held under Justinian at Constantinople in 527.

Literature. — The most important works on Manichaeism are Beausobre, Hist, critique de Manichee et du Manicheisme (2 vols., 1734 seq. ; the Christian elements in Manichaeism are here strongly, indeed too strongly, emphasized) ; Baur, Das manich. Religions- system (1831; in this work Manichaean speculation is exhibited from a speculative standpoint); Fliigel, Mani (1862; a very careful investigation on the basis of the Fihrist) ; Kessler, Untersuchung zur Genesis des manich. Religionssystems (1876) ; and the article " Mani, Manichaer," by the same writer in Herzog-Hauck'si?.£.,xii. 193-228; Kessler, Mani (2 vols., Berlin, 1889, 1903); Ernest Rochat, Essai sur Mani et sa doctrine (Geneva, 1 897); Recherches sur le manichiisme: I. La cosmogonie manicheisme d'apres ThSodore Bar Khdui, by Franz Cumont (Brussels, 1908) ; II. Fragments syriaques d'ouvrages manichiens, by Kugener and F. Cumont. III. Les Formules grecques d' abjuration imposees aux manicheens, by F. Cumont. The accounts of Mosheim, Lardner, Walch and Schrockh, as well as the monograph by Trechsel, Ueber Kanon, Kritik und Exegese der Manichaer (1832), may also be mentioned as still useful. The various researches which have been made regarding Parsism, the ancient Semitic religions, Gnosticism, &c, are of the greatest importance for the investigation of

Manichaeism. (A. Ha. ; F. C. C.)

MANIFEST (Lat. manifestus, clear, open to view), in com- mercial law, a document delivered to the officer of customs by the captain of a ship before leaving port, giving a description of the shipped goods of every kind, and setting forth the marks, numbers and descriptions of the packages and the names of the consignors thereof. In England, by the Revenue Act 1884, s. 3, where goods are exported for which no bond is re- quired, a manifest must be delivered to the officer of customs by the master or owner of the ship within six days after the final clearance, or a declaration in lieu thereof, the penalty in default being a sum not exceeding five pounds.*

MANIHIKI (Manahiki, Monahiki), a scattered archi- pelago in the central Pacific Ocean, between 4 and n° S., and 150° and 162° W., seldom visited, and producing only a little copra and guano. It may be taken to include the Caroline or Thornton Islands, Vostok and Flint to the east; Suvarov, Manihiki or Humphrey, and Tongareva or Penrhyn to the west, and Starbuck and Maiden to the north, the whole thus roughly forming the three corners of a triangle. There are pearl and pearl-shell fisheries at Tongareva and Suvarov. The natives (about 1000) are Polynesians and nominally Christian. There are ancient stone buildings of former in- habitants on Maiden Island. The islands were mostly dis- covered early in the 19th century, and were annexed by Great Britain mainly in 1888-1889.

MANIKIALA, a village of India, in Rawalpindi district of the Punjab. Pop. (1901), 734. It contains one of the largest stupas or Buddhist memorial shrines in N. India, and the one first known to Europeans, who early detected traces of Greek influence in the sculpture. The stupa was excavated by General Court in 1834, and has been identified by Sir A. Cunningham with the scene of Buddha's " body-offering."

MANILA, the capital city and principal port of the Philip- pine Islands, situated on the W. coast of the island of Luzon, on the E. shore of Manila Bay, at the mouth of the Pasig river, in lat. 14 35′ 31″ N., and in long. 120 58′ 8″ E. It is about 4890 m. W.S.W. of Honolulu, 6990 m. W.S.W. of San Francisco, 628 m. S.E. of Hong-Kong, and 1630 m. S. by W. of Yokohama. Pop. (1876), 93,595; (1887), 176,777; (1903), 219,928. Of

the total population in 1903, 185,351 were of the brown race, 21,838 were of the yellow race, 7943 were of the white race, and 232 were of the black race (230 of those of this race were foreign-born), and 4564 were of mixed races; of the same total 131,659, or nearly 60% were males. The foreign-born in 1903 numbered 29,491, comprising 21,083 natives of China, 4300 natives of the United States of America, 2065 natives of

Spain, and 721 natives of Japan. Nearly all of the brown race were native-born, and 80 -6% of them were Tagalogs.

The city covers an area of about 20 sq. m. of low ground, through which flow the Pasig river and several esteros, or tide- water creeks. To the west is the broad expanse of Manila Bay, beyond which are the rugged Mariveles Mountains; to the eastward the city extends about half-way to Laguna de Bay, a lake nearly as large as Manila Bay and surrounded on three sides by mountains. On the south bank of the Pasig and fronting the bay for nearly a mile is the " Ancient City," or Intramuros, enclosed by walls 25 m. long, with a maximum height of 25 ft., built about 1590. Formerly a moat flanked the city on the land sides, and a drawbridge at each- of six gates was raised every night. But this practice was discontinued in 1852 and the moat was filled with earth in 1905. In the north-west angle of the walled enclosure stands Fort Santiago, which was built at the same time as the walls to defend the entrance to the river; the remaining space is occupied largely by a fine cathedral, churches, convents, schools, and government buildings. Out- side the walls the modern city has been formed by the union of several towns whose names are still retained as the names of districts. The Pasig river is crossed by two modern steel cantilever bridges. Near the north-east angle of Intramuros is the Bridge of Spain, a stone structure across the Pasig, leading to Binondo, the principal shopping and financial district; here is the Escolta, the most busy thoroughfare of the city, and the Rosario, noted for its Chinese shops. Between Binondo and the bay is San Nicholas, with the United States custom- house and large shipping interests. North of San Nicholas is Tondo, the most densely populated district; in the suburbs, outside the fire limits, the greater part of the inhabitants live in native houses of bamboo frames roofed and sided with nipa palm, and the thoroughfares consist of narrow streets and navi-gable streams. Paco, south-west of Intramuros, has some large cigar factories, and a large cemetery where the dead are buried in niches in two concentric circular walls. Ermita and Malate along the bay in the south part of the city, San Miguel on the north bank of the river above Intramuros, and Sampaloc farther north, are the more attractive residential districts.

Most of the white inhabitants live in Ermita and Malate, or in San Miguel, where there are several handsome villas along the river front, among them that of the governor-general of the Philippines. The better sort of houses in Manila have two storeys, the lower one built of brick or stone and the upper one of wood, roofed with red Spanish tile or with corrugated iron ; the upper storey contains the living-rooms, and the lower has servants' rooms, store-houses, stables, carriage-houses and poultry yards. On account of the warm climate the cornices are wide, the upper storey projects over the lower, and the outer walls are fitted with sliding frames.

Translucent oyster shells are a common substitute for glass; and the walls are white- washed, but on account of the frequency of earthquakes are not plastered. More than one half of the dwellings in the city are mere shacks or nipa huts. Few of the public buildings are attractive or imposing. There are, however, some churches with graceful towers and beautiful fagades and a few attractive monuments; among the latter are one standing on the Magellan Plaza (Plaza or Paseo de Magellanes) beside the Pasig, to the memory of Ferdinand Magellan, the discoverer of the islands ; and another by A. Querol on the shore of the bay, to the memory of Don Miguel de Legaspi (d. 1572), the founder of the Spanish city, and of Andres de Urdaneta (1498-1568), the Augustinian friar who accompanied Legaspi to Cebu (but not to what is now Manila).

Many improvements have been made in and about the city since the American occupation in 1898. The small tram- cars drawn by native ponies have been replaced by a modern American electric street-railway service, and the railway service to and from other towns on the island of Luzon has been ex- tended; in 1908, 267 m. were open to traffic and 400 m. were under construction. Connected with Manila by electric railway

is Fort William McKinley, a U.S. army post in the hills five miles away, quartering about 3000 men. The scheme for dredging some of the esteros in order to make them more navigable and for filling in others has been in part executed. But the greatest improvement affecting transportation is the construction of a safe and deep harbour. Although Manila Bay is nearly landlocked, it is so large that in times of strong winds it becomes nearly as turbulent as the open sea, and it was formerly so shallow that vessels drawing more than 16 ft. could approach no nearer than two miles to the shore, where typhoons of the south- west monsoon not infrequently obliged them to lie several days before they could be unloaded. Two long jetties or break- waters have now been constructed, about 350 acres of harbour area have been dredged to a depth of 30 ft., and two wharves of steel and concrete, one 600 ft. long and 70 ft. wide, and the other 650 ft. long and no ft. wide, were in process of construc- tion in 1909. The Pasig river has been dredged up to the Bridge of Spain to a depth of 18 ft. and from the Bridge of Spain to Laguna de Bay to a depth of 6 ft. The construction of the harbour was begun about 1880 by the Spanish govern- ment, but the work was less than one-third completed when the Americans took possession. Among other American improvements were: an efficient fire department, a sewer system whereby the sewage by means of pumps is discharged into the bay more than a mile from the shore; a system of

gravity waterworks (1908) whereby the city's water supply is taken from the Mariquina river about 23 m. from the city into a storage reservoir which has a capacity of 2,000,000,000 gallons and is 212 ft. above the sea; the extension of the Luneta, the principal pleasure-ground; a boulevard for several miles along the bay; a botanical garden; and new market buildings. Climate. — Manila has a spring and summer hot season, an autumn and winter cooler season, a summer and autumn rainy season, and a winter and spring dry season. For the twenty years 1883-1902 the annual average of mean monthly temperatures was 26-8° C, the maximum being 27-4° in 1889 and 1897, and the minimum 26-2° in 1884. From May until October the prevailing wind is south- east, from November to January it is north, and from February to April it is east. July and August are the cloudiest months of the year; the average number of rainy days in each of those months being 21, and in February or March only 3. The annual average of rainy days is 138: 94 in the wet season (average precipitation for the six months, 1556-3 mm.) and 44 in the dry season (average pre- cipitation for the six dry months, 382 mm.). Thunderstorms are frequent and occasionally very severe, between May and September; the annual average of thunderstorms for the decennium 1888-1897 was 505, the greatest frequency was in May (average 100-3) an d in June (average 90-7); the severity of these storms may be imagined from the fact that in a half-hour between 5 and 6 p.m. on the 21st of May 1892 the fall (probably the maximum) was 60 mm. The air is very damp: for the period 1 883-1902 the annual average of humidity was 79-4%, the lowest average for any one month was 66-6 °o in April 1896 (the average for the twenty Aprils was 70-7), and the highest average for any one month was 89-9 % for September 1897 (the average for the twenty Septembers was 85-5). The city is so situated as to be affected by shocks from all the various seismo- logical centres of Luzon, especially those from the active volcano Taal, 35 m. south of the city. At the Manila observatory, about 1 m. south-east of the walled city, the number of perceptible earthquakes registered by seismograph between 1880 and 1897 inclusive was 221 ; the greatest numbers for any one year were 26 in 1882 and 23 in 1892, and the least, 5 in 1896 and 6 in 1889 and in 1894; the average number in each May was 1-44, in each July, 1-33, and in January and in February 0-72 ; the frequency is much greater in each of the spring 'summer months (except June, average 0-78) than in the months of autumn and winter.

Public Institutions. — The public school system of Manila includes, besides the common schools and Manila high school, the American school, the Philippine normal school (1901), the Philippine school of arts and trades (1901), the Philippine medical school (1907) and the Philippine school of commerce (1908). The Philippine govern- ment also maintains here a bureau of science which publishes the monthly Philippine Journal of

Science, and co-operates with the Jesuits in maintaining, in Ermita, the Manila observatory (meteoro- logical, seismological and astronomical), which is one of the best equipped institutions of the kind in the East. The royal and pontifical university of St Thomas Aquinas (generally known as the university of Santo Tomas) was founded in 1857 with faculties of theology, law, philosophy, science, medicine and pharmacy, and

trew out of a seminary, for the foundation of which Philip If. of pain gave a grant in 1585, and which opened in 1601 ; and of the Dominican coUege of St Thomas, dating from 161 1. Other educa-

tional institutions are the (Dominican) San Jose medical and pharma-ceutical college, San Juan de Letran (Dominican), which is a primary and secondary school, the ateneo municipal, a corresponding secondary and primary school under the charge of the Jesuits, and the college of St Isabel, a girls' school. In 1908 there were thirty- four newspapers and periodicals published in the citv, of which thirteen were Spanish, fourteen were English, two were Chinese, and five were Tagalog; the principal dailies were the Manila Times, Cablenews American, El Comercio, El Libertas, El Mercantil, El Renacimiento and La Democracia. There are several Spanish hospitals in Manila, in two of which the city's indigent sick are cared for at its expense; in connexion with another a reform school is maintained ; and there are a general hospital, built by the govern- ment, a government hospital for contagious diseases, a government hospital for government employees, a government hospital for lepers, an army hospital, ■ a free dispensary and hospital supported by American philanthropists, St Paul's hospital (Roman Catholic), University hospital (Protestant Episcopal), and the Mary Johnson hospital (Methodist Episcopal). There are several American Protestant churches in the city, notably a Protestant Episcopal cathedral and training schools for native teachers. In Bibilid prison, in the Santa Cruz district, nearly 80% of the prisoners of the archipelago are confined ; it is under the control of the department of public instruction and its inmates are given an opportunity to learn one or more useful trades.

Trade and Industry. — Manila is important chiefly for its commerce, and to make it the chief distributing point for American goods con- signed to Eastern markets the American government undertook the harbour improvements, and abolished the tonnage dues levied under Spanish rule. Manila is the greatest hemp market in the world; IIO >399 tons, valued at $19,444,769, were exported from the archi- pelago in 1906, almost all being shipped from Manila. Other important exports are sugar, copra and tobacco. The imports represent a great variety of food stuffs and manufactured articles. In 1906 the the total value of the exports was $23,902,986 and the total value of the imports was $21,868,257. The coastwise trade is large. The principal manufactures are tobacco, cigars,

cigarettes, malt liquors, distilled liquors, cotton fabrics, clothing, ice, lumber, foundry and machine shop products, carriages, waggons, furniture and boots and shoes. There is some ship and boat building. Lumber is sawed by steam power, and cotton mills in the Tondo district are operated by steam. In the foundries and machine shops small engines, boilers and church bells are made, and the government maintains an ice and cold-storage plant. With these exceptions manufacturing is in a rather primitive state. Another industry of importance, especially in the district of Tondo, is fishing, and the city's markets are well supplied with many varieties of choice fish.

Administration. — Manila is governed under a charter enacted in 1 90 1 by the Philippine commission, and amended in 1903. This vests the legislative and administrative authority mainly in a municipal board of five members, of whom three are ap- pointed by the governor of the Philippines by the advice and with the consent of the Philippine commission, and the others are the president of the advisory board and the city engineer. The administration is divided into eight departments: engineer- ing and public works; sewer and waterworks construction; sanitation and transportation; assessments and collections; police, fire, law and schools. There are no elective offices, but there is an advisory board, appointed by the governor and consisting of one member from each of eleven districts; its recom- mendations the municipal board must seek on all important matters. The administration of justice is vested in a municipal court and in one court under justices of the peace and auxiliary justices; the administration of school affairs is vested in a special board of six members; and matters pertaining to health are administered by the insular bureau of health.

History. — The Spanish city of Manila (named from " nilad," a weed or bush which grew in the locality) was founded by Legaspi in 1 57 1. The site had been previously occupied by a town under a Mahommedan chieftain, but this town had been burned before Legaspi gained possession, although a native settlement still remained, within the present district of Tondo. In 1572, while its fortifications were still slight, the Spanish city was attacked and was nearly captured by a force of Chinese pirates who greatly outnumbered the Spaniards. About 1590 the con- struction of the present walls and other defences was begun. At the beginning of the 17th century Manila had become the commercial metropolis of the Far East. To it came fleets' from China, Japan, India, Malacca and other places in the Far East for an exchange of wares, and from it rich cargoes were sent by way of Mexico to the mother country in exchange for much cheaper

goods. Before the close of the century, however, a decline began, from which there was but little recovery under Spanish rule. Several causes contributed to this, among them the waning of the power of Spain, an exclusive commercial policy, dishonest administration, hostilities with the Chinese, ravages of the Malay pirates, and the growth of Dutch commerce. On several occa- sions the city has been visited with destructive earthquakes; those of 1645 and 1863 were especially disastrous. In 1762, during war between England and Spain, an English force under Vice-Admiral Sir Samuel Cornish (d. 17 70) and Lieut.-General Sir William Draper (1721-1787) breached the walls and captured the city, but by the Treaty of Paris (1763) it was returned to Spain. In 1837 the port of Manila was opened to foreign trade., and there was a steady but slow increase in prosperity up to about 1890. During this period, however, progress was hampered by vested interests, and the spirit of rebellion among the natives became increasingly threatening. About 1892 a large number of Filipinos in and near Manila formed a secret association whose object was independence and separation from Spain. In August 1896 members of this association began an attack; and late in December the movement was reinforced as a result of the execu- tion in Manila of Dr JoseRizaly Mercado (1861-1896), a Filipino patriot. It spread to the provinces, and was only in part sup- pressed when, in April 1898, the United States declared war against Spain. On the 1st of May an American fleet under Commodore George Dewey destroyed the Spanish fleet stationed in Manila Bay (see Spanish-American War). The smouldering Filipino revolt then broke out afresh and an American army under General Wesley Merritt (1836-) was sent from San Francisco to assist in capturing the city. The Spaniards, after making a rather weak defence, surrendered it on the 13th of August 1898. Trouble now arose between the Americans and the Filipinos under the leadership of Emilio Aguinaldo, for the latter wished to establish a government of their own. On the night of the 4th of February 1899 the Filipinos attacked the American army which was defending the city, but were repulsed after suffering a heavy loss. A military government, however, was maintained in the city until August 1901.

MANILA HEMP, the most valuable of all fibres for cordage, the produce of the leaf-stalks of Musa textilis, a native of the Philippine Islands. The plant, called abaca by the islanders, throws up a spurious stem from its underground rootstocks, consisting of a cluster of sheathing leaf-stalks, which rise to a height of from 15 to 25 ft. and spread out into a crown of huge undivided leaves characteristic of the various species of Musa (plantain, banana, &c). From 12 to 20 clusters are developed ■on each rhizome. In its native regions the plant is rudely culti- vated solely as a source of fibre; it requires little attention, and when about three years old develops flowers on a central stem, at which stage it is in the most

favourable condition for yielding fibre. The stock is then cut down, and the sheathing stalks are torn asunder and reduced to small strips. These strips in their fresh'succulent condition are drawn between a knife-edged instrument and a hard wooden block to which it is fixed. The knife is kept in contact with the block except when lifted to introduce the ribbons. Sufficient weight is suspended to the end of the knife to keep back all pith when the operator is drawing forward the ribbon between the block and knife. By repeated scraping in this way the soft cellular matter which surrounds the fibre is removed, and the fibre so cleaned has only to be hung up to dry in the open air, when, without further treatment, it is ready for use. Each stock yields, on an average, a little under 1 lb of fibre; and two natives cutting down plants and separating fibre will prepare not more than 25 lb per day. The fibre yielded by the outer layer of leaf-stalks is hard, fully developed and strong, and used for cordage, but the produce of the inner stalks is increasingly thin, fine and weak. The finer fibre is used by the natives, without spinning or twisting (the ends of the single fibres being knotted or gummed together), for making exceedingly fine, light and transparent yet comparatively strong textures, which they use as articles of dress and ornament. According to Warden, " muslin and grass-cloth are made from the finest

fibres of Manila hemp, and some of them are so fine that a gar- ment made of them may, it is said, be enclosed in the hollow of the hand." In Europe, especially in France, articles of clothing, such as shirts, veils, neckerchiefs and women's hats, are made from abacd. It is also used for matting and twines. It is of a light colour, very lustrous, and possesses great strength, being thus exceptionally suitable for the best class of ropes. It is extensively used for marine and other cordage. The hemp exported for cordage purposes is a somewhat woody fibre, of a bright brownish-white colour, and possessing great durability and strain-resisting power. The strength of Manila hemp compared with English hemp is indicated by the fact that a Manila rope $\ in. in circumference and 2 fathoms long stood a strain of 4669 lb before giving way, while a similar rope of English hemp broke with 3885 lb. The fibre contains a very considerable amount of adherent pectinous matter, and in its so-called dry condition an unusually large proportion, as much as 12% of water. In a damp atmosphere the fibre absorbs moisture so freely that it has been found to contain not less than 40% of water, a circumstance which dealers in the raw fibre should bear in mind. From the old and disintegrated ropes is made the well-known manila paper. The plant has been introduced into tropical lands — the West Indies, India, Borneo, &c. — but only in the Philippines has the fibre been successfully produced as an article of commerce. It is distributed throughout the greater part of the Philippine Archipelago. The area of successful cultivation lies approximately between 6° and 15 N. and 121° and 126° E.;

it may be successfully cultivated up to about 4000 ft. above sea-level. The provinces, or islands, where cultivation is most successful are those with a heavy and evenly distributed rainfall. H. T. Edwards, fibre expert to the Philip- pine bureau of agriculture, wrote in 1904: —

" The opportunities for increasing the production of abacd in the Philippines are almost unlimited. Enormous areas of good abacd land are as yet untouched, while the greater part of land already under cultivation might yield a greatly increased product if more careful attention were given to the various details of cultivation. The introduction of irrigation will make possible the planting of abacd in many districts where it is now unknown. The perfection of a machine for the extraction of the fibre will increase the entire output by nearly one-third, as this amount is now lost by the waste- ful hand-stripping process."

Hitherto, while numerous attempts have been made to extract the fibre with machinery, some obstacle has always prevented the general use of the process. The exports have increased with great rapidity, as shown by the following table: — 1870 31,426 tons.

1880 1890 1900 1904

50,482

67,864

89,438

121,637

In 1901 the value of the export was $14,453,410, or 62-3% of the total exports from the Philippines. The fibre is now so valuable that Manila hemp cordage is freely adulterated by manufacturers, chiefly by admixture of phormium (New Zealand flax) and Russian hemp.

MANILIUS, a Roman poet, author of a poem in five books called A stronomica. The author is neither quoted nor mentioned by any ancient writer. Even his name is uncertain, but it was probably Marcus Manilius; in the earlier MSS. the author is anonymous, the later give Manilius, Manlius, Mallius. The poem itself implies that the writer lived under Augustus or Tiberius, and that he was a citizen of and resident in Rome. According to R. Bentley he was an Asiatic Greek; according to F. Jacob an African. His work is one of great learning; he had studied his subject in the best writers, and generally represents the most advanced views of the ancients on astronomy (or rather astrology). He frequently imitates Lucretius, whom he resembles in earnest- ness and originality and in the power of enlivening the

dry bones of his subject. Although his diction presents some peculiarities, the style is metrically correct. Firmicus, who wrote in the time of Constantine, exhibits so many points of resemblance with the work of Manilius that he must either have used him or have followed some work that Manilius also followed. As Firmicus

says that hardly any Roman except Caesar, Cicero and Fronto had treated the subject, it is probable that he did not know the work of Manilius. The latest event referred to in the poem (i. 898) is the great defeat of Varus by Arminius in the Teuto- burgiensis Saltus (a.d. 9). The fifth book was not written till the reign of Tiberius; the work appears to be incomplete, and was probably never published.

See editions by J. Scaliger (1579); R. Bentley (1739); F. Jacob (1846); A. G. Pingre (1786); and T. Brciter (Leipzig, 1907; and commentary 1909); of book i. by A. E. Housman (1903). On the subject generally see M. Bechert, De emendandi Manilii Ratione (1878) and De M. M. Astronomicorum Poeta (1891); B. Freier, De M. Astronom. Aetate (1880) ; A. Cramer, De Manilii Elocutione (very full; 1882); G. Lanson, De Manilio Poeta, with select bibliog. (1887); P. Monceaux, Les Africains (a study of the Latin literature of Africa; 1894); R. Ellis, Nodes Manilianae (1891); J. P. Postgate, Silva Maniliana (1897), chiefly on textual questions; P. Thomas, Lucubrationes Manilianae (1888), a collation of the Gemblacensis (Gembloux)MS. ; F. Plessis, La Poesie latine (1909), pp. 477-483.

MANILIUS, GAIUS, Roman tribune of the people in 66 b.c. At the beginning of his year of office (Dec. 67) he succeeded in getting a law passed {de libertinorum suffragiis), which gave freedmen the privilege of voting together with those who had manumitted them, that is, in the same tribe as their patroni; this law, however, was almost immediately declared null and void by the senate. Both parties in the state were offended by the law, and Manilius endeavoured to secure the support of Pompey by proposing to confer upon him the command of the war against Mithradates with unlimited power (see Pompey). The proposal was supported by Cicero in his speech, Pro lege Manilla, and carried almost unanimously. Manilius was later accused by the aristocratical party on some unknown charge and defended by Cicero. He was probably convicted, but nothing further is heard of him.

See. Cicero's speech; Dio Cassius xxxvi. 25-27- Plutarch, Pompey, 30; Veil.

Pat. ii. 33; art. Rome: History, § II.

MANIN, DANIELE (1804-1857), Venetian patriot and states- man, was born in Venice, on the 13th of May 1804. He was the son of a converted Jew, who took the name of Manin because that patrician family stood sponsors to him, as the custom then was. He studied law at Padua, and then practised at the bar of his native city. A man of great learning and a profound jurist, he was inspired from an early age with a deep hatred for Austria. The heroic but foolhardy attempt of the brothers Bandiera, Venetians who had served in the Austrian navy against the Neapolitan Bourbons in 1844, was the first event to cause an awakening of Venetian patriotism, and in 1847 Manin presented a petition to the Venetian congregation, a shadowy consultative assembly tolerated by Austria but without any power, informing the emperor of the wants of the nation. He was arrested on a charge of high treason (Jan. 18, 1848), but this only served to increase the agitation of the Venetians, who were beginning to know and love Manin. Two months later, when all Italy and half the rest of Europe were in the throes of revolution, the people forced Count Palffy, the Austrian governor, to release him (March 17). The Austrians soon lost all control of the city, the arsenal was seized by the revolutionists, and under the direction of Manin a civic guard and a provisional government were instituted. The Austrians evacuated Venice on the 26th of March, and Manin became president of the Venetian republic. He was already in favour of Italian unity, and though not anxious for annexation to Piedmont (he would have preferred to invoke French aid), he gave way to the will of the majority, and resigned his powers to the Piedmontese commissioners on the 7th of August. But after the Piedmontese defeats in Lombardy, and the armistice by which King Charles Albert abandoned Lombardy and Venetia to Austria, the Venetians attempted to lynch the royal commissioners, whose lives Manin saved with difficulty; an assembly was summoned, and a triumvirate formed with Manin at its head. Towards the end of 1848 the Austrians, having been heavily reinforced, reoccupied all the Venetian mainland; but the citizens, hard-pressed and threatened with a siege, showed the greatest devotion to the cause of freedom,

all sharing in the dangers and hardships and all giving what they could afford to the state treasury. Early in 1849 Manin was again chosen president of the republic, and conducted the defence of the city with great ability. After the defeat of Charles Albert's f^lorn hope at Novara in March the Venetian assembly voted "Resistance at all costs!" and granted Manin unlimited powers. Meanwhile the Austrian forces closed round the city; but Manin showed an astonishing power of organization, in which he was ably seconded by the Neapolitan general, Guglielmo Pepe. But on the 26th of May the Venetians were forced to abandon Fort Malghera, half-way between the city and the mainland; food was becoming scarce, on the 19th

of June the powder magazine blew up, and in July cholera broke out. Then the Austrian batteries began to bombard Venice itself, and when the Sardinian fleet withdrew from the Adriatic the city was also attacked by sea, while certain demagogues caused internal trouble. At last, on the 24th of August 1849, when all pro- visions and ammunition were exhausted, Manin, who had courted death in vain, succeeded in negotiating an honourable capitula- tion, on terms of amnesty to all save Manin himself, Pepe and some others, who were to go into exile. On the 27th Manin left Venice for ever on board a French ship. His wife died at Marseilles, and he himself reached Paris broken in health and almost destitute, having spent all his fortune for Venice. In Paris he maintained himself by teaching and became a leader among the Italian exiles. There he became a convert from republicanism to monarchism, being convinced that only under the auspices of King Victor Emmanuel could Italy be freed, and together with Giorgio Pallavicini and Giuseppe La Farina he founded the Societa Nazionale Ilaliana with the object of pro- pagating the idea of unity under the Piedmontese monarchy. His last years were embittered by the terrible sufferings of his daughter, who died in 1854, and he himself died on the 22nd of September 1857, and was buried in Ary Scheffer's family tomb. In 1868, two years after the Austrians finally departed from Venice, his remains were brought to his native city and honoured with a public funeral. Manin was a man of the greatest honesty, and possessed genuinely statesmanlike qualities. He believed in Italian unity when most men, even Cavour, regarded it as a vain thing, and his work of propaganda by means of the National Society greatly contributed to the success of the cause.

See A. Errera, Vita di D. Manin (Venice, 1872) ; P. de la Farge, Documents, &c, de D. Manin (Paris, i860) ; Henri Martin, D. Manin (Paris, 1859) ; V. Marchesi, Settant' anni della storia di Venezia (Turin) and an excellent monograph in Countess Martinengo Cesaresco's Italian Characters (London, 1901).

MANING, FREDERICK EDWARD (181 2-1883), New Zealand judge and author, son of Frederick Maning, of Johnville, county Dublin, was born on the 5th of July 1812. His father emigrated to Tasmania in the ship " Ardent " in 1824 and took up a grant of land there. Young Maning served in the fatuous expedition which attempted to drive in the Tasmanian blacks by sweeping with an unbroken line of armed men across the island. Soon afterwards he decided to try the life of a trader among the wild tribes of New Zealand, and, landing in the beautiful inlet of Hokianga in 1833, took up his abode among the Ngapuhi. With them the tall Irish lad — he stood 6 ft. 3 in. — full of daring and good-humour and as fond of fun as of fighting, quickly became a prime favourite, was adopted into the tribe, married a chief's daughter, and became a " Pakeha-Maori " (foreigner turned Maori). With the profits of his trading he bought a farm of 200

acres on the Hokianga, for which, unlike most white adven- turers of the time, he paid full value. When New Zealand was peacefully annexed in 1840, Maning's advice to the Maori was against the arrangement, but from the moment of annexation he became a loyal friend to the government, and in the wars of 1845-46 his influence was exerted with effect in the settlers' favour. Again, in i860, he persuaded the Ngapuhi to volunteer to put down the insurrection in Taranaki. Finally, at the end of 1865, he entered the public service as a judge of the native lands court, where his unequalled knowledge of the Maori language, customs, traditions and prejudices was of solid value.

In this office he served until 1881, when ill-health drove him to resign, and two years later to seek surgical aid in London, where, however, he died of cancer on the 25th of July 1883. At his wish, his body was taken back to New Zealand and buried there. A bust of him is placed in the public library atˆuckland. Maning is chiefly remembered as the author of two short books, Old New Zealand and History of the War in the North of New Zealand against the Chief Heke. Both books were reprinted in . London in 1876 and 1884, with an introduction by the earl of Pembroke.

MANIPLE (Lat. manipulus, from manus, hand, and plere, to fill), a liturgical vestment of the Catholic Church, proper to all orders from the subdeacon upwards. It is a narrow strip of material, silk or half-silk, about a yard long, worn on the left fore-arm in such a way that the ends hang down to an equal length on either side. In order to secure it, it is sometimes tied on with strings attached underneath, sometimes provided with a hole in the lining through which the arm is passed. It is ornamented with three crosses, one in the centre and one at each end, that in the centre being obligatory, and is often elaborately embroidered. It is the special ensign of the office of subdeacon, and at the ordination is placed on the arm of the new subdeacon by the bishop with the words: " Take the maniple, the symbol of the fruit of good works." 1 It is strictly a "mass vestment," being worn, with certain exceptions (e.g. by a subdeacon singing the Gospel at the service of blessing the palms), only at Mass, by the celebrant and the ministers assisting.

The most common name for the maniple up to the beginning of the nth century in the Latin Church was mappula (dim. of mappa, cloth), the Roman name for the vestment until the time of Innocent III. The designation manipulus did not come into general use until the 15th century. Father Braun (Liturg. Gewandung, p. 517) gives other early medieval

names: sudanum, fano, mantile, all of them meaning " cloth" or " handkerchief." He traces the vestment ultimately to a white linen cloth of ceremony (pallium linostinum) worn in the 4th century by the Roman clergy over the left arm, and peculiar at that time to them. Its ultimate origin is obscure, but is probably traceable to some ceremonial handkerchiefs commonly carried by Roman dignitaries, e.g. those with which the magistrates were wont to signal the opening of the games of the circus. As late as the 9th century, indeed, the maniple was still a handkerchief, held folded in the left hand. By what process it became changed into a narrow strip is not known; the earliest extant specimen of the band-like maniple is that found in the grave of St Cuthbert (9th century); by the nth century (except in the case of subdeacons, whose maniples would seem to have continued for a while to be cloths in practical use) the maniple had uni- versally assumed its present general form and purely ceremonial character.

The maniple was originally carried in the left hand. In pictures of the 9th, 10th and nth centuries it is represented as either so carried or as hung over the left fore-arm. By the 12th century the rule according to which it is worn over the left arm had been universally accepted. According to present usage the maniple is put on by priests after the alb and girdle; by deacons and subdeacons after the dalmatic or tunicle; by bishops at the altar after the Confiteor, except at masses for the dead, when it is assumed before the stole. 2

In the East the maniple in its Western form is known only to the Armenians, where it is peculiar to subdeacons. This vest- ment is not derived from the Roman rite, but is properly a stole, which the subdeacons used to carry in the left hand. It is now laid over the subdeacon's left arm at ordination. The true equivalent of the maniple (in the Greek and Armenian rites only) is not, as has been assumed, the epimanikion, a sort of loose, embroidered cuff (see Vestments), but the epigonalion. This is a square of silk, stiffened with cardboard, surrounded by an

1 According to Father Braun this custom cannot be traced earlier than the 9th century. It forms no essential part of the ordination ceremony (Liturg. Gewandung, p. 548).

a For the evolution of these rules see Braun, op. cit. pp. 546 seq.

embroidered border, and usually decorated in the middle with a cross or a sword (the " sword of the Spirit," which it is supposed to symbolize); sometimes, however, the space within the border is embroidered with pictures. It is worn only by bishops and the higher clergy, and derives its name from the fact that it hangs down over the knee (yovv). It is worn on

the right side, under the phelonion, but when the sakkos is worn instead of the phelonion, by metropolitans, &c, it is attached to this. The epigonalion, like the maniple, was originally a cloth held in the hand; a fact sufficiently proved by the ancient name tyxdpuov (x«P, hand), which it retained until the 12th century. For convenience' sake this cloth came to be suspended from the girdle on the right side, and is thus represented in the earliest extant paintings (see Braun, p. 552). The name epigonation, which appears in the latter half of the 12th century, probably marks the date of the complete conventionalizing of the original cloth into the present stiff embroidered square; but the earliest representations of the vestment in its actual form date from the 14'th century, e.g. the mosaic of St Athanasius in the chapel of St Zeno in St Mark's at Venice.

See J. Braun, S. J., Die liturgische Gewandung (Freiburg im Breisgau, 1 907)1 PP- 5i5 _ 56i, and the bibliography to Vestments.

MANIPUR. a native state on the north-east frontier of India, in political subordination to the lieutenant-governor of Eastern Bengal and Assam. Area, 8456 sq. m. Pop. (1901), 284,465. It is bounded on the N. by the Naga country and the hills over- looking the Assam valley, on the W. by Cachar district, on the E. by Upper Burma, and on the S. by the Lushai hills. The state consists of a wide valley, estimated at about 650 sq. m., and a large surrounding tract of mountainous country. The hill ranges generally run north and south, with occasional connecting spurs and ridges of lower elevation between. Their greatest altitude is in the north, where they reach to upwards of 8000 ft. above sea-level. The principal geographical feature in the valley is the Logtak lake, an irregular sheet of water of considerable size,butsaidtobe yearly growing smaller. The valley is watered by numerous rivers, the Barak being the most important. The hills are densely clothed with tree jungle and large forest timber. Some silk is produced and there are a few primitive manufactur- ing industries, e.g. of pottery. Rice and forest produce, however, are the principal exports. The road from Manipur to the Assam- Bengal railway at Dimapur is the principal trade route.

The kingdom of Manipur, or, as the Burmans call it, Kasse or Kathe, first emerges from obscurity as a neighbour and ally of the Shan kingdom of Pong, which had its capital at Mogaung. The valley appears to have been originally occupied by several tribes which came from different directions. Although their general facial characteristics are Mongolian, there is a great diversity of feature among the Manipuris, some of them showing a regularity approaching the Aryan type. In the valley the people are chiefly Hindus, that religion being of recent introduc- tion. Their own name for themselves is Meithei, and their language is a branch of the Kuki-Chin family, spoken by 273,000 persons in all India in 1.901. One of their

peculiarities is the high position enjoyed by women, who conduct most of the trade of the valley. They have a caste system of their own, different from that of India, and chiefly founded on the system of lallup, or forced labour, which has been abolished by the British. Every male between the ages of seventeen and sixty was formerly obliged to place his services at the disposal of the state for a certain number of days each year, and to different classes of the people different employments were assigned. About four hundred Mahommedan families, descendants of settlers from Bengal, reside to the east of the capital. The aboriginal hill- men belong to one of the two great divisions of Nagas and Kukis, and are subdivided into innumerable clans and sections with slight differences in language, customs or dress. The state is noted for the excellence of its breed of ponies. The English game of polo was introduced from Manipur, where it forms a great national pastime.

The first relations of the British with Manipur date from 1762, when the raja solicited British aid to repel a Burmese invasion,

and a treaty was entered into. The force was recalled, and little communication between the two countries took place until 1824, on the outbreak of the first Burmese War. British assistance was again invoked by the raja, and the Burmese were finally expelled from both the Assam and the Manipur valleys. Dis- puted successions have always ˆbeen a cause of trouble. The raja, Chandra Kirtti Singh, died in 1886, and was succeeded by his eldest son, Sur Chandra Singh, who appointed his next brother, Kula Chandra Dhuya Singh, jubraj, or heir-apparent. In 1890 another brother, the senapati, or commander-in-chief, Tikend- rajit Singh, dethroned the raja, and installed the jubraj as regent, the ex-raja retiring to Calcutta. In March 1891 the chief commis- sioner of Assam (Quinton) marched to Manipur with 400 Gurkhas, in order to settle the question of succession. His purpose was to recognize the new ruler, but to remove the senapati. After some futile negotiations, Quinton sent an ultimatum, requiring the surrender of the senapati, by the hands of the political resident, F. Grim wood, but no result followed. An attempt was then made to arrest the senapati, but after some sharp fighting, in which Lieut. Brackenbury was killed, he escaped; and the Manipuris then attacked the British residency with an overwhelming force. Quinton was compelled to ask for a parley, and he, Colonel Skene, Grimwood, Cossins and Lieut. Simpson, unarmed, went to the fort to negotiate. They were all there treacherously murdered, and when the news arrived the Gurkhas retreated to Cachar, Mrs Grimwood and the wounded being with them. This led to a military

expedition, which did not encounter much resistance. The various columns, converging on Manipur, found it deserted; and the regent, senapati, and others were captured during May. After a formal trial the senapati and one of the generals of the rebellion were hanged and the regent was transported to the Andaman Islands. But it was decided to preserve the existence of the state, and a child of the ruling family, named Chura Chand, of the age of five, was nominated raja. He was sent to be educated in the Mayo College at Ajmere, and he afterwards served for two years in the imperial cadet corps. Meanwhile the admin- istration was conducted under British supervision. The oppor- tunity was seized for abolishing slavery and unpaid forced labour, a land revenue of Rs. 2 per acre being substituted in the valley and a house-tax in the hills. The boundaries of the state were demarcated, disarmament was carried out, and the construction of roads was pushed forward. In 1901 Manipur was visited by Lord Curzon, on his way from Cachar to Burma. In May 1907 the government of the state was handed over to Chura Chand, who was to be assisted by a council of six Manipuris, with a member of the Indian civil service as vice-president. At the same time it was announced that the government of India would support the raja with all its powers and suppress summarily all attempts to displace him. The revenue is £26,000. The capital is Imphal, which is really an overgrown village; pop.

(1901), 67,093.

See Mrs Ethel St Clair Grimwood, My Three Years in Manipur (1891) ; Manipur State Gazetteer (Calcutta, 1905) ; T. C. Hodson, The Meitheis (1908).

MANISA (anc. Magnesia ad Sipylum), the chief town of the Saru-khan sanjak of the Aidin (Smyrna) vilayet of Asia Minor, situated in the valley of the Gediz Chai (Hermus), at the foot of Mt Sipylus, and connected by railway with Smyrna and Afium Kara-Hissar. Pop. about 35,000, half being Mussulman. Manisa is an important commercial centre, and contains inter- esting buildings dating from the times of the Seljuk and early Osmanli sultans, including mosques built by Murad II. and III. and a Mevlevi Tekke second only to that at Kouia. It is the seat of a flourishing American mission. In 1204 Manisa was occupied by John Ducas, who when he became emperor made it the Byzantine seat of government. In 1305, after the in- habitants had massacred the Catalan garrison, Roger de Flor besieged it unsuccessfully. In 13 13 the town was taken by Saru Khan and became the capital of the Turcoman emirate of that name. In 1398 it submitted to the Osmanli sultan Bayezid I., and in 1402 was made a treasure city by Timur. In 1419 it was the scene of the insurrection of the liberal reformer, Bedr ed-Din,

which was crushed by Prince Murad, whose residence in the town as Murad II., after twice abdicating the throne, is one of the most romantic stories in Turkish history. In the 17th century Manisa became the residence of the greatest of the Dere Bey families, Kara Osman Oglu, Turcoman by origin, and possibly connected with the former emirs of Sarukhan, which seems to have risen to power by farming the taxes of a province which princes of the house of Othman had often governed and regarded with especial affection. The liva of Sarukhan was one of the twenty-two in the Ottoman Empire leased on a life tenure up to the time of Mahmud II. In the 18th century the family of Kara Osman Oglu (or Karasman) ruled de facto all west central Anatolia, one member being lord of Bergama and another of Aidin, while the head of the house held Manisa with all the Hermus valley and had greater power in Smyrna than the representative of the capitan pasha in whose province that city nominally lay. Out- side their own fiefs the family had so much property that it was commonly said they could sleep in a house of their own at any stage from Smyrna to Baghdad. The last of its great beys was Haji Hussein Zade, who was frequently called in to Smyrna on the petition of his friends, the European merchants, to assure tranquillity in the troublous times consequent on Napoleon's invasion of Egypt, and the British and Russian attacks on the Porte early in the 19th century. He always acquitted himself well, but having refused to bring his contingent to the grand vizier when on the march to Egypt in 1798, and awakened the jealousy of the capitan pasha, he was in continual danger. Exiled in 181 2, he was subsequently restored to Manisa, and died there in 1821. His son succeeded after sanguinary tumults; but Mahmud II., who had long marked the family for destruc- tion, was so hostile towards it, after he had got rid of the janissaries, that it had lost all but the shadow of power by 1830. Descendants survived in Manisa who retained a special right of granting title-deeds within the district, independent of the local administration. (D. G. H.)

MANISTEE, a city and the county-seat of Manistee county, Michigan, U.S.A., on the Manistee river (which here broadens into a small lake) near its entrance into Lake Michigan, about 114 m. W.N.W. of Grand Rapids. Pop. (1890), 12,812; (1900), 14,260 (4966 foreign-born); (1904, state census), 12,708; (1910), 12,381. It is served by the Pere Marquette, the Manistee & Grand Rapids, the Manistee & North-Eastern, and the Manistee & Luther railways, and by steamboat lines to Chicago, Mil- waukee and other lake ports. The channel between Lake Manistee and Lake Michigan has been considerably improved since 1867 by the Federal government. There is a United States life-saving station at the harbour entrance. The city has a county normal school, a school for the deaf and dumb, a domestic science and manual training school, a business college, and a Carnegie library. Manistee is a summer resort, with good trout streams and

well-known brine-baths. One mile from the city limits, on Lake Michigan, is Orchard Beach, a bathing resort, connected with the city by electric railway; and about 9 m. north of Manistee is Portage Lake (about 2 m. long and 1 m. wide), a fishing resort and harbour of refuge (with a good channel from Lake Michigan), connected with the city by steamboat and railway. Manistee has large lumber interests, is the centre of an extensive fruit-growing region, and has various manufac- tures, including lumber and salt. 1 The total value of the factory product in 1904 was $3,256,601. The municipality owns and operates its waterworks. Manistee (the name being taken from a former Ottawa Indian village, probably on Little Traverse Bay, ˆIich.) was settled about 1849, and was chartered as a city in 1869, the charter of that year being revised in 1890.

MANITOBA, a lake of Manitoba province, Canada, situated between 50 n' and 51 48′ N. and 97° 56′ and 99° 35′ W. It has an area of 1711 sq. m., a length of shore line of 535 m., and is at an altitude of 810 ft. above the sea. It has a total length of 119 m., a maximum width of 29 m., discharge of 14,833 cub. ft.

1 There is a very large salt block at Eastlake, I m. east of Manistee, and Filer City, a few miles south-east, is another source of supply.

per second, and has an average depth of 12 ft. Its shores are low, and for the most part swampy. The Waterhen river, which carries the discharge of Lake Winnipegosis, is the only considerable stream entering the lake. It is drained by the Little Saskatchewan river into Lake Winnipeg. It was dis- covered by De la Verendrye in 1739.

MANITOBA, one of the western provinces of the Dominion of Canada, situated midway between the Atlantic and the Pacific coasts of the Dominion, about 1090 m. due west of Quebec. It is bounded S. by the parallel 49 N., which divides it from the United States; W. by 101 20′ W.; N. by 52° 50′ N.; and E. by the western boundary of Ontario. Manitoba formerly belonged to the Hudson's Bay Company, and after the transfer of its territory to Canada was admitted in 1870 as the fifth province of the Dominion. At that time the infant province had an area of 13,500 sq. m., and some 12,000 people, chiefly Indian half-breeds. In 1881 the limits were increased as above, and the province now contains upwards of 73,956 sq. m., extending 264 m. from north to south and upwards of 300 from east to west. The old district of Assiniboia, the result of the efforts in colonization by the earl of Selkirk in 181 1 and succeeding years, was the

nucleus of the province.

The name Manitoba sprang from the union of two Indian words, Manito (the Great Spirit), and Waba (the " narrows " of the lake, which may readily be seen on the map). This well- known strait was a sacred place to the Crees and Saulteaux, who, impressed by the weird sound made by the wind as it rushed through the narrows, as simple children of the prairies called them Manito-Waba, or the " Great Spirit's narrows." The name, arising from this unusual sound, has been by meto- nymy translated into " God's Voice." The word was afterwards contracted into its present form. As there is no accent in Indian words, the natural pronunciation of this name would be Man-I-to-ba. On this account, the custom of both the French and English people of the country was for years before and for several years after 1870 to pronounce it Man-i-to-ba, and even in some cases to spell it " Manitobah." After the formation of the province and the familiar use of the provincial name in the Dominion parliament, where it has occupied much attention for a generation, the pronunciation has changed, so that the province is universally known from ocean to ocean as Man-i-to-ba.

Physical Features. — The drainage of Manitoba is entirely north- eastward to Hudson Bay. The three lakes — whose greatest lengths are 260, 122 and 119 m. respectively — are Winnipeg, Winnipegosis and Manitoba. They are all of irregular shape, but average respectively 30, 18 and 10 m. in width. They are fresh, shallow and tidelcss. Winnipegosis and Manitoba at high water, in spring-time, discharge their overflow through small streams into Winnipeg. The chief rivers emptying into Lake Winnipeg are the Winnipeg, the Red and the Saskatchewan. The Assiniboine river enters the Red river 45 m. from Lake Winnipeg, and at the confluence of the rivers ("The Fork? ") is situated the city of Winnipeg. The Winnipeg, which flows from the territory lying south-east of Lake Winnipeg, is a noble river some 200 m. long, which after leaving Lake of the Woods dashes with its clear water over many cascades, and traverses very beautiful scenery. At its falls from Lake of the Woods is one of the greatest and most easily utilized water-powers in the world, and from falls lower down the river electric power for the city of Winnipeg is obtained. The Red river is at intervals subject to freshets. In a century's experience of the Selkirk colonists there have been four " floods." The highest level of the site of the city of Winnipeg is said to have been under 5 ft. of water for several weeks in May and June in 1826, and l\ ft. in 1852, not covered in 1861 ; only the lowest levels were under water in 1882. The extent of overflow has thus on each occasion been less. The loose soil on the banks of the river is every year carried away in great masses, and the channel has so widened as to render the recurrence of an overflow unlikelj The Saskatchewan, though not in the province, empties into Lake Winnipeg less than half a degree from the northern boundary. It is a mighty river, rising in the Rocky*

Mountains, and crossing eighteen degrees of longitude. Near its mouth are the Grand Rapids. Above these steamers ply to Fort Edmonton, a point upwards of 800 m. north-west of the city of Winnipeg. Steamers run from Grand Rapids, through Lake Winnipeg, up Red river to the city of Winnipeg, important locks having been constructed on the river at St Andrews.

The surface of Manitoba is somewhat level and monotonous. It is chiefly a prairie region, with treeless plains of from 5 to 40 m.

extent, covered in summer with an exuberant vegetable growth, which dies every year. The river banks, however, are fringed with trees, and in the more undulating lands the timber belts vary from a few hundreds of yards to 5 or 10 m. in width, forming at times forests of no inconsiderable size. The chief trees of the country are the aspen (Populus tremuloides) , the ash-leaved maple (Negundo aceroides), oak (Quercus alba), elm (Ulmus Americana), and many varieties of willow. The strawberry, raspberry, currant, plum, cherry and grape are indigenous.

Climate. — The climate of Manitoba, being that of a region of wide extent and of similar conditions, is not subject to frequent variations.

Winter, with cold but clear and bracing weather, usually sets in about the middle of November, and ends with March. In April and May the rivers have opened, the snow has disappeared, and the opportunity has been afforded the farmer of sowing his grain. June is often wet, but most favourable for the springing crops; July and August are warm, but, excepting two or three days at a time, not uncomfortably so; while the autumn weeks of late August and September are very pleasant. Harvest generally extends from the middle of August to near the end of September. The chief crops of the farmer are wheat (which from its flinty hardness and full kernel is the specialty of the Canadian north-west), oats, barley and pease. Hay is made of the native prairie grasses, which grow luxuriantly. From the richness and mellowness of the soil potatoes and all tap- roots reach a great size. Heavy dews in summer give the needed moisture after the rains of June have ceased. The traveller and farmer are at times annoyed by the mosquito.

Area and Population. — The area is 73,956 sq. m., of which 64,066 are land and 9890 water. Pop. (1871), 18,995; (1881), 62,260; (1891), 152,506; (1901), 254,947 (138,332 males, 116,615 females); (1906), 365,688 (205,183 males and 160,505 females). The principal cities and towns are: Winnipeg (90,153), Brandon (10,408), Portage la Prairie

(5106), St Boniface (5119), West Selkirk (2701), and Morden (1437). In 1901, 49,102 families inhabited 48,415 houses, and the proportion of the urban popu- lation to the rural was 27-5 to 72-5. Classified according to place of birth, the principal nationalities were as follows in 1901: Canada, 180,853; England, 20,392; Scotland, 8099; Ireland, 4537; other British possessions, 490; Germany, 2291; Iceland, 5403; Austria, 11,570; Russia and Poland, 8854; Scandinavia, 1772; United States, 6922; other countries, 4028. In -1901 the Indians numbered 5827; half-breeds, 10,372. Of the Indian half-breeds, one half are of English-speaking parentage, and chiefly of Orkney origin; the remainder are known as Metis or Bois-brules, and are descended from French-Canadian voyageurs. In 1875 a number of Russian Mennonites (descen- dants of the Anabaptists of the Reformation) came to the

country. They originally emigrated from Germany to the plains of southern Russia, but came over to Manitoba to escape the conscription. They number upwards of 15,000. About 4000 French Canadians, who had emigrated from Quebec to the United States, have also made the province their home, as well as Icelanders now numbering 20,000. During the decade ending 1907 large reserves were settled with Ruthenians often known as Galicians, Poles and other peoples from central and northern Europe. Some 30,000 of these are found in the province. The remainder of the population is chiefly made up of English-speaking people from the-other provinces of the Dominion, from the United States, from England and Scotland and the north of Ireland.

Religion. — Classified according to religion, the various de- nominations were, in 1901, as follows: Presbyterians, 65,310; Episcopalians, 44,874; Methodists, 49,909; Roman Catholics, 35,622; Baptists, 9098; Lutherans, 16,473; Mennonites, 15,222; Greek Catholics, 7898; other denominations, 9903; not specified,

638.

Government. — The province is under a lieutenant-governor, appointed for a term of five years, with an executive council of sfx members, responsible to the local legislature, which con- sists of forty-two members. It has four members in the Canadian Senate and ten in the House of Commons.

Education. — The dual system of education, established in 1871, was abolished in 1890., and the administrative machinery consolidated under a

minister of the Crown and an advisory board. This act was amended in 1897 to meet the wishes of the Roman Catholic minority, but separate schools were not re- established; nor was the council divided into denominational committees. There are collegiate institutes for more advanced education at Winnipeg, Brandon and Portage la Prairie, with a total of 1094 pupils enrolled. There is also a normal school at .Winnipeg for the training of teachers. Higher education is represented by the provincial university, which teaches science and mathematics, holds examinations, distributes scholarships, and grants degrees in all subjects. It has affiliated to it colleges of the Roman Catholic, Episcopalian, Presbyterian and Methodist denominations, with medical and pharmaceutical colleges. The arts colleges of the churches carry on the several courses required by the university, and send their students to the examinations of the university. A well-equipped agricultural college near Winnipeg is provided for sons and daughters of farmers.

Agriculture is the prevailing industry of Manitoba. Dairy- farming is rapidly increasing in importance, and creameries for the manufacture of butter and cheese are established in almost all parts of the province. Large numbers of horses, cattle, swine and poultry are reared. The growth of cereals is the largest department of agriculture followed.

The following

statistics are interesting:

—

1883.

1890.

1894.

1901.

Bushels.

Bushels.

Bushels.

Bushels.

Wheat Oats Barley- Flax

5,686,355 9,478,965 1,898,430

No statisti

14,665,769

9,513,443

2,069,415

cs collected.

17,172,883

11,907,854

2,981,716

366,000

50,502,085 27,796,588

6,536,155 266,420

Rye Peas Potatoes Other roo

t s

-

»

59,924

18,434

2,035,336

1,841,942

62,261

16,349

4,797,433

2,925,362

The enormous development of the wheat-growing industry is shown by these and the following statistics: —

Wheat inspected in Winnipeg.

51,833,000 bushels

40,396,650

1902

1903 1904 1905 1906

39,784,900 55,849,840 66,636,390

These figures do not include the wheat ground into flour and sent by way of British Columbia to Asia and Australia, nor the wheat retained by the farmers for seed. The Dominion government

maintains an experimental farm of 670 acres at Brandon. The fisheries are all fresh-water, principally white-fish, pickerel and pike. Large quantities of fresh fish caught in lakes Winnipeg and Manitoba are exported to all parts of the United States.

Communications. — The region of the Red River and Assiniboine valleys was opened up by the fur traders, who came by the water- ways from Lake Superior, and afterwards by the water communica- tion with Hudson Bay. While these early traders used the canoe and the York boat,' yet the steam-boat played an important part in the early history of the region from 1.868 till 1885, when access from the United States was gained by steamers down the Red River. The completion of the St Andrew's Rapids canal on Red River, and the Grand Rapids canal on the Saskatchewan river will again give an impetus to inland navigation on the tributaries of Lake Winnipeg. Lake Manitoba also affords opportunity for inland shipping.

The broad expanse of prairie-land in the western provinces of Canada is well suited for the cheap and expeditious building of railways. The first connexion with the United States was by two railways coming down the Red River valley. But the desire for Canadian unity led the Dominion to assist a transcontinental line connecting Manitoba with eastern Canada. The building of the Canadian Pacific railway through almost continuous rocks for 800 miles was one of the greatest engineering feats of modern times. Immediately on the formation of the Canadian Pacific railway company branch lines were begun at Winnipeg and there are eight radial lines running from this centre to all parts of the country. Win- nipeg is thus connected with Montreal on the east, and Vancouver on the west, and is the central point of the Canadian Pacific system, having railway yards and equipment equalled by few places in America. In opposition to the Canadian Pacific railway a southern line was built from Winnipeg to the

American boundary. This fell into the hands of the Northern Pacific railway, but was purchased by the promoters of the Canadian Northern railway. This railway has six radiating lines leaving the city of Winnipeg, and its main line connects Port Arthur on Lake Superior with Edmonton in the west. The Canadian Northern railway has a remarkable network of railways connecting Winnipeg with every corner of Manitoba. The Great Northern railway has also three branch lines in Manitoba and one of these has Winnipeg as its terminus. The grand Trunk Pacific railway, the great transcontinental line promoted by the Laurier government, passes through Manitoba north of the Canadian Pacific, coming from the east deflects southward to pass through Winnipeg, and then strikes northward in a direct line of easy gradients to find its way through the Rocky Mountains to its terminus of Prince Rupert on the north coast of British Columbia.

History. — The first white settlement in Manitoba was made by Pierre Gaultier de Varennes, Sieur de la Verendrye (d. 1749), who, gradually pushing westward from Lake Superior, reached Lake Winnipeg in 1733, and in the following year built a fort not far from the present Fort Alexander. In October 1738 he built another at Fort Rouge, at the junction of the Red and Assiniboine rivers, where is now the city of Winnipeg. After the British conquest of 1763 the west became the scene of a rapidly increasing fur trade, and for many years there was keen rivalry between the Hudson's Bay Company, with its headquarters in England, and the North-West Company of Montreal. French and Scottish farmers and fur-traders gradu- ally settled along the Red River, and by their frequent marriages with the Indians produced a race of metis or half-breeds. From 181 1 to 1818 Lord Selkirk's attempted colonization greatly increased the population; from the time of his failure till 1869 the settlers lived quietly under the mild rule of the Hudson's Bay Company. In that year the newly formed Dominion of Canada bought from the company its territorial and political rights. A too hasty occupation by Canadian officials and settlers led to the rebellion of the Metis under Louis Riel, a native leader. The rebellion was quieted and Sir Garnet Wolseley (now Lord Wolseley) was sent from Canada by the lake route, with several regiments of troops — regulars and volunteers. The Manitoba Act constituting the province was passed by the Canadian parliament in 1870. (See Red River Settlement; and Riel, Louis.)

The admixture of races and religions, and its position as the key to the great West, have ever since made Manitoba the

1 A round-bottomed, strongly built boat, 30 to 36 ft. long, pro- pelled by 8 men. It was devised by the Hudson's Bay Company for carrying freight, as a substitute for the less serviceable canoe, and was named after their York factory, the centre to which the traders brought down the furs for shipment

to England and from which they took back merchandise and supplies to the interior of Rupert's Land.

storm centre of Canadian politics. In the charter granted by the Canadian parliament to the Canadian Pacific railway a clause giving it for twenty years control over the railway construction of the province led to a fierce agitation, till the clause was repealed in 1888. Till 1884 an equally fierce agitation was carried on against Ontario with regard to the eastern boundary of Manitoba. (See Ontario.) In both these disputes the provincial leader was the Hon. John Norquay, in whose veins ran a large admixture of Indian blood. In 1890 changes in the school system unfavourable to the Roman Catholic Church led to a constitutional struggle, to which was due the defeat of the Federal ministry in 1896. Since 1896 its rapid material progress has produced numerous economic problems and disputes, many of which are still unsolved.

(G. Br.; W. L. G.)

MANITOU or Manito (Algonquian Indian, " mystery," " supernatural "), among certain American Indian tribes, a spirit or genius of good or evil. The manitou is almost always an animal, each individual having one assigned him, generally by dream-inspiration, at the greatest religious act of his life — his first fast. This animal then becomes his fetish; its skin is carried as a charm, and representations of it are tattooed and painted on the body or engraved on the weapons.

MANITOWOC (Indian, " Spirit-land"), a city and the county- seat of Manitowoc county, Wisconsin, on the W. shore of Lake Michigan, 75 m. N. of Milwaukee. Pop. (1890), 7710; (1900), 11,786, of whom 2998 were foreign-born; (19T0 census), 13,027. It is served by the Chicago & North- Western, and the Wisconsin Central railways; by ferry across the lake to Frankfort, Mich., and Ludington, Mich.; by the Ann Arbor and the Pere Marquette railways; and by the Goodrich line of lake steamers. The city is finely situated on high ground above the lake at the mouth of the Manitowoc river. At Manitowoc are the county insane asylum and a Polish orphan asylum. The city has a training school for county teachers, a business college, two hospitals and a Carnegie library. There are ship-yards for the construction of both steel and wooden vessels, and several grain elevators. The value of the factory products increased from $1,935,442 in 1900 to $4,427,816 in 1905, or 128-8 per cent. — a greater increase than that of any other city in the state during this period. There is a good

harbour, and the city has a considerable lake commerce in grain, flour, and dairy products. Jacques Vieau established here a post for the North-west Company of fur traders in 1795. The first permanent settlement was made about 1836, and Mani- towoc was chartered as a city in 1870. In Manitowoc county, 18 m. south-west of the city of Manitowoc, is St Nazianz, an unorganized village near which in 1854 a colony or community of German Roman Catholics was established under the leadership of Father Ambrose Oswald, the primary object being to enable poor people by combination and co- operation to supply themselves with the comforts of life at minimum expense and have as much time as possible left for religious thought and worship. The title of the colony's land was vested in Father Oswald after the panic of 1857 until his death in 1874, when he devised the lands to " the colony founded by me." The colony had no legal existence at the time, but was then incorporated as the " Roman Catholic Religious Society of St Nazianz," and as such sued successfully for the bequest. Financially the colony was successful, but as there were some desertions and no new recruits after Father Oswald's death, there were few members by 1909. There are no longer any traces of communism, and the colony's property is actually held by an organization of the local Roman Catholic church.

MANIZALES, a city of Colombia and capital of the department of Caldas (up to 1903 the northern part of Antioquia, 75 m. S. of Medellin, on the old trade route across the Cordillera between Honda, on the Magdalena, and the Cauca Valley. Pop. (1906, estimate), 20,000. The city is situated on a plateau of the western slope of the Cordillera, 6988 ft. above the sea. It is surrounded by rich mineral and agricultural districts.

MANKATO, a city and the county-seat of Blue Earth county, Minnesota, U.S.A., at the southern bend of the Minnesota river, where it is joined by the Blue Earth about 86 m. S.W. of Minneapolis. Pop. (1890), 8838; (1900), 10,599, of whom 2578 were foreign-born; (1910 census), 10,365. Mankato is served by the Chicago, St. Paul, Minneapolis & Omaha, the Chicago & North-Western (both " North Western Lines "), the Chicago, Milwaukee & St Paul, and the Chicago Great Western railways. The city has two fine parks, a Carnegie library, a Federal building, the Immanuel and St Joseph hospitals, two commercial colleges, and a state normal school (1868). The numerous lakes in the neighbourhood, particularly Lake Madison and Lake Washington, are widely known as summer resorts. Four miles west of the city is Minneopa state park (area, 60 acres), in which are Minneopa Falls (60 ft.) and a fine gorge; the park was established by the state in 1905-1906. Mankato has an extensive trade in dairy and agricultural products (especially grain), stone (a pinkish buff limestone is quarried in the vicinity), and forest products. The value of its factory products increased from $1,887,315 in 1900 to $3,422,117 in

1905, or 81-3%.

Mankato was settled about 1853, and was first chartered as a city in 1868. On or near the site of the city stood a village of the Mankato (" blue earth ") band of the Mdewakanton Sioux, who derived their name from one of their chiefs, " Old Mankato." In this region occurred the Sioux uprising of 1862, and from this point operations were carried on which eventually resulted in the subjugation of the Indians and the hanging, at Mankato, in December 1862, of 38 leaders of the revolt. In the uprising the Mankato band was led by another chief named Mankato, who took part in the attack on Ft Ridgeley, Minn., in August, in the engagement on the 3rd of September at Birch Coolie, Minn., and in that on the 23rd of September at Wood Lake, where he was killed.

MANLEY, MARY DE LA RIVIERE (c. 1663-17 24), English writer, daughter of Sir Roger Manley, governor of the Channel Islands, was born on the 7 th of April 1663 in Jersey. She wrote her own biography under the title of The Adventures of Rivella, or the History of the Author of the Atalantis by " Sir Charles Lovemore " (17 14). According to her own account she was left an orphan at the age of sixteen, and beguiled into a mock marriage with a kinsman who deserted her basely three years afterwards. She was patronized for a short time by the duchess of Cleveland, and wrote an unsuccessful comedy, The Lost Lover (1696); in freedom of speech she equalled the most licentious writers of comedy in that generation. Her tragedy, The Royal Mischief (1696) was more successful. From 1696 Mrs Manley was a favourite member of witty and fashionable society. In 1705 appeared The Secret History of Queen Zarah and the Zarazians, a satire on Sarah, duchess of Marlborough, in the guise of romance. This was probably by Mrs Manley, who, four years later, achieved her principal triumph as a writer by her Secret Memoirs . ... of Several Persons of Quality (1709), a scandalous chronicle "from the New Atalantis, an island in the Mediterranean." She was arrested in the autumn of 1709 as the author of a libellous publication, but was dis- charged by the court of queen's bench on the 13th of February 1 7 10. Mrs Manley sought in this scandalous narrative to expose the private vices of the ministers whom Swift, Bolingbroke and Harley combined to drive from office. During the keen political campaign in 1711 she wrote several pamphlets, and many numbers of the Examiner, criticizing persons and policy with equal vivacity. Later were published her tragedy Lucius (1717); The Power of Love, in Seven Novels (1720), and A Stage Coach Journey to Exeter (1725).

MANLIUS, the name of a Roman gens, chiefly patrician, but containing plebeian families also.

1 . Marcus M anlius Capitolinus, a patrician, consul 392 b. c. According to tradition, when in 390 B.C. the besieging Gauls were attempting to scale the Capitol, he was roused by the cackling of the sacred geese, rushed to the spot and threw down the foremost assailants (Livy v. 47; Plutarch, Camillus, 27).

Several years after, seeing a centurion led to prison for debt, he freed him with his own money, and even sold his estate to relieve other poor debtors, while he accused the senate of embezzling public money. He was charged with aspiring to kingly power, and condemned by the comitia, but not until the assembly had adjourned to a place without the walls, where they could no longer see the Capitol which he had saved. His house on the Capitol (the origin of his surname) was razed, and the Manlii resolved that henceforth no patrician Manlius should bear the name of Marcusˆ According to Mommsen, the story of the saving of the Capitol was a later invention to explain his surname, and his attempt to relieve the debtors a fiction of the times of Cinna.

Livy vi. 14-20; Plutarch, Camillus, 36; Cicero, De domo, 38.

2. Titus Manlius Imperiosus Torquatus, twice dictator (353> 349 B – c) an d three times consul (347, 344, 340). When his father, L. Manlius Imperiosus (dictator 363), was brought to trial by the tribune M. Pomponius for abusing his office of dictator, he forced Pomponius to drop the accusation by threaten ing his life (Livy vii. 3-5). In 360, during a war with the Gauls, he slew one of the enemy, a man of gigantic stature, in single combat, and took from him a torques (neck-ornament), whence his surname. When the Latins demanded an equal share in the government of the confederacy, Manlius vowed to kill with his own hand the first Latin he saw in the senate- house. The Latins and Campanians revolted, and Manlius, consul for the third time, marched into Campania and gained two great victories, near Vesuvius, where P. Decius Mus(

Livy vii. 4, 10, 27, viii. 3; Cicero, De off. iii. 31.

3.' Titus Manlius Torquatus, consul 235 B.C. and 224, censor 231, dictator 208. In his first consulship he subjugated Sardinia, recently acquired from the Carthaginians, when the temple of Janus was shut for the second time in Roman history (Livy i. 19). In 216 he opposed the ransoming of the Romans taken prisoners at Cannae; and in 21 5 he was sent to Sardinia and defeated a Carthaginian attempt to regain possession

of the island.

Livy xxiii. 34; Polybius ii. 31.

4. Gnaeus Manlius Vulso, praetor 195, consul 189. He was sent to Asia to conclude peace with Antiochus III., king of Syria. He marched into Pamphylia, defeated the Celts of Galatia on Mt Olympus and drove them back across the Halys. In the winter, assisted by ten delegates sent from Rome, he settled the terms of peace with Antiochus, and in 187 received the honour of a triumph.

Polybius xxii. 16-25; Livy xxxviii. 12-28, 37-50; xxxix. 6.

MANN, HORACE (1796-1859), American educationist, was born in Franklin, Massachusetts, on the 4th of May 1796. His childhood and youth were passed in poverty, and his health was early impaired by hard manual labour. His only means for gratifying his eager desire for books was the small library founded in his native town by Benjamin Franklin and consisting principally of histories and treatises on theology. At the age of twenty he was fitted, in six months, for college, and in 1819, graduated with highest honours, from the Brown University at Providence, Rhode Island, having devoted himself so unremit- tingly to his studies as to weaken further his naturally feeble constitution. He then studied law for a short time at Wrentham, Massachusetts; was tutor in Latin and Greek (1820-1822) and librarian (1821-1823) at Brown University; studied during 1821- 1823 in the famous law school conducted by Judge James Gould at Litchfield, Connecticut; and in 1823 was admitted to the Norfolk (Mass.) bar. For fourteen years, first at Dedham, Massachusetts, and after 1833 at Boston, he devoted himself, with great success, to his profession. Meanwhile he served, with conspicuous ailbity, in the Massachusetts House of Repre- sentatives from 1827 to 1833 and in the Massachusetts Senate

from 1833 to 1837 , for the last two years as president. It was not until he became secretary (1837) of the newly created board of education of Massachusetts, that be began the work which was soon to place him in the foremost rank of American educationists. He held this position till 1848, and worked with a remarkable intensity — holding teachers' conventions, deliver- ing numerous lectures and addresses, carrying on an extensive correspondence, introducing numerous reforms, planning and inaugurating the Massachusetts normal school system, founding and editing The Common School Journal (1838), and preparing a series of Annual Reports, which had a wide circulation and are still considered as being " among the best expositions, if, indeed, they are not the very best ones, of the practical benefits of a common school education both to the individual and to the state " (Hinsdale). The practical result of his work was the

virtual revolutionizing of the common school system of Massachusetts, and indirectly of the common school systems of other states. In carrying out his work he met with bitter opposition, being attacked particularly by certain school-masters of Boston who strongly disapproved of his pedagogical theories and innovations, and by various religious sectaries, who contended against the exclusion of all sectarian instruction from the schools. He answered these attacks in kind, sometimes perhaps with unnecessary vehemence and rancour, but he never faltered in his work, and, an optimist by nature, a disciple of his friend George Combe (q.v.), and a believer in the indefinite improvability of mankind, he was sustained throughout by his conviction that nothing could so much benefit the race, morally, intellectually and materially, as education. Resigning the secretaryship in 1848, he was elected to the national House of Representatives as an anti-slavery Whig to succeed John Quincy Adams, and was re-elected in 1849, and, as an independent candidate, in 1850, serving until March 1853. In 1852 he was the candidate of the Free-soilers for the governorship of Massachusetts, but was defeated. In Congress he was one of the ablest opponents of slavery, contending particularly against the Compromise Measures of 1850, but he was never technically an Abolitionist and he disapproved of the Radicalism of Garrison and his followers. From 1853 until his death, on the second of August 1859, he was president of the newly established Antioch College at Yellow Springs, Ohio, where he taught political economy, intellectual and moral philosophy, and natural theology. The college received insufficient financial support and suffered from the attacks of religious sectaries — he himself was charged with insincerity because, previously a Unitarian, he joined the Christian Connexion, by which the college was founded — but he earned the love of his students, and by his many addresses exerted a beneficial influence upon education in the Middle West.

A collected edition of Mann's writings, together with a memoir (1 vol.) by his second wife, Mary Peabody Mann, a sister of Miss E. P. Peabody, was published (in 5 vols, at Boston in 1867-1891) as the Life and Works of Horace Mann. Of subsequent biographies the best is probably Burke A. Hinsdale's Horace Mann and the Common School Revival in the United States (New York, 1898), in " The Great Educators " series. Among other biographies O. H. Lang's Horace Mann, his Life and Work (New York, 1893), Albert E. Winship's Horace Mann, the Educator (Boston, 1896), and George A. Hubbell's Life of Horace Mann, Educator, Patriot and Reformer (Philadelphia, 1910), may be mentioned. In vol. I. of the Report for 1895-1896 of the United States commissioner of education ihere is a detailed " Bibliography of Horace Mann," containing more than 700 titles.

MANNA, a concrete saccharine exudation obtained by making incisions on the trunk of the flowering or manna ash tree, Fraxi- nus Ornus. The manna

ash is a small tree found in Italy, and extending to Switzerland, South Tirol, Hungary, Greece, Turkey and Asia Minor. It also grows in the islands of Sicily, Corsica and Sardinia. It blossoms early in summer, producing numerous clusters of whitish flowers. At the present day the manna of commerce is collected exclusively in Sicily from cultivated trees, chiefly in the districts around Capaci, Carini, Cinisi and Favarota, small towns 20 to 25 m. W. of Palermo, and in the townships of Geraci, Castelbuono, and other places in the district of Cefalu, 50 to 70 m. E. of Palermo. In the frassinetti or plantations the

trees are placed about 7 ft. apart, and after they are eight years old, and the trunk at least 3 in. in diameter, the collection of manna is begun. This operation is performed in July or August during the dry weather, by making transverse incisions 15 to 2 in. long, and about 1 in. apart, through the bark, one cut being made each day, the first at the bottom of the tree, another directly above the first, and so on. In succeeding years the process is repeated on the untouched sides of the trunk, until the tree has been cut all round and exhausted. It is then cut down, and a young plant arising from the same root takes its place. The finest or flaky manna appears to have been allowed to harden on the stem. A very superior kind, obtained by allowing the juice to encrust pieces of wood or straws inserted in the cuts, is called manna a cannolo. The fragments adhering to the stem, after the finest flakes have been removed are scraped off, and form the small or Tolfa manna of commerce. That which flows from the lower incisions is often collected on tiles or on a concave piece of the prickly pear (Opunlia), but is less crystalline and more glutinous, and is less esteemed.

Manna of good quality dissolves at ordinary temperatures in about 6 parts of water, forming a clear liquid. Its chief consti- tuent is mannite or manna sugar, a hexatomic alcohol, C 6 H 8 (OH)6, which likewise occurs, in much smaller quantity, in certain species of the brown seaweed, Fucus, and in plants of several widely separated natural orders. Mannite is obtained by extracting manna with alcohol and crystallizing the solution. The best manna contains 70 to 80%. It crystallizes in shining rhombic prisms from its aqueous solution and as delicate needles from alcohol. Manna possesses mildly laxative properties, and on account of its sweet taste is employed as a mild aperient for children. It is less used in England now than formerly, but is still largely consumed in South America. In Italy mannite is prepared for sale in the shape of small cones resembling loaf sugar in shape, and is frequently prescribed in medicine instead of manna.

The manna of the present day appears to have been unknown before the 15th century, although a mountain in Sicily with the Arabic name Gibelman, i.e. " manna mountain," appears to point to its collection there during the period that the island was held by the Saracens, 827-1070. In the 16th century it was collected in Calabria, and until recently was produced in the Tuscan Maremma, but none is now brought into commerce from Italy, although the name of Tolfa, a town near Civita Vecchia, is still applied to an inferior variety of the drug.

Various other kinds of manna are known, but none of these has been found to contain mannite. Alhagi manna (Persian and Arabic tar-angubin, also known as terendschabin) is the produce of Alhagi maurorum, a small, spiny, leguminous plant, growing in Arabia, Asia Minor, Persia, Afghanistan, Baluchistan and northern India. This manna occurs in the form of small, roundish, hard, dry tears, varying from the size of a mustard seed to that of a coriander, of a light- brown colour, sweet taste, and senna-like odour. The spines and pods of the plant are often mixed with it. It is collected near Kanda- har and Herat, and imported into India from Cabul and Kandahar. Tamarisk manna (Persian gaz-angubin, tamarisk honey) exudes in June and July from the slender branches of Tamarix gallica, var. mannifera, in the form of honey-like drops, which, in the cold tem- perature of the early morning, are found in the solid state. This secretion is caused by the puncture of an insect, Coccus manniparus. In the valleys of the peninsula of Sinai, especially in the Wady el- Sheikh, this manna (Arabic man), is collected by the Arabs and sold to the monks of St Catherine, who supply it to the pilgrims visiting the convent. It is found also in Persia and the Punjab, but does not appear to be collected in any quantity. This kind of manna seems to be alluded to by Herodotus (vii. 31). Under the same name of gaz-angubin there are sold commonly in the Persian bazaars round cakes, of which a chief ingredient is a manna obtained to the south-west of Ispahan, in the month of August, by shaking the branches or scraping the stems of Astragalus florulentus and A. adscendens. 1 Shir Khist, a manna known to writers on materia medica in the 16th century, is imported into India from Afghanistan and Turkestan to a limited extent ; it is the produce of Cotoneaster nummularia (Rosaceae), and to a less extent of Atraphaxis spinosa (Polygonaceae) ; it is brought chiefly from Herat.

1 See Bombay Lit. Tr., vol. i. art. 16, for details as to the gazangubin. A common Persian sweetmeat consists of wheat-flour kneaded with manna into a thick paste.

Oak manna or Gueze-elefi, according to Haussknecht, is collected from the twigs of Quercus Vallonia and Q. persica, on which it is produced by the puncture of an insect during the month of August. This manna occurs in

the state of agglutinated tears, and forms an object of some industry among the wandering tribes of Kurdistan. It is collected before sunrise, by shaking the grains of manna on to linen cloths spread out beneath the trees, or by dipping the small branches in hot water and evaporating the solution thus obtained. A substance collected by the inhabitants of Laristan from Pyrus glabra strongly resembles oak manna in appearance.

Australian or Eucalyptus manna is found on the leavesof Eucalyptus viminalis, E. Gunnii, var. rubida, E. pulverulenta, &c. The Lerp manna of Australia is of animal origin. '

Briancon manna is met with on the leaves of the common Larch (q.v.), and bide-khecht on those of the willow, Salix fragilis; and a kind of manna was at one time obtained from the cedar.

The manna of the Biblical narrative, notwithstanding the miracu- lous circumstances which distinguish it from anything now known, answers in its description very closely to the tamarisk manna. . See Bentley and Trimen, Medicinal Plants (1880) ; Watt, Dictionary of Economic Products 0} India, under " Manna " (1891). For analyses see A. Ebert, Abst. J.C.S., 1909, 96, p. 176.

MANNERS, CHARLES (1857-), English musician, whose real name was Southcote Mansergh, was born in London, son of Colonel Mansergh, an Irishman. He had a fine bass voice, and was educated for the musical profession in Dublin and at the Royal Academy of Music in London. He began singing in opera in 1881, and in 1882 had great success as the sentry in lolanthe at the Savoy, following this with numerous engagements in opera both in England and America. He married the singer Fanny Moody, already a leading soprano on the operatic stage, in 1890; and in 1897 they formed the Moody-Manners opera company, which had a great success in the provinces and under- took seasons in London in 1902. Manners and his wife were assisted by some other excellent artists, and their enterprise had considerable influence on contemporary English music.

MANNERS-SUTTON, CHARLES (1755-1828), archbishop of Canterbury, was educated at Charterhouse and Cambridge. In 1785 he was appointed to the family living at Averham-with- Kelham,in Nottinghamshire, and in 1791 became dean of Peter- borough. He was consecrated bishop of Norwich in 1792, and two years later received the appointment of dean of Windsor in commendam. In 1805 he was chosen to succeed Archbishop Moore in the see of Canterbury. During his primacy the old archiepiscopal palace at Croydon was sold and the country palace of Addington bought with the proceeds. He presided over the first meeting which issued in the foundation of the National Society, and subsequently lent the scheme his

strong support. He also exerted himself to promote the establishment of the Indian episcopate. His only published works are two sermons, one preached before the Lords (London, 1794), the other before the Society for the Propagation of the Gospel (London, 1797). His brother, Thomas Manners-Sutton, 1st Baron Manners (1 756-1842), was lord chancellor of Ireland. For his son Charles see Canterbury, 1st Viscount.

MANNHEIM, a town of Germany, in the grand-duchy of Baden, lying on the right bank of the Rhine, at its confluence with the Neckar, 39 m. by rail N. of Karlsruhe, 10 m. W. of Heidelberg and 55 m. S. of Frankfort-on-Main. Pop. (1900), 141,131; (1905), 162,607 (of whom about 70,000 are Roman Catholics and 6000 Jews). It is perhaps the most regularly built town in Germany, consisting of twelve parallel streets intersected at right angles by others, which cut it up into 136 square sections of equal size. These blocks are distinguished, after the American fashion, by letters and numerals. Except on the south side all the streets debouch on the promenade, which forms a circle round the town on the site of the old ramparts. Outside this ring are the suburbs Schwetzinger-Vorstadt to the south and Neckar- Vorstadt to the north, others being Lindenhof, Muhlau, Neckarau and Kaferthal. Mannheim is connected by a handsome bridge with Ludwigshafen, a rapidly growing com- mercial and manufacturing town on the left bank of the Rhine, in Bavarian territory. The Neckar is spanned by two bridges.

Nearly the whole of the south-west side of the town is occupied

by the palace (1720-1759), formerly the residence of the elector

- *palatine of the Rhine. It is one of the largest buildings of the*

kind in Germany, covering an area of 15 acres, and having a frontage of about 600 yards. It has 1500 windows. The left wing was totally destroyed by the bombardment of 1795, but has since been restored. The palace contains a picture gallery and collections of natural history and antiquities, and in front of it are two monumental fountains and a monument to the emperor William I. The large and beautiful gardens at the back form the public park of the town. Among the other prominent build- ings are the theatre, the arsenal, the synagogue, the " Kaufhaus," the town-hall {Rathaus, 1771) and the observatory. A newer building is the fine municipal Festhalle with magnificent rooms. The only noteworthy churches are the Jesuit church (1737- 1760), the interior of which is lavishly

decorated with marble and painting; the Koncordienkirche and the Schlosskirche. In front of the theatre are statues of Schiller, August Wilhelm Iffland the actor, and Wolfgang Heribert von Dalberg (1750- 1 806) , intendant of the theatre in the time of Schiller. Mannheim is the chief commercial town on the upper Rhine, and yields in importance to Cologne alone among the lower Rhenish toWns. It stands at the head of the effective navigation on the Rhine, and is not only the largest port on the upper course of that stream, but is the principal emporium for south Germany for such com- modities as cereals, coal, petroleum, timber, sugar and tobacco, with a large trade in hops, wine and other south German produce. Owing to the rapid increase in the traffic, a new harbour at the mouth of the Neckar was opened in 1898. The industries are equal in importance to the transit trade, and embrace metal- working, ironfounding and machine building, the manufac- ture of electric plant, celluloid, automobiles, furniture, cables and chemicals, sugar refining, cigar and tobacco making, and brewing.

Mannheim is the seat of the central board for the navigation of the Rhine, of a high court of justice, and of the grand ducal commissioner for north Baden.

History. — The name of Mannheim was connected with its present site in the 8th century, when a small village belonging to the abbey of Lorsch lay in the marshy district between the Neckar and the Rhine. To the south of this village, on the Rhine, was the castle of Eicholzheim, which acquired some celebrity as the place of confinement assigned to Pope John XXIII. by the council of Constance. The history of modern Mannheim begins, however, with the opening of the 1 7th century, when the elector palatine Frederick IV. founded a town here, which was peopled chiefly with Protestant refugees from Holland. The strongly fortified castle which he erected at the same time had the unfortunate result of making the infant town an object of contention in the Thirty Years' War, during which it was five times taken and retaken. In 1688 Mannheim, which had in the meantime recovered from its former disasters, was captured by the French, and in 1689 it was burned down. Ten years later it was rebuilt on an extended scale, and provided with fortifica- tions by the elector John William. For its subsequent import- ance it was indebted to the elector Charles Philip, who, owing to ecclesiastical disputes, transferred his residence from Heidel- berg to Mannheim in 1720. It remained the capital of the Pala- tinate for nearly sixty years, being especially flourishing under the elector Charles Theodore. In 1794 Mannheim fell into the hands of the French, and in the following year it was retaken by the Austrians after a severe bombardment, which left scarcely a single building uninjured. In 1803 it was assigned to the grand duke of Baden, who caused the fortifications to be razed. To- wards the end of the 18th century Mannheim

attained great celebrity in the literary world as the place where Schiller's early plays were performed for the first time. It was at Mannheim that Kotzebue was assassinated in 1819. During the revolution in Baden in 1849 the town was for a time in the hands of the insurgents, and was afterwards occupied by the Prussians.

See Feder, Geschichte der Stadt Mannheim (1875-1877, 2 vols., new ed. 1903); Pichler, Chronik des Hof-und National Theaters in Mannheim (Mannheim, 1879); Landgraf, Mannheim und Ludwigs- hafen (Zurich, 1890); Die wirlhschaftliche Bedeutung Mannheims, published by the Mannheim Chamber of Commerce (Mannheim, I 9°5) ; the Forschungen zur Geschichte Mannheims und der Pfalz,

published by the Mannheimer Altertumsverein (Leipzig, 1898); and the annual Chronik der Hauptstadt Mannheim (1901 seq.).

MANNING, HENRY EDWARD (1808-1892), English Roman Catholic cardinal, was born at Totteridge, Hertfordshire, on the 15th of July 1808, 1 being the third and youngest son of William Manning, a West India merchant, who was a director of the Bank of England and governor, 1812-1813, and who sat in Parliament for some thirty years, representing in the Tory interest Plympton Earle, Lymington, Evesham, and Penryn consecutively. His mother, Mary, daughter of Henry Leroy Hunter, of Beech Hill, Reading, was of a family said to be of French extraction. Manning's boyhood was mainly spent at Coombe Bank, Sundridge, Kent, where he had for companions Charles and Christopher Wordsworth, afterwards bishops of St Andrews and of Lincoln. He was educated at Harrow, 1822-1827, Dr G. Butler being then the head master, but obtained no distinction beyond being in the cricket eleven in 1825. He matriculated at Balliol College, Oxford, in 1827, and soon made his mark as a debater at the Union, where Gladstone succeeded him as president in 1830. At this date he was ambitious of a political career, but his father had sustained severe losses in business, and in these circumstances Manning, having graduated with first-class honours in 1830, obtained the year following, through Viscount Goderich, a post as supernumerary clerk in the colonial office. This, however, he resigned in 1832, his thoughts having been turned towards a clerical career under Evangelical influences, which affected him deeply throughout life. Returning to Oxford, he was elected a fellow of Merton College, and was ordained; and in 1833 he was presented to the rectory of Lavington-with-Graffham in Sussex by Mrs Sargent, whose granddaughter Caroline he married on the 7th of November 1833, the ceremony being performed by the bride's brother-in-law, Samuel Wilberforce, afterwards bishop of Oxford and of Winchester. Manning's married life was of brief duration. His young and beautiful wife was of a con- sumptive family, and died childless (July 24, 1837). The lasting

sadness that thus early overshadowed him tended to facilitate his acceptance of the austere teaching of the Oxford Tracts; and though he was never an acknowledged disciple of Newman, it was due to the latter's influence that from this date his theology assumed an increasingly High Church character, and his printed sermon on the " Rule of Faith " was taken as a public profession of his alliance with the Tractarians. In 1838 he took a leading part in the Church education movement, by which diocesan boards were established throughout the country; and he wrote an open letter to his bishop in criticism of the recent appointment of the ecclesiastical commission. In December of that year he paid his first visit to Rome, and called on Dr Wiseman in company with W. E. Gladstone. In January 1841 Shuttleworth, bishop of Chichester, appointed him archdeacon, whereupon he began a personal visitation of each parish within his district, completing the task in 1843. In 1842 he published a treatise on The Unity of the Church, and his reputation as an eloquent and earnest preacher being by this time considerable, he was in the same year appointed select preacher by his univer- sity, thus being called upon to fill from time to time the pulpit which Newman, as vicar of St Mary's, was just ceasing to occupy. Four volumes of his sermons appeared between the years 1842 and 1850, and these had reached the 7th, 4th, 3rd and 2nd edi- tions respectively in 1850, but were not afterwards reprinted. In 1844 his portrait was painted by Richmond, and the same year he published a volume of university sermons, in which, however, was not included the one on the Gunpowder Plot k This sermon had much annoyed Newman and his more advanced disciples, but it was a proof that at that date Manning was loyal to the Church of England as Protestant. Newman's secession in 1845 placed Manning in a position of greater responsibility, as one of the High Church leaders, along with Pusey and Ke-ble and Marriott; but it was with Gladstone and James Hope (after- wards Hope-Scott) that he was at this time most closely associ- ated. In the spring of 1847 he was seriously ill, and that autumn

1 Purcell's assertion that the year of his birth was 1807 rests on no trustworthy evidence.

and the following winter he spent abroad, chiefly in Rome, where he saw Newman " wearing the Oratorian habit and dead to the world." He had public and private audiences with the pope on the 9th of April and the nth of May 1848, but recorded next to nothing in his diary concerning them, though numerous other entries show an eager interest in everything connected with the Roman Church, and private papers also indicate that he

recognized at this time grave defects in the Church of England' and a mysterious attractiveness in Roman Catholicism, going so far as to question whether he might not one day be a Roman Catholic himself. Returning to England, he protested, but with moderation, against the appointment of Hampden as bishop of Hereford, and continued to take an active part in the religious education controversy. Through the influence of Samuel Wilberforce, he was offered the post of sub-almoner to Queen Victoria, always recognized as a stepping-stone to the episcopal bench, and his refusal of it was honourably consonant with all else in his career as an Anglican dignitary, in which he united pastoral diligence with an asceticism that was then quite excep- tional. In 1850 the decision of the privy council, that the bishop of Exeter was bound to institute the Rev. G. C. Gorham to the benefice of Brampford Speke in spite of the latter's acknowledged disbelief in the doctrine of baptismal regeneration, brought to a crisis the position within the Church of England of those who believed in that Church as a legitimate part of the infallible Ecclesia docens. Manning made it clear that he regarded the matter as vital, though he did not act on this conviction until no hope remained of the decision being set aside or practically an- nulled by joint action of the bishops. In July he addressed to his bishop an open letter on " The Appellate Jurisdiction of the Crown in Matters Spiritual," and he also took part in a meeting in London which protested against the decision. In the autumn of this year (1850) was the great popular outcry against the " Papal aggression " (see Wiseman), and Manning, feeling himself unable to take part in this protest, resigned, early in December his benefice and his archdeaconry; and writing to Hope-Scott, who a little later became a Roman Catholic with him, stated his conviction that the alternative was " either Rome or licence of thought and will." He was received into the Roman Catholic Church by Father Brownbill, S.J., at the church in Farm Street, on Passion Sunday, the 6th of April 1851. On the following Sunday he was confirmed and received to communion by Cardinal Wiseman, who also, within ten weeks of his reception, ordained him priest. Manning thereupon proceeded to Rome to pursue his theological studies, residing at the college known as the " Academy for Noble Ecclesiastics," and attending lectures by Perrone and Passaglia among others. The pope frequently received him in private audience, and in 1854 conferred on him the degree of D.D. During his visits to England he was at the disposal of Cardinal Wiseman, who through him, at the time of the Crimean War, was enabled to obtain from the government the concession that for the future Roman Catholic army chaplains should not be regarded as part of the staff of the Protestant chaplain-general. In 1857 the pope, proprio motu, appointed him provost (or head of the chapter) of Westminster, and the same year he took up his residence in Bayswater as superior of a community known as the " Oblates of St Charles," an associ- ation of secular priests on the same lines as the institute of the Oratory, but

with this difference, that they are by their consti- tution at the beck and call of the bishop in whose diocese they live. The community was thus of the greatest service to Cardinal „ Wiseman, whose right-hand man Manning thenceforward be- came. During the eight years of his life at Bayswater he was most active in all the duties of the priesthood, preaching, hearing confessions, and receiving converts; and he was notably zealous to promote in England all that was specially Roman and papal, thus giving offence to old-fashioned Catholics, both clerical and lay, many of whom were largely influenced by Gallican ideas, and had with difficulty accepted the restoration of the hierarchy in 1850. In i860 he delivered a course of lectures on the pope's temporal power, at that date seriously threatened, and shortly afterwards he was appointed a papal domestic prelate, thus

becoming a " Monsignor," to be addressed as " Right Reverend." He was now generally recognized as the able and effective leader of the Ultramontane party among English Roman Catholics, acting always, however, in subordination to Cardinal Wiseman; and on the latter's death (Feb. 15, 1865) it was felt that, if Manning should succeed to the vacant archbishopric, the triumph of Ultramontanism would be secured. Such a consummation not being desired by the Westminster chapter, they submitted to the pope three names, and Manning's was not one of them. Great efforts were made to secure the succession for the titular archbishop Errington, who at one time had been Wiseman's coadjutor with that right reserved to him, but who had been ousted from that position by the pope acting under Manning's influence. In such circumstances Pius IX. could hardly do otherwise than ignore Errington's nomination, as he also ignored the nomination of Clifford, bishop of Clifton, and of Grant, bishop of Southwark; and, by what he humorously described as " the Lord's own coup d'itat," he appointed Manning to the archi- episcopal see. Consecrated at the pro-cathedral at Moorfields (since destroyed) by Dr Ullathorne, bishop of Birmingham (June 8, 1865), and enthroned there (Nov. 6), after receiving the pallium in Rome, Manning began his work as archbishop by devoting himself especially to the religious education of the poor and to the establishment of Catholic industrial and reformatory schools. He steadily opposed whatever might encourage the admission of Catholics to the national universities, and so put his foot down on Newman's project to open a branch house of the Oratory at Oxford with himself as superior. He made an un- successful and costly effort to establish a Catholic university at Kensington, and he also made provision for a diocesan seminary of strictly ecclesiastical type. Jealous of the exclusive claims of the Roman Church, he procured a further condemnation at Rome of the " Association for the Promotion of the Unity of Christendom," which advocated prayers for the accomplishment of a kind of federal union between the Roman, Greek and Angli- can Churches, and in a pastoral letter he insisted on the

heretical assumption implied in such an undertaking. He also worked for the due recognition of the dignity of the secular or pastoral clergy, whose position seemed to be threatened by the growing ascend- ancy of the regulars, and especially of the Jesuits, whom, as a practically distinct organization within the Church, he steadily opposed. In addition to his diocesan synods, he presided in 1873 over the fourth provincial synod of Westminster, which legislated on " acatholic " universities, church music, mixed mar- riages, and the order of a priest's household, having previously taken part, as theologian, in the provincial synods of 1853 and 1859, with a hand in the preparation of their decrees. But it was chiefly through his strenuous advocacy of the policy of defining papal infallibility at the Vatican council (1869-1870) that Manning's name obtained world-wide renown. In this he was instant in season and out of season. He brought to Rome a petition in its favour from his chapter at Westminster, and during the progress of the council he laboured incessantly to overcome the opposition of the " inopportunists." And he never ceased to regard it as one of the chief privileges of his life that he had been able to take an active part in securing the definition, and in having heard with his own ears that doctrine proclaimed as a part of divine revelation. In 1875 he published a reply to Gladstone's attack on the Vatican decrees; and on the 15th of March in that year he was created cardinal, with the title of SS. Andrew and Gregory on the Coelian. He was present at the death of Pius IX. (Feb. 7, 1878); and in the subsequent con- clave, while some Italian cardinals were prepared to vote for his election to fill the vacant chair, he himself supported Cardinal Pecci, afterwards known as Leo XIII. With him, however, Manning found less sympathy than with his predecessor, though Manning's advocacy of the claims of labour attracted Leo's attention, and influenced the encyclical which he issued on the subject. After the Vatican council, and more especially after the death of Pius IX., Manning devoted his attention mainly to social questions, and with these his name was popularly associated during the last fifteen years of his life. From 1872 onwards he

was a strict teetotaller, not touching alcohol even as a medicine, and there was some murmuring among his clergy that his teach- ing on this subject verged on heresy. But his example and his zeal profoundly influenced for good the Irish poor forming the majority of his flock; and the " League of the Cross " which he founded, and which held annual demonstrations at the Crystal Palace, numbered nearly 30,000 members in London alone in 1874. He sat on two royal commissions, the one on the housing of the working classes (1884), and the other on primary education (1886); and

in each case the report showed evident marks of his influence, which his fellow-commissioners recognized as that of a wise and competent social reformer. In the cause of labour he was active for many years, and in 1872 he set an example to the clergy of all the churches by taking a prominent part in a meeting held in Exeter Hall on behalf of the newly established Agri- cultural Labourers' Union, Joseph Arch and Charles Bradlaugh being among those who sat with him on the platform. In later years his strenuous advocacy of the claims of the working classes, and his declaration that " every man has a right to work or to bread " led to his being denounced as a Socialist. That he was such he denied more than once (Lemire, Le Cardinal Manning et son action sociale, Paris, 1893, p. 210), nor was he ever a Socialist in principle; but he favoured some of the methods of Socialism, because they alone seemed to him practi- cally to meet the case of that pressing poverty which appealed to his heart. He took a leading part in the settlement of the dockers' strike in the autumn of 1889, and his patient and effectual action on this and on similar occasions secured for him the esteem and affection of great numbers of working men, so that his death on the 14th of January 1892, and his funeral a week later, were the occasion for a remarkable demonstration of popular veneration. The Roman Catholic Cathedral at Westminster is his joint memorial with his predecessor, Cardinal Wiseman.

Whatever may have been the value of Manning's services to the Roman Catholic Church in England in bringing it, as he did, up to a high level of what in earlier years was com- monly denounced as Ultramontanism, it is certain that by his social action, a's well as by the earnestness and holiness of his life, he greatly advanced, in the minds of his countrymen generally, their estimate of the character and value of Catholicism. Pre- eminently he was a devout ecclesiastic, a " great priest "; and his sermons, both Anglican and Catholic, are marked by fervour and dignity, by a conviction of his own authoritative mission as preacher, and by an eloquent insistence on considerations such as warm the heart and bend the will rather than on such as force the intellect to assent. But many of his instincts were those of a statesman, a diplomatist, a man of the world, even of a business man; and herein lay, at least in part, the secret of his influence and success. Intellectually he did not stand in the front rank. He was neither a philosopher nor a literary genius. Among his many publications, written, it is only fair to admit, amidst the urgent pressure of practical work, there is barely a page or even a sentence that bears the stamp of immortality. But within a somewhat narrower field he worked with patience, industry, and self-denying zeal; his ambition, which seemed to many personal, was rather the outcome of his devotion to the cause of the Church; and in the later years of his life especially he showed that he loved righteousness and hated iniquity, and that he realized as clearly as any one that the service of God

was incomplete without the service of man.

The publication in 1896 of Manning's Life, by Purcell, was the occasion for some controversy on the ethics of biography. Edward Purcell was an obscure Catholic journalist, to whom Manning, late in life, had entrusted, rather by way of charitable bequest, his private diaries and other confidential papers. It thus came to pass that in Purcell's voluminous biography much that was obviously never intended for the public eye was, perhaps inadvertently, printed, together with a good deal of ungenerous comment. The facts disclosed which mainly attracted attention were: (1) that Manning, while yet formally an Anglican, and while publicly and privately dissuading others from joining the Roman Catholic Church, was yet within a little convinced that it was his own duty and destiny to take that step himself; (2) that he was continually intriguing at

the back-stairs of the Vatican for the furtherance of his own views as to what was desirable in matters ecclesiastical ; (3) that his rela- tions with Newman were very unfriendly; and (4) that, while for the most part he exhibited towards his own clergy a frigid and masterful demeanour, he held privately very cordial relations with men of diverse religions or of no theological beliefs at all. And certainly Manning does betray in these autobiographical fragments an unheroic sensitiveness to the verdict of posterity on his career. But independent critics (among whom may specially be named Francois de Pressense) held that Manning came- well through the ordeal, and that Purcell's Life had great value as an unintentionally frank revelation of character. (A. W. Hu.)

MANNY, SIR WALTER DE MANNY, Baron de (d. 1372), soldier of fortune and founder of the Charterhouse, younger son of Jean de Mauny, known as Le Borgne de Mauny, by his wife Jeanne de Jenlain, was a native of Hainaut, from whose counts he claimed descent. Manny — the name is thus spelt by most English writers — was a patron and friend of Froissart, in whose chronicles his exploits have a conspicuous and probably an exaggerated place. He appears to have first come to England as an esquire of Queen Philippa in 1327, and he took'a distin- guished part in the Scottish wars of Edward III. In 1337 he was placed in command of an English fleet, and in the following year accompanied Edward to the continent, where in the campaigns of the next few years he proved himself one of the boldest and ablest of the English king's military commanders. He was summoned to parliament as a baron by writ from the 12th of November 1347 to the 8th of January 1371. In 1359 he was made a knight of the Garter; and at various times he received extensive grants of land both in England and in France. He was frequently employed by King Edward in the conduct of diplo- matic negotiations as well as in military commands. He was one of those charged with the safe custody of the

French king John when a prisoner at Calais in 1360; in 1369 he was second in command under John of Gaunt in his invasion of France.

But Manny is chiefly remembered for his share in the found- ation of the Charterhouse in London. In 1349 he bought some acres of land near Smithfield, which were consecrated as a bury- ing-place where large numbers of the victims of the Black Death were interred; and here he built a chapel, from which the place obtained the name of " Newchurchhaw. " The chapel and ground were bought from Manny by the bishop of London, Michael de Northburgh, who died in 1361 and by his will bequeathed a large sum of money to found there a Carthusian convent. It is not clear whether this direction was ever carried out; for in 13 71 Manny obtained letters patent from King Edward III. per- mitting him to found, apparently on the same site, a Carthusian, monastery called " La Salutation Mere Dieu," where the monks were to pray for the soul of Northburgh as well as for the soul of Manny himself. The bishop's bequest may have contributed to the building and endowment of the house; or possibly, as seems to be implied by a bull granted by Urban VI, in 1378, there were originally two kindred establishments owing their foundation to Northburgh and Manny respectively. At all events Manny, who died early in 1372, left instructions that he was to be buried in the church of the Carthusian monastery founded by himself. About 1335 he married Margaret, daughter and heiress of Thomas Plantagenet, earl of Norfolk, son of King Edward I., whose first husband had been John, Lord Segrave. This lady, who outlived Manny by many years, was countess of Norfolk in her own right, and she was created duchess of Norfolk in 1397. Manny left no surviving son. His daughter Anne,

Baroness de Manny in her own right, married John Hastings,

2nd earl of Pembroke; and on the death of her only son unmarried in 1389, the barony of Manny became extinct.

See CEuvres de Froissart, I. Chroniques, edited by Baron Kervyn de Lettenhove (Brussels, 1867-1877), and the Globe edition of Froissart's Chronicles (Eng. trans., London, 1895); G. F. Beltz, Memorials of the Most Noble Order of the Garter (London, 1841); Chronicon Angliae 1323-1388, edited by E. Maunde Thompson (Rolls series 64, London, 1874); Philip Bearcroft, An Historical Account of Thomas Sutton and of his Foundation in Charterhouse (London,

1737)-

MANNYNG, ROBERT (Robert of Brunne) (c. 1264-1340?), English poet, was a native of Brunne, now Bourne, in

Lincolnshire. About 6 m. from Bourne was the Gilbertine monastery of Sempringham, founded by Sir Gilbert de Sempring- ham in 1139. The foundation provided for seven to thirteen canons, with a number of lay brothers and a community of nuns. No books were allowed to the lay brothers and nothing could be written in the monastery without the prior's consent. Mannyng entered this house in 1288, when, according to the rules, he must have been at least 24 years of age, if, as is supposed, he was a lay brother. He says he was at Cambridge with Robert de Bruce and his two brothers, Thomas and Alexander, but this does not necessarily imply that he was a fellow-student. There was a Gilbertine monastery at Cambridge, and Mannyng may have been there on business connected with his order. When he wrote Handlyng Synne he had been (11. 63-76) fifteen years in the priory, beginning to write in " englysch rime in 1303." Thirty-five years later he began his Story of Inglande, and had removed (n. 139, &c.) to the monastery of Sixille (now Sixhills), near Market Rasen, in north Lincolnshire.

Handlyng Synne, a poem of nearly 13,000 lines, is a free trans- lation, with many additions and amplifications, from William of Waddington's Manuel des Pechiez. It is a series of metrical homilies on the Ten Commandments, the Seven Deadly Sins and the Seven Sacraments, illustrated by a number of amusing stories from various sources. The Cursor Mundi had turned re- ligious history into something not very different from a romance of chivalry, and in the stories of Handlyng Synne the in- fluence of the fabliaux is not far to seek. Mannyng wrote in the English tongue not for learned but for " lewd " men, " that talys and ryme wyl blethly here," to occupy the leisure hours during which they might otherwise fall into " vylanye, dedly synne or other folye." Each of his twenty-four topics has its complement of stories. He tells of the English observance of Saturday afternoon as holy to the Virgin, and has much to say of popular amusements, which become sins when they keep people away from church. Tournaments in particular are fer- tile occasions of all the deadly sins; and mystery plays, except those of the birth and resurrection of Christ performed in the churches, also lead men into transgression. He inveighs against the oppression of the poor by the rich, reproves those who, weary of matins or mass, spend their time in church " jang- ling," telling tales, and wondering where they will get the best ale, and revives the legend of the dancers at the church door during mass who were cursed by the priest md went on dancing for a twelvemonth without cessation. Hf loved music himself, and justified this profane pleasure by th . example of Bishop Grosseteste, who lodged his harper in the hamber next

his own; but he holds up as a warning to gleemen ', he fate of the minstrel who sang loud while the bishop said grace, and was miserably killed by a falling stone in consequence. The old monk's keen observation makes the book a far more valuable contribution to history than his professed chronicle. It is a storehouse of quaint stories and out-of-the-way information on manners and customs.

His chronicle, The Story of Inglande, was also written for the solace and amusement of the unlearned when they sit together in fellowship (n. 6-10). The earlier half is written in octosyllabic verse, and begins with the story of the Deluge. The genealogy of Locrine, king of Britain, is traced back to Noah, through Aeneas, and the chronicler relates the incidents of the Trojan war as told by Dares the Phrygian. From this point he follows closely the Brut of Wace. He loved stories for their own sake, and found fault with Wace for questioning the miraculous elements in the legend of Arthur. In the second half of his chronicle, which is less simple in style, he translates from the French of Pierre de Langtoft. He writes in rhyming alexan- drines, and in the latter part of the work uses middle rhymes. Mannyng's Chronicle marks a change in national sentiment. Though he regards the Norman domination as a " bondage," he is loud in his praises of Edward I., "Edward of Inglond."

The linguistic importance of Mannyng's work is very great. He used very few of those Teutonic words which, though still in use, were eventually to drop out of the language, and he introduced

a great number of French words destined to be permanently adopted in English. Moreover, he employed comparatively few obsolete inflexions, and his work no doubt furthered the adoption of the Midland dialect as the acknowledged literary instrument. T. L. Kington-Oliphant (Old and Middle English, 1878) regards his work as the definite starting point of the New English which with slight changes was to form the language of the Book of Common Prayer.

A third work, usually ascribed to Mannyng, chiefly on the ground of its existing side by side with the Handlyng Synne in the Harleian and Bodleian MSS., is the Medylacyuns of the Soper of oure lorde Jhesu, And also of hys passyun And eke of the peynes of hys swete modyr, Mayden marye, a free translation of St Bonaventura's De coena et passione Domini. ...

Robert of Brunne's Chronicle exists in two MSS. : Petyt MS. 511, written in the Northern dialect, in the Inner Temple library; and Lambeth MS. 131 in a Midland dialect. The first part was edited The Story of England . . . (1887) for the Rolls Series, with an introductory essay by F. J. Furnivall ; the second part was published by Thomas Hearne as Peter Langtoft s Chronicle . . . (1725). Peter Langtoft's French version was edited by Thomas Wright for the " Rolls Series " in 1866. Of Handlyng Synne there are complete MSS. in the Bodleian library (MS. 415) and in the British Museum (Harleian MS. 1701), and a fragment in the library of Dulwich College (MS. 24). It was edited, with Waddington's text in parallel columns, by F. J. Furnivall for the Roxburghe Club (1862), and for the Early English Text Society (1901-1903). The Meditacyun was edited from the Bodleian and Harleian MSS. by J. Meadow Cooper for the same society (1875). See also Gerhard Hellmers, Ueber die Sprache Robert Mannyngs of Brunne und iiber die Autorschaft der ihm zuge- schriebenen Meditations … . (Gdttingen, 1885), which contains an analysis of the dialectic peculiarities of Mannyng's work; O. Boerner, " Die Sprache Robert Mannyngs "... in Studien zur engl, Philologie (vol. xii., Halle, 1904) and Oskar Preussner, Robert Mannyne of Brunne's Ubersetzung von Pierre de Langtofts Chronicle (Breslau, 1891). All accounts of his life are based on his own work. For the Semp' ingham priory see Dugdale, Monasticon vi. 947 seq., and Miss Rose Graham's 5. Gilbert of Sempringham and the Gilberlines

(1901).

MANCEUVRES, MILITARY. Manoeuvres may be defined as the higher training for war of troops of all arms in large bodies, and have been carried out in most countries ever since the first formation of standing armies. In England no manoeuvres or camps of exercise appear to have been held till the beginning of the 19th century, when Sir John Moore trained the famous Light Brigade at Shorncliffe camp. In France, however, under Louis XIV., large camps of instruction were frequently held, the earliest recorded being that of 18,000 troops at Compiegne in 1666; and these were continued at intervals under his successor. At these French camps much time was devoted to ceremonial, and the manoeuvres performed were of an elementary descrip- tion. Still their effect upon the training of the army for war was far-reaching, and bore fruit in the

numerous wars in the first half of the 18th century. Moreover, experiments were made with proposed tactical systems and technical improvements, as in the case of the contest between I'ordre mince and I'ordre profonde (see Infantry) between 1785 and 1790. Other coun- tries followed suit, but it was reserved for Frederick the Great to inaugurate a system of real manoeuvres and to develop, on the training-ground the system of tactics which bore such good fruit in his various campaigns. The numbers of troops assem- bled were large; for example, at Spandau in 1753, when 36,000 men carried out manoeuvres for twelve days. The king laid the greatest stress on these exercises, and took immense pains to turn to account the experience gained in his campaigns. Great secrecy was observed, and before the Seven Years' War no stranger was allowed to be present. The result of all this careful training was shown in the Seven Years' War, and after it the Prussian manoeuvres gained a reputation which they have maintained to this day. But with the passing away of the great king they became more and more pedantic, and the fatal results were shown in 1806. After the Napoleonic wars yearly manoeuvres became the custom in every large Continental army. Great Britain alone thought she could dispense with them, perhaps because of the constant practical training her troops and officers received in the various Indian and colonial wars:

and it was not till 1853 that, by the advice of the Prince Consort, a body of troops were gathered together for a camp of exercise on Chobham Common, and that eventually a standing camp of exercise was evolved out of the temporary camp formed during the Crimean War at Aldershot.

Most continental armies have, since the great successes of the Germans in 1870, copied more or less their system of military train- ing ; hence it is appropriate to consider their methods first. The whole training of the army is based on a yearly programme of gradual progression, from the joining of the recruits in October to the training by squads, companies, battalions and regiments, the latter finishing their field training about the middle of August, when the manoeuvre period begins. First of all, the brigades go through five working days of drills on fiat ground, to get them under the hand of their commanders and prepare them for manoeuvres. Then follow ten working days of manoeuvres in new and varied ground, of which four are " brigade," four " divisional " and two " corps " manoeuvres, in each case the unit named being divided into two portions of all arms, which manoeuvre against one another. Each year two or more army corps carry out manoeuvres before the emperor, working against one another. The chief feature of the German manoeuvres is the free hand allowed to leaders of

sides. Of course, for reasons of supply and transport, it is necessary to keep the troops within a certain area, but the general and special ideas ‘ are so framed that, while retaining their own initiative, the leaders of sides have to give such orders as will suit the arrangements made by the director of manoeuvres for supply. The faculty of quartering troops on private individuals to any extent, and the fact of the troops being provided with portable tent equipment, give great latitude to the German leaders in their choice of quarters for troops, and so increase the similitude of manoeuvres to war. The Austrian and Italian man- oeuvres are a close copy of the German, but those of the French present the peculiarity of. a certain amount of prearrangement, especially at grand manoeuvres, when it is frequently laid down beforehand which side is to be victorious. Thus a series of pictures of war is presented, but the manoeuvres are hardly a test of the skill of the rival leaders. But, just as in recent years in France this practice has been modified, so also the entire liberty given to com- manders in the German manoeuvres in 1906-7 had to be curtailed in the following years owing to the strain of forced marches which it entailed on the troops.

In Russia the climatic and social conditions, and the distribution of the army, necessitate a quite peculiar system. The troops leave their barracks and move into standing camps, generally in May, and in these for about three months their training up to that in battalions is carried out on the drill ground. Camps of mixed units are then formed for a month, and from them, but always over the same ground, the manoeuvres of regiments, brigades and divisions are performed. Then follow the so-called mobile manoeuvres, which last for ten days or a fortnight. Of all European manoeuvres these are perhaps the nearest approach to war, for the sides start a great distance apart, and ample time is allowed for cavalry reconnaissance. Besides, the Russian soldier does not require elaborate arrangements for supply; hence the director is not so tied down by consideration of this matter as in other armies. A political colour is sometimes given to such large assemblages of troops, especially when the manoeuvres take place in frontier districts.

In England the military authorities have long been hampered in the organization of manoeuvres by the necessity of carrying them out on very limited portions of government land or on areas lent as a favour by, or hired from, private individuals. There has been no want of recognition by the military authorities of the necessity for, and value of, manoeuvres, and the training at the camps of instruc tion has been supplemented as far as possible by small manoeuvres on such portions of country as could be made available. But, with the exception of spasmodic efforts in 1871 and 1872, it was not until 1897 that the government allowed itself to be convinced by its military advisers, and passed a Military Manoeuvres Act, by which certain districts could be ” proclaimed ” for purposes of manoeuvres, and

troops in consequence could traverse all ground. In 1898 the first manoeuvres under this Act were held in Wilts and Dorset, and were intended to be repeated at fixed intervals in future years. In addition, every effort was made to add to the existing permanent training grounds for troops, and ground was acquired on Salisbury Plain with the intention of developing it into a second Aldershot. But the training on those well-known grounds, excellent as it is in itself as a preparation, is not " manoeuvres," and never can do away with the necessity for them, with a more or less free hand given to the leaders over fresh country.

Much misconception prevails as to the nature and limitation of the military instruction to be imparted at manoeuvres. Manoeuvres are a school for the leaders, in a less degree for the led, and conse-

1 The " general idea " is a document, communicated to both sides, containing such general information of the war — the supposed frontiers, previous battles, &c. — as would be matters of coi.imon knowledge. The "special idea" of each side comprises the in- structions upon which it is acting.

quently the minor details of instruction must be completed, and the troops fully trained as units, before they can take part in them with advantage. The time during which large bodies of troops can be kept together for manoeuvres is too short, and the expense too great, to justify time being spent on exercises which might as well be carried out in the ordinary stations or at the great training camps. There- fore it may be laid down as a principle that manoeuvres, properly so-called, should be begun with units not smaller than a brigade of infantry on each side, with a due proportion of the other arms attached. It is useful if these can precede the manoeuvres of larger bodies, as the training is then progressive and the result more satisfactory. 2

The choice of ground is ot great importance. Its extent should be proportionate to the force to be employed and the nature of the instruction to be imparted. It should not be too hilly nor yet too flat, but both descriptions should be judiciously combined; and regard must be had to the water supply and the road and railway net for the convenience of the supply service. Once the ground has been selected, the general and special ideas must be so framed that the troops are thereby confined to the chosen ground without seeming to tie the hands of the leaders of sides. It is of great advantage if the same idea can be maintained throughout each series of opera- tions, as thereby the interest of all concerned and the likeness to actual warfare are increased; and, if possible, the " state of war " should be continuous also. Within the limits of the special idea, the utmost latitude should be left to leaders ; but if the orders of one or both sides seem to

render a collision unlikely, the director should so modify the special idea as to compel one or other to re-cast his orders in such a way that contact is brought about. Such interfer- ence will scarcely be necessary after the first issues of orders in each series. In war the number of marching days vastly outnumbers those of fighting, but in manoeuvres this must not be allowed ; tactical instruction is what is desired, and a manoeuvre day in which none is imparted is not fully utilized. It is not necessary that all the troops should be engaged, but at least the advanced bodies must come into contact, and the rest must carry out marches as on active service. Each action should be fought to its end, " Cease firing " being sounded when the crisis has been reached; and on a decision being given by the director, one side should retire and the fight be broken off in a proper military manner. The troops should place outposts each day, and act in all respects as if on active service.

The quartering and supply of troops are the chief difficulties in the arrangement of manoeuvres, and afford ample opportunity for the practising of the officers and departments responsible for these matters. In England, where in peace it is not possible to billet troops on private individuals, quartering must be replaced by en- campments or bivouacs, and the selection of ground for them affords invaluable practice. If possible, their position should be selected to conform to the military situation ; but if it is found necessary, for reasons of water or food supply, to withdraw troops to positions other than such as they would occupy in real warfare, time should be allowed them on the following day to regain the positions they would otherwise have occupied. It is next to impossible, for various reasons, financial and other, to organize the food supply in man- oeuvres as it would be in war. Sufficient transport cadres cannot be kept up in peace, and consequently recourse must be had to hired transport, which cannot be treated as a military body. Again, food cannot be requisitioned, and local purchase at the time cannot be trusted to ; so dep6ts of supplies must be formed beforehand in the manoeuvres area, which more or less tie the hands of the supply service. Still, with a judicious choice of the points at which these are formed, much may be done to approximate to service conditions, and the more nearly these are realized the more instructive for the supply will the manoeuvres become.

Finally, a word must be said as to the umpire staff, which repre- sents the bullets. The most careful selection of officers for this important duty is necessary, and they must have sufficient authority and be in sufficient number to make their influence everywhere felt. Their principal object should be to come to a decision quickly, so as to prevent the occurrence of unreal situations; and by constant intercommunication they must ensure uniformity in their decisions, and so maintain continuity of the action all over the manoeuvres battlefield. (J. M. Gr.)

MANOMETER (Gr. navos, thin or loose; juer pov, a measure), an instrument for measuring the pressures exerted by gases or vapours. An alternative name is pressure gauge, but this term may conveniently be restricted to manometers used in connexion with steam-boilers, &c. The principle of hydro- statics suggest the most common forms. Suppose we have a U tube (fig. 1), containing a liquid: if the pressures on the surfaces of the liquid be equal, then the surfaces will be at the same height. If, on the other hand, the pressure in one Umb be greater than the pressure in the other, the surfaces will be at

2 Manoeuvres incidentally afford an excellent opportunity of testing new patterns of equipment, transport or other materiel under conditions approximating to those of active service.

different heights, the difference being directly proportional to the difference of pressures, and inversely as the specific gravity of the liquid used.

Two forms are in use: (i) the " open-tube," in which the pressure in one limb is equal to the atmospheric pressure, and (2) the ' closed- tube," in which the experimental pressure is balanced against the liquid column and the air compressed into the upper part of a closed limb of the tube. In the " open tube " form (fig. 1) the pressure on

Fig. 1.

Fig. 2.

tn? surface a is equal to the pressure on the surface at b (one atmo- sphere) plus the hydrostatic pressure exerted by the liquid column of height a b. The liquid commonly used is mercury. If a scale be placed behind the limbs of the tube, so that the difference a b can be directly determined, then the pressure in a is at once expressible as P + a b in millimetres or inches of mercury, where P is the atmos- pheric pressure, known from an ordinary barometric observation. In the " closed tube " form (fig. 2) the calculation is not so simple, for the variation of pressure on the mercury surface in the closed limb has to be taken into account. Suppose the length of the air column in the closed limb be h when the mercury is at the same height in both tubes. Applying the experimental pressure to the open end, if this be greater than atmospheric pressure the mercury column will rise and the air column diminish in the closed limb. Let the length of the air column be h', then its pressure is hjh' atmospheres. The difference in height of the mercury columns in the two limbs is 2(h-h'), and the pressure in the open

limb is obviously equal to that of a column of mercury of length 2(h-h'), plus hjh' atmospheres. These instruments are equally serviceable for determining pressures less than one atmosphere. In laboratory practice, e.g. when it is required to determine the degree of exhaust of a water pump, a common form consists of a vertical glass tube having its lower end imujersed in a basin of mercury, and its upper end con- nected by means of an intermediate vessel to the exhaust. The mercury rises in the tube, and the difference between the barometric height and the length of the mercury column gives the pressure attained.

MANOR. Any definition of a manor, in land tenure, must take note of two elements — economic and political. The manor has an estate for its basis, although it need not coincide with an estate, but may be wider. It is also a political unit, a district formed for purposes of government, although the political functions made over to it may greatly vary. As a lordship based on land tenure, the manor necessarily comprises a ruler and a population dependent on him, and the characteristic trait of such dependence consists not in ownership extending over persons, as in slave-holding communities, nor in contractual arrangements, as in a modern economic organization, but in various forms and degrees of subjection, chiefly regulated by custom. In the sense mentioned the manor is by no means a peculiarly English institution; it occurs in every country where feudalism got a hold. Under other names we find it not only in France, Germany, Italy, Spain, but also, to a certain extent, in the Byzantine Empire, Russia, Japan, &c. It is especially representative of an aristocratic stage in the development of European nations. When tribal notions and arrangements ceased to be sufficient lor upholding their commonwealths, when social and political life had to be built up on the basis of land-tenure, the type of manorial organization came forward in natural course. It was closely connected with natural economy, and was suited to a narrow horizon of economic wants and politi- cal requirements. At the same time it provided links for a kind of national federation of military estates. We shall only speak of the course of manorial evolution in France and Germany, because this presents the clearest expression of the fundamental principles of manorial life and the best material for comparison with English facts.

One problem common to the entire European world has to be considered from the very beginning. Does the manor date from the Roman Empire, or not? Can its chief features be

traced in Roman institutions ? There can be no doubt that at the end of the Roman period certain traits are noticeable which might, under favourable conditions, develop into a manorial combination. Great estates with political functions, populations subjected to the political lordship of landowners, appear in the closing centuries of the empire, and have to be

reckoned with as precursors of medieval manorial life. The original organization of the ancient world was built up on the self-government of cities and on the sharp distinction between citizens and slaves. Both features were gradually modified by the Roman Empire. Self- government was atrophied by bureaucratic interference; the economy based on the exploitation of slaves began to give way before relations in which the elements of freedom and serfdom were oddly mixed. During the last centuries of its existence the Western Empire became more and more a conglomerate of barbaric and half-civilized populations, and it is not strange that the characteristic germs, of feudalism began to show them-selves within its territory as well as outside it. As far as political institutions are concerned, we notice that the central power, after claiming an absolute sway over its subjects, is obliged more and more to lean on private forces in order to maintain itself. One of its favourite resources in the 4th and 5 th centuries consists in making great landowners responsible for the good behaviour of their tenants and even of their less important neighbours. The saltus, the great domain, is occasion- ally recognized as a separate district exempt from the ordinary administration of the city, subordinated to its owner in respect of taxes and police. Even in ordinary estates (fundi) there is a tendency to make the landowner responsible for military con- scription, for the presentation of criminals to justice. On the other hand the incumbents of ecclesiastical offices are nominated in accordance with the wishes of patrons among the landowners ; in the administration of justice the influence of this same class makes itself felt more and more. Nor are signs of a convergent evolution wanting on the economic side. Slaves are used more and more as small householders provided with rural tenements and burdened with rents and services. Free peasant farmers holding by free agreement get more and more reduced to a status of half-free settlers occupying their tenancies on the strength of custom and traditional ascription to the glebe. Eventually this status is recognized as a distinct class by imperial legislation. Ominous symptoms of growing political disruption and of an aristocratic transformation of society were visible every where at the close of the empire. Yet there could be no talk of a manorial system as long as the empire and the commercial intercourse protected by it continued to exist.

The fall of the empire hastened the course of evolution. It brought into prominence barbaric tribes who were unable to uphold either the political power or the economic system of the Romans. The Germans had from old certain manorial features in the constitution of their government and husbandry. The owner of a house had always been possessed of a certain political power within its precincts, as well as within the fenced area sur-rounding it : the peace of the dwelling and the peace of the hedged- in yard were recognized by the legal customs of all the German tribes. The

aristocratic superiority of warriors over all classes engaged in base peaceful work was also deeply engraved in the minds of the fighting and conquering tribes. On the other hand the downfall of complicated forms of civilization and civil inter- course rendered necessary a kind of subjection in which tributary labourers were left to a certain extent to manage their own affairs. The Germanic conqueror was unable to move slaves about like draughts: he had no scope for a complicated administration of capital and work. The natural outcome was to have recourse to serfdom with its convenient system of tribute and services.

But, as in the case of the Roman Empire, the formation of regular manors was held back for a time in the early Germanic monarchies by the lingering influence of tribal organization. In the second period of medieval development in continental Europe, in the Carolingian epoch, the features of the estate as a political unit are more sharply marked. Notwithstanding the immense efforts of Charles Martel, Pippin and Charlemagne

to strengthen the tottering edifice of the Prankish Empire, public authority had to compromise with aristocratic forces in order to ensure regular government. As regards military organization this is expressed in the recognition of the power of seniores, called upon to lead their vassals in the host; as re- gards jurisdiction, in the increase of the numbers of commended freemen who seek to interpose the powerful patronage of lay and secular magnates between themselves and the Crown. Great estates arose not only on the lands belonging to the king, but on that of churches and of lay potentates, and the con- stitution of these estates, as described for instance in the Polyptique of St Germain des Pres or in the " Brevium exempla ad describendas res ecclesiasticas et fiscales " (Capi- tularia, ed. Boretius, i. 250), reminds us forcibly of that of later feudal estates. They contain a home-farm, with a court and a casa indominicata, or manor-house, some holdings (mansi) of free men (ingenuiles) , of serfs (serviles), and perhaps of half- free people (lidiles). The rents and services of this dependent population are stated in detail, as in later custumals, and there is information about the agricultural implements, the stores and stock on the home-farm. Thus the economic basis of the manor exists in more or less complete order, but it cannot be said as yet to form the prevailing type of land tenure in the country. Holdings of independent free men and village organizations of ancient type still surround the great estates, and in the case of ecclesiastical possessions we are often in a position to watch their gradual extension at the expense of the neighbouring free settlers, by way of direct encroachment, and by that of surrender and commendation on the

part of the weaker citizens. Another factor which plays a great part in the, gradual process of infeudation is the rise of private jurisdictions, which falls chiefly into the 10th and nth centuries. The struggle against Northmen, Magyars and Slavs gave a crowning touch to the process of localization of political life and of the aristocratic constitution of society.

In order to describe the full-grown continental manor of the nth century it is better to take French examples than German, Italian or Spanish. Feudalism in France attained the greatest extension and utmost regularity, while in other European countries it was hampered and intermixed with other institu- tional features. The expression best corresponding to the English " manor," in the sense of an organized district, was seigneurie. Manoir is in use, and is, of course, a French word corresponding to manerium, but it meant strictly " mansion " or chief homestead in France. Baronie is another term which might be employed in some instances as an equivalent of the English manor, but, in a sense, it designates only one species of a larger genus, the estate of a full baron in contrast to a mere knight's fee, as well as to a principality. Some of the attributes of a baron are, however, typical, as the purest expression of manorial rights, and may be used in a general characterization of the latter.

The seigneurie may be considered from three points of view — as a unit of administration, as an economic unit, and as a union of social classes.

(a) In principle the disruption of political life brought about by feudalism ought to have resulted in the complete administrative independence of the manor. Chaque baron est souverain dans sa baronie is a proverb meant to express this radical view of manorial separatism. As a matter of fact this separatism was never com- pletely realized, and even at the time of the greatest prevalence of feudalism the little sovereigns of France were combined into a loose federation of independent fiefs. Still, the proverb was not a mere play of words, and it took a long time for the kings of France to break in potentates, like the little Sire de Coucy in the immediate vicinity of Paris, who sported in his crest the self-complacent motto : Je ne suis ni comte, ni marquis, je suis le sire de Coucy. The institutional expression of this aspect of feudalism in the life of the seigneurie was the jurisdiction combined with the latter. The principal origin of this jurisdiction was the dismemberment of royal justice, the acquisi- tion by certain landowners of the right of holding royal pleas. The assumption of authority over public tribunals of any kind was naturally considered as equivalent to such a transmission of royal right. But other sources may be noticed also. It was.assumed by French feudal law that in all cases when land was granted by a seigneur in subinfeudation the recipients would be bound to appear as members of a court of tenants for the settlement of conflicts in

regard to land. A third source may be traced in the. extension of the patrimonial justice of a person over his serfs and personal dependents to the classes of free and half-free population connected with the seigneurie in one way or another. There arose in conse- quence of these assumptions of jurisdiction a most bewildering con- fusion of tribunals and judicial rights. It happened sometimes that the question as to who should be the judge in some particular contest was decided by matter-of-fact seizure — the holder of pleas who was the first on the spot to proclaim himself judge in a case was deemed entitled to jurisdiction. In other cases one seigneur held the pleas in a certain place for six days in the week, while some competitor of his possessed jurisdiction during the seventh. A certain order vvas brought into this feudal chaos by the classification of judiciary functions according to the four categories of high, middle, low and tenurial justice. The scope of the first three subdivisions is suffici- ently explained by their names; the fourth concerned cases arising from subinfeudation. As a rule the baron or seigneur sat in justice with a court of assessors or peers, but the constitution of such courts varied a great deal. They represented partly the succession of the old popular courts with their scabini, partly courts of vassals and tenants, In strict feudal law an appeal was allowed from a lower to a higher court only in a case of a denial of justice (denie de justice), not in error or revision of sentence. This rule was, however, very often infringed, and gave way ultimately before the restoration of royal justice.

(b) The economic, fabric of the French seigneurie varied greatly, according to localities. In the north of France it was not unlike that of the English manor. The capital messuage, or castle, and the home-farm of the lord, were surrounded by dependent holdings, censives, paying rent, and villein tenements burdened with services. Between these tenancies there were various ties of neighbourhood and economic solidarity recalling the open-field cultivation in Eng- land and Germany. When the harvest was removed from the open strips they returned to a state of undivided pasture in which the householders of the village exercised rights of common with their cattle. Wild pasture and woods were used more or less in the same fashion as in England (droit de pacage de vaine pdture). The inhabi- tants often formed courts 1 and held meetings in order to settle the by- laws, and to adjudicate as to trespasses and encroachments (courts colonglres). In the south, individual property was more prevalent and the villagers were not so closely united by ties of neighbourhood. Yet even there the dependent households were arranged into mansi or colonicae, subjected to approximately equal impositions in respect of rents and services. In any case the characteristic dualism of manorial life, the combined working of a central home-farm, and of its economic satellites providing necessary help in the way of services; and contributing towards the formation of manorial stores, is quite as much a feature of French as of English medieval

husbandry.

(c) The social relations between the manorial lord and his subjects are marked by various forms of the exploitation of the latter by the former. Apart from jurisdictional profits, rents and agricultural services, dues of all kinds are exacted from the rural population. Some of these dues have to be traced to servile origins, although they were evidently gradually extended to groups of people who were nOt descended from downright serfs but had lapsed into a state of Considerable subjection. The main morte of rustic tenants meant that they had no goods of their own, but held movable property on sufferance without the right of passing it on to their successors. As a matter of fact, sons were admitted \o inheritance after their fathers, and sometimes succession was extended to other relatives, but the person taking inheritance paid" a heavy fine for entering into possession, or gave up a. horse, an ox, or some other especially valuable piece of property. The formariage corresponded to the English merchetum, and was exacted from rustics on the marriage of their daughters. Although this payment assumed very different shapes, and sometimes only appeared in ease consorts belonged to different lords, it was considered a badge of serfdom. Chevage (capitagium) might be exacted as a poll-tax from all the unfree inhabitants of a seigneurie, or, more especially, from those who left it to look for sustenance abroad. The power of the lord as a land- owner was more particularly expressed in his right of pre-emption (retrait seignewrial) , and in taxes on alienation (lods et ventes). As a person wielding political authority, a kind of sovereignty, the lord enjoyed divers rights which are commonly attributed to the state— the right of coining money, of levying direct taxes and toll (tallagium, tolneta) and of instituting monopolies. These latter were of common occurrence, and might take the shape, for instance, of forcing the inhabitants to make use of the lord's mill (moulin banal), or of his oven (four banal), or of his bull (taureau banal).

In Germany the history of the manorial system is bound tip with the evolution of the Grundherrschaft (laridlordship), as opposed to Gutsherrschaft (estate-ownership). The latter need not include any elements of public authority and aristocratic supremacy: the former is necessarily connected with public functions and aristocratic standing. The centre of the Grund- herrschaft was the Hof, the court or hall of the lord, from which the political ind economic rights of the lord radiated.

The struggle of the military aristocracy and of ecclesiastical institutions with common freedom was more protracted than in France or England; the

lordships very often took the shape of disparate rights over holdings and groups of population scattered over wide tracts of country and intermixed with estates and inhabitants subjected to entirely different authority. Therefore the aspect of German manorialism is more confused and heterogeneous than that of the French or English systems. One remarkable feature of it is the consistent separation of criminal justice from other kinds of jurisdiction on Church property. Episcopal sees and abbeys delegated their share of criminal justice to lay magnates in the neighbourhood (Voglei), and this division of power became a source Of various conflicts and of many entangled relations. The main lines of German manorialism are not radically different from those of France and England. The communal element, the Dorfverband, is usually more strongly developed than in France, and assumes a form more akin to the English township. But there were regions, e.g. Westphalia, where the population had settled in separate farms (Hofsystem), and where the communal solidarity was reduced to a union for administrative purposes and for the use of pasture.

It need hardly be added that every step in the direction of more active economic intercourse and more efficient public authority tended .to lessen the influence of the manorial system in so far as the latter was based on the localization of govern 1 ment, natural husbandry and aristocratic authority.

See Fustel de Coulanges, Histoire des institutions de la France, especially the volumes " L' Alleu et le domaine rural " and " L'lnva- sion germanique "; Beaudouin, Les Grands domaines dans l'enlpire romain " (Nouvelle revue de droit francais et Uranger, 1898) ; J. Flach, Les Origines de I'ancienne France, I., II., III. (1886); Paul Violletj Histoire des institutions de la France, I., II. (1890, 1898); A. Luchaire; Manuel des institutions francaises (1892); G. Waitz, Deutsche Ver fassungsgeschichte, I.— VIII. (1865-1883); K. T. von Inama-Sternegg, Deutsche Wirtschaftsgeschichte, I., II. (1879-1891); K. Lamprecht, Deutsches Wirthschaflsleben, I. -IV. (1885) ; A. Meitzen, Ansiedelungen, Wanderungen und Agrarwesen der Volker Europas, I.*-IV. (1895 ff.); W. Wittich, Die Grundherrschaft in Nordwestdeutschland (1896); G. F. von Maurer, Geschichte der Mark-, Dorf- und Hofverfassung in Deutschland; and F. Seebohm, The English Village Community (1883). (P.Vi.)*

The Manor in England. — It will be most convenient to describe a typical English manor in its best known period, the 13th century, and to indicate briefly the modifications of the type which varying conditions may produce. Topographically such a manor consisted partly of the houses of the inhabitants more or less closely clustered together, and surrounded by arable land divided into large fields, two or three in number. Each of these fields was divided again into shots or furlongs, and each of the shots was

broken up into cultivated strips a pole wide, each containing an acre, separated by narrow balks of turf. There were also certain meadows for supplying hay; and beyond the cultivated land lay the wood and waste of the manor. Portions of arable or meadow land might be found apart from the organi- zation of the remainder; the lord of the manor might have a park, and each householder a garden, but the land of the manor was the open fields, the meadows and the wastes or common. The condition of the inhabitants of such a manor is as complex as its geography. At the head of the society came the lord of the manor, with his hall, court, or manor-house, Lˆ S °d an ˆ ‘ˆ e l an d immediately about it, and his demesne Tenants, both in the fields and in the meadow land. The arable demesne consisted of certain of the acre strips lying scattered over the various furlongs; his meadow was a por- tion assigned to him each year by the custom of the manor. He had also rights over the surrounding waste paramount to those enjoyed by the other inhabitants. Part of his demesne land would- be granted out to free tenants to hold at a rent or by military or other service; part would be in the lord's own hands, and cultivated by him. Each part so granted out will carry with it a share in the meadow land and in the profits of the waste. These rights of the free tenants over the waste limited the lord's power over it. He could not by enclosure diminish their interest in it. The statute of Merton in ,1236 and the second statute

of Westminster in 1285 marked the utmost limit of enclosure allowed in the 13th century. Below the lord and the free ten- ants came the villeins, natives, bondmen, or holders of virgates or yard-lands, each holding a house, a fixed number of acre strips, a share of the meadow and of the profits of the waste. The number of strips so held was usually about thirty; but vir- gateS' of fifteen acres or even eighty are not unknown. In any one manor, however, the holdings of all the villeins were equal. Normally the holder of a virgate was unfree; he had no rights in the eye of the law against his lord, who vnieias. was protected from all suits by the exceptio villenagii; he j could not without leave quit the manor, and could be re claimed by process of law if he did; the strict contention of law deprived him of all right to hold property; and in many cases he was subject to certain degrading incidents, such as merchet (merchetutn); a payment due to the lord upon the marriage of a daughter, which was regarded as a special mark of unfree con- dition. ; But there are certain limitations to be made. Firstly, all these incidents of tenure, even merchet, might not affect the personal status of the tenant; he might still be free, though holding by an unfree tenure; secondly, even if unfree, he was not exposed to the arbitrary will of his lord but was protected by the* custom of the minor as interpreted by the manor court. Moreover, he was not a slave, he was not bought and sold apart from his holding. The hardship of his condition lay*

in the services due from him. As a rule a villein paid for his holding in money, in' labour and in kind. In money he paid, firstly, a small fixed rent called rent of assize; and, secondly, dues under various names, partly in lieu of services commuted into money payments, and partly for the privileges and profits enjoyed by him on the waste of the manor. In labour he paid more heavily. Week by. week he had to come with his own plough and oxen to plough the lord's demesne; when ploughing was done he had to harrow, to reap the crops, to thresh and carry them, or do what- ever might be required of him, until his allotted number of days' labour- in the year was done. Beyond this his lord might request of him extra days in harvest or other seasons of emer gency,and these requests could not be denied; Further, all the carriage of the manor was provided by the villeins, even to places as much as a hundred miles away from the manor. The mending of the ploughs, hedging, ditching, sheepshearing and other miscellaneous work also fell upon him, and it is sometimes hard to see what time remained to him to work upon his own holding. In kind he usually rendered honey, eggs, chickens and perhaps a ploughshare, but these payments were almost always small in value. Another class of inhabitants remains to be mentioned — the cotters. These are the poor of the manor, who hold a cottage and garden, or perhaps one acre or half an acre in the fields. They were unfree in condition, and in most manors their services were modelled upon those of the villeins. From their ranks were usually drawn the shepherd of the manor, the bee-keeper and other minor officials of the manor.

A complicated organization necessarily involves administra- tors., Just as the services of the tenants and even their names vary from manor to manor, so does the nature, of the staff. Highest in rank came the steward; he was attached to no manor in particular, but controlled a group, travelling from one to another to take accounts, to hold the courts, and generally represent the lord. Under him are the officers of the several manors. First came the bailiff or beadle, the representative of the lord in the manor; his duty was to collect the rents and services, to gather in the lord's crops and account for the receipts and expenditure of the manor. Closely connected with him was the " messor " or reaper; in many cases, indeed, "reaper" seems to have been only another name for the bailiff. But the villeins were not without their own officer, the provost or reeve. His duty was to arrange the distribution of the services due from the tenants, and, as their representative, to assist the bailiff in the management of the manor. Sometimes the same man appears to have united both offices, and we find ,the reeve accounting to thejord for the issues of the manor.

Cotters.

Staff.

manor-house;

To these important officials may be added a number of smaller ones, the shepherd, the swineherd, the beekeeper, the cowherd, the ploughman and so on, mostly selected from the cotters, and occupying their small holdings by the services expressed in their titles. The number varies with the constitution and needs of each estate, and they are often replaced by hired labour.

*The most complicated structure in the system is > the manor court. The complication is, indeed, partly the work of lawyers interpreting institutions they did not .understand: by Court. formulae not adapted to describe them. But be- yond this there remain the facts that the court ;was the meeting-point of the lord and the tenants' both free and un- free, that any question touching on the power and; constitution of the court was bound to affect the interests of the lord and the tenants, and that there was no external power capable of settling such questions as did arise. Amid this maze a few clear lines can be laid down. In the first place, so far as the 13th- century goes, all the discussion that has collected about the terms court leet, court baron and court customary may be put aside; it relates to questions which in the 13th century wereionly just emerging. The manor court at that date exercised, its criminal, civil, or manorial jurisdiction as one court; its names may differ, the parties before it may be free or unfree, but the court is the : same. Its president was the lord's steward; the bailiff was the' lord's representative and the public prosecutor; and the ; tenants of the manor, both free and unfree, attended at the court and gave judgment in the cases brought before it. To modern ears the constitution sounds unfamiliar. The president of the court ■ settled the procedure of the court, carried it out, and gave the- rmal sentence, but over the law of the court he had no power. All that is comprised in the word "i judgment " *as settled by the body of tenants present at the court. This attendance was, indeed, compulsory, and absence subjected to a fine any tenant owing and refusing the service known as .' " suit of court." It' may be asked who in these courts . settled questions of fact. The answer must be that disputed questions of fact could only be settled .in one way, by ordeal; and ifcat in .mb$ti anaii&rial courts the method employed was the wager of law. The business of the court may be divided into criminal, manorial/and civil. Its powers under the first head depended on the franchises enjoyed by the lord in the particular manor; for the .most part only petty offences were triable, such as small, thefts,; breaches of the assize of bread 1 and ale, assaults, and the.lilse; except under special conditions, the justice of great offences remained in the king. But offences against the custom «f the manor, such as bad ploughing, improper : taking of wood from the lord's woods, and the like; were of course the staple criminal business of the court. Under the' head of manorial business the court dealt with the choice of the manorial*

officers, and had some 1 power of making regulations for the management of the manor;, but its most important function was the recording of the surren- ; ders and admittances of the villein tenants. 'Into- the history , and meaning of this form of land transfer itis not necessary to enter here. But it must be 1 noted 1 that the conveyance of a villein's holding was effected by the vendor surrendering his, land to the lord, who thereupon admitted the purchaser to the; holding. The same procedure was employed in all cases of transfer of land, and the transaction was regularly recorded upon the rolls of the court among the records of all the other business transacted there. Finally, the court dealt with all suits as to land within the manor, questions of dower and inheri- tance, and with civil suits not connected with land. But it need hardly be said that in an ordinary rural manor very few of these would occur.

It will be clear on consideration that the manor court as here described consisted of conflicting elements; of very different origin and history. Founded partly on express grants of fran- chises, partly on the inherent right of a feudal lord to hold a court for his free tenants, partly on the obscure community traceable among the unfree inhabitants of the manor, it is incapable of strict legal definition. All these elements, moreover, .contain in themselves reasons for the decay which gradually came over

the system. The history of the decay of the manorial jurisdic- tions in England has not yet been written. On the one hand were the king's courts, with new and improved processes of law; on the other hand the gradual disintegration which marks the history of the manor during the 14th and 15th centuries. The criminal jurisdiction was the first to disappear, and was closely followed by the civil jurisdiction over the free tenants; and in modern times all that is left is the jurisdiction over the custom ary tenants and their holdings, and that in an attenuated form. .A few words must; be given to the legal theories of the 15th century on the manor court. It would seem to have become the law that to the existence of the manor two courts were necessary — a court customary for customary tenants, and a court baron for free tenants. In the court customary the lord's steward is the judge ; in the court baron the freeholders are the judges. If the freeholders in the manor diminish to less than two in number the court baron cannot be. held, and the manor perishes. Nor can it be revived by the grant of new freehold tenures, because under the statute of Quia Emptores such new freeholders would hold not of the lord of the manor, but of his lord. The customary tenants and the court customary may survive, but the manor is only a reputed manor. Of the 13th century aU this is untrue, but even at that date the existence of free tenants was in a measure essential to the existence of the manor court. If there werenone the jurisdiction of the court over free tenants of course collapsed; • but in addition to this the lord also lost his power of exer- cising the highest criminal franchises, even if he

otherwise possessed them; he could, for instance, no longer hang a murderer on his own gallows. Perhaps it may be said that to the exercise of the feudal power and of the royal franchises the presence of free tenants was necessary. But it is clear that no such condition was necessary to the existence of: the. manor.

, Apart from, the change in the court of the manor, the most impor- tant thread inf its history is the process which converted the villein into the copyholder. Here again the subject is imperfectly explored, and part of it is still subject to controversy. In the strict view of contemporary lawyers the holding 1 of the villein tenant of the 13th century was at the will of the lord, and the king's courts of law would .not protect him in his. possession. If, however, the villein were a tenant on. the king's ancient demesne his condition was improved. The writs of monstraiierunt and the little writ of right close protected him from the improper exaction of services and from ejection by the lord.; But in ordinary manors there was no such immunity. That ejection was common cannot be believed, .but it was legally ˆpossible; and it wasˆnot until the well-known decision of Danby, C.J., iand Bryan, C.J., in "} Edw. IV;j that the courts of law -would entertain anaction of trespass brought against his lord by a customarytenarit. Frotfithat date'the courts, both of law and equity, begin to intervene; and the records of the Courts of Star. Chamber and Requests show that in the Tudor period equitable suits brought by tenants against their lords are. not infrequent. Side by side with the, alteration in the legal condition of the manor there went on an economic change. The labour rents; and other services slowly disappeared, and were replaced by money payments. The field divisions gave way before inciosures, effected sometimes by the lords and sometimes by; the tenants. Change in legal and agricultural practice went on side by side, and finally the manor ceased to be an important social form, and became only a peculiar form of land tenure and the abode Of antiquarian curiosities. •

See G. L. von Maurer, Einleitung in die Geschichte der Hof-, Marh-r, D.orf- und;Stadlverfassungin Deutschland (Erlangen, 1856) ;. G. Nasse, Zur Geschichte der ihittelalterlichen ■ Feldgemeinschaft in England (Bonn,. 1869); H. S. Maine, Village Communities in the East and West (Cambridge, .1872) ; F. Seebohm, The English Village Community (1883); W. J. Ashley, English Economic History, pts. i. ii. (1888- 1893); F; W. Maitland, Select Pleas in Manorial Courts (London, Selden Sopipty, 1888);; P. Vinogradoff, Villainage in England (Cam- bridge,. 1892) ; The Growth of the Manor (1905) and English Society in the nth Century (1908) ; A. Meitzen, Siedelung und Agrarwesen'der Westgermanen und Ostgermanen (Berlin, 1896); W. Cunningham, Growth of English Industry and Commerce (Cambridgeˆ 1896); F. Pollock and F.-W. Maitland, History of English La.w (Cambridge, 1 896) ; F'.W.Maitland,Z)0

MANOR-HOUSE (Lat.manerium; Fr. manoir), in architecture, the name given to tjie dwelling-house of the lord of the manof. The manor-house was generally arranged for defence against robbers' and thieves and was often surrounded by a moat with drawbridge, but was not provided with a keep or with towers or lofty curtain walls so as to stand a siege. The early buildings were comparatively small, square in plan, comprising a hall with one or two adjacent chambers; at a later period wings were added, thus forming three sides of a quadrangle, like the house designed by John Thorpe as his residence, the plan of which is among his drawings in the Soane Museum. One of

the most ancient examples is the manor-house built by Richard Cceur de Lion at Southampton as a rendezvous when he was about to cross into France. This consisted of a hall and chapel on the first floor, with cellars on the ground floor; the walls of this structure, with the chimney-piece, are still in existence. The distinction between the " manor-house " and " castle " is not always very clearly defined; in France such buildings as the castles of Aydon (Northumberland) and of Stokesay (Shrop- shire) would be regarded as manor-houses in that they were built as country houses and not as fortresses, like Coucy and Pierrefonds; some of the smaller castles in France were, in the t 1 6th century, transformed into manor-houses by the introduction of windows on the second floors of their towers and the partial destruction of their curtain walls, as in the manor-houses of Sedieres (Correze), Nantouillet and Compiegne; and in the same century, as at Chenonceaux, Blois and Chambord, though angle towers and machicolated parapets still formed part of the design, they were considered to be purely decorative features. The same is found in England; thus in Thornbury and Hurstmonceaux castles, and in Cowdray House, the fortifications Were more for show than for use. There is an interesting example of a French manor-house near Dieppe, known as the Manoir-d'Ango, built in r525, of which a great portion still exists, where the proprietor Ango received Francois I., so that it must have been of con- siderable size.

In England the principal examples of which remains exist are the manor-houses of Appleton, Berkshire, with a moat; King John's house at Warnford (Hampshire); Boothby Ragnell, Lincolnshire, with traces of moat; Godmersham, Kent; Little Wenham Hall, Suffolk, built partly in brick and flint, and one of the earliest in which the bricks, probably imported from Flanders, are found; Charney Hall, Berkshire (T-shaped in plan in two storeys) ; Longthorpe House, near Peterborough >»Stokesay, Shropshire, already referred to ; Cottesford, Oxfordshire ; Wˆoodcroft,

Northamptonshire ; Acton Burnell, Shropshire; Old Soar, Plaxtol, Kent, in two storeys, the ground storey vaulted and used as cellar and storehouse, and the upper floor with hall, solar and chapel. The foundation of all these dates from the 13th century. Ightham Mote, Kent, portions of; which, with the moat, date from the 14th century, is one of the best preserved manor-houses; then follow Norborough Hall, North- amptonshire; Creslow manor-house, Bucks, with moat; Sutton Courtenay, Berkshire ; the Court Lodge, Great Chart, Kent; Stanton St Quentin, Great Chalfield, and South Wraxhall, all in Wilts; Meare manor-house, Somerset; Ockwell, Berks; Kingfield manor- house, Derbyshire; Kirby Muxloe, Leicestershire; Stoke Albany, Northamptonshire; and, m the 16th century, Large Maftiey Hall, Essex (1520); Sutton Place, Surrey (1530); the Vyne, Hampshire, already influenced by the first Renaissance. In the 17th and 18th centuries the manor-house is generally rectangular in plan, and, though well and solidly built, Would seem to have been erected more with a view to internal comfort than to exterior embellishments. There is one other type of manor-house, which partakes of the character of the castle in its design, and takes the form of a tower, rectangular or square, with angle turrets and in several storeys; in France it is represented by the manor-housas of St Medard near Bordeaux and Camarsae (Dordogne), and in England by Tattershall Castle, Lincolnshire and Middleton Tower, Norfolk, both being in brick. (R. P. S.)

MANRESA, a town of north-eastern Spain, in the province of Barcelona, on the river Cardoner and the Barceloria-Lerida railway. Pop. (1000), 23,252. Manresa is the chief town of the highlands watered by the Cardoner and upper Llobregat, which meet below the town, and are also connected by, a canal 18 m. long. Two bridges, one built of stone and dating from the Roman period, the other constructed of iron in 1804, unite the older and larger part of Manresa with the modern suburbs on the right bank of the river. The principal buildings are the colle- giate church of Santa Maria de la Seo, the Dominican monastery, and the church of San Ighazio, built over the cavern (cueva santa) where Ignatius de Loyola spent most of the year 1522 in penitentiary exercises and the composition of his Exercitia spiritualia. Santa Maria is a fine example of Spanish Gothic, and consists, like many Catalan churches, of nave and chancel, aisles and ambulatory, without transepts. One of its chief treasures is an exquisite 15th-century Florentine altar-frontal, preserved in the sacristy. The Dominican monastery, adjoining the cueva santa, commands a magnificent view of the Montserrat (q.v.), and is used for the accommodation of the pilgrims who

yearly visit the cavern in thousands. Manresa has important iron-foundries and' manufactures of woollen, cotton and linen goods, ribbons, hats, paper, soap, chemicals, spirits and flour. Building-stone is quarried near the town.

Manresa is probably the Munorisa of the Romans, which was the capital of the Jacetani or Jaccetani, an important tribe of the south-eastern Pyrenees. A large portion of the town was burned by the French in 181 r.

MANRIQUB, G6MEZ (i4i2?-i4oo?), Spanish poet, soldier, politician and dramatist, was born at Amusco. The fifth son of Pedro Manrique, adelantado mayor of Le6n, and nephew of Santillana (q.v.), Gomez Manrique was .introduced into public life at an early age, took a prominent part against the constable Alvaro de Luna during the reign of John II., went into opposition against Miguel Lucas de Iranzo in the reign of Henry IV., and declared in favour of the infanta Isabel, whose marriage with Ferdinand he promoted. Besides being a distinguished soldier, he acted as a moderating political influence and, when appointed corregidor of Toledo, was active in protecting the converted Jews from popular resentment. His will was signed on the 31st of May 1490, and he is known to have died before the 16th of February 1491. He inherited the literary taste of his uncle Santillana, and was greatly esteemed in his own age; but his reputation was afterwards eclipsed by that of his nephew Jorge Manrique {q.v.); whose Coplas were continually reproduced. ˆG6mez Manrique's poems were not printed till 1885, when, they were edited by Antonio Paz y Melia. They at once revealed him to be a .poet of eminent merit, and it seems certain that his Consejos, addressed to Diego Arias de Avila, inspired the more famous Coplas of his nephew. His didactic verseS are modelled upon those of Santillana, and his satires are somewhat coarse in thought and expression; but his place in the history of Spanish literature' is secure as the earliest Spanish dramatist whose name has reached posterity. He wrote the Representacidn del nascimiento de Nuestro Senor, a play on the Passion, and two momos, or interludes, played at court.*

MANRIQUE, JORGE (i44o?-i478), Spanish poet and soldier, was : born probably at Paredes de Nava. The fourth son of Rodrigo Manrique, count de Paredes, he became like the rest of his family a fervent partisan of Queen Isabel, served with great distinction in many engagements, and was made comendador of Mohtizon in the order of Santiago. He was killed in a skirmish near the fortress of Garci-Munoz in 1478, and was buried in the church attached to the convent of Ucl6s. His love-songs, satires, and acrostic verses are merely ingenious compositions in the taste of his age; he owes his imperishable renown to a single poem, the Coplas por la muerte de su padre, an elegy of forty stanzas on the death of his father, which was apparently first printed in the Cancionero llamado de Fray Inigo de Mendoza about the year 1482. There is no foundation for the theory that Manrique drew his inspiration from an Arabic poem by Abu '1-Baka Salih ar-Rundi; the form of the Coplas is influenced by the Consejos of his uncle, G6mez Manrique, and the matter derives from the Bible, from Boethius and from other sources readily accessible. The great sonorous common-

places on death are vitalized by the intensely personal grief of the poet, who lent a new solemnity and significance to thoughts which had been for centuries the common property of mankind. It was given to Jorge Manrique to have one single moment of sublime expression, and this isolated achievement has won him a fame undimmed by any change of taste during four centuries.

The best edition of the Coplas is that issued by R. Foulchˆ-Delbosc in the Bibliothecahispanica ; the poem has been admirably translated by Longfellow. Manrique's other verses were mostly printed in Hernando del Castillo's Cancionero general (151 1).

MANSE (Med. Lat. mansa, mansus or mansum, from manere, to dwell, remain), originally a dwelling-house together with a portion of land sufficient for the support of a family. It is defined by Du Cange (Glossarium, s.v. Mansus) as . . . certain agri porUonem quae coleretur et in qua coloni aedes esset. The term was particularly applied, in ecclesiastical law, to the house and glebe to which every church was entitled by common right,

the rule of canon law being sancilum est ut unicuique ecclesiae unus mansus integer absque ullo servitio tribuatur (Phillimore, Eccles. Law, 1895, ii. 1125). The word is now chiefly used for the residence of a minister of the Established Church of Scotland; to this every minister of a rural parish is entitled, and the landed proprietors must build and keep it up. " Manse " is also loosely used for the residence of a minister of various Free Church denominations (see Glebe).

MANSEL, HENRY LONGUEVILLE (1820-1871), English philosopher, was born at Cosgrove, Northamptonshire (where his father, also Henry Longueville Mansel, fourth son of General John Mansel, was rector), on the 6th of October 1820. He was educated at Merchant Taylors' School and St John's College, Oxford. He took a double first in 1843, and became tutor of his college. He was appointed reader in moral and metaphysical philosophy at Magdalen College in 1855, and Waynflete professor in 1859. He was a great opponent of university reform and of the Hegelianism which was then beginning to take root in Oxford. In 1867 he succeeded A. P. Stanley as professor of ecclesiastical history, and in 1868 he was appointed dean of St Paul's. He died on the 31st of July 1871.

The philosophy of Mansel, like that of Sir William Hamilton, was mainly

due to Aristotle, Kant and Reid. Like Hamilton, Mansel maintained the purely formal character of logic, the duality of consciousness as testifying to both self and the external world, and the limitation of knowledge to the finite and " conditioned." His doctrines were developed in his edition of Aldrich's Artis logicae rudimenta (1849) — his chief contribu tion to the reviving study of Aristotle— and in his Prolegomena logica: an Inquiry into the Psychological Character of Logical Processes (1851, 2nd ed. enlarged 1862), in which the limits of logic as the " science of formal thinking " are rigorously deter- mined. In his Bampton lectures on The Limits of Religious Thought (1858, 5th ed. 1867; Danish trans. 1888) he applied to Christian theology the metaphysical agnosticism which seemed to result from Kant's criticism, and which had been developed in Hamilton's Philosophy of the Unconditioned. While denying all knowledge of the superserisuous, Mansel deviated from Kant in contending that cognition of the ego as it really is is itself a fact of experience. Consciousness, he held — agreeing thus with the doctrine of " natural realism " which Hamilton developed from Reid — implies knowledge both of self and of the external world. The latter Mansel's psychology reduces to consciousness of our organism as extended; with the former is given consciousness of free will and moral obligation. A summary of his philosophy is contained in his article " Meta- physics " in the 8th edition of the Encyclopaedia Britannica (separately published, i860). Mansel' wrote also The Philosophy of the Conditioned (1866) in reply to Mill's criticism of Hamilton; Letters, Lectures, and Reviews (ed. Chandler, 1873), a v hd. The Gnostic Heresies (ed. J. B. Lightfoot, 1875, with a biographical sketch by Lord Carnarvon). He wrote a commentary on the first two gospels in the Speaker's Commentary.

See J. W. Burgon, Lives of Twelve Good Men (1888-1889) ; James Martineau, Essays, Reviews and Addresses (London, 1 891), ih. 117 seq. ; A. W. Benn, History of Rationalism (1906), ii. 100-112; Masson, Recent British Philosophy (3rd ed., London, 1877), pp. 252 seq. ; Sir Leslie Stephen in Diet. Nat. Biog.

MANSFELD, the name of an old and illustrious German family which took its name from Mansfeld in Saxony, where it was seated from the nth to the 18th century. One of its earliest members was Hoyer von Mansfeld (d. 1115), a partisan of the emperor Henry V. during his struggles with the Saxons; he fought for Henry at Warnstadt and was killed in his service at Welfesholz. Still more famous was Albert, count of Mansfeld (1480-1560), an intimate friend of Luther and one of the earliest and staunchest supporters of the Reformation. He helped to crush the rising of the peasants under Thomas Munzer in Thuringia in 1525; he was a member of the league of Schmalkalden, and took part in all the movements of the Protestants against Charles V. With Albert was associated his brother Gebhard, and another member of the family was Johann Gebhard, elector

of Cologne from 1558 to 1562. A scion of another branch of the Mansfelds was Peter Ernst, Furst von Mansfeld (1517-1604), governor of Luxemburg, who unlike his kinsmen was loyal to Charles V. He went with the emperor to Tunis and fought for him in France. He was equally loyal to his son, Philip II. of Spain, whom he served at St Quentin and in the Netherlands. He distinguished himself in the field and found time to lead a body of troops to aid the king of France against the Huguenots. In this capacity he was present in 1569 at the battle of Moncontour, where another member of his family, Count Wolrad of Mansfeld (d. 1578) was among the Huguenot leaders. The Mansfeld family became extinct in 1780 on the death of Josef Wenzel Nepomuk, prince of Fondi, the lands being divided between Saxony and Prussia.

See L. F. Niemann, Geschichte der Graf en von Mansfeld (Aschers- leben, 1834).

MANSFELD, ERNST, Graf von (c. 1 580-1626), German soldier, was an illegitimate son of Peter Ernst, Furst von Mansfeld, and passed his early years in his father's palace at Luxemburg. He gained his earliest military experiences in Hungary, where his half-brother Charles (1543-1595,) also a soldier of renown, held a high command in the imperial army. Later he served under the Archduke Leopold, until that prince's ingratitude, real or fancied, drove him into the arms of the enemies of the house of Habsburg. Although remaining a Roman Catholic he allied himself with the Protestant princes, and during the earlier part of the Thirty Years' War he was one of their foremost champions. He was despatched by Charles Emmanuel, duke of Savoy, at the head of about 2000 men to aid the revolting Bohemians when war broke out in 1618. He took Pilsen, but in the summer of 1619 he was defeated at Zablat; after this he offered his services to the emperor Ferdinand II. and remained inactive while the titular king of Bohemia, Frederick V., elector palatine of the Rhine, was driven in headlong rout from Prague. Mansfeld, however, was soon appointed by Frederick to command his army in Bohemia, and in 1621 he took up his position in the Upper Palatinate, successfully resisting the efforts made by Tilly to dislodge him. From the Upper he passed into tHe Rhenish Palatinate. Here he relieved Frankenthal and took Hagenau; then, joined by his master, the elector Frederick, he defeated Tilly at Wiesloch in April 1622 and plundered Alsace arid Hesse. But Mansfeld's ravages were not confined to the lands of his enemies; they were ruinous to the districts he was commissioned to defend. At length Frederick was obliged to dismiss Mansfeld's troops from his service. Then joining Christian of Brunswick the count led his army through Lorraine, devastating the country as he went, and in August 1622 defeating the Spaniards at Fleurus. He next entered the service of the United Provinces and took up his quarters in East Frieslahd, capturing fortresses and inflicting' great hardships upon the

inhabitants. A mercenary and a leader of mercenaries, Mansfeld often interrupted his campaigns by journeys made for the purpose of raising money, or in other words of selling his services to the highest bidder, and in these diplomatic matters he showed considerable skill. About 1624 he paid three visits to London, where he was hailed as a hero by the populace, and at least one to Paris. James I. was anxious to furnish him with men and money for the recovery of the palatinate, but it was not until January 1625 that Mansfeld and his army of " raw and poor rascals " sailed from Dover to the Netherlands. Later in the year, the Thirty Years' War having been renewed under the leadership of Christian IV., king of Denmark, he re-entered Germany to take part therein. But on the 25th of April 1626 Wallenstein inflicted a severe defeat upon him at the bridge of Dessau. Mansfeld, however, quickly raised another army, with which he intended to attack the hereditary lands of the house of Austria, and pursued by Wallenstein he pressed forward towards Hungary, where he hoped to accomplish his purpose ,by the aid of Bethlem Gabor, prince of Transylvania. But when Gabor changed his policy and made peace with the emperor, Mansfeld was compelled to disband his troops. He set out for Venice, but when he reached Rakowitza he was taken ill, arid

here he died on the 29th o£ November 1626. He was buried at Spalato.
■..,■..■,.

See F. Stieve, Ernst von Mansfeld (Munich, 1890); R. Reuss, Graf Ernst von Mansfeld im bbhmischen Kriege (Brunswick, 1865); A. C. de Villermont, Ernest de Mansfeldt (Brussels, 1866); L. Graf Uetterodt zu Schaffenberg, Ernst Graf zu Mansfeld (Gbtha, 1867); J. Grossmann, Des Graf en Ernst von Mansfeld letzte Plane und Thaten (Breslau, 1870); E. Fischer, Des Mansfelders Tod (Berlin, 1873); S- R. Gardiner, History of England, vols. iv. and v. (1901); J.,,L. Motley, Life and Death of John of Barneveld (ed. 1904; vol. ii.).

MANSFIELD, RICHARD (1857-1907), American actor, was born on the 24th of May 1857, in Berlin, his mother being Madame [Erminia] Rudersdorff (1822-1882), the singer, and his father, Maurice Mansfield (d. 1861), a London wine merchant. He first appeared on the stage at St George's Hall, London, and then drifted into light opera, playing the Major-General in The Pirates of Penzance, and the Lord High Executioner in The Mikado, both in the English provinces and in America. In 1883 he joined A.M. Palmer's Union Square theatre company in New York, and made a great hit as Baron Chevrial in A Parisian Romance. He appeared

successfully in several plays adapted from well-known stories, and his rendering (1887.) of the doubled title-parts in R. L. Stevenson's Strange Case of Dr Jekyll and Mr Hyde created a profound impression. It was with this play that he made his London reputation during a season (1S88) at the Lyceum theatre, by invitation of Henry Irving. He produced Richard. III. the next. year at the Globe. Among his other chief successes were Prince Karl, Cyrano de Bergerac and Monsieur Beaucaire. He was One ol the earliest to produce G. Bernard Shaw's plays in America, appearing in 1894 as Bluntschii in Arms and the Man, and as Dick Dudgeon in The Devil's Disciple in 1897. As a manager and producer of plays Mansfield was remarkable for his lavish staging. He died in New London, Connecticut, on the 30th of August 1907.

;See the lives by Paul Wilstach (1908) and William Winter (1910).

MANSFIELD, WILLIAM MURRAY, ist Earl of (1705- 1793), English judge, was born at Scone in Perthshire, on the 2nd of March 1705. He was a younger son of David Murray, 5th Viscount Stormont (c. 1665-173 1), the dignity having been granted in 1621 by James I. to his friend and helper, Sir David Murray (d. 163 1), a Scottish politician of some note. Lord Stormont's family was Jacobite in its politics, and his second son James (c. 1690-1728), being apparently mixe,d up in some of the plots of the time, joined the court of the exiled Stuarts and in 1721 was created earl of Dunbar by James Edward, the Old Pretender.

William Murray was educated at Perth grammar school and Westminster School, of which he was a king's scholar. Entering Christ Church, Oxford, he graduated in 1727. , A friend of the family, Lord Foley, provided the funds for his legal training, and he became a member of Lincoln's Inn on his departure from Oxford, being called to the bar in 1730. He was a good scholar and mixed with the best literary society, being an intimate friend of Alexander Pope. His appearance in some important Scottish appeal cases brought him into notice, and in Scotland at least he acquired an immense reputation by his appearance for the city of Edinburgh when it was threatened with disfranchisement for the affair of the Porteouq mob. His English practice had as yet been scanty, but in 1737 a single speech in a jury trial of note placed him at the head of the bar, and from this time he had all he could attend to. In 1738 he married Lady Elizabeth Finch, daughter of the earl, of Wuv chelsea. His political career began in 1742 with his appointment as solicitor-general. During the next fourteen years he was one of the most conspicuous figures in the parliamentary history of the time. By birth a Jacobite, by association a Tory, he was nevertheless a Moderate, and his politics were really dpmi- nated by his legal interests. Although holding an office of subordinate rank, he was the chief defender of the government in the House of Commons, and during the time that Pitt

was in opposition had to bear the brunt of his attacks. In 1754 he became attorney-general, and for the next two years acted as Wader of the House of Commons, under the administration

of the duke of Newcastle. But in 1756, when the government was. evidently approaching its fall, an unexpected vacancy occurred in the chief justiceship of the king's bench, and he claimed the office, being at the same time raised to the peerage as Baron Mansfield.

From this time the chief interest of his career lies in his judicial work, but he did not wholly dissever himself from politics. He became by a singular arrangement, only repeated in the case of Lord Ellenborough, a member of the cabinet, and remained in that position through various changes of administration for nearly fifteen years, and, although he per- sistently refused the chancellorship, he acted as Speaker of the House of Lords while the Great Seal was in commission. During the time of Pitt's ascendancy he took but little part in politics, but while Lord Bute was in power his influence was very con- siderable, and seems mostly to have been exerted in favour of a more moderate line of policy. He was on the whole a supporter of the prerogative, but within definite limits. Macaulay terms him, justly enough, " the father of modern Toryism, of Toryism modified to suit an order of things in which the House of Commons is the most powerful body in the state. " During the stormy session of 1770 he came into violent collision with Chatham and Camden in the questions that arose out of the Middlesex election and the trials for political libel; and in the subsequent years he was made the subject of the bitter attacks of Junius, in which his early Jacobite connexions, and his apparent leanings to arbitrary power, were used against' him with extraordinary ability and virulence. In 1776 he was created earl of Mansfield. In 1783, although he declined to re-enter the cabinet, he acted as Speaker of the House of Lords during the coalition ministry, and with this his political career may be said to have closed. He continued to act as chief justice until his resignation in June 1788, and after five years spent in retirement died on the 20th of March 1793. He left no family, but his title had been re-granted in 1792 with a direct remainder to his nephew David Murray, 7th Viscount Stormont (1727-1796). The 2nd earl was ambassador to Vienna and then to Paris; be was secretary of state for the southern department from 1779 to 1782, and lord president of the council in 1783, and again from 1794 until his death. In 1906 his descendant Alan David Murray (b. 1864) became 6th earl of Mansfield. .-,■•..,■

Lord Mansfield's great reputation rests chiefly on his judicial Career. The political trials over which he presided, although they gave rise to numerous accusations against him, were conducted with singular fairness and propriety. He was accused with especial bitterness of favouring arbitrary

power by the law which he laid down in the trials for libel which arose out of the. publications' of Junius and Home Tooke, and which at a later time he reaffirmed in the case of the dean of St Asaph (see: Libel). But we must remember that his view of the law was concurred in by the great majority of the judges and lawyers of that time, and was supported by undoubted precedents. In other instances, when the government was equally concerned, he was wholly free from suspicion. He supported Lord Camden's decision against general warrants, and reversed the outlawry of Wilkes. He was always ready to protect the rights of con- science, whether they were claimed by Dissenters or Catholics, and the popular fury which led to the destruction of his house during the Gordon riots was mainly due to the fact that a Catholic priest, who was accused of saying Mass, had escaped the penal laws by his charge to the jury. His chief celebrity, however, is founded upon the consummate ability with which he discharged the civil duties of his office. He has always been recognized as the founder of English mercantile law. Tha common law as it existed before his time was wholly inadequate to cope with the new cases and customs which arose with the increasing development of commerce. The facts were left to the jury to decide as best they might, and no principle was ever extracted from them which might serve as a guide in subsequent eases. Mansfield found the law in this chaotic state, and left it in a form that was almost eawvalent to a

code. He defined almost every principle that governed com- mercial transactions in such a manner that his successors had only to apply the rules he had laid down. His knowledge of Roman and foreign law, and the general width of his education, freed him from the danger of relying too exclusively upon narrow precedents, and afforded him a storehouse of principles and illustrations, while the grasp and acuteness of his intellect enabled him to put his judgments in a form which almost always commanded assent. A similar influence was exerted by him in other branches of the common law; and although, after his retirement, a reaction took place, and he was regarded for a while as one who had corrupted the ancient principles of English law, these prejudices passed rapidly away, and the value of his work in bringing the older law into harmony with the needs of modern society has long been fully recognized.

See Holliday's Life (1797); Campbell's Chief Justices; Foss's Judges; Greville's Memoirs, passim; Horace Walpole's Letters; and other memoirs and works on the period.

MANSFIELD, a market town and municipal borough in the Mansfield parliamentary division of Nottinghamshire, England, on the small river Mann or Maun; the junction of several branches of the Midland railway, by which it is 142 m. N.N.W. from London. Pop. (1891), 13,094; (1901), 15,250. Area, 7068 acres. The church of St Peter is partly Early Norman, and partly Perpendicular. There is a grammar school founded by Queen Elizabeth in 1561, occupying modern buildings. Twelve almshouses were founded by Elizabeth Heath in 1693, and to these six were afterwards added. There are a number of other charities. The industries are the manufacture of lace, thread, boots and machinery, iron-founding and brewing. In the neighbourhood, as at Mansfield Woodhouse to the north, there are quarries of limestone, sandstone and freestone. The town is governed by a mayor, 6 aldermen and 18 councillors. During the heptarchy Mansfield was occasionally the residence of the Mercian Icings, and it was afterwards a favourite resort of Norman sovereigns, lying as it does on the western outskirts of Sherwood Forest. By Henry VIII. the manor was granted to the earl of Surrey. Afterwards it went by exchange to the duke of Newcastle, and thence to the Portland family. The town obtained a fair from Richard II. in 1377. It became a municipal borough in 1891.

MANSFIELD, a city and the county-seat of Richland county, Ohio, U.S.A., about 65 m. S.W. of Cleveland. Pop. (1890), J3.473; (io°°)> i7,°4°> of whom 1781 were foreign-born; (1910 census), 20,768. It is served by the Pennsylvania (Pittsburg, Ft Wayne & Chicago division), the Erie, and the Baltimore & Ohio railways. It is built on an eminence (1150 ft.), and has two public parks, a substantial court-house, a soldiers' and sailors' memorial building, a public library, a hospital and many fine residences. It is the seat of the Ohio state reformatory. Mansfield has an extensive trade with the surrounding agricul- tural country, but its largest interests are in manufactures. The total factory product in 1905 was valued at $7,353,578. There are natural gas wells in the vicinity. The waterworks and the sewage disposal plant are owned and operated by the municipality. Mansfield was laid out in 1808, and was named in honour of Lieut. - Colonel Jared Mansfield (1 759-1830), United States surveyor of Ohio and the North-west Territory in 1803- 181 2, and professor of natural and experimental philosophy at West Point from 181 2 to 1828. Mansfield was incorporated as a village in 1828 and was first chartered as a city in 1857. It was the home of John Sherman from 1840 until his death.

MANSION (through O. Fr. mansion, mod. maison, from Lat. mansio, dwelling-place, stage on a journey; manere, to remain), a term applied in early English use to the principal house of the lord of a manor. By the Settled Land Act 1890, § 10, subsec. 2, repealing § 15 of the act of 1882, " the principal mansion house ... on any settled land shall not be sold or exchanged or leased by the tenant for life without the consent of the

trustees of the settlement or an order of the court." The principles guiding an English court of law for making or refusing such an order are laid down in In re the Marquess of Ailesbury's Settled Estate

(1892), 1 Ch. 506, 546; A.C. 356. In general usage, the term " mansion " is given to any large and important house in town or country; and " mansion house " to the official residence, when provided, of the mayor of a borough, particularly to that of the lord mayors of London and Dublin. From the general meaning of a conspicuously large dwelling-place comes the modern employment of the term " mansions," in London and elsewhere, for large buildings composed of " flats."

MANSLAUGHTER (O. Eng., mannslaeht, from mann, man, and slaeht, act of slaying, sledn, to slay, properly to smite; cf. Ger. schlagen, Schlachl, battle), a term in English law signifying " unlawful homicide without malice aforethought " (Stephen, Digest of the Criminal Law, Art. 223). The distinction between manslaughter and murder and other forms of homicide is treated under Homicide.

MANSON, GEORGE (1850-1876), Scottish water-colour painter, was born in Edinburgh on the 3rd of December 1850, When about fifteen he was apprenticed as a woodcutter with W. & R. Chambers, with whom he remained for over five years; diligently employing all his spare time in the study and practice of art, and producing in his morning and evening hours water- colours of much delicacy and beauty. In 187 1 he devoted himself exclusively to painting. His subjects were derived from humble Scottish life — especially child-life, varied occasionally by portraiture, by landscape, and by views of picturesque archi- tecture. In 1873 he visited Normandy, Belgium and Holland; in the following year he spent several months in Sark; and in 1875 he resided at St L6, and in Paris, where he mastered the processes of etching. Meanwhile in his water-colour work he had been adding more of breadth and power to the tenderness and richness of colour which distinguished his early pictures, and he was planning more complex and important subjects. But his health had been gradually failing, and he was ordered to Lympstone in Devonshire, where he died on the 27th of February 1876.

A volume of photographs from his water-colours and sketches, with a memoir by J. M. Gray, was published in 1880. For an account of Manspn's technical method as a wood engraver see P. G. Hamer- ton's Graphic Arts, p. 311.

MANSUR (Arab, "victorious"), a surname (laqab) assumed by a large number of Mahommedan princes. The best known are: (1) Abu Ja'far ibn Mahommed, second caliph of the Abbasid house, who reigned a.d.

754-775 (see Caliphate: § C, §2); (2) Abu Tahir Isma'il ibn al-Qaim, the third Fatimite caliph of Africa (946-953) (see Fatimites); (3) Abu Yusuf Ya 'qub ibn Yusuf, often described as Jacob Almanzor, of the Moorish dynasty of the Almohades, conqueror of Alfonso III. in the battle of Alarcos (1195); (4) Ibn Abi 'Amir Mahommed, commonly called Almanzor by European writers, of an ancient but not illustrious Arab family, which had its seat at Torrox near Algeciras. The last-named was born a.d. 939, and began life as a lawyer at Cordova. In 967 he obtained a place at the court of Hakam II., the Andalusian caliph, and by an unusual combination of the talents of a courtier with administrative ability rapidly rose to distinction, enjoying the powerful support of Subh, the favourite of the caliph and mother of his heir Hisham. The death of Hakam (976) and the accession of a minor gave fresh scope to his genius, and in 978 he became chief minister. The weak young caliph was absorbed in exercises of piety, but at first Mansur had to share the power with his father- in-law Ghalib, the best general of Andalusia, and with the mother of Hisham. At last a rupture took place between the two ministers. Ghalib professed himself the champion of the caliph and called in the aid of the Christians of Leon; but Mansur, anticipating the struggle, had long before remodelled the army and secured its support. Ghalib fell in battle (981) ; a victorious campaign chastised the Leonese; and on his return to Cordova the victor assumed his regal surname of al-Mansur billah, and became practically sovereign of Andalusia. The caliph was a mere prisoner of state, and Mansur ultimately assumed the title as well as the prerogatives of king (996). Unscrupulous in the means by which he rose to power, he wielded the sovereignty

nobly. His strict justice and enlightened administration were not less notable than the military prowess by which he is best known. His arms were the terror of the Christians, and raised the Moslem power in Spain to a pitch it had never before attained. In Africa his armies were for a time hard pressed by the revolt of Zlrl, viceroy of Mauretania, but before his death this enemy had also fallen. Mansxir died at Medinaceli on the ioth of August 1 002, and was succeeded by his son Mozaffar.

MANSURA, the capital of the province of Dakahlia, Lower Egypt, near the west side of Lake Menzala, and on the Cairo- Damietta railway. Pop. (1907), 40,279. It dates from 1221, and is famous as the scene of the battle of Mansura, fought on the 8th of February 1250, between the crusaders commanded by the king of France, St Louis, and the Egyptians. The battle was drawn, but it led to the retreat of the crusaders on

Damietta, and to the surrender of St Louis. Mansura has several cotton-ginning, cotton, linen and sail-cloth factories.

MANT, RICHARD (1776-1848), English divine, was born at Southampton on the 12th of February 1776, and was educated at Winchester and Trinity College, Oxford. He was elected fellow of Oriel in 1798, and after taking orders held a curacy at Southampton (1802), and then the vicarage of Coggeshall, Essex (1810). In 1811 he was Bampton lecturer, in 1816 was made rector of St Botolph's, and in 1820 bishop of Killaloe and Kilfenoragh (Ireland). In 1823 he was translated to Down and Connor, to which Dromore was added in 1842. In connexion with the Rev. George D'Oyly he wrote a commentary on the whole Bible. Other works by him were the Psalms in an English Metrical Version (1842) and a History of the Church of Ireland (1839-1841; 2 vols.).

MANTEGAZZA, PAOLO (1831-1910), Italian physiologist and anthropologist, was born at Monza on the 31st of October 1831. After spending his student-days at the universities of Pisa and Milan, he gained his M.D. degree at Pavia in 1854. After travel- ling" in Europe, India and America, he practised as a doctor in the Argentine Republic and Paraguay. Returning to Italy in 1858 he was appointed surgeon at Milan Hospital and professor of general pathology at Pavia. In 1870 he was nominated professor of anthropology at the Instituto di Studii Superiori, Florence. Here he founded the first Museum of Anthropology and Ethnology in Italy, and later the Italian Anthropological Society. From 1865 to 1876 he was deputy for Monza in the Italian parliament, subsequently being elected to the senate. He became the object of bitter attacks on the ground of the extent to which he carried the practice of vivisection. His published works include Fisiologia del dolore (1880); Fisiologia dell' amore (1896); Elementid' igiene (1875); Fisonomia e mimica (1883); Le Estasi umane (1887).

MANTEGNA, ANDREA (1431-1506), one of the chief heroes in the advance of painting in Italy, was born in Vicenza, of very humble parentage. It is said that in his earliest boyhood Andrea was, like Giotto, put to shepherding or cattle-herding; this is not likely, and can at any rate have lasted only a very short while, as his natural genius for art developed with singular precocity, and excited the attention of Francesco Squarcione, who entered him in the gild of painters before he had completed his eleventh year.

Squarcione, whose original vocation was tailoring, appears to have had a remarkable enthusiasm for ancient art, and a pro- portionate faculty for acting, with profit to himself and others, as a sort of artistic middleman; his own performances as a painter were merely mediocre. He travelled in Italy,

and perhaps in Greece also, collecting antique statues, reliefs, vases, &c, forming the largest collection then extant of such works, making drawings from them himself, and throwing open his stores for others to study from, and then undertaking works on commission for which his pupils no less than himself were made available. As many as one hundred and thirty-seven painters and pictorial students passed through his school, established towards 1440, which became famous all over Italy. Mantegna was, as he deserved to be, Squarcione's favourite pupil. Squarcione adopted him as his son, and purposed making him the heir of

his fortune. Andrea was only seventeen when he painted, in the church of S. Sofia in Padua, a Madonna picture of exceptional and recognized excellence. He was no doubt fully aware of haying achieved no common feat, as he marked the work with his name and the date, and the years of his age. This painting was destroyed in the 17 th century.

As the youth progressed in his studies, he came under the influence of Jacopo Bellini, a painter considerably, superior to Squarcione, father of the celebrated painters Giovanni and Gentile, and of a daughter Nicolosia; and in 1454 Jacopo gave Nicolosia to Andrea in marriage. This connexion of Andrea with the pictorial rival of Squarcione is generally assigned as the reason why the latter became alienated from the son of his adop- tion, and always afterwards hostile to him. Another suggestion, which rests, however, merely on its own internal probability, is that Squarcione had at the outset used his pupil Andrea as the unavowed executant of certain commissions, but that after a while Andrea began painting on his own account, thus injuring the professional interests of his chief. The remarkably definite and original style formed by Mantegna may be traced out as founded on the study of the antique in Squarcione's atelier, followed by a diligent application of principles of work exempli- fied by Paolo Uccello and Donatello, with the practical guidance and example of Jacopo Bellini in the sequel.

Among the other early works of Mantegna are the fresco of two saints over the entrance porch of the church of S. Antonio in Padua, 1452, and an altar-piece of St Luke and other saints for the church of S. Giustina, now in the Brera Gallery in Milan, 1453. It is probable, however, that before this time some of the pupils of Squarcione, including Mantegna, had already begun that series of frescoes in the chapel of S. Cristoforo, in the church of S. Agostino degli Eremitani, by. which the great painter's reputation was fully confirmed, and which remain to this day con- spicuous among his finest achievements. 1 The now censorious Squarcione found much to carp at in the earlier works of this series, illustrating the life of St James; he said the figures were like men of stone, and had better have been coloured stone-colour at once. Andrea, conscious as he was of his own great faculty

and mastery, seems nevertheless to have felt that there was something in his old preceptor's strictures; and the later subjects, from the legend of St Christopher, combine with his other excel- lences more of .natural character and vivacity. Trained as he had been to the study of marbles and the severity of the antique, and openly avowing that he considered the antique superior to nature as being more eclectic in form, he now and always affected precision of outline, dignity of idea and of figure, and he thus tended towards rigidity, and to an austere wholeness rather than gracious sensitiveness of expression. His draperies are tight and closely folded, being studied (as it is said) from models draped in paper and woven fabrics gummed. Figures slim, muscular and bony, action impetuous but of arrested energy, tawny landscape, gritty with littering pebbles, mark the athletic hauteur of his style. He never changed, though he developed and perfected, the manner which he had adopted in Padua; his colouring, at first rather neutral and undecided, strengthened and matured. There is throughout his works more balancing of colour than fineness of tone. One of his great aims was optical illusion, carried out by a mastery of perspective which, though not always impeccably correct, nor absolutely superior in prin- ciple to the highest contemporary point of attainment, was worked out by himself with strenuous labour, and an effect of actuality astonishing in those times.

Successful and admired though he was in Padua, Mantegna left his native city at an early age, and never afterwards resettled

1 His fellow-workers were Bono of Ferrara, Ansuino of Forli, and Niccolo Pizzolo, to whom considerable sections of the fresco- paintings are to be assigned. The acts of St James and St Chris- topher are the leading subjects of the series. St James Exorcizing may have been commenced by Pizzolo, and completed by Mantegna. The Calling of St James to the Apostleship appears to be Mantegna's design, partially carried out by Pizzolo ; the subjects of St James baptizing, his appearing before the judge, and going to execution, and most of the legend of St Christopher, are entirely by Mantegna.

there; the hostility of Squarcione has been assigned as the cause. The rest of his life was passed in Verona, Mantua and Rome — chiefly Mantua; Venice and Florence have also been named, but without confirmation.

It may have been in 1459 that he went to Verona; and he painted, though not on the spot, a grand altar-piece for the church of S. Zeno, a Madonna

and angels, with four saints on each side. The Marquis Lodovico Gonzaga of Mantua had for some time been pressing Mantegna to enter his service; and the following year, 1460, was perhaps the one in which he actually established himself at the Mantuan court, residing at first from time to time at Goito, but, from December 1466 onwards, with his family in Mantua itself. His engagement was for a salary of 75 lire (about £30) a month, a sum so large for that period as to mark conspicuously the high regard in which his art was held. He was in fact the first painter of any eminence ever domiciled in Mantua. He built a stately house in the city, and adorned it with a multitude of paintings. The house remains, but the pictures have perished. Some of his early Mantuan works are in that apartment of the Castello which is termed the Camera degli Sposi — full compositions in fresco, including various portraits of the Gonzaga family, and some figures of genii, &C. In 1488 he went to Rome at the request of Pope Innocent VIII., to paint the frescoes in the chapel of the Belvedere in the Vatican; the marquis of Mantua (Federigo) created him a cavaliere before his departure. This series of frescoes, including a noted " Bap- tism of Christ," was ruthlessly destroyed by Pius VI. in laying out the Museo Pio-Clementino. The pope treated Mantegna with less liberality than he had been used to at the Mantuan court; but on the whole their connexion, which ceased in 1490, 1 was not unsatisfactory to either party. Mantegna then returned to Mantua, and went on with a series of works — the nine tempera- pictures, each of them 9 ft. square, of the "Triumph of Caesar " — which he had probably begun before his leaving for Rome, and which are now in Hampton Court. These superbly invented and designed compositions, gorgeous with all splendour of subject-matter and accessory, and with the classical learning and enthusiasm of one of the master-spirits of the age, have always been accounted of the first rank among Mantegna's works. They were sold in 1628 along with the bulk of the Mantuan art treasures, and were not, as is commonly said, plundered in the sack of Mantua in 1630. They are now greatly damaged by patchy repaintings. Another work of Mantegna's later years was the so-called "Madonna della Vittoria," now in the Louvre. It was painted in tempera about 1495, in com- memoration of the battle of Fornovo, which Ginfrancesco Gonzaga found it convenient to represent to his lieges as an Italian victory, though in fact it had been a French victory; the church which originally housed the picture Was built from Mantegna's own design.. The Madonna is here depicted with various saints, the archangel Michael and St Maurice holding her mantle, which is extended over the kneeling Gianfrancesco Gonzaga, amid a profusion of rich festooning and other accessory. Though not in all respects of his highest order of execution, this counts among the most obviously beautiful and attractive of Mantegna's works — from which the qualities of beauty and attraction are often excluded, in the stringent pursuit of those other excellences more germane to his severe genius, tense

energy passing into haggard passion.

Vasari eulogizes Mantegna for his courteous, distinguished and praiseworthy deportment, although there are indications of his having been not" a little litigious in disposition. With his fellow-pupils at Padua he had been affectionate; and for two of them, Dario da Trevigi and Marco Zoppo, he retained a steady friendship. That he had a high opinion of himself was natural, for no artist of his epoch could produce more manifest vouchers of marked and progressive attainment. He became very expen- sive in his habits, fell at times into difficulties, and had to urge his valid claims upon the marquis's attention. After his return to Mantua from Rome his prosperity was at its height, until the death of his wife. He then formed some other connexion, and became at an advanced age the father of a natural son, Giovanni

Andrea; and at the last, although he continued launching out into various expenses and schemes, he had serious tribulations, such as the banishment from Mantua of his son Francesco, who had incurred the marquis's displeasure. Perhaps the aged master and connoisseur regarded as barely less trying the hard necessity of parting with a beloved antique bust of Faustina. Very soon after this transaction he died in Mantua, on the 13th of Septem- ber 1506. In 1 51 7 a handsome monument was set up to him by his sons in the church of S. Andrea, where he had painted the altar-piece of the mortuary chapel.

Mantegna was no less eminent as an engraver, though his history in that respect is somewhat obscure, partly because he never signed or dated any of his plates, unless in one single disputed instance, 1472. The account which has come down to us is that Mantegna began engraving in Rome, prompted by the engravings produced by Baccio Baldini of Florence after Sandro Botticelli; nor is there anything positive to invalidate this account, except the consideration that it would consign all the numerous and elaborate engravings made by Mantegna to the last sixteen or seventeen years of his life, which s,eems a scanty space for them, and besides the earlier engravings indicate an earlier period of his artistic style. It has been sug- gested that he began engraving while still in Padua, under the tuition of a distinguished goldsmith, Niccolo. He engraved about fifty plates, according to the usuai reckoning; some thirty of them are mostly accounted indisputable — often large, full of figures, and highly studied. Some recent connoisseurs, however, ask us to re- strict to seven the number of his genuine extant engravings — which appears unreasonable. Among the principal examples are " Roman Triumphs " (not the same compositions as the Hampton Court pictures), " A Bacchanal Festival," " Hercules and Antaeus," Marine Gods," "Judith with the Head of Holophernes," the " Deposition from the Cross," the " Entombment," the " Resurrec- tion," the "

Man of Sorrows," the " Virgin in a Grotto." Mantegna has sometimes been credited with the important invention of engrav- ing with the burin on copper. This claim cannot be sustained on a comparison of dates, but at any rate he introduced the art into upper Italy. Several of his engravings are supposed to be executed on some metal less hard than copper. The technique of, himself and his followers is characterized by the strongly marked forms of the design, and by the oblique formal hatchings of the shadows. The prints are frequently to be found in two states, or editions. In the first state the prints have been taken off with the roller, or even by hand- pressing, and they are weak in tint ; in the second state the printing press has been used, and the ink is stronger.

The influence of Mantegna on the style and tendency of his age was very marked, and extended not only to his own flourishing Mantuan school, but over Italian art generally. His vigorous perspectives and trenchant foreshortenings pioneered the way to other artists: in solid antique taste, and the power of reviving the aspect of a remote age with some approach to system and consistency, he distanced all contemporary competition. He did not, however, leave behind him many scholars of superior faculty. His two legiti- mate sons were painters of only ordinary ability. His favourite pupil was known as Carlo del Mantegna; Caroto of Verona was another pupil, Bonsignori an imitator. Giovanni Bellini, in his earlier works, obviously followed the lead of his brother-in-law Andrea.

The works painted by Mantegna, apart from his frescoes, are rot numerous; some thirty-five to forty are regarded as fully authenti- cated. We may name, besides those already specified — in the Naples Museum, " St Euphemia," a fine early work; in Casa Melzi, Milan, the " Madonna and Child with Chanting Angels " (1461) ; in the Tri- bune of the Uffizi, Florence, three pictures remarkable for scrupulous finish; in the Berlin Museum, the " Dead Christ with two Angels "; in the Louvre, the two celebrated pictures of mythic allegory — : " Parnassus " and " Minerva Triumphing over the Vices "; in the National Gallery, London, the " Agony in the Garden," the "Virgin and Child Enthroned, with the Baptist and the Magdalen," a late example; the monochrome of "Vestals," brought from Hamilton Palace; the " Triumph of Scipio " (or Phrygian Mother of the Gods received by the Roman Commonwealth), a tempera in chiaroscuro, painted only a few months before the master's death; in the Brera, Milan, the " Dead Christ, with the two Maries weeping," a remarkable tour de force in the way of foreshortening, which, though it has a stunted appearance, is in correct technical perspective as seen from all points of view. With all its exceptional merit, this is an eminently ugly picture. It remained in Mantegna's studio unsold at his death, and was disposed of to liquidate debts.

Not to speak of earlier periods, a great deal has been written concerning Mantegna of late years. See the works by Maud Crutwell (1901), Paul Kristeller (1901), H. Thode (1897), Paul Yriarte (1901), Julia Cartwright, Mantegna and Francia (1881). (W. M. R.)

MANTELL, GIDEON ALGERNON (1790-1852), English geologist and palaeontologist, was born in 1790 at Lewes, Sussex. Educated for the medical profession, he first practised in his native town, afterwards in 1835 in Brighton, and finally

at Clapham, near London. He found time to prosecute researches on the palaeontology of the Secondary rocks, particularly in Sussex — a region which he made classical in the history of discovery. While he was still a country doctor at Lewes his eminence as a geological investigator was fully recognized on the publication of bis work on The Fossils of the South Downs (1822). His most remarkable discoveries were made in the Wealden formations. He demonstrated the fresh-water origin of the strata, and from them he brought to light and described the remarkable Dinosaurian reptiles known as Iguanodon, Hylaeosaurus, Pelorosaurus and Regnosaurus. For these researches he was awarded the Wollaston medal by the Geological Society and a Royal medal by the Royal Society. He was elected F.R.S. in 1825. Among his other contribu- tions to the literature of palaeontology was his description of the Triassic reptile Telerpeton elginense. Towards the end of his life Dr Mantell retired to London, where he died on the 10th of November 1852. His eldest son, Walter Baldock Durrani Mantell (1820-1895), settled in New Zealand, and there attained high public positions, eventually being secretary for Crown-lands. He obtained remains of the Notornis, a recently extinct bird, and also brought forward evidence to show that the moas were contemporaries of man.

*In addition to the works above mentioned Dr Mantell was author of Illustrations of the Geology of Sussex (4*0 , 1 827); Geology of the South-east of England (1833); The Wonders of Geology, 2 vols. (1838; ed. 7, 1857) ; Geological Excursions round the Isle of Wight, and along the Adjacent Coast of Dorsetshire (1847 ; ed. 3, 1854) ; Petrifactions and their Teachings (1851); The Medals of Creation (2 vols., 1854).*

MANTES-SUR-SEINE, a town of northern France, capital of an arrondissement in the department of Seine-et-Oise on the left bank of the Seine, 34 m. W.N.W. of Paris by rail. Pop. (1006), 81 13. The chief building in Mantes is the celebrated church of Notre-Dame which dates in

the main from the end of the 12th century. A previous edifice was burnt down by William the Conqueror together with the rest of the town, at the capture of which he lost his life in 1087 ; he is said to have bequeathed a large sum for the rebuilding of the church. The plan, which bears a marked resemblance to that of Notre-Dame at Paris, includes a nave, aisles and choir, but no transepts. Three portals open into the church on the west, the two northernmost, which date from the 12th century, being decorated with fine carving; that to the south is of the 14th century and still more ornate. A fine rose-window and an open gallery, above which rise the summits of the western towers, occupy the upper part of the facade. In the interior, chapels dating from the 13th and 14th centuries are of interest. The tower of St Maclbu (14th century), relic of an old church and the hotel de ville (1 5th to 17th centuries), are among the older buildings of the town, and there is a fountain of the Renaissance period. Modern bridges and a medieval bridge unite Mantes with the opposite bank of the Seine on which the town of Limay is built. The town has a sub- prefecture and a tribunal of first instance. Mantes was occupied by the English from 1346 to 1364, and from 14 16 to 1449.

MANTEUFFEL, EDWIN, Freiherr von (1809-1885), Prus- sian general field marshal, son of the president of the superior court of Magdeburg, was born at Dresden on the 24th of February 1809. He was brought up with his cousin, Otto von Manteuffel (1805-1882), the Prussian statesman, entered the guard cavalry at Berlin in 1827, and became an officer in 1828. After attending the War Academy for two years, and serving successively as aide-de-camp to General von Muffling and to Prince Albert of Prussia, he was promoted captain in 1843 and major in 1848, when he became aide-de-camp to Frederick William IV., whose confidence he had gained during the revolutionary movement in Berlin. Promoted lieutenant-colonel in 1852, and colonel to command the 5th Uhlans in 1853, he was sent on important diplomatic missions to Vienna and St Petersburg. In 1857 he became major-general and chief of the military cabinet. He gave hearty support to the prince regent's plans for the re- organization of the army. In 186 1 he was violently attacked in a pamphlet by Karl Twesten (1820-1870), a Liberal leader, whom

he wounded in a duel. He served as lieutenant-general (to which rank he was promoted on the coronation of William I., Oct. 18, 1861) in the Danish war of 1864, and at its conclusion was appointed civil and military governor of Schleswig. In the Austrian War of 1866 he first occupied Holstein and afterwards commanded a division under Vogel von Falkenstein in the Hanoverian campaign, and succeeded him, in July, in command of the Army of the Main (see Seven Weeks' War). His suc- cessful operations ended with the occupation of Wurzburg, and he received the order pour le merite. He was, however, on account of his monarchist

political views and almost bigoted Roman Catholicism, regarded by the parliament as a reactionary, and, unlike the other army commanders, he was not granted a money reward for his services. He then went on a diplomatic mission to St Petersburg, where he was persona grata, and succeeded in gaining Russia's assent to the new position in north Germany. On returning he was gazetted to the colonelcy of the 5th Dragoons. He was appointed to the command of the IX. (Schleswig-Holstein) army corps in 1866. But having formerly exercised both civil and military control in the Elbe duchies he was unwilling to be a purely military commander under one of his late civil subordinates, and retired from the army for a year. In 1868, however, he returned to active service. In the Franco-German War of 1870-71 he commanded the I. corps under Steinmetz, distinguishing himself in the battle of Colombey-Neuilly, and in the repulse of Bazaine at Noisseville (see Franco-German War ; and Metz) . He succeeded Steinmetz in October in the command of the I. army, won the battle of Amiens against General Farre, and occupied Rouen, but was less fortunate against Faidherbe at Pont Noyelles and Bapaume. In January 1871 he commanded the newly formed Army of the South, which he led, in spite of hard frost, through the Cote d'Or and over the plateau of Langres, cut off Bourbaki's army of the east (80,000 men), and, after the action of Pontarlier, compelled it to cross the Swiss frontier, where it was disarmed. His immediate reward was the Grand Cross of the order of the Iron Cross, and at the conclusion of peace he received the Black Eagle. When the Southern Army was disbanded Manteuffel commanded first the II. army, and, from June 1871 until 1873, the army of occupation left in France, showing great tact in a difficult position. On leaving France at the close of the occupation, the emperor promoted Manteuffel to the rank of general field marshal and awarded him a large grant in money, and about the same time Alexander II. of Russia gave him the order of St Andrew. After this he was employed on several diplomatic missions, was for a time governor of Berlin, and in 1879, perhaps, as was com- monly reported, because he was considered by Bismarck as a formidable rival, he was appointed governor-general of Alsace- Lorraine; and this office he exercised — more in the spirit, some said, of a Prussian than of a German official — until his death at Carlsbad, Bohemia, on the 17th of June 1885.

See lives by v. Collas (Berlin, 1874), and K. H. Keck (Bielefeld and Leipzig, 1890).

MANTINEIA, or Mantinea, an ancient city of Arcadia, Greece, situated in the long narrow plain running north and south, which is now called after the chief town Tripolitsa. Tegea was in the same valley, about 10 m. S. of Mantineia, and the two cities continually disputed the supremacy of the district. In every great war we find them ranged on opposite sides, except when superior force constrained both. The worship and mysteries of Cora

at Mantineia were famous. The vaEey in which the city lies has no opening to the coast, and the water finds its way, often only with much care and artificial aid, through underground passages (katavothra) to the sea. It is bounded on the west by Mount Maenalus, on the east by Mount Artemision.

Mantineia is mentioned in the Homeric catalogue of ships, but in early Greek times existed only as a cluster of villages inhabited by a purely agricultural community. In the 6th century it was still insignificant as compared with the neighs bouring city of Tegea, and submitted more readily to Spartan

overlordship. The political history of Mantineia begins soon after the Persian wars, when its five constituent villages, at the suggestion of Argos, were merged into one city, whose military strength forthwith secured it a leading position in the Peloponnesus. Its policy was henceforth guided by three main considerations. Its democratic constitution, which seems to have been entirely congenial to the population of small freeholders, and its ambition to gain control over the Alpheus watershed and both the Arcadian high roads to the isthmus, frequently estranged Mantineia from Sparta and threw it into the arms of Argos. But the chronic frontier disputes with Tegea, which turned the two cities into bitter enemies, contributed most of all to determine their several

a notable victory but lost his own life. After the withdrawal of the Thebans from Arcadia Mantineia failed to recover its pre-eminence from Megalopolis, with which city it had frequent disputes. In contrast with the Macedonian sym- pathies of Megalopolis Mantineia joined the leagues against Antipater (322) and Antigonus Gonatas (266). A change of constitution, imposed perhaps by the Macedonians, was nullified (about 250) by a revolution through which democracy was restored. About 235 B.C. Mantineia entered the Achaean League, from which it had obtained protection against Spartan encroachments, but soon passed in turn to the Aetolians and to Cleomenes III: of Sparta. A renewed defection, inspired apparently by aversion to the aristocratic government of the

policies. About 469 B.C. Mantineia alone of Arcadian town- snips refused to join the league of Tegea and Argos against Sparta. Though formally enrolled on the same side during the Peloponnesian War the two cities used the truce of 423 to wage a fierce but indecisive war with each other. In the time following the peace of Nicias the Mantineians, whose attempts at

expansion beyond Mount Maenalus were being foiled by Sparta, formed a powerful alliance with Argos, Elis and Athens (420), which the Spartans, assisted by Tegea, broke up after a pitched battle in the city's territory (418). In the sub- sequent years Mantineia still found opportunity to give the Athenians covert help, and during the Corinthian War (394- 387) scarcely disguised its sympathy with the anti-Spartan league. In 385 the Spartans seized a pretext to besiege and dismantle Mantineia and to scatter its inhabitants among four villages. The city was reconstituted after the battle of Leuctra and under its statesman Lycomedes played a promi- nent part in organizing the Arcadian League (370). But the long-standing jealousy against Tegea, and a recent one against the new foundation of Megalopolis, created dissensions which resulted in Mantineia passing over to the Spartan side. In the following campaign of 362 Mantineia, after narrowly escaping capture by the Theban general Epaminondas, became the scene of a decisive conflict in which the latter achieved

Wilker&CocVcrallsc.

Achaeans and jealousy of Megalopolis, was punished in 222 by a thorough devastation of the city, which was now recon- stituted as a dependency of Argos and renamed Antigoneia in honour of the Achaeans' ally Antigonus Doson. Mantineia regained its autonomous position in the Achaean League in 192, and its original name during a visit of the emperor Hadrian in a.d. 133. Under the later Roman Empire the city dwindled into a mere village, which since the 6th century bore the Slavonic name of Goritza. It finally became a prey to the malaria which arose when the plain fell out of culti- vation, and under Turkish rule disappeared altogether.

(M. O. B. C.) The site was excavated by M. Fougeres, of the French School at Athens, in 1888. The plan of the agora and adjacent build- ings has been recovered, and the walls have been completely investigated. The town was situated in an unusual position for a Greek city, on a flat marshy plain, and its walls form a regular ellipse about 2\ m. in circumference. When the town was first formed in 476 B.C. by the " synoecism " of the neigh- bouring villages, the river Ophis flowed through the midst of it, and the Spartan king Agesipolis dammed it up below the town and so flooded out the Mantineians and sapped their walls, which were of unbaked brick. Accordingly, when the city was rebuilt in 370 B.C., the river Ophis was divided into

two branches, which between them encircled the walls; and the walls

themselves were constructed to a height of about 3 to 6 feet of stone, the rest being of unbaked brick. These are the walls of which the remains are still extant. There are towers about every 80 ft.; and the gates are so arranged that the passage inwards usually runs from right to left, and so an attacking force would have to expose its right or shieldless side. Within the walls the most conspicuous landmark is the theatre, which, unlike the majority of Greek theatres, consists entirely of an artificial mound standing up from the level plain. Only about a quarter of its original height remains. Its scena is of rather irregular shape, and borders one of the narrow ends of the agora. Close to it are the foundations of several temples, one of them sacred to the hero Podaros. The agora is of unsymmetrical form; its sides are bordered by porticoes, interrupted by streets, like the primitive agora of Elis as described by Pausanias, and unlike the regular agoras of Ionic type. Most of these porticoes were of Rbmarj period — the finest of them were erected, as we learn from inscriptions, by a lady named Epigone: one, which faced south, had a double colonnade, and was called the Bairt) : close to it was a large exedra. The foundations cf a square market-hall of earlier date were found beneath this. On the opposite side of the agora was an extensive Bouleuterion or senate-house. Traces remain of paved roads both within the agora and leading out of it; but the whole site is now a deserted and feverish swamp. The site is interesting for comparison with Megalopolis; the nature of its plan seems to imply that its main features must survive from the earlier " synoecism " a century before the time of Epaminondas.

See Strabo viii. 337; Pausanias viii. 8; Thucyd. iv. 134, v.; Xenophon, ■ Hellenica, iv.-vii. ; Uiodorus xv. 85-87; Polybius ii. 57 sc,q., vi. 43; D. Worenka, Mantineia (1905); B. V. Head, Historia numorum (Oxford, 1887), pp. 376-377; G. Fougeres in Bulletin de correspondance hellenique (1890), id. Mantinie et I Arcadie orientate (Paris, 1898). Consult also Tegea; Arcadia.

Five battles are recorded to "have been fought near Mantineia; 418, 362 (see above), 295 (Demetrius Poliorcetes defeats Archidamus of Sparta), 242 (Aratus beats Agis of Sparta), 207 (Philopoerrien beats Machanidas of Sparta). The battles of 362 and 207 are, discussed at length by J. Kromayer, Antike Schlachtfelder in Griechen- land (Berlin, 1903), 27-123, 281-314; Wiener Studien (1905), pp. 1-16. (E. Gr.)

MANTIS, an insect belonging to the order Orthoptera. Prob- ably no other insect has been the subject of so many and wide- spread legends and superstitions as the common " praying mantis," Mantis religiosa, L. The ancient Greeks endowed it with supernatural powers (/idms, a diviner); the Turks and Arabs hold that it prays constantly with its face turned towards Mecca; the Provencals call it Prega-Diou {Prie-Dieu); and numerous more

or less similar names — preacher, saint, nun, mendicant, soothsayer, &c. — are widely diffused through- out southern Europe. In Nubia it is held in great esteem, and the Hottentots, if not indeed worshipping the local species (M. fausta), as one traveller has alleged, at least appear to regard its alighting upon any person both as a token of saintli- ness and an omen of good fortune.

Yet these are " not the saints but the tigers of the insect world." The front pair of limbs are very peculiarly modified — the coxa being greatly elongated, while the strong third joint or femur bears on its curved underside a channel armed on each edge by strong movable spines. Into this groove the stout tibia is capable of closing like the blade of a penknife, its sharp, serrated edge being adapted to cut and hold. Thus armed, with head raised upon the much-elongated and semi- erect prothorax, and with the half-opened fore-limbs held outwards in the characteristic devotional attitude, it rests motionless upon the four posterior limbs waiting for prey, or occasionally stalks it with slow and silent movements, finally seizing it with its knife-bkdes and devouring it. Although apparently not daring to attack ants, these insects destroy great numbers of flies, grasshoppers and caterpillars, and the larger South- American species even attack small frogs, lizards and birds. They are very pugnacious, fencing with

their sword-like limbs "like hussars with sabres," the larger frequently devouring the smaller, and the females the males. The Chinese keep them in bamboo cages, and matcb them like fighting-cocks.

The common species fixes its somewhat nut-like egg capsules on the stems of plants in September. The young are hatched in early summer, and resemble the adults, but are without wings.

The green coloration and shape of the typical mantis are procryptic, serving to conceal the insect alike from its enemies

Praying Mantis: (Mantis religiosa).

and prey. The passage from leaf to flower simulation is but a-, step which, without interfering with the protective value of the coloration so far as insectivorous foes are concerned, carries with it the additional advantage of attracting flower- feeding insects within reach of the raptorial limbs. This method of allurement has been perfected in certain tropical species of Mantidae by the development on the prothorax and raptorial limbs of laminate expansions so coloured on the under side as to resemble papilionaceous or other! blossoms, to which the likeness is enhanced by a gentle swaying kept up by the insect in imitation of the effect of a lightly blowing breeze. As instances of this may be cited Idalum diabolicum, an

African insect, and Gongylus gongyloides, which comes from India. Examples of another species (Empusa eugena) when standing upon the ground deceptively imitate in shape and hue a greenish white anemone tinted at the edges with rose; and Bates records what appears to be a true case of aggressive mimicry practised by a Brazilian species which exactly resembles tire white ants it preys upon.

MANTIS-FLY, the name given to neuropterous insects of the family Mantispidae, related to the ant-lions, lace- wing flies, &c, and named from their superficial resemblance to a Mantis owing to the length of the prothorax and the shape and prehensorial nature of the anterior legs. The larva, at first campodeiform, makes its way into the egg-case of a spider or the nest of a wasp to feed upon the eggs or young. Sub- sequently it changes into a fat grub with short legs. When full grown it spins a silken cocoon in which the transformation into the pupa is effected. The latter escapes from its double case before moulting into the mature insect.

MANTLE, a long flowing cloak without sleeves, worn by either sex. Particularly applied to the long robe worn over the armour by the men-at-arms of the middle ages, the name is still given to the robes of state of kings, peers, and the members of an order of knights. Thus the " electoral mantle " was a robe of office worn by the imperial electors, and the Teutonic knights were known as the orde alborum mantellorum from their white mantles. As an article of women's dress a mantle now means a loose cloak or cape, of any length, and made of silk, velvet, or other rich material. The word is derived from the Latin mantellum or mantelum, a cloak, and is probably the same as, or another form of, mantelium or mantele, a table- napkin or table-cloth, from manus, hand, and tela, a cloth. A late Latin mantum, from which several Romance languages have taken words (cf. Ital. manto, and Fr. mante), must, as the New English Dictionary points out, be a " back-forma- tion," and this will explain the diminutive form of the Spanish mantilla. From the old French mantel came the English

compounds " mantel-piece," " mantel-6helf," for the stone or wood beam which serves as a support for the structure above a fire-place, together with the whole framework, whether of wood, stone, &c, that acts as an ornament of the same (see Chimneypiece). The modern French form tnanleau is used in English chiefly as a dressmaker's term for a woman's mantle. " Mantua," much used in the 18th century for a similar garment, is probably a corruption of manteau, due to silk or other materials coming

from the Italian town of that name, arid known by the trade name of " mantuas." The Spanish mantilla is a covering for the head and shoulders of white or black lace or other material, the characteristic head-dress of women in southern and central Spain. It is occasionally seen in the other parts of Spain and Spanish countries, and also in Portugal.

"Mantle " is used in many transferred senses, all with the meaning of " covering," as in zoology, for an enclosing sac or integument; thus it is applied to the " tunic " or layer of connective-tissue forming the body-wall of ascidians enclosing muscle-fibres, blood-sinuses and nerves (see Tunicata), The term is also used for a meshed cap of refractory oxides employed in systems of incandescent lighting (see Lighting). The verb is used for the creaming or frothing of liquids and of the suffus- ing of the skin with blood. In heraldry " mantling," also known as " panache," " lambrequin " or " contoise," is an ornamental appendage to an escutcheon, of flowing drapery, forming a background (see Heraldry).

MANTON, THOMAS (1620-1677), English Nonconformist divine, was born at Laurence Lydiard, Somerset, in 1620, and was educated at Hart Hall, Oxford. Joseph Hall, bishop of Norwich, ordained him deacon: he never took priest's orders, holding that "he was properly ordained to the ministerial office." He was one of the clerks at the Westminster Assembly, one of Cromwell's chaplains and a " trier," and held livings at Stoke Newington (1645) and St Paul's, Covent Garden (1656). He disapproved of the execution of Charles I. In 1658 he assisted Baxter to draw up the " Fundamentals of Religion." He helped to restore Charles II. and became one of his chaplains, refusing the deanery of Rochester. In 1662 he lost his living under the Act of Uniformity and preached in his own rooms and in other parts of London. For this he was arrested in 1670.

His works are best known in the collected edition by J. C. Ryle (22 vols. 1870-1875).

MAN-TRAPS, mechanical devices for catching poachers and trespassers. They have taken many forms, the most usual being like a large rat-trap, the steel springs being armed with teeth which met in the victim's leg. Since 1827 they have been illegal in England, except in houses between sunset and sunrise as a defence against burglars.

MANTUA (Ital. Mantova), a fortified city of Lombardy, Italy, the capital of the province of Mantua, the see of a bishop, and the centre of a military district, 25 m. S.S.W. of Verona and 100 m. E.S.E. of Milan by rail. Pop. (1906), 31,783. It is situated 88 ft. above the level of the Adriatic on an almost insular site in the midst of the swampy lagoons of the Mincio. As the belt of marshy ground along the south side can be laid under water at

pleasure, the site of the city proper, exclusive of the considerable suburbs of Borgo di Fortezza to the north and Borgo di San Giorgio to the east, may still be said to con- sist, as it formerly did more distinctly, of two islands separated by a narrow channel and united by a number of bridges. On the west side lies Lago Superiore, on the east side Lago Inferiore — the boundary between the two being marked by the Argine del Mulino, a long mole stretching northward from the north- west angle of the city to the citadel.

On the highest ground in the city rises the cathedral, the interior of which was built after his death according to the plans of Giulio Romano; it has double aisles, a fine fretted ceiling, a dome-covered transept, a bad baroque facade, and a large unfinished Romanesque tower. Much more important architecturally is the church of St Andrea, built towards the close of the 15th century, after plans by Leon Battista Alberti,

and consisting of a single, barrel-vaulted nave 350 ft. long by 62 ft. wide. It has a noble facade with a deeply recessed portico, and a brick campanile of 1414. The interior is decorated with 18th-century frescoes, to which period the dome also belongs. Mantegna is buried in one of the side chapelSi S. Sebastiano is another work of Alberti's. The old ducal palace — one of the largest buildings of its kind in Europe- was begun in 1302 for Guido Bonaccolsi, and probably com- pleted in 1328 for Ludovico Gonzaga; but many of the accessory apartments are of much later date, and the internal decorations are for the most part the work of Giulio Romano and his pupils. There are also some fine rooms of the early 19th century. ■ Close by are the Piazza dell' Erbe. and the Piazza Sordello,. with Gothic palaces. The Castello di Corte here, the old castle of the Gonzagas (1395-121.06), erected by Bartolino da Novara, the architect of the castle of Eerrara, now contains the archives, and has some fine frescoes by Mantegna with scenes from the life' of Ludovico Gonzaga. Outside of the city, to the south of Porta Pusterla, stands the Palazzo del Te, Giulio's architectural masterpiece, erected for Frederick ' Gonzaga in 1523-1535; of the numerous fresco-covered chambers which it contains,' perhaps the most celebrated is the Sala dei Giganti, where, by a combination of mechanical with artistic devices, the" rout of the Titans still contending with artillery of uptorn rocks against the pursuit and thunderbolts of Jove appears to rush downwards on the spectator. The architecture of Giulio's own house in the town is also good.

Mantua has an academy of arts and sciences (Accademia Vergiliana), occupying a fine building erected by Piermarini, a public library founded in 1780 by Maria Theresa, a museum of antiquities dating from 1779, many of which have been brought from Sabbioneta, a small residence town of the Gonzagas in the late 16th century, a mineralogical museum, a good

botanical garden, and an observatory. There are ironworks; tanneries, breweries, oil-mills and flour-mills in the town, which also has printing, furriery, doll-making and playing-card industries. As a fortress Mantua was long one of the most formidable in Europe, a force of thirty to forty thousand men finding accommodation within its walls; but it had two serious defects— the marshy climate told heavily on the health of the garrison, and effective sorties were almost impossible. It lies on the main line of railway between Verona and Modena; and is also connected by rail with Cremona and with Mon- selice, on the line from Padua to Bologna, and by steam tramway with Brescia and other places.

S. Maria delle Grazie, standing some 5 m. outside the town, was consecrated in 1399 as an act of thanksgiving for the cessa- tion- of the plague, and has a curious collection of ex veto pictures (wax figures), and also the tombs of the Gonzaga family. '

Mantua had still a strong Etruscan element in its population during the Roman period. It became a Roman municipium, with the rest of Gallia Transpadana; but Martial calls it little Mantua, and had it not been for Virgil's interest in his native place, and in the expulsion of a number of the Mantuans (and among them the poet himself) from their lands in favour of Octavian's soldiers, we should probably have heard almost nothing of its existence. In 568 the Lombards found Mantua a walled town of some strength; recovered from their grasp in .590 by the exarch of Ravenna, it was again captured by Agilulf in 601. The 9th century was the period of episcopal supremacy, and in the nth the city formed part of the vast possessions of Bonifacio, marquis of Canossa. From him it passed to Geoffrey, duke of Lorraine, and afterwards to the countess Matilda, whose support of the pope led to the con- quest of Mantua by the emperor Henry IV. in 1090. Reduced to obedience by Matilda in 1113, the city obtained its liberty on her death, . arid instituted a communal government of its own, salva imperiali justilia. It afterwards joined the Lombard League; and the unsuccessful attack made by Frederick II. ; in 1236 brought it a confirmation of its privileges. But after a period of internal discord LudoVico Gonzaga attained to power (1328), and was recognized as imperial vicar (1329);

and f ram that time till the death of Per dinando Carbo in 1 708 the Gonzagas were masters of Mantua (see Gonzaga). Under Gian Francesco II., the first marquis, Ludovico III., Gian Francesco III. (whose wife was Isabella d'Este),' and'Federico II., the first duke of Mantua, the city rose

rapidly into impor- tance as a seat of industry and culture. It was stormed and sacked by the Austrians in 1630, and never quite recovered. Claimed in 1708 as a fief of the empire by Joseph I., it was governed for the greater part of the century by the Austrians. In June 1796 it was besieged by Napoleon; but in spite of terrific bombardments it held out till February 1797. A three days' bombardment in 1799 again placed Mantua in the hands of the Austrians; and, though restored to the French by the peace of Luneville (1801), it became Austrian once more from 1814 till 1866. Between 1849 and 1859, whe"n the whole of Lombardy except Mantua was, by the peace of Villafranca, 1 ceded to Italy, the city was the scene of violent political persecution.

See Gaet. Susani, Nuovo prospetto dette pitture, &c, di 'Mantdva (Mantua, 1830); Carlo d'Arco, Delle arti e degli artefici di Mantovd (Mantua, 1857) ; and Storia di Mantova (Mantua, 1874). , :;

■ *MANU (Sanskrit, " man "); in Hindu mythology, the first man, ancestor of the world. In the Satapatha-Brahmana he is represented as a holy man, the chief figure in a flood-myth. Warned by a fish of the impending disaster he. built a ship, and when the waters rose was dragged by the fish, which he harnessed to his craft, beyond the northern mountains. When the deluge ceased, a daughter was miraculously born to him and this pair became the ancestors of -the human race. J In the later scriptures the fish is declared an incarnation of Brahma. See Sanskrit Literature; Indian Law (Hindu).*

MANUAL, i.e. belonging to the hand (Lat. manus), a word chiefly used to describe an occupation which employs the hands, as opposed to that which chiefly or entirely employs the mind. Particular uses of the word are: " sign-manual," a signature or autograph, especially one affixed to a state document; "manual-exercise," in military usage, drill in the handling of the rifle; " manual alphabet," the formation of the letters of the alphabet by the fingers of one ox both hands for com- munication with the deaf and dumb; and " manual acts," the breaking of the bread, and the taking of the cup in the hands by the officiating priest in consecrating the elements during the celebration of the Eucharist. The use of the word for tools and implements to be used by the hand, as, distinct from machinery, only survives in the " manual fire-engine." From the late Latin use of manuale as a substantive, meaning " handbook," comes the use of the word for a book treating a subject in a concise way, but more particularly of a book of offices, containing the forms to be used in the administration of the sacraments other than the Mass, but including com- munion out of the Mass, also the forms for churching, burials, &c. In the Roman Church such a book is usually called a rituale, " manual " being the name given to it in the English Church before the Reformation. The keyboard of an organ, as played by the hands, is called the " manual," in distinction from the "

pedal " keys played by the feet.

*MANUCODE, from the French, an abbreviation of Manu- codiata, and the Latinized form of the Malay Manukdewata, meaning, says Crawfurd (Malay and Engl. Dictionary, p. 97), the " bird of the gods," and a name applied for more than two hundred years apparently to birds-of paradise in general. In the original isense of its inventor, Moritbeillard (Hist. nat. oiseaux, iii. 163), Manucode was restricted to the king bird of -paradise and three allied species; but in English it has curiously been transferred * to a small group of species whose 1 Manucodiata was used by M. J. Brisson (Ornithologie, ii. 130) as a generic term equivalent, to the Linnaean Paradisea. In 1783 Boddaert, when assigning scientific names to the birds figured by Daubenton, called the subject of one of them (Pt. enlum. 634) Manucodia chalybea, the first word being apparently an accidental curtailment of the name of Brisson's genus to which he referred it. Nevertheless some writers have taken it as evidence, of an intention to found a new genus by that name, and hence the importation of Manucodia into scientific nomenclature, and the English form to correspond.*

relationship to the Parddiseidae has been frequently doubted, and must be ■ considered uncertain. These manucodes have a glossy steel-blue plumage of much beauty, but are distinguished from other birds of similar coloration by the outer and middle toes being united for some distance, and by the extraordinary convolution of the trachea, in the males at least, with which is correlated the loud and clear voice of the birds. The con- voluted portion of the trachea lies on the breast, between the skin and the muscles, much as is found in the females of the painted Snipes (Rostratula) , in the males of the curassows (Cracidae), and in a few other birds, but wholly tmknown elsewhere among the Passeres. The' manucodes are peculiar to the Papuan sub-region (including therein the peninsula of Cape York), and comprehend, according to R. B. Sharpe (Cat. B: Brit. Museum, iii. 164), two genera, for the first of which, distinguished by the elongated • tufts on the head; he adopts R. P. Lesson's name Phonygama, and for the second, having no tufts, but the feathers of the head crisped, that of Manucodia; and W; A. Forbes (Proc. 'Zool. Soc. 1882, p. 349) observed that the ; Validity of the separation was con- firmed by their tracheal formation. Of Phony gama Sharpe recognizes three species, .P. keraudreni (the type) and P. jamesi, both from New Guinea, and ; P. gouldi, the Australian repre- sentative species; but the first two' are considered by D. G. Elliot (Ibis. 1878, p. 56) and Count Salvadori (Ornitol. della Papuasia, ii. 510) to be inseparable. There is a greater unanimity in regard to the species of the so- called genus Manu- codia proper, of which four are admitted — M. chalybeala or chalybea from north-western New Guinea, M. comriei from the south-eastern part of the same country, M. atra of wide distribution within the Papuan area, and M . jobiensis peculiar to the island which gives

it a name. Little is known of the habits of these birds, except that they are, as already mentioned, remarkable for their vocal powers, which, in P. keraudreni, Lesson describes (Voy. de la Coquille, " Zoologie," L 638) as enabling them to pass through every note of the gamut. (A. N.)

MANUEL I.y COMNENUS (c. 11 20-1 180), Byzantine emperor (ii43-i'i8o), the fourth son of John II., was born about 1120. Having distinguished himself in his father's Turkish war; he was nominated emperor in preference to his elder surviving brother. Endowed with a fine physique and great personal coufage, he devoted himself whole-heartedly to a military career. He endeavoured to restore by force of arms the pre-dominance of the Byzantine empire in the Mediterranean countries, and so was involved in conflict with his neighbours on all sides. In 1144 he brought back Raymond of Antioch to his allegiance, and in the following year drove the Turks out of Isauria. In 1147 he granted a passage through his dominions to two armies of crusaders under Conrad III. of Germany and Louis VII. of France; but the numerous out- breaks of overt or secret hostility between the Franks and the Greeks on their line of march, for which both sides were to blame, nearly precipitated a conflict between Manuel and his guests. In the same year the emperor made war upon" Roger of Sicily, whose fleet captured Corfu and plundered the Greek towns, but in 1 148 was defeated with the help of the Venetians. In 1 149 Manuel recovered Corfu and prepared to take the offensive against the Normans. With an army mainly composed of mercenary Italians he invaded Sicily and , Apulia, and although the progress of both these expeditions was arrested by defeats on land and sea, Manuel maintained a foothold in southern Italy, which was secured to him by a peace in 1155, and continued to interfere in Italian politics. In his endeavour to- weaken the control of Venice over the trade of his empire he made treaties with Pisa and Genoa; to check the aspirations of Frederic I. of Germany he supported the free Italian cities with his gold and negotiated with pope Alexander III. In spite of his friendliness towards the Roman Church Manuel was refused the title of " Augustus " by Alex ander, and he nowhere succeeded in attaching the Italians permanently to his interests. None the less in a war with the Venetians ! (i 1 7 2-74), he not only held his ground in Italy but*

drove his enemies out of the Aegean Sea. On his northern frontier Manuel reduced the rebellious Serbs to vassalage (1150-52) and made repeated attacks upon the Hungarians with a view to annexing their territory along the Save. In the wars of 1 151-53 and 1163-68 he led his troops into

Hungary but failed to maintain himself there; in 1168, however, a decisive victory near Semlin enabled him to conclude a peace by which Dalmatia and other frontier strips were ceded to him. In 1 169 he sent a joint expedition with King Amalric of Jerusalem to Egypt, which retired after an ineffectual attempt to capture Damietta. In 1 1 58-59 he fought with success against Raymond of Antioch and the Turks of Iconium, but in later wars against the latter he made no headway. In n 76 he was decisively beaten by them in the pass of Myriokephalon, where he allowed himself to be surprised in line of march. This disaster, though partly retrieved in the campaign of the following year, had a serious effect upon his vitality; henceforth he declined in health and in n 80 succumbed to a slow fever.

In spite of his military prowess Manuel achieved but in a slight degree his object of restoring the East Roman empire. His victories were counterbalanced by numerous defeats, sustained by his subordinates, and his lack of statesmanlike talent prevented his securing the loyalty of his subjects. The expense of keeping up his mercenary establishment and the sumptuous magnificence of his court put a severe strain upon the financial resources of the state. The subsequent rapid collapse of the Byzantine empire was largely due to his brilliant but unproductive reign. Manuel married, firstly, a sister-in- law of Conrad III. of Germany; and secondly, a daughter of Raymond of Antioch. His successor, Alexis II., was a son of the latter.

See John Cinnamus, History of John and Manuel (ed. 1836, Bonn) ; E. Gibbon, The Decline and Fall of the Roman Empire (ed. Bury, London, 1896), v. 229 sqq., vi. 214 sqq. ; G. Finlay, History of Greece (ed. "1877, Oxford), iii. 143-197; H. v. Kap-Herr, Die abendldndische Politik Kaiser Manuels (Strassburg, 1881). (M. O. B. C.)

MANUEL II. PALAEOLOGUS (1350-1425), Byzantine em- peror from 1391 to 1425, was born in 1350. At the time of his father's death he was a hostage at the court of Bayezid at Brusa, but succeeded in making his escape; he was forthwith besieged in Constantinople by the sultan, whose victory over the Christians at Nicopolis, however (Sept. 28, 1396), did not secure for him the capital. Manuel subsequently set out in person to seek help from the West, and for this purpose visited Italy, France, Germany and England, but without material success; the victory of Timur in 1402, and the death of Bayezid in the following year were the first events to give him a genuine respite from Ottoman oppression. He stood on friendly terms with Mahommed I., but was again besieged in his capital by Murad II, in 1422. Shortly before his death he was forced to sign an agreement whereby the Byzantine empire undertook to pay tribute to the sultan.

Manuel was the author of numerous works of varied character —

theological, rhetorical, poetical and letters. Most of these are printed in Migne, Patrologia graeca, clvi. ; the letters have been edited by E. Legrand (1893). There is a special monograph, by B. de Xivrey (in Memoires de I'Institut de France, xix. (1853), highly com- mended by C. Krumbacher, whose Geschichte der byzantinischen

(Munich, 1827), i. chs. 8, 14, ii. chs. 4, 5; T. E. Evangelides,, 'Ioropia TTjs T pairtrovvTos (Odessa, 1898), 71-73, 87-88, 126-132.

%

Litter atur (1897) should also be consulted.

MANUEL I. (d. 1263), emperor of Trebizond, surnamed the Great Captain (6 or partly iKinaroi), was the second son of Alexius I., first emperor of Trebizond, and ruled from 1228 to 1263. He was unable to deliver his empire from vassalage, first to the Seljuks and afterwards to the Mongols. He vainly negotiated for a dynastic alliance with the Franks, by which he hoped to secure the help of Crusaders.

Manuel II., the descendant of Manuel I., reigned only a few months in 1332-1333. Manuel III. reigned from 1390 to 1417, but the only interest attaching to his name arises from his con- nexion with Timur, whose vassal he became without resistance.

See G. Finlay, History of Greece (ed. 1877, Oxford), iv. 338-34° > 340-341, 386; Ph. Fallmerayer, Geschichte des Kaisertums Trapezv.nl

XVII. 20

MANUEL, EUGENE (1823-1901), French poet and man of letters, was born in Paris, the son of a Jewish doctor, on the 13th of July 1823. He was educated at the Ecole Normale, and taught rhetoric for some years in provincial schools and then in Paris. In 1870 he entered the department of public instruction, and in 1878 became inspector-general. His works include: Pages intimes (1866), which received a prize from the Academy; Poemes populaires (1874); Pendant la guerre (1871), patriotic poems, which were forbidden in Alsace-Lorraine by the German authorities; En voyage (1881), poems; La France (4 vols., 1854- 1858) ; a school-book written in collaboration with his brother-in- law, Levi Alavares; Les O.uvriers (1870), a drama dealing with social questions, which was crowned by the Academy; L' Absent (1873), a comedy; Poesies du foyer el de V ecole (1889), and editions of the works of J. B. Rousseau (1852) and Andre Chenier (1884). He died in Paris in 1901.

His PoSsies completes (2 vols., 1899) contained some fresh poems; to his

Melanges en prose (Paris, 1905) is prefixed an introductory note by A. Cahen.

MANUEL, JACQUES ANTOINE (1 775-1827), French politician and orator, was born on the 10th of December 1775. When seventeen years old he entered the army, which he left in 1797 to become a lawyer. In 1814 he was chosen a member of the chamber of representatives, and in 181 5 he urged the claim of Napoleon's son to the French throne and protested against the restoration of the Bourbons. After this event he actively opposed the government, his eloquence making him the foremost orator among the members of the Left. In February 1823 his opposition to the proposed expedition into Spain to help Ferdinand VII. against his rebellious subjects produced a tumult in the Assembly. Manuel was expelled, but he refused to accept this sentence, and force was employed to remove him. He died on the 20th of August 1827.

MANUEL, LOUIS PIERRE (1751-1793), French writer and Revolutionist, was born at Montargis (Loiret) . He entered the Congregation o f the Christian Doctrine, and became tutor to the son of a Paris banker. In 1783 he published a pamphlet, called Essais historiques, critiques, litteraires, et philosophiques, for which he was imprisoned in the Bastille. He embraced the revolutionary ideas, and after the taking of the Bastille became a member of the provisional municipality of Paris. He was one of the leaders of the imeutes of the 20th of June and the iath of August 1792, played an important part in the formation of the revolutionary commune which assured the success of the latter coup, and was made procureur of the commune. He was present at the September massacres and saved several prisoners, and on the 7th of September 1792 was elected one of the deputies from Paris to the convention, where he was one of the promoters of the proclamation of the republic. He suppressed the decora- tion of the Cross of St Louis, which he called a stain on a man's coat, and demanded the sale of the palace of Versailles. His missions to the king, however, changed his sentiments; he ber came reconciled to Louis, courageously refused to vote for the death of the sovereign, and had to tender his resignation as deputy. He retired to Montargis, where he was arrested, and was guillotined in Paris on the 17th of November 1793. Besides the work cited above and his political pamphlets, he was the author of Coup d'ceil philosophique sur le regne de St Louis (1 786) ; L' Annee fran$aise (1788); La Bastille devoiUe (1789); La Police de Paris devoilee (1791); and Lettres sur la Revolution (1792). In 1792 he was prosecuted for publishing an edition of the Lettres de Mirabeau a Sophie, but was acquitted.

MANUEL DE MELLO, DOM FRANCISCO (? 1611-1666), Portuguese writer, a connexion on his father's side of the royal house of Braganza,

*was a native of Lisbon. He studied the Humanities at the Jesuit College of S. Antao, where he showed a precocious talent, and tradition says that at the age of fourteen he composed a poem in ottava rima to celebrate the recovery of Bahia from the Dutch, while at seventeen he wrote a scientific work, Concordancias mathematicas. The death of his father^*

Dom Luiz de Mello, drove him early to soldiering, and having joined a contingent for the Flanders war, he found himself in the historic storm of January 1627, when the pick of the Portu- guese fleet suffered shipwreck in the Bay of Biscay. He spent much of the next ten years of his life in military routine work in the Peninsula, varied by visits to the court of Madrid, where he contracted a friendship with the Spanish poet Quevedo and earned the favour of the powerful minister Olivares. In 1637 th? latter despatched him in company with the conde de Linhares on a mission to pacify the revolted city of Evora, and on the same occasion the duke of Braganza, afterwards King John IV. (for whom he acted as confidential agent at Madrid), employed him to satisfy King Philip of his loyalty to the Spanish crown. In the following year he suffered a short imprisonment in Lisbon. In 1639 he was appointed colonel of one of the regi- ments raised for service in Flanders, a.id in June that year he took a leading part in defending Corunna against a French fleet commanded by the archbishop of Bordeaux, while in the following August he directed the embarcation of an expeditionary force of 10,000 men when Admiral Oquendo sailed with seventy ships to meet the French and Dutch. Fie came safely through the naval defeat in the channel suffered by the Spaniards at the hands of Van Tromp, and on th; outbreak- of the Catalonian rebellion became chief of the staff to the commander-in-chief of the royal forces, and was selected to write an account of the campaign, the Historia de la gnerra de Calaluna, which became a Span ish classic. On t he proclamation of Port uguese independence in 1640 he was imprisoned by order of Olivares, and when released hastened to offer his sword to John IV. Fie travelled to England, where he spent some time at the court of Charles I., and thence passing over to Holland assisted the Portuguese ambassador to equip a fleet in aid of Portugal, and himself brought it safely to Lisbon in October 1641. For the next three years he was employed in various important military commis- sions and further busied himself in defending by his pen the king's title to his newly acquired throne. An intrigue with the beau- tiful countess of Villa Nova, and her husband's jealousy, led to his arrest on the 19th of November 1644 on a false charge of assassination, and he lay in prison

about nine year's. Though his innocence was clear, the court of his Order, that of Christ, influenced by his enemies, deprived him of his commenda and sentenced him to perpetual banishment in India with a heavy money fine, and the king would not intervene to save hifn. Owing perhaps to the intercession of the queen regent of France and other powerful friends, his sentence was finally commuted into one of exile to Brazil. During his long imprisonment he finished and printed his history of the Catalonian War, and also wrote and published a volume of Spanish verses and some religious treatises, and composed in Portuguese a volume of homely philosophy, the Carta de Cuia de Casados and a Memorial in his own defence to the king, which Herculano considered " perhaps the most eloquent piece of reasoning in the language." During his exile in Brazil, whither he sailed on the 17th of April 1655, he lived at Bahia, where he wrote one of his Epanaphoras de varia historia and two parts of his masterpiece, the Apologos dialogaes. He returned home in 1659, and from then until 1663 we find him on and off in Lisbon, frequenting the celebrated Acad°mia dos Generosos, of which he was five times elected president. In the last year he proceeded to Parma and Rome, by way of England, and France, and Alphonso VI. charged him to negotiate with the Curia about the provision of bishops for Portu- guese sees and to report on suitable marriages for the king and his brother. During his stay in Rome he published his Obras morales, dedicated to Queen Catherine, wife of Charles II. of England, and his Cartas familiares. On his way back to Portugal he printed his Obras metricas at Lyons in May 1665, and he died in Lisbon the following year.

Manuel de Mello's early Spanish verses are tainted with Gongorism, but his Portugutse sonnets and cartas on moral subjects are notable for their power, sincerity and perfection of form. He strove successfully to emancipate himself from foreign faults of style, and by virtue of his native genius, and his

knowledge of the traditional poetry of the people, and the best Quinhentista models, he became Portugal's leading lyric poet and prose writer of the 17th century. As with Camoens, im- prisonments and exile contributed to make Manuel de Mello a great writer. His Letters, addressed to the leading nobles, ecclesiastics, diplomats and literati of the time, are written in a conversational style, lighted up by flashes of wit and enriched with apposite illustrations and quotations. His commerce with the best authors appears in the Hospital das letlras, a brilliant chapter of criticism forming part of the Apologos dialogaes. His comedy in redondilhas, the Auto do Fidalgo Aprendiz, is one of the last and quite the worthiest production of the school of Gil Vicente, and may be considered an anticipation of Moliere's Le Bourgeois gentilhomme.

There is no uniform edition of his works, but a list of them will be found in his Obras morales, and the various editions are set out in Innocencio da Silva's Diccionario bibliographico portuguez. See Dom Francisco Manuel de Mello, his Life and Writings, by Edgar Prestage (Manchester, 1905), " D. Francisco Manuel de Mello, documentos biographicos " and " D. Francisco Manuel de Mello, obras autographas, e ineditas," by the same writer, in the Archivo historico portuguez for 1909. Manuel de Mello's prose style is considered at length by G. Grot in Mariana historien (Bordeaux, 1905), PP- 37S ' se'q. (E. PR.)

MANUL (Felts manuT), a long-haired small wild cat from the deserts of Central Asia, ranging from Tibet to Siberia. The coat is long and soft, pale silvery grey or light buff in hue, marked with black on the chest and upper parts of the limbs, with trans- verse stripes on the loins and rings on the tail of the same hue. The Manul preys upon small mammals and birds. A separate generic name, Trichaelurus, has been proposed for this species by Dr K. Satunin.

MANURES and MANURING. The term " manure " origin- ally meant that which was " worked by hand " (Fr. manmuvre), but gradually came to apply to any process by which the soil could be improved. Prominent among such processes was that of directly applying " manure " to the land, manure in this sense being what we. now call " farmyard manure " or "dung," the excreta of farm animals mixed with straw or other litter. Grad- ually, however, the use of the term spread to other materials, some of home origin, some imported, some manufactured by artificial processes, but all useful as a means of improving the fertility of the soil. Hence we have two main classes of manures: (a) what may be termed " natural manures," and (b) "artificial manures." Manures, again, may be divided according to the materials from which they are made — e.g. " bone manure," " fish manure," " wool manure," &c; or according to the constituents which they mainly supply— e.g. " phosphatic manures," " potash manures," " nitrogenous manures," or there may be numerous combinations of these to form mixed or " compound " manures. Whatever it be, the word " manure " is now generally applied to anything which is used for fertilizing the soil. In America the f erfn " fertilizers " is more generally adopted, and in Great Britain the introduction of the " Fertilizers and Feeding Stuffs Act " has effected a certain amount of change in the same, direction. The modern tendency to turn attention less to the consideration of manurial applications given to land and more to the physical and mechanical changes introduced thereby in the soil itself, would seem to be carrying the word " manure " back more to its original meaning.

The subject of manures and their application involves a prior consideration of plant life and its requirements. The plant, growing in the soil, and

surrounded by the atmosphere, derives from these two sources its nourishment and means of growth through the various stages of its development.

Chemical analysis has shown that plants are composed of water, organic or combustible matters, and inorganic or mineral matters. Water constitutes by far the greater part of a living plant ; a grass crop will contain about 75% of water, a turnip crop 89 or 90%. The organic or combustible matters are those which are lost, along with the water, when the plant is burnt; the inorganic or mineral matters are those which are left behind as an " ash ' after the burn- ing. The combustible matter is composed of six elements: carbon, hydrogen, oxygen, nitrogen, sulphur and a little phosphorus. About one-half of the combustible matter of plants is carbon. Along with

hydrogen and oxygen the carbon forms the cellulose, starch, sugar, &c, which plants contain, and with these same elements and sulphur the carbon forms the albuminoids of plants. The inorganic or mineral matters comprise a comparatively small part of the plant, but they contain, as essential constituents of plant life, the following elements: potassium, calcium, magnesium, iron, phosphorus and sulphur. In addition, other, but not essential, elements are found in the ash e.g. sodium, silicon and chlorine, together with small quantities of manganese and other rarer elements.

The above constituents that have been classed as " essential," are necessary for the growth of the plant, and absence of any one will involve failure. This has been shown by growing plants in water dissolved in which are salts of the elements present in plants. By omitting in turn one or other of the elements aforesaid it is found that the plants will not grow after they have used up the materials contained in the seed itself. These elements are accordingly termed " essential," and it therefore becomes necessary to inquire how they are to be supplied.

The atmosphere is the great storehouse of organic plant food. The leaves take up, through their stomata, the carbonic acid and other gases of the atmosphere. The carbonic acid, under the in- fluence of light, is decomposed in the chlorophyll cells, oxygen is given off and carbon is assimilated, being subsequently built up into the various organic bodies forming the plant's structure. It would seem, too, that plants can take up a small quantity of ammonia by their leaves, and also water to some extent, but the free or un- combined nitrogen of the air cannot be directly

assimilated by the leaves of plants.

From the soil, on the other hand, the plant obtains, by means of its roots, its mineral requirements, also sulphur and phosphorus, and nearly all its nitrogen and water. Carbon, too, in the case of fungi, is obtained from the decayed vegetable matter in the soil. The roots are able not only to take up soluble salts that are presented to them, but they can attack and render soluble the solid constit- uents of the soil, thus transforming them into available plant food. In this way important substances, such as phosphoric acid and potash, are supplied to the plant, as also lime. Roots can further supply themselves with nitrogen in the form of nitrates, the ammonia and other nitrogenous bodies undergoing ready conversion into nitrates in the soil. These various mineral constituents, being now transferred to the plant, go to form new tissue, and ultimately seed, or else accumulate in the sap and are deposited on the older tissue.'

Whether the nitrogen of the air can be utilized by plants or not has been long and strenuously discussed, Boussingault first, and then Lawes, Gilbert and Pugh, maintaining that there was no evidence of this utilization. But it was always recognized that certain plants, clover for example, enriched the land with nitrogen to an extent greater than could be accounted for by the mere supply to them of nitrates in the soil. Ultimately Hellriegel supplied the explanation by showing that, at all events, certain of the Leguminosae, by the medium of swellings or " nodules " on their roots, were able to fix the atmospheric nitrogen in the soil, and to convert it into nitrates for the use of the plant. This was found to be the result of the action of certain organisms within the nodules themselves, which in turn fed upon the carbohydrates of the plant and were thus living in a state of " symbiosis " with it. So far, however, this has not been

shown to be the case with any other plants than the Leguminosae, and, though it is asserted by some that many other plants can take up the nitrogen of the air directly through their leaves, there is no clear evidence as yet of this.

We must now consider how the different requirements of the plant in regard to the elements necessary to maintain its life and to build up its structure affect the question of manuring.

Under conditions of natural growth and decay, when no crops are gathered in, or consumed on the land by live stock, the herbage, on dying down and decaying, returns to the atmos- phere and the soil the elements taken from them during life; but, under cultivation, a succession of crops deprives the land of the constituents which are essential to healthy and luxuriant growth. Without an adequate return to the land of the matters removed in

the produce, its fertility cannot be maintained for many years. In newly opened countries, where old forests have been cleared and the land brought under cultivation, the virgin soil often possesses at first a high degree of fertility, but gradually its productive power decreases from year to year. Where land is plentiful and easy to be obtained it is more con- venient to clear fresh forest land than to improve more or less exhausted land by the application of manure, labour and skill. But in all densely peopled countries, and where the former mode of cultivation cannot be followed, it is necessary to resort to artificial means to restore the natural fertility of the land and to maintain and increase its productiveness. That continuous cropping without return of manure ends in deterioration of the soil is well seen in the case of the wheat-growing areas in America. Crops of wheat were taken one after another, the straw was burned and nothing was returned to the land – , the produce began to fall off and the cultivators moved on to fresh lands, there to meet, in time, with the same experience; and now that the avail- able land has been more or less intensely occupied, or that new land is too far removed for ready transport of the produce, it has been found necessary to introduce the system of manuring, and America now manufactures and uses for herself large quantities of artificial and pther manures.

That the same exhaustion of soil would go on in Great Britain, if unchecked by manuring, is known to every practical farmer, and, if evidence were needed, it is supplied by the renowned Rothamsted experiments of I^awes and Gilbert, on a heavy land, and also by the more recent Woburn experiments of the Royal Agricultural Society of England, conducted on a light sandy soil. The following table will illustrate this point, and show also how under a system of manuring the fertility is main- tained: —

Table I. — Showing Exhaustion of Land by continuous Cropping without Manure, and the maintenance of fertility through manuring.

(Rothamsted 50 years; Woburn 30 years.)

I. Rothamsted (heavy land).

Crop.

Plot.

Treatment.

Average yield of corn per acre.

8 years,

1 844-1 85 1.

10 years,

1 852-1 86 1.

10 years,

1862-1871.

10 years,

1872-1881.

10 years,

1882-1891.

10 years,

1892-1901.

Average of 50 years,

1852-1901.

Wheat Barley

3

2 7-2 1-0

Unmanured continuously …. Farm-yard manure yearly . Unmanured continuously …. Farm-yard manure yearly ….

Bush.

17-2

28-0

Bush.

15-9 34-2

22-4

45-o

Bush.

14-5 37-5 17-5 51-5

Bush.

10-4 28-7

13-7 50-2

Bush.

12-6

38-2 12-7

47-6

Bush.

12-3 39-2

IO-O

44-3

Bush. I3-I

35-6 15-3

47-7

2. Woburn (light land).

Crop.

Plot

Treatment.

Average yield of corn per acre.

10 years,

1 877-1 886.

10 years,

1887-1896.

10 years,

1897-1906.

Average of 30 years,

1877-1906.

Wheat Barley

7

lib

7

11b

Unmanured continuously …. Farm-yard manure yearly …. Unmanured continuously …. Farm-yard manure yearly ….

Bush.

17-4

26-7

23-0

40-0

Bush.

14-5 27-8 18-1 39-9

Bush.

10-8 24-0

13-3 3 6‘6

Bush.

14-2 26-2

I8-I 38-8 >

Whereas on the heavier and richer land of Rothamsted the produce of unmanured wheat has fallen in 58 years from 17-2 bushels to 12-3 bushels, on the lighter and poorer soil of Woburn it has fallen in 30 years from 17-4 bushels to io-8 bushels; barley has in 50 years at Rothamsted gone from 22-4 bushels to 10 bushels, whilst at Woburn (which is better suited for barley) it has fallen in 30 years from 23 bushels to 13-3 bushels. At both Rothamsted and Woburn the application of farm-yard manure has kept the produce of wheat and barley practically up to what it was at the beginning, or even increased it. Similar conclu- sions can be drawn from the use of artificial manures at each of the experimental stations named, exemplifying the fact that with suitable manuring crops of wheat or barley can be grown years after year without the land undergoing deterioration, whereas if left unmanured it gradually declines in fertility. Practical proof has further been given of this in the well-known " continuous corn-growing " system pursued, in his regular farming, by Mr John Prout of Sawbridgeworth, Herts, and sub- sequently by his son, Mr W. A. Prout, since the year 1862. By supplying, in the form of artificial manures, the necessary con- stituents for his crops, Mr Prout was enabled to grow year after year, with only an occasional interval for a clover crop and to allow of cleaning the land, excellent crops of wheat, barley and oats, and without, it may be added, the use of farm-yard manure at all.

In considering the economical use of manures on the land regard must be had to the following points: (1) the require- ments of the crops intended to be cultivated; (2) the physical condition of the soil; (3) the chemical composition of the soil; and (4) the composition of the manure. Briefly stated, the guiding principle of manuring economically and profitably is to meet the requirements of the crops intended to be cultivated, by incor- porating with the soil, in the most efficacious states of combina- tion, the materials in which it is deficient, or which the various crops usually grown on the farm do not find in the land in a sufficiently available condition to ensure an abundant harvest. Soils vary greatly in composition, and hence ft will be readily understood that in one locality or on one particular field a certain manure may be used with great benefit, while in another field the same manure has little or no effect upon the produce.

For plant life to thrive certain elements are necessary, viz. carbon, hydrogen, oxygen, nitrogen, sulphur, phosphorus, among the organic or combustible matters, and among the inorganic or mineral matters, potassium, calcium, magnesium, iron, phos- phorus and sulphur. We must now examine the extent to which these necessary elements occur in either

of the two great store- houses, the atmosphere and the soil, and how their removal in the form of crops may be made up for by the use of manures, so that the soil may be maintained in a state of fertility. Further, we must consider what functions these elements perform in regard to plant life, and, lastly, the forms in which they can best be applied for the use of crops.

Of carbon, hydrogen and oxygen there is no lack, the atmo- sphere providing carbonic acid in abundance, and rain giving the elements hydrogen and oxygen, so that these are supplied from natural sources. Iron, magnesium and sulphur also are seldom or never deficient in soils, and do not require to be supplemented by manuring. Accordingly, the elements for which there is the greatest demand by plants, and which the soil does not provide in sufficiency, are nitrogen, phosphorus, potassium, and, possibly, calcium. Manuring, apart from the physical and mechanical advantages which it confers upon soils, practically resolves itself, therefore, into the supply of nitrogen, phosphorus and potassium, and it is with the supply of these that we shall accordingly deal in particular.

1. Nitroeen. — Though we are still far from knowing what are the exact Functions which nitrogen fulfils in plant life, there is no doubt as to the important part which it plays in the vegetable growth of the plant and in the formation of stem and leaf. Without a sufficiency of nitrogen the plant would be stunted in growth. Its growth, indeed, may be said to be measured by the supply of nitrogen, for while mineral constituents like phosphoric acid and potash are only taken up to the extent that the plant can use them

i.e. according to its rate of growth, this actual growth itself would seem to be determined by the extent of the nitrogen supply. This it is which causes the ready response given to a crop by the applica- tion of some quickly-acting nitrogenous material like nitrate-pf soda, and which is marked by the dark-green colour produced and the pushing-on of the growth. Similarly, this use of nitrogen, by pro- longing growth, defers maturity, while over-use of nitrogen tends to produce increase of leaf and lateness of ripening. Along with this growth of the vegetative portions, and seen, in the case of corn crops, mainly in the straw, there is a corresponding decrease, from the use of nitrogen in excess, in the quality of the grain. In corn a smaller grain and lesser weight per bushel are the result of over-nitrogen manuring. The composition of the grain is likewise affected, becom- ing more nitrogenous. With crops, however, where rapid green growth is required, nitrogen effects the purpose well, though here, too, over-manuring with nitrogen will tend to produce rankness and coarseness of growth. Experiments at Rothamsted and elsewhere, as well as everyday practice of the farm, bear testimony to the paramount importance of nitrogen-supply, and to the crops it is capable of raising. This applies not only to corn crops of all kinds, but to root crops, grass, potatoes, &c. Leguminous crops alone

seem to have no need of it. In view of this practical experience, Liebig's " mineral theory " — according to which he laid down that plants only needed to have mineral constituents, such as phosphoric acid, potash and lime, supplied to them — reads strangely nowadays. The use of mineral manures without nitrogen other than that already present in the soil or supplied in rain has been shown, alike at Rothamsted and Woburn, to produce crops of wheat and barley little better than those from unmanured land. The lack of nitrogen in ordinary cultivated soils is much more marked than is that of mineral constituents, and consequently even with the application of nitrogen alone (as by the use of nitrate of soda or sulphate of ammonia), good crops have been grown for a large number of years. This has been shown both at Rothamsted and at Woburn. On the other hand, experiments at these stations have demonstrated that better and more lasting results are obtained by the judicious use of nitrogenous materials in conjunction with phosphates and potash.

The form in which nitrogen is taken up by plants is mainly, if not wholly, that of nitrates, which are readily-soluble salts. Ammonia and other nitrogenous bodies undergo in the soil, through the agency of nitrifying organisms present in it (Bacterium nilrificans , &c), rapid conversion into nitrates, and as such are easily assimilable by the plant. Similarly, they are the constituents which are most readily removed in drainage, and hence the adequate supply of nitro- gen for the plant's use is a constant problem in agriculture. Experi- ments on the rate of removal of nitrates from the soil by drainage showed that every inch of rain passing through the drains caused a loss of 2j lb of nitrogen per acre (Voelcker and Frankland). At the same time, soils, as Way showed, have the power of absorbing, in different degrees, ammonia from its solution in water, and when salts of ammonia are passed through soils the ammonia alone is absorbed, the acids passing; generally in combination with lime, into the drainage.

Other experiments at Rothamsted on drainage showed that, though large quantities of ammonia salts were applied to the land, the drainage water contained merely traces of ammonia, but, on the other hand, nitrates in quantity, thus proving that it is as nitrates, and not as ammonia, that plants mainly, if not entirely, take up their nitrogenous food.

From these investigations it follows that much more nitrogen must be added to the land than would be needed to produce a given increase in the crop. Nitrogen, then, being so all-important, the ques- tion is, where is it to come from? We have seen that the leaves take up only minute quantities of ammonia, comparatively small amounts are supplied in the rain, dew, snow, &C., 1 and in the case of Legumi- nosae alone have we any evidence of plants being able to provide themselves with nitrogen from atmospheric sources. Some few organisms present in fertile soils, e.g. Azotobacter

chroococcum, have also the power, under certain conditions, of fixing the free nitrogen of the atmosphere without the intervention of a " host," but all these sources would be very inadequate to meet the demands of an intensive cultivation. An ordinary fertile arable soil will not show, on analysis, much more than -15% of nitrogen, and it is evident that the great source of supply of the needed nitrogen must be the direct manuring of the soil with materials containing nitrogen. These materials will be considered in detail later.

2. Phosphorus. — This is the most important mineral element which has to be supplied to the soil by the agency of manuring. It occurs in ordinary fertile soils to the extent of only about -15%, reckoned as phosphoric acid, and though its absence in sufficiency is not so marked or so soon shown under prolonged cultivation as is that of nitrogen, yet the fact that it is needed by all classes of crops, and that its application in manurial form is attended with great benefits, makes its supply one of great importance. From the time that Liebig, in 1840, suggested the treatment of bones with sulphuric acid in order to make them more readily available for the use of crops, and that

1 The amount of nitrogen thus deposited annually was found at Rothamsted to be 7-21 lb per acre.

the late Sir John Lawes (in 1843) began the dissolving of mineral phosphates for the purpose of manufacturing superphosphate, the " artificial manure " trade took its rise, and ever since then the whole globe has been exploited for the purpose of obtaining the raw phos- phatic materials which form the base of the artificial manures of the past and of the present day. The functions which phosphoric acid fulfils in plant life would appear to be connected rather with the maturing of the plant than with the actual growth of the structure. Phosphates are found concentrated in those parts of the plant where cell growth and reproduction are most active. More especially is this the case with the seed in which phosphates are present in greatest quantity. While nitrogen delays maturity, phosphoric acid has just the opposite effect, and cereal crops not sufficiently supplied with it ripen much more tardily than do others. Moreover, the grain is formed more early when phosphatic manures have been given than when they are withheld. Phosphates increase the proportion of corn to straw, and, as regards the grain itself, they render it less nitrogenous, richer in phosphates, and altogether improve its quality.

While these are the principal functions of phosphates, they also exercise an influence on the young plant in its early stages. This is well seen in the

almost universal practice of applying super- phosphate to the young turnip or swede crop in order to push it beyond the attack of "fly." Undoubtedly phosphates in readily available form stimulate the young seedling, enabling it to develop root growth, and, later on, causing the plant to " tiller out " well. Phosphoric acid occurs in the soil bound up with the oxides of iron and alumina, or, it may be, with lime, and the extent to which it may become useful to plants will depend largely upon the readiness with which it becomes available. For the purpose of ascertaining this different analytical methods have been suggested, the best known one being that of B. Dyer, in which a 1 % solution of citric acid is used as a solvent. As a result of experimenting with Rothamsted soils of known capability it has been put forward that if a soil shows, by this treatment, less than -oi % of phosphoric acid it is in need of phosphatic manuring.

Experiments carried on for many years at Rothamsted and Woburn have clearly established the beneficial effects of phosphatic manuring on corn crops, for though no material increase marks the application of mineral manures in the absence of nitrogen, yet the results when phosphates and nitrogen are used together are very much greater than when nitrogen alone has been applied; and this is-true as regards not only the better ripening and quality of the grain, but also as regards the actual crop increase.

With root crops phosphates are almost indispensable; and, owing to the limited power which these crops have of utilizing the phosphoric acid in the soil, the supply of a readily avail- able phosphatic manure like superphosphate is of the highest importance.

The assimilation of phosphoric acid goes on in a cereal crop after the time of flowering and to a later date than does that of nitrogen and potash, and it is ultimately stored in the seed. Soils possess a retentive power for phosphoric acid which enables the latter to be conserved and not removed to any extent by drainage. This function is exercised mainly by the presence of oxide of iron. Alumina acts in a similar way. In the case of soils that contain clay only traces of phosphoric acid are found in the drainage water.

3. Potassium. — The element third in importance, which requires to be supplied by manuring, is potassium, or, as it is generally ex- pressed, potash. This in its functions resembles phosphoric acid somewhat, being concerned rather with the mature development of the plant than with its actual increase of growth. Like phos- phoric acid, potash is found concentrated throughout the plant in the early stages of its growth, but, unlike it, is in the case of a cereal crop all taken up by the time of full bloom, whereas with phosphoric acid the assimilation continues later. Potash would appear to have an intimate connexion with the quality of

crops, and to be favourable to the production of seed and fruit rather than to stem and leaf development. Certain crops, such as vegetables, fruit, hops, as well as root crops generally, make special demands upon potash supply, and, as checking the tendency to over-develop- ment of leaf, &c, induced by nitrogenous manures when used alone, potash has great practical importance. Potash appears to be bound up in a special way with the process of assimilation, for it has been clearly shown that whenever potash is deficient the forma- tion of the carbohydrates, such as sugar, starch and cellulose, does not go on properly. Hellriegel and Wilfarth showed by experiment the dependence of starch formation on an adequate supply of potash. Cereal grains remained small and undeveloped when potash was withheld, because the formation of starch did not go on. The same effect has been strikingly shown in the Rothamsted experi- ments with mangels, a plot receiving potash salts as manure giving a crop of roots nearly 2 J times as heavy as that grown on a plot which has received no potash. In this case the increase is due almost entirely to the sugar and other carbohydrates elaborated in the leaves, and not to any increase of mineral constituents.

The effect of potash on maturity is somewhat uncertain, inasmuch as in the case of grain crops it would appear to delay maturity and to hasten it in that of root crops.

613

The influence of potash on particular crops is very marked. On clovers and other leguminous crops it is highly beneficial, while on grass land it is of particular importance as inducing the spread of clovers and other leguminous herbage. This is well seen in the Rothamsted grass experiments, where with a mineral manure containing potash one-half of the herbage is leguminous in nature, whereas the same manure without potash gives only 15% of legu- minous plants. Similarly, where nitrogen is used by itself and no potash given there are no leguminous plants at all to be found. Potash occurs in an ordinary fertile soil to the extent of about -20%; a sandy soil will have less, a clay soil may have considerably more' Potash, however, is mostly bound up in the soil in the form of insoluble silicates, and these are often in a far from available form, but require cultivation, the use of lime and other means for getting them acted on by the air and moisture, and so liberating the potash According to B. Dyer's method of ascertaining the availability of potash in soils, the amount of potash soluble in a I % citric acid solution should be about -005 %, otherwise the addition of potash manures will be a requisite. In the case of soils containing much lime a larger quantity would, no doubt, be needed.

Potash, like phosphoric acid, is readily retained by soils, and so is not subject to any considerable losses by drainage. This retention is exercised

by the ferric-oxide and alumina in soils, but still more so by the double silicates, and to some extent also by the humus of the soil. Potash will be liberated from its salts by the action of lime in the soil, the lime taking the place of the potash. Lime is, therefore, of much importance in setting free fresh stores of potash. Soda salts also, when in considerable excess, are able to liberate potash from its compounds, and to this is probably due, in many cases, the beneficial action attending the use of common salt.

4. Calcium. — Though calcium, or lime, is found in sufficiency in most cultivated soils, there are, nevertheless, soils in which lime is clearly deficient and where that deficiency has shown itself in practice. Moreover, so comparatively easy is the removal of lime from the soil by drainage, and so important is the part which lime plays in liberating potash from its compounds, and in helping to retain bases in the soil so that they are not lost in drainage, that the significance of lime cannot be ignored. Further, the avail- ability of both potash and phosphoric acid in the soil has been found to be much increased by the presence of lime. Lime as carbonate of calcium, is also necessary for the process of nitrification to go on in the soil. Some sandy soils, and even some clays, contain so little lime as to call for the direct supply of lime as an addition to the soil. When this is the case nothing can adequately take the place of lime, and in this sense lime may be called a " manure " In the majority of cases, however, the practice of liming or chalk- ing, which was a common one in former times, was resorted to mainly because of the ameliorating effects it produced on the land both in a mechanical and in a physical direction. Thus, on clay soil it flocculates the particles, rendering the soil less tenacious of moisture, improving the drainage and making the soil warmer Nor must the directly chemical results be overlooked, for in addition to those already mentioned, of liberating plant food (chiefly pot- ash and phosphoric acid), retaining bases, and aiding nitrification, lime acts in a special way as regards the sourness or " acidity " which is sometimes produced in land when lime is deficient In soils that are acid through the accumulation of humic acid nitrifica-

, tion does not go on, and bacterial life is repressed. The addition of lime has the effect of " sweetening " the land, and of restoring its bacterial activity. This acidity is also seen in the occurrence of ' the disease known as " finger and toe " in turnips, the fungus pro- ducing this being one that thrives in an acid soil. It is only found in soils poor in lime, and the only remedy for it is liming. The growth of weeds like spurry, marigold, sorrel, &c, is also a sign of land being wanting in lime. The most striking instance of this

soil acidity " is that afforded by the Woburn experiments where, on a soil originally poor in lime, the soil has, through the continuous use of

ammonia salts, been impoverished of its lime to such an extent that it has become quite sterile and is distinctly acid in character. The application of lime, however, to such a soil has had the effect of quite restoring its fertility.

The amount of lime which soils contain is a very variable one, chalk soils being very rich in lime, whereas sandy and peaty soils are generally very poor in it. If the amount of lime in a soil falls below 1 % of carbonate of lime on the dried soil, the soil will sooner or later require liming.

5. Magnesium. — This is not known to be deficient in soils, although an essential element in them, and it is seldom directly applied as a manunal ingredient. Some natural potash salts, such as kainit, contain magnesia salts in considerable quantity; but their influence is not known to be of beneficial nature, though, like common salt, magnesia salts will, doubtless, render some of the potash in the soil available. At the same time magnesia salts are not without their influence on crops, and experiments have been undertaken at the Woburn experimental farm and elsewhere to determine the nature of this influence. Carbonate of magnesia has been tried in connexion with potato-growing, and, it is said, with good results.

_ 6. Iron. — Iron is another essential ingredient of soil that is found in abundance and does not call for special application in manuriaf

form. Iron is essential for the formation of chlorophyll in the leaves, and its presence is believed also to be beneficial for the development of colour in flowers, and for producing flavour in fruits and in vines especially. Ferrous sulphate has, partly with this view, and partly for its fungus-resisting properties, been suggested as a desirable constituent of manures. The function performed by ferric oxide in the soil of retaining phosphoric acid, potash and ammonia has been already alluded to.

7. Sulphur. — This, the last of the " essential " elements, is seldom specially employed in manurial form. There would appear to be no lack of it for the plant's supply, and it is little required except for the building-up, with carbon, hydrogen, oxygen and nitrogen, of the albuminoids. There are few artificial manures which do not contain considerable amounts of sulphur, notably superphosphate. Sulphate of lime (gypsum) is sometimes applied to the land direct as a way of giving lime; this is employed in the case of clover and hops principally.

Having thus dealt with the essential ingredients which plants must have,

and which may require to be supplied to them in the form of additional manures, we may briefly pass over the other constituents found in plants, which may, or may not, be given as manures.

8. Sodium. — This is a widely distributed element. The influence of common salt (chloride of sodium) in liberating, when used in large excess, potash from the silicates in which it is combined in the soil has been already referred to, and in this way common salt and also nitrate of soda (the two forms in which soda salts are used as manures) may have some benefit. The principal purpose for which common salt, however, is used, is that of retaining moisture in the land. It is specially useful in a dry season, or for succulent crops such as cabbage, kale, &c, or again for plants of maritime origin (such as mangels), which thrive near the sea shore.

9. Silicon. — All soils contain silica in abundance. Though silica forms so large a part of the ash of plants and is especially abundant in the straw of cereals, there is no evidence that it is required in plant life. Popularly, it is believed to " stiffen " the stems of cereals and grasses, but plants grown without it will do perfectly well. It would, however, appear that soluble silica does play some part in enabling phosphoric acid to be better assimilated by the plant. Silicates, however, have not justified their use as direct fertilizers.

10. Chlorine. — A certain amount of chlorine is brought down in the rain, and chlorides are also used in the form of common salt, with the effect, as aforesaid, of liberating potash from silicates, when given in excess, but there is no evidence as to any particular part which the chlorine itself plays.

11. Manganese, &c. — Manganese occurs in minute quantities in most plants, and it, along with lithium (found largely in the tobacco- plant), caesium, titanium, uranium and other rare elements, may be found in soils. Experiments at the Woburn pot-culture station and elsewhere, point to stimulating effects on vegetation produced by the action of minute doses of salts of these elements, but, so far, their use as manurial ingredients need not be considered in practice.

12. Humus. — Though not an element, or itself essential, this body, which may be described as decayed vegetable matter, is not without importance in plant life. Of it, farmyard manure is to a large extent composed, and many " organic manures," as they are termed, contain it in quantity. Dead leaves, decayed vegeta- tion, the stubble of cereal crops and many waste materials add humus to the land, and this humus, by exposure to the air, is always undergoing further changes in the soil, opening it out, distributing carbonic acid through it, and supplying it, in its further decom- position,

with nitrogen. The principal effects of humus on the soil are of a physical character, and it exercises particular benefit through its pov/er of retaining moisture. Humus, however, has a distinct chemical action, in that it forms combinations with iron, calcium and ammonia. It thus becomes one of the principal sources of supply of the nitrogenous food of plants, and a soil rich in humus is one rich in nitrogen. The nitrogen in humus is not directly available as a food- for plants, but many kinds of fungi and bacteria are capable of converting it into ammonia, from which, by the agency of nitrifying organisms, it is turned into nitrates and made available for the use of plants. Humus is able to retain phosphoric acid, potash, ammonia and other bases. So important were the functions of humus considered at one time that on this Thaer built his " humus theory," which was, in effect, that, if humus was supplied to the soil, plants required nothing more. This was based, however, on the erroneous belief that the carbon, of which the bulk of the plant consists, was derived from the humus of the soil, and not, as we now know it to be, from the carbonic acid of the atmosphere. This theory was in turn replaced by the " mineral theory " of Liebig, and then both of them by the " nitrogen theory " of Lawes and Gilbert.

We pass next to review, in the light of the foregoing, the manures in common use at the present day.

Manures, as already stated, may be variously classified according to the materials they are made from, the constituents

which they chiefly supply, or the uses to which they are put, But, except with certain few manures, such as nitrate of soda, sulphate of ammonia and potash salts, which are used purely for one particular purpose, it is impossible to make any definite classification of manures, owing to the fact that the majority of them serve more than one purpose, and contain more than one fertilizing constituent of value It is only on broad lines, there-fore, that any division can be framed. Between so-called " natural " manures like farm-yard manure, seaweed, wool waste, shoddy, bones, &c, which undergo no particular artificial preparation, and maufactured manures like superphosphate, dissolved bones, and other artificially prepared materials, there may, however, be a distinction drawn, as also between these and such materials as are imported and used without further preparation, e.g. nitrate of soda, kainit, &c. On the whole, the best classification to attempt is that according to the fertilizing constituents which each principally supplies, and this will be adopted here, with the necessary qualifications.

I. — Nitrogenous (wholly or mainly) Manures

These divided themselves into : (a) Natural nitrogenous manures; (b)

imported or manufactured manures. a. Natural Nitrogenous Manures

Under this heading come — farm-yard manure; seaweed; refuse cakes and meals; wool dust and shoddy; hoof s and horns ; blood; soot; sewage sludge-

Farm-yard Manure. — This is the most important, as well as the most generally used, of all natural manures. It consists of the solid and liquid excreta of animals that are fed at the homestead, together with the material used as litter. The composition of farm-yard manure will vary greatly according to the conditions under which it is produced. The principal determining factors are (1) the nature and age of the animals producing it, (2) the food that is given them, (3) the kind and quantity of litter used, (4) whether it be made in feeding-boxes, covered yards or open yards, (5) the length of time and the way in which it has been stored. The following analysis represents the general composition of well- made farm-yard manure, in which the litter used is straw : — –

Water 75 – 42

•Organic matter 16-52

Oxide of iron and alumina …. -36

Lime 2-28

Magnesia -14

Potash -48

Soda -08

fPhosphoric acid -44

Sulphuric acid -12

Chlorine . -02

Carbonic acid, &c. 1-38

Silica . 2-76

•Containing nitrogen = • 59 %, which is equal to

ammonia -72 %

fEqual to phosphate of lime -96

Put broadly, farm-yard manure will contain from 65 to 80% of water, from -45 to -65% of nitrogen, from -4 to -8% of potash, and from -2 to -5 % of phosphoric acid.

This analysis shows that farm-yard manure contains all the constituents, without exception, which are required by cultivated crops in order to bring them to perfection, and hence it may be called a " perfect " manure. Dung, it may be observed, contains a great variety of organic and inorganic compounds of various degrees of solubility, and this complexity of composition — difficult, if not impossible, to imitate by art — is one of the circumstances which render farm-yard manure a perfect as well as a universal manure.

The excrements of different kinds of animals vary in composition, and those of the same animal will vary according to the nature and quantity of the food given, the age of the animal, and the way it is generally treated. Thus, a young animal which is growing, needs food to produce bone and muscle, and voids poorer dung than one which is fully grown and only has to keep up its condition. Similarly, a milking-cow will produce poorer dung than a fattening bullock. Again, cake-feeding will produce a richer manure than feeding without cake. Straw is the most general litter used, but peat-moss litter, sawdust, &c, may be used, and they will affect the quality of the manure to some extent. Peat-moss is the best absorbent and has a higher manurial value than straw. Box-fed manure, and that made in covered yards will suffer much less loss than that made in an open yard. Lastly, manure kept in a heap covered with earth will be much richer than that left in an uncovered heap. The solid and liquid excrements differ much in composition,

for, while the former contain principally phosphoric acid, lime, magnesia, and silica and comparatively little nitrogen, the urine is almost destitute of phosphoric acid, and abounds in alkaline salts (including salts of potash) and in nitrogenous organic matters, among which are urea and uric acid, and which on decomposition yield ammonia. Unless, therefore, the two kinds of excrements are mixed, a perfect manure supplying all the needs of the plant is not obtained ; care must accordingly be taken to absorb all the urine by the litter. Farm-yard manure, it is well known, is much affected by the length of time and the way in which it has been kept. Fresh dung is soluble in water only to a limited extent, and, in consequence, it acts more slowly on vegetation, and the action lasts longer than when dung is used which has been kept some time; fresh dung is therefore generally used in

autumn or winter, and thoroughly rotten dung in spring, when an immediate forcing effect is required.

The changes which farm-yard manure undergoes on keeping, have been made the subject of much inquiry. In Germany, Maercker and Schneidewind ; in France, Muntz and Girard ; and in England, Voelcker, Wood, Russell and others, have investigated these losses, coming to very similar conclusions concerning them. Perhaps the most complete set of experiments is one conducted at the Woburn experimental station and extending over three years (1890-1901). The dung was cake-fed manure made in feeding-boxes from which no drainage issued, and, after removal, it was kept in a heap, covered with earth. Hence it was made under as good conditions as possible; but, even then, the losses — after deduction for live- weight increase of the animals— were found to be 15% of the total nitrogen of the food, during the making, and 34 % (or a further 19) during storing and by the time the manure came to be put on the land. Accordingly, under ordinary farm conditions it is quite clear that only about 50 of the nitrogen of the food given is re- covered in the dung that goes on the land. This is the figure which Lawes and Gilbert suggested in the practical application of their Tables of Compensation for Unexhausted Manure Value.

During the fermentation of dung a large proportion of the non- nitrogenous organic matters disappear in the forms of carbonic acid and water, while another portion is converted into humic acids which fix the ammonia gradually produced from the nitro- genous constituents of the solid and liquid excreta. The mineral matters remain behind entirely in the rotten dung, if care be taken to prevent loss by drainage. For proper decomposition, both air and moisture are requisite, while extreme dryness or too much water will arrest the due fermentation of the mass.

Well-fermented dung is more concentrated and consequently more efficacious than fresh farm-yard manure. Neither fresh nor rotten dung contains any appreciable quantity of volatile ammonia, and there is no advantage from applying gypsum, dilute acid, superphosphate, kainit, or other substances recommended as fixers of ammonia. If dung is carted into the field and spread out at once in thin layers it will suffer comparatively little loss. But if dung be kept for a length of time in shallow heaps, or in open straw-yards and exposed to rain, it loses by drainage a considerable proportion of its most valuable soluble fertilizing constituents. Experiments with farm-yard manure kept in an open yard showed that, after twelve months' exposure to the weather, nearly all the soluble nitrogen and 78-2% of the soluble mineral matters were lost by drainage (A. Voelcker). To prevent this loss, farmyard manure, as had been pointed out, should, whenever possible, be carted into the field, spread out at once, and

ploughed in at the convenience of the farmer. It is, however, not always practicable to apply farm-yard manure just at the time it is made, and, as the manure heap cannot be altogether dispensed with, it is necessary to see how the manure may best be kept. The best dung is that made in regular pits or feeding-boxes. In them the urine is thoroughly absorbed, and, the manure being more compact through the constant treading, air enters less freely and the decomposition goes on less rapidly, the volatile matters, in consequence, not being so readily lost. External agents, such as rain, wind, sun, &c, do not affect the manure as they would in the case of open yards. Next best to box-fed manure is that made in covered yards, then that in sheds, and lastly that in open yards. When removed from the box or yard, the manure should be put in a heap upon a floor of clay or well-beaten-down earth, and then be covered with earth. When kept in an open yard, care should be taken not to let spout- ings of buildings lead on to it, and if there be a liquid-manure tank, this might be pumped out over the manure again when the latter is too dry.

The advantages of farm-yard manure consist, not only in its supplying all the constituents of plant food, but also in the improved physical condition of the soil which results from its application, inasmuch as the land is thereby kept porous, and air is allowed free access. While, however, farm-yard manure has these advan- tages, experience has shown that artificial manures, properly selected so as to meet the requirements of the crops intended to be grown on the particular land, may be employed to greater advantage. In farm-yard manure about two-thirds of the weight is water and one-third dry matter; a large bulk thus contains only a small proportion of fertilizing substances, and expense is incurred for carriage of much useless matter when dung has to be carted to distant fields. When a plentiful supply of good farm-yard manure

can be produced on the farm or bought at a moderate price in the immediate neighbourhood, it is economy to use it either alone or in conjunction with artificial manures; but when food is dear and fattening does not pay, or farm-yard manure is expensive to buy, it will be found more economical to use artificial manures. This has obtained confirmation from the experience of Mr Prout, at Sawbridgeworth, Herts, where since 1866, successive crops of corn have been grown, and entirely with the use of artificial manures.

The real difficulty with farm-yard manure is to get enough of it, and, if it were available in sufficiency, it would be safe to say that farmers generally would not require to go farther in regard to the manuring of any of the crops of the farm. Moreover, experiments at Rothamsted and Woburn have shown of how " lasting " a cha- racter farm-yard manure is, its influence having told for some 15 to 20 years after its application had ceased.

Light land is benefited by farm-yard manure through its supplying to the soil organic matter, and imparting to it " substance " whereby it becomes more consolidated and is better able to retain the manurial ingredients given to it. By improving the soil's moisture-holding capacity, moreover, " burning " of the land is prevented.

With heavy clay soils the advantages are that these are kept more open in texture, drainage is improved, and the soil rendered easier of working. On light land, well-rotted manure is best to apply; and in spring, whereas on heavy land freshly-made, " long," manure is best, and should be put on in autumn or winter.

Farm-yard manure, where the supply is limited, is mostly saved for the root-crop, which, however, generally needs a little super- phosphate to start it, as farm-yard manure is not sufficiently rich in this constituent. It serves a great purpose in retaining the needed moisture in the soil for the root crop.

For potato-growing, for vegetables, and in market-gardening, farm-yard manure is almost indispensable. On grass-land and on clover-ley it is also very useful, and in the neighbourhood of large towns is employed greatly for the production of hay.

For corn crops also, and especially for wheat on heavy land, farm-yard manure is much used, and, in a dry season in particular, shows excellent results, though experiments at Rothamsted and Woburn have shown that, on heavy and light land alike, heavier crops of wheat and barley can be produced in average seasons by artificial manures.

Seaweed.— Along the sea-coast seaweed is collected, put in heaps and allowed to rot, being subsequently used on the land, just as farm-yard manure is. According to the nature of the weed and its water-contents, it may have from -3 to 1 % of nitrogen, or more, with potash in some quantity.

Green-manuring.— -Though properly belonging to cultivation rather than to manuring, and acting chiefly as a means of improving the condition of the soil, the practice of green-manuring carries with it manurial benefits also, in that it supplies humus and nitrogen to the soil, and provides a substitute for farm-yard manure. The ploughing-in of a leguminous green-crop which has collected nitrogen from the atmosphere should result in a greater accumulation of nitrogen for a succeeding corn-crop, and thus supply the cheapest form of manuring. Green-manuring is most beneficial on light land, poor in vegetable matter.

Manure Cakes, Malt Dust, Spent Hops, &c. — Many waste materials of this kind are used because of their supplying, in the form of nitrogenous organic matter, nitrogen for crop uses. The nitrogen in these is of somewhat slow-acting, but lasting, nature. In addition to nitrogen, some of these materials, e.g. rape cake, cotton cake and castor cake, contain appreciable amounts of phosphoric acid and potash. Rape cake, or " land cake," as it is called in Norfolk, is used considerably for wheat. It is also believed to be a pre- ventive of wireworm, and so is often employed for potatoes and root-crops. Rape-seed from which the oil has been extracted by chemical means, and which is called " rape refuse," is made use of in hop-gardens as a slowly acting supplier of nitrogen. It will contain 4 to 5 % of nitrogen with 3 to 4 % of phosphates. Damaged cotton and other feeding-cakes, no longer fit for feeding, are ground into meal and put on the land. Castor cake is directly imported for manurial purposes, and will have up to 5% of nitrogen with 4 to. 5% of phosphates. Spent hops, malt dust and other waste materials are similarly used. The principal use of these materials is on light land, and to give bulk to the soil while supplying nitrogen in suitable form.

Wool-dust, Shoddy, &c. — The clippings from wool, the refuse from cloth factories, silk, fur and hair waste, carpet clippings and similar waste materials are comprised in this category. They are valuable purely for their nitrogen, and should be purchased according to their nitrogen-contents. They are favourite materials with hop- growers and fruit-farmers, whose experience leads them to prefer a manure which supplies its nitrogen in organic form, and which acts continuously, if not too readily. It is the custom in hop-lands to manure the soil annually with large quantities of these waste materials till it has much fertility stored up in it for succeeding crops. According to its nature, wool-dust or shoddy may contain anything from 3% of nitrogen up to 14%.

Leather is another waste material of the same class, but the process of tanning it has undergone makes its nitrogen but very slowly available and it is avoided, in consequence, as a manure.

There have been several processes started with the object of render- ing leather more useful as a manure.

Hoofs and Horns. — The clippings and shavings from horn factories are largely used by some hop-growers, and, though very slow in their action, they will contain 14 to 15% of nitrogen. They are sometimes very finely

ground and sold as " keronikon," chiefly for use in compound artificial manures.

Dried Blood is another purely nitrogenous material, which how- ever seldom finds its way to the farmer, being used up eagerly by the artificial manure maker. It will contain from 12 to 14% of nitrogen. It is obtained by simply evaporating down the blood obtained from slaughter-houses. It is the most rapidly acting of the organic nitrogenous materials enumerated, and, when obtain- able, is a favourite manure with fruit-growers, being also used for root and vegetable growing.

Soot is an article of very variable nature. It owes its manurial value mainly to the ammonia salts it contains, and a good sample will have about 4% of ammonia. It is frequently adulterated, being mixed with ashes, earth, &c. Flue sweepings of factory chimneys are sometimes sold as soot, but possess little value. Be- sides the ammonia that soot contains, there would undoubtedly seem to be a value attaching to the carbonaceous matter. Soot is a favourite top-dressing for wheat on heavy land, and is efficacious in keeping off slugs, &c. Speaking generally, the lighter a sample of soot is the more likely is it to be genuine.

Sewage Manure. — Where methods of dealing with the solid matters of sewage are in operation, it frequently happens that these matters are dried, generally with the aid of lime, and sold locally. Occasionally they are prepared with the addition of other fertilizing materials and made up as special manures. It may be taken for granted that sewage refuse by itself is not worth transport- ing to any distance. When made up with lime, the " sludge," as it is generally termed, is often useful because of the lime it contains. But, on the whole, the value of such preparations has been greatly exaggerated. Where land is in need of organic matter, or where it is desirable to consolidate light land by the addition of material of this class, sludge may, however, have decided value on mechanical and physical grounds, but such land requires to be near at hand.

b. Imported or Manufactured Nitrogenous Manures. These are nitrate of soda; sulphate of ammonia; calcium cyana- mide; calcium nitrate.

Nitrate of Soda. — This is the best known and most generally used of purely nitrogenous manures. It comes from the rainless districts of Chile and Peru, from which it was first shipped about the year 1830. By 1899 the export had reached to 1,344,550 tons. It is uncertain what its origin is, but it is generally believed to be the deposit from an ancient sea which was raised by volcanic eruption and its waters evaporated. Another theory puts it as the deposit from the saline residues of fresh-water streams. The crude deposit is termed caliche, and from this (which contains common salt and

sulphates of soda, potash and lime) the nitrate is crystallized out and obtained as a salt containing 95 to 96% pure nitrate of soda. It is sold on a basis of 95 % pure, and is but little subject to adulteration.

As a quickly acting nitrogenous manure nitrate of soda has no equal, and it is in great demand as a top-dressing for corn crops, also for roots. On grass-land, if used alone, it tends to produce grass but to exterminate leguminous herbage. Its tendency with corn crops is to produce, if used in quantity, inferiority of quality in grain. It can be employed in conjunction with superphosphate and other artificial manures, though it should not be mixed with them long before the mixture is to be put on. It is a very soluble salt, and the nitrogen being in the form of nitrates, it can be readily taken up by plants. On the other hand, it is readily removed from the soil by drainage, and its effects last only for a single season. Owing to its solubility, it requires to be used in much larger amount than the crop actually will take up. On a heavy soil it has a bad influence if used repeatedly and in quantity, causing the land to " run," and making the tilth bad. Though, doubtless, exhaustive to the soil, when used alone, there is no evidence yet of nitrate of soda causing land to " run out," as has been shown to be the case with sulphate of ammonia. One cwt. to the acre is a common dressing for corn crops, but for mangels it has been used to advantage up to 4 cwt. per acre. As a top-dressing for corn crops it differs little in its crop- results from its rival sulphate of ammonia, but in a dry season it answers better, owing to its more ready solubility and quicker action, whereas in a wet season sulphate of ammonia does better.

Sulphate of Ammonia. — This is the great competitor with nitrate of soda, and, like the latter, is useful purely as a nitrogenous manure. It is obtained in the manufacture of gas and as a by-product in the distillation of shale, &c, as also from coke ovens. By adding sulphuric acid to the ammoniacal liquor distilled over from the coal, &c, the salt is crystallized out. It is seldom adulterated, and, as sold in commerce, generally contains 24 to 25 % of ammonia. It is not quite so readily soluble as nitrate of soda ; it does not act quite so quickly on crops, but is less easily removed from the soil by drainage, leaving also a slight amount of residue for a second crop. It is nearly as efficacious as a top-dressing for corn crops as is nitrate of soda, and for some crops, e.g. potatoes, it is considered superior.

It may also be used like nitrate of soda for root crops. On grass-land its effect in increasing gramineous but reducing leguminous herbage is similar to that of nitrate of soda, but with corn crops it has not the same deteriorating influence on the quality of grain. It can be mixed quite well with superphosphate and other artificial manures, and is therefore a common form in which nitrogen is supplied in compound manures. It does not produce the bad effect on the tilth of certain soils that nitrate of soda

does, but it is open to the objec- tion that, if used continually on soil poor in lime, it will gradually exhaust the soil and leave it in an acid condition, so that the soil is unable to bear crops again until fertility is restored by the addition of lime. A usual dressing of sulphate of ammonia is I cwt. per acre.

Calcium Cyanamide. — This is a new product which represents the earliest result of the utilization, in a commercial form, of atmo- spheric nitrogen as a manurial substance. It is obtained by passing nitrogen gas over the heated calcium carbide obtained in the electric furnace, the nitrogen then uniting with the carbide to form calcium cyanamide. The product contains from 19 to 20% of nitrogen, and, though still under trial as a nitrogenous manure, it bids fair to form a valuable source of supply, especially should the natural deposits of nitrate of soda become exhausted. The cost of produc- tion limits its manufacture to places where electrical power can be cheaply generated. In its action it would seem to resemble most closely sulphate of ammonia.

Calcium Nitrate. — This is another product of the utilization of atmospheric nitrogen as a manurial agent. Nitrogen and oxygen are made to combine within the electric arc and the nitric acid pro- duced is then combined with lime, forming nitrate of lime. Nitrate of lime contains, as put on the market, about 13% of nitrogen. In its action it should be very similar to nitrate of soda, with, possibly, some added benefit to certain soils by reason of the lime it contains. Like cyanamide, it is still in the experimental stage as regards its agricultural use, and can only be produced where electric power is cheaply obtainable.

Neither material is altogether free from objection, the cyanamide heating when mixed with other manures and even with soil, and being liable to give off acetylene gas owing to the presence of calcium carbide, whereas the calcium nitrate is a salt which on exposure to a moist atmosphere readily deliquesces.

II. — Phosphatic Manures

Under the heading of manures that are used purely for their phosphatic benefit to the soil are superphosphate and basic slag.

Superphosphate. — This is the typical phosphatic manure, and is the base of the numerous artificial manures used on the farm. Superphosphate is made by dissolving raw phosphatic minerals in sulphuric acid (oil of vitriol), the tribasic phosphate of lime which these contain being converted into the so-called " soluble phosphate," sulphate of lime being formed at the same time. The first impetus to the manufacture of superphosphate was

given by Liebig, when he suggested, in 1840, the treatment of bones with oil of vitriol in order to make them act more quickly in the soil. Lawes subsequently, in 1843, applied this to mineral phosphates, using phosphorite, first of all, and the great manufacture of mineral superphosphate then began. Coprolites, as found in Cambridgeshire, Suffolk, Bedfordshire and elsewhere were the raw materials at first employed in the United Kingdom. But gradually the demand for the new manure became'so great that distant parts of the world were searched to bring in the raw material for conversion into superphosphate. Many new sources of supply have been worked, and many worked out or abandoned in favour of better and richer phosphates. Among these were the crystalline apatites of Canada and Norway, French, Spanish and German (Lahn) phosphates, and, at a later period, Carolina (land and river), Florida, Tennessee, Somme, Belgian, Algerian and Tunisian phosphates. In addition to these came other materials which, in their origin, were really of the nature of guano, being bird deposits the ammoniacal matters of which were gradually washed out. The mineral matters remained and altered the composition of the original rock on which the guano was deposited, thus forming rich deposits of phosphate of lime. Such were the phosphates obtained from many of the islands of the West Indies and South Pacific, and known under such various names as Sombrero, Curasao, Aruba, Maiden Island, Megillones, Baker Island, Fanning Islands, Lacepedes Islands, &c. guanos. Few of these are now worked, but their place has been largely taken by the rich deposits of Ocean Island and Christmas Island, which are of similar origin. The principal supplies of phosphatic minerals at the present time come from Florida, Algeria, Tunis, Ocean Island and Christmas Island. Other phosphates imported are Redonda and Alta Vela phosphates, but these consist mainly of phosphate of alumina, and are not used for superphosphate manufacture but for phosphorus production.

Coprolites, as formerly used, contained from 50 to 60% of phos- phate of lime, but they are not worked now, the richer sources, which are also better adapted for superphosphate manufacture, having taken their place. The amount of oxide of iron and alumina in raw

Chosphates is of great importance, as phosphates containing these odies are liable to cause superphosphate to " go back " or form I what is called "reverted " phosphate, the percentage of " soluble

MANURES

phosphate " being reduced thereby. For this reason many of the older supplies have been replaced by newer and better ones. Florida rock phosphate of high grade contains 75 to 78 % of phosphate of j% Florida land pebble phosphate about 70%. Algerian

and Tunisian phosphates have from 55 to 65 % of phosphate of lime, and are very free from iron and alumina, this fitting them especially for superphosphate making. Tennessee phosphate has about 70 % of phosphate, Somme and Belgian phosphates 40 to 50%, while Ocean Island and Christmas Island phosphates are of very high grade and yield over 80 and up to 86 % of phosphate of lime. Super- phosphate is made by finely grinding the raw phosphate and mixing it with oil of vitriol (chamber acid) ; what actual product is formed is a matter of some uncertainty, but it is a phosphate soluble in water u b t , d to b ? m ° n °-calcic phosphate. This is the true " soluble phosphate," but in commercial transactions it is universal to express the amount in terms of the original tribasic phosphate which has been rendered soluble. Ordinary grades of mineral superphosphate give from 25 to 27 % of soluble phosphate and higher grades 30 to 35 /o. On reaching the soil, the soluble phosphate becomes pre- cipitated by the calcium and iron compounds in the soil. But it is precipitated in a very fine form of division, in which it is readily attacked by the plant roots. Superphosphate is used practically tor all crops, including cereals, clover and other leguminous crops Its use tends to early maturity in a crop. Its value for giving a start to root crops is particularly recognized, and root crops generally are dependent on it, as they have little power of utilizing the phos- phoric acid in the soil itself. On land poor in lime superphosphate must be used with caution owing to its acid nature, and in such cases an undissolved phosphate is preferable. The quantity in which it is applied ranges from 2 and 3 cwt. per acre to 5 cwt. It suffers but little loss through drainage, and will exercise an influence on crops beyond the year of application.

Basic Slag.— This other principal phosphatic manure is of more recent origin, and is an undissolved phosphate. It is the waste product of steel-making where the Thomas-Gilchrist or " basic " process of manufacture has been employed. This process is used with ores containing much phosphorus, the removal of which is necessary in steel-manufacture. The " converters " which hold the molten iron are lined with lime and magnesia, and the impurities of the iron form a " slag " with these materials. For a long time the slag was regarded as a waste product, but ultimately it was found that, by grinding it very finely, it had distinct agricultural value, and now its use is universal. Basic slag is of various grades containing 12 to 20% of phosphoric acid, which is believed to exist in the form of a tetracalcic phosphate. This phosphate is found to be readily attacked by a weak solution of citric acid, and this probably accounts for the comparative ease with which plants can utilize the phosphate. With it is also a good deal of lime, and the presence of this undoubtedly, in many cases, accounts partly for the benefits that follow the use of basic slag. It should be very finely ground ; a common standard is that 80 to 90 % should pass through a

sieve having 10,000 meshes to the square inch.

The principal use of basic slag is on grass-land, especially where the soil is heavy or clayey. Its effect on such land in causing white clover to appear is in many cases most remarkable, and without doubt, much poor, cold grass-land has been immensely benefited by its use. It is also employed for root crops; but its effect on these as on cereals, is not so marked as on grass-land. On light land its benefit is not nearly so great or universal as on heavier land.

III. — Manures containing Nitrogen and Phosphates These may be classified as follows: (a) Natural manures —

bones, fish and meat guanos, Peruvian guano, bats' guano;

(b) Manufactured manures— dissolved bones, compound

manures.

a. Natural Manures

Bones.— The value and use of these in agriculture has long been known, as also the comparative slowness of their action, which latter induced Liebig to suggest their treatment with sulphuric acid Natural bones will contain from 45 to 50% of phosphate of lime with 4t°4J /o of nitrogen. It is usual to boil bones lightly aftercollection in order to remove the adhering particles of flesh and the fat. If steamed under pressure the nitrogenous matter is to a great extent extracted, yielding glue, size, gelatine, &c, and the bones— known then in agriculture as " steamed bones "—will contain from 55 to 60 /„ of phosphate of lime with 1 tol \ % of nitrogen. Bones are also imported from India, and these are of a very hard and dry nature Bones are principally used for root crops, and to some extent on grass- land. The more finely they are ground the quicker is their action, but they are a slow-acting manure, which remains some years in the land. Mixed with superphosphate, bone meal forms an excellent manure for roots, and obviates the difficulty of using superphos- phate on land poor in lime. Steamed bones, sometimes ground into flour, are much used in dairy pastures.

Fish and Meal Guanos.— The term " guano," though generally applied to these manures, is wrongly so used, for they are in no sense guano (meaning thereby the droppings of sea birds). They are really fish or meat refuse, being generally the dried fish-offal or the residue

from meat-extract manufacture. They vary much in composition according to their origin, some being highly nitrogenous (11 to 12% nitrogen) and comparatively low in phosphate of lime, and others being more highly phosphatic (30 to 40% phosphate of lime) with lower nitrogen. These materials are to some extent used for root and vegetable crops, and chiefly for hop-growing, but they go lareelv also to the artificial manure maker.

Peruvian Guano— This material, though once a name to conjure with, has now not much more than an academic interest, owing to the rapid exhaustion of the supplies. It is true guano, i.e. the deposit ot sea birds, and was originally found on islands off the coast of Peru Peruvian guano was first discovered in 1804 by A. von Humboldt and the wonderful results attending its use gave an enormous impulse to its exportation. The Chincha Islands yielded the finest qualities ot guano this giving up to 14 and 15 % of nitrogen. Gradually the Chincha Islands deposits became worked out, and other sources such as the Pabellon de Pica, Lobos.Guanapeand Huanillos deposits were worked in turn. In many instances the guano had suffered trom washing by rain or by decomposition, or in other cases the bare rock was reached and the shipments contained some consider- able quantity of this rocky matter, so that the highly nitrogenous guanos were no longer forthcoming and deposits more phosphatic in character took their place. Gradually the shipments fell off, and with them the great reputation of the guano as a manure. On some

j r ls ‘ ands the blrds – after having been driven off, have returned and fresh deposits are being formed. On the west coast of Africa also some new deposits have been found, and a certain amount of guano comes from Ichaboe Island ; but the trade will never be what it once was. Occasional shipments come from the Ballista Islands giving from 10 to 11% of nitrogen with 11 to 12% of phosphoric acid, and lower-grade guanos (7% of nitrogen and 16% of phos- phoric acid) are arriving from Guanape, while from Lobos de Tierra comes a still lower grade.

The particular feature that marked guano was that it contained both its nitrogenous and phosphatic ingredients in forms in which they could be very readily assimilated by plants. Moreover the occurrence of the nitrogenous and phosphatic matters in different forms of combination gave to them a special value, and one that could not be exactly imitated in artificial manures. The nitrogenous matters, e.g., exist as urates, carbonates, oxalates and phosphates ot ammonia, and a particular nitrogenous body termed ” guanine ” is also found. Guano contains much alkaline salts, and is from its containing alike phosphates, nitrogen and potash in suitable forms and quantity, an exceedingly well balanced manure. In agriculture it is used for corn crops, and also for root crops, potatoes and hops. It is esteemed for barley, as tending to produce good

quality For vegetable and market-garden crops that require forcing guano is also still in demand. The more phosphatic kinds are sometimes treated with sulphuric acid, and constitute " Dissolved Peruvian Guano "

Bats Guano.— In caves in New Zealand, parts of America, South Atrica and elsewhere, are found deposits formed by bats, and these are used to some extent as a manure, though they have no great commercial value.

b. Manufactured Manures

Dissolved Bones.— These are bones treated with oil of vitriol as in superphosphate manufacture. By this treatment bones become much more readily available, and are used to a considerable extent more especially for root crops. Their composition varies with the method of manufacture and the extent to which they are dissolved Sneaking generally, they will have from n to 19% of soluble phos- phate, with 20 to 24% of insoluble phosphates, and if pure should contain 3 /„ of nitrogen. When mixed with superphosphate in vary- ing amount, or if made with steamed and not raw bone, they are generally known under the indefinite name of " bone manure "

Compound Manures.— To this class belong the manures of every description which it is the aim of the artificial manure manufacturer to compound for particular purposes or to suit particular soils or crops. I he base of all these is, as a rule, mineral superphosphate or else dissolved bones, or the two together, and with these are mixed numerous different manurial substances calculated to supply definite amounts of nitrogen, potash, &c. Such manures, the trade in which is a veryjarge one, are variously known as " corn manure," " turnip manure, " grass manure " and the like, and much care is bestowed on their compounding and on their preparation in good condition to allow of their ready distribution over the land.

IV. — Potash Manures These, with few exceptions, are natural products from the potash mines of Stassf urt (Prussia) . Until the discovery of these deposits, in 1861, the use of potash as a fertilizing constituent was very limited, being confined practically to the employment of wood ashes. At the present time a small quantity of potash salts— principally carbonate of potash— is obtained from sugar refinery and other manufacturing processes, but the great bulk of the potash supply comes from the German mines. In these the different natural salts occur in different layers and in conjunction with layers of rock-salt, carbonate of lime and

other minerals, from which they have to be separated out and andergo subsequently a partial purification by re-crystallization.

The principal potash salts used in agriculture are — (i) sulphate of potash, which is about 90% pure; (2) kainit, an impure form of sulphate of potash, and containing much common salt and magnesia salts, and giving about 12 % of potash (K2O); (3) muriate of potash, which is used to a great extent in agriculture, and contains 75 to 90 % of muriate of potash ; and (4) potash manure salts, a mixture of different salts and containing from 20 to 30 % of potash.

Potash is much esteemed in agriculture, more especially on light land (which is frequently deficient in it) and on peaty soils, and for use with root crops and potatoes in particular. For fruit and vege- table growing and for flowers potash manures are in constant request. Clay land, as a rule, is not benefited by their use, these oils contain- ing generally an abundance of potash. Along with basic slag, potash salts have been frequently used for grass on light land with advantage.

V. — Miscellaneous Manures

There are, in addition to the foregoing, certain materials which in a limited sense only can be called " manures," but the influ- ences of which are mostly seen in the mechanical and physical improvements which they effect in soil. Such are salt, and also lime in its different forms.

Salt. — The action of salt in liberating potash from the soil has been explained. As a manure it is sometimes used along with nitrate of soda as a top-dressing for corn crops, in the belief that it stiffens the straw. For root crops also, and mangels in particular, it is employed ; also for cabbage and other vegetables.

Lime. — The use of this is almost solely to be considered as a soil improvement, and not as that of a manure. Sulphate of lime (gypsum) is, however, occasionally used as a dressing for clover, and also for hops. The fact that superphosphate itself contains a con- siderable amount of sulphate of lime renders the special application of gypsum unnecessary, as a rule.

As compared with " natural " manures, like farm-yard manure, artificial manures have the disadvantage that they, unlike it, do not improve the physical condition of the soil. Artificial manures have, however, the advantage over farm-yard manure that they can supply in a small compass, and even if used in small quantity, the needed nitrogen, phosphoric acid and potash, &c, which crops require, and which farm-yard manure has but in small proportion. They, further, present the expensive fertilizing matters in a concentrated form, and by their application save expense in labour.

(J. A. V.) MANUSCRIPT, a term applied to any document written by the*

human hand (Lat. manu scriptum) with the aid of pen, pencil or other instrument which can be used with cursive facility, as distinguished from an inscription engraved with chisel or graver, worked laboriously. By usage the word has come to be employed in a special sense to indicate a written work of the ancient world or of the middle ages; collections of such " ancient manuscripts " being highly prized and being stored for preservation in public libraries. Down to the time of the invention of printing, and until the printed book had driven it out of the field, the manu- script was the vehicle for the conservation and dissemination of literature, and discharged all the functions of the modern book. In the present article a description is given of the development of the ancient manuscript, particularly among the Greeks and Romans, leading on to the medieval manuscripts of Europe, and bringing down the history of the latter to the invention of printing; the history of the printed volume is dealt with in the article Book (q.v.).

Materials. — The handbooks on palaeography describe in full the different materials which have been employed from remote time to receive writing, and may be referred to for minuter details. To dispose, in the first place, of the harder materials that have been put under requisition, we find metals both referred to by writers and actually represented by surviving examples. Thin leaves of gold or silver were recommended for the inscription of charms in particular. Leaden plates were in common use for incantations; the material was cheap and was supposed to be durable. On such plates were scratched the dirae or solemn devotions of obnoxious persons to the infernal deities; many examples have survived. As an instance of the use of soft substance afterwards hardened may be cited the practice by the Babylonians and Assyrians of writing, or rather of puncturing, their cuneiform characters on clay tablets while moist, which were afterwards dried in the heat of the sun or baked in the oven. Potsherds, or ostraka, were employed for all kinds of tem- porary purposes. Thousands of them have been found in Egypt inscribed with tax receipts and ephemeral drafts and memoranda, children's dictation lessons, &c. Analogous to the clay documents of western Asia are the tablets coated with wax in vogue among the

Greeks and Romans, offering a surface not to be inscribed with the

Cen but to be scratched with the sharp pointed stilus. These will e described more fully below. With them we class the wooden boards, generally whitened with a coating of paint or composition and adapted for the pen, which were common in Egypt, and were specially used for educational purposes. Such boards were also employed for official notices in Athens in the 4th century B.C.

Of the more pliant, and therefore generally more convenient; substances

there were many, such as animal skins and vegetable growths. Practically we might confine our attention to three of them: papyrus, parchment or vellum, and paper, the employment of which, each in turn, as a writing material became almost universal. But there are also others which must be mentioned.

In a primitive state of society leaves of plants and trees strong enough for the purpose might be taken as a ready-made material to receive writing. Palm leaves are used for this purpose to the present day in parts of India; and the references in classical authors to leaves as early writing material among the Greeks and Romans cannot be dismissed as entirely fanciful.

The bark of trees, and particularly the inner bark of the lime-tree, 4>i \ipa, tilia, was employed. The fact that the Latin word liber, bark, eventually meant also a book, would be sufficient proof that that material was once in common literary use, even if it were not referred to by writers.

Linen, too, was a writing material among the early Romans, as it was also among the Etruscans, and as it had been to some extent among the Egyptians.

Skins of animals, tanned, have doubtless served as a writing material from the very earliest period of the use of letters. The Egyptians occasionally employed this material. Instances of the use of leather in western Asia are recorded by ancient authors, and from Herodotus we learn that the Ionian Greeks applied to the rolls of the later-imported papyrus the title 8«£0«p

But generally these materials were superseded in the old world by the famous Egyptian writing material manufactured from the papyrus plant, which gradually passed beyond the boundaries of its native land and was imported at a remote period into other countries. Into Greece and into Rome it was introduced at so early a time that practically it was the vehicle for classical literature throughout its . course. A description of the manufacture and use of this material will be found under Papyrus. Here it need only be noted that papyrus is associated in Greek and Roman literature with the roll form of the ancient manuscript, as will be more fully explained below, and that it was the supersession of this material by parchment or vellum which led to the change of shape to the book form. '

The introduction of the new material, parchment or vellum, was not a revival of the use of animal skins as followed by the old world. The skins were now not tanned into leather, but were prepared by a new process to provide a material, thin, strong, flexible, and smooth of surface on both faces. This improved process was the secret of the success of the new material in ousting the time-honoured papyrus from its high position. The

common story, as told by Pliny, that Eumenes II. of Pergamum (197-158 B.C.), seeking to extend the library of his capital, was opposed by the jealousy of the Ptolemies, who forbade the export of papyrus, hoping thus to check the growth of a rival library, and that he was thus compelled to have recourse to skins as a writing material, at all events points to Pergamum as the chief centre of trade in the material, irepyaintyii, charta pergamena. The old terms Si6kpai, membranae, applied originally to the older leather, were transferred to the newly im- proved substance. In describing MSS. written ort this material, by common consent the term parchment has in modern times given place to that of vellum, properly applicable only to calfskin, but now generally used in reference to a medieval skin-book of any kind. Parchment is a title now usually reserved for the hard sheepskin or other skin material on which law deeds are engrossed. (See Parchment.)

Vellum had a long career as a writing material for the literature of the early centuries of our era and of the middle ages. But in its turn it eventually gave place to paper (q.v.). As early as the 13th century paper, an Asiatic invention, was making its way into Europe and was adopted in the Eastern Empire as a material for Greek literature side by side with vellum. It soon afterwards began to appear in the countries of southern Europe. In the course of the 14th century the use of it became fairly established, and in the middle of the century a number of paper manuscripts were produced along with those on vellum, particularly in ftaly. Finally, in the 15th century paper became the common material for the manuscript book. The new paper, however, made no further change in the form of the manuscript. It possessed exactly the same qualities, as a writing material, as vellum : it could be inscribed on both sides; it could be made up into quires and bound in the codex form; and it had the further advantage of being easily manufactured in large quantities, and therefore of being comparatively cheap.

The Forms of the Manuscript Book. — In describing the de- velopment of the manuscript book in the ancient world, and

subsequently in the middle ages, we have to deal with it in two forms. The common form of the book of the ancient world was the roll, composed of one continuous sheet of material and inscribed only on one side. This form had a long career. In Egyptian literature it can be traced back for thousands of years. In Greek literature it may be assumed to have been in vogue from the earliest times; actual examples have sur- vived of the latter

part of the 4th and beginning of the 3rd centuries B.C. As to its early use in Latin literature we cannot speak so definitely ; but Rome followed the example of Greece in letters, and therefore no doubt also in the material shape of literary productions. Both in Greek and Latin literature the roll lasted down to the early centuries of the Christian era. It was superseded by the codex, the manuscript in book form (in the modern sense of the word book), composed of separate leaves stitched together into quires and made avail- able to receive writing on both sides of the material. This form is still in vogue as the modern printed book, and prob- ably will never be superseded. But the codex in this developed shape was only an evolution from the early waxen tablets of the Greeks and Romans, two or more of which, hinged together, formed the primitive codex which suggested the later form. Therefore it will be necessary to include the description of the tablets with that of the later codex.

*The ordinary terms in use among the Greeks for a book (that is, a roll) were 0tj3Xos (another, form of |3u(3Xos, papyrus) and The Roll. ‘ ts diminutive /3t(3Xtoi’, which included the idea of a written book. The corresponding Latin terms were liber and libcllus; volumen was a rolled-up roll. A roll of material uninscribed was x< *PT77S, charla, or to/ws (originally a cutting of papyrus), applicable also to a roll containing a portion or division of a large work which extended to more than one roll. A work contained within the compass of a single roll was a juoto(3[j3Xos, or yovltfiiffkov. The term TtDxos seems also to have meant a single roll, but it was also applied at a later time to indicate a work contained in several rolls.*

In writing the text of a work, the scribe might choose to make use of separate sheets of papyrus, KoXXˆjuara, schedae, and then join them to one another consecutively so as to make up the roll ; or he might purchase from the stationers a scapus, or ready- made roll of twenty sheets at most; and if this length were not sufficient, he might add other sheets or scapi, and thus make a roll of indefinite length. But proverbially a great book was a great evil, and, considering the inconvenience of unrolling a long roll, not only for perusal, but, still more so, for occasional reference, the practice of subdividing lengthy works into divisions of convenient size, adapted to the capacity of moderate-sized rolls, must have come into vogue at a very early period. ‘

It was the practice to write on one side only of the papyrus; to write on both front and back of a roll would obviously be a clumsy and irritating method. Works intended for the market were never opisthograpk. Of course the blank backs of written rolls which had become obsolete might be turned to account for personal or temporary purposes, as we learn not only from refer- ences in classical authors but also from actual examples. The most

interesting extant case of an opisthograph papyrus is the copy of Aristotle's Constitution of Athens in the British Museum, which is written on the back of a farmer's accounts, of the end of the 1st century — but only for private use. It being the rule, then, to confine the writing to one side of the material, that is, to the inner surface of the made-up roll, that surface was more carefully prepared and smoothed than the other; and, further, the joints of the several sheets were so well made that they offered no obstacle to the action of the pen. Still further, care was taken that this, the redo surface of the material, should be that in which the shreds of papyrus of which it was composed lay horizontally, so that the pen might move freely along the fibres; the shreds of the verso side, on the other hand, being in vertical position. This point is of some importance, as, in cases where two different handwritings are found on the two sides of a papyrus, it may be usually assumed that the one on the recto surface is the earlier.

The text was written in columns, cre\L5es, paginae, the width of which seems not to have been prescribed, but which for calligraphic effect were by preference made narrow, sufficient margins being left at head and foot. The average width of the columns in the best extant papyri ranges from two to three-and- a-half inches. The written lines were parallel with the length of the roll, so that the columns stood, so to say, with the height of the rolled-up roll, and were disclosed consecutively as the roll was unwound. Ruling with lead to guide the writing is mentioned by writers, but it does not appear that the practice was generally followed. The number of lines in the several columns of extant papyri is not constant, nor is the marginal boundary of the beginnings of the lines, for the accuracy of which a ruled vertical line would have proved useful, ordinarily kept even. No doubt in practice the horizontal fibres of the material were found to afford a sufficient guide for the lines of writing.

If the title of the work was to be given, the scribe appears to have written it ordinarily at the end of the text. But something more was needed. To be obliged to unroll a text to the end, in order to ascertain the name of the author, would be the height of inconvenience. Its title was therefore sometimes written at the head of the text. It appears also that at an early period it was inscribed on the outside of the roll, so as to be visible as the roll lay in a chest or on the shelf. But a more general practice was to attach to the top edge of the roll a label or ticket, criXXvjSos, or olrrvfios, tituius, index, which hung down if the roll lay on the shelf, or was conveniently read if the roll stood along with others in the ordinary cylindrical roll-box, kiott/, Kiflairos, cista, capsa. One such label made of papyrus has survived and is in the British Museum.

The scribe would not commence his text at the very beginning, nor would he carry it quite down to the end, of the roll. He would leave blank a

sufficient length of material at either ex- tremity, where the roll would naturally be most exposed to wear and tear by handling in unrolling and re-rolling; and, further, the extreme vertical edges might each be strengthened by the addition of a strip of papyrus so as to form a double thickness of material.

According to the particulars given by classical authors, the roll would be finished off somewhat elaborately; but the details described by them must be taken to apply to the more expensive productions of the book trade, corresponding with the full- bound volumes of our days. In practice, a large proportion of working copies and ordinary editions must have been dealt with more simply. Firstly, the roll should be rolled up round a central stick, of wood or bone, called the 6yuaX6s, umbilicus, to which the last sheet of the papyrus may or may not have been attached. But as a matter of fact no rolling-sticks have been found in company with extant papyri, and it has therefore been suggested that they were not attached to the material but were rolled in loose, and were therefore liable to drop out. In some instances, as in the rolls found at Herculaneum, a central core of papyrus instead of a stick was thought sufficient. The edges, frontes, of the roll, after it had been rolled up, were shorn and were rubbed smooth with pumice, and they were sometimes coloured. A valuable roll might be protected with a vellum wrapper, (baivoKrjs, paenula, stained with colour; and, further, it might be secured with ornamental thongs. The central stick might also be adorned with knobs or " horns," plain or coloured. This seems to be the natural explanation of the Kepara, or cornua, mentioned by the ancient writers. Finally, the title-label described above was attached to the completed roll, now ready for the book-market.

In the perusal of a work the reader held the roll upright and unrolled it gradually with the right hand; with the left hand he rolled up in the reverse direction what he had read. Thus, when he had finished, the roll had become reversed, the beginning of the text being now in the centre of the roll and the end of it being outside. The roll was " explicitus ad umbilicum," or " ad sua cornua." It had therefore now to be unrolled afresh and to be re-rolled into its normal shape — a troublesome pro- cess which the lazy man shirked, and which the careful man

accomplished by making the revolutions with his two hands while he held the revolving material steady under his chin.

Although the codex or manuscript in book-form began to make its way in

Greek and Roman literature as early as the ist century of our era, the roll maintained its position as the recog- nized type of literary document down to the 3rd, and even into the 4th, century, when it was altogether superseded. We shall proceed to describe the codex after giving some account of the waxen, or, to speak more correctly, the waxed, tablet, its pre- cursor in the book-form.

The ordinary waxen tablet in use among the Greeks and Romans was a small oblong slab of wood, beech, fir, and especially box, the surface of which on one or both sides, with Tablet. tne exception of the surrounding margins which were left intact in order to form a frame, was sunk to a slight depth and was therein coated with a thin layer of wax, usually black. The tablet thus presented the appearance of a child's school-slate of the present day. Such tablets were single, double, triple, or of several pieces or leaves. In Greek they were called Tueaij, irivaids, StXros, dekriov.: in Latin cera, tabula, labella, &c. Two or more put together and held together by rings or thongs acting as hinges formed a caudex or codex, literally a stock of wood, which a set of tablets might resemble, and from which they might actually be made by cleaving the wood. A codex of two leaves was called SiOvpoi, fiirrvxa, diptycha; of three, Tplirrvxa-, triptycha: and so on. The triptych appears to have been most generally used. A general term was also Hbellus.

Tablets served for the ordinary minor affairs of life: for memo- randa, literary and other notes and drafts, school exercises, accounts, &c. The writing incised with the stilus could be easily obliterated by smoothing the wax, and the tabula rasa was thus rendered available for a fresh inscription. But tablets were also employed for official purposes, when documents had to be protected from unauthorized scrutiny or from injury. Thus they were the receptacles for wills, conveyances, and other legal transactions; and in such cases they were closed against inspec- tion by being bound round with threads which were covered by the witnesses' seals.

Small tablets, codicilli, pugillares, often of more valuable material, such as ivory, served for correspondence among other purposes; very small specimens are mentioned as vilelliani, for the exchange of love-letters.

A certain number of Greek waxen tablets have been recovered, chiefly from Egypt, but none of them is very early. They are generally of the 3rd century, and are mostly inscribed with school exercises. The largest and most perfect extant codex is one in the British Museum (Add. MS. 33,270), perhaps of the 3rd century, being made up of nine leaves, measuring nearly 9 by 7 in., and inscribed with documents in shorthand.

Of Latin tablets we are fortunate in having a fairly large number of

examples. Exclusive of a few isolated specimens, they are the result of two important finds. Twenty-four tablets containing the records of a burial club, a.d. 131-167, were re- covered between 1786 and 1855 from some ancient mining works in Dacia. In 1875 as many as 127 tablets, containing deeds con- nected with sales- by auction and payment of taxes, a.d. 15-62, were found in the ruins of Pompeii. These specimens have afforded the means of ascertaining the mechanical arrangement of waxen tablets when adopted for legal instruments among the Romans. Most of them are triptychs, severally cloven from single blocks of wood. Subject to some variations, the triptych was usually arranged as follows. Of the six sides or pages of the codex, pages 1 and 6 (the outside pages) were of plain wood; pages 2,3,5 were waxed ; and page 4, which had a groove cut across the middle was sometimes of plain wood, sometimes waxed. The authentic deed was inscribed with the stilus on the waxed pages 2 and 3; and the first two leaves were then bound round with three twisted threads which passed down the groove ,so as to close the deed from inspection. On page 4 the witnesses' names were then inscribed (in ink if the page was plain; with the stilus if waxed), and their seals were impressed in the groove, thus

securing the threads. In addition to the protection afforded to the seals from casual injury by their position in the groove, the third leaf acted as a cover to them. On page 5 an abstract or duplicate of the deed, as required by law, was inscribed. The arrangement of the Dacian tablets differed in this respect, that page 4 was waxed, and that the duplicate copy was begun on that page in the space on the left of the groove, that on the right being reserved for the names of the witnesses. In the case of one of the Pompeian tablets the threads and seals still remain. The survival of the use of tablets to a late time should be noted. St Augustine refers to his tablets, and St Hilary of Aries also mentions their employment for the purpose of correspondence; there is a record of a letter written in tabelld as late as a.d. 1148. They were very commonly used throughout the middle ages in all the west of Europe. Specimens inscribed with money accounts of the 13th and 14th centuries have survived in France, and similar documents of the 14th and 15th centuries are to be found in several of the municipal archives of Germany. Reference to their use in England occurs in literature, and specimens of the 14th or 15th century are said to have been dug up in Ireland. In Italy their employment is both recorded and proved by actual examples of the 13th and 14th centuries. With the beginning of the i6th century they seem to have practically come to an end, although a few survivals of the custom of writing on wax have lingered to modern times.

As already stated, the codex, or MS. in book-form, owed its existence to the substitution of vellum for papyrus as the common writing material for Greek and Roman literature. The fact that vellum was a tough material capable of being Codex. inscribed on both sides, that writing, particularly if

freshly written, could be easily washed off or erased from it, and that the material could thus be made available for second use, no doubt contributed largely to its ready adoption. In Rome in the ist century B.C. it was used, like the waxen tablets for notes, drafts, memoranda, &c. ; and vellum tablets began to take the place of the cerae. References are not wanting in the classical writers to its employment for such temporary purposes. To what extent it was at first pressed into the service of literature and used in the preparation of books for the market must remain uncertain. But in the first three centuries of our era it may be assumed that vellum codices were not numerous. The papyrus roll still held its position as the liber or book of literature. Yet we learn from the poems of Martial that in his day the works of some of the best classical authors were to be had on vellum. From the way in which, in his Apophoreta, he has contrasted as exchangeable gifts certain works written respectively on papyrus and on vellum, it has been argued that vellum at that time was a cheap material, inferior to papyrus, and only used for roughly written copies. Up to a certain point this may be true, but the fact that the earliest great vellum Greek codices of the Bible and of Latin classical authors, dating back to the 4th century, are composed of very finely prepared material would indicate a perfection of manufacture of long standing.

But, apart from the references of writers, we have the results of recent excavations in Egypt to enable us to form a more correct judgment on the early history of the vellum codex. There have been found a certain number of inscribed leaves and fragments of vellum of early date which without doubt originally formed part of codices or MSS. in book-form. It is true that they are not numerous, but from the character of the writing certain of them can be individually assigned to the 3rd, to the 2nd, and even to the ist century. We may then take it for an established fact that the codex form of MS. was gradually thrusting its way into use in the first centuries of our era.

The convenience of the codex form for easy reference was also a special recommendation in its favour. There can be little doubt that such compilations as public registers must at once have been drawn up in the new form. The jurists also were quick to adopt it, and the very title " codex " has been attached to great legal compilations, such as those of Theodosius and Justinian. Again, the book-form was favoured by the early Christians. The Bible, the book which before all others became

the great work of reference in their hands, could only be consulted with

convenience and despatch in the new form. A single codex could hold the contents of a work which formerly must have been distnDuted through many volumes in roll-form. The term owixcltiov, which was one of the names given to a codex, was expressive of its capacity. Turning again to discoveries in Egypt, it appears that in the early centuries the codex-form had become so usual among the Christians in that land that even the native material, papyrus, the recognized material for the roll, was now also made up by them into leaved books. The greater number of papyri of the 3rd century containing Christian writings, fragments of the Scriptures, the " Sayings of Our Lord," and the like, are in book-form. On the other hand, the large majority of the non-Christian papyri of the same period keep to the old roll form. Thus the codex becomes at once identified with the new religion, while the papyrus roll to the last is the chosen vehicle of pagan literature.

In the 4th century the struggle between the roll and the codex for supremacy in the literary field was finished, and the victory of the codex was achieved. Henceforward the roll-form remained in use for records and legal documents, and in certain instances for liturgies; and for such purposes it survives to the present day. But so completely was it superseded in literature by the codex that even when papyrus, the material once identified with the roll-form, was used as it sometimes was down to the 6th and 7th centuries and later, it was made up into the leaved codex, not only in Egypt but also in western Europe.

The shape which the codex usually assumed in the early cen- turies of the middle ages was the broad quarto. The quires or gatherings of which the book was formed generally res ° consisted, in the earliest examples, of four sheets folded to make eight leaves (rerpas or TtTpa.bi.ov, qualernio), although occasionally quinterns, or quires of five sheets (ten leaves), were adopted. Sexterns, or quires of six sheets (twelve leaves), came into use at a later period. In making up the quires, care was generally taken to lay the sheets of vellum in such a way that hair-side faced hair- side, and flesh-side faced flesh-side; so that, when the book was opened, the two pages before the reader had the same appear- ance, either the yellow tinge of the hair-side, or the fresh white- ness of the flesh-side. In Greek MSS. the arrangement of the sheets was afterwards reduced to a system ; the first sheet was laid ..v-ith the flesh-side downwards, so that that side began the quire; /et in so early an example as the Codex Alexandrinus the first page of a quire is the hair-side. In Latin MSS. also the hair-side appears generally to have formed the first page. When paper came into general use for codices in the 15th century, it was not an uncommon practice to give the paper quires additional strength by an admixture of vellum, a sheet of the latter material forming the outer leaves, and sometimes the middle leaves also, of the quire. The quire mark, or " signature," was usually

written at the foot of the last page, but in some early instances {e.g. the Codex Alexandrinus) it appears at the head of the first page of each quire. The numbering of the separate leaves in a quire, in the fashion followed by early printers, came in in the 14th century. Catch-words to connect the quires appear first in the nth century and are not uncommon in the 12th century.

No exact system was followed in ruling the guiding lines on the pages of the codex. In the case of papyri it was enough to mark Bullae with the pencil the vertical marginal lines to bound the text, if indeed even this was considered needful (see above); the fibres of the papyrus were a sufficient guide for the lines of writing. On vellum it became necessary to rule lines to keep the writing even. These lines were at first drawn with a blunt point, almost invariably on the hair (or outer) side of the skin, and strongly enough to be in relief on the flesh (or inner) side. Marginal lines were drawn to bound the text laterally; but the ruled lines which guided the writing were not infrequently drawn right across the sheet. Each sheet should be ruled separately; but two or more sheets were often laid and ruled together, the lines being drawn with so much force that the lower sheets also received the impressions. In rare instances

lines are found ruled on both sides of the leaf, as in some parts of the Codex Alexandrinus. In this same MS. and in other early 1 codices the ruling was not always drawn for every line of writing, but was occasionally spaced so that the writing ran between the ruled lines as well as on them. The lines were evenly spaced by means of guiding pricks made at measured intervals with a compass or rotary instrument down the margins; in some early MSS. these pricks run down the middle of the page. Ruling with the plummet or lead-point is found in the nth century and came into ordinary use in the r"2th century; coloured inks, e.g. red and violet, were used for ornamental ruling in the 15th century. Mechanical Arrangement oj Writing in MSS. — It has already been stated above that in the papyrus rolls the text was 'written in columns. They stood with convenient intervals columns between them and with fair margins at top and bottom. The length of the lines was to some extent governed by the nature of the text. If it was a poetical work, the metrical line was naturally the line of the column, unless, as sometimes was the case, the verse was written continuously as prose. For prose works a narrow column was preferred. It is noticeable that the columns in papyri have a tendency to lean to the right instead of being perpendicular — an indication that it was not the practice to rule marginal lines. In codices the columnar arrange- ment was also largely followed, and the number of columns in a page was commonly two. There are instances, however, of a larger number. The Codex Sinaiticus of the Bible has four columns to the page; and the Codex Vaticanus, three columns. And the tricolumnar arrangement occurs every now and then in later MSS.

In both Greek and Latin literary MSS. of early date the writing runs on continuously without separation of words. This practice however, may be regarded as rather artificial, as in Text with- papyri written in non-literary hands and in Latin out separa- deeds also, contemporary with these early literary t J^ a ° f MSS., there is a tendency to separation. In a text thus continuously written occasional ambiguities necessarily occurred, and then a dot or apostrophe might be inserted between words to aid the reader. Following the system of separation of words which appears in ancient inscriptions, wherein the several words are marked off by single, double, or treble dots or points, the words of the fragmentary poem on the battle of Actium found at Herculaneum are separated by single points, probably to facilitate reading aloud; monosyllables or short prepositions and conjunctions, however, being left un- separated from the words immediately following them — a system which is found in practice at a later time. But such marks of separation are not to be confounded with similar marks of punctu- ation whereby sentences are marked off and the sense of the text is made clear. Throughout the career of the uncial codices down to the 6th century, continuity of text was maintained. In the 7th century there is some evidence of separation of words, but without system. In early Latin minuscule codices partial separation in an uncertain and hesitating manner went on to the time of the Carolingian reform. In early Irish and English MSS., however, separation is more consistently practised. In the 9th and 10th centuries long words tend to separation, but short words, prepositions and conjunctions, still cling to the following word. It was not till the nth century that the smaller words at length stood apart, and systematic separation of words was established. In Greek minuscule codices of the 10th century a certain degree of separation takes place; yet a large proportion of words remain linked together, and they are even incorrectly divided. Indeed a correct system of distinct separation of words in Greek texts was never thoroughly established even as late as the 15th century.

But while distinction of words was disregarded in early literary texts, distinction of important pauses in the sense was recognized from the first. The papyrus of the Persae p an9J!rfi _i s of Timotheus of Miletus, the oldest MS. of a Greek classic in existence, of the end of the 4th century B.C., is written in independent paragraphs. This is a natural system, the simplicity of which has caused it to 1 ” the system of modern

times. But, id addition, the Greek scribe also separated para- graphs by inserting a short horizontal stroke, Tapaypa.4 > os, between them at the commencement of the lines of writing. It should be noted that this stroke

indicated the close of a passage, and therefore belonged to the paragraph just concluded, and did not stand for an initial sign for the new paragraph which followed. The dividing stroke was also used to mark off the different speeches of a play. Besides the stroke, a wedge-shaped sign or tick might be used. But to make every paragraph stand distinctly by itself would have entailed a certain loss of space. If the concluding line were short, there would remain a long space unfilled. Therefore, when this occurred, it became customary to leave only a short space blank to mark the termination of the paragraph, and then to proceed with the new paragraph in the same line, the irapaypacpos at the same time preventing possible ambiguity. The next step was to project the first letter of the first full line of the new paragraph slightly into the margin, as a still further distinction; and lastly to enlarge it. The enlargement of the letter gave it so much prominence that the dividing stroke could then be dispensed with, and in this form the new paragraph was henceforward indicated in Greek MSS., it being immaterial whether the enlarged letter was the initial or a medial letter of a word. As early as the 5th century there is evidence that the rapaypaˆs was losing its meaning with the scribes, for in the Codex Alexandrinus of the Bible it is not infrequently found in anomalous positions, particularly above the initial letters of different books, as if it were a mere ornament.

In Latin MSS. there was no such fixed system of marking off paragraphs as that just described. A new paragraph began with a new line, or a brief space in a line separated the conclusion of a paragraph from the beginning of the next one. It was only by the ultimate introduction of large letters, as the initial letters of the several sentences and paragraphs, and by the establishment of a system of punctuation, in the modern sense of the word, that a complete arrangement of the text was possible into sentences and paragraphs in accordance with its sense.

From the earliest times an elementary system of punctuation by points is found in papyri. Thus the papyrus of the Curse Puactua- of Artemisia, at Vienna, which is at least as early tioa. as the 3rd century B.C., and in one or two other

ancient examples, a double point, resembling the modern colon, separates sentences. But more commonly a single point, placed high in the line of writing, is employed. This single punctuation was reduced to a system by the Alexandrian grammarians, its invention being ascribed to Aristophanes of Byzantium, 260 b. c. The point placed high on a level with the top of the letters had the value of a full-stop; in the middle of the line of writing, of a comma; and low down on the line, of a semicolon. But these distinctions were not observed in the MSS. In the early vellum codices both the high and the middle point are found. In medieval MSS. other signs, coming nearer to our modern system, make their appearance. In Latin MSS. by the

7th century the high point has the value of the modern comma, the semicolon appears with its present value, and a point emphasized with additional signs, such as a second point or point and dash, marks a full-stop. In the Carolingian period the comma appears, as well as the inverted semicolon holding a position between our comma and semicolon.

Another detail which required the scribe's attention in writing his text was the division of the last word in a line, when for DMsloa of wan t of room a portion of it had to be carried over Words at into the next line. It was preferable, indeed, to the End of avo jd suc h division, and in the papyri as well as in the codices letters might be reduced in size and huddled together at the end of the line with this view. In the early codices too it was a common practice to link letters together in monogrammatic form, such as the common verbal terminations ur, unt, and thus save space. But when the division of a word was necessary, it was subject to certain rules. According to the Greek practice the division was or- dinarily made after a vowel, as erv\xov (even monosyllables

Colometry.

might be so treated, as ov\k). But in the case of double consonants the division fell after the first of them, as "7r|7ros: and, when the first of two or more consonants was a liquid or nasal the division followed it, as 6(j>daK\pj>s, nav\9avu. When a word was compounded with a preposition, the division usually followed the preposition, as Trpos\eiirov, but not infrequently the normal practice of dividing after a vowel prevailed, as itpo\v&-wov. In Latin the true syllabic division was followed, but occasionally the scribes adopted the Greek system and divided after a vowel.

A modification of the practice of writing the text continuously was allowed in the case of certain works. Rhetorical texts, such as the orations of Demosthenes and Cicero, and the text of the Bible, might be broken up into short clauses or sense-lines, apparently with the view of assisting reading aloud. Instances of MSS. so written are still extant. This system, to which the name of " colometry " has been given, is the arrangement by cola and commata referred to by St Jerome in his preface to Isaiah. It will be found more fully explained under the heading of Stichometry; where also is described the mechanical computation of the length of a text by measured lines, for the purpose or calculating the pay of the scribe.

The title of a MS., both in roll-form and in codex-form, was frequently written at the end of the text, but even at an early date it stood in some instances at the beginning; and the latter practice in course of time prevailed, colophons. although even in the 15th century the title was

sometimes reserved for the close of the MS. In this latter position it might stand alone or be accompanied by other particulars concerning the MS., such as the length of the work, the date of writing, the name of the scribe, &c, all combined in a final paragraph called the colophon. For distinction, title and colophon might be written in red, as might also the first few lines of the text. This method of rubrication was a very early practice, appearing even in ancient Egyptian papyri. Such rubrics and titles and colophons were at first written in the same character as the text; afterwards, when the admixture of different kinds of writing was allowed, capitals and uncials were used at discretion. Running titles or head-lines are found in some of the earliest Latin MSS. in the same characters as the text, but of a small size. Quotations were usually indicated by ticks or arrow-heads in the margin, serving the _ <.«.„. purpose of the modern inverted commas. Some- times the quoted words were arranged as a sub-paragraph or indented passage. In commentaries of later date, the quota- tions from the work commented upon were often written in a different style from the text of the commentary itself.

Accentuation, &c. — Accentuation was not systematically applied to Greek MSS. before the 7th century, but even in the literary papyri it appears occasionally. In the latter instances accents were applied specially to assist the reader, and they seem to have been used more frequently in texts which may have presented greater difficulties than usual. For example, they are found fairly plentifully in the papyrus of Bacchylides of the 1st century B.C. In the less well- written papyri they are fewer in number; and papyri written in non- literary hands are practically devoid of them. Accents have been frequently added to the ancient texts of Homer, as in the Harris and Bankes papyri, but apparently long after the date of the writing. They were not used in the early uncial MSS. Breathings also appear occasionally in the papyri. The rough and the smooth breathings are found in the form of the two halves of the H (H) in the Bacchy- lides papyrus ; in other papyri they are in rectangular form, never rounded like an apostrophe; in fact rounded breathings do not come into general use until the 12th century. Other signs resembling accents are used occasionally in Greek MSS. For example, a short accent or horizontal stroke was employed to indicate a single-letter word, and an apostrophe was sometimes used to separate words in order to prevent ambiguity and was placed after words ending in k, X, £> Pi and after proper names not having a Greek termination.

Accents were seldom emploj'ed by Latin scribes. In early Irish and English MSS., in particular, an acute accent is occasionally found over a monosyllabic word or one consisting of a single letter. In the 9th and loth centuries a curious occasional practice obtained among the correctors of the texts of expressing the aspirate by the Greek half-eta symbol H , instead of writing the letter h in the ordinary way— perhaps only an affectation.

Corrections. — For obliteration or removing pen strokes from the surface of the material the sponge was used in ancient times. While the writing was still fresh, the scribe could easily wash off the ink by this means; and for a fragile material, such as papyrus, he could well use no other. On vellum he might use sponge or knife. But after a MS. had left his hands it would undergo revision at the hands of a corrector, who had to deal with the text in a different manner. He could no longer conveniently apply the sponge. On hard material he might still use the knife to erase letters or words or sentences. But he could also use his pen for such purposes. Thus we find that a very early system of indicating erasure was the placing of dots or minute strokes above the letters to be thus " expunged." The same marks were also (and generally at later periods) placed under the letters; in rare instances they stood inside them. It need scarcely be said that letters were also struck out with strokes of the pen or altered into others, and that letters and words were interlined. A long sentence, however, which could not be admitted between the lines, was entered in the margin, and its place in the text indicated by corresponding reference marks, such as hd., hs. = hic deest, hoc supra or hie scribas, &c.

A bbreviations and Contractions. — The practice of shortening words in writing has played an important part in the history of the ancient and the medieval manuscript. Two reasons have disposed men to follow this practice: firstly, the desire to avoid the labour of writing over and over again words or portions of words of common occurrence which can be readily understood in a shortened form as when written in full; and, secondly, the necessity of saving space at a time when it was an object to make the most of the writing material to hand. To meet the former requirement, a simple and limited method alone was needed; to satisfy the second, a more elaborate system was necessary. The most natural method of reducing the length of a word is to suppress as much as possible of its termination, consist- ently with intelligibility, that is, by simple abbreviation. But if space of any appreciable value is to be saved in a page of writing, a system is necessary for eliminating letters from the body of the word as well as curtailing the termination, that is, a system of contraction as well as abbreviation ; and, in addition, the employment of arbitrary signs, analogous to shorthand, will serve still further to condense the text. An elaborate system of contraction of this nature was natur- ally only fully developed after very long practice. Both in Greek and in Latin MSS. from the 9th to the 15th century such a system was in full force.

Different kinds of literature were, according to their nature, more or less

abbreviated and contracted. From early times such curtail- ment was more freely employed in works written in technical language, such as works on law or grammar or mathematics, wherein particular words are more liable to repetition, than in MSS. of general literature. The oldest system of abbreviation is that in which a single letter (nearly always the initial letter) or at most two or three letters represent the whole word. This system we know was in common use among both Greek and Latin writers, and ancient inscriptions afford plentiful examples. It is well adapted for the brief expression of the common words and phrases in works of a technical nature (as for example such a phrase asCDERNE = cujus de ea re nolio est) ; but for general literature it is of little use, and practically has been restricted to express proper names and numerals. When abbreviations were employed only with the view of speed in writing, it is obvious that they would occur more frequently in Abbrevla- tne ephemeral documents of daily life than in carefully Hon la ‘ wr ‘ tten literary works intended for the book-market. Greek MSS. Hence they are not to be found in Greek papyri of the ‘ latter class. On the other hand in literary papyri written in non-literary script they naturally occur just as they would in contemporary common documents. As early as the 3rd and 2nd centuries B.C. the ordinary method of abbreviation was to omit the termination or latter portion of the word and to mark the omission by a short horizontal stroke or dash; or the letter which immediately preceded the omission was written above the line as a key to the reading, as re for tcXos. Such a system obviously might be extended indefinitely at the discretion of the writer. But in addition, at quite an early period, symbols and monogrammatic forms for particular words must have been developed, for they are found in common use in cursive papyri. A notable instance of their employment in a full degree occurs in the papyrus of Aristotle’s Constitution of Athens, of the 1st century.*

Like the well-written literary papyri, the early vellum uncial codices of the Bible, being inscribed with calligraphic formality, avoided in principle the use of abbreviations. But by the 4th to the 6th century, the period when they were chiefly produced, the contraction or abbreviation of certain words and terminations had, it seems, become so fixed by usage that the contracted forms were adopted in the texts. They are ec=0eos, iC=li;

n.NA ˆTryfPjuq, CHP =

MHP =fiTiTTip,YC = ui6s, ANOC = &vdpo>iros, OYNOC = oipavbs, K = (cai, T =toi, & =aiou, noi, &c. Final N, especially at the end of a line, was dropped, and its place occupied by the horizontal stroke, as TO .

But while this limited system was used in biblical, and also in liturgical MSS., in profane literature a greater licence was recognized. For example,

in a fragment of a mathematical work at Milan, of the

7th century, we find instances of abbreviation by dropping termina- tions, just as in the earlier papyri, and, in addition, contracted particles and prepositions are numerous. Technical works, in fact, inherited the system instituted in the early papyri written in non- literary or cursive hands; and this system, undergoing continual development, had a larger scope when the cursive writing was cast into a literary form and became the literary minuscule script of the middle ages. From the 9th century onwards a fully developed sys- tem of abbreviation and contraction was practised in Greek MSS., comprising the early system of the papyri, the special contractions of the early biblical MSS., and also a large number of special symbols, derived in great measure from tachygraphical signs.

In the early Greek minuscule MSS. contractions are not very fre- quent in the texts; but in the marginal glosses, where it was an object to save space, they are found in great numbers as early as the 10th century. The MS. of Nonnus, of A.D. 972, in the British Museum (Wattenb. and Von Vels., Exempla, 7) is an instance of a text con- tracted to a degree that almost amounts to tachygraphy. In the r2th, 13th and 14th centuries texts were fully contracted; and as the writing became more cursive contraction-marks were more care- lessly applied, until, in the 15th century, they degenerated into mere flourishes.

As far back as material is available for comparison, it appears that abbreviations and contractions in Latin MSS. followed the same lines as those in Greek MSS. We have no very early papyri written in Latin as we have in Greek to show us what^: ™y the practice of Roman writers was in the 3rd and 2nd } ?/ \|cc and early 1st centuries B.C.; but there can be little doubt ?. that in that remote time there was followed in Latin writing a system of abbreviation similar to that in Greek, that is, by curtail- ment of terminations, and that in ephemeral documents written in cursive characters such abbreviation was allowed more freely than in carefully written literary works. The early system of representing words by their initial letters has already been referred to. It was in common use, as we know, in the inscriptions on coins and monu- ments, and to some extent in the texts of Roman writers. But the ambiguity which must have always accompanied such a system of single-letter abbreviations, or sigla, naturally induced an improve- ment by expressing a word by two or more of its letters. Hence was developed the more regular syllabic system of the Romans, by which the leading letters of_ the several . syllables were written, as EG = ergo, HR = heres, ST=satis. At a later time Christian writers secured greater exactness by expressing the final letter of a contracted word, as ds = deus, do = deo, scs = sanctus. Further, certain marks and signs, many derived from shorthand symbols, came into use to indicate

*inflections and terminations; or the terminating letter or a leading letter to indicate the termination might be written above the line, as Q° = quo, V m = verum, N° = noster, S' = sint. This practice became capable of greater development later on. Among the special signs are c = est, \ = vel, n = non, p' = pre, p = per, j-> = pro, *> = termina- tion us. The letter q with distinctive strokes applied in different positions represented the often recurring relative and other short words, as quod, quia.*

In Latin Biblical uncial MSS. the same restrictions on abbrevia- tions were exer cised as in the Greekˆ The sacred names and titles T5?> = deus, DMS, DNS — dominus, SCS = sanctus, SPS = spiritus, and others appear in the oldest codices. The contracted terminations Q- = que, B- = bus, and the omission of final m, or (more rarely) final n, are common to all Latin MSS. of the earliest period. There is a peculiarity about the contracted form of our Saviour's name that it is always w ritten by t he Lati n scribes in letters imitating the Greek IHC, XPC, the, xpe, and ihs, xps.

The full development of the medieval system of abbreviation and contraction was effected at the time when the Carolingian schools were compelling the reform of the handwriting of western Europe. Then came a freer practice of abbreviation by suppression of termina- tions and the latter portions of words, the omission of which was indicated by the ordinary signs, the horizontal or oblique stroke orthe apostrophe; then came also a freer practice of contraction by omit- ting letters and syllables from the middle as well as the end of words, as oio, omnino, prb, presbyter; and then from the practice of writing above the line a leading letter of an omitted syllable, as int a = intra, t r = tur, conventional signs, with special significations, were also gradually developed. Such growths are well illustrated in the change undergone by the semicolon, which was attached to the end of a word to indicate the omission of the termination, as b; — bus, q; = que, deb ; = debet, and which in course of time became converted into a z, a form which survives in our ordinary abbreviation, viz. (i.e. vi; = videlicet). The different forms of contraction were common to all the nations of western Europe. The Spanish scribes, however, attached differe nt v alues to certain of them. For example, in Visigothic MSS., qm, which elsewhere represented quoniam, may be read as quum; and 5 = est, "B — ejus, Vc — enim, 7 = et, v and u = ut, which were employed particularly in early MSS. of English and Irish origin.

By the nth century the system of Latin contractions had been reduced to exact rules; and from this time onwards it was universally practised. It

reached its culminating point in the 13th century, the period of increasing demand for MSS., when it became more than ever necessary to economize space. After this date the exact forma- tion of the signs of contractions was less strictly observed, and the system deteriorated together with the decline of handwriting. In conclusion, it may be noticed that in MSS. written in the vernacular tongues contractions are more rarely used than in Latin texts. A system suited to the inflexions and terminations of this language could not be readily adapted to other languages so different in grammatical structure.

Palimpsests, &c. — Palimpsest MSS., that is, MSS. written upon material from which older writing has been previously removed by washing or scraping, are described in a separate article (Palim psest) . The ornamentation of MSS. is fully dealt with under the headings Illuminated MSS., and Miniatures.

Writing Implements. — In conclusion, a few words may be added respecting the writing implements employed in the production of MSS. The reed, /cdXaftos, calamus, was adapted for tracing charac- ters either on papyrus or vellum. By the ancient Egyptians, and also Erobably by the early Greek scribes in Egypt, it was used with a soft rush-like point, rather as a paint-brush than as a pen. The Greek and Roman scribes used the reed cut to a point and slit like the quill- pen; and it survived as a writing implement into the middle ages. For scratching letters on the waxen tablet the sharp pointed bodkin, otDXos, ypatiov, stilus, graphium, was necessary, made of iron, bronze, ivory, or other suitable material, with a knobbed or flattened butt-end wherewith corrections could be made by smoothening the wax surface (hence vertere stilum, to correct). Although there is no very early record of the use of quills as pens, it is obvious that, well adapted as they are for the purpose and to be had everywhere, they must have been in request even in ancient times as they afterwards were in the middle ages. Bronze pens, fashioned exactly on the model of the quill-pen, that is in form of a tube ending in a slit nib (sometimes even with a nib at each end), of late Roman manufacture, are still in existence. A score of them are to be found scattered among public and private museums. The ruler for guiding ruled lines was the navoiv, canon, regula; the pencil was the mAXu/SSos, plumbum, the plummet ; the pricker for marking the spacing out of the ruled lines was the 5ia/3aT7js, circinus, punctorium; the pen-knife, ■y \vavov, an'i\r), scalprum ; the erasing-knife, rasorium, novacula.

Inks. — Inks of various colours were employed from early times. The ink of the early papyri is a deep glossy black ; in the Byzantine period it deteriorates. In the middle ages black ink is generally of excellent quality; it tends to deteriorate from the 14th century. But its quality varies in different countries at different periods. Red ink, besides being used for titles and colophons, also served for contrast, as, for example, in glosses. In the

Carolingian period entire MSS. were occasionally written in red ink. Other coloured inks — green, violet and yellow — are also found, at an early date. Gold and silver writing fluids were used in the texts of the ancient purple vellum MSS., and writing in gold was reintroduced under Charlemagne for codices of ordinary white vellum. It was intro- duced into English MSS. in the 10th century.

Authorities. — H. Geraud, Essai sur les livres dans Vantiquite (1840) ; E. Egger, Histoire du livre depuis ses origines jusqu'd, nos jours (1880) ; T. Birt, Das antike Buchwesen (1882) and Die Buchrolle in der Kunst (1907) ; W. Wattenbach, Das Schriftwesen im Mittelalter (1896) ; K. Dziatzko, Untersuchungen iiber ausgewahlte Kapitel des antiken Buchwesens (1900); J. W. Clark, The Care of Books (1901); W. Schubart, Das Buck hex den Griechen und Rdmern (1907) ; and generally the authorities quoted in the article Palaeography. See also Textual Criticism. (E. M. T.)

MANUTIUS, the Latin name of an Italian family (Mannucci, Manuzio), famous in the history of printing as organizers of the Aldine press.

1. Aldus Manutius (1450-1515). Teobaldo Mannucci, better known as Aldo Manuzio, the founder of the Aldine press, was born in 1450 at Sermoneta in the Papal States. He received a scholar's training, studying Latin at Rome under Gasparino da Verona, and Greek at Ferrara under Guarino da Verona. In 1482 he went to reside at Mirandola with his old friend and fellow- student, the illustrious Giovanni Pico. There he stayed two years, prosecuting his studies in Greek literature. Before Pico removed to Florence, he procured for Aldo the post of tutor to his nephews Alberto and Lionello Pio, princes of Carpi. Alberto Pio supplied Aldo with funds for starting his printing press, and gave him lands at Carpi. It was Aldo's ambition to secure the literature of Greece from further accident by com- mitting its chief masterpieces to type. Before his time four Italian towns had won the honours of Greek publications: Milan, with the grammar of Lascaris, Aesop, Theocritus, a Greek Psalter, and Isocrates, between 1476 and 1493; Venice,

with the Erotemata of Chrysoloras in 1484; Vicenza, with reprints of Lascaris's grammar and the Erotemata, in 1488 and 1490; Florence, with Alopa's Homer, in 1488. Of these works, only three, the Milanese Theocritus and Isocrates and the Florentine Homer, were classics. Aldo selected Venice as the most appro- priate station for his labours. He settled there in 1490, and soon afterwards gave to the world editions of the Hero and Leander of Musaeus, the Galeomyomachia, and the Greek Psalter. These have no date; but they are the earliest tracts issued from his press, and are called by him " Precursors of the Greek Library."

At Venice Aldo gathered an army of Greek scholars and com- positors around him. His trade was carried on by Greeks, and Greek was the language of his household. Instructions to type- setters and binders were given in Greek. The prefaces to his editions were written in Greek. Greeks from Crete collated MSS., read proofs, and gave models of calligraphy for casts of Greek type. Not counting the craftsmen employed in merely manual labour, Aldo entertained as many as thirty of these Greek assistants in his family. His own industry and energy were unremitting. In 1495 he issued the first volume of his Aristotle. Four more volumes completed the work in 1497-1498. Nine comedies of Aristophanes appeared in 1498. Thucydides, Sophocles and Herodotus followed in 1502; Xenophon's Hellenics and Euripides in 1503; Demosthenes in 1504. The troubles of Italy, which pressed heavily on Venice at this epoch, suspended Aldo's labours for a while. But in 1508 he resumed his series with an edition of the minor Greek orators; and in 1509 appeared the lesser works of Plutarch. Then came another stoppage. The league of Cambray had driven Venice back to her lagoons, and all the forces of the republic were concentrated on a struggle to the death with the allied powers of Europe. In 1513 Aldo reappeared with Plato, which he dedicated to Leo X. in a preface eloquently and earnestly comparing the miseries of warfare and the woes of Italy with the sublime and tranquil objects of the student's life. Pindar, Hesychius, and Athenaeus followed in*

1514-

These complete the list of Aldo's prime services to Greek literature. But it may be well in this place to observe that his successors continued his work by giving Pausanias, Strabo, Aeschylus, Galen, Hippocrates and Longinus to the world in first editions. Omission has been made of Aldo's reprints, in order that the attention of the reader might be concentrated on his labours in editing Greek classics from MSS. Other presses were at work in Italy; and, as the classics issued from Florence, Rome or Milan, Aldo took them up, bestowing in each case fresh industry upon the collation of codices and the correction of texts. Nor was the Aldine press idle in regard to Latin and Italian classics. The Asolani of Bembo, the collected writings of Poliziano, the Hypnerotomachia Poliphili, Dante's Divine Comedy, Petrarch's poems, a collection ©f early Latin poets of the Christian era, the letters of the younger Pliny, the poems of Pontanus, Sannazzaro's Arcadia, Quintilian, Valerius Maximus, and the Adagia of Erasmus were printed, either in first editions, or with a beauty of type and paper never reached before, between the years 1495 and 15 14. For these Italian and Latin editions Aldo had the elegant type struck which bears his name. It is said to have been copied from Petrarch's handwriting, and was cast under the direction of Francesco da Bologna, who has been identified by Panizzi with Francia the painter.

Aldo's enthusiasm for Greek literature was not confined to the printing-room. Whatever the students of this century may think of his scholarship, they must allow that only vast erudition and thorough familiarity with the Greek language could have enabled him to accomplish what he did. In his own days Aldo's learning won the hearty acknowledgment of ripe scholars. To his fellow workers he was uniformly generous, free from jealousy, and prodigal of praise. While aiming at that excellence of typography which renders his editions the treasures of the book-collector, he strove at the same time to make them cheap. We may perhaps roughly estimate the

current price of his pocket series of Greek, Latin and Italian classics, begun in 1501, at 2s. per volume of our present money. The five volumes of the Aristotle cost about £8. His great undertaking was carried on under continual difficulties, arising from strikes among his workmen, the piracies of rivals, and the interruptions of war. When he died, bequeathing Greek literature as an inalienable possession to the world, he was a poor man. In order to promote Greek studies, Aldo founded an academy of Hellenists in 1 500 under the title of the New Academy. Its rules were written in Greek. Its members were obliged to speak Greek. Their names were Hellenized, and their official titles were Greek. The biographies of all the famous men who were enrolled in this academy must be sought in the pages of Didot's Aide Manuce. It is enough here to mention that they included Erasmus and the English Linacre.

In 1499 Aldo married Maria, daughter of Andrea Torresano of Asola. Andrea had already bought the press established by Nicholas Jenson at Venice. Therefore Aldo's marriage com- bined two important publishing firms. Henceforth the names Aldus and Asolanus were associated on the title pages of the Aldine publications; and after Aldo's death in 1515, Andrea and his two sons carried on the business during the minority of Aldo's children. The device of the dolphin and the anchor, and the motto fcstina lenle, which indicated quickness combined with firmness in the execution of a great scheme, were never wholly abandoned by the Aldines until the expiration of their firm in the third generation.

2. Paulus Manutius (1512-1574). By his marriage with

Maria Torresano, Aldo had three sons, the youngest of whom,

Paolo, was born in 151 2. He had the misfortune to lose his

father at the age of two. After this event his grandfather

and two uncles, the three Asolani, carried on the Aldine press, while Paolo prosecuted his early studies at Venice, Excessive application hurt his health, which remained weak during the rest 'of his life. At the age of twenty-one he had acquired a solid reputation for scholarship and learning. In 1533 Paolo undertook the conduct of his father's business, which had latterly been much neglected by his uncles. In the interregnum between Aldo's death and Paolo's succession (1514-1533) the Asolani continued to issue books, the best of which were Latin classics. But, though their publications count a large number of first editions, and some are works of considerable magnitude, they were not brought out with the scholarly perfection at which Aldo aimed. The Asolani attempted to perform the whole duties of editing, and to reserve all its honours for themselves, dispensing with the service of competent collaborators. The result was that some of their editions, especially their Aeschylus of 1 5 18, are singularly bad. Paolo determined to restore the glories of the house, and in 1540 he separated from his uncles. The field of Greek literature having been well-nigh exhausted, he devoted himself principally to the Latin classics. He was a passionate Ciceronian, and perhaps his chief contributions to scholarship are the corrected editions of Cicero's letters and orations, his own epistles in a Ciceronian style, and his Latin version of Demosthenes. Throughout his life he combined

the occupations of a student and a printer, winning an even higher celebrity in the former field than his father had done. Four treatises from his pen on Roman antiquities deserve to be commemorated for their erudition no less than for the elegance of their Latinity. Several Italian cities contended for the possession of so rare a man; and he received tempting offers from the Spanish court. Yet his life was a long struggle with pecuniary difficulties. To prepare correct editions of the classics, and to print them in a splendid style, has always been a costly undertaking. And, though Paolo's publications were highly esteemed, their sale was slow. In 1556 he received for a time external support from the Venetian Academy, founded by Federigo Badoaro. But Badoaro failed disgracefully in 1559, and the academy was extinct in 1562. Meanwhile Paolo had established his brother, Antonio, a man of good parts but indifferent conduct, in a printing office and book shop at Bologna. Antonio died in 1559, having been a source of trouble and expense to Paolo during the last four years of his life. Other pecuniary embarrassments arose from a contract for supplying fish to Venice, into which Paolo had somewhat strangely entered with the government. In 1561 pope Pius IV. invited him to Rome, offering him a yearly stipend of 500 ducats, and under- taking to Establish and maintain his press there. The profits on publications were to be divided between Paolo Manuzio and the Apostolic camera. Paolo accepted the invitation, and spent the larger portion of his life, under three papacies, with varying fortunes, in the city of Rome. Ill-health, the commercial interests he had left behind at Venice, and the coldness shown him by pope Pius V., induced him at various times and for several reasons to leave Rome. As was natural, his editions after his removal to Rome were mostly Latin works of theology and Biblical or patristic literature.

Paolo married Caterina Odoni in 1546. She brought him three sons and one daughter. His eldest son, the younger Aldus, succeeded him in the management of the Venetian printing house when his father settled at Rome in 1561. Paolo had never been a strong man, and his health was overtaxed with studies and commercial worries. Yet he lived into his sixty-second year, and died at Rome in 1574.

3. Aldus Manutius, Junior (1547-1597). The younger Aldo born in the year after his father Paolo's marriage, proved what is called an infant prodigy. When he was nine years old his name was placed upon the title page of the famous Eleganze della lingua Toscana & Latina. The Eleganze was probably a book made for his instruction and in his company by his father. In 1561, at the age of fourteen, he produced a work upon Latin spelling, called Orthographiae ratio. During a visit to his father at Rome in the next year he was able to improve this treatise by the study of inscriptions, and in 1575 he completed his labours in the same field by the publication of an Epitome orthographiae. Whether Aldo was the sole composer of the work on spelling, in its first edition, may be doubted; but he appropriated the subject and made it his own. Probably his greatest service to scholarship is this analysis of the principles of orthography in Latin.

Aldo remained at Venice, studying literature and superin- tending the Aldine press. In 1572 he married Francesca Lucrezia daughter of Bartolommeo Giunta, and great-grandchild of the first Giunta, who founded the famous printing house in Venice. This was an alliance which augured well of the Giunta for the future of the Aldines, especially as Aldo had recently found time to publish a new revised edition of Velleius Paterculus. Two years later the death of his father at Rome placed Aldo at the head of the firm. In concert with the Giunta, he now edited an extensive collection of Italian letters, and in 1576 he published his commentary upon the Ars poetica of Horace. About the same time, that is to say, about the year 1576, he was appointed professor of literature to the Cancelleria at Venice. The Aldine press continued through this period to issue books, but none of signal merit; and in 1585 Aldo determined to quit his native city for Bologna, where he occupied the chair of eloquence for a few months. In 1587 he left Bologna for Pisa, and there, in his quality of professor, he made the curious mistake of printing Alberti's comedy Philodoxius as a work of the classic Lepidus. Sixtus V. drew him in 1588 from Tuscany to Rome; and at Rome he hoped to make a permanent settlement as lecturer. But his public lessons were ill attended, and he soon fell back upon his old vocation of publisher under the patronage of a new pope, Clement VIII. In 1597 he died, leaving children, but none who cared or had capacity to carry on the Aldine press. Aldo himself, though a precocious student, a scholar of no mean ability, and a publisher of some

distinction, was the least remarkable of the three men who gave books to the public under the old Aldine ensign. This does not of necessity mean that we should adopt Scaliger's critique of the younger Aldo without reservation. Scaliger called him " a poverty- stricken talent, slow in operation; his work is very commonplace; he aped his father." What is true in this remark lies partly in the fact that scholarship in Aldo's days had flown beyond

the Alps, where a new growth of erudition, on a basis different from that of the Italian Renaissance, had begun.

See Renouard's Annates de V imprimerie des Aides (Paris, 1834); Didot's Aide Manuce (Paris, 1873) ; Omont's Catalogue of Aldine publications (Paris, 1892). (J. A. S.)

MANWARING, ROBERT, English 18th-century furniture designer and cabinet maker. The dates of his birth and death are unknown. He was a contemporary and imitator of Chippen- dale, and not the least considerable of his rivals. He prided himself upon work which he described as " genteel," and his speciality was chairs. He manifests the same surprising varia- tions of quality that are noticed in the work of nearly all the English cabinet-makers of the second half of the 18th century, and while his best had an undeniable elegance his worst was exceedingly bad — squat, ill-proportioned and confused. Some of his chairbacks are so nearly identical with Chippendale's that it is difficult to suppose that the one did not copy from the other, and most of the designs of the greater man enjoyed priority of date. During a portion of his career Manwaring was a devotee of the Chinese taste; he likewise practised in the Gothic manner. He appears to have introduced the small bracket between the front rail of the seat and the top of the chair leg, or at all events to have made such constant use of it that it has come to be regarded as characteristic of his work. Man- waring described certain of his own work as " elegant and superb," and as possessing " grandeur and magnificence." He did not confine himself to furniture but produced many designs for rustic gates and railings, often very extravagant. One of his most absurd rural chairs has rock-work with a waterfall in the back.

Among Manwaring's writings were The Cabinet and Chair Makers' Real Friend and Companion, or the Whole System of Chairmaking Made Plain and Easy (1765); The Carpenters' Compleat Guide to Gothic Railing (1765); and The Chair-makers' Guide (1766).

MANYCH, a river and depression in S. Russia, stretching between the lower river Don and the Caspian Sea, through the Don Cossacks territory and between the government of Astrakhan on the N. and that of Stavropol on the S. During the greater part of the year it is either dry or occupied in part by a string of saline lakes {limans or ilmens); but in spring when the streams swell which empty into it, the water flows in two opposite directions from the highest point (near Shara-Khulusun). The western stream flows westwards, with an inclination northwards, until it reaches the Don, though when the latter river is running high, its water penetrates some 60 miles up the Manych. The eastern stream dies away in the sandy steppe about 25 miles from the Caspian, though it is said sometimes to reach the Kuma through the Huiduk, a tributary of the Kuma. Total length of the depression, 330 m. For its significance as a former (geologic) connexion between the Sea of Azov and the Caspian Sea, see Caspian Sea. By some authorities the Manych depression is taken as part of the boundary between Europe and Asia.

MANYEMA (Una-Ma-Nyema, eaters of flesh), a powerful and warlike Bantu-Negroid people in the south-east of the Congo basin. Physically they are of a light colour, with well formed noses and not over-full lips, the women being described as singularly pretty and graceful. Manyemaland was for the greater part of the 19th century an Eldorado of the Arab slave raiders.

MANZANARES, a town of Spain, in the province of Ciudad Real, on the river Azuer, a large sub-tributary of the Zancara, and on the railways from Madrid to Ciudad Real and Linares. Pop. (1900), 11,229. Manzanares is one of the chief towns of La Mancha, and thus in the centre of the district described by Cervantes in Don Quixote. Its citadel was founded as a Christian fortress after the defeat of the Moors at Las Navas de Tolosa (121 2). Bull-fights were formerly held in the main plaza, where galleries to accommodate spectators were built between the buttresses of an ancient parish church. Manzanares has manufactures of soap, bricks and pottery, and an active trade in wheat, wine, spirits, aniseed and saffron.

MANZANILLO, a town and port on the Pacific coast of Mexico, in the state of Colima, 52 m. by rail W.S.W. of the city of that name. It is situated on a large harbour partly formed and sheltered by a long island extending southwards parallel with the coast. Southward also, and in the vicinity of the town, is the large stagnant, shallow lagoon of Cayutlan which renders the town unhealthy. Manzanillo is a commercial town of comparatively recent creation. Its new harbour works, the construction of which was begun in 1899, and its railway connexion with central Mexico, promise to make it one of the chief Pacific ports of the republic. These works include a breakwater 1300 ft. long, with a depth of 12 to 70 ft. and

a maximum breadth of 320 ft. at the base and 25 ft. on top, and all the necessary berthing and mechanical facilities for the handling of cargoes. A narrow-gauge railway was built between Colima and Manzanillo toward the end of the nineteenth century, but the traffic was only sufficient for a tri-weekly service up to 1908, when the gauge was widened and the railway became part of the Mexican Central branch, completed in that year from Irapuato through Guadalajara to Colima. The exports include hides and skins, palm leaf hats, Indian corn, coffee, palm oil, fruit, lumber and minerals.

MANZANILLO, an important commercial city of Cuba, in Santiago province, on the gulf of Guacanabo, about 17 m. S. of the mouth of the Rio Cauto, on the shore of Manzanillo Bay. Pop. (1907), 15,819. It is shut off to the east and south by the Sierra Maestra. Besides the Cauto, the rivers Yara and Buey are near the city. Manzanillo is the only coast town of importance between Trinidad and Santiago. It exports large quantities of sugar, hides, tobacco, and bees- wax; also some cedar and mahogany. The history of the settlement begins in 1784, but the port was already important at that time for a trade in woods and fruits; French and English corsairs resorted thither for ship-building woods. The settlement was sacked by the French in 1792, and in the following year a fort was built for its protection. In 1833 it received an ayuntamiento (council) and in 1837, for its " loyalty " in not following the lead of Santiago in proclaiming the Spanish Constitution, received from the crown the title of Fiel. In 1827 the port was opened to commerce, national and foreign.

MANZOLLI, PIER ANGELO, Italian author, was born about the end of the fifteenth century at La Stellata, near Ferrara. He wrote a poem entitled Zodiacus vitae, published at Basel in 1543, and dedicated to Hercules II. of Ferrara. The poem is full of didactic writing on the subject of human happiness in connexion with scientific knowledge, and combines metaphysical speculation with satirical attacks on ecclesiastical hypocrisy, and especially on the Pope and on Luther. It was translated into several languages, but fell under the ban of the Inquisition on the ground of its rationalizing tendencies.

MANZONI, ALESSANDRO FRANCESCO TOMMASO ANTONIO (1785-1873), Italian poet and novelist, was born at Milan on the 7th of March 1785. Don Pietro, his father, then about fifty, represented an old family settled near Lecco, but originally feudal lords of Barzio, in the Valsassina, where the memory of their violence is still perpetuated in a local proverb, comparing it to that of the mountain torrent. The poet's maternal grandfather, Cesare Beccaria, was a well-known author, and his mother Giulia a woman of some literary ability. Manzoni's intellect was slow in maturing, and at the various colleges where his school days were

passed he ranked among the dunces. At fifteen, however, he developed a passion for poetry, and wrote two sonnets of considerable merit. On the death of his father in 1805, he joined his mother at Auteuil, and spent two years there, mixing in the literary set of the so-called " ideologues," philosophers of the 18th century school, among whom he made many friends, notably Claude Fauriel. There too he imbibed the negative creed of Voltairianism, and only after his marriage, and under the influence of his wife, did he exchange it for that fervent Catholicism which coloured his later life. In 1806-1807, while at Auteuil, he first appeared before the public as a poet, with two pieces, one entitled Urania,

in the classical style, of which he became later the most conspicu- ous adversary, the other an elegy in blank verse, on the death of Count Carlo Imbonati, from whom, through his mother, he inherited considerable property, including the villa of Brusuglio, thenceforward his principal residence.

Manzoni's marriage in 1808 to Henriette Blondel, daughter of a Genevese banker, proved a most happy one, and he led for many years a retired domestic life, divided between literature and the picturesque husbandry of Lombardy. His intellectual energy at this period was devoted to the composition of the Inni sacri, a series of sacred lyrics, and a treatise on Catholic morality, forming a task undertaken under religious guidance, in reparation for his early lapse from faith. In 1818 he had to sell his paternal inheritance, as his affairs had gone to ruin in the hands of a dishonest agent. His characteristic generosity was shown on this occasion in his dealings with his peasants, who were heavily indebted to him. He not only cancelled on the spot the record of all sums owing to him, but bade them keep for themselves the whole of the coming maize harvest.

In 1819 Manzoni published his first tragedy, 77 Conte di Car- magnola, which, boldly violating all classical conventionalisms, excited a lively controversy. It was severely criticized in the Quarterly Review, in an article to which Goethe replied in its defence, "one genius," as Count de Gubernatis remarks, "having divined the other." The death of Napoleon in 1821 inspired Manzoni's powerful stanzas II Cinque maggio, the most popular lyric in the Italian language. The political events of that year, and the imprisonment of many of his friends, weighed much on Manzoni's mind, and the historical studies in which he sought distraction during his subsequent retirement at Brusuglio sug- gested his great work. Round the episode of the Innominato, historically identified with Bernardino Visconti,

the novel / Promessi sposi began to grow into shape, and was com- pleted in September 1822. The work when published, after revision by friends in 1825-1827, at the rate of a volume a year, at once raised its author to the first rank of literary fame. In 1822, Manzoni published his second tragedy Adelchi, turning on the overthrow by Charlemagne of the Lombard domination in Italy, and containing many veiled allusions to the existing Austrian rule. With these works Manzoni's literary career was practically closed. But he laboriously revised / Promessi sposi in the Tuscan idiom, and in 1840 republished it in that form, with a sort of sequel, La Storia della Colonna infante, of very inferior interest. He also wrote a small treatise on the Italian language.

The end of the poet's long life was saddened by domestic sorrows. The loss of his wife in 1833 was followed by that of several of his children, and of his mother. In 1837 he married his second wife, Teresa Borri, widow of Count Stampa, whom he also survived, while of nine children born to him in his two marriages all but two preceded him to the grave. The death of his eldest son, Pier Luigi, on the 28th of April 1873, was the final blow which hastened his end; he fell ill immediately, and died of cerebral meningitis, on the 22nd of May. His country mourned him with almost royal pomp, and his remains, after lying in state for some days, were followed to the cemetery of Milan by a vast cortege, including the royal princes and all the great officers of state. But his noblest monument was Verdi's Requiem, specially written to honour his memory.

Biographical sketches of Manzoni have been published by Cesare Cantu (1885), Angelo de Gubernatis (1879), Arturo Graf (1898). Some of his letters have been published by Giovanni Sforza (1882).

MAORI (pronounced " Mowri "; a Polynesian word meaning " native," " indigenous "; the word occurs in distinction from pakcha, " stranger," in other parts of Polynesia in the forms Maoi and Maoli), the name of the race inhabiting New Zealand when first visited by Tasman in 1642.

That they were not indigenous, but had displaced an earlier Melanesian or Papuan race, the true aborigines, is certain. The Maoris are Polynesians, and, in common with the majority of their kinsfolk throughout the Pacific, they have traditions which

point to Savaii, originally Savaiki, the largest island of the Samoan group, as their cradleland. They say they came to New Zealand from " Hawaiki," and they appear to distinguish between a large and small, or a nearer and farther, " Hawaiki." " The seed of our coming is from Hawaiki; the seed of our nour- ishing, the seed of mankind." Their great chief, Te Kupe, first landed, they say, on Aotearoa, as they called the north island, and, pleased

with his discovery, returned to Hawaiki to tell his fellow-countrymen. Thereafter he returned with seven war canoes, each holding a hundred warriors, priests, stone idols and sacred weapons, as well as native plants and animals. Hawaiki, the name of Te Kupe's traditional home, is identical with several other Polynesian place-names, e.g. Hawaii, Apai in the Tonga Islands, Evava in the Marquesas, all of which are held to be derived from Savii or Savaiki. Dr Thomson, in his Story of New Zealand, quotes a Maori tradition, published by Sir George Grey, that certain islands, among which it names Rarotonga, Parima and Manono, are islands near Hawaiki. The Rarotongas call themselves Maori, and state that their ancestors came from Hawaiki, and Pirima and Manono are the native names of two islands in the Samoan group. The almost identical languages of the Rarotongas and the Maoris strengthen the theory that the two peoples are descended from Polynesians migrating, possibly at widely different dates, from Samoa. The distance from Rarotonga to New Zealand is about 2000 m., and, with the aid of the trade wind, large canoes could traverse the distance within a month. Moreover the fauna and flora of New Zealand in many ways resemble those of Samoa. Thus it would seem certain that the Maoris, starting from " further Hawaiki," or Samoa, first touched at Rarotonga, " nearer Hawaiki," whence, after forming a settlement, they journeyed on to New Zealand. Maori tradition is explicit as to the cause of the exodus from Samoa, gives the names of the canoes in which the journey was made and the time of year at which the coast of New Zealand was sighted. On the question of the date a comparison of genealogies of Maori chiefs shows that, up to the beginning of the 20th century, about eighteen generations or probably not much more than five centuries had passed since the first Maori arrivals. There is some evidence that the " tradition of the six canoes " does not represent the first contact of the Polynesian race with New Zealand. If earlier immigrants from Samoa or other eastern Pacific islands arrived they must have become absorbed into the native Papuan population — arguing from the absence of any distinct tradition earlier than that " of the six canoes." Some have sought to find in the Morioris of Chatham Island the remnants of this Papuan-Polynesian population, expelled by Te Kupe and his followers. The extraordinary ruined fortifications found, and the know- ledge of the higher art of war displayed by the Maoris, suggest (what is no doubt the fact) that there was a hard fight for them when they first arrived, but the greatest resistance must have been from the purer Papuan inhabitants, and not from the half-castes who were probably easily over- whelmed. The shell heaps found on the coasts and elsewhere dispose of the theory that New Zealand was uninhabited or practically so six centuries back.

Any description of the Maoris, who in recent years have come more and more under the influence of white civilization, must necessarily refer rather

to what they have been than what they are. Physically the Maoris are true Polynesians, tall, well-built, with straight or slightly curved noses, high foreheads and oval faces. Their colour is usually a darker brown than that of their kinsfolk of the eastern Pacific, but light-complexioned Maoris, almost European in features, are met with. Their hair is black and straight or wavy, scarcely ever curly. They have long been celebrated for their tattooing, the designs being most elaborate.

Among the most industrious of Polynesian races, they have always been famed for wood-carving; and in building, weaving and dyeing they had made great advances before the whites arrived. They are also good farmers and bold seamen. In the Maori wars they showed much strategic skill, and their know- ledge of fortification was very remarkable. Politically the

Maoris have always been democratic. No approach to a mon- archy ever existed. Each tribe under its chief was autonomous. Tribal lands were held in common and each man was entitled to a share in the products. They had slaves, but so few as not to alter the social conditions. Every Maori was a soldier, and war was the chief business and joy of his life. Tribal wars were incessant. The weapons were wooden spears, clubs and stone tomahawks. Cannibalism, which earned them in earlier years a terrible name, was generally restricted to the bloodthirsty banquets which always followed a victory. The Maoris ate their enemies' hearts to gain their courage, but to whatever degree animistic beliefs may have once contributed to their cannibalism, it is certain that long before Captain Cook's visit religious sanction for the custom had long given place to mere gluttonous enjoyment.

The Maoris had no regular marriage ceremony. Polygamy was universal, and even to-day they are not strictly monogamous. The power of the husband over the wife was absolute, but women took their meals with the men, were allowed a voice in the tribe's affairs, and sometimes accompanied the men into battle. Some tribes were endogamic, and there matriarchy was the rule, descent being traced through the female line. Ferocious as they were in war, the Maoris are generally hospitable and affectionate in their home-life, and a pleasant characteristic, noticed by Captain Cook, is their respect and care of the old. The Maoris buried their dead, the cemeteries being ornamented with carved posts. Their religion was a nature-worship intimately con- nected with the veneration of ancestors. There was a belief in the soul, which was supposed to dwell in the left eye. They had no doubt as to a future state, but no definite idea of a supreme being. They had no places of worship, nor, though they had

sacred wooden figures, is there any reason to consider that they were idolaters in the strict sense of the word. The custom of taboo was very fully developed. Nowadays they are all nominally Christians. While they had no written language, a considerable oral literature of songs, legends and traditions existed. Their priesthood was a highly trained profession, and they had schools which taught a knowledge of the stars and constellations, for many of which they had names. All Maoris are natural orators and poets, and a chief was expected to add these accomplishments to his prowess as a warrior or his skill as a seaman. The Maoris of to-day are law-abiding, peaceable and indolent. They have been called the Britons of the south, and their courage in defending their country and their intelligence amply justify the compliment. By the New Zealanders they are cordially liked. At the census of 1906 they numbered 47,731, as against 45,47° in 1874; and there were 6516 half-castes. See also Polynesia and Samoa.

Bibliography. — Sir G. Grey, Polynesian Mythology and Maori Legends (Wellington, 1885); A. de Quatrefages, Les Polynesiens et leurs migrations (Paris, 1866); Abraham Fornander, An Account of the Polynesian Race (1877-1885) ; Henri Mager, Le Monde polynesien (Paris, 1902) ; Pierre Adolphe Lesson, Les Polynisiens, leur origine, &c. (Paris, 1880-1884); W. Pember Reeves, New Zealand; A. R. Wallace, Australasia (Stanford's Compendium, 1894) ; G. W. Rusden, History of New Zealand (1895); Alfred Saunders, History of New Zealand (1896); James Cowan, The Maoris of New Zealand

(1909).

MAP (or Mapes), WALTER (d. c. 1208/9), medieval ecclesi- astic, author and wit, to whose authority the main body of prose Arthurian literature has, at one time or another, been assigned, flourished in the latter part of the 12 th and early years of the 13th centuries. Concerning the date of his birth and his parent- age nothing definite is known, but as he ascribes his position at court to the merits of his parents they were probably people of some importance. He studied at Paris under Girard la Pucelle, who began to teach in or about 11 60, but as he states in his book De nugis curialium that he was at the court of Henry II. before 1162, his residence at Paris must have been practically comprised in the decade 1150-1160.

Map's career was an active and varied one; he was clerk of the royal household and justice itinerant; in n 79 he was present at the Lateran council at Rome, on his way thither being enter-

tained by the count of Champagne; at this time he apparently held a plurality of ecclesiastical benefices, being a prebend of St Paul's, canon and

precentor of Lincoln and parson of Westbury, Gloucestershire. There seems to be no record of his ordination, but as he was a candidate for the see of Hereford in 11 99 it is most probable that he was in priest's orders. The last reference to him, as living, is in 1208, when an order for payment to him is on record, but Giraldus Cambrensis, in the second edition of his Hibernica, redacted in 1210, utters a prayer for his soul, " cujus animae propitietur Deus," a proof that he was no longer alive.

The special interest of Map lies in the perplexing question of his relation to the Arthurian legend and literature. He is in- variably cited as the author of the Lancelot proper (consisting of two parts), the Queste and the Mort Artus, all three of which are now generally found in one manuscript under the title of Lancelot. The Mort Artus, however, we know to be the prose working over of an earlier and independent poem. Sundry manuscripts of the yet more extensive compilation which begins with the Grand Saint Graal also refer to Map as having composed the cycle in conjunction with Robert de Borron, to whom, as a rule, the Grand Saint Graal and Merlin are exclusively assigned. The curious Merlin text, Bibl. Nat. 337 (fonds Francais), refers throughout to Map as authority; and the enormous Lancelot codex, B. N. 112, a combination of the Lancelot and the Tristan, also couples his name with that of Robert de Borron. In fact it may safely be said that, with the exception of the prose Tristan, always attributed either to Luces de Gast, or Helie de Borron, the authority of Map has been invoked for the entire vˆst mass of Arthurian prose romantic literature. Now it is practically impossible that one man, and that one an occupier of court and public offices, constantly employed in royal and public business, very frequently travelling abroad {e.g. we know he was at Limoges in n 73; at Rome in 1179; in Anjou in n 83; and at Angers in 1199), could have found the necessary leisure. On this point we have the testimony of his one undoubted work, De nugis curialium, which he tells us he composed " by snatches " during his residence at court. De nugis is a comparatively small book; if it were difficult to find leisure for that, much more would it have been difficult to find the time requisite for the composition of one only of the many long-winded romances which have been fathered on Map. Giraldus Cam- brensis, with whom he was on most friendly terms, and who frequently refers to and quotes him, records a speech in which Map contrasted Giraldus' labours with his own, apparently to the disadvantage of the latter, " vos scripta dedistis, et nos verba " — a phrase which has been interpreted as meaning that Map himself had produced no literary work. But inasmuch as the De nugis is undoubtedly, and certain satirical poems directed against the loose life of the clergy of the day most probably, his work, the speech must not be taken too literally. It seems difficult also to believe that Map's name should be so constantly connected with our Arthurian tradition without any ground whatever; though it must be

admitted that he himself never makes any such claim — the references in the romances are all couched in the third person, and bear no sign of being other than the record by the copyist of a traditional attribution.

A different and very interesting piece of evidence is afforded by the Ipomedon of Hue de Rotelande; in relating how his hero appeared at a tournament three days running, in three different suits of armour, red, black and white, the author remarks, Sul ne sai pas de mentir Vart Walter Map reset ben sa part.

This apparently indicated that Map, also, had made himself responsible for a similar story. Now this incident of the " Three Days' Tournament " is found alike in the prose Lancelot and in the German Lanzelet, this latter translated from a French poem which, in 1194, was in the possession of Hugo de Morville. The Ipomedon was written somewhere in the decade n 80-1 190, and there is no evidence of the prose romance having then been in existence. We have no manuscript of any prose Arthurian romance earlier than the 13th century, to which period Gaston

Paris assigned them; they are certainly posterior to the verse romances. Chretien de Troyes, in his Cligis (the date of which falls somewhere in the decade 1160-1170), knew and utilized the story of the " Three Days' Tournament," and moreover makes Lancelot take part in it. Map was, as we have seen, frequently in France; Chretien had for patroness Marie, countess of Champagne, step-daughter to Henry II., Map's patron; Map's position was distinctly superior to that of Chretien. Taking all the evidence into consideration it seems more probable that Map had, at a comparatively early date, before he became so impor- tant an official, composed a poem on the subject of Lancelot, which was the direct source of the German version, and which Chretien also knew and followed.

The form in which certain of the references to him are couched favours the above view; the compiler of Guiron le Cortois says in his prologue that " maislre Gautier Map qui fu clers au roi Henry — dcvisa cil Vestoire de monseigneur Lancelot du Lac, que d'autre chose ne parla il mie gramment en son livre"; and in another place he refers to Map, " qui fit lou propre livre de monsoingnour Lancelot dou Lac." Now only during the early part of his career could Map fairly be referred to as simple " clers au roi Henry," and both extracts emphasize the fact that his work dealt, almost

exclusively, with Lancelot. Neither of these passages would fit the prose romance, as we know it, but both might well suit the lost French source of the Lanzelet ; where we are in a position to compare the German versions of French romances with their originals we find, as a rule, that the translators have followed their source faithfully.

One of the references to Map's works in the Merlin manuscript above referred to (B.N. 337) has an interesting touch not found else- where. After saying how Map translated the romance from the Latin at the bidding of King Henry, the usual statement, the scribe adds " qui riche loier I'en dona." It is of course possible that Map's rise at court may have been due to his having hit the literary taste of the monarch, who, we know, was interested in the Arthurian tradi- tion, but it must be admitted that direct evidence on the subject is practically nil, and that in the present condition of our knowledge we can only advance possible hypotheses.

See art. " Map " in Diet. Nat. Biog. De nugis curialium and the Latin .Poems attributed to Map have been edited for the Camden Society by T. Wright (1841). For discussion of his authorship of the Lancelot cf. The Three Days' Tournament, Grimm Library XV. See also under L ancelot. The passages relating to Map cited above have been frequently quoted by scholars, e.g. Hucher, Le Grand Saint Graal; Paulin Paris, Romans de la Table Ronde; Alfred Nutt, Studies in the Legend of the Holy Grail. (J. L. W.)

MAP, a representation, on a plane and a reduced scale, of part or the whole of the earth's surface. If specially designed to meet the requirements of seamen it is called a chart, if on an exceptionally large scale a plan. The words map and chart are derived from mappa and charta, the former being the Latin for napkin or cloth, the latter for papyrus or parchment. Maps were thus named after the material upon which they were drawn or painted, and it should be noted that even at present maps intended for use in the' open air, by cyclists, military men and others, are frequently printed on cloth. In Italian, Spanish and Portuguese the word mappa has retained its place, by the side of carta, for marine charts, but in other languages both kinds of maps 1 are generally known by a word derived from the Latin charta, as carte in French, Karte in German, Kaart in Dutch. A chart, in French, is called carte hydrographique, marine or des coles; in Spanish or Portuguese carta de mar ear, in Italian carta da navigate, in German Seekarte (to distinguish it from Landkarte), in Dutch Zeekaart or Paskaart. A chart on Mercator's projec- tion is called Wassende graadkaart in Dutch, carte reduite in French. Lastly, a collection of maps is called an atlas, after the figure of Atlas, the Titan, supporting the heavens, which ornamented the title of Lafreri's and Mercator's atlases in the 16th century.

Classification of Maps. — Maps differ greatly, not only as to the scale on which they are drawn, but also with respect to the fullness or the character of the information which they convey. Broadly speaking, they may be divided into two classes, of which the first includes topographical, chorographical and general maps, the second the great variety designed for special purposes.

1 The ancient Greeks called a map Pinax, The Romans Tabula geographica. Mappa mundi was the medieval Latin for a map of the world which the ancients called Tabula totius orbis descriptionem continens.

Topographical maps and plans are drawn on a scale sufficiently large to enable the draughtsman to show most objects on a scale true to nature. 2 Its information should not only be accurate, but also conveyed intelligibly and with taste. Exaggeration, however, is not always to be avoided, for even on the British 1 in. ordnance map the roads appear as if they were 130 ft. in width.

Chorographical (Gr. xwpa, country or region) and general maps are either reduced from topographical maps or compiled from such miscellaneous sources as are available. In the former case the cartographer is merely called upon to reduce and general- ize the information given by his originals, to make a judicious selection of place names, and to take care that the map is not overcrowded with names and details. Far more difficult is his task where no surveys are available, and the map has to be compiled from a variety of sources. These materials generally include reconnaissance survey of small districts, route surveys and astronomical observations supplied by travellers, and information obtained from native sources. The compiler, in combining these materials, is called upon to' examine the various sources of information, and to form an estimate of their value, which he can only do if he have himself some knowledge of surveying and of the methods of determining positions by astronomical observation. A knowledge of the languages in which the accounts of travellers are written, and even of native languages, is almost indispensable. He ought not to be satisfied with compiling his map from existing maps, but should subject each explorer's account to an independent examination, when he will frequently find that either the explorer himself, or the draughtsman employed by him, has failed to introduce into his map the whole of the information available. Latitudes from the observations of travellers may generally be trusted, but longitudes should be accepted with caution; for so competent an observer as Captain Speke placed the capital cf Uganda in longitude 32° 44′ E., when its true longitude as determined by more trustworthy observations is 32° 26′ E., an error of 18'. Again, on the map illustrating Livingstone's " Last Journals " the Luapula is shown as issuing from the Bangweulu in the north-west, when an examination of the

account of the natives who carried the great explorer's remains to the coast would have shown that it leaves that lake on the south.

The second group includes all maps compiled for special purposes. Their variety is considerable, for they are designed to illustrate physical and political geography, travel and naviga- tion, trade and commerce, and, in fact, every subject connected with geographical distribution and capable of being illustrated by means of a map. We thus have (1) physical maps in great variety, including geological, orographical and hydrographical maps, maps illustrative of the geographical distribution of meteorological phenomena, of plants and animals, such as are to be found in Berghaus's " Physical Atlas," of which an enlarged English edition is published by J. G. Bartholomew of Edinburgh; (2) political maps, showing political boundaries; (3) ethnological maps, illustrating the distribution of the varieties of man, the density of population, &c; (4) travel maps, showing roads or railways and ocean-routes (as is done by Philips' " Marine Atlas "), or designed for the special use of cyclists or aviators; (5) statistical maps, illustrating commerce and industries; (6) historical maps; (7) maps specially designed for educational purposes.

Scale of Maps.— Formerly map makers contented themselves with placing upon their maps a linear scale of miles, deduced from the central meridian or the equator. They now add the proportion which these units of length have to nature, or state how many of these units are contained within some local measure of length. The former method, usually called the " natural scale," may be described as " international," for it is quite independent of local measures of length, and depends exclu- sively upon the size and figure of the earth. Thus a scale of 1:1,000,000 signifies that each unit of length on the map

2 Close, " The Ideal Topographical Map," Geog. Journal, vol. xxv,

(1905)-

represents one million of such units in nature. The second method is still employed in many cases, and we find thus: — 1 in. = 1 statute mile (of 63,366 in.) corresponds to I : 63,366 6 in. = 1 ,, „ ,, „ 1 : 10,560

1 in. = 5 chains (of 858 in.) . _ . „ 1 : 4,890

1 in. = 1 nautical mile (of ˆ3,037 in.) . ,, I : 73,037

1 in. = 1 verst (of 42,000 in.) . . „ I 142,000

2 Vienna in. = 1 Austrian mile (of

288,000 in.) ....,, 1 : 144,000

I cm. = 500 metres (of 100 cm.) . . ,, 1 : 50,000

In cases where the draughtsman has omitted to indicate the scale we can ascertain it by dividing the actual length of a meri- dian degree by the length of a degree measure upon the map. Thus a degree between 50 and 51° measures 111,226,000 mm.; on the map it is represented by in mm. Hence the scale is •1 : 1,000,000 approximately.

The linear scale of maps can obviously be used only in the case of maps covering a small area, for in the case of maps of greater extension measurements would be vitiated owing to the distortion or exaggeration inherent in all projections, not to mention the expansion or shrinking of the paper in the process of printing. As an extreme instance of the misleading character of the scale given on maps embracing a wide area we may refer to a map of a hemisphere. The scale of that map, as determined by the equator or centre meridian, we will suppose to be 1 : 125,000,000, while the encircling meridian indicates a scale of 1 : 80,000,000; and a " mean " scale, equal to the square root of the proportion which the area of the map bears to the actual area of a hemisphere, is 1 : 112,000,000. In adopting a scale for their maps, cartographers will do well to choose a multiple of 1000 if possible, for such a scale can claim to be international, while in planning an atlas they ought to avoid a needless multiplicity of scales.

*Map Projections are dealt with separately below. * It will suffice therefore to point out that the ordinary needs of the cartographer can be met by conical projections, and, in the case of maps covering a wide area, by Lambert's equal area projection. The indiscriminate use of Mercator's projection, for maps of the world, is to be deprecated owing to the inordinate exaggeration of areas in high latitudes. In the case of topographical maps sheets bounded by meridians and parallels are to be commended. The meridian of Greenwich has been universally accepted as the initial meridian, but in the case of most topographical maps of foreign countries local meridians are still adhered to — • the more important among which are: —*

Paris (Obs. nationale) . . 2° 20′ 14″ E. of Greenwich.

Pulkova (St Petersburg) . 30 r

Stockholm 18

Rome (Collegio Romano) . 12

Brussels (Old town) . . 4

Madrid 3

Ferro (assumed) ... 20

The outline includes coast-line, rivers, roads, towns, and in fact all objects capable of being shown on a map, with the exception of the hills and of woods, swamps, deserts and the like, which the draughtsman generally describes as "ornament." Conventional signs and symbols are universally used in depicting these objects.

Delineation of the Ground. — The mole-hills and serrated ridges of medieval maps were still in almost general use at the close of the 1 8th century, and are occasionally met with at the present day, being cheaply produced, readily understood by the un- learned, and in reality preferable to the uncouth and misleading hatchings still to be seen on many maps. Far superior are those scenographic representations which enable a person consulting the map to identify prominent landmarks, such as the Pic du Midi, which rises like a pillar to the south of Pau, but is not readily discovered upon an ordinary map. This advantage is still fully recognized, for such views of distant hills are still commonly given on the margin of marine charts for the assistance of navigators; military surveyors are encouraged to introduce sketches of prominent landmarks upon their reconnaissance plans, and the general public is enabled to consult " Picturesque Relief Maps " — such as F. W. Delkeskamp's Switzerland (1830)

19′ 39″ E. ‘ 3′30″E. ‘ 28′ 40″ E. 1 22'n'E. 1 41′ 16″ W. ‘ o' o" W. of Paris

or his Panorama of the Rhine. Delineations such as these do not,

however, satisfy scientific requirements. All objects on a map

are required to be shown as projected horizontally upon a plane.

This principle must naturally be adhered to when delineating

the features of the ground. This was recognized by J. Picard

and other members of the Academy of Science whom Colbert, in

1668, directed to prepare a new map of France, for on David

Vivier's map of the environs of Paris (1674, scale 1 : 86,400)

very crude hachures bounding the rivers have been substituted

for the scenographic hills I

of older maps. Little pro- J

gress in the delineation of =

the ground, however, was °

made until towards the

close of the 18th century,

when horizontal contours

and hachures regulated

according to the angle of

inclination of all slopes,

were adopted. These

contours intersect the

ground at a given dis- tance above or below the

level of the sea, and thus

bound a series of hori- zontal planes (see fig. 1).

Contours of this kind

were first utilized by

M. S. Cruquius in his

chart of the Merwede

(1728); Philip Buache

(1737) introduced such

contours or isobaths (Gr.

tcros, equal; fiaOvs, deep)

upon his chart of the Fig. i.

Channel, and intended to introduce similar contours or isohypses (inj/os, height) for a representation of the land. Dupain-

Triel, acting upon a suggestion of his friend M. Ducarla,

published his La France consideree dans les dij) '(rentes hauteurs

de ses plaines (1791), upon which equidistant contours at intervals of 16 toises found a place. The scientific value of these contoured maps is fully recognized. They not only

indicate the height of the land, but also enable us to compute the declivity of the mountain slopes; and if minor features of ground lying between two contours — such as ravines, as also rocky precipices and glaciers — are indicated, as is done on the Siegfried atlas of Switzerland, they fully meet the requirements of the scientific man, the engineer and the mountain-climber. At the same time it cannot be denied that these maps, unless the contours are inserted at short intervals, lack graphic expression. Two methods are employed to attain this: the first distinguishes the strata or layers by colours; the second indicates the varying slopes by shades or hachures. The first of these methods yields a hypsographical, or — if the sea-bottom be included, in which case all contours are referred to a common datum fine— a bathy hypsographical map. Carl Ritter, in 1806, employed graduated tints, increasing in lightness on proceeding from the lowlands to the highlands; while General F. von Hauslab, director of the Austrian Surveys, in 1842, advised that the darkest tints should be allotted to the highlands, so that they might not obscure details in the densely peopled plainp. The desired effect may be produced by a graduation of the same colour, or by a poly- chromatic scale — such as white, pale red, pale brown, various shades of green, violet and purple, in ascending order. C. von Sonklar, in his map of the Hohe Tauern (1 : 144.°°°; l86 4) coloured plains and valleys green; mountain slopes in five shades of brown; glaciers blue or white. E. G. Ravenstein's map of Ben Nevis (1887) first employed the colours of the spectrum, viz. green to brown, in ascending order for the land ; blue, indigo and violet for the sea, increasing in intensity with the height or the depth. At first cartographers chose their colours rather arbitrarily. Thus Horsell, who was the first to introduce tints

NAMES AND ORTHOGRAPHY]

MAP

on his map of Sweden and Norway (1:600,000; 1835), coloured the lowlands up to 300 ft. in green, succeeded by red, yellow and white for the higher ground; while A. Papen, on his hypso- graphical map of Central Europe (1857) introduced a perplexing range of colours. At the present time compilers of strata maps generally limit themselves to two or three colours, in various shades, with green for the lowlands, brown for the hills and blue for the sea. On the international map of the world, planned by Professor A. Penck on a scale of 1 : 1,000,000, which has been undertaken by the leading governments of the world, the ground is shown by contours at intervals of 100 metres (to be increased to 200 and 500 metres in mountainous districts); the strata are in graded tints, viz. blue for the sea, green for lowlands up to 300 metres, yellow between 300 and 500 metres, brown up to 2000 metres, and reddish tints beyond that height.

The declivities of the ground are still indicated in most topographical maps by a system of strokes or hachures, first devised by L. Chr. Muller (Plan und Kartenzeichnen, 1788) and J. G. Lehmann, who directed a survey of Saxony, 1780-1806, and published his Theorie der Bergzeichnung in 1799. By this method the slopes are indicated by strokes or hachures crossing the contour lines at right angles, in the direction of flowing water, and varying in thickness according to the degree of declivity they represent (cf. for example, the map of Switzerland in this work). The light is supposed to descend vertically upon the country represented, and in a true scale of shade the intensity increases with the inclination from o° to 90 ; but as such a scale does not sufficiently differentiate the lesser inclinations which are the most important, the author adopted a conventional scale, representing a slope of 45 or more, supposed to be inacces- sible, as absolutely black, the level surfaces, which reflect all the light which falls upon them, as perfectly white, and the inter- vening slopes by a proportion between black and white, as in fig. 2.. The main principles of this system have been maintained,

Slope Degrees

80

-r ‘

75

i

. c

ei-

”“!■■

-

—

-$ir~

«S

*u

Fig. 2. but its details have been modified frequently to suit special cases. Thus the French survey commission of 1828 fixed the proportion of black to white at one and a half times the angle of slope; while in Austria, where steep mountains constitute an important feature, solid black has been reserved for a slope of 80°, the proportion of black to white varying from 80:0 (for 50°) to 8 : 72 (for 5). On the map of Germany (1:100,000) a slope of 50 is shown in solid black while stippled hachures are used for gentle slopes up to io°. Instead of shading lines following the greatest slopes, lines following the contours and varying in their thickness and in their intervals apart, according

to the slope of the ground to be represented, may be employed This method affords a ready and expeditious means of sketching the ground, if the draughtsman limits himself to character- istically indicating its features by what have been called ” form lines.” This method can be recommended in the case of plotting the results of an explorer’s route, or in the case of countries of which we have no regular survey (cf . the map of Afghanistan in this work).

Instead of supposing the light to fall vertically upon the surface it is often supposed to fall obliquely, generally at an angle of 45° from the upper left-hand corner. It is claimed for this method that it affords a means of giving a graphic repre- sentation of Alpine districts where other methods of shading fail. The Dufour map of Switzerland (1 :ioo,ooo) is one of the finest examples of this style of hill-shading. For use in the field, however, and for scientific work, a contoured map like Siegfried’s atlas of Switzerland, or, in the case of hilly country, a map shaded on the assumption of a vertical light, will prove more useful than one of these, notwithstanding that truth to nature and artistic beauty are claimed on their behalf.

Instead of shading by lines, a like effect may be produced by mezzotint shading (cf. the map of Italy, or other maps, in this work, on a similar method) , and if this be combined with contour lines very satisfactory results can be achieved. If this tint be printed in grey or brown, isohypses, in black or red, show distinctly above it. The same combination is possible if hills engraved in the ordinary manner are printed in colours, as is done in an edition of the i-inch ordnance map, with contours in red and hills hachured in brown.

Efforts have been made of late years to improve the available methods of representing ground, especially in Switzerland, but the so-called stereoscopic or relief maps produced by F. Becker, X. Imfeld, Kummerly, F. Leuzinger and other able cartographers, however admirable as works of art, do not, from the point of utility, supersede the combination of horizontal contours with shaded slopes, such as have been long in use. There seems to be even less chance for the combination of coloured strata and hachures proposed by K. Peucker, whose theoretical disquisitions on aerial perspective are of interest, but have not hitherto led to satisfactory practical results. 1

The above remarks apply more particularly to topographic maps. In the case of general maps on a smaller scale, the orographic features must be generalized by a skilful draughtsman and artist. One of the best modern examples of this kind is Vogel's map of Germany, on a scale of 1 : 500,000.

Selection of Names and Orthography. — The nomenclature or " lettering " of maps is a subject deserving special attention. Not only should the names be carefully selected with special reference to the objects which the map is intended to serve, and to prevent overcrowding by the introduction of names which can serve no useful object, but they should also be arranged in such a manner as to be read easily by a person consulting the map. It is an accepted rule now that the spelling of names in countries using the Roman alphabet should be retained, with such exceptions as have been familiarized by long usage. In such cases, however, the correct native form should be added within brackets, as Florence (Firenze), Leghorn (Livorno), Cologne (Coin) and so on. At the same time these corrupted forms should be eliminated as far as possible. Names in languages not using the Roman alphabet, or having no written alphabet should be spelt phonetically, as pronounced on the spot. An elaborate universal alphabet, abounding in diacritical marks, has been devised for the purpose by Professor Lepsius, and various other systems have been adopted for Oriental languages, and by certain missionary societies, adapted to the languages in which they teach. The following simple rules, laid down by a Committee of the Royal Geographical Society, will be found sufficient as a rule; according to this

system the vowels are to be sounded as in Italian, the consonants as in English, and no redundant letters are to be introduced. The diphthong ai is

1 K. Peucker, Schattenplastik und Farbenplastik (Vienna, 1898); Geograph. Zeitschrift (1902 and 1908).

to be pronounced as in aisle ; au as ow in how ; aw as in law. Ch is always to be sounded as in church, g is always hard; y always represents a consonant; whilst kh and gh stand for gutturals. One accent only is to be used, the acute, to denote the syllable on which stress is laid. This system has in great measure been followed throughout the present work, but it is obvious that in numerous instances these rules must prove inadequate. The introduction of additional diacritical marks, such as – and -, used to express quantity, and the diaeresis, as in ai, to express consecutive vowels, which are to be pronounced separately, may prove of service, as also such letters as a, o and ii, to be pronounced as in German, and in lieu of the French ai, eu or u. The United States Geographic Board acts upon rules practically identical with those indicated, and compiles official lists of place-names, the use of which is binding upon government departments, but which it would hardly be wise to follow universally in the case of names of places outside America.

Measurement on Maps

Measurement of Distance. — The shortest distance between two places on the surface of a globe is represented by the arc of a great circle. If the two places are upon the same meridian or upon the equator the exact distance separating them is to be found by reference to a table giving the lengths of arcs of a meridian and of the equator. In all other cases recourse must be had to a map, a globe or mathematical formula. Measurements made on a topographical map yield the most satisfactory results. Even a general map may be trusted, as long as we keep within ten degrees of its centre. In the case of more considerable distances, however, a globe of suitable size should be consulted, or — and this seems preferable — they should be calculated by the rules of spherical trigonometry. The problem then resolves itself in the solution of a spherical triangle.

In the formulae which follow we suppose I and /' to represent the latitudes, a and b the co-latitudes (90°—/ or 90° — /'), and / the difference in longitude between them or the meridian distance, whilst D is the distance

required.

If both places have the same latitude we have to deal with an isosceles triangle, of which two sides and the included angle are given. This triangle, for the convenience of calculation, we divide into two right-angled triangles. Then we have sin J D = sin a sin \t, and since sin a = sin (90° —/) = cos I, it follows that sin JD = cos I sin \t. If the latitudes differ, we have to solve an oblique-angled spherical triangle, of which two sides and the included angle are given. Thus, cos D — cos a cos 6 cos ‘ = sin a sin 6

cos D = cos a cos 6 + sin a sin b cos t = sin I sin /’ + cos / cos V cos t. In order to adapt this formula to logarithms, we introduce a subsidiary angle p, such that cot p — cot / cos t ; we then have

cos D = sin I cos(/’ — p) / sin p.

In the above formulae our earth is assumed to be a sphere, but when calculating and reducing to the sea-level, a base-line, or the side of a primary triangulation, account must be taken of the spheroidal shape of the earth and of the elevation above the sea- level. The error due to the neglect of the former would at most amount to I %, while a reduction to the mean level of the sea necessitates but a trifling reduction, amounting, in the case of a base-line 100,000 metres in length, measured on a plateau of 3700 metres (12,000 ft.) in height, to 57 metres only.

These orthodromic distances are of course shorter than those measured along a loxodromic line, which intersects all parallels at the same angle. Thus the distance between New York and Oporto, following the former (great circle sailing), amounts to 3000 m., while following the rhumb, as in Mercator sailing, it would amount to 3120 m.

These direct distances may of course differ widely with the distance which it is necessary to travel between two places along a road, down a winding river or a sinuous coast-line. Thus, the direct distance, as the crow flies, between Brig and the hospice of the Simplon amounts to 4-42 geogr. m. (slope nearly 9), while the distance by road measures 13-85 geogr. m. (slope nearly 3). Distances such as these can be measured only on a topographical map of a fairly large scale, for on general maps many of the details needed for that purpose can no longer be represented. Space runners for facilitating these measurements, variously known as chartometers, curvimeters, opisometers, &c, have been devised

in great variety. Nearly all these instruments register the revolution of a small wheel of known circumference, which is run along the line to be

measured.

_ The Measurement of Areas is easily effected if the map at our disposal is drawn on an equal area projection. In that case we need simply cover the map with a network of squares — the area of each of which has been determined with reference to the scale of the map— count the squares, and estimate the contents of those only partially enclosed within the boundary, and the result will give the area desired. Instead of drawing these squares upon the map itself, they may be engraved or etched upon glass, or drawn upon transparent celluloid or tracing-paper. Still more expeditious is the use of a planimeter, such as Captain Prytz's " Hatchet Planimeter," which yields fairly accurate results, or G. Coradi's " Polar Planimeter," one of the most trustworthy instruments of the kind. 1

When dealing with maps not drawn on an equal area projection we substitute quadrilaterals bounded by meridians and parallels, the areas for which are given in the " Smithsonian Geographical Tables " (1894), in Professor H. Wagner's tables in the geographical Jahrbuch, or similar works.

It is obvious that the area of a group of mountains projected on a horizontal plane, such as is presented by a map, must differ widely from the area of the superficies or physical surface of those mountains exposed to the air. Thus, a slope of 45 having a surface of 100 sq. m. projected upon a horizontal plane only measures 59 sq. m., whilst 100 sq. m. of the snowclad Sentis in Appenzell are reduced to 10 sq. m. A hypsographical map affords the readiest solution of this question. Given the area A of the plane between the two horizontal contours, the height h of the upper above the lower contour, the length of the upper contour /, and the area of the face presented by the edge, of the upper stratum l.h = Ai, the slope a is found to be tan a = h.l I (A — Ai) ; hence its superficies, A = A 2 sec a. The result is an approximation, for inequalities of the ground bounded by the two contours have not been considered.

The hypsographical map facilitates likewise the determination of the mean height of a country, and this height, combined with the area, the determination of volume, or cubic contents, is a simple matter. 2

Relief Maps are intended to present a representation of the ground which shall be absolutely true to nature. The object, however, can be fully attained only if the scale of the map is sufficiently large, if the horizontal and vertical scales are identical, so that there shall be no exaggeration of the heights, and if regard is had, eventually, to the curvature of the earth's surface. Relief maps on a small scale necessitate a generalization of the features of the ground, as in the case of ordinary maps, as like- wise an

exaggeration of the heights. Thus on a relief on a scale of 1 : 1,000,000 a mountain like Ben Nevis would only rise to a height of 1 -3 mm.

The methods of producing reliefs vary according to the scale and the materials available. A simple plan is as follows — draw an outline of the country of which a map is to be produced upon a board ; mark all points the altitude of which is known or can be estimated by pins or wires clipped off so as to denote the heights; mark river-courses and suitable profiles by strips of vellum and finally finish your model with the aid of a good map, in clay or wax. If contoured maps are available it is easy to build up a strata-relief, which facilitates the completion of the relief so that it shall be a fair representation of nature, which the strata-relief cannot claim to be. A pantograph armed with cutting-files 3 which carve the relief out of a block of gypsum, was employed in 1893-1900 by C. Perron of Geneva, in producing his relief map of Switzerland on a scale of 1 : 100,000. After copies of such reliefs have been taken in gypsum, cement, statuary pasteboard, fossil dust mixed with vegetable oil, or some other suitable material, they are painted. If a number of copies is required it may be advisable to print a map of the country represented in colours, and either to emboss this map, backed with papier-mache, or paste it upon a copy of the relief — a task of some difficulty. Relief maps are frequently objected to on

1 Professor Henrici, Report on Planimeters (64th meeting of the British Association, Oxford, 1894); J. Tennant, " The Planimeter " (Engineering, xlv. 1903).

2 ft. Wagner's Lehrbuch (Hanover, 1908, pp. 241-252) refers to numerous authorities who deal fully with the whole question of measurement.

3 Kienzl of Leoben in 1 891 had invented a similar apparatus which he called a Relief Pantograph (Zeitschrift, Vienna Geog. Soc. 1891).

account of their cost, bulk and weight, but their great use in teaching geography is undeniable.

Globes} — It is impossible to represent on a plane the whole of the earth's surface, or even a large extent of it, without a consider- able amount of distortion. On the other hand a map drawn on the surface of a sphere representing a terrestrial globe will prove true to nature, for it possesses, in

combination, the qualities which the ingenuity of no mathematician has hitherto succeeded in imparting to a projection intended for a map of some extent, namely, equivalence of areas of distances and angles. Nevertheless, it should be observed that our globes take no account of the oblateness of our sphere; but as the difference in length between the circumference of the equator and the perimeter of a meridian ellipse only amounts to 0-16%, it could be shown only on a globe of unusual size.

The method of manufacturing a globe is much the same as it was at the beginning of the 16th century. A matrix of wood or iron is covered with successive layers of papers, pasted together so as to form pasteboard. The shell thus formed is then cut along the line of the intended equator into two hemispheres, they are then again glued together and made to revolve round an axis the ends of which passed through the poles and entered a metal meridian circle. The sphere is then coated with plaster or whiting, and when it has been smoothed on a lathe and dried, the lines representing meridians and parallels are drawn upon it. Finally the globe is covered with the paper gores upon which the map is drawn. The adaption of these gores to the curvature of the sphere calls for great care. Generally from 12 to 24 gores and two small segments for the polar regions printed on vellum paper are used for each globe. The method of preparing these gores was originally found empirically, but since the days of Albert Diirer it has also engaged the minds of many mathe- maticians, foremost among whom was Professor A. G. Kastner of Gottingen. One of the best instructions for the manufacture of globes we owe to Altmiitter of Vienna. 2

Larger globes are usually on a stand the top of which supports an artificial horizon. The globe itself rotates within a metallic meridian to which its axis is attached. Other accessories are an hour-circle, around the north pole, a compass placed beneath the globe, and a flexible quadrant used for finding the distances between places. These accessories are indispensable if it be proposed to solve the problems usually propounded in books on the " use of the globes," but can be dispensed with if the globe is to serve only as a map of the world. The size of a globe is usually given in terms of its diameter. To find its scale divide the mean diameter of the earth (1,273,500 m.) by the diameter of the globe; to find its circumference multiply the diameter by w (3-1416).

Map Printing. — Maps were first printed in the second half of the 15th century. Those in the Rudimentum novitiarum published at Lubeck in 1475 are from woodcuts, while the maps in the first two editions of Ptolemy published in Italy in 1472 are from copper plates. Wood engraving kept its ground for a consider- able period, especially in Germany, but copper in the end sup- planted it, and owing to the beauty and clearness of the maps produced by a combination of engraving and etching it still maintains its

ground. The objection that a copper plate shows signs of wear after a thousand impressions have been taken has been removed, since duplicate plates are readily produced by electrotyping, while transfers of copper engravings, on stone, zinc or aluminium, make it possible to turn out large editions in a printing-machine, which thus supersedes the slow-working hand-press. 3 These impressions from transfers, however, are liable to be inferior to impressions taken from an original plate or an electrotype. The art of lithography greatly affected the production of maps. The work is either engraved upon the stone (which yields the most satisfactory result at half the cost of copper-engraving), or it is drawn upon the stone by pen, brush

1 M. Fiorini, Erd- und Himmelsgloben, fret bearbeitet von S. Ciinther (Leipzig, 1895).

2 Jahrb. des polytechn. Instituts in Wien, vol. xv.

3 Compare the maps of Europe, Asia, &c., in this work.

or chalk (after the stone has been " grained "), or it is transferred from a drawing upon transfer paper in lithographic ink. In chromolithography a stone is required for each colour. Owing to the great weight of stones, their cost and their liability of being fractured in the press, zinc plates, and more recently aluminium plates, have largely taken the place of stone. The processes of zincography and of algraphy (aluminium printing) are essentially the same as lithography. Zincographs are generally used for producing surface blocks or plates which may be printed in the same way as a wood-cut. Another process of producing such blocks is known as cerography (Gr. nypos), wax. A copper plate having been coated with wax, outline and orna- ment are cut into the wax, the lettering is impressed with type, and the intaglio thus produced is electrotyped. 4 Movable types are utilized in several other ways in the production of maps. Thus the lettering of the map, having been set up in type, is inked in and transferred to a stone or a zinc-plate, or it is impressed upon transfer-paper and transferred to the stone. Photographic processes have been utilized not only in reducing maps to a smaller scale, but also for producing stones and plates from which they may be printed. The manuscript maps intended to be produced by photographic processes upon stone, zinc or alu- minium, are drawn on a scale somewhat larger than the scale on which they are to be printed, thus eliminating all those imper- fections which are inherent in a pen-drawing. The saving in time and cost by adopting this process is considerable, for a plan, the engraving of which takes two years, can now be produced in two days. Another process, photo- or heliogravure, for obtain- ing an engraved image on a copper plate, was for the first time employed on a large scale for producing a new topographical map of the Austrian Empire in 718

sheets, on a scale of 1 : 75,000, which was completed in seventeen years (1873-1890). The original drawings for this map had to be done with exceptional neatness, the draughtsman spending twelve months on that which he would have completed in four months had it been intended to engrave the map on copper; yet. an average chart, measuring 530 by 630 mm., which would have taken two years and nine months for drawing and engraving, was completed in less than fifteen months — fifty days of which were spent in " retouching " the copper plate. It only cost £169 as compared with £360 had the old method been pursued.

For details of the various methods of reproduction see Litho- graphy; Process, &c.

History of Cartography A capacity to understand the nature of maps is possessed even by peoples whom we are in the habit of describing as " savages." Wandering tribes naturally enjoy a great advantage in this respect over sedentary ones. Our arctic voyagers — Sir E. W. Parry, Sir J. Ross, Sir F. L. MacClintock and others — have profited from rough maps drawn for them by Eskimos. Speci- mens of such maps are given in C. F. Hall's Life with the Esqui- maux (London, 1864). Henry Youle Hind, in his work on the Labrador Peninsula (London, 1863) praises the map which the Montagnais and Nasquapee Indians drew upon bark. Similar essays at map-making are reported in connexion with Australians, Maoris and Polynesians. Tupaya, a Tahitian, who accompanied Captain Cook in the " Endeavour " to Europe, supplied his patron with maps; Raraka drew a map in chalk of the Paumotu archi- pelago on the deck of Captain Wilkes's vessel; the Marshall islanders, according to Captain Winkler (Marine Rundschau, Oct. 1893) possess maps upon which the bearings of the islands are indicated by small strokes. Far superior were the maps found among the semi-civilized Mexicans when the Spainiards first discovered and invaded their country. Among them were cadastral plans of villages, maps of the provinces of the empire of the Aztecs, of towns and of the coast. Montezuma presented Cortes with a map, painted on Nequen cloth, of the Gulf coast. Another map did the Conquistador good service on his campaign against Honduras (Lorenzana, Historia de nueva Espana, Mexico, 1770; W. H. Prescott, History of the Conquest of Mexico, New 4 The great majority of the maps in this work are made by this process.

York, 1843). Peru, the empire of the Incas, had not only- ordinary maps,

but also maps in relief, for Pedro Sarmiento da Gamboa (History of the Incas, translated by A. R. Markham, 1907) tells us that the 9th Inca (who died in 1191) ordered such reliefs to be produced of certain localities in a district which he had recently. conquered and intended to colonize. These were the first relief maps on record. It is possible that these primitive efforts of American Indians might have been further developed, but the Spanish conquest put a stop to all progress, and for a consecutive history of the map and map-making we must turn to the Old World, and trace this history from Egypt and Babylon, through Greece, to our own age.

The ancient Egyptians were famed as " geometers," and as early as the days of Rameses II. (Sesostris of the Greeks, 1333- 1300 B.C.) there had been made a cadastral survey of the country showing the rows of pillars which separated the nomens as well as the boundaries of landed estates. It was upon a map based upon such a source that Eratosthenes (276-196 B.C.) measured the distance between Syene and Alexandria which he required for his determination of the length of a degree. Ptolemy, who had access to the treasures of the famous library of Alexandria was able, no doubt, to utilize these cadastral plans when compiling his geography. It should be noted that he places Syene only two degrees to the east of Alexandria instead of three degrees, the actual meridian distance between the two places; a difference which would result from an error of only 7 is the orientation of the map used by Ptolemy. Scarcely any specimens of ancient Egyptian cartography have survived. In the Turin Museum are preserved two papyri with rough drawings of gold mines estab- lished by Sesostris in the Nubian Desert. 1 These drawings have been commented upon by S. Birch, F. Chabas, R. J. Lauth and other Egyptologists, and have been referred to as the two most ancient maps in existence. They can, however, hardly be described as maps, while in age they are surpassed by several cartographical clay tablets discovered in Babylonia. On another papyrus in the same museum is depicted the victorious return of Seti I. (1366-1333) from Syria, showing the road from Pelusium to Heroopolis, the canal from the Nile with crocodiles, and a lake (mod. Lake Timsah) with fish in it. Apollonius of Rhodes who succeeded Eratosthenes as chief librarian at Alexandria (196 B.C.) reports in his Argonautica (iv. 279) that the inhabitants of Colchis whom, like Herodotus (ii., 104) he looks upon as the descendants of Egyptian colonists, preserved, as heirlooms, certain graven tablets (niipfius) on which land and sea, roads and towns were accurately indicated. 2 Eustathius (since n 60 archbishop of Thessalonica) in his commentary on Dionysius Periegetes, mentions route-maps which Sesostris caused to be prepared, while Strabo (i., 1. 5) dwells at length upon the wealth of geographical documents to be found in the library of Alexandria.

A cadastral survey for purposes of taxation was already at work in

Babylonia in the age of Sargon of Akkad, 3800 B.C. In the British Museum may be seen a series .of clay tablets, circular in shape and dating back to 2300 or 2100 B.C., which contain surveys of lands. One of these depicts in a rough way lower Babylonia encircled by a " salt water river," Oceanus.

Development of Map-making among the Greeks 3 — Ionian mercenaries and traders first arrived in Egypt, on the invitation of Psammetichus I. about the middle of the 7th century B.C. Among the visitors to Egypt, there were, no doubt, some who took, an interest in the science of the Egyptians. One of the most distinguished among them was Thales of Miletus (640-543 B.C.), the founder of the Ionian school of philosophy, whose pupil, Anaximander (611-546 B.C.) is credited by Eratos- thenes with having designed the first map of the world. Anaxi- mander looked upon the earth as a section of a cylinder, of

1 Lepsius, Vrkundenbuch, PI. XXII.

2 These Colchians certainly were not Egyptians. The maps referred to may have been Assyrian.

3 We are indebted to Strabo for nearly all we know about Greek cartographers anterior to Ptolemy, for none of their maps has been preserved.

considerable thickness, suspended in the centre of the circular vault of the heavens, an idea perhaps borrowed from the Baby- lonians, for Job (xxvi. 7) already speaks of the earth as " hanging upon nothing." Like Homer he looked upon the habitable world (oiKoviianj) as being circular in outline and bounded by a circumfluent river. The geographical knowledge of Anaximander was naturally more ample than that of Homer, for it extended from the Cassiterides or Tin Islands in the west to the Caspian in the east, which he conceived to open out into Oceanus. The Aegean Sea occupied the centre of the map, while the line where ocean and firmament seemed to meet represented an enlarged horizon.

Anaximenes, a pupil of Anaximander, was the first to reject the view that the earth was a circular plane, but held it to be an oblong rectangle, buoyed up in the midst of the heavens by the compressed air upon which it rested. Circular maps, however, remained in the popular favour long after their erroneousness had been recognized by the learned.

Even Hecataeus of Miletus (549-472 B.C.), the author of a Periodos or description of the earth, of whom Herodotus borrowed the terse saying that Egypt was the gift of the Nile, retained this circular shape and circumfluent ocean when producing his map of the world, although he had at his

disposal the results of the voyage of Scylax of Caryanda from the Indus to the Red Sea, of Darius' campaign in Scythia (513), the information to be gathered among the merchants from all parts of the world who frequented an emporium like Miletus, and what he had learned in the course of his own extensive travels. Hecataeus was probably the author of the " bronze tablets upon which was engraved the whole circuit of the earth, the sea and rivers " (Herod, v. 49), which Aristagoras, the tyrant of Miletus, showed to Cleomenes, the king of Sparta, in 504, whose aid he sought in vain in a proposed revolt against Darius, which resulted disastrously in 494 in the destruction of Miletus. The map of the world brought upon the stage in Aristophanes' comedy of The Clouds (423 B.C.), whereon a disciple of the Sophists points out upon it the position of Athens and of other places known to the audience, was probably of the popular circular type, which Herodotus (iv. 36) not many years before had derided and which was discarded by Greek cartographers ever after. Thus Democritus of Abdera (b. c. 450, d. after 360), the great philosopher and founder, with Leucippus, of the atomic theory, was also the author of a map of the inhabited world which he supposed to be half as long again from west to east, as it was broad.

Dicaearcus of Messana in Sicily, a pupil of Aristotle (326-296 B.C.), is the author of a topographical account of Hellas, with maps, of which only fragments are preserved; he is credited with having estimated the size of the earth, and, as far as known he was the first to draw a parallel across a map. 4 This parallel, or dividing line, called diaphragm (partition) by a commentator, extended due east from the Pillars of Hercules, through the Mediterranean, and along the Taurus and Imaus (Himalaya) to the eastern ocean. It divided the inhabited world, as then known, into a northern and a southern half. In compiling his map he was able to avail himself of the information obtained by the bemalists (surveyors who determined distances by pacing) who accompanied Alexander the Great on his campaigns; of the results of the voyage of Nearchus from the Indus to the Euphrates, and of the " Periplus " of Scylax of Caryanda, which described the coast from between India and the head of the Arabian Gulf. On the other hand he unwisely rejected the results of the observations for latitude made by Pytheas in 326 B.C. at his native town, Massilia, and during a subsequent voyage to northern Europe. In the end the map of Dicaearcus resembled that of Democritus.

Scientific geography profited largely from the labours of Eratosthenes qi Cyrene, whom Ptolemy Euergetes appointed

4 The gnomon was known to the Chinese in the 5th century B.C., and reached the Greeks (Anaximander) through Babylon. Pytheas, as far as known, was the first to utilize it for the determination of a latitude.

keeper of the famous library of Alexandria in 247 B.C., and died in that city in 195 B.C. He won fame as having been the first to determine the size of the earth by a scientific method. Having determined the difference of latitude between Alexandria and Syene which he erroneously believed to lie on the same meridian, and obtained the distance of those places from each other from the surveys made by Egyptian geometers, he concluded that a degree of the meridan measured 700 stadia. 1

Eratosthenes is the author of a treatise which deals systema- tically with the geographical knowledge of his time, but of which only fragments have been preserved by Strabo and others. This treatise was intended to illustrate and explain his map of the world. In this task he was much helped by the materials collected in his library. Among the travellers of whose informa- tion he was thus able to avail himself were Pytheas of Massilia, Patroclus, who had visited the Caspian (285-282 B.C.), Megas- thenes, who visited Palibothra on the Ganges, as ambassador of Seleucus Nicator (302-291 B.C.), Timosthenus of Rhodes, the commander of the fleet of Ptolemy Philadelphus (284-246 B.C.) who wrote a treatise " On harbours," and Philo, who visited Meroe on the upper Nile. His map formed a parallelogram measuring 75,800 stadia from Usisama (Ushant island) or Sacrum Promontorium in the west to the mouth of the Ganges and the land of the Coniaci (Comorin) in the east, and 46,000 stadia from Thule in the north to the supposed southern limit of Libya. Across it were drawn seven parallels, running through Meroe, Syene, Alexandria, Rhodes, Lysimachia on the Hellespont, the mouth of the Borysthenes and Thule, and these were crossed at right angles by seven meridians, drawn at irregular intervals, and passing through the Pillars of Hercules, Carthage, Alexandria, Thapsacus on the Euphrates, the Caspian gates, the mouth of the Indus and that of the Ganges. The position of all the places mentioned was supposed to have been determined by trustworthy authorities. The inhabited world thus delineated formed an island of irregular shape, surrounded on all sides by the ocean, the Erythrean Sea freely communi- cating with the western ocean. In his text Eratosthenes ignored the popular division of the world into Europe, Asia and Libya, and substituted for it a northern and southern division, divided by the parallel of Rhodes, each of which he subdivided into sphragides or plinthia — seals or plinths. The principles on which these divisions were made remain an enigma to the present day.

This map of Eratosthenes, notwithstanding its many errors, such as the

assumed connexion of the Caspian with a northern ocean and the supposition that Carthage, Sicily and Rome lay on the same meridian, enjoyed a high reputation in his day. Even Strabo (c. 30 3.c.) adopted its main features, but while he improved the European frontier, he rejected the valuable information secured by Pytheas and retained the connexion between the Caspian and the outer ocean. In the extreme east his information extended no further than that of Eratos- thenes, viz. to India and Taprobane (Ceylon) and the Sacae (Kirghiz).

Hipparchus, the famous astronomer, on the other hand, (c. 150 B.C.) proved a somewhat captious critic. He justly objected to the arbitrary network of the map of Eratosthenes. The parallels or climata" drawn through places, of which the longest day is of equal length and the decimation (distance) from the equator is the same, he maintained, ought to have been inserted at equal intervals, say of half an hour, and the meridians inserted on a like principle. In fact, he demanded*

that maps should be based upon a regular projection, several

1 If, with W. Dorpfeld, we assume an Attic stadium of 200 steps (500 ft.) to be equal to 164 metres, a degree of 700 stad. would be equal to 114,800 metres, its actual length according to modern measurement being 1 10,808 metres.

2 Climata based on the length of the longest day were introduced by Hippocrates (c. 400 B.C.). Zones similar to those already drawn out for the celestial sphere were first introduced by the Pythagoreans. Parmenides of Elea (544-430 B.C.) distinguishes five of these zones, viz. a torrid zone, between the tropics of summer and winter, which was uninhabitable on account of heat ; two frigid zones, uninhabitable on account of cold, and two intermediate temperate zones.

descriptions of which he had adopted for his star maps. He moreover accuses Eratosthenes, (whose determination of a degree he accepts without hesitation) with trusting too much to hypothesis in compiling his map instead of having recourse to latitudes and longitudes deduced by astronomical observa- tions. Such observations, however, were but rarely available at the time. A few latitudes had indeed been observed, but although Hipparchus had shown how longitudes could be determined by the observation of eclipses, this method was in reality not available for want of trustworthy time-keepers. The determination of an ocean surrounding the inhabited earth he declared to be based on a mere hypothesis and that it would be equally allowable to describe the Erythraea as a sea surrounded by land. Hipparchus is not known to have compiled a map himself.

About the same time Crates of Mallus (d. 145 B.C.) embodied the views of the Stoic school of philosophy in a globe which has become typical as one of the insignia of royalty. On this globe an equatorial and a meridional ocean divide our earth

Fig. 2. — The Globe of Crates of Mallus.

into four quarters, each inhabited, thus anticipating the discovery of North and South America and Australia. 3

The period between Eratosthenes and Marinus of Tyre was one of great political importance. Carthage had been destroyed (146 B.C.), Julius Caesar had carried on his campaign in Gaul (58-51 B.C.), Egypt had been occupied (30 B.C.), Britannia conquered (a.d. 41-79), and the Roman empire had attained its greatest extent and power under the emperor Trajan (a.d. 98- 117). But although military operations added to our knowledge of the world, scientific cartography was utterly neglected.

Among Greek works written during this period there are several which either give us an idea of the maps available at that time, or furnish information of direct service to the compiler of a map. Among the latter a Periplus or coastal guide of the Erythrean Sea, which clearly reveals the peninsular shape of India (a.d. 90) and Arrian's Periplus Ponti Euoxni (a.d. 131) which Festus Avienus translated into Latin. Among travellers Eudoxus of Cyzicus occupies a foremost rank, since, between 115-87 B.C. he visited India and the east coast of Africa, which subsequently he attempted in vain to circumnavigate by

3 Celestial globes were made much earlier than terrestrial ones. In the museum of Naples there is a celestial globe, 2 metres in diameter, supported upon the shoulders of an Atlas, which E. Heis, judging by the constellations engraved upon it (Atlas coelestis novus, Bonn, 1872) judges to date from the 4th century B.C. It may even be the work of Eudoxus (d. 386 B.C.) the famous astronomer. Aratus of Soli in Cilicia, in his poetical Prognostics of Stars and the World, refers to a globe in his possession. Archimedes, the famous mathematician, had a celestial globe of glass, in the centre of which was a small terrestrial globe. Hero of Alexandria (284-221 B.C.), the ingenious inventor of " Hero's Fountain," is believed to have possessed a similar apparatus. The celestial globe of Hipparchus still existed in the Alexandrian library in the time of Ptolemy, who himself refers to globes in his Almagest, as also in the Geography. Leontius, who wrote a book on the manufacture of globes i (first published at Basel in 1539), is identified by Fiorini with a 1 bishop of Neapolis (Cyprus) of the time of Constantine III.

1 (642-668).

6 3 6

MAP

[HISTORY

following the route of Hanno, along the west coast. Among geographers should be mentioned Posidonius (13-551), the head of the Stoic school of Rhodes, who is stated to be responsible for having reduced the length of a degree to 500 stadia; Artemidorus of Ephesus, whose " Geographumena " (c. 100 B.C.) are based upon his own travels and a study of itineraries, and above all, Strabo, who has already been referred to. Among historians who looked upon geography as an important aid in their work are numbered Polybius (c. 210-120 B.C.), Diodorus Siculus (c. 30 B.C.) and Agathachidus of Cnidus (c. 120 B.C.) to whom we are indebted for a valuable account of the Erythrean Sea and the adjoining parts of Arabia and Ethiopia. The Periegesis of Dionysius of Alexandria is a popular description of the world in hexameters, of no particular scientific value (c. a.d. 130). He as well as Artemidorus and others accepted a circular or ellipsoidal shape of the world and a circumfluent ocean; Strabo alone adhered to the scientific theories of Eratosthenes.

thus led to assume that the distance from the first meridian drawn through the Fortunate islands to Sera (mod. Si-ngan-fu), the capital of China, was equal to 2 2 5 , which Ptolemy reduced to 177°, but which in reality only amount to 126°. A like overestimate of the distances covering the march of Julius Maternus to Agisymba, which Marinus places 24° south of the equator, a latitude which Ptolemy reduces to 18°, but which is probably no farther south than lat. 12 N. The map of Marinus was accompanied by a list of places arranged according to latitude and longitude. It must have been much in demand, for three editions of it were prepared. Masudi (10th century) saw a copy of it and declared it to be superior to Ptolemy's map.

Ptolemy (q.v.) was the author of a Geography 1 (c. a.d. 150) in eight books. " Geography," in the sense in which he uses the term, signifies the delineation of the known world, in the shape of a map, while chorography carries out the same objects in fuller detail, with regard to a particular country. In Book I.

Fig. 3. — Ptolemy's Map.

The credit of having returned to the scientific principles innovated by Eratosthenes and Hipparchus is due to Marinus of Tyre (c. a.d. 120) which, though no longer occupying the pre- eminent position of former

times, was yet an emporium of no inconsiderable importance, having extensive connexions by sea and land. The map of Marinus and the descriptive accounts which accompanied it have perished, but we learn sufficient concerning them from Ptolemy to be able to appreciate their merits and demerits. Marinus was the first who laid down the position of places on a projection according to their latitude and longitude, but the projection used by him was of the rudest. Parallels and meridians were represented by straight lines intersecting each other at right angles, the relative proportions between degrees of longitude and latitude being retained only along the parallel of Rhodes. The distortion of the countries represented would thus increase with the distance, north and south, from this central parallel. The number of places whose position had been determined by astronomical observation was as yet very small, and the map had thus to be compiled mainly from itineraries furnished by travellers or the dead reckoning of seamen. The errors due to an exaggeration of distances were still further increased on account of his assuming a degree to be equal to 500 stadia, as determined by Posidonius, instead of accepting the 700 stadia of Eratosthenes. He was

he deals with the principles of mathematical geography, map projections, and sources of information with special reference

Fig. 4.

to his predecessor Marinus. Books II. to VII. form an index to the maps. They contain about 8000 names, with their

1 The oldest MS. of Ptolemy's Geography is found in the Vatopedi monastery of Mt Athos. It dates from the 12th or 13th century and was published by Victor Langlois in 1867. For the latest edition we are indebted to the late Carl Mfiller (Paris, 1883-1906) to whom we are likewise indebted for an edition of the Geographi graeci minores (1855-1861).

latitudes and longitudes, and with their aid it is possible to reconstruct the maps. These maps existed, as a matter of course, before such an index could be compiled, but it is doubtful whether the maps in our available manuscript, which are attri- buted to Agathodaemon, are copies of Ptolemy's originals or have been compiled, after their loss, from this index. Book VIII. gives further details with reference to the principal towns of each map, as to geographical position, length of day, climata, &c.

Ptolemy's great merit consists in having accepted the views of Hipparchus with respect to a projection suited for a map of the world. Of the two projections proposed by him one is a modified conical projection with curved parallels and straight meridians; in the second projection (see fig. 3) both parallels and meridians are curved. The correct relations in the length of degrees of latitude and longitude are maintained in the first case along the latitude of Thule and the equator, in the second along the parallel of Agisymba, the equator and the parallels of Meroe, Syene and Thule. Following Hipparchus he divided the equator into 360 drawing his prime meridian through the Fortunate Islands (Canaries). The 26 special maps are drawn on a rectangular projection. As a map compiler Ptolemy does not take a high rank. In the main he copied Marinus whose work he revised and supplemented in some points, but he failed to realize the peninsular shape of India, erroneously exaggerated the size of Taprobane (Ceylon), and suggested that the Indian Ocean had no connexion with the western ocean, but formed Mare Clausum. Ptolemy knew but of a few latitudes which had been determined by actual observation, while of three longitudes resulting from simultaneous observation of eclipses he unfor- tunately accepted the least satisfactory, namely, that which placed Arbela 45 to the east of Carthage, while the actual meridian distance only amounts to 34 . An even graver source of error was Ptolemy's acceptance of a degree of 500 instead of 700 Stadia. The extent to which the more correct proportion would have affected the delineation of the Mediterranean is illustrated by fig. 4. But in spite of his errors the scientific method pursued by Ptolemy was correct, and though he was neglected by the Romans and during the middle ages, once he had become known, in the 15th century, he became the teacher of the modern world.

Map-Making among the Romans. — We learn from Cicero, Vitruvius, Seneca, Suetonius, Pliny and others, that the Romans had both general and topographical maps. Thus, Varro (De ruslici) mentions a map of Italy engraved on marble, in the temple of Tellus, Pliny, a map of the seat of war in Armenia, of the time of the emperor Nero, and the more famous map of the Roman Empire which was ordered to be prepared for Julius Caesar (44 B.C.), but only completed in the reign of Augustus, who placed a copy of it, engraved in marble, in the Porticus of his sˆter Octavia (7 B.C.). M. Vipsanius Agrippa, the son-in-law of Augustus (d. 12 B.C.), who superintended the completion of this famous map, also wrote a commentary illustrating it, quotations from which of Ammianus Marcellinus of Antioch (d. 330), Pliny and others, afford the only means of judging of its character. The map is supposed to be based upon actual surveys or rather reconnaissances, and if it be borne in mind that the Roman Empire at that time was traversed in all directions by roads furnished with mile-stones, that the Agrimensores employed upon such a

duty were skilled surveyors, and that the official reports of the commanders of military expeditions and of provincial governors were available, this map, as well as the provincial maps upon which it was based, must have been a work of superior excellence, the loss of which is much to be regretted. A copy of it may possibly have been utilized by Marinus and Ptolemy in their compilations. The Romans have been re- proached for having neglected the scientific methods of map- making advocated by Hipparchus. Their maps, however, seem to have met the practical requirements of political administration and of military undertakings.

Only two specimens ot Roman cartography have come down to us, viz. parts of a plan of Rome, of the time of the emperor

Septimius Severus (a.d. 193-21 1), now in the Museo Capitolino, and an itinerarium scriptum, or road map of the world, com- pressed within a strip 745 mm. in length and 34 mm. broad. Of its character the reduced copy of one of its 12 sections (fig. 5) conveys an idea. The map, apparently of the 3rd century, was copied by a monk at Colmar, in 1265, who fortunately contented himself with adding a few scriptural names, and having been acquired by the learned Conrad Peutingerof

Fig. 5. — A Section of Peutinger's Tabula.

Emery VolKer sc.

Augsburg it became known as Tabula peutingeriana. The original is now in the imperial library of Vienna. 1

Map-Making in the Middle Ages. — In scientific matters the early middle ages were marked by stagnation and retrogression. The fathers of the church did not encourage scientific pursuits, which Lactantius (4th century) declared to be unprofitable. The doctrine of the sphericity of the earth was still held by the more learned, but the heads of the church held it to be unscriptural. Pope Zachary, when in 741 he condemned the views of Virgilius, the learned bishop of Salzburg, an Irishman who had been denounced as a heretic by St Boniface, declares it to be perversa et iniqua doctrina. Even after Gerbert of Aurillac, better known as Pope Sylvester II. (999-1063), Adam of Bremen (1075), Albertus Magnus (d. 1286), Roger Bacon (d. 1294), and indeed all men of leading had accepted as a fact and not a mere hypo- thesis the geocentric system of the universe and sphericity of the globe, the authors of maps of the world, nearly all of whom were monks, still looked in the main to the Holy Scriptures for guidance in outlining the inhabited world. We have to deal thus with three types of these early maps, viz. an oblong rectangular, a circular and an oval type, the latter being either

The Earth beyond the Ocean where men dwelt before the Flood

Fig. 6. — The World according to Cosmas Indicopleustes (535).

a compromise between the two former, or an artistic development of the circular type. In every instance the inhabited world is surrounded by the ocean. The authors of rectangular maps look upon the Tabernacle as an image of the world at large, and believe that such expressions as the " four corners of the earth " (Isa. x. 12), could be reconciled only with a rectangular world. On the other hand there was the expression " circuit of the earth " (Isa. xl. 22), and the statement (Ezek. v. 5) that " God had set Jerusalem in the midst of the nations and countries." In

1 Facsimiles of it have been published by Desjardins(l869-i87i), by K. Miller (1886), who ascribes it to Castorius, a.d. 366, and by others.

nearly every case the East occupies the top of the map. Neither parallels nor meridians are indicated, nor is there a scale. Other features frequently met with are the Paradise in the Far East, miniatures of towns, plants, animals, human beings and monsters^ and an indication of the twelve winds around the margin.

The oldest rectangular map of the world is contained in a most valuable work written by Cosmas, an Alexandrian monk,

surnamed Indicopleustes, after returning from a voyage to India (535 a.d.), and entitled Christian Topography. Accor- ding to Cosmas (fig. 6) the inhabited earth has the shape of an oblong rectangle sur- rounded by an ocean which breaks in in four great gulfs — the Roman or Mediterranean, the Arabian, Persian and Caspian Sea. Beyond this ocean lies another world, which was occupied by man before Fig. 7.— Map of Albi (8th century), the Deluge, and within which

Cosmas placed the Terrestrial Paradise. Above this rise the walls of the heavens like unto the tent of the Tabernacle. Far more simple is a small map of the world of the 8th century found in a codex in the library of Albi, an archiepiscopal seat in the department of Tarn. Its scanty nomenclature is almost wholly derived from the " Historiae adversum paganos " of Paulus Orosius (418). Far greater interest attaches to the so-called Anglo-Saxon Map of the World in the British Museum (Cotton MSS.), where it is

bound up in a codex which also contains a copy of the Periegesis of Priscianus. Map and Periegesis are

Fig. 8. — Anglo-Saxon Map of the World (9th century), copies by the same hand, but no other connexion exists between them. More than half the nomenclature of the map is derived from Orosius, an annotated Anglo-Saxon version of which had been produced by King Alfred (871-901). The Anglo-Saxons of the time were of course well acquainted with Island (first thus named in 870) Slesvic and Norweci (Norway), and there is no need to have recourse to Adam of Bremen (1076) to account

for their presence upon this map. The broad features of the map were derived no doubt from an older document which may likewise have served as the basis for the map of the world engraved on silver for Charlemagne, and was also consulted by the compilers of the Hereford and Ebstorf maps (see fig. 11).

Oriens.

Meri- dies.

Occidens. Fig. 9. — T map from Isidor of Seville's Origines.

The map or diagram of which Leonardo Dati in his poem on the Sphere (Delia Spera) wrote in 1422 " un T dentre a uno O mostra il disegno " (a T within an O shows the design) is one of the most persistent types among the circular or wheel maps of the world. It perpetuates the tripartite division of the world by the ancient Greeks and survives in the Royal Orb. A diagram of this description will be found in Isidor of Seville's Origines (630), see fig. 9.

T maps of more elaborate design illustrate the MS. copies of Sallust's Bellum jugurthinum; one of these taken from a codex of the nth century in the Leipzig town library is shown in fig. 10.

The outlines of several medieval maps resemble each other to such an extent that there can be no doubt that they are derived from the same original source. This source by some

Fig. 10-

-Map illustrating Sallust's Bellum jugurthinum (nth century, Leipzig).

authors is assumed to have been the official map of the Roman Empire, but if we compare the crude outline given toT;he Mediterranean with the more correct delineation of Ptolemy, who was certainly in a position to avail

himself of these official sources, such an assumption is untenable. The earliest delinea- tion of the description has already been referred to as the Anglo- Saxon map of the world. Next in the order of age, follows the oval map which Henry, canon of Mayence Cathedral, dedicated to Mathilda, consort of the emperor Henry V. (11 10). Of far greater importance is the map seen in Hereford Cathedral. It is the work of Richard of Haldingham, and has a diameter of 134 cm. (53ms.). The" survey "ordered by Julius Caesar is referred to in the legend, evidently derived from the Cosmography of

Aethicus a work widely read at the time, but this does not prove that the author was able to avail himself of a map based upon that survey. A map essentially identical with that of Hereford, but larger — its diameter is 156 cm. (6 in.), and consequently

Fig. 11. — The Hereford Map {c. 1280).

fuller of information — was discovered in 1830 in the old monas- tery of Ebstorf in Hanover. Its date is 1484. Both maps abound in miniature pictures of towns, animals, fabulous beings and other subjects. The Hereford map is surmounted by a picture of the Day of Judgment. Similar in design, though much smaller of scale and oval in form, are the maps which illustrate the popular Polychronicon of Ranulf Higden, a monk of St Werburgh's Abbey of Chester (d. 1363).

s gyAT U5 LlVAN ENgˆ

Fig. 12. — The Map of Beatus (776).

Pomponius Mela tells us that beyond the Ethiopian Ocean which sweeps round Africa in the south and the uninhabitable torrid zone, there lies an alter orbis, or fourth part of the world inhabited by Antichthones. On a diagram illustrating the origines of Isidore of Seville (d. 636) this country is shown, but is described as a terra inhabitabilis. It is shown likewise upon a number of maps which illustrate the Commentaries on the Apocalypse, by Beatus, a Benedictine monk of the abbey of Vaicavado at the foot of the hills of Liebana in Asturia (776).

Our little map (fig. 12) is taken from a copy of Beatus' work made in 1 203, and preserved at Burgo de Osma in Castille. Similar maps illustrating

the Commentaries exist at St Sever (1050), Paris (1203), and Tunis; others are rectangular, the oldest being in Lord Ashburnham's library (970). Beatus, too, describes the southern land as inhabitabilis. The habitable world is divided among the twelve apostles, whose portraits are given. On the maps illustrating the encyclopaedic Liber floridus by Lambert,

Fig. 13.

a canon of St Omer (11 20), this south land " unknown to the sons of Adam," is stated to be inhabited " according to the philosophers " by Antipodes. Lambert, indeed, seems to have believed in the sphericity of the earth. Fig. 13 shows his map of the world reduced from a MS. at Wolfenbiittel, to which is added a diagram of the zones from a MS. at Ghent, which illustrates Macrobius' commentary on Cicero's Somnium Scipionis. Dia- grams illustrating the division of the world into climata, are to be found in the opus majus of Roger Bacon (d. 1294) and in Cardinal Pierre d'Ailly's De imagine Mundi (1410).

Among countries represented on a larger scale on maps, Palestine not unnaturally occupies a prominent place in this age of pilgrimages and crusades (1095-1291). The maps which accompany St Jerome's translation of the Onomasticon of St Eusebius (388) . The same subject is illustrated by a picture-map in mosaic, portions of which were discovered in 1896 on the floor of the church of Madaba to the east of the Dead Sea. This is the oldest original of a map in existence, for it dates back to the 6th century. Among more recent maps of Palestine, that by Petrus Vesconte (1320) is greatly superior to the earlier maps. It illustrates Marino Sanuto's Secreta fidelium crucis, in which its author vainly appeals to Christendom to undertake another crusade. One of the earliest plans of Jerusalem is contained in Gesta Francorum, a history of the Crusades up to 1106, based upon information furnished by Fulcherius of Chartres (c. 1109).

There existed, no doubt, special maps of European countries, but the only documents of that description are two maps of Great Britain, the one of the 12th century, the other by Matthew of Paris, the famous historiographer of the monastery of St Albans

(1236-1259). 1

Celestial globes were known in the time of Bede; they formed part of the educational apparatus of the monastic schools. Gerbert of Aurillac is known to have made such globes (929). Their manufac- ture is described by Alphonso the Wise (1252), as also in De sphaera solida of G. Campanus of Novara (1303). Terrestrial globes, how- ever, are not

referred to.

Map-making among the Arabians and other Nations of the East. — • Bagdad early became a famous seat of learning. Indian astrono- mers found apt pupils there among the Arabs; the works of

1 R. Gough, British Topography (London 1768). His " Histories " are published in Rerum brit. scriptores XL. and L VI 1 . 1 866-1 869.

Fig. 14.

AUSIltR

—Matthew of Paris

(1 236-1 2 59).

Ptolemy were translated into Arabic, and in 827, in the reign of the caliph Abdullah al Mamun, an arc of the meridian was measured in the plain of Mesopotamia. Most famous among these Arabian astronomers were Al Batani (d. 998), Ibn Yunis of Cairo (d. 1008), Zarkala (Azarchel), who determined the meridian distance between his observatory in Toledo and Bagdad to amount to 51° 30', an error of 3 only, as compared with Ptolemy's error of 18 , and Abul Hassan (1230) who reduced the great axis of the Mediterranean to 44 .

Further materials serviceable to the compilers of maps were supplied by numerous Arabian travellers and geographers, among

Fig. 15. — Idrisi (1154).

whom Masudi (915-940), Istakhri (950), Ibn Haukal (942- 970), Al Biruni (d. 1038), Ibn Batuta (1325-1356) and Abul Feda (1331-1370), occupy a foremost place, yet the few maps which have reached us are crude in the extreme. Masudi, who saw the maps in the Horismos or Rasm el Ard, a description of

which was engraved for King Roger of Sicily upon a silver plate, or the rectangular map in 70 sheets which accompanies his geography (Nushat-ul Mushtat) take rank with Ptolemy's work. These maps are based upon information collected during many years at the instance of King Roger. The seven climates adopted by Idrisi are erroneously supposed to be equal in latitu- dinal extent. The Mediterranean occupies nearly half the inhabited world in longitude, and the east coast of Africa is shown as if it extended due east.

The Arabians are not known to have produced a terrestrial globe, but several of their celestial globes are to be found in our collections. The oldest of these globes was made at Valentia, and is now in the museum of Florence. Another globe (of 1225) is at Velletri; a third by Ibn Hula of Mosul (1275) is the property of the Royal Asiatic Society of London; a fourth (1289) from the observatory of Maragha, in the Dresden Museum, two globes of uncertain age at Paris (see fig. 17) and another in London. All these globes are of metal (bronze), or they might not have survived so many years.

The charts in use of the medieval navigators of the Indian Ocean — Arabs, Persians or Dravidas — were equal in value if not superior to the charts of the Mediterranean. Marco Polo mentions such charts; Vasco da Gama (1498) found them in the hands of his Indian pilot, and their nature is fully explained in the Mohit or encyclopaedia of the sea compiled from ancient sources by the Turkish admiral Sidi Ali Ben Hosein in 1554. 1 These charts are covered with a close network of lines intersecting each other at right angles. The horizontal lines are parallels, depending upon the altitude of the pole star, the Calves of the Little Bear and the Barrow of the Great Bear above the horizon. This altitude was expressed in isbas or inches each equivalent to i° 42′ 50". Each isba was divided into zatns or eights. The interval between two parallels thus only amounted to 12′ 51". These intervals were mistaken by the Portuguese occasionally for degrees, which account for Malacca, which is in lat. 2′ 13″ N., being placed on

Cantino's Chart (1502) in lat. 14′ S. It may have been a map of this kind which accounts for Ptolemy's moderate exaggerations of the size of Taprobana (Ceylon). A first meridian, separating a leeward from a windward region, oassed through Ras Kumhari (Comorin) and was thus nearly identical with the first meridian of the Indian astronomers which passed through the sacred city of Ujjain (Ozere of Ptolemy) or the meridian of Azin of the Arabs. Additional meridians

Fig. 16. — Idrisi (1154).

Emefy Wa.kcr v

the world by Abu Jafar Mahommed ben Musa of Khiva, the librarian of the caliph el Mamun (833), declares them to be superior to the maps of Ptolemy or Marinus, but maps of a later date by Istakhri (950) or Ibn al Wardi (1349) are certainly of a most rudimentary type. Nor can Idrisi's map of the world,

were drawn at intervals of zam ■■$, supposed to be equal to three hours' sail.

In China, maps in the olden time were engraved on bronze

1 M. Bittner, Die topogr. Capital des ind. Seespiegels (Vienna,

1897).

or stone, but after the 10th century they were printed from wood-blocks. Among the more important productions of more recent times, may be mentioned a map of the empire, said to be based upon actual surveys by Yhang (721), who also manufactured

Fig. 17. — Globe in Bibliotheque Nationale, Paris

a celestial globe (an older globe by Ho-shing-tien, 4 metres in circumference was produced in 450), and an atlas of the empire on a large scale by Thu-sie-pun (1311-1312) of which new enlarged editions with many maps were published in the 16th century and 1799. None of these maps was graduated, which is all the

Fig. 18. — The Indian Ocean according to Mohit, as interpreted by Dr

Tomaschek.

more surprising as the Chinese astronomers are credited with having made use of the gnomon as early as 1000 B.C. for deter- mining latitudes.

In the case of Japan, the earliest reference to a map is of 646, in which year the emperor ordered surveys of certain provinces to be made.

Portolano Maps. — During the long period of stagnation in cartography, which we have already dealt with, there survived among the seamen of the Mediterranean charts of remarkable accuracy, illustrating the Portolani or sailing directories in use among them. Charts of this description are first mentioned in connexion with the Crusade of Louis XI. in 1270, but they originated long before that time, and in the eastern part of the xvii. 21

Mediterranean they embody materials available even in the days before Ptolemy, while the correct delineation of the west seems to be of a later date, and may have been due to Catalan seamen. These charts are based upon estimated bearings and distances between the principal ports or capes, the intervening coast-line being filled in from more detailed surveys. The bearings were

||&\i

lr

32%co<ˆ <

7ˆ-3§H

“XJvA

im-.

/ /i\ nVvv

‘ ittglU 4 ‘ ‘ ‘ ‘ it, ‘ ‘■’ ‘ >J

Fig. 19. — The Eastern Mediterranean, by Petrus Vesconte (1311).

dependent upon the seaman’s observation of the heavens, for these charts were in use long before the compass had been introduced on board ship (as early as 1205, according to Guiot de Provins) although it became fully serviceable only after the needle had been attached to the compass card, an improvement pro- bably introduced by Flavio Gioja of Amalfi in the beginning of

“C7

A.DULCETI

1339

Fig. 20. — The Mediterranean.

a. According to A. Dulceti, 1339, and

b, On Mercator’s projection, according to modern maps.

the 14th century. The compass may of course have been used for improving these charts, but they originated without its aid, and it is therefore misleading to describe them as Compass or Loxodromic charts, and they are now known as Portolano charts.

II

642

MAP

[HISTORY

None of these charts is graduated, and the horizontal and vertical lines which cross many of them represent neither parallels nor meridians. Their most characteristic feature, and

Ponente

Fig. 21. — Map illustrating Marino Sanuto’s Liber secretorum fidelium crucis.

one by which they can most readily be recognized, is presented by groups or systems of rhumb-lines, each group of these lines radiating from a common centre, the ‘central group being generally encircled by eight or sixteen satel- lite groups. In the course of time the centres of radiation of all these groups had imposed upon them ornate rose dei venti, or windroses, such as may still be seen upon our compass-cards. Each chart was fur- nished with a scale of miles. These miles, however, were not the ordi- nary Roman miles of 1000 paces or 5000 ft., but smaller miles of Greek or Oriental origin, of which six were equal to five Roman miles, and as the latter were equal to 1480 metres, the Portolano miles had a length of only 1233 metres, and 75-2 of the former, and 90-3 of the latter were equal to a degree. The difference between these miles ‘ was known, however, only to the more learned among the map-makers, and when the charts were

extended to the Atlantic seaboard the two were assumed to be identical.

On these old charts the Mediter- ranean is delineated with surprising fidelity. The meridian distance be- tween the Straits of Gibraltar and Beirut in Syria amounts upon them to about 3000 Portolano miles, equal in lat. 36 N. to 40-9°, as compared with an actual difference of 41-2°, and a difference of 61° assumed by Ptolemy. There exists, however, a serious error of orientation, due, ac- cording to Professor H. Wagner, to the inexperience of the cartographers

who first combined the charts of the separate basins of the Mediterranean so as to produce a chart of the whole. This accounts for Gibraltar and Alexandria being shown as lying due east and west of each other, although there is a difference of 5° of latitude between them, a fact known long before Ptolemy.

The production of these charts employed numerous licensed draughtsmen in the principal seaports of Italy and Catalonia, and among seamen these MS. charts remained popular long after the productions of the printing-press had become available. The oldest of these maps which have been preserved, the so- called " Pisan chart," which belongs probably to the middle of the 13th century, and a set of eight charts, known by the name of its former owner, the Cavaliere Tamar Luxoro, of somewhat later date, are both the work of Genoese artists. Among more eminent Genoese cartographers are Joannes da Carignano (d. 1344), Petrus Vesconte, who worked in 1311 and 1327, and is the draughtsman of the maps illustrating Marino Sanuto's Liber secretorum fidelium crucis, which was to have roused Chris- tendom to engage in another crusade (figs. 19 and 21) Battista Beccario (1426, 1435) ar >d Bartolomeo Pareto (1455). Venice ranks next to Genoa as a centre of cartographic activity. Asso- ciated with it are Francesco Pizigano (1367-1373), Francesco de Cesanis (1421), Giacomo Giroldi (1422-1446), Andrea Bianco (1436-1448) Giovanni Leardo (1442-1452), Alvise Cadamosto, who was associated with the Portuguese explorers on the west coast of Africa (1454-1456) and whose Portolano was printed at Venice in 1490, and Fra Mauro (1457).

Associated with Ancona are Grazioso Benincasa and his son Andreas, whose numerous charts were produced between 146 1 and 1508, and Count Ortomano Freducci (1497-1538).

The earliest among Majorcan and Catalonian cartographers is Angelino Dulcert (1325-1339) whom A. Managhi claims as a Genoese, whose true name according to him was Angelino Dalorto.

Fig. 22. — Fra Mauro (1457).

Other Catalans are Jahuda Cresques, a Jew of Barcelona, the supposed author of the famous Catalan map of the world (1375), Guglielmo Solerio (1384), Mecia de Viladestes (1413-1433) Gabriel de Valleseche (1430-1447) and Pietro Roselli, a pupil of Beccario of Genoa (1462).

These maps were originally intended for the use of seamen navigating the Mediterranean and the coasts of the Atlantic, but in the course of time they were extended to the mainland and ultimately developed into maps of the whole world as then known. Thus Pizigano's map of 1367 extends as far east as the Gulf of Persia, whilst the Medicean map of 1356 (at Florence) is remarkable on account of a fairly correct delineation of the Caspian, the Shari river in Africa, and the correct direction given to the west coast of India, which had already been pointed out in a letter of the friar Giovanni da Montecorvino of 1252. Most of the expansions of Portolano maps into maps of the world are circular in shape, and resemble the wheel maps of an earlier period. This is the character of the map of Petrus Vesconte of 1320 (fig. 21), of Giovanni Leardo (1448) and of a Catalan map of 1450. Jerusalem occupies the centre of these maps, Arab sources of information are largely drawn upon, while Ptolemy is neglected and con- temporary travellers are ignored. Far superior to these maps is Fra Mauro's map (1457), for the author has availed himself not only of the information collected by Marco Polo and earlier travellers, but "was able, by personal intercourse, to gather additional information from Nicolo de' Conti, who had returned from the east in 1440, and more espe- cially from Abyssinians who lived in Italy at that time. His delineation of Abyssinia, though unduly spread over a wide area, is indeed wonderfully correct.

Very different in character is the Catalan map of 1375, f° r i ts author, discarding Ptolemy, shows India as a peninsula. On

Portolano miles, equivalent in 36 N. to 41 , then the longitudinal extent of the old world as measured on the Genoese map of 1457 would be 136 instead of 177 or more as given by Ptolemy.

Fig. 23. — Catalan Map of the World (1375).

the other hand, an anonymous Genoese would-be reformer of maps (1457; fig. 24), still adheres to the erroneous Ptolemaic

ti*et cit ven Cotmagnphoflitii fcbrfno «ccordatt ducrtptlo quttUle frlvolli

Genoese Map (1457).

delineation of southern Asia, and the same error is perpetuated by Henricus Marvellus Germanus on a rough map showing the Portuguese discoveries up to 1489. None of these maps is graduated, but if we give the Mediterranean a length of 3000

Fig. 25. — Claudius Clavus Swartha (1427).

The Revival of Ptolemy. — Ptolemy's great work became known in western Europe after Jacobus Angelus de Scarparia had translated it into Latin in 1410. This version was first printed in 1475 at Vicenza, but its contents had become known through MS. copies before this, and their study influenced the construction of maps in two respects. They led firstly to the addition of degree lines to maps, and secondly to the compilation of new maps of those countries which had been inadequately represented by Ptolemy. Thus Claudius Clavus Swartha (Niger), who was at Rome in 1424, compiled a map of the world, extending westward as far as Greenland. The learned Cardinal Nicolaus Krebs, of Cusa (Cues) on the Moselle, who died 1464, drew a map of Ger- many which was first published in 1491; D. Nicolaus Germanus, a monk of Reichenbach, in 1466 prepared a set of Ptolemy's maps on a new projection with converging meridians; and Paolo del Pozzo Toscanelli in 1474 compiled a new chart on a rect- angular projection, which was to guide the explorer across the western ocean to Cathay and India.

Of the seven editions of Ptolemy which were published up to the close of the 15th century, all except that of Vicenza (1475) contained Ptolemy's 27 maps, while Francesco Berlinghieri's version (Florence 1478), and two editions published at Ulm (1482 and i486), contained four or five modern maps in addition, those of Ulm being by Nicolaus Germanus.

The geographical ideas which prevailed at the time Columbus started in search of Cathay may be most readily gathered from two contemporary globes, the one known as the Laon globe because it was picked up in i860 at a curiosity shop in that town, the other produced at Nuremberg in 1492 by Martin Behaim. 1 The Laon globe is of copper gilt, and has a diameter of 170 mm. The information which it furnishes, in spite of a legend intended to lead us to believe that it presents us with the results of Portu- guese explorations up to the year 1493, is of more ancient date. The Nuremberg globe is a work of a more ambitious order. It was undertaken at the suggestion of George Holzschuher, a travelled member of the town council. The work was entrusted to Martin Behaim, who had resided for six

years in Portugal and the Azores, and was believed to be a thoroughly qualified cosmographer.

1 E. G. Ravenstein, Martin Behaim, his Life and his Globe (London, 1908). On the original only equator, ecliptics, tropics, polar circles and one meridian 8o° to the west of Lisbon are laid down.

The globe is of pasteboard covered with whiting and parch- ment, and has a diameter of 507 mm. The author followed Ptolemy not only in Asia, but also in the Mediterranean. He did not avail himself of the materials available in his day. Not even the coasts of western Africa are laid down correctly, although the author claimed to have taken part in one of the Portuguese expeditions. The ocean separating Europe from

he was dependent upon dead reckoning, for although various methods for determining a longitude were known, the available astronomical ephemerides were not trustworthy, and errors of 30° in longitude were by no means rare. It was only after the publication of Kepler's Rudolphint Table (1626) that more exact results could be obtained. A further difficulty arose in connexion with the variation of the compass, which induced Pedro Reinel

Fig. 26.

Asia is assumed as being only 126° wide, in accordance with Toscanelli's ideas of 1474. Very inadequate use has been made of the travels of Marco Polo, Nicolo de' Conti, and of others in the east. 1 On the other hand, the globe is made gay with flags and other decorations, the work of George Glockendon, a well-known illuminator of the time.

The maritime discoveries and surveys of that age of great discoveries were laid down upon so-called " plane-charts," that is, charts having merely equidistant parallels indicated upon them, together with the equator, the tropics and polar

Fig. 27.

circles, or, in a more advanced stage, meridians also. The astro- labe quadrant or cross-staff enabled the mariner to determine his latitude with a certain amount of accuracy, but for his longitude

1 See fig. 23, Catalan Map of the World (1375).

to introduce two scales of latitude on his map of the northern Atlantic (1504; fig. 27).' •

The chart of the world by Juan de la Cosa, the companion ol Columbus, is the earliest extant which depicts the discoveries in the new world (1500), Nicolaus de Canerio, a Genoese, and the map which Alberto Cantino caused to be drawn at Lisbon for Hercules d'Este of Ferrara (1502), illustrating in addition the recent discoveries of the Portuguese in the East. Other cosmo- graphers of distinction were Pedro Reinel (1504-1542), Nuno Garcia de Toreno (1520), to whom we are indebted for 21 charts, illustrating Magellan's voyage, Diogo Ribero (maps of the world 1527, 1529), 2 Alonzo de Santa Cruz, of Seville, whose Isolario general includes charts of all parts of the world (1541), John Rotz or Rut (1542), Sebastian Cabot (1544), as also Nicolas Desliens, Pierre Desceliers, G. Breton and V. Vallard, all of Arques, near Dieppe, whose charts were compiled between 1541 and 1554.

Of the many general maps of the world or of particular countries, a large number illustrate such works as G. Reisch's Margarita philosophica (1163), the cosmographies of Peter Apianus or Bienewitz (1520, 1522, 1530), Seb. Minister (1544), J. Honter (1546) and Guliclmus Postel (1 561) or the Geographic of Livio Sanuto (1588); others, and these the more numerous and important, supplement the original maps of several editions of Ptolemy. Thus the Roman edition of 1507, edited by Marcus Benaventura and Joa Cota, contains 6 modern maps, and to these was added in 1508 Joh. Ruysch's famous map of the world on a modified conical projection. The next edition published at Venice in 1511 contained a heart-shaped world by Bernhard Sylvanus. The Strassburg Ptolemy of 15 13 has a supplement of as many as 20 modern maps by Martin Waldseemtiller or Ilacomilus, several among which are copied from Portuguese originals. Waldseemuller was one of the most distinguished cartographers of his day. He was born at Radolfzell in Baden in 1470, was associated with Ringmann at the gymnasium of

2 J. G. Kohl published facsimiles of the American section of the maps (Weimar, i860).

St Die, and died in 1 5 2 1 . He published in 1 507 a huge map of the

world, in 1 2 sheets, together with a small globe of a diameter of 1 10 mm., the segments for which were printed from wood-blocks. On these documents the new world is called America, .after Amerigo Vespucci, its supposed discoverer. In 1511 Waldsee- müller published a large map of Europe, in 1513 he prepared his maps for the Strassburg edition of Ptolemy, and in 1516 he engraved a copy of Canerio's map of the world. The Strassburg Ptolemy of 1522 contains Waldseemuller's maps, 1 edited on a reduced scale by Laurentius Frisius, together with three addi- tional ones. The same set of maps is reprinted in the Strassburg edition of 1524, newly translated by W. Pirckheimer with notes by Joh. Muller Regiomontanus, and in the Lyon edition of 1535, edited by Michael Servetus. The new maps of the Basel edition of 1540, twenty-one in number, are by Sebastian Munster; Jacob Gastaldo supplied the Venice edition of 1548 with 34 modern maps, and these with a few additions are repeated in Girolamo Ruscelli's Italian translation of Ptolemy published at Venice in 1561.

Equally interesting with these Ptolemaic supplements are collections like that of Anton Lafreri, which contains reprints of 142 maps of all parts of the world originally published between 1556 and 1572 (Geografica tavole moderne, Rome, n.d.), or that of J. F. Camocio, published at Venice in 1576, which contains 88 reprints.

The number of cartographers throughout Europe was consider- able, and we confine ourselves to mentioning a few leading men. Among them Germany is then represented by G. Glockedon, the author of an interesting road-map of central Europe (1501), Sebastian Munster (1480-1552), Elias Camerarius, whose map of the mark of Brandenburg won the praise of Mercator; Wolf- gang Latz von Lazius, to whom we are indebted for maps of Austria and Hungary (1561), and Philip Apianus, who made a survey of Bavaria (1553-1563), which was published 1568 on the reduced scale of 1 : 144,000, and is fairly described as the topographical masterpiece of the 16th century. For maps of Switzerland we are indebted to Konrad Ttirst (1495-1497), Johann Stumpf (1548) and Aegidius Tschudi (1538). A map of the Netherlands from actual survey was produced by Jacob of Deventer (1536-1539). Leonardo da Vinci, the famous artist, while in the service of Cesare Borgia as military engineer, made surveys of several districts in central Italy. Other Italian car- tographers of merit were Giovanni Battiste Agnese of Venice, whose atlases (15 17-1564) enjoyed a wide popularity; Benedetto Bordone (1528) ; Giacomo Gastaldo, cosmographerof the Venetian Republic (1 534-1 568), and his successor, Paolo Forlani. New maps of Spain and Portugal appeared in 1 560, the former being due to Pedro de Medina, the latter to Fernando Alvarez Secco and Hernando Alvaro. Among the French map- makers of this period may be mentioned Oronce Finee (Finaeus), who in

1525 published a map of France, and Jean Jolivet (c. 1560). Gregorio Lilly (1546) and Humphrey Lhuyd of Denbigh (d. 15 10) furnished maps of the British Isles, Olaus Magnus (1539) of Scandinavia, Anton Wied (1542), Sigismund von Herberstein (1549) and Anthony Jenkinson (1562) of Muscovy.

The cylindrical and modified conical projections of Marinus and Ptolemy were still widely used, the stereographical projection of Hipparchus, was for the first time employed for terrestrial maps in the 16th century, but new projections were introduced in addi- tion to these. The earliest of these, a trapeziform projection with equidistant parallels, by D. Nicolaus Germanus (1466), naturally led to what is generally known as Flamsteed's projection. Joh. Stabius (1502) and his pupil J. Werner (1514) devised three heart-shaped projections, one of which was equivalent. Petrus Apianus (1524) gave his map an elliptical shape. H. Glareanus (15 10) was the first to employ an equidistant zenithal polar projection.

No reasonable fault can be found with the marine surveyors of this period, but the scientific cartographers allowed themselves too frequently to be influenced by Ptolemaic traditions. Thus

1 Facsimiles of the maps of 1507 and 1 517 were published by J. Fischer and F. M. von Wieser (Innsbruck, 1903).

Gastaldo (1548) presents us with a map of Italy, which, except as to nomenclature, differs but little from that of Ptolemy, although on the Portolano charts the peninsula had long since assumed its correct shape. Many of the local maps, too, were excellent specimens of cartography, but when we follow any cartographer of the period into regions the successful delinea- tion of which depended upon an intelligent interpretation of itineraries, and of information collected by recent travellers, they are generally found to fail utterly. This is illustrated by the four sketch maps shown in fig. 28.

Fig. 28.

Columbus, trusting to Toscanelli's misleading chart, looked upon the countries discovered by him as belonging to eastern Asia, a view still shared about 1507 by his brother Bartolomeo. Waldseemiiller (1507) was the first to separate America and Asia by an ocean of] considerable width, but J. Ruysch (1508) returns to the old idea, and even joins Greenland (Gruenlant) to eastern Asia. Bologninus Zalterius on a map of 1566, and Mercator on his famous chart of 1569, separates the two continents by a narrow strait which they call Streto de Anian, thus anticipating the discovery of Bering Strait by more than a hundred and fifty years. Anian,

however, which they place upon the American coast, is no other than Marco Polo's Anica or Anin, our modern Annam. Such an error could never have arisen had the old compilers of maps taken the trouble to plan Marco Polo's routes.

Globes, both celestial and terrestrial, became popular after the discovery of America. They were included among the scientific apparatus of ships and of educational establishments. Columbus and Magellan had such globes, those of the latter produced by P. Reinel (1519), and Conrad Celtes tells us that he illustrated his lectures at the university of Vienna with the help of globes (1501). Globes were still engraved on copper, or painted by hand, but since 1507, in which year Waldseemiiller published a small globe of a diameter of no mm., covered with printed segments or gores, this cheap and expe- ditious method has come into general use. Waldseemiiller constructed his gores graphically, A. Dtirer (1525) and Hen. Loriti Glareanus (1527) were the first who dealt scientifically with the principles underlying their construction. Globes

covered with printed gores were produced by L. Boulenger (1514), Joh. Schoner (1515), P. Apianus, Gemma Frisius (1530) and G. Mercator (1541). Leonardo da Vinci's rough map of the world in 8 segments (c. 1513) seems likewise to have been in- tended for a globe. Of J. Schoner we know that he produced four globes, three printed from segments (1515, 1523, 1533), and

Fig. 29.

one. of larger size (diam. 822 mm.), which is drawn by hand, and is preserved in the Germanic Museum at Nuremberg. Among engraved globes, one of the most interesting is that which was discovered by R. M. Hunt in Paris, and is preserved in the Lenox Library, New York. Its diameter is only 4.5 in. (127 mm.). The so-called " Nancy globe " is of chased silver, richly ornamented,

the earliest works are a map of Palestine (1537), a map of the world on a double heart-shaped projection (1525); and a topo- graphical map of Flanders based upon his own surveys (1540), a pair of globes (1541, diam. 120 mm.), and a large map of Europe which has been praised deservedly for its accuracy (1554). He is best known by his marine chart (1569) and his atlas., The projection of the former may have been

suggested by a note by W. Pirkheimer in his edition of Ptolemy (1525). Mercator constructed it graphically, the mathematical principles under- lying it being first explained by E. Wright (1594). The "Atlas" was only published after Mercator's death, in 1595. It only con- tained nine maps, but after the plates had been sold to Jodocus (Jesse) Hondius the number of maps was rapidly increased, although Mercator's name was retained. Mercator's maps are carefully engraved on copper. Latin letters are used through- out; the miniatures of older maps are superseded by symbols, and in the better-known countries the maps are fairly correct, but they fail lamentably when we follow their author into regions — the successful delineation of which depends upon a critical combination of imperfect information.

Even before Mercator's death, Antwerp and Amsterdam had become great centres of cartographic activity, and they main- tained their pre-eminence until the beginning of the 18th century. Abraham Ortelius (1527-1592), of Antwerp, a man of culture and enterprise, but not a scientific cartographer, pub- lished the first edition of his Theatrum orbis terrarum in 157°. It then contained 53 maps, by various authors. By 1595 the number of maps had increased to 119, including a Parergon or supplement of 12 maps illustrating ancient history. In 1578 was published the Speculum orbis terrarum of Gerard de Jude or de Judaeis. Lucas Janszon Waghenaer (Aurigarius) of Enkhuizen published the first edition of his Spiegel der Zeevaart (Mariners' Mirror) at Leiden in 1585. It was the first collection of marine maps, lived through many editions, was issued in several languages and became known as Charettier and Waggoner. In the same year Adrian Gerritsz published a valuable Paskaarte of the European Sea. Ten years afterwards, in 1595, W. Barentszoon published a marine atlas of the Mediter- ranean, the major axis of which he reduced to 42 degrees. Jodocus

Fig. 30. — Lenox Globes (1510).

and formerly served the purpose of a pyx. Its diameter is 160 mm., its date about 1530. About the same date is assigned to a globe by Robert de Bailly, engraved on copper and gilt (diam. 440 mm.). Celestial globes were manufactured by Regiomontanus (d. 1476) at Nuremberg, by Joh. Stoffler (1499), and by G. Hartmann (1535).

Mercator and his Successors. — Of Gerhard Kremer (1512-1594)

Hondius has already been referred to as the purchaser of Mer- cator's plates. The business founded by him about 1602 was continued by his sons and his son-in-law, Jan Janszon (Jansonius) and others. By 1653 this firm had already produced atlases including 451 charts. Willem Janszon, the

father of Hondius's partner, published a collection of charts (1608), to which he gave the title of Het Licht der Zeevaart (the seaman's light).

Another cartographic publishing firm was established at Amster- dam in 1612 by Willem Janszon Blaeu (1571-1638), a friend of Tycho Brahe, from 1633 " mapmaker " of the states-general, and a man of scientific culture. He was succeeded by his son Jan (d. 1673) and grandson Cornelius, and before the end of the century turned out a Zee-Spiegel of 108 charts (1623), an Atlas novus (Nieuwe Atlas), 1642, enlarged in the course of time until it consisted of 12 folio volumes containing hundreds of maps. J. A. Colom in 1633 published a collection of maps under the quaint title of Vurig Colom der Zeevaert (Fiery Column of

and his heirs, are stated to have published as many as 600 maps after 1700.

In no other country of Europe was there at the close of the 1 6th century a geographical establishment capable of compet- ing with the Dutch towns or with Sanson, but the number of those who produced maps, in many instances based upon original surveys, was large. Germany is thus represented, among others, by C. Henneberger (map of Prussia, 1576), by M. Oeder, (survey of Saxony, 1586-1607), A. Rauh (fine hill features on a map of the environs of Wangen and Lindau, 1617),

Fig. 31. — Mercator's Chart of the World (1569).

Enury Valfccf ■£> <

Navigation). Among more recent Dutch map publishers are Nicolaus Vischer (Piscator), R. Goos, H. Doncker, F. de Wit, and J. and G. van Keulen, whose atlases were published between 1681 and 1722. These Dutch maps and charts are generally accompanied by descriptive notes or sailing directions printed on the back of them. A similar work is the Arcano del mare of Sir Robert Dudley, duke of Northumberland, the numerous sheets of which are on Mercator's projection (1631).

In France, in the meantime, an arc of the meridian had been measured (1660-1670) by Jean Picard, numerous longitudes had been observed between 1672 and 1680 by the same, and by Phil, de Lahire (d. 1719), and these were utilized in a Carte de France " as corrected from the

observations of the members of the Academy of Sciences " (1666-1699), in a map of the world (1694) by D. Cassini, as also in Le Neptune Franqois (1693) with contributions by Pene, D. Cassini and others. These corrected longitudes were not yet available for the maps produced by Nicolas Sanson of Abbeville, since 1627. The cartographical establishment founded by him in that year was carried on after his death in 1667 by his sons, his son-in-law,- P. Duval (d. 1683) and his grandson Robert du Vaugondy (d. 1766). Among the cartographers whom he employed were M. Tavernier and Mariette, and in many instances he mentioned the authors whose maps he copied. By 17 10 the maps published by the firm numbered 466. Nicolas de Fer, the great rival of Sanson,

W. Schickhardt (survey of Wurttemberg, 1624-1635), and G. M. Vischer (map of Austria and Styrai, 1669-1786); Switzerland by H. C. Gyger (Canton of Zurich, a masterpiece, 1667); Italy by G. A. Magini (1558-1610), and V. Coronelli, appointed cosmographer of the Venetian Republic, 1685, and founder of the Ac. Cosmogr. dei Argonauti, the earliest geographical society, and Diogo Homem, a Portuguese settled at Venice (1558-1574); Denmark by J. Mejer of Husum (1650); Sweden by A. Buraeus, the " father of Swedish cartographers " (1650-1660); the British Islands by Ch. Saxton (County Atlas of England and Wales i575) > J- Speed (Theatrum of Great Britain, 1610), Timothy Pont and Robert Gordon of Strathloch (map of Scotland, 1608), and A. Moll. A Novus atlas sinensis, based upon Chinese sur- veys, was published in 1655 by Martin Martini, S.J., a missionary recently returned from China. Isaac Voss, in his work De Nili (1659), published a map of central Africa, in which he anticipated D'Anville by rejecting all the fanciful details which found a place upon Filippo Pigafetta's map of that continent.

The first maps illustrating the variation of the compass were published by Chris. Burrus (d. 1632) and Athanasius Kircher (Magnes, Rome, 1643), and maps of the ocean and tidal currents by the latter in his Mundus subterraneus (1665). Edmund Halley, the astronomer, compiled the first variation chart of scientific value (1683), as also a chart of the winds (1686).

Globes manufactured for commercial purposes by Blaeu and others have already been mentioned, but several large globes, for show rather than for use, were produced in addition to these. Thus A. Busch, of Limburg

(1656-1664), manufactured a globe for Duke Frederick of Holstein, formerly at Gottorp, but since 1713 at Tsarskoye Zelo. It has a diameter of n ft. (3-57 metres) and is hollow, the inner surface of the shell being covered with a star map, and the outer surface with a map of the world. Professor Erh. Weigel (1696) produced a hollow celestial globe in copper, having a small terrestrial globe in its centre. Its diameter is 3-25 metres. Lastly there is a pair of giant globes of artistic design, turned out by V. Coronelli (1623), and intended as presents to Louis XIV. Their diameter is nearly 5 metres. A pair of globes of 1592 by Emeric Molineux (diam. 610 mm.) is now in the Temple Library, and is referred to in Blundeville's Exercises (1594).

The Eighteenth Century. — It was no mere accident which enabled France to enjoy a pre-eminence in cartographic work during the greater part of the 18th century. Not only had French men of science and scientific travellers done excellent work as explorers in different parts of the world, but France could also boast of two men, Guillaume Delisle and J. B. Bourguignon d'Anville, able to utilize in the compilation of their maps the information they acquired.

Delisle (1675-1726) published 98 maps, and although as works of art they were inferior to the maps of certain contemporaries, they were far superior to them in scientific value. On one of his earliest maps compiled under advice of his father Claude (1700), he gave the Mediterranean its true longitudinal extension of 41 . It was Delisle who assumed the meridian of Ferro, which had been imposed upon French navigators by royal order (1634), to lie exactly 20 to the west of Paris. The work of reform was carried further by B. D'Anville (1697-1782). Altogether he published 211 maps, of which 66 are included in

Fig. 32. his Alias gen&ral (1737-1780); he swept away the fanciful lakes from off the face of Africa, thus forcibly bringing home to us the poverty of our knowledge (fig. 32), delineated the Chinese Empire in accordance with the map based on the surveys con- ducted during the reign of the emperor Kanghi, with the aid of Jesuit missionaries, and published in 1718; boldly refused to believe in the existence of an Antarctic continent covering half the southern hemisphere, and always brought a sound judgment to bear upon the materials which the ever-increasing number of travellers placed at his disposal. Among other French works of importance deserving notice are Le Neptune oriental of Mannevillette (1745) and more especially the Carte geometrique de la France, which is based upon surveys carried on (1744-1783) by Cesar Francois Cassini de Thury and his son Dominique de Cassini. It is on a transversal cylindrical (rectangular) pro- jection devised by Jacques Cassini (d. 1746). The hills are shown in rough hachures.

England, which had entered upon a career of naval con- quest and scientific exploration, had reason to be proud of J. F. W. Desbarres, Atlantic Neptune (1774), a North-American Pilot (1779), which first made known the naval surveys of

J. Cook and of others; and Tho. Jefferys's West Indian and American Atlases (1775, 1778). James Rennell (1742-1830), who was surveyor-general of India, published the Bengal Atlas (1781), and sagaciously arranged the vast mass of information collected by British travellers and others in India and Africa, but it is chiefly with the name of Aaron Arrowsmith, who came to London in 1778, and his successors, with which the glory of the older school of cartographers is most intimately connected. His nephew John died in 1873. Among local cartographers may be mentioned H. Moll (d. 1732), J. Senex, whose atlas was published in 1725, and Dowet, whose atlas was brought out at the expense of the duke of Argyll.

In Germany J. B. Homann (d. 1724) founded a geographical establishment in 1702, which depended at first upon copies of British and French maps, but in course of time published also original maps such as J. M. Hase's Africa (1727) and Tobias Meyer's Mappa critica of Germany (1780), J. T. Giissf eld's map of Brandenburg (1773), John Majef's Wurttemburg (1710), and J. C. Miiller's Bavaria, both based on trigonometrical surveys. Colonel Schmettau's excellent survey of the country to the west of the Weser (1767-1787) was never published, as Frederick the Great feared it might prove of use to his military enemies. Switzerland is represented by J. J. Scheuchzer (171 2), J. Gessner (d. r79o), G. Walser {Atlas novus Helvetiae, 1769), and W. R. Meyer, Atlas der Schweiz (1 786-1 802). Of the Austrian Netherlands, Count Joseph de Ferrari published a chorographic map on the same scale as Cassini's Carte de la France (1777). Of Denmark a fine map was published under the auspices of the Academy of Science of Copenhagen (1766- 1825) of Spain and Portugal an atlas in 102 sheets by Thomas Lopez (1765-1802); of Russia a map by J. N. Delisle in 19 sheets (1739-1745); charts illustrating the variation of the compass and of magnetic "dip" by E. Dunn (1776), J. C. Wiffe (1768); a chart of the world by W. Dampier (1789). Map projections were dealt with by two eminent mathe- maticians, J. H. Lambert (1772) and Leonh. Euler (1777).

On the maps of Delisle and d'Anville the ground is still represented by " molehills." Hachures of a rude nature first made their appearance on David Vivier's map of the environs of Paris (1674), and on Cassini's Carte de la France. Contour lines (isobaths) were introduced for the first time on a chart of the Merwede by M. S. Cruquius (1728), and on a chart of the English Channel by Phil. Buache (1737). Dupain-Triel, acting on a

suggestion of Du Carla, compiled a contoured map of France (1791), and it only needed the introduction of graduated tints between these contours to secure a graphic picture of the features of the ground. It was J. G. Lehmann (1783) who based his method of hill-shading or hachuring upon these horizontal contours. More than 80 methods of showing the hills have found advocates since that time, but all methods must be based upon contours to be scientifically satisfactory.

Two relief maps of Central Switzerland deserve to be mentioned, the one by R. L. Pfyffer in wax, now in Lucerne, the other by J. R. Meyer of Aarau and Muller of Engelberg in papier mache, now in Zurich. Globes of the usual commercial type were manufactured in France by Delisle (1700), Forbin (1710-1731), R. and J. de Vaugondy (1752), Lalande (1 771);. in England by E. and G. Adams (1710-1 766) ; Germany by Homann and Seutter (1750). A hollow celestial globe 18 ft. in diameter was set up by Dr Roger Long at Cambridge; the terrestrial globe which Count Ch. Gravie of Vergennes presented to Louis XVI. in 1787 had a diameter of 26 metres, or 85 ft.

Modern Cartography. — The compiler of maps of the present day enjoys many advantages not enjoyed by men similarly occupied a hundred years ago. Topographical surveys are gradually extending, and explorers of recent years are better trained for their work than they were a generation ago, whilst technical processes of recent invention — such as lithography, photography and heliogravure — facilitate or expedite the completion of his task. This task, however, has grown more difficult and exacting. Mere outline maps, such as formerly satisfied the public, suffice no longer. He is called upon more

especially to give a satisfactory delineation of the ground, he must meet the requirements of various classes of the public, and be prepared to record cartographically all the facts of physical or political geography which are capable of being recorded on his maps. The ingenuity of the compiler is frequently taxed when called upon to illustrate graphically the results of statistical information of every description.

Germany since the middle of the 19th century has become the headquarters of scientific cartography. This is due as much to the inspiriting teachings of Ritter and Humboldt as to the general culture and scientific training

combined with technical skill commanded by the men who more especially devote them- selves to this branch of geography, which elsewhere is too frequently allowed to fall into the hands of mere mechanics. Men like H. Berghaus (1797-1884), H. Kiepert (1818-1899), and A. Petermann (1822-1878) must always occupy a foremost place in the history of cartography. Among the geographical establish- ments of Germany, that founded by Justus Perthes (1785), at Gotha, occupies the highest rank. Among its publications are A. Stieler's Hand-Atlas (1817-1832), K. von Spruner's Historical Atlas (1438-1488), H. Berghaus' Physical Atlas (1838-1842), E. von Sydow's Wall Maps for Schools (1838-1840) and School Atlas (1847). The titles of these atlases survive, though the authors of the original editions are long dead, and the maps have been repeatedly superseded by others bringing the information up to the date of publication. To the same firm we are indebted for Petermann's Mittcilungen, started in 1855 by A. Petermann, after whose death in 1902 they were successively edited by

E. Behm, A. Supan and P. Langhans, as also the Ceographisches Jahrbuch (since 1866), at first edited by E. Behm, afterwards by Professor H. Wagner. Among other geographical institutes in Germany which deserve mention are the Weimar Institut, founded in 1791 by F. J. Bertuch, and directed in 1845-1852 by H. Kiepert; Paul Fleming at Glogau (K. Sohr's Handatlas, 1845), A. Ravenstein at Frankfort, D. Reimer at Berlin (H. Kiepert, Handatlas, i860); R. Andres {Hand- Atlas, 1880), andE. Debes {Hand-Atlas, 1894) in Leipzig, and E. Holzer in Vienna (Vincenz von Haardt's maps). France is represented by the publishing firms of Ch. Delagrave (Levaseur's maps), Hachette (Vivien de St Martin's Atlas universel, in progress since 1875,

F. Schrader's Alias de geographic moderne, 1880), and Armand Colin (Vidal de la Blache's Atlas general, 1894). In Great Britain A. Arrowsmith established himself in London in 1770 {General Atlas, 1817), but the cartographical business ceased on the death of John Arrowsmith in 1873. John Walker, to whose initiative the charts published by the admiralty are indebted for the perspicuous, firm and yet artistic execution, which facilitate their use by the mariner, was also the author of the maps published by the Society for the Diffusion of Useful Know- ledge (1820-1840). Among more recent firms are W. and A. K. Johnston (founded 1825; Royal Atlas, 1855); J. Bartholomew & Co., now carried on by J. G. Bartholomew (Reduced Survey maps, Atlas of the World's Commerce, 1906); Philip & Sons {Imperial Atlas, 1890; Systematic Atlas by E. G. Ravenstein, 1894; Mercantile Marine Atlas, 1904, globes), and E. Stanford {London Atlas).

In 1890 Professor A. Penck proposed to prepare a map of the world,

including the oceans, on a scale of 1 : 1,000,000, and his scheme was promised the support of a committee which met in London in 1909, and upon which were represented the leading powers of the world. Maps on that scale of a great part of Africa, Asia and America have been published by British, French, German and United States authorities. A bathy-metrical chart of the oceans, by Professor J. Thoulet was published in 1904 at the expense of Prince Albert of Monaco.

Reliefs from printed maps were first produced by Bauerkeller of Darmstadt and Dondorf at Frankfort, from originals furnished by A. Ravenstein (1838-1844). The exaggeration in altitude, on these maps and on those of a later date and on a larger scale, was very considerable. No such exaggeration exists in the case of reliefs of parts of the Alps, on a large scale, by P. Keil and Pelikan (1890), X. Imfeld (1891), P. Oberlerchner (1891-1895),

C. Perron (1893-1900), F. Becker (1900), A. Heim (1904) and others. A relief globe was first suggested in a letter of M. Maestlin to J. Kepler (1596). The first globe of this descrip- tion for the use of the blind, was made by A. Zeune in 1810. H. Erben is the author of a rough relief on a convex surface (1842), but the finest example of this description is a relief of Italy, by Cesar Pomba and H. Fritsche, on a scale of 1 : 1,000,000 and without exaggeration of heights (1 880-1 884) . A map of Italy in the baptistery of St Peter at Rome has occasionally been described as a relief, though it is merely a rude outline map of Italy, by Carlo Fontana (1698), carved into a convex surface.

Several globes of unusual dimensions were produced in the course of last century. That which Colonel Langlois erected in the'Champs Elysees(i824) had a diameter of 39 metres. James Wyld's hollow globe, or " Georama," diam. 18 metres, occupied Leicester Square until swept away as a nuisance. The giant globe proposed by Elisee Reclus in 1895 has never been erected; he has, however, produced maps on a concave surface, as suggested by J. D. Hauber in 1742.

Authorities. — The history of maps is dealt with ably in Vivien de Saint Martin's Histoire de la geographic (Paris, 1 875), and in Peschel's Geschichte der Erdkunde (2nd ed. by Sophus Ruge, Ber- lin, 1877), as also by W. Wollkenhauer {Leitfaden zur Geschichte der Kartographie, Breslau, 1895), and H. Zondervan {Allgemeine Karten- kunde, Leipzig, 1901). J. Lelewel's Geographic du moyen dge, with an atlas (Brussels, 1850-1857), has in part been superseded by more recent researches. There are, however, a number of works, beautifully illustrated, which deal fully with particular periods of the subject. Among these may be mentioned Konrad Miller's Die dltesten Weltkarten (Stuttgart, 1895-1897), which only deals with maps

not influenced by the ideas of Ptolemy. The contents of the following collections are more varied in their nature, viz. E. F. Jomard's Monuments de la geographic (Paris, 1862), Santarem's Atlas compose de mappemondes et de portulans, &c. (Paris, 1842-1853, 78 plates). A. E. Nordenskiold's Facsimile Atlas (Stockholm, 1889), Gabriel Marcell, Choix de cartes et de mappemondes XIV" et XV e siecles (Paris, 1896) C. H. Coote's Remarkable Maps of the XVth, X Vlth and X VHth Centuries reproduced in their Original Size (Amster- dam, 1 894-1 897), and Bibliotheca lindesiana (London, 1898) with facsimiles of the Harleian and other Dieppese maps of the 1 6th century. Nautical charts are dealt with in A. E. Nordenskiold's Periplus (Stockholm, 1869), and Th. Fischer's Sammlung mittel- dlterlicher Welt- und Seekarten (Vienna, 1886). The discovery and mapping of America are illustrated by F. Kunstmann's Entdeckung Amerikas (Munich, 1859), K. Kretschmer's Atlas zur Entdeckung Amerikas (Berlin, 1892), G. Marcel's Reproductions de cartes et de globes relatives d la decouverte de I'Amerique du XVI' au XV IIP siecle (Paris, 1893) and E. L. Stevenson's Maps Illustrating the early Discovery and Exploration of America, 1 502-1530 (New Bruns- wick, N.J., 1906). In addition to these collections, numerous single maps have been published in geographical periodicals or separately. See also V. Hantzsch and L. Schmidt, Kartog. Denk- maler zur Entdeckungsgeschichte von Amerika, Asien, Australien und Afrika aus der k. Bibliothek zu Dresden (Leipzig, 1903), and the Crown Collection of photographs of American maps (1600-1800), selected and edited by A. B. Hulbert (Cleveland, 1904-19C9).

For reports on the progress of cartography, see Ceographisches Jahrbuch (Gotha, since 1866) ; for announcements of new publi- cations, Bibliotheca geographica, published annually by the Berlin Geographical Society, and to the geographical Journal (London). Topographical Surveys. The year 1784 marks the beginning of the ordnance survey, for in that year Major-General Roy measured a base line of 27,404 ft. on Hounslow Heath. Six additional base lines were measured up to 1849, including the Lough ia,, gl j 0m , Foyle, in 1827-1828, and that on Salisbury Plain, in 1849. The primary triangulation was only completed in 1858, but in the meantime, in 1791, the detail survey had begun. At first it was merely intended to produce a map sufficiently accurate on a scale of 1 in. to a mile (1 : 63,360). Ireland having been surveyed (1824-1842) on a scale of 6 in. to a mile (1 : 10,560), it was determined in 1840, after the whole of England and Wales, with the exception of Lancashire and Yorkshire, had been completed on one-inch scales, to adopt that scale for the whole of the United Kingdom. Finally, in 1854, a cadastral survey of the whole of the United Kingdom, only excepting uncultivated districts, was resolved upon, on a scale of 1 : 2500, still larger scales (1 : 500 or 1 : 1000) being

adopted for town plans. Parish boundaries are laid down with the help of local meresmen appointed by justices at quarter sessions. The horizontal

contours are based upon instrumental measurement, and as a whole these ordnance maps were undoubtedly superior in accu- racy, with rare exceptions, to similar maps published by foreign governments. Even though the hill hachures on the older one-inch maps are not quite satisfactory, this deficiency is in a large measure compensated for by the presence of absolutely trustworthy contours. Originally the maps were engraved on copper, and the progress of publication was slow; but since the introduction of modern processes, such as electrotyping (in 1840), photography (in 1855) and zincography (in 1859), it has been rapid. A plan, the engraving of which formerly took two years, can now be produced in two days.

The one-inch map for the whole of the United Kingdom was completed in 1890. It covers 697 sheets (or 488 of a " new series " in large sheets), and is published in three editions, viz. (a) in outline, with contours in black, (b) with hills hachured in brown or black, and © printed in five colours. Carefully revised editions of these and of the other maps are brought out at intervals of 15 years at most. Since 1898 the department has also published maps on a smaller scale, viz. a map of England and Wales, on a scale of 2 m. to 1 in., in two editions, both printed in colour, the one with hills stippled in brown, the other coloured on the " layer system " as a strata-relief map; a map of the United Kingdom on a scale of 4 m. to 1 in., also in two editions, the one in outline, showing five classes of roads and parish boundaries, the other in colours, with stippled hills; a map on a scale of 10 m. to 1 in., also in two editions, and finally a map of the United Kingdom on a scale of

1 : 1,000,000.

The geological surveys of Great Britain and Ireland were con- nected from 1832 to 1853 with the ordnance survey, but are now carried on independently. The ordnance survey, too, no longer depends on the war office but upon the board of agriculture and fisheries. A Bathymetrical Survey of the Fresh- water Lochs of Scotland, under the direction of Sir John Murray and L. Pullar, was completed in 1908, and the results published by the Royal Geographical Society.

Proposals for a new map of France, to replace the famous Cassini map of

1744-1793 were made in 1802 and again by p R. Bonne in 1808, but owing to the wars then devas-

tating Europe no steps were taken until 1817, and the Carle de France de Vital major on a scale of 1 : 80,000 was only completed in 1 880. It is engraved on copper. The hachured hills are based upon contours, and are of admirable commen- surability. It has served as a basis for a Carte de la France, published by the Service Vicinal on a scale of 1 : 100,000, in 596 sheets, and of a general map prepared by the ministere des travaux publics on a scale of 1 : 200,000 in 80 sheets. On both these maps the hills are printed in grey chalk. A third topo- graphical map of France is being published in accordance with the recommendation of a committee presided over by General de la Noix in 1897. The surveys for this map were begun in 1905. The maps are based upon the cadastral plans (1 : 1000), thoroughly revised and connected 'with the triangulation of France and furnished with contours at intervals of 5 m. by precise measurement. These minutes are published on a scale of 1 : 10,000 or 1 : 20,000 for mountain districts, while the scale of the general map is 1 : 50,000. Each sheet is bounded by parallels and meridians. The hills are shown in brown contours at intervals of 10 m. and grey shading in chalk (Berthaut, La Carte de France, ij^cy-iSgS; Paris, 1899). A geological map of France on a scale of 1 : 80,000 is nearly completed, there are also a map (1: 500,000) by Carez and Vasseur, and an official Carte geologique (1: 1,000,000; 1906).

By the middle of the 19th century topographical maps of the various German states had been completed, and in several Germany Stances surveys of a more exact nature had been completed or begun, when in 1878 the governments of Prussia, Saxony, Bavaria and Wurttemberg agreed to supersede local maps by publishing a map of the empire (Reichskarte) in 674 sheets on a scale of 1:100,000. The earlier sheets of this excellent map were lithographed, but these are gradually being

superseded by maps engraved on copper. Colour-printing is employed since 1901. The hills are hachured and in some instances contours at intervals of 50 metres are introduced. The map was completed in 1909, but is continually undergoing renewal. The Messtischblatter, called Positionsblatler in Bavaria, are on a scale of 1:25,000. The older among them leave much to be desired, but those of a later date are satisfactory. This applies more especially to the maps of Saxony (since 1879) and Wurttemberg (since 1893). The features of the ground on most of these maps are shown by contours at intervals of 10 metres. The map produced on this large scale numbers over 5000 sheets, and is used as a basis for the geological surveys carried on in several of the states of Germany. A general map of the German Empire (Uebersichtskarte) on a scale of 1 : 200,000,

in 196 sheets, is in progress since 1893. It is printed in three colours, and gives contours at intervals of 10 metres. In addition to these maps there are D. G. Reymann's well-known Specialkarte von Mittel Europa (1 : 200,000), acquired by the Prussian government in 1874 (it will ulti- mately consist of 796 sheets), a government and Liebenow's map of central Europe (1:300,000) and C. Vogel's beautiful map of Germany (1 : 500,000).

The Specialkarte of Austria-Hungary on a scale of 1:75,000 (765 sheets), based upon a triangulation and cadastral surveys (1816-1867), was completed in 1889, and published in

u i- _ to.- t ji a Austria

heliogravure. This map was repeatedly revised, Hungary. but as it no longer met modern requirements as to accuracy the director of the military geographical establishment at Vienna, Field Marshal Chr. von Steeb, in 1896, organized what practically amounts to a re-survey of the entire monarchy, to be completed in 75 years. At the same time the cadastral plans, reduced to a scale of 1:25,000, are being published in photo-lithography. A general map of central Europe in 283 sheets published by the Austrian government (1:200,000) includes nearly the whole of the Balkan Peninsula.

The famous map of Switzerland, with which is associated the name of General H. Dufour (d. 1875), is based upon a triangula- tion (1809-1833) and surveys on a scale of 1:25,000 for the lowlands, 1:50,000 for the alpine districts, and tan"" was published (1842-1865) on a scale of 1:100,000. The hills are hachured, the light, in the case of the loftier regions, being supposed to fall obliquely. The original surveys, carefully revised, have been published since 1870 as a Topographical Atlas of Switzerland — the so-called Siegfried Atlas, in 552 sheets. They are printed in three colours, contours at intervals of 10 and 20 metres being in brown, incidental features (ravines, cliffs, glaciers) in black or blue. To mountain-climbers these contour maps are invaluable, but for ordinary purposes " strata maps," such as J. M. Ziegler's hypsometric maps (1856) or so-called " relief maps," which attempt to delineate the ground so as to give the impression of a relief, are generally preferred.*

The new survey of Belgium was completed in 1872 and there have been published 527 plane-table sections or planchettes on a scale of 1:20,000 (1866-1880), a "Carte topo- B ˆ M graphique de la Belgique," in 72 sheets, on a scale of 1:40,000 (1861-1883), and a more recent map in 26 sheets on a scale of 1:100,000 (1903-19 12). The last is printed in five colours, the ground is shown in contours of 10 metres interval and grey stippling.

The new survey of the Netherlands, based upon General Krayenhoff's primary triangulation (1802-1811) was completed in 1855. The results have been published on a scale of 1:25,000 (776 sheets, since 1866), 1:50,000 (Topographic and Military Map, 62 sheets, 1850-1864, and a Waterstaatskaart, 1864-1892), and 1:200,000 (Topographical Atlas, 21 sheets, 1 868-1871).

In Denmark, on the proposal of the Academy of Science, a survey was carried out in 1766-1825, but the maps issued by the Danish general staff depend upon more Denmar k, recent surveys. These include plane-table sections (Maalebordsblode), 1209 sheets on a scale of 1:20,000, with contours at intervals of 5 to 10 ft., published since 1830; Allasblade

of Jutland and of De Danske Oer, on a scale of 1 : 40,000, the former in 131 sheets, since 1870, the latter, on the same scale, in 04 sheets, since 1890, and still in progress, and a general staff map on a scale of 1 : 100,000, in 68 sheets, since 1890. Maps of the Faroer and of Iceland have likewise been issued.

Modern surveys in Sweden date from the organization of a corps of " Landematare," known since 1874 as a topographical Scaodi- department of the general staff. The maps issued navia. by this authority include one of southern Sweden, 1:100,000, another of northern Sweden, 1:200,000, and a general map on a scale of 1:1,000,000. In Norway a geographical survey (Opmaaling) has been in progress since 1783, but the topographical map of the kingdom on a scale of 1:100,000 in 340 sheets, has not yet been completed.

Of Russia in Europe only the more densely peopled govern- ments have been surveyed, since 1816, in the manner of other Russia European countries, while for most regions there are only so-called "military surveys." The most readily available map of the whole country is the 10-verst map (1:420,000), known as General J. A. Strelbitzki's, and published 1865-1880. A topographic map (1:126,000) embracing the whole of western Russia, with Poland and the country of the Don Cossacks, is designed to be extended over the whole empire. Certain governments — Moscow, Kief, Volhynia, Bessarabia, the Crimea, &c— have been published on a scale of 1:24,000, while Finland, as far as 6i° N., was re-surveyed in

1870-1895, and a map on a scale of 1:42,000 is approaching completion.

Surveys in Asiatic Russia are conducted by the topographical departments organized at Orenburg, Tashkent, Omsk, Irkutsk and Tiflis. To the latter we are indebted for a valuable map of Caucasia, 1:210,000, which since the first publication (1863- 1885) has undergone careful revision. The Siberian departments have published a number of maps on a scale of 1 : 420,000. In addition to these the survey for the Trans-Siberian railway has been published on a scale of 1:630,000, as also maps of the Russo-Chinese frontier districts, 1:210.000 and 1:1,168,000. A map of Asiatic Russia, 1:420,000, by Bolshef, in 192 sheets, is in course of publication. r

*Passing to southern Europe we find that Portugal has com- pleted a Charta chorographica (1:100,000) since 1856. In Spain a plane-table survey on a scale of 1 :2o,ooo aaOSpaiB. nas been * n P r °g ress since 1870, but of the map of Spain in 1078 sheets on a scale of 1 : 50,000 only 150 had been issued by the deposito de la guerra up to 1910. Meanwhile reference may be made to B. F. Coello's Atlas de la Espana (1848-1890), the maps of which are on a scale of*

1 : 200,000.

In Italy Tavulette rilevala on a scale of 1:25,000 or 1:50,000, with contours, based on surveys made 1862-1890, are being published, and a Carta del regno d' Italia, 1 : 100,000, is practically complete. There are a Carta idrologica and a Carta geologica on the same scale, and a Carta orografica on a scale of 1 : 500,000.

Greece is still dependent upon foreigners for its maps, among which the Carte de Grece (1 : 200,000) from rapid surveys made Oreece. ˆy General Palet in 1828, was published in a new edition in 1880. A similar map, mainly based upon surveys made by Austrian officers and revised by H. Kiepert (1:300,000), was published by the Military Geographical Institute of Vienna in 1885. Far superior to these maps is the Karte von Attika (1:100,000 and 1:25,000) based upon careful surveys made by Prussian officers and published by E. Curtius and J. H. Kaupert on behalf of the German Archaeo- logical Institute in Athens (1878), or A. Philippson's map of the Peloponnese (1:300,000; 1901).

For maps of the Balkan Peninsula we are still largely indebted

to the rapid surveys carried on by Austrian and Russian

officers. The Austrian map of central Europe

states. embraces the whole of the Balkan Peninsula on a scale

of 1:200,000; the Russian surveys (1877-1879) are

embodied in a map of the eastern part of the Balkan on a scale

Italy.

1:126,000, and a map of Bulgaria and southern Rumelia, on a scale 1:200,000, both published in 1883. A map of Turkey in Europe, scale 1:210,000, was published by the Turkish general staff (1899), and another map, scale 1:250,000, by the intelli- gence division of the British war office is in progress since 1906. Bosnia and Herzegovina are now included with the surveys of the Austrian Empire, the kingdom of Servia has been surveyed (1880-1891) and the results published on a scale of 1:75,000; in eastern Rumania surveys have been in progress since 1874 and the results have been published on a scale of 1:50,000; a general map of the entire kingdom, scale 1:200,000, was published in 1906-1907; a map of Monte- negro (1:75,000), based on surveys by Austrian and Russian officers, was published at Vienna in 1894.

In Asiatic Turkey several districts of historical interest have been surveyed, and surveys have likewise been made in the interest of railways, or by boundary commis- Asla _

sions, but there is no such thing as a general survey carried on under the direction of government. We are thus, to a large extent, still dependent upon compilations, such as R. Kiepert's Asia Minor (1:400,000; 1904-1908), a map of eastern Turkey in Asia, Syria and western Persia (1:2,000,000; 1 9 10), published by the Royal Geographical Society, or a Russian general map (1:630,000, published 1880-1885). Among maps based upon actual surveys those of Palestine, by Lieutenant G. R. Conder and H. H. (afterwards Lord) Kitchener (1:63,360, 1880), of the Sinai Peninsula by Sir C. W. Wilson and H. S. Palmer (1:126,730, 1870), of Arabia Petraea byDr A. Musil (1:300,000, 1907) or of the Aden territory (1905) are among the more interesting. Of Cyprus an excellent map from surveys by Major (Lord) H. H. Kitchener was published in 1884 (1:63,360).

In the case of Persia and Afghanistan we are still dependent upon compilations such as a Russian staff map (1:840,000, published in 1886), Colonel Sir T. H. Holdich's map of Persia (1:1,014,000, Simla, 1897-1899), or a smaller map (1:2,028,000 and 1:4,056,000), published by the geographical division of the general staff. The settlement of boundaries in northern Afghanistan (1883) and in Seistan (1870) has necessitated surveys of some interest.

A trigonometrical survey of British India was begun in 1800 and the country can now boast of a survey which in most respects is equal to those of most European states. The surveys are made on scales varying according to the necessities of the case or the nature of the country, and they have been extended since 1862 beyond the boundaries of India proper. Revenue surveys for land settlement are published on a scale of 1:4000, but the usual scale for topographical maps is 1:63,360. An Indian Atlas, on a scale of 1 : 255,660, includes also Ceylon and the Malay Peninsula, but although begun so long ago as 1827 many of its sheets are unpublished. There are in addition an official map of India (1:1,000,000), the first edition of which was published in 1903, as also maps of the great provinces of India, including Burma, all on a scale of 1:2,827,520, and a variety of physical and statistical maps. Ceylon and the Straits Settlements, with the Federal Malay States, have their own surveyors-general. The British North Borneo Company pub- lished a Map of British North Borneo, on a scale of 1:633,600

(1905).

In Siam a regular survey was organized by Mr J. McCarthy (1881-1883), a former official of the Indian survey, which did good work in connexion with the determination of the Franco- Siamese frontier (1906). The surveys are made on the scales of 1 : 4000, 1:31 ,680 and 1 : 63,360.

In French Indo-China surveys have been in progress since 1 88 1. The Bureau of the Indo-Chinese general staff, has published a map of Indo-China, including Cambodia, in 45 sheets (1:200,000, 1895), while to the service geographique de l'lndo-Chine, organized in 1899, we owe a Carte de Vlndo-Chine

(1:500,000).

For China we are still largely dependent upon careful compila- tions like Baron F. von Richthofen's Atlas von China (1:750,000,

Africa.

Berlin, 1 885-1890) or Bretschneider's Map of China (1 14,600,000) a new edition of which appeared at St Petersburg in 1900. There are good survey maps of the British colony of Hong-Kong, of Wei-hai-Wei and of the

country around Kiao-chou, and the establishment of topographical offices at Peking and Ngan-king holds out some promise of native surveys. In the meantime large scale maps prepared by European authorities are to be welcomed, such as maps of Chih-li and Shan-tung (1:200,000), from surveys by Prussian officers, 1901-1905, maps on East China (1:1,000,000) and of Yun-nan by British, German and Indian officers, of the Indo-Chinese frontier (1:200,000, Paris 1908), and of the upper Yangtsze-kiang by S. Chevalier (Shanghai, 1900).

Japan has a regular survey department originated by Europeans and successfully carried on by natives. The primary triangulation was completed in 1880, a topographical map coloured geologically (1:200,000) was published 1889-1897, and in addition to this there are being published an agronomical map on a scale of 1:100,000 (since 1887) and others. The Japanese government has likewise published a map of Korea

(1:1,000,000; 1898).

The Philippine Islands are represented in a carefully compiled map by C. W. Hodgson (1:1,115,000, New York, 1908). Of Java we possess an excellent topographical map based upon surveys made 1850-1887 (1:100,000). A similar map has been in progress for Sumatra since 1883, while the maps for the remaining Dutch Indies are still based, almost exclusively, upon flying surveys. For general purposes the A Has der N ederlandsche Beiitlingen in Oost-Indie by J. N. Stemfoort and J. J. Ten Siethoff, of which a new edition has been published since 1900, may be consulted with confidence.

In Africa nearly all the international boundaries have been carefully surveyed and marked on the ground, since 1880, and yield a good basis as a guide for the map compiler. A general map of Africa, by Colonel Lannoy de Bissy, on a scale of 1 : 2,000,000 was first published in 1882- 1888, but is carefully revised from time to time. The geo- graphical section of the British general staff is publishing maps of all Africa on scales of 1 : 250,000 and 1 : 1,000,000. In Egypt excellent work has been done by a survey department organized and directed by Captain H. G. Lyons up to 1909. It has published a topographical map of the Nile valley (1:50,000), an irrigation map (1:100,000), a general map (1:250,000), numerous cadastral plans, &c. Work on similar lines is carried on in the Anglo-Egyptian Sudan. Algeria has been in course of survey since 1868, Tunis since 1878, and the results have been published on scales of 1 :5o,ooo and 1 :250,ooo. Of Morocco there are many maps, among which several compiled by the French service geographique de 1'armee, including a Carle du Maroc (1:200,000), in progress since 1909. In. the British colonies of

tropical and of South Africa 1 surveys for the most part are carried on actively. Of the Gambia Colony there is a map by Major E. L. Cowie (1:250,000, 1904-1905); the survey of the Gold Coast Colony is being published by Major F. G. Guggisberg since 1907 (1:125,000 and 1:200,000); southern and northern Nigeria are adequately represented on the maps of the general staff (1:250,000). The states of British South Africa have each their surveyor-general, and a reconnaissance survey has been in progress since 1903. It is based upon a careful triangulation, superintended by Sir D. Gill, and carried in 1907 within 70 m. of Lake Tanganyika. This survey is rapidly superseding other maps, such as the surveyor-general's map of Cape Colony (1 :i27,ooo) ; A. Duncan's map of the Orange River State (1:148,705; 1902-1904) and Jeppe's map of the Transvaal (1:476,000; 1899). The results of a survey of southern Rhodesia are given on the map of the British general staff (1:500,000; 1909), while of north-eastern Rhodesia we have an excellent map compiled by C. L. Beringer in 1907 (1:1,000,000). Surveys in British Central Africa were taken up in 1894; a survey of Lake Nyasa, by Lieut. E. L.

1 See " The Survey in British Africa " : the Annual Report of the Colonial Survey Commission.

Rhoades and W. B. Phillips, was published in 1902. As regards British East Africa and Uganda, the surveys in the latter (on scales of 1:10,000 and 1:125,000) have made considerable progress. The Victoria Nyanza was surveyed by Captain B. Whitehouse (1898-1900), and the results have been published on a scale of 1:292,000. These British possessions, together with the whole of Somaliland and southern Abyssinia, are satisfactorily represented on the maps of the British general staff.

Maps of the French Africa Colonies have been published by the service geographique de FAfrique occidental and the service geographique des colonies. A map of Senegal (1:100,000) is in progress since 1905. The official maps of the other colonies have been compiled by A. Meunier between 1902 and 1909. They include French West Africa, (1 :2,ooo,ooo; 2nd ed., 1908), French Guinea (1:500,000; 1902) and the Ivory Coast and Dahomey (1:1,500,000; 1907-1908). A map of the French Congo by J. Hansen (1:1,500,000), was published in 1907. In Madagascar a topographical bureau was established by General J. S. Gallieni in 1896, and the surveys are being published since 1900 on a scale of 1 :ioo,ooo.

As regards the German colonies we are dependent upon compilations by R. Kiepert, P. Sprigade and M. Moisel. Good maps of the Portuguese colonies are to be found in an Alias colonial Portugues, a second edition of which was published by the Commissao de Cartographia in 1909. Of the Congo State we have an official map on a scale of 1:1,000,000, published in

1907. Of Italian Eritrea we have excellent maps on various scales of 1:100,000, 1:200,000 and 1:500,000, based upon surveys made between 1888 and 1900.

In the states of Australia cadastral surveys conducted by surveyors-general have been in progress for many years, as also trigonometrical surveys (Western Australia excepted), and the publication of parish and township or county maps keeps pace with the settlement of the country; but with the exception of Victoria none of these states is in possession of a topographical map equal in accuracy to similar maps published in Europe. In Victoria the so-called geodetic survey was begun in 1858; the maps are published on a scale of 1:126,730. There exists also a general map, on a scale of 1:506,930. Maps on the same scale are available of New South Wales, South Australia and Tasmania, on a scale of 1:560,000 for Western Australia, on a scale of 1:253,460 for Queensland. There are likewise maps on smaller scales, which undergo frequent revision. The map of British New Guinea is on a scale of 1:330,200 (1898). New Zealand has a good general map on a scale of 1:633,700. A trigonometrical survey was given up and only details of immediate practical use are required. The " Lands Department " of the Fiji Islands has published a map on a scale of 1 = 380,000 (1908).

The cadastral surveys in Canada are carried on by a com- mission of Crown-lands in the old provinces and by a Dominion land office, which lays out townships as in the United States, but with greater accuracy. A surveyor- America. general is attached to the department of the interior, at Ottawa. He publishes the topographical maps (1:63,366) since 1906. They are based upon theodolite traverses 15 m. apart, and connected with the United States lake and coast surveys, the details being filled in by plane-table surveys on a scale of 1:31,680. The contours, 25 ft. apart, depend upon spirit-levelling. In the Rocky Mountains surveys photographic apparatus is successfully employed. The surveyor-general issues also "sectional maps" (1:190,000 and 1:40,000) and so-called " Standard " topographical maps for the thinly peopled west, on scales of 1:250,000 and 1:500,000. He is responsible likewise for maps of Yukon and of Labrador, supplied by the geological survey, the former on a scale of 1:380,200, the latter of 1:1,584,000. The intelligence branch of the Canadian department of military defence is publishing since 1904 topo- graphical maps on scales of 1:63,366 and 1:126,730, with contours. A geodetic survey department, under Dr. W. F. King, chief astronomer of the Dominion, was established in 1909.

MAP PROJECTIONS]

MAP

Maps of Newfoundland, orographical as well as geological, scale 1: 1,584,200, have been published.

In the United States a " geological survey " was organized in 1879, under Clarence King as director, whose successor, Major J. W. Powell, rightly conceived that it was necessary to produce good topographical maps before a geological survey could be pursued with advantage. It is under his wise guidance that the survey has attained its present efficiency. It is based upon a triangulation by the U.S. Coast and Geodetic Survey. The maps of the more densely peopled parts of the Union are published on a scale of 1 : 62,500, and those of the remainder of the country on half or a quarter of that scale. The hills are shown by contours at intervals of 10 or 100 ft. The details given are considered sufficient to admit of the selection of general routes for railways or other public works. The survey progresses at the rate of about 40,000 sq. m. annually, and in course of time it will supersede the map of the separate states, based on older surveys. A " reconnaissance " map of Alaska (on a scale of 1 : 250,000) was published in 1908.

In Mexico the surveys are in charge of a comision geografica- exploradora attached to the secretaria de Fomento, but only about 140 sheets of a Carta general on a scale of America. J : i°o > ooo have been published. There are also a map of the state of S. Luis Potosi (1 : 250,000), of the environs of Puebla (1 : 50,000) and a Carta general de la rcpublica mexicana (1 : 250,000).

A useful map of Central America has been published by the topographical section of the British general staff on a scale of 1 : 170,300. Of great value for cartographical work is a careful survey, carried out by American engineers (1897-1898), for a continental railway running along the west coast from Mexico to Chile. In South America, in proportion to the area ofohe country, only few surveys of a thoroughly scientific nature have been made, and it is therefore satisfactory that the service geographique of the French army should be publishing, since 1900, a map of the entire continent on a scale.of 1 : 1,000,000.

Colombia is but inadequately represented by rough maps. For Colombia we have F. L. Vergara y Velasco's Atlas de geografia colombiana (1906-1908); Ecuador is fairly well repre- sented by Th. Wolf (1892) and Hans Meier (1907); in the case of Peru we still largely depend upon PazSoldan's Atlas geografica (1865-1867) and A. Raimondi's Mapa del Peru (1 : 500,000) based upon surveys made before 1869. Sir Martin Conway's "Map of the Andes of La Paz" (1 : 600,000; 1900) as well as Major P. H. Fawcett's survey of the Brazilian boundary (1906-1907) are

welcome additions to our knowledge of Bolivia. In Chile a comision topografico was appointed as long ago as 1848, but the map produced under its auspices by Professor F. Pissis (1 : 250,000, 1870-1877), leaves much to be desired. Since that time, however, valuable maps have been published by an Oficina de mensura de tierras, by a seccion de geografia y minas connected with the department of public works, by the Oficina hidrografica, and more especially in con- nexion with surveys necessitated by the boundary disputes with Argentina, which were settled by arbitration in 1899 and 1902. The surveys which led to the latter were conducted by Sir Thomas Holdich.

In Venezuela a commission for producing a piano militar or military map of the country was appointed by General Castro in 1904, but little progress seems to have been made, and mean- time we are dependent upon a revised edition of A. Codazzi's map of 1840 which was published in 1884. In Brazil little or nothing is done by the central government, but the progressive states of Sao Paulo and Mines Gera.es have commissaos geographicos e geologicos engaged in the production of topographical maps. Valuable materials have likewise been acquired by several river surveys including those of the Amazonas by Azevedo and Pinto (1862-1864) and W. Chandless (1862-1869) and of the Rio Madeira by Colonel G. Earl Church and Keller-Leuzinger (1869-1875). The proposal of a committee presided over by the Marshal H. de Beaurepaire-Rohan (1876) to prepare a map of Brazil on a scale of 1 : 200,000 has never been acted upon,

and in the meantime we are dependent upon works like the Atlas do imperio do Brazil by Mendes de Almeida (1868) or the maps in our general atlases.

In Argentina an official geographical institute was established in 1879, but neither A. Seelstrang's Atlas (1886-1892) nor H. Hoskold's Mapa topografica (1 : 2,000,000; London, 1895), which were published by it, nor any of the numerous provincial maps are based upon scientific surveys.

It need hardly be said that hydrographic surveys have been of great service to compilers of maps. There are few coast-lines, frequented by shipping, which have not yet been surveyed in a definite manner. In this work the British hydrographic office may justly claim the credit of having contributed the chief share. Great Britain has likewise taken the lead in those deep-sea explora- tions which reveal to us the configuration of the sea-bottom, and enable us to construct charts of the ocean bed corresponding to the contoured maps of dry land yielded by topographical surveys.

(E. G. R.) Map Projections In the construction of maps, one has to consider

how a portion of spherical surface, or a configuration traced on a sphere, can be represented on a plane. If the area to be represented bear a very small ratio to the whole surface of the sphere, the matter is easy: thus, for instance, there is no difficulty in making a map of a parish, for in such cases the curvature of the surface does not make itself evident. If the district is larger and reaches the size of a county, as Yorkshire for instance, then the curvature begins to be sensible, and one requires to consider how it is to be dealt with. The sphere cannot be opened out into a plane like the cone or cylinder; consequently in a plane representation of configurations on a sphere it is impossible to retain the desired proportions of lines or areas or equality of angles. But though one cannot fulfil all the requirements of the case, we may fulfil some by sacrificing others; we may, for instance, have in the representation exact similarity to all very small portions of the original, but at the expense of the areas, which will be quite misrepresented. Or we may retain equality of areas if we give up the idea of similarity. It is therefore usual, excepting in special cases, to steer a middle course, and, by making com- promises, endeavour to obtain a representation which shall not involve large errors of scale.

A globe gives a perfect representation of the surface of the earth; but, practically, the necessary limits to its size make it impossible to represent in this manner the details of countries. A globe of the ordinary dimensions serves scarcely any other purpose than to convey a clear conception of the earth's surface as a whole, exhibiting the figure, extent, position and general features of the continents and islands, with the intervening oceans and seas; and for this purpose it is indeed absolutely essential and cannot be replaced by any kind of map.

The construction of a map virtually resolves itself into the drawing of two sets of lines, one set to represent meridians, the other to represent parallels. These being drawn, the filling in of the outlines of countries presents no difficulty. The first and most natural idea that occurs to one as to the manner of drawing the circles of latitude and longitude is to draw them according to the laws of perspective. Perhaps the next idea which would occur would be to derive the meridians and parallels in some other simple geometrical way.

Cylindrical Equal Area Projection. — Let us suppose a model of the earth to be enveloped by a cylinder in such a way that the cylinder touches the equator, and let the plane of each parallel such as PR be prolonged to intersect the N

cylinder in the circle pr. Now unroll the cylinder and the projection will appear as in fig. 2. The whole world is now represented as a rectangle, each parallel is a straight line, and its total length is the same as that of the

equator, the distance of each parallel from the equator is sin I (where / is the latitude and the radius of the model earth is taken as unity). The meridians are parallel straight lines spaced at equal distances.

S Fig. 1.

This projection possesses an important property. From the elementary geometry of sphere and cylinder it is clear that each

” . N N

S S

Fig. 2. strip of the projection is equal in area to the zone on the model which it represents, and that each portion of a strip is equal in area to the corresponding portion of a zone. Thus, each small four-sided figure (on the model) bounded by meridians

and parallels

Q’

is represented on the projection by a

rectangle | [which is of exactly the same area, and this applies to any such figure however small. It therefore follows that any figure, of any shape on the model, is correctly represented as regards area by its corresponding figure on the projection. Projections having this property are said to be equal-area projections or equivalent projections; the name of the projection just described is ” the cylindrical equal-area projection.” This projection will serve to ex- emplify the remark made in the first paragraph that it is possible to select certain qualities of the model which shall be represented truthfully, but only at the expense of other qualities. For instance, it is clear that in this case all meridian lengths are too small and all lengths along the parallels, except the equator, are too large. Thus although the areas are pre- served the shapes are, especially away from the equator, much distorted.

The property of preserving areas is, however, a valuable one when the purpose of the map is to exhibit areas. If, for example, it is desired to give

an idea of the area arid distribution of the various states comprising the British Empire, this is a fairly good projection. Mercator's, which is commonly used in atlases, preserves local shape at the expense of area, and is valueless for the purpose of showing areas.

Many other projections can be and have been devised, which depend for their construction on a purely geometrical relation- ship between the imaginary model and the plane. Thus pro- jections rmiy be drawn which are derived from cones which touch or cut the sphere, the parallels being formed by the intersection with the cones of planes parallel to the equator, or by lines drawn radially from the centre. It is convenient to describe all pro- jections which are derived from the model by a simple and direct geometrical construction as " geometrical projections." All other projections may be known as " non-geometrical projec- tions." Geometrical projections, which include perspective projections, are generally speaking of small practical value. They have loomed much more largely on the map-maker's horizon than their importance warrants. It is not going too far to say that the expression " map projection " conveys to most well-informed persons the notion of a geometrical projection; and yet by far the greater number of useful projections are non- geometrical. The notion referred to is no doubt due to the very term " projection," which unfortunately appears to indicate an arrangement of the terrestrial parallels and meridians which can be arrived at by direct geometrical construction. Especially has harm been caused by this idea when dealing with the group of conical projections. The most useful conical projections have nothing to do with the secant cones, but are simply projections in which the meridians are straight lines which converge to a point which is the centre of the circular parallels. The number of really useful geometrical projections may be said to be four: the equal-area cylindrical just described, and the following per- spective projections — the central, the stereographic and Clarke's external.

Perspective Projections.

In perspective drawings of the sphere, the plane on which the representation is actually made may generally be any plane perpendicular to the line joining the centre of the sphere and the point of vision. If V be the point of vision, P any point on the spherical surface, then p, the point in which the straight line VP intersects the plane of the representation, is the projection of P.

Orthographic Projection. — In this projection the point of vision is at an infinite distance and the rays consequently parallel; in this case the plane of the drawing may be supposed to pass through the centre of the sphere. Let the circle (fig. 3) represent the plane of the equator on which we propose to make an orthographic representation of meridians and parallels.

The centre of this circle is clearly the projection of the pole, and the parallels are projected into circles having the pole for a common centre. The diameters aa' , bb' being at right angles, let the semicircle bob' be divided into the required number of equal parts; the diameters drawn through these points are the projections of meridians. The distances of c, of d and of e from the diameter ad' axe the radii of the successive circles representing the parallels. It is clear that, when the points of division are very close, the parallels will be very much crowded towards the outside of the map; so much so, that this projection is not much used.

For an orthographic projection of the globe on a meridian plane let qnrs (fig. 4) be the meridian, ns the axis of rotation, then qr is the projection of the equator. The parallels will be represented by straight lines passing through the points of equal division ; these lines are, like the equator, perpendicular to ns. The meridians will in this case be ellipses described on ns as a common major axis, the distances of c, of d and of e from ns being the minor semiaxes.

Fig. 3.

Fig. 4.

Fig. 5.

Let us next construct an orthographic projection of the sphere on the horizon of any place.

Set off the angle aop (fig. 5) from the radius oa, equal to the latitude. Drop the perpendicular pP on oa, then P is the projection of the pole. On ao produced take ob = pP, then ob is the minor semiaxis of the ellipse representing the equator, its major axis being qr at right angles to ao. The points in which the meridians meet this elliptic equator are determined by lines drawn parallel to aob through the points of equal subdivision cdefgh. Take two points, as d and g, which are 90 apart, and let ik be their projections on the equator; then t is the pole of the meridian which passes through ft. This meridian is of course an ellipse, and is described with reference to i exactly as the equator was described with reference to P. Produce io to /, and make lo equal to half the shortest chord that can be drawn through i; then lo is the semi-axis of the elliptic meridian, and the major axis is the diameter per- pendicular to iol.

For the parallels: let it be required to describe the parallel whose co-latitude is u; take pm = pn=u, and let m'n' be the projections of m and n on 0P0; then m'n' is the minor axis of the ellipse representing the parallel. Its centre is of course mid- way between to' and n', and the greater axis is

equal to mn. Thus the construction is obvious. When pm is less than pa the whole of

Fig. 6.-— Orthographic Projection.

the ellipse is to be drawn. When pm is greater than pa the ellipse touches the circle in two points; these points divide the ellipse into two parts, one of which, being on the other side of the meridian plane aqr, is invisible. Fig. 6 shows the complete orthographic projection.

Stereographic Projection. — In this case the point of vision is on the surface, and the projection is made on the plane of the great circle whose pole is V. Let kplV (fig. 7) be a great circle through the point of vision, and ors the trace of the plane of projec- tion. Let c be the centre of a small circle whose radius is cp = cl; the straight line pi represents this small circle in orthographic projection.

We have first to show that the stereographic projection of the small circle pi is itself a circle; that is to say, a straight line through V, moving along the circumference of pi, traces a circle on the plane of projection ors. This line generates an oblique cone standing on a circular base, its axis being cV (since the angle pVc = angle cVl) ; this cone is divided symmetrically by the plane of the great circle kpl, and also by the plane which passes through the axis Vc, perpendicular to the plane kpl. Now Vr-Vp, being = Vo sec kWp-Vk cos kVp = Vo-Vk, is equal to Vs-Vl; therefore the triangles Vrs, Vlp are similar, and it follows that the section of the cone by the plane rs is similar to the section by the plane pi. But the latter is a circle, hence also the projection is a circle ; and since the representation of every infinitely small circle on the surface is itself a circle, it follows that in this projection the representation of small parts is strictly similar. Another inference is that the angle in which two lines on the sphere intersect is represented by the same angle in the projection. This may otherwise be proved by means of fig. 8, where Wok is the diameter

of the sphere passing through the point of vision, fgh the plane of projection, kt a great circle, passing of course through V, and ouv the line of intersection of these two planes. A tangent plane to the surface at t cuts the plane of pro- jection in the line rvs perpendicular toov; to is a tangent to the circle kt at /, tr and ts are any two tangents to the surface at /. Now the angle vtu (u being the projection of t) is 90° — otV — 90° — o\i =

ouV = tuv, therefore tv is equal to uv; and since tvs and uvs are right angles, it follows that the angles vts and vus are equal. Hence the angle rts also is equal to its projection rus; that is, any angle formed by two intersecting lines on the surface is truly represented in the stereo- graphic projection.

In this projection, therefore, angles are correctly represented and every small triangle is represented by a similar triangle. Projections having this property of similar representation of small parts are called orthomorphic, conjorm or conformable. The word orthomorphic, which was introduced by Germain 1 and adopted by Craig, 2 is perhaps the best to use.

Since in orthomorphic projections very small figures are cor- rectly represented, it follows that the scale is the same in all directions round a point in its immediate neighbourhood, and orthomorphic projections may be defined as possessing this property. There are many other orthomorphic projections, of which the best known is Mercator's. These are described below.

We have seen that the stereographic projection of any circle of the sphere is itself a circle. But in the case in which the circle to be projected passes through V, the projection becomes, for a great circle, a line through the centre of the sphere; otherwise, a line anywhere. It follows that meridians and parallels are represented in a projection on the horizon of any place by two systems of orthogonally cutting circles, one system passing through two fixed points, namely, the poles; and the projected meridians as they pass through the poles show the proper differ- ences of longitude.

To construct a stereographic projection of the sphere on the horizon of a given place. Draw the circle vlkr (fig. 9) with the diameters

1 A. Germain, Traite des Projections (Paris, 1865). 1 T. Craig, A Treatise on Projections (U.S. Coast and Geodetic Survey, Washington, 1882).

kv, Ir at right angles; the latter is to represent the centra!

meridian. Take koP equal to the

co-latitude of the given place, say

u; draw the diameter P0P 1 , and vP,

vt" cutting Ir in pp' : these are the

projections of the poles, through which

all the circles representing meridians

have to pass. All their centres then

will be in a line smn which crosses pp'

at right angles through its middle

point m. Now to describe the meridian

whose west longitude is o>, draw pn

making the angle opn = 90°— «, then

n is the centre of the required circle,

*whose direction as it passes through **

will make an angle opg—01 with pp.

The lengths of the several lines are

op=ta.n$u; op' =cot\u; om = cotu; m» = cosec u cot «.

Again, for the parallels, take Pb = Pc equal to the co-latitude, say c, of the parallel to be projected ; join vb, vc cutting Ir in e, d. Then ed is the diameter of the circle which is the required projection; its centre is of course the middle point of ed, and the lengths of the lines are

o

The line sn itself is the projection of a parallel, namely, that of which the co-latitude c = l8o° — u, a parallel which passes through the point of vision.

Notwithstanding the facility of construction, the stereo- graphic projection is not much used in map-making. It is sometimes used for maps of the hemi- spheres in atlases, and for star charts.

External Perspective Projection. — We now come to the general case in which the point of vision has any position outside the sphere. Let abed (fig. 10) be the great circle section of the sphere by a plane passing through c, the central point of the portion of surface to be represented, and V the point of vision. Let pj perpendicular to Vc be the plane of representation, join

Fig. 10. m\f cutting pj in/, then/ is the projection of any point m in the

circle abc, and ef is the representation of cm.

Let the'angle com = u, Ve = k, Wo = h, ef=p; then, since ef: eV — mg: gV, we have p = k sin u/_(h+cosu), which gives the law connect- ing a spherical distance w with its rectilinear representation p. The relative scale at any point in this system of projection is given by

(T = dp/du, cr' = p/sin u,

the former applying to measurements made in a direction which passes through the centre of the map, the latter to the transverse direction. The product aa' gives the exaggeration of areas. With respect to'the alteration of angles we have 2 = (ft + cos #)/(l+fe cos tt)> and the greatest alteration of angle is

= sin "M , 1 , tan 2 –

KTPr^t}-

This vanishes when h = i, that is if the projection be stereographic; or for « = o, that is at the centre of the map. At a distance of 90 ° from the centre, the greatest alteration is 90° — 2 cot- 1 Vft- (See Phil. Mag. 1862.)

Clarke's Projection. — The constants h and k can be determined, so that the total misrepresentation, viz. :

M=J"/{(

shall be a minimum, ft being the greatest value of u, or the spherical radius of the map. On substituting the expressions] for a and a' the integration is effected without difficulty. Put

X = (i-cos/3)/(ft+cos/3); v = {h-l)\ H=i— (A + i) log„(X + i), H' =X(2-y+ir 2)/(fc+l). Then the value of M is

M=4sin 2 i/3+2£H+£ 2 H'.

When this is a minimum,

dM/dh=o; dU/dk=o .\£H'+H=o; 2dH/dh+kdhH'ldh=o.

Therefore M =4 sin 2 5/S— H'/H 1 , and h must be determined so as to make H 2 :H' a maximum. In any particular case this maximum can only be ascertained by trial, that is to say, log H 2 — log H' must be calculated for certain equidistant values of h, and then the

particular value of h which corresponds to the required maximum can be obtained by interpolation. Thus we find that if it be required to make the best possible perspective representation of a hemi- sphere, the values of h and k are ft = 1-47 and k =2-034; so that in this case

_ 2-034 s ‘ n u p ~ 1-47 + cos u

For a map of Africa or South America, the limiting radius /3 we may take as 40 ; then in this case

_ 2-543 sin u p 1-625 + cos u

For Asia, (3 = 54, and the distance h of the point of sight in this case is i-6i. Fig. 11 is a map of Asia having the meridians and parallels laid down on this system.

Fig. 11.

Fig. 12 is a perspective representation of more than a hemi- sphere, the radius /S being 108 , and the distance h of the point of vision, 1-40.

The co-ordinates xy of any point in this perspective may be ex- pressed in terms of latitude and longitude of the corresponding

Fig. 12. — Twilight Projection. Clarke’s Perspective Projection for a Spherical Radius of 108 .

point on the sphere in the following manner. The co-ordinates originating at the centre take the central meridian for the axis of y and a line perpendicular to it for the axis of x. Let the latitude of the point G, which is to occupy the centre of the map, be 7 ; if , u

be the latitude and longitude of any point P (the longitude being reckoned from the meridian of G), u the distance PG, and /j the azimuth of P at G, then the spherical triangle whose sides are 90 — 7, 90 — 0, and u gives these relations —

sin « sin m = cos sin a,

sin u cos 11 = cos 7 sin — sin 7 cos cos «,

cos u — sin 7 sin 0+cos 7 cos cos o>.

Now x = p sin /», y = p cos p, that is,

x cos sin a

k h t \ sin 7 sin 4> + cos 7 cos cos a y _ cos 7 sin — sin 7 cos cos co k h + sin 7 sin + cos 7 cos cos u'

by which x and y can be computed for any point of the sphere. If from these equations we eliminate «, we get the equation to the parallel whose latitude is <#>; it is an ellipse whose centre is in the central meridian, and its greater axis perpendicular to the same. The radius of curvature of this ellipse at its intersection with the centre meridian is k cos /(h sin 7+sin).

The elimination of between x and y gives the equation of the meridian whose longitude is w, which also is an ellipse whose centre and axes may be determined.

The following table contains the computed co-ordinates for a map of Africa, which is included between latitudes 40 north and 40 south and 40 of longitude east and west of a central meridian.

Values of x and y.

« = o°

<0 = I0°

W = 20°

co =30°.

01=40°

o°

10° 20°

30°

40

x — o-oo y= o-oo

x= o-oo y= 9-69

X= 0-00

y= 19-43

X= 0-00

^=29-25

X= 0-00

y = 39-i7

9-69

o-oo

9-60 9-75 9-32

19-54 8-84

29-40

8-15 39-36

19-43

0-00

19-24

9-92

18-67

19-87

17-70 29-87

16-28

39-94

29-25

0-00

28-95

10-21 28-07

20-43

26-56 30-67

24-39 40-93

39-17

o-oo

38-76

10-63

37-53 21-25

35-44 31-83

32-44 42-34

Central or Gnomonic {Perspective) Projection. — In this projec- tion the eye is imagined to be at the centre of the sphere. It is evident that, since the planes of all great circles of the sphere pass through the centre, the representations of all great circles on this projection will be straight lines, and this is the special property of the central projection, that any great circle (i.e. shortest line on the spherical surface) is represented by a straight line. The plane of projection may be either parallel to the plane of the equator, in which case the parallels are represented by concentric circles and the meri- dians by straight lines radiating from the common centre; or the plane of projection may be parallel to the plane of some meridian, in which case the meridians are parallel straight lines and the parallels are hyperbolas; or the plane of projection may be inclined to the axis of the sphere at any angle X.

In the latter case, which is the most general, if 6 is the angle any meridian makes (on paper) with the central meridian, a the longitude of any point P with reference to the central meridian, I the latitude of P, then it is clear that the central meridian is a straight line at right angles to the equator, which is also a straight line, also tan = sin Xtan a, and the distance of p, the projection of P, from the equator along its meridian is (on paper) m sec a sin / / sin (l+x), where tan x = cot X cos a, and m is a constant which defines the scale.

The three varieties of the central projection are, as is the case with other perspective projections, known as polar, meridian or horizontal, according to the inclination of the plane of pro- jection.

Fig. 14 is an example of a meridian central projection of part of the Atlantic Ocean. The term " gnomonic " was applied

to this projection because the projection of the meridians is a similar problem to that of the graduation of a sun-dial. It is,

however, better to use the term " central, " which explains itself. The central projection is useful for the study of direct routes by sea and land. The United States Hydro- graphic Department has published some charts on this projection. False notions of the direction of shortest lines, which are engendered by a study of maps on Mercator's projection, may be corrected by an inspection of maps drawn on the central projection.

There is no projection which accurately possesses the property of showing shortest paths by straight lines when applied to the spheroid; one which very

(From Text Book of Topographical Surveying, bv permission of the Controller of H. M . Stationery Office.)

Fig. 14. — Part of the Atlantic Ocean on a Meridian Central Pro- jection. The shortest path between any two points is shown on this projection by a straight line.

nearly does so is that which results from the intersection of terrestrial normals with a plane.

We have briefly reviewed the most important projections which are derived from the sphere by direct geometrical construc- tion, and we pass to that more important branch of the subject which deals with projections which are not subject to this limitation.

Conical Projections. Conical projections are those in which the parallels are repre- sented by concentric circles and the meridians by equally spaced radii. There is no necessary connexion between a conical pro- jection and any touching or secant cone. Projections for instance which are derived by

geometrical construction from secant cones are very poor projections, exhibiting large errors, and they will not be discussed. The name conical is given to the group embraced by the above definition, because, as is obvious, a projection so drawn can be bent round to form a cone. The simplest and, at the same time, one of the most useful forms of conical projection is the following:

Conical Projection with Rectified Meridians and Two Standard Parallels. — In some books this has been, most unfortunately, termed the " secant conical," on account of the fact that there are two parallels of the correct length. The use of this term in the past has caused much confusion. Two selected parallels are represented by concentric cir- cular arcs of their true lengths; the meridians are their radii. The degrees along the meridians are represented by their true lengths; and the other parallels are circular arcs through points so deter- mined and are concentric with the chosen parallels.

n'co.tat.t

Fig. 15.

Thus in fig. 15 two parallels Gre and GV are represented by their true lengths on the sphere; all the distances along the meridian PGG', pnri are the true spherical lengths rectified.

Let 7 be the co-latitude of Gn ; 7′ that of GV ; w be the true differ- ence of longitude of PGG' and pnn' ; hu be the angle at O ; and OP = 2, where Vp is the representation of the pole. Then the true length of parallel G« on the sphere is a sin 7, and this is equal to the length on the projection, i.e. o> siny = ha(z+y) ; similarly ■ w sin 7′ = hw(z+y').

The radius of the sphere is assumed to be unity, and 2 and 7 are expressed in circular measure. Hence h = sin 7/(2+7) = sin y'{z+y'); from this h and z are easily found.

In the above description it has been assumed that the two errorless parallels have been selected. But it is usually desirable to impose some condition which itself will fix the errorless

parallels. There are many conditions, any one of which may be imposed. In fig. 15 let Cm and Cm' represent the extreme parallels of the map, and let the co-latitudes of these parallels be c and c', then any one of the following conditions may be fulfilled:—

(a) The errors of scale of the extreme parallels may be made equal and may be equated to the error of scale of the parallel of maximum error

(which is near the mean parallel) .

(b) Or the errors of scale of the extreme parallels may be equated to that of the mean parallel. This is not so good a projection as (a).

(c) Or the absolute errors of the extreme and mean parallels may be equated.

(d) Or in the last the parallel of maximum error may be considered instead of the mean parallel.

(e) Or the mean length of all the parallels may be made correct. This is equivalent to making the total area between the extreme parallels correct, and must be combined with another condition, for example, that the errors of scale on the extreme parallels shall be equal.

We will now discuss (a) above, viz. a conical projection with recti- fied meridians and two standard parallels, the scale errors of the extreme parallels and parallel of maximum error being equated.

Since the scale errors of the extreme parallels are to be equal,

h(z+c) h(z+c') , e'sine— csinc' .. . 1, whence z= _ : _ ,/ — zˆrr- (1.)

sin c —sine

The error of scale along any parallel (near the centre), of which the co-latitude is b is

i-{fe(z+6)/sin 6}. This is a maximum when

(ii.)

Also

tan b — b = z, whence b is found. h(z+b) h(z+c)

sin b

- — 1 , whence h is found.

("i.)

For the errorless parallels of co-latitudes y and 7' we have ft = (2+7) / sin y = (z-fVJ/sin y' .

If this is applied to the case of a map of South Africa between the limits 15°

S. and 35 S. (see fig. 16) it will be found that the parallel of maximum error is 25° 20'; the errorless parallels, to the nearest degree, are those of 18 and 32°. The greatest scale error in this case is about 0-7%.

In the above account the earth has been treated as a sphere. Of course its real shape is approximately a spheroid of revolution, and the values of the axes most commonly employed are those of Clarke or of Bessel. For the spheroid, formulae arrived at by the same principles but more cumbrous in shape must be used. But it will usually be sufficient for the selection of the errorless parallels to use the simple spherical formulae given above ; then, having made the selection of these parallels, the true spheroidal lengths along the meridians between them can be taken out of the ordinary tables (such as those published by the Ordnance Survey or by the U.S. Coast and Geodetic Survey). Thus, if a it a 2 , are the lengths of 1° of the errorless parallels (taken from the tables), d the true rectified length of the meridian arc between them (taken from the tables),

h = {(a 2 — a 1)/d)i8o/7r, and the radius on paper of parallel, ai is aid/{a?.—ai), and the radius of any other parallel = radius of di ± the true meridian distance between the parallels.

This class of projection was used for the 1/1,000,000 Ordnance map of the British Isles. The three maximum scale errors in this case work out to 0-23 %, the range of the projection being from 50 N. to 6i° N., and the errorless parallels are 59°3i' and 5i°44'.

Where no great refinement is required it will be sufficient to take the errorless parallels as those distant from the extreme parallels about one-sixth of the total range in latitude. Thus suppose it is required to plot a projection for India between latitudes 8° and 40 N. By this rough rule the errorless parallels should be distant from the extreme parallels about 32°/6, i.e. 5 20'; they should therefore, to the nearest degree, be 13 and 35 N. The maximum scale errors will be about 2 %.

The scale errors vary approximately as the square of the range of latitude; a rough rule is, largest scale error = L 2 /50,ooo, where L is the range in the latitude in degrees. Thus a country with a range of 7 in latitude (nearly 500 m.) can be plotted on this projection with a maximum linear scale error (along a parallel) of about o-i %■} there is no error along any meridian. It is immaterial with this

1 This error is much less than that which may be expected from contraction and expansion of the paper upon which the projection is drawn or printed.

projection (or with any conical projection) what the extent in longi- tude is. It is clear that this class of projection is accurate, simple and useful.

Fig. 17.

(From Text Book of Topographical Surveying, by permission of the Controller of H. M. Stationery Office.)

Fig. 16. — South Africa on a conical projection with rectified meridians and two standard parallels. Scale 800 m. to 1 in.

In the projections designated by © and (d) above, absolute errors ot length are considered in the place of errors of scale, i.e. between any two meridians © the absolute errors of length of the extreme parallels are equated to the absolute error of length of the middle parallel. Using the same notation

h (z+c)— sin \c-h {z+c')— sin c'= — h {z--\c--\c r)— sin \ (c+c').
L. Euler, in the Acta Acad. Imp. Petrop. (1778), first discussed this projection.

If a map of Asia between parallels 10 N. and 70 N. is constructed on this system, we have c — 20 , c' = 8o°, whence from the above equations 2 = 66-7° and ˆ = -6138. The absolute errors of length along parallels 10°, 40° and 70° between any two meridians are equal but the scale errors are respectively 5, 6-7, and 15%.

The modification (d) of this projection was selected for the 1:1,000,000 map of India and Adjacent Countries under publica- tion by the Survey of India. An account of this is given in a pam- phlet produced by that department in 1903. The limiting parallels are 8° and 40° N., and the parallel of greatest error is 23 40′ 51". The errors of scale are 1-8, 2-3, and 1-9%.

It is not as a rule desirable to select this form of the projection. If the surface of the map is everywhere equally valuable it is clear that an arrangement by which errors of scale are larger towards the pole than towards the equator is unsound, and it is to be noted that in the case quoted the great bulk of the land is in the north of the map. Projection (a) would for the same region have three equal maximum scale errors of 2 %. It may be admitted that the prac- tical difference between the two forms is in this case insignificant, but linear scale errors should be reduced as much as possible in maps intended for general use.

/. In the fifth form of the projection, the total area of the pro- jection between the extreme parallels and any two meridians is equated to the area of the portion of the sphere which it represents, and the errors of scale of the extreme parallels are equated. Then it is easy to show that

z= (c' sin c— c sin c')/(sm c' — sin c) ; h= (cos c — cos c')/(c'—c){z +i (c +«')!• It can also be shown that any other zone of the same range in latitude will have the same scale errors along its limiting parallels. For instance, a series of projections may be constructed for zones, each having

a range of io° of latitude, from the equator to the pole. Treating the earth as a sphere and using the above formulae, the series will possess the following properties : the meridians will all be true to scale, the area of each zone will be correct, the scale errors of the limiting parallels will all be the same, so that the length of the upper parallel of. any zone will be equal to that of the lower parallel of the zone above it. But the curvatures of these parallels will be different, and two adjacent zones will not fit but will be capable of exact rolling contact. Thus a very instructive flat model of the globe may be constructed which will show by suitably arrang- ing the points of contact of the zones the paths of great circles on the sphere. The flat model was devised by Professor J. D. Everett, F.R.S., whoalso pointed out that the projection had the property of the equality of scale errors of the limiting parallels for zones of the same width. The projection may be termed Everett's Projection.

Simple Conical Projection. — If in the last group of projections the two selected parallels which are to be errorless approach each other indefinitely closely, we get a projection in which all the meridians are, as before, of the true rectified lengths, in which one parallel is errorless, the curvature of that parallel being clearly that which would result from the unrolling of a cone touching the sphere along the parallel represented. And it was

in fact originally by a consideration of the tangent cone that the whole group of conical projections came into being. The quasi- geometrical way of regarding conical projections is legitimate in this instance.

The simple conical projection is therefore arrived at in this way : imagine a cone to touch the sphere along any selected parallel, the radius of this parallel on paper (JPp, fig. 17) will be r cot <$>, where r is the radius of the sphere and $ is the latitude ; or if the spheroidal shape is taken into account, the radius of the parallel on paper will be v cot where v is the normal terminated by the minor axis (the value v can be found from ordinary geodetic tables). The meridians are generators of the cone and every parallel such as HH' is a circle, concentric with the selected parallel Pp and distant from it the true rectified length of the meridian arc between them.

This projection has no merits as compared with the group just described. The errors of scale along the parallels increase rapidly as the selected parallel is departed from, the parallels on paper being always too large. As an example we may take the case of a map of South Africa of the same range as that of the example given in (a) above, viz. from 15° S. to 35° S. Let the selected parallel be 25° S. ; the radius of this parallel on paper (taking the radius of the sphere as unity) is cot 25°; the radius of parallel 35° S. =radius of 25° —meridian distance between 25° and 35° = cot 25

— i07r/i8o = 1-970. Also h = sm of selected latitude = sin 25°, and length on paper along parallel 35 of w° = uftXi-970 = wXi-970Xsin 25 ,

but length on sphere of « = « cos 35°,

, , l – 970 sin 25° , „,

hence scale error = — — 3^ 1 = l-6%,

cos 35°

an error which is more than twice as great as that obtained by method (a).

Bonne's Projection. — This projection, which is also called the " modified conical projection," is derived from the simple coni- cal, just described, in the following way: a central meridian is chosen and drawn as a straight line; degrees of latitude spaced at the true rectified distances are marked along this line; the parallels are concentric circular arcs drawn through the proper points on the central meridian, the centre of the arcs being fixed by describing one chosen parallel with a radius of v cot d> as before; the meridians on each side of the central meridian are drawn as follows: along each parallel distances are marked equal to the true lengths along the parallels on sphere or spheroid, and the curve through corresponding points so fixed are the meridians (fig. 18).

This system is that which was adopted in 1803 by the " Depot de la Guerre " for the map of France, and is there known by the title of Projection de Bonne. It is that on which the ordnance survey map of Scotland on the scale of 1 in. to a mile is constructed, and it is frequently met with in ordinary atlases. It is ill-adapted for countries having great extent in longitude, as the intersections of the meridians and parallels become very oblique — as will be seen on examining the map of Asia in most atlases.

If a be taken as the latitude of the centre parallel, and co-ordinates be measured from the intersection of this parallel with the central meridian, then, if p be the radius of the parallel of latitude , we have p = cot<£ +■£„ — . Also, if S be a point on this parallel whose co-ordinates are x, y, so that VS = p, and 8 be the angle VS makes with the central meridian, then p0 = « cos <(>; and x = p sin 9, y — cot —p cos 0.

The projection has the property of equal areas, since each small element bounded by two infinitely close parallels is equal in length and width to the corresponding element on the sphere or spheroid. Also all the meridians cross the chosen parallel (but no other) at right angles, since in the immediate neighbour- hood of that parallel the projection is identical with the simple conical projection. Where an equal-area projection is required

for a country having no great extent in longitude, such as France, Scotland or Madagascar, this projection is a good one to select.

Sinusoidal Equal-area Projection. — This projection, which is

Fig. 18.

MAP PROJECTIONS]

MAP

6 59

Lm-

4A

A

*IJM \ *

‘ j

*\ *

7

/

■

J ‘

**

A i

\\ l

Fig. 19.-

-Sinusoidal Equal-area Projection.

sometimes known as Sanson’s, and is also sometimes incorrectly called Flamsteed’s, is a particular case of Bonne’s in which the selected parallel is the equator. The equator is a straight line at right angles to the central meridian which is also a straight

line. Along the central meridian the latitudes are marked off at the true rectified distances, and from points so found the parallels are drawn as straight lines parallel to the equator, and therefore at right angles to the central meridian. True rectified lengths are marked along the parallels and through correspond- ing points the meridians are drawn. If the earth is treated as a sphere the meridians are clearly sine curves, and for this reason d'Avezac has given the projection the name sinusoidal. But it is equally easy to plot the spheroidal lengths. It is a very suitable projection for an equal-area map of Africa.

Werner's Projection. — This is another limiting case of Bonne's equal-area projection in which the selected parallel is the pole. The parallels on paper then become incomplete circular arcs of which the pole is the centre. The central meridian, is still a straight line which is cut by the parallels at true distances. The projection (after Johann Werner, 1468-15 28), though interesting, is practically useless.

Polyconic Projections.

These pseudo-conical projections are valuable not so much for their intrinsic merits as for the fact that they lend themselves to tabulation. There are two forms, the simple or equidistant polyconic, and the rectangular polyconic.

The Simple Polyconic. — If a cone touches the sphere or spheroid along a parallel of latitude and is then unrolled, the parallel will on paper have a radius of $\nu \cot$ *, where* ν *is the normal terminated by the minor axis. If we imagine a series of cones, each of which touches one of a selected series of parallels, the apex of each cone will lie on the prolonged axis of the spheroid; the generators of each cone lie in meridian planes, and if each cone is unrolled and the generators in any one plane are superposed to form a straight central meridian, we obtain a projection in which the central meridian is a straight line and the parallels are circular arcs each of which has a different centre which lies on the prolongation of the central meridian, the radius of any parallel being* $\nu \cot d>$.

So far the construction is the same for both forms of polyconic. In the simple polyconic the meridians are obtained by measuring outwards from the central meridian along each parallel the true lengths of the degrees of longitude. Through corresponding points so found the meridian curves are drawn. The resulting projection is accurate near the central meridian, but as this is departed from the parallels increasingly separate from each other, and the parallels and meridians (except along the equator) intersect at angles which increasingly differ from a right angle. The real merit of the projection is that each particular parallel has for every map the same

absolute radius, and it is thus easy to construct tables which shall be of universal use. This is especially valuable for the projection of single sheets on compara- tively large scales. A sheet of a degree square on a scale of 1:250,000 projected in this manner differs inappreciably from the same sheet projected on a better system, e.g. an orthomorphic conical projection or the conical with rectified meridians and two standard parallels; there is thus the advantage that the simple polyconic when used for single sheets and large scales is a sufficiently close approximation to the better forms of conical

Fig. 20.

projection. The simple polyconic is used by the topographical section of the general staff, by the United States coast and geodetic survey and by the topographical division of the U.S. geological survey. Useful tables, based on Clarke's spheroid of 1866, have been published by the war office and by the U.S. coast and geodetic survey.

Rectangular Polyconic. — In this the central meridian and the parallels are drawn as in the simple polyconic, but the meridians are curves which cut the parallels at righ t angles.

In this case, let P (fig. 20) be the north pole, CPU the central meridian, U, U' points in that meridian whose co-latitudes are z and z+dz, so that UXJ' =dz. Make PU = z, UC=tan z, U'C'=tan (z+dz); and with CC' as centres describe the arcs UQ, U'Q', which represent the parallels of co-latitude z and z+dz. Let PQQ' be part of a meridian curve cutting the parallels at right angles. Join CQ, C'Q'; these being perpendicular to the circles will be tangents to the curve. Let UCQ = 2a, UC'Q' = 2(o+CQC, or the angle between the tangents at QQ', will = 2

CC' = C'U'-CU-UU'=tan (2+

2 tan ,z tan q _ 2co sin z I f tan 2 a ~ I + w 2 cos 2 a At the equator this becomes simply 2 to. Let any equatorial point whose actual longitude is 2w be represented by a point on the developed equator at the distance 2a from the central meridian, then we have the following very simple construc tion (due to O'Farrell of the ordnance survey). Let P (fig. 21) be the pole, U any point in the central meridian, QUQ the represented parallel whose radius CU = tan z. Draw SUS' per- pendicular to the meridian through U ; then to determine the point Q, whose longitude is, say, 3°, lay off US equal to half the true length of the arc of parallel on the sphere, i.e. i° 30′ to S u S

radius sin z, and with the centre S and Fig. 21.

radius SU describe a circular arc, which will intersect the parallel in the required point Q. For if we suppose 2 W to be the longitude of the required point Q, US is by construction =o> sin z, and the angle subtended by SU at C is

(-^(-co..).

and therefore UCQ = 2a as it should be. The advantages of this method are that with a remarkably simple and convenient mode ot construction we have a map in which the parallels and meridians intersect at right angles.

Fig. 22 is a representation of this system of the continents of Europe and Africa, for which it is well suited. For Asia this system would not do, as in the northern latitudes, say along the parallel of 70°, the representation is much cramped.

With regard to the distortion in the map of Africa as thus con- structed, consider a small square in latitude 40 and in 40° longi- tude east or west of the central meridian, the square being so placed as to be transformed into a rectangle. The sides, originally unity, became 0-95 and 1-13, and the area 1-08, the diagonals inter- secting at 90° ± 9° 56'. In Clarke's perspective projection a

w^Wj \ \^Jr

\A

^j

A j

O

Wh

rV

V

-

im x

— 1

T-K./

*square of unit side occupying the same position, when trans- formed to a rectangle, has its sides 1-02 and 1-15, its area 1-17, and its diagonals intersect at 90° = * = 7° 6'. The latter projection is therefore the best in point of " similarity," but the former represents areas best. This applies, however, only to a par- ticular part of the map; along the equator towards 30 or 40 longitude, the polyconic is certainly inferior, while along the meridian it is better than the perspective — except, of course, near the centre. Upon the whole the more even distribution of distortion gives the advantage to the perspective system. For single sheets on large scales there is nothing to choose between this projection and the simple polyconic. Both are sensibly perfect representations. The rectangular polyconic is occasionally used by the topographical section of the general staff.*

Zenithal Projections.

Some point on the earth is selected as the central point of the map; great circles radiating from this point are represented by straight lines which are inclined at their true angles at the point of intersection. Distances along the radiating lines vary according to any law outwards from the centre. It follows (on the spherical assumption), that circles of which the selected point is the centre are also circles on the projection. It is obvious that all perspective projections are zenithal.

Equidistant Zenithal Projection. — In this projection, which is commonly called the " equidistant projection," any point on the sphere being taken as the centre of the map, great circles through this point are represented by straight lines of the true rectified lengths, and intersect each other at the true angles.

In the general case— if Z\ is the co-latitude of the centre of the map, z the co-latitude of any other point, a the difference of longitude of the two points, A the azimuth of the line joining them, and c the spherical length of the line joining them, then the position of the intersection of any meridian with any parallel is given (on the spherical assumption) by the solution of a simple spherical triangle.

Thus — – let tan = tan z cos a, then cos c = cos z sec 9 cos (z — 0), and sin A = sin z sin o cosec c.

The most useful case is that in which the central point is the pole; the meridians are straight lines inclined to each other at the true angular differences of longitude, and the parallels are equi- distant circles with the pole as centre. This is the best projection to use for maps exhibiting the progress of polar discovery, and is called the polar equidistant projection. The errors are smaller than might be supposed. There are no scale errors along the meridians, and along the parallels the scale error is (z/ sin x) — 1, where z is the co-latitude of the parallel. On a parallel io° distant from the pole the error of scale is only 0-5 %.

General Theory of Zenithal Projections. — For the sake of simplicity it will be at first assumed that the pole is the centre of the map, and that the earth is a sphere. According to what has been said above, the meridians are now straight lines diverging from the pole, dividing the 360 into equal angles; and the parallels are represented by circles having the pole as centre, the radius of the parallel whose co-latitude is z being p, a certain function of z. The particular function selected determines the nature of the projection.

Let Ppq, Prs (fig. 23) be two contiguous meridians crossed by parallels rp, sq, and Op'q', Or's' the straight lines representing these meridians. If the angle at P is dp., this also is the value of the angle at O. Let the co-latitude

Pp = z, Pq = z + dz;Op' = p, Oq' = p + dp,

the circular arcs p'r', q's' representing the parallels pr, qs. If the radius of the sphere be unity,

p'q' = dp; p'r' = pdp., pq = dz; pr = sin zdp. Put

a = dp/dz ; a' = p/sin z, then p'q' = apq and p'r' = a'pr. That is to say, a, a' may be regarded as the relative scales, at co-latitude z, of the representation, a applying to meridional measurements,

Fig. 23.

If it were possible to make a perfect representation, then we should have a = 1, a' = 1 throughout. This, however, is im- possible. We may make cr = 1 throughout by taking p = z. This is the Equidistant Projection just described, a very simple and effective method of representation.

Or we may make cr' = i throughout. This gives p = sin z, a perspective projection, namely, the Orthographic.

Or we may require that areas be strictly represented in the development. This will be effected by making era' = 1 , or pdp — sin zdz, the integral of which is p = 2 sinjz, which is the Zenithal Equal-area Projection of

Lambert, sometimes, though wrongly referred to as Lorgna's Projection after Antonio Lorgna (b. 1736). In this system there is misrepresentation of form, but no misrepresentation of areas.

Or we may require a projection in which all small parts are to be represented in their true forms i.e. an orthomorphic projection. For instance, a small square on the spherical surface is to be represented as a small square in the development. This condi- tion will be attained by making cr = cr', or dp/p = dz/sin z, the integral of which is, c being an arbitrary constant, p = c tan \z. This, again, is a perspective projection, namely, the Stereographic. In this, though all small parts of the surface are represented in their correct shapes, yet, the scale varying from one part of the map to another, the whole is not a similar representation of the original. The scale,

These two last projections are, as it were, at the extremes of the scale; each, perfect in its own way, is in other respects objectionable. We may avoid both extremes by the following considerations. Although we cannot make a = 1 and a' = 1 , so as to have a perfect picture of the spherical surface, yet considering a — I and a' — \ as the local errors of the representation, we may make (a — l) 2 + («■' — i) 2 a minimum over the whole surface to be represented. To effect this we must multiply this expression by the element of surface to which it applies, viz. sin zdzdy., and then integrate from the centre to the (circular) limits of the map. Let /3 be the spherical radius of the segment to be represented, then the total misrepre- sentation is to be taken as

.jo \ \dz V + (sin z"

■*n*

1) [sin zdz,

which is to be made a minimum. Putting p = z+y, and giving to y only a variation subject to the condition 6y = o when z = o, the equations of solution — using the ordinary notation of the calculus of variations — are

N-

., d 2 y . . dy

*l *z 5 p+sinzcosz s y = z*

■©.-

This method of development is due to Sir George Airy, whose original paper

— the investigation is different in form from the above, which is due to Colonel Clarke — will be found in the Philo- sophical Magazine for 1 86 1 . The solution of the differential equation leads to this result —

p = 2 cot \z log e sec \z + C tan \z, C=2 cot 2 i/3 log sec ip. The limiting radius of the map is R=2C tan J/3. In this system, called by Sir George Airy Projection by balance of errors, the total misrepresentation is an absolute minimum. For short it may be called A iry's Projection.*

Returning to the general case where p is any function of z, let us consider the local misrepresentation of direction. Take any indefinitely small line, length —i, making an angle a with the meri- dian in co-latitude z. Its projections on a meridian and parallel are i cos a, i sin a, which in the map are represented by ia cos o, ia' sin a. If then o' be the angle in the map corresponding to a,

tan a' — {a' la) tan a. Put

a' J a — pdz/sin zdp = 2 , and the error a' — a of representation = e, then

(2-l) tan a tan e= . , „ — — 5 — . 1 +2 tan 2 a

Put 2 =cot 2 f, then e is a maximum when a = f, and the correspond- ing value of e is

« = §T-2f.

For simplicity of explanation we have supposed this method of development so applied as to have the pole in the centre. There is, however, no necessity for this, and any point on the

surface of the sphere may be taken as the centre. All that is necessary is to calculate by spherical trigonometry the azimuth and distance, with reference to the assumed centre, of all the points of intersection of meridians and parallels within the space which is to be represented in a plane. Then the azimuth is represented unaltered, and any spherical distance z is represented by p. Thus we get all the points of intersection transferred to the representation, and it remains merely to draw continuous lines through these points, which lines will be the meridians and parallels in

the representation.

Thus treating the earth as a sphere and applying the Zenithal Equal-area Projection to the case of Africa, the central point selected being on the equator, we have, if 6 be the spherical distance of any point from the centre, , a the latitude and longitude (with reference to the centre), of this point, cos = cos 4> cos a. If A is the azimuth of this point at the centre, tan A = sin a cot d>. On paper a line from the centre is drawn at an azimuth A, and the distance 6 is represented by 2 sin %d. This makes a very good projection for a single-sheet equal-area map of Africa. The exaggeration in such systems, it is important to remember, whether of linear scale, area, or angle, is the same for a given distance from the centre, whatever be the azimuth; that is, the exaggeration is a function of the distance from the centre only.

General Theory of Conical Projections.

Meridians are represented by straight lines drawn through

a point, and a difference of longitude co is represented by an angle

hoi. The parallels of latitude are circular arcs, all having

as centre the point of divergence of the

meridian lines. It is clear that perspective

and zenithal projections are particular

groups of conical projections.

Let z be the co-latitude of a parallel, and p, a function of z, the radius of the circle representing this parallel. Consider the in- finitely small space on the sphere contained by two consecutive meridians, the difference of whose longitude is dp., and two con- secutive parallels whose co-latitudes are z and z--dz. The sides of this rectangle are pq = dz, pr = sin zdp.; in the projection p'q'r's' these become p'q'=dp, and p'r' = phdp.. The scales of the projection as compared with the sphere are p'q'jpq = dpjdz = the scale of meridian measurements = a, say, and p 'r Ipr = phdul sm zdp = pfe/sin z = scale of measurements perpen- dicular to the meridian =

Now we may make a = \ throughout, then p = z+const. This gives either the group of conical projections with rectified meridians, or as a particular case the equidistant zenithal.

We may make a = a' throughout, which is the same as requiring that at

any point the scale shall be the same in all directions. This gives a group of orthomorphic projections.

In this case dp/dz = pft/sin z, or dp/p = hdz/sin z. Integrating, p = fe(tan %z) h , (i.)

where k is a constant.

Now h is at our disposal and we may give it such a value that two selected parallels are of the correct lengths. Let Zi, z% be the co-latitudes of these parallels, then it is easy to show that

;,_ log s ‘ n Zi— log sin zi

is, the vertex of the cone has removed to infinity. And at the limit when h is zero we have r = a log e cot \z, which is the cha- racteristic equation of Mercator’s projection.

log tan |zi — log tan §z 2

(ii.)

This projection, given by equations (i.) and (ii.), is Lambert’s orthomorphic projection— commonly called Gauss’s projection; its descriptive name is the orthomorphic conical projection with two standard parallels.

The constant k in (i.) defines the scale and may be used to render the scale errors along the selected parallels not nil but the same; and some other parallel, e.g. the central parallel may then be made errorless.

The value h = \, as suggested by Sir John Herschel, is admirably suited for a map of the world. The representation is fan-shaped, with remarkably little distortion (fig. 24).

If any parallel of co-latitude z is true to scale hk{ta.n §zi) = sin z, if this parallel is the equator, so that Zi=ox> , kh = i, then equation (i.) becomes p = (tan \z) h lh, and the radius of the equator = I jh. The distance r of any parallel from the equator is l/h — (tan \z) h \h = (i// Ojl-(taniz)M._*

If, instead of taking the radius of the earth as unity we call it a, r = {ajh)\i — (tan Jz)|. When h is very small, the angles between the meridian lines in the representation are very small; and pro- ceeding to the limit, when h is zero the meridians are parallel — that*

Fig. 25. — Elliptical equal-area Projection, showing the whole surface of

the globe.

Mercator's Projection. — From the manner in which we have arrived at this projection it is clear that it retains the character- istic property of orthomorphic projections — namely, similarity of representation of small parts of the surface. In Mercator's chart the equator is represented by a straight line, which is crossed at right angles by a system of parallel and equidistant straight lines representing the meridians. The parallels are straight lines parallel to the equator, and the distance of the parallel of latitude d> from the equator is, as we have seen above, r = a log e tan (45° + f) . In the vicinity of the equator, or indeed within 30 of latitude of the equator, the representation is very accurate, but as we proceed northwards or southwards the exaggeration of area becomes larger, and eventually excessive — the poles being at infinity. This distance of the parallels may be expressed in the form r = a (sin \ sin 3 4>\\ sin 5 . . .), showing that near the equator r is nearly proportional to the latitude. As a consequence of the similar representation of small parts, a curve drawn on the sphere cutting all meridians at the same angle — the loxodromic curve — is projected into a straight line, and it is this property which renders Mercator's chart so valuable to seamen. For instance: join by a straight line on the chart Land's End and Bermuda, and measure the angle of intersection of this line with the meridian. We get thus the bearing which a ship has to retain during its course between these ports. This is not great-circle sailing, and the ship so navigated does not take the shortest path. The projection of a great circle (being neither a meridian nor the equator) is a curve which cannot be represented by a simple algebraic equation.

If the true spheroidal shape of the earth is considered, the semi- axes being a and b, putting e= V (a 3 — b 2)/a, and using common logarithms, the distance of any parallel from the equator can be shown to be

(a/M){log tan (45°+itf) -« 2 sin tf>-fe sin 3 0. . . }*

where M, the modulus of common logarithms, = 0'434294. Of course Mercator's projection was not originally arrived at in the manner "above described ; the description has been given to show that Mercator's projection is a particular case of the conical ortho- morphic group. The introduction of the projection is due to the fact that for navigation it is very desirable to possess charts which shall give correct local outlines {i.e. in modern phraseology shall be orthomorphic) and shall at the same time show as a' straight line any line which cuts the meridians at a constant angle. The latter condition clearly necessitates parallel meridians, and the former a continuous increase of scale as the equator is departed from, i.e. the scale at any point must be equal to the scale at the equator X sec. latitude. In early days the calculations were made by assuming that for a

small increase of latitude, say 1', the scale was constant, then summing up the small lengths so obtained. Nowadays (for simplicity the earth will be taken as a sphere) we should say that a small length of meridian ad is represented in this projec- tion by a sec <&d, and the length of the meridian in the projection between the equator and latitude ,

*a/ * a sec = a log. tan (45° + ^*

which is the direct way of arriving at the law of the construction of this very important projection.

[MAP PROJECTIONS

Mercator's projection, although indispensable at sea, is of little value for land maps. For topographical sheets it is obviously unsuitable; and in cases in which it is required to show large areas on small scales on an orthomorphic projection, that form should be chosen which gives two standard parallels (Lambert's conical orthomorphic). Mercator's projection is often used in atlases for maps of the world. It is not a good projection to select for this purpose on account of the great exaggeration of scale near the poles. The misconceptions arising from this exaggeration of scale may, however, be corrected by the juxtaposition of a map of the world on an equal-area projection.

It is now necessary to revert to the general consideration of conical projections.

It has been shown that the scales of the projection (fig. 23) as compared with the sphere are p'q'/pq = dp/dz = ir along a meridian, and p'r'/pr' — ph\ 'sin z = cr' at right angles to a meridian. Now if aa' = 1 the areas are correctly represented, then

hpdp = sin zdz, and integrating \hp = C — cos 2; (i.)*

this gives the whole group of equal-area conical projections.

As a special case let the pole be the centre of the projected paral- lels, then when

z = o, p=o, and const = 1, we have p = 2sin \z\hh (ii.)

Let 01 be the co-latitude of some parallel which is to be correctly

represented, then 2& sin jZi/5/j = sin z u and A = cos 2 \z\ putting this value of h in equation (ii.) the radius of any parallel

= p = 2 sin \z sec §Zi (iii.)

This is Lambert's conical equal-area projection with one standard parallel, the pole being the centre of the parallels.

If we put Zi=B, then k = l, and the meridians are inclined at their true angles, also the scale at the pole becomes correct, and equation (iii.) becomes

p = 2sin§z; (iv.)

this is the zenithal equal-area projection.

Reverting to the general expression for equal-area conical pro- jections

p = V{2(C-cosz)/fc) (i.)

we can dispose of C and h so that any two selected parallels shall be their true lengths ; let their co-latitudes be Zi and z 2 , then

2&(C— coszO =sin 2 Zi (v.)

2h(C— cosz 2) =sin s Z2 (vi.)

from which C and h are easily found, and the radii are obtained from (i.) above. This is H. C. Albers' conical equal-area pro- jection with two standard parallels. The pole is not the centre of the parallels.

Projection by Rectangular Spheroidal Co-ordinates. If in the simple conical projection the selected parallel is the equator, this and the other parallels become parallel straight lines and the meridians are straight lines spaced at equatorial distances, cutting the parallels at right angles; the parallels are their true distances apart. This projection is the simple cylin- drical. If now we imagine the touching cylinder turned through a right-angle in such a way as to touch the sphere along any meridian, a projection is obtained exactly similar to the last, except that in this case we represent, not parallels and meridians, but small circles parallel to the given meridian and great circles at right angles to it. It is clear that the projection is a special case of conical projection. The position of any point on the earth's surface is thus referred, on this projection, to a selected meridian as one axis, and any great circle at right angles to it as the other. Or, in other words, any point is fixed by the length of the perpendicular from it on to the fixed meridian and the distance of the foot of the perpendicular from some fixed

point on the meridian, these spherical or spheroidal co-ordinates being plotted as plane rectangular co-ordinates.

The perpendicular is really a plane section of the surface through the given point at right angles to the chosen meridian, and may be briefly called a great circle. Such a great circle clearly diverges from the parallel; the exact difference in latitude and longitude between the point and the foot of the perpendicular can be at once obtained by ordinary geodetic formulae, putting the azimuth =90°. Approximately the difference of latitude in seconds is x 2 tan tj> cosec i"/2pv where x is the length of the perpendicular, p that of the radius of curvature to the meridian, v that of the normal termin- ated by the minor axis, the latitude of the foot of the perpendicular. The difference of longitude in seconds is approximately x sec p cosec 1 "/"• The resulting error consists principally of an exagger- ation of scale north and south and is approximately equal to sec x (expressing x in arc) ; it is practically independent of the extent in latitude.

It is on this projection that the 1/2,500 Ordnance maps and the 6-in. Ordnance maps of the United Kingdom are plotted, a meridian being chosen for a group of counties. It is also used for the i-in., 5 in. and j in. Ordnance maps of England, the cen- tral meridian chosen being that which passes through a point in Delamere Forest in Cheshire. This projection should not as a rule be used for topographical maps, but is suitable for cadastral plans on account of the convenience of plotting the rectangular co-ordinates of the very numerous trigonometrical or traverse points required in the construction of such plans. As regards the errors involved, a range of about 150 miles each side of the central meridian will give a maximum error in scale in a north and south direction of about o-i %.

Elliptical Equal-area Projection.

In this projection, which is also called Mollweide's projection the parallels are parallel straight lines and the meridians are ellipses, the central meridian being a straight line at right angles to the equator, which is equally divided. If the whole world is represented on the spherical assumption, the equator is twice the length of the central meridian. Each elliptical meridian has for one axis the central meridian, and for the other the intercepted portion of the equally divided equator. It follows that the meridians 90 east and west of the central meridian form a circle. It is easy to show that to preserve the property of equal areas the distance of any parallel from the equator must be V2 sin 5 where ir sin <£=25+sin 25, being the latitude of the parallel. The length of the central meridian from pole to pole = 2 V2, where the radius of the sphere is unity. The length of the equator = 4 V2.

The following equal-area projections may be used to exhibit the entire surface of the globe: Cylindrical equal area, Sinusoidal equal area and Elliptical equal area.

Conventional or Arbitrary Projections.

These projections are devised for simplicity of drawing and not for any special properties. The most useful projection of this class is the globular projection. This is a conventional

N

FlG. 26. — Globular Projection.

representation of a hemisphere in which the equator and central meridian are two equal straight lines at right angles, their inter- section being the centre of the circular boundary. The meridians divide the equator into equal parts and are arcs of circles passing through points so determined and the poles. The parallels are arcs of circles which divide the central and extreme meridians into equal parts. Thus in fig. 26 NS = EW and each is divided into equal parts (in this case each division is 10°); the circumfer- ence NESW is also divided into io° spaces and circular arcs are drawn through the corresponding points. This is a simple and effective projection and one well suited for conveying ideas of the

general shape and position of the chief land masses; it is better for this purpose than the stereographic, which is commonly employed in atlases.

eo's

a'sli

££_

rt?o"

G«'E

7.80 m°F

*30*3*

*t**

istS

D

(From Text Book of Topographical Surveying, by permission of the Controller of H.M. Stationery Office.)

Fig. 27. — Plane Table Graticule, dimensions in inches, for a scale of 4 in. to Ijn.

Projections for Field Sheets.

Field sheets for topographical surveys should be on conical projections with rectified meridians; these projections for small areas and ordinary topographical scales — not less than 1/500,000 — are sensibly errorless. But to save labour it is customary to employ for this purpose either form of polyconic projection, in which the errors for such scales are also negligible. In some surveys, to avoid the difficulty of plotting the flat arcs required for the parallels, the arcs are replaced by polygons, each side being the length of the portion of the arc it replaces. This method is especially suitable for scales of 1:125,000 and larger, but it is also sometimes used for smaller scales.

Fig. 27 shows the method of plotting the projection for a field sheet. Such a projection is usually called a graticule. In this case ABC is the central meridian ; the true meridian lengths of 30′ spaces are marked on this meridian, and to each of these, such as AB, the figure (in this case representing a square half degree), such as ABED, is applied. Thus the point D is the intersection of a circle of radius AD with a circle of radius BD, these lengths being taken from geodetic tables. The method has no merit except that of convenience.

Summary.

The following projections have been briefly described: —

1. Cylindrical equal-area.

2. Orthographic.

3. Stereographic (which is orthomorphic).

4. General external perspective.

5. Minimum error „ (Clarke's). . 6. Central.

7. Conical, with rectified meridians and two standard parallels (5 forms).

8. Simple conical.

9. Simple cylindrical (a special case of 8).

10. Modified conical equal-area (Bonne's).

11. Sinusoidal ,, „ (Sanson's).

12. Werner's conical „ ,,

13. Simple polyconic.

14. Rectangular polyconic.

15. Conical orthomorphic with 2 standard parallels (Lambert's, commonly called Gauss's).

16. Cylindrical orthomorphic (Mercator's).

17. Conical equal-area with one standard parallel.

18. „ „ „ ,, two „ parallels. . 19. Projection by rectangular spheroidal co-ordinates. ■20. Equidistant zenithal.

21. Zenithal equal-area.

22. Zenithal projection by balance of errors (Airy's).

23. Elliptical equal-area (Mollweide's).

24. Globular (conventional). -25. Field sheet graticule.

Of the above 25 projections, 23 are_ conical or quasi-conical, if zenithal and perspective projections be included.. The projections may, if it is preferred, be grouped according to their properties.

Perspective

Conical

Zenithal

Thus in the above list 8 are equal-area, 3 are orthomorphic, 1 balances errors, 1 represents all great circles by straight lines, and in 5 one system of great circles is represented correctly.

Among projections which have not been described may be men- tioned the circular orthomorphic (Lagrange's) and the rectilinear equal-area

(Collignon's) and a considerable number of conventional projections, which latter are for the most part of little value.

The choice of a projection depends on the function which the map is intended to fulfil. If the map is intended for statistical purposes to show areas, density of population, incidence of rainfall, of disease, distribution of wealth, &c, an equal-area projection should be chosen. In such a case an area scale should be given. At sea, Mercator's is practically the only projection used except when it is desired to determine graphically great circle courses in great oceans, when the central projection must be employed. For conveying good general ideas of the shape and distribution of the surface features of continents or of a hemisphere Clarke's perspective projection is the best. For exhibiting the progress of polar explora- tion the polar equidistant projection should be selected. For special maps for general use on scales of 1/1,000,000 and smaller, and for a series of which the sheets are to fit together, the conical, with rectified meridians and two standard parallels, is a good projection. For topographical maps, in which each sheet is plotted independently and the scale is not smaller than 1/500,000, either form of polyconic is very convenient.

The following are the projections adopted for some of the principal official maps of the British Empire : —

Conical, with Rectified Meridians and Two Standard Parallels. — The I : 1,000,000 Ordnance map of the United Kingdom, special maps of the topographical section, General Staff, e.g. the 64-mile map of Afghanistan and Persia. The 1 : 1,000,000 Survey of India series of India and adjacent countries.

Modified Conical, Equal-area (Bonne's). — The 1 in., 5 in., J in. and A in. Ordnance maps of Scotland and Ireland. The I : 800,000 map of the Cape Colony, published by the Surveyor-General.

Simple Polyconic and Rectangular Polyconic maps on scales of 1 : 1,000,000, 1 : 500,000, 1 : 250,000 and 1 : 125,000 of the topo- graphical section of the General Staff, including all maps on these scales of British Africa. A rectilinear approximation to the simple polyconic is also used for the topographical sheets of the Survey of India. The simple polyconic is used for the I in. maps of the Militia Department of Canada.

Zenithal Projection by Balance of Errors (Airy's). — The 10-mile to I in. Ordnance map of England.

Projection by Rectangular Spheroidal Co-ordinates. — The I : 2500 and the 6 in. Ordnance sheets of the United Kingdom, and the I in., 5 in. and j

in. Ordnance maps of England. The cadastral plans of the Survey of India, and cadastral plans throughout the empire.

Authorities. — See Traite des projections des cartes geographiques, by A. Germain (Paris, 1865) and A Treatise on Projections, by j T. Craig, United States Coast and Geodetic Survey (Washington, 1882). Both Germain and Craig (following Germain) make use of the term projections by development, a term which is apt to convey the impression that the spherical surface is developable. As this is not the case, and since such projections are conical, it is best to avoid the use of the term. For the history of the subject see d'Avezac, " Coup d'ceil historique sur la projection des cartes geographiques," SocietS de geographic de Paris (1863).

J. H. Lambert (Beitrdge zum Gebrauch der Mathemalik, u.s.w. Berlin, 1772) devised the following projections of the above list: I, 15, 17, and 21 ; his transverse cylindrical orthomorphic and the trans- verse cylindrical equal-area have not been described, as they are seldom used. Among other contributors we mention Mercator, Euler, Gauss, C. B. Mollweide (1774-1825), Lagrange, Cassini, R. Bonne (1727-1795), Airy and Colonel A. R. Clarke. (C. F. Cl.; A. R. C.)

MAPLE, SIR JOHN BLUNDELL, Bart. (1845-1903), English business magnate, was born on the 1st of March 1845. His father, John Maple (d. 1900), had a small furniture shop in Tottenham Court Road, London, and his business began to develop about the time that his son entered it. The practical management soon devolved on the younger Maple, under whom it attained colossal dimensions. The firm became a limited liability company, with a capital of two millions, in 1890, with Mr Maple as chairman. He entered parliament as Conservative member for Dulwich in 1887, was knighted in 1892, and was made a baronet in 1897. He was the owner of a large stud of race-horses, and from 1885 onwards won many important races, appearing at first under the name of " Mr Childwick." His public benefactions included a hospital and a recreation ground to the city of St Albans, near which his residence, Childwickbury, was situated, and the rebuilding, at a cost of more than £150,000, of University College Hospital, London. He died on the 24th of November 1903. His only surviving daughter married in 1896 Baron von Eckhardstein, of the German Embassy.

' MAPLE, in botany. The maple (0. E. mapel-triow, mapulder) and

sycamore trees are species of Acer, of the order Acerineae. The genus includes about sixty species, natives of Europe, North America and Asia, especially the Himalayas, China and Japan. Maples are for the most part trees with opposite, long- stalked, palmately lobed leaves. The flowers are in fascicles, appearing before the leaves as in the Norway maple, or in racemes or panicles appearing with, or later than, the leaves as in sycamore. Some of the flowers are often imperfect, the stamens or pistil being more or less aborted. The fruit is a two-winged " samara." The genus was represented in the Tertiary flora of Europe, when it extended into the polar regions; nineteen species have been recorded from the Miocene strata of Oeningen in Switzerland. The common maple, A. campestre, is the only species indigenous to Great Britain. This and the sycamore were described by Gerard in 1597 (Herball, p. 1299), the latter being " a stranger to England." Many species have been intro- duced, especially from Japan, for ornamental purposes. The following are more especially worthy of notice.

Acer campestre, the common maple, is common in hedgerows, but less often seen as a tree, when it is seldom more than 20 ft. high, though in sheltered situations 30 ft. or more is attained. The leaves are generally less than 2 in. across, and the five main lobes are blunter than in the sycamore. The clusters of green flowers terminate the young shoots and are erect; the two wings of the fruit spread almost horizontally, and are smaller than in the syca- more. It occurs in northern Europe, the Caucasus, and northern Asia. The wood is excellent fuel, and makes the best charcoal. It is compact, of a fine grain, sometimes beautifully veined, and takes a high polish. Hence it has been celebrated from antiquity for tables, &c. The wood of the roots is frequently knotted, and valuable for small objects of cabinet work. The young shoots, being flexible and tough, are employed in France as whips.

A. pseudo-platanus , the sycamore or great maple, is a handsome tree of quick growth, with a smooth bark. The leaves are large, with finely acute and serrated lobes, affording abundant shade. The" flowers are borne in long pendulous racemes, and the two wings of the fruit are ascending. It lives from 140 to 20b years. It is found wild chiefly in wooded mountainous situations in central Europe. The wood when young is white, but old heartwood is yellow or brownish. Like the common maple it is hard and takes a high polish. It is much prized by wheelwrights, cabinet-makers, sculptors, &c, on the Continent; while knotted roots are used for inlaying. Sugar has been obtained from the sap of this as from other species, the most being one ounce from a quart of sap. The latter has also been made into wine in the Highlands of Scotland. It withstands the sea and mountain breezes better than most other timber trees, and is often planted near farm-houses and cottages in exposed localises for the sake of its dense foliage. Its wood is valued in turnery for cups, bowls and pattern blocks. It produces

abundance of seeds, and is easily raised, but it requires good and tolerably dry soil ; it will not thrive on stiff clays nor on dry sands or chalks. There are many varieties, the variegated and cut- leaved being the most noticeable. The lobed shape of its leaf and its dense foliage caused it to be confused with the true sycamore — Ficus sycamorus — of scripture.

A. platanoides, the Norway maple, is met with from Norway to Italy, Greece, and central and south Russia. It was introduced into Britain in 1683. It is a lofty tree (from 40 to 70 ft.), resembling the sycamore, but with yellow flowers, appearing before the leaves, and more spreading wings to the fruit. There are several varieties. The wood is used for the same purposes as that of the sycamore. Sugar has been made from the sap in Norway and Sweden.

Many varieties of A. palmatum, generally known as polymorphum, with variously laciniated and more or less coloured foliage, have been introduced from Japan as ornamental shrubs. The branches and corolla are purple, the fruit woolly. The foliage of the typical form is bright green with very pointed lobes. It occurs in the central mountains of Nippon and near Nagasaki. Beautiful varieties have been introduced under the varietal names, ampelopsi- folium, atropurpureum, dissectum, &c. They are remarkable for the coppery purple tint that pervades the leaves and young growths of some of the varieties. Other Japanese species are A. japonicum, the varieties of which are among the most handsome of small deciduous shrubs; A. rufinerve, with the habit of the sycamore ; A. distylum, bearing leaves without lobes; A. diabolicum, with large plane-like leaves; and A. carpinifolium, with foliage resembling that of the hornbeam.

A. saccharinum, a North American species, the sugar, rock, or bird's-eye maple, was introduced in 1735. It sometimes attains to 70 or even over 100 ft., more commonly 50 to 60 ft. It is remark- able for the whiteness of the bark. The wood is white, but acquires a rosy tinge after exposure to light. The grain is fine and close, and when polished has a silky lustre. The timber is used instead

of oak where the latter is scarce, and is employed for axle-trees and spokes, as well as for Windsor chairs, &c. It exhibits two accidental forms in the arrangement of the fibres, an undulated one like those of the curled maple {A. rubrum), and one of spots, which gives the name bird's-eye to the wood of this species. Like the curled maple, it is used for inlaying mahogany. It is much prized for bedsteads, writing-desks, shoe-lasts, &c. The wood forms excellent fuel and charcoal, while the ashes are rich in alkaline principles, furnishing a large proportion of the potash exported from Boston and New York. Sugar is principally extracted from this species, the sap being boiled and the syrup when reduced to a proper consistence runs into moulds to

form cakes. Trees growing in low and moist situations afford the most sap but least sugar. A cold north-west wind, with frosty nights and sunny days in alternation, tends to incite the flow, which is more abundant during the day than the night. A thawing night is said to promote the flow, and it ceases during a south-west wind and at the approach of a storm ; and so sensitive are the trees to aspect and climatic varia- tions that the flow of sap on the south and east side has been noticed to be earlier than on the north and west side of the same tree. The average quantity of sap per tree is from 12 to 24 gallons in a season.

A. rubrum, the red-flowering or scarlet maple, is a middle-sized tree, and was introduced in 1656. The bright scarlet or dull red flowers appear before the leaves in March and April. The wood, like that of other species, is applicable to many purposes — as for the seats of Windsor chairs, turnery, &c. The grain in very old trees is sometimes undulated, which suggested the name of curled maple, and gives beautiful effects of light and shade on polished surfaces. The most constant use of curled maple is for the stocks of fowling-pieces and rifles, as it affords toughness and strength combined with lightness and elegance. The inner bark is dusky red. On boiling, it yields a purple colour which with sulphate of iron affords a black dye. The wood is inferior to that of the pre- ceding species in strength and as fuel. Sugar was made from the sap by the French Canadians, but the production is only half as great as that from the sugar maple. In Britain it is cultivated as an ornamental tree, as being conspicuous for its flowers in spring, and for its red fruit and foliage in autumn.

A. macrophyllum, a north-western American species, is a valuable timber tree.

For a good account of the North American species see C. S. Sargent's Silva of North America, vol. ii. See also under Sugar.

MAPU, ABRAHAM (1808-1867), Hebrew novelist. His works are chiefly historical romances in Hebrew. His most famous books were The Love of Zion and the Transgression of Samaria. Besides their intrinsic merits, these novels stand high among the works which produced the romantic movement in modern Hebrew literature. Mapu's plots were somewhat sen- sational, incident being more prominent than characterization. But underlying all was a criticism of contemporary life. His novels made a deep impression and became instantly popular. Mapu's Hebrew style is simple and classical. An English trans- lation of the Love of Zion bears the title Amnon, Prince and Peasant, by F. Jaffe (1887). Mapu's stories have been often translated into other languages.

See N. Slouschz, The Renascence of Hebrew Literature (1909), ch. v. (I.

A.)

MAQQARI, or Makkaei [Abu-1-‘ Abbas Ahmad ibn Mahommed ul-Maqqari] (c. 1591-1632), Arabian historian, was born at Tlemcen in Algeria and studied at Fez and Marrakesh, where he remained engaged in literary work until he made the pilgrimage to Mecca in 1618. In the following year he settled in Cairo. In 1620 he visited Jerusalem and Damascus, and during the next six years made the pilgrimage five times. In 1628 he was again in Damascus, where he gave a course of lectures on Bukharl’s collection of Traditions, spoke much of the glories of Moslem Spain, and received the impulse to write his work on this subject later. In the same year he returned to Cairo, where he spent a year in writing his history. He was just making preparations to settle definitely in Damascus when he died in

1632.

His great work, The Breath of Perfume from the Branch of Green Andalusia and Memorials of its Vizier Lisan ud-Din ibn ul-Khatib, consists of two parts. The first is a compilation from many authors on the description and history of Moslem Spain ; it was published by Wright, Krehl, Dozy and Dugat as Analectes sur Vhistoire et la litterature des Arabes d’Espagne (Leiden, 1855-1861), and in an abridged English translation by P. de Gayangos (London, 1840- 1843). The whole work has been published at Bulaq (1863) and Cairo (1885).

For other works of Maqqarl see C. Brockelmann’s Gesch. der arabischen Litteratur (Berlin, 1902), ii. 297. (G. W. T.)

MAQRlZl, or Makrizi [Taqi ud-Din Ahmad ibn ‘AH] (1364- 1442), Arabian historian, known as al-MaqrlzI because of his ancestral connexion with Maqrlz, a suburb of Baalbek, was born at Cairo and spent most of his life in Egypt, where he was trained in the Hanifite school of law, though later he became a Shafi’ite with an inclination to Zahirite views. In 1385 he made the pilgrimage. For some time he was secretary in a government office, and in 1399 became inspector of markets for Cairo and northern Egypt. This post he soon gave up to become preacher at the mosque of ‘Amr, president of the mosque ul-Hakim, and a lecturer on tradition. In 1408 he went to Damascus to become inspector of the Qalanislyya and lecturer. Later he retired into private life at Cairo. In 1430 he made the pilgrimage with his family and travelled for some five years. His learning

was great, his observation accurate and his judgment good, but his books are largely compilations, and he does not always acknowledge the sources to which he is indebted. Most of his works are concerned with Egypt. The most important is the Mawaiz wal-Vtibar fi dhikr ul-ffitat wal-Aihdr (2 vols., Bulaq, 1854), translated into French by U. Bouriant as Description topographique et historique de l'£gyple (Paris, 1895-1900; cf. A. R. Guest, " A List of Writers, Books and other Authorities mentioned by El Maqrizi in his Khitat," in Journal of the Royal Asiatic Society, 1902, pp. 103-125). Of his History of the Fatimites an extract was published by J. G. L. Kosegarten in his Chrestomathia (Leipzig, 1828), pp. 11 5-1 23; the History of the A yy libit and Mameluke Rulers has been translated into French by E. Quatremere (2 vols., Paris, 1837-1845). Maqrizi began a large work called the Muqajfd, a cyclopaedia of Egyptian biography in alphabetic order. It was intended to be in 80 volumes, but only 16 were written. Three autograph volumes exist in MS. in Leiden, and one in Paris.

Among smaller works published are the Mahomntedan Coinage (ed. O. G. Tychsen, Rostock, 1797 ; French translation by S. de Sacy, Paris, 1797); Arab Weights and Measures (ed. Tychsen, Rostock, 1800) ; the Arabian Tribes that migrated to Egypt (ed. F Wustenfeld, Gottingen, 1847); the Account of Hadhramaut (ed. P. B. Noskowyj, Bonn, 1866); the Strife between the Bant Umayya and the Banl Hushim (ed G. Vos, Leiden, 1888), and the Moslems in Abyssinia (ed. F. T. Rink, Leiden, 1790). For Maqrlzi's life see the quotations from contemporary biographies in S. de Sacy's Chrestomathie arabe (2nd cd., Paris, 1826), ii. 112 seq., and for other works still in MS. C. Brockelmann, Gesch. der arabischen Litteratur (Berlin, 1902), ii. 38-41. (G. W. T.)

MAR, EARLDOM OF. Mar, one of the ancient divisions or provinces of Scotland, comprised the larger portion of Aberdeen- shire, extending from north of the Don southward to the Mounth. Like other such districts, it was in Celtic times under the rule of a mormaer. In the 12th century his place was taken by an earl, but no definite succession of earls appears till the 13th century, nor is any connexion established between them and the mormaers- From the middle of the 13th century the earls were recognized as among " the seven earls of Scotland " and held a great posi- tion. Earl Gratney (/?. c. 1300) married a sister of (King) Robert Bruce, who brought him the lordship of Garioch and castle of Kildrummy, which she held against the earl of Athole, an ally of the English (1335). Their son Donald was made regent in July 1332, but was disastrously defeated and slain at Dupplin next month. His daughter and eventual heir, Margaret, brought the earldom to her husband, William, earl of Douglas, and on the accession of her daughter Isabel a troublous time followed.

While she was living as a widow at her castle of Kildrummy, it was

stormed by Alexander Stewart, a bastard, who forced her to execute a charter (August 12, 1404) settling the reversion to the earldom on himself and his heirs. This act she revoked by a charier of the 19th of September 1404, which cannot now be found; but on marrying him, on the 9th of December 1404, she granted him the earldom for life, the king confirming this on the 21st of June 1405. After her death in 1408 the earl played a great part, commanding the royal forces at the battle of Harlaw, when the Lord of the Isles was defeated in 141 1,

and afterwards acting as warden of the Marches. In 1426 he resigned the earldom to the Crown, the king granting it by a fresh creation to him and certain heirs, with reversion to the Crown. On the earl's death in 1435 the earldom was claimed by Robert, Lord Erskine, as heir of Gratney, earl of Mar, through a daughter; but the Crown claimed as reversionary under the creation of 1426. A long struggle followed, till in 1457 James II. obtained from a justiciary court at Aberdeen a recognition of the Crown's right to the earldom and its lands, and shortly after bestowed them on his son John as earl of Mar and Garioch. He died unmarried in 1479, and in 1483 his elder brother Alexander duke of Albany received the earldom, but was soon forfeited. James III. created his son John earl of Mar and Garioch in i486, and after his death unmarried in 1503, James IV. alienated to Lord Elphinstone (1507-15 10) many of the Mar lands, including Kildrummy. The title was not revived till 1562, when James Stewart, earl of Murray, held it for a few months.

In 1565 John, Lord Erskine, succeeded in getting returned heir to the earldom, and shortly after (June 23, 1565) Queen Margaret restored the charter to him and his heirs " all and hail the said earldom of Mar." As earl he took part against the queen in 1567, and in 1571 was made regent of Scotland, which post he retained till his death (1 572). His son, earl John (c. 1558- 1634), played a great part in the history of the family. His great achievement was the recovery of the Mar estates, alien- ated by the Crown during the long period that his family had been out of possession, including Kildrummy, the " head " of the earldom. It was in his time that the precedence of the earldom (see below) was settled. John, the next earl (c. 1 585-1654) was a Royalist, as was his son John (d. 1668), much to the injury of the family fortune, which was further impaired by the attach- ment of the family, after the Revolution, to the Stuarts. His son Charles (1650-1689) was arrested by the government just before his death (1689), and the next earl, John (1675-1732), a promi- nent Jacobite (see below), was attainted, the earldom remaining under forfeiture for 108 years; by the Old Pretender he was created duke of Mar.

Alloa and other Erskine estates of the attainted earl were re- purchased for the family, and descended to John Francis Erskine (1741-1825), his heir-

male, who was also his heir of line through his daughter. To him, in his eighty-third year, as grandson and lineal representative of the attainted earl, the earldom was restored by act of parliament in 1824. His grandson, who succeeded him in 1828, inherited the earldom of Kellie (1619) and other Erskine dignities by decision of 1835. At his death in 1866, his earldom of Mar was the subject of rival claims, and the right to the succession was not determined till 1875. His estates passed to his cousin and heir-male, who succeeded to his earldom of Kellie and claimed " the honour and dignity of earl of Mar." But the latter was also claimed by a Mr Goodeve, whose father had married the late earl's eldest sister, and who assumed the title. It was not suggested that the late earl had more than one earldom of Mar, but; Lord Kellie claimed it as descendible to heirs-male under a creation by Queen Mary, and Mr Goodeve as descendible to heirs of line under an earlier creation. The House of Lords decided (Feb. 25, 1875) that Lord Kellie was entitled to the earldom as having been created by Queen Mary in 1565, with a limitation which must be presumed to be to heirs-male of the body. This decision gave great dissatisfaction, but was described as " final, right or wrong, and not to be questioned " by Lord Selborne and the lord chancellor in 1877, and Lord Kellie was thenceforth recognized as holding the earldom on the Union Roll, the only one known, though Mr Goodeve continued to assume the title. The Lords' decision could not be reversed, but in 1885, after much agitation, a means was found of evading it in practice by the " Earldom of Mar Restitution Act." By " an equivocation on the facts of the case," it was recited that " doubts may exist whether the said ancient honour, dignity, and title of peerage of earl of Mar . . . was or was not … by any lawful means surrendered or merged in the Crown " before 1565, and that the House of Lords had decided that Queen Mary's known charter of 1565 applied only to lands and " did not operate

or extend to restore " the peerage dignity, and enacted that " John Francis Erskine Goodeve Erskine " (which last name the claimant had added) should be " restored to " the ancient earldom. His previous assumption of the title was thus rejected as invalid, but from the passing of the act two earldoms of Mar were in existence, that of Lord Kellie being confirmed and allowed the precedence of 1565, while the restored earldom was allowed that of the dignity on the Union Roll, the only one known till then. This precedence had been assigned to it by the Decreet of Ranking (1606), and assigns to it an origin in 1404 (or, as some say, 1395). It is frequently, but absurdly, stated to have been " created before 1014," and wrongly spoken of as the Premier Scottish Earldom (see Earl). A barony of Garioch is also

wrongly said to be annexed to it, but the title is used by the earl's eldest son in default of any other.

Bibliography. — Minutes of Evidence, 1875 and 1885; Riddell's Peerage and Consistorial Law, Skene, Celtic Scotland; Lord Crawford's Earldom of Mar in Sunshine and Shade; articles by G. Burnett (Lyon), Sir H. Barkly, Cornelius Hallen, W. A. Lindsay and J. H. Round in Genealogist (N.S.), vols. 3, 4, 9; Lord Redesdale's The Earldom of Mar, a Letter to the Lord Clerk Register (reply to Lord Crawford) (1883); J. H. Round's "Are there two Earls of Mar?" in Foster's Collectanea genealogica, and " The later Earldom of Mar " in Walford's Antiquarian Magazine, vol. ii. ; also his Studies in Peerage and Family History. (J. H. R.)

MAR, JOHN ERSKINE, ist or 6th Earl of (d. 1572), regent of Scotland, was a son of John, 5th Lord Erskine (d. 1552), who was guardian of King James V., and afterwards of Mary Queen of Scots. The younger John, who succeeded his father as 6th Lord Erskine in 1552, joined the religious reformers, but he was never very ardent in the cause, although he subscribed the letter asking Knox to return to Scotland in 1557. The custody of Edinburgh Castle was in his hands, and during the struggle between the regent, Mary of Lorraine, and the lords of the Congregation he appears to have acted consistently in the interests of peace. When Mary Stuart returned to Scotland in 1561 Lord Erskine was a member of her council, he favoured her marriage with Lord Darnley, and his wife, Annabella Murray, called by Knox a " verray Jesabell," was a frequent companion of the queen. In 1565 Erskine was granted the earldom of Mar (see above). As guardian of James, afterwards King James VI., he prevented the young prince from falling into the hands of Bothwell, and when the Scottish nobles rose against Mary and Both well, Mar was one of their leaders; he took part in the govern- ment of Scotland during Mary's imprisonment at Lochleven, and also after her subsequent abdication. In September 1571 he was chosen regent of Scotland, but he was overshadowed and perhaps slighted by the earl of Morton, and he died at Stirling on the 29th of October 1572. t

MAR, JOHN ERSKINE, 2ND or 7TH Earl of (c. 1558-1634), Scottish politician, was the only son of the preceding. Together with King James VI. he was educated by George Buchanan. After attaining his majority he was nominally the guardian of the young king, who was about seven years his junior, and who lived with him at Stirling; but he was in reality a puppet in the hands of the regent, the earl of Morton; and he lost power and position when Morton was imprisoned. He was concerned in the seizure of James VI. in 1582 (a plot known as the raid of Ruth- ven) ; but when James escaped from his new custodians the earl fled into the west of Scotland. Then leaving his hiding-place Mar seized Stirling Castle, whereupon James

marched against him, and he took refuge in England. Queen Elizabeth interceded for him, but in vain, and after some futile communications between the governments of England and Scotland Mar and his friends gathered an army, entered the presence of the king at Stirling, and were soon in supreme authority (1585). Mar was restored to his lands and titles. Henceforward he stood high in the royal favour; he became governor, of Edinburgh Castle and was made tutor to James's son, Prince Henry, and for his second wife he married Mary, daughter of Esme Stewart, duke of Lennox. In 1601 the earl was sent as envoy to London; here Elizabeth assured him that James should be her successor, and his mission was conducted with tact and prudence. Haying joined the

English privy council Mar was created Lord Cardross in 1610; he was a member of the Court of High Commission and was lord high treasurer of Scotland from 161 5 to 1630. He died at Stirling on the 14th of December 1634. John (c. 1585-1654), his only son by his first wife, succeeded to his earldom; by his second wife he had five sons, among them being James (d. 1640), earl of Buchan; Henry (d. 1628), whose son David (d. 1671) succeeded to the barony of Cardross; and Charles, the ancestor of the earls of Rosslyn.

MAR, JOHN ERSKINE, 6th or iith Earl of (1675-1732), Scottish Jacobite, was the eldest son of Charles, the 5th earl (1650-1689), from whom he inherited estates which were heavily loaded with debt. He was associated with the party favourable to the English government; he was one of the commissioners for the Union, and was made a Scottish secretary of state, becoming after the Union of 1707 a representative peer for Scotland, keeper of the signet and a privy councillor. In 1713 Mar was made an English secretary of state by the Tories, but he seems to have been equally ready to side with the Whigs, and in 17 14 he assured the new king, George I., of his loyalty. ˆHowever, like the other Tories, he was deprived of his office, and in August 17 15 he went in disguise to Scotland and placed himself at the head of the adherents of James Edward, the Old Pretender. Meeting many Highland chieftains at Aboyne he avowed an earnest desire for the independence of Scotland, and at Braemar on the 6th of September 17 15 he proclaimed James VIII. king of Scot- land, England, France and Ireland. Gradually the forces under his command were augmented, but as a general he was a complete failure. Precious time was wasted at Perth, a feigned attack on Stirling was resultless, and he could give little assistance to the English Jacobites. At Sheriffmuir, where a battle was fought in November 1715, Mar's forces largely outnumbered those of his opponent, Archibald Campbell, afterwards 3rd duke of Argyll; but no bravery could atone for the signal incompetence displayed by the earl, and the fight was virtually a decisive defeat for the Jacobites. Mar then met James Edward at Fetteresso; the cause however was lost, and the prince

and the earl fled to France. Mar sought to interest foreign powers in the cause of the Stuarts; but in the course of time he became thoroughly distrusted by the Jacobites. In 1721 he accepted a pension of £3500 a year from George I., and in the following year his name was freely mentioned in connexion with the trial of Bishop Atterbury, whom it was asserted that Mar had betrayed. This charge may perhaps be summarized as not proven. At the best his conduct was highly imprudent, and in 1724 he left the Pretender's service. His later years were spent in Paris and at Aix-la-Chapelle, where he died in May 1732.

Mar, who was known as " bobbing John," married for his second wife, Frances (d. 1761), daughter of the ist duke of Kingston, and was thus a brother-in-law of Lady Mary Wortley Montagu. He had been attainted in 1716, and his only son, Thomas, Lord Erskine, died childless in March 1766.

Mar's brother, James Erskine (1679-1754), was educated as a lawyer and became lord justice clerk of the Court of Session and Lord Grange in 17 10. He took no part in the rising of 17 15, although there is little doubt that at times he was in communi- cation with the Jacobites; but was rather known for his piety and for his sympathy with the Presbyterians. He is more famous, however, owing to the story of his wife's disappearance. This lady, Rachel Chicely, was a woman of disordered intellect; probably with reason she suspected her husband of infidelity, and after some years of unhappiness Grange arranged a plan for her seizure. In January 1732 she was conveyed with great secrecy from Edinburgh to the island of Hesker, thence to St Kilda, where she remained for about ten years, thence she was taken to Assynt in Sutherland, and finally to Skye. To complete the idea that she was dead her funeral was publicly celebrated, but she survived until May 1745. Mean- while in 1734 Grange had resigned his judgeship and had become an English member of parliament; here he was a bitter opponent of Sir Robert Walpole. He died in London on the 20th of January 1754.

See the Journal of the Earl of Mar (1716); R. Patten, History of the late Rebellion (1717); and A. Lang, History of Scotland, vol. iv.

(1907).

MARA, GERTRUD ELISABETH (1749-1833), German singer, was born at Cassel, the daughter of a poor musician named Schmeling. From him she

learnt the violin, and while still a child her playing at the fair at Frankfort was so remarkable that money was collected to provide for her. She was helped by influential friends, and studied under Hillel at Leipzig for five years, proving to be endowed with a wonderful soprano voice. She began to sing in public in 1771, and was soon recognized as the greatest singer that Germany had produced. She was permanently engaged for the Prussian Court, but her marriage to a debauched violinist named Mara created difficulties, and in 1780 she was released. After singing at Vienna, Munich and elsewhere, she appeared in Paris in 1782, where her rivalry with the singer Todi developed into a regular faction. In 1784 she went to London, and continued to appear there with great success, with visits at intervals to Italy and to Paris till 1802, when for some years she retired to Russia. She visited England again in 1819, but then abandoned the stage. She went to Livonia, and died on the 20th of January 1833 at Revel.

MARABOUT (the French form of the Arab, murabit, " one who pickets his horse on a hostile frontier ";cf. Portug. marabute; Span, morabito), in Mahommedan religion a hermit or devotee. The word is derived from ribdt, a fortified frontier station. To such stations pious men betook them to win religious merit in war against the infidel; their leisure was spent in devotion, and the habits of the convent superseded those of the camp (see M'G. De Slane in Jour. As., 1842, i. r68; Dozy, Suppl. i. 502). Thus ribdt came to mean a religious house or hospice (zawya). The great sphere of the marabouts is North Africa. There it was that the community formed by Yahya b. Ibrahim and the doctor Abdullah developed into the conquering empire of the Mufabits, or, as Christian writers call them, the Almoravides (q.v.), and there still, among the Berbers, the marabouts enjoy extraordinary influence, being esteemed as living saints and mediators. They are liberally supported by alms, direct all popular assemblies, and have a decisive voice in intertribal quarrels and all matters of consequence. On their death their sanctity is transferred to their tombs (also called marabouts), where chapels are erected and gifts and prayers offered. The marabouts took a prominent part in the resistance offered to the French by the Algerian Moslems; and they have been similarly active in politico-religious movements in Tunisia and Tripoli.

See L. Rinn, Marabouts et Khouan (Algiers, 1884) ; and the article Dervish.

MARACAIBO, a large lake of western Venezuela, extending southward from the Gulf of Venezuela, into which it opens through a long neck, or strait, obstructed at its mouth by islands and bars, and having a large drainage basin bounded on the W. by the Eastern Cordillera, on the S.E. by the Cordillera de Merida, and on the E. by a low range of mountains extending N. by W. from Trujillo to the coast. The lake is roughly quad-

rangular in shape, and extends from the 9th to the nth parallel of S. lat. and from the 71st to the 72nd meridian. It opens into the Gulf through 13 channels, the depth on the bar in the main channel ranging from 7 ft. at low water to 12 ft. at high water. Inside the bar the depth is about 30 ft., and the lake is navigable for vessels of large size. It receives the waters of many rivers, principally on its west and south sides, the largest of which are the Catatumbo and Zulia, Escalante, Chanudo, Ceniza, Sant'Ana, Negro, Apan and Palmar. The first three have navigable chan- nels for river steamers. There are a number of small lakes near Lake Maracaibo's southern and western margins, the largest of which is the Laguna de Zulia. The heavy rainfall on the eastern slopes of the Eastern Cordillera, which is said to exceed 86 in. per annum, is responsible for the great volume of water dis- charged into the lake. The average annual precipitation over the whole basin is said to be 70 in. In the upper half of the lake the water is sweet, but below that, where the tidal influence is stronger, it becomes brackish. The only port of consequence

on the lake is Maracaibo, but there are small ports at its upper end which are in direct communication with the inland cities of Trujillo, Merida and San Cristobal. The Catatumbo River, which enters from the west near the north end of the lake, and its principal tributary, the Zulia, are navigable as far as Villa- mizar, in Colombia, and afford an excellent transportation route for the coffee and other products of Santander.

MARACAIBO (sometimes Maracaybo), a city and seaport of Venezuela and capital of the state of Zulia (formerly Maracaibo) , on the west shore of the broad channel or neck which connects Lake Maracaibo with the Gulf of Venezuela, or Maracaibo, about 25 m. from the mouth of the channel opening into the latter. Pop. (1889), 34,284; (1905), 49,817; there is a considerable German element in the vicinity. The best residential suburb, Haticos, extends along the lake shore toward the south. The city is provided with tramways, telephone service and electric lighting, but the water supply and drainage are inferior. The most important buildings are the executive's residence, the legislative chambers, the municipal hall, the Baralt theatre, the prison, the market, a hospital and six churches. The city also has a school of arts, a public library, and a public garden. In colonial times Maracaibo had a famous Jesuits' college (now gone) and was one of the educational centres of Spanish America; the city now has a national college and a nautical school. The industries include shipbuilding, and the manufacture of saddlery and other leather products, bricks and tile, rum, beer, chocolate and coco-nut oil. Maracaibo is chiefly known, however, as one of the principal commercial centres and shipping ports on the northern coast of South America. The bar at the entrance to Maracaibo channel does not admit vessels drawing more than 12 ft., but there is a depth of 30 ft. inside and near the city. Steam communication is maintained on the

Catatumbo and Zulia rivers to Villamizar, and on the Escalante to Santa Cruz. The principal exports from Maracaibo are coffee, hides and skins, cabinet and dye-woods, cocoa, and mangrove bark, to which may be added dividivi, sugar, copaiba, gamela and hemp straw for paper-making, and fruits. In 1906, 26% of the coffee exports was of Colombian origin.

Maracaibo was founded in 1571 by Alonso Pacheco, who gave it the name Nueva Zamora. Up to 1668 the entrepot for the inland settlements was a station named Gibraltar at the head of the lake, but the destruction of that station by pirates in that year transferred this valuable trade to Maracaibo. The city did not figure actively in the War of Independence until 182 1 (Jan. 28), when the province declared its independence and sought an alliance with Colombia. This brought to an end the armistice between Bolivar and Morillo, and thenceforward the city ex- perienced all the changing fortunes of war until its final capture by the revolutionists in 1823.

MARAGHA, a town of Persia in the province of Azerbaijan, on the Safi River, in 37° 23′ N., 46 16′ E., 80 m. from Tabriz. Pop. about 16,000. It is pleasantly situated in a narrow valley running nearly north and south at the eastern extremity of a well-cultivated plain opening towards Lake Urmia, which lies 18 m. to the west. The town is encompassed by a high wall ruined in many places, and has four gates. Two stone bridges in good condition, said to have been constructed during the reign of Hulaku Khan (1256-ˆ65), and since then several times repaired, lead over the Safi River on the western side of the town. The place is surrounded by extensive vineyards and orchards, all well watered by canals led from the river, and producing great quantities of fruit for exportation to Russia. On a hill west of the town are the remains of a famous observatory (rasad) constructed under the direction of the great astronomer Nasr-ud- din of Tus. The hills west of the town consist of horizontal strata of sandstone covered with irregular pieces of basalt and the top of the hill on which the observatory stood was made level by taking away the basalt. The building, which no doubt served as a citadel as well, enclosed a space of 380 yds. by 150, and the foundations of the walls were 45 to 5 ft. in thickness. The marble, which is known throughout Persia as Maragha marble, is a travertine obtained at the village of Dashkesen (Turkish for

" stone-breakers " (about 30 m. north-west from Maragha. It I is deposited from water, which bubbles up from a number of springs in the form of horizontal layers, which at first are tLin crusts and can easily be broken,

but gradually solidify and harden into blocks with a thickness of 7 to 8 in. It is a singu- larly beautiful substance, being of pink, greenish, or milk-white colour, streaked with reddish, copper-coloured veins. An analysis of the marble gave the following result: calcium carbonate, 90-93; magnesium, -75; iron, 1-37; manganese, 4-34; calcium sulphate, 2-30; calcium phosphate, -24 (R. T. Gunther, Geog. Journ. xiv. 517).

MARANHAO, or Maranham (Span. Maranon, the name given to the upper Amazon), a northern state of Brazil, bounded N. by the Atlantic, E. and S.E. by Piauhy, S.W. and W. by Goyaz and Para. Area, 177,569 sq. m.; pop. (1890), 430,854; (1900), 499,308. The coastal zone and the north-west corner of the state belong to the Amazon valley region, being a heavily forested plain traversed by numerous rivers. The eastern and southern parts, however, belong to the lower terraces of the great Brazilian plateau, broken by eroded river-courses between which are high open plains. There are no true mountain ranges in Maranhao, those indicated on the maps being only plateau escarpments marking either its northern margin or the outlines of river valleys. The climate is hot, and the year is divided into a wet and dry season, extreme humidity being characteristic of the former. The heat, however, is greatly modified on the coast by the south-east trade winds, and the climate is generally considered healthy, though beri-beri and eruptive diseases are common on the coast. The coast itself is broken and dangerous, there being many small indentations, which are usually masked by islands or shoals. The largest of these are the Bay of Tury- assu, facing which is the island of Sao Joao, and several others of small size, and the contiguous bays of Sao Marcos and Sao Jose, between which is the large island of Maranhao. The rivers of the- state all flow northward to the Atlantic and a majority of them have navigable channels. The Parnahyba forms the eastern boundary of Maranhao, but it has one large tributary, the Balsas, entirely within the state. A part of the western boundary is formed by the Tocantins, and another part by the Gurupy, which separates the state from Para. The principal rivers of the state are the Maracassume and Tury-assu, the Mearim and its larger tributaries (the Pindare, Grajahu, Flores and Corda) which discharge into the Bay of Sao Marcos, and the Itapicuru and Monim which discharge into the Bay of Sao Jose. Like the Amazon, the Mearim has a pororoca or bore in its lower channel, which greatly interferes with navigation. There are a number of small lakes in the state, some of which are, apparently, merely reservoirs for the annual floods of the rainy season.

The principal industries of Maranhao are agricultural, the river valleys and coastal zone being highly fertile and being devoted to the cultivation of sugar-cane, cotton, rice, coffee, tobacco, mandioca and a great variety of fruits. The southern highlands, however, are devoted to stock-raising, which was once an important industry. Troublesome insects, vampire bats, and

the failure to introduce new blood into the degenerated herds, are responsible for its decline. Agriculture has also greatly declined, the state producing for export only a compara- tively small quantity of cotton, rice, sugar and aguardiente. Besides Sao Luiz, the capital of the state, the principal towns, with the population of their municipal districts in 1890, are: Caxias (19,443), Alcantara (4730), Carolina (7266), Grajahu (11,704), Tury-assu (8983) and Viana (9965).

The coast of Maranhao was first discovered by Pinzon in 1 500, but it was included in the Portuguese grant of captaincies in 1534. The first European settlement, however, was made by a French trading expedition under Jacques Riffault, of Dieppe, in 1594, who lost two of his three vessels in the vicinity of the island of Maranhao, and left a part of his men on that island when he returned home. Subsequently Daniel de la Rivardiere was sent to report on the place, and was then commissioned by the French crown to found a colony on the island; this was done in 1612. The French were expelled by the Portuguese in 1615,

and the Dutch held the island from 1641 to 1644. In 1621 Ceara, Maranhao and Para, were united and called the " Estado do Maranhao," which was made independent of the southern captaincies. Ceara, was subsequently detached, but the " state " of Maranhao remained independent until 1774, when it again became subject to the colonial administration of Brazil. Maran- hao did not join in the declaration of independence of 1822, but in the following year the Portuguese were driven out by Admiral Lord Cochrane and the province became a part of the new empire of Brazil.

MARANO (accursed or banned), a term applied to Jewish Christians in Spain. Converted to Roman Catholicism under compulsion, these " New Christians " often continued to ob- serve Jewish rites in their homes, as the Inquisition records attest. It was in fact largely due to the Maranos that the Spanish Inquisition was founded. The Maranos made rapid strides in prosperity, and " accumulated honours, wealth and popular hatred " (Lea, History 0} the Spanish Inquisition, i. 125). This was one of the causes that led to the expulsion of the Jews from Spain in 1492. Maranos emigrated to various countries, but many remained in the Peninsula. Subsequently distinguished individuals left home for more tolerant lands. The Jewish community in London was refounded by Maranos in the first half of the 17th century. Hamburg commerce, too, owed much to the enterprise of Portuguese Maranos. In Amsterdam many Maranos found asylum; Spinoza was descended from such a family. There are still remnants of Marano families in Portugal.

See Lea, loc. cit. and elsewhere; see index s.v. " New Christian "; Graetz,

History of the Jews, Eng. trans, see index s.v. " Marranos " ; M. Kayserling, in Jewish Encyclopedia, viii. 318 seq. ; and for the present day Jewish Quarterly Review, xv. 251 seq. (I. A.)

MARASH (anc. Germanicia-Marasion), the chief town of a sanjak of the same name in the Aleppo vilayet, altitude 2600 ft. situated E. of the Jihan river, at the foot of Mt Taurus. The sanjak lies almost wholly in Mt Taurus, and includes the Arme- nian town of Zeitun. Marash is prosperous, and has a large trade in Kurd carpets and embroideries. The climate is good, except in summer. Of the population (50,000) about half are Turkish- speaking Armenians. There are a college, church and schools belonging to the American mission, a native Protestant church and a Jesuit establishment. The site, which lies near the mouths of the three main passes over the eastern Taurus — viz. those descending from Geuksun (Cocysus), Albistan-Yarpuz (x\rabissus), and Malatia (Melitene) — is shown to have had early importance, not only by the occurrence of Marasi in Assyrian inscriptions, but by the discovery of several " Hittite " monu- ments on the spot. These, said to have been unearthed, for the most part, near the Kirk Geuz spring above the modern town, are now in Constantinople and America, and include an inscribed lion, once built into the wall of the citadel known in the middle ages as al-Marwani, and several stelae. No more is known of the place until it appears as Germanicia-Caesarea, striking imperial coins with the head of L. Verus (middle of 2nd cent. a.d.). The identification of Marash with Germanicia has been disputed, but successfully defended by Sir W. M. Ramsay; and it is borne out by the Armenian name Kermanig, which has been given to the place since at least the 12th century. Before the Roman period Marash doubtless shared the fortunes of the Seleucid kingdom of Commagene. Germanicia-Marasion played a great part in Byzantine border warfare: Heraclius was there in a.d. 640; but before 700 it had passed into Saracen hands and been rebuilt by the caliph Moawiya. During the 8th and 9th centuries, when the direct pass from Cocysus came into military use, Marasion (the older name had returned into general use) was often the Byzantine objective and was more than once retaken; but after 770, when Mansur incorporated it in " Palestine " it remained definitely in Moslem power and was refortified by Harun-al- Rashid. It was seized by the crusaders after their march across Mt Taurus, a.d. 1097, became an important town of Lesser Armenia and was taken by the Seljuks in 1147. In the 16th century it was added to the Osmanli Empire by Selim I. Marash

passed with the rest of Syria into Egyptian hands in 1832, and in 1839

received fugitives from the defeat of Nizib, among whom was Moltke. Ibrahim Pasha was encamped near it when directed by his father, at the bidding of the powers, to stay his further advance. Since its reversion to Ottoman power (1 840) the history of Marash has been varied only by Armenian troubles, largely connected with the fortunes of Zeitun, for the reduction of which place it has more than once been used as a base. There was less disturbance there in 1805-1896 than in other north Syrian towns. (D. G. H.)

MARAT, JEAN PAUL (1743-1703), French revolutionary leader, eldest child of Jean Paul Marat, a native of Cagliari in Sardinia, and Louise Cabrol of Geneva, was born at Boudry, in the principality of Neuchatel, on the 24th of May 1743. His father was a designer, who had abandoned his country and his religion, and married a Swiss Protestant. On his mother's death in 1759 Marat set out on his travels, and spent two years at Bordeaux in the study of medicine, whence he moved to Paris, where he made use of his knowledge of his two favourite sciences, optics and electricity, to subdue an obstinate disease of the eyes. After some years in Paris he went to Holland, and then on to London, where he practised his profession. In 1773 he made his first appearance as an author with a Philosophical Essay on Man. The book shows a wonderful knowledge of English, French, German, Italian and Spanish philosophers, and directly attacks Helvetius, who had in his De I'esprit declared a know- ledge of science unnecessary for a philosopher. Marat declares that physiology alone can solve the problems of the connexion between soul and body, and proposes the existence of a nervous fluid as the true solution. In 1774 he published The Chains of Slavery, which was intended to influence-constituencies to return popular members, and reject the king's friends. Its author declared later that it procured him an honorary membership of the patriotic societies of Carlisle, Berwick and Newcastle. He remained devoted to his profession, and in 1775 published in London a little Essay on Gleets, and in Amsterdam a French translation of the first two volumes of his Essay on Man. In this year he visited Edinburgh, and on the recommendation of certain Edinburgh physicians was made an M.D. of St Andrews. On his return to London he published an Enquiry into the Nature, Cause, and Cure of a Singular Disease of the Eyes, with a dedica- tion to the Royal Society. In the same year there appeared the third volume of the French edition of the Essay on Man, which reached Ferney, and exasperated Voltaire, by its onslaught on Helvetius, into a sharp attack which only made the young author more conspicuous. His fame as a clever doctor was now great, and on the 24th of June 1777, the comte d'Artois, afterwards Charles X. of France, made him by brevet physician to his guards with 2000 livres a year and allowances.

Marat was soon in great request as a court doctor among the aristocracy;

and even Brissot, in his Memoires, admits his influ- ence in the scientific world of Paris. The next years were much occupied with scientific work, especially the study of heat, light and electricity, on which he presented memoirs to the Academie des Sciences, but the academicians were horrified at his temerity in differing from Newton, and, though acknowledging his industry, would not receive him among them. His experiments greatly interested Benjamin Franklin, who used to visit him and Goethe always regarded his rejection by the academy as a glaring instance of scientific despotism. In 1780 he had published at Neuchatel a Plan de legislation criminelle, founded on the principles of Beccaria. In April 1786 he resigned his court appointment. The results of his leisure were in 1787 a new translation of Newton's Optics, and in 1788 his Memoires academiques, ou nouvelles d&couvertes sur la lumiere.

His scientific life was now over, his political life was to begin; in the notoriety of that political life his great scientific and philosophical knowledge was to be forgotten, the high position he had given up denied, and he himself scoffed at as an ignorant charlatan, who had sold quack medicines about the streets of Paris, #nd been glad to earn a few sous in the stables of the comte d'Artois. In 1788 the notables had met, and advised

the assembling of the states-general. The elections were the cause of a flood of pamphlets, of which one, Offrande a la patrie, was by Marat, and, though now forgotten, dwelt on much the same points as the famous brochure of the Abbe Sieyes: Qu'est- ce que le tiers Hat? When the states-general met, Marat's interest was as great as ever, and in June 1789 he published a supplement to his Offrande, followed in July by La constitution, in which he embodies his idea of a constitution for France, and in September by his Tableau des vices de la constitution d'Angleterre, which he presented to the Assembly. The latter alone deserves remark. The Assembly was at this time full of anglomaniacs, who desired to establish in France a constitution similar to that of England. Marat had seen that England was at this time being ruled by an oligarchy using the forms of liberty, which, while pretending to represent the country, was really being gradually mastered by the royal power. His heart was now all in politics; and he decided to start a paper. At first appeared a single number of the Moniteur patriote, followed on the 12th of September by the first number of the Publiciste parisien, which on the 16th of September took the title of V Ami du peuple and which he edited, with some interruptions, until the 21st of September 1792.

The life of Marat now becomes part of the history of the French Revolution. From the beginning to the end he stood alone. He was never attached to any party; the tone of his mind was to suspect whoever was in power.

About his paper, the incarna- tion of himself, the first thing to be said is that the man always meant what he said; no poverty, no misery or persecution, could keep him quiet; he was perpetually crying, " Nous sommes trahis." Whoever suspected any one had only to denounce him to the Ami du peuple, and the denounced was never let aJone till he was proved innocent or guilty. Marat began by attacking the most powerful bodies in Paris — the Constituent Assembly, the ministers, the corps municipal, and the court of the Chatelet. Denounced and arrested, he was imprisoned from the 8th of October to the 5th of November 1789. A second time, owing to his violent campaign against Lafayette, he narrowly escaped arrest and had to flee to London (Jan. 1790). There he wrote his DSnonciation contre Necker, and in May dared to return to Paris and continue the Ami du peuple. He was embittered by persecution, and continued his vehement attacks against all in power, and at last, after the day of the Champs du Mars (July 17, 1790), against the king himself. All this time he was in hiding in cellars and sewers, where he was attacked by a horrible skin disease, tended only by the woman Simonne Evrard, who remained true to him. The end of the Constituent Assembly he heard of with joy and with bright hopes for the future, soon dashed by the behaviour of the Legislative Assembly. When almost despairing, in December 1791, he fled once more to London, where he wrote his Ecole du citoyen. In April 1792, summoned again by the Cordeliers' Club, he returned to Paris, and published No. 627 of the Ami. The war was now the question, and Marat saw clearly that it was to serve the purposes of the Royalists and the Girondins, who thought of themselves alone. Again denounced, Marat had to remain in hiding until the 10th of August. The early days of the war being unsuccess- ful, the proclamation of the duke of Brunswick excited all hearts; who could go to save France on the frontiers and leave Paris in the hands of his enemies ? Marat, like Danton, foresaw the massacres of September. After the events of the 10th of August he took his seat at the commune, and demanded a tribunal to try the Royalists in prison. No tribunal was formed, and the massacres in the prisons were the inevitable result. In the elections to the Convention, Marat was elected seventh out of the twenty-four deputies for Paris, and for the first time took his seat in an assembly of the nation. At the declaration of the republic, he closed his Ami du peuple, and commenced, on the 25th, a new paper, the Journal de la ripublique francaise, which was to contain his sentiments as its predecessor had done, and to be always on the watch. In the Assembly Marat had no party; he would always suspect and oppose the powerful, refuse power for himself. After the battle of Valmy, Dumouriez was the

greatest man in France; he could almost have restored the monarchy; yet Marat did not fear to denounce him in placards as a traitor.

His unpopularity in the Assembly was extreme, yet he insisted on speaking on the question of the king's trial, declared it unfair to accuse Louis for anything anterior to his acceptance of the constitution, and though implacable towards the king, as the one man who must die for the people's good, he would not allow Malesherbes, the king's counsel, to be attacked in his paper, and speaks of him as a " sage et respectable vieillard." The king dead, the months from January to May 1793 were spent in an unrelenting struggle between Marat and the Girondins. Marat despised the ruling party because they had suffered nothing for the republic, because they talked too much of their feelings and their antique virtue, because they had for their own virtues plunged the country into war; while the Girondins hated Marat as representative of that rough red republicanism which would not yield itself to a Roman republic, with themselves for tribunes, orators and generals. The Girondins conquered at first in the Convention, and ordered that Marat should be .tried before the Revolutionary Tribunal. But their victory ruined them, for on the 24th of April Marat was acquitted, and returned to the Con- vention with the people at his back. The fall of the Girondins on the 31st of May was a triumph for Marat. But it was his last. The skin disease he had contracted in the subterranean haunts was rapidly closing his life; he could only ease his pain by sitting in a warm bath, where he wrote his journal, and accused the Girondins, who were trying to raise France against Paris. Sitting thus on the 13th of July he heard in the evening a young woman begging to be admitted to see him, saying that she brought news from Caen, where the escaped Girondins were trying to rouse Normandy. He ordered her to be admitted, asked her the names of the deputies then at Caen, and, after writing their names, said, " They shall be soon guillotined," when the young girl, whose name was Charlotte Corday {q.v.), stabbed him to the heart.

His death caused a great commotion at Paris. The Convention attended his funeral, and placed his bust in the hall where it held its sessions. Louis David painted " Marat Assassinated," and a veritable cult was rendered to the Friend of the People, whose ashes were transferred to the Pantheon with great pomp on the 2 1 st of September 1794 — to be cast out again in virtue of the decree of the 8th of February 1795.

Marat's name was long an object of execration on account of his insistence on the death penalty. He stands in history as a bloodthirsty monster, yet in judging him one must remember the persecutions he endured and the terrible disease from which he suffered.

Besides the works mentioned above, Marat wrote: Recherches physiques sur

I'electriciti, &c. (1782); Recherches sur VelectricM medicate (1783); Notions elementaires d'optique (1764); Lettres de t'observateur Bon Sens a M. de M. . . . sur la fatale catastrophe des infortunes Pilatre de Rozier et Rotnain, les aeronautes et I' aerostation ˆ1785) ; Observations de M. V amateur Avec a M. I'abbe Sans . . . &c, {. 1785) ; iioge de Montesquieu (1785), published 1883 by M. de Bresetz ; Les Charlatans modernes, ou lettres sur le charlatanisme academique (1791); Les Aventures du comte Potowski (published in 1847 by Paul Lacroix, the " bibliophile Jacob "); Lettres polonaises (unpublished). Marat's works were published by A. Vermorel, CEuvres de J. P. Marat, I'ami du peuple, recueillies et annoUes (1869). Two of his tracts, (1) On Gleets, (2) A Disease of the Eyes, were reprinted, ed. J. B. Bailey, in 1891.

See A. Vermorel, Jean Paul Marat (1880); Francois Ch6vremont, Marat: esprit politique, accomp. de sa vie (2 vols., 1880); Auguste Cabanes, Marat inconnu (1891); A. Bougeart, Marat, I'ami du peuple (2 vols., 1865); M. Tourneux, Bibliographie de I'histoire de Paris pendant la revolution francaise (vol. ii., 1894; vol. iv., 1906), and E. B. Bax, J. P. Marat (1900). The Correspondance de Marat has been edited with notes by C. Villay (1908). (R. A.)*

MARATHI (properly Marathi), 1 the name of an important Indo-Aryan language spoken in western and central India. In

1 The name is sometimes spelt Mahrathl, with an h before the r, but, according to a phonetic law of the Aryan languages of western India, this is incorrect. The original h in " Maharastri," from which the word is derived, is liable to elision on coming between two vowels.

1901 the number of speakers was 18,237,899, or about the same as the population of Spain. Marathi occupies an irregular trian- gular area of approximately 100,000 sq.m., having its apex about the district of Balaghat in the Central Provinces, and for its base the western coast of the pemnsula from Daman on the Gulf of Cambay in the north to Karwar on the open Arabian Sea in the south. It covers parts of two provinces of British India — Bom- bay and the Central Provinces (including Berar) — with numerous settlers in Central India and Madras, and is also the principal language of Portuguese India and of the north-western portion of His Highness the Nizam's dominions. The standard form of speech is that of Poona in Bombay, and, in its various dialects it covers the larger part of that province, in which it is the vernacular of more than eight and a half millions of people.

As explained in the article Indo- Aryan Languages, there were in ancient times two main groups of these forms of speech — one, the language of the

Midland, spoken in the country near the Gangetic Doab, and the other, the languages of the so-called " Outer Band," containing the Midland on three sides, west, east and south. The country to the south of the Midland, in which members of this Outer group of languages were formerly spoken, included the modern Rajputana and Gujarat, and extended to the basin of the river Nerbudda, being bounded on the south by the Vindhya hills. In the course of time the population of the Midland expanded, and gradually occupied this tract, reaching the sea in Gujarat. The language of the Outer Band was thus forced farther afield. Its speakers crossed the Vindhyas and settled in the central plateau of the Deccan and on the Konkan coast. Here they came into contact with speakers of the Dravidian languages of southern India. As happened elsewhere in India, they retained their own Aryan tongue, and gradually through the influence of their superior civilization imposed it upon the aborigines, so that all the inhabitants of this tract became the ancestors of the speakers of modern Marathi.

In Rajputana and Gujarat the language (see Gujarat) is to a certain extent mixed. Near the original Midland there are few traces of the Outer language, but as we go farther and farther away from that centre we find, as might be expected, the influ- ence of the Midland language becoming weaker and weaker, and traces of the Outer language becoming more and more evident, until in Gujarati we recognize several important survivals of the old language once spoken by the earlier Aryan inhabitants.

Dialects. — Besides the standard form of speech, there is only one real dialect of Marathi, viz. Konkani (Konkani), spoken in the country near Goa. There are also several local varieties, and we may conveniently distinguish between the Marathi of the Deccan, that of the Central Provinces (including Berar), and that of the northern and central Konkan. In the southern part of the district of Ratnagiri this latter Konkani variety of Marathi gradually merges into the true Konkani dialect through a number of intermediate forms of speech. There are also several broken jargones, based upon Marathi, employed by aboriginal tribes surviving in the hill country.

Relations with other Indo-Aryan Languages. — Marathi has to its north, in order from west to east, Gujarati, Rajasthani, Western Hindi and Eastern Hindi. To its east and south it has the Dravidian languages, Gondi, Telugu and Kanarese. Elsewhere in India Aryan languages gradually fade away into each other, so that it is impossible to fix any definite boundary line between them. But this is not the case with Marathi. It does not merge into any of the cognate neighbouring forms of speech, but possesses a distinct linguistic frontier. A native writer 2 says: " The Gujarati language agrees very closely with the languages of the countries lying to the north of it, because the Gujarati people came from the north. If a native of Delhi,

Ajmere, Marwar, Mewar, Jaipur, &c, comes into Gujarat, the Gujarati people find no difficulty in understanding his language. But it is very wonderful that when people from countries border- ing Gujarat on the south, as the Konkan, Maharashtra, &c.

'Shastri Vrajlal Kalidas, quoted by Beames in Comparative Grammar, i. 102.

(i.e. people speaking Marathi) come to Gujarat, the Gujarati people do not in the least comprehend what they say." This isolated character of Marathi is partly due to the barrier of the Vindhya range which lies to its north, and partly to the fact that none of the northern languages belongs now to the Outer Band, but are in more or less close relationship to the language of the Midland. There was no common ground either physical or linguistic, upon which the colliding forms of speech could meet on equal terms. Eastern Hindi is more closely related to Marathi than the others, and in its case, in its bordering dialects, we do find a few traces of the influence of Marathi — traces which are part of the essence of the language, and not mere borrowed waifs floating on the top of a sea of alien speech and not absorbed by it.

Written Character. — Marathi books are generally printed in the well-known Nagari character (see Sanskrit), and this is also used to a great extent in private transactions and correspon- dence. In the Maratha country it is known as the Bdlbodh (" teachable to children," i.e. " easy ") character. A cursive form of Nagari called Modi, or " twisted," is also employed as a handwriting. It is said to have been invented in the 17th century by Balaji Avaji, the secretary of the celebrated Sivaji. Its chief merit is that each word can be written as a whole without lifting the pen from the paper, a feat which is impossible in the case of Nagari. 1

Origin of the Language. — The word " Marathi " signifies (the language) of the Maratha country. It is the modern form of the Sanskrit Mdhdrdstri, just as " Maratha " represents the old Mahd-rdstra, or Great Kingdom. Maharastri was the name given by Sanskrit writers to the particular form of Prakrit spoken in Maharastra, the great Aryan kingdom extending south- wards from the Vindhya range to the Kistna, broadly corre- sponding to the southern part of the Bombay Presidency and to the state of Hyderabad. As pointed out in the article Prakrit this Maharastri early obtained literary pre-eminence in India, and became the form of Prakrit employed as the language not only of lyric poetry but also of the formal

epic (kdvya). Dramatic works were composed in it, and it was the vehicle of the non-canonical scriptures of the Jaina religion. The oldest work in the language of which we have any knowledge is the Sattasai, or Seven Centuries of verses, compiled at Prati§thana, on the Godavari, the capital of King Hala, at some time between the 3rd and 7th centuries a.d. Pratisthana is the modern Paithan in the Aurangabad district of Hyderabad, and that city was for long famous as a centre of literary composition. In later times the political centre of gravity was changed to Poona, the language of which district is now accepted as the standard of the best Marathi.

General Character of the Language. — In the following account of the main features of Marathi, the reader is presumed to be familiar with the leading facts stated in the articles Indo-Aryan Languages and Prakrit. In the Prakrit stage of the Indo- Aryan languages we can divide the Prakrits into two well- defined groups, an Inner, SaurasenI and its connected dialects on the one hand, and an Outer, Maharastri, Ardhamagadhi, and MagadhI with their connected dialects on the other. These two groups differed in their phonetic laws, in their systems of declension and conjugation, in vocabulary, and in general char- acter. 2 In regard to the last point reference may be made to the frequent use of meaningless suffixes, such as -alia, -ilia, -ulla, &c, which can be added, almost ad libitum to any noun, adjective or particle in Maharastri and Ardhamagadhi, but which are hardly ever met in SaurasenI. These give rise to numerous secondary forms of words, used, it might be said, in a spirit of playfulness, which give a distinct flavour to the whole language. Similarly the late Mr Beames {Comparative Grammar, i. 103) well describes Marathi as possessing " a very decided individuality, a type quite its own, arising from its comparative

*1 See B. A. Gupte in Indian Antiquary (1905), xxxiv. 27. * For details see Dr Sten Konow's article on Maharastri and Marathi in Indian Antiauary (1903), xxxii. 180 seq.*

isolation for so many centuries." Elsewhere (p. 38) he uses language which would easily well apply to Maharastri Prakrit when he says, " Marathi is one of those languages which we may call playful — it delights in all sorts of jingling formations, and has struck out a larger quantity of secondary and tertiary words, diminutives, and the like, than any of the cognate tongues," and again (p. 52): —

" In Marathi we see the results of the Pandit's file applied to a form of speech originally possessed of much natural wildness and licence. The hedgerows have been pruned and the wild briars and roses trained into order. It is a copious and beautiful language, second only to Hindi. It has

three genders, and the same elaborate preparation of the base as Sindhi, and, owing to the great corruption which has taken place in its terminations, the difficulty of determin- ing the gender of nouns is as great in Marathi as in German. In fact, if we were to institute a parallel in this respect, we might appropriately describe Hindi as the English, Marathi as the German of the Indian group — Hindi having cast aside whatever could possibly be dispensed with, Marathi having retained whatever has been spared by the action of time. To an Englishman Hindi commends itself by its absence of form, and the positional structure of its sentences resulting therefrom; to our High-German cousins the Marathi, with its fuller array of genders, terminations, and inflexions, would probably seem the completer and finer language."

In the article Prakrit it is explained that the literary Prakrits were not the direct parents of the modern Indo-Aryan ver- naculars. Each Prakrit had first to pass through an intermediate stage — that of the Apabhramsa— before it took the form current at the present day. While we know a good deal about Maha- rastri and very little about SaurasenI Prakrit, the case is reversed in regard to their respective Apabhramsas. The Saurasena Apabhramsa is the only one concerning which we have definite information. Although it would be quite possible to reason from analogy, and thus to obtain what would be the corre- sponding forms of Maharastra Apabhramsa, we should often be travelling upon insecure ground, and it is therefore advisable to compare Marathi, not with the Apabhramsa from which it is immediately derived, but with its grandmother, Ma.har3.strl Prakrit. We shall adopt this course, so far as possible, in the following pages.

Vocabulary. — In the article Indo-Aryan Languages it is ex- plained that, allowing for phonetic development, the vocabulary of SaurasenI Prakrit was the same as that of Sanskrit, but that the farther we go from the Midland, the more examples we meet of a new class of words, the so-called desyas, descendants of the old Primary Prakrits spoken outside the Midland, and strange to Sanskrit. Maharastri Prakrit, the most independent of the Outer languages, was distinguished by the large proportion of these desyas found in its vocabulary, and the same is consequently the case in Marathi. The Brahmins of the Maratha country have always had a great reputation for learning, and their efforts to create a literary language out of their vernacular took, as in other parts of India, the direction of borrowing tatsamas from Sanskrit, to lend what they considered to be dignity to their sentences. But the richness of the language in desya words has often rendered such borrowing unnecessary, and has saved Marathi, although the proportion of tatsamas to tadbhavas z in the language is more than sufficiently high, from the fate of the Pandit-ridden literary Bengali, in which 80 to 90 % of the vocabulary is pure Sanskrit.

There is indeed a tradition of stylistic chastity in the Maratha country from the earliest times, and even Sanskrit writer contrasted the simple elegance of the Deccan (or Vaidarbhi) style with the flowery complexity of eastern India.

The proportion of Persian and, through Persian, of Arabic words in the Marathi vocabulary is comparatively low, when compared with, say, Hindostani. The reason is, firstly, the predominance in the literary world of these learned Brahmins, and, secondly, the fact that the Maratha country was not conquered by the Mussulmans till a fairly late period, nor was it so thoroughly occupied by them as were Sind, the Punjab, and the Gangetic valley.

Phonetics. 4 — In the standard dialect the vowels are the same as in Sanskrit, but r and / only appear in words borrowed directly from that language (tatsamas). Final short vowels (a, i and u) have all disappeared in prose pronunciation, except in a few local dialects, and final i and u are not even written. On the other hand, in the Nagari character, the non-pronunciation of a final a is not indicated. After an accented syllable a medial a is pronounced very lightly, even when the accent is not the main accent of the word. Thus, if we indicate the main accent by ‘, and subsidiary accents (equivalent

3 For the explanation of these terms see Indo-Aryan Languages.

4 Abbreviations : Skr. = Sanskrit. Pr. = Maharastri Prakrit. M. = Marathi.

to the Hebrew melhegh) by \ then the word kdraivat, a saw, is pro-nounced kdr’wat; and kdjakdlanl, to be agitated, is pronounced kdl”kdl a ne. In Konkani the vowel a assumes the sound of in ” hot,” a sound which is also heard in the language of Bengal. In dialectic speech e is often interchangeable with short or long a, so that the standard sdngifle, it was said, may appear as sangifld or sdngifla. The vowels e and are apparently always long in the standard dia- lect, thus following Sanskrit; but in Konkani there is a short and a long form of each vowel. Very probably, although the distinction is not observed in writing, and has not been noticed by native scholars, these vowels are also pronounced short in the standard dialect under the circumstances to be now described. When a long a, I or u precedes an accented syllable it is usually shortened. In the case of a the shortening is not indicated by the spelling, but the written long a is

pronounced short like the a in the Italian hallo. Thus, the dative of plk, a ripe crop, is pikds, and that of hat, a hand, is hatds, pronounced hatds. Almost the only compound consonants which survived in the Prakrit stage were double letters, and in M. these are usually simplified, the preceding vowel being lengthened in compen- sation. Thus, the Prakrit kanno becomes kan, an ear; Pr. bhikkha becomes bhik, alms; and Pr. putto becomes put, a son. In the Pisaca (see Indo-Aryan Languages) and other languages of north- western India it is not usual to lengthen the vowel in compensation, and the same tendency is observable in Konkani, which, it may be remarked, appears to contain many relics of the old Prakrit (Saurastri) spoken in the Gujarat country before the invasion from the Midland. Thus, in Konkani, we have put as well as put, while the word corresponding to the Pr. ekko, one, is ek as well as the standard ek.

On the whole, the consonantal system is much the same as in other Indian languages. Nasalization of long vowels is very common, especially in Konkani. In this article it is indicated by the sign – placed over the affected vowel. The palatals are pronounced as in Skr. in words borrowed from that language or from Hindostani, and also in Marathi tadbhavas before i, I, e or y. Thus, cand (tatsama), fierce; jama (Hindostani), collected; cikhal (M. tadbhava), mud. In other cases they are pronounced ts, tsh, dz, dzh respectively. Thus tsakar (for cakar), a servant; dzane (for jane), to go. There are two j-sounds in the standard dialect which are very similarly dis- tinguished. S, pronounced like an English sh, is used before i, I, e or y; and s, as in English " sin," elsewhere. Thus, simphl, a caste- name; Hl x a stone; sit, a field; iyam, dark blue; but sap, a snake; sumar (Persian shumar), an estimate; strl, a woman. In the dialects s is practically the only sibilant used, and that is changed by the vulgar speakers of Konkani to h (again as in north-western India). Aspirated letters show a tendency to lose their aspiration, especially in Konkani. Thus, bhik (for bhlkh), alms, quoted above; hat (Pr. hattho), a hand. In Konkani we have words such as boin, a sister, against standard bhain; ger, standard ghart, in a house; ami, standard amhi, we. Here again we have agreement with north- western India. Generally speaking Marathi closely follows Maha- rastri when that differs from the Prakrits of other parts of India. Thus we have Skr. vrajati, Maharastri vaccai (instead of vajjai), he goes; Konkani votsil, to go; S& \ira.s&nl genhiduim, Maharastrlg/j£«w», to take ; Marathi ghefle", taken. There is similarly both in Marathi and Maharastri a laxness in distinguishing between cerebral and dental letters (which again reminds us of north-western India). Thus, Skr. dasati, Maharastri dasai, he bites; M. das a ni to bite; Skr. dahati, Maharastri dahai, he burns; M. $acfe K8, to be hot; Skr. gardabhas; Sauraseni gaddaho; Hindostani gadha; but Maharastri gaddaho; M. gadhav, an ass; and so many others. In Maharastri every n becomes n, but in Jaina MSS. when the n was initiator*

doubled it remained unchanged. A similar rule is followed regarding / and the cerebral / common in Vedic Sanskrit, in MSS. coming from southern India, and, according to the grammarians, also in the Pisaca dialects of the north-west. In M. a Pr. double nn or 11 is simplified, according to the usual rule, to » or J respectively, with lengthening of the preceding vowel in compensation. Both n and / are of frequent occurrence in M., but only as medial letters, and then only when they represent » or lin the Pr. stage. When the letter is initial or represents a double nn or 11 of Pr. it is always n or I respectively, thus offering a striking testimony to the accuracy of the Jaina and southern MSS. Thus, ordinary Maharastri na, but Jaina Maharastri na, M. na, not; Maharastri (both kinds) ghano, M. ghan, dense; Maharastri sonnaam, Jaina sonnaam, M. sone, gold; Maharastri kalo, time, southern MSS. of the same kalo, M. kal, time; Maharastri callai, M. tsale, he goes or used to go. In some of the local dialects, following the Vedic practice, we find / where d is employed elsewhere, as in (Berar) gho\a for ghoda, a horse; and there are instances of this change occurring even in Maharastri; e.g. Skr. tadagam, Maharastri tal&am, M. tali, a pond.

The Skr. compound consonant jn is pronounced dny in the standard dialect, but gy in the Konkan. Thus, Skr. jnanam be- comes dnyan or gyan according to locality.

Declension. — Marathi and Gujarati are the only Indo-Aryan languages which have retained the three genders, masculine, feminine and neuter, of Sanskrit and Prakrit. In rural dialects of Western Hindi and of Rajasthani sporadic instances of the neuter

gender have survived, but elsewhere the only example occurs in the interrogative pronoun. In Marathi the neuter denotes not only inanimate things but also animate beings when both sexes are included, or when the sex is left undecided. Thus, ghode, neut., a horse, without regard to sex. In the Konkan the neuter gender is further employed to denote females below the age of puberty, as in cedu, a girl. Numerous masculine and feminine words, however, denote inanimate objects. The rules for distinguishing the gender of such nouns are as complicated as in German, and must be learned from the grammars. For the most part, but not always, words follow the genders of their Skr. originals, and the abrasion of terminations in the modern language renders it impossible to lay down any complete set of rules on the subject. We may, however, say that strong bases (see below) in a — and these do not include talsamas — are masculine, and that the corresponding feminine and neuter words end in t and S respectively. Thus, mul a ga, a son; mul"gl, a daughter; mul"ge, a child of so and so. As a further guide we may say that sex is usually distinguished by the use of the masculine and feminine genders, and that large and powerful inanimate

objects are generally masculine, while small, delicate things are generally feminine. In the case of some animals (as in our ” horse ” and ” mare “) sex is distinguished by the use of different words ; e.g. bokad, he-goat, and sell, a nanny-goat.

The nominative form of a tadbhava word is derived from the nominative form in Sanskrit and Prakrit, but tatsama words are generally borrowed in the form of the Sanskrit crude base. Thus, Skr. crude base malin, nom. sing, mall; Pr. nom. medio {ma\io); M. malt {tadbhava), a gardener; Skr. base mati-; nom. matis; M. matt {tatsama). Some tatsamas are, however, borrowed in the nomi- native form, as in Skr. dhanin, nom. dhanl; M. dhanl, a rich man. In Prakrit the nominative singular of many masculine tatsamas ended in 0. In the Apabhrarhsa stage this was weakened to u, and in modern Marathi, under the general rule, this final short u was dropped, the noun thus reverting as stated above to the form of the Sanskrit crude base. But in old Marathi, the short u was still retained. Thus, the Sanskrit Isvaras, lord, became, as a Prakrit tatsama, lharo, which in Apabhrarhsa took the form isvaru. The old Marathi form was also lharu, but in modern Marathi we have isvar. Tadbhavas derived from Sanskrit bases in a are treated very similarly, the termination being dropped in the modern language. Thus, Skr. nom. masc. karnas, Pr. kanno, M. kan; Skr. nom. sing. fern. khafva, Pr. khatfa, M. kha(, a bed; Skr. nom. sing. neut. grham, Pr. gharam, M. ghar, a house. Sometimes the Skr. nom. sing. fem. of these nouns ends in I, but this makes no difference, as in Skr. and Pr. culll, M. ciil, a fireplace. There is one important set of exceptions to this rule. In the article Prakrit attention is drawn to the fre- quent use of pleonastic suffixes, especially of {a)ka (masc. and neut.), -{i)ka (fem.). This could in Sanskrit be added to any noun, whatever the termination of the base might be. In Prakrit the k of this suffix, being medial, was elided, so that we get forms like Skr. nom. sing, masc. ghofa-kas, Pr. ghoda-o, M. ghoda, a horse; Skr. nom. sing. fem. ghofi-kd, Pr. ghodi-a, M. ghodl, a mare; Skr. ghota-kam, Pr. ghoda- {y)am, M. ghode, a horse (without distinction of sex). Such modern forms made with this pleonastic suffix, and ending in a, I or e are called ” strong forms,” while all those made without it are called ” weak forms.” As a rule the fact that a noun is in a weak or a strong form does not affect its meaning, but sometimes the use of a masculine strong form indicates clumsiness or hugeness. Thus bhakar (weak form) means ” bread,” while bhdk’ra (strong form) means ” a huge loaf of bread.” The other pleonastic suffixes mentioned under Prakrit are also employed in Marathi, but usually with specific senses. Thus the suffix ilia generally forms adjectives, while -da-ka- (in M. -4&, fem. -oil, neut. -de) implies contempt.

The synthetic declension of Sanskrit and Prakrit has been pre- served in Marathi more completely than in any other Indo-Aryan language. While

Maharastri Prakrit, like all others, passed through the Apabhrarhsa stage in the course of its development, the con- servative character of the language retained even in that stage some of the old pure Maharastri forms. In the article Prakrit we have seen how there gradually arose a laxity in distinguishing the cases. In Maharastri the Sanskrit dative fell into almost entire disuse, the genitive being used in its place, while in Apabhrarhsa the case terminations become worn down to -hu, -ho, -hi, -hi and -ha, of which -hi and hi were employed for several cases, both singular and plural. There was also a marked tendency for these terminations to become confused, so that in the earliest stages of most of the modern Indo Aryan vernaculars we find -hi freely employed for any oblique case of the singular, and hi for any oblique case of the plural. Another feature of Prakrit was the simplification of the complicated declen sional system of Sanskrit by assimilating it in all cases to the declen- sion of o-bases, corresponding to the first and second declensions in Latin.

In the formation of the plural the Prakrit declensions are very closely followed by Marathi. We shall confine our remarks to o-bases, which may be either weak or strong forms, and of which the feminine ends sometimes in a, and sometimes in I. In Prakrit the nom. plur. of these nouns ends masc. a, fem. ad, to, neut. aim. We thus get the following: —

MARATHI

t>73

Masculine.

Feminine.

Neuter.

Nom. Sing.

Nom. Plur.

Nom. Sing.

Nom. Plur.

Nom. Sing.

Nom. Plur.

Nom. Sing.

Nom. Plur.

Weak form.

Prakrit ….

Marathi …. Strong form.

Prakrit ….

Marathi ….

kanno, an ear.

kdn

ghodad,

a horse.

ghodd

kannd kdn ghodayd ghode

khaUd, a bed. khd{

ghoiid,

a mare.

ghddi

khatido khdfd

ghotfido ghodyd

culll,

a fireplace.

cul

cullw cult

gharafh,

a house.

ghar

*ghddayam, a horse. ghode

ghardim ghare *ghdijaydim ghddi

Several of the old synthetic cases have survived in Marathi, especially in the antique form of the language preserved in poetry. Most of them have fallen into disuse in the modern prose language. We may note the following, some of which have preserved the Maharastri forms, while others are directly derived from the Apa- bhrarhsa stage of the language. We content ourselves with giving some of the synthetic cases of one noun, a weak neuter o-base, ghar, a house.

Sing.

Nominative .

Dative .

Locative

General oblique Plur.

Nominative

Locative

General oblique

Maharastri Prakrit.

Apabhrarhsa.

Marathi.

gharam

gharassa (genrtive)

ghare

gharassa (genitive)

ghardim gharesu ghardna (genitive)

gharu

gharaho (genitive) gharahi (-hi) gharaho (genitive)

gharai

gharahi (-hi) gharahd (genitive)

ghar

gharas (dative) gharl, ghard ghards, ghard

ghare ghan_ ghara

As already stated, in Prakrit the genitive is employed instead of the dative, and thus forms the basis of the Marathi dative singular. The genitive plural is not used as a dative plural in Marathi, but it is the basis of the plural general oblique case. The Marathi singular general oblique case is really the same as the Marathi dative singular, but in the standard form of speech when so used the final s is dropped, ghards, as a general oblique case, being only found in dialects. This general oblique case is the result of the confusion of the various oblique cases originally distinguished in Sanskrit and in literary Prakrit. In Apabhrarhsa the genitive began to usurp the function of all the other cases. It is obvious that if it were regularly employed in so indeterminate a sense, it would give rise to great confusion. Hence when it was intended to show clearly what parti- cular case was meant, it became usual to add, to this indeterminate genitive, defining particles corresponding to the English " of," " to," " from," " by," &c, which, as in all Indo-Aryan languages they follow the main word, are called " postpositions." Before dealing with these, it will be convenient to give the modern Marathi synthetic declension of the commoner forms of nouns. The only synthetic case which is now employed in prose is the dative, and this can always be formed from the general oblique case by adding an s to the end of the word. It is therefore not given in the following table.

The accusative is usually the same as the nominative, but when definiteness is required the dative is employed instead. The termina- tion ne, with its plural ni, is, as explained in the article Gujarati, really the oblique form, by origin a locative, of the no or no, employed in Gujarati to form the genitive. The suffix nd of the dative plural is derived from the same word. Here it is probably a corruption of the Apabhrarhsa nau or naho. The postposition Id is probably a corruption of the Sanskrit labhe, Apabhrarhsa lahi, for the benefit (of). As regards the ablative, we have in old Marathi poetry a form corresponding to ghardhu-niyd, which explains the derivation. Ghardhu is a by-form of the Prakrit synthetic ablative ghardu, to which niyd, another oblique form of nd, is added to define the meaning. The locative termination" t is a contraction of the Pr. antd, Skr. antar, within.

The genitive ghardtsa is really an adjective mean- ing " belonging to the house," and agrees in gender, number and case with the noun which is possessed. Thus :

mdlyatsd ghodd, the gardener's horse, malyace ghode, the gardener's horses. malyacl ghddi, the gardener's mare, mdlyacyd ghddya, the

gardeners mares. malyace ghode, the gardener's horse (neut.). mdlydci ghda%, the gardener's horses (neut.).

The suffix tsd, cl, ce, is derived from the Sanskrit suffix tyakas, Pr. cad, which is used in much the same sense. In Sanskrit it may be added either to the locative or to the unmodified base of the word to which it is attached, thus, ghotake-tyakas or ghdtaka-tyakas . Similarly in Marathi, while it is usually added to the general oblique base, it may also be added to the unmodified noun, in which case it has a more distinctly adjectival force. The use of tsd has been influenced by the fact that the Sanskrit word krtyas, Pr. kiccao, also takes the same form in Marathi. As explained in the article Hindostani, synonyms of this word are used in other Indo-Aryan languages to form suffixes of the genitive. 1

Strong adjectives, including genitives, can be declined like sub- stantives, and agree with the qualified noun in gender, number and case. When the substantive i,s in an oblique case, the adjective is put into the general oblique form without any defining postposition, which is added to the substantive alone. Weak adjectives are not inflected in modern prose, but are inflected in poetry. As in other

Masculine.

Feminine.

— — ,

Neuter.

Meaning.

Ear.

Horse.

Gardener.

Bed.

Fireplace.

Mare.

House.

Horse.

Pearl.

Sing.

Gen. obi

Plur.

Nom.

Gen. obi

kdn kand

kdn kdna

ghodd ghddya

ghode ghddya

mall mdlyd

mail _ mdlyd

khd{ kha{e

khdfd khafd

cul cull

cull cull

ghda% ghddi

ghddya ghddya

ghar ghara

ghare_ ghara

ghode ghodyd

ghddi _ ghddya

motl mdtyd

moly\ mdtyd

The usual postpositions arej —

Instrumental: ne, plural m, by. Dative: la, plural also nd, to or for. Ablative: hun, un, from. Genitive: tsd, of. Locative:”’, in. We thus get the following complete modern declension of ghar, a house (neut.) : —*

Sing. Nom. ghar

Ace. ghar

Instr. gharane

Dat. gharas, ghardld

Abl. ghardhiln, ghariin

Gen. ghardtsa

Loc. ghar at

XVII. 22

Plur,

ghare

*ghare_*

gharani

gharas, ghar aid, ghardna

ghardhiin

ghardtsa

gharat

Indo-Aryan languages, comparison is effected by putting the noun with which comparison is made in the ablative case.

The pronouns closely follow the Prakrit originals. The origin of all these is discussed in the article Hindostani, and the account need not be repeated here. As usual in these languages, there is no pronoun of the third person, its place being supplied by the demonstratives. The following are the principal pronominal forms : —

1 Fuller information regarding all the above postpositions will be found in G. A. Grierson's article " On Certain Suffixes in the Modern Indo-Aryan Vernaculars," on pp. 473 seq. of the Zeitschrift fur vergleichende Sprachforschung for 1903.

ml, I, instr. ml, myd, dat. mala, obi. madz; amhi, we, instr. dmM, obi. amhi; madzha, my, of me; dmtsd, our, of us.

tu, thou, instr. t&, twd, dat. tula, obi. /«dz; tumhi, you, instr. tumhl, obi. tttmhd; tudzhd, thy, of thee ; tumtsd, your, of you.

apart, self, obi. dp”na, gen. dpHd. This is also employed as an honorific pronoun of the second person, and, in addition, to mean ” we including you.”

ha, this, fern, hi, neut. hi; to, he, that, fem. ti, neut. /I; ozo, who, fem. ji, neut. jl.

kon, who? day, what? obi. hdsa; koni, any one; MAJ, anything.

In all these the plural is employed honorifically instead of the singular.

Conjugation. — In Prakrit (q.v.) the complicated system of Sanskrit conjugation had already disappeared, and all verbs fell into two classes, the first, or a-, conjugation, and the second, or e-, conjugation, in which the e represents the aya of the Sanskrit tenth conjugation and of causal and denominative verbs. Marathi follows Prakrit in this respect and has two conjugations. The first, corresponding to the Prakrit a-class, as a rule consists of intransitive verbs, and the second, corresponding to the e- or causal class, of transitive verbs, but there are numerous exceptions. Verbs whose roots end in vowels or in h belong partly to one and partly to the other conjugation. These conjugations differ only in the present and past participles and in the tenses formed from them. Here, in the first conjugation an a, and in the second conjugation an i, is inserted between the base and the termination.

The only original Prakrit tenses which have survived in Marathi are the present and the imperative. The present has lost its original meaning and is now a habitual past. It is also the base of the Marathi future. These three tenses, the habitual past, the im- perative and the future, are conjugated as follows. They should be compared with the corresponding forms in the article Prakrit. The verb selected is the root uth, rise, of the first conjugation.

Person.

Habitual past (old present), I used to rise.

Imperative. Let me rise.

Future. I shall rise.

Sing.

Plural.

Sing.

Plural.

Sing.

Plural.

I

2

3

u(he

ufhes

uthe

ufhu utha. uthat

u(hA

u(h

u(ho

u(hA uflia uthot

u(hen

u(h"Hl

uthel

u(hu ufhdl uth a M

As in Rajasthani, Bihari and the Indo-Aryan language of Nepal (see Pahari), the future is formed by adding /, or in the first person singular n,

to the old present. In the second person singular the / has been added to a form derived from the Pr. utfhasi, which is also the origin of the old present uthes. Some scholars, however, see in ufhasi a derivation of the Prakrit future utfhihisi, thou shalt arise, and a confusion of the Prakrit present and future is quite possible.

The remaining tenses are modern forms derived from the par- ticiples. The verbal nouns, participles and infinitives are as follows : —

simply the unmodified participle. We thus get the present and the past conjugated as follows, with a masculine subject: —

Prakrit

Marathi

Marathi

(First

First

Second

Verbal Noun .

Conjugation).

Conjugation.

Conjugation.

utthaniam

uth”ni, the act

mdr”ne, the act

of rising.

of killing.

Infinitive .

ulthiurh

u(hA, to rise.

mdfu, to kill.

Present Participle

ufthanto,

uthat, uth a ta,

mdrtt, mdritd,

utfhantad

rising.

killing.

Past Participle

ufthiallao

uthHa, risen.

mdrild, killed.

Future Participle

utthanaadd

u\h”ndr, about

mdr a ndr, about

Active

to rise.

to kill.

Future Participle

uffhiawad

u(hawd, about

mdrawa, about

Passive

to be risen.

to be killed.

Conjunctive Par-

ujlhiu

ufhiln, having

martin, having

ticiple

risen.

killed.

i

2

3

Present, I rise.

Past, I rose.

Singular.

Plural.

Singular.

Plural.

u(h a t8

uthHds

uth'td

ufh'td uth"ta ulh"lal

uthHo

uthHds

uthHa

uthHo ufhHS uthHe

The only form that requires notice is that of the conjunctive participle. It is derived from the Apabhrarhsa form utthiu, to which the dative suffix n (old Marathi ni, niyfi) has been added.

Various tenses are formed by adding personal suffixes to the present, past or future passive participle. When the subject of the verb is in the nominative the tense so formed agrees with it in gender, number and person. We may note four such tenses: a present, uth a ti, I rise; a past, uthHo, 1 rose; past conditional, uth"to, had I risen; and a subjunctive, uthdwd, I should rise. In the present, the terminations are relics of the verb substantive, and in the other tenses of the personal pronouns. In these latter, as there is no pronoun of the third person, the third persons have no termination, but are

The feminine and neuter forms differ from the above: thus, uthHes, thou (fem.) risest ; ufhHis, thou (fem.) didst rise ; and so on for the other persons and for the neuter.

It will be observed that, in the case of transitive verbs, while the present participle is active, the past and future passive participles are passive in meaning. The same is the case with the future passive participle of the intransitive verb. In tenses, therefore, formed from these participles the sentence must be construed passively. The subject must be put into the instrumental case, and the participle inflected to agree with the object. If the object is not expressed, or, as is sometimes the case, is expressed in the guise of a kind of ethic dative, the participle is construed impersonally, and is employed in the neuter form. Thus (present tense) mul a gd (nom. masc.) pdthi vdcito, the boy reads a book, but (past tense) mul"gydni (instrumental pdthi (nom. fem.) vdcili (fem.) the boy read a book, literally, by-the- boy a-book was-read; or mul a gydni pdthild (dative) vacile (neuter), the boy read the book, literally, by-the-boy, with-reference-to-the-book, it-(impersonal)-was-read. Similarly in the subjunctive formed from the future passive participle, mul'gyani pdthi vdcdwi, the boy should read a book (by-the-boy a-book is-to-be-read) or mul"gydni pdthild vdcdwi, the boy should read the book [by-the-boy with-reference-to-the-book, it (impersonal)-is-to-be-read). As an example of the subjunctive of an intransitive verb, we have twd uthdwi, by-thee it-is-to-be- risen, thou shouldst rise. As in intransi- tive verbs the passive sense is not so strong, in their case the tense may also be used actively, as in ta ufhdwas, thou shouldst rise, lit., thou (art) to-be-risen. It will be noted that when a participle is used passively it takes no personal suffix.

We have seen that the present tense is formed by compounding the present participle with the verb substantive. Further tenses are similarly made by suffixing, without compounding, various tenses of the verb substantive to the various participles. Thus mi uthat dhi, I am rising; mi uthat hdto, I was rising; myd ufhdvi hdte (im- personal construction), I should have risen. In the case of tenses formed from the past participle, the auxiliary is appended, not to the participle, but to the past tense, as in ml uthHo dhe, I have risen ; myd mdrild dhe (personal passive construction) or myd mdrili dhe impersonal passive construction), I have killed. Similarly mi uthHo hdto (active construction), I had risen. The usual forms of the present and past of the verb substantive are : —

I

2

3

Present, I am.

Past, I was (masc).

Singular.

Plural.

Singular.

Plural.

dhi

ahes

dhe

dhi aha ah It

hdto

hdtds

hdtd

hdto hdtS hdte

The past changes for gender, but the present is immutable in this respect.

Ahi is usually considered to be a descendant of the Sanskrit asmi, I am, 1 while hold is derived from the Pr. homtad, the present participle of what corresponds to the Skr. root bhii, become.

A potential passive and a causal are formed by adding av to the root of a simple verb. The former follows the first, or intransitive, and the latter the second or transitive conjugation. The potential passive of a neuter verb is necessarily construed impersonally. The causal verb denotes indirect agency; thus, kar a ne, to do, karav"ni, to cause a person to do ; tyacyd-kadun myd li karavili, I caused him to do that, literally, by-means-of-him by-me that was-caused-to-be- done. The potential, being passive, has the subject in the dative (cf. Latin mihi est ludendum) or in the instrumental of the genitive, as in mala (dative), or mdjhydni (instr. of madzha, of me), uth'vati, I can rise, literally, for-me, or by-my- (action), rising-can-be-done. So, Ramdld, or RdmdcydnB, pdthi vdCvali, Ram could read a book (by R. a book could be read).

Several verbs are irregular. These must be learnt from the grammars. Here we may mention hdni, to become, past participle dzhdla; yeni, to come, past participle did; and dzani, to go, past participle geld. There are also numerous compound verbs. One of these, making a passive, is formed by conjugating the verb dzdnS, to go, with the past participle of the principal verb. Thus, mdrild dzatd, he is being killed, literally, he goes killed.

1 See, however, Hoernle, Comparative Grammar, p. 364.

Literature. — As elsewhere in India, the modern vernacular litera- ture of the Maratha country arose under the influence of the religious reformation inaugurated by Ramanuja early in the 12th century. He and his followers taught devotion to a personal deity instead of the pantheism hitherto prevalent. The earliest writer of whom we have any record is Namdev (13th century), whose hymns in honour of Vithoba, a personal form of Vishnu, have travelled far beyond the home of their writer, and are even found in the Sikh Adi Granlh. Dnyiinoba, a younger contemporary, wrote a paraphrase of the Sanskrit Bhagavad Gita, which is still much admired. Passing over several intermediate writers we come to the period of the warrior Sivaji, the opponent of Aurangzeb. He was a disciple of Ramdas (1608-1681), who exercised great influence over him, and whose Dasbodh, a work on religious duty, is a classic. Contemporary with Riimdas and Sivaji was Tukaram (1608-1649), a Sudra by caste, and yet the greatest writer in the language. He began life as a petty shopkeeper, and

being unsuccessful both in his business and in his family relations, he abandoned the world and became a wandering ascetic. His Abhangs or " unbroken " hymns, probably so called from their indefinite length and loose, flowing metre, are famous in the country of his birth. They are fervent, but though abounding in excellent morality, do not rise to any grea.t height as poetry. Other Marathi poets who may be mentioned are Srldhar (1678-1728), the most copious of all, who translated the Bhagavata Purana, and the learned Mayura or Moropant (1 729-1 794), whose works smell too much of the lamp to satisfy European standards of criticism. Mahipati (1715-1790) was an imitator of Tukaram, but his chief importance rests on the fact that he collected the popular traditions about national saints, and was thus the author of the Acta sanctorum of the Marathas. Lavanis, or erotic lyrics, by various writers, are popular, but are often more passionate than decent. Another branch of Marathi literature is composed of Pdwadas or war-ballads, mostly by nameless poets, which are sung everywhere throughout the country. There is a small prose literature, consisting of nar- ratives of historical events (the so-called Bahhars), moral maxims and popular tales.

In the 19th century the facilities of the printing press are respon- sible for a great mass of published matter. Most of the best works have been written in English by learned natives, upon whom the methods of European scholarship have exercised more influence than elsewhere in India, and have given rise to a happy combination of western science with Oriental lore. No vernacular authors of outstanding merit have appeared during the last century.

Konkani once had a literature of its own, which is said to have been destroyed by the Inquisition at Goa. Temples and manuscripts were burnt wholesale. Under Roman Catholic auspices a new literature arose, the earliest writer being an Englishman, Thomas Stephens (Thomaz Estevao), who came to Goa in 1579, wrote the first Konkani grammar, and died there in 1619. Amongst other works, he was the author of a Konkani paraphrase of the New Testament in metrical form, which has been several times reprinted and is still a favourite work with the native Christians. Since his time there has grown up a considerable body of Christian literature from the pens of Portuguese missionaries and native converts.

Authorities. — Marathi is fortunate in possessing the best dictionary of any modern Indian language, j. T. Molesworth's (2nd ed., Bombay, 1857). Navalkar's (3rd ed., Bombay, 1894) ' s the best grammar. The earliest students of Marathi were the Portuguese, who were familiar only with the language as spoken on the coast, i.e. with the standard dialect of the northern Konkan and with Konkani. They have since devoted themselves to these two forms of speech. For the former, reference may be made to the

Grammatica da lingua Concani no dialecto do norte, by J. F. da Cunha Rivara (Goa, 1858). For Konkani proper, see A. F. X. Maffei's Grammar (Mangalore, 1882) and Dictionaries (ibid., 1883). These are in English. Monsenhor S. R. Dalgado is the author of a Konkan-Portuguese Dictionary (Bombay, 1893).

For further information regarding Marathi in general, see the list of authorities under Indo-Aryan Languages. For accounts of Marathi literature, see the preface to Molesworth's Dictionary; also J. Murray Mitchell's " The Chief Marathi Poets " in Transactions of the Congress of Orientalists, London, 1892, i. 282 sqq., and ch. viii. of M. G. Ranade's Rise of the Maratha Power (Bombay, 1900). For Konkani literature, see J. Gerson da Cunha's " Materials for the History of Oriental Studies among the Portuguese," in the Pro- ceedings of the Fourth International Congress of Orientalists , ii. 179 sqq. (Florence, 1881). A full account of Marathi, given in great detail, will be found in vol. vii. of the Linguistic Survey of India (Calcutta, 1905). (G. A. GR.)

MARATHON, a plain on the N.E. coast of Attica, divided from the plain of Athens by the range of Pentelicus; it contained four villages — Marathon, Probalinthos, Tricorythos and Oenoe — which originally formed an independent tetrapolis and in historical times still upheld peculiar rites and legendary associations, chiefly connected with Heracles and Theseus. In the 6th century B.C. it served as a base for Peisistratus (q.v.), who owned much property in that district, for securing the rest of Attica. The

plain derives its fame mainly from the battle in which the Athenians and Plataeans defeated the Persians (490 B.C.). The Persian force had been sent by King Darius to punish the Athenians for previous interferences in Asia and to restore their tyrant Hippias. It was probably by advice of the latter that the generals Datis and Artaphernes landed their troops, number- ing perhaps 50,000, at Marathon. The Athenians, on the recommendation of their strategus Miltiades, resolved to meet this force in the open field, and sent out their full levy of 9000 heavy infantry under the polemarch Callimachus. They were joined on the way by 1000 Plataeans, but were disappointed of the assistance which they expected from Sparta. From their station at the head of the Vrana valley, which slopes down to Marathon plain, the Athenians for some days observed the Persian army, which gave no sign of proceeding to attack. After some waiting, Miltiades, who seems throughout to have played a more prominent part than his superior Callimachus, drew up the Athenian army for battle and charged down upon the enemy, whose line was formed on the level about a mile distant. The Athenian wings, whose formation had been made specially deep, broke the opposing divisions by their impact; the centre was at first overborne by the superior weight of the native Persians, but ultimately was relieved by

the victorious wings, which closed in upon the Persian centre. The Persians were thereupon driven back into the sea all along the line, and, although the majority regained their ships, no less than 6400 were left dead, as against 192 Athenians. The Persian fleet, of which perhaps a detach- ment had been sent on before the battle, now sailed round Cape Sunium in order to effect a landing at Phalerum, close by Athens, and with the help of traitors within the walls to take the city by surprise. But Miltiades, who had suspected some plot all along, and had lately been warned by a signal on Mt Pentelicus which he interpreted as a message to the Persians, marched back the victorious army in time to defend Athens. The enemy, upon noticing his presence, did not venture a second disembarcation and retired straightway out of Greek waters. The details of the battle, and the Persian plan of campaign, are not made clear by our ancient sources, but reconstructions have been attempted by numerous modern authorities. (M. O. B. C.)

The tumulus or " Soros " was excavated by M. Stais in 1891 and 1892. A slight previous excavation had brought to light some prehistoric implements, and it was supposed that the mound had no connexion with the battle; but it has now been discovered that the presence of those prehistoric objects was accidental. Underlying the mound was found a stratum about 85 ft. long by 20 broad, consisting of a layer of sand, above which lay the ashes and bones of many corpses; together with these were the remains of many lecythi and other vases, some of them contemporary with the Persian wars, some of them of much earlier style, and probably taken in the emergency from neigh- bouring cemeteries. It is conjectured with some probability that a large vase containing ashes may have been used as the burial urn of one of the Athenian generals who fell. There was also, in the middle of the stratum, a trench for funeral offerings about 30 ft. by 3; it contained bones of beasts, with ashes and fragments of vases. There can therefore be no doubt that the tumulus was piled up to commemorate the Athenians who fell in the battle, and that it marks the place where the carnage was thickest. A selection from the contents of the tumulus has been placed in the National Museum at Athens. (E.Gr.)

See Herodotus vi. 102-117; W. M. Leake, The Topography of Athens (London, 1841), ii. 203-227; R. W. Macan, Herodotus, iv.-vi. (London, 1895), ii. 149-248; G. B. Grundy, The Great Persian War (London, 1901), pp. 145-194; J. A. Munro in Journal of Hellenic Studies, 1899, pp. 186-197. For the tumulus, 'A.pxa-<-o\oyuc6v AtXrlov 1 89 1, pp. 67 sqq. See also Miltiades.

MARAZION, a small seaport in the St Ives parliamentary division of Cornwall, England, on the shore of Mount's Bay, 2 m. E. of Penzance, served by the Great Western railway. Pop. (1901), 1251. A causeway of

boulders and pebbles, thrown up by the sea and passable at low tide, unites Marazion with the insular St Michael's Mount (q.v.). The church of St Hilary, destroyed by fire in 1853, had a very fine spire, which has been

faithfully reproduced in the restored building. Unusual archaeo- logical interest attaches to the churchyard. Its inscribed stones date from the 4th century, one being in honour of Constantine the Great. Another has Cornish lettering, which can no longer be deciphered; and there are British and Roman crosses. Market gardening and fishing are the main industries.

The charter attributed to Robert count of Mortain, granting lands and liberties to St Michael's, Mount, opposite Marazion, included a market on Thursdays. This appears to have been held from the first on the mainland. From it is probably derived the Marghasbigan (Parvum Forum) of the earlier and the Marghasyewe or Marketjew (Forum Jovis) of the later charters. It may be added that a Jewish origin has been ascribed to the place from the name Marketjew. It is certain that Richard king of the Romans provided that the three fairs, on the two feasts of St Michael and at Mid-Lent, and the three markets which had hitherto been held by the priors of St Michael's Mount on land not their own at Marghasbighan, should in future be held on their own land at Marchadyou. He transferred in fact the fairs and markets from the demesne lands of the Bloyous in Marazion to those of the prior. To remedy the loss incurred by this measure Ralph Bloyou in 1331 procured for himself and his heirs a market on Mondays and a fair on the vigil, feast and morrow of St Andrew at Marghasyon. In Leland's time the market was held at Marhasdeythyow {Forum Jovis), and both Norden (1582) and Carew (1602) tell us that Marcajewe signifies the Thursday's market, which, whether etymologically sound or not, shows that the prior's market had prevailed over its rival. In 1595 Queen Elizabeth granted to Marazion a charter of in- corporation. This ratified the grant of St Andrew's fair, pro- vided for another on the Feast of St Barnabas and established a market on Saturdays. The corporation was to consist of a mayor, 8 aldermen and 12 capital burgesses. This corpo- ration continued to administer the affairs of the borough until it was dissolved under the Municipal Corporations Act in 1835, when the property belonging to it was vested in charity com- missioners. The chairman of the commissioners retains pos- session of the regalia. Of the fairs only the Michaelmas fair has survived and all the markets have gone. It is frequently stated that Marazion had formerly the right of returning two members to parliament, but that owing to its inability to pay the members' expenses the right was lost. Under the Common-

wealth an attempt was made to secure or recover the right, and two members are said to have been returned, but they were not allowed to take their seats. Remains of an ancient bronze furnace, discovered near the town, tend to prove that tin- smelting was practised here at an early period. Marazion was once a flourishing town, and owed its prosperity to the throng of pilgrims who came to visit St Michael's Mount. During the first half of the 16th century it was twice plundered; first by the French, and later by the Cornish rebels. The rise and progress of the neighbouring borough of Penzance in the 17th century was the undoing of Marazion.

MARBLE (from Lat. marmor, Gr. [lappapos, shining stone), a term applied to any limestone or dolomite which is sufficiently close in texture to admit of being polished. Many other orna- mental stones — such as serpentine, alabaster and even granite — are sometimes loosely designated marble, but by accurate writers the term is invariably restricted to those crystalline and compact varieties of carbonate of lime (occasionally with carbonate of magnesia) which, when polished, are applicable to purposes of decoration. The crystalline structure is typically shown in statuary marble. A fractured surface of this stone displays a multitude of sparkling facets, which are the rhombohedral cleavage-planes of the component grains. The beautiful lustre of polished statuary marble is due to the light penetrating for a short distance into the rock and then suffering reflection at the surfaces of the deeper-lying crystals. The durability of marble in a dry atmosphere or when protected from rain renders it a

valuable building stone (?.».); on the other hand, when exposed to the weather or the acid atmosphere of large cities, its surface

readily crumbles.

Statuary and Economic Marbles. — Among statuary marbles the first place may be assigned to the famous Pentelic marble, the material in which Pheidias, Praxiteles, and other Greek sculptors executed their principal works. The characteristics of this stone are well seen in the Elgin marbles, which were removed from the Parthenon at Athens, and are now at the British Museum. The marble was derived from the quarries of Mount Pentelicus in Attica. Several large buildings have recently been constructed with this marble in London. The neighbour- ing mountain of Hymettus likewise yielded marbles, but these were neither so pure in colour nor so fine in texture as those of Pentelicus. Parian marble, another stone much used by Greek sculptors and architects, was quarried in the isle of Paros, chiefly at Mount Marpessa. It is called by ancient writers lychnites (from the Gr. \vxvos, a lamp) in allusion to the fact that the quarries were worked by the light of lamps. The Venus de' Medici is a notable example of work in this material. Carrara marble is better known than any of the

Greek marbles, inasmuch as it constitutes the stone invariably employed by the best sculptors of the present day. This marble occurs abundantly in the Apuan Alps, an offshoot of the Apennines, and is largely worked in the neighbourhood of Carrara, Massa and Serravezza. Stone from this district was employed in Rome for architectural purposes in the time of Augustus, but the finer varieties, adapted to the needs of the sculptor, were not discovered until some time later. It is in Carrara marble that the finest works of Michelangelo and of Canova are executed. The purest varieties of this stone are of snow-white colour and of fine sacch,aroidal texture. Silica is disseminated through some of the marble, becoming a source of annoyance to the workman; while occa- sionally it separates as beautifully pellucid crystals of quartz known as " Carrara diamonds." The geological age of the marbles of the Apuan Alps has been a subject of much dispute, some geologists regarding them as metamorphosed Triassic, Liassic or Rhaetic rocks. Much of the common marble is of a bluish colour, and therefore unfit for statuary purposes; when streaked with blue and grey veins the stone is known as bardiglio. Curiously enough, the common white marble of Tuscany comes to England as Sicilian marble — a name probably due' to its having been formerly re-shipped from some port in Sicily.

Although crystalline marbles fit for statuary work are not found to any extent in Great Britain, the limestones of the Palaeozoic formations yield a great variety of marbles well suited for architectural purposes. The Devonian rocks of south Devon are rich in handsome marbles, presenting great diversity of tint and pattern. Plymouth, Torquay, Ipplepen, Babba- combe and Chudleigh may be named as the principal localities. Many of these limestones owe their beauty to the fossil corals which they contain, and are hence known as " madrepore marbles."

Of far greater importance than the marbles of the Devonian system are those of Carboniferous age. It is from the Carboni- ferous or Mountain Limestone that British marbles are mainly derived. Marbles of this age are worked in Derbyshire and Yorkshire, in the neighbourhood of Bristol, in North Wales, in the Isle of Man, and in various parts of Ireland. One of the most beautiful of these stones is the " encrinital marble," a material which owes its peculiarities to the presence of numerous encrinites, or stone-lilies. These fossils, when cut in various directions, give a characteristic pattern to the stone. The joints of the stems and arms are known from their shape as " wheel-stones," and the rock itself has been called " entrochal marble." The most beautiful varieties are those in which the calcareous fossils appear as white markings on a ground of grey limestone. In Belgium a black marble with small sections of crinoid stems is known as petit granit, while in Derbyshire a similar rock, crowded with fragments of minute encrinites, is termed " bird's-eye marble."

Perhaps the most generally useful marbles yielded by the Carboniferous system are the black varieties, which are largely employed for chimney-pieces, vases, and other ornamental objects. The colour of most black limestone is due to the presence of bituminous matter. Such limestone commonly

emits a fetid odour when struck; and the colour, being of organic origin, is discharged on calcination. Black marbles, more or less dense in colour, are quarried in various parts of Ireland, especially at Kilkenny and near Galway, but the finest kind is obtained from near Ashford in Derbyshire. From Ashford is also derived a very beautiful stone known as " rosewood marble." This is a dense brown laminated limestone, displaying when polished a handsome pattern somewhat resembling the grain of rosewood; it occurs in very limited quantity, and is used chiefly for inlaid work. The black marble of Frosterley, York- shire, is another Carboniferous example which owes its " figure " or pattern to the presence of large corals.

With the rosewood marble may be compared the well-known " landscape marble " or Cotham stone, an argillaceous limestone with peculiar dendritic markings, due probably to the infiltration of water containing oxide of manganese. This limestone occurs in irregular masses near the base of the White Lias, or upper- most division of the Rhaetic series. It is found principally in the neighbourhood of Bristol. The arborescent forms depicted in bluish-grey upon this landscape marble form a marked con- trast to the angular markings of warm brown colour which are seen on slabs of " ruin marble " from Florence — a stone occa- sionally known also as landscape stone, or pietra paesina.

British limestones of Secondary and Tertiary age are not generally compact enough to be used as marbles, but some of the shelly beds are employed to a limited extent for decorative purposes. " Ammonite marble " is a dark brown limestone from the Lower Lias of Somersetshire, crowded with ammonites, principally A. planicostata. Under the name of Forest marble, geologists recognize a local division of the Lower Oolitic series, so named by W. Smith from Wychwood Forest in Oxfordshire, where shelly limestones occur; and these, though of little economic value, are capable of being used as rough marbles. But the most important marbles of the Secondary series are the shelly limestones of the Purbeck formation. Purbeck marble was a favourite material with medieval architects, who used it freely for slender clustered columns and for sepulchral monuments. It consists of a mass of the shells of a fresh-water snail, Paludina

carinifera, embedded in a blue, grey or greenish limestone, and is found in the Upper Purbeck beds of Swanage in Dorsetshire. Excellent examples of its use may be seen in Westminster Abbey and in the Temple Church, as well as in the cathedrals of Salisbury, Winchester, Worcester and Lincoln. Sussex marble is a very similar stone, occurring in thin beds in the Weald clay, and consisting largely of the shells of Paludina, principally P. sussexiensis and P.fluviorum. The altar stones and the episcopal chair in Canterbury Cathedral are of this material. Certain calcareous metamorphic rocks frequently form stones which are sufficiently beautiful to be used for ornamental purposes, and are generally classed as marbles. Such . ser-pentinous limestones are included by petrologists under the term " ophicalcite." The famous verde antico is a rock of this character. Mona marble is an ophicalcite from the metamorphic series of the Isle of Anglesey, while the " Irish green "of archi- tects is a similar rock from Connemara in western Galway. It is notable that some of the " white marble " of Connemara has been found by W. King and T. H. Rowney to consist almost wholly of malacolite, a silicate of calcium and magnesium.

A beautiful marble has been worked to a limited extent in the island of Tiree, one of the Hebrides, but the quarry appears to be now exhausted. This Tiree marble is a limestone having a delicate carnelian colour diffused through it in irregular patches, and containing rounded crystals of sahlite, a green augitic mineral resembling malacolite in composition.

Many marbles which are prized for the variegated patterns they display owe these patterns to their formation in concentric zones — such marbles being in fact stalagmitic deposits of carbonate of lime, sometimes consisting of aragonite. One of the most beautiful stalagmitic rocks is the so-called onyx marble of Algeria. This stone was largely used in the buildings of Carthage and Rome, but the quarries which yielded it were not known to modern sculptors until 1849, when it was redis-

covered near Oued-Abdallah. The stone is a beautifully trans- lucent material, delicately clouded with yellow and brown, and is greatly prized by French workmen. Large deposits of a very fine onyx-like marble, similar to the Algerian stone, have been worked at Tecali, about 3 5 miles from the city of Mexico. Among other stalagmitic marbles, mention may be made of the well- known Gibraltar stone, which is often worked into models of cannon and other ornamental objects. This stalagmite is much deeper in colour and less translucent than the onyx marbles of Algeria and Mexico. A richly tinted stalagmitic stone worked in California is known as Californian marble. It is worth noting that the " alabaster " of the ancients was stalagmitic carbonate of lime, and that this stone is therefore called by mineralogists " Oriental alabaster " in order to distinguish it from our modern " alabaster," which is a sulphate, and not a carbonate, of lime.

Gypsum capable of taking a polish is found at Fauld in Stafford- shire and in Italy and Spain.

The brown and yellow colours which stalagmitic marbles usually present are due to the presence of oxide of iron. This colouring matter gives special characters to certain stones, such as the giallo antico, or antique yellow marble of the Italian antiquaries. Siena marble is a reddish mottled stone obtained from the neighbourhood of Siena in Tuscany; and a somewhat similar stone is found in King's County, Ireland. True red marble is by no means common, but it does occur, of bright and uniform colour, though in very small quantity, in the Carboniferous limestone of Derbyshire and north-east Stafford- shire. The red marble called rosso antico is often confounded with the porfiro rosso antico, which is really a mica-hornblende porphyrite owing its red colour to the mineral withamite.

Fire marble is the name given to a brown shelly limestone containing ammonites and other fossil shells, which present a brilliant display of iridescent colours, like those of precious opal. It occurs in rocks of Liassic age at the lead-mines of Bleiberg in Carinthia, and is worked into snuff-boxes and other small objects. By mineralogists it is often termed lumachella, an Italian name which may, however, be appropriately applied to any marble which contains small shells.

The quarries of France, Belgium, Italy and Spain, not to mention less important localities, yield a great diversity of marbles, and almost each stone bears a distinctive name, often of trivial meaning; but in this article it is impossible to enumerate the local names used by marble-workers in different countries to distinguish the various stones which pass under their hands.

America possesses some valuable deposits of marble, which in the eastern States have been extensively worked. The crystalline limestones of western New England furnish an abun- dance of white and grey marble, while a beautiful material fit for statuary work has been quarried near Rutland in Vermont. A grey bird's-eye marble is obtained from central New York, and the greyish clouded limestones of Thomaston in Maine have been extensively quarried. Of the variegated and coloured marbles, perhaps the most beautiful are those from the northern part of Vermont, in the neighbourhood of Lake Champlain. A fine brecciated marble is found on the Maryland side of the Potomac, below Point of Rocks. Among the principal localities for black marble may be mentioned Shoreham in Vermont and Glen Falls in New York. In 1908 the American States producing marble were, in order of value, Vermont, Georgia,, Tennessee, New York, Massachusetts, Alabama, Pennsylvania, Maryland, California, Colorado, Alaska, N. Carolina, Kentucky, New Mexico, Utah, Missouri

and Idaho. In Canada the crystalline limestones of the pre-Cambrian series yield beautiful marbles.

In India we find important quarries at Makrana in Rajputana, — a locality which is said to have yielded the marble for the famous Taj Mahal at Agra. In the valley of the Nerbudda, near Jabalpur, there is a large development of marble. The white marble which is used for the delicately pierced screens called jalee work is obtained from near Raialo, in Ulwar. (F. W. R.)*

Petrography. — Marbles are uniformly crystalline, and hence have no bedding or schistosity which would tend to make them fissile,

but are entirely massive and free from grain. The microstructure of pure marble is comparatively simple. In thin sections they are seen to be built up of somewhat rounded grains of calcite, fitting closely together in a mosaic; very rarely do any grains show traces of crystalline form. They are colourless and transparent, and are usually traversed by a lattice-work of sharply denned cleavage cracks, which correspond to the rhombohedral faces. In polarized light the colours are pinkish or greenish white, or in very thin sections iridescent because the mineral has a very strong double refraction. They may also be crossed by bars or stripes, each of which indicates a twin plate, for the crystals are usually polysynthetic. This twinning may be produced by pressure acting either during the crystallization of the rock or at a later period.

The purest marbles generally contain some accessory minerals, and in many of these rocks they form a considerable proportion of the whole mass. The commonest are quartz in small rounded grains, scales of colourless or pale yellow mica (muscovite and phlogopite), dark shining flakes of graphite and small crystals of pyrites or iron oxides. Even fine Carrara marble leaves a residue of this sort when dissolved in acid. Many marbles contain other minerals which are usually silicates of lime or magnesia. The list of these accessories is a very large one. Augite is very frequent and may be white (malacolite) or pale green (coccolite, sahlite, diopside) ; hornblende occurs as white bladed tremolite or pale green actinolite ; feldspars may be present also, such as orthoclase, or more frequently some plagioclase such as albite, labradorite and anorthite ; scapolite (or wernerite) ; various kinds of garnet ; vesuvianite, spinel, forsterite, periclase, brucite, talc, zoisite and epidote, chondrodite, biotite, datolite, sphene and apatite may be mentioned as typical accessory minerals. The presence of metalliferous minerals such as galena, grey or

red silver ores, zinc blende, antimonite, chalcopyrite, molybdenite, cassiterite, usually indicates impregnation by ore- bearing solutions, especially if these substances occur in workable quantities. The rubies of Burma are found in crystalline lime- stones and are constantly accompanied by precious spinel (or balas- ruby).

These minerals represent impurities in the original limestone which crystallized at the time that the marble became crystalline. The silicates derive their silica mainly from sand or infiltrated siliceous deposits; the alumina represents an admixture of clay; the iron came from limonite or hematite in the original state of the rock. Where the silicates bulk largely because the original limestone was highly impure, all the carbonic acid may be driven out and replaced by silica during the process of recrystallization. The rock is then a calc-silicate rock, hard, tough, flinty and no longer readily soluble in acids. They are sometimes fine-grained hornstones (known as calc-silicate hornfelses). Where white minerals predominate (wollas- tonite, tremolite, feldspar) these rocks may have a close resemblance to marbles, but often they are green from the abundance of green augites and amphiboles, or brown (when garnet and vesuvianite are present in quantity) or yellow (with epidote, chondrodite or sphene). Decomposition induces further changes in colour owing to the formation of green or yellow serpentine, pale green talc, red hema- tite, and brown limonite. Most of the coloured or variegated crystal- line marbles have originated in this manner. Often bands of calc- silicate rock alternate with bands of marble, and they may be folded or bent ; in other cases, nodules and patches of silicates occur in a matrix of pure marble. Earth movements may shatter the rocks, producing fissures afterwards filled with veins of calcite ; in this way the beautiful brecciated or veined marbles are produced. Sometimes the broken fragments are rolled and rounded by the flow of the marble under pressure and pseudo-conglomerates or " crush con- glomerates " result. In other cases the banding of the marble indicates the original bedding of the calcareous sediments. Crystal- line limestones which contain much mica may be called cipollinsˆ in them quartz, garnet and hornblende often also occur. The ophicalcites are marbles containing much serpentine, which has been formed by the decomposition of forsterite, olivine or augite. The much-discussed Eozoon, at one time supposed to be the earliest known fossil and found in Archaean limestones in Canada, is now known to be inorganic and to belong to the ophicalcites.

Many marbles, probably all of them, are metamorphosed lime- stones. The passage of limestones rich in fossils into true marbles as they approach great crystalline intrusions of granite is a phe- nomenon seen in many parts of the world ; occasionally the recrystal- lization of the rock has not completely obliterated the organic structures (e.g. at Carrara and at Bergen in Norway). The agencies which have induced the metamorphism are heat

and pressure, the heat arising from the granite and the pressure from overlying masses of rock, for these changes took place before the granite cooled and while it was still deeply buried beneath the surface. In 1806 Sir James Hall described a series of experiments proving this. He enclosed chalk in a gun-barrel securely plugged and heated it to a high temperature in a furnace. Carbonic acid was given off by the chalk and produced a great pressure in the interior of the tube. After slow cooling the mass was found to have become converted into granular crystalline marble. As rocks which have undergone changes of this kind are commonest in the oldest and deepest layers of the earth's crust, most marbles are Palaeozoic or pre-Cambrian. They occur very often with mica schists, phyl-

lites, &c, which were beds of clay alternating with the original limestone. Formerly it was supposed that some of these marbles were crystalline sediments or even igneous rocks, but the tendency of modern geology is to assume that they were ordinary limestones, many of which may have been fossiliferous. In regions where the sedimentary rocks have been converted into schists, gneisses and granulites, the limestones are represented by calc schists, cipollins and marbles. Often no granite or other intrusive rock is present which may be regarded as the cause of the metamorphism. The marbles are often banded or schistose, and under the microscope show crushing and deformation of the component crystals, such as would have been produced by the earth pressures which accom- pany rock-folding. These crush structures have been obtained experimentally in marbles subjected to great pressures in steel cylinders. In the recrystallization of these limestones the direct heating action of igneous intrusions may have played no part, but the rise of temperature and increase of pressure due to the folding of great rock masses have probably been the operating causes. This type of metamorphism has been distinguished by the name marmarosis (Sir A. Geikie, Text Book of Geology, 1882).

For descriptions of ancient marbles see F. Corsi, Delle pietre antiche (Rome, 1845); M. W. Porter, What Rome -was built with (Oxford, 1907), and for marbles in general consult E. Hull, Building and Ornamental Stones (1872) ; G. P. Merrill, Stones for Building and Decoration (3rd ed., 1905, New York). (J. S. F.)

MARBLEHEAD, a township of Essex county, Massachusetts, U.S.A., occupying a rocky promontory on Massachusetts Bay, about 16 m. N. of Boston. Pop. (1890), 8202; (1900), 7582; (1905), 7209; (1910), 7338. Area, about 4 sq. m. Marblehead is served by the Boston & Maine railroad, and by electric railways connecting with Salem, Lynn and Boston. It is a quaint old town, with a number of houses dating back to the 17th and 18th centuries. Among the older buildings are the Lee mansion (1768), St Michael's church (P. E., 1714), and the old town-hall (1727), sometimes

called Marblehead's " Cradle of Liberty." Abbot Hall (1877), the municipal building, also contains the public library and several noteworthy paintings, including " The Spirit of '76 " or " Yankee Doodle " by Archibald M. Willard. The post office and custom-house was completed in 1904. There are several parks (Crocker, Fort Sewall, Seaside, and Fountain), and an old burying-ground, in which many of the early settlers and a number of soldiers of the War of Independence (including General John Glover) are buried; and a granite monument near the railway station commemorates the taking of the British supply and powder ship "Hope" off Marblehead in 1776 by Captain James Mugford, who was killed during the fight. The commodious harbour, nearly landlocked, is formed by a rocky peninsula known as Marblehead Neck. On this are the club-houses of the Eastern and Corinthian Yacht clubs; and Marblehead is a popular yachting centre. The manufacture of children's shoes is the principal industry. Shipbuilding, once important, has been superseded by yacht and launch construction.

Marblehead, originally a part of Salem, known as Marble Harbor, was settled about 1629 by English emigrants (probably mostly from Lincolnshire and Devonshire) ; later (after about 1700) many emigrants from the Channel Islands settled here, and to them the dialectical peculiarities of Marblehead have often (perhaps mistakenly) been attributed. Marblehead was separately incorporated as a town in 1649. In the colonial period Marblehead was an important commercial port, and at one time was one of the most populous places in Massachusetts. After the passage of the Boston Port Bill (1774) it was made the port of entry instead of Boston, but its merchants refused to take advantage of this opportunity and patriotically invited the Boston merchants to use their wharves and warehouses. During the War of Independence many " state cruisers " (chartered at the Continental expense) set out from this port, the most famous being the " Lee," commanded by John Manley l (1 733 – 93) ; in November 1775 this cruiser captured the " Nancy " with military stores valued at £20,541, which were taken to the American army at Cambridge. The " Lee " was manned by fifty men of the " amphibious regiment," which under General John Glover (1732-1797) rendered invaluable services to

1 See Robert E. Peabody, " Naval Career of Captain John Manley of Marblehead, "' in Essex Institute Historical Collections (Salem, Mass.) for January 1909.

Washington in conveying his troops across the East River after the battle of Long Island, and later in ferrying them across the Delaware before the battle of Trenton. Marblehead furnished more than 1000 men to the Continental army. During the war of 181 2 the sea fight between the " Chesapeake " and the " Shannon " took place (June 1, 1813) off the adjacent coast. Marblehead was the scene of Benjamin (nicknamed " Flood ") Ireson's ride, immortalized by J. G. Whittier.

See Samuel Roads, jun., The History and Traditions of Marblehead (Boston, 1880; 3rd ed., Marblehead, 1897).

MARBLES, a children's game of great antiquity, wide dis- tribution, and uncertain origin, played with small spheres of stone, glass, baked clay or other material, from one- third of an inch to two inches in diameter. The game was once popular with all classes. Tradition, both at Oxford and Cambridge, attests that the game was formerly prohibited among undergraduates on the steps of the Bodleian or the Senate House. There is a similar tradition at Westminster School that the boys were forbidden to play marbles in Westminster Hall on account of the complaints made by members of parliament and lawyers. An anonymous poem of the 17th century speaks of a boy about to leave Eton as

" A dunce at syntax, but a dab at taw." Rogers, in The Pleasures of Memory, recalls how

" On yon grey stone that fronts the chancel-door, Worn smooth by busy feet, now seen no more, Each eve we shot the marble through the ring."

Defoe (1720) writes of the seer Duncan Campbell: " Marbles, which he used to call children's playing at bowls, yielded him mighty diversion; and he was so dexterous an artist at shooting that little alabaster globe from between the end of his forefinger and the knuckle of his thumb, that he seldom missed hitting plumb, as the boys call it, the marble he aimed at, though at the distance of two "or three yards." The locus classicus on marbles in the 19th century is in the trial in Pickwick, where Serjeant Buzfuz pathetically says of Master Bardell that " his 'alley tors ' and his ' commoneys ' are alike neglected; he forgets the long familiar cry of ' knuckle down,' and at tip-cheese, or odd and even, his hand is out." Many similar passages might be adduced to prove the former popularity of marbles with the young of all classes. In some rural parts of Sussex Good Friday was known as " marble-day " till late in the 19th century, since on that day both old and young, including many who would never have thought of playing marbles at other times, took part in the game. There was some traditional reason for regarding marbles as a Lenten sport — perhaps, as the Rev. W. D. Parish sug- gests, " to keep people from more boisterous

and mischievous enjoyments."

The origin of the game is concealed in the mists of antiquity. Marbles used by Egyptian and Roman children before the Christian era are to be seen in the British Museum. Probably some of the small stone spheres found among neolithic remains, which Evans {A ncient Stone Implements, 2nd ed., p. 420) admits to be too small for projectiles, are prehistoric marbles. It is commonly assumed that the game which the youthful Augustus, like other Roman children, played with nuts was a form of marbles, and that the Latin phrase of relinquere nuces, in the sense of putting away childish things, referred to this game. Strutt believed that nuts of the roundest sort were the original " marbles." The earliest unmistakable reference to marbles in literature seems to be in a French poem of the 12th century, quoted by Littre s.v. Bille.

The marbles with which various games are nowadays played are small spheres of stone, glass or baked clay. In the 18th century they were mostly made from chips of marble (whence the name) or other stone, which were ground into a roughly spherical shape by attrition in a special iron mill. Nuremberg was then the centre of the trade in marbles, though some were made in Derbyshire, and indeed wherever there was a stone- mason's yard to afford raw material. The " alley taw," as its name indicates, was made of alabaster. In the first decade

of the 20th century English marbles were all imported from central Germany, and the alleys, or most valuable marbles, used for shooting, were mostly made of coloured glass, sold retail from ten a penny to a penny each. Coloured stone marbles and so-called china marbles — really of baked clay — were sold at prices varying from forty to a hundred a penny, though even the cheapest of these were painted by hand with concentric rings. The well-made and highly valued alleys of earlier times were no longer procurable, owing to the decline in popularity of the sport. In the United States, however, much more expensive and accurately rounded marbles were still manu- factured, the latest being of hollow steel.

There has never been any recognized authority on the game of marbles, and it is probable that, in the past as in the present, every parish and school and set of boys made its own rules. There are, however, three or four distinct games which are traditional, and may be found, with trifling variations, wherever the game is played. Strutt, writing at the end of the 18th century, describes these as follows: (1) "Taw, wherein a number of boys put each of them one or two marbles in a ring and shoot at them alternately with other marbles, and he who obtains the most of them by beating them out of the ring is the conqueror." The marbles placed in the ring — whence the game is often known as " ring-taw " — are usually of

the cheaper kind known as " commoneys," " stoneys " or " potteys," and the marble with which the player shoots is a more valuable one, knownas an" alley, "or " alley taw," sometimes spelt " tor," as by Dickens. Usually it is necessary that the alley should emerge from the ring as well as drive out another marble; under other rules the ring is smaller, not more than a foot in diameter, and the player must be skilful enough to leave his alley inside it, whilst driving the object marble outside. (2) " Nine holes: which consists in bowling of marbles at a wooden bridge with nine arches." Each arch bears a number, and the owner of the bridge pays that number of marbles to the player who shoots through it, making his profit from the missing marbles, which he confiscates; or the game may simply be played so many up — usually 100. (3) " There is also another game of marbles where four, five or six holes, and sometimes more, are made in the ground at a distance from each other; and the business of every one of the players is to bowl a marble by a regular succession into all the holes, which he who completes in the fewest bowls obtains the victory." This primitive form of golf is played by Zulu adults with great enthusiasm, and is still popular among the car-drivers of Belfast. (4) " Boss out, or boss and span, also called hit and span, wherein one bowls a marble to any distance that he pleases, which serves as a mark for his antagonist to bowl at, whose business it is to hit the marble first bowled, or lay his own near enough to it for him to span the space between them and touch both marbles; in either case he wins, if not, his marble remains where it lay and becomes a mark for the first player, and so alternately until the game be won." In rural parts of England this was known as a " going-to-school game," because it helped the players along the road.

Mr F. W. Hackwood states that, in the middle of the 19th century, taverns in the Black Country had regular marble alleys, consisting of a cement bed 20 ft. long by 12 ft. wide and 18 in. from the ground, with a raised wooden rim to prevent the marbles from running off. Players knelt down to shoot, and had to " knuckle down " fairly — i.e. to place the knuckle of the shooting hand on the ground, so that the flip of the thumb was not aided by a jerk of the wrist. The game was usually ring-taw. But marbles is now obsolete in England as a game for adults {Old English Sports, London, 1907).

A writer in Notes and Queries (IX. ii. 314) thus describes the marbles used by English boys in the middle of the 19th century: "In ring-taw the player put only commoneys in the ring, and shot with the taws, which included stoneys, alleys and blood- alleys. Commoneys were unglazed; potteys glazed in the kiln. Stoneys were made from common pebbles such as were used for road-mending; alleys and blood-alleys out of marble. The blood-alleys were highly prized, and were called by this name because of the spots or streaks of red in them. In Derbyshire, where large numbers were

made, they had relative values. The stoney was worth three commoneys or two potteys. An alley was worth six commoneys or four potteys. Blood-alleys were worth more, accord- ing to the depth and arrangement of colour— from twelve to fifty commoneys and stoneys in proportion." " A taw with a history was prized above rubies," another correspondent observes (IX. ii. 76). " All the best-made marbles were taws, and no commoneys or potteys were used for shooting with, either in ring-taw or the various hole-games." In Belfast, 1854-1858, the marble season extended from Easter to June, when the ground was usually dry and hard. The marbles were stoneys, of composition painted; crockeries, of slightly glazed stone-ware, dark brown and yellow; clayeys, of red brick clay baked in the fire; marbles, of white marble; china alleys, with white glaze and painted rings; and glass marbles. The two chief games were ring-taw and hole and taw ; in the latter three holes were made in a line, 6 ft. to 12 ft. apart, and the player

had to go three times up and down according to somewhat elaborate rules (Notes and Queries, IX. iii. 65). The stoneys and crockeries were sold at twenty a penny; the clayeys were cheaper and were not used as stakes; the marbles proper and china alleys, used as taws for shooting, cost a halfpenny and a farthing respectively. In other parts of the country the phraseology of marbles affords some interesting problems for the philologist. We hear of " alleys, barios, poppos and stoneys"; of " marididdles," home-made marbles of rolled and baked clay; in Scotland of " bools, whinnies, glassies, jauries "; of " Dutch alleys," and so forth. " Dubs, trebs and fobs," stand for twos, threes and fours. To be " mucked " is to lose all one's " mivvies " or marbles. When the taw stayed in the ring it was a " chuck." " Phobbo slips " was a phrase used to forbid the correction of an error.

The fullest account of the various games of marbles played by English children is to be found in Mrs Gomme's Traditional Games of England, Scotland and Ireland (London, 1898), under the headings Boss-out, Bridgeboard, Bun-hole, Cob, Ho-go, Holy Bang, Hundreds, Lag, Long-Tawl, Marbles, Nine-Holes, Ring-taw, Three-Holes. Other games are known as Plum-pudding, or Picking the Plums, in which one shoots at marbles in a row; Pyramids, in which the marbles are arranged in a pyramid; Bounce About, Bounce Eye, Conqueror, Die Shot, Fortifications, Handers, Increase Pound, Knock Out, Rising Taw, Spanners, Tip-shears; Strutt's Sports and Pastimes, ed. J. C. Cox (London, 1902). Much information will also be found in Notes and Queries, passim — especially the 9th series. For

marbles in France see Larousse, s.v. Billes. See also Solitaire. (W. E. G. F.)

MARBOT, JEAN BAPTISTS ANTOINE MARCELIN, Baron de (1782-1854), French soldier, son of General Jean Antoine de Marbot (1754-1800), who died in the defence of Genoa under Massena, was born at La Riviere (Correze), on the 18th of August 1782. He joined the republican army as a volunteer in 1799, rose rapidly to commissioned rank, and was aide-de-camp to Marshal Augereau, commanding the VII. corps, in the war against Prussia and Russia in 1806-7. After this he served with great distinction in the Peninsular War under Lannes and Massena, and showed himself to be a dashing leader of light cavalry in the Russian War of 18 12 and the German cam- paign of the following year. After a slow recovery from the wounds he had received at Leipzig and Hanau, he was promoted general of brigade by Napoleon during the Hundred Days, and took part in, and was wounded at, the battle of Waterloo. He was exiled at the second restoration and only returned to France in 1819, after which, however, his intimacy with the duke of Orleans secured him important military positions. After the July restoration he was made marSchal-de-camp, and in this rank he was present at the siege of Antwerp in 1832. He was promoted lieutenant-general in 1836. From 1835 to 1840 he served in various Algerian expeditions, and in 1845 he was made a member of the Chamber of Peers. Three years later, at the fall of Louis Philippe, he retired into private life. He died at Paris on the 16th of November 1854. Marbot wrote two pamphlets, Remarques critiques sur Vouvrage de M. le general Roguet, intitule Considerations sur I'art de la guerre (1820), and La Necessite d'augmenter les forces militaires de la France (1825), but his fame rests chiefly, if not indeed wholly, on the fascinating Memoirs of his Life and Campaigns which were published in Paris in 1891 (Eng. trans., 1902). To ordinary readers and to students of history alike these give a picture of the Napoleonic age of warfare which for vividness and romantic interest has never been surpassed.

His elder brother, Antoine Adolphe Marcelin de Marbot (1781-1844), was born at La Riviere, on the 22nd of March 1781, entered the army at an early age, obtained commissioned rank in the revolutionary wars and became aide-de-camp to Berna- dotte. In 1802 he was arrested on the ground of being concerned in a plot of the Republicans against the Consulate, but he was released, though Napoleon continued to regard him as an opponent of the established regime. After a term of duty with the army in Santo Domingo he participated in the campaigns of 1806-7, and from 1808 to 181 1 he was employed in the Penin- sular War. In the Russian War of 181 2 he was wounded and made prisoner. At the end of two years of captivity he returned to France at the general peace, was aide-de-camp to Marshal Davout during the Hundred Days, and thereafter passed into retirement, from which he did not emerge till 1830. He attained

the rank of marichal-de-camp under Louis Philippe, and died at Bra, near Tulle, on the 2nd of June 1844.

MARBURG, a town of Austria, in Styria, 41 m. S. of Graz by rail. Pop. (1900), 24,501. It is very picturesquely situated on the left bank of the river Drave, on a plain called the Pettauer- Feld, at the base of the well-wooded Bachergebirge. To the north of the town the train passes through the Leitersberg tunnel (725 yds. long), opened in 1846, while the Drave, which has here a width of 200 yds., is spanned by a magnificent iron bridge, built in 1845. The principal buildings are the cathedral, dating from the 16th century, the tower of which, erected in 1623, is 136 ft. high, and the old castle. Its situation in the midst of a fertile vine and fruit-growing district, connected by the navigable Drave with Hungary, and by railway with Vienna, Trieste, Tirol and Carinthia, makes it the centre of a considerable traffic in wine and grain. Its industrial products are leather, boots and shoes, iron and tin wares, liqueurs and sparkling wine, and it also contains the extensive workshops of the South Austrian railway. Marburg is the seat of the bishop of Lavant, and is the native town of the famous Austrian admiral, Baron Wilhelm of Tegetthoff (1827-1871). Near Marburg is the village of Mariarast, the church of which is a popular place of pilgrimage.

MARBURG, an ancient university town of Germany, in the Prussian province of Hesse-Nassau, situated on the slope of a hill on the right bank of the Lahn, 60 m. by rail N. of Frankfort-on- Main, on the main line to Cassel. Pop. (1905), 20,137. On the opposite bank of the river, here spanned by two bridges, lie the suburb of Weidenhausen and the railway station of the Prussian state railway. The hill on which the town lies is crowned by the extensive old Schloss, a fine Gothic building, the most noteworthy parts of which are the Rittersaal, dating from 1277-1312, and the beautiful little chapel. This Schloss was formerly the residence of the landgraves of Hesse, served afterwards as a prison, and is now the repository of the histori- cally interesting and valuable archives of Hesse. The chief architectural ornament of Marburg is, however, the Elisabethen-kirche, a veritable gem of the purest Early Gothic style, erected by the grand master of the Teutonic Order in 1235-1283, to contain the tomb of St Elizabeth of Hungary. The remains of the saint were deposited in a rich silver-gilt sarcophagus, which may still be seen, and were afterwards visited by myriads of pilgrims, until the Protestant zeal of Landgrave Philip the Generous caused him to remove the body to some unknown spot in the church. The church also contains the tombs of numerous Hessian landgraves and knights of the Teutonic Order. The Lutheran church is another good Gothic edifice, dating mainly from the 15th century. The town-hall, built in 1512, and several fine houses in the Renaissance style, also deserve mention. The university of Marburg, founded by Philip the

Magnanimous in 1527, was the first university established without papal privileges, and speedily acquired a great reputation throughout Protestant Europe. It has a library of 140,000 volumes, is admirably equipped with medical and other institutes, which form some of the finest modern buildings in the town, and was attended, in 1905, by 1576 students. Marburg also possesses a gymnasium, a " Realschule," an agricultural school, a society of naturalists, a hospital, and an extensive lunatic asylum. It is the seat of a district court, and of superintendents of the Lutheran and Reformed Churches. Marburg pottery is re- nowned; and leather, iron wares and surgical instruments are also manufactured there. The environs are very picturesque.

Marburg is first historically mentioned in a document of the beginning of the 13th century, and received its municipal charter from the landgrave Louis of Thuringia in 1227. On his death it became the residence of his wife, Elizabeth of Hungary, who built a hospital there, and died in 1 231, at the age of twenty-four, worn out with works of religion and charity. She was canonized in 1235 at the instance of the Teutonic Knights, who had settled in Marburg in 1233 and were zealous in promoting her cult. By 1247 Marburg had already become the second town of Hesse, and in the 15th and 16th centuries it alternated with Cassel as

the seat of the landgraves. In 1529 the famous conference between Luther and Zwingli on the subject of Transubstantiation took place there in the Rittersaal of the Schloss (see Marburg, Colloquy of). During the Thirty Years' and Seven Years' Wars Marburg suffered considerably from sieges and famine. In 1806, and again in 1810, it was the centre of an abortive rising against the French, in consequence of which the fortifi- cations of the castle were destroyed.

See Kolbe, Marburg im Mittelalter (Marb., 1879); Bucking, Mit- theilungen aus Marburgs Vorzeit (Marb., 1886) ; Schoof , Marburg die Perk des Hessenlandes (2nd ed., 1903).

MARBURG, COLLOQUY OF {Marburger Religions gesprach), the name given to a conference of divines held in 1529 in the interests of the unity of Protestant Germany. The circumstances in which it was held, the influence of the men who conducted its deliberations, and the result of its proceedings, combine to render it of no small importance for the history of the Reformation in Germany.

After the Imperial Diet of Spires in 1526 had decreed that all states of the empire should observe the Edict of Worms (1521), banning Luther and his adherents, in such a manner that they should not be afraid to answer it before God and the emperor, the reform movement had received such an access of strength that the Catholic party felt itself menaced in earnest, and in 1529 again passed a resolution at Spires, deigned not merely to preclude any further expansion of the Reformation, but even to prevent it from maintaining the ground already won. This decision was at once challenged, on the 19th of April, by the protest of the Evangelical states (whence the name Protes- tants); and the effect of this disclaimer was not small. Still, it was devoid of political significance, unless backed by the united force of all the princes and states subscribing to the Evangelical teaching; and this unity was wanting. The feud which jaged round the doctrine of the Lord's Supper had already broken out before the first diet of Spires, and had aroused great and immediate excitement. At a very early period, however, efforts were made to allay the dissension. Strassburg pro- nounced for conciliation: but the most powerful and zealous champion of peace was to be found in the landgrave Philip of Hesse, who recognized the absolute necessity — from a political standpoint — of the union of all German Protestants. It is probable that he had invited Luther to a religious conference as early as the year 1527; but on that occasion he met with a refusal. True, the impression conveyed by the attitude of the Catholic party at the second Diet of Spires had served to awaken the feeling for solidarity among the Evangelicals there assembled; and on the 22nd of April they had even secured the basis for a provisional alliance in the shape of a formula drawn up by Bucer and dealing with the Lord's Supper. But it was obvious that a permanent coalition could not be expected unless some definite understanding on the debated point could be attained; and on the very same day the landgrave despatched to Zwingli an invitation to a colloquy, and received his prompt acquiescence. Melanchthon, who in the tension which prevailed at the synod had shown himself inclined to negotiation, became suspicious on his return, and endeavoured to influence the elector of Saxony and Luther in accordance with his views. The landgrave, however, was so far successful that the beginning of October (1529) saw the colloquy opened in the castle at Marburg. With Zwingli, who had arrived on the 27 th of September, he had several interviews of considerable political importance before the Wittenberg divines made their appearance. These inter- views settled the preliminaries of an alliance; but they rested on the assumption that the theological feud between Wittenberg and Zurich could be removed, or its violence at least abated.

The proceedings opened on the 1st of October with conferences between Luther and Oecolampadius, and Melanchthon and Zwingli: then on the two following days the discussion proper — confined almost entirely to Luther

and Zwingli — was held before the landgrave and his guest Duke Ulrich of Wurttemberg, in the presence of more than fifty persons. As regards the main point of contention, i.e. the doctrine of the Lord's Supper,

no agreement was found practicable; and the private conversa- tions on the 4th of October, which formed the sequel of the debate, carried matters no farther. " You have another spirit," said Luther. Since the landgrave, however, was reluctant to see the colloquy brought to an absolutely fruitless close, he requested Luther to draw up a list of the most important points of doctrine on which it might yet be possible to arrive at some degree of unanimity. This was done on the 4th of October; and a few alterations were introduced to meet the wishes of the Swiss deputies. The Articles of Marburg, which thus came into being, contain the doctrine of the Trinity, of the personality of Christ, of faith and justification, of the Scriptures, of baptism, of good works, of confession, of government, of tradition, and of infant baptism. The fifteenth article, treating of the Lord's Supper, defines the ground common to both parties even in this debateable region, recognizing the necessity of participation in both kinds, and rejecting the sacrifice of the Mass. It then proceeds to fix the point of difference in the fact that no agree- ment had been reached on the question " whether the true body and blood of Christ are corporeally present in the bread and wine " (" Nit vergleicht haben wir uns, ob der war leib und plut Christi leiblich im brot und wein sey "). Nevertheless, the adherents of each doctrine are recommended to display Christian charity to those of the other. These articles were signed by the ten official members of the colloquy: Luther, Jonas, Melanchthon, Osiander, Agricola, Brenz, Oecolampadius, Bucer, Hedio and Zwingli. The personal contact between Luther and Zwingli led to no mental rapprochement between the two; but in the following year the Articles of Marburg did good service as one of the preliminaries to the Augsburg Confession, and remain a valuable document for the fundamental principles common to the Lutheran and Reformed Churches.

See T. Kolde, s.v. " Marburger Religionsgesprach," in Realencyklo- padief. protestant. Theologie, 3rd ed. xii. 248 seq. (C. M.)

MARCA, PIERRE DE (1594-1662), French prelate and historian, was born at Gan, near Pau, on the 24th of January 1594. His family was known among judicial circles in the 1 6th century, and maintained the Roman Catholic faith after the official introduction of the Reformed religion into Navarre. After having studied law at the university of Toulouse he practised successfully at Pau. But he was ambitious, and turned to a larger sphere. He ardently called for the armed intervention of King Louis XIII. in Beam, and on this occasion published his first writing, Discours d'un Bearnais, ires fidele sujet du roi, sur I'edit du retablissement de I'exercice

de la religion catholique dans tout le Beam (161 8). After the easy campaign of 1620, the possessions which had been taken by the Protestants were given back to the Roman Catholic church; this task was performed, under his supervision, with judgment and modera- tion. During the siege of La Rochelle he performed a mission which brought him in touch with Richelieu, who shortly after- wards nominated him intendant de justice in Beam (163 1), and in 1639 summoned him to Paris with the title of counsellor of state. The following year, the question of the intervention of kings in the election of bishops having been raised in a pam- phlet by Charles Hersent (Optalus Gallus ds cavendo schismate, 1640), Marca defended what were then called the liberties of the Gallican Church, in his celebrated treatise De concordia sacerdotii et imperii, seu de libertalibus ecclesiae gallicanae (1641). He was soon rewarded for this service. Although he had not yet taken even the minor holy orders, he was nominated bishop of Couserans by the king on the 28th of December 1641, but the pope refused to give his sanction. It was only after Marca had formally denied those propositions contained in De con- cordia which were displeasing to Rome that he was proclaimed in the consistory (Jan. 13, 1648). During this time, and until 1651, he was governor of the province of Catalonia, then occupied by the French. After the Treaty of the Pyrenees, he was sent to direct the conference which had been formed to fix the limits of Roussillon, which had just been ceded to France (r66o). Marca now interested himself in the fortunes of Mazarin, and remained faithful to him even during the

Fronde. As a recompense, he was nominated archbishop of Toulouse (May 28, 1652), but had to wait for the bulls of investiture till the 23rd of March 1654. It was difficult for him to please both pope and king. In the struggle against the Jansenists he used all the influence he had with the clergy to secure the passage of the apostolic constitution of the 31st of March 1653 (Relation de ce qui s'est fait depuis 1653 dans les assemblies des eveques au sujet des cinq propositions, 1657); but in the rebellion raised by Retz, archbishop of Paris, against the king, he took the part of the king against the pope. Michel Le Tellier having ordered him to refute a thesis of the college of Clermont on the infallibility of the pope, Marca wrote a treatise which was most Gallican in its ideas, but refused to publish it for fear of drawing down " the indignation of Rome." These tactics were successful, and when Retz, weary of a struggle without definite results, resigned the archbishopric, Marca became his successor (Feb. 26, 1662). He did not derive much profit from this new favour, as he died on the 29th of June following, without his nomination having been sanctioned by the

pope.

Marca, clever and covetous, was also an historian of note. When very young he showed his interest in the past history of his native land, and in 161 7, at the age of twenty-three, he had set to work looking through archives, copying charters, and corresponding with the principal men of learning of his time, the brothers Dupuy, Andre Duchesne and Jean Besly, whom he visited in Poitou. His Histoire de Beam was pub- lished at Paris in 1640. It was not so well received as his De concordia, but is more appreciated by posterity. If Marca's criticism is too often undecided, both in the ancient epochs, where he supports the text by a certain amount of guesswork and in certain points where he touches on religion, yet he always gives the text correctly. A number of chapters end with an interesting collection of charters. It is to be regretted that this incomplete work does not go beyond 1300. During his long stay in Catalonia he made preparations for a geographical and historical description of this province, which was bound to France by so many political and literary associations. Baluze, who became his secretary in 1656, helped him with the work and finished it, adding clever appendices and publishing the whole in 1688 under the title Marca hispanica.

Marca married Marguerite de Forgues on the 4th of June 1 61 8, and had one son and three daughters. His son, Galactoire, who was president of the parlement of Navarre, died on the 10th of February 1689.

Marca's biography was written in Latin by two of his intimate friends, Etienne Baluze, his secretary (Epislola ad Samuelem Sorbierium, de vita, gestis et scriptis Petri de Marca, Paris, 1663), and his cousin, Paul de Faget (at the beginning of a collection of Marca's theological pamphlets, first published by Paul de Faget in 1668). This contained four treatises on the Eucharist, the sacrifice of the Mass, the erection of the patriarchate of Constantinople (in Latin), and the sacrament of the Eucharist (in French). It was supposed to contain heretical propositions and caused a good deal of scandal, inciting Baluze against Faget, both of whom abused the other, to defend the memory of the prelate.

See Bayle's article in the Dictionnaire historiqu» et critique (s.v. " Marca "), and the Vie de Marca In the Histoire de Beam (vol. i., 1894) of V. Dubarat.

MARCANTONIO [Marcantonio Raimondi], the chief Italian master of the art of engraving in the age of the Renais- sance, and the first who practised it in order to reproduce, not designs of his own invention, as earlier craftsmen had commonly done, but those of other artists almost exclusively. The date of his birth is uncertain, nor is there any good

authority for assigning it, as is commonly done, approximately to the year 1488. He was probably born some years at least earlier than this, inasmuch as he is mentioned by a contemporary writer, Achillini, as being an artist of repute in 1504. His earliest dated plate, illustrating the story of Pyramus and Thisbe, belongs to the following year, 1505. Marcantonio received his training in the workshop of the famous goldsmith and painter of Bologna, Francesco Raibolini, usually called Francia. " Having more aptitude in design," says Vasari, " than his

master, and managing the graver with facility and grace, he made waist-buckles and many other things in niello, such being then greatly in fashion, and made them most beautifully, as being in truth most excellent in that craft." The real fame, however, of Marcantonio was destined to be founded on his attainments, not in the goldsmith's art generally, but in that particular development of it which consists of engraving designs on metal plates for the purpose of reproduction by the printing press. This art was not new in Italy in the days of Marcan- tonio's apprenticeship. It had been practised, in a more or less elementary form, for not less than forty or fifty years in the workshops alike of Venetia, the Emilia, Tuscany and Lom-bardy. But the technical aim of the Italian engravers had not hitherto been directed, like that of Schongauer or Diirer north of the Alps, towards securing such freedom and precision in the use of the burin as should impart to the impressions taken from their engraved plates both a striking decorative effect and a power of suggesting to the eye a complex variety of natural objects and surfaces in light and shade. The Italian masters had been satisfied with much more rudimentary effects. The Florentine primitives had been content either with very simple cloudy patches of cross-hatching in fine straight lines, or with broad open shadings in the manner of a bold pen-drawing. Mantegna and Pollaiuolo, the two chief original masters who practised the art, had used the latter method with great power but at the same time great simplicity.

By the beginning of the 16th century a desire for a more complicated kind of effects was already arising among the followers of the art in Italy. Both backgrounds and passages of foreground detail were often imitated, inartificially enough, from the works of the northern masters. Marcantonio himself was among the foremost in this movement. About eighty engravings can be referred to the first five or six years of his career (1505-1511). Their subjects are very various, including many of pagan mythology, and some of obscure allegory, along with those of Christian devotion. The types of figures and drapery, and the general character of the compositions, bespeak for the most part the inspiration, and sometimes the direct authorship, of Francia. But the influence of German example is very perceptible also, particularly in the landscape backgrounds, and in the endeavour to express form by means of light and shadow with greater

freedom than had been hitherto the practice of the southern schools. In a few subjects also the figures themselves correspond to a coarse Teutonic, instead of to the refined Italian, ideal. But so far we find Marc- antonio only indirectly leaning on the north for the sake of self- improvement. It must have been for the Sake of commercial profit that he by-and-by produced a series of direct counterfeits on copper from Albert Diirer's woodcuts. These facsimiles are sixty-nine in number, including seventeen of Diirer's " Life of the Virgin," thirty-seven of his " Little Passion," on wood, and a number of single pieces. According to Vasari, Diirer's indig- nation over those counterfeits was the cause of his journey to Venice, where he is said to have lodged a complaint against Marcantonio, and induced the Senate to prohibit the counter- feiting of his monogram, at any rate, upon any future imitations of the kind. Vasari's account must certainly be mistaken, inasmuch as Diirer's journey to Venice took place in 1506, and neither of the two series of woodcuts imitated by Marc- antonio was published until 1 5 1 1 . The greater part of the designs for the " Life of the Virgin " had, it is true, been made andengraved seven years earlier than the date of their publication; and it is to be remarked that, whereas Marcantonio's copies of the " Little Passion " leave out the monogram of Dtirer, it is inserted in his copies of the "Life of the Virgin"; whence it would, after all, seem possible that he had seen and counterfeited a set of impressions of this series at the time when they were originally executed, and before their publication. But the real nature of the transaction, if transaction there was, which took place between Diirer and Marcantonio we cannot now hope to recover. Enough that the Bolognese engraver evidently profited, both in money and in education of the hand, by his

work in imitating in a finer material the energetic characters of these northern woodcuts. He was soon to come under a totally different influence, and to turn the experience he had gained to account in interpreting the work of a master of a quite other stamp. Up till the year 15 10 Marcantonio had lived entirely at Bologna, with the exception, it would appear, of a visit or visits to Venice. (A few of his early en- gravings are from drawings of the school of Giorgione.) Very soon afterwards he was attracted, for good and all, into the circle which surrounded Raphael at Rome. Where or when he had first made Raphael's acquaintance is uncertain. His passage to Rome by way of Florence has been supposed to be marked by an engraving, dated 1510, and known as "The Climbers," Les Grimpeurs (Bartsch, 487), in which he has re- produced a portion of the design of Michelangelo's cartoon of the Soldiers surprised bathing, and has added behind the figures a landscape imitated from the then young

Dutch engraver Lucas of Leiden. Contemporary or somewhat earlier than this is a large engraving done by him from a design by Baldassare Peruzzi, a Sienese artist drawn about the same time into the Raphael circle. The piece in which he is recorded to have first tried his hand after Raphael himself is the Lucretia (Bartsch 192). From that time until he disappears in the catastrophe of 1527, Marcantonio was almost exclusively engaged in reproducing by means of engraving the designs of Raphael or of his immediate pupils. Raphael, the story goes, was so delighted with the print of the Lucretia that he per- sonally trained and helped Marcantonio afterwards. A printing establishment was set up under the charge of Raphael's colour- grinder, II Baviera, and the profits, in the early stage of the business, were shared between .the engraver and the printer. The sale soon became very great; pupils gathered round about Marcantonio, of whom the two most distinguished were Marco Dente, known as Marco da Ravenna, and Agostino de' Musi, known as Agostino Veneziano; and he and they, during the last ten years of Raphael's life, and for several years following his death, gave forth a great profusion of engravings after the master's work — not copying, in most instances, his finished paintings, but working up, with the addition of simple back- grounds and accessories, his first sketches and trials, which often give the composition in a different form from the finished work, and are all the more interesting on that account.

The best of these engravings produced in the workshop of Marcantonio — those, namely, done by his own hand, and especially those done during the first few years after he had attached himself to Raphael — count among the most prized and coveted examples of the art. In them he enters into the genius of his master, and loses little of the chastened science and rhythmical purity of Raphael's contours, or of the inspired and winning sentiment of his faces; while in the parts where he is left to himself — the rounding and shading, the back- ground and landscape — he manages his burin with all the skill and freedom which he had gained by the imitation of northern models, but puts away the northern emphasis and redundance of detail. His work, however, does not long remain at the height marked by pieces like the Lucretia, the Dido, the Judgment of Paris, the Poetry, the Philosophy, or the first Massacre of the Innocents. Marcantonio's engravings after the works of Raphael's later years are cold, ostentatious, and soulless by comparison. Still more so, as is natural, were those which he and his pupils produced after the designs of the degenerate scholars of Raphael and Michelangelo, of a Giulio Romano, a Polidoro, or a Bandinelli. Marcantonio's association with Giulio Romano was the cause of his first great disaster in life. He engraved a series of obscene designs by that painter in illustration of the Sonnetti lussuriosi of Pietro Aretino, and thereby incurred the anger of pope Clement VII., at whose order he was

thrown into prison. Marcantonio's ruin was completed by the calamities attendant on the sack of Rome in 1527. He had to pay a heavy ransom in order to escape from the hands of the Spaniards, and fled from Rome, in the words of Vasari, " all but a beggar." It

is said that he took refuge in his native city, Bologna; but he never again emerges from obscurity, and all we know with certainty is that in 1534 he was dead. (S. C.)

MARCASITE, a mineral with the same chemical composition as pyrites, being iron disulphide FeS2, but crystallizing in the orthorhombic instead of in the cubic system. The name is of Arabic origin and was long applied to crystallized pyrites (q.v.) ; it was restricted to the present species by W. Haidinger in 1845. The mineral was known to G. Agricola in 1546 under the names Wasserkies or Weisserkies and Leberkies, and it has been variously known as white pyrites, hepatic pyrites, lamellar pyrites, radiated pyrites (German Slrahlkies) and prismatic pyrites. The orthorhombic form of the crystals, as distinct from the cubic form of pyrites, was recognized by Rome de l'Isle in 1772, though later R. J. Haiiy considered the crystals to be only distorted cubic forms.

The crystals are isomorphous with mispickel (q.v.), but only rarely are they distinctly developed and simple (fig.). Usually they are twinned on a prism plane, M, pro- ducing pentagonal stellate groups of five crystals; twinning on the plain g, in which the crystals intercross at angles of nearly 6o°, is less common. This frequent twinning gives rise to characteristic forms, with many re-entrant angles, to which the names " spear pyrites " and " cockscomb pyrites " are applied. The commonest state of aggregation is that of radially arranged fibres, the external surface of the mass being globular, nodular or stalactitic in form.

Apart from crystalline form, the external characters of marcasite are very similar to those of pyrites, and when distinct crystals are not available the two species cannot always be easily distinguished. The colour is usually pale bronze-yellow, often rather lighter than that of pyrites; on freshly fractured surfaces of pure marcasite the colour is tin-white, but this rapidly tarnishes on exposure to air. The lustre is metallic and brilliant. The streak is greyish or brownish-black. The hardness (6-6|) is the same as that of pyrites, and the specific gravity (4-8-4-c;) as a rule rather less. Arsenical varieties of marcasite, containing up to 5% of arsenic, are known as lonchidite and kyrosite.

Marcasite readily oxidizes on exposure to moist air, with the production of sulphuric acid and a white fibrous efflorescence of ferrous sulphate, and in course of time specimens in collections often became completely

disintegrated. In nature it is frequently altered to limonite with the separation of native sulphur. Marcasite is thus the less stable of the two modifications of iron disulphide. Many experiments have been made with a view to determining the difference in chemical constitution of marcasite and pyrites, but with no very definite results. It is a noteworthy fact that whilst pyrites has been prepared artificially, marcasite has not.

Marcasite occurs under the same conditions as pyrites, but is much less common. Whilst pyrites is found abundantly in the older crystalline rocks and slates, marcasite is more abundant in clays, and has often been formed as a concretion around organic remains. It is abundant, for example, in the plastic clay of the Brown Coal formation at Littmitz, near Carlsbad, in Bohemia, at which place it has been extensively mined for the manufacture of sulphur and ferrous sulphate. In the Chalk of the south-east of England nodules of marcasite with a fibrous radiated structure are abundant, and in the Chalk Marl between Dover and Folkestone fine twinned groups of " spear pyrites " are common. The mineral is also met with in metalliferous veins, though much less frequently than pyrites; for example the " cockscomb pyrites " of the lead mines of Derbyshire and Cumberland. (L. J. S.)

MARCEAU-DESGRAVIERS, FRANCOIS SEVERIN (1769- 1796), French general, was born at Chartres on the 1st of March 1769. His father was a law officer, and he was educated for a legal career, but at the age of sixteen he enlisted in the regiment of Savoy-Carignan. Whilst on furlough in Paris Marceau joined in the attack on the Bastille (July 14, 1789); after that event he took his discharge from the regular army and returned to Chartres, but the embarrassments of his family soon compelled him to seek fresh military enployment. He became drill instructor, and afterwards captain in the depart- mental (Eure-et-Lpire) regiment of the National Guard. Early

in March 1792 he was elected lieutenant-colonel of one of the battalions of the Eure-et-Loire; he took part in the defence of Verdun in 1792, and it fell to his lot to bear the proposals of capitulation to the Prussian camp. The spiritless conduct of the defenders excited the wrath of the revolutionary author- ities, and Marceau was fortunate in escaping arrest and finding re-employment as a captain in the regular service. Early in 1793 he became with other officers " suspect, " and was for some time imprisoned. On his release he hurried to take part in the defence of Saumur against the Vendean royalists, and distinguished himself at the combat of Saumur

(June 10, 1793) by gallantly rescuing the representative Bourbotte from the hands of the insurgents. The Convention voted him the thanks of the country, and thenceforward his rise was rapid. His conduct at Chantonnay (Sept. 5) won him the provisional rank of general of brigade. On the 17th of October he bore a great part in the victory of Cholet, and on the field of this battle began his friendship with Kleber. For the victory of Cholet Kleber was made general of division and Marceau confirmed as general of brigade. Their advice was of the greatest value to the generals in command, and the military talents of each were the complement of the other's. Marceau, who became general of division (Nov. 10), succeeded to the chief command ad interim, and with his friend won important victories near Le Mans (Dec. 12-13) and Savenay (Dec. 23). After the battle of Le Mans, Marceau rescued and protected a young Royalist lady, Angelique des Mesliers. It is often supposed that he was in love with his prisoner; but the help even of the commander-in-chief did not avail to save her from the guillotine (Jan. 22, 1794). Marceau had already retired from the war, exhausted by the fatigues of the campaign, and he and Kleber were saved from arrest and execution only by the intervention of Bourbotte. Marceau became affianced about this time to Agathe Lepr&tre de Chateaugiron, but his constant military employment, his broken health, and the opposition of the comte de Chateau- giron on the one hand and of Marceau's devoted half-sister " Emira," wife of the Republican politician Sergent, on the other, prevented the realization of his hopes. After spending the winter of 1793-1794 in Paris he took a command in the army under Jourdan, in which Kleber also served. He took part in the various battles about Charleroi, and at the final victory of Fleurus (June 26, 1794) he had a horse shot under him. He distinguished himself again at Jtilich and at Aldenhoven, and stormed the fines of Coblenz on the 23rd of October. With the Army of the Sambre and Meuse he took his share in the campaign of 1795 on the Rhine and the Lahn, distinguishing himself particularly with Kleber in the fighting about Neuwied on the 18th and 19th of October, and at Sulzbach on the 17th of December. In the campaign of 1796 the famous invasion of Germany by the armies of Jourdan and Moreau ended in disaster, and Marceau's men covered Jourdan's retreat over the Rhine. He fought the desperate actions on the Lahn (Sept. 16 and 18), and at Altenkirchen on the 19th received a mortal wound, of which he died on the 21st, at the early age of twenty-seven. The Austrians vied with his own countrymen in doing honour to the dead general. His body was burned, and his ashes, which at the time were placed under a pyramid designed by Kleber, were transferred in 1889 to the Pantheon at Paris.

See Maze, Le General Marceau (1889) ; Parfait, Le Gknkral Marceau (1892); and T. C. Johnson, Marceau (London, 1896).

MARCEL, ETIENNE (d; 1358), provost of the merchants of Paris under

King John II., belonged by birth to the wealthy Parisian bourgeoisie, being the son of a clothier named Simon Marcel and of Isabelle Barbou. He is mentioned as provost of the Grande-Confrerie of Notre Dame in 1350, and in 1354 he succeeded Jean de Pacy as provost of the Parisian merchants. His political career began in 1356, when John was made prisoner after the battle of Poitiers. In conjunction with Robert le Coq, bishop of Laon, he played a leading part in the states- general called together by the dauphin Charles on the 17th

of October. A committee of eighty members, constituted on their initiative, pressed their demands with such insistence that the dauphin prorogued the states-general; but financial straits obliged him to summon them once more on the 3rd of February 1357, and the promulgation of a great edict of reform was the consequence. John the Good forbade its being put into effect, whereupon a conflict began between Marcel and the dauphin, Marcel endeavouring to set up Charles the Bad, king of Navarre, in opposition to him. The states- general assembled again on the 13th of January 1358, and on the 22nd of February the populace of Paris, led by Marcel, invaded the palace and murdered the marshals of Champagne and Normandy before the prince's eyes. Thenceforward Marcel was in open hostility to the throne. After vainly hoping that the insurrection of the Jacquerie might turn to his advantage, he next supported the king of Navarre, whose armed bands infested the neighbourhood of Paris. On the night of the 31st of July Marcel was about to open the gates of the capital to them, but Jean Maillart prevented the execu- tion of this design, and killed him before the Porte Saint-Antoine. During the following days his adherents were likewise put to death, and the dauphin was enabled to re-enter Paris. Etienne Marcel married first Jeanne de Dammartin, and secondly Marguerite des Essars, who survived him.

See F. T. Perrens, Utienne Marcel et le gouvernement de la bour- geoisie au xiv" siecle (Paris, i860) ; P. Fremaux, La Famille d'&tienne Marcel, in the Memoires of the Societe de I'histoire de Paris et de I'tle de France (1903), vol. xxx. ; and Hon. R. D. Denman, Utienne Marcel (1898). (J. V.)*

MARCELLINUS, ST, according to the Liberian catalogue, became bishop of Rome on .the 30th of June, 296; his pre- decessor was Caius or Gaius. He is not mentioned in the Martyr ■ologium hieronymianum, or in the Depositio episcoporum, or in the Depositio martyrum. The Liber pontificalis , basing itself on the Acts of St Marcellinus, the text of which is lost, relates that during Diocletian's persecution Marcellinus was called upon to sacrifice, and offered incense to idols, but that, repenting shortly afterwards, he confessed the faith of Christ and suffered martyrdom with several companions. Other documents speak of his defection, and it is probably this lapse that explains the silence of the ancient liturgical

calendars. In the beginning of the 5th century Petilianus, the Donatist bishop of Constantine, affirmed that Marcellinus and his priests had given up the holy books to the pagans during the perse- cution and offered incense to false gods. St Augustine contents himself with denying the affair {Contra litt. Petiliani, ii. 202; De unico baplismo, 27). The records of the pseudo-council of Sinuessa, which were fabricated at the beginning of the 6th century, state that Marcellinus after his fall presented himself before a council, which refused to try him on the ground that prima sedes a nemine iudicatur. According to the Liber pontificalis, Marcellinus was buried, on the 26th of April 304, in the cemetery of Priscilla, on the Via Salaria, 25 days after his martyrdom; the Liberian catalogue gives as the date the 25th of October. The fact of the martyrdom, too, is not established with certainty. After a considerable interregnum he was succeeded by Marcellus, with whom he has sometimes been confounded.

See L. Duchesne, Liber pontificalis, I. lxxiii.-lxxiv. 162-163, and II. 563. (H. De.)

MARCELLO, BENEDETTO (1686-1739), Italian musical composer, was born in 1686, either on the 31st of July or on the 1st of August. He was of noble family (in his compositions he is frequently described as "Patrizio Veneto "), and although a pupil of Lotti and Gasparini, was intended by his father to devote himself to the law. In 1711 he was a member of the Council of Forty, and in 1730 went to Pola as Provveditore. His health having been impaired by the climate of Istria, he retired after eight years to Brescia in the capacity of Camer- lengo, and died there on the 24th of July 1739.

Marcello is best remembered by his Eslro poetico-armonico (Venice, 1724-1727), a musical setting for voices and strings

of the first fifty Psalms, as paraphrased in Italian by G. Gius- tiniani. They were much admired by Charles Avison, who with John Garth brought out an edition with English words (London, 1757). Some extracts are to be found in Hawkins's History of Music. His other works are chiefly cantatas, either for one voice or several; the library of the Brussels conser- vatoire possesses some interesting volumes of chamber-cantatas composed for his mistress. Although he produced an opera, La Fede riconosciuta, at Vicenza in 1702, he had little sympathy with this form of composition, and vented his opinions on the state of musical drama at the time in the satirical pamphlet // Teatro alia moda, published anonymously in Venice in 1720.

This little work, which was frequently reprinted, is not only extremely amusing, but is also most valuable as a contribution to the history of opera.

A catalogue of his works is given in Monatshefte fur Musik- geschichte, vol. xxiii. (1891).

MARCELLUS, the name of two popes.

Marcellus I. succeeded Marcellinus, after a considerable interval, most probably in May 308, under Maxentius. He was banished from Rome in 309 on account of the tumult caused by the severity of the penances he had imposed on Christians who had lapsed under the recent persecution. He died the same year, being succeeded by Eusebius. He is commemorated on the 1 6th of January.

Marcellus II. (Marcello Cervini), the successor of Julius III., was born on the 6th of May 1501, and was elected pope on the ath of April 1555. He had long been identified with the rigorist party in the church, and as president of the Council of Trent had incurred the anger of the emperor by his jealous defence of papal prerogative. His motives were lofty, his life blameless, his plans for reform nobly conceived. But death removed him (April 30, 1555) before he could do more than give an earnest of his intentions. He was followed by Paul IV.

Contemporary lives are to be found in Panvinio, continuator of Platina, De vitis pontiff, rom.; and Ciaconius, Vitae et res gestae summorum pontiff, rom. (Rome, 1601-1602). P. Polidoro, De gestis, vita et moribus Marcelli II. (Rome, 1744), makes use of an unpub- lished biography of the pope by his brother, Alessandro Cervini. See also Brilli, Intorno alia vita e alle azioni di Marcello II. (Monte- pulciano, 1846) ; Ranke, Popes (Eng. trans. .Austin), i. 284 seq. ; A.von Reumont, Gesch. der Stadt Rom), iii. 2, 512, seq. (T. F. C.)

MARCELLUS, a Roman plebeian family belonging to the Claudian gens. Its most distinguished members were the following : —

1. Marcus Claudius Marcellus (c. 268-208 B.C.), one of the Roman generals during the Second Punic War and conqueror of Syracuse. He first served against Hamilcar in Sicily. In his first consulship (222) he was engaged, with Cn. Cornelius Scipio as colleague, in war against the Insubrian Gauls, and won the spolia opima for the third and last time in Roman history by slaying their chief Viridomarus or Virdumarus (Polybius ii. 34; Propertius v. 10, 39). In 216, after the defeat at Cannae, he took command of the remnant of the army at Canusium, and although he was unable to prevent Capua going over to Hannibal, he saved Nola and

southern Campania. In 214 he was in Sicily as consul at the time of the revolt of Syracuse; he stormed Leontini and besieged Syracuse, but the skill of Archimedes repelled his attacks. After a two years' siege he gradually forced his way into the city and took it in the face of strong Punic reinforcements. He spared the lives of the inhabitants, but carried off their art treasures to Rome, the first instance of a practice afterwards common. Consul again in 210, he took Salapia in Apulia, which had revolted to Hannibal, by help of the Roman party there, and put to death the Numidian garrison. Proconsul in 209, he attacked Hannibal near Venusia, and after a desperate battle retired to that, town; he was accused of bad generalship, and had to leave the army to defend himself in Rome. In his last consulship (208), he and his colleague, while reconnoitring near Venusia, were unexpectedly attacked, and Marcellus was killed. His successes have been exaggerated by Livy, but the name often given to him, the " sword of Rome," was well deserved.

Livy xxm. 14-17, 41-46; xxiv. 27-32, 35-39; xxv. 5-7, 23-31; xxvi. 26, 29-ˆ2; xxvii. 1-5, 21-28; Polybius viii. 5-9, x. 32; Appian, Hannib. 50; Florus ii. 6.

2. M. Claudius Marcellus, an inveterate opponent of Julius Caesar. During his consulship (51 b.c.) he proposed to remove Caesar from his army in March 49, but this decision was delayed by Pompey's irresolution and the skilful opposition of the tribune C. Curio (see Caesar, Julius). In January 49 he tried to put off declaring war against Caesar till an army could be got ready, but his advice was not taken. When Pom- pey left Italy, Marcus and his brother Gaius followed, while his cousin withdrew to Liternum. After Pharsalus M. Marcellus retired to Mytilene, where he practised rhetoric and studied philosophy. In 46 his cousin and the senate successfully appealed to Caesar to pardon him, and Marcellus reluctantly consented to return. On this occasion Cicero's 1 speech Pro Marcello was delivered. Marcellus left for Italy, but was murdered in May by one of his own attendants, P. Magius Chilo, in the Peiraeus. Marcellus was a thorough aristocrat. He was an eloquent speaker (Cicero, Brutus, 71), and a man of firm character, although not free from avarice.

See Cicero, Ad fam. iv. 4, 7, 10, and Ad Alt. v. n (ed. Tyrrell and Purser) ; Caesar, B. C. i. 2 ; Suetonius, Caesar, 29 ; G. Boissier, Cicero and his Friends (Eng. trans., 1897).

3. M. Claudius Marcellus (c. 43-23 b.c), son of C. Marcellus and Octavia, sister of Augustus. In 25 he was adopted by the emperor and married to his daughter Julia. This seemed to mark him out as the heir to the throne, but Augustus, when attacked by a serious illness, gave his signet to M. Vipsanius Agrippa. In 23 Marcellus, then curule aedile, died at Baiae. Livia

was suspected of having poisoned him to get the empire for her son Tiberius. Great hopes had been built on the youth, and he was celebrated by many writers, especially by Virgil in a famous passage (Aeneid, vi. 860). He was buried in the Campus Martius, and Augustus himself pronounced the funeral oration. The Theatrum Marcelli (remains of which can still be seen) was afterwards dedicated in his honour.

Horace, Odes, i. 12; Propertius iii. 18; Dio Cassius liii. 28, 30; Tacitus, Annals, ii. 41; Suetonius, Augustus, 63; Veil. Pat. ii. 93.

MARCESCENT (Lat. marcescens, withering), a botanical term for withering without falling off.

MARCH, EARLS OF, title derived from the " marches " or boundaries (1) between England and Wales, and (2) England and Scotland, and held severally by great feudal families pos- sessed of lands in those border districts. The earls of March on the Welsh borders were descended from Roger de Mortemer (so called from his castle of Mortemer in Normandy), who was connected by marriage with the dukes of Normandy. His son Ralph (d. c. 1 104) figures in Domesday as the holder of vast estates in Shropshire, Herefordshire and«other parts of England, especially in the west; and his grandson Hugh de Mortimer, founder of the priory of Wigmore in Herefordshire, was one of the most powerful of the barons reduced to submission by Henry II., who compelled him to surrender his castles of Cleobury and Wigmore. The Mortimers, however, continued to exercise almost undisputed sway, as lords of Wigmore, over the western counties and the Welsh marches.

I. Welsh Marches. — Roger de Mortimer (c. 1286-1330), 8th baron of Wigmore and 1st earl of March, being an infant at the death of his father, Edmund, was placed by Edward I. under the guardianship of Piers Gaveston, and was knighted by Edward in 1306; Mortimer's mother being a relative of Edward's consort, Eleanor of Castile. Through his marriage with Joan de Join- ville, or Genevill, Roger not only acquired increased possessions on the Welsh marches, including the important castle of Ludlow, which became the chief stronghold of the Mortimers, but also extensive estates and influence in Ireland, whither he went in 1308 to enforce his authority. This brought him into conflict with the De Lacys, who turned for support to Edward Bruce, brother of Robert Bruce, king of Scotland. Mortimer was appointed lord-lieutenant of Ireland by Edward II. in 1316, 1 The authorship of this speech has been disputed.

and at the head of a large army drove Bruce to Carrickfergus, and the De Lacys into Connaught, wreaking vengeance on their adherents whenever they were to be found. He was then occu- pied for some years with baronial disputes on the Welsh border until about 13 18, when he began to interest himself in the growing opposition to Edward II. and his favourites, the Despensers; and he supported Humphrey de Bohun, earl of Hereford, in refusing to obey the king's summons to appear before him in 13 21. Forced to surrender to the king at Shrewsbury in January 1322, Mortimer was consigned to the Tower of London, whence he escaped to France in August 1324. In the following year Isabella, wife of Edward II., anxious to escape from her husband, obtained his consent to her going to France to use her influence with her brother, Charles IV., in favour of peace. At the French court the queen found Roger Mortimer; she became his mistress soon afterwards, and at his instigation refused to return to Eng- land so long as the Despensers retained power as the king's favourites. The scandal of Isabella's relations with Mortimer compelled them both to withdraw from the French court to Flanders, where they obtained assistance for an invasion of England. Landing in England in September 1326, they were joined by Henry, earl of Lancaster; London rose in support of the queen; and Edward took flight to the west, whither he was pursued by Mortimer and Isabella. After wandering helplessly for some weeks in Wales, the king was taken on the 16th of November, and was compelled to abdicate in favour of his son. But though the latter was crowned as Edward III. in January 1327, the country was ruled by Mortimer and Isabella, who pro- cured the murder of Edward II. in the following September. Rich estates and offices of profit and power were now heaped on Mortimer, and in September 1328 he was created earl of March. Greedy and grasping, he was no more competent than the De- spensers to conduct the government of the country. The jealousy and anger of Lancaster having been excited by March's arrogance, Lancaster prevailed upon the young king', Edward III., to throw off the yoke of his mother's paramour. At a parliament held at Nottingham in October 1330 a plot was successfully carried out by which March was arrested in the castle, and, in spite of Isabella's entreaty to her son to " have pity on the gentle Mortimer," was conveyed to the Tower. Accused of assuming royal power and of various other high misdemeanours, he was condemned without trial and hanged at Tyburn on the 29th of November 1330, his vast estates being forfeited to the crown. March's wife, by whom he had four sons and eleven daughters, survived till 1356. The daughters all married into powerful families, chiefly of Marcher houses. His eldest son, Edmund, was father of Roger Mortimer (c. 1328-1360), who was knighted by Edward III. in 1346, and restored to his grandfather's title as 2nd earl of March.

Edmuxd de Mortimer (1351-1381), 3rd earl of March t was son of Roger,

2nd earl of March, by his wife Philippa, daughter of William Montacute, 1st earl of Salisbury. Being an infant at the death of his father, Edmund, as a ward of the crown, was placed by Edward III. under the care of William of Wykeham and Richard Fitzalan, earl of Arundel. The position of the young earl, powerful on account of his possessions and hereditary influence in the Welsh marches, was rendered still more impor- tant by his marriage in 1368 to Philippa, only daughter of Lionel, duke of Clarence, third son of Edward III. Lionel's wife was Elizabeth, daughter and heiress of William de Burgh, 6th Lord of Connaught and 3rd earl of Ulster, and Lionel had himself been created earl of Ulster before his marriage. The earl of March, therefore, not only became the representative of one of the chief Anglo-Norman lordships in Ireland in right of his wife Philippa, but the latter, on the death of her father shortly after her marriage, stood next in succession to the crown after the Black Prince and his sickly son Richard, after- wards king Richard II. This marriage had, therefore, far-reach- ing consequences in the history of England, giving rise to the claim of the house of York to the crown of England, contested in the War of the Roses; Edward IV. being descended from the third son of Edward III. as great-great-grandson of Philippa,

countess of March, and in the male line from Edmund, duke of York, fifth son of Edward III.

Mortimer, now styled earl of March and Ulster, became marshal of England in 1369, and was employed in various diplomatic missions during the next following years. He was a member of the committee appointed by the Peers to confer with the Commons in 1373 — the first instance of such a joint con- ference since the institution of representative parliaments — on the question of granting supplies for John of Gaunt's war in France; and in the opposition to Edward III. and the court party, which grew in strength towards the end of the reign, March took the popular side, being prominent in the Good Parlia- ment of 1376 among the lords who, encouraged by the Prince of Wales, concerted an attack upon the court party led by John of Gaunt. The Speaker of the Commons in this parliament was March's steward, Peter de la Mare; he firmly withstood John of Gaunt in stating the grievances of the Commons, in supporting the impeachment of several high court officials, and in procuring the banishment of the king's mistress, Alice Perrers. March was a member of the administrative council appointed by the same parliament after the death of the Black Prince to attend the king and advise him in all public affairs. On the accession of Richard II., a minor, in 1377, the earl became a member of the standing council of government; though as father of the heir-presumptive to the crown he wisely abstained from claiming any actually administrative office. The most powerful person in the realm was, however, John of Gaunt, duke of Lancaster, whose jealousy of March led to the acceptance by the latter of

the lieutenancy of Ireland in 1379. March succeeded in asserting his authority in eastern Ulster, but failed to subdue the O'Neills farther west. Proceeding to Munster to put down the turbu- lency of the chieftains of the south, March died at Cork on the 27th of December 1381. He was buried in Wigmore Abbey, of which he had been a benefactor, and where his wife Philippa who died about the same time was also interred. The earl had two sons and two daughters, the elder of whom, Elizabeth, married Henry Percy (Hotspur), son of the earl of Northumber- land. His eldest son Roger succeeded him as 4th earl of March and Ulster. His second son Edmund (1376-1409) played an important part in conjunction with his brother-in-law Hotspur against Owen Glendower; but afterwards joined the latter, whose daughter he married about 1402.

Roger de Mortimer, 4th earl of March and Ulster (1374- 1398), son of the 3rd earl, succeeded to the titles and estates of his family when a child of seven, and a month afterwards he was appointed lord-lieutenant of Ireland, his uncle Sir Thomas Mortimer acting as his deputy. Being a ward of the Crown, his guardian was the earl of Kent, half-brother to Richard II. ; and in 1388 he married Kent's daughter, Eleanor. The importance which he owed to his hereditary influence and possessions, and especially to his descent from Edward III., was immensely increased when Richard II. publicly acknowledged him as heir- presumptive to the crown in 1385. In 1394 he accompanied Richard to Ireland, but notwithstanding a commission from the king as lieutenant of the districts over which he exercised nominal authority by hereditary right, he made little headway against the native Irish chieftains. March enjoyed great popularity in England though he took no active part in opposing the des- potic measures of the king; in Ireland he illegally assumed the native Irish costume. In August 1398 he was killed in fight with an Irish clan, and was buried in Wigmore Abbey. March's daughter Anne married Richard earl of Cambridge, son of Edmund duke of York, fifth son of Edward III.; their son Richard, duke of York, was father of King Edward IV., who thus derived his title to the crown and acquired the estates of the house of Mortimer.

Edmund de Mortimer (1391-1425), 5th earl of March and Ulster, son of the 4th earl, succeeded to his father's claim to the crown as well as to his title and estates on the death of the latter in Ireland in 1398. In the following year Richard II. was de- posed and the crown seized by Henry of Lancaster. The young earl of March and his brother Roger were then kept in custody

by Henry IV., who, however, treated them honourably, until March 1405, when they were carried off from Windsor Castle by the opponents of the Lancastrian dynasty, of whom their uncle Sir Edmund Mortimer (see above) and his brother-in-law Henry Percy (Hotspur) were leaders in league with Owen Glendower. The boys were recaptured, and in 1409 were committed to the care of the prince of Wales. On the accession of the latter as Henry V., in 1413, the earl of March was set at liberty and' restored to his estates, his brother Roger having died some years previously; and he continued to enjoy the favour of the king in spite of a conspiracy in 141 5 to place him on the throne, in which his brother-in-law, the earl of Cambridge, played the leading part. March accompanied Henry V. throughout his wars in France, and on the king's death in 1422 became a member of the council of regency. He died in Ireland in 1425, and as he left no issue the earldom of March in the house of Mortimer became extinct, the estates passing to the last earl's nephew Richard, who in 1435 was officially styled duke of York, earl of March and Ulster, and baron of Wigmore. Richard's son Edward having ascended the throne in 1461 as Edward IV., the earldom of March became merged in the crown.

See Thomas Rymer, Foedera, &c. (London, 1704-1732); T. F. Tout, The Political History of England, vol. iii., ed. by William Hunt and R. L. Poole (London, 1905) ; Sir William Dugdale, Monasticcn anglicanum (3 vols., London, 1655-1673); William Stubbs, Con- stitutional History of 4 England, vol. ii. '

II. Scottish Marches. — The Scottish earls of March were descended from Crinan, whose son Maldred married Algitha, daughter of Ughtred, earl of Northumberland, by Elgiva, daughter of the Saxon king .III. in 1255 from the Comyns, and in the same year was nominated guardian of the king and queen by the Treaty of Roxburgh. He signed the Treaty of Perth (July 6, 1 266) by which Magnus VI. of Norway ceded the Isle of Man and the Hebrides to Scot- land. His wife was Christian, daughter of Robert Bruce, the competitor for the crown of Scotland.

Patrick Dunbar, 8th earl of Dunbar and 1st earl of March, claimed the crown of Scotland in 1291 as descendant of Ada, daughter of William the Lion. He was one of the " seven earls of Scotland," a distinct body separate from the other estates of the realm, who claimed the right to elect a king in cases of dis- puted succession, and whose authority was, perhaps, to be traced to the seven provinces of the Pictish kingdom. He was the first of the earls of Dunbar to appear in the records as " comes de Marchia," or earl of March. Like most of his family in later times, he was favourable to the English interest in Scottish affairs, and he did homage to Edward I. of England. His wife Marjory, daughter of Alexander Comyn, earl of Buchan, took the other side and held the castle of Dunbar for Baliol, but was forced

to surrender it to Edward in 1296. In 1298 he was appointed the English king's lieutenant in Scotland.

Patrick Dunbar (1285-1369), 9th earl of Dunbar and 2nd earl of March, son of the preceding, gave refuge to Edward II. of England after Bannockburn, and contrived his escape by sea to England. Later, he made peace with Robert Bruce, and by him was appointed governor of Berwick Castle, which he held against Edward III. until the defeat of the Scots at Halidon Hill (July 19, 1333) made it no longer tenable. His countess, known in Scottish history and romance as " Black Agnes," daughter of Thomas Randolph, earl of Moray (Murray), and grandniece of Robert Bruce, is famous for her defence of Dunbar Castle against the English under the earl of Salisbury in 1338, Salisbury being forced to abandon the attempt after a fierce siege lasting nineteen weeks. This lady succeeded to the estates and titles of her brother, John Randolph, 3rd earl of Moray. The earldom of Moray passed after her death to her second son, John Dunbar, who married Marjory, daughter of King Robert II. Black Agnes also bore to the earl of March two daughters, the elder of whom, Agnes, after being the mistress of King David II., married Sir James Douglas, lord of Dalkeith, from whom were descended the first three earls of Morton; the younger, Elizabeth, married John Maitland of Lethington, ancestor of the duke of Lauderdale, whose second title was marquess of March.

George Dunbar (d. 1420), 10th earl of Dunbar and 3rd earl of March, great-nephew of the 8th earl and warden of the marches, accompanied Douglas in his foray into England in 1388, and commanded the Scots after Otterburn. He after- wards quarrelled with the Douglases, because his daughter was passed over in favour of a daughter of Archibald, " the Grim Earl of Douglas," as wife for David, duke of Rothesay, son of Robert III. When Douglas seized March's lands the latter fled to England, where he was welcomed by Henry IV., to whom he was related. He fought on the English side at Homildon Hill; and, having revealed to Henry the defection of the Percies, who were in league with Douglas and Owen Glendower, he fought against those allies at the battle of Shrewsbury (July 23, 1403). Becoming reconciled with Douglas, he returned to Scotland in 1409, and was restored to his earldom by the regent Albany. He died in 1420.

George Dunbar, nth earl of Dunbar and 4th earl of March, was one of the negotiators for the release of James I. of Scotland in 1423 from his captivity in England, and was knighted at that king's coronation. In 1434, however, on the ground that the regent had had no power to reverse his father's forfeiture for treason, March was imprisoned and his castle of Dunbar seized by the king; and the parliament at Perth declared his lands and titles forfeited to the crown. The earl, being released, retired to England with his son Patrick, whose daughter and heiress Margaret was

ancestress of Patrick, 5th earl of Dumfries, now represented by the marquess of Bute.

The earldom of March in the house of Dunbar having thus been forfeited to the crown, James II. in 1455 conferred the title, together with that of warden of the marches, on his second son Alexander, duke of Albany; but this prince entered into treasonable correspondence with Edward IV. of England, and in 1487 the earldom of March and the barony and castle of Dunbar were again declared forfeited and annexed to the crown of Scotland.

The title of earl of March was next held by the house of Lennox. In 1576 the earldom of Lennox became extinct on the death without male issue of Charles (father of Lady Arabella Stuart), 5th earl of Lennox; and it was then revived in favour of Robert Stuart, a grand-uncle of King James VI., second son of John, 3rd earl of Lennox. But in 1579 Esme Stuart, a member of a collateral branch which in 1508 had inherited the lordship of Aubigny in France, came to Scotland and obtained much favour with James VI. The earldom of Lennox (soon afterwards raised to a dukedom) was taken from Robert and conferred upon Esme; and Robert was compensated by being created earl of March and baron of Dunbar (1582). Robert died without legiti- mate issue in 1586, when the earldom of March again reverted to the crown. In 1619 Esme, 3rd duke of Lennox, was created

earl of March ; and his son James was created duke of Richmond in 1 64 1. On the death without issue of Charles, 6th duke of Lennox and 3rd duke of Richmond, in 1672, his titles devolved upon King Charles II. as nearest collateral heir-male. In 1675 Charles conferred the titles of duke of Richmond and Lennox and earl of March on Charles Lennox, his natural son by Louise de Keroualle, duchess of Portsmouth, from whom the earldom of March has descended to its present holder the duke of Richmond and Gordon. (See Richmond, Earls and Dukes or; and Lennox.)

The title of earl of March in the peerage of Scotland, by another creation, was conferred in 1697 on William Douglas, second son of William, 1st duke of Queensberry. His grandson William, 3rd earl of March, became 4th duke of Queensberry on the death without surviving male issue of his cousin Charles, 3rd duke of Queensberry, in 1778. Dying unmarried in 1810, the several titles of the duke passed to different branches of the house of Douglas. The earldom of March is stated by Sir Bernard Burke

and other authorities to have devolved upon Francis, 8th earl of Wemyss, great-great-grandson of David, 3rd earl of Wemyss, whose wife was Anne, daughter of the 1st duke of Queensberry and sister of the 1st earl of March; and the title is now assumed by the earl of Wemyss. On the other hand, Francis, 8th earl of Wemyss, not having been an heir of the body of the 1st earl of March, Sir Robert Douglas says in The Peerage of Scotland that on the death of the 4th duke of Queensberry in 1810 " the earldom of March, it is supposed, became extinct."

See Andrew Lang, History of Scotland (4 vols., London, 1900- 1907); Sir Bernard Burke, A Genealogical History of Dormant and Extinct Peerages (London, 1866) ; Sir Robert Douglas, The Peerage of Scotland (2 vols., Edinburgh 1813); Lady Elizabeth Cust, Some Account of the Stuarts of Aubigny in France (London, 1891). (R. J. M.)

MARCH, AUZIAS (c. 1395-1458), Catalan poet, was born at Valencia towards the end of the 14th century. Little is known of his career except that he was twice married — first to Na Vsabel Martorell, and second to Na Johanna Scorna — that he died on the 4th of November 1458, and that he left several natural children. Inheriting an easy fortune from his father, the treasurer to the duke of Gandia, and enjoying the powerful patronage of Prince Carlos de Viana of Aragon, March was enabled to devote himself to poetical composition. He is an undisguised follower of Petrarch, carrying the imitation to such a point that he addresses his Cants d'amor to a lady whom he professes to have seen first in church on Good Friday; so far as the difference of language allows, he reproduces the rhythmical cadences of his model, and in the Cants de mort touches a note of brooding sentiment peculiar to himself. Though his poems are disfigured by obscurity and a monotonous morbidity, he was fully entitled to the supremacy which he enjoyed among his contemporaries, and the success of his innovation no doubt encouraged Boscan to introduce the Italian metres into Castilian.

His verses were first printed in Catalan in 1543, but they had already become known through the Castilian translation published by Baltasar de Romani in 1539.

MARCH, FRANCIS ANDREW (1825-), American philo- logist and educationalist, was born on the 25th of October 1825 in Millbury, Massachusetts. He graduated in 1845 at Amherst, where his attention was turned to the study of Anglo-Saxon by Noah Webster. He was a teacher at Swanzey, New Hampshire, and at the Leicester Academy, Massachusetts, in 1845-1847, and attempted the philological method of teaching English " like Latin and Greek," later described in his Method of Philological Study of the English Language (1865); at Amherst in 1847-1849; at

Fredericksburg, Virginia, in 185 2-185 5; ar, d in 1855 became a tutor at Lafayette College, where he became adjunct professor of belles-lettres and English literature in T856, and professor of English language and comparative philology — the first chair of the kind established — in 1857. He lectured on constitutional and public law and Roman law in 1875-1877, and also taught

subjects as diverse as botany and political economy. In 1907 he became professor emeritus. At Lafayette he introduced the first carefully scientific study of English in any American college, and in 1870 published A Comparative Grammar of the Anglo- Saxon Language, in which its Forms are Illustrated by Those of the Sanskrit, Greek, Latin, Gothic, Old Saxon, Old Friesic, Old Norse and Old High German, and An Anglo-Saxon Reader; he •was editor of the " Douglass Series of Christian Greek and Latin Classics," to which he contributed Latin Hymns (1874); he was chairman of the Commission of the State of Pennsylvania on Amended Orthography; and was consulting editor of the Stan- dard Dictionary, and in 1879-1882 was director of the American readers for the Philological Society's (New Oxford) Dictionary. He was president of the American Philological Association in 1873-1874 and in 1895-1896, of the Spelling Reform Associa- tion after 1876, and of the Modern Language Association in 1 891-1893. Among American linguistic scholars March ranks with Whitney, Child and Gildersleeve; and his studies in English, though practically pioneer work in America, are of undoubted value. His article " On Recent Discussions of Grimm's Law " in the Transactions and Proceedings of the American Philological Association for 1873 in large part anticipated Verner's law. With his son, Francis Andrew March, jun. (b. 1863), adjunct- professor of modern languages in 1 884-1 891 and subsequently professor of English literature at Lafayette, he edited A Thesaurus Dictionary of the English Language (1903).

See Addresses in Honor of Professor Francis A. March, LL.D., L.H.D., delivered at Easton, Pennsylvania, on the 24th of October

1895. .....

MARCH, a market town in the Wisbech parliamentary division of Cambridgeshire, England, 30 m. N. by W. of Cam- bridge. Pop. of urban district (1901), 7565. It lies in the midst of the flat fen country, on the old course of the river Nene. It is an important junction on the Great Eastern railway and the starting-point of a line worked by that company jointly with the Great Northern to Lincoln and Doncaster. The church of St Wendreda, in Early English and later styles, is remarkable for a magnificent Perpendicular timber roof, beautifully carved. There are agricultural implement and engineering works, and corn mills.

MARCH, the third month of the modern calendar, containing thirty-one days. It was the Romans' first month until the adoption of the Julian calendar, 46 B.C., and it continued to be the beginning of the legal year in England until the 18th century. In France it was reckoned the first month of the year until 1 564, when, by an edict of Charles IX., January was decreed to be thenceforth the first month. Scotland followed the example of France in 1599; but in England the change did not take place before 1752. The Romans called the month Martius, a name supposed to have been conferred on it by Romulus in honour of his putative father, Mars, the god of war; but Ovid declares the month to have existed before the time of Romulus, though in a different position in the calendar. The Anglo-Saxons called March Hlyd-monath, " loud or stormy month," or Lencten-monath, " lengthening month," in allusion to the fact that the days then rapidly become longer. There is an old saying, common to both England and Scotland — which has its equivalent among the Basques and many European peoples — representing March as borrowing three days from April; the last three days of March being called the " borrowing " or the " borrowed days." As late as the end of the 18th century the first three days of March were known in Devonshire as " Blind Days," and were deemed so unlucky that no farmer would sow seed then.

The chief festival days of March are the 1st, St David; the 1 2th, St Gregory; the 17th, St Patrick; and the 25th, Lady Day, one of the quarter days in England.

MARCH (1) (from Fr. marcher, to walk; the earliest sense in French appears to be " to trample," and the origin has usually been found in the Lat. marcus, hammer; Low Lat. marcare, to hammer; hence to beat the road with the regular tread of a soldier: cf. " beat," of a policeman's round), the movement of military troops with regular rhythmical steps, often with the

time marked by the beat of drum, the sound of pipes or bugles or the music of a military band; hence the advance or movement of a body of troops from one point to another, and the distance covered in so doing. The word is also naturally applied to the music composed for marching to, and to the steady regular advance or progress of non-military bodies or persons, or of events, &c. In the military sense, " marching " is walking in formed bodies of troops, either during drill evolutions on parade or on the " line of march " from one place to another. In both senses the word is used with mounted troops as well as with dismounted men. Formerly all evolutions were

carried out at the so-called " parade-march " pace of about 75-80 paces to the minute, and in one or two armies of the 18th century the parade step cadence was as slow as 60. These cadences are now, how- ever, reserved in all armies for ceremonial occasions, and the usual manoeuvre and marching pace (" quick march ") is about 120, the " double " march pace (pas gymnaslique) about 180. The " quick " march, translated into miles and hours, is about 32 or 3l miles an hour in all armies, though a few special bodies of light troops such as the Italian Bersaglieri are trained to move at a much faster rate for hours together, either by alternate " quick " and " double " marching or by an unvarying " jog- trot." The paces recognized for cavalry are the walk, the trot, the canter and the gallop; the usual practice on the line of march being to alternate the walk and the trot, which combination gives a speed of about 5 miles an hour for many hours together. A " day's march," or more simply a " march," is usually reckoned to be 15-16 miles for a large body of troops, a " forced " march being one of 20 miles or over, or one in which, from whatever cause, the troops are on foot for more than about seven hours. For large bodies of troops the rate of movement on the line of march rarely exceeds 3 miles an hour. The immense assistance afforded by music to marching troops has been recognized from the .earliest times of organized armies, and a great deal of special march-music has been written for military bands, formerly often in f or f time (one bar representing one pace with the foot), but now almost invariably in common or f time, which is more suitable for the " quick march." The music itself is usually a combination of simple, lively melody and well-marked accents for the drums, with little attempt at contrapuntal writing. The fife or piccolo, the natural bugle (in Italy and elsewhere the chro- matic key-bugle is used), and the drum are the principal instru- ments, the " band," as distinct from the "drums " and " bugles," having in addition to drum and fifes clarinets (saxophones in France and Belgium) and saxhorns of all types. In Scottish regiments, and in a few isolated cases elsewhere, bagpipes provide the marching music. The importance of music on the march is attested further by the almost universal practice of singing or whistling marching songs, and even playing them on concertinas, &c, in the absence of the band and drums.

2. From marche, the French form of a common Teutonic word represented in English by " mark " (q.v.), a boundary or frontier region between two countries or districts. The word appears to have been first used in this sense in the 8th century, and the earliest " mark " or " march " districts were tracts of land on the borders of the Carolingian Empire. Wherever Charlemagne pushed forward the frontiers of the Frankish realm he provided for the security of his lands, new and old alike, by establishing mark districts on the borders. The defence and oversight of these were entrusted to special officers, afterwards called margraves, or counts of the

mark, who usually enjoyed more extensive powers than fell to the lot of an ordinary count. It is at this time that we hear first of the Spanish mark (marca hispanica) and the Bavarian mark (marca bajoariae). These mark districts were practically obliterated during the reigns of the feeble sovereigns who succeeded Charlemagne, but the system was revived with the accession of Henry the Fowler to the German throne early in the 10th century and with a renewal of the work of conquering and colonizing the regions east of the Elbe, and in eastern Germany generally. Under Henry and his son, Otto the Great, marks were again set upon the borders of Germany,

districts increased in size and strength, especially those which fell under the dominion of an able and energetic ruler, and some of them became powerful states, retaining the name mark long after the original significance of the word had been forgotten. It is interesting to note that the two most important of the modern German states, Austria and Prussia, both had their origin in mark districts, the mark of Brandenburg, the nucleus of the kingdom of Prussia, being at first a border district to the east of the duchy of Saxony, and the east mark, or mark of Austria, being a border district of the duchy of Bavaria. In Italy march districts made their appearance about the same time as in other parts of the Frankish Empire. The best known of these is the march of Ancona, which with other marches and adjoining districts, was known later as the Marches, a province lying about the centre of Italy between the Apennines and the Adriatic Sea. After forming part of the states of the Church the Marches were united with the kingdom of Italy in i860 (see Marches, The).

In England in the same connexion the plural word " marches " was the form commonly adopted, and soon after the Norman Conquest the disturbed districts on the borders of Wales began to be known as the Welsh marches. Lands therein were granted to powerful nobles on condition that they undertook the defence of the neighbouring counties of England. These lords of the marches, or lords marcher, as they were often called, had special privileges, but they were generally so fully occupied in fighting against each other and in seeking to increase their own wealth and power that the original object of their appointment was entirely forgotten. The condition of the marches grew worse and worse, and during disturbed reigns, like those of Henry III. and Edward II., lawlessness was rampant and rebellion was centred therein. A more satisfactory condition of affairs, however, prevailed after the conclusion of the Wars of the Roses; and the establishment by Henry VIII. in 1542 of a council of Wales and the marches was followed by a notable diminution of disorder in this region. About the time of Elizabeth the Welsh marches ceased to have any but an historical importance. In 1328 Roger Mortimer, a member of one of the most powerful of the marcher families, was created earl of March (comes

de marchia Waliae), and in the reign of Edward III. (1354) the marches were declared to be no part of the principality, but directly subject to the English crown. It is difficult to define the boundaries of the Welsh marches, as their extent varied considerably from time to time, but under Edward I. and again under the Lancastrian kings the marcher lordships included more than half of the area of Wales; they embraced practically the whole of the principality except the counties of Anglesea, Carnarvon and Merioneth in the north and Carmarthen and Cardigan in the south, together with parts of the English border counties, Monmouth, Hereford and Shropshire.

The debateable ground between England and Scotland was also known as the marches, although its condition began to attract the attention of the southern kingdom somewhat later than was the case with Wales. Arrangements were made for garrisoning them and at one time they were divided into three sections: the east, the west, and the middle marches, the over- sight of each being entrusted to a warden. Roughly speaking, they embraced the modern counties of Northumberland and Cumberland, together with a tract on the Scottish side of the border. The heed for protecting them ceased soon after the accession of James VI. of Scotland to the English throne, and they have now only an historical and legendary significance. About 1290 Patrick de Dunbar, earl of Dunbar, called himself earl of March, taking the name from the merse, or march, a tract of land in Berwickshire.

In France under the ancien regime there was a county of La Marche, and in north-east Germany there was the county of La Marck, now part of the kingdom of Prussia.

MARCHE, or La Marche, one of the former provinces of France. It owes its name to its position, it having been in the 10th century a march or border district between the duchy of

and this time the organization was more lasting. The mark I Aquitaine and the domains of the Frankish kings in central

France. Sometimes it was called the Marche Limousine, and originally it was a small district cut partly from Limousin and partly from Poitou. Its area was increased during the 13th century, after which, however, it remained unaltered until the time of the Revolution. It was bounded on the N. by Berry; on the E. by Bourbonnais and Auvergne; on the S. by Limousin; and on the W by Poitou. It embraced the greater part of the

modern department of Creuse, a considerable part of Haute Vienne, and a fragment of Indre. Its area was about 1900 sq. m.; its capital was Charroux and later Gueret, and among its other principal towns were Dorat, Bellac and Confolens.

Marche first appears as a separate fief about the middle of the 10th century when William III., duke of Aquitaine, gave it to one of his vassals named Boso, who took the title of count. In the 1 2th century it passed to the counts of Limousin, and this house retained it until the death of the childless Count Hugh in 1303, when it was seized by the French king, Philip IV. In 1316 it was made a duchy for Prince Charles, afterwards King Charles IV., and a few years later (1327) it passed into the hands of the family of Bourbon. The family of Armagnac held it from 1435 to 1477, when it reverted to the Bourbons, and in 1527 it was seized by Francis I. and became part of the domains of the French crown. It was divided into Haute Marche and Basse Marche, the estates of the former being in existence until the 17th century. From 1470 until the Revolution the province was under the jurisdiction of the parlement of Paris.

See A. Thomas, Les fctats provinciaux de la France centrale

(1879).

MARCHE, a town of Belgium in the province of Luxemburg, H m. S.W. of Liege and about 28 m. S.E. of Namur. Pop. (1904), 3540. It dates from the 7th century, when it was the chief town of the pagus falmiensis, as it still is of the same district now called Famene. Formerly it was fortified, and a treaty was signed there in 1577 between Philip II. and the United Provinces. In 1792 Lafayette was taken prisoner by the Austrians in a skirmish near it.

MARCHENA, a town of southern Spain, in the province of Seville, on the Cordova-Utrera and Marchena-La Roda railways. Pop. (1900), 12,468. Marchena occupies a sandy valley near the river Corbones, a left-hand territory of the Guadalquivir. Formerly it was surrounded with walls and towers, a large portion of which still remains. Among the principal buildings is the palace of the dukes of Arcos, within the enclosure of which is an ancient Moorish building, now the church of Santa Maria de la Mota. At the eastern end of the town is a sulphur spring. There is some trade in wheat, barley, olives, oil and wine. Marchena (perhaps the Castra Gemina of Pliny) was taken from the Moors by St Ferdinand in 1240.

MARCHENA RUIZ DE CASTRO, JOSE (1 768-1821?), Spanish author, was born at Utrera on the 18th of November 1768 and studied with distinction at the university of Seville. He took minor orders and was for

some time professor at the seminary of Vergara, but he became a convert to the doctrines of the French philosophes, scandalizing his acquaintances by his pro- fessions of materialism and his denunciations of celibacy. His writings being brought before the Inquisition in 1792, Marchena escaped to Paris, where he is said to have collaborated with Marat in L' Ami du peuple; at a later date he organized a revolu- tionary movement at Bayonne, returned to Paris, avowed his sympathies with the Girondists, and refused the advances of Robespierre. He acted as editor of L' Ami des lois and other French journals till 1799, when he was expelled from France; he succeeded, however, in obtaining employment under Mareau, upon whose fall in 1804 he declared himself a Bonapartist. In 1808 he accompanied Murat to Spain as private secretary; in this same year he was imprisoned by the Inquisition, but was released by Joseph Bonaparte, who appointed him editor of the official Gaceta. In 1813 Marchena retired to Valencia, and thence to France, where he supported himself by translating into Spanish the works of Montesquieu, Rousseau, Voltaire and Volney. The Liberal triumph of 1820 opened Spain to him once more, but he was coldly received by the revolutionary party. He died at

Madrid shortly before the 26th of February 1821. The interest of his voluminous writings is almost wholly ephemeral, but they are excellent specimens of trenchant journalism. His Frag- mentum Petronii (Basel, 1802), which purports to reconstruct missing passages in the current text of Petronius, is a testimony to Marchena's fine scholarship; but, by the irony of fate, Marchena is best known by his ode to Christ Crucified, which breathes a spirit of profound and tender piety.

MARCHES, THE (It. Le Marche), a territorial division of Italy, embracing the provinces of Pesaro and Urbino, Ancona, Macerata, and Ascoli Piceno, with an area of 3763 sq. m., and a population of 1,088,763 in 1901. It is bounded by the Emilia on the N., the Adriatic on the E., the Abruzzi on the S., and Umbria and Tuscany on the W. The four provinces follow one another in the order given from north to south and have a certain amount of coast-line. The chief rivers, all of which run into the Adriatic east- wards and north-eastwards, are the Metauro (anc. Metaurus, q.v.) and the Tronto (anc. Truentus), the latter forming the southern boundary of the compartimento for some distance. Except for the river valleys and the often very narrow coast strip, the general level is more than 500 ft. above the sea. The lower hills are very largely composed of loose, clayey, unstable earth, while the Apennines are of limestone. The province of Pesaro and Urbino falls within the boundaries of the ancient Umbria (q.v.), while the territory of the other three belonged to Picenum (q.v.). The railway from Bologna to Brindisi runs along the coast-line of the entire territory. At Ancona it is joined by the main line from Foligno and Rome; at Porto Civitanova is a branch to Macerata, San Severino and Fabriano (a station

on the line from Ancona to Rome and the junction for Urbino); at Porto S. Giorgio is a branch to Fermo and, at Porto d' Ascoli, a branch to Ascoli Piceno. But, with the exception of the railway along the coast, there is no communication north and south, owing to the mountainous nature of the country, except by somewhat devious roads.

Owing largely to the mezzadria or metayer system, under which products are equally divided between the owners and the culti- vators of the land, the soil is fairly highly cultivated, though naturally poor in quality. The silk industries, making of straw- plait and straw hats, fearing of silkworms and cocoons, with some sugar-refining, tobacco, terra-cotta manufacture, brick-works and ironworks, furnish the chief occupations of the people next after agriculture and pastoral pursuits. Another important Jjranch of activity is the paper industry, especially at Fabriano. Chiaravalle possesses one of the largest tobacco factories of the Italian regie. Limestone quarries and sulphur mines supply building stone and sulphur to the regions of central Italy; chalk and petroleum are also found. As regards maritime trade the pro- vince possesses facilities in the port of Ancona (the only really good harbour, where are also important shipbuilding works), the canal ports of Senegallia (Sinigaglia), Pesaro, Fano and other smaller harbours chiefly used by fishing boats. Fishing is carried on by the entire coast population, which furnishes a large contingent of sailors to the Italian navy.

For the early history of the territory of the Marches see Picenum. From the Carolingian period onwards the name Marca begins to appear — first the Marca Fermana for the mountainous part of Picenum, the Marca Camerinese for the district farther north, including a part of Umbria, and the Marca Anconitana for the former Pentapolis. In 1080 the Marca Anconitana was given in investiture to Robert Guiscard by Gregory VII., to whom the countess Matilda ceded the Marches of Camerino and of Fermo. In 1105 we find the emperor Henry IV. investing Werner with the whole territory of the three marches under the name of March of Ancona. It was afterwards once more recovered by the Church and governed by papal legates. It became part of the kingdom of Italy in i860.

The pictorial art of the Marches from the 13th century onwards has become the object of considerable interest since the important exhibition held at Macerata in 1905, when many interesting works, scattered all over the district in small towns and villages, were brought together. The result was something of a revelation,

for, though the influence of Umbria was always considerable, there were many independent elements (see F. M. Perkins in Rassegna d' Arte, 1906, 49 sqq.)., (T. As.)

MARCHMONT, EARLS OF. The 1st earl of Marchmont was Sir Patrick Hume or Home (1641-1724), son of Sir Patrick Hume, bart. (d. 1648), of Polwarth, Berwickshire, and a descendant of another Sir Patrick Hume, a supporter of the Reformation in Scotland. A member of the same family was Alexander Hume (c. 1560-1609), the Scottish poet, whose Hymns and Sacred Songs were published in 1599 (new ed. 1832). Polwarth, as Patrick Hume was usually called, became a member of the Scottish parliament in 1665. Here he was active in opposing the harsh policy of the earl of Lauderdale towards the Covenanters, and for his contumacy he was imprisoned. After his release he went to London, where he associated himself with the duke of Monmouth. Suspected of complicity in the Rye House plot, he remained for a time in hiding and then crossed over to the Nether- lands, where he took part in the deliberations of Monmouth, the earl of Argyll and other exiles about the projected invasion o\ Great Britain. Although he appeared to distrust Argyll, Polwarth sailed to Scotland with him in 1685, and after the failure of the rising he escaped to Utrecht, where he lived in great poverty until 1688. He accompanied William of Orange to England, and in 1689 he was again a member of the Scottish parliament. In 1690 he was made a peer as Lord Polwarth; in 1696 he became lord high chancellor of Scotland, and in 1697 was created earl of Marchmont. When Anne became queen in 1702 he was deprived of the chancellorship. He died on the 2nd of August 1724. His son Alexander, the 2nd earl (1676-1740), took the name of Campbell instead of Hume after his marriage in 1697 with Margaret, daughter and heiress of Sir ; George Campbell of Cessnock, Ayrshire. He was a lord of session from 1704 to 1714; ambassador to Denmark from 1715 to 1721, and lord, clerk register from 1716 to 1733. His son Hugh Hume, 3rd earl (1708-1794), who entered parliament in 1734 at the same time as his twin brother Alexander (d. 1756), afterwards lord clerk register of Scotland, was keeper of the great seal of Scotland, one of Bolingbroke's most intimate friends and one of Pope's executors. His two sons having predeceased their father, the earldom became dormant, Marchmont House, Berwickshire, and the estates passing to Sir Hugh Purves, bart., a descendant of the 2nd earl, who took the name of Hume-Campbell. The 3rd earl had, however, three daughters, one of whom, Diana (d. 1827), married Walter Scott of Harden, Berwickshire; and in 1835 her son Hugh Hepburne-Sc6tt (1758-1841) successfully claimed the Scottish barony of Polwarth. In 1867 his grandson, Walter Hugh (b. 1838), became 6th Lord Polwarth.

See The Marchmont Papers, ed. Sir G. H. Rose (1831).

MARCHPANE, or Marzipan, a sweetmeat made of sweet i.lmonds and sugar pounded and worked into a paste, and moulded into various shapes, or used in the icing of cakes, &c. The best marchpane comes from Germany, that from Konigsberg being celebrated. The origin of the word has been much discussed. It is common in various forms in most European languages, Romanic or Teutonic; Italian has marzapane, French massepain, and German marzipan, which has in English to some extent superseded the true English form "marchpane." Italian seems to have been the source from which the word passed into other languages. In Johann Burchard's Diarium curiae romanae (1483-1492) the Latin form appears as martiapanis (Du Cange, Glossarium s.v.), and Minshseu explains the word as Martins pants, bread of Mars, from the " towers, castles and such like " that appeared on elaborate works of the confectioner's art made of this sweatmeat. Another derivation is that from Gr. judf a, barley cake, and Lat. pants. A connexion has been sought with the name of a Venetian coin, matapanus (Du Cange, s.v.), oii which was a figure of Christ enthroned, struck by Enrico Dandolo, doge of Venice (1192-1205). From the coin the word was applied to a small box, and hence apparently to the sweet- meat contained in it.

MARCIAN (c. 390-457), emperor of the East (450-457), was born in Thrace or Illyria, and spent his early life as an obscure

soldier. He subsequently served for nineteen years under Ardaburius and Aspar, and took part in the wars against the Persians and Vandals. Through the influence of these generals he became a captain of the guards, and was later raised to the rank of tribune and senator. On the death of Theodosius II. he was chosen as consort by the latter's sister and successor, Pulcheria, and called upon to govern an empire greatly humbled and impoverished by the ravages of the Huns. Marcian repudi- ated the payment of tribute to Attila; he reformed the finances, checked extravagance, and repeopled the devastated districts. He repelled attacks upon Syria and Egypt (452), and quelled disturbances on the Armenian frontier (456). The other notable event of his reign is the Council of Chalcedon (451), in which Marcian endeavoured to mediate between the rival schools of theology.

See Gibbon, The Decline and Fall of the Roman Empire (ed. Bury, London, 1896), iii. 384, iv. 444-445; J. Bury, The Later Roman Empire (London, 1889), i. 135-136.

MARCIANUS (c. a.d. 400), Greek geographer, was born at Heraclea in Pontus. Two of his works have been preserved in a more or less mutilated condition. In the first, the Periplus of the Outer Sea, in two books, in which he proposed to give a complete description of the coasts of the eastern and

western oceans, his chief authority is Ptolemy; the distances from one point to another are given in stades, with the object of rendering the work easier for the ordinary student. In this he follows Protagoras, who, according to Photius (cod. 188), wrote a sketch of geography in six books. The work contains nothing that cannot be learned from Ptolemy, whom he follows in calling the promontory of the Novantae {Mull of Galloway) the most northern point of Britain. Improving on Ptolemy, he makes the island of Taprobane (Ceylon) twenty times as large as it is in reality. The second, the Periplus of the Inner Sea (the Mediterranean), is a meagre epitome of a similar work by Menippus of Pergamum, who lived during the times of Augustus and Tiberius. It contains a description of the southern coast of the Euxine from the Thracian Bosporus to the river Iris in Pontus. A few fragments remain of an epi- tome by Marcianus of the eleven books of the Geographumena of Artemidorus of Ephesrs.

See J. Hudson, Geographiae veteris scriptores graeci minores, vol. i. (1698), with Dodwell's dissertation; C. W. Muller, Geographici graeci minores, vol. i. pp. cxxix., 515-573; E. Miller, Periple de Marcien d'Heraclee (1839); S. F. G. Hoffmann, Marciani Periplus (1841); E. H. Bunbury, Hist, of Ancient Geography (1879), &• 660; •A. Forbiger, Handbuch der alten Geographie, vol. i. (1842).

MARCION and THE MARCIONITE CHURCHES. In the

period between 130 and 180 a.d. the varied and complicated Chris- tian fellowships in the Roman Empire crystallized into close and mutually exclusive societies — churches with fixed constitutions and creeds, schools with distinctive esoteric doctrines, associa- tions for worship with peculiar mysteries, and ascetic sects with special rules of conduct. Of ecclesiastical organizations the most important, next to Catholicism, was the Marcionite community. Like the Catholic Church, this body professed to comprehend everything belonging to Christianity. It admitted all believers without distinction of age, sex, rank or culture. It was no mere school for the learned, disclosed no mysteries for the privileged, but sought to lay the foundation of the Christian community on the pure gospel, the authentic institutes of Christ. The pure gospel, however, Marcion found to be everywhere more or less corrupted and mutilated in the Christian circles of his time. His undertaking thus resolved itself into a reformation of Christen- dom. This reformation was to deliver Christendom from false Jewish doctrines by restoring the Pauline conception of the gospel, — Paul being, according to Marcion, the only apostle who had rightly understood the new message of salvation as delivered by Christ. In Marcion's own view, therefore, the founding of his church — to which he was first driven by opposition — amounts to a reformation of Christendom through a return to the gospel of Christ and to Paul; nothing was to be accepted beyond that.

This of itself shows that it is a mistake to reckon Marcion among the Gnostics. A dualist he certainly was, but he was not a Gnostic. For he ascribed salvation, not to " knowledge " but to

" faith "; he appealed openly to the whole Christian world; and he nowhere consciously added foreign elements to the revelation given through Christ. It is true that in many features his Christian system — if we may use the expression — resembles the so-called Gnostic systems; but the first duty of the historian is to point out what Marcion plainly aimed at; only in the second place have we to inquire how far the result corresponded with those purposes.

The doctrines of Marcion and the history of his churches from the 2nd to the 7th century are known to us from the controversial works of the Catholic fathers. From Justin onwards, almost every eminent Church teacher takes some notice of Marcion, while very many write extensive treatises against him. The most important of those which have come down to us are the controversial pieces of Irenaeus (in his great work against heretics), Tertullian (Adv. Marc, i.-v.), Hippolytus, Pseudo-Origen Adamantius, Epiphanius, and the Armenian Esnik. 1 From these works the contents of the Marcionite Gospel, and also the text of Paul's epistles in Marcion's recension, can be settled with tolerable accuracy. His opponents, moreover, have preserved some expressions of his, with extracts from his principal work; so that our knowledge of Marcion's views is in part derived from the best sources.

Marcion was a wealthy shipowner, belonging to Sinope in Pontus. He appears to have been a convert from Paganism to Christianity, although it was asserted in later times that his father had been a bishop. That report is probably as untrust- worthy as another, that he was excommunicated from the Church for seducing a virgin. What we know for certain is that after the death of Hyginus, bishop of Rome (or c. 139 a.d.), he arrived, in the course of his travels, at Rome, and made a hand- some donation of money to the local church. Even then, how- ever, the leading features of his peculiar system must have been already thought out. At Rome he tried to gain acceptance for them in the college of presbyters and in the church; indeed he had previously made similar attempts in Asia Minor. But he now encountered such determined opposition from the majority of the congregation that he found it necessary to withdraw from the great church and establish in Rome a community of his own. This was about the year 144. The new society increased in the two following decades; and very

soon numerous sister-churches were flourishing in the east and west of the empire. Marcion took up his residence permanently in Rome, but still undertook journeys for the propagation of his opinions. In Rome he became acquainted with the Syrian Gnostic Cerdo, whose specu- lations influenced the development of the Marcionite theology. Still Marcion seems never to have abandoned his design of gain- ing over the whole Church to his gospel. The proof of this .is found, partly in the fact that he tried to establish relations with Polycarp of Smyrna, from whom he got a sharp rebuff, partly in a legend to the effect that towards the end of his life he sought readmission to the Church. Such, presumably, was the construction put in after times on his earnest endeavour to unite Christians on the footing of the " pure gospel." When he died is not known, but his death can scarcely have been much later than the year 165.

The distinctive teaching of Marcion originated in a comparison of the Old Testament with the gospel of Christ and the theology of the apostle Paul. Its motive was not cosmological or meta- physical, but religious and historical. In the gospel he found a God revealed who is goodness and love, and who desires faith and love from men. This God he could not discover in the Old Testament; on the contrary, he saw there the revelation of a just, stern, jealous, wrathful and variable God, who requires from his servants blind obedience, fear and outward righteous- ness. Overpowered by the majesty and novelty of the Christian message of salvation, too conscientious to rest satisfied with the ordinary attempts at the solution of difficulties, while prevented by the limitations of his time from reaching an historical insight into the relation of Christianity to the Old Testament and to Judaism, he believed that he expressed Paul's view by the

1 Esnik's presentation of the Marcionite system is a late pro- duction, and contains many speculations that cannot be charged upon Marcion himself.

hypothesis of two Gods: the just God of the law (the God of the Jews, who is also the Creator of the world), and the good God, the Father of Jesus Christ. Paradoxes in the history of religion and revelation which Paul draws out, and which Marcion's contemporaries passed by as utterly incomprehensible, are here made the foundation of an ethico-dualistic conception of history and of religion. It may be said that in the 2nd century only one Christian — Marcion — took the trouble to understand Paul; but it must be added that he misunderstood him. The profound reflections of the apostle on the radical antithesis of law and gospel, works and faith, were not appreciated in the 2nd century. Marcion alone perceived their decisive religious importance, and with them confronted the legalizing, and in this sense judaizing, tendencies of his Christian contemporaries. But the Pauline ideas lost their truth under his treatment; for, when it is denied that the God of redemption is at the same time the almighty Lord of heaven and

earth, the gospel is turned upside down.

The assumption of two Gods necessarily led to cosmological speculations. Under the influence of Cerdo, Marcion carried out his ethical dualism in the sphere of cosmology; but the fact that his system is not free from contradictions is the best proof that all along religious knowledge, and not philosophical, had the chief values in his eyes. The main outlines of his teaching are as follows. Man is, in spirit, soul and body, a creature of the just and wrathful god. This god created man from CXtj (matter) , 2 and imposed on him a strict law. Since no one could keep this law, the whole human race fell under the curse, temporal and eternal, of the Demiurge. Then a higher God, hitherto unknown, and concealed even from the Demiurge, took pity on the wretched, condemned race of men. He sent his Son (whom Marcion probably regarded as a manifestation of the supreme God Him- self) 3 down to this earth in order to redeem men. Clothed in a visionary body, in the likeness of a man of thirty years old, the Son made his appearance in the fifteenth year of Tiberius, and preached in the synagogue at Capernaum. But none of the Jewish people understood him. Even the disciples whom he chose did not recognize his true nature, but mistook him for the Messiah promised by the Demiurge through the prophets, who as warrior and king was to come and set up the Jewish empire. The Demiurge himself did not suspect who the stranger was; nevertheless he became angry with him, and, although Jesus had punctually fulfilled his law, caused him to be nailed to the cross. By that act, however, he pronounced his own doom. For the risen Christ appeared before him in his glory, and charged him with having acted contrary to his own law. To make amends for this crime, the Demiurge had now to deliver up to the good God the souls of those who were to be redeemed ; they are, as it were, purchased from him by the death of Christ. Christ then proceeded to the underworld to deliver the spirits of the departed. It was not the Old Testament saints, however, but only sinners and malefactors like Cain, Esau and Saul, who obeyed his summons. The prophets and patriarchs, having been often deceived by the Demiurge, suspected a trick and would not avail themselves of the promised salvation, remaining content with the bliss of being in Abraham's bosom. Then, to gain the living, Christ raised up Paul as his apostle. He alone under stood the gospel, and recognized the difference between the just God and the good. Accordingly, he opposed the original apostles with their Judaistic doctrines, and founded small congregations of true Christians. But the preaching of the false Jewish Christians gained the upper hand; nay, they even falsified the evangelical oracles and the letters of Paul. Marcion himself was the next raised up by the good God, to proclaim once more the true gospel. This he did by setting aside the spurious gospels, purging the real gospel (the Gospel of Luke) from sup- posed judaizing interpolations, and

restoring the true text 'of

2 On the relation of matter to the Creator, Marcion himself seems not to have speculated, though his followers may have done so.

3 Marcion's teaching at this point forestalls the patripassian christology of Noetus and Praxeas (see Neander, Church Hist. ii. 143).— [Ed.]

the Pauline epistles. 1 He likewise composed a book, called the Antitheses? in which he proved the disparity of the two Gods, from a comparison of the Old Testament with the evangelical writings.

On the basis of these writings Marcion proclaimed the true Christianity, and founded churches. He taught that all who put their trust in the good God, and his crucified Son, renounce their allegiance to the Demiurge, and approve themselves by good works of love, shall be saved. But he taught further — and here we trace the influence of the current gnosticism on Marcion — that only the spirit of man is saved by the good God; the body, because material, perishes. Accordingly his ethics also were thoroughly dualistic. By the " works of the Demiurge," which the Christian is to flee, he meant the whole " service of the perishable." The Christian must shun everything sensual, and especially marriage, and free himself from the body by strict asceticism. The original ethical contrast of " good " and " just " is thus transformed into the cosmological contrast of " spirit " and " matter." The good God appears as the god of spirit, the Old Testament God as the god of matter. That is Gnosticism; but it is at the same time illogical. For, since, according to Marcion, the spirit of man is derived, not from the good, but from the just God, it is impossible to see why the spiritual should yet be more closely related to the good God than the material. There is yet another direction in which the system ends with a contradiction. According to Marcion, the good God never judges, but everywhere manifests His goodness — is, therefore, not to be feared, but simply to be loved, as a father. But here the question occurs, What becomes of the men who do not believe the gospel ? Marcion answers, The good God does not judge them, but merely removes them from His presence. Then they fall under the power of the Demiurge, who — rewards them for their fidelity? No, says Marcion, but on the contrary — punishes them in his hell ! The contradiction here is palpable; and at the same time the antithesis of "just" and "good" ultimately vanishes. For the Demiurge now appears as an inferior being, who in reality executes the purposes of the good God. It is plain that dualism here terminates in the idea of the sole supremacy of the

good God.

It is not surprising, therefore, that even in the 2nd century the disciples of Marcion diverged in several directions. Rigorous asceticism, the rejection of the Old Testament, and the recogni- tion of the " new God " remained common to all Marcionites, who, moreover, like the Catholics, lived together in close •com- munities ruled by bishops and presbyters (although their con- stitution was originally very loose, and sought to avoid every appearance of " legality "). Some, however, accepted three first principles (the evil, the just, the good); others held by two, but regarded the Demiurge as the god of evil, i.e. the devil; while a third party, like Apelles, the most distinguished of Marcion's pupils, saw in the Demiurge only an apostate angel of the good God — thus returning to monotheism. The golden age of the Marcionite churches falls between the years 1 50 and 250. During that time they were really dangerous to the great Church; for in fact they maintained certain genuine Christian ideas, which the Catholic Church had forgotten. The earliest inscription (a.d. 318) on a Christian place of worship is Marcionite, and was found on a stone which had stood over the doorway of a house in a Syrian village. From the beginning of the 4th century they began to die out in the West, or rather they fell a prey to Mani- chaeism. In the East also many Marcionites went over to the Manichaeans; but there they survived much longer. They can be traced down to the 7th century, and then they seem to vanish. But it was unquestionably from Marcionite impulses that the new sects of the Paulicians and Bogomils arose; and in so far as the western Cathari, and the antinomian and anticlerical sects

1 Marcion was the earliest critical student of the New Testament canon and text. It is noteworthy that he refused to admit the

fenuineness of the Pastoral Epistles and said that the letter to the ˆphesians was really addressed to the Laodiceans (Tertullian, Adv. Marc. v. 11, 21). — (Ed.)

2 Some have seen a reference to this work in I Tim. vi. 20. — (Ed.)

of the 13th century are connected with these, they also may be included in the history of Marcionitism.

See A. Harnack, History of Dogma, i. 266, 286 ; F. Loofs, Dogmen- geschichle pp. m-114; G. Kriiger, Early Christian Literature, and art. in Hauck-Herzog's Realencyklopddie fur prot. Theol. und Kirche, xii. ; F. J. Foakes Jackson's Christian Difficulties of the Second and Twentieth Centuries, is a study of Marcion and his relation to modern thought. (A. Ha.)

MARCOMANNI (i.e. men of the mark, or border), the name of a Suevic tribe. With kindred peoples they were often in conflict with the Roman Empire, and gave their name to the Marcomannic War, a struggle waged by the emperor Marcus Aurelius against them and the Quadi. The Marcomanni dis- appeared from history during the 4th century, being probably merged in the Baiouarii, the later Bavarians.

See Suebi; also F. M. Wittmann, Die dlteste Geschichte der Marko- mannen (Munich, 1855), and E. Devrient, " Hermunduren und Markomannen " in Neues Jahrb.f. das klassische Altertum (1901), 51.

MARCOS DE NIZA (c. 1495-1558), a Franciscan friar born in Nice about 1495. He went to America in 1531, and after serving his order zealously in Peru, Guatemala and Mexico, was chosen to explore the country north of Sonora, whose wealth was pictured in the hearsay stories of Alvar Nunez Cabeza de Vaca. Preceded by Estevanico, the negro companion of Cabeza de Vaca in his wanderings and the " Black Mexican " of Zufii traditions, Fray Marcos left Culiacan in March 1539, crossed south-eastern Arizona, penetrated to Zuni or the "Seven Cities of Cibola," and in September returned to Culiacan. He saw Zuni only from a distance, and his description of it as equal in size to the city of Mexico was probably exact; but he embodied much mere hearsay in his report, the Descubrimiento de las siete ciudades, which led F. V. de Coronado to make his famous expedition next year to Zuni, of which Fray Marcos was the guide; and the realities proved a great disappointment. Fray Marcos was made Provincial of his order for Mexico before the second trip to Zuni, and returned in 1541 to the capital, where he died on the 25th of March 1558.

The Descubrimiento is one of the world's famous narratives of travel. It may be found in J. F. Pacheco's Documentos (vol. iii.) and Hakluyt's Voyages (vol. iii.) ; also in G. Ramusio, Navigazione (vol. iii.) and H. Ternaux-Compans, Voyages (vol. iii.). See A. F. A. Bandelier, The Gilded Man (El Dorado}, (New York, 1893); H. H. Bancroft, Arizona and New Mexico (San Francisco, 1888), and, for critical opinions, G. P. Winship, " The Coronado Expedition," in U.S. Bureau of Ethnology, Fourteenth Annual Report (for 1892- 1893), (Washington, 1896).

MARCOU, JULES (1824-1898), an eminent Swiss-American geologist, was born at Salins, in the department of Jura, in France, on the 20th of April 1824. He was educated at BesanQon and at the college of St Louis, Paris. He worked in early years with J. Thurmann (1804-1855) on the geology of the Jura mountains. In 1847 he went to North America as travelling geologist for the Jardin des Plantes, and in the following year in Boston he joined Agassiz, whom he had met in Switzerland, and accompanied him to the Lake Superior region. Marcou spent two years in

studying the geology of various parts of the United States and Canada, and returned to Europe for a short time in 1850. In 1853 he published a Geological Map of the United States, and the British Provinces of North America. In 1855 ne became pro- fessor of geology and palaeontology at the polytechnic school of Zurich, but relinquished this office in 1859, and in 1861 again returned to the United States, when he assisted Agassiz in founding the Museum of Comparative Zoology. In 1861 he published his Geological Map of the World (2nd ed. 1875). Of his published papers the more noteworthy are those on the Jura- Cretaceous formations of the Jura, on the " Dyas " (Permian) of Nebraska, and on the Taconic rocks of Vermont and Canada. His other works include Lettres sur les roches du Jura et leur distribution gtographique dans les deux hemispheres (1857-1860) and Geology of North America (1858). Marcou died at Cambridge, Mass., on the 17th of April 1898.

MARCUS AURELIUS ANTONINUS (121-180), Roman emperor and Stoic philosopher, was born in Rome a.d. 121, the date of his birth being variously stated as the 6th, 21st and 26th of April.

His original name was Marcus Annius Verus. 1 His mother Domitia Calvilla (or Lucilla) was a lady of consular rank, and the family of his father Annius Verus (prefect of the city and thrice consul), originally Spanish, had received patrician rank from Vespasian. Marcus was three months old when his father died, and was thereupon adopted by his grandfather. The moral training which he received from his grandfather and his mother must have been all but perfect. The noble qualities of the child attracted the attention of Hadrian, who, playing upon the name " Verus," said that it should be changed to " Verissi- mus " (BHPICCIMOC on medals). Hadrian adopted, as his successor, Titus Antoninus Pius (uncle of Marcus), on condition that he in turn adopted both Marcus (then seventeen) and Lucius Ceionius Commodus, the son of Aelius Caesar, who had originally been intended by Hadrian as his successor, but had died before him. Marcus had been, at the age of fifteen, betrothed to Fabia, the sister of Commodus; the engagement was broken off by Antoninus Pius, and he was betrothed to Faustina, the daughter of the latter. In 139 the title of Caesar was conferred upon him and he dropped the name of Verus. The full name he then bore was Marcus Aelius Aurelius Antoninus, Aelius coming from Hadrian's family, and Aurelius being the original name of Antoninus Pius. In 140 he was made consul.

The education of Aurelius in his youth was minute (see Medit. i. 1-16). A

better guardian than Antoninus Pius could not be conceived. Marcus himself says, " To the gods I am indebted for having good grandfathers, good parents, a good sister, good teachers, good associates, good kinsmen and friends, nearly everything good." He was educated, not at school, but by tutors, Herodes Atticus and M. Cornelius Fronto (g.v.) in the usual curriculum of rhetoric and poetry; but at the age of eleven he became acquainted with Diognetus the painter and Stoic philosopher {Hist, script, aug. i. 305, notes), was fascinated by the philosophy he taught, assumed the dress of his sect, and ultimately abandoned rhetoric and poetry for philosophy and law, having among his teachers of the one Sextus of Chaeronea, grandson of Plutarch, and later Q. Junius Rusticus, and of the other L. Volusius Maecianus (or Metianus), a distinguished jurist. He went thoroughly into the practice as well as the theory of Stoicism, and lived so abstemious and laborious a life that he injured his health. From his Stoic teachers he learned to work hard, to deny himself, to avoid listening to slander, to endure misfortunes, never to deviate from his purpose, to be grave with- out affectation, delicate in correcting others, " not frequently to say to any one, nor to write in a letter, that I have no leisure," nor to excuse the neglect of duties by alleging urgent occupa- tions. Through all his Stoical training Aurelius preserved the natural sweetness of his nature.

During the reign of Antoninus Pius (138 to 161), the concord between him and Aurelius was complete; Capitolinus (c. 7) says " nee praeter duas noctes per tot annos mansit diversis vicibus." The two were associated in the administration and in the simple country occupations of the seaside villa of Lorium, the birth- place of Pius, to which he loved to retire. It has been assumed on the strength of a passage in Capitolinus that Aurelius married Faustina in 146, but the passage is not clear, and other evidence points strongly to 140; at all events it seems certain that a daughter was born to him in 140. Antoninus Pius died in 161, having recommended as his successor Aurelius, then forty years of age, without mentioning Commodus, his other adopted son, commonly called Lucius Verus. It is believed that the senate urged Aurelius to take the sole administration. But he showed the magnanimity of his nature by at once admitting Verus as his partner, giving him the tribunician and proconsular powers, and the titles Caesar and Augustus. This was the first time that Rome had two emperors as colleagues. Verus, a weak, self- indulgent man, had a high respect for his adoptive brother, and deferred uniformly to his judgment. In the first year of his reign Faustina gave birth to twins, one of whom became the emperor Commodus.

1 Capitolinus states that he was originally called Catilius Severus after his mother's grandfather; if so the name was early discarded.

The early part of the reign of Aurelius was clouded by national

misfortunes. An inundation of the Tiber swept away a large part of Rome, destroying fields, drowning cattle, and causing a famine (162) ; then came earthquakes, fires and plagues of insects; the soldiers in Britain tried to induce their general Statius Priscus to proclaim himself emperor; finally, the Parthians under Vologaeses III. resumed hostilities, annihilated the Roman forces under Severianus at Elegia in Cappadocia, and devastated Syria. Verus, originally a man of considerable courage and ability, was sent to oppose the Parthians, but gave himself up to sensual excesses, and . the Roman cause in Armenia would have been lost, and the empire itself, perhaps, imperilled, had not Verus had under him able generals, 2 the chief of whom was Avidius Cassius (see Cassius, Avidius). By them the Parthian . War was brought to a conclusion in 165, but Verus and his army brought back with them a terrible pestilence, which spread through the whole empire. The people seem to have thought that the last days of the empire had come. The Parthians had at the best been beaten, not subdued; the Britons threatened revolt; there were signs that various tribes beyond the Alps intended to break into Italy. Indeed, the bulk of the reign of Aurelius was spent in efforts to ward off the attacks of the barbarians. He went himself to the wars with Verus in- 167, first to Aquileia and then on into Pannonia and Noricum, wintering at Sirmium in Pannonia. Ultimately the Marco- manni, the fiercest of the tribes that inhabited the country between Illyria and the sources of the Danube, sued for peace in 168. In January or February 169 Verus died at Altinum, apparently of apoplexy, though some ventured to say that he was poisoned by Aurelius.

Aurelius was thenceforth indisputed master of the empire, during one of the most troubled periods of its history. His reign is well described by F. W. Farrar (Seekers after God) : " He regarded himself as being, in fact, the servant of all. The registry of the citizens, the suppression of litigation, the elevation of public morals, the care of minors, the retrenchment of public expenses, the limitation of gladiatorial games and shows, the care of roads, the restoration of senatorial privileges, the ap- pointment of none but worthy magistrates, even the regulation of street traffic, these and numberless other duties so completely absorbed his attention that, in spite of indifferent health, they often kept him at severe labour from early morning till long after midnight. His position, indeed, often necessitated his presence at games and shows, but on these occasions he occupied himself either in reading, in being read to, or in writing notes. He was one of those who held that nothing should be done hastily, and that few crimes were worse than the waste of time." The com- prehensiveness of his legal and judicial reforms is very striking. Slaves, heirs, women and children, were benefited, and he made serious attempts to deal with the steady fall in the birth-rate of legitimate children.

In the autumn of 169 two of the German tribes, the Quadi and the

Marcomanni, with their allies the Vandals, Iazyges and Sarmatians, renewed hostilities and, for three years, Aurelius resided almost constantly at Carnuntum. In the end the Marcomanni were driven out of Pannonia, and were almost destroyed in their retreat across the Danube. In 174 Aurelius gained over the Quadi a decisive victory, which is commemorated by one of the sculptures on the column of Antonine. The story is that the Romans, entangled in a defile, were suffering from thirst. A sudden storm gave abundance of rain, while hail and thunder confounded their enemies, and enabled the Romans to gain an easy and complete victory. This triumph was universally considered at the time, and for long afterwards, to have been a miracle, and bore the title of " The Miracle of the Thundering Legion." The pagan writers (e.g. Dio Cassius, Ixx. 8-10) ascribed the victory to the magic arts of an Egyptian named Arnuphis who prevailed on Mercury and other gods to

2 Aurelius has been severely criticized for sending Verus. Among various reasons, the most convincing is that the presence of Aurelius was required in Rome; moreover, the real leader was evidently Cassius.

give relief, while the Christians attributed it to the prayers of their brethren in a legion to which, they affirmed, the emperor then gave the name of " The Thundering." Dacier, however, and others who adhere to the Christian view of the miracle, admit that the appellation of " Thundering " or " Lightning " (nepavPofioXos, or Kepavvcxfiopos) was given to the legion because there was a figure of lightning on their shields. It has also been virtually proved that it had the title even in the reign of Augustus.

Aurelius next marched to Germany. There news reached him that Avidius Cassius, the commander of the Roman troops in Asia, had revolted and proclaimed himself emperor (175). But after three months Cassius was assassinated, and his head was brought to Aurelius, who with characteristic magnanimity, persuaded the senate to pardon all the family of Cassius. It is a proof of the wisdom of Aurelius's clemency that he had little or no trouble in pacifying the provinces which had been the scene of rebellion. He treated them all with forbearance, and it is said that when the correspondence of Cassius was brought him he burnt it without reading it. During his journey of pacifi- cation, Faustina, who had borne him eleven children, died. Dio Cassius and Capitolinus charge Faustina with the most shameless infidelity to her husband, who is even blamed for not paying heed to her crimes. But none of these stories rests on trustworthy evidence; on the other hand, there can be no doubt that Aurelius trusted her while

she lived, and mourned her loss.

After the death of Faustina and the pacification of Syria, Aurelius proceeded, on his return to Italy, through Athens, and was initiated in the Eleusinian mysteries, the reason assigned for his doing so being that it was his custom to conform to the established rites of the countries he visited. He gave large sums of money for the endowment of chairs in philosophy and rhetoric, with a view to making the schools the resort of students from all parts of the empire. Along with his son Commodus he entered Rome in 176, and obtained a triumph for victories in Germany. In 177 occurred that persecution of Christians, the share of Aurelius in which has been the subject of so much con- troversy. Meanwhile the German War continued, and the two Quintilii, who had been left in command, begged Aurelius once more to take the field. In this campaign Aurelius, after a series of successes, was attacked, according to some authorities, by an infectious disease, of which he died after a seven days' illness, either in his camp at Sirmium (Mitrovitz), on the Save, in Lower Pannonia, or at Vindobona (Vienna), on the 17th of March 180, in the fifty-ninth year of his age. Other accounts are: (1) that he was poisoned in the interests of Commodus (Dio. Cass. lxxi. 33, 4), (2) that he died of a chronic stomachic disease; the latter is perhaps the most likely. His ashes (according to some authorities, his body) were taken to Rome. By common consent he was deified and all those who could afford the cost obtained his statue or bust ; for a long time his statues held a place among the penates of the Romans. Commodus, who was with his father when he died, erected to his memory the Antonine column (now in the Piazza Colcnna at Rome), round the shaft of which are sculptures in relief commemorating the miracle of the Thunder- ing Legion and the various victories of Aurelius over the Quadi and the Marcomanni. A bronze equestrian statue was set up in the Forum, now on the Capitol.

Aurelius throughout his reign was hostile to Christianity. The Christians suffered from systematic persecution, and many historians, with a strange lack of historical insight, have poured denunciation upon him for an attitude which was the natural outcome of his convictions. During his reign the atmosphere of Roman society was heavily charged with the popular Greek philosophy to which, ethics apart, Christianity was diametrically opposed. Under Antoninus the " pursuit " of Christians was unknown; under Trajan and Hadrian it was forbidden (cf. Keim, Aus dem Urchrist, p. 99). But Aurelius was an eager patriot and a man of logical mind. From his earliest youth he had learned to identify the ritual of the Roman religion with the very essence of the imperial idea. He became a Salian priest

at the age of eight, and soon knew by heart all the forms and liturgical

order of the official worship, and even the sacred music. In the earliest statue we have he is a youth offering incense; he is a priest at the sacrificial altar in the latest triumphal reliefs. Naturally he felt that the prevalence of Christianity was in- compatible with his ideal of Roman prosperity, and therefore that the policy of the Flavian emperors was the only logical solution of an important problem. Neumann argued that the recrudescence of active persecution was initiated by a deliberate ad hoc rescript issued probably in a.d. 176. Sir W. M. Ramsay, however, doubts this (The Church in the Roman Empire, London, 1893), and argues that it was due to a long series of instructions to provincial governors {mandata, not decreta) who interpreted their duty largely in conformity with the attitude of the reigning emperor. In other words the governors were ordered merely to punish sacrilege, and, under Aurelius, Christianity was re- garded as such. In the second place, though it is true that the persecutions indicated by Celsus (Origen, Celsus, viii. 69), Justin, Melito (in Eusebius, H.E., iv. 26), Athenagoras (Libellus pro Christianis) and the Acts of Martyrs, were greatly in excess of those recorded in previous reigns, it must not be forgotten that it was only in this period that the Christians began to keep records. Thirdly, there can be no doubt that the Christians had recently assumed a much bolder attitude, and thus segre- gated themselves from the mass of those unorthodox sects which the Roman could afford to despise. Like the Druids in Gaul (cf. T. Mommsen, Prov. Rom. Emp., Eng. trans, i. 105, and V. Duruy, Rev. archSol., Apr. 1880), the Christians were particularly dangerous, inasmuch as they taught a unity which transcended that of the Roman Empire, and must, therefore, have been regarded as antagonistic to the existing political and social organism.

When, therefore, we remember that Aurelius knew little of the Christians, that the only mention of them in the Meditations is a contemptuous reference to certain fanatics of their number whom even Clement of Alexandria compares for their thirst for martyrdom to the Indian gymnosophists, and finally that the least worthy of them were doubtless the most prominent, we cannot doubt that Aurelius was acting unquestionably in the best interests of a perfectly intelligible ideal. He was " Roman in resolution and repression, Roman in civic nobility and pride, Roman in tenacity of imperial aim, Roman in respect for law, Roman in self-effacement for the service of the State " (G. H. Rendall).

Philosophy. — The book which contains the philosophy of Aurelius is known by the title of his Reflections, or Meditations, although that is not the name which he gave to it himself (Td els iavrov). Of the genuineness of the work no doubts are now entertained. It is believed that he wrote also an autobiography, which has per- ished. The Meditations were written, it is evident, as occasion offered — in the midst of public business, and on the eve of battles on which the fate of the empire depended — hence their

fragmentary appearance, but hence also much of their practical value and even of their charm. It is believed by many critics that they were intended for the guidance of Aurelius's son, Commodus (g.v .) ; at all events they are generally considered as one of the most precious of the legacies of antiquity. Renan even called them " the most human of all books," and they are described by J. S. Mill in his Utility of Religion as almost equal in ethical elevation to the Sermon on the Mount.

Aurelius throughout his life adhered to the Stoical philosophy. But, as Tenneman says, he imparted to it " a character of gentleness and benevolence, by making it subordinate to a love of mankind, allied to religion." His thoughts represent a transitional move- ment, and it is difficult to discover in them anything like a system- atic philosophy. From the manner, however, in which he seeks to distinguish between matter and cause or reason, and from the earnestness with which he advises men to examine all the impres- sions on their minds, it may be inferred that he held the view of Anaxagoras — that God and matter exist independently, but that God governs matter. There can be no doubt that Aurelius believed in a deity, although Schultz is probably right in maintaining that all his theology amounts to this — the soul of man is most intimately united to his body, and together they make one animal which we call man; and so the deity is most intimately united to the world or the material universe, and together they form one whole. We find in the Meditations no speculations on the absolute nature of the deity, and no clear expressions of opinion as to a future state.

6 9 6

MARCY, W. L.

We may also observe here that, like Epictetus, he is by no means so decided on the subject of suicide as the older Stoics. Aurelius is, above all things, a practical moralist. The goal in life to be aimed at, according to him, is not happiness, but tranquillity, or equanimity. This condition of mind can be obtained only by " living conformably to nature," that is to say, one's whole nature, and as a means to that man must cultivate the four chief virtues, each of which has its distinct sphere — wisdom, or the knowledge of good and evil ; justice, or the giving to every man his due ; fortitude, or the enduring of labour and pain; and temperance, or moderation in all things. It is no " fugitive and cloistered virtue " that Aurelius seeks to encourage ; on the contrary, man must lead the " life of the social animal," must " live as on a mountain "; and "he is an abscess on the universe who withdraws and separates himself from the reason of our common nature through being displeased with the things which happen." While the prime principle in man is the social, " the next in order is not to yield to the

persuasions of the body, when they are not conformable to the rational principle which must govern." This divinity " within a man," this " legislating faculty," which, looked at from one point of view, is conscience, and from another is reason, must be implicitly obeyed. He who thus obeys it will attain tranquillity of mind; nothing can irritate him, for everything is according to nature, and death itself " is such as generation is, a mystery of nature, a composition out of the same elements, and a decom- position into the same, and altogether not a thing of which any man should be ashamed, for it is not contrary to the nature of a reasonable animal, and not contrary to the reason of our constitution."

The morality of Marcus Aurelius cannot be said to have been new when it was given to the world. Its charm lies in its exquisite accent and its infinite tenderness. But above all, what gives the sentences of Marcus Aurelius their enduring value and fascination, and renders them .superior to the utterances of Epictetus and Seneca, is that they are the gospel of his life. His precepts are simply the records of his practice. To the saintliness of the cloister he added the wisdom of the man of the world; he was constant in misfortune, not elated by prosperity, never " carrying things to the sweating-point," but preserving, in a time of universal corruption, unreality and self-indulgence, a nature sweet, pure, self-denying, unaffected.

Bibliography. — P. B. Watson's M. Aurelius Antoninus (1884) contains a general account — life, character, philosophy, relations with Christianity — as well as a bibliography ; see also art. in Pauly- Wissowa, Realencyclopddie, s.v. " Annius " (No. 94), col. 2279. For special points see: (1) Historical: Authorities under Rome: Ancient History; S. Dill, Roman Society front Nero to M. Aurelius (London, 1904). (2) Relations to Christianity: Sir W. M. Ramsay, op. cit. ; W. Moeller, History of the Christian Church, A.D. 1-600 (Eng. trans., A. Rutherford, 1892); W. E. Addis, Christianity and the Roman Empire (1893) ; E. G. Hardy, Christianity and the Roman Government (1894), pp. 145 sqq., which criticizes both Neumann and Ramsay; Leonard Alston, Stoic and Christian of the 2nd century (1906); j. Dartigue-Peyrou, Marc-Aurele dans ses rapports avec le chrisiianisme (Paris, 1897). (3) Philosophical: Besides article Stoics, E. Renan, Marc. Antoninus et la fin du monde antique (Paris, 1882; Eng. trans., W. Hutchinson, 1904); W. Pater, Marius the Epicurean (London, 1888); Matthew Arnold's Essays; C. H. W. Davis, Greek and Roman Stoicism (1903) ; editions of the Meditations (5, below). (4) Military: E. Napp, De rebus imperat. M. Aurel. Anton, in oriente geslis (Bonn, 1879); Conrad, Mark Aurels Marko- mannenkrieg (1889); Th. Mommsen, Provinces of the Roman Empire (Eng. trans., W. P. Dickson, London, 1886); for the Aurelius column, E. Petersen, A. von Domaszewski, and G. Calderini, Die Marcussdule (Munich, 1896), with historical introduction by Th. Mommsen. (5) The Meditations were

published by Xylander in 1558; the best critical edition is that of J. Stich in the Teubner series (Leipzig, 1882; 2nd ed., 1903); textual emendations also in Journal of Philology, xxiii. 116-160 (G. H. Rendall) ; Classical Review, xix. (1905), pp. 18 sqq. (Herbert Richards), ibid., pp. 301 sqq. (A. J. Kronenberg). Translations exist in almost every language; that of George Long (London, 1862, re-edited 1900) has been superseded by those of G. H. Rendall (London, 1898, with valuable introduction) and J. Jackson (Oxford, 1906, with introduction by Charles Bigg). (6) For a full account of the correspondence of Aurelius and Fronto, see Robinson Ellis, Correspondence of Fronto and M. Aurelius (Oxford, 1904). (J. M. M.)

MARCY, WILLIAM LEARNED (1786-1857), American states- man, was born in Southbridge (then part of Sturbridge), Massa- chusetts, on the 1 2th of December 1786. He graduated at Brown University in 1808, studied law, was admitted to the bar in Troy, New York, and began practice there in 1810. During the War of 181 2 he served first as a lieutenant and after- wards as a captain of volunteers, and on the 22nd of October 181 2 took part in the storming of the British post at St Regis, Canada. In 1816 he became recorder of Troy, but as he sided

with the Anti-Clinton faction of the Democratic-Republican Party, known as the " Bucktails," he was removed from office in 1818 by his political opponents. As editor of the Troy Budget (daily) he was a vigorous supporter of Martin Van Buren, and when Van Buren's followers acquired control of the legislature in 1821 Marcy was made adjutant-general of the New York militia. From 1823 to 1829 Marcy was comptroller of the state, an office then especially important on account of the large ex- penditures for internal improvements, and during this period he became the leading member of the famous " Albany Regency," a group of able Democratic politicians who exerted a powerful influence throughout the state by their control of the party patronage and machinery. He was one of the associate justices of the New York Supreme Court from 1829 to 1831, presiding over the trial of the alleged murderers of William Morgan and in other important cases; and was a member of the United States Senate from December 1831 to July 1832, when he resigned to become governor of New York. In a speech in the Senate defending Van Buren against an attack by Henry Clay, Marcy made the unfortunate remark that " to the victors belong the spoils of the enemy," and thereby became widely known as a champion of the proscription of political opponents. He served as governor of New York for six years (Jan. 1, 1833 to Dec. 31, 1838), but was defeated in 1838 by the Whig candidate, William H. Seward. As governor he checked the issue of bank charters by the legislature and secured the enactment, in 1838, of a general banking law, which abolished the monopoly features incident to the old banking system. In 1839-1842 Marcy was a member of a commission appointed by President Van Buren, in accordance with the treaty of 1839 between the United States and Mexico to " examine and decide upon " certain claims of citizens of the United States against Mexico. In 1843 he presided over the Democratic state convention at Syracuse, and in 1 844-1 845 he was recognized as one of the leaders of the " Hunkers," or regular Democrats in New York, and an active opponent of the " Barn- burners." He was secretary of war under President Polk from 1845 to 1849, and as such discharged with ability the especially onerous duties incident to the conduct of the Mexican War; he became involved, however, in controversies with Generals Scott and Taylor, who accused him, it seems very unjustly, of seeking to embarrass their

operations in the field because they were political opponents of the administration. In the Demo- cratic convention at Baltimore, in 1852, Marcy was a prominent candidate for the presidential nomination, and from 1853 to 1857 he was secretary of state in the cabinet of President Pierce. Few cabinet officers in time of peace have had more engrossing duties. His circular of the 1st of June 1853 to American diplo- matic agents abroad, recommending that, whenever practicable, they should " appear in the simple dress of an American citizen, " created much discussion in Europe; in 1867 his recommendation was enacted into a law of Congress. One of the most important matters with which he was called upon to deal was the " Koszta Affair"; 1 his " Hiilsemann letter" (1853), is an important 1 The " Koszta Affair " involved an interesting question of inter- national law — i.e. the right of an alien domiciled in any country to the protection of that country — and has served as a precedent for the American government in somewhat similar cases that have arisen. Martin Koszta, a Hungarian revolutionist of 1848, had emigrated to the United States and had there taken the preliminary step for naturalization by formally declaring his intention to become a citizen of the United States. In 1853 he went on personal business to Smyrna, where he secured a passport from the American consul; the Austrian consul, however, caused him to be seized and detained on an Austrian brig-of-war. Soon afterward Captain Duncan N. Ingraham (1802-1891), in command of a United States sloop-of-war, arrived at Smyrna, and threatened to attack the Austrian vessel unless Koszta were released; and as a compromise Koszta was placed in the custody of the French consul. To Chevalier Hiilse- mann, then representing Austria at Washington, who had demanded from the United States the disavowal of the acts of its agents, the complete surrender of. Koszta, and " satisfaction proportionate to the magnitude of the outrage," Marcy wrote on the 26th of Septem- ber 1853, that Koszta " when seized and imprisoned was invested with the nationality of the United States " and had a right to the protection of the United States government, and added: " Whenever by the law of nations an individual becomes clothed with our national

state paper, and the principles it enunciates have been approved by leading authorities on international law. In the same year he secured the negotiation of the Gadsden Treaty (see Gadsden, James), by which the boundary dispute between Mexico and the United States was adjusted and a large area was added to the Federal domain; and in June 1854 he concluded with Lord Elgin, governor-general of Canada, acting for the British Govern- ment, a treaty designed to settle the fisheries question and

providing for tariff reciprocity (as regards certain enumerated commodities) between Canada and the United States. In 1854 Marcy had to deal with the complications growing out of the bombardment of San Juan del Norte (Greytown), Nicaragua, by the United States sloop-of-war " Cyane " for insults offered the American minister by its inhabitants and for their refusal to make restitution for damages to American property. The expedition of William Walker (q.v.) to Nicaragua in 1855 further complicated the Central American question. The Crimean War, on account of the extensive recruiting therefor by British consuls in several American cities, in violation of American neutrality, led to a diplomatic controversy with Great Britain, and in May 1856 the British minister, John F. T. Crampton (1805-1886), received his passports, and the exequaturs of the British consuls at New York, Philadelphia and Cincinnati were revoked. The incident created great excitement in England, but in 1857 the British government sent Sir Francis Napier to Washington to take Crampton's place. To the Declaration of Paris of 1856, prescribing certain rules of naval warfare, Marcy on behalf of his government refused to subscribe, because Great Britain had rejected his proposed amendment exempting from seizure in time of war all private property not contraband. The diplomatic relations of the United States and Spain furnished, perhaps, the most perplexing of Marcy's problems. Upon the seizure (on Feb. 28, 1854) of the American vessel " Black Warrior," the confiscation of her cargo, and the fining of her captain by the Cuban authorities, on the ground that this vessel had violated the customs regulations of the port of Havana, slavery propa- gandists sought to force the administration into an attitude that would lead to war with Spain and make possible the seizure of Cuba; and it was largely due to Marcy's influence that war was averted, Spain restoring the confiscated cargo and remitting the captain's fine. 1 The secretary, however, was not averse to increasing his popularity and his chances for the presidency by obtaining Cuba in an honourable manner, and it was at his suggestion that James Buchanan, J. Y. Mason and Pierre Soule, the ministers respectively to Great Britain, France and Spain, met at Ostend and Aix-la-Chapelle in October 1854 to discuss the Cuban question. But the remarkable " Ostend Manifesto " (see Buchanan, James), the outcome of their con- ference, was quite unexpected, and Marcy promptly disavowed the document. Marcy died at Ballston Spa, New York, on the 4th of July 1857, a short time after the close of Pierce's adminis- tration. In domestic affairs Marcy was a shrewd, but honest partisan; in diplomacy he exhibited the qualities of a broad- minded, patriotic statesman, endowed, however, with vigour, rather than brilliancy, of intellect.

For his early career, consult J. S. Jenkins, Lives of the Governors of New York (Auburn, New York, 1851), and for his work as secretary of state, see James Ford Rhodes, History of the United States (vols. 1. and ii., New

York, 1892), and an article by Sidney Webster, " Mr Marcy, the Cuban Question, and the Ostend Manifesto," in vol. viii. of the Political Science Quarterly (New York, 1893).

MARDIN, the chief town of a sanjak of the Diarbekr vilayet of Asiatic Turkey. It is a military station on the Diarbekr- Mosul road. It occupies a remarkable site on the south side of a conical hill of soft limestone, and the houses rise tier above tier, character — he can claim the protection of this government, and it may respond to that claim without being obliged to explain its conduct to any foreign power; for it is its duty to make its nationality respected by other nations and respectable in every quarter of the

§lobe." Eventually Koszta was released and returned to the United tates. The Hulsemann letter was published and greatly increased Marcy's popularity.

1 See Henry L. James, " The Black Warrior Affair " in the American Historical Review, vol. xii. (1907).

The streets are narrow and paved in steps, while often the road- way runs along the roof of the house in the tier below. The hill is almost surrounded by old walls, while on the summit are the remains of the famous castle of the Kaleh Shubha (Lat. Maride or Marde,) which from Roman times has played an important part in history. The Arab geographers considered it impregnable, and from its steep approaches and well-arranged defences it was able to offer a protracted resistance to the Mon- golian conqueror Hulagu and to the armies of Timur. It was also for several centuries the residence of more or less indepen- dent princes of the Ortokid Turkoman dynasty. The climate is healthy and dry, and fruit grows well, but water is sometimes scanty in the summer. Mardin is the centre of a good corn-growing district, and is important chiefly as a border town for the Kurds on the north and the Arab tribes to the south. It is the chief centre of the Jacobite Christians, who have many villages in the Tor Abdin hills to the north-east, and whose patriarch lives at Deir Zaferan, a Syrian monastery of the 9th century not far off in the same direction. The population is estimated at 27,000, of whom about one-half are Christians of the Armenian, Chaldean, Jacobite, Protestant and Roman Catholic communities. Besides many mosques and churches there are three monasteries (Syrian, Franciscan and Capuchin), and an important American Mission station, with church, schools and a medical officer.

MARDUK (Bibl. Merodach 2), the name of the patron deity of the city of Babylon, who, when Babylon permanently became the political centre of the united states of the Euphrates valley under Khammurabi (c. 2250

B.C.), rose to the position of the head of the Babylonian pantheon. His original character was that of a solar deity, and he personifies more specifically the sun of the spring-time who conquers the storms of the winter season. He was thus fitted to become the god who triumphs over chaos that reigned in the beginning of time. This earlier Marduk, however, was effaced by the reflex of the political development through which the Euphrates valley passed and which led to imbuing him with traits belonging to gods who at an earlier period were recognized as the heads of the pantheon. There are more particularly two gods — Ea and Bel — whose powers and attributes pass over to Marduk. In the case of Ea the transfer proceeds pacifically and without involving the efface- ment of the older god. Marduk is viewed as the son of Ea. The father voluntarily recognizes the superiority of the son and hands over to him the control of humanity. This association of Marduk and Ea, while indicating primarily the passing of the supremacy once enjoyed by Eridu to Babylon as a religious and political centre, may also reflect an early dependence of Babylon upon Eridu, not necessarily of a political character but, in view of the spread of culture in the Euphrates valley from the south to the north, the recognition of Eridu as the older centre on the part of the younger one. At all events, traces of a cult of Marduk at Eridu are to be noted in the religious literature, and the most reasonable explanation for the existence of a god Marduk in Eridu is to assume that Babylon in this way paid its homage to the old settlement at the head of the Persian Gulf.

While the relationship between Ea (q.v.) and Marduk is thus marked by harmony and an amicable abdication on the part of the father in favour of his son, Marduk's absorption of the power and prerogatives of Bel of Nippur was at the expense of the latter's prestige. After the days of Khammurabi, the cult of Marduk eclipses that of Bel (q.v.), and although during the five centuries of Cassite control in Babylonia (c. 1750-1200 B.C.), Nippur and the cult of the older Bel enjoy a period of renaissance, when the reaction ensued it marked the definite and permanent triumph of Marduk over Bel until the end of the Babylonian empire. The only serious "rival to Marduk after 1200 B.C. is Assur (q.v.) in Assyria. In the south Marduk reigns supreme, and his supremacy is indicated most significantly by making him the Bel, " the lord," par excellence.

The old myths in which Bel of Nippur was celebrated as the hero were transformed by the priests of Babylon in the interest 'The name Mordecai denotes "belonging to Maduk."

of the Marduk cult with the chief role assigned to their favourite. The hymns once sung in the temple of Bel were re-edited and adapted to the cult of Babylon. In this process the older Bel was deliberately set aside, and the climax was reached when the conquest of the monster Tiamat, symbolizing the chaos prevailing in primeval days, was ascribed to Marduk instead of, as in the older form of the epic, to Bel. With this stroke Marduk became the creator of the world, including mankind — again setting aside the far older claims of Bel to this distinction.

Besides absorbing the prerogatives of Ea and Bel, Marduk was also imbued with the attributes of other of the great gods, such as Adad, Shamash, Nergal and Ninib, so that, more particularly as we approach the days of the Neo-Babylonian Empire, the impression is created that Marduk was the only real deity recognized, and that the other gods were merely the various forms under which he manifested himself. So far as one can speak of a monotheistic tendency in Babylonia it connects itself with this conception that was gradually crystallized in regard to the old solar deity of Babylon.

The history of the city of Babylon can now be traced back to the days of Sargon of Agade (before 3000 B.C.) who appears to have given the city its name. There is every reason to assume, therefore, that the cult of Marduk existed already at this early period, though it must always be borne in mind that, until the days of Khammurabi, his jurisdiction was limited to the city of which he was the patron and that he was viewed solely as a solar deity.

On monuments and cylinders he is represented as armed with the weapon with which he despatched the monster Tiamat. At times this monster is also depicted lying vanquished at his feet, and occasionally the monster with the lance or the lance alone is reproduced instead of the god himself.

In the astral-theological system, Marduk is identified with the planet Jupiter. As the creator of the world, the New Year's festival, known as Zagmuk and celebrated at the time of the vernal equinox, was sacred to him. The festival, which lasted for eleven days, symbolized the new birth of nature — a repro- duction therefore of the creation of the world. The arbiter of all fates, Marduk, was pictured as holding an assembly of the gods during the New Year's festival for the purpose of deciding the lot of each individual for the year to come. The epic reciting his wonderful deed in despatching the monster Tiamat and in establishing law and order in the world in the place of chaos was recited in his temple at Babylon known as E-Saggila, " the lofty house," and there are some reasons for believing that the recital was accompanied by a dramatical representa- tion of the epic.

The meaning of the name Marduk is unknown. By a species of word-play the name was interpreted as " the son of the chamber," with reference

perhaps to the sacred chamber of fate in which he sat in judgment on the New Year's festival. Ideo- graphically he is represented by two signs signifying " child of the day " (or " of the sun ") which is a distinct allusion to his original solar character. Other ideographic signs describe him as the " strong and universal ruler." The name of his consort was Sarpanit, i.e. the shining or brilliant one — again an allusion to Marduk's solar- traits— and this name was playfully twisted by the Babylonian priests to mean ""the seed-producing" (as though compounded of zer, seed, and banit, producing, which was regarded as an appropriate appellation for the female counterpart of the creator of mankind and of life in general. The punning etymology betrays the evident desire of the priests to see in Marduk's consort a form or manifestation of the great mother-goddess Ishtar (q.v.), just as in Assyria Ishtar frequently appears as the consort of the chief god of Assyria, known as Assur (q.v.). (M. Ja.)

MARE, the English term for the female of any animal of the family Equidae, of the ass, or zebra, but particularly of the horse. It is also used of the camel. To find a " mare's nest " is an old proverbial saying for a purely imaginary discovery. In " night-mare," an oppressive or terrifying dream, the termination is a word appearing as mar, maer and mara in various Teutonic

languages for a goblin, supposed to sit on a sleeper's chest and cause these dreams: cf. elf. This Teutonic word also appears in the French cauchemar, the first part being from caucher, to tread or trample upon, Lat. calcare.

MARE CLAUSUM and.MARE LIBERUM (Lat. for " closed sea " and " free sea "), in international law, terms associated with the historic controversy which arose out of demands on the part of different states to assert exclusive dominion over areas of the open or high sea. Thus Spain laid claim to exclusive dominion over whole oceans, Great Britain to all her environing narrow seas and so on. These claims gave rise to vigorous opposition by other powers and led to the publication of Grotius's work (1609) called Mare liberum. In Mare clausum (1635) John Selden endeavoured to prove that the sea was practically as capable of appropriation as territory. Owing to the conflict of claims which grew out of the controversy, maritime states had to moderate their demands and base their pretensions to mari- time dominion on the principle that it extended seawards from land.

A formula was found by Bynkershoek in his De dominio maris (1702) for the restriction of dominion over the sea to the actual distance to which cannon range could protect it. This became universally adopted and developed into the three-mile belt (see Territorial Waters). In recent times controversies have arisen in connexion with the Baltic, the Black Sea and

more especially the Bering Sea. In the latter case the United States, after the purchase of Alaska, vainly attempted to assert dominion beyond the three-mile limit. Still more recently the hardship of treating the greater part of Moray Firth as open sea to the exclusion of British and to the advantage of foreign fisher- men has been raised (see North Sea Fisheries Convention; Territorial Waters).

Conventions for the suppression of the slave trade, including the Brussels General Act of 1885, and the North Sea Fisheries Convention, have placed restrictions on the freedom of the high sea, and possibly, in the general interest, other agreements will bring it further under control, on the principle that what is the property of all nations must be used without detriment to its use by others (see High Seas). (T. Ba.)

MAREE, LOCH, a fresh-water lake in the county of Ross and Cromarty, Scotland. Its name — of which Maroy and Mourie are older variants — does not, as is often supposed, commemorate the Virgin, but St Maelrubha, who came from Bangor in Ireland in 671 and founded a monastery at Applecross and a chapel (now in ruins) on Isle Maree. Trending in a south-easterly to north- westerly direction, the lake has a length of 13! m. from Kinloch- ewe at the head of the dam erected in the 16th century (or earlier) by the iron-smelters of the Cheardach Ruardh, or Red Smiddy, on the short but impetuous river Ewe by which it drains to the sea. It lies at a height of 32 ft. above sea-level; the greatest breadth is just over 2 m. at Slattadale, the mean breadth being fis of a mile; and the greatest depth, 367 ft., occurs in the upper basin, the mean depth being 125 ft. Its waters cover an area of fully 11 sq. m., and its islands nearly 1 sq. m., while the drainage area is 171 sq. m. A remarkable feature is the large number (more than 30) and considerable area of the islands. Excepting Loch Crocach, a small lake in the Assynt district of Sutherlandshire, its insularity (i.e. the ratio of the total area of the islands to that of the water surface) is higher than that of any other lake in Great Britain, Loch Lomond coming next. Nearly all the islands lie north and east of Slattadale, the largest being Eilean Subhainn, or St Swithin's Isle, which contains a small lake 750 ft. long, 300 ft. broad and 64 ft. deep. For two- thirds of its length the loch is flanked by magnificent mountains. On the north-east the principal heights are Ben Slioch (3217 ft.), whose sugar-loaf form dominates the landscape, Ben Lair (2817) and Ben Airidh-a-Char (2503), and, on the south-west, the peaks of Ben Eay, four of which exceed 3000 ft.

MAREMMA (a corruption of Marittima, " situated on the sea "), a marshy region of Tuscany, Italy, extending from the mouth of the Cecina to Orbetello and varying in breadth from 15 to 20 m. In Etruscan and Roman times the Maremma was a

populous and fertile coast plain, with considerable towns situated on the hills — Populonia, Russellae, Cosa, &c, and was drained by a complete system of subterranean canals which were brought to light by the excavations made in connexion with the railways passing through the district. But the decline of agriculture at the end of the Republic led to a conversion of the land to pasture, and later the unsettled state of affairs consequent on the fall of the Roman Empire resulted in neglect of the watercourses. Leopold II. of Tuscany (1822-1844) made the first successful efforts to counteract the malaria which has affected the district, by drainage, the filling up of swamps, and the establishment of new farms, and since his time continuous efforts have been made with considerable success.

MARENGO, a village of north Italy, on the road between Alessandria and Tortona, and 4j m. E.S.E. of the gates of the former. It is situated on the Fontanone brook, a small affluent of the Tanaro which marks the western edge of the plain of Marengo, the scene of the great victory won by Napoleon over the Austrians under Baron Melas (1720-1806) on the 14th of June 1800. The antecedents of the battle are described under French Revolutionary Wars) .

The French army, in ignorance of its opponent's position, had advanced westward from the Scrivia towards Alessandria on the

jm — ‘ ˆ-*xˆ£r~’ / Mandrinal|

English Miles

*<ˆ

Alessandria >Jˆ jTˆˆˆcwioio

wM\ r\ )JY // “-ˆ

■V*lmagr* ~”ˆ

I JJˆ. 1 Barbaltarf \ˆ ˆ

‘ i —~ˆOhilhiJ

fˆˆ*ˆ\ˆˆ r J Qa y\ «Poffffff

if Stort&tiotie \ ˆ”ˆo/5**«Bto_

$f \ 4- ‘s?^*,

^Ventolin 1*

*£^** tas fM = * = j*^ttS^°^ ^^*

\ Cassia Gross*. ~~~~~j*

*Emery v*jk*t «c*

1 2th, and its outposts had reached the Bormida on the evening of the 13th. But contact with the main Austrian army was not obtained, and on the assumption that it was moving towards either Valenza or Genoa Napoleon weakened his army by con- siderable detachments sent out right and left to find the enemy and to delay his progress. Unknown, however, to Napoleon Melas’s army was still at Alessandria, and on the morning of the 14th of June it filed out of the fortress and began its advance into the great plain of Marengo, one of the few favourable cavalry battle-grounds in north Italy.

The dispersion of the French army allowed only a fragmentary, though most energetic, resistance to be offered to the Austrian onset. The latter, considerably delayed at first by the crossing of the river Bormida, broke up into two columns, 1 which ad- vanced, the right by the main road on Marengo, the left on Castel Ceriolo. The former, personally commanded by Melas, was 20,000 strong, and General Victor, its immediate opponent, about r 0,000, or including some 5000 of Lannes’ corps who fought on his right, about 15,000 strong; the Austrians were, moreover, greatly superior in guns and cavalry. The French disputed every yard of ground, holding their first line until they had by fire and counter-attack forced practically the whole of the Austrian right to deploy, and two hours passed before the Austrians managed to reach the Fontanone brook. But Victor’s troops, being disorganized and short of ammunition, had then to retire more rapidly across the plain. The retreat was orderly, according to Victor’s report, and made in echelon from the centre,

1 A third column was sent out to the extreme right (3000 under O’Reilly). This destroyed a small French detachment on the extreme left, but took little or no part in the main battle.

and it is certain that at any rate the regiments held together, for the 6000 Austrian sabres found no opportunity to charge home. Many guns and wagons were, however, abandoned.

On the French right, opposed to the column of Lieut. Field Marshal Ott, was Lannes, with some 4000 men (excluding Watrin’s division which was

with Victor) against 7500. He too was after a time forced to retire, with heavy losses. Thus, about 11 a.m. the First Consul, who was at some distance from the field, was at last convinced that he had to deal with Melas's army. At once he sent out his staff officers to bring back his detachments, and pushed forward his only reserve, Monnier's division, to support Lannes and Victor. But before this help arrived Lannes had been driven out of Castel Ceriolo, and Victor and Watrin forced back almost to San Giuliano. A little after 2 p.m. Monnier's division (3500) came into action, and its impetuous advance drove the Austrians out of Castel Ceriolo. But after an hour it was forced back in its turn, and by 3 p.m. therefore, the 20,000 French troops, disordered and exhausted, and in one line without reserves, 2 held a ragged line of battle to the right and left of San Giuliano. The best that could be expected was a prolongation of the struggle till nightfall and a fairly orderly retreat. The Austrian general, believing that the battle was won, returned to Alessandria, leaving a younger man, his chief of staff Zach, to organize the pursuit.

Then followed one of the most dramatic events in military history. Of the two detachments sent away by Napoleon in search of the enemy, one only received its orders of recall. This was Boudet's division of Desaix's corps, away to the south at Rivalta and at noon heading for Pozzolo-Formigaro on the Alessandria-Genoa road. At 1 p.m. a brief message, " Revenez, au nom de Dieu!" altered the direction of the column, and between 4 and 5, after a forced march, the division, headed by Desaix, came on to the battle-field. It was deployed as a unit and moved forward at the word of command along the main road Alessandria-Tortona, the sight of their closed line giving fresh courage to the men of Lannes and Victor. Then, while on the other side Zach was arraying a deep column of troops to pursue along the main road, Napoleon and Desaix, themselves under fire, hastily framed a plan of attack. All arms were combined. First, Marmont with eight of Boudet's guns and ten others (the rest had been abandoned in the retirement) came into action on the right of the road, replying to the fire of the Austrian guns and checking their advanced infantry; close in rear of the artillery was Desaix's infantry with the remnants of Lannes' and Victor's troops rallying on its right and left; on Lannes' right, still facing Ott's column, was Monnier, supported by the Consular Guard of horse and foot; lastly 400 sabres of Kellermann's cavalry brigade, which had already been engaged several times and had lost heavily, formed up on the right of Desaix. About 5 p.m. Desaix advanced against the head of the Austrian main column formed by Zach. He himself fell in the attack, but the onset of his intact troops drove back the leading Austrians upon their supports, and at the critical moment when the attack of Boudet's single weak division had almost spent its force, Kellermann with his 400 sabres sallied out of the French line. Marmont had brought up two guns to assist the infantry, and

as he fired his last round of case-shot the cavalry raced past him to the front, wheeled inwards against the flank of the great column, and rode through and through it. Zach was taken prisoner with more than 2000 men, and Kellermann, rallying some of his troopers, flung himself upon the astonished Austrian cavalry and with the assistance of the Consular Guard cavalry defeated it. The " will to conquer " spread along the whole French line, while the surprise of the Austrians suddenly and strangely became mere panic. Lannes, Victor and Monnier advanced afresh, pushing the Austrians back on Marengo. A few Austrian battalions made a gallant stand at that place, while Melas himself, as night came on, rallied the fugitives beyond. Next day the completely exhausted, but victorious,

8 The Austrians, too, fighting in " linear " formation had few reserves. About one-third only of the imperial forces in Italy was actually engaged in the battle.

French army extorted from the dazed Austrians a convention by which all Italy up to the Mincio was evacuated by them. The respective losses were: French about 4000, Austrians 9500. See the trench official Campagne de Varmie de reserve, vol. ii., by C. de Cugriac.

MAREOTIS (Arabic Mariut), the most westerly of the lakes in the Delta of Egypt. On the narrow strip of land separating the lake from the Mediterranean the city of Alexandria is built. (See Egypt; and Alexandria.)

MARE'S-TAIL, in botany, the popular name for an aquatic herb known botanically as Hippuris vulgaris (natural order Haloragaceae). It grows on margins of lakes, ponds and similar localities, and has a submerged stout creeping rootstock from which spring many-jointed cylindrical stems bearing numerous narrow leaves close-set in whorls. The minute greenish flowers are borne in the leaf-axils. Like many fresh- water plants it has a wide distribution, occurring in arctic and temperate regions in the northern hemisphere and reappear- ing in antarctic South America.

MARET, HUGUES-BERNARD, Due de Bassano (1 763-1839), French statesman and publicist, was born at Dijon. After receiving a sound education, he entered the legal profession and became advocate at the King's Council at Paris. The ideas of the French Revolution profoundly influenced him, and wholly altered his career. The interest aroused by the debates of the first National Assembly suggested to him the idea of publishing them, conjointly with Mejean, in the Bulletin de I'Assemblee.

The publicist Charles Joseph Panckoucke (1 736-1 798), owner of the Mercure de France and publisher of the famous Encyclopedie (1781), persuaded him to merge this in a larger paper, the Moniteur universel, which gained a wide repute for correctness and impartiality. He was a member of the moderate club, the Feuillants; but after the overthrow of the monarchy on the 10th of August 1792 he accepted an office in the ministry of foreign affairs, where he sometimes exercised a steadying influence. On the withdrawal of the British legation from Paris Maret went on a mission to London, where he had a favourable interview with Pitt on the 2nd of December 1792. All hope of an accommodation was, however, in vain. After the execution of Louis XVI. (Jan. 21, 1793), the chief French diplomatic agent, Chauvelin, was ordered to leave England, while the French Convention declared war (Feb. 1, 1793). These events precluded the possibility of success attending a second mission of Maret to London in January. After a space, in which he held no diplomatic post, he became ambassador of the French Republic at Naples; but, while repairing thither with De Semonville he was captured by the Austrians and was kept in durance by them for some thirty months, until, at the close of 179S, the two were set free in return for the liberation of the daughter of Louis XVI. For a. time Maret betook himself to journalism; but he played a useful part in the negotiations for a peace with Great Britain which went on at Lille during the summer of 1797, until the victory of the Jacobins at Paris in the coup d'etat of Fructidor (Sept. 1797) frustrated the hopes of Pitt for peace and inflicted on Maret another reverse of fortune. On the return of Bonaparte from Egypt in 1799 Maret joined the general's party which came to power with the coup d'etat of Brumaire (Nov. 9-10, 1799). Maret now became one of the First Consul's secretaries and shortly afterwards secretary of state. In this position his moderation, industry, good sense, knowledge of men and of affairs, made his services of great value. The Moniteur, which became the official journal of the state in 1800, was placed under his control. He sometimes succeeded in toning down the hard, abrupt language of Napoleon's communications, and in every way proved a useful intermediary. It is known that he had a share in the drawing up of the new constitutions for the Batavian and Italian Republics. In 1804 he became Minister; in 1807 he was named count, and in 1809 he received the title of due de Bassano, an honour which marked the sense entertained by Napoleon of his strenuous toil, especially in connexion with the diplomatic negotiations and treaties of

this period. His personal devotion to the emperor was of that absolute unwavering kind which Napoleon highly valued; it is seen in the attempt to defend the unworthy artifices adopted by the great man in April-May 1808 in order to make himself master of the destinies of Spain. Maret also assisted in drawing up the constitution destined for Spain, which the

Spaniards at once rejected.

Maret accompanied Napoleon through most of his campaigns, including that of 1809; and at its close he expressed himself in favour of the marriage alliance with the archduchess Marie Louise of Austria, which took place in 1810. In the spring of 1811, the due de Bassano replaced Champagny, due de Cadore, as minister of Foreign Affairs. In this capacity he showed his usual industry and devotion, concluding the treaties between France and Austria and France and Prussia, which preceded the French invasion of Russia in 181 2. He was with Napoleon through the greater part of that campaign; and after its disastrous conclu- sion helped to prepare the new forces with which Napoleon waged the equally disastrous campaign of 1813. But in November 1 8 13 Napoleon replaced him by Caulaincourt, due de Vicence, who was thought to be more devoted to the cause of peace and personally grateful to the emperor Alexander I. of Russia. Maret, however, as private secretary of the emperor, remained with his master through the campaign of 1814, as also during that of 181 5. After the second restoration of the Bourbons he was exiled, and retired to Gratz where he occupied himself with literary work. In 1820 he was allowed to return to France, and after the Revolution of 1830, Louis Philippe, king of the French, made him a peer of France; he also held two high offices for a few days. He died at Paris in 1839. He shares with Daru the honour of being the hardest worker and most devoted supporter in Napoleon's service; but it has generally been considered that he carried devotion to the length of servility, and thus often compromised the real interests of France. This view has been contested by Baron Ernouf in his work Maret, due de Bassano, which is the best biography.

For Maret's mission to England in 1792 and his work at Lille in 1797, see Augustus W. Miles, Letters on the French Revolution; J. H. Rose, The Life and Times of William Pitt, and for other in- cidents of Maret's career, the memoirs of Bourrienne, Pasquier, Meneval and Savary (due de Rovigo), may be consulted. Thiers's account of Maret is in general hostile to him. (J. Hl. R.)

MARGARET (Fr. Marguerite, It. Margherita, Ger. Margareta, and Margarete, with dim. Grete, Gretchen, Meta, fr. Lat. margarita, Gr. ixapyapbrris, a pearl), a female proper name, which became very popular in all Christian countries as that of the saint noticed below. Biographies of some who have borne it are arranged below in the following order: saints, queens of Scotland, queens of other countries, princesses and duchesses.

MARGARET, ST (Sancta Margarita), virgin and martyr, is celebrated by the Church of Rome on the 20th of July. According to the legend, she was a native of Antioch, daughter of a pagan priest named Aedesius. She was

scorned by her father for her Christian faith, and lived in the country with a foster mother keeping sheep. Olybrius, the " praeses orientis," offered her marriage as the price of her renunciation of Christianity. Her refusal led to her being cruelly tortured, and after various miraculous incidents, she was put to death. Among the Greeks she is known as Marina, and her festival is on the 17th of July. She has been identified with St Pelagia (q.v.) — Marina being the Latin equivalent of Pelagia — who, according to a legend, was also called Margarito. We possess no historical documents on St Margaret as distinct from St Pelagia. An attempt has been made, but without success, to prove that the group of legends with which that of St Margaret is connected is derived from a transformation of the pagan divinity Aphrodite into a Christian saint. The problem of her identity is a purely literary question. The cult of St Margaret was very wide- spread in England, where more than 250 churches are dedicated to her.

See Ada sanctorum, July, v. 24-45; Bibliolheca hagiographica, Latina (Brussels, 1899), n. 5303-5313; Frances Arnold-Forster, Studies in Church Dedications (London, 1899), i. 131-133 and iii. 19. (H. De.) ,

MARGARET, ST (c. 1045-1093), the queen of Malcolm III. Canmore king of Scotland, was the daughter of the English prince Edward, son of Edmund Ironside, and sister of Edgar vEtheling, and was probably born in Hungary. In 1067 the widow and children of Edward fled from Northumberland with a large number of followers and sought the protection of the Scottish king. The marriage of Malcolm and Margaret soon took place and was followed by several invasions of Northumberland by the Scottish king, probably in support of the claims of his brother-in-law Edgar. These, however, had little result beyond the devastation of the province. Far more important were the effects of this alliance upon the history of Scotland. A considerable portion of the old Northumbrian kingdom had been reduced by the Scottish kings in the previous century, but up to this time the English population had little influence upon the ruling element of the kingdom. Malcolm's marriage undoubtedly improved the condition of the English to a great extent, and under Margaret's sons, Edgar, Alexander I. and David I., the Scottish court practically became anglicized. Margaret died on the 17th of November 1093, four days after her husband and her eldest son Edward, who were slain in an invasion of Northumberland. She rebuilt the monastery of Iona, and was canonized in 1251 on account of her great benefactions to the Church.

See Chronicles of the Picts and Scots (Edinburgh, 1867), edited 1876, by VV. F. Skene; and W. F. Skene, Celtic Scotland (Edinburgh).

MARGARET (1489-1541), queen of Scotland, eldest daughter of Henry VII., king of England, by his wife Elizabeth, daughter of Edward IV., was born at Westminster on the 29th of November 1489. Before she was six years old negotiations were opened, which dragged on for several years, for marrying the princess to James IV. of Scotland, whose support of the pretender Perkin Warbeck it was hoped to avert by such an alliance. Eventually the marriage was celebrated in Edinburgh on the 8th of August 1503. The avaricious Henry VII. gave his daughter a scanty dowry and quarrels on this head embittered the relations between the two kingdoms, which the marriage, although accompanied by a treaty of perpetual peace, did nothing to heal. The whole of Margaret's life after her marriage with James IV. was an unending series of intrigues, first with one political faction then with another; at one time in favour of her native country, at another in hostility to it, her conduct being mainly influenced at all times by considerations affecting her pocket.

Margaret was crowned at Edinburgh in March 1504. Until 1507 she had no children; between that date and 1510 two sons and a daughter were born, all of whom died in infancy ; in 1 51 2 she gave birth to a son who succeeded his father as James V.; in 1514 she bore a posthumous son, Alexander, created duke of Ross, who died in the following year. A dispute with her brother Henry VIII. over a legacy claimed by Margaret was a contributory cause of the war which ended at Flodden, where James IV. was killed on the 9th of September 15 13, having by his will appointed Margaret sole guardian of her infant son, now King James V. Scotland was divided mainly into two parties, one in favour of alliance with England, and the other with France. The leader of the latter was John Stewart, duke of Albany, next heir to the crown of Scotland after Margaret's sons; Margaret herself for the most part inclined to the English faction; and when Albany returned to Scotland from France on the invitation of the Scottish parliament in the spring of 1514, the conflict grew almost to civil war. Various projects for Margaret's remarriage had already been started, Louis XII. of France and the emperor Maximilian being proposed as suitable husbands for the young widow, when the queen privately married Archibald Douglas, earl of Angus, on the 6th of August 1 5 14. The consequences of this marriage were to alienate many of the most powerful of the nobility, especially the earls of Arran and Home, and to make Margaret entirely dependent on the house of Douglas; while it furnished the council with a pretext for removing her from the regency and guardianship of the

king in favour of Albany in July 1515. Albany had to blockade Margaret

in Stirling Castle before she would surrender her sons. After being obliged to capitulate. Margaret returned to Edin- burgh, and being no longer responsible for the custody of the king she fled to England in September, where a month later she bore to Angus a daughter, Margaret, who afterwards became countess of Lennox, mother of Lord Darnley and grandmother of James I. of England.

In the summer of 15 16 Margaret went to her brother's court in London, while Angus, much to his wife's displeasure, returned to Scotland, where he made his peace with Albany and was restored to his estates. The rivalry between the French and English factions in Scotland was complicated by private feuds of the Hamiltons and Douglases, the respective heads of which houses, Arran and Angus, were contending for the supreme power in the absence of Albany in France, where at the instance of Henry VIII. he was detained by Francis I. Margaret, quarrel- ling with her husband over money matters, sided at first with Arran and began to agitate for a divorce from Angus. In this she was probably aided by Albany, who had been in Rome, and who found an unexpected ally in the queen-mother, Margaret being temporarily alienated from the English party by her brother Henry's opposition to her divorce. When Albany returned to Scotland in 1521 his association with Margaret gave rise to the accusation that it was with the intention of marrying her himself that he favoured her divorce from Angus, and it was even suggested that she was Albany's mistress. . As Albany was strongly supported by the Scottish parliament, Angus found it necessary to withdraw to France till 1524. During these years there was constant warfare between the English and the Scots on the border, but in May 1524 Albany was obliged to retire to France. Henry VIII. continually aimed at securing the person of his nephew, the king of Scots; while Margaret veered from faction to faction without any settled policy, unless it were the " erection " of her son, i.e. his proclamation as a reigning sovereign, which she successfully brought about in July 1524. The queen-mother had at this time fallen in love with Henry Stewart, second son of Lord Avondale, whom she married immediately after obtaining her divorce from Angus in 1527. Margaret and her new husband, who was created Lord Methven, now became for a time the ruling influence in the counsels of James V. But when her desire to arrange a meeting between James and Henry VIII. in 1534 was frustrated by the opposition of the clergy and the council, Margaret in her disappointment revealed certain secrets to Henry which led to her being accused by her son of betraying him for money and of acting as an English spy. In 1537 she was anxious to obtain a divorce from Methven, and her desire was on the point of being realized when ic was defeated by the intervention of James. Two years later she was reconciled to her husband, by whom she had no children; and, continuing to the end to intrigue both in Scotland and England, she died at Methven Castle on

the 18th of October i54i-

See Andrew Lang, History of Scotland, vol. i. (London, 1900) ; Mary A. E. Green, Lives of the Princesses of England (6 vols., London, 1849-1855) ; The Hamilton Papers, ed. by J. Bain (2 vols., Edinburgh, 1890) ; John Leslie, History of Scotland, ed. by T. Thompson (4 vols., Edinburgh, 1830) ; Sir H. Ellis, Original Letters Illustrative of English History (London, 1825-1846). (R. J. M.)

MARGARET (1 283-1290), titular queen of Scotland, and generally known as the " maid of Norway," was the daughter of Eric II. king of Norway, and Margaret, daughter of Alexander III. king of Scotland. Her mother died soon after Margaret's birth; and in 1284 the estates of Scotland decided that if Alex- ander died childless the crown should pass to his granddaughter. In March 1286 Alexander was killed and Margaret became queen. The English king Edward I. was closely watching affairs in Scotland, and in 1289 a marriage was arranged between the infant queen and Edward's son, afterwards Edward II. Margaret sailed from Norway and reached the Orkneys, where she died, about the end of September 1290. The news of this occurrence

was first made known in a letter dated the 7th of October 1290. Some mystery, however, surrounded her death, and about 1300 a woman from Leipzig declared she was Queen Margaret. The impostor, if she were such, was burned as a witch at Bergen.

See A. Lang, History of Scotland, vol. i. (Edinburgh, 1904).

MARGARET (1353-1412), queen of Denmark, Norway and Sweden, the daughter of Valdemar IV. of Denmark, was born m J 353 ar) d married ten years later to King Haakon VI. of Norway. Her first act, after her father's death (1375), was to procure the election of her infant son Olaf as king of Denmark. Olaf died in 1387, having in 1380 also succeeded his father; and in the following year Margaret, who had ruled both kingdoms in his name, was chosen regent of Norway and Denmark. She had already given proofs of her superior statesmanship by recovering possession of Schleswig from the Holstein counts, who had held it absolutely for a generation, and who now received it back indeed as a fief (by the compact of Nyborg 1386), but under such stringent conditions that the Danish crown got all the advantage of the arrangement. By this compact, moreover, the chronically rebellious Jutish nobility lost the support they had hitherto always found in Schleswig-Holstein, and Margaret, free from all fear of domestic sedition, could now give her undivided attention to

Sweden, where the mutinous nobles were already in arms against their unpopular king, Albert of Mecklenburg. At a conference held at Dalaborg Castle, in March 1388, the Swedes were compelled to accept all Margaret's conditions, elected her " Sovereign Lady and Ruler," and engaged to accept from her any king she chose to appoint. On the 24th of February 1389, Albert, who had returned from Mecklenburg with an army of mercenaries, was routed and taken prisoner at Aasle near Falkoping, and Margaret was now the omnipotent mistress of three kingdoms. Stockholm then almost entirely a German city, still held out; fear of Margaret induced both the Mecklenburg princes and the Wendish towns to hasten to its assistance; and the Baltic and the North Sea speedily swarmed with the privateers of the Viktualien brodre or Vitalia- ner, so called because their professed object was to revictual Stockholm. Finally the Hansa intervened, and by the compact of Lindholm (1395) Albert was released by Margaret on promising to pay 60,000 marks within three years, the Hansa in the mean-time to hold Stockholm in pawn. Albert failing to pay his ransom within the stipulated time, the Hansa surrendered Stockholm to Margaret in September 1398, in exchange for very considerable commercial privileges.

It had been understood that Margaret should, at the first convenient opportunity, provide the three kingdoms with a king who was to be her nearest kinsman, and in 1389 she proclaimed her infant cousin, Eric of Pomerania, king of Norway. In 1396 homage was rendered to him in Denmark and Sweden likewise, Margaret reserving to herself the office of regent during his minority. To weld the united kingdoms still more closely together, Margaret summoned a congress of the three councils of state to Kalmar in June 1397; and on Trinity Sunday, the 17th of June, Eric was solemnly crowned king of Denmark, Norway and Sweden. The proposed act of union divided the three Rigsraads, but the actual deed embodying the terms of the union never got beyond the stage of an unratified draft. Margaret revolted at the clauses which insisted that each country should retain exclusive possession of its own laws and customs, and be administered by its own dignitaries, as tending in her opinion to prevent the complete amalgamation of Scandinavia. But with her usual prudence she avoided every appearance of an open rupture.

A few years after the union of Kalmar, Eric, now in his eighteenth year, was declared of age and homage was rendered to him in all his three kingdoms, but during her lifetime Margaret was the real ruler of Scandinavia. So long as the union was insecure, Margaret had tolerated the presence near the throne of " good men " from all three realms (the Rigsraad, or council of state, as these councillors now began to be called); but their

influence was always insignificant. In every direction the royal authority

remained supreme. The offices of high constable and earl marshal were left vacant; the Danehojfer or national as- semblies fell into desuetude, and the great queen, an ideal despot, ruled through her court officials acting as superior clerks. But law and order were well maintained; the licence of the nobility was sternly repressed; the kingdoms of Sweden and Norway were treated as integral parts of the Danish state, and national aspirations were frowned upon or checked, though Norway, as being more loyal, was treated more indulgently than Sweden. Margaret also recovered for the Crown all the landed property which had been alienated during the troublous days of Valdemar IV. This so-called " reduktion," or land-recovery, was carried out with the utmost rigour, and hundreds of estates fell into the Crown. Margaret also reformed the Danish currency, substituting good silver coins for the old and worthless copper tokens, to the great advantage both of herself and the state. She had always large sums of money to dispose of, and a consider- able proportion of this treasure was dispensed in works of charity. Margaret's foreign policy was sagaciously circumspect, in sharp contrast with the venturesomeness of her father's. The most tempting offer of alliance, the most favourable conjunctures, could never move her from her system of neutrality. On the other hand she spared no pains to recover lost Danish territory. Gotland she purchased from its actual possessors, Albert of Mecklenburg and the Livonian Order, and the greater part of Schleswig was regained in the same way.

Margaret died suddenly on board her ship in Flensborg harbour on the 28th of October i4r2. We know very little of her private character. Contemporary records are both scanty and hostile to a sovereign who squeezed the utmost out of the people. Craft and wiliness are the qualities most generally attributed to her, coupled with the cynical praise that " in temporal matters she was very lucky."

See Danmarks riges historie, den senere Middelalder, pp. 358- 412 (Copenhagen, 1897-1905) ; Erslev, Danmarks historie under dronning Margrethe (Copenhagen, 1882-1901); Hill, Margaret of Denmark (London, 1898). ~ (R. N. B.)

MARGARET OF ANJOU (1430-1482), queen of England, daughter of Rene of Anjou, titular king of Naples and Jerusalem, was born on the 23rd of March 1430. When just fourteen she was betrothed to Henry VI. king of England, and in the following year was brought to England and married at Titchfield Abbey, near Southampton, on the 23rd of April 1445. On the 28th of May she was welcomed at London with a great pageant, and two days later crowned at Westminster. Margaret's marriage had been negotiated by William de la Pole, duke of Suffolk, and when she came to England, Suffolk and his wife were her only friends. Naturally she fell under Suffolk's influence, and supported his policy. This, added to her

French origin and sympathies, made her from the start unpopular. Though clever and good-looking, she was self-willed and imperious, and without the conciliatory manners which her difficult position required. In almost everything she was the opposite of her gentle husband, but entered into his educational schemes, and gave her patronage to the foundation of Queen's College, Cambridge. Margaret's really active share in politics began after Suffolk's fall in 1450. She not only supported Edmond Beaufort, duke of Somerset, in his opposition to Richard of York, but concerned herself also in the details of government, seeking not over-wisely pecuniary benefits for herself and her friends. But as a childless queen her influence was limited; and when at last her only son, Edward, was born on the 13 th of October 1453, her husband was stricken with insanity. From this time she was the ardent champion of her husband's and son's rights; to her energy the cause of Lancaster owed its endurance, but her implacable spirit contributed to its failure. When York's protectorate was ended by Henry's recovery in January 1455, Margaret, not content with the restoration of Somerset and her other friends to liberty and office, pushed her politics to extremes. The result was the defeat of the Lancastrians at St Albans, and for a year Margaret had to

acquiesce in York's power. Yet at this time one wrote of her: " The queen is a great and strong laboured woman, for she spareth no pain to sue her things to an intent and conclusion to her power " {Paston Letters, i. 378). All the while she was organizing her party; and ultimately, in October 1456 at Coven- try, procured some change in the government. Though formally reconciled to York in March 1458, she continued to intrigue with her partisans in England, and even with friends in France, like Pierre de Breze, the seneschal of Normandy. After the Yorkist failure at Ludlow in 1459, it was Margaret's vindictiveness that embittered the struggle by a wholesale proscription of her opponents in the parliament at Coventry. She was not present with her husband at Northampton on the 10th of July 1460. After romantic adventures, in which she owed her safety to the loyalty of a boy of fourteen, her only companion, she escaped with her little son to Harlech. Thence after a while she made her way to Scotland. From Mary of Gelderland, the queen regent, she purchased the promise of help at the price of surrendering Berwick. Margaret was still in Scotland at the date of Wakefield, so was not, as alleged by hostile writers, responsible for the barbarous treatment of York's body. But she at once joined her friends, and was with the northern army which defeated Warwick at St Albans on the 17th of February 1461; for the executions which followed she must bear the blame. After Towton Margaret with her husband and son

once more took refuge in Scotland.

A year later she went to France, and with help from her father and Louis XL equipped an expedition under Pierre de Breze. She landed in Northumberland in October, and achieved some slight success; but when on the way to seek further help from Scotland the fleet was overwhelmed in a storm, and Margaret herself barely escaped in an open boat to Berwick. In the spring she was again trying to raid Northumberland, meeting with many hardships and adventures. Once she owed her escape from capture to the generosity of a Yorkist squire, who carried her off on his own horse; finally she and her son were brought to Bamburgh through the compassionate help of a robber, whom they had encountered in the forest. 'Thence in August 1463 she crossed to Sluys in Flanders. She was almost destitute, but was courteously treated by Charles the Bold, then count of Charolais, and so made her way to her father in France. For seven years she lived at Saint-Michel-en- Barrois, educating her son with the help of Sir John Fortescue, who wrote at this time: " We be all in great poverty, but yet the queen sustaineth us in meat and drink. Her highness may do no more than she doth " {Works, ii. 72, ed. Clermont). Margaret never lost her hopes of her son's restoration. But when at last the quarrel between Warwick and Edward IV. brought her the opportunity, it was with difficulty that she could consent to be reconciled to so old and bitter an enemy. After Warwick's success and Henry's restoration Margaret still remained in France. When at last she was ready to sail she was delayed by contrary winds. So it was only on the very day of Warwick's defeat at Barnet (14th of April) that Margaret and Edward landed at Weymouth. Three weeks later the Lancastrians were defeated at Tewkesbury, and Edward was killed. Margaret was not at the battle; she was captured a few days after, and brought to London on the 21st of May. For five years she remained a prisoner, but was treated honourably and for part at least of the time was in charge of her old friend the duchess of Suffolk. Finally Louis XL ransomed her under the Treaty of Pecquigny, and she re- turned to France on the 29th of January 1476. Margaret lived for six years at different places in Bar and Anjou, in poverty and dependent for a pension on Louis, who made her surrender in return her claims to her father's inheritance. She died on the 25th of April 1482 and was buried at Angers Cathedral. Rene, whom she probably never saw after 1470, had died in the previous year. During her last years Chastellain wrote for her consolation his Temple de Bocace dealing with the misfortunes of contemporary princes.

As the courageous champion of the rights of her son and

her husband, Margaret must command a certain sympathy. But she was politically unwise, and injured their cause by her readiness to purchase

foreign help at the price of English interests. Comines wrote well of her that she would have done more prudently if she had endeavoured to adjust the disputes of the rival factions instead of saying " I am of this party, and will maintain it " {Mimoires vi. ch. 13). Her fierce partisanship embittered her enemies, and the Yorkists did not hesitate to allege that her son was a bastard. This, like the scandal concerning Margaret and Suffolk, is baseless; the tradition, however, continued and found expression in the Mirror for Magistrates and in Drayton's Heroical Epistles, as well as in Shakespeare's Henry VI.

Bibliography. — For contemporary English authorities see under Henry VI. French authorities and especially the Chroniques of George de Chastellain, and the Memoires of Philippes de Comines contain much that is of value. The Letters of Margaret of Anjou (Camden Soc, 1863) have small historical importance. There have been numerous biographies, the chief is Mrs Hookham's Life of Margaret of Anjou (1872). But the best modern accounts are to be found in G. du Fresne de Beaucourt's Histoire de Charles VII., Dr Gairdner's Introductions to the Paston Letters, Sir James Ramsay's Lancaster and York (1892), and The Political History of England, vol. iv. (1906), by Professor C. Oman. Dr Karl Schmidt's Margareta von Anjou, vor und bei Shakespeare (Palaestra, liv., Berlin, 1906) is a useful digest of authorities. (C. L. K.)

MARGARET OF AUSTRIA (1480-1530), duchess of Savoy and regent of the Netherlands from 1507 to 1530, daughter of the archduke Maximilian of Austria, afterwards the emperor Maximilian I., was born at Brussels on the 10th of January 1480. At two years of age she was betrothed to the dauphin Charles, son of Louis XL of France, and was brought up at the French court. In 1489, however, Charles, now king as Charles VIII. , to prevent Maximilian taking as his second wife the duchess Anne of Brittany, threw over Margaret and married the Breton heiress himself. Her ambitious father now sought for Margaret another throne, and in April 1497 she was married at Burgos to the Infant John, heir to the throne of Castile and Aragon. She was left a widow, however, a few months later. In 1501 Margaret became the wife of Philibert II., duke of Savoy, who only survived until 1504. The sudden death of her brother the archduke, Philip the Handsome (Sept 25, 1506), opened out to her a new career. In 1507 she was appointed by her father regent of the Netherlands and guardian of her nephew Charles, afterwards the emperor Charles V. Charles came of age in 1515, but he entrusted Margaret with the regency, as the vast extent of his dominions permitted him but seldom to visit the Netherlands, and she continued to hold the post until her death in 1530. She was a wise and prudent ruler, of masculine temper and intrepidity, and very capable in affairs.

See E. Munch, Margaretha von Osterreich (Leipzig, 1883); Th. Juste, Charles-Quint et Marguerite d'Autriche (Brussels, 1858); A. Le Glay, Maximilien I. et Marguerite d'Autriche (with correspond- ence, Paris, 1839); De Quinsonas, Materiaux pour servir & I'histoire de Marguerite d'Autriche (Paris, 1855), and E. E. Tremayne, The First Governors of the Netherlands: Margaret of Austria (1908).

MARGARET OF AUSTRIA (1522-1586), duchess of Parma and regent of the Netherlands from 1559 to 1567, was a natural daughter of Charles V. Her mother, Margaret van Ghent, was a Fleming. She was brought up by her aunts Margaret of Austria and Maria of Hungary, who were successively regents of the Netherlands from 1507 to 1530 and from 1530 to 1555. In 1533 she was married to Alexander de' Medici, duke of Florence, who was assassinated in 1537, after which she became the wife of Ottavio Farnese, duke of Parma, in 1542. The union proved an unhappy one. Like her aunts, who had trained her, she was a woman of masculine abilities, and Philip II., when he left the Netherlands in 1559 for Spain, acted wisely in appointing her regent. In ordinary times she would probably have proved as successful a ruler as her two predecessors in that post, but her task was very different from theirs. She had to face the rising storm of discontent against the Inquisition and Spanish despotism, and Philip left her but nominal authority. He was determined to pursue his own arbitrary course, and the

issue was the revolt of the Netherlands. In 1567 Margaret resigned her post into the hands of the duke of Alva and retired to Italy. She had the satisfaction of seeing her son Alexander Farnese appointed to the office she had laid down, and to watch his successful career as governor-general of the Netherlands. She died at Ortona in 1586.

See L. P. Gachard, Correspondance de Marguerite d'Autriche avec Phillippe II. 1554-1568 (Brussels, 1867-1887); R. Fruin, Het voorspel van den tachtig jarigen vorlog (Amsterdam, 1856); E. Rach- fahl, Margaretha von Parma, Statthalterin der Niederlande, 1559- 1567 (Munich, 1895); also bibliography in Cambridge Modern History, iii. 795-809 (1904).

MARGARET OF PROVENCE (1221-1295), Queen of France, was the daughter of Raymond Berenger V., count of Provence. She was married to Saint Louis at Sens on the 27th of May 1234, and was crowned the next day. Blanche of Castile, the queen-mother, arranged the marriage to win over to the cause of France the powerful count of Provence, but treated her

daughter-in-law most unkindly, and her jealousy of the energetic young queen was naturally shared by Louis, whose coldness towards and suspicion of his wife are well known. Margaret did not lack courage, she followed the king on his crusade, and bore herself heroically at Damietta. But her ambition and strong personal prejudices often led her to actions injurious to the realm. This is most noticeable in her hostility to her brother-in-law Charles of Anjou, who had married her sister Beatrice, and her devotion to Henry III. of England, who had married her other sister Eleanor. Aspiring during the reign of her son to the same role which she had seen Blanche of Castile play, she induced, in 1263, the young Philip, heir to the throne, to promise to obey her in everything up to the age of thirty; and Saint Louis was obliged to ask for a bull from Urban IV. which would release the prince from his oath. After Saint Louis' death, Margaret continued obstinately to claim her -rights on the county of Provence against Charles of Anjou. She sought to employ force of arms, calling upon her son, her nephew Edward II. of England, and the German king Rudolph of Habsburg. She did not give up her claim until after the death of Charles of Anjou (1285), when Philip the Bold succeeded in getting her to accept an income from the county of Anjou in exchange for her rights in Provence. She died on the 31st of December 1295.

See E. Boutaric, Marguerite de Provence, in Revue des questions Hstoriques (1867), pp. 417-458.

MARGARET MAULTASCH (1318-1369), countess of Tirol, who received the name of Maultasch (pocket-mouth) on account of the shape of her mouth, was the daughter and heiress of Henry, duke of Carinthia and count of Tirol. When Henry died in 1335 Carinthia passed to Albert II., duke of Austria; but Tirol was inherited by Margaret and her young husband, John Henry, son of John, king of Bohemia, whom she had married in 1330. This union was not a happy one, and the Tirolese disliked the government of Charles, afterwards the emperor Charles IV., who ruled the county for his brother. The result was that John Henry was driven from Tirol, and Margaret's cause was espoused by the emperor Louis IV., who was anxious to add the county to his possessions. Declaring her marriage dis- solved on the ground that it had not been consummated, Louis married Margaret in 1342 to his own son Louis, margrave of Brandenburg. But as this action on the emperor's part en- trenched on the privileges of the Church, Pope Clement VI. placed father and son under the ban, from which they were not released until 1359. In 1361 Margaret's husband died, followed two years later by her only son, Meinhard, when she handed over Tirol to Rudolph IV., duke of Austria, and retired to Vienna, where she died on the 3rd of October 1369. She lived long in the memory of the people of Carinthia, who re- garded her as an amazon, and called her the Wicked Gretl.

See A. Huber, Geschichte der Vereinigung Tir'ols mil Oeslerreich ˆInnsbruck, 1864).

MARGARINE, the name, first given by Chevreul, to an artificial substitute for butter, made from beef and other animal

fats, and sometimes mixed with real butter. The name of " butterine " has also been used. Artificial butter, or " mar- garine-mouries," was for some years manufactured in Paris according to a method made public by the eminent chemist Mege-Mouries. Having surmised that the formation of butter contained in milk was due to the absorption of fat contained in the animal tissues, he was led to experiment on the splitting up of animal fat. The process he ultimately adopted consisted in heating finely minced beef suet with water, carbonate of potash, and fresh sheep's stomach cut up into small fragments. The mixture he raised to a temperature of 45° C. (113° F.). The influence of the pepsine of the sheep's stomach with the heat separated the fat from the cellular tissue; he removed the fatty matter, and submitted it when cool to powerful hydraulic pressure, separating it into stearin and oleomargarin, which last alone he used for butter-making. Of this fat about the proportions of 10 lb with 4 pints of milk, and 3 pints of water were placed in a churn, to which a small quantity of anatto was added for colouring, and the whole churned together. The compound so obtained when well washed was in general appearance, taste and consistency like ordinary butter, and when well freed from water it was found to keep a longer time. Margarine is a perfectly wholesome butter-substitute, and is now largely used, but the ease with which it may be passed off as real butter has led to much discussion and legislative action. (See Adulteration.)

MARGARITA, an island in the Caribbean Sea belonging to Venezuela, about 12 m. N. of the peninsula of Araya, and constituting, under the constitution of 1904,— with Tortuga, Cubagua and Coche — a political division called the Eastern Federal District. The island is about 40 m. long from east to west, has an area of 400 sq. m., and consists of two moun tainous extremities, nearly separated by the Laguna Grande on the south, but connected by a low, narrow isthmus. The highest elevation on the island is the peak of Macanao,4484ft., in the western part, the highest point in the eastern part being the peak of Copei, 4170 ft. The higher valleys of the interior are highly fertile and are well adapted to grazing and stock-raising. The principal industries are fishing and the making of salt. The pearl fisheries, which were so productive in the 16th and 17th centuries, are no longer important. A domestic industry of the women is that of making coarse straw hats, which are sold on the mainland. The products of Margarita, however, are insufficient to support its population, and large numbers periodically emigrate to the mainland, preventing the

increase in population which its healthful climate favours. The population was estimated in 1904 at 40,000, composed in great part of half-caste Guayqueri Indians. The capital is Asuncion (pop. about 3000), on the east side of the island, and its principal port is Pompatar on the south coast. The two small ports of Puebla de la Mar (Porlamar) and Puebla del Norte are merely open roadsteads.

The island of Margarita (from Span. Margarita, pearl) was discovered by Columbus in 1498, and was bestowed in 1524 upon Marceto Villalobos by Charles V. In 1561 the freebooter Lope de Aguirre ravaged the island, and in 1662 the town of Pompatar was destroyed by the Dutch. For a long time Margarita was attached to Cumana, but in the eighteenth century it was made administratively independent. Its traders and sailors rendered invaluable assistance to the revolutionists in the war of independence, and the Spanish general, Morillo, was driven from its shores in 181 7; in recognition of this it was made a separate state and was renamed Nueva Esparta (New Sparta). In 1904-1909 it was a part of the Federal District with Asuncion as its capital. The first Spanish settlement in South America was Nueva Cadiz, founded in 1515 on the barren island of Cubagua; but the place was abandoned when pearl-fishing and slave-trading ceased to be profitable.

MARGATE, a municipal borough and seaside resort in the Isle of Thanet parliamentary division of Kent, England, 74 m. E. by S. of London by the South Eastern & Chatham railway. Pop. (1891), 18,662; (1901), 23,118. It lies on the north coast

of Thanet, and is practically contiguous with Westgate on the west and with Broadstairs on the south-east, owing to the modern extension of these popular watering-places. An elec- tric tramway connects Margate with Broadstairs and Rams- gate, and during the season it is served by numerous pleasure steamers from London. An esplanade faces the sea along nearly the entire front of the town, and is lined with hotels, shops and dwelling-houses. A jetty exceeding a quarter of a mile in length permits the approach of vessels at all tides. It was built in 1854 and subsequently enlarged, but a pier was constructed by John Rennie in 1815, and is now chiefly used by fishermen and colliers. The church of St John the Baptist, founded in 1050, contains some portions of Norman architecture, the remainder being Decorated and Perpendicular. It is rich in ancient brasses and monuments, including a brass to Sir John Daundelyon (1443), whose family occupied a manor in the neighbourhood as early as the 13th

century. The manor house of Daundelyon, or Dent de Lion, with its gateway of the early part of the 15th century, remains between Margate and Westgate. Charitable institutions include a deaf and dumb asylum (1875-1886), the Metropolitan infirmary for children (1841), and the royal sea-bathing infirmary, established in 1791 and enlarged through the munificence of Sir Erasmus Wilson in 1882. Dane Park (33 acres) was opened in 1898.

Margate (Meregate, Mergate), formerly a small fishing village, was an ancient and senior non-corporate member of Dover. In 1347 it contributed 15 ships of small tonnage at the time of the siege of Calais. Throughout the 14th century references are made to Margate in crown regulations regarding fisheries and shipping. A pier existed before 1500, but by the reign of Henry VIII. it was in a decayed condition. The amount of corn shipped was evidently small, the droits being insufficient to keep the pier in repair. Under Elizabeth Margate was still an obscure fishing village employing about 20 small vessels (" hoys ") in the coasting and river trades, chiefly in the con- veyance of grain, on which in 1791 it chiefly subsisted. The droits increased, but were not properly collected until 1724. In 1777 the pier was rebuilt. It was about this time that Margate first began to be known as a bathing-place owing to its fine stretch of firm sand. In 1835 Margate was still a liberty of Dover and no right of citizenship could be acquired. In 1857 it was incorporated. In 1777 a weekly market was granted on Wednesday and Saturday. It is now held daily, but principally on those two days.

MARGGRAF, ANDREAS SIGISMUND (1709-1782), German chemist, was born at Berlin on the 3rd of March 1709. After studying chemistry at Berlin and Strassburg, medicine at Halle, and mineralogy and metallurgy at Freiberg, he returned to his native city in 1735 as assistant to his father, Henning Christian Marggraf, chief apothecary at the court. Three years later he was elected to the Berlin Academy of Sciences, which in 1754 put him in charge of its chemical laboratory and in 1760 appointed him director of its physics class. He died in Berlin on the 7th of August 1782. His name is especially associated with the discovery of sugar in beetroot. In 1747 he published an account of experiments undertaken with the definite view of obtaining true sugar from indigenous plants, and found that for - this purpose the first place is taken by beetroot and carrot, that in those plants sugar like that of cane exists ready formed, and that it may be extracted by boiling the dried roots in alcohol, from which it is deposited on cooling. This investigation is also memorable because he detected the nfinute sugar-crystals in the roots by the help of the microscope, which was thus introduced as an adjunct to chemical inquiry. In another research dealing with the nature of alum he showed that one of the constituents of that substance, alumina, is contained in common clay, and further that the

salt cannot be prepared by the action of sulphuric acid on alumina alone, the addition of an alkali being necessary. He explained and simplified the process of obtaining phos- phorus from urine, and made some admirable observations on phosphoric acid; but though he noted the increase in weight

that attends the conversion of phosphorus into phosphoric acid he was content to remain an adherent of the phlogistic doctrine. For his time he was a skilful chemical analyst; he knew how to distinguish potash and soda by the different colorations they produce in flame, and how to test for iron with prussiate of potash: he was aware that sulphate of potash, gypsum and heavy spar, in spite of their different appearances, all contain sulphuric acid; and he recognized that there are different varieties of urinary calculi. In metallurgy he devised improved methods for the manufacture of zinc and the purifi- cation of silver, tin and other metals.

His papers, mostly written in French, were presented to the Berlin Academy, and with the exception of a few of the latest were collected in two volumes of Chymische Schriften in 1761-1767.

MARGHELAN, or Marghilan, a town of Asiatic Russia, situated in 40 28′ N. and 71 45′ E., the administrative centre of the province of Ferghana. Pop. (1900), 42,855, mostly Sarts, with Tajiks and Jews. It is a very old town, with high earthen walls and twelve gates, commanded by a fort. It lies in a beautiful, extraordinary fertile and well irrigated district. The heat in summer is excessive. The principal industry is the manufacture of silk; camels' hair and woollen fabrics are also made. The new Russian town, founded in 1877, is 10 m. distant to the south-east, and has a population (1897) of 8977.

MARGRAVE (Ger. Markgraf), a German title meaning literally " count of the March " (Lat. marchio, comes marchae, marchisus). The margraves had their origin in the counts established by Charlemagne and his successors to guard the frontier districts of the empire, and for centuries the title was always associated with this function. The margraves had within their own jurisdiction the authority of dukes, but at the outset they were subordinate to the dukes in the feudal army of the empire. In the 12th century, however, the mar- graves of Brandenburg and Austria (the north and east marks) asserted their position as tenants-in-chief of the empire; with the break-up of the great duchies the others did the same; and the margraves henceforward took rank with the great German princes. The title of margrave very early lost its original significance, and was borne by princes whose terri- tories were in no sense frontier districts, e.g. by Hermann, a son of Hermann, margrave of Verona, who assumed in 11 12

the title of margrave of Baden. Thus, too, when the elector Albert Achilles of Brandenburg in 1473 gave Bayreuth and Ansbach as apanages to his sons and their descendants these styled themselves margraves. The title, however, retained in Germany its sovereign significance, and has not, like " mar- quis " in France and " marchese " in Italy, sunk into a mere title of nobility; it is not, therefore, in its present sense the equivalent of the English title " marquess." The German mar- graviates have now all been absorbed into other sovereignties, and the title margrave is borne only as a subsidiary title in the full style of their sovereigns.

MARGUERITE, the popular name for the plant known botanically as Pyrethrum (or Chrysanthemum) frutescens (natural order Compositae), a shrubby perennial with smooth leaves cut pinnately into narrow segments and flower-heads two to three inches across produced singly in summer and autumn on slender erect stalks. The white ray-florets surround a yellow disk. It is a native of the Canary Isles, and a favourite for decoration and for greenhouse cultivation, window-boxes and open ground in the summer. The yellow marguerite {etoile d'or) has somewhat larger pale yellow flowers and glaucous leaves. The plant is propagated from cuttings taken in autumn from old plants and placed in sandy loamy soil in cold frames. By pruning the shoots in autumn the plants may be grown into very large specimens in the course of a few seasons.

MARGUERITE DE VALOIS. The name Marguerite was common in the Valois dynasty, and during the 16th century there were three princesses, all of whom figure in the political as well as in the literary history of the time, and who have

been not unfrequently confounded. The first and last are the most important, but all deserve some account.

I. Marguerite d'Angouleme (1492-1549). This, the most celebrated of the Marguerites, bore no less than four surnames. By family she was entitled to the name of Marguerite de Valois; as the daughter of Charles d'Orleans, count d'Angouleme, she is more properly, and by careful writers almost invariably, called Marguerite d'Angouleme. From her first husband she took, during no small part of her life, the appellation Marguerite d'Alencon, and from her second, Henri d'Albret, king of Navarre, that of Marguerite de Navarre. She was born at Angouleme on the nth of April 1492, and was

two years older than her brother Francis I. She was betrothed early to Charles, duke d'Alencon, and married him in 1509. She was not very fortu- nate in this first marriage, but her brother's accession to the throne made her, next to their mother Louise of Savoy, the most powerful woman of the kingdom. She became a widow in 1525, and was sought in marriage by many persons of dis- tinction, including, it is said, Charles V. and Henry VIII. In 1527 she married Henri d'Albret, titular king of Navarre, who was considerably younger than herself, and whose character was not faultless, but who seems on the whole, despite slander, to have both loved and valued his wife. Navarre was not reconquered for the couple as Francis had promised, but ample apanages were assigned to Marguerite, and at Nerac and Pau miniature courts were kept up, which yielded to none in Europe in the intellectual brilliancy of their frequenters. Marguerite was at once one of the chief patronesses of letters that France possessed, and the chief refuge and defender of advocates of the Reformed doctrines. Round her gathered C. Marot, Bonaventure Des Periers, N. Denisot, J. Peletier, V. Brodeau, and many other men of letters, while she protected Rabelais, E. Dolet, &c. For a time her influence with her brother, to whom she was entirely devoted, and whom she visited when he was imprisoned in Spain, was effectual, but latterly political rather than religious considerations made him discourage Luther- anism, and a fierce persecution was begun against both Protes- tants and freethinkers, a persecution which drove Des Periers to suicide and brought Dolet to the stake. Marguerite herself, however, was protected by her brqther, and her personal inclina- tions seem to have been rather towards a mystical pietism than towards dogmatic Protestant sentiments. Nevertheless bigotry and the desire to tarnish the reputation of women of letters have led to the bringing of odious accusations against her character, for which there is not the smallest foundation. Marguerite died at Odot-en-Bigorre on the 21st of September 1549. By her first husband she had no children, by her second a son who died in infancy, and a daughter, Jeanne d'Albret, who became the mother of Henry IV. Although the poets of the time are unwearied in celebrating her charms, she does not, from the portraits which exist, appear to have been regu- larly beautiful, but as to her sweetness of disposition and strength of mind there is universal consent.

Her literary work consists of the Heptameron, of poems entitled Les Marguerites de la marguerite des princesses, and of Letters. The Heptameron, constructed, as its name indicates, on the lines of the Decameron of Boccaccio, consists of seventy-two short stories told to each other by a company of ladies and gentlemen who are stopped in the journey homewards from Cauterets by the swelling of a river. It was not printed till 1558, ten years after the author's death, and then under the title of Les Amants fortunSs. Internal evidence is strongly in favour of its

having been a joint work, in which more than one of the men of letters who composed Marguerite's household took part. It is a delightful book, and strongly characteristic of the French Renaissance. The sensuality which characterized the period appears in it, but in a less coarse form than in the great work of Rabelais; and there is a poetical spirit which, except in rare instances, is absent from Pantagruel. The Letters are interesting and good. The Marguerites consist of a very miscellaneous collec- tion of poems, mysteries, farces, devotional poems of considerable length, spiritual and miscellaneous songs, &c. The Dernieres poesies, not printed till 1896 (by M. A. Lefranc), are interesting and characteristic, consisting of verse-epistles, comidies (pieces in dramatic form on the death of Francis I., &c), Les Prisons, a long allegorical poem of amorous-religious-historical tenor; some mis- cellaneous verse chiefly in dizains, and a later and remarkable

piece, Le Navire, expressing her despair at her brother's death. Of the other works, never yet completely edited, the best editions are, for the Heptameron, Leroux de Lincy (1855) ; for the Lettres, Genin (1841-1842); and for the Marguerites, &c, Frank (1873), English translations of the Heptameron are rather numerous: one appeared in 1887 by A. Machen, with an introduction by Miss A". M. F. Robinson (Mme Darmesteter) and another (anonymous) in 1894, with an essay by G. Saintsbury. The religious poem, Le Miroir de I'dme pecheresse was translated by Queen Elizabeth. Books on Marguerite and her court are also many. There may be noted Durand's Marguerite de Valois et la cour de Francois 7 er (1848); La Ferri&re's Marguerite d'Angouleme (1891); Lotheissen's Konigin Margareta von Navarra (1885) ; Miss Edith Sichel's Women and Men of the French Renaissance (1901), and P. Courtault's Marguerite de Navarre (1904).

II. The second Marguerite (1523-1574), daughter of Fran- cis I., was born on the 5th of June, 1523, at St Germain-en-Laye, and, at an age the lateness of which caused lampoons, married Emmanuel Philibert, duke of Savoy, in 1559. Like her aunt and her niece she was a good scholar and strongly interested in men of letters. She is noteworthy as having given the chief impulse at the court of her brother Henry II. to the first efforts of the Pleiade (see Ronsard), and as having continued her patronage of literature at Turin. The poet Marc Antonio Flaminio, for instance, congratulates himself in pretty Latin verses on her singing his poems.

Her Letters have been published by A. G. Spinelli.

III. The third Marguerite (1553-1615), called more par- ticularly Marguerite de Valois, was great-niece of the first and niece of the second, being daughter of Henry II. by Catherine de' Medici. She was born on the 14th of May 1553. When very young she became famous for her beauty,

her learning, and the looseness of her conduct. She was married, after a liaison with the duke of Guise, to Henry of Navarre, afterwards Henry IV., on the eve of St Bartholomew's Day. Both husband arid wife were extreme examples of the licentious manners of the time, but they not unfrequently lived together for considerable periods, and nearly always on good terms. Later, however, Marguerite was established in the castle of Usson in Auvergne, and after the accession of Henry the marriage was dissolved by the pope. But Henry and Marguerite still continued friends; she still bore the title of queen; she visited Marie de' Medici on equal terms; and the king frequently consulted her on important affairs, though his somewhat parsimonious spirit was grieved by her extrava- gance. Marguerite exhibited during the rest of her life, which was not a short one, the strange Valois mixture of licentiousness, pious exercises, and the cultivation of art and letters, and died in Paris on the 27th of March 1615. She left letters and memoirs the latter of which are admirably written, and rank among the best of the 16th century. She was the idol of Pierre de Bourdeille Brantome, and is the " Reine Margot " of anecdotic history and romance.

The Memoires are contained in the collection of Michaud and Poujoulat, and have been published separately by Guessard (the best, 1842), Lalanne, Caboche, &c. An English translation with introduction by Vioiet Fane appeared in 1892. Her character, and still more her circumstances, made the pen very unamiably busy with her in her lifetime, the chief of many lampoons being the famous Divorce satirique, variously attributed to Agrippa d'Aubign6, Palma Cayet, and others. The chief recent book on her is SaintPoucy'sHistoiredeMargueritede Valois (1887) .

(G.SA.)

MARGUERITTE, PAUL (i860-) and VICTOR (1866-), French novelists, both born in Algeria, were the sons of General Jean Auguste Margueritte (1823-1870), who after an honourable career in Algeria was mortally wounded in the great cavalry charge at Sedan, and died in Belgium, on the 6th of September 1870. An account of his life was published by Paul Margueritte as Mon pere (1884; enlarged ed., 1897). The names of the two brothers are generally associated, on account of their col- laboration. Paul Margueritte, who has given a picture of his home in Algiers in Le Jardin du passe" (1895), was sent to the military school of La Fleche for the sons of officers, and became in 1880 clerk to the minister of public instruction. He designed two pantomimes, Pierrot assassin de sa femme (Th6atre Libre, 1882), and Colombine pardonnee (Cercle funambulesque, ti

in which the traditional Pierrot, played by Margueritte himself, became a nervous, tragic creature. He resigned his clerkship in 1889 to devote himself entirely to literature, producing in rapid succession a series of novels, among which were Tous quatre (1885), La Confession posthume (1886), Maison ouverte (1887), Pascal Gifosse (1887), Jours d'epreuve (1889), Amants (i8go),La Force des choses (1891), Sur Ic retour (1892), La Tour- mente (1893), Ma grande (1892), Ante d'enfant (1894) and L'Eau qui dort (1896). Paul Margueritte had begun as a realistic novelist, but he was one of the five writers who signed a manifesto against Zola's La Terre, and he made his reputation by delicate, sober studies of the by-ways of sentiment. His brother Victor entered his father's regiment, the 1st chasseurs d'Afrique, in 1888, and served in the army until 1896, when he resigned his com- mission. He was already known by some volumes of poetry, and by a translation from Calderon (La Double m&prise, played at the Odeon, 1898) when he began to collaborate with his brother. From the time of this collaboration Paul Margueritte's work gained in colour and force.

Among the books written in common by the brothers, the most famous is the series known under the collective title, Une Epoque, dealing with the events of 1870-1871, and including the novels Le D&saslre (1898), Les Tronqons du glaive (1900), Les Braves gens (1 90 1), LaCommune (1904). They also collaborated in an Histoire de la guerre de 1870-1871(ˆ03). These books were founded on a mass of documentary and verbal information, amassed with great care and arranged with admirable art; the authors are historians rather than novelists. The disasters and humiliations of the campaigns are faithfully de'scribed, but are traced to defects of organization and leadership; while the courage and patriotism of the army itself is made the basis of an assured confidence in the destinies of France. La Commune is a bold indictment of the methods adopted by the victorious party. The novelists also attacked the laws governing marriage and divorce and the abuses entailed by the dowry demanded from the bride, in pamphlets and in the novels, Femmes nouvelles (1899), Les Deux vies (1902), and Le Prisme (1905). Their literary partner- ship was dissolved in 1907. Paul Margueritte was one of the original members of the Academie de Goncourt.

See P. et V. Margueritte (1905) by E. Pilon, in the series of C4U- brites d'aujourd'hui, and A. France, La Vie littiraire (4th series,

1892).

MARHEINEKE, PHILIP KONRAD (1 780-1846), German Protestant

divine, was born at Hildesheim, Hanover, on the 1st of May 1780. He studied at Gottingen,andin 1805 was appointed professor extraordinarius of philosophy at Erlangen; in 1807 he moved to Heidelberg. In 181 1 he became professor ordinarius at Berlin, where from 1820 he was also preacher at Trinity Church and worked with Schleiermacher. When he died, on the 31st of May 1846, he was a member of the supreme consistorial council. At first influenced by Schelling, Marheineke found a new master in Hegel, and came to be regarded as the leader of the Hegelian Right. He sought to defend and explain all the ortho- dox doctrines of the Church in an orthodox way in the terms of Hegel's philosophy. The dogmatic system that resulted from this procedure was inevitably more Hegelian than Christian; it was in fact an essentially new form of Christianity. Mar- heineke's developed views on dogmatics are given in the third edition (1847) of his Die Grundlehren der christlichen Dogmatik als Wissenschaft. When he published the first edition (1819) he was still under the influence of Schelling;the second edition (1827) marked his change of view. His works on symbolics show profound scholarship, keen critical insight, and rare impartiality. The Christliche Symbolik (1810-1814) has been pronounced his masterpiece,

His other works include Institutiones symbolical (1812; 3rd ed., 1830), Geschichte der deutschen Reformation (1816; 2nd ed., 1831- 1834) ; Die Reformation, ihre Entstehung und Verbreitung in Deutsch- land (1846; 2nd ed., 1858), and the posthumous Theol. Vorlesungen

(1847-1849).

See F. Lichtenberger, History of German Theology (1889) ; A. Weber, Le Systfane dogmatique de Marheineke (1857); and cf. O. Pfleiderer, Development of Theology in Germany (1890).

MARIANA, JUAN DE (1536-1624), Spanish historian, was born at Talavera. He studied at the university of Alcala, and was admitted at the age of seventeen into the Society of Jesus. In 1561 he went to teach theology in Rome, reckoning among his pupils Robert Bellarmine, afterwards cardinal; then passed into Sicily; and in 1569 he was sent to Paris, where his expositions of the writings of Thomas Aquinas attracted large audiences. In 1574, owing to ill health, he obtained permission to return to Spain; the rest of his life being passed at the Jesuits' house in Toledo in vigorous literary activity. He died at Madrid, on the 17th of February 1624.

Mariana's great work, Historiae de rebus Hispaniae, first appeared in twenty books at Toledo in 1592; ten books were subsequently added (1605), bringing the work down to the accession of Charles V. in 1519,

and in a still later abstract of events the author completed it to the accession of Philip IV. in 162 1. It was so well received that Mariana was induced to translate it into Spanish (the first part in 1601 ; completed, 1609; Eng. trans., by J. Stevens, 1699). Mariana's Historiae, though in many parts uncritical, is justly esteemed for its research, accuracy, sagacity and style. Of his other works the most interesting is the treatise De rege et regis inslitutione (Toledo, 1598). In its sixth chapter the question whether it is lawful to overthrow a tyrant is freely discussed and answered in the affirmative, a circumstance which brought much odium upon the Jesuits, especially after the assassination of Henry IV. of France, in 1610. A volume entitled Tractatus VII. theologici et historici (published by Mariana at Cologne, in 1609, containing in particular a tract, " De morte et immortalitate," and another, " De mutalione monetae ") was put upon the index ex- purgatorius, and led to the confinement of its author by the In- quisition. During his confinement there was found among his papers a criticism upon the Jesuits, which was printed after his death as Discursus de erroribus qui in forma gubernationis societatis Jesu occurrunt (Bordeaux, 1625), and was reprinted by order of. Charles III. when he banished the Jesuits from Spain.

See L. von Ranke, Zur Kritik neuerer Geschichtsschreiber (Leipzig, 1874), and Cirot, Etudes sur les historiographes espagnols; Manana, historien (Bordeaux, 1905).

MARIANAO, a city of the province of Havana, Cuba, 6 m. W. by S. of the city of Havana, with which it is connected by the Marianao railway. Pop. (1899), 5416; (1907), 9332. Marianao is on a range of hills about 1500 ft. above the sea, is noted for its salubrious climate, and is mainly a place of residence for the families of prosperous business men of Havana. On the neigh- bouring coast is Marianao Beach, a popular bathing resort. The city dates from about 1830.

MARIANAS, Mariannes, or Ladrones (Ger. Marianen), an archipelago in the north-western Pacific Ocean, in about 12 to 21° N. and 145° E. With the exception of the island of Guam (United States) it belongs to Germany, and administratively forms part of the New Guinea protectorate. It consists of two groups — a northern of ten volcanic main islands, of which only four (Agrigan, Anatahan, Alamagan and Pagan) are inhabited; and a southern of five coralline limestone islands (Rota, Guam, Aguijan, Tinian and Saypan), all inhabited save Aguijan. In the volcanic group an extreme elevation of about 2700 ft. is reached, and there are craters showing signs of activity, while earthquakes are not uncommon. Coral reefs fringe the coasts of the southern isles, which are of slight elevation. The total area, excluding Guam, is about 245 sq. m. and the population 2500, mostly descendants of the Tagal immigrants from the Philippines. All the islands

except Farallon de Medinilla and Urracas or Mangs (in the northern group) are more or less densely wooded, and the vegetation is luxuriant, much resembling that of the Carolines, and also of the Philippines, whence many species of plants have been introduced. Owing to the humidity of the soil cryptogams are numerous, as also most kinds of grasses. Coco-nut and areca palms, yams, sweet potatoes, manioc, coffee, cocoa, sugar, cotton, tobacco and mother-of-pearl are the chief products, and copra is the principal export. Agriculture is neglected, in spite of the exceptional advantages offered by the climate and soil. On most of the islands there is a plentiful supply of water. The native population known to the early Spanish colonists as Chamorros has died out as a distinct people, though their descendants have intermarried with the immigrant Tagals and natives of the Carolines. At the Spanish occupation in 1668 the Chamorros were estimated at 40,000 to 60,000, but

less than a century later only 1800 remained. They were typical Micronesians, with a considerable civilization. In the island of Tinian are some remarkable remains attributed to them, consisting of two rows of massive square stone columns, about 5 ft. 4 in. broad and 14 ft. high, with heavy round capitals. According to early Spanish' accounts cinerary urns were found imbedded in the capitals.

The fauna of the Marianas, though inferior in number and variety, is similar in character to that of the Carolines, and certain species are indigenous to both colonies. Swine and oxen run wild, and are hunted when required: the former were known to the earlier inhabitants; the latter with most other domestic animals were introduced by the Spaniards. The climate though damp is healthy, while the heat, being tempered by the trade winds, is milder than that of the Philippines; the variations of temperature are not great.

The discovery of this archipelago is due to Magellan, who on the 6th of March 1521 observed the two southernmost islands, and sailed between them (O. Peschel, Geschickte des Zeitalters der Entdeckungen, Stuttgart, 1877). The name Islas de los Ladrones (or " Islands of the Thieves ") was given them by the ship's crew of Magellan on account of the thieving propensity of the inhabitants; and the islands are still commonly called the Ladrones. Magellan himself styled them Islas de las Velas Latinos (" Islands of the Lateen Sails "). San Lazarus archipelago, Jardines and Prazeres are among the names applied to them by later navigators. They received the name Las Marianas in 1668 in honour of Maria Anna of

Austria, widow of Philip IV. of Spain. Research in the archipelago was carried out by Commodore Anson, who in August 1742 landed upon the island of Tinian (George, Lord Anson, Voyage round the World, bk. iii., 1748). The Ladrones were visited by Byron in 1765, Wallis in 1767 and Crozet in 1772. 1 he entire archipelago (except Guam) together with the Caroline and Pelew Islands was sold by Spain to Germany for £837,500 in 1899.

*See Anson, op. c*t. ; L. de Freycinet, Voyage autour du monde (Paris, 1826-1844); " The Marianas Islands " in Nautical Magazine, xxxiv., xxxv. (London, 1865-1866); O. Finsch, Karolinen und Marianen (Hamburg, 1900) ; Costenoble, " Die Marianen " in Globus, lxxxviii. (1905).*

MARIANAS, or Maranhas, a tribe of South American Indians on the river Jutahy, north-western Brazil. They wear small pieces of wood in their ears and lips, but are not tattooed. Marianas are also found on the upper reaches of the Putumayo across to the Yapura.

MARIANUS SCOTUS (1028-1082 or 1083), chronicler (who must be distinguished from his namesake Marianus Scotus, d. 1088, abbot of St Peter's, Regensburg), was an Irishman by birth, and called Moelbrigte, or servant of Bridget. He was educated by a certain Tigernach, and having become a monk he crossed over to the continent of Europe in 1056, and his subse- quent life was passed in the abbeys of St Martin at Cologne and of Fulda, and at Mainz. He died at Mainz, on the 22nd of December 1082 or 1083.

Marianus wrote a Chronicon, which purports to be a universal history from the creation of the world to 1082. The Chronicon was very popular during the middle ages, and in England was extensively used by Florence of Worcester and other writers. It was first printed at Basel in 1559, and has been edited with an introduction by G. Waitz for the Monumenta Germaniae historica. Scriptores (Bd. v.). See also W. Wattenbach, Deutschlands Geschichtsquellen (Bd. ii., 1894).

MARIA STELLA, the self-styled legitimate daughter of Philip, duke of Orleans. According to her, Louis Philippe was not the son of Philip duke of Orleans, but a suppositious child, his father being one Lorenzo Chiappini, constable at the village of Modigliana in Tuscany. The story is that the duke and duchess of Orleans, travelling under the incognito of Comte and Comtesse de Join- ville, were at this village in April 1773, when the duchess gave birth to a daughter; and that the duke, desiring a son in order to prevent the rich Penthievre inheritance from reverting to his wife's relations in the event of her death, bribed the Chiappiriis to substitute their

newly-born male child for his own.

Maria Stella, the supposed daughter of Chiappini, went on the stage at Florence, where her putative parents had settled, and there at the age of thirteen became the wife of the first Lord Newborough, after whose death she married the Russian Count Ungern-Sternberg. On the death of her putative father in 1821

she received a letter, written by him shortly before his death, in which he confessed that she was not his daughter, adding " Heaven has repaired my fault, since you are in a better position than your real father, though he was of almost similar rank " (i.e. a French nobleman). Maria Stella henceforward devoted her time and fortune to establishing her identity. Her first success was the judgment of the episcopal court at Faenza, which in 1824 declared that the Comte Louis de Joinville exchanged his daughter for the son of Lorenzo Chiappini,and that the Demoiselle de Joinville had been baptized as Maria Stella, " with the false statement that she was the daughter of L. Chiappini and his wife." The discovery that Joinville was a countship of the Orleans family, and a real or fancied resemblance of Louis Philippe to Chiappini, convinced her that the duke of Orleans was the person for whose sake she had been cheated of her birthright, a conviction strengthened by the striking resemblance which many people discovered in her to the princesses of the Orleans family. In 1830 she published her proofs under the title Maria Stella ou un Schange d'une demoiselle du plus haul rang contre un garcpn de plus vile condition (reprinted 1839 and 1849). This coincided with the advent of Louis Philippe to the throne, and her claim became a weapon for those who wished to throw disˆ credit and ridicule on the " bourgeois monarch." He for his part treated the whole thing with amused contempt, and Baroness Newborough-Sternburg de Joinville, or Marie Etoile d'Orleans, as she called herself, was suffered to live in Paris until on the 23rd of December 1843 she died in poverty and obscurity.

In spite of much discussion and investigation, the case of Maria Stella remains one of the unsolved problems of history. Sir Ralph Payne Gallwey's Mystery of Maria Stella, Lady Newborough (London, 1907), is founded on her own accounts and argues in favour of her point of view. More convincing, however, is Maurice Vitrac's Philippe- £galite et M. Chiappini (Paris, 1907), which is based on un- published material in the Archives nationales. M. Vitrac seeks to overthrow Maria Stella's case by an alibi. The duke and duchess of Chartres could not have been at Modigliana in April 1773, for the , simple reason that they can be proved at that time to have been in Pans. On the 8th of April the duke, according to the official Gazette de France, took part in the Maundy Thursday ceremonies at Versailles; from the 7th to the 14th he was in constant attendance at the

lodge of Freemasons oi which he had just been elected grand master. Moreover, it was impossible for the first prince of the blood royal to leave France without the royal permission, and his absence would certainly have been remarked. Lastly, the duchess's accouche- ment, a semi-public function in the case of royal princesses, did not take place till the 6th of October. M. Vitrac identifies the real father of Maria Stella with Count Carlo Battaglini of Rimini, who died in 1796 without issue; the case being not one of substitution, but of ordinary " farming out " to avoid a scandal.

MARIA THERESA (1717-1780), archduchess of Austria, queen of Hungary and Bohemia, and wife of the Holy Roman emperor Francis I., was born at Vienna on the 13th of May 1717. She was the eldest daughter of the Emperor Charles VI. (q.v.) and his wife Elizabeth of Brunswick-Wolf enbiittel. On the 12th of February 1736 she was married to her cousin Francis of Lorraine (q.v.), then grand duke, of Tuscany, and afterwards emperor. Five sons and eleven daughters were born of this marriage. From the date of her father's death on the 20th of October 1740, till her own death in 1780, Maria Theresa was one of the central figures in the wars and politics of Europe. But unlike some sovereigns, whose reigns have been agitated, but whose personal character has left little trace, Maria Theresa had a strong and in the main a noble individuality. Her great qualities were relieved by human traits which make her more sympathetic. It must be allowed that she was fairly open to the criticism implied in a husbandly jest attributed to Francis I. While they were return- ing from the opera house at Vienna she said to him that the singer they had just heard was the greatest actress who had ever lived, and he answered " Next to you, Madam." Maria Theresa had undoubtedly an instinctive histrionic sense of the perspective of the theatre, and could adopt the appropriate attitude and gesture, passionate, dignified or pathetic, required to impress those she wished to influence. But there was no affectation in her assump- tion of a becoming bearing or in her picturesque words. The common story, that she appeared before the Hungarian magnates in the diet at Pressburg in 1741 with her infant son, afterwards

Joseph II., in her arms, and so worked on their feelings that they shouted Moriamur pro rege nostro Maria Theresia, is only mythically true. But during the delicate negotiations which were required to secure the support of the Hungarian nobles she undoubtedly did appeal to them with passionate eloquence, and, we may believe, with a very pardonable sense of the advantage she obtained from her youth, her beauty and her sex. Her beauty, inherited from her mother, was of an open and noble German type.

The official portrait by Muytens, engraved by Petit, gives a less convincing impression that an excellent chalk drawing of the head by Gabriel Mattei. In the conflict between her sense of what was morally just and her sense of duty to the state she laid herself open to the scoffing taunt of Frederick of Prussia, who said that in. the first partition of Poland elk pleurait et prenait toujours. But the king of Prussia's taunt is deprived of its sting by the almost incredible candour of her own words to Kaunitz, that if she was to lose her reputation before God and man for respecting the rights of others it must not be for a small advantage — if, in fact, Austria was to share in the plunder of Poland, she was to be consoled for the distress caused to her feelings by the magnitude of her share of the booty. There was no hypocrisy in the tears of the empress. Her intellectual honesty was as perfect as Frederick's own, and she was as in- capable as he was of endeavouring to blind herself to the quality of her own acts. No ruler was ever more loyal to a conception of duty. Maria Theresa considered herself first and foremost as the heiress of the rights of the house of Austria. Therefore, when her inheritance was assailed at the beginning of her reign, she fought for it with every weapon an honest woman could employ, and for years she cherished the hope of recovering the lost province of Silesia, conquered by Frederick. Her practical sense showed her the necessity of submitting to spoliation when she was over- powered. She accepted the peace of Berlin in 1742 in order to have a free hand against her Bavarian enemy, the emperor Charles VII. (q.v.). When Frederick renewed the war she accepted the struggle cheerfully, because she hoped to recover her own. Down to the peace of Aix-la-Chapelle in 1 748 she went on fighting for Silesia or its equivalent. In the years following the peace she applied herself to finding allies in France and Russia who would help her to recover Silesia. Here, as later in the case of Poland, she subordinated her feelings to her duty to the state. Though she denied that she had ever written directly to Madame de Pompadour, it is certain that she allowed her ministers to make use of the favourite's influence over the French king. When fate decided against her in the Seven Years' War she bowed to the inevitable, and was thenceforward a resolute advocate of peace.

In her internal government she showed herself anxious to promote the prosperity of her people, and to give more unity to an administration made up by the juxtaposition of many states and races with different characters and constitutions. Her instincts, like those of her enemy Frederick and her son Joseph II., were emphatically absolutist. She suspended the meetings of the estates in most parts of her dominions. She was able to do so because the mass of her subjects found her hand much lighter than that of the privileged classes who composed these bodies. Education, trade, religious toleration, the emancipation of the agricultural population from feudal burdens— all had her approval up to a certain point. She would favour

them, but on the distinct condition that nothing was to be done to weaken the bonds of authority. She took part in the suppression of the Jesuits, and she resisted the pope in the interest of the state. Her methods were those of her cautious younger son, Leopold II., and not of her eldest son and immediate successor, Joseph II. She did not give her consent even to the suppression of torture in legal procedure without hesitation, lest the authority of the law should be weakened. Her caution had its reward, for what- ever she did was permanently gained, whereas her successor in his boundless zeal for reform brought his empire to the verge of a general rebellion.

In her private life Maria Theresa was equally the servant of the state and the sovereign of all about her. She was an

affectionate wife to her husband Francis I.; but she was always the queen of Hungary and Bohemia and archduchess of Austria, like her ancestress, Isabella the Catholic, who never forgot, nor allowed her husband to forget, that she was " proprietary queen " of Castile and Leon. She married her daughters in the interest of Austria, and taught them not to forget their people and their father's house. In the case of Marie Antoinette (q.v.), who married the dauphin, afterwards Louis XVI., she gave an extraordinary proof of her readiness to subordinate everything to the reason of state. She instructed her daughter to show a proper respect to her husband's grandfather, Louis XV., by behaving with politeness to his mistresses, in order that the alliance between the two courts might run no risk. The signing of the peace of Teschen, which averted a great war with Prussia, on the 13th of May 1779, was the last great act of her reign, and so Maria Theresa judged it to be in a letter to Prince Kaunitz; she said that she had now finished her life's journey and could sing a Te Deum, for she had secured the repose of her people at whatever cost to herself. The rest, she said, would not last long. Her fatal illness developed in the autumn of the following year, and she died on the 28th of November 1780. When she lay painfully on her deathbed her son Joseph said to her, " You are not at ease," and her last words were the answer, " I am sufficiently at my ease to die."

See A. von Arneth, Geschichte Maria Theresas (Vienna, 1863- 1879) and J. F. Bright, Maria Theresa (London, 1897); also the article Austria.

MARIAZELL, a village of Austria, in Styria, 89 m. N. of Graz. Pop. (1900), 1499. It is picturesquely situated in the valley of the Salza, amid the north Styrian Alps. Its entire claim to notice lies in the fact that it is the most frequented sanctuary in Austria, being visited annually by about 200,000 pilgrims. The object of veneration is a miracle-working image of the Virgin, carved in lime-tree wood, and about 18 in. high. This was

presented to the place in 1157, and is now enshrined in a chapel lavishly adorned with objects of silver and other costly materials. The large church of which the chapel forms part was erected in 1644 as an expansion of a smaller church built by Louis I., king of Hungary, after a victory over the Turks in 1363. In the vicinity of Mariazell is the pretty Alpine lake of Erlafsee.

See M. M. Rabenlehrer, Mariazell, Osterreichs Loreto (Vienna, 1891) ; and O. Eigner, Geschichte des aufgeshj/benen Benedictinerstiftes Mariazell (Vienna, 1900).

MARIE AMELIE THERESE (1782-1866), queen of Louis Philippe, king of the French, was the daughter of Ferdinand IV., king of Naples, and the archduchess Maria Carolina, daughter of the empress Maria Theresa, and belonged to the house of Bourbon. She was born at Caserta, on the 26th of April 1782, and received a careful education which developed the naturally pious and honourable disposition that earned for her in the family circle the nickname of La Santa. Driven from Naples in 1798, the Neapolitan royal family fled to Palermo, and the years from 1800 to 1802 were spent by Marie Amelie with her mother at the Austrian court. In 1806 they were again in flight before the armies of Massena, and it was during the second residence of her father's court at Palermo that she met the exiled Louis Philippe, then duke of Orleans, whom she married in November 1809. Returning to France in 1814, the duke and duchess of Orleans had barely established themselves in the Palais Royal in Paris when the Hundred Days drove them into exile. Marie Amelie took refuge with her four children in Eng- land, where she spent two years at Orleans House, Twickenham. Again in France in 1817, her life at Neuilly until 1828 was the happiest period of her existence. Neither then nor at any other time did she take any active share in politics; but she was not without indirect influence on affairs, because her strong royalist and legitimist traditions prevented the court from including her in the suspicion with which her husband's liberal views were regarded. Her attention was absorbed by the care and educa- tion of her numerous family, even after the revolution of 1830 had made her queen of the French, a position accepted by her with forebodings of disaster justified by her early experience of

revolutions. During her second exile, from 1848 to the end of her life, she lived at Claremont, where her charity and piety endeared her to the many English friends of the Orleans family. Marie Amelie died at Claremont, on

the 24th of March 1866.

See A. Trognon, Vie de Marie Amelie (1872) ; A. L. Baron Imbert de St Amand, La Jeunesse de Marie Amelie (1891), Marie Amelie au Palais Royal (1892), Marie Amelie et la cour de Palerme (1891), Marie Amelie et la cour des Tuileries (1892), Marie Amelie et I'apogie de rhgne de Louis Philippe (1893), Marie Amelie et la societe francaise en 1847 (1894), and Marie Amelie et la duchesse d'Orleans (1893).

MARIE ANTOINETTE (1755-1793)-, queen of France, ninth child of Maria Theresa and the emperor Francis I., was born at Vienna, on the 2nd of November 1755. She was brought up under a simple and austere regime and educated with a view to the French marriage arranged by Maria Theresa, the abbe Vermond being appointed as her tutor in 1769. Her marriage with the dauphin, which took place at Versailles on the 16th of May 1770, was intended to crown the policy of Choiseul and con- firm the alliance between Austria and France. This fact, com- bined with her youth and the extreme corruption of the French court, made her position very difficult. Madame du Barry, whose influence over Louis XV. was at that time supreme, formed the centre of a powerful anti-Choiseul cabal, which succeeded in less than a year after the dauphin's marriage in bringing about the fall of Choiseul and seriously threatening the stability of the Austrian alliance. Thus the young princess was surrounded by enemies both at court and in the dauphin's household, and came to rely almost entirely upon the Austrian ambassador, the comte de Mercy-Argenteau, whom Maria Theresa had instructed to act as her mentor, at the same time arranging that she herself should be kept informed of all that concerned her daughter, so that she might at once advise her and safeguard the alliance. Hence arose the famous secret correspondence of Mercy-Argenteau, an in- valuable record of all the details of Marie Antoinette's life from her marriage in 1770 till the death of Maria Theresa in 1780.

Marie Antoinette soon won the affection and confidence of the dauphin and endeared herself to the king, but her position was precarious, and both Mercy and Maria Theresa had continually to urge her to conquer her violent dislike for the favourite and try to conciliate her.

The accession of the young king and queen on the death of Louis XV. (May 10, 1774), was hailed with great popular enthu- siasm. But her first steps brought Marie Antoinette into open hostility with the anti-Austrian party. She was urgent in obtain- ing the dismissal of d'Aiguillon, and did all in her power to secure the recall of Choiseul, though without success. Thus from the very first she appeared in the light of a partisan, having against her all the enemies of Choiseul and of the Austrian alliance, and was already given the nickname of " l'autrichienne " by mesdames the king's aunts. At

the same time her undisguised impatience of the cumbrous court etiquette shocked many people, and her taste for pleasure led her to seek the society of the comte d'Artois and his young and dissolute circle. But the greatest weakness in her position lay in her unsatisfactory relations with her husband. The king, though affectionate, was cold and apathetic, and it was not till seven years after her marriage that there was any possibility of her bearing him an heir. This fact naturally decreased her popularity, and as early as September 1774, was made the subject of offensive pamphlets and the like, as in the case of the affaire Beaumarchais. (See Beaumarchais.)

The end of the period of mourning for the late king was the signal for a succession of gaieties, during which the queen dis- played a passion for amusement and excitement which led to unfortunate results. Being childless, arid with a husband who could not command her respect, her longing for affection led her to form various intimate friendships, above all with the princesse de Lamballe and the comtesse Jules de Polignac, who soon obtained such an empire over her affections that no favour was too great for them to ask, and often to obtain. Thus for the benefit of Madame de Lamballe the queen revived the super- fluous and expensive office of superintendent of her household, which led to constant disagreements and jealousies among her

ladies and offended many important families. In frequenting the salons of her friends the queen not only came in contact with a number of the younger and more dissipated courtiers, whose high play and unseemly amusements she countenanced, but she fell under the influence of various ambitious intriguers, such as the baron de Besenval, the comte de Vaudreuil, the due de Lauzun and the comte d'Adhemar, whose interested manoeuvres she was induced to further by her affection for her favourites. Thus she was often led to interfere for frivolous reasons in public affairs, sometimes with serious results, as in the case of the trial of the comte de Guines (1776), when her interference was responsible for the fall of Turgot. At the same time her extravagance in dress, jewelry and amusements (including the gardens and theatricals at Trianon, of the cost of which such exaggerated reports were spread about) and her presence at horse-races and masked balls in Paris without the king, gave rise to great scandal, which was seized upon by her enemies, among whom were Mes- dames, the count of Provence, and the duke of Orleans and the Palais Royal clique.

At this critical period her brother, the emperor Joseph II., decided to visit France. As the result of his visit he left with the queen a memorandum in which he pointed out to her in plain terms the dangers of her conduct. 1 He also took advant- age of his visit to advise the king, with such success that at last, in 1778, the queen had the hope of becoming a mother. For a time

the emperor's remonstrances had some effect, and after the birth of her daughter, Marie Therese Charlotte (afterwards duchesse d'Angouleme) in December 1778, the queen lived a more quiet life. The death of Maria Theresa (Nov. 29, 1780) deprived her of a wise and devoted friend, and by removing all restraint on the rashness of Joseph II. was bound to increase the dislike of the Austrian alliance and cause embarrassment to Marie- Antoinette. Her position was very much strengthened by the birth (Oct. 22, 1781) of a dauphin, Louis Joseph Xavier Francois, and on the death of Maurepas, which left the king without a chief minister, she might have exerted a considerable influence in public affairs had she taken a consistent interest in them; but her repugnance to serious matters triumphed, and she preferred to occupy herself with the education of her children, to whom she was a wise and devoted mother, 2 and with her friends and amusements at Trianon. Personal motives alone would lead her to interfere in public affairs, especially when it was a question of obtaining places or favours for her favourites and their friends. The influence of the Polignacs was now at its height, and they obtained large sums of money, a dukedom, and many nominations to places. It was Madame de Polignac who obtained the appointment of Calonne as controller-general of the finances, 3 and who succeeded Madame de Guemenee as " governess of the children of France " after the bankruptcy of the prince de Guemenee in 1782. 4 Again, in response to Mercy and Joseph II. 's urgent representations, Marie Antoinette exerted herself on behalf of Austria in the affairs of the opening of the Scheldt (1 783-1 784) and the exchange of Bavaria (1785), in which, though she failed to provoke active interference on the part of France, she succeeded in obtaining the payment of considerable indemnities to Austria, a fact which led to the popular legend of her having sent millions to Austria, and aroused much indignation against her. Later, on the recommendation of Mercy and Vermond, she supported the nomination of Lomenie de Brienne in 1787, an appointment which, though widely approved at the time, was laid to the queen's blame when it ended in failure.

Two more children were born to her; Louis Charles, duke of Normandy, afterwards dauphin, on the 27th of March 1785, and Sophie Helene Beatrix (d. June 19, 1787), on the 9th of July 1786. In 1 785-1 786 the affair of the Diamond Necklace (q.v.)

1 See Arneth, Marie Antoinette, Joseph II. and Leopold II., pp. 1-18,

2 v. the Instructions donnees a la marquise de Tourzel, governess of the children of France, dated the 24th of July, i789,inlaRocheterie and Beaucourt, Letlres de Marie Antoinette, ii. 131.

3 But see Arneth and Flammermont, i. 228, foot-note.

4 This had reflected discredit on the queen, Madame de Guernenee having been one of her intimate friends.

revealed the depth of the hatred which her own follies and the calumnies of her enemies had aroused against her. The public held her responsible for the bankrupt state of the country; and though in 1788, following the popular outcry, she prevailed upon the king to recall Necker, it was impossible for him to avert the Revolution. The year 1789 was one of disaster for Marie Antoin- ette; on the 10th of March her brother Joseph II. died, and on the 4th of June her eldest son. The same year saw the assem- bling of the States-general, which she had dreaded, the taking of the Bastille, and the events leading to the terrible days of the 5th and 6th of October at Versailles and the removal of the royal family to the Tuileries. Then began the negotiations with Mirabeau, whose high estimate of the queen is well-known (e.g. his famous remark, " The king has only one man on his side, and that is his wife "). But the queen was violently prejudiced against him, believing him among other things to be responsible for the events of the 5th and 6th of October, and he never gained her full confidence. She was naturally incapable of seeing the full import of the Revolution, and merely temporised with Mirabeau. She dreaded the thought of civil war; and even when she had realized the necessity for decisive action the king's apathy and indecision made it impossible for her to persuade him to carry into effect Mirabeau's plan of leaving Paris and appealing to the provinces. Her difficulties were increased by the departure of Mercy for the Hague in September 1 790, for Montmorin who now took his place in the negotiations had not her confidence to the same extent. Feeling herself helpless and almost isolated in Paris, she now relied chiefly on her friends outside France — Mercy, Count Axel Fersen, and the baron de Breteuil; and it was by their help and that of Bouille that after the death of Mirabeau, on the 8th of April 1791, the plan was arranged of escaping to Montmedy, which ended in the flight to Varennes (June 21, 1791).

After the return from Varennes the royal family were closely guarded, but in spite of this they still found channels of com- munication with the outside world. The king being sunk in apathy, the task of negotiation devolved upon the queen; but in her inexperience and ignorance of affairs, and the uncertainty of information from abroad, it was hard for her to follow any clear policy. Her courageous bearing during the return from Varennes had greatly impressed Barnave, and he now approached her on behalf of the Feuillants and the constitutional party. For about a year she continued to negotiate with them, forward- ing to Mercy and the emperor

Leopold II. letters and memoranda dictated by them, while at the same time secretly warning her friends not to accept these letters as her own opinions, but to realize that she was dependent on the Constitutionals. 1 She agreed with their plan of an armed congress, and on this idea both she and Fersen insisted with all their might, Fersen leaving Brussels and going on a mission to the emperor to try and gain support and checkmate the imigre's, whose desertion the queen bitterly resented, and whose rashness threatened to frustrate her plans and endanger the lives of her family.

As to the acceptance of the constitution (Sept. 1791), " tissue of absurdities " though the queen thought it, and much as she would have preferred a bolder course, she considered that in the circumstances the king was bound to accept it in order to inspire confidence. 2 Mercy ~was also in correspondence with the Consti- tutionals, and in letter after letter to him and the emperor, the queen, strongly supported by Fersen, insisted that the congress should be formed as soon as possible, her appeals increasing in urgency as she saw that Barnave's party would soon be powerless against the extremists. But owing to the lengthy negotiations of the powers the congress was continually postponed. On the 1st of March 1792 Leopold II. died, and was succeeded by the young Francis II. Marie Antoinette's actions were now directed entirely by Fersen, for she suspected Mercy and the emperor of sacrificing her to the interests of Austria {Fersen, i. 251; Arneth, pp. 254, 256, &c). The declaration of war which

1 Letters of 31st July 1791 to Mercy. Arneth, p. 193 and 194, and letter of 1st August.

■ *Arneth, pp. 196, 203; Klinckowstrom, Fersen, i. 192.*

the king was forced to make (April 20) threw her definitely into opposition to the Revolution, and she betrayed to Mercy and Fersen the plans of the French generals (Arneth, p. 2 59; Fersen, ii. 220, 289, 308, 325, 327). She was now certain that the life of the king was threatened, and the events of the 20th of June added to her terrors. She considered their only hope to lie in the intervention of the powers and in the appeal to force, and endorsed the suggestion of a threatening manifesto 3 which should hold the National Assembly and Paris responsible for the safety of the king and royal family. Immediately after Bruns- wick's manifesto followed the storming of the Tuileries and the removal of the royal family to the Temple (Aug. 10). During all these events and the captivity in the Temple Marie Antoinette showed an unvarying courage and dignity, in spite of her failing health and the illness of her son. After the execution of the king (Jan. 17, 1793) several unsuccessful attempts were made by her friends to rescue her and her children, among others by Jarjayes, Toulan and Lepitre, and the " baron de Batz," and negoti- ations for her release or exchange were even

opened with Danton; but as the allied armies approached her trial and condemnation became a certainty. She had already been separated from her son, the sight of whose ill-treatment added terribly to her suffer- ings; she was now parted from her daughter and Madame Elizabeth, and removed on the 1st of August 1793 to the Concier- gerie. Even here, where she was under the closest guard and subjected to the most offensive espionnage, attempts were made to rescue her, among others Michonis' " Conspiration del'oeillet." On the 14th of October began her trial, her defence being entrusted to Chauveau-Lagarde and Tronson-Ducourdray. Her noble attitude, even in the face of the atrocious accusations of Fouquier-Tinville, commanded the admiration even of her enemies, and her answers during her long examination were clear and skilful. The following were the questions finally put to the jury:—

(1) Is it established that manoeuvres and communications have existed with foreign powers and other external enemies of the re- public, the said manoeuvres, &c, tending to furnish them with assistance in money, give them an entry into French territory, and facilitate the progress of their armies ?

(2) Is Marie Antoinette of Austria, the widow Capet, convicted of having co-operated in these manoeuvres and maintained these communications ?

(3) Is it established that a plot and conspiracy has existed tending to kindle civil war within the republic, by arming the citizens against one another ?

(4) Is Marie Antoinette, the widow Capet, convicted of having participated in this plot and conspiracy ?

The jury decided unanimously in the affirmative, and on the 16th of October 1793 Marie Antoinette was led to the guillotine, leaving behind her a touching letter to Madame Elizabeth, known as her " Testament."

As to the justice of these charges, we have seen how the queen was actually guilty of betraying her country, though it was only natural for her to identify the cause of the monarchy with that of France. To civil war she was consistently opposed, and never ceased to dissociate herself from the plans of the imigres, but here again her very position made her an enemy of the republic. In any case, all her actions had as their aim — firstly, the safe- guarding of the monarchy and the king's position, and later, when she saw this to be impossible, that of securing the safety of her husband and her son.

3 H. Belloc, Marie- Antoinette, pp. 311-312, states that clause VIII. of Brunswick's manifesto was " drafted " by Marie Antoinette, i.e., that the

idea of holding Paris responsible for the safety of the royal family was first suggested by her. He bases this statement entirely upon the queen's letters of July 3rd to Fersen, of July 4th to Mercy, the reception of which Fersen notes in his Journal on July 8th and 9th (Fersen ii. 21). But these letters were obviously the answer to Fersen's letter of June 30th to the queen (Fersen ii. 315), in which he tells her the terms of the manifesto. Moreover, the suggestion of holding the Assembly responsible is to be found as early as in the memo, of the Constitutionals of September the 8th, 1791, and is included in the Instructions of Mallet du Pan (Mems. ed. Sayous, i. 281, and appendix 445). Fersen (Fersen ii. 329, 337, 18th July and 28th July to the queen, and p. 338, 29th July to Taube) states that it was he who drew up the manifesto by means of the marquis de Limon.

712

MARIE DE FRANCE

For a bibliographical study see: M. Tourneux, Marie Antoinette devant I'histoire. Essai bibliographique (2nd ed., Paris, 1901); id. Bibliogr. de la villede Paris . . .(vol. iv. 1906), nos. 20980-21338; also Bibliogr. de femmes cel'ebres (Turin and Paris, 1892, &c). The most important material for her life is to be found in her letters and in the correspondence of Mercy-Argenteau, but a large number of forgeries have found their way into certain of the collections, such as those of Paul Vogt d'Hunolstein (Correspondance inedite de Marie Antoinette, (3rd ed., Paris, 1864), and F. Feuillet des Conches Louis X VI., Marie Antoinette et Madame Elisabeth, leltres et documents inidits (6 vols., Paris, 1864-1873), while most of the works on Marie Antoinette published before the appearance of Arneth's publications (1865, &c.) are based partly on these forgeries. For a detailed examination of the question of the authenticity of the letters see the introduction to Leltres de Marie Antoinette. Recueil des lettres authentiques de la reine, publie pour la societe d'histoire contemporaine, par M. de la Rocheterie et le marquis de Beaucourt (2 vols., Paris, 1 895-1 896); also A. Geffroy, Gustave III. et la cour de France (2 vols., Paris, 1869), vol. ii., appendix. Of the highest importance are the letters from the archives of Vienna published by Alfred von Arneth and others : A. von Arneth, Maria Theresia und Marie Antoinette, ihr Briefwechsel 1770-1780 (Paris and Vienna, 1865) ; id., Marie Antoinette, Joseph II. und Leopold II. ihr Briefwechsel (Leipzig, Paris and Vienna, 1866); id. and A. Geffroy, Correspondance secrete de Marie-Therese et du comte de Mercy-Argenteaii (3 vols., Paris, 1874) ; id. and J. Flammer- mont, Correspondance secrete du comte de Mercy-Argenteau avec Joseph II. et le prince de Kaunitz (2 vols., Paris, 1889-1891); for further letters see Comte de Reiset, Lettres de la reine Marie Antoin- ette a la landgrave Louise de Hesse-Darmstadt (1865); id. Lettres inedites de Marie Antoinette et de Marie-Clotilde, reine

de Sardaigne (1877). See also Correspondance entre le comte de Mirabeau et le comte de la March, 1789-1791, recueillie . . . par F. de Bacourt (3 vols., Paris, 1857), and Baron R. M. de Klinckowstrom, Le Comte de Fersen et la cour de France (2 vols., Paris, 1877-1878). Memoirs: See most contemporary memoirs, e.g. those of the prince de Ligne, Choiseul, Segur, Bouilfe, Dumouriez, &c. Some, such as those of Madame Campan, Weber, Clery, Mme de Tourzel, are prejudiced in her favour ; others, such as those of Besenval, Lauzun, Soulavie, are equally prejudiced against her. M. Tourneux (op. cit.) discusses the authen- ticity of the memoirs of Tilly, CliSry, Lauzun, &c. The chief of these memoirs are: Mme Campan, Memoires sur la vie privie de Marie Antoinette (5th ed., 2 vols., Paris, 1823, Eng. trans. 1887), the in- accuracy of which is clearly demonstrated by J. Flammermont in Etudes critiques sur les sources de I'histoire du xviii' siecle: Les Memoires de Mme Campan, in the Bulletin de la Faculte des lettres de Poitiers (4th year, 1886, pp. 56, 109) ; J. Weber, Memoires concern- ant Marie Antoinette (3 vols., London, 1 804-1 809; Eng. trans., 3 vols., London, 1 805-1 806); Memoires de M. le baron de Besenval (3 vols., Paris, 1805); Memoires de M. le due de Lauzun (2nd ed., 2 vols., Paris, 1822); E. Bavoux, Mems. secrets de J. M. Augeard, secretaire des commandements de la reine M. Antoinette (Paris, 1866) ; Mme Vigee-Le-Brun, Mes souvenirs (2 vols., Paris, 1867); Memoires de Mme la duchesse de Tourzel, ed. by the due de Cars (2 vols., Paris, 1883); Memoires de la baronne d'Oberkirch (2 vols., Paris, 1853).

General Works: — See the general works on the period and on Louis XVI., and bibliographies to articles Louis XVI. and French Revolution. A. Sorel, L' Europe et la Rev. jr. (ii. passim) contains a good estimate of Marie Antoinette. See also E. and J. de Gon- court, Histoire de Marie Antoinette (Paris, 1859); P. de Nolhac, Marie Antoinette, dauphine (Paris, 1897) ; id. La Reine Marie Antoin- ette (8th ed., 1898), which gives good descriptions of Versailles, Trianon, &c. ; M. de la Rocheterie, Histoire de Marie Antoinette (2 vols., Paris, 1890); A. L. Bicknell, The Story of Marie Antoinette; R. Frolss, Konigin Marie Antoinette, Bilder aus ihrem Leben (Leipzig, 1894); G. Desjardins, Le Petit-Trianon (Versailles, 1885). For her trial and death, see E. Campardon, Marie Antoinette d, la Con- ciergerie (1863). H. Belloc's Marie Antoinette (London, 1909) is very biassed and sometimes misleading. (C. B. P.)

MARIE DE FRANCE (fl. c. 11 75-1 190), French poet and fabulist. In the introduction (c. 1 240) to his Vie Seint Edmund le Rey l Denis Pyrarhus says she was one of the most popular of authors with counts, barons and knights, but especially with ladies. She is also mentioned by the anonymous author of the Couronnement Renart. Her lays were translated into Nor- wegian 2 by order of Haakon IV. ; and Thomas Chestre, who is generally supposed to have lived in the reign of Henry VI., gave a version of Lanval?

Very little is known about her history, and until comparatively recently the very century in which she lived remained a matter of dispute. In spite of her own state- ment in the epilogue to her fables: " Marie ai num, si suis de

1 Cotton MS. Domit. A xi. (British Museum), edited for the Rolls Series by Thomas Arnold in 1892.

- *Edited by R. Keyser and C. R. Unger as Strengleikar eSa LiotSabok (Christiania, 1850).*

3 Chestre's Sir Launfal was printed by J. Ritson in Ancient English Metrical Romances (1802); and by L. Erling (Kempten, 1883).

France," generally interpreted to mean that Marie was a native of the lie de France, she seems to have been of Norman origin, and certainly spent most of her life in England. Her language, however, shows little trace of Anglo-Norman provincialism. Like Wace, she used a literary dialect which probably differed very widely from common Norman speech. The manuscripts in which Marie's poems are preserved date from the late 13 th or even the 14th century, but the language fixes the date of the poems in the second half of the 12th century. The Lais are dedicated to an unknown king, who is identified as Henry II. of England; and the fables, her Ysopet, were written according to the Epilogus for a Count William, generally recognized to be William Longsword, earl of Salisbury. The author of Couronne- ment Renart, says that Marie had dedicated her poem to the count William to whom the unknown poet addresses himself. This is William of Dampierre (d. 1251), the husband of the countess Margaret of Flanders, and his identification with Marie's count William is almost certainly an error. Marie lived and wrote at the court of Henry II., which was very literary and purely French. Queen Eleanor was a Provencal, and belonged to a family in which the patronage of poetry was a tradition. There is no evidence to show whether Marie was of noble origin or simply pursued the profession of a trouvere for her living.

The origin of the lais has been the subject of much discussion. Marie herself says that she had heard them sung by Breton min- strels. It seems probable that it is the lesser or French Brittany from which the stories were derived, though something may be due to Welsh and Cornish sources. Gaston Paris (Romania,vol. xv.) maintained that Marie had heard the stories from English minstrels, who had assimilated the Celtic legends. In any case the Breton lays offer abundant evidence of traditions from Scandinavian and Oriental sources. The Guigemar of Marie de France presents marked analogies with the ordinary Oriental romance of escape from a harem, for instance, with details superadded from classical mythology. Marie seems to have contented herself with giving new literary form to the stories she heard

by turning them into Norman octosyllabic verse, and apparently made few radical changes from her originals. Joseph Bedier thinks that the lays of the Breton minstrels were prose recitals interspersed with short lyrics something after the manner of the cante-fable of Aucassin et Nicoletle. Marie's task was to give these cante-fables a narrative form destined to be read rather than sung or recited.

The Lais which may be definitely attributed to Marie are: Guigemar, Equitan, Le Frene, Le Bisclavret (the werewolf), Les Deux amants, Laustic, Chaitivel, Lanval, Le Chevrefeuille, Milan, Yonec and Eliduc. The other similar lays are anonymous except the Lai d'Ignaure by Renant and the Lai du cor oi Robert Biket, two authors otherwise unknown. They vary in length from some twelve thousand lines to about a hundred. Le Chevrefeuille, a short episode of the Tristan story, telling how Tristan makes known his presence in the wood to Iseult, is the best known of them all. Laustic 4 (Le Rossignol) is almost as short and simple. In Yonec a mysterious bird visits the lady kept in durance by an old husband, and is turned into a valiant knight. The lover is killed by the husband, but in due time is avenged by his son. The scene of the story is partly laid in Chester, but the fable in slightly different forms occurs in the folk-lore of many countries. 6 Lanval 6 is a fairy story, and the hero vanishes eventually with his fairy princess to the island of Avallon or Avilion. Eliduc is more elaborately planned than any of these, and the action is divided between Exeter and Brittany. Here again the story of the man with two brides is not new, but the three characters of the story are so dealt with that each wins the reader's sympathy. The resignation of the wife of Eliduc and her reception of the new bride find a parallel in another of the lays,

4 The soi-disant Breton folk-song "Ann Eostik " on the same subject translated by La Villemarque in his Barzaz-Breiz (1840) is rejected by competent authorities. Similar stories in which the nightingale is slain by an angry husband occur in Renard contrefait and in the Gesta Romanorum.

6 Cf. the Oiseau bleu of Mme d'Aulnoy.

6 Sir Lambewell in Bishop Percy's Folio MS. (ed. Hales and Furni- vall, vol. ii., 1867), is another version of Lanval, and differs from Chestre's. For the relations between Lanval and the Lai de Graelent, wrongly ascribed to Marie by Roquefort, see W. H. Schpfield, " The Lays of Graelent and Lanval, and the story of Wayland," in the Publications of the Mod. Lang. Assoc, of America, vol. xv. (Baltimore,

1900).

Le Frine. The story is in both cases more human and less repugnant than the, in some respects, similar story of Griselda.

Marie's Ysopet is translated from an English original which she erroneously attributed to Alfred the Great, who had, she said, translated it from the Latin. The collection includes many fables that have come down from Phaedrus, some Oriental stories derived from Jewish sources, with many popular apologues that belong to the Renard cycle, and differ from those of older origin in that they are intended to amuse rather than to instruct. Marie describes the misery of the poor under the feudal regime, but she preaches resigna- tion rather than revolt. The popularity of this collection is attested by the twenty-three MSS. of it that have been preserved.

Another poem attributed to Marie de France is L'Espurgatoire Seint Patriz, a translation from the Tractatus de purgatorio S. Patricii (c. 1 1 85) of Henri de Salterey, which brings her activity down almost to the close of the century.

See Die Fabeln der Marie de France (1898), edited by Karl Warnke with the help of materials left by Eduard Mall ; and Die Lais der Marie de France (2nd ed., 1900), edited by Karl Warnke, with comparative notes by Reinhold Kohler; the two works being vols, vi. and Hi. of the Bibliotheca Normannica of Hermann Suchier; also an extremely interesting article by Joseph Bedier in the Revue des deux mondes (Oct. 1891); another by Alice Kemp-Welch in the Nineteenth Century (Dec. 1907). For an analysis of the Lais see Revue de philologie francaise, viii. 161 seq. ; Karl Warnke, Die Quellen der Esope der Marie de France (1900). The Lais were first published in 1819 by B. de Roquefort. L'Espurgatoire Seint Patriz was edited by T. A. Jenkins (Philadelphia, 1894). Some of the Lays were paraphrased by Arthur O'Shaughnessy in his Lays of France

(1872).

MARIE DE' MEDICI (1573-1642), queen consort and queen regent of France, daughter of Francis de' Medici, grand duke of Tuscany, and Joanna, an Austrian archduchess, was born in Florence on the 26th of April 1573. After Joanna's death in 1578 duke Francis married the notorious Bianca Capello, and the grand-ducal children were brought up away from their father at the Pitti Palace in Florence, where after the death of her brother and sister and the marriage of her elder sister Eleonora, duchess of Mantua, a companion was chosen for Marie, this being Leonora Dori, afterwards known as Leonora Galigai'. She received a good education in company with her half-brother Antonio. After many projects of marriage for Marie had failed Henry IV. of France, who was under great monetary obligations to the house of Medici, offered himself as a suitor although his marriage with Marguerite de Valois was not yet dissolved; but the marriage was not celebrated until October 1600. Her eldest son, the future Louis XIII., was born at Fontainebleau in Sep- tember of the next year; the other children who survived were Gaston duke of Orleans; Elizabeth queen of Spain; Christine duchess of Savoy; and Henrietta Maria queen of England. During her husband's lifetime Marie de' Medici showed little sign of political taste or ability; but after his murder in 1610 when she became regent, she devoted herself to affairs with unfailing regularity and developed an inherited passion for power. She gave her confidence chiefly to Concini, the husband of Leonora Galigai, who squandered the public money and secured a series of important charges with the title of Marechal d'Ancre. Under the regent's lax and capricious rule the princes of the blood and the great nobles of the kingdom revolted; and the queen, too weak to assert her authority, consented at Sainte Menehould (May 15, 1614) to buy off the discontented princes. In 1616 her policy was strengthened by the accession to her councils of Richelieu, who had come to the front at the meeting of the states general in 1614 ; but Louis XIII., who was now sixteen years old, was determined to throw off the tutelage of his mother and Con- cini. By his orders Concini was murdered, Leonora Galigai was tried for sorcery and beheaded, Richelieu was banished to his bishopric, and the queen was exiled to Blois. After two years of virtual imprisonment she escaped in 1619 and became the centre of a new revolt. Louis XIII. easily dispersed the rebels, but through the mediation of Richelieu was reconciled with his mother, who was allowed to hold a small court at Angers, and resumed her place in the royal council in 1621. But differences between her and the cardinal rapidly arose, and the queen mother intrigued to drive Richelieu again from court. For a single day the journee des dupes, the 12th of November 1630, she seemed to have succeeded; but the triumph of Richelieu was followed

by her exile to Compiegne, whence she escaped in 163 1 to Brussels. From that time till her death at Cologne on the 3rd of July 1642 she intrigued in

vain against the cardinal.

Among contemporary authorities for the history of Marie de' Medici, see Mathieu de Morgues, Deux faces de la vie et de la mort de Marie de Medicis (Antwerp, 1643) ; J. B. Matthieu, Moge historial de Marie de Medicis (Paris, 1626) ; Florentin du Ruau, Le Tableau de la regence de Marie de Medicis (Poitiers, 1615) ; F. E. Mezeray, Histoire de la mere et dufils, ou de Marie de Medicis et de Louis XIII. (Amster- dam, 1730); and A. P.. Lord, The Regency of Marie de Medicis (London, 1904). For the political history see the bibliographies to Henry IV. and Louis XIII.

There are lives by Thiroux d'Arconville (3 vols., Paris, 1774) by Miss J. S. H. Pardoe (London, 1852, and again 1890); and by B. Zeller, Henri IV. el Marie de Medicis (Paris, 1877). There is a technical discussion of the causes of her death in A. Masson's La Sorcellerie et la science des poisons au xvii' si'ecle (Paris, 1904), and the minutest details of her private life are in L. Batiffol's La Vie intime d'une reine de France (Paris, 1906; Eng. trans., 1908).

MARIE GALANTE, an island in the French West Indies. It lies in 15° 55′ N. and 61° 17′ W., 16 m. S.E. of Guadeloupe, of which it is a dependency. It is nearly circular in shape and 55 sq. m. in area. A rocky limestone plateau, rising in the east to a height of 675 ft., occupies the centre of the island, and from it the land descends in a series of well-wooded terraces to the sea. The shores are rocky, there are no harbours, and the roadstead off Grand Bourg is difficult of access, owing to the surrounding reefs. The climate is healthy and the soil rich; sugar, coffee and cotton being the chief products. The largest town is Grand Bourg (pop. 6901) on the south-west coast. The island was dis- covered by Columbus in 1493, and received its name from the vessel on which he was sailing. The French who settled here in 1648 suffered numerous attacks both from the Dutch and the British, but since 1766, except for a short period of British rule in the early part of the 19th century, they have held undisturbed possession.

MARIE LESZCZYNSKA (1703-1768), queen consort of France, was born at Breslau on the 23rd of June 1703, being the daughter of Stanislas Leszczynski (who in 1704 became king of Poland) and of Catherine Opalinska. During a temporary flight from Warsaw the child was lost, and eventu- ally discovered in a stable; on another occasion she was for safety's sake hidden in an oven. In his exile Stanislas found his chief consolation in superintending the education of his daughter. Madame de Prie first suggested the Polish princess as a bride for Louis duke of Bourbon, but she was soon betrothed not to him but to Louis XV., a step which was the outcome of the jealousies of the houses of Conde and Orleans, and was everywhere regarded as a misalliance for the French king. The marriage

took place at Fontainebleau on the Jth of September 1725. Marie's one attempt to interfere in politics, an effort to prevent the disgrace of the duke of Bourbon, was the beginning of her husband's alienation from her; and after the birth of her seventh child Louise, Marie was practically deserted by Louis, who openly avowed his liaison with Louise de Nesle, comtesse de Mailly, who was replaced in turn by her sisters Pauline marquise de Vintimille, and Marie Anne, duchess de Chateauroux, and these by Madame de Pompadour. In the meantime the queen saw her father Stanislas established in Lorraine, and the affectionate intimacy which she maintained with him was the chief consolation of her harassed life. After a momentary reconciliation with Louis during his illness at Metz in 1744, Marie shut herself up more closely with her own circle of friends until her death at Versailles on the 24th of June 1 768.

See V. des Diguieres, Lettres inedites de la reine Marie Leczinska et de la duchesse de Luynes au President Henault (1886) ; Marquise des Reaux, Le Roi Stanislas et Marie Leczinska (1895); P. de Raynal, Le Mariage d'un roi (Paris, 1887); H. Gauthier Villars, Le Mariage de Louis XV. d'apres des documents nouveaux (1900); P. de Nolhac, La Reine Marie Leczinska (1900) and Louis X V. et Marie Leczynska (1900); P. Boy6, Lettres du roi Stanislas a Marie Leszczynska 1754- 1766 (Paris and Nancy, 1901); and C. Stryienski's book on Marie Josephs de Saxe (La Mere des trois derniers Bourbons, Paris, 1902). See also the memoirs of President Henault and of the due de Luynes (ed. Dussieux and Souli6, i860, &c).

7i4

MARIE LOUISE— MARIENBERG

MARIE LOUISE (i 791-1847), second wife of Napoleon I., was the daughter of Francis I., emperor of Austria, and of the princess Theresa of Naples, and was born on the 1 2th of Decem- ber 1791. Her disposition, fresh and natural but lacking the qualities that make for distinction, gave no promise of eminence until reasons of state brought Napoleon shortly after his divorce of Josephine to sue for her hand (see Napoleon and Josephine). It is probable, though not quite certain, that the first suggestions as to this marriage alliance emanated secretly from the Austrian chancellor, Metternich. The prince de Ligne claimed to have been instrumental in arranging it. In any case the proposal was well received at Paris both by Napoleon and by his ministers; and though there were difficulties respecting the divorce, of Josephine, yet these were surmounted in a way satisfactory to the emperor and the prelates of Austria. The marriage took place by proxy in the church of St Augustine, Vienna, on the nth of March 1810. The new empress was escorted into France by Queen Caroline Murat, for whom she soon conceived a feeling of distrust. The

civil and religious contracts took place at Paris early in April, and during the honeymoon, spent at the palace of Compiegne, the emperor showed the greatest regard for his wife. " He is so evidently in love with her," wrote Metternich " that he cannot conceal his feelings, and all his customary ways of life are subordinate to her wishes." His joy was complete when on the 20th of March 181 1 she bore him a son who was destined to bear the empty titles of " king of Rome " and " Napoleon II." The regard of Napoleon for his consort was evidenced shortly before the birth of this prince, when he bade the physicians, if the lives of the mother and of the child could not both be saved, to spare her life. Under Marie Louise the etiquette of the court of France became more stately and the ritual of religious ceremonies more elaborate. Before the campaign of 181 2 she accompanied the emperor to Dresden; but after that scene of splendour misfortunes crowded upon Napoleon. In January 1814 he appointed her to act as regent of France (with Joseph Bonaparte as lieutenant-general) during his absence in the field.

At the time of Napoleon's first abdication (April n, 1814), Joseph and Jerome Bonaparte tried to keep the empress under some measure of restraint at Blois; but she succeeded in reaching her father the emperor Francis while Napoleon was on his way to Elba. She, along with her son, was escorted into Austria by Count von Neipperg, and refused to comply with the entreaties and commands of Napoleon to proceed to Elba; and her aliena- tion from him was completed when he ventured to threaten her with a forcible abduction if she did not obey. During the Hundred Days she remained in Austria and manifested no desire for the success of Napoleon in France. At the Congress of Vienna the Powers awarded to her and her son the duchies of Parma, Piacenza and Guastalla, in conformity with the terms of the treaty of Fontainebleau (March, 1814) ; in spite of the determined opposition of Louis XVIII. she gained this right for herself owing largely to the support of the emperor Alexander, but she failed to make good the claims of her son to the inheritance (see Napoleon II.). She proceeded alone to Parma, where she fell more and more under the influence of the count von Neipperg, and had to acquiesce in the title " duke of Reichstadt " accorded to her son. Long before the tidings of the death of Napoleon at St Helena reached her she was living in intimate relations with Neipperg at Parma, and bore a son to him not long after that event. Napoleon on the other hand spoke of her in his will with marked tenderness, and both excused and forgave her infidelity to him. Thereafter Neipperg became her morganatic husband; and they had other children. In 1832, at the time of the last illness of the duke of Reichstadt, she visited him at Vienna and was there at the time of his death; but in other respects she shook off all association with Napoleon. Her rule in Parma, conjointly with Neipperg, was characterized by a clemency and moderation which

were lacking in the other Italian states in that time of reaction. She preserved some of the

Napoleonic laws and institutions; in 181 7 she established the

equality of women in heritage, and ordered the compilation of

a civil code which was promulgated in January 1820. The penal code of November 182 1 abolished many odious customs and punishments of the old code, and allowed publicity in criminal trials. On the death of Neipperg in 1829 his place was taken by Baron Werklein, whose influence was hostile to popular liberty. During the popular movements of 183 1 Marie Louise had to take refuge with the Austrian garrison at Piacenza; on the restoration of her rule by the Austrians its character deteriorated, Parma becoming an outwork of the Austrian empire. She died at Vienna on the 18th of December 1847.

See Correspondence de Marie Louise 1799-1847 (Vienna, 1887); J. A. Baron von Helfert, Marie Louise (Vienna, 1873) ; E. Wertheimer, Die Heirath der Erzherzogin Marie Louise mil Napoleon I. (Vienna, 1882); and The Duke of Reichstadt (Eng. ed., London, 1905). See also the Memoirs of Bausset, Mme Durand MiSneval and Metternich ; and Max Billard, The Marriage Ventures of Marie Louise, English version by Evelyn duchess of Wellington (19 10).

MARIENBAD, a town of Bohemia, Austria, 115 m. W. of Prague by rail. Pop. (1900), 4588. It is one of the most fre- quented watering-places of Europe, lying on the outskirts of the Kaiserwald at an altitude of 2093 ft., and is 40 m. S.W. of Carlsbad by rail. Marienbad is enclosed on all sides except the south by gently sloping hills clad with fragrant pine forests, which are intersected by lovely walks. The principal buildings are: the Roman Catholic church, which was completed in 1851; the English church, the theatre, the Kurhaus, built in 1901, and several bathing establishments and hospitals. The mineral springs, which belong to the adjoining abbey of Tepl, are eight in number, and are used both for bathing and drinking, except the Marienquelle, which is used only for bathing. Some of them, like the Kreuzbrunnen and the Ferdinandsbrunnen, contain alkaline-saline waters which resemble those of Carlsbad, except that they are cold and contain nearly twice the quantity of purgative salts. Others, like the Ambrosiusbrunnen and the Karolinenbrunnen, are among the strongest iron waters in the world, while the Rudolfsbrunnen is an earthy-alkaline spring. The waters are used in cases of liver affections, gout, diabetes and obesity; and the patients must conform during the cure to a strictly regulated diet. Besides the mineral water baths there are also moor or mud-baths, and the peat used for these baths is the richest in iron in the world. About

1,000,000 bottles of mineral water are exported annually.

Amongst the places of interest round Marienbad is the basaltic rock of Podhorn (2776 ft.), situated about 3 m. to the east, from which an extensive view of the Bohmerwald, Fichtelgebirge and Erzgebirge is obtained. About 7 m. in the same direction lies the old and wealthy abbey of Tepl, founded in 1 193. The actual building dates from the end of the 17th and the beginning of the 1 8th century, and contains a fine library with a collection of rare manuscripts and incunabula; near it is the small and old town of Tepl (pop. 2789). To the north-east of Marienbad lies the small watering-place of Konigswart; near it is a castle belonging since 16 18 to the princes of Metternich, which contains an interesting museum, created by the famous Austrian states- man in the first part of the 19th century. It contains, besides a fine library, a collection of the presents he received during bis long career; numerous autographs, and other historical relics, a collection of rare coins, armour, portraits and various minerals.

Marienbad is among the youngest of the Bohemian watering- places, although its springs were known from of old. They appear in a document dating from 1341, where they are called " the Auschowitzer springs belonging to the abbey of Tepl;" but it was only through the efforts of Dr Josef Nehr, the doctor of the abbey, who from 1779 until his death in 1820 worked hard to demonstrate the curative properties of the springs, that the waters began to be used for medicinal purposes. The place obtained its actual name of Marienbad in 1808; became a water- ing-place in 1818, and received its charter as a town in 1868.

See Lang, Fiihrer durch Marienbad und Umgebung (Marienbad. 1902); and Kisch, Marienbad, seine Umgebung und Heilmittel (Marienbad, 1895).

MARIENBERG, a town of Germany, in the kingdom of Saxony 16 m. S.E. of Chemnitz on the Floha-Reitzenhain railway.

Pop. (1905), 7603. It has an Evangelical church, a Roman Catholic church, a non-commissioned officers' school and a pre- paratory school; and the industries comprise wool-spinning, flax- dressing, the making of lace, toys and cigars, and silver-mining. MARIENBURG (Polish, Malborg), a town of Germany, in the Prussian province of West Prussia, 30 m. by rail to the S.E. of Danzig in a fertile plain on the right bank of the Nogat, a channel of the Vistula, here spanned by a handsome railway bridge and by a bridge of boats. Pop. (1905), 13,095. Marien- burg contains large

chemical wool-cleaning works and several other factories, carries on a considerable trade in grain, wood, linen, feathers and brushes, and is the seat of important cattle, horse and wool markets. Its educational institutions include a gymnasium and a Protestant normal school. In the old market-place, many of the houses in which are built with arcades, stands a Gothic town-hall, dating from the end of the T4th century. The town is also embellished with a fine statue of Frederick the Great, who added this district to Prussia, and a monument commemorating the war of 1870-71. Marienburg is chiefly interesting from its having been for a century and a half the residence of the grand masters of the Teutonic order. The large castle of the order here was originally founded in 1274 as the seat of a simple commandery against the pagan Prussians, but in r309 the headquarters of the grand master were trans- ferred hither from Venice, and the " Marienburger Schloss " soon became one of the largest and most strongly fortified buildings in Germany. On the decline of the order in the middle of the 15th century, the castle passed into the hands of the Poles, by whom it was allowed to fall into neglect and decay. It came into the possession of Prussia in 1772, and was carefully restored at the beginning of the 19th century. This interesting and curious building consists of three parts, the Alt- or Hochschloss, the Mittelschloss, and the Vorburg. It is built of brick, in a style of architecture peculiar to the Baltic provinces, and is undoubtedly one of the most important secular buildings of the middle ages in Germany.

Of the numerous monographs published in Germany on the castle of Marienburg, it will suffice to mention here Btisching's Schloss der deutschen Ritter zu Marienburg (Berlin, 1828); Voigt's Geschichte von Marienburg (Konigsberg, 1824); Bergau's Ordenshaupthaus Marienburg (Berlin, 1871); and Steinbrecht, Schloss Marienburg in Preussen (8th ed., Berlin, 1905).

MARIENWERDER, a town of Germany, in the Prussian province of West Prussia, 3 m. E. of the Vistula, 23 m. S. of Marienburg by rail. Pop. (1905), 10,258. The town was founded in the year 1233 by the Teutonic order. It has a cathedral of the same century, a triple Gothic edifice, restored in 1874 and containing the tombs of several grand masters of the Teutonic order; a (Gothic) town-hall (1880); a Roman Catholic basilica (1858); a non-commissioned officers' school; a monument of the war of 1870-71 (1897); an archaeological collection; and a seminary for female teachers. The industries include iron- foundries, saw-mills, sugar-refineries, breweries and printing- works.

MARIE THERESE (1638-1683), queen consort of France, was born on the 10th of September 1638 at the Escurial, being the daughter of Philip IV. of Spain and Elizabeth of France. By pretending to seek a bride for his master

in Margaret of Savoy, Mazarin had induced the king of Spain to make proposals for the marriage of his daughter with Louis XIV., and the treaty of the Pyrenees in 1659 stipulated for her marriage with the French king, Marie renouncing any claim to the Spanish succession. As the treaty, however, hinged on the payment of her dowry, which was practically impossible for Spain, Mazarin could evade the other terms of the contract. Marie Therese was married in June 1660, when Philip IV. with his whole court accompanied the bride to the Isle of Pheasants in the Bidassoa, where she was met by Louis. The new queen's amiability and her un- doubted virtues failed to secure her husband's regard and affec- tion. She saw herself neglected in turn for Louise de la Valliere, Mme. de Montespan and others; but Marie Therese was too pious and too humble openly to resent the position in which she

was placed by the king's avowed infidelities. With the growing influence of Madame de Maintenon over his mind and affections he bestowed more attention on his wife, which she repaid by lavishing kindness on the mistress. She had no part in political affairs except in 1672, when she acted as regent during Louis XIV. 's campaign in Holland. She died on the 30th of July 1683 at Versailles, not without suspicion of foul play on the part of her doctors. Of her six children only one survived her, the dauphin Louis, who died in 1711.

See the funeral oration of Bossuet (Paris, 1684), E. Ducere, Le Mariage de Louis XIV. d'apres les contemporains el des documents inedits (Bayonne, 1905) ; Dr Cabanes, Les Morts mysterieuses de I'histoire (1900), and the literature dealing with her rivals Louise de la Valliere, Madame de Montespan and Madame de Maintenon.

MARIETTA, a city and the county-seat of Cobb county, Georgia, U.S.A., in the N.W. of the state, about 17 m. N.W. of Atlanta. Pop. (1890), 3384; (1900), 4446, of whom 1928 were negroes; (1910), 5949. The city is served by the Louisville & Nashville, the Nashville, Chattanooga & St. Louis, and the Western & Atlantic railways, and is connected with Atlanta by an electric line. Marietta is situated about 1118 ft. above the sea, has a good climate, and is both a summer and a winter resort. The principal industries are the manufacture of chairs and paper, and the preparation of marble for the markets; there are also locomotive works, planing mills, a canning factory, a knitting mill, &c. At Marietta there is a national cemetery, in which more than 10,000 Federal soldiers are buried, and at Kenesaw Mountain (1809 ft.), about 25 m. west of the city, one of the fiercest battles of the Civil War was fought. After the Confed- erate retreat from Dalton in May 1864, General William T. Sherman, the Federal commander, made Marietta his next intermediate point in his Atlanta campaign, and the Confederate commander, General Joseph E. Johnston,

established a line of defence west of the town. After several preliminary engage- ments Sherman on the 26th and 27th of June made repeated unsuccessful attempts to drive trie Confederates from their defences at Kenesaw Mountain; he then resorted to a flanking movement which forced the Confederate general to retire (July 2) toward Atlanta. Marietta was settled about 1840, and was chartered as a city in 1852.

MARIETTA, a city and the county-seat of Washington county, Ohio, U.S.A., on the Ohio River, at the mouth of the Muskingum, about 115 m. S.E. of Columbus. Pop. (1890), 8273; (1900), 13,348, including 679 foreign-born and 361 negroes; (1910), 12,923. It is served by the Pennsylvania (Marietta Division), the Balti- more & Ohio (Marietta & Parkersburg, Marietta & Zanesville, and Ohio River divisions) and the Marietta, Columbus & Cleveland railways, and by steamboat lines to several river ports; a bridge across the Ohio connects it with Williamstown, West Virginia. The city is in a hilly country of much natural beauty, and is of considerable historic interest. On the banks of the Muskingum is a public park, facing which stood the oldest church in the state; this was burned in 1905, but was subsequently rebuilt in the old style. Near by are some 18th century buildings, some interest- ing earthworks of the " mound-builders," and a cemetery in which are buried many soldiers who fought in the War of Independence. Marietta is the seat of Marietta College, dating from 1830, which in 1908 had more than 500 students. It possesses a library of 60,000 volumes, including some rare collections, especially the Stimson collection of books bearing on the history of the North- West Territory. Petroleum, coal, and iron-ore abound in the neighbouring region, and the city has a considerable trade in these and in its manufactures of chairs, leather, flour, carriages, wagons, boats, boilers, bricks and glass. In 1905 the factory products were valued at $2,599,287.

Marietta, named in honour of Marie Antoinette, is the oldest settlement in the state and in the North-west Territory. It was founded in 1788 by a company of Revolutionary officers from New England under the leadership of General Rufus Putnam, and in the same year the North- West Territory was formally organized here. The pseudo-classicism of the period of Marietta's foundation is indicated bv the names — Capitolium for one of

the public squares, Sacra Via for one of the principal streets, and Campus Martins for the fortification. The settlement was incorporated as a town in 1800 and chartered as a city in 1852. In 1890 the village of Harmar, including the site on which Fort Harmar was built in 1785, was annexed.

See Henry Howe, Historical Collections of Ohio (Columbus, 1891).

MARIETTE, AUGUSTE FERDINAND FRANCOIS (1821-1881), French Egyptologist, was born on the nth of February 1821 at Boulogne, where his father was town clerk. Educated at the Boulogne municipal college, where he distinguished himself and showed much artistic talent, he went to England in 1839 when eighteen as professor of French and drawing at a boys' school at Stratford-on-Avon. In 1840 he became pattern-designer to a ribbon manufacturer at Coventry; but weary of ill-paid exile he returned the same year to Boulogne, and in 1841 took his degree at Douai. He now became a professor at his old college, and for some years supplemented his salary by giving private lessons and writing on historical and archaeological subjects for local periodicals. Meanwhile his cousin Nestor L'Hote, the friend and fellow-traveller of Champollion, died, and upon Mariette devolved the task of sorting the papers of the deceased savant. He thenceforth became passionately interested in Egyptology, devoted himself to the study of hieroglyphs and Coptic, and in 1847 published a Catalogue analytique of the Egyptian Gallery of the Boulogne Museum; in 1849, being appointed to a subordinate position in the Louvre, he left Boulogne for Paris. Entrusted with a government mission for the purpose of seeking and purchasing Coptic, Syriac, Arabic and Ethiopic MSS. for the national collection, he started for Egypt in 1850; and soon after his arrival he made his celebrated discovery of the ruins of the Serapeum and the subterraneous catacombs of the Apisbulls. His original mission being aban- doned, funds were now advanced for the prosecution of his researches, and he remained in Egypt for four years, excavating, discovering and despatching archaeological treasures to the Louvre, of which museum he was on his return appointed an assistant conservator. In 1858 he accepted the position of conservator of Egyptian monuments to the ex-khedive, Ismail Pasha, and removed with his family to Cairo. His history thenceforth becomes a chronicle of unwearied exploration and brilliant success. The museum at Bula was founded immedi- ately. The pyramid-fields of Memphis and Sakkara, and the necropolis of Meydum, and those of Abydos and Thebes were examined; the great temples of Dendera and Edfu were dis- interred; important excavations were carried out at Karnak, Medinet-Habu and Deir el-Bahri; Tanis (the Zoan of the Bible) was partially explored in the Delta; and even Gebel Barkal in the Sudan. The Sphinx was bared to the rock-level, and the famous granite and alabaster monument miscalled the " Temple of the Sphinx " was discovered. Mariette was raised successively to the rank of bey and pasha in his own service. Honours and orders were showered on him: the Legion of Honour and the Medjidie in 1852; the Red Eagle (first class) of Prussia in 1855; the Italian order of SS. Maurice and Lazarus in 1857; and the Austrian order of Francis-Joseph in 1858. In 1873 the Academy of Inscriptions decreed to him the biennial prize of

20,000 francs, and in 1878 he was elected a member of the Institute. He was also an honorary member of most of the learned societies of Europe. In 1877 his health broke down through overwork. He lingered for a few years, working to the last, and died at Cairo on the 19th of January 1881.

His chief published works are: Le Serapeum de Memphis (1857 and following years) ; Denderah, five folios and one 4to (1873-1875) ; Abydos, two folios and one 4to (1870-1880); Karnak, folio and 4to (1875) ; Deir el-Bahari, folio and 4to (1877) ; Listes geographiques des pylones de Karnak, folio (1875): Catalogue du Musee de Boulaq (six editions 1864-1876) ; Aper$u de I'histoire d'£.gypte (four editions, 1864-1874, &c.) ; Les Mastabas de Vancien empire (edited by Maspero) (1883). See " Notice biographique," by Maspero in Auguste Mariette. CEuvres diver ses (tome 1, Paris, 1904), and art. Egypt: Exploration and Research.

MARIGNAC, JEAN CHARLES GALISSARD DE (1817-1894), Swiss chemist, was born at Geneva on the 24th of April 181 7.

When sixteen years old he began to attend the ficole Poly- technique in Paris, and from 1837 to 1839 studied at the Ecole des Mines. Then, after a short time in Liebig's laboratory at Giessen, and in the Sevres porcelain factory, he became in 1841 professor of chemistry in the academy of Geneva. In 1845 he was appointed professor of mineralogy also, and held both chairs till 1878, when ill-health obliged him to resign. He died at Geneva on the 15th of April 1894. Marignac's name is well known for the careful and exact determinations of atomic weights which he carried out for twenty-eight of the elements. In undertaking this work he had, like J. S. Stas, the purpose of testing Prout's hypothesis, but he remained more disposed than the Belgian chemist to consider the possibility that it may have some degree of validity. Throughout his life he paid great attention to the " rare earths " and the problem of separating and distinguishing them; in 1878 he extracted ytterbia from what was supposed to be pure erbia, and two years later found gadolinia and samaria in the samarskite earths. In 1858 he pointed out the isomorphism of the fluostannates and the fluosilicates, thus settling the then vexed question of the composition cf silicic acid; and subsequently he studied the fluosalts of zirconium, boron, tungsten, &c, and prepared silicotungstic acid, one of the first examples of the complex inorganic acids. In physical chemistry he carried out many researches on the nature and process of solution, investigating in particular the thermal effects produced by the dilution of saline solutions, the variation of the specific heat of saline solutions with temperature and concentration, and the pheno- mena of liquid diffusion.

A memorial lecture by P. T. Cleve, printed in the Journal of the London

Chemical Society for 1895, contains a list of Marignac's papers.

MARIGNAN, BATTLE OF, fought on the 13th and 14th of September 1515 between the French army under Francis I. and the Swiss. The scene of the battle — which was also that of a hard fought engagement in 1859 (see Italian Wars) — was the northern outskirts of the village of Melegnano, on the river Lambro, 10 m. S.E. of Milan. The circumstances out of which the battle of Marignan arose, almost inconceivable to the modern mind, were not abnormal in the conditions of Italian warfare and politics then prevailing. The young king of France had gathered an army about Lyons, wherewith to overrun the Milanese; his allies were the republics of Venice and Genoa. The duke of Milan, Maximilian Sforza, had secured the support of the emperor, the king of Spain, and the pope, and also that of the Swiss cantons, which then supplied the best and most numerous mercenary soldiers in Europe. The practicable passes of the Alps and the Apennines were held by Swiss and papal troops. Francis however boldly crossed the Col de l'Argentiere (Aug. 1515) by paths that no army had hitherto used, and Marshal de La Palisse surprised and captured a papal corps at Villafranca near Pinerolo, whereupon the whole of the enemy's troops fell back on Milan. The king then marching by Vercelli, Novara and Pavia, joined hands with Alviano, the Venetian commander, and secured a foothold in the Milanese. But in order to avoid the necessity of besieging Milan itself, he offered the Swiss a large sum to retire into their own country. They were about to accept his offer, not having received their sub- sidies from the pope and the king of Spain, when a fresh corps of mercenaries descended into Italy, desirous both of gaining booty and of showing their prowess against their new rivals the French and Lower Rhine "lansquenets" (Landsknechts) and against the French gendarmerie, whom (alluding to the " Battle of the Spurs " at Guinegatte in 1513) they called " hares in armour." The French took position at Melegnano to face the Swiss, the Venetians at Lodi to hold in check the Spanish army at Piacenza. Alviano, who was visiting the king when the Swiss appeared before Melegnano, hurried off to bring thither his own army. Meantime the French and the Swiss engaged in an incredibly fierce struggle.

The king's army was grouped in front of the village, facing in the direction of Milan, with a small stream separating it from the oncoming Swiss. On either side of the Milan road was a

large body of landsknechts, a third being in reserve. The French and - Gascon infantry (largely armed with arquebuses) was on the extreme right,

the various bodies of gendarmerie in the centre. In front of all was the French artillery. The battle opened in the afternoon of the 13th of September. As the Swiss advanced in three huge columns, the French guns fired into them with terrible effect, but the assailants reached the intersected ground bordering the stream, and thus protected from the rush of the French gendarmerie, they debouched on the other side, and fell upon the landsknechts. The crowd of combatants, the gathering darkness, and the dust, prevented any general direction being given to the battle by the leaders of either side. Francis himself at the head of two hundred gendarmes charged and drove back two large bodies of Swiss which were pressing the landsknechts hard. The battle went on by moonlight till close on midnight, when the Swiss retired a short distance. Both sides spent the rest of the night on the battlefield, reorganizing their broken corps. Francis and his gendarmes were the outpost line of the French army, and remained all night mounted, lance in hand and helmet on head. Next morning at sunrise, the battle was renewed. The Swiss now left their centre inactive opposite the king and with two strong corps attempted to work round his flanks. That on the left made for the French baggage, but found it strongly guarded by landsknechts, who drove them back. The nearest French gendarmerie joined in the pursuit, but a detachment from the Swiss centre fell upon these and destroyed them. This detachment in turn followed up its advantage until as Francis himself expressed it, " the whole camp turned out " to aid the landsknechts and " hunted out " the Swiss. Meantime the Swiss left attack had closed with the French infantry bands and the " aventuriers" (afterwards the famous corps of Picardie and Piedmont), who were commanded on this day be the famous engineer Pedro Navarro. It was in the. main struggle of arquebus against pike, but it was not the arquebus alone, or even principally, that gave the victory to the French. When the Swiss ranks had been disordered, the short pike and the sword came into play, and aided by the constable de Bourbon with a handful of the gendarmerie, the French right more than held its own until Alviano with the cavalry from Lodi rode on to the field and completed the rout of the Swiss. In the centre meanwhile the two infantries stood fast for eight hours, separated by the brook, while the artillery on both sides fired into it at short range. But the landsknechts, animated by the king, endured it as well as the Swiss; and at the last, Francis leading a final advance of his exhausted troops, the Swiss gave way and fled. Only 3000 Swiss escaped out of some 25,000 who fought. On the French side probably 8000 were killed or died of wounds. The battle lasted twenty-eight hours. Its tactical lesson was the efficacy of combining two arms against one. The French gendarmerie, burning to avenge the insult of " hares in armour," made more than thirty charges by squadrons, and they were admirably supported by their light artillery. The landsknechts retrieved their first day's defeat by their conduct on the second day. Nevertheless Marignan was in the main

the work of the gendarmerie, the last and greatest triumph of the armoured lancer; and as a fitting close to the battle the young king was knighted by Bayard on the field.

MARIGNOLLI, GIOVANNI DE', a notable traveller to the Far East in the 14th century, born probably before 1290, and sprung from a noble family in Florence. The family is long extinct, but a street near the cathedral (Via de' Cerretani) formerly bore the name of the Marignolli. In 1338 there arrived at Avignon, where Benedict XII. held his court, an embassy from the great khan of Cathay (the Mongol-Chinese emperor), bearing letters to the pontiff from the khan himself, and from certain Christian nobles of the Alan race in his service. These latter represented that they had been eight years (since Monte Corvino's death) without a spiritual guide, and earnestly desired one. The pope replied to the letters, and appointed four ecclesiastics as his legates to the khan's court. The name of John of Florence, i.e. Marignolli, appears third on the letters of commission. A large party was associated with the four chief envoys; when in

Peking the embassy still numbered thirty-two, out of an original fifty.

The mission left Avignon in December 1338; picked up the Tatar envoys at Naples; stayed nearly two months in Constanti- nople (Pera, May 1 — June 24, 1339); and sailed across the Black Sea to Kaffa, whence they travelled to the court of Mahom- med Uzbeg, khan of the Golden Horde, at Sarai on the Volga. The khan entertained them hospitably during the winter of 1339-1340 and then sent them across the steppes to Armalec, Almalig or Almaligh (Kulja), the northern seat of the house of Chaghatai, in what is now the province of Hi. " There," says Marignolli, " we built a church, bought a piece of ground . . . sung masses, and baptized several persons, notwithstanding that only the year before the bishop and six other minor friars had there undergone glorious martyrdom for Christ's salvation." Quitting Almaligh in 1341, they seem to have reached Peking (by way of Kamul or Hami) in May or June 1342. They were well received by the reigning khan, the last of the Mongol dynasty in China. An entry in the Chinese annals fixes the year of Marignolli's presentation by its mention of the arrival of the great horses from the kingdom of Fulang (Farang or Europe), one of which was n ft. 6 in. in length, and 6 ft. 8 in. high, and black all over.

Marignolli stayed at Peking or Cambalec three or four years, after which he travelled through eastern China to Zayton or Amoy Harbour, quitting China apparently in December 1347, and reaching Columbum (Kaulam or Quilon in Malabar) in Easter week of 1348. At this place he found a church of the Latin communion, probably founded by Jordanus of Severac. who had been appointed bishop of Columbum by Pope John XXII. in 1330.

Here Marignolli remained sixteen months, after which he proceeded on what seems a most devious voyage. First he visited the shrine of St Thomas near the modern Madras, and then proceeded to what he calls the kingdom of Saba, and identifies with the Sheba of Scripture, but which seems from various particulars to have been Java. Taking ship again for Malabar on his way to Europe, he encountered great storms. They found shelter in the little port of Pervily or Pervilis (Beruwala or Berberyn) in the south-west of Ceylon; but here the legate fell into the hands of " a certain tyrant Coya Jaan (Khoja Jahan), a eunuch and an accursed Saracen," who pro- fessed to treat him with all deference, but detained him four months, and plundered all the gifts and Eastern rarities that he was carrying home. This detention in Seyllan enables Marig- nolli to give a variety of curious particulars regarding Adam's Peak, Buddhist monasticism, the aboriginal races of Ceylon, and other marvels. After this we have only fragmentary notices, showing that his route to Europe lay by Ormuz, the ruins of Babel, Bagdad, Mosul, Aleppo and thence to Damascus and Jerusalem. In 1353 he arrived at Avignon, and delivered a letter from the great khan to Pope Innocent VI. In the following year the emperor Charles IV., on a visit to Italy, made Marignolli one of his chaplains. Soon after, the pope made him bishop of Bisignano; but he seems to have been in no hurry to reside there. He appears to have accompanied the emperor to Prague in I 3S4 _ i3SS; in 1356 he is found acting as envoy to the Pope from Florence; and in 1357 he is at Bologna. We know not when he died. The last trace of Marignolli is a letter addressed to him, which was found in the 18th century among the records in the Chapter Library at Prague. The writer is an unnamed bishop of Armagh, easily identified with Richard Fitz Ralph, a strenuous foe of the Franciscans, who had broken lances in controversy with Ockham and Burley. The letter implies that some inten- tion had been intimated from Avignon of sending Marignolli to Ireland in connexion with matters then in debate — a project which stirs Fitz Ralph's wrath.

The fragmentary notes of Marignolli's Eastern travels often con- tain vivid remembrance and graphic description, but combined with an incontinent vanity, and an incoherent lapse from one thing to another. They have no claim to be called a narrative, and it is with no small pains that anything like a narrative can be pieced out of them. Indeed the mode in which they were elicited curiously illustrates how little medieval travellers thought of publication

The emperor Charles, instead of urging his chaplain to write a history of his vast journeys, set him to the repugnant task of recasting the annals of

Bohemia; and he consoled himself by salting the insipid stuff by interpolations, a propos de holies, of his recollections of Asiatic travel.

Nobody seems to have noticed the work till 1 768, when the chronicle was published in vol. ii. of the Monumenta hist. Bohemiae nusquam antehac edila by Father Gelasius Dobner. But, though Marignolli was thus at last in type, no one seems to have read him till 1820, when an interesting paper on his travels was published by J. G. Meinert. Professor Friedrich Kunstmann of Munich also devoted to the subject one of his admirable series of papers on the ecclesiastical travellers of the middle ages.

See Forties rerum bohemicarum, iii. 492-604 (1882, best text); G. Dobner's Monumenta hist, boh., vol. ii. (Prague, 1768) ; J. G. Meinert, in Abhandl. der k. bbhm. Gesellsch. der Wissenschaften, vol. vii.; F. Kunstmann, in Historisch-politische Blatter von Phillips und Gorres, xxxviii. 701-719, 793-813 (Munich, 1859); Luke Wadding, Annales minorum, A.D. 1338, vii. 210-219 (ed. of 1733, &c); Sbaralea, Supplementum et castigatio ad scriptores trium ordinum S. Francisci a Waddingo, p. 436 (Rome, 1806); John of Winterthur, in Eccard, Corpus historicum medii aevi, vol. i., 1852; Mosheim, Historia Tartarorum ecclesiastica, part i., p. 115; Henry Yule, Cathay and the Way Thither, ii. 309-394 (Hak. Soc, 1866) ; C. Raymond Beazley, Dawn of Modern Geography, iii. 142, 180-181, 184-185, 215, 231, 236, 288-309 (1906). (H. Y.; C. R. B.)

MARIGNY, ENGUERRAND DE (1260-1315), French cham- berlain, and minister of Philip IV. the Fair, was born at Lyons- la-Foret in Normandy, of an old Norman family of the smaller baronage called Le Portier, which took the name of Marigny about 1200. Enguerrand entered the service of Hugues de Bonville, chamberlain and secretary of Philip IV., as a squire, and then was attached to the household of Queen Jeanne, who made him one of the executors of her will. He married her god- daughter, Jeanne de St Martin. In 1298 he received the custody of the castle of Issoudun. After the death of Pierre Flotte and Hugues de Bonville at the battle of Mons-en-Pevele in 1304, he became Philip's grand chamberlain and chief minister. In 1306 he was sent to preside over the exchequer of Normandy. He received numerous gifts of land and money from Philip as well as a pension from Edward II. of England. Possessed of an ingratiating manner, politic, learned and astute, he acted as an able instrument in carrying out Philip's plans, and received corresponding confidence. He shared the popular odium which Philip incurred by debasing the coinage. He acted as the agent of Philip in his contest with Louis de Nevers, the son of Robert count of Flanders, imprisoning Louis and forcing Robert to surrender Lille, Douay and Bethune. He obtained for his half-brother Philip de Marigny in 1301 the bishopric of Cambray, and in 1309 the archbishopric of Sens, and for

his brother Jean in 13 12 the bishopric of Beauvais. Still another relative, Nicolas de Freauville, became the king's confessor and a cardinal. He addressed the estates general in 1314 and suc- ceeded in getting further taxes for the Flemish war, incurring at the same time much ill will. This soon came to a head when the princes of the blood, eager to fight the Flemings, were disap- pointed by his negotiating a peace in September. He was accused of receiving bribes, and Charles of Valois denounced him to the king himself; but Philip stood by him and the attack was of no avail. The death of Philip IV. on the 29th of November 13 14 was a signal for a reaction against his policy. The feudal party, whose power the king had tried to limit, turned on his ministers and chiefly on his chamberlain. Enguerrand was arrested by Louis X. at the instigation of Charles of Valois, and twenty-eight articles of accusation including charges of receiving bribes were brought against him. He was refused a hearing; but his accounts were correct, and Louis was inclined to spare him anything more than banishment to the island of Cyprus. Charles then brought forward a charge of sorcery which was more effectual. He was condemned at once and hanged on the public gallows at Montfaucon, protesting that in all his acts he had only been carrying out Philip's commands (April 30, 1315). Louis X. seems to have repented of his treatment of Marigny, and left legacies to his children. When his chief enemy, Charles of Valois, lay dying in 1325, he was stricken with remorse and ordered alms to'be distributed among the poor of Paris with a request to "pray for the souls of Enguerrand and Charles."

Marigny founded the collegiate church of Notre Dame d'Escoes near Rouen in 1313. He was twice married, first to Jeanne de St Martin, by whom he had three children, Louis, Marie and Isabelle (who married Robert, son of Robert de Tancarville) ; and the second time to Alips de Mons.

See contemporary chroniclers in vols. Xx. to xxiii. of D. Bouquet, Hisloriens de la France; P. Clement, Trois drames historiques (Paris, 1857); Ch. Dufayard, La Reaction ftiodale sous les fils de Philippe le Bel, in the Revue historique (1894, liv. 241-272) and lv. 241-290.

MARIGNY, JEAN DE (d. 1350), French bishop, was a younger brother of the preceding. Entering the church at an early age, he was rapidly advanced until in 13 13 he was made bishop of Beauvais. During the next twenty years he was one of the most notable of the members of the French episcopate, and was par- ticularly in favour with King Philip VI. He devoted himself in 1335 to the completion of the choir of Beauvais Cathedral, the enormous windows of which were filled with the richest glass. But this building activity, which has left one of the most notable Gothic monuments in Europe, was broken into by the Hundred Years' War. Jean de Marigny, a successful administrator and man of affairs rather than

a saintly churchman, was made one of the king's lieutenants in southern France in 1341 against the English invasion. His most important military operation, how- ever, was when in 1346 he successfully held out in Beauvais against a siege by the English, who had overrun the country up to the walls of the city. Created archbishop of Rouen in 1347 as a reward for this defence, he enjoyed his new honours only three years; he died on the 26th of December 1350.

MARIGOLD. This name has been given to several plants, of which the following are the best known: Calendula officinalis, the pot-marigold; Tageteserecta, the African marigold; T. palula, the French marigold; and Chrysanthemum segetum, the corn marigold. All these belong to the order Compositae; but Caltha palustris, the marsh marigold, belongs to the order Ranunculaceae.

The first-mentioned is the familiar garden plant with large orange-coloured blossoms, and is probably not known in a wild state. There are now many fine garden varieties of it. The florets are unisexual, the " ray " florets being female, the " disk " florets male. This and the double variety have been in cultiva- tion for at least three hundred years, as well as a proliferous form, C. prolifera, or the " fruitful marigolde " of Gerard (Herball, p. 602), in which small flower-heads proceed from beneath the circumference of the flower. The figure of " the greatest double marigold," C. multiflora maxima, given by Gerard (loc. cit. p. 600) is larger than most specimens now seen, being 3 in. in diameter. He remarks of " the marigolde " that it is called Calendula " as it is to be seene to flower in the calends of almost euerie moneth." It was supposed to have several specific virtues, but they are non-existent. " The marigold, that goes to bed wi' the sun," is mentioned by Shakespeare, Winter's Tale, iv. 3.

Tagetes patula, and T. erecta, the French and African mari- golds, are natives of Mexico, and are equally familiar garden plants, having been long in cultivation. Gerard figures five varieties of Flos africanus, of the single and double kind (loc. cit., p. 609). Besides the above species the following have been introduced later, T. lucida, T. signata, also from Mexico, and T. tenuifolia from Peru.

Chrysanthemum segetum, the yellow corn marigold, is indi- genous to Great Britain, and is frequent in corn-fields in most parts of England. When dried it has been employed as hay. It is also used in Germany for dyeing yellow. Gerard observes that in his day " the stalke and leaues of Come Marigolde, as Dioscorides saith, are eaten as other potherbes are."

Caltha palustris, the marsh marigold, or king-cups, the " winking Mary-buds " of Shakespeare (Cymb., ii. 3), is a common British plant in marshy

meadows and beside water. It bears smooth heart-shaped leaves, and flowers with a golden yellow calyx but no corolla, blossoming in March and April. The flower-buds preserved in salted vinegar are a good substitute for capers. A double-flowered variety is often cultivated, and is occasionally found wild. .

MARIINSK, a town of Russia, in West Siberia and the govern- ment of Tomsk, on the bank of the Kiya river and on the Siberian railway, 147 m. E.S.E. of Tomsk. Pop. (1897), 8300. It is built of timber, but has a stately cathedral. There are tanneries and soapworks; and Mariinsk is an entrepot for the goldmines.

MARILLAC, CHARLES DE (c. 1510-1560), French prelate and diplomatist, came of a good family of Auvergne, and at the age of twenty-two was advocate at the parlement of Paris. Suspected, however, of sympathizing with the reformers, he deemed it prudent to leave Paris, and in 1535 went to the East with his cousin Jean de la Foret, the first French ambassador at Constantinople. Cunning and ambitious, he soon made his mark, and his cousin having died during his embassy, Marillac was appointed his successor. He did not return from the East until 1538, when he was sent almost immediately to England, where he remained ambassador until 1543. He retained his influence during the reign of Henry II., fulfilling important missions in Switzerland and at the imperial court (1547-1551), and at the courts of the German princes (1 553-1 554). In

1555 he was one of the French deputies at the conferences held at Mark near Ardres to discuss peace with England. His two last missions were at Rome (1557) and at the Diet of Augsburg (1559). In 1550 he was given the bishopric of Vannes, and in 1557 the archbishopric of Vienne; he also became a member of the privy council. He distinguished himself as a statesman at the Assembly of Notables at Fontainebleau in 1560, when he delivered an exceedingly brilliant discourse, in which he opposed the policy of violence and demanded a national council and the assembly of the states general. Irritated by his opposition, the Guises compelled him to leave the court, and he died on the 2nd of December of the same year.

His works include: Discours sur la roupture de la Trefve en Van

1556 (Paris, 1556), and " Somraaire de l'ambassade en Allemagne de feu M r . l'archevesque de Vienne en l'an 1550," published in Ranke's Deutsche Gesckichte im Zeitalter der Reformation, vol. vi. (Leipzig, 1882).

See J. Kaulek, Correspondance politique de Castillon et Marillac (1537-1542) (Paris, 1885); P. de Vassiere, Charles de Marillac (Paris, 1896).

MARINES (from Lat. mare, sea), the technical term for sea- soldiers, i.e. troops appropriated and specially adapted to the requirements of maritime war. This force — formerly (1694) styled " mariners " — is in origin, use and application peculiarly British. The only other nation possessing a special force dis- charging exactly similar functions is the United States (see below). In the armed forces of the great European Powers marines and marine artillery are mentioned, but these troops have little in common with British and American marines. In France their duties are to garrison military forts and colonies and take part in marine and other wars. In Germany they are used for coast defence. In Holland, Austria and Italy they haye a military organization, but not as complements .of sea-going ships.

The origin of the British marine force was an order in council 1664, directing " 1200 Land souldgers to be forthwith rayzed to be in readiness to be distributed in His Majesty's fleete pre- pared for sea service." This body was named the " Admiral's regiment." At this period land warfare had developed a system and was waged by men organized, disciplined and trained. Sea warfare was left " to every man's own conceit." War-ships were built to be manned in a hurry, by " the press," when needed. Men were thus obtained by force and grouped without organiza- tion or previous training in ships. When no longer required they were turned adrift. The administration of England's fleet was " a prodigy of wastefulness, corruption and indolence; no estimate could be trusted, no contract was performed, no check was enforced." Such officers as had been " bred to the sea seemed a strange and savage race." They robbed the king and cheated the seamen. As regards land force, it was a viola- tion of the law to keep at home in the king's pay " any other body of armed men, save as a guard for the royal person." On the other hand it was " illegal to land press men " in a foreign country, but soldiers " only required a little persuasion to land. " Thus by thrusting into naval chaos and confusion a nucleus of

disciplined, trained and organized land troops, an expedient was found which offered a solution of the many political and adminis- trative difficulties of the time. This " Admiral's regiment." was the germ which by a constant process of evolution during a period of over 235 years has produced not merely the marine forces, but the royal navy, organized, disciplined and trained as it is to-day. In 1668 the experiment of the Admiral's regiment was extended. At a council held " to discourse about the fitness for entering men presently for manning the fleete," King Charles II. " cried very civilly, ' If ever you intend to man the fleet without being

cheated by the captains and pursers, you may go to bed and resolve never to have it manned.' " This seems to throw some light on the council's order a few days later "to draw out and furnish such numbers of His Majesty's Foot Guards for His Majesty's service at sea this summer, as H.R.H. the duke of York, lord high admiral of England, shall from time to time desire." The men were to be paid and accounted for by their own officers. This maritime force subsequently disap- peared, but two new regiments of " marines " were raised in 1694, the House of Commons directing they " were to be employed in the service of the navy only." One regiment only was to be on shore at a time, and to be employed in the dockyards with extra pay. None of the officers were to be sea commanders, save two colonels. The intention was to make these regiments feeders for the navy, captains being ordered to report periodi- cally " the names of such soldiers as shall in any measure be made seamen, and how far each of them is qualified toward being an able seaman." In 1697 these regiments were disbanded, but early in the reign of Queen Anne a number of regiments of marines were raised, and independent companies of marines were also enlisted in the West Indies. At the peace of Utrecht (1713) the marines were disbanded, but reappeared in 1739 as part of the army; and in 1740 three regiments of marines were raised in America, the colonels being appointed by the crown, the captains by the provinces. In 1747 the marine regiments were transferred from the control of the secretary at war to that of the admiralty, and the next year once more wholly disappeared on the treaty of Aix-la-Chapelle (1748).

During the preceding period of fifty-four years the marine force appeared and disappeared with war. It was a military body, applied to naval purposes. Its main functions were three- fold — (1) for fighting in ships; (2) for seizing and holding land positions necessary or advantageous to the naval operations of war; (3) for maintaining discipline of the ships, and by " expert- ness in handling arms to incite our seamen to the imitation of them." Incidentally the force came to be regarded as so good a feeder for the navy that Admiral Vernon (1739) urged " the necessity of converting most of our marching regiments into marines, and if, as they became seamen they were admitted to be discharged as such, that would make a good nursery for the breeding of them."

The organization of the force was purely military. Regiments were embarked in fleets, and distributed in the ships. The officers were interchangeable with those of the guards and line. John Churchill (afterwards duke of Marlborough) and George Rooke (afterwards Admiral Sir George Rooke) were together at one time ensigns of marines. During this period the marines were never regarded as a reserve for the fleet. The navy in peace did without them. The necessities of maritime war demanded a mobile military force adapted to naval conditions and at naval disposal,

and so in all naval operations during these eighty-four years the marines played a conspicuous part. The navy had been slowly groping towards a system. For example, sea officers had been granted a uniform, and a naval academy (1729) had been established for the education of young gentlemen for the sea service. But in its main features the navy remained in 1748 as it was in 1664. The sailor was kidnapped and forced into ships, to become an outcast when no longer wanted. The marine when not in a ship was comfortably housed and looked after by his officers in barracks on shore.

In 1755 the marine force once more reappeared under the Admiralty, and from that date its history has been continuous.

But the regimental system was abandoned, and an entirely new principle of organization was applied. Companies were raised, and these companies were grouped into great depots, called divisions, at Portsmouth, Plymouth and Chatham. At these divisions this force could be increased and reduced at pleasure, without disturbing the basis of organization, and from them could be supplied as many or as few sea-soldiers as fleets or ships needed, while preserving in the varying units so provided all the essentials of uniformity of system, drill, training, ties of comradeship and esprit de corps. This force then and for ninety- eight years afterwards was the only continuously trained, disciplined and organized fighting force placed by the country at the disposal of naval officers. On the establishment of this new marine force the purchase of commissions was abolished, but interchange with the army was for a time permitted. When embarked, marines were under the naval code of discipline; when on shore, under the marine Mutiny Act, identical with that of the army. When the seamen of the fleet mutinied at the Nore, at the close of the 18th century, and turned their officers out of the ships, the marines, undaunted, stood firm by theirs.

Mutiny lurked beneath the deck of many a ship before and long years after that event. The control of admirals and captains over their own men was precarious in the extreme. This was the natural result of the country's neglect of its sea- men. The discipline of the fleet in those days rested on the firm bayonets of the marines. What England owes to them may be gathered from Lord St Vincent's recorded testimony: " There never was an appeal made to them for honour, courage or loyalty, that they did not more than realize my highest expectation. If ever real danger should come to England, the marines will be found the country's sheet-anchor." At his earnest solicitation the marines were made a royal corps in 1802. It is

worthy of note that in those days of masts, yards, sails and pure seamanship, this greatest of naval statesmen, this matchless naval strategist, whose practical experience of mari- time war was unrivalled, strenuously advocated as the true policy for England what in these days of steam and mastless ships would be scouted and ridiculed. It was to make service afloat as marines a part of the duty of every regiment of the line in rotation.

Down to 1804 the marines were an infantry force; the improve- ment in artillery towards the close of the century had necessitated the occasional putting into the fleet of detachments of Royal Artillery. This, as regards gunnery duties in the fleet, was repeating on a smaller scale the expedient adopted in the time of Charles II. So much friction arose between the naval and the artillery officers that a special corps of Royal Marine Artillery was raised in 1804, on the recommendation of Nelson. This special corps fulfilled the expectations of its founders. It was charged with the care, equipment and working of the larger ordnance afloat and field-guns ashore, and was employed also as a body of gunnery instructors to the fleet. In 1 83 1, a certain number of naval officers being thought to be sufficiently trained in gunnery, this corps, of which Napier wrote, " Never in my life have I seen soldiers like the Royal Marine Artillery," was, without warning, abolished. Then the marine force ceased to be composed of two corps, artillery and infantry, and it reverted to a single one of infantry. Very soon afterwards, however, the Admiralty began to build up what they had so suddenly and ruthlessly destroyed, by ordering the conver- sion of one company of each infantry marine division into artillery. The number of these artillery companies gradually increased, and were grouped in a separate depot. Just as the wars from Charles II. to George III. had demanded marines, so the Crimean War led to their increase. Thus in 1859 the artillery companies of marines were formed into a separate division, and in 1862 the old name of Royal Marine Artillery was restored.

The marines thus became once more and still remain two corps,

the official designation of the whole being Royal Marine Forces. In 1855 the marine infantry corps became light infantry, and in 1869 the Woolwich division (added in 1805) was abolished; and more recently a marine depot, as a feeder of the other divisions, was established at Walmer. The headquarters of the R.M.A. are at Eastney, Southsea. The divisions R.M.L.I. are at Gosport, Chatham and Devonport. The uniform of the R.M.A. is blue with red facings, that of R.M.L.I. red with blue facings. The badge of both corps is the globe surrounded with the laurel wreath, with the motto " Per mare per terram." The Royal Marine Forces share with the 3rd Battalion Grenadier Guards, the East Kent Regiment (formerly the Buffs), and the Royal London Militia the privilege of marching through the city of

London with colours flying, bands playing and bayonets fixed. This is due to a common original association with the London train bands.

War Services. — To describe these would be to review the wars waged by England by sea and by land for over 200 years. In every sea fight, great or small, marines have taken . part, and on every continent they have served in big and little wars, sometimes as part of the army, sometimes with naval contingents, sometimes alone.

Throughout the Napoleonic war the marines took part in every sort of operation afloat and ashore. During the Crimean War, mortar-boat flotillas in the Baltic and Black Sea were commanded and manned by R.M.A., while comrades in the same corps served with the Royal Artillery in the trenches before Sebastopol — a marine infantry brigade occupying the heights of Balaclava. During the Indian Mutiny, marines (artillery and infantry) served with the Naval Brigade under Peel. In the China wars batteries and brigades of the marine force played a prominent part, and likewise were represented in all the Egyptian and Sudan campaigns, 1881 to 1898. In one action the R.M.A. gunners came to the relief of the Royal Horse Artillery when exhausted, and fought their guns; in another the R.M.A., out of the debris of the enemy's Krupp guns captured, built up one complete gun and fought it with effect; in the final campaign gunboats were brought up in pieces, put together and fought by a detachment of the R.M.A.

In 1899 in the Boer War the marine artillery and infantry took part with the Naval Brigade, maintaining their historic reputation, and at the battle of Enslin their losses were exceptionally severe.

Characteristics of Marine System. — The recruit first goes to the depot at Walmer, and is trained as a soldier before joining his division to complete instruction as a marine. His division is his permanent military home, from which he goes on service and to which he returns at its conclusion. Restrictions on marriage, necessary under the army system, are not necessary in the marine forces. The permanent home of the wife and family is not broken up by the marine going abroad ; the wife thus can continue any local goodwill in any business her industry may secure. This fixed home enables a marine to learn a trade in the workshops of his division which supply the clothing, &c, to the corps. Marines are enlisted for 12 years, and if of good character they can re-engage to complete 21 years, entitling to pen- sion. The periods of service abroad for marines are shorter (generally 3 years), but more constantly recurrent than for the army. The administrative, as distinct from the instructional, staff necessary for a marine division is more simple and less expensive than that of a numerical army equivalent expressed in regiments.. The system of pay and accounts is

also less complex. The following table shows the relative proportions of marine forces to the whole navy at different periods up to the South African War of 1899: —

Year.

Navy

proper.

Officers

and Men.

Marines.

Officers

and Men,

Grand Total.

Maritime.

Peace or

War.

Percent. Marines to Total Forces.

Nature of Ships.

1805

1838 1858 1878 1898

90,000

23,165 40,219 42,046 78,441'

30,000

9,000 14.919 13,727 17,099

120,000

32.165 55.138 55-773 95.540

War (Trafalgar)

{■ Peace

25

28 27 24 17

Sailing.

Sailing.

Sailing with auxiliary steam. Steam with auxiliary sail. Steam and mastless ships.

The above table indicates a gradual change in naval policy and practice as regards marines. It will be observed that, concurrently with thegradual disappearance of masts, sails and yards, the propor- tion of marines has steadily declined. Down to very recent times the marine spent more time ashore than afloat. Now the reverse is the case.

By the introduction of the Continuous Service Act 1853, the bluer jacket was placed on exactly the same footing as the marine in respect

1 Including 22,289 of the engineer branch providing the locomotion of modern ships — just as seamen from 1805-1858 provided it for ships of the past.

of conditions of service and pension, and now the blue-jacket when not afloat is quartered in barracks. The main difference between the blue-jacket and marine is the dress and the pay. The blue-jacket is better paid than the marine. As regards opportunity of discipline, there is now no difference; and in short, all the reasons for the exist- ence of a marine force have disappeared except as regards duties on shore incidental to naval operations of war, e.g. the holding of ports and the seizing of minor positions necessary to prosecution of maritime war. The facts that modern ships cannot now as formerly carry a supernumerary force sufficient for such purposes, and are more dependent on fixed bases of supply and repair than in old days, point to a different method of using and applying the marine force to the sole purpose for which they are now necessary as a distinct branch of the naval service. If employed at the headquarters of a naval station, their efficiency as marines could be preserved by occasional

embarcation of the officers and men in rotation. The substitution of marine for army garrisons at coaling stations would also relieve the army of a class of duties incidental to naval warfare which the marine force formerly performed, and which prejudicially affects the organization and arrangement of the army as a mobile field force.

Marine Corps, United States. — This dates from the establish- ment of the American navy. 'It is a wholly separate military body, though under the control of the Navy Department. It was formed in 1775, and it has a history of brilliant services rendered by land and sea in all the wars of America since that date. The headquarters of the corps are at Washington, and the strength of the corps was fixed by Act of Congress (March 3, 1899) at 211 officers and 5920 non-commissioned officers and men. Its organization and system are based on the British model, and the dress corresponds to that of the United States army. The corps is commanded by a brigadier-general who bears to the secretary a relation similar to that of a chief of bureau. Although the organization closely follows the army system, regimental or even permanent battalion organizations are impracticable, owing to their numerous and widely-separated stations. Practically all shore stations have barracks where marines are enlisted and drilled. At these places they also do sentry, police and orderly duties. From such stations they are sent to ships for sea duty. Nearly all ships carry a body of marines known as the guard, varying in size from a few men commanded by a sergeant, on small ships, to eighty or more, with one or more commissioned officers, on large vessels. It is customary to cause all marines to serve at sea three of the four years of each enlist- ment. On board ship they perform sentry and orderly duty, and assist in police duties. They are also instructed in many exercises pertaining to the navy, as rowing, naval signalling, gun drill, &c. In action they act as riflemen, and on many ships serve a portion of the guns. When circumstances require a force to be landed from ships present to guard American interests in foreign countries, legations, &c, the marine guard is usually sent, though, if numerically insufficient, sailors are landed also. Marines also garrison places beyond the terri- torial limits of the United States which are under navy control. Candidates for first enlistment must be between the ages of 21 and 35 and unmarried, must be citizens of the United States, be able to read, write and speak English, and pass a physical examination. Second lieutenants are appointed from civil life after examination or from the graduates of the Naval Academy. Promotion is by seniority as in the navy.

Admiral Farragut's opinion that " the marine guard is one of the great essentials of a man-of-war " is corroborated by that of Admiral Wilkes, who considered that " marines constituted the great differ- ence between a man-of-war and a privateer." In the famous battles between the " Bonhomme Richard " and " Serapis " in 1777, and in that between the "

Chesapeake ” and ” Shannon,” the American marines displayed brilliant gallantry; and while on the one hand they at Dernc in 1803 first planted the American flag on a fortress of the Old World, for which exploit ” Tripoli ” is inscribed on their colours, they on the other shared in the hard fighting of the Mexican War as well as all the important coast actions of the Civil War of 1861-65. A proposal to incorporate them with the army after the struggle met with universal condemnation from the authorities best qualified to judge of their value. A brigade of three battalions served in the Philippines in 1899. Their device is a globe resting on an anchor and surmounted by an eagle. ” Ever faithful ” is the title which Captain Luce, the historian of the force, appropriately applies to them. (J. C. R. C.)

MARINETTE, a city and the county-seat of Marinette county, Wisconsin, U.S.A., 162 m. N. of Milwaukee, on the W. shore ci’ Green Bay, at the mouth of the Menominee River. Pop. (1890), 11,523; (1900), 16,195, of whom 5542 were foreign-born; (1905), I S>354; (I0I °), 14,610. It is served directly by the Wisconsin & Michigan, the Chicago, Milwaukee & St Paul, and the Chicago & North-Western railways, and by several steamboat lines connecting with lake ports; and is connected by ferry with Frankfort, Michigan (served by the Ann Arbor railroad). The city has a fine harbour and a considerable commerce in iron and lumber products. Five bridges connect Marinette with Menomi- nee, Michigan, on the other side of the river. Marinette has a Federal building; the Stephenson public library, founded by Senator Isaac Stephenson (b. 1829), a local ” lumber king “; a county agricultural school and training school for rural teachers, and three public parks. The Northern Chautauqua Assembly holds its annual summer session in Chautauqua Park, on the shore of Green Bay. The growth of Marinette began with the develop- ment of the neighbouring pine forests; and the manufacture of lumber and lumber products has always been its principal industry. The water-power of the Menominee River is largely utilized for the manufacture of paper and flour. Other manufac- tures are boxes, furniture and woodware, boats, boilers ajid agri- cultural machinery. In 1905 the factory products were valued at $3,633,399. The first white settlement was made here on the site of a Menominee Indian village in 1830, and the city was named in honour of the daughter of an Indian chief, Marinette (Jacobs), whose name was a composite of Marie and Antoinette. A city charter was granted in 1887.

MARINI (or Marino), GIAMBATTISTA (1569-1625), Italian poet, was born at Naples on the 18th of October 1569. After a somewhat disreputable youth, during which he became known for his Canzone de’ bad, he secured the powerful patronage of Cardinal Aldobrandini, whom he accompanied from Rome to Ravenna and Turin. An edition of his poems, La Lira, was published at Venice in 1602-1614. His ungoverned pen and dis- ordered life compelled him to leave Turin and take refuge

from 1615 to 1622 in Paris, where he was favourably recognized by Marie de' Medici. There his long poem Adone was published in 1623. He died at Naples on the 25th of March 1625. The licence, extravagance and conceits of Marini, the chief of the school of " Secentisti " (see Italy: Literature), were character- istic of a period of literary decadence.

See M. Menghini, G. B. Marini (Rome, 18

MARINO, a town of Italy, in the province of Rome, 15 m. S.E. of it by rail, and also accessible by electric .tramway. Pop. (1901), 7307. It is picturesquely situated on a spur of the Alban Hills, 1165 ft. above sea level, and occupies the site of the ancient Castrimoenium, a municipium of no great importance, though the surrounding district, which now produces much wine, is full of remains of ancient villas. The origin of the name is uncertain; perhaps it is derived from the medieval Morena (itself derived from the Latin Murena, from one of the Roman owners of the district), a name originally given to the lower ground between the 9th and nth mile of the Via Latina. In the early 13 th century it belonged to the Frangipani family, but passed into the hands of the Orsini in 1266. In 1378 a battle took place here between the partisans of Urban VI. and those of the anti-pope Clement VII. of Geneva (the Orsini having taken the side of the latter), who were, however, defeated; and in 1399 Marino was apparently under the Papacy. In 1408 it passed to the Colonna family, to whom it still belongs. There are some remains of the medieval fortifications.

See G. Tomassetti, La Via latina net medio evo (Rome, 1886), p. 96 seq. ; T. Ashby, in Papers of the British School at Rome, vol. iv. (1907). (T. As.)

MARINUS, the name of two popes. Marinus I., sometimes called Martin II., pope from 882 to 884, was the son of a Tuscan priest, and entered the church at an early age, becoming a deacon about 862. Three successive popes sent him as legate to Constantinople, his mission in each case having reference to

the controversy excited by Photius (q.v.) ; and having become an archdeacon and a bishop, he also negotiated on behalf of pope John VIII. with the emperor Charles the Fat. About the end of December 882 he succeeded John VIII. as pope, but his elec- tion did not pass unchallenged either in eastern or in western Europe. However, having secured his position, Marinus restored Formosus, cardinal-bishop of Porto, and anathematized Photius. This pope was on friendly terms with the English

king, Alfred the Great. He died in May 884, and was succeeded by Adrian III.

Marinus II., sometimes called Martin III., pope from 942 to 946, was merely the puppet of Alberic (d. 954), prince and senator of the Romans. He died in May 946, and was succeeded by Agapetus II.

MARINUS, neo-Platonist philosopher, was born in Palestine and was early converted to the old Greek religion. He came to Athens at a time when, with the exception of Proclus, there was a great dearth of eminent men in the neo-Platonic school. It was for this reason rather than for any striking ability of his own that he succeeded to the headship of the school on the death of Proclus. During this period the professors of the old Greek religion suffered severe persecution at the hands of the Christians and Marinus was compelled to seek refuge at Epidaurus. His chief work was a biography of Proclus, which is extant. It was first published with the works of Marcus Antoninus in 1559; it was republished separately by Fabricius at Hamburg in 1700, and re-edited in 1814 by Boissonade with emendations and notes. Other philosophical works are attri- buted to him, including commentaries on Aristotle and on the Philebus. It is said that he destroyed the latter because Isidore, his successor, expressed disapproval of it.

MARINUS OF TYRE, geographer and mathematician, the founder of mathematical geography, flourished in the 2nd cen- tury a.d. He lived before Ptolemy, who acknowledges his great obligations to him. His chief merits were that he assigned to each place its proper latitude and longtitude, and introduced improvements in the construction of his maps. He also care- fully studied the works of his predecessors and the diaries of travellers. His geographical treatise is lost.

See A. Forbiger, Handbuch der alien Geographic, vol. i. (1842) ; E. H. Bunbury, Hist, of Ancient Geography (1879), ii. p. 519; and especially E. H. Berger, Geschichte der wissenschaftlichen Erdkunde der Griechen

(1903).

MARIO, GIUSEPPE, Count of Candia (1810-1883), Italian singer, the most famous tenor of the 19th century, son of General di Candia, was born at Cagliari in 1810. His career as a singer was the result of accidental circumstances. While serving as an officer in the Sardinian army he was imprisoned at Cagliari for some trifling offence. When his period of confinement was over, he resigned his commission. His resignation was refused, and he fled to Paris. There his success as an amateur vocalist produced an offer of an engagement at the Opera. He studied singing for two years under M. Ponchard and Signor Bordogni, and made his debut in

1838 as the hero of Meyerbeer's Robert le Diable. His success was immediate and complete, but he did not stay long at the Opera. In 1839 he joined the company of the Theatre Italien, which then included Malibran, Sontag, Persiani and Grisi, Rubini, Tamburini and Lablache. His first appearance here was made in the character of Nemorino in Donizetti's Elisir d'Amore. He sang in London for the first time in the same year. His success in Italian opera far surpassed that which he had won in French, and in a short time he acquired a European reputation. He had a handsome face and a graceful figure, and his voice, though less powerful than that of Rubini or that of Tamberlik, had a velvety softness and richness which have never been equalled. Experience gave him ease as an actor, but he never excelled in tragic parts. He was an ideal stage lover, and he retained the grace and charm of youth long after his voice had begun to show signs of decay. He created very few new parts, that of Ernesto in Don Pasquale (1843) being perhaps the only one deserving of mention. Among the most successful of his other parts were Otello in Rossini's opera of that

name, Gennaro in Lucrezia Borgia, Alamviva in II Barbiere di Siviglia, Fernando in La Favorita, and Manrico in II Trovatore. Mario made occasional appearances in oratorio singing at the Birmingham Festival of 1849 and at the Hereford Festival of 1855, and undertook various concert tours in the United King- dom, but his name is principally associated with triumphs in the theatre. In 1856 he married Giulia Grisi, the famous soprano, by whom he had five daughters. Mario bade farewell to the stage in 1871. He died at Rome in reduced circumstances on the nth of December 1883.

MARION, FRANCIS (173 2-i 795), American soldier, was born in 1732, probably at Winyah, near Georgetown, South Carolina, of Huguenot ancestry. In 1759 he settled on Pond Bluff plantation near Eutaw Springs, in St John's parish, Berkeley county. In 1761 he served as a lieutenant under William Moultrie in a campaign against the Cherokees. In 1775 he was a member of the South Carolina Provincial Congress; and on the 21st of June was commissioned captain in the 2nd South Carolina regiment under W. Moultrie, with whom he served in June 1776 in the defence of Fort Sullivan (Fort Moultrie), in Charleston Harbor. In September 1776 the Continental Congress commissioned him a lieutenant-colonel. In the autumn of 1 7 79 he took part in the siege of Savannah, and early in 1780, under General Benjamin Lincoln, was engaged in drilling militia. After the capture of Charleston (May 12, 1780) and the defeats of General Isaac Huger at Monk's Corner (Berkeley county, South Carolina) and Lieut. -Colonel Abraham Buford at the Waxhaws (near the North Carolina line, in what is now Lancaster county), Marion organized a small troop — which usually consisted of between 20 and 70 men — the only force then

opposing the British in the state. Governor John Rutledge made him a brigadier-general of state troops, and in August 1780 Marion took command of the scanty militia, ill equipped and ill fed. With this force he was identified for almost all the remainder of the war in a partisan warfare in which he showed himself a singularly able leader of irregular troops. On the 20th of August he captured 150 Maryland prisoners, and about a score of their British guard; and in September and October repeatedly sur- prised larger bodies of Loyalists or British regulars. Colonel Banastre Tarleton, sent out to capture him, despaired of finding the " old swamp fox," who eluded him by following swamp paths. When General Nathanael Greene took command in the south, Marion and Colonel Henry Lee were ordered in January 1781 to attack Georgetown, but they were unsuccessful. In April, however, they took Fort Watson and in May Fort Motte, and they succeeded in breaking communications between the British posts in the Carolinas. On the 31st of August Marion rescued a small American force hemmed in by Major C. Fraser with 500 British; and for this he received the thanks of Congress. He commanded the right wing under General Greene at Eutaw Springs. In 1782, during his absence as state senator at Jack- sonborough, his brigade deteriorated and there was a conspiracy to turn him over to the British. In June of the same year he put down a Loyalist uprising on the banks of the Pedee river; and in August he left his brigade and returned to his plantation. He served several terms in the state Senate, and in 1784, in recog- nition of his services, was made commander of Fort Johnson, practically a courtesy title with a salary of £500 per annum. He died on his estate on the 27th of February 1795. Marion was small, slight and sickly-looking. As a soldier he was quick, watchful, resourceful and calm, the greatest of partisan leaders in the bitter struggle in the Carolinas.

See the Life (New York, 1844) by W. G. Simms ; Edward McCrady, South Carolina in the Revolution (New York, 1 901-1902) ; and a careful study of Marion's ancestry and early life by " R. Y." in vols. i. and ii. of the Southern and Western Monthly Magazine and Review (Charleston, 1845).

MARION, HENRI FRANCOIS (1846-1896), French philosopher and educationalist, was born at Saint-Parize-en-Viry (Nievre) on the 9th of September 1846. He studied at Nevers, and at the ficole Normale, where he graduated in 1868. After occupying several minor positions, he returned to Paris in i875-as professor

of the Lycee Henri IV., and in 1880 he became docteur-es-lettres. In the

same year he was elected a member of the Council of Public Instruction, and devoted himself to improving the scheme of French education, especially in girls' schools. He was largely instrumental in the foundation of ecoles normales in provincial towns, and himself gave courses of lectures on psychology and practical ethics in their early days. He died in Paris on the 5th of April 1896.

His chief philosophical works were an edition of the Thiodieee of Leibnitz (1874), a monograph on Locke (1878), Devoirs et droits de Vhomme (1880), Glissonius utrum Leibnilio de nalura subslantiae cogitanti quidquam tribuerit (1880); De La solidarity morale (4th ed., 1893). His lectures at Fontenoy have been published in two volumes entitled Leqons de psychologie appliqufe d, I 'education, and Lemons de morale; those delivered at the Sorbonne are collected in L' Educa- tion dans I'universite (1892).

MARION, a city and the county-seat of Grant county, Indiana, U.S.A., about 60 m. N.E. of Indianapolis, on the Mississinewa River. Pop. (1910), 19,359. It is served by the Chicago, Cincin- nati & Louisville, the Cleveland, Cincinnati, Chicago & St Louis, the Pittsburgh, Cincinnati, Chicago & St Louis, and the Toledo, St Louis & Western railways, and by interurban electric lines connecting with Indianapolis, Muncie, Fort Wayne, Kokomo and many other towns and cities. The city is the seat of the Marion Normal College and Business University, and has a Carnegie library. Marion lies in a good farming country and in the centre of the state's natural gas region. Among the manufactures are glass, stoves, iron bedsteads, foundry and machine-shop products, steel, planing-mill products, paper and pulp, and leather. The total value of the factory products in 1005 was $4,290,166, the value of the glass product alone being $1,042,057, or 24.3% of the total. Marion was settled in 1832, and was named in honour of General Francis Marion.

MARION, a city and the county-seat of Marion county, Ohio, LT.S.A.,44m. N. by W. of Columbus. Pop. (1900), 11,862, including 782 foreign-born and 112 negroes; (1910), 18,232. Marion is served by the Pennsylvania, the Erie, the Cleveland, Cincinnati, Chicago & St. Louis, and the Hocking Valley railways, and by interurban electric railway to Columbus. It is the trade centre of a rich farming district. Limestone is abundant, and the city has various manufactures, including lime, foundry and machine-shop products, agricultural implements, planing-mill products, engines, steam shovels, dredges, pianos and silks. In 1905 the value of factory products was $3,227,712, being 33.1 % greater than in 1900. Marion was laid out in 1821, and was chartered as a city in 1890.

MARIONETTES (probably from Ital. morio, a fool or buffoon, but also

said to be derived from the mariolettes, or little figures of the Virgin Mary), Fantoccini (from fantino, a child) or Puppets (Fr. poupie Lat. pupa, a baby or doll), the names given to figures, generally below life-size, suspended by threads or wires and imitating with their limbs and heads the movements of living persons.

The high antiquity of puppets appears from the fact that figures with movable limbs have been discovered in the tombs of Egypt and among the remains of Etruria; they were also common among the Greeks, from whom they were imported to Rome. Plays in which the characters are represented by puppets or by the shadows of moving figures, worked by concealed performers who deliver the dialogue, are not only popular in India and China, but during several centuries past maintained an important position among the amusements of the people in most European countries. Goethe and Lessing deemed them worthy of attention; and in 17 21 Le Sage wrote plays for puppets to perform.

The earliest performances in English were drawn or founded upon Bible narratives and the lives of the saints, in the same vein as the " morality " plays which they succeeded. Popular subjects in the 16th century were The Prodigal Son and Nineveh, with Jonah and the Whale. And in a pamphlet of 1641, de- scribing Bartholomew Fair, we read, " Here a knave in a fool's coat, with a trumpet sounding or a drum beating, invites you to see his puppets. Here a rogue like a wild woodman, or in an

antic shape like an incubus, desires your company to view his motion." In 1667 Pepys recorded how at Bartholomew Fair he found " my Lady Castlemaine at a puppet play, Patient Grizill." Besides The Sorrows of Griselda, other puppet plays of the period were Dick Whittington, The Vagaries of Merry Andrew, and The Humours of Bartholomew Fair. Powell's noted marionette show was the subject of an article in The Taller, 1709, and again in The Spectator, 171 1. The latter refers also to Pinkethman, a " motion-maker," in whose scenes the divinities of Olympus ascended and descended to the strains of music. An idea of the class of representation may be gathered from an advertisement of Crawley, a rival of Pinkethman, which sets forth — " The Old Creation of the World, with the addition of Noah's Flood," also several fountains playing water during the time of the play. The best scene represented " Noah and his family coming out of the ark, with all the animals two by two, and all the fowls of the air seen in a prospect sitting upon trees; likewise over the ark is the sun rising in a gorgeous manner; moreover a multitude of angels in a double rank," the angels ringing bells. " Likewise machines descending from above, double, with Dives rising out of hell and Lazarus seen in Abraham's bosom; besides several figures dancing jiggs, sara- bands, and country dances, with the merry conceits of Squire Punch and Sir John Spendall." Yates showed

a moving picture of a city, with an artificial cascade, and a temple — with mechani- cal birds in which attention was called to the exact imitation of living birds, the quick motion of the bills, just swelling of the throat, and fluttering of the wings. The puppets were wax figures 5 ft. in stature. Toward the end of the 18th century, Flockton's show presented five hundred figures at work at various trades. Brown's Theatre of Arts showed at country fairs, from 1830 to 1840, the battle of Trafalgar, Napoleon's army crossing the Alps, and the marble palace of St Petersburg; and at a still later date Clapton's similar exhibition presented Grace Darling rescuing the crew of the " Forfarshire " steamer wrecked on the Fern Islands, with many ingenious moving figures of quadrupeds, and, in particular, a swan which dipped its head into imitation water, opened its wings, and with flexible neck preened and trimmed its plumage. In these mechanical scenes the figures, painted upon a flat surface and cut out, commonly of pasteboard, are slid along grooves arranged trans- versely in front of the set scenery, the actions of legs and arms being worked by wires from the hands of persons below the stage, though sometimes use is made of clockwork. In recent days the literature for the marionette stage has had an important literary recruit in the person of the Belgian author Maurice Maeterlinck.

Marionettes proper, and the dolls exhibited in puppet shows (not including Punch and his companion actors), are constructed of wood or of pasteboard, with faces of composition, sometimes of wax; and each figure is suspended by a number of threads to a short bar of wood which is commonly held in one hand of the hidden performer while the finger of his other hand poses the figure or gives action to it by means of the threads. In the mode of constructing the joints, and the greater elaboration with which the several parts of the limbs are supported and moved, and especially in the fine degrees of movement given to the heads, marionettes have been so improved as to present very exact imitations of the gestures of actors and actresses, and the postures and evolutions of acrobats; and, in addition, ingenious exhibitors such as Theodon, who introduced many novelties in the 'sixties of the 19th century, have employed mechanical arrangements for accomplishing the tricks of pantomime harlequinade. Among the puppet personages presented in the small street shows are generally included a sailor who dances a hornpipe, a hoop-dancer, a dancer of the Highland fling, a wooden-legged pensioner, a vaulter on a pole also balancing two chairs, a clown playing with a butterfly, a dancing figure without head until the head rises out of the body, gradually displaying an enormously long neck, and a skeleton, seen at first in scattered parts lying about the stage, but piece successively flying to piece, the body first sitting up, then standing, and finally capped by the skull, when the com- pleted figure begins to dance.

Ombres Chinoises are performances by means of the shadows of figures

projected upon a stretched sheet of thin calico or a gauze scene painted as a transparency. The cardboard flat figures are held behind this screen, illuminated from behind — the performer supporting each figure by a long wire held in one hand while wires

from all the movable parts terminate in rings in which are inserted the fingers of his other hand.

See also C. Magnin, Histoire des marionettes (1852 ; 2nd ed., 1862) ; L. de Neuville, Histoire des marionettes (1892).

MARIOTTE, EDME (c. 1620-1684), French physicist, spent most of his life at Dijon, where he was prior of St Martin sous Beaune. He was one of the first members of the Academy of Sciences founded at Paris in 1666. He died at Paris on the 1 2th of May 1684. The first volume of the Histoire et memoires de I'Academie (1733) contains many original papers by him upon a great variety of physical subjects, such as the motion of fluids, the nature of colour, the notes of the trumpet, the barometer, the fall of bodies, the recoil of guns, the freezing of water, &c.

His Essais de physique, four in number, of which the first three were published at Paris between 1676 and 1679, are his most im- portant works, and form, together with a TraitS de la percussion des corps, the first volume of the CEuvres de Mariotte (2 vols., Leiden, 1717). The second of these essays (De La nature de Vair) contains the statement of the law that the volume of a gas varies inversely as the pressure, which, though very generally called by the name of Mariotte, had been discovered in 1660 by Robert Boyle. The fourth essay is a systematic treatment of the nature of colour, with a description of many curious experiments and a discussion of the rainbow, halos, parhelia, diffraction, and the more purely physio- logical phenomena of colour. The discovery of the blind spot is noted in a short paper in the second volume of his collected works.

MARIPOSAN, or Yokuts, a linguistic stock of North Ameri- can Indians, including some 40 small tribes. Its former territory was in southern California, around Tulare lake. The Mari- posans were fishers and hunters. Their villages consisted of a single row of wedge-shaped huts, with an awning of brush along the front. In 1850 they numbered some 3000; in 1905 there were 154 on the Tule river reservation.

MARIS, JACOB (183 7- 1 899), Dutch painter, first studied at the Antwerp Academy, and subsequently in Hebert's studio during a stay in

Paris from 1865 till 1871. He returned to Holland when the Franco-Prussian War broke out, and died there in August 1899. Though he painted, especially in early life, domestic scenes and interiors invested with deeply sym- pathetic feeling, it is as a landscape painter that Maris will be famous. He was the painter of bridges and windmills, of old quays, massive towers, and level banks; even more was he the painter of water, and misty skies, and chasing clouds. In all his works, whether in water or oil colour, and in his etchings, the subject is always subordinate to the effect. His art is suggestive rather than decorative, and his force does not seem to depend on any preconceived method, such as a synthetical treatment of form or gradations of tone. And yet, though his means appear so simple, the artist's mind seems to communicate with the spectator's by directness of pictorial instinct, and we have only to observe the admirable balance of composition and truthful perspective to understand the sure knowledge of his business that underlies such purely impressionist handling. Maris has shown all that is gravest or brightest in the landscape of Holland, all that is heaviest or clearest in its atmosphere — for instance, in the " Grey Tower, Old Amsterdam," in the " Landscape near Dordrecht," in the " Sea-weed Carts, Scheven- ingen," in " A Village Scene," and in the numerous other pictures which have been exhibited in the Royal Academy, London, in Edinburgh (1885), Paris, Brussels and Holland, and in various private collections. " No painter," says M. Philippe Zilcken, " has so well expressed the ethereal effects, bathed in air and light through floating silvery mist, in which painters delight, and the characteristic remote horizons blurred by haze; or again, the grey yet luminous weather of Holland, unlike the dead grey rain of England or the heavy sky of Paris."

See Max Rooses, Dutch Painters of the Nineteenth Century (London, 1899) ; R. A. M. Stevenson, " Jacob Maris," Magazine of Art (1900) ; Ph. Zilcken, Peintres Hollandais modernes (Amsterdam, 1893); Jan Veth, " Een Studie over Jacob Maris," Onze Kunst (Antwerp, 1902).

MARITIME PROVINCE (Russ., Primorskaya Oblast), a province of Russia, in East Siberia. It consists of a strip of territory along the coast of the Pacific from Korea to the Arctic Ocean, including also the peninsula of Kamchatka, part of the island of Sakhalin, and several small islands along the coast.

Its western boundary stretches northwards from a point S.W. of Peter the Great Bay (42° 40′ N.) by Lake Hanka or Khanka and along the Usuri, then goes due north from the mouth of the Usuri as far as 52° N., runs along the Stanovoi watershed, crosses the spurs of this plateau through barren tundras, and finally reaches the Arctic Ocean at Chaun Bay (70 N.). Area, 715 = 735 sq- m-

The northern part lies between the Arctic Ocean and the Seas of Bering and Okhotsk, and has the character of a barren plateau 1000 to 2000 ft. high, deeply indented by the rivers of the Anadyr basin and by long fiords, such as Kolyuchin Bay (the wintering-place of Nordenskiold's " Vega "), the Gulf of Anadyr, and the Bays of Penzhina and Ghizhiga. To the north this plateau is bordered by a chain of mountains, several summits of which reach 8000 ft- (Makachinga peak), while the promontories by which the Asiatic continent terminates towards Bering Strait run up to 1000 to 2000 ft. Only lichens and mosses, with a few dwarf species of Siberian trees, grow in this district. The fauna, however, is far richer than might be expected. A few American birds and mammals cross the strait when it is frozen. This country, and the seas which surround it, have for the last two centuries supplied Siberian trade with its best furs. The blue fox and black sable have been nearly extermi- nated, and the whale has become very rare. The sea-otter is rapidly becoming extinct, as well as the sea-lion (Otaria stelleri) ; while the sea-cow (Rhytina stelleri) was completely extirpated in the course of forty years. The sea-bear (Otaria ursina), which at one time seemed likely to meet with the same fate, is now nearly domesticated, and multiplies rapidly. The middle part of the province is a narrow strip (40 to 60 m. wide) along the Sea of Okhotsk, including the basin of the Uda in the south. This area is occupied by rugged mountains, 4000 to 7000 ft. high, forming the eastern border of the high plateau of East Siberia. Thick forests of larch clothe the mountains half way up, as well as the deep valleys. The undulating hills of the basin of the Uda, which is a continuation to the south-west, between the Stanovoi and Bureya mountains, of the deep indentation of the Sea of Okhotsk, are covered with forests and marshes.

The southern part of the province includes two distinct regions. From the north-eastern extremity of the Bureya, or Little Khingan range, of which the group of the Shantar Islands is a continuation, a wide, deep depression runs south-west to the confluence of the Amur and the Usuri, and thence to the lowlands of the lower Sungari. This is for the most part less than 500 ft. above sea-level. The region on the right banks of the Amur and the Usuri, between these rivers and the coast, is occupied by several systems of mountains, usually represented as a single range, the Sikhota-alin. The summits reach 5150 ft. (Golaya Gora), and the average elevation of the few passes is about 2500 ft. There is, however, one depression occupied by Lake Kidzi, which may have been at one time an outflow of the Amur to the sea. The Sikhota-alin mountains are covered with impenetrable forests. The flora and fauna of this region (especially in the Usuri district) exhibit a striking combination of species of warm climates with those of subarctic regions; the wild vine clings to the larch and the cedar-pine, and the tiger meets the bear and the sable. The quantity of fish in the rivers is immense,

and in August the Amur and the Usuri swarm with salmon.

The best part of the Maritime Province is at its southern extremity in the valley of the Suifeng river, which enters the Pacific in the Gulf of Peter the Great, and on the shores of the bays of the southern coast. But even there the climate is very harsh. The warm sea- current of the Kuro-Siwo does not reach the coasts of Siberia, while a cold current originating in the Sea of Okhotsk brings its icy water and chilling fogs to the coasts of Sakhalin, and flows along the Pacific shore to the eastern coast of Korea. The high mountains of the sea-coast and the monsoons of the Chinese Sea produce in the southern parts of the Maritime Province cold winters and wet summers. Accordingly, at Vladivostok (on the Gulf of Peter the Great), although it has the same latitude as Marseilles, the average yearly temperature is only 39-5° F., and the harbour is frozen for nearly three months in the year; the Amur and the Usuri are frozen in November. To-wards the end of summer the moist monsoons bring heavy rains, which destroy the harvests and give rise to serious inundations of the Amur. The sea-coast farther north has a continental and arctic climate. At Nikolayevsk, temperatures as low as — 41-5° F. are observed in winter, and as high as 94-6° in summer, the average yearly temperature being below zero (— 0-9°). At Ayan (56 27′ N.) the average temperature of the year is 25-5° (—0-4° in winter and 50-5° in summer), and at Okhotsk (59° 21′ N.) it is 23° (—6° in winter and 52-5° in summer).

Russian settlements occur throughout the whole of the province, but, with the exception of those on the banks of the Amur and the Usuri, and the southern ports of the sea-coast, they are mere centres of administration.

Okhotsk is one of the oldest towns of East Siberia, having been founded in 1649. Nikolayevsk, on the left bank of the Amur, was formerly the capital of the Maritime Province; but the difficulties of navigation and of communication with the interior, and the complete failure of the governmental colonization of the Amur,

caused the seat of government to be transferred to Khabarovsk. Since the loss (1905) of Port Arthur to the Japanese, Vladivostok on Peter the Great Bay has again become the chief naval station of Russia on the Pacific. The trade is in the hands of the Chinese, who export stags' horns, seaweed and mushrooms, and of the Germans, who import groceries and spirits.

The total population was 209,516 in 1897, of whom 57-7% were

Russians, the others being Tunguses, Golds, Orochons, Lamuts, Chuvantses, Chukchis, Koryaks, Ghilyaks and Kamchadales. Their chief occupations are hunting and fishing ; the Russians carry on agriculture and trade in furs. Active measures were taken in 1883-1897 for increasing the Russian population in the South Usuri district, the result being that over 29,000 immigrants, chiefly Little Russian peasants, settled there; while Cossacks from the Don and Orenburg came to settle among the Usuri Cossacks. Agriculture is gradually developing in the South Usuri region. Gold-mining has been started on the Amgun, a tributary of the Amur. Coal is found near Vladivostok, as well as in Kamchatka. Roads exist only in the South Usuri district. A railway runs from Vladivostok to Nikolsk (69 m.), and thence to Khabarovsk along the right bank of the Usuri (412 m.). At Nikolsk the Manchurian railway begins.

(P. A. K.; J. T. Be.)

MARITIME TERRITORY, a term used in international law to denote coastal waters which are not Territorial Waters though in immediate contact with the sea. In the case of Territorial Waters (q.v.) the dominion of the adjacent state is subject to a limitation. Dominion over maritime territory is not subject to any limitation. Thus any strait through which the right of passage of foreign vessels can be forbidden (as the Solent or the Inland Sea of Japan), or bays so land-locked that they cannot be held to form part of any ocean-highway, are maritime territory. MARIUPOL, a seaport of Russia, on the north shore of the Sea of Azov, at the mouth of the Kalmius, in the government of Ekaterinoslav, 67 m. W. of Taganrog. Pop. (1900), 52,770, including the inhabitants of two suburbs, Mariinsk and Kara-su. The place is said to have been inhabited in remote times under the name of Adamakha; the present town was built only in 1779, by Greek emigrants from the Crimea. Its inhabitants are engaged in agriculture, cattle-breeding, fishing, and the manufacture of leather, agricultural implements, iron goods and bricks. In export trade Mariupol ranks next to Taganrog among the ports of the Sea of Azov; but its harbour is open to the south-east and shallow, though it is being gradually deepened by systematic dredging. The principal articles of export are cereals, with some oilcake, phosphate and coal; but the total value is only about £2,000,000 annually. The imports do not reach a quarter of a million sterling.

MARIUS OF AVENCHES (or Aventicum) (d. 593 or 594), chronicler and ecclesiastic, was born in the neighbourhood of Autun probably in 530, and became bishop of Avenches about 573. In addition to being a good bishop, Marius was a clever goldsmith; he was present at the council of Macon in 585, and transferred the seat of his bishopric from Avenches to Lausanne. He died on the 31st of December 593 or 594. As a continuation of the

Chronicon of Prosper of Aquitaine, Marius wrote a short Chronicon dealing with the period from 435 to 581; and although he borrowed from various sources his work has some importance for the history of Burgundy. Regarding himself and his land as still under the authority of the Roman empire, he dates his Qhronicon according to the years of the Roman consuls and of the East Roman emperors.

The only extant manuscript of the Chronicon is in the British Museum. Among several editions may be mentioned the one in the Monumenta Germaniae historica, chronica minora, Band II. (1893), with introduction by T. Mommsen. See also W. Arndt, Bischof Marius von Aventicum (Leipzig, 1875); and W. Wattenbach, Deulschlands Geschichtsquellen, Bd. I. (1904).

MARIUS, GAIUS (155-86 B.C.), Roman general, of plebeian descent, the son of a small farmer of Cereatae (mod. Casamare, " home of Marius ") near Arpinum. He served first in Spain under the great Scipio Africanus, and rose from the ranks to be an officer. In 119 as tribune he proposed a law intended to limit the influence of the nobles at elections. This brought him into conflict with the aristocratic party, who prevented him from obtaining the aedileship. When about forty years of age he married a lady of patrician rank, Julia, the aunt of

Julius Caesar. This gave him a new social status, and being at the same time a popular favourite and a brave, energetic soldier, he was in 115 elected praetor, in which capacity he effected the subjugation of the troublesome province of Further Spain. In the war with Jugurtha (109-106) he came to the front as lieutenant of the consul Quintus Caecilius Metellus Numidicus. When he had already achieved some important successes over Jugurtha {q.v.), in 107 he was elected consul for the first time (an almost unheard-of honour for a " new man "), his popularity with the army and people being sufficient to bear down all opposition. In the following year, in conjunction with Sulla, he brought the war to a triumphant issue, and passed two years in his province of Numidia, which he thoroughly subdued and annexed. The surrender of the person of Jugurtha to Sulla gave rise to the view that he, not Marius, had really ended the war, and so laid the foundation of the subsequent enmity between the two leaders.

By this time Marius was generally recognized as the ablest general of the day, and was appointed to the chief command against the Cimbri and Teutones. Two Roman armies had been destroyed near the Lake of Geneva, and it seemed as if a repetition of the disaster of the Allia and the capture of Rome itself might not be impossible. Marius, out of unpromising materials and a demoralized soldiery, organized a well-disciplined army,

with which he inflicted on the invaders two decisive defeats, the first in 102 at Aquae Sextiae (Aix), 18 m. north of Marseilles, and the second in the following year on the Raudian plain near Vercellae (Vercelli), about midway between Turin and Milan. For some centuries afterwards Rome remained unmolested by northern barbarians. In 101 Marius was elected consul a fifth time (previously in 107, 104, 103, 102), hailed as the " saviour of his country," and honoured with a triumph of unprecedented splendour.

The glorious part of his career was now over. Though a very able soldier, he was without the intellectual culture which the Gracchi, his political ancestors, possessed. As a politician he on the whole failed, though he retained the confidence of the popular party almost to the last. But he unfortunately associated himself with the demagogues Saturninus (q.v.) and Glaucia, in order to secure the consulship for the sixth time (100). The manner in which he turned against his former associates (although he probably had no choice in the matter) alienated the sympathies of the plebs; and Marius, feeling that his only chance of rehabilitation lay in war, left Rome for Asia, where he endeavoured to provoke Mithradates to hostilities. On his return he served as legate in the Social War (90), and defeated the Marsi on two occasions. In 88 war broke out with Mithradates, and Sulla was appointed by the senate to the chief command, which was eagerly desired by Marius. This led to a rupture. With the assistance of the tribune Sulpicius Rufus, Marius succeeded in getting the command transferred to himself. Sulla marched upon Rome and defeated Marius, who fled to the marshes of Minturnae in Latium. He was discovered and taken prisoner; and the local magistrates, in accordance with Sulla's proclamation, resolved to put him to death. The Gallic trooper sent to strike off the old man's head quailed, it is said, before the fire of his eyes, and fled exclaiming, "I cannot kill Gaius Marius." The inhabitants out of com- passion then allowed Marius to depart, and put him on board a ship which conveyed him to Carthage. When forbidden to land, he told the messenger to inform the governor that he had seen Marius sitting as a fugitive among the ruins of Carthage. Having been joined by his son, he took refuge in the island of Cercina. Meantime, Sulla having left Italy for the Mithradatic war, Cinna's sudden and violent revolution put the senate at the mercy of the popular leaders, and Marius greedily caught at the opportunity of a bloody vengeance, which became in fact a reign of terror in which senators and nobles were slaughtered wholesale. He had himself elected consul for the seventh time, in fulfilment of a prophecy given to him in early manhood. Less than three weeks afterwards he died of fever, on the 13th of January 86.

Marius was not only a great general, but also a great military- reformer. From his time a citizen militia was replaced by a professional soldiery, which had hitherto been little liked by the Roman people. He further made the cohort the military unit instead of the maniple, and his cavalry and light-armed troops were drawn from foreign countries, so that it may be said that Marius was the originator of the mercenary army. The Roman soldier was henceforth a man who had no trade but war. A great general could hardly fail to become the foremost man in the state. Marius, however, unlike Caesar, did not attempt to overturn the oligarchy by means of the army; he used rather such expedients as the constitution seemed to allow, though they had to be backed up by riot and violence. He failed as a political reformer because the merchants and the moneyed classes, whom the Gracchi had tried to conciliate, feared that they would themselves be swept away by a revolution of which the mob and its leaders would be the ultimate controllers. Marius had a decided tinge of fanaticism and superstition. In canvassing for the consulship he was guided by the counsels of an Etruscan soothsayer, and was accompanied in his campaigns by a Syrian prophetess. The fashionable accomplishments of the day, and the new Greek culture, were wholly alien to his taste.

For the life of Marius the original sources are numerous passages in Cicero's works, Sallust's Jugurtha, the epitomes of the lost books of Livy, Plutarch's Lives of Sulla and Marius, Velleius Paterculus, Florus and Appian's Bellum civile. See F. D. Gerlach, Marius und Sulla (Basel, 1856); I. Gilles, Campagne de Marius dans la Gaule (1870); W. Votsch, Marius als Reformator des rbmischen Heerwesens (with notes and references to ancient authorities, 1 886); A. H. J. Greenidge, History of Rome, vol. i. (1904); also Rome: History, II. " The Republic."

MARIVAUX, PIERRE CARLET DE CHAMBLAIN DE (1688- 1763), French novelist and dramatist, was born at Paris on the 4th.of February 1688. His father was a financier of Norman extraction whose real name was Carlet, but who assumed the surname of Chamblain, and then superadded that of Marivaux. M. Carlet de Marivaux was a man of good reputation, and he received the appointment of director of the mint at Riom in Auvergne, where and at Limoges the young Pierre was brought up. It is said that he developed literary tastes early, and wrote his first play, the Pere prudent et iquitable, when he was only eighteen; it was not, however, published till 171 2, when he was twenty-four. His chief attention in those early days was paid to novel writing, not the drama. In the three years from 1713 to 1715 he produced three novels — Effete surprenants de la sympathie; La Voiture embourbSe, and a book which had three titles — – Pharsamon, Les Folies romanesques, and Le Don Quichotte moderne. All

these books were in a curious strain, not in the least resembling the pieces which long after- wards were to make his reputation, but following partly, the Spanish romances and partly the heroic novels of the preceding century, with a certain intermixture of the marvellous. Then Marivaux's literary ardour took a new phase. He fell under the influence of Antoine Hondar[d] de La Motte, and thought to serve the cause of that ingenious paradoxer by travestying Homer, an ignoble task, which he followed up (perhaps, for it is not certain) by performing the same office in regard to Fenelon. His friendship for La Motte, however, introduced him to the Mercure, the chief newspaper of France, where in 171 7 he produced various articles of the " Spectator " kind, which were distinguished by much keenness of observation and not a little literary skill. It was at this time that the peculiar style called Marivaudage first made its appearance in him. The year 1720 and those immediately following were very important ones for Marivaux; not only did he produce a comedy, now lost except in small part, entitled L' Amour et la vSriti, and another and far better one entitled Arlequin poll par Vamour, but he wrote a tragedy, Annibal (printed 1737), which was and deserved to be unsuccessful. Meanwhile his wordly affairs underwent a sudden revolution. His father had left him a comfortable subsistence, but he was persuaded by friends to risk it in the Mississippi scheme, and after vastly increasing it for a time lost all that

he had. His prosperity had enabled him to marry (perhaps in 1 721) a certain Mile Martin, of whom much good is said, and to whom he was deeply attached, but who died very shortly. His pen now became almost his sole resource. He had a con- nexion with both the fashionable theatres, for his Annibal had been played at the Comedie Francaise and his Arlequin poli at the Comedie Italienne, where at the time a company who were extremely popular, despite their imperfect command of French, were established. He endeavoured too to turn his newspaper practice in the Mercure to more account by starting a weekly Spectateur Franqais (1722-1723), to which he was the sole contributor. But his habits were the reverse of methodical; the paper appeared at the most irregular intervals; and, though it contained some excellent work, its irregularity killed it. For nearly twenty years the theatre, and especially the Italian theatre, was Marivaux's chief support, for his pieces, though they were not ill received by the actors at the Francais, were rarely successful there. The best of a very large number of plays (Marivaux's theatre numbers between thirty and forty items) were the Surprise de I' amour (1722), the Triomphe de Plutus (1728), the Jeu de V amour et du hasard (1730), Les Fausses confidences (1737), all produced at the Italian theatre, and Le Legs (1736), produced at the French. Meanwhile he had at intervals returned to both his other lines of composition. A periodical publication called L'Indigent philosophe appeared in 1727, and another called Le Cabinet du

philosophe in 1734, but the same causes which had proved fatal to the Spectateur pre- vented these later efforts from succeeding. In 1731 Marivaux published the first two parts of his best and greatest work, Marianne, a novel of a new and remarkable kind. The eleven parts appeared in batches at intervals during a period of exactly the same number of years, and after all it was left unfinished. In 1735 another novel, Le Paysan parvenu, was begun, but this also was left unfinished. He was elected a member of the Academy in 1742. He survived for more than twenty years, and was not idle, again contributing occasionally to the Mercure, writing plays, " reflections " (which were seldom of much worth), and so forth. He died on the 12th February 1763, aged seventy-five years.

The personal character of Marivaux was curious and somewhat contradictory, though not without analogies, one of the closest of which is to be found in Goldsmith. He was, however, unlike Gold- smith, at least as brilliant in conversation as with the pen. _ He was extremely good-natured, but fond of saying very severe things, unhesitating in his acceptance of favours (he drew a regular annuity from Helvetius), but exceedingly touchy if he thought himself in any way slighted. He was, though a great cultivator of sensibilite, on the whole decent and moral in his writings, and was unsparing in his criticism of the rising Philosophes. This last circumstance, and perhaps jealousy as well, made him a dangerous enemy in Voltaire, who lost but few opportunities of speaking disparagingly of him. He had good friends, not merely in the rich, generous and aniiable Helvetius, but in Mme de Tencin, in Fontenelle and even in Mme de Pompadour, who gave him, it is said, a considerable pension, of the source of which he was ignorant. His extreme sensitiveness is shown by many stories. He had one daughter, who took the veil, the duke of Orleans, the regent's successor, furnishing her with her dowry.

The so-called Marivaudage is the main point of importance about Marivaux's literary work, though the best of the comedies have greˆt merits, and Marianne is an extremely important step in the legiti- mate development of the French novel — legitimate, that is, in opposition to the brilliant but episodic productions of Le Sage. Its connexion, and that of Le Paysan parvenu, with the work not only of Richardson but of Fielding is also an interesting though a difficult subject. The subject matter of Marivaux's peculiar style has been generally and with tolerable exactness described as the metaphysic of love-making. His characters, in a happy phrase of Claude Prosper Jolyot Crebillon's, not only tell each other and the reader everything they have thought, but everything that they would like to persuade themselves that they have thought. The style chosen for this is justly regarded as derived mainly from Fontenelle, and through him from the Precieuses, though there are traces of it even in La BruyˆrU It abuses metaphor somewhat, and delights to turn off a metaphor itself in

some unexpected and bizarre fashion. Now it is a familiar phrase which is used where dignified language would be expected; now the reverse. In the criticism of Crebillon's already quoted occurs another happy description of Marivaux's style as being " an introduction to each other of words which have never made acquaintance, and which think that they

will not get on together," a phrase as happy in its imitation as in its satire of the style itself. This kind of writing, of course, recurs at several periods of literature, and did so remarkably at the end of the 19th century in more countries than one. Yet this fantastic embroidery of language has a certain charm, and suits perhaps better than any other style the somewhat unreal gallantry and sensibilite which it describes and exhibits. The author possessed, moreover, both thought and observation, besides considerable command of pathos.

The best and most complete edition of Mariyaux is that of 1781 in 12 vols, reprinted with additions 1825-1830. The plays had been published during the author's lifetime in 1740 and 1748. There are modern editions by Paul de Saint Heylli Victor (1863), by G. d' Hey Hi (1876) and by E. Fournier (1878), while issues of selections and separate plays and novels are numerous. Of works concerning him J. Fleury's Marivaux et le Marivaudage (Paris, 1881), G. Larroumet's Marivaux, sa vie et ses ceuvres (1882; new ed., 1894), the standard work on the subject, and G. Deschamps's Marivaux (1897), in the Grands ecrivains francais, are the most important. Separate articles on him will be found in the collected essays of the chief modern French critics from Sainte-Beuve onwards. (G. Sa.)

MARJORAM, (O. Fr. majorane, Med. Lat. majorana; not connected with major, greater, nor with amaracus), in botany, the common name for some aromatic herbs or undershrubs, belonging to the genus Origanum (natural order Labiatae). Wild marjoram is O. vulgare, a perennial common in England in dry copses and on hedge-banks, with many stout stems 1 to 3 ft. high, bearing short-stalked somewhat ovate leaves and clusters of purple flowers. Sweet or knotted marjoram, O. Marjorana, and pot marjoram, O. Onites, are cultivated for the use of their aromatic leaves, either green or dry, for culinary purposes; the tops are cut as the plants begin to flower and are dried slowly in the shade.

MARK, ST, the traditional author of the second Gospel. His name occurs in several books of the New Testament, and doubtless refers in all cases to the

same person, though this has been questioned. In the Acts of the Apostles (xii. 12) we read of " John, whose surname was Mark," and gather that Peter was a familiar visitor at the house of his mother Mary, which was a centre of Christian life in Jerusalem. That he was, as his Roman surname would suggest, a Hellenist, follows from the fact that he was also cousin (" nephew " is a later sense of aveipibs, see J. B. Lightfoot on Col. iv. 10) of Barnabas, who belonged to Cyprus. When Barnabas and Paul returned from their relief visit to Judaea (c. a.d. 46), Mark accompanied them (xii. 25). Possibly he had shown in connexion with their relief work that practical capacity which seems to have been his distinctive excellence (cf. 2 Tim. iv. 11). When, not long after, they started on a joint mission beyond Syria, Mark went as their assistant, undertaking the minor personal duties connected with travel, as well as with their work proper (xiii. 5). As soon, however, as their plans developed, after leaving Cyprus and on arrival at Perga in Pamphylia (see Paul), Mark withdrew, probably on some matter of principle, and returned to Jerusalem (xiii. 13). When, then, Paul proposed, after the Jerusalem council of Acts xv., to revisit with Barnabas the scenes of their joint labours, he naturally demurred to taking Mark with them again, feeling that he could not be relied on should fresh openings demand a new policy. But Barnabas stood by his younger kinsman and" took Mark and sailed away to Cyprus "(xv. 38 seq.). Barna- bas does not reappear, unless we trust trie tradition which makes him an evangelist in Alexandria (Clem. Horn. i. 9 seq., cf. the attribution to him of the Alexandrine Epistle of Barnabas).

When Mark appears once more, it is in Paul's company at Rome, as a fellow-worker joining in salutations to Christians at Colossae (Col. iv. 10; Philem. 24). We gather, too, that his restoration to Paul's confidence took place some time earlier, as the Colossians had already been bidden by oral message or letter to welcome him if he should visit them. This points to a reconciliation during Paul's last sojourn in Jerusalem or Caesarea. Not long after Col. iv. 10 Mark seems to have been sent by Paul to some place in the province of Asia, lying on the route between Ephesus and Rome. For in 2 Tim. iv. 1 1 Paul bids Timothy, " Pick up Mark and bring him with thee, for he is useful to me for ministering."

Once more Mark's name occurs in the New Testament, this time with yet another leader, Peter, the friend of his earliest Christian years in Jerusalem, to whom he attached himself after the deaths of Barnabas and Paul. Peter's words, " Mark, my son," show how close was the spiritual tie between the older and the younger man (1 Pet. v. 13); and as he is writing from Rome (" Babylon," since Paul's death and the change of policy it implied), this forms a link between the New Testa- ment and early tradition, which speaks of Mark as an Evangelist ' writing his Gospel under the influence of Peter's preaching (in Rome). This is the essence of the

tradition preserved from " the elders of former days " by Clement of Alexandria (in Eus. ii. 15, vi. 14), a tradition probably based on Papias's record (cf. Eus. iii. 39) of the explanation given by " the Elder " (John) as to the contrast in form between Mark's memoirs of Peter's discourses and the Gospel of Matthew (see Gospels; Papias), but defining the place where these memoirs were written as Rome. That he acted to some degree as Peter's interpreter or dragoman (epurjvevs), owing to the apostle's imperfect mastery of Greek, is held by some but denied by others (e.g. by Zahn). His role throughout his career was servus servorum dei; and the fact that he was this successively to Barnabas, Paul and Peter, helps to show the essential harmony of their message.

The identification of the author of the second Gospel with Mark, which we owe to tradition, enables us to fill in our picture of him a little further. Thus it is possible that Mark was himself the youth (vtavio-Kos) to whom his Gospel refers as present at Jesus's arrest (xiv. 51 seq.; cf. his detailed knowledge as to the place of the last supper, 13 seq.). It is probably as evangelist, and not in his own person, that he became known as "he of the stunted extremities " (koKoˆoSAktvKos, " curt- fingered"), a title first found in Hippolytus (Haer. vii. 30), in a context which makes its metaphorical reference to his Gospel pretty evident. 1 It was too as evangelist that he became personally a subject of later interest, and of speculative legends due to this, e.g. he was one of the Seventy (first found in Adamantius, Dial, de recta fide, 4th century), he was the founder of the Alexandrine Church (recorded as a tradition by Eusebius, ii. 16) and its first bishop (id. ii. 2), and was author of the local type of liturgy (cf. the Acts of Mark, ch. vii., not earlier than the end of the 4th century).

As to his last days and death nothing is really known. It is possible — even probable, if we accept the theory that he had already 2 been there with Barnabas — that Alexandria was his final sphere of work, as the earliest tradition on the point implies (the Latin Prologue, and Eusebius as above, probably after Julius Africanus in the early 3rd century), and as was widely assumed in the 4th century. That he died and was buried there is first stated by Jerome {De vir. ill. 8), to which his Acts adds the glory of martyrdom (cf. Ps. Hippoly tus, De LXX Apostolis).

Literature. — H. B. Swete, The Gospel ace. to St Mark (1898), Introduction, § I., where the authorities are fully cited; also the art. in Hastings's Diet. Bible. The Patristic and other legends are discussed at length by R. A. Lipsius, Die apokr. Apostelgesch. u.s.w. (1884), ii. 2, and T. Schermann, Propheten- und Apostelle- genden (1907), 285 seq. (with sepcial reference to Ps.-Hippolytus and Ps.-Dorotheus). (J. V. B.)

Medieval Legends.

The majority of medieval writers on the subject state that Mark was a Levite; but this is probably no more than an inference from his supposed relationship to Barnabas. The Alexandrian tradition seems to have been that he was of Cyrenaean origin; and Severus, a writer of the loth century, adds to this the statement that his father's name was Aristobulus, who, with his wife Mary, was driven from the Pentapolis to Jerusalem by an invasion of barbarians

1 The divergent lines of the later attempts at a literal interpreta- tion — e.g. he amputated his thumb in order to -escape the Levitical priesthood (Latin Prologue), or it was a natural defect (Cod. Tolet.) — suggest that all they had to start from was the epithet itself.

2 Nicephorus Callistus, Hist. Eccl. ii. 43, assumes this in his pictur- esque account of Mark's preaching in a quarter of the city which seems to have contained the tomb of the early bishops of Alexandria (cf. his Acts).

(Severus Aschimon in Renaudot, Hist, patriarch, alex., p. 2). In the apocryphal Acts of Barnabas, which profess to be written by him, he speaks of himself as having been formerly a servant of Cyrillus, the high priest of Zeus, and as having been baptized at Iconium. The presbyter John, whom Papias quotes, says distinctly that " he neither heard the Lord nor accompanied Him " (Eusebius, loc. cit.) ; and this positive statement is fatal to the tradition, which does not appear until about two hundred and fifty years afterwards, that he was one of the seventy disciples (Epiphanius, pseudo-Origen De recta in Deum fide, and the author of the Paschal Chronicle). ■ *Various other results of the tendency to fill up blank names in the gospel history must be set aside on the same ground; it was, for example, believed that Mark was one of the disciples who " went back " because of the " hard saying " (pseudo-Hippolyt., De LXX Apostolis in Cod. Barocc. Migne, Patrol, graec. x. 955) ; there was an Alexandrian tradition that he was one of the servants at the miracle of Cana of Galilee, that he was the " man bearing a pitcher of water " in whose house the last supper was prepared, and that he was also the owner of the house in which the disciples met on the evening of the resurrection (Renaudot, loc. cit.) ; and even in modern times there has been the conjecture that he was the " certain young man " who " fled naked " from Gethsemane, Mark xiv. 51, 52 (Olshausen).*

A tradition which was widely diffused, and which is not in itself improbable, was that he afterwards preached the gospel and presided over the church at Alexandria (the earliest extant testimony is that of Eusebius, H. E. ii. 16, 1; ii. 24; for the fully-developed legend of later times see Symeon Metaphrastes, Vita S. Marci, and Eutychius Origines ecclesiae Alexandrinae) . There was another, though perhaps not incompatible, tradition that he preached the gospel and presided over the church at Aquileia in North Italy. The earliest testimony in favour of this tradition is the vague statement of Gregory of Nazianzus that Mark preached in Italy, but its existence in the 7th century is shown by the fact that in a.d. 629 Heraclius sent the patriarchal chair from Alexandria to Grado, to which city the patriarchate of Aquileia had been then transferred (Chron. patriarch. Cradens., in Ughelli, Italia sacra, torn. v. p. 1086; for other references to the general tradition see De Rubeis, Monum. eccles. aquileien., c. I ; Acta sanctorum, ad April, xxv.). It was through this tradition that Mark became connected with Venice, whither the patriarchate was further transferred from Grado; an early Venetian legend, which is represented in the Cappella Zen in the basilica of St Mark,

antedates this connexion by picturing the evangelist as having been stranded on the Rialto, while it was still an uninhabited island, and as having had the future greatness of the city revealed to him (Danduli, Chron. iv. 1, ap. Muratori, Rer. ital. script, xii. 14).

The earliest traditions appear to imply that he died a natural death (Eusebius, Jerome, and even Isidore of Seville) ; but the Martyr- ologies claim him as a martyr, though they do not agree as to the manner of his martyrdom. According to the pseudo-Hippolytus he was burned ; but Symeon Metaphrastes and the Paschal Chronicle represent him to have been dragged over rough stones until he died. But, however that may be, his tomb appears to have been venerated at Alexandria, and there was a firm belief at Venice in the middle ages that his remains had been translated thither in the 9th century (the fact of the translation is denied even by Tillemont ; the weakness of the evidence in support of the tradition is apparent even in Molini's vigorous defence of it, lib. ii. c. 2; the minute account which the same writer gives, lib., ii. c. 11, of the discovery of the supposed actual bones of the evangelist in a.d. 1811, is interesting). There was another though less widely accepted tradition, that the remains soon after their translation to Venice were retranslated to the abbey of Reichenau on Lake Constance; a circumstantial account of this retranslation is given in the treatise Ex miractdis S. Marci, in Pertz, Mon. hist, german. script., torn. iv. p. 449. It may be added that the Venetians prided themselves on possessing, not only the body of St Mark, but also the autograph of his Gospel; this autograph, however, proved on examination to be only part of a 6th-century book of the Gospels, the remainder of which was published by Bianchini as the Evangeliarium forojuliense; the Venetian part of this MS. was found some years ago to have been wholly destroyed by damp.

It has been at various times supposed that Mark wrote other works besides the Gospel. Several books of the New Testament have been attributed to him: viz. the Epistle to the Hebrews (Spanheim, Op. miscell. ii. 240), the Epistle of Jude (cf. Holtzmann, Die synoptischen Evangelien, p. 373), the Apocalypse (Hitzig, Ueber Johannes Marcus, Zurich, 1843). The apocryphal Acta Barnabae purport to have been written by him. There is a liturgy which bears his name, and which exists in two forms; the one form was found in a MS. of the 12th century in Calabria, and is, according to Renaudot, the foundation of the three liturgies of St Basil, St Gregory Nazianzen and St Cyril; the other is that which is used by the Maronite and Jacobite Syrians. Both forms have been published by Renaudot, Liturg. oriental, collect, i. 127, and ii. 176, and in Neale's History of the Holy Eastern Church; but neither has any substantial claim to belong to the ante-Nicene period of Christian literature.

The symbol by which Mark is designated in Christian art is usually that of a lion. Each of the " four living creatures " of Ezekiel and the Apocalypse has been attributed to each of the four evangelists

in turn; Augustine and Bede think that Mark is designated by the " man "; Theophylact and others think that he is designated by the eagle; Anastasius Sinaita makes his symbol the ox; but medieval art acquiesced in the opinion of Jerome that he was indicated by the lion. Most of the martyrologies and calendars assign April 25 as the day on which he should be commemorated ; but the Martyr. Hieron. gives the 23rd of September, and some Greek martyrologies give the nth of January. This unusual variation probably arises from early differences of opinion as to whether there was one Mark or more than one.

See Canon Molini of Venice, De vita et lipsanis S. Marci Evangeˆ listae, edited, after the author's death, by S. Pieralisi, the librarian of the Barberini library (1864); R. A. Lipsius, Die apokryphen Apostelgesch. und Apostellegenden (1883 foil), vol. ii. part 2, pp.

321-353-

MARK, a word of which the principal meanings are in their probable order of development, — boundary, an object set up to indicate a boundary or position; hence a sign or token, impression or trace. The word in O. Eng. is mearc, and appears in all Teutonic languages, cf. Du. merk, Ger. Mark, boundary, marke, sign, impression; Romanic languages have borrowed the word, cf. Fr. marque, Ital. marca. Cognate forms outside Teutonic have been found in Lat. margo, " margin," and Pers. man, boundary. Others would refer to the Lith. margas, striped, parti-coloured, and Sanskrit marga, trace, especially of hunted game. In the sense of boundary, or a tract of country on or near a boundary or frontier, " mark " in English usage proper is obsolete, and " march " (q.v.) has established itself. It still remains, however, to represent the German mark, a tract of land held in common by a village community (see Mark System), and also historically the name of certain principalities, such as the mark of Brandenburg. The Italian marca is also sometimes rendered by " mark," as in the mark of Ancona. Mark is also the name of a modern silver coin of the German empire. This is apparently a distinct word and not of Teutonic origin; it is found in all Teutonic and Romanic languages, Latinized as marca or marcus. The mark was originally a measure of weight only for gold and silver and was common throughout western Europe and was equivalent to 8 oz. The variations, however, throughout the middle ages were considerable (see Du Cange, Gloss, med. et infim. Lat., s.v. Marca for a full list). In England the " mark " was never a coin, but a money of account only, and apparently came into use in the 10th century through the Danes.

It first was taken as equal to 100 pennies, but after the Norman Conquest was equal to 160 pennies (20 pennies to the oz.) = f of the pound sterling, or 13s. 4d., and therefore in Scotland i3§d. English; the mark (merk) Scots was a silver coin of this value, issued first in 1570 and afterwards in 1663. The modern German mark was adopted in 1873 as the standard of value and the money of account. It is of the value of 6-146 grains of gold, 900 fine, and is equal to English standard gold of the value of 1 1 -747 pence. The modern silver coin, nearly equal in value to the English shilling, was first issued in 1875. (See Numismatics,

§ iv.)

MARK, GOSPEL OF ST, the second of the four canonical Gospels of the Christian Church. Till quite recent times this Gospel, though nominally equal to the others in authority, has unquestionably not aroused the same interest or feelings of attachment as they have, partly from its not bearing the name of an apostle fof its author, as the first and fourth do, partly, also, owing to the fact that the first and third, while they include most of what is found in it, contain much additional matter, which is of the highest value. Of late, however, it has acquired new importance through the critical inquiries which have led to the conclusion that the two other synoptic Gospels are based upon it, or upon a document which is upon the whole most truly represented in it (see Gospel), so that it possesses the advantage of being an earlier source of informa- tion, or at least of bringing us more fully into contact with such a source. The significance of all that we can learn as to the history of the composition of Mark's Gospel is clearly enhanced by this consideration.

(1) Early Account of a Writing by Mark. — According to a fragment of Papias (ap. Eus. Hist. Eccl. III. 30) taken from

a work probably written c. a.d. 140, Mark, who was the follower and interpreter of Peter, recorded after the latter's decease the words of Christ and the narratives of His deeds which he had heard the Apostle deliver, but he could not arrange the matter " in order," because he had not himself been a personal follower of Jesus. This account Papias had derived, he tells us, from an informant who had heard it repeatedly given by " the elder," a Christian of the first generation.

There can be little doubt that the work to which Papias himself supposed this story to apply was the Gospel of Mark virtually as 'we know it. The

tradition in regard to this work must have been continuous between his time and that of Irenaeus, who (c. a.d. 180) gives a similar account of its. composition. It may be noted also that the same view of the origin of the Gospel of Mark appears to have been held by a contemporary of Papias, Justin Martyr. In his Dialogue with Trypho (c. 106) he cites a fact about the name of Peter from " his Memoirs," and adds also another similar fact about the name given to the sons of Zebedee, just as they are stated in Mark iii. 16, 17, and nowhere else so far as we know. He may well have been ready to call the work " Peter's," though he believed that Mark actually composed it, on the ground that the latter recorded what the Apostle said (cf. ibid. c. 103).

But is our Gospel of Mark also to be identified with the writing by Mark spoken of by " the elder " whose account had been reported to Papias ? Some confusion is here more con- ceivable; while, if it is supposed that such a writing was worked up in our second Gospel, this may seem sufficient to explain the connexion of Mark's name with the latter.

In support of this view it is urged, though it is so much less often now than it used to be, that the description " not in order " does not fit our Gospel of Mark, the order in which is from an historical point of view as good as, if not better than, in the other Gospels. But from whomsoever the expression proceeds — whether from Papias, or his informant, or " the elder " — we may feel sure that considerations such as appeal to us from our training in historical criticism are not those which suggested it, but rather the want of agreement between this Gospel and some standard which on altogether different grounds was applied to it. This argument, then, for supposing that the original writing by Mark differed widely in form and contents from the Gospel which now bears his name appears to be without force. The question whether the two differed to any, and if so to what, extent can be decided only from an examination of the Gospel itself.

(2) The Question of the Integrity of the Gospel of Mark. — There are in a good many parts of this Gospel indications that the narrative has been derived from Simon Peter, or some one else who was a personal follower of Jesus in the days of His earthly ministry. It has been widely felt that the account of the call of the first four disciples and of the events which immediately followed (i. 15-39) at the opening of the Galilean ministry, bears strong marks of proceeding from Simon Peter. Other passages might be pointed out in which it is suitable to suppose that this disciple in particular was the informant. But we will content ourselves with noticing signs that the reminiscences of some eyewitness are recorded, (a) Traits appear which are wholly without importance, and upon which no stress is laid in the context, but which it was natural for a narrator who was actually present, and only for such a one to introduce, because he

remembered them as associated with the principal events. The following are instances and others might be cited: the mention of " other boats," iv. 36; the half-foolish remark made by Peter when in a dazed condition at the Transfiguration, ix. 5, 6; the young man who, when Jesus was arrested, followed, " having a linen cloth cast about him, " xiv. 51, 52; the fact that Simon of Cyrene was " coming from the country," xv. 21. (b) There is great truth of local colouring. The references to places and the descriptions of natural features (the lake-shore, i. 16; ii. 13; iii. 7; the hills near at hand, iii. 13; v. 5, 13; vi. 46; the desert places among the hills or by the shore, i. 35, 45; vi. 31, 32) appear to be

accurate; the routes indicated in the journeys that are taken are probable (vii. 24, 31; viii. 27; x. 17, 32, 46; xi. 1). Again, the term " village-towns " (i. 38) is a remarkably appropriate one (cf. Josephus, B. I. III. iii. 2). There would, indeed, be an exception to the general correctness of the topography if we were compelled to suppose that " country of the Gerasenes " (which is the best reading according to existing MS. evidence at Mark v. 1) must mean the territory of the city of Gerasa. But it is easy to imagine that some confusion may have arisen in the transliteration of the name into Greek, and that the place really indicated is Khersa, near the middle of the eastern shore of the lake. The pair of references (vi. 45, 53) which might also be adduced as an exception, will be noticed below. Further, the conditions of life and thought in Palestine at the time in question are faithfully represented, Aramaic words spoken on some important occasions are preserved (iii. 17; v. 41; xv. 34). And, to mention a point of a different kind, the parts played by different sections among the Jewish people are such as might be expected. The point of view of speakers and actors is throughout that belonging to the time of the ministry of Jesus, not to that when the Christian Church had come into existence, (c) The good order in this Gospel, i.e. the natural development of the narrative, will be indicated below. It has without good reason, as we have seen, been supposed to show that it cannot be the record by Mark referred to by Papias. And in reality it would be difficult to account for this feature except on the supposition that one who had lived through the events had been accustomed, when required to give a comprehensive sketch of the history of the ministry and sufferings of Jesus, to relate the facts in the main as they happened; and that a hearer of his has to a considerable extent reproduced them in the same order.

The last consideration seems to show that the general form and structure of the Gospel, and not merely certain portions of it, are original. In point of style, also, there is a large amount of uniformity. The chief exceptions are that, whereas some incidents are related in a very concise manner (e.g. i. 23-28, and 40-45), there,: is in other cases considerable amplitude of description (see esp. v. 1-20, 35-43 and ix. 14-27). But Mark's own

writing might exhibit this variety, according to what he had been told or could remember. Moreover, a ten- dency to amplitude of language may be noticed here and there in some of the more concise narratives. Further, it would be unreasonable to suppose that Mark, even if he relied chiefly on what he had heard Peter teach, would refrain from using any other sources of information which he possessed. Some have supposed that the same Logian document in Greek which was used by the first and third evangelists was also used by Mark. This is highly improbable, but he may have derived particular sayings from the Aramaic source itself of that docu- ment by independent translation; and may also have learned both sayings and narratives in other ways. It would seem also that the Discourse on the Last Things in ch. xiii., differing as it does both in its greater length and in its systematic struc- ture from other discourses recorded by him, must have come to his hands in a written form. In it some genuine sayings of Christ appear to have been worked up along with matter taken from Jewish Apocalypses and in accordance with an Apocalyptic model.

There does not, then, seem to be good reason for thinking that the work which proceeded from the hands of Mark differed widely in character and contents from the Gospel which now bears his name. But there are indications that some passages have been interpolated in it: e.g. in Mark iv. 10 there is some want of fitness in the inquiry of the disciples as to the meaning of " the parables " after only one has been given, and again a want of agreement between that inquiry and the words of Jesus at v. 13, " Know ye not this parable, and how shall ye know all the parables ? " We notice further that the two parables in m. 26-32 are somewhat loosely appended. It looks as if they were insertions in the passage as it originally stood, and that the references to parables in the plural, together

with the statement at w. 33, 34, had been introduced in order to adapt the context to these additions. This view is confirmed by the fact that in Luke viii. 4 seq. only one parable, that of the sower, is given or referred to. This evangelist has probably here followed the original form of Mark. Similarly the collec- tion of sayings after Mark ix. 40 (vv. 41-50) has probably been interpolated. They are thrown together in a way unusual with Mark, who is accustomed to place each important saying in a setting of its own. Here again we note that they do not appear at the corresponding point in Luke, though some of them are given by him in other contexts. The account of the crossing of the lake (vi. 45-53) after the feeding of the five thousand furnishes an instance of a different kind. The diffi- culty as to the position of Bethsaida, or (if els to izkpav, " unto the other side," at v. 45 is taken to

refer only to the crossing of a bay at the north-eastern corner of the lake) the discrepancy between " crossing " in this sense and in that of v. 53 would be explained if the narrative (which is not in Luke) may be held to be an interpolation by one not familiar with the localities. Once more, the account of the feeding of the four thousand (viii. 1-9) resembles that of the feeding of the five thousand (vi. 35-44) closely in all respects except that of the numbers given, about which differences might easily arise in tradition, and it looks therefore as if it might be a " doublet," i.e. another form of the same narrative derived through a different channel. And it is not so likely that Mark should have mistaken it for a distinct incident as that an editor of his Gospel should have done so. Some other instances, of greater or less probability, might be mentioned.

In addition to such larger insertions, the text of the original document seems to have undergone a certain amount of revision. Some of the cases in which the first and third evangelist agree against Mark in a word or clause may be best accounted for by their both having reproduced the common source (an example may be seen under 4 below).

As we have found it necessary to distinguish between the original composition by Mark, to whom in the main the work appears to be due, and some enlargement and alteration which it subsequently underwent whereby it reached its present form, these stages must be borne in mind in considering dates that may be assigned in connexion with this Gospel. According to Papias, Mark wrote after the death of Peter, i.e. after a.d. 64, if we suppose, as it is usual to do, that Peter was martyred in the massacre by Nero after the burning of Rome. It would be natural for Mark to set himself to make his record soon after the Apostle's death; and in confirmation of the view that he did so it may be pointed out that in the form of the prophecy in ch. xiii. of the calamities that were to come upon Jerusalem, no details occur of a kind to suggest that it had actually taken place. Further, Mark's work may very probably have been used by Luke in its original form, On the other hand, it was known to our first evangelist very nearly in the form in which we have it. The chief revision of Mark would seem, then, to have taken place between the times of the composition of the first and third Gospels, which cannot be far removed from one another (see Matthew, Gospel of St). The last twelve verses were added later still, probably early in the 2nd century, probably to take the place of the ending which had been lostˆ or which was regarded as defective. (On the evidence that the last 12 verses are not by the same hand as the rest of the Gospels see Westcott and Hort's New Testament in Greek, append., p. 29 seq. and Swete's St Mark in he. and p. xcvi. seq. of his introduction.)

(3) The Gospel History as represented in Mark. — After a (i) pre- fatory passage, »• I-I3. the Gospel deals with (ii) Christ's ministry in Galilee and

other parts of northern Palestine, i. 14-ix. 50. This portion of the history may suitably be divided into three periods: (a) Early period. From the opening of the work of Jesus to the first plot to destroy Him (i. 14-iii. 6). (b) Middle period. From the gathering of crowds from all parts and appointment of the Twelve to the sending forth of the Twelve to extend Christ's work and the alarm of Herod (iii. 7-vi. 29). (c) Closing period. From Christ's withdrawal with His disciples after their return from their mission to His final departure from Galilee (vi. 30-ix. 50). Throughout

we can trace a development as to (a) the stir created and the attitude of men towards Jesus : .i. 32-34, 37 (excitement at Capernaum) ; 38, 45 (fame spreads through a wide district) ; iii. 7, 8 (people from distant parts appear in the crowds) ; iv. 2 sen. (the word of the King- dom is received in very various ways) ; viii. 28 (great diversity of opinions as_to the claims of Jesus); (b) the opposition to Him, 11. 1-111. 6-111. 22 (scribes come from Jerusalem and a more heinous charge is_ preferred) ; (c) the formation of a band of disciples and the position accorded to them: i. 16-20 (four are called to follow Him); 11 14 (yet another) ; iii. 14 (He "makes twelve" including those before called) ; vi. 7 seq (He sends them out to preach and work cures); (d) the methods which he adopts: i. 21, 39 — iii. 1 (preaches in the synagogues, later more commonly by the lake-shore or on the mountain sides; or He teaches in a house where He happens to be) ; at iv. 1 seq. he adopts a new mode of address because a sitting-process was required ; from vi. 45 onwards He mainly devotes Himself to the'training of the Twelve, while seeking retirement from the multitude ; (e) in the districts which he visits : i. 38 (tour in the neighbourhood of Capernaum) ; v. I (crosses to eastern shore of the lake); vi. 6b (a tour which includes Nazareth); vi. 45 (Bethsaida)- vii. 31 (journey to Tyre and Sidon and back through Decapolis); viii. 22, 27 (is at Bethsaida and visits neighbourhood of Caesarea Phihppi); (/) His self-revelation; viii. 27 seq. (first unambiguous declaration of His Messiahship).

(iii) The Journey from Galilee to Jerusalem, the Last Days, Passion and Resurrection, x. 1 to end. He goes first to " the borders of Judaea and beyond Jordan " (Peraea), and exercises His ministry there, x. 1-16. In connexion with the journey from this region to Jerusalem three striking incidents are recorded, x. 17-52. The account of the time in Jerusalem includes a series of conflicts with opponents xi. 27-xii. 40, and the discourse on the Last Things, xiii. The only notes of time in the Gospel occur in connexion with the conspiracy to kill Jesus (xiv. 1) and the Last Supper (verse 12). _ (4) The Leading Ideas of St Mark.— Ch. i. 1, which stands as a title, was probably, even according to the short form of it which is supported by MS. evidence, due to a reviser of the original. Both Matthew and Luke show signs of having had a somewhat different beginning before them. Nevertheless, that title fitly describes the work. It is

emphatically " the Gospel," because it sets forth the person and work of the Christ. The evangelist is conscious of this aim. It appears not only at great moments of the history such as the Baptism (i. n), the confession of Peter (viii. 29), the Transfiguration (ix. 7); nor again merely in the prominence given to the miracles of Jesus and in particular to the casting out of devils, but also in many of the sayings recorded in it, as in the great series contained in the narratives in ch. ii. 5, 10, 17, 10; and again in the reply of Jesus to those who charged Him with being in collusion with Satan (iii. 27). The character of the genuine disciples of the Christ and the demands that are made of them form, as it were, the complement to the representation of what He Himself is, and are set forth in other striking sayings, related along with the memorable occasions on which they were spoken: (iii. 34, 3s; viii. 34-36; ix. 23, 29, 35-37; x . 14; 15, 42-45).

See Swete, Commentary on St Mark (2nd ed., 1902) ; A Menzies The Earliest Gospel (1901); D. W. Wrede, Das Messiasgeheimnis's in den Evangelien, zugleich ein Beitrag zum Verstandniss des Markus- evangehums (1901); E. J. Weiss, Das dlteste Evangelium (1903) Also bibliography to the article Gospel. (V. H. S.)

MARKBY, SIR WILLIAM (1829- "), English jurist, the fourth son of the Rev. William Henry Markby, rector of Duxford St Peter's, was born at Duxford, Cambridge, in 1829. He was educated at Bury St Edmunds and Merton College, Oxford, where he took his degree in 1850. In 1856 he was called to the bar, and in 1865 he became recorder of Buckingham. In 1866 he went to India as judge of the High Court of Calcutta. This post he held for twelve years, and on his retirement was appointed Reader in Indian Law at Oxford. In 1892 he was a member of the Commission to inquire into the administration of justice at Trinidad and Tobago. Besides Lectures on Indian Law, he wrote Elements of Law considered with reference to the General Principles of Jurisprudence. The latter, being intended in the first place for Indian students, calls attention to many difficulties in the definition and application of legal conceptions which are usually passed over in textbooks, and it ranks as one of the few books on the philosophy of law which are both useful to beginners and profitable to teachers and thinkers. In 1897 appeared The Indian Evidence Act, with Notes. Sir William Markby

also contributed to the law magazines, articles on Law and Fact, German Jurists and Roman Law, Legal Fictions, &c, several of which are embodied in the later editions of the Elements. He was made D.C.L. of Oxford in

1879, and K.C.I.E. in 1889.

MARKET (Lat. mercatus, trade or place of trade). This term is used in two well-defined senses. (1) It means a definite place where (a) traders who are retail sellers of a specific class of commodity or commodities are in the habit of awaiting buyers every day in shops or stalls; or whither (b) they are in the habit of proceeding on specified days at more or less frequent regular intervals. Covent Garden market for fruit and flowers, and Leadenhall market for meat and poultry, are good examples in London of the kind of institution included in class (a). They are a very ancient economic phenomenon, dating from the earliest period of the development of organized communities of human beings, and in general characteristics have changed little since they began to exist. Markets of the type of class (b) are also of very ancient origin (see Fairs), but inasmuch as they are constituted essentially by the presence of persons, many of whom assemble from various places outside the place of meeting, they were capable of a little more development than those belonging to class (a), owing to increased facilities for locomotion. The nature of an ancient market of class (a), whither a citizen, say of Athens, or his chief slave, pro- ceeded daily to make household purchases, differs little from the group of shops visited by the wives of the less wealthy citizens of modern states. In many places abroad, and not a few in England, actual markets still exist. It may be said that the huge collections of shops, such as the various co- operative stores, are only a revival of the old " market-place," with its shops or booths gathered round a central area, adapted to the needs of modern big cities. (2) The term " market " has .come to be used in another and more general sense in modern times. According to Jevons, a market is " any body of persons who are in intimate business relations, and carry on extensive transactions in any commodity." He adds that " these markets may or may not be localized," and he instances the money market as a case in which the term " market " denotes no special locality. As a rule, however, most of the business of a market is transacted at some particular place, such as the London Stock Exchange, the Baltic, the Bourse of Paris, the Chicago " Wheat-pit." Even in the case of the London money market, merchants still meet twice a week at the Royal Exchange to deal in foreign bills, although a considerable part of the dealings in these securities is arranged daily at offices and counting-houses by personal visits or by telegraphic or telephonic communication. The markets in any important article are all closely interconnected. The submarine cable has long ago made Chicago as important an influence on the London corn market as Liverpool, or rather both London and Liverpool affect and are simultaneously affected by Chicago and other foreign markets. In like manner the Liverpool cotton market is influenced by the markets in New Orleans and other American cities separated from it widely in space. In a minor degree the dealers in all*

places where a cotton market exists affect the bigger markets to some extent. What is true of the cotton market is also true to some extent of all markets, though few markets are so highly organized or show such large transactions as that for cotton. Among other markets of the first class may be mentioned those for pig-iron, wheat, copper, coffee, and sugarh There are many articles the markets for which are of considerable dimensions at times, but are of an intermittent character, such as the London Wool Sales, which take place now in five " series " during the year. Formerly the number of " series " was four. (For " market overt " see Sale of Goods and Stolen Goods.)

Characteristics of Markets.— The conditions required in order that the operations of a trading body may display the fully developed features of a modern market, whether for commod- ities or securities, are: —

(1) A large number of parties dealing.

(2) A large amount of the commodities or securities to be dealt with.

(3) An organization by which all persons interested in the Commodity or security can rapidly communicate with one another.

(4) Existence and frequent publication of statistical and other information as to the present and probable future supply of the commodity or security.

The movements which take place in prices in any market,

whether fully organized or not, depend largely on changes

of opinion among buyers and sellers. The changes „

, . . i_ jl 11 Movements

of opinion may be caused by erroneous as well //v/ ces .

as by correct information. They may also be the result of wrong inferences drawn from correct information. In markets for commodities of the first importance, such as wheat, cotton, iron, and other articles which are dealt in daily, the state of opinion may vary much during a few hours. The broad characteristics of markets of this class are similar. There is a tendency in all of them to show phenomena of annual periodicity, due partly to the seasons, the activity of certain months being in normal years greater in the case of any given market than that of other months. This tendency was always liable to be interfered with by the special forces at work in particular years; and the great increase in the facilities of communication between dealers by telegraph, and of trans- portation of

commodities between widely distant points, which was one of the marked features of the development of the economic organism in all actively commercial countries during the last thirty years of the 19th century, has still further inter- fered with it. Nevertheless, a tendency to annual periodicity is still perceptible, especially in markets for produce of the soil, the supply of which largely depends on the meteorological conditions of the areas where they are grown on a scale suffi- cient to furnish an appreciable proportion of the total produce. Periodicity of another kind known as "cyclic," and due to a different set of causes, is believed to exist by many persons competent to form a judgment; but although the „ . evidence for this view is very strong, the theory expounding it is not yet in a sufficiently advanced state to admit of its being regarded as established.

Phenomena of Markets. — Bagehot said of the money market that it is " often very dull and sometimes extremely excited." This classical description of the market for " money " applies to a large extent to all markets.

Every market is at every moment tending to an equilibrium between the quantity of commodities offered and that of com- modities desired; supposing equilibrium to have been attained in a given market, and that for some Equilibrium. appreciable period it is not disturbed, the price for the commodity dealt in, in the market, will remain prac- tically unchanged during that period. Not that there will be no transactions going on, but that the amounts offered daily will be approximately equal to the amounts demanded daily.

*We have briefly described the statical condition of a market; we must now briefly examine its dynamics. Dis- turbance may take place through a change in — ˆBulli-'**

(1) Supply, or opinion as to future probable brium. supply.

(2) Demand, or opinion as to future probable demand.

(3) In both simultaneously, but such a change that demand is increased or decreased more than the supply, or vice versa.

A moderate disturbance caused by one of the above changes, or a combination of them, will produce an immediate effect . on the price of the commodity, which again will tend to react on both the supply and the demand by altering the opinions of sellers and buyers. If no further change tending to disturb the market takes place, the market will gradually settle down again to a state of equilibrium. But if the disturbance has been considerable, a relatively long time may elapse before the market becomes quiet; and very likely the level of price at which the new equilibrium is

established will be very different from that ruling before the disturbance set in. Further scientific

Future DeUvery.

investigation of the dynamics of a market is in any case very difficult, and is impossible without a complete analysis of the statical condition, such as is found at length in the textbooks of mathematical economics; but it is possible to describe briefly certain dynamical phenomena of markets which are of a comparatively simple character, and are also of practical interest.

Every great market is organized with a view not merely to the purchase and sale of a commodity at once, or "on the spot," but also with a view to the future require- ments of buyers and • sellers. This organization arises naturally from the necessities of business, since modern industry and commerce are carried on continu- ously, and provision has to be made for the requirements, say, of a spinning-mill, by arranging for the delivery of successive quan- tities of cotton, wool or silk over a period of months " ahead." In the case of cotton, "forward deliveries" can be purchased six or seven months in advance, and the person who undertakes to deliver the cotton at the times stated is said in the language of the market to " sell forward." If the quantity of cotton produced each year were always the same, no very remarkable results would follow from this mode of doing business, except the economy resulting to the spinner from not being compelled to lock up part of his capital in raw material before he could use it. But as the cotton and other crops vary considerably from year to year, some curious consequences follow from the practice of " selling forward." The seller, of course, makes his bargain in the belief that he will be able to " cover " the sale he has made at a profit — that is, he hopes to be able to buy the cotton he has to deliver at a lower price than he undertook to deliver it at. If so, all is well for both parties, for the buyer has had the advantage of having insured a supply of cotton. But supposing something has happened to raise the price con- siderably, such as a great " shortage " of the crop, the seller may lose. If a great many other persons have, taken the same mistaken view of the probabilities of the market, a condition of things may arise in which they may be "cornered." (See Cotton.)

A " corner " in an exchangeable article is an abnormal condition of the market for it, in which, owing to a serious "Comers." miscalculation of probable supply, many traders who have made contracts to deliver at a certain date are unable to fulfil them. In most cases the fact that the

market is " oversold " becomes known some time before the date for the completion of the contracts, and other traders take advantage of the position to raise the price against those who are " short " of the article. A corner is therefore usually a result of the failure of a speculation for the fall. Theoretically a trader who has undertaken to deliver 100 tons of an article, but cannot, after every endeavour, obtain more than 90 tons, could be made to pay his whole capital in order to be relieved from the bargain. In practice he gets off more easily than this. Frequently when many traders have sold largely " forward " other traders deliberately try to use that position as a basis for creating a " corner." Generally, however, they only succeed in causing great inconvenience to all parties, themselves in- cluded, for as a rule they are only able to make the " corner " effective by buying up so much of the article that when they have compelled their opponents to pay largely to be relieved of contracts to deliver, they are left with so big a stock of the article that they cannot sell it except at a loss, which is sometimes big enough to absorb the gain previously secured. In the case of very small markets " corners " may be complete, but in big markets they are never complete, something always happening to prevent the full realization of the operators' plans. The idea of a " corner " is, however, so fascinating to the commercial mind, especially in the United States, that probably no year passes without an attempt at some operation of the kind, though the conditions may in most cases prevent any serious result.

" Corners " have what is called a " moral " aspect. It is curious to note that the indignation of the " market " at the

disturbance to prices which results from operations of this kind is generally directed against the speculators for the fall, while that of the public, including trade consumers, is directed against the operator for the rise. The operator for the fall, or " bear," is denounced for " selling what he has not got," a very inaccurate description of his action, while the " bull " or operator for the rise is spoken of by a much wider circle as a heartless person who endeavours to make a profit out of the necessities of others. From a strict ethical standpoint there is really nothing to choose between the two.

The Money Market. — There is one market which presents features of so peculiar a character that it is necessary to describe it more particularly than other phenomena of the kind, and that is the money market. The term money is here used to denote " money-market money " or " bankers' money," a form of wealth which has existed from early times, but not in great abundance until within the last two or three hundred years. Immense wealth has existed in certain countries at various epochs, owing to the fertility of the soil, success in trade, or the plunder of other -.communities, and all states which have been great have at the time of their greatness

possessed wealth; but the wealth which the countries, or a few fortunate individuals belonging to them, owned consisted largely of what is still called real property — that is, land and buildings — and of the produce of the soil or of mines. The balance consisted partly of merchandise of various kinds and shipping, and to a large extent of the precious metals in the form of coin or bullion, or of precious ston.es and jewelry. Where no settled government was established no one could become or remain very wealthy who was not in a position to defend himself by the strong hand or allied with those who were; and as a rule the only people who could so defend themselves were possessors of large areas of rich land, who were able to retain the services of those who dwelt on it either through their personal military qualities or in virtue of habit and custom. The inhabitants of wealthy cities were able to protect themselves to some extent, but they nearly always found it necessary to ally themselves with the neighbouring land-owners, whom they aided with money in return for military support.

A money market in the modern sense of the word could only exist in a rudimentary form under these conditions. There was a sort of money market, for there was a changing rate of interest and a whole code of law relating to it (Macleod, Banking, 3rd ed., p. 174) in republican Rome; but although large lending and borrowing transactions were part of the daily life of the Roman business world, as well as of those of the Greek cities and of Carthage and its dependencies, none of these communities presented the phenomena of a highly organised market. Money- lending was also a regular practice in Egypt, Chaldea and other ancient seats of civilization, as recent discoveries show. It was only in comparatively recent times, however, when Europe had formed itself into more or less organized states, with conditions fairly favourable to the steady growth of trade and industry, that organized money markets came into existence in places such as Venice, Genoa, Augsburg, Basel, the Hanse towns, and various cities in the Low Countries, Spain and Portugal, as well as in London. The financial strength of these rudimentary money markets was not very great, and as it depended a good deal on the possession by individuals of actual cash, the existence of these markets was precarious. " Hoarded ducats " were too often an attraction to needy princes, whose unwelcome attentions a rich merchant, even when an influential burgher of a powerful city, was less able to resist than the violence of a housebreaker, against whom strong vaults and well-secured chests situated in defensible mansions were a good protection. The necessitous potentate could often urge his desire for a " loan " by very persuasive methods. Occasionally, if his predecessors had ac- quired the confidence of the banking class sufficiently to induce them to place their cash reserves in one of his strong places " for safety " an unscrupulous ruler could help himself, as Charles II. helped himself to the stores of the London goldsmiths which were left in the Mint. The power of

the banking class continued to grow, however, and a real market for money had come into

existence in many cities of Europe by the middle of the 17th century. (See Banks and Banking.)

In the 1 8th century the " money market " consisted of the Bank of England and various banks and merchants, and dis- tinction between the two being still not complete. Towards the end of that century arose an important class of dealers in credit, the bill brokers, and with their appearance the modern money market of London may be said to have assumed its present

form, for though the process of development has The Early no(. (.gagg^ the changes have been of the nature Market of growth and not of the acquisition of new organs.

The formation of joint-stock banks and discount companies, however, and the reconstitution of the Bank of England by the Act of 1844, exercised an important influence on the way in which the money market of London has developed. It must be explained that in the every-day talk of the City " the market " has a special meaning, by which only the banks and discount houses, or even only the latter in some cases, are denoted, as in the phrases constantly seen in the daily reports published in the newspapers towards the end of a quarter, " the market has to-day borrowed largely from the Bank of England," or, " the market was obliged to renew part of the loans which fell due to the Bank to-day." But this use of the term in a special sense, thoroughly understood by those to whom it is habitual, The Modern an< ^ resulting in no ambiguity in practice, is not in Money accord with the requirements of economic analysis. Market of The working organs of the money market of Lo.idon. London at the beginning of the 20th century were: —

A. (1) The Bank of England.

(2) Banks, joint-stock and private, including several great

foreign banks.

(3) Discount houses and bill-brokers.

B. (4) Certain members of the Stock Exchange. (5) Certain great

merchants and finance houses.

The institutions included in group A are the most constantly active organs of the money market; those included in group B are intermittently active, but in the case of section (4), though their activity is greater at some times than others, they are never wholly outside the market. Even in the case of (5) a certain amount of qualification is needed, which is indicated by the fact that most of the great merchant houses are " registered " as bankers, though they do not perform the functions usually associated with that term in the United Kingdom. Several of the great houses were originally and still are nominally merchants, but are largely concerned with finance business — that is, with the making of loans to foreign governments and the issue of capital on behalf of companies. These powerful capitalists often have large amounts of money temporarily in their hands, and lend it in the money market or on the Stock Exchange; one or two of them are large buyers of bills from time to time, and generally the members of this group may be said to be in sufficiently close touch with the active organs of the money market to form part of it.

The actual working of the money market has been described by Walter Bagehot in his Lombard Street, a work which has The Work- attained the rank of a classic. Most of what he said lagofthe in 1873 is true now, but in certain minor respects Money developments have taken place, the most important "" e ' being the greater extent to which money is " used up " every day, or rather every night. In Bagehot's time the discount houses only quoted " allowance " rates for " loans at call and short notice," based on the rate " allowed " by the banks for loans at seven days' notice; but since then the bill-brokers have been obliged — (1) occasionally to fix their terms independently of the banks, and (2) to " allow " a rate for " money for the night." This latter practice became usual about 1888 or 1889. The change it introduced was not a vital one, but has some importance from the point of view of the historian. A good deal of the " money " thus dealt with is derived from the group of traders included in class (5). It is (a) money which is tempor- arily in the hands of houses or institutions which have just received subscriptions to loans or other capital offered to the

public; (b) balances left temporarily with finance houses or banks on behalf of foreign governments or other parties who have payments to make in London. In the former case the " money " is almost invariably only available for a short time, probably only for a few days; in the latter case also it probably will be only available for a few days, but may be available for months. Money derived from either of these sources is usually to be had cheap, but is not, in the slang of the City, " good," because it is uncertain how long loans at call obtained from either of them will remain undisturbed. Nevertheless, there has been at times so much " money " of

this fugitive character, and derived from such varied sources since about 1888, that its cheapness has been an attraction to the less wealthy bill-brokers, who have occasionally been able to go on using it profitably for many continuous weeks, or even months, in their business. The risk run by employing it is, of course, the certainty that it will be " called " from the borrower sooner or later, and probably at a time when it is very inconvenient to repay it. The more wealthy houses take money of this kind when it suits them, but never rely on it as a basis for business.

Since Bagehot wrote the growth of the big joint-stock banks has been enormous, not so much through the increased business done by banks generally, though the expansion in banking has been considerable, as by the absorption Banks. of a great number of small banks by three or four large institutions (see Banks and Banking). The growth of these large institutions tends to facilitate combination for purposes of common concern among banks generally — e.g. to support the Bank of England in maintaining its reserve, which is the sole reserve of all the banks, at a proper level, and thus render the money market more stable. Two or three of the banks have for a long time, owing to their large holding of bills, had much more influence than the Bank of England over the foreign exchanges, on which the foreign bullion movements chiefly depend; and since 1890 persons of weight in the joint- stock banking body have implicitly, though not explicitly, admitted a certain degree of responsibility in the matter on behalf of their institutions. It is, however, characteristic of British business arrangements that the question of the responsibility for the reserve of the Bank of England, the ultimate reserve of the whole country, is still in as nebulous a condition, so far as explicit acceptance of responsibility by any institution is concerned, as it was in 1870. There has been no improvement in theory, though in practice there has been real improvement, since Bagehot's time. The tendency is, indeed, decidedly in the direc- tion of closer combination between the Bank and the banks. On more than one occasion the Bank has, not merely by borrow- ing " in the market," but by more or less private negotiations with the big banks, obtained temporary control of large sums belonging to the banks in order to take cash off the market. This proceeding, and its concomitants, did not meet with univer-sal approval; but the results were satisfactory on the whole, and on the later occasions when the measure was carried out there was little or no friction.

The enormous war loans raised by Japan in 1904, 1905, 1906 exemplified aptly the more modern methods of dealing with the disturbance to the money market which such oper- ations produce. The loans were issued by three

Effect of Big Foreign

banks, one of which was a Japanese institution and Loans. represented the Japanese government in the oper- ations connected with the various loans. Of the other two, one was a leading London bank and the other the principal British bank doing business in China. These large loans were issued with the minimum of disturbance to the London money market. The very large amounts of cash which were suddenly withdrawn from other banks, and deposited with the institutions issuing the loan as " application money," were lent out again in the short loan market as soon as possible, usually on the afternoon of the day of issue. The work involved was very heavy, as a great number of cheques had to be cleared in a brief space of time, but by skilful organization this was done. Similar promptitude was displayed when the successive instalments on the loans

became due and were paid, most of the cash being available for borrowers a few hours after it was paid in by the holders of the scrip which represented the loans until the definitive bonds were ready. The task of dealing with cash forming instalments of the loans was not, however, the only problem before the banks which issued them. As the scrip of each loan gradually became " fully paid " the proceeds of the loan in the hands of the banks became a very large sum. The Japanese government held the whole of it at its disposal, and might have seriously embar- rassed the London money market if it had not dealt with its huge balances considerately. The Japanese government had promised not to withdraw any portion of the loans raised in London in gold, but it was under no restrictions as to how it should employ the money lying to its account. It might have kept it locked up until it had a bill for ships or clothing to pay. As might be expected, the government from the outset trans- ferred a portion cf what was deposited with the banks to the Bank of England, finding it advantageous on various grounds to do so. The remainder was lent for short periods by the banks, but for some time no means were available for lending for any considerable length of time, though the Japanese government had no immediate use for the whole of it. It was suggested to the government by its advisers that it would be a convenience to the money market, and no inconvenience to Japanese policy, if any balances which were not likely to be wanted for some months were invested in British treasury bills, and the govern- ment, after fully acquainting itself with the nature of the opera- tion, agreed to it. The plan was found to work well; it released for definite periods money that would otherwise have been of little use to the money market, and it was of pecuniary benefit to the Japanese exchequer to the extent of the interest earned by the portion of the balances so employed. Incidentally it suited the British treasury; the Japanese demand, which became a constant

feature in connexion with treasury bill issues, lowered trie discount rates at which " sixes " were placed. The Japanese not only applied for treasury bills and bought them in the market, but they also took up some of the exchequer bonds issued in connexion with the South African war towards the end of their currency, thus relieving the money market of a further part of the weight of British government paper which it would otherwise have had to take on itself. A further important development of Japanese management of its London balances took place in 1906, when a portion of these balances was placed under the control of agents of the Bank of England, to be lent, or not lent, in the market as suited the Bank's policy, which was at that time directed to raising the value of money in order to protect and increase its reserve. The plan worked very well on the whole. It was merely an adaptation of a practice initiated some years before, whereby the Bank sometimes obtained temporary control of moneys belonging to the India Council. The same idea, that of " intercepting " market funds, which were beating down the discount rate, depressing the foreign exchanges and depleting the Bank's reserve, has been employed in regard to the clearing banks themselves, the banks having on more than one occasion agreed to lend the Bank of England a certain portion of their balances.

The discount houses, though an important body of institutions, are not of so much importance as they were before 1866, when they suffered a serious blow through the failure of The « Overend's," from which as a body they have never

Houses. fully recovered. The five large concerns which still exist are, however, very powerful and exercise con- siderable influence on the market. They hold considerable quantities of bills at all times; occasionally their holdings are very large, but they turn out the contents of their bill cases readily if they think fit. Their business is different in practice from that of the smaller " bill-brokers," who usually are what their name suggests, namely, persons who do not hold many bills, but find them for banks who need them, charging a small commission. The small bill-brokers borrow from the Bank of England much more freely than the big discount houses. The latter only " go to the bank " in ordinary times perhaps once or

twice a year. During the South African War, which disturbed the money market very much, they obtained accommodation from the Bank more frequently than usual. The small brokers almost always have to borrow from the Bank at the end of every quarter, when money is scarce owing to the regular quarterly requirements of business, and also, to some extent, because certain of the banks make it a practice to call in loans at the end of each month in order to show a satisfactory cash reserve in their monthly balance-sheet. This practice is not approved by the best authorities, for

although it does no great harm in quiet times, the banks who follow it might find it difficult, or even impossible, to call in their loans in times ef severe stringency.

Authorities. — Walter Bagehot, Lombard Street (1873); Arthur Ellis, Rationale of Market Fluctations ; Robert Giffen, Stock Exchange Securities (1879); W. Stanley Jevons, Theory of Political Economy (2nded., 1879), pp.91 seq., and Investigations in Currency and Finance; Henry Sidgwick, Principles of Political Economy, book ii. ch. ii. ; Augustin Cournot, Theory of Wealth (1838), translated by Nathaniel T. Bacon; George Clare, A Money Market Primer and Key to the Exchanges ; John Stuart Mill, Principles of Political Economy, book iii. ch. i.-vi. ; John Shield Nicholson, Bankers' Money ; Hartley Withers, The Meaning of Money (1909). (W. Ho.)

MARKET BOSWORTH, a market town in the Bosworth parliamentary division of Leicestershire, England; 105 m. N.N.W. from London on a branch from Nuneaton of the London & North Western and Midland railways, near the Ashby-de- la-Zouch canal. Pop. (1901), 659. The church of St Peter is Perpendicular, with a lofty tower and spire. At the grammar school, founded in 1528, Dr Samuel Johnson was a master about 1732, but found the work unbearable. The trade of Market Bosworth is principally agricultural, and there are brickworks. Two miles south is the scene of the battle of Bosworth, in 1485, where Richard III. fell before Henry earl of Richmond, who thereupon assumed the crown as Henry VII.

MARKET DRAYTON, a market town in the Newport division of Shropshire, England, on the river Tern and the Shropshire Union canal, 178 m. N.W. from London. Pop. (civil parish of Drayton-in-Hales, 1901), 5167. The Wellington-Crewe line of the Great Western railway is here joined by a branch into Staffordshire of the North Staffordshire railway. The church of St Mary has Norman remains but is modernised by restoration. The town is a centre of agricultural trade, and there are large iron foundries. It is in the parish of Drayton-in-Hales, a name sometimes applied to it; and it is also known as Drayton Magna. It is an ancient town, of which the manor was held successively by the abbots of St Ebrulph in Normandy and Combermere in Cheshire. On Blore Heath, 3 m. east'in Staffordshire, Audley Cross marks a great battle in the Wars of the Roses (1459), in which the Yorkists were successful and Lord Audley fell.

MARKET HARBOROUGH, a market town in the Harborough parliamentary division of Leicestershire, England; on the river Welland and the Grand Union Canal. Pop. of urban district (1901), 7735. It is 81 m. N.N.W. from London by the Midland railway, and is served by branches of the London & North Western and Great Northern railways. The church of

St Dionysius is Decorated and Perpendicular, with a fine tower and spire. The grammar school was founded in 1614; it occupies modern buildings, but the original house remains, a picturesque half-timbered building, raised upon pillars of wood. Both British and Roman remains have been found in the vicinity. There are malt-houses and boot, shoe and stay factories. The town is also an important fox-hunting centre.

MARKHAM, SIR CLEMENTS ROBERT (1830-), English traveller, geographer and author, son of the Rev. David F. Mark- ham, canon of Windsor, and of Catherine, daughter of Sir W. Milner, Bart., of Nunappleton, Yorkshire, was born on the 20th of July 1830 at Stillingfleet, near York, and educated at West- minster School. He entered the navy in 1844, became midship- man in 1846, and passed for a lieutenant in 1851. In 1850-1851 he served on the Franklin search expedition in' the' Arctic regions, under Captain Austin. He retired from the navy in 1852, and in

1852-1854 travelled in Peru and the forests of the eastern Andes. He visited South America again in 1 860-1 861, in order to arrange for the introduction of the cinchona plant into India, a service of the highest value to humanity. In 1865-1866 he visited Ceylon and India, to inspect and report upon the Tinnevelly pearl-fishery and the cinchona plantations. On the Abys- sinian expedition of 1867-68 he served as geographer, and was present at the storming of Magdala. In 1874 he accompanied the Arctic expedition under Sir George Nares as far as Greenland. In later years Sir Clements Markham travelled extensively in western Asia and the United States. In 1855 he became a clerk in the Board of Control. From 1867-1877 he was in charge of the geographical department of the Indian Office. He was secretary to the Hakluyt Society from 1858-1887, and became its president in 1890. From 1863-1888 he acted as secretary to the Royal Geo- graphical Society, and on his retirement received the society's gold medal for his distinguished services to geography. He was elected president of the same society in 1893, and retained office for the unprecedented period of twelve years, taking an active share in the work of the society and in increasing its useful- ness in various directions. It was almost entirely due to his exertions that funds were obtained for the National Antarctic Expedition under Captain Robert Scott, which left England in the summer of 1901. Sir Clements Markham was elected F.R.S. in 1873; was created C.B. in 1871, and K.C.B. in 1896; became an honorary member of the principal geographical societies; and was president of the International Geographical Congress which met in London in 1895.

Sir Clements Markham conducted the Geographical Magazine from 1872-1878, when it became merged in the Proceedings of the Royal Geographical Society. Among his other publications may be mentioned the following: Franklin's Footsteps (1852); Cuzco and Lima (1856) ; Travels in Peru and India (1862) ; A Quichua Grammar and Dictionary (1863); Spanish Irrigation (1867); A History of the Abyssinian Expedition (1869); A Life of the Great Lord Fairfax (1870); Ollanta, a Quichua Drama (1871); Memoir on the Indian Surveys (1871 ; 2nd ed., 1878); General Sketch of the History of Persia (1873); The Threshold of the Unknown Region (1874, 4 editions); .4 Memoir of the Countess of Chinchon, (1875); Missions to Thibet, (1877; 2nd ed., 1879); Memoir of the Indian Surveys; Peruvian Bark (1880); Peru (1880): The War between Chili and Peru (1879- 81; 3rd ed., 1883); The Sea Fathers (1885); The Fighting Veres (1888); Paladins of King Edwin (1896); Life of John Davis the Navigator (1889); a Life of Richard III. (1906), in which he main- tained that the king was not guilty of the murder of the two princes in the Tower; also lives of Admiral Fairfax, Admiral John Markham, Columbus and Major Rennel; a History of Peru; editions with introductions of twenty works for the Hakluyt Society, of which fourteen were also translations; about seventy papers in the Royal Geographical Society's Journal; the Reports on the Moral and Material Progress of India for 1871-1872 and 1872-1873; Memoir of Sir John Harington for the Roxburghe Club (1880) ; the Peruvian chapters for J. Winsor's History of America, and the chapters on discovery and surveying for Clowes's History of the Navy.

MARKHAM, GERVASE (or Jervis) (15687-1637), English poet and miscellaneous writer, third son of Sir Robert Markham of Cotham, Nottinghamshire, was born probably in 1568. He was a soldier of fortune in the Low Countries, and later was a captain under the earl of Essex's command in Ireland. He was acquainted with Latin and several modern languages, and had an exhaustive practical acquaintance with the arts of forestry and agriculture. He was a noted horse-breeder, and is said to have imported the first Arab. Very little is known of the events of his life. The story of the murderous quarrel between Gervase Markham and Sir John Holies related in the Biographia Britannica (s.v. Holies) has been generally connected with him, but in the Dictionary of National Biography, Sir Clements R. Markham, a descendant from the same family, refers it to another contemporary of the same name, whose monument is still to be seen in Laneham church. Gervase Markham was buried at St Giles's, Cripplegate, London, on the 3rd of February 1637. He was a voluminous writer on many subjects, but he repeated himself considerably in his works, sometimes reprinting the same books under other titles. His booksellers procured a declaration from him in 1617 that he would produce no more on certain topics.

Markham's writings include: The Teares of the Beloved (1600) and Marie Magdalene's Teares (1601) long and rather commonplace

Eoems on the Passion and Resurrection of Christ, both reprinted y Dr A. B. Grosart in the Miscellanies of the Fuller Worthies Library (1871) ; The most Honorable Tragedy of Sir Richard Grinvile (1595), reprinted (1871) by Professor E. Arber, a prolix and euphuistic poem in eight-lined stanzas which was no doubt in Tennyson's mind when he wrote his stirring ballad ; The Poem of Poems, or Syon's Muse (!595). dedicated to Elizabeth, daughter of Sir Philip Sidney; Devoreux, Vertues Teares (1597). Herod and Antipater, a Tragedy (1622) was written in conjunction with William Sampson, and with Henry Machin he wrote a comedy called The Dumbe Knight (1608). A Discourse of Horsemanshippe (1593) was followed by other popular treatises on horsemanship and farriery. Honour in his Perfection (1624) is in praise of the earls of Oxford, Southampton and Essex, and the Souldier's Accidence (1625) turns his military experiences to account. He edited Juliana Berners's Boke of Saint Albans under the title of The Gentleman's Academic (1595), and produced numerous books on husbandry, many of which are catalogued in Lowndes's Bibliographer' s Manual (Bohn's ed., 1857-1864).

MARKHAM, MRS, the pseudonym of Elizabeth Penrose (1780-1837), English writer, daughter of Edmund Cartwright the inventor of the power-loom. She was born at her father's rectory at Goadby Marwood, Leicestershire, on the 3rd of August 1780. In 1804 she married the Rev. John Penrose, a country clergyman in Lincolnshire and a voluminous theological writer. During her girlhood Mrs Penrose had frequently stayed with relatives at Markham, a. village in Nottinghamshire, and from this place she took the nom de plume of " Mrs Markham," under which she gained celebrity as a writer of history and other books for the young. The best known of her books was A History of England from the First Invasion by the Romans to the End of the Reign of George III. (1823), which went through numerous editions. In 1828 she published a History of France. Both these works enjoyed a wide popularity in America as well as in England. The distinctive characteristic of " Mrs Markham's " histories was the elimination of all the " horrors " of history, and of the complications of modern party politics, as being un- suitable for the youthful mind; and the addition to each chapter of " Conversations " between a fictitious group consisting of teacher and pupils bearing upon the subject matter. Her less well-known works were Amusements of Westernhealh, or Moral Stories for Children (2 vols., 1824); A Visit to the Zoological Gardens (1829); two volumes of stories entitled The New Chil- dren's Friend (1832); Historical Conversations for Young People (1836); Sermons for Children (1837). Mrs Markham died at Lincoln on the 24th of January 1837.

See Samuel Smiles, A Publisher and his Friends (2 vols., London,

1891); G. C. Boase and W. P. Courtney, Bibliotheca Cornubiensis

(3 vols., London, 1874-1882).

MARKHAM, WILLIAM (1719-1807), archbishop of York, was educated at Westminster and at Christ Church, Oxford. He was one of the best scholars of his day, and attained to the head- ship of his old school and college in 1753 and 1767 respectively. He held from time to time a number of livings, and in 1771 was made bishop of Chester and tutor to George prince of Wales. In 1777 he became archbishop of York, and also lord high almoner and privy councillor. He was for some time a close friend of Edmund Burke, but his strong championship of Warren Hastings caused a breach. He was accused by Lord Chatham of preaching pernicious doctrines, and was a victim of the Gordon riots in 1780. He died in 1807.

MARKHOR ("snake-eater"), the Pushtu name of a large Himalayan wild goat (Capra falconeri), characterized by its spirally twisted horns, and long shaggy winter coat. From the Pir-Panjal range of Kashmir the markhor extends westwards into Baltistan, Astor, Hunza, Afghanistan and the trans-Indus ranges of the Punjab. The twist of the horns varies to a great extent locally, the spiral being most open and corkscrew-like in the typical Astor animal, and closest and most screw-like in the race (C. falconeri jerdoni) inhabiting the Suleiman and adjacent ranges.

MARKIRCH (French, Ste-Marie-aux-Mines), a town of Germany, in Upper Alsace, prettily situated in the valley of the Leber, an affluent of the Rhine, near the French frontier. Pop. (1900), 12,372. The once productive silver, copper and lead

mines of the neighbourhood were practically unworked during the whole of the 19th century, but have recently been reopened. The main industries of the place are, however, weaving and dyeing, and it is estimated that there are about 40,000 work- people in the industrial district of which Markirch is the centre. The small river Leber, which intersects the town, was at one time the boundary between the German and French languages, and traces of this separation still exist. The German-speaking inhabitants on the right bank were Protestants, and subject to the counts of Rappoltstein, while the French inhabitants were Roman Catholics, and under the rule of the dukes of Lorraine.

See Muhlenbeck, Documents historiques concernant Ste-Marie aux Mines (Markirch, 1876-1877); Hauser, Das Bergbaugebiet von Markirch (Strass., 1 900).

MARKLAND, JEREMIAH (1693-1776), English classical scholar, was born at Childwall in Lancashire on the 29th (or 18th) of October 1693. He was educated at Christ's Hospital and Peterhouse, Cambridge. He died at Milton, near Dorking, on the 7th of July 1776.

His most important works are Epistola critica (1723), the Sylvae of Statius (1728), notes to the editions of Lysias by Taylor, of Maximus of Tyre by Davies, of Euripides' Hippolytus by Musgrave, editions of Euripides' Supplices, Iphigenia in Tauride and in Aulide (ed. 'T. Gaisford, 181 1); and Remarks on the Epistles of Cicero to Brutus

('745)- . .

See J. Nichols's Literary Anecdotes (1812), iv. 272; also biography by F. A. Wolf, Literarische Analekten, ii. 370 (1818).

MARKO KRALYEVICH, Servian hero, was a son of the

Servian king or prince, Vukashin (d. 1371). Chagrined at not himself becoming king after his father's death, he headed a revolt against the new ruler of the Servians. Later he passed into the service of the sultan of Turkey, and was killed in battle about 1394. Marko, however, is more celebrated in legend than in history. He is regarded as the personification of the Servian race, and stories of strength and wonder have gathered round his name. He is supposed to have lived for 300 years, to have ridden a horse 150 years old, and to have used his enormous physical strength against oppressors, especially against the Turks. He is a great figure in Servian poetry, and his deeds are also told in the epic poems of the Rumanians and the Bulgarians. One tradition relates how he retired from the world owing to the advent of firearms, which, he held, made strength and valour of no account in battle. Goethe regards Marko as the counter-part of Hercules and of the Persian Rustem.

The Servian poems about him were published in 1878; a German translation by Grober {Marko, der Konigssohn) appeared at Vienna in 1883.

MARK SYSTEM, the name given to a social organization which rests on the common tenure and common cultivation of the land by small groups of freemen. Both politically and economically the mark was an independent community, and its earliest members were doubtless blood relatives. In its origin the word is the same as mark or march (q.v.), a boundary. First

used in this sense, it was then applied to the land cleared by the settlers in the forest areas of Germany, and later it was used for the system which prevailed — to what extent or for how long is uncertain — in that country. It is generally assumed that the lands of the mark were divided into three portions, forest, meadow and arable, and as in the manorial system which was later in vogue elsewhere, a system of rotation of crops in two, three or even six fields was adopted, each member of the community having rights of pasture in the forest and the meadow, and a certain share of the arable. The mark was a self-governing community. Its affairs were ordered by the markmen who met together at stated times in the markmoot. Soon, however, their freedom was encroached upon, and in the course of a very short time it disappeared altogether.

The extent and nature of the mark system has been, and still is, a subject of controversy among historians. One school holds that it was almost universal in Germany; that it was, in fact, the typical Teutonic method of holding and cultivating the land. From Germany, it is argued, it was introduced by the Angle and Saxon invaders into England, where it was

extensively adopted, being the foundation upon which the pre- vailing land system in early England was built. An opposing school denies entirely the existence of the mark system, and a French writer, Fustel de Coulanges, refers to it contemptuously as " a figment of the Teutonic imagination." This view is based largely upon the supposition that common ownership of the land was practically unknown among the early Germans, and was by no means general among the early English. The truth will doubtless be found to lie somewhere between the two extremes. The complete mark system was certainly not prevalent in Anglo-Saxon England, nor did it exist very widely, or for any very long period in Germany, but the system which did prevail in these two countries contained elements which are also found in the mark system.

The chief authority on the mark system is G. L. von Maurer, who has written Einleitung zur Geschichte der Mark- Hof Dorf- und Stadtverfassung und der bffentlichen Gewall (Munich, 1854; new ed., Vienna, 1896), and Geschichte der Markenverfassung in Deutschland (Erlangen, 1856). See also N. D. Fustel de Coulanges, Recherches sur quelques problemes de Vhi'stoire (1885); and a translation from the same writer's works called The Origin of Property in Land, by M. Ashley. This contains an introductory chapter by Professor W. J. Ashley. Other authorities are K. Lamprecht, Deutsches Wirt- schaftsleben im Mittelalter (Leipzig, 1886) ; R. Schroder, Lehrbuch der deutschen Rechts geschichte (Leipzig, 1902) ; and W. Stubbs, Constitutional History of England, vol. i. (1891).*

MARL (from O. Fr. marie, Late Lat. margila, dim. of marga; cf. Du. and Ger. Mergel), a calcareous clay, or a mixture of carbonate of lime with argillaceous matter. It is impossible to give a strict definition of a marl, for the term is applied to a great variety of rocks and soils with a considerable range of composition. On the one hand, the marls graduate into clays by diminution in the amount of lime that they contain, and on the other hand they pass into argillaceous limestones (see Lime- stone). From 25-75% °f carbonate of lime may be regarded as characteristic of the marls. But in popular usage many substances are called marls which would not be included under the definition given here. The practice formerly much in vogue of top-dressing land with marls, and the use of many different kinds of earth and clay for that purpose, has led to a very general misapplication of the term; for all sorts of rotted rock, some being of igneous origin while others are rain-wash, loams, and various superficial deposits, have been called " marls " in different parts of Britain, if only it was believed that an application of them to the surface of the fields would result in increased fertility.

The typical marls are soft, earthy, and of a white, grey or brownish colour. Many of them disintegrate in water; and they are readily attacked by dilute hydrochloric acid, which dissolves the carbonate of lime rapidly, giving off bubbles of carbon dioxide. The lime of some marls is present in the form of shells, whole or broken; in others it is a fine impalpable powder mixed with the clay. In many marls there is organic matter (plant fragments or humus). Sand is usually not abundant but is rarely absent. Gypsum occurs in some marls, occasionally in large simple crystals with the form of lozenge-shaped plates or in twinned groups resembling an arrow-head; fine examples of these are obtained in the marls of Montmartre near Paris, where celestine (strontium sulphate) occurs also in nodular or concretionary masses. Large crystals of calcite or of dolomite, lumps of iron pyrites or radiate nodules of marcasite, and small crystals of quartz are found in certain marl deposits; and in Westphalia the marls of the Senonian (part of the Cretaceous system) at Hamm yield masses of strontianite up to two feet in length. A very large variety of accessory minerals may be proved to exist in marls by microscopic examination.

The rocks known as shell marls are found in many parts of Britain and other northern countries, and are much valued by farmers as a source of carbonate of lime, though rarely burned to produce quicklime. They are generally obtained by digging pits in marshy spots or meadows, and often occur below considerable thicknesses of peat. Large numbers of shells of fresh-water mollusca are scattered through a matrix of clay ; usually retaining their shapes though they are in a friable and semi-decomposed state. The species represented I are very few, and from their unbroken state it is obvious that they

have not been transported but lived in the place where their remains are found. As mollusca of this kind thrive best in open stretches of clear water, the sites of the marl deposits must have been shallow lakes and open pools.

Among the older strata it is not uncommon to find beds which have the same composition and in many cases the same origin as shell marl. While some of them are fresh-water deposits, others are of marine origin. The " crag beds " of the Pliocene formation in Norfolk, Suffolk and Essex are essentially sand and gravel, which are often rich in shells; with them occur clays such as the Chillesford clay ; and many of these beds have actually been used as marls for dressing the surface of agricultural land. Better examples occur among the Oligocene beds of the Hampshire basin and the Isle of Wight, where the Steadon, Bembridge and Hempstead marls are clays, more or less sandy, containing fresh-water shells. In the Cretaceous rocks of the south of England soft argillaceous limestones of marine origin, which may be described as marls, occur on several horizons. At its base the white chalk is often mixed with clay, and the " chalk marl " is a rock of this kind; it is known in Cambridge- shire, at Folkestone, in the Isle of Wight, &c. _ The chloritic marl, which underlies the chalk and is well developed in the Isle of Wight, is a greenish argillaceous limestone, the colour being due to the presence of glauconite, not of chlorite; it is often very fossiliferous. The Gault, an argillaceous type of the Upper Greensand, is a stiff greyish calcareous clay, beneath the white chalk, well known for the excellent preservation of its fossils. It outcrops along the base of the escarpment of the North and South Downs; the original name given to it by William Smith was " the blue marl." In the Jurassic rocks of England there are marls or shelly fresh-water clays in the Purbeck series and also in the estuarine beds of the Great Oolite, but the name " marlstone " has long been reserved for the argilla- ceous limestone of the Middle Lias. It ranges from the Dorset coast, through Edge Hill in Warwickshire and Lincolnshire, and thence to the sea in the north of Yorkshire, presenting many variations in this long extent of country and often accompanied by, or con- verted into, beds of clay ironstone. The marlstone is typically a firm, greyish limestone weathering to a rusty brown colour, and is always more or less argillaceous.

In the Triassic rocks of Britain there is a very important series of red, green and mottled clays, over a thousand feet thick in some places, which have been called the New Red marls. They belong to the Keuper or uppermost division of the system, and in Cheshire contain- valuable deposits of rock salt, the principal sources of that mineral in Great Britain. In the strict

sense these rocks are not marls, being ferruginous clays rather than calcareous clays. Most of them appear to have been laid down in saline lakes in desert regions. As a rule they contain very few fossils, and often they have little or no carbonate of lime, but beds and veins of fibrous gypsum occur in them in considerable profusion. These rocks cover a wide area in the midland counties extending to the south coast near Exmouth, and reappear in the north in the Vale of Eden and a few places in southern Scotland. The clays are used for brick- making, and yield a stiff soil, mostly devoted to pasture and dairy farming. In the Rhaetic beds which immediately overlie the Triassic rocks there are three seams of calcareous clay, often only a few feet thick, which have been called the " grey marls " and the " tea-green marls."

To rocks older than these the name marl has not often been given, probably because, though argillaceous limestones are often common in the Carboniferous and Silurian rocks, they are usually firm and compact, while marls usually comprise rocks which are more or less soft and friable. In other countries, and especially in Germany, many different kinds of marl and of marl-slate are described. Two of these are of especial importance — the dark copper-bearing marl slate of the Permian rocks near Mansfeld in Germany, which has been long and extensively worked as sources of copper, and the white or creamy Solenhofen limestone, much quarried in Bavaria, and used as a lithographic stone. (J. S. F.)

MARLBOROUGH, EARLS AND DUKES OF. The earldom of Marlborough was held by the family of Ley from 1626 to 1679. James Ley, the 1st earl (c. 1550-1629), was lord chief justice of the King's Bench in Ireland and then in England; he was an English member of parliament and was lord high treasurer from 1624 to 1628. In 1624 he was created Baron Ley and in 1626 earl of Marlborough. The 3rd earl was his grandson James (1618-1665), a naval officer who was killed in action with the Dutch. James was succeeded by his uncle William, a younger son of the 1st earl, on whose death in 1679 the earldom became extinct.

In 1689 John Churchill was created earl and in 1702 duke of Marlborough (see below) . After the death of his only son Charles in 1 703 an act of parliament was passed in 1 706 settling the duke's titles upon his daughters and their issue. Consequently when he died in June 1722 his eldest daughter Henrietta (1681-1733), wife of Francis Godolphin, 2nd earl of Godolphin, became duchess XVII. 24

of Marlborough. She died without sons and was succeeded by her nephew Charles Spencer, 5th earl of Sunderland (1706-1758), a son of the great duke's second daughter Anne (d. 17 16). Al- though at this time Charles handed over the Sunderland estates to his younger brother John, the

ancestor of the earls Spencer, he did not obtain Blenheim until Sarah, the dowager duchess, died in 1744. His eldest son George Spencer, the 4th duke (1739- 18 1 7), left three sons. The eldest, George Spencer, the 5th duke (1 766-1840), was summoned to the House of Lords as Baron Spencer of Wormleighton in 1806, and in 1817, after succeeding to the dukedom, he took the name of Spencer-Churchill. The 4th duke's second son was Lord Henry John Spencer (1770-1795), envoy to Sweden and to Prussia; and his third son was Lord Francis Almeric Spencer (1779-1845), who was created a peer as Baron Churchill of Whichwood in 1815. His grandson Victor Albert Francis Charles Spencer (b. 1864) succeeded his father as 3rd Baron Churchill in 1886, and was raised to the rank of a viscount in 1902.

The 7th duke of Marlborough, John Winston Spencer-Churchill (1822-1883), a prominent Conservative politician, was lord- lieutenant of Ireland 1876-1880, and when marquess of Blandford (the courtesy title borne by the duke's eldest son in his father's lifetime) was responsible for the act of 1856 called the " Blandford Act," enabling populous parishes to be divided for purposes of Church work. In 1892 his grandson Charles Richard John Spencer- Churchill (b. 1871) became 9th duke of Marlborough.

MARLBOROUGH, JOHN CHURCHILL, ist Duke of (1650- 1722), English soldier, was born in the small manor house of Ash, in Musbury, Devonshire, near Axminster, in May or June 1650. Arabella Churchill, his eldest sister, and the mother of the duke of Berwick, was born in the same house on the 28th of February 1648. They were the children of Winston Churchill of Glanville Wotton in Dorset and Elizabeth the fourth daughter of Sir John Drake, who died in 1636; his widow, after the close of the civil war, received her son-in-law into her own house. From 1663 to 1665 John Churchill went to St Paul's school, and there is a tradition that during this period he showed the bent of his taste by reading and re-reading Vegetius De re militari. When fifteen years old he became page of honour to the duke of York, and about the same time his sister Arabella became maid of honour to the duchess, two events which contributed greatly to the advancement of the Churchills. On the 14th of September 1667 he received through the influence of his master a commission in the Guards, and left England for service at Tangier but returned home in the winter of 1670-1671. For a short interval Churchill remained in attendance at the court, and it was during this period that the natural carefulness of his disposition was shown by his investing in an annuity a present of £5,000 given him by the duchess of Cleveland.

In June 1672, when England to her shame sent six thousand troops to aid Louis XIV. in his attempt to subdue the Dutch, Churchill was made a

captain in the company of which the duke of York was colonel, and soon attracted the attention of Turenne, by whose profound military genius the whole army was directed. At the siege of Nimeguen Churchill acquitted himself with such success that the French commander predicted his ultimate rise to distinction. When Maestricht was besieged in June 1673 he saved the life of the duke of Monmouth, and received the thanks of Louis XIV. for his- services. In 1678 he was married to Sarah Jennings (b. June 5, 1660), the favourite attendant on the Princess Anne, younger daughter of the duke of York. Her father, Richard Jennings of Sandridge, near St Albans, had twenty-two brothers and sisters; one of the latter married a London tradesman named Francis Hill, and their daughter Abigail Hill afterwards succeeded her cousin the duchess of Marlborough as favourite to Queen Anne.

On the accession of James II. the Churchills received a great increase in fortune. Colonel Churchill had been created a Scotch peer as Lord Churchill of Eyemouth on the 21st of December 1682; and as a reward for his services in going on a special mission from the new monarch to Louis XIV. he was

*advanced on the 14th of May 1685 to the English peerage under the title of Baron Churchill of Sandridge in Hertfordshire. When the duke of Monmouth attempted his ill-fated enterprise in the western counties, the second position in command of the king's army was bestowed on Lord Churchill, and on the 3rd of July 1685 he was raised to the rank of major-general. Through his vigilance and energy at the battle of Sedgemoor (July 6) victory declared itself on the king's side. After the death of Monmouth he withdrew as far as*possible from the administra- tion of public business, but both he and his wife remained the favourite attendants of the princess Anne. Whilst on his embassy to the French court he had declared with emphasis that if the king of England should change the religion of the state he should at once leave his service, and it was not long before the design of James became apparent to the world. Churchill was one of the first to send overtures of obedience to the prince of Orange, to whom he had gone on a commission in 1678. Although he continued in a high position under James and drew the emoluments of his places, he promised William of Orange to use every exertion to bring over the troops to his side. James had been warned against putting any trust in the loyalty of the man on whom he had showered so many favours, but the warnings were in vain, and on the landing of the Dutch prince at Brixham Churchill was promoted to be lieutenant-general (Nov. 7, 1688) and was sent against him with five*

thousand men. When the royal army had advanced to the downs of Wiltshire and a battle seemed imminent, James was dismayed at finding that in the dead of night his general had stolen away like a thief into the opposite camp.

Churchill was sworn as a privy councillor on the 14th of February 1688/9 and on the 9th of April became earl of Marl- borough. William felt, however, that he could not place implicit reliance in his friend's integrity; and, with a clear sense of the manner in which Marlborough's talents might be employed without any detriment to the stability of his throne, he sent him in June 1689 with the army into the Netherlands, and in the autumn of 1690 into Ireland, where owing to his generalship Cork and Kinsale fell into his hands after short sieges. For some time there was no open avowal of any distrust in Marl- borough's loyalty, but in May 1692 he was thrown into the Tower on an accusation of treason. Though the evidence which could be brought against him was slight, and he was soon set at liberty, there is no doubt that Marlborough was in close relations with the exiled king at St Germains, and that he even went so far as to disclose,- in May 1694, to his late master the intention of the English to attack the town of Brest. The talents of the statesmen of this reign were chiefly displayed in their attempts to convince both the exiled and the reigning king of England of their attachment to his fortunes. The sin of Marlborough lay in the fact that he had been favoured above his fellows by each in turn, and that he betrayed both alike apparently without scruple or without shame. Once again during the Fenwick plot of 1696 he was charged with treason, but William, knowing that if he pushed Marlborough and his friends to extremities there were no other statesmen on whom he could rely, contented himself with ignoring the accusation of Sii John Fenwick, and with executing that conspirator himself. In 1698 the forgiven traitor was made governor to the young duke of Gloucester, the only one of Anne's numerous children who gave promise of attaining to manhood. During the last years of William's reign Marlborough once more was placed in positions of responsibility. His daughters were married into the most prominent families of the land; Henrietta, the eldest, became the wife of Francis, the eldest son of Lord Godolphin; the second, the loveliest woman at the court, with her father's tact and tem- per and her mother's beauty, married Charles, Lord Spencer, the only surviving son of the earl of Sunderland. Higher honours came on the accession of Queen Anne in March 1702. He was at once appointed a Knight of the Garter, captain-general of the English troops both at home and abroad, and master- general of the ordnance. The new queen did not forget the life- long service of his wife; three positions at the court by which she

was enabled to continue by the side of the sovereign were united in her person. The queen showed her devotion to her friend by another signal

mark of favour. The rangership of Windsor Park was granted her for life, with the especial object of enabling Lady Marlborough to live in the Great Lodge. These were the opening days of many years of fame and power. A week or two after the death of William it was agreed by the three great powers, England, Holland and Austria, which formed the grand alliance, that war should be declared against France on the same day, and on the 4th of May 1 702 the War of the Spanish Succession was declared by the three countries. Marlborough was made commander-in-chief of the united armies of England and Holland, but throughout the war his plans were impeded by the jealousy of the commanders who were nominally his inferiors, and by the opposite aims of the various countries that were striving to break the power of France. He himself wished to penetrate into the French lines; the anxiety of the Dutch was for the maintenance of their frontier and for an augmentation of their territory; the desire of the Austrian emperor was to secure that his son the Archduke Charles should rule over Spain. To secure concerted action by these different powers taxed all the diplomacy of Marlborough, but he succeeded for the most part in his desires. In the first year of the campaign it was shown that the armies of the French were not invincible. Several fortresses which Louis XIV. had seized upon surrendered to the allies. Kaiserswerth on the Rhine surrendered on the 15th of June, and Venlo on the Meuse on the 23rd of September. The prosperous commercial town of Liege with its commanding citadel capitulated on the 29th of October. The successes of Marlborough caused much rejoicing in his own country, and for these brilliant exploits he was raised (Dec. 14, 1702) to be duke of Marlborough, and received a grant of £5000 per annum for the queen's life. In the spring of the following year a crushing blow fell upon the duke and duchess. Their eldest and only surviving son, the marquess of Blandford, was seized whilst at King's College, Cambridge (under the care of Francis Hare, afterwards bishop of Chichester), with the small-pox, and died on the 20th of February 1703, in his seventeenth year. His talents had already justified the prediction that he would rise to the highest position in the state.

The result of the campaign of 1703 inspired the French king with fresh hopes of ultimate victory. The dashing plans of Marlborough were frustrated by the opposition of his Dutch colleagues. When he wished to invade the French territory they urged him to besiege Bonn, and he was compelled to accede to their wishes. It surrendered on the 15th of May, whereupon he returned to his original plan of attacking Antwerp; but, in consequence of the incapacity of the Dutch leaders, the generals (Villeroi and Boufflers) of the French army surprised the Dutch division on the 30th of June and inflicted on it a loss of many thousands of men. Marlborough was forced to abandon his enterprise, and all the compensation which he received was the capture of the insignificant forts of Huy and Limburg.

After a year of comparative failure for the allies, Louis XIV. was emboldened to enter upon an offensive movement against Austria; and Marlborough, smarting under the misadventures of 1703, was eager to meet him. A magnificent army was sent by the French king, under the command of Marshal Tallard, to join the forces of the elector of Bavaria and to march by the Danube so as to seize Vienna itself. Marlborough divined the intention of the expedition, and while making a feint of marching into Alsace led his troops into Bavaria. The two armies (that under Marlborough and Prince Eugene numbering more than fifty thousand men, whilst Tallard's forces were nearly four thousand stronger) met in battle near the village of Blenheim on the left bank of the Danube. The French commander made the mistake of supposing that the enemy's attack would be directed against his position in the village, and he concentrated an excessive number of his troops at that point. The early part of the fight was in favour of the French. Three times were the troops led by Prince Eugene, which were attacking the Bavarians, the enemy's left wing, driven back in confusion; Marlborough's cavalry

failed on their first attack in breaking the line of the enemy's centre. But in the end the victory of the allies was conclusive. Nearly thirty thousand of the French and Bavarians were killed and wounded, and eleven thousand of the French who had been driven down to the Danube were forced to surrender. Bavaria fell into the hands of the allies. Never was a victory more eagerly welcomed than this, and never was a conquering leader more rewarded than Marlborough. Poets and prose writers were employed to do him honour, and the lines of Addison com- paring the English commander to the angel who passed over " pale Britannia " in the storm of 1703 have been famous for over two centuries. The manor of Woodstock, which was transferred by act of parliament from the crown to the duke, was a reward more after his own heart. The gift even in that form was noble, but the queen heightened it by instructing Sir John Vanbrugh to build a palace in the park at the royal expense, and £240,000 of public money was spent on the buildings. He was also created a prince of the empire and the principality of Mindelheim was formed in his honour.

The following year was not marked by any stirring incident. Marlborough was hampered by tedious formalities at the Hague and by jealousies at the German courts. The armies of the French were again brought up to their full standard, but the generals of Louis were instructed to entrench themselves behind earthworks and to act on the defensive. In the darkness of a July night these lines were broken through near Tirlemont, and the

French were forced to take shelter under the walls of Louvain. Marlborough in vain urged an attack upon them in their new position, and when 1705 had passed away the forces of the French king had suffered no diminution. This immunity from disaster tempted Villeroi in the next spring into meeting the allied forces in an open fight, but his assurance proved his ruin. Through the superior tactics of Marlborough the battle of Ramillies (May 23, 1706) ended in the total rout of the French, and caused the transference of nearly the whole of Brabant and Flanders to the allies. Five days afterwards the victor entered Brussels in state, and the inhabitants acknowledged the rule of the archduke. Antwerp and Ostend surrendered themselves with slight loss. Menin held out until three thousand of the soldiers of the allies were laid low around its walls, but Dendermonde, which Louis had forty years previously besieged in vain, quickly gave itself up to the resistless Marlborough. Again a year of activity and triumph was succeeded by a period of languor and depression. During the whole of 1707 fortune inclined to the other side, with the result that in July 1708 Ghent and Bruges returned to the allegiance of the French, and Marlborough, fearing that their example might be followed by the other cities, advanced with his whole army towards Ouden- arde. Had the counsels of Venddme, one of the ablest of the French generals, prevailed, the fight might have had a different issue, but his suggestions were disregarded by the duke of Burgundy, the grandson of Louis, and the battle, which raged on the high ground above Oudenarde, ended in their defeat (July 1 1 , 1 708) . After this victory Marlborough, ever anxious for decisive measures, wished to advance on Paris, but he was over- ruled. The allied army invested the town of Lille, on the forti- fications of which Vauban had expended an immensity of thought ; and after a struggle of nearly four months, and the loss to the combatants of thirty thousand men, the citadel was surrendered by Marshal Boufflers on the 9th of December. By the end of the year Brabant was again subject to the rule of the allies. The suffering in France at this time weighed so heavily upon the people that its proud king humbled himself to sue for peace. Each of the allies in turn did he supplicate, and Torcy his minister endeavoured by promises of large sums of money to obtain the support of Marlborough to his proposals. These attempts were in vain, and when the winter passed away a French army of one hundred and ten thousand, under the command of Villars, took the field. On the 3rd of September 1709 Tournay capitulated, and the two leaders, Marlborough and Eugene, led their forces to Mons, in spite of the attempt of Villars to prevent them. For the last time during the protracted war the two armies met

in fair fight at Malplaquet, on the south of Mons (Sept. n, 1709), where the French leader had strengthened his position by extensive earthworks. The fight was long and doubtful, and although the French ultimately

retreated under the direction of Boufflers, for Villars had been wounded on the knee, it was in good order, and their losses were less than those of their oppo- nents. The campaign lasted for a year or two after this indecisive contest, but it was not signalized by any such " glorious victory " as Blenheim. All that the English could plume themselves on was the acquisition of a few such fortresses as Douai and Bethune, and all that the French had to fear was the gradual tightening of the enemy's chain until it reached the walls of Paris. The energies of the French were concentrated in the construction of fresh lines of defence, until their commander boasted that his position was impregnable. In this way the war dragged on until the conclusion of the Peace of Utrecht in June 171 2.

These victorious campaigns had not prevented the position of Marlborough from being undermined by party intrigues at home. In the early part of Queen Anne's reign his political friends were to be found among the Tories, and the ministry under Sidney Godolphin was chiefly composed of members of that party. After a year or two, however, the more ardent Tories withdrew, and two younger adherents of the same cause, Harley and St John, were introduced in May 1704 into the ministry. The duchess, partly through the influence of her son-in-law, the earl of Sunderland, who came into office against the queen's wish on the 3rd of December 1706, and partly through the opposition of the Tories to the French war, had gone over to the Whig cause, and she pressed her views on the sovereign with more vehemence than discretion. She had obtained for her indigent cousin, Abigail Hill, a small position at court, and the poor relation very soon began to injure the benefactor who had befriended her. With Hill's assistance Harley and St John widened the breach with the queen which was commenced by the imperious manner of the duchess. The love of the two friends changed into hate, and no opportunity for humiliating the family of Marlborough was allowed to pass neglected. Sunderland and Godolphin were the first to fall (July-Aug. 1 7 10); a few months later the duchess was dismissed from her offices; and, although Marlborough himself was permitted to continue in his position a short time longer, his fall was only delayed until the last day of 1711. Life in England had become so unpleasant that he went to the Continent in November 171 2 and remained abroad until the death of Anne (Aug, 1, 17 14). Then he once more returned to England and resumed his old military posts, but he took little part in public affairs. Even if he had wished to regain his commanding position in the country, ill health would have prevented him from obtaining his desires. Johnson indeed says, in the Vanity of Human Wishes, that " the streams of dotage " flowed from his eyes; but this is a poetical exaggeration. It is certain that at the time of his death he was able to understand the remarks of others and to express his own wishes. At four o'clock on the morning of the 16th of June 1722 he died at Cranbourn

Lodge, near Windsor. His remains were at first deposited in Westminster Abbey, in the vault at the east end of King Henry VII. 's chapel, but they now rest in a mausoleum in the chapel at Blenheim.*

His widow, to whom must be assigned a considerable share both in his rise and in his fall, survived till the 18th of October 1744. Those years were spent in bitter animosity with many within and without her own family. Left by her husband with the command of boundless wealth, she used it for the vindication of his memory and for the justification of her own resentment. Two of the leading opponents of the Whig ministry, Chesterfield and Pitt, were especially honoured by her attentions. To Pitt she left ten thousand pounds, to the other statesman twice that Sum and a reversionary interest in her landed property at Wimbledon. Whilst a widow she received numerous offers of marriage from titled suitors. She refused them all: from her marriage to her death her heart had no other inmate than the man as whose wife she had become almost a rival to royalty.

74°

MARLBOROUGH— MARLITT

The rapid rise of Marlborough to the highest position in the State was due to his singular tact and his diplomatic skill in the management of men. In an age remarkable for grace of manner and for adroitness of compliment, his courteous demeanour and the art with which he refused or granted a favour extorted the admiration of every one with whom he came in contact. Through his consideration for the welfare of his soldiers he held together for years an army drawn from every nation in Christendom. His talents may not have been profound (he possessed " an excellent plain understanding and sound judgment " is the opinion of Lord Chesterfield) , but they were such as Englishmen love. Alike in planning and in executing, he took infinite pains in all points of detail. Nothing escaped his observation, and in the hottest moment of the fight the coolness of his intellect shone conspicuous. His enemies indeed affected to attribute his uniform success in the field to fortune, and they magnified his love of money by drawing up balance sheets which included every penny which he had received, but omitted the pounds which he had spent in the cause he had sincerely at heart. All that can be alleged in excuse of his attempts to serve two masters, the king whom he had deserted and the king who had received him into favour, is that not one of his associates was without sin in this respect.

The books on Marlborough are very numerous. Under his name in the catalogue of the British Museum there are 165 entries, and 44 under that of his wife. The chief works are Lediard's, Arch- deacon William Coxe's

(1818-1819), Sir Archibald Alison's (1855), and Viscount Wolseley's (1894) Lives, but Wolseley stops with the accession of Queen Anne; a French memoir in three volumes, 1808; Marlborough's Letters and Despatches, edited by Sir George Murray (5 vols., 1845); and the interesting summaries of Mrs Creighton (1879) and George Saintsbury (1885). The descriptions in John Hill Burton's Reign of Queen Anne of the battle scenes of Marlborough are from personal observation. . A good account of his birthplace and country will be found in G. P. R. Pulman's Book of the Axe. District (4th ed., 1875); and for the home of the duchess the reader can refer to the History of Hertfordshire, by J. E. Cussans. A memoir of her, by one of her descendants, Mrs Arthur Colville, appeared in 1904. The pamphlets written on her conduct at court relate to matters of little interest at the present time. (W. P. C.)

MARLBOROUGH, a market town and municipal borough in the Devizes parliamentary division of Wiltshire, England, 75! m. W. of London, on the Great Western and the Midland and South Western Junction railways. Pop. (1901), 3887. It is an old- fashioned place on the skirts of Savernake Forest, lying in a valley of the chalk uplands known as Marlborough Downs, and traversed by the river Kennet. It consists mainly of one broad street, in which a majority of the houses are Jacobean; those on the north side, which have projecting upper storeys, forming the colonnade commended in the Diary of Samuel Pepys for 1668. St Peter's church, a Perpendicular building, is said to have been the scene of the ordination of Cardinal Wolsey in 1498. The church of Preshute, largely rebuilt, but preserving its Norman pillars, has a curious piscina, and a black basalt font of great size dating from 1100-1150, in which according to a very old tradition King John was baptized. Other noteworthy buildings are the town-hall, 16th century grammar school and Marlborough College. This important public school was opened in 1843, originally for the sons of clergymen, by whom alone certain scholarships are tenable. The number of boys is about 600. Marlborough possesses little trade other than agricultural; but there are breweries, tanneries and roperies. The town is governed by a mayor, 4 aldermen and 12 councillors. Area, 598 acres.

The antiquity of Marlborough is shown by the Castle Mound, a British earthwork, which local legend makes the grave of Merlin; and the name of Marlborough has been regarded as a corrupt form of Merlin's Berg or Rock.

Near the site of the modern Marlborough (Merleberge, Marle- berge) was originally a Roman castrum called Cunetio, and later there was a Norman fortress in which William I. established a mint. In Domesday it was royal demesne and during the following centuries figures in numerous grants generally as the dowry of queens. The castle, built under Henry I., by

Roger, bishop of Salisbury, was held for Matilda against Stephen, and

became a favourite residence of Henry II., Savernake being a royal deer-park. In 1267 Henry III. held his last parliament here, at which the Statute of Marlborough was passed. The castle ceased to be an important stronghold after the Wars of the Roses, but was garrisoned for Charles I. by its owners, the Seymour family. Marlborough itself, however, is mentioned by Clarendon as " the most notoriously disaffected [town] in Wilt- shire," and was captured by the royal forces in 1642, and partly burnt. At the Restoration Charles II. was received and mag- nificently entertained by Lord Seymour, whose mansion forms the oldest part of Marlborough College. The town was consti- tuted a suffragan see by Henry II. Sacheverell, the politician and divine, was born here in 1674, and educated at the grammar school. In 1653 the town was nearly destroyed by fire, and it again suffered in 1679 and 1690; after which an act was passed forbidding the use of thatch. Marlborough, from its position on the Great Bath Road, was a famous coaching centre.

The first charter was granted by John in 1204, and conferred a gild merchant, together with freedom from all pleas except pleas of the Crown and from all secular exactions by sea and land. This was confirmed by subsequent sovereigns from Henry III. to Henry VIII. Later charters were obtained from Henry IV. in 1407 and from Elizabeth in 1576. The former granted some additional exemptions whilst the latter incorporated the town under the title of mayor and burgesses of Marlborough. The corporation was finally reconstructed in 1835 under the title of a mayor, 4 aldermen and 12 councillors. Marlborough returned two members to parliament until 1867 when the number was reduced to one, and in 1885 the representation was merged in that of the county. A yearly fair was "granted by John in 1204, for eight days from August 14, and two more by Henry III. for three days from November 11 and June 29 respectively. In 1204 John also granted a weekly market on Wednesday and Saturday. In Tudor times the corn trade prospered here.

See " Victoria County History ": Wilts; James Waglen, History of Marlboro (London, 1854).

MARLBOROUGH, a city of Middlesex county, Massachusetts, U.S.A., about 28 m. W. of Boston. Pop. (1900), 13,609 (3311 were foreign-born); (1910), 14,579; it i s served by the Boston & Maine and the New York New Haven & Hartford railways, and by inter-urban electric lines. The city, with a total area of 21-08 sq. m., lies in a fertile hilly country, and contains several ponds, including the beautiful Williams Pond, which covers 1 sq. m. A public library was established here in 1792; it was housed in a new building in 1904. Other public buildings are the city hall,

the Federal building and a state armoury. There is a boarding school for girls, St Ann's Academy (1887), under the direction of the Sisters of St Ann. The city's importance is industrial; in 1905 its factory product was valued at $7,468,849 (an increase of 66% since 1900), of which 88-6% was the value of boots and shoes. Whether the city is named from Marl-borough in Wiltshire, or, as seems more probable, because of early spellings " Marlberg " and " Marlbridge," from the presence of marl in the neighbourhood, is uncertain. Settlers from Sud- bury in 1665 took possession of a hill called by the Indians Whipsuffenicke and gradually hemmed in the Christian Indian village of Ockoocangansett (or Ognoikonguamescitt) , on an adjoining hill still bearing this name. The town was incor- porated in 1660. It was destroyed by Indians in March 1676, during King Philip's war, and was abandoned for a year. West-borough was separated from it in 171 7, Southborough in 1727, and a part of Berlin in 1784; parts of it were annexed to North- borough in 1807, to Bolton in 1829 and to Hudson in 1866; and it annexed parts of Framingham in 1791, and of Southborough in 1843. In 1890 it was incorporated as a city.

See S. A. Drake, History of Middlesex County, ii. 137 sqq., " Marlborough " by Rev. R. S. Griffin and E. L. Bigelow (Boston,

1880).

MARLITT, E., the pseudonym of Eugenie John (1825-1887), German novelist, who was born at Arnstadt in Thuringia, the daughter of a merchant, on the 5th of December 1825. By her musical talent she attracted the notice of the reigning princess

of Schwarzburg-Sondershausen, who provided for her training as a singer at the Vienna Conservatoire. After three years' study she made a successful stage debut, but was compelled in consequence of deafness to abandon this career. She then became reader and travelling companion to her patroness, and her life at the court and on her many travels furnished her with material for her novels. In 1863 she resigned her post, and then lived with her brother at Arnstadt until her death on the 22nd of June 1887.

Her first novel, Die zwolf Apostel, was published in the Garten- laube in 1865 and this was followed in 1866 by Goldelse (23rd ed., 1890), with which she established her literary reputation. Among others of her novels may be mentioned Blaubart (1866); Das Ge- heimnis der alten Mamsell

(1867; 13th ed., 1888); Reichsgrafin Gisela (1869; 9th ed., 1900), Das Heideprinzesschen (1871; 8th ed., 1888) and Im Hause des Kommerzienrats (1877; 5th ed., 1891). All these works are directed against social prejudices, but, although attrac- tively written, are deficient in higher literary qualities and appeal mostly to juvenile readers.

E. Marlitt's Gesammelte Romane und Novellen were published in 10 volumes (1888-1890; 2nd ed., 1891-1894), to which is appended a biographical memoir.

MARLOW (Great Marlow), a market town in the Wycombe parliamentary division of Buckinghamshire, England, 315 m. W. of London on a branch of the Great Western railway. Pop. of urban district (1901), 4526. It is beautifully situated on the north (left) bank of the Thames, which is here confined closely between low wooded hills. A weir and lock, near which rise the high tower and spire of the modern church of All Saints, separate two fine reaches of the river, and the town is a favourite resort for boating and fishing. The village of Little Marlow, where the foundations of a Benedictine nunnery of the time of Henry III. have been revealed by excavation, lies near the river two miles below. The town is, as a whole, modern in appearance, but a few old houses remain, such as the grammar school, founded as a bluecoat school in 1624, adjoining which is a house occupied by the poet Shelley in 1817. The town has manufactures of chairs, lace and embroidery, paper mills and breweries.

Great Marlow (Merlaue, Merlawe, Marlowe, Marlow) appears as a manor in Domesday Book, but its " borough and liberties " are not mentioned before 1261. It was then held by the earls of Gloucester, and its importance was probably due to the bridge across the Thames, first built, according to tradition, by the Templars at Bisham. No charter of incorporation was ever granted to the town, but there are faint traces of its constitution in the 14th century. In 1342 the mayor and burgesses presented to a chantry and continued to be the patrons till 1394. Later writs addressed to the town only mention two bailiffs as officers of the borough, nor were the pontage rights and dues held by it until the 15th century. Two burgesses sat in parliament from 1300 to 1309, but the representation of the borough lapsed until 1621, when the right to return members was re-established. After the Reform Bill of 1832 the boundaries of the parliamen- tary borough were enlarged, but in 1867 its representation was reduced to one member, and in 1885 was merged in that of the county. No grant of a market in the borough has been found, but a market was held by the Despensers who had suc- ceeded the De Clares as lords of the manor in the 14th century. In the 1 6th century the market seems to have been given up, but it was revived and held in the 18th century, only to disappear again before 1862. Fairs were mentioned in 1306 on the death of Gilbert de

Clare, when they were held on St Luke's Day and on the Wednesday in Whit-week by the earl of Gloucester, and Hugh le Despenser was granted a fair in his manor of Marlow in 1324. In 1792 there were two fairs, one of which, for horses and cattle, is still held on the 29th of October. Lace and satin-stitch work used to be made to a considerable extent.

MARLOWE, CHRISTOPHER (1564-1593), English dramatist, the father of English tragedy, and instaurator of dramatic blank verse, the eldest son of a shoemaker at Canterbury, was born in that city on the 6th of February 1564. He was chris- tened at St George's Church, Canterbury, on the 26th of February, 1563/4, some two months before Shakespeare's baptism at Strat- ford-on-Avon. His father, John Marlowe, is said to have been

the grandson of John Morley or Marlowe, a substantial tanner of Canterbury. The father, who survived by a dozen years or so his illustrious son, married on the 22nd of May 1561 Catherine, daughter of Christopher Arthur, at one time rector of St Peter's, Canterbury, who had been ejected by Queen Mary as a married minister. The dramatist received the rudiments of his educa- tion at the King's School, Canterbury, which he entered at Michaelmas 1578, and where he had as his fellow-pupils Richard Boyle, afterwards known as the great earl of Cork, and Will Lyly, the brother of the dramatist. Stephen Gosson entered the same school a little before, and William Harvey, the famous physician, a little after Marlowe. He went to Cambridge as one of Archbishop Parker's scholars from the King's School, and matriculated at Benet (Corpus Christi) College, on the 17th of March 1571, taking his B.A. degree in 1584, and that of M.A. three or four years later.

Francis Kett, the mystic, burnt in 1589 for heresy, was a fellow and tutor of his college, and may have had some share in developing Marlowe's opinions in religious matters. Marlowe's classical acquirements were of a kind which was then extremely common, being based for the most part upon a minute acquain- tance with Roman mythology, as revealed in Ovid's Meta- morphoses. His spirited translation of Ovid's Amores (printed 1596), which was at any rate commenced at Cambridge, does not seem to point to any very intimate acquaintance with the gram- mar and syntax of the Latin tongue. Before 1587 he seems to have quitted Cambridge for London, where he attached himself to the Lord Admiral's Company of Players, under the leadership of the famed actor Edward Alleyn, and almost at once began writing for the stage. Of Marlowe's career in London, apart from his four great theatrical successes, we know hardly anything; but he evidently knew Thomas Kyd, who shared his unorthodox opinions. Nash criticized his verse, Greene affected to shudder at his atheism; Gabriel Harvey maligned his memory. On the other hand Marlowe was intimate with the Walsinghams of Scadbury, Chiselhurst, kinsmen of Sir Francis

Walsingham: he was also the personal friend of Sir Walter Raleigh, and perhaps of the poetical earl of Oxford, with both of whom, and with such men as Walter Warner and Robert Hughes the mathemati- cians, Thomas Harriott the notable astronomer, and Matthew Royden, the dramatist is said to have met in free converse. Either this free converse or the licentious character of some of the young dramatist's tirades seems to have sown a suspicion among the strait-laced that his morals left everything to be desired. It is probable enough that this attitude of reprobation drove a man of so exalted a disposition as Marlowe into a more in- surgent attitude than he would have otherwise adopted. He seems at any rate to have been associated with what was denounced as Sir Walter Raleigh's school of atheism, and to have dallied with opinions which were then regarded as putting a man outside the pale of civilized humanity. As the result of some depositions made by Thomas Kyd under the influence of torture, the Privy Council were upon the eve of investigating some serious charges against Marlowe when his career was abruptly and somewhat scan- dalously terminated. The order had already been issued for his arrest, when he was slain in a quarrel by a man variously named (Archer and Ingram) at Deptford, at the end of May 1593, and he was buried on the 1st of June in the churchyard of St Nicholas at Deptford. The following September Gabriel Harvey referred to him as " dead of the plague." The disgraceful particulars attached to the tragedy of Marlowe in the popular mind would not seem to have appeared until four years later (1597) when Thomas Beard, the Puritan author of The Theatre of God's Judgements, used the death of this playmaker and atheist as one of his warning examples of the vengeance of God. Upon the embellishments of this story, such as that of Francis Meres the critic, in 1598, that Marlowe came to be " stabbed to death by a bawdy servingman, a rival of his in his lewde love," or that of William Vaughan in the Golden Grove of 1600, in which the unfortunate poet's dagger is thrust into his own eye in prevention of his felonious assault upon an innocent man, his guest, it is impossible now to pronounce. We really do not know the

circumstances of Marlowe's death. The probability is he was I killed in a brawl, and his atheism must be interpreted not accord- ing to' the ex parte accusation of one Richard Baines, a profes- sional informer (among the Privy Council records), but as a species of rationalistic antinomianism, dialectic in character, and closely related to the deflection from conventional orthodoxy for which Kett was burnt at Norwich in 1589. A few months before the end of his life there is reason to believe that he transferred his services from the Lord Admiral's to Lord Strange's

Company, and may have thus been brought into communication with Shakespeare, who in such plays as Richard, II. and Richard III. owed not a little to the influence of his romantic predecessor.

Marlowe's career as a dramatist lies between the years 1587 and 1 593, and the four great plays to which reference has been made were Tamburlaine the Great, an heroic epic in dramatic form divided into two parts of five acts each (1587, printed in 1590); Dr Faustus (1588, entered at Stationers' Hall 1601); The Famous Tragedy of the Rich Jew of Malta (dating perhaps from 1589, acted in 1592, printed in 1633); and Edward the Second (printed 1594). The very first words of Tamburlaine sound the trumpet note of attack in the older order of things dramatic : —

" From jigging veins of riming mother wits And such conceits as clownage keeps in pay We'll lead you to the stately tent of war, Where you shall hear the Scythian Tamburlaine Threatening the world with high astounding terms And scourging kingdoms with his conquering sword."

It leapt with a bound to a place beside Kyd's Spanish Tragedy, and few plays have been more imitated by rivals (Greene's Alphonsus of Aragon, Peele's Battle of Alcazar, Selimus, Scander- beg) or more keenly satirized by the jealousy and prejudice of out-distanced competitors. (T. Se.)

The majestic and exquisite excellence of various lines and passages in Marlowe's first play must be admitted to relieve, if it cannot be allowed to redeem, the stormy monotony of Titanic truculence which blusters like a simoom through the noisy course of its ten fierce acts. With many and heavy faults, there is some- thing of genuine greatness in Tamburlaine the Great; and for two grave reasons it must always be remembered with distinction and mentioned with honour. It is the first poem ever written in English blank verse, as distinguished from mere rhymeless deca- syllabics; and it contains one of the noblest passages, perhaps indeed the noblest, in the literature of the world, ever written by one of the greatest masters of poetry in loving praise of the glorious delights and sublime submission to the everlasting limits of his art. In its highest and most distinctive qualities, in unfaltering and infallible command of the right note of music and the proper tone of colour for the finest touches of poetic execution, no poet of the most elaborate modern school, working at ease upon every consummate resource of luxurious learning and leisurely refinement, has ever excelled the best and most representative work of a man who had literally no models before him and probably or evidently was often if not always compelled to write against time for his living.

The just and generous judgment passed by Goethe on the Faustus of his English predecessor in tragic treatment of the same subject is somewhat

more than sufficient to counterbalance the slighting or the sneering references to that magnificent poem which might have been expected from the ignorance of Byron or the incompetence of Hallam. And the particular note of merit observed, the special point of the praise conferred, by the great German poet should be no less sufficient to dispose of the vulgar misconception yet lingering among sciolists and pre- tenders to criticism, which regards a writer than whom no man was ever born with a finer or a stronger instinct for perfection of excellence in execution as a mere noble savage of letters, a rough self-taught sketcher or scribbler of crude and rude genius, whose unhewn blocks of verse had in them some veins of rare enough metal to be quarried and polished by Shakespeare. What most impressed the author of Faust in the work of Marlowe was a quality the want of which in the author of Manfred is proof enough to consign his best work to the second or third class at

most. "How greatly it is all planned!" the first requisite of all great work, and one of which the highest genius possible to a greatly gifted barbarian could by no possibility understand the nature or conceive the existence. That Goethe " had thought of translating it " is perhaps hardly less precious a tribute to its greatness than the fact that it has been actually and admirably translated by the matchless translator of Shakespeare — the son of Victor Hugo; whose labour of love may thus be said to have made another point in common, and forged as it were another link of union, between Shakespeare and the young master of Shakespeare's youth. Of all great poems in dramatic form it is perhaps the most remarkable for absolute singleness of aim and simplicity of construction; yet is it wholly free from all possible imputation of monotony or aridity. Tamburlaine is monotonous in the general roll and flow of its stately and sonorous verse through a noisy wilderness of perpetual bluster and slaugh- ter; but the unity of tone and purpose in Doctor Faustus is not unrelieved by change of manner and variety of incident. The comic scenes, written evidently with as little of labour as of relish, are for the most part scarcely more than transcripts, thrown into the form of dialogue, from a popular prose History of Dr Faustus, and therefore should be set down as little to the discredit as to the credit of the poet. Few masterpieces of any age in any language can stand beside this tragic poem — it has hardly the structure of a play — for the qualities of terror and splendour, for intensity of purpose and sublimity of note. In the vision of Helen, for example, the intense perception of loveliness gives actual sublimity to the sweetness and radiance of mere beauty in the passionate and spontaneous selection of words the most choice and perfect; and in like manner the sublimity of simplicity in Marlowe's conception and expression of the agonies endured by Faustus under the immediate imminence of his doom gives the highest note of beauty, the quality of absolute fitness and propriety, to the sheer

straightforwardness of speech in which his agonizing horror finds vent ever more and more terrible from the first to the last equally beautifuland fearful verse of that tremendous monologue which has no parallel in all the range of tragedy.

It is now a commonplace of criticism to observe and regret the decline of power and interest after the opening acts of The Jew of Malta. This decline is undeniable, though even the latter part of the play (the text of which is very corrupt) is not wanting in rough energy; but the first two acts would be sufficient foundation for the durable fame of a dramatic poet. In the blank verse of Milton alone — who perhaps was hardly less indebted than Shakespeare was before him to Marlowe as the first English master of word-music in its grander forms — has the glory or the melody of passages in the opening soliloquy of Barabbas been possibly surpassed. The figure of the hero before it degenerates into caricature is as finely touched as the poetic execution is excel- lent; and the rude and rapid sketches of the minor characters show at least some vigour and vivacity of touch.

In Edward the Second the interest rises and the execution improves as visibly and as greatly with the course of the advanc- ing story as they decline in The Jew of Malta. The scene of the king's deposition at Kenilworth is almost as much finer in tragic effect and poetic quality as it is shorter and less elaborate than the corresponding scene in Shakespeare's King Richard II. The terror of the death-scene undoubtedly rises into horror; but this horror is with skilful simplicity of treatment preserved from passing into disgust. In pure poetry, in sublime and splendid imagination, this tragedy is excelled by Doctor Faustus; in dramatic power and positive impression of natural effect it is certainly the masterpiece of Marlowe. It was almost inevitable, in the hands of any poet but Shakespeare, that none of the characters represented should be capable of securing or even exciting any finer sympathy or more serious interest than attends on the mere evolution of. successive events or the mere display of emotions (except always in the great scene of the deposition) rather animal than spiritual in their expression of rage or tenderness or suffering. The exact balance of mutual effect, the final note of scenic harmony, between ideal

conception and realistic execution is not yet struck with perfect accuracy of touch and security of hand; but on this point also Marlowe has here come nearer by many degrees to Shake- speare than any of his other predecessors have ever come near to Marlowe.

Of The Massacre at Paris (acted in 1593, printed 1600?) it is impossible to judge fairly from the garbled fragment of its genuine text which is all that has come down to us. To Mr Collier, among numberless other obligations, we owe the discovery of a noble passage excised in the piratical edition which gives us the only version extant of this unlucky play, and which, it must be allowed, contains nothing of quite equal value. This is obviously an occasional and polemical work, and being as it is overcharged with the anti-Catholic passion of the time has a typical quality which gives it some empirical significance and interest. That antipapal ardour is indeed the only note of unity in a rough and ragged chronicle which shambles and stumbles onward from the death of Queen Jeanne of Navarre to the murder of the last Valois. It is possible to conjecture, what it would be fruitless to affirm, that it gave a hint in the next century to Nathaniel Lee for his far superior and really admirable tragedy on the same subject, issued ninety-seven years after the death of Marlowe.

In the tragedy of Dido Queen of Carthage (completed by Thomas Nash, produced and printed 1594), a servile fidelity to the text of Virgil's narrative has naturally resulted in the failure which might have been expected from an attempt at once to transcribe what is essentially inimitable and to reproduce it under the hopelessly alien conditions of dramatic adaptation. The one really noble passage in a generally feeble and incomposite piece of work is, however, uninspired by the unattainable model to which the dramatists have been only too obsequious in their subservience. It is as nearly certain as anything can be which depends chiefly upon cumulative and collateral evidence that the better part of what is best in the serious scenes of King Henry VI. is mainly the work of Marlowe. That he is at any rate the principal author of the second and third plays passing under that name among the works of Shakespeare, but first and imperfectly printed as The Contention between the two Famous Houses of York and Lancaster, can hardly be now a matter of debate among competent judges. The crucial difficulty of criticism in this matter is to determine, if indeed we should not rather say to conjecture, the authorship of the humorous scenes in prose, showing as they generally do a power of comparatively high and pure comic realism to which nothing in the acknowledged works of any pre-Shakespearian dramatist is even remotely compar- able. Yet, especially in the original text of these scenes as they stand unpurified by the ultimate revision of Shakespeare or his editors, there are tones and touches which recall rather the clownish horseplay and homely ribaldry of his predecessors than anything in the lighter interludes of his very earliest plays. We find the same sort of thing which we find in their writings, only better done than they usually do it, rather than such work as Shakespeare's a little worse done than usual. And even in the final text of the tragic or metrical scenes the highest note struck is always, with

one magnificent and unquestionable exception, rather in the key of Marlowe at his best than of Shakespeare while yet in great measure his disciple.

A Taming of a Shrew, the play oh which Shakespeare's comedy was founded, has been attributed, without good reason, to Marlowe. The passages in the play borrowed from Marlowe's works provide an argument against, rather than for his author- ship ; while the humorous character of the play is not in keeping with his other work. He may have had a share in The Trouble- some Raigne of King John (1591), and Fleay conjectured that the plays Edward III. and Richard HI. usually included in editions of Shakespeare are at least based on plays by Marlowe. Lusfs Dominion, printed in 1657, was incorrectly ascribed to him, and a play no longer extant, The True History of George Scanderbage, was assumed by Fleay on the authority of an obscure passage of Gabriel Harvey to be his work. The Maiden's Holiday, assigned to Day and Marlowe, was destroyed by Warburton's

cook. Day was considerably Marlowe's junior, and collaboration between the two is not probable.

Had every copy of Marlowe's boyish version or perversion of Ovid's Elegies (P. Ovidii Nasonis Amorum compressed into three books) deservedly perished in the flames to which it was judicially condemned by the sentence of a brace of prelates, it is possible that an occasional bookworm, it is certain that no poetical student, would have deplored its destruction, if its demerits could in that case have been imagined. His translation of the first book of Lucan alternately rises above the original and falls short of it, — often inferior to the Latin in point and weight of expressive rhetoric, now and then brightened by a clearer note of poetry and lifted into a higher mood of verse. Its terseness, vigour and purity of style would in any case have been praiseworthy, but are nothing less than admirable, if not wonder- ful, when we consider how close the translator has on the whole (in spite of occasional slips into inaccuracy) kept himself to the most rigid limit of literal representation, phrase by phrase and often line by line. The really startling force and felicity of occasional verses are worthier of remark than the inevitable stiffness and heaviness of others, when the technical difficulty of such a task is duly taken into account.

One of the most faultless lyrics and one of the loveliest frag- ments in the whole range of descriptive and fanciful poetry would have secured a place for Marlowe among the memorable men of his epoch, even if his plays had perished with himself. His Passionate Shepherd remains ever since unrivalled in its way — – a way of pure fancy and radiant melody without break or lapse. The untitled fragment, on the other hand, has been very

closely rivalled, perhaps very happily imitated, but only by the greatest lyric poet of England — by Shelley alone. Marlowe's poem of Hero and Leander (entered at Stationers' Hall in September 1593; completed and brought out by George Chapman, who divided Marlowe's work into two sestiads and added four of his own, 1598), closing with the sunrise which closes the night of the lovers' union, stands alone in its age, and far ahead of the work of any possible competitor between the death of Spenser and the dawn of Milton. In clear mastery of narrative and presentation, in melodious ease and simplicity of strength, it is not less pre-eminent than in the adorable beauty and impec- cable perfection of separate lines or passages. It is doubtful whether the heroic couplet has ever been more finely handled.

The place and the value of Christopher Marlowe as a leader among English poets it would be almost impossible for historical criticism to over-estimate. To none of them all, perhaps, have so many of the greatest among them been so deeply and so directly indebted. Nor was ever any great writer's influence upon his fellows more utterly and unmixedly an influence for good. He first, and he alone, guided Shakespeare into the right way of work; his music, in which there is no echo of any man's before him, found its own echo in the more prolonged but hardly more exalted harmony of Milton's. He is the greatest discoverer, the most daring and inspired pioneer, in all our poetic literature. Before him there was neither genuine blank verse nor a genuine tragedy in our language. After his arrival the way was prepared, the paths were made straight, for Shakespeare. (A. C. S.)

Marlowe's fame, so finely appreciated by Shakespeare and Drayton, "was in obscuration from the fall of the theatres until the generation of Lamb and Hazlitt. A collected edition was brought out by Pickering in 1826. This was greatly improved upon by A. Dyce (1858, 1865, 1876). A one-volume edition was prepared by Colonel Francis Cunningham in 1871. The standard edition of Mr A. H. Buhen in 3 vols, appeared in 1 884-1 885 and is now under revision. The " Best Plays " were edited for the Mermaid series by Havelock Ellis with an Introduction by J. A. Symonds (1887-1889). The best modern text is that edited by C. F. Tucker Brooke (Oxf. Univ. Press, 1910). A sketch in outline of Marlowe's Life was essayed by J. G. Lewis (Canterbury, 1891). A not very conclusive monograph on Christopher Marlowe and his Associates by J. H. Ingram, followed in 1904. For further information the reader should consult the histories of the stage by Collier, Ward, Fleay, Schelling, and the studies of Shakespeare's Predecessors by Symonds, Mezieres, Boas, Manley, Churton Collins, Feuillerat and J. M. Robertson. See also Verity's Essay on Marlowe's Influence (1886); Mod. Lang. Rev. iv. 167 (M. at Cambridge); Swinburne,

Study of Shakespeare (1880); Elze, Notes, and Hazlitt Dramatic Lit. of the Age of Elizabeth; Fortnightly Review, xiii., lxxi., and Sept.- Oct., 1905; Jusserand, Hist, of English Lit.; the Cambridge Hist, of English Lit. ; Seccombe and Allen, Age of Shakespeare (vol. ii. 3rd ed., 1909), and the separate editions of Dr Faustus, Edward II., &c. The main sources of Marlowe were as follows : for Tamburlaine, Pedro Mexia's Life of Timur in his Silva (Madrid, 1543), anglicized by Fortescue in his Foreste (1571) and Petrus Perondinus Vita Magni Tamerlanis (1551) ; for Faustus: a contemporary English version of the Faust-buch or Historia von D. Johann Fausten (Frankfort, 1587), and for Edward II., the Chronicles of Fabyan (1516), Holinshed (1577) and Stow (1580). (T. Se.)

MARLOWE, JULIA [Sarah Frances Frost] (1870-), American actress, was born near Keswick, England, on the 17th of August 1870, and went with her family to America in 1875. Her first formal appearance on the stage was in New York in 1887, although she had before that travelled with a juvenile opera company in H.M.S. Pinafore, and afterwards was given such parts as Maria in Twelfth Night in Miss Josephine Riley's travelling company. Her first great success was as Parthenia in Ingomar, and her subsequent presentations of Rosalind, Viola, and Julia in The Hunchback confirmed her position as a " star." In 1894 she married Robert Taber, an actor, with whom she played until their divorce in 1900. Subsequently she had great success as Barbara Frietchie in Clyde Fitch's play of that name, and other dramas; and from 1904 to 1907 she acted with E. H. Sothern in a notable, series of Shakespeare plays, as well as in modern drama.

MARLY-LE-ROI, a village of northern France in the depart- ment of Seine-et-Oise, 5 m. N. by W. of Versailles by road. Pop. (1906), 1409. Notwithstanding some fine country houses, Marly is dull and unattractive, and owes all its celebrity to the sumptuous chateau built towards the end of the 17th century by Louis XIV., and now destroyed. It was originally designed as a simple hermitage to which the king could occasionally retire with a few of his more intimate friends from the pomp of Versailles, but gradually it grew until it became one of the most ruinous extravagances of the Grand Monarque. The central pavilion (inhabited by the king himself) and its twelve subsidiary pavilions were intended to suggest the sun surrounded by the signs of the zodiac. Seldom visited by Louis XV., and wholly abandoned by Louis XVI., it was demolished after the Revolu- tion, its art treasures having previously been dispersed, and the remains now consist of a large basin, the Abreuvoir, a few mouldering ivy-grown walls, some traces of parterres with magni- ficent trees, the park, and the forest of

85 sq. m., one of the most pleasant promenades of the neighbourhood of Paris, containing the shooting preserves of the President of the Republic.

Close to the Seine, half-way between Marly-le-Roi and St Germain, is the village of Port-Marly, and one mile farther up is the hamlet of Marly-la-Machine. Here, in 1684, an immense hydraulic engine, driven by the current of the river, was erected; it raised the water to a high tower, where the aqueduct of Marly began (700 yds. in length, 75 in height, with 36 arches, still well-preserved), carrying the waters of the Seine to Versailles.

MARMALADE (adopted from Fr. marmelade, from marmelo, a quince, derived through the Lat. melimelum, from Gr. ne\i, honey, and (ifj\ov, an apple, an apple grafted on a quince), a preserve originally made of quinces, but now commonly of Seville oranges. The " marmalade-tree " (Lucuma mammosa) bears a fruit whose thick pulp resembles marmalade and is called natural marmalade. " Marmalade box " is the name of the fruit of the Genipa Americana, which opens in the same manner as a walnut, the nut being replaced by a soft pulp.

MARMANDE, a town of south-western France, capital of an arrondissement in the department of Lot-et-Garonne, 35 m. N.W. of Agen, on the Southern railway from Bordeaux to Cette. Pop. (1906), town 6373; commune, 9748. Marmande is situated at the confluence of the Tree with the Garonne on the right bank of the latter river, which is here crossed by a suspension bridge. Public institutions include the sub-prefecture, the tribunals of first instance and commerce, the communal college and schools of commerce and industry and of agriculture. Apart from

the administrative offices, the only building of importance is the church of Notre-Dame, which dates from the 13th, 14th and 15th centuries. The graceful windows of the nave, the altar- piece of the 1 8th century, and in particular, the Renaissance cloister adjoining the south side, are its most interesting features. Among the industries are iron-founding, steam sawing, the manufacture of woollens, carriage-making, cooperage and brandy-distilling. There is a large trade in wine, plums, cattle, grain and other agricultural produce.

Marmande was a bastide founded about 1195 on the site of a more ancient town by Richard Cceur de Lion, who granted it a liberal measure of self-government. Its position on the banks of the Garonne made it an important place of toll. It soon passed into the hands of the counts of Toulouse, and was three times besieged and taken during the Albigensian crusade, its capture by Amaury de Montfort in 1219 being followed by a massacre of the inhabitants. It was united to the French crown under Louis IX. A short occupation by the English in 1447, an unsuccessful siege by Henry IV. in

1577 and its resistance of a month to a division of Wellington's army in 1814, are the chief events in its subsequent history.

MARMIER, XAVIER (1809-1892), French author, was born at Pontarlier, in Doubs, on the 24th of June 1809. He had a passion for travelling, and this he combined throughout his life with the production of literature. After journeying in Switzer- land, Belgium and Holland, he was attached in 1835 to the Arctic expedition of the " Recherche "; and after a couple of years at Rennes as professor of foreign literature, he visited (1842) Russia, (1845) Syria, (1846) Algeria, (1848-1849) North and South America, and numerous volumes from his pen were the result. In 1870 he was elected to the Academy, and he was for many years prominently identified with the Sainte-Genevieve library. He did much to encourage the study of Scandinavian literature in France, publishing translations of Holberg, Oehlenschlager and others. He died in Paris on the nth of October 1892.

MARMONT, AUGUSTE FREDERIC LOUIS VIESSE DE, Duke of Ragusa (i 774-1852), marshal of France, was born at Chatillon- sur-Seine, on the 20th of July 1774. He was the son of an ex- officer in the army who belonged to the petite noblesse and adopted the principles of the Revolution. His love of soldiering soon showing itself, his father took him to Dijon to learn mathematics prior to entering the artillery, and there he made the acquain- tance of Bonaparte, which he renewed after obtaining his com- mission when he served in Toulon. The acquaintance ripened into intimacy; Marmont became General Bonaparte's aide-de- camp, remained with him during his disgrace and accompanied him to Italy and Egypt, winning distinction and promotion to general of brigade. In 1799 he returned to Europe with his chief; he was present at the coup d'itat of the 18th Brumaire, and organized the artillery for the expedition to Italy, which he commanded with great effect at Marengo. For this he was at once made general of division. In 1801 he became inspector- general of artillery, and in 1804 grand officer of the Legion of Honour, but was greatly disappointed at being omitted from the list of officers who were made marshals. In 1805 he received the command of a corps, with which he did good service at Ulrn. He was then directed to take possession of Dalmatia with his army, and occupied Ragusa. For the next five years he was military and civil governor of Dalmatia, and traces of his bene- ficent regime still survive both in great public works and in the memories of the people. In 1808 he was made duke of Ragusa, and in 1809, being summoned by Napoleon to take part in the Austrian War, he marched to Vienna and bore a share in the closing operations of the campaign. Napoleon now made him a marshal and governor-general of all the Illyrian provinces of the empire. In July 18 10 Marmont was hastily summoned to succeed Massena in the command of the French army in the north of Spain. The skill with which he manoeuvred his army during the year he

commande'd it has been always acknowledged. His relief of Ciudad Rodrigo in the autumn of 181 1 in spite of the presence of the English army was a great feat, and in the manoeuvring which preceded the battle of Salamanca he had

the best of it. But Wellington more than retrieved his position in the battle (see Salamanca), and inflicted a severe defeat on the French, Marmont himself being gravely wounded in the right arm and side. He retired to France to recover, and was still hardly cured when in April 1813 Napoleon, who soon forgot his fleeting resentment for the defeat, gave him the command of a corps. With it he served at the battles of Liitzen, Bautzen and Dresden, and throughout the great defensive campaign of 1814 until the last battle before Paris, from which he drew back his forces to the commanding position of Essonne. Here he had 20,000 men in hand, and was the pivot of all thoughts. Napoleon said of this camp of Essonne, " C'est la que viendront s'addresser toutes les intrigues, toutes les trahisons; aussi y ai-je plac6 Marmont, mon enfant elev6 sous ma tente." Marmont then took upon himself a political role which has, no doubt justly, been stigmatized as ungrateful and treasonable. A secret convention was concluded, and Marmont's corps was surrounded by the enemy. Napoleon, who still hoped to retain the crown for his infant son, was prostrated, and said with a sadness deeper than violent words, " Marmont me porte le dernier coup."

This act was never forgiven by Marmont's countrymen. On the restoration of the Bourbons he was indeed made a peer of France and a major-general of the royal guard, and' in 1820 a knight of the Saint Esprit and a grand officer of the order of St Louis; but he was never trusted. He was the major-general of the guard on duty in July 1830, and was ordered to put down with a strong hand any opposition to the ordinances (see France) . Himself opposed to the court policy, he yet tried to do his duty, and only gave up the attempt to suppress the revolution when it became clear that his troops were outmatched. This brought more obloquy upon him, and the due d'Angouleme even ordered him under arrest, saying, " Will you betray us, as you betrayed him?" Marmont did not betray them; he accompanied the king into exile and forfeited his marshalate thereby. His desire to return to France was never gratified and he wandered in central and eastern Europe, settling finally in Vienna, where he was well received by the Austrian government, and strange to say made tutor to the duke of Reichstadt, the young man who had once for a few weeks been styled Napoleon II. He died at Venice on the 22nd of March 1852.

Much of his time in his last years was spent upon his Memoires, which are of great value for the military history of his time, though they must be read as a personal defence of himself in various junctures rather than as an unbiased account of his times. They show Marmont, as he really was, an embittered man, who never thought his services sufficiently requited, and above all, a man too much in love with himself and his own glory to be a true friend or a faithful servant. His strategy indeed tended to become pure virtuosity, and his tactics, though neat, appear frigid and antiquated when contrasted with those of the instinctive leaders, the fighting generals whom the theorists affect to despise. But his military genius is undeniable, and he was as far superior to the mere theorist as Lannes and Davout were to the pure divisionnaire or " fighting " general.

His works are Voyage en Hongrie, &c. (4 vols., 1837); Voyage en Sicile (1838); Esprit des institutions militaires (1845); Cesar; Xenophon; and Memoires (8 vols., published after his death in 1856). See the long and careful notice by Sainte-Beuve, Causeries du Lundi, vol. vi.

MARMONTEL, JEAN FRANCOIS (1723-1799), French writer, was born of poor parents at Bort, in Cantal, on the nth of July 1723. After studying with the Jesuits at Mauriac, he taught in their colleges at Clermont and Toulouse; and in 1745, acting on the advice of Voltaire, he set out for Paris to try for literary honours. From 1748 to 1753 he wrote a succession of tragedies which, 1 though only moderately successful on the stage, secured the admission of the author to literary and fashionable circles. He wrote for the Encyclopedic a series of articles evincing con- siderable critical power and insight, which in their collected form, under the title Elements de Litterature, still rank among the French

1 Denvs le Tyran (1748); Aristom'ene (1749); Cleopdtre (1750); Heraclides (1752); Egyptus (1753)-

classics. He also wrote several comic operas, the two best of which probably are Sylvain (1770) and Zemire et Azore (1771). In the Gluck-Piccini controversy he was an eager partisan of Piccini with whom he collaborated in Didon (1783) and Penelope (1785). In 1758 he gained the patronage of Madame de Pom- padour, who obtained for him a place as a civil servant, and the management of the official journal Le Mercure, in which he had already begun the famous series ,of Contes moraux. The merit of these tales lies partly in the delicate finish of the style, but mainly in the graphic and charming pictures of French society under Louis XV. The author was elected to the French Academy in 1763. In 1767 he published a romance, Belisaire, now remark- able only on account of a chapter on religious toleration which incurred the censure of the Sorbonne and the archbishop of Paris. Marmontel retorted in Les Incas (1778) by tracing the cruelties in Spanish America to the religious fanaticism of the invaders.

He was appointed historiographer of France (177 1), secretary to the Academy (1783), and professor of history in the Lycee (1786). In his character of historiographer Marmontel wrote a history of the regency (1788) which is of little value. Reduced to poverty by the Revolution, Marmontel in 1792 retired during the Terror to Evreux, and soon after to a cottage at Abloville in the department of Eure. To that retreat we owe his Memoires d'un pere (4 vols., 1804) giving a picturesque review of his whole life, a literary history of two important reigns, a great gallery of portraits extending from the venerable Massillon, whom more than half a century previously he had seen at Clermont, to Mirabeau. The book was

nominally written for the instruction of his children. It contains an exquisitely drawn picture of his own childhood in the Limousin; its value for the literary historian is very great. Marmontel lived for some time under the roof of Mme Geoffrin, and was present at her famous dinners given to artists; he was, indeed, an habitue of most of the houses where the encyclopaedists met. He had thus at his command the best material for his portraits, and made good use of his opportunities. After a short stay in Paris when elected in 1797 to the Conseil des Anciens, he died on the 31st of December 1799 at Abloville.

See Sainte-Beuve, Causeries du lundi, iv. ; Morellet, fcloge (1805).

MARMORA (anc. Proconnesus) , an island in the sea of the same name. Originally settled by Greeks from Miletus in the 8th century B.C., Proconnesus was annexed by its powerful neighbour Cyzicus in 362. The island has at all times been noted for its quarries of white marble which supplied the material for several famous buildings of antiquity (e.g. the palace of Mausolus at Halicarnassus).

See C. Texier, Asie mineure (Paris, 1839-1849); M. I. Gedeon, npou6w77<7o$ (Constantinople, 1895); an exhaustive monograph by F. W. Hasluck in Journ. Hell. Stud., xxix., 1909.

MARMORA, SEA OF (anc. Propontis; Turk. Mermer Denisi), the small inland sea which (in part) separates the Turkish dominions in Europe from those in Asia, and is connected through the Bosporus with the Black Sea (q.v.) and through the Darda- nelles with the Aegean. It is 170 m. long (E. to W.) and nearly 50 m. in extreme width, and has an area of 4500 sq. m. Its greatest depth is about 700 fathoms, the deepest parts (over 500 fathoms) occurring in three depressions in the northern portion — one close under the European shore to the south of Rodosto, another near the centre of the sea, and a third at the mouth of the Gulf of Ismid. There are several considerable islands, of which the largest, Marmora, lies in the west, off the peninsula of Kapu Dagh, along with Afsia, Aloni and smaller islands. In the east, off the Asiatic shore between the Bosporus and the Gulf of Ismid, are the Princes' Islands.

MARMOSET, a name derived from Fr. marmouset (meaning " of a gross figure "), and used to designate the small tropical American monkeys classed by naturalists in the family Hapalidae (or Chrysothricidae) . Marmosets are not larger than squirrels, and present great variation in colour; all have long tails, and many have the ears tufted. They differ from the other American monkeys in having one pair less of molar teeth in each jaw. The common marmoset, Hapale (or Chrysothrix) jacchus, is locally

known as the oustiti, while the name piriche is applied to another species (see Primates).

MARMOT, the vernacular name of a large, thickly built, burrowing Alpine rodent mammal, allied to the squirrels, and typifying the genus Arctomys, of which there are numerous species ranging from the Alps through Asia north of (but in- cluding the inner ranges of) the Himalaya, and recurring in North America. All these may be included under the name marmot. In addition to their stout build and long thickly haired tails, marmots are characterized by the absence of cheek-pouches, and the rudimentary first front-toe, which is furnished with a flat nail, as well as by certain features of the skull and cheek-teeth. Europe possesses two species, the Alpine or true marmot {A . marmotta) , and the more eastern bobac (A . bobac) ; and there are numerous kinds in Central Asia, one of which, the red marmot (A . caudata) , is a much larger animal, with a longer tail. Marmots inhabit open country, either among mountains, or, more to the north, in the plains; and associate in large colonies, forming burrows, each tenanted by a single family. During the day- time the hillock at the entrance to the burrow is frequently occupied by one or more members of the family, which at the approach of strangers sit up on their hind-legs in order to get a better view. If alarmed they utter a shrill loud whistle, and rush down the burrow, but reappear after a few minutes to see if the danger is past. In the winter when the ground is deep in snow, marmots retire to the depths of their burrows, where as many as ten or fifteen may occupy the same chamber. No store of food is accumulated, and the winter sleep is probably unbroken. From two to four is the usual number of young in a litter. In America marmots are known as ” wood-chucks ”

ztsssmzweˆ

The Alpine Marmot {Arctomys marmotta).

(q.v.), the commonest species being A. monax % The so-called prairie-dogs, which are smaller and more slender North American rodents with small cheek-pouches, form a separate genus, Cynomys; while the term poUched-marmots denotes the various species of souslik (q.v.), Spermophilus (or Citillus), which are common to both hemispheres, and distinguished by the presence of large cheek-pouches (see Rodentta). (R.L.*)

MARNE, a river of northern France, rising on the Plateau of Langres, 3 m.

S. by E. of Langres, and uniting with the Seine at Charenton, an eastern suburb of Paris. Leaving Langres on the left the river flows northward, passing Chaumont, as far as a point a little above St Dizier. Here it turns west and enters the department of Marne, where it waters the Perthois and the wide plain of Champagne-Pouilleuse. Soon after its entrance into this department it receives the Blaise; and turning north- west passes Vitry-le-Francois where it receives the Saulx, Chalons, below which it resumes a westerly course, and Epernay, where it enters picturesque and undulating country. Its sub- sequent course lies through the departments of Aisne, where it flows through Chateau-Thierry; Seine-et-Marne, where it drives the picturesque mills of Meaux; Seine-et-Oise and Seine. Its chief tributaries in those departments are the Petit-Morin, the Ourcq and the Grand-Morin. The length of the Marne is 328 m., the area of its basin 4894 sq. m. It is joined a mile from

its source of the Marne-Sa6ne canal which is continued at Rouvroy by the Haute-Marne canal as far as Vitry-le-Francois. From that town, which is the starting-point of the canal between the Marne and the Rhine, it is accompanied by the lateral canal of the Marne to Dizy where its own channel is canalized. At Conde, above Epernay, the river is joined by the canal connecting it with the Aisne. From Lizy, above Meaux, it is accompanied on the right bank, though at some distance, by the Ourcq canal. 1 MARNE, a department of north-eastern France, made up from Champagne-Pouilleuse, Remois, Haute-Champagne, Perthois, Tardenois, Bocage and Brie-Pouilleuse, districts formerly belong- ing to Champagne, and bounded W. by Seine-et-Marne and Aisne, N. by Aisne and Ardennes, E. by Meuse, and S. by Haute- Marne and Aube. Pop. (1906), 434,157. Area 3167 sq. m.

About one-half consists of Champagne-Pouilleuse, a mono- tonous and barren plain covering a bed of chalk 1300 ft. in thick- ness. On the west and on the east it is commanded by two ranges of hills. The highest point in the department (920 ft.) is in the hill district of Reims, which rises to the south-west of the town of the same name, between the Vesle and the Marne. The lowest level (164 ft.) where the Aisne leaves the department, is not far distant. To the south of the Marne the hills of Reims are continued by the heights of Brie (700 to 800 ft.) . All these belong geologically to the basin of Paris. They slope gently towards the west, but command the plain of Champagne-Pouilleuse by a steep descent on the east. On the farther side of the plain are the heights of Argonne (860 ft.) formed of beds of the Lower Chalk, and covered by forests; they unite the calcareous forma- tions of Langres to the schists of Ardennes, and a continuation of them stretches southward into Perthois and the marshy Bocage. The department belongs entirely to the Seine basin, but includes only 13 miles of that river, in the south-west ; it there receives the Aube, which flows for 10 miles within the

department. The principal river is the Marne, which runs through the department for 105 miles in a great sweep concave to the south-west. The Aisne enters the department at a point 12 miles from its source, and traverses it for 37 miles. Two of its affluents on the left, the Suippes and the Vesle, on which stands Reims, have a longer course from south-east to north-west across the department.

Marne has the temperate climate of the region of the Seine; the annual mean temperature is 50° F., the rainfall about 24 in. Oats, wheat, rye and barley among the cereals, lucerne, sainfoin and clover, and potatoes, mangold-wurzels and sugar- beet are the principal agricultural crops. The raising of sheep of a mixed merino breed and of other stock together with bee- farming are profitable. The vineyards, concentrated chiefly round Reims and Epernay, are of high value; the manufacture of the sparkling Champagne wines being a highly important industry, of which Epernay, Reims and Chalons are the chief centres. Several communes supply the more valuable vegetables, such as asparagus, onions, &c. The principal orchard fruits are the apple, plum and cherry. Pine woods are largely planted in Champagne-Pouilleuse. The department produces peat, millstones and chalk.

The woollen industry has brought together in the neighbour- hood of Reims establishments for spinning, carding, dyeing and weaving. The materials wrought are flannels, merinoes, tartans, shawls, rugs and fancy articles; the manufacture of woollen and cotton hosiery must also be mentioned. The manufacture of wine-cases, corks, casks and other goods for the wine trade is actively carried on. Marne contains blast- furnaces, iron and copper foundries, and manufactories of agricultural implements. Besides these there are tan-yards, currying and leather-dressing establishments and glassworks, which, with sugar, chemical, whiting and oil works, potteries, flour-mills and breweries, complete the list of the most important industries. Biscuits and gingerbread are a speciality of Reims. The chief imports are wool and coal; the exports are wine, grain, live-stock, stone, whiting, pit-props and woollen stuffs. Communication is afforded chiefly by the river Marne with its canal connexions, and by the Eastern railway. There are five arrondissements — those of Chalons (the capital), Epernay,

Reims, Ste Menehould and Vitry-le-Francois — with 33 cantons and 662 communes. The department belongs partly to the archbishopric of Reims and partly to the see of Chalons. Chalons is the headquarters of the VI. army corps. Its educa- tional centre and court of appeal are at Paris. The

principal towns — Chalons-sur-Marne, Reims, Epernay and Vitry-le-Francois — are separately treated. The towns next in population are Ay (4994) and Sezanne (4504). Other places of interest are Ste Menehould (3348), formerly an important fortress and capital of the Argonne; Montmort with a Renaissance chateau once the property of Sully; Trois-Fontaines with a ruined church of the 1 2th century and the remains of a Cistercian abbey founded in 1115; and Orbais with an abbey church dating from about 1200.

MARNIAN EPOCH, the name given by G. de Mortillet to the period usually called in France the Gallic, which extends from about five centuries before the Christian era to the conquest of Gaul by Caesar. M. de Mortillet objects to the term " Gallic," as the civilization characteristic of the epoch was not peculiar to the ancient Gauls, but was common to nearly all Europe at the same date. The name is derived from the fact that the French department of Marne has afforded the richest " finds." MAROCHETTI, CARLO, Baron (1805-1867), Italian sculptor, was born at Turin. Most of his early life was spent in France, his first systematic instruction being given him by Bosio and Gros in Paris. Here his statue of " A Young Girl playing with a Dog " won a medal in 1829. But between 1822 and 1830 he studied chiefly in Rome. From 1832 to 1848 he lived in France. His " Fallen Angel " was exhibited in 183 1. In 1848 Marochetti removed to London, and there he lived for the greater part of his time till his death in 1867. Among his chief works were statues of Queen Victoria, Lord Clyde (the obelisk in Waterloo Place), Richard Cceur-de-Lion (West- minster), Emmanuel Philibert (1833, Turin), the tomb of Bellini (Pere-la-Chaise), and the altar in the Madeleine. His style was vigorous and effective, but rather popular than artistic. Marochetti, who was created a baron by the king of Sardinia, was also a chevalier of the Legion of Honour.

MARONITES (Arab. Mawarina), a Christian people of the Ottoman Empire in communion with the Papal Church, but forming a distinct denomination. The original seat and present home of the nucleus of the Maronites is Mt Lebanon; but they are also to be found in considerable force in Anti-Lebanon and Hermon, and more sporadically in and near Antioch, in Galilee, and on the Syrian coast. Colonies exist in Cyprus (with a large convent near Cape Kormakiti), in Alexandria, and in the United States of America. These began to be formed during the troubles of i860. The Lebanon community numbers about 300,000, and the total of the whole denomination cannot be much under half a million.

The origin of Maronism has been much obscured by the efforts of learned Maronites like Yusuf as-Simani (Assemanus), Vatican librarian under Clement XII., Faustus Nairon, Gabriel Sionita and Abraham Ecchellensis to clear its history from all taint of heresy. We are told of an early

Antiochene, Mar Marun or Maro, who died about a.d. 400 in the odour of sanctity in a convent at Rihla on the Orontes, whence orthodoxy spread over mid-Syria. But nothing sure is known of him, and not much more about a more historical personage, Yuhanna Marun (John Sirimensis of Suedia) , said to have been patriarch of Antioch, to have converted Lebanon from Monothelism, and to have died in a.d. 707. It is, however, certain that the Lebanon Christians as a whole were not orthodox in the time of Justinian II., against whose supporters, the Melkites, they ranged themselves after having co-operated awhile with the emperor against the Moslems. They were then called Mardaites or rebels, and were mainly Monothelite in the 12th century, and remained largely so even a century later. The last two facts are attested by William of Tyre and Barhebraeus. It seems most probable that the Lebanon offered refuge to Antiochene Monothelites flying from the ban of the Constantinopolitan Council of a.d, 680; that these converted part of the old mountain folk, who already

held some kind of Incarnationist creed; and that their first patriarch and his successors, for about 500 years at any rate, were Monothelite, and perhaps also Monophysite. It is worth noting that even as late as the close of the 16th century the Maronite patriarch found it necessary to protest by anathema against imputations of heresy. In 118 2 it is said that Amaury, patriarch of Antioch, induced some Maronite bishops, who had fallen under crusading influences, to rally to Rome; and a definite acceptance of the Maronite Church into the Roman communion took place at the Council of Florence in 1445. But it is evident that the local particularism of the Lebanon was adverse to this union, and that even Gregory XIII., who sent the pallium to the patriarch Michael, and Clement VII. who in 1596 dispatched a mission to a synod convoked at Kannobin, the old patriarchal residence, did not prevail on the lower clergy or the mass of the Maronites. A century and a half later Clement XII. was more successful. He sent to Syria, Assemanus, a Maronite educated at the Roman college of Gregory XIII.; and at last, at a council held at the monastery of Lowaizi on the 30th of September 1736, the Maronite Church accepted from Rome a constitution which is still in force, and agreed to abandon some of its more incongruous usages such as mixed convents of monks and nuns. It retained, however, its Syriac liturgy and a non-celibate priesthood. The former still persists unchanged, while the Bible is read and exhortations are given in Arabic; and priests may still be ordained after marriage. But marriage is not permitted subsequent to ordina- tion, nor does it any longer usually precede it. The tendency to a celibate clergy increases, together with other romanizing usages, promoted by the papal legate in Beirut, the Catholic missioners, and the higher native clergy who are usually educated in Rome or at St Sulpice. The legate exercises growing influence on patriarchal and other elections, and on Church government and discipline. The patriarch

receives confirmation from Rome, and the political representation of the Maronites at Constantinople is in the hands of the vicar apostolic. Rome has incorporated most of the Maronite saints in her calendar, while refusing (despite their apologists) to canonize either of the reputed eponymous founders of Maronism.

While retaining many local usages, the Maronite Church does not differ now in anything essential from the Papal, either in dogma or practice. It has, like the Greek Church, two kinds of clergy — parochial and monastic. The former are supported by their parishes; the latter by the revenues of the monasteries, which own about one-sixth of the Lebanon lands. There are some 1400 monks in about 120 monastic establishments (many of these being mere farms in charge of one or two monks). All are of the order of St Anthony, but divided into three congregations, the Ishaya, the Halebiyeh (Aleppine) and the Beladiyeh or Libnaniyeh (local). The distinction of the last named dates only from the early 18th century. The lower clergy are educated at the theological college of Ain Warka» There are five archbishoprics and five bishoprics under the patriarch, who alone can consecrate. The sees are Aleppo, Baalbek, Tripoli, Ehden, Damascus, Beirut, Tyre, Cyprus and Jebeil (held by the patriarch himself ex officio). There are also four prelates in partibus.

The Maronites are most numerous and unmixed in the north of Lebanon (districts of Bsherreh and Kesrawan). Formerly they were wholly organized on a clan system under feudal chiefs, of whom those of the house of Khazin were the most powerful; and these fought among themselves rather than with the Druses or other denominations down to the 1 8th century, when the Arab family of Shehab for its own purposes began to stir up strife between Maronites and Druses (see Druses). Feudalism died hard, but since i860 has been practically extinct; and so far as the Maronites own a chief of their own people it is the " Patriarch of Antioch arid the whole East," who resides at Bkerkeh near Beirut in winter, and at a hill station (Bdiman or Raifun) in summer. The latter, however, has no recognized jurisdiction except over his clergy. The Maronites have four members on the provincial council, two of whom are the sole representatives of the two mudirats of Kesra- wan; and they have derived benefit from the fact that so far the governor of the privileged province has always been a Catholic I (see Lebanon). The French protection of them, which dates

from Louis XIV., is no longer operative but to French official representatives is still accorded a courteous precedence. The Maronite

population has greatly increased at the expense of the Druses, and is now obliged to emigrate in considerable numbers. Increase of wealth and the influence of returned emigrants tend to soften Maronite character, and the last remnants of the barbarous state of the community — even the obstinate blood-feud— are disappearing.

See C. F. Schnurrer, De ecclesia Maronitica (1810); F. J. Bliss in Pal. Expl. Fund Quarterly Statement (1892) ; and authorities for Druses and Lebanon. (D. G. H.)

MAROONS. A negre marron is denned by Littre as a fugitive slave who betakes himself to the woods; a similar definition of cimarron (apparently from cima, a mountain top) is given in the Dictionary of the Spanish Academy. The old English form of the word is symaron (see Hawkins's Voyage, § 68). The term "Maroons" is applied almost as a proper name to the descendants of those negroes in Jamaica who at the first English occupation in the 17th century fled to the mountains. (See Jamaica.)

MAROS-VAsARHELY, a town of Hungary in Transylvania, capital of the county of Maros-Torda, 79 m. E. of Kolozsvar by rail. Pop. (1900), 19,522. It is situated on the left bank of the Maros, and is a well-built town, once the capital of the territory of the Szeklers. On a hill dominating the town stands the old fortress, which contains a beautiful church in Gothic style built about 1446, where in 1571 the diet was held which proclaimed the equality of the Unitarian Church with the Roman Catholic, the Lutheran, and Calvinistic Churches. The Teleki palace contains the Teleki collections, which include a library of 70,000 volumes and several valuable manuscripts {e.g. the Teleki Codex), a collection of old Hungarian poems, and a manuscript of Tacitus, besides a collection of antiquities and another of minerals. Maros- Vasarhely has also an interest- ing Szekler industrial museum. The trade is chiefly in timber, grain, wine, tobacco, fruit and other products of the neighbour- hood. There are manufactures of sugar, spirits and beer.

MAROT, CLEMENT (1496-1544), French poet, was born

at Cahors, the capital of the province of Quercy, some time

during the winter of the year 1496-1497. His father, Jean Marot

(c. 1463-1523), whose more correct name appears to have been

des Mares, Marais or Marets, was a Norman of the neighbourhood

of Caen. Jean was himself a poet of considerable merit, and

held the post of escripvain (apparently uniting the duties of poet laureate and historiographer) to Anne of Brittany. He had however resided in Cahors for a considerable time, and was twice married there, his second wife being the mother of Clement. The boy was " brought into France " — it is his own expression, and is not unnoteworthy as showing the strict sense in which that term was still used at the beginning of the 16th century — in 1 506, and he appears to have been educated at the university of Paris, and to have then begun the study of law. But, whereas most other poets have had to cultivate poetry against their father's will, Jean Marot took great pains to instruct his son in the fashionable forms of verse-making, which indeed required not a little instruction. It was the palmy time of the rhttoriqueurs, poets who combined stilted and pedantic language with an obstinate adherence to the allegorical manner of the 15th century and to the most complicated and artificial forms of the ballade and the rondeau. Clement himself practised with diligence this poetry (which he was to do more than any other man to overthrow), and he has left panegyrics of its coryphaeus Guillaume Cretin, the supposed original of the Raminagrobis of Rabelais, while he translated Virgil's first eclogue in 1512. Nor did he long continue even a nominal devotion to law. He became page to Nicolas de Neuville, seigneur de Villeroy, and this opened to him the way to court

life. Besides this, his father's interest must have been not

inconsiderable, and the house of Valois, which was about to

hold the throne of France for the greater part of a century,

was devoted to letters.

As early as 1514, before the accession of Francis I., C16ment presented to him his Judgment of Minos, and shortly afterwards he was either styled or styled himself facteur (poet) de la reine

to Queen Claude. In 1519 he was attached to the suite of Marguerite d'Angouleme, the king's sister, who was for many years to be the mainstay not only of him but of almost all French men of letters. He was also a great favourite of Francis himself, attended the Field of the Cloth of Gold in 1520, and duly celebrated it in verse. Next year he was at the camp in Flanders, and writes of the horrors of war. It is certain that Marot, like most of Marguerite's literary court, and perhaps more than most of them, was greatly attracted by her gracious ways, her unfailing kindness, and her admirable intellectual accomplishments, but there is not the slightest ground for thinking that his attachment was other than platonic. It is, however, evident that at this time either sentiment or matured critical judgment effected a great change in his style, a change which was wholly for the better. At the same time he celebrates a certain Diane, whom it has been sought to identify with Diane de Poitiers. There is nothing to support this idea and much against it, for it was an almost invariable habit of the poets of the 16th century, when the mistresses whom they celebrated were flesh and blood at all (which was not always the case), to celebrate them under pseudonyms. In the same year, 1524, Marot accompanied Francis on his disastrous Italian campaign. He was wounded and taken at Pavia, but soon released, and he was back again at Paris by the beginning of 1525. His luck had, however, turned. Marguerite for intellectual reasons, and her brother for political, had hitherto favoured the double movement of Aufklarung, partly humanist, partly Reforming, which distinguished the beginning of the century. Formidable opposition to both forms of innovation, however, now began to be manifested, and Marot, who was at no time par- ticularly prudent, was arrested on a charge of heresy and lodged in the Chatelet, February 1526. But this was only a foretaste of the coming trouble, and a friendly prelate, acting for Marguerite, extricated him from his durance before Easter. The imprison- ment gave him occasion to write a vigorous poem on it entitled Enfer, which was afterwards imitated by his luckless friend Etienne Dolet. His father died about this time, and Marot seems to have been appointed to the place which Jean had latterly enjoyed, that of valet de chambre to the king. He was certainly a

member of the royal household in 1528 with a stipend of 250 livres, besides which he had inherited property in Quercy. In 1 530, probably, he married. Next year he was again in trouble, not it is said for heresy, but for attempting to rescue a prisoner, and was again delivered; this time the king and queen of Navarre seem to have bailed him themselves.

In 1532 he published (it had perhaps appeared three years earlier), under the title of Adolescence Clementine, a title the characteristic grace of which excuses its slight savour of affecta- tion, the first printed collection of his works, which was very popular and was frequently reprinted with additions. Dolet's edition of 1538 is believed to be the most authoritative. Un- fortunately, however, the poet's enemies were by no means discouraged by their previous ill-success, and the political situation was very unfavourable to the Reforming party. In 1535 Marot was implicated in the affair of " The Placards," 1 and this time he was advised or thought it best to fly. He passed through Beam, and then made his way to Renee, duchess of Ferrara, a supporter of the French reformers as steadfast as her aunt Marguerite, and even more efficacious, because her dominions were out of France. At Ferrara he wrote a good deal, his work there including his celebrated Blasons (a descriptive poem, improved upon medieval models 2), which set all the verse-writers of France imitating them. But the duchess Renee was not able to persuade her husband, Ercole d'Este, to share her views, and Marot had to quit the city.

1 These " placards " were the work of the extreme Protestants. Pasted up in the principal streets of Paris on the night of the 17th of October 1534, they vilified the Mass and its celebrants, and thus led to a renewal of the religious persecution.

2 The blason was defined by Thomas Sibilet as a perpetual praise or continuous vituperation of its subject. The blasons of Marot's followers were printed in 1543 with the title of Blasons anatomiques du corps fiminin.

He then went to Venice, but before very long the pope Paul III. remonstrated with Francis I. on the severity with which the Protestants were treated, and they were allowed to return to Paris on condition of recanting their errors. Marot returned with the rest, and abjured his heresy at Lyons. In 1539 Francis gave him a house and grounds in the suburbs.

It was at this time that his famous translations of the Psalms appeared. The

merit of these has been sometimes denied, it is, however, considerable, and the powerful influence which the book exercised on contemporaries is not denied by anyone. The great persons of the court chose different pieces, each as his or her favourite. They were sung in court and city, and they are said, with exaggeration doubtless, but still with a basis of truth, to have done more than anything else to advance the cause of the Reformation in France. Indeed, the vernacular prose translations of the Scriptures were in that country of little merit or power, and the form of poetry was still preferred to prose, even for the most incongruous subjects. At the same time Marot engaged in a curious literary quarrel characteristic of the time, with a bad poet named Sagon, who represented the reactionary Sorbonne. Half the verse-writers of France ranged themselves among the Marotiques or the Sagontiques, and a great deal of versified abuse was exchanged. The victory, as far as wit was concerned, naturally rested with Marot, but his biographers are probably not fanciful in supposing that a certain amount of odium was created against him by the squabble, and that, as in Dolet's case, his subsequent misfortunes were not altogether unconnected with a too little governed tongue and pen.

The publication of the Psalms gave the Sorbonne a handle, and the book was condemned by that body. In 1543 it was evident that he could not rely on the protection of Francis. Marot accordingly fled to Geneva; but the stars were now decidedly against him. He had, like most of his friends, been at least as much of a freethinker as of a Protestant, and this was fatal to his reputation in the austere city of Calvin. He had again to fly, and made his way into Piedmont, and he died at Turin in the autumn of 1544.

In character Marot seems to have been a typical Frenchman of the old stamp, cheerful, good-humoured and amiable enough, but probably not very much disposed to elaborately moral life and conversation or to serious reflection. He has sometimes been charged with a want of independence of character; but it is fair to remember that in the middle ages men of letters naturally attached them- selves as dependants to the great. Such scanty knowledge as we have of his relations with his equals is favourable to him. He certainly at one time quarrelled with Dolet, or at least wrote a violent epigram against him, for which there is no known cause. But, as Dolet quarrelled with almost every friend he ever had, and in two or three cases played them the shabbiest of tricks, the pre- sumption is not against Marot in this matter. With other poets like Mellin de Saint Gelais and Brodeau, with prose writers like Rabelais and Bonaventure Desperiers, he was always on excellent terms. And whatever may have been his personal weaknesses, his importance in the history of French literature is very great, and was long rather under than over-valued. Coming immediately before a great literary reform — that of the Pleiade — Marot suffered the drawbacks of his position; he was both eclipsed and decried by the partakers in that

reform. In the reaction against the Pleiade he recovered honour; but its restoration to virtual favour, a per- fectly just restoration, again unjustly depressed him. Yet Marot is in no sense one of those writers of transition who are rightly obscured by those who come after them. He himself was a reformer, and a reformer on perfectly independent lines, and he carried his own reform as far as it would go. His early work was couched in the rhetoriqueur style, the distinguishing characteristics of which are elaborate metre and rhyme, allegoric matter and pedantic language. In his second stage he entirely emancipated himself from this, and became one of the easiest, least affected and most vernacular poets of France. In these points indeed he has, with the exception of La Fontaine, no rival, and the lighter verse-writers ever since have taken one or the other or both as model. In his third period he lost a little of this flowing grace and ease, but ac- quired something in stateliness, while he certainly lost nothing in wit. Marot is the first poet who strikes readers of French as being distinctively modern. He is not so great a poet as Villon nor as some of his successors of the Pleiade, but he is much less antiquated than the first (whose works, as well as the Roman de la rose, it may be well to mention that he edited) and not so elaborately artificial as the second. Indeed if there be a fault to find with Marot, it is

undoubtedly that in his gallant and successful effort to break up, supple, and liquefy the stiff forms and stiffer language of the 15th century, he made his poetry almost too vernacular and pedestrian. He has passion, and picturesqueness, but rarely; in his hands, and while the style Marotique was supreme, French poetry ran some risk of finding itself unequal to anything but graceful vers de societe. But it is only fair to remember that for a century and more its best achievements, with rare exceptions, had been vers de societe which were not graceful.

The most important early editions of Marot's CEuvres are those published at Lyons in 1538 and 1544. In the second of these the arrangement of his poems which has been accepted in later issues was first adopted. In 1596 an enlarged edition was edited by Frangois Miziere. Others of later date are those of N. Lenglet du Fresnoy (the Hague, 1731) and P. Jannet (1868-1872; new ed., 1873-1876), on the whole the best, but there is a very good selection with a still better introduction by Charles d'Hericault, the joint editor of the Jannet edition in the larger Collection Gamier (no date). An elaborate edition by G. Guiffrey remained incomplete, only vols. ii. and iii. (1875-1881) having been issued. For infor- mation about Marot himself see Notices biographiques des trois Marot, edited from the MS. of Guillaume Colletet by G. Guiffrey (187 1); H. Morley, Clement Marot, a study of Marot as a reformer; O. Douen, Clement Marot et le psautier huguenot; the section con- cerning him in G. Saintsbury s The Early Renaissance (1901); and A. Tilley, Literature of the French Renaissance,

vol. i., ch. iv. (1904). (G. Sa.)

MAROT, DANIEL (seventeenth century), French architect, furniture designer and engraver, and pupil of Jean le Pautre (q.v.), was the son of Jean Marot (1620-1679), who was also an architect and engraver. He was a Huguenot, and was compelled by the Revocation of the Edict of Nantes in 1685 to settle in Holland. His earlier work is characteristic of the second period of Louis XIV., but eventually it became tinged with Dutch influence, and in the end the English style which is loosely called " Queen Anne " owed much to his manner. In Holland he was taken almost immediately into the service of the Stadt- holder, who, when he shortly afterwards became William III. of England, appointed him one of his architects and master of the works. Comparatively little is known of his architectural achievements, and his name cannot be attached to any English building, although we know from his own engraving that he designed the great hall of audience for the States-General at the Hague. He also decorated many Dutch country-houses. In England his activities appear to have been concentrated upon the adornment of Hampton Court Palace. Among his plans for gardens is one inscribed: "Parterre d'Amton-court invente par D. Marot." Much of the furniture — especially the mirrors, gueridons and beds — at Hampton Court bears unmistakable traces of his authorship; the tall and monumental beds, with their plumes of ostrich feathers, their elaborate valances and chantournes in crimson velvet or other rich stuffs agree very closely with his published designs. As befits an artist of the time of Louis XIV. splendour and elaboration are the out- standing characteristics of Marot's style, and he appears even to have been responsible for some of the curious and rather barbaric silver furniture which was introduced into England from France in the latter part of the 17th century. At Windsor Castle there is a silver table, attributed to him, supported by caryatid legs and gadrooned feet, with a foot-rail supporting the pine-apple which is so familiar a motive in work of this type. The slab is engraved with the arms of William III. and with the British national emblems with crowns and cherubs. Unquestionably it is an exceedingly fine example of its type. During his life in France. Marot made many designs for Andr6 Charles Boulle (q.v.), more especially for long case and bracket clocks. The bracket clocks were intended to be mounted in chased and gilded bronze, and with their garlands and masque- rons and elegant dials are far superior artistically to those of the " grandfather " variety. It is impossible to examine the designs for Marot's long clocks without suspecting that Chippen- dale derived from them some at least of the inspiration which made him a master of that kind of furniture. Marot's range was extraordinarily wide. He designed practically every detail in the internal ornamentation of the house — carved chimney- pieces, ceilings, panels for walls, girandoles and wall brackets, and even tea urns and

cream jugs — he was indeed a prolific

designer of gold and silver plate. Many of his interiors are very rich and harmonious although commonly over-elaborated. The craze for collecting china which was at its height in his time is illustrated in his lavish designs for receptacles for porcelain — in one of his plates there are more than 300 pieces of china on the chimney-piece alone. Marot was still living in 1718, and the date of his death is unknown.

We owe much of our knowledge of his work to the volume of his designs published at Amsterdam in 17 12: CEuvres du Sieur D. Marot, architecte de Guillaume III. Roi de la Grande Bretagne, and to Receuil des planches des sieurs Marot, pere etfils. In addition to decorative work these books contain prints of scenes in Dutch history, and engravings of the statues and vases, produced by Marot, at the Palace of Loo.

MARPLE, an urban district in the Hyde parliamentary division of Cheshire, England, 12 m. S.E. of Manchester, served by the Great Central, Midland & Sheffield and Midland railways, and the Cheshire lines. Pop. (1901), 5595- It lies on and above the valley of the Goyt, and its situation has brought the town into favour as a residential centre for those whose business lies in Manchester, Stockport, and the great manufacturing district to the west. Marple Hall, a beautiful Elizabethan mansion, is connected with the youth, and some- times stated to be the birthplace, of John Bradshaw the regicide (1602-1659).

MARPRELATE CONTROVERSY, a war of pamphlets waged

in 1588 and 1589 between a puritan writer who employed

the pseudonym “Martin Marprelate ” and defenders of the

Established Church. Martin’s tracts are characterized by

violent and personal invective against the Anglican dignitaries,

by the assumption that the writer had numerous and powerful

adherents and was able to enforce his demands for reform, and

by a plain and homely style combined with pungent wit. While

he maintained the puritan doctrines as a whole, the special

peint of his attack was the Episcopacy. The pamphlets were printed at a secret press established by John Penry, a Welsh puritan, with the help of the printer Robert Waldegrave, about midsummer 1588, for the issue of puritan literature forbidden by the authorities. The first tract by " Martin Marprelate," known as the Epistle, appeared at Molesey in November 1588. It is in answer to A Defence of the Government established in the Church of Englande, by Dr. John Bridges, dean of Salisbury, itself a reply to earlier puritan works, and besides attacking the episcopal office in general assails certain prelates with much personal abuse. The Epistle attracted considerable notice, and a reply was written by Thomas Cooper, bishop of Winchester, under the title An Admonition to the People of England, but this was too long and too dull to appeal to the same class of readers as the Marprelate pamphlets, and produced little effect. Penry's press, now removed to Fawsley, near Northampton, produced a second tract by Martin, the Epitome, which contains more serious argument than the Epistle but is otherwise similar, and shortly afterwards, at Coventry, Martin's reply to the Admonition, entitled Hay any Worke for Cooper (March 1589). It now appeared to some of the ecclesiastical authorities that the only way to silence Martin was to have him attacked in his own railing style, and accordingly certain writers of ready wit, among them John Lyly, Thomas Nashe and Robert

Greene, were secretly commissioned to answer the pamphlets. Among the productions of this group were Pappe with an Hatchet (Sept. 1589), probably by Lyly, and An Almond for a Parrat (1590), which, with certain tracts under the pseudonym of Pasquil, has been attributed to Nashe (q.v.). Some anti-Martinist plays or shows (now lost) performed in 1589 were perhaps also their work. Meanwhile, in July 1589, Penry's press, now at Wolston, near Coventry, produced two tracts purporting to be by " sons " of Martin, but probably by Martin himself, namely, Theses Martinianae by Martin Junior, and The Just Censure of Martin Junior by Martin Senior. Shortly after this, More Work for Cooper, a sequel to Hay any Worke, was begun at Manchester, but while it was in progress the press was seized. Penry however was not found, and in September issued from Wolston or Haseley The Protestation of Martin Marprelate, the last work of the series, though several of the anti-Martinist pamphlets appeared after this date. He then fled to Scotland, but was later apprehended in London, charged with inciting rebellion, and hanged (May 1593)- The author- ship of the tracts has been attributed to several persons: to Penry himself, who however emphatically denied it and whose acknowledged works have little resemblance in style to those of Martin, to Job Throckmorton, and to Henry Barrow.

See, for list and full titles of the tracts, related documents, and discussion of the authorship, E. Arber's Introductory Sketch to the Martin Marprelate Controversy (1880), which, however, gives no connected account of the matter. A good summary, with quota- tions from the pamphlets, will be found in H. M. Dexter's Con- gregationalism (New York, 1880), pp. 129-202. See also articles on John Penry and Job Throckmorton in Diet, of Nat. Biography; and for the history of the press, Bibliographica, ii. 172-180. Maskell's Martin Marprelate Controversy (1845) is of little service. The more important tracts have been reprinted by Petheram in his

series of Puritan Discipline Tracts (1842-1860), in Arber's English Scholar's Library (1879-1880), in R. W. Bond's edition of Lyly and in the editions of Nashe. (R. B. McK.)

MARQUAND, HENRY GURDON (1819-1902), American philanthropist and collector, was born in New York City on the nth of April 1819. In 1839, upon the retirement from the jewelry business of his brother Frederick (1799-1882), who was a liberal benefactor of Yale College and of the Union Theological Seminary, he became his brother's agent. He was one of the purchasers in 1868 of the Iron Mountain railroad, afterwards its president, and a director of the Missouri-Pacific system. He was the first honorary member of the American Institute of Archi- tects, and president (1889-1902) of the Metropolitan Museum of Art, to which he made valuable presents and loans from his collection of paintings. He died in New York City, on the 26th of February 1902. His varied and valuable art collection and rare books were sold in 1903. He was a benefactor of Princeton University and other institutions. His son, Allan Marquand (b. 1853), graduated at Princeton in 1874, and in 1883 became professor of archaeology and art.

MARQUARDT, JOACHIM (1812-1882), German historian and writer on Roman antiquities, was born at Danzig on the 19th of April 1812. He studied at Berlin and Leipzig, held various educational appointments from 1833 onwards at Berlin, Danzig and Posen, and became in 1859 head of the gymnasium in Gotha, where he died on the 30th of November 1882. The dedication of his treatise Historiae equitum romanorum libri quatuor (1841) to Lachmann led to his being recommended to the publisher of W. A. Becker's Handbuch der rdmischen Alterlhiimer to continue the work on the death of the author in 1846. It took twenty years to complete, and met with such success that a new edition was soon called for. Finding himself unequal to the task single-handed, Marquardt left the preparation of the first three volumes (Romisches Staatsrecht) to Theodor Mommsen, while he himself contributed vols, iv.-vi. (Romische Staatsverwaltung, 1873-1878; 2nd ed., 1881-1885, vol. v. by H. Dessau and A. von Domaszewski, vol. vi. by G. Wissowa) and vol. vii.(DasPrivatleben der Romer, 1879-1882; 2nd ed., by A. Mau, 1886). Its clearness of style, systematic arrangement and abundant references to authorities ancient and modern, will always render it valuable to the student.

See E. Forstemann in Allgemeine deutsche Biographie, Bd. XX; R. Ehwald, Geddchtnisrede (progr. Gotha, 1883).

MARQUESAS or Mendana Islands (Fr. Les Marquises), an archipelago of the Pacific Ocean lying between 7 50′ and IO °3S'S.andi38° 5o'andi40° 50′ W., and belonging to France. It extends over 250 m. from S.E. to

N.W., and has a total area of 490 sq. m. The southern or Mendana group consists of the islands Fatuhiva or Magdalena, Motane or San Pedro, Tahuata or Santa Christina and Hivaoa or Dominica, the last with a coast-line of more than 60 m. With these is often included the rocky islet of Fatuhuku or Hood, lying in mid-channel to the north of Hivaoa. The north-western or Washington group is formed of seven islands, the four largest being Huapu or Adams, Huahuna or Washington, Nukuhiva (70 m. in circumference) and Eiao. 1 Along

1 Most of the islands have each three or four alternative names.

the centre of each island is a ridge of mountains, attaining an altitude of 4042 ft. in Huapu, whence rugged spurs forming deep valleys stretch towards the sea. The volcanic origin of the whole archipelago is proved by the principal rocks being of basalt, trachyte and lava. Vegetation is luxuriant in the valleys, which are well watered with streams and, from their seaward termination in small bays, are themselves known as " bays." The flora includes about four hundred known species, many of them identical with those belonging to the Society Islands. The vegetable products comprise bananas, bread-fruit, yams, plan- tains, wild cotton, bamboos, sugar-cane, coco-nut and dwarf palms, and several kinds of timber trees. The land fauna how- ever is very poor; there are few mammals with the exception of dogs, rats and pigs; and amphibia and insects are also generally scarce. Of twenty species of birds more than half belong to the sea, where animal life is as abundant as about other sub-tropical Polynesian groups. The climate, although hot and damp, is not unhealthy. During the greater part of the year moderate easterly trade-winds prevail, and at the larger islands there are often both land and sea breezes. The rainy season accompanied by variable winds sets in at the end of November, and lasts for about six months. During this period the thermometer varies from 84 to 91° F.; in the dry season its average range is from 77° to 86°. The archipelago, which has some small trade in copra, cotton and cotton seeds, is administered by a French resident, and has a total population of about 4300, nearly all natives.

The natives, a pure Polynesian race, are usually described as physically the finest of all South Sea Islanders. Their traditions point to Samoa as the colonizing centre from which they sprang. Their complexion is a healthy bronze. Until the introduction of civilization they were remarkable for their elaborate tattooing. Their cannibalism seems to have been dictated by taste, for it was never associated with their religion, the sacrifices to their gods

.being always swine. Of these and fowls they rear a great quantity. Their native drink is kava. Their houses are unlike those usual in Polynesia in being built on platforms raised from the ground. In disposition the islanders are friendly and hos- pitable, brave and somewhat bloodthirsty; and, although natur- ally indolent and morose, they have proved industrious and keen traders. As among their kinsfolk the Tahitians, debauchery was systematized and infariticide an organized institution. A popu- lation which at the time of the annexation by France (1842) was 20,000 has been reduced to little over 4000. Latterly the natives have for the most part outwardly adopted Christianity. The Marquesas Islands were discovered on the 21st of July '595 by Alvaro Mendana, who, however, only knew of the south- eastern group, to which he gave the name by which they are gener- ally known (although they also bear his own), in honour of Don Garcia Hurtado de Mendoza, marquis of Cafiete, viceroy of Peru, and patron of the voyage. Captain Cook pursuing the same track rediscovered this group, with the addition of Fatuhuku, in 1774. The north-western islands were first sighted by the American Captain Ingraham in 1791, and given the name of Washington by him; the French Captain Marchand followed in the same year, and Lieut. Hergest in 1792. The Russian explorer, Adam Ivan Krusenstern, made an extensive investigation of the archi- pelago in 1804. In 1813 the American Commodore David Porter failed to establish a colony here; and in May 1842, after French Roman Catholic missionaries had prepared the way, Rear-admiral Dupetit-Thouars took formal possession of the archipelago for France. A complete settlement was not effected without bloodshed and about 1 860-1 870 the colony was practically abandoned.

See Vincendon-Dumoulin ties Marquises (Paris, 1843); E. Jardin, Essai sur Vhistoire naturelle de Varchipel de Mendana (Paris, i860) ; Clavel, Les Marquisiens (Paris, 1885); Dordillon, Grammaire et dictionnaire de la langue des lies Marquises (Paris, 1904).

MARQUESS, or Marquis (Fr. marquis, Ital. marchese; from med. Lat. marchio, marchisus, i.e. comes marchiae, " count of the March "), a title and rank of nobility. In the British peerage it is the second in order and therefore next to duke. In this sense the word was a reintroduction from abroad; but lords of the Welsh and Scottish •" marches " are occasionally termed marchiones from an early date. The first marquess in England was Robert de Vere, the 9th earl of Oxford, who was created marquess of Dublin by Richard II. on the 1st of December 1385 and assigned precedence between dukes and earls. On the 13th

of October following the patent of this marquessate was recalled, Robert de Vere then having been raised to a dukedom. John de Beaufort, earl of Somerset, the second legitimate son of John of Gaunt, was raised to the

second marquessate as marquess of Dorset on the 29th of September 1397, but degraded again to earl in 1399. The Commons petitioned for the restoration of his marquessate in 1402, but he himself objected because " le noun de Marquys feust estraunge noun en cest Roialme." From that period this title appears to have been dormant till the reign of Henry VI., when it was revived (1442), and thenceforward it maintained its place in the British peerage. Anne Boleyn was created marchioness of Pembroke in 1532. A marquess is "most honourable," and is styled " my lord marquess." His wife, who is also " most honourable," is a marchioness, and is styled " my lady marchioness." The coronet is a circlet of gold on which rest four leaves and as many large pearls, all of them of equal height and connected. The cap and lining, if worn, are the same as in the other coronets (see Crown and Coronet). The mantle of parliament is scarlet, and has three and a half doublings of ermine.

In France , so early as the 9th century, counts who held several counties and had succeeded in making themselves quasi-indepen- dent began to describe themselves as marchiones, this use of the word being due to the fact that originally none but the margraves, or counts of the marches, had been allowed to hold more than one county. The marchio or marquess thus came to be no more than a count of exceptional power and dignity, the original signi- ficance of the title being lost. In course of time the title was recognized as ranking between those of duke and count; but with the decay of feudalism it lost much of its dignity, and by the 17th century the savour of pretentiousness attached to it had made it a favourite subject of satire for Moliere and other drama- tists of the classical comedy. Abolished at the Revolution, the title of marquess was not restored by Napoleon, but it was again revived by Louis XVIIL, who created many of Napoleon's counts marquesses. This again tended to cheapen the title, a process hastened under the republic by its frequent assumption on very slender grounds in the absence of any authority to prevent its abuse. In Italy too the title of marchese, once borne only by the powerful margraves of Verona, has shared the fate of most other titles of nobility in becoming common and of no great social significance. (See also Margrave.) (J. H. R.)

MARQUETRY (Fr. marqueterie, from marqueter, to inlay, literally to mark, marquer), an inlay of ornamental woods, ivory, bone, brass and other metals, tortoise-shell, mother-of- pearl, &c, in which shaped pieces of different materials or tints are combined to form a design. It is a later development of the ornamental inlays of wood known by the name of Intarsia, and though in the main the latter was a true inlay of one or more colours upon a darker or lighter ground, while marquetry is composed of pieces of quite thin wood or other material of equal thickness laid down upon a matrix with glue, there are examples of Intarsia in which this mode of manufacture was evidently followed. For instance, the backs of the stalls

in the cathedral of Ferrara show the perspective lines of some of the subjects traced upon the ground where the marquetry has fallen off, but none of the sinkings in the surface which would be there if the panels had been executed as true inlays. In the endeavour to gain greater relief, shading and tinting the wood were resorted to, the shading being generally produced by scorching, either with a hot iron or hot sand, and the tinting by chemical washes and even by the use of actual colour, but the result is usually hardly commen- surate with the labour expended. A combination of tortoise- shell and metal, the one forming the ground and the other the pattern upon it, which may be classed as marquetry also appears in the 17th century. The subjects of the intarsiatori are gener- ally arabesques or panels with elaborate perspectives, either of buildings or cupboards with different articles upon the shelves seen through half-open doors, which themselves are frequently of lattice- work delineated with extraordinary perfection, though figure subjects occur also. The later marqueteurs used a freer form of design for the most part, and scrolls and bunches of

flowers appear in profusion, while if architectural forms occur they are generally in the shape of ruins amid landscape. The greater portion of the examples in England are importations, either from Holland (in which country very fine work was pro- duced during the latter half of the 16th and 17th centuries) or from France. The reputation of the Dutch marqueteurs was so great that Colbert engaged two, named Pierre Gole and Vordt, for the Gobelins at the beginning of the 17th century. Jean Mace of Blois, the first Frenchman known to have practised the art, who was at work in Paris from 1644 (when he was lodged in the Louvre), or earlier, till 1672, as a sculptor and painter, learnt it in the Netherlands. His title was " menuisier et faiseur de cabinets et tableaux en marqueterie de bois"; but as early as 1576 a certain Hans Kraus had been called " marqueteur du roi." Jean Mace's daughter married Pierre Boulle, and the greatest of the family, Andre Charles Boulle (q.v.) , succeeded to his lodging in the Louvre on his death in 1672. The members of this family are perhaps the best known of the French marqueteurs. Their greatest triumphs were gained in the marquetry of metal and tortoise-shell combined with beautifully chiselled ormulu mountings; but many foreign workmen found employment in France from the time of Colbert, and some of them rose to the highest eminence. The names of Roentgen, under whom the later German marquetry perhaps reached its highest point, Riesener and Oeben, testify to their nationality. A good deal of marquetry was executed in England in the later Stuart period, mainly upon long-case clocks, cabinets and chests of drawers, and it is often of real excellence. Marquetry in a shallower form

was also extensively used in the latter part of the 18th century. The most beautiful examples of the art in Italy are mainly panels of choir stalls or sacristy cupboards, though marriage coffers were also often sumptuously decorated in this manner. With the increase in luxury and display in the 17th and 18th centuries in France and Germany cabinets and escritoires became objects upon which extraordinary talent and expenditure were lavished. In South Germany musical instruments, weapons and bride chests were often lavishly decorated with marquetry. The cabinets are of elaborate architectural design with inlays of ebony and ivory or with veneers of black and white, the design counterchanging so that one cutting produced several repeats of the same pattern in one colour or the other. In modern practice as many as four or even six thicknesses are put together and so cut. When all the parts have been cut and fitted to- gether face downwards paper is glued over them to keep them in place and the ground and the veneer are carefully levelled and toothed so as to obtain a freshly worked surface. The ground is then well wetted with glue at a high temperature and the surfaces squeezed tightly together between frames called " cauls " till the glue is hard. There are several modes of ensuring the accurate fitting of the various parts, which is a matter of the first importance.

MARQUETTE, JACQUES (1637-1675), French Jesuit mission- ary and explorer, re-discoverer (with Louis Joliet) of the Missis- sippi. He was born at Laon, went to Canada in 1666, and was sent in 1668 to the upper lakes of the St Lawrence. Here he worked at Sault Ste Marie, St Esprit (near the western extremity of Lake Superior) and St Ignace (near Michilimackinac or Mackinaw, on the strait between Huron and Michigan). In 1673 he was chosen with Joliet for the exploration of the Mississippi, of which the French had begun to gain knowledge from Indians of the central prairies. The route taken lay up the north-west side of Lake Michigan, up Green Bay and Fox river, across Lake Winnebago, over the portage to the Wisconsin river, and down the latter into the Mississippi, which was descended to within 700 m. of the sea, at the confluence of the Arkansas river. Entering the Mississippi on the 17th of May, Joliet and his companion turned back on the 17th of July, and returned to Green Bay and Michigan (by way of the Illinois river) at the end of September 1673. On the journey Marquette fell ill of dys- entery; and a fresh excursion which he undertook to plant a mission among the Indians of the Illinois river in the winter of 1674-1675 proved fatal. He died on his way home to St Ignace on

the banks of a small stream (the lesser and older Marquette River) which enters the east side of Lake Michigan in Marquette Bay (May 18, 1675). His name is now borne by a larger watercourse which flows some distance from the scene of his death.

See Marquette's Journal, first published in Melchissedech Theve- not's Recueil de Voyages (Paris, 1681), and fully given in Martin's Relations inedites, and in Shea's Discovery and Exploration of the Mississippi Valley (New York, 1852); cf. also Pierre Margry's Decouvertes . . . des Frangais dans I'ouestet dans le sud del' Amerique septentrionale (1614-1754) ; Memoires et documents originaux (Paris, !875), containing Joliet 's Details and Relations; Francis Parkman, La Salle and the Discovery of the Great West (Boston 1 869-1 878), esp. pp. x., 20, 32-33, 49-72.

MARQUETTE, a city, a port of entry and the county seat of Marquette county, Michigan U.S.A., on the south shore of Lake Superior. Pop. (1900), 10,058 (3460 foreign-born); (1910), 11,503. It is served by the Duluth, South Shore & Atlantic, the Marquette & South-Eastern, the Chicago, Milwaukee & St Paul, the Chicago & North-Western, and the Lake Superior & Ishpeming railways. The city, which is situated on a bluff 100 ft. above the lake, in a region characterized by rounded hills and picturesque irregu- larities, has a delightful climate, and is a popular summer resort. Presque Isle park (400 acres), a headland north of the city, is one of its principal attractions. Marquette is the seat of the Northern State Normal School (established 1899) and of the state house of correction and branch prison (established 1885). A county-court-house, the Peter White library, and the Federal building are the most prominent public buildings. Marquette is the seat of Roman Catholic and Protestant Episcopal bishoprics. The city is best known as a shipping centre of one of the richest iron-ore districts in the world, and its large and well-equipped ore docks are among its most prominent features. Marquette is the port of entry of the customs district of Superior. In 1896 its imports were valued at $358,505 and its exports at $4,708,302; in 1908, imports $1,845,724 and exports $7,040,473. Foundries, railway machine-shops, lumber and planing-mills, brewery and bottling works, and quarries of brownish-red sandstone contri- bute largely to the city's economic importance. The charcoal iron blast-furnaces of the city manufacture pig-iron, and, as by-products, wood alcohol and acetic acid, recovered from the smoke of the charcoal pits. The value of the city's factory products increased from $1,585,083 in 1900 to $2,364,081 in 1905, or 49-1 %. The first settlement was made about 1845, and in 1849 it was named Worcester; but " Marquette " was soon substituted in honour of Jacques Marquette. It was incorporated as a village in 1859, and chartered as a city in

1871.

MARR, CARL (1858-), American artist, was born at Milwaukee, Wisconsin, on the 14th of February 1858, the son of an engraver. He was a pupil of Henry Vianden in Milwaukee, of Schauss in Weimar, of Gussow in Berlin, and subsequently of Otto Seitz, Gabriel and Max Lindenschmitt

in Munich. His first work, " Ahasuerus, the Wandering Jew," received a medal in Munich. One of his pictures, " Episode of 1813," is in the Royal Hanover Gallery, and his " Germany in 1806 " received a gold medal in Munich and is in the Royal Academy of Koenigs- berg. A large canvas " The Flagellants," now in the Milwaukee public library, received a gold medal at the Munich Exposition in 1889. Another canvas, " Summer Afternoon," in the Phoebe Hearst collection, received a gold medal in Berlin, in 1892. Marr became a professor in the Munich Academy in 1893, and in 1895 a member of the Berlin Academy of Arts.

MARRADI, GIOVANNI (1852-), Italian poet, was born at Leghorn, and educated at Pisa and Florence. At the latter place he started with others a short-lived review, the Nuovi Goliardi, which made some literary sensation. He became a teacher at various colleges, and eventually an educational inspector in Massa Carrara. He was much influenced by Carducci, and became known not only as a critic but as a charming descriptive poet, his principal volumes of verse being Canzone moderne (1870), Fantasie marnie (1881), Canzoni e fantasie (1853), Ricordi lirici (1884), Poesie (1887), Nuovi canti (1891) and Ballate moderne (1895).

MARRAKESH (erroneously Morocco or Marocco City) , one of the quasi-capitals of the sultanate of Morocco, Fez and Mequinez being the other two. It lies in a spacious plain — Blad el Hamra, " The Red " — about 15 m. from the northern underfalls of the Atlas, and 96 m. E.S.E. of Saffi, at a height variously estimated at 1639 ft. (Hooker and Ball) and 1410 ft. (Beaumier). Rank- ing during the early centuries of its existence as one of the greatest cities of Islam, Marrakesh has long been in a state of grievous decay, but it is rendered attractive by the exceptional beauty of its situation, the luxuriant groves and gardens by which it is encompassed and interspersed, and the magnificent outlook which it enjoys towards the mountains. The wall, 25 or 30 ft. high, and relieved at intervals of 360 ft. by square towers, is so dilapidated that foot-passengers, and in places even horsemen, can find their way through the breaches. Open spaces of great extent are numerous within the walls, but for the most part they are defaced by mounds of rubbish and putrid refuse. With the exception of the tower of the Kutubia Mosque and a certain archway which was brought in pieces from Spain, there is not, it is asserted, a single stone building in the city; and even bricks (although the local manufacture is of excellent quality) are sparingly employed. Tabiya or rammed concrete of red earth and stone is the almost universal building material, and the houses are consequently seldom more than two storeys in height. The palace of the

sultan covers an extensive area, and beyond it lie the imperial parks of Agudal, the inner one reserved for the sultan's exclusive use. The tower of the Kutubia is a memorial of the constructive genius of the early Moors; both it and the similar Hasan tower at Rabat are after the type of the contemporary Giralda at Seville, and if tradition may be trusted, all three were designed by the same architect, Jabir. The mosque to which the tower belongs is a large brick building erected by 'Abd el Mumin; the interior is adorned with marble pillars, and the whole of the crypt is occupied by a vast cistern excavated by Yakub el Mansur. Other mosques of some note are those of Ibn Yusef, El Mansur and El Mo'izz; the chapel of Sidi Bel Abbas, in the extreme north of the city, possesses property of great value, and serves as an almshouse and asylum. There is a special Jews' quarter walled off from the rest. The general population is of a very mixed and turbulent kind; crimes of violence are common, and there are many professional thieves. The murder of a Frenchman, Dr Mauchamp, in March 1907, by the rabble of Marrakesh was the immediate cause of the occupation of Udja by France (see Morocco: History). Almost the only manufacture extensively prosecuted is that of Morocco leather, mainly red and yellow, about 1,500 men being employed as tanners and shoemakers. Scottish missionaries and a few European traders have become established here. The city was founded in 1062 by Yusef bin Tashfin. Before it was a hundred years old it is said to have had 700,000 inhabitants, but the population in 1906 probably did not exceed 50,000 to 60,000.

See Leo Africanus, and Paul Lambert's detailed description in Notice stir la ville de Maroc (Paris, 1868). Lambert's plan of Marrakesh is reproduced with some additions by Dr A. Leared, and another may be found in Gatell.

MARRI, a Baluch tribe on the Dera Ghazi Khan border of Baluchistan. In the census of 1901 they numbered 19,161 and their fighting strength is about 3000. Their relations with the British commenced in 1840 with attacks made on the communica- tions of Sir John Keane's army, after it had passed through the Bolan. An attempt was made to punish the tribe, which ended in disastrous failure. Major Clibborn was repulsed in an attempt to storm the Naffusak Pass, losing 179 killed and 92 wounded out of 650. Many of his force died of heat and thirst. The fort of Kahan, which he was trying to relieve at the time, was forced to capitulate with the honours of war. The Marris, however, joined the British against the Bugtis in 1845. After the annexa- tion of Sind in 1843 trie Marris gave much trouble, but were pacified by the policy of General John Jacob and Sir Robert Sandeman. In 1880 during the second Afghan War they made frequent raids on the British line of communications, ending with the plunder of a treasure convoy. A force of 3070 British

troops under Brigadier-General Macgregor marched through the country,

and the tribe submitted and paid i| lakh (£12,500) out of a fine of 2 lakhs (£20,000) ; they also gave hostages for their future good behaviour. Since then they have given little trouble. The Marri-Bugti country is classed as a tribal area in Baluchis- tan, politically controlled from Sibi, but enjoying a large measure of autonomy under its own chieftains. Total area, 7129 sq. m.; total pop. (1901), 38,919, almost equally divided between the two tribes of Marris and Bugtis.

MARRIAGE. Marriage (Fr. mariage, from marier, to marry; Lat. maritare, from mas, maris, a male), or " matrimony " (Lat. matrimomum, from mater, a mother), may be defined either (a) as the act, ceremony, or process by which the legal relationship of husband and wife is constituted; or (b) as a physical, legal and moral union between man and woman' in complete community of life for the establishment of a family. 1 It is possible to discriminate between three stages, taking mar- riage in the latter sense as an institution — the animal or physical stage, the proprietary or legal stage, and the personal or moral stage. In the first or physical stage the relation of the sexes was unregulated, and in many cases of brief duration. In the second or legal stage greater permanence was secured in marriage by assigning the husband a property right in his wife or wives. In the last stage the proprietary relation falls more and more into the background, and the relation of husband and wife approxi- mates that of two individuals entirely equal before the. law. Although in the history of marriage these three stages have been roughly successive, the order of their entering the conscious experience of the individual is usually the reverse of their order in the development. of the race; and in the solemnization of a marriage based upon affection and choice the growth of the relation begins with the moral, advances to the legal and ˆcul- minates in the physical union, each one of these deriving its meaning and its worth from the preceding. In most legal systems marriage, in the sense of a ceremony, takes the form of a contract — the mutual assent of the parties being the prominent and indispensable feature. Whether it is really a contract or not, and if so to what class of contracts it belongs, are ques- tions which have been much discussed, but into which it is not necessary to enter. While the consent of parties is uni- versally deemed one of the conditions of a legal marriage, all the incidents of the relationship constituted by the act are abso- lutely fixed by law. The jurist has to deal with marriage in so far as it creates the legal status of husband and wife. It should be added that, while marriage is generally spoken of by lawyers as a contract, its complete isolation from all other contracts is invariably recognized. Its peculiar position may be seen at once by comparing it with other contracts giving rise to continu- ous relationships with more or less indefinite obligations, like those of landlord and tenant, master and servant, &c. In these the parties may in general make their rights and duties what they please, the

law only intervening when they are silent. In marriage every resulting right and duty is fixed by the law.

Besides true marriage, inferior forms of union have from time to time been recognized, and may be briefly noticed here. These have all but disappeared from modern society, depending as they do on matrimonial restrictions now obsolete.

The institution of slavery is a fruitful source of this kind of de- based matrimony. In Roman law no slave could contract marriage whether with another slave or a free person. The union of male and female slaves (contubernium) was recognized for various purposes ; a free woman entering into a union with a slave incurred under the S.C- Claudianum the forfeiture of her own liberty; but the bond- woman might be the concubine of a freeman. In the United States, where slavery was said to be regulated by the principle of the civil law, the marriage of slaves was so far recognized that on emancipation complete matrimony took effect and the children became legitimate without any new ceremony.

1 It is doubtless true, as anthropologists have pointed out, that in the history of the race " marriage is rooted in the family rather than the family in marriage " (Westermarck: History of Human Marriage, p. 22); but in that conscious experience of the individual with which law and ethics are especially concerned, this relationship is reversed, and the family originates in marriage (see Family, and allied headings).

In Roman law no legal marriage could be contracted unless there was connubium between the parties. Originally there was no connubium between plebs and patricians, and the privilege was conceded after a long struggle by the Lex Canuleia. In later times Latini and Peregrini were excluded from connubium except where the right had been expressly conferred. The great matrimonial law of the early empire (Lex Julia et Papia Poppaea) introduced restrictions depending on the condition of the parties which later legislation extended and perpetuated. Senators under that law were forbidden to marry freedwomen or women of inferior rank, and the husband of a freedwoman becoming a senator was set free from his marriage. In the canon law 1 new restrictions were developed. Persons who bound themselves not to marry were deemed incapable of marrying. The order of the clergy were forbidden to marry. And disparity of faith was recognized by the early church as a bar to matrimony, e.g. between Christians and pagans and between orthodox and heretics (see Dictionary

of Christian Antiquities, art. " Marriage ").

Concubinage, which such restrictions tended to develop, is noticed under a separate heading (q.v.). It might be described as marriage which has no consequences, or only slight and peculiar consequences, in legal status. In the left-handed or " morganatic " marriages of the German royal families we have the nearest approach ever made by concubinage to true marriage, the children being legitimate, but neither they nor the wife acquiring any right to the rank or fortune of the husband. The marriage of persons of different religions frequently requires the intervention of the law as to the faith of the children, more particularly in Europe as between Roman Catholics and Protestants. English law gives the father, except under special circumstances, the right to dictate the faith of his children (see Infant). The practice on this point varies in Europe — the question being ignored in French law, Germany following in some parts the same rule as England, in others giving effect to ante-nuptial stipulations. In Ireland mixed marriages (i.e. between Roman Catholic and Protestant) were by 19 Geo. II. c. 13 null and void if celebrated by a Roman Catholic priest. This act was repealed by 33 & 34 Vict. c. no, which permits mixed marriages to be validly celebrated by an Episcopalian or Roman Catholic clergyman, subject to conditions set forth in § 38.

Roman law. — The three primitive modes of marriage were confarreatio , coemptio in manum, and usus, all of which had the effect of placing the woman in the " power " (manus) of her husband, and on the same footing as the children. The first was a religious ceremony before ten witnesses, in which an ox was sacrificed and a wheaten cake broken and divided between the spouses by the priest. Coemptio was a conveyance of the woman by mancipalio, and might be described as a fictitious sale per aes et libram, like that employed in emancipation and testa- mentary disposition and other processes. Usus was the acqui- sition of the wife by prescription, through her cohabiting with the husband for one year, without having been absent from his house three continuous nights. But a true marriage might be concluded without adopting any of these modes, and they all fell into desuetude and with them the subjection of the wife to the manus. Marriage without manus was contracted by the interchange of consent, without writing or formality of any kind. By some jurists it is regarded as incomplete until con- summated by delivery of the woman, and is accordingly referred to the class of real contracts. The restrictions as to age, rela- tionship by consanguinity and affinity, previous marriage, &c, were in the main those which have continued to prevail in modern Europe with one important exception. The consent of the paterfamilias to the marriage of the children under his power was essential.

Canon law. — The canon law of marriage is based partly on the Roman

law, the validity of which the Church from the first recognized, partly on the Jewish law as modified by the new principles introduced by Christ and his apostles, developed by the fathers of the Church and medieval schoolmen, and regu- lated and defined by popes and councils. The most important of these principles was that of the indissolubility of marriage, proclaimed by Christ without qualification according to Mark x. n, 12, and with the qualifying clause "saving for the cause of fornication " according to Matt. v. 32. This lofty view of marriage, according to which man and wife are made " one

1 The restrictions are enumerated in the following lines: — Error, Conditio, Votum, Cognatio, Crimen, Cultus, Disparitas, Vis, Ordo, Ligamen, Honestas, Aetas, Affinis, si Clandestinus et Impos, Raptave sit mulier nee parti reddita tutae.

flesh " by the act of God (" What therefore God hath joined together, let no man put asunder," Mark x. 9) was, however, modified by the idea of the consummating act of marriage as in itself something unholy, a result of the Fall. Christ himself, indeed, did not teach this; but for St Paul marriage is clearly a concession to the weakness of the flesh (1 Cor. vii.). " The time is short," and in view of the imminent coming of the Lord the procreation of children a matter of no importance (v. 29), but "it is better to marry than to burn" (v. 9). He is, however, obviously not clear on the point, and at the end of his argu- ment strikes a note of doubt (v. 40) ; elsewhere he defends mar- riage, against those who would have forbidden it altogether, as a gift of God (1 Tit. iv. 3-5) and even, in seeming contradiction to 1 Cor. vii. 29, commands the bearing of children (1 Tit. v. 14). Finally it is to St Paul that the idea of marriage as a sacrament is to be traced, in the mystic comparison of the relations of husband and wife to those of Christ and his Church (Eph. v. 23-32). These are the main foundations in Scripture on which the Christian law of marriage is built up, and they are obviously principles which admit of a large amount of variety of interpre- tation and of practice. They were developed in the early Church under the influence of the rapidly growing passion for the celibate life, partly an outcome of the same dualistic principle which produced the asceticism of the Jewish Essenes and of the Gnostics, partly perhaps a natural reaction from the appalling moral corruption of the decaying empire. Marriage, it is true, from being no more than a terminable civil contract, became a thing holy, a mystic union of souls and bodies never to be divided; valid, indeed, but not spiritually complete, without the public blessing of the Church (Tertullian, Ad uxorem, lib. ii. cap. 9) ; and from Augustine's time onward it was reckoned as a sacrament. But at the same time there was a tendency to re- strict its rights and its range. So far as marriage was a physical union, this had for its object solely the perpetuation of the race and the avoidance of fornication; the most that was conceded was that the

intention of having offspring not only made the conjugal act blameless, but even gave to the desire that inspired it an element of good (Augustine, de nupl.et cone. 3). But the ideal married life was that attributed to Mary and Joseph. Thus Augustine cited this as an example that a true marriage may exist where there is a mutual vow of chastity (op. oil. 12), and held that the sooner this relation was established the better (de bono conjug. 22). Marriage being then an inferior state, to be discouraged rather than the reverse, the tendency was rapidly to narrow the field within which it might be contracted. Remarriage (bigamy) was only allowed after many struggles, and then only to the laity; St Paul had laid down that a " bishop " must be " the husband of one wife," and to this day the priests of the Orthodox Eastern Church may not remarry. Clerical celibacy, at first a counsel of perfection, was soon to become the rule of the Church, though it was long before it was universally enforced in the West; in the East it still applies only to monks, nuns and bishops (see Celibacy). The marriage of the laity Was hampered by the creation of a number of impedi- ments. The few and definite prohibitions of the Roman and of the Jewish law (Lev. xviii. 6-18; xx.) in the matter of marriage between kindred, were indefinitely extended; until in 506 the council of Agde laid it down that any consanguinity or affinity whatever constituted an impediment. 2 Moreover, man and wife being " one flesh," the Church exaggerated relationship by affinity into equal importance with that of consanguinity as an impediment to matrimony; and, finally, to all this added the impediments created by " spirtual affinity," i.e. the relations established between baptizer and baptized, confirmer and conˆ- firmed, and between godparents, their godchildren and their godchildren's relatives.

The result of this system was hopeless confusion and 2 Canon lxi. Aut qui ex propria consanguinitate aliquam, aut quam consanguineus habuit . . . duceret uxorem . . . incestos esse non dubitamus (Mansi Cone. viii. p. 336). According to the canon law " affinity " is the relation between two persons of whom one has had commerce, licit or illicit, with a relation of the other.

uncertainty, and it was early found necessary to modify it. This was done by Pope Gregory I., who limited the impediment to the 7 th degree of relationship inclusive (civil computation) 1 which was afterwards made the law of the empire by Charle- magne. Later still Innocent III. found it necessary again to issue a decree (4th Lateran Council) permitting marriages be- tween a husband and the relations of his wife, and vice versa, beyond the 4th degree inclusive (canonical computation). 2 This

remains the canonical rule of the Roman Catholic Church. As regards impediments due to spiritual affinity, these were limited by the Council of Trent to the relation of the baptizer and baptized; the baptizer and the parents of the baptized; the bap- tizer and the godfather and godmother; the godparents and the baptized and its parents: i.e. a godfather may not marry the mother of the child he has held at the font, nor the godmother the father of such child.

In the fully developed canon law impediments to marriage are of two kinds, public and private (impedimenta publico, and privata), i.e. according as the objection arises out of the very nature of marriage itself or from consideration for the rights of particular persons; near relationship, for instance, is a public impediment, impotence (impo(enlia) and force (vis et metus) are private impediments. Impediments are further divided into separating (impedimenta dirimentia) or merely suspensive (impedimenta lantum impedientia) ; to the first class belongs, e.g. a previous marriage not dissolved by death, which involves the nullification of the marriage even where through ignorance the crime of bigamy is not involved; to the second belongs the case of one or both of the contracting parties being under the age of puberty. 3 Impediments, moreover, are absolute or relative, according as they are of universal application or only affect certain persons; near relationship, for instance, is an absolute impediment, difference of religion between the parties a relative impediment. In addition to consanguinity and affinity, impuberty and existing marriage, the canon law lays down as public and absolute impediments to marriage the taking of holy orders and the vows of chastity made on entering any of the religious orders approved by the Holy See. In these impediments the canon law further distinguishes between those which are based on the law of nature (jus naturae) and those which are based on the law of the Church (jus ecclesiae). From impediments based on the law of nature, or of God, there is no power even in the pope to dispense; e.g. marriage of father and daughter, brother and sister, or remarriage of husband or wife during the lifetime of the wife or husband of another marriage, which is held to be a violation of the very nature of marriage as 1 The civil law counts, in the direct line, as many degrees as there are generations between the parties; e.g. the son is in regard to his father in the 1st degree, the grandson in the 2nd, and vice versa. In the collateral line it computes degrees by generations, i.e. from one of the relations to the common ancestor, without including him or her, and from him or her back to the other relation ; e.g. two brothers are in the 2nd degree of relationship to one another, uncle and nephew in the 3rd, cousins-german in the 4th.

The canon law, which in this case derives from the old Germanic law, has the same computation as regards the direct line. In the case of collateral relations, however, it differs, having two rules: (1) In the case of equal line

— i.e. when the collaterals are equally removed from the common progenitor, it reckons the same number of degrees between the collaterals as between one of them and the progenitor; e.g. brothers are related in the 1st degree, while cousins- german are related in the 2nd degree because they are two genera- tions from the common grandfather. (2) In the case of unequal line — i.e. when the collaterals are unequally removed from the common ancestor, the degree of their relationship is that of the most remote from the common progenitor; e.g. uncle and niece are related in the 2nd degree — i.e. that of the niece to the grandfather. The civil computation was furiously attacked by canonists as tending to laxity (see Peter Damianus, " De parentelae gradibus," in Migne, Patrol. Lat. cxlv. 191, &c).

2 Innocent III. also decided that the husband's relations were not related to those of the wife, and vice versa, thus establishing the rule that " affinity does not breed affinity " (affinitas non paril affinitatem).

3 This is fixed by the canon law at 14 for a male, 12 for a female. If, however, owing to the precocious physical development of a girl, the marriage has been consummated before she has reached this age, it cannot be nullified.

an indissoluble union. 4 From impediments arising out of the law of the Church dispensations are granted, more or less readily, either by the pope or by the bishop of the diocese in virtue of powers delegated by the pope (see Dispensation). Thus dis- pensations may be granted for marriage between persons related by consanguinity in any beyond the 2nd degree and not in the direct line of ascent or descent; e.g. between uncle and niece (confined by the council of Trent to the case of royal marriages for reasons of state) and between cousins-german, or in the case of marriage with a heretic. In this latter case a dispensation is now (i.e. since the papal decrees ne temere of the 2nd of August 1907, which came into force at Easter 1908) only granted on con- dition that the parties are married by a Catholic bishop, or a priest accredited by him, that no religious ceremony shall take place except in a Catholic church, and that all the children shall be brought up in the Roman Catholic faith. 5

In the absence of any impediment a marriage is according to- the canon law completed between baptized persons by the facts of consent and consummation; the principle is still main- tained that the parties to the marriage, not the priest, are the "ministers of the sacrament" (minislri sacramenti) . 6 From the first, however, the Church, while recognizing the validity of private contracts, enjoined the addition of a public religious ceremony, so that they might be " sanctified by the word of God and prayer " (1 Tim. iv. s). 7 Tertullian (de pudicitia, cap. iv.) says that

clandestine marriages, not professed in the Church, were reckoned among Christians as all but fornication, and he speaks of the custom of seeking permission to marry from the bishop, priests and deacons (de monogamia, cap. xi,). This latter precaution became increasingly necessary as impediments were multiplied, and Charlemagne, in a capitulary of 802, forbade the celebration of a marriage until " the bishops, priests and elders of the people " had made diligent inquiry into the question of the consanguinity of the parties. This was the origin of the publication of banns which, long customary in France, was made obligatory on the whole Church by Pope Innocent III. In the Eastern Church the primitive practice survives in the ceremonial blessing by the priest of the betrothal, as distinguished from the marriage ceremony. The ecclesiastical recognition of clandestine marriages, however, survived until the crying evil was remedied

4 It is maintained that no pope has ever given a dispensation for such a marriage. Such a case seems, however, to be narrated by Ordericus Vitalis (Hist, eccles. viii. 23; ed. A. le Prevost, Paris, 1 838-1855, t. Hi. p. 408; ed. A. Duchesne, 1619, 704 B). Robert Mowbray, earl of Northumberland, had only been married to Maud de Laigle three months when he was condemned to perpetual imprisonment for rebellion against King William Rufus. After describing her forlorn state Orderic continues: " Nee ipsa eo vivente, secundum legem Dei, alteri nubere legitime valebat. Tandum, permissu Paschalis Papae (II.), cui res, a curiosis enucleata, patuit, post multos dies Nigellus de Albineo ipsam uxorem accepit." This may mean no more, of course, than that the curiosi " untied the knot " by discovering an impediment — the usual expedient in such cases. In any case the fact that Nigel de Albini, in his turn, soon afterwards obtained a " divorce " from her on the ground that her first husband was his relative by consanguinity, hardly points to a strict view of the sanctity of the marriage tie.

6 The customary rule for more than three centuries after the Council of Trent was that male children followed the religion of the father, female children that of the mother. On the general subject of the attitude of the Church towards mixed marriages see O. D. Watkins, Holy Matrimony, pp. 468 et seq. For the Roman Catholic view see " An Instruction on Mixed Marriages " in Bishop Ullathorne's Keel. Discourses (London, 1876).

6 Among the " errors " denounced by Pope Pius IX. in the Sylla- bus of 1864 is lxvi. : Matrimonii sacramentum non est, nisi quid contractu! accessorium ab eoque separabile, ipsumque sacramentum in una tantum nuptiali benedictione situm est." This condemns the attempts of certain canonists (e.g. Melchior Cano) to distinguish between the contractus naturalis and sacramentalis. This view, which was first advanced by the jurist and theologian Johann Gropper (1502-1559) at the council of Cologne (1536), and gained support especially in France, makes the "

matter " of the sacrament the consent of the parties, the " form " the prayers and benedictions, the " minister " the priests (see e.g. " Du sacrament de mariage " in vol. v. of the Dissertationes selectae of Petrus de Marca, d. 1662, archbishop of Paris, Bamberg, 1789, p. 148).

7 See the list of quotations from the early fathers given by Watkins, Holy Matrimony, p. 93.

by a decree of the council of Trent (Sess. xiv. de matrim.), 1 which laid it down that for a valid marriage it was at least necessary that consent should be declared before a priest and in the pres- ence of three witnesses. According to the actual law of the Roman Catholic Church, then, a civil marriage is only valid when the Tridentine decree has not been published; where this has been published, or has been in practice without publication, such a marriage can only become valid if followed by a religious ceremony in the prescribed form. Where such form has not followed the ecclesiastical courts must treat the marriage as voidable through the impedimentum clandestinitatis.

Divorce, i.e. the annulment of marriage for any cause but an impediment which makes the marriage ipso facto void, is un- known to the Roman Catholic Church. Separation a vinculo matrimonii is only possible under the canon law by a judicial decree of nullity (annullatio matrimonii), which implies, not the severing of the ties of a real marriage, but the solemn declaration that such marriage has never existed. There may, however, be a " separation from bed and board " (a thoro et mensa), even perpetual, which does not however give either party the right to remarry during the lifetime of the other. But, marriage not being regarded as a sacrament until consummated, it may be dissolved, if non-consummation be proved, by one or both parties taking the religious vows, or by papal dispensation. The Church claims exclusive control over marriage, and the council of Trent anathematized the opinion held by Luther and other Reformers, that it was properly a subject for the civil courts (si quis dixerit causas matrimoniales non speclare ad judices ecclesiasticos anathema sit, Sess. xxiv. cap. 2). This attitude became of extreme political importance when even in Catholic countries the codes established civil marriage as the only legally binding form.

England. — Marriage may be the subject of an ordinary contract on which an action may be brought by either party. It is not necessary that the promise should be in writing, or that any particular time should be named.

Promises to marry are not within the meaning of " agreement made in consideration of marriage " in the statute of frauds, which requires such agree- ments to be in writing. Contracts in restraint of marriage, i.e. whose object is to prevent a person from marrying anybody whatever, are void, as are also contracts undertaking for reward to procure a marriage between two persons. These latter are termed marriage brocage contracts.

Any man and woman are capable of marrying, subject to certain disabilities, some of which are said to be canonical as having been formerly under the cognisance of the ecclesiastical courts, others civil. The effect of a canonical disability as such was to make the marriage not void but voidable. The marriage must be set aside by regular process, and sentence pronounced during the lifetime of the parties. Natural inability at. the time of the marriage to procreate children is a canonical dis- ability. So was relationship within the prohibited degrees, which has been made an absolute avoidance of marriage by the Marriage Act 1835. Civil disabilities are (1) the fact that either party is already married and has a spouse still living; 2

(2) the fact that either person is a party of unsound mind;

(3) want of full age, which for this purpose is fixed at the age of puberty as denned in the Roman law, viz. fourteen for males and twelve for females; 3 (4) relationship within the prohibited degrees.

The statute which lawyers regard as establishing the rule on

1 The later teaching of the Eastern Church is laid down in the Orthodox Confession of Peter Mogilas, patriarch of Kiev (1640). There are three essentials for a Christian marriage: (1) suitable matter (6X17 4pju68tos), i.e. a man and woman whose union no impediment bars, (2) a duly ordained bishop or priest, (3) the invocation of the Holy Ghost, and the solemnity of the formularies (to eI5os roiv \oyia)v).

2 A divorce nisi does not enable the parties to marry until it is made absolute.

3 A marriage in which either of the parties is below the age of consent is, however, said to be not absolutely void; if the parties agree to continue together at the age of consent no new marriage is necessary, but either of them may disagree and avoid the marriage.

this last point is the 32 Hen. VIII. c. 38 (repealed in part by 2 & 3 Edw. VI. c. 23, in whole by 1 & 2 P. and M. c. 8, but revived by 1 Eliz. c. 1, and so left as under the Act of Edward), which enacts that " no prohibition, God's law except, shall trouble or impeach any marriage without the Levitical

degrees." The forbidden marriages, as more particularly specified in previous statutes, are those between persons in the ascending and descending line in infinitum, and those between collaterals to the third degree inclusive, according to the computation of the civil law. The prohibitions extend not only to consanguinei (related by blood) but to affines (related by marriage) , now altered so far as a deceased wife's sister is concerned (see below). The act of 1835 enacted that " all marriages which shall hereafter be celebrated between persons within the prohibited degrees of consanguinity or affinity shall be absolutely null and void to all intents and purposes whatsoever." They had previously been only voidable. The act at the same time legalized marriages within the prohibited degrees of affinity (but not con- sanguinity) actually celebrated before the 31st of August 1835.

For many years an active and ceaseless agitation was carried on on behalf of the legalization in England of marriage with a deceased wife's sister. In all the self-governing colonies, with the „ . exception of Newfoundland, the restriction had ceased to f ft a ge exist. The first act legalizing marriage with a deceased fl ecease< / wife's sister was adopted by South Australia. The wife's royal assent, however, was not given till the parliament sister. of that state had five times passed the bill. In quick succession similar statutes followed in Victoria, Tasmania, New South Wales, Queensland, New Zealand, West Australia, Barbados, Canada, Mauritius, Natal and Cape Colony. As regards the Channel Islands, marriages of the kind in question were made legal in 1899, and in 1907 in the Isle of Man.

In England the bill to render marriage with a deceased wife's sister valid was first adopted by the House of Commons in 1850, and rejected by the House of Lords in 185 1. It was subsequently brought before the legislature in 1855, 1856, 1858, 1859, 1861, 1862, 1866, 1869, 1870, 1871, 1872, 1873, 1875, 1877 and 1878 (Colonial bills), 1879 (6th May, when in the House of Lords the prince of Wales and the duke of Edinburgh voted in favour of it), 1880, 1882, 1883, 1884, 1886, 1888, 1889, 1890, 1891, 1896, and 1898 and 1900 (Colonial bills). In most cases it passed the House of Commons but was rejected in the House of Lords. The bill of 1896, however, which was judiciously drafted to avoid the compulsory celebration by clergymen of marriages against which they had conscientious scruples, was carried in the Lords. Both the prince of Wales and the duke of York were among the " contents." The prime minister and eighteen bishops, including the two archbishops, voted against the bill, the earl of Rosebery and Lord Kimberley for it. At the third reading the bill was carried by 142 to 104 votes. Its promoters, however, did not succeed in getting an opportunity of bringing it before the House of Commons.

From 1896 to 1901 no further direct steps were taken, but in 1898 and

again in 1900 (May 28) the subject was brought forward in the House of Lords by Lord Strathcona in the form of a bill under which marriages with a deceased wife's sister contracted in any British colony should be deemed valid for all purposes within the United Kingdom. In 1898, and again in 1900, the bill was carried on the third reading without a dissentient vote. The House of Commons took no action on either occasion. An imperial bill reached a second reading in the House of Commons in 1901 and again in 1902, but it was blocked by the High Church opponents of the measure when attempts were made to get it to the committee stage (Feb. 5 and June 6). The reform was, however, finally adopted in 1906 under the title of the Colonial Marriages (Deceased Wife's Sister) Act. The effect of the act was to make such marriages legal in all respects, including the right of succession to real property and to honours and dignities within the United Kingdom. The natural sequence of the passing of the act of 1906 was the reintroduction in 1907 of the bill relating to England. Introduced by a private member, it was adopted by the government, passed the House of Commons, and finally the House of Lords (on the second reading by 1 1 1 votes to 79), and became law as the Deceased Wife's Sister Marriage Act, 1907. The act contains a proviso justifying clergymen in refusing to solemnize marriages with a deceased wife's sister, and it preserves the peculiar status of the wife's sister under the Matrimonial Causes Act 1857, under which adultery with her by the husband is incestuous adultery.

The celebration of marriages is now regulated wholly by statutory legislation. The most important acts in force are the Marriage Acts 1823, 1836, 1886 and 1898. 4 The former regulates marriages

- *A complete list of the acts regulating the solemnization of mar- riage or confirming marriages, which through some defect might be void, will be feund in Phillimore's Ecclesiastical Law (2nd ed. 1895).*

MARRIAGE

within the Church of England, but was intended to be of universal application, Jews and Quakers only being excepted by section 31. It requires either the previous publication of banns, or a licence from the proper ecclesiastical authority. As to banns, the rule of the rubric, so far as not altered by the statute, is required to be observed. They must be published on three successive Sundays at morning service after the second lesson, in the church of the parish in which the parties dwell ; the bishop may, however, authorize the publication of banns in a public chapel. Seven days' notice must be given to the clergyman of the names of the parties, their place ot abode, and the time during which they have lived there. If either party is under age, the dissent of the parents or guardians expressed at the time of publication of banns renders such publication null and void.

Licence in lieu of banns may only be granted by the archbishop, bishop or other authority, for the solemnization of a marriage within the church of the parish in which one of the parties shall have resided for fifteen days before. Before a licence can be granted an oath must be taken as to the fact of residence and that the necessary consent has been obtained in the case of persons under age. The father, or lawful guardian, is the proper person to consent to the marriage of a minor, and the place of any such person incapaci- tated mentally is taken by the lord chancellor. The absence of such consent does not, however, avoid a marriage once solemnized But if persons wilfully intermarry (unless by special licence) in a place not being a church or public chapel, or without due publication ot banns or proper licence, or before a person not in holy orders, the marriage is null and void to all purposes. Marriage must be celebrated within three months after banns or licence, and between the hours of eight in the morning and three in the afternoon.

For the relief of the great body of Dissenters the act of 1836 was passed. It permits marriage to be solemnized in two additional ways— viz. (1) by certificate of the superintendent registrar of a district without licence, and (2) by such certificate with licence In the first case, notice must be given to the registrar of the district or districts within which the parties have resided for seven days previous, which notice is inscribed in a marriage-notice-book, open to public inspection at all reasonable times, and thereafter suspended for twenty-one days in some conspicuous place in the registrar's office. Any person whose consent is necessary to an ecclesiastical licence may forbid the issue of a certificate, but in default of such prohibition the certificate will issue at the end of the twenty-one days. The marriage may then take place on any day within three months of the entry of notice, and in one of the following ways: (1)111 a certified place of religious worship, registered for the solemni- zation of marriage ; in that case a registrar of the district with two witnesses must be present, and the ceremony must include a mutual declaration of assent by the parties and a disavowal of any impedi- ment ; (2) at the superintendent registrar's office, with the same declaration, but with no religious service; (3) in a church according to the usual form, the consent of the minister thereof having been previously obtained ; (4) according to the usages of Jews and Quakers. 1 he place of marriage in all cases must have been specified in the notice and certificate.

In the second case, when it is desired to proceed by licence, notice must be given to the registrar of the district in which one of the persons resides, together with a declaration that he or she has resided tor fifteen days therein, that there is no impediment, and that the necessary consents if any have been obtained. The notice is not exhibited in the registrar's office, and the certificate may be obtained at the expiration of one whole day after entry, together with the licence. No registrar's licence can be granted for a marriage in church or according to the forms of the Church of England— the ecclesiastical authorities retaining their jurisdiction in that respect It is also provided that in the case of persons wilfully intermarrying in a place other than that mentioned in the notice and certificate or without notice or certificate, &c, the marriage shall be null and void.

The various rules as to consent of parents, &c, to the marriages ot minors are regulations of procedure only. The absence of the necessary consent is not a disability invalidating a marriage actually solemnized. J

The Act 26 Geo. II. c. 33, commonly known as Lord Hardwicke's Act, which forbids the solemnization of marriage without banns or licence, also enacts that " in no case whatsoever shall any suit or proceeding be had in any ecclesiastical court in order to compel a celebration in facie ecclesiae,

by reason of any contract of matrimony whatsoever whether per verba de presenti or per verba de futuro ' Blackstone observes that previous to this act " any contract made per verba de presenti, or in words of the present tense, and in case of cohabitation per verba de futuro also, was deemed valid marriage to many purposes; and the parties might be compelled in the spiritual courts to celebrate it in facie ecclesiae."*

T , R °y al marriages in England have been subject to special laws. The Royal Marriage Act of 1772 (12 Geo. III. c. 11), passed in con- sequence of the marriages of the dukes of Cumberland and Gloucester enacted that no descendant of his late majesty George II. (other than the issue of princesses married or who may marry into foreign families) shall be capable of contracting matrimony without the previous consent of his majesty, his heirs and successors, signified under the Great Seal. But in case any descendant of George II.,

'57

being above twenty-five years old, shall persist to contract a marriage disapproved of by his majesty, such descendant, after giving twelve months notice to the privy council, may contract such marriage and the same may be duly solemnized without the consent of his majesty, &c, and shall be good except both Houses of Parliament shall declare their disapprobation thereto."

In 1886 an act was passed in the British parliament to remove doubts which had been entertained as to the validity of certain marriages solemnized in England when one of the parties was resident in Scotland. The Summary Jurisdiction (Married Women) Act of 1895 enabled a wife whose husband is convicted of an assault on her, or who has been deserted by him, or been obliged owing to his cruelty to live apart from him, to apply to the justices, who are empowered by the act to make an order for separation and for payment by the husband to his wife of such weekly sum, not ex- ceeding two pounds, as they may consider reasonable. The Marriage Act 1898 authorized the celebration of marriages in places of worship duly registered for the solemnization of marriages under the Marriage Act of 1836 without the presence of the registrar on condition of their being solemnized in the presence of a person duly authorized by the governing body of the place of worship in question It also made further provision for the due recording of all marriages in the general registers. The Marriages Validity Act of 1899 removed doubts as to the validity of marriages in England on Irish banns and in Ireland on English banns. Lastly, the Marriage with Foreigners Act 1906 enabled a British subject desirous of marrying a foreigner in a foreign country to comply with the foreign law by obtaining from a registrar a certificate that no legal impedi-

ment to the marriage has been shown. Similar certificates by arrangement between His Majesty and foreign countries, are issued in the case of a foreigner desirous of marrying a British subject in the United Kingdom.

The Foreign Marriage Act 1892 has consolidated the English law relating to marriages celebrated abroad, and brings it into har- mony with the current tendencies of marriage law reform generally Under it a marriage between British subjects abroad is as valid as a marriage duly solemnized in England (as heretofore), if celebrated in accordance, with the local law or in the presence of diplomatic or consular agents who are appointed to act as " marriage officers " V he old fiction of assimilation of a British embassy to British soil can no longer be relied upon to uphold a marriage at a British embassy solemnized by an ordained clergyman. An orde- in council of the 28th of October 1892, moreover, provides that in the case of any marriage under the act, if it appears to the marriage officer that the woman about to be married is a British subject and that the man is an alien, he must be satisfied that the marriage will te recognized by the law of the foreign country to which the alien

A marriage may be solemnized on board one of His Majesty's ships at a foreign station, provided a warrant of a secretary of state has authorized the commanding officer to be a marriage officer At sea, marriages on British public or private ships seem still valid at common law if performed by an episcopally ordained minister. The Merchant Shipping Act 1894 (sect. 240) provides that the master of a ship for which an official log is required shall enter in it every marriage taking place on board, with the names and ages of the parties. s

Again under the Foreign Marriage Act all marriages solemnized within the British lines by a chaplain or officer or other person officiating under the orders of the commanding officer of a British army serving abroad, are as valid in law as if they had been solem- nized within the United Kingdom subject to due observance of all forms required by law. The Naval Marriages Act 1908 authorizes for the purpose of marriages in the United Kingdom, the publica- tion ot banns and the issue of certificates on board His Majesty's ships in certain cases, or when one of the parties to a marriage intended to be solemnized in the United Kingdom is an officer atˆa" ° r ma " ne ' e on the books of one of His Majesty's ships

The principle of the English law of marriage, that a marriage contracted abroad is valid if it has been solemnized according to the lex loci may be now taken to apply just as much to a marriage in a heathen as in a Christian country. Whether the marriage has or has not been celebrated according to Christian laws has no bearing upon the question, providing it is a monogamous marriage —a marriage which prevents the man who

enters into it from marrying any other woman while his wife continues alive.

Scotland.— The chief point of distinction, as compared with English law, is the recognition of irregular marriages. (1) " A public or regular marriage," says Fraser, " is one celebrated after due proclamation of banns, by a minister of religion- and it may be celebrated either in a church or in a private house' and on any day of the week at any hour of the day." The ministers of the National Church at first alone could perform the ceremony; but the privilege was extended to Episcopalians by 10 Anne c. 7 (17 n), and to other ministers by 4 and 5 Will. IV. c. 28 (1834). (2) A marriage may also "be constituted by

declarations made by the man and the woman that they presently do take each other for husband and wife." These declarations " may be emitted on any day at any time and without the presence of witnesses," and either by writing or orally or by signs, and in any form which is clearly expressive of intention. Such a marriage is as effectual to all intents and purposes as a public marriage. The children of it would be legitimate; and the parties to it would have all the rights in the property of each other, given by the law of Scotland to husband and wife. (3) A promise followed by copula does not constitute marriage, unless followed either by solemnization in facie ecclesiae or declarator. Lord Moncreiff's opinion in the case of Brown v. Burns is admitted to be good law, viz. that declarator is essential to the constitution of a marriage of this kind, so that, if no such declarator be brought in the lifetime of both parties, the marriage can never be established afterwards. The copula is presumed to have reference to the promise, but evidence may be adduced to show that such was not the case.

By the Marriage (Scotland) Act 1856 it is enacted that no irregular marriage shall be valid in Scotland, unless one of the parties has lived in Scotland for the twenty-one days next preced- ing the marriage, or has his or her usual residence there at the time.

" Habit and repute " has sometimes been spoken of as constituting marriage in the law of Scotland, but it is more correctly described as evidence from which marriage may be inferred. The repute must be the general, constant, and unvarying belief of friends and neighbours, not merely the controverted opinion of a section of them. The cohabitation must be in Scotland, but in one case proof of cohabita- tion in another country was allowed, as tending to throw light on the nature of the cohabitation in Scotland.

The consent of parents is not necessary to the validity of the marriage, even of minors, but marriage under the age of puberty with or without such consent is void.

United States. — The absence of ecclesiastical courts has sug- gested difficulties as to the extent to which the law of England on this subject continued to prevail after the revolution. Bishop holds it to be the universal fact running through all the cases that everywhere in the country the English decisions on marriage and divorce are referred to with the same apparent deference which is shown on other subjects to the decisions of the English common law and equity tribunals. The same author observes that " all our marriage and divorce laws, and of course all our statutes on the subject, in so far as they pertain to localities embraced within the limits of particular states, are state laws and state statutes, the national power with us not having legis- lative or judicial cognisance of the matter within those localities." Some of the states have extended the ages below which marriage cannot take place. The common law of the states is assumed to be that " a contract per verba de presenti, or per verba defuturo cum copula, constitutes a complete marriage." Conditions, however, may be imposed by the various state legislatures, and as to these the rule has established itself in American juris- prudence that " a marriage good at common law is good not- withstanding the existence of any statute on the subject, unless the statute contains express words of nullity." Thus in Pennsyl- vania, where a statute provided that all marriages " should be solemnized before twelve witnesses," marriages not so celebrated were nevertheless held to be good. In New Hampshire justices and ministers of the gospel are authorized to solemnize marriage, and all other persons are forbidden to do so under penalties; yet a marriage by consent, as at common law, without justice or minister, has been held valid. On the other hand, under a very similar statute in Massachusetts, it was held that " parties could not solemnize their own marriage," and that a marriage by mutual agreement, not in accordance with the statute, was void. Bishop regards this as an isolated exception to the general course of the decisions. So when state legislation requires any particular form to be used the want thereof only invalidates the act if the statute expressly so enacts. Many of the state codes inflict penalties on ministers or justices for celebrating the marriage of minors without the consent of the parents or guardians. The original law as to prohibited degrees has been considerably modified in the states. The prohibition of marriage with a deceased wife's sister has been abolished in

the United States. But New Hampshire, Ohio, Indiana, Kansas^ Arkansas, Nevada, Washington, the Dakotas and Montana have for long forbidden marriages between first cousins by blood,and Louisiana, Oregon, Pennsylvania, Michigan, Nebraska, Utah and Wisconsin have since adopted the same principle. Virginia prohibits the marriage of a woman

with the husband of her brother's or sister's daughter.

Attention is also being paid to the question of marriage from a physical point of view. New Jersey prohibits the marriage of any person who has been confined in any public asylum as an epileptic, insane or feeble-minded patient, without a medical certificate from two physicians of complete recovery, and that there is no probability of the transmission of such defects. This prohibits the granting of a marriage licence where either party is an habitual drunkard, epileptic, imbecile or insane, or where the applicant at the time of making application is under the influence of any in- toxicant or narcotic drug. In Michigan, Minnesota, Kansas and Oregon, marriage is prohibited to epileptics, &c, except when the woman is over forty-five. In Michigan, also, marriage is forbidden to anyone who has suffered from a venereal disease and has not been cured. The equality of property rights between husband and wife is fully established in America. Indeed, in many states the movement has gone so far as to give the wife in matters of property and in reference to divorce greater privileges than the husband. Thus a husband is often liable for a wife's debts where a wife would not be, mutatis mutandis, for a husband's; and a wife may usually obtain a decree of divorce for any ground on which one may be awarded to the husband, and, in addition, for neglect to provide sustenance or support. Emphasis on the personal or moral relation of the parties in marriage tends to throw into the background the legal aspects and requirements; and it tends also to minimize, so far as the state is concerned, the religious and sacramental aspect of marriage, Marriage tends to become a relation established by parties between themselves, and one in which the consent of the parties becomes the only constitutive element. In the theory of American law no ceremony is essential to create the marriage relation. But this position has never been endorsed by any considerable proportion of the community, and in fact probablv ˆths and perhaps jY 5 ths of the marriages in the United States are contracted through some ceremony.

France. — Articles 144-226 of the Code Napoleon, as amended by an act of 1907, prescribe the qualifications and conditions of marriage. The man must be eighteen and the woman fifteen years of age. A son and daughter under twenty-one cannot marry without consent of the father and mother, or of the father only if they disagree, or of the survivor if one be dead. If both are dead grandfather and grandmother take their place. Between the ages of twenty-one and thirty the parties must still obtain the consent of their parents, but if this be refused it can be regulated by means of a " respectful and formal act " before a notary. If the consent is not given within thirty days the marriage may take place without it. If neither parents nor grandparents be alive, parties under twenty-one require the consent of the family council. These rules apply to natural children when affiliated; those not affiliated require the consent of a specially appointed guardian.

Marriage is prohibited between all ascendants and descendants in the direct line, and between persons related by marriage in the same line, between brother and sister, between uncle and niece, and brother-in-law and sister-in-law.

Before the solemnization of marriage banns are required to be published for a period of ten days, which must include two Sundays, containing the names, occupations, and domiciles of the parties and their parents. There must be an interval of three days before the marriage can take place, and if a year is allowed to elapse fresh banns must be put up. On the day appointed by the parties, and in the parish to which one of them belongs, the marriage is cele- brated by the civil officer or registrar reading over to them the various necessary documents, with the chapter of the code relating to husband and wife, receiving from each a declaration that they take each other for husband and wife, and drawing up the act oi marriage. All this has to be done in the presence of four witnesses.

Marriages contracted abroad between French subjects or between French subjects and foreigners are valid in France if celebrated according to the forms of the foreign law, provided the French conditions as to consent of parents have been observed. (See also Marriage with Foreigners Act, supra.)

Germany. — The code of 1900 lays down rules applicable to the celebration of all marriages within the German Empire. Civil marriage alone is recognized by the code. It is effected by the declaration of the parties before a registrar in the presence

of each other of their intention to be married. Two witnesses of full age must be present. The registrar asks each of the parties whether he or she will marry the other, and on their answer in the affirmative declares them duly married and enters the marriage in the register. The marriage must be preceded by a public notice. Marriages are void between descendants and ascendants; relatives by marriage in the ascending or descending line; brother and sister of the whole or half blood.

Other Countries. — In the great majority of the other European countries civil marriage is obligatory. In Roman Catholic countries the parties usually supplement the obligatory civil marriage by a religious ceremony, more especially since the papal decree Ne temere of the 2nd of August 1007 (which came into force at Easter 1908), which requires marriages between

Roman Catholics, or between Roman Catholics and those not professing that faith, to be celebrated before a bishop or priest duly authorized for the celebration thereof.

Authorities. — Eversley, The Law of Domestic Relations (3rd ed., London, 1906) ; Lush, The Law of Husband and Wife (London, 1909); Crawley, The Law of Husband and Wife (London, 1892); Geary. Marriage and Family Relations (London, 1892); Griffiths, Married Women's Property Acts (London, 1891); Vaizley, Law of Settlements of Property made on Marriage (London, 1887); Bishop, (America) Marriage, Divorce and Separation (Chicago, 1892) ; David Murray, (Scotland) The Law relating to the Property of Married Persons (Glasgow, 1892); E. A. Westermarck, History of Human Marriage (3rd ed., 1901), with other works cited in the article Family. M. Neustadt, Kritische Studien zum Familienrecht des bur ■gerlichen Gesetzbuchs (Berlin, 1907) ; O. D. Watkins, Holy Matri- mony (London, 1895), a comprehensive study of the history and theory of Christian marriage, from the High Anglican point of view, with special reference to missions dealing with heathen converts; J. Wickham Legg, " Notes on the Marriage Service in the Book of Common Prayer of 1549," in Ecclesiological Essays (London, 1905), a valuable comparative study of Christian marriage rites, with numerous references; the articles " Ehe, Christliche," by Gottschick, and " Eherecht " (many references), by Sehling, in Herzog-Hauck, Realencyklopadie (3rd ed., Leipzig, 1898, vol. v.) ; Abbe Andre, Cours de droit canon (3rd ed., Wagner, Paris, 1901), art. " Manage," " Affinity," &c.

See also Age; Divorce; Family; Husband and Wife; Legi- timacy and Legitimation; Morganatic Marriage.

MARRUCINI, an ancient tribe which occupied a small strip of territory round about Teate (mod. Chieti), on the east coast of Italy. It is first mentioned in history as a member of a confederacy with which the Romans came into conflict in the second Samnite War, 325 B.C., and it entered the Roman Alliance as a separate unit at the end of that war (see further Paeligni) . We know something of the language of the Marrucini from an inscription known as the " Bronze of Rapino," which belongs to about the middle of the 3rd century B.C. It is written in Latin alphabet, but in a dialect which belongs to the North Oscan group (see Paeligni). The name of the city or tribe which it gives us is touta marouca, and it mentions also a citadel with the epithet tarincris. Several of its linguistic features, both in vocabulary and in syntax, are of considerable interest to the student of Latin or Italic grammar (e.g. the use of the subjunc- tive, without any conjunction, to express purpose, a clause prescribing a sacrifice to Ceres being followed immediately by pacr si ut propitia sit). The earliest Latin inscriptions are of Ciceronian date.

The form of the name is of considerable interest, as it shows the suffix NO superimposed upon the suffix CO, a change which probably indicates some conquest of an earlier tribe by the invading Safini (or Sabini, q.v.).

For further details as to Marrucine inscriptions and place-names see R. S. Conway, The Italic Dialects, p. 253 seq. (R. S. C.)

MARRUVIUM, the chief town of the Marsi, on the E. bank of the Lacus Fucinus, 4 m. S. of Cerfennia. on the Via Valeria. Though no doubt of great antiquity, nothing is known of its history before the imperial period; and none of the remains visible there (city walls, various buildings within them, an amphitheatre, &c), from which it seems to have been a place of some importance, can be attributed to an earlier date. On the site is the insignificant village of St Benedetto.

MARRYAT, FREDERICK (1792-1848), English sailor and novelist, was born at Westminster on the 10th of July 1792. He was the grandson of Thomas Marryat (physician, author of The Philosophy of Masons, and writer of verse), and son of Joseph Marryat, agent for the island of Grenada, who wrote pamphlets in defence of the Slave Trade. His mother was a Bostonian of German extraction. Young Marryat distinguished himself as a boy by frequently running away to go to sea; and at last, at the age of fourteen, he was allowed to enter the navy. His first service was under Lord Cochrane (afterwards tenth earl of Dundonald) in the famous " Imperieuse," and no midshipman ever had a livelier apprenticeship to the sea. During his two and a half years of service under Cochrane, the young midship- man witnessed more than fifty engagements, and had much experience of service on the coast of Spain in the early stage of the Peninsular War, in the attack on the French squadron in the Roads (April 1809) and in the Walcheren expedition. Before the general peace of 181 5 he had served in North America and the West Indies and gained a wide knowledge of conditions of life on board ship under various commanders. In 1815 he was promoted to the rank of commander. After holding various commands he commissioned the " Larne," 20, for the East Indies and was senior naval officer at Rangoon during the Burmese War from May to September 1824. In the early part of the next year he commanded an expedition up the Bassein River, in which Bassein was occupied and the Burmese stores seized. His services were acknowledged by a nomination as C.B, in 1826. He frequently received honourable mention for his behaviour in action, and in 181 8 he received the medal of the Humane Society for " at least a dozen " gallant rescues. Marryat 's honours were not confined to gallant exploits. He adapted Sir Home Popham's code of signals to a code for the Mercantile Marine, for which he was made F.R.S. in 1819, and received the Legion of Honour from Louis Philippe in 1833. A pamphlet written to propose a substitute for the system of impressment in 1822 is

said to have offended King William IV.

Marryat brought ripe experience and unimpaired vivacity to his work when he began to write novels. Frank Mildmay, or the Naval Officer, was published in 1829, and The King's Own followed in 1830. The novels of the sea captain at once won public favour. The freshness of the new field which was opened up to the imagination — so full of vivid lights and shadows, light-hearted fun, grinding hardship, stirring adventure, heroic action, warm friendships, bitter hatreds — was in exhilarating contrast to the world of the historical romancer and the fashion- able novelist, to which the mind of the general reader was at that date given over. He had an admirable gift of lucid, direct narrative, and an unfailing fund of incident, and of humour, sometimes bordering on farce. Of all his portraits of adven- turous sailors, " Gentleman Chucks " in Peter Simple and " Equality Jack " in Mr Midshipman Easy are the most famous, but he created many other types which take rank among the characteristic figures in English fiction. Marryat's first attempt was somewhat severely criticized from an artistic point of view, and he was accused of gratifying private grudges by introducing real personages too thinly disguised; and as he attributed some of his own adventures to Frank Mildmay he was rather shocked to learn that readers identified him with that disagreeable character. The King's Own was a vast improvement, in point of construction, upon Frank Mildmay; and he went on, through a quick succession of tales, Newton Forster (1832), Peter Simple (1834), Jacob Faithful (1834), The Pacha of Many Tales (1835), Japhet in Search of a Father (1836), Mr Midshipman Easy (1836), The Pirate and the Three Cutters (1836), till he reached his high- water mark of constructive skill in Snarley-yow, or the Dog Fiend (1837). The best of his books after this date are those written expressly for boys, the favourites being Masterman Ready (1841), The Settlers in Canada (1844), and The Children of the New Forest (1847). Among his other works are The Phantom Ship (1839); A Diary in America (1839); Olla Podrida (1840), a collection of miscellaneous papers ; Poor Jack (1840); Joseph Rushbrook (1841); Percival Keene (1842); Monsieur Violet (1842); The Privateer's

Man (1844); The Mission, or Scenes in Africa (1845); The Little Savage (1848-1849), published posthumously; and Valerie, not completed (1849). His novels form an important link between Smollett and Fielding and Charles Dickens.

Captain Marryat had retired from the naval service in 1830, becoming

equerry to the duke of Sussex. He edited the Metro- politan Magazine from 1832 to 1835, and some of his best stories appeared in that paper. He spent a great part of his time in Brussels, where he was very popular. He visited Canada during Papineau's revolt and the United States in 1837, and gave a disparaging account of American institutions in a Diary published on his return to England. While at New York he wrote a play, The Ocean Waif, or Channel Outlaw, which was acted, and is forgotten. His versatility is further shown by the fact that he drew rough caricatures and other sketches with some spirit. Some capital snatches of verse are scattered throughout his novels, the best being " Poll put her arms akimbo " in Snarley- yow, and the " Hunter and the Maid " in Poor Jack. In 1843 he settled at Langham Manor, Norfolk. He indulged in costly experiments in farming, so that in spite of the large income earned by his books he was not a rich man. He died at Langham on the 9th of August 1848, his death being hastened by news of the loss of his son by shipwreck.

His daughter, Florence Marryat, herself a novelist, published his Life and Letters in 1872. See also David Hannay, Life of Marryat (1889). (D. H.)

MARS, MLLE [ANNE FRANQOISE HYPPOLYTE BOUTET]

(1779-1847), French actress, was born in Paris on the 9th of February 1779, the natural daughter of the actor-author named Monvel [Jacques Marie Boutet, 1745-1812], and .Mile Mars Salvetat, an actress whose southern accent had made her Paris debut a failure. Mile Mars began her stage career in children's parts, and by 1799, after the rehabilitation of the Comedie Francaise, she and her sister (Mars ainee) joined that company, of which she remained an active member for thirty-three years. Her beauty and talents soon placed her at the top of her profession. She was incomparable in inginue parts, and equally charming as the coquette. Moliere, Mari- vaux, Sedaine, and Beaumarchais had no more accomplished interpreter, and in her career of half a century, besides many comedy roles of the older repertoire, she created fully a hundred parts in plays which owed success largely to her. For her farewell performance she selected Elmire in Tartuffe, and Silvia in Jeu de V amour et du hasard, two of her most popular roles; and for her benefit, a few days after, Celimene in Le Mis- anthrope and Araminthe in Les Femmes savantes. She retired in 1841, and died in Paris on the 20th of March 1847.

MARS (Mavors, Marmar, Marspiter cr Maspiter), after

Jupiter the most important deity of the Roman state, and

one who, unlike most Roman deities, was never so much affected

by foreign influences as to lose his essentially Roman and Italian character. Traces of his worship are found in all parts of central and southern Italy, in Umbria, Picenum, Samnium, and in one or two Etruscan cities, as well as in Latium; and in several communities, as we learn from Ovid (Fasti, 3. 93 seq.), he gave his name to a month, as at Rome to the first month of the old Roman year. We know little of the character of his cult except at Rome, and even at Rome it has been variously interpreted. He has been explained as a sun-god, a god of wind and storm, a god of the year and a god of vegetation; and he has been compared with Apollo by Roscher (Apollo, and Mars, 1873, and in the article "Mars" in his Lexicon of Mythology). But in historical times his chief function at Rome was to protect the state in war, and it is as a god of war that he is known to all readers of Roman literature. So entirely did this characteristic get the better of all others, that his name came to be used as a synonym for helium; and in the latest and most careful of all accounts of the Roman religion he is pronounced to have been from first to last a god of war only (see Wissowa, Religion und Kultus der Romer, p. 129 seq.).

Until the time of Augustus Mars had but two temples at Rome, and both are connected with warlike operations. One of these was originally only an altar; it was in the Campus Martius, the exercising-ground of the army. The other was outside the Porta Capena, the gate through which the army marched on its way to campaigns to the south: here too each year the Equites met in order to start in procession through the city (Dion. Hal. 6. 13). Each of these sites was outside the

pomerium, and this has been explained to mean that the war-god " must be kept at a distance " (Carter, Religion of Numa, p. 19). But in the heart of the city there was a sacrarium of Mars in the regia, originally the king's house, in which the sacred spears of Mars were kept, and the fact that on the outbreak of war the consul had to shake these spears, saying as he did it, Mars vigila (" Mars, wake up!"), shows that the god was believed to reside here in some spiritual sense. If the spears moved of themselves, the omen was bad and called for expiation. The ancilia, or sacred shields, also formed part of this symbolic armoury of the Roman state: they were carried in procession by the Salii (q.v.) or dancing warrior-priests of Mars on several occa- sions during the month of March up to the 23rd (tubilustrium) , when the military trumpets (lubae) were lustrated: and again in October to the 19th (armilustrium) , when both the ancilia and the arms of the exercitus were purified and put away for the winter. During the four months of the Italian winter the worship of Mars seems at a standstill: we have no trace of it in the calendar or in Roman literature. His activity is all in the warm season, i.e. in the season of warfare. It is only at the end of February that we find indications of the coming force of the Mars-cult in the month which bears his name: Quirinus, who was probably the Mars of the community settled on the Quirinal Hill, and had his twelve Salii corre- sponding to those of the Palatine Mars, held his festival on the 17th of February, and on the 27th was the first festival called Equirria, the second being on the 14th of March. The name indicates horse-racing; horses were bred and used at Rome chiefly for military purposes, and it is possible to see here, as in the Equirria of the 14th of March, which we know was a festival of Mars (W. W. Fowler, Roman Festivals, p. 44), an exercise of the war-horses, accompanied with sacrifice to Mars, preparatory to the opening of the season of arms.

There is thus abundant evidence, based on the ancient calen- dars and the features of the cult, that Mars was all along a deity especially connected with warfare; and it is hardly neces- sary to add proof of a less convincing kind, e.g. that the wolf, his special animal, is a warlike beast, or that Nerio, a female deity who may anciently have been coupled with him, seems to be etymologically " the strong one," or that he is in legend the father of Romulus the warlike king and founder of the Roman army, as compared with Numa, who instituted the Roman law and religion. Enough has been said to show why Mars should have become exclusively a god of war, even if the Roman state in its advance in the conquest of other peoples had not given a continual impulse to this aspect of the cult. In founding his famous temple of Mars Ultor (the avenger of Caesar) in the Forum Augusti, Augustus gave a new turn to this worship, and for a time it seems to have been a rival of that of the Capitoline Jupiter (see Carter, Religion of Numa, p. 174 seq.), and late in the period of the empire Mars became the most

prominent of the di militares worshipped by the Roman legions.

There are however certain features in the Mars cult which make it probable that this god was not entirely warlike in character. He seems, in early times, at least, to have been also associated with agriculture; and this is in harmony with the facts: (1) that the season of arms is also the season of the growth, ripening and harvesting of the crops; (2) that the early Roman community was an agricultural as well as a military one, as is indicated in its religious calendar (Fowler, Roman Festivals, p. 334). Thus Mars was invoked in the ancient hymn of the Arval Brothers, whose religious duties had as their object to keep off enemies of all kinds from crops and herds (Henzen, Acta Fratr. An. p. 26, 1874; Wordsworth, Fragments and Specimens of Early Latin, p. 385 seq.); and his association here

with the Lares (g.v.) proves that he is not regarded as a war- god who could avert the raid of an enemy. Still more striking is the invocation of Mars (with the cult-title Silvanus) in the yearly lustration of his land by the Roman farmer (Cato, De re rustica, 141), where it is not a human enemy, but disease, and all unwholesome influences, which the god is besought to avert from the farm and land, plantations and flocks. Three times the procession went round the land, reciting prayers and driving the victims to be sacrificed, viz. ox, sheep and pig (suovetaurilia), representing the farmer's most valuable stock. We can hardly doubt that in the state ceremony of the Ambarvalia, i.e. the luslratio of the ager romanus in its earliest form, the same god was invoked and the same ritual used (Fowler, op. cit. p. 124 seq.). Again in the curious ritual of the sacrifice to Mars of the October horse (Oct. 1 5 : Fowler op. cit. 241), though the animal was undoubtedly a war-horse, the head was cut off and decked with cakes, as we are told (Paul. Diac. 220) ob frugum eventum. Even Quirinus, the form of Mars worshipped in the Quirinal community, is not without an association with agricultural perils, for it was his flamen who sacrificed the victims at the Robigalia on the 25th of April, when the spirit of the mildew (robigus) was invoked to spare the corn (Ovid, Fasti, 4. 901 seq.).

War and agriculture are thus the two factors of human life and experience which are unquestionably prominent in the cult of Mars, and explain his importance in a community like that of Rome: and there is no need, in a short account of this religious conception, to determine whether he was by origin a solar deity, a storm-god, or a vegetation-spirit. His name gives us no help, its etymology is uncertain (Roscher in Mytho- logical Lexicon, s.v. " Mars," p. 2436). But we are safe in con- jecturing that Mars first came

into prominence among the Latins and kindred peoples in the course of their long struggle for settlements among the mountains and forests of Italy. The clearing of primeval woodland, the perils of agriculture from the raids of enemies and of wild beasts, and from the ravages of disease, are all indicated in the later Mars cult. The wolf and the woodpecker, denizens of the forest, always remained his sacred animals, and were believed in Italian legend to have led the Piceni and Hirpini to their places of settlement. Mars is specially associated with the early founda- tion legends of Italy, as was the case at Rome: and it was to him that the ver sacrum was dedicated, i.e. the entire produce of a spring, including the children born then, who were eventually driven forth from their homes to form new settlements else- where (Roscher in Lex. Myth. 241 1). The fierce character of the god, gained no doubt in this period of struggle and danger, never entirely left him. Even in the hymn of the Fratres Arvales he is the " fierce Mars " {fere Mars), and in the prayer of Cato's farmer, though he has become " Father Mars," he is Silvanus (q.v.), the dweller in the woodland which surrounded the agricultural clearing.

See Roscher in 'Myth. Lex. s.v. 2385 seq. ; Wissowa, Religion und Kultus der Romer, p. 129 seq.; Preller, Romische Mythologie, ed. Jordan, i. 332 seq. ; Fowler, Roman Festivals, p, 33 seq. (W. W. F.)*

MARS, in astronomy, the fourth planet in the order of distance from the sun, and the next outside the earth. To the naked eye it appears as a bright star of a decidedly reddish or lurid tint, which contrasts strongly with the whiteness of Venus and Jupiter. At opposition it is brighter than a first magnitude star, sometimes outshining even Sirius. It is by virtue of its position the most favourably situated of all the planets for observation from the earth. The eccentricity of its orbit, 0-0933, is greater than that of any other major planet except Mercury. The result is that at an opposition near perihelion Mars is markedly nearer to the earth than at an opposition near aphelion, the one distance being about 35 million miles; the other 63 million. These numbers express only the minimum distances at or near opposition, and not the distance at other times. The time of revolution of Mars is 686-98 days. The mean interval between oppositions is 2 years 495 days, but, owing to the eccentricity of the orbit, the actual excess over

two years ranges from 36 days to more than 25 months. Its period of rotation is 24 h. 37 m. 22-66 s. (H. G. Bakhuyzen).

Motions. — The accompanying diagram will convey a notion of the varied aspects presented by the planet, of the cycles of change through which they go, and of the order in which the oppositions follow each other. The outer circle represents the orbit of Mars, the inner one that of the earth. AE is the line of the equinoxes from which longitudes are counted. The perihelion of

Mars is in longitude 335° at the point ir. The as- cending node is in longitude 47 . The line of nodes makes

Fig. 1. — Orbits of Mars and the Earth, showing aspects of the planet relative to the earth and sun.

an angle of 74 with the major axis, so that Mars is south of the ecliptic near perihelion, but north of it near aphelion. Around the inner circle, representing the earth's orbit, are marked the months during which the earth passes through the different parts of the orbit. It will be seen that the distance of Mars at the time of any opposition depends upon the month in which opposition occurs. The least possible distance would occur in an opposition about the end of August, a little before Mars reached the perihelion, because the eccentricity of the earth's orbit throws our planet a little farther from the sun and nearer the orbit of Mars in July than it does in August. The opposition of 1909 occurred on the 24th of September, at a point marked by the year near the equinox, and the month and years of the oppositions following, up to 1941, are also shown in the same way. Tracing them around, it will be seen that the points of opposition travel around the orbit in about 16 years, so that oppositions near perihelion, when Mars is therefore nearest the earth, occur at intervals of 15 or 17 years.

The axis of rotation of the planet is inclined between 23 and 24° to the orbit, and the equator of the planet has the same inclination to the plane of the orbit. The north pole is directed toward a point in longitude 355°, in consequence of which the projection of the planet's axis upon the plane of the ecliptic is nearly parallel to the line of our equinoxes. This projection is shown by the dotted line SP-NP, which corresponds closely to the line of the Martian solstices. It will be seen that at a September opposition the north pole of the planet is turned away from the sun, so that only the southern hemisphere is presented to us, and only the south pole can be seen from the earth. The Martian vernal equinox is near Q and the northern solstice near A. Here at the point S.P. the northern hemisphere is turned toward the sun. It will be seen that the aspect of the planet at opposition, especially the hemisphere which is visible, varies with the month of opposition, the general rule being that the northern hemisphere of the planet is entirely seen only near aphelion oppositions, and therefore when farthest

from us, while the southern hemisphere is best seen near perihelion

oppositions. The distances of the planet from the sun at aphelion and at perihelion are nearly in the ratio 6:5. The intensity of the sun's radiation on the planet is as the inverse square of this ratio. It is therefore more than 40% greater near perihelion than near aphelion. It follows from all this that the southern hemisphere is subjected to a more intense solar heat than the northern, and must therefore have a warmer summer season. But the length of the seasons is the inverse of this, the summer of the northern hemisphere being longer and the heat of the southern hemisphere shorter in proportion.

Surface Features. — The surface features of the planet will be better understood by first considering what is known of its atmosphere and of the temperature which probably prevails on its surface. One method of detecting an atmosphere is through its absorption of the different rays in the spectrum of the sunlight reflected from the planet. Several observers have thought that they saw fairly distinct evidence of such absorption when the planet was examined with the spectroscope. But the observations were not conclusive; and with the view of setting the question at rest if possible, W. W. Campbell at the Lick Observatory instituted a very careful series of spectroscopic observations. 1 To reduce the chances of error to a minimum the spectrum of Mars was compared with that of the moon when the two bodies were near each other. Not the slightest difference could be seen between any of the lines in the two spectra. It being certain that the spectrum of the moon is not affected by absorption, it followed that any absorption produced by the atmosphere of Mars is below the limit of perception. It was considered by Campbell that if the atmosphere of Mars were j that of the earth in density, the absorption would have been visible. Consequently the atmosphere of Mars would be of a density less than j that of the earth. 2

Closely . related to the question of an atmosphere is that of possible clouds above the surface of the planet, the existence of which, if real, would necessarily imply an atmosphere of a density approaching the limit set by Campbell's observations. The most favourable opportunity for seeing clouds would be when they are formed above a region of the planet upon which the sun is about to rise, or from which it has just been setting. The cloud will then be illuminated by the sun's rays while the surface below it is in darkness, and will appear to an observer on the earth as a spot of light outside the terminator, or visible edge of the illuminated part of the disk. It is noticeable that phe- nomena more or less of this character, though by no means common, have been noted by observers on several occasions. Among these have been the Mt Hamilton and Lowell observers, and W. H. Pickering at Arequipa. Campbell has shown that many of them may be accounted for by supposing the presence of mountains not more than two miles in height, which may well exist on the planet. While this hypothesis

will serve to explain several of these appearances, this can scarcely be said of a detached spot observed on the evening of the 26th of May 1903, at the Lowell Observatory. 3 Dr Slipher, who first saw it, was so struck by the appearance of the projection from the terminator upon the dark side of the disk that he called the other observers to witness it. Micrometric measures showed that it was some 300 miles in length, and that its highest

1 Astronomy and Astrophysics, iii. 752, and Astron. Soc. of the Pacific, Publications, vi. 273 and ix. 109.

1 According to Percival Lowell these results were, however, inconclusive because the strong atmospheric lines lie redwards beyond the part of the spectrum then possible to observe. Subse- quently, by experimenting with sensitizing dyes, Dr Slipher of the Lowell Observatory succeeded in 1908 in photographing the spectrum far into the red. Comparison spectrograms of Mars and the Moon, taken by him at equal altitudes on such plates, eight in all, show the " a " band, the great band of water-vapour was distinctly stronger in the spectrum of Mars, thus affording what appeared decisive evidence of water vapour in the atmosphere of the planet.

3 Lowell, Mars and its Canals, o. 101.

point stood some 17 miles above- the surface of the planet. That a cloud should be formed at such a height in so rare an atmosphere seems difficult to account for except on the principle that the rate of diminution of the density of an atmosphere with its height is proportional to the intensity of gravity, which is smaller on Mars than on the earth. The colour was not white, but tawny, of the tint exhibited by a cloud of dust. Percival Lowell therefore suggests that this and other appear- ances of the same kind seen from time to time are probably dust clouds, travelling over the desert, as they sometimes do on the earth, and settling slowly again to the ground.

Temperature. — Up to a recent time all that could be said of the probable temperature of Mars was that, being more distant from the sun than the earth, and having a rarer atmo- sphere, it had a general mean temperature probably below that of the earth. Greater precision can now be given to this theoretical conclusion by recent determination of the law of radiation of heat by bodies at different temperatures. Regard- ing it as fairly well established that at ordinary temperatures the radiation varies directly as the fourth power of the absolute temperature, it is possible when the " solar constant " is known to compute the temperature of a non-coloured body at the distance of Mars which presents every part of its surface in rapid succession to the sun's rays in the absence of atmosphere only. This has been elaborately done for the major planets by J. H. Poynting, 4 who computes that the mean temperature of Mars is far below the freezing point

of water. On the other hand an investigation made by Lowell in 1907, 6 taking into account the effect of the rare atmosphere on the heat lost by reflection, and of several other factors in the problem hitherto overlooked, led him to the conclusion that the mean temper- ature is about 48 Fahr. 6 But the temperature may rise much above the mean on those regions of the surface exposed to a nearly vertical noon-day sun. The diurnal changes of temper- ature, being diminished by an atmosphere, must be greater on Mars than on the earth, so that the vicissitudes of temperature are there very great, but cannot be exactly determined, because they must depend upon the conductivity and thermal capacity of the matter composing the surface of the planet. What we can say with confidence is that, during the Martian winter of between eight and twelve of our months, the regions around either pole must fall to a temperature nearer the absolute zero than any known on this planet. In fact the climatic conditions in all but the equatorial regions are probably of the same nature as those which prevail on the tops of our highest mountains, except that the cold is more intense. 7

Having these preliminary considerations in mind, we may now study the features presented to our view by the surface of the planet. These have a permanence and invariability which markedly differentiate them from the ever varying surfaces of Jupiter and Saturn, and show that what we see is a solid surface, like that of our earth. They were observed and delineated by the leading astronomers of the 16th century, especially Huygens, Cassini and Hooke. These observers could only distinguish the different regions upon the planet as bright or dark. Reasoning as they did in the case of the moon, it was naturally supposed that the brighter regions were land and the darker ones seas. The observers of our time find that the darker regions have a slightly blue-green aspect, which might suggest the idea of water, but are variegated in a way to show that they must be composed of a solid crust, like the brighter regions. The latter have a decidedly warm red or ochre tint, which gives the characteristic colour to the planet as seen by the naked eye. The regions in equatorial and middle latitudes, which are those best seen from our planet, show a surface of which the general aspect is not dissimilar to that which would be presented by the deserts of our earth

4 Phil. Trans., vol. 202 A, p. 525.

6 Proc. Amer. Acad. Arts and Sciences, vol. xlii. No. 25.

6 Professor F. W. Very concurs with Lowell (Phil. Mag., 1908).

7 According to Lowell, the climatic conditions are" proportionally warm in summer.

when seen from the moon. With each improvement in the telescope the numerous drawings of the planet show more definiteness and certainty in details. About 1830 a fairly good map was made by W. Beer and J. H. Madler, a work which has been repeated by a number of observers since that time. The volume of literature on the subject, illustrated by drawings and maps, has become so great that it is impossible here to present even an abstract of it; and it would not be practicable, even were it instructive, to enter upon any detailed description of Martian topography. A few great and well- marked features were depicted by the earliest observers, who saw them so plainly that they may be recognized by their drawings at the present time. There is also a general agreement among nearly all observers with good instruments as to the general features of the planet, but even in the latest drawings there is a marked! .divergence as to the minuter details. This is especially true of the boundaries of the more ill-defined regions, and of the faint and difficult markings of various kinds which are very numerous on every part of the planet. There is not even a close agreement between the drawings by the same observer at different oppositions; but this may be largely due to seasonal and other changes.

The most striking feature, and one which shows the greatest resemblance to a familiar terrestrial process, is that when either polar region comes into view after being turned nearly a year away from the sun, it is found to be covered with a white cap. This gradually contracts in extent as the sun shines upon it during the remaining half of the Martian year, sometimes nearly disappearing. That this change is due to the pre- cipitation of watery vapour in the form of ice, snow or frost during the winter, and its melting or evaporation when exposed to the sun's rays, is so obvious a conclusion that it has never been seriously questioned. It has indeed been suggested that the deposit may be frozen carbonic acid. While we cannot pronounce this out of the question, the probabilities seem in favour of the deposit being due to the precipitation of aqueous vapour in a frozen form. At a temperature of -50° C, which is far above what we can suppose to prevail in the polar regions during the winter, the tension of aqueous vapour is 0ˆ034 mm. On the other hand Faraday found the tension of carbonic acid to be still an entire atmosphere at as low a temperature as 8o° C. Numerically exact statements are impossible owing to our want of knowledge of the actual temperature, which must depend partly upon air currents between the equator and the poles of Mars. It can, however, be said, in a general way, that a proportion of aqueous vapour in the rare atmosphere of Mars, far smaller than that which prevails on the earth, would suffice to explain the observed formation and disappear ances of the polar caps. Since every improvement in the telescope and in the conditions of observation must enable modern observers to see all that their

predecessors did and yet more, we shall confine our statements to the latest results. These may be derived from the work of Professor Lowell of Boston, who in 1894 founded an observatory at Flagstaff, Arizona, 7250 ft. above sea-level, and supplied it with a 24″ telescope, of which the main purpose was the study of Mars. This work has been continued with such care and assiduity that its results must take precedence of all others in everything that relates to our present subject. 1

Among the more probable conclusions to be drawn from Lowell's observations, the following are of most interest. The darker areas are all seamed by lines and dots darker than them- selves, which are permanent in position, so that there can be no bodies of water on the planet. On the other hand, their colour, blue-green, is that of vegetation. This fades out as vegetation would at certain seasons to faint blue-green, but in some places to a tawny brown. Each hemisphere undergoes these changes in its turn, the changes being opposite in opposite 1 The great space penetration of the Lowell Observatory is shown in the case of stars. More stars have been mapped there in a given space than at the Lick, and Mr Ritchey of the Yerkes Observatory found stars easily visible there which were only just perceptible at Yerkes.

hemispheres. The changes in the dark areas follow some time after the, melting of the polar caps. The aspect of these areas suggests old sea bottoms, and when on the terminator appear as depressions, though this may be only apparent and due to the dark colour. The smoothness and soft outline of the terminator shows that there are no mountains on Mars comparable with ours, but that the surface is surprisingly flat. White spots are occasionally visible in the tropical and temperate regions, which are perhaps due to the condensation of frost or snow, or to saline exudation such as seasonally occurs in India (Lowell). Moreover in winter the temperate zones are more or less covered by a whitish veil, which may be either hoar frost or cloud. A spring haze seems to surround the north polar cap during its most extensive melting; otherwise the Martian sky is quite clear, like that of a dry desert land. When either polar cap is melting it is bordered by a bluish area, which Lowell attributes to the water produced by the melting. But the obliquity at which the sun's rays strike the surface as the cap is melting away is so great that it would seem to preclude the possibility of a temperature high enough to melt the snow into water. Under the low barometric pressure prevailing on the planet, snow would evaporate under the influence of the sun's rays without changing into water. It is also contended that what looks like such a bluish border may be formed around a bright area by the secondary aberration of a refracting telescope. 2

The modern studies of Mars which have aroused so much public interest began with the work of Schiaparelli in 1877. Accepting the term " ocean,"

used by the older observers, to designate the widely extended darker regions on the planet, and holding that they were really bodies of water, he found that they were connected by comparatively narrow streaks. (Schiaparelli considered them really water until after the Lowell observations.) In accordance with the adopted system of nomenclature, he termed these streaks canale, a word of which the proper rendering into English would be channels. But the word was actually translated into both English and French as canal, thus connoting artificiality in the supposed waterways, which were attributed to the inhabitants of the planet. The fact that they were many miles in breadth, and that it was therefore absurd to call them canals, did not prevent this term from being so extensively used that it is now scarcely possible to do away with it. A second series of observations was made by Schiaparelli at the opposition of 1879, when the planet was farther away, but was better situated as to altitude above the horizon. He now found a number of additional channels, which were much finer than those he had previously drawn. The great interest attaching to their seemingly artificial character gave an impetus to telescopic study of the planet which has continued to the present time. New canals were added, especi- ally at the Lowell Observatory, until the entire number listed in 1908 amounted to more than 585. The general character of this complex system of lines is described by Lowell as a network covering the whole face of the planet, light and dark regions alike, and connecting at either end with the respective polar caps there. At their junctions are small dark pinheads of spots. The lines vary in size between themselves, but each maintains its own width throughout. But the more difficult of these objects are only seen occasionally and are variable in definiteness. Of two canals equally well situated for seeing, only one may be visible at one time and only the other at other times. If this variability of aspect among different canals is true as they are seen from the Lowell Observatory, we find it true to a much greater extent when we compare descriptions by different observers. At Flagstaff, the most favourably situated of all the points of observation, they are seen as fine sharp lines, sometimes as well marked as if drawn with a pencil. But other observers see them with varying degrees of breadth and diffuseness.

One remarkable feature of these objects is their occasional

2 As against this, Lowell's answer is that the effect is not optical ; for the belt surrounds the melting, not the making cap.

" gemination," some of the canals appearing as if doubled. This was first

noticed by Schiaparelli, and has been confirmed, so far as observations can confirm it, by other observers. Dif- ferent explanations of this phenomenon have been suggested, but the descriptions of it are not sufficiently definite to render any explanation worthy of entire confidence possible. Indeed the more cautious astronomers, who have not specially devoted themselves to the particular phenomena, reserve a doubt as to how far the apparent phenomena of the finer canals are real, and what the markings which give rise to their appearance might prove to be if a better and nearer view of the planet than is now possible could be obtained. Of the reality of the better marked ones there can be no doubt, as they have been seen repeatedly by many observers, including those at the Lick Observatory, and have actually been photographed at the Lowell Observatory. The doubt is therefore confined to the vast network of lines so fine that they never certainly have been seen elsewhere than at Flagstaff. The difficulty of pronouncing upon their reality arises from the fact that we have to do mainly with objects not plainly visible (or, as Lowell contends, not plainly visible elsewhere). The question therefore becomes one of psychological optics rather than of astronomy. When the question is considered from this point of view it is found that combinations of light and shaded areas very different from continuous lines, will, under certain con- ditions, be interpreted by the eye as such lines; and when such is the case, long practice by an observer, however carefully conducted, may confirm him in this interpretation. To give a single example of the principles involved; it is found by experiment that if, through a long line so fine as to approach the limit of visibility, segments not too near each other, or so short that they would not be visible by themselves, be taken out, their absence from the line will not be noticed, and the latter will still seem continuous. 1 In other words we do not change the aspect of the line by taking away from it a part which by itself would be invisible. This act of the eye, in interpreting a discontinuous series of very faint patches as a continuous line, is not, properly speaking, an optical illusion, but rather a habit. The arguments for the reality of all the phenomena associated with the canals, while cogent, have not sufficed to bring about a general consensus of opinion among critics beyond the limit already mentioned.

Accepting the view that the dark lines on Mars are objectively real and continuous, and are features as definite in reality as they appear in the telescope, Professor Lowell has put forth an explanation of sufficient interest to be mentioned here. His first proposition is that lines frequently thousands of miles long, each following closely a great circle, must be the product of design rather than of natural causes. His explanation is that they indicate the existence of irrigating canals which carry the water produced annually by the melting of the polar snows to every part of the planet. The actual canals are too minute to be visible to us. What we really

see as dark lines are broad strips of vegetation, produced by artificial cultivation extending along each border of the irrigating streams. On the other hand, in the view of his critics, the quantity of ice or snow which the sun's rays could melt around the poles of Mars, the rate of flow and evaporation as the water is carried toward the equator, and several other of the conditions involved, require investigation before the theory can be established. 2

The accompanying illustrations of Mars and its canals are

1 For limits of this theory and Lowell's view of its inapplicability to Mars, see Astrophys. Jour., Sept. 1907.

2 Prof. Lowell's theory is supported by so much evidence of differ- ent kinds that his own exposition should be read in extenso in Mars and its canals and Mars as the abode of life. In order, however, that his views may be adequately presented here, he has kindly supplied the following summary in his own words : —

" Owing to inadequate atmospheric advantages generally, much misapprehension exists as to the definiteness with which the surface of Mars is seen under good conditions. In steady air the canals are perfectly distinct lines, not unlike the Fraunhofer ones of the Spectrum, pencil lines or gossamer filaments according to size. All the observers at Flagstaff concur in this. The photographs of them

those of Lowell, and represent the planet as seen by the Flagstaff observers.

Satellites and Pole of Mars. — At the opposition of Mars which occurred in August 1877 the planet was unusually near the earth. Asaph Hall, then in charge of the 26" telescope at the Naval Observatory in Washington, took advantage of this favourable circumstance to make a careful search for a visible satellite of the planet. On the night of the nth of August he found a faint object near the planet. Cloudy weather intervened, and

Fig. 2.

the object was not again seen until the 16th, when it was found to be moving with the planet, leaving no doubt as to its being a satellite. On the night following an inner satellite much nearer the planet was observed. This discovery, apart from its intrinsic taken there also confirm it up to the limit of their ability. Careful experiments by the same observers on artificial lines show that if the canals had breaks amounting to 16 m. across, such breaks would be visible. None are; while the lines themselves are thousands of miles long and perfectly straight (Astrophys. Journ., Sept. 1907). Between expert observers representing the planet at the same epoch the accordance

is striking; differences in drawings are differences of time and are due to seasonal and secular changes in the planet itself. These seasonal changes have been carefully followed at Flagstaff, and the law governing them detected. They are found to depend upon the melting of the polar caps. After the melting is under way the canals next the cap proceed to darken, and the darken- ing thence progresses regularly down the latitudes. Twice this happens every Martian year, first from one cap and then six Martian months later from the other. The action reminds one of the quicken- ing of the Nile valley after the melting of the snows in Abyssinia; only with planet-wide rhythm. Some of the canals are paired. The phenomenon is peculiar to certain canals, for only about one- tenth of the whole number, 56 out of 585, ever show double and these do so regularly. Each double has its special width ; this width between the pair being 400 m. in some cases, only 75 in others. Care- ful plotting has disclosed the fact that the doubles cluster round the planet's equator, rarely pass 40 ° Lat., and never occur at the poles, though the planet's axial tilt reveals all its latitudes to us in turn. They are thus features of those latitudes where the surface is greatest compared with the area of the polar cap, which is suggestive. Space precludes mention of many other equally striking peculiarities of the canals' positioning and development. At the junctions of the canals are small, dark round spots, which also wax and wane with the seasons. These facts and a host of others of like significance have led Lowell to the conclusion that the whole canal system is of artifi- cial origin, first because of each appearance and secondly because of the laws governing its development. Every opposition has added to the assurance that the canals are artificial; both by disclosing their peculiarities better and better and by removing generic doubts as to the planet's habitability. The warmer temperature disclosed from Lowell's investigation on the subject, and the spectrographic detection by Slipher of water-vapour in the Martian air, are among the latest of these confirmations." — [Ed.]

interest, is also noteworthy as the first of a series of discoveries of satellites of the outer planets. The satellites of Mars are difficult to observe, on account not merely of their faintness, but of their proximity to the planet, the light of which is so bright as to nearly blot out that of the satellite. Intrinsically the inner satellite is brighter than the outer one, but for the reason just mentioned it is more difficult to observe. The names given them by Hall were Deimos for the outer satellite and Phobos for the inner one, derived from the mythological horses that drew the chariot of the god Mars. A remarkable feature of the orbit of Phobos is that it is so near the planet as to perform a revolu- tion in less than one-third that of the diurnal

rotation of Mars. The result is that to an inhabitant of Mars this satellite would rise in the west and set in the east, making two apparent diurnal revolutions every day. The period of Deimos is only six days greater than that of a Martian day; consequently its apparent

Fig. 3.

motion around the planet would be so slow that more than two days elapse between rising and setting, and again between setting and rising.

Owing to the minuteness of these bodies it is impossible to make any measures of their diameters. These can be inferred only from their brightness. Assuming them to be of the same colour as Mars, Lowell estimates them to be about ten miles for Deimos and somewhat more for Phobos. But these estimates are uncertain, not only from the somewhat hypothetical character of the data on which they rest, but from the difficulty of accu- rately estimating the brightness of such an object in the glare of the planet.

A long and careful series of observations was made upon these bodies by other observers. Later, especially at the very favour- able oppositions of 1892 and 1894, observations were made by Hermann Struve at Poulkova, who subjected all the obser- vations up to 1898 to a very careful discussion. He showed that the inclination of the planes of the orbits to the equator of the planet is quite small, thus making it certain that these two planes can never wander far from each other. In the following state- ment of the numerical elements of the entire system, Struve's results are given for the satellites, while those of Lowell are adopted for the position of the plane of the equator.

The relations of the several planes can be best conceived by considering the points at which lines perpendicular to them, or their poles, meet the celestial sphere. By theory, the pole of the orbital plane of each satellite revolves round the pole of a certain fixed plane, differing less from the plane of the equator of Mars the nearer the satellite is to Mars. Lowell from a combi-

nation of his own observations with those of Schiaparelli, Lohse and Cerulli, found for the pole of the axis of rotation of Mars 1 : — R.A. =317-5°; Dec. = + 54-5°; Epoch, 1905.

Tilt 2 of Martian Equator to Martian ecliptic, 23 . 59'. Her- mann Struve, from the observations of the satellites, found theoretically the following positions of this pole, and of those of the fixed planes of the satellite orbits for 1900: —

Pole of Mars : R.A. =317-25° Dec. =52-63°

Pole of fixed plane for Phobos =317-24° = 52-64°

Poleof fixed plane for Deimos = 3i6-20° = 53-37

Lowell's position of the pole is that now adopted by the British Nautical Almanac.

The actual positions of the poles of the satellite — orbits revolve around these poles of the two fixed planes in circles. Putting N for the right-ascensions of their nodes on the plane of the terres- trial equator, and J for their angular distance from the north terrestrial pole, N, and J, for the corresponding poles of the fixed planes, and t for the time in years after 1900, Struve's results are: —

*Deimos. Ni=46°.l2′ 0-463′ *; J=36°.42'-o-24′ t (N-NO sin J =97-6′ sin (356-8° 6 3 75° J -j! =97-6 cos (356-8° -6-375° Phobos. N!=47 8 14-3′ + 0-46′ t; Ji = 37° 21-9′ – 0-24′ t (N – Ni) sin J = 53-1′ sin (2 5 7°-i' – 158-0° /) J-Ji = 53-i cos (257V – 158-0ˆ*

The other elements are: —

Deimos. Phobos.

Mean long. 1894, Oct. 0.0. G.M.T 186-25° 296-13°

Mean daily motion (tropical) 285-16198° 1128-84396°

Mean distance (A = 1) 32-373″ 12-938″

Long, of pericentre, (ir+N) 264°+6-375° t I4°+I58-o° t

Eccentricity of orbit 0-0031 0-0217

Epoch for t 1900-0 1900-0

Bibliography. — Flammarion, La Planete Mars et ses conditions d'habitilite (Paris, 1892), embodies so copious a resume of all the publications and drawings relating to Mars up to 1891 that there is little occasion for reference in detail to early publications. Among the principal sources may be mentioned the Monthly Notices and Memoirs of the Royal Astronomical Society, the publications of the Astronomical Society of the Pacific, especially vols, vi., viii. and ix., containing observations and discussions by the Mt Hamilton astronomers, and the journals, Sidereal Messenger, Astronomy and Astrophysics and Astrophysical Journal. Schiaparelli's extended memoirs appeared under the general title Osservazioni

astronomiche e fisiche still' asse di rotazione e sulla topografia del pianeta Marie, and were published in different volumes of the Memoirs of the Reale Accademia dei Lincei of Rome. The observations and drawings of Lowell are found in extenso in Annals of the Lowell Observatory. Lowell's conclusions are summarized in Mars and its Canals, by Percival Lowell (1906), and Mars as the Abode of Life (1909). In connexion with his work may be mentioned Mars and its Mystery, by Edward S. Morse (Boston, 1906), the work of a naturalist who made studies of the planet at the Lowell Observatory in 1905. Brief discussions and notices will also be found in the Lowell Observa- tory Bulletins. The optical principles involved in the interpreta- tions of the canals are discussed in recent volumes of the Monthly Notices, R.A.S., and in the Astrophysical Journal. In 1907 the veteran A. R. Wallace disputed Lowell's views vigorously in his Is Mars Habitable? and was briefly answered by Lowell in Nature, who contended that Wallace's theory was not in accord with celestial mechanics. (S. N.)

MARSALA, a seaport of Sicily, in the province of Trapani, 19 m. by rail S. of Trapani. Pop. (1881), 19,732; (1901), 57,567. The low coast on which it is situated is the westernmost point of the island. The town is the seat of a bishop, and the cathedral contains 16 grey marble columns, which are said to have been intended for Canterbury Cathedral in England, the vessel conveying them having been wrecked here. The town owes its importance mainly to the trade in Marsala wine.

Marsala occupies the site of Lilybaeum, the principal strong- hold of the Carthaginians in Sicily, founded by Himilco after the abandonment of Motya. Neither Pyrrhus nor the Romans were able to reduce it by siege, but it was surrendered to the latter in 241 B.C. at the end of the First Punic War. In the later wars it was a starting point for the Roman expeditions against Carthage;

1 Bulletin Lowell Obsy., Monthly Notices, R.A.S. (1905), 66, p. 51.

2 St Petersburg Memoirs, series viii., Phys. Mars-classe, vol. viii.

and under Roman rule it enjoyed considerable prosperity (C.I.L. x. p. 742). It obtained municipal rights from Augustus and became a colony under Pertinax or Septimus Severus. The Saracens gave it its present name, Marsa Alt, port of Ali. The harbour, which lay on the north-east, was destroyed by Charles V. to prevent its occupation by pirates. The modern harbour lies to the south-east. In i860 Garibaldi landed at Marsala with

1000 men and began his campaign in Sicily. Scanty remains of the ancient Lilybaeum (fragments of the city walls, of squared stones, and some foundations of buildings between the walls and the sea) are visible; and the so-called grotto and spring of the Sibyl may be mentioned. To the east of the town is a great fosse which defended it on the land side, and beyond this again are quarries like those of Syracuse on a small scale. The modern town takes the shape of the Roman camp within the earlier city, one of the gates of which still existed in 1887. The main street (the Cassaro) perpetuates the name castrum.

MARSDEN, WILLIAM (1754-1836), English orientalist, the son of a Dublin merchant, was born at Verval, Co. Wicklow on the 1 6th of November 1754. He was educated in Dublin, and having obtained an appointment in the civil service of the East India Company arrived at Benkulen, Sumatra, in 1771. There he soon rose to the office of principal secretary to the government, and acquired a knowledge of the Malay language and country. Returning to England in 1779 with a pension, he wrote his History of Sumatra, published in 1783. Marsden was appointed in 1795 second secretary and afterwards first secretary to the admiralty. In 1807 he retired and published in 1812 his Gram- mar and Dictionary of the Malay Language, and in 1818 his translation of the Travels of Marco Polo. He was a member of many learned societies, and treasurer and vice-president of the Royal Society. In 1834 he presented his collection of oriental coins to the British Museum, and his library of books and Oriental MSS. to King's College, London. He died on the 6th of October 1836.

Marsden's other works are: Numismata orientalia (London, 1823-1825); Catalogue of Dictionaries, Vocabularies, Grammars and Alphabets (1796); and several papers on Eastern topics in the Philosophical Transactions and the Archaelogia.

MARSEILLES, a city of southern France, chief seaport of France and of the Mediterranean, 219 m. S. by E. of Lyons and S34 m. S.S.E. of Paris, by the Paris-Lyon-Mediterranee railway. Pop. (1906), commune 517,498; town 421,116. Marseilles is situated on the Golfe du Lion on the eastern shore of a bay protected to the south by Cape Croisette but open towards the west; to the east the horizon is bounded by an amphitheatre of hills, those in the foreground clothed with vegetation while the more distant eminences are bare and rugged. The city is built on undulating ground and the south-western and most aristocratic quarter covers the slopes of the ridge crowned by a fort and the church of Notre-Dame de la Garde and projecting westward into the bay to form a protection for the harbour. The newest and most pleasant portion lies on the south-eastern slope of the ridge, between the southern end of the Rue Paradis and the Prado avenues, which is better protected than most other quarters from the mistral that

blows down the Rhone valley, and where in summer the temperature is always a little lower than in the centre of the town. The old harbour of Marseilles opens on the west to the Golfe du Lion, the famous Rue Cannebiere 1 prolonged by the Rue Noailles leading E.N.E. from its inner end. These two streets are the centre of the life of the city. Continued in the Allees de Meilhan and the Boule- vard de la Madeleine, they form one of its main arteries. The other, at right angles with the first, connects the Place d'Aix with the spacious and fashionable Promenade du Prado, by way of the Cours Belsunce and the Rue de Rome. Other fine streets— the Rue St Ferreol, the Rue Paradis and the Rue Breteuil are to the south of the Cannebiere running parallel with the Rue de Rome. To these must be added the neighbouring avenue of Pierre Puget named after the sculptor whose statue

1 From the Latin cannabis, Provencal cannebe, " hemp," in allusion to the rope-walks formerly occupying its site.

stands in the Borely Park. The Prado, with its avenues of trees and fine houses, runs to within a quarter of a mile of the Huveaune, a stream that borders the city on the south-east, then turns off at right angles and extends to the sea, coming to an end close to the Borely Park and the race-course. From its extremity the Chemin de la Corniche runs northwards along the coast, fringed by villas and bathing establishments, to the Anse des Catalans, a distance of 45 miles.

The old town of Marseilles is bounded W. by the Joliette basin and the sea, E. by the Cours Belsunce, S. by the northern quay of the old port, and N. by the Boulevard des Dames. It consists of a labyrinth of steep, dark and narrow streets inhabited by a seafaring population. Through its centre runs the broad Rue de la Republique, extending from the Cannebiere to the Place de la Joliette. The entrance to the old harbour is defended by Fort St Jean on the north and Fort St Nicolas on the south. Behind the latter is the Anse (Creek) de la Reserve. Beyond this again, situated in succession along the shore, come the Chateau du Pharo, given by the empress Eugenie to the town, the Anse du Pharo, the military exercising ground, and the Anse des Catalans. To the old harbour, which covers only 70 acres with a mean depth of 192 ft. and is now used by sailing vessels, the basin of La Joliette (55 acres) with an entrance harbour "was added in 1853. Communicating with the old harbour by a channel which passes behind Fort St Jean, this dock opens on the south into the outer harbour, opposite the palace and the Anse du Pharo. A series of similar basins separated from the roadstead by a jetty 25 m. long was subsequently added along the shore to the north, viz. the basins of Lazaret and Arenc, bordered by the harbour railway station and the extensive ware- houses of the Compagnie des Docks et Entrep6ts, the Bassin de la Gare Maritime with the warehouses of the

chamber of commerce; the Bassin National with the refitting basin, comprising six dry docks behind it; and the Bassin de la Pinede entered from the northern outer harbour. These new docks have a water area of 414 acres and over n m. of quays, and are commodious and deep enough for the largest vessels to manoeuvre easily.

In the roads to the south-west of the port lie the islands of Ratonneau and Pomegue, united by a jetty forming a quarantine port. Between them and the mainland is the islet of Chateau d'lf, in which the scene of part of Dumas' Monte Cristo is laid.

Marseilles possesses few remains of either the Greek or Roman periods of occupation, and is poor in medieval buildings. The old cathedral of la Major (Sainte-Marie-Majeure), dating chiefly from the 12th century and built on the ruins of a temple of Diana, is in bad preservation. The chapel of St Lazare (late 15th century) in the left aisle is in the earliest Renaissance style, and a bas-relief of white porcelain by Lucca della Robbia is of artistic value. Beside this church and alongside the Joliette basin is a modern building begun in 1852, opened for worship in 1893 and recognized as the finest modern cathedral in France. It is a Byzantine basilica, in the form of a Latin cross, 460 ft. long, built in green Florentine stone blended with white stone from the neighbourhood of Aries. The four towers which surmount it — two at the west front, one over the crossing, one at the east end — are roofed with cupolas. Near the cathedral stands the bishop's palace, and the Place de la Major, which they overlook, is em-" bellished with the statue of Bishop Belsunce, who displayed great devotion during the plague of r 7 20-1 721. The celebrated Notre- Dame de la Garde, the steeple of which, surmounted by a gilded statue of the Virgin, 30 ft. in height, rises 150 ft. above the summit of the hill on which it stands, commands a view of the whole port and town, as well as of the surrounding mountains and the neighbouring sea. The present chapel is modern and occupies the site of one built in 12 14.

On the south side of the old harbour near the Fort St Nicolas stands the church of St Victor, built in the 13th century and once attached to an abbey founded early in the 4th century. With its lofty crenellated walls and square towers built of large blocks of uncemented stone, it resembles a fortress. St Victor is built

above crypts dating mainly from the nth century but also embodying architecture of the Carolingian period and of the early centuries of the

Christian era. Tradition relates that St Lazarus inhabited the catacombs under St Victor; and the black image of the Virgin, still preserved there, is popularly attributed to St Luke. The spire, which is the only relic of the ancient church of Accoules, marks the centre of Old Marseilles. At its foot are a " calvary " and a curious underground chapel in rock work, both modern. Notre-Dame du Mont Carmel, also in the old town, occupies the place of what was the citadel of the Massaliots when they were besieged by Julius Caesar.

Of the civil buildings of the city, the prefecture, one of the finest in France, the Palais de Justice, in front of which is the statue of the advocate Antoine Berryer (1790-1868) and the Exchange, all date from the latter half of the 19th century. The Exchange, built at the expense of the Chamber of Commerce, includes the spacious hall of that institution with its fine mural paintings and gilding. The hotel-de-ville (17th century) stands on the northern quay of the old harbour. All these buildings are surpassed by the Palais Longchamp (1862-1870), situated in the north-east of the town at the end of the Boulevard Long- champ. The centre of the building is occupied by a monumental chdteau d'eau (reservoir). Colonnades branch off from this, uniting it on the left to the picture gallery, with a fine collection of ancient and modern works, and on the right to the natural history museum, remarkable for its conchological department and collection of ammonites. In front are ornamental grounds; behind are extensive zoological gardens, with the astronomical observatory. The museum of antiquities is established in the Chateau Borely (1766-1778) in a fine park at the end of the Prado. It includes a Phoenician collection (containing the remains that support the hypothesis of the Phoenician origin of Marseilles), an Egyptian collection, numerous Greek, Latin, and Christian inscriptions in stone, &c. A special building within the city contains the school of art with a valuable library and a collection of medals and coins annexed to it. The city also has a colonial museum and a laboratory of marine zoology. The triumphal arch of Aix, originally dedicated to the victors of the Trocadero, was in 1830 appropriated to the conquests of the empire.

The canal de Marseille, constructed from 1837 to 1848, which has metamorphosed the town and its arid surroundings by bring- ing to them the waters of the Durance, leaves the river opposite Pertuis. It has a length of 97 miles (including its four main branches) of which 13 are underground, and irrigates some 7500 acres. After crossing the valley of the Arc, between Aix and Rognac, by the magnificent aqueduct of Roquefavour, it purifies its waters, charged with ooze, in the basins of Realtort. It draws about 2200 gallons of water per second from the Durance, supplies 2450 horse-power to works in the vicinity of Marseilles, and ensures a good water-supply and efficient sanitation to the city.

Marseilles is the headquarters of the XV. army corps and the seat of a bishop and a prefect. It has tribunals of first instance and of commerce, a chamber of commerce, a board of trade arbitration, and a branch of the Bank of France. The educa- tional institutions include a faculty of science, a school of medicine and pharmacy, and a faculty (Jaculti libre) of law, these three forming part of the university of Aix-Marseille; lycees for boys and girls, a conservatoire of music, a school of fine art, a higher school of commerce, a school for ships' boys, a school of navigation and industrial schools for both sexes.

Trade and Industry.— Marseilles is the western emporium for the Levant trade and the French gate of the Far East. It suffers, however, from the competition of Genoa, which is linked with the Rhine basin by the Simplon and St Gotthard railway routes, and from lack of communication with the inland waterways of France. In January 1902 the chamber Of deputies voted £3,656,000 for the con- struction of a canal from Marseilles to the Rhone at Aries. This scheme was designed to overcome the difficulties of egress from the Rhone and to make the city the natural outlet of the rich Rhone basin. Much of the activity of the port is due to the demand for raw material created by the industries of Marseilles itself. The imports include raw silk, sesame, ground-nuts and other oil-producing

fruits and seeds largely used in the soap manufacture, cereals and flour, wool, hides and skins, olive and other oils, raw cotton, sheep and other livestock, woven goods, table fruit, wine, potatoes and dry vegetables, lead, cocoon silk, coffee, coal, timber. The total value of imports was £64,189,000 in 1907, an increase of £18,000,000 in the preceding decade. The exports, of which the total value was £52,901,000 (an increase of £21,000,000 in the decade) included cotton fabrics, silk fabrics, cereals and flour, hides and skins, wool fabrics, worked skins, olive and other oils, chemical products, wine, refined sugar, raw cotton, wool, coal, building- material, machinery and pottery.

The port is the centre for numerous lines of steamers, of which the chief are the Messageries Maritimes, which ply to the eastern Mediterranean, the east coast of Africa, Australia, India, Indo-China, Havre and London, and the Compagnie Gfinerale Transatlantique, whose vessels run to Algiers, Tunis, Malta, Corsica, Morocco and the Antilles. In addition many important foreign lines call at the port, among them being the P. and O., the Orient, the North German Lloyd, and the German East Africa lines.

Marseilles has five chief railway stations, two of which serve the new harbours, while one is alongside the old port ; the city is on the main line of the Paris-Lyon-Mediterranee railway from the Riviera and Toulon to Paris via Aries, Avignon and Lyons, another less important line connecting it

with Aix.

Soap-making, introduced in antiquity from Savona and Genoa, is carried on in upwards of fifty factories. These utilize the products of the oil-distilleries and of the chemical works, the latter being also an important adjunct to the manufacture of candles, another leading industry. A large quantity of iron, copper and other ores is smelted in the blast-furnaces of Saint Louis in the vicinity and in other foundries, and the Mediterranean Engineering Company and other companies have large workshops for the construction or repair of marine steam-engines and every branch of iron ship-building. To these industries must be added flour-milling, the manufacture of semolina and other farinaceous foods and of biscuits, bricks and tiles, rope, casks, capsules for bottles and other tin-goods, tanning, distilling, brewing and sulphur- and sugar-refining. There are state tobacco and match factories.

History. — The Greek colony of Massalia (Lat. Massilia) was founded by the mariners of Phocaea in Asia Minor, about 600 B.C. The settlement of the Greeks in waters which the Carthaginians reserved for their own commerce was not effected without a naval conflict; it is not improbable that the Phoenicians were settled at Marseilles before the Greek period, and that the name of the town is the Phoenician for " settlement." Whether the judges (sophetim, " suffetes ") of the Phoenician sacrificial tablet of Marseilles were the rulers of a city existing before the advent of the Phocaeans, or were consuls for Punic residents in the Greek period, is disputed. In 542 B.C. the fall of the Phocaean cities before the Persians probably sent new settlers to the Ligurian coast and cut off the remote city of Massalia from close connexion with the mother country. Isolated amid alien populations, the Massaliots made their way by prudence in dealing with the inland tribes, by vigilant administration of their oligarchical government, and by frugality united to remarkable commercial and naval enterprise. Their colonies spread east and west along the coast from Monaco to Cape St Martin in Spain, carrying with them the worship of Artemis; the inland trade, in which wine was an important element, can be traced by finds of Massalian coins across Gaul and through the Alps as far as Tirol. In the 4th century B.C. the Massaliot Pytheas visited the coasts of Gaul, Britain and Germany, and Euthymenes is said to have sailed down the west coast of Africa as far as Senegal. The great rival of Massalian trade was Carthage, and in the Punic Wars the city took the side of Rome, and was rewarded by Roman assistance in the subjugation of the native tribes of Liguria. In the war between Caesar and Pompey Massilia took Pompey's side and in a.d. 49 offered a vain resistance to Caesar's lieutenant Trebonius. In memory of its ancient services the city, " without which," as Cicero says, " Rome had never triumphed over the Transalpine nations," was left as a civilas libera, but her power was broken and most of

her dependencies taken from her. From this time Massilia has little place in Roman history; it became for a time an important school of letters and medicine, but its commercial and intellectual importance declined. The town appears to have been christianized before the end of the 3rd century, and at the beginning of the 4th century was the scene of the martyr- dom of St Victor. Its reputation partly revived through the names of Gennadius and Cassian, which give it prominence

in the history of Semi-Pelagianism and the foundation of western monachism.

After the ravages of successive invaders, Marseilles was re- peopled in the ioth century under the protection of its viscounts. The town gradually bought up their rights, and at the beginning of the 13th century was formed into a republic, governed by a podestal, who was appointed for life, and exercised his office in conjunction with 3 notables, and a municipal council, composed of 80 citizens, 3 clerics, and 6 principal tradesmen. During the rest of the middle ages, however, the higher town was governed by the bishop, and had its harbour at the creek of La Joliette which at that period ran inland to the north of the old town. The southern suburb was governed by the abbot of St Victor, and owned the Port des Catalans. Situated between the two, the lower town, the republic, retained the old harbour, and was the most powerful of the three divisions. The period of the crusades brought prosperity to Marseilles, though throughout the middle ages it suffered from the competition of Pisa, Genoa and Venice. In 1245 and 1256 Charles of Anjou, count of Provence, whose predecessors had left the citizens a large measure of independence, established his authority above that of the republic. In 1423 Alphonso V. of Aragon sacked the town. King Rene, who had made it his winter residence, however, caused trade, arts and . manufactures again to flourish. On the embodiment of Provence in the kingdom of France in 1481, Marseilles preserved a separate administration directed by royal officials. Under Francis I. the disaffected constable Charles de Bourbon vainly besieged the town with the imperial forces in 1524. During the wars of religion, Marseilles took part against the Protestants, and long refused to acknowledge Henry IV. The loss of the ancient liberties of the town brought new disturbances under the Fronde, which Louis XIV. came in person to suppress. He entered the town by a breach in the walls and afterwards had Fort St Nicolas constructed. Marseilles repeatedly suffered from the plague, notably from May 1720 to May 1721.

During the Revolution the people rose against the aristocracy, who up to that time had governed the commune. In the Terror they rebelled against the Convention, but were promptly subdued by General Carteaux. The wars of the empire, by dealing a blow to their maritime commerce, excited the hatred of the inhabitants against Napoleon, and they hailed the return of the Bourbons and the defeat of Waterloo. The news of the latter provoked a bloody reaction in the town against those suspected of imperialism. The prosperity of the city received a considerable impulse from the conquest of Algeria and from the opening of the Suez Canal.

See P. Castanier, Histoire de la Provence dans Vanliquite, vol. ii. (Paris, 1896) ; E. Caman, Marseille au XX m ° siecle (Paris, 1905) ; P. Joanne, Marseille el ses environs.

MARSH, ADAM (Adam de Marisco) (d. c. 1258), English Franciscan, scholar and theologian, was born about 1200 in the diocese of Bath, and educated at Oxford under the famous Grosseteste. Before 1226 Adam received the benefice of Wear- mouth from his uncle, Richard Marsh, bishop of Durham; but between that year and 1230 he entered the Franciscan order. About 1238 he became the lecturer of the Franciscan house at Oxford, and within a few years was regarded by the English province of that order as an intellectual and spiritual leader. Roger Bacon, his pupil, speaks highly of his attainments in theology and mathematics. His fame, however, rests upon the influence which he exercised over the statesmen of his day. Consulted as a friend by Grosseteste, as a spiritual director by Simon de Montfort, the countess of Leicester and the queen, as an expert lawyer and theologian by the primate, Boniface of Savoy, he did much to guide the policy both of the opposition and of the court party in all matters affecting the interests of the Church. He shrank from office, and never became provincial minister of the English Franciscans, though constantly charged with responsible commissions. Henry III. and Archbishop Boniface unsuccessfully endeavoured to secure for him the see of Ely in 1256. In 1257 Adam's health was failing, and he appears to have died in the following year. To judge from his corre-

spondence he took no interest in secular politics. He sympathized with Montfort as with a friend of the Church and an unjustly treated man; but on the eve of the baronial revolution he was on friendly terms with the king. Faithful to the traditions of his order, he made it his ambition to be a mediator. He rebuked both parties in the state for their shortcomings, but he did not break with either.

See his correspondence, with J. S. Brewer's introduction, in Monumenta franciscana, vol. i. (Rolls ser., 1858); the biographical notice in A. G. Little's Grey Friars in Oxford (Oxford, 1892), where all the references are

collected. On Marsh's relations with Grosse- teste, see Roberti Grosseteste epistolae, ed. H. R. Luard (Rolls ed., 1861), and F. S. Stevenson, Robert Grosseteste (London, 1809).

(H. W. C. D.)

MARSH, GEORGE PERKINS (1801-1882), American diplo- matist and philologist, was born at Woodstock, Vermont, on the 15th of March 1801. He graduated at Dartmouth College in 1820, was admitted to the bar in 1825, and practised law at Burlington, Vermont, devoting himself also with ardour to philological studies. In 1835 he was a member of the Supreme Executive Council of Vermont, and from 1843 to 1849 & Whig representative in Congress. In 1849 he was appointed United States minister resident in Turkey, and in 1852-1853 discharged a mission to Greece in connexion with the imprisonment by the authorities of that country of an American missionary, Dr Jonas King (1792-1869). He returned to Vermont in 1854, and in 1857 was a member of the state railway commission. In 1861 he became the first United States minister to the kingdom of Italy, and died in that office at Vallombrosa on the 23rd of July 1882. He was buried in a Protestant cemetery in Rome. Marsh was an able linguist, writing and speaking with ease the Scandinavian and half a dozen other European languages, a remarkable philologist for his day, and a scholar of great breadth, knowing much of military science, engraving and physics, as well as of Icelandic, which was his specialty. He wrote many articles for Johnson's Universal Cyclopaedia, and contributed many reviews and letters to the Nation. His chief published works are: A Compendious Grammar of the Old Northern or Icelandic Language (1838), compiled and translated from the grammars of Rask; The Camel, his Organization, Habits, and Uses, with Reference to his Introduction into the United States (1856); Lectures on the English Language (i860); The Origin and History of the English Language (1862; revised ed., 1885); and Man and Nature (1865). The last-named work was translated into Italian in 1872, and, largely rewritten, was issued in 1874 under the title The Earth as Modified by Human Action; a revised edition was published in 1885. He also published a work on Mediaeval and Modern Saints and Miracles (1876). His valuable library was presented in 1883 by Frederick Billings to the university of Vermont. His second wife, Caroline (Crane) Marsh (1816-1901), whom he married in 1839, published Wolfe of the Knoll and other Poems (i860), and the Life and Letters of George Perkins Marsh (New York, 1888). This last work was left incomplete, the second volume never having been pub- lished. She also translated from the German of Johann C. Biernatzki (1 795-1840), The Hallig; or the Sheep] old in the Waters (1856).

MARSH, HERBERT (1757-1839), English divine, was born at Faversham,

Kent, on the ioth of December 1757, and was educated at St John's College, Cambridge, where he was elected fellow in 1782, having been second wrangler and second Smith's prizeman. For some years he studied at Leipzig; and between 1793 and 1 801 published in four volumes a translation of J. D. Michaelis's Introduction to the New Testament, with notes of his own, in which he may be said to have intro- duced German methods of research into English biblical scholarship. His History of the Politics of Great Britain and France (1799) brought him much notice and a pension from William Pitt. In 1807 he was appointed Lady Margaret professor of divinity at Cambridge, and lectured to large audiences on biblical criticism, substituting English for the traditional Latin. Both here, and afterwards as bishop of Llandaff (1816) and of Peterborough (1819). he stoutly opposed

hymn-singing, Calvinism, Roman Catholicism, and the Evangel- ical movement as represented by Charles Simeon and the Bible Society. Among his writings are Lectures on the Criticism and Interpretation of the Bible (1828), A Comparative View of the Churches of England and Rome (1814), and Horae Pelasgicae (1815). He died at Peterborough on the 1st of May 1839.

*MARSH, NARCISSUS (1638-1713), archbishop of Dublin and Armagh, was born at Hannington, Wiltshire, and educated at Oxford. He became a fellow of Exeter College, Oxford, in 1658. In 1662 he was ordained, and presented to the living of Swindon, which he resigned in the following year. After acting as chaplain to Seth Ward, bishop of Exeter and Salisbury, and Lord Chancellor Clarendon, he was elected principal of St Alban Hall, Oxford, in 1673. I n *679 he was appointed provost of Trinity College, Dublin, where he did much to encourage the study of the Irish language. He helped to found the Royal Dublin Society, and contributed to it a paper entitled " Introductory Essay to the Doctrine of Sounds " (printed in Philosophical Transactions, No. 156, Oxford, 1684). In 1683 he was consecrated bishop of Ferns and Leighlin, but after the accession of James II. he was compelled by the turbulent soldiery to flee to England (1689), where he became vicar of Gresford, Flint, and canon of St Asaph. Returning to Ireland in 1691 after the battle of the Boyne, he was made archbishop of Cashel, and three years later he became archbishop of Dublin. About this time he founded the Marsh Library in Dublin. He became archbishop of Armagh in 1703. Between 1699 and 1711 he was six times a lord justice of Ireland. He died on the 2nd of November 1713.*

MARSH, OTHNIEL CHARLES (1831-1899), American palaeontologist, was born in Lockport, New York, on the 29th of October 183 1. He graduated at Yale College in i860, and studied geology and mineralogy in the Sheffield scientific school, New Haven, and afterwards palaeontology and anatomy in Berlin, Heidelberg and Breslau. Returning to America in 1866 he' was appointed professor of vertebrate palaeontology at Yale College, and there began the researches of the fossil vertebrata of the western states, whereby he established his reputation. He was aided by a private fortune from his uncle, George Peabody, whom he induced to establish the Peabody Museum of Natural History (especially devoted to zoology, geology and mineralogy) in the college. In May 187 1 he discovered the first pterodactyl remains found in America, and in subsequent years he brought to light from Wyoming and other regions many new genera and families, and some entirely new orders of extinct vertebrata, which he described in monographs or periodical articles. These included remains of the Cretaceous toothed birds Hesperornis and Ichthyomis, the Cretaceous flying-reptiles (Pteranodon) , the swimming reptiles or Mosasauria, and the Cretaceous and Jurassic land reptiles (Dinosauria) among which were the Bronto- saurus and Atlantosaurus. The remarkable mammals which he termed Brontotheria (now grouped as Titanotheriidae), and the huge Dinocerata, one being the Uintatherium, were also brought to light by him. Among his later discoveries were remains of early ancestors of horses in America. On becoming vice- president of the American Association for the Advancement, of Science in 1875 he gave an address on the " Introduction and Succession of Vertebrate Life in America," summarizing his conclusions to that date. He repeatedly organized and often accompanied scientific exploring expeditions in the Rocky Mountains, and their results tended in an important degree to support the doctrines of natural selection and evolution. He oublished many papers on these, and found time — besides that necessarily given to the accumulation and care of the most extensive collection of fossils in the world — to write Odont- omilhes: A Monograph on the Extinct Toothed Birds of North America (1880); Dinocerata: A Monograph on an Extinct Order of Gigantic Mammals (1884) ; and The Dinosaurs of North America (1896). His work is full of accurately recorded facts of perma- nent value. He was long in charge of the division of vertebrate palaeontology in the United States Geological Survey, and received many scientific honours, medals and degrees, American and foreign. He died in New Haven on the 18th of March 1899. xvii. 25

See obituary by Dr Henry Woodward (with portrait) in Geol. Mag. (1899), p. 237.

MARSH (O. F. mersc, for merisc, a place full of "meres" or pools; cf. Ger. Meer, sea, Lat. mare), an area of low-lying watery land. The significance

of a marsh area is not so much in the manner of its formation as in the peculiar chemical and physical results that accompany it, and its relation to the ecology of plant and animal life. Chemically it is productive of such gases as arise from decomposing vegetation and are transitory in their effects, and in the production of hydrated iron oxide, which may be seen floating as an iridescent scum at the edge of rusty, marshy pools. This sinks into the soil and forms a powerful iron cement to many sandstones, binding them into a hard local mass, while the surrounding sandstones are loose and friable. A curious morphological inversion follows in a later geological period, the marsh area forming the hard cap of a hill (see Mesa) while the surrounding sandstones are weathered away. Salt marshes are a feature of many low-lying sea-coasts and areas of inland drainage.

MARSHAL (med. Lat. marescalcus, from O.H.Ger. marah, horse, and scale, servant), a title given in various countries to certain military and civil officers, usually of high rank. The origin and development of the meaning of the designation is closely analogous with that of constable (q.v.). Just as the title of constable, in all its medieval and modern uses, is traceable to the style and functions of the Byzantine count of the stable, so that of marshal was evolved from the title of the marescalci, or masters of the horse, of the early Frankish kings. In this original sense the word survived down to the close of the Holy Roman empire in the titular office of Erz-Marschalk (arch- marshal), borne by the electors of Saxony. Elsewhere the meaning of office and title was modified. The importance of cavalry in medieval warfare led to the marshalship being associ- ated with military command; this again led to the duty of keeping order in court and camp, of deciding questions of chivalry, and to the assumption of judicial and executive functions. The marshal, as a military leader, was originally a subordinate officer, the chief command under the king being held by the constable; but in the 12th century, though still nominally second to the constable, the marshal has come to the forefront as commander of the royal forces and a great officer of state. In England after the Conquest the marshalship was hereditary in the family which derived its surname from the office, and the hereditary title of earl-marshal originated in the marriage of William Marshal with the heiress of the earldom of Pembroke (see Earl Marshal). Similarly, in Scotland, the office of marischal (from the French martchal), probably introduced under David I., became in the 14th century hereditary in the house of Keith. In 1485 the Scottish marischal became an earl under the designation of earl-marischal, the dignity coming to an end by the attainder of George, 10th earl-marischal, in 1716. In France, on the other hand, though under Philip Augustus the marshal of France (marescalcus Franciae) appears as commander-in-chief of the forces, care was taken not to allow the office to become descendible; under Francis I. the number of marshals of France was raised to two, under

Henry III. to four, and under Louis XIV. to twenty. Revived by Napoleon, the title fell into abeyance with the downfall of the Second empire.

In England the use of the word marshal in the sense of com- mander of an army appears very early; so Matthew Paris records that in 12 14 King John constituted William, earl of Salisbury, marescalcus of his forces. The modern military title of field marshal, imported from Germany by King George II. in 1736, is derived from the high dignity of the marescalcus in a round- about way. The marescalcus campi, or marechal des champs, was originally one of a number of officials to whom the name, with certain of the functions, of the marshal was given. The marshal, being responsible for order in court and camp, had to employ subordinates, who developed into officials often but nominally dependent upon him. On military expeditions it was usual for two such marshals to precede the army, select the site of the camp and assign to the lords and knights their places in it. In

time of peace they preceded the king on a journey and arranged for his lodging and maintenance. In France marechal des logis is the title of superior non-commissioned officers in the cavalry.

Similarly at the king's court the marescalcus aulae or inlrin- secus was responsible for order, the admission or exclusion of those seeking access, ceremonial arrangements, &c. Such " marshals " were maintained, not only by the king, but by great lords and ecclesiastics. The more dignified of their functions, together with the title, survive in the various German courts, where the court marshal (Hofmarschall) is equivalent to the English lord chamberlain. Just as the marescalcus intrinsecus acted as the vicar of the marshal for duties " within " the court, so the marescalcus forinsecus was deputed to perform those acts of serjeanty due from the marshal to the Crown "without." Similarly there appears in the statute 5 Edw. III. cap. 8, a marescalcus band regii {marechal du Banc du Roy), or marshal of the king's bench, who presided over the Marshalsea Court, and was responsible for the safe custody of prisoners, who were bestowed in the mareschalcia, or Marshalsea prison. The office of marshal of the queen's bench survived till 1849 (see Lord Steward; and Marshalsea). The official known as a judge's marshal, whose office is of considerable antiquity, and whose duties consisted of making abstracts of indictments and pleadings for the use of the judge, still survives, but no longer exercises the above functions. He accompanies a judge of assize on circuit and is appointed by him at the beginning of each circuit. His travelling and other expenses are paid by the judge, and he receives an allowance of two guineas a day, which is paid

through the Treasury. He introduces the high sheriff of the county to the judge of assize on his arrival, and swears in the grand jury. For the French marechaussie see France: § Law and Institutions.

In the sense of executive legal officer the title marshal survives in the United States of America in two senses. The United States marshal is the executive officer of the Federal courts, one being appointed for each district, or exceptionally, one for two districts. His duties are to open and close the sessions of the district and circuit courts, serve warrants, and execute through- out the district the orders of the court. There are United States marshals also in Alaska, Hawaii, Porto Rico and the Philippines. They are appointed by the President, with the advice and consent of the Senate, for a term of four years, and, besides their duties in connexion with the courts, are employed in the service of the internal revenue, public lands, post office, &c. The temporary police sworn in to maintain order in times of disturbance, known in England as special constables, are also termed marshals in the United States. In some of the southern and western states of the Union the title marshal has sunk to that of the village policeman, as distinct from the county officers known as sheriffs and those of the justices' courts called constables.

In England the title of marshal, as applied to an executive officer, survives only in the army, where the provost marshal is chief of the military police in large garrisons and in field forces. Office and title were borrowed from the French prevot des marechaux, the modern equivalent of the medieval praepositus marescalcorum or guerrarum.

MARSHALL, ALFRED (1842-), English economist, was born in London on the 26th of July 1842. He was educated at the Merchant Taylors' School and St John's College, Cambridge, being second wrangler in 1865, and in the same year becoming fellow of his college. He became principal of University College, Bristol, in 1877, an(i was lecturer and fellow of Balliol College, Oxford in 1 883- 1 884. He was professor of political economy at Cambridge University from 1885 to 1908, and was a member of the Royal Commission on Labour in 1891. He became a fellow of the British Academy in 1902. He wrote (in conjunction with his wife) Economics of Industry (1879), whilst his Principles of Economics (1st ed., 1890) is a standard English treatise.

MARSHALL, JOHN (1755-1835), American jurist, chief- justice of the U.S. Supreme Court, was born on the 24th of Sep- tember 1755 at Germantown (now Midland), in what four years later became Fauquier county, Virginia. He was of English

descent, the son of Thomas Marshall (1732-1806) and his wife Mary

Isham Keith. Marshall served first as lieutenant and after July 1778 as captain in the Continental Army during the War of Independence. He resigned his commission early in 1781; was admitted to the bar after a brief course of study, first practised in Fauquier county; and after two years began to practise in Richmond. In 1786 we find him counsel in a case of great importance, Hite v. Fairfax, involving the original title of Lord Fairfax to that large tract of country between the head- waters of the Potomac and Rappahannock, known as the north- ern neck of Virginia. Marshall represented tenants of Lord Fairfax and won his case. From this time, as is shown by an examination of Call's Virginia Reports which cover the period, he maintained the leadership of the bar of Virginia. He was a member of the Virginia Assembly in 1 782-1 791 and again in 1795-1797; and in 1788, he took a leading part in the Virginia Con- vention called to act on the proposed constitution for the United States, with Madison ably urging the ratification of that instru- ment. In 1795 Washington offered him the attorney-generalship, and in 1796, after the retirement of James Monroe, the position of minister to France. Marshall declined both offers because his situation at the bar appeared to him " to be more indepen- dent and not less honourable than any other," and his " prefer- ence for it was decided." He spent the autumn and winter of 1 797-1 798 in France as one of the three commissioners appointed by President John Adams to adjust the differences between the young republic and the directory. The commission failed, but the course pursued by Marshall was approved in America, and with the resentment felt because of the way in which the commission had been treated in France, made him, on his return, exceedingly popular. To this popularity, as well as to the earnest advocacy of Patrick Henry, he owed his election as a Federalist to the National House of Representatives in the spring of 1799, though the feeling in Richmond was overwhelmingly in favour of the opposition or Republican party. His most notable service in Congress was his speech on the case of Thomas Nash, alias Jonathan Robbins, in which he showed that there is nothing in the constitution of the United States which prevents the Federal government from carrying out an extradition treaty. He was secretary of state under President Adams from the 6th of June 1800 to the 4th of March 1801. In the meantime he had been appointed chief-justice of the Supreme Court, his commission bearing date the 31st of January. Thus while still secretary he presided as chief-justice.

At the time of Marshall's appointment it was generally con- sidered that the Supreme Court was the one department of the new government which had failed in its purpose. John Jay, the first chief-justice, who had resigned in 1795, had just declined a reappointment to the chief-justiceship on the ground that he had left the bench perfectly convinced that the court would never acquire proper weight and dignity, its organization being fatally

defective. The advent of the new chief-justice was marked by a change in the conduct of business in the court. Since its organi- zation, following the prevailing English custom, the judges had pronounced their opinions seriatim. But beginning with the December term 1801, the chief-justice became practically the sole mouthpiece of the court. For eleven years the opinions are almost exclusively his, and there are few recorded dissents. The change was admirably adapted to strengthen the power and dignity of the court. The chief-justice embodied the majesty of the judicial department of the government almost as fully as the president stood for the power of the executive. That this change was acquiesced in by his associates without diminishing their goodwill towards their new chief is testimony to the per- suasive force of Marshall's personality; for his associates were not men of mediocre ability. After the advent of Mr Justice Joseph Story the practice was abandoned. Marshall, however, still delivered the opinion in the great majority of cases, and in practically all cases of any importance involving the inter- pretation of the Constitution. During the course of his judicial life his associates were as a rule men of learning and ability. During most of the time the majority were the appointees of

Democratic presidents, and before their elevation to the bench supposed to be out of sympathy with the federalistic ideas of the chief-justice. Yet in matters pertaining to constitutional con- struction, they seem to have had hardly any other function than to add the weight of their silent concurrence to the decision of their great chief. Thus the task of expounding the constitution during the most critical period of its history was his, and it was given to him to preside over the Supreme Court when it was called upon to decide four cases of vital importance: Marbury v. Madison, M'Culloch v. Maryland, Cohens v. Virginia and Gibbons v. Ogden. In each of these cases it is Marshall who writes the opinion of the court; in each the continued existence of the peculiar Federal system established by the Constitution depended on the action of the court, and in each the court adopted a principle which is now generally perceived to be essential to the preservation of the United States as a federal state.

In Marbury v. Madison, which was decided two years after his elevation to the bench, he decided that it was the duty of the court to disregard any act of Congress, and, therefore, a fortiori any act of a legislature of one of the states, which the court thought contrary to the Federal Constitution.

In Cohens v. Virginia, in spite of the contention of Jefferson and the then prevalent school of political thought that it was contrary to the Constitution

for a person to bring one of the states of the United States, though only as an appellee, into a court of justice, he held that Congress could lawfully pass an act which permitted a person who was convicted in a state court, to appeal to the Supreme Court of the United States, if he alleged that the state act under which he was convicted conflicted with the Federal Constitution or with an act of Congress.

In M'Culloch v. Maryland, though admitting that the Federal government is one of delegated powers and cannot exercise any power not expressly given in the Constitution, he laid down the rule that Congress in the exercise of a delegated power has a wide latitude in the choice of means, not being confined in its choice of means to those which must be used if the power is to be exercised at all.

Lastly, in Gibbons v. Ogden, he held that when the power to regu- late interstate and foreign commerce was conferred by the Constitu- tion on the Federal government, the word " commerce " included not only the exchange of commodities, but the means by which interstate and foreign intercourse was carried on, and therefore that Congress had the power to license vessels to carry goods and passengers between the states, and an act of one of the states making a regulation which interfered with such regulation of Congress was, pro tanlo, of no effect. It will be seen that in the first two cases he established the Supreme Court as the final interpreter of the Constitution.

The decision in M'Culloch v. Maryland, by leaving Congress unhampered in the choice of means to execute its delegated powers, made it possible for the Federal government to accomplish the ends of its existence. " Let the end be legitimate," said Marshall in the course of its opinion, " let it be within the scope of the Constitution, and all means which are appropriate, which are plainly adapted to that end, which are not prohibited, but consist with the letter and spirit of the Constitution, are constitutional."

If the decision in M'Culloch v. Maryland gave vigour to all Federal power, the decision in Gibbons v. Ogden, by giving the Federal government control over the means by which interstate and foreign commerce is carried on, preserved the material prosperity of the country. The decision recognizes what the framers of the Consti- tution recognized, namely that the United States is an economic union, and that business which is national should be under national, not state, control.

Though for the reasons stated, the four cases mentioned are the most important of his decisions, the value of his work as an expounder of the Constitution of the United States is not to be measured by these cases alone. In all he decided forty-four cases involving constitutional questions.

Nearly every impor- tant part of the Constitution of the United States as it existed before the amendments which were adopted after the Civil War, is treated in one or more of them. The Constitution in its most important aspects is the Constitution as he interpreted it. He did not work out completely the position of the states in the Federal system, but he did grasp and establish the position of the Federal legislature and the Federal judiciary. To appreciate his work, however, it is necessary to see that it was the work not of a statesman but of a judge. Had Marshall been merely a far-seeing statesman, while most of his important cases would have been decided as he decided them, his life- work would have been a failure. It was not only necessary

that he should decide great constitutional questions properly, but also that the people of the United States should be convinced of the correctness of his interpretation of the Constitution. His opinions, therefore, had to carry to those who studied them a conviction that the constitution as written had been interpreted according to its evident meaning. They fulfilled this prime requisite. Their chief characteristic is the cumulative force of the argument. The ground for the premiss is carefully prepared, the premiss itself is clearly stated; nearly every possible objection is examined and answered; and then comes the conclusion. There is little or no repetition, but there is a wealth of illustration, a completeness of analysis, that convinces the reader, not only that the subject has been adequately treated, but that it has been exhausted. His style, reflecting his character, suits perfectly the subject matter. Simple in the best sense of the word, his intellectual processes were so clear that he never doubted the correctness of the conclusion to which they led him. Apparently from his own point of view, he merely indicated the question at issue, and the inexor- able rules of logic did the rest. Thus his opinions are simple, clear, dignified. Intensely interesting, the interest is in the argument, not in its expression. He had, in a wonderful degree, the power of phrase. He expressed important principles of law in language which tersely yet clearly conveyed his exact meaning. Not only is the Constitution interpreted largely as he taught the people of the United States to interpret it, but when they wish to express important constitutional prin- ciples which he enunciated they use his exact words. Again, his opinions show that he adhered closely to the words of the Constitution; indeed no one who has attempted to expound that instrument has confined himself more strictly to an examination of the text. In the proper, though not in the historical, sense he was the strictest of strict constructionalists, and as a result his opinions are practically devoid of theories of government, sovereignty and the rights of man.

A single illustration of his avoidance of all theory and his adher- ence to the words of the Constitution will suffice. In the case of the United States v. Fisher the constitutional question involved was the power of Congress to

give to the United States a preference over all other creditors in the distribution of the assets of a bankrupt. Such an act can be upheld on the ground that all governments have necessarily the right to give themselves priority. Not so Marshall. To him the act must be supported,, if supported at all, not on any theory of the innate nature of the government, national or otherwise, but as a reasonable means of carrying out one of the express powers conferred by the Constitution on the Federal government. Thus, he upholds the act in question because of the power expressly conferred on the Federal government to pay the debts of the union, and as a necessary consequence of this power the right to make remittances by bills or otherwise and to take precautions which will render the transactions safe.

It is important to emphasize the fact that Marshall adhered in his opinions to the Constitution as written, not only because it is a fact which must be recognized if we are to understand the correct value of his work in the field of constitutional law, but also because there exists to-day a popular impression that by implication he stretched to the utmost the powers of the Federal government. This impression is due primarily to the ignorance of many of those who have undertaken to praise him. During his life he was charged by followers of the States Rights School of political thought with upholding Federal power in cases not warranted by the constitution. Later, however, those who admired a strong national government, without taking the trouble to ascertain whether the old criticism by members of the States Rights Party was just, regarded the assumption on which it was founded as Marshall's best claim to his country's gratitude.

As a constitutional lawyer, Marshall stands without a rival. His work on international law and admiralty is of first rank. But though a good, he was not a great, common law or equity lawyer. In these fields he did not make new law nor clarify what was obscure, and his constitutional opinions which to-day are found least satisfactory are those in which the question to be solved necessarily involves the discussion of some common-law

conception, especially those cases in which he was required to construe the restriction imposed by the Constitution on any state impairing the obligation of contracts. H|s decision in the celebrated case of Dartmouth College v. Woodward, in which he held that a state could not repeal a charter of a private corporation, because a charter is a contract which a subsequent act of the state repealing the charter impairs, though of great economic importance, does not touch any fundamental question of constitutional law. The argument which he advances lacks the clearness

and finality for which most of his opinions are celebrated. It is not certain with whom he thought the' contract was made: with the corporation created by the charter, with the trustees of the corporation, or with those who had contributed money to its objects.

Of the wonderful persuasive force of Marshall's personality there is abundant evidence. His influence over his associates, already referred to, is but one example though a most impressive one. From the moment he delivered the opinion in Marbury v. Madison the legal profession knew that he was a great judge. Each year added to his reputation and made for a better appreciation of his intellectual and moral qualities. The bar of the Supreme Court during his chief-justiceship was the most brilliant which the United States has ever known. Leaders, not only of legal, but political thought were among its members; one, Webster, was a man of genius and commanding position. To a very great degree Marshall impressed on the members of this bar and on the profession generally his own ideas of the correct interpretation of the Constitution and his own love for the union. He did this, not merely by his arguments but by the influence which was his by right of his strong, sweet nature. Statesmen and politicians, great and small, were at this time, almost without exception, members of the bar. To influence the political thought of the bar was to a great extent to influence the political thought of the people.

In 1782 he married Mary Willis Ambler, the daughter of the then treasurer of Virginia. They had ten children, six of whom grew to full age. For the greater part of the forty- eight years of their married life Mrs Marshall suffered in- tensely from a nervous affliction. Her condition called out the love and sympathy of her husband's deep and affectionate nature. Judge Story tells us: " That which, in a just sense, was his highest glory, was the. purity, affectionateness, liberality and devotedness of his domestic life." For the first thirty years of his chief-justiceship his life was a singularly happy one. He never had to remain in Washington for more than three months. During the rest of the year, with the exception of a visit to Raleigh, which his duties as circuit judge required him to make, and a visit to his old home in Fauquier county, he lived in Richmond. His house on Shockhoe Hill is still standing.

On Christmas Day 1831 his wife died. He never was quite the same again. On returning from Washington in the spring of 1835 he suffered severe contusions, from an accident to the stage coach in which he was riding. His health, which had not been good, now rapidly declined and in June he returned to Philadelphia for medical attendance. There he died on the 6th of July. His body, which was taken to Richmond, lies in Shockhoe Hill Cemetery under a plain marble slab, on which is a simple inscription written by himself. In addition to his decisions Marshallfffrrote a famous

biography of George Washing- ton (5 vols., 1804-1807; 2nd ed., 2 vols., 1832), which though prepared hastily contains much material of value.

The principal sources of information are: an essay by James B. Thayer (Boston and New York, 1904) ; Great American Lawyers (Philadelphia, 1908), ii. 313-408, an essay by Wm. Draper Lewis; and Allan B. Magruder, John Marshall (Boston, 1885), in the " Ameri- can Statesmen Series." The addresses delivered on Marshall Day, the 4th of February 1901, are collected by John F. Dillon (Chicago, 1903). In the " Appendix " to Dillon's collection will be found the " Dis- course " by Joseph Story and the " Eulogy " by Horace Binney, both delivered soon after Marshall's death. For a study of Marshall's decisions, the Constitutional Decisions of John Marshall, edited by Joseph P. Cotlon, Jr. (New York and London, 1905), is of value.

(W. D. L.)

MARSHALL, JOHN (1818-1891), British surgeon and physiolo- gist, was born at Ely, on the nth of September 1818, his father being a lawyer of that city. He entered University College, London, in 1838, and in 1847 he was appointed assistant-surgeon at the hospital, becoming in 1866 surgeon and professor of surgery. He was professor of anatomy at the Royal Academy from 1873 till his death. In 1883 he was president of the College of Surgeons, also Bradshaw lecturer (on " Nerve- stretching for the relief or cure of pain "), Hunterian orator in 1885, and Morton lecturer in 1889. In 1867 he published his well-known textbook The Outlines of Physiology in two volumes. He died on the 1st of January 1891. " Marshall's fame," wrote Sir W. MacCormac in his volume on the Centenary of the College of Surgeons (1900), " rests on the great ability with which he taught anatomy in relation to art, on the introduction into modern surgery of the galvano-cautery, and on the operation for the excision of varicose veins. He was one of the first to show that cholera might be spread by means of drinking water, and issued a report on the outbreak of cholera in Broad Street, St James's, 1854. He also invented the system of circular wards for hospitals, and to him are largely owing the details of the modern medical student's education."

MARSHALL, STEPHEN (c. 1594-1655), English Nonconformist divine, was born at Godmanchester in Huntingdonshire, and was educated at Emmanuel College, Cambridge (M.A. 1622, B.D. 1629). After holding the living of Wethersfield in Essex he became vicar of Finchingfield in the same county, and in 1636 was reported for " want of conformity." He was a preacher of great power, and influenced the elections for the Short Parliament of 1640. Clarendon esteemed his influence on the parliamentary side greater than that of Laud on the royalist. In 1642 he

was appointed lecturer at St Margaret's, Westminster, and delivered a series of addresses to the Commons in which he advocated episcopal and liturgical reform. He had a share in writing Smectymnuus, was appointed chaplain to the earl of Essex's regiment in 1642, and a member of the Westminster Assembly in 1643. He represented the English Parliament in Scotland in 1643, and attended the parliamentary commissions at the Uxbridge Conference in 1645. He waited on Archbishop Laud before his execution, and was chaplain to Charles I. at Holmby House and at Carisbrooke. A moderate and judicious presbyterian, he prepared with others the " Shorter Catechism " in 1647, and was one of the " Triers," 1654. He died in November 1655 and was buried in Westminster Abbey, but his body was exhumed and maltreated at the Restoration. His sermons, especially that on the death of John Pym in 1643, reveal eloquence and fervour. The only " systematic " work he published was A Defence of Infant Baptism, against John Tombes (London,

1646).

MARSHALL, a city and the county-seat of Saline county, Missouri, U.S.A., situated a little W. of the centre of the state, near the Salt Fork of the La Mine River. Pop. (1890), 4297; (1900), 5086 (208 being foreign-born and 98 negroes); (1910) 4869. It is served by the Missouri Pacific and the Chicago & Alton railways. The city is laid out regularly on a high, undulating prairie. It is the seat of Missouri Valley College (opened 1889; coeducational), which was established by the Cumberland Presbyterian church, and includes a preparatory department and a conservatory of music. The court-house (1883), a Roman Catholic convent and a high school (1907) are the principal buildings. The Missouri colony for the feeble-minded and epileptic (1899) is at Marshall. The' principal trade is with the surrounding farming country. The municipality owns and operates the waterworks. Marshall was first settled and was made the county seat in 1839; it became a town in 1866 (re-incorporated 1870) and a city in

1878.

MARSHALL, a city and the county-seat of Harrison county, Texas, U.S.A., about 145 m. E. by S. of Dallas. Pop. (1890), 7207; (1900) 7855 (3769 negroes); (1910) 11,452. Marshall is served by the Texas & Pacific and the Marshall & East Texas railways, which have large shops here. Wiley University was

founded in 1873 by the Freedman's Aid Society of the Methodist Episcopal Church, and Bishop College, was founded in 1881- by the American Baptist Home Mission Society and incorporated in 1885. Marshall is situated in a region growing cotton and Indian corn, vegetables, small fruits and sugar-cane; in the surrounding country there are valuable forests of pine, oak and gum. In the vicinity of the city there are several lakes (including Caddo Lake) and springs (including Hynson and Rosborough springs). The city has a cotton compress, and among its manu- factures are cotton-seed oil, lumber, ice, foundry products and canned goods. The municipality owns and operates the waterworks. Marshall was first settled in 1842, was incorporated in 1843, and received a city charter in 1848; in 1909 it adopted the commission form of government.

MARSHALL ISLANDS, an island group in the western Pacific Ocean (Micronesia) belonging to Germany. The group consists of a number of atolls ranged in two almost parallel lines, which run from N.W. to S.E. between 4 and 15 N. and 161 and 1 74° E. The north-east line, with fifteen islands, is called Ratak, the other, numbering eighteen, Ralik. These atolls are of coralline formation and of irregular shape. They rise but little above high-water mark. The highest elevation occurs on the island of Likieb, but is only 33 ft. The lagoon is scarcely more than 150 ft. deep and is accessible through numerous breaks in the reef. On the outward side the shore sinks rapidly to a great depth. The surface of the atolls is covered with sand, except in a few places where it has been turned into soil through the admixture of decayed vegetation. The reef in scarcely any instance exceeds 600 ft. in width.

The climate is moist and hot, the mean temperature being 80-50° F. Easterly winds prevail all the year round. There is no difference between the seasons, which, though the islands belong to the northern hemisphere, have the highest temperature in January and the lowest in July. Vegetation, on the whole, is very poor. There are many coco-nut palms, bread-fruit trees (Artocarpus incisa), various kinds of bananas, yams and taro, and pandanus, of which the natives eat the seeds. From the bark of another plant they manufacture mats. There are few animals. Cattle do not thrive, and even poultry are scarce. Pigs, cats, dogs and rats have been imported. There are a few pigeons and aquatic birds, butterflies and beetles. Crustacea and fish abound on the reefs.

The natives are Micronesians of a dark brown colour, though lighter shades occur. Their hair is not woolly but straight and long. They practise tattooing, and show Papuan influence by distending the ear-lobes by the insertion of wooden disks. They are expert navigators, and construct curious charts of thin strips of wood tied together with fibres, some giving the position of the islands and some the direction of the prevailing winds.

Their canoes carry sails and are made of the trunk of the bread-fruit tree. The people are divided into four classes, of which only two are allowed to own land. The islands lie entirely within the German sphere of interest, and the boundaries were agreed upon between Great Britain and Germany on the 10th of April 1880. Their area is estimated at 160 sq. m., with 15,000 inhabitants, who are apparently increasing, though the contrary was long believed. All but about 250 are natives. The administrator of the islands is the governor of German New Guinea, but a number of officials reside on the islands. There is no military force, the natives being of peaceful disposition. The chief island and seat of government is Jaluit. The most populous island is Majeru, with 1600 inhabitants. The natives are generally pagans, but a Roman Catholic mission has been established, and the American Mission Board maintains coloured teachers on many of the islands. There is com- munication with Sydney by private steamer, and a steamer sails between Jaluit and Ponape to connect with the French boats for Singapore. The chief products for export are copra, tortoise-shell, mother-of-pearl, sharks' fins and trepang. The natives are clever boat-builders, and find a market for their canoes on neighbouring islands. They have made such progress in their art that they have even built seaworthy little schooners

of 30 to 40 tons. The only other articles they make are a few shell ornaments.

The Marshall Islands may have been visited by Alvaro de Saavedra in 1529, Captain Wallis touched at the group in 1767, and in 1788 Captains Marshall and Gilbert explored it. The Germans made a treaty with the chieftains of Jaluit in 1878 and annexed the group in 1885-1886.

See C. Hager, Die Marshall- Inseln (Leipzig, 1886) ; Steinbach and Grosser, Worterbuch der Marshall- Sprache (Hamburg, 1902).

MARSHALLTOWN, a city and the county-seat of Marshall county, Iowa, U.S.A., near the Iowa River and about 60 m. N.E. of Des Moines. Pop. (1890), 8914; (1900), 11,544, of whom 1590 were foreign-born; (1910 census) 13,374. Mar- shalltown is served ' by the Chicago & North-Western, the Chicago Great Western, and the Iowa Central railways, the last of which has machine shops here. At Marshalltown are the Iowa soldiers' home, supported in part by the Federal Government, and St. Mary's institute, a Roman Catholic commercial and business school. The city is situated in a rich, agricultural region, and is a market for grain, neat cattle, horses and swine. There are miscellaneous manufactures, and in 1905 the factory product was valued at $3,090,312. The municipality owns and operates its waterworks and its electric-lighting plant. Marshalltown, named in honour of Chief Justice John Marshall, was laid out in 1853, an d became the county-seat in i860. It was incorporated as a

town in 1863, and was chartered as a city in 1868.

MARSHALSEA, a prison formerly existing in Southwark, London. It was attached to the court of that name held by the steward and marshal of the king's house (see Lord Steward and Marshal). The date of its first establishment is unknown, but it existed as early as the reign of Edward III. It was consolidated in 1842 with the queen's bench and the Fleet, and was then described as " a prison for debtors and for persons charged with contempt of Her Majesty's courts of the Marshalsea, the court of the queen's palace of Westminster, and the high court of admiralty, and also for admiralty prisoners under sentence of courts martial." It was abolished in 1849. The Marshalsea Prison is described in Charles Dickens' Little Dorrit.

MARSHBUCK, a book-name proposed for such of the African bushbucks or harnessed antelopes as have abnormally long hoofs to support them in walking on marshy or swampy ground. (See Bushbuck and Antelope.)

MARSHFIELD, a city of Wood county, Wisconsin, about 165 m. N.W. of Milwaukee. Pop. (1890), 3450; (1900), 5240, of whom 1 161 were foreign-born; (1905) 6036; (1910) 5783. It is served by the Chicago & North-Western, the Chicago, St Paul, Minneapolis & Omaha, and the Minneapolis, St Paul & Sault Ste Marie railways. It contains the mother-house of the Sisters of the Sorrowful Mother. Lumbering is the most important industry, and there are various manufactures. The city is situated in a clover region, in which dairying is important, and Guernsey and Holstein-Friesland cattle are raised. The municipality owns and operates the waterworks and the electric-lighting plant. The site of Marshfield was part of a tract granted by the Federal government to the Fox River Improvement Company, organized to construct a waterway between the Mississippi river and Green Bay, and among the original owners of the town site were Samuel Marsh of Massachu- setts (in whose honour the place was named) and Horatio Seymour, Ezra Cornell, Erastus Corning, and William A. Butler of New York. Marshfield was settled about 1870, and was first chartered as a city in 1883.

MARSH GAS (methane), CH 4 , the first member of the series of paraffin hydrocarbons. It occurs as a constituent of the " fire-damp " of coal-mines, in the gases evolved from volcanoes, and in the gases which arise in marshy districts (due to the decomposition of vegetable matter under the surface of water). It is found associated with petroleum and also in human intes- tinal gases. It is a product of the destructive distillation of complex organic matter (wood, coal, bituminous shale, &c). forming in this way from 30 to 40% of ordinary illuminating

gas. It may be, synthetically obtained by passing a mixture of the vapour of carbon bisulphide with sulphuretted hydrogen over red-hot copper (M. Berthelot, Comptes rendus, 1856, 43, p. 236), CS 2 + 2H2S + 8Cu = 4CU2S + CH 4 ; by passing a mixture of hydrogen and carbon monoxide over reduced nickel at 200-2 50 C, or hydrogen and carbon dioxide at 230-300 C. (P. Sabatier and J. B. Senderens, Comptes rendus, 1902, 134, pp. 514, 689); by the decomposition of aluminium carbide with water [H. Moissan, Bull. Soc. Chim., 1894, (3) n, p. 1012]; and by heating phosphonium iodide with carbon bisulphide in a sealed tube to 120-140 C. (H. Jahn, Ber., 1880, 13, p. 127). It is also obtained by the reduction of many methyl compounds with nascent hydrogen; thus methyl iodide dissolved in methyl alcohol readily yields methane when acted on by the zinc-copper couple (J. H. Gladstone and A. Tribe, Jour. Chem. Soc, 1884, 45, p. 156) or by the aluminium-mercury couple. It may be obtained in an indirect manner from methyl iodide by conversion of this compound into zinc methyl, or into magne- sium methyl iodide (formed by the action of magnesium on methyl iodide dissolved in anhydrous ether), and decomposing these latter substances with water (E. Frankland, 1856; V. Grignard, 1900),

Zn(CH 3) 2 +H 2 0=2CH4+ZnO;2CH 3 MgI+H 2 0=2CH 4 +MgI 2 +MgO.

In the laboratory it is usually prepared by J. B. A. Dumas' method {Ann., 1840, 33, p. 181), which consists in heating an- hydrous sodium acetate with soda lime, CH 3 C0 2 Na f NaOH = Na 2 C0 3 + CH,. The product obtained by this method is not pure, containing generally more or less ethylene and hydrogen.

Methane is a colourless gas of specific gravity 0-559 (air = 1). It may be condensed to a colourless liquid at -155 to -160 C. under atmospheric pressure (S. Wroblewsky, Comptes rendus, 1884, 99, p. 136). It boils at -162 C. and freezes at -i86 c C. Its critical temperature is -99-5° C. (J. Dewar). The gas is almost insoluble in water, but is slightly soluble in alcohol. It decom- poses into its constituents when passed through a red-hot tube, small quantities of other hydrocarbons (ethane, ethylene, acetylene, benzene, &c.) being formed at the same time. It burns with a pale flame, and when mixed with air or oxygen forms a highly explosive mixture. W. A. Bone {Jour. Chem. Soc, 1902, 81, p. 535; 1903, 83, p. 1074) has shown that in the oxidation of methane by oxygen at 450-500° C. formaldehyde (or possibly methyl alcohol) is formed as an intermediate

product, and is ultimately oxidized to carbon dioxide. Methane is an exceedingly stable gas, being unaffected by the action of chromic acid, nitric acid, or a mixture of nitric and sulphuric acids. Chlorine and bromine, however, react with methane, gradually replacing hydrogen and forming chlor- and brom- substitution products.

MARSHMAN, JOSHUA (1768-1837), English Baptist mission- ary and orientalist, was born on the 20th of April 1768, at Westbury Leigh, in Wiltshire. He followed the occupation of a weaver until 1794, but having meanwhile devoted himself to study he removed to Broadmead, Bristol, to take charge of a small school. In 1799 he was sent by the Baptist Missionary Society to join their mission at Serampur. Here, in addition to his more special duties, he studied Bengali and Sanskrit, and afterwards Chinese. He translated the Bible into various dialects, and, aided by his son, established newspapers and founded Serampur College. He received the degree of D.D. from Brown University, U.S.A., in 1810. He died at Serampur on the 5th of December 1837. His son, John Clark Marshman (1794-1877), was official Bengali translator; he published a Guide to the Civil Law which, before the work of Macaulay, was the civil code of India, and wrote a History of India (1842).

Marshman translated into Chinese the book of Genesis, the Gospels, and the Epistles of Paul to the Romans and the Corinthians; in 181 1 he pubhshed The Works of Confucius, containing the Original Text vntha Translation, and in 18 14 his Claris Sinica. He was also the author of Elements of Chinese Grammar, with Preliminary Dissertation on the Characters and Colloquial Mediums of the Chinese, and was associated with W. Carey in the preparation of a Sanskrit grammar and of a Bengali-English dictionary.

See J. C. Marshman, Life and Times of Carey, Marshman and Ward (2 vols., 1859).

MARSI, an ancient people of Italy, whose chief centre was Marruvium, on the eastern shore of Lake Fucinus. They are first mentioned as members of a confederacy with the Vestini, Paeligni and Marrucini (Liv. viii. 29, cf. viii. 6, and Polyb. ii. 24, 12). They joined the Samnites in 308 B.C. (Liv. ix. 41) , and on their submission became allies of Rome in 304 B.C. (Liv. ix. 45). After a short-lived revolt two years later, for which they were punished by loss of territory (Liv. x. 3), they were readmitted to the Roman alliance and remained faithful down to the social war, their contingent {e.g. Liv. xliv. 46) being always regarded as the flower of the Italian forces {e.g. Hor. Od. ii. 20, 18). In this war, which, owing to the prominence of the Marsian rebels is often known as the Marsic War, they fought bravely against odds under their leader Q. Pompaedius Silo, and, though they were

frequently defeated, the result of the war was the enfranchisement of the allies (see Rome: History, " The Republic "). The Marsi were a hardy mountain people, famed for their simple habits and indomitable courage. It was said that the Romans had never triumphed over them or without them (Appian). They were also renowned for their magicians, who had strange remedies for various diseases.

The Latin colony of Alba Fucens near the north-west corner of the lake was founded in the adjoining Aequian territory in 303, so that from the beginning of the 3rd century the Marsians were in touch with a Latin-speaking community, to say nothing of the Latin colony of Carsioli (298 B.C.) farther west. The earliest pure Latin inscriptions of the district seem to be C.I.L. ix. 3827 and 3848 from the neighbourhood of Supinum; its character generally is of the Gracchan period, though it might be somewhat earlier.

Mommsen {Unteritalische Dialekten, p. 345) pointed out that in the social war all the coins of Pompaedius Silo have the Latin legend " Italia," while the other leaders in all but one case used Oscan.

The chief record of the dialect or patois we owe to the goddess Angitia, whose chief temple and grove stood at the south-west corner of Lake Fucinus, near the inlet to the emissarius of Claudius (restored by Prince Torlonia), and the modern village of Luco. She (or they, for the name is in the plural in the Latin inscription next cited) was widely worshipped in the central highlands (Sulmo, C.I.L. ix. 3074, Furfo Vestinorum, ibid. 3515) as a goddess of healing, especially skilled to cure serpent bites by charms and the herbs of the Marsian woods. Her worshippers naturally practised the same arts— as their descendants do (see A. de Nino's charming collection of Usi e costumi abrmzesi) , their country being in Rome counted the home of witchcraft; see Hor. Sat. 1, 9, 29, Epod. 17, 28, &c.

The earliest local inscriptions date from about 300 to 150 B.C. and include the interesting and difficult bronze of Lake Fucinus, which seems to record a votive offering to Angitia, if A{n)ctia, as is probable, was the local form of her name. Their language differs very slightly from Roman Latin of that date; for appar- ently contracted forms like Fougno instead of Fucino may really only be a matter of spelling. In final syllables the diphthongs at, ei, oi, all appear as e. On the other hand, the older form of the name of the tribe (dat. plur. Martses = Lat. Martiis) shows its derivation and exhibits the assibilation of tio into tso proper to many Oscan dialects (see Osca Lingua) but strange to classical Latin.

See R. S Conway, The Italic Dialects, pp. 290 seq. (from which some portions of this article are taken by permission of the syndics of the Camb.

Univ. Press) ; on the Fucino-Bronze, ib. p. 294. (R. S. C.)

MARSIGLI [Latinized Marsilitjs], LUIGI FERDINANDO,

Count (1658-1730), Italian soldier and scientific writer, was born at Bologna on the 10th of July 1658. After a course of scientific studies in his native city he travelled through Turkey collecting data on the military organization of that empire, as well as on its natural history. On his return he entered the ser- vice of the emperor Leopold (1682) and fought with distinction against the Turks, by whom he was wounded and captured in an

action on the river Raab, and sold to a pasha whom he accom- panied to the siege of Vienna. His release was purchased in 1684, and he afterwards took part in the war of the Spanish succession. In 1703 he was appointed second in command under Count Arco in the defence of Alt-Breisach. The fortress surrendered to the duke of Burgundy, and both Arco and Marsigli were court martiaOed; the former was condemned to death and the latter cashiered, although acquitted of blame by public opinion. Having thus been forced to give up soldiering, he devoted the rest of his life to scientific investigations, in the pursuit of which he made many journeys through Europe, spending a considerable time at Marseilles to study the nature of the sea. In 171 2 he presented his collections to his native city, where they formed the nucleus of the Bologna Institute of Science and Art. He died at Bologna on the 1st of November 1730. Marsigli was a fellow of the London Royal Society and a member of the Paris Academy of Science.

Bibliography. — A list of his works, oyer twenty in number, is given in Niceron's Memoirs; his Breve ristretto del saggio fisico intorno alia storia del mare was published at Venice in 171 1, and again at Amsterdam (in French) in 1725; the Stato militare dell' impero ottomano was published at Amsterdam and the Hague in Italian and French (1732), the Osservazioni intorno al Bosforo Tracio in Rome (1681) and the Danubius pannonico-mysicus, a large work in six volumes containing much valuable historic and scientific information on, the Danubian countries, at the Hague (1725). See Fontenelle, " Eloge " in the Mim. de Vacad. des sciences (Paris, 1730); Quincy, Memoires sur la vie de M. le comte Marsigli (Zurich, 1741), and Fantuzzi's biography of Marsigli (Bologna, 1770).

MARSILIUS OF PADUA [Marsiglio Mainardino] (1270- 1342), Italian medieval scholar, was born at Padua, and at first studied medicine in his

own country. After practising various professions, among others that of a soldier, he went to Paris about 131 1. The reputation which he had gained in the physical sciences soon caused him to be raised to the position of rector of the university (for the first term of the year 1313). While still practising medicine he entered into relations with another master of Paris, the philosopher John of Jandun, who collabo- rated with him in the composition of the famous Defensor pads (1324), one of the most extraordinary political and religious works which appeared during the 14th century. A violent struggle had just broken out between pope John XXII. and Louis of Bavaria, king of the Romans, and the latter, on being excom- municated and called upon to give up the empire, only replied to the pope's threats with fresh provocations. Marsilius of Padua and John of Jandun, though they had both reason to be grateful for the benefits of John XXII. , chose this moment to demonstrate, by plausible arguments, the supremacy of the Empire, its independence of the Holy See, and the emptiness of the prerogatives " usurped " by the sovereign pontiffs — a demonstration naturally calculated to give them a claim on the gratitude of the German sovereign.

The Defensor pads, as its name implies, is a work intended to restore peace, as the most indispensable benefit of human society. The author of the law is the people, i.e. the whole body, or at least the most important part (valenlior) of the citizens; the people should themselves elect, or at least appoint, the head of the government, who, lest he should be tempted to put himself above the scope of the laws, should have at his disposal only a limited armed force. This chief is responsible to the people for his breaches of the law, and in serious cases they can condemn him to death. The real cause of the trouble which prevails among men is the papacy, a " fictitious " power, the develop- ment of which is the result of a series of usurpations. Marsilius denies, not only to the pope, but to the bishops and clergy, any coercive jurisdiction or any right to pronounce on their own authority excommunications and interdicts, or in any way to impose the observation of the divine law. He is not opposed to penalties against heretics, but he would have them pronounced only by civil tribunals. Desiring to see the clergy practise a holy poverty, he proposes the suppression of tithes and the seizure by the secular power of the greater part of the property of the church. The clergy, thus deprived of its wealth, privileges and jurisdiction, is further to be deprived of independence, for

the civil power is to have the right of appointing to benefices, &c. The supreme authority in the church is to be the council, but a council summoned by the emperor. The pope, no longer possessing any more power than other bishops (though Marsilius recognizes that the supremacy of the Church of Rome goes back to the earliest times of Christianity), is to content himself with a pre-eminence mainly of an honorary kind, without

claiming to interpret the Holy Scriptures, define dogmas or distribute benefices; moreover, he is to be elected by the Christian people, or by the delegates of the people, i.e. the princes, or by the council, and these are also to have the power to punish, suspend or depose him. Such is this famous work, full of obscurities, redundancies and contradictions, in which the thread of the argument is sometimes lost in a labyrinth of reasonings and citations, both sacred and profane, but which nevertheless expresses, both in religion and politics, such audacious and novel ideas that it has been possible to trace in it, as it were, a rough sketch of the doctrines developed during the periods of the Reformation and of the French Revolution. The theory was purely democratic, but was all ready to be transformed, by means of a series of fictions and implications, into an imperialist doctrine; and in like manner it contained a visionary plan of reformation which ended, not in the separation of the church from the state, but in the subjection of the church to the state. To overthrow the ecclesiastical hierarchy, to deprive the clergy of all their privileges, to reduce the pope to the rank of a kind of president of a Christian republic, which governs itself, or rather submits to the government of Caesar — such is the dream formed in 1324 by two masters of the university of Paris.

When in 1326 Louis of Bavaria saw the arrival in Nuremberg of the two authors of the book dedicated to him, startled by the boldness of their political and religious theories, he was at first inclined to treat them as heretics. He soon changed his mind, however, and, admitting them to the circle of his intimates, loaded them with favours. Having become one of the chief inspirers of the imperial policy, Marsilius accompanied Louis of Bavaria to Italy, where he preached or circulated written attacks against the pope, especially at Milan, and where he came within the sight of the realization of his wildest Utopias. To see a king of the Romans crowned emperor at Rome, not by the pope, but by those who claimed to be the delegates of the people (Jan. 17, 1328), to see John XXII. deposed by the head of the Empire (April 18), and a mendicant friar, Pietro de Corbara, raised by an imperial decree to the throne of St Peter (as Nicholas V.) after a sham of a popular election (May 12), all this was merely the application of principles laid down in the Defensor pads. The two authors of this book played a most active part in the Roman Revolution. Marsilius, appointed imperial vicar, abused his power to persecute the clergy who had remained faithful to John XXII. In recompense for his services, he seems to have been appointed archbishop of Milan, while his collaborator, John of Jandun, obtained from Louis of Bavaria the bishopric of Ferrara.

Marsilius of Padua also composed a treatise De translatione imperii romani, which is merely a rearrangement of a work of Landolfo Colonna, De jurisdictione imperatoris in causa matri- moniali, intended to prove the exclusive jurisdiction of the emperor in matrimonial affairs, or rather, to

justify the inter- vention of Louis of Bavaria, who, in the interests of his policy, had just annulled the marriage of the son of the king of Bohemia and the countess of Tirol. But, above all, in an unpublished work preserved at Oxford, the Defensor minor, Marsilius com- pleted and elaborated in a curious manner certain points in the doctrine laid down in the Defensor pads. In it he deals with ecclesiastical jurisdiction, penances, indulgences, crusades and pilgrimages, vows, excommunication, the pope and the council, marriage and divorce. Here his democratic theory still more clearly leads up to a proclamation of the imperial omnipotence.

Marsilius of Padua does not seem to have lived long after 1342. But the scandal provoked by his Defensor pads, condemned by the court of Avignon in 1326, lasted much longer. Benedict XII. and Clement VI. censured it in turn; Louis of Bavaria

disowned it. Translated into French, then into Italian (14th century) and into English (16th century), it was known by Wycliffe and Luther, and was not without an influence on the Reform movement.

See J. Sullivan, American Historical Review, vol. 11. (1896-1897), and English Historical Review for April 1905; Histoire litteraire de la France (1906), xxxiii. 528-623; Sigmund Riezler, Die literari- schen Widersacher der Pdpste zur Zeit Ludwig des Baiers (Leipzig,

1874).

There are numerous manuscripts of the Defensor pacis extant. We will here mention only one edition, that given by Goldast, in 1614, in vol. i. of his Monorchia sacri imperii; an unpublished last chapter was published by Karl Miiller, in 1883, in the Gottin- gische gelehrte Anzeigen, pp. 923-925.

Count Liitzow in The Life and Times of Master John Hus (London and New York, 1909), pp. 5-9, gives a good abstract of the Defensor pacis and the relations of Marsilius to other precursors of the Reformation. (N. V,)

MARSIVAN, or Meezifun (anc. PhazemonT), a town in the Amasia sanjak of the Sivas vilayet of Asia Minor, situated at the foot of the Tavshan Dagh. Pop. about 20,000, two-thirds Mussulman. It is a centre of American missionary and educa- tional enterprise, and the seat of Anatolia College, a theological seminary, and schools which were partly destroyed in the anti- Armenian riots of 1893 and 1895. There is also a Jesuit school. Marsivan is an unusually European place both in its aspect and the

commodities procurable in the bazaar.

MARS-LA-TOUR, a village of Lorraine, between Metz and the French frontier, which formed part of the battlefield of the 16th of August 1870. The battle is often called the battle of Mars- la-Tour, though it is more usually named after Vionville. (See Metz; and Franco-German War.) At Mars-la-Tour occurred the destruction of the German 38th brigade.

MARSTON, JOHN (c. 1575-1634), English dramatist and satirist, eldest son of John Marston of Coventry, at one time lecturer of the Middle Temple, was born in 1575, or early in 1576. Swinburne notes his affinities with Italian literature, which may be partially explained by his parentage, for his mother was the daughter of an Italian physician, Andrew Guarsi. He entered Brasenose College, Oxford, in 1592, taking his B.A. degree in 1594. The elder Marston in his will expresses regret that his son, to whom he left his law-books and the furniture of his rooms in the Temple, had not been willing to follow his profession. John Marston married Mary Wilkes, daughter of one of the royal chaplains, and Ben Jonson said that " Marston wrote his father-in-law's preachings, and his father-in-law his sermons." His first work was The Metamorphosis of Pigmalions Image, and cerlaine Satyres (1598). " Pigmalion " is an erotic poem in the metre of Venus and Adonis, and Joseph Hall attached a rather clumsy epigram to every copy that was exposed for sale in Cambridge. In the same year Marston published, under the pseudonym of W. Kinsayder, already employed in the earlier volume, his Scourge of Villanie, eleven satires, in the sixth of which he asserted that Pigmalion was intended to parody the amorous poetry of the time. Both this volume and its predeces- sor were burnt by order of the archbishop of Canterbury. The satires, in which Marston avowedly took Persius as his model, are coarse and vigorous. In addition to a general attack on the vices of his age he avenges himself on Joseph Hall who had assailed him in Virgidemiae. He had a great reputation among his contemporaries. John Weever couples his name with Ben Jonson's in an epigram; Francis Meres in Palladis tamia (1598) mentions him among the satirists; a long passage is devoted to " Monsieur Kinsayder " in the Return from Parnassus (1606), and Dr Brinsley Nicholson has suggested that Furor poeticus in that piece may be a satirical portrait of him. But his invective by its general tone, goes far to justify Mr W. J. Courthope's ' judgment that " it is likely enough that in seeming to satirize the world without him, he is usually holding up the mirror to his own prurient mind."

On the 28th of September 1599 Henslowe notices in his diary that he lent " unto Mr Maxton, the new poete, the sum of forty shillings," as an advance on a play which is not named. Another 1 Hist, of Eng. Poetry, iii. 70.

hand has amended " Maxton " to " Mastone." The earliest plays to which Marston's name is attached are The History of Antonio and Mellida. The First Part; and Antonio's Revenge. The Second Part (both entered at Stationers' Hall in 1601 and printed 1602). The second part is preceded by a prologue which, in its gloomy forecast of the play, moved the admiration of Charles Lamb, who also compares the situation of Andrugio and Lucia to Lear and Kent, but the scene which he quotes gives a misleading idea of the play and of the general tenor of Marston's work.

The melodrama and the exaggerated expression of these two plays offered an opportunity to Ben Jonson, who had already twice ridiculed Marston, and now pilloried him as Crispinus in The Poetaster (1601). The quarrel was patched up, for Marston dedicated his Malcontent (1604) to Jonson, and in the next year he prefixed commendatory verses to Sejanus. Far greater restraint is shown in The Malcontent than in the earlier plays. It was printed twice in .1604, the second time with additions by John Webster. The Dutch Courtezan (1605) and Parasitaster, or the Fawne (1606) followed. In 1605 Eastward Hoe, 1 a gay comedy of London life, which gave offence to the king's Scottish friends, caused the playwrights concerned in its production- — Marston, Chapman and Jonson — to be imprisoned at the instance of Sir James Murray. The Wonder of Women, or the Tragedie of Sophonisba (1606), seems to have been put forward by Marston as a model of what could be accomplished in tragedy. In the preface he mocks at those authors who make a parade of their authorities and their learning, and the next play, What you Will (printed 1607; but probably written much earlier), contains a further attack on Jonson. The tragedy of The Insatiate Countesse was printed in 16 13, and again, this time anonymously, in 1616. It was not included in the collected edition of Marston's plays in 1633, and in the Duke of Devonshire's library there is a copy bearing the name of William Barksteed, the author of the poems, Myrrha, the Mother of Adonis (1607), and Hiren and the Fair Greek (1611). The piece contains many passages superior to anything to be found in Marston's well-authenticated plays, and Mr A. H. Bullen suggests that it may be Barksteed's version of an earlier one drafted by Marston. The character and history of Isabella are taken chiefly from " The Disordered Lyfe of the Countess of Celant " in William Paynter's Palace of Pleasure, derived eventually from Bandello. There is no certain evidence of Marston's authorship in Histriomastix (printed 1610, but probably produced before 1599), or in Jacke Drums Entertainement, or the Comedie of Pasquil and Katherine (1616), though he probably had a hand in both. Mr R. Boyle (Englische Sludien, vol. xxx., 1901), in a critical study of Shake- speare's Troilus and Cressida, assigns to Marston's hand the whole of the action dealing with Hector, with the prologue and epilogue, and attributes to him the bombast and coarseness in the last scenes of the play. It will be seen

that his undoubted dramatic work was completed in 1607. It is uncertain at what time he exchanged professions, but in 1616 he waspresented to the living of Christchurch, Hampshire. He formally resigned his charge in 1631, and when his works were collected in 1633 the publisher, William Sheares, stated that the author " in his autumn and declining age " was living " far distant from this place." Nevertheless he died in London, in the parish of Alder- manbury, on the 25th of June 1634. He was buried in the Temple Church.

Marston's works were first published in 1633, once anonymously as Tragedies and Comedies, and then in the same year as Workes of Mr John Marston. The Works of John Marston (3 vols.) were reprinted by Mr J. O. Halliwell (Phillipps) in 1856, and again by Mr. A. H. Bullen (3 vols.) in 1887. His Poems (2 vols.) were edited by Dr A. B. Grosart in 1879. The British Museum Catalogue tenta- tively assigns to Marston The Whipper of the Satyre his pennance in a white sheete; or, the Beadle's Confutation (1601), a pamphlet in answer to The Whipping of the Satyre. For an account of the quarrel of Dekker and Marston with Ben Jonson see Dr R. A. Small, The

- *Revived at Drury Lane (1751) as The Prentices, in 1775 as Old City Manners, -and said to have suggested Hogarth's " Industrious 1 and Idle Prentices."*

Stage Quarrel between Ben Jonson and the so-called Poetasters; in E. Koelbing, Forschungen zur englischen Sprache und Litteratur, pt. i. (1899). See also three articles John Marston als Dramatiker, by Ph. Aronstein in Englische Studien (vols. xx. and xxi., 1895), and " Quellenstudien zu den Dramen Ben Jonsons, John Marstons …" by Emil Koeppel {Milnchener Beitrdge zur roman. und engl. Philologie, pt. xi. 1895).

MARSTON, PHILIP BOURKE (1850-1887), English poet, was born in London on the 13th of August 1850. His father, John Westland Marston (1819-1890), of Lincolnshire origin, the friend of Dickens, Macready and Charles Kean, was the author of a series of metrical dramas which held the stage in succession to the ambitious efforts of John Tobin, Talfourd, Bulwer and Sheridan Knowles. . His chief plays were The Patrician's Daughter (1841), Strathmore (1849), A Hard Struggle (1858) and Donna Diana (1863). He was looked up to as the upholder of the outworn tradition of the acted poetic drama, but his plays showed little vitality, and Marston's reviews for the Athenaeum, including one of Swinburne's Atalanta in

Calydon, and his dramatic criticisms embodied in Our Recent Actors (1888) will probably claim a more enduring reputation. His Dramatic and Poetical Works were collected in 1876. The son, Philip Bourke, was born in a literary atmosphere. His sponsors were Philip James Bailey and Dinah Mulock (Mrs Craik). At his father's house near Chalk Farm he met authors and actors of his father's generation, and subsequently the Rossettis, Swinburne, Arthur O'Shaughnessy and Irving. From his earliest years his literary precocity was overshadowed by misfortunes. In his fourth year, in part owing to an accident, his sight began to decay, and he gradually became almost totally blind. His mother died in 1870. His fiancee, Mary Nesbit, died in 1871; his closest friend, Oliver Madox Brown, in 1874; his sister Cicely, his amanuensis, in 1878; in 1879 his remaining sister, Eleanor, who was followed to the grave after a brief interval by her husband, the poet O'Shaughnessy, and her two children. In 1882 the death of his chief poetic ally and inspirer, Rossetti, was followed closely by the tragedy of another kindred spirit, the sympa- thetic pessimist, James Thomson (" B. V."), who was carried dying from his blind friend's rooms, where he had sought refuge from his latest miseries early in June of the same year. It is said that Marston came to dread making new friendships, for fear of evil coming to the recipients of his affection. In the face of such calamities it is not surprising that Marston's verse became more and more sorrowful and melancholy. The idylls of flower-life, such as the early and very beautiful " The Rose and the Wind " were succeeded by dreams of sleep and the repose of death. These qualities and gradations of feeling, reflecting the poet's successive ideals of action and quiescence, are traceable through his three published collections, Songtide (1871), All in All (1875) and Wind Voices (1883). The first and third, con- taining his best work, went out of print, but Marston's verse was collected in 1892 by Mrs Louise Chandler Moulton, a loyal and devoted friend, and herself a poet. Marston read little else but poetry; and of poetic values, especially of the intenser order, his judgment could not be surpassed in sensitiveness. He was saturated with Rossetti and Swinburne, and his imitative power was remarkable. In his later years he endeavoured to make money by writing short stories in Home Chimes and other American magazines, through the agency of Mrs Chandler Moulton. His popularity in America far exceeded that in his own country. His health showed signs of collapse from 1883;

in January 1887 he lost his voice, and suffered intensely from the

failure to make himself understood. He died on the 13th of

February 1887.

He was commemorated in Dr Gordon Hake's " Blind Boy," and in a fine sonnet by Swinburne, beginning " The days of a man are threescore years

and ten." There is an intimate sketch of the blind poet bv a friend, Mr Coulson Kernahan, in Sorrow and Song (1894), p. 127. (T. Se.)

MARSTON MOOR, BATTLE OF, was fought on the 2nd of July 1644 on a moor (now enclosed) seven miles west of York, between the Royalist army under Prince Rupert and the Parliamentary and Scottish armies under the earl of Manchester, Lord Fairfax

and Lord Leven. For the operations that preceded the battle see Great Rebellion. Rupert had relieved York and joined forces with the marquess of Newcastle's army that had defended that city, and the Parliamentarians and Scots who had besieged it had drawn off south-westward followed by the Royalists. On the morning of the 2nd of July, however, Rupert's attack on their rearguard forced them to halt and deploy on rising ground on the south edge of the moor, their position being defined on the right and left by Long Marston and Tockwith and divided from the Royalist army on the moor by a lane connecting these two villages. The respective forces were — Royalists about 18,000, Parliamentarians and Scots about 27,000. The armies stood front to front. On the Royalist right was half the cavalry under Rupert; the infantry was in the centre in two lines and the left wing of cavalry was under General (Lord) Goring. The lane along the front was held by skirmishers. On the other side the cavalry of the Eastern Association under Lieut.-General Cromwell and that of the Scots under Major-General Leslie (Lord Newark) formed the left, the infantry of the Eastern Association under Major-General Crawford, of the Scots under Lord Leven, and of the Yorkshire Parliamentarians under Lord Fairfax was in the centre and the Yorkshire cavalry under Sir Thomas Fairfax was on the right wing.

During the afternoon there was a desultory cannonade, but neither side advanced. At last, concluding from movements in the enemy's lines that there would be no fighting that day, Rupert and Newcastle strolled away to their coaches and their soldiers dismounted and lay down to rest. But seeing this Cromwell instantly advanced his wing to the attack (5 p.m.). His dragoons drove away the skirmishers along the lane, and the line cavalry crossed into the moor. The general forward move- ment spread along the Parliamentary line from left to right, the Eastern Association infantry being the first to cross the road. In Rupert's momentary absence, the surprised Royalist cavalry could make no head against Cromwell's charge, although the latter was only made piecemeal as each unit crossed the lane and formed to the front. Rupert soon galloped up with his fresh second line and drove back Cromwell's men, Cromwell him- self being wounded, but Leslie and the Scots Cavalry, taking ground to their left, swung in upon Rupert's flank, and after a hard struggle the hitherto unconquered cavalry of the prince was broken and routed. Then, being

unlike other cavalry of the time, a thoroughly disciplined force, the Eastern Association cavalry rallied, leaving the pursuit to the Scots light horse. On the Parliamentary right, Goring had swept away the Yorkshire horse, and although most of his troopers had followed in dis- orderly pursuit, Sir Charles Lucas with some squadrons was attacking the exposed right of Leven's infantry. At the same time the Parliamentary infantry had mostly crossed the lane and was fighting at close quarters and suffering severely, New- castle's north-country " White-Coat " brigade driving back and finally penetrating their centre. Lord Leven gave up the battle as lost and rode away to Tadcaster. But the Scots on the right of the foot held firm against Lucas's attacks, and Cromwell and Leslie with their cavalry passed along the rear of the Royal army, guided by Sir Thomas Fairfax (who though wounded in the rout of his Yorkshire horse had made his way to the other flank). Then, on the ground where Goring had routed Fairfax, Cromwell and Leslie won an easy victory over Goring's scattered and disordered horsemen. The Eastern Association infantry had followed the horse and was now in rear of the Royalists. The original Parliamentary centre of foot, a re"mnant, but one containing only the bravest and steadiest men, held fast, and soon the Royalist infantry was broken up into isolated regiments and surrounded by the victorious horse and foot of the enemy. The White-Coats retreated into an enclosure and there defended themselves to the last man. The rest were cut down on the field or scattered in the pursuit and 'at nightfall the Royalist army had ceased to exist. Some of Rupert's foot regiments made their way to York, but the dispirited garrison only held out for a fort- night. Rupert rallied some six thousand of the men and escaped . over the hills into Lancashire, thence rejoining King Charles in

the south. But the Northern army, the main hope of the Royalist cause, was destroyed.

MARSUPIALIA (from Lat. marsupium, a "pouch," or "bag"), the group of mammals in which the young are usually carried for some time after birth in a pouch on the under-surface of the body of the female. The group, which has also the alternative title of Didelphia, is by some authorities regarded as a sub-class of the mammalia of equal rank with the Monotremata, while by others it is brigaded with the placentals, so that the two to- gether form a sub-class of equal grade with the one represented by the monotremes. There is much to be urged in favour of either view; and in adopting the former alternative, it must be borne in mind that the difference between monotremes and marsupials is vastly greater than that

which separates the latter from placen- tals. In elevating the marsupials to the rank of a sub-class the name Metatheria has been suggested as the title for the higher grade, with Marsupialia as the designation for the single order by which they are now represented. It is, however, less liable to cause confusion, and in many other ways more convenient to employ the better known term Marsupialia in both senses.

Marsupials may be denned as viviparous (that is non-egg- laying) mammals, in which the young are born in an imperfect condition, and almost immediately attached to the teats of the mammary glands; the latter being generally enclosed in a pouch, and the front edge of the pelvis being always furnished with epipubic or " marsupial " bones. As a rule there is no allantoic placenta forming the means of communication between the blood of the parent and the foetus, and when such a structure does occur its development is incomplete. In all cases a more or less full series of teeth is developed, these being differentiated into incisors, canines, premolars and molars, when all are present; but only a single pair of teeth in each jaw has deciduous predecessors.

The pouch from which the marsupials take their name is supported by the two epipubic bones, but does not correspond to the temporary breeding-pouch of the monotremes. It may open either forward or backwards; and although present in the great majority of the species, and enclosing the teats, it may, as in many of the opossums, be completely absent, when the teats extend in two rows along the whole length of the under-surface of the body. Whether a pouch is present or not, the young are born in an exceedingly imperfect state of development, after a very short period of gestation, and are immediately transferred by the female parent to the teats, where they remain firmly attached for a considerable time; the milk being injected into their mouths at intervals by means of a special muscle which compresses the glands. In the case of the great grey kangaroo, for instance, the period of gestation is less than forty days, and the newly-born embryo, which is blind, naked, and unable to use its bud-like limbs, is little more than an inch in length.

As additional features of the subclass may be mentioned the absence of a corpus callosum connecting the right and left hemi- spheres of the brain, 1 and of a fossa in the septum between the two auricles of the heart. In the skull there are always vacuities, or unossified spaces in the bones of the palate, while the " angle," or lower hind extremity of each half of the lower jaw is strongly bent inwards so as to form a kind of shelf, and the alisphenoid bone takes a share in the formation of the tympanum, or auditory bladder, or bulla. Didelphia, the alternative name of the group was given in allusion to the circumstance that the uterus has two separate open- ings; while other features are the inclusion of the openings of the

alimentary canal and the urino-genital sinus in a common sphincter muscle, and the position of the scrotum in advance of the penis. The bandicoots alone possess a placenta. Lastly the number of trunk- vertebrae is always nineteen, while there are generally thirteen pairs of ribs.

As regards the teeth, in all cases except the wombats the number of upper incisors differs from that of the corresponding lower teeth. As already stated, there is no vertical displacement and succession of the functional teeth except in the case of a single tooth on each side of each jaw, which is the third of the premolar series, and is preceded by a tooth having more or less of the characters of a molar (see fig. i). In some cases (as in rat-kangaroos) this tooth retains its place and function until the animal has nearly, if not quite,

attained its full stature, and is not shed and replaced by its successor until after all the other teeth, including the molars, are in place and use. In others, as the thylacine, it is rudimentary, being shed or absorbed before any of the other teeth have cut the gum, and there- fore functionless. It may be added that there are some marsupials, such as the wombat, koala, marsupial ant-eater and the dasyures,

'The presence or absence of the corpus callosum has been much disputed ; the latest researches, however, indicate its absence.

Fig. I. — Teeth of Upper Jaw of Opossum (Didelphys marsupialis), all of which are unchanged, except the third premolar, the place of which is Occupied in the young animal by a molariform tooth, repre- sented in the figure below the line of the other teeth.

in which no such deciduous tooth, even in a rudimentary state, has been discovered. In addition to this replacement of a single pair of functional teeth in each jaw, it has been discovered that marsupials possess rudimentary tooth-germs which never cut the gum. Accord- ing to one theory, these rudimentary teeth, together with the one pair of functional teeth in each jaw that has vertical successors, represent the milk-teeth of placental mammals. On the other hand, there are those who believe that the functional dentition (other than the replacing premolar and the molars) correspond to the milk-dentition of placentals, and that the rudimentary tooth-germs represent a " prelacteal " dentition. The question, however, is of academic rather than of practical interest, and whichever way it is answered does not affect our general conception of the nature and relationships of the group.

Unfortunately the homology of the functional series does not by any means end the uncertainty connected with the marsupial denti- tion ; as there is

also a difference of opinion with regard to the serial homology of some of the cheek-teeth. For instance, according to the older view, the dental formula in the thylacine or Tasmanian wolf is i. |, c, \, p. f, m. | =46. On the other hand, in the opinion of the present writer, this formula, so far as the cheek-teeth are concerned, should be altered to p. J, m. f , thus bringing it in accord, so far as these teeth are concerned, with the placental formula, and making the single pair of replacing teeth the third premolars. It may be added that the formula given above shows that the marsupial denti- tion may comprise more teeth than the 44 which form the normal full placental complement.

As regards geographical distribution, existing marsupials, with the exception of two families, Didelphyidae and Epanorth- idae, are mainly limited to the Australian region, forming the chief mammalian fauna of Australia, New Guinea, and some of the adjacent islands. The Didelphyidae are almost exclusively Central and South American, only one or two species ranging into North America. Fossil remains of members of this family have also been found in Europe in strata of the Oligocene period.

History. — The origin and evolution of the Australian marsupials have been discussed by Mr B. A. Bensley. In broad contrast to the views of Dr A. R. Wallace, this author is of opinion that marsupials did not effect an entrance into Australia till about the middle of the Tertiary period, their ancestors being probably opossums of the American type. They were then arboreal; but they speedily entered upon a rapid, although short-lived, course of evolution, during which leaping terrestrial forms like the kangaroos were developed. The short period of this evolution is at least one factor in the primitive grade of even the most specialized members of the group. In the advance of their molar teeth from a tritubercular to a grinding type, the author traces a curious parallelism between marsupials and placentals. Taking opossums to have been the ancestors of the group, the author considers that the present writer may be right in his view that marsupials entered Australia from Asia by way of New Guinea. On the other hand there is nothing absolutely decisive against their origin being southern.

Again, taking as a text Mr L. Dollo's view that marsupials were originally arboreal, that, on account of their foot-structure, they could not have been the ancestors of placentals, and that they themselves are degenerate placentals, Mr Bensley contrasts this with Huxley's scheme of mammalian evolution. According

to the latter, the early monotremes which became specialized into modern monotremes, gave rise to the ancestors of the modern marsupials; while the modern placentals are likewise an offshoot from the ancestral marsupial stock. This phylogeny, the author thinks, is the most probable of all. It is urged that the imperfect placenta of the bandicoots instead of being vestigial, may be an instance of parallelism, and that in marsupials generally the allantois failed to form a placental connexion. Owing to the antiquity of both placentals and marsupials, the arboreal character of the feet of the modern forms of the latter is of little importance. Further, it is considered that too much weight has been assigned to the characters distinguishing monotremes from other mammals, foetal marsupials showing a monotreme type of coracoid, while it is probable that in the long run it will be found impossible to maintain the essential dissimilarity between the milk-glands of monotremes and other mammals.

Another view is to regard both marsupials and placentals as derivates from implacental ancestors more or less nearly related to the creodont carnivora, or possibly as independently descended from anomodont reptiles (see Creodonta). Finally, there is the hypothesis that marsupials are the descendants of placentals, in which case, as was suggested by its discoverer, the placenta of the bandicoots would be a true vestigial structure.

Classification.

Existing marsupials may be divided into three main divisions or sub-orders, of which the first, or Polyprotodontia, is common to America and Australasia; the second, or Paucituberculata, is exclusively South American; while the third, or Diprotodonts, is as solely Australasian inclusive of a few in the eastern Austro-Malayan islands.

i. Polyprotodonts. — The Polyprotodonts are characterized by their numerous, small, sub-equal incisors, of which there are either five or four pairs in the upper and always three in the lower jaw, (fig. 2) and the generally strong and large canines, as well as by the

From Flower, Quart. Jour. Geol. Soc. Fig. 2. — Front View of Skull of the Tasmanian Devil (Sarcophilus ursinus) to exhibit polyprotodont type of dentition.

presence of from four to five sharp cusps or tubercles on the crown of the molars. The pouch is often absent, and may open backwards. For the most part the species are carnivorous or insectivorous.

The first family is that of the true or American opossums — Didelphyidae,

in which there are five pairs of upper incisors, while the feet are of the presumed primitive arboreal type, the hind foot having the four outer toes subequal and separate, with the first opposable to them all. With the exception of the water-opossum, forming the genus Chironectes, all the living members of the family may be included in the genus Didelphys. The latter may, however, be split up into several sub-generic groups, such as Metachirus, Philan- der, Marmosa {Micoureus or Grymaeomys), Peramys, Dromiciops, &c. The small South American forms included in Marmosa, which lack the pouch, and have numerous teats, and molar teeth of a primitive type, are doubtless the most generalized representatives of the group (see Opossum; and Water-Opossum).

Nearly allied is the Australian family Dasyuridae, characterized by the presence of only four pairs of upper incisors, the generally small and rudimentary condition of the first hind toe, which can but seldom be opposed to the rest, and the absence of prehensile power in the tail; the pouch being either present or absent, and the fore feet always five-toed. The stomach is simple, and there is no caecum to the intestine, although this is present in the opossums.

The largest representative of the family is the Tasmanian wolf, or thylacine, alone representing the genus Thylacinus, in which the dentition numbers i. f , c. \, p. J, m. | = 46 ; with the incisors small and vertical, the outer one in the upper jaw being larger than the others. Summits of the lower incisors, before they are worn, with a deep transverse groove, dividing it into an anterior and a posterior cusp. Canines long, strong and conical. Premolars with compressed crowns, increasing in size from before backwards. Molars in general characters resembling those of Sarcophilus, but of more simple form, the cusps being less distinct and not so sharply pointed. Deciduous

Fig. x — The Tasmanian Wolf, or Thylacine (Thylacinus cynocephalus).
molar very small, and shed before the animal leaves the mother's pouch. General form dog-like, with the head elongated, the muzzle pointed, and the ears moderate, erect and triangular. Fur short and closely applied to the skin. Tail of moderate length, thick at the base and tapering towards the apex, clothed with short hair. First hind toe (including the metacarpal bone) absent. Vertebrae : C. 7, D. 13, L. 6, S. 2, Ca. 23. Marsupial bones unossified. The gradual passage of the thick root of the tail into the body is a character com- mon to the Tasmanian wolf and the aard-vark, and may be directly inherited from reptilian ancestors (see Thylacine).

The next genus is represented solely by the Tasmanian devil, Sarcophilus (or Diabolus) ursinus, a medium-sized animal with a dental formula similar to that of the dasyures, but with teeth (fig. 2) approximating to

those of the thylacine, though markedly different in details. The first hind toe is absent.

In the " native cats," or dasyures, constituting the genus Dasyu- rus, the dental formula is i. f, c. \, p. |, m. |: total 42. The upper incisors are nearly equal and vertical, with the first slightly longer, narrower, and separated from the rest. Lower incisors sloping forward and upward. Canines large and sharply pointed. First two premolars with compressed and sharp-pointed crowns, and slightly developed anterior and posterior accessory basal cusps. Molars with numerous sharp-pointed cusps. In the upper jaw the first two with crowns having a triangular free surface; the last small, simple, narrow and placed transversely. In the lower jaw the molars more compressed, with longer cusps; the last not notably smaller than the others. Ears of moderate size, prominent and obtusely pointed. First hind toe rudimentary, clawless or absent; its metatarsal bone always present. Tail generally long and well clothed with hair. Vertebrae: C. 7, D. 13, L. 6, S. 2, Ca. 18-20 (see Dasyure).

The genus Phascologale comprises a number of small marsupials, none exceeding a rat in size, differing from the dasyures in possessing an additional premolar — the dentition being i. f, c. \, p. j, m. | : total 46 — and in having the teeth generally developed upon an insecti- vorous rather than a carnivorous pattern, the upper middle incisors being larger and inclined forward, the canines relatively smaller, and the molars with broad crowns, armed with prickly tubercles. The muzzle is pointed. Ears moderately rounded, and nearly naked. Fore feet with five sub-equal toes, with compressed, slightly curved pointed claws. Hind feet with the four outer toes sub-equal, with claws similar to those in the fore feet; the first toe almost always distinct and partially opposable, though small and nailless, some- times absent.

In some respects intermediate between the preceding and the next genus is Dasyuroides byrnei, of Central Australia, an animal of the size of a rat, with one lower premolar less than in Phascologale, without the first hind toe, and with a somewhat thickened tail. The pouch is incomplete, with two lateral folds, and the number of teats six.

Sminthopsis includes several very small species, with the same

dental formula as Phascologale, but distinguished from that genus

by the narrowness of the hind foot, in which the first toe is present,

I and the granulated or hairy (in place of broad, smooth and naked)

soles. A pouch is present, and there are eight or ten teats. Nearly allied is the jumping Antechinomys laniger, of East Central Australia, an elegant mouse-like creature, with large oval ears, elongated limbs, a long and tufted tail and no first hind toe. In connexion with the large size of the ears is the excessive inflation of the auditory bulla of the skull.

From all other members of the family the marsupial, or banded, ant-eater (Myrmecobius fasciatus) differs by the presence of more than seven pairs of cheek-teeth in each jaw, as well as by the exceedingly long and protrusile tongue. Hence it is made the type of a distinct subfamily, the Myrmecobiinae, as distinct from the Dasyurinae, which includes all the other members of the family. From the number of its cheek-teeth, the banded ant-eater has been regarded as related to some of the primitive Jurassic mammals; but this view is disputed by Mr Bensley, who regards this multiplicity of teeth as a degenerate feature. On the other hand, it is noteworthy that this marsupial retains in its lower jaw the so-called mylo-hyoid groove, which is found in the aforesaid Jurassic mammals. Myrmeco- bius has a total of 52 or 54 teeth, which may be classed as i. f, c. \, p. + m. §~Jt§. The teeth are all small and (except the four pos-terior inferior molars) separated from each other by an interval. Head elongated, but broad behind; muzzle long and pointed; ears of moderate size, ovate and rather pointed. Fore-feet with five toes, all having strong pointed, compressed claws, the second, third and fourth nearly equal, the fifth somewhat and the first considerably shorter. Hind-feet with no trace of first toe externally, but the metatarsal bone is present. Tail long, clothed with long hairs. Fur rather harsh and bristly. Female without pouch, the young when attached to the nipples being concealed by the long hair of the abdomen. Vertebrae: C. 7, D. 13, L. 6, S. 3, Ca. 23.

From Gould.

Fig. 4. — The Marsupial or Banded Ant-eater (Myrmecobius fasciatus).

The single species, which is a native of western and southern Australia, is about the size of an English squirrel, to which its long bushy tail gives it some resemblance; but it lives entirely on the ground, especi- ally in sterile sandy districts, feeding on ants. Its prevailing colour is chestnut-red, but the hinder part of the back is marked with broad, white, transverse bands on a dark ground.

With the bandicoots, or Peramelidae, we come to a family of poly-protodonts which resemble the diprotodonts in the peculiarly specialized structure of their hind limbs; an adaptation which we must apparently

regard as having been independently acquired in the two groups. The dentition is i. |, c. }, p. f , m. jj ; total, 48; the upper incisors being small, with short, broad crowns; the lower incisors moderate, narrow, proclivous; canines well developed. Premolars compressed, pointed; and the molars with quadrate tuberculated crowns. Deciduous premolar preceded by a minute molariform tooth, which remains in place until the animal is nearly full grown. Fore feet with two or three of the middle toes of nearly equal size, and provided with strong, sharp, slightly curved claws, the other toes rudimentary. Hind feet long and narrow; the first toe rudimentary or absent; the second and third very slender and united in a common integument; the fourth very large, with a stout elongated conical claw; the fifth smaller than the fourth (see fig. 6). The terminal phalanges of the large toes of both feet cleft at their extremities. Head elongated, with the muzzle long, narrow and pointed. Stomach simple. Caecum of moderate size. Pouch complete, generally opening backwards. Alone among marsupials

bandicoots have no clavicles. More remarkable stiK is the development of a small allantoic placenta.

*In the true bandicoots of the genus Perameles (fig. 5) the fore-feet have the three middle toes well developed, the third slightly larger than the second, the fourth somewhat shorter, provided with long, strong, slightly curved, pointed claws. First and fifth toes very short and without claws. Hind feet with one or two phalanges, in the first toe forming a distinct tubercle visible externally; th< * second and third toes very slender, of equal length, joined as far*

From Gouid.

Fig. 5,

-Gunn's Bandicoot (Perameles gunni).

\m

as the terminal phalange, but with distinct claws; the fifth inter- mediate in length between these and the largely developed fourth toe. Ears of moderate or small size, ovate, pointed. Tail rather short, clothed with short depressed hairs. Fur short and harsh. Pouch opening backwards. Vertebrae: C. 7, D. 13, L. 6, S. I, Ca. 17. (see Bandicoot.)

The rabbit-bandicoot, Peragale (or Thylacomys) represents a genus in which the cheek-teeth are curved, with longer crowns and shorter roots than in the last. Hind extremities proportion- ally longer with inner toe represented only by a small metatarsal bone. Muzzle much elongated and

narrow. Fur soft and silky. Ears very large, long and pointed. Tail long, its apical half-clothed on ,.£ the dorsal surface with long hairs. Pouch opening forwards. Vertebrae: C. 7, D. 13, L. 6, S. 2, Ca. 23. The one species, from Western Australia, is the largest member of the family, being about the size of a rabbit, to which it bears sufficient superficial resemblance to have acquired the name of " native rabbit " from the colonists. It burrows in the ground, but in other respects resembles bandicoots in habits.

In the pig-footed bandicoot (Choeropus castanotis) the dentition generally resembles that of Perameles, but the canines are less developed, and in the upper jaw two-rooted. Limbs very slender; posterior nearly twice the length of the anterior. Fore feet with the functional toes reduced to two, the second and third, of equal length, with closely united metacarpals and short, sharp, slightly curved, com- pressed claws. First toe represented by a minute rudiment of a metacarpal bone; the fourth by a metacarpal and two small phalanges without a claw, and not reaching the middle of the metacarpal of the third ; fifth entirely absent. Hind foot long and ciiofrop-, narrow, mainly composed of the strongly developed miis. fourth toe, terminating in a conical pointed nail, c – calcanium ; with a strong pad behind it; the first toe repre- cibofd'' Tˆnavi- sented by a rudimentary metatarsal; the remaining cular ; ' C 3, 'ectocu- toes completely developed, with claws, but exceed- neiform ; II. and ingly slender; the united second and third reaching ™- f. he c ?''?? e j a little way beyond the metatarso- phalangeal articu- digits ; ˆV. the lation of the fourth; the fifth somewhat shorter, large and only rune- Tail not quite so long as the body, and covered tio 5 al di 8't ; V. the with short hairs. Ears large and pointed, and r d "J t meIltaly Mth folded down when the animal is at rest. Fur soft and loose. Pouch opening backwards. Vertebrae : C. 7, D. 13, L. 6, S. 1, Ca. 20.

The only species of this genus is about the size of a small rat, found in the interior of Australia. Its general habits and food appear to resemble those of other bandicoots. A separate family, Notoryc- tidae, is represented by the marsupial mole (Notoryctes typhlcps), of the deserts of south Central Australia, a silky, golden-haired, burrowing creature, with a curious leathery muzzle, and a short, naked stumpy tail. The limbs are five-toed, with the third and fourth toes of the front pair armed with enormous digging claws;

Fig. 6.— Skeleton of Hind Foot of casta-

there are no external ear-conchs ; and the dentition includes four pairs of upper, and three of lower, incisors, and distinctly tritubercular cheek-teeth. The small pouch, supported by the usual epipubic bones, opens backwards. In correlation with its burrowing habits, some of the vertebrae of the neck and of the loins are respectively welded together. The eyes have degenerated to a greater extent than

From Gould.

Fig. 7. — The Pig-footed Bandicoot (Choeropus castanotis).

those of any other burrowing mammal, the retina being reduced to a mass of simple cells, and the cornea and sclerotic (" white ") to a pear- shaped fibrous capsule enclosing a ball of pigment. The reason for this extreme degeneration is probably to be found in the sandy nature of the soil in which the creature burrows, a substance which would evidently irritate and inflame any functional remnant of an eye. The portion of the lachrymal duct cotnmunicating with the cavity of the nose has, on the other hand, been abnormally developed, apparently for the purpose of cleansing that chamber from particles of sand which may obtain an entrance while the animal is burrowing. (See Marsupial Mole.)

2. Paucituberculates. — The second suborder of marsupials, the Paucituberculata, is exclusively South American, and typically represented by the family Epanorthidae, the majority of the members of which are extinct, their remains being found in the probably Miocene Santa Cruz beds of Patagonia, although one existing genus < Caenolestes) survives in Ecuador and Colombia. One of the two living species was, indeed, described so long ago as the year 1863, under the preoccupied name of Hyracodon, but attracted little or no attention, as its affinities were not fully recognized. Externally Caenolestes has a shrew-like appearance. The elongated skull (fitj. 8) has four pairs of upper incisors and long upper canines, while in the lower jaw there is a single pair of procumbent incisors.

After Thomas.

Fig. 8. — Skull of Caenolestes obscurus.

followed by several small teeth representing the canine and earlier premolars. The three pairs of molars in each jaw are, like the last premolar, quadritubercular oblong teeth. The five-toed feet are of normal structure, and the rat-like tail is prehensile towards the tip. The female has a small pouch. The extinct members of the family are represented by the genera Epanorthus, Acdestis, Garzonia, &c. In a second family —

Abderilidae — also from the Patagonian Miocene, the penultimate premolar is developed into an enormous tooth, with a tall, secant and grooved crown, somewhat after the fashion of the enlarged premolar of Plagiaulax. From the struc- ture of the skull, it is thought probable that Abderites had an elon- gated snout, like that of many Insectivora. As a sub-order, the

Paucituberculata are characterized by the presence of four pairs of upper and three of lower incisor teeth ; the enlargement and forward inclination of the first pair of lower incisors, and the presence of four or five sharp cusps on the cheek-teeth, coupled with the absence of " syndactylism " in the hind limbs.

3. Diprotodonts. — The third and last sub-order of marsupials is the Diprotodontia, which is exclusively Australasian and includes the wombats, koala, cuscuses, kangaroos and their relatives. There are never more than three pairs of upper and one of lower incisors, of which the middle upper and the single lower pair are large and chisel-like (fig. 9) ; the canines are small or absent ; the cheek-teeth have bluntly tuberculate or transversely-ridged crowns in most cases; and the hind-feet are syndactylous. With one exception, the intestine has a caecum, and the pouch is large and opens for- wards. It should be added that Professor Elliot Smith has pointed out a certain peculiarity in its commissures whereby the brain of the diprotodonts differs markedly from that of the polyprotodonts

Fig.

From Flower, Quart. Journ. Geol. Soc.

— Front view of Skull of the Koala (Phascolarctus cinereus) to exhibit Diprotodont type of dentition.

and approximates to the placental type. Dr Einar Lonnberg has also recorded certain adaptive peculiarities in the stomach. Most of the species, particularly the specialized types, are more or less completely herbivorous.

The first family, Phascolomyidae, is typified by the wombats; but according to the view adopted by Mr H. Winge, and endorsed by Professor Max Weber, is also taken to include the koala. In this wider sense the family may be characterized as follows. The tym- panic process of the alisphenoid bone of the skull is short, not cover- ing the cavity of the tympanum, nor reaching the paroccipital process. The tail is rudimentary, the first hind-toe opposable, the first pair of upper incisors very large, but the second and third either absent or small and placed partially behind the larger pair ; and only five pairs of cheek-teeth in each jaw. The stomach has a cardiac

gland, and the number of teats is two.

In the wombats (Phascolomys) the dentition is i. }, c. $, p. + m. f, total 24 ; all the teeth growing from persistent pulps, and the incisors large and chisel-like, with enamel only on the front surface. The cheek-teeth strongly curved, forming from the base to the summit about a quarter of a circle, the concavity being directed outwards in the upper and inwards in the lower teeth. The first of the series (which appears to have no predecessor) single-lobed ; the other four composed of two lobes, each subtriangular in section. Limbs equal, stout and short. Fore-feet with five distinct toes, each furnished with a long, strong and slightly curved nail, the first and fifth consider- ably shorter than the other three. Hind-feet with a very short nail- less first toe, the second, third and fourth toes partially united by integument, of nearly equal length, the fifth distinct and rather shorter; all four with long and curved nails. In the skeleton the second and third toes are distinctly more slender than the fourth, showing a tendency towards the character so marked in the following families. Tail rudimentary. Caecum very short and wide, with a vermiform appendage (see Wombat).

In addition to remains referable to the existing genus, the Pleisto- cetlfc deposits of Australia have yielded evidence of an extinct giant wombat constituting the genus Phascolonus (Sceparnodon) .

The koala, or" native bear " (Phascolarctus cinereus), which differs widely from the wombats in its arboreal habits, is less specialized as regards its dentition, of which the formula is i. f , c. J, p. + m. £.. total 30. Upper incisors crowded together, cylindroidal, the first much larger than the others, with a bevelled cutting edge (fig. 9). Canine very small; a considerable interval between it and the first premolar, which is as long from before backwards but not so broad as the molars, and has a cutting edge, with a smaller parallel inner ridge. The molar-like teeth slightly diminishing in size from the

first to the fourth, with square crowns, each bearing four pyramidal cusps. The lower incisors are partially inclined forwards, compressed and tapering, bevelled at the ends. Cheek-teeth in continuous series, as in the upper jaw. Fore-feet with the two inner toes slightly separated from and opposable to the remaining three, all with strong curved and much compressed claws. Hind-foot (fig. 10) with the

first toe placed far back, large and broad, the second and third (united)

toes considerably smaller than the other two ; the fourth the largest. No external tail. Fur dense and woolly. Ears of moderate size, thickly clothed with long hair. Caecum very long and dilated, with numerous folds. Vertebrae: C. 7, D. 11, L. 8, S. 2, Ca. 8. Ribs eleven pairs (see Koala).

Here may be noticed three genera of large extinct marsupials from the Pleistocene of Australia whose affinities appear to ally them to the wombat-group on the one hand and to the phalangers on the other. The longest known is Diprotodon, an animal of the size of a rhinoceros, with a dental formula of i. f, c. §, p. \, m. J, total 28. The first upper Fig. 10. — Skeleton of Right incisor very large and chisel-like, Hind-Foot of Koala {Phas- molars with prominent transverse colarctus cinereus), showing ridges, as in Macropus, but without stout opposable hallux, fol- the longitudinal connecting ridge, lowed by two slender toes, Complete skeletons disinterred by which in the living animal are Dr E. C. Stirling indicate that in the enclosed as far as the nails in structure of the feet this creature a common integument. presents resemblances both to the

wombats and the phalangers, but is nearer to the former than to the latter. On the other hand, the considerably smaller Nolotherium, characterized by its sharp and broad skull and smaller incisors, seems to have been much more wombat-like, and may perhaps have possessed similar burrowing habits.

The last of the three is Thylacoleo carnife-x, so named on account of its supposed carnivorous habits. In the adult the dentition (fig. 1 1) is i. f , c. J, p. +m. I, total 24. The first upper incisor is much larger than the others; canine and first two premolars rudimentary. In the lower jaw there are also one or two small and early deciduous premolars; third premolars of both jaws formed on the same type as that of the rat-kangaroos, but relatively much larger; molars rudimentary, tubercular. The functional teeth are reduced to one

From Flower, Quart. Journ. Geol. Soc.

Fig. 11. — Front view of Skull of Thylacoleo carnij ‘ex, restored.

pair of large cutting incisors situated close to the middle line, and one great, cutting, compressed premolar, on each side above and below. As already mentioned, Thylacoleo was originally regarded as a carnivorous creature, but this view was subsequently disputed, and its diet supposed to consist of soft roots, bulbs and fruits, with an occasional small bird or mammal. Recently, however, the pendulum of opinion has swung back towards the original view: and Dr R. Broom believes Thylacoleo to have been ” a purely carni vorous animal, and one which would be quite able to,

and probably did, kill animals as large or larger than itself." The affinities of the creature are clearly with the phalangers.

By means of the little musk-kangaroo, the cuscuses and phadangers; constituting the family Phalangeridae, are so closely connected with the kangaroos, or Macropodidae, that in the opinion of some natural- ists they ought all to be included in a single family, with three sub-families. Theoretically, no doubt, this is correct, but the typical members of the two groups are so different from one another that, as a matter of convenience, the retention of the two families seems advisable. From the Phascolomyidoe, the two families, which may be collectively designated Phalangeroidea, differ by the circum- stance that in the skull the tympanic process of the alisphenoid covers the tympanic cavity and reaches the paroccipital process. The tail is long and in some cases prehensile; the first hind-toe may be either large, small or absent; the dentition usually includes three pairs of upper and one of lower incisors, and six or seven pairs of cheek- teeth in each jaw; the stomach is either simple or sacculated, with- out a cardiac gland ; and there are four teats.

With the exception of the aberrant long-snouted phalanger, the members of the family Phalangeridae have the normal number of functional incisors, in addition to which there may be one or two rudimentary pairs in the lower jaw. The first in the upper jaw is strong, curved and cutting, the other two generally somewhat smaller; the single lower functional incisor large, more or less

inclined forwards; canines —J—, upper small or moderate, conical

a I or o

and sharp-pointed; lower absent or rudimentary; premolars variable; molars f, or £, with four obtuse tubercles, sometimes forming crescents. Limbs subequal. Fore-feet with five distinct subequal toes with claws. Hind- feet short and broad, with five well- de yeloped toes; the first large, nailless and opposable; the second a u y 11 ™ slender and united by a common integument as far as the claws. Caecum present (except in Tarsipes), and usually large.

From Gould. Fig. 12.-

-The Long-snouted Phalanger {Tarsipes rostratus).

The lower jaw has no pocket on the outer side. All are animals of small or moderate size and arboreal habits, feeding on a vegetable or mixed diet, and inhabiting Australia, Papua and the Moluccan Islands.

As the first example of the group may be taken the elegant little long-snouted phalanger {Tarsipes rostratus, fig. 12), a west Australian creature of the size of a mouse, which may be regarded as represent- ing by itself a sub-family (Tarsipediinae), characterized by the rudi- mentary teeth, the long and extensile tongue, and absence of a caecum. The head is elongated, with a slender muzzle and the mouth-opening small. The two lower incisors are long, very slender, sharp-pointed and horizontally placed. All the other teeth are simple, conical, minute and placed at considerable and irregular intervals apart in the jaws, the number appearing to vary in different individuals and even on different sides of the jaw of the same indi- viduals. The formula in one specimen was i 2 ~ 2 c r — I

I — 1′ 0—0′

P-+ m jˆr”f ‘ tota ‘ 2a The lower jaw is slender, nearly straight,

and without a coronoid process or inflected angle. Fore-feet with five well-developed toes, carrying small, flat, scale-like nails, not reaching the extremity of the digits. Hind-feet rather long and slender, with a well-developed opposable and nailless first toe;

MARSUPIALIA

*?*fr*

second and third digits united, with sharp, compressed curved claws; the fourth and fifth free, with small flat nails. Ears of moderate size and rounded. Tail longer than the body and head, scantily clothed with short hairs, prehensile. Vertebrae: C. 7, D. 13, L. 5, S. 3, Ca. 24.

As indicated in the accompanying illustration, the long-snouted phalanger is arboreal in habits, extracting honey and probably small insects from long-tubed flowers by means of its extensile tongue.

The remaining members of the family may be included in the sub family Phalangerinae, characterized by the normal nature of the dentition (which shows rudimentary lower canines) and tongue. Cuscuses and phalangers form a numerous group, all the members of which are arboreal, and some of which are provided with lateral expansions of skin enabling them to glide from tree to tree like flying-squirrels. The typical members of the group are the cuscuses (Phalanger), ranging from the Moluccas and Celebes to New Guinea, in which the males are often different in colour from the females. The true phalangers, or opossums of the colonists, constitute the genus Trichosurus, while the ring-tailed species are known as Pseudo- chirus; the latter ranging to New Guinea. Dactylopsila is easily recognized by its attenuated fourth finger and parti-coloured fur; the flying

species are classed as Petauroides, Petaurus, Gymnobe- lideus and Acrobates, the last no larger than a mouse; while Dromicia, Distaechurus and Acrobates are allied types without parachutes (see Phalanger).

An equally brief notice must suffice of the kangaroo tribe or Macropodidae, since these receive a special notice elsewhere. The

dentition is i. -c. ° or P-— m.3_;theincisorsbeingsharpandcutting,

and those of the lower jaw frequently having a scissor-like action against one another. The broad molars are either bluntly tuber- culated or transversely ridged ; the outer side of the hind part of the lower jaw has a deep pocket; and the hind-limbs are generally very long, with the structure of the foot similar to that of the bandi- coots. The family is connected with the Phalangeridae by means of the musk-kangaroo (Hypsiprymnodon moschatus) ; forming the sub-family Hypsiprymnodontinae. Then come the rat-kangaroos, or kangaroo-rats, constituting the sub-family Potoroinae; while the tree-kangaroos (Dendrolagus), rock- wallabies (Petrogale), and wal- labies and kangaroos (Macropus) form the Macropodinae (see Kangaroo).

Extinct Marsupials

Reference has been made to the Australasian Pleistocene genera Phascolonus, Diprotodon, Nototherium and Thylacoleo, whose affinities are with the wombats and phalangers. The same deposits have also yielded remains of extinct types of kangaroo, some of gigantic size, constituting the genera Sthenurus, Procoptodon and Palorchestes. Numerous types more or less nearly allied to the phalangers, such as Burramys and Triclis have also been described, as well as a flying form, Palaeopetaurus. It is also interesting to note that fossil remains indicate the former occurrence of thylacines and Tasmanian devils on the Australian mainland. Of more interest is the im- perfectly known Wynyardia, from older Tertiary beds in Tasmania, which apparently presents points of affinity both to phalangers and dasyures. From the Oligocene deposits of France and southern England have been obtained numerous remains of opossums refer- able to the American family Didelphyidae. These ancient opossums have been separated generically from Didelphys (in its widest sense) on account of certain differences in the relative sizes of the lower premolars, but as nearly the whole of the species have been formed on lower jaws, of which some hundreds have been found, if is im- possible to judge how far these differences are correlated with other dental or osteological characters. In the opinion of Dr H. Filhol, the fossils themselves represent two genera, Peratherium, containing the greater part of the species, about twenty in number, and Amphi- peratherium, with three species only. All are

comparatively small animals, few of them exceeding the size of a rat.

Besides these interesting European fossils, a certain number of didelphian bones have been found in the caves of Brazil, but these are either closely allied to or identical with the species now living in the same region.

The occurrence in the Santa Cruz beds of Patagonia of fossil marsupials allied to the living Caenolestes has been mentioned above. The alleged occurrence in the same beds of marsupials allied to the thylacine is based on remains now more generally regarded as refer- able to the creodont carnivores (see Creodonta).

Mesozoic Mammals. — Under the heading of Multituberculata will be found a brief account of certain extinct mammals from the Mesozoic formations of Europe and North America which have been regarded as more or less nearly related to the monotremes. The same deposits have yielded remains of small mammals whose denti- tion approximates more nearly to that of either polyprotodont marsupials or insectivores; and these may be conveniently noticed here without prejudice to their true affinities. Before proceeding further it may be mentioned that the remains of many of these mammals are very scarce, even in formations apparently in every way suitable to the preservation of such fossils, and it hence seems

probable that these creatures are stragglers from a country where primitive small mammals were abundant. Not improbably this country was either " Gondwana-land," connecting Mesozoic India with Africa, or perhaps Africa itself. At any rate, there seems little doubt that it was the region where creodonts and other primitive mammals were first differentiated from their reptilian ancestors.

Of the Old World forms, the family Triconodontidae is typified by the genus Triconodon, from the English Purbeck, in which the cheek-teeth carry three cut- ting cusps arranged longitudinally. There seems to have been a replace- ment of some of these teeth; and it has been suggested that this was of the marsupial type. To the same family are referred Phascolotherium (fig. 14), of the Lower Jurassic Stonesfield slate of England, and Spalacotherium (fig. 15), of the Dorsetshire Purbeck; the latter having the three cusps of the cheek-teeth rotated so as to assume a tritubercular type. Other

From Owen.

Fig. 13. — Lower Jaw of Triconodon mordax (nat. size) .

From Owen.

Fig. 14. — Lower Jaw and Teeth of Phascolotherium bucklandi (nit. _size in outline).'

genera are Menacodon and Priacodon, the former American, and the latter common to Europe and North America. By one authority

, Amphilestes (fig. 16), of the Stonesfield Slate, is included in the same group, while by a second it is regarded as representing a family by it- self. Amphitherium, of the. From Owen. Stonesfield Slate, typifies the

Fig. 15. — Spalacotherium tricuspidens family Amphitheriidae, which Purbeck beds. includes the American Dryo

lestes, and in which some would class the European Purbeck genus Amblotherium, although Professor H. F. Osborn has made the last the type of a distinct family. Yet another family, according to the palaeontologist last named, is typified by the genus Stylacodon, of the English Purbeck. To mention the other forms which have received names will be unnecessary on this occasion.

It will be observed from the figures of the lower jaws, which are in most cases the only parts known, that in many instances the number of cheek-teeth exceeds that found in modern marsupials except Myrmecobius. The latter has indeed been regarded as the direct descendant of these Mesozoic forms; but as already stated, in the opinion of Mr B. A. Bensley, this is incorrect. It may be added that the division of these teeth into premolars and molars in figs. 14 and 16 is based upon the view of Sir R. Owen, and is not altogether trustworthy, while the restoration of some of the missing

From Owen.

Fig. 16. — Lower Jaw and Teeth of Amphilestes broderipi.

teeth is more Oi less conjectural. As regards the affinities of the creatures to which these jaws belonged, Professor Osborn has referred the Triconodontidae and Amphitheriidae, together with the Curto- dontidae (as represented by the English Purbeck Curtodon), to a primitive group of marsupials, while he has assigned the Amblotheri- idae and Stylacodontidae to an ancestral assemblage of Insectivora. On the other hand, in the opinion of Professor H. Winge, a large number of these creatures are primitive monotremes. Besides the above, in the Trias of North America we have Dromotherium and Microconodon, extremely primitive forms, representing the family

yj®.

Marsupial Mole (Notoryctes typhlops).

Dromotheriidae, and apparently showing decided traces of reptilian affinity. It may be added that a few traces of mammals have been obtained from the English Wealden, among which an incisor tooth foreshadows the rodent type.

Authorities. — The above article is partly based on that by Sir W. H. Flower in the 9th edition of this work. See also O. Thomas, Catalogue of Monotremata and Marsupialia in the British Museum (1888); "On Caenolestes, a Survivor of the Epanorthidae," Proc. Zool. Soc. London (1895); J. D. Ogilby, Catalogue of Australian Mammals (Sydney, 1895) ; B. A. Bensley, " A Theory of the Origin and Evolution of the Australian Marsupialia," American Naturalist (1901);" On the Evolution of the Australian Marsupialia, &c," Trans. Linn. Soc. (vol. ix., 1903) ; L.Dollo, "Arboreal Ancestry of Marsupials," Miscett. Biologiques (Paris, 1899); B. Spencer, " Mammalia of the Horn Expedition " (1896) ; "Wynyardia, a Fossil Ma»supial from Tas- mania," Proc. Zool. Soc. London (1900) ; J. P. Hill, " Contributions' to the Morphology of the Female Urino-genital Organs in Marsupialia," Proc. Linn. Soc. N. S. Wales, vols. xxiv. and xxv. ; " Contributions to the Embryology of the Marsupialia," Quart. Journ. Micr. Science, vol. xliii. ; E. C. Stirling, " On Notoryctes typhlops," Proc. Zool. Soc. London (1891); " Fossil Remains of Lake Cadibona," Part I. Dipro- lodon, Mem. R. Soc. S. Australia (vol. i., 1889); R. Broom, " On the Affinities of Thylacoleo," Proc. Linn. Soc. N. S. Wales (1898); H. F. Osborn, " Mesozoic Mammalia," Journ. Acad. Nat. Sci. Philadelphia (vol. ix., 1888) ; E. S. Goodrich, " On the Fossil Mammalia from the Stonesfield Slate," Quart. Journ. Micr. Science (vol. xxxv., 1894).

(R. L.)*

MARSUPIAL MOLE (Notoryctes typhlops), the " Ur-quamata " of the natives, an aberrant polyprotodont from central South

Australia, constituting a family (Notoryctidae). This is a small burrowing animal, " of a pale golden-yellow colour, with long silky hair, a horny shield on the nose, and a stumpy leathery tail. The feet are five-toed, and the third and fourth toes of the front pair armed with enor- mous claws adapted for digging. Neither ear-conches nor eyes are visible externally. There are but three pairs of incisor teeth in each jaw, and the upper molars are tricuspid. This animal spends most of its time burrowing in the sand in

search of insects and their larvae, but occasionally makes its appearance on the surface.

MARSUS, DOMITIUS, Latin poet, the friend of Virgil and Tibullus, and contemporary of Horace. He survived Tibullus (d. 19 B.C.), but was no longer alive when Ovid wrote (c. a.d. 12) the epistle from Pontus (£ai Ponto, iv. 16) containing a list of poets. He was the author of a collection of epigrams called Cicuta(" hemlock "^from their bitter sarcasm, and of a beautiful epitaph on the death of Tibullus; of elegiac poems, probably of an erotic character; of an epic poem Amazonis; and of a prose work on wit (De urbanitate). Martial often alludes to Marsus as one of his predecessors, but he is never mentioned by Horace, although a passage in the Odes (iv. 4, 19) is supposed to be an indirect allusion to the Amazonis (M. Haupt, Opuscula, iii. 332). See J. A. Weichert, Poetarum laiinorum vitae et reliquiae (1830); R. linger, De Dom. Marsi cicuta (Friedland, 1861).

MARSYAS, in Greek mythology, a Phrygian god or Silenus, son of Hyagnis. He was originally the god of the small river of the same name near Celaenae, an old Phrygian town. He represents the art of playing the flute as opposed to the lyre — the one the accompaniment of the worship of Cybele, the other that of the worship of Apollo. According to the legend, Athena, who had invented the flute, threw it away in disgust, because it distorted the features. Marsyas found it, and having acquired great skill in playing it, challenged Apollo to a contest with his lyre. Midas, king of Phrygia, who had been appointed judge, declared in favour of Marsyas, and Apollo punished Midas by changing his ears into ass's ears. In another version, the Muses were judges and awarded the victory to Apollo, who tied Marsyas to a tree and flayed him alive. Marsyas, as well as Midas and Silenus, are associated in legend with Dionysus and belong to the cycle of legends of Cybele. A statue of Marsyas was set

1 According to others, a reed-pipe made of the stalks of hemlock; the reading scutica (" whip ") has also been proposed.

up in the Roman forum and colonies as a symbol of liberty. The contest and punishment of Marsyas were favourite subjects in Greek art, both painting and sculpture. In Florence there are several statues of Marsyas hanging on the tree as he is going to be flayed (see Greek Art, fig. 54, PI. II.) ; Apollo and the executioner complete the group. In the Lateran museum at Rome there is a statue representing Marsyas in the act of picking up the flute, a copy of a masterpiece by Myron (Hyginus, Fab. 167, 191; Apollodorus i. 4, 2; Ovid, Metam. vi. 382-400, xi. 145-193), for which see Greek Art, fig. 64 (PL III.).

MARTABAN, a town in the Thaton district of Lower Burma, on the right bank of the Salween, opposite Moulmein. It is said to have been founded in a.d. 573, by the first king of Pegu, and was once the capital of a powerful

Taking kingdom; but it is now little more than a village. Martaban is frequently mentioned by European voyagers of the 16th century; and it has given the name of " Martavans " to a class of large vessels of glazed pottery, also known in India as " Pegu jars." It was twice captured by the British, in 1824 and 1852. The Bay of Martaban receives the rivers Irrawaddy and Salween.

MARTELLO TOWER, a kind of tower formerly used in English coast defence. The name is a corruption of Mortella. The Martello tower was introduced in consequence of an incident of the French revolutionary wars. In September 1793 a British squadron of three ships of the line and two frigates was ordered to support the Corsican insurgents. It was determined in the first place to take a tower on Cape Mortella which com- manded the only secure anchorage in the Gulf of San Fiorenzo. This tower, according to James, was named " after its inventor " ; but the real derivation appears to be the name of a wild myrtle which grew thickly around. The tower, which mounted one 24-pounder and two 18-pounders on its top, was bombarded for a short time by the frigates, was then deserted by its little garrison, and occupied by a landing party. The tower was afterwards retaken by the French from the Corsicans. So far it had done nothing to justify its subsequent reputation. In 1 794, however, a fresh attempt was made to support the insur- gents. On the 7th of February 1400 troops were laftded, arid the tower was attacked by land and sea on the 8th. The " Fortitude " and " Juno " kept up a cannonade for 25 hours and then hauled off, the former being on fire and having sixty- two men killed and wounded. The fire from the batteries on shore produced no impression until a hot shot set fire to the " bass junk with which, to the depth of 5 ft., the immensely thick parapet was lined." The garrison of thirty-three men then surrendered. The armament was found to consist only of two 18-pounders and one 6-pounder. The strong resistance offered by these three guns seems to have led to the conclusion that towers of this description were specially formidable, and Martello towers were built in large numbers, and at heavy expense, along the shores of England, especially on the southern and eastern coasts, which in certain parts are lined with these towers at short intervals. They are structures of solid masonry, containing vaulted rooms for the garrison, and providing a platform at the top for two or three guns, which fire over a low masonry parapet. Access is provided by a ladder, communi- cating with a door about 20 ft. above the ground. In some cases a deep ditch is provided around the base. The chief defect of the tower was its weakness against vertical fire; its masonry was further liable to be cut through by breaching batteries. The French tours modeles were somewhat similar to the Martello towers; their chief use was to serve as keeps to unrevetted works. While the Martello tower owes its reputation and its widespread adoption in Great Britain to a single incident of modern

warfare, the round masonry structure entered by a door raised high above the base is to be found in many lands, and is one of the earliest types of masonry fortification.

MARTEN, HENRY (1 602-1 680), English regicide, was the elder son of Sir Henry Marten, and was educated at University College, Oxford. As a public man he first became prominent in 1639 when he refused to contribute to a general loan, and in 1640 he entered parliament as one of the members for

Berkshire. In the House of Commons he joined the popular party, spoke in favour of the proposed bill of attainder against Strafford, and in 1642 was a member of the committee of safety. Some of his language about the king was so frank that Charles demanded his arrest and his trial for high treason. When the Great Rebellion broke out Marten did not take the field, although he was appointed governor of Reading, but in parliament he was very active. On one occasion his zeal in the parliamentary cause led him to open a letter from the earl of Northumberland to his countess, an impertinence for which, says Clarendon, he was '"cudgelled" by the earl; and in 1643, on account of some remark about extirpating the royal family, he was expelled from parliament and was imprisoned for a few days. In the following year, however, he was made governor of Aylesbury, and about this time took some small part in the war. Allowed to return to parliament in January 1646, Marten again advocated extreme views. He spoke of his desire to prepare the king for heaven; he attacked the Presbyterians, and, supporting the army against the parliament, he signed the agreement of August 1647. He was closely associated with John Lilburne and the Levellers, and was one of those who suspected the sincerity of Cromwell, whose murder he is said personally to have contemplated. However, he acted with Cromwell in bringing Charles I. to trial; he was one of the most prominent of the king's judges and signed the death warrant. He was then energetic in establishing the republic and in destroying the remaining vestiges of the monarchical system. He was chosen a member of the council of state in 1649, an d as compensation for his losses and reward for his services during the war, lands valued at £1000 a year were settled upon him. In parliament he spoke often and with effect, but he took no part in public life during the Protectorate, passing part of this time in prison, where he was placed on account of his debts. Having sat among the restored members of the Long Parliament in 1659, Marten surrendered himself to the authorities as a regicide in June 1660, and with some others he was excepted from the act of indemnity, but

with a saving clause. He behaved courageously at his trial, which took place in October 1660, but he was found guilty of taking part in the king's death. Through the action, or rather the inaction of the House of Lords, he was spared the death penalty, but he remained a captive, and was in prison at Chepstow Castle when he died on the 9th of September 1680. Although a leading Puritan, Marten was a man of loose morals. He wrote and published several pamphlets, and in 1662 there appeared Henry Marten's Familiar Letters to his Lady of Delight, which contained letters to his mistress, Mary Ward.

Marten's father, Sir Henry Marten (c. 1 562-1641), was born in London and was educated at Winchester school and at New College, Oxford, becoming a fellow of the college in 1582. Having become a barrister, he secured a large practice and soon came to the front in public life. He was sent abroad on some royal business, was made chancellor of the diocese of London, was knighted, and in 1617 became a judge of the admiralty court. Later he was appointed a member of the court of high commission and dean of the arches. He became a member of parliament in 1625, and in 1628 represented the university of Oxford, taking part in the debates on the petition of right.

See J. Forster, Statesmen of the Commonwealth (1840); M. Noble, Lives of the English Regicides (1798); the article by C. H. Firth in Diet. Nat. Biog. (1893); and S. R. Gardiner, History of the Great Civil War and History of the Commonwealth and Protectorate.

MARTEN, 1 a name originally belonging to the pine-marten (Mustela martes), but now applied to all members of the same

1 By all old authors, as Ray, Pennant, Shaw and Fleming, the word is written " Martin," but this form of spelling is now generally reserved for the bird (see Martin). The word, as applied to the animal here described, occurs in most Germanic and Romanic languages: German, marder; Dutch, marter; Swedish, mard; Danish, maar; English, marteron, martern, marten, martin and martlett; French, marte and martre; Italian, martora and martorella ; Spanish and Portuguese, marta. Its earliest known use is in the form martes (Martial, Ep. x. 37), but it can scarcely be an old Latin word, as it is not found in Pliny or other classical writers, and Martial often introduced foreign words into his Latin. Its etymology has

genus of carnivorous mammals (see Carnivora). Martens are limited to the northern hemisphere, ranging throughout the greater part of the northern temperate regions of both Old and New Worlds, and southwards in America to 35° N. lat., while in Asia one species is met with in Java.

The species appear to be similar in their habits. They live in woods and rocky places, and spend most of their time in trees, although descending to the ground in quest of prey. They climb with great facility, and are agile and graceful in their movements. Some are said occasionally to resort to berries and other fruit for food, but as a rule they are carnivorous, feeding chiefly on birds and their eggs, small mammals, as squirrels, hares, rabbits and moles, but chiefly mice of various kinds, and occasionally snakes, lizards and frogs. In proportion to their size they are among the most bloodthirsty of animals, though less so than the weasels. The female makes her nest of moss, dried leaves and grass in the hollow of a tree, but sometimes in a hole among rocks or ruined buildings, and pro- duces several young at a birth, usually from four to six. Though wild and untameable to a great degree if captured when fully grown, if taken young they are docile, and have frequently been made pets, not having the strong unpleasant odour of the smaller Mustelidae. The pine-marten appears to have been partially domesticated by the Greeks and Romans, and used to keep houses clear from rats and mice. In the same way, accord- ing to Brian Hodgson, the yellow-bellied weasel (Putorius kathia) " is exceedingly prized by the Nepalese for its service in ridding houses of rats. It is easily tamed; and such is the dread of it common to all murine animals that not one will approach a house where it is domiciled." It is, however, to the great value attached to the pelts of these animals that their importance to man is chiefly due. Though all yield fur of serviceable quality, the commercial value varies immensely, not only accord- ing to the species from which it is obtained, but according to individual variation, depending upon age, sex, season, and other circumstances. The skins from northern regions are more full and of a finer colour and gloss than those from more tem- perate climates, as are those of animals killed in winter compared to the same individuals in summer. Fashion has, moreover, set fictitious values upon slight shades of colour. Enormous numbers of animals are caught, chiefly in traps, to supply the demand of the fur trade, Siberia and North America being the principal localities from which they are obtained.

With the exception of the pekan (M. pennanti), the martens are much alike in size, general colouring and cranial and dental char- acters. The following description by Dr Elliott Coues of the American marten (M. americana) will apply almost equally well to most of the others. "It is almost impossible to describe the colour of the marten, except in general terms, without going into the details of the endless diversities occasioned by age, sex, season, or other inci- dents. The animal is ' brown,' of a shade from orange or fawny to quite blackish; the tail and feet are ordinarily the darkest, the head lightest, often quite whitish; the ears usually have a whitish rim, while on the throat there is usually a large tawny-yellowish or orange-brown patch, from the chin to the fore legs, sometimes entire,

sometimes broken into a number of smaller, irregular blotches, sometimes wanting, sometimes prolonged on the whole under surface, when the animal is bicolor like a stoat in summer. The general ‘ brown’ has a greyish cast, as far as the under fur is concerned, and is overlaid with rich lustrous blackish-brown in places where the long bristly hairs prevail. The claws are whitish; the naked nose pad and whiskers are black. The tail occasionally shows interspersed white hairs, or a white tip.”

The following are the best-known species : — Mustela foina: the beech-marten, stone-marten or white-breasted marten.— Distinguished from the following by the greater breadth of the skull, and some minute but constant dental characters, by the dull greyish-brown colour of the fur of the upper parts and the pure white of the throat and breast. It inhabits the greater part of the continent of Europe, but is more southern than the next in its distribution, not being found in Sweden or Norway.

M. martes, the pine-marten (see figure). — Fur rich dark brown; under fur reddish-grey, with clear yellow tips; breast spot usually yellow, varying from bright orange to pale cream-colour or yellowish- white. Length of head and body 16 to 18 in., of tail (including

been connected with the German ” martern,” to torment. A second Romanic name for the same animal is fuina, in French foxeine. The term ” Marten Cat ‘ is also used.

the hair) 9 to 12 in. This species is extensively distributed throughout northern Europe and Asia, and was formerly common in most parts of Great Britain and Ireland. It is still found in the northern counties of England and North Wales, but in decreasing numbers. In Scotland it is rare, but in Ireland may be found in ilmost every county occasionally. Though commonly called

Hi

The Pine-Marten (Mustela martes).

” pine-marten,” it does not appear to have any special preference for coniferous trees.

Next comes M. zibellina, the sable (German, Zobel and Zebel; Swedish, sabel; Russian, sobel, a word probably of Turanian origin), which closely resembles the iast, if indeed it differs except in the quality of the fur — the

most highly valued of that of all the group. The sable is found chiefly in eastern Siberia.

Very distinct is the brilliantly coloured orange-and-black Indian marten \M. flavigula), found from the Himalaya and Ceylon to Java.

The North American M. americana is closely allied to the pine- marten and Asiatic sable. The importance of the fur of this animal as an article of commerce may be judged of from the fact that 15,000 skins were sold in one year by the Hudson's Bay Company as long ago as 1743. It is ordinarily caught in wooden traps of simple con- struction, being little enclosures of stakes or brush in which the bait is placed upon a trigger, with a short upright stick supporting a log of wood, which falls upon its victim on the slightest disturbance. A line of such traps, several to a mile, often extends many miles. The bait is any kind of meat, a mouse, squirrel, piece of fish or bird's head. It is principally trapped during the colder months, from October to April, when the fur is in good condition, as it is nearly valueless during the shedding in summer. It maintains its numbers partly in consequence of its shyness, which keeps it away from the abodes of men, and partly because it is so prolific, bringing forth six to eight young at a litter. Its home is sometimes a den under ground or beneath rocks, but oftener the hollow of a tree, and it is said to take possession of a squirrel's nest, driving off or devouring the rightful proprietor.

The pekan or Pennant's marten, also called fisher marten, though there appears to be nothing in its habits to justify the appellation, is the largest of the group, the head and body measuring from 24 to 30 in., and the tail 14 to 18 in. It is also more robust in form than the others, its general aspect being more that of a fox than a weasel ; in fact its usual name among the American hunters is " black fox." Its general colour is blackish, lighter by mixture of brown or grey on the head and upper fore part of the body, with no light patch on the throat, and unlike other martens generally darker below than above. It was generally distributed in wooded districts throughout the greater part of North America, as far north as Great Slave Lake, lat. 63 N., and Alaska, and extending south to the parallel of 35 ; but at the present time is almost exterminated in the settled parts of the United States east of the Mississippi.

(W. H.F.)

MARTENS, FREDERIC FROMMHOLD DE (1845-1909), Russian jurist, was born at Pernau in Livonia. In 1868 he entered the Russian ministry of foreign affairs, was admitted in 1871 as a Dozent in international law in the university of St Petersburg, and in 1871 became lecturer and then (1872) pro- fessor of public law in the Imperial School of Law and the

Imperial Alexander Lyceum. In 1874 when Prince Gorchakov, then imperial chancellor, needed assistance for certain kinds of

special work, Martens was chosen to afford it. His book on The Right of Private Property in War. had appeared in 1869, and had been followed in 1873 by that upon The Office of Consul and Consular Jurisdiction in the East, which had been translated into German and republished at Berlin. These were the first of a long series of studies which won for their author a world-wide reputation, and raised the character of the Russian school of international jurisprudence in all civilized countries. First amongst them must be placed the great Recueil des traiUs et conventions conclus par la Russie avec les puissances iirangeres (13 vols., 1874-1902). This collection, published in Russian and French in parallel columns, contains not only the texts of the treaties but valuable introductions dealing with the diplomatic conditions of which the treaties were the outcome. These introductions are based largely on unpublished documents from the Russian archives. Of Martens' original works his Inter- national Law of Civilized Nations is perhaps the best known; it was written in Russian, a German edition appearing in 1884- 1885, and a French edition in 1887-1888. It displays much judgment and acumen, though some of the doctrines which it defends by no means command universal assent. More openly " tendencious " in character are such treatises as Russia and England in Central Asia (1879) ; Russia's Conflict with China (1881), The Egyptian Question (1882), and The African Con- ference of Berlin and the Colonial Policy of Modern States (1887). In the delicate questions raised in some of these works Martens stated his case with learning and ability, even when it was obvious that he was arguing as a special pleader. Martens was repeatedly chosen to act in international arbitrations. Among the controversies which he helped to adjust were that between Mexico and the United States — the first case determined by the permanent tribunal of The Hague — and the difference between Great Britain and France in regard to Newfoundland in 1 89 1. He played an important part in the negotiations between his own country and Japan, which led to the peace of Portsmouth (Aug. 1905) and prepared the way for the Russo-Japanese convention. He was employed in laying the foundations for The Hague Conferences. He was one of the Russian plenipotentiaries at the first conference and president of the fourth committee — that on maritime law — at the second conference. His visits to the chief capitals of Europe in the early part of 1907 were an important preliminary in the pre- paration of the programme. He was judge of the Russian supreme prize court established to determine cases arising during the war with Japan. He received honorary degrees from the universities of Oxford, Cambridge and Yale; he was also awarded the Nobel Peace Prize in 1902. In April 1907 he addressed a remarkable letter to The Times on the position of the second Duma, in

which he argued that the best remedy for the ills of Russia would be the dissolution of that assembly and the election of another on a narrower franchise. He died suddenly on the 20th of June 1909.

See T. E. Holland, in Journal of the Society of Comparative Legisla- tion for October 1909, where a list of the writings of Martens appears.

MARTENS, GEORG FRIEDRICH VON (1756-1821), German jurist and diplomatist, was born at Hamburg on the 22nd of February 1756. Educated at the universities of Gottingen, Regensburg and Vienna, he became professor of jurisprudence at Gottingen in 1783 and was ennobled in 1789. He was made a counsellor of state by the elector of Hanover in 1808, and in 1810 was president of the financial section of the council of state of the kingdom of Westphalia. In 18 14 he was appointed privy cabinet-councillor (Geheimer Kabinetsrat) by the king of Hanover, and in 18 16 went as representative of the king to the diet of the new German Confederation at Frankfort, where he died on the 21st of February 1821.

Of his works the most important is the great collection of treaties Recueil des traites, 6”c.) from 1761 onwards. Of this the first seven volumes were published at Gottingen (1791-1801), followed by four supplementary volumes partly edited by his nephew Karl von Martens (see below). These were followed by Nouveau recueil, of treaties subsequent to 1808, in 16 vols. (Gottingen, 1817-1842), of which G. F. von Martens edited the first four, the fifth being the

work of K. von Martens, the others (6-9) by F. Saalfeld and (10-16) F. Murhard. A Nouveau supplement, in 3 vols., filling gaps in the previous collection, was also published by Murhard (Gottingen, 1 839- 1 842). This was followed by Nouveau recueil . . . continua- tion du grand recueil de Martens, in 20 vols. (Gottingen, 1843-1875), edited in turn by F. Murhard, C. Murhard, J. Pinhas, C. Samwer and J. Hopf, with a general index of treaties from 1494 to 1874 (1876). This was followed by Nouveau recueil, sme serie (Gottingen, 1876- 1896; vols, xxii.-xxxv., Leipzig, 1897-1908). From vol. xi. on this series was edited by Felix Stork, professor of public law at Greifswald. In 1909 appeared vol. i. of a further Continuation (troisieme serie) under the editorship of Professor Heinrich Triepel of Kiel University.

Of Martens’ other works the most important are the Precis du droit des gens modernes de I’ Europe (1789; 3rd ed., Gottingen, 1 821 ; new ed., G.

S. Pinheiro-Ferreira, 2 vols., 1858, 1864); Erzdhlungen merkwurdiger Fdlle des neueren europdischen Volkerrechts, 2 vols. (Gottingen, 1800-1802); Cours diplomatique ou tableau des relations des puissances de I' Europe, 3 vols. (Berlin, 1 801); Grundriss einer diplomatischen Gesch. der europ, Staatshdndel u. Friedensschliisse seitdemEndedes 15. Jahrhunderts (ibid. 1807).

His nephew Karl von Martens (1790-1863), who athisdeath was minister resident of the grand-duke of Weimar at Dresden, published a Manuel diplomatique (Leipzig, 1823), re-issued as Guide diplomatique in two vols, in 1832 (5th ed. by Geffcken, 1866), a valuable textbook of the rules and customs of the diplomatic service; Causes cilibres du droit des gens (2 vols., ibid., 1827) and Nouvelles causes cUebres (2 vols., ibid., 1843), both republished, in 5 vols. (1858-1861) ; Recueil ntanuel el pratique de train's (7 vols., ibid., 1846-1857); continued by Geffcken in 3 vols., 1885-1888).

MARTENSEN, HANS LASSEN (1808-1884), Danish divine, was born at Flensburg on the 19th of August 1808. He studied in Copenhagen, and was ordained in the Danish Church. At Copenhagen he was lektor in theology in 1838, professor extra- ordinarius in 1840, court preacher also in 1845, and professor ordinarius in 1850. In 1854 he was made bishop of Seeland. In his studies he had come under the influence of Schleiermacher, Hegel and Franz Baader; but he was a man of independent mind, and developed a peculiar speculative theology which showed a disposition towards mysticism and theosophy. His contributions to theological literature included treatises on Christian ethics and dogmatics, on moral philosophy, on baptism, and a sketch of the life of Jakob Boehme, who exercised so marked an influence on the mind of the great English theologian of the 1 8th century, William Law. Martensen was a distin- guished preacher, and his works were translated into various languages. The " official " eulogy he pronounced upon Bishop Jakob P. Mynster (1775-1854) in 1854, brought down upon his head the invectives of the philosopher Soren Kierkegaard. He died at Copenhagen on the 3rd of February 1884.

Amongst his works are: Grundriss des Systems der Moral- philosophie (1841 ; 3rded., l879;German, 1845), Die christl. Taufeund die baptistische Frage (2nd ed., 1847; German, 2nd ed., i860), Den Christelige Dogmatik (4th ed., 1883; Eng. trans., 1866; German by himself, 4th ed., 1897); Christliche Ethik (1871; Eng. trans., Part 1. 1873, Part II. 1881 seq.); Hirtenspiegel (1870-1872); Katholizismus und Prot-estanlismus (1874); Jacob Bohme (1882; Eng. trans., 1885). An autobiography, Aus meinem Leben, appeared in 1883, and after his death the Briefwechsel zwischen Martensen und Dorner (1

MARTHA'S VINEYARD, an island including the greater part of Dukes

county, Massachusetts, U.S.A., lying about 3 m. off the southern coast of that state. Its extreme length (east to west) is about 20 m., and its extreme width (north to south) about g\ m. Along its north-west and a portion of its north-east shore lies Vineyard Sound. Its principal bays are Vineyard Haven Harbor, a deep indentation at the northernmost angle of the island; and, on the eastern coast, Edgartown Harbor and Katama Bay, both formed by the juxtaposition of Chappaquiddick Island. The surface is mainly flat, excepting a strip about 2 m. broad along the north-western coast, and the two western townships (Chilmark and Gay Head), which are hilly, with several eminences of 200 to 300 ft. — the highest, Prospect Peak, in Chilmark township, 308 ft. Gay Head Light a beacon near the western extremity, stands among picturesque cliffs, 145 ft. above the sea. Along the southern coast are many ponds, all shut off from the ocean by a narrow strip of land, excepting Tisbury Great Pond, which has a small outlet to the sea. Others are Sengekontacket Pond on the eastern coast; Lagoon Pond, which is practically an arm of*

Vineyard Haven Harbor; and, about a mile east of the Harbor, Chappaquonsett Pond. Martha's Vineyard is divided into the following townships (from east to west) : Edgartown (in the south-eastern part of the island), pop. (1910), 1191; area, 297 sq. m.; Oak Bluffs (north-eastern portion), pop. (1910J, 1084; area, 7ˆ9 sq. m.; Tisbury, pop. (1910), 1196; area, 7"i sq. m.; West Tisbury, pop. (1910), 437; area, 3C5 sq. m.; Chilmark, pop. (1910), 282; area, 19-4 sq. m.; and Gay Head, pop. (1910), 162; area 5'2 sq. m. The population of the county, including the Elizabeth Ids. (Gosnold town, pop. 152), N. W. of Martha's Vineyard; Chappaquiddick Island (Edgartown township), and No Man's Land (a small island south-west of Martha's Vineyard), was 4561 in 1900 (of whom 645 were foreign-born, including 79 Portuguese and 72 English-Canadians, and 154 Indians), and in 1910, 4504. The principal villages are Oak Bluffs on the north-east coast, facing Vineyard Sound; Vineyard Haven, in Tisbury township, beautifully situated on the west shore of Vineyard Haven Harbor, and Edgartown on Edgar- town Harbor — all summer resorts. No Man's Land, included politically in Chilmark township, lies about 6| m. south of Gay Head. It is about 1ˆ m. long (east and west) and about 1 m. wide, is composed of treeless swamps, and is used mainly for sheep-grazing; the neighbouring waters are excellent fishing ground. Martha's Vineyard is served by steamship lines from Wood's Hole and New Bedford to Vineyard Haven, Oak Bluffs, and Edgartown. The Martha's Vineyard railway (from Oak Bluffs to the south-east extremity of the island, by way of Edgartown), opened in 1874, was not a financial success, and had been practically abandoned in 1909, but an electric line from Oak Bluffs to Vineyard Haven provides transit facilities for that part of the island.

For more than a century whale fishing was practically the sole industry of Martha's Vineyard. It was carried on at first from the shore in small boats; but by the first decade of the 1 8th century vessels especially built for the purpose were being used, and by 1760 shore fishing had been practically abandoned. The industry, seriously crippled by invasions of British troops during the War of American Independence — especially by a force which landed at Holmes's Hole (Vineyard Haven) in September 1778 — and again during the War of 1812, revived and was at its height in 1840-1850, only to receive another setback during the Civil War. In the last part of the 19th century its decline was rapid, not only because of the increasing scarcity of whales, but because of the introduction of the mineral oils, and by the end of the century whaling had ceased to be of any economic importance. Herring fishing, on both the north and the south shore, occupies a small percent- age of the inhabitants, and there is also some deep-sea fishing. Sheep-raising, especially for wool, is an industry of considerable importance, and Dukes county is one of the three most important counties of the state in this industry.

Martha's Vineyard was discovered in 1602 by Captain Bar- tholomew Gosnold, who landed (May 21) on the island now called No Man's Land, and named it Martha's Vineyard, 1 which name was subsequently applied to the larger island. Captain Gosnold rounded Gay Head, which he named Dover Cliff, and established on what is now Cuttyhunk Island, which he called Elizabeth Island, the first (though, as it proved, a temporary) English settlement in New England. The entire line of sixteen islands, of which Cuttyhunk is the westernmost of the larger ones, have since been called the Elizabeth Islands; they form the dividing line between Buzzards Bay and Vineyard Sound, and in 1864 were incorporated as Gosnold township (pop. in 1905, 161) of Dukes county.

The territory within the jurisdiction of the Council for New England was parcelled in 1635 among the patentees in such

1 In the 17th century both " Martha's Vineyard " and "Martin's Vineyard " were used, and the latter appears in a book as early as 1638 and in another as late as 1699, and on a map as late as 1670. It seems probable that the original form was Martin, the name of one of Gosnold's crew; according to some authorities the name Martha's Vineyard was adopted by Mayhew in honour w his wife or daughter.

terms — owing to insufficient knowledge of the geography of the coast —

that both William Alexander, earl of Stirling, and Sir Ferdinando Gorges, proprietor of Maine, claimed Martha's Vineyard. In 1641 Stirling's agent, Forrett, sold to Thomas Mayhew (1502-1682), 1 of Watertown, Massachusetts, for $200, the island of Nantucket, with several smaller neighbouring islands, and also Martha's Vineyard. It seems probable that Forrett acted without authority, and his successor, Forrester, was arrested by the Dutch in New Amsterdam and sent to Holland before he could confirm the transfer. In 1644 the Commissioners of the United Colonies, apparently at the request of the inhabitants of Martha's Vineyard, annexed the island to Massachusetts, but ten years later the islanders declared their independence of that colony, and apparently for the next decade managed their own affairs. Meanwhile Mayhew had recognized the jurisdiction of Maine; 2 and though the officials of that province showed no disposition to press their claim, it seems that this technical suzerainty continued until 1664, when the Duke of York received from his brother, Charles II., the charter for governing New York, New Jersey, and other territory, including Martha's Vineyard. In 167 1 Governor Francis Lovelace, of New York, appointed Mayhew governor for life of Martha's Vineyard; in 1683, the island, with Nantucket, the Elizabeth Islands, No Man's Land, and Chappaquiddick Island were erected into Dukes county, and in 1695 the county was re-incorporated by Massachusetts with Nantucket excluded. Under the new charter of Massachusetts Bay (1691), after some dispute between Massachusetts and New York, Martha's Vineyard became a part of Massachusetts.

There is a tradition that the first settlement of Martha's Vineyard was made in 1632, at or near the present site of Edgar- town village, by several English families forming part of a company bound for Virginia, their ship having put in at this harbour on account of heavy weather. It is certain, however, that in 1642, the year after Thomas Mayhew bought the island, his son, also named Thomas Mayhew (c. 1616-1657), and several other persons established a plantation on the site of what is now Edgartown village. This settlement was at first called " Great Harbor," but soon after Mayhew was appointed governor of the island it was named Edgartown, probably in honour of the only surviving son of the Duke of York. The younger Mayhew, soon after removing to Martha's Vineyard, devoted himself to missionary work among the Indians, his work beginning at about the same time as that of John Eliot; he was lost at sea in 1657 while on his way to secure financial assistance in England, and his work was continued successfully by his father. 3 The township of Edgartown was incorporated in 167 1, and is the county-seat of Dukes county. In 1783 several Edgartown families joined the association made up of Martha's Vineyard, Nantucket, Providence and Newport whalers, who founded Hudson, on the Hudson river, in Columbia county, New York. Oak Bluffs had its origin as

a settlement in the camp meetings, which were begun here in 1835, and by i860 had grown to large proportions. As the village expanded

1 Mayhew was born at Tisbury, Wiltshire, was a merchant in Southampton, emigrated to Massachusetts about 1633, settled at Watertown, Mass., in 1635; was a member of the Massachusetts General Court in 1636-1644, and after 1644 or 1645 lived on Martha's Vineyard.

2 It appears from a letter from Mayhew to Governor Andros in 1675 that about 1641 Mayhew obtained a conveyance to Martha's Vineyard from Richard Vines, agent of Gorges. See F. B. Hough, Papers Relating to the Island of Nantucket, with Documents Relating to the Original Settlement of that Island, Martha's Vineyard, &c. (Albany, N.Y., 1856).

3 In 1901, a boulder memorial was erected to the younger Mayhew on the West Tisbury road, between the village of that name and Edgartown, marking the spot where the missionary bade farewell to several hundred Indians. The Martha's Vineyard Indians were subject to the Wampanoag tribe, on the mainland, were expert watermen, and were very numerous when the whites first came. Nearly all of them were converted to Christianity by the Mayhews, and they were friendly to the settlers during King Philip's war. By 1698 their numbers had been reduced to about 1000, and by 1764 to about 300. Soon after this they began to intermarry with negroes, and now only faint traces of them remain.

it took the name of Cottage City. In 1880 the township was incorporated under that name, which it retained until January 1907, when the name (and that of the village also) was changed to Oak Bluffs. Tisbury township was bought from the Indians in 1669 and was incorporated in 1671. Its principal village, Vineyard Haven, was called " Holmes's Hole " (in honour of one of the early settlers) until 1871, when the present name was adopted. West Tisbury township was set off from Tisbury, and incorporated in 1892. Chilmark township was incorporated in 1694. Gay Head township was set off from Chilmark, and incorporated in 1870.

See C. Gilbert Hine, The Story of Martha's Vineyard (New York, 1908); Charles E. Banks, " Martha's Vineyard and the Province of Maine " in Collections and Proceedings of the Maine Historical Society, 2nd series, vol. ix. p. 123 (Portland, Maine, 1898); and Walter S. Tower, A History of the American Whale Fishery (Philadelphia, 1907). (G. G.)*

MART!, JUAN JOSE (i57o?-i6o4), Spanish novelist, was born at Orihuela (Valencia) about 1570. He graduated as bachelor of canon law at Valencia in 1591, and in 1598 took his degree as doctor of canon law; in the latter year he was appointed co-examiner in canon law at Valencia

University, and held the post for six years. He died at Valencia, and was buried in the cathedral of that city on the 22nd of December 1604. Marti joined the Valencian Academia de los nocturnos, under the name of " Atrevimiento," but is best known by another pseudonym, Mateo Lujan de Sayavedra, under which he issued an apocryphal continuation (1602) of Aleman's Guzntdn de Alfarache (1599). Marti obtained access to Aleman's un- finished manuscript, and stole some of his ideas; this dishonesty lends point to the sarcastic congratulations which Aleman, in the genuine sequel (1604) pays to his rival's sallies: "I greatly envy them, and should be proud that they were mine." Marti's book is clever, but the circumstances in which it was produced account for its cold reception and afford presumption that the best scenes are not original.

It has been suggested that Marti is identical with Avellaneda, the writer of a spurious continuation (1614) to Don Quixote; but he died before the first part of Don Quixote was published (1605).

MARTIAL (Marcus Valerius Martialis), Latin epigram- matist, was born in one of the years a.d. 38-41, for in book x., of which the poems were composed in the years 95-98, he is found celebrating his fifty-seventh birthday (x. 24). Our knowledge of his career is derived almost entirely from himself. Reference to public events enables us approximately to fix the date of the publication of the different books of epigrams, and from these dates to determine those of various important events in his life. The place of his birth was Bilbilis, officially Augusta Bilbilis, in Spain. His name seems to imply that he was born a Roman citizen, but he speaks of himself as " sprung from the Celts and Iberians, and a countryman of the Tagus; " and, in contrasting his own masculine appearance with that of an effeminate Greek, he draws especial attention to " his stiff Spanish hair " (x. 6s, 7). His parents, Fronto and Flaccilla, appear to have died in his youth (v. 34). His home was evidently one of rude comfort and plenty, sufficiently in the country to afford him the amusements of hunting and fishing, which he often recalls with keen pleasure, and sufficiently near the town to afford him the companionship of many comrades, the few survivors of whom he looks forward to meeting again after his four-and-thirty years' absence (x. 104). The memories of this old home, and of other spots, the rough names and local associations which he delights to introduce into his verse, attest the enjoyment which he had in his early life, and were among the influences which kept his spirit alive in the routine of social life in Rome. But his Spanish home could impart, not only the vigorous vitality which was one condition of his success as a wit and poet, but the education which made him so accomplished a writer. The literary distinction obtained by the Senecas, by Lucan, by Quintilian, who belonged to a somewhat older generation, and by his friends and contem- poraries, Licinianus of Bilbilis, Decianus of Emerita, and Canius of Gades, proves

how eagerly the novel impulse of letters was

received in Spain in the first century of the empire. The success of his countrymen may have been the motive which induced Martial to remove to Rome when he had completed his education. This he did in a.d. 64, one year before the fall of Seneca and Lucan, who were probably his earliest patrons. Of the details of his life for the first twenty years or so after he came to Rome we do not know much. He published some juvenile poems of which he thought very little in his maturer years, and he laughs at a foolish bookseller who would not allow them to die a natural death (i. 113). Martial had neither youthful passion nor youthful enthusiasm to make him pre- cociously a poet. His faculty ripened with experience and with the knowledge of that social life which was both his theme and his inspiration; and many of his best epigrams are among those written in his last years. From many answers which he makes to the remonstrances of friends — among others to those of Quintilian — it may be inferred that he was urged to practise at the bar, but that he preferred his own lazy Bohemian kind of life. He made many influential friends and patrons, and secured the favour both of Titus and Domitian. From them he obtained various privileges, among others the semestris tribunatus, which conferred on him equestrian rank. He failed, however, in his application to the latter for more substantial advantages, although he commemorates the glory of having been invited to dinner by him, and also the fact that he procured the privilege of citizenship for many persons in whose behalf he appealed to him. The earliest of his extant works, that known by the name of Liber spectaculorum, was first published at the opening of the Colosseum in the reign of Titus, and relates to the theatrical performances given by him; but the book as it now stands was given to the world in or about the first year of Domitian, i.e. about a.d. 81. The favour of the emperor procured him the countenance of some of the worst creatures at the imperial court — among them of the notorious Crispinus, and probably of Paris, the supposed author of Juvenal's exile, for whose monument Martial afterwards wrote a eulogistic epitaph. The two books, numbered by editors xiii. and xiv., and known by the names of Xenia and Apophoreta — inscrip- tions in two lines each for presents, — were published at the Saturnalia of 84. In 86 he gave to the world the first two of the twelve books on which his reputation rests. From that time till his return to Spain in a.d. 98 he published a volume almost every year. The first nine books and the first edition of book x. appeared in the reign of Domitian; and book xi. at the end of a.d. 96, shortly after the accession of Nerva. A revised edition of book x., that which we now possess, appeared in a.d. 98,

about the time of the entrance of Trajan into Rome. The last book was written after three years' absence in Spain, shortly before his death, which happened about the year a.d. 102 or 103.

These twelve books bring Martial's ordinary mode of life between the age of five-and-forty and sixty very fully before us. His regular home for five-and-thirty years was Rome. He lived at first up three pairs of stairs, and his " garret " overlooked the laurels in front of the portico of Agrippa. He had a small villa and unproductive farm near Nomentum, in the Sabine territory, to which he occasionally retired from the bores and noises of the city (ii. 38, xii. 57). In his later years he had also a small house on the Quirinal, near the temple of Quirinus. At the time when his third book was brought out he had retired for a short time to Cisalpine Gaul, in weariness, as he tells us, of his unremunerative attendance on the levees of the great. For a time he seems to have felt the charm of the new scenes which he visited, and in a later book (iv. 25) he contemplates the prospect of retiring to the neighbourhood of Aquileia and the Timavus. But the spell exercised over him by Rome and Roman society was too great; even the epigrams sent from Forum Corneli and the Aemilian Way ring much more of the Roman forum, and of the streets, baths, porticos and clubs of Rome, than of the places from which they are dated. So too his motive for his final departure from Rome in a.d. 98 was a weariness of the burdens imposed on him by his social

position, and apparently the difficulties of meeting the ordinary expenses of living in the metropolis (x. 96) ; and he looks forward to a return to the scenes familiar to his youth. The well-known epigram addressed to Juvenal (xii. 18) shows that for a time his ideal was realized; but the more trustworthy evidence of the prose epistle prefixed to book xii. proves that his con- tentment was of short duration, and that he could not live happily away from the literary and social pleasures of Rome. The one consolation of his exile was the society of a lady, Mar- cella, of whom he writes rather as if she were his patroness — and it seems to have been a necessity of his being to have always a patron or patroness— than his wife or mistress.

During his life at Rome, although he never rose to a position of real independence, and had always a hard struggle with poverty, he seems to have known everybody, especially every one of any eminence at the bar or in literature. In addition to Lucan and Quintilian, he numbered among his friends or more intimate acquaintances Silius Italicus, Juvenal, the younger Pliny; and there were many others of high position whose society and patronage he enjoyed. The silence which he and Statius, although authors writing at the same time, having common friends and treating often of the same subjects, main- tain in regard to one another may be explained by mutual dislike or want of sympathy. Martial in many places shows an

undisguised contempt for the artificial kind of epic on which Statius's reputation chiefly rests; and it seems quite natural that the respectable author of the Thebaid and the Silvae should feel little admiration for either the life or the works of the Bohemian epigrammatist.

Martial's faults are of the most glaring kind, and are exhibited without the least concealment. Living under perhaps the worst of the many bad emperors who ruled the world in the 1 st century, he addresses him and his favourites with the most servile flattery in his lifetime, censures him immediately after his death (xii. 6), and offers incense at the shrine of his successor. He is not ashamed to be dependent on his wealthy friends and patrons for gifts of money, for his dinner, and even for his dress. We cannot feel sure that even what seem his sincerest tributes of regard may not be prompted by the hope of payment. Further, there are in every book epigrams which cannot be read with any other feelings than those of extreme distaste.

These faults are so unmistakable and undeniable that many have formed their whole estimate of Martial from them, and have declined to make any further acquaintance with him. Even those who greatly admire his genius, and find the freshest interest in his representation of Roman life and his sketches of manners and character, do not attempt to palliate his faults, though they may partially account for them by reference to the morals of his age and the circumstances of his life. The age was one when literature had either to be silent or to be servile. Martial was essentially a man of letters: he was bound either to gain favour by his writings or to starve. Even Statius, whose writings are in other respects irreproachable, is nearly as fulsome in his adulation. The relation of client to patron had been recognized as an honourable one by the best Roman traditions. No blame had attached to Virgil or Horace on account of the favours which they received from Augustus and Maecenas, or of the return which they made for these favours in their verse. That old honourable relationship had, however, greatly changed between Augustus and Domitian. Men of good birth and education, and sometimes even of high official position (Juv. i. 117), accepted the dole (sportula). Martial was merely following a general fashion in paying his court to " a lord," and he made the best of the custom. In his earlier career he used to accompany his patrons to their villas at Baiae or Tibur, and to attend their morning levees. Later on he went to his own small country house, near Nomentum, and sent a poem, or a small volume of his poems, as his representative at the early visit. The fault of grossness Martial shares with nearly all ancient and many modern writers who treat of life from the baser or more ridiculous side. That he offends more than perhaps any of them is not, apparently, to be explained on

the ground that he had to amuse a peculiarly corrupt public. Although there is the most cynical effrontery and want of self- respect in Martial's use of language, there is not much trace of the satyr in him — much less, many readers will think, than in Juvenal. It remains to ask, What were those qualities of nature and intellect which enable us to read his best work — even the great body of his work — with the freshest sense of pleasure in the present day? He had the keenest capacity for enjoyment, the keenest curiosity and power of observation. He had also a very just discernment. It is rare to find any one endowed with so quick a perception of the ridiculous who is so little of a caricaturist. He was himself singularly free from cant, pedantry or affectation of any kind. Though tolerant of most vices, he had a hearty scorn of hypocrisy. There are few better satirists of social and literary pretenders in ancient or modern times. Living in a very artificial age, he was quite natural, hating pomp and show, and desiring to secure in life only what really gave him pleasure. To live one's own life heartily from day to day without looking before or after, and to be one's self without trying to be that for which nature did not intend him, is the sum of his philosophy. Further, while tolerant of much that is bad and base — the characters of Crispinus and Regulus, for instance — he shows himself genuinely grateful for kindness and appreciative of excellence. He has no bitterness, malice or envy in his composition. He professes to avoid personalities in his satire; — " Ludimus innocui " is the character he claims for it. Pliny, in the short tribute which he pays to him on hearing of his death, says, " He. had as much good-nature as wit and pungency in his writings " (Ep. iii. 21).

Honour and sincerity (fides and simplicilas) are the qualities which he most admires in his friends. Though many of his epigrams indicate a cynical disbelief in the character of women, yet others prove that he could reSpect and almost reverence a fefined and courteous lady. His own life in Rome afforded him no experience of domestic virtue; but his epigrams show that, even in the age which is known to modern readers chiefly from the Satires of Juvenal, virtue was recognized as the purest source of happiness. The tenderest element in Martial's nature seems, however, to have been his affection for children and for his dependents.

The permanent literary interest of Martial's epigrams arises not so much from their verbal brilliancy, though in this they are unsurpassed, as from the amount of human life and character which they contain. He, better than any other writer, enables us to revive the outward spectacle of the imperial Rome. If Juvenal enforces the lesson of that time, and has

penetrated more deeply into the heart of society, Martial has sketched its external aspect with a much fairer pencil and from a much more intimate contact with it. Martial was to Rome in the decay of its ancient virtue and patriotism what Menander was to Athens in its decline. They were both men of cosmo- politan rather than of a national type, and had a closer affinity to the life of Paris or London in the 18th century than to that of Rome in the days of the Scipios or of Athens in the age of Pericles. The form of epigram was fitted to the critical temper of Rome as the comedy of manners was fitted to the. dramatic genius of Greece. Martial professes to be of the school of Catullus, Pedo, and Marsus, and admits his inferiority only to the first. But, though he is a poet of a less pure and genuine inspiration he is a greater epigrammatist even than his master. Indeed the epigram bears to this day the form impressed upon it by his unrivalled skill.

Authorities. — The MSS. of Martial are divided by editors into three families according to the recension of the text which they offer. Of these the oldest and best is represented by three MSS. which contain only selected extracts. The second family is derived from an inferior source, a MS. which was edited in A.D. 401 by Torquatus Gennadius; it comprises four MSS. and contains the whole of the text. The third family, of which the MSS. are very numerous, also contains the whole of the text in a recension slightly different from that of the other two; the best representative of this family is the MS. preserved in the Advocates' Library at Edinburgh.

The best separate edition of the text is that of Lindsay (Oxford, 1902) ; earlier editions of importance are those of Schneidewin (1842 and 1853), and of Gilbert (Leipzig, 1886). The best commen- tary is that of L. Friedlander (Leipzig, 1886) in two volumes with German notes) and in the same scholar's Sittengeschichte Roms much will be found that explains and illustrates Martial's epigrams. There is a large selection from the epigrams with English notes by Paley and Stone (1875), a smaller selection with notes by Stephenson (1880); see also Edwin Post, Selected Epigrams of Martial (1908), with introduction and notes. The translation into English verse by Elphinston (London, 1782) is famous for its absurdity, which drew an epigram from Burns. (W. Y. S.)

MARTIALIS, QUINTUS GARGILIUS, a Latin writer on horticultural subjects. He has been identified by some with the military commander of the same name, mentioned in a Latin inscription of a.d. 260 (C. /. L. viii. 9047) as having lost his life in the colony of Auzia (Aumale) in Mauretania Caesariensis. Considerable fragments of his work (probably called De hortis), which treated of the cultivation of trees and vegetables, and also of their medicinal properties, have survived, chiefly in the body of and as an appendix to the Medicina Plinii (an anonymous 4th century handbook of medical recipes based upon Pliny, Nat. Hist, xx.-xxxii.).

Extant sections treat of apples, peaches, quinces, almonds and chestnuts. Gargilius also wrote a treatise on the tending of cattle (De curis bourn), and a biography of the emperor Alexander Severus is attributed by two of the Scriptores historiae Augustae (Aelius Lampridius and Flavius Vopiscus) to a Gargilius Martialis, who may be the same person.

Bibliography. — Gargilii Martialis . . . fragmenta, ed. A. Mai (1846); Plinii secundi quae fertur medicina, ed. V. Rose (1876); De curis bourn, ed. E. Lommatzsch (1903) with Vegetius Renatus's Mulomedicina ; " Gargilius Martialis und die Maurenkriege," C. Cichorius in G. Curtius, Leipziger Studien. x. (1887), where the inscription referred to above is fully discussed; see also Teuffel- Schwabe, Hist, of Roman Literature (Eng. trans.), § 380.

MARTIAL LAW. " Martial law " is an unfortunate term and in a sense a misnomer. It describes a suspension of ordinary law, rendered necessary by circumstances of war or rebellion. The confusion arose from the fact that the marshal's court administered military law before the introduction of articles of war, which were in their turn merged in the Army Act. But martial law is not a law in the proper sense of the term. It is the exercise of the will of the military commander, who takes upon himself the responsibility of suspending ordinary law in order to ensure the safety of the state. It is declared, by a proclamation issued by the executive, that ordinary law is inadequate to cope with the circumstances, and provides exceptional means of arrest and punishment of persons who resist the government or aid the enemy. But such a proclama- tion, while invariably issued in order to give publicity to the suspension of ordinary law, does not invest the step with the force of law. It is simply military authority exercised in accordance with the laws and usages of war, and is limited by military necessity. Yet in reality it is part of common law which justifies acts done by necessity for the defence of the commonwealth when there is war. H. W. Halleck in his work on International Law (i. 544), says, " Martial law originates either in the prerogative of the crown, as in Great Britain, or from the exigency of the occasion, as in other states: it is one of the rights of sovereignty, and is essential to the existence of a state, as is the right to declare or to carry on war."

This opinion, however, must be read, as regards the British Empire, with the passage in the Petition of Right which is reproduced in the preamble of each annual Army Act, and asserts the illegality of martial law in time of peace in the following terms: — " No man shall be fore-judged or subjected in time of peace to any kind of punishment within this realm by martial law." Therefore, whilst martial law is declared illegal in time of peace, it is indirectly declared lawful in time of war and intestinal commotion when the courts are closed, or when there is no time for their cumbrous action. C.

M. Clode, in Military Forces of the Crown, argues that the words of the Petition of Right and of the Military Act since the reign of Anne are plain in this respect " that . . . the crown possesses

the right of issuing commissions in war and rebellion." But he rightly adds that the military commander may permit the usual courts to continue their jurisdiction upon such subjects as he thinks proper. Legislative enactments have also sanc- tioned this special jurisdiction at various times, notably in 1798, 1799, 1801, and in 1803. These enactments lay down that exceptional powers may be exercised " whether the ordinary courts shall or shall not be open." As an invariable rule an act of indemnity has been passed on the withdrawal of martial law, but only to protect any person in charge of the execution of martial law who has exceeded his powers in good faith.

There has been much discussion as to whether, in districts where martial law has not been proclaimed, a person can be sent for trial from such district into a district where martial law was in operation. It is argued that if the ordinary courts were open and at work in the non-proclaimed district recourse should be had to them. The Privy Council in 1902 (re Marais) refused leave to appeal where the Supreme Court of Cape Colony had declined to issue a writ of Habeas Corpus in these circum- stances. Mr Justice Blackburn in his charge in R. v. Eyre says, " I have come to the conclusion that, looking at what martial law was, the bringing of a person into the proclaimed district to be tried might, in a proper case, be justified." The learned judge admits that there should be a power of summary trial, observing all the substantials of justice, in order to stamp out an insurrection by speedy trial.

Whilst martial law is the will of the commanders, and is only limited by the customs of war and the discretion of those who administer it, still, as far as practicable, the procedure of military law is followed, and a military court is held on the same lines as a court-martial. Charges are simply framed without technicalities. The prisoner is present, the evidence of prosecution and prisoner is taken on oath, the proceedings are recorded, and the sentence of the court must be confirmed according to the rules of the Army Act. Sentences of death and penal servitude must be referred to headquarters for con- firmation. In the South African War (1899-1902) these limits of procedure were observed, and when possible will always be.

Entering more into detail, the term martial law has been employed in

*several senses: — (1) As applied to the military Different ioTces of the crown, apart from the military law Applications under the old Mutiny Acts, and the present annual of Martial Army Acts. (2) As applied to the enemy. (3) * As applied to rebels. (4) As applied to civilian*

subjects who are not in rebellion, but in a district where the ordinary course of civil life cannot be maintained owing to war or rebellion.

1 . In regard to the military forces of the crown, the superseding of justice as administered under the Army Act could only occur in a time of great need; e.g. mutiny of five or six regiments in the field, with no time to take the opinion of any executive authority. The officer in command would then be bound to take measures for the purpose of suppressing such mutiny, even to putting soldiers to death if necessary. It would be a case where necessity forced immediate action.

2. Martial law as applied to the enemy or the population of the enemy's country, is in the words of the duke of Welling- ton, " the will of the general of the army, though it must be administered in accordance with the customs of war."

3. 4. But it is as affecting the subjects of the crown in rebellion that the subject of martial law really obtains its chief importance; and it is in this sense that the term is generally used; i.e. the suspension of ordinary law and the temporary government of the country, or parts of it, or all of it, by military tribunals. It has often been laid down that martial law in this sense is unknown to the law of England. A. V. Dicey, for instance, restricts martial law to only another expression for " the common right of the crown and its servants to repel force by force, in the case of invasion, insurrection, or riot, or generally of any violent resistance." But more than this is understood by the term martial law.

When the proposition was laid down that martial law in this sense is unknown to the law of England, it is to be remem- bered that fortunately in England there never had been a state at all similar to that prevailing in Cape Colony in 1900- 1902, and it may perhaps be questioned whether the statement would have been made with such certainty if similar events had been present to the writers' minds.

In the charge delivered by Mr Justice Blackburn in the Jamaica case the law as affecting the general question of martial law is well set out.

" By the laws of this country," said Mr Justice Blackburn, " be- ginning at Magna Carta and getting more and more established, down to the time of the Revolution, when it was finally and com- pletely established, the

general rule was that a subject was not to be tried or punished except by due course of law; all crimes are to be determined by juries subject to the guidance of the judge; that is the general rule, and is established law. But from the earliest times there was this also which was the law, and is the law still, that when there was a foreign invasion or an insurrection, it was the duty of every good subject, in obedience to the officers and magistrates, to resist the rebels, ... in such a case as that of insurrection pre- vailing so far that the courts of law cannot sit, there must really be anarchy unless there is some power to keep the people in order, . . . before that principle the crown claimed the prerogative to exercise summary proceedings by martial law … in time of war when this disturbance was going on, over others than the army. And further than that, the crown made this further claim against the insurgents, that whilst it existed, pending the insurrection and for a short time afterwards, the crown had . . . the power to proclaim martial law in the sense of using summary proceedings, to punish the insurgents and to check and stop the spread of the rebellion by summary pro- ceedings against the insurgents, so as … to stamp out the rebellion. Now no doubt the extent to which the crown had power to do that has never been yet decided. Our law has been declared from time to time and has always been a practical science, that is, the judges have decided so much as was necessary for the particular case, and that has become part of the law. But it never has come to be decided what this precise power is."

So far as the United Kingdom is concerned the need has never arisen. It has always been found possible to employ the ordinary courts directly the rebels have been defeated in the field and have been made prisoners or surrendered. " Fortu- nately in England only three occasions have arisen since the Revolution when the authority of the civil power was for a time, and then only partially, suspended," 1715, 1745 and 1780. Clode, Military Forces, ii. 163, says: " Upon the threat of invasion followed by rebellion in 1715, the first action of the government was to issue a proclamation authorizing all officers, civil and military, by force of arms (if necessary) to suppress the rebellion." This, therefore, would only seem to fall within the limited sense in which Dicey understands martial law to be legal, " the right of the crown and its servants to repel force by force." There was no attempt to bring persons before courts-martial who ought to be tried by the common lav,', and all the extraordinary acts of the crown were sanctioned by parliament. After the rebellion had been' suppressed two statutes were passed, one for indemnity and the other for pardon. Before the revolution of 1745 similar action was adopted, a proclamation charging civil magistrates to do their utmost to prevent and suppress all riots, and acts of parliament suspending Habeas Corpus, providing for speedy trials; and of indemnity. In the Gordon Riots of 1780 a very similar course was pursued, and nothing was done which would not fall within

Dicey's limitation. No prisoners were tried by martial law.

In Ireland the ordinary law was suspended in 1 798-1801 and in 1803. In 1798 an order in Council was issued to all general officers commanding H.M. forces to punish all persons acting in, aiding, or in any way assisting the rebellion, according to martial law, either by death or otherwise, as to them should seem expedient for the suppression and punishment of all rebels; but the order was communicated to the Irish houses of parliament, who expressed their approval by addresses to the viceroy. It was during the operation of this order that Wolfe Tone's case arose. Tone, a subject of the king, was captured on board a French man-of-war, and condemned to death by a court-martial. Curran, his counsel, applied to the king's

bench at Dublin for a Habeas Corpus, on the grounds that only when war was raging could courts-martial be endured, not while the court of king's bench sat. The court granted his application; but no ultimate decision was ever given, as Tone died before it could be arrived at.

In 1799 application was made to parliament for express sanction to martial law. The preamble of the act declared that "The Rebellion still continues . . . and stopped the ordinary course of justice and of the common law; and that many persons . . . who had been taken by H.M. forces … have availed themselves of such partial restoration of the ordinary course of the common law to evade the punishment of their crimes, whereby it had become necessary for parliament to interfere." The act declared that martial law should prevail and be put in force whether the ordinary courts were or were not open, &c. And nothing in the act could be held to take away, abridge or eliminate the acknowledged prerogative of war, for the public safety to resort to the exercise of martial law against open enemies or traitors, &c.

After the suppression of the rebellion an act of indemnity was passed in 180 1.

In 1803 a similar act was passed by the parliament of the United Kingdom as it was after the Act of Union. In intro- ducing it Mr Pitt stated: " The bill is not one to enable the government in Ireland to declare martial law in districts where insurrection exists, for that is a power which His Majesty already possesses — the object will be to enable the lord-lieutenant, when any persons shall be taken in rebellion, to order them to be tried immediately by a court- martial."

During the 19th century martial law was proclaimed by the British government in the following places : —

1. Barbados, 1 805-1 8 16. 6. Cephalonia, 1848.

2. Demerara, 1823. 7. Cape of Good Hope, 1834; 3". Jamaica, 1831-1832; 1865. 1849-1851.

4. Canada, 1837-1838. 8. St Vincent, 1863.

5. Ceylon, 1817 and 1848. 9. South Africa, 1899-1901. The proclamation was always based on the grounds of necessity, and where any local body of a representative character existed it would seem that its assent was given, and an act of indemnity obtained after the suppression of the rebellion. (Jno. S.)

MARTIGNAC, JEAN BAPTISTE SYLVERE GAY, Vicomte de (1778-1832-), French statesman, was born at Bordeaux on the 20th of June 1778. In 1798 he acted as secretary to Sieyes; then after serving for a while in the army, he turned to literature, producing several light plays. Under the Empire he practised with success as an advocate at Bordeaux, where in 1818 he became advocate-general of the cour royale. In 1819 he was appointed procureur-gineral at Limoges, and in 1821 was returned for Marmande to the Chamber of Deputies, where he supported the policy of Villele. In 1822 he was appointed councillor of state, in 1823 he accompanied the due d'Angouleme to Spain as civil commissary; in 1824 he was created a viscount and appointed director-general of registration. In contact with practical politics his ultra-royalist views were gradually modified in the direction of the Doctrinaires, and on the fall of Villele he was selected by Charles X. to carry out the new policy of compromise. On the 4th of January 1828 he was appointed minister of the interior, and, though not bearing the title of president, became the virtual head of the cabinet. He succeeded in passing the act abolishing the press censorship, and in persuad- ing the king to sign the ordinances of the 16th of June 1828 on the Jesuits and the little seminaries. He was exposed to attack from both the extreme Left and the extreme Right, and when in April 1829 a coalition of these groups defeated him in the chamber, Charles X., who had never believed in the policy he represented, replaced him by the prince de Polignac. In March 1830 Martignac voted with the majority for the address protesting against the famous ordinances; but during the revolution that followed he remained true to his legitimist principles. His last public appearance was in defence of Polignac in the Chamber of Peers in December 1830. He died on the 3rd of April 1832. ■■

Martignac published Bordeaux au mois de Mars 18 is (Paris, 1830), and

an Essai historique sur les revolutions d'Espagne et V intervention francaise de 1823 (Paris, 1832). See also E. Daudet,L« Ministere de M. de Martignac (Paris, 1875).

MARTIGUES, a port of south-eastern France in the depart- ment of Bouches-du-Rhone, on the southern shore of the lagoon of Berre, and at the eastern extremity of that of Caronte, by which the former is connected with the Mediterranean. Pop. (1906), 4,178. Martigues is 23 m. W.N.W. of Marseilles by rail. Divided into three quarters by canals, the place has been called the Venice of Provence. It has a harbour (used by coasting and fishing vessels), marine workshops, oil and soap manufactures and cod-drying works. A special industry consists in the preparation of boutargue from the roes of the grey mullet caught in the salt lagoons, which rivals Russian caviare.

Built in 1232 by Raymond BeYenger, count of Provence, Martigues was made a viscountship by Joanna I., queen of Naples. Henry IV. made it a principality, in favour of a princess of the house of Luxem- bourg. It afterwards passed into the hands of the duke of Villars.

MARTIN, ST (c. 316-400), bishop of Tours, was born of heathen parents at Sabaria (Stein am Agger) in Pannonia, about the year 316. When ten years old he became a catechumen, and at fifteen he reluctantly entered the army. While stationed at Amiens he divided his cloak with a beggar, and on the following night had the vision of Christ making known to his angels this act of charity to Himself on the part of " Martinus, still a catechumen." Soon afterwards he received baptism, and two years later, having left the army, he joined Hilary of Poitiers, who wished to make him a deacon, but at his own request ordained him to the humbler office of an exorcist. On a visit home he converted his mother, but his zeal against the Arians roused persecution against him and for some time he lived an ascetic life on the desert island of Gallinaria near Genoa. Between 360 and 370 he was again with Hilary at Poitiers, and founded in the neighbourhood the monasterium locociagense (Licuge). In 371-372 the people of Tours chose him for their bishop. He did much to extirpate idolatry from his diocese and from France, and to extend the monastic system. To obtain privacy for the maintenance of his personal religion, he established the monastery of Marmoutier-les-Tours (Martini monasterium) on the banks of the Loire. At Treves, in 385, he entreated that the lives of the Priscillianist heretics should be spared, and he ever afterwards refused to hold ecclesiastical fellowship with those bishops who had sanctioned their execution. He died at Candes in the year 400, and is commemorated by the Roman Church on the nth of November (duplex). He left no writings, the so-called Confessio being spurious. He is the patron saint of France and of the cities of Mainz and Wurzburg. The Life by his disciple

Sulpicius Severus is practically the only source for his biography, but it is full of legendary matter and chronological errors. Gregory of Tours gives a list of 206 miracles wrought by him after his death; Sidonius Apollinaris composed a metrical biography of him. The Feast of St Martin (Martinmas) took the place of an old pagan festival, and inherited some of its usages (such as the MarUnsmannchen, Martinsfeuer, Martinshorn and the like, in various parts of Germany) ; by this circumstance is probably to be explained the fact that Martin is regarded as the patron of drinking and jovial meetings, as well as of reformed drunkards.

See A. Dupuy, Geschichte des heiligen Martins (Schaff hausen, 1 855) ; J. G. Cazenove in Diet. chr. biog. iii. 838.

MARTIN (Martinus), the name of several popes.

Martin I. succeeded Theodore I. in June or July 649. He had previously acted as papal apocrisiarius at Constantinople, and was held in high repute for learning and virtue. Almost his first official act was to summon a synod (the first Lateran) for dealing with the Monothelite heresy. It met in the Lateran church, was attended by one hundred and five bishops (chiefly from Italy, Sicily and Sardinia, a few being from Africa and other quarters), held five sessions or " secretarii " from the 5th to the 31st of October 649, and in twenty canons condemned the Monothelite heresy, its authors, and the writings by which

it had been promulgated. In this condemnation were included, not only the Ecthesis or exposition of faith of the patriarch Sergius for which the emperor Heraclius had stood sponsor, but also the Typus of Paul, the successor of Sergius, which had the support of the reigning emperor (Constans II.) . Martin published the decrees of his Lateran synod in an encyclical, and Constans replied by enjoining his exarch to seize the pope and send him prisoner to Constantinople. Martin was arrested in the Lateran (June 15, 653), hurried out of Rome, and conveyed first to Naxos and subsequently to Constantinople (Sept. 17, 654). He was ultimately banished to Cherson, where he arrived on the 26th of March 655, and died on the 16th of September following. His successor was Eugenius I. (L. D.)*

A full account of the events of his pontificate will be found in Hefele's Conciliengeschichte, vol. iii. (1877).

Martin II., the name commonly given in error to Marinus I.

Martin III., see Marinus II.

Martin IV. (Simon Mompitie de Brion), pope from the 22nd of February 1281 to the 28th of March 1285, should have been named Martin II. He was born about 1210 in Touraine. He became a priest at Rouen and canon of St Martin's at Tours, and was made chancellor of France by Louis IX. in 1260 and cardinal-priest of Sta Cecilia by Urban IV. in 126 1. As papal legate in France he held several synods for the reformation of the clergy and conducted the negotiations for the assumption of the crown of Sicily by Charles of Anjou. It was through the latter's influence that he succeeded Nicholas III., after a six-months' struggle between the French and Italian cardinals. The Romans at first declined to receive him, and he was consecrated at Orvieto on the 23rd of March 1281. Peaceful and unassuming, he relied completely on Charles of Anjou, and showed little ability as pope. His excommunication of the emperor Michael Palaeologus (Nov. 1281), who stood in the way of the French projects against Greece, weakened the union with the Eastern Christians, dating from the Lyons Council of 1274. He unduly favoured his own countrymen, and for three years after the Sicilian Vespers (Mar. 31, 1282) he employed all the spiritual and material resources at his com- mand on behalf of his patron against Peter of Aragon. He was driven from Rome by a popular uprising and died at Perugia. His successor was Honorius IV. (C. H. Ha.)

His registers have been published in the Bibliotheque des icoles francaises d'Athenes et de Rome (Paris, 1901).

See A. Potthast, Regesta pontif. roman., vol. 2 (Berlin, 1875) ; K. J. von Hefele, Conciliengeschichte, Bd. 6, 2nd ed.; F. Gregorovius, Rome in the Middle Ages, vol. 5, trans, by Mrs G. W. Hamilton (London, 1900-1902); H. H. Milman, Latin Christianity, vol. 6 (London, 1899); W. Norden, Das Papsttum u. Byzanz (Berlin, 1903); E. Chouliier, " Recherches sur la vie du pape Martin IV.," in Revue de Champagne, vol. 4 (1878); Processo istorico dell' insur- rezione di Sicilia dell' anno 1282, ed. by G. di Marzo (Palermo, 1882).

Martin V. (Otto Colonna) (1417-1431) was elected at Con- stance on St Martin's Day, in a conclave composed of twenty- three cardinals and thirty delegates from the five different " nations " of the council. Son of Agapito Colonna, who had himself become a bishop and cardinal, the new pope belonged to one of the greatest Roman families; to Urban VI. had been due his entry, as referendarius, upon an ecclesiastical career. Having become a cardinal under Innocent VII., he had seceded from Gregory XII. in 1408, and together with the other cardinals at Pisa, had taken part in the election

of Alexander V. and afterwards of John XXIII. At Constance, his role had been chiefly that of an arbiter; he was a good and gentle man, leading a simple life, free from intrigue. While refraining from making any pronouncement as to the validity of the decrees of the fourth and fifth sessions, which had seemed to proclaim the superiority of the council over the pope, Martin V. nevertheless soon revealed his personal feelings by having a constitution read in consistory which forbade any appeal from the judgment of the sovereign pontiff in matters of faith (May 10, 1418). As to the reform, of which everybody felt the necessity, the fathers in council had not succeeded in arriving at any agreement.

Martin V. himself settled a great number of points, and then passed a series of special concordats with Germany, France, Italy, Spain ˆand England. Though this was not the thorough reform of which need was felt, the council itself gave the pope a satisfecit. When the council was dissolved Martin V. made it his task to regain Italy. After staying for long periods at Mantua and Florence, where the deposed pope, Baldassare Cossa (John XXIII.), came and made submission to him, Martin V. was enabled to enter Rome (Sept. 30, 1420) and measure the extent of the ruins left there by the Great Schism of the West. He set to work to restore some of these ruins, to recon- stitute and pacify the Papal State, to put an end to the Schism, which showed signs of continuing in Aragon and certain parts of southern France; to enter into negotiations, unfortunately unfruitful, with the Greek Church also with a view to a return to unity, to organize the struggle against heresy in Bohemia; to interpose his pacific mediation between France and England, as well as between the parties which were rending France; and, finally, to welcome and act as patron to saintly re-formers like Bernardino of Siena and Francesca Romana, foundress of the nursing sisterhood of the Oblate di Tor de' Specchi (1425).

In accordance with the decree Frequens, and the promises which he had made, Martin V., after an interval of five years, summoned a new council, which was almost immediately transferred from Pavia to Siena, in consequence of an epidemic (1423). But the small number of fathers who attended at the latter town, and above all, the disquieting tendencies whicl began to make themselves felt there, induced the pope to force on a dissolution of the synod. Pending the reunion of the new council which had been summoned at Basel for the end of a period of seven years, Martin V. himself endeavoured to effect a reformation in certain points, but he was carried off by apoplexy (Feb. 20, 1431), just as he had designated the young and brilliant Cardinal Giuliano Cesarini to preside in his place over the council of Basel.

See L. Pastor, Geschichte der Papste (1901), i. 205-279; J. Guiraud, L'£tat pontifical apres le Grand Schisme (1896); Müntz, Les Arts d, la

cour des papes pendant le xV et le xvi e siecle (1878) ; N. Valois, La Crise religieuse du xV siecle; le pape et le concile (1909), vol. i. p. i.-xxix., 1-93. (N. V.)

MARTIN, BON LOUIS HENRI (1810-1883), French historian, was born on the 20th of February 1810 at St Quentin (Aisne), where his father was a judge. Trained as a notary, he followed this profession for some time but having achieved success with an historical romance, Wolfthurm (1830), he applied himself to historical research. Becoming associated with Paul Lacroix (" le Bibliophile Jacob "), he planned with him a history of France, to consist of excerpts from the chief chroniclers and historians, with original matter filling up gaps in the continuity. The first volume, which appeared in 1833, encouraged the author to make the work his own, and his Histoire de France, in fifteen volumes (1833-1836), was the result. This magnum opus, rewritten and further elaborated (4th ed., 16 vols, and index, 1861-1865) gained for the author in 1856 the first prize of the Academy, and in 1869 the grand biennial prize of 20,000 francs. A popular abridgment in seven volumes was published in 1867. This, together with the continuation, Histoire de France depuis 1789 jusqu'd nos jours (6 vols. 1878-1883), gives a complete history of France, and superseded Sismondi's Histoire des Frangais.

This work is in parts defective; Martin's descriptions of the Gauls are based rather on romance than on history, and in this respect he was too much under the influence of Jean Reynaud and his cosmogonic philosophy. However he gave a great impetus to Celtic and anthropological studies. His knowledge of the mddile ages is inadequate, and his criticisms are not discriminating. As a free-thinking republican, his prejudices often biassed his judgment on the political and religious history of the ancien rigime. The last six volumes, devoted to the 17th and 1 8th centuries, are superior to the earlier ones. Martin sat in the assemble nationale as deputy for Aisne in 1871,

and was elected life senator in 1878, but he left no mark as a politician. He died in Paris on the 14th of December 1883.

Among his minor works may be mentioned : — De la France, de son genie el de ses destinies (1847); Daniel Manin (i860), La Russie et I'Europe (1866) ; Etudes d'archeologie celtique (1872) ; Les Napoleon el les fronlikres de la France (1874). See his biography by Gabriel Hanotaux, Henri Martin; sa vie, ses ceuvres, son temps (1885).

MARTIN, CLAUD (1735-1800), French adventurer and officer in the army of the English East India Company, was born at Lyons on the 4th of January 1735, the son of a cooper. He went out to India in 1751 to serve under Dupleix and Lally in the Carnatic wars. When Pondicherry fell in 1761, he seems, like others of his countrymen, to have accepted service in the Bengal army of the English, obtaining an ensign's commission in 1 763, and steadily rising to the rank of major-general. He was employed on the building of the new Fort William at Calcutta, and afterwards on the survey of Bengal under Rennell. In 1776 he was allowed to accept the appointment of superintendent of the arsenal of the nawab of Oudh at Lucknow, retaining his rank but being ultimately placed on half pay. He acquired a large fortune, and on his death (Sept. 13, 1800) he bequeathed his residuary estate to found institutions for the education of European children at Lucknow, Calcutta and Lyons, all known by the name of " La Martiniere." That at Lucknow is the best known. It was housed in the palace that he had built called Constantia, which, though damaged during the Mutiny, retains many personal memorials of its founder.

See S. C. Hill, The Life of Claud Martin (Calcutta, 1901).

MARTIN, FRANQOIS XAVIER (1762-1846), American jurist and author, was born in Marseilles, France, on the 17th of March 1762, of Provencal descent. In 1780 he went to Martinique, and before the close of the American war of Independence went to North Carolina, where (in New Bern) he taught French and learnt English, and set up as a printer. He studied law, and was admitted to the North Carolina. bar in 1789. He published various legal books, and edited Acts of the North Carolina Assembly from 1715 to 1803 (2nd ed., 1809). He was a member of the lower house of the General Assembly in 1 806- 1 807. In 1809 he was commissioned a judge of the superior court of the territory of Mississippi, and in March 1 8 10 became judge of the superior court of the territory of Orleans. Here the law was in a chaotic condition, what with

French law before O'Reilly's rule, then a Spanish code, and in 1808 the Digest of the Civil Laws, an adaptation by James Brown and Moreau Lislet of the code of Napoleon, which repealed the Spanish fueros, partidas, recopilationes and laws of the Indies only as they conflicted with its provisions. Martin published in 181 1 and 1813 reports of cases decided by the superior court of the territory of Orleans. For two years from February 1813 Martin was attorney-general of the newly established state of Louisiana, and then until March 1846 was a judge and (from 1836 to 1846) presiding judge of the supreme court of the state. For the period until 1830 he published reports of the decisions of the supreme court; and in 18 16 he published two volumes, one French and one English, of A General Digest of the Acts of Legislatures of the Late Territory of Orleans and of the State of Louisiana. He won the name of the " father of Louisiana jurisprudence " and his work was of great assistance to Edward Livingston, Pierre Derbigny and Moreau Lislet in the Louisiana codification of 1821-1826. Martin's eyesight had begun to fail when he was seventy, and after 1836 he could no longer write opinions with his own hand. 1 He died in New Orleans on the nth of December 1846.

Martin translated Robert J. Pothier On Obligations (1802), and wrote The History of Louisiana from the Earliest Period (2 vols. 1827-1829) and The History of North Carolina (2 vols., 1829). There

1 His holographic will in favour of his brother (written in 1844 and devising property worth nearly $400,000) was unsuccessfully contested by

the state of Louisiana on the ground that the will was void as being a legal and physical impossibility, or as being an attempted fraud on the state, as under it the state would not receive a 10% tax if the property went to the heirs of Martin (as intestate) in France.*

is a memoir by Henry A. Bullard in part ii. of B. F. French's Historical Collections of Louisiana (Philadelphia, 1850), and one by W. W. Howe in John F. Condon's edition of Martin's History of Louisiana (New Orleans, 1882).

MARTIN, HOMER DODGE (1836-1897), American artist, was born at Albany, New York, on the 28th of October 1836. A pupil for a short time of William Hart, his earlier work followed the lines of the Hudson River School. He was elected as associate of the National Academy of Design, New York, in 1868, and a full academician in 1874. During a trip to Europe in 1876 he was captivated by the Barbizon school, and from 1882 to 1886 he lived in France spending much of the time in Normandy. At Villerville he painted his " Harp of the Winds," now at the Metropolitan Museum of Art, New York. Among his important canvases are " Westchester Hills," " Adirondack Scenery," " The Cinquebceuf Church," " Sand Dunes," and "A Newport Landscape." Martin is generally spoken of as one of the great trio of American landscapists, the other two being Inness and Wyant, and examples of his work are in most of the important American collections. He died at St. Paul, Minnesota, on the 2nd of February 1897.

MARTIN, JOHN (1789-1854), English painter, was born at Haydon Bridge, near Hexham, on the 19th of July 1789. He was apprenticed by his father to a coachbuilder to learn heraldic painting, but owing to a quarrel the indentures were cancelled, and he was placed under Bonifacio Musso, an Italian artist, father of the enamel painter Charles Musso. With his master Martin removed to London in 1806, where he married at the age of nineteen, and supported himself by giving draw- ing lessons, and by painting in water colours, and on china and glass. His leisure was occupied in the study of perspective and architecture. His first picture, " Sadak in Search of the Waters of Oblivion," was exhibited in the Royal Academy of 181 2, and sold for fifty guineas. It was followed by the "Expulsion" (1813), "Paradise" (1813), "Clytie" (1814), and "Joshua" (1815). In 1821 appeared his " Belshazzar's Feast," which excited much favour- able and hostile comment, and was awarded a prize of £200 at the British Institution, where the Joshua had previously carried off a premium of £100. Then came the "Destruction of Herculaneum" (1822), the " Creation " (1824), the "Eve of the Deluge" (1841), and a series of other Biblical and imaginative subjects. In 1832- 1833 Martin received £2000 for drawing and engraving a fine series of designs to Milton, and with

Westall he produced a set of Bible illustrations. He was also occupied with schemes for the improvement of London, and published various pamphlets and plans dealing with the metropolitan water supply, sewage, dock and railway systems. During the last four years of his life he was engaged upon his large subjects of "The Judgment," the " Day of Wrath," and the " Plains of Heaven." He was attacked with paralysis while painting, and died in the Isle of Man on the 17th of February 1854.

MARTIN, LUTHER (1 748-1826), American lawyer, was born in New Brunswick, New Jersey, on the 9th of February 1 748. He graduated at the college of New Jersey (now Princeton University) at the head of a class of thirty-five in 1766, and immediately afterwards removed to Maryland, teaching at Queenstown in that colony until 1770, and being admitted to the bar in 177 1. He practised law for a short time in Virginia, then returned to Maryland, and became recognized as the leader of the Maryland bar and as one of the ablest lawyers in the United States. From 1778 to 1805 he was attorney-general of Maryland; in 1814-1816 he was chief judge of the court of Oyer and Terminer for the city of Baltimore; and in 18 18-1822 he was attorney-general of Maryland. He was one of Maryland's representatives in the Continental Congress in 1 784-1 785 and in the Constitutional Convention of 1787 at Philadelphia, but opposed the constitution and refused to affix his signature. He subsequently allied himself with the Federalists, and was an opponent of Thomas Jefferson, who in 1807 spoke of him as the "Federal Bull-Dog." His ability was shown in his famous defence of Judge Samuel Chase (q.v.) in the impeachment trial before the United States Senate in 1804- 1805, and in his defence of Aaron

Burr (q.v.) against the charge of treason in 1807. He has been described by the historian Henry Adams, writing of the Chase trial, as at that time the " most formidable of American advo- cates." Though he received a large income, he was so impro- vident that he was frequently in want, and on the 22nd of February 1822 the legislature of Maryland passed a remarkable resolution — the only one of the kind in American history — requiring every lawyer in the state to pay an annual licence fee of five dollars, to be handed over to trustees appointed " for the appropriation of the proceeds raised by virtue of this re- solution to the use of Luther Martin." This resolution was rescinded on the 6th of February 1823. Martin died at the home of Aaron Burr in New York on the 10th of July 1826. In 1783 he had married a daughter of the Captain Michael Cresap (1742-1775), who was unjustly charged by Jefferson, in his Notes on

Virginia, with the murder of the family of the Indian chief, John Logan, and whom Martin defended in a pamphlet long out of print.

See the biographical sketch by Henry P. Goddard, Luther Martin, the Federal Bull-Dog (Baltimore, 1887), No. 24 of the " Peabody Fund Publications," of the Maryland Historical Society.

MARTIN, SIR THEODORE (1816-1000), British author and translator, the son of a solicitor, was born at Edinburgh on the 16th of September 1816, and educated at the Royal High School and the University, from which he subsequently received the honorary degree of LL.D. He practised for some time as a solicitor in Edinburgh, but in 1846 went to London, where he became senior partner in the firm of Martin & Leslie, parliamentary agents. He early contributed to Fraser's Magazine and Tait's Magazine, under the signature of " Bon Gaultier," and in 1856, in conjunction with Professor Aytoun, he published the Book of Ballads under the same pseudonym. This work at once obtained popular favour. In 1858 he published a volume of translations of the Poems and Ballads of Goethe, and this was followed by a rendering of the Danish poet Henrik Hertz's lyric drama, King Rene's Daughter. The principal character in this drama, Iolanthe, was sustained by Helena Faucit (q.v.), who in 1 85 1 became the author's wife. Martin's translations of Ohlenschlager's dramas, Correggio (1854) and Aladdin, or the Wonderful Lamp (1857), widened the fame of the Danish poet in England. In i860 appeared Martin's metrical translation of the Odes of Horace; and in 1870 he wrote a volume on Horace for the series of " Ancient Classics for English Readers." In 1882 his Horatian labours were concluded by a translation of the poet's whole works, with a life and notes, in two volumes. A poetical translation of Catullus was published in 1861, followed by a privately printed volume of Poems, Original and Translated, in 1863. The came translations of the Vita Nuova of Dante, and the first part of Goethe's Faust. A metrical translation of the second part of Faust appeared in 1866. Martin wrote a memoir of his friend Aytoun in 1867, and while engaged upon this work he was requested by Queen Victoria, to whom he was introduced by his friend Sir Arthur Helps, to undertake the Life of His Royal Highness the Prince Consort. The first volume of this well-known work was published in 1874. In 1878 Martin's translation of Heine's Poems and Ballads appeared. Two years later the Life of the Prince Consort was brought to a successful conclusion by the publication of the fifth volume. A knighthood was then conferred upon him. In the following November he was elected lord rector of the university of St Andrews. Martin's Life of Lord Lyndhurst, based upon papers furnished by the family, was published in 1883. In 1889 appeared The Song of the Bell, and other Translations from Schiller, Goethe, Uhland, and Others; in 1894 Madonna Pia, a Tragedy, and three Other Dramas; a translation of Leopardi's poems in 1905; and in 1901 he

published a biography of his wife. The kindly relations which subsisted between Queen Victoria and Sir Theodore Martin were continued after the completion of the Life of the prince consort up to the queen's death. Sir Theodore's account of these relations was privately printed in 1902, and, with King Edward's consent, for general publication in 1908. This little book, Queen Victoria as I knew her, throws a good deal of light on the Queen's

character and private life. Sir Theodore Martin died on the r8th of August 1909.

MARTIN, WILLIAM (1767-1810), English naturalist, the son of a hosier, was born at Mansfield, Nottinghamshire, in 1767. He studied drawing at an early age from James Bolton at Halifax, and gained from him a taste for the study of natural history. In 1805 he was appointed drawing master in the gram- mar school at Macclesfield. Meanwhile he cultivated his taste for natural history, and was in 1796 elected a fellow of the Linnaean Society. He is best known for his early works on British fossils, entitled Petrifacta derbiensia or Figures and Descriptions of Petrifactions collected in Derbyshire (1809); and Outlines of an Attempt to establish a Knowledge of Extraneous Fossils on Scientific Principles (1 809) . He died at Macclesfield on the 31st of May 1810.

MARTIN, SIR WILLIAM FANSHAWE (1801-1895), British admiral, son of Admiral of the Fleet Sir Thomas Byam Martin, comptroller of the navy, and grandson, on the mother's side, of Captain Robert Fanshawe, who commanded the " Namur " 90 in Rodney's victory of the 1 2th of April 1 782, was born on the 5th of December 1801. Entering the navy at the age of twelve, his father's interest secured his rapid promotion: he was made a lieutenant on the 15th of December 1820; on the 8th of February 1823 he was promoted to be commander of the " Fly " sloop, his good service in which in support of the inter- ests of British merchants at Callao secured his promotion as captain on the 5th of June 1824. He afterwards served in the Mediterranean and on the home station. In 1849- 1852 he was commodore commanding the Channel squadron, and gave evidence of a remarkable aptitude for command. He was made rear-admiral in May 1853, and for the next four years was superintendent of Portsmouth dockyard. He was made vice-admiral in February 1858, and after a year as a lord of the admiralty, was appointed commander-in-chief in the Mediterranean. The discipline of the navy was then bad. It was a tradition sprung from the wholesale shipment of gaol-birds during the old war, that the men were to be treated without consideration; moreover the ships had been largely filled up with " bounty men" bought into the service with a £10 note. without training. Out of this unpromising material Martin formed the fleet which was at that time the ideal of excellence. He had no war

service, and, beyond the Italian disturbance of 1860-61, no opportunity for showing diplomatic ability. But his memory lives as that of the reformer of discipline and the originator of a comprehensive system of steam manoeuvres. He became an admiral in November 1863, and on the 4th of December succeeded to the baronetcy which had been conferred on his grandfather. His last appointment was the command at Plymouth, 1866ˆ1869, and in 1870 he was put on the retired list. In 1873 the G.C.B. was conferred on him, and in 1878 he was made rear-admiral. He died at Upton Grey, near Winchfield, on the 24th of March 1895. He was twice married, and left, besides daughters, one son, who succeeded to the baronetcy.

MARTIN OF TROPPAU, or Martin the Pole (d. 1278), chron- icler, was born at Troppau, and entered the order of St Dominic at Prague. Afterwards he went to Rome and became papal chaplain under Clement IV. and other popes. In 1278 Pope Nicholas III. appointed him archbishop of Gnesen, but he died at Bologna whilst proceeding to Poland to take up his new duties. Martin wrote some sermons and some commentaries on the canon law; but more important is his Chronicon pontificum et imperatorum, a history of the popes and emperors to 1277. Written at the request of Clement IV. the Chronicon is jejune and untrustworthy, and was mainly responsible for the currency of the legend of Pope Joan, and the one about the institution of seven electors by the pope. Nevertheless it enjoyed an extra- ordinary popularity and found many continuators; but its value to students arises solely from the fact that it was used by numerous chroniclers during the 14th, 15th and 16th centuries. In the 15th century it was translated into French, and as part of the Chronique martiniane was often quoted by controversialists. It has also been translated into German, Italian and Bohemian.

The Latin text is printed, with introduction by L. Weiland, in Band XXII. of the Monumenta Germaniae hislorica (Hanover and Berlin, 1826 seq.). See G. Waitz, H. Brosien and others in the Neues Archiv der Gesellschaft fur dltere deutsche Geschichtskunde (Hanover, 1876 seq.); W. Wattenbach, Deutschlands Geschichts- quellen. Band II. (Berlin, 1894); and A. Molinier, Les Sources de I'histoire de France, Tome III. (Paris, 1903).

MARTIN x (Fr. Martinet), the Hirundo urbica of Linnaeus and Chelidon urbica of modern ornithologists, a bird well known throughout Europe, including even Lapland, where it is abun- dant, retiring in winter to the south of Africa. It also inhabits the western part of Asia, and appears from

time to time in large flocks in India. The martin (or house-martin, as it is often called, to distinguish it from the sand-martin) commonly reaches its summer quarters a few days later than the Swallow (q.v.), with which it is often confused in spite of the differences between them, the martin's white rump and lower parts being conspicuous as it flies or clings to its nest attached to houses. This nest, made of the same material as the swallow's, is, how- ever, a more difficult structure to rear, and a week or more is often occupied in laying its foundations — the builders clinging to the wall while depositing the mud of which it is composed. The base once fixed, the superstructure is often quickly added, till the whole takes the shape of the half or quarter of a hemi- sphere, and is finished with a lining of feathers mixed with a few bents or straws. The martin builds soon after its return, and a nest that has outlasted the winter is almost at once re-occupied. The bird usually in the course of the summer raises a second, or rarely a third, brood of offspring — though the latest broods often die in the nest, apparently through failure of food. What seem to be adults are observed in England every year so. late as November, and sometimes within a few days of the winter solstice, but these late birds are almost certainly strangers.

•The sand-martin, Hirundo riparia of Linnaeus and Cotile riparia of modern writers, differs much in appearance and habits from the former. Its smaller size, mouse-coloured upper surface and jerking flight distinguish it from the other British Hirun- dinidae; but it is seldom discriminated, and, being the first of the family to return to its northern home, the so-called " early swallow " is nearly always of this species. Instead of the clay- built nest of the house-martin, this bird bores horizontal galleries in an escarpment. When beginning its excavation, it clings to the face of the bank, and with its bill loosens the earth, working from the centre outwards, and often hanging head downwards. The tunnel may extend to 4, 6, or even 9 ft. The gallery seems intended to be straight, but inequalities of the ground, and espe- cially the meeting with stones, often causes it to take a sinuous course. At the end is formed a nest lined with a few grass-stalks and feathers. The sand-martin has several broods in the year, and is more regular than other Hirundinidae in its departure for the south. The kind of soil needed for its nesting habits makes it somewhat local, but no species of the order Passeres has a geographical range that can compare with this. In Europe it is found nearly to the North Cape, and thence to the Sea of Okhotsk. In winter it visits many parts of India and South Africa to the Transvaal. In America its range extends (having due regard to the season) from Melville Island to Caicara in Brazil, and from Newfoundland to Alaska.

The purple martin of America, Progne purpurea, is a favourite in Canada and the United States. Naturally breeding in hollow trees, it readily adapts itself to the nest-boxes which are com- monly set up for it; but its numbers

are in some years and places diminished in a manner unexplained. The limits of its range in winter are not determined, chiefly owing to the differences of opinion as to the validity of certain supposed kindred species found in South America; but according to some authorities it reaches the border of Patagonia, while in summer it is known to inhabit lands within the Arctic Circle. The male is almost

1 The older English form, martlet (French, Martelet), is, except in heralds' language, almost obsolete, and when used is now applied in some places to the Swift (q.v.). The bird called martin by French colonists in the Old World is a mynah (Acridotheres). (See Grackle.)

wholly of a glossy steel-blue, while the female is duller in colour above, and beneath of a brownish-grey.

Birds that may be called martins occur almost all over the world except in New Zealand, which is not regularly inhabited by any member of the family. The ordinary martin of Australia is the Petrochelidon nigricans of most ornithologists, and another and more beautiful form is the ariel or fairy-martin of the same country, Petrochelidon ariel. This last builds a bottle-shaped nest of mud, as does also the rock-martin of Europe, Cotile rupeslris. The eggs of martins are from four to seven in number, and generally white, while those of swallows usually have brown, grey or lilac markings. (A. N.)

MARTINEAU, HARRIET (1802-1876), English writer, was born at Norwich, where her father was a manufacturer, on the 1 2th of June 1802. The family was of Huguenot extraction (see Martineau, James) and professed Unitarian views. The atmosphere of her home was industrious, intellectual and austere ; she herself was clever, but weakly and unhappy; she had no sense of taste or smell, and moreover early grew deaf. At the age of fifteen the state of her health and nerves led to a prolonged visit to her father's sister, Mrs Kentish, who kept a school at Bristol. Here, in the companionship of amiable and talented people, her life became happier. Here, also, she fell under the influence of the Unitarian minister, Dr Lant Carpenter, from whose instruc- tions, she says, she derived " an abominable spiritual rigidity and a truly respectable force of conscience strangely mingled together." From 1819 to 1830 she again resided chiefly at Norwich. About her twentieth year her deafness became con- firmed. In 182 1 she began to write anonymously for the Monthly Repository, a Unitarian periodical, and in 1823 she published Devotional Exercises and Addresses, Prayers and Hymns.

In 1826 her father died, leaving a bare maintenance to his wife and daughters. His death had been preceded by that of his eldest son, and was

shortly followed by that of a man to whom Harriet was engaged. Mrs Martineau and her daughters soon after lost all their means by the failure of the house where their money was placed. Harriet had to earn her living, and, being precluded by deafness from teaching, took up authorship in earnest. Besides reviewing for the Repository she wrote stories (afterwards collected as Traditions of Palestine), gained in one year (1830) three essay-prizes of the Unitarian Association, and eked out her income by needlework. In 1831 she was seeking a publisher for a series of tales designed as Illustrations of Political Economy. After many failures she accepted disad- vantageous terms from Charles Fox, to whom she was introduced by his brother, the editor of the Repository. The sale of the first of the series was immediate and enormous, the demand increased with each new number, and from that time her literary success was secured. In 1832 she moved to London, where she numbered among her acquaintance Hallam, Milman, Malthus, Monckton Milnes, Sydney Smith, Bulwer, and later Carlyle. Till 1834 she continued to be occupied with her political economy series and with a supplemental series of Illustrations of Taxation. Four stories dealing with the poor-law came out about the same time. These tales, direct, lucid, written without any appearance of effort, and yet practically effective, display the characteris- tics of their author's style. In 1834, when the series was com- plete, Miss Martineau paid a long visit to America. Here her open adhesion to the Abolitionist party, then small and very unpopular, gave great offence, which was deepened by the pub- lication, soon after her return, of Society in America (1837) and a Retrospect of Western Travel (1838). An article in the West- minster Review, " The Martyr Age of the United States," intro- duced English readers to the struggles of the Abolitionists. The American books were followed by a novel, Deerbrook (1839) — a story of middle-class country life. To the same period belong a few little handbooks, forming parts of a Guide to Service. The veracity of her Maid of All Work led to a wide- spread belief, which she regarded with some complacency, that she had once been a maid of all work herself.

In 1839, during a visit to the Continent, Miss Martineau's health broke down. She retired to solitary lodgings in Tyne-

mouth, and remained an invalid till 1844. Besides a novel, The Hour and the Man (1840), Life in the Sickroom (1844), and the Playfellow (1841), she published a series of tales for children containing some of her most popular work: Settlers at Home, The Peasant and the Prince, Feats on the Fiord, &c. During this illness she for a second time declined a pension on the civil list, fearing to compromise her political independence. Her letter on the subject was published, and some of her friends raised a small

annuity for her soon after.

In 1844 Miss Martineau underwent a course of mesmerism, and in a few months was restored to health. She eventually published an account of her case, which had caused much dis- cussion, in sixteen Letters on Mesmerism. On her recovery she removed to Ambleside, where she built herself " The Knoll," the house in which the greater part of her after life was spent. In 1845 she published three volumes of Forest and Game Law Tales. In 1846 she made a tour with some friends in Egypt, Palestine and Syria, and on her return published Eastern Life, Present and Past (1848). This work showed that as humanity passed through one after another of the world's historic religions, the conception of the Deity and of Divine government became at each step more and more abstract and indefinite. The ultimate goal Miss Martineau believed to be philosophic atheism, but this belief she did not expressly declare. She published about this time Household Education, expounding the theory that freedom and rationality, rather than command and obedience, are the most effectual instruments of education. Her interest in schemes of instruction led her to start a series of lectures, addressed at first to the school children of Ambleside, but after- wards extended, at their own desire, to their elders. The subjects were sanitary principles and practice, the histories of England and North America, and the scenes of her Eastern travels. At the request of Charles Knight she wrote, in 1849, The History of the Thirty Years' Peace, 1816-1846 — an excellent popular history written from the point of view of a " philosophical Radical," completed in twelve months.

In 1851 Miss Martineau edited a volume of Letters on the Laws of Man's Nature and Development. Its form is that of a corre- spondence between herself and H. G. Atkinson, and it expounds that doctrine of philosophical atheism to which Miss Martineau in Eastern Life had depicted the course of human belief as tending. The existence of a first cause is not denied, but is declared unknowable, and the authors, while regarded by others as denying it, certainly considered themselves to be affirming the doctrine of man's moral obligation. Atkinson was a zealous exponent of mesmerism, and the prominence given to the topics of mesmerism and clairvoyance heightened the general dis- approbation of the book, which caused a lasting division between Miss Martineau and some of her friends.

She published a condensed English version of the Philosophie Positive (1853). To the Daily News she contributed regularly from 1852 to 1866. Her Letters from Ireland, written during a visit to that country in the summer of 1852, appeared in that paper. She was for many years a contributor to the Westminster Review, and was one of the little band of supporters whose pecuniary assistance in 1854 prevented its extinction or forced sale. In the early part of 1855 Miss Martineau found herself

suffering from heart disease. She now began to write her auto- biography, but her life, which she supposed to be so near its close, was prolonged for twenty years. She died at " The Knoll " on the 27th of June 1876.

She cultivated a tiny farm at Ambleside with success, and her poorer neighbours owed much to her. Her busy life bears the consistent impress of two leading characteristics — industry and sincerity. The verdict which she records on herself in the autobiographical sketch left to be published by the Daily News has been endorsed by posterity. She says — " Her original power was nothing more than was due to earnestness and intellectual clearness within a certain range. With small imaginative and suggestive powers, and therefore nothing approaching to genius, she could see clearly what she did see, and give a clear expression

to what she had to say. In short, she could popularize while she could neither discover nor invent." Her judgment on large questions was clear and sound, and was always the judgment of a mind naturally progressive and Protestant.

See her Autobiography, with Memorials by Maria Weston Chapman (1877) and Mrs. Fenwick Miller, Harriet Martineau (1884, " Eminent Women Series ").

MARTINEAU, JAMES (1805-1900), English philosopher and divine, was born at Norwich on the 21st of April 1805, the seventh child of Thomas Martineau and Elizabeth Rankin, the sixth, his senior by almost three years, being his sister Harriet (see above). He was descended from Gaston Martineau, a Huguenot surgeon and refugee, who married in 1693 Marie Pierre, and settled soon afterwards in Norwich. His son and grandson — respectively the great-grandfather and grandfather of James Martineau— were surgeons in the same city, while his father was a manufacturer and merchant. James was educated at Norwich Grammar School under Edward Valpy, as good a scholar as his better-known brother Richard. But the boy proving too sensi- tive for the life of a public day school, was sent to Bristol to the private academy of Dr Lant Carpenter, under whom he studied for two years. On leaving he was apprenticed to a civil engineer at Derby, where he acquired " a store of exclusively scientific conceptions," 1 but also experienced the hunger of mind which forced him to look to religion for satisfaction. Hence came his " conversion," and the sense of vocation for the ministry which impelled him in 1822 to enter Manchester College, then lodged at York. Here he " woke up to the interest of moral and metaphysical speculations." Of his teachers, one, the Rev. Charles Wellbeloved, was, Martineau said, " a master of the true Lardner type,

candid and catholic, simple and thorough, humanly fond indeed of the counsels of peace, but piously serving every bidding of sacred truth." " He never justified a prejudice; he never misdirected our admiration; he never hurt an innocent feeling or overbore a serious judgment ; and he set up within us a standard of Christian scholarship to which it must ever exalt us to aspire." 2 The other, the Rev. John Kenrick, he described as .a man so learned as to be placed by Dean Stanley " in the same line with Blomfield and Thirlwall," 3 and as " so far above the level of either vanity or dogmatism, that cynicism itself could not think of them in his presence." 4

On leaving the college in 1827 Martineau returned to Bristol to teach in the school of Lant Carpenter; but in the following year he was ordained for a Unitarian church in Dublin, whose senior minister was a relative of his own. But his career there was in 1832 suddenly cut short by difficulties growing out of the " regium donum," which had on the death of the senior minister fallen to him. He conceived it as " a religious monopoly " to which " the nation at large contributes," while " Presbyterians alone receive," and which placed him in " a relation to the state " so "seriously objectionable" as to be "impossible to hold." 6 The invidious distinction it drew between Presbyterians on the one hand, and Catholics, Friends, freethinking Christians, unbe- lievers and Jews on the other, who were compelled to support a ministry they " conscientiously disapproved," offended his always delicate conscience; while possibly the intellectual and ecclesi- astical atmosphere of the city proved uncongenial to his liberal magnanimity. From Dublin he was called to Liverpool, and there for a quarter of a century he exercised extraordinary influence as a preacher, and achieved a high reputation as a writer in religious philosophy. In 1840 he was appointed professor of mental and moral philosophy and political economy in Manchester New College, the seminary in which he had himself been educated, and which had now removed from York to the city after which it was named. This position he held for forty- five years. In 1853 the college removed to London, and four years later he followed it thither. In 1858 he was called to

1 Types of Ethical Theory, i. 8.

2 Essays, Reviews and Addresses, iv. 54. 3 Ibid. i. 397. 4 Essays, Reviews arid Addresses, i. 419.

6 Martineau's " Letter to the Dissenting Congregation of Eustace Street " (Dublin).

occupy the pulpit of Little Portland Street chapel in London, which he did at first for two years in conjunction with the Rev. J. J. Tayler, who was also his colleague in the college, and then for twelve years alone. In 1866 the chair of the philosophy of mind and logic in University College, London, fell vacant, and Martineau became a candidate. But potent opposition was offered to the appointment of a minister of religion, and the chair went to George Croom Robertson— then an untried man — between whom and Martineau a cordial friendship came to exist. In 1885 he retired, full of years and honours, from the prin- cipalship of the college he had so long served and adorned. Martineau, who was in his youth denied the benefit of a university education, yet in his age found famous universities eager to confer upon him their highest distinctions. He was made LL.D. of Harvard in 1872, S.T.D. of Leiden in 1874, D.D. of Edinburgh in 1884, D.C.L. of Oxford in 1888 and D.Litt. of Dublin in 1891. He died in London on the nth of January 1900.

The life of Martineau was so essentially the life of the thinker, and was so typical of the century in which he lived and the society within which he moved, that he can be better understood through his spoken mind than through his outward history. He was a man happy in his ancestry; he inherited the dignity, the reserve, the keen and vivid intellect, and the picturesque imagination of the French Huguenot, though they came to him chastened and purified by generations of Puritan discipline exercised under the gravest ecclesiastical disabilities, and of culture maintained in the face of exclusion from academic privileges. He had the sweet and patient temper which knew how to live, unrepining and unsoured, in the midst of the most watchful persecution, public and private; and it is wonderful how rarely he used his splendid rhetoric for the purposes of invective against the spirit and policy from which he must have suffered deeply, while, it may be added, he never hid an innuendo under a metaphor or a trope. He was fundamentally too much a man of strong convictions to be correctly described as open-minded, for if nature ever determined any man's faith, it was his; the root of his whole intellectual life, which was too deep to be disturbed by any superficial change in his philosophy, being the feeling for God. He has, indeed, described in graphic terms the greatest of the more superficial changes he underwent; how he had " carried into logical and ethical problems the maxims and postulates of physical knowledge," and had moved within the narrow lines drawn by the philosophical instructions of the class-room " interpreting human phenomena by the analogy of external nature "; how he served in willing captivity " the 'empirical ' and ' necessarian ' mode of thought," even though " shocked " by the dogmatism and acrid humours " of certain distinguished representatives "-, 1 and how in a period of " second education " at Berlin, " mainly under the admirable guidance of Professor Trendelenburg," he experienced " a new intellectual birth" which " was essentially the gift of fresh conceptions, the unsealing of hidden openings of self-consciousness, with unmeasured corridors and sacred halls behind; and, once gained, was more or less avail- able throughout the history of philosophy, and lifted the darkness from the pages of Kant and even Hegel." 2 But though this momentous change of view illuminated his old beliefs and helped him to re-interpret and re-articulate them, yet it made him no more of a theist than he had been before. And as his theism was, so was his religion and his philosophy. Certainly it was true of him, in a far higher degree than of John Henry Newman, that the being of God and himself were to his mind two absolutely self-luminous truths — though both his God and his self were almost infinitely remote from Newman's. And as these truths were self-evident, so the religion he deduced from them was sufficient, not only for his own moral and intellectual nature, but also for man as he conceived him, for history as he knew it, and for society as he saw it.

We may, alternatively, describe Martineau's religion as his applied philosophy or his philosophy as his explicated religion, and both as

the expression of his singularly fine ethical and reverent nature. But to understand these in their mutual and explanatory relations it will be necessary to exhibit the conditions under which his thought grew into consistency and system. His main function made him in his early life a preacher even more emphatically than a teacher. In all he said and all he thought he had the preacher's end in view. He was, indeed, no mere orator or speaker to mul- titudes. He addressed a comparatively small and select circle, a congregation of thoughtful and devout men, who cultivated reverence and loved religion all the more that their own beliefs were limited to the simplest and sublimest truths. He felt the majesty of these truths to be the greater that they so represented to him not only the most fundamental of human beliefs, but also all that man could be reasonably expected to believe, though to believe with his whole reason. Hence the beliefs he preached were never to him mere speculative ideas, but rather the ultimate realities of being and thought, the final truths as to the character and ways of God interpreted into a law for the government of conscience and the regulation of life. And so he became a positive religious teacher by virtue of the very ideas that made the words of the Hebrew prophets so potent and sublime. But he did more than interpret to his age the significance of man's ultimate theistic beliefs, he gave them vitality by reading them through the consciousness of Jesus Christ. His religion was what he conceived the personal religion of Jesus to have been; and He was to him more a person to be imitated than an authority to be obeyed, rather an ideal to be revered than a being to be worshipped.

Martineau's mental qualities fitted him to fulfil these high inter- pretative functions. He had the imagination that invested with personal being and ethical qualities the most abstruse notions. To him space became a mode of divine activity, alive with the presence and illuminated by the vision of God ; time was an arena where the divine hand guided and the divine will reigned. And though he did not believe in the Incarnation, yet he held deity to be in a sense manifest in humanity; its saints and heroes became, in spite of innumerable frailties, after a sort divine; man underwent an apotheosis, and all life was touched with the dignity and the grace which it owed to its source. The 19th century had no more reverent thinker than Martineau; the awe of the Eternal was the very atmosphere that he breathed, and he looked at man with the compassion of one whose thoughts were full of God.

To his function as a preacher we owe some of his most character- istic and stimulating works, especially the discourses by which it may be said he won his way to wide and influential recognition — Endeavours after the

Christian Life, 1st series, 1843; 2nd series, 1847; Hours of Thought, 1st series, 1876; 2nd series, 1879; the various hymn-books he issued at Dublin in 1 83 1, at Liverpool in 1840, in London in 1873; and the Home Prayers in 1 89 1. But besides the vocation he had freely selected and assiduously laboured to fulfil, two more external influences helped to shape Martineau's mind and define his problem and his work; the awakening of English thought to the problems which underlie both philosophy and religion, and the new and higher opportunities offered for their discussion in the periodical press. The questions which lived in the earlier and more formative period of his life concerned mainly the idea of the church, the historical interpretation of the documents which described the persons who had created the Christian religion, especially the person and work of its founder; but those most alive in his later and maturer time chiefly related to the philosophy of religion and ethics. In one respect Martineau was singularly happy; he just escaped the active and, on the whole, belittling period of the old Unitarian controversy. When his ministry began its fires were slowly dying down, though the embers still glowed. We feel its presence in his earliest notable work, The Rationale of Religious Enquiry, 1836; and may there see the rigour with which it applied audacious logic to narrow premisses, the tenacity with which it clung to a limited literal supernaturalism which it had no philosophy to justify, and so could not believe without historical and verbal authority. This traditional conservatism survived in the statement, which, while it caused vehement discussion when the book appeared, was yet not so much characteristic of the man as of the school in which he had been trained, that "in no intelligible sense can any one who denies the supernatural origin of the religion of Christ be termed a Christian," which term, he explained, was used not as " a name of praise," but simply as " a designation of belief." 3 He censured the German rationalists " for having preferred, by convulsive efforts of interpretation, to compress the memoirs of Christ and His apostles into the dimensions of ordinary life, rather than admit the operation of miracle on the one hand, or proclaim their abandon- ment of Christianity on the other." 4 The echoes of the dying controversy are thus distinct and not very distant in this book, though it also offers in its larger outlook, in the author's evident uneasiness under the burden of inherited beliefs, and his inability to reconcile them with his new standpoint and accepted principles, a curious forecast of his later development, while in its positive premisses it presents a still more instructive contrast to the con- clusions of his later dialectic. Nor did the sound of the ancient controversy ever cease to be audible to him. In 1839 he sprang

1 Types of Ethical Theory, i. pp. vii.-ix.

1 Ibid. p. xiii.

3 Rationale, 2nd ed., pref., p. vii.

4 Ibid. p. 133.

to the defence of Unitarian doctrine, which had been assailed by certain Liverpool clergymen, of whom Fielding Ould was the most active and Hugh McNeill the most famous. As his share in the controversy, Martineau published five discourses, in which he discussed " the Bible as the great autobiography of human nature from its infancy to its perfection," " the Deity of Christ," " Vicarious Redemption," " Evil," and " Christianity without Priest and without Ritual." 1 He remained to the end a keen and vigilant apologist of the school in which he had been nursed. But the questions proper to the new day came swiftly upon his quick and susceptible mind — enlarged, deepened and developed it. Within his own fold new light was breaking. To W. E. Channing (q.v.), whom Martineau had called " the inspirer of his youth," Theodore Parker had succeeded, introducing more radical ideas as to religion and a more drastic criticism of sacred history. Blanco White, " the rationalist A'Kempis," who had dared to appear as " a religious sceptic in God's presence," had found a biographer and interpreter in Martineau's friend and colleague, John Hamilton Thorn. Within the English Church men with whom he had both personal and religious sympathy rose— Whately, of whom he said, " We know no living writer who has proved so little and disproved so much " ; 2 and Thomas Arnold, "a man who could be a hero without romance " ; 3 F. D. Maurice, whose character, marked by " religious realism," sought in the past " the witness to eternal truths, the manifestation by time-samples of infinite realities and unchanging relations"; 4 and Charles Kingsley, " a great teacher," though one " certain to go astray the moment he becomes didactic." 6 Beside these may be placed men like E. B. Pusey and J. H. Newman, whose mind Martineau said was " critical, not prophetic, since without immedi- ateness of religious vision," and whose faith is " an escape from an alternative scepticism, which receives the veto not of his reason but of his will," 6 as men for whose teachings and methods he had a potent and stimulating antipathy. The philosophic principles and religious deductions of Dean Mansel he disliked as much as those of Newman, but he respected his arguments more. Apart from the Churches, men like Carlyle and Matthew Arnold — with whom he had much in common — influenced him; while Herbert Spencer in England and Comte in France afforded the antithesis needful to the dialectical development of his own views. He came to know German philosophy and criticism, especially the criticism of Baur and the Tubingen school, which affected profoundly his construction of Christian history. And these were strengthened by French influences, notably those of Renan and the Strassburg theologians. The rise

of evolution, and the new scientific way of looking at nature and her creative methods, compelled him to rethink and reformulate his theistic principles and conclusions, especially as to the forms under which the relation of God to the world and His action within it could be conceived. Under the impulses which came from these various sides Martineau's mind lived and moved, and as they successively rose he promptly, by appreciation or criticism, responded to the dialectical issues which they raised.

In the discussion of these questions the periodical press supplied him with the opportunity of taking an effective part. At first his literary activity was limited to sectional publications, and he ad- dressed his public, now as editor and now as leading contributor, in the Monthly Repository, the Christian Reformer, the Prospective, the Westminster and the National Review. Later, especially when scientific speculation had made the theistic problem urgent, he was a frequent contributor to the literary monthlies. And when in 1890 he began to gather together the miscellaneous essays and papers written during a period of sixty years, he expressed the hope that, though " they could lay no claim to logical consistency," they might yet show " beneath the varying complexion of their thought some intelligible moral continuity," " leading in the end to a view of life more coherent and less defective than was presented at the begin- ning." 7 And though it is a proud as well as a modest hope, no one could call it unjustified. For his essays are fine examples of per- manent literature appearing in an ephemeral medium, and represent work which has solid worth for later thought as well as for the specu- lation of their own time. There is hardly a name or a movement in the religious history of the century which he did not touch and illuminate. It was in this form that he criticized the " atheistic mesmerism " to which his sister Harriet had committed herself, and she never forgave his criticism. But his course was always singularly independent, and, though one of the most affectionate and most sensitive of men, yet it was his fortune to be so fas- tidious in thought and so conscientious in judgment as often to give offence or create alarm in those he deeply respected or tenderly loved.

The theological and philosophical discussions which thus appeared he later described as " the tentatives which gradually prepared the way for the more systematic expositions of the Types of Ethical

'They stand as Lectures ii., v., vi., xi., xii. in the volume Uni- tarianism Defended, 1839.

2 Essays, Reviews and Addresses, ii. 10. » Ibid. i. 46.

6 Ibid. ii. 285.

7 Essays, Reviews and Addresses, i., Hi.

4 Ibid. i. 258, 262. 8 Ibid. i. 233.

Theory and The Study of Religion, and, in some measure, of The Seat of Authority in Religion." 8 These books expressed his mature thought, and may be said to contain, in what he conceived as a final form, the speculative achievements of his life. They appeared re- spectively in"i885, 1888 and 1890, and were without doubt remarkable feats to be performed by a man who had passed his eightieth year. Their literary and speculative qualities are indeed exceptionally brilliant ; they are splendid in diction, elaborate in argument, cogent yet reverent, keen while fearless in criticism. But they have also most obvious defects: they are unquestionably the books of an old man who had thought much as well as spoken and written often on the themes he discusses, yet who had finally put his material together in haste at a time when his mind had lost, if not its dialectic vigour, yet its freshness and its sense of proportion; and who had been so accustomed to amplify the single stages of his argument that he had forgotten how much they needed to be reduced to scale and to be built into an organic whole. In the first of these books his nomen- clature is unfortunate; his division of ethical theories into the " unpsychological," " idiopsychological," and the " hetero-psycho- logical," is incapable of historical justification; his exposition of single ethical systems is, though always interesting and suggestive, often arbitrary and inadequate, being governed by dialectical exigencies rather than historical order and perspective. In the second of the above books his idea of religion is somewhat of an anachronism; as he himself confessed, he "used the word in the sense which it invariably bore half a century ago," as denoting " belief in an ever-living God, a divine mind and will ruling the universe and holding moral relations with mankind." As thus used, it was a term which governed the problems of speculative theism rather than those connected with the historical origin, the evolution and the organization of religion. And these are the questions which are now to the front. These criticisms mean that his most elaborate discussions came forty years too late, for they were concerned with problems which agitated the middle rather than the end of the 19th century. But if we pass from this criticism of form to the actual contents of the two books, we are bound to confess that they constitute a wonderfully cogent and persuasive theistic argument. That argument may be described as a criticism of man and his world used as a basis for the construction of a reasoned idea of nature and being. Man and nature, thought and being, fitted each other. What was implicit in nature had become explicit in man; the problem of the individual was one with the problem of universal experience. The interpretation of man was therefore the interpretation of

his universe. Emphasis was made to fall on the reason, the conscience and the will of the finite personality; and just as these were found to be native in him they were held to be immanent in the cause of his universe. What lived in time belonged to eternity; the microcosm was the epitome of the macrocosm;, the reason which reigned in man interpreted the law that was revealed in conscience and the power which governed human destiny, while the freedom which man realized was the direct negation both of necessity and of the operation of any fortuitous cause in the cosmos.

It was not possible, however, that the theistic idea could be dis- cussed in relation to nature only. It was necessary that it should be applied to history and to the forces and personalities active within it. And of these the greatest was of course the Person that had created the Christian religion. What did Jesus signify? What authority belonged to Him and to the books that contain His history and interpret His person? This was the problem which Martineau attempted to deal with in The Seat of Authority in Religion. The workmanship of the book is unequal: historical and literary criticism had never been Martineau's strongest point, although he had almost continuously maintained an amount of New Testament study, as his note-books show. In its speculative parts the book is quite equal to those that had gone before, but in its literary and historical parts there are indications of a mind in which a long- practised logic had become a rooted habit. While a comparison of his expositions of the Pauline and Johannine Christologies with the earlier Unitarian exegesis in which he had been trained shows how wide is the interval, the work does not represent a mind that had throughout its history lived and worked in the delicate and judicial investigations he here tried to conduct.

Martineau's theory of the religious society or church was that of an idealist rather than of a statesman or practical politi- cian. He stood equally remote from the old Voluntary principle, that " the State had nothing to do with religion," and from the sacerdotal position that the clergy stood in an apostolic suc- cession, and either constituted the Church or were the persons into whose hands its guidance had been committed. He hated two things intensely, a sacrosanct priesthood and an enforced uniformity. He may be said to have believed in the sanity and sanctity of the state rather than of the Church. Statesmen he could trust as he would not trust ecclesiastics. And so he even propounded a scheme, which fell still-born, that would ha^ 8 Ibid. iii.. pref., p. vi.

repealed uniformity, taken the church out of the hands of a clerical order, and allowed the coordination of sects or churches under the state. Not that he would have allowed the state to touch doctrine, to determine polity or discipline; but he would have had it to recognize historical achievement, religious char- acter and capacity, arid endow out of its ample resources those societies which had vindicated their right to be regarded as making for religion. His ideal may have been academic, but it was the dream of a mind that thought nobly both of religion and of the state.

See Life and Letters by J. Drummond and C. B. Upton (2 vols., 1901); J. E. Carpenter, James Martineau, Theologian and Teacher (I 9°5) ; J- Crawford, Recollections of James Martineau (1903) ; A. W. Jackson, James Martineau, a Biography and a Study (Boston, 1900) ; H. Sidgwick, Lectures on the Ethics of Green, Spencer and Martineau (1902) ; and J. Hunt, Religious Thought in England in the igth Century.

(A. M. F.)

MARTINET, a military term (more generally used in a disparaging than in a complimentary sense) implying a strict disciplinarian or drill-master. The term originated in the French army about the middle of Louis XIV. 's reign, and was derived from Jean Martinet (d. 1672), who as lieutenant-colonel of the King's regiment of foot and inspector-general of infantry drilled and trained that arm in the model regular army created by Louis and Louvois between 1660 and 1670. Martinet seems also to have introduced the copper pontoons with. which Louis bridged the Rhine in 1672. He was killed, as a marechal de camp, at the siege of Duisburg in the same year, being accidentally shot by his own artillery while leading the infantry assault. His death, and that of the Swiss captain Soury by the same discharge gave rise to a bon mot, typical of the polite ingratitude of the age, that Duisburg had only cost the king a martin and a mouse. The " martin " as a matter of fact shares with Vauban and other professional soldiers of Louis XIV. the glory of having made the French army the first and best regular army in Europe. Great nobles, such as Turenne, Conde and Luxemburg, led this army and inspired it, but their fame has obscured that of the men who made it manageable and efficient. It was about this time that the soldier of fortune, who joined a regiment with his own arms and equipment and had learned his trade by varied experience, began to give place to the soldier regularly enlisted as a recruit in permanent regiments and trained by his own officers. The consequence of this was the introduction of a uniform, or nearly uniform system of drill and training, which in all essentials has endured to the present day. Thus Martinet was the forerunner of Leopold of Dessau and Frederick William, just as Jean Jacques de Fourilles, the organizer of the cavalry, who was forced into an untimely charge at Seneffe (1674) by a brutal taunt of Conde, and there

met his death, was the forerunner of Zieten and Seydlitz. These men, while differing from the creators of the Prussian army in that they contributed nothing to the tactics of their arms, at least made tactics possible by the thorough drilling and organization they imparted to the formerly heterogeneous and hardly coherent elements of an army.

MARTfNEZ DE LA ROSA, FRANCISCO DE PAULA (1780- 1862), Spanish statesman and dramatist, was born on the 10th of Majrch 1789 at Granada, and educated at the university there. He won popularity with a series of epigrams on local celebrities published under the title of El Cementerio de momo. During the struggle against Napoleon he took the patriotic side, was elected deputy, and at Cadiz produced his first play, Lo que puede un empleo, a prose comedy in the manner of the younger Moratin. La Viuda de Padilla (1814), a tragedy modelled upon Alfieri, was less acceptable to the Spanish public. Meanwhile the author became more and more engulfed in politics, and in 1814 was banished to Africa, where he remained till 1820, when he was suddenly recalled and appointed prime minister. During the next three years he was the most unpopular man in Spain; denounced as a revolutionist by the Conservatives and as a reactionary by the Liberals, he alienated the sympathies of all parties, and his rhetoric earned for him the contemptuous nick- name of Rosita la Paslelera. Exiled in 1823, he took refuge in Paris, where he issued his Obras literarias (1827), including his

Arte poitica, in which he exaggerated the literary theories already promulgated by Luzan. Returning to Spain in 1831, he became prime minister on the death of Ferdinand VII., but proved incapable of coping with the insurrectionary movement and resigned in 1834. He was ambassador at Paris in 1839-1840 and at Rome in 1842-1843, joined the Conservative party, held many important offices, and was president of congress and director of the Spanish academy at the time of his death, which took place at Madrid on the 7th of February 1862. As a states- man, Martinez de la Rosa never rose above mediocrity. It was his misfortune to be in place without real power, to struggle against a turbulent pseudo-democratic movement promoted by unscrupulous soldiers, and to contend with the intrigues of the king, the court camarilla and the clergy. But circumstances which hampered him in politics favoured his career in literature. He was not a great natural force; his early plays and poems are influenced by Moratin or by Melendez Valdes; his Espiritu del siglo (1835) is an elegant summary of all the commonplaces con- cerning the philosophy of history; his Dona Isabel de Solis (1837- 1846) is a weak imitation of Walter Scott's historical novels. Still his place in the history of Spanish literature is secure, if not eminent. Through the happy accident of his exile at Paris he was thrown into relations with the leaders of the French'romantic movement, and was so far impressed with the innovations

of the new school as to write in French a romantic piece entitled Aben-Humeya (1830), which was played at the Porte Saint-Martin. The experiment was not unsuccessful, and on his return to Madrid Martinez de la Rosa produced La Conjuracidn de Venecia (April 23, 1834), which entitles him to be called the pioneer of the romantic drama in Spain. The play is more reminiscent of Casimir Delavigne than of Victor Hugo; but it was unquestion- ably effective, and smoothed the way for the bolder essays of Rivas, Garcia Gutierrez and Hartzenbusch.

MARTINI, GIOVANNI BATTISTA (1706-1784), Italian musi- cian, was born at Bologna on the 24th of April 1706. His father, Antonio Maria Martini, a violinist, taught him the elements of music and the violin; later he learned singing and harpsichord playing from Padre Pradieri, and counterpoint from Antonio Riccieri. Having received his education in classics from the fathers of the oratory of San Filippo Neri, he afterwards entered upon a noviciate at the Franciscan monastery at Lago, at the close of which he was received as a Minorite on the nth of September 1722. In 1725, though only nineteen years old, he received the appointment of chapel-master in the Franciscan church at Bologna, where his compositions attracted attention. At the invitation of amateurs and professional friends he opened a school of composition at which several celebrated musicians were trained; as a teacher he consistently declared his preference for the traditions of >the old Roman school of composition. Padre Martini was a zealous collector of musical literature, and possessed an extensive musical library. Burney estimated it at 17,000 volumes; after Martini's death a portion of it passed to the Imperial library at Vienna, the rest remaining in Bologna, now in the Liceo Rossini. Most contemporary musicians speak of Martini with admiration, and Mozart's father consulted him with regard to the talents of his son. Abt Vogler, however, makes reservations in his praise, condemning his philosophical principles as too much in sympathy with those of Fox, which had already been expressed by P. Vallotti. He died at Bologna on the 4th of August 1784. His Elogio was published by Pietro della Valle at Bologna in the same year.

The greater number of Martini's sacred compositions remain unprinted. The Liceo of Bologna possesses the MSS. of two ora- torios; and a requiem, with some other pieces of church music, are now in Vienna. Litaniae atque antiphonae finales B. V. Mariae were published at Bologna in 1734, as also twelve Sonate d'intavolatura; six Sonate per Vorgano ed il cembalo in 1747; and Duetti da camera in 1763. Martini's most important works are his Storia della musica (Bologna, 1757-1781) and his Saggio di contrapunto (Bologna, 1774-1775). The former, of which the three published volumes relate wholly to ancient music, and thus represent a mere fragment of the author's vast plan, exhibits immense reading and industry, but is written in a dry and unattractive style, and is overloaded

with matter which cannot be regarded as historical. At the beginning

and end of each chapter occur puzzle-canons, wherein the primary part or parts alone are given, and the reader has to discover the canon that fixes the period and the interval at which the response is to enter. Some of these are exceedingly difficult, but Cherubini solved the whole of them. The Saggio is a learned and valuable work, containing an important collection of examples from the best masters of the old Italian and Spanish schools, with excellent explanatory notes. It treats chiefly of the tonalities of the plain chant, and of counterpoints constructed upon them. Besides being the author of several controversial works, Martini drew up a Diction- ary of Ancient Musical Terms, which appeared in the second volume of G. B. Doni's Works; he also published a treatise on The Theory of Numbers as applied to Music. His celebrated canons, published in London, about 1800, edited by Pio Cianchettini, show him to have had a strong sense of musical humour.

MARTINI, SIMONE (1 283-1344), Sienese painter, called also Simone di Martino, and more commonly, but not correctly, Simon Memmi, 1 was born in 1283. He followed the manner of painting proper to his native Siena, as improved by Duccio, which is essentially different from the style of Giotto and his school, and the idea that Simone was himself a pupil of Giotto is therefore wide of the mark. The Sienese style is less natural, dignified and reserved than the Florentine; it has less unity of impression, has more tendency to pietism, and is marked by exaggerations which are partly related to the obsolescent Byzantine manner, and partly seem to forebode certain pecu- liarities of the fully developed art which we find prevalent in Michelangelo. Simone, in especial, tended to an excessive and rather affected tenderness in his female figures; he was more successful in single figures and in portraits than in large com- positions of incident. He finished with scrupulous minuteness, and was elaborate in decorations of patterning, gilding, &c.

The first known fresco of Simone is the vast one which he executed in the hall of the Palazzo Pubblico in Siena — the " Madonna Enthroned, with the Infant," and a number of angels and saints; its date is 1315, at which period he was already an artist of repute throughout Italy. In S. Lorenzo Maggiore of Naples he painted a life-sized picture of King Robert crowned by his brother Lewis, bishop of Toulouse; this also is extant, but much damaged. In 1320 he painted for the high altar of the church of S. Caterina in Pisa the Virgin and Child between six saints; above are

archangels, apostles and other figures. The compartmented portions of this work are now dispersed, some of them being in the academy of Siena. Towards 1321 he executed for the church of S. Domenico in Orvieto a picture of the bishop of Savona kneeling before the Madonna attended by saints, now in the Fabriceria of the cathedral. Certain frescoes in Assisi in the chapel of San Martino, representing the life of that saint, ascribed by Vasari to Puccio Capanna, are now, upon internal evidence, assigned to Simone. He painted also, in the south transept of the lower church of the same edifice, figures of the Virgin and eight saints. In 1328 he produced for the sala del consilio in Siena a striking eques- trian portrait of the victorious general Guidoriccio Fogliani de' Ricci.

Simone had married in 1324 Giovanna, the daughter of Memmo (Guglielmo) di Filippuccio. Her brother, named Lippo Memmi, was also a painter, and was frequently associated with Simone in his work; and this is the only reason why Simone has come down to us with the family-name Memmi. They painted together in 1333 the " Annunciation " which is now in the Uffizi gallery. Simone kept a bottega (or shop), undertaking any ornamental woik, and his gains were large. In 1339 he settled at the papal court in Avignon, where he made the acquaintance of Petrarch and Laura; and he painted for the poet a portrait of his lady, which gave occasion for two of Petrarch's sonnets, in which Simone is eulogized. He also illuminated for the poet a copy of the commentary of Servius upon Virgil, now preserved in the Ambrosian library of Milan. He was largely employed in the decorations of the papal buildings

1 The ordinary account of Simone is that given by Vasari, and since repeated in a variety of forms. Modern research shows that it is far from correct, the incidents being erroneous, and the paintings attributed to Simone in various principal instances not his. We follow the authority of Crowe and Cavalcaselle.

in Avignon, and several of his works still remain — in the cathe- dral, in the hall of the consistory, and, in the two chapels of the palace, the stories of the Baptist, and of Stephen and other saints. One of his latest productions (1342) is the picture of " Christ Found by his Parents in the Temple," now in the Liverpool Gallery. Simone died in Avignon in July 1344.

Some of the works with which Simone's name and fame have been generally identified are not now regarded as his. Such are the com- positions, in the Campo Santo of Pisa, from the legend of S. Ranieri, and the " Assumption of the Virgin "; and the great frescoes in the Cappellone

degli Spagnuoli, in S. Maria Novella, Florence, represent- ing the Triumph of Religion through the work of the Dominican order, &c. (W. M. R.)

MARTINIQUE, an island of the West Indies, belonging to the chain of the Lesser Antilles, and constituting a French colony, between the British islands of Dominica and St Lucia, 25 m. S. of the one and 20 m. N. of the other, about 14 40′ N., 61° W. Its length is 40 m., its greatest width 21 m.; and the area comprises 380 sq. m. A cluster of volcanic mountains in the north, a similar group in the south, and a line of lower heights between them, form the backbone of the island. Its deep ravines and precipitous escarpments are reduced in appearance to gentle undulations by the drapery of the forests. The massif of Mont Pele in the north is the culminating point of the island (4430 ft.); that of Carbet is little inferior (3963 ft.), but the mountains in the south are much lower. Mont Pele is notorious for an appalling eruption in May 1902.

Of the numerous streams which traverse the few miles of country between the watershed and the sea (the longest radiating from Mount Carbet) , about seventy-five are of considerable size, and in the rainy season become deep and often destructive torrents. On the north- west and north the coast is elevated and bold ; and similarly on the south, where a lateral range, branching from the backbone of the island, forms a blunt peninsula bounding the low-shored western bay of Fort de France on the south. Another peninsula, called Caravelle, projects from the middle part of the east coast, and south of this the coast is low and fretted, with many islets and cays lying off it. Coral reefs occur especially in this locality. Plains, most numerous and extensive in the south, occupy about one-third of the total area of the island.

The mean annual temperature is 8o° F. in the coast region, the monthly mean for June being 83 , and that for January 77°. Of the annual rainfall of 87 in., August has the heaviest share (11-3 in.), though the rainy season extends from June to October; March, the driest month, has 3-7. Martinique enjoys a marked immunity from hurricanes. The low coastal districts are not very healthy for Europeans in the hotter months, but there are numerous sanatoria in the forest region at an elevation of about 1500 ft., where the average temperature is some 10° F. lower than that already quoted. The north winds which prevail from November to February are comparatively fresh and dry; those from the south (July to October) are damp and warm. From March to June easterly winds are prevalent.

The population increased from 162,861 in 1878 to 175,863 in 1888 and 203,781 in 1901. In 1902 the great eruption of Mont Pele occurred, and in 1905 the population was only 182,024. The bulk of the population consists of Creole negroes and half- castes of various grades, ranging from

the " Saccatra," who has retained hardly any trace of Caucasian blood, to the so-called " Sangmele," with only a suspicion of negro commixture. The capital of the island is Fort de France, on the west-coast bay of the same name, with a fine harbour defended by three forts, and a population of 18,000. The other principal centres of popula- tion are, on the west coast Lamentin, on the same bay as the capital, and on the east coast Le Francois and Le Robert. The colony is administered by a governor and a general council, and returns a senator and two deputies. There are elective municipal councils. The chief product is sugar, and some coffee, cocoa, tobacco and cotton are grown. The island is served by British, French and American steamship lines, and local communications are carried on by small coasting steamers and by subsidized mail coaches, as there are excellent roads. In 1905 the total value of the exports, consisting mainly of sugar, rum and cocoa, was £725,460, France taking by far the greater part, while imports were valued at £596,294, of which rather more than one-half by value came from France, the United States oi America being the next principal importing country. In 1903,

the year following the eruption of Mont Pele, exports were valued at £604,163.

Martinique, the name of which may be derived from a native form Madiana or Mantinino, was probably discovered by Colum- bus on the 15th of June 1502; although by some authorities its discovery is placed in 1493. It was at that time inhabited by Caribs who had expelled or incorporated an older stock. It was not until the 25th of June 1635 that possession was taken of the island in the name of the French Compagnie des lies d' Amerique. Actual settlement was carried out in the same year by Pierre Belain, Sieur d'Esnambuc, captain-general of the island of St Christopher. In 1637 his nephew Dyel Dupar- quet (d. 1658) became captain-general of the colony, now numbering seven hundred men, and subsequently obtained the seigneurie of the island by purchase from the company under the authority of the king of France. In 1654 welcome was given to three hundred Jews expelled from Brazil, and by 1658

*Grand'Rivicrjˆ C- St. Mart.'**

*«***

' MARTINIQUE

entflishTliteS

there were at least five thousand people exclusive of the Caribs, who were soon after exterminated. Purchased by the French government from Duparquet's children for 120,000 livres, Martinique was assigned to the West India Company, but in 1674 it became part of the royal domain. The habitants (French landholders) at first devoted themselves to the cultivation of cotton and tobacco; but in 1650 sugar plantations were begun, and in 1723 the coffee plant was introduced. Slave labour having been introduced at an early period of the occupation, there were 60,000 blacks in the island by 1736. This slavery was abolished in i860. Martinique had a full share of wars. In early days the Caribs were not brought under subjection without severe ' struggles. In 1666 and 1667 the island was attacked by the British without success, and hostilities were terminated by the treaty of Breda. The Dutch made similar attempts in 1674, and the British again attacked the island in 1693. Captured by Rodney in 1762, Martinique was next year restored to the French; but after the conquest by Sir John Jervis and Sir Charles Grey in 1793 it was retained for eight years; and, seized again in 1809, it was not surrendered till 1814. The island was the birth-place of the Empress Josephine.

Martinique has suffered from occasional severe storms, as in 1767, when 1600 persons perished, and M. de la Pagerie, father of the Empress Josephine, was practically ruined, and in 1839, 1891 and 1903, when much damage was done to the sugar crop.

Earthquakes have also been frequent, but the most terrible natural disaster was the eruption of Mont Pele in 1902, by which the town of St Pierre, formerly the chief commercial centre of the island, was destroyed. During the earlier months of the year various manifestations of volcanic activity had occurred; on the 25th of April there was a heavy fall of ashes, and on the 2nd and 3rd of May a heavy eruption destroyed extensive sugar plantations north of St Pierre, and caused a loss of some 150 lives. A few days later the news that the Souffriere in St Vincent was in eruption reassured the inhabitants of St Pierre, as it was supposed that this outbreak might relieve the volcano of Pele. But on the 8th of May the final catastrophe came without warning; a mass of fire, compared to a flaming whirlwind, swept over St Pierre, destroying the ships in the harbour, among which, however, one, the " Roddam " of Scrutton, escaped. A fall of molten lava and ashes followed the flames, accompanied by dense gases which asphyxiated those who had thus far escaped. The total loss of life was estimated at 40,000. Consternation was caused not only in the West Indies, but in France and throughout the world, and at first it was seriously

suggested that the island should be evacuated, but no countenance was lent to this proposal by the French government. Relief measures were undertaken and voluntary subscriptions raised. The material losses were estimated at £4,000,000; but, besides St Pierre, only one-tenth of the island had been devastated, and although during July there was further volcanic activity, causing more destruction, the economic situation recovered more " rapidly than was expected.

See Annuaire de la Martinique (Fort de France) ; H. Mouet, La Martinique (Paris, 1892); M. J. Guet, Origines de la Martinique (Vannes, 1893) ; G. Landes, Notice sur la Martinique (with full bibliography), (Paris, 1900) ; M. Dumoret, Au pays du Sucre (Paris, 1902) ; and on the eruption of 1902, A. Heilprin, Mont Pelee and the Tragedy of Martinique (Philadelphia and London, 1903) ; A. Lacroix, La Montagne Pelee et ses eruptions (Paris, 1904) ; and the report of Drs J. S. Flett and T. Anderson (November 20, 1902), who investigated the eruptions on behalf of the Royal Society; cf. T. Anderson, " Recent Volcanic Eruptions in the West Indies," in Geographical Journal, vol. xxi. (1903).

MARTINSBURG, a town and the county-seat of Berkeley county, West Virginia, U.S.A., about 74 m. W.N.W. of Washing- ton, D.C. Pop. (1890) 7226; (1900) 7564 (678 negroes); (1910) 10,698. It is served by the Baltimore & Ohio and the Cumberland Valley railways; the former has repair shops here. It lies in the Lower Shenandoah Valley at the foot of Little North mountain, in the midst of a fruit-growing region, peaches and apples being the principal crops. Slate and limestone also abound in the vicinity. The town has a fine Federal Building and a King's Daughters' hospital. There are grain elevators, and various manufactures, including hosiery, woollen goods, dressed lumber, &c. Martinsburg owns its waterworks, the supply being derived from a neighbouring spring. A town was laid out here a short time before the War of Independence and was named Martinstown in honour of Colonel Thomas Bryan Martin, a nephew of Thomas, Lord Fairfax (1692-1782); in 1778 it was incorporated under its present name. During the Civil War Martinsburg was occupied by several different Union and Confederate forces.

MARTINS FERRY, a city of Belmont county, Ohio, U.S.A., on the Ohio River, nearly opposite Wheeling, West Virginia. Pop. (1890), 6250; (1900), 7760, including 1033 foreign-born and 252 negroes; (1910), 9133. It is served by the Pennsylvania (Cleveland & Pittsburg Division), the Baltimore & Ohio, and the Wheeling & Lake Erie (Wabash System) railways, and by several steamboat lines. The city is situated on two plateaus; the lower is occupied chiefly by factories, the upper by dwellings. Coal mining and manufacturing are the principal industries; among factory products are iron, steel, tin, stoves, machinery and glassware. The

municipality owns and operates the water- works and an electric-lighting plant. A settlement was attempted here in 1785, but was abandoned on account of trouble with the Indians. In 1795 a town was laid out by Absalom Martin and was called Jefferson, but this, too, was abandoned, od

account of its not being made the county-seat. The town was laid out again in 1835 by Ebenezer Martin (son of Absalom Martin) and was called Martinsville; the present name was substituted a few years later. The Martins and other pioneers are buried in Walnut Grove Cemetery within the city limits. Martins Ferry was incorporated as a town in 1865 and chartered as a city in 1885.

MARTINUZZI, GEORGE [Gyorgy Utiesenovic] (1482-1551), Hungarian statesman, who, since he usually signed himself " Frater Georgius," is known in Hungarian history as Frater Gyorgy or simply The Frater, was born at Kamicic in Croatia, the son of Gregory Utiesenovic, a Croatian gentleman. His mother was a Martinuzzi, a Venetian patrician family. From his eighth to his twentieth year he was attached to the court of John Corvinus; subsequently, entering the service of the Zapolya family, he saw something of warfare under John Zapolya but, tiring of a military life, he entered the Paulician Order in his twenty-eighth year. His historical career began when his old patron Zapolya, now king of Hungary, forced to fly before his successful rival Ferdinand, afterwards the emperor Ferdinand I., sent him on a diplomatic mission to Hungary. It was due to his tact and ability that John recovered Buda (1529), and henceforth Frater Gyorgy became his treasurer and chief counsellor. In 1534 he became bishop of Grosswardein ; in 1538 he concluded with Austria the peace of Grosswardein, whereby the royal title and the greater part of Hungary were conceded to Zapolya. King John left the Frater the guardian of his infant son John Sigismund, who was proclaimed and crowned king of Hungary, the Frater acting as regent. He frustrated all the attempts of the queen mother, Isabella, to bring in the Austrians, and when, in 1541, an Austrian army appeared beneath the walls of Buda, he arrested the queen and applied to the Porte for help. On the 28th of August 1541, the Frater did homage to the sultan, but during his absence with the baby king in the Turkish camp, the grand vizier took Buda by subtlety. Then only the Frater recognized the necessity of a composition with both Austria and Turkey. He attained it by the treaty of Gyula (Dec. 29, 1541), whereby western Hungary fell to Ferdinand, while Transylvania, as an independent principality under Turkish suzerainty, reverted to John Sigismund. It

included, besides Transylvania proper, many Hungarian counties on both sides of the Theiss, and the important city of Kassa. It was the Frater's policy to preserve Transylvania neutral and intact by cultivating amicable relations with Austria without offending the Porte. It was a difficult policy, but succeeded brilliantly for a time. In 1545, encouraged by the growing unpopularity of Ferdinand, owing to his incapacity to defend Hungary against the Turks, the Frater was tempted to unite Austrian Hungary to Transylvania and procure the election of John Sigismund as the national king. But recognizing that this was impossible, he aimed at an alliance with Ferdinand on terms of relative equality, and to this system he adhered till his death. Queen Isabella, who hated the Frater and constantly opposed him, complained of him to the sultan, who commanded that either the traitor himself or his head should be sent to Constantinople (1550). A combination was then formed against him of the queen, the hospodars of Moldavia and Wallachia and the Turks; but the Frater shut the queen up in Gyula- Fehervar, drove the hospodars out of Transylvania, defeated the Turks at Deva, and finally compelled Isabella to accept a composition with Austria very profitable to her family and to Transylvania, at the same time soothing the rage of the sultan by flatteries and gifts. This compact, a masterpiece of statesmanship, was con- firmed by the diet of Kolozsvar in August 1551. The Frater retained the governorship of Transylvania, and was subsequently consecrated archbishop of Esztergom and received the red hat. Thus Hungary was once more reunited, but the inability of Ferdinand to defend it against the Turks, as promised, forced the Frater, for the common safety, to resume the payment of tribute to the Porte in December 1551. Unfortunately, the Turks no longer trusted a diplomatist they could not understand, while Ferdinand suspected him of an intention to secure Hungary

for himself. When the Turks (in 1551) took Csanad and other places, the Frater and the imperial generals Castaldo and Pallavicini combined their forces against the common foe; but when the Frater privately endeavoured to mediate between the Turks and the Hungarians, Castaldo represented him to Ferdinand as a traitor, and asked permission to kill him if necessary. The Frater's secretary Marco Aurelio Ferrari was hired, and stabbed his master from behind at the castle of Alvinczy while reading a letter, on the 18th of December 1551; but the cardinal, though in his sixty-ninth year, fought for his life, and was only despatched with the aid of Pallavicini and a band of bravos Ferdinand took the responsibility of the murder on himself He sent to Julius III. an accusation of treason against the Frater in eighty-seven articles, and after long hesitation, and hearing one hundred and sixteen witnesses, the pope exonerated Ferdinand of blame.

See A. Bechet, Histoire du ministere du cardinal Martinusius (Paris, 1 71

5); O. M. Utiesenovic, Lebensgeschichte des Cardinals Georg Vtiesenovit (Vienna, 1881); Codex epistolaris Fratris Georgii 1535-1551, ed. A. Karolyi (Budapest, 1881). But the most vivid presentation of Frater is to be found in M. Jokai's fine historical romance, Brother George (Hung.) (Budapest, 1893). (R. N. B.)

MARTIUS, CARL FRIEDRICH PHILIPP VON (1794-1868), German botanist and traveller, was born on the 17 th of April 1794 at Erlangen, where he graduated M.D. in 1814, publishing as his thesis a critical catalogue of plants in the botanic garden of the university. He afterwards devoted himself to botanical study, and in 1817 he and J. B. von Spix were sent to Brazil by the king of Bavaria. They travelled from Rio de Janeiro through several of the southern and eastern provinces of Brazil, and ascended the river Amazon to Tabatinga, as well as some of its larger affluents. On his return to Europe in 1820 he was appointed conservator of the botanic garden at Munich, and in 1826 professor of botany in the university there, and held both offices till 1864. He devoted his chief attention to the flora of Brazil, and in addition to numerous short papers he published the Nova Genera et Species Plantarum Brasiliensium (1823-1832, 3 vols.) and Icones selectae Plantarum Cryptogamicarum Brasil- iensium (1827), both works being finely illustrated. An account of his travels in Brazil appeared in 3 vols. 4to, 1823-1831, with an atlas of plates, but probably the work by which he is best known is his Historia Palmarum (1823-1850) in 3 large folio volumes, of which one describes the palms discovered by himself in Brazil. In 1840 he began the Flora Brasiliensis, with the assistance of the most distinguished European botanists, who undertook monographs of the various orders. Its publication was continued after his death under the editorship of A. W. Eichler (1830-1887) until 1887, and subsequently of Ignaz von Urban. He also edited several works on the zoological collec- tions made in Brazil by Spix, after the death of the latter in 1826. On the outbreak of potato disease in Europe he investi- gated it and published his observations in 1842. He also published works and short papers on the aborigines of Brazil, on their civil and social condition, on their past and probable future, on their diseases and medicines, and on the languages of the various tribes, especially the Tupi. He died at Munich on the 13th of December 1868.

MARTOS, CHRISTINO (1830-1893), Spanish politician, was born at Granada on the 13th of September 1830. He was educated there and at Madrid University, where his Radicalism soon got him into trouble, and he narrowly escaped being expelled for his share in student riots and other demonstrations against the governments of Queen Isabella. He distinguished himself as a journalist on El Tribuno. He joined O'Donnell and Espartero in 1854 against a revolutionary cabinet, and shortly afterwards turned against O'Donnell to assist the Democrats and Progressists under Prim,

Rivero, Castelar, and Sagasta in the unsuccessful movements of 1866, and was obliged to go abroad. His political career had not prevented Martos from rising into note at the bar, where he was successful for forty years. After remaining abroad three years, he returned to Spain to take his seat in the Cortes of 1869 after the revolution

of 1868. Throughout the revolutionary period he represented in cabinets with Prim, Serrano and Ruiz Zorilla, and lastly under King Amadeus, the advanced Radical tendencies of the men who wanted to give Spain a democratic monarchy. After the abdication of Amadeus of Savoy, Martos played a prominent part in the proclamation of the federal republic, in the struggle between the executive of that republic and the permanent committee of the Cortes, backed by the generals and militia, who nearly put an end to the executive and republic in April 1873. When the republicans triumphed Martos retired into exile, and soon afterwards into private life. He reappeared for a few months after General Pavia's coup d'etat in January 1874, to join a coalition cabinet formed by Marshal Serrano, with Sagasta and Ulloa. Martos returned to the Bar in May 1874, and quietly looked on when the restoration took place at the end of that year. He stuck to his democratic ideals for some years, even going to Biarritz in 1881 to be present at a republican congress presided over by Ruiz Zorilla. Shortly afterwards Martos joined the dynastic Left organized by Marshal Serrano, General Lopez Dominguez, and Moret, Becerra, Balaguer, and other quondam revolutionaries. He sat in several parliaments of the reign of Alphonso XII. and of the regency of Queen Christina, joined the dynastic Liberals under Sagasta, and gave Sagasta not a little trouble when the latter allowed him to preside over the House of Deputies. Having failed to form a rival party against Sagasta, Martos subsided into political insignificance, despite his great talent as an orator and debater, and died in Madrid on the 16th of January 1893.

MARTOS, a town of southern Spain, in the province of Jaen, 16 m. W.S.W. of Jaen, by the Jaen-Lucena railway. Pop. (1900), 17,078. Martos is situated on an outlying western peak of the Jabalcuz mountains, which is surmounted by a ruined castle and overlooks the plain of Andalusia. In the neighbour- hood are two sulphurous springs with bathing establishments. The local trade is almost exclusively agricultural.

Martos perhaps stands on or near the site of the Tucci of Ptolemy, which was fortified and renamed Colonia Augusta Gemella by the Romans. By Ferdinand III. it was taken from the Moors in 1225, and given to the

knights of Calatrava ; it was here that the brothers Carvajal, commanders of the order, were in 1312 executed by command of Ferdinand IV. Before their death they summoned Ferdinand to meet them within thirty days at the judgment-seat of God. Ferdinand died a month later and thus received the popular name of el Emplazado — " the Summoned."

MARTYN, HENRY (1781-1812), English missionary to India, was born on the 18th of February 1781, at Truro, Cornwall. His father, John Martyn, was a " captain " or mine-agent at Gwennap. The lad was educated at Truro grammar school under Dr Cardew, entered St John's College, Cambridge, in the autumn of 1797, and was senior wrangler and first Smith's prizeman in 1801. In 1802 he was chosen a fellow of his College. He had intended to go to the bar, but in the October term of 1802 he chanced to hear Charles Simeon speaking of the good done in India by a single missionary, William Carey, and some time afterwards he read the life of David Brainerd, the apostle of the Indians of North America. He resolved, accordingly, to become a Christian missionary. On the 22nd of October, 1803, he was ordained deacon at Ely, and afterwards priest, and served as Simeon's curate at the church of Holy Trinity, taking charge of the neighbouring parish of Lolworth. He was about to offer his services to the Church Missionary Society, when a disaster in Cornwall deprived him and his unmarried sister of the provision their father had made for them, and rendered it necessary that he should obtain a salary that would support her as well as himself. He accordingly obtained a chaplaincy under the East India Company and left for India on the 5th of July 1805. For some months he was stationed at Aldeen, near Serampur; in October 1806 he proceeded to Dinapur, where he was soon able to conduct worship among the natives in the vernacular, and established schools. In April 1809 he was transferred to Cawnpore, where he preached in his own compound, in spite of interruptions and threats. He occupied himself in linguistic study, and had already, during his residence at Dinapur, been

engaged in revising the sheets of his Hindostani version of the New Testament. He now translated the whole of the New Testament into Hindi also, and into Persian twice. He trans- lated the Psalms into Persian, the Gospels into Judaeo-Persic, and the Prayer-book into Hindostani, in spite of ill-health and " the pride, pedantry and fury of his chief munshi Sabat." Ordered by the doctors to take a sea voyage, he obtained leave to go to Persia and correct his Persian New Testament, whence he wished to go to Arabia, and there compose an Arabic version. Accordingly, on the 1st of October 1810, having seen his work at Cawnpore crowned on the previous day by the opening of a church, he left for Calcutta, whence he sailed on the 7th of January 181 1, for Bombay, which he reached on his thirtieth birthday. From Bombay he set out for Bushire, bearing letters from Sir John Malcolm to men of position there, as also at Shiraz and Isfahan.

After an exhausting journey from the coast he reached Shiraz, and was soon plunged into discussion with the disputants of all classes, " Sufi, Mahommedan, Jew, and Jewish- Mahommedan, even Armenian, all anxious to test their powers of argument with the first English priest who had visited them." Having made an unsuccessful journey to Tabriz to present the shah with his translation of the New Testament, he was seized with fever, and after a temporary recovery, had to seek a change of climate. On the 12th of September 1812, he started with two Armenian servants, crossed the Araxes, rode from Tabriz to Erivan, from Erivan to Kars, from Kars to Erzerum,. from Erzerum to Chiflik, urged on from place to place by a thoughtless Tatar guide, and, though the plague was raging at Tokat (near Eski-Shehr in Asia Minor), he was compelled by prostration to stop there. On the 6th of October he died. Macaulay's youthful lines, written early in 1813, testify to the impression made by his career.

His Journals and Letters were published by Samuel Wilberforce in 1837. See also Lives by John Sargent (1819; new ed. 1885), and G. Smith (1892) ; and The Church Quarterly Review (Oct. 1881).

MARTYN, JOHN (1699-1768), English botanist, was born in London on the 12 th of September 1699. Originally intended for a business career, he abandoned it in favour of medical and botanical studies. He was one of the founders (with J. J. Dillen and others) and the secretary of a botanical society which met for a few years in the Rainbow Coffee-house, Watling Street ; he also started the Grub Street Journal, a weekly satirical review, which lasted from 1730 to 1737. In 1732 he was appointed professor of botany in Cambridge University, but, finding little encourage- ment and hampered by lack of appliances, he soon discontinued lecturing. He retained his professorship, however, till 1762, when he resigned in favour of his son Thomas (1735-1825), author of Flora rustica (1792-1794). Although he had not taken a medical degree, he long practised as a physician at Chelsea, where he died on the 29th of January 1768. His reputation chiefly rests upon his Historia plantarum rariorum (1728-1737), and his translation, with valuable agricultural. and botanical notes, of the Eclogues (1749) and Georgics (1741) of Virgil. On resigning the botanical chair at Cambridge he pre- sented the university with a number of his botanical specimens and books.

See memoir by Thomas Martyn in Memoirs of John Martyn ana Thomas Martyn, by G. C. Gorham (1830).

MARTYR (Gr. fiaprvp or naprvs), a word meaning literally " witness " and often used in that sense in the New Testament e.g. Matt, xviii. 16; Mark xiv. 63. During the conflict between Paganism and Christianity when many Christians " testified " to the truth of their convictions by sacrificing their

lives, the word assumed its modern technical sense. The beginnings of this use are to be seen in such passages as Acts xxii. 20; Rev. ii. 13, xiii. 6. During the first three centuries the fortitude of these " witnesses " won the admiration of their brethren. Ardent spirits craved the martyr's crown, and to confess Christ in persecution was to attain a glory inferior only to that won by those who actually died. Confessors were visited in prison, martyrs' graves were scenes of pilgrimage, and the day on which

they suffered was celebrated as the birthday of their glory. Martyrology was the most popular literature in the early Church. While the honour paid to martyrdom was a grea.t support to early champions of the faith, it was attended by serious evils. It was thought that martyrdom would atone for sin, and imprisoned confessors not only issued to the Churches commands which were regarded almost as inspired utterances, but granted pardons in rash profusion to those who had been excommunicated by the regular clergy, a practice which caused Cyprian and his fellow bishops much difficulty. The zeal of Ignatius (c. 115), who begs the Roman Church to do nothing to avert from him the martyr's death, was natural enough in a spiritual knight-errant, but with others in later days, especially in Phrygia and North Africa, the passion became artificial. Fanatics sought death by insulting the magistrates or by breaking idols, and in their enthusiasm for martyrdom became self-centred and forgetful of their normal duty. None the less it is true that these men and women endured torments, often unthinkable in their cruelty, and death rather than abandon their faith. The same phenomena have been witnessed, not only in the conflicts within the Church that marked the 13th to the 16th centuries, but in the different mission fields, and particularly in Madagascar and China.

See A. J. Mason, The Historic Martyrs of the Primitive Church (London, 1905) ; H. B. Workman, Persecution in the Early Church (London, 1906); Paul Allard, Ten Lectures on the Martyrs (London, !9°7) I John Foxe, The Book of Martyrs; Mary I. Bryson, Cross and Crown (London, 1904).

MARTYROLOGY, a catalogue or list of martyrs, or, more exactly, of saints, arranged in the order of their anniversaries. This is the now accepted meaning in the Latin Church. In the Greek Church the nearest equivalent to the martyrology is the Synaxarium (q.v.). As regards form, we should distinguish between simple martyrologies, which consist merely of an enumeration of names, and historical martyrologies, which also include stories or biographical details. As regards documents, the most important distinction is between local and general martyrologies. The

former give a list of the festivals of some particular Church; the latter are the result of a combination of several local martyrologies. We may add certain compilations of a factitious character, to which the name of martyrology is given by analogy, e.g. the Martyrologe universel of Chatelain (1709). As types of local martyrologies we may quote that of Rome, formed from the Depositio martyrum and the Depositio episcoporum of the chronograph of 354; the Gothic calendar of Ulfila's Bible, the calendar of Carthage published by Mabillon, the calendar of fasts and vigils of the Church of Tours, going back as far as Bishop Perpetuus (d. 490), and preserved in the Historia francorum (xi. 31) of Gregory of Tours. The Syriac martyrology discovered by Wright (Journal of Sacred Literature, 1866) gives the idea of a general martyrology. The most important ancient martyrology preserved to the present day is the compilation falsely attributed to St Jerome, which in its present form goes back to the end of the 6th century. It is the result of the combination of a general martyrology of the Eastern Churches, a local martyrology of the Church of Rome, some general martyrologies of Italy and Africa, and a series of local martyrologies of Gaul. The task of critics is to distinguish between its various constituent elements. Unfortunately, this document has reached us in a lamentable condition. The proper names are distorted, repeated or misplaced, and in many places the text is so corrupt that it is impossible to understand it. With the exception of a few traces of borrowings from the Passions of the martyrs, the compilation is in the form of a simple martyrology. Of the best-known historical martyrologies the oldest are those which go under the name of Bede and of Florus (Acta sanctorum Martii, vol. ii.); of Wandelbert, a monk of Priim (842); of Rhabanus Maurus (c. 845); of Ado (d. 875); of Notker (896); and of Wolfhard (c. 896 v. Analecta bollandiana, xvii. n). The most famous is that of Usuard

(c. 875), on which the Roman martyrology was based. The first edition of the Roman martyrology appeared at Rome in 1583. The third edition, which appeared in 1584, was approved by

Gregory XIII., who imposed the Roman martyrology upon the whole Church. In 1586 Baronius published his annotated edition, which in spite of its omissions and inaccuracies is a mine of valuable information.

The chief works on the martyrologies are those of Rosweyde, who in 161 3 published at Antwerp the martyrology of Ado (also edition of Giorgi, Rome, 1745); of Sollerius, to whom we owe a learned edition of Usuard (Acta sanctorum Junii, vols. vi. and vii.) ; and of Fiorentini, who published in 1688 an annotated edition of the Martyr- ology of St Jerome. The critical edition of the latter by J. B. de Rossi and Mgr. L. Duchesne, was published in 1894, in vol. ii. of the Acta sanctorum Novembris. The

historical martyrologies taken as a whole have been studied by Dom Quentin (1908). There are also numerous editions of calendars or martyrologies of less universal interest, and commentaries upon them. Mention ought to be made of the famous calendar of Naples, commented on by Mazocchi (Naples, 1744) and Sabbatini (Naples, 1744).

See C. de Smedt, Introductio generalis ad historiam ecclesiasticam (Gandavi, 1876), pp. 127-156; H. Matagne and V. de Buck in De Backer, Bibliotheque des ecrivains de la Compagnie de Jesus, 2nd ed., vol. iii. pp. 369-387 ; De Rossi-Duchesne, Les Sources du martyrologe hieronymien (Rome, 1885); H. Achelis, Die Martyr ologien, ihre Geschichte und ihr Wert (Berlin, 1900) ; H. Delehaye, " Le Temoignage des martyrologes," in Analecta bollandiana, xxvi. 78-99 (1907); H. Quentin, Les Martyrologes historiques du moyen age (Paris, T908). (H. De.)

MARULLUS, MICHAEL TARCHANIOTA (d. 1500), Greek scholar, poet, and soldier, was born at Constantinople. In i453> when the Turks captured Constantinople, he was taken to Ancona in Italy, where he became the friend and pupil of J. J. Pontanus, with whom his name is associated by Ariosto (Orl. Fur. xxxvii. 8). He received his education at Florence, where he obtained the patronage of Lorenzo de' Medici. He was the author of epigrams and hymni naturales, in which he happily imitated Lucretius. He took no part in the work of translation, then the favourite exercise of scholars, but he was understood to be planning some great work when he was drowned, on the 10th of April 1500, in the river Cecina near Volterra. He was a bitter enemy of Politian, whose successful rival he had been in the affections of the beautiful and learned Alessandra Scala. He is remembered chiefly for the brilliant emendations on Lucretius which he left unpublished; these were used for the Juntine edition (Munro's Lucretius, Introduction).

The hymns, some of the epigrams, and a fragment, De Principum institutione, were reprinted in Paris by C. M. Sathas in Docu- ments inedits relatifs a Vhistoire de la Grece au moyen age, vol. vii.

(1888).

MARUM, MARTIN VAN (1750-1837), Dutch man of science, was born on the 20th of March 1750 at Groningen, where he graduated in medicine and philosophy. He began to practise medicine at Haarlem, but devoted himself mainly to lecturing on physical subjects. He became secretary of the scientific society of that city, and under his management the society was advanced to the position of one of the most noted in Europe. He was also entrusted with the care of the collection left to Haarlem by P. Teyler van der Hulst (1702-1778). His name is not associated with any discovery of

the first order, but his researches (especially in connexion with electricity) were remark- able for their number and variety. He died at Haarlem on the 26th of December 1837.

MARUTS, in Hindu mythology, storm-gods. Their numbers vary in the different scriptures, usually thrice seven or thrice sixty. In the Vedas they are called the sons of Rudra. They are the companions of Indra, and associated with him in the wielding of thunderbolts, sometimes as his equals, sometimes as his servants. They are armed with golden weapons and lightnings. They split drought (Vritra) and bring rain, and cause earthquakes. Various myths surround their birth. A derivative word, Maruti or Maroti, is the popular name through- out the Deccan for Hanuman (q.v.).

MARVELL, ANDREW (1621-1678), English poet and satirist, son of Andrew Marvell and his wife Anne Pease, was born at the rectory house, Winestead, in the Holderness division of York- shire, on the 31st of March 1621. In 1624 his father exchanged the living of Winestead for the mastership of Hull grammar I school. He also became lecturer at Holy Trinity Church and

master of the Charterhouse in the same town. Thomas Fuller (Worthies of England, ed. 1811, i. 165) describes him as " a most excellent preacher." The younger Marvell was educated at Hull grammar school until his thirteenth year, when he matricu- lated on the 14th of December 1633 (according to a doubtful statement in Wood's Athen. oxon.) at Trinity College, Cambridge. It is related by his early biographer, Thomas Cooke, that he was induced by some Jesuit priests to leave the university. After some months he was discovered by his father in a bookseller's shop in London, and returned to Cambridge. 1 He contributed two poems to the Musa cantabrigiensis in 1637, and in the following year he received a scholarship at Trinity College, and took his B.A. degree in 1639. His father was drowned in 1640 while crossing the Humber in company with the daughter of a Mrs Skinner, almost certainly connected with the Cyriack Skinner to whom two of Milton's sonnets are addressed. It is said that Mrs Skinner adopted Marvell and provided for him at her death. The Conclusion Book of Trinity College, Cambridge, registers the decision (Sept. 24, 1641) that he with others should be excluded from further advantages from the college either because they were married, or did not attend their " days " or " acts." He travelled for four years on the Continent, visiting Holland, France, Italy and Spain. In Rome he met Richard Flecknoe, whom

he satirized in the amusing verses on " Flecnoe, an English priest at Rome."

Although Marvell ranks as a great Puritan poet his sympathies were at first with Charles L, and in the lines on " Tom May's Death " he found no words too strong to express his scorn for the historian of the Long Parliament. He himself was no partisan, but had a passion for law and order. He acquiesced, accordingly, in the strong rule of Cromwell, but in his famous " Horatian Ode upon Cromwell's Return from Ireland" (1650) 2 he inserts a tribute to the courage and dignity of Charles I., which forms the best-known section of the poem. In 1650 he became tutor to Lord Fairfax's daughter Mary, afterwards duchess of Bucking- ham, then in her twelfth year. During his life with the Fair- faxes at Nunappleton, Yorkshire, he wrote the poems " Upon the Hill and Grove at Billborow " and " On Appleton House." Doubtless the other poems on country life, and his exquisite " garden poetry " may be referred to this period. " Clorinda and Damon " and " The Nymph complaining for the Death of her Faun " are good examples of the beauty and simplicity of much of this early verse. But he had affinities with John Donne and the metaphysical poets, and could be obscure on occasion.

Marvell was acquainted with Milton probably through their common friends, the Skinners, and in February 1653 Milton sent him with a letter to the lord president of the council, John Bradshaw, recommending him as " a man of singular desert for the state to make use of," and suggesting his appointment as assistant to himself in his duties as foreign secretary. The appointment was, however, given at the time to Philip Meadows, and Marvell became tutor to Cromwell's ward, William Dutton. In 1653 he was established with his pupil at Eton in the house of John Oxenbridge, then a fellow of the college, but formerly a minister in the Bermudas. No doubt the well-known verses, " Bermudas," were inspired by intercourse with the Oxenbridges. At Eton he enjoyed the society of John Hales, then living in retirement. He was employed by Milton in 1654 to convey to Bradshaw a copy of the Defensio secunda, and the letter to Milton in which he describes the reception of the gift is preserved. When the secretaryship again fell vacant in 1657 Marvell was appointed, and retained the appointment until the accession of Charles II. During this period he wrote many political poems,

1 There is an allusion to this escapade addressed by another anxious parent to the elder Marvell in the Hull Corporation Records (No. 498) [see Grosart, i. xxviii.]. The document is without address or signature, but the identification seems safe.

2 This poem has been highly praised by Goldwin Smith (T. H. Ward's English Poets, ii. 383 (1880)). It was first printed, so far as we know, in

1776, and the only external testimony to Marvell's authorship is the statement of Captain Thompson, who had included many poems by other writers in his edition of Marvell, that this ode was in poet's own handwriting. The internal evidence in favour of Marvell may, however, be accepted as conclusive.

all of them displaying admiration for Cromwell. His " Poem upon the Death of his late Highness the Lord Protector " has been unfavourably compared to Edmund Waller's" Panegyric," but Marvell's poem is inspired with affection.

Marvell's connexion with Hull had been strengthened by the marriages of his sisters with persons of local importance, and in January 1659 he was elected to represent the borough in parlia- ment. He was re-elected in 1660, again in 1661, and continued to represent the town until his death. According to Milton's nephew, Edward Phillips, the poet owed his safety at the Restoration largely to the efforts of Marvell, who " made a considerable party for him " in the House of Commons. From 1663 to 1665 he acted as secretary to Charles Howard, 1st earl of Carlisle, on his difficult and unsuccessful embassy to Muscovy, Sweden, and Denmark; and this is the only official post he filled during the reign of Charles. With the exception of this absence, for which he had leave from his constituents, and of shorter intervals of travel on private business which took him to Holland, Marvell was constant in his parliamentary attendance to the day of his death. He seldom spoke in the House, but his parliamentary influence is established by other evidence. He was an excellent man of affairs, and looked after the special interests of the port of Hull. He was a member of the corporation of Trinity House, both in London and Hull, and became a younger warden of the London Trinity House. His correspondence with his con- stituents, from 1660 to 1678, some 400 letters in all, printed by Dr Grosart (Complete Works, vol. ii.), forms a source of informa- tion all the more valuable because by a resolution passed at the Restoration the publication of the proceedings of the House without leave was forbidden. He made it a point of duty to write at each post — that is, every two or three days — both on local interests and on all matters of public interest. The discreet reserve of these letters, natural at a time when the post office was a favourite source of information to the government, contrasts curiously with the freedom of the few private letters which state opinions as well as facts. Marvell's constituents, in their turn, were not unmindful of their member. He makes frequent references to their presents, usually of Hull ale and of salmon, and he regularly drew from them the wages of a member, six-and-eightpence a day during session.

The development of Marvell's political opinions rnay be traced in the satirical verse he published during the reign of Charles II., and in his

private letters. With all his admiration for Cromwell he had retained his sympathies with the royal house, and had loyally accepted the Restoration. In 1667 the Dutch fleet sailed up the Thames, and Marvell expressed his wrath at the gross mismanagement of public affairs in " Last Instructions to a Painter," a satire which was published as a broadside and of course remained anonymous. Edmund Waller had published in 1665 a gratulatory poem on the duke of York's victory in that year over the Dutch as " Instructions to a Painter for the drawing up and posture of his Majesty's forces at sea. . ." A similar form was adopted in Sir John Denham's four satirical " Directions to a Painter," and Marvell writes on the same model. His indigna- tion was well grounded, but he had no scruples in the choice of the weapons he employed in his warfare against the corruption of the court, which he paints even blacker than do contemporary memoir writers; and his satire often descends to the level of the lampoon. The most inexcusable of his scandalous verses are perhaps those on the duchess of York. In the same year he attacked Lord Clarendon, evidently hoping that with the removal of the " betrayer of England and Flanders " matters would improve. But in 1672 when he wrote his " Poem on the Statue in the Stocks-Market" he had no illusions left about Charles, whom he describes as too often " purchased and sold," though he concludes with " Yet we'd rather have him than his bigoted brother." " An Historical Poem," " Advice to a Painter," and " Britannia and Raleigh " urge the same advice in grave language. In the last-named poem, probably written early in 1674, Raleigh pleads that " 'tis god-like good to save a fallen king," but Britannia has at length decided that the tyrant canriot be divided from the Stuart, and proposes to reform the state

on the republican model of Venice. These and other equally- bold satires were probably handed round in MS., or secretly printed, and it was not until after the Revolution that they were collected with those of other writers in Poems on Affairs of State (3 pts., 1689; 4 pts., 1703-1707). Marvell's controversial prose writings are wittier than his verse satires, and are free from the scurrility which defaces the " Last Instructions to a Painter." A short and brilliant example of his irony is " His Majesty's Most Gracious Speech to both Houses of Parliament "(printed in Grosart, ii. 431 seq.),in which Charles is made to take the house into the friendliest confidence on his domestic affairs.

Marvell was among the masters of Jonathan Swift, who, in the " Apology " prefixed to the Tale of a Tub, wrote that his answer to Samuel Parker could be still read with pleasure, although the pamphlets that provoked it

were long since forgotten. Parker had written a Discourse of Ecclesiastical Politye (1670) and other polemics against Dissenters, to which Marvell replied in The Rehearsal Transposed (2 pts., 1672 and 1673). The book contains some passages of dignified eloquence, and some coarse vituperation, but the prevailing tone is that of grave and ironical banter of Parker as " Mr Bayes." Parker was attacked, says Bishop Burnet (Hist, of His Own Time, ed. 1823, i. 451), " by the liveliest droll of the age, who writ in a burlesque strain, but with so peculiar and entertaining a conduct, that, from the king down to the tradesman, his books were read with great pleasure." He certainly humbled Parker, but whether this effect extended, as Burnet asserts, to the whole party, is doubtful. Parker had intimated that Milton had a share in the first part of Marvell's reply. This Marvell emphatically denied (Grosart, iii. 498). He points out that Parker had, like Milton, profited by the royal clemency, and that he had first met him at Milton's house. He takes the opportunity to praise Milton's " great learning and sharpness of wit," and to the second edition of Paradise Lost (1674) he contributed some verses of just and eloquent praise.

His Mr Smirke, or the Divine in Mode . . . (1676) was a defence of Herbert Croft, bishop of Hereford, against the criticisms of Dr Francis Turner, master of St John's College, Cambridge. A far more important work was An Account of the Growth of Popery and Arbitrary Government in England, more particularly from the Long Prorogation of Parliament . . . (1677). This pamphlet was written in the same outspoken tone as the verse satires, and brought against the court the indictment of nursing designs to establish absolute monarchy and the Roman Catholic religion at the same time. A reward was offered for the author, whose identity was evidently suspected, and it is said that Marvell was in danger of assassination. He died on the 16th of August 1678 in consequence of an overdose of an opiate taken during an attack of ague. He was buried in the church of St Giles-in-the Fields, London. Joint administration of his estate was granted to one of his creditors, and to his widow, Mary Marvell, of whom we have no previous mention.

As a humorist, and as a great " parliament man," no name is of more interest to a student of the reign of Charles II. than that of Marvell. He had friends among the republican thinkers of the times. Aubrey says that he was intimate with James Harrington, the author of Oceana, and he was probably a member of the " Rota " club. In the heyday of political infamy, he, a needy man, obliged to accept wages from his constituents, kept his political virtue unspotted, and he stood throughout his career as the champion of moderate and tolerant measures. There is a story that his old schoolfellow, Danby, was sent by the king to offer the incorruptible poet a place at court and a gift of £1000, which Marvell refused with the words: " I live here to serve my constituents: the ministry may seek men for their

purpose; I am not one." When self-indulgence was the ordinary habit of town life, Marvell was a temperate man. His personal appearance is described by John Aubrey: " He was of a middling stature, pretty strong set, roundish faced, cherry cheeked, hazel eyed, brown haired. In his conversation he was modest and of very few words."' (" Lives of Eminent Persons," printed in Letters . . . .in the 17th and 18th Centuries, 1813).

Among Marvell's works is also a Defence of John Howe on God's Prescience . . . (1678), and among the spurious works fathered on him are: A Seasonable Argument . . . for a new Parliament (1677), A Seasonable Question and a Useful Answer . . . (1676), A Letter from a Parliament Man . . . (1675), and a translation of Suetonius (1672). Marvell's satires were no doubt first printed as broadsides, but very few are still extant in that form. Such of his poems as were printed during his lifetime appeared in collections of other men's works. The earliest edition of his non-political verse is Miscellaneous Poems (1681), edited by his wife, Mary Marvell. The political satires were printed as A Collection of Poems on Affairs of

State, by A M /, Esq. and other Eminent Wits (1689), with

second and third parts in the same year. The works of Andrew Marvell contained in these two publications were also edited by Thomas Cooke (2 vols., 1726), who added some letters. Cooke's edition was reprinted by Thomas Davies in 1772. Marvell's next editor was Captain Thompson of Hull, who was connected with the poet's family, and made further additions from a commonplace book since lost. Other editions followed, but were superseded by Dr A. B. Grosart's laborious work, which, in spite of many defects of style, remains indispensable to the student. The Complete Works in Verse and Prose of Andrew Marvell, M.P. (4 vols., 1872-1875) forms part of his " Fuller Worthies Library." See also the admirable edition of the Poems and Satires of Andrew Marvell. . . (2 vols., 1892) in the " Muses' Library," where a full bibliography of his wor.ks and of the commentaries on them is provided; also The Poems and some Satires of Andrew Marvell (ed. Edward Wright, 1904), and Andrew Marvell (1905), by Augustine Birrell in the " English Men of Letters " series. .

MARX, HEINRICH KARL (1818-1883), German socialist, and head of the International Working Men's Association, was born on the 5th of May 1818 in Treves (Rhenish Prussia). His father, a Jewish lawyer, in 1824 went over to Christianity, and he and his whole family were baptized as Christian Protestants. The son went to the high grammar school at Treves, and from 1835 to the universities of Bonn and Berlin. He studied first law, then history and philosophy, and in 1841 took the degree of doctor of philosophy. In Berlin he had close intimacy with the most prominent representatives of the young Hegelians — the brothers Bruno and Edgar

Bauer and their circle, the so-called " Freien." He at first intended to settle as a lecturer at Bonn University, but his Radical views made a university career out of the question, and he accepted work on a Radical paper, the Rheinische Zeitung, which expounded the ideas of the most advanced section of the Rhenish Radical bourgeoisie. In October 1842 he became one of the editors of this paper, which, however, after an incessant struggle with press censors, was suppressed in the beginning of 1843. In the summer of this year Marx married Jenny von Westphalen, the daughter of a high govern- ment official. Through her mother Jenny von Westphalen was a lineal descendant of the earl of Argyle, who was beheaded under James II. She was a most faithful companion to Marx during all the vicissitudes of his career, and died on the 2nd of December 1 881; he outliving her only fifteen months.

Already in the Rheinische Zeitung some socialist voices had been audible, couched in a somewhat philosophical strain. Marx, though not accepting these views, refused to criticize them until he had studied the question thoroughly. For this purpose he went in the autumn of 1843 to Paris, where the socialist movement was then at its intellectual zenith, and where he, together with Arnold Ruge, the well-known literary leader of Radical Hegelianism, was to edit a review, the Deutsch-franzo- sische Jahrbucher, of which, however, only one number appeared. It contained two articles by Marx — a criticism of Bruno Bauer's treatment of the Jewish question, and an introduction to a criticism of Hegel's philosophy of the law. The first concluded that the social emancipation of the Jews could only be achieved together with the emancipation of society from Judaism, i.e. commercialism. The second declared that in Germany no partial political emancipation was possible; there was now only one class from which a real and reckless fight against authority was to be expected — namely, the proletariate. But the proletariate could not emancipate itself except by breaking all the chains, by dissolving the whole constituted society, by recreating man as a member of the human society in the place of established states and classes. "Then the day of German resurrection will be announced by the crowing of the Gallican cock." Both

articles thus relegated the solution of the questions then promi- nent in Germany to the advent of socialism, and so far resembled in principle other socialist publications of the time. But the way of reasoning was different, and the final words of the last quoted sentence pointed to a political revolution, to begin in France as soon as the industrial evolution had created a sufficiently strong proletariate. In contradistinc- tion to most of

the socialists of the day, Marx laid stress upon the political struggle as the lever of social emancipa- tion. In some letters which formed part of a correspondence between Marx, Ruge, Ludwig Feuerbach, and Mikhail Bakunin, published as an introduction to the review, this opposition of Marx to socialistic " dogmatism " was enunciated in a still more pronounced form: " Nothing prevents us," he said, " from combining our criticism with the criticism of politics, from participating in politics, and consequently in real struggles. We will not, then, oppose the world like doctrinarians with a new principle: here is truth, kneel down here! We expose new prin- ciples to the world out of the principles of the world itself. We don't tell it: ' Give up your struggles, they are rubbish, we will show you the true war-cry.' We explain to it only the real object for which it struggles, and consciousness is a thing it must acquire even if it objects to it."

In Paris Marx met Friedrich Engels (1820-1895), from whom the Deutsch-franzosische Jahrbilcher had two articles — a power- fully written outline of a criticism of political economy, and a letter on Carlyle's Past and Present. Engels, the son of a wealthy cotton-spinner, was born in 1820 at Barmen. Although destined by his father for a commercial career, he attended a classical school, and during his apprenticeship and whilst undergoing in Berlin his one year's military service, he had given up part of his free hours to philosophical studies. In Berlin he had frequented the' society of the " Freien," and had written letters to the Rheinische Zeitung. In 1842 he had gone to England, his father's firm having a factory near Manchester, and had entered into con- nexion with the Owenite and Chartist movements, as well as with German communists. He contributed to Owen's New Moral World and to the Chartist Northern Star, gave up much of his abstract speculative reasoning for a more positivist conception of things, and took to economic studies. Now, in September 1844, on a short stay in Paris, he visited Marx, and the two found that in regard to all theoretical points there was perfect agreement between them. From that visit dates the close friendship and uninterrupted collaboration and exchange of ideas which lasted during their lives, so that even some of Marx's subsequent works, which he published under his own name, are more or less also the work of Engels. The first result of their collaboration was the book Die heilige Familie oder Kritik der kritischen Kritik, gegen Bruno Bauer und Konsorten, a scathing exposition of the per- verseness of the high-sounding speculative radicalism of Bauer and the other Berlin " Freie." By aid of an analysis, which, though not free from exaggeration and a certain diffuseness, bears testimony to the great learning of Marx and the vigorous discerning faculty of both the authors, it is shown that the supposed superior criticism — the " critical criticism " of the Bauer school, based upon the doctrine of a " self-conscious " idea, represented by or

incarnated in the critic — was in fact inferior to the older Hegelian idealism. The socialist and working-class movements in Great Britain, France and Germany are defended against the superior criticism of the " holy " Bauer family.

In Paris, where he had very intimate intercourse with Heinrich Heine, who always speaks of him with the greatest respect, and some of whose poems were suggested by Marx, the latter contributed to a Radical magazine, the Vorwarts; but in conse- quence of a request by the Prussian government, nearly the whole staff of the magazine soon got orders to leave France. Marx now went to Brussels, where he shortly afterwards was joined by Engels. In Brussels he published his second great work, La Misere de la philosophic, a sharp rejoinder to the Philosophie de la misere ou contradictions iconomiqu-s of J. P. Proudhon. In this he deals with Proudhon, whom in the former work he had

defended against the Bauers, not less severely than with the latter. It is shown that in many points Proudhon is inferior to both the middle-class economists and the socialists, that his somewhat noisily proclaimed discoveries in regard to political economy were made long before by English socialists, and that his main remedies, the " constitution of the labour-value " and the establishment of exchange bazaars, were but a repetition of what English socialists had already worked out much more thoroughly and more consistently. Altogether the book shows remarkable knowledge of political economy. In justice to Proudhon, it must be added that it is more often his mode of speaking than the thought underlying the attacked sentences that is hit by Marx's criticism. In Brussels Marx and Engels also wrote a number of essays, wherein they criticized the German literary representatives of that kind of socialism and philosophic radicalism which was mainly influenced by the writings of Ludwig Feuerbach, and deduced its theorems or postulates from speculations on the " nature of man." They mockingly nicknamed this kind of socialism " German or True Socialism," and ridiculed the idea that by disregarding historical and class distinctions a conception of society and socialism superior to that of the English and French workers and theorists could be obtained. Some of these essays were published at the time, two or three, curiously enough, by one of the attacked writers in his own magazine; one, a criticism of Feuerbach himself, was in a modified form published by Engels in 1885, but others have remained in manuscript. They were at first intended for publication in two volumes as a criticism of post-Hegelian German philosophy, but the Revolution of 1848 postponed for a time all interest in theoretical discussions.

In Brussels Marx and Engels came into still closer contact with the socialist working-class movement. They founded a German workers' society,

acquired a local German weekly, the Brusseller deutsche Zeitung, and finally joined a communistic society of German workers, the " League of the Just," a secret society which had its main branches in London, Paris, Brussels and several Swiss towns. For this league, which till then had adhered to the rough-and-ready communism of the gifted German workman Wilhelm Weitling, but which now called itself " League of the Communists," and gave up its leanings towards conspiracy and became an educational and propagandistic body, Marx and Engels at the end of 1847 wrote their famous pamphlet, Manifest der Kommunisten. It was a concise exposition of the history of the working-class movement in modern society according to their views, to which was added a critical survey of the existing socialist and communist literature, and an explanation of the attitude of the Communists towards the advanced opposition parties in the different countries. Scarcely was the manifesto printed when, in February 1848, the Revolution broke out in France, and " the crowing of the Gallican cock" gave the signal for an upheaval in Germany such as Marx had prophesied. After a short stay in France, Marx and Engels went to Cologne in May 1848, and there with some friends they founded the Neue rheinische Zeitung, with the sub-title " An Organ of Democracy," a political daily paper on a large scale, of which Marx was the chief editor. They took a frankly revolutionary attitude, and directed their criticism to a great extent against the middle-class democratic parties, who, by evading all decisive issues, delayed the achievement of the upheaval. When in November 1848 the king of Prussia dissolved the National Assembly, Marx and his friends advocated the non-payment of taxes and the organization of armed resistance. Then the state of siege was declared in Cologne, the Neue rheinische Zeitung was suspended, and Marx was put on trial for high treason. He was unanimously acquitted by a middle-class jury, but in May 1840 he was expelled from Prussian territory. He went to Paris, but was soon given the option of either leaving France or settling at a small provincial place. He preferred the former, and went to England. He settled in London, and remained there for the rest of his life.

At first he tried to reorganize the Communist League; but soon a conflict broke out in its ranks, and after some of its members had been tried in Germany and condemned for high

treason, Marx, who had done everything to save the accused, dissolved the Communist League altogether. Nor was a literary enterprise, a review, also called the Neue rheinische Zeilung, more successful ; only six numbers of it were issued. It contained, however, some very remarkable contributions;

and a series of articles on the career of the French Revolution of 1848, which first appeared there, was in 1895 published by Engels in book form under the title of Die Klassenkampfe in Frankreich von 1848 " by Karl Marx." Carlyle's Latter Day Pamphlets, pub- lished at that time, met with a very vehement criticism in the Neue rheinische Zeitung. The endeavours of Ernest Jones and others to revive the Chartist movement were heartily supported by Marx, who contributed to several of the Chartist journals of the period, mostly, if not wholly, without getting or asking pay- ment. He lived at this time in great financial straits, occupied a few small rooms in Dean Street, Soho, and all his children then born died very young. At length he was invited to write letters for the New York Tribune, whose staff consisted of advanced democrats and socialists of the Fourierist school. For these letters he was paid at the rate of a guinea each. Part of them, dealing with the Eastern Question and the Crimean War, were republished in 1897 (London, Sonnenschein). Some were even at the time reprinted in pamphlet form. The co-operation of Marx, who was determinedly anti- Russian, since Russia was the leading reactionary power in Europe, was obtained by David Urquhart and his followers. A number of Marx's articles were issued as pamphlets by the Urquhartite committees, and Marx wrote a series of articles on the diplomatic history of the 18th century for the Urqu- hartite Free Press (Sheffield and London, 1856-1857). When in 1859 the Franco-Austrian War about Italy broke out, Marx denounced it as a Franco-Russian intrigue, directed against Germany on the one hand and the revolutionary movement in France on the other. He opposed those democrats who sup- ported a war which in their eyes aimed at the independence of the Italian nation and promised to weaken Austria, whose superiority in Germany was the hindrance to German unity. Violent derogatory remarks directed against him by the well- known naturalist Karl Vogt gave occasion to a not less violent rejoinder, Herr Vogt, a book full of interesting material for the student of modern history. Marx's contention, that Vogt acted as an agent of the Bonapartist clique, seems to have been well founded, whilst it must be an open question how far Vogt acted from dishonourable motives. The discussions raised by the war also resulted in a great estrangement between Marx and Ferdi- nand Lassalle. Lassalle had taken a similar view of the war to that advocated by Vogt, and fought tooth and nail for it in letters to Marx. In the same year, 1859, Marx published as a first result of his renewed economic studies the book Zur Kritik der politischen Okonomie. It was the first part of a much larger work planned to cover the whole ground of political economy. But Marx found that the arrangement of his materials did not fully answer his purpose, and that many details had still to be worked out. He consequently altered the whole plan and sat down to rewrite the book, of which in 1867 he published the first volume under the title Das Kapital.

In the meantime, in 1864, the International Working Men's Association was founded in London, and Marx became in fact though not in name, the head of its general council. All its addresses and proclamations were penned by him and explained in lectures to the members of the council. The first years of the International went smoothly enough. Marx was then at his best. He displayed in the International a political sagacity and toleration which compare most favourably with the spirit of some of the publications of the Communist League. He was more of its teacher than an agitator, and his expositions of such subjects as education, trade unions, the working day, and co- operation were highly instructive. He did not hurry on extreme resolutions, but put his proposals in such a form that they could be adopted by even the more backward sections, and yet contained no concessions to reactionary tendencies. But this condition of things was not permitted to go on. The anarchist

agitation of Bakunin, the Franco-German War, and the Paris Commune created a state of things before which the International succumbed. Passions and prejudices ran so high that it proved impossible to maintain any sort of centralized federation. At the congress of the Hague, September 1872, the general council was removed from London to New York. But this was only a makeshift, and in July 1876 the rest of the old International was formally dissolved at a conference held in Philadelphia. That its spirit had not passed away was shown by subsequent international congresses, and by the growth and character of socialist labour parties in different countries. They have mostly founded their programmes on the basis of its principles, but are not always in their details quite in accordance with Marx's views. Thus the programme which the German socialist party accepted at its congress in 1875 was very severely criticized by Marx. This criticism, reprinted in 1891 in the review Die neue Zeit, is of great importance for the analysis of Marx's conception of socialism.

The dissolution of the International gave Marx an opportunity of returning to his scientific work. He did not, however, succeed in publishing further volumes of Das Kapital. In order to make it — and especially the part dealing with property in land — as complete as possible, he took up, as Engels tells us, a number of new studies, but repeated illness interrupted his researches, and on the 14th of March 1883 he passed quietly away.

From the manuscripts he left Engels compiled a second and a third volume of Das Kapital by judiciously and elaborately using complete and incomplete chapters, rough copies and excerpts, which Marx had at different times written down. Much of the copy used dates back to the 'sixties, i.e. represents the work as at first conceived by Marx, so that, e.g., the matter published as the third volume was in the main written much earlier than the matter which was used for compiling the second volume.

The same applies to the fourth volume. Although the work thus comprises the four volumes promised in the preface to the book,- it can only in a very restricted sense be regarded as complete. In substance and demons- tration it must be regarded as a torso. And it is perhaps not quite accidental that it should be so. Marx, if he had lived longer and had enjoyed better health, would have given the world a much greater amount of scientific work of high value than is now the case. But it seems doubtful whether he would have brought Das Kapital, his main work, to a satisfactory conclusion.

Das Kapital proposes to show up historically and critically the whole mechanism of capitalist economy. The first volume deals with the processes of producing capital, the second with the circula- tion of capital, the third with the movements of capital as a whole, whilst the fourth gives the history of the theories concerning capital. Capital is, according to Marx, the means of appropriating sur- plus-value as distinguished from ground rent (rent on every kind of terrestrial property, such as land, mines, rivers, &c, based upon the monopolist nature of such property). Surplus- value is created in the process of production only, it is this part of the value of the newly created product which is not given to the workman as a return — the wage — of the labour-force he expended in working. If at first taken by the employer, it is in the different phases of economic intercourse split up into the profit of industrial enterprise, commercial or merchants' profit, interest and ground rent. The value of every commodity consists in the labour expended on it, and is measured according to the time occupied by the labour employed on its produc- tion. Labour in itself has no value, being only the measure of value, but the labour-force of the workman has a value, the value of the means required to maintain the worker in normal conditions of social existence. Thus, in distinction to other commodities, in the deter- mination of the value of labour-force, besides the purely economical, a moral and historical element enter. If to-day the worker receives a wage which covers the bare necessaries of life, he is underpaid- he does not receive the real value of his labour-force. For the value of any commodity is determined by its socially necessary costs of production (or in this case, maintenance). " Socially necessary " means, further, that no more labour is embodied in a commodity than is required by applying labour-force, tools, &c, of average or normal efficiency, and that the commodity is produced in such quan- tity as is required to meet the effective demand for it. As this generally cannot be known in advance, the market value of a com- modity only gravitates round its (abstract) value. But in the long run an equalization takes place, and for his further deductions Marx assumes that commodities exchange according to their value.

That part of an industrial capital which is employed for installa- tions, machines, raw and auxiliary materials, is called by Marx constant capital,

for the value of it or of its wear and tear reappears in equal proportions in the value of the new product. It is other- wise with labour. The new value of the product must by necessity

be always higher than the value of the employed labour-force. Hence the capital employed in buying labour-force, i.e. in wages, is called variable capital. It is the tendency of capitalist production to reduce the amount spent in wages and to increase the amount invested in machines, &c. For with natural and social, legal and other limitations of the working day, and the opposition to unlimited reduction of wages, it is not possible otherwise to cheapen production and beat competition. According to the proportion of constant to variable capital, Marx distinguishes capitals of lowest average and highest composition, the highest composition being that where proportionately the least amount of variable (wages) capital is employed.

The ratio of the wages which workmen receive to the surplus- value which they produce Marx calls the rate of surplus-value; that of the surplus-value produced to the whole capital employed is the rate of profit. It is evident, then, that at the same time the rate of surplus-value can increase and the rate of profit decrease, and this in fact is the case. There is a continuous tendency of the rates of profit to decrease, and only by some counteracting forces is their decrease temporarily interrupted, protracted, or even sometimes reversed. Besides, by competition and movement of capitals the rates of profit in the different branches of trade are pressed towards an equalization in the shape of an average rate of profits. This average rate or profits, added to the actual cost price of a given commodity, constitutes its price of production, and it is this price of production which appears to the empirical mind of the business man as the value of the commodity. The real law of value, on the contrary, disappears from the surface in a society where, as to-day, commodities are bought and sold against money and not exchanged against other commodities. Nevertheless, according to Marx, it is also to-day this law of value (" labour-value ") which in the last resort rules the prices and profits.

The tendency to cheapen production by increasing the relative proportion of constant capital — the fixed capital of the classical economist plus that portion of the circulating capital which con- sists of raw and auxiliary materials, &c. — leads to a continuous increase in the size of private enterprises, to their growing concentra- tion. It is the larger enterprise that beats and swallows the smaller. The number of dependent workmen — " proletarians " — is thus con- tinually growing, whilst employment only

periodically keeps pace with their number. Capital alternately attracts and repels work- men, and creates a constant surplus-population of workmen — a reserve-army for its requirements — which helps to lower wages and to keep the whole class in economic dependency. A decreasing number of capitalists usurp and monopolize all the benefits of industrial progress, whilst the mass of misery, of oppression, of servitude, of depravation, and of exploitation increases. But at the same time the working class continuously grows in numbers, and is disciplined, united and organized by the very mechanism of the capitalist mode of production. The centralization of the means of production and the socialization of the mode of production reach a point where they will become incompatible with their capitalist integument. Then the knell of capitalist private property will have been rung. Those who used to expropriate will be expropriated. Individual property will again be established based upon co-opera- tion and common ownership of the earth and the means of production produced by labour.

These are the principal outlines of Das Kapital. Its purely economic deductions are dominated throughout by the theory of surplus-value. Its leading sociological principle is the materialist conception of history. This theory is in Das Kapital only laid down by implication, but it has been more connectedly explained in the preface of Zur Kritik and several works of Engels. According to it the material basis of life, the manner in which life and its require- ments are produced, determines in the last instance the social ideas and institutions of the time or historical epoch, so that fundamental changes in the former produce in the long run also fundamental changes in the latter. A set of social institutions answer to a given mode of production, and periods where the institutions no longer answer to the mode of production are periods of social revolution, which go on until sufficient adjustment has taken place. The main subjective forces of the struggle between the old order and the new are the classes into which society is divided after the dissolution of the communistic or semi-communistic tribes and the creation of states. And as long as society is divided into classes a class war will persist, sometimes in a more latent or disguised, sometimes in a more open or acute form, according to circumstances. In advanced capitalist society the classes between whom the decisive war takes place are the capitalist owners of the means of production and the non-propertied or wage-earning workers, the " proletariate." But the proletariate cannot free itself without freeing all other oppressed classes, and thus its victory means the end of exploitation and political repression altogether. Consequently the state as a repres- sive power will die out, and a free association will take its place.

Almost from the first Das Kapital and the publications of Marx and Engels connected with it have been subjected to all kinds of criticisms. The originality of its leading ideas has been disputed, the ideas themselves have

been declared to be false or only partially true, and consequently leading to wrong conclusions; and it has been said of many of Marx's statements that they are incorrect, and that

many of the statistics upon which he bases his deductions do not prove what he wants them to prove. In regard to the first point, it must be conceded that the disjecta membra of Marx's value theory and of his materialist conception of history are already to be found in the writings of former socialists and sociologists. It may even be said that just those points of the Marxist doctrine which have become popular are in a very small degree the produce of Marx's genius, and that what really belongs to Marx, the methodical conjunction and elaboration of these points, as well as the finer deductions drawn from their application, are generally ignored. But this is an experience repeated over and over again in the history of deductive sciences, and is quite irrelevant for the question of Marx's place in the history of socialism and social science.

It must further be admitted that in several places the statistical evidence upon which Marx bases his deductions is insufficient or inconclusive. Moreover — and this is one of the most damaging admissions — it repeatedly happens that he points out all the pheno- mena connected with a certain question, but afterwards Ignores some of them and proceeds as if they did not exist. Thus, e.g., he speaks at the end of the first volume, where he sketches the his- torical tendency of capitalist accumulation, of the decreasing number of magnates of capital as of an established fact. But all statistics show that the number of capitalists does not decrease, but increase; and in other places in Das Kapital this fact is indeed fully admitted, and even accentuated. Marx was, as the third volume shows, also quite aware that limited liability companies play an important part in the distribution of wealth. But he leaves this factor, too, quite out of sight, and confuses the concentration of private enterprises with the centralization of fortunes and capitals. By these and other omissions, quite apart from developments he could not well foresee, he announces a coming evolution which is very unlikely to take place in the way described.

In this and in other features of his work a dualism reveals itself which is also often observable in his actions in life — the alternating predominance of the spirit of the scholar and the spirit of the radical revolutionary. Marx originally entitled his great social work Criti- cism of Political Economy, and this is still the sub-title of Das Kapital. But the conception of critic or criticize has with Marx a very pro- nounced meaning. He uses them mostly as identical with funda- mentally opposing. Much as he had mocked the " critical criticism " of the Bauers, he is in this respect yet of their breed and relapses into their habits. He retained in principle the Hegelian dialectical method, of which he said that in order to be rationally employed it must be

” turned upside down,” i.e. put upon a materialist basis. But as a matter of fact he has in many respects contravened against this prescription. Strict materialist dialectics cannot conclude much beyond actual facts. Dialectical materialism is revolutionary in the sense that it recognizes no finality, but otherwise it is necessarily positivist in the general meaning of that term. But Marx’s opposi- tion to modern society was fundamental and revolutionary, answer- ing to that of the proletarian to the bourgeois. And here we come to the main and fatal contradiction of his work. He wanted to pro- ceed, and to a very great extent did proceed, scientifically. Nothing was to be deduced from preconceived ideas; from the observed evolutionary laws and forces of modern society alone were conclu- sions to be drawn. And yet the final conclusion of the work, as already noted, is a preconceived idea; it is the announcement of a state of society logically opposed to the given one. Imperceptibly the dialectical movement of ideas is substituted for the dialectical movement of facts, and the real movement of facts is only considered so far as is compatible with the former. Science is violated in the service of speculation. The picture given at the end of the first volume answers to a conception arrived at by speculative socialism in the ‘forties. True, Marx calls this chapter ” the historical tendency of capitalist accumulation,” and ” tendency ” does not necessarily mean realization in every detail. But on the whole the language used there is much too absolute to allow of the interpretation that Marx only wanted to give a speculative picture of the goal to which capitalist accumulation would lead if unhampered by socialist counteraction. The epithet ” historical ” indicates rather that the passage in question was meant to give in the main the true outline of the forthcoming social revolution. We are led to this conclusion also by the fact that, in language which is not in the least conditional, it is there said that the change of capitalist property into social property will mean ” only the expropriation of a few usurpers by the mass of the people.” In short, the principal reason for the undeniable contradictions in Das Kapital is to be found in the fact that where Marx has to do with details or subordinate subjects he mostly notices the important changes which actual evolution had brought about since the time of his first socialist writings, and thus himself states how far their presuppositions have been corrected by facts. But when he comes to general conclusions, he adheres in the main to the original propositions based upon the old uncorrected presuppositions. Besides, the complex character of modern society is greatly under- estimated, so that, e.g., such important features as the influence of the changes of traffic and aggregation on modern life are scarcely considered at all; and industrial and political problems are viewed only from the aspect of class antagonism, and never under their administrative aspect. With regard to the theory of surplus-value and its foundation, the theory of labour-value, so much may be

safely said that, its premisses accepted, it is most ingeniously and most consistently worked out. And since its principal contention is in any case so far true that the wage-earning workers as a whole produce more than they receive, the theory has the great merit of demonstrating in an admirably lucid way the relations between wages and surplus-produce and the growth and movements of capital. But the theory of labour-value as the determining factor of the exchange or market value of commodities can with justification be disputed, and is surely not more true than those theories of value based on social demand or utility. Marx himself, in placing in the third volume what he calls the law of value in the background and setting out the formation of the " price of production " as the empirical determinator of prices in modern society, justifies those who look upon the conception of labour-value as an abstract formula which does not apply to individual exchanges of commodities at all, but which only serves to show an imagined typical example of what in reality to-day is only true with regard to the production of the whole of social wealth. Thus understood, the conception of labour-value is quite unobjectionable, but it loses much of the signifi- cance attributed to it by most of the disciples of Marx and occasionally by Marx himself. It is a means of analysing and exemplifying sur- plus labour, but quite inconclusive as to the proof of the surplus value, or as an indication of the degree of the exploitation of the workers. This becomes the more apparent the more the reader advances in the second and third volumes of Das Kapital, where commercial capital, money capital and ground rent are dealt with. Though full of fine observations and deductions, they form, from a revolutionary standpoint, an anti-climax to the first volume. It is difficult to see how, after all that is explained there on the functions of the classes that stand between industrial employers and workers, Marx could have returned to those sweeping conclusions with which the first volume ends.

The great scientific achievement of Marx lies, then, not in these conclusions, but in the details and yet more in the method and prin- ciples of his investigations in his philosophy of history. Here he has, as is now generally admitted, broken new ground and opened new ways and new outlooks. Nobody before him had so clearly shown the r61e of the productive agencies in historical evolution; nobody so masterfully exhibited their great determining influence on the forms and ideologies of social organisms. The passages and chapters dealing with this subject form, notwithstanding occasional exaggera- tions, the crowning parts of his works. If he has been justly compared with Darwin, it is in these respects that he ranks with that great genius, not through his value theory,

ingenious though it be. With the great theorist of biological transformation he had also in common the indefatigable way in which he made painstaking studies of the minutest details connected with his researches. In the same year as Darwin's epoch-making work on the origin of species there appeared also Marx's work Zur Kritik der politischen Okonomie, where he explains in concise sentences in the preface that philosophy of history which has for the theory of the transformation or evolution of social organisms the same significance that the argument of Darwin had for the theory of the transformation of biological organisms.

Bibliography. — The main writings of Karl Marx and Friedrich Engels are as follow (we give only the titles of the original works and of their English translations): (i) Of Karl Marx alone: La Misere de la philosophie, reponse d, la philosophie de la misere de M. Proudhon (Paris, 1847; new ed., 1892; English ed., The Poverty of Philosophy, London, 1900) ; Lohnarbeit und Kapital, pamphlet, written 1848 (new ed., Berlin, 1891); English ed., Wage, Labour and Capital (London, 1900); Die Klassenkampfe in Frankreich, 1848 to 1850 (Berlin, 1895); Der Achtzehnte Brumaire des Louis Bonaparte (New York, 1852; 3rd ed., Hamburg, 1889; Eng. ed., New York, 1889); Enthiillungen iiber den Kolner Kommunistenprozess (Basel, 1852; new ed., Zurich- Berlin, 1885); " European Revolutions and Counter-Revolutions" (reprints from the New York Tribune, 1851-1852; London, 1897); " The Eastern Question " (reprints from the New York Tribune, 1853- 1856; London, 1898); Zur Kritik der politischen Okonomie (Berlin, 1859 ; new ed., Stuttgart, 1897) ; Herr Vogt (London, i860) ; Inaugural Address of the International Working Men's Association (London, 1864); Value, Price and Profit (written 1865, published London, 1898) ; Das Kapital, Kritik der politischen Okonomie (3 vols., Hamburg, 1867, 1885 and 1895; Eng. ed. of 1st vol., 1886); The Civil War in France, 1871 (London, 1871 ; new ed., 1894); V Alliance de la democratie socialiste (London, 1873) ; articles printed or reprinted in Rheinische Zeitung (1842-1843), Deutsch-franzosische Jahrbucher (Paris, 1844), Das westphdiische Dampfboot (Bielefeld und Paderborn, 1845-1848), Der Gesellschaftsspiegel (Elberfeld, 1846), Deutsche brusseler Zeitung (Brussels, 1847), Neue rheinische Zeitung (daily, Cologne, 1 848-1 849; monthly, Hamburg, 1850), The People (London, 1852-1858), The NewYork Tribune (New York, 1853-1860), The Free Press (Sheffield and London, 1856-1857), Das Volk (London, 1859), Der Vorbote (Geneva, 1866-1875), Der Volkstaat (Leipzig, 1869-1876), Die Neue Zeit (Stuttgart, 1883, sqq.); Sozialistische Monatshefte (Berlin, 1895, sqq.). (2) Of Friedrich Engels alone: Die Lage der arbeitenden Klassen in England (Leipzig, 1845; newed., Stuttgart, 1892; Eng. ed., London, 1892); Zur Wohnungsfrage (Leipzig, 1873-1874; new ed., Zurich-Berlin, 1887); Herrn Eugen Duhrings Umwalzung der Wissenschaft (Leipzig, 1877; 3rd ed.,

Stuttgart, 1894). Three chapters of the first-named are published in English under the title Socialism, Utopian and Scientific (London, 1892). Der Ur sprung des Eigenthums, der Familie und des Staates (Zurich and Stuttgart, 1885 and 1892); Ludwig Feuerbach und der Ausgang der klassischen deutschen Philosophie (Stuttgart, 1886). In- troductions to most of the posthumous works of K. Marx and articles in the same periodicals as Marx. (3) Of Karl Marx and Friedrich Engels together: Die heilige Familie oder Kritik der kritischen Kritik (Frankfurt, 1845); Manifest der kommunistischen Partei (London, 1848; Eng. ed., 1848 and 1888). (4) With regard to Marx generally, his theory and his school, see J. Stammhammer, Biblio- graphic des Sozialismus und Kommunismus (Jena, 1893); and Th. G. Masaryk, Die philosophischen und soziologischen Grundlagen des Marxismus (Vienna, 1899). Much biographical and biblio- graphical information on Marx and Engels is to be found in Dr Franz Mehring, Geschichte der deutschen Sozialdemokratie (Stuttgart, 1897-1898), and in the collection, edited also by Dr Fr. Mehring, Aus dem liter arischen Nachlass von Karl Marx, Friedrich Engels und Ferdinand Lassalle (Stuttgart, 1902). Of the criticisms of Marx's economics, one of the most comprehensive is E. von Boehm-Bawerk's Karl Marx and the Close of his System (London, 1898). Marx's historic theory is, apart from Masaryk, very exhaustively analysed by R. Stammler in Wirthschaft und Recht (Leipzig, 1896). (E. Bn.)

MARY 1 (Mopta Mapid/i), the mother of Jesus. At the time when the gospel history begins, she had her home in Galilee, at the village of Nazareth. Of her parentage nothing is recorded in any extant historical document of the 1st century, for the genealogy in Luke iii. (cf. i. 27) is manifestly that of Joseph. In early life she became the wife of Joseph (q.v.) and the mother of Jesus Christ; that she afterwards had other children is a natural inference from Matt. i. 25, which the evangelists, who frequently allude to " the brethren of the Lord," are at no pains to obviate. The few incidents mentioned in Scripture regarding her show that she followed our Lord to the very close of His earthly career with unfailing motherliness, but the " Magnificat " assigned to her in Luke i. is the only passage which would distinctly imply on her part a high prophetic appreciation of His divine mission. It is however doubtful whether Luke really intended to assign this hymn to Mary or to Elizabeth (cf . especially Niceta of Remesiana by A. E. Burn, Cambridge, 1905; Harnack's "Das Magnificat der Elizabeth" in the Sitzungsberichte of the Berlin Academy for 1900, and Burkitt's " Who spoke the Magnificat ? " in the Journal of Theological Studies, Jan. 1906). The original text of Luke probably mentioned no name in introducing the Magnificat; scribes supplied the ambiguity by inserting, some Mary, others Elizabeth. It is doubtful which represents the intention of the writer: there is perhaps more to be said for the view that he

meant to assign the Magnificat to Elizabeth. Mary was present at the Crucifixion, where she was commended by Jesus to the care of the apostle John (John xix. 26, 27), Joseph having apparently died before this time. Mary is mentioned in Acts i. 14 as having been among those who continued in prayer along with the apostles at Jerusalem during the interval between the Ascension and Pentecost. There is no allusion in the New Testament to the time or place of her death.

The subsequent growth of ecclesiastical tradition and belief regarding Mary will be traced most conveniently under the separ- ate heads of (1) her perpetual virginity, (2) her absolute sinless- ness, (3) her peculiar relation to the Godhead, which specially fits her for successful intercession on behalf of mankind.

Her Perpetual Virginity. — This doctrine was, to say the least, of no importance in the eyes of the evangelists, and so far as extant writings go there is no evidence of its having been anywhere taught within the pale of the Catholic Church of the first three centuries. On the contrary, to Tertullian the fact of

1 The name (Heb. nj'ip), that of the sister of Moses and Aaron, is of uncertain etymology; many interpretations have been sug gested, including Stella maris (" star of the sea "), which, though it has attained considerable currency through Jerome (the Ono- masticon), may be at once dismissed. It seems to have been very common among the Jews in New Testament times: besides the subject of the present notice there are mentioned (1) " Mary (the wife) of Clopas," who was perhaps the mother of James " the little " (6 juxp6s) and of Joses; (2) Mary Magdalene, i.e. of Magdala ; (3) Mary of Bethany, sister of Martha and Lazarus; (4) Mary, the mother of Mark; and (5) Mary, an otherwise unknown benefactress of the apostle Paul (Rom. xvi. 6).

Mary's marriage after the birth of Christ is a useful argument for the reality of the Incarnation against gnostic notions, and Origen relies upon the references to the Lord's brethren as disproving the Docetism with which he had to contend. The aeLTrapdevia though very ancient, is in reality a doctrine of non-Catholic origin, and first occurs in a, work proscribed by the earliest papal Index librorum prohibitorum (attributed to Gelasius) as heretical, — the so-called Protevangelium Jacobi, written, it is generally admitted, within the 2nd century. Ac- cording to this very early source, which seems to have formed the basis of the later Liber de infantia Mariae

et Christi salvaloris and Evangelium de nativitate Mariae, the name of Mary's father was Joachim (in the Liber de infantia a shepherd of the tribe of Judah, living in Jerusalem); he had long been married to Anna her mother, whose continual childlessness had become a cause of much humiliation and sorrow to them both. The birth of a daughter was at last angelically predicted to each parent separately. From her third to her twelfth year " Mary was in the Temple as if she were a dove that dwelt there, and she received food from the hand of an angel." When she became of nubile age a guardian was sought for her by the priests among the widowers of Israel " lest she should defile the sanctuary of the Lord "; and Joseph, an elderly man with a family, was indicated for this charge by a miraculous token. Some time afterwards the annunciation took place; when the Virgin's pregnancy was discovered, Joseph and she were brought before the high priest, and, though asserting their innocence in all sincerity, were acquitted only after they had been tried with " the water of the ordeal of the Lord " (Num. v. n). Numerous details regarding the birth at Bethlehem are then given. The perpetual physical virginity of Mary, naively insisted upon in this apocryphon, is alluded to only with a half belief and a " some say " by Clement of Alexandria {Strom. vii. 16), but became of much importance to the leaders of the Church in the 4th century, as for example to Ambrose, who sees in Ezek. xliv. 1-3 a prophetic indication of so great a mystery. 1 Those who continued to believe that Mary, after the miraculous birth of Jesus, had become the mother of other children by Joseph came accordingly to be spoken of as her enemies — Antidicomarianitae (Epiphanius) or Antidicomaritae (Augus- tine) — and the first-mentioned author devotes a whole chapter (ch. 78) of his great work upon heresies to their confutation. For holding the same view Bonosus of Sardica was condemned by the synod of Capua in 391. To Jerome the perpetual virginity not only of Mary but even of Joseph appeared of so much consequence that while a young man he wrote (387) the long and vehement tract Against Helvidius, in which he was the first to broach the theory (which has since gained wide currency) that the brethren of our Lord were children neither of Mary by her husband nor of Joseph by a former marriage, but of another Mary, sister to the Virgin and wife of Clopas or Alphaeus. At last the epithet of del irapdivos was authoritatively applied to the Virgin by the council of Chalcedon in 45 r, and the doctrine implied has ever since been an undisputed point of orthodoxy both in the Eastern and in the Roman Churches, some even seeking, to hold the Anglican Church committed to it on account of the general declaration (in the Homilies) of con- currence in the decisions of the first four general councils.

Her Absolute Sinlessness. — While much of the apocryphal literature of the early sects in which she is repeatedly spoken of as " undefiled before God "

would seem to encourage some such doctrine as this, many passages from the acknowledged fathers of the Church could be cited to show that it was originally quite unknown to Catholicism. Even Augustine repeatedly asserts that she was born in original sin (De gen. ad lit. x. 18); and the locus dassicus regarding her possible immunity from actual transgression, on which the subsequent doctrine of Lombardus and his commentators was based, is simply an extremely guarded passage (De nat. et grat. ch. 36), in which,

1 De Inst. Virg., " quse est hsec porta nisi Maria ? . . . per quam Christus intravit in hunc mundum, quando virginali fusus est partu et genitalia virginitatis claustra non solvit."

while contradicting the assertion of Pelagius that many had lived free from sin, he wishes exception to be made in favour of " the holy Virgin Mary, of whom out of honour to the Lord I wish no question to be made where sins are treated of — for how do we know what mode of grace wholly to conquer sin may have been bestowed upon her who was found meet to conceive and bear Him of whom it is certain that He had no sin." A writer so late as Anselm (Cur deus homo, ii. 16). declares that " the Virgin herself whence He (Christ) was assumed was conceived in iniquity, and in sin did her mother conceive her, and with original sin was she born, because she too sinned in Adam in whom all sinned," and the same view was expressed by Damiani. For the growth of the modern Roman doctrine of the immaculate conception from the time in the 12th century, when the canons of Lyons sought to institute a festival in honour of her " holy conception," and were remonstrated with by Bernard, see Immaculate Conception. The epithets applied to her in the Greek Church are such as d/i6Xucros, iravayvos, ayia, iravayia; but in the East generally no clear distinction is drawn between immunity from actual sin and original sinlessness.

Her Peculiar Relation to the Godhead, which specially fits Her for Successful Intercession on Behalf of Mankind. — It seems probable that the epithet OeoroKos (" Mother of God ") was first applied to Mary by theologians of Alexandria towards the close of the 3rd century; but it does not occur in any genuine extant writing of that period, unless we are to assign an early date to the apocryphal Transitus Mariae, in which the word is of frequent occurrence. In the 4th century it is met with frequently, being used by Eusebius, Athanasius, Didymus and Gregory of Nazian2;us, — the latter declaring that the man who believes not Mary to have been OeoroKos has no part in God (Oral. Ii. p. 738) . 2 If its use was first recom- mended by a desire to bring into prominence the divinity of the Incarnate Word, there can be no doubt that latterly the expression came to be valued as directly honourable to Mary herself and as corresponding to the greatly increased esteem in which she personally was held throughout the Catholic

world, so that when Nestorius and others began to dispute its propriety, in the following century, their temerity was resented, not as an attack upon the established orthodox doctrine of the Nicene creed, but as threatening a more vulnerable and more tender part of the popular faith. It is sufficient in illustration of the drift of theological opinion to refer to the first sermon of Proclus, preached on a certain festival of the Virgin (irav-qyvpis TapdtviKij) at Constantinople about the year 430 or to that of Cyril of Alexandria delivered in the church of the Virgin Mary at the opening of the council of Ephesus in 43r. In the former the orator speaks of " the holy Virgin and Mother of God " as " the spotless treasure-house of virginity, the spiritual paradise of the second Adam; the workshop in which two natures were welded together .... the one bridge between God and men"; 3 in the latter she is saluted as the "mother and virgin," " through whom (Si' ˆs) the Trinity is glorified and worshipped, the cross of the Saviour exalted and honoured, through whom heaven triumphs, the angels are made glad, devils driven forth, the tempter overcome, and the fallen creature raised up even to heaven." The response which such language found in the popular heart was sufficiently shown by the shouts of joy with which the Ephesian mob heard of the deposition of Nestorius, escorting his judges with torches and incense to their homes, and celebrating the occasion by a general illumination. The causes which in the preceding century had led to this exaltation of the Mother of God in the esteem of the Catholic world are not far to seek. On the one hand the solution of the Arian controversy, however correct it may have been theoretically, undoubtedly had the practical effect

s _See Gieseler (KG., Bd. i. Abth. 1), who points out instances in which anti-Arianizing zeal went so far as to call David 8eoir&.Twp and James AScXˆeos.

3 Labbe\ Cone. iii. 51. Considerable extracts are given by Augusti (Denkw. iii.); see also Milman (Lat. Christ, i. 185), who characterizes much of it as a " wild labyrinth of untranslatable metaphor."

of relegating the God-man redeemer for ordinary minds into a far away region of " remote and awful Godhead," so that the need for a mediator to deal with the very Mediator could not fail to be felt. On the other hand, the religious instincts of mankind are very ready to pay worship, in grosser or more refined forms, to the idea of womanhood; at all events many of those who became professing Christians at the political fall of Paganism entered the Church with such instincts (derived from the nature-religions in which they had been brought up) very fully developed. Probably it ought to be

added that the comparative colourlessness with which the character of Mary is presented, not only in the canonical gospels but even in the most copious of the apocrypha, left greater scope for the un- trammelled exercise of devout imagination than was possible in the case of Christ, in the circumstances of whose humiliation and in whose recorded utterances there were many things which the religious consciousness found difficulty in under- standing or in adapting to itself. At all events, from the time of the council of Ephesus, to exhibit figures of the Virgin and Child became the approved expression of orthodoxy, and the relationship of motherhood in which Mary had been formally declared to stand to God 1 was instinctively felt to give the fullest and freest sanction of the Church to that invocation of her aid which had previously been resorted to only hesitatingly and occasionally. Previously to the council of Ephesus, indeed, the practice had obtained complete recognition, so far as we know, in those circles only in which one or other of the numerous redactions of the Transilus Mariae passed current. 2 There we read of Mary's prayer to Christ: " Do Thou bestow Thine aid upon every man calling upon, or praying to, or naming the name of Thine handmaid "; to which His answer is, " Every soul that calls upon Thy name shall not be ashamed, but shall find mercy and support and confidence both in the world that now is and in that which is to come in the presence of My Father in the heavens." But Gregory of Nazianzus also, in his pane- gyric upon Justina, mentions with incidental approval that in her hour of peril she " implored Mary the Virgin to come to the aid of a virgin in her danger." 3 Of the growth of the Marian cultus, alike in the East and in the West, after the decision at Ephesus it would be impossible to trace the history, however slightly, within the limitsof the present article. Justinian in one of his laws bespeaks her advocacy for the empire, and he inscribes the high altar in the new church of St Sophia with her name. Narses looks to her for directions on the field of battle. The emperor Heraclius bears her image on his banner. John of Damascus speaks of her as the sovereign lady to whom the whole creation has been made subject by her son. Peter Damian recognizes her as the most exalted of all creatures, and apostrophizes her as deified and endowed with all power in heaven and in earth, yet not forgetful of our race. 4 In a word, popular devotion gradually developed the entire system of doctrine and practice which Protestant contro-

1 The term 0eor

2 It is true that Irenaeus (Haer. v. 19, 1) in the passage in which he draws his well-known parallel and contrast between the first and second Eve (cf. Justin, Dial. c. Tryph. 100), to the effect that " as the human race fell into bondage to death by a virgin, so is it rescued by a virgin," takes occasion to speak of Mary as the " advocata" of Eve; but it seems certain that this word is a transla- tion of the Greek avvqyopos, and implies hostility and

rebuke rather than advocacy.

3 It is probable that the commemorations and invocations of the Virgin which occur in the present texts of the ancient liturgies of " St James " and " St Mark " are due to interpolation. In this connexion ought also to be noted the chapter in Epiphanius {Haer., 79) against the " Collyridians," certain women in Thrace, Scythia and Arabia, who were in the habit of worshipping the Virgin (&tl irapdivov) as a goddess, the offering of a cake (icoWvpL&a rtra) being one of the features of their worship. He rebukes them for offering the worship which was due to the Trinity alone; " let Mary be held in honour, but by no means worshipped." The cultus was probably a relic of heathenism; cf. Jer. xhv. 19.

4 " Numquid quia ita deificata, ideo nostrae humanitatis oblita es? Nequaquam, Domina. . . . Data est tibi omnis potestas in coelo et in terra. Nil tibi impossibile." Serm. de nativ. Mariae, ap. Gieseler, KG., Bd. ii. Abth. 1.

versialists are accustomed to call by the name of Mariolatry. With reference to this much-disputed phrase it is always to be kept in mind that the directly authoritative documents, alike of the Greek and of the Roman Church, distinguish formally between latria and dulia, and declare that the " worship " to be paid to the mother of God must never exceed that superlative degree of dulia which is vaguely described as hyperdulia. But the comparative reserve shown by the council of Trent in its decrees, and even in its catechism, 6 on this subject has not been observed by individual theologians, and in view of the fact of the canonization of some of these (such as Liguori) — a fact guaranteeing the absence of erroneous teaching from their writings — it does not seem unfair, to hold the Roman Church responsible for the natural interpretations and just inferences which may be drawn even from apparently exagger- ated expressions in such works as the well-known Glories of Mary and others frequently quoted in controversial literature. There is a good resume of Catholic developments of the cultus of Mary in Pusey's Eirenicon.

The following are the principal feasts of the Virgin in the order in which they occur in the ecclesiastical year. (1) That of the Presentation (Praesentatio B. V.M.,tA. eiadSia rijj 9(ot6kov), to com- memorate the beginning of her stay in the Temple, as recorded in the Protevangelium Jacobi. It is believed to have originated in the East in the 8th century, the earliest allusion to it being made by George of Nicomedia (9th century) ; Manuel Comnenus made it universal for the Eastern Empire, and in the modern Greek Church it is one of the five great festivals in honour of the Deipara. It was introduced into the Western Church late in the 14th century, and, after having been withdrawn from the calendar by Pius V.,

was restored by Sixtus V., the day observed in both East and West being the 21st of November. It is not mentioned in the English calendar. (2) the Feast of the Conception (Conceptio B. V. M., Conceptio immaculata B. V. M.,

6 The points taught in the catechism are — that she is truly the Mother of God, and the second Eve, by whose means we have received blessing and life; that she is the Mother of Pity, and very specially our advocate; that her merits are highly exalted, and that her dispositions towards us are extremely gracious; that her images are of the utmost utility. In the Missal her intercessions (though alluded to in the canon and elsewhere) are seldom directly appealed to except in the Litany and in some of the later offices, such as those for the 8th of September and for the Festival of the Seven Sorrows (decree by Benedict XIII. in 1727). Noteworthy are the versicles in the office for the 8th of December (The Feast of the Immaculate Conception), " Tota pulchra es, Maria, et macula originalis non est in te, and " Gloriosa dicta sunt de te, Maria, quia fecit tibi magna qui potens est."

the Western Church seems to be that found in the proceedings of the synod of Salzburg in 800; it is also spoken of in the thirty-sixth canon of the reforming synod of Mainz, held in 813. It was not at that time universal, being mentioned as doubtful in the capitu- laries of Charlemagne. The doctrine of the bodily assumption of the Virgin into heaven, although extensively believed, and indeed flowing as a natural theological consequence from that of her sinlessness, has never been declared to be " de fide " by the Church of Rome, and is still merely a " pia sententia." (7) The Nativity of Mary {Nativitas, yevi£\iov rijs Bcotokov) observed on the 8th of September, is first men- tioned in one of the homilies of Andrew of Crete (c. 750), and with the Feasts of the Purification, the Annunciation and the Assumption, it was appointed to be observed by the synod of Salzburg in 800, but seems to have been unknown at that time in the Gallican Church, and even two centuries later it was by no means general in Italy. In the Roman Catholic Church a large number of minor festivals in honour of the Virgin are locally celebrated ; and all the Saturdays of the year as well as the entire month of May are also regarded as sacred to her.

The chief apocryphal writings concerned with Mary are the following: (1) The Portevangelium Jacobi, with its derivatives the De nativitate Mariae, the Evangelium Ps.-Matthaei, the Historia Josephifabri lignarii (all edited by Teschendorf , Evangelia apocrypha ; cf. Harnack, Geschichte der

altchristlichen Litteratur, p. 20 seq. and Chronologic, i. 598 sqq.). (2) Evangelium Mariae (see Sitzungsberichte der Berlinischen Akademie der Wissenschaften 1896, pp. 839-847). (3) Iwavvov tov deok&yov Xoyos €t$ ttjv Kol/njaiv rijs dtordKov, which appears in Latin under the title of the Transitus Mariae (ed. Tischen- dorf, Apocalypses apocryphae and Evangelia apocrypha, and see Bonnet, Zeitschr. f. wissensch. Tkeol., 1880, pp. 222-247).

(J. S.Bl.; K. L.)

MARY, known as Mary Magdalene, a woman mentioned in the Gospels, first in Luke viii. 2, as one of a company who " healed of evil spirits and infirmities . . . ministered unto them (Jesus and the apostles) of their substance." It is said that seven demons were cast out of her, but this need not imply simply one occasion. Her name implies that she came from Magdala (el-Mejdel, 3 m. N.W. from Tiberias: in Matt. xv. 39 the right reading is not Magdala but Magadan). She went with Jesus on the last journey to Jerusalem, witnessed the Crucifixion, followed to the burial, and returned to prepare spices. John xx. gives an account of her finding the tomb empty and of her interview with the risen Jesus. Mary of Magdala has been confounded (1) with the unnamed fallen woman who in Simon's house anointed Christ's feet (Luke vii. 37); (2) with Mary of Bethany, sister of Lazarus and Martha.

MARY I., queen of England (1516-1558), unpleasantly re- membered as " the Bloody Mary " on account of the religious persecutions which prevailed during her reign, was the daughter of Henry VIII. and Catherine of Aragon, born in the earlier years of their married life, when as yet no cloud had darkened the prospect of Henry's reign. Her birth occurred at Greenwich, on Monday, the 18th February 1516, and she was baptized on the following Wednesday, Cardinal Wolsey standing as her godfather. She seems to have been a singularly precocious child, and is reported in July 1520, when scarcely four and a half years old, as entertaining some visitors by a performance on the virginals. When she was little over nine she was addressed in a complimentary Latin oration by commissioners sent over from Flanders on commercial matters, and replied to them in the same language " with as much assurance and facility as if she had been twelve years old " (Gayangos, iii. pt. 1, 82). Her father was proud of her achievements. About the same time that she replied to the commissioners in Latin he was arranging that she should learn Spanish, Italian and French. A great part, however, of the credit of her early education was un- doubtedly due to her mother, who not only consulted the Spanish scholar Vives upon the subject, but was herself Mary's first teacher in Latin. She was also well instructed in music, and among her principal recreations as she grew up was that of playing on the virginals and lute.

It was a misfortune that she shared with high-born ladies generally in those days that her prospects in life were made a matter of sordid bargaining from the first. Mary was little more than two years old when she was proposed in marriage to the dauphin, son of Francis I. Three years afterwards the French alliance was broken off, and in 1522 she was affianced to her cousin the young emperor Charles V. by the Treaty of

Windsor. No one, perhaps, seriously expected either of these arrangements to endure; and, though we read in grave state papers of some curious compliments and love tokens (really the mere counters of diplomacy) professedly sent by the girl of nine to her powerful cousin, not many years passed away before Charles released himself from this engagement and made a more convenient match. In 1526 a rearrangement was made of the royal household, and it was thought right to give Mary an establishment of her own along with a council on the borders of Wales, for the better government of the Marches. For some years she accordingly kept her court at Ludlow, while new arrangements were' made for the disposal of her hand. She was now proposed as a wife, not for the dauphin as before, but for his father Francis I., who had just been redeemed from captivity at Madrid, and who was only too glad of an alliance with England to mitigate the severe conditions imposed on him by the emperor. Wolsey, however, on this occasion, only made use of the princess as a bait to enhance the terms of the compact, and left Francis free in the end to marry the emperor's sister.

It was during this negotiation, as Henry afterwards pre- tended, that the question was first raised whether Henry's own marriage with Catherine was a lawful one. Grammont, bishop of Tarbes,'who was one of the ambassadors sent over by Francis to ask the princess in marriage, had, it was said, started an objection that she might possibly be considered illegitimate on account of her mother having been once the wife of he,r father's brother. The statement was a mere pretence to shield the king when the unpopularity of the divorce became apparent. It is proved to be untrue by the strongest evidence, for we have pretty full contemporary records of the whole negotiation. On the contrary, it is quite clear that Henry, who had already for some time conceived the project of a divorce, kept the matter a dead secret, and was particularly anxious that the French ambassadors should not know it, while he used his daughter's hand as a bait for a new alliance. The alliance itself, however, was actually concluded by a treaty dated West- minster, the 30th of April 1527, in which it was provided, as regards the Princess Mary, that she should be married either to Francis himself or to his second son Henry duke of Orleans. But the real object was only to lay the foundation of a perfect mutual understanding between the two kings, which Wolsey soon after went into France to confirm.

During the next nine years the life of (Mary, as well as that of her mother, was rendered miserable by the conduct of Henry VIII. in seeking a divorce. During most of that .period mother and daughter seem to have been kept apart. Possibly Queen Catherine had the harder trial; but Mary's was scarcely less severe. Removed from court and treated as a bastard, she was, on the birth of Anne Boleyn's daughter, required to give up the dignity of princess and acknowledge the illegitimacy of her own birth. On her refusal her household was broken up, and she was sent to Hatfield to act as lady-in-waiting to her own infant half-sister. Nor was even this the worst of her trials; her very life was in danger from the hatred of Anne Boleyn. Her health, moreover, was indifferent, and even when she was seriously ill, although Henry sent his own physician, Dr Buttes, to attend her, he declined to let her mother visit her. So also at her mother's death, in January 1536, she was forbidden to take a last farewell of her. But in May following another change occurred. Anne Boleyn, the real cause of all her miseries, fell under the king's displeasure and was put to death. Mary was then urged to make a humble submission to her father as the means of recovering his favour, and after a good deal of correspondence with the king's secretary, Cromwell, she actually did so. The terms exacted of her were bitter in the extreme, but there was no chance of making life tolerable otherwise, if indeed she was permitted to live at all; and the poor friendless girl, absolutely at the mercy of a father who could brook no contradiction, at length subscribed an act of submission, acknowledging the king as " Supreme Head of the Church of England under Christ," repudiating the pooe'a

authority, and confessing that the marriage between her father and mother " was by God's law and man's law incestuous and unlawful."

No act, perhaps, in the whole of Henry's reign gives us a more painful idea of his revolting despotism. Mary was a high-spirited girl, and undoubtedly popular. All Europe looked upon her at that time as the only legitimate child of her father, but her father himself compelled her to disown the title and pass an unjust stigma on her own birth and her mother's good name. Nevertheless Henry was now reconciled to her, and gave her a household in some degree suitable to her rank. During the rest of the reign we hear little about her except in connexion with a number of new marriage projects taken up and abandoned successively, one of which, to the count palatine Philip, duke of Bavaria, was specially repugnant to her in the matter of religion. Her privy purse expenses for nearly the whole of this period have been published, and show that Hatfield, Beaulieu or Newhall in Essex,

Richmond and Hunsdon were among her principal places of residence. Although she was still treated as of illegitimate birth, it was believed that the king, having obtained from parliament the extraordinary power to dispose of the crown by will, would restore her to her place in the succession, and three years before his death she was so restored by statute, but still under con- ditions to be regulated by her father's will.

Under the reign of her brother, Edward VI. she was again subjected to severe trials, which at one time made her seriously meditate taking flight and escaping abroad. Edward himself indeed seems to have been personally not unkind to her, but the religious revolution in his reign assumed proportions such as it had not done before, and Mary, who had done sufficient violence to her own convictions in submitting to a despotic father, was not disposed to yield an equally tame obedience to authority exercised by a factious council in the name of a younger brother not yet come to years of discretion. Besides, the cause of the pope was naturally her own. In spite of the forced declaration formerly wrung from herself, no one really regarded her as a bastard, and the full recognition of her rights depended on the recognition of the pope as head of the Church. Hence, when Edward's parliament passed an Act of Uniformity enjoining services in English and communion in both kinds, the law appeared to her totally void of authority, and she insisted on having Mass in her own private chapel under the old form. When ordered to desist, she appealed for protection to the emperor Charles V., who, being her cousin, intervened for some time not ineffectually, threatening war with England if her religious liberty was interfered with. But Edward's, court was composed of factions of which the most violent eventually carried the day. Lord Seymour, the admiral, was attainted of treason and beheaded in 1549. His brother, the Protector Somerset, met with the same fate in 1552. Dudley, duke of Northumberland, then became paramount in the privy council, and easily obtained the sanction of the young king to those schemes for altering the succession which led imme- diately after his death to the usurpation of Lady Jane Grey. Dudley had, in fact, overawed all the rest of the privy council, and when the event occurred he took such energetic measures to give effect to the scheme that Lady Jane was actually recog- nized as queen for some days, and Mary had even to fly from Hunsdon into Norfolk. But the country was really devoted to her cause, as indeed her right in law was unquestionable, and before many days she was royally received in London, and took up her abode within the Tower.

Her first acts at the beginning of her reign displayed a char- acter very different from that which she still holds in popular estimation. Her clemency towards those who had taken up arms against her was altogether remarkable. She released from prison Lady Jane's father, Suffolk, and had difficulty even in signing the warrant for the execution of Northumberland.

Lady Jane herself she fully meant to spare, and did spare till after Wyatt's formidable insurrection. Her conduct, indeed, was in every respect conciliatory and pacific, and so far as they

depended on her personal character the prospects of the new reign might have appeared altogether favourable. But un- fortunately her position was one of peculiar difficulty, and the policy on which she determined was far from judicious. In- experienced in the art of governing, she had no trusty councillor but Gardiner; every other member of the council had been more or less implicated in the conspiracy against her. And though she valued Gardiner's advice she was naturally led to rely even more on that of her cousin, the emperor, who had been her mother's friend in adversity, and had done such material service to herself in the preceding reign. Following the emperor's guidance she determined almost from the first to make his son Philip her husband, though she was eleven years his senior. She was also strongly desirous of restoring the old religion and wiping out the stigma of illegitimacy upon her birth, so that she might not seem to reign by virtue of a mere parlia- mentary settlement.

Each of these different objects was attended by difficulties or objections peculiar to itself; but the marriage was the most unpopular of all. A restoration of the old religion threatened to deprive the new owners of abbey lands of their easy and comfortable acquisitions; and it was only with an express reservation of their interests that the thing was actually accom- plished. A declaration of her own legitimacy necessarily cast a slur on that of her sister Elizabeth, and cut her off from the succession. But the marriage promised to throw England into the arms of Spain and place the resources of the kingdom at the command of the emperor's son. The Commons sent her a deputation to entreat that she would not marry a foreigner, and when her resolution was known insurrections broke out in different parts of the country. Suffolk, whose first rebellion had been pardoned, proclaimed Lady Jane Grey again in Leicestershire, while young Wyatt raised the county of Kent and, though denied access by London Bridge, led his men round by Kingston to the very gates of London before he was repulsed. In the midst of the danger Mary showed great intrepidity, and the rebellion was presently quelled; after which, unhappily, she got leave to pursue her own course unchecked. She married Philip, restored the old religion, and got Cardinal Pole to come over and absolve the kingdom from its past disobedience to the Holy See.

It was a more than questionable policy thus to ally England with Spain — a power then actually at war with France. By the treaty, indeed, England was to remain neutral; but the force of events, in the end, compelled her, as might have been expected, to take part in the quarrel. Meanwhile the country was full of faction, and seditious pamphlets of Protestant origin

inflamed the people with hatred against the Spaniards. Philip's Spanish followers met with positive ill-usage everywhere, and violent outbreaks occurred. A year after his marriage Philip went over to Brussels to receive from his father the government of the Low Countries and afterwards the kingdom of Spain. Much to Mary's distress, his absence was prolonged for a year and a half, and when he returned in March 1557 it was only to commit England completely to the war; after which he went back to Brussels in July, to return no more to England.

Hostilities with France were inevitable, because France had encouraged disaffection among Mary's subjects, even during the brief truce of Vaucelles. Conspiracies had been hatched by English refugees in Paris, and an attempt to seize Scarborough had been made with the aid of vessels from the Seine. But perhaps the strangest thing about the situation was that the pope took part with France against Spain; and so the very marriage which Mary had contracted to bring England back to the Holy See made her the wife of the pope's enemy. It was, moreover, this war with France that occasioned the final calamity of the loss of Calais, which sank so deeply into Mary's heart some time before she died.

The cruel persecution of the Protestants, which has cast so much infamy upon her reign, was not due, as commonly supposed, to inhumanity on her part. When the kingdom was reconciled to Rome and absolved by Cardinal Pole, it

followed, almost as a matter of necessity, that the old heresy laws should be revived, as they were then by Act of Parliament. They had been abolished by the Protector Somerset for the express purpose of promoting changes of doctrine which did violence to what was still the prevailing religious sentiment; and now the old religion required to be protected from insult and fanatical outrages. Doubts were felt as to the result even from the first ; but the law having been once passed could not be relaxed merely because the victims were so numerous; for that would only have encouraged the irreverence Which it was intended to check. No doubt there were milder men among the heretics, but as a class their stern fanaticism and ill-will to the old religion made them dangerous, even to the public peace. Rogers, the first of the martyrs, was burnt on the 4th of February 1555. Hooper, bishop of Gloucester, had been condemned six days before, and suffered the same fate upon the 9th. From this time the persecution went on uninterrupted for three years and three quarters, numbering among its victims Ridley, Latimer and Cranmer. It came to an end at last

on the death of Mary. It seems to have been more severe in the eastern and southern parts of England, and the largest number of sufferers was naturally in the diocese of Bonner, bishop of London. From first to last nearly three hundred victims are known to have perished at the stake; and their fate certainly created a revulsion against Rome that nothing else was likely to have effected.

Mary was of weak constitution and subject to frequent illnesses, both before and after her accession. One special infirmity caused her to believe a few months after her marriage that she was with child, and thanksgiving services were ordered throughout the diocese of London in November 1554. The same delusion recurred in March 1558, when though she did not make her expectation public, she drew up a will in antici- pation of the dangers of childbirth, constituting her husband regent during the minority of her prospective heir. To this she added a codicil on the 28th of October following, when the illness that was to be her last had set in, showing that she had ceased to have much expectation of maternity, and earnestly entreating her " next heir and successor by the laws " (whom she did not name) to allow execution of the instrument. She died on the 17th of November.

Her name deserved better treatment than it has generally met with; for she was far from cruel. Her kindness to poor people is undoubted, and the severe execution of her laws seemed only a necessity. Even in this matter, moreover, she was alive to the injustice with which the law was usually strained in behalf of the prerogative; and in appointing Sir Richard Morgan chief justice of the Common Pleas she charged him " not to sit in judgment otherwise for her highness than for her subjects," and to avoid the old error of refusing to admit witnesses against the Crown (Holinshed III. 1112). Her conduct as queen was certainly governed by the best possible intentions; and it is evident that her very zeal for goodness caused most of the trouble she brought upon herself. Her subjects were entirely released, even by papal authority, from any obligation to restore the confiscated lands of the Church. But she herself made it an object, at her own expense, to restore several of the monasteries; and courtiers who did not like to follow her example, encouraged the fanatics to spread an alarm that it would even yet be made compulsory. So the worldly minded joined hands with the godly heretics in stirring up enmity against her. (J. Ga.)

MARY II. (1662-1694), queen of England and wife of king William III., elder daughter of James, duke of York, afterwards King James II., by his first wife, Anne, daughter of Edward Hyde, 1st earl of Clarendon, was born in London on the 30th of April 1662. She was educated as a Protestant, and as it was probable that she would succeed to the English throne after the deaths of her uncle, Charles II., and her father, the choice

of a husband for her was a political event of high importance. About 1672 the name of William, prince of Orange, was men-

tioned in this connexion; and after some hesitation on both sides caused by the condition of European politics, the betrothal of William and Mary took place in October 1677, and was quickly followed by their marriage in London on the 4th of November. Mary's married life in Holland does not appear to have been a happy one. Although she soon became popular among the Dutch, she remained childless, while William treated her with neglect and even with insult; and her troubles were not diminished after her father became king of England in 1685. James had treated his daughter very shabbily in money matters; and it was increasingly difficult for her to remain loyal to both father and husband when they were so divergent in character and policy. Although Mary never entirely lost her affection for her father the wife prevailed over the daughter; and after the birth of her half-brother, the prince of Wales, in 1688, she regarded the dethronement of James as inevitable. It cannot be said, however, that William merited this confidence. Possibly he was jealous of his wife as the heiress of the English throne, contrasting her future position with his own ; but according to Burnet, who was then staying at the Hague, this cause of difference was removed by the tactful interference of Burnet himself. The latter asserts that having divined the reason of the prince's jealousy he mentioned the matter to the princess, who in her ignorance of statecraft had never considered the relative positions of herself and her husband with regard to the English throne; and that Mary, by telling the prince " she would be no more but his wife, and that she would do all that lay in her power to make him king for life " (Burnet, Supplement, ed. Foxcroft, p. 309), probably mollified her husband's jealousy. On the other hand Macaulay's statement that henceforward there was " entire friendship and confidence " between them must be taken with some reserve. Mary shared heartily in the events which immediately preceded William's expedition to England in 1688. After the success of the undertaking she arrived in London in February 1689; and by her faithful adher- ence to her promise made a satisfactory settlement of the English crown possible. William and Mary were together proclaimed king and queen of England, and afterwards of Scotland, and were crowned on the nth of April 1689. During the king's absence from England the queen, assisted by a committee of the privy council, was entrusted with the duties of government, duties which she performed faithfully, but which she gladly laid down on William's return. In these times of danger, however, she acted when necessary with courage and prompti- tude, as when in 1690 she directed the arrest of her uncle Henry Hyde, 2nd earl of Clarendon; but she was constantly anxious for William's safety, and unable to trust many of her advisers. She was further distressed by a quarrel with her sister Anne in 1692 following the dismissal of

Marlborough, and this event somewhat diminished her popularity, which had hitherto been one of the mainstays of the throne. Weak in body and troubled in mind, the queen died at Kensington Palace from small-pox on the 28th of December 1694, and was buried in Westminster Abbey. Mary was a woman of a remarkably modest and retiring disposition, whose outstanding virtue was perhaps her unswerving loyalty to William. Burnet has passed a remarkable panegyric upon her character. She was extremely pious and charitable; her blameless private life was in marked contrast with her surroundings, both in England and Holland; without bigotry she was greatly attached to the Protestant faith and to the Church of England; and she was always eager to improve the tone of public morals, and to secure a better observance of Sunday. Greenwich Hospital for Seamen was founded in her honour.

For the political events of Mary's life see William III. For her private life see Sir John Dalrymple, Memoirs of Great Britain and Ireland (London, 1790); Countess Bentinck, Lettres et mimoires de Marie, reine d'Angleterre (The Hague, 1880); Memoires and Letters of Mary Queen of England (ed. by R. Doebner, Leipzig, 1886) ; F. J. L. Kramer, Maria II. Stuart (Utrecht, 1890); Agnes Strickland, Lives of the Queens of England, vols. x. and xi. (London, 1847); G. Burnet, History of my own Time (Oxford, 1833) ; and O. Klopp, Der Fall des Hauses Stuart (Vienna, 1875-18

MARY QUEEN OF SCOTS

817

MARY QUEEN OF SCOTS 1 (1542-1587), daughter of King James V. and his wife Mary of Lorraine, was born in December 1 542, a few days before the death of her father, heart-broken by the disgrace of his arms at Solway Moss, where the disaffected nobles had declined to encounter an enemy of inferior force in the cause of a king whose systematic policy had been directed against the privileges of their order, and whose representative on the occasion was an unpopular favourite appointed general in defiance of their ill-will. On the ath of September following the ceremony of coronation was duly performed upon the infant. A scheme for her betrothal to Edward, prince of Wales, was de- feated by the grasping greed of his father, whose obvious ambi- tion to annex the crown of Scotland at once to that of England aroused instantly the general suspicion and indignation of Scot- tish patriotism. In 1548 the queen of six years old was betrothed to the dauphin Francis, and set sail for France, where she arrived on the 15th of August. The society in which the child was thenceforward reared is known to readers of Brant6me as well as that of imperial Rome at its worst is known to readers of Suetonius or Petronius as well as that of papal Rome at its worst is known to readers of the diary kept by the domestic chaplain

of Pope Alexander VI. Only in their pages can a parallel be found to the gay and easy record which reveals without sign of shame or suspicion of offence the daily life of a court compared to which the court of King Charles II. is as the court of Queen Victoria to the society described by Grammont. Debauchery of all kinds, and murder in all forms, were the daily matter of excite- ment or of jest to the brilliant circle which revolved around Queen Catherine de' Medici. After ten years' training under the tutelage of the woman whose main instrument of policy was the corruption of her own children, the queen of Scots, aged fifteen years and five months, was married to the eldest and feeblest of the brood on the 24th of April 1558. On the 17th of November Elizabeth became queen of England, and the princes of Lorraine — Francis the great duke of Guise, and his brother the cardinal — ■ induced their niece and her husband to assume, in addition to the arms of France and Scotland, the arms of a country over which they asserted the right of Mary Stuart to reign as legiti- mate heiress of Mary Tudor. Civil strife broke out in Scotland between John Knox and the queen-dowager — between the self- styled " congregation of the Lord " and the adherents of the regent, whose French troops repelled the combined forces of the Scotch and their English allies from the beleaguered walls of Leith, little more than a month before the death of their mistress in the castle of Edinburgh, on the 10th of June 1560. On the 25th of August Protestantism was proclaimed and Catholicism suppressed in Scotland by a convention of states assembled without the assent of the absent queen. On the 5th of December Francis II. died; in August 1561 his widow left France for Scotland, having been refused a safe-conduct by Elizabeth on the ground of her own previous refusal to ratify the treaty made with England by her commissioners in the same month of the preceding year. She arrived nevertheless in safety at Leith, es- corted by three of her uncles of the house of Lorraine, and bring- ing in her train her future biographer, Brantdme, and Chastelard, the first of all her voluntary victims. On the 21st of August she first met the only man able to withstand her; and their first passage of arms left, as he has recorded, upon the mind of John Knox an ineffaceable . impression of her " proud mind, crafty wit and indurate heart against God and His truth." And

1 In a letter dated the 4th of April 1882, referring to the publica- tion of his drama Mary Stuart, Swinburne wrote to Edmund Clarence Stedman: " Mary Stuart has procured me two satisfactions which I prefer infinitely to six columns of adulation in The Times and any profit thence resulting. (1) A letter from Sir Henry Taylor . . . (2) An application from the editor of the Encyclopaedia Britannica — who might, 1 suppose, as in Macaulay's time, almost command the services of the most eminent scholars and historians of the country — to me, a mere poet, proposing that I should contribute to that great repository of erudition the biography of Mary

Queen of Scots. I doubt if the like compliment was ever paid before to one of our ‘ idle trade.’ ” The present article is the biography contributed by the poet to the 9th ed. in response to the invitation referred to in this letter.

yet her acts of concession and conciliation were such as no fanatic on the opposite side could have approved. She assented, not only to the undisturbed maintenance of the new creed, but even to a scheme for the endowment of the Protestant ministry out of the confiscated lands of the Church. Her half-brother, Lord James Stuart, shared the duties of her chief counsellor with William Maitland of Lethington, the keenest and most liberal thinker in the country. By the influence of Lord James, in spite of the earnest opposition of Knox, permission was obtained for her to hear Mass celebrated in her private chapel — a licence to which, said the Reformer, he would have preferred the invasion of ten thousand Frenchmen. Through all the first troubles of her reign the young queen steered her skilful and dauntless way with the tact of a woman and the courage of a man. An insurrec- tion in the north, headed by the earl of Huntly under pretext of rescuing from justice the life which his son had forfeited by his share in a homicidal brawl, was crushed at a blow by the Lord James against whose life, as well as against his sister’s liberty, the conspiracy of the Gordons had been aimed, and on whom, after the father had fallen in fight and the son had expiated his double offence on the scaffold, the leading rebel’s earldom of Murray was conferred by the gratitude of the queen. Exactly four months after the battle of Corrichie, and the subsequent execution of a criminal whom she is said to have ” loved en- tirely,” had put an end to the first insurrection raised against her, Pierre de Boscosel de Chastelard, who had returned to France with the other companions of her arrival, and in November 1562 had revisited Scotland, expiated with his head the offence or the misfortune of a second detection at night in her bed-chamber. In the same month, twenty-five years afterwards, the execution of his mistress, according to the verdict of her contemporaries in France, avenged the blood of a lover who had died without uttering a word to realize the apprehension which (according to Knox) had before his trial impelled her to desire her brother ” that, as he loved her, he would slay Chastelard, and let him never speak word.” And in the same month, two years from the date of Chastelard’s execution, her first step was unconsciously taken on the road to Fotheringhay, when she gave her heart at first sight to her kinsman Henry, Lord Darnley, son of Matthew Stuart, earl of Lennox, who had suffered an exile of twenty years in expiation of his intrigues with England, and had married the niece of King Henry VIII., daughter of his sister Margaret, the widow of James IV., by her second husband, the earl of Angus. Queen Elizabeth, with the almost incredible want of tact or instinctive delicacy which distinguished and disfigured her vigorous intelligence, had recently proposed as a suitor to the

queen of Scots her own low-born favourite, Lord Robert Dudley, the widower if not the murderer of Amy Robsart; and she now protested against the project of marriage between Mary and Darnley. Mary who had already married her kinsman in secret at Stirling Castle with Catholic rites celebrated in the apartment of David Rizzio, her secretary for correspondence with France, assured the English ambassador, in reply to the protest of his mistress, that the marriage would not take place for three, months, when a dispensation from the pope would allow the cousins to be publicly united without offence to the Church. On the 29th of July 1565 they were accordingly remarried at Holyrood. The hapless and worthless bridegroom had already incurred the hatred of two powerful enemies, the earls of Morton and Glencairn; but the former of these took part with the queen against the forces raised by Murray, Glencairn and others, under the nominal leadership of Hamilton, duke of Chatelherault, on the double plea of danger to the new religion of the country, and of the illegal proceeding by which Darnley had been proclaimed king of Scots without the needful constitutional assent of the estates of the realm. Murray was cited to attend the " raid " or array levied by the king and queen, and was duly denounced by public blast of trumpet for his non-appearance. He entered Edinburgh with his forces, but failed to hold the town against the guns of the castle, and fell back upon Dumfries before the advance of the royal army, which was now joined by James Hepburn, earl of Bothwell, on his return from a three years'

outlawed exile in France. He had been accused in 1562 of a plot to seize the queen and put her into the keeping of the earl of Arran, whose pretensions to her hand ended only when his insanity could no longer be concealed. Another new adherent was the son of the late earl of Huntly, to whom the forfeited honours of his house were restored a few months before the marriage of his sister to Bothwell. The queen now appealed to France for aid; but Castelnau, the French ambassador, replied to her passionate pleading by sober and earnest advice to make peace with the malcontents. This counsel was rejected, and in October 1565 the queen marched an army of 18,000 men against them from Edinburgh; their forces dispersed in face of superior numbers, and Murray, on seeking shelter in England, was received with contumely by Elizabeth, whose half-hearted help had failed to support his enterprise, and whose intercession for his return found at first no favour with the queen of Scots. But the conduct of the besotted boy on whom at their marriage she had bestowed the title of king began at once to justify the enter- prise and to play into the hands of all his enemies alike. His father set him on to demand the crown matrimonial, which would at

least have assured to him the rank and station of inde- pendent royalty for life. Rizzio, hitherto his friend and advo- cate, induced the queen to reply by a reasonable refusal to this hazardous and audacious request. Darnley at once threw him- self into the arms of the party opposed to the policy of the queen and her secretary — a policy which at that moment was doubly and trebly calculated to exasperate the fears of the religious and the pride of the patriotic. Mary was invited if not induced by the king of Spain to join his league for the suppression of Pro- testantism; while the actual or prospective endowment of Rizzio with Morton's office of chancellor, and the projected attainder of Murray and his allies, combined to inflame at once the anger and the apprehension of the Protestant nobles. According to one account, Darnley privately assured his uncle George Douglas of his wife's infidelity; he had himself, if he might be believed, discovered the secretary in the queen's apartment at midnight, under circumstances yet more unequivocally compromising than those which had brought Chastelard to the scaffold. Another version of the pitiful history represents Douglas as infusing suspicion of Rizzio into the empty mind of his nephew, and thus winning his consent to a deed already designed by others. A bond was drawn in which Darnley pledged himself to support the confederates who undertook to punish " certain privy persons " offensive to the state, " especially a strange Italian, called Davie "; another was subscribed by Darnley and the banished lords, then biding their time in Newcastle, which engaged him to procure their pardon and restoration, while pledging them to insure to him the enjoyment of the title he coveted, with the consequent security of an undisputed succes- sion to the crown, despite the counter claims of the house of Hamilton, in case his wife should die without issue — a result which, intentionally or not, he and his fellow-conspirators did all that brutality could have suggested to accelerate and secure. On the 9th of March the palace of Holyrood was invested by a troop under the command of Morton, while Rizzio was dragged by force out of the queen's presence and slain without trial in the heat of the moment. The parliament was discharged by proclamation issued in the name of Darnley as king; and in the evening of the next day the banished lords, whom it was to have condemned to outlawry, returned to Edinburgh. On the day following they were graciously received by the queen, who under- took to sign a bond for their security, but delayed the subscrip- tion till next morning under plea of sickness. During the night she escaped with Darnley, whom she had already seduced from the party of his accomplices, and arrived at Dunbar on the third morning after the slaughter of her favourite. From thence they returned to Edinburgh on the 28th of March, guarded by two thousand horsemen under the command of Bothwell, who had escaped from Holyrood on the night of the murder, to raise a force on the queen's behalf with his usual soldierly promptitude. The slayers of Rizzio fled to England, and were outlawed; Darnley was permitted to protest his innocence and

denounce

his accomplices; after which he became the scorn of all parties alike, and few men dared or cared to be seen in his company. On the 19th of June a son was born to his wife, and in the face of his previous protestations he was induced to acknow- ledge himself the father. But, as Murray and his partisans returned to favour and influence no longer incompatible with that of Bothwell and Huntly, he grew desperate enough with terror to dream of escape to France. This design was at once frustrated by the queen's resolution. She summoned him to declare his reasons for it in presence of the French ambassador and an assembly of the nobles; she besought him for God's sake to speak out, and not spare her; and at last he left her presence with an avowal that he had nothing to allege. The favour shown to Bothwell had not yet given occasion for scandal, though his character as an adventurous libertine was as notable as his reputation for military hardihood; but as the summer advanced his insolence increased with his influence at court and the general aversion of his rivals. He was richly endowed by Mary from the greater and lesser spoils of the Church; and the three wardenships of the border, united for the first time in his person, gave the lord high admiral of Scotland a position of unequalled power. In the gallant discharge of its duties he was dangerously wounded by a leading outlaw, whom he slew in single combat; and while yet confined to Hermitage Castle he received a visit of two hours from the queen, who rode thither from Jedburgh and back through 20 miles of the wild borderland where her person was in perpetual danger from the freebooters whom her father's policy had striven and had failed to extirpate. The result of this daring ride was a ten days' fever, after which she removed by short stages to Craigmillar, where a proposal for her divorce from Darnley was laid before her by Bothwell, Murray, Huntly, Argyle and Lethington, who was chosen spokes- man for the rest. She assented on condition that the divorce could be lawfully effected without impeachment of her son's legitimacy; whereupon Lethington undertook in the name of all present that she should be rid of her husband without any pre- judice to the child — at whose baptism a few days afterwards Bothwell took the place of the putative father, though Darnley was actually residing under the same roof, and it was not till after the ceremony that he was suddenly struck down by a sickness so violent as to excite suspicions of poison. He was removed to Glasgow, and left for the time in charge of his father; but on the news of his progress towards recovery a bond was drawn up for execution of the sentence of death which had secretly been pronounced against the twice-turned traitor who had earned his doom at all hands alike. On the 22nd of the next month (Jan. 1567) the queen visited her husband at Glasgow and proposed to remove him to Craigmillar Castle, where he would have the benefit of medicinal baths; but instead of this resort he was conveyed on

the last day of the month to the lonely and squalid shelter of the residence which was soon to be made memorable by his murder. Between the ruins of two sacred buildings, with the town-wall to the south and a suburban hamlet known to ill fame as the Thieves' Row to the north of it, a lodging was prepared for the titular king of Scotland, and fitted up with tapestries taken from the Gordons after the battle of Corrichie. On the evening of Sunday, the 9th of February, Mary took her last leave of the miserable boy who had so often and so mortally outraged her as consort and as queen. That night the whole city was shaken out of sleep by an explosion of gunpowder which shattered to fragments the building in which he should have slept and perished ;and the next morning the bodies of Darnley and a page were found strangled in a garden adjoining it, whither they had apparently escaped over a wall, to be despatched by the hands of Bothwell's attendant confederates.

Upon a view which may be taken of Mary's conduct during the next three months depends the whole debateable question of her character. According to the professed champions of that character, this conduct was a tissue of such dastardly imbecility, such heartless irresolution and such brainless inconsistency as for ever to dispose of her time-honoured claim to the credit of intelligence and courage. It is certain that just three months

and six days after the murder of her husband she became the wife of her husband's murderer. On the nth of February she wrote to the bishop of Glasgow, her ambassador in France, a brief letter of simple eloquence, announcing her providential escape from a design upon her own as well as her husband's life. A reward of two thousand pounds was offered by proclamation for discovery of the murderer. Bothwell and others, his satellites or the queen's, were instantly placarded by name as the criminals. Voices were heard by night in the streets of Edinburgh calling down judgment on the assassins. Four days after the discovery of the bodies, Darnley was buried in the chapel of Holyrood with secrecy, as remarkable as the solemnity with which Rizzio had been interred there less than a year before. On the Sunday following, Mary left Edinburgh for Seton Palace, 12 miles from the capital, where scandal asserted that she passed the time merrily in shooting-matches with Both- well for her partner against Lords Seton and Huntly; other accounts represent Huntly and Bothwell as left at Holyrood in charge of the infant prince. Gracefully and respectfully, with statesmanlike yet feminine dexterity, the demands of Darnley's father for justice on the murderers of his son were accepted and eluded by his daughter-in-law. Bothwell, with a troop of fifty men, rode through Edinburgh defiantly denouncing vengeance on his concealed accusers. As weeks elapsed without action on the part of the royal widow, while the cry of blood was up throughout the country, raising echoes from England and abroad, the murmur of accusation began to rise against her also. Mur- ray, with his sister's ready permission, withdrew to France. Already the report was abroad that the queen was bent on mar- riage with Bothwell, whose last year's marriage with the sister of Huntly would be dissolved, and the assent of his wife's brother purchased by the restitution of his forfeited estates. According to the Memoirs of Sir James Melville, both Lord Herries and himself resolved to appeal to the queen in terms of bold and earnest remonstrance against so desperate and scandalous a design; Herries, having been met with assurances of its unreality and professions of astonishment at the suggestion, instantly fled from court; Melville, evading the danger of a merely personal protest without backers to support him, laid before Mary a letter from a loyal Scot long resident in England, which urged upon her consideration and her conscience the danger and disgrace of such a project yet more freely than Herries had ventured to do by word of mouth; but the sole result was that it needed all the queen's courage and resolution to rescue him from the violence of the man for whom, she was reported to have said, she cared not if she lost France, England and her own country, and would go with him to the world's end in a white petticoat before she would leave him. On the 28th of March the privy council, in which Bothwell himself sat, appointed the 12th of April as the day of his trial,

Lennox, instead of the crown, being named as the accuser, and cited by royal letters to appear at " the humble request and petition of the said Earl Bothwell," who, on the day of the trial, had 4000 armed men be- hind him in the streets, while the castle was also at his command. Under these arrangements it was not thought wonderful that Lennox discreetly declined the danger of attendance, even with 3000 men ready to follow him, at the risk of desperate street fighting. He pleaded sickness, asked for more time, and demanded that the accused, instead of enjoying special favour, should share the treatment of other suspected criminals. But, as no particle of evidence on his side was advanced, the protest of his representative was rejected, and Bothwell, acquitted in default of witnesses against him, was free to challenge any persistent accuser to the ancient ordeal of battle. His wealth and power were enlarged by gift of the parliament which met on the 14th and rose on the 19th of April — a date made notable by the subsequent supper at Ainslie's tavern, where Bothwell obtained the signatures of its leading members to a document affirming his innocence, and pledging the subscribers to maintain it against all challengers, to stand by him in all his quarrels and finally to promote by all means in their power the marriage by which they recommended the queen to reward his

services and benefit the country. On the second day following Mary went to visit her child at Stirling, where his guardian, the earl of Mar, refused to admit more than two women in lier train. It was well known in Edinburgh that Bothwell had a body of men ready to intercept her on the way back, and carry her to Dunbar — not, as was naturally inferred, without good assurance of her consent. On the 24th of April, as she approached Edinburgh, Bothwell accordingly met her at the head of 800 spearmen, assured her (as she after- wards averred) that she was in the utmost peril, and escorted her, together with Huntly, Lethington and Melville, who were then in attendance, to Dunbar Castle. On the 3rd of May Lady Jane Gordon, who had become countess of Bothwell on the 22nd of February of the year preceding, obtained, on the ground of her husband's infidelities, a separation which, however, would not under the old laws of Catholic Scotland have left him free to marry again; on the 7th, accordingly, the necessary divorce was pronounced, after two days' session, by a clerical tribunal which ten days before had received from the queen a special commission to give judgment on a plea of somewhat apocryphal consanguinity alleged by Bothwell as the ground of an action for divorce against his wife. The fact was studiously evaded or concealed that a dispensation had been granted by the archbishop of St Andrews for this irregularity, which could only have arisen through some illicit connexion of the husband with a relative of the wife be- tween whom and himself no affinity by blood or marriage could be proved. On the day when the first or Protestant divorce was pronounced, Mary and Bothwell returned to

Edinburgh with every prepared appearance of a peaceful triumph. Lest her captivity should have been held to invalidate the late legal proceedings in her name, proclamation was made of forgiveness accorded by the queen to her captor in consideration of his past and future services; and her intention was announced to reward them by further promotion; and on the same day (May 12), he was duly created duke of Orkney and Shetland. The duke, as a conscientious Protestant, refused to marry his mistress according to the rites of her Church, and she, the chosen champion of its cause, agreed to be married to him, not merely by a Protestant but by one who before his conversion had been a Catholic bishop, and should therefore have been more hateful and contemptible in her eyes than any ordinary heretic, had not religion as well as policy, faith as well as reason, been absorbed or superseded by some more mastering passion or emotion. This passion or emotion, according to those who deny her attachment to Both-well, was simply terror — the blind and irrational prostration of an abject spirit before the cruel force of circumstances and the crafty wickedness of men. Hitherto, according to all evidence, she had shown herself on all occasions, as on all subsequent occasions she indisputably showed herself, the most fearless, the most keen-sighted, the most ready-witted, the most high-gifted and high-spirited of women; gallant and generous, skilful and practical, never to be cowed by fortune, never to be cajoled by craft; neither more unselfish in her ends nor more unscrupulous in her practice than might have been expected from her training and her creed. But at the crowning moment of trial there are those who assert their belief that the woman who on her way to the field of Corrichie had uttered her wish to be a man, that she might know all the hardship and all the enjoyment of a soldier's life, riding forth " in jack and knapscull " — the woman who long afterwards was to hold her own for two days together without help of counsel against all the array of English law and English statesmanship, armed with irrefragable evidence and supported by the resentment of a nation— showed herself equally devoid of moral and of physical resolution; too senseless to realize the significance and too heartless to face the danger of a situation from which the -simplest exercise of reason, principle or courage must have rescued the most unsuspicious and inexperienced of honest women who was not helplessly deficient in self-reliance and self-respect. The famous correspondence produced next year in evidence against her at the conference of York may have been, as her partisans affirm, so craftily garbled and falsified by interpolation, suppression perversion, or

absolute forgery as to be all but historically worthless. Its accep- tance or

its rejection does not in any degree whatever affect, for better or for worse, the rational estimate of her character. The problem presented by the simple existence of the facts just summed up remains in either case absolutely the same.

That the coarse and imperious nature of the hardy and able ruffian who had now become openly her master should no less openly have shown itself even in the first moments of their inauspicious union is what any bystander of common insight must inevitably have foreseen. Tears, dejection and passionate expressions of a despair " wishing only for death," bore fitful and variable witness to her first sense of a heavier yoke than yet had galled her spirit and her pride. At other times her affectionate gaiety would give evidence as trustworthy of a fearless and improvident satisfaction. They rode out in state together, and if he kept cap in hand as a subject she would snatch it from him and clap it on his head again ; while in graver things she took all due or possible care to gratify his ambition, by the insertion of a clause in their contract of marriage which made their joint signature necessary to all documents of state issued under the sign-manual. She despatched to France a special envoy, the bishop of Dumblane, with instructions setting forth at length the unparalleled and hitherto ill-requited services and merits of Bothwell, and the necessity of compliance at once with his passion and with the unanimous counsel of the nation — a people who would endure the rule of no foreign consort, and whom none of their own countrymen were so competent to control, alike by wisdom and by valour, as the incomparable subject of her choice. These personal merits and this politi- cal necessity were the only pleas advanced in a letter to her ambassador in England. But that neither plea would avail her for a moment in Scotland she had ominous evidence on the. thirteenth day after her marriage, when no response was made to the usual form of proclamation for a raid or levy of forces under pretext of a campaign against the rievers of the border. On the 6th or 7th of June Mary and Bothwell took refuge in Borthwick Castle, twelve miles from the capital, where the fortress was in the keeping of an adherent whom the diplo- macy of Sir James Melville had succeeded in detaching from his allegiance to Bothwell. The fugitives were pursued and be- leaguered by the earl of Morton and Lord Hume, who declared their purpose to rescue the queen from the thraldom of her hus- band. He escaped, leaving her free to follow him or to join the party of her professed deliverers. But whatever cause she might have found since marriage to complain of his rigorous custody and domineering brutality was insufficient to break the ties by which he held her. Alone, in the disguise of a page, she slipped out of the castle at midnight, and rode off to meet him at a tower two miles distant, whence they fled together to Dunbar. The confederate lords on entering Edinburgh were welcomed by the citizens, and after three hours' persuasion

Lethington, who had now joined them, prevailed on the captain of the castle to deliver it also into their hands. Proclamations were issued in which the crime of Bothwell was denounced, and the disgrace of the country, the thraldom of the queen and the mortal peril of her infant son, were set forth as reasons for summoning all the lieges of the chief cities of Scotland to rise in arms on three hours' notice and join the forces assembled against the one common enemy. News of his approach reached them on the night of June 14, and they marched before dawn with 2200 men to meet him near Mussel- burgh. Mary meanwhile had passed from Dunbar to Hadding- ton, and thence to Seton, where 1600 men rallied to her side. On the 15th of June, one month from their marriage day, the queen and Bothwell, at the head of a force of fairly equal numbers but visibly inferior discipline, met the army of the confederates at Carberry Hill, some six miles from Edinburgh. Du Croc, the French ambassador, obtained permission through the influence of Maitland to convey to the queen the terms proposed by their leaders — that she and Bothwell should part, or that he should meet in single combat a champion chosen from among their number. Bothwell offered to meet any man of sufficient quality; Mary would not assent. As the afternoon wore on

their force began to melt away by desertion and to break up for lack of discipline. Again the trial by single combat was pro- posed, and thrice the proposal fell through, owing to objections on this side or on that. At last it was agreed that the queen should yield herself prisoner, and Bothwell be allowed to retire in safety to Dunbar with the few followers who remained to him. Mary took leave of her first and last master with passionate anguish and many parting kisses; but in face of his enemies, and in hear- ing of the cries which burst from the ranks, demanding her death by fire as a murderess and harlot, the whole heroic and passionate spirit of the woman, represented by her admirers as a spiritless imbecile, flamed out in responsive threats to have all the men hanged and crucified, in whose power she now stood helpless and alone. She grasped the hand of Lord Lindsay as he rode beside her, and swore " by this hand " she would " have his head for this." In Edinburgh she was received by a yelling mob, which flaunted before her at each turn a banner representing the corpse of Darnley with her child beside it invoking on his knees the retribution of divine justice. From the violence of a multitude in which women of the worst class were more furious than the men she was sheltered in the house of the provost, where she repeatedly showed herself at the window, appealing aloud with dishevelled hair and dress to the mercy which no man could look upon her and refuse. At nine in the evening she was removed to Holyrood, and thence to the port of Leith, where she embarked under guard, with her attendants, for the island castle of Loch- leven. On the 20th a silver casket containing letters and French verses, miscalled sonnets, in

the handwriting of the queen, was taken from the person of a servant who had been sent by Both- well to bring it from Edinburgh to Dunbar. Even in the exist- ing versions of the letters, translated from the lost originals and retranslated from this translation of a text which was probably destroyed in 1603 by order of King James on his accession to the English throne — even in these possibly disfigured versions, the fiery pathos of passion, the fierce and piteous fluctuations of spirit between love and hate, hope and rage and jealousy, have an eloquence apparently beyond the imitation or invention of art (see Casket Letters 1). Three days after this discovery Lord Lindsay, Lord Ruthven and Sir Robert Melville were despatched to Lochleven, there to obtain the queen's signature to an act of abdication in favour of her son, and another appoint- ing Murray regent during his minority. She submitted, and a commission of regency was established till the return from France of Murray, who, on the 15th of August, arrived at Loch- leven with Morton and Athole. According to his own account, the expostulations as to her past conduct which preceded his admonitions for the future were received with tears, confessions and attempts at extenuation or excuse; but when they parted next day on good terms she had regained her usual spirits. Nor from that day forward had they reason to sink again, in spite of the close keeping in which she was held, with the daughters of the house for bedfellows. Their mother and the regent's, her father's former mistress, was herself not impervious to her prisoner's lifelong power of seduction and subjugation. Her son George Douglas fell inevitably under the charm. A rumour transmitted to England went so far as to assert that she had proposed him to their common half-brother Murray as a fourth husband for herself; a later tradition represented her as the mother of a child by him. A third report, at least as im- probable as either, asserted that a daughter of Mary and Both- well, born about this time, lived to be a nun in France. It is certain that the necessary removal of George Douglas from Loch- leven enabled him to devise a method of escape for the prisoner on the 25th of March, 1568, which was frustrated by detection of her white hands under the disguise of a laundress. But a younger member of the household, Willie Douglas, aged eighteen, whose devotion was afterwards remembered and his safety cared for by Mary at a time of utmost risk and perplexity to herself, succeeded on the 2nd of May in assisting her to escape by a

1 It is to be observed that the above conclusion as to the authen- ticity of the Casket Letters is the same as that arrived at upon dif- ferent grounds by the most recent research on the subject. — Ed. E. B.

postern gate to the lake-side, and thence in a boat to the main- land, where George Douglas, Lord Seton and others were await- ing her. Thence they rode to Seton's castle of Niddry, and next day to Hamilton palace, round which an army of 6000 men was soon assembled, and whither the new French ambassador to Scotland hastened to pay his duty. The queen's abdication was revoked, messengers were despatched to the English and French courts, and word was sent to Murray at Glasgow that he must resign the regency, and should be pardoned in common with all offenders against the queen. But on the day when Mary arrived at Hamilton Murray had summoned to Glasgow the feudatories of the Crown to take arms against the insurgent enemies of the infant king. Elizabeth sent conditional offers of help to her kinswoman, provided she would accept of English intervention and abstain from seeking foreign assistance; but the messenger came too late. Mary's followers had failed to retake Dunbar Castle from the regent, and made for Dumbarton instead, marching two miles south of Glasgow, by the village of Langside. Here Murray, with 4500 men, under leaders of high distinction, met the 6000 of the queen's army, whose ablest man, Hemes, was as much distrusted by Mary as by every one else, while the Hamiltons could only be trusted to think of their own interests, and were suspected of treasonable designs on all who stood between their house and the monarchy. On the 13th of May the battle or skirmish of Langside determined the result of the campaign in three-quarters of an hour. Kirkaldy of Grange, who commanded the regent's cavalry, seized and kept the place of vantage from the beginning, and at the first sign of wavering on the other side shattered at a single charge the forces of the queen with a loss of one man to three hundred. Mary fled 60 miles from the field of her last battle before she halted at Sanquhar, and for three days of flight, according to her own account, had to sleep on the hard ground, live on oat-meal and sour milk, and fare at night like the owls, in hunger, cold and fear. On the third day from the rout of Langside she crossed the Solway and landed at Workington in Cumberland, May 16, 1568. On the 20th Lord Scrope and Sir Francis Knollys were sent from court to carry messages and letters of comfort from Elizabeth to Mary at Carlisle. On the nth of June Knollys wrote to Cecil at once the best description and the noblest panegyric extant of the queen of Scots — enlarging, with a brave man's sympathy, on her indifference to form and cere mony, her daring grace and openness of manner, her frank dis- play of a great desire to be avenged of her enemies, her readiness to expose herself to all perils in hope of victory, her delight to hear of hardihood and courage, commending by name all her enemies of approved valour, sparing no cowardice in her friends, but above all things athirst for victory by any means at any price, so that for its sake pain and peril seemed pleasant to her, and wealth and all things, if compared with it, contemptible and vile. What was to be done with such a princess, whether she were to be nourished in one's bosom,

above all whether it could be advisable or safe to try any diplomatic tricks upon such a lady, Knollys left for the minister to judge. It is remarkable that he should not have discovered in her the qualities so obvious to modern champions of her character — easiness, gullibility, incurable innocence and invincible ignorance of evil, incapacity to suspect or resent anything, readiness to believe and forgive all things. On the 15th of July, after various delays interposed by her reluc- tance to leave the neighbourhood of the border, where on her arrival she had received the welcome and the homage of the leading Catholic houses of Northumberland and Cumberland, she was removed to Bolton Castle in North Yorkshire. During her residence here a conference was held at York between her own and Elizabeth's commissioners and those appointed to represent her son as a king of Scots. These latter, of whom Murray himself was the chief, privately laid before the English commissioners the contents of the famous casket. On the 24th of October the place of the conference was shifted from York to London, where the inquiry was to be held before Queen Elizabeth in council. Mary was already aware that the chief of the English commissioners, the duke of Norfolk, was secretly an aspirant to

the peril of her hand; and on the 21st of October she gave the first sign of assent to the suggestion of a divorce from Bothwell. On the 26th of October the charge of complicity in the murder of Darnley was distinctly brought forward against her in spite of Norfolk's reluctance and Murray's previous hesitation. Eliza- beth, by the mouth of her chief justice, formally rebuked the audacity of the subjects who durst bring such a charge against their sovereign, and challenged them to advance their proofs. They complied by the production of an indictment under five heads, supported by the necessary evidence of documents. The number of English commissioners was increased, and they were bound to preserve secrecy as to the matters revealed. Further evidence was supplied by Thomas Crawford, a retainer of the house of Lennox, tallying so exactly with the text of the casket letters as to have been cited in proof that the latter must needs be a forgery. Elizabeth, on the close of the evidence, invited Mary to reply to the proofs alleged before she could be admitted to her presence; but Mary simply desired her commissioners to withdraw from the conference. She declined with scorn the pro- posal made by Elizabeth through Knollys, that she should sign a second abdication in favour of her son. On the 10th of January, 1569, the judgment given at the conference acquitted Murray and his adherents of rebellion, while affirming that nothing had been proved against Mary — a verdict accepted by Murray as equiva lent to a practical recognition of his office as regent for the infant king. This position he was not long to hold; and the fierce exultation of Mary at the news of his murder gave to those who believed in her complicity with the murderer, on whom a pension was bestowed by her unblushing gratitude, fresh reason to

fear, if her liberty of correspondence and intrigue were not restrained, the likelihood of a similar fate for Elizabeth. On the 26th of Jan- uary 1569 she had been removed from Bolton Castle to Tutbury in Staffordshire, where proposals were conveyed to her, at the instigation of Leicester, for a marriage with the duke of Norfolk, to which she gave a graciously conditional assent; but the dis- covery of these proposals consigned Norfolk to the Tower, and on the outbreak of an insurrection in the north Mary, by Lord Hunsdon's advice, was again removed to Coventry, when a body of her intending deliverers was within a day's ride of Tutbury. On the 23rd of January following Murray was assassinated; and a second northern insurrection was crushed in a single sharp fight by Lord Hunsdon. In October Cecil had an interview with Mary at Chatsworth, when the conditions of her possible restoration to the throne in compliance with French demands were debated at length. The queen of Scots, with dauntless dignity, refused to yield the castles of Edinburgh and Dumbarton into English keeping, or to deliver up her fugitive English partisans then in Scotland; upon other points they came to terms, and the articles were signed the 16th of October. On the same day Mary wrote to Elizabeth, requesting with graceful earnestness the favour of an interview which might reassure her against the suggestion that this treaty was a mere pretence. On the 28th of November she was removed to Sheffield Castle, where she remained for the next fourteeen years in charge of the earl of Shrewsbury. The detection of a plot, in which Norfolk was implicated, for the invasion of England by Spain on behalf of Mary, who was then to take him as the fourth and most contemptible of her husbands, made necessary the reduction of her household and the stricter confinement of her person. On the 28th of May 1572 a demand from both houses of parliament for her execution as well as Norfolk's was generously rejected by Elizabeth; but after the punishment of the traitorous pretender to her hand, on whom she had lavished many eloquent letters of affectionate protestation, she fell into " a passion of sickness " which convinced her honest keeper of her genuine grief for the ducal caitiff. A treaty projected on the news of the massacre of St Bartholomew, by which Mary should be sent back to Scotland for immediate execution, was broken off by the death of the earl of Mar, who had succeeded Lennox as regent; nor was it found possible to come to acceptable terms on a like understanding with his successor Morton, who in 1577 sent a proposal to Mary for her restoration, which she declined, in

suspicion of a plot laid to entrap her by the policy of Sir Francis Walsingham, the most unscrupulously patriotic of her English enemies, who four years afterwards sent word to Scotland that the execution of Morton,

so long the ally of England, would be answered by the execution of Mary. But on that occasion Elizabeth again refused her assent either to the trial of Mary or to her transference from Sheffield to the Tower. In 1581 Mary accepted the advice of Catherine de' Medici and Henry III. that she should allow her son's title to reign as king of Scotland conjointly with herself when released and restored to a share of the throne. This plan was but part of a scheme including the invasion of England by her kinsman the duke of Guise, who was to land in the north and raise a Scottish army to place the re- leased prisoner of Sheffield beside her son on the throne of Eliza- beth. After the overthrow of the Scottish accomplices in this notable project, Mary poured forth upon Elizabeth a torrent of pathetic and eloquent reproach for the many wrongs she had suffered at the hands of her hostess, and pledged her honour to the assurance that she now aspired to no kingdom but that of heaven. In the spring of 1583 she retained enough of this saintly resignation to ask for nothing but liberty, without a share in the government of Scotland; but Lord Burghley not unreasonably preferred, if feasible, to reconcile the alliance of her son with the detention of his mother. In 1584 the long-suffering earl of Shrewsbury was relieved of his fourteen years' charge through the involuntary good offices of his wife, whose daughter by her first husband had married a brother of Darnley; and their orphan child Arabella, born in England, of royal descent on the father's side, was now,' in the hopeful view of her grandmother, a more plausible claimant than the king or queen of Scots to the inheritance of the English throne. In December 1583 Mary had laid before the French ambassador her first complaint of the slanders spread by Lady Shrewsbury and her sons, who were ultimately compelled to confess the falsehood of their imputa- tions on the queen of Scots and her. keeper. It was probably at the time when a desire for revenge on her calumniatress made her think the opportunity good and safe for discharge of such a two-edged dart at the countess and the queen that Mary wrote, but abstained from despatching, the famous and terrible letter in which, with many gracious excuses and professions of regret and attachment, she transmits to Elizabeth a full and vivid report of the hideous gossip retailed by Bess of Hardwick regard- ing her character and person at a time when the reporter of these abominations was on friendly terms with her husband's royal charge. In the autumn of 1584 she was removed to Wingfield Manor under charge of Sir Ralph Sadler and John Somers, who accompanied her also on her next removal to Tutbury in January 1585. A letter received by her in that cold, dark and unhealthy castle, of which fifteen years before she had made painful and malodorous experience, assured her that her son would acknow- ledge her only as queen-mother, and provoked at once the threat of a parent's curse and an application to Elizabeth for sympathy. In April 1585 Sir Amyas Paulet was appointed to the office of which Sadler, accused of careless indulgence, had requested to be relieved; and on Christmas Eve she was

removed from the hateful shelter of Tutbury to the castle of Chartley in the same county. Her correspondence in cipher from thence with her Eng- lish agents abroad, intercepted by Walsingham and deciphered by his secretary, gave eager encouragement to the design for a Spanish invasion of England under the prince of Parma,— an enterprise in which she would do her utmost to make her son take part, and in case of his refusal would induce the Catholic nobles of Scotland to betray him into the hands of Philip, from whose tutelage he should be released only on her demand, or if after her death he should wish to return, nor then unless he had become a Catholic. But even these patriotic and maternal schemes to consign her child and re-consign the kingdom to the keeping of the Inquisition, incarnate in the widower of Mary Tudor, were superseded by the attraction of a conspiracy against the throne and life of Elizabeth. Anthony Babington, in his boyhood a ward of Shrewsbury, resident in the household at Sheffield Castle, and thus subjected to the charm before which so

many victims had already fallen, was now induced to under- take the deliverance of the queen of Scots by the murder of the queen of England. It is maintained by those admirers of Mary who assume her to have been an almost absolute imbecile, gifted with the power of imposing herself on the world as a woman of unsurpassed ability, that, while cognisant of the plot for her deliverance by English rebels and an invading army of foreign auxiliaries, she might have been innocently unconscious that this conspiracy involved the simultaneous assassination of Elizabeth. In the conduct and detection of her correspondence with Babing- ton, traitor Was played off against traitor, and spies were utilized against assassins, with as little scruple as could be required or expected in the diplomacy of the time. As in the case of the casket letters, it is alleged that forgery was employed to inter- polate sufficient evidence of Mary's complicity in a design of which it is thought credible that she was kept in ignorance by the traitors and murderers who had enrolled themselves in her service, — that one who pensioned the actual murderer of Murray and a would-be murderer of Elizabeth was incapable of approving what her keen and practised intelligence was too blunt and torpid to anticipate as inevitable and inseparable from the general design. In August the conspirators were netted, and Mary was arrested at the gate of Tixall Park, whither Paulet had taken her under pretence of a hunting party. At Tixall she was detained till her papers at Chartley had undergone thorough research. That she was at length taken in her own toils even such a dullard as her admirers depict her could not have failed to understand; that she was no such dastard as to desire or deserve such defen- ders the whole brief course of her remaining life bore consistent and irrefragable witness. Her first thought on her return to Chartley was one of loyal gratitude and womanly sympathy. She cheered the wife of her English secretary, now under arrest, with promises

to answer for her husband to all accusations brought against him, took her new-born child from the mother's arms, and in default of clergy baptized it, to Paulet's Puritanic horror, with her own hands by her own name. The next or the twin-born impulse of her indomitable nature was, as usual in all times of danger, one of passionate and high-spirited defiance on discovering the seizure of her papers. A fortnight afterwards her keys and her money were confiscated, while she, bedridden and unable to move her hand, could only ply the terrible weapon of her bitter and fiery tongue. Her secretaries were examined in London, and one of them gave evidence that she had first heard of the conspiracy by letter from Babington, of whose design against the life of Elizabeth she thought it best to take no notice in her reply, though she did not hold herself bound to reveal it. On the 25th of September she was removed to the strong castle of Fotheringay in Northamptonshire. On the 6th of October she was desired by letter from Elizabeth to answer the charges brought against her before certain of the chief English nobles appointed to sit in commission on the cause. In spite of her first refusal to submit, she was induced by the arguments of the vice-chamberlain, Sir Christopher Hatton, to appear before this tribunal on condition that her protest should be registered against the legality of its jurisdiction over a sovereign, the next heir of the English crown.

On the 14th and 15th of October 1586 the trial was held in the hall 'of Fotheringay Castle. Alone, " without one counsellor on her side among so many," Mary conducted the whole of her own defence with courage incomparable and unsurpassable ability. Pathos and indignation, subtlety and simplicity, personal appeal and political reasoning, were the alternate weapons with which she fought against all odds of evidence or inference, and disputed step by step every inch of debatable ground. She repeatedly insisted on the production of proof in her own handwriting as to her complicity with the project of the assassins who had expiated their crime on the 20th and 21st of the month preceding. When the charge was shifted to the question of her intrigues with Spain, she took her stand resolutely on her own right to convey whatever right she possessed, though now no kingdom was left her for disposal, to whomsoever she might choose. One single slip she made in the; whole course of

her defence; but none could have been more unluckily character- istic and significant. When Burghley brought against her the unanswerable charge of having at that moment in her service, and in receipt of an annual pension, the instigator of a previous attempt on the life of Elizabeth, she had the unwary audacity to cite in her justification the pensions allowed by

Elizabeth to her adversaries in Scotland, and especially to her son. It is remarkable that just two months later, in a conversation with her keepers, she again made use of the same extraordinary argument in reply to the same inevitable imputation, and would not be brought to admit that the two cases were other than parallel. But except for this single instance of oversight or perversity her defence was throughout a masterpiece of indomit- able ingenuity, of delicate and steadfast courage, of womanly dignity and genius. Finally she demanded, as she had demanded before, a trial either before the estates of the realm lawfully assembled or else before the queen in council. So closed the second day of the trial; and before the next day's work could begin a note of two or three lines hastily written at midnight informed the commissioners that Elizabeth had suddenly deter- mined to adjourn the expected judgment and transfer the place of it to the star-chamber. Here, on the 25th of October, the commissioners again met; and one of them alone, Lord Zouch, dissented from the verdict by which Mary was found guilty of having, since the 1st of June preceding, compassed and imagined divers matters tending to the destruction of Elizabeth. This verdict was conveyed to her, about three weeks later, by Lord Buckhurst and Robert Beale, clerk of the privy council. At the intimation that her life was an impediment to the security of the received religion, " she seemed with a certain unwonted alacrity to triumph, giving God thanks, and rejoicing in her heart that she was held to be an instrument " for the restoration of her own faith. This note of exultation as in martyrdom was maintained with unflinching courage to the last. She wrote to Elizabeth and the duke of Guise two letters of almost matchless eloquence and pathos, admirable especially for their loyal and grateful remembrance of all her faithful servants. Between the date of these letters and the day of her execution wellnigh three months of suspense elapsed. Elizabeth, fearless almost to a fault in face of physical danger, constant in her confidence even after discovery of her narrow escape from the poisoned bullets of household conspirators, was cowardly even to a crime in face of subtler and more complicated peril. She rejected with resolute dignity the intercession of French envoys for the life of the queen-dowager of France; she allowed the sentence of death to be proclaimed and welcomed with bonfires and bell- ringing throughout the length of England; she yielded a respite of twelve days to the pleading of the French ambassador, and had a charge trumped up against him of participation in a conspiracy against her life; -at length, on the 1st of February 1587, she signed the death-warrant, and then made her secre- taries write word to Paulet of her displeasure that in all this time he should not of himself have found out some way to shorten the life of his prisoner, as in duty bound by his oath, and thus relieve her singularly tender conscience from the guilt of blood- shed. Paulet, with loyal and regretful indignation, declined the disgrace proposed to him in a suggestion " to shed blood without law or warrant "; and on the

7 th of February the earls of Shrewsbury and Kent arrived at Fotheringay with the commis- sion of the council for execution of the sentence given against his prisoner. Mary received the announcement with majestic tranquillity, expressing in dignified terms her readiness to die, her consciousness that she was a martyr for her religion, and her total ignorance of any conspiracy against the life of Elizabeth. At night she took a graceful and affectionate leave of her atten- dants, distributed among them her money and jewels, wrote out in full the various legacies to be conveyed by her will, and charged her apothecary Gorion with her last messages for the king of Spain. In these messages the whole nature of the woman was revealed. Not a single friend, not a single enemy, was forgotten; the slightest service, the slightest wrong, had its place assigned in her faithful and implacable memory for retribution or reward.

Forgiveness of injuries was as alien from her fierce and loyal spirit as forgetfulness of benefits; the destruction of England and its liberties by Spanish invasion and conquest was the strongest aspiration of her parting soul. At eight next morning she entered the hall of execution, having taken leave of the weeping envoy from Scotland, to whom she gave a brief message for her son; took her seat on the scaffold, listened with an air of even cheerful unconcern to the reading of her sentence, solemnly declared her innocence of the charge conveyed in it and her consolation in the prospect of ultimate justice, rejected the professional services of Richard Fletcher, dean of Peter- borough, lifted up her voice in Latin against his in English prayer, and when he and his fellow-worshippers had fallen duly silent prayed aloud for the prosperity of her own church, for Elizabeth, for her son, and for all the enemies whom she had commended overnight to the notice of the Spanish invader; then, with no less courage than had marked every hour and every action of her life, received the stroke of death from the wavering hand of the headsman.

Mary Stuart was in many respects the creature of her age, of her creed, and of her station; but the noblest and most noteworthy qualities of her nature were independent of rank, opinion or time. Even the detractors who defend her conduct on the plea that she was a dastard and a dupe are compelled in the same breath to retract this implied reproach, and to admit, with illogical acclamation and incongruous applause, that the world never saw more splendid courage at the service of more brilliant intelligence, that a braver if not " a rarer spirit never did steer humanity." A kinder or more faithful friend, a deadlier or more dangerous enemy, it would be impossible to dread or to desire. Passion alone could shake the double fortress of her impregnable heart and ever-active brain. The passion of love, after very sufficient experience, she apparently and naturally outlived; the passion of hatred and revenge was as inextinguishable in her inmost nature as the emotion of loyalty and gratitude. Of repentance it

would seem that she knew as little as of fear, having been trained from her infancy in a religion where the Decalogue was supplanted by the Creed. Adept as she was in the most exquisite delicacy of dissimulation, the most salient note of her original disposition was daring rather than subtlety. Beside or behind the voluptuous or intellectual attractions of beauty and culture, she had about her the fresher charm of a fearless and frank simplicity, a genuine and enduring pleasure in small and harmless things no less than in such as were neither. In 1562 she amused herself for some days by living " with her little troop " in the house of a burgess of St Andrews " like a burgess's wife," assuring the English ambas- sador that he should not find the queen there, — " nor I know not myself where she is become." From Sheffield Lodge, twelve years later, she applied to the archbishop of Glasgow and the cardinal of Guise for some pretty little dogs, to be sent her in baskets very warmly packed, — " for besides reading and working, I take pleasure only in all the little animals that I can get." No lapse of reconciling time, no extent of comparative indulgence, could break her in to resignation, submission, or toleration of evert partial restraint. Three months after the massacre of St Bartholomew had caused some additional restrictions to be placed upon her freedom of action, Shrewsbury writes to Burghley that " rather than continue this imprisonment she sticks not to say she will give her body, her son, and country for liberty "; nor did she ever show any excess of regard for any of the three. For her own freedom of will and of way, of passion and of action, she cared much; for her creed she cared something; for her country she cared less than nothing. She would have flung Scotland with England into the hell fire of Spanish Catholicism rather than forgo the faintest chance of personal revenge. Her profession of a desire to be instructed in the doctrines of Anglican Protestantism was so transparently a pious fraud as rather to afford confirmation than to arouse suspicion of her fidelity to the teaching of her church. Elizabeth, so shamefully her inferior in personal loyalty, fidelity and gratitude, was as clearly her superior on the one all-important point of patriotism. The

saving salt of Elizabeth's character, with all its wellnigh incred- ible mixture of heroism and egotism, meanness and magnificence, was simply this, that, overmuch as she loved herself, she did yet love England better. Her best though not her only fine qualities were national and political, the high public virtues of a good public servant; in the private and personal qualities which attract and attach a friend to his friend and a follower to his leader, no man or woman was ever more constant and more eminent than Mary Queen of Scots. (A. C. S.)

Bibliography. — The biography of Mary Stuart being virtually the history of Scotland during the period covered by her life, with which the history of England at the same period is also largely concerned, the chief events in which she figured are related in all the general Histories of both countries. The most important original authorities are the voluminous State Papers of the period, with other MS. documents preserved at the British Museum, the Cambridge University Library, Hatfield and elsewhere. See especially the Reports of the Hist. MSS. Commission; Calendar of State Papers relating to Scotland and Mary Queen of Scots (Scottish Record Publ. 1898); Calendar of Letters and State Papers relating to English Affairs, principally in the Archives at Simancas (vols. i.-iv., 1392-1899); and the Calendars of State Papers: Domestic Series, Edw. VI. -James I.; Foreign Series, Elizabeth; Venice Series.

The most important unofficial contemporary works are the Histories of John Knox, Bishop John Lesley, George Buchanan, and Robert Lindsay of Pitscottie; the Diurnal of Remarkable Occurrents from the death of James IV. till 157$ (Bannatyne Club, 1833); Robert Birrell's " Diary" in Sir J. G. Dalzell's Fragments of Scottish History (Edinburgh, 1798); History of Mary Stuart, by her secretary Claude Nau, ed. by J. Stevenson (Edinburgh, 1883); Sir James Melville's Memoirs of his own Life (Bannatyne Club, 1827); Richard Bannatyne, Memoriales of Transactions in Scot- land (Edinburgh, 1836); William Camden's Annates (Eng. trans., London, 1635); Michel de Castelnau's Memoires (Brussels, 1731); the Memoires of Brantome (ed. by L. Lalanne, 12 vols., Paris, 1 864-1 896); Relations politiques de la France et de I'Espagne avec VEcosse au l6 e siecle (ed. by J. B. A. Teulet, 5 vols., Paris, 1862), containing important original letters and documents; Thomas Wright's Queen Elizabeth and her Times (2 vols., London, 1838), consists of private letters of Elizabethan statesmen many of which refer to Mary Stuart, and others are to be found in Sir Henry Ellis's Original Letters illustrative of English History (London, 1825-1846); much of Mary's own correspondence will be found in Prince A. Labanoff's Lettres inedites, 15 58-1 587 (Paris, 1839), and Lettres, instructions, et memoires de Marie Stuart (7 vols., London, 1844), selections from which have been translated into English by W. Turnbull in Letters of Mary Queen of Scots (London, 1845), and by Agnes Strickland in Letters of Mary Queen of Scots and Documents connected with her Personal History (3 vols., London, 1842).

Among authorities not actually contemporary but written within a century of Mary's death are David Calderwood's Hist, of the Kirk of Scotland (8 vols., Edinburgh, 1842-1849); Archbishop Spottiswoode's Hist, of the Church of Scotland (ed. by M. Russell, 3 vols., Edinburgh, 1847-1851), and Robert Keith's Hist, of Affairs of Church and State in Scotland (Spottiswoode Society ed., 1844); to which should be added the modern

classic, George Grub's Eccle- siastical History of Scotland (4 vols., Edinburgh, 1861).

Of modern general histories those of chief importance on the subject are the Histories of England by Hume, Lingard and Froude; and the Histories of Scotland by Robertson, P. F. Tytler, John Hill Burton, Malcolm Laing and Andrew Lang. Numerous biographies of Mary Stuart have been published, as well as essays and treatises dealing with particular episodes in her life, of which the most worthy of mention are: George Chalmers, Life of Mary Queen of Scots, (2 vols., London, 1818); Henry Glassford Bell, Life of Mary Queen of Scots (2 vols., Edinburgh, 1828-1831); the "Life" in Agnes Strickland's Lives of the Queens of Scotland (8 vols., Edinburgh, 1850); J. D. Leader, Mary Queen of Scots in Captivity (Sheffield, 1880); Colin Lindsay, Mary Queen of Scots and her Marriage with Bothwell (London, 1883); Mrs Maxwell-Scott, The Tragedy of Fotheringay (London, 1895); F. A. M. Mignet, Histoire de Marie Stuart (2 vols., Brussels, 1851); Martin Philippson, Histoire du r'egne de Marie Stuart (3 vols., Paris, 1891) ; Sir John Skelton, Mary Stuart (London, 1893), Maitland of Lethington and the Scotland of Mary Stuart (2 vols., Edinburgh, 1887), The Impeachment of Mary Stuart (Edinburgh, 1878), and Essays in History and Biography, including the Defence of Mary Stuart (Edinburgh, 1883); Joseph Stevenson, Mary Stuart: The First Eighteen Years of her Life (Edinburgh, 1886); D. Hay Fleming, Mary Stuart (2nd ed. 1898); Jane Stoddart, Girlhood of Mary Queen of Scots.

With special reference to the controversy concerning the Casket Letters, in addition to the article Casket Letters and the above- mentioned works by Sir John Skelton, the following should be consulted: Walter Goodall, Examination of the Letters said to be written by Mary Queen of Scots to Bothwell (2 vols., Edinburgh, 1754), which contains the letters themselves; William Tytler, Inquiry into the Evidence against Mary Queen of Scots (2 vols., London,

1790); John Whitaker, Mary Queen of Scots Vindicated (3 vols., London, 1788); F. de Peyster, Mary Stuart, Bothwell and the Casket Letters (London, 1890); T. F. Henderson, The Casket Letters and Mary Queen of Scots (Edinburgh, 1889); Andrew Lang, The Mystery of Mary Stuart (London, 1900).

In 1690 Giovanni Francesco Savaro published a play La Maria Stuarda,_ and since then the story of the Queen of Scots has been the subject of numerous poems and dramas, of which the most celebrated are Schiller's Maria Stuart, and three tragedies by A. C Swinburne — Chastelard (1865), Bothwell (1874), and Mary Stuart (1881).

MARY (1457-1482}, duchess of Burgundy, only child of Charles the Bold, duke of Burgundy, and his wife Isabella of Bourbon, was born on the 13th of February 1457. As heiress of the rich Burgundian domains her hand was eagerly sought by a number of princes. When her father fell upon the field of Nancy, on the 5th of ˆanuary 1477, Mary was not yet twenty years of age. Louis' XL of France seized the opportunity afforded by his rival's defeat and death to take possession of the duchy of Burgundy as a fief lapsed to the French crown, and also of Franche Comte, Picardy and Artois. He was anxious that Mary should marry the Dauphin Charles arid thus secure the inheritance of the Netherlands for his descendants. Mary, however, distrusted Louis; declined the French alliance, and turned to her Netherland subjects for help. She obtained the help only at the price of great concessions. On the nth of February 1477 she was compelled to sign a charter of rights, known as " the Great Privilege," by which the provinces and towns of the Netherlands recovered all the local and communal rights which had been abolished by the arbitrary decrees of the dukes of Burgundy in their efforts to create in the Low Countries a centralized state. Mary had to undertake not to declare war, make peace, or raise taxes without the consent of the States, and not to employ any but natives in official posts. Such was the hatred of the people to the old regime that two influential councillors of Charles the Bold, the Chancellor Hugonet and the Sire d'Humbercourt, having been discovered in correspondence with the French king, were executed at Ghent despite the tears and entreaties of the youthful duchess. Mary now made her choice among the many suitors for her hand, and selected the archduke Maximilian of Austria, afterwards the emperor Maximilian I., and the marriage took place at Ghent on the 18th of August 1477. Affairs now went more smoothly in the Netherlands, the French aggression was checked, and internal peace was in a large measure restored, when the duchess met her death by a fall from her horse on the 27th of March 1482. Three children had been the issue of her marriage, and her elder son, Philip, succeeded to her dominions under the guardianship of his father.

See E. Munch, Maria von Burgund, nebst d. Leben v. Margaretha v. York (2 vols., Leipzig, 1832), and the Cambridge Mod. Hist. (vol. i., c. xii., bibliography, 1903).

MARY (1496-1533), queen of France, was the daughter of Henry VII. of England and Elizabeth of York. At first it was intended to marry her to Charles of Austria, the future emperor Charles V., and by the treaty of Calais (Dec. 21, 1507) it was agreed that the marriage should take place when Charles should have attained the age of fourteen, the contract being secured by bonds taken from various princes and cities in the Low Countries. On the 17th of December 1508 the Sieur de Bergues, who had come over as Charles's representative at the head of a magnificent

embassy, married the princess by proxy. The contract, originally made by Henry VII., was renewed on the 17th of October 15 13 by Henry VIII. at a meeting with Margaret of Savoy at Lille, the wedding being fixed for the following year. But the emperor Maximilian I., to whom Louis XII. had pro- posed his daughter Renee as wife for Charles, with Brittany for dowry, postponed the match with the English princess in a way that left no doubt of his intention to withdraw from the contract altogether. He was forestalled by the diplomacy of Wolsey, at whose instance peace was signed with France on the 7th of August 1514, and on the same date a treaty was concluded for the marriage of Mary Tudor with Louis XII., who had recently lost his wife Anne of Brittany. The marriage was celebrated

at Abbeville on the 9th of October. The bridegroom was a broken man of fifty-two; the bride a beautiful, well-educated and charming girl of eighteen, whose heart was already engaged to Charles Brandon, duke of Suffolk, her future husband. The political marriage was, however, no long one. Mary was crowned queen of France on the 5th of November 1514; on the 1st of January following King Louis died. Mary had only been induced to consent to the marriage with Louis by the promise that, on his death, she should be allowed to marry the man of her choice. But there was danger that the agreement would not be kept. In France the dukes of Lorraine and Savoy were mentioned as possible suitors, and meanwhile the new king, Francis I., was making advances to her, and only desisted when she confessed to him her previous attachment to Suffolk. The duke himself was at the head of the embassy which came from England to congratulate the new king, and to the detriment of his political mission he used the opportunity to win the hand of the queen. Francis good-naturedly promised to use his influence in his favour; Henry VIII. himself was not averse to the match, but Mary feared the opposition of the lords of the council, and, in spite of Suffolk's promise to the king not to take any steps in the matter until after his return, she persuaded him to marry her secretly before he left Paris. On their return to England in April, Suffolk was for a while in serious danger from the king's indignation, but was ultimately pardoned through Wolsey's intercession, on payment of a heavy fine and the surrender of all the queen's jewels and plate. The marriage was publicly solemnized at Greenwich on the 13th of May 1515. Suffolk had been already twice married, and his first wife was still alive. He thought it necessary later on (1528) to obtain a bull from Pope Clement VII. declaring his marriage with his first wife invalid and his union with Mary therefore canonical. Mary's life after this was comparatively uneventful. She lived mainly in the retirement of the country, but shared from time to

time in the festivities of the court, and was present at the Field of the Cloth of Gold. She died on the 24th of June 1533. By the duke of Suffolk she had three children: Henry, born on the nth of March 15 16, created earl of Lincoln (1525), who died young; Frances, born on the 16th of July 1517, the wife of Henry Grey, marquess of Northampton, and mother of Lady Jane Grey (q.v.) ; and Eleanor.

See Lettres de Louis XII. et du cardinal Georges d'Amboise (Brussels, 1712) ; Letters and Papers of Henry VIII. (Cal. State Pap.) ; M. A. E. Green, Lives of the Princesses of England (vol. v., 1849— 1855) ; Life by James Gairdner in Diet. Nat. Biog. ■

MARY OF LORRAINE (1515-1560), generally known as Mary of Guise, queen of James V. and afterwards regent of Scotland, was born at Bar on the 22nd of November 1515. She was the eldest child of Claude of Guise and Antoinette of Bourbon, and married in 1534 Louis II. of Orleans, duke of Longueville, to whom in 1535 she bore a son, Francis (d. 1551). The duke died in June 1537, and Mary was sought in marriage by James V., whose wife Magdalene died in July, and by Henry VIII. after the death of Jane Seymour. Henry persisted in his offers after the announcement of her betrothal to James V. Mary, who was made by adoption a daughter of France, received a papal dispensation for her marriage with James, which was celebrated by proxy in Paris (May 1 538) and at St Andrews on her arrival in Scotland. Her two sons, James (b. May 1540) and Robert or Arthur (b. April 1541), died within a few days of one another in April 1541, and her husband died in December 1542, within a week of the birth of his daughter and heiress, Mary, Queen of Scots. Cardinal David Beton, the head of the French and Catholic party and therefore Mary of Lorraine's friend and ally, produced a will of the late king in which the primacy in the regency was assigned to himself. John Knox accused the queen of undue intimacy with Beton, and a popular report of a similar nature, probably unfounded, was revived in 1543 by Sir Ralph Sadler, the English envoy. Beton was arrested and the regency fell to the heir presumptive James, earl of Arran, whose inclina- tions were towards England and the Protestant party, and who hoped to secure the hand of the infant princess for his own son.

Mary of Lorraine was approached by the English commissioner, Sir Ralph Sadler, to induce her to further her daughter's marriage contract with Edward VI. She informed Sadler that Arran had asked her whether Henry had made propositions of marriage to herself, and that she had stated that " if Henry should mind or offer her such an honour she must account herself much bounden." Sadler further learnt that she was " singularly well affected to Henry's desires." The marriage treaty between Mary, not then one year old, and Edward VI. was signed on the 1st of July at Greenwich,

and guaranteed that Mary should be placed in Henry's keeping when she was ten years old. The queen dowager and her daughter were carefully watched at Linlithgow, but on the 23rd of July 1543 they escaped, with the help of Cardinal Beton, to the safer walls of Stirling castle. After the queen's coronation in September Mary of Lorraine was made principal member of the council appointed to direct the affairs of the kingdom. ■ *She was constantly in communication with her kinsmen in France, and was already planning to secure for her daughter a French alliance, which was opposed on different grounds by all her advisers. She made fresh alliances with the earl of Angus and Sir George Douglas, and in 1544 she made a premature attempt to seize the regency; but a reconciliation with Arran was brought about by Cardinal Beton. The assassi- nation of Beton left her the cleverest politician in Scotland. The English invasions of 1547, undertaken with a view to enforcing the English marriage, gave Mary the desired pretext for a French alliance. In June 1548 a French fleet, with provisions and 5000 soldiers on board, under the command of Andre de Montalembert, seigneur d'Esse, landed at Leith to reinforce the Scots army, and laid siege to Haddington, then in the hands of the English. The Scottish parliament agreed to the marriage of the young queen with the dauphin of France, and, on the plea of securing her safety from English designs, she set sail from Dumbarton in August 1548 to complete her education at the French court.*

Mary of Lorraine now gave her energies to the expulsion of the English and to the difficult task of keeping the peace between the Scots and their French auxiliaries. In September 1550 she visited France and obtained from Henry II. the confirmation of the dukedom and revenues of Chatelherault for the earl of Arran, in the hope of inducing him to resign the regency. On her way back to Scotland she was driven by storms to Ports- mouth harbour and paid a friendly visit to Edward VI. Arran refused, however, to relinquish the regency until April 1554, when he resigned after receiving an assurance of his rights to the succession. The new regent had to deal with an empty exchequer and with a strong opposition to her daughter's marriage with the dauphin. The gift of high offices of state to Frenchmen lent to the Protestant opposition the aspect of a national resistance to foreign domination. The hostility of Arran and his brother Archbishop Hamilton forced Mary into friendly relations with the lords who favoured the Protestant party. Soon after her marriage miners had been brought from Lorraine to dig for gold at Crawford Moor, and she now carried on successful mining enterprises for coal and lead, which enabled her to meet the expenses of her government. In 1554 she took into her service William Maitland of Lethington, who as secretary of state gained very great influence over her. She also provoked a dangerous enemy in John Knox by her expressed contempt for a letter which he had written to her, but the

first revolt against her authority arose from an attempt to establish a standing army. When she provoked a war with England in 1557 the nobles refused to cross the border. In matters of religion she at first tried to hold the balance between the Catholic and Protestant factions and allowed the Presbyterian preachers the practice of their religion so long as they refrained from public preachings in Edinburgh and Leith. The marriage of Francis II. and her daughter Mary in 1558 strengthened her position, and in 1559 she relinquished her conciliatory tactics to submit to the dictation of her relatives, the Guises, by falling more into line with their religious policy. She was reconciled with Archbishop Hamilton, and

took up arms against the Protestants of Perth, who, incited by Knox, had destroyed the Charterhouse, where many of the . Scottish kings were buried. The reformers submitted on con- dition that no foreign garrison was to be imposed on Perth and that the religious questions in dispute should be brought before the Scottish parliament. Mary of Lorraine broke the spirit of this agreement by garrisoning Perth with Scottish troops in the pay of France. The lords of the Congregation soon assembled in considerable force on Cupar Muir. Mary retreated to Edin- burgh and thence to Dunbar, while Edinburgh opened its gates to the reformers, who issued a proclamation (Oct. 21, 1559) claiming that the regent was deposed. The lords of the Con- gregation sought help from Elizabeth, while the regent had recourse to France, where an expedition under her (brother, Rene of Lorraine, marquis of Elbeuf, was already in preparation. Mary, with the assistance of a French contingent, began to fortify Leith. The strength of her opponents was increased by the defection of Chatelherault and his son Arran; and an even more serious danger was the treachery of her secretary Maitland, who betrayed her plans to the lords of the Congregation. In October 1559 they made an unsuccessful attack on Leith and the seizure of an English convoy on the way to their army by James Hepburn, earl of Bothwell, increased their difficulties. Mary entered Edinburgh and conducted a campaign in Fife. Meanwhile Maitland of Lethington had been at the English court, and an English fleet under William Winter was sent to the Forth in January 1560 to waylay Elbeuf 's fleet, which was, however, driven back by a storm to Calais. Elbeuf had been commissioned by Francis I. and Mary to take over Mary's regency on account of her failing health. An English army under Lord Grey entered Scotland on the 29th of March 1 360, and the regent received an asylum in Edinburgh castle, which was held strictly neutral by John Erskine. When she knew that she was dying Mary sent for the lords of the Congregation, with whom she pleaded for the maintenance of the French alliance. She even consented to listen to the exhortations of

the preacher John Willock. She died on the nth of June 1560. Her body was taken to Reims and buried in the church of the nunnery of St Peter, of which her sister was abbess.

The chief sources for her history are the Calendar of State Papers for the reigns of Henry VIII. and Edward VI. in the Rolls Series; A. Teulet, Papiers d Stat . . . relatifs a Vhistoire de I'Hcosse au XVI' slide (Paris, 3 vols., 1851), for the Bannatyne Club; Hamilton Papers, ed. J. Bain (Edinburgh, 2 vols., 1890-1899); Calendar of State Papers relating to Scotland and Mary Queen of Scots, 1 547-1603 (Edinburgh, 2 vols., 1898-1900), &c. There is a Life in Miss Strickland's Queens of Scotland (vols, i.-ii.) based on original documents.

MARY OF MODENA [Maria Beatrice Anne Margaret Isabel d'Este] (1658-1718), queen of the English king James II., was the daughter of Alphonso IV., duke of Modena, and the Duchess Laura, of the Roman family Martinozzi. She was born at Modena on the 5th of October 1658. Her education was strict, and her own wish was to be a nun in a convent of the order of the Visitation founded by her mother. As a princess she was not free to choose for herself, and was selected, mainly by the king of France, Louis XIV., as the wife of James, duke of York, heir-presumptive to the English throne. The duke had become a Roman Catholic, and it was a point of policy with the French king to provide him with a Roman Catholic wife. Mary Beatrice of Este was chosen partly on the ground of her known religious zeal, but also because of her beauty. The marriage was celebrated by proxy on the 30th of September 1673. She reached England in November. In later life she confessed that her first feelings towards her husband could only be expressed by tears. In England the duchess, who was commonly spoken of as Madam East, was supposed to be an agent of the pope, who had indeed exerted himself to secure her consent. Her beauty and her fine manners secured her the respect of her brother-in-law, Charles II., and she lived on good terms with her husband's daughters by his first marriage, but she was always disliked by the nation. The birth of her first son (who died in infancy) on the 16th of January 1675 was

regretted. During the Popish Plot, to which her secretary Coleman was a victim, she went abroad with her husband. After her husband's accession she suffered much domestic misery through his infidelity. Her influence on him was unfortunate, for she was a strong supporter of the Jesuit party which was in favour of extreme measures. Her second son, James Francis Edward, was born on the 10th of June (o.s.) 1688. The public refused to believe that the baby was Mary's child, and declared that a fraud had been perpetrated to secure a Roman Catholic heir. When the revolution had broken out she made the disastrous mistake of consenting to escape to France (Dec. 10, 1688) with her son. She urged her husband to follow her

to France when it was his manifest interest to stay in England, and when he went to Ireland she pressed incessantly for his return. Her daughter, Louisa Maria, was born at St Germain on the 28th of June 1692. When her husband died on the 6th of September 1701, she succeeded in inducing King Louis to recognize her son as king of England, an act which precipitated the war of the Spanish Succession. Queen Mary survived her husband for seventeen years and her daughter for two. She received a pension of 100,000 crowns, which was largely spent in supporting Jacobite exiles. At the close of her life she had some success in obtaining payment of her jointure. She lived at St Germain or at Chaillot, a religious house of the Visitation. Her death occurred on the 7th of May 1 7 18, and is said by Saint-Simon to have been that of a saint.

See Miss Strickland, Queens of England (vols. 9 and 10, London, 1846); Campana di Cavelli, Les Verniers Stuarts a Saint-Germain en-Laye (London, 187 1); and Martin Haile Mary of Modena (London, 1905).

MARY OF ORANGE (1631-1660), eldest daughter of the English king Charles I., was born in London on the 4th of November 1631. Her father wished her to marry a son of Philip IV., king of Spain, while her cousin, the elector palatine, Charles Louis, was also a suitor for her hand, but both proposals fell through and she became the wife of a Dutch prince, William, son of Frederick Henry, prince of Orange. The marriage took place in London on the 2nd of May 1641, but owing to the tender years of the bride it was not consummated for several years. However in 1642 Mary crossed over to Holland with her mother, Queen Henrietta Maria, and in 1644, as the daughter-in-law of the stadtholder, she began to take her place in public life. In 1647 her husband, William II., succeeded his father as stadt-holder, but three years later, just after his attempt to capture Amsterdam, he died; a son, afterwards the English king William III., being born to him a few days later (Nov. 14, 1650)/ Mary was obliged to share the guardianship of her infant son with his grandmother Amelia, the widow of Frederick Henry, and with Frederick William, elector of Brandenburg; moreover, she was unpopular with the Dutch owing to her sympathies with her kinsfolk, the Stuarts, and at length public opinion having been further angered by the hospitality which she showed to her brothers, Charles II. and James, duke of York, she was forbidden to receive her relatives. From 1654 to 1657 the princess passed most of her time away from Holland. In 1657 she was appointed regent on behalf of her son for the principality of Orange, but the difficulties of her position led her to implore the assistance of Louis XIV., and the French king answered by seizing Orange himself. The position both of Mary and of her son in Holland was greatly bettered through the restoration of Charles II. in Great Britain. In September 1660 Mary journeyed to England. She was taken ill of small-pox, and died in London on the 24th of December 1660, her death, says Bishop Burnet,

being " not much lamented."

MARYBOROUGH, a market town and the county town of Queen's County, Ireland. Pop. (1901), 2957. It lies in the broad lowland east of the Slieve Bloom mountains, on the river Triogue, an affluent of the Barrow, and on the main line of the Great Southern & Western railway, by which it is 51 m. W.S.W. of Dublin. The town was chosen as county town in the reign of Mary (1556), in whose honour both town and county received their names. Its charter was granted in 1570,

but its present appearance, save a bastion of the ancient castle, is wholly modern. There are flour-mills and a considerable general trade. Maryborough returned two members to the Irish parliament from 1585 until the union in 1800. The singular lofty rock of Dunamase or Dunmall, about 3 m. from the town, bears on its summit extensive ruins of a castle, originally belonging to the kings of Leinster, but probably built in the main by William Bruce (c. 1200) and dismantled in 1650 by Cromwell's troops.

MARYBOROUGH, a town of March county, Queensland, Australia, on the left bank and 25 m. from the mouth of the Mary river, 180 m. by rail N. of Brisbane. Pop. (1901), 10,159. Besides a handsome court-house and town hall, the principal buildings are the hospital, a technical college, a library, the Anglican Church of St Paul with a fine tower and peal of bells, and the grammar schools. There is a large shipbuilding yard, and breweries, distilleries, a tannery, boot factories, soap works, saw-mills, flour-mills, carriage works and iron foundries, besides extensive sugar factories in the neighbourhood. The largest smelting works in Australia are 5 m. distant, in which ore from all the states is treated. Maryborough is the port of shipment for a wide agricultural district yielding maize and sugar, and also for the Gympie gold-fields. Timber abounds in the neigh- bourhood and is exported. Maryborough is also the second coaling port in Queensland, the government railway wharf being in direct communication with the Burrum coal-fields.

MARYBOROUGH, a municipal town of Talbot county, Victoria, Australia, 112 m. by rail N.W. of Melbourne. Pop. (1901), 5633. It has fine government buildings, a town hall, a botanical garden, and numerous park lands. It is an important railway centre, and has extensive railway workshops, as well as coach factories, breweries and foundries. The gold mining of _ the district is deep alluvial. Wheat, oats and wine are the chief agricultural products of the neighbourhood.

MARYLAND, a South Atlantic state of the United States, and one of the original thirteen, situated between latitudes 37 53′ and 39° 44′ N. and longitudes 75 4′ and 79 33′ W. (the precise western boundary has not been determined). It is bounded N. by Pennsylvania and Delaware; E. by Delaware and the Atlantic Ocean; S. and W. by the Potomac river and its north branch, which separate it, except on the extreme W. border, from Virginia and West Virginia; W., also, by West Virginia. It is one of the small states of the Union — only seven are smaller — its total area being 12,327 sq. m. of which 2386 sq. m. are water surface.

Physical Features. — Maryland is crossed from north to south by each of the leading topographical regions of the east section of the United States— the Coastal Plain, the Piedmont Plateau, the Appalachian Mountains, and the Appalachian Plateau— hence its great diversity of surface. The portion within the Coastal Plain embraces nearly the whole of the south-east half of the state and is commonly known as tide-water Maryland. It is marked off from the Piedmont Plateau by a " Fall Line " extending from Washington (D.C.) north-east through Baltimore to a point a little south of the north-east corner of the state, and is divided by the Chesapeake Bay into two parts known as the East Shore and the West Shore. The East Shore is a low level plain, the least elevated section of the state. Along its entire Atlantic border extends the narrow sandy Sinepuxent Beach, which encloses a shallow lagoon or bay also called Sinepuxent at the north, where, except in the extreme north, it is very narrow, and Chincoteague at the south, where its width is in most places from 4 to 5 m. Between this and the Chesapeake to the west and north-west there is a slight general rise, a height of about 100 ft. being reached in the extreme north. A water-parting extending from north-east to south-west and close to the Atlantic border separates the East Shore into two drainage systems, though that next to the Atlantic is insignificant. That on the Chesapeake side is drained chiefly by the Pocomoke, Nanti- coke, Choptank and Chester rivers, together with their numerous branches, the general direction of all of which is south-west. The branches as well as the upper parts of the main streams flow through broad and shallow valleys; the middle courses of the main streams wind their way through reed-covered marshes, the water ebbing and flowing with the tide; in their lower courses they become estuarine and the water flows between low banks. The West Shore is somewhat more undulating than the East and also more elevated. Its general slope is from north-west to south-east ; along the west border are points 300 ft. or more in height. The principal rivers

crossing this section are the Patuxent, Patapsco and Gunpowder, with which may be grouped the Potomac, forming the state's southern boundary. These rivers, lined in most instances with terraces 30 to 40 ft. high on one or both sides, flow south-east into the Chesapeake Bay through valleys

bounded by low hills. The Fall Line, which forms the boundary between the Coastal Plain and the Piedmont Plateau, is a zone in which a descent of about 100 ft. or more is made in many places within a few miles and in consequence is marked by waterfalls, cascades and rapids.

The part of Maryland within the Piedmont Plateau extends west from the Fall Line to the base of Catoctin Mountain, or the west border of Frederick county, and has an area of about 2500 sq. m. In general it has a broad rolling surface. It is divided into two sections by an elevated strip known as Parr's Ridge, which extends from north-east to south-west a short distance west of the middle. The east section rises from about 450 ft. along the Fall Line to from 850 to 900 ft. along the summit of Parr's Ridge. Its principal streams are those that cross the West Shore of the Coastal Plain and here wind their way from Parr's Ridge rapidly toward the south-east in narrow steep-sided gorges through broad lime- stone valleys. To the west of Parr's Ridge the surface for the most part slopes gently down to the east bank of the Monocacy river (which flows nearly at a right angle with the streams east of the Ridge), and then from the opposite bank rises rapidly toward the Catoctin Mountain ; but just above the mouth of the Monocacy on the east side of the valley is Sugar Loaf Mountain, which makes a steep ascent of 1250 ft.

The portion of the state lying within the Appalachian Region is commonly known as Western Maryland. To the eastward it abounds in mountains and valleys; to the westward it is a rolling plateau. West of Catoctin Mountain (1800 ft.) is Middletown Valley, with Catoctin Creek running through it from north to south, and the Blue Ridge Mountains (2400 ft.), near the Pennsylvania border, forming its west slope. Farther west the serrated crests of the Blue Ridge overlook the Greater Appalachian Valley, here 73 m. in width, the broad gently-rolling slopes of the Great Cumber- land or Hagerstown Valley occupying its eastern and the Appala- chian Ridges its western portion. Through the eastern portion Antietam Creek to the east and Conococheague Creek to the west flow rapidly in meandering trenches that in places exceed 75 ft. in depth. The Appalachian Ridges of the western portion begin with North Mountain on the east and end with Wills Mountain on the west. They are long, narrow, uniformly-sloping and level-crested mountains, extending along parallel lines from north-east to south- west, and reaching a maximum height in Martin's Ridge of more than 2000 ft. Overlooking them from the west are the higher ranges of the Alleghenies, among which the Savage, Backbone and Negro Mountains reach elevations of 3000 ft. or more. In the extreme west part of the state these mountains merge, as it were, into a rolling plateau, the Appalachian Plateau, having an average elevation of 2500 ft. All rivers of Western Maryland flow south into the Potomac except in the extreme west, where the waters of theYoughiogheny and its tributaries flow north into the

Monongahela. Fauna and Flora. — In primitive times deer, ducks, turkeys, fish and oysters were especially numerous, and wolves, squirrels and crows were a source of annoyance to the early settlers. Deer, black bears and wild cats (lynx) are still found'in some uncultivated sections. Much more numerous are squirrels, rabbits, " ground- hogs " (woodchucks), opossums, skunks, weasels and minks. Many species of ducks are also still found; and the reed-bird (bobolink), " partridge " (elsewhere called quail or " Bob White "), ruffed grouse (elsewhere called partridge), woodcock, snipe, plover and Carolina rail still abound. The waters of the Chesapeake Bay are especially rich in oysters and crabs, and there, also, shad, alewives, "striped" (commonly called " rock ") bass, menhaden, white perch and weak-fish (" sea-trout ") occur in large numbers. Among the more common trees are several species of oak, pine, hickory, gums and maple, and the chestnut, the poplar, the beech, the cypress and the red cedar; the merchantable pine has been cut, but the chestnut and other hard woods of West Maryland are still a product of considerable value. Among wild fruit-trees are the persimmon and Chickasaw plum; grape-vines and a large variety of berry-bushes grow wild and in abundance.

Climate.— The climate of Maryland in the south-east is influenced by ocean and bay-ˆperhaps also by the sandy soil— while in the west it is influenced by the mountains. The prevailing winds are westerly; but generally north-west in winter in the west section and south-west in summer in the south section. In the south the normal winter is mild, the normal summer rather hot ; in the west the normal winter is cold, the normal summer cool. The normal average annual temperature for the entire state is between 53° and 54° F:, ranging from 48 at Grantsville in the north-west to 53° at Darlington in the north-east, and to 57° at Princess Anne in the south-east. The normal temperature for the state during July (the warmest month) is 75-2° F., and during January (the coldest month) 32-14° F. Although the west section is generally much the cooler in summer, yet both of the greatest extremes recorded since 1891 were at points not far apart in Western Maryland: 109° F. at Boettcherville and — 26° F. at Sunnyside. The normal

annual precipitation for the state is about 43 in. It is greatest, about 53 in., on the east slope of Catoctin Mountain, owing to the elevations which obstruct the moisture-bearing winds, and is above the average along the middle of the shores of the Chesapeake. It is least, from 25 to 35 in., in the Greater Appalachian Valley, in the south on the West Shore, and along the Atlantic border. During spring and summer the precipitation throughout the

state is about 2 in. more than during autumn and winter.

Soils and Agriculture. — The great variety of soils is one of the more marked features of Maryland. On the East Shore to the north is a marly loam overlying a yellowish-red clay sub-soil, to the south is a soil quite stiff with light coloured clay, while here and there, especially in the middle and south, are considerable areas both of light sandy soils and tidal marsh loams. On the West Shore the soils range from a light sandy loam in the lower levels south from Baltimore to rather heavy loams overlying a yellowish clay on the rolling uplands and on the terraces along the Potomac and Patuxent. Crossing the state along the lower edge of the Fall Line is a belt heavy with clay, but so impervious to water as to be of little value for agricultural purposes. The soils of the Piedmont Plateau east of Parr's Ridge are, like the under- lying rocks, exceptionally variable in composition, texture and colour. For the most part they are considerably heavier with clay than are those of the Coastal Plain, and better adapted to general agricultural purposes. Light loams, however, are found both in the north-east and south-east. A soil of very close texture, the gabbro, is found, most largely in the north-east. Alluvial loams occupy the narrow river valleys; but the most common soil of the section is that formed from gneiss with a large per cent, of clay in the subsoil. West of Parr's Ridge in the Piedmont, the principal soils are those the character of which is determined either by decomposed red sandstone or by decomposed limestone. In the east portion of the mountainous region the soil so well adapted to peach culture contains much clay, together with particles of Cambrian sandstone. In Hagerstown Valley are rich red or yellow limestone-clay soils. The Allegheny ridges have only a thin stony soil; but good limestone, sandstone, shale and alluvial soils, occur in the valleys and in some of the plateaus of the extreme west.

Of the total land surface of the state 82 % was in 1900 included in "farms and 68% of the farmland was improved. There were 46,012 farms, of which 15,833 contained less than 50 acres, 3940 contained 260 acres or more, and 79 contained 1,000 acres or more — the average size being 112-4 acres. In 1890, 69% of the farms were worked by the owners or their managers, in 1900 only 66-4%; but share tenants outnumber cash tenants by almost three to one. Of the total number of farms about seven times as many are operated by white as by negro farmers, though the number of farms operated by white share tenants outnumber those operated by negro share tenants by only about five to one. Of all the inhabitants of the state, at least ten years old, who in 1900 were engaged in gainful occupations, 20-8% were farmers. The leading agricultural pur- suits are the growing of Indian corn and wheat and the raising of livestock, yet it is in the production of fruits, vegetables and tobacco, that Maryland ranks highest as an agricultural state, and in no other state except South Carolina

is so large a per cent, of the value of the crop expended for fertilizers. In 1907, according to the Year Book of the U.S. Department of Agriculture, the Indian corn crop was 22,196,000 bushels, valued at $11,986,000; the wheat crop was 14,763,000 bushels, valued at $14,172,000; the oat crop was 825,000 bushels, valued at $404,000; and the crop of rye was 3×5,000 bushels, valued at $236,000. Of the livestock, hogs were the most numerous in 1900, cattle next, sheep third, and horses fourth. The hay and forage crop of 1899 (exclusive of corn-stalks) grew on 374,848 acres. Until after the middle of the 18th century tobacco was the staple crop of Maryland, and the total yield did not reach its maximum until i860 when the crop amounted to 51,000 hhds. ; from this it decreased to 14,000 hhds., or 12,356,838 lb in 1889; in 1899 it rose again to 24,589,480 tb, in 1907 the crop was only 16,962,000 lb, less than that of nine other states. In market-garden products, including small fruits, Maryland ranked in 1899 sixth among the states of the Union, the crop being valued at $4,766,760, an increase of 350-9% over that of 1889. In the yield both of strawberries and of tomatoes it ranked first ; the yield of raspberries and blackberries is also large. In its crop of green- peas Maryland was exceeded (1899) by New York only; in sweet Indian corn it ranked fifth; in kale, second; in spinach, third; in cabbages, ninth. The number of peach-trees, especially in the west part of the state, where the quality is of the best, is rapidly increasing, and in the yield of peaches and nectarines the state ranked thirteenth in 1899; in the yield of pears it ranked fifth; in apples seventeenth.

The Indian-corn, wheat and livestock sections of the state, are in the Piedmont Plateau, the Hagerstown Valley and the central portion of the East Shore. Garrett county in the extreme north- west, however, raises the largest number of sheep. Most of the tobacco is grown in the south counties of the West Shore. The great centre for vegetables and small fruits is in the counties border- ing on the north-west shore of the Chesapeake, and in Howard, Frederick and Washington counties, directly west, Anne Arundel

county producing the second largest quantity of strawberries of all the counties in the Union in 1899. Peaches and pears grow in large quantities in Kent and neighbouring counties on the East Shore and in Washington and Frederick counties ; apples grow in abundance in all parts of the Piedmont Plateau.

The woodland area of the state in 1900 was 4400 sq. m., about 44% (estimated in 1907 to be 3450 sq. m., about 35%) of the total land area, but with the exception of considerable oak and chest- nut, some maple and other hard woods in west Maryland, about all of the merchantable timber has been cut. The lumber industry, nevertheless, has steadily increased in importance, the value of the product in i860 amounting to only $605,864,

that in 1890 to $1,600,472, and that in 1900 to $2,650,082, of which sum $2,495,169 was the value of products under the factory system ; in 1905 the value of the factory product was $2,750,339.

Fisheries. — In 1897 the value of the fishery product of Maryland was exceeded only by that of Massachusetts, but by 1901, although it had increased somewhat during the four years, it was exceeded by the product of New Jersey, of Virginia and of New York. Oysters constitute more than 80% of the total value, the product in 1901 amounting to 5,685,561 bushels, and being valued at $3,031,518. The supply on natural beds has been diminishing, but the planting of private beds promises a large increase. Crabs are next in value and are caught chiefly along the East Shore and in Anne Arundel and Calvert counties on the West Shore. Shad, to the number of 3,111,181 and valued at $120,602, were caught during 1901. In Somerset and Worcester counties clams are a source of considerable value. The terrapin catch decreased in value from $22,333 in 1891 to $1,139 in 1901. The total value of the fish product of 1901 was $3,767,461. The state laws for the protection of fish and shell-fish were long carelessly enforced because of the fishermen's strong feeling against them, but this sentiment has slowly changed and enforcement has become more vigorous.

Minerals and Manufactures. — The coal deposits, which form a

part of the well-known Cumberland field, furnish by far the most important mineral product of the state; more than 98% of this, in 1901, was mined in Allegany county from a bed about 20 m. long and 5 m. wide and the remainder in Garrett county, whose deposits, though undeveloped, are of great value. The coal is of two varieties : bituminous and semi-bituminous. The bituminous is of excellent quality for the manufacture of coke and gas, but up to 1902 had been mined only in small quantities. Most of the product has been of the semi-bituminous variety and of the best quality in the country for the generation of steam. Nearly all the high

trade blacksmithing coal mined in the United States comes from laryland. The deposits were discovered early in the 19th century (probably first in 1804 near the present Frostburg), but were not exploited until railway transport became available in 1842, and the output was not large until after the close of the Civil War; in 1865 it was 1,025,208 short tons, from which it steadily increased to 5,532,628 short tons in 1907. From 1722 until the War of Independence the iron-ore product of North and West Maryland was greater than that of any of the other colonies, but since then ores of superior quality have been discovered in other states and the output in Maryland, taken chiefly from the west border of the Coastal Plain in Anne Arundel and Prince George's counties, has become comparatively of

little importance — 24,367 long tons in 1902 and only 8269 tons in 1905. Gold, silver and copper ores, have been found in the state, and attempts have been made to mine them, without much success. The Maryland building stone, of which there is an abundance of good quality, consists chiefly of granites, limestones, slate, marble and sandstones, the greater part of which is quarried in the east section of the Piedmont Plateau especially in Cecil county, though some limestones, including those from which hydraulic cement is manufactured, and some sand- stones are obtained from the western part of the Piedmont Plateau and the east section of the Appalachian region; the value of stone quarried in the state in 1907 was $1,439,355, of which $1,183,753 was the value of granite, $142,825 that of limestone, $98,918 that of marble, and $13,859 that of sandstone. Brick, potter's and tile clays are obtained most largely along the west border of the Coastal Plain, and fire-clay from the coal region of West Maryland; in J907 the value of clay products was $1,886,362. Materials for porcelain, including flint, feldspar and kaolin, abound in the east portion of the Piedmont, the kaolin chiefly in Cecil county, and material for mineral paint in Anne Arundel and Prince George's counties, as well as farther north-west.

Between 1850 and 1900, while the population increased 103-8 , the average number of wage-earners employed in manufacturing establishments increased 258-5, constituting 5-2% of the total population in 1850 and 9-1% in 1900. In 1900 the total value of manufactured goods was $242,552,990, an increase of 41-1% over that of 1890. Of the total given for 1900, $211,076,143 was the value of products under the factory system; and in 1905 the value of factory products was $243,375,996, being 15-3% more than in 1900. The products of greatest value in 1905 were: custom-made men's clothing; fruits and vegetables and oysters, canned and preserved; iron and steel; foundry and machine-shop products, including stoves and furnaces; flour and grist mill products; tin- ware, coppersmithing and sheet iron working ; fertilizers ; slaughtering

and meat-packing; cars and repairs by steam railways; shirts; cotton goods; malt liquors; and cigars and cigarettes. In the value of fertilizers manufactured, and in that of oysters canned and preserved, Maryland was first among the states in 1900 and second in 1905; in 1900 and in 1905 it was fourth among the states in the value of men's clothing. Baltimore is still the great manu- facturing centre, but of the state's total product the percentage in value of that manufactured there decreased from 82-5 in 1890 to 66-5 in 1900, and to 62-3 (of the factory product) in 1905. The

largest secondary centres are Cumberland, Hagerstown and Frede- rick the total value of whose factory products in 1905 was less than

$10,000,000.

Communications. — Tide- water Maryland is afforded rather unusual facilities of water transportation by the Chesapeake Bay, with its deep channel, numerous deep inlets, and navigable tributaries, together with the Chesapeake and Delaware Canal, which crosses the state of Delaware and connects its waters with those of the Delaware river and bay. As early as 1783 steps were taken to extend these facilities to the navigable waters of the Ohio, chiefly by improving the navigation of the Potomac above Georgetown. By 1820 this project was merged into a movement for a Chesapeake and Ohio canal along the same line. Ground was broken in 1828 and in 1850 the canal was opened to navigation from Georgetown to Cumberland, a distance of 186 m. In 1878 and again in 1889 it was wrecked by a freshet, and since then has been of little service. 1 However, on the same day that ground was broken for this canal, ground was also broken for the Baltimore & Ohio railway, of which 15 m. was built in 1 828-1 830 and which was one of the first steam railway lines in operation in the United States. Since then railway building has progressed steadily. In Maryland (and including the District of Columbia) there were 259 m. of railway in 1850, 386 m. in i860, 671 m. in 1870, and 1040 m. in 1880; in 1890, in Maryland alone, the mileage was 1270-04 m., and in 1909 it was 1394-19 m. The more important railway lines are the Baltimore & Ohio, the Philadelphia, Baltimore & Washington (controlled by the Pennsyl- vania and a consolidation of the Philadelphia, Wilmington & Baltimore, and the Baltimore & Potomac), the Western Maryland, the West Virginia Central & Pittsburg (leased by the Western Maryland), the Northern Central, the Maryland electric railways (including what was formerly the Baltimore & Annapolis Short Line), and the Washington, Baltimore & Annapolis electric railway. Baltimore is the chief railway centre and its harbour is one of the most important in the country.

Inhabitants. — The population of Maryland in 1 880 was 934,943 ; in 1890, 1,042,390, an increase of 11-5%; in 1900, 1,188,044 (14%); in 1910, 1,295,346 (increase 9%). Of the total population in 1900 there were 952,424 whites, 235,064 negroes, 544 Chinese, 9 Japanese and 3 Indians, the increase in the white population from 1890 to 1900 being 15-2%, while that of the negroes was only 9%. In 1900 there were 1,094,110 native born to 93,934 foreign-born, and of the foreign-born 44,990 were natives of Germany and 68,600 were residents of the city of Baltimore. The urban population, i.e. total population of cities of 4000 or more inhabitants, in 1900, was 572,795, or 48-2% of the total and an increase of 16-6% over that of 1890; while the rural population, i.e.

population outside of incorporated places, was 539,685, an increase of about 8% over that of 1890. There are about 59 religious sects, of which the members of the Roman Catholic Church, which was prominent in the early history of Maryland, are far the most numerous, having in 1906 166,941 members out of 473,257 communicants of all denominations j in the same year there were 137,156 Methodists, 34,965 Protes- tant Episcopalians, 32,246 Lutherans, 30,928 Baptists, 17,895 Presbyterians and 13,442 members of the Reformed Church in the United States. The chief cities are Baltimore, pop. (1910) 558,485, Cumberland 21,839, Hagerstown 16,507, Frederick 10,411 and Annapolis 8609.

Government. — The state constitution of 1867, the one now" in force, has been frequently amended, all that is required for its amendment being a three-fifths vote of all of the members elected to each of the two houses of the General Assembly, fol- lowed by a majority vote of the state electorate, and it is further

1 Maryland and Delaware together began the construction of the Chesapeake and Delaware canal (13! m. long) across the north part of the state of Delaware, between the Delaware river and Chesa- peake Bay; this canal received Federal aid in 1828, was completed in 1829, and in 1907 was chosen as the most practicable route for a proposed ship waterway between the Chesapeake and the Delaware.

2 The population at previous censuses was as follows: 319,728 in 1790; 34I.54 8 ˆ 1800; 380,546 in 1810; 407,350 in 1820; 447,040 in 1830; 470,019 in 1840; 583,034 in 1850; 687,049 in i860; and 780,894 in 1870.

provided that once in twenty years, beginning with 1887, the wish of the people in regard to calling a convention for altering the constitution shall be ascertained by a poll. Any constitution or constitutional amendment proposed by such constitutional convention comes into effect only if approved by a majority of the votes cast in a popular election. Since 1870 suffrage has been the right of all male citizens (including negroes) twenty-one years of age or over who shall have lived within the state for one year and within the county or the legislative district of the city of Baltimore in which they may offer to vote for six months immediately preceding an election; persons convicted of larceny or other infamous crime and not since pardoned by the governor, as well as lunatics or those who have been convicted of bribery at a previous election are excepted. In 1908 the General Assembly passed a law providing for annual direct primary elections (outside of Baltimore; and making the Baltimore special primary law applicable to state as well as city officials), but, as regards state officers, making only a slight improvement upon previous conditions

inasmuch as the county or district is the unit and the vote of county or district merely " instructs " delegates to the party's state nominating convention, representa- tion in which is not strictly in proportion to population, the rural counties having an advantage over Baltimore; no nomi- nation petition is required. In the same year a separate law was passed providing for primary elections for the choice of United States senators; but here also the method is not that of nomina- tion by a plurality throughout the state, but by the vote of counties and legislative districts, so that this measure, like the other primary law, is not sufficiently direct to give Baltimore a vote proportional to its population.

The chief executive authority is vested in a governor elected by popular vote for a term of four years. Since becoming a state Mary- land has had no lieutenant-goyernor except under the constitution of 1864 ; and the office of governor is to be filled in case of a vacancy by such person as the General Assembly may elect. 3 Any citizen of Maryland may be elected to the office who is thirty years of age or over, who has been for ten years a citizen of the state, who has lived in the state for five years immediately preceding election, and who is at the time of his election a qualified voter therein. Until 1838 the governor had a rather large appointing power, but since that date most of the more important offices have been filled by popular election. He, however, still appoints, subject to the confirmation of the senate, the secretary of state, the superintendent of public education, the commissioner of the land office, the adjutant- general, justices of the peace, notaries public, the members of numerous administrative boards, and other administrative officers. He is himself one of the board of education, of the board of public works, and of the board for the management of the house of cor- rection. No veto power whatever was given to the governor until 1867, when, in the present constitution, it was provided that no bill vetoed by him should become a law unless passed over his veto by a three-fifths vote of the members elected to each house, and an amendment of 1890 (ratified by the people in 1891) further provides that any item of a money bill may likewise be separately vetoed. The governor's salary is fixed by the constitution at $4500 a year. Other executive officers are a treasurer, elected by joint ballot of the General Assembly for a term of two years, a comptroller elected by popular vote for a similar term, and an attorney-general elected by popular vote for four years.

The legislature, or General Assembly, meets biennially in even- numbered years, at Annapolis, and consists of a Senate and a House of Delegates. Senators are elected, one from each of the twenty- three counties and one from each of the four legislative districts of the city of Baltimore, for a term of four years, the terms of one-half expiring every two years. Delegates are elected for a term of two years, from each county and from each legislative district of Baltimore, according to population, as follows: for a population

of 18,000 or less, two delegates; 18,000 to 28,000, three; 28,000 to 40,000, four; 40,000 to 55,000, five; 55,000 and upwards, six. Each legislative district of Baltimore is entitled to the number of delegates to which the largest county shall or may be entitled under the foregoing apportionment, and the General Assembly may from time to time alter the boundaries of Baltimore city districts in order to equalize their population. This system of apportionment gives to the rural counties a considerable pplitical advantage over the city of Baltimore, which, with 42-8 % of the total population according to the census of 1900, has only 4 out of 27 members of the Senate and only 24 out of 101 members of the House of Delegates. Since far back in the colonial era, no minister, preacher, or priest

3 The General Assembly regularly elected the governor during the period 1776-1838.

has been eligible to a seat in either house. A senator must be twenty- five years of age or over, and both senators and delegates must have lived within the state at least three years and in their county or legislative district at least one year immediately preceding their election.

The constitution provides that no bill or joint resolution shall pass either house except by an affirmative vote of a majority of all the members elected to that house and requires that on the final vote the yeas and nays be recorded.

Justice, &c. — The administration of justice is entrusted to a court of appeals, circuit courts, special courts for the city of Balti- more, orphans' courts, and justices of the peace. Exclusive of the city of Baltimore, the state is divided into seven judicial circuits, in each of which are elected for a term of fifteen years one chief judge and two associate judges, who at the time of their election must be members of the Maryland bar, between the ages of thirty and seventy, and must have been residents of the state for at least five years. The seven chief judges so elected, together with one elected from the city of Baltimore, constitute the court of appeals, the governor with the advice and consent of the senate designating one of the eight as chief judge of that court. The court has appellate jurisdic- tion only. The three judges elected in each circuit constitute the circuit court of each of the several counties in such circuit. The courts have both original and appellate jurisdiction and are required to hold at least two sessions to which jurors shall be summoned every year in each county of its circuit, and if only two

such terms are held, there must be two other and intermediate terms to which jurors shall not be summoned. Three other judges are elected for four-year terms, in each county and in the city of Baltimore to constitute an orphans' court. The number of justices of the peace for each county is fixed by local law; they are appointed by the governor, subject to the confirmation of the Senate, for a term of two years.

In the colonial era Maryland had an interesting list of governmental subdivisions — the manor, the hundred, the parish, the county, and the city — but the two last are about all that remain and even these are in considerable measure subject to the special local acts of the General Assembly. In general, each county has from three to seven commissioners — the number is fixed by county laws — elected on a general ticket of each county for a term of from two to six years, entrusted with the charge and control of property owned by the county, empowered to appoint constables, judges of elections, collectors of taxes, trustees of the poor, and road supervisors, to levy taxes, to revise taxable valuations of real property, and open or close public roads.

In Maryland a wife holds her property as if single except that she can convey real estate only by a joint deed with her husband (this requirement being for the purpose of effecting a release of the husband's " dower interest "), neither husband nor wife is liable for the separate debts of the other, and on the death of either the rights of the survivor in the estate of the other are about equal. Wife-beating is made punishable by whipping in gaol, not exceeding forty lashes. Prior to 1841 a divorce was granted by the legislature only, from then until 1 85 1 it could be granted by either the legislature or the equity courts, since 1 85 1 by the courts only. The grounds for a divorce a mensa et thoro, which may be granted for ever or for a limited time only, are cruelty, excessively vicious conduct, or desertion; for a divorce a vinculo matrimonii the chief grounds are impotence at the time of marriage, adultery or deliberate abandonment for three years. There is no homestead exemption law and exemptions from levy- for the satisfaction of debts extend only to $100 worth of property, besides wearing apparel and books and tools used by the debtor in his profession or trade, and to all money payable in the nature of insurance. Employers of workmen in a clay or coal mine, stone quarry, or on a steam or street railway are liable for damage in case of an injury to any of their workmen where such injury is caused by the negligence of the employer or of any servant or employee of the employer. The chief of the bureau of labour statistics is directed, in case of danger of a strike or lockout to seek to mediate between the parties and if unsuccessful in that, then to endeavour to secure their consent to the formation of a board of arbitration.

The state penal and charitable institutions include a penitentiary at Baltimore; a house of correction at Jessups, two houses of refuge at Baltimore; a house of reformation in Prince George's county; St Mary's industrial school for boys at Baltimore; an industrial home for negro girls at Melvale; an asylum and training school for the feeble-minded at Owings Mills; an infirmary at Cumberland; the Maryland hospital for the insane at Catonsville; the Springfield state hospital for the insane; the Maryland school for the deaf and dumb at Frederick city; and the Maryland school for the blind at Baltimore. Each of these is under the management of a board appointed by the governor subject to the confirmation of the senate. Besides these there are a large number of state- aided charitable institutions. In 1900 there was created a board of state aid and charities, composed of seven members appointed by the governor for a term of two years, not more than four to be reappointed. There is also a state lunacy commission of four members, who are appointed for terms of four years, one annually, by the governor.

Education. — The basis of the present common school system was laid in 1865, after which a marked development was accompanied by some important changes in the system and its administration, and the percentage of total illiteracy (i.e. inability to write among those ten years old and over) decreased from 19-3 in 1800 to 11 • I in 1900, while illiteracy among the native whites decreased during the same period from 7-8 to 4- 1 and among negroes from 59-6 to 35-2. At the head of the system is a state board and a state superintendent, and under these in each county is a county board which appoints a superintendent for the county and a board of trustees for each school district none of which is to be more than four miles square. The state board is composed of the governor as its president, the state superintendent as its secretary, six other members appointed by the governor for a term of six years, and, as ex-officio members without the right to vote, the principals of the state and other normal schools. Prior to 1900 the principal of the state normal was ex-officio state superintendent, but since then the superintendent has been appointed by the governor for a term of four years. Each county board is also appointed by the governor for a term of six years. In both the state and the county boards at least one-third of the members appointed by the governor are not to be of the dominant political party and only one-third of the members are to be appointed every two years. The state board enacts by-laws for the administration of the system ; its decision of controversies arising under the school law is final; it may suspend or remove a county superintendent for inefficiency or incompetency; it issues life state certificates, but applicants must have had seven years of experience in teaching, five in Maryland, and must hold a first-class certificate or a college or normal school diploma; and it pensions teachers who have taught successfully for twenty-five years

*in any of the public or normal schools of the state, who have reached the age of sixty, and who have become physically or mentally incapable of teaching longer, the pension amounting to $200 a year. The legislature of 1908 passed a law under which the minimum pay for a teacher holding a first-class certificate should be $350 a year after three years' teaching, $400 after five years' teaching and $450 after eight years' teaching. By a law of 1904 all teachers who taught an average of 15 pupils were to receive at least $300. School books are purchased out of the proceeds of the school tax, but parents may purchase if they prefer. In 1908 the average school year was nine and seven-tenths months — ten in the cities and nine and four-tenths in the counties; the aim is ten months throughout, and a law of 1904 provides that if a school is taught less than nine months a portion of the funds set apart for it shall be withheld. A compulsory education law of 1902 — to operate, however, only in the city of Baltimore and in Allegany county — requires the attendance for the whole school year of children between the ages of eight and twelve and also of those between the ages of twelve and sixteen who are not employed at home or elsewhere. A separate school for negro children is to be maintained in every election district in which the population warrants it. The system is maintained by a state tf*x of 16 cents on each $100 of taxabb property.*

The higher state educational institutions are two normal schools and one agricultural college. One of the normal schools was opened in Baltimore in 1866, the other at Frostburg in 1904. Both are under the management of the state Board of Education, which appoints the principals and teachers and prescribes the course of study. There is besides, in Washington College at Chestertown, a normal department supported by the state and under the supervision of the state Board of Education. The Maryland Agricultural College, to which an experiment station has been added, was opened in 1859; it is at College Park in Prince George's county, and is largely under state management. Maryland supports no state university, but Johns Hopkins University, one of the leading institutions of its kind in the country, receives $25,000 a year from the state; the medical department of the university of Maryland receives an annual appropriation of about I2500, and St John's College, the academic department of the university of Maryland, receives from the state $13,000 annually and gives for each county in the state one free scholarship and one scholarship covering all expenses. Among the principal institutions in the state are the university of Maryland, an outgrowth of the medical college of Maryland (1807) in Baltimore, with a law school (reorganized in 1 869), a dental school (1882), a school of pharmacy (1904), and, since 1907, a department of arts and science in St John's College (non-sect., opened in 1789) at Annapolis; Washington College, with a normal department (non-sect.,

opened in 1782) at Chestertown; Mount St Mary's College (Roman Catholic, 1808) at Emmitsburg; New Windsor College (Presbyterian, 1843) at New Windsor; St Charles College (Roman Catholic, opened in 1848) and Rock Hill College (Roman Catholic, 1857) near Ellicott City; Loyola College (Roman Catholic, 1852) at Baltimore; Western Maryland College (Methodist Protestant, 1867) at Westminster; Johns Hopkins University (non- sect., 1876) at Baltimore; Morgan College (coloured, Methodist, 1876) at Baltimore; Goucher College (Methodist, founded 1884, opened 1888) at Baltimore; several professional schools mostly in Baltimore (q.i.) ; the Peabody Institute at Baltimore; and the United States Naval Academy at Annapolis.

Revenue. — The state's revenue is derived from a general direct property tax, a licence tax, corporation taxes, a collateral inheritance

tax, fines, forfeitures and fees; and the penitentiary yields an annual net revenue of about $40,000. There is no provision for a general periodic assessment, but a state tax commissioner appointed by the governor, treasurer and comptroller assesses the corporations, and the county commissioners (in the counties) and the appeal tax court (in the city of Baltimore) revise valuations of real property every two years. From 1820 to 1836 Maryland, in its enthusiasm over internal improvements, incurred an indebtedness of more than $16,000,000. To meet the interest, such heavy taxes were levied that anti-tax associations were formed to resist the collection, and in 1842 the state failed to pay what was due; but the accumulated interest had been funded by 1848 and was paid soon afterwards, the expenses of the government were curtailed by the constitution of 1 85 1, and after the Civil War the amount of indebtedness steadily decreased until in 1902 the funded debt was $6,909,326 and the net debt only $2,797,269-13, while on the 1st of October 1908 the net debt was $366,643-91. As a result of incurring the large debt, a clause in the constitution prohibits the legislature from contracting a debt without providing by the imposition of taxes for the payment of the interest annually and the principal within fifteen years, except to meet a temporary deficiency not exceeding $50,000. The first bank of the state was established in 1790, and by 1817 there was one in each of twelve counties and several in Baltimore; in 181 8-1820 and in 1837-1839 there were several serious bank failures, but there have been no serious failures since. A constitutional provision makes each stockholder in a state bank liable to the amount of his share or shares for all the bank's debts and liabilities. A savings bank is taxed on its deposits, and a state bank is taxed on its

capital-stock.

History. — The history of Maryland begins in 1632 with the procedure of Charles I. to grant a charter conveying almost unlimited territorial and governmental rights therein to George Calvert, first Lord Baltimore (i58o?-i632), and styling him its absolute lord and proprietor. George Calvert died before the charter had passed the great seal, but about two months later in the same year it was issued to his eldest son, Cecilius. In November 1633 two vessels, the " Ark " and the " Dove," carrying at least two hundred colonists under Leonard Calvert (c. 1582-1647), a brother of the proprietor, as governor, sailed from Gravesend and arrived in Maryland late in March of the following year. Friendly relations were at the outset estab- lished with the Indians, and the province never had much trouble with that race; but with William Claiborne (15897-1676?), the arch-enemy of the province as long as he lived, it was otherwise. He had opposed the grant of the Maryland charter, had estab- lished a trading post on Kent Island in Chesapeake Bay in 163 1, and when commanded to submit to the new government he and his followers offered armed resistance. A little later, during his temporary absence in England, his followers on the island were reduced to submission; but in 1644, while the Civil War in England was in progress, he was back in the province assisting Richard Ingle, a pirate who claimed to be acting in the interest of parliament, in raising an insurrection which deprived Governor Calvert of his office for about a year and a half. Finally, the lord proprietor was deprived of his government from 1654 to 1658 in obedience to instructions from parliament which were originally intended to affect only Virginia, but were so modified, through the influence of Claiborne and some Puritan exiles from Virginia who had settled in Maryland, as to apply also to " the plantations within Chesapeake Bay." Then the long continued unrest both in the mother country and in the province seems to have encouraged Josias Fendall, the proprietor's own appointee as governor, to strike a blow against the proprietary government and attempt to set up a commonwealth in its place; but this revolt was easily suppressed and order was generally preserved in the province from the English Restoration of 1660 to the English Revolution of 1688.

Meanwhile an interesting internal development had been in progress. The proprietor was a Roman Catholic and probably it was his intention that Maryland should be an asylum for per- secuted Roman Catholics, but it is even more clear that he was desirous of having Protestant colonists also. To this end he promised religious toleration from the beginning and directed his officers accordingly; this led to the famous toleration act passed by the assembly in 1649, which, however, extended its protection only to sects of Trinitarian Christianity. Again, although the charter reserved to the proprietor the right of calling an assembly of the freemen or their delegates

at such

times and in such form and manner as he should choose, he sur- rendered in 1638 his claim to the sole right of initiating legislation. By 1650 the assembly had been divided into two houses, in one of which sat only the representatives of the freemen without whose consent no bill could become a law, and annual sessions as well as triennial elections were coming to be the usual order. When suffrage had thus come to be a thing really worth possessing, the proprietor, in 1670, sought to check the opposition by dis- franchising all freemen who did not have a freehold of fifty acres or a visible estate of forty pounds sterling. But this step was followed by more and more impassioned complaints against him, such as: that he was interfering with elections, that he was summoning only a part of the delegates elected, that he was seeking to overawe those summoned, that he was abusing his veto power, and that he was keeping the government in the hands of Roman Catholics, who were mostly members of his own family. About this time also the north and east boundaries of the province were beginning to suffer from the aggressions of William Penn. The territory now forming the state of Delaware was within the boundaries defined by the Maryland charter, but in 1682 it was transferred by the duke of York to William Penn and in 1685 Lord Baltimore's claim to it was denied by an order in council, on the ground that it had been inhabited by Christians before the Maryland charter was granted. In the next place, although it was clear from the words of the charter that the parallel of 40 N. was intended for its north boundary, and although Penn's charter prescribed that Pennsylvania should extend on the south to the " beginning of the fortieth degree of Northern Latitude," a controversy arose with regard to the boundary between the two provinces, and there was a long period of litigation; in 1763- 1767 Charles Mason and Jeremiah Dixon, two English mathe- maticians, established the line named from them (see Mason and Decon Line), which runs along the parallel 39 43′ 26"3 N. and later became famous as the dividing line between the free states and the slave states. While the proprietor was absent defending his claims against Penn the English Revolution of 1688 was started. Owing to the death of a messenger there was long delay in proclaiming the new monarchs in Maryland; this delay, to gether with a rumor of a Popish plot to slaughter the Protestants, enabled the opposition to overthrow the proprietary government, and then the crown, in the interest of its trade policy, set up a royal government in its place, in 1692, without, however, divest- ing the proprietor of his territorial rights. Under the royal government the Church of England was established, the people acquired a strong control of their branch of the legislature and they were governed more by statute law and less by executive ordinance. The proprietor having become a Protestant, the proprietary government was restored in 171 5. Roman Catholics were

disfranchised immediately afterward. In 1730 Germans began to settle in considerable numbers in the west-central part of the colony, where they greatly promoted its industrial develop- ment but at the same time added much strength to the opposi- tion. The first great dispute between proprietor and people after the restoration of 171 5 was with regard to the extension of the English statutes to Maryland, the popular branch of the legisla- ture vigorously contending that all such statutes except those expressly excluded extended to the province, and the lord pro- prietor contending that only those in which the dominions were expressly mentioned were in force there. Many other disputes speedily followed and when the final struggle between the English and French for possession in America came, although appro- priations were made at its beginning to protect her own west frontier from the attacks of the enemy, a dead-lock between the two branches of the assembly prevented Maryland from respond- ing to repeated appeals from the mother country for aid in the latter part of that struggle. This failure was used as an argument in favour of imposing the famous Stamp Act. Nevertheless, popular clamour against parliament on account of that measure was even greater than it had been against the proprietor. The stamp distributor was driven out, and the arguments of Daniel Dulany (1721-1797), the ablest lawyer in the province, against the act were quoted by speakers in parliament for its repeal.

In the years immediately preceding the Declaration of Inde- pendence Maryland pursued much the same course as did other leading colonies in the struggle — a vessel with tea on board was even burned to the water's edge— and yet when it came to the decisive act of declaring independence there was hesitation. As the contest against the proprietor had been nearly won, the majority of the best citizens desired the continuance of the old government and it was not until the Maryland delegates in the Continental Congress were found almost alone in holding back that their instructions not to vote for independence were rescinded. The new constitution drawn and adopted in 1776 to take the place of the charter was of an aristocratic rather than a democratic nature. Under it the property qualification for suffrage was a freehold of 50 acres or £30 current money, the property qualifications for delegates £500, for senators £1000, and for governor £5000. Four delegates were chosen from each county and two each from Baltimore and Annapolis, the same as under the proprietary government, population not being taken into account. Senators were chosen by a college of fifteen electors elected in the same manner as the delegates, and the governor by a joint ballot of the two houses of assembly. In 1802 negroes were disfranchised, and in 18 10 property qualifi- cations for suffrage and

office were abolished. The system of representation that, with the rapid growth of population in the north-east sections, especially in the city of Baltimore, placed the government in the hands of a decreasing minority also began to be attacked about this time; but the fear of that minority which represented the tobacco-raising and slave-holding counties of south Maryland, with respect to the attitude of the majority toward slavery prevented any changes until 1837, when the oppo- sition awakened by the enthusiasm over internal improvements effected the adoption of amendments which provided for the election of the governor and senators by a direct vote of the people, a slight increase in the representation of the city of Baltimore and the larger counties, and a slight decrease in that of the smaller counties. Scarcely had these amendments been carried when the serious financial straits brought on by debt in- curred through the state's promotion of internal improvements gave rise to the demand for a reduction of governmental expenses and a limitation of the power of the General Assembly to contract debts. The result was the new constitution of 1851, which fully established representation in the counties on the basis of popula- tion and further increased that of Baltimore. The constitution of 1851 was however chiefly a patchwork of compromises. So, when during the Civil War Maryland was largely under Federal control and the demand arose for the abolition of slavery by the state, another constitutional convention was called, in 1864, which framed a constitution providing that those who had given aid to the Rebellion should be disfranchised and that only those qualified for suffrage in accordance with the new document could vote on its adoption. This was too revolutionary to stand long and in 1867 it was superseded by the present constitution. In national affairs Maryland early took a stand of perhaps far- reaching consequences in refusing to sign the Articles of Con- federation (which required the assent of all the states before coming into effect), after all the other states had done so (in 1779), until those states claiming territory between the Alleghany Mountains and the Mississippi and north of the Ohio — Virginia, New York, Massachusetts and Connecticut — should have sur rendered such claims. As those states finally yielded, the Union was strengthened by reason of a greater equality and con- sequently less jealousy among the original states, and the United States came into possession of the first territory in which all the states had a common interest and out of which new states were to be created. In the War of 1812 Frederick, Havre de Grace, and Frenchtown were burned by the British; but particularly noteworthy were the unsuccessful movements of the enemy by land and by sea against Baltimore, in which General Robert Ross (c. 1 766-1814), the British commander of the land force, was killed before anything had been accomplished and the failure of the fleet to take Fort McHenry after a siege of a day and a night inspired the song The Star-spangled Banner, composed by

Francis Scott Key who had gone under a flag of truce to secure from General Ross the release of a friend held as a prisoner by the British and during the attack was detained on his vessel within the British lines. In 1861 Maryland as a whole was opposed to secession but also opposed to coercing the seceded states. During the war that followed the west section was generally loyal to the north while the south section favoured the Confederacy and furnished many soldiers for its army; but most of the state was kept under Federal control, the writ of habeas corpus being suspended. The only battle of much importance fought on Maryland soil during the war was that of Sharpsburg or Antietam on the 16th and 17th of September 1862. As between political parties the state has usually been quite equally divided. From 1820 to i860, however, the Whigs were in general a trifle the stronger; and from 1866 to 1895 the Democrats were triumphant; in 1895 a Republican governor was elected; in 1896 Maryland gave McKinley 32,232 votes more than it gave Bryan; and in 1904 seven Democratic electors and one Republican were chosen; and in 1908 five Democratic and three Republican.

The proprietors of Maryland were : Cecilius Calvert, second Lord Baltimore (l6o5[?]-i67=j) from 1632 to 1675; Charles Calvert, third Lord Baltimore (1629-1715) from 1675 to 1715; Benedict Leonard Calvert, fourth Lord Baltimore (i684?-I7I5) 1715; Charles Calvert, fifth Lord Baltimore (1699-1751) from 1715 to 1751 ; Frederick Calvert, sixth and last Lord Baltimore (1731-1771) from 1751 to 1771; Henry Harford, from 1771 to 1776.

Governors of Maryland. Proprietary.

Leonard Calvert

Richard Ingle (usurper)

Edward Hill (chosen by the council) .

Leonard Calvert

(commissioners of) parliament) {

Thomas Greene

William Stone .

Richard Bennett

Edmund Curtis

William Claiborne

William Stone .....

William Fuller and others (appointed by the com- missioners of parliament)

Josias Fendall

Philip Calvert

Charles Calvert

Charles Calvert, third Lord Baltimore

Cecilius Calvert (titular) and Jesse Wharton (real) .

Thomas Notley

Charles Calvert, third Lord Baltimore Benedict Leonard Calvert (titular) and council (real) . William Joseph (president of the council) . Protestant Associators under John Coode .

Royal.

Sir Lionel Copley

Sir Edmund Andros

Francis Nicholson

Nathaniel Blackistone

Thomas Tench (president of the council) .

John Seymour

Edward Lloyd (president of the council)

John Hart ohn Hart

Charles Calvert

Benedict Leonard Calvert

Samuel Ogle

Charles Calvert, fifth Lord Baltimore ....

Samuel Ogle

Thomas Bladen

Samuel Ogle •

Benjamin Tasker (president of the council)

Horatio Sharpe

Robert Eden

Robert Eden (nominal) and Convention and Council of Safety (real)

1633-1645

1645

1646

1 646-1 647

1 647- 1 649

1649-1652

1652

1 652-1 654

1654-1658

1 658-1 660

1660-1661

1661-1675

1675-1676

1676

1 676-1 679

1 679-1 684

1684-1688

1 688-1 689

1689-1692

STATE

Thomas Johnson Thomas Sim Lee William Paca . William Smallwood John Eager Howard George Plater l .

1 692-1 693 1 693-1 694 1694-1699 1699-1702 1 702-1 704 1 704-1 709 1709-1714 1714-1715 1 715-1720 1720-1727 1727-1731 1731-1732 1732-1733 1 733-1 742 1 742-1 747 1747-1752 1752-1753 1 752-1 769 1769-1774

1 774-1 776

1777-1779 1779-1782 1782-1785 1785-1788 1 788-1 791 1791-1792

1 Died in office.

MARYPORT— MASACCIO

833

James Brice (acting)

1792

Thomas Sim Lee

1792-1794

John H. Stone . . . .

1 794-1 797

John Henry .

Democratic Republican

1 797-1 798

Benjamin Ogle

Federalist

1798-1801

John Francis Mercer

Democratic Republican

1801-1803

Robert Bowie .

1 803-1 806

Robert Wright 1

!> •>

1806-1808

James Butcher (acting) .

1808-1809

Edward Lloyd . . . .

Whig

1809-1811

Robert Bowie . . . .

Democratic Republican

1811-1812

Levin Winder .

Federalist

1812-1815

Charles Ridgely

M

1815-1818

Charles Goldsborough

1818-1819

Samuel Sprigg .

Democratic Republican

1819-1822

Samuel Stevens, jun.

1822-1825

Joseph Kent

1825-1828

Daniel Martin .

Anti-Jackson

1828-1829

Thomas King Carroll

Jackson Democrat

1829-1830

Daniel Martin .

Anti-Jackson

1 830-1 83 1

George Howard (acting).

Whig

1 831-1832

George Howard

1832-1833

James Thomas

)»

1 833-1 835

Thomas W. Veazey

It

1 835-1 838

William Grason

Democrat

1838-1841

Francis Thomas

1841-1844

Thomas G. Pratt

Whig

1 844-1 847

Philip Francis Thomas

Democrat

1847-1850

Enoch Louis Lowe .

»

1850-1853

Thomas Watkins Ligon .

>»

1853-1857

Thomas Holliday Hicks .

American or

Know-Nothing

1857-1861

Augustus W. Bradford .

Unionist

1861-1865

Thomas Swann

u

1 865-1 868

Oden Bowie

Democrat

1 868-1 872

William Pinkney Whyte 2

i»

1872-1874

James Black Groome

»i

I 874-1 876

John Lee Carroll

»

1876-1880

William T. Hamilton

»»

1880-1884

Robert M. McLane .

»»

1884-1885

-Henry Lloyd

1885-1888

Elihu E. Jackson

- *it*

I888-1892

Frank Brown .

11

1892-1896

Lloyd Lowndes

Republican

1 896-1 900

John Walter Smith

Democrat

1900-1904

Edwin Warfield

it

1 904- 1 908

Austin L. Crothers .

*1**

1908-

Bibliography. — Publications of the Maryland Geological Survey (Baltimore, 1897); Maryland Weather Service Climatology and Physical Features, biennial reports (Baltimore, 1892-) ; United States Census ; Reports of the U.S. Fish Commissioner and Bureau of Fisheries (Washington, 1871); State Department, Maryland Manual, a Compendium of Legal, Historical and Statistical Information (Baltimore, 1900-) ; B.C. Steiner, Citizenship and Suffrage in Maryland (Balti- more, 1895), an historical review of the subject; J. W. Harry, The Maryland Constitution

of 1851, Johns Hopkins University Studies in Historical and Political Science (Baltimore, 1902), contains an account of the agitation from 1835 to 1850 for constitutional reform ; B.C. Steiner, History of Education in Maryland, Circulars of Informa- tion of the United States Bureau of Education (Washington, 1894), a general historical survey of the common schools, public and private, and a particular account of each college, university and professional school; A. D. Mayo, The Final Establishment of the American School System in West Virginia, Maryland, Virginia and Delaware, Report of the Commissioner of Education (Washington, 1905) contains an interesting account of the development of the public school system of the state from 1864 to 1900; F. S. Adams, Taxation in Maryland, Johns Hopkins University Studies (Baltimore, 1900), an historical account of the sources of the state's revenue and administration of its taxing system; A. V. Bryan, History of State Banking in Maryland, Johns Hopkins University Studies (Baltimore, 1899), a careful study of the state's experience with banks from 1790 to 1864; J. L. Bozman, History of Maryland from 1633 to 1660 (Balti- more, 1837), a compilation of much of the more important material relating to the early history of the province; J. V. L. McMahon, An Historical View of the Government of Maryland from its Coloniza- tion to the Present Day (Baltimore, 1833), an able treatment of the subject by a learned jurist; J. T. Scharf, History of Maryland (Baltimore, 1879), the most extensive general history of the state, but it contains numerous errors and the arrangement is poor; W. H. Browne, Maryland: the History of a Palatinate (Boston, 1884 and 1895), an excellent outline of the colonial history; N. D. Mereness, Maryland as a Proprietary Province (New York, 1901), a constitutional history of the province in the light of its industrial and social development, contains a bibliography; and Bernard

1 Resigned on the 6th of May 1808.

2 Resigned in 1874 to become (March 4, 1875) U.S. senator from Maryland.

XVII. 27

C. Steiner, Maryland during the English Civil War (2 vols., Balti- more, 1906-1907), one of the Johns Hopkins University Studies.

(N. D. M.)

MARYPORT, a market town and seaport in the Cockermouth parliamentary division of Cumberland, England, 25 m. W.S.W. of Carlisle, on the Maryport & Carlisle railway. Pop. of urban district (1901), 11,897. It is irregularly built on the shore of the Irish Sea and on the cliffs above, at

the mouth of the river Ellen. Until 1750 there were only a few huts here, the spot being called Ellen-foot, but at this time the harbour was built by Humphrey Senhouse. In 1892 Maryport became an independent port with Workington, Whitehaven and Millom subordinate to it. Coal and pig-iron are exported from the mining district inland, and shipbuilding is carried on. There are also rope and sail works, iron-foundries, saw-mills, breweries and tanneries. On the hill north of the town there is a Roman fort whkh guarded the coast, and many remains of this period have been discovered. The fort was called Uxellodunum.

MARZABOTTO, a village of Emilia, Italy, in the province of Bologna, 17 m. S.S.W. of Bologna by rail. Pop. (1901), 617 (village); 5272 (commune). It lies in the valley of the Reno, 443 ft. above sea-level. In and below the grounds of the Villa Aria, close to it, are the remains of an Etruscan town of the 5th century B.C., protected on the west by the mountains, on the east and south by the river, which by a change of course has destroyed about half of it. The acropolis was just below the villa: here remains of temples were found. The town lay below the modern high-road and was laid out on a rectangular plan divided by main streets into eight quarters, and these in turn into blocks or insidae. Cemeteries were found on the east and north of the site. The name of the place is unknown: it was partially inhabited later by the Gauls, but was not occupied by the Romans.

The discoveries of 1 888-1 889 (with references to previous works) are described by E. Brizio in Monumenti dei Lincei (1891), i. 249 sqq.

(T. As.)

MASACCIO (1402-1429), Italian painter. Tommaso Guidi, son of a notary, Ser Giovanni di Simone Guidi, of the family of the Scheggia, who had property in Castel S. Giovanni di Val d'Arno, was born in 1402 (according to Milanesi, on the 21st of December 1401), and acquired the nickname of Masaccio, which may be translated " Lubberly Tom," in consequence of his slovenly dressing and deportment. From childhood he showed a great inclination for the arts of design, and he is said to have studied under his contemporary Masolino da Panicale. In 142 1, or perhaps 1423, he was enrolled in the gild of the speziali (druggists) in Florence, in 1424 in the gild of painters. His first attempts in painting were made in Florence, and then in Pisa. Next he went to Rome, still no doubt very young; although the statement that he returned from Rome to Florence, in 1420, when only eighteen or nineteen, seems incredible, considering the works he undertook in the papal city. These in- cluded a series of frescoes still extant in a chapel of the church of S. Clemente, a Crucifixion, and scenes from the life of St Catherine and of St Clement, or perhaps some other saint. Though much inferior to his later productions,

these paintings are, for natural- ism and propriety of representation, in advance of their time. Some critics, however, consider that the design only, if even that, was furnished by Masaccio, and the execution left to an inferior hand ; this appears highly improbable, as Masaccio, at his early age, can scarcely have held the position of a master laying out work for subordinates; indeed Vasari says that Lubberly Tom was held in small esteem at all times of his brief life. In the Crucifixion subject the group of the Marys is remarkable; the picture most generally admired is that of Catherine, in the presence of Maxentius, arguing against and converting eight learned doctors. After returning to Florence, Masaccio was chiefly occupied in painting in the church of the Carmine, and especially in that " Brancacci Chapel " which he has rendered famous almost beyond rivalry in the annals of painting.

The chapel had been built early in the 15th century by Felice Michele di Piuvichese Brancacci, a noble Florentine. Masaccio's work in it began probably in 1423, and continued at intervals until

he finally quitted Florence in 1428. There is a whole library-shelf of discussion as to what particular things were done by Masaccio and what by Masolino, and long afterwards by Filippino Lippi, in the Brancacci Chapel, and also as to certain other paintings by Masaccio in the Carmine. He began with a trial piece, a majestic figure of St Paul, not in the chapel; this has perished. A mono- chrome of the Procession for the Consecration of the Chapel, regarded as a wonderful example, for that early period, of perspective and of grouping, has also disappeared ; it contains portraits of Brunelleschi, Dohatello and many others. In the cloister of the Carmine was discovered in recent years a portion of a fresco by Masaccio represent- ing a procession ; but this, being in colours and not in monochrome, does not appear to be the Brancacci procession. As regards the works in the Brancacci chapel itself, the prevalent opinion now is that Masolino, who used to be credited with a considerable portion of them, did either nothing, or at most the solitary compartment which represents St Peter restoring Tabitha to life, and the same saint healing a cripple. The share which Filippino Lippi bore in the work admits of little doubt; to him are due various items on which the fame of Masaccio used principally to be based — as for instance the figure of St Paul addressing Peter in prison, which Raphael partly appropriated ; and hence it may be observed that an eloquent and often-quoted outpouring of Sir Joshua Reynolds in praise of

Masaccio ought in great part to be transferred to Filippino. What Masaccio really painted in the chapel appears with tolerable certainty to be as follows, and is ample enough to sustain the high reputa- tion he has always enjoyed: — (1) The " Temptation of Adam and Eve "; (2) " Peter and the Tribute-Money "; (3) The " Expulsion from Eden"; (4) "Peter Preaching"; (5) "Peter Baptizing"; (6) " Peter Almsgiving "; (7) " Peter and John curing the Sick "; (8) " Peter restoring to Life the Son of King Theophilus of Antioch " was begun by Masaccio, including the separate incident of " Peter Enthroned," but a large proportion is by Filippino; (9) the double subject already allotted to Masolino may perhaps be by Masaccio, and in that case it must have been one of the first in order of execu- tion. A few words may be given to these pictures individually. (1) The " Temptation " shows a degree of appreciation of nude form, corresponding to the feeling of the antique, such as was at that date unexampled in painting. (2) The " Tribute-Money," a full, harmoni- ous and expressive composition, contains a head reputed to be the portrait of Masaccio himself — one of the apostles, with full locks, a solid resolute countenance and a pointed beard. (3) The " Expul- sion " was so much admired by Raphael that, with comparatively slight modifications, he adopted it as his own in one of the subjects of the Logge of the Vatican. (5) " Peter Baptizing " contains some nude figures of strong naturalistic design ; that of the young man, prepared for the baptismal ceremony, who stands half-shivering in the raw air, has always been a popular favourite and an object of artistic study. (8) The restoration of the young man to life has been open to much discussion as to what precise subject was in view, but the most probable opinion is that the legend of King Theophilus was intended.

In 1427 Masaccio was living in Florence with his mother, then for the second time a widow, and with his younger brother Giovanni, a painter of no distinction; he possessed nothing but debts. In 1428 he was working, as we have seen, in the Brancacci chapel. Before the end of that year he disappeared from Florence, going, as it would appear, to Rome, to evade the importunities of creditors. Immediately afterwards, in 1429, when his age was twenty-seven or twenty-eight, he was reported dead. Poisoning by jealous rivals in art was rumoured, but of this nothing is known. The statement that several years after- wards, in 1443, he was buried in the Florentine Church of the Carmine, without any monument, seems to be improbable, and to depend upon a confused account of the dates, which have now, after long causing much bewilderment, been satisfactorily cleared up from extant documents.

It has been said that Masaccio introduced into painting the plastic boldness of Donatello, and carried out the linear per- spective of Paolo Uccello and Brunelleschi (who had given him practical instruction), and he was also the first painter who made some considerable advance in atmospheric

perspective. He was the first to make the architectural framework of his pictures correspond in a reasonable way to the proportions of the figures. In the Brancacci chapel he painted with extraordinary swiftness. The contours of the feet and articulations in his pictures are imperfect; and his most prominent device for giving roundness to the figures (a point in which he made a great advance upon his predecessors) was a somewhat mannered way of putting the high lights upon the edges. His draperies were broad and easy, and his landscape details natural, and superior to his age. [n fact, he led the way in representing the objects of nature

correctly, with action, liveliness and relief. Soon after his death, his work was recognized at its right value, and led to notable advances; and all the greatest artists of Italy, through studying the Brancacci chapel, became his champions and disciples.

Of the works attributed to. Masaccio in public or private galleries hardly_ any are authentic. The one in the Florentine Academy, the " Virgin and Child in the Lap of St Anna," is an exception. The so-called portrait of Masaccio in the Uffizi Gallery is more probably Filippino Lippi; and Filippino, or Botticelli, may be the real author of the head, at first termed a Masaccio, in the National Gallery, London.

An early work on Masaccio was that of T. Patch, Life with Engrav- ings (Florence, 1770-1772). See Layard, The Brancacci Chapel, &c. (1868); H. Eckstein, Life of Masaccio, Giotto, &c. (1882); Charles Yriarte, Tommaso dei Guidi (1894). (W. M. R.)

MASAI, an Eastern Equatorial African people of Negro- Hamitic stock, speaking a Nilotic language. The Hamitic element, which is not great, has probably been derived from the Galla. The Masai were probably isolated in the high moun- tains or plateaus which lie between the Nile and the Karamojo country. There they originally had their home, and there to-day the Latuka, who show affinities with them, still live. Famine or inter-tribal wars drove the Masai in the direction of Mount Elgon and Lake Rudolf. After a long settlement there they split into two groups, the Masai proper and the Wa-Kuafi or agricultural Masai, and this at no very remote date, as the two tribes speak practically the same language. The more powerful Masai were purely nomadic and pastoral, their wealth consisting in enormous herds. The Wa-Kuafi, losing their cattle to their stronger kinsmen, split up again into the Burkeneji, the Gwas Ngishu, and the Nyarusi (Enjamusi) and settled as agriculturists. Meantime the Masai became masters of the greater part of inner East Africa from Ugogo and the Unyamwezi countries on the south and west to Mount Kenya and Galla- land on the north, and eastward to the hundred-mile strip of more or less settled Bantu country on the coast of the Indian Ocean. The Masai physical

type is slender, but among the finest in Africa. A tall, well-made people, the men are often well over six feet, with slim wiry figures, chocolate-coloured, with eyes often slightly oblique like the Mongolians, but the nose especially being often almost Caucasian in type, with well formed bridge and finely cut nostrils. Almost all the men and women knock out the two lower incisor teeth. For this custom they give the curious explanation that lockjaw was once very common in Masai-land, and that it was found to be easy to feed the sufferer through the gap thus made. All the hair on the body of both sexes is pulled out with iron tweezers; a Masai with a moustache or beard is unknown. The hair of the head is shaved in women and married men; but the hair of a youth at puberty is allowed to grow till it is long enough to have thin strips of leather plaited into it. In this way the hair, after a coating of red clay and mutton fat, is made into pigtails, the largest of which hangs down the back, another over the forehead, and one on each side. The warriors smear their whole bodies with the clay and fat, mixed in equal proportion.

No tattooing or scarring is performed on the men, but Sir Harry Johnston noticed women with parallel lines burnt into the skin round the eyes. In both sexes the lobes of the ears are distended into great loops, through holes in which large disks of wood are thrust. Bead necklaces, bead and wood armlets are worn by men, and before marriage the Masai girl has thick iron wire wound round her legs so tightly as to check the calf development. The women wear dressed hides or calico ; the old men wear a skin or cloth cape. The warriors wind red calico round their waists, a circle of ostrich feathers round their face (or a cap of lion or colobus skin) and fringes of long white fur round the knee. Masai houses are of two kinds. The agricultural tribes build round huts with walls of reeds or sticks, and conical, grass-thatched roofs. The true Masai nomads, how- ever, have houses unlike those of any other neighbouring negro tribe. Long, low (not more than 6 ft. high), flat-roofed, they are built on a framework of sticks with strong partitions dividing the structure into separate compartments, each a dwelling, with low, oblong door. Mud and cow-dung are plastered on to the brushwood used in the roofing. Beds are made of brushwood neatly stacked and covered with hides. The fireplace is a circle of stones. The only furniture, besides cooking-pots, consists of long gourds used as milkcans, half- gourds as cups, and small three-legged stools cut out of a single block

of wood and used by the elder men to sit on. The Masai are not hunters of big game except lions, but they eat the eland and kudu. The domestic

animals are cattle, sheep, goats, donkeys and dogs. Only women and the married men smoke. The dead are ordinarily not buried, but the bodies are carried a short distance from the village and left on the ground to be devoured by hyenas, jackals and vultures. Important chiefs are buried, however, and a year later the eldest son or successor recovers the skull, which is treasured as a charm. The medicine men of Masai are often the chiefs, and the supreme chief is almost always a medicine man.

The Masai believe in a nature-god as a supreme being — Ngai (" sky ") — and his aid is invoked in cases of drought by a ceremonial chant of the children, standing in a circle after sunset, each with a bunch of grass in its hand. They have creation-myths involving four gods, the black, white, grey and red deities. They believe there is no future for women or common people, but that such distinction is reserved for chiefs. Pythons and a species of snake are revered as the reincarnated forms of their more celebrated ancestors. A kind of worship is paid to the hyena in some districts : the whole tribe going into mourning if the beast crosses their path. The Masai also have a vague tree-worship, and grass is a sacred symbol. When making peace a tuft is held in the right hand, and when the warriors start out on a raid their sweethearts throw grass after them or lay it in the forks of trees. But the oddest of their superstitious customs is the importance attached to spitting. To spit upon a person or thing is regarded as a sign of reverence and goodwill, as among other Nilotic tribes. Newly born children are spat on by every one who sees them. Johnston states that every Masai before extending his hand to him spat on it first. They spit when they meet and when they part, and bargains are sealed in this way. Joseph Thomson writes, " being regarded as a wizard of the first water, the Masai flocked to me . . . and the more copiously I spat on them the greater was their delight." The Masai has no love for work, and practises no industries. The women attend to his personal needs; and trades such as smelting and forging are left to enslaved tribes such as the Dorobo (Wandorobo). These manu- facture spears with long blades and butts and the peculiar swords or simes like long slender leaves, very narrow towards the hilt and broad at the point. Most of the Masai live in the British East Africa Protectorate.

See A. C. Hollis, The Masai, their Language and Folklore (1905) ; M-. Merker, Die Nasai (1904); Sir H. H. Johnston, Kilimanjaro Expedition (1886) and Uganda Protectorate (1902); Joseph Thomson, Through Masai-land (1885); O. Baumann, Durch Massai-land zur Nilquelle (1894); F. Kallenberg, Auf dem Kriegspfad gegen die Massai (1892).

MASANIELLO, an abbreviation of Tommaso Aniello (1622- 1647), an Amalfi fisherman, who became leader of the revolt against Spanish rule in Naples in 1647. Misgovernment and fiscal oppression having aroused much

discontent throughout the two Sicilies, a revolt broke out at Palermo in May 1647, and the people of Naples followed the example of the Sicilians. The immediate occasion of the latter rising was a new tax on fruit, the ordinary food of the poor, and the chief instigator of the movement was Masaniello, who took command of the malcon- tents. The outbreak began on the 7th of July 1647 with a riot at the city gates between the fruit-vendors of the environs and the customs officers; the latter were forced to flee, and the customs office was burnt. The rioters then poured into Naples and forced their way into the palace of the viceroy, the hated Count d'Arcos, who had to take refuge first in a neighbouring convent, then in Castel Sant' Elmo, and finally in Castelnuovo. Masaniello attempted to discipline the mob and restrain its vandalic instincts, and to some extent he succeeded; attired in his fisherman's garb, he gave audiences and administered justice from a wooden scaffolding outside his house. Several rioters, including the duke of Maddaloni, an opponent of the viceroy, and his brother Giuseppe Caraffa, who had come to Naples to make trouble, were condemned to death by him and executed. The mob, which every day obtained more arms and was becom- ing more intractable, terrorized the city, drove off the troops summoned from outside, and elected Masaniello " captain- general "; the revolt was even spreading to the provinces. Finally, the viceroy, whose negotiations with Masaniello had been frequently interrupted by fresh tumults, ended by granting all the concessions demanded of him. On the 13th of July, through the mediation of Cardinal Filomarino, archbishop of Naples, a convention was signed between D'Arcos and Masaniello as " leader of the most faithful people of Naples," by which the rebels were pardoned, the more oppressive taxes removed, and the citizens granted certain rights, including that of remaining

in arms until the treaty should have been ratified by the king of Spain. The astute D'Arcos then invited Masaniello to the palace, confirmed his title of "captain-general of the Neapolitan people," gave him a gold chain of office, and offered him a pension. Masaniello refused the pension and laid down his dignities, saying that he wished to return to his old life as a fisherman; but he was entertained by the viceroy and, partly owing to the strain and excitement of the past days, partly because he was made dizzy by his astonishing change of fortune, or perhaps, as it was believed, because he was poisoned, he lost his head and behaved like a frenzied maniac. The people continued to obey him for some days, until, abandoned by his best friends, who went over to the Spanish party, he was murdered while haranguing a mob on the market-place on the 16th of July 1647; his head was cut off and brought by a band of roughs to the viceroy and the body buried outside the city. But the next day the populace, angered by the alteration of the measures for weighing bread, repented of its insane fury; the body of Masaniello was dug up and given a splendid funeral, at which

the viceroy himself was represented.

Masaniello's insurrection appealed to the imagination of poets and composers, and formed the subject of several operas, of which the most famous is Auber's La Muette de Portici (1828).

See Saavedra, Insurreccion de Napoli en 1647 (2 vols. , Madrid, 1 849) ; A. von Reumont, Die Caraffa von Maddaloni (2 vols., Berlin, 1849); Capasso, La Casa efamiglia di Masaniello (Naples, 1893) ; V. Spinazzola, Masaniello e la sua famiglia, secondo un codice bolognese del sec. xvi. (in the review Flegrea, 1900) ; A. G. Meissner, Masaniello (in German); E. Bourg, Masaniello (in French); F. Palermo, Documenti diversi sulle novita accadute in Napoli I'anno 1647 (in the Archivio storico italiano, 1st series, vol. ix.). See also Naples.

MASAYA, the capital of the department of Masaya, Nicaragua, 13 m. W.N.W. of Lake Nicaragua and the city of Granada, on the eastern shore of Lake Masaya, and on the Granada-Managua railway. Pop. (1905), about 20,000. The city is built in the midst of a very fertile lowland region, which yields large quantities of tobacco. The majority of the inhabitants are Indians or half-castes. Lake Masaya occupies an extinct crater; the isolated volcano of Masaya (3000 ft.) on the opposite side of the lake was active at the time of the conquest of Nicaragua in 1522, and the conquerors, thinking the lava they saw was gold, had themselves lowered into the crater at the risk of their lives. The volcano was in eruption in 1670, 1782, 1857 and 1902.

MASCAGNI, PIETRO (1863-), Italian operatic composer, was born at Leghorn, the son of a baker, and educated for the law; but he neglected his legal studies for music, taking secret lessons at the Instituto Luigi Cherubini. There a symphony by him was performed in 1879, and various other compositions attracted attention, so that money was provided by a wealthy amateur for him to study at the Milan Conservatoire. But Mascagni chafed at the teaching, and soon left Milan to become conductor to a touring operatic company. After a somewhat chequered period he suddenly leapt into fame by the production at Rome in 1890 of his one-act opera Cavalleria Rusticana, containing a tuneful " intermezzo," which became wildly popular. Mascagni was the musical hero of the hour, and Cavalleria Rusticana was performed everywhere. But his later work failed to repeat this success. L'Amico Fritz (1891), 1 Rantzau (1892), Guglielmo Ratclijf (1895), Silvano (1895), Zanetto (1896), Iris (1898), Le Maschere (1901), and Arnica (1905), were coldly or adversely received; and though Cavalleria Rusticana, with its catchy melodies, still held the stage, this succession of failures involved a steady decline in the composer's reputation. From 1895 to 1903 Mascagni was director of the Pesaro

Conservatoire, but in the latter year, having left his post in order to tour through the United States, he was dismissed from the appointment.

MASCARA, chief town of an arrondissement in the department of Oran, Algeria, 60 m. S.E. of Oran. It lies 1800 ft. above the sea, on the southern slope of a range forming part of the Little Atlas Mountains, and occupies two small hills separated by the Wad Tudman, which is crossed by three stone bridges. The walls, upwards of two miles in circuit, and strengthened by bastions and towers, give the place a somewhat imposing

appearance. Mascara is a town of the French colonial type, few vestiges of the Moorish period remaining. Among the public buildings are two mosques, in one of which Abd-el-Kader preached the jihad. The town also contains the usual establish- ments attaching to the seat of a sub-prefect and the centre of a military subdivision. The principal industry is the making of wine, the white wines of Mascara being held in high repute. There is also a considerable trade in grains and oil. A branch railway eight miles long connects Mascara with the line from the seaport of Arzeu to Ain Sefra. Access is also gained by this line to Oran, Algiers, &c. Pop. (1006) of the town, 18,989; of the commune, which includes several villages, 22,934; of the arrondissement, comprising eleven communes, 190,154.

Mascara (i.e. " mother of soldiers ") was the capital of a Turkish beylik during the Spanish occupation of Oran from the 16th to the close of the 18th century; but for the most of that period it occupied a site about two miles distant from the present position. On the removal of the bey to Oran its importance rapidly declined ; and it was an insignificant place when in 1832 Abdt-el-Kader, who was born in the neighbourhood, chose it as the seat of his power. It was laid in ruins by the French under Marshal Clausel and the duke of Orleans in 1835, the amir retreating south. Being reoccupied by Abd-el-Kader in 1838, Mascara was again captured in 1841 by Marshal Bugeaud and General Lamoriciere.

MASCARENE ISLANDS (occasionally Mascarenhas) , the collective title of a group in the Indian Ocean east of Madagascar, viz. Mauritius, Reunion and Rodriguez (q.v.). The collective title is derived from the Portuguese navigator Mascarenhas, by whom Reunion, at first called Mascarenhas, was discovered.

MASCARON, JULES (1634-1703), French preacher, was the son of a barrister at Aix. Born at Marseilles in 1634, he early entered the French

Oratory, and obtained great reputation as a preacher. Paris confirmed the judgment of the provinces; in 1666 he was asked to preach before the court, and became a great favourite with Louis XIV., who said that his eloquence was one of the few things that never grew old. In 1671 he was appointed bishop of Tulle; eight years later he was transferred to the larger diocese of Agen. He still continued, however, to preach regularly at court, being especially in request for funeral orations. A panegyric on Turenne, delivered in 1675, is con- sidered his masterpiece. His style is strongly tinged with preciosite; and his chief surviving interest is as a glaring example of the evils from which Bossuet delivered the French pulpit. During his later years he devoted himself entirely to his pastoral duties at Agen, where he died in 1703.

Six of his most famous sermons were edited, with a biographical sketch of their author, by the Oratorian Borde in 1704.

MASCHERONI, LORENZO (1750-1800), Italian geometer, was professor of mathematics at the university of Pavia, and pub- lished a variety of mathematical works, the best known of which is his Geometria del compasso (Pavia, 1797), a collection of geometrical constructions in which the use of the circle alone is postulated. Many of the solutions are most ingenious, and some of the constructions of considerable practical importance.

There is a French translation by A. M. Carette (Paris, 1798), who also wrote a biography of Mascheroni. See Poggendorff, Biog. Lit. Handworterbuch.

MASCOT (Fr. slang: perhaps from Port, mascotto, " witch- craft "), the term for any person, animal, or thing supposed to bring luck. The word was first popularized by Edmond Audran through his comic opera La Mascolte (1880), but it had been common in France long before among gamblers. It has been traced back to a dialectic use .in Provence and Gascony, where it meant something which brought luck to a household. The suggestion that it is from masque (masked or concealed), the provincial French for a child born with a caul, in allusion to the lucky destiny of such children, is improbable.

MASDEU, JUAN FRANCISCO (1744-1817), Spanish historian, was born at Palermo on the 4th of October 1 744. He joined the Company of Jesus on the 19th of December 1759, and became professor in the Jesuit seminaries at Ferrara and Ascoli. He visited Spain in 1799, was exiled, and returned in 1815, dying at Valencia on the nth of April 181 7. His Storia critica di Spagna

e della cultura spagnuola in ogni genere (2 vols., 1781-1784) was finally expanded into the Historia critica de Espana y de la cultura espanola (1783-1805), which, though it consists of twenty volumes, was left unfinished; had it been continued on the same scale, the work would have consisted of fifty volumes. Masdeu wrote in a critical spirit and with a regard for accuracy rare in his time; but he is more concerned with small details than with the philosophy of history. Still, his narrative is lucid, and later researches have not yet rendered his work obsolete.

MASERU, the capital of Basutoland, British South Africa. It is pleasantly situated on the left bank of the Caledon river, 90 m. by rail E. by S. of Bloemfontein, and 40 m. N.E. of Wepener. It is in the centre of a fertile grain-growing district. Pop. (1904), 862, of whom 99 were Europeans. The principal buildings are Government House, the church of the Paris Evangelical Missionary Society, the hospital, and the railway station. (See Basutoland.)

MASHAM, ABIGAIL, Lady (d. 1734), favourite of Anne, queen of England, was the daughter of Francis Hill, a London merchant, her mother being an aunt of Sarah Jennings, duchess of Marlborough. The family being reduced to poor circumstances through Hill's speculations, Lady Churchill (as she then was), lady of the bedchamber to the Princess Anne, befriended her cousin Abigail, whom she took into her own household at St Albans, and for whom after the accession of the princess to the throne she procured an appointment in the queen's household about the year 1704. It was not long before Abigail Hill began to supplant her powerful and imperious kinswoman in the favour of Queen Anne. Whether she was guilty of the deliberate ingratitude charged against her by the duchess of Marlborough is uncertain. It is not unlikely that, in the first instance at all events, Abigail's influence over the queen was not so much due to subtle scheming on her part as to the pleasing contrast between her gentle and genial character and the dictatorial temper of the duchess, which after many years of undisputed sway had at last become intolerable to Anne. The first intimation of her protege's growing favour with the queen came to the duchess in the summer of 1707, when she learned that Abigail Hill had been privately married to a gentleman of the queen's household named Samuel Masham, and that the queen herself had been present at the marriage. Inquiry then elicited the information that Abigail had for some time enjoyed considerable intimacy with her royal mistress, no hint of which had previously reached the duchess. Abigail was said to be a cousin of Robert Harley, earl of Oxford, and after the latter's dismissal from office in February 1708 she assisted him in maintaining confidential relations with the queen. The completeness of her ascendancy was seen in 17 10 when the queen compelled Marlborough, much against his will, to give an important command to Colonel John Hill, Abigail's brother; and when

Sunderland, Godolphin, and the other Whig ministers were dismissed from office, largely owing to her influence, to make way for Oxford and Bolingbroke. In the following year the duchess of Marlborough was also dis- missed from her appointment at court, Mrs Masham taking her place as keeper of the privy purse. In 1 7 1 1 the ministers, intent on bringing about the disgrace of Marlborough and arranging the Peace of Utrecht, found it necessary to secure their position in the House of Lords by creating twelve new peers; one of these was Samuel Masham, the favourite's husband, though Anne showed some reluctance to raise her bedchamber woman to a position in which she might show herself less ready to give her personal services to the queen. Lady Masham soon quarrelled with Oxford, and set herself to foster by all the means in her power the queen's growing personal distaste for her minister. Oxford's vacillation between the Jacobites and the adherents of the Hanoverian succession to the Crown probably strengthened the opposition of Lady Masham, who now warmly favoured the Jacobite party led by Bolingbroke and Atterbury. Altercations took place in the queen's presence between Lady Masham and the minister; and finally, on the 27th of July 1714, Anne dis- missed Oxford from his office of lord high treasurer, and three days later gave the staff to the duke of Shrewsbury. Anne died

on the 1st of August, and Lady Masham then retired into private life. She died on the 6th of December 1734.

Lady Masham was by no means the vulgar, ill-educated person she was represented to have been by her defeated rival, the duchess of Marlborough; her extant letters, showing not a little refinement of literary style, prove the reverse. Swift, with whom both she and her husband were intimate, describes Lady Masham as " a person of a plain sound understanding, of great truth and sincerity, without the least mixture of falsehood or disguise." The barony of Masham became extinct when Lady Masham's son, Samuel, the 2nd baron, died in June 1776.

Authorities. — Gilbert Burnet, History of My Own Time, vol. vi. (2nd ed., 6 vols., Oxford, 1833); F. W. Wyon, History of Great Britain during the Reign of Queen Anne (2 vols., London, 1876) ; Earl Stanhope, History of England, comprising the Reign of Queen Anne until the Peace of Utrecht (London, 1870), and History of England from the Peace of Utrecht, vol. i. (7 vols., London, 1836-1854); Justin McCarthy, The Reign of Queen Anne (2 vols., London, 1902); An A ccount of the Conduct of the Dowager Duchess of Marlborough from first coming to Court to 1710, edited by

Nathaniel Hooke, with an anonymous reply entitled A Review of a Late Treatise (London, 1842); Private Correspondence of Sarah, Duchess of Marlborough (2 vols., London, 1838); Letters of Sarah, Duchess of Marlborough (London, 1875) ; Mrs Arthur Colville, Duchess Sarah (London, 1904). Numerous references to Lady Masham will also be found scattered through Swift's Works (2nd ed., 19 vols., Edinburgh, 1824).

(R. J- M.)

MASHAM, SAMUEL CUNLIFFE LISTER, ist Baron (1815- 1906), English inventor, born at Calverley Hall, near Bradford, on the 1 st of January 181 5, was the fourth son of Ellis Cunliffe (1774-1853), who successively took the names of Lister and Lister-Kay, and was the first member of parliament elected for Bradford after the Reform Act of 1832. It was at first proposed that he should take orders, but he preferred a business career and became a clerk at Liverpool. In 1838 he and his elder brother John started as worsted spinners and manu- facturers in a new mill which their father built for them at Manningham, and about five years later he turned his atten- tion to the problem of mechanical wool-combing, which, in spite of the efforts of E. Cartwright and numerous other inventors, still awaited a satisfactory solution. Two years of hard work spent in modifying and improving existing devices enabled him to produce a machine which worked well, and subsequently he consolidated his position by buying up rival patents, as well as by taking out additional ones of his own. His combing machines came into such demand that though they were made for only £200 apiece he was able to sell them for £1200, and the saving they effected in the cost of production not only brought about a reduction in the price of clothing, but in consequence of the increase in the sales created the necessity for new supplies of wool, and thus contributed to the development of Australian sheep-farming. In 1855 he was sent a sample of silk waste (the refuse left in reeling silk from the cocoons) and asked whether he could find a way of utilizing the fibre it contained. The task occupied his time for many years and brought him to the verge of bank- ruptcy, but at last he succeeded in perfecting silk-combing appliances which enabled him to make yarn that in one year sold for 23s. a pound, though produced from raw material costing only 6d. or is. a pound. Another important and lucrative invention in connexion with silk manufacture was his velvet loom for piled fabrics; and this, with the silk comb worked at his Manningham mill, yielded him an annual income of £200,000 for many years. But the business was seriously affected by the prohibitory duties imposed by America, and this was one reason why he was an early and determined critic of the British policy of free imports. In 1891 he was made a peer; he took his title from the little Yorkshire town of Masham, close to which is Swinton Park, purchased by him in 1888. In 1886 an Albert medal was awarded him for his inventions, which were mostly related to the textile

industries, though he occasionally diverged to other subjects, such as an air-brake for railways. He was fond of outdoor sports, especially coursing and snooting, and was a keen patron of the fine arts. He died at Swinton

Park on the 2nd of February 1906, and was succeeded in the title by his son.

MASHONA, a Bantu-negro people, inhabitants of Mashona- land, Southern Rhodesia. The name Mashona has been derived from the contemptuous term Amashuina applied by the Matabele to the aborigines owing to the habit of the latter of taking refuge in the rocky hills with which the country abounds. Before the Matabele invasion about 1840 most of Southern Rhodesia was occupied by the Makalanga, the Makorikori and the Banyai, all closely related. Most of them became subject to the Matabele, but although they suffered severely from their attacks, the Mashona preserved a certain national unity. In 1890 the Mashona came under British protection (see Rhodesia). They are in general a peaceful, mild-mannered people, industrious and successful farmers, skilful potters, and weavers of bark cloth.

The crafts, however, in which they excel are the smelting and forging of iron and wood-carving. They are also great hunters; and they are very fond of music, the most usual instru- ment being the " piano " with iron keys. Bows and arrows, assegais and axes are the native weapons, but all who can get them now use guns. Up to their conquest by the Matabele the Mashona worked the gold diggings which are scattered over their country; indeed as late as 1870 certain Mashona were still extracting gold from quartz (Geog. Jour. April 1906).

For the. possible connexion of these people with the builders of the ruins at Zimbabwe and elsewhere, see Rhodesia: Archaeology; and Zimbabwe.

MASK (Fr. masque, apparently from med. Lat. mascus, masca, spectre, through Ital. maschera, Span, mascara), a covering for the face, taking various forms, used either as a protective screen or as a disguise. In the latter sense masks are mostly associated with the artificial faces worn by actors in dramatic representations, or assumed for exciting terror (e.g. in savage rites). The spelling " masque," representing the same word, is now in English used more specially for certain varieties of drama in which masks were originally worn (see Drama); so also " masquerade," particularly in the sense of a masked ball or an entertainment where the personages are disguised. Both " mask " and " masquerade " have naturally passed into figurative and technical meanings, the former especially for various senses of face and head (head of a fox, grotesque faces in sculpture), or as equivalent to " cloak " or " screen " (as in

fortification or other military uses, fencing, &c). And in the case of " death-masks " the term is employed for the portrait- casts, generally of plaster or metallic foil, taken from the face of a dead person (also similarly from the living), an ancient practice of considerable interest in art. An interesting collection made by Laurence Hutton (see his Portraits in Plaster, 1894), is at Princeton University in the United States. (For the historical mystery of the " man in the iron mask," see Iron Mask.)

The ancient Greek and Roman masks worn by their actors — hollow figures of heads — had the double object of identifying the performers with the characters assumed, and of increasing the power of the voice by means of metallic mouthpieces. They were derived like the drama from the rural religious festivities, the wearing of mock faces or beards being a primitive custom, connected no doubt with many early types of folk-lore and religion. The use of the dramatic mask was evolved in the later theatre through the mimes and the Italian popular comedy into pantomime; and the masquerade similarly came from Italy, where the domino was introduced from Venice. The domino (originally apparently an ecclesiastical garment) was a loose cloak with a small half-mask worn at masquerades and costume-balls by persons not otherwise dressed in character; and the word is applied also to the person wearing it.

See generally Altmann, Die Masken der Schauspieler (1875; new ed., 1896); and Dale, Masks, Labrels and Certain Aboriginal Customs (1885) ; also Drama.

MASKELYNE, NEVIL (1732-1811), English astronomer- royal, was born in London on the 6th of October 1732. The

solar eclipse of 1748 made a deep impression upon him; and having graduated as seventh wrangler from Trinity College, Cambridge, in 1754, he determined to devote himself wholly to astronomy. He became intimate with James Bradley in 1755, and in 1761 was deputed by the Royal Society to make observations of the transit of Venus at St Helena. During the voyage he experimented upon the determination of longitude by lunar distances, and ultimately effected the introduction of the method into navigation (q.v.). In 1765 he succeeded Nathaniel Bliss as astronomer-royal. Having energetically discharged the duties of his office during forty-six years, he died on the 9th of February 181 1.

Maskelyne's first contribution to astronomical literature was " A Proposal

for Discovering the Annual Parallax of Sirius," pub- lished in 1760 (Phil. Trans, li. 889). Subsequent volumes of the same series contained his observations of the transits of Venus (1761 and 1769), on the tides at St Helena (1762), and on various astronomical phenomena at St Helena (1764) and at Barbados (1764). In 1763 he published the British Mariner's Guide, which includes the suggestion that in order to facilitate the finding of longitude at sea lunar distances should be calculated beforehand for each year and published in a form accessible to navigators. This important proposal, the germ of the Nautical Almanac, was approved of by the government, and under the care of Maskelyne the Nautical Almanac for 1767 was published in 1766. He continued during the remainder of his life the superintendence of this invaluable annual. He further induced the government to print his observa- tions annually, thereby securing the prompt dissemination of a large mass of data inestimable from their continuity and accuracy. Maskelyne had but one assistant, yet the work of the obser- vatory was perfectly organized and methodically executed. He introduced several practical improvements, such as the measure- ment of time to tenths of a second; and he prevailed upon the government to replace Bird's mural quadrant by a repeating circle 6 ft. in diameter. The new instrument was constructed by E. Troughton; but Maskelyne did not live to see it completed. In 1772 he suggested to the Royal Society the famous Schehallion experiment for the determination of the earth's density and carried out his plan in 1774 (Phil. Trans. 1. 495), the apparent difference of latitude between two stations on opposite sides of the mountain being compared with the real difference of latitude obtained by triangulation. From Maskelyne's observations Charles Hutton deduced a density for the earth 4-5 times that of water (ib. lxviii. 782). Maskelyne also took a great interest in various geodetical operations, notably the measurement of the length of a degree of latitude in Maryland and Pennsylvania (ibid, lviii. 323), executed by Mason and Dixon in 1766-1768, and later the determination of the relative longitude of Greenwich and Paris (ib. lxxvii. 151). On the French side the work was conducted by Count Cassini, Legendre, and Mechain ; on the English side by General Roy. This triangula- tion was the beginning of the great trigonometrical survey which has since been extended all over the country. His observations appeared in four large folio volumes (1776-1811). Some of them were reprinted in S. Vince's Astronomy (vol. iii.). (A. M. C.)

MASOLINO DA PANICALE (1383-c. 144s), Florentine painter, was said to have been born at Panicale di Valdelsa, near Florence. It is more probable, however, that he was born in Florence itself, his father, Cristoforo Fini, who was an " imbiancatore," or whitewasher, having been domiciled in the Florentine quarter of S. Croce. There is reason to believe that Tommaso, nick- named Masolino, was a pupil of the painter Stamina,

and was principally influenced in style by Antonio Veneziano; he may probably enough have become in the sequel the master of Masaccio. He was born in 1383; he died later than 1429, perhaps as late as 1440 or even 1447. Towards 1423 he entered the service of Filippo Scolari, the Florentine-born ober- gcspann of Temeswar in Hungary, and stayed some time in that country, returning towards 1427 to Italy. The only works which can with certainty be assigned to him are a series of wall paintings executed towards 1428, commissioned by Cardi- nal Branda Castiglione, in the church of Castiglione d'Olona, not far from Milan, and another series in the adjoining bap- tistery. The first set is signed as painted by " Masolinus de Florentia." It was recovered in 1843 from a coating of white-wash, considerably damaged; its subject matter is taken from the lives of the Virgin and of SS Lawrence and Stephen. The series in the baptistery relates to the life and death of John the Baptist. The reputation of Masolino had previously rested almost entirely upon the considerable share which he

was supposed to have had in the celebrated frescoes of the Brancacci Chapel, in the Church of the Carmine in Florence; he was regarded as the precursor of Masaccio, and by many years the predecessor of Filippino Lippi, in the execution of a large proportion of these works. But from a comparison of the Castiglione with the Brancacci frescoes, and from other data, it is very doubtful whether Masolino had any hand at all in the latter series. Possibly he painted in the Brancacci Chapel certain specified subjects which are now either destroyed or worked over. Several paintings assigned to Masolino on the authority of Vasari are now ascribed to Masaccio. (W. M. R.)

MASON, FRANCIS (1799-1874), American missionary, was born in York, England, on the 2nd of April 1799. His grand- father, Francis Mason, was the founder of the Baptist Society in York, and his father, a shoemaker by trade, was a Baptist lay preacher there. After working with his father as a shoemaker for several years, he emigrated in 1818 to the United States, and in Massachusetts was licensed to preach as a Baptist in 1827. In 1830 he was sent by the American Baptist Missionary Convention to labour among the Karens in Burma. Besides conducting a training college for native preachers and teachers at Tavoy, he translated the Bible into the two principal dialects of the Karens, the Sgaw and the Pwo (his translation being pub- lished in 1853), and Matthew, Genesis, and the Psalms into the Bghai dialect. He also published A Pali Grammar on the Basis of Kachchayano, with Chrestomathy and Vocabulary (1868). In 1852 he published a book of great value on the fauna and flora of British Burma, of which an improved edition appeared in i860 under the title Burmah, its People and Natural Productions, and a third edition (2 vols.) revised and enlarged by W. Theobald in 1882-1883. He died at Rangoon on the 3rd of March 1874.

See his autobiography, The Story cf a Working Man's Life, with Sketches of Travel in Europe, Asia, Africa and America (New York,

1870).

MASON, GEORGE (1725-1792), American statesman, was born in Stafford county (the part which is now Fairfax county), Virginia, in 1725. His family was of Royalist descent and emigrated to America after the execution of Charles I. His colonial ancestors held official positions in the civil and military service of Virginia. Mason was a near neighbour and a life- long friend of George Washington, though in later years they disagreed in politics. His large estates and high social standing, together with his personal ability, gave Mason great influence among the Virginia planters, and he became identified with many enterprises, such as the organization of the Ohio Company and the founding of Alexandria (1749). He was a member of the Virginia House of Burgesses in 1759-1760. In 1769 he drew up for Washington a series of non-importation resolutions, which were adopted by the Virginia legislature. In July 1774 he wrote for a convention in Fairfax county a series of resolutions known as the Fairfax Resolves, in which he advocated a congress of the colonies and suggested non-intercourse with Great Britain, a policy subsequently adopted by Virginia and later by the Continental Congress. He was a member of the Virginia Committee of Safety from August to December 1775, and of the Virginia Convention in 1775 and 1776; and in 1776 he drew up the Virginia Constitution and the famous Bill of Rights, a radically democratic document which had great influence on American political institutions. In 1780 he outlined the plan which was subsequently adopted by Virginia for ceding to the Federal government her claim to the " back lands," i.e. to territory north and north-west of the Ohio river. From 1776 to 1788 he represented Fairfax county in the Virginia Assembly. He was a member of the Virginia House of Delegates in 1 776-1 780 and again in 1787-1788, and in 1787- was a member of the conven- tion that framed the Federal Constitution, and as one of its ablest debaters took an active part in the work. Particularly notable was his opposition to the compromises in regard to slavery and the slave-trade. Indeed, like most of the prominent Virginians of the time, Mason was strongly in favour of the gradual abolition of slavery. He objected to the large and indefinite powers given by the completed Constitution to

Congress, so he joined with Patrick Henry in opposing its rati- fication in the Virginia Convention (1788). Failing in this he suggested amendments,

the substance of several of which was afterwards embodied in the present Bill of Rights. Declining an appointment as a United States Senator from Virginia, he retired to his home, Gunston Hall (built by him about 1758 and named after the family home in Staffordshire, England), where he died on the 7th of October 1792. With James Madison and Thomas Jefferson, Mason carried through the Virginia legislature measures disestablishing the Episcopal Church and protecting all forms of worship. In politics he was a radical republican, who believed that local government should be kept strong and central government weak; his democratic theories had much influence in Virginia and other southern and western states.

See Kate Mason Rowland, Life and Writings of George Mason (2 vols., New York, 1892).

MASON, GEORGE HEMMING (1818-1872), English painter, was born at Wetley Abbey, the eldest son of a Staffordshire county gentleman. He was educated at King Edward's School, Birmingham, and studied for the medical profession for five years under Dr Watt of that city. But all his thoughts being given to art, he abandoned medicine in 1844 and travelled for a time on the Continent', finally settling in Rome, where he remained for some years and sought to make a living as an artist. During this period he underwent many privations which permanently affected his health; but he continued to labour assiduously, making studies of the picturesque scenery that surrounded him, and with hardly any instruction except that received from Nature and from the Italian pictures he gradually acquired the painter's skill. At least two important works are referable to this period: " Ploughing in the Cam- pagna," shown in the Royal Academy of 1857, and " In the Salt Marshes, Campagna," exhibited in the following year. After Mason's return from the continent, in 1858, when he settled at Wetley Abbey, he continued for a while to paint Italian subjects from studies made during his stay abroad, and then his art began to touch in a wonderfully tender and poetic way the peasant life of England, especially of his native Staffordshire, and the homely landscape in the midst of which that life was set. The first picture of this class was " Wind on the Wold," and it was followed — along with much else of admirable quality — by the painter's three greatest works: The " Evening Hymn " (1868), a band of Staffordshire mill-girls returning from their work; " Girls dancing by the Sea " (1869); and the " Harvest Moon " (1872). He left Staffordshire in 1865 and went to live at Hammersmith; and he was elected an associate of the Royal Academy in 1869. By that time he had fully established his position as an artist of unusual power and individuality. Mason died on the 22nd of October 1872. In his work he laboured under the double disadvantage of feeble and uncertain health, and a want of thorough art-training, so that his pictures were never produced easily, or without strenuous and long-continued effort. His art is great in virtue of the 'solemn

pathos which pervades it, of the dignity and beauty in rustic life which it reveals, of its keen perception of noble form and graceful motion, and of rich effects of colour and subdued light. In motif and treatment it has something in common with the art of Millet and Jules Breton, as with that of Frederick Walker among Englishmen; though he had neither the occasional uncouth robustness of Millet nor the firm actuality of Jules Breton. His pictures " Wind on the Wold " and " The Cast Shoe " are in the National Gallery of British Art.

MASON, JAMES MURRAY (1798-1871), American political leader, was born in Fairfax county, Virginia, on the 3rd of November 1798, the grandson of George Mason (1725-1792). Educated at the university of Pennsylvania and the college of William and Mary, he was admitted to the bar in 1820. He was a member of the Virginia House of Delegates in 1826-1827 and 1828-1831, of the state Constitutional Convention of 1829, of the National House of Representatives (1837-1839), of the United States Senate from 1847 until July 1861 (when, with

other Southern senators he was formally expelled— he had previously withdrawn), and of the Virginia Secession Convention in April 1861. Entering politics as a Jacksonian Democrat, Mason was throughout his career a consistent strict construc- tionist, opposing protective tariffs, internal improvements by the national government, and all attempts to restrict or control the spread of slavery, which he sincerely believed to be essential to the social and political welfare of the South. He was the author of the Fugitive Slave Act of 1850, and in i860 was chairman of the Senate committee which investigated the John Brown raid. After Lincoln's election as President he was one of the strongest advocates of secession in Virginia. He was appointed in August 1861 commissioner of the Confederate States to Great Britain. The British ship " Trent," upon which he and John Slidell, the commissioner to France, sailed, was intercepted (Nov. 8, 1861) by a United States ship-of-war (the " San Jacinto," Captain Charles Wilkes), and the two commissioners were seized and carried as prisoners to Boston. Great Britain immediately demanded their release, and war for a time seemed imminent; but owing mainly to the tactful diplomacy of the prince consort, Lincoln acknowledged that the seizure of Mason and Slidell was a violation of the rights of Great Britain as a neutral, and on the 1st of January 1862 released the commissioners. The incident has become known in history as the " Trent Affair." Mason at once proceeded to London, where, however, he was unable to secure official recognition, and his commission to Great Britain was withdrawn late in 1863. He remained in Europe, spending most of his time at Paris and holding blank commissions which he was authorized to fill in at his discretion in case the presence of a Confederate commissioner should seem desirable at any par- ticular European court. These commissions, however, he did not use. After the war

he lived for several years in Canada, but returned in 1869 to Virginia, and on the 28th of April 1871 died at Alexandria.

See The Public Life and Diplomatic Correspondence of James M. Mason, with some Personal History (Roanoke, Va., 1903), by his daughter, Virginia Mason; Sir Theodore Martin, Life of the Prince Consort.

MASON, SIR JOHN (1503-1566), English diplomatist, was born of humble parentage at Abingdon in 1503, and was educated at Oxford, where he became Fellow of All Souls in 1521. He was ordained before 1531. Most of his early years were spent on the Continent, where he witnessed the meeting between Henry VIII. and Francis I. at Calais in 1532, and where he was employed in collecting information for the English govern- ment, gaining in this work the reputation of a capable diploma- tist. By his never-failing caution, moderation and pliancy, Mason succeeded in keeping himself in favour with four successive sovereigns of the Tudor monarchy. In 1537 he became secretary to the English ambassador at Madrid, Sir Thomas Wyat; but when the latter was put on his trial for treason in 1541 Masen was unmolested, and soon afterwards was appointed clerk of the privy council, and procured for himself sundry other posts and privileges. Mason was knighted and made dean of Win- chester by Edward VI. He was one of the commissioners to negotiate the treaty by which Boulogne was restored to France in 1550, and in the same year he became English ambassador in Paris, where he helped to arrange the bethrothal of Edward VI. to the princess Elizabeth of France. He returned to England at the end of 1 551, became clerk of parliament, received extensive grants of land, and in 1552 was made chancellor of Oxford University. He was elected member of parliament in the same year. On the death of Edward VI., he at first joined the party of Northumberland and the Lady Jane Grey; but quickly perceiving his mistake he took an active part in procuring the proclamation of Mary as queen. Mason now received fresh tokens of royal favour, being confirmed in all his secular, though not in his ecclesiastical, offices; and in 1553 he was appointed English ambassador at the court of the emperor Charles V., of whose abdication at Brussels in October 1555 he wrote a vivid account. He took a prominent share in the

administrative business of the government in the first years of Elizabeth's reign, and largely influenced her foreign policy until his death, which occurred on the 20th of April 1 566. Sir John Mason married Elizabeth, daughter of Sir Thomas Isley of Sundridge, Kent, and widow of Richard

Hill. He had no children, and his heir was Anthony Wyckes, whom he had adopted, and who assumed the name of Mason and left a large family.

See J. A. Froude, History of England (12 vols., London, 1856- 1870); Charles Wriothesley, Chronicle of England during the Reigns of the Tudors, edited by W. D. Hamilton (Camden Soc., 2 vols., London, 1875) ; P. F. Tytler, England under the Reigns of Edward VI. and Mary (2 vols., London, 1839); John Strype, Ecclesiastical Memorials (3 vols., Oxford, 1824) and Memorials of Thomas Cranmer (3 vols., Oxford, 1848); Acts of the Privy Council of England (new series), edited by J. R. Dasent, vols. i.-vii.

MASON, JOHN (1586-1635), founder of New Hampshire, U.S.A., was born in King's Lynn, Norfolk, England. In 1610 he commanded a small naval force sent by James I. to assist in subduing the Hebrides Islands. From 1615 to 1621 he was governor of the English colony on the north side of Conception Bay in Newfoundland; he explored the island, made the first English map of it (published in 1625), and wrote a descriptive tract entitled A Brief e Discourse of the Newfoundland (Edin- burgh, 1620) to promote the colonization of the island by Scots- men. Here he was brought into official relations with Sir Ferdinando Gorges, then a commissioner to regulate the New- foundland fisheries. In March 1622 Mason obtained from the Council for New England, of which Gorges was the most influential member, a grant of the territory (which he named Mariana) between the Naumkeag or Salem river and the Merrimac, and in the following August he and Gorges together received a grant of the region between the Merrimac and Kennebec rivers, and extending 60 m. inland. From 1625 to 1629 Mason was engaged as treasurer and paymaster of the English army in the wars which England was waging against Spain and France. Towards the close of 1629 Mason and Gorges agreed upon a division of the territory held jointly by them, and on the 7th of November 1629 Mason received from the Council a separate grant of the tract between the Merrimac and the Piscataqua, which he now named New Hampshire. Thinking that the Piscataqua river had its source in Lake Champlain, Mason with Gorges and a few other asso- ciates secured, on the 17th of November 1629, a grant of a region which was named Laconia (apparently from the number of lakes it was supposed to contain), and was described as bordering on Lake Champlain, extending 10 m. east and south from it and far to the west and north-west, together with 1000 acres to be located along some convenient harbour, presumably near the mouth of the Piscataqua. In November 1631 Mason and his associates obtained, under the name of the Pescataway Grant, a tract on both sides of the Piscataqua river, extending 30 m. inland and including also the Isles of Shoals. Mason became a member of the Council for New England in June 1632, and its vice-president in the follow- ing November; and in 1635, when the

members decided to divide their territory among themselves and surrender their charter, he was allotted as his share all the region between the Naumkeag and Piscataqua rivers extending 60 m. inland, the southern half of the Isles of Shoals, and a ten-thousand acre tract, called Masonia, on the west side of the 'Kennebec river. In October 1635 he was appointed vice-admiral of New England, but he died early in December, before crossing the Atlantic. He was buried in Westminster Abbey. Forty-four years after his death New Hampshire was made a royal province.

See Captain John Mason, the Founder of New Hampshire (Boston, 1887; published by the Prince Society), which contains a memoir by C. W. Tuttle and historical papers relating to Mason's career, edited by J. W. Dean.

MASON, JOHN YOUNG (1799-1859), American political leader and diplomatist, was born in Greenesville county, Virginia, on the 18th of April 1799. Graduating at the univer- sity of North Carolina in 1816, he studied law in the famous

Litchfield (Connecticut) law school, and in 181 9 was admitted to practice in Southampton county, Virginia. He served in the Virginia house of delegates in 1823-1827, in the state consti- tutional convention of 1829-1830, and from 1831 to 1837 in the National House of Representatives, being chairman of the committee on foreign affairs in 1835-1836. He was secretary of the navy in President Tyler's cabinet (1844-1845), and was attorney-general (1845-1846) and secretary of the navy (1846- 1849), succeeding George Bancroft, under President Polk. He was president of the Virginia constitutional convention of 1851, and from 1853 until his death at Paris on the 3rd of October 1859, was United States minister to France. In this capacity he attracted attention by wearing at the court of Napoleon III. a simple diplomatic uniform (for this he was rebuked by Secretary of State W. L. Marcy, who had ordered American ministers to wear a plain civilian costume), and by joining with James Buchanan and Pierre Soule, ministers to Great Britain and Spain respectively, in drawing up (Oct. 1854) the famous Ostend Manifesto. Hawthorne called him a " fat-brained, good-hearted, sensible old man"; and in politics he was a typical Virginian of the old school, a state's rights Democrat, upholding slavery and hating abolitionism.

MASON, SIR JOSIAH (1795-1881), English pen-manufac- turer, was born in Kidderminster on the 23rd of February 1795, the son of a carpet-weaver. He began life as a street hawker of cakes, fruits and vegetables. After trying his hand in his native town at shoemaking, baking, carpentering, blacksmith- ing, house-painting and carpet-weaving, he moved in 1814 to Birmingham. Here he found employment in the gilt-toy trade. In 1824 he set up on his own account as a manufacturer of split-

rings by machinery, to which he subsequently added the making of steel pens. Owing to the circumstance of his pens being supplied through James Perry, the London stationer whose name they bore, he was less well known than Joseph Gillott and other makers, although he was really the largest producer in England. In 1874 the business was converted into a limited liability company. Besides his steel-pen trade Mason carried on for many years the business of electro-plating, copper-smelting, and india-rubber ring making, in conjunction with George R. Elkington. Mason was almost entirely self- educated, having taught himself to write when a shoemaker's apprentice, and in later life he felt his deficiencies keenly. It was this which led him in i860 to establish his great orphanage at Erdington, near Birmingham. Upon it he expended about £300,000, and for this munificent endowment he was knighted in 1872. He had previously given a dispensary to his native town and an almshouse to Erdington. In 1880 Mason College, since incorporated in the university of Birmingham, was opened, the total value of the endowment being about £250,000. Mason died on the 16th of June 1881.

See J. T. Bunce, Josiah Mason (1882).

MASON, LOWELL (1792-1872), American musician, was born at Medfield, Massachusetts. For some years he led a business life, but was always studying music; and in 1827, as the result of his work in forming the collection of church music published in 1821 at Boston by the Handel and Haydn Society, he moved to Boston and there first became president of the society and then founder of the Boston Academy of Music (1832). He published some successful educational books, and was a pioneer of musical instruction in the public schools, adopted in 1838. He received the degree of doctor of music from New York University in 1855. He died at Orange, New Jersey, on the nth of August 1872.

His son William Mason (1829-1908), an accomplished pianist and composer, published an interesting volume of reminiscences, Memoirs of a Musical Life, in 1901.

MASON, WILLIAM (1725-1797), English poet, son of William Mason, vicar of Holy Trinity, Hull, was born on the 12th of February 1725, was educated at St John's College, Cambridge, and took holy orders. In 1744 he wrote Musaeus, a lament for Pope in imitation of Lycidas, and in 1749 through the

influence of Thomas Gray he was elected a fellow of Pembroke College. He became a devoted friend and admirer of Gray, who addressed him as " Skroddles," and corrected the worst solecisms in his verses. In 1748 he published Isis, a poem directed against the supposed Jacobitism of the university of Oxford, which provoked Thomas Warton's Triumph of Isis. Mason conceived the ambition of reconciling modern drama with ancient forms by strict observance of the unities and the restoration of the chorus. These ideas were exemplified in Elfrida (1752) and Caractacus (1759), two frigid performances no doubt intended to be read rather than acted, but produced with some alterations at Covent Garden in 1772 and 1776 respectively. Horace Walpole described Caractacus as " la- boured, uninteresting, and no more resembling the manners of Britons than of Japanese "; while Gray declared he had read the manuscript " not with pleasure only, but with emotion." In 1754 Mason was presented to the rectory of Aston, near Rotherham, Yorkshire, and in 1757 through the influence of the duke of Devonshire he became one of the king's chaplains. He also received the prebend of Holme in York Minster (1756), was made canon residentiary in 1762, and in 1763 became precentor and prebendary of Driffield. He married in 1764 Mary Sherman, who died three years later. When Gray died in 1 771 he made Mason his literary executor. In the preparation of the Life and Letters of Gray, which appeared in 1774, he had much help from Horace Walpole, with whom he corresponded regularly until 1784 when Mason opposed Fox's India Bill, and offended Walpole by thrusting on him political advice unasked. Twelve years of silence followed, but in the year before his death the correspondence was renewed on friendly terms. Mason died at Aston on the 7th of April 1797.

His correspondence with Gray and Walpole shows him to have been a man of cultivated tastes. He was something of an anti- quarian, a good musician, and an amateur of painting. He is said to have invented an instrument called the celestina, a modified pianoforte. Gray rewarded his faithful admiration with good- humoured kindness. He warned him against confounding Mona with the Isle of Man, or the Goths with the Celts, corrected his grammar, pointed out his plagiarisms, and laughed gently at his superficial learning. His powers show to better advantage in the unacknowledged satirical poems which he produced under the pseudonym of Malcolm Macgregor. In editing Gray's letters he took considerable liberties with his originals, and did not print all that related to himself.

Mason's other works included Odes (1756); The English Garden, a didactic poem in blank verse, the four books of which appeared in 1772, 1777, 1779 and 1782; An Heroic Epistle to Sir William Chambers (1774); an Ode to Mr Pinchbeck (1776) and an Epistle to Dr Shebbeare (1777) — all these by " Malcolm Macgregor "; Essay, Historical and Critical, of

Church Music (1795), and a lyrical drama, Sappho (1797).

His poems were collected in 1764 and 1774, and an edition of his Works appeared in 181 1. His poems with a Life are included in Alexander Chalmers's English Poets. His correspondence with Walpole was edited by J. Mitford in 1851 ; and his correspondence with Gray by the same editor in 1853. See also the standard editions of the letters of Gray and of Walpole. There is a very pleasant picture of Mason's character in Southey's Doctor (ch. cxxvi.).

MASON AND DIXON LINE, in America, the boundary line (lat. 39° 43′ 263″ N.) between Maryland and Pennsylvania, U.S.A.; popularly the line separating " free " states and " slave " states before the Civil War. The line derives its name from Charles Mason (1 730-1 787) and Jeremiah Dixon, two English astronomers, whose survey of it to a point about 244 m. west of the Delaware between 1763 and 1767 1 marked the close of the protracted boundary dispute (arising upon the grant of Pennsylvania to William Penn in 1681) between the Balti- mores and Penns, proprietors respectively of Maryland and Pennsylvania. The dispute arose from the designation, in the grant to Penn, of the southern boundary of Pennsylvania mainly as the parallel marking the " beginning of the fortieth degree of Northerne Latitude," after the northern boundary of Mary- land had been defined as a line " which lieth under the fortieth degree of north latitude from the equinoctial." The eastern part of the line as far as Sideling Hill in the western part of the

1 These surveyors also surveyed and marked the boundary between Maryland and Delaware.

present Washington county, was originally marked with mile- stones brought from England, every fifth of which bore on one side the arms of Baltimore and on the opposite side those of Penn; but the difficulties in transporting them to the westward were so great that many of them were not set up. Owing to the removal of the stone marking the north-east corner of Maryland, this point was again determined and marked in 1849-1850 by Lieut.-Colonel J. D. Graham of the U.S. topographical engineers; and as the western part of the boundary was not marked by stones, and local disputes arose, the line was again surveyed between 1901 and 1903 under the direction of a commission appointed by Pennsylvania and Maryland.

The use of the term " Mason and Dixon Line " to designate the boundary between the free and the slave states (and in general between the North and the South) dates from the debates in Con- gress over the Missouri Compromise in 1819-1820. As so used it may be defined as not only the Mason and Dixon Line proper, but also the line formed by the Ohio River

from its intersection with the Pennsylvania boundary to its mouth, thence the eastern, northern and western boundaries of Missouri, and thence westward the parallel 36 30′ — the line established by the Missouri Compromise to separate free and slave territory in the " Louisiana Purchase," except as regards Missouri. It is to be noted, however, that the Missouri Compromise did not affect the territory later acquired from Mexico.

MASON CITY, a city and the county-seat of Cerro Gordo county, Iowa, U.S.A., on Lime Creek, in the northern part of the state. Pop. (1905, state census), 8357 (929 foreign- born) ; (1910) 11,230. It is served by the Chicago Milwaukee & St Paul, the Chicago & North-Western, the Chicago Great Western, the Iowa Central and the St Paul & Des Moines railways, and also by the Mason City & Clear Lake (electric) railway, which connects Mason City with Clear Lake, a pleasure resort, 10 m. west of the city. At Mason City is Memorial University (co-educational; founded in 1900 by the National Encampment of the Sons of Veterans, and opened in 1902), dedicated to the Grand Army of the Republic, the special aim of which is to teach American history. The city is situated in a good agricultural region, and there are valu- able stone quarries in the vicinity. The manufactures include lime, Portland cement, brick and tile. Mason City was settled in 1853, laid out in 1855, incorporated as a town in 1870 and chartered as a city in 1881.

MASONRY, 2 the art of building in stone. The earliest remains (apart from the primitive work in rude stone — see Stone Monu- ments; Archaeology, &c.) are those of the ancient temples of India and Egypt. Many of these early works were constructed of stones of huge size, and it still remains a mystery how the ancients were able to quarry and raise to a considerable height above the ground blocks seven or eight hundred tons in weight. Many of the early buildings of the middle ages were entirely constructed of masses of concrete, often faced with a species of rough cast. The early masonry seems to have been for the most part worked with the axe and not with the chisel. A very ex- cellent example of the contrast between the earlier and later Norman masonry may be seen in the choir of Canterbury Cathe- dral. In those times the groining was frequently filled in with a light tufa stone, said by some to have been brought from Italy, but more probably from the Rhine. The Normans imported a great quantity of stone from Caen, it being easily worked, and particularly fit for carving. The freestones of England were also much used; and in the first Pointed period, Purbeck and Bethersden marbles were employed for column shafts, &c. The methods of working and setting stone were much the same as at present, except that owing to difficulties of conveyance the 2 The English word " mason " is from the French, which appears in the two forms, machun and masson (from the last comes the modern Fr. form maqon, which means

indifferently a bricklayer or mason. In O. H. Ger. the word is mezzo, which survives in the German for a stone-mason, Steinmetz. The med. Lat. form, machio, was connected with machina — obviously a guess. The Low Lat., macheria or maceria (see Du Cange, Glossarium, s.v. macio), a wall, has been suggested as showing some connexion. Some popular Lat. form as macio or matlio is probably the origin. No Teut. word, accord- ing to the New English Dictionary, except that which appears in " mattock," seems to have any bearing on the ultimate origin.

stones were used in much smaller sizes. As time went on the art of masonry advanced till in England, in point of execution, it at length rivalled that of any country.

Tools. — The mason's tools may be grouped under five heads — hammers and mallets, saws, chisels, setting-out and setting tools, and hoisting appliances.

There are several different kinds of iron hammers used by the stone worker ; the mash hammer has a short handle and heavy head for use with chisels; the iron hammer, used in carving, rfflMJMs m s h a P e resembles a carpenter's mallet but is smaller; a " a ' the waller's hammer is used for roughly shaping stones in rubble work; the spalling hammer for roughly dressing stones in the quarry; the scabbling-hammer, for the same purpose, has one end pointed for use on hard stone; the pick has a long head pointed at both ends, weighs from 14 to 20 lb. and is used for rough dressing and splitting ; the axe has a double wedge-shaped head and is used to bring stones to a fairly level face preparatory to their being worked smooth ; the patent axe, or patent hammer, is formed with a number of plates with sharpened edges bolted together to form a head ; the mallet of hard wood is used for the finishing chisel work and carving ; and the dummy is of similar shape but smaller.

A hand saw similar to that used by the carpenter is used for cutting small soft stones. Larger blocks are cut with the two-handed saw worked by two men. For the largest blocks the Saws – frame saw is used, and is slung by a rope and pulleys

fitted with balance weights to relieve the operator of its weight. The blade is of plain steel, the cutting action being supplied by sand with water as a lubricant constantly applied.

There are perhaps even more varieties of chisels, than of hammers. The

point and the punch have very small cutting edges, a quarter of an inch or less in width. The former is used on the se Sm harder and the latter on the softer varieties of stone after the rough hammer dressing. The pitching tool has a wide thick edge and is used in rough dressing. Jumpers are shafts of steel having a widened edge, and are used for boring holes in hard stone. Chisels are made with edges from a quarter-inch to one and a half inches wide : those that exceed this width are termed boasters. The claw chisel has a number of teeth from one-eighth to three-eighths wide, and is used on the surface of hard stones after the point has been used". The drag is a semi-circular steel plate, the straight edge having teeth cut on it. It is used to level down the surfaces of soft stones. Cockscombs are used for the same purpose on mouldings and are shaped to various curves.. Wedges of various sizes are used in splitting stones and are inserted either in holes made with the jumper or in chases cut with the stone-pick.

The implements for setting out the work are similar to those used, s … _ , by the bricklayer and other tradesmen, comprising the and Settlor ru ‘ e ‘ sc l uare ‘ set square, the bevel capable of being set to Tools any re q u i re d angle, compasses, spirit level, plumb-rule

and bob and mortar trowels. Gauges and moulds are required in sinking moulds to the proper section.

Latuis DoH". Fig. 2.

The nippers (fig. 1), or scissors, as they are sometimes termed, have two hooked arms fitting into notches in the opposite sides of Hoisting ?^ e block to be lifted. These arms are riveted together Appliances. ‘ n { h e sa . me wav as a P a ‘ r °f scissors, the upper ends having rings attached for the insertion of a rope or chain which when pulled tight' in the operation of lifting causes the hooked ends to grip the stone. Lewises (fig. 2.) are wedge-shaped pieces of steel which are fitted into a dovetailed mortise in the stone to be hoisted. They are also used for setting blocks too large to be set by hand, and are made in several forms. These are the usual methods of securing the stone to the hoisting rope or chain, the hoist- ing being effected by a pulley and fall, by a crane, or by other means.

Scaffolding— -For rubble walls single scaffolds, resting partly on the walls, similar to those used for brickwork (q.v.), are employed; for ashlar and other gauged stonework (see below) self-supporting scaffolds are used with a second set of standards and ledgers erected close to the wall, the whole standing entirely independent. The reason for the use of this double scaffold is that otherwise holes for the putlogs to rest in would have to be left in the wall, and obviously

in an ashlar stone wall it would be impossible properly to make these good on the removal of the scaffold (see further Scaffold).

Seasoning Stone. — Stone freshly quarried is full of sap, and thus admits of being easily worked. On being exposed to the air the sap dries out, and the stone becomes much harder in consequence. For this reason, and because carriage charges are lessened by the smaller bulk of the worked stone as compared with the rough block, the stone for a building is often specified to be quarry-worked. Vitruvius recommended that stone should be quarried in summer when driest, and that it should be seasoned by being allowed to lie two years before being used, so as to allow the natural sap to evapo- rate. In the erection of St Paul's Cathedral, Sir Christopher Wren required that the stone after being quarried should be exposed for three years on the sea-beach before its introduction into the building. The regular and determined form of bricks makes it to a large extent a matter of practice to enable a man to become a good brick- layer, but beyond these a continual exercise of judgment is required of the workman in stone, who has for the most part to deal with masses of all forms and of all sizes.

Setting Stones. — All beds and joints should be truly worked and perfectly level. If the surface be convex it will give rise to wide un- sightly joints; if concave the weight thrown on the stone will rest on the edges and probably cause them to " flush " or break off and dis- figure the work. Large stones are placed in position with the aid of hoisting appliances and should be tried in position before being finally set. Great care should be taken to avoid fracturing or chip- ping the stone in the process of handling, as it is impossible to make good such damage. All stratified stones — and this includes by far the largest proportion of building stones — when set in a level position should be laid on their natural bed, i.e. with their laminae horizontal. The greatest strength of a. stone is obtained when the laminae lie at right angles to the pressure placed upon it. In the case of arches these layers should be parallel with the centre line of the voussoirs and at right angles to the face of the arch. For cornices (except the corner-stones) and work of a like nature, the stone is set with the laminae on edge and perpendicular to the face of the work. With many stones it is easy to determine the bed by moistening with water, when the laminae will become apparent. Some stones, however, it is impossible to read in this way, and it is therefore advisable to have them marked in the quarry. A horizontal line in a quarry does not in all cases give the proper bed of the stone, for since the deposits were made ages ago natural upheavals have possibly occurred to alter the " lie " of the material.

For the shafts of columns especially it is necessary to have the layers horizontally placed, and a stone should be selected from a quarry with a bed of the required depth. An example of the omis- sion of this precaution

is visible in the arcading of the Royal Courts of Justice, London, where the small shafts of the front arcade in red sandstone have been turned with the laminae in a vertical posi- tion, with the result that nearly every shaft is flaking away or is cracked.

Use of Mortar. — See Brickwork. Of whatever quality the stone may be of which a wall is built, it should consist as much of stone and as little of mortar as possible. Only fine mortar is admissible if we are to obtain as thin joints as possible. The joints should be well raked out and pointed in Portland cement mortar. This applies only to some sandstones, as marbles and many limestones are stained by the use of Portland cement. For these a special cement must be employed, composed of plaster of Paris, lime, and marble or stone- dust.

Bonding. — Bond (see Brickwork) is of not less importance in stone walling than in brickwork. In ashlar-work the work is bonded uniformly, the joints being kept perpendicularly one over the other; but in rubble-work, instead of making the joints recur one over the other in alternate courses they should be carefully made to lock, so as to give the strength of two or three courses or layers between a joint in one course and the joint that next occurs vertically above it in another course. In the through or transverse bonding of a wall a good proportion of header stones running about two-thirds of the distance through the width of the wall should be provided to bind the whole structure together. The use of through stones, i.e. stones running through the whole thickness of the wall from front to back, is not to be recommended. Such stones are liable to fracture and convey damp to the internal face.

Slip Joints. — As with brickwork so in masonry great care must be exercised to prevent the different parts of a building settling un- equally. When two portions of a building differing considerably in height come together, it is usual to employ a slip or housed joint instead of bonding the walls into each other. This arrangement allows the heavier work to settle to a greater extent than the low portion without causing any defect in the stones.

Footings. — The footings of stone walls should consist of large stones of even thickness proportionate to their length; if' possible they should be the full breadth in one piece. Each course should be well bedded and levelled.

Walling. — There are broadly speaking two classes of stone walling : rubble and ashlar. Rubble walls are built of stones more or less irregular in shape and size and coarsely jointed. Ashlar walls are constructed of carefully worked blocks of regular dimensions and set with fine joints.

Random Rubble (fig. 3) is the roughest form of stonework. It is built with irregular pieces of stone usually less than 9 in. thick, loosely packed without much regard to courses, the interstices between the large stones being occupied by small ones, the remaining crevices filled up with mortar. Bond stones or headers should be used frequently in every course. This form of walling is much used

Elevation Section

RANDOM RUBBLE WALLING

Fig. 3.

in stone districts for boundary walls and is often set dry. without mortar. For this work the mason uses no tool but the trowel to lay on the mortar, the scabbling hammer to break off the most repulsive irregularities from the stone, and the plumb-rule to keep his work perpendicular.

Coursed Rubble (fig. 4) is levelled up in courses 12 or 18 in. deep, the depth varying in different courses according to the sizes

Elevation Section

COURSED RUBBLE

Fig. 4.

of the stones. The stones are dressed by the workman before he begins building, to obtain a fairly level bed and perpendicular face.

Irregularly Coursed Squared Rubble is a development of uncoursed ■ *random rubble, the stones in this case being squared with the hammer and roughly faced up with the axe. The courses jump abruptly from one level to another as the sizes of the blocks demand ; the interstices are filled in with small pieces of stone called "snecks." For Coursed Squared Rubble the stone is faced in a similar manner and set in courses, the depth of each course being made up of one or more stones.*

In Regular Coursed Rubble all the stones in one course are of the same height.

Block-in-course is the name applied to a form of stone walling that has some of the characteristics of ashlar but the execution of which is much rougher. The courses are usually less than 12 in. high. It is much used by engineers for waterside and railway work where a good appearance is desired.

The Angles or Quoins of rubble- work are always carefully and precisely worked and serve as a gauge for the rest of the walling. Frequently the quoins and jambs are executed in ashlar, which gives a neat and finished appearance and adds strength to the work. The name Ashlar is given, without regard to the finish of the face of the stone, to walling composed of stones carefully dressed, from 12 to 18 in. deep, the mortar joints being about an eighth of an inch or less in thickness. No stone except the hardest should exceed in length three times its depth when required to resist a heavy load and its breadth should be from one and a half to three times its depth. The hardest stone may have a length equal to four or perhaps five

times its depth and a width three times its depth. The face of ashlar- work may be plain and level, or have rebated, chamfered, or moulded joints.

The great cost of this form of stonework renders the employment of a backing of an inferior nature very general. This backing varies according to the district in which the building operations Backing to are b e ; n g carried on, being rubble stonework in stone Stonework, districts and brick or concrete elsewhere, the whole being thoroughly tied together both transversely and longitudinally with bondstones. In England a stone much used for backing ashlar

and Kentish rag rubble-work is a soft sandstone called " hassock." In the districts where it is quarried it is much cheaper than brick- work. (For brickbacking see Brickwork.) Ashlar facing usually varies from 4 to 9 in. in thickness. The work must not be all of one thickness, but should vary in order that effective bond with the backing may be obtained. If the work is in courses of uneven depth the narrow courses are made of the greater thickness and the deep courses are narrow. It is sometimes necessary to secure the stone facing back with iron ties, but this should be avoided wherever possible, 1 as they are liable to rust and split the stonework. When it is necessary to use them they should be covered with some protective coating. The use of a backing to a stone wall, besides lessening the cost, gives a more equable temperature inside the building and prevents the transmission of wet by capillary attraction to the interior, which would take place if single stones were used for the entire thickness.

All work of this description must be executed in Portland cement, mortar of good strength, to avoid as much as possible the unequal settlement of the deep courses of stone facing and the narrower courses of the brick or rough stone backing. If the backing is of brick it should never be less than 9 in. thick, and whether of stone or brick it should be levelled up in courses of the same thickness as the ashlar.

There are many different sorts of walling, or modes of structure, arising from the nature of the materials available in various localities. That is perhaps of most frequent occurrence in which \v a m either squared, broken, or round flints are used. This, ng '

when executed with care, has a distinctly decorative appearance. To give stability to the structure, lacing courses of tiles, bricks or dressed stones are introduced, and brick or stone piers are built at intervals, thus forming a flint panelled wall. The quoins, too, in this type of wall are formed in dressed stone or brick work.

Uncoursed rubble built with irregular blocks of ragstone, aa unstratified

rock quarried in Kent, is in great favour for facing the external walls of churches and similar works (fig. 5).

KerdisK Raasjbrxe 'Wallma cpith a&hlar ,: u>ir\aa»ju dreˆb; .H\a& at\d &trii\0)5.

Fig. 5.

Sechbn

Pointing. — As with brickwork this is generally done when the work is completed and before the scaffolding is removed. Suitable weather should be chosen, for if the weather be either frosty or too hot the pointing will suffer. The joints are raked out to a depth of half an inch or more, well wetted, and then refilled with a fine mortar com- posed specially to resist the action of the weather. This is finished flat or compressed with a special tool to a shaped joint, the usual forms of which are shown in fig. 6.

Three jbm\s,. of.. Keyed JoiKfi> Fig. 6.

v. joirsr:

Stonewash. — To give a uniform appearance to the stonework and preserve the finished face until a hardened skin has formed, it is usual to coat the surface of exposed masonry with a protective compound of ordinary limewhite with a little size mixed in it, or a special mixture of stone-dust, lime, salt, whiting and size with a little

ochre to tone it down. After six months or more the work is cleaned down with water and stiff bristle or wire brushes. Sometimes muriatic acid much diluted with water is used.

Technical Terms. — Of the following technical terms, many will be

found embodied in the drawing of a gable wall (fig. 7), which shows the manner and position in which many different members are used. Apex Stone,— The topmost stone of a gable forming a finial for the two sloping sides; it is sometimes termed a " saddle " (fig. 7).

or

chisel- ,~t draughted/ N* w i margins.* fˆ.%,*

\crrmculafafl!

hammcr-

chamfercd Jointe.

p«nkd mouWl«d,

♦furrowed-

PIAN

Fig. 7.

MASONRY

845

Blocking Course, a heavy course of stone above a cornice to form a parapet and weigh down the back of the cornice (fig. 8).

Elevatiotv .

P SocHfe . P.

t

**fc*

Pic

Saddle

Fig. 8. Bed. — The bed surface upon which a stone is set or bedded should be worked truly level in every part. Many workmen to form a neat thin joint with a minimum amount of labour hollow the bed and thus when the stone is set all weight is thrown upon the edges with the frequent result that these are crushed.

Coping. — The coping or capping stones are placed on the top of walls not covered by a roof, spanning their entire width and throwing off the rain and snow, thus keeping the interior of the wall dry. The fewer the number of joints the better the security, and for this reason it is well to form copings with as long stones as possible. To throw water off clear, and prevent it from running down the face of the wall, the coping should project an inch or two on each side and have a throat worked on the under-side of the projections (fig. 7).

Cornice, a projecting course of moulded stone crowning a structure, forming a cap or finish and serving to throw any wet clear of the walls. A deep drip should always be worked in the upper members of a cornice to prevent the rain trickling down and disfiguring the face of the moulding and the wall below (fig. 8).

Corbel, a stone built into a wall and projecting to form a cantilever, supporting a load beyond the face of the wall. It is frequently richly ornamented by carving (fig. 7).

Skew Corbel, a stone placed at the base of the sloping side of a gable wall to resist any sliding tendency of the sloping coping. Stones placed for a similar purpose at intervals along the sloping side, tailing into the wall, are termed " kneelers " and have the section of the coping worked upon them (fig. 7).

Corbel Table, a line of small corbels placed at short distances apart supporting a parapet or arcade. This forms an ornamental feature which was much employed in early Gothic times. It probably originates from the machicolations of ancient fortresses.

Dressings, the finished stones of window and door jambs and quoins. For example, a " brick building with stone dressings " would have brick walls with stone door and window jambs, heads and sills, and perhaps also stone quoins (fig. 7).

Diaper, a square pattern formed on the face of the stonework by means of stones of different colours and varieties or by patterns carved on the surface (fig. 7).

Finial, a finishing ornament applied usually to a gable end (fig. 7). Gablet, small gable-shaped carved panels frequently used in Gothic stonework for apex stones, and in spires, &c.

Gargoyle, a detail, not often met with in modern work, which consists of a waterspout projecting so as to throw the rain-water from the gutters clear of the walls. In early work it was often carved into grotesque shapes of animal and other forms.

Galleting. — The joints of rubble are sometimes enriched by having small pebbles or chips of flint pressed into the mortar whilst green. The joints are then said to be " galleted."

Jamb. — Window and door jambs should always be of dressed stone, both on account of the extra strength thus gained and in order to give a finish to the work. The stones are laid alternately as stretchers and headers ; the

former are called outbands, the latter inbands (fig. 7).

Label Moulding, a projecting course of stone running round an arch. When not very large it is sometimes cut on the voussoirs, but is usually made a separate course of stone. Often, and especially in the case of door openings, a small sinking is worked on the top surface of the moulding to form a gutter which leads to the sides any water that trickles down the face of the wall.

Lacing Stone. — This is placed as a voussoir in brick arches of wide span, and serves to bond or lace several courses together (see Brickwork).

Lacing Course, a course of dressed stone, bricks or tiles, run at intervals in a wall of rubble or flint masonry to impart strength and tie the whole together (fig. 7).

Long and Short Work, a typical Saxon method of arranging quoin stones, flat slabs and long narrow vertical stones being placed alter-

nately. Earls Barton church in Northamptonshire is an example of their use in old work. In modern work long and short work, sometimes termed " block and start," is little used (fig. 7).

Parapet, a fence wall at the top of a wall at the eaves of the roof. The gutter lies behind, and waterways are formed through the parapet wall for the escape of the rain-water.

Plinth, a projecting base to a wall serving to give an appearance of stability to the work.

Quoin, the angle at the junction of two walls. Quoins are often executed in dressed stone (Fig. 7).

Rag-bolt, the end of an iron bolt when required to be let into stone is roughed or ragged. A dovetailed mortise is prepared in the stone and the ragged end of the bolt placed in this, and the mortise filled in with molten lead or sand and sulphur (fig. 9).

Sill, the stone which forms a finish to the wall at the bottom of an opening. Sills should always be weathered, slightly in the case of door sills, more sharply for windows, and throated on the under side to throw off the wet. The weathering is not carried through the whole length of the sill, but a stool is left on at each end to form a square end for building in (fig. 7).

String Courses, horizontal bands of stone, either projecting beyond or flush with the face of the wall and often moulded or carved. They are frequently

continuations of the sills or head lines of windows (figs. 5 and 7).

Scontion. — In a thick wall the dressed stones forming the inside angles of the jamb of a window or door opening are termed scontions.

Spalls, small pieces chipped off whilst working a stone.

Templates, slabs of hard stone set in a wall to take the ends of a beam or girder so as to distribute the load over a larger area of the wall.

Tympanum, the triangular filling of masonry in a pediment be- tween the cornices, or between the horizontal head of a window or door and the under-side of the relieving arch above it. It is often panelled or enriched with carved ornament (fig. 7).

Throat, a groove worked on the under-side of projecting external members to intercept rain-water and cause it to drop off the member clear of the work beneath (fig. 8).

Weathering. — The surface of an exposed stone is weathered when it is worked to a slope so as to throw off the water. Cornices, copings, sills and string courses should all be so weathered.

Voussoirs, the wedge-shaped blocks of which an arch is built up. Methods of finishing Face of Stones. — The self face or quarry face is the natural surface formed when the stone is detached from the mass in the quarry or when a stone is split. Saw-face, the surface formed by sawing.

Hammer-dressed, Rock-faced, or Pitch-faced. — This face is used for ashlar-work, usually with a chisel-draughted margin around each block. It gives a very massive and solid appearance to the lower storeys of masonry buildings, and is formed with little labour, and is therefore the cheapest face to adopt for ashlar-work (fig. 7).

Broached and Pointed Work. — This face is also generally used with a chisel-draughted margin. The stone as left from the scabbling hammer at the quarry has its rocky face worked down to an approxi- mate level by the point. In broached work the grooves made by the tool are continuous, often running obliquely across the face of the block. In pointed work the lines are not continuous; the surface is rough or fine pointed according as the point is used over every inch or half-inch of the stone. The point is used more upon hard stones than soft ones (fig. 7).

Tooth-chiselled Work. — The cheapest method of dressing soft stones is by the toothed chisel which gives a surface very much like the pointed work of hard stones.

Droved Work. — This surface is obtained with a chisel about two and a half inches wide, no attempt being made to keep the cuts in continuous lines.

Tooled Work is somewhat similar to droved work and is done with a flat chisel, the edge of which is about four inches wide, care being taken to make the cuts in continuous lines across the width of the stone.

Combed or Dragged Work. — For soft stones the steel comb or drag is often employed to remove all irregularities from the face and thus form a fine surface. These tools are specially useful for moulded work, as they are formed to fit a variety of curves.

Rubbed Work. — For this finish the surface of the stone is previously brought with the chisel to a level and approximately smooth face, and then the surface is rubbed until it is quite smooth with a piece of grit stone aided by fine sand and water as a lubricant. Marbles are polished by being rubbed with gritstone, then with pumice, and lastly with emery powder.

Besides these, the most usual methods of finishing the faces of stonework, there are several kinds of surface formed with hammers or axes of various descriptions. These types of hammers are more used on the continent of Europe and in America perhaps than in England, but they deserve notice here.

The toothed axe has its edges divided into teeth, fine or coarse according to the work to be done. It is used to reduce the face of limestones and sandstones to a condition ready for the chisel. The bush hammer has a heavy square-shaped double-faced head, upon which are cut projecting pyramidal points. It is used to form a sur- face full of little holes, and with it the face of sand and limestones may be brought to a somewhat ornamental finish. The patent hammer is used on granite and other hard rocks, which have been first dressed to a medium surface with the point. The fineness of the result is determined by the number of blades in the hammer, and the work is said to be ” six,” ” eight ” or ” ten-cut ” work According to the number of blades inserted or bolted in the hammer head. The crandall has an iron handle slotted at one end with a hole f in. wide and 3 in. long. In this slot are fixed by a key ten or eleven double-headed

points of } in. square steel about 9 in. long. It is used for finishing sandstone and soft stones after the surface has been levelled down with the axe or chisel. It gives a fine pebbly sparkling appearance.

There are several methods of finishing stone which involve a great deal of labour and are therefore expensive to work, but which result in imparting a very stiff and unnatural appearance to the masonry.

Vermicidated Work. — This is formed by carving a number of curling worm-like lines over the face of the block, sinking in between the worms to a depth of a fourth of an inch. The surface of the strings is worked smooth, and the sinkings are pock-marked with a pointed tool (fig. 7).

Furrowed Work. — In this face the stone is cut with a chisel into a number of small parallel grooves or furrows (fig. 7).

Reticulated Face is a finish somewhat similar to vermiculated work, but the divisions are more nearly squares.

Face Joints of Ashlar. — The face joints of ashlar stonework are often sunk or rebated to form what are termed rusticated joints; sometimes the angles of each block are moulded or chamfered to give relief to the surface or to show a massive effect (fig. 7).

Joints in Stonework. — The joints between one block of stone and another are formed in many ways by cramps, dowels and joggles of various descriptions.

*lor\gi1udir\d sedfbrv J\ro. , cerrtre df meia cramp .^*

Fig. 10.

The stones of copings, cornices and works of a similar nature, are often tied together with metal cramps to check any tendency for the _ stones to separate under the force of the wind (figs: 10

ramps. an[j ^ c ram p S are made of iron (plain or galvanized), copper or gun-metal, of varying sections and lengths to suit the work. A typical cramp would be about 9 in. long, 1 or 1 J in. wide, and from

t«V\cf

aarv\p. Fig. 11.

5ecjibrv ftiro. cerdre of Slate, crcvnp.

Slortc Bed Joggle..

Dowels are used for connecting stones where the use of cramps

would be impracticable, as in the joints of window mullions, the shafts

of small columns, and in similar works (figs. 7, 8 and 20).

Dowels. Dowels for bed and side joints may be used. They are

of slate, metal, or sometimes of hard wood.

There are many ways of making a joggle joint. The joggle may be worked on one of the stones so , . as to fit into a. groove

ogges. j n ˆ e ac jjoining s tone, or grooves may be cut in both the stones and an independent joggle of slate, pebbles, or Portland ce- ment fitted, the joggle being really a kind of dowel. The pebble joggle joint is formed with the aid of pebbles as small dowels fitted into mortises in the jointing faces of two stones and set with Port- land cement; but joggles of slate have generally taken the place of pebbles. Portland cement joggles are formed by pouring cement grout into a vertical or oblique mortise formed by cutting a groove in each of the joining surfaces of the stones. What is known as a he-and-she joggle, worked on the edges of the stones themselves, is shown in fig. 13.

Plugs or dowels of lead are formed by pouring molten lead through

} to \ in. thick, and turned down about 1$ in. at each end. A dove- tailed mortise is formed at a suitable point in each of the stones to be joined and connected by a chase. The cramp is placed in this channel with its turned-down ends in the mortises, and it is then fixed with molten lead, sulphur and sand, or Portland cement. Lead Bhrinks on cooling, and if used at all should be well caulked when cold. Double dovetailed slate cramps bedded in Portland cement are occasionally used (fig. 11).

Fig. 12.

a channel into dovetailed mortises in each stone (figs. 14 and 15). When cold the metal is caulked to compress it tightly into the holes.

»\|

P lu S|

I Seclibrs 1f\i

OtTsfrc Of

lead plti Fig. 14.

The saddle joint is used for cornices, and is formed when 'a portion of the stone next the joint is left raised so as to guide rain-water away from the joint (fig. 8).

Two forms of, rebated joints for stone copings and roofs are com- mon. In one form (shown in fig. 7) the stones forming the coping are thicker at their lower and rebated edge than at the top plain edge, giving a stepped surface. The other form has a level surface and the stone is of the same thickness throughout and worked to a rebate on top and bottom edges. In laying stone roofs the joints are usually lapped over with an upper slab of stone.

Joints in Spires. — Four forms of jointing for the battering stone- work of spires are shown in fig. 16. A is a plain horizontal joint. B is a similar joint formed at right angles to the face of the work. This is the most economical form of joint, the stone being cut with its sides square with each other; but if the mortar in the joint decay moisture is allowed to penetrate. With these

Fig. 15.

Joggle

•fer'

HMfTI

forms dowelling is frequently necessary for greater stability. The joints C and D are more elaborate and much more expensive on account of the extra labour involved in working and fitting. _

Where a concentrated weight is carried by piers or columns the bed joints are in many cases formed with- out the use of mortar, a thin sheet of milled lead being placed between the blocks of stone to fill up any slight inequalities.

Moulded Work. — The working of mouldings in stone is an important part of the mason's craft, and forms a costly item in the erection of a stone structure. Much skill and care is re- quired to retain the arrises sharp and ■k. the curved members of accurate and proportionate outline. As in the case of wood mouldings, machinery now plays an important part in the

pre- paration of stone moulded work. The process of working a stone by hand labour is as follows: The profile of Fig. 16. the moulding is marked on to a zinc

temprate on opposite ends of the stone to be worked; a short portion, an inch or two in length termed a " draught," is at each end worked to the required section. The remaining portion is then proceeded with, the craftsman con- tinually checking the accuracy of his work with a straight-edge and zinc templates. A stone to be moulded by machinery is fixed to a moving table placed under a shaped tool which is fixed in an immov-

four

ft °f J9′ J used ii

slceple ujorl

able portion of the machine, and is so adjusted as to cut or chip off a small layer of stone. Each time the stone passes under the cutter it is automatically moved a trifle nearer, and thus it gradually reduces the stone until the required shape is attained.

Iron in Stonework. — The use of iron dowels or cramps in stonework, unless entirely and per- manently protected from oxidation is attended by the gravest risks; for upon the expansion of the iron by rusting the stone may split, and perhaps bring about a more or less serious failure in that portion of the building. A case in point is that of the church of St Mary-le-Strand, London, where the ashlar facing was secured to the backing with iron cramps; these were inefficiently pro- tected from damp, with the, result that many of the blocks have been split in consequence of rusting. John Smeaton in his Eddystone Lighthouse used dowels of Purbeck marble.

looses

soaoaaH

8 4 8

MASPERO— MASS

Stone Arches. — Stone arches are very frequently used both in stone and brick buildings. (For general definitions and terms see Brick- work.) They may be built in a great variety of styles, either flat, segmental, circular, elliptical or pointed. Each block or voussoir should be cut to fit exactly in its appointed place, the joints being made as fine as possible. The joints should radiate from the centre from which the soffit or intrados is struck,

or in the case of an ellip- tical arch they should be at right angles to a tangent drawn to the intrados at that point. The extrados or back of the arch is usually concentric with the intrados, but is sometimes made thicker in one portion than in another; thus the arch may be deeper at the crown than at the sides, or at the sides than in the centre. In some cases two or more voussoirs are of one stone, having a false joint cut in the centre ; this is economical, and in some cases adds to the stability of the arch. Generally the arch is divided into an uneven number of voussoirs so as to give a keystone, the voussoirs being laid from each side of the keystone and fitting exactly in the centre of the arch. The keystone is not a necessity, arches being frequently formed with an even number of voussoirs; some architects hold that the danger of the voussoirs cracking is thereby lessened. Where lintels are used in a stone wall over openings of small span it is usual to build a relieving arch above to take the superincumbent weight of masonry ; or the same purpose may be effected in walls of ashlar by a flat relieving or " save " arch, formed in the next course of three stones above the lintel, the tapering keystone resting between the two side stones which are tailed well into the wall.

In very many cases it is desired to form square heads to openings of greater span than it is convenient to obtain lintels for in one piece, and some form of flat arch must therefore be adopted. The vous- soirs are connected by joggles worked on their joints, as in fig. 17. The weight of the superimposed wall is taken by a lintel with relieving arch above at the back of the arch.

Arches built to an elliptical form when used for large spans (if of flat curve they should bridge over 8 ft. or 10 ft.) are liable if heavily loaded to fail by the voussoirs at the centre being forced down, or else to burst up at the haunches. With arches of this description there is a large amount of outward thrust, and abut- ments of ample strength must be placed to receive the springers.

Stone Tracery. — The designs of Gothic and other tracery stonework are almost infinite, and there are many methods, ingenious and otherwise, of setting out such work. Nearly all diagrams of con- struction are planned on the principle of geometrical intersections. In the example illustrated in fig. 18 the method of setting out and finishing the design is very clearly shown, together with the best positions for the joints of the various parts. The jointing is a matter which must be carefully considered in order to avoid any waste of stone and labour. It will be observed that the right-hand side of the elevation shows the method of setting out the tracery by the centre lines of the various intersecting branches, the other half giving the completed design with the cusping drawn in and the positions of joints. All the upper construction of windows and doors and of aisle arches should be protected from superincumbent pressure by strong relieving arches above

the labels, as shown in the figure, which should be worked with the ordinary masonry, and so set that the weight above should avoid pressure on the fair work, which would be liable to flush or otherwise destroy the joints of the tracery.

Carving. — Stone carving is a craft quite apart from the work of the ordinary stonemason, and like carving in wood needs an artistic feeling and special training. Carving-stone should be of fine grain and sufficiently soft to admit of easy working. The Bath stones in England and the Caen stone of France are largely used for internal work, but if for the exterior they should be treated with some chemical preservative. Carving is frequently done after the stone is built into position, the face being left rough — " boasted " — and projecting sufficiently for the intended design.

See E. Viollet-le-Duc, Dictionnaire raisonne de V architecture francaise; W. R. Purchase, Practical Masonry; J. O. Baker, A Treatise on Masonry Construction; C. F. Mitchell, Brickwork and Masonry; W. Diack, The Art of Masonry in Britain. (J. Bt.)

MASPERO, GASTON CAMILLE CHARLES (1846-), French Egyptologist, was born in Paris on the 23rd of June 1846, his parents being of Lombard origin. While at school he showed a special taste for history, and when fourteen years' old was already interested in hieroglyphic writing. It was not until his second year at the Ecole Normale in 1867 that Maspero met with an Egyptologist in the person of Mariette, who was then in Paris as commissioner for the Egyptian section of the exhibition. Mariette gave him two newly discovered hieroglyphic texts of considerable difficulty to study, and, self-taught, the young scholar produced translations of them in less than a fortnight, a great feat in those days when Egyptology was still almost in its infancy. The publication of these in the same year established his reputation. A short time was spent in assisting a gentleman in Peru, who was

seeking to prove an Aryan affinity for the dialects spoken by the Indians of that country, to publish his researches; but in 1868 Maspero was back in France at more profitable work. In 1869 he became a teacher (rgpetiteur) of Egyptian language and archaeology at the Ecole des Hautes Etudes; in 1874 he was appointed to the chair of Champollion at the College de France.

In November 1880 Professor Maspero went to Egypt as. head of an archaeological mission despatched thither by the French government, which ultimately developed into the well-equipped Institut Francais de l'Archeologie Oriental. This was but a few months before the death of Mariette, whom Maspero then succeeded as director-general of excavations

and of the antiquities of Egypt. He held this post till June 1886; in these five years he had organized the mission, and his labours for the Bulak museum and for archaeology had been early rewarded by the discovery of the great cache of royal mummies at Deir el-Bahri in July 1 88 1. Maspero now resumed his professorial duties in Paris until 1899, when he returned to Egypt in his old capacity as director-general of the department of antiquities. He found the collections in the Cairo Museum enormously increased, and he superintended their removal from Gizeh to the new quarters at Kasr en-Nil in 1902. The vast catalogue of the collections made rapid progress under Maspero's direction. Twenty-four volumes or sections were already published in 1909. The repairs and clearances at the temple of Karnak, begun in his previous tenure of office, led to the most remarkable discoveries in later years (see Karnak), during which a vast amount of excavation and exploration has been carried on also by unofficial but authorized explorers of many nationalities.

Among his best-known publications are the large Histoire ancienne des peuples de I'Orient classique (3 vols., Paris, 1895-1897, trans- lated into English by Mrs McClure for the S.P.C.K.), displaying the history of the whole of the nearer East from the beginnings to the conquest by Alexander; a smaller Histoire des peuples de I'Orient, 1 vol., of the same scope, which has passed through six editions from 1875 to 1904; litudes de mythologie et d'archeologie egyptiennes (Paris, 1893, &c), a collection of reviews and essays originally published in various journals, and especially important as contributions to the study of Egyptian religion; L'Archeologie egyptienne (latest ed., 1907), of which several editions have been published in English. He also established the journal Recueil de travaux relatifs a la philologie et a I'archeologte egyptiennes et assyriennes; the Bibliotheque egyptologique, in which the scattered essays of the French Egyptologists are collected, with biographies, &c. ; and the Annates du service des antiquites de I'Egypte, a reposi- tory for reports on official excavations, &c.

Maspero also wrote: Les Inscriptions des pyramides de Saqqarah (Paris, 1894); Les Monties royales de Deir el-Bahart (Paris, 1889); Les Contes populaires de I'Ugypte ancienne (3rd ed., Paris, 1906); Causeries d'Hgypte (1907), translated by Elizabeth Lee as New Light on Ancient Egypt (1908).

MASS (O.E. maesse; Fr. messe; Ger. Messe; Ital. messa; from eccl. Lat. missa), a name for the Christian eucharistic service, practically confined since the Reformation to that of the Roman Catholic Church. The various orders for the celebration of Mass are dealt with under Liturgy; a detailed account of the Roman order is given under Missal; and the general development of the eucharistic service, including the Mass, is described in the article Eucharist. The present article is confined (1) to the considera-

tion of certain special meanings which have become attached to the word Mass and are the subject of somewhat acute con- troversy, (2) to the Mass in music.

The origin of the word missa, as applied to the Eucharist, is obscure. The first to discuss the matter is Isidore of Seville {Etym. vi. 19), who mentions an " evening office " (officium vespertinum) , a " morning office " (officium matutinum), and an office called missa. Of the latter he says: " Missa tempore sacrificii est, quando catechumeni foras mittuntur, clamante levita ' si quis catechumenus remansit, exeat foras.' Et inde ' missa,' quia sacramentis altaris interesse non possunt, qui non- dum regenerati sunt " (" The missa is at the time of the sacrifice, when the catechumens are sent out, the deacon crying, ' If any catechumen remain, let him go forth.' " Hence missa, because those who are as yet unregenerate — i.e. unbaptized — may not be present at the sacraments of the altar). This derivation of

the word Mass, which would connect it with the special formula of dismissal still preserved in the Roman liturgy — Ite, missa est — once generally accepted, is now disputed. It is pointed out that the word missa long continued to be applied to any church service, and more particularly to the lections (see Du Cange for numerous examples), and it is held that such services received their name of missal from the solemn form of dismissal with which it was customary to conclude them; thus, in the 4th century Pilgrimage of Etheria (Silvia) the word missa is used indis- criminately of the Eucharist, other services, and the ceremony of dismissal. F. Kattenbusch (Herzog-Hauck, Realencyklop. s. " Messe ") ingeniously, but with little evidence, suggests that the word may have had a double origin and meaning: (1) in the sense of dimissio, "dismissal"; (2) in that of commissio, " commission," " official duty," i.e. the exact Latin equivalent of the Greek \eiTOvpyia (see Liturgy), and hence the conflicting use of the term. It is, however, far more probable that it was a general term that gradually became crystallized as applying to that service in which the dismissal represented a more solemn function. In the narrower sense of " Mass " it is first found in St Ambrose (Ep. 20, 4, ed. Ballerini): " Missam facere coepi. Dum offero. . . " which evidently identifies the missa with the sacrifice. It continued, however, to be used loosely, though its ten- dency to become proper only to the principal Christian service is clear from a passage in the 12th homily of Caesarius, bishop of Aries (d. 542) : " If you will diligently attend, you will recog- nize that missae are not celebrated when the divine readings are recited in the church, but when gifts are offered and the Body and Blood of the Lord are consecrated." The

complete service (missa ad integrum), the bishop goes on to say, cannot be had at home by reading and prayer, but only in the house of God, where, besides the Eucharist, " the divine word is preached and the blessing is given to the people."

Whatever its origin, the word Mass had by the time of the Reformation been long applied only to the Eucharist; and, though in itself a perfectly colourless term, and used as such dur- ing the earlier stages of the 16th century controversies concerning the Eucharist, it soon became identified with that sacrificial aspect of the sacrament of the altar which it was the chief object of the Reformers to overthrow. In England, so late as the first Prayer-book of Edward VI. , it remained one of the official designations of the Eucharist, which is there described as " The Supper of the Lorde and holy Communion, commonly called the Masse." This, however, like the service itself, repre- sented a compromise which the more extreme reformers would not tolerate, and in the second Prayer-book, together with such language in the canon as might imply the doctrine of transub- stantiation and of the sacrifice, the word Mass also disappears. That this abolition of the word Mass, as implying the offering of Christ's Body and Blood by the priest for the living and the dead was deliberate is clear from the language of those who were chiefly responsible for the change. Bishops Ridley and Latimer, the two most conspicuous champions of " the new religion," de- nounced " the Mass " with unmeasured violence; Latimer said of " Mistress Missa " that " the devil hath brought her in again "; Ridley said: " I do not take the Mass as it is at this day for the communion of the Church, but for a popish device," &c. (Works, ed. Parker Soc.,pp. 121, 120), and again: " In the stead of the Lord's holy table they give the people, with much solemn dis- guising, a thing which they call their mass; but in deed and in truth it is a very masking and mockery of the true Supper of the Lord, or rather I may call it a crafty juggling, whereby these false thieves and jugglers have bewitched the minds of the simple people . . . unto pernicious idolatory " (ib. p. 409). This language is reflected in the 31st of the Articles of Religion of the Church of England: " Wherefore the sacrifices of Masses, in which it was commonly said that the Priest did offer Christ for the quick and the dead, to have remission of pain and guilt, were blasphemous fables and dangerous deceits." Clearly the word Mass had ceased to be a colourless term generally applicable to the eucharistic service; it was, in fact, not only proscribed officially, but in the common language of English people it passed

entirely out of use except in the sense in which it is defined in Johnson's Dictionary, i.e. that of the " Service of the Romish Church at the celebration of the Eucharist." In connexion with the Catholic reaction in the Church of England, which had its origin in the " Oxford Movement " of the 19th century, efforts have been made by some of the clergy to

reintroduce the term " Mass " for the Holy Communion in the English Church.

See Du Cange, Glossarium, s.v. " Missa " ; F. Kattenbusch in Herzog-Hauck, Realencyklopddie (ed. 1903), s.v. " Messe, dogmen- geschichtlich "; for the facts as to the use of the word " Mass " at the time of the Reformation see the article by J. H. Round in the Nineteenth Century for May 1897. (W. A. P.)

Mass, in Music: i. Polyphonic Masses.— The composition of musical settings of the Mass plays a part in the history of music which is of special importance up to and including the 1 6th century. As an art-form the musical Mass is governed to a peculiar degree by the structure of its text. It so happens that the supremely important parts of the Mass are those which have the smallest number of words, namely the Kyrie, important as being the opening prayer; the Sanctus and Benedictus, embody- ing the central acts and ideas of the service; and the Agnus Dei, the prayer with which it concludes. The 16th-century methods were specially fitted for highly developed music when words were few and embodied ideas of such important emotional significance or finality that they could be constantly repeated without losing force. Now the texts of the Gloria and Credo were more voluminous than any others which 16th-century composers attempted to handle in a continuous scheme. The practical limits of the church service made it impossible to break them up by setting each clause to a separate movement, a method by which 16th-century music composers contrived to set psalms and other long texts to compositions lasting an hour or longer. Accordingly, Palestrina and his great contemporaries and pre- decessors treated the Gloria and Credo in a style midway in polyphonic organization and rhythmic breadth between that of the elaborate motet (adopted in the Sanctus) and the homophonic reciting style of the Litany. The various ways in which this special style could be modified by the scale of the work, and con- trasted with the broader and more elaborate parts, gave the Mass (even in its merely technical aspects) a range which made it to the 16th-century composer what the symphony is to the great instru- mental classics. Moreover, as being inseparably associated with the highest act of worship, it inspired composers in direct propor- tion to their piety and depth of mind. Of course there were many false methods of attacking the art-problem, and many other rela- tionships, true and false, between the complexity of the settings of the various parts of the Mass and of motets. The story of the action of the council of Trent on the subject of corruption of church music is told elsewhere (see Music and Palestrina); and it has been recently paralleled by a decree of Pope Pius X., which has restored the 16th-century polyphonic Mass to a perma- nent place in the Roman Catholic Church music.

2. Instrumental Masses in the Neapolitan Form. — The next definite stage in the musical history of the Mass was attained by the Neapolitan composers who were first to reach musical coherence after the monodic revolution at the beginning of the 17 th century. The fruit of their efforts came to maturity in the Masses of Mozart and Haydn. By this time the resources of music were such that the long and varied text of the Gloria and Credo inevitably either overbalanced the scheme or met with an obviously perfunctory treatment. It is almost impossible, without asceticism of a radically inartistic kind, to treat with the resources of instrumental music and free harmony such passages as that from the Crucifixus to the Resurrexit, without an emotional contrast which inevitably throws any natural treatment of the Sanctus into the background, and makes the Agnus Dei an inadequate conclusion to the musical scheme. So unfavourable were the conditions of 18th-century music for the formation of a good ecclesiastical style that only a very small proportion of Mozart's and Haydn's Mass music may be said to represent their ideas of religious music at all. The best fea- tures of their Masses are those that combine faithfulness to the Neapolitan forms with a contrapuntal richness such as no Neapo-

iitan composer ever achieved. Thus Mozart's most perfect as well as most ecclesiastical example is his extremely terse Mass in F, written at the age of seventeen, which is scored simply for four- part chorus and solo voices accompanied by the organ with a largely independent bass and by two violins mostly in indepen- dent real parts. This scheme, with the addition of a pair of trumpets and drums and, occasionally, oboes, forms the normal orchestra of 18th-century Masses developed or degenerated from this model. Trombones often played with the three lower voices, a practice of high antiquity surviving from a time when there were soprano trombones or connetti (Zincken, a sort of treble serpent) to play with the sopranos.

3. Symphonic Masses. — The enormous dramatic development in the symphonic music of Beethoven made the problem of the Mass with orchestral accompaniment almost insoluble. This makes it all the more remarkable that Beethoven's second and only important Mass (in D, Op. 123) is not only the most dramatic ever penned but is, perhaps, the last classical Mass that is thoughtfully based upon the liturgy, and is not a mere-musical setting of what happens to be a liturgic text. It was intended for the installation of Beethoven's friend, the archduke Rudolph, as archbishop of Olmutz; and, though not ready until two years after that occasion, it shows the most careful consideration of the meaning of a

church service, no doubt of altogether excep- tional length and pomp, but by no means impossible for its unique occasion. Immense as was Beethoven's dramatic force, it was equalled by his power of sublime repose; and he was accordingly able once more to put the supreme moment of the music where the service requires it to be, viz. in the Sanclus and Benedictus. In the Agnus Dei the circumstances of the time gave him something special to say which has never so impera- tively demanded utterance since. Europe had been shattered by the Napoleonic wars. Beethoven read the final prayer of the Mass as a " prayer for inward and outward peace," and, giving it that title, organized it on the basis of a contrast between terrible martial sounds and the triumph of peaceful themes, in a scheme none the less spiritual and sublime because those who first heard it had derived their notions of the horror of war from living in Vienna during its bombardment. Critics who have lived in London during the relief of Mafeking have blamed Beethoven for his realism.

Schubert's Masses show rather the influence of Beethoven's not very impressive first Mass, which they easily surpass in interest, though they rather pathetically show an ignorance of the meaning of the Latin words. The last two Masses are later than Beethoven's Mass in D and contain many remarkable passages. It is evident from them that a dramatic treatment of the Agnus Dei was " in the air"; all the more so, since Schubert does not imitate Beethoven's realism.

4. Lutheran Masses. — Music with Latin words is not excluded from the Lutheran Church, and the Kyrie and Gloria are fre- quently sung in succession and entitled a Mass. Thus the Four Short Masses of Bach are called short, not because they are on a small scale, which is far from being the case, but because they consist only of the Kyrie and Gloria. Bach's method is to treat each clause of his text as a separate movement, alternating choruses with groups of arias; a method which was indepen- dently adopted by Mozart in those larger masses in which he transcends the Neapolitan type, such as the great unfinished Mass in C minor. This method, in the case of an entire Mass, results in a length far too great for a Roman Catholic service; and Bach's B minor Mass, which is such a setting of the entire test, must be regarded as a kind of oratorio. It thus has obviously nothing to do with the Roman liturgy; but as an independent setting of the text it is one of the most sublime and profoundly reli- gious works in all art; and its singular perfection as a design is nowhere more evident than in its numerous adaptations of earlier works.

The most interesting of all these adaptations is the setting of the words: " Et expecto resurrectionem mortuorum et vitam venturi saeculi. — Amen." Obviously the greatest difficulty in any elaborate instrumental setting of the Credo is the inevitable

anti-climax after the Resurrexit. Bach contrives to give this anti-climax a definite artistic value; all the more from the fact that his Crucifixus and Resurrexit, and the contrast between them, are among the most sublime and directly impressive things in all music. To the end of his Resurrexit chorus he appends an orchestral ritornello, summing up the material of the chorus in the most formal possible way, and thereby utterly destroying all sense of finality as a member of a large group, while at the same time not in the least impairing the force and contrast of the whole — that contrast having ineffaceably asserted itself at the moment when it occurred. After this the aria " Et in spiritum sanctum," in which the next dogmatic clauses are enshrined like relics in a casket, furnishes a beautiful decorative design on which the listener can repose his mind; and then comes the voluminous ecclesiastical fugue, Confiteor union baptisma, leading, as through the door and world-wide spaces of the Catho- lic Church, to that veil which is not all darkness to the eye of faith. At the words " Et expecto resurrectionem mortuorum " the music plunges suddenly into a slow series of some of the most sublime and mysterious modulations ever written, until it breaks out as suddenly into a vivace e allegro of broad but terse design, which comes to its climax very rapidly and ends as abruptly as possible, the last chord being carefully written as a short note without a pause. This gives the utmost possible effect of finality to the whole Credo, and contrasts admirably with the coldly formal instrumental end of the Resurrexit three movements further back. Now, such subtleties seem as if they must be un- conscious on the part of the composer; yet here Bach is so far aware of his reasons that his vivace e allegro is an arrangement of the second chorus of a church cantata, Gott man lobet dich in der Slille; and in the cantata the chorus has introductory and final symphonies and a middle section with a da capo!

5. The Requiem. — The Missa pro defunctis or Requiem Mass has a far less definite musical history than the ordinary Mass; and such special musical forms as it has produced have little in common with each other. The text of the Dies Irae so impera- tively demands either a very dramatic elaboration or none at all, that even in the 10th century it could not possibly be set to ' continuous,,music on the lines of the Gloria and Credo. Fortu- nately, however, the Gregorian canto fermo associated with it is of exceptional beauty and symmetry; and the great 16th century masters either, like Palestrina, left it to be sung as plain-chant, or obviated all occasion for dramatic expression by setting it in versicles (like their settings of the Magnificat and other canticles) for two groups of voices alternatively, or for the choir in alternation with the plain chant of the priests.

With modern orchestral conditions the text seems positively to demand an unecclesiastical, not to say sensational, style, and probably the only

instrumental Requiem Masses which can be said to be great church music are the sublime unfinished work of Mozart (the antecedent's of which would be a very interesting subject) and the two beautiful works by Cherubini. These latter, however, tend to be funereal rather than uplifting. The only other artistic solution of the problem is to follow Berlioz, Verdi and Dvorak in the complete renunciation of all ecclesiastical style. Brahms's Deutsches requiem has nothing to do with the Mass for the dead, being simply a large choral work on a text compiled from the Bible by the composer. (D. F. T.)

MASSA, a town of Tuscany, Italy, the joint capital with Carrara of the province of Massa and Carrara, and sharing with it the episcopal see, 20 m. S.E. of Spezia by rail, 246 ft. above sea-level. Pop. (1901), 10,559 (town); 26,118 (commune). The Palazzo Ducale (now the prefecture) was erected in 1701, and was a summer residence of Napoleon's sister, Elisa Baciocchi, princess of Lucca, who caused the ancient cathedral opposite to be destroyed. The hills round the town yield marble, and there is a narrow-gauge railway to the Marina d'Avenza, where the marble is shipped.

MASSACHUSETTS (an Indian name, originally applied to a tribe of Indians), one of the original thirteen states of the American Union, bounded on the N. by Vermont and New Hampshire, on the E. by the Atlantic, on the S. by Rhode Island

and Connecticut, and on the W. by New York. It lies approxi- mately between 41° 15′ and 42° 50′ N. lat. and 6o° 55′ and 73 30′ W. long. The bulk of its area — which is about 8266 sq. m. (of which 227 are water) — forms a parallelogram of 130 m. E. and W., 46 m. N. and S., the additional area lying in a projection at the S.E. and a lesser one at the N.E., which give the mainland a breadth of 90 m. where it borders upon the ocean, while the general irregularity of the coast-line gives a sea frontage of about 250 m.

Physical Features. — The east and south-east portions are in general undulating or level, the central hilly and broken, and the west rugged and mountainous. (For geological details see United States: Geology, ad fin.) The Hoosac Hills (1200-1600 ft. high), separating the valleys of the Housatonic and Connecticut, are a range of the Berkshires, a part of the Appalachian system, and a continuation of the Green Mountains of Vermont, and with the Taconic range on the west side of the Housatonic Valley — of which the highest peaks are Greylock, or " Saddleback "

(3535 ft.), and Mt Williams (3040 ft.)— in the extreme north-west corner of the state, form the only considerable elevated land. 1 Bordering on the lowlands of the Connecticut, Mt Tom (1214 ft.) and a few other hills (Mt Holyoke, 954 ft.; Mt Toby, 1275) form conspicuous landmarks. East of this valley the country continues more or less hilly and rocky, but the elevations eastward become increasingly slight and of little consequence. Mt Lincoln (1246 ft.) and especi- ally Mt Wachusett (2108 ft.), to the east in a level country, are very exceptional. The Blue Hills in Milton are the nearest eleva- tions to the coast, and are conspicuous to navigators approaching Boston. The south-east corner of the state is a sandy lowland, generally level with a slightly elevated ridge (Manomet) south of Plymouth, and well watered by ponds.

With the exception of this corner, Massachusetts is a part of the slanting upland that includes all of southern New England. This upland is an uplifted peneplain of subaerial denudation, 2 now so far advanced in a " second " cycle of weathering and so thoroughly dissected that to an untrained eye it appears to be only a country of hills confusedly arranged. The general contour of the upland, marked by a remarkably even sky-line, is evident at almost every locality in the state. In the nature and position of the upland rocks— mainly crystalline schists and gneisses, excessively compli- cated and disordered in mass, and also internally deformed — there is found abundant proof that the peneplain is a degraded mountain region. The uplahd is interrupted by the rivers, and on the coast by great lowlands, and is everywhere marked by hills somewhat sur- mounting the generally even skyline. Monadnock (in New Hamp- shire, nearN. E.Massachusetts), the Blue Hills near Boston, Greylock, in the north-west, and Wachusett in the centre, are the most com- manding remnant-summits (known •generically as " Monadnocks “) of the original mountain system. But in the derivant valley peneplains developed in the present cycle of denudation, and there are residual summits also; in the Connecticut Valley trap ridges, of which Mt Tom and Mt Holyoke are the best examples; at Mt Holyoke, lava necks; occasionally in the lowlands, ridges of resistant sandstone, like Deerfield Mountain near Northampton; in the Berkshire Valley, summits of resistant schists, like Greylock, the highest summit in the state. The larger streams have cut their channels to very moderate gradients, but the smaller ones are steeper. The Housatonic and Millers (and the Connecticut also, but not in its course within Massachusetts alone) afford beauti- ful examples of the dependence of valley breadth upon the strike of soft or harder rocks across the stream. The Connecticut low- land is cut from 5 to 18 m. wide in soft sandstones and shales. The . glacial era has left abundant evidences in the topography of the state. The ice covered even the Monadnocks. Till drumlins, notably abundant on the lowland about Boston and the highland near Spencer; morainic hills,

extending, e.g. all along Cape Cod; eskers, kames and river terraces afford the plainest evidences of the extent of the glacial sheet. The Berkshire country — Berkshire, Hampden, Hampshire and Franklin counties — is among the most beautiful regions of the United States. It is a rolling highland dominated by long, wooded hill-ridges, remarkably even-topped in general elevation, intersected and broken by deep valleys. Scores of charming lakes lie in the hollows. The district is often called the Lake Region of America, partly from the comparableness of its scenic beauties with the English Lake Country (Matthew Arnold, however, wrote: " The country is pleasing but not to be compared with Westmoreland. It is wider and opener, and neither hills nor lakes are so effective."), and partly from the parallelism of literary associations. It has become since 1850, and especially in much more recent years, a favoured resort of summer residents. Owing to topography, and also to the manner in which Massachusetts

1 At least seventy hills in the state, mainly in this quarter, have an elevation of 1500 ft. (twenty-four above 2000 ft.).

1 In some localities it is not easy to establish irrefutably and in detail the inter-arrangement of drainage and rock structure that proves it to be a subaerial peneplain instead of an uplifted sub- marine platform; but the general proof is very clear.

was settled, the western counties were long connected commercially more closely with New York than with Massachusetts, and this territory was long in dispute between these two states.

The Connecticut is the most considerable stream, and is navigable by small craft. Its valley, much the richest portion of the state agriculturally, is celebrated for the quiet variety and beauty of its scenery. The Housatonic, in portions placid, in others wild and rapid, winding along the deflecting barrier of the Hoosac Hills, is the most beautiful river of the state, despite the mercantile use of its water-power. The Merrimac, the second stream of the state in volume, runs in a charming valley through the extreme north-east corner, and affords immensely valuable water-power at Lowell, Lawrence and Haverhill.

South of Cohasset the shore is sandy, with a few isolated rocky ledges and boulders. About Boston, and to the north of it, the shore is rocky and picturesque. Cape Cod, like a human arm doubled at the elbow, 40 m. from shoulder to elbow and 30 from elbow to hand, is nowhere more than a few miles broad. It is a sandy ridge, dotted with summer resorts and cottages. Cape Ann has a rugged interior and a ragged, rocky coast. It, too, is a summer recreation ground, with much beautiful scenery. Boston

Harbor (originally known as Massachusetts Bay, a name which now has a much broader signification) is the finest roadstead on the coast. The extreme hook of the Cape Cod Peninsula forms Provincetown Harbor, which is an excellent and capacious port of refuge for vessels, approaching Boston. Salem Harbor is the most considerable other haven on Massachusetts Bay; on Buzzard's Bay New Bedford has a good harbour, and on the Atlantic coast are the excellent harbours of Gloucester and Marblehead, both fre- quented by summer residents. Gloucester has the largest fishery interests of any place in the country, and is one of the chief fishing ports of the world. Buzzard's Bay is also a popular yachting ground, and all about its shores are towns of summer residence. Wood's Hole is a station of the United States Bureau of Fisheries, and a marine biological laboratory is there.

The principal islands lie off the south coast. The largest is Martha's Vineyard, about 20 m. long, with an extreme breadth of about 9 j m. It has in Vineyard Haven (Holmes's Hole) a spacious harbour, much frequented by wind-bound vessels seeking a passage round Cape Cod. The island is covered with stunted trees. Its population was formerly dependent wholly upon the sea, but its climate has made it a popular summer resort, Oak Bluffs being one of the chief resorts of the Atlantic coast. Farther east, Nantucket, a smaller island of triangular shape, is likewise the home of a seafaring folk who still retain in some degree primitive habits, though summer visitors are more and more affecting its life.

Flora and Fauna. — Massachusetts lies entirely in the humid area of the Transition life-zone, with the exception of the extreme north-western corner of the state, which lies in the Boreal zone. Thus the original native trees and plants were those common to New England and northern New York. The presence of a dense population has driven out some, and brought in others, including some noxious weeds. The larger wild animals have disappeared, excepting an occasional black bear or deer. Of the smaller fur- bearing animals, the beaver was long ago exterminated, the otter is seen very rarely, and the mink only in the most isolated districts; but foxes, skunks, weasels, musk-rats, rabbits, and grey and red squirrels are not uncommon. Copperhead snakes and rattlesnakes are occasionally seen, and there are several species of harmless serpents. Of game birds the most characteristic is the partridge (ruffed grouse), exclusively a woodland bird ; the Wilson's snipe and the woodcock are not uncommon in favourable localities, and several species of ducks are found especially in the bays and marshes near the coast during the seasons of migration. A stray eagle is sometimes seen. Very interesting to ornithologists are the few heath hens, the eastern representative of the prairie hen (pinnated grouse), which are found on the island of Martha's Vineyard, and are the sole survivors in the eastern states of one of the finest of American game birds, now practically

exterminated even on the western plains. There are many insectivorous birds; among the song birds are the hermit thrush, the wood thrush, the Wilson's thrush, the brown thrasher, the bobolink, the catbird, the oven bird, the house wren, the song sparrow, the fox sparrow, the vesper sparrow, the white-throated sparrow (Peabody bird), the gold- finch and the robin. Brook trout are found, especially in the streams in the western part of the state, and bass, pickerel, perch and smaller fish occur in the rivers and other inland waters. Fish are so abun- dant on the coast that the cod is sometimes used as an emblem of the state ; thus a figure of one hangs in the representatives' chamber at the State House. The artificial propagation and preservation of salmon and other edible fresh-water fish have been carried on successfully under the supervision of a state commission. The commonwealth has expended large sums since 1890 in a vain attempt to exterminate the gipsy moth (Ocneria, or more exactly Porthetria, dispar), accidentally allowed to escape in 1869 by a French naturalist.

Climate. — The climate is trying, showing great extremes of temper- ature (20 F. below zero to 100 ° above) and marked local variations. The south-eastern coast and islands are mildest. The mean average

temperature of Boston is 48 F. In the interior it is slightly lower. The mean summer temperature generally over the state is about 70 F. Changes are often sudden, and the passage from winter to summer is through a rapid spring. The ocean tempers the climate considerably on the seaboard. Boston Harbor has been frozen over in the past, but steamtugs plying constantly now prevent the occur- rence of such obstruction. In the elevated region in the west the winters are decidedly severe, and the springs and summers often late and cold. Williamstown has a winter mean of about 23 ° F. The yearly precipitation is about 39 to 45 in., decreasing inland, and is evenly distributed throughout the year. Fogs are common on the coast, and east wind drizzles; the north-east winds being the weather bane of spring and late autumn. In the summer and the autumn the weather is commonly fine, and often most beautiful ; and especially in the Berkshires a cool, pure and elastic atmosphere prevails, relatively dry, and altogether delightful.

Agriculture. — The soil, except in some of the valleys, is not naturally fertile; and sandy wastes are common in the south-east parts. High cultivation, however, has produced valuable market- gardens about Boston and the larger towns; and industry has made tillage remunerative in most other parts. The gross value of agricultural products is not great compared

with that of other industries, but they are of great importance in the economy of the state. The total value of farm property in 1900 was $182,646,704, including livestock valued at $15,798,464. Of the increase in the total value of farm property between 1850 and 1900 more than half was in the decade 1890-1900; this increase being due partly to the rising value of suburban realty, but also to a development of intensive farming that has been very marked since 1880. The total value of farm products in 1899 was $42,298,274 (expenditure for fertilizers $1,320,600); crops representing 54-7 and animal products 45-3% of this total. The leading crops and their per- centages of the total crop value were hay and forage (39-1%), vegetables (23-9%), fruits and nuts (11-7%), forest products (8-4%), and flowers and plants (7-1%). Of the animal products 67 – 3% were dairy products, and 20-8% poultry and eggs. Cereals 1 have been for many years declining, although Indian corn is a valuable subsidiary to the dairy interest, which is the most thriving farm industry. The value of farms on which dairying was the chief source of income in 1900 was 46% of the total farm value of the. state; the corresponding percentages for livestock, vegetables, hay and grain, flowers and plants, fruit and tobacco, being respec- tively 14-6, 10-2, 8-o, 4-2, 3-2, and 1-8%. The shrinkage of cereal crops has been mainly responsible for the idea that Massachusetts is agriculturally decadent. Parallel to this shrinkage was the decrease in ranging sheep (82-0% from 1850-1900; 34-2% from 1890-1900), and cattle, once numerous in the hill counties of the west, and in the Connecticut Valley; Boston, then ranking after London as the second wool market of the world, and being at one time the chief packing centre of the country. Dairy cows in- creased, however, from 1850 to 1900 by 41-9 % (1890-1900, 7 – 3%). The amount of improved farmland decreased in the same period 39-4%, decreasing even more since 1880 than earlier, and amount- ing in 1900 to no more than 25-1 % of the area of the state; but this decrease has been compensated by increased value of products, especially since the beginning of intensive agriculture. An unusual density of urban settlement, furnishing excellent home markets and transportation facilities, are the main props of this new interest. Worcester and Middlesex counties are agriculturally foremost. Tobacco, which has been cultivated since colonial times, especially since the Civil War, is grown exclusively in the Connecticut Valley or on its borders. In the swamps and bogs of the south-east' coast cranberry culture is practised, this district producing in 1900 three-fifths of the entire yield of the United States. " Abandoned farms " (aggregating, in 1890, 3-4% of the total farm area, and 6-85% in Hampshire county) are common, especially in the west and south-east.

Mines and Mining. — Granite is the chief mineral, and granite quarrying is the principal mineral industry of the state. In 1900 the value of manufactures based primarily upon the products of mines and quarries was

$196,930,979, or 19% of the state's total manufactured product. In 1906 Massachusetts led all states in the value of its granite output, but in 1907 and 1908 it was second to Vermont. The value of the product (including a small output of igneous rocks) was in 1903, $2,351,027; 1904, $2,554,748; 1905,

$2,251,319; 1906, $3,327,416; 1907, $2,328,777; 1908, $2,027,463.

Granite boulders were used for construction in Massachusetts as early as 1 650. Systematic quarrying of siliceous crystalline rocks in New England began at Quincy in about 1820! The Gloucester quarries, opened in 1824, were probably the next to be worked regularly. The principal granite quarries are in Milford,

1 The yield of cereals and of such other crops in 1907 as are recorded in the Yearbook of the United States Department of Agriculture was as follows: Indian corn, 1,584,000 bushels; oats, 245,000 bushels; barley, 64,000 bushels; buckwheat, 42,000 bushels;

Sotatoes, 3,600,000 bushels; hay, 760,000 tons; tobacco, 7,167,500). In the same year, according to the same authority, there were in the state 196,000 milch cows, 92,000 other neat cattle, 45,000 sheep and 70,000 swine.

(Worcester county), Quincy and Milton (Norfolk county), Rockport (Essex county) and Becket (Berkshire county). Of the fourteen quarries of " Milford granite," twelve are in the township of that name, and two in Hopkinton township, Middlesex county. B. K. Emerson and J. H. Perry classify this granite as post-Cambrian. They describe it 2 as " a compact, massive rock, somewhat above medium grain, and of light colour. The light flesh colour of the feldspar, and the blue of the quartz give it in some places a slight pinkish tint, and it is now much used as a building-stone under the name of ' pink granite.' "

The Quincy granite district lies around the north-east end of the Blue Hill region, about II m. south of Boston. For monumental purposes this granite is classified as " medium," " dark," and " extra dark." Quincy granite takes a very high polish, owing to the absence of mica and to the coarser cleavage of its hornblende and augite. The lightest of the monumental stone quarried at Quincy is called gold-leaf; it is bluish-green gray, speckled with black and light yellow brown. Another variety has small, rather widely separated cherry-red dots.

The Rockport granite is found along or near the seashore, between Rockport and Bay View, and within about three-quarters of a mile of Cape

Ann. The granite is of two kinds, known commercially as " g re y granite " and " green granite." Both varieties are hard and take a very high polish.

The Becker granite (known as " Chester dark" and " Chester light ") is a muscovite-biotite granite varying from medium grey to medium bluish grey colour, and fine in texture. It is used principally for monuments.

In 1907 Massachusetts ranked sixth among the states in the value of its trap rock product ($432,604), and eighth in sandstone ($243,328). The value of the marble produced in the same year was $212,438, the state ranking fifth in the value of the total product and fourth in building-marble. Other minerals are emery, limestone and quartz. The state ranked fifth in 1906 in the total value of stone quarried ($4,333,616), and eighth in 1908 ($2,955,195)- The output of lime in 1908 was 107,813 tons, valued at $566,022. Second in value to the various stones were the clay products of the state, which were valued in 1906 at $2,172,733 (of which $1,415,864 was the value of common brick) and in 1908 at $1,647,362 (of which $950,921 was the value of common brick). There are many mineral springs in the state, more than half being in Essex and Middlesex counties. The total amount of mineral waters sold in 1908 was valued at $227,907. In that year the total value of the minerals and mining products of the state was $5>9 2 5.949- Gold has been found in small quantities in Middlesex, Norfolk and Plymouth counties.

Manufactures. — Though only four states of the Union are smaller, only three exceeded Massachusetts in 1905 in the value of manufac- tured products (six exceeding it in population) ; and this despite very scant native resources of raw materials and a very limited home market. Historical priority of development, exceptionally extensive and well utilized water-power, and good transportation facilities are largely responsible for the exceptional rank of Massachusetts as a manufacturing state. Vast water-power is developed on the Merrimac at Lawrence and Lowell, and on the Connecticut at South Hadley, and to a less extent at scores of other cities on many streams and artificial ponds; many of the machines that have revolutionized industrial conditions since the beginning of the factory system have been invented by Massachusetts men; and the state contains various technical schools of great impor- tance. In 1900 the value of manufactures was $1,035,198,989, an increase from 1890 of 16-6%; that from 1880 to 1890 having been 4°'7 • In textiles — cottons, worsteds, woollens and carpets — in boots and shoes, in rubber foot-wear, in fine writing paper, and in other minor products, it is the leading state of the country. The textile industries (the making of carpets and rugs, cotton goods, cotton smallwares, dyeing and finishing textiles, felt goods, felt hats, hosiery and knit goods, shoddy, silk and silk goods, woollen goods, and worsted goods), employed 32-5 of all manufacturing wage earners in

1905, and their product ($271,369,816) was 24-1% of the total, and of this nearly one-half ($129,171,449) was in cotton goods, being 28-9% of the total output of the country, as compared with 1 1 % for South Carolina, the nearest competitor of Massa- chusetts. There is a steadily increasing product of fine grade fabrics. The output of worsted goods in 1905 ($51,973,944) was more than three-tenths that of the entire country, Rhode Island being second with $44,477,596; in Massachusetts the increase in the value of this product was 28-2 % between 1900 and 1905. The value of woollen goods in 1905 ($44,653,940) was more than thsee-tenths of the entire product for the country; and it was 446% more than that of 1900. The value of boots and shoes and cut stock in 1905 was $173,612,660, being 23% greater than in 1900; the value of boots and shoes in 1905 ($144,291,426) was 45-1 % of the country's output, that of New York, the second state, being only 10-7%. In this industry, as in the manufacture of cotton goods, Massa- chusetts has long been without serious rivalry; Brockton, Lynn,

2 The Green Schists and Associated Granites and Porphyries of Rhode Island, Bulletin, U.S. Geological Survey, No. 311, 1907.

-J

K

CO

+-3

":*

CO

. :s

5 .2

(-1

vn

ˆi

o

Haverhill, Marlboro and Boston, in the order named, being the principal centres. The third industry in 1905 was that of foundry and machine-shop products ($58,508,793), of which Boston and Worcester are the principal centres. Lesser interests, in the order of importance, with the product value of each in 1905, were: rubber goods ($53,133,020), tanned, curried and finished leather ($33,352,999). in the manufacture of which Massachusetts ranked second among the states; paper and wood pulp 1 ($32,012,247), in the production of which the state ranked second among the states of the Union ; slaughtering and meat packing ($30,253,838) ; printing and publishing ($33,900,748, of which $21,020,237 was the value of newspapers and periodicals); clothing ($21,724,056); electrical machinery, apparatus and supplies ($15,882,216); lumber ($12,636,329); iron and steel, steel works and rolling-mills products ($11,947,731; less than in 1900); cordage and twine ($11,173,521), in the manufacture of which Massachusetts was second only to New York; furniture ($11,092,581); malt liquors ($11,080,944); jewelry ($10,073,595), Massachusetts ranking second to Rhode Island ; confectionery ($9,317,996), in which Massachusetts was third among the states.

Many of these industries have a history going back far into colonial times, some even dating from the first half of the 17th century. Textile products were really varied and of considerable importance before 1700. The policy of the British government towards such industries in the colonial period was in general repressive. The non-importation sentiment preceding the War of Independence fostered home manufactures considerably, and the Embargo and Non-Intercourse Acts before the war of 1812, as well as that war itself (despite the subsequent glut of British goods) had a much greater effect ; for they mark the introduction of the factory system, which by 1830 was firmly established in the textile industry and was rapidly transforming other industries. Improvements were introduced much more slowly than in England, the cost of cotton machinery as late as 1826 being 50-60% greater in America. The first successful power loom in America was set up at Waltham in 1814. Carding, roving and spinning machines were constructed, at Bridgewater in 1786. The first cotton mill had been established in Beverly in 1788, and the first real woollen factory at Byfield in 1794. Woolcard machinery destined to revolutionize the in- dustry was devised by Amos Whittemore (1759-1828) in 1797; spinning jennies were in operation under water-power before 1815. Carpet-weaving was begun at Worcester in 1804. " Not a yard of fancy wool fabric had ever been woven by the power-loom in any country till done by William Crompton at the Middlesex Mills, Lowell, in 1840" (Samuel Lawrence). 2 The introduction of the remarkably complete machinery of the shoe industry was practically complete by 1865, this being the last of the great industries to come under

the full dominance of machinery. At Pittsfield and at Dalton is centred the manufacture of fine writing papers, including that of paper used by the national government for bonds and paper money. Four-fifths of all loft-dried paper produced in the country from 1860-1897 was made within 15 m. of Springfield; Holyoke and South Hadley being the greatest producers. Vulcan- ized rubber is a Massachusetts invention. Most of the imitation jewelry of the United States is produced at Attleboro and North Attleboro, and in Providence, Rhode Island. In 1905 Boston produced i6 – 4% of all the manufactures of the state, and Lynn, the second city, which had been fifth in 1900, 4-9 %. Some industries which have since become dead or of relatively slight magnitude were once of much greater significance, economically or socially: such as the rum-distilling connected with the colonial slave trade, and various interests concerned with shipbuilding and navigation. The packing of pork and beef formerly centred in Boston; but, while the volume of this business has not diminished, it has been greatly exceeded in the west. For many years Massa- chusetts controlled a vast lumber trade, drawing upon the forests of Maine, but the growth of the west changed the old channels of trade, and Boston carpenters came to make use of western timber. It was between 1840 and 1850 that the cotton manu- factures of Massachusetts began to assume large proportions; and about the same time the manufacture of boots and shoes centred there. Medford ships began to be famous shortly after the beginning of the 19th century, and by 1845 that town employed one quarter of all the shipwrights in the state.

Fishing is an important industry. Drift whales were utilized in the earliest years of the colony, and shore boating for the baleen (or " right ") whale — rich in bone and in blubber yielding common oil — was an industry already regulated by various towns before 1650; but the pursuit of the sperm whale did not begin until about 1 7 13. The former industry had died out before the War of In- dependence; the latter is not yet quite extinct. Nantucket and New Bedford were the centres of the whaling trade, which, for the

1 In 1905 Massachusetts produced 607% of the writing paper manufactured in the country. Besides writing paper, book paper and building paper are made in the state, but very little newspaper.

2 It must be noted, however, that the first successful construction of cards, drawing and roving, and of spindles, on the Arkwright principle was by S. Slater at Pawtucket, Rhode Island in 1790.

energy and skill required and the length (three to five years when sailing vessels were employed) of the ever-widening voyages which finally took the fishermen into every quarter of the globe, con- tributes the most romantic

chapters in the history of American commerce. At one time it gave occupation to a thousand ships, but the introduction of petroleum gradually diminished this resource of the lesser ports. The Newfoundland Bank fisheries were of greater economic importance and are still very important. Glou- cester is the chief centre of the trade. The value of fishery products in 1895 was $5,703,143, and in 1905 $7,025,249; and 15,694 persons were engaged in the fisheries. Though cod is much the most important fish (in 1905 fresh cod were valued at $991,679, and salted cod at $696,928), haddock (fresh, $1,051,910; salted, $17,194), mackerel (value in 1905, including horse mackerel, $970,876), herring (fresh, $266,699; salted, $114,997), pollock ($267,927), hake ($258,438), halibut ($218,232), and many other varieties are taken in great quantities. The shell fisheries are less important than those of Maine.

Commerce. — Already by 1660 New England products were an " important element in the commerce and industries of the mother country " (Weeden). Codfish was perhaps the truest basis of her commerce, which soon came to include the West Indies, Africa and southern Europe. Of fundamental importance was the trade with the French West Indies, licit and illicit, particularly after the Peace of Utrecht (1713). Provisions taken to Newfoundland, poor fish to the West Indies, molasses to New England, rum to Africa and good cod to France and Spain, [were the commonest ventures of foreign trade. The English Navigation Acts were generally evaded, and were economically of little effect ; politically they were of great importance in Massachusetts as a force that worked for indepen- dence. Privateering, piracy and slave-trading — which though of less extent than in Rhode Island became early of importance, and declined but little before the American War of Independence — give colour to the history of colonial trade.

Trade with China and India from Salem was begun in 1785 (first voyage from New York, 1784), and was first controlled there, and afterwards in Boston till the trade was lost to New York. The Boston trade to the Canadian north-west coast was begun in 1788. The first regular steamship line from Boston to other American Atlantic ports was established in 1824. In commercial relations the chief port of Massachusetts attained its greatest importance about 1840, when it was selected as the American terminus of the first steamship line (Cunard) connecting Great Britain with the United States; but Boston lost the commercial prestige then won by the failure of the state to promote railway communication with the west, so as to equal the development effected by other cities. The decline of commerce, however, had already begun, manufacturing sup- planting it in importance; and this decline was rapid by 1850. From 1840 to i860 Massachusetts-built ships competed successfully in the carrying trade of the world. Before 1840 a ship of 500 tons was a large ship, but after the discovery of gold in

California the size of vessels increased rapidly and their lines were more and more adapted to speed. The limit of size was reached in an immense clipper of 4555 tons, and the greatest speed was attained in a passage from San Francisco to Boston in seventy-five days, and from San Francisco to Cork in ninety-three days. The development of steam navigation for the carrying of large cargoes has driven this fleet from the sea. Only a small part of the exports and imports of Massachusetts is now carried in American bottoms. 3 The first grain elevator built in Boston, and one of the first in the world, was erected in 1843, when Massachusetts sent Indian corn to Ireland. When the Civil War and steam navigation put an end to the supre- macy of Massachusetts wooden sailing ships, much of the capital which had been employed in navigation was turned into developing railway facilities and coasting steamship lines. In 1872 the great fire in Boston made large drains upon the capital of the state, and several years of depression followed. But in 1907 Boston was the second port of the United States in the magnitude of its foreign commerce. In that year the value of imports at the Boston-Charles- town customs district was $123,411,168, and the value of exports was $104,610,908; for 1909 the corresponding figures were $127,025,654 and $72,936,869. Other ports of entry in the state in 1909 were Newburyport, Gloucester, Salem, Marblehead, Plymouth, Barnstable, Nantucket, Edgartown, New Bedford and Fall River. A protective tariff was imposed in early colonial times and protec- tion was generally approved in the state until toward the close of the 19th century, when a strong demand became apparent for reciprocity with Canada and for tariff reductions on the raw materials (notably hides) of Massachusetts manufactures.

At the end of 1908 the length of railway lines within the state was 2,109-33 miles. The Hoosac Tunnel, 5! m. long, pierces the Hoosac Mountain in the north-west corner of the state, affording a communication with western lines. It cost about $20,000,000, the state lending its credit, and was built between 1855 and 1874. The inter-urban electric railways are of very great importance in the state; in 1908 the total mileage of street and inter-urban electric

3 The tax valuation on ships engaged in foreign trade was lowered between 1884 and 1900 from $2,801,405 to $147,768.

railways was 2841-59 m. (2233-85 m. being first main track). The Cape Cod canal, 12 m. long, from Sandwich on Barnstable Bay to Buzzard's Bay, was begun in June 1909, with a view to shortening the distance by

water from Boston to New York and eliminating the danger of the voyage round Cape Cod.

Population. — The population of the state in 1910 was 3,366,416, the increases in successive decades after 1790 being respectively n-6, n-6, 10-9, 16-6, 20-9, 34-8, 23-8, 18-4, 22-4, 25-6, 25-3 and 20%.' With the exception of Rhode Island, it is the most densely populated state in the Union, the average number to the square mile in 1900 being 349 (in 1910, 418-8), and the urban population, i.e. the population of places having above 8000 or more inhabitants, being 69-9 % in 1890 and in 1900 76-0% of the total population (in places above 2500, 91-5%; in places above 25,000, 58-3 %). The female population is greater (and has been since 1765, at least) than the male, the percentage being in 1900 greater than in any other state of the Union (51 3 ; District of Columbia, owing to clerks in govern ment service 52-6). In 1900 less than 1-3% of the population was coloured; 30-2 % were foreign-born (this element having almost continuously risen from 16-49% i n 1855), and 62-3% of all inhabitants and 46-5% of those native- born had one or both parents of foreign birth. Ireland con- tributed the largest proportion of the foreign-born (29-5%), although since 1875 the proportion of Irish in the total popula- tion has considerably fallen. After the Irish the leading foreign elements are Canadian English (18-7%), Canadian French (15-8) and English (9-7), these four constituting three- fourths of the foreign population. Since 1885 the natives of southern Italy have greatly increased in number. Of the increase in total population from 1856-1895 only a third could be attributed to the excess of births over deaths ; two-thirds being due to immigration from other states or from abroad. Boston is the second immigrant port of the country. A large part of the trans- atlantic immigrants pass speedily to permanent homes in the west, but by far the greater part of the Canadian influx remains.

According to the census of 1910 there were 32 incorporated cities 2 in Massachusetts, of which 6 had between 12,000 and 20,000 in- habitants; 3 between 20,000 and 25,000 (Gloucester, Medford and North Adams); II between 25,000 and 50,000 (Maiden, Haverhill, Salem, Newton, Fitchburg, Taunton, Everett, Quincy, Pittsfield, Waltham, Chicopee); 7 between 50,000 and 100,000 (New Bedford, Lynn, Springfield, Lawrence, Somerville, Holyoke, Brockton); and 5 more than 100,000 (Boston, 670,585; Worcester, 145,986; Fall River, 119,295; Lowell, 106,294; Cambridge, 104,839).

Taking quinquennial periods from 1 856-1905 the birth-rates were 29-5, 25-3, 26-0, 27-6, 24-2, 25-0, 25-8, 27-6, 27-0 and 24-2 per 1,000; and the death-rates 17-7, 20-7, 18-2,20-8, 18-8,19-8, 19-4, 19-8, i8-oand l6-4. 3 Pneumonia and consumption, approximately of equal fatality (15

to 18 per 10,000 each), exceed more than twofold the diseases of next lower fatality, cancer and cholera infantum.

Of males (1,097, 581) engaged in 1900 in gainful occupations 47-1 % were engaged in manufacturing and mechanical pursuits (77-9 in every 100 in 1870 and 73 in 1900), 27-1 in trade and transportation, 14-2 in domestic and personal service, 7-4 in agricultural pursuits and 42 in professional service. The corresponding percentages for females (1,169,467) were 46-4 in manufacturing (in 1890, 52 %), 32-3 in domestic and personal service, 13-6 in trade and transporta- tion, 7-1 in professional service and o-6 in agriculture. Formerly farmers' daughters of native stock were much employed in factories; but since operatives of foreign birth or parentage have in great part

1 The population of the state was 378,787 in 1790; 422,845 in 1800; 472,040 in 1810; 523,287 in 1820; 610,408 in 1830; 737,699 in 1840 5994,514 in 1850; 1,231,066 in i860; 1,457,351 in 1870; 1,783,085 in 1880; 2,238,943 in 1890 ; and 2,805,346 in 1900. In 1905, accord- ing to the state census, the population was 3,003,680, or about 7-7 % more than in 1900.

2 In 1910 the following townships each had populations of more than 15,000: Revere, Leominster, Westfield, Attleborough, Peabody, Hyde Park.

3 The birth-rates every fifth (census) year up to 1895 varied for natives from 14-48 to 19-49; f° r foreigners from 45-87 to 66-68. The marriage rates in quinquennial periods up to 1905 were 19-6, 18-6,21-0, 19-8, 15-6, 18-6, 18-6, 18-6, 17-4 and 17-4; the ratio of marriages to the marriageable population was for males (above 16 years) 61-5, for females (above 14) 46-0; the fecundity of marriages seemed to have increased, being about twice as high for foreigners as for natives. See Annual Report of the Board of Health (1896), by S. W. Abbott ; and Sixty-fourth Report of Births, Marriages and Deaths in Massachusetts (1906).

taken their places, they have sought other occupations, largely in the manufacture of small wares in the cities, and particularly in depart- ments of trade where skilled labour is essential. Household service is seldom now done, as it formerly was, by women of native stock. The federal census of 1900 showed that of every 100 persons employed for gain only 37-5 % were of native descent (that is, had a native- born father). Natives heavily predominated in agriculture and the professions, slightly in trade, and held barely more than half of all governmental positions; but in transportation, personal service, manufactures, labour and domestic service, the predominance of the foreign element warranted the assertion of the state Bureau of Statistics of Labour that " the strong industrial condition of

M&ssachusetts has been secured and is held not by the labour of what is called the 'native stock,' but by that of the immigrants." After the original and exclusively English immigration from 1620 to 1640 there was nothing like regular foreign immigration until the 19th century; and it was a favourite assertion of Dr Palfrey that the blood of the fishing folk on Cape Cod was more purely English through two centuries than that of the inhabitants of any English county.

With foreign immigration the strength of the Roman Catholic Church has greatly increased: in 1906 of every 1000 of estimated population 355 were members of the Roman Catholic Church (a proportion exceeded only in New Mexico and in Rhode Island; 310 was the number per 1000 in Louisiana), and only 148 were com- municants of Protestant bodies; in 1906 there were 1,080,706 Roman Catholics (out of a total of 1,562,621 communicants of all denominations), 119,196 Congregationalists, 80,894 Baptists, 65,498 Methodists and 51,636 Protestant Episcopalians.

Reference has been made to " abandoned farms " in Massachusetts. The desertion of farms was an inevitable result of the opening of the great cereal regions of the west, but it is by no means character- istic of Massachusetts alone. The Berkshire district affords an excellent example of the interrelations of topography, soil and population. Many hill towns once thriving have long since become abandoned, desolate and comparatively inaccessible; though with the development of the summer resident's interests many will probably eventually regain prosperity. Almost half of the high-land towns reached their maximum population before the opening of the 19th century, although Berkshire was scarcely settled till after 1760, and three-fourths of them before 1850. On the other hand three-fourths of the lowland towns reached their maximum since that date, and half of them since 1880. The lowland population increased six and a half times in the century, the upland diminished by an eighth. Socially and educationally the upland has furnished an interesting example of decadence. Since 1865 (at least) various parts of Cape Cod have shrunk greatly in population, agriculture and manufactures, and even in fishing interests ; this reconstruction of industrial and social interests being, apparently, simply part of the general urban movement — a movement toward better opportunities. What prosperity or stability remains in various Cape Cod communities is largely due to foreign immigrants — especially British-Americans and Portuguese from the Azores; although the popula- tion remains, to a degree exceptional in northern states, of native stock.

Government. — Representative government goes back to 1634, and the bicameral legislature to 1644. The constitution of 1780, which still endures (the only remaining state constitution of the 1 8th century), was framed in the main by Samuel Adams, and as an embodiment of colonial experience

and revolutionary prin- ciples, and as a model of constitution-making in the early years of independence, is of very great historical interest. It has been amended with considerable freedom (37 amendments up to 1907), but with more conservatism than has often prevailed in the con- stitutional reform of other states; so that the constitution of Massachusetts is not so completely in harmony with modern democratic sentiment as are the public opinion and statute law of the state. The commonwealth, for example, is still denomi- nated " sovereign," and education is not declared a constitutional duty of the commonwealth. One unique feature is the duty of the supreme court to give legal advice, on request, to the governor and council. Another almost equally exceptional feature is the persistence of the colonial executive council, consisting of mem- bers chosen to represent divisions of the state, who assist the governor in his executive functions. Massachusetts is also one of the few states in which the legislature meets in annual session. 4 Townships were represented as such in this body (called the General Court) until 1856. Religious qualifications for suffrage and office-holding were somewhat relaxed, except in the case of 4 The number of representatives from 1832 to 1908 varied from 240 to 635, and the length of session from 58 to 206 days (since 1867 none of under 100 days), with an almost continual increase in both respects.

Roman Catholics, after 1601. 1 Real toleration in public opinion grew slowly through the 18th century, removing the religious tests of voters; and a constitutional amendment in 1821 explicitly forbade such tests in the case of office-holders. Property quali- fications for the suffrage and for office-holding — universal through colonial times — were abolished in the main in 1780. From 1821 to 1 89 1 the payment of at least a poll-tax was a condition pre- cedent to the exercise of the suffrage. An educational test (dating from 1857) is exacted for the privilege of voting, every voter being required to be able to read the constitution of the commonwealth in the English language, and to write his name. The property qualification of the governor was not abolished until 1892. In the presidential election of 1896, when an unprece- dentedly large vote was cast, the number of voters registered was nearly 20 % of the population, and of these nearly 82 % actually voted. Massachusetts is one of the only two states in the Union in which elections for state officers are held annually. In 1888 an act was passed providing for the use in state elections of a blanket ballot, on which the names of all candidates for each office are arranged alphabetically under the heading of that office, and there is no arrangement in party columns. This was the first state law of the kind in the country. The same method of voting has been adopted in about two-thirds of the townships of

the state. A limited suffrage was conferred upon women in 1879. Every female citizen having the qualifications of a male voter may vote in the city and town elections for members of the school committee.

A householder with a family may, by recording the proper declara- tion in a registry of deeds, hold exempt from attachment, levy on execution, and sale for the payment of debts thereafter contracted an estate of homestead, not exceeding $800 in value, in a farm or lot with buildings thereon which he lawfully possesses by lease or otherwise and occupies as his residence. The exemption does not extend, however, to the prohibition of sale for taxes, and in case the householder's buildings are on land which he has leased those buildings are not exempt from sale or levy for the ground rent. If the householder has a wife he can mortgage or convey his estate of homestead only with her consent, and if he dies leaving a widow or minor children the homestead exemption survives until the youngest child is twenty-one years of age, or until the death or marriage of the widow, provided the widow or a child continues to occupy it.

The scope of state activity has become somewhat ramarkable. In addition to the usual state boards of education (1837), agriculture (1852), railroad commissioners (1869), health (1869), statistics of labour, fisheries and game, charity (1879), the dairy bureau (1891), of insanity (1898), prison, highways, insurance and banking com- missions, there are also commissions on ballot-law, voting machines, civil service (1884), uniformity of legislation, gas and electric lighting corporations, conciliation and arbitration in labour disputes (1886), &c. There are efficient state boards of registration in pharmacy, dentistry and medicine. Foods and drugs have been inspected since 1882. In general it may be said that the excellence of administrative results is noteworthy. The work of the Bureau of Statistics of Labor, of the Bureau of Health, of the Board of Railroad Commissioners, and of the Board of Conciliation and Arbitration, and the progress of civil service, have been remarkable for value and efficiency. Almost all state employees are under civil service rules; the same is true of the city of Boston; and of the clerical, stenographic, prison, police, civil engineering, fire, labour- foreman, inspection and bridge tender services of all cities; and under a law (1894) by which cities and towns may on petition enlarge the application of, their civil service rules. Various other public services, including even common labourers of the larger towns, are rapidly passing under civil service regulation. Veterans of the Civil War have privileges in the administration of the state service. In the settlement of labour disputes conciliatory methods were suc- cessful in the formative period, when the parties to disputes adopted customary attitudes of hostility and fought to the end unless they were reconciled by the Board to a final agreement or to an agreement to arbitrate. 2 In this earlier period (before 1900), thanks to the

1 However, every office-holder was, and every subject might be, required to take (though this was not a condition of the franchise) the oaths enjoined by parliament in the first year of the reign of William and Mary as a substitute for the oaths of Allegiance and Supremacy; and the same still applies to the signing of the Declaration.

2 From 1887-1900, out of 290 cases settled, only 107 were formal arbitrations, 124 agreements were effected by the mediation of the Board, 100 were effected otherwise while proceedings were pending, and in 59 cases the Board interposed when the parties preferred hostilities.

efforts of the board there was an increase iri the frequency of appeal to arbitration, and settlements by compromise were often made. Afterwards the number of arbitrations by the board increased in number: from 1900 to 1908 (inclusive), of 568 controversies sub- mitted to the board, 525 were settled by an award and 43 by an induced agreement. In the same period the mediation of the Board settled disputes affecting 5560 establishments; and in the latter half of this period labour disputes involving hostilities and of the magnitude contemplated by the statute governing the Board of Conciliation and Arbitration had almost disappeared. The laws relating to labour are full, but, as compared with those of other states, present few features calling for comment. 3 In 1899 eight hours were made to constitute a day's work for all labourers employed by or for any city or town adopting the act at an annual election. Acts have been passed extending the common-law liability of employers, prohibiting the manufacture and sale of sweat-shop clothing, and authorizing cities and towns to provide free lectures and to maintain public baths, gymnasia and playgrounds. Boston has been a leader in the establishment of municipal baths. The state controls and largely maintains two beaches magnificently equipped near the city. The Massachusetts railroad commission, though preceded in point of time by that of New Hampshire of 1 844, was the real beginning of modern state commissions. Its powers do not extend to direct and mandatory regulation, being supervisory and advisory only, but it can make recommendations at its dis- cretion, appealing if necessary to the General Court ; and it has had great influence and excellent results. The Torrens system of land registration was adopted in 1898, and a court created for its admini- stration. In the case of all quasi-public corporations rigid laws exist prohibiting the issue of stock or bonds unless the par value is first paid in; prohibiting the declaration of any stock or scrip dividend, and requiring that new stock shall be offered to stock- holders at not less than its market value, to be determined by the proper state officials, any shares not so subscribed for to be sold by public auction. These laws are to prevent fictitious capitaliza- tion and " stock- watering." In the twenty years preceding 1880 60 % of all sentences for crime were found traceable to liquor. In 1881 a local option law was passed, by which the granting of

licences for the sale of liquor was confined to cities and towns voting at the annual election to authorize their issue. In 1888 the number of licences to be granted in municipalities voting in favour of their issue was limited to one for each 1000 inhabitants, except in Boston, where one licence may be issued for every 500 inhabitants. The vote varies from year to year, and it is not unusual for a certain number of municipalities to change from " licence " to " no licence," and vice versa. The general result has been that centres of population, especially where the foreign element is large, usually vote for licence, while those in which native population predominates, as well as the smaller towns, usually vote for prohibition. Through a growing acquiescence in the operation of the local option law, the relative importance of the vote of the Prohibition Party has diminished. Since 1895 indeterminate sentences have been imposed on all con- victs sentenced to the state prison otherwise than for life or as habitual criminals; i.e. maximum and minimum terms are estab- lished by law and On the expiration of the latter a revocable permit of liberty may be issued. Execution by electricity has been the death penalty since 1898. Stringent legislation controls prison labour.

The extension of state activity presents some surprising features in view of the strength of local self-sufficiency nurtured by the old system of township government. But this form of pure democracy was in various cases long since inevitably abandoned : by Boston reluctantly in 1822, and subsequently by many other townships or cities, as growing population made action in town meeting un- bearably cumbersome. In modern times state activity has encroached on the cities. Especially has the commonwealth undertaken certain noteworthy enterprises as the agent of the several municipalities in the immediate vicinity of Boston, constituting what is known as the Metropolitan District ; as, for example, in bringing water thither from the Nashua River at Clinton, 40 m. from Boston, and in the development of a magnificent park.system of woods, fells, river-banks and seashore, unrivalled elsewhere in the country. The common- wealth joined the city of Boston in the construction of a subway beneath the most congested portion of the city for the passage of electric cars. For the better accommodation of the increasing commerce of the port of Boston, the commonwealth bought a con- siderable frontage upon the harbour lines and constructed a dock capable of receiving the largest vessels, and has supplemented the work of the United States government in deepening the approaches to the wharves. It has secured as public reservations the summit and sides of Greylock (3535 ft.) in the north-west corner of the state, and of Wachusett (2108 ft.) near the centre. Since 1885 a large expenditure has been incurred in the abolition of grade

3 For a summary statement of state labour laws in the United States in 1903 see Bulletin 54 of the United States Bureau of Labor, September

1904; and for a summary of labour laws in force at the end of 1907 see 22nd Annual Report (for 1907) of the U.S. Com- missioner of Labor (Washington, 1908).

crossings of railways and highways, 1 and in 1894 the commonwealth began the construction and maintenance of state highways. 2

Since 1 885, in Boston, and since 1894, in Fall River, the admini- stration of the city police departments, including the granting of liquor licences, has been in the hands of state commissioners (one commissioner in Boston, a board in Fall River) appointed by the governor. But though in each case the result has been an improved administration, it has been generally conceded that only most exceptional circumstances can justify such interference with local self-government, and later attempts to extend the practice have failed. The referendum has been sparingly used in matters of local concern. Beginning in 1892 various townships and cities, numbering 18 in 1903, adopted municipal ownership and operation of lighting works. The gasworks have been notably more successful than the electric plants.

In Massachusetts, as in New England generally, the word "town " is used, officially and colloquially, to designate a township, and during the colonial era the New England town-meeting was a notable school for education in self-government. The members of the first group of settlers in these colonies were mostly small farmers, be- longed to the same church, and dwelt in a village for protection from the Indians. They adapted to these conditions some of the methods for managing local affairs with which they had been familiar in England, and called the resultant institution a town. The territorial extent of each town was determined by its grant or grants from the general court, which the towns served as agents in the management of land. A settlement or " plantation " was some- times incorporated first as a " district " and later as a town, the difference being that the latter had the right of corporate representa- tion in the general court, while the former had no such right. The towns elected (until 1856) the deputies to the general court, and were the administrative units for the assessment and collection of taxes, maintaining churches and schools, organizing and training the militia, preserving the peace, caring for the poor, building and repairing roads and bridges, and recording deeds, births, deaths and marriages; and to discuss questions relating to these matters as well as other matters of peculiarly local concern, to determine the amount of taxes for town purposes, and to elect officers. All the citizens were expected to attend the annual town-meeting, and such male inhabitants as were not

citizens were privileged to attend and to propose and discuss measures, although they had no right to vote. Generally several villages have grown up in the same ” town,” and some of the more populous ” towns,” usually those in which manufacturing has become more important than farming, have been incorporated as ” cities “; thus either a town or a city may now include a farming country and various small villages. Although the tendency in Massachusetts is towards chartering as cities ” towns ” which have a population of 12,000 or more, the democratic institution of the town-meeting persists in many large municipalities which are still technically towns. 3 Most ” towns ” hold their annual meeting in March, but some hold them in February and others in April. In the larger ” towns ” the officers elected at this meeting may consist of five, seven or nine selectmen, a clerk, a treasurer, three or more assessors, three or more overseers of the poor, one or more collectors of taxes, one or more auditors, one or more surveyors of highways, a road commissioner, a sewer commis- sioner, a board of health, one or more constables, two or more field drivers, two or more fence viewers, and a tree warden; but in the smaller ” towns ” the number of selectmen may be limited to three, the selectmen may assess the taxes, be overseers of the poor, and act as a board of health, and the treasurer or constable may collect the taxes. The term of all these officers may be limited to one year, or the selectmen, clerk, assessors and overseers of the poor may be elected for a term of three years, in which case a part only of the selectmen, assessors and overseers of the poor are elected each year. The selectmen have the general management of a ” town’s ” affairs during the interval between town-meetings. They may call special town-meetings ; they ap- point election officers and may appoint additional constables or*

1 The usual allotment of the cost of this work is as follows : 65 % is paid by the railway company, 25 % by the commonwealth and 10 % by the municipality in which the crossing is located.

2 The cost was apportioned between the commonwealth and the local government in the proportion of 3 to 1.

3 Boston remained a township, governed by town-meetings, until 1822, when it had a population of some 47,000. The government of Brookline (pop. in 1905, 23,436) is an interesting example of the adaptation of the township system to urban conditions. The town is frequently referred to as a model residential suburb; its budgets are very large, its schools are excellent, and, among other things, it has established a township gymnasium. The town hall is not large enough for an assemblage of all the voters, but actually the attendance is usually limited to about 200, and since 1901 there has been in force a kind of referendum, under which any measure passed by a town-meeting attended by 700 or more voters may be

referred, upon petition of 100 legal voters, to a regular vote at the polls. Much of the work of the town-meetings is done through special committees.

public officers, and such minor officials as inspectors of milk, in- spectors of buildings, gauger of measures, cullers of staves and hoops, fish warden and forester. A school committee consisting of any number of members divisible by three is chosen, one-third each year, at the annual town-meeting or at a special meeting which is held in the same month. Any " town " having a village or district within its limits that contains 1000 inhabitants or more may authorize that village or district to establish a separate organization for lighting its streets, building and maintaining sidewalks, and employing a watchman or policeman, the officers of such organization to include at least a prudential committee and a clerk. All laws relative to " towns " are applied to " cities " in so far as they are not incon- sistent with general or special laws relative to the latter, and the powers of the selectmen are vested in the mayor and aldermen.

Education. — For cities of above 8000 inhabitants (for which alone comparative statistics are annually available), in 1902- 1903 the ratio of average attendance to school enrolment, the average number of days' attendance of each pupil enrolled, and the value of school property per capita of pupils in average attendance were higher than in any other state; the average length of the school term was slightly exceeded in eight states; and the total cost of the schools per capita of pupils in average attendance ($39-05) was exceeded in six other states. In 1905- 1906 the percentage of average attendance in the public schools to the number of children (between 5 and 15 years) in the state was 80; in Barnstable county it was 95, and in Plymouth 92; and the lowest rate of any county was 68, that of Bristol. In the same year the amount of the various school taxes and other contributions was $30-53 for each child in the average member- ship of the public schools, and the highest amount for each child in any county was $35-77 in Suffolk county, and in any township or city $68-oi — in Lincoln. The school system is not one of marked state centralization — as contrasted, e.g. with New York. A state board of education has general control, its secretary acting as superintendent of the state system in conjunction with local superintendents and committees. Women are eligible for these positions, and among the teachers in the schools they are greatly in excess over men (more than 10 to 1), especially in lower grades. No recognition exists in the schools of race, colour or religion. The proportion of the child popula- tion that attends schools is equalled in but two or three states east of the Mississippi river. The services of Horace Mann (q.v.) as secretary of the state board (183 7-1848) were productive of almost revolutionary benefits not only to Massachusetts but to the entire country. His reforms, which reached every part of the school system, were fortunately introduced just at the beginning of railway and city growth.

Since 1850 truant and compulsory attendance laws (the first compulsory education law was passed in 1642) have been enforced in conjunction with laws against child labour. In 1900 the average period of schooling per inhabi- tant for the United States was 4-3 years, for Massachusetts 7 years. (The same year the ratio of wealth productivity was as 66 to 37.) Massachusetts stands " foremost in the Union in the universality of its provision for secondary education." 4 The laws practically offer such education free to every child of the commonwealth. Illiterate persons not less than ten years of age constituted in 1900 5-9 % of the population; and o-8, 14-6, 10-7 % respectively of native whites, foreign-born whites and negroes. More patents are issued, relatively, to citizens of Massachusetts than to those of any other state except Connecti- cut. Post office statistics indicate a similarly high average of intelligence.

The public school system includes common, high and normal schools, and various evening, industrial and truant schools. Many townships and cities maintain free evening schools. In 1894 manual training was made a part of the curriculum in all municipalities having 20,000 inhabitants. There are also many private business colleges, academic schools and college-preparatory schools. The high schools enjoy an exceptional reputation. An unusual pro- portion of teachers in the public schools are graduates of the state normal schools, of which the first were founded in 1839 at Lexington and Barre, the former being the first normal school of the United

4 E. G. Brown, in Monographs on Education in the United States prepared for the Paris Exposition of 1900 and edited by N. M. Butler.

States. 1 These two schools were removed subsequently to Framing- ham (1853) and Westfield (1844), where they are still active; while others flourish at Bridgewater (1840), Salem (1854), Worcester (1874), Fitchburg (1895), North Adams (1897), Hyannis (1897) and Lowell (1897), that at Framingham being open to women only. There is also a state normal art school at Boston (1873) for both sexes.

The commonwealth contributes to the support of textile schools in cities in which 450,000 spindles are in operation. Such schools exist (1909) in Lowell, Fall River and New Bedford. The common- wealth also maintains aboard a national ship a nautical training school (1891) for iristruction in the science and practice of naviga- tion. During the Spanish-American War of 1898 more than half of the graduates and cadets of the school enlisted in the United States service.

There are several hundred private schools, whose pupils con- stituted in 1905-1906 15-7 % of the total school-enrolment of the state. Of higher academies and college-preparatory schools there are scores. Among those for boys Phillips Academy, at Andover' the Groton school, and the Mount Hermon school are well-known examples. For girls the largest school is the Northfield Seminary at East Northfield. In Boston and in the towns in its environs are various famous schools, among them the boys' classical school in Boston, founded in 1635, one of the oldest secondary schools in the country. The leading educational institution of the state, as it is the oldest and most famous of the country, is Harvard University (founded 1636) at Cambridge. In the extreme north-west of the state, at Williamstown, is Williams College (1793), and in the Con- necticut Valley is Amherst College (1821), both of these unsectarian. Boston University (Methodist Episcopal, 1867); Tufts College (1852), a few miles from Boston in Medford, originally a Universalist school; Clark University (1889, devoted wholly to graduate in- struction until 1902, when Clark College was added), at Worcester, are important institutions. Two Roman Catholic schools are maintained — Boston College (1863) and the College of the Holy Cross (1843), at Worcester. Of various institutions for the educa- tion of women, Mount Holyoke (1837) at South Hadley, Smith College (1875) at Northampton, Wellesley College (1875) at Wellesley near Boston, Radcliffe College (1879) in connexion with Harvard at Cambridge and Simmons College (1899) at Boston, are of national repute. The last emphasizes scientific instruction in domestic economy.

For agricultural students the state supports a school at Amherst (1867), and Harvard University the Bussey Institution. In techno- logical science special instruction is given — in addition to the scientific departments of the schools already mentioned — in the Worcester Polytechnic Institute (1865), and the Massachusetts Institute of Technology (opened in 1865). There are schools of theology at Cambridge (Protestant Episcopal), Newton (Baptist) and Waltham (New Church), as well as in connexion with Boston University (Methodist), Tufts College (Universalist) and Harvard (non-sectarian, and the affiliated Congregational Andover Theological Seminary at Cambridge). Law and medical schools are maintained in Boston and Harvard universities.

Public Institutions. — Massachusetts was in 1903, in proportion to the population, more richly provided with public collections of books than any other state: in that year she had nearly a seventh of all books in public, society and school libraries in the country, and a much larger supply of books per capita (2-56) than any other state. The rate for New York, the only state having a larger number of books in such libraries, being only 119. The Boston public library, exceeded in size in the United States by the library of Congress at Washington — and probably first, because of the

large number of duplicates in the library of Con- gress — and the largest free municipal library in .the world; the library of Harvard, extremely well chosen and valuable for research; the collections of the Massachusetts Historical Society (1791); the Boston Athenaeum (1807); the State Library (1826); the New England Historic Genealogical Society (1845); the Con- gregational Library; the American Academy of Arts and Sciences (1780); and the Boston Society of Natural History (1830), all in Boston, leave it easily unrivalled, unless by Washington, as the best research centre of the country. The collections of the American Antiquarian Society (1812) at Worcester are also notable. Massachusetts led, about 1850, in the founding of town and city libraries supported by public taxes, and by 1880 had established more of such institutions than existed in all other states combined. In 1900 out of 353 towns and cities

1 This is an especially honourable distinction, for William T. Harris has said that " The history of education since the time of Horace Mann is very largely an account of the successive modifica- tions introduced into elementary schools through the direct or indirect influence of the normal school."

only five, representing less than half of 1 %, were without free library facilities, and three of these five had association libraries charging only a small fee.

The state is very well supplied with charitable and reformatory institutions, in which noteworthy methods have been employed with success. The state institutions, each governed by a board of trustees, and all under the supervision of the state board of charity, include a state hospital at Tewksbury, for paupers (1866); a state farm at Bridgewater (1887) for paupers and petty criminals; the Lyman school for boys at Westboro, a reformatory for male criminals under fifteen years of age sentenced to imprisonment for terms less than life in connexion with which a very successful farm is maintained for the younger boys at Berlin ; an industrial school for girls at Lancaster, also a reformatory school — a third reformatory school for boys was planned in 1909 ; a state sanatorium at Rutland for tuberculous patients (the first public hospital for such in the United States) and a hospital school at Canton for the care and instruction of crippled and deformed children. Three more hospitals for consumptives were planned in 1909. Under the supervision of the state board of insanity, and each under the government of a board of seven trustees (of whom two are women) are state hospitals for the insane at Worcester (1833), Taunton, Northampton, Danvers, Westboro and Medford, a state colony for the insane at Gardner, a state hospital for epileptics at Palmer, a state school for the feeble- minded at Waltham (governed by six trustees), a state school at Wrentham, state " hospital cottages for children " (1882) at

Baldwin- ville (governed by five trustees), and the Foxboro state hospital for dipsomaniacs and insane. There are also semi-state institutions for the insane at Waverley, Barre, Wrentham and Baldwinville, and nineteen small private institutions, all under the supervision of the state board of insanity. Under the supervision of a board of prison commissioners, which appoints the superintendent and warden of each, are a reformatory prison for women at Sherborn (1877), a state reformatory for men at Concord (1884), a state prison at Boston (Charlestown), and a prison camp and hospital at Rutland (1905). There is a prison department at the state farm which receives misdemeanants. Other institutions receiving state aid, each governed by trustees appointed by the governor, are the Massachusetts general hospital at Boston, the Massachusetts charit- able eye and ear infirmary at Boston, the Massachusetts homoeo- pathic hospital at Boston, the Perkins Institution and Massachusetts school for the blind at South Boston and the soldiers' home in Massachusetts at Boston. The Horace Mann school in Boston, a public day school for the deaf, the New England industrial school for deaf mutes at Beverly and the Clarke school for the deaf at Northampton are maintained in part by the state. Finally, many private charitable corporations (about 500 in 1905) report to the state board of charity, and town and city almshouses (205 in 1904) are subject to visitation. The Perkins Institution is memorable for its association with the fame of S. G. Howe (q.v.), whose reforms in charity methods were felt through all the charitable interests of the state. The net yearly cost of support and relief from 1884 to 1904 averaged $2,136,653, exclusive of vagrancy cases (average $31,714). The whole number of paupers, besides vagrants, in 1908 was 23-02 per 1000 of state population, and the cost of relief ($5,104,255) was $1-699 for each inhabitant of the state. The number of sane paupers declined steadily and markedly from 1863 to 1904.

Finance. — Massachusetts is a very rich state, and Boston a very wealthy city. The debt of the state (especially the con- tingent debt, secured by sinking funds) has been steadily rising since 1888, and especially since 1896, chiefly owing to the erec- tion of important public buildings, the construction of state highways and metropolitan park roadways, the improvement of Boston harbour, the abolition of grade crossings on railways, and the expenses incurred for the Spanish-American War of

1898.

The net direct funded debt (also secured by accumulating sinking funds) in December 1908 was $17,669,372 (3-61 millions in 1893). The average interest on this and the contingent debt ($60,428,223 in December 1908) combined was only 3-35 . The net debts of towns and cities rose in the years 1885-1908 from $63,306,213 to $163,558,325. The county debts

in 1908 aggregated $6,076,867. The assessed valuation of realty in the state in 1908 was $2,799,062,707 and of personalty $1,775,073,438. No other state has given so vigorous a test of the ordinary American general-property tax, and the results have been as discouraging as elsewhere. The " doom- ing " process (i.e. estimation by assessors, without relief for over-valuation except for excess more than 50 above the proper valuation) was introduced in 1868 as a method of securing returns of personalty. But the most rigorous application of the doomage law has only proved its complete futility as an effort to reach un- ascertained corporate and personal property. 2 Various special

2 In 1869 the personalty valuation was 60 % that of realty; but it steadily fell thereafter, amounting in 1893 to 32 %. From 1874-

methods are used for the taxation of banks, insurance companies, railways, tramways, trust companies and corporations, some of them noteworthy. In the case of corporations realty and machinery are taxed generally by the local authorities, and stock values by the commonwealth. The Boston stock exchange is the second of the country in the extent of the securities in which it deals. The proportion of holders of U.S. bonds among the total population is higher than that in any other state.

History. — It is possible that the coasts of Massachusetts were visited by the Northmen, and by the earliest navigators who followed Cabot, but this is only conjecture. In 1602 Bartholo- mew Gosnold landed at and named Cape Cod and coasted as far south as the present No-Man's Land, which he named Martin's or Martha's Vineyard, a name later transferred to a neighbouring larger island. Pring and Champlain at a later date coasted along what is now Massachusetts, but the map of Champlain is hardly recognizable. The first sufficient explorations for carto- graphical record were made by John Smith in 1614, and his map was long the basis — particularly in its nomenclature — of later maps. Permanency of occupation, however, dates from the voyage of the " Mayflower," which brought about a hundred men, women and children who had mostly belonged to an English sect of Separatists, originating in Yorkshire, but who had passed a period of exile for religion's sake in Holland. In the early winter of 1620 they made the coast of Cape Cod; they had intended to make their landing farther south, within the juris- diction of the Virginia Company, which had granted them a patent; but stress of weather prevented their doing so. Finding themselves without warrant in a region beyond their patent, and threatened with the desertion of disaffected

members of their company (probably all servants or men of the " lesser " sort) unless concessions were made to these, they drew up and signed before landing a democratic compact of government which is accounted the earliest written constitution in history. 1 After some exploration of the coast they made a permanent land- ing on the 21st of December 1620 (N.S.) at Plymouth, a harbour which had already been so named by John Smith in his maps of 1614 and 1616. During the first winter nearly one-half their number died from exposure, and the relations of the survivors with their partners of the London Company, who had insisted that for seven years the plantation should be managed as a joint stock company, were unsatisfactory. However, about thirty-five new colonists arrived in 1622 and ninety-six more in 1623. The abandonment of the communal system was begun in the latter year, and with the dissolution of the partner-ship with the adventurers of the London Company in 1627 Plymouth became a corporate colony with its chief authority vested in the whole body of freemen convened in the General Court. Upon the death of the first governor, John Carver, in the spring of 1621, the General Court chose William Bradford as his successor, and with him was chosen one assistant.' The subsequent elections were annual, and within a few years the number of assistants was increased to seven. The General Court was the legislature and the electorate; the governor and assistants were the executive and the judiciary. The whole body of freemen composed the General Court until other towns than Plymouth had been organized, the first of which were Scituate in 1636 and Duxbury in 1637, and then the representa- tive form of government was adopted and there was a gradual differentiation between Plymouth the town and Plymouth the

1882 the assessment of realty increased nearly twelve times as much as personalty. In the intervening period the assessed valua- tion of realty in Boston increased more than 100%, while that of personalty slightly diminished (the corresponding figures for the entire United States from i860 to 1890 being 172% and 12%), yet the most competent business and expert opinions regarded the true value of personalty as at least equal to and most likely twice as great as that of realty.

1 In this document, whose democracy is characteristic of differ- ences between the Plymouth Colony and that of Massachusetts Bay, the signatories " solemnly and mutually . . . covenant and combine ourselves together into a civil body politic, for our better ordering and preservation and furtherance of the ends aforesaid; and by virtue hereof to enact, constitute and frame — [laws] — unto which we promise all due submission and obedience." This was signed n/21 of November 1620 by 41 persons.

colony. When it had become known that the colony was within the territory

of the New England Council, John Pierce, in 1621, procured from that body a grant which made the colonists its tenants. A year later Pierce surrendered this and procured another, which in effect made him proprietor of the colony, but he was twice shipwrecked and was forced to assign to the adven- turers his second patent. In 1629 Governor Bradford procured from the same council a definite grant of the tract which corre- sponds to the south-eastern portion of the present state. But all attempts to procure a royal charter for Plymouth Colony were unsuccessful, and in 1691 it was annexed to the Colony of Massa- chusetts Bay under what is termed the Provincial Charter.

King James having by patent in 1620 created a Council for New England to whom he made a large grant of territory, the council in 1628 made a sub-grant, confirmed by a royal charter that passed the seals on the 4th of March 1629, to the "Governor and Company of the Massachusetts Bay in Newe England." There had been various minor expeditions during the few years since Smith was on the coast before this company, in the Puritan interests, had sent over John Endecott with a party in 1628 to what is now Salem. In 1630 the government of the company, with questionable right (for the charter seems evidently to have contemplated the residence of the company in England), trans- ferred itself to their territory, and under the leadership of John Winthrop laid the foundations anew of the Massachusetts colony, when they first settled Boston in the autumn of that year. Winthrop served repeatedly, though not continuously, as gover- nor of the colony till his death in 1649, his rejection in 1636 being due to a party of theological revolt which chose Henry Vane (afterwards Sir Henry) to the office. This was an incident in a famous episode, important rather as a symptom than in itself, namely, the Antinomian controversy, " New England's earliest protest against formulas," in which Vane and Ann Hutchinson took the lead in criticizing the official orthodoxy of the colony.

The magistrates successfully asserted themselves to the dis- comfiture of their critics (Ann Hutchinson being banished), and this was characteristic of the colony's early history. The charter gave the company control over the admission of " free- men " (co-partners in the enterprise, and voters), "full and absolute power and authority to correct, punish and rule " subjects settling in the territory comprised in their grant, and power to " resist … by all fitting ways and means whatever " all persons attempting the "destruction, invasion, detriment or annoyance " of the plantation. Some writers deny the company's right under this instrument to rule as they proceeded to do; but at any rate what they did was to make the suffrage depen- dent on stringent religious tests, and to repress with determined zeal all theological " vagaries " and " whimsies." Criticism of church or magistrates was not tolerated. Laws were modelled closely on the Bible. The clergy were a ruling class. The government was frankly theocratic.

Said Winthrop (1637): " We see not that any should have authority to set up any other exercises besides what authority hath already set up " ; and a synod at Cambridge in 1637 catalogued eighty-two " opinions, some blasphemous, others erroneous and all unsafe," besides nine " unwholesome expressions," all of which were consigned " to the devil of hell from whence they came." Another synod at Cambridge in 1647 more formally established the principle of state control. The legislation against Baptists (about 1644- 1678) and the persecution of the Quakers (especially 1656-1662) partook of the brutality of the time, including scourging, boring of tongues, cutting of ears and in rare cases capital punishment. It cannot be denied that men like Roger Williams and some of the persecuted Quakers, though undeniably contentious and aggres- sive in their conscientious dissent, showed a spirit which to-day seems sweeter in tolerance and humanity than that of the Puri- tans. And it seems necessary to emphasize these facts because until about 1870 it was almost unchallenged tradition to regard the men of Massachusetts Bay as seekers and champions of " religious liberty." They left! England, indeed, for liberty to discard the " poperies " of the English Church, and once in Massachusetts they even discarded far more than those

" poperies." But religious liberty in our modern sense they did not seek for themselves, nor accord to others; they abhorred it, they trampled on it, and their own lives they subjected to all the rigid restrictions to which they subjected others. They were narrow but strong; no better example can be imagined of what the French call " the defects of one's qualities." Their failures were small compared with those of their contemporaries in England and elsewhere in Europe, and public opinion did not long sustain violent persecution of opinion. More than once mobs freed Quaker prisoners. Also it is to be said that with the single exception of religious toleration the record of the state in devo- tion to human rights has been from the first a splendid one, whether in human principles of criminal law, or in the defence of the civil rights commonly declared in American constitutions. It was once generally assumed that the repression practised attained its end of securing harmony of opinion. The fact seems to be that intellectual speculation was as strong in America as in Puritan England; the assumption that the inhibition of its expression was good seems wholly gratuitous, and contrary to general convictions underlying modern freedom of speech. A safer opinion is probably that " the spiritual growth of Massa- chusetts withered under the shadow of dominant orthodoxy; the colony was only saved from mental atrophy by its vigorous political life " (J. A. Doyle). In literature the second half of the 17th century is a sterile waste of

forbidding theology; and its life, judged by the present day, singularly sombre.

In addition to the few persons banished to Rhode Island, theological and political differences led many to emigrate thither. Others, discontented with Massachusetts autocracy and wishing, too, " to secure more room," went to Connecticut (q.v.) where they established a bulwark against the Dutch of New York.

A witchcraft scare (at its worst in 1691-1697, though the earliest Connecticut case was in 1 646-1 647 and the earliest in Boston in 1648) led to another tragedy of ignorance. In all thirty-two persons were executed (according to W. F. Poole, about a thousandth part of those executed for witchcraft in the British Isles in the 16th and 17th centuries). Salem was the scene of the greatest excitement in 1691-1692.

Exceptionally honourable to the early colonists was their aevotion to education (see Harvard University and Boston). Massachusetts Bay had a large learned element; it is supposed that about 1640 there was an Oxford or Cambridge graduate to every 250 persons in the colony. The earliest printing in the British-American colonies was done at Cambridge in 1639; it was not until 1674 that the authorities of the colony permitted printing, except at Cambridge. Boston and Cam- bridge remain leading publishing centres to-day. The first regular newspaper of Boston, the Boston Newsletter, was the pioneer of the American newspaper press.

The early history was rendered unquiet at times by wars with the Indians, the chief of which were the Pequot War in 1637, and King Philip's War in 1675-76; and for better combining against these enemies, Massachusetts, with Con- necticut, New Haven and New Plymouth, formed a confederacy in 1643, considered the prototype of the larger union of the colonies which conducted the War of American Independence (I 775~ 83). The struggle with the Crown, which ended in independence, began at the foundation of the colony, with assumptions of power under the charter which the colonial government was always trying to maintain, and the crown was as assiduously endeavouring to counteract. After more than half a century of struggle, the crown finally annulled the charter of the colony in 1684, though not until 1686 was the old government actually supplanted on the arrival of Joseph Dudley, a native of the colony, as president of a provisional council; later, Sir Edmund Andros was sent over with a com- mission to unite New York and New England under his rule. The colonists had been for many years almost independent ; they made their own laws, the Crown appointed natives as officials, and the colonial interpretation of the old charter had in general been allowed to stand. Massachusetts had excluded the English Book of Common Prayer, she had restricted

the franchise, laid the death penalty L on religious opinions, and passed various other laws repugnant to the Crown, notably to Charles II. and James II. ; she had caused laws and writs to run in her own name, she had neglected to exact the oath of allegiance to the sovereign, though carefully exacting an oath of fidelity to her own government, she had protected the regicides, she had coined money with her own seal, she had blocked legal appeals to the English courts, she had not compelled the observance of the navigation acts. The revo- cation of the charter aroused the strongest fears of the colonists Andros speedily met determined opposition by measures under- taken relative to taxation and land titles, by efforts to secure a church for Episcopal service, and an attempt to curb the town meetings. His government was supported by a small party (largely an Anglican Church party), but was intensely unpopular with the bulk of the people; and — it is a disputed question, whether before or after news arrived of the landing in England of William of Orange — in April 1689 the citizens of Boston rose in revolution, deposed Andros, imprisoned him and re-established their old colonial form of government. Then came a struggle, carried on in England by Increase Mather as agent (1688-1692) of the colony, to secure such a form of govern- ment under a new charter as would preserve as many as possible of their old liberties. Plymouth Colony, acting through its agent in London, endeavoured to secure a separate existence by royal charter, but accepted finally union with Massachusetts when association with New York became the probable alter- native. The province of Maine was also united in the new provincial charter of 1691, and Sir William Phips came over with it, commissioned as the first royal governor. As has been mentioned already, the new charter softened religious tests for office and the suffrage, and accorded " liberty of conscience " except to Roman Catholics. The old religious exclusiveness had already been greatly lessened: the clergy were less powerful, heresy had thrived under repression, Anglican churchmen had come to the colony and were borne with perforce, devotion to trade and commerce had weakened theological tests in favour of ideals of mere good order and prosperity, and a spirit of toleration had grown.

Throughout the continuance of the government under the provincial charter, there was a constant struggle between a prerogative party, headed by the royal governor, and a popular party who cherished recollections of their practical independence under the colonial charter, and who were nursing the sentiments which finally took the form of resistance in 1775. The inter- charter period, 1686-1691, is of great importance in this con- nexion. The popular majority kept up the feeling of hostility to the royal authority in recurrent combats in the legislative assembly over the salary to be voted to the governor; though these antagonisms were from time to time forgotten in the wars with the French and Indians. During the earl of Bellomont's administration, New York was again united with

Massachusetts under the same executive (1697-1701). The scenes of the recurrent wars were mostly distant from Massachusetts proper, either in Maine or on Canadian or Acadian territory, although some savage inroads of the Indians were now and then made on the exposed frontier towns, as, for instance, upon Deerfield in 1704 and upon Haverhill in 1708. Phips, who had succeeded in an attack on Port Royal, had ignominiously failed when he led the Massachusetts fleet against Quebec in 1690; and the later expedition of 1711 was no less a failure. The most note- worthy administration was that of William Shirley (1741-1749 and 1753-1756), who at one time was the commanding officer of the British forces in North America. He made a brilliant success of the expedition against Louisburg in 1745, William Pepperell, a Maine officer, being in immediate command. Shirley with Massachusetts troops also took part in the Oswego expedition of 1755; and Massachusetts proposed, and lent the chief assistance in the expedition of Nova Scotia in 1755 which ended in the removal of the Acadians. Her officers and troops also played an important part in the Crown Point and second Louisburg expedition (1758).

The first decided protests against the exercise of sovereign power by the crown, the first general moral and political revolt that marked the approach of the American War of Independence, took place in Massachusetts; so that the most striking events in the general history of the colonies as a whole from 1760 to 1775 are an intimate part of her annals. The beginning of the active opposition to the crown may be placed in the resistance, led by James Otis, to the issuing of writs (after 1752, Otis's famous argument against them being made in 1760- 1761) to compel citizens to assist the revenue officers; followed later by the outburst of feeling at the imposition of the Stamp Act (1765), when Massachusetts took the lead in confronting the royal power. The governors put in office at this time by the crown were not of conciliatory temperaments, and the measures instituted in parliament (see United States) served to increase bitterness of feeling. Royal troops sent to Boston (several regiments, 1768) irritated the populace, who were highly excited at the time, until in an outbreak on the 5th of March 1770 a file of garrison troops shot down in self-defence a few citizens in a crowd which assailed them. This is known as the " Boston Massacre." The merchants combined to prevent the importation of goods which by law would yield the crown a revenue; and the patriots — as the anti-prerogative party called themselves — under the lead of Samuel Adams, instituted regular communication between the different towns, and after- wards, following the initiative of Virginia, with the other colonies, through "committees of correspondence"; a method of

the utmost advantage thereafter in forcing on the revolution by intensifying and unifying the resistance of the colony, and by inducing the co-operation of other colonies. In 1773 (Dec. 16) a party of citizens, disguised as Indians and instigated by popular meetings, boarded some tea-ships in -the harbour of Boston, and to prevent the landing of their taxable cargoes threw them into the sea; this incident is known in history as the " Boston tea-party." Parliament in retalia- tion closed the port of Boston (1774), a proceeding which only aroused more bitter feeling in the country towns and enlisted the sympathy of the other colonies. The governorship was now given to General Thomas Gage, who commanded the troops which had been sent to Boston. Everything foreboded an outbreak. Most of the families of the highest social position were averse to extreme measures; a large number were not won over and became expatriated loyalists. The popular agitators, headed by Samuel Adams — with whom John Hancock, an opulent merchant and one of the few of the richer people who deserted the crown, leagued himself — forced on the movement, which became war in April 1775, when Gage sent an expedition to Concord and Lexington to destroy military stores accumulated by the patriots and to capture Adams and Hancock, temporarily staying at Lexington. This detachment, commanded by Lord Percy, was assaulted, and returned with heavy loss. The country towns now poured their militia into Cambridge, opposite Boston; troops came from neighbouring colonies, and Artemas Ward, a Massachusetts general, was placed in command of the irregular force, which with superior numbers at once shut the royal army up in Boston. An attempt of the provincials to seize and hold a commanding hill in Charles-town brought on the battle of Bunker Hill (June 17, 1775), in which the provincials were driven from the ground, although they lost much less heavily than the royal troops. Washington, chosen by the Continental Congress to command the army, arrived in Cambridge in July 1775, and stretching his lines around Boston, forced its evacuation in March 1776. The state was not again the scene of any conflict during the war. Generals Henry Knox and Benjamin Lincoln were the most distinguished officers contributed by the state to the revolutionary army. Out of an assessment at one time upon the states of $5,000,000 for the expenses of the war, Massachu- setts was charged with $820,000, the next highest being $800,000 for Virginia. Of the 231,791 troops sent by all the colonies into the field, reckoning by annual terms, Massachusetts sent 67,907, the next highest being 31,939 from Connecticut,

Virginia furnishing only 26,678; and her proportion of sailors was very much greater still. In every campaign in every colony save in 1779-80 her soldiery were in absolute, and still more in relative, number greater than those of any other colony. After the outbreak of the war a somewhat indefinite, hetero- geneous provisional government was in power till a

constitution was adopted in 1780, when John Hancock became the first governor. Governor James Bowdoin in 1786-1787 put down with clemency an almost bloodless insurrection in the western counties (there was strong disaffection, however, as far east as Middlesex), known as the Shays Rebellion, significant of the rife ideas of popular power, the economic distress, and the unsettled political conditions of the years of the Confederation. Daniel Shays (1747-1825), the leader, was a brave Revolutionary captain of no special personal importance. The state debt was large, taxation was heavy, and industry was unsettled; worthless paper money was in circulation, yet some men de- manded more; debtors were made desperate by prosecution; the state government seemed weak, the Federal government contemptibly so; the local courts would not, or from intimidation feared to, punish the turbulent, and demagogues encouraged ideas of popular power. A convention of delegates representing the malcontents of numerous towns in Worcester county met at Worcester on the 15th of August 1786 to consider grievances, and a week later a similar convention assembled at Hatfield, Hampshire county. Encouraged by these and other conventions in order to obstruct the collection of debts and taxes, a mob prevented a session of the Court of Common Pleas and General Sessions of the Peace at Northampton on the 29th of August, and in September other mobs prevented the same court from sitting in Worcester, Middlesex and Berkshire counties. About 1000 insurgents under Shays assembled at Springfield on the 26th of September to prevent the sitting there of the Supreme Court, from which they feared indictments. To protect the court and the national arsenal at Springfield, for which the Federal government was powerless to provide a guard, Major- General William Shepard (1737-1817) ordered out the militia, called for volunteers, and supplied them with arms from the arsenal, and the court sat for three days. The Federal govern- ment now' attempted to enlist recruits, ostensibly to protect the western frontier from the Indians, but actually for the suppression of the insurrection; but the plan failed from lack of funds, and the insurgents continued to interrupt the pro- cedure of the courts. In January 1787, however, Governor Bowdoin raised an army of 4400 men and placed it under the command of Major-General Benjamin Lincoln (1733-1810). While Lincoln was at Worcester Shays planned to capture the arsenal at Springfield, but on the 25th of January Shepard's men fired upon Shays's followers, killing four and putting the rest to flight. Lincoln pursued them to Petersham, Worcester county, where on the 4th of February he routed them and took 150 prisoners. Subsequently the insurgents gathered in small bands in Berkshire county; but here, a league having been formed to assist the government, 84 insurgents were captured at West Stockbridge, and the insurrection practically terminated in an action at Sheffield on the 27th of February, in which the insurgents lost 2 killed and 30 wounded and the militia 2 killed and 1 wounded. Two of the

insurgent leaders, Daniel Shays and Eli Parsons, escaped to Vermont soon after the rout at Petersham. Fourteen other insurgents who were tried by the Supreme Court in the spring of 1787 were found guilty of treason and sentenced to death. They were, however, held rather as hostages for the good behaviour of worse offenders who had escaped, and were pardoned in September. In Feb- ruary 1788 Shays and Parsons petitioned for pardon, and this was granted by the legislature in the following June. The outcome of the uprising was an encouraging test of loyalty to the commonwealth; and the insurrection is regarded as having been very potent in preparing public opinion throughout the country for the adoption of a stronger national government- The Federal Constitution was ratified by Massachusetts by only a small majority on the 6th of February 1788, after its

rejection had been at one time imminent; but Massachusetts became a strong Federalist state. Indeed, the general interest of her history in the quarter-century after the adoption of the Constitution lies mainly in her connexion with the fortunes of that great political party. Her leading politicians were out of sympathy with the conduct of national affairs (in the conduct of foreign relations, the distribution of political patron- age, naval policy, the question of public debt) from 1804 — when Jefferson's party showed its complete supremacy — onward; and particularly after the passage of the Embargo Act of 1807, which caused great losses to Massachusetts com- merce, and, so far from being accepted by her leaders as a proper diplomatic weapon, seemed to them designed in the interests of the Democratic party. The Federalist preference for England over France was strong in Massachusetts, and her sentiment was against the war with England of 1812-15. New England's discontent culminated in the Hartford Convention (Dec. 1814), in which Massachusetts men predominated. The state, however, bore her full part in the war, and much of its naval success was due to her sailors.

During the interval till the outbreak of the Civil War in 1 86 1, Massachusetts held a distinguished place in national life and politics. As a state she may justly be said to have been foremost in the struggle against slavery. 1 She opposed the policy that led to the Mexican War in 1846, although a regiment was raised in Massachusetts by the personal exertions of Caleb Cushing. The leaders of the ultra non-political aboli- tionists (who opposed the formation of the Liberty party) were mainly Massachusetts men, notably W. L. Garrison and Wendell Phillips. The Federalist domination had been suc- ceeded by Whig rule in the state ; but after the

death of the great Whig, Daniel Webster, in 1852, all parties disintegrated, re-aligning themselves gradually in an aggressive anti-slavery party and the temporizing Democratic party. First, for many years the Free-Soilers gained strength; then in 1855 m an extraordinary party upheaval the Know-Nothings quite broke up Democratic, Free-Soil and Whig organizations; the Free- Soilers however captured the Know-Nothing organization and directed it to their own ends; and by their junction with the anti-slavery Whigs there was formed the Republican party. To this the original Free-Soilers contributed as leaders Charles Sumner and C. F. Adams; the Know-Nothings, Henry Wilson and N. P. Banks; and later, the War Democrats, B. F. Butler — • all men of mark in the history of the state. Charles Sumner, the most eminent exponent of the new party, was the state's senator in Congress (1851-1874). The feelings which grew up, and the movements that were fostered till they rendered the Civil War inevitable, received something of the same impulse from Massachusetts which she had given a century before to the feelings and movements forerunning the War of American Independence. When the war broke out it was her troops who first received hostile fire in Baltimore, and turning their mechanical training to account opened the obstructed railroad to Washington. In the war thus begun she built, equipped and manned many vessels for the Federal navy, and furnished from 1 86 1 to 1865 26,163 (or, including final credits, probably more than 30,000) men for the navy. During the war all but twelve small townships raised troops in excess of every call, the excess throughout the state amounting in all to more than 15,000 men; while the total recruits to the Federal army (in- cluding re-enlistments) numbered, according to the adjutant- general of the state, 159,165 men, of which less than 7000 were raised by draft. 2 The state, as such, and the townships spent

1 Slavery had existed as a social fact from the earliest years, and legally after 1641; but it was never profitable, and was virtually abolished long before the War of American Independence; still it was never abolished explicitly by Massachusetts, though the slave trade was prohibited in 1788, and though a number of negroes were declared free after the adoption of the constitution of 1780 on the strength of the sweeping declaration of human rights in that instrument.

2 According to the final report of the U.S. Adjutant-General in 1885, the enlistments were 146,730 men, of whom 13,942 died in

$42,605,517.19 in the war; and private contributions of citizens are reckoned in addition at about $9,000,000, exclusive of the aid to families of soldiers, paid then and later by the state.

Since the close of the war Massachusetts has remained gener- ally steadfast

in adherence to the principles of the Republican party, and has continued to develop its resources. Navigation, which was formerly the distinctive feature of its business prosperity, has under the pressure of laws and circumstances given place to manufactures, and the development of carrying facilities on the land rather than on the sea.

In the Spanish- American War of 1898 Massachusetts furnished 11,780 soldiers and sailors, though her quota was but 7388; supplementing from her own treasury the pay accorded them by the national government.

No statement of the influence which Massachusetts has exerted upon the American people, through intellectual activity, and even through vagary, is complete without an enumeration of the names which, to Americans at least, are the signs of this influence and activity. In science the state can boast of John Winthrop, the most eminent of colonial scientists; Benjamin Thompson (Count Rumford); Nathaniel Bowditch, the trans- lator of Laplace; Benjamin Peirce and Morse the electrician; not to include an adopted citizen in Louis Agassiz. In history, Winthrop and Bradford laid the foundations of her story in the very beginning; but the best example of the colonial period is Thomas Hutchinson, and in later days Bancroft, Sparks, Palfrey, Prescott, Motley and Parkman. In poetry, a pioneer of the modern spirit in American verse was Richard Henry Dana; and later came Bryant, Longfellow, Whittier, Lowell and Holmes. In philosophy and the science of living, Jonathan Edwards, Franklin, Channing, Emerson and Theodore Parker. In education, Horace Mann; in philanthropy, S. G. Howe. In oratory, James Otis, Fisher Ames, Josiah Quincy, junr., Webster, Choate, Everett, Sumner, Winthrop and Wendell Phillips; and, in addition, in statesmanship, Samuel Adams, John Adams and John Quincy Adams. In fiction, Hawthorne and Mrs Stowe. In law, Story, Parsons and Shaw. In scholar- ship, Ticknor, William M. Hunt, Horatio Greenough, W. W. Story and Thomas Ball. The " transcendental movement," which sprang out of German affiliations and produced as one of its results the well-known community of Brook Farm (1841- 1847), under the leadership of Dr George Ripley, was a Massa- chusetts growth, and in passing away it left, instead of traces of an organization, a sentiment and an aspiration for higher thinking which gave Emerson his following. When Massa- chusetts was called upon to select for Statuary Hall in the capitol at Washington two figures from the long line of her worthies, she chose as her fittest representatives John Winthrop, the type of Puritanism and state-builder, and Samuel Adams (though here the choice was difficult between Samuel Adams and John Adams) as her greatest leader in the heroic period of the War of Independence.

Governors of Plymouth Colony

(Chosen annually by the people).

John Carver 1620-1621

William Bradford 1 621-1633

Edward Winslow 1633-1634

Thomas Prence (or Prince) 1634-1635

William Bradford 1635-1636

Edward Winslow 1636-1637

William Bradford 1637-1638

Thomas Prence (or Prince) 1638-1639

William Bradford 1630-1644

Edward Winslow 1 644-1 645

William Bradford 1645-1657

Thomas Prence (or Prince) 1 657-1 673

Josiah Winslow 1673-1680

Thomas Hinckley 1680-1686

Sir Edmund Andros 1686-1689

Thomas Hinckley 1689-1692

war. These figures are probably less accurate than those of the state.

Governors of Massachusetts (Under the First Charter — chosen annually).

John Endecott l

John Winthrop

Thomas Dudley

John Haynes

Henry Vane

John Winthrop . ■

Thomas Dudley

Richard Bellingham

John Winthrop

John Endecott

Thomas Dudley

John Winthrop

John Endecott

Thomas Dudley

John Endecott

Richard Bellingham

John Endecott

Richard Bellingham

John Leverett (acting, 1672-1673)

Simon Bradstreet

1629 1630 1 634-;

1635- 1636-

1637- 1640- 1641- 1642- 1644- 1645- 1646- 1649- 1650- 1651-: 1654 1655 1665 1672- 1679

Sir Edmund Andros 1686-

Simon Bradstreet 1689-

Under Second Charter — appointed by the Crown. 2

Sir William Phips 1692-

William Stoughton (acting) 1694-

Richard Coote, earl of Bellomont 1699-

William Stoughton (acting) 1700

Joseph Dudley 1702-

William Tailer (acting) 1715-

Samuel Shute 1716-

William Dummer (acting) 1722-

William Burnet 1728-

William Dummer (acting) 1729-

William Tailer (acting) 1730

Jonathan Belcher 1730-

William Shirley 1741-

Sp'encer Phips (acting) I749 –

William Shirley '753-

Spencer Phips (acting) 1756-

Thomas Pownal 1757—

Thomas Hutchinson (acting) 1760

Sir Francis Bernard, Bart 1760-

Thomas Hutchinson (acting) 1769-

Thomas Hutchinson 1771—

Thomas Gage 3 I774~

Under the Constitution.

John Hancock 1780-

James Bowdoin 1785-

John Hancock 1787-

Samuel Adams (acting) !793~

Samuel Adams I794~

Increase Sumner …. Federalist J 797

Moses Gill (lieut.-governor; acting) . ,, I799 –

Caleb Strong …. „ 1800-

Jas. Sullivan …. Democratic-Republican 1807-

Levi Lincoln (acting) ... „ 1808-

Christopher Gore …. Federalist 1809-

Elbridge Gerry . . . . Democratic-Republican 1810-

Caleb Strong …. Federalist 1812-

John Brooks …. ,, 1816-

William Eustis …. Democratic- Republican 1823-:

Levi Lincoln . John Davis . Edward Everett . Marcus Morton . John Davis . Marcus Morton . George N. Briggs George S. Bout well John H. Clifford . Emory Washburn Henry J. Gardner Nathaniel P. Banks

Whig

1,

Democrat

Whig

Democrat

Whig

Free-Soil Democrat

Whig

M

Know-Nothing Republican

1825

1834

1836-

1840-

1841-

1843-

1844-

1851-

1853-

1854-

1855-

1858-

630 634 635 636

637 640 641 642 644

645 646 649 650 651 654 655 665 672 679 686

689 692

694 699 700 701

715 716 722 728 729

73°

74i

749 753 756 757 760

769

771 774 775

785 787 793 794 797 799 800 807 808 809 810 812 816 823 825 834 835 840 841

843

844

851 853 854 855 858 861

1 Endecott, by commission dated the 30th of April 1629, was made " governor of London's plantation in the Massachusetts Bay." Matthew Cradock, first governor of the Company, from the 4th of March 1629 to the 20th of October 1629, was succeeded on the latter date by John Winthrop, who, on reaching Salem on the 12th of June 1630 with the charter, superseded Endecott.

2 During three periods, 1701-1702, in February 1715, and from April to August 1757 the affairs of the colony were administered by the Executive Council.

a General Gage was military governor, Hutchinson remaining nominally civil governor.

John A. Andrew . Alexander H. Bullock . William Claflin . William B. Washburn Thomas Talbot (acting) William Gaston . Alexander H. Rice Thomas Talbot John Davis Long Benjamin F. Butler George D. Robinson .

Oliver Ames John Q. A. Brackett . William E. Russell Frederic T. Greenhalge Roger Wolcott Roger Wolcott W. Murray Crane John L. Bates William L. Douglas Curtis L. Guild Eben S. Draper . Eugene N. Foss

Republican

Democrat Republican

Democrat Republican

Democrat Republican

Democrat Republican

Democrat

l86r-l866

1 866-1 869

I 869-1 872 I 872-1 874

1874-1875 1875-1876 1876-1879

I 879-1 880 I 880-1 883

1 883-1 884

I 884-1 887

1 887-1 890 1890-1891 1891-1894

I 894-1 896

1896-1897

I 897-1900 I 900- 1 903 I 903-1 905

1905-1906

I 906- I 909

1909-1911 1911-

BiblIOGraphy. — For Topography: W. M. Davis, Physical Geo- graphy of Southern New England (New York, 1895), and for the western counties, R. D. Mallary, Lenox and the Berkshire Highlands (New York-London, 1902) ; also Inland Massachusetts, Illustrated. . . (Springfield, 1890) ; C. F.

Warner, Picturesque Berkshire (also Frank- lin, Hampden, Hampshire, Northampton, 1 890-1 893) ; U. S. Geologi- cal Survey, Bulletin 116, H. Gannett, " Geographic Dictionary of Massachusetts." On Minerals: U.S. Census, 1900, and U.S. Geolo- gical Survey, annual volume on Mineral Resources. On Agricul- ture: U.S. Census and reports of Mass. Census (alternating with Federal census), and reports and bulletins of the Board of Agriculture (1852) and the Agricultural College (1867), and Ex- periment Station (1883) at Amherst. On Manufactures, &c. : See Reports of state and Federal censuses; also Annual Reports (1869) of the state Bureau of Statistics of Labor, which con- tain a wealth of valuable material (e.g. 1903, " Race in Industry "; 1902, " Sex in Industry "; 1885, " Wages and Prices, 1752-1863," &c.) ; W. R. Bagnall, The Textile Industries of the United States (vol. i., 1639-1810, Cambridge, 1893); J. L. Hayes, "American Textile Machinery: its Early History, &c." (Cambridge, 1870; Bulletin of National Association of Wool Manufacturers), and literature therein referred to. On Commerce and Communications: U.S. Census, 1902 (vol.. on " Electric Railways ") ; U.S. Interstate Commerce Commission, annual Statistics of Railways; publications of the State Board of Trade; W.Hill on " First Stages of the Tariff Policy of the United States " in American Economic Association Publications, vol. viii., no. 6 (1893). On Population: Census reports, state and Federal, publications of Bureau of Statistics of Labor, Board of Health (1869-; the Annual Report of 1896 contains an exhaustive analysis of vital statistics, 1856-1895); Board of Charity (1878-), &c. On Administration: G. H. Haynes, Representation and Suffrage in Massachusetts, 1620-1691, in Johns Hopkins University, Studies in History, xii. ; Manual for the General Court (Annual) ; R. H. Whitten, Public Administration in Massachu- setts, in Columbia University, Studies in History, vol. viii. (1898); H. R. Spencer, Constitutional Conflict in Provincial Massachusetts (Columbus, O., 1905) ; and the annual Public Documents of Massachu- setts, embracing the reports of all state officers and institutions. On Taxation: See especially the official " Report of the Commission Appointed to Inquire into the Expediency of Revising and Amending the Laws . . . Relating to Taxation " (1897), and vol. xi. of the Report of the United States Industrial Commission (Wash., 1901); H. G. Friedman, The Taxation of Corporations in Massachusetts (New York, 1907) ; and C. J. Bullock, Historical Sketch of the Finances and Financial Policy of Massachusetts (1907). On Education: See Annual Reports of the United States Commissioner of Education; G. G. Bush, History of Higher Education in Massachusetts (Washing- ton, U.S. Bureau of Education, 1891) ; article on Harvard Univer- sity. On History: Elaborate bibliography is given in J. Winsor's Narrative and Critical History of America and in his Memorial History of Boston. The colonial historical classics are William Bradford, History of Plimoth Plantation (pub. by the commonwealth, 1898; also edited by Charles Deane, in Collections of the

Massachu- setts Historical Society, 1856, series 4, vol. iii.) ; J. Winthrop, History of New England 1630-1649, edited by J. Savage (Boston, 2 vols. 1825-1826, new ed., 1853); S. E. Sewall, Diary, 1674-172Q (3 vols., Collections of the Massachusetts Historical Society, series 5, vols, v.-vii., 1878-1882), a fascinating and microscopic picture of colonial life; T. Hutchinson, History of . . . Massachusetts (3 vols., respec- tively Boston, 1764, 1767, London, 1828); also the very valuable Hutchinson Papers (2 vols., Prince Society, Boston, 1865). For the period 1662-1666, when Massachusetts was investigated by royal commissioners, see Collections of the Massachusetts Historical Society, series 2, vol. viii., 1819; on the Andros period, 1689-1691, see the Andros Tracts (3 vols., Prince Society Publications, v.-vii., Boston, 1868-1874), ed. by J. H. Whitmore. The one-time~

standard general history was that of J. G. Palfrey, History of New England (5 vols., Boston, 1858-1890), to the War of Independence. It is generally accurate in facts but written in an unsatisfactorily eulogistic vein. Of importance in more modern views is a volume of Lectures Delivered . . . before the Lowell Institute . . . by Members of the Massachusetts Historical Society on Subjects Relating to the Early History of Massachusetts (Boston, 1869), perhaps especially the lectures of G. E. Ellis, later expanded, and in the process some- what weakened, into his Puritan Age and Rule in the Colony of the Massachusetts Bay, 1620-1685 (Boston, 1888; 3rd ed., 1891). See C. F. Adams, Massachusetts: its Historians and its History (Boston, 1893), for a critique of the " filiopietistic " traditions of Massachu- setts writers; also his Three Episodes of Massachusetts History, — • namely, Settlement of the Colony, Antinomianism, and church and town government in Quincy from 1634-1888 (2 vols., Boston, 1892). On town government see further E. Channing in Johns Hopkins University, Studies in History vol. ii. (1884); P. E. Aldrich in American Antiquarian Society, Proceedings, new series, vol. 3, pp. m-124; and C. F. Adams and others in Massachusetts Historical Society, Proceedings, 2nd series, vol. vii (1892). On the Pilgrimsand Puritans: See article Plymouth; also E. H. Byington, The Puritan in England and America (Boston, 1896) and The Puritan as Colonist and Reformer (Boston, 1899). On the Quaker Persecution: R. P. Hallowell, The Quaker Invasion of Massachusetts (Boston, 1883; rev. ed., 1887). On Witchcraft : See C. W. Upham, Witch-craft in Salem (2 vols., Boston, 1867) ; S. G. Drake, Annals of Witch-craft (Boston, 1869) and The Witchcraft Delusion in New England (3

vols., Roxbury, 1866), this last a reprint of accounts of the time by Cotton Mather and R. Calef; W. F. Poole, " Cotton Mather and Salem Witchcraft" (North American Review, April 1869); and controversy of A. C. Goodell and G. H. Moore in Massachusetts Historical Society, Proceedings. On Slavery: G. H. Moore, Notes on the History of Slavery (New York, 1866) ; E. Washburn in Collections, Massachusetts Historical Society, series 4, iv., 333-346; C. Deane in same, pp. 375-442, and in Proceedings, American Antiquarian Society, new series, iv., 191-222. In the essays of ". R. Lowell are two on " New England two Centuries Ago " and ' Witchcraft." For economic history, W. B. Weeden, Economic and Social History of New England, 1620-1789 (2 vols., Boston, 1 890); C. H. J. Douglas, The Financial History of Massachusetts . . . to the American Revolution (in Columbia University Studies, vol i., 1892). On the revolutionary epoch, Mellen Chamberlain, John Adams . . . with other Essays and Addresses (Boston, 1898); T. Hutchinson, Diary and Letters (2 vols., Boston, 1884-1886); H. A. Cushing, Transition from Provincial to Commonwealth Govern- ment in Massachusetts (Columbia University Studies in History, vol. iil-, 1896); S. B. Harding, Contest over the Ratification of the Federal Constitution in Massachusetts (Harvard University Studies, New York, 1896) ; and on the Shays Rebellion compare J. P. Warren in American Historical Review (Oct., 1905). On New England discontent preced- ing 1812, Henry Adams, Documents Relating to New England Federalism, 1780-1813 (Boston, 1877); T. W. Higginson, Massachu- setts in the Army and Navy during the War of 186163 (Official, Boston, 2 vols., 1896). For a list of the historical societies of the state consult A. M. Davis in Publications of the Colonial Society of Massachusetts, vol. i. ; the most important are the Massachusetts His- torical Society, established 179 1, publishing Collections and Proceed- ings (Boston) and the American Antiquarian Society, established 1812, publishing Proceedings (Worcester). In many cases the most valuable material on various periods is indicated under the biographies (or autobiographies in some cases) of the public men named in the above article, to which add Timothy Pickering, George Cabot, Joseph Warren, Elbridge Gerry, Benjamin F. Butler, G. S. Boutwell and George F. Hoar. Many townships have published their local re- cords, and many township and county histories contain valuable matter of general interest (e.g. as showing in detail township action before the War of Independence), though generally weighted heavily with genealogy and matters of merely local interest. In American works of fiction, particularly of New England authors, the reader will find a wealth of description of Massachusetts and New England life, past and present, as in the writings of William D. Howells, Sarah O. Jewett, Mary E. Wilkins-Freeman, Harriet B. Stowe and others. MASSACRE, a wholesale indiscriminate killing of persons, and also, in a transferred sense, of animals. The word is adopted from the French; but its origin is obscure. The meaning and the old form

macecle seem to point to it being a corruption of the Lat. macellum, butcher's shop or shambles, hence meat market; this is probably from the root mac-, seen in ixkxecdai, to fight, /x&xaipa, sword, and Lat. mactare, to sacrifice. Another derivation connects with the Old Low Ger. matsken, to cut in pieces; cf. mod. Ger. metzeln, to massacre.

MASSAGE. The word massage has of late years come into general use to signify the method of treating disease or other physical conditions by manipulating the muscles and joints. According to Littre the word is derived from the Arabic mass, and has the specific meaning of " pressing the muscular parts

of the body with the hands, and exercising traction on the joints in order to give suppleness and stimulate vitality." It was probably adopted from the Arabian physicians by the French, who have played a leading part in reviving this method of treatment, which has been practised from time immemorial, and by the most primitive people, but has from time to time fallen into disuse among Western nations. In the Odyssey the women are described as rubbing and kneading the heroes on their return from battle. In India, under the name " sham- poo " (tshdmpud), the same process has formed part of the native system of medicine from the most remote times; pro- fessional massers were employed there by Alexander the Great in 327 B.C. In China the method is also of great antiquity, and practised by a professional class; the Swedish gymnastic system instituted by Pehr Henrik Ling is derived from the book of Cong-Fou, the bonze of Tao-Sse. Hippocrates describes and enjoins the use of manipulation, especially in cases of stiff joints, and he was followed by other Greek physicians. Oribasius gives an account of the application of friction with the bare hands, which exactly corresponds with the modern practice of massage. It is worthy of note that the treatment, after being held in high esteem by the leading Greek physicians, fell into disrepute with the profession, apparently on account of its association with vicious abuses. The same drawback has made itself felt in the present day, and can only be met by the most scrupulous care in the choice of agents and the manner of their employment. Among the Greeks, Romans, Egyptians, and later the Turks, massage came to be part of the ordinary procedure of the bath without any special therapeutic intention, and the usage has survived until to-day; but that mode of application was no doubt a refinement of civilized life. Medical rubbing is older and more elementary than bathing, as we see from its employment by savages. Pro- bably it was evolved independently among different races from the natural instinct — shared by the lower animals — which teaches to rub, press or lick any part of the body in which uneasiness is felt, and is therefore the oldest of all therapeutic means.

According to Weiss, the therapeutic use of massage was revived in Europe

by Hieronymus Fabricius ab Aquapendente (1537-1619), who applied it to stiff joints and similar conditions. Paracelsus in. his De medicina Aegyptiorum (1591), gives a description of methodical massage as practised by the Egyptians quite on modern lines. Thereafter it appears to have been adopted here and there by individual practitioners, and various references are made to it, especially by French writers. The word " massage " occurs in an essay written by Pierre Adolphe Piorry (1 794-1879) for a large encyclopaedia which appeared in 1818, but it was probably used before. The practice was gradually advocated by an increasing number of medical men. In Great Britain it was called " medical rubbing," and at Edinburgh Beveridge had a staff of eight trained male rubbers. A book published by Estradere in 1863 attracted much attention, but the man who contributed most to the modern popularity of massage was Metzger of Amsterdam, who began to use it tentatively in 1853, and then proceeded to study and apply it methodically. He published an essay on the subject in 1868. The modern refinements of the treatment are chiefly due to him. At the same time, its application by Dr Silas Weir Mitchell to hysterical and other nervous conditions, in conjunction with the " rest cure," has done much to make it known.

Massage, as now practised, includes several processes, some of which are passive and others active. The former are carried out by an operator, and consist of rubbing and kneading the skin and deeper tissues with the hands, and exercising the joints by bending the patient's limbs. The active movements consist of a special form of gymnastics, designed to exercise particular muscles or groups of muscles. In what is called " Swedish massage " the operator moves the limbs while the patient resists, thus bringing the opposing muscles into play. Some writers insist on confining the word " massage " to the rubbing processes, and use the general term "manipulation"

to cover all the movements mentioned; but this is a verbal subtlety of no importance. It is evident that alike among the Greeks, the Orientals, and savage races, the two processes have always been applied as part of the same treatment, and the definition quoted above from Littre goes to show that the word " massage " is properly applied to both.

Rubbing has been subdivided into several processes, namely (i) stroking, (2) kneading, (3) rubbing, and (4) tapping, and some practitioners attach great importance to the application of a particular process in a particular way. As a rule, oils and other lubricants are not used. But, however it may

be applied, the treat- ment acts essentially by increasing circulation and improving nutrition. It has been shown by Lauder Brunton that more blood actually flows through the tissues during and after rubbing. The number of red corpuscles, and, to some extent, their haemoglobin value, are also said to be increased (Mitchell). At the same time the movement of the lymph stream is accelerated. In order to assist the flow of blood and lymph, stroking is applied centripetally, that is to say, upwards along the limbs and the lower part of the body, downwards from the head. The effects of the increased physiological activity set up are numerous. Functional ability is restored to exhausted muscles by the removal of fatigue products and the induction of a fresh blood supply; congestion is relieved; collections of serous fluid are dispersed; secretion and excretion are stimulated ; local and general nutrition are improved. These effects indicate the conditions in which massage may be usefully applied. Such are various forms of paralysis and muscular wasting, chronic and subacute affections of the joints, muscular rheumatism, sciatica and other neuralgias, local congestions, sprains, contractions, insomnia and some forms of headache, in which downward stroking from the head relieves cerebral congestion. It has also been used in anaemia, hysteria and " neurasthenia," disorders of the female organs, melancholia and other forms of insanity, morphinism, obesity, constipation, inflammatory and other affections of the eye, including even cataract. General massage is sometimes applied, as a form of passive exercise, to indolent persons whose tissues are overloaded with the products of incomplete metabolism.

As with other methods of treatment, there has been a tendency oh the part of some practitioners to exalt it into a cure-all, and of others to ignore it altogether. Of its therapeutic value, when judiciously used, there is no doubt, but it is for the physician or surgeon to say when and how it should be applied. Affections to which it is not applicable are fevers, pregnancy, collections of pus, acute inflammation of the joints, inflamed veins, fragile arteries, wounds of the skin and, generally speaking, those conditions in which it is not desirable to increase the circulation, or in which the patient cannot bear handling. In such conditions it may have a very in- jurious and even dangerous effect, and therefore should not be used in a haphazard manner without competent advice.

The revival of massage in Europe and America has called into existence a considerable number of professional operators, both male and female, who may be regarded as forming a branch of the nursing profession. Some of these are trained in hospitals or other institutions, some by private practitioners and some not at all. Similarly some are attached to organized societies or institutions while others pursue their calling independently. Several things are required for a good operator. One is physical strength. Deep massage is very laborious work, and cannot be carried on for an

hour, or even half an hour, without unusual muscular power. Feeble persons cannot practise it effectively at all. The duration of a sitting may vary from five or ten minutes to an hour. For general massage at least half an hour is required. A masser should have strength enough to do the work without too obvious exhaustion, which gives the patient an unpleasant impression. A second requirement is tactile and muscular sensibility. A person not endowed with a fine sense of touch and resistance is liable to exert too great or too little pressure; the one hurts the patient, the other is ineffective. Then skill and knowledge, which can only be acquired by a course of instruction, are necessary. Finally, some guarantee of cleanliness and character is almost indispensable. Independent massers may possess all these qualifications in a higher degree than those con- nected with an institution, but they may also be totally devoid of them, whereas connexion with a recognized hospital or society is a guarantee for a certain standard of efficiency. In London there are several such institutions, which train and send out both male and female massers. The fee is 5s. an hour, or from two to four guineas a week. On the European continent, where trained massers are much employed by some practitioners, the fee is considerably lower ; in the United States it is higher. For reasons mentioned above, it is most desirable that patients should be attended by operators of their own sex. If this is not insisted upon, a valuable therapeutic means will be in danger of falling into disrepute both with the medical profession and the general public. (A. Si-.)

MASSAGETAE, an ancient warlike people described by Herodotus (i. 203-216; iv. 22, 172) as dwelling beyond the Araxes (i.e. the Oxus) in what is now Balkh and Bokhara.

It was against their queen Tomyris that Cyrus undertook tht> expedition in which according to one story he met his end. In their usages some tribes were nomads like the people of Scythia (q.v.), others with their community of wives and habit of killing and eating their parents recalled the Issedones (q.v.); while the dwellers in the islands of the river were fish-eating savages. Probably the name denoted no ethnic unity, but included all the barbarous north-eastern neighbours of the Persians. Herodotus says they only used gold and copper (or bronze), not silver or iron. Their lavish use of gold has caused certain massive ornaments from southern Siberia, now in the Hermitage at St Petersburg, to be referred to the Massagetae. (E. H. M.)

MASSA MARITTIMA, a town and episcopal see of the province of Grosseto, Tuscany, Italy, 24 m. N.N.W. of Grosseto direct and 16 m. by rail N.E. of Follonica (which is 28 m. N.W. of Grosseto on the main coast railway), 1444 ft. above sea-level. Pop. (1901), (town) 9219; (commune) 17,519. It has a cathe- dral of the 13th century containing a Romanesque

font (1267 with a cover of 1447) and a Gothic reliquary (1324) of the saint Cerbone, to whom the cathedral is dedicated. The battle- mented municipal palace of the 13th century is picturesque. There are mineral springs, mines of iron, mercury, lignite and copper, with foundries, ironworks and olive-oil mills. At Follonica on the coast, but in this commune, are the furnaces in which are smelted the iron ore of Elba.

MASSAWA, or Massowah, a fortified town on the African coast of the Red Sea, chief port Of the Italian colony of Eritrea, in 15° 36′ N. and 39 28′ E. Pop. about 10,000. The town stands at the north end of the bay of Massawa and is built partly on a coral island of the same name — where was the original settlement — and partly on the islets of Tautlub and Sheik Said, and the neighbouring mainland. Massawa Island is from 20 to 25 ft. above the sea, its length does not exceed 3 m. and its breadth is about \ m. The harbour is formed by the channel between the island and the mainland. It affords good anchorage in from 5 to 9 fathoms. The town possesses several good public buildings, chiefly built of coral, as are the houses of the principal European and Arab merchants. Landward the town is guarded by forts erected by the Italians since 1885. Water was formerly scarce; but in 1872 an ancient aqueduct from Mokullu (5 m. distant westward) was restored and continued by an embankment to the town. A railway connects Massawa with Asmara, the capital of the colony. Besides the Abyssinians, who speak a Tigre dialect corrupted with Arabic, the inhabitants comprise Italian officials and traders, Greeks, Indians, Arabs from Yemen and Hadramut, Gallas and Somalis. Massawa is the natural port for northern Abyssinia but commerce is undeveloped owing to the lack of rapid means of communication. The trade done consists mainly in exporting hides, butter, Abyssinian coffee and civet, and importing European and Indian cotton goods and silks. It increased in value from about £65,000 per annum in 1865 (the last year of Turkish control) to from £240,000 m £280,000 between 1879 and 1881, when under the administration of Egypt. Under the Italians trade greatly developed. The returns for the five years 1901-1905 showed an average annual value of £1,800,000, about two-thirds being imports.

The island of Massawa has probably been inhabited from a very early date. It appears to have formed part of the Abyssinian dominions for many centuries. It was at Massawa (Matzua, as it is called by the Portuguese chroniclers) that Christopher da Gama and his comrades landed in July 1541 on their way to aid the Abyssinians against the Moslem invaders. Captured by the Turks in 1557, the island remained a Turkish possession over two hundred years. A military colony of Bosnians settled at Arkiko (a port on the bay 4 m. south of Massawa Island) was appointed not only to defend it in case of attack from the mainland, but to keep it supplied with water in return for $1400 per month from the town's customs. For some

time at the close of the 18th century Massawa was held by the sherif of Mecca, and it afterwards passed to Mehemet Ali

of Egypt. The Turks were reinstated about 1850, but in 1865 they handed the island back to Egypt for an annual tribute of 2 J million piastres. In February 1885 Massawa was occupied by an Italian force, the Egyptian garrison stationed there being withdrawn in the November following (see Egypt; Italy; Abyssinia). The port was the capital of the Italian colony until 1900 when the seat of administration was removed to Asmara (see Eritrea).

For a description of the town in 1769 see the Travels of James Bruce. At that time the governor, though appointed by the Turks, paid one half of the customs receipts to the negus of Abyssinia in return for the protection of that monarch.

MASSENA, ANDRfi, or Andrea, duke of Rivoli, prince of Essling (1756-1817), the greatest of Napoleon's marshals, son of a small wine merchant, it is said of Jewish origin, was born at Nice on the 6th of May 1756. His parents were very poor, and he began life as a cabin boy, but he did not care much for the sea, and in 1775 he enlisted in the Royal-Italien regiment. He quickly rose to be under-ofncer-adjutant; but, finding his birth would prevent his ever getting a com- mission, he left the army in 1789, retired to his native city, and married. At the sound of war, however, and the word republic, his desire to see service increased, and he once more left Italy, and joined the 3rd battalion of the volunteers of the Var in 1 791. In those days when men elected their officers, and many of the old commissioned officers had emigrated, promotion to a man with a knowledge of his drill was rapid, and by February 1792 Massena was a lieutenant-colonel. His regiment was one of those in the army which occupied Nice, and in the advance to the Apennines which followed, his know- ledge of the country, of the language, and of the people was so useful that in December 1793 he was already a general of division. In command of the advanced guard he won the battle of Saorgio in August 1794, capturing ninety guns, and after many successes he at last, on the 23rd of November 1795, with the right wing of the army of Italy, had the greatest share in the victory of Loano, won by Scherer over the Austrians and Sardinians. In Bonaparte's great campaign of 1796-97 Massena was his most trusted general of division ; in each battle he won fresh laurels, up to the crowning victory of Rivoli, from which he afterwards took his title. It was during this campaign that Bonaparte gave him the title of enfant gdlS

de la vicloire, which he was to justify till he met the English in 1810. In 1798 he commanded the army of Rome for a short time, but was displaced by the intrigues of his subordinate Berthier. Massena's next important service was in command of the army in Switzerland, which united the army in Germany under Moreau, and that in Italy under Joubert. There he proved himself a great captain, as he had already proved him- self a great lieutenant; the archduke Charles and Suvarov had each been successful in Germany and in Italy, and now turned upon Massena in Switzerland. That general held his ground well against the archduke, and then suddenly, leaving Soult to face the Austrians, he transported his army to Zurich, where, on the 26th of September 1799, he entirely defeated Korsakov, taking 200 guns and 5000 prisoners. This campaign and battle placed his reputation on a level with that of his com- patriot Bonaparte, and he might have made the revolution of Brumaire, but he was sincerely attached to the republic, and had no ambition beyond a desire to live well and to have plenty of money to spend. Bonaparte, now First Consul, sent him to Genoa to command the debris of the army of Italy, and he nobly defended Genoa from February to June to the very last extremity, giving time for Bonaparte to strike his great blow at Marengo. He now went to Paris, where he sat in the Corps Legislatif in 1803, and actually defended Moreau without drawing upon himself the ill-will of Napoleon, who well knew his honesty and lack of ambition.

In 1804 he was made one of the first marshals of France of

the new regime, and in 1805 was decorated with the Grand Eagle

of the Legion of Honour. In that year Napoleon needed an able

general to keep in check the archduke Charles in Italy, while he

advanced through Germany with the grand army. Massena was chosen; he kept the archduke occupied till he received news of the surrender of Ulm, and then on the 30th of October defeated him in the battle of Caldiero. After the peace of Pressburg had been signed, Massena was ordered to take possession of the kingdom of Naples, and to place Joseph Bonaparte on the throne. This task done, Napoleon summoned Massena to Poland, where he as usual distinguished himself, and where he for the time gave up his republican principles. In 1808 he was made duke of Rivoli. In 1808 he was accidentally wounded by his old enemy Berthier when both were in attendance on the emperor at a shooting party, and he lost the sight of one eye. In the campaign in 1809 he covered himself with glory at Landshut and at Eckmuhl, and finally at the battle of Aspern-Essling his magnifi-

cent leadership made what would without him have been an appalling disaster into a mere reverse of which the enemy could make no use. On the field of Wagram Massena, though too ill to ride, directed from his carriage the movements of the right wing. For his great services he was created prince of Essling, and given the princely castle of Thouars. He was then ordered to Spain to " drive the English into the sea." (For the campaigns of 1810 and 181 1, the advance to and the retreat from Torres Vedras see Peninsular War.) Massena himself, with some justice, ascribed his failure to the frequent disobedience of his subordinates Ney, Reynier and Junot, and public opinion attributed this disobedience to the presence with the army of Massena's mistress, and to the resentment thereat felt by the wives of the three generals. Still, unsuccessful as he was, Massena displayed the determination of the defence of Genoa and the fertility in expedients of the campaign of Zurich, and kept his army for five weary months close up to Wellington's impregnable position before retiring. His retreat through a devastated country was terrible, but his force of character kept his men together, and Ney having shown the worst side of his character now showed the best in the frequent and brilliant rear- guard actions, until a new act of insubordination at last made the old marshal dismiss Ney from his command. Soon Massena was once again ready to try his fortune, and he nearly defeated Wellington at Fuentes d'Onoro, though much hampered by Bessieres. But his recall soon followed this and he returned home to find his prestige gone. The old marshal felt he had a right to complain of Ney and of Napoleon himself, and, it is said, opened communications with Fouche and the remnant of the republican party. Whether this be true or not, Napoleon gave his greatest marshal no more employment in the field, but made him merely a territorial commandant at Marseilles. This com- mand he still held at the restoration, when Louis XVIII. con- firmed him in it, and with true Bourbon stupidity gave him letters of naturalization, as if the great leader of the French armies had not ceased to be an Italian. When Napoleon returned from Elba, Massena, probably by the advice of Fouche, kept Marseilles quiet to await events, the greatest service he could do the royal- ists, but afterwards imputed to him as a fault. After the second restoration Mass6na was summoned to sit on the court-martial which tried Marshal Ney, but, though he had been on bad terms with that general, and attributed his own disgrace to him, the old soldier would not be his comrade's judge. This refusal was used by the royalists to attack the marshal, against whom they raked up every offence they could think of. This annoyance shortened his life, and on the 4th of April 181 7 the old hero died. He was buried in Pere-la-Chaise, with only the word " Massena " upon his tombstone.

In private life indolent, greedy, rapacious, ill-educated and morose, in war Massena was, like Napoleon, the incarnation of battle. Only his indolence

and his consequent lack of far- ranging imagination prevented him being as great in strategy as in tactics. His genius needed the presence of the enemy to stimu- late it, but once it sprang to life Massena became an ideal leader, absolutely brave, resourceful, unrelenting and indefatigable. He was as great a master of the strategy of forces in immediate contact — of gathering up as it were the threads of the fugue into a " stretto." For the planning of a whole perfect campaign he

had neither knowledge nor inclination, and he falls short there- fore of the highest rank amongst great generals; but his place amongst the greatest of soldiers is beyond challenge.

See Thi6bault's Eloge funebre, and Koch's Memoires de MassSna (4 vols., 1849), a valuable work, carefully compiled. In more modern times E. Gachot has produced several important works dealing with Massena's campaigns.

MASSENBACH, CHRISTIAN KARL AUGUST LUDWIG VON

(1758-1827), Prussian soldier, was born at Schmalkalden on the 16th of April 1758, and educated at Heilbronn and Stuttgart, devoting himself chiefly to mathematics. He became an officer of the Wtirttemberg army in 1778, and left this for the service of Frederick the Great in 1782. The pay of his rank was small, and his appointment on the quartermaster-general's staff made it necessary to keep two horses, so that he had to write mathe- matical school-books in his spare time to eke out his resources. He was far however from neglecting the science and art of war, for thus early he had begun to make his name as a theorist as well as a mathematician. After serving as instructor in mathe- matics to the young prince Louis, he took part with credit in the expedition into Holland, and was given the order Pour le merite. On returning to Prussia he became mathematical instructor at the school of military engineering, leaving this post in 1792 to take part as a general staff officer in the war against France. He was awarded a prebend at Minden for his services as a topo- graphical engineer on the day of Valmy, and after serving through the campaigns of 1793 and 1794 he published a number of memoirs on the military history of these years. He was chiefly occupied however with framing schemes for the reorganization of the then neglected general staff of the Prussian army, and many of his proposals were accepted. Bronsart von Schellendorf in his Duties of the General Staff says of Massenbach's work in this connexion, " the organization which he proposed and in the main carried out survived even

the catastrophes of 1806-1807, and exists even at the present moment in its original outline." This must be accounted as high praise when it is remembered how much of the responsibility for these very disasters must be laid to Massenbach's account. The permanent gain to the service due to his exertions was far more than formal, for it is to him that the general staff owes its tradition of thorough and patient individual effort. But the actual doctrine taught by Massenbach, who was now a colonel, may be summarized as the doctrine of positions carried to a ludicrous excess; the claims put forward for the general staff, that it was to prepare cut-and-dried plans of operations in peace which were to be imposed on the troop leaders in war, were derided by the responsible generals; and the memoirs on proposed plans of campaign to suit certain political combinations were worked out in quite unnecessary detail. It was noteworthy that none of the proposed plans of campaign considered France as an enemy.

In 1805 came threats of the war with Napoleon which Massen- bach had strongly opposed. He was made quartermaster- general (chief of staff) to Prince Hohenlohe, over whom he soon obtained a fatal ascendancy. War was averted for a moment by the result of the battle of Austerlitz, but it broke out in earnest in October 1806. Massenbach's influence clouded all the Prussian operations. The battles of Jena and Auerstadt were lost, and the capitulation of Prince Hohenlohe's army was negotiated. Even suggestions of disloyalty were not wanting; an attempt to try him by court-martial was only frustrated by Prince Hohenlohe's action in taking upon himself, as commander- in-chief, the whole responsibility for Massenbach's actions. He then retired to his estate in the Posen province, and occupied himself in writing pamphlets, memoirs, &c. When his estates passed into the grand duchy of Warsaw, he chose to remain a Prussian subject, and on the outbreak of the war of liberation he asked in vain for a post on the Prussian staff. After the fall of Napoleon he took part in Wtirttemberg politics, was expelled from Stuttgart and Heidelberg, and soon afterwards arrested at Frankfurt, delivered over to the Prussian authorities and con-demned to fourteen years' fortress imprisonment for his alleged publication of state secrets in his memoirs. He was kept in

prison till 1826, when Frederick William III., having recovered from an accident, pardoned those whom he considered to have wronged him most deeply. He died on the 21st of November 1827, at his estate of Bialokoscz, Posen.

The obituary in Neuer Nekrolog der Deutschen, pt. ii. (Ilmenau, 1827) is founded on a memoir (Der Oberst C. v. Massenbach) which was published at the beginning of his imprisonment.

MASSENET, JULES EMILE FREDERIC (1842-), French composer, was

born at Montaud, on the 12th of May 1842. He studied at the Paris Conservatoire, where he obtained the Grand Prix de Rome in 1863 with the cantata David Rizzio. Massenet became one of the most prolific composers of his time. His operas include the following: La Grande tante, one act, opera comique (1867); Don Cesar de Bazan, three acts, opera comique (1872); Le Rot de Lahore, five acts, opera (1877); Herodiade, five acts (Brussels, 1881); Manon, five acts, opera comique (1884); Le Cid, four acts, opera (1885); Esdarmonde, four acts, opera comique (1889); Le Mage, five acts, opera (1891); Werther, four acts (Vienna, 1892); Thais, three acts, opera (1894); Le Portrait de Manon, one act, opera comique (1894); La Navarraise, two acts (Covent Garden, 1894); Sapho, opera comique (1897); Cendrillon, opera comique (1900); Griselidis, op6ra comique (1901) ; Le Jongleur de Notre Dame (Mentone, 1902). Of these the most popular is Manon. Massenet's other works include Marie Madeleine, sacred drama (1873) ; Eve, a mystery (1875) ;La Vierge, sacred legend (1880); six orchestral suites entitled Scenes hon- groises, Scenes pittoresques, Scenes dramatiques, Scenes napoli- taines, Scenes de fterie, Scenes alsaciennes; music to the tragedy Les Erynnies, to Theodora, Le Crocodile, L'Hetman; a requiem, Narcisse; an idyll, Biblis; a Scene antique; several sets of songs, entitled Poeme d'avril, Poems d'amour, Poeme d'hiver, Poeme d'octobre, Poeme pastoral, Poeme du souvenir; also a large number of detached songs. He was professor of composition at the Conservatoire from 1878 to 1896, among his pupils being Hillemacher, Marty, Bruneau, Vidal, Pierne, Leroux and Char- pentier. Massenet undoubtedly possesses a style of his own. He is at his best in music descriptive of the tender passion, and many of the love scenes in his operas are very beautiful.

MASSEREENE, JOHN CLOTWORTHY, ist Viscount (d. 1665), Anglo-Irish politician, was a son of Sir Hugh Clotworthy, sheriff of county Antrim. He was elected to the Irish parliament as member for county Antrim in 1634, and was a member both of tlie Short and of the Long Parliament in England. Clotworthy was a vehement opponent of the earl of Strafford, in whose impeachment he took an active share. He also took part in the prosecution of Archbishop Laud. Having unsuccessfully nego- tiated with Ormond for the surrender of Dublin to the Parlia- mentary forces in 1646, he was accused in the following year of having betrayed his cause, and also of embezzlement; in con- sequence of these charges he fled to the Continent, but returned to parliament in June 1648. On the 12th of December in that year he was arrested, and remained in prison for nearly three years. Having taken an active part in forwarding the Restor- ation, he was employed in Ireland in arranging the affairs of the soldiers and other adventurers who had settled in Ireland. Clotworthy- in no way abated his old animosity against " papists " and high Anglicans, and he championed

the cause of the Irish Presbyterians; but being personally agreeable to Charles II., his ecclesiastical views were overlooked, and on the 21st of November 1660 he was created Baron Loughneagh and Viscount Massereene in the Irish peerage, with remainder in default of male heirs to his son-in-law, Sir John Skeffington. Massereene died without male issue in September 1665, and the title devolved on Skeffington, whose great-grandson, the fifth viscount, was created earl of Massereene in 1756. The earldom became extinct on the death of the fourth earl without male issue in

1816, the viscounty and barony of Loughneagh descending to his daughter Harriet, whose husband, Thomas Foster, took the name of Skeffington, and inherited from his mother in 1824 the titles of Viscount Ferrard and Baron Oriel of -Collon in the Irish peerage, and from his father in 1828 that of Baron Oriel of Ferrard in the peerage of the United Kingdom.

MASSEY, SIR EDWARD (c. 1619-c. 1674), English soldier in the Great Rebellion, was the son of John Massey of Coddirigton, Cheshire. Little is known of his early life, but it is said that he served in the Dutch army against the Spaniards. In 1639 he appears as a captain of pioneers in the army raised by Charles I. to fight against the Scots. At the outbreak of the Great Rebel- lion he was with the king at York, but he soon joined the Parlia- mentary army. As lieutenant-colonel under the earl of Stamford he became deputy governor of Gloucester, where he remained till towards the end of the first Civil War, becoming governor early in 1643. He conducted minor operations against numerous small bodies of Royalists, and conducted the defence of Glou- cester against the king's main army in August 1643, with great steadiness and ability, receiving the thanks of parliament and a grant of £1000 for his services. In 1644 Massey continued to keep the field and to disperse the local Royalists, and on several occasions he measured swords with Prince Rupert. In May 1644 he was made general of the forces of the Western Association. In 1645 he took the offensive against Lord Goring and the western Royalists, advanced to the relief of Taunton, and in the autumn co-operated effectively with Sir Thomas Fairfax and the New Model army in the Langport campaign. After taking part in the desultory operations which closed the first war, he took his seat in the House of Commons as member for Gloucester. He then began to take an active part in politics on the Presby- terian side, and was one of the generals who was impeached by the army on the ground that

they were attempting to revive the Civil War in the Presbyterian interests. Massey fled from England in June 1647, and though he resumed his seat in the house in 1648 he was again excluded by Pride's Purge, and after a short imprisonment escaped to Holland. Thence, taking the side of the king openly and definitely like many other Presby- terians, he accompanied Charles II. to Scotland. He fought against Cromwell at the bridge of Stirling and Inverkeithing, and commanded the advanced guard of the Royalist army in the invasion of England in 1651. It was hoped that Massey's influence would win over the towns of the Severn valley to the cause of the king, and the march of the army on Worcester was partly inspired by this expectation. However, he effected little, and after riding with the king for some distance from the field of Worcester, fell into the hands of his former comrades and was lodged in the Tower. He again managed to escape to Holland. While negotiating with the English Presbyterians for the restor- ation of Charles, he visited England twice, in 1654 and 1656. In 1660 he was active in preparing for Charles's return, and was rewarded by a knighthood and a grant of £3000. The rest of his life was spent in political, and occasionally in military and administrative business, and he is said to have died in Ireland in 1674 or 1675.

MASSEY, GERALD (1828-1007), English poet, was born near Tring, Hertfordshire, on the 29th of May 1828. His parents were in humble circumstances, and Massey was little more than a child when he was set to hard work in a silk factory, which he afterwards deserted for the equally laborious occupation of straw- plaiting. These early years were rendered gloomy by much distress and deprivation, against which the young man strove with increasing spirit and virility, educating himself in his spare time, and gradually cultivating his innate taste for literary work. He was attracted by the movement known as Christian Socialism, into which he threw himself with whole-hearted vigour, and so became associated with Maurice and Kingsley. His first public appearance as a writer was in connexion with a journal called the Spirit of Freedom, of which he became editor, and he was only twenty-two when he published his first volume of poems, Voices of Freedom and Lyrics of Love. These he followed in rapid succession by The Ballad of Babe Christabel (1854), War Waits (1855), Havelock's March (i860), and A Tale of Eternity (1869). Many years afterwards in 1889, he collected the best of the contents of these volumes, with additions, into a two-volume edition of his poems called My Lyrical Life. He also published works dealing with spiritualism, the study of Shakespeare's sonnets (1872 and 1890), and theological speculation. It is

generally understood that he was the original of George Eliot's Felix Holt. Massey's poetry has a certain rough and vigorous element of sincerity and strength which easily accounts for its popularity at the time of its production. He treated the theme of Sir Richard Grenville before Tennyson

thought of using it, with much force and vitality. Indeed, Tennyson's own praise of Massey's work is still its best eulogy, for the Laureate found in him " a poet of fine lyrical impulse, and of a rich half-Oriental imagination." The inspiration of his poetry is essentially British; he was a patriot to the core. It is, however, as an Egyptologist that Gerald Massey is best known in the world of letters. He first published The Book of the Beginnings, followed by The Natural Genesis; but by far his most important work is Ancient Egypt: The Light of the World, published shortly before his death. He died on the 29th of October

1907.

See an article by J. Churton Collins in the Contemporary Review (May 1904).

MASSICUS, MONS, a mountain ridge of ancient Italy, in the territory of the Aurunci, and on the border of Campania and Latium adjectum — attributed by most authors to the latter. It projects south-west from the volcanic system of Rocca Monfina (see Suessa Aurunca) as far as the sea, and separates the lower course of the Liris from the plain of Campania. It consists of limestone, with a superstratum of pliocenic and volcanic masses, and was once an island; its highest point is 2661 ft. above sea-level.

It was very famous for its wine in ancient times. There was just room along the coast for the road to pass through; the pass was guarded by the Auruncan town of Vescia (probably on the mountain side), which ceased to exist in 314 B.C. after the defeat of the Ausones, but left its name to the spot. Its successor, Sinuessa, on the coast, a station on the Via Appia, was constructed in 312 B.C., and a colony was founded there in 295 B.C. It is not infrequently mentioned by classical writers as a place in which travellers halted. Here Virgil joined Horace on the famous journey to Brundusium. Domitian considerably increased its importance by the construction of the Via Domitiana, which left the Via Appia here and ran to Cumae and Puteoli, and it was he, no doubt, who raised it to the position of colonia Flavia. The town was destroyed by the Saracens, but some ruins of it are still visible two miles north-west of the modern village of Mondragone. The mineral springs which still rise here were frequented in antiquity.

MASSIF, a French term, adopted in geology and physical geography for a mountainous mass or group of connected heights, whether isolated or forming part of a larger mountain system. A " massif " is more or less clearly marked off by valleys.

MASSILLON, JEAN BAPTISTE (1663-1742), French bishop and preacher,

was born at Hyeres on the 24th of June 1663, his father being a royal notary of that town. At the age of eighteen he joined the Congregation of the Oratory and taught for a time in the colleges of his order at Pezenas, and Montbrison and at the Seminary of Vienne. On the death of Henri de Villars, archbishop of Vienne, in 1693, he was commissioned to deliver a funeral oration, and this was the beginning of his fame. In obedience to Cardinal de Noailles, archbishop of Paris, he left the Cistercian abbey of Sept-Fonds, to which he had retired, and settled in Paris, where he was placed at the head of the famous seminary of Saint Magloire. He soon gained a wide reputation as a preacher and was selected to be the Advent preacher at the court of Versailles in 1699. He was made bishop of Clermont in 1717, and two years later was elected a member of the French Academy. The last years of his life were spent in the faithful discharge of his episcopal duties; his death took place at Clermont on the 18th of September 1742. Massillon enjoyed in the 18th century a reputation equal to that of Bossuet and of Bourdaloue, and has been much praised by Voltaire, D'Alembert and kindred spirits among the Encyclopaedists. His popularity was probably due to the fact that in his sermons he lays little stress on dog- matic questions, but treats generally of moral subjects, in which the secrets of the human heart and the processes of man's reason are described with poetical feeling. He has usually been con- trasted with his predecessor Bourdaloue, the latter having the credit of vigorous denunciation, Massillon that of gentle per- suasiveness. Besides the Petit Careme, a sermon which he

delivered before the young king Louis XV. in 1718, his sermons on the Prodigal Son, on the small number of the elect, on death, for Christmas Day, and for the Fourth Sunday in Advent, may be perhaps cited as his masterpieces. His funeral oratiori on Louis XIV. is only noted now for the opening sentence: " Dieu seul est grand." But in truth Massillon is singularly free from inequality. His great literary power, his reputation for benevolence, and his known toleration and dislike of doctrinal disputes caused him to be much more favourably regarded than most churchmen by the philosophes of the 18th century.

The first edition of Massillon's complete works was published by his nephew, also an Oratorian (Paris, 1 745-1 748), and upon this, in the absence of MSS., succeeding reprints were based. The best modern edition is that of the Abbe Blampignon (Paris, 1865-1868, 4 vols. ; new ed. 1886).

See AbW Blampignon, Massillon, d'apres des documents inidits (Paris, 1879) ; and V Hpiscopat de Massillon d'apres des documents inedits, suivi de sa correspondence (Paris, 1884); F. Brunetiere " L'filoquence de Massillon " in Etudes critiques (Paris, 1882); Pere Ingold, L'Oratoire et le jansenisme au temps de Massillon (Paris, 1880); and Louis Petit de Julleville's Histoire de la langue et de la litterature francaise, v. 372-385 (Paris, 1898).

MASSILLON, a city of Stark county, Ohio, U.S.A., on the Tuscarawas river and> the Ohio canal, 8 m. W. of Canton, and about 50 m. S. by E. of Cleveland. Pop. (1900), 11,944 (1693 foreign-born); (1910), 13,879. It is served by the Pennsylvania (Pittsburg, Ft Wayne & Chicago Division), the Baltimore & Ohio and the Wheeling & Lake Erie railways. Massillon is built among hills in a part of the state noted for its large produc- tion of coal and wheat and abounding in white sandstone, iron ore and potter's clay. The city has various manufactures, including iron, engines, furnaces, reapers, threshers and bottles. The total value of the factory products in 1905 was $3,707,013, an increase of 34-8% over that of 1900. The first settlement was made in 1825; in 1826 the town was laid out and named in honour of Jean Baptiste Massillon; it was incorporated a village in 1853, and became a city in 1868.

MASSIMO, or Massimi, a Roman princely family of great antiquity, said to be descended from the ancient Maximi of republican Rome. The name is first mentioned in 1012 in the person of Leo de Maximis, and the family played a considerable part in the history of the city in the middle ages. The brothers Pietro and Francesco Massimi acquired fame by protecting and encouraging the German printer Ulrich Hahn, who came to Rome in 1467. In the 16th century the Massimi were the richest of the Roman nobles. A marquisate was conferred on them in 1544, and the lordship of Arsoli in 1574. To-day there are two branches of the Massimi, viz. the Principi Massimo, descended from Camillo ' Massimiliano (1770-1840), and the dukes of Rignano, descended from Francesco Massimo (1773-1844). One of the sons of the present Prince Camillo Carlo Alberto, Don Fabrizio, married Princess Beatrice, daughter of Don Carlos of Bourbon (duke of Madrid), the pretender to the Spanish throne. The Palazzo Massimo in Rome was built by Baldassare Peruzzi by order of Pietro Massimo, on the ruins of an earlier palace destroyed in the sack of Rome in 1527.

See F. Gregorovius, Geschickte der Stadt Rom (Stuttgart, 1880) ; A. von Reumont, Geschickte der Stadt Rom (Berlin, 1868); Almanack de Gotka; J. H. Douglas, The Principal Noble Families of Rome (Rome, 1905).

MASSINGER, PHILIP (1 583-1640), English dramatist, son of Arthur Massinger or Messanger, was baptized at St Thomas's, Salisbury, on the

24th of November 1583. He apparently belonged to an" old Salisbury family, for the name occurs in the city records as early as 141 5. He is described in his matricu- lation entry at St Alban Hall, Oxford (1602), as the son of a gentleman. His father, who had also been educated at St Alban Hall, was a member of parliament, and was attached to the house- hold of Henry Herbert, 2nd earl of Pembroke, who recommended him in 1 587 for the office of examiner in the court of the marches. The 3rd earl of Pembroke, the William Herbert whose name has been connected with Shakespeare's sonnets, succeeded to the title in 1601. It has been suggested that he supported the poet at Oxford, but the significant omission of any reference to him

in any of Massinger's prefaces points to the contrary. Massinger left Oxford without a degree in 1606. His father had died in 1603, and he was perhaps dependent on his own exertions. The lack of a degree and the want of patronage from Lord Pembroke may both be explained on the supposition that he had become a Roman Catholic. On leaving the university he went to London to make his living as a dramatist, but his name cannot be de- finitely affixed to any play until fifteen years later, when The Virgin Martyr (ent. at Stationers' Hall, Dec. 7, 1621) appeared as the work of Massinger and Dekker. During these years he worked in collaboration with other dramatists. A joint letter, from Nathaniel Field, Robert Daborne and Philip Massinger, to Philip Henslowe, begs for an immediate loan of five pounds to release them from their " unfortunate extremitie," the money to be taken from the balance due for the " play of Mr Fletcher's and ours." A second document shows that Massinger and Daborne owed Henslowe £3 on the 4th of July 161 5. The earlier note pro- bably dates from 1613, and from this time Massinger apparently worked regularly with John Fletcher, although in editions of Beaumont and Fletcher's works his co-operation is usually unrecognized. Sir Aston Cokayne, Massinger's constant friend and patron, refers in explicit terms to this collaboration in a sonnet addressed to Humphrey Moseley on the publication of his folio edition of Beaumont and Fletcher (Small Poems of Divers Sorts, 1658), and in an epitaph on the two poets he says: — " Plays they did write together, were great friends, And now one grave includes them in their ends."

After Philip Henslowe's death in 1616 Massinger and Fletcher began to write for the King's Men. Between 1623 and 1626 Massinger produced unaided for the Lady Elizabeth's Men then playing at the Cockpit three pieces, The Parliament of Love, The Bondman and The Renegado. With the exception of these plays and The Great Duke of Florence, produced in 1627 by the Queen's servants, Massinger continued to write regularly for the King's Men until his death. The tone of the dedications of his later plays affords evidence of his continued poverty. Thus in the preface to The Maid

of Honour (1632) he wrote, addressing Sir Francis Foljambe and Sir Thomas Bland: " I had not to this time subsisted, but that I was supported by your frequent courtesies and favours." The prologue to The Guardian (licensed 1633) refers to two unsuccessful plays and two years of silence, when the author feared he had lost the popular favour. S. R. Gardiner, in an essay on " The Political Element in Massinger " (Contemp. Review, Aug. 1876), maintained that Massinger's dramas are before all else political, that the events of his day were as openly criticized in his plays as current politics are in the cartoons of Punch. It is probable that this break in his production was owing to his free handling of public matters. In 1631 Sir Henry Herbert, the master of the revels, refused to license an unnamed play by Massinger because of " dangerous matter as the deposing of Sebastian, King of Portugal," calculated presumably to endanger good relations between England and Spain. There is little doubt that this was the same piece as Believe as You List, in which time and place are changed, Antiochus being substituted for Sebastian, and Rome for Spain. In the prologue Massinger ironically apologizes for his ignorance of history, and professes that his accuracy is at fault if his picture comes near " a late and sad example." The obvious " late and sad example " of a wandering prince could be no other than Charles I.'s brother-in-law, the elector palatine. An allusion to the same subject may be traced in The Maid of Honour. In another play by Massinger, not extant, Charles I. is reported to have himself struck out a passage put into the mouth of Don Pedro, king of Spain, as "too insolent." The poet seems to have adhered closely to the politics of his patron, Philip Herbert, earl of Montgomery, and afterwards 4th earl of Pembroke, who had leanings to democracy and was a personal enemy of the duke of Buckingham. In The Bondman, dealing with the history of Timoleon, Buckingham is satirized as Gisco. The servility towards the Crown displayed in Beaumont and Fletcher's plays reflected the temper of the court of James I. The attitude of Massinger's heroes and heroines towards kings

is very different. Camiola's remarks on the limitations of the royal prerogative (Maid of Honour, act iv. sc. v.) could hardly be acceptable at court.

Massinger died suddenly at his house near the Globe theatre, and was buried in the churchyard of St Saviour's, Southwark, on the 1 8th of March 1640. In the entry in the parish register he is described as a " stranger," which, however, implies nothing more than that he belonged to another parish.

The supposition that Massinger was a Roman Catholic rests upon three of his plays, The Virgin Martyr (licensed 1620), The Renegado (licensed 1624) and The Maid of Honour (c. 1621). The religious sentiment is certainly such as would obviously best appeal to an audience sympathetic to Roman Catholic doctrine. The Virgin Martyr, in which Dekker probably had a large share, is really a miracle play, dealing with the martyrdom of Dorothea in the time of Diocletian, and the supernatural element is freely used. Little stress can be laid on this per- formance as elucidating Massinger's views. It is not entirely his work, and the story is early Christian, not Roman Catholic. In The Renegado, however, the action is dominated by the beneficent influence of a Jesuit priest, Francisco, and the doctrine of baptismal regeneration is enforced. In The Maid of Honour a complicated situation is solved by the decision of the heroine, Camio'a, to take the veil. For this she is held up " to all pos- terity a fair example for noble maids to imitate." Among all Massinger's heroines Camiola is distinguished by genuine purity and heroism.

His plays have generally an obvious moral intention. He sets himself to work out a series of ethical problems through a succes- sion of ingenious and effective plots. In the art of construction he has, indeed, few rivals. But the virtue of his heroes and heroines is rather morbid than natural, and often singularly divorced from common-sense. His dramatis personae are in general types rather than living persons, and their actions do not appear to spring inevitably from their characters, but rather from the exigencies of the plot. The heroes are too good, and the villains too wicked to be quite convincing. Moreover their respective goodness and villainy are too often represented as extraneous to themselves. This defect of characterization shows that English drama had already begun to decline.

It seems doubtful whether Massinger was ever a popular play- wright, for the best qualities of his plays would appeal rather to politicians and moralists than to the ordinary playgoer. He contributed, however, at least one great and popular character to the English stage. Sir Giles Overreach, in A New Way to Pay Old Debts, is a sort of commercial Richard III., a compound of the lion and the fox, and the part provides many opportunities for a great actor. He made another considerable contribution to the comedy of manners in The City Madam. In Massinger's own judgment The Roman Actor was " the most perfect birth of his Minerva." It is a study of the tyrant Domitian, and of the results of despotic rule on the despot himself and his court. Other favourable examples of his grave and restrained art are The Duke of Milan, The Bondman and The Great Duke of Florence.

Massinger was a student and follower of Shakespeare. The form of his verse, especially in the number of run-on lines, approximates in some

respects to Shakespeare's later manner. He is rhetorical and picturesque, but rarely rises to extraordinary felicity. His verse is never mean, but it sometimes comes peri- lously near to prose, and in dealing with passionate situations it lacks fire and directness.

The plays attributed to Massinger alone are: The Duke of Milan, a Tragedy (c. 1618, pr. 1623 and 1638); The Unnatural Combat, a Tragedy (c. 1619, pr. 1639); The Bondman, an Antient Storie (licensed 1623, pr. 1624) ; The Renegado, a Tragaecomedie (lie. 1624, pr. 1630); The Parliament of Love (lie. 1624; ascribed, no doubt erroneously, in the Stationers' Register, 1660, to W. Rowley; first printed by Gifford from an imperfect MS. in 1805) ; A New Way to Pay Old Debts, a Comoedie (c. 1625, pr. 1632); The Roman Actor. A Tragaedie (lie. 1626, pr. 1629) ; The Maid of Honour (dating perhaps from 1621, pr. 1632); The Picture, a Tragecomedie (lie. 1629, pr. 1630); The Great Duke of Florence, a Comicall Historie (lie. 1627, pr. 1635) ; The Emperor of the East, a Tragaecomoedie (lie. and pr.

1631), founded on the story of Theodosius the Younger; Believe as You List (rejected by the censor in January, but licensed in May, 1631; pr. 1848-1849 for the Percy Society); The City Madam, a Comedie (lie. 1632, pr. 1658), which Mr Fleay (Bwg. Chron. of the Eng. Drama, i. 226), however, considers to be a rifaciamento of an older play, protibly by Jonson; The Guardian (lie. 1633, pr. 1655); and The Bashful Lover (lie. 1636, pr. 1655). A Very Woman, or The Prince of Tarent, licensed in 1634 as the work of Massinger alone, is generally referred to his collaboration with Fletcher. The " exquisite temperance and justice " of this piece are, according to Swinburne, foreign to Fletcher's genius, and afford a striking example of Massinger's artistic skill and moderation.

Twelve plays of Massinger are said to be lost, but the titles of some of these may be duplicates of those of existing plays. Five of these lost plays were MSS. used by John Warburton's cook for pie- covers. The numerous plays in which Massinger's co-operation with John Fletcher is generally assumed are dealt with under Beaumont and Fletcher._ But it may be here noted that Mr R. Boyle has constructed an ingenious case for the joint authorship by Fletcher and Massinger of the two " Shakespearian " plays, Henry VIII. and Two Noble Kinsmen (see the New Shakspere Society's Transac- tions, 1884 and 1882). Mr Boyle sees the touch of Massinger in the first two acts of the Second Maiden's Tragedy (Lansdowne MS., lie. 161 1), a play with which the names of Fletcher and Tourneur are also associated by different critics. The Fatall Dowry, a Tragedy (c. 1619, pr. 1632), which was adapted without acknowledgment by Nicholas Rowe in his Fair Penitent, was written in conjunction with Nathaniel Field; and The Virgin Martir, a Tragedie (lie. 1620, pr. 162 1), with Thomas Dekker.

Massinger's independent works were collected by Coxeter (4 vols., I 759. revised edition with introduction by Thomas Davies, 1779), by J. Monck Mason (4 vols., 1779), by William Gifford (4 vols., 1805, 1813), by Hartley Coleridge (1840), by Lieut.Colonel Cunning ham (1867), and selections by Mr Arthur Symons in the Mermaid Series (1887-1889). Gifford's remains the standard edition, and formed the basis of Cunningham's text. It contains " An Essay on the Dramatic Writings of Massinger " by Dr John Ferriar.

Massinger has been the object of a good deal of criticism. A metrical examination of the plays in which Massinger was concerned is given in Englische Studien (Halle, v. 74, vii. 66, viii. 39, ix. 209 and x. 383), by Mr R. Boyle, who also contributed the life of the poet in the Dictionary of National Biography. The sources of his plays are dealt with by E. Koeppel in Quellen Studien zu den Dramen Chapman's, Massinger's und Ford's (Strassburg, 1897). For detailed criticism, beside the introductions to the editions quoted, see A. W. Ward, Hist, of Eng. Dram. Lit. (1899), iii. 1-47, and F. G. Fleay, Biog. Chron. of the Eng. Drama (1891), under Fletcher; a general estimate of Massinger, dealing especially with his moral standpoint, is given in Sir Leslie Stephen's Hours in a Library (3rd series, 1879) ; Swinburne, in the Fortnightly Review (July 1889), while acknowledg- ing the justice of Sir L. Stephen's main strictures, found much to say in praise of the poet.

MASSINISSA (c. 238-149 B.C.), king of Massylian or eastern Numidia. He was educated, like many of the Numidian chiefs, at Carthage, learnt Latin and Greek, and was an accomplished as well as a naturally clever man. Although his kingdom was nominally independent of Carthage, it really stood to it in a relation of vassalage; it was directly under Carthaginian influ- ences, and was imbued to a very considerable extent with Cartha- ginian civilization. It was to this that Massinissa owed his fame and success; he was a barbarian at heart, but he had a varnish of culture, and to this he added the craft and cunning in which Carthaginian statesmen were supposed to excel. While yet a young man (212) he forced his neighbour Syphax, prince of western Numidia, who had recently entered into an alliance with Rome, to fly to the Moors in the extreme west of Africa. Soon afterwards he appeared in Spain, fighting for Carthage with a large force of Numidian cavalry against the Romans under the two Scipios. The defeat of the Carthaginian army in 206 led him to cast in his lot with Rome. Scipio Africanus is said to have cultivated his friendship. Massinissa now quitted Spain for a while for Africa, and was again engaged in a war with Syphax in which he was decidedly worsted. Scipio's arrival in Africa in 204 gave him another chance, and no sooner had he joined the Roman general than he crushed his old enemy Syphax, and captured his capital Cirta (Constantine). Here occurs the romantic story of

Sophonisba, daughter of the Carthaginian Hasdrubal, who had been promised in marriage to Massinissa, but had subsequently become the wife of Syphax. Massinissa, according to the story, married Sophonisba immediately after his victory, but was required by Scipio to dismiss her as a Carthaginian, and consequently an enemy to Rome.

To save her from such humiliation he sent her poison, with which she destroyed herself. Massinissa was now accepted as a loyal ally of Rome, and was confirmed by Scipio in the possession of his kingdom. In the battle of Zama (202) (see Punic Wars), he commanded the cavalry on Scipio's right wing, and materially assisted the Roman victory. For his services he received the kingdom of Syphax, and thus under Roman protection he became master of the whole of Numidia, and his dominions completely enclosed the Carthaginian territories, now straitened and reduced at the close of the Second Punic War. It would seem that he had thoughts of annexing Carthage itself with the connivance of Rome. In a war which soon followed he was successful; the remonstrances of Carthage with Rome on the behaviour of her ally were answered by the appointment of Scipio as arbitrator; but, as though intentionally on the part of Rome, no definite settlement was arrived at, and thus the relations between Massinissa and the Carthaginians continued strained. Rome, it is certain, deliberately favoured her ally's unjust claims with the view of keeping Carthage weak, and Massinissa on his part was cunning enough to retain the friend- ship of the Roman people by helping them with liberal supplies in their wars against Perseus of Macedon and Antiochus. As soon as Carthage seemed to be recovering herself, and some of Massinissa's partisans were driven from the city into exile, his polity was to excite the fears of Rome, till at last in 149 war was declared — the Third Punic War, which ended in the final overthrow of Carthage. The king took some part in the negotia- tions which preceded the war, but died soon after its com- mencement in the ninetieth year of his age and the sixtieth of his reign.

Massinissa was an able ruler and a decided benefactor to Numidia. He converted a plundering tribe into a settled and civilized population, and out of robbers and marauders made efficient and disciplined soldiers. To his sons he bequeathed a well-stored treasury, a formidable army, and even a fleet. Cirta (g.v.), his capital, became a famous centre of Phoenician civilization. In fact Massinissa changed for the better the whole aspect of a great part of northern Africa. He had much of the Arab nature, was singularly temperate, and equal to any amount of fatigue. His fidelity to Rome was merely that of temporary expediency. He espoused now one

side, and now the other, but on the whole supported Rome, so that orators and historians could speak of him as " a most faithful ally of the Roman people."

See Livy xxiv. 49, xxviii. II, 35, 42, xxix. 27, xxx. 3, 12, 28, 37, xlii. 23, 29, xliii. 3; Polybius iii. 5, ix. 42, xiv. 1, xxxii. 2, xxxvii. 3; Appian, Hisp. 37, Punica, 11, 27, 105; Justin xxxiii. 1 ; A. H. J. Greenidge, Hist, of Rome (London, 1904).

MASSON, DAVID (1822-1907), Scottish man of letters, was born at Aberdeen on the 2nd of December 1822, and educated at the grammar school there and at Marischal College. Intending to enter the Church, he proceeded to Edinburgh University, where he studied theology under Dr Chalmers, whose friendship he enjoyed until the divine's death in 1847. However, abandon- ing his project of the ministry, he returned to his native city to undertake the editorship of the Banner, a weekly paper devoted to the advocacy of Free Kirk principles. After two years he resigned this post and went back to the capital, bent upon pursuing a purely literary career. There he wrote a great deal, contributing to Fraser's Magazine, Dublin University Magazine (in which appeared his essays on Chatterton) and other periodicals. In 1847 he went to London, where he found wider scope for his energy and knowledge. He was secretary (1851-1852) of the " Society of the Friends of Italy." In a famous interview with Mrs Browning at Florence he contested her admiration for Napoleon III. He had known De Quincey, whose biography he contributed in 1878 to the " English Men of Letters " series, and he was an enthusiastic friend and admirer of Carlyle. In 1852 he was appointed professor of English literature at University College, London, in succession to A. H. Clough, and from 1858 to 1865 he edited the newly established Macmillan's Magazine. In 1865 he was selected

for the chair of rhetoric and English literature at Edinburgh, and during the early years of his professorship actively pro- moted the movement for the university education of women. In 1879 he became editor of the Register of the Scottish Privy Council, and in 1893 was appointed Historiographer Royal for Scotland. Two years later he resigned his professorship. His magnum opus in his Life of Milton in Connexion with the History of His Own Time in six volumes, the first of which appeared in 1858 and the last in 1880. He also edited the library edition of Milton's Poetical Works (3 vols., 1874), and De Quincey's Collected Works (14 vols., 1889-1890). Among his other publi- cations are Essays, Biographical and Critical (1856, reprinted with additions, 3 vols., 1874), British Novelists and their Styles (1859), Drummond of Hawthornden (1873), Chatterton (1873) and Edinburgh Sketches (r892). He died on the 6th of October 1907. A bust of Masson was presented to the senate of the university of Edinburgh

in 1897. Professor Masson had married Rosaline Orme. His son Orme Masson became professor of chemistry in the university of Melbourne, and his daughter Rosaline is known as a writer and novelist.

MASSON, LOUIS CLAUDE FREDERIC (1847-), French historian, was born at Paris on the 8th of March 1847. His father, Francis Masson, a solicitor, was killed on the 23rd of June 1848, when major in the garde nationale. Young Masson was educated at the college of Sainte Barbe, and at the lycee Louis-le-Grand, and then travelled in Germany and in England; from 1869 to 1880 he was librarian at the Foreign Office. At first he devoted himself to the history of diplomacy, and pub- lished between 1877 and 1884 several volumes connected with that subject. Later he published a number of more or less curious memoirs illustrating the history of the Revolution and of the empire. But he is best known for his books connected with Napoleon. In Napoleon inconnu (1895), Masson, together with M. Guido Biagi, brought out the unpublished writings (1786-1793) of the future emperor. These were notes, extracts from historical, philosophical and literary books, and personal reflections in which one can watch the growth of the ideas later carried out by the emperor with modifications necessitated by the force of circumstances and his own genius. But this was only one in a remarkable series: Josephine de Beauharnais, 1763-1706 (1898); Josephine, imperatrice et reine (1899); Josephine repudite 1809-1814 (1901); L' Imperatrice Marie Louise (1902); Napolion et les femmes (1894); Napoleon et sa famille (9 vols., 1897-1907); Napolion et son fils (1904); and Autour de I'lle d'Elbe (1908). These works abound in details and amusing anecdotes, which throw much light on the events and men of the time, laying stress on the personal, romantic and dramatic aspects of history. The author was made a member of the Academie francaise in 1903. From 1886 to 1889 he edited the review Arts and Letters, published in London and New York.

A bibliography of his works, including anonymous ones and those under an assumed name, has been published by G. Vicaire {Manuel de Vamateur des livres du XIX' Steele, tome v., 1904). Napoleon et les femmes has been translated into English as Napoleon and the Fair Sex (1894).

MAST (1) (O. Eng. maest; a common Teutonic word, cognate with Lat. malus; from the medieval latinized form mastus comes Fr. mat), in nautical language, the name of the spar, or straight piece of timber, or combination of spars, on which are hung the yards and sails of a vessel of any size. It has been ingeniously supposed that man himself was the first mast. He discovered by standing up in his prehistoric " dugout," or canoe, that the wind blowing on him would carry his craft along. But the origin of the mast, like that of the ship, is lost in times anterior to all record. The earliest form of mast which prevailed till the close of the middle ages, and is still in

use for small vessels, was and is a single spar made of some tough and elastic wood; the conifers supply the best timber for the purpose. In sketching the history of the development of the mast, we must distinguish between the increase in the number erected, and the improve- ments made in the mast itself. The earliest ships had only one, carrying a single sail. So little is known of the rigging of

classical ships that nothing can be affirmed of them with absolute confidence. The Norse vessels carried one mast placed in the middle. The number gradually increased till it reached four or five. All were at first upright, but the mast which stood nearest the bow was by degrees lowered forward till it became the bow-sprit of modern times, and lost the name of mast. The next from the bows became the foremast — called in Mediterra- nean sea language mizzana, in French misaine. Then came the main-mast — in French grand mdt; and then the mizen — in French, which follows the Mediterranean usage, the artimon, i.e. " next the rudder," timon. A small mast was sometimes erected in the very end of the ship, and called in English a " bonaventure mizen." It had a close resemblance to the jigger of yawl-rigged yachts. By the close of the 16th century it had become the established rule that a ship proper had three masts — fore, main and mizen. The third takes its name not as the other two do, from its place, but from the lateen sail originally hoisted on it (see Rigging) , which was placed fore and aft in the middle (Italian, mizzo) of the ship, and did not lie across like the courses and topsails. With the development of very large sailing clippers in the middle of the 19th century a return was made to the practice of carrying more than three masts. Ships and barques are built with four or five. Some of the large schooners employed in the American coast trade have six or seven, and some steamers have had as many.

The mast was for long made out of a single spar. Thence the Mediterranean name of " palo " (spar) and the Spanish " arbol " (tree). The typical Mediterranean mast of " lateen " (Latin) vessels is short and bends forward. In other classes it is upright, or bends slightly backwards with what is called a " rake.' The mast is grounded, or in technical language " stepped," on the kelson (or keelson), the solid timber or metal beam lying parallel with, and above the keel. As the 15th century advanced the growth of the ship made it difficult, or even impossible, to find spars large enough to make a mast. The practice of dividing it into lower, and upper or topmast, was introduced. At first the two were fastened firmly, and the topmast could not be lowered. In the 16th century the top- mast became movable. No date can be given for the change, which was gradual, and was

not simultaneously adopted. When the masting of sailing ships was fully developed, the division was into lower or standing mast, topmast, topgallant mast, and topgallant royal. The topgallant royal is a small spar which is often a continua- tion of the topgallant mast, and is fixed. Increase of size also made it impossible to construct each of these subdivisions out of single timbers. A distinction was made between " whole " or single-spar masts and " armed " and " made masts." The first were used for the lighter spars, for small vessels and the Mediterranean craft called " polacras." Armed masts were composed of two single timbers. Made masts were built of many pieces, bolted and " coaked," i.e. dovetailed and fitted together, fastened round by iron hoops, and between them by twelve or thirteen close turns of rope, firmly secured. " Made masts " are stronger than those made of a single tree and less liable to be sprung. The general principle of construc- tion is that it is built round a central shaft, called in English the " spindle " or " upper tree," and in French the mhche or wick. The other pieces — " side trees," " keel pieces," " side fishes," " cant pieces " and " fillings " are " coaked," i.e. dovetailed and bolted on to and around the " spindle," which itself is made of two pieces, coaked and bolted. The whole is bound by iron bands, and between the bands, by rope firmly " woulded " or turned round, and nailed tight. The art of constructing made masts, like that of building wooden ships, is in process of dying out. In sailing men-of-war the mizen-mast often did not reach to the kelson, but was stepped on the orlop deck. Hollow metal cylinders are now used as masts. In the case of a masted screw steamer the masts abaft the engines could not be stepped on the kelson because they would interfere with the shaft of the screw. It is therefore necessary to step them on the lower deck, where they are supported by stanchions, or on a horseshoe covering the screw shaft. The size of masts naturally varies very much. In a no-gun ship of 2164 tons the proportions of the mainmast were: for the lower mast, length 117 ft., diameter 3 ft. 3 in.; topmast, 70 ft., and 2of in.; topgallant mast, 35 ft., and 1 1 f in., 222 ft. in all. At the other end of the scale, a cutter of 200 tons had a lower mast of 88 ft., of 22 in. diameter, and a topgallant mast (there was no topmast between them) of 44 ft., of 9! in. in diameter, 132 ft. in all; topgallant mast of 44 ft., and 9} in. in diam- eter. The masts of a warship were more lofty than those of a merchant ship of the same tonnage. At present masts are only used by warships for signalling and military purposes. In sailing merchant ships, the masts are more lofty than they were about a century ago. A merchant ship of 1300 tons, in 1830, had a main- mast 179 ft. in height; a vessel of the same size would have a mast of 198 ft. to-day.

A " jury mast " is a temporary mast put up by the crew when the spars have been carried away in a storm or in action, or have been cut away to relieve pressure in a storm. The word has been supposed without any

foundation to be short for " injury " mast; it may be a mere fanciful sailor adaptation of " jury " in some connexion now lost. Skeat suggests that it is short for O. Fr. ajoitrie, Lat. adjulare, to aid. There is no reason to connect with jour, day. _ See L. Jal, Glossaire Nautique (Paris, 1848); Sir Henry Manway- ring, The Seaman's Dictionary (London, 1644) ; N. Hutchinson, Treatise on Naval Architecture and Practical Seamanship (Liverpool, 1777); David Steel, Elements and Practice of Rigging, Seamanship and Naval Tactics (London, 1800); William Burney's Falconer's Dictionary (London, 1830) ; Sir Gervais Nares's Seamanship (Ports- mouth, 1882); and John Fincham, On Masting Ships and Mast Making (London, 1829). (D. H.)

Mast (2) (Anglo-Saxon maest, food, common to some Teutonic languages, and ultimately connected with "meat"), the fruit of the beech, oak, and other forest trees, used as food for swine.

MASTABA (Arab, for "bench"), in Egyptian architecture, the term given to the rectangular tombs in stone with raking sides and a flat roof. There were three chambers inside. In one the walls were sometimes richly decorated with paintings and had a low bench of stone in them on which incense was burnt. The second chamber was either closed, with holes pierced in the wall separating it from the first chamber, or entered through a narrow passage through which the fumes of the incense passed; this chamber contained the serdab or figure of the deceased. A vertical well-hole cut in the rock descended to a third chamber in which the mummy was laid.

MASTER (Lat. tnagister, related to magis, more, as the corresponding minister is to minus, less; the English form is due partly to the O. Eng. maegister, and partly to O. Fr. maistre, mod. mattre; cf. Du. meester, Ger. Meister, Ital. maestro), one holding a position of authority, disposition or control over persons or things. The various applications of the word fall roughly into the following main divisions; as the title of the holder of a position of command or authority; as that of the holder of certain public or private offices, and hence a title of address; and as implying the relationship of a teacher to his pupils or of an employer to the persons he employs. As a title of the holder of an office, the use of the Lat. magister is very ancient. Magister equitum, master of the horse, goes back to the early history of the Roman Republic (see Dictator; and for the British office, Master of the Horse). In medieval times the title was of great frequency. In Du Cange (Glossarium) the article magister contains over 120 sub-headings. In the British royal household most of the offices bearing this title are now obsolete. Of the greater offices, that of master of the buckhounds was abolished by the Civil List Act 1901. The master of the household, master of the ceremonies, master of the king's music still survive. Since 1870 the office of master of the mint has been held by the chancellor of the

exchequer, all the administrative and other duties being exercised by the deputy master.

At sea, a " master " is more properly styled " master mariner." In the merchant service he is the commander of a ship, and is by courtesy known as the captain. In the British navy he was the officer entrusted with the navigation under the captain. He had no royal commission, but a warrant from the Navy Board. Very often he had been a merchant captain. His duties are now performed by the staff commander or navigating lieutenant. The master-at-arms is the head of the internal police of a ship; the same title is borne by a senior gymnastic instructor in the army. In -the United States navy, the master is a commissioned officer below the rank of lieutenant.

" Master " appears as the title of many legal functionaries (for the masters of the supreme court see Chancery; and King's Bench, Court or; for masters in lunacy see Insanity: § Law; see also Master of the Rolls, below). The " master of the faculties " is the chief officer of the archbishop of Canterbury in his court of faculties. His duties are concerned with the appointment of notaries and the granting of special licences of marriage. The duties are performed ex officio by the judge of the provincial courts of Canterbury and York, who is also I dean of Arches, in accordance with § 7 of the Public Worship

Regulation Act 1874. The " master of the Temple " is the title of the priest-in-charge of the Temple Church in London. It was formerly the title of the grand master of the Knights Templars. The priest-in-charge of the Templars' Church was properly styled the custos, and this was preserved by the Knights Hospitallers when they were granted the property of the Templars at the dissolution of that order. The act of 1540 (32 Henry VIII.), which dissolved the order of the Hospitallers, wrongly styled the custos master of the Temple, and the mistake has been continued. The proper title of a bencher of the Inns of Court is " master of the Bench " (see Inns of Court). The title of " Master-General of the Ordnance " was revived in 1904 for the head of the Ordnance Department in the British military administration.

" Master " is the ordinary word for a teacher, very generally used in the compound " schoolmaster." The word also is used in a sense transferred from this to express the relation between the founder of a school of religion, philosophy, science, art, &c, and his disciples. It is partly in this sense and partly in that of one whose work serves as a model or type of superlative excellence that such terms as " old masters " are used. In

medieval universities magister was particularly applied to one who had been granted a degree carrying with it the licentia docendi, the licence to teach. In English usage this survives in the faculty of arts. The degree is that of artium magister, master of arts, abbreviated M.A. In the other faculties the corresponding degree is doctor. Some British universities give a master's degree in surgery, magister chirurgiae, CM. or M.Ch., and also in science) magister scientiae, M.Sc. The academic use of " master " as the title of the head of certain colleges at the universities of Oxford and Cambridge is to be referred to the frequent application of the term to the holder of a presiding office in an institution.

Master was the usual prefix of address to a man's name, though originally confined to people of some social standing. Probably under the influence of " mistress," it was corrupted in sound to " mister," and was abbreviated to " Mr." In the case of the puisne judges of the High Court " Mr Justice " is still used as the proper official form of written address. The Speaker of the House of Commons is also formally addressed as " Mr Speaker." In some Scottish peerages below the rank of earl, " master " is used in the courtesy title of the heir, e.g. the " Master of Ruthven."

MASTER AND SERVANT. These are scarcely to be con- sidered as technical terms in English law. The relationship which they imply is created when one man hires the labour of another for a term. Thus it is not constituted by merely contracting with another for the performance of a definite work, or by sending an article to an artificer to be repaired, or engaging a builder to construct a house. Nor would the employment of a man for one definite act of personal service — e.g. the engage- ment of a messenger for a single occasion — generally make the one master and the other servant. It was held, however, in relation to the offence of embezzlement, that a drover employed on one occasion to drive rattle home from market was a servant within the statute. On the other hand, there are many decisions limiting the meaning of " servants " under wills giving legacies to the class of servants generally. Thus " a person who was not obliged to give his whole time to the master, but was yet in some sense a servant," was held not entitled to share in a legacy to the servants. These cases are, however, interpreta- tions of wills where the intention obviously is to benefit domestic servants only. And so in other connexions questions may arise as to the exact nature of the relations between the parties — whether they are master and servant, or principal and agent, or landlord and tenant, or partners, &c.

The terms of the contract of service are for the most part such as the parties choose to make them, but in the absence of express stipulations terms will be implied by the law. Thus, " where no time is limited either expressly or by implication for the duration of a contract of hiring and

service, the hiring is considered as a general hiring, and in point of law a hiring for

a year." But " in the case of domestic and menial servants there is a well-known rule, founded solely on custom, that their contract of service may be determined at any time by giving a month's warning or paying a month's wages, but a domestic or other yearly servant, wrongfully quitting his master's service, forfeits all claim to wages for that part of the current year during which he has served, and cannot claim the sum to which his wages would have amounted had he kept his contract, merely deducting therefrom one month's wages. Domestic servants have a right by custom to leave their situations at any time on payment of a calendar month's wages in advance, just as a master may discharge them in a similar manner " (Manley Smith's Law of Master and Servant, chs. ii. and iii.). The following are sufficient grounds for discharging a servant: (1) wilful disobedience of any lawful order; (2) gross moral mis- conduct; (3) habitual negligence; (4) incompetence or permanent disability caused by illness. A master has a right of action against any person who deprives him of the services of his servant, by enticing him away, harbouring or detaining him after notice, confining or disabling him, or by seducing his female servant. Indeed, the ordinary and only available action for seduction in English law is in form of a claim by a parent for the loss of his daughter's services. The death of either master or servant in general puts an end to the contract. A servant wrongfully discharged may either treat the contract as rescinded and sue for services actually rendered, or he may bring a special action for damages for the breach. The common law liabilities of a master towards his servants have been further regulated by the Workmen's Compensation Acts (see Employer's Lia- bility) . A master is bound to provide food for a servant living under his roof, and wilful breach of duty in that respect is a misdemeanour under the Offences against the Person Act

1861.

A servant has no right to demand " a character " from an employer, and if a character be given it will be deemed a privi- leged communication, so that the master will not be liable thereon to the servant unless it be false and malicious. A master by knowingly giving a false character of a servant to an intending employer may render himself liable — should the servant for example rob or injure his new master.

Reference may be made to the articles on Labour Legislation for the cases in which special terms have been introduced into con- tracts of service by statute (e.g. Truck Acts).

MASTER OF THE HORSE, in England, an important official of the

sovereign's household. The master of the horse is the third dignitary of the court, and is always a member of the ministry (before 1782 the office was of cabinet rank), a peer and a privy councillor. All matters connected with the horses and hounds of the sovereign, as well as the stables and coach-houses, the stud, mews and kennels, are within his jurisdiction. The practical management of the royal stables and stud devolves on the chief or crown equerry, formerly called the gentleman of the horse, who is never in personal attendance on the sovereign and whose appointment is permanent. The clerk marshal has the supervision of the accounts of the department before they are submitted to the Board of Green Cloth, and is in waiting on the sovereign on state occasions only. Exclusive of the crown equerry there are seven regular equerries, besides extra and honorary equerries, one of whom is always in attendance on the sovereign and rides at the side of the royal carriage. They are always officers of the army, and each of them is " on duty " for about the same time as the lords and grooms in waiting. There are also several pages of honour in the master of the horse's department, who must not be confounded with the pages of various kinds who are in the department of the lord chamber- lain. They are youths aged from twelve to sixteen, selected by the sovereign in person, to attend on him at state ceremonies, when two of them, arrayed in an antique costume, assist the groom of the stole in carrying the royal train.

In France the master of the horse (" Grand Ecuyer," or more usually " Monsieur le grand ") was one of the seven great officers of the crown from 1617. As well as the superintendence of the royal

stables, he had that of the retinue of the sovereign, also the charge of the funds set aside for the religious functions of the court, corona- tions, &c. On the death of a sovereign he had the right to all the horses and their equipment in the royal stables. Distinct from this officer and independent of him, was the first equerry (" Premier Ecuyer "), who had charge of the horses which the sovereign used personally (" la petite ecurie "), and who attended on him when he rode out. The office of master of the horse existed down to the reign of Louis XVI. Under Louis XVIII. and Charles X. the duties were discharged by the first equerry, but under Napoleon I. and Napoleon III. the office was revived with much of its old importance.

In Germany the master of the horse (Oberststallmeister) is a high court dignitary ; but his office is merely titular, the superintendence of the king's stables being carried out by the Oberstallmeister, an official corresponding to the crown equerry in England.

MASTER OF THE ROLLS, the third member of the Supreme Court of Judicature in England, the lord chancellor, president of the chancery division, being the first, and the lord chief justice, president of the king's bench division, being the second. At first he was the principal clerk of the chancery, and as such had charge of the records of the court, especially of the register of original writs and of all patents and grants under the Great Seal. Until the end of the 15th century he was called either the clerk or the keeper of the rolls, and he is still formally designated as the master or keeper of the rolls. The earliest mention of him as master of the rolls is in an act of 149s; and in another act of the same year he is again described as clerk of the rolls, showing that his official designation still remained unsettled. About the same period, however, the chief clerks of the chancery came to be called masters in chancery, and the clerk, master or keeper of the rolls was always the first among them, whichever name they bore. In course of time, from causes which are not very easy to trace, his original functions as keeper of the records passed away from him and he gradually assumed a jurisdiction in the court of chancery second only to that of the lord chan- cellor himself. In the beginning he only heard causes in con- junction with the other masters in chancery, and his decrees were invalid until they had been approved and signed by the lord chancellor. Sitting in the Rolls chapel or in the court in Rolls yard, he heard causes without assistance, and his decrees held good until they were reversed on petition either to the lord chancellor or afterwards to the lords justices of appeal. Before any judge with the formal title of vice-chancellor was appointed the master of the rolls was often spoken of as vice- chancellor, and in theory acted as such, sitting only when the lord chancellor was not sitting and holding his court in the evening from six o'clock to ten. Only since 1827 has the master of the rolls sat in the morning hours. By the Public Record Office Act 1838 the custody of the records was restored to him, and he is chairman of the State Papers and Historical Manu- scripts Commissions. Under the Judicature Act 1875, and the Appellate Jurisdiction Act 1876, he now always sits with the lords justices in the court of appeal (which usually sits in two divisions of three judges, the master of the rolls presiding over one division), whose decisions can be questioned only in the House of Lords. The master of the rolls was formerly eligible to a seat in the House of Commons — a privilege enjoyed by no other member of the judicial bench; 1 but he was deprived of it by the Supreme Court of Judicature Act 1873, which provides that all judges of the High Court of Justice and the court of appeal shall be incapable of being elected to or sitting in the House of Commons. The master of the rolls is always sworn of the privy council. His salary is £6000 a year.

See Lord Hardwicke, Office of the Master of the Rolls. MASTIC, or Mastich (Gr. iiaarixv, probably connected with HacaaOcu, to chew, since

mastic is used in the East as a chewing gum), a resinous exudation obtained from the lentisk, Pistacia lentiscus, an evergreen shrub of the natural order Anacardiaceae. The lentisk or mastic plant is indigenous to the Mediterranean coast region from Syria to Spain, but grows also in Portugal, Morocco and the Canaries. Although experiments have proved that excellent mastic might be obtained in other islands in the

1 Sir John Romilly, M.P. for Devonport, 1847 to 1852, was the last master of the rolls to sit in Parliament. He was appointed master >f the rolls in 1851.

archipelago, the production of the substance has been, since the time of Dioscorides, almost exclusively confined to the island of Chios. The mastic districts of that island are for the most part flat and stony, with little hills and few streams. The shrubs are about 6 ft. high. The resin is contained in the bark and not in the wood, and in order to obtain it numerous vertical incisions are made, during June, July and August, in the stem and chief branches. The resin speedily exudes and hardens into roundish or oval tears, which are collected, after about fifteen days, by women and children in little baskets lined with white paper or cotton wool. The ground around the trees is kept hard and clean, and flat pieces of stone are often laid beneath them to prevent any droppings of resin from becoming contaminated with dirt. The collection is repeated three or four times between June and September, a fine tree being found to yield about 8 or 10 lb of mastic during the season. Besides that obtained from the incisions, mastic of very fine quality spontaneously exudes from the small branches. The harvest is affected by showers of rain during the period of collection, and the trees are much injured by frost, which is, however, of rare occurrence in the districts where they grow. Mastic occurs in commerce in the form of roundish tears about the size of peas. They are transparent, with a glassy fracture, of a pale yellow or faint greenish tinge, which darkens slowly by age. During the 15th, 16th and 17th centuries mastic enjoyed a high reputation as a medicine, and formed an ingredient in a large number of medical compounds; but its use in medicine is now obsolete, and it is chiefly employed for making varnish.

Pistacia Khinjuk and P. cabulica, trees growing throughout Sindh, Baluchistan and Cabul, yield a kind of mastic which is met with in the Indian bazaars under the name of Mustagiruml, i.e. Roman mastic. This when occurring in the European market is known as East Indian or Bombay mastic. In Algeria P. Atlantica yields a solid resin, which is collected and used by the Arabs as a masticatory. Cape mastic is the produce of Euryops . multifidus, the resin bush, or harpuis bosch of the Boers — a plant of the compo- site order growing abundantly in the Clanwilliam district. Dammar resin is sometimes sold under the name of

mastic. The West Indian mastic tree is the Bursera gummifera and the Peruvian mastic is Schinus molle; but neither of these furnishes commercial resins. The name mastic tree is also applied to a timber tree, Sider oxylon mastichodendron, nat. ord. Sapotaceae, which grows in the West Indies and on the coast of Florida.

MASTIGOPHORA, a group of Protozoa, moving and ingesting

food by long flagella (Gr. /idtmi;, whip), usually few in number, and multiplying by fission, usually longitudinal, in the active condition. They were separated off from the rest of the old " Infusoria " by K. Dtising, and subdivided by 0. Butschli and E. R. Lankester into (1) Flagellata (q.v.), including Haemo- flagellata (q.v.), (2) Dinoflagellata (q.v.) and Rhyncho = Cysto- flagellata E. Haeckel (q.v.) = Rhynchoflagellata E. R. Lankester. The Mastigophora are frequently termed Flagellata or Flagellates.

MASTODON (Gr. juacrros, breast, 65ovs, tooth), a name given by Cuvier to the Pliocene and Miocene forerunners of the elephants, on account of the nipple-like prominences on the molar teeth of some of the species (fig. 2), which are of a much simpler type than those of true elephants. Mastodons, like elephants, always have a pair of upper tusks, while the earlier ones likewise have a short pair in the lower jaw, which is prolonged into a snout-like symphysis for their support. These long-chinned mastodons are now regarded as forming a genus by themselves (Tetrabelodon), well-known examples of this group being Tetrabelodon angustidens from the Miocene and T. longirostris (fig. 1 C.) from the Lower Pliocene of the Conti- nent. In the former the upper tusks are bent down so as to cross the tips of the short and chisel-like lower pair. These long-chinned mastodons must have had an extremely elongated muzzle, formed by the upper lip and nose above and the lower lip below, with which they were able to reach the ground, the neck being probably rather longer than in elephants. On the other hand, in the short-chinned mastodons, as represented by the Pleistocene North American Mastodon americanus and the Pliocene European M. turicensis (fig. 1), the chin had shrunk

to the dimensions characteristic of elephants, with the loss of the lower incisors (or with temporary retention of rudimentary ones), while at the same time a true elephant-like trunk must have been developed by the shortening of the lower lip and the prolongation of the combined upper lip and nose.

Mastodons are found in almost all parts of the world. In Asia they gave rise to the elephants, while they themselves originated in Africa from ungulates of more normal type. (See Proboscidea.)

The upper tusks of the early mastodons differ from those of ele- phants in retaining longitudinal bands of enamel. The molar teeth

species the summits of the ridges are divided into conical cusps, and may have accessory cusps clustering around them (as in M . arvernensis, dg. 2). When the summits of these are worn by mastication their surfaces present circles of dentine surrounded by a border of enamel, and as attrition proceeds different patterns are produced by the union of the bases of the cusps, a trefoil form being characteristic of some species.

Certain of the molar teeth of the middle of the series in both elephants and mastodons have the same number of principal ridges; those in front having fewer, and those behind a greater number. These teeth are distinguished as " intermediate " molars. In ele- phants there are only two, the last milk-molar and the first true molar (or the third and fourth of the whole series), which are alike in the number of ridges; whereas in mastodons there are three such

teeth, the last milk-molar and the first and second molars (or the third, fourth and fifth of the whole series). In elephants the number of ridges on the intermediate molars always exceeds five, but in mastodons it is nearly always three or four, and the tooth in front has usually one fewer and that behind one more, so that the ridge- formula {i.e. a formula ex- pressing the number of ridges on each of the six molar teeth) of most mastodons can be reduced either to 1, 2, 3, 3, 3, 4, or 2, 3, 4, 4, 4, 5. Three- ridged and four-ridged types occur both in Mastodon and

Tetrabelodon. (R. L.)*

MAS'UDI (Abu

'All IBN IJUSAIN

ul-Mas'udi] (d. Arabian historian, at Bagdad close of the

Fig. 1. — Mastodon turicensis (Pliocene). A, B, Skull and Lower Jaw of Mastodon americanus. C, Lower Jaw of Tetrabelodon longirostris,

are six in number on each side, increasing in size from before back- wards, and, as in the elephants, with a horizontal succession, the anterior teeth being lost before the full development of the posterior ones, which gradually move forward, taking the place of those that are destroyed by wear. This

process is, however, less fully developed than in elephants, and as many as three teeth may be in place in each jaw at one time. There is, moreover, in many species a vertical succession, affecting either the third, or the third and second, or (in one American species, Tetrabelodon productus) the first, second and third of the six molar teeth. These three are therefore reckoned as milk-molars, and their successors as premolars, while the last three correspond to the true molars of other mammals. The mode of succession of the teeth in the mastodons exhibits so many stages of the process by which the dentition of elephants has been derived from that of more ordinary mammals. It also shows that the an- terior molars of elephants do not correspond to the premolars of other ungulates, but to the milk-molars, the early loss of which in consequence of the peculiar process of horizontal forward-moving

and went in the following year thence to Cambay, Saimur and back to Oman. as far as China.

(From Owen.)

Fig. 2. — Upper Molar of Mastodon arvernensis, viewed from below.

succession does not require their replacement by premolars. Special- ized species like Mastodon americanus have completely lost the rudimentary premolars.

Mastodons have fewer ridges on their molar teeth than elephants ; the ridges are also less elevated, wider apart, with a thicker enamel covering, and scarcely any cement filling the space between them. Sometimes (as in M. americanus) the ridges are simple transverse wedge-shaped elevations, with straight or concave edges. In other

L Hasan

IBN ‘AlI

c. 956), was born towards the 9th century. Much of his life was spent in travel. After he had been in Persia and Kerman, he visited Istakhr in 915, to Multan and Mansura, Ceylon, to Madagascar and He seems about this time to have been After a visit to the shores of the Caspian Sea he visited Tiberias in Palestine, examined the Christian church there, and described its relics. In 943 he was in Antioch, studying the ruins, and two years later in Damascus. The last ten years of his life he spent in Syria and Egypt. His great object in life had been to study with his own eyes the peculiarities of every land and to collect whatever was of interest for archaeology, history and manners. Himself a Mo’tazilite (see Mahommedan Religion: Sects), he was singularly free from bigotry, and took his information, when necessary,

from Persians, Jews, Indians, and even the chronicle of a Christian bishop.

His most extensive work was the Kitab akhbar uz-Zaman or Annals, in 30 volumes with a supplement, the Kitab ul-Ausaf, a chronological sketch of general history. Of these the first part only of the former is extant in MS. in Vienna, while the latter seems to be in the Bodleian Library, also in MS. The substance of the two was united by him in the work by which he is now best known, the Muruj udh-Dhahab wa Ma'adin ul-Jawahir (" Meadows of Gold and Mines of Precious Stones "), an historical work which he completed in 947. In 956 he finished a second edition of this and made it double its former size, but no copy of this seems to be extant. The original edition has been published at Bulaq and Cairo, and with French translation by C. Barbier de Meynard and Pavet de Courteille (9 vols., Paris, 1 861-1877). Another work of Mas'udI, written in the last year of his life, is the Kitab ut-Tanbih wal Ishraf (the " Book of Indication and Revision"), in which he summarizes the work of his life and corrects and completes his former writings. It has been edited by M. J. de Goeje (Leiden, 1894), and a French translation has been made by Carra de Vaux (Paris, 1896) ; cf. also the memoir of S. de Sacy published in Meynard's edition of the Muriij.

An account of Mas'udl's works is to be found in de Sacy's memoir and in Goeje's preface to his edition of the Taritnh, and of the works extant in C. Brockelmann's Gesch. der Arabischen Litteratur, i. 144-145 (Weimar, 1898). C. Field's Tales of the Caliphs (1909) is based on Mas'udI. (G. W. T.)

MASULIPATAM, or Bandar, a seaport of British India, administrative headquarters of the Kistna district of Madras, on one of the mouths of the river Kistna, 215 m. N. of Madras city. Pop. (1001), 39,507- Masulipatam was the earliest English settlement on the Coromandel coast, its importance being due to the fact that it was the bandar or port of Golconda. An agency was established there in 161 1. During the wars of the Carnatic, the English were temporarily expelled the town, which was held by the French for some years. In 1759 the town and fort were carried by storm by Colonel Forde, an achievement followed by the acquisition of the Northern Circars (q.v.). In 1864 a great storm-wave swept over the entire town and is said to have destroyed 30,000 lives. Weavers form a large portion of the inhabitants, though their trade has greatly declined since the beginning of the 19th century. Their opera- tions, besides weaving, include printing, bleaching washing and dressing. In former days the chintzes of Masulipatam had a great reputation abroad for the freshness

and permanency of their dyes. Masulipatam is a station of the Church Missionary Society. The port is only a roadstead, where vessels anchor 5 m. out. A branch line from Bezwada on the Southern Mahratta railway was opened in 1908. The chief educational institution is the Noble College of the C.M.S.

MAT (O. Eng. meatt, from late Lat. malta, whence Ital. matta, Ger. and Dan. matte, Du. mat, &c), an article of various sizes and shapes, according to the purpose for Which it is intended, and made of plaited or woven materials, such as coir, hemp, coco-nut fibre, straw, rushes, &c, or of rope or coarse twine. The finer fabrics are known as "matting" (q.v.). Mats are mainly used for covering floors, or in horticulture as a protection against cold or exposure for plants and trees. When used near the entrance to a house for people to wipe their boots on " door mats " are usually made of coarse coco-nut fibre, or india-rubber, cork, or of thickly coiled wire. Bags, rolls or sacks made of matting are used to hold coffee, flax, rice and other produce, and the term is often used with reference to the specific quantities of such produce, e.g. so many " mats " of coffee, rice, &c.

To be distinguished from the above is the term " mat " in glass- painting or gilding, meaning dull, unpolished or unburnished. This is the same as Ger. matt, dead, dull, cf. tnatt-blau, Med. Lat. mattus, adapted from Persian mat, dazed, astonished, at a loss, helpless, and seen in " mate " in chess, from Pers. shah mat the king is dead.

MATABELE (" vanishing " or " hidden " people, so called from their appearance in battle, hidden behind enormous oxhide shields), a people of Zulu origin who began national life under the chief Mosilikatze. Driven out of the Transvaal by the Boers in 1837, Mosilikatze crossed the Limpopo with a military host which had been recruited from every tribe conquered by him during his ten years' predominance in the Transvaal. In their new territories the Matabele absorbed into their ranks many members of the conquered Mashona tribes and established a military despotism. Their sole occupation was war, for which their laws and organization were designed to fit them. This system of constant warfare is, since the conquest of Matabeleland by the British in 1893, a thing of the past. The Matabele are now herdsmen and agriculturists. (See Rhodesia.)

MATACHINES (Span, matachin, clown, or masked dancer), bands of mummers or itinerant players in Mexico, especially popular around the Rio Grande, who wander from village to village during Lent, playing in rough-and-ready style a set drama based on the history of Montezuma. Dressed in fan- tastic Indian costumes and carrying rattles as their orchestra, the chief characters are El Monarca " the monarch " (Monte- zuma) ; Malinche, or Malintzin, the Indian mistress of Hernando Cortes; El Toro, " the bull," the

malevolent " comic man " of the play, dressed in buffalo skin with the animal's horns on his head; Aguelo, the " grandfather," and A guela, " grandmother." With the help of a chorus of dancers they portray the desertion of his people by Montezuma, the luring of him back by the wiles and smiles of Malinche, the final reunion of king and people, and the killing of El Toro, who is supposed to have made all the mischief.

MATADOR, a Spanish word meaning literally " killer," from matar, Lat. mactare, especially applied to the principal performer in a bull-fight, whose function it is to slay the bull (see Bull- fighting). The word is also used of certain important cards in such games as quadrille, ombre, &c, and more particularly of a special form of the game of dominoes.

MATAMOROS, a town and port of the state of Tamaulipas, Mexico, on the S. bank of the Rio Grande, 28 m. from its mouth, opposite Brownsville, Texas. Pop. (1900), 8347. Matamoros stands in an open plain, the commercial centre for a large district, but its import trade is prejudiced by the bar at the mouth of the Rio Grande, which permits the entrance of small vessels only. The exports include hides, wool and live stock. The importance of the town in the foreign trade of northern Mexico, however, has been largely diminished by the great railways. Formerly it was the centre of a large contra- band trade with Brownsville, Texas. Matamoros was founded early in the 19th century, and was named in honour of the Mexican patriot Mariano Matamoros (c. 17 70-1 8 14). In the war between the United States and Mexico, Matamoros was easily taken by the Americans on the 18th of May 1846, following General Zachary Taylor's victories at Palo Alto and Resaca de la Palma. Matamoros was occupied by the Mexican im- perialists under Mejia in 1864, and by the French in 1866.

MATANZAS, an important city of Cuba, capital of Matanzas Province, situated on a large deep bay on the N. coast, about 54 m. (by rail) E. of Havana. Pop. (1907), 36,009. There are railway outlets W., S. and E., and Matanzas is served by steam- ships to New York and by the coast steamers of the Herrera Line. The bay, unlike all the other better harbours of the island, has a broad mouth, 2 m. across, but there is good shelter against all winds except from the N.E. A coral reef lies across the entrance. Three rivers emptying into the bay — the San Juan, Canimar and Yumuri — have deposited much silt, necessitating the use of lighters in loading and unloading large ships. The city is finely placed at the head of the bay, on a low, sloping plain backed by wooded hills, over some of which the city itself has spread. The conical Pan de Matanzas (1277 ft.) is a striking land- mark for sailors. The San Juan and Yumuri rivers divide Matanzas into three districts. The Teatro Esteban, Casino Espafiol and Government House are noteworthy among the buildings. The broad Paseo de Marti (Alameda

de Versalles, Paseo de Santa Cristina) extends along the edge of the harbour, and is perhaps the handsomest parkway and boulevard in Cuba. At one end is a statue of Ferdinand VII., at the other a monument to 63 Cubans executed by the Spanish Government as traitors for bearing arms in the cause of independence. A splendid military road continues the Paseo to the Castillo de San Serverino (built in 1694-1695, reconstructed in 1773 and following years). There are two smaller forts, established in the 18th century. Near Matanzas are two of the most noted natural resorts of Cuba: the valley of the Yumuri, and the caves of Bellamar. Com- manding the Yumuri Valley is the hill called Cumbre, on which is the Hermitage of Monteserrate (1870), with a famous shrine. Matanzas is the second port of the island in commerce. Sugar and molasses are the chief exports. The city is the chief outlet for the sugar product of the province, which, with the province of Santa Clara, produces two-thirds of the crop of the island. There are many large warehouses, rum distilleries, sugar-mills and railway machine-shops. Matanzas is frequently mentioned in the annals of the 16th and 17th centuries, when its bay was frequented by buccaneers; but the city was not laid out until 1693. In the next year it received an ayuntamiento (council). Its prosperity rapidly increased after the establishment of free commerce early in the 19th century. In 181 5 it was made a department capital. The mulatto poet, Gabriel de la Conception Valdes, known as Placido (1809-1844), was born in Matanzas, and was executed there for participation in the supposed conspiracy of negroes in 1844, which is one of the most famous episodes in Cuban history. The hurricanes of 1844 and 1846 are the only other prominent local events. American commercial influence has always been particularly strong.

HATAR6 (anc. Iluro), a seaport of north-eastern Spain, in the province of Barcelona, on the Mediterranean Sea and the Barcelona-Perpignan railway. Pop. (1900), 19,704. The streets of the new town, lying next the sea, are wide and regularly built; those of the old town, farther up the hill, still preserve much of their ancient character. The parish church of Santa Maria has some good pictures and wood carvings. The wine of the neighbourhood, which resembles port, is shipped in large quantities from Barcelona; and the district furnishes fine roses and strawberries for the Barcelona market. The leading indus- tries are manufactures of linen and cotton goods, especially canvas and tarpaulin, and of soap, paper, chemicals, starch, glass, leather, spirits and flour. The railway to Barcelona, opened in October 1848, was the first to be constructed in Spain. Outside the town is the much-frequented carbonated mineral spring of Argentona.

MATCH: 1. O. Eng. gemaecca, a cognate form of "make," meaning originally " fit " or " suitable "; a pair, or one of a pair of objects, persons or animals. As particularly applied to a husband and wife, and hence to a marriage, the word is especially used of two persons or things which correspond exactly to each other. The verb " to match " has also the meaning to " pit one against each other," and so is applied in sport to an arranged contest between individuals or sides.

2. O. Fr. mesche; apparently from a latinized form of Gr. /uu£a, mucus from the nose, applied to the nozzle of a lamp; primarily the wick which conveys oil or molten wax to the flame of a lamp or candle (this use is now obsolete) , the word being then applied to various objects having the property of carrying fire. With early firearms a match, consisting of a cord of hemp or similar material treated with nitre and other substances so that it continued to smoulder after it had been ignited, was used for firing the charge, being either held in the gunner's hand or at- tached to the cock of the musket or arquebus and brought down by the action of the trigger on the powder priming (" match- lock ") ; and more or less similar preparations, made to burn more or less rapidly as required (" quick-match " and " slow-match "), are employed as fuses in blasting and demolition work in military operations. The word " match " was further used of a splint of wood, tipped with sulphur so that it would readily ignite, but it now most commonly means a slip of wood or other combustible material, having its end covered with a composition which takes fire when rubbed either on any rough surface or on another specially prepared composition.

The first attempt to make matches in the modern sense may probably be ascribed to Godfrey Haukwitz, who, in 1680, acting under the direction of Robert Boyle, who at that time had just discovered how to prepare phosphorus, employed small pieces of that element, ignited by friction, to light splints of wood dipped in sulphur. This device, however, did not come into extensive use owing to its danger and inconvenience and to the cost of the phosphorus, and till the beginning of the 19th century flint and steel with tinder-box and sulphur-tipped splints of wood — " spunks " or matches — were the common means of obtaining fire for domestic and other purposes. The sparks struck off by the percussion of flint and steel were made to fall among the tinder, which consisted of carbonized fragments of cotton and linen; the entire mass of the tinder was set into a glow, developing sufficient heat to ignite the sulphur with which the matches were tipped, and thereby the splints themselves were set on fire. In 1805 one Chancel, assistant to Professor L. J. Thenard of Paris, introduced an apparatus consisting of a small bottle containing asbestos, saturated with strong sulphuric acid, with splints or matches coated with sulphur, and tipped with a mixture of chlorate of potash and sugar. The matches so pre- pared, when brought into contact with the sulphuric acid in the bottle,

ignited, and thus, by chemical action, fire was produced. In 1823 a decided impetus was given to the artificial production of fire by the introduction of the Dobereiner lamp, so called after its inventor, J. W. Dobereiner of Jena. The first really practical friction matches were made in England in 1827, by John Walker, a druggist of Stockton-on-Tees. These were known as

" Congreves " after Sir William Congreve, the inventor of the Congreve rocket, and consisted of wooden splints or sticks of cardboard coated with sulphur and tipped with a mixture of sulphide of antimony, chlorate of potash and gum. With each box which was retailed at a shilling, there was supplied a folded piece of glass paper, the folds of which were to be tightly pressed together, while the match was drawn through between them. The same idea occurred to Sir Isaac Holden independently two and a half years later. The so-called " Prometheans," patented by S. Jones of London in 1830, consisted of a short roll of paper with a small quantity of a mixture of chlorate of potash and sugar at one end, a thin glass globule of strong sulphuric acid being attached at the same point. When the sulphuric acid was liberated by pinching the glass globule, it acted on the mixed chlorate and sugar, producing fire. The phosphorus friction- match of the present day was first introduced on a commercial scale in 1 833 . It appears to have been made almost simultaneously in several distinct centres. The name most prominently connected with the early stages of the invention is that of J. Preschel of Vienna, who in 1833 had a factory in operation for making phos- phorus matches, fusees, and amadou slips tipped with igniting composition. At the same time also matches were being made by F. Moldenhauer in Darmstadt; and for a long series of years Austria and the South-German states were the principal centres of the new industry.

But the use of ordinary white or yellow phosphorus as a princi- pal ingredient in the igniting mixture of matches was found to be accompanied with very serious disadvantages. It is a deadly poison, and its free dissemination has -led to many accidental deaths, and to numerous cases of wilful murder and suicide. Workers also who are exposed to phosphoric vapours are subject to a peculiarly distressing disease which attacks the jaw, and ultimately produces necrosis of the jaw-bone (" phossy jaw "), though with scrupulous attention to ventilation and cleanliness much of the risk of the disease may be avoided. The most serious objections to the use of phosphorus, however, were overcome by the discovery of the modified form of that body known as red or amorphous phosphorus. That substance was utilized for the manufacture of the well-known " safety matches" by J. E. Lundstrom, of Jonkoping, Sweden, in 1852; its employ- ment for this purpose had been patented eight years previously by another Swede, G. E. Pasch, who, however, regarded it as an oxide of phosphorus. Red phosphorus is in itself a perfectly innocuous substance, and no evil effects arise from freely working the compositions of which it forms an ingredient.

The fact again that safety matches ignite only in exceptional circumstances on any other than the prepared surfaces which accompany the box — which surfaces and not the matches themselves contain the phosphorus required for ignition — makes them much less liable to cause accidental fires than other kinds.

The processes carried out in a match factory include preparing the splints, dipping them first in molten paraffin wax and then in the igniting composition, and filling the matches into boxes. All these operations are performed by complicated automatic machinery, in the development of which the Diamond Match Company of America has taken a leading part, with the minimum of manual intervention.

The chief element in the igniting mixture of ordinary or " strike anywhere " matches used to be common yellow phosphorus, com- bined with one or more other bodies which readily part with oxygen under the influence of heat. Chief among these latter substances is chlorate of potash, others being red lead, nitrate of lead, bichro- mate of potash and peroxide of manganese. But at the beginning of the 20th century many countries took steps to stop the use of yellow phosphorus owing to the danger to health attending its manipulation. In Sweden, matches made with it have been pro- hibited for home consumption, but not for export, since 1901. In 1905 and 1906 two conferences, attended by representatives of most of the governments of Europe, were held at Berne to consider the question of prohibiting yellow phosphorus, but no general agree- ment was reached owing to the objections entertained by Sweden, Norway, Spain and Portugal, and also Japan. Germany, France, Italy, Denmark, Holland, Switzerland and Luxemburg, however, agreed to a convention whereby yellow phosphorus was prohibited as from 1912, and to this Great Britain expressed her adherence

after the passing of the White Matches Prohibition Act 1908, which forbade the manufacture and importation of such matches from the 1st of January 1910 ; though to avoid hardship to retailers and others holding large stocks it permitted their sale for a year longer. Phos- phorous sulphide (sesquisulphide of phosphorus) is one of the sub- stances widely employed as a substitute for yellow phosphorus in matches which will strike anywhere without the need of a specially prepared surface.

Safety matches contain no phosphorus in the heads; according to one formula that has been published the mixture with which they are tipped

consists of chlorate of potash, 32 parts; bichromate of potash, 12; red lead, 32; sulphide of antimony, 24; while the ingredients of a suitable rubbing surface are eight parts of amorphous phosphorus to nine of sulphide of antimony. There is no doubt, however, that there is considerable diversity in the composition of the mixtures actually employed.

" Vestas " are matches in which short pieces of thin " wax taper " are used in place of wooden splints. Fusees or vesuvians consist of large oval heads fixed on a round splint. These heacls consist of a porous mixture of charcoal, saltpetre, cascarilla or other scented bark, glass and gum, tipped with common igniting composition. When lighted they form a glowing mass, without flame.

It is calculated that in the principal European countries from six to ten matches are used for each inhabitant daily, and the world's annual output must reach a total which requires twelve or thirteen figures for its expression. In the United States the manufacture is under the control of the Diamond Match Company, formed in 1 88 1 ; which company also has an important share in the industry in Great Britain, where it has established large works. Similarly the manufacture of safety matches in Sweden is largely controlled by one big combination. In France matches are a government monopoly, and are both dear in price and inferior in quality, as compared with other countries where the industry is left to private enterprise. The French government formerly leased the manufac- ture to a company {Societe generate des allumettes chimiques), but since 1890 it has been undertaken directly by the state.

MATE (a corruption of make, from O. Eng. gemaca, a " com- rade "), a companion. In the language of the sea, the mate is the companion or assistant of the master, or of any officer at the head of a division of the crew. In the merchant service the mates are the officers who serve under the master, commonly called the captain, navigate the vessel under his direction, and replace him if he dies, or is disabled. In a war-ship mates serve under the gunner, boatswain, carpenter, &c. They are officers told off to attend to a particular part of the ship, as for example mate of the upper deck, whose duty is to see that it is kept clean, or mate of the hold, who is employed to serve out the water and other stores, and to keep the weights adjusted so as to preserve the trim — -or balance — of the ship. (For " mate " in chess, see Chess.)

MATE, or Paraguay Tea, the dried leaves of Ilex paraguari- ensis, 1 an evergreen shrub or small tree belonging to the same genus as the common holly, a plant to which it bears some resemblance in size and habit. The leaves are from 6 to 8 in. long, shortly stalked, with a somewhat acute tip and finely toothed at the margin. The small white flowers grow in forked

clusters in the axils of the leaves; the sepals, petals and stamens are four in number, or occasionally five; and the berry is 4-seeded. The plant grows abundantly in Paraguay, and the south of Brazil, forming woods called yerbales. One of the principal centres of the mate industry is the Villa Real, a small town above Asuncion on the Paraguay river; another is the Villa de San Xavier, in the district between the rivers Uruguay and Parana.

Although mate appears to have been used from time immemorial by the Indians, the Jesuits were the first to attempt its cultivation. This was begun at their branch missions in Paraguay and the province of Rio Grande de San Pedro, where some plantations still exist, and yield the best tea that is made. From this circumstance the names Jesuits' tea, tea of the Missions, St Bartholomew's tea, &c, are sometimes applied to mate. Under cultivation the quality of the tea improves, but the plant remains a small shrub with numerous stems, instead of forming, as in the wild state, a tree with a rounded head. From cultivated plants the leaves are gathered every two or three years, that interval being necessary for restoration to vigorous growth. The collection of mate is, however, chiefly effected by Indians employed for that purpose by merchants, who pay a money consideration to government for the privilege.

When a verbal or mate wood is found, the Indians, who usually travel in companies of about twenty-five in number, build wigwams

and settle down to the work for about six months. Their first operation is to prepare an open space, called a tatacua, about 6 ft. square, in which the surface of the soil is beaten hard and smooth with mallets. The leafy branches of the mate are then cut down and placed on the tatacua, where they undergo a preliminary roasting from a fire kindled around it. An arch of poles, or of hurdles, is then erected above it, on which the mate is placed, a fire being lighted underneath. This part of the process demands some care, since by it the leaves have to be rendered brittle enough to be easily pulverized, and the aroma has to be developed, the necessary amount of heat being only learned by experience. After drying, the leaves are reduced to coarse powder in mortars formed of pits in the earth well rammed. Mate so prepared is called caa gazu or yenia do polos, and is chiefly used in Brazil. In Paraguay and the vicinity of Parana in the Argentine Republic, the leaves are deprived of the midrib before roasting; this is called caa-miri. A very superior quality, or caa-cuys, is also prepared in Paraguay from the scarcely expanded buds. Another method of drying mate has been adopted, the leaves being heated in large cast-iron pans set in brickwork, in the same way that tea is dried in China; it is afterwards powdered by machinery.

Mate (Ilex paraguariensis) .

Portion of plant. Flower, drupe and nuts. leaf showing minute glands, natural size.

Part of under-side of

1 /. gigantea, I. ovalifolia, I. Humholdtiana, and I. nigropunctata, besides several varieties of these species, are also used for preparing mate.

The different methods of preparation influence to a certain extent the value of the product, the mate prepared in Paraguay being considered the best, that of Oran and Paranagua very inferior. The leaves when dried are packed tightly in serons or oblong packages made of raw hides, which are then carefully sewed up. These shrink by exposure to the sun, and in a couple of days form compact parcels each containing about 200 lb of tea; in this form it keeps well. The tea is generally prepared for use in a small silver-mounted calabash, made of the fruit of Crescendo, cujete (Cuca) or of Lagen- aria (Cabaco), usually about the size of a large orange, the tapering end of the latter serving for a handle. In the top of the calabash, or mate, 1 a circular hole about the size of a florin is made, and through

this opening the tea is sucked by means of a bombilla. This instru- ment consists of a small tube 6 or 7 in. long, formed either of metal or a reed, which has at one end a bulb made either of extremely fine basket-work or of metal perforated with minute holes, so as to prevent the particles of the tea-leaves from being drawn up into the mouth. Some sugar and a little hot water are first placed in the gourd, the yerva is then added, and finally the vessel is filled to the brim with boiling water, or milk previously heated by a spirit lamp.

2 The word caa signified the plant in the native Indian language. The Spaniards gave it a similar name, yerba. Mate comes from the language of the Incas, and originally means a calabash. The Paraguay tea was called at first yerva do matS, and then ; the yerva being dropped, the name matS came to signify the same thing.

A little burnt sugar or lemon juice is sometimes added instead of milk. The beverage is then handed round to the company, each person being furnished with a bombilla. The leaves will bear steep- ing about three times. The infusion, if not drunk soon after it is made, rapidly turns black. Persons who are fond of mate drink it before every meal, and consume about 1 oz. of the leaves per day. In the neighbourhood of Parana it is prepared and drunk like Chinese tea. Mate is generally considered disagreeable by those unaccustomed to it, having a somewhat bitter taste; moreover, it is the custom to drink it so hot as to be unpleasant. But in the south-eastern republics it is a much-prized article of luxury, and is the first thing offered to visitors. The gaucho of the plains will travel on horseback for weeks asking no better fare than dried beef washed down with copious draughts of mat6, and for it he will forego any other luxury, such as sugar, rice or biscuit. Mat6 acts as a restorative after great fatigue' in the same manner as tea. Since it does not lose its flavour so quickly as tea by exposure to the air and damp it is more valuable to travellers.

Since the beginning of the 17th century mate has been drunk by all classes in Paraguay, and it is now used throughout Brazil and the neighbouring countries.

The virtues of this substance are due to the occurrence in it of caffeine, of which a given quantity of mate\ as prepared for drink- ing, contains definitely less than a similar quantity of tea or coffee. It is less astringent than either of these, and thus is, on all scores, less open to objection.

See Scully, Brazil (London, 1866); Mansfield, Brazil (London, 1856); Christy, New Commercial Plants, No. 3 (London, 1880); Kew Bulletin (1892), p. 132.

MATERA, a city of Basilicata, Italy, in the province of Potenza, from which it is 68 m. E. by road (13 m. S. of the station of Altamura), 1312 ft. above sea-level. Pop. (1901), 17,801. Part of it is built on a level plateau and part in deep valleys adjoining, the tops of the campaniles of the lower portions being on a level with the streets of the upper. The principal building is the cathedral of the archbishopric of Acerenza and Matera, formed in 1203 by the union of the two bishoprics, dating respec- tively from 300 and 398. The western facade of the cathedral is plain, while the utmost richness of decoration is lavished on the south front which faces the piazza. Almost in the centre of this south fagade is an exquisitely sculptured window, from which letters from the Greek patriarch at Constantinople used to be read. The campanile is 175 ft. high. In the vicinity are the troglodyte caverns of Monte Scaglioso, still inhabited by some of the lower classes, and other caves with 13th-century frescoes.

Neolithic pottery has been found here, but the origin of the town is uncertain. Under the Normans Matera was a countship for William Bras de Fer and his successors. It was the chief town of the Basilicata from 1664 till 181 1, when the French transferred the administration to Potenza.

MATERIALISM (from Lat. materia, matter), in philosophy, the theory which regards all the facts of the universe as explainable in terms of matter and motion, and in particular explains all psychical processes by physical and chemical changes in the nervous system. It is thus opposed both to natural realism and to idealism. For the natural realist stands upon the common-sense position that minds and material objects have equally effective existence; while the idealist explains matter by mind and denies that mind can be explained by matter. The various forms into which materialism may be classified correspond to the various causes which induce men to time up materialistic views. Naive materialism is due to a cause which still, perhaps, has no small power, the natural difficulty which persons who have had no philosophic training experience in observing and appre- ciating the importance of the immaterial facts of consciousness. The pre-Socratics may be classed as naive materialists in this sense; though, as at that early period the contrast between matter and spirit had not been fully realized and matter was credited with properties that belong to life, it is usual to apply the term hylozoism (q.v.) to the earliest stage of Greek metaphysical theory. It is not difficult to discern the influence of naive materialism in contemporary thinking. We see it in Huxley, and still more in Haeckel, whose materialism (which he chooses to term ” monism “) is evidently conditioned by ignorance of the history and present position of

speculation. Cosmological materialism is that form of the doctrine in which the dominant motive is the formation of a comprehensive world-scheme:

the Stoics and Epicureans were cosmological materialists. In anti-religious materialism the motive is hostility to established dogmas which are connected, in the Christian system especially, with certain forms of spiritual doctrine. Such a motive weighed much with Hobbes and with the French materialists of the 18th century, such as La Mettrie and d'Holbach. The cause of medical materialism is the natural bias of physicians towards explaining the health and disease of mind by the health and disease of body. It has received its greatest support from the study of insanity, which is now fully recognized as conditioned by disease of the brain. To this school belong Drs Maudsley and Mercier. The highest form of the doctrine is scientific materialism, by which term is meant the doctrine so commonly adopted by the physicist, zoologist and biologist.

It may perhaps be fairly said that materialism is at present a necessary methodological postulate of natural-scientific inquiry. The business of the scientist is to explain everything by the physical causes which are comparatively well understood and to exclude the interference of spiritual causes. It was the great work of Descartes to exclude rigorously from science all explana- tions which were not scientifically verifiable; and the prevalence of materialism at certain epochs, as in the enlightenment of the 1 8th century and in the German philosophy of the middle 19th, were occasioned by special need to vindicate the scientific position, in the former case against the Church, in the latter case against the pseudo-science of the Hegelian dialectic. The chief definite periods of materialism are the pre-Socratic and the post- Aristotelian in Greece, the 18th century in France, and in Germany the 19th century from about 1850 to 1880. In England materialism has been endemic, so to speak, from Hobbes to the present time, and English materialism is more important perhaps than that of any other country. But, from the national distrust of system, it has not been elaborated into a consistent metaphysic, but is rather traceable as a tendency harmonizing with the spirit of natural science. Hobbes, Locke, Hume, Mill and Herbert Spencer are not systematic materialists, but show tendencies towards materialism.

See Metaphysics; and Lange's History of Materialism. ' MATER MATUTA (connected with Lat. mane, matutinus, " morning '.'), an old Italian goddess of dawn. The idea of light being closely connected with childbirth, whereby the infant is brought into the light of the world, she came to be regarded as a double of Juno, and was identified by the Greeks with Eilithyia. Matuta had a temple in Rome in the Forum Boarium, where the festival of Matralia was celebrated on the nth of June. Only married women were admitted, and none who had been married more than once

were allowed to crown her image with garlands. Under hellenizing influences, she became a goddess of sea and harbours, the Ino-Leucothea of the Greeks. In this connexion it is noticeable that, as Ino tended her nephew Dionysus, so at the Matralia the participants prayed for the welfare of their nephews and nieces before that of their own children. The transformation was complete in 174 B.C., when Tiberius Sempronius Gracchus, after the conquest of Sardinia, placed in the temple of Matuta a map commemorative of the campaign, containing a plan of the island and the various engagements. The progress of navigation and the association of divinities of the sky with maritime affairs probably also assisted to bring about the change, although the memory of her earlier function as a goddess of childbirth survived till imperial times.

Ovid, Fasti, vi. 475; Livy xli. 28; Plutarch, Quaestiones romanae,

16, 17.

MATHEMATICS (Gr. ixadrjuariKi), sc. Ttxvy] or hmaTT)\xi\; from fiadrjua, "learning" or "science"), the general term for the various applications of mathematical thought, the traditional field of which is number and quantity. It has been usual to define mathematics as " the science of discrete and continuous magnitude." Even Leibnitz, 1 who initiated a more modern point of view, follows the tradition in thus confining the scope of mathematics properly so called, while apparently conceiving it as a department of a yet wider science of reasoning. A short

1 Cf. La Logique de Leibnitz, ch. vii., by L. Couturat (Paris, 1901).

consideration of some leading topics of the science will exemplify both the plausibility and inadequacy of the above definition. Arithmetic, algebra, and the infinitesimal calculus, are sciences directly concerned with integral numbers, rational (or fractional) numbers, and real numbers generally, which include incom- mensurable numbers. It would seem that " the general theory of discrete and continuous quantity " is the exact description of the topics of these sciences. Furthermore, can we not complete the circle of the mathematical sciences by adding geometry? Now geometry deals with'points, lines, planes and cubic contents. Of these all except points are quantities: lines involve lengths, planes involve areas, and cubic contents involve volumes. Also, as the Cartesian geometry shows, all the relations between points are expressible in terms of geometric quantities. Accordingly, at first sight it seems reasonable to define geometry in some such way

as " the science of dimensional quantity." Thus every subdivision of mathematical science would appear to deal with quantity, and the definition of mathematics as " the science of quantity " would appear to be justified. We have now to consider the reasons for rejecting this definition as inadequate.

Types of Critical Questions. — What are numbers? We can talk of five apples and ten pears. But what are " five " and " ten " apart from the apples and pears? Also in addition to the cardinal numbers there are the ordinal numbers: the fifth apple and the tenth pear claim thought. What is the relation of "the fifth" and "the tenth " to "five" and "ten"? " The first rose of summer " and " the last rose of summer " are parallel phrases, yet one explicitly introduces an ordinal number and the other does not. Again, " half a foot " and " half a pound " are easily defined. But in what sense is there " a half," which is the same for " half a foot " as " half a pound " ? Furthermore, incommensurable numbers are defined as the limits arrived at as the result of certain procedures with rational numbers. But how do we know that there is anything to reach ? We must know that V2 exists before we can prove that any procedure will reach it. An expedition to the North Pole has nothing to reach unless the earth rotates.

Also in geometry, what is a point ? The straightness of a straight line and the planeness of a plane require consideration. Furthermore, " congruence " is a difficulty. For when a triangle " moves," the points do not move with it. So what is it that keeps unaltered in the moving triangle ? Thus the whole method of measurement in geometry as described in the elemen- tary textbooks and the older treatises is obscure to the last degree. Lastly, what are " dimensions " ? All these topics require thorough discussion before we can rest content with the definition of mathematics as the general science of magnitude; and by the time they are discussed the definition has evaporated. An outline of the modern answers to questions such as the above will now be given. A critical defence of them would require a volume. 1

Cardinal Numbers. — A one-one relation between the members of two classes a and /3 is any method of correlating all the members of o to all the members of fl, so that any member of a has one and only one correlate in /9, and any member of jS has one and only one correlate in a. Two classes between which a one-one relation exists have the same cardinal number and are called cardinally similar; and the cardinal number of the class a is a certain class whose members are themselves classes — namely, it is the class composed of all those classes for which a one-one correlation with a exists. Thus the cardinal number of o is itself a class, and furthermore a is a member of it. For a one-one relation can be established between the members of a and a by the simple process of correlating each

member of a with itself. Thus the cardinal number one is the class of unit classes, the cardinal number two is the class of doublets, and so on. Also a unit class is any class with the property that it possesses a member x such that, if y is any member of the class, then x and y are identical. A doublet is any class which possesses a member x such that the modified class formed by all the other members except x is a unit class. And so on for all the finite cardinals, which are thus defined successively. The cardinal number zero is the class of classes with no members; but there is only one such class, namely — the null class. Thus this cardinal

1 Cf. The Principles of Mathematics, by Bertrand Russell (Cam- bridge, 1903).

number has only one member. The operations of addition and multiplication of two given cardinal numbers can be defined by taking two classes a and /}, satisfying the conditions (1) that their cardinal numbers are respectively the given numbers, and (2) that they contain no member in common, and then by defining by refer- ence to a and /3 two other suitable classes whose cardinal numbers are defined to be respectively the required sum and product of the cardinal numbers in question. We need not here consider the details of this process.

With these definitions it is now possible to prove the following six premisses applying to finite cardinal numbers, from which Peano 2 has shown that all arithmetic can be deduced : —

i. Cardinal numbers form a class.

ii. Zero is a cardinal number.

iii. If a is a cardinal number, a--i is a cardinal number.

iv. If x is any class and zero is a member of it, also if when x is a cardinal number and a member of s, also x--i is a member of J, then the whole class of cardinal numbers is contained in s.

v. If a and b are cardinal numbers, and a+l =6 + 1, then a = 6.

vi. If a is a cardinal number, then a+i =f o.

It may be noticed that (iv) is the familar principle of mathe- matical induction. Peano in an historical note refers its first explicit employment, although without a general enunciation, to Maurolycus in his work, Arithmeticorum libri duo (Venice, 1575).

But now the difficulty of confining mathematics to being the science of

number and quantity is immediately apparent. For there is no self-contained science of cardinal numbers. The proof of the six premisses requires an elaborate investigation into the general properties of classes and relations which can be deduced by the strictest reasoning from our ultimate logical principles. Also it is purely arbitrary to erect the consequences of these six principles into a separate science. They are excellent principles of the highest value, but they are in no sense the necessary pre- misses which must be proved before any other propositions of cardinal numbers can be established. On the contrary, the pre- misses of arithmetic can be put in other forms, and, furthermore, an indefinite number of propositions of arithmetic can be proved directly from logical principles without mentioning them. Thus, while arithmetic may be defined as that branch of deductive reason- ing concerning classes and relations which is concerned With the establishment of propositions concerning cardinal numbers, it must be added that the introduction of cardinal numbers makes no great break in this general science. (It is no more than an interesting subdivision in a general theory.

Ordinal Numbers. — We must first understand what is meant by " order," that is, by " serial arrangement." An order of a set of things is to be sought in that relation holding between members of the set which constitutes that order. The set viewed as a class has many orders. Thus the telegraph posts along a certain road have a space-order very obvious to our senses; but they have also a time-order according to dates of erection, perhaps more important to the postal authorities who replace them after fixed intervals. A set of cardinal numbers have an order of magnitude, often called the order of the set because of its insistent obviousness to us; but, if they are the numbers drawn in a lottery, their time-order of occurrence in that drawing also ranges them in an order of some importance. Thus the order is defined by the " serial " relation. A relation ® is serial 3 when (1) it implies diversity, so that, if x has the relation R to y, x is diverse from y; (2) it is transitive, so that if x has the relation R to y, and y to z, then x has the relation R to z; (3) it has the property of connexity, so that if x and y are things to which any things bear the relation R, or which bear the relation R to any things, then either x is identical with y, or x has the relation R to y, or y has the relation R to x. These conditions are necessary and sufficient to secure that our ordinary ideas of " preceding " and " succeeding " hold in respect to the relation R. The " field " of the relation R is the class of things ranged in order by it. Two relations R and R' are said to be ordinally similar, if a one-one relation holds between the members of the two fields of R and R', such that if x and y are any two members of the field of R, such that x has the relation R to y, and if x' and y' are the correlates in the field of R' of x and y, then in all such cases x' has the relation R' to y', and conversely, interchanging the dashes on the letters,

i.e. R and R', x and x', &c. It is evident that the ordinal similarity of two relations implies the cardinal , similarity of their fields, but not conversely. Also, two relations need not be serial in order to be ordinally similar; but if one is serial, so is the other. The relation-number of a relation is the class whose members are all those relations which are ordinally similar to it. This class will include the original relation itself. The relation-number of a relation should be compared with the cardinal number of a class. When a relation is serial its relation-number is often called its serial type. The addition and multiplication of two relation-numbers is defined by taking two relations R and S, such that (1) their fields have no

2 Cf. Formulaire mathematique (Turin, ed. of 1903) ; earlier formulations of the bases of arithmetic are given by him in the editions of 1898 and of 1901. The variations are only trivial.

3 Cf. Russell, loc. cit., pp. 199-256.

terms in common; (2) their relation-numbers are the two relation- numbers in question, and then by denning by reference to R and S two other suitable relations whose relation-numbers are denned to be respectively the sum and product of the relation-numbers in question. We need not consider the details of this process. Now if n be any finite cardinal number, it can be proved that the class of those serial relations, which have a field whose cardinal number is n, is a relation-number. This relation-number is the ordinal number corresponding to n; let it be symbolized by n. Thus, corresponding to the cardinal numbers 2, 3, 4 . . . there are the ordinal numbers 2, 3, 4 . . . The definition of the ordinal number I requires some little ingenuity owing to the fact that no serial relation can have a field whose cardinal number is I ; but we must omit here the explanation of the process. The ordinal number 6 is the class whose sole member is the null relation — that is, the relation which never holds between any pair of entities. The defini- tions of the finite ordinals can be expressed without use of the corresponding cardinals, so there is no essential priority of cardinals to ordinals. Here also it can be seen that the science of the finite ordinals is a particular subdivision of the general theory of classes and relations. Thus the illusory nature of the traditional definition of mathematics is again illustrated.

Cantor's Infinite Numbers. — Owing to the correspondence between the finite cardinals and the finite ordinals, the propositions of cardinal arithmetic and ordinal arithmetic correspond point by point. But the

definition of the cardinal number of a class applies when the class is not finite, and it can be proved that there are different infinite cardinal numbers, and that there is a least infinite cardinal, now usually denoted by K , where N is the Hebrew letter aleph. Similarly, a class of serial relations, called well-ordered serial relations, can be defined, such that their corresponding relation-numbers include the ordinary finite ordinals, but also include relation-numbers which have many properties like those of the finite ordinals, though the fields of the relations belonging to them are not finite. These relation-numbers are the infinite ordinal numbers. The arithmetic of the infinite cardinals does not corre : spond to that of the infinite ordinals. The theory of these extensions of the ideas of number is dealt with in the article Number. It will suffice to mention here that Peano's fourth premiss of arithmetic does not hold for infinite cardinals or for infinite ordinals. Con- trasting the above definitions of number, cardinal and ordinals, with the alternative theory that number is an ultimate idea incapable of definition, we notice that our procedure exacts a greater attention, combined with a smaller credulity; for every idea, assumed as ultimate, demands a separate act of faith.

The Data of Analysis. — Rational numbers and real numbers in

feneral can now be defined according to the same general method, f m and n are finite cardinal numbers, the rational number m/n is the relation which any finite cardinal number x bears to any finite cardinal number y when nXxˆmXy- Thus the rational number one, which we will denote by l„ is not the cardinal number 1 ; for i r is the relation i/l as defined above, and is thus a relation holding between certain pairs of cardinals. Similarly, the other rational integers must be distinguished from the corresponding cardinals. The arithmetic of rational numbers is now established by means of appropriate definitions, which indicate the entities meant by the operations of addition and multiplication. But the desire to obtain general enunciations of theorems without exceptional cases has led mathematicians to employ entities of ever-ascending types of elaboration. These entities are not created by mathematicians, they are employed by them, and their definitions should point out the construction of the new entities in terms of those already on hand. The real numbers, which include irrational numbers, have now to be defined. Consider the serial arrangement of the rationals in their order of magnitude. A real number is a class (a, say) of rational numbers which satisfies the condition that it is the same as the class of those rationals each of which precedes at least one member of a. Thus, consider the class of rationals less than 2 r ; any member of this class precedes some other members of the class — thus 1/2 precedes 4/3, 3/2 and so on; also the class of predecessors of predecessors of 2, is itself the class of predecessors of 2,. Accordingly this class is a real number; it will be called the real number 2 R . Note that the class of rationals less than or

*equal to 2, is not a real number. For 2 r is not a predecessor of some member of the class. In the above example 2 R is an integral real number, which is distinct from a rational integer, and from a cardinal number. Similarly, any rational real number is distinct from the corresponding rational number. But now the irrational real numbers have all made their appearance. For example, the class of rationals whose squares are less than 2, satisfies the definition of a real number; it is the real number V2. The arithmetic of real numbers follows from appropriate definitions of the operations of addition and multiplication. Except for the immediate purposes of an explanation, such as the above, it is unnecessary for mathematicians to have separate symbols, such as 2, 2 r and 2 R , or 2/3 and (2/3)1!. Real numbers with signs (+or —) are now defined. If a is a real number, +a is defined to be the relation which any real number of the form x+a bears to the real number x, and —a is the relation which any real number x bears to the real number *+a. The addition and multiplication of these " signed " real*

*numbers is suitably defined, and it is proved that the usual arith- metic of such numbers follows. Finally, we reach a complex number of the rath order. Such a number is a " one-many " relation which relates n signed real numbers (or n algebraic complex numbers when they are already defined by this procedure) to the n cardinal numbers I, 2 . . . n respectively. If such a complex number is written (as usual) in the form *i«i +X2«2+ • • • --x n e n , then this par- ticular complex number relates Xi to I, X2 to 2, . . . x, to n. Also the " unit " ei (or e,) considered as a number of the system is merely a shortened form for the complex number (+ 1) £1+062+ . . . +oc„. This last number exemplifies the fact that one signed real number, such as o, may be correlated to many of the n cardinals, such as 2 . . . n in the example, but that each cardinal is only correlated with one signed number. Hence the relation has been called above " one-many." The sum of two complex numbers Xiei+X2«2+ . . .--x„e„ and yi«i+y2«2+-•. +y n e„ is always defined to be the complex number (xi+yi)ei + (x 2 y{)e2 . . . + (x n +y„)e n . But an in- definite number of definitions of the product of two complex numbers yield interesting results. Each definition gives rise to a corresponding algebra of higher complex numbers. We will confine ourselves here to algebraic complex numbers — that is, to complex numbers of the second order taken in connexion with that definition of multiplication which leads to ordinary algebra. The product of two complex numbers of the second order— namely, *iei+x 2 «2 and yiei+ytfi, is in this case defined to mean the complex (xiji— Xiy%)ei--{xiy 1 --Xiyi)e i . Thus eiXei=ei> «2X«2 = — «i, «i X «2 =«2 X ei = e2- With this defi- nition it is usual to omit the first symbol ei, and to write i or V —I instead of e 2 – Accordingly, the typical form for such a complex number is x+yi, and then with this notation the*

above-mentioned definition of multiplication is invariably adopted. The importance of this algebra arises from the fact that in terms of such complex numbers with this definition of multiplication the utmost generality of expression, to the exclusion of exceptional cases, can be obtained for theorems which occur in analogous forms, but complicated with exceptional cases, in the algebras of real numbers and of signed real numbers. This is exactly the same reason as that which has led mathematicians to work with signed real numbers in preference to real numbers, and with real numbers in preference to rational numbers. The evolution of mathematical thought in the invention of the data of analysis has thus been completely traced in outline.

Definition of Mathematics.— It has now become apparent that the traditional field of mathematics in the province of discrete and continuous number can only be separated from the general abstract theory of classes and relations by a wavering and inde terminate line. Of course a discussion as to the mere application of a word easily degenerates into the most fruitless logomachy. It is open to any one to use any word in any sense. But on the assumption that " mathematics " is to denote a science well marked out by its subject matter and its methods from other topics of thought, and that at least it is to include all topics habitually assigned to it, there is now no option but to employ " mathematics " in the general sense 1 of the " science concerned with the logical deduction of consequences from the general premisses of all reasoning."

Geometry. — The typical mathematical proposition is: " If x, y, z . . . satisfy such and such conditions, then such and such other conditions hold with respect to them." By taking fixed conditions for the hypothesis of such a proposition a definite department of mathematics is marked out. For example, geometry is such a department. The " axioms " of geometry are the fixed conditions which occur in the hypotheses of the geometrical propositions. The special nature of the " axioms " which constitute geometry is considered in the article Geometry (A xioms) . It is sufficient to observe here that they are concerned with special types of classes of classes and of classes of relations, and that the connexion of geometry with number and magnitude is in no way an essential part of the foundation of the science. In fact, the whole theory of measurement in geometry arises at a comparatively late stage as the result of a variety of complicated considerations.

Classes and Relations. — The foregoing account of the nature of mathematics necessitates a strict deduction of the general properties

1 The first unqualified explicit statement of part of this definition seems to be by B. Peirce, " Mathematics is the science which draws necessary

conclusions" (Linear Associative Algebra, § i. (1870), re- published in the Amer. Journ. of Math., vol. iv. (1881)). But it will be noticed that the second half of the definition in the text — " from the general premisses of all reasoning " — is left unexpressed. The full expression of the idea and its development into a philosophy of mathematics is due to Russell, loc. cit.

of classes and relations from the ultimate logical premisses. In the course of this process, undertaken for the first time with the rigour of mathematicians, some contradictions have become apparent. That first discovered is known as Burali-Forti's contradiction, 1 and consists in the proof that there both is and is not a greatest infinite ordinal number. But these contradictions do not depend upon any theory of number, for Russell's contradiction 2 does not involve number in any form. This contradiction arises from considering the class possessing as members all classes which are not members of themselves. Call this class w; then to say that x is a w is equivalent to saying that x is not an x. Accordingly, to say that w is a w is equivalent to saying that w is not a w. An analogous contradiction can be found for relations. It follows that a careful scrutiny of the very idea of classes and relations is required. Note that classes are here required in extension, so that the class of human beings and the class pf rational featherless bipeds are identical; similarly for relations, which are to be determined by the entities related. Now a class in respect to its components is many. In what sense then can it be one? This problem of " the one and the many " has been discussed continuously by the philosophers. 3 All the contradictions can be avoided, and yet the use of classes and relations can be preserved as required by mathematics, and indeed by common sense, by a theory which denies to a class — or relation — existence or being in any sense in which the entities composing it— or related by it — exist. Thus, to say that a pen is an entity and the class of pens is an entity is merely a play upon the word " entity " ; the second sense of ' : entity " (if any) is indeed derived from the first, but has a more complex signification. Consider an incomplete proposition, incomplete in the sense that some entity which ought to be involved in it is represented by an undetermined x, which may stand for any entity. Call it a propositional function; and, if x and ˆx are " exten- sionally identical " if any determination of x in x which converts x into a true proposition also converts \j/x into a true proposition, and conversely for i// and . Now consider a propositional function Fx in which the variable argument x is itself a propositional function. If Fx is true when, and only when, x is determined to be either (j> or some other propositional function extensionally equivalent to , then the proposition F<£ is of the form which

is ordinarily recognized as being about the class determined by x taken in extension — that is, the' class of entities for which x is a true proposition when x is determined to be any one of them. A similar theory holds for relations which arise from the consideration of propositional functions with two or more variable arguments. It is then possible to define by a parallel elaboration what is meant by classes of classes, classes of relations, relations between classes, and so on. Accord- ingly, the number of a class of relations can be defined, or of a class of classes, and so on. This theory 4 is in effect a theory of the use of classes and relations, and does not decide the philosophic question as to the sense (if any) in which a class in extension is one entity. It does indeed deny that it is an entity in the sense in which one of its members is an entity. Accordingly, it is a fallacy for any determination of x to consider " x is an x " or " x is not an x " as having the meaning of propositions. Note that for any deter- mination of x, " x is an x " and " x is not an x," are neither of them fallacies but are both meaningless, according to this theory. Thus Russell's contradiction vanishes, and an examination of the other contradictions shows that they vanish also.

Applied Mathematics. — The selection of the topics of mathe- matical inquiry among the infinite variety open to it has been guided by the useful applications, and indeed the abstract theory has only recently been disentangled from the empirical elements connected with these applications. For example, the application of the theory of cardinal numbers to classes of physical entities involves in practice some process of counting. It is only recently that the succession of processes which is involved in any act of counting has been seen to be irrelevant to the idea of number. Indeed, it is only by experience that we can know that any definite process of counting will give the true cardinal number of some class of entities. It is perfectly possible to imagine a universe in which any act of counting by a being in it annihilated some members of the class counted during the time and only during the time of its continuance. A legend of the Council of Nicea 5 illustrates this point: "When the Bishops took their 1 " Una questione sui numeri transfiniti," Rend, del circolo mat. di Palermo, vol. xi. (1897) ; and Russell, he. cit., ch. xxxviii. – Cf. Russell, loc. ctt., ch. x.

3 Cf. Pragmatism: a New Name for some Old Ways of Thinking

(1907)-

4 Due to Bertrand Russell, cf. " Mathematical Logic as based on the Theory of Types," Amer. Journ. of Math. vol. xxx. (1908). It is more fully explained by him, with later simplifications, in Principia mathematica (Cambridge).

6 Cf. Stanley's Eastern Church, Lecture v.

places on their thrones, they were 318; when they rose up to be called over, it appeared that they were 319; so that they never could make the number come right, and whenever they approached the last of the series, he immediately turned into the likeness of his next neighbour." Whatever be the historical worth of this story, it may safely be said that it cannot be disproved by deduc- tive reasoning from the premisses of abstract logic. The most we can do is to assert that a universe in which such things are liable to happen on a large scale is unfitted for the practical application of the theory of cardinal numbers. The application of the theory of real numbers to physical quantities involves analogous considerations. In the first place, some physical process of addition is presupposed, involving some inductively inferred law of permanence during that process. Thus in the theory of masses we must know that two pounds of lead when put together will counterbalance in the scales two pounds o'f sugar, or a pound of lead and a pound of sugar. Furthermore, the sort of continuity of the series (in order of magnitude) of rational numbers is known to be different from that of the series of real numbers. Indeed, mathematicians now reserve " con- tinuity " as the term for the latter kind of continuity; the mere property of having an infinite number of terms between any two terms is called " compactness." The compactness of the series of rational numbers is consistent with quasi-gaps in it — that is, with the possible absence of limits to classes in it. Thus the class of rational numbers whose squares are less than 2 has no upper limit among the rational numbers. But among the real numbers all classes have limits. Now, owing to the neces- sary inexactness of measurement, it is impossible to discriminate directly whether any kind of continuous physical quantity possesses the compactness of the series of rationals or the conti- nuity of the series of real numbers. In calculations the latter hypothesis is made because of its mathematical simplicity. But, the assumption has certainly no a priori grounds in its favour, and it is not very easy to see how to base it upon experience. For example, if it should turn out that the mass of a body is to be estimated by counting the number of corpuscles (whatever they may be) which go to form it, then a body with an irrational measure of mass is intrinsically impossible. Similarly, the continuity of space apparently rests upon sheer assumption unsupported by any a priori or experimental grounds. Thus the current applications of mathematics to the analysis of phenomena can be justified by no a priori necessity.

In one sense there is no science of applied mathematics. When once the fixed conditions which any hypothetical group of entities are to satisfy have been precisely formulated, the deduction of the further propositions, which also will hold respec- ting them, can proceed in complete independence of the question as to whether or no any such group of entities can be found in

the world of phenomena. Thus rational mechanics, based on the Newtonian Laws, viewed as mathematics is independent of its supposed application, and hydrodynamics remains a coherent and respected science though it is extremely improbable that any perfect fluid exists in the physical world. But this unbend- ingly logical point of view cannot be the last word upon the matter. For no one can doubt the essential difference between characteristic treatises upon " pure " and " applied " mathematics. The difference is a difference in method. In pure mathematics the hypotheses which a set of entities are to satisfy are given, and a group of interesting deductions are sought. In " applied mathematics " the " deductions " are given in the shape of the experimental evidence of natural science, and the hypotheses from which the " deductions " can be deduced are sought. Accordingly, every treatise on applied mathematics, properly so-called, is directed to the criticism of the " laws " from which the reasoning starts, or to a suggestion of results which experi- ment may hope to find. Thus if it calculates the result of some experiment, it is not the experimentalist's well-attested results which are on their trial, but the basis of the calculation. Newton's Hypotheses non jingo was a proud boast, but it rests upon an entire misconception of the capacities of the mind of I man in dealing with external nature.

MATHEMATICS

Synopsis of Existing Developments of Pure Mathematics. — A com- plete classification of mathematical sciences, as they at present exist, is to be found in the International Catalogue of Scientific Literature promoted by the Royal Society. The classification in question was drawn up by an international committee of eminent mathe- maticians, and thus has the highest authority. It would be unfair to criticize it from an exacting philosophical point of view. The practical object of the enterprise required that the proportionate quantity of yearly output in the various branches, and that the liability of various topics as a matter of fact to occur in connexion with each other, should modify the classification.

Section A deals with pure mathematics. Under the general heading " Fundamental Notions " occur the subheadings " Founda- tions of Arithmetic" with the topics rational, irrational and trans- cendental numbers, and aggregates; " Universal Algebra," with the topics complex numbers, quaternions, ausdehnungslehre, vector analysis, matrices, and algebra of logic; and " Theory of Croups," with the topics finite and continuous groups. For the subjects of this general heading see the articles Algebra, Universal; Groups, Theory of; Infinitesimal Calculus; Number; Quaternions; Vector Analysis. Under the general heading " Algebra and

Theory of Numbers " occur the subheadings " Elements of Algebra," with the topics rational polynomials, permutations, &c, partitions, probabilities; " Linear Substitutions," with the topics determinants, &c, linear substitutions, general theory of quantics; " Theory of Algebraic Equations," with the topics existence of roots, separa- tion of and approximation to, theory of Galois, &c. " Theory of Numbers," with the topics congruences, quadratic residues, prime numbers, particular irrational and transcendental numbers. For the subjects of this general heading see the articles Algebra ; Algebraic Forms; Arithmetic; Combinatorial Analysis; Determinants; Equation ; Fraction, Continued ; Interpolation ; Logarithms ; Magic Square; Probability. Under the general heading " Analysis " occur the subheadings " Foundations of Analysis," with the topics theory of functions of real variables, series and other infinite processes, principles and elements of the differential and of the integral calculus, definite integrals, and calculus of variations; " Theory of Functions of Complex Variables," with the topics functions of one variable and of several variables; "Algebraic Functions and their Integrals," with the topics algebraic functions of one and of several variables, elliptic functions and single theta functions, Abelian integrals; ' : Other Special Functions," with the topics Euler's, Legendre's, Bessel's and automorphic functions; " Differential Equations," with the topics existence theorems, methods of solution, general theory; "Differential Forms and Differential Invariants," with the topics differential forms, including Pfaffians, transformation of differential forms, including tangential (or contact) transformations, differential invariants; "Analytical Methods connected with Physical Subjects," with the topics harmonic analysis, Fourier's series, the differential equations of applied mathematics, Dirichlet's problem ; " Difference Equations and Functional Equations," with the topics recurring series, solution of equations of finite differences and functional equations. For the subjects of this heading see the articles Differential Equa- tions; Fourier's Series; Continued Fractions; Function; Function of Real Variables; Function Complex; Groups, Theory of; Infinitesimal Calculus; Maxima and Minima; Series; Spherical Harmonics; Trigonometry; Variations, Calculus of. Under the general heading " Geometry " occur the subheadings "Foundations,' with the topics principles of geometry, non-Euclidean geometries, hyperspace, methods of analytical geometry; " Elementary Geometry," with the topics planimetry, stereometry, trigonometry, descriptive geometry; "Geometry of Conies and Quadrics" with the implied topics; "Algebraic Curves and Surfaces of Degree higher than the Second," with the implied topics; " Transformations and General Methods for Algebraic Con- figurations," with the topics collineation, duality, transformations, correspondence, groups of points on algebraic curves and surfaces, genus of curves and surfaces, enumerative geometry, connexes, complexes, congruences, higher elements in space, algebraic con- figurations in hyperspace; " Infinitesimal Geometry:

applications of Differential and Integral Calculus to Geometry," with the topics kinematic geometry, curvature, rectification and quadrature, special transcendental curves and surfaces; " Differential Geometry: applications of Differential Equations to Geometry," with the topics curves on surfaces, minimal surfaces, surfaces determined by differ- ential properties, conformal and other representation of surfaces on others, deformation of surfaces, orthogonal and isothermic surfaces. For the subjects under this heading see the articles Conic Sections; Circle; Curve; Geometrical Continuity; Geometry, Axioms of; Geometry, Euclidean; Geometry, Pro- jective; Geometry, Analytical; Geometry, Line; Knots, Mathematical Theory of; Mensuration; Models; Pro- jection ; Surface ; Trigonometry.

This survey of the existing developments of pure mathematics confirms the conclusions arrived at from the previous survey of the theoretical principles of the subject. Functions, operations, transformations, substitutions, correspondences, are but names for various types of relations. A group is a class of relations possessing

a special property. Thus the modern ideas, which have so power- fully extended and unified the subject, have loosened its connexion with " number " and " quantity," while bringing ideas of form and structure into increasing prominence. Number must indeed ever remain the great topic of mathematical interest, because it is in reality the great topic of applied mathematics. All the world, including savages who cannot count beyond rive, daily " apply " theorems of number; But the complexity of the idea of number is practically illustrated by the fact that it is best studied as a department of a science wider than itself.

Synopsis of Existing Developments of Applied Mathematics. — Section B of the International Catalogue deals with mechanics. The heading " Measurement of Dynamical Quantities " includes the topics units, measurements, and the constant of gravitation. The topics of the other headings do not require express mention. These headings are: " Geometry and Kinematics of Particles and Solid Bodies "; " Principles of Rational Mechanics " ; " Statics of Particles, Rigid Bodies, &c"; "Kinetics of Particles, Rigid Bodies, &c"; " General Analytical Mechanics "; "Statics and Dynamics of Fluids"; "Hydraulics and Fluid Resistances"; "Elasticity." For the subjects of this general heading see the articles Mechanics; Dynamics, Analytical; Gyroscope; Harmonic Analysis; Wave; Hydromechanics ; Elasticity; Motion, Laws of; Energy ; Energetics; Astronomy (Celestial Mechanics) ; Tide. Mechanics (including dynamical astronomy) is that subject among those traditionally classed as " applied " which has been most completely transfused by mathematics — that is to say, which is studied with the deductive spirit of the pure mathematician, and not with the covert inductive intention overlaid with the superficial

forms of deduction, characteristic of the applied mathematician.

Every branch of physics gives rise to an application of mathe- matics. A prophecy may be hazarded that in the future these applications will unify themselves into a mathematical theory of a hypothetical substructure of the universe, uniform under all the diverse phenomena. This reflection is suggested by the following articles: Aether; Molecule; Capillary Action; Diffusion; Radiation, Theory of; and others.

The applications of mathematics to statistics (see Statistics and Probability) should not be lost sight of; the leading fields for these applications are insurance, sociology, variation in zoology and economics.

The History of Mathematics. — The history of mathematics is in the main the history of its various branches. A short account of the history of each branch will be found in connexion with the article which deals with it. Viewing the subject as a whole, and apart from remote developments which have not in fact seriously influenced the great structure of the mathematics of the European races, it may be said to have had its origin with the Greeks, working on pre-existing fragmentary lines of thought derived from the Egyptians and Phoenicians. The Greeks created the sciences of geometry and of number as applied to the measurement of continuous quantities. The great abstract ideas (considered directly and not merely in tacit use) which have dominated the science were due to them — namely, ratio, irra- tionality, continuity, the point, the straight line, the plane. This period lasted 1 from the time of Thales, c. 600 B.C., to the capture of Alexandria by the Mahommedans, a.d. 641. The medieval Arabians invented our system of numeration and developed algebra. The next period of advance stretches from the Renais- sance to Newton and Leibnitz at the end of the 17th century. During this period logarithms were invented, trigonometry and algebra developed, analytical geometry invented, dynamics put upon a sound basis, and the period closed with the magnifi- cent invention of (or at least the perfecting of) the differential calculus by Newton and Leibnitz and the discovery of gravita- tion. The 1 8th century witnessed a rapid development of analy- sis, and the period culminated with the genius of Lagrange and Laplace. This period may be conceived as continuing throughout the first quarter of the 19th century. It was remarkable both for the brilliance of its achievements and for the large number of French mathematicians of the first rank who flourished during it. The next period was inaugurated in analysis by K. F. Gauss, N. H. Abel and A. L. Cauchy. Between them the general theory of the complex variable, and of the various " infinite" processes of mathematical analysis, was established, while Other mathematicians, such as Poncelet, Steiner, Lobatschewsky and von Staudt, were founding modern geometry, and Gauss in- augurated the differential geometry of surfaces. The applied

mathematical sciences of light, electricity and electromagnetism, 1 Cf A Short History of Mathematics, by W. W. R. Ball.

and of heat, were now largely developed. This school of mathe- matical thought lasted beyond the middle of the century, after which a change and further development can be traced. In the next and last period the progress of pure mathematics has been dominated by the critical spirit introduced by the German mathematicians under the guidance of Weierstrass, though fore- shadowed by earlier analysts, such as Abel. Also such ideas as those of invariants, groups and of form, have modified the entire science. But the progress in all directions has been too rapid to admit of any one adequate characterization. During the same period a brilliant group of mathematical physicists, notably Lord Kelvin (W. Thomson), H. V. Helmholtz, J. C. Maxwell, H. Hertz, have transformed applied mathematics by systematically basing their deductions upon the Law of the conservation of energy, and the hypothesis of an ether pervading space.

Bibliography. — References to the works containing expositions of the various branches of mathematics are given in the appropriate articles. It must suffice here to refer to sources in which the subject is considered as one whole. Most philosophers refer in their works to mathematics more or less cursorily, either in the treatment of the ideas of number and magnitude, or in their consideration of the alleged a priori and necessary truths. A bibliography of such references would be in effect a bibliography of metaphysics, or rather of epistemology. The founder of the modern point of view, explained in this article, was Leibnitz, who, however, was so far in advance of contemporary thought that his ideas remained neglected and undeveloped until recently ; cf . Opuscules et fragments inedits de Leibnitz. Extra-its des manuscrits de la bibliotheque royale de Hanovre, by Louis Couturat (Paris, 1903), especially PP- 35fr~399. "Generales inquisitiones de analysi notionum et veritatum " (written in 1686) ; also cf. La Logique de Leibnitz, already referred to. For the modern authors who have rediscovered and improved upon the position of Leibnitz, cf. Grundgesetze der Arith- metik, begriffsschriftlich abgeleitet von Dr G. Frege, a.o. Professor an der Univ. Jena (Bd. i., 1893; Bd. ii., 1903, Jena); also cf. Frege's earlier works, Begriffsschrift, eine der arithmetischen nachgebildete Formelsprache des reinen Denkens (Halle, 1879), and Die Grundlagen der Arithmetik (Breslau, 1884); also cf. Bertrand Russell, The Principles of Mathematics (Cambridge, 1903), and his article on " Mathematical Logic " in Amer. Quart. Jotirn. of Math. (vol. xxx., 1908). Also the following works are of importance, though not all expressly expounding the

Leibnitzian point of view: cf. G. Cantor, " Grundlagen einer allgemeinen Mannigfaltigkeitslehre," Math. Annal., vol. xxi. (1883) and subsequent articles in vols. xlvi. and xlix. ; also R. Dedekind, Stetigkeit und trralionales Zahlen (1st ed., 1872), and Was sind und was sollen die Zahlen? (1st ed., 1887), both tracts translated into English under the title Essays on the Theory of Numbers (Chicago, 1901). These works of G. Cantor and Dedekind were of the greatest importance in the progress of the subject. Also cf. G. Peano (with various collaborators of the Italian school), Pormulaire de mathemaliques (Turin, various editions, 1894-1908; the earlier editions are the more interesting philosophically) ; Felix Klein, Lectures on Mathematics (New York, 1894); W. K. Clifford, The Common Sense of the exact Sciences (London, 1885) ; H. Poincare, La Science et I'hypothese (Paris, 1st ed., 1902), English translation under the title, Science and Hypothesis (London, 1905) ; L. Couturat, Les Principes des maMmatiques (Paris, 1905) ; E. Mach, Die Mechanik in ihrer Entwickelung (Prague, 1883), English trans- lation under the title, The Science of Mechanics (London, 1893); K. Pearson, The Grammar of Science (London, 1st ed., 1892; 2nd ed., 1900, enlarged) ; A. Cayley, Presidential Address (Brit. Assoc, 1883) ; B. Russell and A. N. Whitehead, Principia Malhematica (Cambridge, 191 1). For the history of mathematics the one modern and complete source of information is M. Cantor's Vorlesungen uber Geschichte der Matkematik (Leipzig, 1st Bd., 1880; 2nd Bd., 1892; 3rd Bd., 1898; 4th Bd., 1908; 1st Bd., von den dltesten Zeiten bts sum Jahre 1200, n. Chr. ; 2nd Bd., von 1200-1668 ; 3rd Bd., von 1668-1758 ; 4th Bd., von '795 bis 1700) ; W. W. R. Ball, A Short History of Mathematics (London 1st ed., 1888, three subsequent editions, enlarged and revised, and translations into French and Italian). (A. N. W.)

MATHER, COTTON (1663-1728), American Congregational clergyman and author, was born in Boston, Massachusetts, on the 1 2th of February 1663. He was the grandson of Richard Mather, and the eldest child of Increase Mather (q.v.), and Maria, daughter of John Cotton. After studying under the famous Ezekiel Cheever (1614-1708), he entered Harvard College at twelve, and graduated in 1678. While teaching (1678-1685), he began the study of theology, but soon, on account of an impediment in his speech, discontinued it and took up medi- cine. Later, however, he conquered the difficulty and finished his preparation for the ministry. He was elected assistant pastor

in his father's church, the North, or Second, Church of Boston, in 1681 and was ordained as his father's colleague in 1685. In 1688, when his father went to England as agent for the colony, he was left at twenty-five in charge of the largest congregation in New England, and he ministered to it for the rest of his life. He soon became one of the most influential men in

the colonies. He had much to do with the witchcraft persecution of his day; in 1692 when the magistrates appealed to the Boston clergy for advice in regard to the witchcraft cases in Salem he drafted their reply, upon which the prosecutions were based; in 1689 he had written Memorable Providences Relating to Witchcraft and Possessions, and even his earlier diaries have many entries showing his belief in diabolical possession and his fear and hatred of it. Thinking as he did that the New World had been the undisturbed realm of Satan before the settlements were made in Massachusetts, he considered it natural that the Devil should make a peculiar effort to bring moral destruction on these godly invaders. He used prayer and fasting to deliver himself from evil enchantment; and when he saw ecstatic and mystical visions promising him the Lord's help and great usefulness in the Lord's work, he feared that these revelations might be of diabolic origin. He used his great influence to bring the suspected persons to trial and punishment. He attended the trials, investigated many of the cases himself, and wrote sermons on witchcraft, the Memorable Providences and The Wonders of the Invisible World (1693), which increased the excitement of the people. Accordingly, when the persecutions ceased and the reaction set in, much of the blame was laid upon him; the influence of Judge Samuel Sewall, after he had come to think his part in the Salem delusion a great mistake, was turned against the Mathers; and the liberal leaders of Congregationalism in Boston, notably the Brattles, found this a vulnerable point in Cotton Mather's armour and used their knowledge to much ■ effect, notably by assisting Robert Calef (d. c. 1723) in the preparation of More Wonders of the Invisible World (1700) a powerful criticism of Cotton Mather's part in the delusion at Salem.

Mather took some part as adviser in the Revolution of 1689 in Massachusetts. In 1690 he became a member of the Corpora- tion (probably the youngest ever chosen as Fellow) of Harvard College, and in 1707 he was greatly disappointed at his failure to be chosen president of that institution. He received the degree of D.D. from the University of Glasgow in 1710, and in 1 7 13 was made a Fellow of the Royal Society. Like his father he was deeply grieved by the liberal theology and Church polity of the new Brattle Street Congregation, and conscientiously opposed its pastor Benjamin Colman, who had been irregularly ordained in England and by a Presbyterian body; but with his father he took part in 1700 in services in Colman's church. Harvard College was now controlled by the Liberals of the Brattle Street Church, and as it grew farther and farther away from Cal- vinism, Mather looked with increasing favour upon the college in Connecticut; before September 1701 he had drawn up a " scheme for a college," the oldest document now in the Yale archives; and finally (Jan. 1718) he wrote to a London merchant, Elihu Yale, and persuaded him to make a liberal gift to the college, which was named in his

honour. During the smallpox epidemic of 1721 he attempted in vain to have treatment by inoculation employed, for the first time in America; and for this he was bitterly attacked on all sides, and his life was at one time in danger; but, nevertheless, he used the treatment on his son, who recovered, and he wrote An Account of the Method and further Success of Inoculating for the Small Pox in London (1721). In addition he advocated temperance, missions, Bible societies, and the education of the negro; favoured the establishing of libraries for working men and of religious organizations for young people, and organized societies for other branches of philanthropic work. His later years were clouded with many sorrows and disappointments; his relations with Governor Joseph Dudley were unfriendly; he lost much of his former prestige in the Church — his own congregation dwindled — and in the college; his uncle John Cotton was expelled from his

charge in the Plymouth Church; his son Increase turned out a ne'er-do-well; four of his children and his second wife died in November 1713; his wife's brothers and the husbands of his sisters were ungodly and violent men; his favourite daughter Katherine, who " understood Latin and read Hebrew fluently," died in 1716; his third wife went mad in 1719; his personal enemies circulated incredible scandals about him; and in 1724- 1725 he saw a Liberal once more preferred to him as a new president of Harvard. He died in Boston on the 13th of February 1728 and is buried in the Copps Hill burial-ground, Boston. He was thrice married — to Abigail Phillips (d. 1702) in 1686, to Mrs Elizabeth Hubbard (d. 1713) in 1703, and in 1715 to Mrs Lydia George (d. 1734). Of hil fifteen children only two survived him.

Though self-conscious and vain, Cotton Mather had on the whole a noble character. He believed strongly in the power of prayer and repeatedly had assurances that his prayers were heard; and when he was disappointed by non-fulfilment his grief and depression were terrible. His spiritual nature was high-strung and delicate; and this condition was aggravated by his constant study, his long fasts and his frequent vigils — in one year, according to his diary, he kept sixty fasts and twenty vigils. In his later years his diaries have less and less of personal detail, and repeated entries prefaced by the letters " G.D." meaning Good Device, embodying precepts of kindliness and practical Christianity. He was remarkable for his godliness, his enthusiasm for knowledge, and his prodigious memory. He became a skilled linguist, a widely read scholar — though much of his learning was more curious than useful — a powerful preacher, a valued

citizen, and a voluminous writer, and did a vast deal for the intellectual and spiritual quickening of New England. He worked with might and main for the continuation of the old theocracy, but before he died it had given way before an increasing Liberalism — even Yale was infected with the Episcopalianism that he hated.

Among his four hundred or more published works, many of which are sermons, tracts and letters, the most notable is his Magnolia Christi Americana: or the Ecclesiastical History of New England, from Its First Planting in the Year 1620 unto the Year of Our Lord, i6q8. Begun in 1693 and finished in 1697, this work was published in London, in 1702, in one volume, and was republished in Hartford in 1820 and in 1 853-1 855, in two volumes. It is in seven books and concerns itself mainly with the settlement and religious history of New England. It is often inaccurate, and it abounds in far- fetched conceits and odd and pedantic features. Its style, though in the main rather unnatural and declamatory, is at its best spontaneous, dignified and rhythmical ; the book is valuable for occasional facts and for its picture of the times, and it did much to make Mather the most eminent American writer of his day. His other writings include A Poem Dedicated to the Memory of the Reverend and Excellent Mr Urian Oakes (1682); The Present State of New England (1690); The Life of the Renowned John Eliot (1691), later included in Book III. of the Magnolia; The Short History of New England (1694) ; Bonifacius, usually known as Essays To Do Good (Boston, 1710; Glasgow, 1825; Boston, 1845), one of his principal books and one which had a shaping influence on the life of Benjamin Franklin; Psalterium Americanum (1718), a blank verse translation of the Psalms from the original Hebrew; The Christian Philosopher: A Collection of the Best Discoveries in Nature, with Religious Im- provements {ij2\)- T Parentator (1724), a memoir of his father; Ratio Disciplinae (1726), an account of the discipline in New England churches; Manuductio ad Ministerium: Directions for a Candidate of the Ministry (1726), one of the most readable of his books. He also left a number of works in manuscript, including diaries, a medical treatise and a huge commentary on the Bible, entitled " Biblia Americana."

See The Life of Cotton Mather (Boston, 1729), by his son, Samuel Mather; William B. O. Peabody, The Life of Cotton Mather. (1836) (in Jared Sparks's " Library of Amerjcan Biography," vol. vi.) ; Enoch Pond, The Mather Family (Boston, 1844); John L. Sibley, Biographical Sketches of Graduates of Harvard University, vol. iii. (Cambridge, 1885); Barrett Wendell, Cotton Mather, the Puritan Priest (New York, 1891), a remarkably sympathetic study and particularly valuable for its insight into (and its defence of) Mather's attitude toward witchcraft; Abijah P. Marvin, The Life and Times of Cotton Mather (Boston, 1892) ; M. C. Tyler, A History of American Literature during the Colonial Period, vol. ii. (New

York, 1878); and Barrett Wendell, A Literary History of America (New York,

1900).

Cotton Mather's son, Samuel Mather (1706-1785), also

a clergyman, graduated at Harvard in 1723, was pastor of the North Church, Boston, from 1732 to 1742, when, owing to a dispute among his congregation over revivals, he resigned to take charge of a church established for him in North Bennett Street.

Among his works are The Life of Cotton Mather (1729) ; An Apology for the Liberties of the Churches in New England (1738), and America Known to the Ancients (1773). (W. L. C.)*

MATHER, INCREASE (1639-1723), American' Congregational minister, was born in Dorchester, Massachusetts, on the 21st of June 1639, the youngest son of Richard Mather. 1 He entered Harvard in 1651, and graduated in 1656. In 1657, on his eighteenth birthday, he preached his first sermon; in the same year he went to visit his eldest brother in Dublin, and studied there at Trinity College, where he graduated M.A. in 1658. He was chaplain to the English garrison at Guernsey in April-December 1659 and again in 1661; and in the latter year, refusing valuable livings in England offered on condition of conformity, he returned to America. In the winter of 1661- 1662 he began to preach to the Second (or North) Church of Boston, and was ordained there on the 27th of May 1664. As a delegate from Dorchester, his father's church, to the Synod of 1662, he opposed the Half-Way Covenant adopted by the Synod and defended by Richard - Mather and by Jonathan Mitchell (1624-1668) of Cambridge; but soon afterwards he " surrendered a glad captive " to " the truth so victoriously cleared' by Mr Mitchell," and like his father and his son became one of the chief exponents of the Half-Way Covenant. He was bitterly opposed, however, to the liberal practices that followed the Half-Way Covenant and (after 1677) in particular to " Stoddardeanism," the doctrine of Solomon Stoddard (1643- 1729) that all " such Persons as have a good Conversation and a Competent Knowledge may come to the Lord's Supper," only those of openly immoral life being excluded. In May 1679 Mather was a petitioner to the General Court for the call of a Synod to consider the reformation in New England of " the Evils that have Provoked the Lord to bring his Judgments," 2 and when the " Reforming Synod " met in September it appointed him one of a committee to draft a creed ; this committee reported in May 1680, at the Synod's second session, of which Mather was moderator, the Savoy Declaration (slightly modified, notably in ch. xxiv., " Of the Civil Magistrate "), which was approved but was not

made mandatory on the churches by the General Court, and in 1708 was reaffirmed at Saybrook, Connecticut. With the Cambridge Platform of 1646, drafted by his father, the Confession of 1680, for which Increase Mather was largely responsible, was printed as a book of doctrine and government for the churches of Massachusetts.

After the threat of a Quo Warranto writ in 1683 for the surrender of the Massachusetts charter, Mather used all his tremendous influence to persuade the colonists not to give up the charter; and the Boston freemen unanimously voted against submission. The royal agents immediately afterwards sent to London a treasonable letter, falsely attributed to Mather; but its spuriousness seems to have been suspected in England and Mather was not " fetch'd over and made a Sacrifice." He became a leader in the opposition to Sir Edmund Andros, to his secretary Edward Randolph, and to Governor Joseph Dudley. He was chosen by the General Court to represent the colony's interests in England, eluded officers sent to ajrest him, 3 and in disguise boarded a ship on which he reached Weymouth on the 6th of May 1688. In London he acted with Sir Henry Ashurst, the resident agent, and had two or

1 He was so christened " because of the never-to-be-forgotten increase, of every sort, wherewith God favoured the country about the time of his nativity." He often latinized his name, spelling it Crescenlius Malherus.

2 That is, King Philip's War, the Boston fires of 1676, when Mather's church and home were burned, and 1679, the threatened introduction of Episcopacy, and the general spiritual decay of the country.

3 He had previously been arrested and acquitted on a charge of having attributed the forged letter to Randolph.

three fruitless audiences with James II. His first audience with William III. was on the 9th of January 1689; he was active in influencing the Commons to vote (1689) that the New England charters should be restored; and he published A Narrative of the Miseries of New-England, By Reason of an Arbitrary Government Erected there Under Sir Edmund Andros (1688), A Brief Relation for the Confirmation of Charter Privileges (1691), and other pamphlets. In 1690 he was joined by Elisha Cooke (1638-1715) and Thomas Oakes (1644-1719), additional agents, who were uncompromisingly for the renewal of the old charter. Mather, however, was instrumental in securing a new charter (signed on Oct. 7,

1691), and prevented the annexation of the Plymouth Colony to New York. The nomination of officers left to the Crown was reserved to the agents. Mather had expressed strong dissatisfaction with the clause giving the governor the right of veto, and regretted the less theocratic tone of the charter which made all freemen (and not merely church members) electors. With Sir William Phips, the new governor, a member of Mather's church, he arrived in Boston on the 14th of May 1692. The value of his services to the colony at this time is not easily over-estimated. In England he won the friendship of divines like Baxter, Tillotson and Burnet, and effectively promoted the union in 1691 of English Presbyterians and Congregationalists. He was at heavy expense throughout his stay, and even greater than his financial loss was his loss of authority and control in the church and in Harvard College because of his absence.

Mather had been acting president of Harvard College in 1681-1682, and in June 1685 he again became acting president (or rector), but still preached every Sunday in Boston and would not comply with an order of the General Court that he should reside in Cambridge. In 1701 after a short residence there he returned to Boston and wrote to the General Court to " think of another President for the Colledge." The opposition to him had been increasing in strength, his resignation was accepted, and Samuel Willard took charge of the college as vice-president, although he also refused to reside in Cambridge. That Mather's administration of the college was excellent is admitted even by his harsh critic, Josiah Quincy, in his History of Harvard University. 1 The Liberal party, which now came into control in the college repeatedly disappointed the hopes of Cotton Mather (q.v.) that he might be chosen president, and by its ecclesiastical laxness and its broader views of Church polity forced the Mathers to turn from Harvard to Yale as a truer school of the prophets.

The Liberal leaders, John Leverett (1662-1724), William Brattle (1662-1713) — who graduated with Leverett in 1680, and with him as tutor controlled the college during Increase Mather's absence in England — William Brattle's eldest brother, Thomas Brattle (1658-1713), and Ebenezer Pemberton (1671- 171 7), pastor of the Old South Church, desired an " enrichment of the service," and greater liberality in the matter of baptism. In 1697 the Second Boston Church, in which Cotton Mather had been his father's colleague since 1685, upbraided the Charles- town Church " for betraying the liberties of the churches in their late putting into the hands of the whole inhabitants the choice of a minister." In 1699 Increase Mather published The Order of the Gospel, which severely (although indirectly, criticized the methods of the " Liberals " in establishing the Brattle Street Church and especially the ordination of their minister Benjamin Colman by a Presbyterian body in London; the Liberals replied with The Gospel Order Revived, which was printed in New York to

lend colour to the (partly true) charge of its authors that the printers of Massachusetts would print

1 Mather led the resistance to the royal demand instigated by Edward Randolph in 1683, for the annulment of the college charter, and after its vacation in 1684 strove for the grant of a new charter; King James promised him a confirmation of the former charter; the new provincial charter granted by William and Mary confirmed all gifts and grants to colleges; in 1692 Mather drafted an act incorporating the college, which was signed by Phips but was disallowed in England; and in 1696, 1697, 1699, and 1700, Mather repeated his efforts for a college charter.

nothing hostile to Increase Mather. 2 The autocracy of the Mathers in church, college, colony and press, had slipped from them. The later years of Mather's life were spent almost entirely in the work of the ministry, now beginning to be a less varied career than when he entered on it. He died on the 23rd of August 1723. He married in 1662 Maria, daughter of Sarah and John Cotton. His first wife died in 17 14; and in 171 5 he married Ann Lake, widow of John Cotton, of Hampton, N.H., a grandson of John Cotton of Boston.

Increase Mather was a great preacher with a simple style and a splendid voice, which had a " Tonitruous Cogency," to quote his son's phrase. His style was much simpler and more vernacular than his son's. He was an assiduous student, commonly spending sixteen hours a day among his books; but his learning (to quote Justin Winsor's contrast between Increase and Cotton Mather) " usually left his natural ability and his education free from entanglements." He was not so much self-seeking and personally ambitious as eager to advance the cause of the church in which he so implicitly believed. That it is a mistake to consider him a narrow churchman is shown by his assisting in 1718 at the ordination of Elisha Callender in the First Baptist Church of Boston. Like the most learned men of his time he was superstitious and a firm believer in " praesagious impressions "; his Essay for the Recording of Illustrious Providences: Wherein an Account is Given of many Remarkable and very Memorable Events which have Hapned in this Last Age, Especially in New England (1684) shows that he believed only less thoroughly than his son in witchcraft, though in his Cases of Conscience Concerning Evil Spirits (1693) he considered some current proofs of witchcraft inadequate. The revulsion of feeling after the witchcraft delusion undermined his authority greatly, and Robert's Calef's More Wonders of the Spiritual World (1700) was a personal blow to him as well as to his son. With Jonathan Edwards, than whom he was much more of a man of affairs, and with Benjamin Franklin, whose mission in England somewhat resembled Mather's, he may be ranked among the greatest Americans of the period before the War of

Independence.

The first authority for the life of Increase Mather is the work of his son Cotton Mather, Parentalor: Memoirs of Remark ables in the Life and Death of the Ever Memorable Dr Increase Mather (Boston, 1 724) ; there are also a memoir and constant references in Cotton Mather's Magnolia (London, 1702) especially vol. iv. ; there is an excellent sketch in the first volume of J. L. Sibley's Biographical Sketches of Graduates of Harvard University (Cambridge, 1873), with an exhaustive list of Mather's works (about 150 titles) ; there is much valuable matter in Williston Walker's Ten New England Leaders (New York, 1901) and in his Creeds and Platforms of Congre- gationalismˆ (New York, 1893) ; for literary criticism of the Mathers see ch. xii. of M. C. Tyler's History of American Literature, 1607-1676 (New York, 1878),' and Barrett Wendell's Cotton Mather (New York, l8gi)._ Mather's worth has been under-estimated by Josiah Quincy, Justin Winsor and other historians out of sympathy with his ecclesiastical spirit, who represent him as only an ambitious narrow-minded schemer. (R. We.)

MATHER, RICHARD (1 596-1 669), American Congregational clergyman, was born in Lowton, in the parish of Winwick, near Liverpool, England, of a family which was in reduced cir- cumstances but entitled to bear a coat-of-arms. He studied at Winwick grammar school, of which he was appointed a master in his fifteenth year, and left it in 1612 to become master of a newly established school at Toxteth Park, Liverpool. After a few months at Brasenose College, Oxford, he began in November 1618 to preach at Toxteth, and was ordained there, possibly only as deacon, early in 1619. In August-November 1633 he was suspended for nonconformity in matters of ceremony; and in 1634 was again suspended by the visitors of Richard Neile, archbishop of York, who, hearing that he had never worn a surplice during the fifteen years of his ministry, refused to reinstate him and said that " it had been better for him that he had gotten Seven Bastards." He had a great reputation as a preacher in and about Liverpool; but, advised by letters of John Cotton and Thomas Hooker, and persuaded by his

2 Mather was made a licenser of the Press in 1674 when the General Court abolished the monopoly of the Cambridge Press.

own elaborate formal " Arguments tending to prove the Remov- ing from Old-England to New … to be not only lawful, but also necessary for them

that are not otherwise tyed, but free," he left England and on the 17th of August 1635, and landed in Boston after an " extraordinary and miraculous deliverance " from a terrible storm. As a famous preacher " he was desired at Plimouth, Dorchester, and Roxbury." He went to Dorchester, where the Church had been greatly depleted by migrations to Windsor, Connecticut ; and where, after a delay of several months, in August 1636 there was constituted by the consent of magistrates and clergy a church of which he was " teacher " until his death in Dorchester on the 22nd of April

1669.

He was an able preacher, " aiming," said his biographer, " to shoot his arrows not over his people's heads, but into their Hearts and Consciences " ; and he was a leader of New England Congre- gationalism, whose policy he defended and described in the tract Church Government and Church Covenant Discussed, in an Answer of the Elders of the Severall Churches of New England to Two and Thirty Questions (written 1639; printed 1643), and in his Reply to Mr Rutherford (1647), a polemic against the Presbyterianism to which the English Congregationalists were then tending. He drafted the Cambridge Platform, an ecclesiastical constitution in seventeen chapters, adopted (with the omission of Mather's paragraph favour- ing the " Half-way Covenant," of which he strongly approved) by the general synod in August 1646. In 1657 he drafted the declara- tion of the Ministerial Convention on the meaning and force of the Half-way Covenant; this was published in 1659 under the title: A Disputation concerning Church Members and their Children in Answer to XXI. Questions. With Thomas Welde and John Eliot he wrote the " Bay Psalm Book," or, more accurately, The Whole Booke of Psalmes Faithfully Translated into English Metre (1640), probably the first book printed in the English colonies.

He married in 1624 Katherine Hoult or Holt (d. 1655), and secondly in 1656 Sarah Hankredge (d. 1676), the widow of John Cotton. Of six sons, all by his first wife, four were ministers: Samuel (1626-1671), the first fellow of Harvard College who was a graduate, chaplain of Magdalen College, Oxford, in 1650-1653, and pastor (1656-1671, excepting suspension in 1660-1662) of St Nicholas's in Dublin; Nathaniel (1630-1697), who graduated at Harvard in 1647, was vicar of Barnstaple, Devon, in 1656-1662, pastor of the English Church in Rotterdam, his brother's successor in Dublin in 1671-1688, and then until his death pastor of a church in London; Eleazar (1637-1669), who graduated at Harvard in 1656 and after preaching in Northampton, Massachusetts, for three years, became in 1661 pastor of the church there; and Increase Mather (q.v.). Horace E. Mather, in his Lineage of Richard

Mather (Hartford, Con- necticut, 1890), gives a list of 80 clergymen descended from Richard Mather, of whom 29 bore the name Mather and 51 other names, the more famous being Storrs and Schauffler.

See The Life and Death of That Reverend Man of God, Mr Richard Mather (Cambridge, 1670; reprinted 1850, with his Journal for l6 3.5. by the Dorchester Antiquarian and Historical Society), with an introduction by Increase Mather, who may have been the author ; W. B. Sprague's Annals of the American Pulpit, vol. i. (New York, 1857); Cotton Mather's Magnolia (London, 1702); an essay on Richard Mather in Williston Walker's Ten New England Leaders (New York, 1901); and the works referred to in the article on Increase Mather. (R. We.)

MATHERAN, a hill sanatorium in India, in the Kolaba district of Bombay, 2460 ft. above the sea, and about 30 m. E. of Bombay city. Pop. (1901), 3060. It consists of several thickly wooded ridges, on a spur of the Western Ghats, with a magnificent outlook over the plain below and the distant sea. First explored in 1850, it has since become the favourite resort of the middle classes of Bombay (especially the Parsis) during the spring and autumn months. It has recently been connected by a 2 ft. gauge mountain line with Neral station on the Great Indian Peninsula railway, 54 m. from Bombay.

MATHESON, GEORGE (1842-1906), Scottish theologian and preacher, was born in Glasgow in 1842, the son of George Matheson, a merchant. He was educated at the university of Glasgow, where he graduated first in classics, logic and philosophy. In his twentieth year he became totally blind, but he held to his resolve to enter the ministry, and gave himself

to theological and historical study. His first ministry began in 1868 at Innellan, on the Argyllshire coast between Dunoon and Toward. His books on Aids to the Study of German Theology, Can the Old Faith live with the New? The Growth of the Spirit of Christianity from the First Century to the Dawn of the Lutheran Era, established his reputation as a liberal and spiritually minded theologian; and Queen Victoria invited him to preach at Balmoral. In 1886 he removed to Edinburgh, where he became minister of St Bernard's Parish Church. Here his chief work as a preacher was done. In 1879 the university of Edinburgh conferred upon him the honorary degree of D.D., and the same year he declined an invitation to the pastorate of Crown Court, London, in succession to Dr John Cumming (1807-1881). In 1881 'he was chosen as Baird lecturer, and took for his subject " Natural Elements of Revealed Theology," and in 1882 he was the St Giles lecturer, his subject being " Confucianism." In 1890 he was elected a fellow of the Royal Society of Edinburgh, Aberdeen gave him its honorary LL.D., and in 1899 he was appointed Gifford lecturer by that university, but declined on*

grounds of health. In the same year he severed his active connexion with St Bernard's. One of his hymns, " O love that will not let me go," has passed into the popular hymnology of the Christian Church. He died suddenly of apoplexy on the 28th of August 1906. His exegesis owes its interest to his subjective resources rather than to breadth of learning; his power lay in spiritual vision rather than balanced judgment, and in the vivid apprehension of the factors which make the Christian personality, rather than in constructive doctrinal statement.

MATHEW, THEOBALD (1790-1856), Irish temperance reformer, popularly known as Father Mathew, was descended from a branch of the Llandaff family, and was born at Thomas- town, Tipperary, on the 10th of October 1790. He received his school education at Kilkenny, whence he passed for a short time to Maynooth; from 1808 to 1814 he studied at Dublin, where in the latter year he was ordained to the priesthood. Having entered the Capuchin order, he, after a brief time of service at Kilkenny, joined the mission in Cork, which was the scene of his religious and benevolent labours for many years. The movement with which his name is most intimately associated began in 1838 with the establishment of a total abstinence association, which in less than nine months, thanks to his moral influence and eloquence, enrolled no fewer than 150,000 names. It rapidly spread to Limerick and elsewhere, and some idea of its popularity may be formed from the fact that at Nenagh 20,000 persons are said to have taken the pledge in one day, 100,000 at Galway in two days, and 70,000 in Dublin in five days. In 1844 he visited Liverpool, Manchester and London with almost equal success. Meanwhile the expenses of his enterprise had involved him in heavy liabilities, and led on one occasion to his arrest for debt; from this embarrassment he was only partially relieved by a pension of £300 granted by Queen Victoria in 1847. In 1849 he paid a visit to the United States, returning in 1851. He died at Queenstown on the 8th of December,

1856.

See Father Mathew, a Biography, by J. F. Maguire, M.P. (1863).
MATHEWS, CHARLES (1776-1835), English actor, was born in London on the 28th of June 1776. His father was " a serious bookseller," who also officiated as minister in one of Lady Huntingdon's chapels. Mathews was educated at Merchant Taylors' School. His love for the stage was formed in his boyhood, when he was apprentice to his father, and the latter in 1794 unwillingly permitted him to enter on a theatrical engagement in Dublin. For several years Mathews had not only to content himself with thankless parts at a low salary, but in May 1803 he made his first London appearance at the Haymarket as Jabel in Cumberland's The Jew and as Lingo in The Agreeable Surprise. From this time his professional career was

an uninterrupted triumph. He had a wonderful gift of mimicry, and could completely disguise his personality without the smallest change of dress. The versatility and originality of his powers were admirably displayed in his " At

MATHEWS, T.

Homes, begun in the Lyceum theatre in 1818, which, according to Leigh Hunt, " for the richness and variety of his humour were as good as half a dozen plays distilled." Off the stage his' simple and kind-hearted disposition won him affection and esteem. In 1822 Mathews visited America, his observation on his experiences there forming for the reader a most entertain- ing portion of his biography. From infancy his health had been uncertain, and the toils of his profession gradually under- mined it. In 1834 he paid a second visit to America. His last appearance in New York was on the nth of February 1835, when he played Samuel Coddle in Married Life and Andrew Steward in The Lone House. He died at Plymouth on the 28th of June 1835. In 1797 he had married Eliza Kirkham strong (d. 1802), and in 1803 Anne Jackson, an actress, the author of the popular and diverting Memoirs, by Mrs Mathews (4 vols., 1838-1839).

*His son Charles James Mathews (1803-1878), who was born at Liverpool on the 26th of December 1803, became even better known as an actor. After attending Merchant Taylors' bcnool he was articled as pupil to an architect, and continued lor some years nominally to follow this profession. His first public appearance on the stage was made on the 7 th of December , 35 ' ** the °'y m P ic > London, as George Rattleton in his own play The Humpbacked Lover, and as Tim Topple the Tiger in Leman Rode's Old and Young Stager. In !8 3 8 he married Madame Vestris, then lessee of the Olympic, but neither his management of this theatre, nor subsequently of Covent Garden nor of the Lyceum, resulted in pecuniary success, although the introduction of scenery more realistic and careful in detail than had hitherto been employed was due to his enterprise. In the year of his marriage he visited America, but without receiving a very cordial welcome. As an actor he held in England an unrivalled place in his peculiar vein of light eccentric comedy. I he easy grace of his manner, and the imperturbable solemnity with which he perpetrated his absurdities, never failed to charm and amuse; his humour was never broad, but always measured and restrained. It was as the leading character in such plays as the Came of Speculation, My Awful Dad, Cool as a Cucumber, fatter versus Clatter, and Little Toddlekins, that he specially excelled. In 1856 Mme Vestris died, and in the following year Mathews again visited the United States, where in 1858 f ™f rr u d MrS A – H – Daven P ort – In 1861 they gave a series ot At Homes " at the Haymarket theatre, which*

were almost as popular as had been those of the elder Mathews. Charles James Mathews was one of the few English actors who played in French successfully— his appearance in Paris in 1863 in a i-rench version of Cool as a Cucumber, written by himself, being received with great approbation. He also played there again m 1865 as Sir Charles Coldcream in the original play L'Homme blase (English version by Boucicault, Used up). After reaching his sixty-sixth year, Mathews, set out on a tour round the world, in which was included a third visit to America, and on his return in 1872 he continued to act without interruption till within a few weeks of his death on the 24th of June 1878. He made his last appearance in New York at Wallack's theatre on the 7th of June 1872, in H, J. Byron's Not such a Fool as he Looks. His last appearance in London was at the Opera Comique on the 2nd of June 1877, in The Liar and The Cosy Couple. At btalybndge he gave his last performance on the 8th of June

\, \ W , , he played Adonis Ev ergreen in his own comedy My Awful Dad.

f, ™ e u the ,£ˆ L Ch r rl » ? am – es Mathews ' edited b V Char 'es Dickens nZJl r ?, 9 i : o G – Pame ln Actors and Actresses of Great Britain and the United Stales (New York, 1886).

MATHEWS, THOMAS (1676-1751), British admiral, son of Colonel Edward Mathews (d. 1700), and grandson on his mother's side of Sir Thomas Armstrong (1624-1684), who was executed for the Rye House Plot, was born at Llandaff Court, Llandaff. He entered the navy and became lieutenant in 1699, being promoted captain in 1703. During the short war with Spain (1718-20) he commanded the "Kent" in the fleet of Sir George Byng (Lord Torrington), and from 1722 to 1724 he had

the command of a small squadron sent to the East Indies to repress the pirates of the coast of Malabar. He saw no further

Se T C t, tll l March I741 ' when he was appointed to the command in the Mediterranean, and plenipotentiary to the king of Sardinia and the other courts of Italy. It is impossible to understand upon what grounds he was selected. As an admiral he was not distinguished; he was quite destitute of the experience and the tact required for his diplomatic duties; and he was on the worst possible terms with his second in command, Richard Lestock (i679?- I74 6). Yet the purpose for which he was sent out in his double capacity was not altogether ill performed In 1742 Mathews sent a small squadron to Naples to compel King Charles III., afterwards king of Spain, to remain «™- „ W ? S commanded by commodore, afterwards admiral, William Martin (i6 9 6?i7 5 6), who refused to enter into negotia tions,

and gave the king half an hour in which to return an answer. In June of the same year a squadron of Spanish galleys, which had taken refuge in the Bay of Saint Tropez was burnt by the fireships of Mathews' fleet. In the meantime a Spanish squadron of line-of-battleships had taken refuge in Toulon, and was watched by the British fleet from its anchorage at Hyeres. In February i 744 the Spaniards put to sea in company with a French force. Mathews, who had now returned to his flagship, followed, and an engagement took place on the 11th of February The battle was highly discreditable to the British fleet and not very honourable to their opponents, but it is of the highest historical importance in the history of the navy. It marked the lowest pitch reached in discipline and fighting and efficiency by the fleet in the 18th century, and it had a very bad effect in confirming the pedantic system of tactics set up by the old Fighting Instructions. The British fleet followed the enemy in light winds on the 10th of February and became scattered. Mathews hoisted the signal to form the line, and then when night fell, to lie to. At that moment Lestock, who commanded in the rear, was at a considerable distance from the body of the fleet, and he ought undoubtedly to have joined his admiral before lying to, but he obeyed' the second order, with the result, which it is impossible not to feel that he foresaw and desired, that when morning came he was a long way off the flag of Mathews. The enemy were within striking distance of the van and centre of the British fleet and Mathews attacked their rear. The battle was ill fought' as it had been ill prepared. Lestock never came into action at all. One Spanish line-of-battleship, the " Poder " (74) was taken but afterwards burnt. Several of the British captains behaved very badly, and Mathews in a heat of confused anger bore down on the enemy out of his line while the signal to keep the line was still flying at his mast head. The French and Spaniards got away, and were not pursued by Mathews, though they were of inferior strength

Deep indignation was aroused at home by this naval mis- carnage, and the battle led to more than twenty courts-martial and a parliamentary inquiry. The evils which had overrun the navy were clearly displayed, and in so far some good was done It was shown for instance that one of the captains whose ship behaved worst was a man of extreme age who was nearly blind and deaf One of the captains was so frightened at the prospect of a trial that he deserted on his way home and disappeared into Spam. Mathews resigned and returned home after the battle. In consequence of the parliamentary motion for inquiry, Lestock was brought to trial, and acquitted on the ground that he had obeyed orders. Then Mathews was tried in 1746, and was condemned to be dismissed the service on the ground that he had not only failed to pursue the enemy but had taken his fleet into action in a confused manner He had in fact not waited till he had his fleet in a line with the enemy before bearing down on them, and he had

disordered his own line. To the country at large it appeared strange that the admiral who had actually fought should be condemned while the admiral who had kept at a distance was acquitted'. Mathews looked upon his condemnation as the result of mere party spirit. Sheer pedantry on the part of the officers forming

the court-martial affords a more satisfactory explanation. They judged that a naval officer was bound not to go beyond the Fighting Instructions as Mathews had undoubtedly done, and therefore condemned him. Their decision had a serious effect in fixing the rule that all battles, at any rate against enemies of equal or nearly equal numbers, were to be fought on one pattern. Mathews died on the 2nd of October 1751 in London. There is a portrait of him in the Painted Hall at Greenwich.

In Beatson's Naval and Military Memoirs, vol. i., will be found a fair account of the battle of February 1744. It is fully dealt with by Montagu Burrows in his Life of Hawke. The French account may be found in Tronde's Batailles Navales de la France. The Spanish view is in the Vida de Don Josef Navarro by Don Josef de Vargas. The battle led to a violent pamphlet controversy. The charges and findings at the courts-martial on both Lestock and Mathews were published at the time. The minor trials arising out of the action are collected in a folio under the title " Copies of all the Minutes and Proceedings taken at and upon the several Tryals of Captain George Burrish " (1746). A " Narrative" was published by, or for, Lestock in 1744, and answered by, or on behalf of, Mathews

under the title " Ad— — 1 M w's Conduct in the late Engagement

Vindicated " in 1745. (D. H.)

MATHY, KARL (1807-1868), Badenese statesman, was born at Mannheim on the 17th of March 1807. He studied law and politics at Heidelberg, and entered the Baden government department of finance in 1829. His sympathy with the revolu- tionary ideas of 1830, expressed in his paper the Zeitgeist, cost him his appointment in 1834, and he made his way to Switzer- land, where he contributed to the Jeune Suisse directed by Mazzini. On his return to Baden in 1840 he edited the Landlags- zeitung at Carlsruhe, and in 1842 he entered the estates for the town of Constance. He became one of the opposition leaders and in 1847 helped to found the Deutsche Zeilung, a paper which eventually did much to further the cause of German unity. He took part in the preliminary parliament and in the

assembly of Frankfort in 1848-1849, where he supported the policy of H. W. A. von Gagern, and after the refusal of Frederick William IV. to accept the imperial crown he still worked for the cause of unity. He was made finance minister in Baden in May 1849, but was dismissed after a few days of office. He then applied his financial knowledge to banking business in Cologne, Berlin, Gotha and Leipzig. He was recalled to Baden in 1862, and in 1864 became president of the new ministry of commerce. He sought to bring Baden institutions into line with those of northern Germany with a view to ultimate union, and when in 1866 Baden took sides with Austria against Prussia he sent in his resignation. After the war he became president of a new cabinet, but he did not live to see the realiza- tion of the policy for which he had striven. He died at Carlsruhe on the 3rd of February 1868.

His letters during the years 1 846-1 848 were edited by Ludwig Mathy (Leipzig, 1899), and his life was written by G. Freytag (Leipzig, 2nd ed., 1872).

MATILDA (1102-1164), queen of England and empress, daughter of Henry I. of England, by Matilda, his first wife, was born in 1102. In 1109 she was betrothed to the emperor- elect, Henry V., and was sent to Germany, but the marriage was delayed till n 14. Her husband died after eleven years of wedlock, leaving her childless; and, since both her brothers were now dead, she was recalled to her father's court in order that she might be recognized as his successor in England and Normandy. The Great Council of England did homage to her under considerable pressure. Their reluctance to acknowledge a female sovereign was increased when Henry gave her in marriage to Geoffrey Plantagenet, the heir of Anjou and Maine (n 29); nor was it removed by the birth of the future Henry II. in 1133. On the old king's death both England and Normandy accepted his nephew, Stephen, of Mortain and Boulogne. Matilda and her husband were in Anjou at the time. They wasted the next few years in the attempt to win Normandy; but Earl Robert of Gloucester, the half-brother of the empress, at length induced her to visit England and raise her standard in the western shires, where his influence

was supreme. Though on her first landihg Matilda only escaped capture through the misplaced chivalry of her opponent, she soon turned the tables upon him with the help of the Church and the barons of the west. Stephen was defeated and captured at Lincoln (1141); the empress was acclaimed lady or queen of England (she used both titles indifferently) and crowned at London. But the arrogance which she displayed in her prosperity alienated the Londoners and the papal legate, Bishop Henry of Winchester. Routed at the siege of Winches- ter, she was compelled to release Stephen in exchange for Earl Robert, . and thenceforward her cause steadily

declined in England. In 1148, having lost by the earl's death her principal supporter, she retired to Normandy, of which her husband had in the meantime gained possession. Henceforward she remained in the background, leaving her eldest son Henry to pursue the struggle with Stephen. She outlived Henry's coronation by ten years; her husband had died in 1151. As queen-mother she played the part of a mediator between her sons and political parties. Age mellowed her temper, and she turned more and more from secular ambitions to charity and religious works. She died on the 30th of January 1164.

See O. Rossler, Kaiserin Mathilde (Berlin, 1897); J. H. Round, Geoffrey de Mandeville (London, 1892). (H. W. C. D.)

MATILDA (1046-1115), countess or margravine of Tuscany, popularly known as the Great Countess, was descended from a noble Lombard family. Her great-grandfather, Athone of Canossa, had been made count of Modena and Reggio by the emperor Otto I., and her grandfather had, in addition, acquired Mantua, Ferrara and Brescia. Her own father, Boniface II., the Pious, secured Tuscany, the duchy of Spoleto, the county of Parma, and probably that of Cremona; and was loyal to the emperor until Henry plotted against him. Through the murder of Count Boniface in 1052 and the death of her older brother and sister three years later, Matilda was left, at the age of nine, sole heiress to the richest estate in Italy. She received an excellent education under the care of her mother, Beatrice of Bar, the daughter of Frederick of Lorraine and aunt of Henry III., who, after a brief detention in Germany by the emperor, married Godfrey IV. of Lorraine, brother of Pope Stephen IX. (1057-1058). Thenceforth Matilda's lot was cast against the emperor in the great struggle over investiture, and for over thirty years she maintained the cause of the successive pontiffs, Gregory VII., Victor III., Urban II., Paschal II., with varying fortune, but with undaunted resolu- tion. She aided the pope against the Normans in 1074, and in 1075 attended the synod at which Guibert was condemned and deprived of the archbishopric of Ravenna. Her heredi- tary fief of Canossa was the scene (Jan. 28, 1077) of the celebrated penance of Henry IV. before Gregory VII. She provided an asylum for Henry's second wife, Praxides, and urged his son Conrad to revolt . against his father. In the course of the protracted struggle her villages were plundered, her fortresses demolished, and Pisa and Lucca temporarily lost, but she remained steadfast in her allegiance, and, before her death, had, by means of a league of Lombard cities which she formed, recovered all her possessions. The donation of her estates to the Holy See, originally made in 1077 and renewed on the 17th of November 1102, though never fully consummated on account of imperial opposition, constituted the greater part of the temporal dominion of the papacy. Matilda was twice married, first to Godfrey V. of Lorraine, surnamed the Hump- backed, who was the son of

her step-father and was murdered on the 26th of February 1076; and secondly to the 17-year-old Welf V. of Bavaria, from whom she finally separated in 1095 — both marriages of policy, which counted for little in her life. Matilda was an eager student: she spoke Italian, French and German fluently, and wrote many Latin letters; she collected a considerable library; she supervised an edition of the Pandects of Justinian; and Anselm of Canterbury sent her his Meditations. She combined her devotion to the papacy and her learning with very deep personal piety. She died after a long illness at Bodeno, near Modena, on the 24th of July 1115, and was buried

in the Benedictine church at Polirone, whence her remains were taken to Rome by order of Urban VIII. in 1635 and interred in St Peter's.

The contemporary record of Matilda's life in rude Latin verse, by her chaplain Domnizone (Donizo or Domenico), is preserved in the Vatican Library. The best edition is that of Bethmann in the Monumenta germ. hist, scriptores, xii. 348-409. The text, with an Italian translation, was published by F. Davoli under the title Vita delta granda contessa Matilda di Canossa (Reggio nell' Emilia 1888 seq.).

*See A. Overmann, Grafin Mathilde von Tuscien; ihre Besitzungen . . . u. ihre Regesten (Innsbruck, 1895); A. Colombo, Una Nuova vita delta contessa Matilda in R. accad. d. sci. Atti, vol. 39 (Turin, 1904) ; L. Tosti, La Contessa Matilda ed i romani pontefici (Florence, 1859); A. Pannenborg, Studien zur Geschichte der Herzogin Matilde von Canossa (Gottingen, 1872); F. M. Fiorentini, Memorie della Matilda (Lucca, 1756); and Nora Duff, Matilda of Tuscany (1910). * (C. H. Ha.)*

MATINS (Fr. matines K med. Lat. matutinae, sc. possibly vigiliae, morning watches; from matutinus, " belonging to the morning "), a word now only used in an ecclesiastical sense for one of the canonical hours in the Roman Breviary, originally intended to be said at midnight, but sometimes said at dawn, after which " lauds " were recited or sung. In the modern Roman Catholic Church, outside monastic services, the office is usually said on the preceding afternoon or evening. The word is also used in the Roman Catholic Church for the public service held on Sunday mornings before the mass (see Breviary; and Hours, Canonical). In the Church of England since the Reformation matins is used for the order of public morning prayer.

MATLOCK, a market town in the western parliamentary division of

Derbyshire, England, on the river Derwent, 17 m. N. by W. of Derby on the Midland railway. Pop. (1901), of urban district of Matlock, 5979! of Matlock Bath and Scarthin Nick," 1819. The entire township includes the old village of Matlock, the commercial and manufacturing district of Matlock Bridge, and the fashionable health resorts of Matlock Bath and Matlock Bank. The town possesses cotton, corn and paper mills, while in the vicinity there are stone-quarries and lead mines. A peculiar local industry is the manufacture of so-called " petrified " birds' nests, plants, and other objects. These are steeped in water from the mineral springs until they become encrusted with a calcareous deposit which gives them the appearance of fossils. Ornaments fashioned out of spar and stalactites have also a considerable sale.

Matlock Bath, one and a half miles south of Matlock, having a separate railway station, overlooks the narrow and preci- pitous gorge of the Derwent, and stands in the midst of woods and cliffs, deriving its name from three medicinal springs, which first became celebrated towards the close of the 17th century. They were not known to the Romans, although lead-mining was carried on extensively in the district in the 1st and 2nd centuries a.d. The mean temperature of the springs is 68° F. Extensive grounds have been laid out for public use; and in the neighbourhood there are several fine stalactite caverns.

Sheltered under the high moorlands of Darley, Matlock Bank has grown up about a mile north-east of the old village, and has become celebrated for the number and excellence of its hydropathic establishments. A tramway, worked by a single cable, over a gradient said to be the steepest in the world, affords easy communication with Matlock Bridge.

MATOS FRAGOSO, JUAN DE (i6i4?i689), Spanish drama tist, of Portuguese descent, was born about 1614 at Alsito (Alemtejo). After taking his degree in law at the university of Evora, he proceeded to Madrid, where he made acquaintance with Perez de Montalban, and thus obtained an introduction to the stage. He quickly displayed great cleverness in hitting the public taste, and many contemporaries of superior talent eagerly sought his aid as a collaborator. The earliest of his printed plays is La Defense, de la fe y principe prodigioso (1651), and twelve more pieces were published in 1658. But though his popularity continued long after his death (January 4, 1689),

Matos Fragoso's dramas do not stand the test of reading. His emphatic preciosity and sophistical insistence on the " point of honour " are tedious and unconvincing; in La Venganza en el despeno, in A lo que obliga un agravio, and in other plays, he merely recasts, very adroitly, works by Lope de Vega.

MATRASS (mod. Lat. matracium), a glass vessel with a round or oval body and a long narrow neck, used in chemistry, &c, as a digester or distiller. The Florence flask of commerce is frequently used for this purpose. The word is possibly identical with an old name " matrass " (Fr. materas, malelas) for the bolt or quarrel of a cross-bow. If so, some identity of shape is the reason for the application of the word; " bolt- head " is also used as a name for the vessel. Another connexion is suggested with the Arabic matra, a leather bottle.

MATRIARCHATE (" rule of the mother "), a term used to express a supposed earliest and lowest form of family life, typical of primitive societies, in which the promiscuous relations of the sexes result in the child's father being unknown (see Family). In such communities the mother took precedence of the father in certain important respects, especially in line of descent and inheritance. Matriarchate is assumed on this theory to have been universal in prehistoric times. The promi- nent position then naturally assigned women did not, however, imply any personal power, since they were in the position of mere chattels: it simply constituted them the sole relatives of their children and the only centre of any such family life as existed. The custom of tracing descent through the female is still observed among certain savage tribes. In Fiji father and son are not regarded as relatives. Among the Bechuanas the chieftainship passes to a brother, not to a son. In Senegal, Loango, Congo and Guinea, relationship is traced through the female. Among the Tuareg Berbers a child takes rank, freeman's or slave's, from its mother.

Bibliography. — J. F. McLennan, Patriarchal Theory (London, 1885); T. T. Bachofen, Das Mutterrecht (Stuttgart, 1861); E. Westermarck, History of Human Marriage (1894); A. Giraud- Teulon, La Mere chez certains peuples de I'antiquite (Paris, 1867); Les Origines du mariage el de la famille (Geneva and Paris, 1884) ; C. S. Wake, The Development of Marriage and Kinship (London, 1889); Ch. Letourneau, L'Evolution du mariage et de la famille (Paris, 1888) ; L. H. Morgan, Systems of Consanguinity and Affinity of Human Family, " Smithsonian Contributions to Knowledge," vol. xvii. (Washington, 1871); C. N. Starcke, The Primitive Family (London, 1889).

MATRIMONY (Lat. matrimonium, marriage, which is the ordinary English sense), a game at cards played with a full whist pack upon a table divided into three compartments labelled " Matrimony," " Intrigue " and " Confederacy," and two smaller spaces, " Pair " and " Best." These names indi- cate combinations of two cards, any king and queen being " Matrimony," any queen and knave " Intrigue," any king and knave " Confederacy "; while any two cards of the same denomination form a " Pair " and the diamond ace is " Best." The dealer distributes a number of

counters, to which an agreed value has been given, upon the compartments, and the other players do likewise. The dealer then gives one card to each player, face down, and a second, face up. If any turned-up card is the diamond ace, the player holding it takes everything on the space and the deal passes. If not turned, the diamond ace has only the value of the other three aces. If it is not turned, the players, beginning with the eldest hand, expose their second cards, and the resulting combinations, if among the five successful ones, win the counters of the corresponding spaces. If the counters on a space are not won, they remain until the next deal.

MATRIX, a word of somewhat wide application, chiefly used in the sense of a bed or enclosing mass in which something is shaped or formed (Late Lat. matrix, womb; in classical Latin matrix was only applied to an animal kept for breeding). Matrix is thus used of a mould of metal or other substance in which a design or pattern is made in intaglio, and from which an impression in relief is taken. In die-sinking and coining, the matrix is the hardened steel mould from which

the die-punches are taken. The term " seal " should strictly be applied to the impression only on wax of the design of the matrix, but is often used both of the matrix and of the impres- sion (see Seals). In mineralogy, the matrix is the mass in which a crystal mineral or fossil is embedded. In mathematics, the name " matrix " is used of an arrangement of numbers or symbols in a rectangular or square figure. (See Algebraic Forms.)

In med. Latin matrix and the diminutive matricula had the meaning of a roll or register, particularly one containing the names of the members of an institution, as of the clergy belonging to a cathedral, collegiate or other church, or of the members of a univer- sity. From this use is derived " matriculation," the admission to membership of a university, also the name of the examination for such admission. Matricula was also the name of the contribu- tions in men and money made by the various states of the Holy Roman Empire, and in the modern German Empire the contri- butions made by the federal states to the imperial finances are called Matrikularbeitrage, matricular contributions. (See Germany : Finance.)

MATROSS, the name (now obsolete) for a soldier of artillery, who ranked next below a gunner. The duty of a matross was to assist the gunners in loading, firing and sponging the guns. They were provided with firelocks, and marched with the store- wagons, acting as guards. In the American army a matross ranked as a private of artillery. The word is probably

derived from Fr. matelot, a sailor.

MATSUKATA, Marquis (1835-), Japanese statesman, was born at Kagoshima in 183s, being a son of a samurai of the Satsuma clan. On the completion of the feudal revolution of 1868 he was appointed governor of the province of Tosa, and having served six years in ,this office, was transferred to Tokyo as assistant minister of finance. As representative of Japan at the Paris Exhibition of 1878, he took the opportunity afforded by his mission to study the financial systems of the great European powers. On his return home, he held for a short time in 1880 the portfolio of home affairs, and was in 1 88 1 appointed minister of finance. The condition of the currency of Japan was at that time deplorable, and national bankruptcy threatened. The coinage had not only been seriously debased during the closing years of the Tokugawa regime, but large quantities of paper currency had been issued and circulated, both by many of the feudal lords, and by the central government itself, as a temporary expedient for filling an impoverished exchequer. In 1878 depreciation had set in, and the inconvertible paper had by the close of 1881 grown to such an extent that it was then at a discount of 80% as com- pared with silver. Matsukata showed the government the danger of the situation, and urged that the issue of further paper currency should be stopped at once, the expenses of administration curtailed, and the resulting surplus of revenue used in the redemption of the paper currency and in the creation of a specie reserve. These proposals were acted upon: the Bank of Japan was established, and the right of issuing con- vertible notes given to it; and within three years of the initia- tion of these financial reforms, the paper currency, largely reduced in quantity, was restored to its full par value with silver, and the currency as a whole placed on a solvent basis. From this time forward Japan's commercial and military advancement continued to make uninterrupted progress. But pari passu with the extraordinary impetus given to its trade by the successful conclusion of the war with China, the national expenditure enormously increased, rising within a few years from 80 to 250 million yen. The task of providing for this expenditure fell entirely on Matsukata, who had to face strong opposition on the part of the diet. But he distri- buted the increased taxation so equally, and chose its subjects so wisely, that the ordinary administrative expenditure and the interest on the national debt were fully provided for, while the extraordinary expenditure for military purposes was met from the Chinese indemnity. As far back as 1878 Matsukata perceived the advantages of a gold standard, but it was not until 1897 that his scheme could be realized. In this year the bill authorizing it was under his auspices submitted to the

diet and passed; and with this financial achievement Matsukata saw the fulfilment of his ideas of financial reform, which were conceived during his first visit to Europe. Matsukata, who in 1884 was created Count, twice

held the office of prime minister (1891-1892, 1896-1898), and during both his administrations he combined the portfolio of finance with the premiership; from October 1898 to October 1900 he was minister of finance only. His name in Japanese history is indissolubly connected with the financial progress of his country at the end of the 19th century. In 1902 he visited England and America, and he was created G.C.M.G., and given the Oxford degree of D.C.L. In September 1907 he was advanced to the rank of Marquis.

MATSYS (Massys or Metzys), QUINTIN (1466-1530), Flemish artist, was born at Louvain, where he first learned a mechanical art. During the greater part of the 15th century the centres in which the painters of .the Low Countries most congregated were Bruges, Ghent and Brussels. Towards the close of the same period Louvain took a prominent part in giving employment to workmen of every craft. It was not till the opening of the 16th century that Antwerp usurped the lead which it afterwards maintained against Bruges and Ghent, Brussels, Mechlin and Louvain. Quintin Matsys was one of the first men of any note who gave repute to the gild of Antwerp. A legend relates how the smith of Louvain was induced by affection for the daughter of an artist to change his trade and acquire proficiency in painting. A less poetic but perhaps more real version of the story tells that Quintin had a brother with v/hom he was brought up by his father Josse Matsys, a smith, who held the lucrative offices of clockmaker and architect to the municipality of Louvain. It came to be a question which of the sons should follow the paternal business, and which carve out a new profession for himself. Josse the son elected to succeed his father, and Quintin then gave himself to the study of painting. We are not told expressly by whom Quintin was taught, but his style seems necessarily derived from the lessons of Dierick Bouts, who took to Louvain the mixed art of Memlinc and Van der Weyden. When he settled at Antwerp, at the age of twenty-five, he probably had a style with an impress of its own, which certainly contributed most im- portantly to the revival of Flemish art on the lines of Van Eyck and Van der Weyden. What particularly characterizes Quintin Matsys is the strong religious feeling which he inherited from earlier schools. But that again was permeated by realism which frequently degenerated into the grotesque. Nor would it be too much to say that the facial peculiarities of the boors of Van Steen or Ostade have their counterparts in the pictures of Matsys, who was not, however, trained to use them in the same homely way. From Van der Weyden's example we may trace the dryness of outline and shadeless modelling and the pitiless finish even of trivial detail, from the Van Eycks and Memlinc through Dierick Bouts the superior glow and richness of transparent pigments, which mark the pictures of Matsys. The date of his retirement from Louvain is 1491, when he became a master in the gild of painters at

Antwerp. His most celebrated picture is that which he executed in 1508 for the joiners' company in the cathedral of his adopted city. Next in importance to that is the Marys of Scripture round the Virgin and Child, which was ordered for a chapel in the cathedral of Louvain. Both altar-pieces are now in public museums, one at Antwerp, the other at Brussels. They display great earnestness in expression, great minuteness of finish, and a general absence of effect by light or shade. As in early Flemish pictures, so in those of Matsys, superfluous care is lavished on jewelry, edgings and ornament. To the great defect of want of atmosphere such faults may be added as affectation, the result of excessive straining after tenderness in women, or common gesture and grimace suggested by a wish to render pictorially the brutality of gaolers and executioners. Yet in every instance an effort is manifest to develop and express individual character. This tendency in Matsys is chiefly illustrated in his pictures of male and female market bankers

(Louvre and Windsor), in which an attempt is made to display concentrated cupidity and avarice. The other tendency to excessive emphasis of tenderness may be seen in two replicas of the " Virgin and Child " at Berlin and Amsterdam, where the ecstatic kiss of the mother is quite unreal. But in these examples there is a remarkable glow of colour which makes up for many defects. Expression of despair is strongly exaggerated in a Locretia at the museum of Vienna. On the whole the best pictures of Matsys are the quietest; his " Virgin and Christ " or " Ecce Homo " and " Mater Dolorosa " (London and Antwerp) display as much serenity and dignity as seems consistent with the master's art. He had considerable skill as a portrait painter. Egidius at Longford, which drew from Sir Thomas More a eulogy in Latin verse, is but one of a numerous class, to which we may add the portrait of Maximilian of Austria in the gallery of Amsterdam. Matsys in this branch of practice was much under the influence of his contemporaries Lucas of Leiden and Mabuse. His tendency to polish and smoothness excluded to some extent the subtlety of modulation remarkable in Holbein and Diirer. There is reason to think that he was well acquainted with both these German masters. He probably met Holbein more than once on his way to England. He saw Diirer at Antwerp in 1520. Quintin died at Antwerp in 1530. The puritan feeling which slumbered in him was fatal to some of his relatives. His sister Catherine and her husband suffered at Louvain in 1543 for the then capital offence of reading the Bible, he being decapitated, she buried alive in the square fronting the cathedral.

Quintin's son, Jan Matsys, inherited the art but not the skill of his parent. The earliest of his works, a " St Jerome," dated 1537, in the gallery of Vienna, the latest, a " Healing of Tobias," of 1564, in the museum of Antwerp, are sufficient evidence of his tendency to substitute imitation for original thought.

MATTEAWAN, a village of Fishkill township, Dutchess county, New York, U.S.A., on the eastern bank of the Hudson river, opposite Newburgh and 15 m. S. of Poughkeepsie. Pop. (1890), 4278; (1900), 5807 (1044 foreign-born); (1905, state census), 3584; (1910), 6727. The village is served by the Central New England railway, and is the seat of the Matteawan state hospital for the criminal insane, the Highland hospital, and the Sargeant industrial school. The Teller House dates back to the beginning of the 18th century. Near Matteawan is Beacon Hill, the highest of the highlands, which has an electric railway to its summit. There are manufactures of hats, rubber goods, machinery (notably " fuel-economizers "), &c, water-power being furnished by Fishkill Creek. The village owns its water-works, the supply for which is derived from Beacon Hill. Matteawan was incorporated as a village in 1886.

MATTER. Our conceptions of the nature and structure of matter have been profoundly influenced in recent years by investigations on the Conduction of Electricity through Gases (see Conduction, Electric) and on Radio-activity (q.v.). These researches and the ideas which they have suggested have already thrown much light on some of the most fundamental questions connected with matter; they have, too, furnished us with far more powerful methods for investigating many problems connected with the structure of matter than those hitherto available. There is thus every reason to believe that our knowledge of the structure of matter will soon become far more precise and complete than it is at present, for now we have the means of settling by testing directly many points which are still doubtful, but which formerly seemed far beyond the reach of experiment.

The Molecular Theory of Matter — the only theory ever seriously advocated — supposes that all visible forms of matter are collocations of simpler and smaller portions. There has been a continuous tendency as science has advanced to reduce further and further the number of the different kinds of things of which all matter is supposed to be built up. First came the molecular theory teaching us to regard matter as made up of an enormous number of small particles, each kind of matter having its characteristic particle, thus the particles

of water were supposed to be different from those of air and indeed from those of any other substance. Then came Dalton's Atomic Theory which taught that these molecules, in spite of their almost infinite variety, were all

built up of still smaller bodies, the atoms of the chemical elements, and that the number of different types of these smaller bodies was limited to the sixty or seventy types which represent the atoms of the substance regarded by chemists as elements.

In 1815 Prout suggested that the atoms of the heavier chemi- cal elements were themselves composite and that they were all built up of atoms of the lightest element, hydrogen, so that all the different forms of matter are edifices built of the same material — the atom of hydrogen. If the atoms of hydro- gen do not alter in weight when they combine to form atoms of other elements the atomic weights of all elements would be multiples of that of hydrogen; though the number of elements whose atomic weights are multiples or very nearly so of hydrogen is very striking, there are several which are universally admitted to have atomic weights differing largely from whole numbers. We do not know enough about gravity to say whether this is due to the change of weight of the hydrogen atoms when they combine to form other atoms, or whether the primordial form from which all matter is built up is something other than the hy- drogen atom. Whatever may be the nature of this primordial form, the tendency of all recent discoveries has been to empha- size the truth of the conception of a common basis of matter of all kinds. That the atoms of the different elements have a common basis, that they behave as if they consisted of different numbers of small particles of the same kind, is proved to most minds by the Periodic Law of Mendeleeff and Newlands (see Element). This law shows that the physical and chemical properties of the different elements are determined by their atomic weights, or to use the language of mathematics, the properties of an element are functions of its atomic weight. Now if we constructed models of the atoms out of different materials, the atomic weight would be but one factor out of many which would influence the physical and chemical proper- ties of the model, we should require to know more than the atomic weight to fix its behaviour. If we were to plot a curve representing the variation of some property of the substance with the atomic weight we should not expect the curve to be a smooth one, for instance two atoms might have the same atomic weight and yet if they were made of different materials have no other property in common. The influence of the atomic weight on the properties of the elements is nowhere more strikingly shown than in the recent developments of physics connected with the discharge of electricity through gases and with radio-activity. The transparency of bodies to Rontgen rays, to cathode rays, to the rays emitted by radio- active substances, the quality of the secondary radiation emitted by the different elements are all determined by the atomic weight of the element. So much is this the case that the behaviour of the element with respect to these rays has been used to determine its atomic weight, when as in the case of Indium, uncertainty as

to the valency of the element makes the result of ordinary chemical methods ambiguous.

The radio-active elements indeed furnish us with direct evi- dence of this unity of composition of matter, for not only does one element uranium, produce another, radium, but all the radio-active substances give rise to helium, so that the substance of the atoms of this gas must be contained in the atoms of the radio-active elements.

It is not radio-active atoms alone that contain a common constituent, for it has been found that all bodies can by suitable treatment, such as raising them to incandescence or exposing them to ultra-violet light, be made to emit negatively electri- fied particles', and that these particles are the same from whatever source they may be derived. These particles all carry the same charge of negative electricity and all have the same mass, this mass is exceedingly small even when compared with the mass of an atom of hydrogen, which until the discovery of these particles was the smallest mass known to science. These

particles are called corpuscles or electrons; their mass according to the most recent determinations is only about -pfW oi that of an atom of hydrogen, and their radius is only about one hundred-thousandth part of the radius of the hydrogen atom. As corpuscles of this kind can be obtained from all substances, we infer that they form a constituent of the atoms of all bodies. The atoms of the different elements do not all contain the same number of corpuscles — there are more corpuscles in the atoms of the heavier elements than in the atoms of the lighter ones; in fact, many different considerations point to the con- clusion that the number of corpuscles in the atom of any element is proportional to the atomic weight of the element. Different methods of estimating the exact number of corpuscles in the atom have all led to the conclusion that this number is of the same order as the atomic weight; that, for instance, the number of corpuscles in the atom of oxygen is not a large multiple of 1 6. Some methods indicate that the number of corpuscles in the atom is equal to the atomic weight, while the maximum value obtained by any method is only about four times the atomic weight. This is one of the points on which further experiments will enable us to speak with greater precision. Thus one of the constituents of all atoms is the negatively charged corpuscle; since the atoms are electrically neutral, this negative charge must be accompanied by an equal positive one, so that on this view the atoms must contain a charge of positive elec- tricity proportional to the atomic weight;

the way in which this positive electricity is arranged is a matter of great import- ance in the consideration of the constitution of matter. The question naturally arises, is the positive electricity done up into definite units like the negative, or does it merely indicate a property acquired by an atom when one or more corpuscles leave it? It is very remarkable that we have up to the present (ioio), in spite of many investigations on this point, no direct evidence of the existence of positively charged particles with a mass comparable with that of a corpuscle; the smallest positive particle of which we have any direct indication has a mass equal to the mass of an atom of hydrogen, and it is a most remarkable fact that we get positively charged particles having this mass when we send the electric discharge through gases at low pressures, whatever be the kind of gas. It is no doubt exceedingly difficult to get rid of traces of hydrogen in vessels containing gases at low pressures through which an electric discharge is passing, but the circumstances under which the positively electrified particles just alluded to appear, and the way in which they remain unaltered in spite of all efforts to clear out any traces of hydrogen, all seem to indicate that these positively electrified particles, whose mass is equal to that of an atom of hydrogen, do not come from minute traces of hydrogen present as an impurity but from the oxygen, nitrogen, or helium, or whatever may be the gas through which the dis- charge passes. If this is so, then the most natural conclusion we can come to is that these positively electrified particles with the mass of the atom of hydrogen are the natural units of positive electricity, just as the corpuscles are those of negative, and that these positive particles form a part of all atoms.

Thus in this way we are led to an electrical view of the con- stitution of the atom. We regard the atom as built up of units of negative electricity and of an equal number of units of positive electricity; these two units are of very different mass, the mass of the negative unit being only TfVff oi that of the positive. The number of units of either kind is proportional to the atomic weight of the element and of the same order as this quantity. Whether this is anything besides the positive and negative electricity in the atom we do not know. In the present state of our knowledge of the properties of matter it is unnecessary to postulate the existence of anything besides these positive and negative units.

The atom of a chemical element on this view of the con- stitution of matter is a system formed by n corpuscles and n units of positive electricity which is in equilibrium or in a state of steady motion under the electrical forces which the

charged 2ti constituents exert upon each other. Sir J. J. Thomson {Phil. Mag., March 1904, " Corpuscular Theory of Matter ") has investigated the systems in steady motion which can be formed by various numbers of

negatively electrified particles immersed in a sphere of uniform positive electrification, a case, which in consequence of the enormous volume of the units of positive electricity in comparison with that of the negative has much in common with the problem under considera- tion, and has shown that some of the properties of n systems of corpuscles vary in a periodic way suggestive of the Periodic Law in Chemistry as n is continually increased.

Mass on the Electrical Theory of Matter. — One of the most characteristic things about matter is the possession of mass. When we take the electrical theory of matter the idea of mass takes new and interesting forms. This point may be illustrated by the case of a single electrified particle; when this moves it produces in the region around it a magnetic field, the magnetic force being proportional to the velocity of the electrified par- ticle. 1 In a magnetic field, however, there is energy, and the amount of energy per unit volume at any place is proportional to the square of the magnetic force at that place. Thus there will be energy distributed through the space around the moving particle, and when the velocity of the particle is small compared with that of light we can easily show that the energy in the

region around the charged particle is — ,when v is the velocity

of the particle, e its charge, a its radius, and ju the magnetic permeability of the region round the particle. If m is the ordinary mass of the particle, the part of the kinetic energy due to the motion of this mass is i rm?, thus the total kinetic

energy is 5

\m + I — / . Thus the electric charge on the particle

.fie'

makes it behave as if its mass were increased by f — . Since

a

this increase in mass is due to the energy in the region outside the charged particle, it is natural to look to that region for this additional mass. This region is traversed by the tubes of force which start from the electrified body and move with it, and a very simple calculation shows that we should get the increase in the mass which is due to the electrification if we suppose that these tubes of force as they move carry with them a certain amount of the ether, and that this ether had mass. The mass of ether thus carried along must be such that the amount of it in unit volume at any part of the field is such that if this were to move with the velocity of light its kinetic

energy would be equal to the potential energy of the electric field in the unit volume under consideration. When a tube moves this mass of ether only participates in the motion at right angles to the tube, it is not set in motion by a movement of the tube along its length. We may compare the mass which a charged body acquires in virtue of its charge with the additional mass which a ball apparently acquires when it is placed in water; a ball placed in water behaves as if its mass were greater than its mass when moving in vacuo; we can easily understand why this should be the case, because when the ball in the water moves the water around it must move as well; so that when a force acting on the ball sets it in motion it has to move some of the water as well as the ball, and thus the ball behaves as if its mass were increased. Similarly in the case of the electrified particle, which when it moves carries with it its lines of force, which grip the ether and carry some of it along with them. When the electrified particle is moved a mass of ether has to be moved too, and thus the apparent mass of the particle is increased. The mass of the electrified particle is thus resident in every part of space reached by its lines of force; in this sense an electrified body may be said to extend to an infinite distance; the amount of the mass of the ether attached to the particle diminishes so rapidly as we recede from it that the contributions of regions remote from the particle 1 We may measure this velocity with reference to any axes, pro- vided we refer the motion of all the bodies which come into considera- tion to the same axes.

are quite insignificant, and in the case of a particle as small as a corpuscle not one millionth part of its mass will be farther away from it than the radius of an atom.

The increase in the mass of a particle due to given charges varies as we have seen inversely as the radius of the particle; thus the smaller the particle the greater the increase in the mass. For bodies of appreciable size or even for those as small as ordinary atoms the effect of any realizable electric charge is quite insignificant, on the other hand for the smallest bodies known, the corpuscle, there is evidence that the whole of the mass is due to the electric charge. This result has been deduced by the help of an extremely interesting property of the mass due to a charge of electricity, which is that this mass is not constant but varies with the velocity. This comes about in the following way. When the charged particle, which for simplicity we shall suppose to be spherical, is at rest or moving very slowly the lines of electric force are distributed uniformly aro'ind it in all directions; when the sphere moves, however, magnetic forces are produced in the region around it, while these, in consequence of electro-magnetic

induction in a moving magnetic field, give rise to electric forces which displace the tubes of electric force in such a way as to make them set themselves so as to be more at right angles to the direction in which they are moving than they were before. Thus if the charged sphere were moving along the line AB, the tubes of force would, when the sphere was in motion, tend to leave the region near AB and crowd towards a plane through the centre of the sphere and at right angles to AB, where they would be moving more nearly at right angles to themselves. This crowding of the lines of force increases, however, the potential energy of the electric field, and since the mass of the ether carried along by the lines of force is proportional to the potential energy, the mass of the charged particle will also be increased. The amount of variation of the mass with the velocity depends to some extent on the assumptions we make as to the shape of the corpuscle and the way in which it is electrified. The simplest expression connecting the mass with the velocity is that when the velocity is v the mass is equal V£- , — – ˆ where c is the velocity of light. We see from

this that the variation of mass with velocity is very small unless the velocity of the body approaches that of light, but when, as in the case of the /3 particles emitted by radium, the velocity is only a few per cent, less than that of light, the effect of velocity on the mass becomes very considerable; the formula indicates that if the particles were moving with a velocity equal to that of light they would behave as if their mass were infinite. By observing the variation in the mass of a corpuscle as its velocity changes we can determine how much of the mass depends upon the electric charge and how much is independent of it. For since the latter part of the mass is independent of the velocity, if it predominates the variation with velocity of the mass of . a corpuscle will be small; if on the other hand it is negligible the variation in mass with velocity will be that indicated by theory given above. The experiment of Kaufmann . (Gollingen Nach., Nov. 8, 1001), Bucherer (Ann. der Physik., xxviii. 513, 1909) on the masses of the (3 particles shot out by radium, as well as those by Hupka (Berichte der dentsch. physik. Gesell., 1909, p. 249) on the masses of the corpuscle in cathode rays are in agreement with the view that the whole of the mass of these particles is due to their electric charge.

The alteration in the mass of a moving charge with its velocity is primarily due to the increase in the potential energy which accompanies the increase in velocity. The connexion between potential energy and mass is general and holds for any arrange- ment of electrified particles; thus if we assume the electrical constitution of matter, there will be a part of the mass of any system dependent upon the potential energy and in fact propor- tional to it. Thus every change in potential energy, such for example as occurs when two elements combine with evolution or absorption of heat, must be attended by a change in mass.

to f —

*The amount of this change can be calculated by the rule that if a mass equal to the change in mass were to move with the velocity of light its kinetic energy would equal the change in the potential energy. If we apply this result to the case of the combination of hydrogen and oxygen, where the evolution of heat, about i-6Xio n ergs per gramme of water, is greater than in any other known case of chemical combination, we see that the change in mass would only amount to one part in 3000 million, which is far beyond the reach of experiment. The evolution of energy by radio-active substances is enormously larger than in ordinary chemical transformations; thus one gramme of radium emits per day about as much energy as is evolved in the formation of one gramme of water, and goes on doing this for thousands of years. We see, however, that even in this case it would require hundreds of years before the chang*es in mass became appreciable.*

The evolution of energy from the gaseous emanation given off by radium is more rapid than that from radium itself, since according to the experiments of Rutherford (Rutherford, Radio- activity, p. 432) a gramme of the emanation would evolve about 2-iXio 16 ergs in four days; this by the rule given above would diminish the mass by about one part in 20,000; but since only very small quantities of the emanation could be used the detection of the change of mass does not seem feasible even in this case.

On the view we have been discussing the existence of potential energy due to an electric field is always associated with mass; wherever there is potential energy there is mass. On the electro-magnetic theory of light, however, a wave of light is accompanied by electric forces, and therefore by potential energy; thus waves of light must behave as if they possessed mass. It may be shown that it follows from the same principles that they must also possess momentum, the direction of the momentum being the direction along which the light is travelling; when the light is absorbed by an opaque substance the momentum in the light is communicated to the substance, which therefore behaves as if the light pressed upon it. The pressure exerted by light was shown by Maxwell (Electricity and Magnetism, 3rd ed., p. 440) to be a consequence of his electro-magnetic theory, its existence has been established by the experiment of Lebedew, of Nichols and Hull, and of Poynting.

We have hitherto been considering mass from the point of view that the constitution of matter is electrical; we shall proceed to consider the question of weight from the same point of view. The relation between mass and weight is, while the simplest in expression, perhaps the most fundamental and mysterious property possessed by matter. The weight of a body is proportional to its mass, that is if the weights of a number of

substances are equal the masses will be equal, whatever the substances may be. This result was verified to a considerable degree of approximation by Newton by means of experiments with pendulums; later, in 1830 Bessel by a very extensive and accurate series of experiments, also made on pendulums, showed that the ratio of mass to weight was certainly to one part in 60,000 the same for all the substances examined by him, these included brass, silver, iron, lead, copper, ivory, water.

*The constancy of this ratio acquires new interest when looked at from the point of view of the electrical constitution of matter. We have seen that the atoms of all bodies contain corpuscles, that the mass of a corpuscle is only t^u of the mass of an atom of hydrogen, that it carries a constant charge of negative electricity, and that its mass is entirely due to this charge, and can be regarded as arising from ether gripped by the lines of force starting from the electrical charge. The question at once suggests itself, Is this kind of mass ponderable? does it add to the weight of the body? and, if so, is the proportion between mass and weight the same as for ordinary bodies? Let us suppose for a moment that this mass is not ponderable, so that the corpuscles increase the mass but not the weight of an atom. Then, since the mass of a corpuscle is ttVt of that of an atom of hydrogen, the addition or removal of one corpuscle would in the case of an atom of atomic weight * alter the mass by one part in 1700 x, without altering the weight, this would produce an effect of the*

Weight.

same magnitude on the ratio of mass to weight and would in the case of the atoms of the lighter elements be easily measurable in experiments of the same order of accuracy as those made by Bessel. If the number of corpuscles in the atom were proportional to the atomic weight, then the ratio of mass to weight would be constant whether the corpuscles were ponderable or not. If the number were not proportional there would be greater dis- crepancies in the ratio of mass to weight than is consistent with Bessel's experiments if the corpuscles had no weight. We have seen there are other grounds for concluding that the number of corpuscles in an atom is proportional to the atom weight, so that the constancy of the ratio of mass to weight for a large number of substances does not enable us to determine whether or not mass due to charges of electricity is ponderable or not.

There seems some hope that the determination of this ratio for radio-active

substances may throw some light on this point. The enormous amount of heat evolved by these bodies may indicate that they possess much greater stores of potential energy than other substances. If we suppose that the heat developed by one gramme of a radio-active substance in the transformations which it undergoes before it reaches the non- radio-active stage is a measure of the excess of the potential energy in a gramme of this substance above that in a gramme of non-radio-active substance, it would follow that a larger part of the mass was due to electric charges in radio-active than in non-radio-active substances; in the case of uranium this difference would amount to at least one part in 20,000 of the total mass. If this extra mass had no weight the ratio of mass to weight for uranium would differ from the normal amount by more than one part in 20,000, a quantity quite within the range of pendulum experiments. It thus appears very desirable to make experiments on the ratio of mass to weight for radio-active substances. Sir J. J. Thomson, by swinging a small pendulum whose bob was made of radium bromide, has shown that this ratio for radium does not differ from the normal by one part in 2000. The small quantity of radium available prevented the attainment of greater accuracy. Experiments just completed (1910) by Southerns at the Cavendish Laboratory on this ratio for uranium show that it is normal to an accuracy of one part in 200,000; indicating that in non-radio-active, as in radio-active, substances the electrical mass is proportional to the atomic weight.

Though but few experiments have been made in recent years on the value of the ratio of mass to weight, many important investigations have been made on the effect of alterations in the chemical and physical conditions on the weight of bodies. These have all led to the conclusion that no change which can be detected by our present means of investigation occurs in the weight of a body in consequence of any physical or chemical changes yet investigated. Thus Landolt, who devoted a great number of years to the question whether any change in weight occurs during chemical combination, came finally to the con- clusion that in no case out of the many he investigated did any measurable change of weight occur during chemical combi- nation. Poynting and Phillips (Proc. Roy. Soc, 76, p. 445), as well as Southerns (78, p. 392), have shown that change in tempera- ture produces no change in the weight of a body; and Poynting has also shown that neither the weight of a crystal nor the attraction between two crystals depends at all upon the direction in which the axis of the crystal points. The result of these laborious and very carefully made experiments has been to strengthen the conviction that the weight of a given portion of matter is absolutely independent of its physical condition or state of chemical combinations. It should, however, be noticed that we have as yet no accurate investigation as to whether or not any changes of weight occur during radio-active transformations, such for example as the

emanation from radium undergoes when the atoms themselves of the substance are disrupted.

It is a matter of some interest in connexion with a discussion of any views of the constitution of matter to consider the theories of gravitation which have been put forward to explain that apparently invariable property of matter — its weight. It would

be impossible to consider in detail the numerous theories which have been put forward to account for gravitation; a concise summary of many of these has been given by Drude (Wied. Ann. 62, p. i): 1 there is no dearth of theories as to the cause of gravi- tation, what is lacking is the means of putting any of them to a decisive test.

There are, however, two theories of gravitation, both old, which seem to be especially closely connected with the idea of the electrical constitution of matter. The first of these is the theory, associated with the two fluid theory of electricity, that gravity is a kind of residual electrical effect, due to the attraction between the units of positive and negative electricity being a little greater than the repulsion between the units of electricity of the same kind. Thus on this view two charges of equal magnitude, but of opposite sign, would exert an attraction varying inversely as the square of the distance on a charge of electricity of either sign, and therefore an attraction on a system consisting of two charges equal in magnitude but opposite in sign forming an electrically neutral system. Thus if we had two neutral systems, A and B, A consisting of m positive units of electricity and an equal number of negative, while B has n units of each kind, then the gravitational attraction between A and B would be inversely proportional to the square of the distance and proportional to n m. The connexion between this view of gravity and that of the electrical constitution of matter is evidently very close, for if gravity arose in this way the weight of a body would only depend upon the number of units of elec- tricity in the body. On the view that the constitution of matter is electrical, the fundamental units which build up matter are the units of electric charge, and as the magnitude of these charges does not change, whatever chemical or physical vicissitudes matter, the weight of matter ought not to be affected by such changes. There is one result of this theory which might possibly afford a means of testing it: since the charge on a corpuscle is equal to that on a positive unit, the weights of the two are equal; but the mass of the corpuscle is only 1 tVis" °^ tnat °^ ^ e positive unit, so that the acceleration of the corpuscle under gravity will be 1700 times that of the positive unit, which we should expect to be the same as that for ponderable matter or 981.

The acceleration of the corpuscle under gravity on this view would be i-6Xio 6 . It does not seem altogether impossible that with methods slightly

more powerful than those we now possess we might measure the effect of gravity on a corpuscle if the acceleration were as large as this.

The other theory of gravitation to which we call attention is that due to Le Sage of Geneva and published in 1818. Le Sage supposed that the universe was thronged with exceedingly small particles moving with very great velocities. These particles he called ultra-mundane corpuscles, because they came to us from regions far beyond the solar system. He assumed that these were so penetrating that they could pass through masses as large as the sun or the earth without being absorbed to more than a very small extent. There is, however, some absorption, and if bodies are made up of the same kind of atoms, whose dimensions are small compared with the distances between them, the absorption will be proportional to the mass of the body. So that as the ultra-mundane corpuscles stream through the body a small fraction, proportional to the mass of the body, of their momentum is communicated to it. If the direction of the ultra-mundane corpuscles passing through the body were uniformly distributed, the momentum communi- cated by them to the body would not tend to move it in one direction rather than in another, so that a body, A, alone in the universe and exposed to bombardment by the ultra-mundane corpuscles would remain at rest. If, however, there were a second body, B, in the neighbourhood of A, B will shield A from some of the corpuscles moving in the direction BA; thus A will not receive as much momentum in this direction as when it was alone; but in this case it only received just enough to

1 A theory published after Drude's paper in that of Professor Osborne Reynolds, given in his Rede lecture " On an Inversion of Ideas as to the Structure of the Universe."

keep it in equilibrium, so that when B is present the momentum in the opposite direction will get the upper hand and A will move in the direction AB, and will thus be attracted by B. Similarly, we see that B will be attracted by A. Le Sage proved that the rate at which momentum was being communicated to A or B by the passage through them of his corpuscles was proportional to the product of the masses of A and B, and if the distance between A and B was large compared with their dimensions, inversely proportional to the square of the distance between them; in fact, that the forces acting on them would obey the same laws as the gravitational attraction between them. Clerk Maxwell (article " Atom," Ency. Brit., 9th ed.) pointed out that this transference of momentum from the ultra-mundane corpuscles to the body through which they passed involved the loss of kinetic energy by the corpuscles, and if the loss of momen- tum were

large enough to account for the gravitational attraction, the loss of kinetic energy would be so large that if converted into heat it would be sufficient to keep the body white hot. We need not, however, suppose that this energy is converted into heat; it might, as in the case where Rontgen rays are produced by the passage of electrified corpuscles through matter, be transformed into the energy of a still more penetrating form of radiation, which might escape from the gravitating body without heating it. It is a very interesting result of recent discoveries that the machinery which Le Sage introduced for the purpose of his theory has a very close analogy with things for which we have now direct experimental evidence. We know that small particles moving with very high speeds do exist, that they possess considerable powers of penetrating solids, though not, as far as we know at present, to an extent comparable with that postulated by Le Sage; and we know that the energy lost by them as they pass through a solid is to a large extent converted into a still more penetrating form of radiation, Rontgen rays. In Le Sage's theory the only function of the corpuscles is to act as carriers of momentum, any systems which possessed momentum, moved with a high velocity and had the power of penetrating solids, might be substituted for them ; now waves of electric and magnetic force, such as light waves or Rontgen rays, possess momentum, move with a high velocity, and the latter at any rate possess considerable powers of penetration; so that we might formulate a theory in which penetrating Rontgen rays replaced Le Sage's corpuscles. Rontgen rays, however, when absorbed do not, as far as we know, give rise to more penetrating Rontgen rays as they should to explain attraction, but either to less penetrating rays or to rays of the same kind.

We have confined our attention in this article to the view that the constitution of matter is electrical; we have done so because this view is more closely in touch with experiment than any other yet advanced. The units of which matter is built up on this theory have been isolated and detected in the laboratory, and we may hope to discover more and more of their properties. By seeing whether the properties of matter are or are not such as would arise from a collection of units having these properties, we can apply to this theory tests of a much more definite and rigorous character than we can apply to any other theory of matter. (J. J. T.)

MATTERHORN, one of the best known mountains (14,782 ft.) in the Alps. It rises S.W. of the village of Zermatt, and on the frontier between Switzerland (canton of the Valais) and Italy. Though on the Swiss side it appears to be an isolated obelisk, it is really but the butt end of a ridge, while the Swiss slope is not nearly as steep or difficult as the grand terraced walls of the Italian slope. It was first conquered, after a number of attempts chiefly on the Italian side, on the 14th of July 1865, by Mr E. Whymper's party, three members of which (Lord Francis Douglas, the Rev. C. Hudson

and Mr Hadow) with the guide, Michel Croz, perished by a slip on the descent. Three days later it was scaled from the Italian side by a party of men from Val Tournanche. Nowadays it is frequently ascended in summer, especially from Zermatt.

MATTEUCCI, CARLO (1811-1868), Italian physicist, was born at ForB on the 20th of June 181 1. After attending the Ecole

Polytechnique at Paris, he became professor of physics succes- sively at Bologna (1832), Ravenna (1837) and Pisa (1840). From 1847 he took an active part in politics, and in i860 was chosen an Italian senator, at the same time becoming inspector-general of the Italian telegraph lines. Two years later he was minister of education. He died near Leghorn on the 25th of June

1868.

He was the author of four scientific treatises : Lezioni di fisica (2 vols., Pisa, 1841), Lezioni sui fenomeni fisicochimici dei corpi viventi (Pisa, 1844), Manuale di telegrafia elettrica (Pisa, 1850) and Cours special sur Vinduction, le magnetisme de rotation, &c. (Paris, 1854). His numerous papers were published in the Annates de chimie et de physique (1 829-1 858); and most of them also appeared at the time in the Italian scientific journals. They relate almost entirely to electrical phenomena, such as the magnetic rotation of light, the action of gas batteries, the effects of torsion on magnetism, the polarization of electrodes, &c, sufficiently complete accounts of which are given in Wiedemann's Galvanismus. Nine memoirs, entitled " Electro-Physiological Researches," were published in the Philosophical Transactions, 1845-1860. See »Bianchi's Carlo Matteucci e V Italia del suo tempo (Rome, 1874).

MATTHEW, ST (MaMaios or Mardalos, probably a shortened form of the Hebrew equivalent to Theodorus), one of the twelve apostles, and the traditional author of the First Gospel, where he is described as having been a tax-gatherer or customs-officer (reXcovijs, x. 3), in the service of the tetrarch Herod. The circumstances of his call to become a follower of Jesus, received as he sat in the " customs house " in one of the towns by the Sea of Galilee — apparently Capernaum (Mark ii. 1, 13), are briefly related in ix. 9. We should gather from the parallel narrative in Mark ii. 14, Luke v. 27, that he was at the time known as " Levi the son of Alphaeus " (compare Simon Cephas, Joseph Barnabas) : if so, " James the son of Alphaeus " may have been his brother. Possibly " Matthew " (Yahweh's gift) was his Christian surname, since two native names, neither being a patronymic, is contrary to Jewish usage. It must be noted, however, that Matthew and Levi were sometimes distinguished in early times, as by

Heracleon (c. 170 A.D.), and more dubiously by Origen (c. Celsum, i. 62), also apparently in the Syriac Didascalia (sec. iii.), V. xiv. 14. It has generally been supposed, on the strength of Luke's account (v. 29), that Matthew gave a feast in Jesus' honour (like Zacchaeus, Luke xix. 6 seq.). But Mark (ii. 15), followed by Matthew (ix. 10), may mean that the meal in question was one in Jesus' own home at Capernaum (cf. v. 1). In the lists of the Apostles given in the Synoptic Gospels and in Acts, Matthew ranks third or fourth in the second group of four — a fair index of his relative importance in the apostolic age. The only other facts related of Matthew on good authority concern him as Evangelist. Eusebius (H.E. iii. 24) says that he, like John, wrote only at the spur of necessity. " For Matthew, after preaching to Hebrews, when about to go also to others, committed to writing in his native tongue the Gospel that bears his name; and so by his writing supplied, for those whom he was leaving, the loss of his presence." The value of this tradition, which may be based on Papias, who certainly reported that " Matthew compiled the Oracles (of the Lord) in Hebrew," can be estimated only in connexion with the study of the Gospel itself (see below). No historical use can be made of the artificial story, in Sanhedrin 43a, that Matthew was condemned to death by a Jewish court (see Laible, Christ in the Talmud, 71 seq.). According to the Gnostic Heracleon, quoted by Clement of Alexandria {Strom, iv. 9), Matthew died a natural death. The tradition as to his ascetic diet (in Clem. Alex. Paedag. ii. 16) may be due to confusion with Matthias (cf. Mart. Matthaei, i.). The earliest legend as to his later labours, one of Syrian origin, places them in the Parthian kingdom, where it represents him as dying a natural death at Hierapolis (= Mabog on the Euphrates). This agrees with his legend as known to Ambrose and Paulinus of Nola, and is the most probable in itself. The legends which make him work with Andrew among the Anthropophagi near the Black Sea, or again in Ethiopia (Rufinus, and Socrates, H.E. i. 19), are due to confusion with Matthias, who from the first was associated in his Acts with Andrew (see M. Bonnet, Acta Apost. apocr., 1898, II. i. 65.), Another

legend, his Martyrium, makes him labour and suffer in Mysore. He is commemorated as a martyr by the Greek Church on the 16th of November, and by the Roman on the 21st of Sep- tember, the scene of his martyrdom being placed in Ethiopia. The Latin Breviary also affirms that his body was afterwards translated to Salerno, where it is said to lie in the church built by Robert Guiscard. In Christian art (following Jerome) the Evangelist Matthew is generally symbolized by the "man "in the imagery of Ezek. i. 10, Rev. iv. 7.

For the historical Matthew, see Ency. Bibl. and Zahn, Introd. to New Test., ii. S06 seq., S22 seq. For his legends, as under Mark.

(J.V.B.)

MATTHEW, TOBIAS, or Tobie (1546-1628), archbishop of York, was the son of Sir John Matthew of Ross in Herefordshire, and of his wife Eleanor Crofton of Ludlow. He was born at Bristol in 1546. He was educated at Wells, and then in suc- cession at University College and Christ Church, Oxford. He proceeded B.A. in 1564, and M.A. in 1566. He attracted the favourable notice of Queen Elizabeth, and his rise was steady though not very rapid. He was public orator in 1 569, president of St John's College, Oxford, in 1572, dean of Christ Church in 1576, vice-chancellor of the university in 1579, dean of Durham in 1583, bishop of Durham in 1595, and archbishop of York in 1606. In 1581 he had a controversy with the Jesuit Edmund Campion, and published at Oxford his arguments in 1638 under the title, Piissimi et eminentissimi viri Tobiae Matthew, archi-episcopi olim Eboracencis concio apologetica adversus Campianam. While in the north he was active in forcing the recusants to conform to the Church of England, preaching hundreds of sermons and carrying out thorough visitations. During his later years he was to some extent in opposition to the administration of James I. He was exempted from attendance in the parliament of '1625 on the ground of age and infirmities, and died on the 29th of March 1628. His wife, Frances, was the daughter of William Barlow, bishop of Chichester.

His son, Sir Tobias, or Tobie, Matthew (iS77-i 6 S5)> is remembered as the correspondent and friend of Francis Bacon. He was educated at Christ Church, and was early attached to the court, serving in the embassy at Paris. His debts and dissipa- tions were a great source of sorrow to his father, from whom he is known to have received at different times £14,000, the modern equivalent of which is much larger. He was chosen member for Newport in Cornwall in the parliament of 1601, and member for St Albans in 1604. Before this time he had become the intimate friend of Bacon, whom he replaced as member for St Albans. When peace was made with Spain, on the accession of James I., he wished to travel abroad. His family, who feared his con- version to Roman Catholicism, opposed his wish, but he promised not to go beyond France. When once safe out of England he broke his word and went to Italy. The persuasion of some of his countrymen in Florence, one of whom is said to have been the Jesuit Robert Parsons, and a story he heard of the miraculous liquefaction of the blood of San Januarius at Naples, led to his conversion in 1606. When he returned to England he was imprisoned, and many efforts were made to obtain his reconver- sion without success. He would not take the oath of allegiance to the king. In 1608 he was exiled, and remained out of England

for ten years, mostly in Flanders and Spain. He returned in 16 1 7 , but went abroad again in 1619. His friends obtained his leave to return in 1621. At home he was known as the intimate friend of Gondomar, the Spanish ambassador. In 1623 he was sent to join Prince Charles, afterwards Charles I., at Madrid, and was knighted on the 23rd of October of that year. He remained in England till 1640, when he was finally driven abroad by the parliament, which looked upon him as an agent of the pope. He died in the English college in Ghent on the 13th of October 1655. In 1618 he published an Italian translation of Bacon's essays. The " Essay on Friendship " was written for him. He was also the author of a translation of The Confessions of the Incomparable Doctor St Augustine, which led him into con- troversy. His correspondence was published in London in

1660.

For the father, see John Le Neve's Fasti ecclesiae anglicanae (London, 1716), and Anthony Wood's Athenae oxonienses. For the son, the notice in Athenae oxonienses, an abridgment of his autobiographical Historical Relation of his own life, published by Alban Butler in 1795, and A. H. Matthew and A. Calthrop, Life of Sir Tobie Matthew (London, 1907).

MATTHEW, GOSPEL OF ST, the first of the four canonical Gospels of the Christian Church. The indications of the use of this Gospel in the two or three generations following the Apostolic Age (see Gospel) are more plentiful than of any of the others. Throughout the history of the Church, also, it has held a place second to none of the Gospels alike in public instruction and in the private reading of Christians. The reasons for its having impressed itself in this way and become thus familiar are in large part to be found in the characteristics noticed below. But in addition there has been from an early time the belief that it was the work of one of those publicans whose heart Jesus touched and of whose call to follow Him the three Synoptics contain an interesting account, but who is identified as Matthew (q.v.) only in this one (Matt. ix. 9~i3 = Mark ii. i3-i7 = Luke v. 27-32).

1. The Connexion of our Greek Gospel of Matthew with the Apostle whose name it bears. — The earliest reference to a writing by Matthew occurs in a fragment taken by Eusebius from the same work of Papias from which he has given an account of the composition of a record by Mark (Euseb. Hist. Ecd. iii. 39; see Mark, Gospel of St) . The statement about Matthew is much briefer and is harder to interpret. In spite of much controversy, the same measure of agreement as to its meaning cannot be said to have been attained. This is the fragment: "Matthew, however, put together and wrote down the Oracles (to. Xcryia cvvky paif/w) in the Hebrew language, and each man interpreted them as he was able." Whether " the elder " referred

to in the passage on Mark, or some other like authority, was the source of this statement also does not appear; but it is probable that this was the case from the context in which Eusebius gives it. Conservative writers on the Gospels have frequently maintained that the writing here referred to was virtually the Hebrew original of our Greek Gospel which bears his name. And it is indeed likely that Papias himself closely associated the latter with the Hebrew (or Aramaic) work by Matthew, of which he had been told, since the traditional connexion of this Greek Gospel with Matthew can hardly have begun later than this time. It is reasonable also to suppose that there was some ground for it. The description, however, of what Matthew did suits better the making of a collection of Christ's discourses and sayings than the composition of a work corresponding in form and character to our Gospel of Matthew.

The next reference in Christian literature to a Gospel-record by Matthew is that of Irenaeus in his famous passage on the four Gospels (Adv. haer. iii. i. 1). He says that it was written in Hebrew; but in all probability he regarded the Greek Gospel, which stood first in his, as it does in our, enumeration, as in the strict sense a translation of the Apostle's work; and this was the view of it universally taken till the 16th century, when some of the scholars of the Reformation maintained that the Greek Gospel itself was by Matthew.

The actual phenomena, however, of this Gospel, and of its relation to sources that have been used in it, cannot be explained consistently with either of the two views just mentioned. It is a composite work in which two chief sources, known in Greek to the author of our present Gospel, have, together with some other matter, been combined. It is inconceivable that one of the Twelve should have proceeded in this way in giving an account of Christ's ministry. One of the ckief documents, however, here referred to seems to correspond in character with the description given in Papias' fragment of a record of the compilation of " the divine utterances " made by Matthew; and the use made of it in our first Gospel may explain the connexion of this Apostle's name with it. In the Gospel of Luke also, it is true, this same source has been used for the teaching of Jesus. But the original Aramaic Logian document may have been more largely reproduced in our Greek Matthew. Indeed, in the case of one impor- tant passage (v. 1 7-48) this is suggested by a comparison with

Luke itself, and there are one or two others where from the character of the matter it seems not improbable, especially vi. 1-18 and xxiii. 1-5, 7b-io,

15-22. On the whole, as will be seen below, what appears to be a Palestinian form of the Gospel- tradition is most fully represented in this Gospel; but in many instances at least this may well be due to some other cause than the use of the original Logian document.

2. The Plan on which the Contents is arranged. — In two respects the arrangement of the book itself is significant.

(a) As to the general outline in the first half of the account of the Galilean ministry (iv. 23-xi. 30). Immediately after relating the call of the first four disciples (iv. 18-22) the evangelist gives in iv. 23 a comprehensive summary of Christ's work in Galilee under its two chief aspects, teaching and healing. In the sequel both these are illustrated. First, he gives in the Sermon on the Mount (v.-vii.) a considerable body of teaching, of the kind required by the disciples of Jesus generally, and a large portion of which probably also stood not far from the beginning of the Logian document. After this he turns to the other aspect. Up to this point he has mentioned no miracle. He now describes a number in succession, introducing all but the first of those told between Mark i. 23 and ii. 12, and also four specially remarkable ones, which occurred a good deal later according to Mark's order (Matt. viii. 23~34 = Mark iv. 35-v. 20; Matt. ix. 18-26 = Mark v. 21-43); and he also adds some derived from another source, or other sources (viii. 5-13; ix. 27-34). Then, after another general description at ix. 35, similar to that at iv. 23, he brings strikingly before us the needs of the masses of the people and Christ's compassion for them, and so introduces the mission of the Twelve (which again occurs later according to Mark's order, viz. at vi. 7 seq.), whereby the ministry both of teaching and of healing was further extended (ix. 36-x. 42). Finally, the message of John the Baptist, and the reply of Jesus, and the reflections that follow (xi.), bring out the significance of the preceding narrative. It should be observed that examples have been given of every kind of mighty work referred to in the reply of Jesus to the messengers of the Baptist; and that in the discourse which follows their departure the perversity and unbelief of the people generally are condemned, and the faith of the humble-minded is contrasted therewith. The greater part of the matter from ix. 37 to end of xi. is taken from the Logian document. After this point, i.e. from xii. 1 onwards, the first evangelist follows Markalmost step by step down to the point (Mark xvi. 8), after which Mark's Gospel breaks off, and another ending has been supplied; and gives in substance almost the whole of Mark's contents, with the exception that he passes over the few narratives that he has (aswe have seen) placed earlier. At the same time he brings in additional matter in connexion with most of the Marcan sections.

(b) With the accounts of the words of Jesus spoken on certain occasions, which our first evangelist found given in one or another of his sources, he

has combined other pieces, taken from other parts of the same source or from different sources, which seemed to him connected in subject, e.g. into the discourse spoken on a mountain, when crowds from all parts were present, given in the Logian docu- ment, he has introduced some pieces which, as we infer from Luke, stood separately in that document (cf. Matt. vi. 19-21 with Luke xii. 33. 34; Matt. vi. 22, 23 with Luke xi. 34-36; Matt. vi. 24 with Luke xvi. 13 ; Matt. vi. 25-34 with Luke xii. 22-32 ; Matt. vii. 7-1 1 with Luke xi. 9-13). Again, the address to the Twelve in Mark vi. 7-1 1, which in Matthew is combined with an address to disciples, from the Logian document, is connected by Luke with the sending out of seventy disciples (Luke x. 1-16). Our first evangelist has also added here various other sayings (Matt. x. 17-39, 42). Again, with the Marcan account of the charge of collusion with Satan and Christ's reply (Mark iii. 22-30), the first evangelist (xii. 24-45) combines the parallel account in the Logian document and adds Christ's reply to another attack (Luke xi. 14-16, 17-26, 29-32). These are some examples. He has in all in this manner constructed eight discourses or collections of sayings, into which the greater part of Christ's teaching is gathered: (1) On the character of the heirs of the kingdom (v.-vn.); (2) The Mission address (x.) ; (3) Teaching suggested by the message of John the Baptist (xi.) ; (4) The reply to an accusation and a challenge (xii. 22-45); (5) The teaching by parables (xiii.); (6) On offences (xviii.); (7) Concerning the Scribes and Pharisees (xxiii.); (8) On the Last Things (xxiv., xxv.). In this arrangement of h's material the writer has in many instances disregarded chronological considerations. But his documents also gave only very imperfect indications of the occasions of many of the utterances; and the result of his method of procedure has been to give us an exceedingly effective representation of the teaching of Jesus.

In the concluding verses of the Gospel, where the original Marcan parallel is wanting, the evangelist may still have followed in part that document while making additions as before. The account of the silencing of the Roman guard by the chief priests is the sequel to the setting of this guard and their presence at the Resurrection, which at an earlier point are peculiar to Matthew (xxvii. 62-66, xxvm 4). And, further, this matter seems to belong to the same cycle of tradition as the story of Pilate's wife and his throwing the guilt of the Crucifixion of Jesus upon the Jews, and the testimony

borne by the Roman guard (as well as the centurion) who kept watch by the cross (xxvii. 15-26, 54), all which also are peculiar to this Gospel. It cannot but seem probable that these are legendary additions which had arisen through the desire to commend the Gospel to the Romans.

On the other hand, the meeting of Jesus with the disciples in Galilee (Matt, xxviii. 16 seq.) is the natural sequel to the message to them related in Mark xvi. 7, as well as in Matt, xxviii. 7. Again, the commission to them to preach throughout the world is supported by Luke xxiv. 47, and by the present ending of Mark (xvi. 15), though neither of these mention Galilee as the place where it was given. _ The baptismal formula in Matt, xxviii. 19, is, how- ever, peculiar, and in view of its non-occurrence in the Acts and Epistles of the New Testament must be regarded as probably an addition in accordance with Church usage at the time the Gospel was written.

3. The Palestinian Element. — Teaching is preserved in this Gospel which would have peculiar interest and be specially required in the home of Judaism. The. best examples of this are the passages already referred to near end of §1, as probably derived from the Logian document. There are, besides, a good many turns of expression and sayings peculiar to this Gospel which have a Semitic cast, or which suggest a point of view that would be natural to Palestinian Christians, e.g. " kingdom of heaven" frequently for "kingdom of God"; xiii. 52 ("every scribe"); xxiv. 20 ("neither on a Sabbath"). See also v. 35 and xix. 9; x. 5, 23. Again, several of the quotations which are peculiar to this Gospel are not taken from the LXX., as those in the other Gospels and in the corresponding contexts in this Gospel commonly are, but are wholly or partly independent renderings from the Hebrew (ii. 6, 15, 18; viii. 17, xii. 17-21, &c). Once more, there is somewhat more parallelism between the fragments of the Gospel according to the Hebrews and this Gospel than is the case with Luke, not to say Mark.

4. Doctrinal Character. — In this Gospel, more decidedly than in either of the other two Synoptics, there is a doctrinal point of view from which the whole history is regarded. Certain aspects which are of profound significance are dwelt upon, and this without there being any great difference between this Gospel and the two other Synoptics in respect to the facts recorded or the beliefs implied. The effect is produced partly by the com- ments of the evangelist, which especially take the form of citations from the Old Testament; partly by the frequency with which certain expressions are used, and the prominence that is given in this and other ways to particular traits and topics.

He sets forth the restriction of the mission of Jesus during His life on earth - to the people of Israel in a way which suggests at first sight a spirit of Jewish exclusiveness. But there are various indications that this is not the true explanation. In particular the evangelist brings out more strongly than either Mark or Luke the national rejection of Jesus, while the Gospel ends with the commission of Jesus to His disciples after His resurrection to "

make disciples of all the peoples." One may divine in all this an intention to " justify the ways of God " to the Jew, by proving that God in His faithfulness to His ancient people had given them the first opportunity of salvation through Christ, but that now their national privilege had been rightly forfeited. He was also specially concerned to show that prophecy is fulfilled in the life and work of Jesus, but the conception of this fulfilment which is presented to us is a large one ; it is to be seen not merely in particular events or features of Christ's ministry, but in the whole new dispensation, new relations between God and men, and new rules of conduct which Christ has introduced. The divine meaning of the work of Jesus is thus made apparent, while of the majesty and glory of His person a peculiarly strong impression is conveyed.

Some illustrations in detail of these points are subjoined. Where there are parallels in the other Gospels they should be compared and the words in Matthew noted which in many instances serve to emphasize the points in question.

(a) The Ministry of Jesus among the Jewish People as their promised Messiah, their rejection of Him, and the extension of the Gospel to the Gentiles. The mission to Israel: Matt. i. 21; iv. 23 (note in these passages the use of 6 XaAs, which here, as generally in Matthew, denotes the chosen nation), ix. 33, 35, xv. 31. For the rule limiting

II

the work of Jesus while on earth see xv. 24 (and note l£i>&ovea in verse 22, which implies that Jesus had not himself entered the heathen borders), and for a similar rule prescribed to the disciples, x. 5, 6 and 23.

The rejection of Jesus by the people in Galilee, xi. 21 ; xiii. 13-15, and by the heads of " the nation," xxvi. 3, 47 and by " the whole nation," xxvii. 25; their condemnation xxiii. 38.

Mercy to the Gentiles and the punishment of " the sons of the kingdom " is foretold viii. II, 12. The commission to go and convert Gentile peoples (IBvy) is given after Christ's resurrection (xxviii. 19).

(b) The Fulfilment of Prophecy. — -In the birth and childhood of Jesus, i. 23; ii. 6, 15, 18, 23. By these citations attention is drawn to the lowliness of the beginnings of the Saviour's life, the unexpected and secret manner of His appearing, the dangers to which from the first He was exposed and from which He escaped.

The ministry of Christ's forerunner, iii. 3. (The same prophecy, Isa. xl. 3, is also quoted in the other Gospels.)

The ministry of Jesus. The quotations serve to bring out the significance of important events, especially such as were turning- points, and also to mark the broad features of Christ's life and work, iv. 15, 16; viii. 17; xii. 18 seq. ; xiii. 35; xxi. 5; xxvii. 9.

(c) The Teaching on the Kingdom of God. — Note the collection of parables " of the Kingdom " in xiii. ; also the use of ˆ |8a

(d) The Relation of the New Law to the Old. — Verses 17-48, cf. also, addition at xxii. 40 and xix. 19b. Further, his use of oiKauxriwri (" righteousness ") and Sucaios (" righteous ") (specially frequent in this Gospel) is such as to connect the New with the Old; the standard in mind is the law which " fulfilled " that previously given.

(e) The Christian Ecclesia. — Chap. xvi. 18, xviii. 17.

(f) The Messianic Dignity and Glory of Jesus. — The narrative in i. and ii. show the royalty of the new-born child. The title " Son of" David " occurs with special frequency in this Gospel. The follow- ing instances are without parallels in the other Gospels: ix. 27; xii. 23; xv. 22; xxi. 9; xxi. 15. The title " Son of God " is also used with somewhat greater frequency than in Mark and Luke: ii. 15; xiv. 33; xvi. 16; xxii. 2 seq. (where it is implied); xxvii.

4°. 43-

The thought of the future coming of Christ, and in particular of the judgment to be executed by Him then, is much more prominent in this Gospel than in the others. Some of the following predic- tions are peculiar to it, while in several others there are additional touches: vii. 22, 23; x. 23, 32, 33; xiii. 39-43; xvi. 27, 28; xix. 28; xxiv. 3, 27, 30, 31, 37, 39; xxv. 31-46; xxvi. 64.

The majesty of Christ is also impressed upon us by the signs at His crucifixion, some of which are related only in this Gospel, xxvii. 51-53, and by the sublime vision of the Risen Christ at the close, xxviii. 16—20.

(5) Time of Composition and Readers addressed. — The signs of dogmatic reflection in this Gospel point to its having been com- posed somewhat late in the 1st century, probably after Luke's Gospel, and this is in accord with the conclusion that some inser- tions had been made in the Marcan document used by this evangelist which were not in that used by Luke (see Luke, Gospel of St). We may assign a.d. 80-100 as a probable time for the

composition. The author was in all probability a Jew by race, and he would seem to have addressed himself especially to Jewish readers; but they were Jews of the Dispersion. For although he was in specially close touch with Palestine, either personally or through the sources at his command, or both, his book was composed in Greek by the aid of Greek documents.

See commentaries by Th. Zahn (1903) and W. C. Allen (in the series of International Critical Commentaries, 1907); also books on the Four Gospels or the Synoptic Gospels cited at the end of, Gospel. (V. H. S.)

MATTHEW CANTACUZENUS, Byzantine emperor, was the son of John VI. Cantacuzenus (q.v.). In return for the support he gave to his father during his struggle with John V. he was allowed to annex part of Thrace under his own dominion and in 1353 was proclaimed joint emperor. From his Thracian principality he levied several wars against the Servians. An attack which he prepared in 1350 was frustrated by the defection of his Turkish auxiliaries. In 1357 he was captured by his enemies, who delivered him to the rival emperor, John V.

Compelled to abdicate, he withdrew to a monastery, where he busied himself with writing commentaries on the Scriptures.

MATTHEW OF PARIS (d. 1259), English monk and chronicler known to us only through his voluminous writings. In spite of his surname, and of his knowledge of the French language, his attitude towards foreigners attests that he was of English birth. He may have studied at Paris in his youth, but the earliest fact which he records of himself is his admission as a monk at St Albans in the year 121 7. His life was mainly spent in this religious house. In 1248, however, he was sent to Norway as the bearer of a message from Louis IX. of France to Haakon VI. ; he made himself so agreeable to the Norwegian sovereign that he was invited, a little later, to superintend the reformation of the Benedictine monastery of St Benet Holme at Trondhjem. Apart from these missions, his activities were devoted to the com- position of history, a pursuit for which the monks of St Albans had long been famous. Matthew edited anew the works of Abbot John de Cella and Roger of Wendover, which in their altered form constitute the first part of his most important work, the Chronica majora. From 1235, the point at which Wendover dropped his pen, Matthew continued the history on the plan which his predecessors had followed. He derived much of his information from the letters of important personages, which he sometimes inserts, but much more from conversation with the eye-witnesses of events. Among his informants were Earl Richard of Cornwall and Henry III. With the latter he appears to have been on terms of intimacy. The king knew that Matthew was writing a history, and showed some anxiety that it should be

as exact as possible. In 1257, in the course of a week's visit to St Albans, Henry kept the chronicler beside him night and day, " and guided my pen," says Paris, "with much good will and diligence." It is therefore curious that the Chronica majora should give so unfavourable an account of the king's policy. Luard supposes that Matthew never intended his work to see the light in its present form, and many passages of the autograph have against them the note offendiculum, which shows that the writer understood the danger which he ran. On the other hand, unexpurgated copies were made in Matthew's lifetime; though the offending passages are duly omitted or softened in his abridgment of his longer work, the Historia Anglorum (written about 1253), the real sentiments of the author must have been an open secret. In any case there is no ground for the old theory that he was an official historiographer.

Matthew Paris was unfortunate in living at a time when English politics were peculiarly involved and tedious. His talent is for narrative and description. Though he took a keen interest in the personal side of politics he has no claim to be considered a judge of character. His appreciations of his contemporaries throw more light on his own prejudices than on their aims and ideas. His work is always vigorous, but he imputes motives in the spirit of a partisan who never pauses to weigh the evidence or to take a comprehensive view of the situation. His redeeming feature is his generous admira- tion for strength of character, even when it goes along with a policy of which he disapproves. Thus he praises Grosseteste, while he denounces Grosseteste's scheme of monastic reform. Matthew is a vehement supporter of the monastic orders against their rivals, the secular clergy and the mendicant friars. He is violently opposed to the court and the foreign favourites. He despises the king as a statesman, though for the man he has some kindly feeling. The frankness with which he attacks the court of Rome for its exactions is remarkable; so, too, is the intense nationalism v/hich he displays in dealing with this topic. His faults of presentment are more often due to carelessness and narrow views than to deliberate purpose. But he is sometimes guilty of inserting rhetorical speeches which are not only fictitious, but also misleading as an account of the speaker's sentiments. In other cases he tampers with the docu- ments which he inserts (as, for instance, with the text of Magna Carta). His chronology is, for a contemporary, inexact; and he occasionally inserts duplicate versions of the same incident in differ- ent places. Hence he must always be rigorously checked where other authorities exist and used with caution where he is our sole informant. None the less, he gives a more vivid impression of his age than any other English chronicler ; and it is a matter for regret that his great history breaks off in 1259, on the eve of the crowning struggle between Henry III and the baronage.

Authorities. — The relation of Matthew Paris's work to those of John de

Cella and Roger of Wendover may best be studied in H. R. Luard's edition of the Chronica majora (7 vols., Rolls series, 1872-1883), which contains valuable prefaces. The Historia

Anglorum site hisloria minor (1067-1253) has been edited by F. Madden (3 vols., Rolls series, 1866-1869). Matthew Paris is often confused with " Matthew of Westminster," the reputed author of the Flores historiarum edited by H. R. Luard (3 vols., Rolls series, 1890). This work, compiled by various hands, is an edition of Matthew Paris, with continuations extending to 1326. Matthew Paris also wrote a life of Edmund Rich (q.v.), which is probably the work printed in W. Wallace's St Edmund of Canterbury (London, !893) pp. 543-588, though this is attributed by the editor to the monk Eustace; Vitae abbatum S Albani (up to 1225) which have been edited by W. Watts (1640, &c.) ; and (possibly) the Abbreviatio chronicorum (1000-1255), edited by F. Madden, in the third volume of the Historia Anglorum. On the value of Matthew as an historian see F. Liebermann in G. H. Pertz's Scriptores xxviii. pp. 74-106; A. Jessopp's Studies by a Recluse (London, 1893); H. Plehn's Politische Character Matheus Parisiensis (Leipzig, 1897).

(H. W. C. D.)

MATTHEW OF WESTMINSTER, the name of an imaginary person who was long regarded as the author of the Flores Historiarum. The error was first discovered in 1826 by Sir F. Palgrave, who said that Matthew was " a phantom who never existed," and later the truth of this statement was completely proved by H. R. Luard. The name appears to have been taken from that of Matthew of Paris, from whose Chronica majora the earlier part of the work was mainly copied, and from West- minster, the abbey in which the work was partially written.

The Flores historiarum is a Latin chronicle dealing with English history from the creation to 1326, although some of the earlier manuscripts end at 1306; it was compiled by various persons, and written partly at St Albans and partly at Westminster. The part from 1306 to 1326 was written by Robert of Reading (d. 1325) and another Westminster monk. Except for parts dealing with the reign of Edward I. its value is not great. It was first printed by Matthew Parker, archbishop of Canterbury, in 1567, and the best edition is the one edited with introduction by H. R. Luard for the Rolls series (London, 1890). It has been translated into English by C. D. Yonge (London, 1853). See Luard's introduction, and C. Bemont in the Revue

critique d'histoire (Paris, 1891).

MATTHEWS, STANLEY (1824-1889), American jurist, was born in Cincinnati, Ohio, on the 21st of July 1824. He gradu- ated from Kenyon College in 1840, studied law, and in 1842 was admitted to the bar of Maury county, Tennessee. In 1844 he became assistant prosecuting attorney of Hamilton county, Ohio; and in 1846- 1849 edited a short-lived anti-slavery paper, the Cincinnati Herald. He was clerk of the Ohio House of Representatives in 1848-1849, a judge of common pleas of Hamil- ton county in 1850-1853, state senator in 1856-1858, and U.S. district-attorney for the southern district of Ohio in 1858-1861. First a Whig and then a Free-Soiler, he joined the Republican party in 1861. After the outbreak of the Civil War he was commissioned a lieutenant of the 23rd Ohio, of which Ruther- ford B. Hayes was major; but saw service only with the 57th Ohio, of which he was colonel, and with a brigade which he com- manded in the Army of the Cumberland. He resigned from the army in 1863, and was judge of the Cincinnati superior court in 1863-1864. He was a Republican presidential elector in 1864 and 1868. In 1872 he joined the Liberal Republican movement, and was temporary chairman of the Cincinnati convention which nominated Horace Greeley for the presidency, but in the campaign he supported Grant. In 1877, as counsel before the Electoral Commission, he opened the argument for the Repub- lican electors of Florida and made the principal argument for the Republican electors of Oregon. In March of the same year he succeeded John Sherman as senator from Ohio, and served until March 1879. In 1881 President Hayes nominated him as asso- ciate justice of the Supreme Court, to succeed Noah H. Swayne; there was much opposition, especially in the press, to this ap- pointment, because Matthews had been a prominent railway and corporation lawyer and had been one of the Republican " visiting statesmen" who witnessed the canvass of the vote of Louisiana 1 in 1876; and the nomination had not been approved when the session of Congress expired. Matthews was renominated by President Garfield on the 15th of March, and the nomination was confirmed by the Senate (22 for, 21 against) on the 12th of

1 It seems certain that Matthews and Charles Foster of Ohio gave their written promise that Hayes, if elected, would recognize the Democratic governors in Louisiana and South Carolina.

May. He was an honest, impartial and conscientious judge. He died in Washington, on the 22nd of March 1889.

MATTHIAE, AUGUST HEINRICH (1769-1835), German classical scholar, was born at Gottingen, on the 25th of December 1769, and educated at the university. He then spent some years as a tutor in Amsterdam. In 1798 he

returned to Germany, and in 1802 was appointed director of the Friedrichsgymnasium at Altenburg, which post he held till his death, on the 6th of January 1835. Of his numerous important works the best-known are his Greek Grammar (3rd ed., 1835), translated into English by E. V. Blomfield (5th ed., by J. Kenrick, 1832), his edition of Euripides (9 vols., 1813-1829), Grundriss der Geschichte der griechischen und romischen Litteratur (3rd ed., 1834, Eng. trans., Oxford, 1 841) Lehrbuch fur den ersten Unterricht in der Philo- sophie (3rd ed., 1833), Encyklopadie und Methodologie der Philo- logie (1835). His Life was written by his son Constantin (1845).

His brother, Friedrich Christian Matthiae (1763-1822), rector of the Frankfort gymnasium, published valuable editions of Seneca's Letters, Aratus, and Dionysius Periegetes.

MATTHIAS, the disciple elected by the primitive Christian community to fill the place in the Twelve vacated by Judas Iscariot (Acts i. 21-26). Nothing further is recorded of him in the New Testament. Eusebius {Hist. Eccl., I. xii.) says he was, like his competitor, Barsabas Justus, one of the seventy, and the Syriac version of Eusebius calls him throughout not Matthias but Tolmai, i.e. Bartholomew, without confusing him with the Bartholomew who was originally one of the Twelve, and is often identified with the Nathanael mentioned in the Fourth Gospel (Expository Times, ix. 566). Clement of Alex- andria says some identified him with Zacchaeus, the Clementine Recognitions identify him with Barnabas, Hilgenfeld thinks he is the same as Nathanael.

Various works — a Gospel, Traditions and Apocryphal Words — were ascribed to him; and there is also extant The Acts of Andrew and Matthias, which places his activity in " the city of the cannibals " in Ethiopia. Clement of Alexandria quotes two sayings from the Traditions: (1) Wonder at the things before you (suggesting, like Plato, that wonder is the first step to new knowledge); (2) If an elect man's neighbour sin, the elect man has sinned.

MATTHIAS (15 57-16 19), Roman emperor, son of the emperor Maximilian II. and Maria, daughter of the emperor Charles V., was born in Vienna, on the 24th of February 1557. Educated by the diplomatist 0. G. de Busbecq, he began his public life in 1 577, soon after his father's death, when he was invited to assume the governorship of the Netherlands, then in the midst of the long struggle with Spain. He eagerly accepted this invitation, although it involved a definite breach with his Spanish kinsman, Philip II., and entering Brussels in January 1578 was named governor-general; but he was merely a cipher, and only held the position for about three years, returning to Germany in October 1581. Matthias was

appointed governor of Austria in 1593 by his brother, the emperor Rudolph II. ; and two years later, when another brother, the archduke Ernest, died, he became a person of more importance as the eldest surviving brother of the un- married emperor. As governor of Austria Matthias continued the policy of crushing the Protestants, although personally he appears to have been inclined to religious tolerance; and he dealt with the rising of the peasants in 1595, in addition to repre- senting Rudolph at the imperial diets, and gaining some fame as a soldier during the Turkish War. A few years later the discon- tent felt by the members of the Habsburg family at the incom- petence of the emperor became very acute, and the lead was taken by Matthias. Obtaining in May 1605 a reluctant consent from his brother, he took over the conduct of affairs in Hungary, where a revolt had broken out, and was formally recognized by the Habsburgs as their head in April 1606, and was promised the succession to the Empire. In June 1606 he concluded the peace of Vienna with the rebellious Hungarians, and was thus in a better position to treat with the sultan, with whom peace was made in November. This pacific policy was displeasing to Rudolph, who prepared to renew the Turkish War; but having secured the support of the national party in Hungary and gath- ered an army, Matthias forced his brother to cede to him this

kingdom, together with Austria and Moravia, both of which had thrown in their lot with Hungary (1608). The king of Hungary, as Matthias now became, was reluctantly compelled to grant religious liberty to the inhabitants of Austria. The strained relations which had arisen between Rudolph and Matthias as a result of these proceedings were temporarily improved, and a formal reconciliation took place in 1610; but affairs in Bohemia soon destroyed this fraternal peace. In spite of the letter of majesty (Majestatsbrief) which the Bohemians had extorted from Rudolph, they were very dissatisfied with their ruler, whose troops were ravaging their land; and in 16 11 they invited Matthias to come to their aid. Accepting this invitation, he inflicted another humiliation upon his brother, and was crowned king of Bohemia in May 161 1. Rudolph, however, was success- ful in preventing the election of Matthias as German king, or king of the Romans, and when he died, in January 161 2, no pro- vision had been made for a successor. Already king of Hungary and Bohemia, however, Matthias obtained the remaining heredi- tary dominions of the Habsburgs, – and in June 161 2 was crowned emperor, although the ecclesiastical electors favoured his younger brother, the archduke Albert (1559-1621).

The short reign of the new emperor was troubled by the religious dissensions of Germany. His health became impaired and his indolence increased, and he fell completely under the influence of Melchior Klesl (q.v.), who practically conducted the imperial business. By Klesl's advice he took up an attitude of moderation and sought to reconcile the contending religious parties; but the proceedings at the diet of Regensburg in 1613 proved the hopelessness of these attempts, while their author was regarded with general distrust. Meanwhile the younger Habs- burgs, led by the emperor's brother, the archduke Maximilian, and his cousin, Ferdinand, archduke of Styria, afterwards the emperor Ferdinand II., disliking the peaceful policy of Klesl, had allied themselves with the unyielding Roman Catholics, while the question of the imperial succession was forcing its way to the front. In 161 1 Matthias had married his cousin Anna (d. 1618), daughter of the archduke Ferdinand (d. 1595), but he was old and childless and the Habsburgs were anxious to retain his extensive possessions in the family. Klesl, on the one hand, wished the settlement of the religious difficulties to precede any arrangement about the imperial succession; the Habsburgs, on the other, regarded the question of the succession as urgent and vital. Meanwhile the disputed succession to the duchies of Cleves and Jiilich again threatened a European war; the imperial commands were flouted in Cologne and Aix-la-Chapelle, and the Bohemians were again becoming troublesome. Having decided that Ferdinand should succeed Matthias as emperor, the Habs- burgs had secured his election as king of Bohemia in June 161 7, but^ were unable to stem the rising tide of disorder in that country. Matthias and Klesl were in favour of concessions, but Ferdinand and Maximilian met this move by seizing and imprisoning Klesl. Ferdinand had just secured his coronation as king of Hungary when there broke out in Bohemia those struggles which heralded the Thirty Years' War; and on the 20th of March 1619 the emperor died at Vienna.

For tlie life and reign of Matthias the following works may be consulted: J. Heling, Die Wahl des rbmischen Konigs Matthias (Belgrade, 1892); A. Gindely, Rudolf II. und seine Zeit (Prague, 1 862-1 868) ; F. Stieve, Die Verhandlungen uber die Nachfolge Kaisers Rudolf II. (Munich, 1880); P. von Chlumecky, Karl von Zierotin und seine Zeit (Briinn, 1862-1879); A. Kerschbaumer, Kardinal Klesel (Vienna, 1865); M. Ritter, Quellenbeitrdge zur Geschichte des Kaisers Rudolf II. (Munich, 1872); Deutsche Geschichte im Zeitalter der Gegenreformation und des dreissigjdhrigen Krieges (Stuttgart, 1887, seq.); and the article on Matthias in the Allgemeine deutsche Biographie, Bd. XX. (Leipzig, 1884); L. von Ranke, Zur deutschen Geschichte vom Religionsfrieden bis zum 30-jdhrigen Kriege (Leipzig, 1888) ; and J. Janssen, Geschichte des deutschen Volks seit dem Ausgang des Mittelalters (Freiburg, 1878 seq.), Eng. trans, by M. A. Mitchell and A.

M. Christie (London, 1896, seq.).

MATTHIAS I., HUNYADI (1440-1490), king of Hungary, also known as Matthias Corvinus, a surname which he received from the raven (corvus) on his escutcheon, second son of Janos Hun- yadi and Elizabeth Seilagyi, was born at Kolozsvar, probably on

the 23rd of February 1440. His tutors were the learned Janos Vitez, bishop of Nagyvarad, whom he subsequently raised to the primacy, and the Polish humanist Gregory Sanocki. The precocious lad quickly mastered the German, Latin and principal Slavonic languages, frequently acting as his father's interpreter at the reception of ambassadors. His military training proceeded under the eye of his father, whom he began to follow on his campaigns when only twelve years of age. In 1453 he was created count of Bistercze, and was knighted at the siege of Bel- grade in 1454. The same care for his welfare led his father to choose him a bride in the powerful Cilli family, but the young Elizabeth died before the marriage was consummated, leaving Matthias a widower at the age of fifteen. On the death of his father he was inveigled to Buda by the enemies of his house, and, on the pretext of being concerned in a purely imaginary con- spiracy against Ladislaus V., was condemned to decapitation, but was spared on account of his youth, and on the king's death fell into the hands of George Podebrad, governor of Bohemia, the friend of the Hunyadis, in whose interests it was that a national king should sit on the Magyar throne. Podebrad treated Matthias hospitably and affianced him with his daughter Catherine, but still detained him, for safety's sake, in Prague, even after a Magyar deputation had hastened thither to offer the youth the crown. Matthias was the elect of the Hungarian people, gratefully mindful of his father's services to the state and inimical to all foreign candidates; and though an influen- tial section of the magnates, headed by the palatine Laszlo Garai and the voivode of Transylvania, Miklos Ujlaki, who had been concerned in the judicial murder of Matthias's brother Laszlo, and hated the Hunyadis as semi-foreign upstarts, were fiercely opposed to Matthias's election, they were not strong enough to resist the manifest wish of the nation, supported as it was by Matthias's uncle Mihaiy Szilagyi at the head of 15,000 veterans. On the 24th of January 1458, 40,000 Hungarian noble- men, assembled on the ice of the frozen Danube, unanimously elected Matthias Hunyadi king of Hungary, and on the 14th of February the new king made his state entry into Buda.

The realm at this time was environed by perils. The Turks and the Venetians threatened it from the south, the emperor Frederick III. from the west, and Casimir IV. of Poland from the north, both Frederick and Casimir claiming the throne. The Czech mercenaries under Giszkra held the northern counties and from thence plundered those in the centre.

Meanwhile Matthias's friends had only pacified the hostile dignitaries by engaging to marry the daughter of the palatine Garai to their nominee, whereas Matthias not unnaturally refused to marry into the family of one of his brother's murderers, and on the 9th of February confirmed his previous nuptial contract with the daughter of George Podebrad, who shortly afterwards was elected king of Bohemia (March 2, 1458). Throughout 1458 the struggle between the young king and the magnates, reinforced by Matthias's own uncle and guardian Szilagyi, was acute. But Matthias, who began by deposing Garai and dismissing Szilagyi, and then proceeded to levy a tax, without the con- sent of the Diet, in order to hire mercenaries, easily prevailed. Nor did these complications prevent him from recovering the fortress of Galamboc from the Turks, successfully invading Servia, and reasserting the suzerainty of the Hungarian crown over Bosnia. In the following year there was a fresh rebellion, when the emperor Frederick was actually crowned king by the malcontents at Vienna-Neustadt (March 4, 1459); but Matthias drove him out, and Pope Pius II. intervened so as to leave Mat- thias free to engage in a projected crusade against the Turks, which subsequent political complications, however, rendered im- possible. From 1 46 1 to 1465 the career of Matthias was a per- petual struggle punctuated by truces. Having come to an under- standing with his father-in-law Podebrad, he was able to turn his arms against the emperor Frederick, and in April 1462 Frederick restored the holy crown for 60,000 ducats and was allowed to retain certain Hungarian counties with the title of king; in return for which concessions, extorted from Matthias by the necessity of coping with a simultaneous rebellion of the Magyar noble

in league with Podebrad's son Victorinus, the emperor recog- nized Matthias as the actual sovereign of Hungary. Only now was Matthias, able to turn against the Turks, who were again threatening the southern provinces. He began by defeating Ali Pasha, and then penetrated into Bosnia, and captured the newly built fortress of Jajce after a long and obstinate defence (Dec. 1463). On returning home he was crowned with the holy crown on the 29th of March 1464, and, after driving the Czechs out of his northern counties, turned southwards again, this time recovering all the parts of Bosnia which still remained in Turkish hands. — – A political event of the first importance now riveted his atten- tion upon the north. Podebrad, who had gained the throne of Bohemia with the aid of the Hussites and Utraquists, had long been in ill odour at Rome, and in 1465 Pope Paul II. determined to depose the semi-Catholic monarch. All the neighbouring princes, the emperor, Casimir IV. of Poland and Matthias,

were commanded in turn to execute the papal decree of deposition, and Matthias gladly placed his army at the disposal of the Holy See. The war began on the 31st of May 1468, but, as early as the 27th of February 1469, Matthias anticipated an alliance be- tween George and Frederick by himself concluding an armistice with the former. On the 3rd of May the Czech Catholics elected Matthias king of Bohemia, but this was contrary to the wishes of both pope and emperor, who preferred to partition Bohemia. But now George discomfited all his enemies by suddenly exclud- ing his own son from the throne in favour of Ladislaus, the eldest son of Casimir IV., thus skilfully enlisting Poland on his side. The sudden death of Podebrad on the 22nd of March 147 1 led to fresh complications. At the very moment when Matthias was about to profit by the disappearance of his most capable rival, another dangerous rebellion, headed by the primate and the chief dignitaries of the state, with the object of placing Casimir, son of Casimir IV., on the throne, paralysed Matthias's foreign policy during the critical years 1470-147 1. He suppressed this domestic rebellion indeed, but in the mean- time the Poles had invaded the Bohemian domains with 60,000 men, and when in 1474 Matthias was at last able to take the field against them in order to raise the siege of Breslau, he was obliged to fortify himself in an entrenched camp, whence he so skilfully harried the enemy that the Poles, impatient to return to their own country, made peace at Breslau (Feb. 1475) on an uti possidetis basis, a peace subsequently confirmed by the con- gress of Olmtitz (July 1479). During the interval between these peaces, Matthias, in self-defence, again made war on the emperor, reducing Frederick to such extremities that he was glad to accept peace on any terms. By the final arrangement made between the contending princes, Matthias recognized Ladislaus as king of Bohemia proper in return for the surrender of Moravia, Silesia and Upper and Lower Lusatia, hitherto component parts of the Czech monarchy, till he should have redeemed them for 400,000 florins. The emperor promised to pay Matthias 100.000 florins as a war indemnity, and recognized him as the legitimate king of Hungary on the understanding that he should succeed him if he died without male issue, a contingency at this time somewhat improbable, as Matthias, only three years pre- viously (Dec. 15, 1476), had married his third wife, Beatrice of Naples, daughter of Ferdinand of Aragon.

The endless tergiversations and depredations of the emperor speedily induced Matthias to declare war against him for the third time (1481), the Magyar king conquering all the fortresses in Frederick's hereditary domains. Finally, on the 1st of June 1485, at the head of 8000 veterans, he made his triumphal entry into Vienna, which he henceforth made his capital. Styria, Carinthia and Carniola were next subdued, and Trieste was only saved by the intervention of the Venetians. Matthias consoli- dated his

position by alliances with the dukes ot Saxony and Bavaria, with the Swiss Confederation, and the archbishop of Salzburg, and was henceforth the greatest potentate in central Europe. His far-reaching hand even extended to Italy. Thus, in 1480, when a Turkish fleet seized Otranto, Matthias, at the earnest solicitation of the pope, sent Balasz Magyar to recover

the fortress, which surrendered to him on the 10th of May 1481. Again in 1488, Matthias took Ancona under his protection for a time and occupied it with a Hungarian garrison.

Though Matthias's policy was so predominantly occidental that he soon abandoned his youthful idea of driving the Turks out of Europe, he at least succeeded in making them respect Hungarian territory. Thus in 1479 a huge Turkish army, on its return home from ravaging Transylvania, was annihilated at Szaszvaros (Oct. 13), and in 1480 Matthias recaptured Jajce, drove the Turks from Servia and erected two new military banates, Jajce and Srebernik, out of reconquered Bosnian terri- tory. On the death of Mahommed II. in 1481, a unique oppor- tunity for the intervention of Europe in Turkish affairs presented itself. A civil war ensued in Turkey between his sons Bayezid and Jem, and the latter, being worsted, fled to the knights of Rhodes, by whom he was kept in custody in France (see Bayezid II.). Matthias, as the next-door neighbour of the Turks, claimed the custody of so valuable a hostage, and would have used him as a means of extorting concessions from Bayezid. But neither the pope nor the Venetians would hear of such a transfer, and the negotiations on this subject greatly embittered Matthias against the Curia. The last days of Matthias were occupied in endeavouring to secure the succession to the throne for his illegitimate son Janos (see Corvinus, JAnos) ; but Queen Beatrice, though childless, fiercely and openly opposed the idea and the matter was still pending when Matthias, who had long been crippled by gout, expired very suddenly on Palm Sunday, the 4th of April 1490.

Matthias Hunyadi was indisputably the greatest man of his day, and one of the greatest monarchs who ever reigned. The precocity and universality of his genius impress one the most. Like Napoleon, with whom he has often been compared, he was equally illustrious as a soldier, a statesman, an orator, a legislator and an administrator. But in all moral qualities the brilliant adventurer of the 15th was infinitely superior to the brilliant adventurer of the 19th century. Though naturally passionate, Matthias's self-control was almost superhuman, and throughout his stormy life, with his innumerable experiences of ingratitude and treachery, he never was guilty of a single cruel or vindictive action. His capacity for work was inexhaustible. Frequently half his nights were spent in reading, after the labour of his most strenuous days. There was no branch of knowledge in which he did not take an absorbing interest, no polite art which he did not

cultivate and encourage. His camp was a school of chivalry, his court a nursery of poets and artists. Matthias was a middle- sized, broad-shouldered man of martial bearing, with a large fleshy nose, hair reaching to his heels, and the clean-shaven, heavy chinned face of an early Roman emperor.

See Vilmos Fraknoi, King Matthias Hunyadi (Hung., Budapest, 1890, German ed., Freiburg, 1891); Ignacz Acsady History of the Hungarian Realm (Hung. vol. i., Budapest, 1904) ; Jozsef Teleki, The Age of the Hunyadis in Hungary (Hung., vols. 3-5, Budapest, 1 852-1 890); V. Fraknoi Life of Jdnos Vitez (Hung. Budapest 1879) ; Karl Schober, Die Eroberung Niederosterreichs durch Matthias Corvinus (Vienna, 1879); Janos Huszar, Matthias's Black Army (Hung. Budapest, 1890); Antonio Bonfini, Rerum hungaricarum decades (7th ed., Leipzig, 1771); Aeneas Sylvius, Opera (Frankfort, 1707); The Correspondence of King Matthias (Hung, and Lat., Budapest, 1893); V. Fraknoi, The Embassies of Cardinal Carvajal to Hungary (Hung., Budapest, 1889); Marzio Galeotti, De egregie sapienter et jocose dictis ac factis Matthiae regis (Script, reg. hung. I.) (Vienna, 1746). Of the above the first is the best general sketch and is rich in notes ; the second somewhat chauvinistic but excellently written; the third the best work for scholars; the seventh, eighth and eleventh are valuable as being by contemporaries.

(R. N. B.)

MATTHISSON, FRIEDRICH VON (1761-1831), German poet, was born at Hohendodeleben near Magdeburg, the son of the village pastor, on the 23rd of January 1761. After studying theology and philology at the university of Halle, he was appointed in 1781 master at the classical school Philanthropin in Dessau. This once famous seminary was, however, then rapidly decaying in public favour, and in 1784 Matthisson was glad to accept a travelling tutorship. He lived for two years with the Swiss author Bonstetten at Nyon on the lake of Geneva.

In 1794 he was appointed reader and travelling companion to the princess Louisa of Anhalt-Dessau. In 181 2 he entered the service of the king of Wurttemberg, was ennobled, created counsellor of legation, appointed intendant of the court theatre and chief librarian of the royal library at Stuttgart. In 1828 he retired and settled at Worlitz near Dessau, where he died on the 12th ofMarchi83i. Matthisson enjoyed for a time a great popularity on account of his poems, Gedichte (1787; 15th ed., 1851; new

ed., 1876), which Schiller extravagantly praised for their melancholy sweetness and their fine descriptions of scenery. The verse is melodious and the language musical, but the thought and senti- ments they express are too often artificial and insincere. His Adelaide has been rendered famous owing to Beethoven's setting of the song. Of his elegies, Die Elegie in den Ruinen eines alien Bergschlosses is still a favourite. His reminiscences, Erinner- ungen (5 vols., 1810-1816), contain interesting accounts of his travels.

Matthisson's Schriften appeared in eight volumes (1825-1829), of which the first contains his poems, the remainder his Erinnerungen ; a ninth volume was added in 1833 containing his biography by H. Doring. His Literarischer Nachlass, with a selection from his cor- respondence, was published in four volumes by F. R. Schoch in 1832. MATTING, a general term embracing many coarse woven or plaited fibrous materials used for covering floors or furniture, for hanging as screens, for wrapping up heavy merchandise and for other miscellaneous purposes. In the United Kingdom, under the name of " coir " matting, a large amount of a coarse kind of carpet is made from coco-nut fibre; and the same material, as well as strips of cane, Manila hemp, various grasses and rushes, is largely employed in various forms for making door mats. Large quantities of the coco-nut fibre are woven in heavy looms, then cut up into various sizes, and finally bound round the edges by a kind of rope made from the same material. The mats may be of one colour only, or they may be made of different colours and in different designs. Sometimes the names of institutions are introduced into the mats. Another type of mat is made exclusively from the above-mentioned rope by arranging alternate layers in sinuous and straight paths, and then stitching the parts together. It is also largely used for the outer covering of ships' fenders. Perforated and otherwise prepared rubber, as well as wire-woven material, are also largely utilized for door and floor mats. Matting of various kinds is very extensively employed throughout India for floor coverings, the bottoms of bedsteads, fans and fly-flaps, &c. ; and a considerable export trade in such manufactures is carried on. The materials used are numerous; but the principal substances are straw, the bulrushes Typha elephantina and T. angustifolia, leaves of the date palm {Phoenix sylvestris), of the dwarf palm (Chamaerops Ritchiana), of the Palmyra palm (Borassus flabelliformis) , of the coco-nut palm (Cocos nucifera)a.ndoi the screw pine (Pandanus odora- tissimus) , the munja or munj grass {Saccharum Munja) and allied grasses, and the mat grasses Cyperus textilis and C. Pangorei, from the last of which the well-known Palghat mats of the Madras Presidency are made. Many of these Indian grass-mats are admirable examples of elegant design, and the colours in which they are woven are rich, harmonious and effective in the highest degree. Several useful household articles are made from the different kinds

of grasses. The grasses are dyed in all shades and plaited to form attractive designs suitable for the purposes to which they are to be applied. This class of work obtains in India, Japan and other Eastern countries. Vast quantities of coarse matting used for packing furniture, heavy and coarse goods, flax and other plants, &c, are made in Russia from the bast or inner bark of the lime tree. This industry centres in the great forest governments of Viatka, Nizhniy-Novgorod, Kostroma, Kazan, Perm and Simbirsk.

MATTOCK (O.E. mattuc, of uncertain origin), a tool having a double iron head, of which one end is shaped like an adze, and the other like a pickaxe. The head has a socket in the centre in which the handle is inserted transversely to the blades. It is used chiefly for grubbing and rooting among tree stumps in plantations and copses, where the roots are too close for the use of a spade, or for loosening hard soil.

MATTO 6R0SS0, an inland state of Brazil, bounded N. by Amazonas and Para, E. by Goyaz, Minas Geraes, Sao Paulo and Parana, S. by Paraguay and S.W. and W. by Bolivia. It ranks next to Amazonas in size, its area, which is largely unsettled and unexplored, being 532,370 sq. m., and its population only 92,827 in 1890 and 118,025 in 1900. No satisfactory estimate of its Indian population can be made. The greater part of the state belongs to the western extension of the Brazilian plateau, across which, between the 14th and 16th parallels, runs the water-shed which separates the drainage basins of the Amazon and La Plata. This elevated region is known as the plateau of Matto Grosso, and its elevations so far as known rarely exceed 3000 ft. The northern slope of this great plateau is drained by the Araguaya- Tocantins, Xingu, Tapajos and Guapore-Mamore-Madeira, which flow northward, and, except the first, empty into the Amazon; the southern slope drains southward through a multi- tude of streams flowing into the Parana and Paraguay. The general elevation in the south part of the state is much lower, and large areas bordering the Paraguay are swampy, partially submerged plains which the sluggish rivers are unable to drain. The lowland elevations in this part of the state range from 300 to 400 ft. above sea-level, the climate is hot, humid and unhealthy, and the conditions for permanent settlement are apparently unfavourable. On the highlands, however, which contain extensive open campos, the climate, though dry and hot, is considered healthy. The basins of the Parana and Paraguay are separated by low mountain ranges extending north from the sierras of Paraguay. In the north, however, the ranges which separate the river valleys are apparently the remains of the table-land through which deep valleys have been eroded. The resources of Matto Grosso are practically undeveloped, owing to the isolated situation of the state, the costs of transportation and the small population.

The first industry was that of mining, gold having been dis- covered in the

river valleys on the southern slopes of the plateau, and diamonds on the head-waters of the Paraguay, about Diamantino and in two or three other districts. Gold is found chiefly in placers, and in colonial times the output was large, but the deposits were long ago exhausted and the industry is now comparatively unimportant. As to other minerals little is definitely known. Agriculture exists only for the supply of local needs, though tobacco of a superior quality is grown. Cattle-raising, however, has received some attention and is the principal industry of the landowners. The forest products of the state include fine woods, rubber, ipecacuanha, sarsapa- rilla, jaborandi, vanilla and copaiba. There is little export, however, the only means of communication being down the Paraguay and Parana rivers by means of subsidized steamers. The capital of the state is Cuyaba, and the chief commercial town is Corumba at the head of navigation for the larger river boats, and 1986 m. from the mouth of the La Plata. Com- munication between these two towns is maintained by a line of smaller boats, the distance being 517 m.

The first permanent settlements in Matto Grosso seem to have been made in 1718 and 1719, in the first year at Forquilha and in the second at or near the site of Cuyaba, where rich placer mines had been found. At this time all this inland region was considered a part of Sao Paulo, but in 1748 it was made a separate capitania and was named Matto Grosso (" great woods "). In 1752 its capital was situated on the right bank of the Guapore river and was named Villa Bella da Santissima Trindade de Matto Grosso, but in 1820 the seat of government was removed to Cuyaba and Villa Bella has fallen into decay. In 1822 Matto Grosso became a province of the empire and in 1889 a republican state. It was invaded by the Paraguayans in the war of 1860-65.

MATTOON, a city of Coles county, IUinois, U.S.A., in the east central part of the state, about 12 m. south-east of Peoria. Pop. (1890), 6833; (1900), 9622, of whom 430 were foreign-born; (1910 census) 11,456. It is served by the Illinois Central and Cleveland, Cincinnati, Chicago & St Louis railways, which have repair shops here, and by inter-urban electric lines. The

city has a public library, a Methodist Episcopal Hospital, and an Old Folks' Home, the last supported by the Independent Order of Odd Fellows. Mattoon is an important shipping point for Indian corn and broom corn, extensively grown in the vici- nity, and for fruit and livestock. Among its manufactures are foundry and machine shop products, stoves and bricks;

in 1905 the factory product was valued at $1,308,781, an increase of 71-2% over that in 1900. The municipality owns the water- works and an electric lighting plant. Mattoon was first settled about 1855, was named in honour of William Mattoon, an early landowner, was first chartered as a city in 1857, and was re- organized under a general state law in 1879.

MATTRESS (O.Fr. materas, mod. matelas; the origin is the Arab, al-malerah, cushion, whence Span, and Port, almadraque, Ital. malerasso), the padded foundation of a bed, formed of canvas or other stout material stuffed with wool, hair, flock or straw; in the last case it is properly known as a " palliasse " (Fr. paille, straw; Lat. paled); but this term is often applied to an under-mattress stuffed with substances other than straw. The padded mattress on which lay the feather-bed has been replaced by the " wire-mattress," a network of wire stretched on a light wooden or iron frame, which is either a separate structure or a component part of the bedstead itself. The "wire-mattress" has taken the place of the " spring mattress," in which spiral springs support the stuffing. The term " mattress " is used in engineering for a mat of brushwood, faggots, &c, corded to-gether and used as a foundation or as surface in the construction of dams, jetties, dikes, &c.

MATURIN, CHARLES ROBERT (1 782-1824), Irish novelist and dramatist, was born in Dublin in 1782. His grandfather, Gabriel Jasper Maturin, had been Swift's successor in the deanery of St Patrick. Charles Maturin was educated at Trinity College, Dublin, and became curate of Loughrea and then of St Peter's, Dublin. His first novels, The Fatal Revenge; or, the Family of Montorio (1807), The Wild Irish Boy (1808), The Milesian Chief (1812), were issued under the pseudonym of " Dennis Jasper Murphy." All these were mercilessly ridiculed, but the irregular power displayed in them attracted the notice of Sir Walter Scott, who recommended the author to Byron. Through their influence Maturin's tragedy of Bertram was pro- duced at Drury Lane in 1816, with Kean and Miss Kelly in the leading parts. A French version by Charles Nodier and Baron Taylor was produced in Paris at the Theatre Favart. Two more tragedies, Manuel (1817) and Fredolfo (1819), were failures, and his poem The Universe (1821) fell flat. He wrote three more novels, Women (1818), Melmoth, the Wanderer (1820), and The Albigenses (1824). Melmoth, which forms its author's title to remembrance, is the best of them, and has for hero a kind of " Wandering Jew." Honore de Balzac wrote a sequel to it under the title of Melmoth recondite & I'iglise (1835). Maturin died in Dublin on the 30th of October 1824.

MATVYEEV, ARTAMON SERGYEEVICH (-1682), Russian statesman and reformer, was one of the greatest of the precursors of Peter the Great. His parentage and the date of his birth are uncertain. Apparently his birth was

humble, but when the obscure figure of the young Artamon emerges into the light of history we find him equipped at all points with the newest ideas, absolutely free from the worst prejudices of his age, a ripe scholar, and even an author of some distinction. In 167 1 the tsar Alexius and Artamon were already on intimate terms, and on the retirement of Orduin-Nashchokin Matvyeev became the tsar's chief counsellor. It was at his house, full of all the wondrous, half-forbidden novelties of the west, that Alexius, after the death of his first consort, Martha, met Matvyeev's favourite pupil, the beautiful Natalia Naruishkina, whom he married on the 21st of January 1672. At the end of the year Matvyeev was raised to the rank of okolnichy, and on the 1st of September 1674 attained the still higher dignity of boyar. Matvyeev remained paramount to the end of the reign and introduced play-acting and all sorts of refining western novelties into Muscovy. The deplorable physical condition of Alexius's immediate successor, Theodore III. suggested to Matvyeev the

desirability of elevating to the throne the sturdy little tsarevich Peter, then in his fourth year. He purchased the allegiance of the stryeltsi, or musketeers, and then, summoning the boyars of the council, earnestly represented to them that Theodore, scarce able to live, was surely unable to reign, and urged the substitution of little Peter. But the reactionary boyars, among whom were the near kinsmen of Theodore, proclaimed him tsar and Matvyeev was banished to Pustozersk, in northern Russia, where he remained till Theodore's death (April 27, 1682). Immediately afterwards Peter was proclaimed tsar by the patriarch, and the first ukaz issued in Peter's name summoned Matvyeev to return to the capital and act as chief adviser to the tsaritsa Natalia. He reached Moscow on the 15th of May, prepared " to lay down his life for the tsar," and at once pro- ceeded to the head of the Red Staircase to meet and argue with the assembled stryeltsi, who had been instigated to rebel by the anti-Petrine faction. He had already succeeded in partially pacifying them, when one of their colonels began to abuse the still hesitating and suspicious musketeers. Infuriated, they seized and flung Matvyeev into the square below, where he was hacked to pieces by their comrades.

See R. Nisbet Bain, The First Romanovs (London, 1905); M. P. Pogodin, The First Seventeen Years of the Life of Peter the Great (Rus.), (Moscow, 1875) ; S. M. Solovev, History of Russia (Rus.), (vols. 12, 13, (St Petersburg, 1895, &c.) ; L. Shchepotev, A. S. Matvyeev as an Educa- tional and Political Reformer (Rus.), (St Petersburg, 1906). (R. N. B.)

MAUBEUGE, a town of northern France, in the department of Nord, situated on both banks of the Sambre, here canalized, 23ˆ m. by rail E. by S. of Valenciennes, and about 2 m. from the Belgian frontier. Pop. (1906), town 13,569, commune 21,520. As a fortress Maubeuge has an old

enceinte of bastion trace which serves as the centre of an important entrenched camp of 18 m. perimeter, constructed for the most part after the war of 1870, but since modernized and augmented. The town has a board of trade arbitration, a communal college, a commercial and industrial school; and there are important foundries, forges and blast-furnaces, together with manufactures of machine-tools, porcelain, &c. It is united by electric tramway with Haut- mont (pop. 12,473), a lso an important metallurgical centre.

Maubeuge (Malbodium) owes its origin to a double monastery, for men and women, founded in the 7th century by St Aldegonde relics of whom are preserved in the church. It subsequently belonged to the territory of Hainault. It was burnt by Louis XL, by Francis I., and by Henry II., and was finally assigned to France by the Treaty of Nijmwegen. It was fortified at Vauban by the command of Louis XIV., who under Turenne first saw military service there. Besieged in 1793 by Prince Josias of Coburg, it was relieved by the victory of Wattignies, which is commemorated by a monument in the town. It was unsuccessfully besieged in 18 14, but was compelled to capitulate, after a vigorous resistance, in the Hundred Days.

MAUCH CHUNK, a borough and the county-seat of Carbon county, Pennsylvania, U.S.A., on the W. bank of the Lehigh river and on the Lehigh Coal and Navigation Company's Canal, 46 m. by rail W.N.W. of Easton. Pop. (1890), 4101; (1900X4029 (571 foreign-born); (1910), 3952. Mauch Chunk is served by the Central of New Jersey railway and, at East Mauch Chunk, across the river, connected by electric railway, by the Lehigh Valley railway. The borough lies in the valley of the Lehigh river, along which runs one of its few streets and in another deeply cut valley at right angles to the river; through this second valley east and west runs the main street, on which is an electric railway; parallel to it on the south is High Street, formerly an Irish settlement; half way up the steep hill, and on the north at the top of the opposite hill is the ward of Upper Mauch Chunk, reached by the electric railway. An incline railway, originally used to transport coal from the mines to the river and named the " Switch-Back," now carries tourists up the steep slopes of Mount Pisgah and Mount Jefferson, to Summit Hill, a rich anthracite coal region, with a famous " burning mine," which has been on fire since 1832, and then back. An electric railway to the top of Flagstaff Mountain, built in 1900, was completed in 1901 to Lehigh ton, 4 m. south-

east of Mauch Chunk, where coal is mined and silk and stoves are

manufactured, and which had a population in 1900 of 4629, and in 1910 of 5316. Immediately above Mauch Chunk the river forms a horseshoe; on the opposite side, connected by a bridge, is the borough of East Mauch Chunk (pop. 1900, 3458; 1910, 3548); and 2 m. up the river is Glen Onoko, with fine falls and cascades. The principal buildings in Mauch Chunk are the county court house, a county gaol, a Young Men's Christian Association building, and the Dimmick Memorial Library (1890). The borough was long a famous shipping point for coal. It now has ironworks and foundries, and in East Mauch Chunk there are silk mills. The name is Indian and means " Bear Mountain," this English name being used for a mountain on the east side of the river. The borough was founded by the Lehigh Coal and Navigation Company in 1818. This company began in 1827 the operation of the " Switch-Back, " probably the first railway in the country to be used for transporting coal. In 1831 the town was opened to individual enterprise, and in 1850 it was incorporated as a borough. Mauch Chunk was for many years the home of Asa Packer, the projector and builder of the Lehigh Valley railroad from Mauch Chunk to Easton.

MAUCHLINE, a town in the division of Kyle, Ayrshire, Scotland. Pop. (1901), 1767. It lies 8 m. E.S.E. of Kilmarnock and 11 m. E. by N. of Ayr by the Glasgow and South-Western railway. It is situated on a gentle slope about 1 m. from the river Ayr, which flows through the south of the parish of Mauch- line. It is noted for its manufacture of snuff-boxes and knick-knacks in wood, and of curling-stones. There is also some cabinet-making, besides spinning and weaving, and its horse fairs and cattle markets have more than local celebrity. The parish church, dating from 1829, stands in the middle of the village, and on the green a monument, erected in 1830, marks the spot where five Covenanters were killed in 1685. Robert Burns lived with his brother Gilbert on the farm of Mossgiel, about a mile to the north, from 1784 to 1788. Mauchline kirkyard was the scene of the "Holy Fair "; at " Poosie Nansie's" (Agnes Gibson's) — still, though much altered, a popular inn — the " Jolly Beggars " held their high jinks; near the church (in the poet's day an old, barn-like structure) was the Whiteford Arms inn, where on a pane of glass Burns wrote the epitaph on John Dove, the landlord; " auld Nanse Tinnock's " house, with the date of 1744 above the door, nearly faces the entrance to the churchyard; the Rev. William Auld was minister of Mauchline, and " Holy Willie," whom the poet scourged in the celebrated " Prayer," was one of " Daddy Auld's " elders; behind the kirkyard stands the house of Gavin Hamilton, the lawyer and firm friend of Burns, in which the poet was married. The braes of Ballochmyle, where he met the heroine of his song, " The Lass o' Ballochmyle," lie about a mile to the south-east. Adjoining them is the considerable manufacturing town of Catrine (pop. 2340), with cotton factories, bleach fields and brewery, where Dr Matthew Stewart

(1717-1785), the father of Dugald Stewart — had a mansion, and where there is a big water-wheel said to be inferior in size only to that of Laxey in the Isle of Man. Barskimming House, 2 m. south by west of Mauch- line, the seat of Lord-President Miller (1717-1789), was burned down in 1882. Near the confluence of the Fail and the Ayr was the scene of Burns's parting with Highland Mary.

MAUDE, CYRIL (1862-), English actor, was born in London and educated at Charterhouse. He began his career as an actor in 1883 in America, and from 1896 to 1905 was co-manager with F. Harrison of the Haymarket Theatre, London. There he became distinguished for his quietly humorous acting in many parts. In 1906 he went into management on his own account, and in 1907 opened his new theatre The Playhouse. In 1888 he married the actress Winifred Emery (b. 1862), who had made her London debut as a child in 1875, and acted with Irving at the Lyceum between 1881 and 1887. She was a daughter of Samuel Anderson Emery (1817-1881) and grand- daughter of John Emery (1777-1822), both well-known actors in their day. MAULE, a coast province of central Chile, bounded N. by

Talca, E. by Linares and Nuble, and S. by Conception, and lying between the rivers Maule and Itata, which form its northern and southern boundaries. Pop. (1895), 119,791; area, 2475 sq. m. Maule is traversed from north to south by the coast range and its surfaces are much broken. The Buchupureo river flows westward across the province. The climate is mild and healthy. Agriculture and stock-raising are the principal occupations, and hides, cattle, wheat and timber are exported. Transport facilities are afforded by the Maule and the Itata, which are navigable, and by a branch of the government railway from Cauquenes to Parral, an important town of southern Linares. The provincial capital, Cauquenes (pop., in 1895, 8574; 1902 estimate, 9895), is centrally situated on the Buchu- pureo river, on the eastern slopes of the coast Cordilleras. The town and port of Constituci6n (pop., in 1900, about 7000) on the south bank of the Maule, one mile above its mouth, was formerly the capital of the province. The port suffers from a dangerous bar at the mouth of the river, but is connected with Talca by rail and has a considerable trade.

The Maule river, from which the province takes its name, is of historic interest because it is said to have marked the southern limits of the Inca Empire. It rises in the Laguna del Maule, an Andean lake near the Argentine frontier, 7218 ft. above sea-level, and flows westward about 140 m. to the Pacific, into which it discharges in 35° 18′ S. The upper part of its drainage basin, to which the Anuario Hydrografico gives an area of 8000 sq. m., contains the volcanoes of San Pedro (11,800 ft.), the Descabezado (12,795 ft.), and others of the same group of lower*

elevations. The upper course and tributaries of the Maule, principally in the province of Linares, are largely used for irrigation.

MAULEON, SAVARI DE (d. 1236), French soldier, was the son of Raoul de Mauleon, vicomte de Thouars and lord of Mauleon (now Chatillon-sur-Sevre). Having espoused the cause of Arthur of Brittany, he was captured at Mirebeau (1202), and imprisoned in the chateau of Corfe. But John set him at liberty in 1204, gained him to his side and named him seneschal of Poitou (1205). In 1211 Savari de Mauleon assisted Raymond VI. count of Toulouse, and with him besieged Simon de Montfort in Castel- naudary. Philip Augustus bought his services in 121 2 and gave him command of a fleet which was destroyed in the Flemish port of Damme. Then Mauleon returned to John, whom he aided in his struggle with the barons in 121 5. He was one of those whom John designated on his deathbed for a council of regency (12 16). Then he went to Egypt (12 19), and was present at the taking of Damietta. Returning to Poitou he was a second time seneschal for the king of England. He defended Saintonge against Louis VIII. in 1224, but was accused of having given La Bochelle up to the king of France, and the suspicions of the English again threw him back upon the French. Louis VIII. then turned over to him the defence of La Rochelle and the coast of Saintonge. In 1227 he took part in the rising of the barons of Poitiers and Anjou against the young Louis IX. He enjoyed a certain reputation for his poems in the langue d'oc.

See Chilhaud-Dumaine, " Savari de Mauleon," in Positions des Theses des eleves de I'&ole des Charles (1877); Histoire litteraire de la France, xviii. 671-682.

MAULSTICK, or Mahlstick, a stick with a soft leather or padded head, used by painters to support the hand that holds the brush. The word is an adaptation of the Dutch maalstok, i.e. the painter's stick, from maien, to paint.

MAUNDY THURSDAY (through O. Fr. mande from Lat. mandatum, commandment, in allusion to Christ's words: " A new commandment give I unto you," after he had washed the disciples' feet at the Last Supper), the Thursday before Easter. Maundy Thursday is sometimes known as Sheer or Chare Thursday, either in allusion, it is thought, to the " shearing " of heads and beards in preparation for Easter, or more probably in the word's Middle English sense of " pure," in allusion to the ablutions of the day. The chief ceremony, as kept from the early middle ages onwards — the washing of the feet of twelve or more poor men or beggars — was in the early Church almost unknown. Of Chry- sostom and St Augustine, who both speak of Maundy Thursday

as being marked by a solemn celebration of the Sacrament, the former does not mention the foot-washing, and the latter merely alludes to it. Perhaps an indication of it may be discerned as early as the 4th century in a custom, current in Spain, northern Italy and elsewhere, of washing the feet of the catechumens towards the end of Lent before their baptism. It was not, however, universal, and in the 48th canon of the synod of Elvira (a.o. 306) it is expressly prohibited (cf. Corp. Jur. Can., c. 104, caus. i. qu. 1). From the 4th century ceremonial foot-washing became yearly more common, till it was regarded as a necessary rite, to be performed by the pope, all Catholic sovereigns, prelates, priests and nobles. In England the king washed the feet of as many poor men as he was years old, and then distributed to them meat, money and clothes. At Durham Cathedral, until the 16th century, every charity-boy had a monk to wash his feet. At Peterborough Abbey, in 1530, Wolsey made " his maund in Our Lady's Chapel, having fifty-nine poor men whose feet he washed and kissed; and after he had wiped them he gave every of the said poor men twelve pence in money, three ells of good canvas to make them shirts, a pair of new shoes, a cast of red herrings and three white herrings." Queen Elizabeth performed the ceremony, the paupers' feet, however, being first washed by the yeomen of the laundry with warm water and sweet herbs. James II. was the last English monarch to perform the rite. William III. delegated the washing to his almoner, and this was usual until the middle of the 18th century. Since 1754 the foot- washing has been abandoned, and the ceremony now consists of the presentation of Maundy money, officially called Maundy Pennies. These were first coined in the reign of Charles II. They come straight from the Mint, and have their edges unmilled. The service which formerly took place in the Chapel Royal, Whitehall, is now held in Westminster Abbey. A procession is formed in the nave, consisting of the lord high almoner repre- senting the sovereign, the clergy and the yeomen of the guard, the latter carrying white and red purses in baskets. The clothes formerly given are now commuted for in cash. The full ritual is gone through by the Roman Catholic archbishop of Westminster, and abroad it survives in all Catholic countries, a notable example being that of the Austrian emperor. In the Greek Church the rite survives notably at Moscow, St Petersburg and Constantinople. It is on Maundy Thursday that in the Church of Rome the sacred ojl is blessed, and the chrism prepared according to an elaborate ritual which is given in the Pontificate.

MAUPASSANT, HENRI RENfi ALBERT GUY DE (1850-1893), French novelist and poet, wasborn at the Chateau of Miromesnil in the department of Seine-Inferieure on the 5th August 1850. His grandfather, a landed proprietor of a good Lorraine family, owned an estate at Neuville-Champ-

d'Oisel near Rouen, and bequeathed a moderate fortune to his son, a Paris stockbroker, who married Mademoiselle Laure Lepoitevin. Maupassant was educated at Yvetot and at the Rouen lycee. A copy of verses entitled Le Dieu createur, written during his year of philosophy, has been preserved and printed. He entered the ministry of marine, and was promoted by M. Bardoux to the Cabinet de l'lnstruction publique. A pleasant legend says that, in a report by his official chief , Maupassant is mentioned as not reaching the standard of the department in the matter of style. He may very well have been an unsatisfactory clerk, as he divided his time between rowing expeditions and attending the literary gatherings at the house of Gustave Flaubert, who was not, as he is often alleged to be, connected with Maupassant by any blood tie. Flaubert was not his uncle, nor his cousin, nor even his godfather, but merely an old friend of Madame de Maupassant, whom he had known from childhood. At the literary meetings Maupas- sant seldom shared in the conversation. Upon those who met him — Tourgenieff, Alphonse Daudet, Catulle Mendes, Jose- Maria de Heredia and Fmile Zola — he left the impression of a simple young athlete. Even Flaubert, to whom Maupassant submitted some sketches, was not greatly struck by their talent, though he encouraged the youth to persevere. Maupassant's first essay was a dramatic piece twice given at Etretat in 1873 before an audience which included Tourgenieff, Flaubert and

Meilhac. In this indecorous performance, of which nothing more is heard, Maupassant played the part of a woman. During the next seven years he served a severe apprenticeship to Flau- bert, who by this time realized his pupil's exceptional gifts. In 1880 Maupassant published a volume of poems, Des Vers, against which the public prosecutor of Etampes took proceedings that were finally withdrawn through the influence of the senator Cordier. From Flaubert, who had himself been prosecuted for his first book, Madame Bomry, there came a letter congratulating the poet on the similarity between their first literary experiences. Des Vers is an extremely interesting experiment, which shows Maupassant to us still hesitating in his choice of a medium; but he recognized that it was not wholly satisfactory, and that its chief deficiency — the absence of verbal melody — was fatal. Later in the same year he contributed to the Soirees de M&dan, a collection of short stories by MM. Zola, J.K. Huysmans, Henry Ceard, Leon Hennique and Paul Alexis; and in Boule de suif the young unknown author revealed himself to his amazed colla borators and to the public as an admirable writer of prose and a consummate master of the conte. There is perhaps no other instance in modern literary history of a writer beginning, as a fully equipped artist, with a genuine masterpiece. This early success was quickly followed by another. The volume entitled La Maison Tellier (1881) confirmed the first impression, and vanquished even those who were repelled by the author's choice of subjects. In Mademoiselle Fiji (188$) he

repeated his previous triumphs as a conteur, and in this same year he, for the first time, attempted to write on a larger scale. Choosing to portray the life of a blameless girl, unfortunate in her marriage, unfortunate in her son, consistently unfortunate in every circumstance of existence, he leaves her, ruined and prematurely old, clinging to the tragic hope, which time, as one feels, will belie, that she may find happiness in her grandson. This picture of an average woman undergoing the constant agony of disillusion Maupassant calls Une Vie (1883), and as in modern literature there is no finer example of cruel observation, so there is no sadder book than this, while the effect of extreme truthfulness which it conveys justifies its sub-title — L' Humble verite. Certain passages of Une Vie are of such a character that the sale of the volume at railway bookstalls was forbidden throughout France. The matter was brought before the chamber of deputies, with the result of drawing still more attention to the book, and of advertising the Contes de la becasse (1883), a collection of stories as improper as they are clever. Au soleil (1884), a book of travels which has the eminent qualities of lucid observation and exact description, was less read than Clair de lune, Miss Harriet, Les Sceurs Rondoli and Yvette, all published in 1 883-1 884 when Maupassant's powers were at their highest level. Three further collections of short tales, entitled Contes et nouvelles, Monsieur Parent, and Contes du jour et de la nuit, issued in 1885, proved that while the author's vision was as incomparable as ever, his fecundity had not improved his impeccable form. To 1885 also belongs an elaborate novel, Bel-ami, the cynical history of a particularly detestable, brutal scoundrel who makes his way in the world by means of his handsome face. Maupassant is here no less vivid in realizing his literary men, financiers and frivolous women than in dealing with his favourite peasants, boors and servants, to whom he returned in Toine (1886) and in La Petite rogue (1886). About this time appeared the first symptoms of the malady which destroyed him; he wrote less, and though the novel Monl-Oriol (1887) shows him apparently in undiminished possession of his faculty, Le Horla (1887) suggests that he was already subject to alarming hallucinations. Restored to some extent by a sea-voyage, recorded in Sur I'eau (1888), he went back to short stories in Le Rosier de Madame H us son {1888), a burst of Rabelaisian humour equal to anything he had ever written. His novels Pierre et Jean (1888), Fort comme la morl (1889), and Notre cceur (1890) are penetrating studies touched with a profounder sympathy than had hitherto distinguished him; and this softening into pity for the tragedy of life is deepened in some of the tales included in Inutile beaute (r89o). One of these, Le Champ d'Oliviers, is an unsurpassable example of

poignant, emotional narrative. With La Vie erranie (1890), a volume of travels, Maupassant's career practically closed. Musolte, a theatrical piece written in collaboration with M. Jacques Normand, was published in 1 89 1 . By this time inherited nervous maladies, aggravated by excessive physical exercises and by the imprudent use of drugs, had undermined his con- stitution. He began to take an interest in religious problems, and for a while made the Imitation his handbook; but his misanthropy deepened, and he suffered from curious delusions as to his wealth and rank. A victim of general paralysis, of which La Folic des grandeurs was one of the symptoms, he drank the waters at Aix-les-Bains during the summer of 1891, and re- tired to Cannes, where he purposed passing the winter. The singularities of conduct which had been observed at Aix-les- Bains grew more and more marked. Maupassant's reason slowly gave way. On the 6th of January 1892 he attempted suicide, and was removed to Paris, where he died in the most painful circumstances on the 6th of July 1893. He is buried in the cemetery of Montparnasse. The opening chapters of two projected novels, L'Angelus and L'Ame Hr anger e, were found among his papers; these, with La Paix du manage, a comedy in two acts, and two collections of tales, Le Pere Milon (1898) and Le Colporteur (1899), have been published posthumously. A correspondence, called AmitiS amoureuse (1897), and dedi- cated to his mother, is probably unauthentic. Among the prefaces which he wrote for the works of others, only one — an introduction to a French prose version of Mr Swinburne's Poems and Ballads — is likely to interest English readers.

Maupassant began as a follower of Flaubert and of M. Zola, but, whatever the masters may have called themselves, they both remained essentially romantiques. The pupil is the last of the " naturalists ": he even destroyed naturalism, since he did all that can be done in that direction. He had no psychology, no theories of art, no moral or strong social prejudices, no disturbing imagination, no wealth of perplexing ideas. It is no paradox to say that his marked limitations made him the incomparable artist that he was. Undisturbed by any external influence, his marvellous vision enabled him to become a supreme observer, and, given his literary sense, the rest was simple. He prided himself in having no invention; he described nothing that he had not seen. The peasants whom he had known as a boy figure in a score of tales; what he saw in Government offices is set down in L'Heritage; from Algiers he gathers the material for Maroca; he drinks the waters and builds up Mont-Oriol; he enters journalism, constructs Bel-ami, and, for the sake of precision, makes his brother, Herve de Maupassant, sit for the infamous hero's portrait; he sees fashionable society, and, though it wearied him intensely, he transcribes its life in Fort comme la mort and Notre cosur. Fundamentally he finds all men alike. In every grade he finds the same ferocious, cunning, animal instincts at work: it is not a gay world,

but he knows no other; he is pos- sessed by the dread of growing old, of ceasing to enjoy; the horror of death haunts him like a spectre. It is an extremely simple outlook. Maupassant does not prefer good to bad, one man to another; he never pauses to argue about the meaning of life, a senseless thing which has the one advantage of yielding materials for art; his one aim is to discover the hidden aspect of visible things, to relate what he has observed, to give an objective rendering of it, and he has seen so intensely and so serenely that he is the most exact transcriber in literature. And as the substance is, so is the form: his style is exceedingly simple and exceedingly strong;, he uses no rare or superfluous word, and is content to use the humblest word if only it conveys the exact picture of the thing seen. In ten years he produced some thirty volumes. With the exception of Pierre et Jean, his novels, excellent as they are, scarcely represent him at his best, and of over two hundred contes a proportion must be rejected. But enough will remain to vindicate his claim to a permanent place in literature as an unmatched observer and the most perfect master of the short story.

See also F. Brunetiere, Le Roman naturaliste (1883); T. Lemattre, Les Contemporains (vols. i. v. vi.) ; R. Doumic, Ecrivains d'aujourd'hui

(1894); an introduction by Henry James to The Odd Number . . , (1891) ; a critical preface by the. earl of Crewe to Pierre and Jean (1902) ; A. Symons, Studies in Prose and Verse (1904). There are many references to Maupassant in the Journal des Goncourt, and some correspondence with Marie Bashkirtseff was printed with Further Memoirs of that lady in 1901. (J. F.-K.)

MAUPEOU, RENfi NICOLAS CHARLES AUGUSTIN (1714- 1792), chancellor of France, was born on the 25th of February 1714, being the eldest son of Rene Charles de Maupeou (1688- i775)j who was president of the parlement of Paris from 1743 to 1757. He married in 1744 a rich heiress, Anne de Roncherolles, a cousin of Madame d'Epinay. Entering public life, he was his father's right hand in the conflicts between the parlement and Christophe de Beaumont, archbishop of Paris, who was supported by the court., Between 1763 and 1768, dates which cover the revision of the case of Jean Calas and the trial of the comte de Lally, Maupeou was himself president of the parlement. In 1768, through the protection of Choiseul, whose fall two years later was in large measure his work, he became chancellor in succession to his father, who had held the office for a few days only. He determined to support the royal authority against the parlement, which in league with the provincial magistratures was seeking to arrogate to itself the functions of the states-general. He allied himself with the due d'Aiguillon and Madame du Barry, and secured for a creature of his own, the Abbe Terrai, the office of comptroller-general. The struggle came over the trial of the case of the due d'Aiguillon,

ex-governor of Brittany, and of La Chalotais, procureur-general of the province, who had been imprisoned by the governor for accusations against his admini- stration. When the parlement showed signs of hostility against Aiguillon, Maupeou read letters patent from Louis XV. annulling the proceedings. Louis replied to remonstrances from the parle- ment by a lit de justice, in which he demanded the surrender of the minutes of procedure. On the 27th of November 1770 appeared the Edit de reglement et de discipline, which was promulgated by the chancellor, forbidding the union of the various branches of the parlement and correspondence with the provincial magis- tratures. It also made a strike on the part of the parlement punishable by confiscation of goods, and forbade further obstruc- tion to the registration of royal decrees after the royal reply had been given to a first remonstrance. This edict the magistrates refused to register, and it was registered in a lit de justice held at Versailles on the 7th of December, whereupon the parlement suspended its functions. After five summonses to return to their duties, the magistrates were surprised individually on the night of the 19th of January 17 71 by musketeers, who required them to sign yes or no to a further request to return. Thirty- eight magistrates gave an affirmative answer, but on the exile of their former colleagues by lettres de cachet they retracted, and were also exiled. Maupeou installed the council of state to administer justice pending the establishment of six superior courts in the provinces, and of a new parlement in Paris. The cour des aides was next suppressed.

Voltaire praised this revolution, applauding the suppression of the old hereditary magistrature, but in general Maupeou's policy was regarded as the triumph of tyranny. The remon- strances of the princes, of the nobles, and of the minor courts, were met by exile and suppression, but by the end of 1771 the new system was established, and the Bar, which had offered a passive resistance, recommenced to plead. But the death of Louis XV. in May 1 7 74 ruined the chancellor. The restoration of the parlements was followed by a renewal of the quarrels between the new king and the magistrature. Maupeou and Terrai were replaced by Malesherbes and Turgot. Maupeou lived in retreat until his death at Thuit on the 29th of July 1792, having lived to see the overthrow of the ancien regime. His work, in so far as it was directed towards the separation of the judicial and political functions and to the reform of the abuses attaching to a hereditary magistrature, was subsequently endorsed by the Revolution ; but no justification of his violent methods or defence of his intriguing and avaricious character is possible. He aimed at securing absolute power for Louis XV., but his action was in reality a serious blow to the monarchy.

The chief authority for the administration of Maupeou is the compte rendu in his own justification presented by him to Louis XVI. in 1789, which included a dossier of his speeches and edicts, and is preserved in the Bibliotheque nationale. These documents, in the hands of his former secretary, C. F. Lebrun, due de Plaisance, formed the basis of the judicial system of France as established under the consulate (cf. C. F. Lebrun, Opinions, rapports et choix d'icrits politiques, published posthumously in 1829). See further Maupeouana (6 vols., Paris, 1775), which contains the pamphlets directed against him; Journal hist, de la revolution operee . . . par M. de Maupeou (7 vols., 1775) ; the official correspondence of Mercy-Argenteau, the letters of Mme d'Epinay; and Jules Flammermont, Le Chancelier Maupeou et les parlements (1883).

MAUPERTUIS, PIERRE LOUIS MOREAU DE (1698-1759), French mathematician and astronomer, was born at St Malo on the 17th of July 1698. When twenty years of age he entered the army, becoming lieutenant in a regiment of cavalry, and employing his leisure on mathematical studies. After five years he quitted the army and was admitted in 1723 a member of the Academy of Sciences. In 1728 he visited London, and was elected a fellow of the Royal Society. In 1736 he acted as chief of the expedition sent by Louis XV. into Lapland to measure the length of a degree of the meridian (see Earth, Figure of), and on his return home he became a member of almost all the scientific societies of Europe. In 1740 Maupertuis went to Berlin on the invitation of the king of Prussia, and took part in the battle of Mollwitz, where he was taken prisoner by the Austrians. On his release he returned to Berlin, and thence to Paris, where he was elected director of the Academy of Sciences in 1 742, and in the following year was admitted into the Academy. Returning to Berlin in 1744, at the desire of Frederick II., he was chosen president of the Royal Academy of Sciences in 1746. Finding his health declining, he repaired in 1757 to the south of France, but went in 1758 to Basel, where he died on the 27th of July 1759. Maupertuis was unquestionably a mkn of consider- able ability as a mathematician, but his restless, gloomy dis- position involved him in constant quarrels, of which his con- troversies with Konig and Voltaire during the latter part of his life furnish examples.

The following are his most important works: Sur la figure de la terre (Paris, 17 38) ; Discours sur la parallaxe de la lune (Paris, 1741); Discours sur la figure des astres (Paris, 1742) ; Elements de la giographie (Paris, 1742); Lettre sur la coniete de 1742 (Paris, 1742); Astronomie nautique (Paris, 1745 and 1746); Vinus physique (Paris, 1745); Essai de cosmologie (Amsterdam, 1750). His CEuvres were published in 1752 at Dresden and in 1756 at Lyons.

MAU RANIPUR, a town of British India in Jahnsi district, in the United

Provinces. Pop. (1901), 17,231. It contains a large community of wealthy merchants and bankers. A special variety of red cotton cloth, known as kharua, is manufactured and exported to all parts of India. Trees line many of the streets, and handsome temples ornament the town.

MAUREL, ABDIAS (d. 1705), Camisard leader, became a cavalry officer in the French army and gained distinction in Italy; here he served under Marshal Catinat, and on this account he himself is sometimes known as Catinat. In 1702, when the revolt in the Cevennes broke out, he became one of the Camisard leaders, and in this capacity his name was soon known and feared. He refused to accept the peace made by Jean Cavalier in 1704, and after passing a few weeks in Switzerland he returned to France and became one of the chiefs of those Camisards who were still in arms. He was deeply concerned in a plot to capture some French towns, a scheme which, it was hoped, would be helped by England and Holland. But it failed; Maurel was betrayed, and with three other leaders of the movement was burned to death at Nimes on the 22nd of April 1705. He was a man of great physical strength; but he was very cruel, and boasted he had killed 200 Roman Catholics with his own hands. ' MAUREL, VICTOR (1848-), French singer, was born at Marseilles, and educated in music at the Paris Conservatoire. He made his debut in opera at Paris in 1868, and in London in 1873, and from that time onwards his admirable acting and vocal method established his reputation as one of the finest of operatic baritones. He created the leading part in Verdi's Otello, and was equally fine in Wagnerian and Italian opera.

MAURENBRECHER, KARL PETER WILHELM (1838-1892), German historian, was born at Bonn on the 21st of December, 1838, and studied in Berlin and Munich under Ranke and Von Sybel, being especially influenced by the latter historian. After doing some research work at Simancas in Spain, he became professor of history at the university of Dorpat in 1867; and was then in turn professor at Konigsberg, Bonn and Leipzig. He died at Leipzig on the 6th of November, 1892.

Many of Maurenbrecher's works are concerned with the Reforma- tion, among them being England im Reformationszeitalter (Dusseldorf, 1866); Karl V. und die deutschen Protestanten (Dusseldorf, 1865); Sludien und Skizzen zur Geschichte der Reformationszeit (Leipzig, 1874) ; and the incomplete Geschichte der Katholischen Reformation (Nordlingen, 1880). He also wrote Don Karlos (Berlin, 1876); Griindung des deutschen Reiches 185Q-1871 (Leipzig, 1892, and again 1902) ; and Geschichte der deutschen Konigswahlen (Leipzig, 1889). See G. Wolf, Wilhelm Maurenbrecher (Berlin, 1893).

MAUREPAS, JEAN FREDERIC PHtLYPEAUX, Comte de (1701-1781),

French statesman, was born on the 9th of July 1701 at Versailles, being the son of Jer6me de Pontchartrain, secretary of state for the marine and the royal household. Maurepas succeeded to his father's charge at fourteen, and began his functions in the royal household at seventeen, while in 1725 he undertook the actual administration of the navy. Although essentially light and frivolous in character, Maurepas was seriously interested in scientific matters, and he used the best brains of France to apply science to questions of navigation and of naval construction. He was disgraced in 1749, and exiled from Paris for an epigram against Madame de Pompadour. On the accession of Louis XVI., twenty-five years later, he became a minister of state and Louis XVI. 's chief adviser. He gave Turgot the direction of finance, placed Lamoignon-Malesherbes over the royal household and made Vergennes minister for foreign affairs. At the outset of his new career he showed his weakness by recalling to their functions, in deference to popular clamour, the members of the old parlement ousted by Maupeou, thus re- constituting the most dangerous enemy of the royal power. This step, and his intervention on behalf of the American states, helped to pave the way for the French revolution. Jealous of his personal ascendancy over Louis XVI., he intrigued against Turgot, whose disgrace in 1776 was followed after six months of disorder by the appointment of Necker. In 1781 Maurepas deserted Necker as he had done Turgot, and he died at Versailles on the 21st of November 1781.

Maurepas is credited with contributions to the collection of facetiae known as the fctrennes de la Saint Jean (2nd ed., 1742). Four volumes of Memoires de Maurepas, purporting to be collected by his secretary and edited by J. L. G. Soulavie in 1792, must be regarded as apocryphal. Some of his letters were published in 1896 by the Soc. de I' hist, de Paris. His Moge in the Academy of Sciences was pronounced by Condorcet.

MAURER, GEORG LUDWIG VON (1790-1872), German statesman and historian, son of a Protestant pastor, was born at Erpolzheim, near Durkheim, in the Rhenish Palatinate, on the 2nd of November 1790. Educated at Heidelberg, he went in 18 1 2 to reside in Paris, where he entered upon a systematic study of the ancient legal institutions of the Germans. Return- ing to Germany in 1814, he received an appointment under the Bavarian government, and afterwards filled several important official positions. In 1824 he published at Heidelberg his Geschichte des aitgertnanischen und namentlich altbayrischen djfentlichmiindlichen Gerichtsverfahrens, which obtained the first prize of the academy of Munich, and in 1826 he became professor in the university of Munich. In 1829 he returned to official life, and was soon offered an important post. In 1832, when Otto (Otho), son of Louis I., king of Bavaria, was chosen to fill the throne of Greece, a council of regency was nominated during his minority, and Maurer was appointed a member. He applied himself

energetically to the task of creating institutions adapted to the requirements of a modern civilized community; but grave difficulties soon arose and Maurer was recalled in 1834, when he returned to Munich. This loss was a serious one for Greece. Maurer was the ablest, most energetic and most liberal-minded member of the council, and it was through his enlightened

efforts that Greece obtained a revised penal code, regular tri- bunals and an improved system of civil procedure. Soon after his recall he published Das griechische Volk in ojfentlicher, kirchlicher; und privalrechtlicher Beziehung vor und nach dent Freiheitskampje bis zum 31 Juli 1834 (Heidelberg, 1835-1836), a useful source of information for the history of Greece before Otto ascended the throne, and also for the labours of the council of regency to the time of the author's recall. After the fall of the ministry of Karl von Abel (1788-1859) in 1847, he became chief Bavarian minister and head of the departments of foreign affairs and of justice, but was overthrown in the same year. He died at Munich on the 9th of May 1872. His only son, Conrad von Maurer (1823-1902), was a Scandinavian scholar of some repute, and like his father was a professor at the university of Munich.

Maurer's most important contribution to history is a series of books on the early institutions of the Germans. These are: Ein- leitung zur Geschichte der Mark-, Hof-, Dorf-, und Stadtverfassung und der bffentlichen Gewalt (Munich, 1854) ; Geschichte der Marken- verfassung in Deutschland (Erlangen, 1856) ; Geschichte der Fronhofe, der Bauernhofe, und der Hofverfassung in Deutschland (Erlangen, 1862-1863); Geschichte der Dorfverfassung in Deutsch- land (Erlangen, 1865-1866); and Geschichte der Stddteverfassung in Deutschland (Erlangen, 1869-1871). These works are still impor- tant authorities for the early history of the Germans. Among other works are, Das Stadt- und Landrechtsbuch Ruprechts von Freising, ein Beitrag zur Geschichte des Sckwabenspiegels (Stuttgart, 1839) ; Uber die Freipflege (plegium liberale), und die Entstehung der grossen und kleinen Jury in England (Munich, 1848); and Uber die deutsche Reichsterritorial- und Rechts geschichte (1830).

See K. T. von Heigel, Denkwiirdigkeiten des bayrischen Staatsrats G. L. von Maurer (Munich, 1903).

MAURETANIA, the ancient name of the north-western angle of the African continent, and under the Roman Empire also of a large territory eastward of that angle. The name had different significations at different times; but

before the Roman occupation, Mauretania comprised a considerable part of the modern Morocco i.e. the northern portion bounded on the east by Algiers. Towards the south we may suppose it bounded by the Atlas range, and it seems to have been regarded by geographers as extending along the coast to the Atlantic as far as the point where that chain descends to the sea, in about 30 N. lat. (Strabo, p. 825). The magnificent plateau in which the city of Morocco is situated seems to have been unknown to ancient geographers, and was certainly never included in the Roman Empire. On the other hand, the Gaetulians to the south of the Atlas range, on the date-producing slopes towards the Sahara, seem to have owned a precarious subjection to the kings of Mauretania, as afterwards to the Roman government. A large part of the country is of great natural fertility, and in ancient times produced large quantities of corn, while the slopes of Atlas were clothed with forests, which, besides other kinds of timber, produced the celebrated ornamental wood called citrum (Plin. Hist. Nat. 13-96), for tables of which the Romans gave fabulous prices. (For physical geography, see Morocco.)

Mauretania, or Maurusia as it was called by Greek writers, signified the land of the Mauri, a term still retained in the modern name of Moors (q.v.). The origin and ethnical affinities of the race are un- certain ; but it is probable that all the inhabitants of this northern tract of Africa were kindred races belonging to the great Berber family, possibly with an intermingled fair-skinned race from Europe (see Tissot, Geographie compared de la province romaine d'Afrique, i. 400 seq. ; also Berbers). They first appear in history at the time of the Jugurthine War (1 10-106 B.C.), when Mauretania was under the government of Bocchus and seems to have been recognized as organized state (Sallust, Jugurtha, 19). To this Bocchus was given, after the war, the western part of Jugurtha's kingdom of Numidia, perhaps as far east as Saldae (Bougie). Sixty years later, at the time of the dictator Caesar, we find two Mauretanian king- doms, one to the west of the river Mulucha under Bogud, and the other to the east under a Bocchus ; as to the date or cause of the division we are ignorant. Both these kings took Caesar's part in the civil wars, and had their territory enlarged by him (Appian, B.C. 4, 54). In 25 B.C., after their deaths, Augustus gave the two kingdoms to Juba II. of Numidia (see under Juba), with the river Ampsaga as the eastern frontier (Plin. 5. 22; Ptol. 4. 3. 1). Juba and his son Ptolemaeus after him reigned till A.D. 40, when the latter was put to death by Caligula, and shortly afterwards Claudius incorporated the kingdom into the Roman state as two provinces,

viz. Mauretania Tingitana to the west of the Mulucha and M. Caesariensis to the east of that river, the latter taking its name from the city Caesarea (formerly Iol), which Juba had thus named and adopted as his capital. Thus the dividing line between the two provinces was the same as that

which had originally separated Mauretania from Numidia (q.v.). These provinces were governed until the time of Diocletian by imperial procurators, and were occasionally united for military purposes. Under and after Dio- cletian M. Tingitana was attached administratively to the dioicesis of Spain, with which it was in all respects closely connected ; while M. Caesariensis was divided by making its eastern part into a separate government, which was called M. Sitifensis from the Roman colony Sitifis.

In the two provinces of Mauretania there were at the time of Pliny a number of towns, including seven (possibly eight) Roman colonies in M. Tingitana and eleven in M. Caesariensis; others were added later. These were mostly military foundations, and served the purpose of securing civilization against the inroads of the natives, who were not in a condition to be used as material for town-life as in Gaul and Spain, but were under the immediate government of the procurators, retaining their own clan organization. Of these colonies the most important, beginning from the west, were Lixus on the Atlantic, Tingis (Tangier), Rusaddir (Melila, Melilla), Cartenna (Tenes), Iol or Caesarea (Cherchel), Icosium (Algiers), Saldae (Bougie), Igilgili (Jijelli) and Sitifis (Setif). All these were on the coast but the last, which was some distance inland. Besides these there were many municipia or oppida civium romanorum (Plin. 5. 19 seq.), but, as has been made clear by French archaeolo- gists who have explored these regions, Roman settlements are less frequent the farther we go west, and M. Tingitana has as yet yielded but scanty evidence of Roman civilization. On the whole Mauretania was in a flourishing condition down to the irruption of the Vandals in A.D. 429 ; in the Notitia nearly a hundred and seventy episcopal sees are enumerated here, but we must remember that numbers of these were mere villages.

In 1904 the term Mauretania was revived as an official designation by the French government, and applied to the territory north of the lower Senegal under French protection (see Senegal).

To the authorities quoted under Africa, Roman, may be added here Gobel, Die West-kiiste Afrikas im Alterthum. (W. W. F.)*

MAURIAC, a town of central France, capital of an arrondisse- ment in the department of Cantal, 39 m. N.N.W. of Aurillac by rail. Pop. (1906), 2558. Mauriac, built on the slope of a volcanic hill, has a church of the 12th century, and the buildings of an old abbey now used as public offices and dwellings; the town owes its origin to the abbey, founded during the 6th century. It is the seat of a sub-prefect and has a tribunal of first instance and a communal college. There are marble quarries in the vicinity.

MAURICE [or Mauritius], ST (d. c. 286), an early Christian martyr, who, with his companions, is commemorated by the Roman Catholic Church on the 22nd of September. The oldest form of his story is found in the Passio ascribed to Eucherius, bishop of Lyons, c. 450, who relates how the " Theban " legion commanded by Mauritius was sent to north Italy to reinforce the army of Maximinian. Maximinian wished to use them in persecuting the Christians, but as they themselves were of this faith, they refused, and for this, after having been twice deci- mated, the legion was exterminated at Octodurum (Martigny) near Geneva. In late versions this legend was expanded and varied, the martyrdom was connected with a refusal to take part in a great sacrifice ordered at Octodurum and the name of Exsuperius was added to that of Mauritius. Gregory of Tours (c – 539~593) speaks of a company of the same legion which suffered at Cologne.

The Magdeburg Centuries, in spite of Mauritius being the patron saint of Magdeburg, declared the whole legend fictitious; J. A. du Bordien La Legion thebeenne (Amsterdam, 1705); J. J. Hottinger in Helvetische Kirchengeschichte (Zurich, 1708); and F. W. Rettberg, Kirchengeschichte Deutschlands (Gottingen, 1845-1848) have also demonstrated its untrustworthiness, while the Bollandlsts, De Rivaz and Joh. Friedrich uphold it. Apart from the a priori improbability of a whole legion being martyred, the difficulties are that in 286 Christians everywhere throughout the empire were not molested, that at no later date have we evidence of the presence of Maximinian in the Valais, and that none of the writers nearest to the event (Eusebius, Lactantius, Orosius, Sulpicius Severus) know anything of it. It is of course quite possible that isolated cases of officers being put to death for their faith occurred during Maximinian's reign, and on some such cases the legend may have grown up during the century and a half between Maximinian and Eucherius. The cult of St Maurice and the Theban legion is found in Switzerland (where two places bear the name in Valais,

besides St Moritz in Grisons), along the Rhine, and in north Italy. The foundation of the abbey of St Maurice (Agaunum) in the Valais is usually ascribed to Sigismund of Burgundy (515). Relics of the saint are preserved here and at Brieg and Turin.

MAURICE (Mauricius Flavius Tiberius) (c. 539-602), East Roman emperor from 582 to 602, was of Roman descent, but a native of Arabissus in Cappadocia. He spent his youth at the court of Justin II., and, having

joined the army, fought with distinction in the Persian War (578-581). At the age of forty- three he was declared Caesar by the dying emperor Tiberius II., who bestowed upon him the hand of his daughter Constantina. Maurice brought the Persian War to a successful close by the restoration of Chosroes II. to the throne (591). On the northern frontier he at first bought off the Avars by payments which compelled him to exercise strict economy in his general adminis- tration, but after 595 inflicted several defeats upon them through his general Crispus. By his strict discipline and his refusal to ransom a captive corps he provoked to mutiny the army on the Danube. The revolt spread to the popular factions in Constanti- nople, and Maurice consented to abdicate. He withdrew to Chalcedon, but was hunted down and put to death after witness- ing the slaughter of his five sons.

The work on military art (or par-try uca) ascribed to him is a con- temporary work of unknown authorship (ed. Scheffer, Arriani tactica et Mauricii ars militaris, Upsala, 1664; see Max Jahns, Gesch. d. Kriegswissensch., i. 152-156).

See Theophylactus Simocatta, Vita Mauricii (ed. de Boor, 1887); E. Gibbon, The Decline and Fall of the Roman Empire (ed. Bury, London, 1896, v. 19-21, 57); J. B. Bury, The Later Roman Empire (London, 1889, ii. 83-94); G. Finlay, History of Greece (ed. 1877, Oxford, i. 299-306).

MAURICE (1 521-1553), elector of Saxony, elder son of Henry, duke of Saxony, belonging to the Albertine branch of the Wettin family, was born at Freiberg on the 21st of March 1521. In January 1541 he married Agnes, daughter of Philip, landgrave of Hesse. In that year he became duke of Saxony by his father's death, and he continued Henry's work in forwarding the progress of the Reformation. Duke Henry had decreed that his lands should be divided between his two sons, but as a partition was regarded as undesirable the whole of the duchy came to his elder son. Maurice, however, made generous provision for his brother Augustus, and the desire to compensate him still further was one of the minor threads of his subsequent policy. In

1542 he assisted the emperor Charles V. against the Turks, in

1543 against William, duke of Cleves, and in 1544 against the French; but his ambition soon took a wider range. The har- monious relations which subsisted between the two branches of the Wettins were disturbed by the interference of Maurice in Cleves, a proceeding distasteful to the Saxon elector, John Frederick; and a dispute over the bishopric of Meissen having widened the breach, war was only averted by the mediation of Philip of Hesse and Luther. About this time Maurice seized the idea of securing for himself the electoral dignity held by John Frederick, and his opportunity

came when Charles was preparing to attack the league of Schmalkalden. Although educated as a Lutheran, religious questions had never seriously appealed to Maurice. As a youth he had joined the league of Schmalkalden, but this adhesion, as well as his subsequent declaration to stand by the confession of Augsburg, cannot be regarded as the decision of his maturer years. In June 1546 he took a decided step by making a secret agreement with Charles at Regensburg. Maurice was promised some rights over the archbishopric of Magdeburg and the bishopric of Halberstadt; immunity, in part at least, for his subjects from the Tridentine decrees; and the question of transferring the electoral dignity w'as discussed. In return the duke probably agreed to aid Charles in his proposed attack on the league as soon as he could gain the consent of the Saxon estates, or at all events to remain neutral during the impending war. The struggle began in July 1546, and in October Maurice declared war against John Frede- rick. He secured the formal consent of Charles to the transfer of the electoral dignity and took the field in November. He had gained a few successes when John Frederick hastened from south Germany to defend his dominions. Maurics's ally, Albert

Alcibiades, prince of Bayreuth, was taken prisoner at Rochlitz; and the duke, driven from electoral Saxony, was unable to prevent his own lands from being overrun. Salvation, however, was at hand. Marching against John Frederick, Charles V., aided by Maurice, gained a decisive victory at Miihlberg in April 1547, after which by the capitulation of Wittenberg John Frederick renounced the electoral dignity in favour of Maurice, who also obtained a large part of his kinsman's lands. The formal inves- titure of the new elector took place at Augsburg in February

1548.

The plans of Maurice soon took a form less agreeable to the emperor. The continued imprisonment of his father-in-law, Philip of Hesse, whom he had induced to surrender to Charles and whose freedom he had guaranteed, was neither his greatest nor his only cause of complaint. The emperor had refused to complete the humiliation of the family of John Frederick; he had embarked upon a course of action which boded danger to the elector's Lutheran subjects, and his increased power was a menace to the position of Maurice. Assuring Charles of his continued loyalty, the elector entered into negotiations with the discontented Protestant princes. An event happened which gave him a base of operations, and enabled him to mask his schemes against the emperor. In 1550 he had been entrusted with the execution of the imperial ban against the city of Magdeburg, and under cover of these operations he was able to collect troops and to concert measures with his allies. Favour- able terms were granted to Magdeburg, which surrendered and remained in the power of Maurice, and in January 1552 a treaty was

concluded with Henry II. of France at Chambord. Mean- while Maurice had refused to recognize the Interim issued from Augsburg in May 1548 as binding on Saxony; but a compromise was arranged on the basis of which the Leipzig Interim was drawn up for his lands. It is uncertain how far Charles was ignorant of the elector's preparations, but certainly he was unprepared for the attack made by Maurice and his allies in March 1552. Augsburg was taken, the pass of Ehrenberg was forced, and in a few days the emperor left Innsbruck as a fugitive. Ferdinand undertook to make peace, and the Treaty of Passau, signed in August 1552, was the result. Maurice obtained a general amnesty and freedom for Philip of Hesse, but was unable to obtain a perpetual religious peace for the Lutherans. Charles stubbornly insisted that this question must be referred to the Diet, and Maurice was obliged to give way. He then fought against the Turks, and renewed his communications with Henry of France. Returning from Hungary the elector placed himself at the head of the princes who were seeking to check the career of his former ally, Albert Alcibiades, whose depredations were making him a curse to Germany. The rival armies met at Sievershausen on the 9th of July 1553, where after a fierce encounter Albert was defeated. The victor, however, was wounded during the fight and died two days later.

Maurice was a friend to learning, and devoted some of the secularized church property to the advancement of education. Very different estimates have been formed of his character. He has been represented as the saviour of German Protestantism on the one hand, and on the other as a traitor to his faith and country. In all probability he was neither the one nor the other, but a man of great ambition who, indifferent to religious considerations, made good use of the exigencies of the time. He was generous and enlightened, a good soldier and a clever diplomatist. He left an only daughter Anna (d. 1577), who became the second wife of William the Silent, prince of Orange.

The elector's Politische Korrespondenz has been edited by E. Brandenburg (Leipzig, 1900-1904) ; and a sketch of him is given by Roger Ascham in A Report and Discourse of the Affairs and State of Germany (London, 1864-1865). See also F. A. von Langenn, Moritz Herzog und ChurfiXrst zu Sachsen (Leipzig, 1841); G. Voigt, Moritz von Sachsen (Leipzig, 1876) ; E. Brandenburg, Moritz von Sachsen (Leipzig, 1898); S. Issleib, Moritz von Sachsen als protestan- tischer Fiirst (Hamburg, 1 898) ; J . Witter, Die Beziehung und der Verkehr des Kurfilrsten Moritz mit Konig Ferdinand (Jena, 1886); L. von Ranke, Deutsche Geschichte im Zeitalter der Reformation, Bde. IV. and V. (Leipzig, 1882); and W. Maurenbrecher in the Allgemeine deutsche Biographie, Bd. XXII. (Leipzig, 1885). For

bibliography see Maurenbrecher ; and The Cambridge Modern History, vol. ii. (Cambridge, 1903).

MAURICE, JOHN FREDERICK DENISON (1805-1872), English theologian, was born at Normanston, Suffolk, on the 29th of August, 1805. He was the son of a Unitarian minister, and entered Trinity College, Cambridge, in 1823, though it was then impossible for any but members of the Established Church to obtain a degree. Together with John Sterling (with whom he founded the Apostles' Club) he migrated to Trinity Hall, whence he obtained a first class in civil law in 1827; he then came to London, and gave himself to literary work, writing a novel, Eustace Conyers, and editing the London Literary Chronicle until 1830, and also for a short time the Athenaeum. At this time he was much perplexed as to his religious opinions, and he ultimately found relief in a decision to take a further university course and to seek Anglican orders. Entering Exeter College, Oxford, he took a second class in classics in 1831. He was ordained in 1834, and after a short curacy at Bubbenhall in Warwickshire was appointed chaplain of Guy's Hospital, and became thenceforward a sensible factor in the intellectual and social life of London. From 1839 to 1841 Maurice was editor of the Education Magazine. In 1840 he was appointed professor of English history and literature in King's College, and to this post in 1846 was added the chair of divinity. In 1845 he was Boyle lecturer and Warburton lecturer. These chairs he held till 1853. In that year he published Theological Essays, wherein were stated opinions which savoured to the principal, Dr R. W. Jelf , and to the council, of unsound theology in regard to eternal punishment. He had previously been called on to clear himself from charges of heterodoxy brought against him in the Quarterly Review (1851), and had been acquitted by a committee of inquiry. Now again he maintained with great warmth of conviction that his- views were in close accordance with Scripture and the Anglican standards, but the council, without specifying any distinct " heresy " and declining to submit the case to the judg- ment of competent theologians, ruled otherwise, and he was deprived of his professorships. He held at the same time the chaplaincy of Lincoln's Inn, for which he had resigned Guy's (1846-1860), but when he offered to resign this the benchers refused. Nor was he assailed in the incumbency of St. Peter's, Vere Street, which he held for nine years (1860-1869), and where he drew round him a circle of thoughtful people. During the early years of this period he was engaged in a hot and bitter controversy with H. L. Mansel (afterwards dean of St Paul's), arising out of the latter's Bampton lecture upon reason and revelation.

During his residence in London Maurice was specially identified with two

important movements for education. He helped to found Queen's College for the education of women (1848),. and the Working Men's College (1854), of which he was the first principal. He strongly advocated the abolition of university tests (1853), and threw himself with great energy into all that affected the social life of the people. Certain abortive attempts at co-operation among working men, and the movement known as Christian Socialism, were the immediate outcome of his teaching. In 1866 Maurice was appointed professor of moral philosophy at Cambridge, and from 1870 to 1872 was incumbent of St Edward's in that city. He died on the 1st of April 1872.

He was twice married, first to Anna Barton, a sister of John Sterling's wife, secondly to a half-sister of his friend Archdeacon Hare. His son Major-General Sir J. Frederick Maurice (b. 1841), became a distinguished soldier and one of the most prominent military writers of his time.

Those who knew Maurice best were deeply impressed with the spirituality of his character. " Whenever he woke in the night," says his wife, " he was always praying." Charles Kingsley called him " the most beautiful human soul whom God has ever allowed me to meet with." As regards his intellectual attainments we may set Julius Hare's verdict " the greatest mind since Plato " over against Ruskin's " by nature puzzle-headed and indeed wrong-headed." Such contradictory impressions bespeak a life made up of contradictory element. Maurice was a man of*

peace, yet his life was spent in a series of conflicts; of deep humility, yet so polemical that he often seemed biased; of large charity, yet bitter in his attack upon the religious press of his time; a loyal churchman who detested the label " Broad," yet poured out criticism upon the leaders of the Church. With an intense capacity for visualizing the unseen, and a kindly dignity, he combined a large sense of humour. While most of the " Broad Churchmen " were influenced by ethical and emotional considerations in their repudiation of the dogma of everlasting torment, he was swayed by purely intellectual and theological arguments, and in questions of a more general liberty he often opposed the proposed Liberal theologians, though he as often took their side if he saw them hard pressed. He had a wide metaphysical and philosophical knowledge which he applied to the history of theology. He was a strenuous advocate of ecclesiastical control in elementary education, and an opponent of the new school of higher biblical criticism, though so far an evolutionist as to believe in growth and development as applied to the history of nations.

As a preacher, his message was apparently simple; his two great convictions were the fatherhood of God, and that all religious sys- tems which had any stability lasted because of a portion of truth which had to be disentangled

from the error differentiating them from the doctrines of the Church of England as understood by himself. His love to God as his Father was a passionate adoration which filled his whole heart. The prophetic, even apocalyptic, note of his preach- ing was particularly impressive. He prophesied in London as Isaiah prophesied to the little towns of Palestine and Syria, " often with dark foreboding, but seeing through all unrest and convulsion the working out of a sure divine purpose." Both at King's College and at Cambridge Maurice gathered round him a band of earnest students, to whom he directly taught much that was valuable drawn from wide stores of his own reading, wide rather than deep, for he never was, strictly speaking, a learned man. Still more did he encourage the habit of inquiry and research, more valuable than his direct teaching. In his Socratic power of convincing his pupils of their ignorance he did more than perhaps any other man of his time to awaken in those who came under his sway the desire for knowledge and the process of independent thought.

As a social reformer, Maurice was before his time, and gave his eager support to schemes for which the world was not ready. From an early period of his life in London the condition of the poor pressed upon him with consuming force; the enormous magnitude of the social questions involved was a burden which he could hardly bear. For many years he was the clergyman whom working men of all opinions seemed to trust even if their faith in other religious men and all religious systems had faded, and he had a marvellous power of attracting the zealot and the outcast.

His works cover nearly 40 volumes, often obscure, often tauto- logical, and with no great distinction of style. But their high pur- pose and philosophical outlook give his writings a permanent place in the history of the thought of his time. The following are the more important works — some of them were rewritten and in a measure recast, and the date given is not necessarily that of the first appear- ance of the book, but of its more complete and abiding form: Eustace Conway, or the Brother and Sister, a novel (1834) ; The King- dom of Christ (1842) ; Christmas Day and Other Sermons (1843) ; The Unity of the New Testament (1844) ; The Epistle to the Hebrews (1846) ; The Religions of the World (1847) ; Moral and Metaphysical Philosophy (at first an article in the Encyclopaedia Metropolitans, 1848) ; The Church a Family (1850); The Old Testament (1851); Theological Essays (1853); The Prophets and Kings of the Old. Testament (1853); Lectures on Ecclesiastical History (1854); The Doctrine of Sacrifice (1854); The Patriarchs and Lawgivers of the Old Testament (1855); The Epistles of St John (1857) ; The Commandments as Instruments of National Reformation (1866); On the Gospel of St Luke (1808); The Conscience: Lectures on Casuistry (1868); The Lord's Prayer, a Manual (1870). The greater part of these works were first deli- vered as sermons or lectures. Maurice also contributed many pre- faces and

introductions to the works of friends, as to Archdeacon Hare's Charges, Kingsley's Saint's Tragedy, &c.

See Life by his son (2 vols., London, 1884), and a monograph by C. F. G. Masterman (1907) in " Leader of the Church " series; W. E. Collins in Typical English Churchmen, pp. 327-360 (1902), and T. Hughes in The Friendship of Books (1873).

MAURICE OF NASSAU, prince of Orange (1567-1625), the second son of William the Silent, by Anna, only daughter of the famous Maurice, elector of Saxony, was born at Dillenburg. At the time of his father's assassination in 1584 he was being educated at the university of Leiden, at the expense of the states of Holland and Zeeland. Despite his youth he was made stadt-holder of those two provinces and president of the council of

state. During the period of Leicester's governorship he remained in the background, engaged in acquiring a thorough knowledge of the military art, and in 1586 the States of Holland conferred upon him the title of prince. On the withdrawal of Leicester from the Netherlands in August 1587, Johan van Oldenbarne- veldt, the advocate of Holland, became the leading statesman of the country, a position which he retained for upwards of thirty years. He had been a devoted adherent of William the Silent and he now used his influence to forward the interests of Maurice. In 1588 he was appointed by the States-General captain and admiral-general of the Union, in 1590 he was elected stadtholder of Utrecht and Overysel, and in 1501 of Gelderland. From this time forward, Oldenbarneveldt at the head of the civil government and Maurice in command of the armed forces of the republic worked together in the task of rescuing the United Netherlands from Spanish domination (for details see Holland). Maurice soon showed himself to be a general second in skill to none of his contemporaries. He was especially famed for his consummate knowledge of the science of sieges. The twelve years' truce on the 9th of April 1609 brought to an end the cordial relations between Maurice and Oldenbarneveldt. Maurice was opposed to the truce, but the advocate's policy triumphed and henceforward there was enmity between them. The theological disputes between the Remonstrants and contra- Remonstrants found them on different sides; and the theological quarrel soon became a political one. Oldenbarneveldt, supported by the states of Holland, came forward as the champion of pro- vincial sovereignty against that of the states-general; Maurice threw the weight of his sword on the side of the union. The struggle was a short one, for the army obeyed the general who had so often

led them to victory. Oldenbarneveldt perished on the scaffold, and the share which Maurice had in securing the illegal condemnation by a packed court of judges of the aged patriot must ever remain a stain upon his memory.

Maurice, who had on the death of his elder brother Philip William, in February 1618, become prince of Orange, was now supreme in the state, but during the remainder of his life he sorely missed the wise counsels of the experienced Oldenbarne- veldt. War broke out again in 1621, but success had ceased to accompany him on his campaigns. His health gave way, and he died, a prematurely aged man, at the Hague on the 4th of April 1625. He was buried by his father's side at Delft.

Bibliography.— I. Commelin, Wilhelm en Maurits v. Nassau, pr. v. Orangien, haer leven en bedrijf (Amsterdam, 1651); G. Groen van Prinsterer, Archives ou correspondance de la maison d 'Orange- Nassau, i" serie, 9 vols. (Leiden, 1841-1861); G. Groen van Prin- sterer, Maurice et Barneveldt (Utrecht, 1875) ; J. L. Motley, Life and Death of John of Barneveldt (2 vols., The Hague, 1894); C. M. Kemp, v.d. Maurits v. Nassau, prins v. Oranje in zijn leven en verdiensten (4 vols., Rotterdam, 1843); M. O. Nutting, The Days of Prince Maurice (Boston and Chicago, 1894).

MAURISTS, a congregation of French Benedictines called after St Maurus (d. 565), a disciple of St Benedict and the legendary introducer of the Benedictine rule and life into Gaul. 1 At the end of the 16th century the Benedictine monasteries of France had fallen into a state of disorganization and relaxation. In the abbey of St Vaune near Verdun a reform was initiated by Dom Didier de la Cour, which spread to other houses in Lorraine, and in 1604 the reformed congregation of St Vaune was established, the most distinguished members of which were Ceillier and Calmet. A number of French houses joined the new con- gregation; but as Lorraine was still independent of the French crown, it was considered desirable to form on the same lines a separate congregation for France. Thus in 1621 was established the famous French congregation of St Maur. Most of the Benedictine monasteries of France, except those belonging to Cluny, gradually joined the new congregation, which eventually embraced nearly two hundred houses. The chief house was Saint-Germain-des-Pres, Paris, the residence of the superior- general and centre of the literary activity of the congregation.

1 His festival is kept on the 15th of January. He founded the monastery of Glanfeuil or St Maur-sur-Loire.

The primary idea of the movement was not the undertaking of literary and

historical work, but the return to a strict monastic regime and the faithful carrying out of Benedictine life; and throughout the most glorious period of Maurist history the literary work was not allowed to interfere with the due per- formance of the choral office and the other duties of the monastic life. Towards the end of the 18th century a tendency crept in, in some quarters, to relax the monastic observances in favour of study; but the constitutions of 1770 show that a strict monastic regime was maintained until the end. The course of Maurist history and work was checkered by the ecclesiastical controversies that distracted the French Church during the 17th and 18th centuries. Some of the members identified themselves with the Jansenist cause; but the bulk, including nearly all the greatest names, pursued a middle path, opposing the lax moral theology condemned in 1679 by Pope Innocent XL, and adhering to those strong views on grace and predestination associated with the Augustinian and Thomist schools of Catholic theology; and like all the theological faculties and schools on French soil, they were bound to teach the four Gallican articles. It seems that towards the end of the 18th century a rationalistic and free- thinking spirit invaded some of the houses. The congregation was suppressed and the monks scattered at the revolution, the last superior-general with forty of his monks dying on the scaffold in Paris. The present French congregation of Benedictines initiated by Dom Gueranger in 1833 is a new creation and has no continuity with the congregation of St Maur.

The great claim of the Maurists to the gratitude and admira- tion of posterity is their historical and critical school, which stands quite alone in history, and produced an extraordinary number of colossal works of erudition which still are of per- manent value. The foundations of this school were laid by Dom Tarisse, the first superior-general, who in 1632 issued instructions to the superiors of the monasteries to train the young monks in the habits of research and of organized work. The pioneers in production were Menard and d'Achery.

The following tables give, divided into groups, the most important Maurist works, along with such information as may be useful to students. All works are folio when not otherwise noted:—

I. — The Editions of the Fathers

Epistle of Barnabas Me'nard 1645 I in4 to

(editio princeps)

Lanfranc d'Achery 1648 I

Guibert of Nogent d'Achery 1651 1 Robert Pulleyn and Peter

of Poitiers Mathou 1655 l

Bernard Mabillon 1667 2

Anselm Gerberon 1675 x

Cassiodorus Garet 1679 I Augustine (see Kukula, Delfau, Blampin,

Die Mauriner-Ausgabe Coustant, Guesnie 1681-1700 n

des Augustinus, 1898)

Ambrose du Frische 1686-1690 2

Acta martyrum sincera Ruinart 1689 _ 1

Hilary Coustant 1693 I

Jerome Martianay 1693-1706 5 Athanasius Loppin and Mont-

faucon 1698 3

Gregory of Tours Ruinart 1699 J

Gregory the Great Sainte-Marthe 1705 4

Hildebert of Tours Beaugendre 1708 1

Irenaeus Massuet 17 10 I

Chrysostom Montfaucon 1718-1738 13

Cyril of Jerusalem Touttee and Maran 1720 I

Epistolae romanorum Coustant 1 72 1 I

pontificum 2

Basil Gamier and Maran 1721-1730 3 Cyprian (Baluze, not a

Maurist) finished

by Maran 1726 1 Origen Ch. de la Rue (1,

2, 3) V.delaRue(4)i733-i759 4

Justin anc the Apolo- Maran 1742 1*

gists Gregory Nazianzen 3 Maran and Clemen-

cet 1778 1

2 14 vols, of materials collected for the continuation are at Paris.

3 The printing of vol. ii. was impeded by the Revolution,

II. — Biblical Works

St Jerome's Latin Bible Martianay 1693

Origen's Hexapla Montfaucon 1713

Old Latin versions Sabbathier 1 743-1 749

III. — Great Collections of Documents

Spicilegium Veterae analecta Musaeum italicum Collectio nova patrum

graecorum Thesaurus novus anecdo-

torum Veterum scriptorum

lectio

d'Achery Mabillon Mabillon Montfaucon

Martene and Dur- and col- Martene and Dur- and

1655-1677 1675-1685 1687-1689 1706

1

2 3

13 in 4 1 4 in 8 V ° 2 in 4 t0

2

to

De antiquis ritibus

ecclesiae- Martene

(Final form)

IV. — Monastic History

1717

1 724-1 733 1690-1706

I73&-I738

d'Achery, Mabillon

and Ruinart 1668-1701 9

Mabillon (1-4), Mas- suet (5), Martene

(6) 1 703-1 739 6

Ecclesiastical History and Antiquities of France A. — General. Sainte-Marthe

(1, 2, 3)

Acta of the Benedictine

Saints Benedictine Annals (to

"57)

V.-

Montfaucon

Rivet, Clemencet, C16ment

(12-19)

Gallia Christiana (3 other

vols, were published

1856-1865)

Monuments de la mon- archic francaise Histoire litteraire de la

France (16 other vols.

were published 1814-

1881)

Recueil des historiens de Bouquet (1-8), Brial

la France (4 other vols.

were published 1840-

1876)

Concilia Galliae (the

printing of vol. ii. was

interrupted by the Re- volution ; there were

to have been 8 vols.

B. — Histories of the Provinces.

Lobineau 1707

Felibien and Lobi- neau 1725 Vaissette and deVic 1 730-1 745 Plancher (1-3), Merle 1739-1748,

(4) 1 78 1

Morice 1742-1756

Labbat

1715-1785 13 1 729-1 733 5

I733-I7°3 12 in 4°

1738-1833 19

1789

Bretagne Paris

Languedoc Bourgogne

Bretagne VI.-

-Miscellaneous Works of Technical Erudition

De re diplomatica

Ditto Supplement Nouveau traite de dip- lomatique Paleographia graeca Bibliotheca coisliniana Bibliotheca bibliotheca-

rum manuscriptorum

nova L'Antiquite expliqu6 New ed. of Du Cange's

glossarium

Ditto Supplement Apparatus ad biblio-

thecam maximam

patrum L'Art de verifier les

dates

Ed. 2

Ed. 3

Mabillon Mabillon Toustain and Tassin

Montfaucon Montfaucon Montfaucon

Montfaucon Dantine and Car- pen tier Carpentier le Nourry

1681 1704 1 750-1 765

1708 1715 1739

6in4to

1719-1724 15

1 733-1 736 1766

I7< >3

1104'*

Dantine, Durand,

Clemencet 1750

Clfiment 1770

Clement 1 783-1 787 3

The 58 works in the above list comprise 199 great folio volumes and 39 in 4°° or 8™. The full Maurist bibliography contains the names of some 220 writers and more than 700 works. The lesser works in large measure cover the same fields as those in the list, but the number of works of purely religious character, of piety, devotion and edification, is very striking. Perhaps the most wonderful pheno- menon of Maurist work is that what was produced was only a portion of what was contemplated and prepared for. The French Revolution cut short many gigantic undertakings, the collected materials for which fill hundreds of manuscript volumes in the Bibliotheque nationale of Paris and other libraries of France. There are at Paris 31 volumes of Berthereau's materials for the Historians of the Crusades, not only in Latin and Greek, but in the oriental tongues; from them have been taken in great measure the Recueil des historiens des croisades.

whereof 15 folio volumes have been published by the Acadˆmie des Inscriptions. There exist also the preparations for an edition of Rufinus and one of Eusebius, and for the continuation of the Papal Letters and of the Concilia Galliae. Dom Caffiaux and Dom Ville- vielle left 236 volumes of materials for a Tresor genealogique. There are Benedictine Antiquities (37 vols.), a Monasticon Gallicanum and a Monasticon Benedictinum (54 vols.). Of the Histories of the Provinces of France barely half a dozen were printed, but all were in hand, and the collections for the others fill 800 volumes of MSS. The materials for a geography of Gaul and France in 50 volumes perished in a fire during the Revolution.

When these figures were considered, and when one contemplates the vastness of the works in progress during any decade of the cen- tury 1680-1780; and still more, when not only the quantity but the quality of the work, and the abiding value of most of it is realized, it will be recognized that the output was prodigious and unique in the history of letters, as coming from a single society. The quali- ties that have made Maurist work proverbial for sound learning are its fine critical tact and its thoroughness.

The chief source of information on the Maurists and their work is Dom Tassin's Histoire litteraire de la congregation de Saint-Maur (1770); it has been reduced to a bare bibliography and completed by de Lama, Bibliotheque des ecrivains de la congr. de S.-M. (1882). The two works of de Broglie, Mabillon (2 vols., 1888) and Montfaucon (2 vols., 1891), give a charming picture of the inner life of the great Maurists of the earlier generation in the midst of their work and their friends. Sketches of the lives of a few of the chief Maurists will be found in McCarthy's Principal Writers

of the Congr. of S. M. (1868). Useful information about their literary undertakings will be found in De Lisle's Cabinet des MSS. de la Bibl. Nat. Fonds St Germain-des- Pres. General information will be found in the standard authori- ties: Helyot, Hist, des ordres religieux (1718), vi. c. 37; Heimbucher, Orden und, Kongregationen (1907) i. § 36; Wetzer und Welte, Kirchen- lexicon (ed. 2) and Herzog-Hauck's Realencyklopddie (ed. 3), the latter an interesting appreciation by the Protestant historian Otto Zockler of the spirit and the merits of the work of the Maurists.

(E. C. B.)

MAURITIUS, an island and British colony in the Indian Ocean (known whilst a French possession as the lie de France). It lies between 57° 18′ and 57° 49′ E., and 19 58′ and 20° 32′ S., 550 m. E. of Madagascar, 2300 m. from the Cape of Good Hope, and 9500 m. from England via Suez. The island is irregularly elliptical — somewhat triangular — in shape, and is 36 m. long from N.N.E. to S.S.W., and about 23 m. broad. It is 130 m. in circumference, and its total area is about 710 sq. m. (For map see Madagascar.) The island is surrounded by coral reefs, so that the ports are difficult of access.

From its mountainous character Mauritius is a most pic- turesque island, and its scenery is very varied and beautiful. It has been admirably described by Bernardin de St Pierre, who lived in the island towards the close of the 18th century, in Paul el Virginie. The most level portions of the coast districts are the north and north-east, all the rest being broken by hills, which vary from 500 to 2700 ft. in height. The principal mountain masses are the north-western or Pouce range, in the district of Port Louis; the south-western, in the districts of Riviere Noire and Savanne; and the south-eastern range, in the Grand Port district. In the first of these, which consists of one principal ridge with several lateral spurs, overlooking Port Louis, are the singular peak of the Pouce (2650 ft.), so called from its supposed resemblance to the human thumb; and the still loftier Pieter Botte (2685 ft.), a tall obelisk of bare rock, crowned with a globular mass of stone. The highest summit in the island is in the south-western mass of hills, the Piton de la Riviere Noire, which is 2711- ft. above the sea. The south-eastern group of hills consists of the Montagne du Bambou, with several spurs running down to the sea. In the interior are extensive fertile plains, some 1200 ft. in height, forming the districts of Moka, Vacois, and Plaines Wilhelms; and from nearly the centre of the island an abrupt peak, the Piton du Milieu de l'lle rises to a height of 1932 ft. Other prominent summits are the Trois Mamelles, the Montagne du Corps de Garde, the Signal Mountain, near Port Louis, and the Morne Brabant, at the south-west corner of the island.

The rivers are small, and none is navigable beyond a few hundred yards from the sea. In the dry season little more than brooks, they become raging torrents in the wet season. The principal stream is the Grande Riviere, with a course of about 10 m. There is a remarkable and very deep lake, called

Grand Bassin, in the south of the island, it is probably the extinct crater of an ancient volcano; similar lakes are the Mare aux Vacois and the Mare aux Jones, and there are other deep hollows which have a like origin.

Geology. — The island is of volcanic origin, but has ceased to show signs of volcanic activity. All the rocks are of basalt and greyish- tinted lavas, excepting some beds of upraised coral. Columnar basalt is seen in several places. The remains of ancient craters can be distinguished, but their outlines have been greatly destroyed by denudation. There are many caverns and steep ravines, and from the character of the rocks the ascents are rugged and precipitous. The island has few minerals, although iron, lead and copper in very small quantities have in former times been obtained. The greater part of the surface is composed of a volcanic breccia, with here and there lava-streams exposed in ravines, and sometimes on the surface. The commonest lavas are dolerites. In at least two places sedimentary rocks are found at considerable elevations. In the Black River Mountains, at a height of about 1200 ft., there is a clay-slate; and near Midlands, in the Grand Port group of mountains, a chloritic schist occurs about 1700 ft. above the sea, 'forming the hill of La Selle. This schist is much contorted, but seems to have a general dip to the south or south-east. Evidence of recent elevation of the island is furnished by masses of coral reef and beach coral rock standing at heights of 40 ft. above sea-level in the south, 12 ft. in the north and 7 ft. on the islands situated on the bank extending to the north-east. 1

Climate. — The climate is pleasant during the cool season of the year, but oppressively hot in summer (December to April), except in the elevated plains of the interior, where the thermometer ranges from 70 to 8o° F., while in Port Louis and on the coast generally it ranges from 90 to 96". The mean temperature for the year at Port Louis is 78-6°. There are two seasons, the cool and compara- tively dry season, from April to November, and the hotter season, during the rest of the year. The climate is now less healthy than it was, severe epidemics of malarial fever having frequently occurred, so that malaria now appears to be endemic among the non-European population. The rainfall varies greatly in different parts of the island. Cluny in the Grand Port (south-eastern) district has a mean annual

rainfall of 145 in.; Albion on the west coast is the driest station, with a mean annual rainfall of 31 in. The mean monthly rainfall for the whole island varies from 12 in. in March to 2-6 in. in September and October. The Royal Alfred Observatory is situ- ated at Pamplemousses, on the north-west or dry side of the island. From January to the middle of April, Mauritius, in common with the neighbouring islands and the surrounding ocean from 8° to 30 of southern latitude is subject to severe cyclones, accompanied by torrents of rain, which often cause great destruction to houses and plantations. These hurricanes generally last about eight hours, but they appear to be less frequent and violent than in former times, owing, it is thought, to the destruction of the ancient forests and the consequent drier condition of the atmosphere.

Fauna and Flora. — Mauritius being an oceanic island of small size, its present fauna is very limited in extent. When first seen by Europeans it contained no mammals except a large fruit-eating bat (Pteropus vulgaris), which is plentiful in the woods; but several mam- mals have been introduced, and are now numerous in the uncultivated region. Among these are two monkeys of the genera Macacus and Cercopithecus, a stag (Cervus hippelaphus) , a small hare, a shrew- mouse, and the ubiquitous rat. A lemur and one of the curious hedgehog-like Insectivora of Madagascar (Centetes ecaudatus) have probably both been brought from the larger island. The avifauna resembles that of Madagascar; there are species of a peculiar genus of caterpillar shrikes (Campephagidae), as well as of the genera fratincola, Hypsipetes, Phedina, Tchitrea, Zosterops, Foudia, Collo-calia and Coracopsis, and peculiar forms of doves and parakeets. The living reptiles are small and few in number. The surrounding seas contain great numbers of fish ; the coral reefs abound with a great variety of molluscs; and there are numerous land-shells. The ex- tinct fauna of Mauritius has considerable interest. In common with the other Mascarene islands, it was the home of the dodo (Didus ineptus) ; there were also Aphanapteryx, a species of rail, and a short- winged heron (Ardea megacephala), which probably seldom flew. The defenceless condition of these birds led to their extinction after the island was colonized. Considerable quantities of the bones of the dodo and other extinct birds — a rail (Aphanapteryx), and a short- winged heron — have been discovered in the beds of some of the ancient lakes (see Dodo). Several species of large fossil tortoises have also been discovered ; they are quite different from the living ones of Aldabra, in the same zoological region.

Owing to the destruction of the primeval forests for the formation of sugar plantations, the indigenous flora is only seen in parts of the interior plains, in the river valleys and on the hills; and it is not now easy to distinguish between what is native and what has come from abroad. The principal timber tree is the ebony (Diospyros ebeneum), which grows to a

considerable size. Besides this there are bois de cannelle, olive-tree, benzoin (Croton Benzoe), colophane (Colophonia), and iron-wood, all of which are useful in carpentry;

1 See Geog. Journ. (June 1895), p. 597.

the coco-nut palm, an importation, but a tree which has been so extensively planted during the last hundred years that it is extremely plentiful; the palmiste (Palma dactylifera latifolia), the latanier (Corypha umbraculifera) and the date-palm. The vacoa or vacois, (Pandanus utilis) is largely grown, the long tough leaves being manufactured into bags for the export of sugar, and the roots being also made of use; and in the few remnants of the original forests the traveller's tree (Urania speciosa), grows abundantly. A species of bamboo is very plentiful in the river valleys and in marshy situa- tions. A large variety of fruit is produced, including the tamarind, mango, banana, pine-apple, guava, shaddock, fig, avocado-pear, litchi, custard-apple and the mabolo (Diospyros discolor), a fruit of exquisite flavour, but very disagreeable odour. Many of the roots and vegetables of Europe have been introduced, as well as some of those peculiar to the tropics, including maize, millet, yams, manioc, dhol, gram, &c. Small quantities of tea, rice and sago, have been grown, as well as many of the spices (cloves, nutmeg, ginger, pepper and allspice) , and also cotton, indigo, betel, camphor, turmeric and vanilla. The Royal Botanical Gardens at Pample- mousses, which date from the French occupation of the island, contain a rich collection of tropical and extra-tropical species.

Inhabitants. — The inhabitants consist of two great divisions, those of European blood, chiefly French and British, together with numerous half-caste people, and those of Asiatic or African blood. The population of European blood, which calls itself Creole, is greater than that of any other tropical colony; many of the inhabitants trace their descent from ancient French families, and the higher and middle classes are distinguished for their intellectual culture. French is more commonly spoken than English. The Creole class is, however, diminishing, though slowly, and the most numerous section of the population is of Indian blood.

The introduction of Indian coolies to work the sugar plantations dates from the period of the emancipation of the slaves in 1834- 1839. At that time the negroes who showed great unwillingness to work on their late masters' estates, numbered about 66,000. Immigration from India began in 1834, and at a census taken in 1846, when the total population was 158,462, there were already 56,245 Indians in the island. In 1851 the total population had increased to 180,823, while in 1861 it was 310,050. This great increase was almost entirely due to Indian immigration, the Indian population, 77,996 in 1851, being 192,634 in 1861. From that year the

increase in the Indian population has been more gradual but steady, while the non-Indian population has decreased. From 102,827 in 1851 it rose to 117,416 in 1861 to sink to 99,784 in 1871. The figures for the three following census years were: —

1881.

Indians 248,993

Others 110,881

255.920 114,668

1901. 259,086

m>937

Total 359-874 370,588 371.023

Including the military and crews of ships in harbour, the total population in 1901 was 373,336. 2 This total included 198,958 Indo-Mauritians, i.e. persons of Indian descent born in Mauritius, and 62,022 other Indians. There were 3,509 Chinese, while the remaining 108,847 included persons of European, African or mixed descent, Malagasy, Malays and Sinhalese. The Indian female population increased from 51,019 in 1861 to 115,986 in 1901. In the same period the non-Indian female population but slightly varied, being 56,070 in 1861 and 55,485 in 1901. The Indo-Mauritians are now dominant in commercial, agricultural and domestic callings, and much town and agricultural land has been transferred from the Creole planters to Indians and Chinese. The tendency to an Indian peasant proprietorship is marked. Since 1864 real property to the value of over £1,250,000 has been acquired by Asiatics. Between 1881 and 1901 the number of sugar estates decreased from 171 to 115, those sold being held in small parcels by Indians. The average death-rate for the period 1873-1901 was 32-6 per 1000. The average birth-rate in the Indian community is 37 per 1000; in the non-Indian community 34 per 1000. Many Mauritian Creoles have emigrated to South Africa. The great increase in the population since 185 1 has made Mauritius one of the most densely peopled regions of the world, having over 520 persons per square mile.

Chief Towns. — The capital and seat of government, the crty of Port Louis, is on the north-western side of the island, in 20° 10′ S., 57° 30′ E. at the head of an excellent harbour, a deep inlet about a mile long, available for ships of the deepest draught. This is protected by Fort William and Fort George, as well as by the citadel (Fort Adelaide), and it has three graving-

docks connected with the inner harbour, the depths alongside quays and berths being from 12 to 28 ft. The trade of the island passes almost entirely through the port. Government House is a three-storeyed structure with broad

2 The total population of the colony (including dependencies) on the 1st of January 1907 was estimated at 383,206.

verandas, of no particular style of architecture, while the Protestant cathedral was formerly a powder magazine, to which a tower and spire have been added. The Roman Catholic cathedral is more pretentious in style, but is tawdry in its interior. There are, besides the town-hall, Royal College, public offices and theatre, large barracks and military stores. Port Louis, which is governed by an elective municipal council, is surrounded by lofty hills and its unhealthy situation is aggravated by the difficulty of effective drainage owing to the small amount of tide in the harbour. Though much has been done to make the town sanitary, including the provision of a good water-supply, the death-rate is generally over 44 per 1000. Consequently all those who can make their homes in the cooler up-lands ot the interior. As a result the population of the city decreased from about 70,000 in 1891 to 53,000 in 1901. The favourite resi- dential town is Curepipe, where the climate resembles that of the south of France. It is built on the central plateau about 20 m. distant from Port Louis by rail and 1800 ft. above the sea. Curepipe was incorporated in 1888 and had a population (1901) of 13,000. On the railway between Port Louis and Curepipe are other residential towns — Beau Bassin, Rose Hill and Quatre Bornes. Mahehourg, pop. (1901), 4810, is a town on the shores of Grand Port on the south-east side of the island, Souillac a small town on the south coast.

Industries. — The Sugar Plantations: The soil of the island is of considerable fertility; it is a ferruginous red clay, but so largely mingled with stones of all sizes that no plough can be used, and the hoe has to be employed to prepare the ground for cultivation. The greater portion of the plains is now a vast sugar plantation. The bright green of the sugar fields is a striking feature in a view of Mauritius from the sea, and gives a peculiar beauty and freshness to the prospect. The soil is suitable for the cultivation of almost all kinds of tropical produce, and it is to be regretted that the prosperity of the colony depends almost entirely on one article of production, for the consequences are serious when there is a failure, more or less, of the sugar crop. Guano is extensively imported as a manure, and

by its use the natural fertility of the soil has been increased to a wonderful extent. Since the beginning of the 20th century some attention has been paid to the cultivation of tea and cotton, with encouraging results. Of the exports, sugar amounts on an average to about- 95 % of the total. The quantity of sugar exported rose from 102,000 tons in 1854 to 189,164 tons in 1877. The competition of beet-sugar and the effect of bounties granted by various countries then began to tell on the production in Mauritius, the average crop for the seven years ending 1900-1901 being only 150,449 tons. The Brussels Sugar Convention of 1902 led to an increase in production, the average annual weight of sugar exported for the three years 1904-1906 being 182,000 tons. The value of the crop was likewise seriously affected by the causes mentioned, and by various diseases which attacked the canes. Thus in 1878 the value of the sugar exported was £3,408,000; in 1888 it had sunk to £1,911,000, and in 1898 to £1,632,000. In 1900 the value was £1,922,000, and in 1905 it had risen to £2,172,000. India and the South African colonies between them take some two-thirds of the total produce. The remainder is taken chiefly by Great Britain, Canada and Hong-Kong. Next to sugar, aloe-fibre is the most important export, the average annual export for the five years ending 1906 being 1840 tons. In addition, a considerable quantity of molasses and smaller quantities of rum, vanilla and coco-nut oil are exported. The imports are mainly rice, wheat, cotton goods, wine, coal, hardware and haber- dashery, and guano. The rice comes principally from India and. Madagascar; cattle are imported from Madagascar, sheep from South Africa and Australia, and frozen meat from Australia. The average annual value of the exports for the ten years 1896-1905 was £ 2 . I 53. I 59; the average annual value of the imports for the same period £1,453,089. These figures when compared with those in years before the beet and bounty-fed sugar had entered into severe competition with cane sugar, show how greatly the island had thereby suffered. In 1864 the exports were valued at £2,249,000; in 1868 at £2,339,000; in 1877 at £4,201,000 and in 1880 at £3,634,000. And in each of the years named the imports exceeded £2,000,000 in value. Nearly all the aloe-fibre exported is taken by Great Britain and France, while the molasses goes to India. Among the minor exports is that of bambara or sea-slugs, which are sent to Hong-Kong and Singapore. This industry is chiefly in Chinese hands. The great majority of the imports are from Great Britain or British possessions.

The currency of Mauritius is rupees and cents of a rupee, the Indian rupee (= i6d.) being the standard unit. The metric system of weights and measures has been in force since 1878.

Communications. — There is a regular fortnightly steamship ser- vice between Marseilles and Port Louis by the Messageries Maritimes, a four-weekly service with Southampton via Cape Town by the Union Castle, and

*a four-weekly service with Colombo direct by the British India Co.'s boats. There is also frequent communication with Madagascar, Reunion and Natal. The average annual tonnage of ships entering Port Louis is about 750,000 of which five-sevenths is British. Cable communication with Europe, via the Seychelles, Zanzibar and Aden, was established in 1893, an(ˆ * e Mauritius section of the Cape-Australian cable, via Rodriguez, was completed in 1902.*

Railways connect all the principal places and sugar estates on the island, that known as the Midland line, 36 miles long, beginning at Port Louis crosses the island to Mahebourg, passing through Curepipe, where it is 1822 ft. above the sea. There are in all over 120 miles of railway, all owned and worked by the government. The first railway was opened in 1864. The roads are well kept and there is an extensive system of tramways for bringing produce from the sugar estates to the railway lines. Traction engines are also largely used. There is a complete telegraphic and telephonic service.

Government and Revenue. — Mauritius is a crown colony. The governor is assisted by an executive council of five official and two elected members, and a legislative council of 27 members, 8 sitting ex officio, 9 being nominated by the governor and 10 elected on a moderate franchise. Two of the elected members represent St Louis, the 8 rural districts into which the island is divided electing each one member. At least one-third of the nominated members must be persons not holding any public office. The number of registered electors in 1908 was 6186. The legislative session usually lasts from April to December. Members may speak either in French or English. The average annual revenue of the colony for the ten years 1896-1905, was £608,245, tne average annual expenditure during the same period £663,606. Up to 1854 there was a surplus in hand, but since that time expenditure has on many occasions exceeded income, and the public debt in 1908 was £1,305,000, mainly incurred however on reproductive works.

The island has largely retained the old French laws, the codes civil, de procedure, du commerce, and d' instruction criminelle being still in force, except so far as altered by colonial ordinances. A supreme court of civil and criminal justice was established in 1 83 1 under a chief judge and three puisne judges.

Religion and Education. — The majority of the European inhabi- tants belong to the Roman Catholic faith. They numbered at the 1901 census 117,102, and the Protestants 6644. Anglicans, Roman Catholics and the Church of Scotland are helped by state grants. At the head of the Anglican community is the bishop of Mauritius ; the chief Romanist dignitary is

styled bishop of Port Louis. The Mahommedans number over 30,000, but the majority of the Indian coolies are Hindus.

The educational system, as brought into force in 1900, is under a director of public instruction assisted by an advisory committee, and consists of two branches (1) superior or secondary instruction, (2) primary instruction. For primary instruction there are govern- ment schools and schools maintained by the Roman Catholics, Pro- testants and other faiths, to which the government gives grants in aid. In 1908 there were 67 government schools with 8400 scholars and 90 grant schools with 10,200 scholars, besides Hindu schools receiving no grant. The Roman Catholic scholars number 67-72 ; the Protestants 3-80; Mahommedans 8-37%; and Hindus and others 20- 1 1 %. Secondary and higher education is given in the Royal College and associated schools at Port Louis and Curepipe.

Defence. — Mauritius occupies an important strategic position on the route between South Africa and India and in relation to Madagascar and East Africa, while in Port Louis it possesses one of the finest harbours in the Indian Ocean. A permanent garrison of some 3000 men is maintained in the island at a cost of about £1 80,000 per annum. To the cost of the troops Mauritius contributeˆ 5 1 % of its annual revenue — about £30,000.

History. — Mauritius appears to have been unknown to Euro- pean nations, if not to all other peoples, until the year 1505, when it was discovered by Mascarenhas, a Portuguese navigator. It had then no inhabitants, and there seem to be no traces of a pre- vious occupation by any people. The island was retained for most of the 1 6th century by its discoverers, but they made no settle- ments in it. In 1598 the Dutch took possession, and named the island " Mauritius," in honour of their stadtholder, Count Maurice of Nassau. It had been previously called by the Portu- guese " Ilha do Cerne," from the belief that it was the island so named by Pliny. But though the Dutch built a fort at Grand Port and introduced a number of slaves and convicts, they made no permanent settlement in Mauritius, finally aban- doning the island in 1710. From 1715 to 1767 (when the French government assumed direct control) the island was held by agents of the French East India Company, by whom its name was again changed to " lie de France." The Company was fortunate in having several able men as governors of its colony, especially the celebrated Mahe de Labourdonnais (q.v.), who made sugar

planting the main industry of the inhabitants. 1 Under his direction roads were made, forts built, and considerable portions of the forest were cleared,

and the present capital, Port Louis, was founded. Labourdonnais also promoted the planting of cotton and indigo, and is remembered as the most enlightened and best of all the French governors. He also put down the maroons or runaway slaves who had long been the pest of the island. The colony continued to rise in value during the time it was held by the French crown, and to one of the intendants, 2 Pierre Poivre, was due the introduction of the clove, nutmeg and other spices. Another governor was D'Entrecasteaux, whose name is kept in remembrance by a group of islands east of New Guinea.

During the long war between France and England, at the commencement of the 19th century, Mauritius was a continual source of much mischief to English Indiamen and other merchant vessels; and at length the British government determined upon an expedition for its capture. This was effected in 1810; and upon the restoration of peace in 1814 the possession of the island was confirmed to Britain by the Treaty of Paris. By the eighth article of capitulation it was agreed that the inhabi- tants should retain their own laws, customs, and religion; and thus the island is still largely French in language, habits, and predilections; but its name has again been changed to that given by the Dutch. One of the most distinguished of the British governors was Sir Robert Farquhar (1810-1823), who did much to abolish the Malagasy slave trade and to establish friendly relations with the rising power of the Hova sovereign of Mada- gascar. Later governors of note were Sir Henry Barkly (1863- 187 1), and Sir J. Pope Hennessy (1 883-1 886 and 1888).

The history of the colony since its acquisition by Great Britain has been one of social and political evolution. At first all power was concentrated in the hands of the governor, but in 1832 a legislative council was constituted on which non-official nominated members served. In 1884-1885 this council was transformed into a partly elected body. Of more importance than the constitutional changes were the economic results which followed the freeing of the slaves (1834-1839) — for the loss of whose labour the planters received over £2,000,000 compen- sation. Coolies were introduced to supply the place of the negroes, immigration being definitely sanctioned by the govern- ment of India in 1842. Though under government control the system of coolie labour led to many abuses. A royal commis- sion investigated the matter in 1871 and since that time the evils which were attendant on the system have been gradually remedied. One result of the introduction of free labour has been to reduce the descendants of the slave population to a small and unimportant class — Mauritius in this respect offering a striking contrast to the British colonies in the West Indies. The last half of the 19th century was, however, chiefly notable in Mauritius for the number of calamities which overtook the island. In 1854 cholera caused the death of 17,000 persons; in 1867 over 30,000 people died of

malarial fever; in 1892 a hurricane of terrific violence caused immense destruction of property and serious loss of life; in 1893 great part of Port Louis was destroyed by fire. There were in addition several epidemics of small-pox and plague, and from about 1880 onward the continual decline in the price of sugar seriously affected the islanders, especially the Creole population. During 1902-1905 an outbreak of surra, which caused great mortality among draught animals, further tried the sugar planters and neces- sitated government help. Notwithstanding all these calamities the Mauritians, especially the Indo-Mauritians, have succeeded in maintaining the position of the colony as an important sugar- producing country.

Dependencies.— Dependent upon Mauritius and forming part of the colony are a number of small islands scattered over a large

1 Labourdonnais is credited by several writers with the introduc- tion of the sugar cane into the island. Leguat, however, mentions it as being cultivated during the Dutch occupation.

'The regime introduced in 1767 divided the administration between a governor, primarily charged with military matters, and an intendant.

extent of the Indian Ocean. Of these the chief is Rodriguez (q.v.), 375 m. east of Mauritius. Considerably north-east of Rodriguez Re the Oil Islands or Chagos archipelago, of which the chief is Diego Garcia (see Chagos). The Cargados, Carayos or St Brandon islets, deeps and shoals, lie at the south end of the Nazareth Bank about 250 m. N.N.E. of Mauritius. Until 1903 the Seychelles, Amirantes, Aldabra and other islands lying north of Madagascar were also part of the colony of Mauritius. In the year named they were formed into a separate colony (see Seychelles). _ Two islands, Farquhar and Coetivy, though geographically within the Seychelles area, remained dependent on Mauritius, being owned by residents in that island. In 1908, however, Coetivy was transferred to the Seychelles administration. Amsterdam and St Paul, un- inhabited islands in the South Indian Ocean, included in an official list of the dependencies of Mauritius drawn up in 1880, were in 1893 annexed by France. The total population of the dependencies of Mauritius was estimated in 1905 at 5400.

Authorities. — F. Leguat, Voyages et aventures en deux isles desertes des Indes orientales (Eng. trans., A New Voyage to the East Indies; London, 1708) ; Prudham, " England's Colonial Empire," vol. i., The Mauritius and its Dependencies (1846) ; C. P. Lucas, A Historical Geography of the British Colonies, vol. i. (Oxford, 1888); Ch. Grant,

History of Mauritius, or the Isle of France and Neighbouring Islands (t8oi); J. Milbert, Voyage pittoresque & l'lle-de- France, &c, 4 vols. (1812); Aug. Billiard, Voyage aux colonies orientales (1822); P. Beaton, Creoles and Coolies, or Five Years in Mauritius (1859); Paul Chasteau, Histoire et description de Vile Maurice (i860) ; F. P. Flemyng, Mauritius, or the Isle of France (1862); Ch. J. Boyle, Far Away, or Sketches of Scenery and Society in Mauritius (1867) ; L. Simonin, Les Pays lointains, notes de voyage {Maurice, &c.) (1867); N. Pike, Sub-Tropical Rambles in the Land of the Aphan- apteryx (1873) ; A. R. Wallace. " The Mascarene Islands," in ch. xi. vol. i. of The Geographical Distribution of Animals (1876) ; K. Mobius, F. Richter and E. von Martens, Beitrage zur Meeresfauna der Insel Mauritius und der Seychellen (Berlin, 1880) ; G. Clark, A Brief Notice of the Fauna of Mauritius (1881) ; A. d'Epinay, Renseignements pour servir A I' histoire de Vile de France jusqu'd, 1810 (Mauritius, 1890); N. Decotter, Geography of Mauritius and its Dependencies (Mauritius, 1892); H. de Haga Haig, " The Physical Features and Geology of Mauritius " in vol. li., Q. J. Geol. Soc. (1895) ; the Annual Reports on Mauritius issued by the Colonial Office, London; The Mauritius Almanack published yearly at Port Louis. A map of the island in six sheets on the scale of one inch to a mile was issued by the War Office in 1905. (J. Si.)*

MAURY, JEAN SIFFREIN (1746-1817), French cardinal and archbishop of Paris, the son of a poor cobbler, was born on the 26th of June 1746 at Valreas in the Comtat-Venaissin, the dis- trict in France which belonged to the pope. His acuteness was observed by the priests of the seminary at Avignon, where he was educated and took orders. He tried his fortune by writing eloges of famous persons, then a favourite practice; and in 1771 his iloge on F6nelon was pronounced next best to Laharpe's by the Academy. The real foundation of his fortunes was the success of a panegyric on St Louis delivered before the Academy in 1772, which caused him to be recommended for an abbacy. In 1777 he published under the title of Discours choisis his panegyrics on Saint Louis, Saint Augustine and Fenelon, his remarks on Bossuet and his Essai sur I'Sloquence de la chaire, a volume which contains much good criticism, and remains a French classic. The book was often reprinted as Principes de V eloquence.' He became a favourite preacher in Paris, and was Lent preacher at court in 1781, when King Louis XVI. said of his sermon: " If the abbe had only said a few words on religion he would have dis- cussed every possible subject." In 1781 he obtained the rich priory of Lyons, near Peronne, and in 1785 he was elected to the Academy, as successor of Lefranc de Pompignan. His morals were as loose as those of his great rival Mirabeau, but he was famed in Paris for his wit and gaiety. In 1789 he was elected a member of the states-general by the clergy of the bailliage of Peronne, and from the first proved to be the most able and persevering defender of the ancien

regime, although he had drawn up the greater part of the cahier of the clergy of Peronne, which contained a considerable programme of reform. It is said that he attempted to emigrate both in July and in October 1789; but after that time he held firmly to his place, when almost universally deserted by his friends. In the Constituent Assembly he took an active part in every important debate, combating with especial vigour the alienation of the property of the clergy. His life was often in danger, but his ready wit always saved it, and it was said that one ion mot would preserve him for a month.

When he did emigrate in 1792 he found himself regarded as a martyr to the church and the king, and was at once named archbishop in parlibus, and extra nuncio to the diet at Frankfort, and in 1794 cardinal. He was finally made bishop of Monte- fiascone, and settled down in that little Italian town — but not for long, for in 1798 the French drove him from his retreat, and he sought refuge in Venice and St Petersburg. Next year he returned to Rome as ambassador of the exiled Louis XVIII. at the papal court. In 1804 he began to prepare his return to France by a well-turned letter to Napoleon, congratulating him on restoring religion to France once more. In 1806 he did return; in 1807 he was again received into the Academy; and in 1810, on the refusal of Cardinal Fesch, was made archbishop of Paris. He was presently ordered by the pope to surrender his functions as archbishop of Paris. This he refused to do. On the restora- tion of the Bourbons he was summarily expelled from the Aca- demy and from the archiepiscopal palace. He retired to Rome, where he was imprisoned in the castle of St Angelo for six months for his disobedience to the papal orders, and died in 181 7, a year or two after his release, of disease contracted in prison and of chagrin. As a critic he was a very able writer, and Sainte-Beuve gives him the credit of discovering Father Jacques Bridayne, and of giving Bossuet his rightful place as a preacher above Massillon; as a politician, his wit and eloquence make him a worthy rival of Mirabeau. He sacrificed too much to personal ambition, yet it would have been a graceful act if Louis XVIII. had remembered the courageous supporter of Louis XVI., and the pope the one intrepid defender of the Church in the states- general.

The CEuvres choisies du Cardinal Maury (5 vols., 1827) contain what is worth preserving. Mgr Ricard has published Maury's Correspondance diplomatique (2 vols., Lille, 1891). For his life and character see Vie du Cardinal Maury, by Louis Siffrcin Maury, his nephew (1828); J. J. F. Poujoulat, Cardinal Maury, sa vie et ses ceuvres (1855); Sainte-Beuve,

Causeries du lundi (vol. iv.); Mgr Ricard, L 'Abbe Maury (1746-1791), V Abbe Maury avant 1789, L'Abbe Maury et Mirabeau (1887); G. Bonet-Maury, Le Cardinal Maury d'apr'es ses memoires et sa correspondance inedits (Paris, 1892); A. Aulard, Les Oraleurs de la constituanle (Paris, 1882). Of the many libels written against him during the Revolution the most noteworthy are the Petit careme de I'abbi Maury, with a supple- ment called the Seconde annee (1790), and the Vie privte de I'abbe Maury (1790), claimed by J. R. Hubert, but attributed by some writers to Restif de la Bretonne. For further bibliographical details see J. M. Querard, La France litteraire, vol. v. (1833).

MAURY, LOUIS FERDINAND ALFRED (1817-1892), French scholar, was born at Meaux on the 23rd of March 1817. In 1836, having completed his education, he entered the Biblio- theque Nationale, and afterwards the Bibliotheque de 1'Institut (1844), where he devoted himself to the study of archaeology, ancient and modern languages, medicine and law. Gifted with a great capacity for work, a remarkable memory and an unbiassed and critical mind, he produced without great effort a number of learned pamphlets and books on the most varied subjects. He rendered great service to the Academie des Inscriptions et Belles Lettres, of which he had been elected a member in 1857. Napo- leon III. employed him in research work connected with the Histoire de CUsar, and he was rewarded, proportionately to his active, if modest, part in this work, with the positions of librarian of the Tuileries (i860), professor at the College of France (1862) and director-general of the Archives (1868). It was not, however, to the imperial favour that he owed these high positions. He used his influence for the advancement of science and higher education, and with Victor Duruy was one of the founders of the Ecole des Hautes Etudes. He died at Paris four years after his retirement from the last post, on the nth of February 1892.

Bibliography. — His works are numerous: Les Fees au moyen dge and Histoire des legendes pieuses au moyen age; two books filled with ingenious ideas, which were published in 1843, and reprinted after the death of the author, with numerous additions under the title Croyances et legendes du moyen Age (1 896) ; Histoire des grandes for Us de la Gaule et de Vancienne France (1850, a 3rd ed. revised appeared in 1867 under the title Les Forits de la Gaule et de Vancienne France) ; La Terre et I'homme, a general historical sketch of geology, geography and ethnology, being the introduction to the Histoire universelH, by Victor Duruy (1854); Histoire des religions de la

Grece antique, (3 vols., 1857-1859); La Magie et Vastrologie dans I'antiquite et dans le moyen dge (1863) ; Histoire de I' ancienne acadSmie des sciences (1864) ; Histoire de VAcademie des Inscriptions et Belles

Lettres (1865) ; a learned paper on the reports of French archaeology, written on the occasion of the universal exhibition (1867) ; a number of articles in the Encyclopedic moderne (1846-1851),ˆ Michaud's Biographie universelle (1858 and seq.), in the Journal des savants in the Revue_ des deux monies (1873, 1877, 1879-1880, &c). A detailed bibliography of his works has been placed by Auguste Longnon at the beginning of the volume Les Croyances et legendes du moyen Age.

MAURY, MATTHEW FONTAINE (1806-1873), American naval officer and hydrographer, was born near Fredericksburg in Spottsylvania county, Virginia, on the 24th of January 1806. He was educated at Harpeth academy, and in 1825 entered the navy as midshipman, circumnavigating the globe in the " Vincennes," during a cruise of four years (1826-1830). In 1831 he was appointed master of the sloop " P'almouth " on the Pacific station, and subsequently served in other vessels before returning home in 1834, when he married his cousin, Ann Herndon. In 1835-1836 he was actively engaged in producing for publication a treatise on navigation, a remarkable achievement at so early a stage in his career; he was at this time made lieutenant, and gazetted astronomer to a South Sea exploring expedition, but resigned this position and was appointed to the survey of south- ern harbours. In 1839 he met with an accident which resulted in permanent lameness, and unfitted him for active service. In the same year, however, he began to write a series of articles on naval reform and other subjects, under the title of Scraps from the Lucky-Bag, which attracted much attention; and in 1841 he was placed in charge of the Depot of Charts and Instruments, out of which grew the United States Naval Observatory and the Hydrographic Office. He laboured assiduously to obtain obser- vations as to the winds and currents by distributing to captains of vessels specially prepared log-books; and in the course of nine years he had collected a sufficient number of logs to make two hundred manuscript volumes, each with about two thousand five hundred days' observations. One result was to show the necessity for combined action on the part of maritime nations in regard to ocean meteorology. This led to an international conference at Brussels in 1853, which produced the greatest benefit to navigation as well as indirectly to meteorology. Maury attempted to organize co-operative meteorological work on land, but the government did not at this time take any steps in this direction. His oceanographical work, however, received recognition in all parts of the civilized world, and in 1855 if was proposed in the senate to remunerate him, but in the same year the Naval Retiring Board, erected under an act to promote the efficiency of the navy, placed him on the retired list. This action aroused wide opposition, and in 1858 he was reinstated with the rank of commander as from 1855. In 1853 Maury had published his Letters on the Amazon and Atlantic Slopes of South America, and the most widely

popular of his works, the Physical Geography of the Sea, was published in London in 1855, and in New York in 1856; it was translated into several European languages. On the outbreak of the American Civil War in 1861, Maury threw in his lot with the South, and became head of coast, harbour and river defences. He invented an electric torpedo for harbour defence, and in 1862 was ordered to England to purchase torpedo material, &c. Here he took active part in organizing a petition for peace to the American people, which was unsuc- cessful. Afterwards he became imperial commissioner of emi- gration to the emperor Maximilian of Mexico, and attempted to form a Virginian colony in that country. Incidentally he introduced there the cultivation of cinchona. The scheme of colonization was abandoned by the emperor (1866), and Maury, who had lost nearly his all during the war, settled for a while in England, where he was presented with a testimonial raised by public subscription, and among other honours received the degree of LL.D. of Cambridge University (1868). In the same year, a general amnesty admitting of his return to America, he accepted the professorship of meteorology in the Virginia Military Insti- tute, and settled at Lexington, Virginia, where he died on the 1st of February 1873.

Among works published by Maury, in addition to those mentioned, are the papers contributed by him to the Astronomical Observations of the United States Observatory, Letter concerning Lanes for Steamers crossing the Atlantic (1855); Physical Geography (1864) and Manual of Geography (1871). In 1859 he began the publication of a series of Nautical Monographs.

See Diana Fontaine Maury Corbin (his daughter), Life of Matthew Fontaine Maury (London, 1888).

MAUSOLEUM, the term given to a monument erected to receive the remains of a deceased person, which may sometimes take the form of a sepulchral chapel. The term cenotaph (Gr. Ktvbs, empty, tol4>os, tomb) is employed for a similar monu- ment where the body is not buried in the structure. The term ” mausoleum ” originated with the magnificent monument erected by Queen Artemisia in 353 B.C. in memory of her husband King Mausolus, of which the remains were brought to England in 1859 by Sir Charles Newton and placed in the British Museum. The tombs of Augustus and of Hadrian in Rome are perhaps the largest monuments of the kind ever erected.

MAUSOLUS (more correctly Maussolltjs) , satrap and practi- cally ruler of Caria (377-353 B.C.). The part he took in the revolt against Artaxerxes Mnemon, his conquest of a great part of Lycia, Ionia and of several of the Greek islands, his co-opera- tion with the Rhodians and their allies in the war against Athens, and the removal of his capital from Mylasa, the ancient seat of the Carian kings, to Halicarnassus are the leading facts of his history. He is best known from the tomb erected for him by his widow Artemisia. The architects Satyrus and Pythis, and the sculptors Scopas, Leochares, Bryaxis and Timotheus, finished the work after her death. (See Halicarnassus.) An inscription discovered at Mylasa (Bockh, Inscr. gr. ii. 2691 c.) details the punishment of certain conspirators who had made an attempt upon his life at a festival in a temple at Labranda in 353.

See Diod. Sic. xv. 90, 3, xvi. 7, 4, 36, 2; Demosthenes, De Rhodi- orum libertate; J. B. Bury, Hist, of Greece (1902), ii. 271 ; W. Judeich, Kleinasiatische Studien (Marburg, 1892), pp. 226-256, and authorities under Halicarnassus.

MAUVE, ANTON (1838-1888), Dutch landscape painter, was born at Zaandam, the son of a Baptist minister. Much against the wish of his parents he took up the study of art and entered the studio of Van Os, whose dry academic manner had, however, but little attraction for him. He benefited far more by his intimacy with his friends Jozef Israels and W. Maris. Encour- aged by their example he abandoned his early tight and highly finished manner for a freer, looser method of painting, and the brilliant palette of his youthful work for a tender lyric harmony which is generally restricted to delicate greys, greens, and light blue. He excelled in rendering the soft hazy atmosphere that lingers over the green meadows of Holland, and devoted himself almost exclusively to depicting the peaceful rural life of the fields and country lanes of Holland — especially of the districts near Oosterbeek and Wolfhezen, the sand dunes of the coast at Scheveningen, and the country near Laren, where he spent the last years of his life. A little sad and melancholy, his pas- toral scenes are nevertheless conceived in a peaceful soothing lyrical mood, which is in marked contrast to the epic power and almost tragic intensity of J. F. Millet. There are fourteen of Mauve's pictures at the Mesdag Museum at the Hague, and two ('• Milking Time " and " A Fishing Boat putting to Sea ") at the Ryks Museum in Amsterdam. The Glasgow Corporation Gallery owns his painting of " A Flock of Sheep." The finest and most representative private collection of pictures by Mauve was made by Mr J. C. J. Drucker, London.

MAVROCORDATO, Mavrocordat or Mavrogordato, the name of a family of Phanariot Greeks, distinguished in the history of Turkey, Rumania and modern Greece. The family was founded by a merchant of Chios, whose son Alexander Mavrocordato (c. 1636-1709), a doctor of philosophy and

medi- cine of Bologna, became dragoman to the sultan in 1673, and was much employed in negotiations with Austria. It was he who drew up the treaty of Karlowitz (1699). He became a secretary of state, and was created a count of the Holy Roman Empire. His authority, with that of Hussein Kupruli and Rami Pasha, was supreme at the court of Mustapha II., and he did

much to ameliorate the condition of the Christians in Turkey. He was disgraced in 1703, but was recalled to court by Sultan Ahmed III. He left some historical, grammatical, &c. treatises of little value.

His son Nicholas Mavrocordato (1670-1730) was grand dragoman to the Divan (1697), and in 1708 was appointed hospodar (prince) of Moldavia. Deposed, owing to the sultan's suspicions, in favour of Demetrius Cantacuzene, he was restored in 171 1, and soon afterwards became hospodar of Walachia. In 1 7 16 he was deposed by the Austrians, but was restored after the peace of Passarowitz. He was the first Greek set to rule the Danubian principalities, and was responsible for establishing the system which for a hundred years was to make the name of Greek hateful to the Rumanians. He introduced Greek manners, the Greek language and Greek costume, and set up a splendid court on the Byzantine model. For the rest he was a man of enlightenment, founded libraries and was himself the author of a curious work entitled LTepi KadriKovroov (Bucharest, 17 19). He was succeeded as grand dragoman (1709) by his son John (Ioannes), who was for a short while hospodar of Moldavia, and died in 1720. Nicholas Mavrocordato was succeeded as prince of Walachia in 1730 by his son Constantine. He was deprived in the same year, but again ruled the principality from 1735 to 1741 and from 1744 to 1748; he was prince of Moldavia from 1741 to 1744 and from 1748 to 1749. His rule was distinguished by numerous tentative reforms in the fiscal and administrative systems. He was wounded and taken prisoner in the affair of Galati during the Russo-Turkish War, on the 5th of November 1769, and died in captivity.

Prince Alexander Mavrocordato (1791-1865), Greek statesman, a descendant of the hospodars, was born at Constan- tinople on the nth of February 1791. In 1812 he went to the court of his uncle Ioannes Caradja, hospodar of Walachia, with whom he passed into exile in Russia and Italy (181 7). He was a member of the Hetairia Philike and was among the Phanariot Greeks who hastened to the Morea on the outbreak of the War of Independence in 182 1. He was active in endeavouring to establish a regular government, and in January 1822 presided over the first Greek national assembly at Epidaurus. He com- manded the advance of the Greeks into western Hellas the same year, and suffered a defeat at Peta on the 16th of July, but retrieved this disaster somewhat by his successful

resistance to the first siege of Missolonghi (Nov. 1822 to Jan. 1823). His English sympathies brought him, in the subsequent strife of factions, into opposition to the " Russian " party headed by Demetrius Ypsilanti and Kolokotrones ; and though he held the portfolio of foreign affairs for a short while under the presidency of Petrobey (Petros Mavromichales), he was compelled to with- draw from affairs until February 1825, when he again became a secretary of state. The landing of Ibrahim Pasha followed, and Mavrocordato again joined the army, only escaping capture in the disaster at Sphagia (Spakteria), on the 9th of May 1815, by swimming to Navarino. After the fall of Missolonghi (April 22, 1826) he went into retirement, until President Capo d'Istria made him a member of the committee for the administration of war material, a position he resigned in 1828. After Capo d'ls- tria's murder (Oct. 9, 1831) and the resignation of his brother and successor, Agostino Capo d'Istria (April 13, 1832), Mavro-cordato became minister of finance. He was vice-president of the National Assembly at Argos (July, 1832), and was appointed by King Otto minister of finance, and in 1833 premier. From 1834 onwards he was Greek envoy at Munich, Berlin, London and — after a short interlude as premier in Greece in 1841 — Constantinople. In 1843, after the revolution of September, he returned to Athens as minister without portfolio in the Metaxas cabinet, and from April to August 1844 was head of the govern-ment formed after the fall of the " Russian " party. Going into opposition, he distinguished himself by his violent attacks on the Kolettis government. In 1854-1855 he was again head of the government for a few months. He died in Aegina on the 18th of August 1865. .

See E. Legrand, Genealogie des Mavrocordato (Paris, 1886).

gi8

MAWKMAI— MAXIMA AND MINIMA

MAWKMAI (Burmese Maukme), one of the largest states in the eastern division of the southern Shan States of Burma. It lies approximately between 19 30′ and 20 30′ N. and 97° 30′ and 98 15′ E., and has an area of 2,787 sq. m. The central portion of the state consists of a wide plain well watered and under rice cultivation. The rest is chiefly hills in ranges running north and south. There is a good deal of teak in the state, but it has been ruinously worked. The sawbwa now works as con- tractor for government, which takes one-third of the net profits. Rice is the chief crop, but much tobacco of good quality is grown in the Langko district on the Teng river. There is also a great deal of cattle-breeding. The population in 1901 was 29,454, over two-thirds of whom were Shans and the remainder Taungthu, Burmese, Yangsek and Red Karens. The capital, Mawkmai, stands in a fine rice plain in 20 9′ N. and 97 25′ E. It had

about 150 houses when it first submitted in 1887, but was burnt out by the Red Karens in the following year. It has since recovered. There are very fine orange groves a few miles south of the town at Kantu-awn, called Kadugate by the Burmese.

MAXENTIUS, MARCUS AURELIUS VALERIUS, Roman emperor from a.d. 306 to 312, was the son of Maximianus Herculius, and the son-in-law of Galerius. Owing to his vices and incapacity he was left out of account in the division of the empire which took place in 305. A variety of causes, however, had produced strong dissatisfaction at Rome with many of the arrangements established by Diocletian, and on the 28th of October 306, the public discontent found expression- in the massacre of those magistrates who remained loyal to Flavius Valerius Severus and in the election of Maxentius to the imperial dignity. With the help of his father, Maxentius was enabled to put Severus to death and to repel the invasion of Galerius; his next steps were first to banish Maximianus, and then, after achieving a military success in Africa against the rebellious governor, L. Domitius Alexander, to declare war against Constantine as having brought about the death of his father Maximianus. His intention of carrying the war into Gaul was anticipated by Constantine, who marched into Italy. Maxentius was defeated at Saxa Rubra near Rome and drowned in the Tiber while attempting to make his way across the Milvian bridge into Rome. He was a man of brutal and worthless character; but although Gibbon's statement that he was " just, humane and even partial towards the afflicted Christians " may be exaggerated, it is probable that he never exhibited any special hostility towards them.

See De Broglie, L'lZglise el Vempire Romain au quatrieme Hide (1856-1866), and on the attitude of the Romans towards Christian- ity generally, app. 8 in vol. ii. of J. B. Bury's edition of Gibbon (Zosimus ii. 9-18; Zonaras xii. 33, xiii. 1; Aurelius Victor, Epit. 40; Eutropius, x. 2).

MAXIM, SIR HIRAM STEVENS (1840-), Anglo-American engineer and inventor, was born at Sangerville, Maine, U.S.A., on the 5th of February 1840. After serving an apprenticeship with a coachbuilder, he entered the machine works of his uncle, Levi Stevens, at Fitchburg, Massachusetts, in 1864, and four years later he became a draughtsman in the Novelty Iron Works and Shipbuilding Company in New York City. About this period he produced several inventions connected with illumination by gas; and from 1877 he was one of the numerous inventors who were trying to solve the problem of making an efficient and durable incandescent electric lamp, in this connexion introducing the widely-used process of treating the carbon filaments by heat- ing them in an atmosphere of hydrocarbon vapour. In 1880 he came to Europe, and soon began to devote himself to the con- struction of a machine-gun which should be automatically loaded and fired

by the energy of the recoil (see Machine-Gun)'. In order to realize the full usefulness of the weapon, which was first exhibited in an underground range at Hatton Garden, London, in 1884, he felt the necessity of employing a smokeless powder, and accordingly he devised maximite, a mixture of trinitro- cellulose, nitroglycerine and castor oil, which was patented in 1889. He also undertook to make a flying machine, and after

numerous preliminary experiments constructed an apparatus which was tried at Bexley Heath, Kent, in 1894. (See Flight.) Having been naturalized as a British subject, he was knighted in 1901. His younger brother, Hudson Maxim (b. 1853), took out numerous patents in connexion with explosives.

MAXIMA AND MINIMA, in mathematics. By the maximum or minimum value of an expression or quantity is meant primarily the " greatest " or " least " value that it can receive. In general, however, there are points at which its value ceases to increase and begins to decrease; its value at such a point is called a maximum. So there are points at which its value ceases to decrease and begins to increase; such a value is called a minimum. There may be several maxima or minima, and a minimum is not necessarily less than a maximum. For instance, the expression (x 2 + x + i)l{x— 1) can take all values from — 00 to — 1 and from + 7 to + 00 , but has, so long as x is real, no value between — 1 and + 7. Here — 1 is a maximum value, and + 7 is a minimum value of the expression, though it can be made greater or less than any assignable quantity.

The first general method of investigating maxima and minima seems to have been published in a.d. 1629 by Pierre Fermat. Particular cases had been discussed. Thus Euclid in book III. of the Elements finds the greatest and least straight lines that can be drawn from a point to the circumference of a circle, and in book VI. (in a proposition generally omitted from editions of his works) finds the parallelogram of greatest area with a given perimeter. Apollonius investigated the greatest and least distances of a point from the perimeter of a conic section, and discovered them to be the normals, and that their feet were the intersections of the conic with a rectangular hyperbola. Some remarkable theorems on maximum areas are attributed to Zenodorus, and preserved by Pappus and Theon of Alexandria. The most noteworthy of them are the following: —

1. Of polygons of n sides with a given perimeter the regular polygon encloses the greatest area.

2. Of two regular polygons of the same perimeter, that with the greater number of sides encloses the greater area.

3. The circle encloses a greater area than any polygon of the same

perimeter.

4. The sum of the areas of two isosceles triangles on given bases, the sum of whose perimeters is given, is greatest when the triangles are similar.

5. Of segments of a circle of given perimeter, the semicircle encloses the greatest area.

6 The sphere is the surface of given area which encloses the greatest volume.

Serenus of Antissa investigated the somewhat trifling problem of finding the triangle of greatest area whose sides are formed by the intersections with the base and curved surface of a right circular cone of a plane drawn through its vertex.

The next problem on maxima and minima of which there appears to be any record occurs in a letter from Regiomontanus to Roder (July 4, 1471), and is a particular numerical example of the problem of finding the point on a given straight line at which two given points subtend a maximum angle. N. Tartaglia in his General trattaio de numeri et mesuri (c. 1556) gives, without proof, a rule for dividing a number into two parts such that the continued product of the numbers and their difference is a maximum.

Fermat investigated maxima and minima by means of the principle that in the neighbourhood of a maximum or minimum the differences of the values of a function are insensible, a method virtually the same as that of the differential calculus, and of great use in dealing with geometrical maxima and minima. His method was developed by Huygens, Leibnitz, Newton and others, and in particular by John Hudde, who investigated maxima and minima of functions of more than one independent variable, and made some attempt to discriminate between maxima and minima, a question first definitely settled, so far as one variable is con- cerned, by Colin Maclaurin in his Treatise on Fluxions (1742). The method of the differential calculus was perfected by Euler and Lagrange.

John Bernoulli's famous problem of the " brachistochrone," or curve of quickest descent from one point to another under

the action of gravity, proposed in 1696, gave rise to a new kind of maximum and minimum problem in which we have to find a curve and not points on a given curve. From these problems arose the " Calculus of

Variations." (See Variations, Calculus or.)

The only general methods of attacking problems on maxima and minima are those of the differential calculus or, in geo- metrical problems, what is practically Fermat's method. Some problems may be solved by algebra; thus if y=f (x) f ***(x)—f (x)=o must have real roots. This is a useful method in the case in which (x) and / (x) are quad- ratics, but scarcely ever in any other case. The problem of finding the maximum product of n positive quantities whose sum is given may also be found, algebraically, thus. If a and b are any two real unequal quantities whatever \%(a+b)} 2 >ab, so that we can increase the product leaving the sum un- altered by replacing any two terms by half their sum, and so long as any two of the quantities are unequal we can increase the product. Now, the quantities being all positive, the product cannot be increased without limit and must somewhere attain a maximum, and no other form of the product than that in which they are all equal can be the maximum, so that the product is a maximum when they are all equal. Its minimum value is obviously zero. If the restriction that all the quantities shall be positive is removed, the product can be made equal to any quantity, positive or negative. So other theorems of algebra, which are stated as theorems on inequalities, may be regarded as algebraic solutions of problems on maxima and minima.***

For purely geometrical questions the only general method available is practically that employed by Fermat. If a quantity depends on the position of some point P on a curve, and if its value is equal at two neighbouring points P and P', then at some position between P and P' it attains a maximum or minimum, and this position may be found by making P and P' approach each other indefinitely. Take for instance the problem of Regio- montanus " to find a point on a given straight line which subtends a maximum angle at two given points A and B." Let P and P' be two near points on the given straight line such that the angles APB and AP'B are equal. Then ABPP' lie on a circle. By making P and P' approach each other we see that for a maximum or minimum value of the angle APB, P is a point in which a circle drawn through AB touches the given straight line. There*are two such points, and unless the given straight line is at right angles to AB the two angles obtained are not the same. It is easily seen that both angles are maxima, one for points on the given straight line on one side of its intersection with AB, the other for points on the other side. For further examples of this method together with most other geometrical problems on maxima and minima of any interest or importance the reader may consult such a book as J. W. Russell's A Sequel to Elementary Geometry (Oxford, 1907).

The method of the differential calculus is theoretically very simple. Let u be a function of several variables Xu xt, xa, . . .x,,, supposed for the present independent; if u is a maximum or minimum for the set of values Xi, Xi, Xz, . . . x n , and » becomes u+Su, when x s , X2, X3, . . . x n receive 'small increments Sx t , Sxi, . . . 5x,,; then 5k must have the same sign for all possible values of Sxi, bxi, . . . Sx n .

Now , Su . , A „$>u , , , „ 5% , , I .

*The sign of this expression in general is that of Z(8«/8'xi)Ixi, which cannot be one-signed when Xi, Xi, . . . x n can take all possible values, for a set of increments 8*1, 8×2, . . • Sx n will give an opposite sign to the set — 5xi,— 5× 2 , . . . — Sx n . Hence 2(5w/5xi)8xi must vanish for all sets of increments ix u . . . 5x,,, and since these are independent, we must have 5m/5xi=o, iu/Sx2 = o, ... 5u/$#n = o. A value of u given by a set of solutions of these equa- tions is called a " critical value " of u. The value of 5k now becomes*

i \^^+ 2 ^Jx i Sx i +...\;

for u to be a maximum or minimum this must have always the same

sign. For the case of a single variable x, corresponding to a value of x given by the equation du/dx = o, u is a maximum or minimum as d?u/dx 2 is negative or positive. If d i ujdx i vanishes, then there is no maximum or minimun unless d 3 uldx 3 vanishes, and there is a maximum or minimum according as d i u\dx i is negative or positive. Generally, if the first differential coefficient which does not vanish is even, there is a maximum or minimum according as this is negative or positive. If it is odd, there is no maximum or minimum. In the case of several variables, the quadratic

must be one-signed. The condition for this is that the series of discriminants

On

Oil

012 ,

On

021

022 1

021

Osi

Ol2 O13

O32 O33

where o,,, denotes S 2 m/8o p 5o, should be all positive, if the quadratic is always positive, and alternately negative and positive, if the quadratic is always negative. If the first condition is satisfied the critical value is a minimum, if the second it is a maximum. For the case of two variables the conditions are

8 2 k &u I Fu y Sxf 8× 2 2> WiSxJ

for a maximum or minimum at all and 8 2 k/8xi 2 and 8 2 k/Sx2 2 both negative for a maximum, and both positive for a minimum. It is important to notice that by the quadratic being one-signed is meant that it cannot be made to vanish except when 5xi, 6×2, . . , 8x,, all vanish. If , in the case of two variables,

8 2 K «%. = I 8 2 k V 5xi 2 &t2 2 \5xi8xv

then the quadratic is one-signed unless it vanishes, but the value of u is not necessarily a maximum or minimum, and the terms of the third and possibly fourth order must be taken account of.

Take for instance the function u x 3 — xy 2 +y 3 . Here the values x = o, y = o satisfy the equations du/6x = o, Su/Sy = o, so that zero is a critical value of «, but it is neither a maximum nor a minimum although the terms of the second order are (8x) 2 , and are never negative. Here &u = Sx 2 — SxSy 2 +Sy 3 , and by putting 5a; = or an infinitesimal of the same order as 5y 2 , we can make the sign of 5k depend on that of by 3 , and so be positive or negative as we please. On the other hand, if we take the function w=ac 2 — xy 2 -- y l , x=o, y = o make zero a critical value of u, arid here 5k = 8× 2 — 5×5y 2 +5;y', which is always positive, because we can write it as the sum of two squares, viz. (8x — |5>' 2) 2 -r-f8y 4 ; so that in this case zero is a minimum value of u.

A critical value usually gives a maximum or minimum in the case of a function of one variable, and often in the case of several independent variables, but. all maxima and minima, particularly absolutely greatest and least values, are not necessarily critical values. If, for example, x is restricted to lie between the values a and b and '(x)=o has no roots in this interval, it follows that '(x) is one-signed as x increases from a to b, so that {x) is increas- ing or diminishing all the time, and the greatest and least values of (x) are {a) and (b), though neither of them is a critical value. Consider the following example: A person in a boat a miles from the nearest point of the beach wishes to reach as quickly as possible a point b miles from that point along the shore. The ratio of his rate of walking to his rate of rowing is cosec a. Where should he land?

Here let AB be the direction of the beach, A the nearest point to the boat O, and B the point he wishes to reach. Clearly he must land, if at all, between A and B. Suppose he lands at P. Let the angle AOP be 9, so that OP =0 sec 9, and PB =b-a tan 9. If his rate of rowing is V miles an hour his time will be a sec 0/V-f (b — a tan 9) sin a/V hours. Call this T. Then to the first power of 59, 5T = (a/V) sec 2 9 (sin 9- sin a)59, so that if AOB>a, 6T and 56 have opposite signs from 9=0 to 9 = a, and the same signs from 9 = a to 9 = A0B. So that when AOB is > a, T decreases from 9 = to 9 — a, and then increases, so that he should land at a point distant a tan a from A, unless a tan a > b. When this is the case, 5T and 59 have opposite signs throughout the whole range of 9, so that T decreases as 9

increases, and he should row direct to B. In the first case the minimum value of T is also a critical value ; in the second case it is not.

The greatest and least values of the bending moments of loaded rods are often at the extremities of the divisions of the rods and not at points given by critical values.

In the case of a function of several variables, Xi, Xi, . . . x n , not independent but connected by m functional relations «i=o, «2 = o, . . . , u m = o, we might proceed to eliminate tn of the variables; but Lagrange's " Method of undetermined Multipliers" is more elegant and generally more useful.

We have 5ki=o, 5m 2 = o, . . . , 5w m =o. Consider instead of Su, what is the same thing, viz., Sw+Mwi+ˆSttj f . . . + X m 8« m , where Xi, X2, . . . X m , are arbitrary multipliers. The terms of the first order in this expression are

We can choose Xi, . . . X m , to make the coefficients of Sxi, bxi, . . . bx m , vanish, and the remaining bx m+ i to Sx,, may be regarded as independent, so that, when u has a critical value, their co- efficients must also vanish. So that we put

. • + X m ˆr = o

&Xr + Al a; + '*

«,

for all values of r. These equations with the equations «i = o, . . ., u m =o are exactly enough to determine Xi, . . . ,X m , Xi x lt . . ., x n , so that we find critical values of u, and examine the terms of the second order to decide whether we obtain a maximum or minimum. To take a very simple illustration ; consider the problem of deter- mining the maximum and minimum radii vectors of the ellipsoid x 1 l l a"—-y l lb' l +z 1 lc' l = i, where a 2 >fr 2 >c 2 . Here we require the maxi- mum and minimum values of x 2 +y 2 +z 2 where x 2 /a 2 --y 2 /b 2 +z 2 /c 2 = i.

We have bu = 2xSx (i +-) + 2yby (i + ˆ + 2z5z (i + \)

+ S 4+!)+ˆ(1 f) 8z ‘(I + ?) To make the terms of the first order disappear, we have the three equations: —

x(i +X/a 2) =o, y(i+X/6 2) =o, z(i +X/c 2) =o. These have three sets of solutions consistent with the conditions x 2 la?+y*/b t +z i /c 2 =l, a 2 >b 2 >c 2 , viz.:—

(i) y = o, z = o, X= —a 2 ; (2) z = o, x = o, X= — b 2 ; (3) x = o, y = o, X= — c 2 . In the case of (1) bu = dy 2 {i-a 2 jb 2) + Sz 2 (i-a 2 /c 2), which is always negative, so that u=a 2 giyes a maximum.

In the case of (3) bu = bx 2 (1 -c 2 /a 2)+Sy 2 (1 -c 2 [b 2), which is always positive, so that u = c 2 gives a minimum.

In the case of (2) bu = bx 2 (i — 6 2 /a 2)— 5z 2 (6 2 /c 2 — i), which can be made either positive or negative, or even zero if we move in the planes x 2 (i—b 2 /a 2)=z 2 (b 2 /c 2 —i), which are well known to be the central planes of circular section. So that u — b 2 , though a critical value, is neither a maximum nor minimum, and the central planes of circular section divide the ellipsoid into four portions in two of which a 2 > r 2 > b 2 , and in the other two b 2 > r 2 > c 2 .

(A. E. J.)

MAXIMIANUS, a Latin elegiac poet who flourished during the 6th century a.d. He was an Etruscan by birth, and spent his youth at Rome, where he enjoyed a great reputation as an orator. At an advanced age he was sent on an important mission to the East, perhaps by Theodoric, if he is the Maxim- ianus to whom that monarch addressed a letter preserved in Cassiodorus (Variarum, i. 21). The six elegies extant under his name, written in old age, in which he laments the loss of his youth, contain descriptions of various amours. They show the author’s familiarity with the best writers of the Augustan age.

Editions by J. C. Wernsdorf , Poetae latini minores, vi. ; E. Bahrens, Poetae latini minores, v.; M. Petschenig (1890), in C. F. Ascherson’s Berliner Sludien, xi. ; R. Webster (Princeton, 1901 ; see Classical Review, Oct. 1901), with introduction and commentary; see also Robinson Ellis in American Journal of Philology, v. (1884) and Teuffel-Schwabe, Hist, of Roman Literature (Eng. trans.), §490. There is an English version (as from Cornelius Gallus), by Hovenden Walker (1689), under the title of The Impotent Lover.

MAXIMIANUS, MARCUS AURELIUS VALERIUS, surnamed Herculius, Roman emperor from a.d. 286 to 305, was born of humble parents at Sirmium in Pannonia. He achieved distinc- tion during long service in the army, and having been made Caesar by Diocletian in 285, received the title of Augustus in the following year (April 1, 286). In 287 he suppressed the rising of the peasants (Bagaudae) in Gaul, but in 289, after a three years' struggle, his colleague and he were compelled to acquiesce in the assumption by his lieutenant Carausius (who had crossed over to Britain) of the title of Augustus. After 293 Maximianus left the care of the Rhine frontier to Constantius Chlorus, who had been designated Caesar in that year, but in 297 his arms achieved a rapid and decisive victory over the barbarians of Mauretania, and in 302 he shared at Rome the triumph of Diocletian, the last pageant of the kind ever witnessed by that city. On the 1st of May 305, the day of Diocletian's abdication, he also, but without his colleague's sincerity, divested himself of the imperial dignity at Mediolanum (Milan), which had been his capital, and retired to a villa in Lucania; in the following year, however, he was induced by his son Maxentius to reassume the purple. In 307 he brought the emperor Flavius Valerius

Severus a captive to Rome, and also compelled Galerius to retreat, but in 308 he was himself driven by Maxentius from Italy into Illyricum, whence again he was compelled to seek refuge at Arelate (Aries), the court of his son-in-law, Constantine. Here a false report was received, or invented, of the death of Constan- tine, at that time absent on the Rhine. Maximianus at once grasped at the succession, but was soon driven to Massilia (Marseilles), where, having been delivered up to his pursuers, he strangled himself.

See Zosimus ii. 7-1 1 ; Zonaras xii. 31-33; Eutropius ix. 20, x. 2, 3; Aurelius Victor, p. 39. For the emperor Galerius Valerius Maximianus see Galerius.

MAXIMILIAN I. (1573-1651), called "the Great," elector and duke of Bavaria, eldest son of William V. of Bavaria, was born at Munich on the 17th of April 1573. He was educated by the Jesuits at the university of Ingolstadt, and began to take part in the government in 1591. He married in 1595 his cousin, Elizabeth, daughter of Charles II., duke of Lorraine, and became duke of Bavaria upon his father's abdication in 1597. He refrained from any interference in German politics until 1607, when he was entrusted with the duty of executing the imperial ban against the free city of Donauworth, a Protestant stronghold. In December 1607 his troops occupied the city, and vigorous steps were taken to restore the supremacy of the older faith.

Some Protestant princes, alarmed at this action, formed a union to defend their interests, which was answered in 1609 by the establishment of a league, in the formation of which Maximilian took an important part. Under his leadership an army was set on foot, but his policy was strictly defensive and he refused to allow the league to become a tool in the hands of the house of Habsburg. Dissensions among his colleagues led the duke to resign his office in 16 16, but the approach of trouble brought about his return to the league about two years later.

Having refused to become a candidate for the imperial throne in 161 9, Maximilian was faced with the complications arising from the outbreak of war in Bohemia. After some delay he made a treaty with the emperor Ferdinand II. in October 161 9, and in return for large concessions placed the forces of the league at the emperor's service. Anxious to curtail the area of the struggle, he made a treaty of neutrality with the Protestant Union, and occupied Upper Austria as security for the expenses of the campaign. On the 8th of November 1620 his troops under Count Tilly defeated the forces of Frederick, king of Bohemia and count palatine of the Rhine, at the White Hill near Prague. In spite of the arrangement with the union Tilly then devastated the Rhenish Palatinate, and in February 1623 Maximilian was formally invested with the electoral dignity and the attendant office of imperial steward, which had been enjoyed since 1356 by the counts palatine of the Rhine. After receiving the Upper Palatinate and restoring Upper Austria to Ferdinand, Maximilian became leader of the party which sought to bring about Wallenstein's dismissal from the imperial service. At the diet of Regensburg in 1630 Ferdinand was compelled to assent to this demand, but the sequel was disastrous both for Bavaria and its ruler. Early in 1632 the Swedes marched into the duchy and occupied Munich, and Maximilian could only obtain the assistance of the imperialists by placing himself under the orders of Wallenstein, now restored to the command of the emperor's forces. The ravages of the Swedes and their French allies induced the elector to enter into negotiations for peace with Gustavus Adolphus and Cardinal Richelieu. He also proposed to disarm the Protestants by modifying the Restitution edict of 1629; but these efforts were abortive. In March 1647 he concluded an armistice with France and Sweden at Ulm, but the entreaties of the emperor Ferdinand III. led him to disregard his Undertaking. Bavaria was again ravaged, and the elector's forces defeated in May 1648 at Zusmarshausen. But the peace of Westphalia soon put an end to the struggle. By this treaty it was agreed that Maximilian should retain the electoral dignity, which was made hereditary in his

family; and the Upper Palati- nate was incorporated with Bavaria. The elector died at Ingolstadt on the 27th of September 1651. By his second wife,

MAXIMILIAN I., II. OF BAVARIA

921

Maria Anne, daughter of the emperor Ferdinand II., he left two sons, Ferdinand Maria, who succeeded him, and Maximilian Philip. In 1839 a statue was erected to his memory at Munich by Louis I., king of Bavaria. Weak in health and feeble in frame, Maximilian had high ambitions both for himself and his duchy, and was tenacious and resourceful in prosecuting his designs. As the ablest prince of his age he sought to prevent Germany from becoming the battleground of Europe, and although a rigid adherent of the Catholic faith, was not always subservient to the priest.

See P. P. Wolf, Geschichte Kurfiirst Maximilians I. und seiner Zeit (Munich, 1807-1809); C. M. Freiherr von Aretin, Geschichte des bayerschen Herzogs und Kurfursten Maximilian des Ersten (Passau, 1842); M. Lossen, Die Reichstadt Donauworth und Herzog Maximilian (Munich, 1866); F. Stieve, Kurfiirst Maximilian I. von Bayern (Munich, 1882); F. A. W. Schreiber, Maximilian I. der Katholische Kurfiirst von Bayern, und der dreissigjahrige Krieg (Munich, 1868) ; M. Hogl, Die Bekehrung der Oberpfalz durch Kurfiirst Maximilian I. (Regensburg, 1903).

MAXIMILIAN I. (Maximilian Joseph) (1756-1825), king of Bavaria, was the son of the count palatine Frederick of Zwei- brucken-Birkenfeld, and was born on the 27th of May 1756. He was carefully educated under the supervision of his uncle, Duke Christian IV. of Zweibriicken, took service in 1777 as a colonel in the French army, and rose rapidly to the rank of major-general. From 1782 to 1789 he was stationed at Strass- burg, but at the outbreak of the revolution he exchanged the French for the Austrian service, taking part in the opening campaigns of the revolutionary wars. On the 1st of April 1795 he succeeded his brother, Charles II., as duke of Zweibriicken, and on the 16th of February 1799 became elector of Bavaria on the extinction of the Sulzbach line with the death of the elector Charles Theodore.

The sympathy with France and with French ideas of en- lightenment which characterized his reign was at once manifested. In the newly organized ministry Count Max Josef von Montgelas (q.v.), who, after

falling into disfavour with Charles Theodore, had acted for a time as Maximilian Joseph's private secretary, was the most potent influence, an influence wholly " enlightened " and French. Agriculture and commerce were fostered, the laws were ameliorated, a new criminal code drawn up, taxes and imposts equalized without regard to traditional privileges, while a number of religious houses were suppressed and their revenues used for educational and other useful purposes. In foreign politics Maximilian Joseph's attitude was from the German point of view less commendable. With the growing sentiment of German nationality he had from first to last no sympathy, and his attitude throughout was dictated by wholly dynastic, or at least Bavarian, considerations. Until 1813 he was the most faithful of Napoleon's German allies, the relation being cemented by the marriage of his daughter to Eugene Beauharnais. His reward came with the treaty of Pressburg (Dec. 26, 1805), by the terms of which he was to receive the royal title and important territorial acquisitions in Swabia and Franconia to round off his kingdom. The style of king he actually assumed on the 1st of January 1806.

The new king of Bavaria was the most important of the princes belonging to the Confederation of the Rhine, and remained Napoleon's ally until the eve of the battle of Leipzig, when by the convention of Ried (Oct. 8, 1813) he made the guarantee of the integrity of his kingdom the price of his joining the Allies. By the first treaty of Paris (June 3, 1814), however, he ceded Tirol to Austria in exchange for the former duchy of Wiirzburg. At the congress of Vienna, too, which he attended in person, Maximilian had to make further concessions to Austria, ceding the quarters of the Inn and Hausruck in return for a part of the old Palatinate. The king fought hard to maintain the contiguity of the Bavarian territories as guaranteed at Ried; but the most he could obtain was an assurance from Metternich in the matter of the Baden succession, in which he was also doomed to be disappointed (see Baden: History, iii. 506).

At Vienna and afterwards Maximilian sturdily opposed any reconstitution of Germany which should endanger the indepen-

dence of Bavaria, and it was his insistence on the principle of full sovereignty being left to the German reigning princes that largely contributed to the loose and weak organization of the new German Confederation. The Federal Act of the Vienna congress was proclaimed in Bavaria, not as a law but as an international treaty. It was partly to secure popular support in his resistance to any interference of the federal diet in the internal affairs of Bavaria,

partly to give unity to his somewhat heterogeneous territories, that Maximilian on the 26th of May 1818 granted a liberal constitution to his people. Montgelas, who had opposed this concession, had fallen in the previous year, and Maximilian had also reversed his ecclesiastical policy, signing on the 24th of October 181 7 a concordat with Rome by which the powers of the clergy, largely curtailed under Montgelas's administration, were restored. The new parliament proved so intractable that in 1819 Maximilian was driven to appeal to the powers against his own creation; but his Bavarian " particularism " and his genuine popular sympathies prevented him from allowing the Carlsbad decrees to be strictly enforced within his dominions. The suspects arrested by order of the Mainz Commission he was accustomed to examine himself, with the result that in many cases the whole proceedings were quashed, and in not a few the accused dismissed with a present of money. Maximilian died on the 13th of October 1825 and was succeeded by his son Louis I.

In private life Maximilian was kindly and simple. He loved to play the part of Landesvaler, walking about the streets of his capital en bourgeois and entering into conversation with all ranks of his subjects, by whom he was regarded with great affection. He was twice married: (1) in 1785 to Princess Wilhelmine Auguste of Hesse-Darmstadt, (2) in 1 797 to Princess Caroline Friederike of Baden.

See G. Freiherr von Lerchenfeld, Gesch. Bayerns unter Konig Maximilian Joseph I. (Berlin, 1854); J. M. Soltl, Max Joseph, Konig von Bayern (Stuttgart, 1837); L. von Kobell, Unter den vier ersten Konigen Bayerns. Nach Brief en und eigenen Erinnerungen (Munich, 1894).

MAXIMILIAN II. (1811-1864), king of Bavaria, son of king Louis I. and of his consort Theresa of Saxe-Hildburghausen, was born on the 28th of November 181 1. After studying at Gottin- gen and Berlin and travelling in Germany, Italy and Greece, he was introduced by his father into the council of state (1836). From the first he showed a studious disposition,declaring on one occasion that had he not been born in a royal cradle his choice would have been to become a professor. As crown prince, in the chateau of Hohenschwangau near Fiissen, which he had rebuilt with excellent taste, he gathered about him an intimate society of artists and men of learning, and devoted his time to scientific and historical study. When the abdication of Louis I. (March 28, 1848) called him suddenly to the throne, his choice of ministers promised a liberal regime. The progress of the revolution, however, gave him pause. He strenuously opposed the

unionist plans of the Frankfort parliament, refused to recog- nize the imperial constitution devised by it, and assisted Austria in restoring the federal diet and in carrying out the federal exe- cution in Hesse and Holstein. Although, however, from 1850 onwards his government tended in the direction of absolutism, he refused to become the tool of the clerical reaction, and even incurred the bitter criticism of the Ultramontanes by inviting a number of celebrated men of learning and science (e.g. Liebig and Sybel) to Munich, regardless of their religious views. Finally, in 1859, he dismissed the reactionary ministry of von der Pford- ten, and met the wishes of his people for a moderate constitu- tional government. In his German policy he was guided by the desire to maintain the union of the princes, and hoped to attain this as against the perilous rivalry of Austria and Prussia by the creation of a league of the "middle " and small states — the so-called Trias. In 1863, however, seeing what he thought to be a better way, he supported the project of reform proposed by Austria at the Furstentag of Frankfort. The failure of this proposal, and the attitude of Austria towards the Confederation and in the Schleswig-Holstein question, undeceived him; but

befoie he could deal with the new situation created by the outbreak of the war with Denmark he died suddenly at Munich, on the ioth of March 1864.

Maximilian was a man of amiable qualities and of intellectual attainments far above the average, but as a king he was hampered by constant ill-health, which compelled him to be often abroad, and when at home to live much in the country. By his wife, Maria Hedwig, daughter of Prince William of Prussia, whom he married in 1842, he had two sons, Louis II., king of Bavaria, and Otto, king of Bavaria, both of whom lost their reason.

See J. M. Sold, Max der Zweite, Konig von Bayern (Munich, 1865); biography by G. K. Heigel in Allgem. Deutsche Biographic, vol. xxi. (Leipzig, 1885). Maximilian's correspondence with Schlegel was published at Stuttgart in 1890.

MAXIMILIAN I. (1459-1519), Roman emperor, son of the emperor Frederick III. and Leonora, daughter of Edward, king of Portugal, was born at Vienna Neustadt on the 22nd of March 1459. On the 18th of August 1477, by his marriage at Ghent to Mary, who had

just inherited Burgundy and the Netherlands from her father Charles the Bold, duke of Burgundy, he effected a union of great importance in the history of the house of Habs- burg. He at once undertook the defence of his wife's dominions from an attack by Louis XL, king of France, and defeated the French forces at Guinegatte, the modern Enguinegatte, on the 7th of August 1479. But Maximilian was regarded with suspicion by the states of Netherlands, and after suppressing a rising in Gelderland his position was further weakened by the death of his wife on the 27th of March 1482. He claimed to be recognized as guardian of his young son Philip and as regent of the Netherlands, but some of the states refused to agree to his demands and disorder was general. Maximilian was compelled to assent to the treaty of Arras in 1482 between the states of the • Netherlands and Louis XL This treaty provided that Maximilian's daughter Margaret should marry Charles, the dauphin of France, and have for her dowry Artois and Franche- Comte, two of the provinces in dispute, while the claim of Louis on the duchy of Burgundy was tacitly admitted. Maximilian did not, however, abandon the struggle in the Netherlands. Having crushed a rebellion at Utrecht, he compelled the burghers of Ghent to restore Philip to him in 1485, and returning to Germany was chosen king of the Romans, or German king, at Frankfort on the 1 6th of February i486, and crowned at Aix-la-Chapelle on the 9th of the following April. Again in the Netherlands, he made a treaty with Francis II., duke of Brittany, whose independence was threatened by the French regent, Anne of Beaujeu, and the struggle with France was scon renewed. This war was very unpopular with the trading cities of the Netherlands, and early in 1488 Maximilian, having entered Bruges, was detained there as a prisoner for nearly three months, and only set at liberty on the approach of his father with a large force. On his release he had promised he would maintain the treaty of Arras and withdraw from the Netherlands; but he delayed his departure for nearly a year and took part in a punitive campaign against his captors and their allies. On his return to Germany he made peace with France at Frankfort in July 1489, and in October several of the states of the Netherlands recognized him as their ruler and as guardian of his son. In March 1490 the county of Tirol was added to his possessions through the abdication of his kinsman, Count Sigismund, and this district soon became his favourite residence.

Meanwhile the king had formed an alliance with Henry VII. king of England, and Ferdinand II., king of Aragon, to defend the possessions of the duchess Anne, daughter and successor of Francis, duke of Brittany. Early in 1490 he took a further step and was

betrothed to the duchess, and later in the same year the marriage was celebrated by proxy; but Brittany was still occupied by French troops, and Maximilian was unable to go to the assistance of his bride. The sequel was startling. In December 1491 Anne was married to Charles VIII., king of France, and Maximilian's daughter Margaret, who had resided in France since her betrothal, was sent back to her father. The inaction of Maximilian at this time is explained by the

condition of affairs in Hungary, where the death of king Matthias Corvinus had brought about a struggle for this throne. The Roman king, who was an unsuccessful candidate, took up arms, drove the Hungarians from Austria, and regained Vienna, which had been in the possession of Matthias since 1485; but he was compelled by want of money to retreat, and on the 7th of Novem- ber 1 49 1 signed the treaty of Pressburg with Ladislaus, king of Bohemia, who had obtained the Hungarian throne. By this treaty it was agreed that Maximilian should succeed to the crown in case Ladislaus left no legitimate male issue. Having defeated the invading Turks at Villach in 1492, the king was eager to take revenge upon the king of France; but the states of the Nether- lands would afford him no assistance. The German diet was indifferent, and in May 1493 he agreed to the peace of Senlis and regained Artois and Franche-Comte.

In August 1493 the death of the emperor left Maximilian sole ruler of Germany and head of the house of Habsburg; and on the 16th of March 1494 he married at Innsbruck Bianca Maria Sforza, daughter of Galeazzo Sforza, duke of Milan (d. 1476). At this time Bianca's uncle, Ludovico Sforza, was invested with the duchy of Milan in return for the substantial dowry which his niece brought to the king. Maximilian harboured the idea of driving the Turks from Europe; but his appeal to all Christian sovereigns was ineffectual. In 1494 he was again in the Netherlands, where he led an expedition against the rebels of Gelderland, assisted Perkin Warbeck to make a descent upon England, and formally handed over the government of the Low Countries to Philip. His attention was next turned to Italy, and, alarmed at the progress of Charles VIII. in the peninsula, he signed the league of Venice in March 1495, an d about the same time arranged a marriage between his son Philip and Joanna, daughter of Ferdinand and Isabella, king and queen of Castile and Aragon. The need for help to prosecute the war in Italy caused the king to call the diet to Worms in March 1495, when he urged the necessity of checking the progress of Charles. As during his father's lifetime Maximilian had favoured the reforming party among the princes, proposals for the better government of the empire were brought

forward at Worms as a necessary preliminary to financial and military support. Some reforms were adopted, the public peace was proclaimed without any limitation of time and a general tax was levied. The three succeeding years were mainly occupied with quarrels with the diet, with two invasions of France, and a war in Gelderland against Charles, count of Egmont, who claimed that duchy, and was supported by French troops. The reforms of 1495 were rendered abortive by the refusal of Maximilian to attend the diets or to take any part in the working of the new constitution and in 1497 he strengthened his own authority by establishing an Aulic Council (Reichshofrath) , which he declared was competent to deal with all business of the empire, and about the same time set up a court to centralize the financial administration of Germany.

In February 1499 the king became involved in a war with the Swiss, who had refused to pay the imperial taxes or to furnish a contribution for the Italian expedition. Aided by France they defeated the German troops, and the peace of Basel in September 1499 recognized them as virtually independent of the empire. About this time Maximilian's ally, Ludovico of Milan, was taken prisoner by Louis XII., king of France, and Maximilian was again compelled to ask the diet for help. An elaborate scheme for raising an army was agreed to, and in return a council of regency (Reichsregiment) was established, which amounted, in the words of a Venetian envoy, to a depo- sition of the king. The relations were now very strained between the reforming princes and Maximilian, who, unable to raise an army, refused to attend the meetings of the council at Nuremberg, while both parties treated for peace with France. The hostility of the king rendered the council impotent. He was successful in winning the support of many of the younger princes, and in establishing a new court of justice, the members of which were named by himself. The negotiations with France ended in the treaty of Blois, signed in September 1504, when

Maximilian's grandson Charles was betrothed to Claude, daughter of Louis XII., and Louis, invested with the duchy of Milan, agreed to aid the king of the Romans to secure the imperial crown. A succession difficulty in Bavaria-Landshut was only decided after Maximilian had taken up arms and narrowly escaped with his life at Regensburg. In the settlement of this question, made in 1505, he secured a considerable increase of territory, and when the king met the diet at

Cologne in 1505 he was at the height of his power. His enemies at home were crushed, and their leader, Berthold, elector of Mainz, was dead; while the outlook abroad was more favourable than it had been since his accession.

It is at this period that Ranke believes Maximilian to have entertained the idea of a universal monarchy; but whatever hopes he may have had were shattered by the death of his son Philip and the rupture of the treaty of Blois. The diet of Cologne discussed the question of reform in a halting fashion, but afforded the king supplies for an expedition into Hungary, to aid his ally Ladislaus, and to uphold his own influence in the East. Having established his daughter Margaret as regent for Charles in the Netherlands, Maximilian met the diet at Constance in 1507, when the imperial chamber (Reichskammergericht) was revised and took a more permanent form, and help was granted for an expedition to Italy. The king set out for Rome to secure his coronation, but Venice refused to let him pass through her territories; and at Trant, on the 4th of February 1 508, he took the important step of assuming the title of Roman Emperor Elect, to which he soon received the assent of pope Julius II. He attacked the Venetians, but finding the war unpopular with the trading cities of southern Germany, made a truce with the republic for three years. The treaty of Blois had contained a secret article providing for an attack on Venice, and this ripened into.the league of Cambray, which was joined by the emperor in December 1509. He soon took the field, but after his failure to capture Padua the league broke up; and his sole ally, the French king, joined him in calling a general council at Pisa to discuss the question of Church reform. A breach with pope Julius followed, and at this time Maximilian appears to have entertained, perhaps quite seriously, the idea of seating himself in the chair of St Peter. After a period of vacillation he deserted Louis and joined the Holy League, which had been formed to expel the French from Italy; but unable to raise troops, he served with the English forces as a volunteer and shared in the victory gained over the French at the battle of the Spurs near Therou- anne on the 16th of August 1513. In 1500 the diet had divided Germany into six circles, for the maintenance of peace, to which the emperor at the diet of Cologne in 151 2 added four others. Having made an alliance with Christian II., king of Denmark, and interfered to protect the Teutonic Order against Sigismund I., king of Poland, Maximilian was again in Italy early in 1516 fighting the French who had overrun Milan. His want of success compelled him on the 4th of December 1516 to sign the treaty of Brussels, which left Milan in the hands of the French king, while Verona was soon

afterwards transferred to Venice. He attempted in vain to secure the election of his grandson Charles as king of the Romans, and in spite of increasing infirmity was eager to lead the imperial troops against the Turks, At the diet of Augsburg in 1518 the emperor heard warnings of the Refor- mation in the shape of complaints against papal exactions, and a repetition of the complaints preferred at the diet of Mainz in 1 51 7 about the administration of Germany. Leaving the diet, he travelled to Wels in Upper Austria, where he died on the 12th of January 1510. He was buried in the church of St George in Vienna Neustadt, and a superb monument, which may still be seen, was raised to his memory at Innsbruck.

Maximilian had many excellent personal qualities. He was not handsome, but of a robust and well-proportioned frame. Simple in his habits, conciliatory in his bearing, and catholic in his tastes, he enjoyed great popularity and rarely made a personal enemy. He was a skilled knight and a daring huntsman, and although not a great general, was intrepid on the field of battle. His mental interests were extensive. He knew something of six languages, and could discuss art, music, literature or theology. He reorganized

the university of Vienna and encouraged the development of the universities of Ingolstadt and Freiburg. He was the friend and patron of scholars, caused manuscripts to be copied and medieval poems to be collected. He was the author of military reforms, which included the establishment of standing troops, called Lands- knechte, the improvement of artillery by making cannon portable, and some changes in the equipment of the cavalry. He was continually devising plans for the better government of Austria, and although they ended in failure, he established the unity of the Austrian dominions. Maximilian has been called the second founder of the house of Habsburg, and certainly by bringing about marriages between Charles and Joanna and between his grandson Ferdinand and Anna, daughter of Ladislaus, king of Hungary and Bohemia, he paved the way for the vast empire of Charles V. and for the influence of the Habsburgs in eastern Europe. But he had many qualities less desirable. He was reckless and unstable, resorting often to lying and deceit, and never pausing to count the cost of an enterprise or troubling to adapt means to ends. For absurd and impracticable schemes in Italy and elsewhere he neglected Germany, and sought to involve its princes in wars under- taken solely for private aggrandizement or personal jealousy. Ignoring his responsibilities as ruler of Germany, he only considered the question of its government when in need of money and support from the princes. As the " last of the knights " he could not see that the old order of society was

passing away and a new order arising, while he was fascinated by the glitter of the medieval empire and spent the better part of his life in vague schemes for its revival. As " a gifted amateur in politics " he increased the disorder of Germany and Italy and exposed himself and the empire to the jeers of Europe.

Maximilian was also a writer of books, and his writings display his inordinate vanity. His Geh.eim.es Jagdbuch, containing about 25CO words, is a treatise purporting to teach his grandsons the art of hunting. He inspired the production of The Dangers and Adven- tures of the Famous Hero and Knight Sir Teuerdank, an allegorical poem describing his adventures on his journey to marry Mary of Burgundy. The emperor's share in the work is not clear, but it seems certain that the general scheme and many of the incidents are due to him. It was first published at Nuremberg by Melchior Pfintzing in 1517, and was adorned with woodcuts by Hans Leonhard Schaufelein. The Weisskunig was long regarded as the work of the emperor's secretary, Marx Treitzsaurwein, but it is now believed that the greater part of the book at least is the work of the emperor himself. It is an unfinished autobiography containing an account of the achievements of Maximilian, who is called " the young white king." It was first published at Vienna in 1775. He also is re- sponsible for Freydal, an allegorical account of the tournaments in which he took part during his wooing of Mary of Burgundy; Ehrenpforten, Triumphwagen and Der weisen konige Stammbaum, books concerning his own history and that of the house of Habsburg, and works on various subjects, as Das Stahlbuch, Die Baumeisterei and Die Gartnerei. These works are all profusely illustrated, some by Albrecht Dilrer, and in the preparation of the woodcuts Maximilian himself took the liveliest interest. A facsimile of the original editions of Maximilian's autobiographical and semi-auto- biographical works has been published in nine volumes in the Jahrbilcher der kunsthislorischen Sammlungen des Kaiserhauses (Vienna, 1880-1888). For this edition S. Laschitzer wrote an introduction to Sir Teuerdank, Q. von Leitner to Freydal, and N. A. von Schultz to Der Weisskunig. The Holbein society issued a facsimile of Sir Teuerdank (London, 1884) and Triumphwagen (London, 1883).

See Correspondance de Vempereur Maximilien I. et de Marguerite d'Autriche, 1507-151Q, edited by A. G. le Glay (Paris, 1839); Maxi- milians I. vertraulicher Briefwechsel mit Sigmund Pruschenk, edited by V. von Kraus (Innsbruck, 1875) ; J. Chmel, Urkunden, Briefe und Aktenstucke zur Geschichte Maximilians I. und seiner Zeit. (Stuttgart, 1845) and Aktenstucke und Briefe zur Geschichte des Hauses Habsburg im Zeitalter Maximilians I. (Vienna, 1 854-1 858);

K. Khlpfel, Kaiser Maximilian I. (Berlin, 1854) ; H. Ulmann, Kaiser Maxi- milian I. (Stuttgart, 1884) ; L. P. Gachard, Lettres inedites de Maxi- milien I. sur les affaires des Pays Bas (Brussels, 1851-1852) ; L. von Ranke, Geschichte der romanischen und germanischen V 'biker, 14Q4- 1$ 14 (Leipzig, 1874); R. W. S. Watson, Maximilian I. (London, 1902) ; A. Jager, ffber Kaiser Maximilians I. Verhdltnis zum Papst- thum (Vienna, 1854); H. Ulmann, Kaiser Maximilians I. Absichten auf das Papstthum (Stuttgart, 1888), and A. Schulte, Kaiser Maxi- milian I. als Kandidat fur den papstlichen Stuhl (Leipzig, 1006).

(A. W. H.;*

MAXIMILIAN II. (1527-1576), Roman emperor, was the eldest son of the emperor Ferdinand I. by his wife Anne, daughter of Ladislaus, king of Hungary and Bohemia, and was born in Vienna on the 31st of July 1527. Educated principally in Spain, he gained some experience of warfare during the campaign of Charles V. against France in 1544, and also during the war of the league of Schmalkalden, and soon began to take part in imperial business. Having in September 1548 married his

cousin Maria, daughter of Charles V., he acted as the emperor's representative in Spain from 1548 to 1550, returning to Germany in December 1550 in order to take part in the discussion over the imperial succession. Charles V. wished his son Philip (afterwards king of Spain) to succeed him as emperor, but his brother Ferdinand, who had already been designated as the next occupant of the imperial throne, and Maximilian objected to this proposal. At length a compromise was reached. Philip was to succeed Ferdinand, but during the former's reign Maximilian, as king of the Romans, was to govern Germany. This arrangement was not carried out, and is only important because the insistence of the emperor seriously disturbed the harmonious relations which had hitherto existed between the two branches of the Habsburg family; and the estrangement went so far that an illness which befell Maximilian in 1552 was attributed to poison given to him in the interests of his cousin and brother-in-law, Philip of Spain. About this time he took up his residence in Vienna, and was engaged mainly in the government of the Austrian dominions and in defending them against the Turks. The religious views of the king of Bohemia, as Maximilian had been called since

his recognition as the future ruler of that country in 1549, had always been somewhat uncertain, and he had probably learned something of Luther- anism in his youth; but his amicable relations with several Protestant princes, which began about the time of the discussion over the succession, were probably due more to political than to religious considerations. However, in Vienna he became very intimate with Sebastian Pfauser (1520-1569), a court preacher with strong leanings towards Lutheranism, and his religious attitude caused some uneasiness to his father. Fears were freeiy expressed that he would definitely leave the Catholic Church, and when Ferdinand became emperor in 1558 he was prepared to assure Pope Paul IV. that his son should not succeed him if he took this step. Eventually Maximilian remained nominally an adherent of the older faith, although his views were tinged with Lutheranism until the end of his life. After several refusals he consented in 1560 to the banishment of Pfauser, and began again to attend the services of the Catholic Church. This uneasiness having been dispelled, in November

1562 Maximilian was chosen king of the Romans, or German king, at Frankfort, where he was crowned a few days later, after assuring the Catholic electors of his fidelity to their faith, and promising the Protestant electors that he would publicly accept the confession of Augsburg when he became emperor. He also took the usual oath to protect the Church, and his election was afterwards confirmed by the papacy. In September

1563 he was crowned king of Hungary, and on his father's death, in July 1564, succeeded to the empire and to the kingdoms of Hungary and Bohemia.

The new emperor had already shown that he believed in the necessity for a thorough reform of the Church. He was unable, however, to obtain the consent of Pope Pius IV. to the marriage of the clergy, and in 1 568 the concession of communion in both kinds to the laity was withdrawn. On his part Maximilian granted religious liberty to the Lutheran nobles and knights in Austria, and refused to allow the publication of the decrees of the council of Trent. Amid general expectations on the part of the Protestants he met his first Diet at Augsburg in March 1566. He refused to accede to the demands of the Lutheran princes; on the other hand, although the increase of sectarianism was discussed, no decisive steps were taken to suppress it, and the only result of the meeting was a grant of assistance for the Turkish War, which had just been renewed. Collecting a large and splendid army Maximilian marched to defend his territories; but no decisive engagement had taken place when a truce was made in

1568, and the emperor continued to pay tribute to the sultan for Hungary. Meanwhile the rela- tions between Maximilian and Philip of Spain had improved; and the emperor's increasingly cautious and moderate attitude in religious matters was doubtless due to the fact that the death of Philip's son, Don Carlos, had opened the way for the succession of Maximilian, or of one of his sons, to the Spanish

throne. Evidence of this friendly feeling was given in 1570, when the emperor's daughter, Anne, became the fourth wife of Philip; but Maximilian was unable to moderate the harsh proceedings of the Spanish king against the revolting inhabitants of the Netherlands. In 1570 the emperor met the diet at Spires and asked for aid to place his eastern borders in a state of defence, and also for power to repress the disorder caused by troops in the service of foreign powers passing through Germany. He proposed that his consent should be necessary before any soldiers for foreign service were recruited in the empire; but the estates were unwilling to strengthen the im- perial authority, the Protestant princes regarded the suggestion as an attempt to prevent them from assisting their coreligionists in France and the Netherlands, and nothing was done in this direction, although some assistance was voted for the defence of Austria. The religious demands of the Protestants were still unsatisfied, while the policy of toleration had failed to give peace to Austria. Maximilian's power was very limited; it was inability rather than unwillingness that prevented him from yielding to the entreaties of Pope Pius V. to join in an attack on the Turks both before and after the victory of Lepanto in 1571; and he remained inert while the authority of the empire in north-eastern Europe was threatened. His last important act was to make a bid for the throne of Poland, either for himself or for his son Ernest. In December 1575 he was elected by a powerful faction, but the diet which met at Regensburg was loath to assist; and on the 12th of October 1576 the emperor died, refusing on his deathbed to receive the last sacraments of the Church.

By his wife Maria he had a family of nine sons and six daugh- ters. He was succeeded by his eldest surviving son, Rudolph, who had been chosen king of the Romans in October 1575. Another of his sons, Matthias, also became emperor; three others, Ernest, Albert and Maximilian, took some part in the government of the Habsburg territories or of the Netherlands, and a daughter, Elizabeth, married Charles IX. king of France.

The religious attitude of Maximilian has given rise to mucL discussion, and on this subject the writings of W. Maurenbrecher, W. Goetz and E. Reimann in the Historische Zeitschrift, Bande VII.,

XV..XXXII. and LXXVII. (Munich, 1870 fol.) should be consulted, and also O. H. Hopfen, Maximilian II. und der Kompromiss-katholizismus (Munich, 1895); CT Haupt. Melanchthons und seiner Lehrer Einfluss auf Maximilian II. (Wittenberg, 1897) ; F. Walter, Die Wahl Maximilians II. (Heidelberg, 1892) ; W. Goetz, Maximilians II. Wahl zum romischen Konige (Wiirzburg, 189.1), and T. J. Scherg, Uber die religiose Entwickelung Kaiser Maximilians II. bis zu seiner Wahl zum romischen Konige (Wiirzburg, 1903). For a more general account of his life and work see Briefe und Akten zur Geschichte Maximilians II., edited by W. E. Schwarz (Paderborn, 1889-1891); M. Koch, Quellcn zur Geschichte des Kaisers Maximilian II. in Archiven gesammelt (Leipzig, 1857-1861); R. Holtzmann, Kaiser Maximilian II. bis zu seiner Thronbesteigung (Berlin, 1903) ; E. Wertheimer, Zur Geschichte der Tiirkenkriege Maximilians II (Vienna, 1875); L. von Ranke, Uber die Zeiten Ferdinands I. und Maximilians II. in Band VII. of his Sdmmtliche Werke (Leipzig, 1874), an d J. Janssen, Geschichte des deutschen Volkes seitdem Ausgangdes Mittelalters, Bande IV. to VIII. (Freiburg, 1885-1894), English translation by M. A. Mitchell and A. M. Christie (London, 1896 fol.).

MAXIMILIAN (1832-1867), emperor of Mexico, second son of the archduke Francis Charles of Austria, was born in the palace of Schonbrunn, on the 6th of July 1832. He was a particularly clever boy, showed considerable taste for the arts, and early displayed an interest in science, especially botany. He was trained for the navy, and threw himself into this career with so much zeal that he quickly rose to high command, and was mainly instrumental in creating the naval port of Trieste and the fleet with which Tegethoff won his victories in the Italian War. He had some reputation as a Liberal, and this led, in February 1857, to his appointment as viceroy of the Lombardo- Venetian kingdom; in the same year he married the Princess Charlotte, daughter of Leopold I., king of the Belgians. On the outbreak of the war of 1859 he retired into private life, chiefly at Trieste, near which he built the beautiful chateau of Miramar. In this same year he was first approached by Mexican exiles with the proposal to become the candidate

tor the throne of Mexico. He did not at first accept, but sought to satisfy his restless desire for adventure by a botanical expedi- tion to the tropical forests of Brazil. In 1863, however, under pressure from

Napoleon III., and after General Forey's capture of the city of Mexico and the plebiscite which confirmed his proclamation of the empire, he consented to accept the crown. This decision was contrary to the advice of his brother, the emperor Francis Joseph, and involved the loss of all his rights in Austria. Maximilian landed at Vera Cruz on the 28th of May 1864; but from the very outset he found himself involved in difficulties of the most serious kind, which in 1866 made apparent to almost every one outside of Mexico the necessity for his abdicating. Though urged to this course by Napoleon himself, whose withdrawal from Mexico was the final blow to his cause, Maximilian refused to desert his followers. With- drawing, in February 1867, to Queretaro, he there sustained a siege for several weeks, but on the 15th of May resolved to attempt an escape through the enemy's lines. He was, however, arrested before he could carry out this resolution, and after trial by court-martial was condemned to death. The sentence was carried out on the 19th of June 1867. His remains were conveyed to Vienna, where they were buried in the imperial vault early in the following year. (See Mexico.)

Maximilian's papers were published at Leipzig in 1867, in seven volumes, under the title Aus meinem Leben, Reiseskizzen, Aphorismen, Gedichte. See Pierre de la Gorce, Hist, du Second Empire, IV., liv. xxv. ii. (Paris, 1904) ; article by von Hoffinger in Allgemeine Deutsche Biographie, xxi. 70, where authorities are cited.

MAXIMINUS, GAIUS JULIUS VERUS, Roman emperor from a.d. 235 to 238, was born in a village on the confines of Thrace. He was of barbarian parentage and was brought up as a shepherd. His immense stature and enormous feats of strength attracted the attention of the emperor Septimius Severus. He entered the army, and under Caracalla rose to the rank of centurion. He carefully absented himself from court during the reign of Heliogabalus, but under his successor Alexander Severus, was appointed supreme commander of the Roman armies. After the murder of Alexander in Gaul, hastened, it is said, by his instigation, Maximinus was proclaimed emperor by the soldiers on the 19th of March 235. The three years of his reign, which were spent wholly in the camp, were marked by great cruelty and oppression; the wide- spread discontent thus produced culminated in a revolt in Africa and the assumption of the purple by Gordian (q.v.). Maximinus, who was in Pannonia at the time, marched against Rome, and passing over the Julian Alps descended on Aquileia; while detained before that city he and his son were murdered in their tent by a body of praetorians. Their heads were cut off and despatched to Rome, where they were burnt on the Campus Martius by the exultant crowd.

Capitolinus, Maximini duo; Herodian vi. 8, vii., viii. 1-5; Zosimus i. 13-15).

MAXIMINUS [Maximin], GALERIUS VALERIUS, Roman emperor from a.d. 308 to 314, was originally an Ulyrian shepherd named Daia. He rose to high distinction after he had joined the army, and in 305 he was raised by his uncle, Galerius, to the rank of Caesar, with the government of Syria and Egypt. In 308, after the elevation of Licinius, he insisted on receiving the title of Augustus; on the death of Galerius, in 311, he succeeded to the supreme command of the provinces of Asia, and when Licinius and Constantine began to make common cause with one another Maximinus entered into a secret alliance with Maxentius. He came to an open rupture with Licinius in 313, sustained a crushing defeat in the neighbourhood of Heraclea Pontica on the 30th of April, and fled, first to Nicomedia and afterwards to Tarsus, where he died in August following. His death was variously ascribed " to despair, to poison, and to the divine justice." Maximinus has a bad name in Christian annals, as having renewed persecution after the publication of the toleration edict of Galerius, but it is probable that he has been judged too harshly.

See Maxentius; Zosimus ii. 8; Aurelius Victor, Epit. 40.

MAXIMS, LEGAL. A maxim is an established principle or proposition. The Latin term maxima is not to be found in Roman law with any meaning exactly analogous to that of a legal maxim in the modern sense of the word, but the treatises of many of the Roman jurists on Regulae deftnitiones, and Sententiae juris are, in some measure, collections of maxims (see an article on " Latin Maxims in English Law " in Law Mag. and Rev. xx. 285); Fortescue (De laudibus, c. 8) and Du Cange treat maxima and regula as identical. The attitude of early English commentators towards the maxims of the law was one of unmingled adulation. In Doctor and Student (p. 26) they are described as "of the same strength and effect in the law as statutes be." Coke (Co. Litt. n a) says that a maxim is so called " Quia maxima est ejus dignitas et certissima auctoritas, atque quod maxime omnibus probetur." " Not only," observes Bacon in the Preface to his Collection of Maxims, " will the use of maxims be in deciding doubt and helping soundness of judgment, but, further, in gracing argument, in correcting unprofitable subtlety, and reducing the same to a more sound and substantial sense of law, in reclaiming vulgar errors, and, generally, in the amendment in some measure of the very nature and complexion of the whole law." A similar note was sounded in Scotland; and it has been well observed that " a glance at the pages of Morrison's Dictionary or at other early reports

will show how frequently in the older Scots law questions respecting the rights, remedies and liabilities of individuals were determined by an immediate reference to legal maxims " (J. M. Irving, Encyclo. Scots Law, s.v. " Maxims "). In later times less value has been attached to the maxims of the law, as the development of civilization and the increasing complexity of business relations have shown the necessity of qualifying the propositions which they enun- ciate (see Stephen, Hist. Crim. Law, ii. 94 n: Yarmouth v. Prance, 1887, 19 Q.B.D., per Lord Esher, at p. 653, and Ameri- can authorities collected in Bouvier's Law Diet. s.v. " Maxim "). But both historically and practically they must always possess interest and value.

A brief reference need only be made here, with examples by way of illustration, to the field which the maxims of the law cover.

Commencing with rules founded on public policy, we may note the famous principle — Salus poputi suprema lex (xii. Tables; Bacon, Maxims, reg. 12) — " the public welfare is the highest law." It is on this maxim that the coercive action of the State towards individual liberty in a hundred matters is based. To the same category belong the maxims — Summa ratio est quae pro religione facit (Co. Litt. 341 a) — " the best rule is that which advances religion " — a maxim which finds its application when the enforcement of foreign laws or judgments supposed to violate our own laws or the principles of natural justice is in question; and Dies dominicus non est juridicus, which exempts Sunday from the lawful days for juridical acts. Among the maxims relating to the crown, the most important are Rex non potest peccare (2 Rolle R. 304) — " The King can do no wrong " — which enshrines the principle of ministerial responsibility, and Nullum tempus occurrit regi (2 Co. Inst. 273) — " lapse of time does not bar the crown," a maxim qualified by various enactments in modern times. Passing to the judicial office and the administra- tion of justice, we may refer to the rules — Audi alteram partem— a proposition too familiar to need either translation or comment; N emo debet esse judex in proprid sudcausd (12 Co. Rep. 1 14) — " no man ought to be judge in his own cause " — a maxim which French law, and the legal systems based upon or allied to it, have embodied in an elaborate network of rules for judicial challenge; and the maxim which defines the relative functions of judge and jury, Ad quaestionem facti non respondent judices, ad quaestionem legis non respondent jura.tores_ (8 Co. Rep. 155). The maxim Boni judicis est ampliart jurisdictionem (Ch. Prec. 329) is certainly erroneous as it stands, as a judge has no right to " extend his jurisdiction." If justitiam is substituted for jurisdictionem, as Lord Mansfield said it

*should be (1 Burr. 304), the maxim is near the truth. A group of maxims supposed to embody certain fundamental principles of legal right and obligations may next be referred to: (a) Ubi jus ibi remedium (see Co. Litt. *

*built up. In this category may also be classed Volenti nonfit injuria (Wingate, Maxims), out of which sprang the theory— now profoundly modified by statute— of "common employment" in the law of employers liability ; see Smith v. Baker, 18ˆ1, A.C. 32s Other maxims deal with rights of property— Qui prior est tempore, potior est jure (Co. Lilt. 14 a), which consecrates the position of the beati possidentis alike in municipal and in international law; Sic utere tuout ahenumnon laedas (9 Co. Rep. 59), which has played its part in the determination of the rights of adjacent owners; and Domus suacuique est tutissimum refugium (5 Co. Rep. 92)—" a man's house is his castle, a doctrine which has imposed limitations on the rights of execution creditors (see Execution). In the laws of family relations there are the maxims Consensus non concubitus facit matrimonium (Co. Litt. 33 a)— the canon law of Europe prior to the council of Trent, and still law in Scotland, though modified by legislation in England; and Pater is est quern nuptiae demonstrant (see Co. Litt. 7 b), on which, in most civilized countries, the pre- sumption of legitimacy depends. In the interpretation of written instruments, the maxim Noscitur a sociis (3 Term Reports, 87) which proclaims the importance of the context, still applies. So do the rules Expressio unius est exclusio alterius (Co. Litt. 210 a) and Lontemporanea exposilio est optima etfortissima in lege{2 Co. Inst 1 1) which lets in evidence of contemporaneous user as an aid to the in- r?f et £ tl ? n , °J s * atu t es or documents; see Van Diemen's Land Co. v. 1 able Cape Marine Board, 1906, A.C. 92, 98. We may conclude this sketch with a miscellaneous summary: Caveat emptor (Hob. 99)—*

l e – u tn e P urch aser beware"; Qui facit per alium facile per se, which affirms the principal's liability for the acts of his agent' lgnorantia juris nemmem excusat, on which rests the ordinary citizen's obhgation to know the law; and Vigilantibus non dormientibus jura subyeniunt (2 Co. Inst. 690), one of the maxims in accordance with which courts of equity administer relief. Among other " maxims of equity come the rules that " he that seeks equity must do equity " i.e. must act fairly and that " equity looks upon that as done which ought to be done —a principle from which the " conversion " into money of land directed to be sold, and of money directed to be invested in the purchase of land, is derived.

The principal collections of legal maxims are: English Law: bacon, Collection of Some Principal Rules and Maxims of the Common Law (1630) ; Noy Treatise of the principal Grounds and Maxims of TfJtS? °J En ˆ an ˆ (l6 4l- 8th ed., 1824); Wingate, Maxims of Reason (1 72 8) ; >rancis, Grounds and Rudiments of Law and Equity (2nd ed U£'a 1 ° fft j annexed t° h's Reports, 1776); Broom, Legal Maxims llj 1 ! London ! 'j* 00)- J c ° ts Law: Lord Trayner, Latin Maxims and Phrases (2nd ed 1876) ; Stair, Institutions of the Law of Scotland, with Index by More (Edinburgh, 1832). American Treatises : A. I. Morgan, English Version of Legal Maxims (Cincinnati, 1878); oq ; ˆ eloube t. Legal Maxims in Law and Equity (New York '• (A. W. R.) '*

MAXIMUS, the name of four Roman emperors.

I. M. Clodius Pupienus Maximus, joint emperor with D. Caelius Calvinus Balbinus during a few months of the year a.d. 238. Pupienus was a distinguished soldier, who had been proconsul of Bithynia, Achaea, and Gallia Narbonensis. At the advanced age of seventy-four, he was chosen by the senate with Balbinus to resist the barbarian Maximinus. Their complete equality is shown by the fact that each assumed the titles of pontifex maximus and princeps senatus. It was arranged that Pupienus should take the field against Maximinus, while Balbinus remained at Rome to maintain order, a task in which he signally failed. A revolt of the praetorians was not repressed till much blood had been shed and a considerable part of the city reduced to ashes. On his march, Pupienus, having received the news that Maximinus had been assassinated by his own troops, returned in triumph to Rome. Shortly afterwards, when both emperors were on the point of leaving the city on an expedition— Pupienus against the Persians and Balbinus against the Goths— the praetorians, who had always resented the appointment of the senatorial emperors and cherished the memory of the soldier-emperor Maximinus seized the opportunity of revenge. When most of the people were at the Capitoline games, they forced their way into the palace, dragged Balbinus and Pupienus through the streets and put them to death. '

See Capitolinus, Life of Maximus and Balbinus; Herodian vii 10 ym. 6; Zonaras xu. 16; Orosius vii. 19; Eutropius ix. 2; Zosimus 1. 14; Aurehus Victor, Caesares, 26, epit. 26; H. Schiller, Geschichte ier romtschen Kaiserzeit, 1. 2 ; Gibbon, Decline and Fall, ch. 7 and (lor the chronology) appendix 12 (Bury's edition).

II. Magnus Maximus, a native of Spain, who had accom- panied

Theodosius on several expeditions and from 368 held high military rank in Britain. The disaffected troops having

proclaimed Maximus emperor, he crossed over to Gaul, attacked Gratian (q.v.), and drove him from Paris to Lyons, where he was murdered by a partisan of Maximus. Theodosius being unable to avenge the death of his colleague, an agreement was made (384 or 385) by which Maximus was recognized as Augustus and sole emperor in Gaul, Spain and Britain, while Valentiman II. was to remain unmolested in Italy and Illyricum, Theodosius retaining his sovereignty in the East. In 387 Maximus crossed the Alps, Valentinian was speedily put to flight, while the invader established himself in Milan and for the time became master of Italy. Theodosius now took vigorous measures. Advancing with a powerful army, he twice defeated the troops of Maximus— at Siscia on the Save, and at Poetovio on the Danube. He then hurried on to Aquileia, where Maximus had shut himself up, and had him beheaded. Under the name of Maxen Wledig, Maximus appears in the list of Welsh royal heroes (see R. Williams , Biog. Did. of Eminent Welshmen, 1852;

The Dream of Maxen Wledig," in the Mabinogion).

Full account with classical references in H. Richter, Das west-romische Reich, besonders unter den Kaisern Gratian, Valentinian II und Maximus (1865); see also H. Schiller, Geschichte der romischen Kaiserzeit, 11. (1887); Gibbon, Decline and Fall, ch. 27; Tillemont Hist, des empereurs, v. '

III. Maximus Tyrannus, made emperor in Spain by the Roman general, Gerontius, who had rebelled against the usurper Constantine in 408. After the defeat of Gerontius at Arelate (Aries) and his death in 411 Maximus renounced the imperial title and was permitted by Constantine to retire into private life. About 418 he rebelled again, but, failing in his attempt, was seized, carried into Italy, and put to death at Ravenna in 422.

„ If Orosius vii. 42; Zosimus vi. 5; Sozomen ix. 3; E. A. Freeman,

mstlXietXtˆ): and Spain> A – D – 406_411 -" in English

IV. Petronius Maximus, a member of the higher Roman nobility, had held several court and public offices, including those of praefectus Romae (420) and Italiae (439-441 and 445) arid consul (433, 443). He was one of the intimate associates of Valentinian III., whom he assisted in the palace intrigues which led to the death of

Aetius in 454; but an outrage committed on the wife of Maximus by the emperor turned his friendship into hatred. Maximus was proclaimed emperor immediately after Valentinian's murder (March 16, 455), but after reigning less than three months, he was murdered by some Burgundian mercenaries as he was fleeing before the troops of Genseric, who, invited by Eudoxia, 'the widow of Valentinian, had landed at the mouth of the Tiber (May or June 455).

See Procopius, Vand. i. 4; Sidonius Apollinaris, Panegyr. Aviti e P' "• ˆ ; J- h , e v anous Chronicles; Gibbon, Decline and Fall, ens. 35, 36 ; 1 lllemont, Hist, des empereurs, vi.

<(MAXIMUS, ST (c. 580-662), abbot of Chrysopolis, known as the Confessor " from his orthodox zeal in the Monothelite (q.v.) controversy, or as " the monk," was born of noble paren- tage at Constantinople about the year 580. Educated with great care, he early became distinguished by his talents and acquirements, and some time after the accession of the emperor Heraclius in 610 was made his private secretary. In 630 he abandoned the secular life and entered the monastery of Chryso- polis (Scutari), actuated, it was believed, less by any longing for the life of a recluse than by the dissatisfaction he felt with the Monothelite leanings of his master. The date of his promotion to the abbacy is uncertain. In 633 he was one of the party of Sophronius of Jerusalem (the chief original opponent of the Monothelites) at the council of Alexandria; and in 645 he was again in Africa, when he held in presence of the governor and a number of bishops the disputation with Pyrrhus, the deposed and banished patriarch of Constantinople, which resulted in the (temporary) conversion of his interlocutor to the Dyothelite view. In the following year several African synods, held under the influence of Maximus, declared for orthodoxy. In 649, after the accession of Martin I., he went to Rome, and did much to fan the zeal of the new pope, who in

October of that year held the (first) Lateran synod, by which not only the Monothelite doctrine but also the moderating ecthesis of Heraclius and typus of Constans II. were anathema- tized. About 653 Maximus, for the part he had taken against the latter document especially, was apprehended (together with the pope) by order of Constans and carried a prisoner to Constantinople. In 655, after repeated examinations, in which he maintained his theological

opinions with memorable constancy, he was banished to Byzia in Thrace, and afterwards to Perberis. In 662 he was again brought to Constantinople and was condemned by a synod to be scourged, to have his tongue cut out by the root, and to have his right hand chopped off. After this sentence had been carried out he was again banished to Lazica, where he died on the 13th of August 662. He is venerated as a saint both in the Greek and in the Latin Churches. Maximus was not only a leader in the Monothelite struggle but a mystic who zealously followed and advocated the system of Pseudo-Dionysius, while adding to it an ethical element in the conception of the freedom of the will. His works had considerable influence in shaping the system of John Scotus Erigena.

The most important of the works of Maximus will be found in Migne, Patrologia graeca, xc. xci., together with an anonymous life; an exhaustive list in Wagenmann's article in vol. xii. (1903) of Hauck-Herzog's Realencyklopadie where the following classification is adopted: (a) exegetical, (b) scholia on the Fathers, (c) dogmatic and controversial, (d) ethical and ascetic, (e) miscellaneous. The details of the disputation with Pyrrhus and of the martyrdom are given very fully and clearly in Hefele's Conciliengeschichte, iii. For Further literature see H. Gelzer in C. Krumbacher's Geschichte der byzantinischen Litteratur (1897).

MAXIMUS OF SMYRNA, a Greek philosopher of the Neo- platonist school, who lived towards the end of the 4th century a.d. He was perhaps the most important of the followers of Iambli- chus. He is said to have been of a rich and noble family, and exercised great influence over the emperor Julian, who was commended to him by Aedesius. He pandered to the emperor's love of magic and theurgy, and by judicious administration of the omens won a high position at court. His overbearing manner made him numerous enemies, and, after being imprisoned on the death of Julian, he was put to death by Valens. He is a representative of the least attractive side of Neoplatonism. Attaching no value to logical proof and argument, he enlarged on the wonders and mysteries of nature, and maintained his position by the working of miracles. In logic he is reported to have agreed with Eusebius, Iamblichus and Porphyry in asserting the validity of the second and third figures of the syllogism.

MAXIMUS OF TYRE (Cassius Maximus Tyrius), a Greek rhetorician and philosopher who flourished in the time of the Antonines and Commodus (2nd century a.d.). After the manner of the sophists of his age, he travelled extensively, delivering lectures on the way. His writings contain many allusions to the history of Greece, while there

is little reference to Rome; hence it is inferred that he lived longer in Greece, perhaps as a professor at Athens. Although nominally a Platonist, he is really an Eclectic and one of the precursors of Neoplatonism; There are still extant by him forty-one essays or discourses (5ta\e£eis) on theological, ethical, and other philosophical commonplaces. With him God is the supreme being, one and indivisible though called by many names, accessible to reason alone; but as animals form the intermediate stage between plants and human beings, so there exist intermediaries between God and man, viz. daemons, who dwell on the confines of heaven and earth. The soul in many ways bears a great resemblance to the divinity; it is partly mortal, partly immortal, and, when freed from the fetters of the body, becomes a daemon. Life is the sleep of the soul, from which it awakes at death. The style of Maximus is superior to that of the ordinary sophistical rhetorician, but scholars differ widely as to the merits of the essays themselves.

Maximus of Tyre must be distinguished from the Stoic Maximus, tutor of Marcus Aurelius.

Editions by J. Davies, revised with valuable notes by J. Markland (1740); J. J. Reiske (1774); F. Dubner (1840, with Theophrastus, &c, in the Didot series). Monographs by R. Rohdich (Beuthen, 1879); H. Hobein, De Maximo Tyrio quaestiones philol. (Jena, 1895). There is an English translation (1804) by Thomas Taylor, the Platonist.

MAX MULLER, FRIEDRICH (18 23- 1900), Anglo-German orientalist and comparative philologist, was born at Dessau on the 6th of December 1823, being the son of Wilhelm Miiller (1794-1827), the German poet, celebrated for his phil-Hellenie lyrics, who was ducal librarian at Dessau. The elder Miiller had endeared himself to the most intellectual circles in Germany by his amiable character and his genuine poetic gift; his songs had been utilized by musical composers, notably Schubert; and it was his son's good fortune to meet in his youth with a succession of eminent friends, who, already interested in him for his father's sake, and charmed by the qualities which they discovered in the young man himself, powerfully aided him by advice and patronage. Mendelssohn, who was his godfather, dissuaded him from indulging his natural bent to the study of music; Professor Brockhaus of the University of Leipzig, where Max Miiller matriculated in 1841, induced him to take up Sanskrit; Bopp, at the University of Berlin (1844), made the Sanskrit student a scientific comparative philologist; Schelling at the same university, inspired him with a love for metaphysical speculation, though failing to attract him to his own

philosophy; Burnouf, at Paris in the following year, by teaching him Zend, started him on the track of inquiry into the science of comparative religion, and impelled him to edit the Rig Veda; and when, in 1846, Max Miiller came to England upon this errand, Bunsen, in conjunction with Professor H. H. Wilson, prevailed upon the East India Company to undertake the expense of publication. Up to this time Max Miiller had lived the life of a poor student, supporting himself partly by copying manuscripts, but Bunsen's introductions to Queen Victoria and the prince consort, and to Oxford University, laid the foundation for him of fame and fortune. In 1848 the printing of his Rig Veda at the University Press obliged him to settle in Oxford, a step which decided his future career. He arrived at a favourable conjuncture: the Tractarian strife, which had so long thrust learning into the background, was just over, and Oxford was becoming accessible to modern ideas. The young German excited curiosity and interest, and it was soon discovered that, although a genuine scholar, he was no mere bookworm. Part of his social success was due to his readiness to exert his musical talents at private parties. Max Miiller was speedily subjugated by the genius loci. He was appointed deputy Taylorian professor of modern languages in 1850, and the German government failed to tempt him back to Strassburg. In the following year he was made M.A. and honorary fellow of Christ Church, and in 1858 he was elected a fellow of All Souls. In 1854 the Crimean War gave him the opportunity of utilizing his oriental learning in vocabularies and schemes of transliteration. In 1857 he successfully essayed another kind of literature in his beautiful story Deutsche Liebe, written both in German and English. He had by this time become an extensive contributor to English periodical literature, and had written several of the essays subsequently collected as Chips from a German Workshop. The most important of them was the fascinating essay on " Comparative Mythology " in the Oxford Essays for 1856. His valuable History of Ancient Sanskrit Literature, so far as it illustrates the primitive religion of the Brahmans (and hence the Vedic period only), was published in 1859.

Though Max Miiller's reputation was that of a comparative philologist and orientalist, his professional duties at Oxford were long confined to lecturing on modern languages, or at least their medieval forms. In i860 the death of Horace Hayman Wilson, professor of Sanskrit, seemed to open a more congenial sphere to him. His claims to the succession seemed incontestable, for his opponent, Monier Williams, though well qualified as a Sanskritist, lacked Max Miiller's brilliant versatility, and although educated at

Oxford, had held no University

office. But Max Muller was a Liberal, and the friend of Liberals in university matters, in politics, and in theology, and this consideration united with his foreign birth to bring the country clergy in such hosts to the poll that the voice of resident Oxford was overborne, and Monier Williams was elected by a large majority. It was the one great disappointment of Max Miiller's life, and made a lasting impression upon him. It was, never- theless, serviceable to his influence and reputation by permitting him to enter upon a wider field of subjects than would have been possible otherwise. Directly, Sanskrit philology received little more from him, except in connexion with his later undertak- ing of The Sacred Books of the East; but indirectly he exalted it more than any predecessor by proclaiming its commanding position in the history of the human intellect by his Science of Language, two courses of lectures delivered at the Royal Institution in 1861 and 1863. Max Muller ought not to be described as " the introducer of comparative philology into England." Prichard had proved the Aryan affinities of the Celtic languages by the methods of comparative philology so long before as 1831; Winning's Manual of Comparative Philology had been published in 1838; the discoveries of Bopp and Pott and Pictet had been recognized in brilliant articles in the Quarterly Review, and had guided the researches of Raw- linson. But Max Muller undoubtedly did far more to popularize the subject than had been done, or could have been done, by any predecessor. He was on less sure ground in another department of the study of language — the problem of its origin. He wrote upon it as a disciple of Kant, whose Critique of Pure Reason he translated. His essays on mythology are among the most delightful of his writings, but their value is somewhat impaired by a too uncompromising adherence to the seductive generalization of the solar myth.

Max Miiller's studies in mythology led him to another field of activity in which his influence was more durable and extensive, that of the comparative science of religions. Here, so far as Great Britain is concerned, he does deserve the fame of an originator, and his Introduction to the Science of Religion (1873: the same year in which he lectured on the subject, at Dean Stanley's invitation, in Westminster Abbey, this being the only occasion on which a layman had given an address there) marks an epoch. It was followed by

other works of importance, especially the four volumes of Gifford lectures, delivered between 1888 and 1892; but the most tangible result of the impulse he had given was the publication under his editorship, from 1875 onwards, of The Sacred Books of the East, in fifty-one volumes, including indexes, all but three of which appeared under his superintendence during his lifetime. These comprise translations by the most competent scholars of all the really important non-Christian scriptures of Oriental nations, which can now be appreciated without a knowledge of the original languages. Max Muller also wrote on Indian philosophy in his latter years, and his exertions to stimulate search for Oriental manuscripts and inscriptions were rewarded with important discoveries of early Buddhist scriptures, in their Indian form, made in Japan. He was on particularly friendly terms with native Japanese scholars, and after his death his library was purchased by the university of Tokyo.

In 1868 Max Muller had been indemnified for his disappoint- ment over the Sanskrit professorship by the establishment of a chair of Comparative Philology to be filled by him. He retired, however, from the actual duties of the post in 1875, when entering upon the editorship of The Sacred Books of the East. The most remarkable external events of. his latter years were his delivery of lectures at the restored university of Strassburg in 1872, when he devoted his honorarium to the endowment of a Sanskrit lectureship, and his presidency over the International Congress of Orientalists in 1892. But his days, if uneventful, were busy. He participated in every movement at Oxford of which he could approve, and was intimate with nearly all its men of light and leading; he was a curator of the Bodleian Library, and a delegate of the Univer- sity Press. He was acquainted with most of the crowned heads

of Europe, and was an especial favourite with the English royal family. His hospitality was ample, especially to visitors from India, where he was far better known than any other European Orientalist. His distinctions, conferred by foreign governments and learned societies, were innumerable, and, having been naturalized shortly after his arrival in England, he received the high honour of being made a privy councillor. In 1898 and 1899 he published autobiographical reminiscences under the title of Auld Lang Syne. He was writing a more detailed autobiography when overtaken by death on the 28th of October 1900. Max Muller married in 1859 Georgiana Adelaide Grenfell, sister of the wives of Charles Kingsley and J. A. Froude. One of his daughters, Mrs Conybeare, distin- guished herself by a translation of Scherer's History of German Literature.

Though undoubtedly a great scholar, Max Muller did not so much represent scholarship pure and simple as her hybrid types — the scholar-author and the scholar-courtier. In the former capacity, though manifesting little of the originality of genius, he rendered vast service by popularizing high truths among high minds. In his public and social character he represented Oriental studies with a brilliancy, and conferred upon them a distinction, which they had not previously enjoyed in Great Britain. There were drawbacks in both respects: the author was too prone to build upon insecure foundations, and the man of the world incurred censure for failings which may perhaps be best indicated by the remark that he seemed too much of a diplomatist. But the sum of foibles seems insignificant in comparison with the life of intense labour dedi- cated to the service of culture and humanity.

Max Miiller's Collected Works were published in 1903. (R. G.) MAXWELL, the name of a Scottish family, members of which have held the titles of earl of Morton, earl of Nithsdale, Lord Maxwell, and Lord Hemes. The name is taken probably from Maccuswell, or Maxwell, near Kelso, whither the family migrated from England about 1100. Sir Herbert Maxwell won great fame by defending his castle of Carlaverock against Edward I. in 1300; another Sir Herbert was made a lord of the Scottish parliament before 1445; and his great-grandson John, 3rd Lord Maxwell, was killed at Flodden in 1513. John's son Robert, the 4th lord (d. 1546), was a member of the royal council under James V.; he was also an extraordinary lord of session, high admiral, and warden of the west marches, and was taken prisoner by the English at the rout of Solway Moss in 1542. Robert's grandson John, 7th Lord Maxwell (1553-1503)1 was the second son of Robert, the 5th lord (d. 1552), and his wife Beatrix, daughter of James Douglas, 3rd earl of Morton. After the execution of the regent Morton, the 4th earl, in 1581 this earldom was bestowed upon Maxwell, but in 1586 the attainder of the late earl was reversed and he was deprived of his new title. He had helped in 1585 to drive the royal favourite James Stewart, earl of Arran, from power, and he made active preparations to assist the invading Spaniards in 1588. His son John, the 8th lord {c. 1586-1613), was at feud with the Johnstones, who had killed his father in a skirmish, and with the Douglases over the earldom of Morton, which he regarded as his inheritance. After a life of exceptional and continuous lawlessness he escaped from Scotland and in his absence was sentenced to death; having returned to his native country he was seized and was beheaded in Edinburgh. In 1618 John's brother and heir Robert (d. 1646) was restored to the lordship of Maxwell, and

in 1620 was created earl of Nithsdale, surrendering at this time his claim to the earldom of Morton. He and his son Robert, afterwards the 2nd earl, fought under Montrose for Charles I. during the Civil War. Robert died without sons in October 1667, when a cousin John Maxwell, 7th Lord Herries (d. 1677), became third earl.

William, 5th earl of Nithsdale (1676-1744), a grandson of the third earl, was like his ancestor a Roman Catholic and was attached to the cause of the exiled house of Stuart. In 171 5 he joined the Jacobite insurgents, being taken prisoner at the battle of Preston and sentenced to death. He escaped, however,

from the Tower of London through the courage and devotion of his wife Winifred (d. 1749), daughter of William Herbert, 1st marquess of Powis. He was attainted in 1716 and his titles became extinct, but his estates passed to his son William (d. 1 7 76) , whose descendant, William Constable-Maxwell, regained the title of Lord Herries in 1858. The countess of Nithsdale wrote an account of her husband's escape, which is published in vol. i. of the Transactions of the Society of Antiquaries of Scotland.

A few words may be added about other prominent members of the Maxwell family. John Maxwell (c. 1590-1647), archbishop of Tuam, was a Scottish ecclesiastic who took a leading part in helping Archbishop Laud in his futile attempt to restore the liturgy in Scotland. He was bishop of Ross from 1633 until 1638, when he was deposed by the General Assembly; then crossing over to Ireland he was bishop of Killala and Achonry from 1640 to 1645, and arch-bishop of Tuam from 1645 until his death. James Maxwell of Kirkconnell (c. 1708-1762), the Jacobite, wrote the Narrative of Charles Prince of Wales's Expedition to Scotland in 1745, which was printed for the Maitland Club in 1841. Robert Maxwell (1695-1765) was the author of Select Transactions of the Society of _ Improvers and was a great benefactor to Scottish agriculture. Sir Murray Maxwell (1775-1831), a naval officer, gained much fame by his conduct when his ship the " Alceste " was wrecked in Gaspar Strait in 1817. William Hamilton Maxwell (1792-1850), the Irish novelist, wrote, in addition to several novels, a Life of the Duke of Wellington (1839-1841 and again 1883), and a History of the Irish Rebellion in 179S (1845 and 1891). Sir Herbert Maxwell, 7th bart. (b. 1845), member of parliament for Wigtownshire from 1880 to 1906, and

president of the Society of Antiquaries of Scotland, became well known as a writer, his works including Life and Times of the Right Hon. W. II. Smith (1893); Life of the Duke of Wellington (1899); The House of Douglas (1902) ; Robert the Bruce (1897) and A Duke of Britain (1895).

MAXWELL, JAMES CLERK (1831-1879), British physicist, was the last representative of a younger branch of the well- known Scottish family of Clerk of Penicuik, and was born at Edinburgh on the 13th of November 1831. He was educated at the Edinburgh Academy (1840-1847) and the university of Edinburgh (1 847-1850). Entering at Cambridge in 1850, he spent a term or two at Peterhouse, but afterwards migrated to Trinity. In 1854 he took his degree as second wrangler, and was declared equal with the senior wrangler of his year (E. J. Routh, q.v.) in the higher ordeal of the Smith's prize examination. He held the chair of Natural Philosophy in Marischal College, Aberdeen, from 1856 till the fusion of the two colleges there in i860. For eight years subsequently he held the chair of Physics and Astronomy in King's College, London, but resigned in 1868 and retired to his estate of Glenlair in Kirkcudbrightshire. He was summoned from his seclusion in 187 1 to become the first holder of the newly founded professorship of Experimental Physics in Cambridge; and it was under his direction that the plans of the Cavendish Laboratory were prepared. He superintended every step of the progress of the building and of the purchase of the very valuable collection of apparatus with which it was equipped at the expense of its munificent founder the seventh duke of Devonshire (chancellor of the university, and one of its most distinguished alumni). He died at Cambridge on the 5th of November 1879.

For more than half of his brief life he held a prominent position in the very foremost rank of natural philosophers. His contributions to scientific societies began in his fifteenth year, when Professor J. D. Forbes communicated to the Royal Society of Edinburgh a short paper of his on a mechanical method of tracing Cartesian ovals. In his eighteenth year, while still a student in Edinburgh, he contributed two valuable papers to the Transactions of the same society — one of which, " On the Equilibrium of Elastic Solids," is remarkable, not only on account of its intrinsic power and the youth of its author, but also because in it he laid the foundation of one of the most singular discoveries of his later life, the temporary double refraction produced in viscous liquids by shearing stress. Im- mediately after taking his degree, he read to the Cambridge Philosophical Society a very novel memoir, " On the Trans- formation of Surfaces by Bending." This is one of the few purely mathematical papers he

published, and it exhibited at once to experts the full genius of its author. About the same xvii. 30

time appeared his elaborate memoir, " On Faraday's Lines of Force," in which he gave the first indication of some of those extraordinary electrical investigations which culminated in the greatest work of his life. He obtained in 1859 the Adams prize in Cambridge for a very original and powerful essay, " On the Stability of Saturn's Rings." From 1855 to 1872 he pub- lished at intervals a series of valuable investigations connected with the " Perception of Colour " and " Colour-Blindness," for the earlier of which he received the Rumford medal from the Royal Society in i860. The instruments which he devised for these investigations were simple and convenient, but could not have been thought of for the purpose except by a man whose knowledge was co-extensive with his ingenuity. One of his greatest investigations bore on the " Kinetic Theory of Gases." Originating with D. Bernoulli, this theory was advanced by the successive labours of John Herapath, J. P. Joule, and particularly R. Clausius, to such an extent as to put its general accuracy beyond a doubt; but it received enormous developments from Maxwell, who in this field appeared as an experimenter (on the laws of gaseous friction) as well as a mathematician. He wrote an admirable textbook of the Theory of Heat (187 1), and a very excellent elementary treatise on Matter and Motion (1876).

But the great work of his life was devoted to electricity. He began by reading, with the most profound admiration and attention, the whole of Faraday's extraordinary self-revela- tions, and proceeded to translate the ideas of that master into the succinct and expressive notation of the mathematicians. A considerable part of this translation was accomplished during his career as an undergraduate in Cambridge. The writer had the opportunity of perusing the MS. of " On Faraday's Lines of Force," in a form little different from the final one, a year before Maxwell took his degree. His great object, as it was also the great object of Faraday, was to overturn the idea of action at a distance. The splendid researches of S. D. Poisson and K. F. Gauss had shown how to reduce all the phenomena of statical electricity to mere attractions and repulsions exerted at a distance by particles of an imponderable on one another. Lord Kelvin (Sir W. Thomson) had, in 1846, shown that a totally different assumption, based upon other analogies, led (by its own special mathematical methods) to precisely the same results. He treated the resultant electric force at any point as analo- gous to the flux of heat from sources distributed in the same manner as the supposed electric particles. This paper of Thomson's, whose ideas Maxwell afterwards

developed in an extraordinary manner, seems to have given the first hint that there are at least two perfectly distinct methods of arriving at the known formulae of statical electricity. The step to magnetic phenomena was comparatively simple; but it was otherwise as regards electromagnetic phenomena, where current electricity is essentially involved. An exceedingly ingenious, but highly artificial, theory had been devised by W. E. Weber, which was found capable of explaining all the phenomena investi- gated by Ampere as well as the induction currents of Faraday. But this was based upon the assumption of a distance-action between electric particles, the intensity of which depended on their relative motion as well as on their position. This was, of course, even more repugnant to Maxwell's mind than the statical distance-action developed by Poisson. The first paper of Maxwell's in which an attempt at an admissible physical theory of electromagnetism was made was communicated to the Royal Society in 1867. But the theory, in a fully developed form, first appeared in 1873 in his great treatise on Electricity and Magnetism. This work was one of the most splendid monuments ever raised by the genius of a single individual. Availing himself of the admirable generalized co-ordinate system of Lagrange, Maxwell showed how to reduce all electric and magnetic phenomena to stresses and motions of a material medium, and, as one preliminary, but excessively severe, test of the truth of his theory, he pointed out that (if the electro- magnetic medium be that which is required for the explanation of the phenomena of light) the velocity of light in vacuo should

be numerically the same as the ratio of the electromagnetic and electrostatic units. In fact, the means of the best determi- nations of each of these quantities separately agree with one another more closely than do the various values of either.

One of Maxwell's last great contributions to science was the editing (with copious original notes) of the Electrical Re- searches of the Hon. Henry Cavendish, from which it appeared that Cavendish, already famous by many other researches (such as the mean density of the earth, the composition of water, &c), must be looked on as, in his day, a man of Maxwell's own stamp as a theorist and an experimenter of the very first rank.

In private life Clerk Maxwell was one of the most lovable of men, a sincere and unostentatious Christian. Though perfectly free from any trace of envy or ill-will, he yet showed on fit occasion his contempt for that pseudo-science which seeks for the applause of the ignorant by professing to reduce the whole system of the universe to a fortuitous sequence of uncaused events.

His collected works, including the series of articles on the proper- ties of matter, such as " Atom," " Attraction," " Capillary Action," " Diffusion," " Ether," &c, which he contributed to the gth edition of this encyclopaedia, were issued in two volumes by the Cambridge University Press in 1890; and an extended biography, by his former schoolfellow and lifelong friend Professor Lewis Campbell, was published in 1882. (P. G. T.)

MAXWELLTOWN, a burgh of barony and police burgh of Kirkcudbrightshire, Scotland. Pop. (1001), 5796. It lies on the Nith, opposite to Dumfries, with which it is connected by three bridges, being united with it for parliamentary purposes. It has a station on the Glasgow & South-Western line from Dumfries to Kirkcudbright. Its public buildings include a court-house, the prison for the south-west of Scotland, and an observatory and museum, housed in a disused windmill. The chief manufactures are woollens and hosiery, besides dyeworks and "sawmills. It was a hamlet known as Bridgend up till 1810, in which year it was erected into a burgh of barony under its present name. To the north-west lies the parish of Terregles, said to be a corruption of Tir-eglwys (terra ecclesia, that is, " Kirk land "). The parish contains the beautiful ruin of Lincluden Abbey (see Dumfries), and Terregles House, once the seat of William Maxwell, last earl of Nithsdale. In the parish of Lochrutton, a few miles south-west of Maxwelltown, there is a good example of a stone circle, the " Seven Grey Sisters," and an old peel-tower in the Mains of Hills.

MAY. PHIL (1864-1903), English caricaturist, was born at Wortley, near Leeds, on the 22nd of April 1864, the son of an engineer. His father died when the child was nine years old, and at twelve he had begun to earn his living. Before he was fifteen he had acted as time-keeper at a foundry, had tried to become a jockey, and had been on the stage at Scarborough and Leeds. When he was about seventeen he went to London with a sovereign in his pocket. He suffered extreme want, sleeping out in the parks and streets, until he obtained employment as designer to a theatrical costumier. He also drew posters and cartoons, and for about two years worked for the St Stephen's Review, until he was advised to go to Australia for his

health. During the three years he spent there he was attached to the Sydney Bulletin, for which many of his best drawings were made. On his return to Europe he went to Paris by way of Rome, where he worked hard for some time before he appeared in 1892 in London to resume his interrupted connexion with the St Stephen's Review. His studies of the London " guttersnipe " and the coster-girl rapidly made him famous. His overflowing sense of fun, his genuine sympathy with his subjects, and his kindly wit were on a par with his artistic ability. It was often said that the extraordinary economy of line which was a characteristic feature of his drawings had been forced upon him by the defici- encies of the printing machines of the Sydney Bulletin. It was in fact the result of a laborious process which involved a number of preliminary sketches, and of a carefully considered system of elimination. His later work included some excellent political portraits. He became a regular member of the staff

of Punch in 1896, and in his later years his services were retained exclusively for Punch and the Graphic. He died on the 5th of August 1903.

There was an exhibition of his drawings at the Fine Arts Society in 1895, and another at the Leicester Galleries in 1903. A selection of his drawings contributed to the periodical press and from Phil May's Annual and Phil May's Sketch Books, with a portrait and biography of the artist, entitled The Phil May Folio, appeared in

1903.

MAY, THOMAS (1595-1650), English poet and historian, son of Sir Thomas May of Mayfield, Sussex, was born in 1595. He entered Sidney Sussex College, Cambridge, in 1609, and took his B.A. degree three years later. His father having lost his fortune and sold the family estate, Thomas May, who was hampered by an impediment in his speech, made literature his profession. In 1620 he produced The Heir, an ingeniously con- structed comedy, and, probably about the same time, The Old Couple, which was not printed until 1658. His other dramatic works are classical tragedies on the subjects of Antigone, Cleo- patra, and Agrippina. F. G. Fleay has suggested that the more famous anonymous tragedy of Nero (printed 1624, reprints in A. H. Bullen's Old English Plays and the Mermaid Series) should also be assigned to May. But his most important work in the department of pure literature was his translation (1627) into heroic couplets of the Pharsalia of Lucan. Its success led May to write a continuation of Lucan's narrative down to the death of Caesar. Charles I. became his patron, and commanded him to write metrical

histories of Henry II. and Edward III., which were completed in 1635. When the earl of Pembroke, then lord chamberlain, broke his staff across May's shoulders at a masque, the king took him under his protection as " my poet," and Pembroke made him an apology accompanied with a gift of £50. These marks of the royal favour seem to have led May to expect the posts of poet- laureate and city chronologer when they fell vacant on the death of Ben Jonson in 1637, but he was disappointed, and he forsook the court and attached himself to the party of the Parliament. In 1646 he is styled one of the " secretaries " of the Parliament, and in 1647 he published his best known work, The History of the Long Parliament. In this official apology for the moderate or Presbyterian party, he professes to give an impartial state- ment of facts, unaccompanied by any expression of party or personal opinion. If he refrained from actual invective, he accomplished his purpose, according to Guizot, by " omission, palliation and dissimulation." Accusations of this kind were foreseen by May, who says in his preface that if he gives more information about the Parliament men than their opponents it is that he was more conversant with them and their affairs. In 1650 he followed this with another work written with a more definite bias, a Breviary of the History of the Parliament of England, in Latin and English, in which he defended the position of the Independents. He stopped short of the catastrophe of the king's execution, and it seems likely that his subservience to Cromwell was not quite voluntary. In February 1650 he was brought to London from Weymouth under a strong guard for having spread false reports of the Parliament and of Cromwell. He died on the 13th of November in the same year, and was buried in Westminster Abbey, but after the Restoration his remains were exhumed and buried in a pit in the yard of St Margaret's, Westminster. May's change of side made him many bitter enemies, and he is the object of scathing condemna- tion from many of his contemporaries.

There is a long notice of May in the Biographia Britannica. See also W. J. Courthope, Hist, of Eng. Poetry, vol. 3; and Guizot, Mtudes biographiques sur la revolution d'Angleterre (pp. 403-426, ed.

1851).

MAY, or Mey(e), WILLIAM (d. 1560), English divine, was the brother of John May, bishop of Carlisle. He was educated at Cambridge, where he was a fellow of Trinity Hall, and in 1537, president of Queen's College. May heartily supported the Reformation, signed the Ten Articles in 1536, and helped in the production of The Institution of a Christian Man. He had close

connexion with the diocese of Ely, being

successively chancellor, vicar-general and prebendary. In 1545 he was made a prebendary of St Paul's, and in the following year dean. His favourable report on the Cambridge colleges saved them from dissolution. He was dispossessed during the reign of Mary, but restored to the deanery on Elizabeth's acces- sion. He died on the day of his election to the archbishopric of York.

MAY, the fifth month of our modern year, the third of the old Roman calendar. The origin of the name is disputed; the derivation from Maia, the mother of Mercury, to whom the Romans were accustomed to sacrifice on the first day of this month, is usually accepted. The ancient Romans used on May Day to go in procession to the grotto of Egeria. From the 28th of April to the 2nd of May was kept the festival in honour of Flora, goddess of flowers. By the Romans the month was regarded as unlucky for marriages, owing to the celebration on the 9th, nth and 13th of the Lemuria, the festival of the unhappy dead. This superstition has survived to the present day.

In medieval and Tudor England, May Day was a great public holiday. All classes of the people, young and old alike, were up with the dawn, and went "a-Maying" in the woods. Branches of trees and flowers were borne back in triumph to the towns and villages, the centre of the procession being occupied by those who shouldered the maypole, glorious with ribbons and wreaths. The maypole was usually of birch, and set up for the day only; but in London and the larger towns the poles were of durable wood and permanently erected. They were special eyesores to the Puritans. John Stubbes in his Anatomy of Abuses (1583) speaks of them as those " stinckyng idols," about which the people " leape and daunce, as the heathen did." Maypoles were forbidden by the parliament in 1644, but came once more into favour at the Restoration, the last to be erected in London being that set up in 1661. This pole, which was of cedar, 134 ft. high, was set up by twelve British sailors under the per- sonal supervision of James II., then duke of York and lord high admiral, in the Strand on or about the site of the present church of St Mary's-in-the-Strand. Taken down in 1717, it was conveyed to Wanstead Park in Essex, where it was fixed by Sir Isaac Newton as part of the support of a large telescope, presented to the Royal Society by a French astronomer.

For an account of the May Day survivals in rural England see P. H. Ditchfield, Old English Customs extant at Present Times (1897).

MAY, ISLE OF, an island belonging to Fifeshire, Scotland, at the entrance to the Firth of Forth, 5 m. S.E. of Crail and Anstruther. It has a N.W. to S.E. trend, is more than 1 m. long, and measures at its widest about J m. St Adrian, who had settled here, was martyred by the Danes about the middle of the 9th century. The ruins of the small chapel dedicated to him, which was a favourite place of pilgrimage, still exist. The place where the pilgrims — of whom James IV. was often one — landed is yet known as Pilgrims' Haven, and traces may yet be seen of the various wells of St Andrew, St John, Our Lady, and the Pilgrims, though their waters have become brackish. In 1499 Sir Andrew Wood of Largo, with the "Yellow Carvel " and " Mayflower," captured the English seaman Stephen Bull, and three ships, after a fierce fight which took place between the island and the Bass Rock. In 1636 a coal beacon was lighted on the May and maintained by Alexander Cunningham of Barns. The oil light substituted for it in 1816 was replaced in 1888 by an electric light.

MAYA, an important tribe and stock of American Indians, the dominant race of Yucatan and other states of Mexico and part of Central America at the time of the Spanish conquest. They were then divided into many nations, chief among them being the Maya proper, the Huastecs, the Tzental, the Pokom, the Mame and the Cakchiquel and Quiche. They were spread over Yucatan, Vera Cruz, Tabasco, Campeche, and Chiapas in Mexico, and over the greater part of Guatemala and Salvador. In civilization the Mayan peoples rivalled the Aztecs. Their traditions give as their place of origin the extreme north; thence a migration took place, perhaps at the beginning of the

Christian era. They appear to have reached Yucatan as early as the 5th century. From the evidence of the Quiche chronicles, which are said to date back to about a.d. 700, Guatemala was shortly afterwards overrun. Physically the Mayans are a dark-skinned, round-headed, short and sturdy type. Although they were already decadent when the Spaniards arrived they made a fierce resistance. They still form the bulk of the inhabitants of Yucatan. For their culture, ruined cities, &c. see Central America and Mexico.

MAYAGUEZ, the third largest city of Porto Rico, a seaport, and the seat of government of the department of Mayaguez, on the west coast, at the mouth of Rio Yaguez, about 72 m. W. by S. of San Juan. Pop. of the city (1899), i, including 1381 negroes and 471 1 of mixed races; (1910), 16, 591; of the municipal district, 35,700

(1899), of whom 2687 were negroes and 9933 were of mixed races. Mayaguez is connected by the American railroad of Porto Rico with San Juan and Ponce, and it is served regularly by steamboats from San Juan, Ponce and New York, although its harbour is not accessible to vessels drawing more than 16 ft. of water. It is situated at the foot of Las Mesas mountains and commands picturesque views. The climate is healthy and good water is obtained from the mountain region. From the shipping district along the water-front a thoroughfare leads to the main portion of the city, about 1 m. distant. There are four public squares, in one of which is a statue of Columbus. Prominent among the public buildings are the City Hall (con- taining a public library), San Antonio Hospital, Roman Catholic churches, a Presbyterian church, the court-house and a theatre. The United States has an agricultural experiment station here, and the Insular Reform School is 1 m. south of the city. Coffee, sugar-cane and tropical fruits are grown in the surrounding country; and the business of the city consists chiefly in their export and the import of flour. Among the manufactures are sugar, tobacco and chocolate. Mayaguez was founded about the middle of the 18th century on the site of a hamlet which was first settled about 1680. It was incorporated as a town in 1836, and became a city in 1873. In 1841 it was nearly all destroyed by fire.

MAYAVARAM, a town of British India, in the Tanjore district of Madras, on the Cauvery river; junction on the South Indian railway, 174 m. S.W. of Madras. Pop. (1901), 24,276. Itpossesses a speciality of fine cotton and silk cloth, known as Kornad from the suburb in which the weavers live. During October and November the town is the scene of a great pilgrimage to the holy waters of the Cauvery.

MAYBOLE, a burgh of barony and police burgh of Ayrshire, Scotland. Pop. (1901), 5892. It is situated 9 m. S. of Ayr and 50j m. S.W. of Glasgow by the Glasgow & South- Western railway. It is an ancient place, having received a charter from Duncan II. in 1 193. In 1516 it was made a burgh of regality, but for generations it remained under the subjection of the Kennedys, afterwards earls of Cassillis and marquesses of Ailsa, the most powerful family in Ayrshire. Of old Maybole was the capital of the district of Carrick, and for long its characteristic feature was the family mansions of the barons of Carrick. The castle of the earls of Cassillis still remains. The public buildings include the town-hall, the Ashgrove and the Lumsden fresh-air fortnightly homes, and the Maybole combination poorhouse. The leading manufactures are of boots and shoes and agricultural implements. Two miles to the south-west are the ruins of Crossraguel

(Cross of St Regulus) Abbey, founded about 1240. Kirkoswald, where Burns spent his seventeenth year, learning land-surveying, lies a little farther west. In the parish churchyard lie " Tam o' Shanter " (Douglas Graham) and " Souter Johnnie " (John Davidson). Four miles to the west of Maybole on the coast is Culzean Castle, the chief seat of the marquess of Ailsa, dating from 1777; it stands on a basaltic cliff, beneath which are the Coves of Culzean, once the retreat of outlaws and a resort of the fairies. Farther south are the ruins of Turnberry Castle, where Robert Bruce is said to have been born. A few miles to the north of Culzean are the ruins of Dunure Castle, an ancient stronghold of the Kennedys.

MAYEN, a town of Germany, in the Prussian Rhine province, on the northern declivity of the Eifel range, 16 m. W. from Coblenz, on the railway Andernach-Gerolstein. Pop. (1905), 13,435. It is still partly surrounded by medieval walls, and the ruins of a castle rise above the town. There are some small industries, embracing textile manufactures, oil mills and tanneries, and a trade in wine, while near the town are extensive quarries of basalt. Having been a Roman settlement, Mayen became a town in 1291. In 1689 it was destroyed by the French.

MAYENNE, CHARLES OF LORRAINE, Duke of (1554-1611), second son of Francis of Lorraine, second duke of Guise, was born on the 26th of March 1554. He was absent from France at the time of the massacre of Saint Bartholomew, but took part in the siege of La Rochelle in the following year, when he was created duke and peer of France. He went with Henry of Valois, duke of Anjou (afterwards Henry III.), on his election as king of Poland, but soon returned to France to become the energetic supporter and lieutenant of his brother, the 3rd duke of Guise. In 1577 he gained conspicuous successes over the Huguenot forces in Poitou. As governor of Burgundy he raised his province in the cause of the League in 1585. The assassination of his brothers at Blois on the 23rd and 24th of December 1588 left him. at the head of the Catholic party. The Venetian ambassador, Mocenigo, states that Mayenne had warned Henry III. that there was a plot afoot to seize his person and to send him by force to Paris. At the time of the murder he was at Lyons, where he received a letter from the king saying that he had acted on his warning, and ordering him to retire to his government. Mayenne professed obedience, but immediately made preparations for

marching on Paris. After a vain attempt to recover the persons of those of his relatives who had been arrested at Blois he proceeded to recruit troops in his government of Burgundy and in Champagne. Paris was devoted to the house of Guise and had been roused to fury by the news of the nurder. When Mayenne entered the city in February 1589 he found it dominated by representatives of the sixteen quarters of Paris, all fanatics of the League. He formed a council general to direct the affairs of the city and to maintain relations with the other towns faithful to the League. To this council each quarter sent four representatives, and Mayenne added representatives of the various trades and professions of Paris in order to counterbalance this revolutionary element. He constituted himself " lieutenant-general of the state and crown of France," taking his oath before the parlement of Paris. In April he advanced on Tours. Henry III. in his extremity sought an alliance with Henry of Navarre, and the allied forces drove the leaguers back, and had laid siege to Paris, when the murder of Henry III. by a Dominican fanatic changed the face of affairs and gave new strength to the Catholic party.

Mayenne was urged to claim the crown for himself, but he was faithful to the official programme of the League and pro- claimed Charles, cardinal of Bourbon, at that time a prisoner in the hands of Henry IV., as Charles X. Henry IV. retired to Dieppe, followed by Mayenne, who joined his forces with those of his cousin Charles, duke of Aumale, and Charles de Cosse, comte de Brissac, and engaged the royal forces in a succession of fights in the neighbourhood of Arques (September 1589). He was defeated and out-marched by Henry IV., who moved on Paris, but retreated before Mayenne's forces. In 159Q Mayenne received additions to his army from the Spanish Netherlands, and took the field again, only to suffer complete defeat at Ivry (March 14, 1590). He then escaped to Mantes, and in September collected a fresh army at Meaux, and with the assistance of Alexander Farnese, prince of Parma, sent by Philip II., raised the siege of Paris, which was about to sur- render to Henry IV. Mayenne feared with reason the designs of Philip II., and his difficulties were increased by the death of Charles X., the " king of the league." The extreme section of the party, represented by the Sixteen, urged him to proceed to the election of a Catholic king and to accept the help and the claims of their Spanish allies. But Mayenne,

who had not the popular gifts of his brother, the duke of Guise, had no sympathy with the demagogues, and himself inclined to the moderate side of his party, which began to urge reconcilia- tion with Henry IV. He maintained the ancient forms of the constitution

against the revolutionary policy of the Sixteen, who during his absence from Paris took the law into their own hands and in November 1591 executed one of the leaders of the more moderate party, Barnabe Brisson, president of the parle- ment. He returned to Paris and executed four of the chief malcontents. The power of the Sixteen diminished from that time, but with it the strength of the League. 1

Mayenne entered into negotiations with Henry IV. while he was still appearing to consider with Philip II. the succession to the French crown of the Infanta Elizabeth, granddaughter, through her mother Elizabeth of Valois, of Henry II. He demanded that Henry IV. should accomplish his conversion to Catholicism before he was recognized by the leaguers. He also desired the continuation to himself of the high offices which had accumu- lated in his family and the reservation of their provinces to his relatives among the leaguers. In 1593 he summoned the States General to Paris and placed before them the claims of the Infanta, but they protested against foreign intervention. Mayenne signed a truce at La Villette on the 31st of July 1593. The internal dissensions of the league continued to increase, and the principal chiefs submitted. Mayenne finally made his peace only in October iS95- Henry IV. allowed him the possession of Chalon-sur-Saone, of Seurre and Soissons for three years, made him governor of the Isle of France and paid a large indemnity. Mayenne died at Soissons on the 3rd of October 1 6 1 1 .

A Histoire de la vie et de la mart du due de Mayenne appeared at Lyons in 1618. See also J. B. H. Capefigue, Hist, de la Reforme, de la ligue et du regne de Henri IV. (8 vols., 1 834-1 835) and the literature dealing with the house of Guise (q.v.).

MAYENNE, a department of north-western France, three- fourths of which formerly belonged to Lower Maine and the remainder to Anjou, bounded on the N. by Manche and Orne, E. by Sarthe, S. by Maine-et-Loire and W. by Ille-et-Vilaine. Area, 2012 sq. m. Pop. (1906), 305,457. Its ancient geological formations connect it with Brittany. The surface is agreeably undulating; forests are numerous, and the beauty of the culti- vated portions is enhanced by the hedgerows and lines of trees by which the farms are divided. The highest point of the department, and indeed of the whole north-west of France, is the Mont des Avaloirs (1368 ft.). Hydrographically Mayenne belongs to the basins of the Loire, the Vilaine and the Selune, the first mentioned draining by far the larger part of the entire area. The principal stream is the Mayenne, which passes successively from north to south through Mayenne, Laval and

Chateau-Gontier; by means of weirs and sluices it is navi- gable below Mayenne, but traffic is inconsiderable. The chief affluents are the Jouanne on the left, and on the right the Colmont, the Ernee and the Oudon. A small area in the east of the department drains by the Erve into the Sarthe; the Vilaine rises in the west, and in the north-west two small rivers flow into the Selune. The climate of Mayenne is generally healthy except in the neighbourhood of the numerous marshes. The temperature is lower and the moisture of the atmosphere greater than in the neighbouring departments; the rainfall (about 32 in. annually) is above the average for France.

Agriculture and stock-raising are prosperous. A large number of horned cattle are reared, and in no other French department are

'The estates of the League in 1593 were the occasion of the famous Satire Menippee, circulated in MS. in that year, but only printed at Tours in 1594. It was the work of a circle of men of letters who belonged to the politiques or party of the centre and ridiculed the League. The authors were Pierre Le Roy, Jean Passerat, Florent Chrestien, Nicolas Rapin and Pierre Pithou. It opened with " La vertu du catholicon," in which a Spanish quack (the cardinal of Plaisance) vaunts the virtues of his drug " catholicon composed" manufactured in the Escurial, while a Lorrainer rival (the cardinal of Pellev6) tries to sell a rival cure. A mock account of the estates, with harangues delivered by Mayenne and the other chiefs of the League, followed. Mayenne's discourse is said to have been written by the jurist Pithou.

so many horses found within the same area ; the breed, that of Craon, is famed for its strength. Craon has also given its name to the most prized breed of pigs in western France. Mayenne produces excellent butter and poultry and a large quantity of honey. The cultivation of the vine is very limited, and the most common beverage is cider. Wheat, oats, barley and buckwheat, in the order named, are the most important crops, and a large quantity of flax and hemp is produced. Game is abundant. The timber grown is chiefly beech, oak, birch, elm and chestnut. The department produces antimony, auriferous quartz and coal. Marble, slate and other stone are quarried. There are several chalybeate springs. The industries include flour-milling, brick and tile making, brewing, cotton and wool spinning, and the production of various textile fabrics (especi- ally ticking) for which Laval and Chateau-Gontier are the centres,

agricultural implement making, wood and marble sawing, tanning and dyeing. The exports include agricultural produce, live-stock, stone and textiles; the chief imports are coal, brandy, wine, furniture and clothing. The department is served by the Western railway. It forms part of the circumscriptions of the IV. army corps, the academie (educational division) of Rennes, and the court of appeal of Angers. It comprises three arrondissements (Laval, Chateau-Gontier and Mayenne), with 27 cantons and 276 communes. Laval, the capital, is the seat of a bishopric of the province of Tours. The other principal towns are Chateau-Gontier and Mayenne, which are treated under separate headings. The following places are also of interest : Evron, which has a church of the 12th and 13th centuries; Jublains, with a Roman fort and other Roman remains; Lassay, with a fine chateau of the 14th and 16th centuries; and Ste Suzanne, which has remains of medieval ramparts and a fortress with a keep of the Romanesque period.

MAYENNE, a town of north-western France, capital of an arrondissement in the department of Mayenne, 19 m. N.N.E. of Laval by rail. Pop., town 7003, commune 10,020. Mayenne is an old feudal town, irregularly built on hills on both sides of the river Mayenne. Of the old castle overlooking the river several towers remain, one of which has retained its conical roof; the vaulted chambers and chapel are ornamented in the style of the 13th century; the building is now used as a prison. The church of Notre-Dame, beside which there is a statue of Joan of Arc, dates partly from the 12th century; the choir was rebuilt in the igth century. In the Place de Cheverus is a statue, by David of Angers, to Cardinal Jean de Cheverus (1 768-1836), who was born in Mayenne. Mayenne has a subprefecture, tribunals of first instance and of commerce, a chamber of arts and manufactures, and a board of trade- arbitration. There is a school of agriculture in the vicinity. The chief industry of the place is the manufacture of tickings, linen, handkerchiefs and calicoes.

Mayenne had its origin in the castle built here by Juhel, baron of Mayenne, the son of Geoffrey of Maine, in the beginning of the nth century. It was taken by the English in 1424, and several times suffered capture by the opposing parties in the wars of religion and the Vendee. At the beginning of the 16th century the territory passed to the family of Guise, and in 1573 was made a duchy in favour of Charles of Mayenne, leader of the League.

MAYER, JOHANN TOBIAS (1723-1762), German astronomer, was born at Marbach, in Wurtemberg, on the 17th of February 1723, and

brought up at Esslingen in poor circumstances. A self-taught mathematician, he had already published two original geometrical works when, in 1746, he entered J. B. Homann's cartographic establishment at Nuremberg. Here he introduced many improvements in map-making, and gained a scientific reputation which led (in 1751) to his election to the chair of economy and mathematics in the university of Gdttingen. In 1754 he became superintendent of the observatory, where he laboured with great zeal and success until his death, on the 20th of February 1762. His first im- portant astronomical work was a careful investigation of the libration of the moon (Kosmographische Nachrichten, Nuremberg, 1750), and his chart of the full moon (published in 1775) was unsurpassed for half a century. But his fame rests chiefly on his lunar tables, communicated in 1752, with new solar tables, to the Royal Society of Gottingen, and published in their Transactions (vol. ii.). In 1755 he submitted to the English government an amended body of MS. tables, which James Bradley compared with the Greenwich observations, and found to be sufficiently accurate to determine the moon's place to

75", and consequently the longitude at sea to about half a degree. An improved set was afterwards published in London (1770), as also the theory {Theoria lunae juxla systema Newlon- ianum, 1767) upon which the tables are based. His widow, by whom they were sent to England, received in consideration from the British government a grant of £3000. Appended to the London edition of the solar and lunar tables are two short tracts — the one on determining longitude by lunar distances, together with a description of the repeating circle (invented by Mayer in 1752), the other on a formula for atmospheric refraction, which applies a remarkably accurate correction for temperature.

Mayer left behind him a considerable quantity of manuscript, part of which was collected by G. C. Lichtenberg and published in one volume {Opera inedita, Gottingen, 1775). It contains an easy and accurate method for calculating eclipses; an essay on colour, in which three primary colours are recognized; a catalogue of 998 zodiacal stars; and a memoir, the earliest of any real value, on the proper motion of eighty stars, originally communicated to the Gottingen Royal Society in 1760. The manuscript residue includes papers on atmospheric refraction (dated 1755), on the motion of Mars as affected by the perturba- tions of Jupiter and the Earth (1756), and on terrestrial magnet- ism (1760 and 1762). In these last Mayer sought to explain the magnetic action of the earth by a modification of Euler's hypothesis, and made the first really definite

attempt to establish a mathematical theory of magnetic action (C. Hansteen, Magnetismus der Erde, i. 283). E. Klinkerfuss published in 1 88 1 photo-lithographic reproductions of Mayer's local charts and general map of the moon; and his star-catalogue was re-edited by F. Baily in 1830 (Memoirs Roy. Astr. Soc. iv. 391) and by G. F. J. A. Auvers in 1894.

Authorities. — A. G. Kastner, Plagium Tobiae Mayeri (Gottingen, 1762) ; Connaissance des temps, 1767, p. 187 (J. Lalande) ; Monatliche Corresponded viii. 257, ix. 45, 415, 487, xi. 462; Allg. Geographische Ephemeriden iii. 116, 1799 (portrait) ; Berliner Astr. Jahrbuch, Suppl. Bd. iii. 209, 1797 (A. G. Kastner) ; J. B. J. Delambre, Hist, de I Astr. au XVllK siecle, p. 429; R. Grant, Hist, of Phys. Astr. pp. 46, 488, 555; A. Berry, Short Hist, of Astr. p. 282; J. S. Putter, Geschichte von der Universitdt zu Gottingen, i. 68; J. Gehler, Physik. Worterbuch neu bearbeitet, vi. 746, 1039: Allg. Deutsche Biographie (S. Gtinther).

(A. M. C.)

MAYER, JULIUS ROBERT (1814-1878), German physicist, was born at Heilbronn on the 25th of November 1814, studied medicine at Tubingen, Munich and Paris, and after a journey to Java in 1840 as surgeon of a Dutch vessel obtained a medical post in his native town. He claims recognition as an indepen- dent a priori propounder of the " First Law of Thermodynamics," but more especially as having early and ably applied that law to the explanation of many remarkable phenomena, both cos- mical and terrestrial. His first little paper on the subject, " Betnerkungen tiber die Krafte der unbeleblen Natur," appeared in 1842 in Liebig's Annalen, five years after the republication, in the same journal, of an extract from K. F. Mohr's paper on the nature of heat, and three years later he published Die organ- ische Bewegung in ihren Zusammenhange mit dem Stoffwechsel.

It has been repeatedly claimed for Mayer that he calculated the value of the dynamical equivalent of heat, indirectly, no doubt, but in a manner altogether free from error, and with a result according almost exactly with that obtained by J. P. Joule after years of patient labour in direct experimenting. This claim on Mayer's behalf was first shown to be baseless by W. Thomson (Lord Kelvin) and P. G. Tait in an article on " Energy," published in Good Words in 1862, which gave rise to a long but lively discussion. A calm and judicial annihilation of the claim is to be found in a brief article by Sir G. G. Stokes, Proc. Roy. Soc, 1871, p. 54. See also Maxwell's Theory of

Heat, chap. xiii. Mayer entirely ignored the grand fundamental principle laid down by Sadi Carnot — that nothing can be concluded as to the relation between heat and work from an experiment in which the working substance is left at the end of an operation in a different physical state from that in which it was at the commencement. Mayer has also been styled the discoverer of the fact that heat consists in (the energy of) motion, a matter settled at the very end of the 18th century by Count Rumford and Sir H. Davy; but in the teeth of this statement we have Mayer's own words, " We might much rather assume the contrary — that in order to become heat motion must cease to be motion."

Mayer's real merit consists in the fact that, having for himself made out, on inadequate and even questionable grounds, the conservation of energy, and having obtained (though by inaccurate reasoning) a numerical result correct so far as his data permitted, he applied the principle with great power and insight to the explanation of numerous physical phenomena. His papers, which were republished in a single volume with the title Die Mechanik_ der Wdrme (3rd ed., 1893), are of unequal merit. But some, especially those on Celestial Dynamics and Organic Motion, are admirable examples of what really valuable work may be effected by a man of high intellectual powers, in spite of imperfect information and defective logic.

Different, and it would appear exaggerated, estimates of Mayer are given in John Tyndall's papers in the Phil. Mag., 1863-1864 (whose avowed object was " to raise a noble and a suffering man to the position which his labours entitled him to occupy "), and in E. Duhring's Robert Mayer, der Galilei des neunzehnten Jahrhunderts, Chemnitz, 1 880. Some of the simpler facts of the case are summarized by Tait in the Phil. Mag., 1864, ii. 289.

MAYFLOWER, the vessel which carried from Southampton, England, to Plymouth, Massachusetts, the Pilgrims who estab- lished the first permanent colony in New England. It was of about 180 tons burden, and in company with the " Speedwell " sailed from Southampton on the 5th of August 1620, the two having on board 120 Pilgrims. After two trials the " Speedwell " was pronounced unseaworthy, and the " Mayflower " sailed alone from Plymouth, England, on the 6th of September with the 100 (or 102) passengers, some 41 of whom on

the nth of November (o.s.) signed the famous " Mayflower Compact " in Provincetown Harbor, and a small party of whom, including William Bradford, sent to choose a place for settlement, landed at what is now Plymouth, Massachusetts, on the nth of Decem- ber (21st n.s.), an event which is celebrated, as Forefathers' Day, on the 22nd of December. A " General Society of May- flower Descendants " was organized in 1894 by lineal descen- dants of passengers of the " Mayflower " to " preserve their memory, their records, their history, and all facts relating to them, their ancestors and their posterity." Every lineal descen- dant, over eighteen years of age, of any passenger of the " May- flower " is eligible to membership. Branch societies have since been organized in several of the states and in the District of Columbia, and a triennial congress is held in Plymouth.

See Azel Ames, The May-Flower and Her Log (Boston, 1901); Blanche McManus, The Voyage of the Mayflower (New York, 1897); The General Society of Mayflower: Meetings, Officers and Members, arranged in State Societies, Ancestors and their Descendants (New York, 1901). Also the articles Plymouth, Mass. ; Massachusetts, § History; Pilgrim; and Provincetown, Mass.

MAY-FLY. The Mayflies belong to the Ephemeridae, a remarkable family of winged insects, included by Linnaeus in his order Neuroptera, which derive their scientific name from irinepos, in allusion to their very short lives. In some species it is possible that- they have scarcely more than one day's exis- tence, but others are far longer lived, though the extreme limit is probably rarely more than a week. The family has very sharply defined characters, which separate its members at once from all other neuropterous (or pseudo-neuropterous) groups.

These insects are universally aquatic in their preparatory states. The eggs are dropped into the water by the female in large masses, resembling, in some species, bunches of grapes in miniature. Probably several months elapse before the young larvae are excluded. The sub-aquatic condition lasts a consider- able time: in Cloeon, a genus of small and delicate species, Sir J. Lubbock (Lord Avebury) proved it to extend over more than six months; but in larger and more robust genera (e.g. Palingenia) there appears reason to believe that the greater part of three years is occupied in preparatory conditions.

The larva is elongate and campodeiform. The head is rather large, and is furnished at first with five simple eyes of nearly equal size;

but as it increases in size the homologues of the facetted eyes of the imago become larger, whereas those equivalent to the ocelli remain small. The antennae are long and thread-like, composed at first of few joints, but the number of these latter apparently in- creases at each moult. The mouth parts are well developed, consist- ing of an upper lip, powerful mandibles, maxillae with three-jointed palpi, and a deeply quadrifid labium or lower lip with three-jointed labial palpi. Distinct and conspicuous maxillulae are associated with the tongue or hypopharynx. There are three distinct and large

thoracic segments, whereof the prothorax is narrower than the others; the legs are much shorter and stouter than in the winged insect, with monomerous tarsi terminated by a single claw. The abdomen consists of ten segments, the tenth furnished with long and slender multi-articulate tails, which appear to be only two in number at first, but an intermediate one gradually develops itself (though this latter is often lost in the winged insect). Respiration is effected by means of external gills placed along both sides of the dorsum of the abdomen and hinder segments of the thorax. These vary in form : in some species they are entire plates, in others they are cut up into numerous divisions, in all cases traversed by numerous tracheal ramifications. According to the researches of Lubbock and of E. Joly, the very young larvae have no breathing organs, and respiration is effected through the skin. Lubbock traced at least twenty moults in Cloeon ; at about the tenth rudiments of the wing- cases began to appear. These gradually become larger, and when so the creature may be said to have entered its " nymph " stage; but there is no condition analogous to the pupa-stage of insects with complete metamorphoses.

There may be said to be three or four different modes of life in these larvae : some are fossorial, and form tubes in the mud or clay in which they live; others are found on or beneath stones; while others again swim and crawl freely among water plants. It is probable that some are carnivorous, either attacking other larvae or subsisting on more minute forms of animal life; but others perhaps feed more exclusively on vegetable matters of a low type, such as diatoms.

The most aberrant type of larva is that of the genus Prosopistoma, which was originally described as an entomostracous crustacean on account of the presence of a large carapace overlapping the greater part of the body. The dorsal skeletal elements of the thorax and of the anterior six abdominal segments unite with the wing-cases to form a large respiratory chamber, containing five pairs of tracheal gills, with lateral slits for the inflow and a posterior orifice for the

outflow of water. Species of this genus occur in Europe, Africa and Madagascar.

When the aquatic insect has reached its full growth it emerges from the water or seeks its surface; the thorax splits down the back and the winged form appears. But this is not yet perfect, although it has all the form of a perfect insect and is capable of flight; it is what is variously termed a " pseud- imago," " sub-imago " or " pro-imago." Contrary to the habits of all other insects, there yet remains a pellicle that has to be shed, covering every part of the body. This final moult is effected soon after the insect's appearance in the winged form; the creature seeks a temporary resting-place, the pellicle splits down the back, and the now perfect insect comes forth, often differing very greatly in colours and markings from the condition in which it was only a few moments before. If the observer takes up a suitable position near water, his coat is often seen to be covered with the cast sub-imaginal skins of these insects, which had chosen him as a convenient object upon which to undergo their final change. In some few genera of very low type it appears probable that, at any rate in the female, this final change is never effected and that the creature dies a sub-imago.

The winged insect differs considerably in form from its sub-aquatic condition. The head is smaller, often occupied almost entirely above in the male by the very large eyes, which in some species are curiously double in that sex, one portion being pillared, and forming what is termed a " turban," the mouth parts are aborted, for the creature is now incapable of taking nutriment either solid or fluid; the antennae are mere short bristles, consisting of two rather large basal joints and a multi-articulate thread. The prothorax is much narrowed, whereas the other segments (especially the mesothorax) are greatly enlarged ; the legs long and slender, the anterior pair often very much longer in the male than in the female; the tarsi four- or five-jointed; but in some genera (e.g. Oligoneuria and allies) the legs are aborted, and the creatures are driven helplessly about by the wind. The wings are carried erect : the anterior pair large, with numerous longitudinal nervures, and usually abundant trans- verse reticulation ; the posterior pair very much smaller, often lance-olate, and frequently wanting absolutely. The abdomen consists of ten segments ; at the end are either two or three long multi-articulate tails; in the male the ninth joint bears forcipated appendages; in the female the oviducts terminate at the junction of the seventh and eighth ventral segments. The independent opening of the genital ducts and the absence of an ectodermal vagina and ejacula- tory duct are remarkable archaic features of these insects, as has been pointed out

by J. A. Palmen. The sexual act takes place in the air, and is of very short duration, but is apparently repeated several times, at any rate in some cases.

Ephemeridae are found all over the world, even up to high northern latitudes. F. J. Pictet, A. E. Eaton and others have

given us valuable works or monographs on the family; but the subject still remains little understood, partly owing to the great difficulty of preserving such delicate insects; and it appears probable they can only be satisfactorily investigated as moist preparations. The number of described species is less than 200, spread over many genera.

From the earliest times attention has been drawn to the enor- mous abundance of species of the family in certain localities. Johann Anton Scopoli, writing in the 18th century, speaks of them as so abundant in one place in Carniola that in June twenty cart- loads were carried away for manure! Polymitarcys virgo, which, though not found in England, occurs in many parts of Europe (and is common at Paris), emerges from the water soon after sunset, and continues for several hours in such myriads as to resemble snow showers, putting out lights, and causing incon- venience to man, and annoyance to horses by entering their nostrils. In other parts of the world they have been recorded in multitudes that obscured passers-by on the other side of the street. And similar records might be multiplied almost to any extent. In Britain, although they are often very abundant, we have scarcely anything analogous.

Fish, as is well known, devour them greedily, and enjoy a veritable feast during the short period in which any particular species appears. By anglers the common English species of Ephemera (vulgata and danica, but more especially the latter, which is more abundant) is known as the " may-fly," but the terms " green drake " and " bastard drake " are applied to conditions of the same species. Useful information on this point will be found in Ronalds's Fly-Fisher's Entomology, edited by Westwood.

Ephemeridae belong to a very ancient type of insects, and fossil imprints of allied forms occur even in the Devonian and .Carboniferous formations.

There is much to be said in favour of the view entertained by some

entomologists that the structural and developmental characteristics of may-flies are sufficiently peculiar to warrant the formation for them of a special order of insects, for which the names Agnatha, Plectoptera and Ephemeroptera have been proposed. (See Hexapoda, Neuroptera.)

Bibliography. — Of especial value to students of these insects are A. E. Eatoti's monograph {Trans. Linn. Soc. (2) iii. 1883-1885) and A. Vayssiere's " Recherches sur 1′ organisation des larves " {Ann. Sci. Nat. Zaol. (6) xiii. 1882 (7) ix. 1890). J. A. Palmen's memoirs Zur Morphologie des Tracheensy stents (Leipzig, 1877) and Uber paarige Ausfuhrungsgdnge der Geschlechtsorgane bei Insekten (Helsing- fors, 1884), contain important observations on may-flies. See also L. C. Miall, Nat. Hist. Aquatic Insects (London, 1895); J. G. Need- ham and others (New York State Museum, Bull. 86, 1905).

(R. McL.; G. H. C.)

MAYHEM (for derivation see Maiming), an old Anglo-French term of the law signifying an assault whereby the injured person is deprived of a member proper for his defence in fight, e.g. an arm, a leg, a fore tooth, &c. The loss of an ear, jaw tooth, &c, was not mayhem. The most ancient punishment in English law was retaliative — membrum pro membro, but ulti- mately at common law fine and imprisonment. Various statutes were passed aimed at the offence of maiming and disfiguring, which is now dealt with by section 18 of the Offences against the Person Act 1861. Mayhem may also be the ground of a civil action, which had this peculiarity that the court on sight of the wound might increase the damages awarded by the jury.

MAYHEW, HENRY (1812-1887), English author and jour- • nalist, son of a London solicitor, was born in 181 2. He was sent to Westminster school, but ran away to sea. He sailed to India, and on his return studied law for a short time under his father. He began his journalistic career by founding, with Gilbert a Beckett, in 1831, a weekly paper, Figaro in London. This was followed in 1832 by a short-lived paper called The Thief; and he produced one or two successful farces. His brothers Horace (1816-1872) and Augustus Septimus (1826-1875) were also journalists, and with them Henry occasionally collaborated, notably with the younger in The Greatest Plague of Life (1847) and in Acting Charades (1850). In 1841 Henry Mayhew was

one of the leading spirits in the foundation of Punch, of which he was for the first two years joint-editor with Mark Lemon. He afterwards wrote on all kinds of subjects, and published a number of volumes of no permanent reputation — humorous stories, travel and practical handbooks. He is credited with being the first to " write up " the poverty side of London life from a philan- thropic point of view; with the collaboration of John Binny and others he published London Labour and London Poor (1851 ; com- pleted 1864) and other works on social and economic questions. He died in London, on the 25th of July 1887. Horace Mayhew was for some years sub-editor of Punch, and was the author of several humorous publications and plays. The books of Horace and Augustus Mayhew owe their survival chiefly to Cruikshank's illustrations.

MAYHEW, JONATHAN (1720-1766), American clergyman, was born at Martha's Vineyard on the 8th of October 1720, being fifth in descent from Thomas Mayhew (1 592-1682), an early settler and the grantee (1641) of Martha's Vineyard. Thomas Mayhew (c. 1616-1657), the younger, his son John (d. 1689) and John's son,

Experience (1673-1758), were active missionaries among the Indians of Martha's Vineyard and the vicinity. Jonathan, the son of Experience, graduated at Harvard in 1744. So liberal were his theological views that when he was to be or- dained minister of the West Church in Boston in 1 747 only two ministers attended the first council called for the ordination, and it was necessary to summon a second council. Mayhew's preaching made his church practically the first " Unitarian " Congregational church in New England, though it was never officially Unitarian. In 1763 he published Observations on the Charter and Conduct of the Society for Propagating the Gospel in Foreign Parts, an attack on the policy of the society in sending missionaries to New England contrary to its original purpose of " Maintaining Ministers of the Gospel " in places " wholly des- titute and unprovided with means for the maintenance of minis- ters and for the public worship of God; " the Observations marked him as a leader among those in New England who feared, as Mayhew said (1762), "that there is a scheme forming for sending a bishop into this part of the country, and that our Governor, 1 a true churchman, is deeply in the plot." To an American reply to the Observations, entitled A Candid Examina- tion (1763), Mayhew wrote a Defense; and after the publication of an Answer, anonymous-ly published in London in 1764 and written by Thomas Seeker, archbishop of Canterbury, he wrote a Second Defense. He bitterly opposed the Stamp Act, and urged the necessity of colonial union (or " communion ") to secure colonial liberties. He died on the 9th of July 1766. Mayhew was Dudleian lecturer at Harvard in 1765, and in 1749 had received the degree of D.D. from the University of Aberdeen.

See Alden Bradford, Memoir of the Life and Writings of Rev. Jonathan Mayhew (Boston, 1838), and " An Early Pulpit Champion of Colonial Rights," chapter vi., in vol. i. of M. C. Tyler's Literary History of the American Revolution (2 vols., New York, 1897).

MAYHEW, THOMAS, English 18th century cabinet-maker. Mayhew was the less distinguished partner of William Ince (q.v.). The chief source of information as to his work is supplied by his own drawings in the volume of designs, The universal system of household furniture, which he published in collaboration with his partner. The name of the firm appears to have been Mayhew and Ince, but on the title page of this book the names are reversed, perhaps as an indication that Ince was the more extensive con- tributor. In the main Mayhew's designs are heavy and clumsy, and often downright extravagant, but he had a certain lightness of accomplishment in his applications of the bizarre Chinese style. Of original talent he

possessed little, yet it is certain that much of his Chinese work has been attributed to Chippendale. It is indeed often only by reference to books of design that the respective work of the English cabinet-makers of the second half of the 1 8th century can be correctly attributed.

MAYMYO, a hill sanatorium in India, in the Mandalay district of Upper Burma, 3500 ft. above the sea, with a station on the

1 Francis Bernard, whose project for a college at Northampton seemed to Mayhew and others a move to strengthen Anglicanism.

Mandalay-Lashio railway 422 m. from Rangoon. Pop. (1901), 6223. It consists of an undulating plateau, surrounded by hills, which are covered with thin oak forest and bracken. Though not entirely free from malaria, it has been chosen for the summer residence of the lieutenant-governor; and it is also the permanent headquarters of the lieutenant-general commanding the Burma division, and of other officials.

MAYNARD, FRANCOIS DE (1582-1646), French poet, was born at Toulouse in 1582. His father was conseiller in the parle- ment of the town, and Francois was also trained for the law, becoming eventually president of Aurillac. He became secre- tary to Margaret of Valois, wife of Henry IV., for whom his early poems are written. He was a disciple of Malherbe, who said that in the workmanship of his lines he excelled Racan, but lacked his rival's energy. In 1634 he accompanied the Cardinal de Noailles to Rome and spent about two years in Italy. On his return to France he made many unsuccessful efforts to obtain the favour of Richelieu, but was obliged to retire to Toulouse. He never ceased to lament his exile from Paris and his inability to be present at the meetings of the Academy, of which he was one of the earliest members. The best of his poems is in imitation of Horace, " Alcippe, reviens dans nos bois." He died at Toulouse on the 23rd of December 1646.

His works consist of odes, epigrams, songs and letters, and were published in 1646 by Marin le Roy de Gomberville.

MAYNE, JASPER (1604-1672), English author, was baptized at Hatherleigh, Devonshire, on the 23rd of November 1604. He was educated at Westminster School and at Christ Church, Oxford, where

he had a distinguished career. He was presented to two college livings in Oxfordshire, and was made D.D. in 1646. During the Commonwealth he was dispossessed,' and became chaplain to the duke of Devonshire. At the Restoration he was made canon of Christ Church, archdeacon of Chichester and chaplain in ordinary to the king. He wrote a farcical domestic comedy, The City Match (1639), which is reprinted in vol. xiii. of Hazlitt's edition of Dodsley's Old Plays, and a fantastic tragi-comedy entitled The Amorous War (printed 1648). After receiving ecclesiastical preferment he gave up poetry as unbe- fitting his profession. His other works comprise some occasional gems, a translation of Lucian's Dialogues (printed 1664) and a number of sermons. He died on the 6th of December 1672 at Oxford.

MAYNOOTH, a small town of county Kildare, Ireland, on the Midland Great Western railway and the Royal Canal, 15 m. W. by N. of Dublin. Pop. (1901), 948. The Royal Catholic College of Maynooth, founded by an Act of the Irish parliament in 1795, is the chief seminary for the education of the Roman Catholic clergy, of Ireland. The building is a fine Gothic struc- ture by A. W. Pugin, erected by a parliamentary grant obtained in 1846. The chapel, with fine oak choir-stalls, mosaic pave- ments, marble altars and stained glass, and with adjoining cloisters, was dedicated in 1890. The average number of students is about 500 — the number specified under the act of 1845 — and the full course of instruction is eight years. Near the college stand the ruins of Maynooth Castle, probably built in 1 1 76, but subsequently extended, and formerly the residence of the Fitzgerald family. It was besieged in the reigns of Henry VIII. and Edward VI., and during the Cromwellian Wars, when it was demolished. The beautiful mansion of Carton is about a mile from the town.

MAYO, RICHARD SOUTHWELL BOURKE, 6th Earl of (1822-1872), British statesman, son of Robert Bourke, the 5th earl (1797-1867), was born in Dublin on the 21st of February, 1822, and was educated at Trinity College, Dublin. After travelling in Russia he entered parliament, and sat successively for Kildare, Coleraine and Cockermouth. He was chief secretary for Ireland in three administrations, in 1852, 1858 and 1866, and was appointed viceroy of India in January 1869. He consoli- dated the frontiers of India and met Shere Ali, amir of Afghanis- tan, in durbar at Umballa in March 1869. His reorganization of the finances of the country put India on a paying basis; and he did much to promote irrigation, railways, forests and other

useful public works. Visiting the convict settlement at Port Blair in the Andaman Islands, for the purpose of inspection, the viceroy was assassinated by a convict on the 8th of February 1872. His successor was his son, Dermot Robert Wyndham Bourke (b. 1851) who became 7th earl of Mayo.

See Sir W. W. Hunter, Life of the Earl of Mayo, (1876), and The Earl of Mayo in the Rulers of India Series (1891).

MAYO, a western county of Ireland, in the province of Connaught, bounded N. and W. by the Atlantic Ocean, N.E. by Sligo, E. by Roscommon, S.E. and S. by Galway. The area is 1,380,390 acres, or about 2157 sq. m., the county being the largest in Ireland after Cork and Galway. About two-thirds of the boundary of Mayo is formed by sea', and the coast is very much indented, and abounds in picturesque scenery. The principal inlets are Killary Harbour between Mayo and Galway; Clew Bay, in which are the harbours of Westport and Newport; Blacksod Bay and Broad Haven, which form the peninsula of the Mullet; and Killala Bay between Mayo and Sligo. The islands are very numerous, the principal being Inishturk, near Killary Harbour; Clare Island, at the mouth of Clew Bay, where there are many islets, all formed of drift; and Achill, the largest island off Ireland. The coast scenery is not surpassed by that of Donegal northward and Connemara southward, and there are several small coast-towns, among which may be named Killala on the north coast, Belmullet on the isthmus between Blacksod Bay and Broad Haven, Newport and Westport on Clew Bay, with the watering-place of Mallaranny. The majestic cliffs of the north coast, however, which reach an extreme height in Benwee Head (892 ft.), are difficult of access and rarely visited. In the eastern half of the county the surface is comparatively level, with occasional hills; the western half is mountainous. Mweelrea (2688 ft.) is included in a mountain range lying between Killary Harbour and Lough Mask. The next highest summits are Nephin (2646 ft.), to the west of Lough Conn, and Croagh Patrick (2510 ft.), to the south of Clew Bay. The river Moy flows northwards, forming part of the boundary of the county with Sligo, and falls into Killala Bay. The courses of the other streams are short, and except when swollen by rains their volume is small. The principal lakes are Lough Mask and Lough Corrib, on the borders of the county with Galway, and Loughs Conn in the east, Carrowmore in the north-west, Beltra in the west, and Carra adjoining Lough Mask. These loughs and the smaller loughs, with the streams generally, afford admirable sport with salmon, sea-trout and brown trout, and Ballina is a favourite centre.

Geology: — The wild and barren west of this county, including the great hills on Achill Island, is formed of " Dalradian " rocks, schists and quartzites, highly folded and metamorphosed, with intrusions of granite near Belmullet. At Blacksod Bay the granite has been quarried as an ornamental stone. Nephin Beg, Nephin and Croagh Patrick are typical quartzite summits, the last named belonging possibly to a Silurian horizon but rising from a metamorphosed area on the south side of Clew Bay. The schists and gneisses of the Ox Mountain axis also enter the county north of Castlebar. The Muilrea and Ben Gorm range, bounding the fine fjord of Killary Harbour, is formed of terraced Silurian rocks, from Bala to Ludlow age. These beds, with intercalated lavas, form the mountainous west shore of Lough Mask, the east, like that of Lough Corrib, being formed of low Carboniferous Limestone ground. Silurian rocks, with Old Red Sandstone over them, come out at the west end of the Curlew range at Ballaghaderreen. Clew Bay, with its islets capped by glacial drift, is a submerged part of a synclinal of Carbo- niferous strata, and Old Red Sandstone comes out on the north side of this, from near Achill to Lough Conn. The country from Lough Conn northward to the sea is a lowland of Carboniferous Limestone, with L. Carboniferous Sandstone against the Dalradian on the west.

Industries. — There are some very fertile regions in the level portions of the county, but in the mountainous districts the soil is poor, the holdings are subdivided beyond the possibility of affording proper sustenance to their occupiers, and, except where fishing is combined with agricultural operations, the circumstances of the peasantry are among the most wretched of any district of Ireland. The proportion of tillage to pasturage is roughly as 1 to 3J. Oats and potatoes are the principal crops. Cattle, sheep, pigs and poultry are reared. Coarse linen and woollen cloths are manufac- tured to a small extent. At Foxford woollen-mills are established at a nunnery, in connexion with a scheme of technical instruction. I Keel, Belmullet and Ballycastle are the headquarters of sea and

coast fishing districts, and Ballina of a salmon-fishing district, and these fisheries are of some value to the poor inhabitants. A branch of the Midland Great Western railway enters the county from Athlone, in the south-east, and runs north to Ballina and Killala on the coast, branches diverging from Claremorris to Ballinrobe, and from Manulla to Westport and Achill on the west coast. The Limerick and

Sligo line of the Great Southern and Western passes from south to north-east by way of Claremorris.

Population and Administration. — The population was 218,698 in 1891, and 199,166 in 1901. The decrease of population and the number of emigrants are slightly below the average of the Irish counties. Of the total population about 97% are rural, and about the same percentage are Roman Catholics. The chief towns are Ballina (pop. 4505), Westport (3892) and Castle- bar (3585), the county town. Ballaghaderreen, Claremorris (Clare), Crossmolina and Swineford are lesser market towns; and Newport and Westport are small seaports on Clew Bay. The county includes nine baronies. Assizes are held at Castlebar, and quarter sessions at Ballina, Ballinrobe, Belmullet, Castlebar, Claremorris, Swineford and Westport. In the Irish parliament two members were returned for the county, and two for the borough of Castlebar, but at the union Castlebar was disfran- chised. The division since 1885 is into north, south, east and west parliamentary divisions, each returning one member. The county is in the Protestant diocese of Tuam and the Roman Catholic dioceses of Taum, Achonry, Galway and Kilmacduagh, and Killala.

History and Antiquities. — Erris in Mayo was the scene of the landing of the chief colony of the Firbolgs, and the battle which is said to have resulted in the overthrow and almost annihilation of this tribe took place also in this county, at Moytura near Cong. At the close of the 1 2th century what is now the county of Mayo was granted, with other lands, by king John to William, brother of Hubert de Burgh. After the murder of William de Burgh, 3rd earl of Ulster (1333), the Bourkes (de Burghs) of the collateral male line, rejecting the claim of William's heiress (the wife of Lionel, son of King Edward III.) to the succession, succeeded in holding the bulk of the De Burgh possessions, what is now Mayo falling to the branch known by the name of "Mac William Oughter," who maintained their virtual independence till the time of Elizabeth. Sir Henry Sydney, during his first viceroy- alty, after making efforts to improve communications between Dublin and Connaught in 1566, arranged for the shiring of that province, and Mayo was made shire ground, taking its name from the monastery of Maio or Mageo, which was the seat of a bishop. Even after this period the MacWilliams continued to exercise very great authority, which was regularized in 1603, when " the MacWilliam Oughter," Theobald Bourke, surrendered his lands and received them back, to hold them by English tenure, with the title of Viscount Mayo (see Burgh, De). Large confiscations of the estates in the county were made in 1586, and on the termi- nation of the wars

of 1641; and in 1666 the restoration of his estates to the 4th Viscount Mayo involved another confiscation, at the expense of Cromwell's settlers. Killala was the scene of the landing of a French squadron in connexion with the rebellion of 1798. In 1879 the village of Knock in the south-east acquired notoriety from a story that the Virgin Mary had appeared in the church, which became, the resort of many pilgrims.

There are round towers at Killala, Turlough, Meelick and Balla, and an imperfect one at Aughagower. Killala was for- merly a bishopric. The monasteries were numerous, and many of them of considerable importance: the principal being those at Mayo, Ballyhaunis, Cong, Ballinrobe, Ballintober, Burrishoole, Cross or Holycross in the peninsula of Mullet, Moyne, Roserk or Rosserick and Templemore or Strade. Of the old castles the most notable are Carrigahooly near Newport, said to have been built by the celebrated Grace O'Malley, and Deel Castle near Ballina, at one time the residence of the earls of Arran.

See Hubert Thomas Knox, History of the County of Mayo (1908).

MAYOR, JOHN EYTON BICKERSTETH (1825-), English classical scholar, was born at Baddegama, Ceylon, on the 28th of January 1825, and educated in England at Shrewsbury School and St John's College, Cambridge. From 1863 to 1867 he

was librarian of the university, and in 1872 succeeded H. A. J. Munro in the professorship of Latin. His best-known work, an edition of thirteen satires of Juvenal, is marked by an extra- ordinary wealth of illustrative quotations. His Bibliographical Clue to Latin Literature (1873), based on E. Hiibner's Grundriss zu Vorlesungen iiber die rbmische Litter aturgeschichte is a valuable aid to the student, and his edition of Cicero's Second Philippic is widely used. He also edited the English works of J. Fisher, bishop of Rochester, i. (1876); Thomas Baker's History of St John's College, Cambridge (1869); Richard of Cirencester's Speculum historiale de gestis regum Angliae 447-1066 ■ (1863- 1869); Roger Ascham's Schoolmaster (new ed., 1883); the Latin Heptateuch (1889); and the Journal of Philology.

His brother, Joseph Bickersteth Mayor (1828-), classical scholar and theologian, was educated at Rugby and St John's College, Cambridge, and from 1870 to 1879 was professor of classics at King's College, London. His most important classical works are an edition of Cicero's De natura deorum (3 vols., 1880-1885) and

Guide to the Choice of Classical Books (3rd ed., 1885, with supplement, 1896). He also devoted atten- tion to theological literature and edited the epistles of St James (2nd ed., 1892), St Jude and St Peter (1907), and the Miscellanies of Clement of Alexandria (with F. J. A. Hort, 1902). From 1887 to 1893 he was editor of the Classical Review. His Chapters on English Metre (1886) reached a second edition in 1901.

MAYOR (Lat. major, greater), in modern times the title of a municipal officer who discharges judicial and administrative functions. The French form of the word is maire. In Germany the corresponding title is Bur germeister, in Italy sindico, and in Spain alcalde. " Mayor " had originally a much wider signifi- cance. Among the nations which arose on the ruins of the Roman empire of the West, and which made use of the Latin spoken by their " Roman " subjects as their official and legal language, major and the Low Latin feminine majorissa were found to be very convenient terms to describe important officials of both sexes who had the superintendence of others. Any female servant or slave in the houselold of a barbarian, whose business it was to overlook other female servants or slaves, would be quite naturally called a majorissa. So the male officer who governed the king's household would be the major domus. In the households of the Frankish kings of the Merovingian line, the major domus, who was also variously known as the gubernator, rector, moderator or praefectus palatii, was so great an officer that he ended by evicting his master. He was the " mayor of the palace " (q.v.). The fact that his office became hereditary in the family of Pippin of Heristal made the fortune of the Carolingian line. But besides the major domus (the major-domo), there were other officers who were majores, the major cubiculi, mayor of the bedchamber, and major equorum, mayor of the horse. In fact a word which could be applied so easily and with accuracy in so many circumstances was certain to be widely used by itself, or in its derivatives. The post-Augustine majorinus, " one of the larger kind," was the origin of the medieval Spanish merinus, who in Castillian is the merino, and sometimes the merino mayor, or chief merino. He was a judicial and administra- tive officer of the king's . The gregum merinus was the superin- tendent of the flocks of the corporation of sheep-owners called the mesta. From him the sheep, and then the wool, have come to be known as merinos — a word identical in origin with the muni- cipal title of mayor. The .latter came directly from the heads of gilds, and other associations of freemen, who had their banner and formed a group on the populations of the towns, the majores baneriae or vexilli.

In England the major is the modern representative of the lord's bailiff or reeve (see Borough). We find the chief magistrate of London bearing the title of portreeve for considerably more than a century after the Conquest. This official was elected by popular choice, a privilege secured from king John. By the beginning of the nth century the title of portreeve 1 gave way to that of mayor as the designation of the chief officer of

1 If a place was of mercantile importance it was called a port (from porta, the city gate), and the reeve or bailiff, a " portreeve."

London, 1 and the adoption of the title by other boroughs followed at various intervals.

A mayor is now in England and America the official head of a municipal government. In the United Kingdom the Municipal Corporations Act, 1882, s. 15, regulates the election of mayors. He is to be a fit person elected annually on the 9th of November by the council of the borough from among the aldermen or councillors or persons qualified to be such. His term of office is one year, but he is eligible for re-election. He may appoint a deputy to act during illness or absence, and such deputy must be either an alderman or councillor. A mayor who is absent from the borough for more than two months becomes disqualified and vacates his office. A mayor is ex officio during his year of office and the next year a justice of the peace for the borough. He receives such remuneration as the council thinks reasonable. The office of mayor in an English borough does not entail any important administrative duties. It is generally regarded as an honour conferred for past services. The mayor is expected to devote much of his time to ornamental func- tions and to preside over meetings which have for their object the advancement of the public welfare. His administrative duties are merely to act as returning officer at municipal elections, and as chairman of the meetings of the council.

The position and power of an English mayor contrast very strongly with those of the similar official in the United States. The latter is elected directly by the voters within the city, usually for several years ; and he has extensive administrative powers.

The English method of selecting a mayor by the council is followed

for the corresponding functionaries in France (except Paris), the more important cities of Italy, and in Germany, where, however, the central government must confirm the choice of the council. Direct appointment by the central government exists in Belgium, Holland, Denmark, Norway, Sweden and the smaller towns of Italy and Spain. As a rule, too, the term of office is longer in other countries than in the United Kingdom. In France election is for four years, in Holland for six, in Belgium for an indefinite period, and in Germany usually for twelve years, but in some cases for life. In Germany the post may be said to be a professional one, the burgomaster being the head of the city magistracy, and requiring, in order to be eligible, a training in administration. German buFgomasters are most frequently elected by promotion from another city. In France the maire, and a number of experienced members termed " adjuncts," who assist him as an executive committee, are elected directly by the municipal council from among their own number. Most of the administrative work is left in the hands of the maire and his adjuncts, the full council meeting comparatively seldom. The maire and the adjuncts receive no salary.

Further information will be found in the sections on local government in the articles on the various countries; see also A. Shaw, Municipal Government in Continental Europe ; J. A. Fairlie, Municipal Administration; S. and B. Webb, English Local Government; Redlich and Hirst, Local Government in England; A. L. Lowell, The Government of England.

MAYOR OF THE PALACE— The office of mayor of the palace was an institution peculiar to the Franks of the Merovin- gian period. A landowner who did not manage his own estate placed it in the hands of a steward (major), who superintended the working of the estate and collected its revenues. If he had several estates, he appointed a chief steward, who managed the whole of the estates and was called the major domtis. Each great personage had a major domus — the queen had hers, the king his; and since the royal house was called the palace, this officer took the name of " mayor of the palace." The mayor of the palace, however, did not remain restricted to domestic functions; he had the discipline of the palace and tried persons who resided there. Soon his functions expanded. If the king were a minor, the mayor of the palace supervised his education in the capacity of guardian (nutricius), and often also occupied himself with affairs of state. When the king came of age, the mayor exerted himself to keep this power, and succeeded. In the 7th century he be- came the head of the administration and a veritable prime minis- ter. He took part in the nomination of the counts and dukes; in the king's absence he

presided over the royal tribunal; and he often commanded the armies. When the custom of commen- dation developed, the king charged the mayor of the palace to protect those who had commended themselves to him and to J The mayors of certain cities in the United Kingdom (London, York, Dublin) have acquired by prescription the prefix of " lord." In the case of London it seems to date from 1540. It has also been conferred during the closing years of the 19th century by letters patent on other cities — Birmingham, Liverpool, Manchester, Bristol, Sheffield, Leeds, Cardiff, Bradford, Newcastle-on-Tyne, Belfast, Cork. In 1910 it was granted to Norwich. Lord mayors are entitled to be addressed as " right honourable."

intervene at law on their behalf. The mayor of the palace thus found himself at the head of the commendali, just as he was at the head of the functionaries.

It is difficult to trace the names of some of the mayors of the palace, the post being of almost no significance in the time of Gregory of Tours. When the office increased in importance the mayors of the palace did not, as has been thought, pursue an identical policy. Some — for instance, Otto, the mayor of the palace of Austrasia towards 640 — were devoted to the Crown. On the other hand, mayors like Flaochat (in Burgundy) and Erkinoald (in Neustria) stirred up the great nobles, who claimed the right to take part in their nomination, against the king. Others again, sought to exercise the power in their own name both against the king and against the great nobles — such as Ebro'in (in Neustria), and, later, the Carolingians Pippin II., Charles Martel, and Pippin III., who, after making use of the great nobles, kept the authority for themselves. In 751 Pippin III., fortified by his consultation with Pope Zacharias, could quite naturally exchange the title of mayor for that of king; and when he became king, he suppressed the title of mayor of the palace. It must be observed that from 639 there were generally separate mayors of Neustria, Austrasia and Burgundy, even when Austrasia and Burgundy formed a single kingdom; the mayor was a sign of the independence of the region. Each mayor, however, sought to supplant the others; the Pippins and Charles Martel succeeded, and their victory was at the same time the victory of Austrasia over Neustria and Burgundy.

See G. H. Pertz, Geschichte der merowingischen Hausmeier (Hanover, 1819); H. Bonnell, De dignitate maj oris domus (Berlin, 1858); E. Hermann, Das Hausmeieramt, ein echt germanisches Amt, vol. ix. of Untersuchungen zur deutschen Stoats- und Rechtsgeschichte, ed.

by O. Gierke (Breslau, 1878, seq.); G. Waitz, Deutsche Verfassungs-geschichte, 3rd ed., revised by K. Zeumer; and Fustel de Coulanges, Histoire des institutions polikques de V ancienne France: La monarchie franque (Paris, 1888). (C. Pf.)

MAYORUNA, a tribe of South American Indians of Panoan stock. Their country is between the Ucayali and Javari rivers, north-eastern Peru. They are a fine race, roaming the forests and living by hunting. They cut their hair in a line across the forehead and let it hang down their backs. Many have fair skins and beards, a peculiarity sometimes explained by their alleged descent from Ursua's soldiers, but this theory is impro- bable. They are famous for the potency of their blow-gun poison.

MAYO-SMITH, RICHMOND (1854-1901), American econo- mist, was born in Troy, Ohio, on the 9th of February 1854. Educated at Amherst, and at Berlin and Heidelberg, he became assistant professor of economics at Columbia University in 1877. He was an adjunct professor from 1878 to 1883, when he was appointed professor of political economy and social science, a post which he held until his death on the nth of November 1901. He devoted himself especially to the study of statistics, and was recognized as one of the foremost authori- ties on the subject. His works include Emigration and Immigra- tion (1890); Sociology and Statistics (1895), and Statistics and Economics (1899).

MAYOTTE, one of the Comoro Islands, in the Mozambique Channel between Madagascar and the African mainland. It has belonged to France since 1843 (see Comoro Islands).

MAYOW, JOHN (1643-1679), English chemist and physiolo- gist, was born in London in May 1643. At the age of fifteen he went up to Wadham College, Oxford, of which he became a scholar a year later, and in 1660 he was elected to a fellowship at All Souls. He graduated in law (bachelor, 1665, doctor, 1670), but made medicine his profession, and " became noted for bis practice . therein, especially in the summer time, in the city of Bath." In 1678, on the proposal of R. Hooke, he was chosen a fellow of the Royal Society. The following year, after a marriage which was " not altogether to his content," he died in London in September 1679. He published at Oxford in 1668 two tracts, on respiration and rickets, and in 1674 these were reprinted, the former in an enlarged and corrected form, with three others " De sal-nitro et spiritu nitro-aereo," " De respiratione foetus in

utero et ovo," and " De motu musculari et spiritibus animalibus " as Traclatus quinque medico-physici. The contents of this work, which was several times republished and translated into Dutch, German and French, show him to have been an investigator much in advance of his time.

Accepting as proved by Boyle's experiments that air is necessary for combustion, he showed that fire is supported not by the air as a whole but by a " more active and subtle part of it." This part he called spiritus igneo-aereus, or sometimes nitro-aereus ; for he identified it with one of the constituents of the acid portion of nitre which he regarded as formed by the union of fixed alkali with a spiritus acidus. In combustion the particular nitro-aereae — either pre-existent in the thing consumed or supplied by the air — combined with the material burnt; as he inferred from his observation that antimony, strongly heated with a burning glass, undergoes an increase of weight which can be attributed to nothing else but these particles. In respiration he argued that the same particles are consumed, because he found that when a small animal and a lighted candle were placed in a closed vessel full of air the candle first went out and soon afterwards the animal died, but if there was no candle present it lived twice as long. He concluded that this constituent of the air is absolutely necessary for life, and supposed that the lungs separate it from the atmosphere and pass it into the blood. It is also necessary, he inferred, for all muscular movements, and he thought there was reason to believe that the sudden contraction of muscle is produced by its combination with other combustible (salino-sulphureous) particles in the body; hence the heart, being a muscle, ceases to beat when respiration is stopped. Animal heat also is due to the union of nitro-aerial particles, breathed in from the air, with the combustible particles in the blood, and is further formed by the combination of these two sets of particles in muscle during violent exertion. In effect, therefore, Mayow — who also gives a remarkably correct anatomical description of the mechanism of respiration — preceded Priestley and Lavoisier by a century in recognizing the existence of oxygen, under the guise of his spiritus nitro-aereus, as a separate entity distinct from the general mass of the air ; he perceived the part it plays in combustion and in increas- ing the weight of the calces of metals as compared with metals themselves; and, rejecting the common notions of his time that the use of breathing is to cool the heart, or assist the passage of the blood from

the right to the left side of the heart, or merely to agitate it, he saw in inspiration a mechanism for introducing oxygen into the body, where it is consumed for the production of heat and muscular activity, and even vaguely conceived of expiration as an excretory process.

MAYSVILLE, a city and the county-seat of Mason county, Kentucky, U.S.A., on the Ohio river, 60 m. by rail S.E. of Cin- cinnati. Pop. (1890) 5358; (1900) 6423 (1155 negroes); (1910) 6 141. It is served by the Louisville & Nashville, and the Chesapeake & Ohio railways, and by steamboats on the Ohio river. Among its principal buildings are the Mason county public library (1878), the Federal building and Masonic and Odd Fellows' temples. The city lies between the river and a range of hills; at the back of the hills is a fine farming country, of which tobacco of excellent quality is a leading product. There is a large plant of the American Tobacco Company at Maysville, and among the city's manufactures are pulleys, ploughs, whisky, flour, lumber, furniture, carriages, cigars, foundry and machine-shop products, bricks and cotton goods. The city is a distributing point for coal and other products brought to it by Ohio river boats. Formerly it was one of the principal hemp markets of the country. The place early became a landing point for immigrants to Kentucky, and in 1784 a double log cabin and a blockhouse were erected here. It was then called Limestone, from the creek which flows into the Ohio here, but several years later the present name was adopted in honour of John May, who with Simon Kenton laid out the town in 1787, and who in 1790 was killed by the Indians. Maysville was incorporated as a town in 1787, was chartered as a city in 1833, and became the county-seat in 1848.

In 1830, when the question of " internal improvements" by the National government was an important political issue, Congress passed a bill directing the government to aid in building a turnpike road from Maysville to Lexington. President Andrew Jackson vetoed the bill on the ground that the proposed improvement was a local rather than a national one ; but one-half the capital was then furnished privately, the other half was furnished through several state appropriations, and the road was completed in 1835 and marked the beginning of a system of turnpike roads built with state aid.

MAZAGAN {El Jadida), a port on the Atlantic coast of Morocco in 33° 16′ N. 8° 26′ W. Pop. (1908), about 12,000, of whom a

fourth are Jews and some 400 Europeans. It is the port for Marrakesh, from which it is no m. nearly due north, and also for the

fertile province of Dukalla. Mazagan presents from the sea a very un-Moorish appearance; it has massive Portuguese walls of hewn stone. The exports, which include beans, almonds, maize, chick-peas, wool, hides, wax, eggs, &c, were valued at £360,000 in 1900, £364,000 in 1904, and £248,000 in 1906. The imports (cotton goods, sugar, tea, rice, &c.) were valued at £280,000 in 1900, £286,000 in 1904, and £320,000 in 1906. About 46% of the trade is with Great Britain and 34% with France. Mazagan was built in 1506 by the Portuguese, who abandoned it to the Moors in 1769 and established a colony, New Mazagan, on the shores of Para in Brazil.

See A. H. Dye, " Les ports du Maroc " in Bull. Soc. Geog. Comm. Paris, xxx. 325-332 (1908), and British consular reports.

MAZAMET, an industrial town of south-western France in the department of Tarn, 41 m. S.S.E. of Albi by rail. Pop. (1906), town, 11,370; commune, 14,386. Mazamet is situated on the northern slope of the Montagnes Noires and on the Arnette, a small sub-tributary of the Agout. Numerous estab- lishments are employed in wool-spinning and in the manufacture of " swan-skins " and flannels, and clothing for troops, and hosiery, and there are important tanneries and leather-dressing, glove and dye works. Extensive commerce is carried on in wool and raw hides from Argentina, Australia and Cape Colony.

MAZANDARAN, a province of northern Persia, lying between the Caspian Sea and the Elburz range, and bounded E. and W. by the provinces of Astarabad and Gilan respectively, 220 m. in length and 60 m. in (mean) breadth, with an area of about 10,000 sq. m. and a population estimated at from 150,000 to 200,000. Mazandaran comprises two distinct natural regions presenting the sharpest contrasts in their relief, climate and products. In the north the Caspian is encircled by the level and swampy lowlands, varying in breadth from 10 to 30 m., partly under im- penetrable jungle, partly under rice, cotton, sugar and other crops. This section is fringed northwards by the sandy beach of the Caspian, here almost destitute of natural harbours, and rises somewhat abruptly inland to the second section, comprising the northern slopes and spurs of the Elburz, which approach at some points within 1 or 2 m. of the sea, and are almost everywhere covered with dense forest. The lowlands, rising but a few feet above the Caspian, and subject to frequent floodings, are ex- tremely malarious, while the highlands, culminating with the magnificent Demavend (19,400 ft.), enjoy a tolerably healthy climate. But the climate, generally hot and moist in summer, is everywhere capricious and liable to sudden changes of

tempera- ture, whence the prevalence of rheumatism, dropsy and especially ophthalmia, noticed by all travellers. Snow falls heavily in the uplands, where it often lies for weeks on the ground. The direction of the long sandbanks at the river mouths, which project with remarkable uniformity from west to east, shows that the prevailing winds blow from the west and north-west. The rivers themselves, of which there are as many as fifty, are little more than mountain torrents, all rising on the northern slopes of Elburz, flowing mostly in independent channels to the Caspian, and subject to sudden freshets and inundations along their lower course. The chief are the Sardab-rud, Chalus, Herhaz (Lar in its upper course), Babul, Tejen and Nika, and all are well stocked with trout, salmon (azad-mahi) , perch (safid-mahi) , carp (kupur), bream (subulu), sturgeon (sag-mahi) and other fish, which with rice form the staple food of the inhabitants; the sturgeon supplies the caviare for the Russian market. Near their mouths the rivers, running counter to the prevailing winds and waves of the Caspian, form long sand-hills 20 to 30 ft. high and about 200 yds. broad, behind which are developed the so- called mtird-db, or " dead waters," stagnant pools and swamps characteristic of this coast, and a main cause of its unhealthiness. The chief products are rice, cotton, sugar, a little silk, and fruits in great Variety, including several kinds of the orange, lemon and citron. Some of the slopes are covered with extensive thickets of the pomegranate, and the wild vine climbs to a great height round the trunks of the forest trees. These woodlands

are haunted by the tiger, panther, bear, wolf and wild boar in considerable numbers. Of the domestic animals, all remarkable for their small size, the chief are the black, humped cattle some- what resembling the Indian variety, and sheep and goats.

Kinneir, Fraser and other observers speak unfavourably of the Mazandarani people, whom they describe as very ignorant and bigoted, arrogant, rudely inquisitive and almost insolent towards strangers. The peasantry, however, are far from dull, and betray much shrewdness where their interests are concerned. In the healthy districts they are stout and well made, and are considered a warlike race, furnishing some cavalry (800 men) and eight bat- talions of infantry (5600 men) to government. They speak a marked Persian dialect, but a Turki idion closely akin to the Turkoman is still current amongst the tribes, although they have mostly already passed

from the nomad to the settled state. Of these tribes the most numerous are the Modaunlu, Khojehvand and Abdul Maleki, originally of Lek or Kurd stock, besides branches of the royal Afshar and Kajar tribes of Turki descent. All these are exempt from taxes in consideration of their military service.

The export trade is chiefly with Russia from Meshed-i-Sar, the principal port of the province, to Baku, where European goods are taken in exchange for the white and coloured calicoes, caviare, rice, fruits and raw cotton of Mazandaran. Great quantities of rice are also exported to the interior of Persia, principally to Teheran and Kazvin. Owing to the almost impenetrable character of the country there are scarcely any roads accessible to Wheeled carriages, and the great causeway of Shah Abbas along the coast has in many places even disappeared under the jungle. Two routes, however, lead to Teheran, one by Firuz Kuh, 180 m. long, the other by Larijan, 144 m. long, both in tolerably good repair. Except where crossed by these routes the Elburz forms an almost impassable barrier to the south.

The administration is in the hands of a governor, who appoints the sub-governors of the nine districts of Amol, Barfarush, Meshed- i-Sar, Sari, Ashref, Farah-abad, Tunakabun, Kelarrustak and Kujur into which the province is divided. There is fair security for life and property; and, although otherwise indifferently administered, the country is quite free from marauders; but local disturbances have latterly been frequent in the two last-named districts. The revenue is about £30,000, of which little goes to the state treasury, most being required for the governors, troops and pensions. The capital is Sari, the other chief towns being Barfarush, Meshed-i-Sar, Ashref and Farah-abad. (A. H.-S.)

MAZARIN, JULES (1602-1661), French cardinal and states- man, elder son of a Sicilian, Pietro Mazarini, the intendant of the household of Philip Colonna, and of his wife Ortensia Buffalini, a connexion of the Colonnas, was born at Piscina in the Abruzzi on the 14th of July 1602. He was educated by the Jesuits at Rome till his seventeenth year, when he accompanied Jerome Colonna as chamberlain to the university of Alcala in Spain. There he distinguished himself more by his love of gambling and his gallant adventures than by study, but made himself a thorough master, not only of the Spanish language and character, but also of that romantic fashion of Spanish love-making which was to help him greatly in after life, when he became the servant of a Spanish queen. On his return to Rome, about 1622, he took his degree as Doctor utriusque juris, and then became captain of infantry in the regiment

of Colonna, which took part in the war in the Valtelline. During this war he gave proofs of much diplomatic ability, and Pope Urban VIII. entrusted him, in 1629, with the difficult task of putting an end to the war of the Mantuan succession. His success marked him out for further distinction. He was presented to two canonries in the churches of St John Lateran and Sta Maria Maggiore, although he had only taken the minor orders, and had never been consecrated priest; he negotiated the treaty of Turin be- tween France and Savoy in 1632, became vice-legate at Avignon in 1634, and nuncio at the court of France from 1634 to 1636. But he began to wish for a wider shpere than papal negotiations, and, seeing that he had no chance of becoming a cardinal except by the aid of some great power, he accepted Richelieu's offer of entering the service of the king of France, and in 1639 became a naturalized Frenchman.

In 1640 Richelieu sent him to Savoy, where the regency of Christine, the duchess of Savoy, and sister of Louis XIII. , was disputed by her brothers-in-law, the princes Maurice and Thomas of Savoy, and he succeeded not only in firmly establishing Christine but in winning over the princes to France. This great service was rewarded by his promotion to the rank of cardinal

on the presentation of the king of France in December 1641. On the 4th of December 1642 Cardinal Richelieu died, and on the very next day the king sent a circular letter to all officials ordering them to send in their reports to Cardinal Mazarin, as they had formerly done to Cardinal Richelieu. Mazarin was thus acknow- ledged supreme minister, but he still had a difficult part to play. The king evidently could not live long, and to preserve power he must make himself necessary to the queen, who would then be regent, and do this without arousing the suspicions of the king or the distrust of the queen. His measures were ably taken, and when the king died, on the 14th of May 1643, to everyone's surprise her husband's minister remained the queen's. The king had by a royal edict cumbered the queen-regent with a council and other restrictions, and it was necessary to get the parlement of Paris to overrule the edict and make the queen absolute regent, which was done with the greatest complaisance. Now that the queen was all-powerful, it was expected she would at once dismiss Mazarin and summon her own friends to power. One of them, Potier, bishop of Beauvais, already gave himself airs as prime minister, but Mazarin had had the address to touch both the queen's heart by his Spanish gallantry and her desire for her son's glory by his skilful policy abroad, and he found himself able easily to overthrow the clique of Importants, as they were called. That skilful policy was shown in every arena on which the great

Thirty Years' War was being fought out. Mazarin had inherited the policy of France during the Thirty Years' War from Richelieu. He had inherited his desire for the humiliation of the house of Austria in both its branches, his desire to push the French frontier to the Rhine and maintain a counterpoise of German states against Austria, his alliances with the Netherlands and with Sweden, and his four theatres of war — on the Rhine, in Flanders, in Italy and in Catalonia.

During the last five years of the great war it was Mazarin alone who directed the French diplomacy of the period. He it was who made the peace of Bromsebro between the Danes and the Swedes, and turned the latter once again against the empire; he it was who sent Lionne to make the peace of Castro, and combine the princes of North Italy against the Spaniards, and who made the peace of Ulm between France and Bavaria, thus detaching the emperor's best ally. He made one fatal mistake — he dreamt of the French frontier being the Rhine and the Scheldt, and that a Spanish princess might bring the Spanish Netherlands as dowry to Louis XIV. This roused the jealousy of the United Provinces, and they made a separate peace with Spain in January 1648; but the valour of the French generals made the skill of the Spanish diplomatists of no avail, for Turenne's victory at Zusmars- hausen, and Conde's at Lens, caused the peace of Westphalia to be definitely signed in October 1648. This celebrated treaty belongs rather to the history of Germany than to a life of Mazarin; but two questions have been often asked, whether Mazarin did not delay the peace as long as possible in order to more completely ruin Germany, and whether Richelieu would have made a similar peace. To the first question Mazarin's letters, published by M. Cheruel, prove a complete negative, for in them appears the zeal of Mazarin for the peace. On the second point, Richelieu's letters in many places indicate that his treatment of the great question of frontier would have been more thorough, but then he would not have been hampered in France itself.

At home Mazarin's policy lacked the strength of Richelieu's. The Frondes were largely due to his own fault. The arrest of Broussel threw the people on the side of the parlement. His avarice and unscrupulous plundering of the revenues of the realm, the enormous fortune which he thus amassed, his supple ways, his nepotism, and the general lack of public interest in the great foreign policy of Richelieu, made Mazarin the especial object of hatred both by bourgeois and nobles. The irritation of the latter was greatly Mazarin's own fault; he had tried con- sistently to play off the king's brother Gaston of Orleans against Conde, and their respective

followers against each other, and had also, as his carnets prove, jealously kept any courtier from getting into the good graces of the queen-regent except by his means, so

that it was not unnatural that the nobility should hate him, while the queen found herself surrounded by his creatures alone. Events followed each other quickly; the day of the barricades was followed by the peace of Ruel, the peace of Ruel by the arrest of the princes, by the battle of Rethel, and Mazarin's exile to Bruhl before the union of the two Frondes. It was while in exile at Bruhl that Mazarin saw the mistake he had made in isolating himself and the queen, and that his policy of balancing every party in the state against each other had made every party distrust him. So by his counsel the queen, while nominally in league with De Retz and the parliamentary Fronde, laboured to form a purely royal party, wearied by civil dissensions, who should act for her and her son's interest alone, under the leader- ship of Mathieu Mole, the famous premier president of the parlement of Paris. The new party grew in strength, and in January 1652, after exactly a year's absence, Mazarin returned to the court. Turenne had now become the royal general, and out-manceuvred Conde, while the royal party at last grew to such strength in Paris that Conde had to leave the capital and France. In order to promote a reconciliation with the parlement of Paris Mazarin had again retired from court, this time to Sedan, in August 1652, but he returned finally in February 1653. Long had been the trial, and greatly had Mazarin been to blame in allowing the Frondes to come into existence, but he had retrieved his position by founding that great royal party which steadily grew until Louis XIV. could fairly have said "L'Etat, c'est moi." As the war had progressed, Mazarin had steadily followed Riche- lieu's policy of weakening the nobles on their country estates. Whenever he had an opportunity he destroyed a feudal castle, and by destroying the towers which commanded nearly every town in France, he freed such towns as Bourges, for instance, from their long practical subjection to the neighbouring great lord. –

The Fronde over, Mazarin had to build up afresh the power

of France at home and abroad. It is to his shame that he did so

little at home. Beyond destroying the brick-and-mortar remains

of feudalism, he did nothing for the people. But abroad his policy was everywhere successful, and opened the way for the policy of Louis XIV. He at first, by means of an alliance with Cromwell, recovered the north-western cities of France, though at the price of yielding Dunkirk to the Protector. On the Baltic, France guaranteed the Treaty of Oliva between her old allies Sweden, Poland and Brandenburg, which preserved her influence in that quarter. In Germany he, through Hugues de Lionne, formed the league of the Rhine, by which the states along the Rhine bound themselves under the headship of France to be on their guard against the house of Austria. By such measures Spain was induced to sue for peace, which was finally signed in the Isle of Pheasants on the Bidassoa, and is known as the Treaty of the Pyrenees. By it Spain recovered Franche Comte, but ceded to France Roussillon, and much of French Flanders; and, what was of greater ultimate importance to Europe, Louis XIV. was to marry a Spanish princess, who was to renounce her claims to the Spanish succession if her dowry was paid, which Mazarin knew could not happen at present from the emptiness of the Spanish exchequer. He returned to Paris in declining health, and did not long survive the unhealthy sojourn on the Bidassoa; after some political instruction to his young master he passed away at Vincennes on the 9th of March 1661, leaving a fortune estimated at from 18 to 40 million livres behind him, and his

nieces married into the greatest families of France and Italy.

The man who could have had such success, who could have made the Treaties of Westphalia and the Pyrenees, who could have weathered the storm of the Fronde, and left France at peace with itself and with Europe to Louis XIV., must have been a great man; and historians, relying too much on the brilliant memoirs of his adversaries, like De Retz, are apt to rank him too low. That he had many a petty fault there can be no doubt; that he was avaricious and double-dealing was also undoubted; and his camels show to what unworthy means he had recourse to maintain his in- fluence over the queen. What that influence was will be always debated, but both his camels and the Bruhl letters show that a real personal affection, amounting to passion on the queen's part, existed. Whether they were ever married may be doubted; but that hypo-

thesis is made more possible by M. Cheruel's having been able to prove from Mazarin's letters that the cardinal himself had never taken more than the minor orders, which could always be thrown off. With regard to France he played a more patriotic part than Cond6 or Turenne, for he never treated with the Spaniards, and his letters show that in the midst of his difficulties he followed with intense eagerness every movement on the frontiers. It is that immense mass of letters that prove the real greatness of the states- man, and disprove De Retz's portrait, which is carefully arranged to show off his enemy against the might of Richelieu. To concede that the master was the greater man and the greater statesman does not imply that Mazarin was but a foil to his predecessor. It is true that we find none of those deep plans for the internal prosperity of France which shine through Richelieu's policy. Mazarin was not a Frenchman, but a citizen of the world, and always paid most attention to foreign affairs; in his letters all that could teach a diplo- matist is to be found, broad general views of policy, minute details carefully elaborated, keen insight into men's characters, cunning directions when to dissimulate or when to be frank. Italian though he was by birth, education and nature, France owed him a great debt for his skilful management during the early years of Louis XIV., and the king owed him yet more, for he had not only transmitted to him a nation at peace, but had educated for him his great servants Le Tellier, Lionne and Colbert. Literary men owed him also much ; not only did he throw his famous library open to them, but he pensioned all their leaders, including Descartes, Vincent Voiture (1598-1648), Jean Louis Guez de Balzac (1597-1654) and Pierre Corneille. The last-named applied, with an adroit allusion to his birthplace, in the dedication of his Pompee, the line of Virgil : — " Tu regere imperio

populos, Romane, memento."

(H. M. S.) Authorities. — All the earlier works on Mazarin, and early ac- counts of his administration, of which the best were Bazin's Histoire de France sous Louis XIII. el sous le Cardinal Mazarin, 4 vols. (1846), and Saint- Aulaire's Hisloire de la Fronde, have been super- seded by P. A. Cheruel's admirable Histoire de France pendant la minorite de Louis XIV., 4 vols. (1879-1880), which covers from 1643-1651, and its sequel Histoire de France sous le ministere de Cardinal Mazarin, 2 vols. (1881-1882), which is the first account of the period written by one able to sift the statements of De Retz and the memoir writers, and rest upon such documents as Mazarin's letters and camels. Mazarin's Lettres, which must be carefully studied by any student of the history of France, have appeared in the Collection des documents inedits, 9 vols. For his camels reference must be made to V. Cousin's articles in the Journal des Savants, and Cheruel in Revue historique (1877), see also Cheruel's Histoire de France pendant la minorite, &c, app. to vol. iii.; for his early life to Cousin's Jeunesse de Mazarin (1865), and for the careers of his nieces to Renee's Les Nieces de Mazarin (1856). For the Mazarinades or squibs written against him in Paris during the Fronde, see C. Moreau's Bibliographic des mazarinades (1850), containing an account of 4082 Mazarinades. See also A. Hassall, Mazarin (1903).

MAZAR-I-SHARIF, a town of Afghanistan, the capital of the province of Afghan Turkestan. Owing to the importance of the military cantonment of Takhtapul, and its religious sanctity, it has long ago supplanted the more ancient capital of Balkh. It is situated in a malarious, almost desert plain, 9 m. E. of Balkh, and 30 m. S. of the Pata Kesar ferry on the Oxus river. In this neighbourhood is concentrated most of the Afghan army north of the Hindu Kush mountains, the fortified cantonment of Dehdadi having been completed by Sirdar Ghulam Ali Khan and incorporated with Mazar. Mazar-i-Sharif also contains a celebrated mosque, from which the town takes its name. It is a huge ornate building with minarets and a lofty cupola faced with shining blue tiles. It was built by Sultan Ali Mirza about a.d. 1420, and is held in great veneration by all Mussulmans, and especially by Shiites, because it is supposed to be the tomb of Ali, the son-in-law of Mahomet.

MAZARRON, a town of eastern Spain, in the province of Murcia, 19 m. W. of Cartagena. Pop. (1900), 23,284. There are soap and flour mills and metallurgic factories in the town, and iron, copper and lead mines in the neighbouring Sierra de Alme- nara. A railway 5 m.

long unites Mazarron to its port on the Mediterranean, where there is a suburb with 2500 inhabitants (mostly engaged in fisheries and coasting trade), containing barracks, a custom-house, and important leadworks. Outside of the suburb there are saltpans, most of the proceeds of which are exported to Galicia.

MAZATLAN, a city and port of the state of Sinaloa, Mexico, 120 m. (direct) W.S.W. of the city of Durango, in lat. 23 12′ N., long. 106 24′ W. Pop. (1895), 15,852; (1900), 17,852. It is

the Pacific coast terminus of the International railway which crosses northern Mexico from Ciudad Porfirio Diaz, and a port of call for the principal steamship lines on this coast. The harbour is spacious, but the entrance is obstructed by a bar. The city is built on a small peninsula. Its public buildings include a fine town-hall, chamber of commerce, a custom-house and two hospitals, besides which there is a nautical school and a meteoro- logical station, one of the first established in Mexico. The harbour is provided with a sea-wall at Olas Altas. A govern- ment wireless telegraph service is maintained between Mazatlan and La Paz, Lower California. Among the manufactures are saw-mills, foundries, cotton factories and ropeworks, and the exports are chiefly hides, ixtle, dried and salted fish, gold, silver and copper (bars and ores), fruit, rubber, tortoise-shell, and gums and resins.

HAZE, a network of winding paths, a labyrinth (q.v.). The word means properly a state of confusion or wonder, and is probably of Scandinavian origin; cf. Norw. mas, exhausting labour, also chatter, masa, to be busy, also to worry, annoy; Swed. masa, to lounge, move slowly and lazily, to dream, muse. Skeat (Elym. Diet.) takes the original sense to be probably ” to be lost in thought,” ” to dream,” and connects with the root ma-man-, to think, cf. ” mind,” ” man,” &c. The word ” maze ” represents the addition of an intensive suffix.

MAZEPA-KOLEDINSKY, IVAN STEPANOVICH (1644?- 1709), hetman of the Cossacks, belonging to a noble Orthodox family, was born possibly at Mazeptsina, either in 1629 or 1644, the latter being the more probable date. He was educated at the court of the Polish king, John Casimir, and completed his studies abroad. An intrigue with a Polish married lady forced him to fly into the Ukraine. There is a trustworthy tradition that the infuriated husband tied the naked

youth to the back of a wild horse and sent him forth into the steppe. He was rescued and cared for by the Dnieperian Cossacks, and speedily became one of their ablest leaders. In 1687, during a visit to Moscow, he won the favour of the then all-powerful Vasily Golitsuin, from whom he virtually purchased the hetmanship of the Cossacks (July 25). He took a very active part in the Azov campaigns of Peter the Great and won the entire confidence of the young tsar by his zeal and energy. He was also very serviceable to Peter at the beginning of the Great Northern War, especially in 1705 and 1706, when he took part in the Volhynian campaign and helped to construct the fortress of Pechersk. The power and influence of Mazepa were fully recognized by Peter the Great. No other Cossack hetman had ever been treated with such deference at Moscow. He ranked with the highest dignitaries in the state; he sat at the tsar's own table. He had been made one of the first cavaliers of the newly established order of St Andrew, and Augustus of Poland had bestowed upon him, at Peter's earnest solicitation, the universally coveted order of the White Eagle. Mazepa had no temptations to be anything but loyal, and loyal he would doubtless have remained had not Charles XII. cros'sed the Russian frontier. Then it was that Mazepa, who had had doubts of the issue of the struggle all along, made up his mind that Charles, not Peter, was going to win, and that it was high time he looked after his own interests. Besides, he had his personal grievances against the tsar. He did not like the new ways because they interfered with his old ones. He was very jealous of the favourite (Menshikov), whom he suspected of a design to supplant him. But he proceeded very cautiously. Indeed, he would have preferred to remain neutral, but he' was not strong enough to stand alone. The crisis came when Peter ordered him to co-operate actively with the Russian forces in the Ukraine. At this very time he was in communication with Charles's first minister, Count Piper, and had agreed to harbour the Swedes in the Ukraine and close it against the Russians (Oct. 1708). The last doubt disappeared when Menshikov was sent to supervise Mazepa. At the approach of his rival the old hetman hastened to the Swedish outposts at Horki, in Severia. Mazepa's treason took Peter completely by surprise. He instantly commanded Menshikov to get a new hetman elected and raze Baturin, Mazepa's chief stronghold in the Ukraine, to the ground. When

Charles, a week later, passed Baturin by, all that remained of the Cossack capital was a heap of smouldering mills and ruined houses. The total destruction of Baturin, almost in sight of the Swedes, overawed the bulk of the Cossacks into obedience, and Mazepa's

ancient prestige was ruined in a day when the metro- politan of Kiev solemnly excommunicated him from the high altar, and his effigy, after being dragged with contumely through the mud at Kiev, was publicly burnt by the common hangman. Henceforth Mazepa, perforce, attached himself to Charles. What part he took at the battle of Poltava is not quite clear. After the catastrophe he accompanied Charles to Turkey with some 1500 horsemen (the miserable remnant of his 80,000 warriors). The sultan refused to surrender him to the tsar, though Peter offered 300,000 ducats for his head. He died at Bender on the 22nd of August 1709.

See N. I. Kostomarov, Mazepa and the Mazepanites (Russ.) (St Petersburg), 1885; R. Nisbet Bain, The First Romanovs (London, J"} ^); S. M. Solovev, History of Russia (Russ.), vol. xv. (St Peters- burg, 1895). (R. N. B.)

MAZER, the name of a special type of drinking vessel, properly made of maple-wood, and so-called from the spotted or " birds- eye " marking on the wood (Ger. Maser, spot, marking, especially on wood; cf. " measles "). These drinking vessels are shallow bowls without handles, with a broad fiat foot and a knob or boss in the centre of the inside, known technically as the " print." They were made from the 13th to the 16th centuries, and were the most prized of the various wooden cups in use, and so were ornamented with a rim of precious metal, generally of silver or silver gilt; the foot and the " print " being also of metal. The depth of the mazers seems to have decreased in course of time, those of the 16th century that survive being much shal- lower than the earlier examples. There are examples with wooden covers with a metal handle, such as the Flemish and German mazers in the Franks Bequest in the British Museum. On the metal rim is usually an inscription, religious or bacchana- lian, and the "print" was also often decorated. The later mazers sometimes had metal straps between the rim and the foot.

A very fine mazer with silver gilt ornamentation 3 in. deep and 9J in. in diameter was sold in the Braikenridge collection in 1908 for £2300. It bears the London hall-mark of 1534. This example is illustrated in the article Plate: see also Drinking Vessels.

MAZURKA (Polish for a woman of the province of Mazovia), a lively dance, originating in Poland, somewhat resembling the polka. It is danced in couples, the music being in f or \ time.

MAZZARA DEL VALLO, a town of Sicily, in the province of Trapani, on the south-west coast of the island, 32 m. by rail S. of Trapani.

Pop. (1901), 20,130. It is the seat of a bishop; the cathedral, founded in 1093, was rebuilt in the 17th century. The castle, at the south-eastern angle of the town walls, was erected in 1073. The mouth of the river, which bears the same name, serves as a port for small ships only. Mazzara was in origin a colony of Selinus: it was destroyed in 409, but it is mentioned again as a Carthaginian fortress in the First Punic War and as a post station on the Roman coast road, though whether it had municipal rights is doubtful. 1 A few inscriptions of the imperial period exist, but no other remains of importance. On the west bank of the river are grottoes cut in the rock, of uncertain date: and there are quarries in the neighbourhood resembling those of Syracuse, but on a smaller scale.

See A. Castiglione, Sulle cose antiche delta cittd, di Mazzara (Alcamo,

1878).

MAZZINI, GIUSEPPE (1805-1872), Italian patriot, was born on the 22nd of June 1805 at Genoa, where his father, Giacomo Mazzini, was a physician in good practice, and a professor in the university. His mother is described as having been a woman of great personal beauty, as well as of active intellect and strong affections. During infancy and childhood his health was extremely delicate, and it appears that he was nearly six years of age before he was quite able to walk; but he had already begun to devour books of all kinds and to show other signs of great intellectual precocity. He studied Latin with his first tutor, 1 Th. Mommsen in Corpus inscr. lat. (Berlin, 1883), x. 739.

an old priest, but no one directed his extensive course of reading. He became a student at the university of Genoa at an unusually early age, and intended to follow his father's profession, but being unable to conquer his horror of practical anatomy, he decided to graduate in law (1826). His exceptional abilities, together with his remarkable generosity, kindness and loftiness of character, endeared him to his fellow students. As to his inner life during this period, we have only one brief but signifi- cant sentence; " for a short time," he says, " my mind was some- what tainted by the doctrines of the foreign materialistic school; but the study of history and the intuitions of conscience — the only tests of truth — soon led me back to the

spiritualism of our Italian fathers."

The natural bent of his genius was towards literature, and, in the course of the four years of his nominal connexion with the legal profession, he wrote a considerable number of essays and reviews, some of which have been wholly or partially reproduced in the critical and literary volumes of his Life and Writings. His first essay, characteristically enough on " Dante's Love of Country," was sent to the editor of the Antologia fiorentina in 1826, but did not appear until some years afterwards in the Subalpino. He was an ardent supporter of romanticism as against what he called " literary servitude under the name of classicism "; and in this interest all his critiques (as, for example, that of Giannoni's " Exile " in the Indicatore Livornese, 1829) were penned. But in the meantime the " republican instincts " which he tells us he had inherited from his mother had been developing, and his sense of the evils under which Italy was groan- ing had been intensified; and at the same time he became pos- sessed with the idea that Italians, and he himself in particular, " could and therefore ought to struggle for liberty of country." Therefore, he at once put aside his dearest ambition, that of producing a complete history of religion, developing his scheme of a new theology uniting the spiritual with the practical life, and devoted himself to political thought. His literary articles accordingly became more and more suggestive of advanced liberalism in politics, and led to the suppression by government of the Indicatore Geriovese and the Indicatore Livornese succes- sively. Having joined the Carbonari, he soon rose to one of the higher grades in their hierarchy, and was entrusted with a special secret mission into Tuscany; but, as his acquaintance grew, his dissatisfaction with the organization of the society increased, and he was already meditating the formation of a new association stripped of foolish mysterious and theatrical formulae, which instead of merely combating existing authorities should have a definite and purely patriotic aim, when shortly after the French revolution of 1 830 he was betrayed, while initiating a new member, to the Piedmontese authorities. He was imprisoned in the fortress of Savona on the western Riviera for about six months, when, a conviction having been found impracticable through deficiency of evidence, he was released, but upon conditions involving so many restrictions of his liberty that he preferred the alternative of leaving the country. He withdrew accordingly into France, living chiefly in Marseilles.

While in his lonely cell at Savona, in presence of " those symbols of the infinite, the sky and the sea," with a greenfinch for his sole companion, and having access to no books but " a Tacitus, a Byron,

and a Bible," he had finally become aware of the great mission or " apostolate " (as he himself called it) of his life; and soon after his release his prison meditations took shape in the programme of the organization which was destined soon to become so famous throughout Europe, that of La Ciovine Italia, or Young Italy. Its publicly avowed aims were to be the liberation of Italy both from foreign and domestic tyranny, and its unification under a republican form of government; the means to be used were education, and, where advisable, insurrection by guerrilla bands; the motto was to be " God and the people," and the banner was to bear on one side the words " Unity " and " Independence " and on the other " Liberty," " Equality," and '■' Humanity," to describe respectively the national and the international aims. In April 1831 Charles Albert, " the ex-Carbonaro conspirator of 1821," succeeded Charles Felix on the

Sardinian throne, and towards the close of that year Mazzini, making himself, as he afterwards confessed, " the interpreter of a hope which he did not share," wrote the new king a letter, published at Marseilles, urging him to take the lead in the impending struggle for Italian independence. Clandestinely reprinted, and rapidly circulated all over Italy, its bold and out- spoken words produced a great sensation, but so deep was v the offence it gave to the Sardinian government that orders were issued for the immediate arrest and imprisonment of the author should he attempt to cross the frontier. Towards the end of the same year appeared the important Young Italy " Manifesto," the substance of which is given in the first volume of the Life and Writings of Mazzini; and this was followed soon afterwards by the society's Journal, which, smuggled across the Italian frontier, had great success in the objects for which it was written, numerous " congregations " being formed at Genoa, Leghorn, and elsewhere. Representations were consequently made by the Sardinian to the French government, which issued in an order for Mazzini's withdrawal from Marseilles (Aug. 1832); he lingered for a few months in concealment, but ultimately found it necessary to retire into Switzerland.

From this point it is somewhat difficult to follow the career of the mysterious and terrible conspirator who for twenty years out of the next thirty led a life of voluntary imprisonment (as he himself tells us) " within the four walls of a room," and " kept no record of dates, made no biographical notes, and preserved no copies of letters." In 1833, however, he is known to have been concerned in an abortive revolutionary movement which took place in the Sardinian army; several executions took place, and he himself was laid under sentence of death. Before the close of the same year a similar

movement in Genoa had been planned, but failed through the youth and inexperience of the leaders. At Geneva, also in 1833, Mazzini set on foot L'Europe Centrale, a journal of which one of the main objects was the emancipation of Savoy; but he did not confine himself to a merely literary agitation for this end. Chiefly through his agency a considerable body of German, Polish and Italian exiles was organized, and an armed invasion of the duchy planned. The frontier was actually crossed on the 1st of February 1834, but the attack ignominiously broke down without a shot having been fired. Mazzini, who personally accompanied the expedition, is no doubt correct in attributing the failure to dissensions with the Carbonari leaders in Paris, and to want of a cordial under- standing between himself and the Savoyard Ramorino, who had been chosen as military leader.

In April 1834 the " Young Europe " association " of men believing in a future of liberty, equality and fraternity for all mankind, and desirous of consecrating their thoughts and actions to the realization of that future " was formed also under the influence of Mazzini's enthusiasm; it was followed soon after- wards by a " Young Switzerland " society, having for its leading idea the formation of an Alpine confederation, to include Switzerland, Tyrol, Savoy and the rest of the Alpine chain as well. But La Jeune Suisse newspaper was compelled to stop within a year, and in other respects the affairs of the struggling patriot became embarrassed. He was permitted to remain at Grenchen in Solothurn for a while, but at last the Swiss diet, yielding to strong and persistent pressure from abroad, exiled him about the end of 1836. In January 1837 he arrived in London, where for many months he had to carry on a hard fight with poverty and the sense of spiritual loneliness, so touchingly described by himself in the first volume of the Life and Writings. Ultimately, as he gained command of the English language, he began to earn a livelihood by writing review articles, some of which have since been reprinted, and are of a high order of literary merit; they include papers on "Italian Literature since 1830 " and " Paolo Sarpi " in the Westminster Review, articles on " Lamennais," " George Sand," " Byron and Goethe " in the Monthly Chronicle, and on " Lamartine," " Carlyle," and" The Minor Works of Dante " in the British and Foreign Review. In 1839 he entered into relations with the revolutionary committees sitting in Malta and Paris, and in 1840 he originated a working

men's association, and the weekly journal entitled Apostolato Popolare, in which the admirable popular treatise " On the Duties of Man " was commenced. Among the patriotic and philanthropic labours undertaken by Mazzini during this period of retirement in London may be mentioned a free evening school conducted by himself and a few others for some years, at which several hundreds of Italian children received at least the rudi- ments of secular and religious education. He also exposed and combated the infamous traffic carried on in southern Italy, where scoundrels bought small boys from poverty-stricken parents and carried them off to England and elsewhere to grind organs and suffer martyrdom at the hands of cruel taskmasters. The most memorable episode in his life during the same period was perhaps that which arose out of the conduct of Sir James Graham, the home secretary, in systematically, for some months, opening Mazzini's letters as they passed through the British post office, and communicating their contents to the Neapolitan government — a proceeding which was believed at the time to have led to the arrest and execution of the brothers Bandiera, Austrian subjects, who had been planning an expedition against Naples, although the recent publication of Sir James Graham's life seems to exonerate him from the charge. The prolonged discussions in parliament, and the report of the committee appointed to inquire into the matter, did not, however, lead to any practical result, unless indeed the incidental vindication of Mazzini's character, which had been recklessly assailed in the course of debate. In this connexion Thomas Carlyle wrote to The Times: " I have had the honour to know Mr Mazzini for a series of years, and, whatever I may think of his practical insight and skill in worldly affairs, I can with great freedom testify that he, if I have ever seen one such, is a man of genius and virtue, one of those rare men, numerable unfortunately but as units in this world, who are worthy to be called martyr souls; who in silence, piously in their daily life, practise what is meant by that."

Mazzini did not share the enthusiastic hopes everywhere raised in the ranks of the Liberal party throughout Europe by the first acts of Pius IX., in 1846, but at the same time he availed himself, towards the end of 1847, of the opportunity to publish a letter addressed to the new pope, indicating the nature of the religious and national mission which the Liberals expected him to under- take. The leaders of the revolutionary outbreaks in Milan and Messina in the beginning of 1848 had long been in secret corre- spondence with Mazzini; and their action, along with the revolu- tion in Paris, brought him early in the same year to Italy, where he took a great and active interest in the events which dragged Charles Albert into an unprofitable war

with Austria; he actually for a short time bore arms under Garibaldi immediately before the reoccupation of Milan, but ultimately, after vain attempts to maintain the insurrection in the mountain districts, found it necessary to retire to Lugano. In the beginning of the following year he was nominated a member of the short-lived provisional government of Tuscany formed after the flight of the grand-duke, and almost simultaneously, when Rome had, in consequence of the withdrawal of Pius IX., been proclaimed a republic, he was declared a member of the constituent assembly there. A month afterwards, the battle of Novara having again decided against Charles Albert in the brief struggle with Austria, into which he had once more been drawn, Mazzini was appointed a member of the Roman triumvirate, with supreme executive power (March 23,1 849) . The opportunity he now had for showing the adminis- trative and political ability which he was believed to possess was more apparent than real, for the approach of the professedly friendly French troops soon led to hostilities, and resulted in a siege which terminated, towards the end of June, with the assembly's resolution to discontinue the defence, and Mazzini's indignant resignation. That he succeeded, however, for so long a time, and in circumstances so adverse, in maintaining a high degree of order within the turbulent city is a fact that speaks for itself. His diplomacy, backed as it was by no adequate physical force, naturally showed at the time to very great disadvantage, but his official correspondence and proclamations can still be

read with admiration and intellectual pleasure, as well as his eloquent vindication of the revolution in his published " Letter to MM. de Tocqueville and de Falloux." The surrender of the city on the 30th of June was followed by Mazzini's not too precipitate flight by way of Marseilles into Switzerland, whence he once more found his way to London. Here in 1850 he became president of the National Italian Committee, and at the same time entered into close relations with Ledru-Rollin and Kossuth. He had a firm belief in the value of revolutionary attempts, however hopeless they might seem ; he had a hand in the abortive rising at Mantua in 1852, and again, in February 1853, a consider- able share in the ill-planned insurrection at Milan on the 6th of February 1853, the failure of which greatly weakened his influence; once more, in 1854, he had gone far with preparations for renewed action when his plans were completely disconcerted by the withdrawal of professed supporters, and by the action of the French and English governments in sending ships of war to Naples.

The year 1857 found him yet once more in Italy, where, for

complicity in short-lived emeutes which took place at Genoa, Leghorn and Naples, he was again laid under sentence of death. Undiscouraged in the pursuit of the one great aim of his life by any such incidents as these, he returned to London, where he edited his new journal Pensiero ed Azione, in which the constant burden of his message to the overcautious practical politicians of Italy was: " I am but a voice crying Action; but the state of Italy ccies for it also. So do the best men and people of her cities. Do you wish to'destroy my influence? Act." The same tone was at a somewhat later date assumed in the letter he wrote to Victor Emmanuel, urging him to put himself at the head of the movement for Italian unity, and promising republican support. As regards the events of 1859-1860, however, it may be questioned whether, through his characteristic inability to distinguish between the ideally perfect and the practically possible, he did not actually hinder more than he helped the course of events by which the realization of so much of the great dream of his life was at last brought about. If Mazzini was the prophet of Italian unity, and Garibaldi its knight errant, to Cavour alone belongs the honour of having been the statesman by whom it was finally accomplished. After the irresistible pressure of the popular movement had led to the establishment not of an Italian republic but of an Italian kingdom, Mazzini could honestly enough write, " I too have striven to realize unity under a monarchical flag," but candour compelled him to add, " The Italian people are led astray by a delusion at the present day, a delusion which has induced them to substitute material for moral unity and their own reorganization. Not so I. I bow my head sorrowfully to the sovereignty of the national will; but monarchy will never number me amongst its servants or followers." In 1865, by way of protest against the still uncancelled sentence of death under which he lay, Mazzini was elected by Messina as delegate to the Italian parliament, but, feeling himself unable to take the oath of allegiance to the monarchy, he never took his seat. In the following year, when a general amnesty was granted after the cession of Venice to Italy, the sentence of death was at last removed, but he declined to accept such an " offer of oblivion and pardon for having loved Italy above all earthly things." In May 1869 he was again expelled from Switzerland at the instance of the Italian government for having conspired with Garibaldi; after a few months spent in England he set out (1870) for Sicily, but was promptly arrested at sea and carried to Gaeta, where he was imprisoned for two months. Events soon made it evident that there was little danger to fear from the contemplated rising, and the occasion of the birth of a prince was seized for restoring him to liberty. The remainder of his life, spent partly in London and partly at Lugano, presents no noteworthy

incidents. For some time his health had been far from satisfactory, but the immediate cause of his death was an attack of pleurisy with which he was seized at Pisa, and which terminated fatally on the 10th of March 1872. The Italian parliament by a unanimous vote expressed the national sorrow with which the tidings of his death had been received, the president pronouncing an eloquent

eulogy on the departed patriot as a model of disinterestedness and self-denial, and one who had dedicated his whole life ungrudgingly to the cause of his country's freedom. A public funeral took place at Pisa on the 14th of March, and the remains were afterwards conveyed to Genoa. (J. S. Bl.)

The published writings of Mazzini, mostly occasional, are very voluminous. An edition was begun by himself and continued by A. Sam, Scritti editi e inediti di Giuseppe Mazzini, in 18 vols. (Milan and Rome, 1861-1891); many of the most important are found in the partially autobiographical Life and Writings of Joseph Mazzini (1 864-1 870) and the two most systematic— Thoughts upon Democracy in Europe, a remarkable series of criticisms on Benthamism, St Simonianism, Fourierism, and other economic and socialistic schools of the day, and the treatise On the Duties of Man, an admirable primer of ethics, dedicated to the Italian working class — will be found in Joseph Mazzini: a Memoir, by Mrs E. A. Venturi (London, 1875). Mazzini's " first great sacrifice," he tells us, was " the re- nunciation of the career of literature for the more direct path of political action," and as late as 1861 we find him still recurring to the long-cherished hope of being able to leave the stormy arena of politics and consecrate the last years of his life to the dream of his youth. He had specially contemplated three considerable literary undertakings — a volume of Thoughts on Religion, a popular History of Italy, to enable the working classes to apprehend what he con- ceived to be the " mission " of Italy in God's providential ordering of the world, and a comprehensive collection of translations of ancient and modern classics into Italian. None of these was actually achieved. No one, however, can read even the briefest and most occasional writing of Mazzini without gaining some impression of the simple grandeur of the man, the lofty elevation of his moral tone, his unwavering faith in the living God, who is ever revealing Himself in the progressive development of humanity. His last public utterance is to be found in a highly characteristic article on Renan's Reforme

Morale et Inlellectuelle, finished on the 3rd of March 1872, and published in the Fortnightly Review for February 1874. Of the 40,000 letters of Mazzini only a small part have been published. In 1887 two hundred unpublished letters were printed at Turin (Duecento iettere inedite di Giuseppe Mazzini), in 1895 the Lettres intimes were published in Paris, and in 1905 Francesco Rosso published. Lettre inedite di Giuseppe Mazzini (Turin, 1905). A popular edition of Mazzini's writings has been undertaken by order of the Italian government.

For Mazzini's biography see Jessie White Mario, Delia vita di Giuseppe Mazzini (Milan, 1886), a useful if somewhat too enthusiastic work; Bolton King, Mazzini (London, 1903); Count von Schack, Joseph Mazzini und die italienische Einheit (Stuttgart, 1891). A. Luzio's Giuseppe Mazzini (Milan, 1905) contains a great deal of valuable information, bibliographical and other, and Dora Melegari in La giovine Italia e Giuseppe Mazzini (Milan, 1906) publishes the correspondence between Mazzini and Luigi A. Melegari during the early days of " Young Italy." For the literary side of Mazzini's life see Peretti, Gli scritti letterarii di Giuseppe Mazzini (Turin, 1904). (L. V.)*

MAZZONI, GIACOMO (1548-1598), Italian philosopher, was born at Cesena and died at Ferrara. A member of a noble family and highly educated, he was one of the most eminent savants of the period. He occupied chairs in the universities of Pisa and Rome, was one of the founders of the Delia Crusca Academy, and had the distinction, it is said, of thrice vanquishing the Admirable Crichton in dialectic. His chief work in philo- sophy was an attempt to reconcile Plato and Aristotle, and in this spirit he published in 1597 a treatise In universam Platonis et Aristotelis philosophiam praecludia. He wrote also De triplici hominum vita, wherein he outlined a theory of the infinite perfec- tion and development of nature. Apart from philosophy, he was prominent in literature as the champion of Dante, and produced two works in the poet's defence: Discorso composto in difesa della comedia di Dante (1572), and Delia difesa delta comedia di Dante (1587, reprinted 1688). He was an authority on ancient languages and philology, and gave a great impetus to the scientific study of the Italian language.

MAZZONI, GUIDO (1859-), Italian poet, was born at Florence, and educated at Pisa and Bologna. In 1887 he became professor of Italian at Padua, and in 1894 at Florence. He was much influenced by Carducci, and became prominent both as a prolific and well-read critic and as a poet of individual distinction. His chief volumes of

verse are Versi (1880), Nuove poesie (1886), Poesie (1891), Voci della vita (1893).

MEAD, LARKIN GOLDSMITH (1835-), American sculptor, was born at Chesterfield, New Hampshire, on the 3rd of January 1835. He was a pupil (1853-1855) of Henry Kirke

Brown. During the early part of the Civil War he was at the front for six months, with the army of the Potomac, as an artist for Harper's Weekly; and in 1862-1865 he was in Italy, being for part of the time attached to the United States consulate at Venice, while William D. Ho wells, his brother-in-law, was consul. He returned to America in 1865, but subsequently went back to Italy and lived at Florence. His first important work was a statue of Ethan Allen, now at the State House, Montpelier, Vermont. His principal works are : the monument to President Lincoln, Springfield, Illinois; " Ethan Allen " (1876), National Hall of Statuary, Capitol, Washington; an heroic marble statue, " The Father of Waters," New Orleans; and " Triumph of Ceres," made for the Columbian Exposition, Chicago.

His brother, William Rutherford Mead (1846-), graduated at Amherst College in 1867, and studied architecture in New York under Russell Sturgis, and also abroad. In 1879 he and J. F. McKim, with whom he had been in partnership for two years as architects, were joined by Stanford White, and formed the well-known firm of McKim, Mead & White.

MEAD, RICHARD (1673-1754), English physician, eleventh child of Matthew Mead (1 630-1 699), Independent divine, was born on the nth of August 1673 at Stepney, London. He studied at Utrecht for three years under J. G. Graevius; having decided to follow the medical profession, he then went to Leiden and attended the lectures of Paul Hermann and Archibald Pitcairne. In 1695 he graduated in philosophy and physic at Padua, and in 1696 he returned to London, entering at once on a successful practice. His Mechanical Account of Poisons appeared in 1702, and in 1703 he was admitted to the Royal Society, to whose Transactions he contributed in that year a paper on the parasitic nature of scabies. In the same year he was elected physician to St Thomas's Hospital, and appointed to read anatomical lectures at the Surgeons' Hall. On the death of John Radcliffe in 1714 Mead became the recognized head of his profession; he attended Queen Anne on her deathbed, and in 1727 was appointed physician to George II., having previously served him in that capacity when he was prince of Wales. He died in London on the 16th of February 1754.

Besides the Mechanical Account of Poisons (2nd ed., 1708), Mead published a treatise De imperio solis et lunae in corpora humana et morbis inde oriundis (1704), A Short Discourse concerning Pestilential Contagion, and the Method to be used to prevent it (1720), De variolis et morbillis dissertatio (1747), Medica sacra, sive de morbis insignior- ibus qui in bibliis memorantur commentarius (1748), On the Scurvy (1749), and Monita et praeceptd medica (1751). A Life of Mead by Dr Matthew Maty appeared in 1755.

MEAD. (1) A word now only used more or less poetically for the commoner form " meadow," properly land laid down for grass and cut for hay, but often extended in meaning to include pasture-land. " Meadow " represents the oblique case, maedwe, of O. Eng. maid, which comes from the root seen in " mow "; the woid, therefore, means " mowed land." Cognate words appear in other Teutonic languages, a familiar instance being Ger. matt, seen in place-names such as Zermatt, Andermatt, &c. (See Grass.) (2) The name of a drink made by the fermentation of honey mixed with water. Alcoholic drinks made from honey were common in ancient times, and during the middle ages throughout Europe. The Greeks and Romans knew of such under the names of 65po/xeXi and hydromel; mulsum was a form of mead with the addition of wine. The word is common to Teutonic languages (cf. Du. mede, Ger. Met or Meth), and is cognate with Gr. ixkQv, wine, and Sansk. mddku, sweet drink. " Metheglin," another word for mead, properly a medicated or spiced form of the drink, is an adaptation of the Welsh meddyglyn, which is derived from meddyg, healing (Lat. medicus) and llyn, liquor. It therefore means " spiced or medicated drink," and is not etymologically connected with " mead."

MEADE, GEORGE GORDON (181 5-1872), American soldier, was born of American parentage at Cadiz, Spain, on the 31st of December 181 5. On graduation at the United States Military Academy in 1835, he served in Florida with the 3rd Artillery against the Seminoles. Resigning from the army in 1836, he

became a civil engineer and constructor of railways, and was engaged under the war department in survey work. In 1842 he was appointed a second lieutenant in the corps of the topo- graphical engineers. In the war with Mexico he was on the staffs successively

of Generals Taylor, J. Worth and Robert Patterson, and was brevetted for gallant conduct at Monterey. Until the Civil War he was engaged in various engineering works, mainly in connexion with lighthouses, and later as a captain of topographical engineers in the survey of the northern lakes. In 1 86 1 he was appointed brigadier-general of volunteers, and had command of the 2nd brigade of the Pennsylvania Reserves in the Army of the Potomac under General M'Call. He served in the Seven Days, receiving a severe wound at the action of Frazier's Farm. He was absent from his command until the second battle of Bull Run, after which he obtained the command of his division. He distinguished himself greatly at the battles of South Mountain and Antietam. At Fredericksburg he and his division won great distinction by their attack on the position held by Jackson's corps, and Meade was promoted major- general of volunteers, to date from the 29th of November. Soon afterwards he was placed in command of the V. corps. At Chancellorsville he displayed great intrepidity and energy, and on the eve of the battle of Gettysburg was appointed to succeed Hooker. The choice was unexpected, but Meade justified it by his conduct of the operations, and in the famous three days' battle he inflicted a complete defeat on General Lee's army. His reward was the commission of brigadier-general in the regular army. In the autumn of 1863 a war of manoeuvre was fought between the two commanders, on the whole favourably to the Union arms. Grant, commanding all the armies of the United States, joined the Army of the Potomac in the spring of 1864, and remained with it until the end of the war; but he continued Meade in his command, and successfully urged his appointment as" major-general in the regular army (Aug. 18, 1864), eulogizing him as the commander who had successfully met and defeated the best general and the strongest army on the Confede- rate side. After the war Meade commanded successively the military division of the Atlantic, the department of the east, the third military district (Georgia and Alabama) and the department of the south. He died at Philadelphia on the 6th of November, 1872. The degree of LL.D. was conferred upon him by Harvard University, and his scientific attainments were recognized by the American Philosophical Society and the Philadelphia Academy of Natural Sciences. There are statues of General Meade in Philadelphia and at Gettysburg.

See I. R. Pennypacker, General Meade (" Great Commanders " series, New York, 1901).

MEADE, WILLIAM (1789-1862), American Protestant Episcopal bishop, the son of Richard Kidder Meade (1746-1805), one of General Washington's aides during the War of Independ- ence, was

born on the nth of November 1789, near Millwood, in that part of Frederick county which is now Clarke county, Virginia. He graduated as valedictorian in 1808 at the college of New Jersey (Princeton); studied theology under the Rev. Walter Addison of Maryland, and in Princeton; was ordained deacon in 1811 and priest in 1814; and preached both in the Stone Chapel, MiHwood, and in Christ Church, Alexandria, for some time. He became assistant bishop of Virginia in 1829; was pastor of Christ Church, Norfolk, in 1834-1836; in 1841 became bishop of Virginia; and in 1842-1862 was president of the Protestant Episcopal Theological Seminary in Virginia, near Alexandria, delivering an annual course of lectures on pastoral theology. In 1819 he had acted as the agent of the American Colonization Society to purchase slaves, illegally brought into Georgia, which had become the property of that state and were sold publicly at Milledgeville. He had been prominent in the work of the Education Society, which was organized in 1818 to advance funds to needy students for the ministry of the American Episcopal Church, and in the establishment of the Theological Seminary near Alexandria, as he was afterwards in the work of the American Tract Society, and the Bible Society. He was a founder and president of the Evangelical Knowledge Society

(1847), which, opposing what it considered the heterodoxy of. many of the books published by the Sunday School Union, attempted to displace them by issuing works of a more evangelical type. A low Churchman, he strongly opposed Tractarianism. He was active in the case against Bishop Henry Ustick Onderdonk (1 789-1858) of Pennsylvania, who because of intemperance was forced to resign and was suspended from the ministry in 1844; in that against Bishop Benjamin Tredwell Onderdonk (1791-1861) of New York, who in 1845 was suspended from the ministry on the charge of intoxication and improper conduct; and in that against Bishop G. W. Doane of New Jersey. He fought against the threatening secession of Virginia, but acquiesced in the decision of the state and became presiding bishop of the Southern Church. He died in Richmond, Virginia, on the 14th of March

1862.

Among his publications, besides many sermons, were A Brief Review of the Episcopal Church in Virginia (1845) ; Wilberforce, Cranmer, Jewett and the Prayer Book on the Incarnation (1850); Reasons for Loving the Episcopal Church (1852) ; and Old Churches, Ministers and Families of Virginia (1857); a storehouse of material on the ecclesiastical history of the state.

See the Life by John Johns (Baltimore, 1867).

MEADVILLE, a city and the county-seat of Crawford county, Pennsylvania, U.S.A., on French Creek, 36 m. S. of Erie. Pop. (1900), 10,291, of whom 912 were foreign-born and 173 were negroes; (1910 census) 12,780. It is served by the Erie, and the Bessemer & Lake Erie railways. Meadville has three public parks, two general hospitals and a public library, and is the seat of the Pennsylvania College of Music, of a commercial college, of the Meadville Theological School (1844, Unitarian), and of Allegheny College (co-educational), which was opened in 1815, came under the general patronage of the Methodist Episcopal Church in 1833, and in 1909 had 3 22 students (200 men and 122 women). Meadville is the commercial centre of a good agricultural region, which also abounds in oil and natural gas. The Erie Railroad has extensive shops here, which in 1905 employed 46-7 % of the total number of wage-earners, and there are various manufactures. The factory product in 1905 was valued at $2,074,600, being 24-4% more than that of 1900. Meadville, the oldest settlement in N.W. Pennsylvania, was founded as a fortified post by David Mead in 1793, laid out as a town in 1795, incorporated as a borough in 1823 and chartered as a city in 1866.

MEAGHER, THOMAS FRANCIS (1823-1867), Irish nation- alist and American soldier, was born in Waterford, Ireland, on the 3rd of August 1823. He graduated at Stonyhurst College, Lancashire, in 1843, and in 1844 began the study of law at Dublin. He became a member of the Young Ireland Party in 1845, and in 1847 was one of the founders of the Irish Confedera- tion. In March 1848 he made a speech before the Confederation which led to his arrest for sedition, but at his trial the jury failed to agree and he was discharged. In the following July the Con- federation created a " war directory " of five, of which Meagher was a member, and he and William Smith O'Brien travelled through Ireland for the purpose of starting a revolution. The attempt proved abortive; Meagher was arrested in August, and in October was tried for high treason before a special commission at Clonmel. He was found guilty and was condemned to death, but his sentence was commuted to life imprisonment in Van Diemen's Land, whither he was transported in the summer of 1849. Early in 1852 he escaped, and in May reached New York City. He made a tour of the cities of the United States as a popular lecturer, and then studied law and was admitted to the New York bar in 1855. He made two unsuccessful ventures in journalism, and in 1857 went to Central America, where he acquired material for another series of lectures. In 1861 he was captain of a company (which he had raised)

in the 69th regiment of New York volunteers and fought at the first battle of Bull Run; he then organized an Irish brigade, of whose first regiment he was colonel until the 3rd of February 1862, when he was appointed to the command of this organization with the rank of brigadier-general. He took part in the siege of York- town, the battle of Fair Oaks, the seven days' battle before

Richmond, and the battles of Antietam, Fredericksburg, where he was wounded, and Chancellorsville, where his brigade was reduced in numbers to less than a regiment, and General Meagher resigned his commission. On the 23rd of December 1863 his resignation was cancelled, and he was assigned to the command of the military district of Etowah, with headquarters at Chatta- nooga. At the close of the war he was appointed by President Johnson secretary of Montana Territory, and there, in the absence of the territorial governor, he acted as governor from September 1866 until his death from accidental drowning in the Missouri River near Fort Benton, Montana, on the 1st of July 1867. He published Speeches on the Legislative Independence of Ireland (1852).

W. F. Lyons, in Brigadier-General Thomas Francis Meagher (New York, 1870), gives a eulogistic account of his career.

MEAL. (1) (A word common to Teutonic languages, cf. Ger. Mehl, Du. meel; the ultimate source is the root seen in various Teutonic words meaning " to grind," and in Eng. " mill," Lat. mola, molSre, Gr. y.v\r\), a powder made from the edible part of any grain or pulse, with the exception of wheat, which is known as " flour." In America the word is specifically applied to the meal produced from Indian corn or maize, as in Scotland and Ireland to that produced from oats, while in South Africa the ears of the Indian corn itself are called " mealies." (2) Properly, eating and drinking at regular stated times of the day, as breakfast, dinner, &c, hence taking of food at any time and also the food provided. The word was in O.E. mael, which also had the meanings (now lost) of time, mark, measure, &c, which still appear in many forms of the word in Teutonic languages; thus Ger. mal, time, mark, cf. Denkmal, monument, Mahl, meal, repast, or Du. maal, Swed. mal, also with both meanings. The ultimate source is the pre-Teutonic root me- ma-, to measure, and the word thus stood for a marked-out point of time.

MEALIE, the South African name for Indian corn or maize. The word as spelled represents the pronunciation of the Cape Dutch milje, an adaptation of milho (da India), the millet of India, the Portuguese name for millet, used in South Africa for maize.

MEAN, an homonymous word, the chief uses of which may be divided thus. (1) A verb with two principal applications, to intend, purpose or design, and to signify. This word is in O.E. maenan, and cognate forms appear in other Teutonic languages, cf. Du. meenen, Ger. meinen. The ultimate origin is usually taken to be the root men-, to think, the root of " mind." (2) An adjective and substantive meaning " that which is in the middle." This is derived through the O. Fr. men, meien or moien, modern moyen, from the late Lat. adjective medianus, from medius, middle. The law French form mesne is still preserved in certain legal phrases (see Mesne). The adjective "mean" is chiefly used in the sense of " average," as in mean temperature, mean birth or death rate, &c.

" Mean " as a substantive has the following principal applica- tions; it is used of that quality, course of action, condition, state, &c, which is equally distant from two extremes, as in such phrases as the " golden (or happy) mean." For the philosophic application see Aristotle and Ethics.

In mathematics, the term " mean," in its most general sense, is given to some function of two or more quantities which (1) becomes equal to each of the quantities when they themselves are made equal, and (2) is unaffected in value when the quantities suffer any transpositions. The three commonest means are the arithmetical, geometrical, and harmonic; of less importance are the contraharmonical, arithmetico-geometrical, and quadratic.

From the sense of that which stands between two things, " mean," or the plural " means," often with a singular construc- tion, takes the further significance of agency, instrument, &c, of which that produces some result, hence resources capable of producing a result, particularly the pecuniary or other resources by which a person is enabled to live, and so used either of employ- ment or of property, wealth, &c. There are many adverbial phrases, such as " by all means," " by no means," &c, which are extensions of " means " in the sense if agency.

The word " mean " (like the French moyen) had also the sense of middling, moderate, and this considerably influenced the uses of " mean " (3). This, which is now chiefly used in the sense of inferior,

low, ignoble, or of avaricious, penurious, " stingy," meant originally that which is common to more persons or things than one. The word in O. E. is gemaine, and is represented in the modern Ger. gemein, common. It is cognate with Lat. communis, from which " common " is derived. The descent in meaning from that which is shared alike by several to that which is inferior, vulgar or low, is paralleled by the uses of " common."

In astronomy the " mean sun " is a fictitious sun which moves uniformly in the celestial equator and has its right ascension always equal to the sun's mean longitude. The time recorded by the mean sun is termed mean-solar or clock time; it is regular as distinct from the non-uniform solar or sun-dial time. The " mean moon " is a fictitious moon which moves around the earth with a uniform velocity and in the same time as the real moon. The " mean longitude " of a planet is the longitude of the " mean " planet, i.e. a fictitious planet performing uniform revolutions in the same time as the real planet.

The arithmetical mean of n quantities is the sum of the quantities divided by their number n. The geometrical mean of n quantities is the nth root of their product. The harmonic mean of n quantities is the arithmetical mean of their reciprocals. The significance of the word " mean," i.e., middle, is seen by considering 3 instead of n quantities ; these will be denoted by a, b, c. The arithmetic mean b, is seen to be such that the terms a, b, c are in arithmetical progression, i.e. 6 = j (a-f-c) ; the geometrical mean b places a, b, c in geometrical progression, i.e. in the proportion a : b :: b : c or b 2 =ac : and the har- monic mean places the quantities in harmonic proportion, i.e. a : c ::a — b :b—c, or b = 2ac/(a+c). The contraharmonical mean is the quantity b given by the proportion a : c ::b—c : a — b, i.e. 6 = (a 2 +c 2)/(a-j-c). The arithmetico-geometrical mean of two quantities is obtained by first forming the geometrical and arith- metical means, then forming the means of these means, and repeating the process until the numbers become equal. They were invented by Gauss to facilitate the computation of elliptic integrals. The quadratic mean of n quantities is the square root of the arithmetical mean of their squares.

MEASLES, (Morbilli, Rubeola; the M. E. word is maseles, properly a diminutive of a word meaning " spot," O.H.G. mdsa, cf. " mazer"; the equivalent is Ger. Masern; Fr. Rougeole), an acute infectious disease occurring mostly in children. It is mentioned in the writings of Rhazes and others of the Arabian physicians in the 10th century. For long, however, it was held to be a variety of small-pox. After the

non-identity of these two diseases had been established, measles and scarlet-fever continued to be confounded with each other; and in the account given by Thomas Sydenham of epidemics of measles in London in 1670 and 1674 it is evident that even that accurate observer had not as yet clearly perceived their pathological distinction, although it would seem to have been made a century earlier by Giovanni Filippo Ingrassias (1510-1580), a physician of Palermo. The specific micro-organism responsible for measles has not been definitely isolated.

Its progress is marked by several stages more or less sharply defined. After the reception of the contagion into the system, there follows a period of incubation or latency during which scarcely any disturbance of the health is perceptible. This period generally lasts for from ten to fourteen days, when it is followed by the invasion of the symptoms specially characteristic of measles. These consist in the somewhat sudden onset of acute catarrh of the mucous membranes. At this stage minute white spots in the buccal mucous membrane frequently occur; when they do, they are diagnostic of the disease. Sneezing, accompanied with a watery discharge, sometimes bleeding, from the nose, redness and watering of the eyes, cough of a short, frequent, and noisy character, with little or no expectoration, hoarseness of the voice, and occasionally sickness and diarrhoea, are the chief local phenomena of this stage. With these there is well-marked febrile disturbance, the temperature being elevated (io2°-io4° F.), and the pulse rapid, while headache, thirst, and restlessness are usually present. In some instances, these initiai symptoms are slight, and the child is allowed to associate with

others at a time when, as will be afterwards seen, the contagion of the disease is most active. In rare cases, especially in young children, convulsions usher in, or occur in the course of, this stage of invasion, which lasts as a rule for four or five days, the febrile symptoms, however, showing some tendency to undergo abatement after the second day. On the fourth or fifth day after the invasion, sometimes later, rarely earlier, the character- istic eruption appears on the skin, being first noticed on the brow, cheeks, chin, also behind the ears, and on the neck. It consists of small spots of a dusky red or crimson colour, just like flea-bites, slightly elevated above the surface, at first isolated, but tending to become grouped into patches of irregular, occa- sionally crescentic, outline, with portions of skin free from the

eruption intervening. The face acquires a swollen and bloated appearance, which, taken with the catarrh of the nostrils and eyes, is almost characteristic, and renders the diagnosis at this stage a matter of no difficulty. The eruption spreads downwards over the body and limbs, which are soon thickly studded with the red spots or patches. Sometimes these become confluent over a considerable surface. The rash continues to come out for two or three days, and then begins to fade in the order in which it first showed itself, namely from above downwards. By the end of about a week after its first appearance scarcely any trace of the eruption remains beyond a faint staining of the skin. Usually during convalescence slight peeling of the epidermis takes place, but much less distinctly than is the case in scarlet fever. At the commencement of the eruptive stage the fever, catarrh, and other constitutional disturbance, which were present from the beginning, become aggravated, the temperature often rising to 105 or more, and there is headache, thirst, furred tongue, and soreness of the throat, upon which red patches similar to those on the surface of the body may be observed. These symptoms usually decline as soon as the rash has attained its maximum, and often there occurs a sudden and extensive fall of temperature, indicating that the crisis of the disease has been reached. In favourable cases convalescence proceeds rapidly, the patient feeling perfectly well even before the rash has faded from the skin.

Measles may, however, occur in a very malignant form, in which the symptoms throughout are of urgent character, the rash but feebly developed, and of dark purple hue, while there is great prostration, accompanied with intense catarrh of the respiratory or gastro-intestinal mucous membrane. Such cases are rare, occurring mostly in circumstances of bad hygiene, both as regards the individual and his surroundings. On the other hand, cases of measles are often of so mild a form through- out that the patient can scarcely be persuaded to submit to treatment.

Measles as a disease derives its chief importance from the risk, by no means slight, of certain complications which are apt to arise during its course, more especially inflammatory affections of the respiratory organs. These are most liable to occur in the colder seasons of the year and in very young and delicate children. It has been already stated that irritation of the respiratory passages is one of the symptoms characteristic of measles, but that this subsides with the decline of the eruption. Not unfrequently, however, these symptoms, instead of abating, become aggravated, and bronchitis of the capillary form (see Bronchitis), or pneumonia, generally of the diffuse or lobular variety (see Pneumonia), supervene. By far the

greater propor- tion of the mortality in measles is due to its complications, of which those just mentioned are the most common, but which also include inflammatory affections of the larynx, with attacks resembling Croup, and also diarrhoea assuming a dysenteric character. Or there may remain as direct results of the disease chronic ophthalmia, or discharge from the ears with deafness, and occasionally a form of gangrene affecting the tissues of the mouth or cheeks and other parts of the body, leading to dis- figurement and gravely endangering life.

Apart from those immediate risks there appears to be a tendency in many cases for the disease to leave behind a weakened and vulnerable condition of the general health, which may render

children, previously robust, delicate and liable to chest com- plaints, and is in not a few instances the precursor of some of those tubercular affections to which the period of childhood and youth is liable. These various effects or sequelae of measles indicate that although in itself a comparatively mild ailment, it should not be regarded with indifference. Indeed it is doubtful whether any other disease of early life demands more careful watching as to its influence on the health. Happily many of those attending evils may by proper management be averted.

Measles is a disease of the earlier years of childhood. Like other infectious maladies, it is admittedly rare, though not unknown, in nurslings or infants under six months old. It is com- paratively seldom met with in adults, but this is due to the fact that most persons have undergone an attack in early life. Where this has not been the case, the old suffer equally with the young. All races of men appear liable to this disease, provided that which constitutes the essential factor in its origin and spread exists, namely, contagion. Some countries enjoy long immunity from outbreaks of measles, but it has frequently been found in such cases that when the contagion has once been introduced the disease extends with great rapidity and virulence. This was shown by the epidemic in the Faroe Islands in 1846, where, within six months after the arrival of a single case of measles, more than three-fourths of the entire population were attacked and many perished; and the similarly produced and still more destructive outbreak in Fiji in 1875, in which it was estimated that about one-fourth of the inhabitants died from the disease in about three months. In both these cases the great mortality was due to the complications of the malady, specially induced by overcrowding, insanitary surroundings, the absence of proper nourishment and nursing for the sick, and the utter prostration and

*terror of the people, and to the disease being specially malignant, occurring on what might be termed virgin soil. * It may be regarded as an invariable rule that the first epidemic of any disease in a community is specially virulent, each successive attack conferring a certain immunity.*

Ln many lands, such as the United Kingdom, measles is rarely absent, especially from large centres of population, where sporadic cases are found at all seasons. Every now and then epidemics arise from the extension of the disease among those members of a community who have not been in some measure protected by a previous attack. There are few diseases so con- tagious as measles, and its rapid spread in epidemic outbreaks is no doubt due to the well-ascertained fact that contagion is most potent in the earlier stages, even before its real nature has been evinced by the characteristic appearances on the skin. Hence the difficulty of timely isolation, and the readiness with which the disease is spread in schools and families. The contagion is present in the skin and the various secretions. While the contagion is generally direct, it can also be conveyed by the particles from the nose and mouth which, after being expelled, become dry and are conveyed as dust on clothes, toys, &c. Fortunately the germs of measles do not retain their virulence long under such conditions, comparing favourably with those of some other diseases.

Treatment. — The treatment embraces the preventive measures to be adopted by the isolation of the sick at as early a period as possible. Epidemics have often, especially in limited localities, been curtailed by such a precaution. In families with little house accommodation this measure is frequently, for the reason given regarding the communicable period of the disease, ineffec- tual; nevertheless where practicable it ought to be tried. The unaffected children should be kept from school for a time (probably about three weeks from the outbreak in the family would suffice if no other case occur in the interval), and all clothing in contact with the patient or nurses should be dis- infected. In extensive epidemics it is often desirable to close the schools for a time. As regards special treatment, in an ordinary case of measles little is required beyond what is neces- sary in febrile conditions generally. Confinement to bed in a somewhat darkened room, into which, however, air is freely 1 Transactions of the Epidemiological Society (London, 1877).

admitted; light, nourishing, liquid diet (soups, milk, &c), water almost ad lib. to drink, and mild diaphoretic remedies such as the acetate of ammonia or ipecacuanha, are all that is necessary in the febrile stage. When the fever is very severe, sponging the body generally or the chest and arms affords relief. The serious chest complications of measles are to be dealt with by those measures applicable for the relief of the particular symptoms (see Bronchitis; Pneumonia). The preparations of ammonia are of special efficacy. During convalescence the patient must be guarded from exposure to cold, and for a time after recovery the state of the health ought to be watched with a view of averting the evils, both local and constitutional, which too often follow this disease.

" German measles " {Rotheln, or Epidemic Roseola) is a term applied to a contagious eruptive disorder having certain points of resemblance to measles, and also to scarlet fever, but exhibiting its distinct individuality in the fact that it protects from neither of these diseases. It occurs most commonly in children, but frequently in adults also, and is occasionally seen in extensive epidemics. Beyond confinement to the house in the eruptive stage, which, from the slight symptoms experienced, is often difficult of accomplishment, no special treatment is called for. There is little doubt that the disease is often mistaken for true measles, and many of the alleged second attacks of the latter malady are probably cases of rotheln. The chief points of difference are the following: (i) The absence of distinct premonitory symptoms, the stage of invasion, which in measles is usually of four days' duration, and accompanied with well-marked fever and catarrh, being in rotheln either wholly absent or exceedingly slight, enduring only for one day. (2) The eruption of rotheln, which, although as regards its locality and manner of progress similar to measles, differs somewhat in its appearance, the spots being of smaller size, paler colour, and with less tendency to grouping in crescentic patches. The rash attains its maximum in about one day, and quickly disappears. There is not the same increase of temperature in this stage as in measles. (3) The presence of white spots on the buccal mucous membrane, in the case of measles. (4) The milder character of the symptoms of rotheln throughout its whole course, and the absence of complications and of liability to subsequent impairment of health such as have been seen to appertain to measles.

MEAT, a word originally applied to food in general, and so still used in such phrases as "meat and drink"; but now, except as an archaism, generally used of the flesh of certain domestic animals, slaughtered for human food by butchers, " butcher's meat," as

opposed to " game," that of wild animals, " fish " or " poultry." Cognate forms of the O. Eng. mete are found in certain Teutonic languages, e.g. Swed. mat, Dan. mad and 0. H. Ger. Maz. The ultimate origin has been disputed; the New English Dictionary considers probable a connexion with the root med-, " to be fat," seen in Sansk. meda, Lat. madere, " to be wet." and Eng. " mast," the fruit of the beech as food for pigs.

See Dietetics; Food Preservation; Public Health; Agri- culture; and the sections dealing with agricultural statistics under the names of the various countries.

MEATH (pronounced with th soft, as in the), a county of Ireland in the province of Leinster, bounded E. by the Irish Sea. S.E. by Dublin, S. by Kildare and King's County, W. by Westmeath, N.W. by Cavan and Monaghan, and N.E. by Louth. Area 579,320 acres, or about 905 sq. m. In some districts the surface is varied by hills and swells, which to the west reach a considerable elevation, although the general features of a fine champain country are never lost. The coast, low and shelving, extends about 10 m., but there is no harbour of importance. Laytown is a small seaside resort, 5 m. S.E. of Drogheda. The Boyne enters the county at its south-western extremity, and flowing north-east to Drogheda divides it into two almost equal parts. At Navan it receives the Blackwater, which flows south-west from Cavan. Both these rivers are noted for their trout, and salmon are taken in the Boyne. The Boyne is navigable for barges as far as Navan whence a canal is carried to Trim. The Royal Canal passes along the southern boundary of the county from Dublin.

In the north is a broken country of Silurian rocks with much igneous material, partly contemporaneous, partly intrusive, near Slane. Carboniferous Limestone stretches from the Boyne valley to the Dublin border, giving rise to a flat plain especially suitable for grazing. Outliers of higher Carboniferous strata occur on the sur- face ; but the Coal Measures have all been removed by denudation.

The climate is genial and favourable for all kinds of crops, there being less rain than even in the neighbouring counties. Except a small portion occupied by the Bog of Allen, the county is verdant and fertile. The soil is principally a rich deep loam resting on limestone gravel, but varies from a strong clayey loam to a light sandy gravel. The proportion of tillage to pasturage is roughly as I to 3J. Oats, potatoes and turnips are the principal crops, but all decrease. The numbers of cattle, sheep and poultry, however, are increasing or well

maintained. Agriculture is almost the sole industry, but coarse linen is woven by hand-looms, and there are a few woollen manufactories. The main line of the Midland Great Western railway skirts the southern boundary, with a branch line north from Cicnsi la to Navan and Kingscourt (county Cavan). From Kilmessan on this line a branch serves Trim and Athboy. From Droghsda (county Louth) a branch of the Great Northern railway crosses the county from east to West by Navan and Kells to Oldcastle.

The population (76,111 in 1891 ; 67,497 i n I9 01) suffers a large decrease, considerably above the average of Irish counties, and emigration is heavy. Nearly 93% are Roman Catholics. The chief towns are Navan (pop. 3839), Kells (2428) and Trim (1513), the county town. Lesser market towns are Oldcastle and Athboy, an ancient town which received a charter from Henry IV. The county includes eighteen baronies. Assizes are held at Trim, and quarter sessions at Kells, Navan and Trim. The county is in the Protestant dioceses of Armagh, Kilmore and Meath, and in the Roman Catholic dioceses of Armagh and Meath. Before the Union in 1800 it sent fourteen members to parliament, but now only two members are returned, for the north and south divisions of the county respectively.

History and Antiquities. — A district known as Meath (Midhe), and including the present county of Meath as well as Westmeath and Longford, with parts of Cavan, Kildare and King's County, was formed by Tuathal (c. 130) into a kingdom to serve as mensal land or personal estate of the Ard Ri or over-king of Ireland. Kings of Meath reigned until 1173, and the title was claimed as late as the 15th century by their descendants, but at the date mentioned Hugh de Lacy obtained the lordship of the country and was confirmed in it by Henry II. Meath thus came into the English " Pale." But though it was declared a county in the reign of Edward I. (1296), and though it came by descent into the possession of the Crown in the person of Edward IV., it was long before it was fully subdued and its boundaries clearly defined. In 1543 Westmeath was created a county apart from that of Meath, but as late as 1598 Meath was still regarded as a province by some, who included in it the counties Westmeath, East Meath, Longford and Cavan. In the early part of the 17th century it was at last established as a county, and no longer considered as a fifth province of Ireland.

There are two ancient round towers, the one at Kells and the other in the churchyard of Donaghmore, near Navan. By the river Boyne near Slane there is an extensive ancient burial-place called Brugh. Here are some twenty burial mounds, the largest of which is that of New

Grange, a domed tumulus erected above a circular chamber, which is entered by a narrow passage enclosed by great upright blocks of stone, covered with carvings. The mound is surrounded by remains of a stone circle, and the whole forms one of the most remarkable extant erections of its kind. Tara (q.v.) is famous in history, especially as the seat of a royal palace referred to in the well-known lines of Thomas Moore. Monastic buildings were very numerous in Meath, among the more important ruins being those of Duleek, which is said to have been the first ecclesiastical building in Ireland of stone and mortar; the extensive remains of Bective Abbey; and those of Clonard, where also were a cathedral and a famous college. Of the old fortresses, the castle of Trim still presents an imposing appearance. There are many fine old mansions.

MEAUX, a town of northern France, capital of an arrondisse- ment in the department of Seine-et-Marne, and chief town of the agricultural region of Brie, 28 m. E.N.E. of Paris by rail. Pop. (1906), 11,989. The town proper stands on an eminence on the right bank of the Marne; on the left bank lies the old suburb of Le Marche, with which it is united by a bridge of the 1 6th century. Two rows of picturesque mills of the same period are built across the river. The cathedral of St Stephen dates from the 12th to the 16th centuries, and was restored in

the 19th century. Of the two western towers, the completed one is that to the north of the facade, the other being disfigured by an unsightly slate roof. The building, which is 275 ft. long and 105 ft. high, consists of a short nave, with aisles, a fine transept, a choir and a sanctury. The choir contains the statue and the tomb of Bossuet, bishop from 1681 to 1704, and the pulpit of the cathedral has been reconstructed with the panels of that from which the " eagle of Meaux " used to preach. The transept terminates at each end in a fine portal surmounted by a rose-window. The episcopal palace (17th century) has several curious old rooms; the buildings of the choir school are likewise of some archaeological interest. A statue of General Raoult (1870) stands in one of the squares.

Meaux is the centre of a considerable trade in cereals, wool, Brie cheeses, and other farm-produce, while its mills provide much of the flour with which Paris is supplied. Other indus- tries are saw-milling, metal-founding, distilling, the preparation of vermicelli and

preserved vegetables, and the manufacture of mustard, hosiery, plaster and machinery. There are nursery- gardens in the vicinity. The Canal de l'Ourcq, which surrounds the town, and the Marne furnish the means of transport. Meaux is the seat of a bishopric dating from the 4th century, and has among its public institutions a sub-prefecture, and tribunals of first instance and of commerce.

In the Roman period Meaux was the capital of the Meldi, a small Gallic tribe, and in the middle ages of the Brie. It formed part of the kingdom of Austrasia, and afterwards belonged to the counts of Vermandois and Champagne, the latter of whom established important markets on the left bank of the Marne. Its communal charter, received from them, is dated n 79. A treaty signed at Meaux in 1229 after the Albigensian War sealed the submission of Raymond VII., count of Toulouse. The town suffered much during the Jacquerie, the peasants receiving a severe check there in 1358; during the Hundred Years' War; and also during the Religious Wars, in which it was an important Protestant centre. It was the first town which opened its gates to Henry IV. in 1594. On the high-road for invaders marching on Paris from the east of France, Meaux saw its environs ravaged by the army of Lorraine in 1652, and was laid under heavy requisitions in 1814, 1815 and 1870. In September 1567 Meaux was the scene of an attempt made by the Protestants to seize the French king Charles IX., and his mother Catherine de' Medici. The plot, which is sometimes called the " enterprise of Meaux," failed, the king and queen with their courtiers escaping to Paris. This conduct, however, on the part of the Huguenots had doubtless some share in influencing Charles to assent to the massacre of St Bartholomew.

MECCA (Arab. Makkah), 1 the chief town of the Hejaz in Arabia, and the great holy city of Islam. It is situated two camel marches (the resting-place being Bahra or Hadda), or about 45 m. almost due E., from Jidda on the Red Sea. Thus on a rough estimate Mecca lies in 21 2s' N., 39 50′ E. It is said in the Koran {Sur. xiv. 40) that Mecca lies in a sterile valley, and the old geographers observe that the whole Haram or sacred territory round the city is almost without cultivation or date palms, while fruit trees, springs, wells, gardens and green valleys are found immediately beyond. Mecca in fact lies in the heart of a mass of rough hills, intersected by a labyrinth of narrow valleys and passes, and projecting into the Tehama or low country on the Red Sea, in front of the great mountain wall that divides the coast-lands from the central plateau, though in turn they are themselves separated from the sea by a second curtain of hills forming the western wall of the great Wadi Marr. The inner

mountain wall is pierced by only two great passes, and the valleys descending from these embrace on both sides the Mecca hills.

Holding this position commanding two great routes between the lowlands and inner Arabia, and situated in a narrow and 1 A variant of the name Makkah is Bakkah (Sur. iii. 90 ; Bakri, 155 seq.). For other names and honorific epithets of the city see Bakri, ut supra, Azraqi, p. 197, Yaqut iv. 617 seq. The lists are in part corrupt, and some of the names (Kutha and "Arsh or "Ursh, the huts ') are not properly names of the town as a whole.

barren valley incapable of supporting an urban population, Mecca must have been from the first a commercial centre. 2 In the palmy days of South Arabia it was probably a station on the great incense route, and thus Ptolemy may have learned the name, which he writes Makoraba. At all events, long before Mahomet we find Mecca established in the twofold quality of a commercial centre and a privileged holy place, surrounded by an inviolable territory (the Haram), which was not the sanctuary of a single . tribe but a place of pilgrimage, where religious observances were associated with a series of annual fairs at different points in the vicinity. Indeed in the unsettled state of the country commerce was possible only under the sanctions of religion, and through the provisions of the sacred truce which prohibited war for four months of the year, three of these being the month of pilgrimage, with those immediately preceding and following. The first of the series of fairs in which the Meccans had an interest was at Okaz on the easier road between Mecca and Taif, where there was also a sanctuary, and from it the visitors moved on to points still nearer Mecca (Majanna, and finally Dhul-Majaz, on the flank of Jebel Kabkab behind Arafa) where further fairs were held, 3 culminating in the special religious ceremonies of the great feast at "Arafa, Quzah (Mozdalifa), and Mecca itself. The system of intercalation in the lunar calendar of the heathen Arabs was designed to secure that the feast should always fall at the time when the hides, fruits and other mer- chandise were ready for market, 4 and the Meccans, who knew how to attract the Bedouins by hospitality, bought up these wares in exchange for imported goods, and so became the leaders of the international trade of Arabia. Their caravans traversed the length and breadth of the peninsula. Syria, and especially Gaza, was their chief goal. The Syrian caravan intercepted, on its return, at Badr (see Mahomet) represented capital to the value of £20,000, an enormous sum for those days. 6

The victory of Mahommedanism made a vast change in the position of Mecca. The merchant aristocracy became satraps or pensioners of

a great empire; but the seat of dominion was removed beyond the desert, and though Mecca and the Hejaz strove for a time to maintain political as well as religious pre- dominance, the struggle was vain, and terminated on the death of Ibn Zubair, the Meccan pretendant to the caliphate, when the city was taken by Hajjaj (a.d. 692). The sanctuary and feast of Mecca received, however, a new prestige from the victory of Islam. Purged of elements obviously heathen, the Ka'ba became the holiest site, and the pilgrimage the most sacred ritual observance of Mahommedanism, drawing wor- shippers from so wide a circle that the confluence of the petty traders of the desert was no longer the main feature of the holy season. The pilgrimage retained its importance for the com- mercial well-being of Mecca; to this day the Meccans live by the Hajj — letting rooms, acting as guides and directors in the sacred ceremonies, as contractors and touts for land and sea transport, as well as exploiting the many benefactions that flow to the holy city; while the surrounding Bedouins derive support from the camel-transport it demands and from the subsidies by which they are engaged to protect or abstain from molesting the pilgrim caravans. But the ancient " fairs of heathenism " were given up, and the traffic of the pilgrim season, sanctioned by the Prophet in Sur. ii. 194, was concentrated at Mina and Mecca, where most of the pilgrims still have some- thing to buy or sell, so that Mina, after the sacrifice of the feast day, presents the aspect of a huge international fancy

2 Mecca, says one of its citizens, in Waqidi (Kremer's ed., p. 196, or Muh. in Med, p. 100), is a settlement formed for trade with Syria in summer and Abyssinia in winter, and cannot continue to exist if the trade is interrupted.

3 The details are variously related. See Blruni, p. 328 (E. T. , p. 324) ; Asma'i in Yaqut, iii. 705, iv. 416, 421; Azraqi, p. 129 seq.; Bakri, p. 661. Jebel Kabkab is a great mountain occupying the angle between W. Naman and the plain of Arafa. The peak is due north of Sheddad, the hamlet which Burckhardt (i. 115) calls Shedad. According to Azraqi, p. 80, the last shrine visited was that of the three trees of Uzza in W. Nakhla.

- *So we are told by Blruni, p. 62 (E. T., 73).*

6 Waqidi, ed. Kremer, pp. 20, 21 ; Muh. in Med. p. 39.

fair. 1 In the middle ages this trade was much more important than it is now. Ibn Jubair (ed. Wright, p. 118 seq.) in the 12th century describes the mart of Mecca in the eight days following the feast as full of gems, unguents, precious drugs, and all rare merchandise from India, Irak, Khorasan, and every part of the Moslem world.

The hills east and west of Mecca, which are partly built over and rise several hundred feet above the valley, so enclose the city that the ancient walls only barred the valley at three points, where three gates led into the town. In the time of Ibn Jubair the gates still stood though the walls were ruined, but now the gates have only left their names to quarters of the town. At the northern or upper end was the Bab el Ma'la, or gate of the upper quarter, whence the road continues up the valley towards Mina and Arafa as well as towards Zeima and the Nejd. Beyond the gate, in a place called the Hajun, is the chief cemetery, commonly called el Ma'la, and said to be the resting-place of many of the companions of Mahomet. Here a cross-road, running over the hill to join the main Medina road from the western gate, turns off to the west by the pass of Kada, the point from which the troops of the Prophet stormed the city (a.h. 8). 2 Here too the body of Ibn Zubair was hung on a cross by Hajjaj. The lower or southern gate, at the Masfala quarter, opened on the Yemen road, where the rain-water from Mecca flows off into an open valley. Beyond, there are mountains on both sides; on that to the east, commanding the town, is the great castle, a fortress of considerable strength. The third or western gate, Bab el- Omra (formerly also Bab el-Zahir, from a village of that name), lay almost opposite the great mosque, and opened on a road leading westwards round the southern spurs of the Red Moun- tain. This is the way to Wadi Fatima and Medina, the Jidda road branching off from it to the left. Considerable suburbs now lie outside the quarter named after this gate; in the middle ages a pleasant country road led for some miles through partly cultivated land with good wells, as far as the boundary of the sacred territory and gathering place of the pilgrims at Tanlm, near the mosque of Ayesha. This is the spot on the Medina road now called the Omra, from a ceremonial connected with it which will be mentioned below.

The length of the sinuous main axis of the city from the farthest suburbs on the Medina road to the suburbs in the extreme north, now frequented by Bedouins, is, according to Burckhardt, 3500 paces. 3 About the middle of this line the longitudinal thoroughfares are pushed aside by the vast court- yard and colonnades composing the great mosque, which, with its spacious arcades surrounding the Ka'ba and other holy places, and its seven minarets, forms the only prominent archi- tectural feature of the city. The mosque is enclosed by houses with windows opening on the arcades and commanding a view of the Ka'ba. Immediately beyond these, on the side facing Jebel Abu Kobais, a broad street runs south-east and north-west across the valley. This is the Mas'a (sacred course) between the eminences of Safa and Merwa, and has been from very early times one of the most lively bazaars and the centre of Meccan life. The other chief bazaars are also near the mosque in smaller streets. The general aspect of the town is picturesque; the streets are fairly spacious, though ill-kept and filthy; the houses are all of stone, many of them well-built and four or five storeys high, with terraced roofs and large projecting windows as in Jidda — a style of building which has not varied materially since the 10th century (MukaddasI, p. 71), and gains in effect from the way in which the dwellings run up the sides and spurs of the mountains. Of public institutions there are baths, ribats, or hospices, for poor pilgrims from India, Java, &c, a hospital and a public kitchen for the poor.

1 The older fairs were not entirely deserted till the troubles of the last days of the Omayyads (Azraqi, p. 131).

2 This is the cross-road traversed by Burckhardt (i. 109), and described by him as cut through the rocks with much labour.

8 Isˆakhri gives the length of the city proper from north to south as 2 m., and the greatest breadth from the Jiyad quarter east of the great mosque across the valley and up the western slopes as two- thirds of the length.

The mosque is at the same time the university hall, where between two pilgrim seasons lectures are delivered on Mahom- medan law, doctrine and connected branches of science. A poorly provided public library is open to the use of students. The madrassehs or buildings around the mosque, originally intended as lodgings for students and prof essois, have long been let out to rich pilgrims. The minor places of visitation for pilgrims, such as the birthplaces of the prophet and his chief followers, are not notable. 4 Both these and the court of the

great mosque lie beneath the general level of the city, the site having been gradually raised by accumulated rubbish. The town in fact has little air of antiquity; genuine Arab buildings do not last long, especially in a valley periodically ravaged by tremendous floods when the tropical rains burst on the surround- ing hills. The history of Mecca is full of the record of these inunda- tions, unsuccessfully combated by the great dam drawn across the valley by the caliph Omar (Kutbeddin, p. 76), and later works of Mahdi. 5

The fixed population of Mecca in 1878 was estimated by Assistant-Surgeon "Abd el-Razzaq at 50,000 to 60,000; there is a large floating population — and that not merely at the proper season of pilgrimage, the pilgrims of one season often beginning to arrive before those of the former season have all dispersed. At the height of the season the town is much overcrowded, and the entire want of a drainage system is severely felt. Fortunately good water is tolerably plentiful; for, though the wells are mostly undrinkable, and even the famous Zamzam water only available for medicinal or religious purposes, the underground conduit from beyond Arafa, completed by Sultan Selim II. in 1571, supplies to the public fountains a sweet and light water, con- taining, according to 'Abd el-Razzaq, a large amount of chlorides. The water is said to be free to townsmen, but is sold to the pilgrims at a rather high rate. 6

Medieval writers celebrate the copious supplies, especially of fine fruits, brought to the city from Taif and other fertile parts of Arabia. These fruits are still famous; rice and other foreign products are brought by sea to Jidda; mutton, milk and butter are plentifully supplied from the desert. 7 The industries all centre in the pilgrimage; the chief object of every Meccan — from the notables and sheikhs, who use their influence to gain custom for the Jidda speculators in the pilgrim traffic, down to the cicerones, pilgrim brokers, lodging-house keepers, and mendicants at the holy places— being to pillage the visitor in every possible way. The fanaticism of the Meccan is an affair of the purse; the mongrel population (for the town is by no means purely Arab) has exchanged the virtues of the Bedouin for the worst corruptions of Eastern town life, without casting off the ferocity of the desert, and it is hardly possible to find a worse certificate of character than the three parallel gashes on each cheek, called Tashrlt, which are the customary mark of birth in the holy city. The unspeakable vices of Mecca are a scandal to all Islam, and a constant source of wonder to pious pilgrims. 8 The slave trade has connexions with the pilgrimage which are not thoroughly clear; but under cover of the pilgrimage a great deal of importation and exportation of slaves goes on. Since the fall of Ibn Zubair the

political position of Mecca

4 For details as to the ancient quarters of Mecca, where the several families or septs lived apart, see Azraqi, 455 pp. seq., and compare Ya'qubi, ed. Juynboll, p. 100. The minor sacred places are described at length by Azraqi and Ibn Jubair. They are either connected with genuine memories of the Prophet and his times, or have spurious legends to conceal the fact that they were originally holy stones, wells, or the like, of heathen sanctity.

6 Baladhuri, in his chapter on the floods of Mecca (pp. 53 seq.), says that 'Omar built two dams.

6 The aqueduct is the successor of an older one associated with the names of Zobaida, wife of Harun al-Rashid, and other benefactors. But the old aqueduct was frequently out of repair, and seems to have played but a secondary part in the medieval water supply. Even the new aqueduct gave no adequate supply in Burckhardt's time.

7 In Ibn Jubair's time large supplies were brought from the Yemen mountains.

8 The corruption of manners in Mecca is no new thing. See the letter of the caliph Mahdi on the subject ; Wustenfeld, Chron- Mek., iv. 168.

has always been dependent on the movements of the greater Mahommedan world. In the splendid times of the caliphs immense sums were lavished upon the pilgrimage and the holy city; and conversely the decay of the central authority of Islam brought with it a long period of faction, wars and misery, in which the most notable episode was the sack of Mecca by the Carmathians at the pilgrimage season of a.d. 930. The victors carried off the " black stone," which was not restored for twenty- two years, and then only for a great ransom, when it was plain that even the loss of its palladium could not destroy the sacred character of the city. Under the Fatimites Egyptian influence began to be strong in Mecca; it was opposed by the sultans of Yemen, while native princes claiming descent from the Prophet — the Hashimite amirs of Mecca, and after them the amirs of the house of Qatada (since 1202) — attained to great authority and aimed at independence; but soon after the final fall of the Abbasids the Egyptian overlordship was definitely established by

sultan Bibars (a.d. 1269). The Turkish conquest of Egypt transferred the supremacy to the Ottoman sultans (1517), who treated Mecca with much favour, and during the 16th century executed great works in the sanctuary and temple. The Ottoman power, however, became gradually almost nominal, and that of the amirs or sherifs increased in proportion, cul- minating under Ghalib, whose accession dates from 1786. Then followed the wars of the Wahhabis (see Arabia and Wahhabis) and the restoration of Turkish rule by the troops of Mehemet 'Ali. By him the dignity of sherlf was deprived of much of its weight, and in 1827 a change of dynasty was effected by the appointment of Ibn 'Aun. Afterwards Turkish authority again decayed. Mecca is, however, officially the capital of a Turkish province, and has a governor-general and a Turkish garrison, white Mahommedan law is administered by a judge sent from Constantinople. But the real sovereign of Mecca and the Hejaz is the sherif, who, as head of a princely family claiming descent from the Prophet, holds a sort of feudal position. The dignity of sherif (or grand sherif, as Europeans usually say for the sake of distinction, since all the kin of the princely houses reckoning descent from the Prophet are also named sherifs), although by no means a religious pontificate, is highly respected owing to its traditional descent in the line of Hasan, son of the fourth caliph 'Ali. From a political point of view the sherif is the modern counterpart of the ancient amirs of Mecca, who were named in the public prayers immediately after the reigning caliph. When the great Mahommedan sultanates had become too much occupied in internecine wars to maintain order in the distant Hejaz, those branches of the Hassanids which from the beginning of Islam had retained rural property in Arabia usurped power in the holy cities and the adjacent Bedouin territories. About a.d. 960 they established a sort of kingdom with Mecca as capital. The influence of the princes of Mecca has varied from time to time, according to the strength of the foreign protectorate in the Hejaz or in consequence of feuds among the branches of the house; until about 1882 it was for most purposes much greater than that of the Turks. The latter were strong, enough to hold the garrisoned towns, and thus the sultan was able within certain limits — playing off one against the other the two rival branches of the aristocracy, viz. the kin of Ghalib and the house of Ibn' Aun — to assert the right of designating or removing the sherif, to whom in turn he owed the possibility of maintaining, with the aid of con- siderable pensions, the semblance of his much-prized lordship over the holy cities. The grand sherif can muster a considerable force of freedmen and clients, and his kin, holding wells and lands in various places through the Hejaz, act as his deputies and administer the old Arabic customary

law to the Bedouin. To this influence the Hejaz owes what little of law and order it enjoys. During the last quarter of the 19th century Turkish influence became preponderant in western Arabia, and the railway from Syria to the Hejaz tended to consolidate the sultan's supremacy. After the sherifs, the principal family of Mecca is the house of Shaibah, which holds the hereditary custodianship of the Ka'ba.

The Great Mosque and the Ka'ba. — Long before Mahomet the chief sanctuary of Mecca was the Ka'ba, a rude stone building without windows, and having a door 7 ft. from the ground; and so named from its resemblance to a monstrous astragalus (die) of about 40 ft. cube, though the shapeless structure is not really an exact cube nor even exactly rectangular. 1 The Ka'ba has been rebuilt more than once since Mahomet purged it of idols and adopted it as the chief sanctuary of Islam, but the old form has been preserved, except in secondary details; 2 so that the " Ancient House," as it is titled, is still essentially a heathen temple, adapted to the worship of Islam by the clumsy fiction that it was built by Abraham and Ishmael by divine revelation as a temple of pure monotheism, and that it was only temporarily perverted to idol worship from the time when 'Amr ibn Lohai introduced the statue of Hobal from Syria 3 till the victory of Islam. This fiction has involved the superinduction of a new mythology over the old heathen ritual, which remains practically unchanged. Thus the chief object of veneration is the black stone, which is fixed in the external angle facing Safa. The building is not exactly oriented, but it may be called the south-east corner. Its technical name is the black corner, the others being named the Yemen (south- west), Syrian (north-west), and Irak (north-east) corners, from the lands to which they approximately point. The black stone is a small dark mass a span long, with an aspect suggesting volcanic or meteoric origin, fixed at such a height that it can be conveniently kissed by a person of middle size. It was broken by fire in the siege of a.d. 683 (not, as many authors relate, by the Carmathians), and the pieces are kept together by a silver setting. The history of this heavenly stone, given by Gabriel to Abraham, does not conceal the fact that it was originally a fetish, the most venerated of a multitude of idols and sacred stones which stood all round the sanctuary in the time of Mahomet. The Prophet destroyed the idols, but he left the characteristic form of worship — the tawdf, or sevenfold circuit of the sanctuary, the worshipper kissing or touching the objects of his veneration — and besides the black stone he recognized the so-called " southern " stone, the same pre- sumably as that which is still touched in the tawaf at the Yemen corner (Muh.

in Med. pp. 336, 425). The ceremony of the tawaf and the worship of stone fetishes was common to Mecca with other ancient Arabian sanctuaries. 4 It was, as it still is, a frequent religious exercise of the Meccans, and the first duty of one who returned to the city or arrived there under ft vow of pilgrimage; and thus the outside of the Ka'ba was and is more important than the inside. Islam did away with the worship of idols; what was lost in interest by their suppression

1 The exact measurements (which, however, vary according to different authorities) are stated to be: sides 37 ft. 2 in. and 38 ft. 4 in. ; ends 31 ft. 7 in. and 29 ft. ; height 35 ft.

2 The Ka'ba of Mahomet's time was the successor of an older building, said to have been destroyed by fire. It was constructed in the still usual rude style of Arabic masonry, with string courses of timber between the stones (like Solomon's Temple). The roof rested on six pillars; the door was raised above the ground and approached by a stair (probably on account of the floods which often swept the valley) ; and worshippers left their shoes under the stair before entering. During the first siege of Mecca (a.d. 683), the build- ing was burned down, the Ibn Zubair reconstructed it on an enlarged scale and in better style of solid ashlar- work. After his death his most glaring innovations (the introduction of two doors on a level with the ground, and the extension of the building lengthwise to include the rjijr) were corrected by Hajjaj, under orders from the caliph, but the building retained its more solid structure. The roof now rested on three pillars, and the height was raised one-half. The Ka'ba was again entirely rebuilt after the flood of a.d. 1626, but since Hajjaj there seem to have been no structural changes.

3 Hobal was set up within the Temple over the pit that contained the sacred treasures. His chief function was connected with the sacred lot to which the Meccans were accustomed to betake them- selves in all matters of difficulty.

4 See Ibn Hisham i. 54, Azraki p. 80 ('Uzza in Batn Marr) ; Yakut iii. 705 (Otheyda); Bar Hebraeus on Psalm xii. 9. Stones wor- shipped by circling round them bore the name dawar or duwar (Krehl, Ret. d. Araber, p. 69). The later Arabs not unnaturally viewed such cultus as imitated from that of Mecca (Y&qut iv. 622, cf. Dozy, Israeliten te Mekka, p. 125, who draws very perverse

, inferences).

has been supplied by the invention of spots consecrated by recollections of Abraham, Ishmael and Hagar, or held to be acceptable places of prayer. Thus the space of ten spans between the black stone and the door, which is on the east side, between the black and Irak corners, and a man's height from the ground, is called the Multazam, and here prayer should be offered after the tawaf with outstretched arms and breast pressed against the house. On the other side of the door, against the same wall, is a shallow trough, which is said to mark the original site of the stone on which Abraham stood to build the Ka'ba. Here the growth of the legend can be traced, for the place is now called the " kneading-place " (Ma'jan), where the cement for the Ka'ba was prepared. This name and story do not appear in the older accounts. Once more, on the north side of the Ka'ba, there projects a low semicircular wall of marble, with an opening at each end between it and the walls of the house. The space within is paved with mosaic, and is called the Hijr. It is included in the tawaf, and two slabs of verde antico within it are called the graves of Ishmael and Hagar, and are places of acceptable prayer. Even the golden or gilded mizdb (water-spout) that projects into the Hijr marks a place where prayer is heard, and another such place is the part of the west wall close to the Yemen corner.

The feeling of religious conservatism which has preserved the structural rudeness of the Ka'ba did not prohibit costly surface decoration. In Mahomet's time the outer walls were covered by a veil (or kiswa) of striped Yemen cloth. The caliphs substituted a covering of figured brocade, and the Egyptian government still sends with each pilgrim caravan from Cairo a new kiswa of black brocade, adorned with a broad band embroidered with golden inscriptions from the Koran, as well as a richer curtain for the door. 1 The door of two leaves, with its posts and lintel, is of silver gilt.

The" interior of the Ka'ba is now opened but a few times every year for the general public, which ascends by the portable staircase brought forward for the purpose. Foreigners can obtain admission at any time for a special fee. The modern descriptions, from observations made under difficulties, are not very complete. Little change, however, seems to have been made since the time of Ibn Jubair, who describes the floor and walls as overlaid with richly variegated marbles, and the upper half of the walls as plated with silver thickly gilt, while the roof was veiled with coloured silk.

Modern writers describe the place as windowless, but Ibn Jubair mentions five windows of rich stained glass from Irak. Between the three pillars of teak hung thirteen silver lamps. A chest in the corner to the left of one entering contained Korans, and at the Irak corner a space was cut off enclosing the stair that leads to the roof. The door to this stair (called the door of mercy — Bab el-Rahma) was plated with silver by the caliph Motawakkil. Here, in the time of Ibn Jubair, the Maqam or standing stone of Abraham was usually placed for better security, but brought out on great occasions. 2

The houses of ancient Mecca pressed close upon the Ka'ba, the noblest families, who traced their descent from Kosai, the reputed founder of the city, having their dwellings immedi- ately round the sanctuary. To the north of the Ka'ba was the Dar el-Nadwa, or place of assembly of the Koreish. The multiplication of pilgrims after Islam soon made it necessary to clear away the nearest dwellings and enlarge the place of prayer around the Ancient House. Omar, Othman and Ibn Jubair had all a share in this work, but the great founder of the mosque in its present form, with its spacious area and deep

1 The old kiswa is removed on the 25th day of the month before the pilgrimage, and fragments of it are bought by the pilgrims as charms. Till the 10th day of the pilgrimage month the Ka'ba is bare.

2 Before Islam the Ka'ba was opened every Monday and Thursday ; in the time of Ibn Jubair it was opened with considerable ceremony every Monday and Friday, and daily in the month Rajab. But, though prayer within the building is favoured by the example of the Prophet, it is not compulsory on the Moslem, and even in the time of Ibn Batuta the opportunities of entrance were reduced to Friday and the birthday of the Prophet.

colonnades, was the caliph Mahdl, who spent enormous sums in bringing costly pillars from Egypt and Syria. The work was still incomplete at his death in a.d. 785, and was finished in less sumptuous style by his successor. Subsequent repairs and additions, extending, down to Turkish times, have left little of Mahdl's work untouched, though a few of the pillars probably date from his days. There are more than five hundred pillars in all, of very various style and workmanship, and the enclosure — 250 paces in length and 200 in breadth, according to Burckhardt's measurement — is entered by nineteen archways irregularly disposed.

After the Ka'ba the principal points of interest in the mosque are the

well Zamzam and the Maqam Ibrahim. The former is a deep shaft enclosed in a massive vaulted building paved with marble, and, according to Mahommedan tradition, is the source (corresponding to the Beer-lahai-roi of Gen. xvi. 14) from which Hagar drew water for her son Ishmael. The legend tells that the well was long covered up and rediscovered by 'Abd al-Mottalib, the grandfather of the Prophet. Sacred wells are familiar features of Semitic sanctuaries, and Islam, retaining the well, made a quasi-biblical story for it, and endowed its tepid waters with miraculous curative virtues. They are eagerly drunk by the pilgrims, or when poured over the body are held to give a miraculous refreshment after the fatigues of religious exercise; and the manufacture of bottles or jars for carrying the water to distant countries is quite a trade. Ibn Jubair mentions a curious superstition of the Meccans, who believed that the water rose in the shaft at the full moon of the month Shaban. On this occasion a great crowd, especially of young people, thronged round the well with shouts of religious enthusiasm, while the servants of the well dashed buckets of water over their heads. The Maqam of Abraham is also connected with a relic of heathenism, the ancient holy stone which once stood on the Ma'jan, and is said to bear the prints of the patriarch's feet. The whole legend of this stone, which is full of miraculous incidents, seems to have arisen from a misconception, the Maqam Ibrahim in the Koran meaning the sanctuary itself; but the stone, which is a block about 3 spans in height and 2 in breadth, and in shape " like a potter's furnace " (Ibn Jubair), is certainly very ancient. No one is now allowed to see it, though the box in which it lies can be seen or touched through a grating in the little chapel that surrounds it. In the middle ages it was sometimes shown, and Ibn Jubair describes the pious enthusiasm with which he drank Zamzam water poured on the footprints. It was covered with inscriptions in an unknown character, one of which was copied by Fakihi in his history of Mecca. To judge by the facsimile in Dozy's Israelites, te Mekka, the character is probably essentially one with that of the Syrian Safa inscriptions, which extended through the Nejd and into the Hejaz. 3

Safa and Merwa. — In religious importance these two points or " hills," connected by the Mas'a, stand second only to the Ka'ba. Safa, is an elevated platform surmounted by a triple arch, and approached by a flight of steps. It lies south-east of the Ka'ba, facing the black corner, and 76 paces from the " Gate of Safa," which is architecturally the chief gate of the mosque. Merwa is a similar platform, formerly covered with a single arch, on the opposite side of the valley. It stands on a spur of the Red Mountain called Jebel Kuaykian. The course between these two sacred points is 493 paces*

long, and the religious ceremony called the " sa'y " consists in traversing it seven times, beginning and ending at SafS,. The lowest part of the course, between the so- called green milestones, is done at a run. This ceremony, which, as we shall presently see, is part of the omra, is generally said to be performed in memory of Hagar, who ran to and fro between the two eminences vainly seeking water for her son. The observance, however, is certainly of pagan origin; and at one time there were idols on both the so-called hills (see especially Azraqi, pp. 74, 78).

The Ceremonies and the Pilgrimage. — Before Islam the Ka'ba was the local sanctuary of the Meccans, where they prayed and did

3 See De Vogue\ Syrie centrale: inscr. sem. ; Lady Anne Blunt Pilgrimage of Nejd, ii., and W. R. Smith, in the Athenaeum, March

20, 1880.

4 Ibn Jubair speaks of fourteen steps, Ali Bey of four, Burckhardt of three. The surrounding ground no doubt has risen so that the old name " hill of Safa, " is now inapplicable.

sacrifice, where oaths were administered and hard cases submitted to divine sentence according to the immemorial custom of Semitic shrines. But, besides this, Mecca was already a place of pilgrimage. Pilgrimage with the ancient Arabs was the fulfilment of a vow, which appears to have generally terminated — at least on the part of the-well-to-do — in a sacrificial feast. A vow of pilgrimage might be directed to other sanctuaries than Mecca — the technical word for it (ihlal) is applied, for example, to the pilgrimage to Manat (Bakri, p. 519). He who was under such a vow was bound by cere- monial observances of abstinence from certain acts (e.g. hunting) and sensual pleasures, and in particular was forbidden to shear or comb his hair till the fulfilment of the vow. This old Semitic usage has its close parallel in the vow of the Nazarite. It was not pecu- liarly connected with Mecca ; at Taif , for example, it was customary on return to the city after an absence to present oneself at the sanc- tuary, and there shear the hair (Muh. in Med., p. 381). Pilgrimages to Mecca were not tied to a single time, but they were naturally associated with festive occasions, and especially with the great annual feast and market. The pilgrimage was so intimately connected

with the wellbeing of Mecca, and had already such a hold on the Arabs round about, that Mahomet could not afford to sacrifice it to an abstract purity of religion, and thus the old usages were transplanted into Islam in the double form of the omra or vow of pilgrimage to Mecca, which can be discharged at any time, and the hajj or pilgrimage at the great annual feast. The latter closes with a visit to the Ka'ba, but its essential ceremonies lie outside Mecca, at the neighbouring shrines where the old Arabs gathered before the Meccan fair.

The omra begins at some point outside the rjaramfor holy territory) , generally at Tanim, both for convenience sake and because Ayesha began the omra there in the year 10 of the Hegira. The pilgrim enters the Haram in the antique and scanty pilgrimage dress (ihram), consisting of two cloths wound round his person in a way prescribed by ritual. His devotion is expressed in shouts of "Labbeyka" (a word of obscure origin and meaning; he enters the great mosque, performs the tawaf and the sa'y 1 and then has his head shaved and resumes his common dress. This ceremony is now generally combined with the hajj , or is performed by every stranger or traveller when he enters Mecca, and the ihram (which involves the acts of abstinence already referred to) is assumed at a considerable distance from the city. But it is also proper during one's residence in the holy city to perform at least one omra from Tanim in connexion with a visit to the mosque of Ayesha there. The triviality of these rites is ill concealed by the legends of the sa'y of Hagar and of the tawaf being first performed by Adam in imitation of the circuit of the angels about the throne of God; the meaning of their cere- monies seems to have been almost a blank to the Arabs.before Islam, whose religion had become a mere formal tradition. We do not even know to what deity the worship expressed in the tawaf was properly addressed. There is a tradition that the Ka'ba was a temple of Saturn (Shahrast3.nl, p. 431) ; perhaps the most distinctive feature of the shrine may be sought in the sacred doves which still enjoy the protection of the sanctuary. These recall the sacred doves of Ascalon (Philo vi. 200 of Richter's ed.), and suggests Venus- worship as at least one element (cf. Herod i. 131, iii. 8; Ephr. Syr., Op. Syr. ii. 457).

To the ordinary pilgrim the omra has become so much an episode of the hajj that it is described by some European pilgrims as a mere visit to the mosque of Ayesha; a better conception of its original significance is got from the Meccan feast of the seventh month (Rajab), graphically described by Ibn Jubair from his observations in a.d. 1 184. Rajab was one of the ancient sacred months, and the feast, which extended through the whole month and was a joyful

season of hospitality and thanksgiving, no doubt represents the ancient feasts of Mecca more exactly than the ceremonies of the hajj, in which old usage has been overlaid by traditions and glosses of Islam. The omra was performed by crowds from day to day, especially at new and full moon. 2 The new moon celebration was nocturnal; the road to Tanim, the Mas'a, and the mosque were brilliantly illuminated ; and the appearing of the moon was greeted with noisy music. A genuine old Arab market was held, for the wild Bedouins of the Yemen mountains came in thousands to barter their cattle and fruits for clothing, and deemed that to absent them- selves would bring drought and cattle plague in their homes. Though ignorant of the legal ritual and prayers, they performed the tawaf with enthusiasm, throwing themselves against the Ka'ba and clinging to its curtains as a child clings to its mother. They also made a point of entering the Ka'ba. The 29th of the month was the feast day of the Meccan women, when they and their little ones had the Ka'ba to themselves without the presence even of the Sheybas.

The central and essential ceremonies of the hajj or greater pilgrim- age are those of the day of Arafa, the 9th of the pilgrimage month " (Dhu'l Hijja), the last of the Arab year; and every Moslem who is his own master, and can command the necessary means, is bound to join in these once in his life, or to have them fulfilled by a substitute

1 The latter perhaps was no part of the ancient omra ; see Snouck-Hurgronje, Het Mekkaansche freest (1880) p. 115 sqq. _ 2 The 27th was also a great day, but this day was in commemora- tion of the rebuilding of the Ka'ba by Ibn Jubair.

on his behalf and at his expense. By them the pilgrim becomes as pure from sin as when he was born, and gains for the rest of his life the honourable title of hajj. Neglect of many other parts of the pilgrim ceremonial may be compensated by offerings, but to miss the " stand " (woqilf) at Arafa is to miss the pilgrimage. Arafa or Arafat is a space, artificially limited, round a small isolated hill called the Hill of Mercy, a little way outside the holy territory, on the road from Mecca to Taif.. One leaving Mecca after midday can easily reach the place on foot the same evening. The road is first north- wards along the Mecca valley and then turns eastward. It leads through the straggling village of Mina, occupying a long narrow valley (Wadi Mina), two to three hours from Mecca, and thence by the mosque of Mozdalifa over a narrow pass opening out into the plain of Arafa,which is an expansion of the great Wadi Naman, through which the Taif road descends from Mount Kara. The lofty and rugged mountains of the Hodheyl tower over the plain on the

north side and overshadow the little Hill of Mercy, which is one of those bosses of weathered granite so common in the Hejaz. Arafa lay quite near Dhul-Majaz, where, according to Arabian tradition, a great fair was held from the 1st to the 8th of the pilgrimage month; and the ceremonies from which the hajj was derived were originally an appendix to this fair. Now, on the contrary, the pilgrim is expected to follow as closely as may be the movements of the prophet at his " farewell pilgrimage " in the year 10 of the Hegira (a.d. 632). He therefore leaves Mecca in pilgrim garb on the 8th of Dhu'l Hijja, called the day of tarwiya (an obscure and pre-Islamic name), and, strictly speaking, should spend the night at Mina. It is now, however, customary to go right on and encamp at once at Arafa. The night should be spent in devotion, but the coffee booths do a lively trade, and songs are as common as prayers. Next forenoon the pilgrim is free to move about, and towards midday he may if he please hear a sermon. In the afternoon the essential ceremony begins; it consists simply in " standing " on Arafa shouting " Lab- beyka " and reciting prayers and texts till sunset. After the sun is down the vast assemblage breaks up, and a rush (technically ifdda, daf,nafr is made in the utmost confusion to Mozdalifa, where the night prayer is said and the night spent. Before sunrise next morning (the 10th) a second "stand " like that on Arafa is made for a short time by torchlight round the mosque of Mozdalifa, but before the sun is fairly up all must be in motion in the second ifdda towards Mina. The day thus begun is the " day of sacrifice," and has four ceremonies — (1) to pelt with seven stones a cairn (jamrat al 'aqaba) at the eastern end of W. Mina, (2) to slay a victim at Mina and hold a sacrificial meal, part of the flesh being also dried and so preserved, or given to the poor, 3 (3) to be shaved and so terminate the ihram, (4) to make the third ifdda, i.e. go to Mecca and perform the tawaf and sa'y ('omrat al-ifdda), returning thereafter to Mina. The sacrifice and visit to Mecca may, however, be delayed till the nth, 12th or 13th. These are the days of Mina, a fair and joyous feast, with no special ceremony except that each day the pilgrim is expected to throw seven stones at the jamrat al 'aqaba, and also at each of two similar cairns in the valley. The stones are thrown in the name of Allah, and are generally thought to be directed at the devil. This is, however, a custom older than Islam, and a tradition in Azraqi, p. 412, represents it as an act of worship to idols at Mina. As the stones are thrown on the days of the fair, it is not unlikely that they have something to do with the old Arab mode of closing a sale by the purchaser throwing a stone (Biruni, p. 328). The pil- grims leave Mina on the 12th or 13th, and the hajj is then over. (See further Mahommedan Religion.)*

The colourless character of these ceremonies is plainly due to the fact that they are nothing more than expurgated heathen rites. In Islam proper they have no raison d'etre; the legends about Adam and Eve on Arafa, about Abraham's sacrifice of the ram at Thabii by Mina, imitated in the sacrifices of the pilgrimage, are clumsy afterthoughts, as appears from their variations and only partial acceptance. It is not so easy to get at the nature of the original rites, which Islam was careful to suppress. But we find mention of practices condemned by the orthodox, or forming no part of the Moslem ritual, which may be regarded as traces of an older ceremonial. Such are nocturnal illuminations at Mina (Ibn Batuta •• 396)i Arafa and Mozdalifa (Ibn Jubair, 179), and tawafs performed by the ignorant at holy spots at Arafa not recognized by law (Snouck- Hurgronje p. 149 sqq.). We know that the rites at Mozdalifa were originally connected with a holy hill bearing the name of the god Quzah (the Edomite Koze) whose bow is the rainbow, and there is reason to think that the ifadas from Arafa and Quzah, which were not made as now after sunset and before sunrise, but when the sun rested on the tops of the mountains, were ceremonies of farewell and salutation to the sun-god.

The statistics of the pilgrimage cannot be given with certainty and vary much from year to year. The quarantine office keeps a record of arrivals by sea at Jidda (66,000 for 1904) ; but to these must be added those travelling by land from Cairo, Damascus

3 The sacrifice is not indispensable except for those who can afford it and are combining the hajj with the omra.

4 On the similar pelting of the supposed graves of Abu Lahab and his wife (Ibn Jubair, p. 1 10) and of Abu Righal at Mughammas, see Noldeke's translation of Tabari, p. 208.

and Irak, the pilgrims who reach Medina from Yanbu and go on to Mecca, and those from all parts of the peninsula. Burckhardt in 1814 estimated the crowd at Arafa at 70,000, Burton in 1853 at 50,000, 'Abd el-Razzak in 1858 at 60,000. This great assemblage is always a dangerous centre of infection, and the days of Mina especially, spent under circumstances originally adapted only for a

Bedouin fair, with no provisions for proper cleanliness, and with the air full of the smell of putrefying offal and flesh drying in the sun, produce much sickness.

Literature. — Besides the Arabic geographers and cosmographers, we have Ibn 'Abd Rabbih's description of the mosque, early in the 10th century ('Ikd Farid, Cairo ed., iii. 362 sqq.), but above all the admirable record of Ibn Jubair (a.d. 1 184), by far the best account extant of Mecca and the pilgrimage. It has been much pillaged by Ibn Batuta. The Arabic historians are largely occupied with fabulous matter as to Mecca before Islam ; for these legends the reader may refer to C. de Perceval's Essai. How little confidence can be placed in the pre-Islamic history appears very clearly from the distorted accounts of Abraha's excursion against the Hejaz, which fell but a few years before the birth of the Prophet, and is the first event in Meccan history which has confirmation from other sources. See Noldeke's version of Tabari, p. 204 sqq. For the period of the Prophet, Ibn Hisham and Wakidi are valuable sources in topography as well as history. Of the special histories and descriptions of Mecca published by Wiistenfeld (Chroniken der Stadt Mekka, 3 vols., 1857-1859, with an abstract in German, 1861), the most valuable is that of Azraqi It has passed through the hands of several editors, but the oldest part goes back to the beginning of the 9th Christian century. Kutbeddin's history (vol. iii. of the Chroniken) goes down with the additions of his nephew to A.D. 1592.

Of European descriptions of Mecca from personal observation the best is Burckhardt's Travels in Arabia (cited above from the 8vo ed , 1829). The Travels of Aly Bey (Badia, London, 1816) describe a visit in 1807 ; Burton's Pilgrimage (3rd ed., 1879) often supplements Burckhardt; Von Maltzan's Wallfahrt nach Mekka (1865) is lively but very slight. 'Abd el-Razzaq's report to the government of India on the pilgrimage of 1858 is specially directed to sanitary questions; C. Snouck-Hurgronje, Mekka (2 vols., and a collection of photographs, The Hague, 1888-1889), gives a description of the Meccan sanctuary and of the public and private life of the Meccans as observed by the authcr during a sojourn in the holy city in 1 884-1 885 and a political history of Mecca from native sources from the Hegira till 1884. For the pilgrimage see particularly Snouck-Hurgronje, Het Mekkaansche Feest (Leiden, 1880). (W. R. S.)

MECHANICS. The subject of mechanics may be divided into two parts: (1) theoretical or abstract mechanics, and (2) applied mechanics.

1. Theoretical Mechanics Historically theoretical mechanics began with the study of practical contrivances such as the lever, and the name mechanics Gr. to. prixaviica) , which might more properly be restricted to the theory of mechanisms, and which was indeed used in this narrower sense by Newton, has clung to it, although the subject has long attained a far wider scope. In recent times it has been proposed to adopt the term dynamics (from Gr. jwa/iis force,) as including the whole science of the action of force on bodies, whether at rest or in motion. The subject is usually expounded under the two divisions of statics and kinetics, the former dealing with the conditions of rest or equili- brium and the latter with the phenomena of motion as affected by force. To this latter division the old name of dynamics (in a restricted sense) is still often applied. The mere geometri- cal description and analysis of various types of motion, apart from the consideration of the forces concerned, belongs to kinematics. This is sometimes discussed as a separate theory, but for our present purposes it is more convenient to introduce kinematical motions as they are required. We follow also the traditional practice of dealing first with statics and then with kinetics. This is, in the main, the historical order of development, and for purposes of exposition it has many advan- tages. The laws of equilibrium are, it is true, necessarily included as a particular case under those of motion; but there is no real inconvenience in formulating as the basis of statics a few provisional postulates which are afterwards seen to be comprehended in a more general scheme.

The whole subject rests ultimately on the Newtonian laws of motion and on some natural extensions of them. As these laws are discussed under a separate heading (Motion, Laws of), it is here only necessary to indicate the standpoint from which the present article is written. It is a purely empirical one.

Guided by experience, we are able to frame rules which enable us to say with more or less accuracy what will be the conse- quences, or what were the antecedents, of a given state of things. These rules are sometimes dignified by the name of " laws of nature," but they have .relation to our present state of know- ledge and to the degree of skill with which we have succeeded in giving more or less compact expression to it. They are therefore liable to be modified from time to time, ! or to be superseded by more convenient or more comprehensive modes of statement. Again, we do not aim at anything so hopeless, or indeed so useless, as a complete description of any phe- nomenon. Some features are naturally more important or more interesting to us than others; by their relative simplicity and evident constancy they have the first hold on our attention, whilst those

which are apparently accidental and vary from one occasion to another are ignored, or postponed for later examination. It follows that for the purposes of such descrip- tion as is possible some process of abstraction is inevitable if our statements are to be simple and definite. Thus in studying the flight of a stone through the air we replace the body in imagination by a mathematical point endowed with a mass- coefficient. The size and shape, the complicated spinning motion which it is seen to execute, the internal strains and vibrations which doubtless take place, are all sacrificed in the mental picture in order that attention may be concentrated on those features of the phenomenon which are in the first place most interesting to us. At a later stage in our subject the conception of the ideal rigid body is introduced; this enables us to fill in some details which were previously wanting, but others are still omitted. Again, the conception of a force as concentrated in a mathematical line is as unreal as that of a mass concentrated in a point, but it is a convenient fiction for our purpose, owing to the simplicity which it lends to our statements.

The laws which are to be imposed on these ideal representa- tions are in the first instance largely at our choice. Any scheme of abstract dynamics constructed in this way, provided it be self consistent, is mathematically legitimate; but from the physical point of view we require that it should help us to picture the sequence of phenomena as they actually occur. Its success or failure in this respect can only be judged a pos teriori, by comparison of the results to which it leads with the facts. It is to be noticed, moreover, that all available tests apply only to the scheme as a whole; owing to the complexity of phenomena we cannot submit any one of its postulates to verification apart from the rest.

It is from this point of view that the question of relativity of motion, which is often felt to be a stumbling-block on the very threshold of the subject, is to be judged. By " motion " we mean of necessity motion relative to some frame of reference which is conventionally spoken of as " fixed." In the earlier stages of our subject this may be any rigid, or apparently rigid, structure fixed relatively to the earth. If we meet with phenomena which do not fit easily into this view, we have the alternatives either to modify our assumed laws of motion, or to call to our aid adventitious forces, or to examine whether the discrepancy can be reconciled by the simpler expedient of a new basis of reference. It is hardly necessary to say that the latter procedure has hitherto been found to be adequate. As a first step we adopt a system of rectangular axes whose origin is fixed in the earth, but whose directions are fixed by relation to the stars; in the

planetary theory the origin is trans- ferred to the sun, and afterwards to the mass-centre of the solar system; and so on. At each step there is a gain in accu- racy and comprehensiveness; and the conviction is cherished that some system of rectangular axes exists with respect to which the Newtonian scheme holds with all imaginable accuracy.

A similar account might be given of the conception of time as a measurable quantity, but the remarks which it is necessary to make under this head will find a place later.

95 6

MECHANICS

[STATICS

The following synopsis shows the scheme on which the treatment is based : —

Part I. — Statics.

1. Statics of a particle.

2. Statics of a system of particles.

3. Plane kinematics of a rigid body.

4. Plane statics.

5. Graphical statics.

6. Theory of frames.

7. Three-dimensional kinematics of a rigid body.

8. Three-dimensional statics.

9. Work.

10. Statics of inextensible chains.

11. Theory of mass-systems.

Part 2. — Kinetics.

12. Rectilinear motion.

13. General motion of a particle.

14. Central forces. Hodograph.

15. Kinetics of a system of discrete particles.

16. Kinetics of a rigid body. Fundamental principles.

17. Two-dimensional problems.

18. Equations of motion in three dimensions.

19. Free motion of a solid.

20. Motion of a solid of revolution.

21. Moving axes of reference.

22. Equations of motion in generalized co-ordinates.

23. Stability of equilibrium. Theory of vibrations.

Part I. — Statics

§ 1. Statics of a Particle. — By a particle is meant a body whose position can for the purpose in hand be sufficiently specified by a mathematical point. It need not be " infinitely small," or even small compared with ordinary standards; thus in astronomy such vast bodies as the sun, the earth, and the other planets can for many purposes be treated merely as points endowed with mass.

A force is conceived as an effort having a certain direction and a certain magnitude. It is therefore adequately repre- sented, for mathematical purposes, by a straight line AB drawn in the direction in question, of length proportional (on any convenient scale) to the magnitude of the force. In other words, a force is mathematically of the nature of a " vector " (see Vector Analysis, Quaternions). In most questions of pure statics we are concerned only with the ratios of the various forces which enter into the problem, so that it is indiffer- ent what unit of force is adopted. For many purposes a gravita- tional system of measurement is most natural; thus we speak of a force of so many pounds or so many kilogrammes. The " absolute " system of measurement will be referred to below in Part II., Kinetics. It is to be remembered that all " force " is of the nature of a push or a pull, and that according to the accepted terminology of modern mechanics such phrases as " force of inertia," " accelerating force," " moving force," once classical, are proscribed. This rigorous limitation of the meaning of the word is of

comparatively recent origin, and it is perhaps to be regretted that some more technical term has not been devised, but the convention must now be regarded as established.

The fundamental postulate of this part of our subject is that the two forces acting on a particle may be compounded by the " parallelogram rule." Thus, if the two forces P,Q be represented by the lines OA, OB, they can be replaced by a single force

R represented by the diagonal OC of the parallelogram deter- mined by OA, OB. This is of course a physical assumption whose propriety is justified solely by experience. We shall see later that it is implied in Newton's statement of his Second

Law of motion. In modern language, forces are compounded by " vector-addition "; thus, if we draw in succession vectors

HK, KL to represent P, Q, the force R is represented by the

vector HL which is the " geometric sum " of HK, KL.

By successive applications of the above rule any number of forces acting on a particle may be replaced by a single force which is the vector-sum of the given forces; this single force

is called the resultant. Thus if AB. BC, CD . . . , HK be vectors representing the given forces, the resultant will be given

by AK. It "will be understood that the figure ABCD . . . K need not be confined to one plane.

If, in particular, the point K coincides with A, so that the resultant vanishes, the given system of forces is said to be

Fig. 2.

in equilibrium — i.e. the particle could remain permanently at rest under its action. This is the proposition known as the polygon of forces. In the particular case of three forces it reduces to the triangle of forces, viz. " If three forces acting on a particle are represented as to magnitude and direction by the sides of a triangle taken in order, they are in equilibrium."

A sort of converse proposition is frequently useful, viz. if three forces acting on a particle be in equilibrium, and any triangle be constructed whose sides are respectively parallel to the forces, the

magnitudes of the forces will be to one another as the corresponding sides of the triangle. This follows from the fact that all such triangles are necessarily similar.

As a simple example of the geometrical method of treating statical problems we may consider the equilibrium of a particle on a " rough " inclined plane. The usual empirical law of sliding friction is that the mutual action between two plane surfaces in contact, or between a particle and a curve or surface, cannot make with the normal an angle exceeding a certain limit X called the angle of friction. If the conditions of equilibrium require an obliquity greater than this, sliding will take place. The precise value of X will vary with the nature and condition of the surfaces in contact. In the case of a body simply resting on an inclined plane, the reaction must of course be vertical, for equilibrium, and the slope o of the plane must there- fore not exceed X. For this reason X is also known as the angle of repose. If a > X, a force P must be applied in order to maintain equilibrium ; let 8 be the inclination of P to the plane, as shown in the left-hand diagram. The relations between this force P, the gravity W of the body, and the reaction S of the plane are then determined by a triangle of forces HKL. Since the inclination of S

H

Fig. 3.

to the normal cannot exceed X on either side, the value of P must lie between two limits which are represented by LiH, L 2 H, in the right-hand diagram. Denoting these limits by Pi, P 2 , we have Pi/W = L 1 H/HK = sin (o-X)/cos (0+X), P 2 /W = L 2 H/HK = sin (a+X)/ cos (0-X). It appears, moreover, that if 6 be varied P will be least when LiH is at right angles to KLi, in which case Pi=W sin (a — X), corre- sponding to 6 = — X.

Just as two or more forces can be combined into a single resultant, so a single force may be resolved into components

Fig. 4.

acting in assigned directions. Thus a force can be uniquely resolved

into two components acting in two assigned directions in the same plane with it by an inversion of the parallelogram construction of fig. 1. If, as is usually most convenient, the two assigned directions are at right angles, the two components of a force P will be P cos 6, P sin d, where d is the inclination

of P to the direction of the former component. This leads to formulae for the analytical reduction of a system of co- planar forces acting on a particle. Adopting rectangular axes Ox, Oy, in the plane of the forces, and distinguishing the various forces of the system by suffixes, we can replace the system by two forces X, Y, in the direction of co-ordinate axes; viz. —

X = P,cos0i + P 2 cos0 2 +. . . = S (Pcos0), } , s

Y = Pi sin 0i + P 2 sin0 2 + . . . = Z (P sine).) K '

These two forces X, Y, may be combined into a single resultant R making an angle 4> with Ox, provided

X = R cos , Y = R sin 4>, (2)

whence

R 2 = X 2 + Y 2 , tan = Y /X. (3)

For equilibrium we must have R = o, which requires X = o, Y = o; in words, the sum of, the components of the system must be zero for each of two perpendicular directions in the plane.

A similar procedure applies to a three-dimensional system,

-> Thus if, O being the origin, OH represent any force P of the

system, the planes drawn through H parallel to the co-ordinate planes will enclose with the latter a parallelepiped, and it is evident

that OH is the geometric sum of

OA, AN, NH, or OA, OB, OC, in M the figure. Hence P is equivalent

to three forces VI, Pm, P« acting Fig. 5. along Ox, Oy, Oz, respectively,

— > where I, m, n, are the " direction-

ratios " of OH. The whole system can be reduced in this way to three

forces

X = 2 (PI), Y = 2 (Pm), Z = 2 (Pn), (4)

acting along the co-ordinate axes. These can again be combined into a single resultant R acting in the direction (X, ju, v), provided X = RX, Y = R M , Z = Rx. (5)

If the axes are rectangular, the direction-ratios become direc- tion-cosines, so that X 2 + /x 2 + v 2 = 1, whence

R 2 = X 2 + Y 2 + Z 2 . (6)

The conditions of equilibrium are X = o, Y = o, Z = o.

*§ 2. Statics of a System of Particles. — We assume that the mutual forces between the pairs of particles, whatever their nature, are subject. to the "Law of Action and Reaction" (Newton's Third Law); i.e. the force exerted by a particle A on a particle B, and the force exerted by B on A, are equal and opposite in the line AB. The problem of determining the possible configurations of equilibrium of a system of particles subject to extraneous forces which are known functions of the positions of the particles, and to internal forces which are known functions of the distances of the pairs of particles between which they act, is in general determinate For if n be the number of particles, the 3» conditions of equilibrium (three for each particle) are equal in number to the 3» Cartesian (or other) co-ordinates of the particles, which are to be found. If the system be subject to frictionless constraints, e.g. if some of the particles be constrained to lie on smooth surfaces, or if pairs of particles be connected by inextensible strings, then for each geometrical relation thus introduced we have an un- known r*acti*n (e.g. the pressure of the smooth surface, or*

./c

B

,/

N

◦

/

H

/

S.*

the tension of the string), so that the problem is still deter- minate.

The case of the funicular polygon will be of use to us later. A number of particles attached at various points of a string are acted on by given extraneous forces Pi, P 2 , P 3 – . . respectively. The relation between the three forces acting on any particle, viz. the extraneous force and the tensions in the two adjacent portions of the string can be exhibited by means of a triangle of forces; and if the successive triangles be drawn to the same scale they can be fitted together so as to constitute a single force-diagram, as shown in fig. 6. This diagram consists of a polygon whose successive sides represent

Fig. 7.

Fig. 6.

the given forces Pi, P 2 , P 3 . . . , and of a series of lines connecting

the vertices with a point O. These latter lines measure the tensions

in the successive portions of string. As a special, but very important

case, the forces Pi, P 2 , P 3 . . . may be parallel, e.g. they may be the

weights of the several

particles. The polygon

of forces is then made

up of segments of a

vertical line. We note

that the tensions have

now the same horizontal

projection (represented

by the dotted line in

fig. 7). It is further of

interest to note that if

the weights be all equal,

and at equal horizontal

intervals, the vertices of the funicular will lie on a parabola whose

axis is vertical. To prove this statement, let A, B, C, D … be

successive vertices, and let H, K … be the middle points of AC,

BD . . . ; then BH, CK . . . will be vertical by the hypothesis, and

since the geometric sum of

-> -> -*f*

BA, BC is represented by 2BH,

the tension in BA : tension in

BC : weight at B

asBA:BC:2BH. The tensions in the successive por- tions of the string are therefore proportional to the respective lengths, and the lines BH,CK . . . are all equal. Hence AD, BC are parallel and are bisected by the same vertical line; and a parabola with vertical axis can therefore be described through A, B, C, D. The same holds for the four points B, C, D, E and so on; but since a parabola is uniquely determined by the direction of its axis and by three points on the curve, the successive parabolas ABCD, BCDE, CDEF . . . must be coincident.

§ 3. Plane Kinematics of a Rigid Body. — The ideal rigid body is one in which the distance between any two points is invariable. For the present we confine ourselves to the con- sideration of displacements in two dimensions, so that the body is adequately represented by a thin lamina or plate.

The position of a lamina movable in its own plane is deter- minate when we know the positions of any two points A, B of it. Since the four co-ordinates (Cartesian or other) of these two points are

connected by the relation which ex- presses the invariability of the length AB, it is plain that virtually three inde- pendent elements are re- quired and suffice to specify the position of the lamina.

For instance, the lamina Fig. 9.

may in general be fixed by

connecting any three points of it by rigid links to three fixed points in its plane. The three independent elements may be chosen in a variety of ways {e.g. they may be the lengths

Fig. io.

of the three links in the above example). They may be called (in a generalized sense) the co-ordinates of the lamina. The lamina when perfectly free to move in its own plane is said to have three degrees of freedom.

By a theorem due to M. Chasles any displacement whatever of the lamina in its own plane is equivalent to a rotation about some finite or infinitely distant point J. For suppose that in consequence of the displacement a point of the lamina is brought from A to B, whilst the point of the lamina which was originally at B is brought to C. Since AB, BC, are two different positions of the same line in the lamina they are equal, and it is evident that the rotation could have been effected by a rotation about J, the centre of the circle ABC, through an angle AJB. As a special case the three points A, B, C may be in a straight line; J is then at infinity and the displacement is equivalent to a pure translation, since every point of the lamina is now displaced parallel to AB through a space equal to AB.

Next, consider any continuous motion of the lamina. The latter may be brought from any one of its positions to a neigh- bouring one by a rotation about the proper centre. The limiting position J of this centre, when the two positions are taken infinitely close to one another, is called the instantaneous centre. If P, P' be consecutive positions of the same point, and 56 the corresponding angle of rotation, then ultimately PP' is at right angles to JP and equal to JP . 59. The instantaneous centre will have a certain locus in space, and

a certain locus in the lamina. These two loci are called pole-curves or centrodes, and are sometimes distinguished as the space-centrode and the body-centrode, respectively. In the continuous motion in question the latter curve rolls without slipping on the former (M. Chasles). Consider in fact any series of successive positions i, 2, 3. . . of the lamina (fig. 11); and let J12, J23, J34 . . .

be the positions in space of the centres of the rotations by which the lamina can be brought from the first position to the second, from the second to the third, and so on. Further, in the position 1, let J12, J'23, J'34 ... be the points of the lamina which have become the successive centres of rotation. The given series of positions if we imagine the lamina to rotate first about J 12 until J'23 comes into coincidence with J23, then about J23 until J'34 comes into coincidence with J34, and so on. This is equivalent to imagining the polygon J12 J'23 J'34 ... , supposed fixed in the lamina, to roll on the polygon J12 J23 J34 . ■ . , which is supposed fixed in space. By imagining the successive positions to be taken infinitely close to one another we derive the theorem stated. The particular case where both centrodes are circles is specially important in mechanism.

The theory may be illustrated by the case of " three-bar motion." Let ABCD be any quadrilateral formed of jointed links. If,

AB being held fixed, the J quadrilateral be slightly de-

/'\ formed, it is obvious that the

instantaneous centre J will be at the intersection of the straight lines AD, BC, since the displacements of the points D, C are necessarily at right angles to AD, BC, respectively. Hence these displacements are proportional to ID, JC, and therefore to DD , CC, where CD' is any line drawn parallel to CD, meeting BC, AD in C, D', respectively. The determination of the centrodes in three-bar motion is in

•Fig. 11.

will be assumed in succession

Fig. 13.

general complicated, but in one case, that of the " crossed

Earallelogram " (fig. 13), they assume simple forms. We then ave AB = DC and AD-BC, and from the symmetries of the figure it is plain that

AJ + JB = CJ + JD = AD. Hence the locus of J • relative to AB, and the locus relative to CD are equal ellipses of which A, B and C, D are respectively the foci. It may be noticed that the lamina in fig. 9 is not, strictly speaking, fixed, but admits of infinitesimal displacement, when- ever the directions of the three links are concurrent (or parallel).

The matter may of course be treated analytically, but we shall only require the formula for infinitely small displacements. If the origin of rectangular axes fixed in the lamina be shifted through a space whose projections on the original directions of the axes are A, ft, and if the axes are simultaneously turned through an angle e, the co-ordinates of a point of the lamina, relative to the original axes, are changed from x, y to --x cos e— y sin e, p+x sin e+y cos e, or X + x—ye,n + xe + y, ultimately. Hence the component displacements are ultimately

Sx = X — ye, Sy = p + xt (1)

If we equate these to zero we get the co-ordinates of the instan-taneous centre.

§ 4. Plane Statics. — The statics of a rigid body rests on the following two assumptions: —

(i) A force may be supposed to be applied indifferently at any point in its line of action. In other words, a force is of the nature of a " bound " or " localized " vector; it is regarded as resident in a certain line, but has no special reference to any particular point of the line.

(ii) Two forces in intersecting lines may be replaced by a force which is their geometric sum, acting through the inter- section. The theory of parallel forces is included as a limiting case. For if O, A, B be any three points, and m, n any scalar quantities, we have in vectors

-> — > -k

m . OA + n . OB = (m + n) OC,

provided

m. CA + n. CB = o. (2)

Hence if forces P, Q act in OA, OB, the resultant R will pass through C, provided

m = P/OA, » = Q/OB;

also

R = P . OC/OA + Q . OC/OB, (3)

and

P . AC : Q . CB = OA : OB. (4)

These formulae give a means of constructing the resultant by means of any transversal AB cutting the lines of action. If we now imagine the point O to recede to infinity, the forces P, Q and the resultant R are parallel, and we have

R = P + Q, P.AC = Q.CB. (5)

When P, Q have opposite signs the point C divides AB exter- nally on the side of the greater force. The investigation fails when P + Q = 0, since it leads to an infinitely small resultant acting in an infinitely distant line. A combination of two equal, parallel, but oppositely directed forces cannot in fact be replaced by anything simpler, and must therefore be recognized as an independent entity in statics. It was called by L. Poinsot, who first systematically investigated its properties, a couple.

We now restrict ourselves for the present to the systems of forces in one plane. By successive applications of (ii) any

(1)

Fig. 15.

such coplanar system can in general be reduced to a single resultant acting in a definite line. As exceptional cases the system may reduce to a couple, or it may be in equilibrium. The moment of a force about a point O is the product of the force into the perpendicular drawn to its line of action from 0, this perpendicular being reckoned positive or negative according as O lies on one side or other of the line of action. If we mark off a segment AB along the line of action so as to represent the force completely, the moment is represented as to

magni- tude by twice the area of the triangle OAB, and the usual convention as io sign is that the area is to be reckoned positive or negative according as the letters O, A, B, occur in " counter-clockwise " or " clockwise " order.

The sum of the moments of two forces about any point O is equal to the moment of their resultant (P. Varignon, 1687). Let AB, AC (fig. 16) represent the two forces, AD their resultant; we have to prove that the sum of the triangles OAB, OAC is

equal to the triangle OAD, regard being had to signs. Since the side OA is common, we have to prove that the sum of the perpendiculars from B and C on OA is equal to the perpendicular from D on OA, these perpen- diculars being reckoned positive or negative according as they lie to the right or left of AO. Regarded as a statement concerning the orthogonal projections

-> > ->

of the vectors AB and AC (or BD), and of their sum AD, on a line perpendicular to AO, this is obvious.

It is now evident that in the process of reduction of a coplanar system no change is made at any stage either in the sum of the projections of the forces on any line or in the sum of their moments about any point. It follows that the single resultant to which the system in general reduces is uniquely determinate, i.e. it acts in a definite line and has a definite magnitude and sense. Again it is necessary and sufficient for equilibrium that the sum of the projections of the forces on each of two perpendicular directions should vanish, and (moreover) that the sum of the moments about some one point should be zero. The fact that three independent conditions must hold for equili- brium is important. The conditions may of course be expressed in different (but equivalent) forms; e.g.the sum of the moments of the forces about each of the three points which are not col- linear must be zero.

The particular case of three forces is of interest. If they ire not all parallel they must be concurrent, and their vector- sum must be zero. Thus three forces acting perpendicular

Fig. 16.

the planes, must meet at a point J on the vertical through G. Hence JG/o = sin (9-a)/sin a, JG/6 = sin (0-H3)/sin/S, a cot a — b cot0

whence

cot 9 =

(6)

a + b If the bar is uniform we have = 6, and

cot0 = J (coto-cot/3).

The problem of a rod suspended by strings attached to two points of it is virtually identical, the tensions of the strings taking the place of the reactions of the planes.

(7)

Fig. 17. to the sides of a triangle at the middle points will be in equi- librium provided they are proportional to the respective sides, and act all inwards or all outwards. This result is easily extended to the case of a polygon of any number of sides; it has an important application in hydrostatics.

Again, suppose we have a bar AB resting with its ends on two smooth inclined planes which face each other. Let G be the centre of gravity (§ 11), and let AG = o, GB = 6. Let a, /3 be the inclina- tions of the planes, and the angle which the bar makes with the vertical. The position of equilibrium is determined by the considera- tion that the reactions at A and B, which are by hypothesis normal to

Fig. 18.

Just as a system of forces is in general equivalent to a single force, so a given force can conversely be replaced by combi- nations of other forces, in various ways. For instance, a given force (and consequently a system of forces) can be replaced in one and only one way by three forces acting in three assigned straight lines, provided these lines be not concurrent or parallel. Thus if the three lines form a triangle ABC, and if the given force F meet BC in H, then F can be resolved into two components acting in HA, BC, respectively. And the force in HA can be resolved into two components acting in BC, CA, respectively. A simple graphical construction is indicated in fig. 19, where

Fig. 19.

the dotted lines are parallel. As an example, any system of forces

acting on the lamina in fig. 9 is balanced by three determinate tensions (or thrusts) in the three links, provided the directions of the latter are not concurrent.

If P, Q, R, be any three forces acting along BC, CA, AB, respectively, the line of action of the resultant is determined by the consideration that the sum of the moments about any point on it must vanish. Hence in " trilinear " co-ordinates, with ABC as fundamental triangle, its equation is Pa+Q/?+R7=o. If P : Q : R = a : b : c, where a, b, c are the lengths of the sides, this becomes the " line at infinity," and the forces reduce to a couple.

The sum of the moments of the two forces of a couple is the same about any point in the plane. Thus in the figure the sum of the moments about O is P . OA — P . OB or P . AB, which is independent of the position of _.

*0. This sum is called the *

moment of the couple; it must of course have the proper sign attributed to it. It easily follows that any two couples of the same moment are equivalent, and that any number of couples can be replaced by a single couple whose moment is the sum of their moments. Since a couple is for our purposes sufficiently represented by its moment, it has been proposed to substitute the name torque (or twisting effort), as free from the suggestion of any special pair of forces.

A system of forces represented completely by the sides of a plane polygon taken in order is equivalent to a couple whose

Fig. 20.

moment is represented by twice the area of the polygon; this is proved by taking moments about any point. If the polygon intersects itself, care must be taken to attribute to the different parts of the area their proper signs.

A,

Y,

X,

Fig. 22.

Fig. 21. Again, any coplanar system of forces can be replaced by a single force R acting at any assigned point O, together with a couple G. The force R is the geometric sum of the given forces, and the moment (G) of the couple is equal to the sum of the moments of the given forces about O. The value of G will in general vary with the position of O, and will vanish when O lies on the line of action of the single resultant.

*The formal analytical reduction of a system of coplanar forces is as follows. Let (x h yi), (x 2 , 3*2), ... be the rectangular co-ordi- nates of any points A lt A 2 , . . . on the lines of action of the respec- tive forces. The force at Ai may be replaced by its components*

Xi, Yi, parallel to the co- ordinate axes; that at A 2 by Y, its components X 2 , Y 2 , and

so on. Introducing at two > x equal and opposite forces

*y 1 ‘ = *= Xi in Ox, we see that Xi*

at Ai may be replaced by an

x <~ — ?H "s L — — — * equal and parallel force at*

O together with a couple — V1X1. Similarly the force Yi at Ai may be replaced by a force Yi at O together with a couple x, Yi. The forces Xi, Yi, at O can thus be transferred to O provided we introduce a couple XiYi — yiXi. Treating the remaining forces in the same way we get a force Xi +X 2 + ... or 2(X) along Ox, a force Yi + Y 2 + . . . or 2(Y) along Oy, and a couple (xjYi— yiXi) + (x 2 Y 2 — y 2 X 2) + . . . or 2(xY— yX). The three conditions of equilibrium are therefore

*S(X) = o, 2(Y) = o, 2(*Y-yX) = o. (8)*

If 0′ be a point whose co-ordinates are (£, t;), the moment of

the couple when the forces are transferred to O’ as a new origin

will be 2|(x— £) Y— (y— ?j) X). This vanishes, i.e. the system

reduces to a single resultant through O', provided

*- f. 2 (Y) + ,.2 (X) + 2 (*Y – yX) = o. (9)*

If £, 17 be regarded as current co-ordinates, this is the equation of the line of action of the single resultant to which the system is in general reducible.

If the forces are all parallel, making say an angle 6 with Ox, we may write X x = Pi cos 0, Y r = Pi sin 6, X 2 = P 2 cos 6, Y 2 = P 2 sin 8, . . . The equation (9) then becomes

*{2(*P)-£.2(P)} sin 6 – (2(yP) – j,.2(P)) cos 0=0. (10) If the forces Pi, P 2 , ... be turned in the same sense through the same angle about the respective points Ai, A 2 , ... so as to remain parallel, the value of 6 is alone altered, and the resultant 2(P) passes always through the point*

- *2(P) ' y ~ 2(P) ' UI)*

which is determined solely by the configuration of the points Ai, A 2 , . . . and by the ratios Pi: P 2 : ... of the forces acting at them respectively. This point is called the centre of the given system of parallel forces; it is finite and determinate unless 2(P) =0. A geometrical proof of this theorem, which is not restricted to a two-dimensional system, is given later (§ n). It contains the theory of the centre of gravity as ordinarily under- stood. For if we have an assemblage of particles whose mutual distances are small compared with the dimensions of the earth, the forces of gravity on them constitute a system of sensibly parallel

forces, sensibly proportional to the respective masses. If now the assemblage be brought into any other position relative to the earth, without alteration of the mutual distances, this is equiva- lent to a rotation of the directions of the forces relatively to the assemblage, the ratios of the forces remaining unaltered. Hence there is a certain point, fixed relatively to the assemblage, through which the resultant of gravitational action always passes; this resultant is moreover equal to the sum of the forces on the several particles.

The theorem that any coplanar system of forces can be reduced to a force acting through any assigned point, together with a couple, has an important illustration in the theory of the distribution of shearing stress and bending moment in a horizontal beam, or other structure, subject to vertical extraneous forces. If we consider any vertical section P, the forces exerted across the section by the portion of the

structure on one side on the portion on the other

23 £

Fig. 23. may be reduced to a vertical force F at P and a couple M. The force measures the shearing stress, and the couple the bending moment at P ; we will reckon these quantities positive when the senses are as indicated in the figure.

If the remaining forces acting on the portion of the structure on either side of P are known, then resolving vertically we find F, and taking moments about P we find M. Again if PQ be any seg- ment of the beam which is free from load, Q lying to the right of P, we find

Fp = F 0> Mp-Mo

-F.PQ;

(12)

hence F is constant between the loads, whilst M decreases as we travel to the right, with a constant gradient — F. If PQ be a short segment containing an isolated load W, we have

F Q -F P =-W, M Q =M P ; _ (13)

hence F is discontinuous at a concentrated load, diminishing by an amount equal to the load as we pass the loaded point to the right, whilst M is continuous. Ac- cordingly the graph of F for any system of isolated loads will consist of a series of horizontal lines, whilst that of M will be a continuous polygon.

To pass to the case of continuous loads, let x be measured horizontally along the beam to the right. The load on an element ix of the beam may be represented by wbx, where w is in general a function of x. The equations (12) are npw replaced by

SF = – w5x, SM = – Fix, .

Fig. 24.

whence

F Q -Fp=-j>

(H)

Q -i p— J^WUX, 1V1Q

The latter relation shows that the bending moment varies as the area cut off by the ordinate in the graph of F. In the case of uni- form load we have

*F = *-«*■ + A, M = iM > x 2 -Ax + B, (15)*

where the arbitrary constants A,B are to be determined by the

conditions of the special problem, ^

e.g. the conditions at the ends of the beam. The graph of F is a straight line ; that of M is a parabola with vertical axis. In all cases the graphs due to different distributions of load may be superposed. The figure shows the case of a uniform heavy beam supported at its ends.

§ 5. Graphical Statics. — A graph- ical method of reducing a plane system of forces was introduced by C. Culmann (1864). Itinvoives the construction of two figures, a force-diagram and a funicular polygon. The force-diagram is constructed by placing end to end a series of vectors representing the given forces in

magnitude and direction, and joining the vertices of the polygon thus formed to an arbitrary pole O. The funicular or link polygon has its vertices on the lines of action of the given forces, and its sides respectively parallel to the lines drawn from O in the force-diagram; in particular, the two sides meeting in any vertex are respectively parallel to the lines drawn from O to the ends of that side of the force-polygon which represents the corre- sponding force. The relations will be understood from the an- nexed diagram, where corresponding lines in the force-diagram

Fig. 26.

(to the right) and the funicular (to the left) are numbered simi- larly. The sides of the force-polygon may in the first instance be arranged in any order; the force-diagram can then be completed in a doubly infinite number of ways, owing to the arbitrary position of O; and for

each force-diagram a simply infinite num- ber of funiculars can be drawn. The two diagrams being sup- posed constructed, it is seen that each of the given systems of forces can be replaced by two components acting in the sides of the funicular which meet at the corresponding vertex, and that the magnitudes of these components will be given by the corre- sponding triangle of forces in the force-diagram; thus the force 1 in the figure is equivalent to two forces represented by Oi and 12. When this process of replacement is complete, each ter- minated side of the funicular is the seat of two forces which neutralize one another, and there remain only two uncompen- sated forces, viz., those resident in the first and last sides of the funicular. If these sides intersect, the resultant acts through the intersection, and its magnitude and direction are given by the line joining the first and last sides of the force-polygon (see fig. 26, where the resultant of the four given forces is denbted by R). As a special case it may happen that the force-polygon is closed, i.e. its first and last points coincide; the first and last sides of the funicular will then be parallel (unless they coincide), and the two uncompensated forces form a couple. If, however, the first and last sides of the funicular coincide, the two outstand- ing forces neutralize one another, and we have equilibrium. Hence the necessary and sufficient conditions of equilibrium are that the force-polygon and the funicular should both be closed. This is illustrated by fig. 26 if we imagine the force R, reversed, to be included in the system of given forces.

It is evident that a system of jointed bars having the shape of the funicular polygon would be in equilibrium under the action of the given forces, supposed applied to the joints; moreover any bar in which the stress is of the nature of a tension (as dis- tinguished from a thrust) might be replaced by a string. This is the origin of the names " link-polygon " and " funicular " (cf- § 2).

If funiculars be drawn for two positions 0,0′ of the pole in the force-diagram, their corresponding sides will intersect on a straight line parallel to OO'. This is essentially a theorem of projective geometry, but the following statical proof is interesting. Let AB (fig. 27) be any side of the force-polygon, and construct the corre- sponding portions of the two diagrams, first with O and then with O as pole. The force corresponding to AB may be replaced by the two components marked x, y; and a force corresponding to BA may be represented by the two components marked x' , y'. Hence the forces x, y, x\ y' are in equilibrium. Now x, x' have a resultant through H, represented in magnitude and direction by OO', whilst y,y have a resultant through K represented in magnitude and direction by O'O. Hence HK must be

parallel to 00'. This xvii. 31

theorem enables us, when one funicular has been drawn, to construct any other without further reference to the force-diagram.

The complete figures obtained by drawing first the force-diagrams of a system of forces in equilibrium with two distinct poles O, O', arid secondly the corresponding funiculars, have various interesting relations. In the first place, each of these figures may be conceived as an orthogonal projection of a closed plane-faced polyhedron

Fig. 27. As regards the former figure this is evident at once; viz. the poly- hedron consists of two pyramids with vertices represented by O, O', and a common base whose perimeter is represented by the force-polygon (only one of these is shown in fig. 28). As regards the tunicular diagram, let LM be the line on which the pairs of corre- sponding sides of the two polygons meet, and through it draw any two planes w, and co' respectively. The points thus obtained are evidently the vertices of a polyhedron with plane faces.

Fig. 28.

To every line in either of the original figures corresponds of course a parallel line in the other; moreover, it is seen that concurrent lines in either figure correspond to lines forming a closed polygon in the other. Two plane figures so related are called reciprocal, since the properties of the first figure in relation to the second are the same as those of the second with respect to the first. A still simpler instance of reciprocal figures is supplied by the case of concurrent forces in equilibrium (fig. 29). The theory of these reciprocal figures was first studied by J. Clerk Maxwell, who showed amongst other things that a reciprocal can always be drawn to any figure which is the orthogonal projection of a plane-faced polyhedron. If in fact we

Fig. 29.

take the pole of each face of such a polyhedron with respect to a paraboloid of revolution, these poles will be the vertices of a second polyhedron whose edges are the " conjugate lines " of those of the former. _ If we project both polyhedra orthogonally on a plane perpendicular to the axis of the paraboloid, we obtain two figures which are reciprocal, except that corresponding lines are orthogonal instead of parallel. Another proof will be indicated later (§8) in connexion with the properties of the linear complex. It is

convenient to have a notation which shall put in evidence the reciprocal character. For this purpose we may designate the points in one figure by letters A, B, C, . . . and the corresponding polygons in the other figure by the same letters; a line joining two points A, B in one figure will then correspond to the side common to the two polygons A, B in the other. This notation was employed by R. H. Bow in connexion with the theory of frames(§ 6, and see also Applied Mechanics below) where reciprocal diagrams are frequently of use (cf. Diagram).

When the given forces are all parallel, the force-polygon consists of a series of segments of a straight line. This case has important practical applications; for instance we may use the method to find the pressures on the supports of a beam loaded in any given manner. Thus if AB, BC, CD represent the given loads, in the force-diagram, we construct the sides corresponding to OA, OB, OC, OD in the funicular; we then draw the closing line of the funicular polygon, and a parallel OE to it in the force diagram. The segments DE, EA then represent -the upward pressures of the two supports on the beam, which pressures together with the given loads constitute a system of forces in equilibrium. The pressures of the beam on the supports are of course represented by ED, AE. The two diagrams are portions of reciprocal figures, so that Bow's notation is applicable.

Fig. 30. A graphical method can also be applied to find the moment of a force, or of a system of forces, about any assigned point P. Let F be a force represented by AB in the force-diagram. Draw a parallel through P to meet the sides of the funicular which correspond to OA, OB in the points H, K. If R be the intersection of these sides,

apart ; the only change is then in the position of the closing line of the funicular. It may be remarked that since this line joins homologous points of two " similar " rows it will envelope a parabola.

The " centre " (§ 4) of a system of parallel forces of given magnitudes, acting at given points, is easily determined graphi- cally. We have only to construct the line of action of the resul- tant for each of two arbitrary directions of the forces; the inter- section of the two lines gives the point required. The construc- tion is neatest if the

two arbitrary directions are taken at right angles to one another.

§ 6. Theory of Frames. — A frame is a structure made up of pieces, or members, each of which has two joints connecting it with other members. In a two-dimensional frame, each joint may be conceived as consisting of a small cylindrical pin fitting accurately and smoothly into holes drilled through the members which it connects. This supposition is a somewhat ideal one, and is often only roughly approximated to in practice. We shall suppose, in the first instance, that extraneous forces act on the frame at the joints only, i.e. on the pins.

On this assumption, the reactions on any member at its two joints must be equal and opposite. This combination of equal and opposite forces is called the stress in the member; it may be a tension or a thrust. For diagrammatic purposes each member is sufficiently represented by a straight line terminating at the two joints; these lines will be referred to as the bars of the frame.

Fig. 31.

the triangles OAB, RHK are similar, and if the perpendiculars OM , RN be drawn we have

HK . OM = AB . RN = F . RN, which is the moment of F about P. If the given forces are all parallel (say vertical) OM is the same for all, and the moments of the several forces about P are represented on a certain scale by the lengths intercepted by the successive pairs of sides on the vertical through P. Moreover, the moments are compounded by adding (geometrically) the corresponding lengths HK. Hence if a system of vertical forces be in equilibrium, so that the funicular polygon is closed, the length which this polygon intercepts on the vertical through any point P gives the sum of the moments about P of all the forces on one side of this vertical. For instance, in the case of a beam in equilibrium under any given loads and the reactions at the supports, we get a graphical representation of the distribution of bending moment over the beam. The construction in fig. 30 can easily be adjusted so that the closing line shall be horizontal; and the figure then becomes identical with the bending-moment diagram of § 4. If we wish to study the effects of a movable load, or system of loads, in different positions on the beam, it is only neces- sary to shift the lines of action of the pressures of the supports relatively to the funicular, keeping them at the same distance

Fig. 32.

In structural applications a frame must be stiff, or rigid, i.e. it must be incapable of deformation without alteration of length in at least one of its bars. It is said to be just rigid if it ceases to be rigid when any one of its bars is removed. A frame which has more bars than are essential for rigidity may be called over-rigid; such a frame is in general self-stressed, i.e. it is in a state of stress independently of the action of extraneous forces. A plane frame of n joints which is just rigid (as regards deforma- tion in its own plane) has 2W-3 bars, for if one bar be held fixed the 2(71-2) co-ordinates of the remaining n-2 joints must just be determined by the lengths of the remaining bars. The total number of bars is therefore 2(11-2) + 1. When a plane frame which is just rigid is subject to a given system of equilibrating extraneous forces (in its own plane) acting on the joints, the stresses in the bars are in general uniquely determinate. For the conditions of equilibrium of the forces on each pin furnish 2« equations, viz. two for each point, which are linear in respect of the stresses and the extraneous forces. This system of equations must involve the three conditions of equilibrium of the extraneous forces which are already identically satisfied, by hypothesis; there remain therefore 2» -3 independent relations to determine the 271-3 unknown stresses. A frame of n joints and 2« – 3 bars may of course fail to be rigid owing to some parts being over-stiff whilst others are deformable; in such a case it will be found that the statical equations, apart from the three identical relations imposed by the equilibrium of the extraneous forces, are not all independent but are equivalent to less than 2«~3 relations. Another exceptional case, known as the critical case, will be noticed later (§ 9).

A plane frame which can be built up from a single bar by suc- cessive steps, at each of which a new joint is introduced by two

new bars meeting there, is called a simple frame; it is obviously just rigid. The stresses produced by extraneous forces in a simple frame can be found by considering the equilibrium of the various joints in a proper succession; and if the graphical method be employed the various polygons of force can be combined into a single force-diagram. This procedure was introduced by W. J. M. Rankine and J. Clerk Maxwell (1864). It may be noticed that if we take an arbitrary pole in the force-diagram, and draw a corresponding funicular in the

skeleton diagram which represents the frame together with the lines of action of the extraneous forces, we obtain two complete reciprocal figures, in Maxwell's sense. It is accordingly convenient to use Bow's notation (§ 5), and to distinguish the several compart- ments of the frame-diagram by letters. See fig. 33, where the

Fig. 33. successive triangles in the diagram of forces may be constructed in the order XYZ, ZXA, AZB. The class of " simple " frames includes many of the frameworks used in the construction of roofs, lattice girders and suspension bridges; a number of ex- amples will be found in the article Bridges. By examining the senses in which the respective forces act at each joint we can ascer- tain which members are in tension and which are in thrust ; in fig- 33 this is indicated by the directions of the arrowheads.

When a frame, though just rigid, is not " simple " in the above sense, the preceding method must be replaced, or supplemented, by one or other of various artifices. In some cases the method of sections is sufficient for the purpose. If an ideal section be drawn across the frame, the extraneous forces on either side must be in equilibrium with the forces in the bars cut across; and if

the section can be drawn so \ as to cut only three bars,

the forces in these can be found, since the problem reduces to that of resolving a given force into three components acting in three given lines (§ 4). The " criti- cal case " where the direc- tions of the three bars are concurrent is of course ex- Another method, always available, will be explained Work " (§ 0).

Fig. 34.

in the modified problem where the loads Wi and W2 on the two bars are replaced by loads Pi, Qi, and P2, Qj respectively, acting on the

— ˆ pins. Compounding with this XV, which represents Qi, we get

— > the actual pressure ZV exerted by AB on B. The directions and magnitudes of the reactions at A and C are then easily ascertained. On account of its practical importance several other graphical solutions of this problem have been devised.

§ 7. Three-dimensional Kinematics of a Rigid Body. — The position of a rigid body is determined when we know the positions of three points A, B, C of it which are not colljnear, for the posi- tion of any other point P is then determined by the three dis- tances PA, PB, PC.

The nine co-ordinates (Cartesian or other) of A, B, C are subject to the three relations which express the invariability of the distances BC, CA, AB, and are therefore equivalent to six independent quantities. Hence a rigid body not constrained in any way is said to have six degrees of freedom. Conversely, any six geometrical relations restrict the body in general to one or other of a series of definite positions, none of which can be departed from without violating the conditions in question. For instance, the position of a theodolite is fixed by the fact that its rounded feet rest in contact with six given plane surfaces. Again, a rigid three-dimensional frame can be rigidly fixed relatively to the earth by means of six links.

The six independent quantities, or " co-ordinates," which serve to specify the position of a rigid body in space may of course be chosen in an endless variety of ways. We may, for instance, employ the three Cartesian co-ordinates of a particular point O of the body, and three angular co-ordinates which express the orienta- tion of the body with respect to O. Thus in fig. 36, if OA, OB, OC be three mutually perpendicular lines in the solid, we may denote by 6 the angle which OC makes with a fixed direction OZ, by V" the azimuth of the plane ZOC measured from some fixed plane through OZ, and by $ the inclination of the plane COA to the plane ZOC. In fig. 36 these various lines and planes are represented by theii intersections with a unit sphere having O as centre. This very

eluded under

When extraneous forces act on the bars themselves the stress in each bar no longer consists of a simple longitudinal tension or thrust. To find the reactions at the joints we may proceed as follows. Each extraneous force W acting on a bar may be replaced (in an infinite number of ways) by two components P, Q in lines through the centres of the pins at the extremities. In practice the forces W are usually vertical, and the components P, Q are then conveniently taken to be vertical also. We first alter the problem by transferring the forces P, Q to the pins. The stresses in the bars, in the problem as thus modified, may be supposed found by the preceding methods; it remains to infer from the results thus obtained the reactions in the original form of the problem. To find the pressure exerted by a bar AB on the pin A we compound with the force in AB given by the diagram a force equal to P. Conversely, to find the pressure of the pin A on the bar AB we must compound with the force given by the diagram a force equal and opposite to P. This question arises in practice in the theory of " three-jointed " structures; for the purpose in hand such a structure is sufficiently represented by two bars AB,

BC. The right-hand figure represents a portion of the

— ˆ force-diagram ; in particular ZX represents the pressure of AB on B

Fig. 36.

Fig. 37.

useful, although unsymmetrical, system of angular co-ordinates was introduced by L. Euler. It is exemplified in ” Cardan’s suspension,” as used in connexion with a compass-bowl or a gyroscope. Thus in the gyroscope the ” flywheel ” (represented by the globe in fig. 37) can turn about a diameter OC of a ring which is itself free to turn about a diametral axis OX at right angles to the former; this axis is carried by a second ring which is free to turn about a fixed diameter OZ, which is at right angles to OX.

We proceed to sketch the theory of the finite displacements of a rigid body. It was shown by Euler (1776) that any displacement

Fig. io.

rotation a about OA, about OB; and let A,

in which one point of the body is fixed is equivalent to a pure rotation about some axis through O. Imagine two spheres of equal radius with O as their common centre, one fixed in the body and moving with it, the other fixed in space. In any displace- ment about O as a fixed point, the former sphere slides over the latter, as in a ” ball-and-socket ” joint. Suppose that as the result of the displacement a point of the moving sphere is brought from A to B, whilst the point which was at B is brought to C (cf. fig. io). Let J be the pole of the circle ABC (usually a, ” small circle ” of the fixed sphere), and join JA, JB, JC, AB, BC by great-circle arcs. The spherical isosceles triangles AJB, BJC are con- gruent, and we see that AB can be brought into the position BC by a rotation about the axis OJ through an angle AJB. It is convenient to distinguish the two senses in which rotation may take place about an axis OA by opposite signs. We shall reckon a rotation as positive when it is related to the direction from

O to A as the direction of rotation is related to that of translation in a right-handed screw. Thus a negative rotation about OA may be re- garded as a positive rotation about OA', the prolongation of AO. Now suppose that a body receives first a positive and secondly a positive rotation /3 B be the intersections of these axes with a sphere described about O as centre. If we construct the spherical triangles ABC, ABC (fig. 38), having in each case the angles at A and B equal to |a and j/3 respective- ly, it is evident that the first rotation will bring a point from C to C and that the second will bring it back to C; the result is therefore equiva- lent to a rotation about OC. We note also that if the given rotations had been effected in the inverse order, the axis of the resultant rotation would have been OC, so that finite rotations do not obey the " commutative law." To find the angle of the equivalent rotation, in the actual case, suppose that the second rotation (about OB) brings a point from A to A'. The

*spherical triangles ABC, A'BC (fig. 39) are " symmetrically equal," and the angle of the resultant rotation, viz. ACA', is "C "~-«^ *\ 27T — 2C. This is equivalent to*

a negative rotation 2C about OC, whence the theorem that Fig. 39. the effect of three successive

positive rotations 2A, 2B, 2C about OA, OB, OC, respectively, is to leave the body in its original position, provided the circuit ABC is left-handed as seen from O. This theorem is due to O. Rodrigues (1840). The composition of finite rotations about parallel axes is a particular case of the preceding; the radius of the sphere is now infinite, and the triangles are plane.

In any continuous motion of a solid about a fixed point O, the limiting position of the axis of the rotation by which the body can be brought from any one of its positions to a consecutive one is called the instantaneous axis. This axis traces out a certain cone in the body, and a certain cone in space, and the continuous motion in question may be represented as consisting in a rolling of the former cone on the latter. The proof is similar to that of the corresponding theorem of plane kinematics (§3).

It follows from Euler's theorem that the most general displace- ment of a rigid body may be effected by a pure translation which brings any one point of it to its final position O, followed by a pure rotation about some axis through O. Those planes in the body which are perpendicular to this axis obviously remain

Fig. 38.

parallel to their original positions. Hence, if a, a' denote the initial and final positions of any figure in one of these planes, the displacement could evidently have been effected by. (1) a translation perpendicular to the planes in question, bringing a into some position a" in the plane of a', and (2) a rotation about a normal to the planes, bringing er" into coincidence with cr (§ 3). In other words, the most general displacement is equivalent to a translation parallel to a certain axis combined with a rotation about that axis; i.e. it may be described as a twist about a certain screw. In particular cases, of course, the translation, or the rota- tion, may vanish.

The preceding theorem, which is due to Michel Chasles (1830), may be proved in various other interesting ways. Thus if a point of the body be displaced from A to B, whilst the point which was at B is displaced to C, and that which was at C to D, the four points A, B, C, D lie on a helix whose axis is the Common perpendicular to the bisectors of the angles ABC, BCD. This is the axis of the required screw; the amount of the translation is measured by the projection of AB or BC or CD on the axis; and the angle of rotation is given by the inclination of the aforesaid bisectors. This con- struction was given by M. W. Crofton. Again, H. .Wiener and W. Burnside have employed the half-turn (i.e. a rotation through two right angles) as the fundamental operation. This has the advantage that it is completely specified by the axis of the rotation, the sense being immaterial. Successive half-turns about parallel axes a, b are equivalent to a translation measured by double the distance between these axes in the direction from a to b. Successive half- turns about intersecting axes a, b are equivalent to a rotation about the common perpendicular to a, b at their intersection, of amount equal to twice the acute angle between them, in the direction from a to b. Successive half-turns about two skew axes a, b are equivalent to a twist about a screw whose axis is the common perpendicular to a, b, the translation being double the shortest distance, and the angle of rotation being twice the acute angle between a, b, in the direction from a to b. It is easily shown that any displacement whatever is equivalent to two half-turns and therefore to a screw.

In mechanics we are specially concerned with the theory of infinitesimal displacements. This is included in the preceding, but it is simpler in that the various operations are commutative. An infinitely small rotation about any axis is conveniently represented geometrically by a length AB measures along the axis and proportional to the angle of rotation, with the conven- tion that the

direction from A to B shall be related to the rota- tion as is the direction of translation to that of rotation in a right- handed screw. The consequent displacement of any point P will then be at right angles to the plane PAB, its amount will be represented by double the area of the triangle PAB, and its sense will depend on the cyclical order of the letters P, A, B. If AB, AC represent infinitesimal rotations about intersecting axes, the consequent displacement of any point in the plane BAC will be at right angles to this plane, and will be represented by twice the sum of the areas OAB, OAC, taken with proper signs. It follows by analogy with the theory of moments (§ 4) that the resultant rotation will be represented by AD, the vector-sum of AB, AC (see fig. 16). It is easily inferred as a limiting case, or proved directly, that two infini- tesimal rotations a, jS about parallel axes are equivalent to a rotation a+/3 about a parallel axis in the same plane with the two former, and dividing a com- mon perpendicular AB in a point C so that AC/CB=/3/a. If the rotations are equal and opposite, so that a+j3 = o, the point C is

at infinity, and the effect is a translation perpendicular to the plane of the two given axes, of amount a . AB. It thus appears that an infinitesimal rotation is of the nature of a " localized vector," and is subject in all respects to the same mathematical laws as a force, conceived as acting on a rigid body. Moreover;, that an infinitesimal translation is analogous to a couple and follows the same laws. These results are due to Poinsot.

The analytical treatment of small displacements is as follows. We first suppose that one point O of the body is fixed, and take this as the origin of a " right-handed " system of rectangular

Fig. 16.

Fig. 40.

co-ordinates; i.e. the positive directions of the axes are assumed to be so arranged that a positive rotation of 90° about 0 would bring Oy into the position of Oz, and so on. The displacement will consist of an infinitesimal rotation e about some axis through O, whose direction-cosines are, say, I, m, n. From the equiva- lence of a small rotation to a localized vector it follows that the rotation e will be*

equivalent to rotations £,??,f about Ox, Oy, Oz, respectively, provided

i, = U, v — mt, f = ne, (1)

and we note that

?■? =

Thus in the case of fig. 36 it may be required to connect the infinitesimal rotations £, r;, f about OA, OB, OC with the variations of the angular co-ordinates 6, \j/, 4>. The displacement of the point C of the body is made up of 80 tangential to the meridian ZC and sin Sip perpendicular to the plane of this meridian. Hence, re- solving along the tangents to the arcs BC, CA, respectively, we have

£ = 50 sin — sin S\j/ cos , i) = 80 cos <£+sin Sip sin . (3)

Again, consider the point of the solid which was initially at A' in the figure. This is displaced relatively to A' through a space S perpendicular to the plane of the meridian, whilst A' itself is displaced through a space cos Ity in the same direction. Hence

f = S+ cosS 8^. (4)

To find the component displace- ments of a point P of the body, whose co-ordinates are x, y, z, we draw PL normal to the plane yOz, and LH, LK perpendicular to Oy, Oz, respectively. The displace- ment of P parallel to Oz is the same as that of L, which is made up of t)2 a.nd – fy. In this way we obtain the formulae

Sx =‘ijz'~ iy, fry. = ? – £2. 52 = & —qX. (5)*

The most general case is derived from this by adding the com- ponent displacements X, /U, v (say) of the point which was at O; thus

Sx = X + i\z – fy, -I

Sy = M+r-£z» \ (6)*

Sz = v + ky – 7i. i The displacement is thus expressed in terms of the six inde- pendent quantities £, 77, f , X, /j,, v. The points whose displace- ments are in the direction of the resultant axis of rotation are determined by 5x: by: dz = £: 17: f, or*

(X + n z – £y) /£ = (ji + Sx – £z) In = (y -Kly – r,x) /£. (7)

These are the equations of a straight line, and the displacement is in fact equivalent to a twist about a screw having this line as axis. The translation parallel to this axis is

ISx + mSy + nSz = (X{ + Ml + "S) /«• (8)

The linear magnitude which measures the ratio of translation to rotation in a screw is called the pitch. In the present case the pitch is

(XS+MTj + .'SW+ˆ.-m. (9)

Since £ 2 + if + f 2 , or t 2 , is necessarily an absolute invariant for all transformations of the (rectangular) co-ordinate axes, we infer that X£ + fir) f v% is also an absolute invariant. When the latter invariant, but not the former, vanishes, the displace- ment is equivalent to a pure rotation.

If the small displacements of a rigid body be subject to one constraint, e.g. if a point of the body be restricted to lie on a given surface, the mathematical expression of this fact leads to a homo- geneous linear equation between the infinitesimals £, tj, f , X, p, v, say A4+Bij-|-Q-r-FX+GA<-|-H,,=o. (I0)

The quantities J, 17, f, X, n, v are no longer' independent, and the body has now only five degrees of freedom. Every additional constraint introduces an additional equation of the type (10) and reduces the number of degrees of freedom by one. In Sir R. S. Ball's Theory of Screws an analysis is made of the possible displace- ments of a body which has respectively two, three, four, five degrees of freedom. We will briefly notice the case of two degrees, which involves an interesting generalization of the method (already explained) of compounding rotations about intersecting axes. We assume that the body receives arbitrary twists about two

given screws, and it is required to determine the character of the resultant displacement. We examine first the case where the axes of the two screws are at right angles and intersect. We take these as axes of x and y; then if £, i\ be the component rotations about them, we have

X ='h£, /i =ki), v = o, (11)

where h, k, are the pitches of the two given screws. The equations (7) of the axis of the resultant screw then reduce to

**/« = ?/»?. z(?+r?) =(k-h)fr. (12)*

Hence, whatever the ratio J : 77, the axis of the resultant screw lies on the conoidal surface

z(2 +y 2) =«;;)[(13)*

where c = i(k — h). The co-ordinates of any point on (13) may be written

x=r cos 6, y = r sin 0, z — c sin 20; (14)

hence if we imagine a curve of sines to be traced on a circular cylinder so that the circumference just includes two complete undulations, a straight line cutting the axis of the cylinder at right angles and

From Sir Robert S. Ball's Theory of Screws.

Fig. 41.

meeting this "curve will generate "the surface. This is called a cylindroid. Again, the pitch of the resultant screw Is

P = (M+fv)i(i 2 +V 2) = h cos 2 0+£ sin 2 0. (15)

The distribution of pitch among the various screws has therefore a simple relation to the pitch-conic

hx 2 +ky 2 = const; (16)

viz. the pitch of any screw varies inversely as the square of that diameter of the conic which is parallel to its axis. It is to be noticed that the parameter c of the cylindroid is unaltered if the two pitches h, k be increased by equal amounts ; the only change is that all the pitches are increased by the same amount. It remains to show that a system of screws of the above type can be constructed so as to contain any two given screws whatever. In the first place, a cylindroid can be constructed so as to have its axis coincident with the common perpendicular to the axes of the two given screws and to satisfy three other conditions, for the position of the centre, the parameter, and the orientation about the axis are still at our disposal. Hence we can adjust these so that the surface shall contain the axes of the two given screws as generators, and that the difference of the corresponding pitches shall have the proper value. It follows that when a body has two degrees of freedom it can twist about any one of a singly infinite system of screws whose axes lie on a certain cylindroid. In particular cases the cylindroid may

degenerate into a plane, the pitches being then all equal.

§ 8. Three-dimensional Statics. — A system of parallel forces can be combined two and two until they are replaced by a single resultant equal to their sum, acting in a certain line. As special cases, the system may reduce to a couple, or it may be in equili- brium.

In general, however, a three-dimensional system of forces cannot be replaced by a single resultant force. But it may be reduced to simpler elements in a variety of ways. For example, it may be reduced to two forces in perpendicular skew lines. For consider any plane, and let each force, at its intersection with the plane, be resolved into two components, one (P) normal to the plane, the other (Q) in the plane. The assemblage of parallel forces P can be replaced in general by a single force, and the coplanar system of forces Q by another single force.

If the plane in question be chosen perpendicular to the direc- tion of the vector-sum of the given forces, the vector-sum of the components Q is zero, and these components are therefore equivalent to a couple (§ 4). Hence any three-dimensional system can be reduced to a single force R acting in a certain line, together with a couple G in a plane perpendicular to the line. This theorem was first given by L. Poinsot, and the line of action of R was called by him the central axis of the system. The com- bination of a force and a couple in a perpendicular plane is termed by Sir R. S. Ball a wrench. Its type, as distinguished from its absolute magnitude, may be specified by a screw whose axis is the line of action of R, and whose pitch is the ratio G/R.

The case of two forces may be specially noticed. Let AB be the shortest distance between the lines of action, and let AA', BB'

(fig. 42) represent the forces. Let a, /3 be the angles which AA', BB' make with the direction of the vector-sum, on opposite sides. Divide AB in O, so that AA'. cos o. AO =

BB'. cos /3. OB, (1) and draw OC parallel to the vector-sum. Resolving AA', BB' each into two compon- ents parallel and perpendicular to OC, we see that the former

— B

Fig. 42.

components have a single resultant in OC, of amount

R = AA' cos o + BB' cos 0, (2)

whilst the latter components form a couple of moment

G = AA'. AB. sin o = BB'. AB. sin 0. (3)

Conversely it is seen that any wrench can be replaced in an infinite number of ways by two forces, and that the line of action of one of these may be chosen quite arbitrarily. Also, we find from (2) and (3) that

G.R = AA. BB'. AB. sin (o + /J). (4)

The right-hand expression is six times the volume of the tetrahedron of which the lines AA', BB' representihg the forces are opposite edges; and we infer that, in whatever way the wrench be resolved into two forces, the volume of this tetrahedron is invariable.

To define the moment of a force about an axis HK, we project the force orthogonally on a plane perpendicular to HK and take the moment of the projection about the intersection of HK with the plane (see § 4). Some convention as to sign is necessary; we shall reckon the moment to be positive when the tendency of the force is right-handed as regards the direction from H to K. Since two concurrent forces and their resultant obviously project into two concurrent forces and their resultant, we see that the sum of the moments of two concurrent forces about any axis HK is equal to the moment of their resultant. Parallel forces may be included in this statement as a limiting case. Hence, in whatever way one system of forces is by successive steps replaced by an- other, no change is made in the sum of the moments about any assigned axis. By means of this theorem we can show that the previous reduction of any system to a wrench is unique.

From the analogy of couples to translations which was pointed out in § 7, we may infer that a couple is sufficiently represented by a " free " (or non-localized) vector perpendicular to its plane. The length of the vector must be proportional to the moment of the couple, and its sense must be such that the sum of the mo- ments of the two forces of the couple about it is positive. In particular, we infer that couples of the same moment in parallel planes are equivalent; and that couples in any two planes may be compounded by geometrical addition of the corresponding vectors. Independent statical proofs' are of course easily given. Thus, let the plane of the paper be perpendicular to the planes of two couples, and therefore perpendicular to the line of inter- section of these planes. By § 4, each couple can be replaced by two forces ± P (fig. 43) perpendicular to the plane of the paper, and so that one force of each couple is in the line of intersection (B) ; the

arms (AB,BC) will then be proportional to the respective moments. The two forces at B will cancel, and we are left with a couple of moment P.AC in the plane AC. If we draw three vectors to represent these three couples, they will be perpendicu- lar and proportional to the respective sides of the triangle ABC; hence the third vector is the geometric sum of the other two.

Since, in this proof the magnitude of P is arbitrary, it follows incidentally that couples of the same moment in parallel planes, e.g. planes parallel to AC, are equivalent.

Hence a couple of moment G, whose axis has the direction (I, m, n) relative to a right-handed system of rectangular axes.

etpj

Fig. 43.

h(-p)

is equivalent to three couples 10, «G, «G in the co-ordinate planes. The analytical reduction of a three-dimensional system can now be conducted as follows. Let (x h y u 0i) be the co-ordi- nates of a point Pi on the line of action of one of the forces, whose com- ponents are (say) X 1; Yi, Zj. Draw PiH normal to the plane zOx, and HK perpendicular to Oz. In KH introduce two equal and opposite forces ± X t . The force Xi at Pi with -Xi in KH forms a couple about Oz, of moment -yiXi. Next, introduce along Ox two equal and opposite forces = > =Xi. The force X t in KH with -Xi in Ox forms a couple about Oy, of moment 2iX,. Hence the force X! can be transferred from P, to O, provided we introduce couples of moments Z1X1 about Oy and -yiXi, about Oz. Dealing in the same way with the forces Yi, Z x at Pj, we find that all three components of the force at ¥ t can be transferred to O, provided we introduce three couples Li, Mi, Ni about 0, Oy, Oz respectively, viz.*

Li=yiZi- Zl Yi, Miˆ iXi-ˆZi, Ni=xiYi-yiXi. (5)

It is seen that Li, Mi, N x are the moments of the original force at Pi about the co-ordinate axes. Summing up for all the forces of the given system, we obtain a force R at 0, whose components are X=2(X,), Y=2(Y r), Z=2(Z r), (6)

and a couple G whose components are

L=S(Lr), M=2(M r), N=2(N r), (7)

where r= 1, 2, 3. . . Since R 2 = X 2 +Y 2 +Z 2 , G 2 = L 2 +M 2 +N 2 , it is necessary and sufficient for equilibrium that the six quanti- ties X, Y, Z, L, M, N, should all vanish. In words: the sum of the projections of the forces on each of the co-ordinate axes must vanish; and, the sum of the moments of the forces about each of these axes must vanish.

If any other point 0', whose co-ordinates are x, y, z, be chosen in place of 0, as the point to which the forces are transferred, we have to write xi—x, yi— y, Zi— z for x u y u z h and so on, in the preceding process. The components of the resultant force R are unaltered, but the new components of couple are found to be

L' = L-yZ+2Y,: M' = M-zX+xZ,

*N' = N-*Y+yX.!*

(8)

By properly choosing 0′ we can make the plane of the couple perpendicular to the resultant force. The conditions for this are V: M': N' = X : Y : Z, or

L-yZ+zY X

M-zX+ xZ ¥

*N-*Y+yX Z*

(9)

STATICS]

MECHANICS

967

These are the equations of the central axis. Since the moment of the resultant couple is now

G ,.X L , + Y M , + Z N ,_ LX + MY + NZ

(10)

the pitch of the equivalent wrench is

(LX + MY + NZ)/(X 2 + Y 2 + Z 2). It appears that X^V+Z and*

$LX+MY+NZ$ are absolute invariants (cf. § 7). When the latter invariant, but not the former, vanishes, the system reduces to a single force.

The analogy between the mathematical relations of infinitely small displacements on the one hand and those of force-systems on the other enables us immediately to convert any theorem in the one subject into a theorem in the other. For example, we can assert without further proof that any infinitely small dis- placement may be resolved into two rotations, and that the axis of one of these can be chosen arbitrarily. Again, that wrenches of arbitrary amounts about two given screws compound into a wrench the locus of whose axis is a cylindroid.

The mathematical properties of a twist or of a wrench have been the subject of many remarkable investigations, which are, however, of secondary importance from a physical point of view. In the " Null-System " of A. F. Mobius (1790-1868), a line such that the moment of a given wrench about it is zero is called a null-line. The triply infinite system of null-lines form what is called in line- geometry a " complex." As regards the configuration of this complex, consider a line whose shortest distance from the central axis is r, and whose inclination to the central axis is 0. The moment of the resultant force R of the wrench about this line is — Rr sin 6, and that of the couple G is G cos 9. Hence the line will be a null- line provided

tan9 = k/r, (11)

where k is the pitch of the wrench. The null-lines which are at a given distance r from a point O of the central axis will therefore form one system of generators of a hyperboloid of revolution; and by varying r we get a series of such hyperboloids with a common centre .and axis. By moving O along the central axis we obtain the whole complex of null-lines. It appears also from (11) that the null-lines whose distance from the central axis is r are tangent lines to a system of helices of slope tan— i(r/fe) ; and it is to be noticed that these helices are left-handed if the given wrench is right- handed, and vice versa.

Since the given wrench can be replaced by a force acting through any assigned point P, and a couple, the locus of the null-lines through P is a plane, viz. a plane perpendicular to the vector which represents the couple. The complex is therefore of the type called " linear " (in relation to the degree of this locus). The plane in question is called the null-plane of P. If the null-plane of P pass through Q, the null-

plane of Q will pass through P, since PQ is a null-line. Again, any plane w is the locus of a system of null-lines meeting in a point, called the null-point of o>. If a plane revolve about a fixed straight line p in it, its null-point describes another straight line p', which is called the conjugate line of p. We have seen that the wrench may be replaced by two forces, one of which may act in any arbitrary line p. It is now evident that the second force must act in the conjugate line p', since every line meeting p, p' is a null-line. Again, since the shortest distance between any two conjugate lines cuts the central axis at right angles, the orthogonal projections of two conjugate lines on a plane perpendicular to the central axis will be parallel (fig. 42). This property was employed by L. Cremona to prove the existence under certain conditions of " reciprocal figures " in, a plane (§5). If we take any polyhedron with plane faces, the null-planes of its vertices with respect to a given wrench will form another polyhedron, and the edges of the latter will be conjugate (in the above sense) to those of the former. Projecting orthogonally on a plane perpendicular to the central axis we obtain two reciprocal figures.

In the analogous theory of infinitely small displacements of a solid, a "null-line " is a line such that the lengthwise displacement of any point on it is zero.

Since a wrench is defined by six independent quantities, it can in general be replaced by any system of forces which involves six adjustable elements. For instance, it can in general be replaced by six forces acting in six given lines, e.g. in the six edges of a given tetrahedron. An exception to the general statement occurs when the six lines are such that they are possible lines of action of a system of six forces in equilibrium; they are then said to be in involution. The theory of forces in involution has been studied by A. Cayley, J. J. Sylvester and others. We have seen that a rigid structure may in general be rigidly connected with the earth by six links,, and it now appears that any system of forces acting on the structure can in general be balanced by six determinate forces exerted by the links. If, however, the links are in involution, these forces become infinite or indeterminate. There is a corresponding kinematic peculiarity, in that the connexion is now not strictly rigid, an infinitely small relative displacement being possible. See § 9.

When parallel forces of given magnitudes act at given points , the resultant acts through a definite point, or centre of parallel forces, which is independent of the special direction of the forces- If P, be the force at (x r , y r , «r), acting in the direction (/, m, n), the formulae (6) and (7) reduce to

X = 2(P) .1, Y = 2(P). m, Z = 2(P). n, (12)

and

L = 2(P).(ny-wz), M = 2(P).(2z – nx), N = 2(P).(ms – ly), (13)

*■a a 9 s (p *) – 2(Py) . 2(Pz) . ,*

*provtded * = ipf , y = -frdf, z = -ˆmf (14)*

These are the same as if we had a single force 2(P) acting at the point (, y,~z), which is the same for all directions (/, m, n). We can hence derive the theory of the centre of gravity, as in § 4. An exceptional case occurs when 2(P)=o.*

If we imagine a rigid body to be acted on at given points by forces of given magnitudes in directions (not all parallel) which are fixed in space, then as the body is turned about the resultant wrench will assume different configurations in the body, and will in certain positions reduce to a single force. The investigation of such questions forms the subject of " Astatics," which has been cultivated by Mobius, Minding, G. Darboux and others. As it has no physical bearing it is passed over here.

§ 9. Work. — The work done by a force acting on a particle, in any infinitely small displacement, is defined as the product of the force into the orthogonal projection of the displacement on the direction of the force; i.e. it is equal to F. 5 s cos 6, where F is the force, Ss the displacement, and is the angle between the directions of F and 8s. In the language of vector analysis (q.v.) it is the " scalar product " of the vector representing the force and the displacement. In the same way, the work done by a force acting on a rigid body in any infinitely small displacement of the body is the scalar product of the force into the displace- ment of any point on the line of action. This product is the same whatever point on the line of action be taken, since the lengthwise components of the displacements of any two points A, B on a line AB are equal, to the first order of small quantities. To see this, let A', B' be the displaced positions of A, B, and let be the infinitely small angle between AB and A'B'. Then if

Fig. 45.

a, j3 be the orthogonal projections of A', B' on AB, we have Aa-B/3=AB-a;8 = AB(i-cos4>)=iAB. 2 ,*

ultimately. Since this is of the second order, the products F.Aa and

F.B/3 are ultimately equal.

The total work done by two concurrent forces acting on a particle, or on a rigid body, in any infinitely small displacement, is equal to the work of their resultant. Let AB, AC (fig. 46) represent the forces, AD their resultant, and let AH be the direction of the displacement 8s of the point A. The proposi-

5 ~~.*

Fig. 46.

Fig. 47.

tion follows at once from the fact that the sum of orthogonal

projections of AB, AC on AH is equal to the projection of AD. It is to be noticed that AH need not be in the same plane with AB, AC. I It follows from the preceding statements that any two systems

of forces which are statically equivalent, according to the prin- ciples of §§ 4, 8, will (to the first order of small quantities) do the same amount of work in any infinitely small displacement of a rigid body to which they may be applied. It is also evident that the total work done in two or more successive infinitely small displacements is equal to the work done in the resultant dis- placement.

The work of a couple in any infinitely small rotation of a rigid body about an axis perpendicular to the plane of the couple is equal to the product of the moment of the couple into the angle of rotation, proper conventions as to sign being observed. Let the couple consist of two forces P, P (fig. 47) in the plane of the paper, and let J be the point where this plane is met by the axis of rotation. Draw JBA perpendicular to the lines of action, and let e be the angle of rotation. The work of the couple is

*P. JA. *-P. JB.« = P. AB. e = G<-, if G be the moment of the couple.*

The analytical calculation of the work done by a system of

forces in any infinitesimal displacement is as follows. For a

two-dimensional system we have, in the notation of §§ 3, 4,

2(X5x + YSy) = S{X(X-y€) + Y(M + xe)!

*= 2(X).A + 2(Y). /i + S(*Y-yX) (:*

= XX + Y /i + N€. (1)

Again, for a three-dimensional system, in the notation of §§ 7, 8,
2(XSx + '$y + Z&z)

*= 2{X(\+ v z-ft) + Y(v + !;x-lix) + Z(r + Zy- v x)\ = 2(X) .X + 2(Y) .m + 2(Z) . v + 2(yZ-zY) . £ + 2(zX-*Z) .tj*

*+ 2(*Y-yX).f = XX + Y M + Z^-|-L| + M,-|-Nf. (2)*

This expression gives the work done by a given wrench when the body receives a given infinitely small twist; it must of course be an absolute invariant for all transformations of rectangular axes". The first three terms express the work done by the com- ponents of a force (X, Y, Z) acting at O, and the remaining three terms express the work of a couple (L, M, N).

The work done by a wrench about a given screw, when the body twists about a second given screw, may be calculated directly as follows. In fig. 48 let R, G be the force and couple of the wrench, (,t the rotation and translation in the twist. Let the axes of the

**-T*

Fig. 48.

wrench and the twist be inclined at an angle 8, and let h be the shortest distance between them. The displacement of the point H in the figure, resolved in the direction of R, is t cos 8— eh sin 8. The work is therefore

R(t cos 8 — th sin 0) + G cos 8

= R{ (/> + £') cos B-h sin 8\, (3)*

if G = pR, T — p'i, i-e. p, p' are the pitches of the two screws. The factor (p + p') cos 8 — h sin 9 is called the virtual coefficient of the two screws which define the types of the wrench and twist, respectively. A screw is determined by its axis and its pitch, and

therefore involves five independent elements. These may be, for instance, the five ratios £ : tj: f : X:ˆ: c of the six quantities which specify an infinitesimal twist about the screw. If the twist is a pure rotation, these quantities are subject to the relation

\$+H7,+v? = o. (4)

In the analytical investigations of line geometry, these six quantities, supposed subject to the relation (4), are used to specify a line, and are called the six " co-ordinates" of the line; they are of course equivalent to only four independent quantities. If a line is a null-line with respect to the wrench (X, Y, Z, L, M, N), the work done in an infinitely small rotation about it is zero, and its co- ordinates are accordingly subject to the further relation

L| + M,-|-Nf+XX-r-YM+Zˆ = o, _ (5)

where the coefficients are constant. This is the equation of a " linear complex" (cf. § 8).

Two screws are reciprocal when a wrench about one does no work on a body which twists about the other. The condition for this is

XJ'fW+>'r'+V£+A!-x'r = 0, (6)

if the screws be defined by the ratios £ : n : f : X : m : " and £': t;': f': X': /': v'.*

respectively. The theory of the screw-systems which are reciprocal to one, two, three, four given screws respectively has been investi- gated by Sir R. S. Ball.

Considering a rigid body in any given position, we may con- template the whole group of infinitesimal displacements which might be given to it. If the extraneous forces are n equilibrium the total work which they would perform in any such displace- ment would be zero, since they reduce to a zero force and a zero couple. This is (in part) the celebrated principle of virtual- velocities, now often described as the principle of virtual work, enunciated by John Bernoulli (1667-1748). The word "vir- tual " is used because the displacements in question are not regarded as actually taking place, the body being in fact at rest. The " velocities " referred to are the velocities of the various points of the body in any imagined motion of the body through the position in question; they obviously bear to one another the same ratios as the corresponding infinitesimal dis- placements. Conversely, we can show that if the virtual work of the

extraneous forces be zero for every infinitesimal displace- ment of the body as rigid, these forces must be in equilibrium. For by giving the body (in imagination) a displacement of trans- lation we learn that the sum of the resolved parts of the forces in any assigned direction is zero, and by giving it a displacement of pure rotation we learn that the sum of the moments about any assigned axis is zero. The same thing follows of course from the analytical expression (2) for the virtual work. If this vanishes for all values of X, ;u, v, £ , 7), f we must have X, Y, Z, L, M, N = o, which are the conditions of equilibrium.

The principle can of course be extended to any system of particles or rigid bodies, connected together in any way, pro- vided we take into account the internal stresses, or reactions, between the various parts. Each such reaction consists of two equal and opposite'forces, both of which may contribute to the equation of virtual work.

The proper significance of the principle of virtual work, and of its converse, will appear more clearly when we come to kinetics (§ 16); for the present it may be regarded merely as a compact and (for many purposes) highly convenient summary of the laws of equilibrium. Its special value lies in this, that by a suitable adjustment of the hypothetical displacements we are often enabled to eliminate unknown reactions. For example, in the case of a particle lying on a smooth curve, or on a smooth surface, if it be displaced along the curve, or on the surface, the virtual work of the normal component of the pressure may be ignored, since it is of the second order. Again, if two bodies are connected by a string or rod, and if the hypothetical displace- ments be adjusted so that the distance between the points of attachment is unaltered, the corresponding stress may be ignored. This is evident from fig. 45; if AB, A'B' represent the two posi- tions of a string, and T be the tension, the virtual work of the two forces ± Tit A,B is T(Aa-B|S), which was shown to be of the second order. Again, the normal pressure between two surfaces disappears from the equation, provided the displace- ments be such that one of these surfaces merely slides relatively to the other. It is evident, in the first place, that in any displace- ment common to the two surfaces, the work of the two equal and opposite normal pressures will cancel; moreover if, one of the surfaces being fixed, an infinitely small displacement shifts the point of contact from A to B, and if A' be the new position of that point of the sliding body which was at A, the projection of AA' on the normal at A is of the second order. It is to be noticed, in this case, that the tangential reaction (if any) between the two surfaces is not eliminated. Again, if the displacements be such that one curved surface rolls without

sliding on another, the reaction, whether normal or tangential, at the point of con- tact may be ignored. For the virtual work of two equal and opposite forces will cancel in any displacement which is common to the two surfaces; whilst, if one surface be fixed, the displace- ment of that point of the rolling surface which was in contact with the other is of the second order. We are thus able to imagine a great variety of mechanical systems to which the principle of virtual work can be applied without any regard to

the internal stresses, provided the hypothetical displacements be such that none of the connexions of the system are violated. If the system be subject to gravity, the corresponding part of the virtual work can be calculated from the displacement of the centre of gravity. If W,, W 2 , . . . be the weights of a system of particles, whose depths below a fixed horizontal plane of reference are z,, z 2 , . . . , respectively, the virtual work oi gravity is

Wifei + W 2 Sz 2 + . . . = 5(WxZ! + W 2 z, + .:.) (7)

= (Wi + W 2 + . . .)82, where z is the depth of the centre of gravity (see § 8 (14) and § 11 (6)). This expression is the same as if the whole mass were concentrated at the centre of gravity, and displaced with this point. An important conclusion is that in any displacement of a system of bodies in equilibrium, such that the virtual work of all forces except gravity may be ignored, the depth of the centre of gravity is " stationary."

The question as to stability of equilibrium belongs essentially to kinetics; but we may state by anticipation that in cases where gravity is the only force which does work, the equilibrium of a body or system of bodies is stable only if the depth of the centre of gravity be a maximum.

Consider for instance, the case of a bar resting with its ends on two smooth inclines (fig. 18). If the bar be displaced in a vertical plane so that its ends slide on the two inclines, the instantaneous centre is at the point J The displacement of G is at right angles to JO; this shows that for equilibrium JG must be vertical. Again, the locus of G is an arc of an ellipse whose centre is in the intersection ot the planes; since this arc is convex upwards the equilibrium is unstable. A general criterion for the case of a rigid body movable in two

dimensions, with one degree of freedom, can be obtained as follows. We have seen (§ 3) that the sequence of possible positions is obtained if we imagine the " body-centrode " to roll on the " space- centrode. For equilibrium, the altitude of the centre of gravity G must be stationary; hence G must lie in the same vertical line with the point of contact J of the two curves. Further, it is known from the theory of roulettes " that the locus of G will be concave or convex upwards according as

9 6 9

cos

(8)

where p, p are the radii of curvature of the two curves at J, is the inclination of the common tangent at J to the horizontal, and h is the height of G above J. The signs of p, p' are to be taken positive when the curvatures are as in the standard case shown in fig. 49. Hence for stability the upper sign must obtain in (8). The same criterion may be arrived at in a more intuitive manner as follows. If the body be supposed to roll (say to the right) until the curves touch at J . and i f JJ' = S, the angle through which the upper figure rotates is &s/p + $s/p', and the horizontal displace- ment of G is equal to the product of this expression into h. If this displace- ment be less than the horizontal projection of JJ', viz. Ss cos , the vertical through the new position of G will fall to the left of J' and gravity will tend to restore the body to its former position. It is here assumed that the remaining forces acting on the body in its displaced position have iU , . . . zero moment about J'; this is evidently*

the case, tor instance, in the problem of " rocking stones."

The principle of virtual work is specially convenient in the theory of frames (§6), since the reactions at smooth joints and the stresses in inextensible bars may be left out of account. In particular, in the case of a frame which is just rigid, the principle enables us to find the stress in any one bar indepen- dently of the rest. If we imagine the bar in question to be removed, equilibrium will still persist if we introduce two equal and opposite forces S, of suitable magnitude, at the joints which it connected. In any infinitely small deformation of the frame as thus modified, the virtual work of the forces S, together with that of the original extraneous forces, must vanish; this determines S.

As a simple example, take the case of a light frame, whose bars torm the slides of a rhombus ABCD with the diagonal BD, suspended from A and carrying a weight W at C; and let it be required to find

the stress in BD. If we remove the bar BD, and apply two equal and opposite forces S at B and D, the equation is

W. 8(2/ cos 0) + 2 S . S{1 sin 0) = o, where I is the length of a side of the rhombus, and its inclination to the vertical. Hence

S = Wtan0 = W. BD/AC. (8)

The method is specially appropriate when the frame, although just rigid, is not " simple " in the sense of § 6, and when accordingly the method of reciprocal figures is not immediately available. To avoid the intricate trigonometrical calcu- lations which would often be necessary, graphical devices have been introduced by H. Muller-Breslau and others. For this purpose the infinitesimal displacements of the various joints are replaced by finite lengths proportional to them, and there- fore proportional to the velocities of the joints in some imagined motion of the deformable frame through its actual configuration ; this is really (it may be remarked) a reversion to the original notion of virtual velocities. " Let J be the instantaneous centre for any bar CD (fig. 12), and let s u s 2 , represent the virtual velocities of C, D. If these lines be turned through a right angle m , the same sen se, they take up positions such as CC, DD', whlre rJ'Jc a – e ,? n ,J C ' J P^ respectively, and CD' is parallel to CD. further, if Fi (fig. 51) be any force acting on the joint C, its virtual work will be equal to the moment of Fj about C; the equation of virtual work is thus transformed into an equation of moments.

J

Fig. 50.

Fig.

Fig. 51.

Fig. 52.

Consider, for example, a frame whose sides form the six sides of a hexagon ABCDEF and the three diagonals AD, BE, CF; and sup- pose that it is required to find the stress in CF due to a given system of extraneous forces in equilibrium, acting on the joints. Imagine the bar CF to be removed, and consider a deformation in which AB is

fixed. The instantaneous centre of CD will be at the intersection of AD, BC, and if CD' be drawn parallel to CD, the lines CC, DD' may be taken to represent the virtual velocities of C, D turned each through a right angle. Moreover, if we draw D'E' parallel to DE, and E'F' parallel to EF, the lines CC, DD', EE', FF' will represent on the same scale the virtual velocities of the points C, D, E, F, respectively, turned each through a right angle. The equation of virtual work is then formed by taking moments about C, D', E', P' of the extraneous forces which act at C, D, E, F, respectively. Amongst these forces we must include the two equal and opposite forces S which take the place of the stress in the removed bar FC.

The above method lends itself naturally to the investigation of the critical forms of a frame whose general structure is given. We have seen that the stresses produced by an equilibrating system of extraneous forces in a frame which is just rigid, according to the criterion of § 6, are in general uniquely determinate; in particular, when there are no extraneous forces the bars are in genera! free from stress. It may however happen that owing to some special relation between the lengths of the bars the frame admits of an infinitesimal deformation. The simplest case is that of a frame of three bars, when the three joints A, B, C fall into a straght line; a small dis- placement of the joint B at right angles to AC would involve changes in the lengths of AB, BC which are only of the second order of small quantities. Another example is shown in fig. 53. The graphical method leads at once to the detection of such cases. Thus in the hexagonal frame of fig. 52, if an infinitesimal deformation is possible without removing the bar CF, the instantaneous centre of CF (when AB is fixed) will be at the intersection of AF and BC, and since CC, FF represent the virtual velocities of the points C, F, turned each through a right angle, CF' must be parallel to CF. Conversely, if this condition be satisfied, an infinitesimal deformation is possible. The result may be generalized into the statement that a frame has a critical form whenever a frame of the same structure can be designed

with corresponding bars parallel, but without complete geometric similarity. In the case of fig. 52 it may be shown that an equivalent condition is that the six points A, B, C, D, E, F should lie on a conic (M. W. Crofton). This is fulfilled when the opposite sides of the

hexagon are parallel, and (as a still more special case) when the hexagon is regular.

When a frame has a critical form it may be in a state of stress independently of the action of extraneous forces ; moreover, the stresses due to extraneous forces are indeterminate, and may be infinite. For suppose as before that one of the bars is removed. If there are no extra- neous forces the equation of virtual work reduces to S.Ss — o, where S is the stress in the removed bar, and 6s is the change in the distance between the joints which it connected. In a critical form we have Js = o, and the equation is satisfied p IG — by an arbitrary value of S; a consistent

' system of stresses in the remaining bars

can then be found by preceding rules. Again, when extraneous forces P act on the joints, the equation is

Z(P.8£) + S.6\s = o,

where Sp is the displacement of any joint in the direction of the corresponding force P. If S(P.5p) = o, the stresses are merely indeterminate as before; but if 2 (P. Sp) does not vanish, the equation cannot be satisfied by any finite value of S, since Ss = 0. This means that, if the material of the frame were absolutely unyielding, no finite stresses in the bars would enable it to withstand the extraneous forces. With actual materials, the frame would yield elastically, until its configuration is no longer " critical." The stresses in the bars would then be comparatively very great, although finite. The use of frames which approximate to a critical form is of course to be avoided in practice.

A brief reference must suffice to the theory of three dimensional frames. This is important from a technical point of view, since all structures are practically three-dimensional. We may note that a frame of n joints which is just rigid must have 3» — 6 bars; and that the stresses produced in such a frame by a given system of extraneous forces in equilibrium are statically determinate, subject to the exception of " critical forms."

§ 10. Statics of Inextensible Chains. — The theory of bodies or structures which are deformable in their smallest parts belongs properly to elasticity (q.v.). The case of inextensible strings or chains is, however, so simple that it is generally included in expositions of pure statics.

It is assumed that the form can be sufficiently represented by a plane curve, that the stress (tension) at any point P of the curve, between the two portions which meet there, is in the direction of the tangent at P, and that the forces on any linear element Ss must satisfy the conditions of equilibrium laid down in § 1. It follows that the forces on any finite portion will satisfy the conditions of equilibrium which apply to the case of a rigid body (§ 4).

We will suppose in the first instance that the curve is plane. It is often convenient to resolve the forces on an element PQ

(= 5s) in the directions of the tangent and normal respectively. T +5T If T, T + ST be the tensions at P, Q, and 5\// be the angle between the directions of the curve at these points, the components Q of the tensions along the tangent

at P give (T + 5T) cos iˆ-T, or 5T, ultimately; whilst for the component along the normal at Fig- 54- P we have (T + 5T) sin 5$, or

T&if/, or TSsjp, where p is the radius of curvature.

Suppose, for example, that we have a light string stretched over a smooth curve; and let RSs denote the normal pressure (outwards from the centre of curvature) on 5s. The two resolu- tions give ST = o, 154 = R5s, or*

T=const., R=T/ P . (1)

The tension is constant, and the pressure per unit length varies as the curvature.

Next suppose that the curve is " rough "; and let FSs be the tangential force of friction on 5s. We have 5T = ± = FSs = o, Tty = Rfo, where the upper or lower sign is to be taken

according to the sense in which F acts. We assume that in limiting equilibrium we have F = nR, everywhere, where ju is the coefficient of friction. If the string be on the point of slipping in the direction in which ˆ increases, the lower sign, is to be taken; hence 51 = FSs = mT5ˆ, whence

T=T eˆ, (2)

if To be the tension corresponding to ˆ=0. This illustrates the resistance to dragging of a rope coiled round a post; e.g. if we put M

=- 3, 4″ =2r j we nn d for the change of tension in one turn T/T =6-s. In two turns this ratio is squared, and so on.

Again, take the case of a string under gravity, in contact with a smooth curve in a vertical plane. Let ˆ denote the inclination to the horizontal, and w5s the weight of an element 5s. jThe tangential and normal components of wds are — w5s sin \[/ and — w5s cos \//. Hence

ST =wSs sin , T$f=wSs cos f+RSs. (3)

If we take rectangular axes Ox, Oy, of which Oy is drawn vertically upwards, we have 5y=sin 4 1 Ss, whence 5T=w5y. If the string be uniform, w is constant, and

T =wy + const. = w(y— y a), (4)

say; hence the tension varies as the height above some fixed level (yo). The pressure is then given by the formula

(5)

R=Tx-i» cos ifr.

In the case of a chain hanging freely under gravity it is usually convenient to formulate the conditions of equilibrium of a finite portion PQ. The forces on this reduce to three, viz. the weight of PQ and the tensions at P,Q. Hence these three forces will be concurrent, and their ratios will be given by a triangle of forces. In particular, if we consider a length AP beginning at the lowest point A, then resolving horizontally and vertically we have

T cos ˆ=T , T sin ˆ=W, (6)

where To is the tension at A, and W is the weight of PA. The former equation expresses that the horizontal tension is constant.

If the chain be uniform we have W=ws, where j is the arc AP: hence ws = To tan ˆ. If we write To = wa, so that a is

Fig. 55.

the length of a portion of the chain whose weight would equal the horizontal tension, this becomes

s = a tan f. (7)

This is the " intrinsic " equation of the curve. If the axes of x and y be taken horizontal and vertical (upwards), we derive x =0 log (sec ^+tan ^), y — a sec $. (8)

Eliminating \[/ we obtain the Cartesian equation

y = a cosh –

(9)

of the common catenary, as it is called (fig. 56). The omission of the additive arbitrary constants of integration in (8) is equivalent to a special choice of the origin O of co-ordinates; viz. O is at a distance a vertically below the lowest point (i^ = o) of the curve. The horizontal line through O is called the directrix. The relations

s=asinh%,y":a?+s*, T=T, sec $ = wy, (10)*

STATICS]

MECHANICS

971

which are involved in the preceding formulae are also note- worthy. It is a classical problem in the calculus of variations

to deduce the equation (9) from the condition that the depth of the centre of gravity of a chain of given length hanging between fixed points must be stationary (§ 9). The length a is called the parameter of the catenary; it determines the scale of the curve, all cate- naries being geometrically simi- lar. If weights be suspended from various points of a hang- ing chain, the intervening por- tions will form arcs of equal catenaries, since the horizontal tension (wo) is the same for all. Again, if a chain pass over a perfectly smooth peg, the cate- naries in which it hangs on the two sides, though usually of different parameters, will have the same directrix, since by (10) y is the same for both at the peg.

As an example of the use of the formulae we may determine the maximum span for a wire of given material. The condition is that the tension must not exceed the weight of a certain length X of the wire. At the ends we shall have y = \, or

Differ- ed

X = a cosh -, a

and the problem is to make x a maximum for variations of a. entiating (11) we find that, if dx/da = o,

- tanh – = 1. a a

It is easily seen graphically, or from a table of hyperbolic tangents, that the equation u tanh u = I has only one positive root (u = I -200) ; the span is therefore

2x =2au =2X/ sinh u =1-326 X, and the length of wire is

*2s = 2\ju =1-667 *• The tangents at the ends meet on the directrix, and their inclination to the horizontal is 56 30'.*

The relation between the sag, the tension, and the span of a wire (e.g. a telegraph wire) stretched nearly straight between two points A, B at the same level is determined most simply from first principles. If T be the tension, W the total weight, k the sag in the middle, and

Fig. 57.

$ the inclination to the horizontal at A or B, we have 2T^ = W, AB =2p^, approximately, where p is the radius of curvature. Since 2&p=(JAB) 2 , ultimately, we have

- *= iW.AB/T. (13)*

The same formula applies if A, B be at different levels, provided k be the sag, measured vertically, half way between A and B.

In relation to the theory of suspension bridges the case where the weight of any portion of the chain varies as its horizontal projection is of interest. The vertical through the centre of gravity of the arc AP (see fig. 55) will then bisect its horizontal projection AN; hence if PS be the tangent at P we shall have AS = SN. This property is characteristic of a parabola whose axis is vertical. If we take A as origin and AN as axis of x, the weight of AP may be denoted by wx, where w is the weight per unit length at A. Since PNS is a triangle of forces for the portion AP of the chain, we have w/T = PN/NS, or*

y=w.3?l2Tt, (14)

which is the equation of the parabola in question. The result might of course have been inferred from the theory of the parabolic funicular

in § 2.

Finally, we may refer to the catenary of uniform strength, where the cross-section of the wire (or cable) is supposed to vary as the tension. Hence w, the weight per foot, varies as T, and we may

write T = wX, where X is a constant length. Resolving along the normal the forces on an element 6s, we find TSˆ = wds cos

*ds p= 2ˆ- =Xsec *- (J 5)*

From this we derive

x = \p, y = \ log sec r,

(16)

*where the directions of x and y are horizontal and vertical, and the origin is taken at the lowest point. The curve (fig. 58) has two vertical asymptotes *= =»=5irX; this shows that however the thickness of a cable be adjusted there is a limit irX to the horizontal span, where X depends on the tensile strength of the material. For a uniform catenary the limit was found above to be I-326X.*

For investigations relating to the equilibrium of a string in three dimensions we must refer to the textbooks. In the case of a string stretched over a smooth surface, but in other respects free from extraneous force, the tensions at the ends of a small element 5s must be balanced by the normal reaction of the surface. It follows that the osculating plane of the curve formed by the string must contain the normal to the surface, i. e. the curve must be a " geodesic," and that the normal pressure per unit length must vary as the principal curvature of the curve.

§ 11. Theory of Mass-Systems. — This is a purely geometrical subject. We consider a system of points Pi, P 2 . . . , P,,, with which are associated certain co-efficients mi, m 2 , . . . m n , respectively. In the application to mechanics these coefficients are the masses of particles situate at the respective points, and are therefore all positive. We shall make this supposition in what follows, but it should be remarked that hardly any difference is made in the theory if some of the coefficients have a different sign from the rest, except in the special case where S(w) = o. This has a certain interest in magnetism.

In a given mass-system there exists one and only one point G such

that

'2(m.GP) = o." For, take any point O, and construct the vector

OG – Z(») ■ Then

— > — > -> — > ->

2(m . GP) = 2{m(G0 + OP) 1 = 2(w) . GO + 2(w) . OP = o. (3)

Also there cannot be a distinct point G' such that 2(w. G'P) = 0, for we should have, by subtraction,

2{m(GP + PG')l = o, or2(w).GG' = o; (4)

i.e. G' must coincide with G. The point G determined by (1) is called the mass-centre or centre of inertia of the given system. It is easily seen that, in the process of determining the mass- centre, any group of particles may be replaced by a single particle whose mass is 'equal to that of the group, situate at the mass-centre of the group.

If through Pi, P 2 , . . . P,, we draw any system of parallel planes meeting a straight line OX in the points Mi, M 2 , . . .

M,,, the collinear vectors OMi, OM 2 . . . OM,, may be called ˆ x v

the " projections " of OPi, OP 2 , . . . OP n on OX. Let these

projections be denoted algebraically by x x , z 2 , . . . x,,, the

sign being positive or negative according as the direction is

that of OX or the reverse. Since the projection of a vector-

(1)

(2)

sum is the sum of the projections of the several vectors, the equation (2) gives

(5)

= – S(»»*) 2(«) ‘

if x be the projection of OG. Hence if the Cartesian co-ordinates of Pi, P2, . . . Pn relative to any axes, rectangular or oblique be (x^ yi, 21), (*2, y2, 22), . . . , (x n , y n , u), the mass-centre (x, y, z) is determined by the formulae

- 2(mx) – 2(«y) – 2(mz) ,, x

*=2W”y=2(4 ,3= 2W (6)

Jf we write * = *+£, y=y-H7, z=z+f> so that £, 77, f denote co-ordinates relative to the mass-centre G, we have from (6)

2(m£)=o, 20»i,)=o, 2(wJ)=o. (7)

One or two special cases may be noticed. If three masses a, p, 7 be situate at the vertices of a triangle ABC, the mass-centre of /S and 7 is at a point A’ in BC.such that /3. BA’=7.A’C. The mass- centre (G) of a, ft 7 will then divide AA’ so that o .AG = (p+y) GA’. It is easily proved that

o : : 7= ABGA : AGCA : AGAB; also, by giving suitable values (positive or negative) to the ratios o : : 7 we can make G assume any assigned position in the plane ABC. We have here the origin of the ” barycentric co-ordinates ” of Mobius, now usually known as ” areal ” co-ordinates. If a+/3+7=o, G is at infinity; if a = /3=7, G is at the intersection of the median lines of the triangle; if a : (3 : y—a : b : c, G is at the centre of the inscribed circle. Again, if G be the mass-centre of four particles o, /9, 7, 5 situate at the vertices of a tetrahedron ABCD, we find

o :/3 :y :S = tet*> GBCD : tet-GCDA : tefGDAB :tet»GABC, and by suitable determination of the ratios on the left hand we can make G assume any assigned position in space. If a+/S-|-7-|-8 = 0, G is at infinity ; if a = /S =7 = 8, G bisects the lines joining the middle points of opposite edges of the tetrahedron ABCD ; if a : /3 : 7 : S = ABCD : ACDA : ADAB : AABC, G is at the centre of the inscribed sphere.

If we have a continuous distribution of matter, instead of a system of discrete particles, the summations in (6) are to be replaced by integrations. Examples will be found in textbooks of the calculus and of analytical statics. As particular cases: the mass-centre of a uniform thin triangular plate coincides with that of three equal particles at the corners; and that of a uniform solid tetra- hedron

coincides with that of four equal particles at the vertices. Again, the mass-centre of a uniform solid right circular cone divides the axis in the ratio 3:1; that of a uniform solid hemisphere divides the axial radius in the ratio 3 : 5.

It is easily seen from (6) that if the configuration of a system of particles be altered by " homogeneous strain " (see Elasticity) the new position of the mass-centre will be at that point of the strained figure which corresponds to the original mass-centre.

The formula (2) shows that a system of concurrent forces

represented by Wi . OPj, nh- OP 2 , ... w n .OP B will have a

• — ˆ resultant represented by 2(ra).0G. If we imagine to recede to infinity in any direction we learn that a system of parallel forces proportional to mi, ith, . . . m„, acting at Pi, P 2 . . . . P„ have a resultant proportional to 2(w) which acts always through a point G fixed relatively to the given mass-system. This contains the theory of the " centre of gravity " (§§ 4, 9). We may note also that if Pi, P 2 , . . . P„, and Pi', P 2 ', . . . P„' represent two configurations of the series of particles, then

2(w. PP') = 2(m).GG', (8)

where G,G' are the two positions of the mass-centre. The

-» -> ->

forces TO1.P1P1', W2.P2P2', . . . w„.P„Pn', considered as localized vectors, do not, however, as a rule reduce to a single resultant.

We proceed to the theory of the plane, axial and polar quadratic moments of the system. Thˆ axial moments have alone a dynamical significance, but the others are useful as subsidiary conceptions. If h u hi, . . . h n be the perpendicular distances of the particles from any fixed plane, the sum 2(mA 2) is the quadratic moment with respect to the plane. If pi, pi, ■ ■ ■ pn be the perpendicular distances from any given axis, the sum Z(mp 2) is the quadratic moment with respect to the axis; it is also called the moment of inertia about the axis. If n, n, . . . r» be the distances from a fixed point, the sum 2(w 3) is the quadratic moment with respect to that point (or pole). If we divide any of the above quadratic moments

by the total mass 2(w), the result is called the mean square of the distances of the particles from the respective plane, axis or pole. In

the case of an axial moment, the square root of the resulting mean square is called the radius of gyration of the system about the axis in question. If we take rectangular axes through any point O, the quadratic moments with respect to the co-ordinate planes are

l x = S,{mx i), I v =X(mf), I 2 =2(m 2 2); (9)

those with respect to the co-ordinate axes are

I^=2{w(y 2 +z 2)j, I« = 2(w(2 2 +^)), I Ii , = 2{w(x'-(-y 2)!; (10) whilst the polar quadratic moment with respect to O is

\ =X,[m{x' L +y i +z i). (11)

We note that

lyz=l V -\rh, I«=L + Ix, Im=I + I,„ (12)*

and

h = l x +Iv+L = i(Iv+L*+h»). (13)*

In the case of continuous distributions of matter the summations in (9), (10), (11) are of course to be replaced by integrations. For a uniform thin circular plate, we find, taking the origin at its centre, and the axis of z normal to its plane, I» = §M

If

2{m(x, y, s)[= 2\m(x+£, y+v, z+?))

= S{m(x, y, 2)!+2{w

since the terms which are bilinear in respect to x, y, z, and £, r;, f vanish, in virtue of the relations (7). Thus

L=I£+2(m)rS (15)

I, ! =«+S(«).(j i +5 !), (16)

with similar relations, and

Io = iG+2(m).0G 2 . (17)

The formula (16) expresses that the squared radius of gyration about any axis (Ox) exceeds the squared radius of gyration about a parallel axis through G by the square of the distance between the two

axes. The formula (17) is due to J. L. Lagrange; it may be written

S(m.QP 2) _ 2(OT .GP 2) , OC 2 fl ™

%) 2(m) +u ‘ K ‘

and expresses that the mean square of the distances of the particles from O exceeds the mean square of the distances from G by OG 2 . The mass-centre is accordingly that point the mean square of whose distances from the several particles is least. If in (18) we make O coincide with Pi, P 2 , . . . P„ in succession, we obtain

o +w 2 . P1P2 2 +...+««. PiP„ 2 = S(m . GP 2) +S(m) . GPi 2 , P 2 Pi 2 + o +... +m».P 2 P„ 2 = S(m.GP 2)-|-2(m). GP 2 2 ,

(19)

mi . PbPi 2 + >B2 . P»P 2 2 + . . . + o = 2(m . GP 2) -|-2(m) . GP» 2 . J

If we multiply these equations by mi, m-i, . . . m n , respectively, and add, we find

22 («,.«, . P r P, 2) = S(») . 2(w . GP 2), (20)*

provided the summation 22 on the left hand be understood to include each pair of particles once only. This . theorem, also due to Lagrange, enables us to express the mean square of the distances of the particles from the centre of mass in terms of the masses and mutual distances. For instance, considering four equal particles at the vertices of a regular tetrahedron, we can infer that the radius R of the circumscribing sphere is given by R 2 =| 0?, if a be the length of an edge.

Another type of quadratic moment is supplied by the deviation-moments, or products of inertia of a distribution of matter. Thus the sum ~Z(m.yz) is called the ” product of inertia ” with respect to the planes y = o, z=o. This may be expressed in terms of the product of inertia with respect to parallel planes through G by means of the formula (14); viz.: —

X(m . yz) =2(w.i(f)-(-2(»j) . y~z (21)

STATICS]

MECHANICS

The quadratic moments with respect to different planes through a fixed point O are related to one another as follows. The moment with respect to the plane

)&+iiy+vss = o, (22)

where X, y., v are direction-cosines, is ■Z{m{\x+v.y+vzY\=-Z(mx*) . X 2 +S(wy 2) . n 2 --Z{mz 2) .v 2

+22(myz) . pv+2'E(mzx) . v\+2'Z(mxy) . V. (23) and therefore varies as the square of the perpendicular drawn from O to a tangent plane of a certain quadric surface, the tangent plane in question being parallel to (22). If the co-ordinate axes coincide with the principal axes of this quadric, we shall have

X(myz)=o, 2(mzx)=o, 2(mxy)=o; (24)

and if we write

2(rf) = Mo ! , Z(my 2)=*Mb 2 , 2(mz 2)=Mc 2 , (25)

where M = 2(w), the quadratic moment becomes M(a?\ 2 +b 2 fi 2 + cV), or Mp 2 , where p is the distance of the origin from that tangent plane of the ellipsoid

! _2

(26)

2 + 6 2+ c 2

which is parallel to (22). It appears from (24) that through any assigned point O three rectangular axes can be drawn such that the product of inertia with respect to each pair of co-ordinate planes vanishes; these are called the principal axes of inertia at O. The ellipsoid (26) was first employed by J. Binet (1811), and may be called " Binet's Ellipsoid " for the point O. Evidently the quadratic moment for a variable plane through O will have a " stationary " value when, and only when, the plane coincides with a principal plane of (26). It may further be shown that if Binet's ellipsoid be referred to any system of conjugate diameters as co-ordinate axes, its equation will be

S+F- 2 +S = I ' w

provided

2(mi' !) = Ma", X(my' 2) = Mb' 2 , 2(mz' 2) = Me' 2 ;

also that

2,{my'z') = o, 2(mz'x') = o, 2(mx'y') = o. (28)

Let us now take as co-ordinate axes the principal axes of inertia at the mass-centre G. If a, b, c be the semi-axes of the Binet's ellipsoid of G, the quadratic moment with respect to the plane \x + ny + vz = 0 will be M(a 2 X 2 + b 2 ˆ + cV), and that with respect to a parallel plane

~Kx + ny + vz = p (29)

will be M(a 2 \ 2 + b 2 ix 2 + c 2 v 2 + p 2), by (15). This will have a given value M& 2 , provided

p 2 = (k 2 – o 2)X 2 + {k 2 – &V + (£ 2 – c 2 y. (30)

Hence the planes of constant quadratic moment Mk 2 will en- velop the quadric

5 + 1

S + l

= 1,

k 2 -a 2 ' k 2 -b 2 ' k 2 -c 2 " (3I)

and the quadrics corresponding to different values of k 2 will be confocal. If we write –

k 2 = a 2 + b 2 + c 2 + 0, 6 2 + c 2 = a 2 , c 2 + a 2 = p>, a 2 + b 2 = y 2

the equation (31) becomes

(32)

3 + 1

; + -

i = i;

a 2 +8 ‘ fft + B ‘ y 2 + d ” ^3)

for different values of 6 this represents a system of quadrics confocal with the ellipsoid

-2 -.2 „2

(34)

= 1,

&3 2 + &i 2 , ki 2 + ki 2 ; hence by (32) and (35) they are r 2 — 0i,

which we shall meet with presently as the ” ellipsoid of gyration ” at G. Now consider the tangent plane co at any point P of a confocal, the tangent plane 00′ at an adjacent point N’, and a plane co” through P parallel to co’. The distance between the planes co’ and co” will be of the second order of small quantities, and the quadratic moments with respect to co’ and co” will there- fore be equal, to the first order. Since the quadratic moments with respect to co and co’ are equal, it follows that co is a plane of stationary quadratic moment at P, and therefore a principal plane of inertia at P. In other words, the principal axes of inertia at P are the normals to the three confocals of the system

(33) which pass through P. Moreover if x, y, z be the co-ordinates of P, (33) is an equation to find the corresponding values of 6; and if 9 h 2 , #3 be the roots we find

e l +e 2 +e 3 =r 2 -a 2 -$ i -y 2 , (35)

where r 2 = x 2 --y 2 +z 2 . The squares of the radii of gyration about the principal axes at P may be denoted by fe 2 +£3 2 ,

, 2 + fci 2 , r 2 — 02, r 2 — 03, respectively.

To find the relations between the moments of inertia about different axes through any assigned point O, we take O as origin. Since the square of the distance of a point (x, y, z) from the axis

£=2 = – z (36)

A jU v

is x 2 +y 2 z 2 —(\x ny+vz) 2 , the moment of inertia about

this axis is

I = 2[m((\ 2 +n 2 +v 2) (x 2 +y 2 z 2) – {\x ny +"Z) 2 }]

= AX 2 +B m 2 +Cx 2 -2Fm>'-2G>'X-2HAm, (37)

provided

*A = 2{m(y 2 +z 2)}, B=2(m(z 2 + * 2)!. C=2jm(* 2 +y 2)l,) f , G = 2(max), H = 2(wxy); $ Kd '*

i.e. A, B, C are the moments of inertia about the co-ordinate axes, and F, G, H are the products of inertia with respect to the pairs of co-ordinate planes. If we construct the quadric

Ax 2 +By 2 +C2 2 -2F ; yz-2Gzx-2Hxy = M<: 4 l (39)

where e is an arbitrary linear magnitude, the intercept r which it makes on a radius drawn in the direction X, n, v is found by putting x, y, z=\r, fir, vr. Hence, by comparison with (37),

l = Mt i lr 2 . (40)

The moment of inertia about any radius of the quadric (39) therefore varies inversely as the square of the length of this radius. When referred to its principal axes, the equation of the quadric takes the form

A 2 +B;y 2 +Cz 2 = M<- 4 . (41)*

The directions of these axes are determined by the property (24), and therefore coincide with those of the principal axes of inertia at O, as already defined in connexion with the theory of plane quadratic moments. The new A, B, C are called the principal moments of inertia at O. Since they are essentially positive the quadric is an ellipsoid; it is called the momental ellipsoid at O. Since, by (12), B+C> A, &c, the sum of the two lesser principal moments must exceed the greatest principal moment. A limi- tation is thus imposed on the possible forms of the momental ellipsoid; e.g. in the case of symmetry about an axis it appears that the ratio of the polar to the equatorial diameter of the ellipsoid cannot be less than 1/V2.

If we write A = Ma 2 , B = M/3 2 , C = M7 2 , the formula (37), when referred to the principal axes at 0, becomes

I = M(a 2 A 2 +/3V+7V = Mp 2 , (42)

if p denotes the perpendicular drawn from O in the direction (X, ix, v) to a tangent plane of the ellipsoid

g+|+!= 1 (43)

This is called the ellipsoid of gyration at O ; it was introduced into the theory by J. MacCullagh. The ellipsoids (41) and (43) are reciprocal polars with respect to a sphere having O as centre.

If A = B = C, the momental ellipsoid becomes a sphere; all axes through O are then principal axes, and the moment of inertia is the same for each. The mass-system is then said to possess kinetic symmetry about O.

If all the masses lie in a plane (z = o) we have, in the notation of (25), c 2 = o, and therefore A = Mfe 2 , B=Mo 2 , C=M(a 2 +6 2), so that the equation of the momental ellipsoid takes the form

b 2 × 2 +a 2 y 2 + (a 2 +b 2) z 2 = e 4 . (44)

The section of this by the plane z = o is similar to

g+g = i, (45)

which may be called the momental ellipse at O. It possesses the property that the radius of gyration about any diameter is half the distance between the two tangents which are parallel to that diameter. In the case of a uniform triangular plate it may be shown that the momental ellipse at G is concentric, similar and similarly situated

to the ellipse which touches the sides of the triangle at their middle points.

The graphical methods of determining the moment of inertia of a plane system of particles with respect to any line in its plane may be briefly noticed. It appears from § 5 (fig. 31) that the linear moment of each particle about the line may be found by means of a funicular polygon. If we replace the mass of each particle by its moment, as thus found, we can in like manner obtain the quadratic moment of

the system with respect to the line. For if the line in question be the axis of y, the first process gives us the values of mx, and the second the value of 2(mx.x) or Z(mx 2). The construction of a second funicular may be dispensed with by the employment of a planimeter, as follows. In fig. 59 p is the line with respect to which moments are to be taken, and the masses of the respective

particles are indicated by the corresponding segments of a line in the force-diagram, drawn parallel to p. The funicular ZABCD . . . corresponding to any pole is constructed for a system of forces acting parallel to p through the positions of the particles and proportional to the respective masses ; and its successive sides are produced to meet p in the points H, K, L, M , . . As explained in § 5, the moment of the first par- ticle is represented on a cer- tain scale by HK, that of the second by KL, and so on. The quadratic moment of the first particle will then be represented by twice the area AHK, that of the second by twice the area BKL, and so r – 1—™ — – .."«««..... of the whole system is there- fore represented by twice the area AHEDCBA. Since a quadratic moment is essentially positive, the various areas are to taken positive in all cases. If k be the radius of gyration about p we find

k i =2X area AHEDCBA X ON f a/9, where afi is the line in the force-diagram which represents the sum of the masses, and ON is the distance of the pole from this line. If some of the particles lie on one side of p and some on the other! the quadratic moment of each set may be found, and the results added. This is illustrated in fig. 60, where the total quadratic

on.

Fig. 59.

The quadratic moment

moment is represented by the sum of the shaded areas. It is seen that for a given direction of p this moment is least when p passes through the intersection X of the first and last sides of the funicular; i.e. when p goes through the mass-centre of the given system; cf. equation (15).

*Part II.— Kinetics § 12. Rectilinear Motion.— Let * denote the distance OP of a moving point P at time / from a fixed origin on the line of motion, this distance being reckoned positive or negative accord- ing as it lies to one side or the other of O. At time l+St let*

the point be at Q, and let OQ = x+Sx. The mean velocity of the point in the interval 5/ is 8x/8t. The limiting value of this when it is infinitely small, viz. dxjdt, is adopted as the definition of the velocity at the instant t. Again, let u be the velocity at time I, u+8u that at time t+8t. The mean rate of increase of velocity, or the mean acceleration, in the interval 5/ is then 8u/8t. The limiting value of this when 8t is infinitely small, viz., du/dt, is adopted as the definition of the acceleration at the instant t. Since « = dx\dl, the acceleration is also denoted by (Px/dP. It is often convenient to use the " fluxional " notation for differential

coefficients with respect to the time; thus the velocity may be represented by x and the acceleration by u or x. There is another formula for the acceleration, in which u is regarded as a function

of the position; thus ^ = - = u£. The relation between

x and / in any particular case may be illustrated by means of a curve constructed with t as abscissa and x as ordinate. This is called the curve of positions or space-time curve; its gradient represents the velocity. Such curves are often traced mechani- cally in acoustical and other experiments. A_ curve with t as abscissa and u as ordinate is called the curve of velocities or velocity-time curve. Its gradient represents the acceleration, and the area (judt) included between any two ordinates represents the space described in the interval between the corresponding instants (see fig. 62).

So far nothing has been said about the measurement of time. From the purely kinematic point of view, the / of our formulae may be any continuous independent variable, suggested (it may be) by some physical process. But from the dynamical standpoint it is obvious that equations which represent the facts correctly on one system of time-measurement might become seriously defective on another. It is found that for almost all purposes a system of measurement based ultimately on the earth's rotation is perfectly adequate. It is only when we come to consider such delicate questions as the influence of tidal friction that other standards become necessary.

The most important conception in kinetics is that of " inertia." It is a matter of ordinary observation that different bodies acted on by the same force, or what is judged to be the same force, undergo different changes of velocity in equal times. In our ideal representation of natural phenomena this is allowed for by endowing each material particle with a suitable mass or inertia- coefficient m. The product mu of the mass into the velocity is called the momentum or (in

Newton's phrase) the quantity of motion. On the Newtonian system the motion of a particle entirely uninfluenced by other bodies, when referred to a suitable base, would be rectilinear, with constant velocity. If the velocity changes, this is attributed to the action of force; and if we agree to measure the force (X) by the rate of change of momentum which it produces, we have the equation d

It

(mu) = X.

(1)

From this point of view the equation is a mere truism, its real importance resting on the fact that by attributing suitable values to the masses m, and by making simple assumptions as to the value of X in each case, we are able to frame adequate representations of whole classes of phenomena as they actually occur. The question remains, of course, as to how far the measurement of force here implied is practically consistent with the gravitational method usually adopted in statics; this will be referred to presently.

The practical unit or standard of mass must, from the nature of the case, be the mass of some particular body, e.g. the imperial pound, or the kilogramme. In the " C.G.S." system a sub- division of the latter, viz. the gramme, is adopted, and is associ- ated with the centimetre as the unit of length, and the mean solar second as the unit of time. The unit of force implied in (1) is that which produces unit momentum in unit time. On the C.G.S. system it is that force which acting on one gramme for one second produces a velocity of one centimetre per second; this unit is known as the dyne. Units of this kind are called absolute on account of their fundamental and invariable character as contrasted with gravitational units, which (as we shall see presently) vary somewhat with the locality at which the measure- ments are supposed to be made.

If we integrate the equation (1) with respect to t between the limits t, t' we obtain

mu'—mu— (Xdt. (2)

The time-integral on the right hand is called the impulse of the force on the interval t'-t. The statement that the increase of

momentum is equal to the impulse is (it may be remarked) equivalent to Newton's own formulation of his Second Law. The form (i) is deduced from it by putting t' — t = 8t, and taking St to be infinitely small. In problems of impact we have to deal with cases of practically instantaneous impulse, where a very great and rapidly varying force produces an appreciable change of momentum in an exceedingly minute interval of time.

In the case of a constant force, the acceleration it or x is, according to (i), constant, and we have

*d*x . .*

dfi = a ' (3)

say, the general solution of which is

x = iaC + At + B. (4)

The " arbitrary constants " A, B enable us to represent the circumstances of any particular case; thus if the velocity x and the position x be given for any one value of t, we have two conditions to determine A, B. The curve of positions corresponding to (4) is a parabola, and that of velocities is a straight line. We may take it as an experimental result, although the best evidence is indirect, that a particle falling freely under gravity experiences a constant acceleration which at the same place is the same for all bodies. This acceleration is denoted by g; its value at Greenwich is about 981 centimetre-second units, or 32-2 feet per second. It increases somewhat with the latitude, the extreme variation from the equator to the pole being about i%. We infer that on our reckoning the force of gravity on a mass m is to be measured by mg, the momentum produced per second when this force acts alone. Since this is proportional to the mass, the relative masses to be attributed to various bodies can be deter- mined practically by means of the balance. We learn also that on account of the variation of g with the locality a gravitational system of force-measurement is inapplicable when more than a moderate degree of accuracy is desired.

We take next the case of a particle attracted towards a fixed point O in the line of motion with a force varying as the distance from that point. If fi be the acceleration at unit distance, the equation of

motion becomes

d?x , ,

7? = -“• (5)*

the solution of which may be written in either of the forms x=A cos

where a = Vm> arj d the two constants A, B or a, e are arbitrary. The particle oscillates between the two positions #=±a, and the same point is passed through in the same direction with the same velocity at equal intervals of time 271-/0-. The type of motion represented by (6) is of fundamental importance in the theory of vibrations (§ 23); it is called a simple-harmonic or (shortly) a simple vibration. If we imagine a point Q to describe a circle of radius a with the angular velocity a, its orthogonal projection P on a fixed diameter AA' will execute a vibration of this character. The angle crt +e (or AOQ) is called the phase; the arbitrary elements a, e are called the amplitude and epoch (or initial phase), respec- tively. In the case of very rapid vibrations it is usual to specify, not the period (nr/o), but its reciprocal the frequency, i.e. the number of complete vibrations per unit time. Fig. 62 shows the curves of position and velocity; they both have the form of the " curve of sines." The numbers correspond to an amplitude of 10 centimetres and a period of two seconds.

*The vertical oscillations of a weight which hangs from a fixed point by a spiral spring come under this case. If M be the mass, and * the vertical displacement from the position of equilibrium, the equation of motion is of the form .&x*

becomes identical with (5) if we put ju = K/M; and the period is therefore 2irV(M/K), the same for all amplitudes. The period is increased by an increase of the mass M, and diminished by an increase in the stiffness (K) of the spring. If c be the statical increase of length which is produced by the gravity of the mass M, we have Kc = Mg, and the period is 2 xV(c/g).

The small oscillations of a simple pendulum in a vertical plane also come under equation (5). According to the principles of

Fig. 61.

M

dP

-Kx,

(7)

40

is

s:

/””»*

30

-v

*» $ **

to

«0

10

x, \ s

°0

*a**

**

*f **

*1 * /*

1 /

\ HO

|

5/

*\ *

1 /

‘ / * 1 / *

«9

to

% \

1 / \

\°

«>

to

\

1 / \

- / *

o\

E

*!?

6

%

1\

/ I 2

\ 3

1

to

to

1 1

\ -10 ■■•■•«

I

-5

%

\

1

\ *-20*

to

-10

\

t

t

“3

u

\

>.„”

\

-5o,

to

Fig. 62.

§ 13, the horizontal motion of the bob is affected only by the horizontal component of the force acting upon it. If the inclin- ation of the string to the vertical does not exceed a few degrees, the vertical displacement of the particle is of the second order, so that the vertical acceleration may be neglected, and the tension of the string may be equated to the gravity mg of the particle. Hence if I be the length of the string, and x the horizontal displacement of the bob from the equilibrium position, the horizontal component of gravity is mgx/l, whence

dp I' w

The motion is therefore simple-harmonic, of period r= 2irˆJ(l/g). This indicates an experimental method of determining g with considerable accuracy, using the formula g = 47r 2 //r 2 .

In the case of a repulsive force varying as the distance from the origin, the equation of motion is of the type

d?x . .

ffi =V- X ' (9)

the solution of which is

x = A«"'-|-B«-»', (10)

where n = 4v- Unless the initial conditions be adjusted so as to make A = o exactly, x will ultimately increase indefinitely with /. The position x = o is one of equilibrium, but it is unstable. This applies to the inverted pendulum, with n —g/l, but the equation (9) is then only approximate, and the solution therefore only serves to represent the initial stages of a motion in the neighbourhood of the position of unstable equilibrium.

In acoustics we meet with the case where a body is urged

towards a fixed point by a force varying as the distance, and

is also acted upon by an " extraneous " or " disturbing " force

which is a given function of the time. The most important case

is where this function is simple-harmonic, so that the equation

(5) is replaced by

d 2 x

jˆ-r-M =/ cos (*

where ffi is prescribed. A particular solution is

(12)

This represents a forced oscillation whose period 2ir/o-i, coincides with that of the disturbing force; and the phase agrees with that of*

the force, or is opposed to it, according as cri 2 ˆ; i.e. according as the imposed period is greater or less than the natural period 27t/Vm- The solution fails when the two periods agree exactly; the formula (12) is then replaced by

provided the inertia of the sDrinp, itself be neglected. This

t x=—ˆ—j cos (ffj+a).

*ft *=Jˆsin (*

(13)

which represents a vibration of continually increasing amplitude. Since the equation (12) is in practice generally only an approximation (as in the case of the pendulum), this solution can only

be accepted as a representation of the initial stages of the forced oscillation. To obtain the complete solution of (n) we must of course superpose the free vibration (6) with its arbitrary con- stants in order to obtain a complete representation of the most general motion consequent on arbitrary initial conditions.

A simple mechanical illustration is afforded by the pendulum. If the point of suspension have an imposed simple vibration £ = a cos at in a horizontal line, the equation of small motion of the bob is

x-l mx=—mg—r~,

x+

gx

(14)

.C

This is the same as if the point of suspension were fixed, and a horizontal disturbing force mg£/l were to act on the bob. The

difference of phase of the forced vibration in the two cases is

illustrated and explained in the an- nexed fig. 63, where the pendulum virtually oscil- lates about C as a fixed point of suspension. This illustration was given by T. Young in connexion with the kinetic theory of the tides, where the same point arises.

We may notice also the case of an attractive force varying inversely as the square of the distance from the origin. If n be

Fig. 63.

the acceleration at unit distance, we have

du

(15)

whence u> =— + C. (16)

In the case of a particle falling directly towards the earth from rest at a very great distance we have C=o and, by Newton's Law of Gravitation, nja? = g, where a is the earth's radius. The deviation of the earth's figure from sphericity, and the variation of g with latitude, are here ignored. We find that the velocity with which the particle would arrive at the earth's surface (x=a)is V (2ga). If we take as rough values = 21 Xio 6 feet, g = 32 foot-second units, we get a velocity of 36,500 feet, or about seven miles, per second. If the particles start from rest at a finite distance c, we have in (16), C = — 2m/c, and therefore

(17)

If we put

Tt- U -~V \ ex '

the minus sign indicating motion towards the origin. x = c cos 2 $, we find

' = 7^ (<> + sin<*>), (18)*

no additive constant being necessary if t be reckoned from the instant of starting, when 4> = o. The time / of reaching the origin (=-) is*

This may be compared with the period of revolution in a circular orbit of radius c about the same centre of force, viz. 27rd/Vju(§i4). We learn that if the orbital motion of a planet, or a satellite, were

arrested, the body would fall into the sun, or into its primary, in the fraction 0-1768 of its actual periodic time. Thus the moon would reach the earth in about five days. It may be noticed that if the scales of x and t be properly adjusted, the curve of positions in the present problem is the portion of a cycloid extending from a vertex to a cusp.

In any case of rectilinear motion, if we integrate both sides of the equation

‘ muj£. = X, (20)

*which is equivalent to (1), with respect to * between the limits x , x h we obtain*

5 mui 2 — \mud

J x„

Xdx.

(21)

We recognize the right-hand member as the work done by the force X on the particle as the latter moves from the position x to the position Xi. If we construct a curve with x as abscissa and X as ordinate, this work is represented, as in J. Watt’s

” indicator-diagram,” by the area cut off by the ordinates x = x , x = Xi. The product |»k ! is called the kinetic energy of the particle, and the equation (21) is therefore equivalent to the statement that the increment of the kinetic energy is equal to the work done on the particle. If the force X be always the same in the same position, the particle may be regarded as moving in a certain invariable ” field of force.” The work which would have to be supplied by other forces, extraneous to the field, in order to bring the particle from rest in some standard position P to rest in any assigned position P, will depend only on the position of P; it is called the statical or potential energy of the particle with respect to the field, in the position P. Denoting this by V, we have 5V — X5# = o, whence

—& <->

The equation (21) may now be written

*htnu?Vi = \mu *\ , (23)*

which asserts that when no extraneous forces act the sum of the kinetic and potential energies is constant. Thus in the case of a weight hanging by a spiral spring the work required to increase the length by x is V =JlKxdx = |K 2 , whence jM# 2 + 5K* 2 = const., as is easily verified from preceding results. It is easily seen that the effect of extraneous forces will, be to increase the sum of the kinetic and potential energies by an amount equal to the work done by them. If this amount be negative the sum in question is diminished by a corresponding amount. It appears then that this sum is a measure of the total capacity for doing work against extraneous resistances which the particle possesses in virtue of its motion and its position; this is in fact the origin of the term " energy." The product mv 2 had been called by G. W. Leibnitz the "vis viva"', the name " energy " was substituted by T. Young; finally the name " actual energy " was appropriated to the expression imv 2 by W. J. M. Rankine.*

The laws which regulate the resistance of a medium such as air to the motion of bodies through it are only imperfectly known. We may briefly notice the case of resistance varying as the square of the velocity, which is mathematically simple. If the positiv direction of a: be downwards, the equation of motion of a falling particle will be of the form*

^=g-fc« 2 ; (24)

this shows that the velocity u will send asymptotically to a certain limit V (called the terminal velocity) such that hV = g. The solution is

« = V tanh y , x = — log cosh y ,

(25)

if the particle start from rest in the position x = o at the instant t = o. In the case of a particle projected vertically upwards we have

f t = -g-hu\ (26)

the positive direction being now upwards. This leads to

«. -1 u 4. ,«o et V 2 , V 2 +w 2 , ,

*tan * y = tan-* y – y, * = — log yjtpjr, (27)*

where «o is the velocity of projection. The particle comes to rest when

< = -taniy, x = —\og[i+ v – 2).

(28)

For small velocities the resistance of the air is more nearly proportional to the first power of the velocity. The effect of forces of this type on small vibratory motions may be investigated as follows. The equation (5) when modified by the introduction of a frictional term becomes

x= — fix — hx. (29)

If & 2 <4j« the solution is

x=ae~j!z COS (crt+e), (30)

where

t=2/£,

and the constants o, e are arbitrary. This may be described as a simple harmonic oscillation whose amplitude diminishes asymptotically to zero according to the law e~'l T . The constant t is called the modulus of decay of the oscillations ; if it is large compared with 27r/<7 the effect of friction on the period is of the second order of small quantities and may in general be ignored. We have seen that

KINETICS]

MECHANICS

977

a true simple-harmonic vibration may be regarded as the orthogonal projection of uniform circular motion; it was pointed out by P. G. Tait that a similar representation of the type (30) is obtained if we replace the circle by an equiangular spiral described, with a constant angular velocity about the pole, in the direction of diminishing radius vector. When k 2 > 4m, the solution of (29) is, in real form,

x=a i (T'! Tl +ai(r'iT. i , (32)

where i/ti, i/r 2 = Jfe ± V (j& 2 -m). (33)

The body now passes once (at most) through its equilibrium position, and the vibration is therefore styled aperiodic.

To find the forced oscillation due to a periodic force we have

ii+ki--fiX=f cos(ait--e). (34)

The solution is

provided

f x = rrCOS (

R=|(m-o-i 2) 5 +£WH, tanei =

(35)

(36)

li — ai'

Hence the phase of the vibration lags behind that of the force by the amount «i, which lies between o and Jjt or between J- and it, according as tri 2 $M. If the friction be comparatively slight the amplitude is greatest when the imposed period coincides with the free period, being then equal to f/k*

For purposes of mathematical treatment a force which produces a finite change of velocity in a time too short to be appreciated is regarded as infinitely great, and the time of action as infinitely short. The whole effect is summed up in the value of the instantaneous impulse, which is the time- integral of the force. Thus if an instantaneous impulse £ changes the velocity of a mass m from u to u' we have;

mu'—mu = £. (37)

The effect of ordinary finite forces during the infinitely short duration of this impulse is of course ignored.

We may apply this to the theory of impact. If two masses nti, w 2 moving in the same straight line impinge, with the result that the velocities are changed from u iy « 2 , to «/, w 2 ', then, since the impulses on the two bodies must be equal and opposite, the total momentum is unchanged, i.e.

Witti' + matta' = miWi+m 2 « 2 . (38)

The complete determination of the result of a collision under given circumstances is not a matter of abstract dynamics alone, but

requires some auxiliary assumption. If we assume that there is no loss of apparent kinetic energy we have also

WlMl 2 +jn 2 tt2′ 2 = WiMi 2 +W 2 M2 2 . (39)

Hence, and from (38),

« 2 ‘tti’=(tt2-Jd), (40)

(i.e. the relative velocity of the two bodies is reversed in direction, but unaltered in magnitude. This appears to be the case very approximately with steel or glass balls; generally, however, there is some appreciable loss of apparent energy; this is ac- counted for by vibrations produced in the balls and imperfect elasticity of the materials. The usual empirical assumption is that

« 2 ‘-Mi’=-e(« 2 -Mi), (41)

where e is a proper fraction which is constant for the same two bodies. It follows from the formula § 15 (10) for the internal kinetic energy of a system of particles that as a result of the impact this energy is diminished by the amount

The further theoretical discussion of the subject belongs to Elasticity.

This is perhaps the most suitable place for a few remarks on the theory of ” dimensions.” (See also Units, Dimensions of.) In any absolute system of dynamical measurement the fundamental units are those of mass, length and time; we may denote them by the symbols M, L, T, respectively.

They may be chosen quite arbitrarily, e.g. on the C.G.S. system they are the gramme, centimetre and second. All other units are derived from these. Thus the unit of velocity is that of a point describing the unit of length in the unit of time; it may be denoted by LT _1 , this symbol indicating that the magnitude of the unit in question varies directly as the unit of length and inversely as the unit of time. The unit of acceleration is the acceleration of a point which gains unit velocity in unit time; it is accordingly denoted by LT -2 . The unit of momentum is MLT 1 ; the unit force generates unit momentum in unit time and is there fore denoted by MLT 2 . The unit of work on the same principles is ML 2 T~ 2 , and it is to be noticed that this is identical with the unit of kinetic energy. Some of these derivative units have special names assigned to them; thus on the C.G.S. system the unit of force is called the dyne, and the unit of work or energy the erg. The number which expresses a physical quantity of any

particular kind will of course vary inversely as the magnitude of the corresponding unit. In any general dynami cal equation the dimensions of each term in the fundamental units must be the same, for a change of units would otherwise alter the various terms in different ratios. This principle is often useful as a check on the accuracy of an equation.

The theory of dimensions often enables us to forecast, to some extent, the manner in which the magnitudes involved in any particular problem will enter into the result. Thus, assuming that the period of a small oscillation of a given pendulum at a given place ,is a definite quantity, we see that it must vary as V (l/g). For it can only depend on the mass m of the bob, the length / of the string, and the value of g at the place in question; and the above expression is the only combination of these symbols whose dimensions are those of a time, simply. Again, the time of falling from a distance a into a given centre of force varying inversely as the square of the distance wiil depend only on a and on the constant n of equation (15). The dimensions of fi/x 2 are those of an acceleration ; hence the dimensions of \j. are L'T -2 . Assuming that the time in question varies as a x n v , whose dimensions are L I+3 "T _2! ', we must have x+3y = o, — 2y = l, so that the time of falling will vary as a'/V m, in agreement with (19).

The argument appears in a more demonstrative form in the theory of " similar " systems, or (more precisely) of the similar motion of similar systems. Thus, considering the equations

&x_P L ^V_ £ji ,

dp ~ x 2 ' dt' 2 ~ x' 2 ' ™>

which refer to two particles falling independently into two distinct centres of force, it is obvious that it is possible to have x in a constant ratio to x', and t in a constant ratio to /', provided that

XX fl y. .

p"T 2 ~x?"x li ' ^4)

and that there is a suitable correspondence between the initial conditions. The relation (44) is equivalent to

*x% x'^*

*where *, x' are any two corresponding distances; e.g. they may be the*

initial distances, both particles being supposed to start from rest. The consideration of dimensions was introduced by J. B. Fourier (1822) in connexion with the conduction of heat.

§ 13. General Motion of a Particle. — Let P, Q be the positions of a moving point at times t, t+dt respectively. A vector

OU drawn parallel to PQ, of length proportional to PQ/Si on any convenient scale, will represent the mean velocity in the interval 5t, i.e. a point moving with a constant velocity having the magnitude and direction indicated by this vector would

experience the same resultant displacement PQ in the same

time. As St is indefinitely diminished, the vector OU will tend to a definite limit OV; this is adopted as the definition

of the velocity of the moving point at the instant t. Obviously

OV is parallel to the tangent to the path at P, and its magnitude

— ˆ is dsjdt, where s is the arc. If we project OV on the co-ordinate axes (rectangular or oblique) in the usual manner, the pro- jections «, v, w are called the component velocities parallel to the axes. If x, y, z be the co-ordinates of P it is easily proved that

dx dy dz

u = dt' v= dt' w = df

(I)

The momentum of a particle is the vector obtained by multi- plying the velocity by the mass m. The impulse of a force in any infinitely small interval of time St is the product of the force into St; it is to be regarded as a vector. The total impulse in any finite interval of time is the integral of the impulses corresponding to the infinitesimal elements St into which the interval may be subdivided; the summation of which the integral is the limit is of course to be understood in the vectorial sense.

Newton's Second Law asserts that change of momentum is equal to the impulse; this is a statement as to equality of vectors and so implies identity of direction as well as of magnitude. If X, Y, Z are the components of force, then considering the changes in an infinitely short time St we have, by projection on the co-ordinate axes, S(mu) = 'X.8t, and so on, or

du ., dv .. dw _ , .

m Tt =x ' m ir Y > m u =z – (2)

For example, the path of a particle projected anyhow under gravity will obviously be confined to the vertical plane through the initial direction of motion. Taking this as the plane xy, with the axis of x drawn horizontally, and that of y vertically upwards, we have X = o, Y= — mg; so that

d?x

d¥ =0 <2p = z »>

The solution is

x=At+B, y=-igP+Ct+D. (4)

If the initial values of x, y, x, y are given, we have four conditions to determine the four arbitrary constants A, B, C, D. Thus if the particle start at time t=o from the origin, with the com- ponent velocities u , vo, we have

1. = «< > <, y=vot — \gP. (5)

Eliminating / we have the equation of the path, viz.

(6)

_vo gx

This is a parabola with vertical axis, of latus-rectum 2U 2 /g. The range on a horizontal plane through is got by putting y = o, viz. it is 2UoVo/g- If we denote the resultant velocity at any instant by i we have

p=&+y=s*

Another important example is that of a particle subject to an acceleration which is directed always towards a fixed point O and is

proportional to the distance from O. The motion will evidently be m one plane, which we take as the plane 2 = 0. If n be the acceleration at unit distance, the component accelera- tions parallel to axes of x and y through O as origin will be – ixx, -fiy, whence

TZ? = — UX. 7= — U*

(8)

with the " excentric angle." The motion of the bob of a " spher- ical pendulum," i e. a simple pendulum whose oscillations are not confined to one vertical plane, is of this character, provided the extreme inclination of the string to the vertical be small. The acceleration is towards the vertical through the point of suspension, and is equal to gr/l, approximately, if r denote distance from this vertical. Hence the path is approximately an ellipse, and the period is 2T V('/g).

The above problem is identical with that of the oscillation of a particle in a smooth spherical bowl, in the neighbourhood of the lowest point, If the bowl has any other shape, the axes Ox, Oy may be taken tangential to the lines fof curvature at the lowest point O; the equations of small motion then are

The solution is

x=A cos nt+B sin nt, y = C cos nt+D sin nt, (9)

where «=V>- If P be the initial position of the particle, we may conveniently take OP as axis of x, and draw Oy parallel to the direction of motion at P. If OP=a, and s,, be the velocity at P, we have, initially, x=a, y = o, x=o, y = s a ; whence x=acosnt, y = b sin nt, (10)

if b — soln. The path is therefore an ellipse of which a, b are conjugate semi-diameters, and is described in the period 2x/Vm; moreover, the velocity at any point P is equal to Vm • OD, where OD is the semi-diameter conjugate to OP. ,,This type of motion is called elliptic harmonic. If the co-ordinate axes are the principal axes of the ellipse, the angle nt in (10) is identical

dhe dt 2 =

(11)

v+Sv

x d?y v

- V 3? = -£'*

where pi, p 2 , are the principal radii of curvature at O. The motion is therefore the resultant of two simple vibrations in perpendicular direc- tions, of periods 2irV (pi/g), 2irV (P2/g). The circumstances are realized in " Blackburn's pendulum," which consists of a weight P hanging from a point C of a string ACB whose ends A, B are fixed. If E be the point in which the line of the string meets AB, we have pi = CP, pj = EP. Many contrivances for actually drawing the resulting curves have been devised.

It is sometimes convenient to resolve the accelerations in directions having a more intrinsic relation to the path. Thus, in a plane path, let P,Q be two con- secutive positions, corresponding to the times t, t + St; and let the normals at P, Q meet in C, making an angle 8\f/. Let v (= s) be the velocity at P, v+Sv that at Q. In the time St the velocity parallel to the tangent at P changes from v to v--Sv, ulti- mately, and the tangential accelera- tion at P is therefore dv/dt or s. Again, the velocity parallel to the normal at P changes from o to vS \p, ultimately, so that the normal acceleration is vd\f>/dt. Since

dv_dvds_ dv d

dt'dsdt – ^' p 3i -8 3Jd<~p' U2 '

where p is the radius of curvature of the path at P, the tangential and normal accelerations are also expressed by v dv/ds and zi 2 /p, respectively. Take, for example, the case of a particle moving on a smooth curve in a vertical plane, under the action of gravity and the pressure R of the curve. If the axes of x and y be drawn horizontal and vertical (upwards), and if \f/ be the inclination of the tangent to the horizontal, we have

dv . ,

mv-r- = — mg sin if/ ■■

dy – m ^Ts'

mv , r D

— = — mg cos ^+R.

(13)

The former equation gives

a 2 = C-2g;y, (14)

and the latter then determines R.

In the case of the pendulum the tension of the string takes the place of the pressure of the curve. If / be the length of the string, 4/ its inclination to the downward vertical, we have Ss=liil', so that v—ldtyl&t. The tangential resolution then gives

b« = -gsin.*

If we multiply by 2d\j/jdt and integrate, we obtain

=-f cos iA+const.,

which is seen to be equivalent to (14). between the limits ˆ = == a, we have*

(15)

(16)

If the pendulum oscillate

(I)"

= f (cos

■cos a) =V(sin 2

ˆo-sin 2 iiA);

(17)

and, putting sin 5ˆ = sin \a. sin <£, we find for the period ® of a complete oscillation

" r d4>

i Jo v (i-sin 4 £a.sin 2 <£)

J- • Fi(sin Ja), (18)

-V;

in the notation of elliptic integrals. The function Fi (sin f?) was tabulated by A. M. Legendre for values of /J ranging from 0° to 90 °. The following table gives the period, for various amplitudes a, in terms of that of oscillation in an infinitely small arc [viz. 2xV {ljg\ as unit.

a/x

T

a/x

r

•I

1-0062

■6

1-2817

•2

1-0253

•7

1-4283

■3

1-0585

•8

I-655I

•4

1-1087

•9

2-0724

•5

1-1804

; I-O

00

The value of ,t can also be obtained as an infinite series, by expanding the integrand in (18) by the binomial theorem, and integrating term by term. Thus

-W-i-l

1-hpsin 2

ˆ +

‘ • .V

2’. 4′

i« + .

..(.

(19)

If a be small, an approximation (usually sufficient) is

t=2W (//£).(1 + !>*). In the extreme case of a = x, the equation (17) is immediately integrable ; thus the time from the lowest position is

< = V(//g).logtan(ix + M. (20)

This becomes infinite for ˆ = x, showing that the pendulum only tends asymptotically to the highest position.

1 The variation of period with amplitude was at one time a hindrance to the accurate performance of pendulum clocks, since the errors produced are cumulative. It was therefore sought to replace the circular pendulum by some other contrivance free from this

defect. The equation of motion of a particle in any smooth path is

5-=-gsin, (21)

where \j/ is the inclination of the tangent to the horizontal. If sin 4> were accurately and not merely approximately proportional to the arc s, say

s — k sin ˆ, , (22)

the equation (21) would assume the same form as § 12 (5). The motion along the arc would then be accurately simple-harmonic, and the period 2xV (k/g) would be the same for all amplitudes. Now equation (22) is the intrinsic equation of a cycloid; viz. the

curve is that traced by a point on the circumference of a circle of radius \k which rolls on the under side of a horizontal straight line. Since the evolute of a cycloid is an equal cycloid the object is attained / by means of two metal cheeks, ,' having the form of the evolute near the cusp, on which the string wraps itself alternately as the pen- dulum swings. The device has long been abandoned, the difficulty being met in other ways, but the problem, originally investigated by C. Huygens, is important in the history of mathematics.

The component accelerations of a point describing a tortuous curve, in the directions of the tangent, the principal normal,

-> and the binormal, respectively, are found as follows. If V, — >

OV be vectors representing the velocities at two consecutive points P, P' of the path, the plane VOV' is ultimately parallel to the osculating plane of the path at P; the resultant accelera- tion is therefore in the osculating plane. Also, the projections

of VV on OV and on a perpendicular to OV in the plane VOV' are 8v and vSe, where Se is the angle between the directions of the tangents at P,P'. Since 8e = 8s/p, where 8s =PP' = v8t and p is the radius of principal curvature at P, the component accelerations along the tangent and principal normal are dvjdt and vde/dt, respectively, or vdv/ds and &/p. For example, if a particle moves on a smooth surface, under no forces except the reaction of the surface, v is constant, and the principal normal to the path will coincide with the normal to the surface. Hence the path is a " geodesic " on the surface.

If we resolve along the tangent to the path (whether plane or tortuous), the equation of motion of a particle may be written

dv

(26)

X = -— Y = -— Z = -—

dx ‘ dy ‘ dz’

‘ds

= V,

(23)

where tl is the tangential component of the force. Integrating with respect to s we find

«»! – \ mv, 1 = J% tids ; (24)

i.e. the increase of kinetic energy between any two positions is equal to the work done by the forces. The result follows also from the Cartesian equations (2) ; viz. we have

m(xx + yy + zz) = Xx + Yy + Zz, (25)

whence, on integration with respect to t,

im(x’ + f + z) = f(Xx + Yy + Zz)dt + const. = f(Xdx + Ydy + Zdz) + const. If the axes be rectangular, this has the same interpretation as*

(24)-

Suppose now that we have a constant field of force; i.e. the force acting on the particle is always the same at the same place. The work which must be done by forces extraneous to the field in order to bring the particle from rest in some standard position A to rest in any other position P will not necessarily be the same for all paths between A and P. If it is different for different paths, then by bringing the particle from A to P by one path, and back again from P to A by another, we might secure a gain of work, and the process could be repeated indef- initely. If the work required is the same for all paths between A and P, and therefore zero for a closed circuit, the field is said to be conservative. In this case the work required to

bring the particle from rest at A to rest at P is called the potential energy of the particle in the position P; we denote it by V. If PP' be a linear element 8s drawn in any direction from P, and S be the force due to the field, resolved in the direction PP', we have 8V = – S8s or

In particular, by taking PP' parallel to each of the (rectangular) co-ordinate axes in succession, we find

The equation (24) or (26) now gives

imv 1 2 +V l = %mv 2 +V< t ; (29)

i.e. the sum of the kinetic and potential energies is constant when no work is done by extraneous forces. For example, if the field be that due to gravity we have V=fmgdy=mgy--' const., if the axis of y be drawn vertically upwards; hence imv 2 +mgy = const. (30)

This applies to motion on a smooth curve, as well as to the free motion of a projectile; cf. (7), (14). Again, in the case of a force Kr towards O, where r denotes distance from O we have V=/KrJr=jKr 2 +const., whence

imi/ 2 -r-JKr 2 = const. (31)

It has been seen that the orbit is in this case an ellipse; also that if we put ju=K/w the velocity at any point P is v = Vju. OD, where OD is the semi-diameter conjugate to OP. Hence (31) is consistent with the known property of the ellipse that OP 2 +OD 2 is constant.

The forms assumed by the dynamical equations when the axes of reference are themselves in motion will be considered in § 21. At present we take only the case where the rectangular axes Ox, Oy rotate in their own plane, with angular velocity o> about Oz, which is fixed. In the interval St the projections of the line joining the origin to any point (, y, z) on the directions of the co-ordinate axes at time / are changed from x, y, z to (x--5x) cos udt — (y+Sy) sin oiM, (x +&x) sin o>St+ (y--Sy) cos w&t, 2 respectively. Hence the component velocities parallel to the instantaneous positions of the co-ordinate axes at time / are*

u=x — ay, v=y+oiz, m—i. (32)

In the same way we find that the component accelerations are ii—ov, v-^-uu, ii. (33)

Hence if o> be constant the equations of motion take the forms m(x

— 2oiy— w 2 x) =X, m(y--2ux—w l y) = Y,mz = Z. (34) These become identical with the equations of motion relative to fixed axes provided we introduce a fictitious force m«V acting out- wards from the axis of z, where r = V (x?+y 2), and a second fictitious force 2ot«z> at right angles to the path, where v is the component of the relative velocity parallel to the plane xy. The former force is called by French writers the force centrifuge ordinaire, and the latter the force centrifuge composee, or force de Coriolis. As an appli- cation of (34) we may take the case of a symmetrical Blackburn's pendulum hanging from a horizontal bar which is made to rotate

r«B=0,l

?)B=o.J

(37)

about a vertical axis half-way between the points of attachment of the upper string. The equations of small motion are then of the type

x— 2ay— ui i x= — p*x,y +2wx—w 2 y=—q'*y. (35)

This is satisfied by

x = k cos {vt+e), y = B sin (

provided

(ff 2 +« 2 -^ 2)A+2o-wB = 2 < raA + (

Eliminating the ratio A:B we have

(

It is easily proved that the roots of this quadratic in) of revolution of the arm lies between the two periods (2ir/p, 2ir/q) of oscillation when the arm is fixed.

§ 14. Central Forces. Hodograph. — The motion of a particle subject to a force which passes always through a fixed point O is necessarily in a plane orbit. For its investigation we require two equations; these

may be obtained in a variety of forms.

Since the impulse of the force in any element of time 8t has zero moment about O, the same will be true of the additional momentum generated. Hence the moment of the momentum (considered as a localized vector) about O will be constant. In symbols, if v be the velocity and p the perpendicular from O to the tangent to the path,

pv=h, (1)

where h is a constant. If 8s be an element of the path, pSs is twice the area enclosed by 8s and the radii drawn to its extremi- ties from O. Hence if 5 A be this area, we have 5A = j p8s = § h8t, or

Hence equal areas are swept over by the radius vector in equal times.

If P be the acceleration towards O, we have

*dv _ p ir v ds~~*ds'*

(3)

would be acquired by a particle falling from rest at infinity to the distance r. Hence the character of the orbit depends on whether the velocity at any point is less than, equal to, or greater than the velocity from infinity, as it is called. In an elliptic orbit the area irab is swept over in the time

vab 2vai

2 1

-r^l<

(7)

\h ~ Vm

(10)

since h=nU i =iJ. i ba % by (8).

The converse problem, to determine the law of force under which a given orbit can be described about a given pole, is solved by differ- entiating (5) with respect to r; thus

W-dp

P =

pHr'

(11)

In the case of an ellipse described about the centre as pole we have

**a?+b 2 ~r 2 ;*

(12)

since dr/ds is the cosine of the angle between the directions of r and 8s. We will suppose that P is a function of r only; then integrating (3) we find

1 »» = _ jpdr -fconst. , (4)

which is recognized as the equation of energy. Combining this with (1) we have

!=c- 2 jp<>, (5)*

which completely determines the path except as to its orienta- tion with respect to O.

If the law of attraction be that of the inverse square of the distance, we have P = /i/r 2 , and

Jj-C-^. (6)

Now in a conic whose focus is at O we have

*l_*

P

where / is half the latus-rectum, a is half the major axis, and the upper or lower sign is to be taken according as the conic is an ellipse or hyperbola. In the intermediate case of the parabola we have a = 00 and the last term disappears. The equations (6) and (7) are identified by putting

J=>/m,b-=fm/C. (8)*

Since

it appears that the orbit is an ellipse, parabola or hyperbola, according as ji 2 is less than, equal to, or greater than 2/i/r. Now it appears from (6) that 2/1/r is the square of the velocity which

hence P=/jr, if fi = h?/a?b 2 . This merely shows that a particular ellipse may be described under the law of the direct distance provided the circumstances of projection be suitably adjusted. But since an ellipse can always be constructed with a given centre so as to touch a given line at a given point, and to have a given value of ab{ = h/^ m) we infer that the orbit will be elliptic whatever the initial circumstances. Also the period is 2vabjh = 2ir/ Vju, as previously found.

Again, in the equiangular spiral we have p — r sin a, and therefore P=nfr i , if ju=ft 2 /sin 2 o. But since an equiangular spiral having a given pole is completely determined by a given point and a given tangent, this type of orbit is not a general one for the law of the inverse cube. In order that the spiral may be described it is necessary that the velocity of projection should be adjusted to make li = Vfi- sin o. Similarly, in the case of a circle with the pole on the circumference we have p 2 = r 2 /2a, P=ix/r b , if ju = 8fc 2 a 2 ; but this orbit is not a general one for the law of the inverse fifth power.

In astronomical and other investigations relating to central

forces it is often convenient the centre of force as pole. Let P, Q be the positions of a moving point at times t, t + 8t, and write 0P = /", OQ = r+8r, z.POQ=50, O being any fixed origin. If u, v be the com- ponent velocities at P along and perpendicular to OP (in the direction of 8 increasing),

we have

Sr dr

to use polar co-ordinates with

u-t-Su

u = hm -si=dr v=hm —st =r dt-

(13)

Again, the velocities parallel and perpendicular to OP change in the time 8t from u, v to u — v8d, v--u86, ultimately. The component

accelerations at P in these directions are therefore

du

it

dd &r

dv de_id_(2 de\ dtt +u dt ~r dt V dt) •

(H)

respectively.

In the case of a central force, with O as pole, the transverse acceleration vanishes, so that

r 2 de/dt=h, (15)

where h is constant; this shows (again) that the radius vector sweeps over equal areas in equal times. The radial resolution gives

*d*f {de* „ . ,.*

w- r {dt) = – p < < I6 >

where P, as before, denotes the acceleration towards O. If in this we put r= i/w, and eliminate t by means of (15), we obtain the general differential equation of central orbits, viz.

*If, for example, the law be that of the inverse square, we have P =i*u 2 , and the solution is of the form*

*d*u .*

« = ;3{l+ecos(0-a)),

(18)

where e, a are arbitrary constants. This is recognized as the polar equation of a conic referred to the focus, the half latus-rectum being

The law of the inverse cube P=(iii' is interesting byway of contrast. The orbits may be divided into two classes according as A 2 5ji, i.e. according as the transverse velocity (hu) is greater or less than the velocity V l>—u appropriate to a circular orbit at the same distance. In the former case the equation (17) takes the form

■ˆ+m 2 «=o, (19)

the solution of which is

o« = sin m (8 — a). (20)

The orbit has therefore two asymptotes, inclined at an angle x/tn. In the latter case the differential equation is of the form

w =mu < (2I)*

so that

« = Ae m »+Be- m9 (22)

If A, B have the same sign, this is equivalent to

aw = cosh m9, (23)

if the origin of 6 be suitably adjusted ; hence r has a maximum value «, and the particle ultimately approaches the pole asymptoti- cally by an infinite number of convolutions. If A, B have opposite signs the form is

au = sinh mB, (24)

this has an asymptote parallel to = 0, but the path near the origin has the same general form as in the case of (23). If A or B vanish we have an equiangular spiral, and the velocity at infinity is zero. In the critical case of W=p, we have d 2 u/dff ! =o, and

w = A9+B; (25)

the orbit is therefore a " reciprocal spiral," except in the special case of A = o, when it is a circle. It will be seen that unless the conditions be exactly adjusted for a circular orbit the particle will either recede to infinity or approach the pole asymptotically. This problem was investigated by R. Cotes (1682-1716), and the various curves obtained are known as Cotes's spirals.

A point on a central orbit where the radial velocity (dr[dl) vanishes

is called an apse, and the corresponding radius is called an apse-line. If the force is always the same at the same distance any apse-line will divide the orbit symmetrically, as is seen by imagining the velocity at the apse to be reversed. It follows that the angle between successive apse-lines is constant; it is called the apsidal angle of the orbit.

If in a central orbit the velocity is equal to the velocity from infinity, we have, from (5),

! = 2 jyP

this determines the form of the critical orbit, as it is called. If P=ju/r n , its polar equation is

r m cos mS — a m , (27)

where m = \{i—n), except in the case w = 3, when the orbit is an equiangular spiral. The case n = 2 gives the parabola as before. If we eliminate dS/dt between (15) and (16) we obtain

d'x V I 3\ ,, . ,,, .*

Hence if h and a be connected by the relation h?—a 3 f(a) proper to a circular orbit, we have

|£+j/'(a)+f/(2)}=0. (28)*

If the coefficient of x be positive the variations of x are simple-harmonic, and x can remain permanently small; the circular orbit is then said to be stable. The condition for this may be written

£ a \a»f{a)}>o, (29)

i.e. the intensity of the force in the region for which r = a, nearly, must diminish with increasing distance less rapidly than according to the law of the inverse cube. Again, the half -period of x is ir/ V{/'(a)+30 _1 /(a)(, and since the angular velocity in the orbit is A/ a 2 , approximately, the apsidal angle is, ultimately,

r 3 r

-fir).

r \ I WW+iUfl) J '

(30)

or, in the case of f(a) =/u/r", ir/V (3— re). This is in agreement with the known results for n = 2, re = — I .

We have seen that under the law of the inverse square all finite orbits are elliptical. The question presents itself whether there

then is any other law of force, giving a finite velocity from infinity, under which all finite orbits are necessarily closed curves. If this is the case, the apsidal angle must evidently be commensurable with t, and since it cannot vary discontinuously the apsidal angle in a nearly circular orbit must be constant. Equating the expression (30) to ir/m, we find that /(a) = C/o n , where re = 3— ret 2 . The force must therefore vary as a power of the distance, and re must be less than 3. Moreover, the case re = 2 is the only one in which the critical orbit (27) can be regarded as the limiting form of a closed curve. Hence the only law of force which satisfies the conditions is that of the inverse square.

At the beginning of § 13 the velocity of a moving point P was — > represented by a vector OV drawn from a fixed origin 0. The locus of the point V is called the hodograph (q.v.) ; and it appears that the velocity of the point V along the hodograph represents in magnitude and in direction thw acceleration in the original orbit. Thus in the case of a plane orbit, if v be the velocity of P, ˆ the inclination of the direction of motion to some fixed direction, the polar co-ordinates of V may be taken to be v, ˆ; hence the velocities of V along and perpendicular to OV will be dv/dt and vd\j//dt. These expressions therefore give the tangen- tial and normal accelerations of P; cf. § 13 (12).

In the motion of a projectile under gravity the hodograph is a vertical line described with constant velocity. In elliptic har- monic motion the velocity of P is parallel and proportional to the semi-diameter CD which is conjugate to the radius CP; the hodograph is therefore an ellipse similar to the actual orbit. In the case of a central orbit described under the law of the inverse square we have v = h/SY = h. SZ/& 2 , where S is the centre of force, SY is the per- pendicular to the tangent at P, and Z is the point where YS meets the auxiliary circle again. Hence the hodograph is similar and similarly situated to the locus of Z (the auxiliary circle) turned about S through a

right angle. This applies to an elliptic or hyperbolic orbit ; the case of the parabolic orbit may be examired separately or treated as a limit- ing case. The annexed fig. 70 exhibits the various cases, with the hodograph in its proper orientation. The pole of the hodograph is

inside on or outside the circle, according as the orbit is an ellipse, parabola or hyperbola. In any case of a central orbit the hodograph (when turned through a right angle) is similar and similarly situated to the " reciprocal polar " of the orbit with respect to the centre of force. Thus for a circular orbit with the centre of force at an excentric point, the hodograph is a conic with the pole as focus. In the case of a particle oscillating under gravity on a smooth cycloid from rest at the cusp the hodograph is a circle through the pole, described with constant velocity.

§ 1 5. Kinetics of a System of Discrete Particles. — The momenta of the several particles constitute a system of localized vectors which, for purposes of resolving and taking moments, may be reduced like a system of forces in statics (§ 8). Thus taking any point as base, we have first a linear momentum whose com- ponents referred to rectangular axes through are

X{mx), ~Z{my), S(otz); (i)

its representative vector is the same whatever point be chosen. Secondly, we have an angular momentum whose components are

2{m(yi— zy)}, 2{«(z — xz)\, X\m(xy— yx)}, (2)*

these being the sums of the moments of the momenta of the several particles about the respective axes. This is subject to the same relations as a couple in statics; it may be represented by a vector which will, however, in general vary with the position of 0.

The linear momentum is the same as if the whole mass were concentrated at the centre of mass G, and endowed with the velocity of this point. This follows at once from equation (8) of § 11, if we imagine the two configurations of the system there referred to to be those corresponding to the instants t, t+5t. Thus

2 (f) = S(«)4f'. (3)

Analytically we have

2(wx) = ˆZ(w) = S(m)-gf- (4)*

with two similar formulae.

Q82

MECHANICS

Again, if the instantaneous position of G be taken as base, the angular momentum of the absolute motion is the same as the angular momentum of the motion relative to G. For the velocity of a particle m at P may be replaced by two components one of which (v) is identical in magnitude and direction with the velocity of G, whilst the other (v) is the velocity relative to G.

For let G' be a consecutive position of G. At the instant t--5t the momenta of the system are equivalent to a linear momentum represented by a localized vector ~2(m) .(v+Sv) in a line through G' tangential to the path of G', together with a certain angular momentum. Now the moment of this localized vector with respect to any axis through G is zero, to the first order of St, since the perpendicular distance of G from the tangent line at G' is of the order (St) 2 . Analytically we have from (s),

|2{ W (yi- 2 y)J=S(«).(?g-ˆg)+|s(mW-r«)). (6)

If we put X, y, 2 = o, the theorem is proved as regards axes parallel to Ox.

Next consider the kinetic energy of the system. If from a

-> -> fixed point O we draw vectors OVi> OVj velocities of the several particles mi, W2, . . the vector

Fig. 70.

The aggregate of the components rrOO of momentum is equivalent to a single localized vector 2(w).» in a line through G,and has therefore zero moment about any axis through G; hence in taking moments about such an axis we need only regard the velocities relative to G. In symbols, we have

2{m(yz-zy)\ =2(«) . (sˆ-ˆ) +ZWlf-M)l- (5)

since 2(«£) = o, 2(>»£)=o, and so on, the notation being as in § 1 1. This expresses that the moment of momentum about any fixed axis (e.g. Ox) is equal to the moment of momentum of the motion relative to G about a parallel axis through G, together with the moment of momentum of the whole mass supposed rm{v+Sv) concentrated at G and moving with this point. If in (5) we make O coincide with the instantaneous posi- tion of G, we have x, y, z=o, and the theorem follows.

Finally, the rates of change of the components of the angular momen- tum of the motion relative to G referred to G as a moving base, are equal to the rates of change of the corresponding components of angular momentum relative to a fixed base coincident with the instantaneous position of G.

mV

. to represent the and if we construct

OK=-1$)

(7)

Fig. 71

this will represent the velocity of the mass-centre, by (3). We find,

exactly as in the proof of Lagrange's First Theorem (§ n), that

& (m . OV 2) = is (m) . OK 2 + J2 (m . KV 2) ; (8)

i.e. the total kinetic energy is equal to the kinetic energy of the whole mass supposed concentrated at G and moving with this point, together with the kinetic energy of the motion relative to G. The latter may be called the internal kinetic energy of the system. Analytically we have

*mm(y)ˆ(m)-\©\i$)\® l *

HzMˆ+'r'+i 2)}. (9)

There is also an analogue to Lagrange's Second Theorem, viz.

iZfr.KV)- *ˆ , do)*

which expresses the internal kinetic energy in terms of the rela- tive velocities of the several pairs of particles. This formula is due to Mobius.

The preceding theorems are purely kinematical. We have now to consider the effect of the forces acting on the particles. These may be divided into two categories; we have first, the extraneous forces exerted on the various particles from without, and, secondly, the mutual or internal forces between the various pairs of particles. It is assumed that these latter are subject to the law of equality of action and reaction. If the equations of motion of each particle be formed separately, each such internal force will appear twice over, with opposite signs for its compo- nents, viz. as affecting the motion of each of the two particles between which it acts. The full working out is in general difficult, the comparatively simple problem of " three bodies," for instance, in gravitational astronomy being still' unsolved, but some general theorems can be formulated.

The first of these may be called the Principle of Linear Momen- tum. If there are no extraneous forces, the resultant linear momentum is constant in every respect. For consider any two particles at P and Q, acting on one another with equal and oppo- site forces in the line PQ. In the time St a certain impulse is given to the first particle in the direction (say) from P to Q, whilst an equal and opposite impulse is given to the second in the direction from Q to P. Since these impulses produce equal and opposite momenta in the two particles, the resultant linear momentum of the system is unaltered. If extraneous forces act, it is seen in like manner that the resultant linear

momentum of the system is in any given time modified by the geometric addition of the total impulse of the extraneous forces. It follows, by the preceding kinematic theory, that the mass-centre G of the system will move exactly as if the whole mass were concentrated there and were acted on by the extraneous forces applied parallel to their original directions. For example, the mass-centre of a system free from extraneous force will describe a straight line with constant velocity. Again, the mass-centre gf a chain of

particles connected by strings, projected anyhow under gravity, will describe a parabola.

The second general result is the Principle of Angular Momen- tum. If there are no extraneous forces, the moment of momen- tum about any fixed axis is constant. For in time St the mutual action between two particles at P and Q produces equal and opposite momenta in the line PQ, and these will have equal and opposite moments about the fixed axis. If extraneous forces act, the total angular momentum about any fixed axis is in time St increased by the total extraneous impulse about that axis. The kinematical relations above explained now lead to the con- clusion that in calculating the effect of extraneous forces in an infinitely short time St we may take moments about an axis passing through the instantaneous position of G exactly as if G were fixed; moreover, the result will be the same whether in this process we employ the true velocities of the particles or merely their velocities relative to G. If there are no extraneous forces, or if the extraneous forces have zero moment about any axis through G, the vector which represents the resultant angular momentum relative to G is constant in every respect. A plane through G perpendicular to this vector has a fixed direction in space, and is called the invariable plane; it may sometimes be conveniently used as a plane of reference.

For example, if we have two particles connected by a string, the invariable plane passes through the string, and if u be the angular velocity in this plane, the angular momentum relative to G is

miwin . n --miuri . r 2 = (win 2 +mirˆ)a, where n, r 2 are the distances of mi, m 2 from their mass-centre G. Hence if the

extraneous forces (e.g. gravity) have zero moment about G, to will be constant. Again, the tension R of the string is given by

where a = n + n. Also by (10) the internal kinetic energy is

■'mi + mi The increase of the kinetic energy of the system in any interval of time will of course be equal to the total work done by all the forces acting on the particles. In many questions relating to systems of discrete particles the internal force R P5 (which we will reckon positive when attractive) between any two particles m,, m, is a function only of the distance r P , between them. In this case the work done by the internal forces will be represented by

— 2/ Rpqdr P q,

when the summation includes every pair of particles, and each

integral is to be taken between the proper limits. If we write

V = -zfR PQ dr p(l , (u)

when r vq ranges from its value in some standard configuration A of the system to its value in any other configuration P, it is plain that V represents the work which would have to be done in order to bring the system from rest in the configuration A to rest in the configuration P. Hence V is a definite function of the configuration P; it is called the internal potential energy. If T denote the kinetic energy, we may say then that the sum T + V is in any interval of time increased by an amount equal to the work done by the extraneous forces. In particular, if there are no extraneous forces T + V is constant. Again, if some of the extraneous forces are due to a conservative field of force, the work which they do may be reckoned as a diminution of the potential energy relative to the field as in § 13.

§ 16. Kinetics of a Rigid Body. Fundamental Principles. — When we pass from the consideration of discrete particles to that of continuous distributions of matter, we require some physical postulate over and above what is contained in the Laws of Motion, in their original formulation. This additional postulate may be introduced under various forms. One plan is to assume that any body whatever may be treated as if it were composed of material particles, i.e. mathematical points endowed with inertia coefficients, separated by finite intervals, and acting on one another with forces in the lines joining them subject to the law of equality of action and reaction. In the case of a rigid

body we must suppose that those forces adjust themselves so as to preserve the mutual distances of the various particles unaltered. On this basis we can predicate the principles of linear and angular momentum, as in § 15.

An alternative procedure is to adopt the principle first for- mally enunciated by J. Le R. d'Alembert and since known by his name. If x, y, z be the rectangular co-ordinates of a mass- element m, the expressions mx, my, mi must be equal to the components of the total force on m, these forces being partly extraneous and partly forces exerted on m by other mass elements of the system. Hence (mx, my, mz) is called the actual or effective force on m. According to d'Alembert's formulation, the extraneous forces together with the effective forces reversed fulfil the statical conditions of equilibrium. In other words, the whole assemblage of effective forces is statically equivalent to the extraneous forces. This leads, by the principles of § 8, to the equations

$$X(mx)=X,\ \sim Z(my) = Y,"\ Z(mz) = Z,\ )\ ,\ ,$$

$$2\{m(yz\text{-}zi/)\}=L,\ 2\{m(zx\text{-}xz)\} = M,\ 2\ \backslash m(xy\text{-}y\pounds)\backslash = N,\ )\ K\ '$$

where (X, Y, Z) and (L, M, N) are the force — and couple — con- stituents of the system of extraneous forces, referred to O as base, and the summations extend over all the mass-elements of the system. These equations may be written

$$\hat{}M) = X,^{H)} = Y,\ M = Z,\ )\ '$$

$$jjS,\backslash m\{yi\text{-}zy)\backslash = U\ \pounds x\backslash m(zx\text{-}xz)\} = M,\ \pounds x\{m(xy\text{-}yx)\} = N,\ )$$

and so express that the rate of change of the linear momentum in any fixed direction (e.g. that of Ox) is equal to the total extraneous force in that direction, and that the rate of change of the ungular momentum about any fixed axis is equal to the moment of the extraneous forces about that axis. If we integrate with respect to t between fixed limits, we obtain the principles of linear and angular momentum in the form previously given, Hence, whichever form of postulate we adopt, we are led to the principles of linear and angular momentum, which form in fact the basis of all our subsequent work. It is to be noticed that the preceding statements are not intended to be restricted to rigid bodies; they are assumed to hold for all material systems whatever. The peculiar status of rigid bodies is that the prin- ciples in question are in most cases sufficient for the complete determination of the motion, the dynamical equations (1 or 2) being

equal in number to the degrees of freedom (six) of a rigid solid, whereas in cases where the freedom is greater we have to invoke the aid of other supplementary physical hypotheses (cf. Elasticity; Hydromechanics).

The increase of the kinetic energy of a rigid body in any interval of time is equal to the work done by the extraneous forces acting on the body. This is an immediate consequence of the fundamental postulate, in either of the forms above stated, since the internal forces do on the whole no work. The statement may be extended to a system of rigid bodies, provided the mutual reactions consist of the stresses in in- extensible links, or the pressures between smooth surfaces, or the reactions at rolling contacts (§9).

§ 17. Two-dimensionall Problems. — In the case of rotation about a fixed axis, the principles take a very simple form. The position of the body is specified by a single co-ordinate, viz. the angle d through which some plane passing through the axis and fixed in the body has turned from a standard position in space. Then d6ldt, = ca say, is the angular velocity of the body. The angular momentum of a particle m at a distance r from the axis is mwr. r, and the total angular momentum is S(wr 2) . co, or Ico, if I denote the moment of inertia (§ n) about the axis. Hence if N be the moment of the extraneous forces about the axis, we have

|(M = N. (i)

This may be compared with the equation of rectilinear motion of a particle, viz. djdt.(M.u) = X; it shows that I measures the inertia of the body as regards rotation, just as M measures its inertia as regards translation. If N = o, 00 is constant.

As a first example, suppose we have a flywheel free to rotate about a horizontal axis, and that a weight m hangs by a vertical string

from the circumferences of an axle of radius b (fig. 72). Neglecting frictional resistance we have, if R be the tension of the string,

I

, . mb 2 , N

6a= nnsss8- (2)

This gives the acceleration of m as modified by the inertia of the wheel.

A " compound pendulum " is a body of any form which is free to rotate about a fixed horizontal axis, the only extraneous force (other than the pressures of the axis) being that of gravity. If M be the total mass, k the radius of gyration (§11) about the axis, we have

S(M^)—M«* 8 mfl, (3)*

where 8 is the angle which the plane containing the axis and the centre of gravity G makes with the vertical, and h is the distance of G from the axis. This coincides with the equation of motion of a simple pendulum [§ 13 (15)] of length /, provided l = k 2 /h. The plane of the diagram (fig. 73) is supposed to be a plane through G perpendicular to the axis, which it meets in O. If we produce OG to P, making 0P=/, the point P is called the centre of oscillation; the bob of a simple pendulum of length OP suspended from O will keep step with the motion of P, if properly started. If k be the radius of gyration about a parallel axis through G, we have k 2 = K 2 --h 2 by § II (16), and therefore l = h+K 2 /h, whence

*GO.GP = * 2 . (4)*

This shows that if the body were swung from a parallel axis through P the new centre of oscillation would be at O. For different parallel axes, the period of a small oscillation varies as V^, or V (GO+'OP) ; this is least, subject to the condition (4), when GO = GP = k. The reciprocal relation between the centres of suspension and oscillation is the basis of Kater's method of determining g experimentally. A pendulum is constructed with two parallel knife-edges as nearly as possible in the same plane with G, the position of one of them being adjustable. If it could be arranged that the period of a small oscillation should be exactly the same about either edge, the two knife-edges would in general occupy the positions of conjugate centres of suspension and oscillation ; and the distances between them would be the length / of the equivalent simple pendulum. For if hi +K 2 [hi = Ih+K 2 /kt, then unless hi — hi, we must have K 2 — hihi, l = hi--Ih. Exact equality of the two observed periods (n, n, say) cannot of course be secured in practice, and a modification is necessary. If we write h = hi + K 2 /hi, l 2 = hi f /c 2 /fe, we find, on elimination

of k,

h+l;

h-h

1 “i 1 ‘ 1 1 SI J

- *fci+V 2 hi -hi*

= i,

whence

4ji = I (ri 2 4- t 2 ‘) j (V-t 2 3)

g hi +h 2 h—h

(5)

The distance Ai+ˆ2, which occurs in the first term on the right hand can be measured directly. For the second term we require the values of hi, ht separately, but if n, t 2 are nearly equal whilst hi, ˆare distinctly unequal this term will be relatively small, so that an approximate knowledge of hi, h% is sufficient.

As a final example we may note the arrangement, often employed in physical measurements, where a body performs small oscillations about a vertical axis through its mass-centre G, under the influence of a couple whose moment varies as the angle of rotation from the equilibrium position. The equation of motion is of the type

\$=-K6, (6)

and the period is therefore t = 2t\ (I/K). If by the attachment of another body of known moment of inertia I’, the period is altered from t to t, we have T’=27rV{(I + I’)/K!- We are thus enabled to determine both I and K, viz.

I/I’=tV(t’ 2 -t 2), K = 4x J r ! I/(T’ 2 -T 2).’ (7)

The couple may be due to the earth’s magnetism, or to the torsion

of a suspending wire, or to a ” bifilar ” suspension. In the latter case, the body hangs by two vertical threads of equal length / in a plane through G. The motion being assumed to be small, the tensions of the two strings may be taken to have their statical values Mgb/(a+b),

Mga/(a+b), where a, b are the distances of G from the two threads. When the body is twisted through an angle the threads make angles a8/l, b8/l with the vertical, and the moment of the tensions about the vertical through G is accordingly — K0, where K = M gab/l.

For the determination of the motion it has only been necessary to use one of the dynamical equations. The remaining equations serve to determine the reactions of the rotating body on its bearings. Suppose, for example, that there are no extraneous forces. Take rectangular axes, of which Oz coincides with the axis of rotation. The angular velocity being constant, the effective force on a particle m at a distance r from Oz is moo 2 r towards this axis, and its components are accordingly —uP-mx, —w 2 my, 0. Since the reactions on the bearings must be statically equivalent to the whole system of effective forces, they will reduce to a force (X Y Z) at and a couple (L M N) given by

X= -o> 2 2(mx) = -oi 2 X(m) x, Y = – a 2 Z(my) = -w 2 Z(m) y, Z = o, L = oi 2 ? {myz) , M = – u 2 S (mzx) , N = o, (8)

where x, y refer to the mass-centre G. The reactions do not therefore reduce to a single force at unless S(wyz) = o, ~Z{mzx)—o, i.e. unless the axis of rotation be a principal axis of inertia (§ 11) at 0. In order that the force may vanish we must also have x, y=o, i.e. the mass-centre must lie in the axis of rotation. These considerations are important in the " balancing " [of machinery. We note further that if a body be free to turn about a fixed point 0, there are three mutually perpendicular lines through this point about which it can rotate steadily, without further constraint. The theory of principal or " permanent " axes was first investigated from this point of view by J. A. Segner (1755). The origin of the name "deviation moment " sometimes applied to a product of inertia is also now apparent.

Proceeding to the general motion of a rigid body in two dimensions we may take as the three co-ordinates of the body the rectangular Cartesian co-ordinates x, y of the mass-centre G and the angle through which the body has turned from some standard position. The components of linear momentum are then Mx, My, and the angular momentum relative to G as base is 10, where M is the mass and I the moment of inertia about G. If the extraneous forces be re- duced to a force (X, Y) at G and a couple N, we have

MX = X, My = Y, 10 = N. (9) If the extraneous forces have zero moment about G the angular velocity is constant. Thus a circular disk projected under gravity in a vertical plane spins with constant

angular velocity, a parabola.

*We may apply the equations (o,)~to the case of a solid of revolution rolling with its axis horizontal on a plane of inclination a. If the axis of x be taken parallel to the slope of the plane, with * increasing downwards, we have*

Mi" = Mg sin a-F, o = Mg cos o-R, Mn 2 8 = Fa (10)

where k is the radius of gyration about the axis of symmetry, a is the constant distance of G from the plane, and R, F are the normal and tangential components of the reaction of the plane, as shown in fig. 74. We have also the kinematical relation x = ai. Hence

whilst its

Fig. 74. centre describes

i g sin a, R = Mg cos o, F = -^-5 Mg sin a.

(11)

The acceleration of G is therefore less than in the case of frictionless sliding in the ratio a 2 /{K 2 +a 2). For a homogeneous sphe.e this ratio is f, for a uniform circular cylinder or disk |, for a circular hoop or a thin cylindrical shell if.

The equation of energy for a rigid body has already been stated (in effect) as a corollary from fundamental assumptions.

KINETICS]

MECHANICS

985

Fig. 75.

It may also be deduced from the principles of linear and angular momentum as embodied in the equations (9). We have

M(xx+yy) + leQ+Xx+Yy+N6, (12)

whence, integrating with respect to t,

JM {&+?) + \W = j{Xdx+Ydy+NdO) +const. (13)

The left-hand side is the kinetic energy of the whole mass, supposed concentrated at G and moving with this point, together with the kinetic energy of the motion relative to G (§ 15); and the right-hand member represents the integral work done by the extraneous forces in the successive infinitesimal displacements into which the motion may be resolved.

The formula (13) may be easily verified in the case of the compound pendulum, or of the solid rolling down an incline. As another

example, suppose we have a circular cylinder whose mass- centre is at an excentric point, rolling on a horizontal plane. This includes the case of a com- pound pendulum in which the knife-edge is replaced by a cylin- drical pin. If a be the radius of the cylinder, h the distance of G from its axis (O), k the radius of gyration about a longitudinal axis through G, and 9 the inclin- ation of OG to the vertical, the kinetic energy is JMk 2 | iM . CG 2 . 2 , by § 3, since the body is turning about the line of contact © as instantaneous axis, and the potential energy is — Mgh cos B. The equation of energy is therefore

lM(K 2 +a , +k?-2 ah cos 0) (P-Mgh cos 0-const. (14)

Whenever, as in the preceding examples, a body or a system of bodies, is subject to constraints which leave it virtually only one degree of freedom, the equation of energy is sufficient for the' complete determination of the motion. If q be any variable co-ordinate defining the position or (in the case of a system of bodies) the configuration, the velocity of each particle at any instant will be proportional to 4, and the total kinetic energy may be expressed in the form 5A9 2 , where A is in general a function of q [cf. equation (14)]. This coefficient A is called the coefficient of inertia, or the reduced inertia of the system, referred to the co-ordinate q.

Thus in the case of a railway truck travelling with velocity u the kinetic energy is ˆ(M+mˆja 2)ˆ, where M is the total mass, a the radius and k the radius of gyration of each wheel, and m is the sum of the masses of the wheels ; the reduced inertia is therefore M +»i/c 2 /o 2 . Again, take the system composed of the flywheel, connecting rod, and piston of a steam-engine. We have here a limiting case of three- bar motion (§ 3), and the ".J instantaneous centre J of

the connecting-rod PQ will have the position shown in the figure. The velocities of P and Q will be in the ratio of JP to JQ, or OR to OQ; the velocity .of the piston is therefore yd, where y = OR. Hence if,

for simplicity, we neglect the inertia of the connecting- rod, the kinetic energy will be i(I+My 2)d 2 , where I is the moment of inertia of the flywheel, and M is the mass of the piston. The effect of the mass of the piston is therefore to increase the apparent moment of inertia of the flywheel by the variable amount My 2 . If, on the other hand, we take OP (= x) as our vari- able, the kinetic energy is J(M + I/y 2) 2 . We may also say, there- fore, that the effect of the flywheel is to increase the apparent mass of the piston by the amount I/y 2 ; this becomes infinite at the " dead- points " where the crank is in line with the connecting-rod.*

If the system be " conservative," we have

JAj 2 +V = const., (15)

where V is the potential energy. If we differentiate this with respect to t, and divide out by q, we obtain

(16)

Fig. 76.

... . ,d., . dV

as the equation of motion of the system with the unknown reactions (if any) eliminated. For equilibrium this must be

satisfied by #=0; this requires that dV/dq=o, i.e. the potential energy must be " stationary." To examine the effect of a small disturbance from equilibrium we put V =/(?), and write q=q Q +il, where q is a root of /'(?o) =0 and tj is small. Neglect- ing terms of the second order in 17 we have dVjdq=f(q) = f"(.qo)-y, and the equation (16) reduces to*

Aij+/" (20)17=0, (17)

where A may be supposed to be constant and to have the value corresponding to q = qa. Hence if /"(?o) >o, i.e. if V is a minimum in the configuration of equilibrium, the variation of 17 is simple-harmonic, and the period is 2ir^{Alf"(q). This depends only on the constitution of the system, whereas the amplitude and epoch will vary with the initial circum- stances. If f"(q)

As an example of the method, we may take the problem to which equation (14) relates. If we differentiate, and divide by 6, and retain only the terms of the first order in 0, we obtain

{x 2 +(h-a¥}9+g}id=o, (18)

as the equation of small oscillations about the position 6=0. The length of the equivalent simple pendulum is {n 2 + (h— a) 2]/h.

The equations which express the change of motion (in two dimensions) due to an instantaneous impulse are of the forms M (»' -«)={, M (»' – v) – 7), I(ta' – co) = v. (19)

Here u', v' are the values of the component velocities of G just before, and u, v their values just after, the impulse, whilst co', (o denote the corresponding angular velocities. Further, £, 77 are the time-integrals of the forces parallel to the co-ordinate axes, and v is the time-integral of their moment about G. Suppose, for example, that a rigid lamina at rest, but free to move, is struck by an instantaneous impulse F in a given line. Evidently G will begin to move parallel to the line of F; let its initial velocity be u', and let co' be the initial angular velocity. Then MV = F, Ico' = F.GP, where GP is the perpendicular from G to the line of F. If PG be produced to any point C, the initial velocity of the point C of the lamina will be

«'-«'. GC = (F/M).(i GC.CP/x 2), where k 2 is the radius of gyration about G. The initial centre of rotation will therefore be at C, provided GC . GP=/c 2 . If this condition be satisfied there would be no impulsive reaction at C even if this point were fixed. The point P is therefore called the centre of percussion for the axis at C. It will be noted that the relation between C and P is the same as that which con nects the centres of suspension and oscillation in the compound pendulum.

§ 18. Equations of Motion in Three Dimensions. — It was proved in § 7 that a body moving about a fixed point O can be brought from its position at time / to its position at time t--8t by an infinitesimal rotation e about some axis through O; and the limiting position of this axis, when 8t is infinitely small, was called the " instantaneous axis." The limiting value of the ratio e/dt is called the angular velocity of the body; we denote it by co. If £, t\, f are the components of e about rectangular co-ordinate axes through O, the limiting values of %\U, ti/St, f/5/ are called the component angular velocities; we denote them by p, q, r. If /, m, n be the direction-cosines of the instantaneous axis we have

p = la, q = moi, r = ma, (1)

p+q*+r*=a > . (2)*

If we draw a vector OJ to represent the angular velocity, then J traces out a certain curve in the body, called the polhode, and a certain curve in space, called the herpolhode. The cones generated by the instantaneous axis in the body and in space are called the polhode and herpolhode cones, respectively; in the actual motion the former cone rolls on the latter (§7).

Fig. 77-

The special case where both cones are right circular and « is constant is important in astronomy and also in mechanism (theory of bevel wheels). The ” precession of the equinoxes ” is due to the fact that the earth performs a motion of this kind about its centre, and the whole class of such motions has therefore been termed 4>recessional. In fig. 78, which shows the various cases, OZ is the

axis of the fixed and OC that of the rolling cone, and J is the point of contact of the polhode and herpolhode, which are of course both circles. If a be the semi-angle of the rolling cone, (3 the constant inclination of OC to OZ, and ip the angular velocity with which the plane ZOC revolves about OZ, then, considering the velocity of a point in OC at unit distance from O, we have

w sin a = ±ˆ sin 0, (3)

where the lower sign belongs to the third case. The earth’s processional motion is of this latter type, the angles being a = -0087”, = 23° 28’.

If m be the mass of a particle at P, and PN the perpendicular to the instantaneous axis, the kinetic energy T is given by

2T=2{m(a>. PN) 2 i=co 2 . 2(m.PN 2) = Ico 2 , (4)

where I is the moment of inertia about the instantaneous axis. With the same notation for moments and products of inertia as in § 11 (38), we have

I =A/ 2 +Bf» 2 +C» 2 -2Fmn-2Gn/-2H/m, and therefore by (1),

2T = Ap+Bq+Cr i -2Fqr-2Grp- 2 Hpq. (5)*

Again, if x, y, z be the co-ordinates of P, the component velocities of m art

qz-ry, rx-pz, py-qx, (6)

by § 7 (s) ! hence, if X, n, v be now used to denote the compo- nent angular momenta about the co-ordinate axes, we have \=2\m(py—qx)y—m(rx—pz)z\, with two similar formulae, or

X= Ap-Kq At=-H£+Bg-Fr

~ dT dp,'

dT dq'

Gp-Fq+Cr=§f.

(7)

If the co-ordinate axes be taken to coincide with the principal axes of inertia at O, at the instant under consideration, we have the simpler formulae

2T=A£ 2 +B 2 2 +Cr ! , (8)

\=Ap,n = Bq,p = Cr. (9)

It is to be carefully noticed that the axis of resultant angular momentum about O does not in general coincide with the instantaneous axis of rotation. The relation between these axes may be expressed by means of the momenta! ellipsoid at O. The equation of the latter, referred to its principal axes, being as in § 11 (41), the co-ordinates of the point J where it is met by the instantaneous axis are proportional to p, q, r, and the direction-cosines of the normal at J are therefore propor- tional to Ap, Bq, Cr, or X, n, v. The axis of resultant angular momentum is therefore normal to the tangent plane at J, and does not coincide with OJ unless the latter be a principal axis. Again, if T be the resultant angular momentum, so that

X 2 +M 2 +^ = r 2 , (10)

the length of the perpendicular OH on the tangent plane at J is

oh-M P j_§2 2. j_ Cr r 2T

where p = OJ. This relation will be of (§ 19).

(n) use to us presently

*The motion of a rigid body in the most general case may be specified by means of the component velocities u, v, w of any point O of it which is taken as base, and the component angular velocities p, q, r. The component velocities of any point whose co-ordinates relative to are *, y, 2 are then*

u+qz — ry, v+rx—pz, w+py—qx (12)

by § 7 (6). It is usually convenient to take as our base-point the mass-centre of the body. In this case the kinetic energy is given by

2T = M (it l +vS+w)+Apl l +Bq*+Cr 1 -2Vqr-2Grp-2Hpq, (I3)*
where M is the mass, and A, B, C, F, G, H are the moments and products of inertia with respect to the mass-centre; cf. § iS (9).

The components £, r\, f of linear momentum are

£ = M„«=ˆ,„ = Moˆ, r = M„ W =ˆ, (14)

whilst those of the relative angular momentum are given by (7). The preceding formulae are sufficient for the treatment of instantaneous impulses. Thus if an impulse (£, 77, f, X, /i, v) change the motion from (u, v, w, p, q, r) to («', if, uf , p', q', r') we have

M («' -«)=£, Mo(»'-»)=u, Mo(w'-w) = r,) /..n

A(p'-p)=\, B(2 '-g)= M , C(r'-r)=„„J V&

where, for simplicity, the co-ordinate axes are supposed to coincide with the principal axes at the mass-centre. Hence the change of kinetic energy is

T'-T = £.§(« + «') + ,. Uv +z>')+r • J(w + W),

+ ■«+/>') +M.i(2 + 20 »■(»•■ 1"), (16)*

The factors of £, rj, f , X, fi, v on the right-hand side are proportional to the constituents of a possible infinitesimal displace- ment of the solid, and the whole expression is proportional (on the same scale) to the work done by the given system of impulsive forces in such a displacement. As in § 9 this must be equal to the total work done in such a displacement by the several forces, whatever they are, which make up the impulse. We are thus led to the following

statement: the change of kinetic energy due to any system of impulsive forces is equal to the sum of the products of the several forces into the semi- sum of the initial and final velocities of their respective points of application, resolved in the directions of the forces. Thus in the problem of fig. 77 the kinetic energy generated is jM(/c 2 +Ct2 2)w' 2 , if C be the instantaneous centre; this is seen to be equal to £F. «'. CP, where & > '. CP represents the initial velocity of P.

The equations of continuous motion of a solid are obtained by substituting the values of £, rj, f , X, n, v from (14) and (7) in the general equations

dt

=X,

drj

dt ~~

Y ^ = Z Y ' dt Z "

d\ T dn ,, dv .. di= L >dl= M >di= N –

(17)

.Z+R

where (X, Y, Z. L, M, N) denotes the system of extraneous forces referred (like the momenta) to the mass-centre as base, the co-ordinate axes being of course fixed in direction. The resulting equations are not as a rule easy of application, owing to the fact that the moments and products of inertia A, B, C, F, G, H are not constants but vary in conse- quence of the changing orienta- tion of the body with respect to the co-ordinate axes.

An exception occurs, however, in the case of a solid which is kinetically symmetrical (§ 11) about the mass-centre, e.g. a uniform Fig. 79.

sphere. The equations then take the forms

M « = X, M » = Y, Moi« = Z, . „.

C£ = L, Cq = M, Cr = N, (l8 >

where C is the constant moment of inertia about any axis through

—V

**-F.*

KINETICS1

MECHANICS

987

the mass-centre. Take, for example, the case of a sphere rolling on a plane; and let the axes Ox, Oy be drawn through the centre parallel to the plane, so that the equation of the latter is a=-o. We will suppose that the extraneous forces consist of a known force (X, Y, Z) at the centre, and of the reactions (Fi, F 2 , R) at the point of contact. Hence

M « = X+Fi, Mrf> =Y+F,, o=Z+R,) ,.

Cp = F 2 a, Cg=-Fia, Cr = o. \ ™

The last equation shows that the angular velocity about the normal to the plane is constant. Again, since the point of the sphere which is in contact with the plane is instantaneously at rest, we have the geometrical relations

«+go = o, v+pa = o, w = o, (20)

by (12). Eliminating p, q, we get

(M +Ca- 2)«=X, (M +Co- 2) = Y. (21)*

The acceleration of the centre is therefore the same as if the plane were smooth and the mass of the sphere were increased by C/o 2 . Thus the centre of a sphere rolling under gravity on a plane of inclination a describes a parabola with an acceleration

gsina/(i+C/Ma 2) parallel to the lines of greatest slope.

Take next the case of a sphere rolling on a fixed spherical surface. Let a be the radius of the rolling sphere, c that of the spherical surface which is the locus of its centre, and let x, y, z be the co-ordinates of this centre relative to axes through O, the centre of the fixed sphere. If the only extraneous forces are the reactions (P, Q, R) at the point of contact, we have

Moi; = P, M y = Q, MoS = R,

*Cp=-2(yR- 2 Q), Cg=-2(2 P-*R), o=-f(*Q-yP),*

(22)

the standard case being that where the rolling sphere is outside the fixed surface. The opposite case is obtained by reversing the sign of a. We have also the geometrical relations

x = (ajc)(qz-ry), y = (a/c)(rx-pz), z = (ajc)(py-qx). (23)

If we eliminate P, Q, R from (22), the resulting equations are integrable with respect to /; thus

M a, ... „ 2= — q^{zx-xz)+P,

Mod, ... ,

r = — ^(xy-yx) +y, (24)

where a, j3, y are arbitrary constants. Substituting in (23) we find

M a, . .. ,

: — ^-(y-*y)+«.*

/ ,M a 2 . a,. , / , M a 2 . a,

(

.Moa'.

I+ -cT :

-(ay -fix).

(25)

Hence ax--Py+yz=o, or

ax +Py+yz = const.; (26)

which shows that the centre of the rolling sphere describes a circle. If the axis of z be taken normal to the plane of this circle we have = 0,

/3 = o, and

/ , M a 2 \ . a I . Mod 2 \ . a

The solution of these equations is of the type

x = bcos(at+e), y = bsin(at+t), where b, e are arbitrary, and

_ ya/c ""i+MoaVC

The circle is described with the constant angular velocity tr.

When the gravity of the rolling sphere is to be taken into account the preceding method is not in general convenient, unless the whole motion of G is small. As an example of this latter type, suppose that a sphere is placed on the highest point of a fixed sphere and set spinning about the vertical diameter with the angular velocity »; it will appear that under a certain condition the motion of G consequent on a slight disturbance will be oscillatory. If Oz be drawn vertically upwards, then in the beginning of the disturbed motion the quantities x, y, p, q, P, Q will all be small. Hence- omitting terms of the second order, we find

M» = P, M„y = Q, R = M„g*

(27)

(28)

(29)

C/> =-(M„ga/c)y+aQ, Cg = (M ga/c)-aP, Cr = o.*

(30)

The last equation shows that the component r of the angular velocity retains (to the first order) the constant value n. The geometrical relations reduce to

x-aq — (nalc)y, y= —ap+(na/c)x.

Eliminating p, q, P, Q, we obtain the equations

(C Moa)x (Cna/c)y – (M ga'/c)x = o, (C + Moaˆy- (Cna/c)x – (M ga 2 lc)y =*

which are both contained in

j (C+M') 2 p-« T5 f-\ (x+iy)=o.*

= 0,)

(31)

(32)

(33)

This has two solutions of the type x--iy = ae i (''' +t '>, where o, e are arbitrary, and a is a root of the quadratic

(C+M

If

» 2 >(4 Mg C /C) (l + Moa 2 /C), (35)

both roots are real, and have the same sign as n. The motion of G then consists of two superposed circular vibrations of the type

3C = ocos (

in each of which the direction of revolution is the same as that of the initial spin of the sphere. It follows therefore that the original position is stable provided the spin n exceed the limit defined by (35). The case of a sphere spinning about a vertical axis at the lowest point of a spherical bowl is obtained by reversing the signs of a and c. It appears that this position is always stable.

It is to be remarked, however, that in the first form of the problem the stability above investigated is practically of a limited or temporary kind. The slightest frictional forces — such as the resistance of the air— even if they act in lines through the centre of the rolling sphere, and so do not directly affect its angular momentum, will cause the centre gradually to descend in an ever-widening spiral path.

§ 19. Free Motion of a Solid. — Before proceeding to further problems of motion under extraneous forces it is convenient to investigate the free motion of a solid relative to its mass-centre O, in the most general case. This is the same as the motion about a fixed point under the action of extraneous forces which have zero moment about that point. The question was first discussed by Euler (1750); the geometrical representation to be given is due to Poinsot (1851).

The kinetic energy T of the motion relative to O will be con- stant. Now T = 5lco 2 , where u is the angular velocity and I is the moment of inertia about the instantaneous axis. If p be the radius-vector OJ of the momental ellipsoid

Ax 2 +By 2 -t-Cz 2 = Me 4 (1)

drawn in the direction of the instantaneous axis, we have 1 = Me 4 /p 2 (§ 11) ; hence a> varies as p. The locus of J may there- fore be taken as the " polhode " (§ 18). Again, the vector which represents the angular momentum with respect to O will be constant in every respect. We have seen (§18) that this vector coincides in direction with the perpendicular OH to the tangent plane of the momental ellipsoid at J; also that

2T p

0H = –

(2)

where T is the resultant angular momentum about O. Since ca varies as p, it follows that OH is constant, and the tangent plane at J is therefore fixed in space. The motion of the body relative to O is therefore completely represented if we imagine the mo- mental ellipsoid at O to roll without sliding on a plane fixed in space, with an angular velocity proportional at each instant to the radius-vector of the point of contact. The fixed plane is parallel to the invariable plane at O, and the line OH is called the invariable line. The trace of the point of contact J on the fixed plane is the " herpolhode."

If p, q, r be the component angular velocities about the principal axes at O, we have

(A 2 /> 2 + BV+CV 2)/r 2 = (Aˆ+Bg 2 -|-Cr 2)/2T, (3)

each side being in fact equal to unity. At a point on the polhode cone x:y:z = p:q:r, and the equation of this cone is therefore

A2 (i -5&)ˆ+ B2 (i -2-Bt)ˆ+ C2 (i -2-ct) 2S = °- (4) Since 2AT-P = B (A-B)g 2 +C(A-C)r 2 , it appears that if A>B>C the coefficient of x 2 in (4) is positive, that of z 2 is negative, whilst that of y 2 is positive or negative according as 2BT % P. Hence the polhode cone surrounds the axis of greatest or least moment according as 2BT % T 2 . In the critical case of 2BT=P it breaks up into two planes through the axis of mean moment (Oy). The

herpolhode curve in the fixed plane is obviously confined between two concentric circles which it alternately touches; it is not in general a re-entrant curve. It has been shown by De Sparre that, owing to the limitation imposed on the possible -forms of the momental ellipsoid by the relation B + C > A, the curve has no points of inflexion. The invariable line OH describes another cone in the

body, called the invariable cone. At any point of this we have x : y : z = Ap. Bq : Cr, and the equation is therefore

(I -5?r)ˆ+ (I – 2 -Fr)ˆ+ (I -i&) 22 = – ˆ)

The signs of the coefficients follow the same rule as in the case of (4). The possible forms of the invariable cone are indicated in fig. 80 by means of the intersections with a concentric spherical

surface. In the critical case of 2 BT = P the cone degenerates into two planes. It appears that if the body be sightly dis- turbed from a state of rotation about the principal axis of greatest or least moment, the invariable cone will closely sur- round this axis, which will therefore never deviate far from the invariable line. If, on the other hand, the body be slightly disturbed from a state r-,, „ of rotation about the mean axis

r IG. oO. .... , .

a wide deviation willtake place. Hence a rotation about the axis of greatest or least moment is reckoned as stable, a rotation about the mean axis as unstable. The question is greatly simplified when two of the principal moments are equal, say A = B. The polhode and herpolhode cones are then right circular, and the motion is ” precessional ” according to the definition of § 18. If a be the inclination of the instantaneous axis to the axis of symmetry, (3 the inclination of the latter axis to the invariable line, we have

rcoSj8 = C«cos a, r sin (3 = Aw sin a, (6)

whence

A tan/3 = p tan a. (7)

Hence fl < a, and the circumstances are therefore those of the first or second case in fig. 78, according as A < C If ˆ be the

c

Fig. 81. rate at which the plane HOJ revolves about OH, we have

C cos a

> sin a

- *= iinlS a ‘ = Acˆs T”*

(8)

by § 18 (3). Also if x be the rate at which J describes the

polhode, we have ip sin (j3— a) = x sin |3, whence

. sin (a—)

X— ‘ £ – i ». (a)

A sin a w;

If the instantaneous axis only deviate slightly from the axis of symmetry the angles a, /3 are small, and x = (A — C) A. .«; the instantaneous axis therefore completes its revolution in the body in the period

27T A-C . s

In the case of the earth it is inferred from the independent phenomenon of luni-solar precession that (C-A)/A = -00313. Hence if the earth’s axis of rotation deviates slightly from the axis of figure, it should describe a cone about the latter in 320 sidereal days. This would cause a periodic variation in the latitude of any place on the earth’s surface, as determined by astronomical methods. There appears to be evidence of a slight periodic variation of latitude, but the period would seem to be about fourteen months. The discrepancy is attributed to a defect of rigidity in the earth. The phenomenon is known as the Eulerian nutation, since it is supposed to come under the free rotations first discussed by Euler.

*§ 20. Motion of a Solid of Revolution. — In the case of a solid of revolution, or (more generally) whenever there is kinetic sym- metry about an a*is through the mass-centre, or through a fixed*

Fig. 82.

point O, a number of interesting problems can be treated almost directly from first principles. It frequently happens that the extraneous forces have zero moment about the axis of symmetry, as e.g. in the case of the flywheel of a gyroscope if we neglect the friction at the bearings. The angular velocity ® about this axis is then constant. For we have seen that r is constant when there are no extraneous forces; and r is evidently not affected by an instantaneous impulse which leaves the angular momen- tum Cr, about the axis of symmetry, unaltered. And a con- tinuous force may be regarded as the limit of a succession of infinitesimal instantaneous impulses.

Suppose, for example, that a flywheel is rotating with angular velocity n about its axis, which is (say) horizontal, and that this axis is made to rotate with the angular velocity

— > at time /, the vector which represents it at time t--U will be OK',

equal to OK in magnitude and making with it an angle d

KK' { = Cn&if) will represent the change in this component due to the extraneous forces. Hence, so far as this component is con- cerned, the extraneous forces must supply a couple of moment Cn-ij/ in a vertical plane through the axis of the flywheel. If this couple be absent, the axis will be tilted out of the horizontal plane in such a sense that the direction of the spin n approxi- mates, to that of the azimuthal rota- tion ip- The remaining constituent of the extraneous forces is a couple Aˆ about the vertical; this vanishes if \p is constant. If the axis of the flywheel make an angle 8 with the vertical, it is seen in like manner that the required couple in the vertical plane through the axis is Cm sin 6 tp. This matter can be strikingly illustrated with an ordinary gyroscope, e.g. by making the larger movable ring in fig. 37 rotate about its vertical diameter.

If the direction of the axis of kinetic symmetry be specified by means of the angular co-ordinates 0,iˆ of § 7, then considering the component velocities of the point C in fig. 83, which are and sin dip along and perpendicular to the meridian ZC, we see that the com- ponent angular velocities about the lines OA',OB'are-sin0 \p and 6 respectively. Hence if the principal moments of inertia at O be A, A, C, and if n be the constant angular velocity about the axis OC, the

kinetic energy is given by

2T=A(

i= A sin?*

We can hence deduce the condition of steady precessional motion in a top. A solid of revolution is supposed to be free to turn about a fixed point O on its axis of symmetry, its mass- centre G being in this axis at a distance h from O. In fig. 83 OZ is supposed to be vertical, and OC is the axis of the solid drawn in the direction OG. If 8 is constant the points C, A' will in timeSfcome to positions C", A" such that CC" = sin &/<, A'A" = cos dip, and the angular momentum about OB' will become Cn sin 6 fop- A sin 6 ˆ. cos 6 8\p. Equating this to Mgh sin 6 8t, and dividing out by sin 6, we obtain

A cose fe-Cnj> +Mgh = o, (3)

as the condition in question. For given values of n and 9 we have two possible values of \p provided n exceed a certain limit. With a very rapid spin, or (more precisely) with Cn large in comparison with VUAMgA cos 0), one value of ip is small and the other large, viz. the two values are Mgh/Cn and Cm/A cos approximately. The absence of g from the latter expression indicates that the circumstances of the rapid precession are very

(1)

KINETICS]

MECHANICS

989

Fig. 84.

(c+Ma 2 +Aˆ cos 8\ft = Mgj cot 9,

nearly those of a free Eulerian rotation (§ 19), gravity playing only a subordinate part.

Again, take the case of a circular disk rolling in steady motion on a horizontal plane. The centre O of the disk is supposed to

describe a horizontal circle of radius c wjth the constant angular velocity ˆ, whilst its plane pre- serves a constant inclination 6 to the horizontal. The components of the reaction of the horizontal lane

will be Mcft at right angles to the tangent line at the point of contact and Mg vertically up- wards, and the moment of these about the horizontal diameter of the disk, which corresponds to OB' in fig. 83, is Mcft . a sin 9-Mga cos 9, where a is the radius of the disk. Equating this to the rate of increase of the angular momentum about OB', investigated as above, we find

(4)

where use has been made of the obvious relation wtf = c^. If c and 9 be given this formula determines the value of ^ for which the motion will be steady.

In the case of the top, the equation of energy and the con- dition of constant angular momentum (ji) about the vertical OZ are sufficient to determine the motion of the axis. Thus, we have

AC + sin 2 9 ft + iCn 2 + Ugh cos 6 = const., (5)

A sin 2 9 if + v cos 6 = m, (6)

where v is written for C«. From these \j/ may be eliminated, and

on differentiating the resulting equation with respect to t we

obtain

^_ (M – , cos 9)(m cos »-,) _ Mg> sin & = Q (7)

If we put = o we get the condition of steady precessional motion in a form equivalent to (3). To find the small oscillation about a state of steady precession in which the axis makes a constant angle a with the vertical, we write = a+x, and neglect terms of the second order in x- The result is of the form

X + a* X =0, (8)

where

a 3 = |(m — v cos a) 2 + 2(m — v COS a)(/u COS a — v) COS a +

(n cos a — v) 2)/A 2 sin 4 a. (9)

When v is large we have, for the " slow " precession a = v/A, and for the "rapid" precession cr = A/i> cos a = ^, approximately. Further, on examining the small variation in ip, it appears that in a slightly disturbed slow precession the motion of any point of the axis

consists of a rapid circular vibration superposed on the steady precession, so that the resultant path has a trochoidal character. This is a type of motion commonly observed in a top spun in the ordinary way, although the successive undulations of the trochoid may be too small to be easily observed. In a slightly disturbed rapid precession the superposed vibration is elliptic-harmonic, with a period equal to that of the precession itself. The ratio of the axes of the ellipse is sec a, the longer axis being in the plane of 0. The result is that the axis of the top describes a circular cone about a fixed line making a small angle with the vertical. This is, in fact, the " invariable line " of the free Eulerian rotation with which (as already remarked) we are here virtually concerned. For the more general discussion of the motion of a top see Gyroscope.

§ 21. Moving Axes of Reference. — For the more general treat- ment of the kinetics of a rigid body it is usually convenient to adopt a system of moving axes. In order that the moments and products of inertia with respect to these axes may be constant, it is in general necessary to suppose them fixed in the solid.

We will assume for the present that the origin O is fixed. The moving axes Ox, Oy, Oz form a rigid frame of reference whose motion at time t may be specified by the three component angular velocities p, q, r. The components of angular momentum about Ox, Oy, Oz will be denoted as usual by X, ix, v. Now con- sider a system of fixed axes Ox', Oy', Oz' chosen so as to coincide at the instant t with the moving system O, Oy, Oz. At the instant t+St, Ox, Oy, Oz will no longer coincide with Ox', Oy', Oz';*

in particular they will make with Ox' angles whose cosines are, to the first order, i,-r8t, qSt, respectively. Hence the altered angular momentum about Ox' will be X+5X+ (pi+5/u) (– rSl) + (v +8v)q8t. If L, M,N be the moments of the extraneous forces about Ox, Oy, Oz this must be equal to X-I-L5/. Hence, and b" symmetry, we obtain

Tt -rn+qv djj.

■u

(1)

§-gX+£ M =N.

These equations are applicable to any dynamical system what- ever. If we now apply them to the case of a rigid body moving about a

fixed point O, and make Ox, Oy, Oz coincide with the principal axes of inertia at O, we have X, /x, v = Ap, Bq, O, whence

dt dq dt dr

-(B-C)gr=L,

-{C-A)rp = U,

(2)

-(A-B) = N._

If we multiply these by p, q, r and add, we get

I • KA£ 2 +B 2 2 +0 2) = Lp+Mq+Nr, (3)

which is (virtually) the equation of energy.

As a first application of the equations (2) take the case of a solid constrained to rotate with constant angular velocity 01 about a fixed axis (/, m, n) . Since p, q, r are then constant, the requisite constraining couple is

l = (c-b)ot«o) 2 , m = (a-c)»/o > 2 , n=(b-a);«o > 2 . (4)

If we reverse the signs, we get the " centrifugal couple " exerted by the solid on its bearings. This couple vanishes when the axis of rotation is a principal axis at O, and in no other case

(cf. § 17). If in (2) we put, L, M, N = we get the case of free rotation;

thus

Af=(B-C)

or.

B^2

dt 3j-(C-A)rA

rfr

cf r (A-B) P q.

(5)

These equations are due to Euler, with whom the conception of moving axes, and the application to the problem of free rotation, originated. If we multiply them by p, q, r, respectively, or again by Ap, Bq, O respectively, and add, we verify that the expressions hpi + B3 2 + O 2 and AV 2 + By + CV are both constaxit. The former is, in fact , equal to 2T, and the latter to T 2 , where T is the kinetic energy and T the resultant angular momentum. To complete the solution of (2) a third integral is required; this involves in general the use of elliptic functions. The problem has been the subject of numerous memoirs; we will here notice only the form of solution given by Rueb (1834), and at a later period by G. Kirchhoff (1875). If we write

"=/!♦' ^ = V(l-fc 2 sin 2 0), we have, in the notation of elliptic functions, = am u. If we*

assume

p = po cos am (ot--t) we find

. apo

g = 2osinam (at+e), r = f«Aam(d + «), (7) feVro

qara 1

q = -^rrpt

Hence (5) will be satisfied, provided

apo _ B — C o-qo _ C — A – B !

- Van A – B

(8)

g r A "• r«po B ' poqo C W

These equations, together with the arbitrary initial values of p, q, r, determine the six constants which we have denoted by po, go, U, k 2 , a, t. We will suppose that A>B>C. From the form of the polhode curves referred to in §19 it appears that the angular velocity g about the axis of mean moment must vanish periodically. If we adopt one of these epochs as the origin of t, we have e = o, and po, ro will become identical with the initial values of p, r. TV "" conditions (9) then lead to

The

2«'

, 2 =

A(A-C) B(B-C)

*pa 2 , o**

(A-Q(B-C) ,

*A(A-B) Po 2 * ~C(B-C) ro 2*

(10)

99°

MECHANICS

[KINETICS

For a real solution we must have & < i, which is equivalent to 2BT > r 2 . If the initial conditions are such as to make 2BT < r 2 , we must interchange the forms of p and r in (7). In the present case the instantaneous axis returns to its initial position in the body whenever increases by 2tt, i.e. whenever t increases by 4K/0-, when K is the " complete " elliptic integral of the first kind with respect to the modulus k.

The elliptic functions degenerate into simpler forms when k 2 = o or k 2 = 1. The former case arises when two of the principal moments are equal; this has been sufficiently dealt with in §19. If k 2 = i, we must haye 2BT = r 2 . We have seen that the alternative 2BT § T 2 determines whether the polhode cone surrounds the principal axis of least or greatest moment. The case of 2BT = r 2 , exactly, is therefore a critical case; it may be shown that the instantaneous axis either coincides permanently with the axis of mean moment or approaches it asymptotically.

When the origin of the moving axes is also in motion with a velocity whose components are u, v, w, the dynamical equations are

dt

g-n, + 2 f = X, %-pt+n-Y, §-qS+pr, = Z, Tfi--qv— wi]--vi — L, T7 —pi> +r\ — ut;-w£ = M,

~)

dt '

' dt qX+pH — v£{-ui\ = N.

(II)

(12)

To prove these, we may take fixed axes OV, O'y', O'z' co- incident with the moving axes at time t, and compare the linear and angular momenta £+5£, 17+617, f +5f, X+5X, ix--dfi, v+Sv relative to the new position of the axes, O*, Oy, Oz at time t--bt with the original momenta £, ij, f , X, /i, v relative to OV, O'y', O'z' at time t. As in the case of (2), the equations are applicable to any dynamical system whatever. If the moving origin coin- cide always with the mass-centre, we have £, rj, f = Mo«, M v, Mow, where M is the total mass, and the equations simplify.

When, in any problem, the values of u, v, w, p, q, r have been determined as functions of t, it still remains to connect the moving axes with some fixed frame of reference. It will be sufficient to take the case of motion about a fixed point O; the angular co-ordinates 6, , \j/ of Euler may then be used for the purpose. Referring to fig. 36 we see that the angular velocities p, q, r of the moving lines, OA, OB, OC about their instantaneous positions are

p=8 sin (£— sin 9 cos #i£, q = 6 cos <£+ sin9sin<^,) , .

r = 4> +cos0$, \ U3)

by § 7 (3), (4). If OA, OB, OC be principal axes of inertia of a solid, and if A, B, C denote the corresponding moments of inertia, the kinetic energy is given by

2T = A(0 sin 4>-sin 9 cos <^) 2 +B (4 cos +sin sin ff^) 2) .

+ C (<£+cos 9 t) 2 . \ CHJ

If A = B this reduces to

2T = AC^+sin 2 6 ft) +C(

cf. § 20 (1).

§ 22. Equations of Motion in Generalized Co-ordinates. — Sup- pose

we have a dynamical system composed of a finite number of material particles or rigid bodies, whether free or constrained in any way, which are subject to mutual forces and also to the action of any given extraneous forces. The configuration of such a system can be completely specified by means of a certain number (n) of independent quantities, called the generalized co- ordinates of the system. These co-ordinates may be chosen in an endless variety of ways, 'but their number is determinate, and expresses the number of degrees of freedom of the system. We denote these co-ordinates by qi,qt, . . .qn. It is implied in the above description of the system that the Cartesian co-ordinates x, y, z of any particle of the system are known functions of the q's, varying in form (of course) from particle to particle. Hence the kinet'c energy T is given by

2T = 2{m(2 -f-y 2 +2 2)|*

= a n q l 2 +a n qi i + . . . +2ai 2 jig 2 + . . . , (1)

where

—[•}©■+©■+(©■!]■

• _ (/dx dx ,dydy. bz dz\ ) a " = X l m {dJ r dq-.+dq:, dj+dj, dq-J \ =a –

Thus T is expressed as a homogeneous quadratic function of the quantities ji, 52, . . . q tt , which are called the generalized

(2)

components of velocity. The coefficients a,,, a,, are called the co-efficients of inertia; they are not in general constants, being functions of the q's and so variable with the configuration. Again, if (X, Y, Z) be the force on m, the work done in an infini- tesimal change of configuration is

2(XSx+YSy+ZSz) = Q l Sq 1 +Q^q i + . . . +Q.Sq,, ,, (3)

where

Q r = S (x£+Y^ + Z az

dq r

called

;)■

dq, dq, the generalized

The quantities Q r are force.

The equations of motion of m being

m»=X, my = Y, m2=Z, we have

(4)

components of

(5)

Now

whence

Also

Hence

:| m(x

„dx , ,.dy , „dz

dq, n ‘dq^*dq,

Dl-ft-

dx .

.dx . . +^2 +-‘

. dx .

■ + *Wr? n ‘*

*dx_*

dq,

dx ‘ dq,’

(6)

(7)

(8)

\dqj

d 2 x

dq,/ dqidq, 1 ‘ dqidq,*

.+,*

d 2 x

•<&+... +

dH . dq n dqfi

Bx “dq,”

dZ- (9)

„dx

,3i_ .‘dx

>5r/ X l

(10)

(II)

**dq, dt \ dq,/ x dt \dq,J dt \ x dq,/ ~dq r ‘ By these and the similar transformations relating to y and z the equation (6) takes the form*

d_(dT_dT„

dt\dq,j dq, U’-

If we put r= 1, 2, ...» in succession, we get the n independent equations of motion of the system. These equations are due to Lagrange, with whom indeed the first conception, as well as the establishment, of a general dynamical method applicable to .all systems whatever appears to have originated. The above proof was given by Sir W. R. Hamilton (1835). Lagrange’s own proof will be found under Dynamics, § Analytical. In a conservative system free from extraneous force we have

2(XSx+YSy+ZSz) = -SV, (12)

where V is the potential energy. Hence

av

Qr=-

and

dq,'

dt \dq,} dq, ~ dq,'

(13)

(14)

If we imagine any given state of motion (q u

AT '

where Q/ is the time integral of Q, and so represents a general- ized component of impulse. By an obvious analogy, the ex- pressions dT/ dq, may be called the generalized components of momentum; they are usually denoted by p r , thus

p r = dT/dq, = a l ,q 1 +a 2 ,q 2 + . . . --On4n. (16)

Since T is a homogeneous quadratic function of the velocities qi, q\ . . . q n , we have

dT. , 3T. , , aT,

Hence

2T= a^+6i 2

■+Q0n=Piq2+M2+-

. +Pnq. (17)

2-3J =p

+ P1Q1 +M2 + • • • +P»Hn

*/strong>.. + (g+Q.)**

, ST.. , aT.. ,

+dq-p+dJP+-

J- aT «

= "j7 +CMi + Q 2 &+ • • • +Q»?».

dt

or

3P-Qiii+Qi+. ■•+&*•*

(18)

(19)

KINETICS]

MECHANICS

991

This equation expresses that the kinetic energy is increasing at a rate equal to that at which work is being done by the forces. In the case of a conservative system free from extraneous force it becomes the equation of energy

j t (T+V) =0, or T+V=const., (20)

in virtue of (13).

As a first application of Lagrange's formula (11) we may form the equations of motion of a particle in spherical polar co-ordinates. Let r be the distance of a point P from a fixed origin O, 9 the angle which OP makes with a fixed direction OZ, ˆ the azimuth of the plane ZOP relative to some fixed plane through OZ. The dis- placements of P due to small variations of these co-ordinates are Sr along OP, rdO perpendicular to OP in the plane ZOP, and r sin0 hty perpendicular to this plane. The component velocities in these directions are therefore f, r6, r sin 6

2T = m(r 2 + r 2 © 2 + r 2 sin 2 ft). (21)

Hence the formula (11) gives

mix – ri.- r sin 2 6 ft) = R,*

57 (mr'd) — mr* sin cos ft = e.

| t (mr» sin 2 9 f)

*.

(22)

The quantities R, e, * are the coefficients in the expression R5r +e59+ *S^' for the work done in an infinitely small dis- placement ; viz. R is the radial component of force, e is the moment about a line through O perpendicular to the plane ZOP, and * is the moment about OZ. In the case of the spherical pendulum we have r = l, e=— mgl sin 9, * = o, if OZ be drawn vertically downwards, and therefore

sin 9 cos 6ft = — f sin 0,

(23)

the angular momentum about the axis of symmetry. • If M be the total mass, the potential energy is V = Mg/j cos 9, if OZ be drawn vertically upwards. Hence the equations (11) become

AS— A sin 9 cos9i^ 2 +C(0+cos9^)^ sin0 = Mgh sin 9,]

d/dt.{Asm 2 0t+C(4+cos0

d/dt.{C(

of which the last two express the constancy of the momenta n, v. Hence

A0" — Asin0cos0^ 2 +vsin0^ = Mgftsin0, 1 A sin 2 9^-)-y cos 0=/i.)

If we eliminate

= C (<£+cos0$.

(29)

sin 2 e^ = fc

where h is a constant. The latter equation expresses that the angular momentum mP sin 2 9^ about the vertical OZ is constant. By

elimination of ˆ we obtain

B – W cos 2 9/sin 3 = — |sin 0. (24)

If the particle describes a horizontal circle of angular radius a with constant angular velocity fi, we have = 0, h = Q 2 sin a, and therefore

fi 2 =|-cosa, (25)

as is otherwise evident from the elementary theory of uniform circular motion. To investigate the small oscillations about this state of steady motion we write — a+x in (24) and neglect terms of the second order in x- We find, after some reductions,

X + (i+3cos 2 a)n 2 x = o; (26)

this shows that the variation of x is simple-harmonic, with the period

2jr/V(l+3 cos 2 a). a

As regards the most general motion of a spherical pendulum, it is obvious that a particle moving under gravity on a smooth sphere cannot pass through the highest or lowest point unless it describes a vertical circle. In all other cases there must be an upper and a lower limit to the altitude. Again, a vertical plane passing through O and a point where the motion is horizontal is evidently a plane of symmetry as regards the path. Hence the path will be confined between two horizontal circles which it touches alternately, and the direction of motion is never horizontal except at these circles. In the case of disturbed steady motion, just considered, these circles are nearly coincident. When both are near the lowest point the horizontal projection of the path is approximately an ellipse, as shown in § 13; a closer investigation shows that the ellipse is to be regarded as revolving about its centre with the angular velocity |aj>n// 2 , where a, b are the semi-axes.

To apply the equations (11) to the case of the top we start with the expression (15) of § 21 for the kinetic energy, the simplified form (1) of § 20 being for the present purpose inadmissible, since it is essential that the generalized co-ordinates employed should be competent to specify the position of every particle. If X, m, v be the components of momentum, we have

\ 9T .,, X = w = A0

*a'T**

M = §4 =A sinW+C (<£+cos eft cos 0, \ (27)

*= 3T * d*

The meaning of these quantities is easily recognized; thus X is the angular momentum about a horizontal axis normal to the plane of 0, n is the angular momentum about the vertical OZ, and v is

if_0i2=_

p 2 -4AMgft

2 « = const.,

4A 2

'9,

where

ia = \li-

•2A

(30)

(31)

Since 0, a> are the polar co-ordinates (in a horizontal plane) of a point on the axis of symmetry, relative to an initial line which revolves with constant angular velocity W2A, we see by comparison with § 14 (15) (16) that the motion of such a point will be elliptic-har- monic superposed on a uniform rotation c/2A, provided j/ 2 >4AMgft. This gives (in essentials) the theory of the " gyroscopic pendulum."

§ 23. Stability of Equilibrium. Theory of Vibrations. — If, in a conservative system, the configuration (qi, q 2 , . . . q n) be one of equilibrium, the equations (14) of § 22 must be satisfied by jii ?2, . • • ?b = o, whence

dVJdq r =o. (1)

A necessary and sufficient condition of equilibrium is therefore that the value of the potential energy should be stationary for

infinitesimal variations of the co-ordinates. If, further, V be a minimum, the equilibrium is necessarily stable, as was shown by P. G. L. Dirichlet (1846). In the motion consequent on any slight disturbance the total energy T+V is constant, and since T is essentially positive it follows that V can never exceed its equilibrium value by more than a slight amount, depending on the energy of the disturbance. This implies, on the present hypothesis, that there is an upper limit to the deviation of each co-ordinate from its equilibrium value; moreover, this limit diminishes indefinitely with the energy of the original disturb- ance. No such simple proof is available to show without quali- fication that the above condition is necessary. If, however, we recognize the existence of dissipative forces called into play by any motion whatever of the system, the conclusion can be drawn as follows. However slight these forces may be, the total energy T+V must continually diminish so long as the velocities

In discussing the small oscillations of a system about a con- figuration of stable equilibrium it is convenient so to choose the generalized co-ordinates q u q 2 , . . .q n that they shall vanish in the configuration in question. The potential energy is then given with sufficient approximation by an expression of the form

2V = Cu2i 2 +C5 2 g 2 2 + . . . 2c 12 g 1 j2 .... (2)

a constant term being irrelevant, and the terms of the first order being absent since the equilibrium value of V is stationary. The coefficients c„, c r , are called coefficients of stability. We may further treat the coefficients of inertia a„, a rs of § 22 ® as constants. The Lagrangian equations of motion are then of the type

ai r #i+02'ft+ . . . +a m q n +cirq i +c 2r q i + . . . +c»,g„ = Q r , (3) where Q> now stands for a component of extraneous force. In a free oscillation we have Qi, Q2, . . . Qn = o, and if we assume

q r =A T e i , (4)

we obtain n equations of the type

(Ci,-cr 2 ai r) Ai + idr-a-'"^) A 2 + : . . +(c„ r -a 2 a m .) A„=0. (5)

992

Eliminating ' the «— i ratios Ai:A 2 : determinantal equation

A(

where

MECHANICS

[KINETICS

:A„ we obtain the

(6)

A(a) =*

*en —o'avz, Cm — 0*032, . ■ , c n i —*

Cm — ram, c% n — a aw,

i C n n 0" O n

(7)

The quadratic expression for T is essentially positive, and the same holds with regard to V in virtue of the assumed stability. It may be shown algebraically that under these conditions the n roots of the above equation in

q r = Cor cos (ff/+e), (8)

where 01, a 2 . . . a r are a determinate series of quantites having to one another the above-mentioned ratios, whilst the constants C, t are arbitrary. This solution, taken by itself, represents a motion in which each particle of the system (since its displacements parallel to Cartesian co-ordinate axes are linear functions of the q's) executes a simple vibration of period 2t/

As an example of the method of determination of the normal modes we may take the " double pendulum." A mass M hangs from a fixed point by a string of length a, and a second mass m hangs from M by a string of length b. For simplicity we will suppose that the motion is confined to one vertical plane. If 0, be the inclinations of the two strings to the vertical, we have, approximately,

2T = Ma 2 9 2 +»»(a9+fc<£) i! , > , v

2V = Mga« 2 +mg(a0 2 + 64> 2).S w

The equations (3) take the forms

Fig. 85.

o6+ju&<£+g8=o, 1 aB+bii>+g(j>=oA where ji=«/(M+»). Hence

(o—g/a)a6+iMT 2 b=o, } =0.) The frequency equation is therefore*

*{? t -g/a)(L a I -g/b)~^r * = o.*

(10)

(11)

(12)

The roots of this quadratic in ct 2 are easily seen to be' real and positive. If M be large compared with m, n is small, and the roots are g/a and g/b, approximately. In the normal mode corresponding to the former root, M swings almost like the bob of a simple pendulum of length a, being comparatively uninfluenced by the presence of m, whilst m executes a " forced " vibration (§12) of the corresponding period. In the second mode, M is nearly at rest [as appears from the second of equations (11)], whilst m swings almost like the bob of a simple pendulum of length b. Whatever the ratio M/m, the two values of a 1 can never be exactly equal, but they are approximately equal if a, b are nearly equal and p is very small. A curious pheno- menon is then to be observed; the motion of each particle, being made up (in general) of two superposed simple vibrations of nearly equal period, is seen to fluctuate greatly in extent, and if the ampli- tudes be equal we have periods of approximate rest, as in the case of " beats " in acoustics. The vibration then appears to be transferred alternately from m to M at regular intervals. If, on the other hand, M is small compared with m, n is nearly equal to unity, and the roots of (12) are o i= gl(a+b) and

The former root makes 6 = , nearly; in the corresponding normal mode m oscillates like the bob of a simple pendulum of length o+b. In the second mode ad--b=0, nearly, so that m is approximately at rest. The oscillation of M then resembles that of a particle at a distance a from one end of a string of length a +6 fixed at the ends and subject to a tension mg.

The motion of the system consequent on arbitrary initial conditions may be obtained by superposition of the n normal modes with suitable amplitudes and phases. We have then

e r = o r 0+a/0′ + o/0″ + . . ., (13)

where

«=Ccos(«/+ e), e’=C’cos(

flnaioi’ 02202112’ . . . +Oi2(aia 2 ‘a2ai’) . ■ . =0, (15)

CnOia/ + £220202’+ . . . +Ci2(aia2’020i’) . . . =0, (16)

provided the symbols a r , a/ correspond to two distinct roots a 2 , er’ 2 of (6). To prove these relations, we replace the symbols Ai, A 2 , ...A„ in (5) by 01, a 2 , . . . ctn respectively, multiply the resulting equations by a/, a’ 2 , . . . a’ n , in order, and add. The result, owing to its symmetry, must still hold if we interchange accented and unaccented Greek letters, and by comparison we deduce (15) and (16), provided

C cos e = H, — C sin e = K, (17)

we must have

o r H+o r ‘H’o/H” ... =[q r]o,\ fTR ˆ

ff a r H+TVH’(rV”H” . . . =[&]<,,$ W

where the zero suffix indicates initial values. These equations can be at once solved for H,H’,H”, . . . and K, K’, K”, . . . by means of the orthogonal relations (15).

By a suitable choice of the generalized co-ordinates it is possible to reduce T and V simultaneously to sums of squares. The transformation is in fact effected by the assumption (1 3) , in virtue of the relations (15) (16), and we may write

2T = oe 2 +a’

2V = c0 2 +c‘0′ 2 +c”0″ 2 + . . . A (19 >

The new co-ordinates 0,6’, 9″ . . . are called the normal co-ordinates of the system; in a normal mode of vibration one of these varies alone. The physical characteristics of a normal mode are that an impulse of a particular normal type generates an initial velocity of that type only, and that a constant extraneous force of a particular normal type maintains a displacement of that type only. The normal modes are further distinguished by an impor- tant ” stationary ” property, as regards the frequency. If we imagine the

system reduced by frictionless constraints to one degree of freedom, so that the co-ordinates 9, 6′ , 6”, ... have prescribed ratios to one another, we have, from (19),

, _ cir+c’e’^c”e”+ . . . , .*

*‘ ~ a0 2 +a‘0′ 2 +a”0″ 2 + . . .’ *• ;*

This shows that the value of a 2 for the constrained mode is intermediate to the greatest and least of the values c/a,c’/a’, c”/a”, . . . proper to the several normal modes. Also that if the constrained mode differs little from a normal mode of free vibration (e.g. if 6’, 6”, . . . are small compared with 0),the change in the frequency is of the second order. This property can often be utilized to estimate the frequency of the gravest normal mode of a system, by means of an assumed approximate type, when the exact deter- mination would be difficult. It also appears that an estimate thus obtained is necessarily too high.

From another point of view it is easily recognized that the equations (5) are exactly those to which we are led in the ordinary process of finding the stationary values of the function

V (ffl, g2, ■ ■ ■ On)*

T (21, .32, • . • S”)’ where the denominator stands for the same homogeneous quadratic function of the q’s that T is for the q’s. It is easy to construct in this connexion a proof that the n values of 0 are all real and positive.*

KINETICS]

MECHANICS

993

(21)

(22)

The case of three degrees of freedom is instructive on account of the geometrical analogies. With a view to these we may write 2T = ax —-by’ 1 --ci 2 --2fyi+2gzx-{-2hx

It is obvious that the ratio

V (x,y,z) T (x,y,z)

must have a least value, which is moreover positive, since the

numerator and denominator are both essentially positive. Denoting

this value by cti 2 , we have

Axi + Hyi+Gzi=

VLX l +By l +Vz l = ai \hx l +by 1 + /2i), \ (23)

*G*i +Fyi +C21 = ffi s (gXi. +fyi + czi) , J*

provided xi: yi:zi be the corresponding values of the ratios x:y:z.

Again, the expression (22) will also have a least value when the ratios

x: y: z are subject to the condition

av , av , av

x >7^+y^+ z >

'dx

dy

"dz

=0;

(24)

and if this be denoted by er 2 2 we have a second system of equations similar to (23). The remaining value o£ is the value of (22) when x: y: z are chosen so as to satisfy (24) and

3V, av, 6V , ,

- *2 aT+? 2 37 +22 aT =0 – (2 5)*

The problem is identical with that of finding the common conjugate diameters of the ellipsoids T(x, y, z) = const., V(#, y, z) = const. If in (21) we imagine that x, y, z denote infinitesimal rotations of a solid free to turn about a fixed point in a given field of force, it appears that the three normal modes consist each of a rotation about one of the three diameters aforesaid, and that the values of a are

proportional to the ratios of the lengths of corresponding diameters of the two quadrics.

We proceed to the forced vibrations of the system. The typical case is where the extraneous forces are of the simple-harmonic type cos (ol--e) ; the most general law of variation with time can be derived from this by superposition, in virtue of Fourier's theorem. Analytically, it is convenient to put Q, equal to e itr ' multiplied by a complex coefficient; owing to the linearity of the equations the factor e' at will run through them all, and need not always be exhibited. For a system of one degree of freedom we have

aq + cq = Q, (26)

and therefore on the present supposition as to the nature of Q

2 = ?^- (2 «

This solution has been discussed to some extent in § 12, in con-nexion with the forced oscillations of a pendulum, We may note further that when cr is small the displacement q has the " equi-librium value " Q/c, the same as would be produced by a steady force equal to the instantaneous value of the actual force, the inertia of the system being inoperative. On the other hand, when cr 2 is great q tends to the value -Q/

When there are n degrees

+ (c,, r — ff 2 a,,r)g» = Qr,

(28) (29)

where a, b, c are positive. The solution of this has been suffici- ently discussed in § 12. In the case of multiple freedom, the equations of small motion when modified by the introduction of terms proportional to the velocities are of the type

(3i)

the potential energy were ignored, of freedom we have from (3)

(c iT – a 2 o 2r)qi + (c\ —

A () . q r = airQ! + a 2l .Q 2 + . . . + a,, r Q,,, where air, a 2r , . . . a,, r are the minors of the rth row of the determinant (7). Every particle of the system executes in general a simple vibration of the

imposed period 2v\a,- and all the particles pass simultaneously through their equilibrium positions. The amplitude becomes very great when <7 2 approxi- mates to a root of (6), i.e. when the imposed period nearly coin- cides with one of the free periods. Since a r » = a, r , the coefficient of Q, in the expression for q r is identical with that of Q r in the expression for q,. Various important " reciprocal theorems " formulated by H. Helmholtz and Lord Rayleigh are founded on this relation. Free vibrations must of course be superposed on the forced vibrations given by (29) in order to obtain the complete solution of the dynamical equations.

In practice the vibrations of a system are more or less affected by dissipative forces. In order to obtain at all events a quali- tative representation of these it is usual to introduce into the equations frictional terms proportional to the velocities. Thus in the case of one degree of freedom we have, in place of (26), oq+bq+cq = Q, (30)

xvu. 3i

It ˆ + B + B «+ ··· B»r2»| = Qr.*

If we put

b„ = b K = i(B r . + B„), &. = ■ this may be written

d dT , 9F , ...

dtdq- + Wr + 01rqi + P2rq2 + ■

r = i(B r8 -B 8r), (32)

+ Pn4n + ˆf r = Qr, (33)

provided

2F = b u qi 2 + b 22 q 2 2 + . . . + 2b l2 qiq 2 + . . . (34)

The terms due to F in (33) are such as would arise from frictional resistances proportional to the absolute velocities of the particles, or to mutual forces of resistance proportional to the relative velocities; they are therefore classed as frictional or dissipative forces. The terms affected with the coefficients /3 rs on the other hand are such as occur in "cyclic" systems with latent motion (Dynamics, § Analytical); they are called the gyrostatic terms. If we multiply {$ˆ) by ([, and sum with respect to r from 1 to n, we obtain, in virtue of the relations /3 rs = —fi sr , f3 r r = o,

■§t (T + V) = 2F + Q,4 + Q 2 g 2 + . . . + Q„2„- (35)

This shows that mechanical energy is lost at the rate 2 F per unit time. The function F is therefore called by Lord Rayleigh the dissipation function.

If we omit the gyrostatic terms, and write q r = C r e xt , we find,, for a free vibration,

(OlrX 2 + bi r \ + Clr)Cl + (fljrX 2 + b 2r \ + C 2r)C 2 + • • •

+ (a„ r X 2 + &„ r X + C w) Cn = o. (36)

This leads to a determinantal equation in X whose 2« roots are either real and negative, or complex with negative real parts, on the present hypothesis that the functions T, V, F are all essen- tially positive. If we combine the solutions corresponding to a pair of conjugate complex roots, we obtain, in real form,

q T = Ca r e— t l T cos {at+e—t,), (37)

where cr, r, a r , t r are determined by the constitution of the sys- tem, whilst C, e are arbitrary, and independent of r. The n formulae of this type represent a normal mode of free vibration; the individual particles revolve as a rule in elliptic orbits which gradually contract according to the law indicated by the expon- ential factor. If the friction be relatively small, all the normal modes are of this character, and unless two or more values of a are nearly equal the elliptic orbits are very elongated. The effect of friction on the period is moreover of the second order. In a forced vibration of e i(rt the variation of each co-ordinate is simple-harmonic, with the prescribed period, but there is a retardation of phase as compared with the force. If the friction be small the amplitude becomes relatively very great if the imposed period approximate to a free period. The validity of the "reciprocal theorems " of Helmholtz and Lord Rayleigh, already referred to, is not affected by frictional forces of the kind here considered.

The most important applications of the theory of vibrations are to the case of continuous systems such as strings, bars, membranes, plates, columns of air, where the number of degrees of freedom is infinite. The series of equations of the type (3) is then replaced by a single linear partial differential equation, or by a set of two or three such equations, according to the number of dependent variables. These variables represent the whole assemblage of generalized co-ordinates q r ; they are continuous functions of the independent variables x, y,

*z whose range of variation corresponds to that of the index r, and of t. For example, in a one-dimensional system such as a string or a bar, we have one dependent variable, and two in- dependent variables x and /. To determine the free oscillations we assume a time factor e iat ; the equations then become linear differential equations between the dependent variables of the problem and the independent variables *, or x, y, or x, y, z as the case may be. If the range of the independent variable or variables is unlimited, the value of a is at our disposal, and the solution gives us the laws of wave-propagation (see Wave). If, on the other hand, the body is finite, certain terminal conditions have to be satisfied. These limit the admissible values of a, which are in general determined*

T(*I) + ^= °-*

by a transcendental equation corresponding to the determinantal equation (6).

*Numerous examples of this procedure, and of the corresponding treatment of forced oscillations, present themselves in theoretical acoustics. It must suffice here to consider the small oscillations of a chain hanging vertically from a fixed extremity. If * be measured upwards from the lower end, the horizontal component of the tension P at any point will be Pdy/dx, approximately, if y denote the lateral displacement. Hence, forming the equation of motion of a mass-element, phx, we have*

pSx.p = S(P.dy/dx). (38)

Neglecting the vertical acceleration we have P = gpz, whence

&y s / dy\ , .

W^ZTxVTx)- (39)

Assuming that y varies as e iat we have

(40)

provided k = o[g. The solution of (40) which is finite for x = o is readily obtained in the form of a series, thus*

;y = C (i-ˆ+g-...)=CJo(Z), (41)

in the notation of Bessel's functions, if z i = 4kx. Since y must vanish

at the upper end (x~l), the admissible values of a are determined by

o° =gz/4l, Jo(*)=o. _ (42)*

The function J (z) has been tabulated ; its lower roots are given by

z/tt= -7655. I-757I. 2-7546

approximately, where the numbers tend to the form s — L The frequency of the gravest mode is to that of a uniform bar in the ratio •9815. That this ratio should be less than unity agrees with the theory of " constrained types " already given. In the higher normal modes there are nodes or points of rest (y = o) ; thus in the second mode there is a node at a distance -190ˆ from the lower end.

Authorities. — For indications as to the earlier history of the subject see W. W. R. Ball, Short Account of the History of Mathematics ; M. Cantor, Geschichte der Mathematik (Leipzig, 1880 . . .); J. Cox, Mechanics (Cambridge, 1 904); E. Mach, Die Mechanik in ihrer Entwickelung (4th ed., Leipzig, 1901 ; Eng. trans.). Of the classical treatises which have had a notable influence on the development of the subject, and which may still be consulted with advantage, we may note particularly, Sir I. Newton, Philosophiae naturalis Principia Mathematica (1st ed., London, 1687); J. L. Lagrange, Mecanique analytique (2nd ed., Paris, 1811-1815); P. S. Laplace, Mecanique celeste (Paris, 1799-1825); A. F. Mobius, Lehrbuch der Statik (Leipzig, 1837), and Mechanik des Himmels; L. Poinsot, Elements de statique (Paris, 1804), and Theorie nouvelle de la rotation des corps (Paris, 1834).

Of the more recent general treatises we may mention Sir W. Thomson (Lord Kelvin) and P. G. Tait, Natural Philosophy (2nd ed., Cambridge, 1879-1883); E. J. Routh, Analytical Statics (2nd. ed., Cambridge, 1896), Dynamics of a Particle (Cambridge, 1898), Rigid Dynamics (6th ed., Cambridge 1905) ; G. Minchin, Statics (4th ed., Oxford, 1888); A. E. H. Love, Theoretical Mechanics (2nd ed., Cambridge, 1909); A. G. Webster, Dynamics of Particles, &c. (1904); E. T. VVhittaker, Analytical Dynamics (Cambridge, 1904) ; L. Arnal,

Traite de mecanique (1888-1898); P. Appell, Mecanique rationelle (Paris, vols. i. and ii., 2nd ed., 1902 and 1904; vol. hi., 1st ed., 1896,) ; G. Kirchhoff, Vorlesungen iiber Mechanik (Leipzig, 1896); H. Helm- holtz, Vorlesungen iiber theoretische Physik, vol. i. (Leipzig, 1898); J. Somoff, Theoretische Mechanik (Leipzig, 1878-1879).

The literature of graphical statics and its technical applications is very extensive. We may mention K. Culmann, Graphische Statik (2nd ed., Zurich, 1895); A. Foppl, Technische Mechanik, vol. ii. (Leipzig, 1900) ; L. Henneberg, Statik des starren Systems (Darmstadt, 1886); M. Levy, La statique graphique (2nd ed., Paris, 1 886-1888); II. Miiller-Breslau, Graphische Statik (3rd ed., Berlin, 1901). Sir R. S. Ball's highly original investigations in kinematics and dynamics were published in collected form under the title Theory of Screws (Cambridge, 1900).

Detailed accounts of the developments of the various branches of the subject from the beginning of the 19th century to the present time, with full bibliographical references, are given in the fourth volume (edited by Professor F. Klein) of the Encyclopddie der matkemalischen Wissenschaften (Leipzig). There is a French translation of this work. (See also Dynamics.) (H. Lb.)

II. — Applied Mechanics 1

§ 1. The practical application of mechanics may be divided into two classes, according as the assemblages of material

objects to which they relate are intended to remain fixed or to move relatively to each other — the former class being com- prehended under the term "Theory of Structures" and the latter under the term " Theory of Machines."

PART I.— OUTLINE OF THE THEORY OF STRUCTURES

§ 2. Support of Structures.— Every structure, as a whole, is maintained in equilibrium by the joint action of its own weight, of the external load or pressure applied to it from without and tending to displace it, and of the resistance of the material which supports it. A structure is supported either by resting on the solid crust of the earth, as buildings do, or by floating in a fluid, as ships do in water and balloons in air. The principles of the support of a floating structure form an important part of Hydromechanics {q.v.). The principles of the support, as a whole, of a structure resting on the land, are so far

identical with those which regulate the equilibrium and stability of the several parts of that structure that the only principle which seems to require special mention here is one which comprehends in one statement the power both of liquids and of loose earth to support structures. This was first demonstrated in a paper " On the Stability of Loose Earth," read to the Royal Society on the 19th of June 1856 (Phil. Trans. 1856), as follows: —

Let E represent the weight of the portion of a horizontal stratum of earth which is displaced by the foundation of a structure, S the utmost weight of that structure consistently with the power of the earth to resist displacement, the angle of repose of the earth ; then

i _ / 1 +sin 4> \ '■ -~ \l —sin)

1 In view of the great authority of the author, the late Professor Macquorn Rankine, it has been thought desirable to retain the greater part of this article as it appeared in the 9th edition of the Encyclo- paedia Britannica. Considerable additions, however, have been introduced in order to indicate subsequent developments of the subject; the new sections are numbered continuously with the old,

To apply this to liquids must be made zero, and then S/E = 1 , as is well known. For a proof of this expression see Rankine's Applied Mechanics, 17th ed., p. 219.

§ 3. Composition of a Structure, and Connexion of its Pieces. — A structure is composed of pieces, — such as the stones of a building in masonry, the beams of a timber frame- work, the bars, plates and bolts of an iron bridge. Those pieces are connected at their joints or surfaces of mutual contact, either by simple pressure and friction (as in masonry with moist mortar or without mortar), by pressure and adhesion (as in masonry with cement or with hardened mortar, and timber with glue), or by the resistance of fastenings of different kinds, whether made by means of the form of the joint (as dovetails, notches, mortices and tenons) or by separate fastening pieces (as trenails, pins, spikes, nails, holdfasts, screws, bolts, rivets, hoops, straps and sockets.

§ 4. Stability, Stiffness and Strength. — A structure may be damaged or destroyed in three ways: — first, by displacement of its pieces from their proper positions relatively to each other or to the earth ; secondly by disfigurement of one or more of those pieces, owing to their being unable to preserve their proper shapes under the pressures to which they are subjected; thirdly, by breaking of one or more of

those pieces. The power of resisting displacement constitutes stability, the power of each piece to resist disfigurement is its stiffness; and its power to resist breaking, its strength.

§ 5. Conditions of Stability. — The principles of the stability of a structure can be to a certain extent investigated independently of the stiffness and strength, by assuming, in the first instance, that each piece has strength sufficient to be safe against being broken, and stiffness sufficient to prevent its being disfigured to an extent inconsistent with the purposes of the structure, by the greatest forces which are to be applied to it. The condition that each piece of the structure is to be maintained in equilibrium by having its gross load, consisting of its own weight and of the external pressure applied to it, balanced by the resistances or pressures exerted between it and the contiguous pieces, furnishes the means of determining the magnitude, position and direction of the resistances required at each joint in order to produce equilibrium ; and the conditions of stability are, first, that the position, and, secondly, that the direction, of the resistance required at each joint shall, under all the variations to which the load is subject, be such as the joint is capable of exerting — conditions which are fulfilled by suitably adjusting the figures and positions of the joints, and the ratios of the gross loads of the pieces. As for the magnitude of the resistance, it is limited by conditions, not of stability, but of strength and stiffness.

§ 6. Principle of Least Resistance. — Where more than one system of resistances are alike capable of balancing the same system of loads applied to a given structure, the smallest of those alternative systems, as was demonstrated by the Rev. Henry Moseley in his Mechanics of Engineering and Architecture, is that which will actually be exerted —

but are distinguished by an asterisk. Also, two short chapters which concluded the original article have been omitted — ch. iii., " On Purposes and Effects of Machines," which was really a classification of machines, because the classification of Franz Reuleaux is now usually followed, and ch. iv., " Applied Energetics, or Theory of Prime Movers," because its subject matter is now treated in various special articles, e.g. Hydraulics, Steam Engine, Gas Engine, Oil Engine, and fully developed in Rankine's The Steam Engine and Other Prime Movers (London, 1902). (Ed. E.B.)

THEORY OF STRUCTURES]

MECHANICS

Fig. 86.

because the resistances to displacement are the effect of a strained state of the pieces, which strained state is the effect of the load, and when the load is applied the strained state and the resistances produced by it increase until the resistances acquire just those magnitudes which are sufficient to balance the load, after which they increase no further.

This principle of least resistance renders determinate many problems in the statics of structures which were formerly considered indeterminate.

§ 7. Relations between Polygons of Loads and of Resistances.— In a structure in which each piece is supported at two joints only, the well-known laws of statics show that the directions of the gross load on each piece and of the two resistances by which it is supported must lie in one plane, must either be parallel or meet in one point, and must bear to each other, if not parallel, the proportions of the sides of a triangle respectively parallel to their directions, and, if parallel, such proportions that each of the three forces shall be proportional to the distance between the other two, — all the three distances being measured along one direction.

Considering, in the first place, the case in which the load and the two resistances by which each piece is balanced meet in one point, which may be called the centre of load, there will be as many such points of intersection, or centres of load, as there are pieces in the structure ; and the directions and positions of the resistances or mutual pressures exerted between the pieces will be represented by the sides

of a polygon joining _?•* those points, as in fig.

86 where Pi, P 2 , P 3 , P 4 represent the cen- tres of load in a structure of four pieces, and the sides of the polygon of resistances Pi P2 P3 P< represent respectively the direc- tions and positions of the resistances ex- erted at the joints. Further, at any one of the centres of load let PL represent the magnitude and direction of the gross load, and Pa, Pb the two resist- ances by which the piece to which that load is applied is supported ; then will those three lines be respectively the diagonal and sides of a parallelogram; or, what is the same thing, they will be equal to the three sides of a triangle; and they must be in the same plane, although the sides of the polygon of

resistances may be in different planes.

According to a well-known principle of statics, because the loads or external pressures P1L1, &c, balance each other, they must be proportional to the sides of a closed polygon drawn respectively parallel to their directions. In fig. 87 construct such a polygon of loads by drawing the lines Li, &c, parallel and propor- tional to, and joined end to end in the order of, the gross loads on the pieces of the structure. Then from the proportionality and parallelism of the load and the two resistances applied to each piece of the structure to the three sides of a triangle, there results the following theorem (originally due to Rankine) : —

If from the angles of the polygon of loads there be drawn lines (Rj, R 2 , &c), each of which is parallel to the resistance (as P1P2, &c.) exerted at the joint between the pieces to which the two loads represented by the contiguous sides of the polygon of loads {such as Li, L2, &c.) are applied; then will all those lines meet in one point (O), and their lengths, measured from that point to the angles of the polygon, will represent the magnitudes of the resis- tances to which they are respectively parallel.

When the load on one of the pieces is parallel to the resistances which balance it, the polygon of resistances ceases to be closed, two of the sides becoming parallel to each other and to the load in question, and extending indefinitely. In the polygon of loads the direction of a load sustained by parallel resistances traverses the point O. 1

1 Since the relation discussed in § 7 was enunciated by Rankine, an enormous development has taken place in the subject of Graphic Statics, the first comprehensive textbook on the subject being Die Graphische Statik by K. Culmann, published at Zurich in 1866. Many of the graphical methods therein given have now passed into the textbooks usually studied by engineers. One of the most beautiful graphical constructions regularly used by engineers and known as " the method of reciprocal figures " is that for finding the loads supported by the several members of a braced structure, having given a system of external loads. The method was discovered by Clerk Maxwell, and the complete theory is discussed and exempli- fied in a paper " On Reciprocal Figures, Frames and Diagrams of Forces," Trans. Roy. Soc. Ed., vol. xxvi. (1870). Professor M. W. Crofton read a paper on " Stress- Diagrams in Warren and Lattice Girders " at the meeting of the Mathematical Society (April 13,

Fig. 87.

§ 8. How the Earth's Resistance is to be treated . . .When the pressure exerted by a structure on the earth (to which the earth's resistance is equal and opposite) consists either of one pressure, which is neces- sarily the resultant of the weight of the structure and of all the other forces applied to it, or of two or more parallel vertical forces, whose 1 amount can be determined at the outset of the investigation, the resistance of the earth can be treated as one or more upward loads applied to the structure. But in other cases the earth is to be treated as one of the pieces of the structure, loaded with a force equal and opposite in direction and position to the resultant of the weight of the structure and of the other pressures applied to it.

§ 9. Partial Polygons of Resistance. — In a structure in which there are pieces supported at more than two joints, let a polygon be constructed of lines connecting the centres of load of any continuous series of pieces. This may be called a partial polygon of resistances. In considering its properties, the load at each centre of load is to be held to include the resistances of those joints which are not comprehended in the partial polygon of resistances, to which the theorem of § 7 will then apply in every respect. By constructing several partial polygons, and computing the relations between the loads and resistances which are determined by the application of that theorem to each of them, with the aid, if necessary, of Moseley's principle of the least resistance, the whole of the relations amongst the loads and resistances may be found.

§ 10. Line of Pressures — Centres and Line of Resistance. — The line of pressures is a line to which the directions of all the resistances in one polygon are tangents. The centre of resistance at any joint is the point where the line representing the total resistance exerted at that joint intersects the joint. The line of resistance is a line tra- versing all the centres of resistance of a series of joints, — its form, in the positions intermediate between the actual joints of the structure, being determined by supposing the pieces and their loads to be subdivided by the introduction of intermediate joints ad infinitum, and finding the continuous line, curved or straight, in which the intermediate centres of resistance are all situated, however great their number. The difference between the line of resistance and the line of pressures was first pointed out by Moseley.

§ 11 . The principles of the two preceding sections may be illustrated by the consideration of a particular case of a buttress of

blocks forming a continuous series of pieces (fig. 88), where aa, bb, cc, dd represent plane joints. Let the centre of pressure C at the first joint aa be known, and also the pressure P acting at C in direction and magnitude. Find Ri the resultant of this pressure, the weight of the block aabb acting through its centre of gravity, and any other external force which may be acting on the block, and produce its line of action to cut the joint bb in &. Q is then the centre of pressure for the joint bb, and Ri is the total force acting there. Re- peating this process for each block in succession there will be found the centres of pres- sure C2, C3, &c, and also the resultant pressures R2, R3, &c, acting at these respec- tive centres. The centres of pressure at the joints are also called centres of resistance, and the curve passing through these points is called a line of resistance. Let all the resultants acting at the several centres of resistance be produced until they cut one another in a series of points so as to form an unclosed polygon. This polygon is the partial polygon of resistance. A curve tangential to all the sides of the polygon is the line of pressures.

§ 12. Stability of Position, and Stability of Friction. — The resist- ances at the several joints having been determined by the principles ' set forth in § § 6, 7, 8, 9 and 10, not only under the ordinary load of the structure, but under all the variations to which the load is subject as to amount and distribution, the joints are now to be placed and shaped so that the pieces shall not suffer relative displacement under any of those loads. The relative displacement of the two pieces which abut against each other at a joint may take place either

1871), and Professor O. Henrici illustrated the subject by a simple and ingenious notation. The application of the method of reciprocal figures was facilitated by a system of notation published in Economics of Construction in relation to framed Structures, by Robert H. Bow (London, 1873). A notable work on the general subject is that of Luigi Cremona, translated from the Italian by Professor T. H. Beare (Oxford, 1890), and a discussion of the subject of reciprocal figures from the special point of view of the engineering student is given in Vectors and Rotors by Henrici and Turner (London, 1903) See also above under " Theoretical Mechanics," Part I. § 5.

Fig. 88,

by turning or by sliding. Safety against displacement by turning is called stability of position ; safety against displacement by sliding, stability of friction.

§ 13. Condition of Stability of Position. — If the materials of a structure were infinitely stiff and strong, stability of position at any joint would be insured simply by making the centre of resistance fall within the joint under all possible variations of load. In order to allow for the finite stiffness and strength of materials, the least distance of the centre of resistance inward from the nearest edge of the joint is made to bear a definite proportion to the depth of the joint measured in the same direction, which proportion is fixed, sometimes empirically, sometimes by theoretical deduction from the laws of the strength of materials. That least distance is called by Moseley the modulus of stability. The following are some of the ratios of the modulus of stability to the depth of the joint which occur in practice: —

Retaining walls, as designed by British engineers . . 1:8

Retaining walls, as designed by French engineers . . 1:5

Rectangular piers of bridges and other buildings, and

arch-stones 1:3

Rectangular foundations, firm ground 1:3

Rectangular foundations, very soft ground 1:2

Rectangular foundations, intermediate kinds of ground I : 3 to 1:2
Thin, hollow towers (such as furnace chimneys exposed

to high winds), square 1:6

Thin, hollow towers, circular 1:4

Frames of timber or metal, under their ordinary or

average distribution of load I : 3

Frames of timber or metal, under the greatest irregularities

of load 1:3

In the case of the towers, the depth of the joint is to be understood to mean the diameter of the tower.

§ 14. Condition of Stability of Friction. — If the resistance to be exerted at a joint is always perpendicular to the surfaces which abut at and form that joint, there is no tendency of the pieces to be displaced by sliding. If the resistance be oblique, let JK (fig. 89) be the joint, C its centre of resistance, CR a line representing the resistance, CN a perpendicular to the joint at the centre of resistance. The angle NCR is the obliquity of the resistance. From R draw RP parallel and RQ perpendicular to the joint; then, by the principles of statics, the component of the resistance normal

Fig. 89. to the joint is —

CP = CR.cosPCR; and the component tangential to the joint is —

CQ = CR.sin PCR = CP.tan PCR. If the joint be provided either with projections and recesses, such as mortises and tenons, or with fastenings, such as pins or bolts, so as to resist displacement by sliding, the question of the utmost amount of the tangential resistance CQ which it is capable of exerting depends on the strength of such projections, recesses, or fastenings; and belongs to the subject of strength, and not to that of stability. In other cases the safety of the joint against displacement by sliding depends on its power of exerting friction, and that power depends on the law, known by experiment, that the friction between two surfaces bears a constant ratio, depending on the nature of the surfaces, to the force by which they are pressed together. In order that the surfaces which abut at the joint JK may be pressed together, the resistance required by the conditions of equilibrium CR, must be a thrust and not a pull; and in that case the force by which the sur- faces are pressed together is equal and opposite to the normal com- ponent CP of the resistance. The condition of stability of friction is that the tangential component CQ of the resistance required shall not exceed the friction due to the normal component ; that is, that

CQ>/.CP, where / denotes the coefficient of friction for the surfaces in question. The angle whose tangent is the coefficient of friction is called the angle of repose, and is expressed symbolically by — <> = tan-»/. NowCQ = CP.tan PCR; consequently the condition of stability of friction is fulfilled if the angle PCR is not greater than ; that is to say, if the obliquity of the resistance required at the joint does not exceed the angle of repose ; and this condition ought to be fulfilled under all possible variations of the load.*

It is chiefly in masonry and earthwork that stability of friction is relied on.

§ 15. Stability of Friction in Earth. — The grains of a mass of loose earth are to be regarded as so many separate pieces abutting against each other at joints in all possible positions, and depending for their stability on friction. To determine whether a mass of earth is stable at a given point, conceive that point to be traversed by planes in all possible positions, and determine which position gives the

greatest obliquity to the total pressure exerted between the portions of the mass which abut against each other at the plane. The condition of stability is that this obliquity shall not exceed the angle of repose of the earth. The consequences of this principle are developed in a paper, " On the Stability of Loose Earth," already cited in § 2.

§ 16. Parallel Projections of Figures. — If any figure be referred to a system of co-ordinates, rectangular or oblique, and if a second figure be constructed by means of a second system of co-ordinates, rectangular or oblique, and either agreeing with or differing from the first system in rectangularity or obliquity, but so related to the co-ordin- ates of the first figure that for each point in the first figure there shall be a corresponding point in the second figure, the lengths of whose co-ordinates shall bear respectively to the three corresponding co-ordinates of the corresponding point in the first figure three ratios which are the same for every pair of corresponding points in the two figures, these corresponding figures are called parallel projections of each other. The properties of parallel projections of most importance to the subject of the present article are the following: — ■

(1) A parallel projection of a straight line is a straight line.

(2) A parallel projection of a plane is a plane.

(3) A parallel projection of a straight line or a plane surface divided in a given ratio is a straight line or a plane surface divided in the same ratio.

(4) A parallel projection of a pair of equal and parallel straight lines, or plain surfaces, is a pair of equal and parallel straight lines, or plane surfaces; whence it follows

(5) That a parallel projection of a parallelogram is a parallelogram, and

(6) That a parallel projection of a parallelepiped is a parallel-epiped.

(7) A parallel projection of a pair of solids having a given ratio is a pair of solids having the same ratio.

Though not essential for the purposes of the present article, the following consequence will serve to illustrate the principle of parallel projections: —

(8) A parallel projection of a curve, or of a surface of a given algebraical order, is a curve or a surface of the same order.

For example, all ellipsoids referred to co-ordinates parallel to any three conjugate diameters are parallel projections of each other and of a sphere referred to rectangular co-ordinates.

§ 17. Parallel Projections of Systems of Forces. — If a balanced system of forces be represented by a system of lines, then will every parallel projection of that system of lines represent a balanced system of forces.

For the condition of equilibrium of forces not parallel is that they shall be represented in direction and magnitude by the sides and diagonals of certain parallelograms, and of parallel forces that they shall divide certain straight lines in certain ratios; and the parallel projection of a parallelogram is a parallelogram, and that of a straight line divided in a given ratio is a straight line divided in the same ratio.

The resultant of a .parallel projection of any system of forces is the projection of their resultant; and the centre of gravity of a parallel projection of a solid is the projection of the centre of gravity of the first solid.

§ 18. Principle of the Transformation of Structures. ——Here we have the following theorem : If a structure of a given figure have stability of position ander a system of forces represented by a given system of lines, then will any structure whose figure is a parallel projection of that of the first structure have stability of position under a system of forces represented by the corresponding projection of the first system of lines.

For in the second structure the weights, external pressures, and resistances will balance each other as in the first structure; the weights of the pieces and all other parallel systems of forces will

have the same ratios as in the first structure; and the several centres of resistance will divide the depths of the joints in the same proportions as in the first structure.

If the first structure have stability of friction, the second struc- ture will have stability of friction also, so long as the effect of the projection is not to increase the obliquity of the resistance at any joint beyond the angle of repose.

The lines representing the forces in the second figure show their relative directions and magnitudes. To find their absolute directions and magnitudes, a vertical line is to be drawn in the first figure, of such a length as to represent the weight of a particular portion of the structure. Then will the projection of that line in the projected figure indicate the vertical direction, and represent the weight of the part of the second structure corresponding to the before-mentioned portion of the first structure.

The foregoing " principle of the transformation of structures " was first announced, though in a somewhat less comprehensive form, to the Royal Society on the 6th of March 1856. It is useful in practice, by enabling the engineer easily to deduce the conditions of equilibrium and stability of structures of complex and unsym- metrical figures from those of structures of simple and symmetrical figures. By its aid, for example, the whole of the properties of

elliptical arches, whether square or skew, whether level or sloping in their span, are at once deduced by projection from those of sym- metrical circular arches, and the properties of ellipsoidal and elliptic- conoidal domes from those of hemispherical and circular- conoidal domes; and the figures of arches fitted to resist the thrust of earth, which is less horizontally than vertically in a certain given ratio, can be deduced by a projection from those of arches fitted to resist the thrust of a liquid, which is of equal intensity, horizontally and vertically.

§ 19. Conditions of Stiffness and Strength. — After the arrangement of the pieces of a structure and the size and figure of their joints or surfaces of contact have been determined so as to fulfil the conditions of stability, — conditions which depend mainly on the

position and direction of the resultant or total load on each piece, and the relative magnitude of the loads on the different pieces — the dimensions of each piece singly have to be adjusted so as to fulfil the conditions of stiffness and strength — conditions which depend not only on the absolute magnitude of the load on each piece, and of the resistances by which it is balanced, but also on the mode of distribution of the load over the piece, and of the resistances over the joints.

The effect of the pressures applied to a piece, consisting of the load and the supporting resistances, is to force the piece into a state of strain or disfigurement, which increases until the elasticity, or resistance to strain, of the material causes it to exert a stress, or effort to recover its figure, equal and opposite to the system of applied pressures. The condition of stiffness is that the strain or disfigurement shall not be greater than is consistent with the purposes of the structure ; and the condition of strength is that the stress shall be within the limits of that which the material can bear with safety against breaking. The ratio in which the utmost stress before breaking exceeds the safe working stress is called the factor of safety, and is determined empirically. It varies from three to twelve for various materials and structures. (See Strength of Materials.)

PART II. THEORY OF MACHINES § 20. Parts of a Machine: Frame and Mechanism. — The parts of a machine may be distinguished into two principal divisions, — the frame, or fixed parts, and the mechanism, or moving parts. The frame is a structure which supports the pieces of the mechanism, and to a certain extent determines the nature of their motions.

The form and arrangement of the pieces of the frame depend upon the arrangement and the motions of the mechanism; the dimensions of the pieces of the frame required in order to give it stability and strength are determined from the pressures applied to it by means of the mechanism. It appears therefore that in general the mechan- ism is to be designed first and the frame afterwards, and that the designing of the frame is regulated by the principles of the stability of structures and of the strength and stiffness of materials, — care being taken to adapt the frame to the most severe load which can be thrown upon it at any period of the action of the mechanism.

Each independent piece of the mechanism also is a structure, and its dimensions are to be adapted, according to the principles of the strength and stiffness of materials, to the most severe load to which it can be subjected during the action of the machine.

§ 21. Definition and Division of the Theory of Machines. — From what has been said in the last section it appears that the department of the art of designing machines which has reference to the stability of the frame and to the stiffness and strength of the frame and mechanism is a branch of the art of construction. It is therefore to be separated from the theory of machines, properly speaking, which has reference to the action of machines considered as moving. In the action of a machine the following three things take place: — Firstly, Some natural source, of energy communicates motion and force to a piece or pieces of the mechanism, called the receiver of power or prime mover.

Secondly, The motion and force are transmitted from the prime mover through the train of mechanism to the working piece or pieces, and during that transmission the motion and force are modified in amount and direction, so as to be rendered suitable for the purpose to which they are to be applied.

Thirdly, The working piece or pieces by their motion, or by their motion and force combined, produce some useful effect.

Such are the phenomena of the action of a machine, arranged in the order of causation. But in studying or treating of the theory of machines, the order of simplicity is the best ; and in this order the first branch of the subject is the modification of motion and force by the train of mechanism; the next is the effect or purpose of the machine ; and the last, or most complex, is the action of the prime mover.

The modification of motion and the modification of force take place together, and are connected by certain laws; but in the study of the theory of machines, as well as in that of pure mechanics, much advantage has been gained in point of clearness and simplicity by first considering alone the principles of the modification of motion, which are founded upon what is now known as Kinematics, and after- wards considering the principles of the combined modification of motion and force, which are founded both on geometry and on the laws of dynamics. The separation of kinematics from dynamics is due mainly to G. Monge, Ampere and R. Willis.

The theory of machines in the present article will be considered under the following heads : —

I. Pure Mechanism, or Applied Kinematics; being the theory

of machines considered simply as modifying motion. II. Applied Dynamics; being the theory of machines considered as modifying both motion and force.

Chap. I. On Pure Mechanism § 22. Division of the Subject. — Proceeding in the order of simplicity, the subject of Pure Mechanism, or Applied Kinematics, may be thus divided ; —

. Division I. — Motion of a point. ” Division 2. — Motion of the surface of a fluid. Division 3. — Motion of a rigid solid. Division 4. — Motions of a pair of connected pieces, or of an

” elementary combination ” in mechanism. Division 5. — Motions of trains of pieces of mechanism. Division 6. — Motions of sets of more than two connected pieces,

or of ” aggregate combinations.” A point is the boundary of a line, which is the boundary of a surface, which is the boundary of a volume. Points, lines and surfaces have no independent existence, and consequently those divisions of this chapter which relate to their motions are only preliminary to the subsequent divisions, which relate to the motions of bodies.

Division 1 . Motion of a Point. § 23. Comparative Motion. — The comparative motion of two points is the relation which exists between their motions, without having regard to their absolute amounts. It consists of two elements, — the velocity ratio, which is the ratio of any two magnitudes bearing to each other the proportions of the respective velocities of the two points at a given instant, and the directional relation, which is the relation borne to each other by the respective directions of the motions of the two points at the same given instant.

It is obvious that the motions of a pair of points may be varied in any manner, whether by direct or by lateral deviation, and yet that their comparative motion may remain constant, in consequence of the deviations taking place in the same proportions, in the same directions and at the same instants for both points.

Robert Willis (1 800-1 875) has the merit of having been the first to simplify considerably the theory of puie mechanism, by pointing out that that branch of mechanics relates wholly to comparative motions.

The comparative motion of two points at a given instant is capable of being completely expressed by one of Sir William Hamilton’s

Quaternions, — the " tensor " expressing the velocity ratio, and the " versor " the directional relation.

Graphical methods of analysis founded on this way of representing velocity and acceleration were developed by R. H. Smith in"a paper communicated to the Royal Society of Edinburgh in 1885, and illustrations of the method will be found below.

Division 2. Motion of the Surface of a Fluid Mass. § 24. General Principle. — A mass of fluid is used in mechanism to transmit motion and force between two or more movable portions (called pistons or plungers) of the solid envelope or vessel in which the fluid is contained; and, when such transmission is the sole action, or the only appreciable action of the fluid mass, its volume is either absolutely constant, by reason of its temperature and pressure being maintained constant, or not sensibly varied.

Let a represent the area of the section of a piston made by a plane perpendicular to its direction of motion, and v its velocity, which is to be considered as positive when outward, and negative when inward. Then the variation of the cubic contents of the vessel in a unit of time by reason of the motion of one piston is va. The condition that the volume of the fluid mass shall remain unchanged requires that there shall be more than one piston, and that the .velocities and areas of the pistons shall be connected by the equation —

2.ra = o. (1)

§ 25. Comparative Motion of Two Pistons. — If there be but two pistons, whose areas are Oi and a 2 , and their velocities Vi and v 2 , their comparative motion is expressed by the equation —

vjvi= — aia/ 2 ; (2)

that is to say, their velocities are opposite as to inwardness and outwardness and inversely proportional to their areas.

§26. Applications: Hydraulic Press: Pneumatic Power-Trans- mitter. — In the hydraulic press the vessel consists of two cylinders, viz. the pump-barrel and the press-barrel, each having its piston, and of a passage connecting them having a valve opening towards the press-barrel. The action of the enclosed water in transmitting motion takes place during the inward stroke of the pump-plunger, when the above-mentioned valve is open ; and at that time the press- plunger moves outwards with a velocity which is less than the inward velocity of the

pump-plunger, in the same ratio that the area of the pump-plunger is less than the area of the press-plunger. (See Hydraulics.)

In the pneumatic power-transmitter the motion of one piston is

transmitted to another at a distance by means of a mass of air contained in two cylinders and an intervening tube. When the pressure and temperature of the air can be maintained constant, this machine fulfils equation (2), like the hydraulic press. The amount and effect of the variations of pressure and temperature undergone by the air depend on the principles of the mechanical action of heat, or Thermodynamics (g.i>.), and are foreign to the subject of pure mechanism.

Division 3. Motion of a Rigid Solid. § 27. Motions Classed. — In problems of mechanism, each solid piece of the machine is supposed to be so stiff and strong as not to undergo any sensible change of figure or dimensions by the forces applied to it — a supposition which is realized in practice if the machine is skilfully designed.

This being the case, the various possible motions of a rigid solid body may all be classed under the following heads: (1) Shifting or Translation; (2) Turning or Rotation; (3) Motions compounded of Shifting and Turning.

The most common forms for the paths of the points of a piece of mechanism, whose motion is simple shifting, are the straight line and the circle.

Shifting in a straight line is regulated either by straight fixed guides, in contact with which the moving piece slides, or by combina- tions of link-work, called parallel motions, which will be described in the sequel. Shifting in a straight line is usually reciprocating; that is to say, the piece, after shifting through a certain distance, returns to its original position by reversing its motion.

Circular shifting is regulated by attaching two or more points of the shifting piece to ends of equal and parallel rotating cranks, or by combinations of wheel-work to be afterwards described. As an example of circular shifting may be cited the motion of the coup- ling

rod, by which the parallel and equal cranks upon two or more axles of a locomotive engine are connected and made to rotate simultaneously. The coupling rod remains always parallel to itself, and all its points describe equal and similar circles relatively to the frame of the engine, and move in parallel directions with equal velocities at the same instant.

§ 28. Rotation about a Fixed Axis: Lever, Wheel and Axle. — The fixed axis of a turning body is a line fixed relatively to the body and relatively to the fixed space in which the body turns. In mechanism it is usually the central line either of a rotating shaft or axle having journals, gudgeons, or pivots turning in fixed bear- ings, or of a fixed spindle or dead centre round which a rotating bush turns; but it may sometimes be entirely beyond the limits of the turning body. For example, if a sliding piece moves in circular fixed guides, that piece rotates about an ideal fixed axis traversing the centre of those guides.

Let the angular velocity of the rotation be denoted by a = dO/dt, then the linear velocity of any point A at the distance r from the axis is or; and the path of that point is a circle of the radius r described about the axis.

This is the principle of the modification of motion by the lever, which consists of a rigid body turning about a fixed axis called a fulcrum, and having two points at the same or different distances from that axis, and in the same or different directions, one of which receives motion and the other transmits motion, modified in direction and velocity according to the above law.

In the wheel and axle, motion is received and transmitted by two cylindrical surfaces of different radii described about their common fixed axis of turning, their velocity-ratio being that of their radii.

§ 29. Velocity Ratio of Components of Motion. — As the distance between any two points in a rigid body is invariable, the projections

of their velocities upon the line joining them must be equal. Hence it follows that, if A in fig. 90 be a point in a rigid body CD, rotating round the fixed axis F, the component of the velocity of A in any direction AP parallel to the plane of rotation is equal to the total velocity of the point m, found by letting fall Fm perpendicular to AP; that is to say, is equal to

a . Fot.

Hence also the ratio of the com- ponents of the velocities of two points A and B in the directions AP and BW respectively, both in the plane of rotation, is equal to the ratio of the perpendiculars Fw and Fn.

§ 30. Instantaneous Axis of a Cylinder rolling on a Cylinder. — Let a cylinder 666, whose axis of figure is B and angular velocity 7, roll on a fixed cylinder aaa, whose axis of figure is A, either outside (as in fig. 91), when the rolling will be towards the same hand as the rotation, or inside (as in fig. 92), when the rolling will be towards the opposite hand ; and at a given instant let T be the line of cop- tact of the two cylindrical surfaces, which is at their common intersection with the plane AB traversing the two axes of figure.

The line T on the surface bbb has for the instant no velocity in

a direction perpendicular to AB ; because for the instant it touches, without sliding, the line T on the fixed surface aaa.

The line T on the surface bbb has also for the instant no velocity in the plane AB; for it has just ceased to move towards the fixed surface aaa, and is just about to begin to move away from that surface.

The line of contact T, therefore, on the surface of the cylinder bbb, is for the instant at rest, and is the " instantaneous axis "

Fig. 90.

Fig. 91. Fig. 92.

about which the cylinder 666 turns, together with any body rigidly attached to that cylinder.

To find, then, the direction and velocity at the given instant of any point P, either in or rigidly attached to the rolling cylinder T, draw the plane PT; the direction of motion of P will be perpendi- cular to that plane, and towards the right or left hand according to the direction of the rotation of 666; and the velocity of P will be
tfp = 7.PT, (3)

PT denoting the perpendicular distance of P from T. The path of P is a curve of the kind called epitrochoids. If P is in the circumference of 666, that path becomes an epicycloid.

The velocity of any point in the axis of figure B is

TO = 7.TB; (4)

and the path of such a point is a circle described about A with the radius AB, being for outside rolling the sum, and for inside rolling the difference, of the radii of the cylinders.

Let a denote the angular velocity with which the plane of axes AB rotates about the fixed axis A. Then it is evident that » =o.AB, (5)

and consequently that a = 7 . TB/AB (6)

For internal rolling, as in fig. 92, AB is to be treated as negative, which will give a negative value to o, indicating that in this case the rotation of AB round A is contrary to that of the cylinder 666.

The angular velocity of the rolling cylinder, relatively to the plane of axes AB, is obviously given by the equation —

P=y-a\ whence /3 = 7 . TA/AB) ‘ (7)

care being taken to attend to the sign of a, so that when that is negative the arithmetical values of 7 and a are to be added in order to give that of 0.

The whole of the foregoing reasonings are applicable, not merely when aaa and 666 are actual cylinders, but also when they are the osculating cylinders of a pair of cylindroidal surfaces of varying curvature, A and B being the axes of curvature of the parts of those surfaces which are in contact for the instant under consideration.

§ 31. Instantaneous Axis of a Cone rolling on a Cone. — Let Oaa (fig. 93) be a fixed cone, OA its axis, 066 a cone rolling on it, OB

Fig. 93.

the axis of the rolling cone, OT the line of contact of the two cones at the instant under consideration. By reasoning similar to that of § 30, it appears that OT is the instantaneous axis of rotation of the rolling cone.

Let 7 denote the total angular velocity of the rotation of the cone B about the instantaneous axis, /J its angular velocity about the axis OB relatively to the plane AOB, and a the angular velocity with which the plane AOB turns round the axis OA. It is required to find the ratios of those angular velocities.

Solution. — In OT take any point E, from which draw EC parallel to OA, and ED parallel to OB, so as to construct the parallelogram OCED. Then

OD : OC : OE : : o : /3 : 7. (8)

Or because of the proportionality of the sides of triangles to the sines of the opposite angles,

sin TOB : sin TOA : sin AOB : : o : : 7, (8 A)

that is to say, the angular velocity about each axis is proportional to the sine of the angle between the other two.

Demonstration. — From C draw CF perpendicular to OA, and CG perpendicular to OE

_ y. area ECO

*ThenCF**

and CG = 2X

CE area ECO

OE ‘ .. CG :CF ::CE = OD:OE. Let v c denote the linear velocity of the point C. Then n c = o . CF = 7 . CG .. y.a:: CF : CG :: OE : OD, which is one part of the solution above stated. From E draw EH perpendicular to OB, and EK to OA. Then it can be shown as before that

EK :EH ::OC : OD.

Let t’ E be the linear velocity of the point E fixed in the plane of axes AOB. Then

r B = a . EK. Now, as the line of contact OT is for the instant at rest on the rolling cone as well as on the fixed cone, the linear velocity of the point E fixed to the plane AOB relatively to the rolling cone is the same with its velocity relatively to the fixed cone. That is to say,

/J.EH = v K = o.EK; therefore a : /J :: EH : EK :: OD : OC,

which is the remainder of the solution.

The path of a point P in or attached to the rolling cone is a spherical epitrochoid traced on the surface of a sphere of the radius OP. From P draw PQ perpendicular to the instantaneous axis. Then the motion of P is perpendicular to the plane OPQ, and its velocity is

fp = y.PQ. (9)

The whole of the foregoing reasonings are applicable, not merely

when A and B are actual regular cones, but also when they are the

osculating regular cones of a pair of irregular conical surfaces,

having a common apex at O.

§32ˆ Screw-like or Helical Motion. — Since any displacement in a plane can be represented in general by a rotation, it follows that the only combination of translation and rotation, in which a complex movement which is not a mere rotation is produced, occurs when there is a translation perpendicular to the plane and parallel to the axis of rotation.

Such a complex motion is called screw-like or helical motion; for each point in the body describes a helix or screw round the axis of rotation, fixed or instantaneous as the case may be. To cause a body to move in this manner it is usually made of a helical or screw-like figure, and moves in a guide of a corresponding figure. Helical motion and screws adapted to it are said to be right- or left-handed according to the appearance presented by the rotation to an observer looking towards the direction of the translation. Thus the screw G in fig. 94 is right- handed.

The translation of a body in helical motion is called its advance. Let v x denote the velocity of advance at a given instant, which of course is common to all the particles of the body; a the angular velocity of the rotation at the same instant; 21 = 6-2832 nearly, the circumference of a circle of the radius unity. Then

T= 27r/a (10)

is the time of one turn at the rate a ; and

p = v x T= 2-miJa (II)

is the pitch or advance per turn — a length which expresses the comparative motion of the translation and the rotation.

The pitch of a screw is the distance, measured parallel to its axis, between two successive turns of the same thread or helical projection. Let r denote the perpendicular distance of a point in a body moving helically from the axis. Then

v r = ar (12)

is the component of the velocity of that point in a plane perpendicular to the axis, and its total velocity is

» = V {Vj+Vr'l _ _ (13)

The ratio of the two components of that velocity is

Vxlv, = p\2-rr = tan 0. (14)

where denotes the angle made by the helical path of the point with a plane perpendicular to the axis.

Division 4. Elementary Combinations in Mechanism § 33. Definitions. — An elementary combination in mechanism con- sists of two pieces whose kinds of motion are determined by their connexion with the frame, and their comparative, motion by their connexion with each other — that connexion being effected either

Fig. 94.

by direct contact of the pieces, or by a connecting piece, which is not connected with the frame, and whose motion depends entirely on the motions of the pieces which it connects.

The piece whose motion is the cause is called the driver; the piece whose motion is the effect, the follower.

The connexion of each of those two pieces with the frame is in general such as to determine the path of every point in it. In the investigation, therefore, of the comparative motion of the driver and follower, in an elementary combination, it is unnecessary to consider relations of angular direction, which are already fixed by the connexion of each piece with the frame; so that the inquiry is confined to the determination of the velocity ratio, and of the directional relation, so far only as it expresses the connexion between forward and backward movements of the driver and follower. When a continuous motion of the driver produces a continuous motion of the follower, forward or backward, and a reciprocating motion a motion reciprocating at the same instant, the directional relation is said to be constant. When a continuous motion produces a reciprocating motion, or vice versa, or when a reciprocating motion produces a motion not reciprocating at the same instant, the directional relation is said to be variable.

The line of action or of connexion of the driver and follower is a line traversing a pair of points in the driver and follower respectively, which are so connected that the component of their velocity re- latively to each other, resolved along the line of connexion, is null. There may be several or an indefinite number of lines of connexion, or there may be but one; and a line of connexion may connect either the same pair of points or a succession of different pairs.

§ 34. General Principle. — From the definition of a line of connexion

it follows that the components of the velocities of a pair of connected points along their line of connexion are equal. And from this, and from the property of a rigid body, already stated in § 29, it follows, that the components along a line of connexion of all the points traversed by that line, whether in the driver or in the follower, are equal ; and consequently, that the velocities of any pair of points traversed by a line of connexion are to each other inversely as the cosines, or directly as the secants, of the angles made by the paths of those points with the line of connexion.

The general principle stated above in different forms serves to solve every problem in which — the mode of connexion of a pair of pieces being given — it is required to find their comparative motion at a given instant, or vice versa.

§ 35- Application to a Pair of Shifting Pieces. — In fig. 95, let P1P2 be the line of connexion of a pair of pieces, each of which has a motion of translation or shifting. Through any point T in that line draw TVi, TV2, respectively paral- lel to the simultaneous direction of motion of the pieces; through any other point A in the line of con- nexion draw a plane perpendicular to that line, cutting TVi, TV 2 in Vi, V 2 ; then, velocity of piece 1: velocity of piece 2 : : TVi : TVj. Also TA represents the equal com- ponents of the velocities of the pieces parallel to their line of con- nexion, and the line V1V2 represents their velocity relatively to each other.

§ 36. Application to a Pair of Turning Pieces. — Let en, 02 be the angular velocities of a pair of turning pieces; 0i, 2 the angles which their line of connexion makes with their respective planes of rotation; n, r 2 the common perpendiculars let fall from the line of connexion upon the respective axes of rotation of the pieces. Then the equal components, along the line of connexion, of the velocities of the points where those perpendiculars meet that line are —

ctiri cos 0i = a%r% cos 82 ; consequently, the comparative motion of the pieces is given by the equation

a? _ n cos 9 i /j .-,

01 n cos 8i § 37. Application to a Shifting Piece and a Turning Piece. — Let a shifting piece be connected with a turning piece, and at a given instant let 01 be the angular velocity of the turning piece, n the common perpendicular of its axis of rotation and the line of con- nexion, 0i the angle made by the line of connexion with the plane of rotation, 02 the angle made by the line of connexion with the

direction of motion of the shifting piece, v 2 the linear velocity of that piece. Then

ain cos 61 =»j cos $2 ; (16)

which equation expresses the comparative motion of the two pieces.
§ 38. Classification of Elementary Combinations in Mechanism. — The first systematic classification of elementary combinations in mechanism was that founded by Monge, and fully developed by Lanz and Betancourt, which has been generally received, and has been adopted in most treatises on applied mechanics. But that classification is founded on the absolute instead of the comparative

Fig. 95.

motions of the pieces, and is, for that reason, defective, as Willis pointed out in his admirable treatise On the Principles of Mechanism.

Willis's classification is founded, in the first place, on comparative motion, as expressed by velocity ratio and directional relation, and in the second place, on the mode of connexion of the driver and follower. He divides the elementary combinations in mechanism into three classes, of which the characters are as follows : —

Class A: Directional relation constant; velocity ratio constant.

Class B : Directional relation constant ; velocity ratio varying.

Class C: Directional relation changing periodically; velocity ratio constant or varying.

Each of those classes is subdivided by Willis into five divisions, of which the characters are as follows : —

Division A : Connexion by rolling contact. ,, B: ,, ,, sliding contact.

,, C: „ ,, wrapping connectors.

,, D: ,, ,, link-work.

,, E: ,, „ reduplication.

In the Reuleaux system of analysis of mechanisms the principle of comparative motion is generalized, and mechanisms apparently very diverse in character are shown to be founded on the same sequence of elementary combinations forming a kinematic chain. A short description of this system is given in § 80, but in the present article the principle of Willis's classification is followed mainly. The arrangement is, however, modified by taking the mode of connexion as the basis of the primary classification, and by removing the subject of connexion by reduplication to the section of aggregate combinations. This modified arrangement is adopted as being better suited than the original arrangement to the limits of an article in an encyclopaedia; but it is not disputed that the original arrangement may be the best for a separate treatise.

§ 39. Rolling Contact: Smooth Wheels and Racks. — In order that two pieces may move in rolling contact, it is necessary that each pair of points in the two pieces which touch each other should at the instant of contact be moving in the same direction with the same velocity. In the case of two shifting pieces this would involve equal and parallel velocities for all the points of each piece, so that there could be no rolling, and, in fact, the two pieces would move like one; hence, in the case of rolling contact, either one or both of the pieces must rotate.

The direction of motion of a point in a turning piece being perpendicular to a plane passing through its axis, the condition that each pair of points in contact with each other must move in the same direction leads to the following consequences : —

I. That, when both pieces rotate, their axes, and all their points of contact, lie in the same plane.

II. That, when one piece rotates, and the other shifts, the axis of the rotating piece, and all the points of contact, lie in a plane perpendicular to the direction of motion of the shifting piece.

The condition that the velocity of each pair of points of contact must be equal leads to the following consequences: —

III. That the angular velocities of a pair of turning pieces in rolling contact must be inversely as the perpendicular distances of any pair of points of contact from the respective axes.

IV. That the linear velocity of a shifting piece in rolling contact with a turning piece is equal to the product of the angular velocity of the

turning piece by the perpendicular distance from its axis to a pair of points of contact.

The line of contact is that line in which the points of contact are all situated. Respecting this line, the above Principles III. and IV. lead to the following conclusions: —

V. That for a pair of turning pieces with parallel axes, and for a turning piece and a shifting piece, the line of contact is straight, and parallel to the axes or axis; and hence that the rolling surfaces are either plane or cylindrical (the term " cylindrical " including all surfaces generated by the motion of a straight line parallel to itself).

VI. That for a pair of turning pieces with intersecting axes the line of contact is also straight, and traverses the. point of inter- section of the axes; and hence that the rolling surfaces are conical, with a common apex (the term " conical " including all surfaces generated by the motion of a straight line which traverses a fixed point).

Turning pieces in rolling contact are called smooth or toothless wheels. Shifting pieces in rolling contact with turning pieces may be called smooth or toothless racks.

VII. In a pair of pieces in rolling contact every straight line traversing the line of contact is a line of connexion.

, § 40. Cylindrical Wheels and Smooth Racks. — In designing cylin- drical wheels and smooth racks, and determining their comparative motion, it is sufficient to consider a section of the pair of pieces made by a plane perpendicular to the axis or axes.

The points where axes intersect the plane of section are called centres; the point where the line of contact intersects it, the point of contact, or pitch-point ; and the wheels are described as circular, elliptical, &c, according to the forms of their sections made by that plane.

When the point of contact of two wheels lies between their centres, they are said to be in outside gearing; when beyond their

centres, in inside gearing, because the rolling surface of the larger wheel must in this case be turned inward or towards its centre.

From Principle III. of § 39 it appears that the angular velocity- ratio of a pair of wheels is the inverse ratio of the distances of the point of contact from the centres respectively.

For outside gearing that ratio is negative, because the wheels turn contrary ways; for in- side gearing it is positive, because they turn the same way.

If the velocity ratio is to be -constant, as in Willis's Class A, the wheels must be circular; and this is the most common form for wheels.

If the velocity ratio is to be variable, as in Willis's Class B, the figures of the wheels are a pair of rolling curves, subject to the condition that the distance between their poles (which are the centres of rotation) shall be constant.

The following is the geometrical relation which must exist between such a pair of curves : —

Let Ci, C2 (fig. 96) be the poles of a pair of rolling curves; Ti, T2 any pair of points of con- tact; Ui, U2 any other pair of points of contact. Then, for every possible pair of points of contact, the two following equations must be simultaneously fulfilled : —

Sum of radii, CiUi + C 2 U2 = CiTi + C2T2 = constant;

arc, T2U2 = T1U1. (17)

A condition equivalent to the above, and necessarily connected with it, is, that at each pair of points of contact the inclinations of the curves to their radii-vectores shall be equal and contrary; or, denoting by ri, r 2 the radii-vectores at any given pair of points of contact, and s the length of the equal arcs measured from a certain fixed pair of points of contact —

dr 2 /ds = — dri/ds ; (18)

which is the differential equation of a pair of rolling curves whose poles are at a constant distance apart.

For full details as to rolling curves, see Willis's work, already mentioned, and Clerk Maxwell's paper on Rolling Curves, Trans. Roy. Soc. Edin., 1849.

A rack, to work with a circular wheel, must be straight. To work with a wheel of any other figure, its section must be a rolling curve, subject to the condition that the perpendicular distance from the pole or centre of the wheel to a straight line parallel to the direction of the motion of the rack shall be constant. Let ri be the radius- vector

of a point of contact on the wheel, Xz the ordinate from the straight line before mentioned to the corresponding point of contact on the rack. Then

dx 2 /ds= —dri/ds (19)

is the differential equation of the pair of rolling curves.

To illustrate this subject, it may be mentioned that an ellipse rotating about one focus rolls completely round in outside gearing with an equal and similar ellipse also rotating about one focus, the distance between the axes of rotation being equal to the major axis

of the ellipses, and the velocity ratio varying from r-r-ˆ

I —eccentricity I — eccentricity to -ˆr . . ; an hyperbola rotating about its further focus

rolls in inside gearing, through a limited arc, with an equal and similar hyperbola rotating about its nearer focus, the distance between the axes of rotation being equal to the axis of the hyper- bolas, and the velocity ratio varying between ˆ~- and

eccentricity — I

unity; and a parabola rotating about its focus rolls with an equal and similar parabola, shifting parallel to its directrix.

§ 41. Conical or Bevel and Disk Wheels. — From Principles III. and VI. of § 39 it appears that the angular velocities of a pair of wheels whose axes meet in a point are to each other inversely as the sines of the angles which the axes of the wheels make with the line of contact. Hence we have the following construction (figs. 97 and 98). — Let O be the apex or point of intersection of the two axes OCi, OC2. The angular velocity ratio being given, it is required to find the line of contact. On OCi, OC2 take lengths OAj, OA2, respectively pro- portional to the angular velocities of the pieces on whose axes they are taken. Complete the parallelogram OA1EA2; the diagonal OET will be the line of contact required.

When the velocity ratio is variable, the line of contact will shift its position in the plane C1OC2, and the wheels will be cones, with eccentric or irregular bases. In every case which occurs in _

practice, however, the velocity ratio is FlG. 97.

constant ; the line of contact is constant in position, and the rolling surfaces of the wheels are regular circular cones (when they are called bevel wheels) ; or one of a pair of wheels may have a flat disk

for its rolling surface, as W2 in fig. 98, in which case it is a disk wheel. The rolling surfaces of actual wheels consist of frusta or zones of the complete cones or disks, as shown by Wi, W2 in figs. 97 and 98.

§ 42. Sliding Contact (lateral): Skew-Bevel Wheels. — An hyperboloid of revolution is a surface resembling a sheaf or a dice box, generated

by the rotation of a straight rˆvi line round an axis from which it is at a constant distance, and to which it is inclined at a constant angle. If two such hyperboloids E, F, equal or unequal, be placed in the closest possible contact, as in fig- 99, they will touch each other along one of the gener- ating straight lines of each, which will form their line of inclined to the axes AG, BH in opposite will not be parallel, nor will they intersect

Fig. 98.

be

contact, and will directions. The axes each other.

The motion of two such hyperboloids, turning in contact with each other, has hitherto been classed amongst cases of rolling

contact; but that classification is not strictly correct, for, although the com- ponent velocities of a pair of points of contact in a direction at right angles to the line of contact are equal, still, as the axes are parallel neither to each other nor to the line of contact, the velocities of a pair of points of contact have components along the line of contact which are unequal, and their difference constitutes a lateral sliding. •

The directions and positions of the axes being given, and the required angular velocity ratio, the following construction serves to determine

the line of contact, by whose rotation round the two axes respectively the hyperboloids are generated : —

In fig. 100, let B1C1, B 2 C 2 be the two axes; B1B2 their common perpendicular. Through any point O in this common perpendicular

draw OAi parallel to B1C1 and OA 2 parallel to B2C2 ; make those lines pro- portional to the angular velocities about the axes to which they are respectively paiallel; complete the parallelogram OA! EA 2 , and draw the diagonal OE; divide B1B2 in D into two parts, inversely proportional to the angular velocities about the axes which they respectively adjoin; through D parallel to OE draw DT. This will be the line of contact.

A pair of thin frusta of a pair of hyperboloids are used in practice to communicate motion between a pair of axes neither parallel nor intersect- ing, and are called skew-bevel wheels. In skew-bevel wheels the properties of a line of connexion are not possessed by every line traversing the line of contact, but only by every line traversing the line of contact at right angles.

If the velocity ratio to be communicated were variable, the point D would alter its position, and the line DT its direction, at different periods of the motion, and the wheels would be hyperboloids of an eccentric or irregular cross-section; but forms of this kind are not used in practice.

§ 43. Sliding Contact (circular): Grooved Wheels. — As the adhesion or friction between a pair of smooth wheels is seldom sufficient to prevent their slipping on each other, contrivances are «sed to increase their mutual hold. One of those consists in forming the rim of each wheel into a series of alternate ridges and grooves parallel to the plane of rotation; it is applicable to cylindrical and bevel wheels, but not to skew-bevel wheels. The comparative motion of a pair of wheels so ridged and grooved is the same as that of a pair of smooth wheels in rolling contact, whose cylindrical or conical surfaces lie midway between the tops of the ridges and bottoms of the grooves, and those ideal smooth surfaces are called the pitch surfaces of the wheels.

The relative motion of the faces of contact of the ridges and grooves is a rotatory sliding or grinding motion, about the line of contact of the pitch-surfaces as an instantaneous axis. Grooved wheels have hitherto been but little used. § 44. Sliding Contact (direct): Teeth of Wheels, their Number and Pilch. — The ordinary method of

connecting a pair of wheels, or a wheel and a rack, and the only method which ensures the exact maintenance of a given numerical velocity ratio, is by means of a series of alternate ridges and hollows parallel or nearly parallel to the successive lines of contact of the ideal smooth wheels whose velocity ratio would be the same with that of the toothed wheels. The ridges are called teeth; the hollows, spaces. The teeth of the

Fig. 100.

driver push those of the follower before them, and in so doing sliding takes place between them in a direction across their lines of contact.

The pitch-surfaces of a pair of toothed wheels are the ideal smooth surfaces which would have the same comparative motion by rolling contact that the actual wheels have by the sliding contact of their teeth. The pitch-circles of a pair of circular toothed wheels are sections of their pitch-surfaces, made for spur-wheels (that is, for wheels whose axes are parallel) by a plane at right angles to the axes, and for bevel wheels by a sphere described about the common apex. For a pair of skew-bevel wheels the pitch-circles are a pair of contiguous rectangular sections of the pitch-surfaces. The pitch-point is the point of contact of the pitch-circles.

The pitch-surface of a wheel lies intermediate between the points of the teeth and the bottoms of the hollows between them. That part of the acting surface of a tooth which projects beyond the pitch-surface is called the face; that part which lies within the pitch-surface, the flank.

Teeth, when not otherwise specified, are understood to be made in one piece with the wheel, the material being generally cast-iron, brass or bronze. Separate teeth, fixed into mortises in the rim of the wheel, are called cogs. A pinion is a small toothed wheel ; a trundle is a pinion with cylindrical staves for teeth.

The radius of the pitch-circle of a wheel is called the geometrical radius; a circle touching the ends of the teeth is called the addendum circle, and its radius the real radius; the difference between these radii, being the projection of the teeth beyond the pitch-surface, is called the addendum.

The distance, measured along the pitch-circle, from the face of one tooth to the face of the next, is called the pitch. The pitch and the number of teeth in wheels are regulated by the following principles :

—

I. In wheels which rotate continuously for one revolution or more, it is obviously necessary that the pitch should be an aliquot part of the circumference.

In wheels which reciprocate without performing a complete revolution this condition is not necessary. Such wheels are called sectors.

II. In order that a pair of wheels, or a wheel and a rack, may work correctly together, it is in all cases essential that the pitch should be the same in each.

III. Hence, in any pair of circular wheels which work together, the numbers of teeth in a complete circumference are directly as the radii and inversely as the angular velocities.

IV. Hence also, in any pair of circular wheels which rotate continuously for one revolution or more, the ratio of the numbers of teeth and its reciprocal the angular velocity ratio must be expressible in whole numbers.

From this principle arise problems of a kind which will be referred to in treating of Trains of Mechanism.

V. Let n, N be the respective numbers of teeth in a pair of wheels, N being the greater. Let /, T be a pair of teeth in the smaller and larger wheel respectively, which at a particular instant work together. It is required to find, first, how many pairs of teeth must pass the line of contact of the pitch-surfaces before t and T work together again (let this number be called a); and, secondly, with how many different teeth of the larger wheel the tooth t will work at different times (let this number be called b) ; thirdly, with how many different teeth of the smaller wheel the tooth T will work at different times (let this be called c)

Case i. If n is a divisor of N,

o = N; b = N/n; c = i. (20)

Case 2. If the greatest common divisor of N and n be d, a number less than n, so that n — md, N = MJ; then

a=mH = Mn = Mmd; 6 = M; c = m. (21)

Case 3. If N and n be prime to each other,

a = »N; 6 = N; c = n. (22)

It is considered desirable by millwrights, with a view to the preservation of the uniformity of shape of the teeth of a pair of wheels, that each given tooth in one wheel should work with as many different teeth in the other wheel as possible. They there- fore study that the numbers of teeth in each pair of wheels which work together shall either be prime to each other, or shall have their greatest common divisor as small as is consistent with a velocity ratio suited for the purposes of the machine. s

§ 45. Sliding Contact: Forms of the Teeth of Spur-wheels and Racks. — A line of connexion of two pieces in sliding contact is a line perpendicular to their surfaces at a point where they touch. Bearing this in mind, the principle of the comparative motion of a pair of teeth belonging to a pair of spur-wheels, or to a spur-wheel and a rack, is found by applying the principles stated generally in §§ 36 and 37 to the case of parallel axes for a pair of spur-wheels, and to the case of an axis perpendicular to the direction of shifting for a wheel and a rack.

In fig. 101, let Ci, C 2 be the centres of a pair of spur-wheels; B1IB1', B2IB2' portions of their pitch-circles, touching at I, the pitch-point. Let the wheel I be the driver, and the wheel 2 the follower.

Let D1TB1A1, DjTB 2 A 2 be the positions, at a given instant, of the acting surfaces of a pair of teeth in the driver and follower

respectively, touching each other at T; the line of connexion of. those teeth is P1P2, perpendicu- lar to their surfaces at T. Let C1P1, C2P2 be perpendiculars let fall from the centres of the wheels on the line of contact. Then, by § 36, the angular velocity-ratio is

oj/ai'CiPi/CPs. (23)

The following principles regu- late the forms of the teeth and their relative motions: —

I. The angular velocity ratio due to the sliding contact of the teeth will be the same with that due to the rolling contact of the pitch-circles, if the line of connexion of the teeth cuts the line of centres at the pitch- point.

For, let P1P2 cut the line of centres at I; then, by similar

triangles,

C2P2

C,P, : :IC, : :IC; (24)

which is also the angular velocity ratio due to the rolling contact of the circles B, IB,', B2IB2'.

This principle determines the forms of all teeth of spur-wheels. It also determines the forms of the teeth of straight racks, if one of the centres be removed, and a straight line EIE', parallel to the direction of motion of the rack, and perpendicular to QIC2, be substituted for a pitch-circle.

II. The component of the velocity of the point of contact of the teeth T along the line of connexion is

aj.CiP^oj.CjP,. (25)

III. The relative velocity perpendicular to P1P2 of the teeth at their point of contact — that is, their velocity of sliding on each other — is found by supposing one of the wheels, such as I, to be fixed; the line of centres CiC 2 to rotate backwards round Ci with the angular velocity 01, and the wheel 2 to rotate round C 2 as before, with the angular velocity 02 relatively to the line of centres C1C2, so as to have the same motion as if its pitch-circle rolled. on the pitch-circle of the first wheel. Thus the relative motion of the wheels is unchanged; but I is considered as fixed, and 2 has the total motion, that is, a rotation about the instantaneous axis I, with the angular velocity 01 + 02. Hence the velocity of sliding is that due to this rotation about I, with the radius IT; that is to say, its value is

(ox + ojJ.IT; _ (26)

so that it is greater the farther the point of contact is from the line of centres ; and at the instant when that point passes the line of centres, and coincides with the pitch-point, the velocity of sliding is null, and the action of the teeth is, for the instant, that of rolling contact.

IV. The path of contact is the line traversing the various positions of the point T. If the line of connexion preserves always the same position, the path of contact coincides with it, and is straight; in other cases the path of contact is curved.

It is divided by the pitch-point I into two -parts — the arc or line of approach described by T in approaching the line of centres, and the arc or line of recess described by T after having passed the line of centres.

During the approach, the flank D1B1 of the driving tooth drives the face D 2 B 2 of the following tooth, and the teeth are sliding towards each other. During the recess (in which the position of the teeth is exemplified in the figure by curves marked with accented letters), the face B/Ai' of the driving tooth drives the flank B t 'Ai of the following tooth, and the teeth are sliding from each other.

The path of contact is bounded where the approach commences by the addendum-circle of the follower, and where the recess terminates by the addendum-circle of the driver. The length of the path of contact should be such that there shall always be at least one pair of teeth in contact ; and it is better still to make it so long that there shall always be at least two pairs of teeth in contact.

*V. The obliquity of the action of the teeth is the angle EIT = ICPˆICP** ■ •

In practice it is found desirable that the mean value of the obliquity of action during the contact of teeth should not exceed 15 , nor the maximum value 30°.

It is unnecessary to give separate figures and demonstrations for inside gearing. The only modification required in the formulae is, that in equation (26) the difference of the angular velocities should be substituted for their sum.

§ 46. Involute Teeth. — The simplest form of tooth which fulfils the conditions of § 45 is obtained in the following manner (see fig. 102). Let Q, C 8 be the centres of two wheels, BJBi', B2IB2' their pitch-circles, I the pitch-point; let the obliquity of action of the

Fig. 102.

teeth be constant, so that the same straight line P1IP2 shafl represent at once the constant line of connexion of teeth and the path of contact. Draw GPi, C 2 P 2 perpendicular to P1IP2, and with those

lines as radii describe about the centres of the wheels the circles D1D1', D2D2', called base-circles. It is evident that the radii of the base-circles bear to each other the same proportions as the radii of the pitch-circles, and also that

C1P1 = ICi .cos obliquity) (27)

C2P2 = IC 2 .cos obliquity) (The obliquity which is found to answer best in practice is about 145°; its cosine is about §J, and its sine about J. These values though not absolutely exact, are near enough to the truth for practical purposes.)

Suppose the base-circles to be a pair of circular pulleys connected by means of a cord whose course from pulley to pulley is P1IP2. As the line of connexion of those pulleys is the same as that of the proposed teeth, they will rotate with the required velocity ratio. Now, suppose a tracing point T to be fixed to the cord, so as to be carried along the path of con- tact P1IP2, that point will trace on a plane rotating along with the wheel I part of the involute of the base-circle DiD/, and on a plane rotating along with the wheel 2 part of the involute of the base- circle D2D2'; and the two curves so traced will always touch .each other in the required point of contact T, and will therefore fulfil the condition required by Principle I. of § 45.

Consequently, one of the forms suitable for the teeth of wheels is the involute of a circle; and the obliquity of the action of such teeth is the angle whose cosine is the ratio of the radius of their base-circle to that of the pitch-circle of the wheel.

All involute teeth of the same pitch work smoothly together. To find the length of the path of contact on either side of the pitch-point I, it is to be observed that the distance between the fronts of two successive teeth, as measured along P1IP2, is less than the pitch in the ratio of cos obliquity : 1 ; and consequently that, if distances equal to the pitch be marked off either way from I towards Pi and P2 respectively, as the extremities of the path of contact, and if, according to Principle IV. of § 45, the addendum- circles be described through the points so found, there will always be at least two pairs of teeth in action at once. In practice it is usual to make the path of contact somewhat longer, viz. about 2-4 times the pitch; and with this length of path, and the obliquity already mentioned of 14!°, the addendum is about 3-1 of the pitch. The teeth of a rack, to work correctly with wheels having involute teeth, should have plane surfaces perpendicular to the line of con- nexion, and consequently making with the direction of motion of the rack angles equal to the

complement of the obliquity of action. § 47. Teeth for a given Path of Contact: Sang's Method. — In the preceding section the form of the teeth is found by assuming a figure for the path of contact, viz. the straight line. Any other convenient figure may be assumed for the path of contact, and the corresponding forms of the teeth found by determining what curves a point T, moving along the assumed path of contact, will trace on two disks rotating round the centres of the wheels with angular velocities bearing that relation to the component velocity of T along TI, which is given by Principle II. of §45, and'by equation (25). This method of finding the forms of the teeth of wheels forms the subject of an elaborate and most interesting treatise by Edward Sang. .

All wheels having teeth of the same pitch, traced from the same path of contact, work correctly together, and are said to belong to the same set.

§ 48. Teeth traced by Rolling Curves. — If any curve R (fig. 103) be rolled on the inside of the pitch-circle BB of a wheel, it appears, from § 30, that the instan- taneous axis of the rolling curve at any instant will be at the point I, where it touches the pitch-circle for the moment, and that consequently the line AT, traced by a tracing-point T, fixed to the rolling curve upon the plane of the wheel, will be every- where perpendicular to the straight line TI; so that the traced curve AT will be suitable for the flank of a tooth, in which T is the point of contact corresponding to the position I of the pitch-point. If the

Fig. 103.

same rolling curve R, with the same tracing-point T, be rolled on the outside of any other pitch-circle, it will have the face of a tooth suitable to work with the flank AT.

In like manner, if either the same or any other rolling curve R' be rolled the opposite way, on the outside of the pitch-circle BB, so that the tracing point T' shall start from A, it will trace the face AT' of a tooth suitable to work with a flank traced by rolling the same curve R' with the same tracing-point T' inside any other pitch-circle.

The figure of the path of contact is that traced on a fixed plane by the tracing-point, when the rolling curve is rotated in such a manner as always to touch a fixed straight line EIE (or E'I'E', as the case may be) at a fixed point I (or I').

If the same rolling curve and tracing-point be used to trace both the faces and the flanks of the teeth of a number of wheels of different sizes but of the same pitch, all those wheels will work correctly together, and will form a set. The teeth of a rack, of the same set, are traced by rolling the rolling curve on both sides of a straight line.

The teeth of wheels of any figure, as well as of circular wheels, may be traced by rolling curves on their pitch-surfaces; and all teeth of the same pitch, traced by the same rolling curve with the same tracing-point, will work together correctly if their pitch- surfaces are in rolling contact.

§ 49. Epicycloidal Teeth. — The most convenient rolling curve is the circle. The path of contact which it traces is identical with

itself ; and the flanks of the teeth are internal and their faces ex- ternal epicycloids for wheels, and both flanks and faces are cycloids for a rack.

For a pitch-circle of twice the radius of the rolling or describing circle (as it is called) the internal epicycloid is a straight line, being, in fact, a diameter of the pitch- circle, so that the flanks of the teeth for such a pitch-circle are planes radiating from the axis. For a smaller pitch-circle the flanks would be convex and in- curved or under-cut, which would be inconvenient; therefore the smallest wheel of a set should have its pitch-circle of twice the radius of the describing circle, so that the flanks may be either straight or concave.

In fig. 104 let BB' be part of the pitch-circle of a wheel with epicycloidal teeth; CIC the line of centres; I the pitch-point; EIE'. a straight tangent to the pitch-circle at that point; R the internal and R' the equal external describing circles, so placed as to touch the pitch-circle and each other at I. Let DID' be the path of con- tact, consisting of the arc of approach DI and the arc of recess ID'. In order that there may always be at least two pairs of teeth in action, each of those arcs should be equal to the pitch.

The obliquity of the action in passing the line of centres is nothing ; the maximum obliquity is the angle EID = E'ID; and the mean

obliquity is one-half of that angle.

It appears from experience that the mean obliquity should not exceed 15 ; therefore the maximum obliquity should be about 30 ; therefore the equal arcs DI and ID' should each be one-sixth of a circumference; therefore the circumference of the describing circle should be six times the pitch.

It follows that the smallest pinion of a set in which pinion the flanks are straight should have twelve teeth.

§ 50. Nearly Epicycloidal Teeth: Willis's Method. — To facilitate the drawing of epicycloidal teeth in practice, Willis showed how to approximate to their figure by means of two circular arcs — one concave, for the flank, and the other convex, for the face — and each having for its radius the mean radius of curvature of the epicycloidal arc. Willis's formulae are founded on the following properties of epicycloids : —

Let R be the radius of the pitch-circle; r that of the describing circle; the angle made by the normal Tl to the epicycloid at a given point T, witn a tangent-to the circle at I — that is, the obliquity of the action at T.

Then the radius of curvature of the epicycloid at T is —

1ˆ „ -.

For an internal epicycloid, p = 4r sin 6ˆ-

FiG. 104.

(28)

-2/-I R A-r \ For an external epicycloid, p' = \r sin 8 tj-tˆZ J

Also, to find the position of the centres of curvature relatively to the pitch-circle, we have, denoting the chord of the describing circle TI by c, c = 2r sin 0; and therefore

R 1 For the flank, p —c = 2r sin t>_ 2r I

Fig. 105.

For the face, p'—c — 2r sin

R

(29)

R + 2rJ

For the proportions approved of by Willis, sin = i nearly; r=p (the pitch) nearly; c = §/> nearly; and, if N be the number of teeth in the wheel, r/R = 6/N nearly; therefore, approximately,

(30)

Hence the following construction (fig. 105). Let BB be part of the pitch-circle, and a the point where a tooth is to cross it. Set off ab = ac = ip. Draw radii bd, ce; draw fb, eg, making angles of 75i° with those radii. Make bf=p'—c, cg—p—c. From /, with the radius/a, draw the circular arc ah ; from g, with the radius ga, •'G draw the circular arc ak. Then B- ah is the face and ak the flank of the tooth required.

To facilitate the application of this rule, Willis published tables of p — c and p'—c, and invented an in- strument called the"odontograph."

§51. Trundles and Pin-Wheels. — If a wheel or trundle have cylindrical pins or staves for teeth, the faces of the teeth of a wheel suitable for driving it are described by first tracing external epi-cycloids, by rolling the pitch-circle of the pin-wheel or trundle on the pitch-circle of the driving-wheel, with the centre of a stave for a tracing-point, and then drawing curves parallel to, and within the epicycloids, at a distance from them equal to the radius of a stave. Trundles having only six staves will work with large wheels.

§ 52. Backs of Teeth and Spaces. — Toothed wheels being in general intended to rotate either way, the backs of the teeth are made similar to the fronts. The space between two teeth, measured on the pitch-circle, is made about fcth part wider than the thickness of the tooth on the pitch-circle — that is to say,

Thickness of tooth = 1 B r pitch; Width of space = T ˆ pitch. The difference of ˆ of the pitch is called the back-lash. The clearance allowed between the points of teeth and the bottoms of the spaces between the teeth of the other wheel is about one-tenth of the pitch.

§ 53- Stepped and Helical Teeth. — R. J. Hooke invented the mak-ing of the fronts of teeth in a series of steps with a view to increase the smoothness of action. A wheel thus formed resembles in shape a series of equal and similar toothed disks placed side by s de, with the

teeth of each a little behind those of the preceding c isk. He also invented, with the same object, teeth whose fronts, instead of being parallel to the line of contact of the pitch-circles, cross it obliquely, so as to be of a screw-like or helical form. In wheel- work of this kind the contact of each pair of teeth commences at the foremost end of the_ helical front, and terminates at the aftermost end ; and the helix is of such a pitch that the contact of one pair of teeth shall not terminate until that of the next pair has commenced.

Stepped and helical teeth have the desired effect of increasing the smoothness of motion, but they require more difficult and expensive workmanship than common teeth; and helical teeth are, besides, open to the objection that they exert a laterally oblique pressure, which tends to increase resistance, and unduly strain the machinery.
§54. Teeth of Bevel-Wheels. — The acting surfaces of the teeth of bevel-wheels are of the conical kind, generated by the motion of a line passing through the common apex of the pitch-cones, while its extremity is carried round the outlines of the cross section of the teeth made by a sphere described about that apex.

The operations of describing the exact figures of the teeth of bevel-wheels, whether by involutes or by rolling curves, are in every respect analogous to those for describing the figures of the teeth of spur-wheels, except that in the case of bevel-wheels all those opera- tions are to be performed on the surface of a sphere described about the apex instead of on a plane, sub- stituting poles for centres, and great circles for straight lines.

In consideration of the prac- tical difficulty, especially in the case of large wheels, of obtain- ing an accurate spherical sur- face, and of drawing upon it when obtained, the following approximate method, proposed originally by T red gold, is generally used : —

Let 0(fig. 1 06) be the common apex of a pair of bevel- wheels ; OBJ, OB 2 I their pitch cones; OCi, OCj their axes; OI their line of contact. Perpendicular to 01 draw A1IA2, cutting the axes in Ai, A 2 ; make the outer rims of the patterns and of the wheels

Fig. 106.

portions of the cones AiBJ, A2B2I, of which the narrow zones occupied by the teeth will be sufficiently near to a spherical surface described about O for practical purposes. To find the figures of the teeth, draw on a flat surface circular arcs IDi, IDs, with the radii Ail, A 2 I; those arcs will be the developments of arcs of the pitch- circles Bil, B2I, when the conical surfaces A1B1I, A2B2I are spread out flat. Describe the figures of teeth for the developed arcs as for a pair of spur-wheels; then wrap the developed arcs on the cones, so as to make them coincide with the pitch-circles, and trace the teeth on the conical surfaces.

§ 55. Teeth of Skew-Bevel Wheels. — The crests of the teeth of a skew-bevel wheel are parallel to the generating straight line of the hyperboloidal pitch-surface ; and the transverse sections of the teeth at a given pitch-circle are similar to those of the teeth of a bevel-wheel whose pitch surface is a cone touching the hyperboloidal surface at the given circle.

§ 56. Cams. — A cam is a single tooth, either rotating continuously or oscillating, and driving a sliding or turning piece either constantly or at intervals. AH the principles which have been stated in § 45 as being applicable to teeth are applicable to cams; but in designing cams it is not usual to determine or take into consideration the form of the ideal pitch-surface, which would give the same comparative motion by rolling contact that the cam gives by sliding contact.

§ 57. Screws. — The figure of a screw is that of a convex or concave cylinder, with one or more helical projections, called threads, winding round it. Convex and concave screws are distinguished technically by the respective names of male and female ; a short concave screw is called a nut; and when a screw is spoken of without qualification a convex screw is usually understood.

The relation between the advance and the rotation, which compose the motion of a screw working in contact with a fixed screw or helical guide, has already been demonstrated in § 32 ; and the same relation exists between the magnitudes of the rotation of a screw about a fixed axis and the advance of a shifting nut in which it rotates. The advance of the nut takes place in the opposite direction to that of the advance of the screw in the case in which the nut is fixed. The pitch or axial pitch of a screw has the meaning assigned to it in that section, viz. the distance, measured parallel to the axis, between the corresponding points in two successive turns of the same thread. If, therefore, the screw has several equidistant threads, the true pitch is equal to the divided axial pitch, as measured between

two adjacent threads, multiplied by the number of threads.

If a helix be described round the screw, crossing each turn of the thread at right angles, the distance between two corresponding points on two successive turns of the same thread, measured along this normal helix, may be called the normal pitch; and when the screw bis more than one thread the normal pitch from thread to thread 1 lay be called the normal divided pitch.

The d stance from thread to thread, measured on a circle described about the axis of the screw, called the pitch-circle, may be called the circumferential pitch; for a screw of one thread it is one circum-

t c r ˆ.i_ j one circumference

ference ; tor a screw of n threads.

n Let r denote the radius of the pitch circle ; n the number of threads;

the obliquity of the threads to the pitch circle, and of the normal helix to the axis ;

Pa] [pitch,

Pa = . > the axial -j n p “) [divided pitch ;

_ P »l .. fpitch,

£ji_£ !- the normal 4 n P “J [divided pitch;

P„ the circumferential pitch;

then

Pe = Pa COt 9 = />„ COS 9 =

Pa=pnsec8 = p c ta.n0 =

p n =pcS\u.6=p a COS 8 =

2irr ~

n

270- tan

n ‘

2-irr sin 9

n

(31)

If a screw rotates, the number of threads which pass a fixed point in one revolution is the number of threads in the screw.

A pair of convex screws, each rotating about its axis, are used as an elementary combination to transmit motion by the sliding contact of their threads. Such screws are commonly called endless screws. At the point of contact of the screws their threads must be parallel; and their line of connexion is the common perpendi- cular to the acting surfaces of the threads at their point of contact. Hence the following principles : — ■

I. If the screws are both right-handed or both left-handed, the angle between the directions of their axes is the sum of their obli- quities; if one is right-handed and the other left-handed, that angle is the difference of their obliquities.

II. The normal pitch for a screw of one thread, and the normal divided pitch for a screw of more than one thread, must be the same in each screw.

Fig. 107. E2E2 a bar sliding in a

III. The angular velocities of the screws are inversely as their numbers of threads.

Hooke's wheels with oblique or helical teeth are in fact screws of many threads, and of large diameters as compared with their lengths.

The ordinary position of a pair of endless screws is with their axes at right angles to each other. When one is of considerably greater diameter than the other, the larger is commonly called in practice a wheel, the name screw being applied to the smaller only ; but they are nevertheless both screws in fact.

To make the teeth of a pair of endless screws fit. correctly and work smoothly, a hardened steel screw is made of the figure of the smaller screw, with its thread or threads notched so as to form a cutting tool; the larger screw, or " wheel," is cast approximately of the required figure ; the larger screw and the steel screw are fitted up in their proper relative position, and made to rotate in contact with each

other by turning the steel screw, which cuts the threads of the larger screw to their true figure.

§ 58. Coupling of Parallel Axes — Oldham's Coupling. — A coupling is a mode of connecting a pair of shafts so that they shall rotate in the same direction with the same mean angular velocity. If the axes of the shafts are in the same straight line, the coupling consists in so connecting their contiguous ends that they shall rotate as one piece; but if the axes are not in the same straight line combinations of mechanism are required. A coupling for parallel shafts which acts by sliding contact was invented by Oldham, and is represented in fig. 107. G, C2 are the axes of the two parallel shafts; Di, D2 two disks facing each other, fixed on the ends of the two shafts respectively; E1E1 a bar sliding in a diametral groove in the face of Di ;

diametral groove in the face of D2: those bars are fixed together at A, so as to form a rigid cross. The angular velocities of the two disks and' of the cross are all equal at every instant; the middle point of the cross, at A, revolves in the dotted circle de- scribed upon £he line of centres GC 2 as a diameter twice for each turn of the disks and cross ; the instantaneous axis of rotation of the cross at any instant is at I, the point in ,the circle C1C2 diametrically opposite to A.

Oldham's coupling may be used with advantage where the axes of the shafts are intended to be as nearly in the same straight line as is possible, but where there is some doubt as to the practibility or permanency of their exact continuity.

8 59. Wrapping Connectors — Belts, Cords and Chains. — Flat belts of leather or of gutta percha, round cords of catgut, hemp or other material, and metal chains are used as wrapping connectors to transmit rotatory motion between pairs of pulleys and drums.

Belts (the most frequently used of all wrapping connectors) require nearly cylindrical pulleys. A belt tends to move towards that part of a pulley whose radius is greatest; pulleys for belts, therefore, are slightly swelled in the middle, in order that the belt may remain on the pulley, unless forcibly shifted. A belt when in motion is shifted off a pulley, or from one pulley on to another of equal size alongside of it, by pressing against that part of the belt which is moving towards the pulley.

Cords require either cylindrical drums with ledges or grooved pulleys.

Chains require pulleys or drums, grooved, notched and toothed, so as to fit the links of the chain.

Wrapping connectors for communicating continuous motion are endless.

Wrapping connectors for communicating reciprocating motion have usually their ends made fast to the pulleys or drums which they connect, and which in this case may be sectors.

The line of connexion of two pieces connected by a wrapping connector is the centre line of the belt, cord or chain; and the comparative motions of the pieces are determined by the [principles of § 36 if both pieces turn, and of § 37 if one turns and the other shifts, in which latter case the motion must be reciprocating.

The pitch-line of a pulley or drum is a curve to which the line of connexion is always a tangent — that : s to say, it is a curve parallel to the acting surface of the pulley or drum, and distant from it by half the thickness of the wrapping con- nector.

Pulleys and drums for communi- cating a constant velocity ratio are circular.

Fig. 108.

The effective radius, or radius of the pitch-circle of a circular pulley or drum, is equal to the real radius added to half the thickness of the connector. The

Theory of machines]

MECHANICS

angular velocities of a pair of connected circular pulleys or drums are inversely as the effective radii.

A crossed belt, as in fig. 108, A, reverses the direction of the rotation communicated; an uncrossed belt, as in fig. 108, B, preserves that direction.

The length L of an endless belt connecting a pair of pulleys whose effective radii are r u r 2 , with parallel axes whose distance apart is c, is given by the following formulae, in each of which the first term, containing the radical, expresses the length of the straight parts of the belt, and the remainder of the formula the length of the curved

parts.

For a crossed belt : —

-in +

IOO5

L = 2Vc 2 -(r,r 2) 2 . (ri + r 2) (w-2 sin" 1 ?^) ;

and for an uncrossed belt : —

L = 2V [c 2 – (n-r 2) ! ! +,(ri + r , +2(r 1

• r 2) sin

-in— r s .

(32 A)

(32 B)

Fig. 109.

in which n is the greater radius, and r 2 the less.

When the axes of a pair of pulleys are not parallel, the pulleys should be so placed that the part of the belt which is approaching each pulley shall be in the plane of the pulley.

§ 60. Speed-Cones. — A pair of speed-cones (fig. 109) is a contrivance for varying and adjusting the velocity ratio communicated between a pair of parallel shafts by means of a belt. The speed-cones are either continuous cones or conoids, as A, B, whose velocity ratio can be varied gradually while they are in motion by shifting the belt, or sets of pulleys whose radii vary by steps, as C, D, in which case the velocity ratio can be changed by shifting the belt from one pair of pulleys to another.

In order that the belt may fit accurately in every possible position on a pair of speed-cones, the quantity L must be constant, in equa- tions (32 A) or (32 B), accord- ing as the belt is crossed or uncrossed.

For a crossed belt, as in A and C, fig. 109, L depends solely cm c and on n + r 2 . Now c is constant because the axes are parallel ; therefore the sum of the radii of the pitch- circles connected in every position of the belt is to be constant. That condition is fulfilled by a

pair of con- tinuous cones generated by the revolution of two straight lines inclined opposite ways to their respective axes at equal angles.

For an uncrossed belt, the quantity L in equation (32 B) is to be made constant. The exact fulfilment of this condition requires the solution of a transcendental equation; but it may be fulfilled with accuracy sufficient for practical purposes by using, instead of (32 B) the following approximate equation : —

L nearly = 2c +ir(n +r 2) + (n – r 2) 2 /c. (33)

The following is the most convenient practical rule for the application of this equation: —

Let the speed-cones be equal and similar conoids, as in B, fig. 109, but with their large and small ends turned opposite ways. Let r, be the radius of the large end of each, r 2 that of the small end, r that of the middle ; and let v be the sagitta, measured perpendicular to the axes, of the arc by whose revolution each of the conoids is generated, or, in other words, the bulging of the conoids in the middle of their length. Then

v = r -(ri +r 2)/2 = (n -r 2) 2 /27rc. (34)

2t = 6-2832; but 6 may be used in most practical cases without sensible error.

The radii at the middle and end being thus determined, make the generating curve an arc either of a circle or of a parabola.

§ 61. Link-work in General. — The pieces which are connected by hnkwork, if they rotate or oscillate, are usually called cranks, beams and levers. The link by which they are connected is a rigid rod or bar, which may be straight or of any other figure ; the straight figure being the most favourable to strength, is always used when there is no special reason to the contrary. The link is known by various names m various circumstances, such as coupling-rod, connecting-rod, crank-rod, eccentric-rod, &c. It is attached to the pieces which it connects by two pins, about which it is free to turn. The effect of the link is to maintain the distance between the axes of those pins invariable ; hence the common perpendicular of the axes of the pins is the line of connexion, and its extremities may be called the connected points. In a turning piece, the perpendicular let fall from its connected point upon its axis of rotation is the arm or crank-arm.

The axes of rotation of a pair of turning pieces connected by a link

are almost always parallel, and perpendicular to the line of connexion

in which case the angular velocity ratio at any instant is the reciprocal of the ratio of the common perpendiculars let fall from the line of connexion upon the respective axes of rotation.

If at any instant the direction of one of the crank-arms coincides with the line of connexion, the common perpendicular of the line of connexion and the axis of that crank-arm vanishes, and the directional relation of the motions becomes indeterminate. The position of the connected point of the crank-arm in question at such an instant is called a dead-point. The velocity of the other connected point at such an instant is null, unless it also reaches a dead-point at the same instant, so that the line of connexion is in the plane of the two axes of rotation, in which case the velocity ratio is indeterminate. Examples of dead-points, and of the means of preventing the inconvenience which they tend to occasion, will appear in the sequel.

§ 62. Coupling of Parallel Axes.— Two or more parallel shafts (such as those of a locomotive engine, with two or more pairs of driving wheels) are made to rotate with constantly equal angular velocities by having equal cranks, which are maintained parallel by a coupling-rod of such a length that the line of connexion is equal to _ the distance between the axes. The cranks pass their dead- points simultaneously. To obviate the unsteadiness of motion which this tends to cause, the shafts are provided with a second set of cranks at right angles to the first, connected by means of a similar coupling-rod, so that one set of cranks pass their dead points at the instant when the other set are farthest from theirs. _ § 63. Comparative Motion of Connected Points. — As the link is a rigid body, it is obvious that its action in communicating motion may be determined by finding the comparative motion of the connected points, and this is often the most convenient method of proceeding.

If a connected point belongs to a turning piece, the direction of its motion at a given instant is perpendicular to the plane containing the axis and crank-arm of the piece. If a connected point belongs to a shifting piece, the direction of its motion at any instant is given, and a plane can be drawn perpendicular to that direction.

The line of intersection of the planes perpendicular to the paths of the two connected points at a given instant is the instantaneous axis of the link at that instant; and the velocities of the connected points

are directly as their distances from that axis.

In drawing on a plane surface, the two planes perpendicular to the paths of the connected points are represented by two lines (being their sections by a plane normal to them), and the instantaneous axis by a point (fig. no); and, should the length of the two lines render it impracticable to produce them until they actually intersect, the velocity ratio of the connected points may be found by the principle that it is equal to the ratio of the segments which a line parallel to the line of connexion cuts off from any two lines drawn from a given point, perpendicular respectively to the paths of the connected points.

To illustrate this by one example. Let G be the axis, and Ti the connected point of the beam of a steam-engine; TiT 2 the connecting or crank-rod; T 2 the other connected point, and the centre of the crank-pin; Ci the axis of the crank and its shaft. Let »i denote the velocity of Ti at any given instant ; v 2 that of T 2 . To find the ratio of these velocities, produce C1T1, C 2 T 2 till they intersect in K; K is the instantaneous axis of the connecting rod, and the velocity ratio is

»i : Vi : : KT X : KT 2 . (35)

Should K be inconveniently far off, draw any triangle with its sides respectively parallel to QTi, C 2 T 2 and TiT 2 ; the ratio of the twa sides first mentioned will be the velocity ratio required. For example, draw C 2 A parallel to C1T1, cutting TiT 2 in A; then

Vi : » 2 : : C 2 A : C 2 T 2 . (36)

§ 64. Eccentric. — An eccentric circular disk fixed on a shaft, and used to give a reciprocating motion to a rod, is in effect a crank-pin of sufficiently large diameter to surround the shaft, and so to avoid the weakening of the shaft which would arise from bending it so as to form an ordinary crank. The centre of the eccentric is its connected point; and its eccentricity, or the distance from that centre to the axis of the shaft, is its crank-arm.

An eccentric may be made capable of having its eccentricity alteredby means of an adjusting screw, so as to vary the extent of the reciprocating motion which it communicates.

§65. Reciprocating Pieces — Stroke — Dead-Points. — The distance between the extremities of the path of the connected point in a reciprocating piece (such as the piston of a steam-engine) is called the stroke or length of stroke of that piece. When it is connected with

a continuously turning piece (such as the crank of a steam-engine) the ends of the stroke of the reciprocating piece correspond to the

dead-points of the path of the connected point of the turning piece, where the line of connexion is continuous with or coincides with the crank-arm.

Let S be the length of stroke of the reciprocating piece, L the length of the line of connexion, and R the crank-arm of the con- tinuously turning piece. Then, if the two ends of the stroke be in one straight line with the axis of the crank,

S= 2 R; (37)

and if these ends be not in one straight line with that axis, then S, L — R, and L+R, are the three sides of a triangle, having the angle opposite S at that axis ; so that, if 8 be the supplement of the arc between the dead-points,

S 2 =2(L 2 +R 2)-2(L 2 -R 2) cosfl,)

„ . 2U + 2R2 – ff [(3 8)

cos e = 2(L 2_ R2))

§ 66. Coupling of Intersecting Axes — Hooke's Universal Joint. — Intersecting axes are coupled by a contrivance of Hooke's, known as the " universal joint," which belongs to the class of linkwork (see fig. in). Let be the point of intersection of the axesOCi, OC2,

and 8 their angle of inclination

to each other. The pair of

shafts Ci, C2 terminate in a pair

Cifl>ˆ /^^— IL// of forks Fi, Fa in bearings at

the extremities of which turn the gudgeons at the ends of the arms of a rectangular cross, having its centre at O. This cross is the link; the connected points are the centres of the bearings Fi, F2. At each in-

stant each of those points Fig. in. moves at right angles to the

central plane of its shaft and fork, therefore the line of intersection of the central planes of the two forks at any instant is the instantaneous axis of the cross, and the velocity ratio of the points Fi, F2 (which, as the forks are equal, is also the angular velocity ratio of the shafts) is equal to the ratio of the distances of those points from that instantaneous axis. The mean value of that velocity ratio is that of equality, for each successive quarter-turn is made by both shafts in the same time; but its actual value fluctuates between the limits: —

and

— = r when Fi is the plane of OC1C2

.1 cosfl y (3g)

— = cos 6 when F2 is in that plane, ai

Its value at intermediate instants is given by the following equations: let <(>i, i tan fa, ~)

22. = — di+ cot

ai dfa tan

§ 67. Intermittent Linkwork — Click and Ratchet. — A click acting upon a ratchet-wheel or rack, which it pushes or pulls through a certain arc at each forward stroke and leaves at rest at each backward stroke, is an example of intermittent linkwork. During the forward stroke the action of the click is governed by the principles of linkwork; during the backward stroke that action ceases. A catch or pall, turning on a fixed axis, prevents the ratchet-wheel or rack from reversing its motion.

Division 5. — Trains of Mechanism.

§ 68. General Principles. — A train of mechanism consists of a series of pieces each of which is follower to that which drives it and driver to that which follows it.

The comparative motion of the first driver and last follower is obtained by combining the proportions expressing by their terms the velocity ratios and by their signs the directional relations of the several elementary combinations of which the train consists.

§ 69. Trains of Wheel-work. — Let Ai, As, A3, &c, Am_i, A m denote a series of axes, and 01, oj, 03, &c, om-i, am their angular velocities. Let the axis Ai carry a wheel of Ni teeth, driving a wheel of nˆ teeth on the axis A 2 , which carries also a wheel of N 2 teeth, driving a wheel of «3 teeth on the axis A3, and so on; the numbers of teeth in drivers being denoted by N's, and in followers by re's, and the axes to which the wheels are fixed being denoted by numbers. Then the resulting velocity ratio is denoted by

£2 Oj

&c.

a m = Ni . N2. . &c N„-i .

e-m-i «2 • »3 • . &c. . . . n M '

(41)

that is to say, the velocity ratio of the last and first axes is the ratio of the product of the numbers of teeth in the drivers to the product of the numbers of teeth in the followers.

Supposing all the wheels to be in outside gearing, then, as each elementary combination reverses the direction of rotation, and as the number of elementary combinations m — 1 is one less than the

number of axes m, it is evident that if m is odd the direction of rotation is preserved, and if even reversed.

It is often a question of importance to determine the number of teeth in a train of wheels best suited for giving a determinate velocity ratio to two axes. It was shown by Young that, to do this with the least total number of teeth, the velocity ratio of each elementary combination should approximate as nearly as possible to 3-59. This would in many cases give too many axes; and, as a useful practical rule, it may be laid down that from 3 to 6 ought to be the limit of the velocity ratio of an elementary combination in wheelwork. The smallest number of teeth in a pinion for epicycloidal teeth ought to be twelve (see § 49) — but it is better, for smoothness of motion, not to go below fifteen ; and for involute teeth the smallest number is about twenty-four.

Let B/C be the velocity ratio required, reduced to its least terms, and let B be greater than C. If B/C is not greater than 6, and C lies between the prescribed minimum number of teeth (which may be

called /) and its double 2t, then one pair of wheels will answer the purpose, and B and C will themselves be the numbers required. Should B and C be inconveniently large, they are, if possible, to be resolved into factors, and those factors (or if they are too small, multiples of them) used for the number of teeth. Should B or C, or both, be at once inconveniently large and prime, then, instead of the exact ratio B/C some ratio approximating to that ratio, and capable of resolution into convenient factors, is to be found by the method of continued fractions.

Should B/C be greater than 6, the best number of elementary combinations m — 1 will lie between

l og B-logC and log B-log C log 6 log 3

Then, if possible, B and ,C themselves are to be resolved each into m — I factors (counting I as a factor), which factors, or multiples of them, shall be not less than / nor greater than 6t; or if B and C contain inconveniently large prime factors, an approximate velocity ratio, found by the method of continued fractions, is to be substituted for B/C as before.

So far as the resultant velocity ratio is concerned, the order of the drivers N and of the followers n is immaterial: but to secure equable wear of the teeth, as explained in § 44, the wheels ought to be so arranged that, for each elementary combination, the greatest common divisor of N and « shall be either 1 , or as small as possible.
§ 70. Double Hooke's Coupling. — It has been shown in § 66 that the velocity ratio of a pair of shafts coupled by a universal joint fluctuates between the limits cos 8 and i/cos 8. Hence one or both of the shafts must have a vibratory and unsteady motion, injurious to the mechanism and framework. To obviate this evil a short intermediate shaft is introduced, making equal angles with the first and last shaft, coupled with each of them by a Hooke's joint, and having its own two forks in the same plane. Let 01, a 2 , a 3 be the angular velocities of the first, intermediate, and last shaft in this train of two Hooke's couplings. Then, from the principles of § 60 it is evident that at each instant 02/01 = 02/03, and consequently that 03 = 01 ; so that the fluctuations of angular velocity ratio caused by the first coupling are exactly neutralized by the second, and the first and last shafts have equal angular velocities at each instant.

§ 71. Converging and Diverging Trains of Me.'-hanism. — Two or more trains of mechanism may converge into one — as when the two pistons of a pair of steam-engines, each through its own connecting-

rod, act upon one crank-shaft. One train of mechanism may diverge into two or more — as when a single shaft, driven by a prime mover, carries several pulleys, each of which drives a different machine. The principles of comparative motion in such converging and diverg- ing trains are the same as in simple trains.

Division 6. — Aggregate Combinations.

§ 72. General Principles. — Willis designated as ” aggregate combinations ” those assemblages of pieces of mechanism in which the motion of one follower is the resultant of component motions impressed on it by more than one driver. Two classes of aggregate combinations may be distinguished which, though not different in their actual nature, differ in the data which they present to the designer, and in the method of solution to be followed in questions respecting them.

Class I. comprises those cases in which a piece A is not carried directly by the frame C, but by another piece B. relatively to which the motion of A is given — the motion of the piece B relatively to the frame C being also given. Then the motion of A relatively to the frame C is the resultant of the motion of A relatively to B and of B relatively ˆto C ; and that resultant is to be found by the principles already explafned in Division 3 of this Chapter §§ 27-32.

Class II. comprises those cases in which the motions of three points in one follower are determined by their connexions with two or with three different drivers.

This classification is founded on the kinds of problems arising from the combinations. Willis adopts another classification founded on the objects of the combinations, which objects he divides into two classes, viz. (1) to produce aggregate velocity, or a velocity which is the resultant of two or more components in the same path, and (2) to produce an aggregate path — that is, to make a given point

in a rigid body move in an assigned path by communicating certain motions to other points in that body.

It is seldcm that one of these effects is produced without at the same

time producing the other; but the classification of Willis depends upon which of those two effects, even supposing them to occur together, is the practical object of the mechanism.

§ 73. Differential Windlass. — The axis C (fig. 112) carries a larger barrel AE and a smaller barrel DB, rotating as one ·£ piece with the angular velocity ai in the direction

/Vjn\ AE. The pulley or sheave FG has a weight W ‘ ‘ hung to its centre. A cord has one end made fast

to and wrapped round the barrel AE; it passes from A under the sheave FG, and has the other end wrapped round and made fast to the barrel BD. Required the relation between the velocity of translation » 2 of W and the angular velocity ai of f N. the differential barrel.

1_ In this case i>2 is an aggregate velocity, produced

by the joint action of the two drivers AE and BD, transmitted by wrapping connectors to FG, and combined by that sheave so as to act on the fol- lower W, whose motion is the same with that of the centre of FG.

The velocity of the point F is ai . AC, upward

motion being considered positive. The velocity

of the point G is — ai . CB, downward motion being negative.

Hence the instantaneous axis of the sheave FG is in the diameter

FG, at the distance

FG AC-BC 2 ‘ AC + BC from the centre towards G ; the angular velocity of the sheave is

AC + BC

02 – ai FG :

and, consequently, the velocity of its centre is

FG AC-BC ai(AC- ‘ AC + BC ~

6 w

Fig. 112.

Vi = at

•BC)

2 AU + BC 2 ˆ 2)

or the mean between the velocities of the two vertical parts of the cord.

If the cord be fixed to the framework at the point B, instead of being wound on a barrel, the velocity of W is half that of AF.

A case -containing several sheaves is called a block. A fall-bloek is attached to a fixed point ; a running-block is movable to and from a fall-block, with which it is connected by two or more plies of a rope. The whole combination constitutes a tackle or purchase. (See Pulleys for practical applications of these principles.)

§ 74. Differential Screw. — On the same axis let there be two screws of the respective pitches pi and p2, made in one piece, and rotating with the angular velocity a. Let this piece be called B. Let the first screw turn in a fixed nut C, and the second in a sliding nut A. The velocity of advance of B relatively to C is (according to § 32) ap u and of A relatively to B (according to § 57) —apt; hence the velocity of A relatively to C is

a(pi-p 2), (46)

being the same with the velocity of advance of a screw of the pitch pi — pi- This combination, called Hunter's or the differential screw, combines the strength of a large thread with the slowness of motion due to a small one.

§ 75. Epicyclic Trains. — The term epicyclic train is used by Willis to denote a train of wheels carried by an arm, and having certain rotations relatively to that arm, which itself rotates. The arm may either be driven by the wheels or assist in driving them. The comparative motions of the wheels and of the arm, and the aggregate paths traced by points in the wheels, are determined by the principles of the composition of rotations, and of the description of rolling curves, explained in §§ 30, 31.

§ 76. Link Motion. — A slide valve operated by a link motion receives an aggregate motion from the mechanism driving it. (See

Steam-engine for a description of this and other types of mechanism of this class.)

§ 77. Parallel Motions.— A parallel motion is a combination of turning pieces in mechanism designed to guide the motion of a

reciprocating piece either exactly or aoproximately in a straight line, so as to avoid the friction which arises from the use of straight guides for that purpose.

Fig. 113 represents an exact parallel motion, first proposed, it is believed, by Scott Russell. The arm CD turns on the axis C, and is jointed at D to the middle of the bar ADB, whose length is double of that of CD, and one of whose ends B is jointed to a slider, sliding in straight guides along the line CB. Draw BE perpendicular to CB, cutting CD produced in E, then E is the instantaneous axis of the bar ADB; and the direction of motion of A is at every instant perpendicular to EA — that is, along

••'* .-•'«*

Fig 113.

the straight line ACa. While the stroke of A is ACo, extending to equal distances on either side of C, and equal to twice the chord of the arc X)d, the stroke of B is only equal to twice the sagitta; and thus A is guided through a comparatively long stroke by the sliding of B through a comparatively short stroke, and by rotatory motions at the joints C, D, B.

§ 78. An example of an approximate straight-line motion composed of three bars fixed to a frame is shown in fig. 114. It is due*

Fig. 114.

Fig. 115.

to P. L. Tchebichev of St Petersburg. The links AB and CD are equal in length and are centred respectively at A and C. The ends D and B are joined by a link DB. If the respective lengths are made in the proportions AC: CD : DB = 1 : 1-3:0-4 the middle point P of DB will describe an approximately straight line parallel to AC within limits of length about equal to AC. C. N. Peaucellier, a French engineer officer, was the first, in 1864, to invent a linkwoik with which an exact straight line could be drawn. The linkwork is shown in fig. 115, from which it will be seen that it consists of a rhombus of four

equal bars ABCD, jointed at opposite corners with two equal bars BE and DE. The seventh link AF is equal in length to hah the distance EA when the mechanism is in its central position, The points E and F are fixed. It can be proved that the point C always moves in a straight line at right angles to the line EF. The more general property of the mechanism corresponding to proper- tions between the lengths FA and EF other than that of equality is that the curve described by the point C is the inverse of the curve described by A. There are other arrangements of bars giving straight-line motions, and these arrangements together with th«s general properties of mechanisms of this kind are discussed in How to Draw a Straight Line by A. B. Kempe (London, 1877).

§ 79. The Pantograph. — If a parallelogram of links (fig. 116), be fixed at any one point a in any one of the links produced in eithsr direction, and if any straight line be drawn from this point to cut the links in the points b and c, then the points a, b, c will be in a straight line for all positions of the mechanism, and if the point b be guided in any curve whatever, the point c will trace a similar FlG. 116.*

curve to a scale enlarged

in the ratio ab : ac. This property of the parallelogram is utilized in the construction of the pantograph, an instrument used for obtaining a copy of a map or drawing on a different scale. Professor J. J. Sylvester discovered that this property of the parallelogram is not confined to points lying in one line with the fixed point. Thus if b (fig. 117) be q

any point on the link CD, and if a point c be taken on the link DE such that the triangles C6D and DcE are similar and similarly situated with regard to their respective links, then the ratio of the distances ab and ac is constant, and the angle bac E

is constant for all positions of the mechanism; so that, if b is guided in any curve, the point c will describe a similar curve turned through an angle bac, the scales of the curves being in the ratio ab to ac. Sylvester called an instrument based on this property a plagiograph or a skew pantograph.

The combination of the parallelogram with a straight-line motion, for guiding one of the points in a straight line, is illustrated in Watt s parallel motion for steam-engines. (See Steam-engine.)

§ 80. The Reuleaux System of Analysis.— If two pieces, A and B.*

(fig. 118) are jointed together by a pin, the pin being fixed, say, to A. the only relative motion possible between the pieces is one of turning about the axis of the pin. Whatever motion the pair of pieces may have as a whole each separate piece shares in common, and thw common motion in no way affects the relative motion of A and B The motion of one piece is said to be completely constrained relatively to the other piece. Again, the pieces A and B_(fig. 119) are paired together as a slide, and the only relative motion possible between them now is that of sliding, and therefore the motion of one relatively to the other is completely constrained. The pieces may be paired

Fig. 117.

together as a screw and nut, in which case the relative motion is compounded of turning with sliding.

These combinations of pieces are known individually as kinematic pairs of elements, or briefly kinematic pairs. The three pairs mentioned above have each the peculiarity that contact between the two pieces forming the pair is distributed over a surface. Kinematic

Fig. 118.

Fig. 119.

Fig. 120.

pairs which have surface contact are classified as lower pairs. Kinematic pairs in which contact takes place along a line only are classified as higher pairs. A pair of spur wheels in gear is an example of a higher pair, because the wheels have contact between their teeth along lines only.

A kinematic link of the simplest form is made by joining up the halves of two kinematic pairs by means of a rigid link. Thus if A1B1 represent a turning pair, and A2B2 a second turning pair, the rigid link formed by joining Bi to B 2 is a kinematic link. Four links of this kind are shown in fig. 120 joined up to form a closed kinematic chain.

In order that a kinematic chain may be made the basis of a mechanism, every point in any link of it must be completely constrained with regard to every other link. Thus in fig. 120 the motion

of a point a in the link AiA 2 is completely con- strained with regard to the link B1B4 by the turning pair A1B1, and it can be proved that the motion of a relatively to the non-adjacent link A3A4 is completely constrained, and therefore the four- bar chain, as it is called, can be and is used as the basis of many mechanisms. Another way of considering the question of constraint is to imagine any one link of the chain fixed; then, however the chain be moved, the path of a point, as a, will always remain the same. In a five-bar chain, if a is a point in a link non- adjacent to a fixed link, its path is indeterminate. Still another way of stating the matter is to say that, if any one link in the chain be fixed, any point in the chain must have only one degree of freedom. In a five-bar chain a point, as a, in a link non-adjacent to the fixed link has two degrees of freedom arid the chain cannot therefore be used for a mechanism. These principles may be applied to examine any possible combination of links forming a kinematic chain in order to test its suitability for use as a mechanism. Compound chains are formed by the super-position of two or more simple chains, and in these more complex chains links will be found carrying three, or even more, halves of kine- matic pairs. The Joy valve gear mechanism is a good example of a compound kinematic chain.

A chain built up of three turning pairs and one sliding pair, and known as the slider crank chain, is shown in fig. 121. It will be seen

that the piece Ai can only slide relatively to the piece Bi, and these two pieces therefore form the sliding pair. The piece Ai carries the

Ein B4, which is one alf of the turning pair A 4 B<. The piece Ai together with the pin B« therefore form a kinematic link A1B4. The other links of the chain are, B1A2, B 2 B 3 , A 3 A 4 . In order to convert a chain into a mechanism it is necessary to fix one link in it. Any one of the links may be fixed. It follows therefore that there are as many possible mechanisms as there are links in the chain. For example, there is a well-known mechanism corresponding to the fixing of three of the four links of the slider crank chain (fig. 121). If the link d is fixed the chain at once becomes the mechanism of the ordinary steam engine; if the link e is fixed the mechanism obtained is that of the oscillating cylinder steam engine; if the link c is fixed the mechanism becomes either the Whitworth quick-return motion or the slot-bar motion, depending upon the proportion between the

lengths of the links c and e. These different mechanisms are called

Fig. 121.

inversions of the slider crank chain. What was the fixed frame- work of the mechanism in one case becomes a moving link in an inversion.

The Reuleaux system, therefore, consists essentially of the analysis of every mechanism into a kinematic chain, and since each link of the chain may be the fixed frame of a mechanism quite diverse mechanisms are found to be merely inversions of the same kinematic chain. Franz Reuleaux's Kinematics of Machinery, translated by Sir A. B. W. Kennedy (London, 1876), is the book in which the sys- tem is set forth in all its completeness. In Mechanics of Machinery, by Sir A. B. W. Kennedy (London, 1886), the system was used for the first time in an English textbook, and now it has found its way into most modern textbooks relating to the subject of mechanism.

§ 81. Centrodes, Instantaneous Centres, Velocity Image, Velocity Diagram. — Problems concerning the relative motion of the several parts of a kinematic chain may be considered in two ways, in addition to the way hitherto used in this article and based on the principle of § 34. The first is by the method of instantaneous centres, already exemplified in § 63, and rolling centroids, developed by Reuleaux in connexion with his method of analysis. The second is by means of Professor R. H. Smith's method already referred to in § 23.*

Method 1. — By reference to § 30 it will be seen that the motion of a cylinder rolling on a fixed cylinder is one of rotation about an instantaneous axis T, and that the velocity both as regards direction and magnitude is the same as if the rolling piece B were for the instant turning about a fixed axis coincident with the instantaneous axis. If the rolling cylinder B and its path A now be assumed to receive a common plane motion, what was before the velocity of the point P becomes the velocity of P relatively to the cylinder A, since the motion of B relatively to A still takes place about the instantaneous axis T. If B stops rolling, then the two cylinders continue to move as though they were parts of a rigid body. Notice that the shape of either rolling curve (fig. 91 or 92) may be found by considering each fixed in turn and then tracing out the locus of the instantaneous axis. These rolling cylinders are sometimes called axodes, and a section of an axode in a plane parallel to the plane of motion is called a centrode. The axode is hence the locus of the instantaneous axis, whilst the centrode is the locus of the instan- taneous centre in any plane parallel to the plane of motion. There is

no restriction on the shape of these rolling axodes ; they may have any shape consistent with rolling (that is, no slipping is permitted), and the relative velocity of a point P is still found by considering it with regard to the instantaneous centre.

Reuleaux has shown that the relative motion of any pair of non-adjacent links of a kinematic chain is determined by the rolling together of two ideal cylindrical surfaces (cylindrical being used here in the general sense), each of which may be assumed to be formed by the extension of the material of the link to which it corresponds. These surfaces have contact at the instantaneous axis, which is now called the instantaneous axis of the two links concerned. To find the form of these surfaces corresponding to a particular pair of non-adjacent links, consider each link of the pair fixed in turn, then the locus of the instantaneous axis is the axode corresponding to the fixed link, or, considering a plane of motion only, the locus of the instantaneous centre is the centrode corresponding to the fixed link.

To find the instantaneous centre for a particular link corresponding to any given configuration of the kinematic chain, it is only necessary to know the direction of motion of any two points in the link, since lines through these points respectively at right angles to their direc- tions of motion intersect in the instantaneous centre.

To illustrate this principle, consider the four-bar chain shown in fig. 122 made up of the four links, a, b, c, d. Let a be the fixed link,

and consider the link c. Its extremities are moving respectively in directions at right angles to the links b and d; hence produce the links b and d to meet in the point O ae – This point is the in-stantaneous centre of the motion of the link c relatively to the fixed link a, a fact indicated by the suffix ac placed after the letter O. The process being repeated for different values of the angle 6 the curve through the several points ac is the centroid which may be imagined as formed by an extension of the material of the link a. To find the corresponding centroid for the link c, fix c and repeat the process. Again, imagine d fixed, then the instantaneous centre Ou of b with regard to d is found by producing the links c and a to intersect in Obd, and the shapes of the centroids belonging respectively to the links b and d can be found as before. The axis about which a pair of adjacent links turn is a permanent axis, and is of course the axis

of the pin which forms the point. Adding the centres corresponding to these several axes to the figure, it will be seen that there are six centres in connexion with the four-bar chain of which four are permanent and two are instantaneous or virtual centres; and, further, that whatever be the configuration of the chain these centres group themselves into three sets of three, each set lying on a straight line. This peculiarity is not an accident or a special property of the four-bar chain, but is an illustration of a general law regarding the subject discovered by Aronhold and Sir A. B. W. Kennedy independently, which may be thus stated: If any three bodies, a, b, c, have plane motion their three virtual centres, O a &, Ob c , O ac , are three points on one straight line. A proof of this will be found in The Mechanics of Machinery quoted above. Having obtained the set of instantaneous centres for a chain, suppose a is the fixed link of the chain and c any other link; then O O0 is the instantaneous centre of the two links and may be considered for the instant as the trace of an axis fixed to an extension of the link a about which c is turning, and thus problems of instantaneous velocity concerning the link c are solved as though the link c were merely rotating for the instant about a fixed axis coincident with the instantaneous axis.

Method 2. — The second method is based upon the vector representation of velocity, and may be illustrated by applying it to the four-bar chain. Let AD (fig. 123) be the fixed link. Consider the link BC, and let it be required to find the velocity of the point B having given the velocity of the point C. The principle upon which

Fig. 123. Fig. 124.

the solution is based is that the only motion which B can have relatively to an axis through C fixed to the link CD is one of turning about C. Choose any pole (fig. 124). From this pole set out Oc to repre- sent the velocity of the point C. The direction of this must be at right angles to the line CD, because this is the only direction possible to the point C. If the link BC moves without turning, Oc will also represent the velocity of the point B; but, if the link is turning, B can only move about the axis C, and its direction of motion is therefore at right angles to the line CB. Hence set out the possible direction of B's motion in the velocity diagram, namely cbi, at right angles to CB. But the point B must also move at right angles to AB in the case under consideration. Hence draw a line through in the velocity diagram at right angles to AB to cut ch in b. Then 06 is the velocity of the point b in magnitude and direction, and cb is the

tangential velocity of B relatively to C. Moreover, whatever be the actual magnitudes of the velocities, the instantaneous velocity ratio of the points C and B is given by the ratio Oc/Ob.

*A most important property of the diagram (figs. 123 and 124) is the following : If points X and * are taken dividing the link BC and the tangential velocity cb, sothat ex: x& = CX:XB, then Ox represents the velocity of the point X in magnitude and direction. The line cb has been called the velocity image of the rod, since it may be looked upon as a scale drawing of the rod turned through 90 from the actual rod. Or, put in another way, if the link CB is drawn to scale on the new length cb in the velocity diagram (fig. 124), then a vector drawn from O to any point on the new drawing of the rod will represent the velocity of that point of the actual rod in magnitude and direction. It will be understood that there is a new velocity diagram for every new configuration of the mechanism, and that in each new diagram the image of the rod will be different in scale. Following the method indicated above for a kinematic chain in general, there will be obtained a velocity diagram similar to that of fig. 124 for each configuration of the mechanism, a diagram in which the velocity of the several points in the chain utilized for drawing the diagram will appear to the same scale, all radiating from the pole O. The lines joining the ends of these several velocities are the several tangential velocities, each being the velocity image of a link in the chain. These several images are not to the same scale, so that although the images may be considered to form collectively an image of the chain itself, the several members of this chain-image are to different scales in any one velocity diagram, and thus the chain- image is distorted from the actual proportions of the mechanism which it represents.*

§ 82. Acceleration Diagram. Acceleration Image. — Although it is possible to obtain the acceleration of points in a kinematic chain with one link fixed by methods which utilize the instantaneous centres of the chain, the vector method more readily lends itself to this purpose. It should be understood that the instantaneous centre considered in the preceding paragraphs is available only for estimating relative velocities ; it cannot be used in a similar manner*

Fig. 125.

for questions regarding acceleration. That is to say, although the instantaneous centre is a centre of no velocity for the instant, it is not a centre of no acceleration, and in fact the centre of no acceleration is in general a quite different point. The general principle on which the method of drawing an acceleration diagram depends is

that if a link CB (fig. 125) have plane motion and the acceleration of any point C be given in magnitude and direction, the acceleration of any other point B is the vector sum of the acceleration of C, the radial acceleration of B about C and the tangential acceleration of B about C. Let A be any origin, and let Ac represent the acceleration of the point C, ct the radial acceleration of B about C which must be in a direc- tion parallel to BC, and tb the tan- gential acceleration of B about C, which must of course be at right angles to ct; then the vector sum of these three magnitudes is Kb, and this vectoi represents the acceleration of the point B. The directions of the radial and tangential accelerations of the point B are always known when the position of the link is assigned, since these are to be drawn respectively parallel to and at right angles to the link itself. The magnitude of the radial acceleration is given by the expression zj'/ BC, v being the velocity of the point B about the point C. This velocity can always be found from the velocity diagram of the chain of which the link forms a part. If do>/dt is the angular acceleration of the link, du/dt X CB is the tangential acceleration of the point B about the point C. Generally this tangential acceleration is unknown in magnitude, and it becomes part of the problem to find it. An important property of the diagram is that if points X and x are taken dividing the link CB and the whole acceleration of B about C, namely, cb in the same ratio, then Ax represents the acceleration of the point X in magnitude and direction ; cb is called the accelera- tion image of the rod. In applying this principle to the drawing of an acceleration diagram for a mechanism, the velocity diagram of the mechanism must be first drawn in order to afford the means of calculating the several radial accelerations of the links. Then assuming that the acceleration of one point of a particuar link of the mechanism is known together with the corresponding configura- tion of the mechanism, the two vectors Ac and ct can be drawn. The direction of tb, the third vector in the diagram, is also known, so that the problem is reduced to the condition that b is somewhere on the line tb. Then other conditions consequent upon the fact that the link forms part of a kinematic chain operate to enable b to be 'fixed. These methods are set forth and exemplified in Graphics, by R. H. Smith (London, 1889). Examples, completely worked out, of velocity and acceleration diagrams for the slider crank chain, the four-bar chain, and the mechanism of the Joy valve gear will be found in ch. ix. of Valves and Valve Gear Mechanism, by W. E. Dalby (London, 1906).

Chapter II. On Applied Dynamics

§ 83. Laws of Motion. — The action of a machine in transmitting

force and motion simultaneously, or performing work, is governed, in common with the phenomena of moving bodies in general, by two " laws of motion."

Division 1. Balanced Forces in Machines of Uniform Velocity.

§ 84. Application of Force to Mechanism. — Forces are applied in units of weight; and the unit most commonly employed in Britain is the pound avoirdupois. The action of a force applied to a body is always in reality distributed over some definite space, either a volume of three dimensions or a surface of two. An example of a force distributed throughout a volume is the weight of the body itself, which acts on every particle, however small. The pressure exerted between two bodies at their surface of contact, or between the two parts of one body on either side of an ideal surface of separa- tion, is an example of a force distributed over a surface. The mode of distribution of a force applied to a solid body requires to be considered when its stiffness and strength are treated of; but, in questions respecting the action of a force upon a rigid body considered as a whole, the resultant of the distributed force, determined according to the principles of statics, and considered as acting in a single line and applied at a single point, may, for the occasion, be substituted for the force as really distributed. Thus, the weight of each separate piece in a machine is treated as acting wholly at its centre of gravity, and each pressure applied to it as acting at a point called the centre of pressure of the surface to which the pressure is really applied.

I 85. Forces applied to Mechanism Classed. — If be the obliquity of a force F applied to a piece of a machine — that is, the angle made by the direction of the force with the direction of motion of its point of application — then by the principles of statics, F may be resolved into two rectangular components, viz. : — ■

Along the direction of motion, P = F cos 6) / »

Across the direction of motion, Q = F sin 0\ "'*

If the component along the direction of motion acts with the motion, it is called an effort; if against the motion, a resistance. The

component across the direction of motion is a lateral pressure; the unbalanced lateral pressure on any piece, or part of a piece, is deflecting force. A lateral pressure may increase resistance by causing friction; the friction so caused acts against the motion, and is a resistance, but the lateral pressure causing it is not a resistance. Resistances are distinguished into useful and prejudicial, according as they arise from the useful effect produced by the machine or from other causes.

§ 86. Work. — Work consists in moving against resistance. The work is said to be performed, and the resistance overcome. Work is measured by the product of the resistance into the distance through which its point of application is moved. The unit of work commonly used in Britain is a resistance of one pound overcome through a distance of one foot, and is called a foot-pound.

Work is distinguished into useful work and prejudicial or lost work, according as it is performed in producing the useful effect of the machine, or in overcoming prejudicial resistance.

§ 87. Energy: Potential Energy. — Energy means capacity for performing work. The energy of an effort, or potential energy, is measured by the product of the effort into the distance through which its point of application is capable of being moved. The unit of energy is the same with the unit of work.

When the point of application of an effort has been moved through a given distance, energy is said to have been exerted to an amount expressed by the product of the effort into the distance through which its point of application has been moved.

§ 88. Variable Effort and Resistance. — If an effort has different magnitudes during different portions of the motion of its point of application through a given distance, let each different magnitude of the effort P be multiplied by the length As of the corresponding portion ot the path of the point of application ; the sum

2 . PAs (50)

is the whole energy exerted. If the effort varies by insensible gradations, the energy exerted is the integral or limit towards which that sum approaches continually as the divisions of the path are made smaller and more numerous, and is expressed by

jPds. (5 i)

Similar processes are applicable to the finding of the work performed in overcoming a varying resistance.

The work done by a machine can be actually measured by means of a dynamometer (q.v.).

§ 89. Principle of the Equality of Energy and Work. — From the first law of motion it follows that in a machine whose pieces move with uniform velocities the efforts and resistances must balance each other. Now from the laws of statics it is known that, in order that a system of forces applied to a system of connected points may be in equilibrium, it is necessary that the sum formed by putting together the products of the forces by the respective distances through which their points of application are capable of moving simultaneously, i:ach along the direction of the force applied to it, shall be zero, — products being considered positive or negative according as the direction of the forces and the possible motions of their points of application are the same or opposite.

In other words, the sum of the negative products is equal to the sum of the positive products. This principle, applied to a machine whose parts move with uniform velocities, is equivalent to saying that in any given interval of time the energy exerted is equal to the work performed.

The symbolical expression of this law is as follows: let efforts be applied to one or any number of points of a machine; let any one of these efforts be represented by P, and the distance traversed by its point of application in a given interval of time by ds; let resist- ances be overcome at one or any number of points of the same machine; let any one of these resistances be denoted by R, and the distance traversed by its point of application in the gi- en interval of time by ds' ; then

X.Pdsˆ S.Rds'. (52)

The lengths ds, ds' are proportional to the velocities of the points

to whose paths they belong, and the proportions of those velocities

to each other are deducible from the construction of the machine

by the principles of pure mechanism explained in Chapter I.

§ 90. Static Equilibrium of Mechanisms. — The principle stated in the preceding section, namely, that the energy exerted is equal to the*

work performed, enables the ratio of the components of the forces acting in the respective directions of motion at two points of a mechanism, one being the point of application of the effort, and the other the point of application of the resistance, to be readily found. Removing the summation signs in equation (52) in order to restrict its application to two points and dividing by the common time interval during which the respective small displacements ds and ds' were made, it becomes Pdsfdt = Rds'jdt, that is, Pv = Rv', which shows that the force ratio is the inverse of the velocity ratio. It follows at once that any method which may be available for the determina- tion of the velocity ratio is equally available for the determination of the force ratio, it being clearly understood that the forces involved are the components of the actual forces resolved in the direction

Fig. 126.

of motion of the points. The relation between the effort and the resistance may be found by means of this principle for all kinds of mechanisms, when the friction produced by the components of the forces across the direction of motion of the two points is neglected. Consider the following example : —

A four-bar chain having the configuration shown in fig. 126 supports a load P at the point x. What load is required at the point y to maintain the con- »

*figuration shown, both loads being supposed to act vertically? Find the instantaneous cen- tre Obd, and resolve each load in the respective directions of motion of the points * and y; thus there are obtained the components P cos 8 and R cos <#>. Let the mechanism have a small motion; then, for the instant, the link b is turning about its instantaneous centre*

Obd, and, if a is its

instantaneous angular

velocity, the velocity

of the point x is o>r,

and the velocity of the

point y is us. Hence,

by the principle just

stated, P cos 0X«r =

R cos X ws. But, p

and q being respectively

the perpendiculars to

the lines of action of

the forces, this equation

reduces to Pp = Rq,

which shows that the

ratio of the two forces may be found by taking moments about the

instantaneous centre of the link on which they act.

The forces P and R may, however, act on different links. The

general problem may then be thus stated : Given a mechanism of

which r is the fixed link, and i and I any other two links, given also a

force f, acting on the link s, to find the force / (acting in a given

direction on the link t, which will keep the mechanism in static

equilibrium. The graphic solution of this problem may be effected

thus : —

(1) Find the three virtual centres O r «, Oh, 0, (, which must be

three points in a line.

(2) Resolve /, into two components, one of which, namely, /„,

passes through O r „ and may be neglected, and the other/, passes through 0, <. Find the point M, where f p joins the given direction of ft, and resolve f p into two components, of which one is in the direction MOh and may be neglected because it passes through O rl , and the other is in the given direction of f t and is there- fore the force required. This statement of the problem and the solution is due to Sir

A. B.

W. Kennedy, and is given in ch. 8 of his Mechanics of Machinery.

Another general solution of

the problem is given in the

Proc. Lond. Math. Soc. (1878-

1879), by the same author.

An example of the method of

solution stated above, and

taken from the Mechanics of

Machinery, is illustrated by

the mechanism fig. 127, which

is an epicyclic train of three

wheels with the first wheel r

fixed. Let it be required to

find the vertical force which

must act at the pitch radius

of the last wheel t to balance

exactly a force f, acting ver- tically downwards on the arm

at the point indicated in the

figure. The two links con- cerned are the last wheel I

and the arm s, the wheel r being the fixed link of the mechanism.

The virtual centres 0,,, Bt are at the respective axes of the wheels

r and /, and the centre O r t divides the line through these two points

externally in the ratio of the train of wheels. The figure sufficiently

indicates the various steps of the solution.

The relation between the effort and the resistance in a machine

to include the effect of friction at the joints has been investigated in

a paper by Professor Fleeming Jenkin, " On the application of graphic

methods to the determination of the efficiency of machinery "

(3)

Fig. 127.

APPLIED DYNAMICS]

MECHANICS

ion

(Trans. Roy. Soc. Ed., vol. 28). It is shown that a machine may at any instant be represented by a frame of links the stresses in which are identical with the pressures at the joints of the mechanism. This self-strained frame is called the dynamic frame of the machine. The driving and resisting efforts are represented by elastic links in the dynamic frame, and when the frame with its elastic links is drawn the stresses in the several members of it may be determined by means of reciprocal figures. Incidentally the method gives the pressures at every joint of the mechanism.

§ 91. Efficiency. — The efficiency of a machine is the ratio of the useful work to the total work — that is, to the energy exerted — and is represented by

2 . RJs' X.R u ds' _ 2.RJs' _U

2 . Rds' = 2 . Ruds'+Z . Rpds' – 2 . Pds ~E' K53)

R u being taken to represent useful and R f prejudicial resistances. The more nearly the efficiency of a machine approaches to unity the better is the machine.

§ 92. Power and Effect. — The power of a machine is the energy exerted, and the effect the useful work performed, in some interval of time of definite length, such as a second, an hour, or a day.

The unit of power, called conventionally a horse-power, is 550 foot-pounds per second, or 33,000 foot-pounds per minute, or 1,980,000 foot-pounds per hour.

§ 93. Modulus of a Machine. — In the investigation of the properties of a machine, the useful resistances to be overcome and the useful work to be performed are usually given. The prejudicial resistances are generally functions of the useful resistances of the weights of the pieces of the mechanism, and of their form and arrangement ; and, having been determined, they serve for the computation of the lost work, which, being added to the useful work, gives the expenditure of energy required. The result of this investigation, expressed in the form of an equation between this energy and the useful work, is called by Moseley the modulus of the machine. The general form of the modulus may be expressed thus —

*E-U + *(U,A) + *(A), (54)*

where A denotes some quantity or set of quantities depending on the form, arrangement, weight and other properties of the mechanism. Moseley, however, has pointed out that in most cases this equation takes the much more simple form of

E = (i+A)U+B, (55)

where A and B are constants, depending on the form, arrangement and weight of the mechanism. The efficiency corresponding to the

last equation is U I , ,..

E – i+A+B/lT ^ b >

§ 94. Trains of Mechanism. — In applying the preceding principles to a train of mechanism, it may either be treated as a whole, or it may be considered in sections consisting of single pieces, or of any convenient portion of the train — each section being treated as a. machine driven by the effort applied to it and energy exerted upon it through its line of connexion with the preceding section, performing useful work by driving the following section, and losing work by overcoming its own prejudicial resistances. It is evident that the efficiency of the whole train is the product of the efficiencies of its sections.

§ 95. Rotating Pieces: Couples of Forces. — It is often convenient to express the energy exerted upon and the work performed by a turning piece in a machine in terms of the moment of the couples of

forces acting on it, and of the angular velocity. The ordinary British unit of moment is a foot-pound ; but it is to be remembered that this is a foot-pound of a different sort from the unit of energy and work.

If a force be applied to a turning piece in a line not passing through its axis, the axis will press against its bearings with an equal and parallel force, and the equal and opposite reaction of the bearings will constitute, together with the first-mentioned force, a couple whose arm is the perpendicular distance from the axis to the line of action of the first force.

A couple is said to be right or left handed with reference to the observer, according to the direction in which it tends to turn the body, and is a driving couple or a resisting couple according as its tendency is with or against that of the actual rotation.

Let dt be an interval of time, a the angular velocity of the piece ; then adt is the angle through which it turns in the interval dt, and ds = vdt — radt is the distance through which the point of application of the force moves. Let P represent an effort, so that Pr is a driving couple, then

Fds = Fvdt = 'Pradt = Madt (57)

is the energy exerted by the couple M in the interval dt; and a similar equation gives the work performed in overcoming a resisting couple. When several couples act on one piece, the resultant of their moments is to be multiplied by the common angular velocity of the whole piece.

§ 96. Reduction of Forces to a given Point, and of Couples to the Axis of a given Piece. — In computations respecting machines it is often convenient to substitute for a force applied to a given point, or a couple applied to a given piece, the equivalent force or couple applied to some other point or piece; that is to say, the force or

couple, which, if applied to the other point or piece, would exert equal energy or employ equal work. The principles of this reduction are that the ratio of the given to the equivalent force is the reciprocal of the ratio of the velocities of their points of application, and the ratio of the given to the equivalent couple is the reciprocal of the ratio of the angular velocities of the pieces to which they are applied. These velocity ratios are known by the construction of the mechanism, and are independent of the absolute speed.

§ 97. Balanced Lateral Pressure of Guides and Bearings. — The most

important part of the lateral pressure on a piece of mechanism is the reaction of its guides, if it is a sliding piece, or of the bearings of its axis, if it is a turning piece; and the balanced portion of this reaction is equal and opposite to the resultant of all the other forces applied to the piece, its own weight included. There may be or may not be an unbalanced component in this pressure, due to the deviated motion. Its laws will be considered in the sequel.

§98. Friction. Unguents. — The most important kind of resistance in machines is the friction or rubbing resistance of surfaces which slide over each other. The direction of the resistance of friction is opposite to that in which the sliding takes place. Its magnitude is the product of the normal pressure or force which presses the. rubbing surfaces together in- a direction perpendicular to themselves into a specific constant already mentioned in § 14, as the coefficient of friction, which depends on the nature and condition of the sur- faces of the unguent, if any, with which they are covered. The total pressure exerted between the rubbing surfaces is the resultant of the normal pressure and of the friction, and its obliquity, or inclina- tion to the common perpendicular of the surfaces, is the angle of repose formerly mentioned in § 14, whose tangent is the coefficient of friction. Thus, let N be the normal pressure, R the friction, T the total pressure, / the coefficient of friction, and the angle of repose; then

/= tan tf>) , ~

R=/N = N tan = Tsin*

Experiments on friction have been made by Coulomb, Samuel Vince, John Rennie, James Wood, D. Rankine and others. The most complete and elaborate experiments are those of Morin, pub- lished in his Notions fondamentales de m&canique, and republished in Britain in the works of Moseley and Gordon.

The experiments of Beauchamp Tower (" Report of Friction Experiments," Proc. Inst. Mech. Eng., 1883) showed that when oil is supplied to a journal by means of an oil bath the coefficient of friction varies nearly inversely as the load on the bearing, thus making the product of the load on the bearing and the coefficient of friction a constant. Mr Tower's experiments were carried out at nearly constant temperature. The more recent experiments of Lasche (Zeitsch, Verein Deutsche Ingen., 1902, 46, 1881) show that the product of the coefficient of friction, the load on the bearing, and the temperature is approximately constant. For further information on

this point and on Osborne Reynolds's theory of lubrication see Bearings and Lubrication.

§ 99. Work of Friction. Moment of Friction. — The work performed in a unit of time in overcoming the friction of a pair of surfaces is the product of the friction by the velocity of sliding of the surfaces over each other, if that is the same throughout the whole extent of the rubbing surfaces. If that velocity is different for different por- tions of the rubbing surfaces, the velocity of each portion is to be multiplied by the friction of that portion, and the results summed or integrated.

When the relative motion of the rubbing surfaces is one of rota- tion, the work of friction in a unit of time, for a portion of the rubbing surfaces at a given distance from the axis of rotation, may be found by multiplying together the friction of that portion, its distance from the axis, and the angular velocity. The product of the force of friction by the distance at which it acts from the axis of rotation is called the moment of friction. The total moment of friction of a pair of rotating rubbing surfaces is the sum or integral of the moments of friction of their several portions.

To express this symbolically, let du represent the area of a portion of a pair of rubbing surfaces at a distance r from the axis of their relative rotation ; p the intensity of the normal pressure at du per unit of area ; and / the coefficient of friction. Then the moment of friction of du is fprdu ; the total moment of friction is f f pr. du ; and the work performed in a unit cf time in overcoming friction, when the angular velocity is a, is af C pr. du.

It is evident that the moment of friction, and the work lost by being performed in overcoming friction, are less in a rotating piece as the bearings are of smaller radius. But a limit is put to the diminution of the radii of journals and pivots by the conditions of durability and of proper lubrication, and also by conditions of strength and stiffness.

§ 100. Total Pressure between Journal and Bearing. — A single piece rotating with a uniform velocity has four mutually balanced forces applied to it: (1) the effort exerted on it by the piece which drives it; (2) the resistance of the piece which follows it — which may be considered for the purposes of the present question as useful resistance; (3) its weight; and (4) the reaction of its own cylindrical bearings. There are given the following data: —

Fig. 128.

The direction of the effort. The direction of the useful resistance. The weight of the piece and the direction in which it acts. The magnitude of the useful resistance. The radius of the bearing r.

The angle of repose , corresponding to the friction of the journal on the bearing. And there are required the following: —

The direction of the reaction of the bearing. The magnitude of that reaction. The magnitude of the effort.

Let the useful resistance and the weight of the piece be com- pounded by the principles of statics into one force, and let this be called the given force.

The directions of the effort and of the given force are either parallel or meet in a point. If they are parallel, the direction of the reaction of the bearing is also parallel to them; if they meet in a point, the direction of the reaction traverses the same point. Also, let AAA, fig. 128, be a section of the bearing, and C its axis; then the direction of the reaction, at the point where it intersects the circle AAA, must make the angle with the radius of that circle; that is to say, it must be a line such as PT touching the smaller circle BB, whose radius is r. sin . The side on which it touches that circle is determined by the fact that the obliquity of the reaction is such as to oppose the rotation.

Thus is determined the direction of the reaction of the bearing; and the magnitude of that reaction and of the effort are then found by the principles of the equilibrium of three forces already stated in § 7.

The work lost in overcoming the friction of the bearing is the same as that which would be performed in overcoming at the circumference of the small circle BB a resistance equal to the whole pressure between the journal and bearing.

In order to diminish that pressure to the smallest possible amount, the effort, and the resultant of the useful resistance, and the weight of the piece (called above the ” given force “) ought to be opposed to each other as directly as is practicable consistently with the purposes

of the machine.

An investigation of the forces acting on a bearing and journal lubricated by an oil bath will be found in a paper by Osborne Reynolds in the Phil. Trans., pt. i. (1886). (See also Bearings.)

§ 101. Friction of Pivots and Collars. — When a shaft is acted upon by a force tending to 'shift it lengthways, that force must be balanced by the reaction of a bearing against a pivot at the end of the shaft; or, if that be impossible, against one or more collars, or rings projecting from the body of the shaft. The bearing of the pivot is called a step or footstep. Pivots require great hardness, and are usually made of steel. The flat pivot is a cylinder of steel having a plane circular end as a rubbing surface. Let N be the total pressure sustained by a flat pivot of the radius r; if that pressure be uniformly distributed, which is the case when the rubbing surfaces of the pivot and its step are both true planes, the intensity of the pressure is

ˆ = N/7rr 2 ; (60)

and, introducing this value into equation 59, the moment of friction of the flat pivot is found to be

l/NV • (61)

or two-thirds of that of a cylindrical journal of the same radius under the same normal pressure.

The friction of a conical pivot exceeds that of a flat pivot of the same radius, and under the same pressure, in the proportion of the side of the cone to the radius of its base.

The moment of friction of a collar is given by the formula—

a/' r 2_f'2>*

(62)

where r is the external and >' the internal radius.

In the cup and ball pivot the end of the shaft and the step present two recesses facing each other, into which are fitted two shallow cups of steel or hard bronze. Between the concave spherical surfaces of those cups is placed a steel ball, being either a complete sphere or a lens having convex surfaces of a somewhat less radius than the concave surfaces of the cups. The moment of friction of this pivot is at first

almost inappreciable from the extreme smallness of the radius of the circles of contact of the ball and cups, but, as they wear, that radius and the moment of friction increase.

It appears that the rapidity with which a rubbing surface wears away is proportional to the friction and to the velocity jointly, or nearly so. Hence the pivots already mentioned wear unequally at different points, and tend to alter their figures. Schiele has invented a pivot which preserves its original figure by wearing

equally at all points in a direction parallel to its axis. The following are the principles on which this equality of wear depends : —

The rapidity of wear of a surface measured in an oblique direction is to the rapidity of wear measured normally as the secant of the obliquity is to unity. Let OX (fig. 129) be the axis of a pivot, and let RPC be a portion of a curve such that at any point P the secant of the obliquity to the normal of the curve of a line parallel to the axis is inversely proportional to the ordinate PY, to which the velocity of P is proportional. The rotation of that curve round OX will generate the form of pivot required. Now let PT be a tangent to the curve at P, cutting OX in T; PT = PYX secant obliquity, and this is to be a constant quantity ; hence the curve is that known as the tractory of the straight line OX, in which PT = OR = constant. This curve is described by having a fixed straight edge parallel to OX, along which slides a slider carrying a pin whose centre is T. On that pin turns an arm, carrying at a point P a tracing-point, pencil or pen. Should the pen have a nib of two jaws, like those of an ordinary drawing-pen, the plane of the jaws must pass through PT. Then, while T is slid along the axis from O towards X, P will be drawn after it from R towards C along the tractory. This curve, being an asymptote to its axis, is capable of being indefinitely prolonged towards X; but in designing pivots it should stop before the angle PTY becomes less than the angle of repose of the rubbing surfaces, otherwise the pivot will be liable to stick in its bearing. The moment of friction of " Schiele's anti-friction pivot," as it is called, is equal to that of a cylindrical journal of the radius OR = PT the constant tangent, under the same pressure.

Records of experiments on the friction of a pivot bearing will be found in the Proc. Inst. Mech. Eng. (1891), and on the friction of a collar bearing ib. May 1888.

§ 102. Friction of Teeth. — Let N be the normal pressure exerted between a pair of teeth of a pair of wheels; s the total distance

through which they slide upon each other; n the number of pairs of teeth which pass the plane of axis in a unit of time ; then

n/Ni (63)

is the work lost in unity of time by tne friction of the teeth. The sliding s is composed of two parts, which take place during the approach and recess respectively. Let those be denoted by Si and s 2 , so that s = si+.s 2 . In § 45 the velocity of sliding at any instant has been given, viz. u = c (111+02), where u is that velocity, c the distance TI at any instant from the point of contact of the teeth to the pitch-point, and oi, a 2 the respective angular velocities of the wheels.

Let v be the common velocity of the two pitch-circles, n, r 2 , their radii ; then the above equation becomes

Fig. 129.

u = cv I 1 —) .

Vi r~J

To apply this to involute teeth, let Ci be the length of the approach, c 2 that of the recess, u\, the mean volocity of sliding during the approach, u 2 that during the recess; then

*CiV (I , I \ C 2 V 1 1 , 1 *

also, let be the obliquity of the action; then the times occupied

by the approach and recess are respectively

C\ c 2

v cos 6′ v cos B’

giving, finally, for the length of sliding between each pair of teeth,

S = Si+S 2 =

Vi rj

(64)

2 cos

which, substituted in equation (63), gives the work lost in a unit of

time by the friction of involute teeth. This result, which is exact

for involute teeth, is approximately true for teeth of any figure.

For inside gearing, if n be the less radius and r 2 the greater,

is to be substituted for — I — .

ri r 2 ri r 2

§ 103. Friction of Cords and Belts. — A flexible band, such as a cord, rope, belt or strap, may be used either to exert an effort or a resistance upon a pulley round which it wraps. In either case the tangential force, whether effort or resistance, exerted between the band and the pulley is their mutual friction, caused by and proportional to the normal pressure between them.

Let Ti be the tension of the free part of the band at that side towards which it tends to draw the pulley, or from which the pulley tends to draw it; T 2 the tension of the free part at the other side; T the tension of the band at any intermediate point of its arc of contact with the pulley; the ratio of the length of that arc to the radius of the pulley; dd the ratio of an indefinitely small element of that arc to the radius; F = Ti— T 2 the total friction between the band and the pulley; dp the elementary portion of that friction due to the elementary arc dd ; f the coefficient of friction between the materials of the band and pulley.

Then, according to a well-known principle in statics, the normal pressure at the elementary arc dd is TdO, T being the mean tension of the band at that elementary arc; consequently the friction on that arc is d¥ = fTdB. Now that friction is also the difference

(66)

between the tensions of the band at the two ends of the elementary arc, or dT = dF = fTd6; which equation, being integrated throughout the entire arc of contact, gives the following formulae: —

T

hyp log. y =fl

T 2 ~ e J

*F = Ti – T 2 = T t (1 -e-f) = T 2 (ef – i)_*

When a belt connecting a pair of pulleys has the tensions of its two sides originally equal, the pulleys being at rest, and when the pulleys are next set in motion, so that one of them drives the other by means of the belt, it is found that the advancing side of the belt is exactly as much tightened as the returning side is slackened, so that the mean tension remains unchanged. Its value is given by this formula —

Ti+iy ˆ ef + i 2 2{ef — i)

which is useful in determining the original tension required to enable a belt to transmit a given force between two pulleys.

The equations 65 and 66 are applicable to a kind of brake called a friction-strap, used to stop or moderate the velocity of machines by being tightened round a pulley. The strap is usually of iron, and the pulley of hard wood.

Let a denote the arc of contact expressed in turns and fractions of a turn; then

= 6-2832(1 \ /, N

*ef = number whose common logarithm is 2-7288/0 J *• ”*

See also Dynamometer for illustrations of the use of what are essentially friction-straps of different forms for the measurement of the brake horse-power of an engine or motor.

§ 104. Stiffness of Ropes. — Ropes offer a resistance to being bent, and, when bent, to being straightened again, which arises from the mutual friction of their fibres. It increases with the sectional area of the rope, and is inversely proportional to the radius of the curve into which it is bent.

The work lost in pulling a given length of rope over a pulley is found by multiplying the length of the rope in feet by its stiffness in pounds, that stiffness being the excess of the tension at the leading side of the rope above that at the following side, which is necessary to bend it

into a curve fitting the pulley, and then to straighten it again.

The following empirical formulae for the stiffness of hempen ropes have been deduced by Morin from the experiments of Coulomb : —

Let F be the stiffness in pounds avoirdupois; d the diameter of the rope in inches, n = <$8d i for white ropes and 35J 2 for tarred ropes; r the effective radius of the pulley in inches ; T the tension in pounds. Then

For white ropes, F=- (o-ooi2+o-ooio26n+o-ooi2T For tarred ropes, F = – (o-oo6+o-ooi392»+o-ooi68T

(68)

§ 105. Friction-Couplings. — Friction is useful as a means of communicating motion where sudden changes either of force or velocity take place, because, being limited in amount, it may be so adjusted as to limit the forces which strain the pieces of the mechanism within the bounds of safety. Amongst contrivances for effecting this object are friction-cones. A rotating shaft carries upon a cylin- drical portion of its figure a wheel or pulley turning loosely on it, and consequently capable of remaining at rest when the shaft is in motion. This pulley has fixed to one side, and concentric with it. a short frustum of a hollow cone. At a small distance from the pulley the shaft carries a short frustum of a solid cone accurately turned to fit the hollow cone. This frustum is made always to turn along with the shaft by being fitted on a square portion of it, or by means of a rib and groove, or otherwise, but is capable of a slight longitudinal motion, so as to be pressed into, or withdrawn from, the hollow cone by means of a lever. When the cones are pressed together or engaged, their friction causes the pulley to rotate along with the shaft; when they are disengaged, the pulley is free to stand still. The angle made by the sides of the cones with the axis should not be less than the angle of repose. In the friction-clutch, a pulley loose on a shaft has a hoop or gland made to embrace it more or less tightly by means of a screw; this hoop has short projecting arms or ears. A fork or clutch rotates along with the shaft, and is capable of being moved longitudinally by a handle. When the clutch is moved towards the hoop, its arms catch those of the hoop, and cause the hoop to rotate and to communicate its rotation to the pulley by friction. There are many other contrivances of the same class, but the two just mentioned may serve for examples.

§ 106. Heal of Friction: Unguents. — The work lost in friction is

employed in producing heat. This fact is very obvious, and has been known from a remote period ; but the exact determination of the proportion of the work lost to the heat produced, and the experimental proof that that proportion is the same under all circumstances and with all materials, solid, liquid and gaseous, are comparatively recent achievements of J. P. Joule. The quantity of work which produces a British unit of heat (or so much heat as elevates the

temperature of one pound of pure water, at or near ordinary atmospheric temperatures, by 1° F.) is 772 foot-pounds. This constant, now designated as " Joule's equivalent," is the principal experimental datum of the science of thermodynamics.

A more recent determination {Phil. Trans., 1897), by Osborne Reynolds and W. M. Moorby, gives 778 as the mean value of Joule's equivalent through the range of 32° to 212° F. See also the papers of Rowland in the Proc. Amer. Acad. (1879), and Griffiths, Phil. Trans. (1893).

The heat produced by friction, when moderate in amount, is useful in softening and liquefying thick unguents; but when excessive it is prejudicial, by decomposing the unguents, and sometimes even by softening the metal of the bearings, and raising their temperature so high as to set fire to neighbouring combustible matters.

Excessive heating is prevented by a constant and copious supply of a good unguent. The elevation of temperature produced by the friction of a journal is sometimes used as an experimental test of the quality of unguents. For modern methods of forced lubrication see Bearings.

§ 107. Rolling Resistance. — By the rolling of two surfaces over each other without sliding a resistance is caused which is called sometimes " rolling friction," but more correctly rolling resistance. It is of the nature of a couple, resisting rotation. Its moment is found by multiplying the normal pressure between the rolling sur- faces by an arm, whose length depends on the nature of the rolling surfaces, and the work lost in a unit of time in overcoming it is the product of its moment by the angular velocity of the rolling surfaces relatively to each other. The following are approximate values of the arm in decimals of a foot: —

Oak upon oak 0-006 (Coulomb).

Lignum vitae on oak 0-004 "

Cast iron on cast iron 0-002 (Tredgold).

§ 108. Reciprocating Forces: Stored and Restored Energy. — When a force acts on a machine alternately as an effort and as a resistance, it may be called a reciprocating force. Of this kind is the weight of any piece in the mechanism whose centre of gravity alternately rises and falls ; for during the rise of the centre of gravity that weight acts as a resistance, and energy is employed in lifting it to an amount expressed by the product of the weight into the vertical height of its rise ; and during the fall of the centre of gravity the weight acts as an effort, and exerts in assisting to perform the work of the machine an amount of energy exactly equal to that which had previously been employed in lifting it. Thus that amount of energy is not lost, but has its operation deferred ; and it is said to be stored when the weight is lifted, and restored when it falls.

In a machine of which each piece is to move with a uniform velocity, if the effort and the resistance be constant, the weight of each piece must be balanced on its axis, so that it may produce lateral pressure only, and not act as a reciprocating force. But if the effort and the resistance be alternately in excess, the uniformity of speed may still be preserved by so adjusting some moving weight in the mechanism that when the effort is in excess it may be lifted, and so balance and employ the excess of effort, and that when the resistance is in excess it may fall, and so balance and overcome the excess of resistance — thus storing the periodical excess of energy and restoring that energy to perform the periodical excess of work.

Other forces besides gravity may be used as reciprocating forces for storing and restoring energy — for example, the elasticity of a spring or of a mass of air.

In most of the delusive machines commonly called " perpetual motions," of which so many are patented in each year, and which are expected by their inventors to perform work without receiving energy, the fundamental fallacy consists in an expectation that some reciprocating force shall restore more energy than it has been the means of storing.

Division 2. Deflecting Forces.

§ 109. Deflecting Force for Translation in a Curved Path. — In machinery, deflecting force is supplied by the tenacity of some piece, such as a crank, which guides the deflected body in its curved path, and is unbalanced, being employed in producing deflexion, and not

in balancing another force.

§ no. Centrifugal Force of a Rotating Body.— The centrifugal force exerted by a rotating body on its axis of rotation is the same in magnitude as if the mass of the body were concentrated at its centre of gravity, and acts in a plane passing through the axis of rotation and the centre of gravity of the body.

The particles of a rotating body exert centrifugal forces on each other, which strain the body, and tend to tear it asunder, but these forces balance each other, and do not affect the resultant centrifugal force exerted on the axis of rotation. 1

// the axis of rotation traverses the centre of gravity of the body, the centrifugal force exerted on that axis is nothing.

Hence, unless there be some reason to the contrary, each piece of a machine should be balanced on its axis of rotation; otherwise the

1 This is a particular case of a more general principle, that the motion of the centre of gravity of a body is not affected by the mutual actions of its parts.

centrifugal force will cause strains, vibration and increased friction, and a tendency of the shafts to jump out of their bearings.

§m. Centrifugal Couples of a Rotating Body. — Besides the tendency (if any) of the combined centrifugal forces of the particles of a rotating body to shift the axis of rotation, they may also tend to turn it out of its original direction. The latter tendency is called a centrifugal couple, and vanishes for rotation about a principal axis. It is essential to the steady motion of every rapidly rotating piece in a machine that its axis of rotation should not merely traverse its centre of gravity, but should be a permanent axis; for otherwise the centrifugal couples will increase friction, produce oscillation of the shaft and tend to make it leave its bearings.

The principles of this and the preceding section are those which regulate the adjustment of the weight and position of the counterpoises which are placed between the spokes of the driving-wheels of

locomotive engines.

§ 112. Method of computing the position and magnitudes of balance weights which must be added to a given system of arbitrarily chosen rotating masses in order to make the common axis of rotation a permanent axis. — The method here briefly explained is taken from a paper by W. E. Dalby, " The Balancing of Engines with special reference to Marine Work," Trans. Inst. Nav. Arch. (1899). Let the weight (fig. 130), attached to a truly turned disk, be rotated by the shaft OX, and conceive that the shaft is held*

in a bearing at one point, O. The force required to constrain the weight to move in a circle, that is the de- viating force, produces an equal and opposite reaction on the shaft, whose amount. F is equal to the centrifugal force WaV/g lb, where r is the radius of the mass centre of the weight, and a is its angular velocity in radians per second. Transferring this force to by the point O, it is equivalent to, (1) a force at O equal and parallel to F, and, (2) a centrifugal couple of Fa foot-pounds. In order that OX may be a permanent axis it is necessary that there should De a sufficient number of weights attached to the shaft and so distributed that when each is referred to the point

(1) SF =0) ()

(2) SFo =o\ (a > The plane through to which the shaft is perpendicular is called the reference plane, because all the transferred forces act in that plane at the point O. The plane through the radius of the weight contain- ing the axis OX is called the axial plane because it contains the forces forming the couple due to the transference of F to the reference plane. Substituting the values of F in (a) the two conditions become •

(From Balancing of Engines, permission of Edward Arnold.)

Fig. 130.

(1) (W 1 r 1 +W 2 r, + W,r,f...)| = o

(2) (WiOin + WWz-r-. . .)^-~o

(b)

(0

In order that these conditions may obtain, the quantities in the

brackets must be zero, since the factor a'jg is not zero. Hence finally the conditions which must be satisfied by the system of weights in order that the axis of rotation may be a permanent axis is

(1) (Wiri + W 2 > -2 + W3r 3) = o

(2) (W^in + \V2a2r2 +) = o It must be remembered that these are all directed quantities, and that their respective sums are to be taken by drawing vector poly- gons. In drawing these polygons the magnitude of the vector of the type Wr is the product Wr, and the direction of the vector is from the shaft outwards towards the weight W, parallel to the radius r. For the vector representing a couple of the type War, if the masses are all on the same side of the reference plane, the direction of drawing is from the axis outwards; if the masses are some on one side of the reference plane and some on the other side, the direction of drawing is from the axis outwards towards the weight for all masses on the one side, and from the mass inwards towards the axis for all weights on the other side, drawing always parallel to the direction defined by the radius r. The magnitude of the vector is the product War. The conditions © may thus be expressed : first, that the sum of the vectors Wr must form a closed polygon, and, second, that the sum of the vectors War must form a closed polygon. The general problem in practice is, given a system of weights attached to a shaft, to find the respective weights and positions of two balance weights or counterpoises which must be added to the system in order to make the shaft a permanent axis, the planes in which the balance weights are to revolve also being given. To solve this the reference plane must be chosen so that it coincides with the plane of revolution of one of the as yet unknown balance weights. The balance weight in this plane has therefore no couple corresponding to it. Hence by drawing a couple polygon for the given weights the vector which is required to close the polygon is at once found and from it the magnitude and position of the balance weight which must be added to the system to balance the couples follow at once. Then, transferring the product Wr corresponding

with this balance weight to the reference plane, proceed to draw the force polygon. The vector required to close it will determine the second balance weight, the work may be checked by taking the reference plane to coincide with the plane of revolution of the second balance weight and then re-determining them, or by taking a refer- ence plane anywhere and including the two balance weights trying if condition © is satisfied.

When a weight is reciprocated, the equal and opposite force re-

quired for its acceleration at any instant appears as an unbalanced force on the frame of the machine to which the weight belongs. In the particular case where the motion is of the kind known as " simple harmonic " the disturbing force on the frame due to the reciprocation of the weight is equal to the component of the centrifugal force in the line of stroke due to a weight equal to the reciprocated weight supposed concentrated at the crank pin. Using this principle the method of finding the balance weights to be added to a given system of reciprocating weights in order to produce a system of forces on the frame continuously in equilibrium is exactly the same as that just explained for a system of revolving weights, because for the purpose of finding the balance weights each reciprocating weight may be supposed attached to the crank pin which operates it, thus forming an equivalent revolving system. The balance weights found as part of the equivalent revolving system when reciprocated by their respective crank pins form the balance weights for the given reciprocating system. These conditions may be exactly realized by a system of weights reciprocated by slotted bars, the crank shaft driving the slotted bars rotating uniformly. In practice reciprocation is usually effected through a connecting rod, as in the case of steam engines. In balancing the mechanism of a steam engine it is often sufficiently accurate to consider the motion of the pistons as simple harmonic, and the effect on the framework of the acceleration of the connecting rod may be approximately allowed for by distributing the weight of the rod between the crank pin and the piston inversely as the centre of gravity of the rod divides the distance between the centre of the cross head pin and the centre of the crank pin. The moving parts of the engine are then divided into two complete and independent systems, namely, one system of revolving weights consisting of crank pins, crank arms, &c, attached to and revolving with the crank shaft, and a second system of reciprocating weights consisting of the pistons, cross-heads, &c, supposed to be moving each in its line of stroke with simple harmonic motion. The balance weights are to be separately calculated for each system, the one set being added to the crank shaft as revolving weights, and the second set being included with the reciprocating weights and operated by a properly placed crank on the crank shaft. Balance weights added in this way to a set of reciprocating weights are sometimes called bob-weights. In the case of locomotives the balance weights required to balance the pistons are added as revolving weights to the crank shaft system, and in fact are generally combined with the weights required to balance the revolving system so as to form one weight, the counterpoise referred to in the preceding section, which is seen between the spokes of the wheels of a locomotive. Although this method balances the

pistons in the horizontal plane, and thus allows the pull of the engine on the train to be exerted without the variation due to the reciprocation of the pistons, yet the force balanced horizontally is introduced vertically and appears as a variation of pressure on the rail. In practice about two-thirds of the reciprocating weight is balanced in order to keep this variation of rail pressure within safe limits. The assumption that the pistons of an engine move with simple harmonic motion is increasingly erroneous as the ratio of the length of the crank r, to the length of the connecting rod / increases. A more accurate though still approxi- mate expression for the force on the frame due to the acceleration of the piston whose weight is W is given by

W , J

cos 8 + t cos

20 i

The conditipns regulating the balancing of a system of weights reciprocating under the action of accelerating forces given by the above expression are investigated in a paper by Otto Schlick, " On Balancing of Steam Engines," Trans, Inst. Nav. Arch. (1900), and in a paper by W. E. Dalby, " On the Balancing of the Recipro- cating Parts of Engines, including the Effect of the Connecting Rod " (ibid., 1901). A still more accurate expression than the above is obtained by expansion in a Fourier series, regarding which and its bearing on balancing engines see a paper by J. H. Macalpine, " A Solution of the Vibration Problem " (ibid., 1901). The whole subject is dealt with in a treatise, The Balancing of Engines, by W. E. Dalby (London, 1906). Most of the original papers on this subject of engine balancing are to be found in the Transactions of the Institution of Naval Architects.

§113. Centrifugal Whirling of Shafts. — When a system of revolv- ing masses is balanced so that the conditions of the preceding section are fulfilled, the centre of gravity of the system lies on the axis of revolution. If there is the slightest displacement of the centre of gravity of the system from the axis of revolution a force acts on the shaft tending to deflect it, and varies as the deflexion and as the square of the speed. If the shaft is therefore to revolve stably, this force must be balanced at any instant by the elastic resistance of the shaft to deflexion. To take a simple case, suppose a shaft,*

supported on two bearings to carry a disk of weight W at its centre, and let the centre of gravity of the disk be at a distance e from the axis of rotation, this small distance being due to imperfections of material or faulty construction. Neglecting the mass of the shaft itself, when the shaft rotates with an angular velocity a, the centrifugal force Wa 2 e/g will act upon the shaft and cause its axis to deflect from the axis of rotation a distance, y say. The elastic resistance evoked by this deflexion is proportional to the deflexion, so that if c is a constant depending upon the form, material and_ method of support of the shaft, the following equality must hold if the shaft is to rotate stably at the stated speed —

ˆ (y + e)aˆcy,

from which y = VJa?e/(gc — Wo 2).

This expression shows that as a increases y increases until when Wn ! = gc, y beco mes infinitely large. The corresponding value of a, namely Vgt/ W , is called the critical velocity of the shaft, and is the speed at which the shaft ceases to rotate stably and at which centrifugal whirling begins. The general problem is to find the value of a corresponding to all kinds of loadings on shafts supported in any manner. The question was investigated by Rankine in an article in the Engineer (April 9, 1869). Professor A. G. Greenhill treated the problem of the centrifugal whirling of an unloaded shaft with different supporting conditions in a paper " On the Strength of Shafting exposed both to torsion and to end thrust," Proc. Inst. Mech. Eng. (1883). Professor S. Dunkerley (" On the Whirling and Vibration of Shafts," Phil. Trans., 1894) investigated the ques- tion for the cases of loaded and unloaded shafts, and, owing to the complication arising from the application of the general theory to the cases of loaded shafts, devised empirical formulae for the critical speeds of shafts loaded with heavy pulleys, based generally upon the following assumption, which is stated for the case of a shaft carrying one pulley : If Ni, Nj be the separate speeds of whirl of the shaft and pulley on the assumption that the effect of one is neglected when that of the other is under consideration, then the resulting speed of whirl due to bot h causes combined may be taken to be of the form N1N2V (N 2 i + N 2 2) where N means revolutions per minute. This form is extended to include the cases of several pulleys on the same shaft. The interesting and important part of the investigation is that a

number of experiments were made on small shafts arranged in different ways and loaded in different ways, and the speed at which whirling actually occurred was compared with the speed calculated from formulae of the general type indicated above. The agreement between the observed and calculated values of the critical speeds was in most cases quite remarkable. In a paper by Dr C. Chree, " The Whirling and Transverse Vibrations of Rotating Shafts," Proc. Pkys. Soc. Lon., vol. 19 (1904); also Phil. Mag., vol. 7 (1904), the question is investigated from a new mathematical point of view, and expressions for the whirling of loaded shafts are obtained without the necessity of any assumption of the kind stated above. An elementary presentation of the problem from a practical point of view will be found in Steam Turbines, by Dr A. Stodola (London,

1905)-

§ 114. Revolving Pendulum. Governors.— In fig. 131 AO represents an upright axis or spindle; B a weight called a bob, suspended by rod OB from a horizontal axis at O, carried by the vertical axis. When the spindle is at rest the bob hangs close to it ; when the spindle rotates, the bob, being made to revolve round it, diverges until the resultant of the centrifugal force and the weight of the bob is a force acting atO in the direction OB, and then it revolves steadily in a circle. This combination is called a revolving, centrifugal, or conical pendulum. Revolving pendulums are usually constructed with pairs of rods and bobs, as OB, Ob, hung at opposite sides of the spindle, that the centrifugal forces exerted at the point O may balance each other.

In finding the position in which the bob will revolve with a given angular velocity, a, for most practical cases connected with machinery the mass of the rod may be considered as insensible compared with that of the bob. Let the bob be a sphere, and from the centre of that sphere draw BH = y perpendicular to OA. Let OH = z; let W be the weight of the bob, F its centrifugal force. Then the condition of its steady revolution isW:F::z:;y; that is to say, y/z = F/W = ;yo 2 /g; consequently

z = g/a 2 (69)

Or, if n = a ; '27r = 0/6-2832 be the number of turns or fractions of a turn in a second,

= _^ = o-8i65 ft. = 9-7977iin. ? 4jr 2 n 2 » 2 w)

2 is called the altitude of the pendulum.

not

■o ■ o»

If the rod of a revolving pendulum be jointed, as in fig. 132, to a point in the vertical axis, but to the end of a projecting arm C, the position in which the bob will revolve will be the same as if the rod were jointed to the point O, where its prolongation cuts the vertical axis.

A revolving pendulum is an essential part of most of the contrivances called governors, for regulating the speed of prime movers, for further particulars of which see Steam Engine. Fig. 132.

Division 3. Working of Machines of Varying Velocity.

§ 115. General Principles.— -In order that the velocity of every piece of a machine may be uniform, it is necessary that the forces acting on each piece should be always exactly balanced. Also, in order that the forces acting on each piece of a machine may be always exactly balanced, it is necessary that the velocity of that piece should be uniform.

An excess of the effort exerted on any piece, above that which is necessary to balance the resistance, is accompanied with acceleration ; a deficiency of the effort, with retardation.

When a machine is being started from a state of rest, and brought by degrees up to its pVoper speed, the effort must be in excess; when it is being retarded for the purpose of stopping it, the resistance must be in excess.

An excess of effort above resistance involves an excess of energy exerted above work performed ; that excess of energy is employed in producing acceleration.

An excess of resistance above effort involves an excess of work performed above energy expended ; that excess of work is performed by means of the retardation of the machinery.

When a machine undergoes alternate acceleration and retardation, so that at certain instants of time, occurring at the end of intervals called periods or cycles, it returns to its original speed, then in each of those periods or cycles the alternate excesses of energy and of

work neutralize each other; and at the end of each cycle the principle of the equality of energy and work stated in § 87, with all its consequences, is verified exactly as in the case of machines of uniform speed.

At intermediate instants, however, other principles have also to be taken into account, which are deduced from the second law of motion, as applied to direct deviation, or acceleration and retardation.

§ 116. Energy of Acceleration and Work of Retardation for a Shifting Body. — Let w be the weight of a body which has a motion of translation in any path, and in the course of the interval of time At let its velocity be increased at a uniform rate of acceleration from Vi to »2- The rate of acceleration will be

dv/dt = const. = (v 2 —Vi) At ; and to produce this acceleration a uniform effort will be required, expressed by

P = w(d 2 — Vi)gAt (71)

(The product iw/g of the mass of a body by its velocity is called its momentum; so that the effort required is found by dividing the increase of momentum by the time in which it is produced.) _ To find the energy which has to be exerted to produce the accelera- tion from Vi to Vi, it is to be observed that the distance through which the effort P acts during the acceleration is

As= (vi+Vi)At/2 ; consequently, the energy of acceleration is

PAs = w{v2-v i)(v 2 +v l)/2g = iu(v 2 2 -Vi 2)2g, (72)

being proportional to the increase in the square of the velocity, and independent of the time.

In order to produce a retardation from the greater velocity v to the less velocity Vi, it is necessary to apply to the body a resistance connected with the retardation and the time by an equation identical in every respect with equation (71), except by the substitution of a resistance for an effort ; and in overcoming that resistance the body performs work to an amount determined by equation (72), putting Rdi for Pas..*

§ 117. Energy Stored and Restored by Deviations of Velocity. — Thus a body alternately accelerated and retarded, so as to be brought back to its original speed, performs work during its

retardation exactly equal in amount to the energy exerted upon it during its acceleration; so that that energy may be considered as stored during the acceleration, and restored during the retardation, in a manner analogous to the operation of a reciprocating force (§ 108).

Let there be given the mean velocity V = | (1/2 +Ki) of a body whose weight is w, and let it be required to determine the fluctuation of velocity Vz — Vi, and the extreme velocities Vi, v 2 , which that body must have, in order alternately to store and restore an amount of energy E. By equation (72) we have

E = w(y 2 2 — »l 2)/2g

j which, being divided by V = |(»2-fi»i), gives

I E/V = ai(»2— Vi)lg;

1 and consequently vz— Vi = gE/Vw (73)

roi6

MECHANICS

[APPLIED DYNAMICS

The ratio of this fluctuation to the mean velocity, sometimes called the unsteadiness of the motion of the body, is

(r,-in)V=gE/V»M>. (74)

§ 1 1 8. Actual Energy of a Shifting Body. — The energy which must be exerted on a body of the weight w, to accelerate it from a state of rest up to a given velocity of translation v, and the equal amount of work which that body is capable of performing by overcoming resistance while being retarded from the same velocity of translation v to a state of rest, is

W/2g. (75)

This is called the actual energy of the motion of the bbdy, and is half the quantity which in some treatises is called wj viva.

The energy stored or restored, as the case may be, by the deviations of velocity of a body or a system of bodies, is the amount by which the actual energy is increased or diminished.

§ 119. Principle of the Conservation of Energy in Machines. — The following principle, expressing the general law of the action of machines with a velocity uniform or varying, includes the law of the equality of energy and work stated in § 89 for machines of uniform speed.

In any given interval during the working of a machine, the energy exerted added to the energy restored is equal to the energy stored added to the work performed. •

§ 120. Actual Energy of Circular Translation — Moment of Inertia. — Let a small body of the weight w undergo translation in a circulai path of the radius p, with the angular velocity of deflexion a, so that the common linear velocity of all its particles is v = ap. Then the actual energy of that body is

wv 2 /2g = wa?p 2 [2g. (76)

By comparing this with the expression for the centrifugal force (wa? p/g), it appears that the actual energy of a revolving body is equal to the potential energy Fp/2 due to the action of the deflecting force along one-half of the radius of curvature of the path of the body.

The product wp 2 /g, by which the half-square of the angular velocity is multiplied, is called the moment of inertia of the revolving body.

§ 121. Flywheels. — A flywheel is a rotating piece in a machine, generally shaped like a wheel (that is to say, consisting of a rim with spokes) , and suited to store and restore energy by the periodical variations in its angular velocity.

The principles according to which variations of angular velocity store and restore energy are the same as those of § 1 17, only substitu- ting moment of inertia for mass, and angular for linear velocity.

Let W be the weight of a flywheel, R its radius of gyration, 02 its maximum,

l/S = (a,as)/A denote the unsteadiness of the motion of the flywheel; the denom inator S of this fraction is called the steadiness. Let e denote the quantity by which the energy exerted in each cycle of the working of the machine alternately exceeds and falls short of the work per- formed, and which has consequently to be alternately stored by acceleration and restored by retardation of the flywheel. The value of this periodical excess is —

e = R 2 W(a 2 2 – ai 2),2g, (77)

from which, dividing both sides by A 2 , we obtain the following equations : —

e/A 2 = R 2 W/gS> R 2 WA 2 /2g = Se/2]' The latter of these equations may be thus expressed in words : The actual energy due to the rotation of the fly, with its mean angular velocity, is equal to one-half of the periodical excess of energy multiplied by the steadiness.

In ordinary machinery S = about 32; in machinery for fine purposes S=from 50 to 60; and when great steadiness is required S = from 100 to 150..

The periodical excess e may arise either from variations in the effort exerted by the prime mover, or from variations in the resis- tance of the work, or from both these causes combined. When but one flywheel is used, it should be placed in as direct connexion as possible with that part of the mechanism where the greatest amount of the periodical excess originates; but when it originates at two or more points, it is best to have a flywheel in connexion with each of these points. For example, in a machine-work, the steam-engine, which is the prime mover of the various tools, has a flywheel on the crank-shaft to store and restore the periodical excess of energy arising from the variations in the effort exerted by the connecting-rod upon the crank ; and each of the slotting machines, punching machines, riveting machines, and other tools has a flywheel of its own to store and restore energy, so as to enable the very different resistances opposed to those tools at different times to be overcome without too great unsteadiness of motion. For tools performing useful work at intervals, and having only their own friction to overcome during the intermediate intervals, e should be assumed equal to the whole work performed at each separate operation.

(78)

§ 1 22 . Brakes. — A brake is an apparatus for stopping and diminish- ing the velocity of a machine by friction, such as the friction-strap already referred to in § 103. To find the distance s through which a brake, exerting the friction F, must rub in order to stop a machine having the total actual energy E at the moment when the brake begins to act, reduce, by the principles of § 96, the various efforts and other resistances of the machine which act at the same time with the friction of the brake to the rubbing surface of the

brake, and let R be their resultant — positive if resistance, negative if effort preponderates. Then

**-E/(F+R). (79)*

§ 123. Energy distributed between two Bodies: Projection and Propulsion. — Hitherto the effort by which a machine is movei! has been treated as a force exerted between a movable body and a fixed body, so that the whole energy exerted by it is employed upon the movable body, and none upon the fixed body. This conception is sensibly realized in practice when one of the two bodies between which the effort acts is either so heavy as compared with the other, or has so great a resistance opposed to its motion, that it may, without sensible error, be treated as fixed. But there are cases in which the motions of both bodies are appreciable, and must be taken into account — such as the projection of projectiles, where the velocity of the recoil or backward motion of the gun bears an appreciable proportion to the forward motion of the projectile; and such as the propulsion of vessels, where the velocity of the water thrown backward by the paddle, screw or other propeller bears a very considerable proportion to the velocity of the water moved forwards and sideways by the ship. In cases of this kind the energy exerted by the effort is distributed between the two bodies between which the effort is exerted in shares proportional to the velocities of the two bodies during the action of the effort; and those velocities are to each other directly as the portions of the effort unbalanced by resis- tance on the respective bodies, and inversely as the weights of the bodies.

To express this symbolically, let Wi, W 2 be the weights of the bodies; P the effort exerted between them; S the distance through which it acts; Ri, R 2 the resistances opposed to the effort overcome by Wi, W 2 respectively; Ei, E 2 the shares of the whole energy E exerted upon Wi, W 2 respectively. Then

E • Ei W 2 (P – R.) + Wi(P – R 8) [P_- Ri WiWj

. E 2 P- R 2

Wi

W 2

(80)

If Ri = R 2 , which is the case when the resistance, as well as the effort, arises from the mutual actions of the two bodies, the above

becomes,

::Wi + W 2 :W2:wl(‘ (8l)

that is to say, the energy is exerted on the bodies in shares inversely proportional to their weights; and they receive accelerations inversely proportional to their weights, according to the principle of dynamics, already quoted in a note to § 1 10, that the mutual actions of a system of bodies do not affect the motion of their common centre of gravity.

For example, if the weight of a gun be 160 times that of its ball }ˆ? of the energy exerted by the powder in exploding will be employed in propelling the ball, and t ˆ in producing the recoil of the gun, provided the gun up to the instant of the ball’s quitting the muzzle meets with no resistance to its recoil except the friction of the ball.

§ 124. Centre of Percussion. — It is obviously desirable that the deviations or changes of motion of oscillating pieces in machinery should, as far as possible, be effected by forces applied at their centres of percussion.

If the deviation be a translation — that is, an equal change of motion of all the particles of the body — the centre of percussion is obviously the centre of gravity itself; and, according to the second law of motion, if dv be the deviation of velocity to be produced in the interval dt, and W the weight of the body, then

“?■£ < >

is the unbalanced effort required.

If the deviation be a rotation about an axis traversing the centre of gravity, there is no centre of percussion; for such a deviation can only be produced by a couple of forces, and not by any single force. Let da be the deviation of angular velocity to be produced in the interval dt, and I the moment of the inertia of the body about an axis through its centre of gravity; then \ld{aP) = lada is the variation of the body’s actual energy. Let M be the moment of the unbalanced couple required to produce the deviation; then by equation 57, § 104, the energy exerted by this couple in the interval dt is Modi, which, being equated to the variation of energy, gives

,. ,da R 2 W da

M – 1 7t—T-‘di- («3)

R is called the radius of gyration of the body with regard to an axis through its centre of gravity.

Now (fig. 133) let the required deviation be a rotation of the body BB about an axis O, not traversing the centre of gravity G, da

being, as before, the deviation of angular velocity to be produced

in the interval dt. A

rotation with the angular velocity a about an axis O may be considered as compounded of a rotation with the same angular velocity about an axis drawn through G parallel to O and a translation with the velocity a. OG, OG being the perpendicular distance between the two axes. Hence the required deviation may be regarded as compounded of a deviation of translation rfi) = OG. da, to produce which there would be required, according to equation (82), a force applied at G perpendicular to the plane OG —

p = W 0G da

g dt

(84)

and a deviation da of rotation about an axis drawn through G parallel to O, to produce which there would be required a couple of the moment M given by equation (83). According to the principles of statics, the resultant of the force P, applied at G perpendicular to the plane OG, and the couple M is a force equal and parallel to P, but applied at a distance GC from G, in the prolongation of the perpendicular OG, whose value is

GC = M/P = R 2 /OG. (85)

Thus is determined the position of the centre of percussion C, corresponding to the axis of rotation O. It is obvious from this equation that, for an axis of rotation parallel to O traversing C, the centre of percussion is at the point where the perpendicular OG meets O.

§ 125. To find the moment of inertia of a body about an axis through Us centre of gravity experimentally. — Suspend the body from any conveniently selected axis O (fig. 48) and hang near it a small plumb bob. Adjust the length of the plumb-line until it and the body oscil- late together in unison. The length of the plumb-line, measured from its point of suspension to the centre of the bob, is for all prac- tical purposes equal to the length OC, C being therefore the centre of percussion corresponding to the selected axis O. From equation*

(85)

R 2 = CGxOG = (OC-OG)OG.

The position of G can be found experimentally ; hence OG is known, and the quantity R 2 can be calculated, from which and the ascertained weight W of the body the moment of inertia about an axis through G, namely, W/gXR 2 , can be computed.

§ 126. To find the force competent to produce the instantaneous acceleration of any link of a mechanism. — In many practical problems it is necessary to know the magnitude and position of the forces acting to produce the accelerations of the several links of a mechan- ism. For a given link, this force is the resultant of all the accelerating forces distributed through the substance of the material of the link required to produce the requisite acceleration of each particle, and the determination of this force depends upon the principles of the two preceding sections. The investigation of the distribution of the forces through the material and the stress consequently pro- duced belongs to the subject of the Strength of Materials {q. v.). Let BK (fig. 134) be any link moving in any manner in a plane, and*

let G be its centre of gravity. Then its motion may be an- alysed into (1) a translation of its centre of gravity; and (2) a rotation about an axis through its centre of gravity perpen- dicular to its plane of motion. Let a "be the acceleration of the centre of gravity and let A be the angular acceleration about the axis through the centre of gravity; then the force required to produce the translation of the centre of gravity is F =Wa/g, and the couple required to produce the angular acceleration about the centre of gravity is M = IA/g, W and I being respectively the inertia of the link about the gravity. The couple M may be produced by shifting the force F parallel to itself through a distance x, such that Fx = M. When the link forms part of a mechanism the respective accelerations of two points in the link

can be determined by means of the velocity and acceleration diagrams described in § 82, it being understood that the motion of one link in the mechanism is prescribed, for instance, in the steam-engine's mechanism that the crank shall revolve uniformly. Let the accelera- tion of the two points B and K therefore be supposed known. The problem is now to find the acceleration a and A. Take any pole O (fig- 49). and set out 06 equal to the acceleration of B and Ok equal to the acceleration of K. Join bk and take the point g so that KG :

Fig. 134. weight and the moment through the centre

of of

GB = kg:gb. Og is then the acceleration of the centre of gravity and the force F can therefore be immediately calculated. To find the angular acceleration A, draw kt, bt respectively parallel to and at right angles to the link KB. Then tb represents the angular acceleration of the point B relatively to the point K and hence IbjKB is the value of A, the angular acceleration of the link. Its moment of inertia about G can be found experimentally by the method explained in § 125, and then the value of the couple M can be computed. The value of x is found immediately from the quotient M/F. Hence the magnitude F and the position of F relatively to the centre of gravity of the link, necessary to give rise to the couple M, are known, and this force is therefore the resultant force required.

§ 127. Alternative construction for finding the position of F relatively to the centre of gravity of the link. — Let B and K be any two points in the link which for greater generality are taken in fig. 135, so that the centre of gravity G is not in the line join- ing them. First find the value of R ex- perimentally. Then produce the given directions of acceleration of B and K to meet in 0; draw a circle through the three points B, K and 0; produce the line join- ing and G to cut the circle in Y; and take a point Z on the line OY so that \GXGZ = R 2 . Then Z is a point in the line of action of the force F. This useful theorem is due to G. T. Bennett, of Emmanuel College, Cambridge. A proof of it and three corollaries are given in appendix 4 of the second edition of Dalby's Balancing of Engines (London, 1906). It is to be noticed that only the directions of the accelerations of two points are required to find the point Z.*

For an example of the application of the principles of the two preceding sections to a practical problem see Valve and Valve Gear Mechanisms, by W. E. Dalby (London, 1906), where the inertia

stresses brought upon the several links of a Joy valve gear, belonging to an express passenger engine of the Lancashire & Yorkshire railway, are investigated for an engine-speed of 68 m. an hour.

§ 128. The Connecting Rod Problem. — A particular problem of practical importance is the determination of the force producing the motion of the connecting rod of a steam-engine mechanism of the usual type. The methods of the two preceding sections may be used when the acceleration of two points in the rod are known. In this problem it is usually assumed that the crank pin K (fig. 136)*

Fig. 136.

moves with uniform velocity, so that if a is its angular velocity and r its radius, the acceleration is a 2 r in a direction along the crank arm from the crank pin to the centre of the shaft. Thus the accelera tion of one point K is known completely. The acceleration of a second point, usually taken at the centre of the crosshead pin, can be found by the principles of § 82, but several special geometrical constructions have been devised for this purpose, notably the con- struction of Klein, 1 discovered also independently by Kirsch. 2 But probably the most convenient is the construction due to G. T. Bennett 3 which is as follows: Let OK be the crank and KB the con- necting rod. On the connecting rod take a point L such that KLxKB = K0 2 . Then, the crank standing at any angle with the line of stroke, draw LP at right angles to the connecting rod, PN at right angles to the line of stroke OB and NA at right angles to the connecting rod; then AO is the acceleration of the point B to the scale on which KO represents the acceleration of the point K. The proof of this construction is given in The Balancing of Engines.

The finding of F may be continued thus: join AK, then AK is the acceleration image of the rod, OKA being the acceleration dia- gram. Through G, the centre of gravity of the rod, draw Gg parallel to the line of stroke, thus dividing the image at g in the proportion that the connecting rod is divided by G. Hence Og represents the acceleration of the centre of gravity and, the weight of the connecting

1 J. F. Klein, " New Constructions of the Force of Inertia of Connecting Rods and Couplers and Constructions of the Pressures on their Pins," Journ. Franklin Inst., vol. 132 (Sept. and Oct., 1891).

2 Prof. Kirsch, " ttber die graphische Bestimmung der Kolben- beschleunigung," Zeitsch. Veretn deutsche Ingen. (1800), p. 1320.

3 Dalby, The Balancing of Engines (London, 1906), app. 1.

rod being ascertained, F can be immediately calculated. To find a point in its line of action, take a point Q on the rod such that KG X GQ = R 2 , R having been determined experimentally by the method of § 125; join G with O and through Q draw a line parallel to BO to cut GO in Z. Z is a point in the line of action of the result- ant force F ; hence through Z draw a line parallel to Og. The force F acts in this line, and thus the problem is completely solved. The above construction for Z is a corollary of the general theorem given in § 127.

§ 129. Impact. Impact or collision is a pressure of short duration exerted between two bodies.

The effects of impact are sometimes an alteration of the distribu- tion of actual energy between the two bodies, and always a loss of a portion of that energy, depending on the imperfection of the elasticity of the bodies, in permanently altering their figures, and producing heat. The determination of the distribution of the actual energy after collision and of the loss of energy is effected by means of the following principles : —

I. The motion of the common centre of gravity of the two bodies is unchanged by the collision.

.II. The loss of energy consists of a certain proportion of that part of the actual energy of the bodies which is due to their motion relatively to their common centre of gravity.

Unless there is some special reason for using impact in machines, it ought to be avoided, on account not only of the waste of energy which it causes, but from the damage which it occasions to the frame and mechanism. (W. J. M. R.; W. E. D.)

MECHANICVILLE, a village of Saratoga county, New York, U.S.A., on the west bank of the Hudson River, about 20 m. N. of Albany; on the Delaware & Hudson and Boston & Maine railways. Pop. (1900), 4695 (702 foreign-born); (1905, state census), 5877; (1910) 0,634. It lies partly within Stillwater and partly within Half-Moon townships, in the bottom-lands at the mouth of the Anthony Kill, about i£ m. S. of the mouth of the Hoosick River. On the north and

south are hills reaching a maximum height of 200 ft. There is ample water power, and there are manufactures of paper, sash and blinds, fibre, &c. From a dam here power is derived for the General Electric Company at Schenectady. The first settlement in this vicinity was made in what is now Half-Moon township about 1680. Mechanicville (originally called Burrow) was chartered by the county court in 1859, and incorporated as a village in 1870. It was the birthplace of Colonel Ephraim Elmer Ellsworth (1837-1861), the first Federal officer to lose his life in the Civil War.

MECHITHARISTS, a congregation of Armenian monks in communion with the Church of Rome. The founder, Mechithar, was born at Sebaste in Armenia, 1676. He entered a monastery, but under the influence of Western missionaries he became possessed with the idea of propagating Western ideas and culture in Armenia, and of converting the Armenian Church from its monophysitism and uniting it to the Latin Church. Mechithar set out for Rome in 1695 to make his ecclesiastical studies there, but he was compelled by illness to abandon the journey and return to Armenia. In 1696 he was ordained priest and for four years worked among his people. In 1700 he went to Constantinople and began to gather disciples around him. Mechithar formally joined the Latin Church, and in 1 701, with sixteen companions, he formed a definitely religious institute of which he became the superior. Their Uniat pro- paganda encountered the opposition of the Armenians and they were compelled to move to the Morea, at that time Venetian territory, and there built a monastery, 1706. On the outbreak of hostilities between the Turks and Venetians they migrated to Venice, and the island of St Lazzaro was bestowed on them, 1 71 7. This has since been the headquarters of the congregation, and here Mechithar died in 1749, leaving his institute firmly established. The rule followed at first was that attributed to St Anthony; but when they settled in the West modifications from the Benedictine rule were introduced, and the Mechithar- ists are numbered among the lesser orders affiliated to the Benedictines. They have ever been faithful to their founder's programme. Their work has been fourfold: (1) they have brought out editions of important patristic works, some Arme- nian, others translated into Armenian from Greek and Syriac originals no longer extant; (2) they print and circulate Armenian literature among the Armenians, and thereby exercise a powerful

educational influence; (3) they carry on schools both in Europe and Asia, in which Uniat Armenian boys receive a good secondary education; (4) they work as Uniat missioners in Armenia. The congregation is divided into two branches, the head houses being at

St Lazzaro and Vienna. They have fifteen establish- ments in various places in Asia Minor and Europe. There are some 150 monks, all Armenians; they use the Armenian language and rite in the liturgy.

See Vita del servo di Dio Mechitar (Venice, 1901); E. Bore, Saint-Lazare (1835); Max Heimbucher, Orden u. Kongregationen (1907) I. § 37; and the articles in Wetzer u. Welte, Kirchenlexicon (ed. 2) and Herzog, Realencyklopadie (ed. 3) , also articles by Sargisean, a Mechitharist, in Rivista storica benedettina (1906), " La Congrega- zione Mechitarista." (E. C. B.)

MECKLENBURG, a territory in northern Germany, on the Baltic Sea, extending from 53° 4′ to 54° 22′ N. and from io° 35′ to 13° 57′ E., unequally divided into the two grand duchies of Mecklenburg-Schwerin and Mecklenburg-Strelitz.

Mecklenburg-Schwerin is bounded N. by the Baltic Sea, W. by the principality of Ratzeburg and Schleswig-Holstein, S. by Brandenburg and Hanover, and E. by Pomerania and Mecklenburg-Strelitz. It embraces the duchies of Schwerin and Gustrow, the district of Rostock, the principality of Schwerin, and the barony of Wismar, besides several small en- claves (Ahrensberg, Rosson, Tretzeband, &c.) in the adjacent territories. Its area is 5080 sq. m. Pop. (1905), 625,045.

Mecklenburg-Strelitz consists of two detached parts, the duchy of Strelitz on the E. of Mecklenburg-Schwerin, and the principality of Ratzeburg on the W. The first is bounded by Mecklenburg-Schwerin, Pomerania and Branden- burg, the second by Mecklenburg-Schwerin, Lauenburg, and the territory of the free town of Liibeck. Their joint area is T130 sq. m. Pop. (1905), 103,451.

Mecklenburg lies wholly within the great North-European plain, and its flat surface is interrupted only by one raiige of low hills, intersecting the country from south-east to north-west, and forming the watershed between the Baltic Sea and the Elbe. Its highest point, the Helpter Berg, is 587 ft. above sea-level. The coast-line runs for 65 m. along the Baltic (without including indentations), for the most part in flat sandy stretches covered with dunes. The chief inlets are Wismar Bay, the Salzhaff, and the roads of Warne- miinde. The rivers are numerous though small; most of them are affluents of the Elbe, which traverses a small portion of Mecklenburg. Several are navigable, and the facilities for inland water traffic are increased by canals. Lakes are numerous; about four hundred, covering an area of 500 sq. m., are reckoned in the two duchies. The largest is Lake

Mtiritz, 52 sq. m. in extent. The climate resembles that of Great Britain, but the winters are generally more severe; the mean annual temperature is 48 ° F., and the annual rainfall is about 28 in. Although there are long stretches of marshy moorland along the coast, the soil is on the whole productive. About 57% of the total area of Mecklenburg-Schwerin consists of cultivated land, 18 % of forest, and 13 % of heath and pasture. In Mecklenburg-Strelitz the corresponding figures are 47, 21 and 10%. Agriculture is by far the most important industry in both duchies. The chief crops are rye, oats, wheat, potatoes and hay. Smaller areas are devoted to maize, buckwheat, pease, rape, hemp, flax, hops and tobacco. The extensive pastures support large herds of sheep and cattle, including a noteworthy breed of merino sheep. The horses of Mecklenburg are of a fine sturdy quality and highly esteemed. Red deer, wild swine and various other game are found in the forests. The industrial establishments include a few iron- foundries, wool-spinning mills, carriage and machine factories, dye- works, tanneries, brick-fields, soap-works, breweries, distilleries, numerous limekilns and tar-boiling works, tobacco and cigar factories, and numerous mills of various kinds. Mining is insignificant, though a fair variety of minerals is represented in the district. Amber is found on and near the Baltic coast. Rostock, Warnemuride and Wismar are the principal commercial centres. The chief exports are grain and other agricultural produce, live stock, spirits, wood and wool; the chief imports are colonial produce, iron, coal, salt, wine, beer and tobacco. The horse and wool markets of Mecklenburg are largely attended by buyers from various parts of Germany. Fishing is carried on extensively in the numerous inland lakes.

In 1907 the grand dukes of both duchies promised a constitution to their subjects. The duchies had always been under a government of feudal character, the grand dukes having the executive entirely in their hands (though acting through ministers), while the duchies shared a diet (Landtag), meeting for a short session each year, and at other times represented by a committee, and consisting of the proprietors of knights' estates (Ritterguter), known as the Ritter-schaft, and the Landschaft or burgomasters of certain towns.

Mecklenburg-Schwerin returns six members to the Reichstag and Mecklenburg-Strelitz one member.

In Mecklenburg-Schwerin the chief towns are Rostock (with a university), Schwerin, and Wismar the capital. The capital of Mecklenburg-Strelitz is Neu-Strelitz. The peasantry of Mecklenburg retain traces of their Slavonic origin, especially in speech, but their peculiarities have been much modified by amalgamation with German colonists. The townspeople and nobility are almost wholly of Saxon strain. The slowness of the increase in population is chiefly accounted for by emigration.

History. — The Teutonic peoples, who in the time of Tacitus occupied the region now known as Mecklenburg, were succeeded in the 6th century by some Salvonic tribes, one of these being the Obotrites, whose chief fortress was Michilenburg, the modern Mecklenburg, near Wismar; hence the name of the country. Though partly subdued by Charlemagne towards the close of the 8th century, they soon regained their independence, and until the 10th century no serious effort was made by their Christian neighbours to subject them. Then the German king, Henry the Fowler, reduced the Slavs of Mecklenburg to obedience and introduced Christianity among them. During the period of weakness through which the German kingdom passed under the later Ottos, however, they wrenched themselves free from this bondage; the nth and the early part of the 12th century saw the ebb and flow of the tide of conquest, and then came the effective subjugation of Mecklenburg by Henry the Lion, duke of Saxony. The Obotrite prince Niklot was killed in battle in 1160 whilst resisting the Saxons, but his son Pribislaus (d. 11 78) submitted to Henry the Lion, married his daughter to the son of the duke, embraced Christianity, and was permitted to retain his office. His descendants and successors, the present grand dukes of Mecklenburg, are the only ruling princes of Slavonic origin in Germany. Henry the Lion introduced German settlers and restored the bishoprics of Ratzeburg and SGhwerin; in n 70 the emperor Frederick I. made Pribislaus a prince of the empire. From 1214 to 1227 Mecklenburg was under the supremacy of Denmark; then, in 1229, after it had been regained by the Germans, there took place the first of the many divisions of territory which with subsequent reunions con- stitute much of its complicated history. At this time the country was divided between four princes, grandsons of duke Henry Borwin, who had died two years previously. But in less than a century the families of two of these princes became extinct, and after dividing into three branches a third family suffered the same fate in 1436. There then remained only the line ruling in Mecklenburg proper, and the princes of this family, in addition to inheriting the lands of their dead kinsmen, made many additions to their territory, including the counties of

Schwerin and of Strelitz. In 1352 the two princes of this family made a division of their lands, Stargard being separated from the rest of the country to form a principality for John (d. 1393), but on the extinction of his line in 1471 the whole of Mecklenburg was again united under a single ruler. One member of this family, Albert (c. 1338-1412), was king of Sweden from 1364 to 1389. In 1348 the emperor Charles IV. had raised Mecklenburg to the rank of a duchy, and in 1418 the university of Rostock was founded.

The troubles which arose from the rivalry and jealousy of two or more joint rulers incited the prelates, the nobles and the burghers to form a union among themselves, and the results of this are still visible in the existence of the Landesunion for the whole country which was established in 1523. About the same time the teaching of Luther and the reformers was welcomed in Mecklenburg, although Duke Albert (d. 1547) soon reverted to the Catholic faith; in 1549 Lutheranism was recognized as the state religion; a little later the churches and schools were reformed and most of the monasteries were suppressed. A division of the land which took place in 1555 was of short duration, but a more important one was effected in 1611, although Duke John Albert I. (d. 1576) had introduced the principle of primogeniture and had forbidden all further divi- sions of territory. By this partition John Albert's grandson Adolphus Frederick I. (d. 1658) received Schwerin, and another grandson John Albert II. (d. 1636) received Gustrow. The

town of Rostock " with its university and high court of justice " was declared to be common property, while the Diet or Landtag also retained its joint character, its meetings being held alter- nately at Sternberg and at Malchin.

During the early part of the Thirty Years' War the dukes of Mecklenburg-Schwerin and Mecklenburg-Gustrow were on the Protestant side, but about 1627 they submitted to the emperor Ferdinand II. This did not prevent Ferdinand from promising their land to Wallenstein, who, having driven out the dukes, was invested with the duchies in 1629 and ruled them until 1 63 1. In this year the former rulers were restored by Gustavus Adolphus of Sweden, and in 1635 they came to terms with the emperor and signed the peace of Prague, but their land continued to be ravaged by both sides until the conclusion of the war. In 1648 by the Treaty of Westphalia, Wismar and some other parts of Mecklenburg were surrendered to Sweden, the recompense assigned to the duchies, including the secularized bishoprics of Schwerin and of Ratzeburg. The sufferings of the peasants in Mecklenburg during the Thirty Years' War were

not exceeded by those of their class in any other part of Germany; most of them were reduced to a state of serfdom and in some cases whole villages vanished. Christian Louis who ruled Mecklenburg-Schwerin from 1658 until his death in 1692 was, like his father Adolphus Frederick, frequently at variance with the estates of the land and with members of his family. He was a Roman Catholic and a supporter of Louis XIV., and his country suffered severely during the wars waged by France and her allies in Germany.

In June 1692 when Christian Louis died in exile and without sons, a dispute arose about the succession to his duchy between his brother Adolphus Frederick and his nephew Frederick William. The emperor and the rulers of Sweden and of Branden- burg took part in this struggle which was intensified when, three years later, on the death of Duke Gustavus Adolphus, the family ruling over Mecklenburg-Gustrow became extinct. At length the partition Treaty of Hamburg was signed on the 8th of March 1701, and a new division of the country was made. Mecklenburg was divided between the two claimants, the shares given to each being represented by the existing duchies of Mecklenburg-Schwerin, the part which fell to Frederick William, and Mecklenburg-Strelitz, the share of Adolphus Frederick. At the same time the principle of primogeniture was again asserted, and the right of summoning the joint Landtag was reserved to the ruler of Mecklenburg-Schwerin.

Mecklenburg-Schwerin began its existence by a series of con- stitutional struggles between the duke and the nobles. The heavy debt incurred by Duke Charles Leopold (d. 1747), who iiad joined Russia in a war against Sweden, brought matters to a crisis; the emperor Charles VI. interfered and in 1728 the imperial court of justice declared the duke incapable of governing and his brother Christian Louis was appointed administrator of the duchy. Under this prince, who became ruler de jure in 1747, there was signed in April 1755 the convention of Rostock by which a new constitution was framed for the duchy. By this instrument all power was in the hands of the duke, the nobles and the upper classes generally, the lower classes being entirely unrepresented. During the Seven Years' War Duke Frederick (d. 1785) took up a hostile attitude towards Frederick the Great, and in consequence Mecklenburg was occupied by Prussian troops, but in other ways his rule was beneficial to the country. In the early years of the French revolutionary wars Duke Frederick Francis I. (1756-1837) remained neutral, and in 1803 he regained Wismar from Sweden, but in 1806 his land was overrun by the French and in 1808 he joined the Confederation of the Rhine. He was the first member of the confederation to abandon Napoleon, to

whose armies he had sent a contingent, and in 1813-1814 he fought against France. In 181 5 he joined the Germanic Confederation (Bund) and took the title of grand duke. In 1819 serfdom was abolished in his dominions. During the movement of 1848 the duchy witnessed a considerable agitation in favour of a more liberal constitution, but in the subsequent reaction all the concessions which had been

made to the democracy were withdrawn and further restrictive measures were introduced in 1851 and 1832.

Mecklenburg-Strelitz adopted the constitution of the sister duchy by an act of September 1755. In 1806 it was spared the infliction of a French occupation through the good offices of the king of Bavaria; in 1808 its duke, Charles (d. 1816), joined the confederation of the Rhine, but in 181 3 he withdrew therefrom. Having been a member of the alliance against Napoleon he joined the Germanic confederation in 1815 and assumed the title of grand duke.

In 1866 both the grand dukes of Mecklenburg joined the North German confederation and the Zollverein, and began to pass more and more under the influence of Prussia, who in the war with Austria had been aided by the soldiers of Mecklen- burg-Schwerin. In the Franco-German War also Prussia received valuable assistance from Mecklenburg, Duke Frederick Francis II. (1823-1883), an ardent advocate of German unity, holding a high command in her armies. In 187 1 the two grand duchies became states of the German Empire. There was now a renewal of the agitation for a more democratic constitution, and the German Reichstag gave some countenance to this movement. In 1897 Frederick Francis IV. (b. 1882) succeeded his father Frederick Francis III. (1851-1897) as grand duke of

Mecklenburg-Schwerin, and in 1904 Adolphus Frederick (b. 1848) a son of the grand duke Frederick William (1819-1904) and his wife Augusta Carolina, daughter of Adolphus Frederick, duke of Cambridge, became grand duke of Mecklenburg- Strelitz. The grand dukes still style themselves princes of the Wends.

See F. A. Rudloff, Pragmatisches Handbuch der mecklenburgischen Geschickte (Schwerin, 1780-1822) ; C. C. F. von Lutzow, Versuch einer pragmatiscken Geschickte von Mecklenburg (Berlin, 1 827-1

835); Mecklenburgische Geschickte in Einzeldarstellungen, edited by R. Beltz, C. Beyer, W. P. Graff and others; C. Hegel, Geschickte der mecklenburgischen Landstande bis 1555 (Rostock, 1856); A. Mayer, Geschickte des Grossherzogtums Mecklenburg-Strelitz 1816-18QO (New Strelitz, 1890); Tolzien, Die Grosskerzoge von Mecklenburg-Schwerin (Wismar, 1904) ; Lehsten, Der Adel Mecklenburgs seit dem landes- grundgesetzlicken Erbvergleich (Rostock, 1864); the Mecklenburgisches Urkundenbuch in 21 vols. (Schwerin, 1873-1903); the Jahrbilcker des Vereins fiir mecklenburgische Geschickte und Altertumskunde (Schwerin, 1836 fol.) ; and W. Raabe, Mecklenburgische Vaterlands- kunde (Wismar, 1 894-1 896); von Hirschfeld, Friedrick Franz II., Grosskerzog von Mecklenburg-Schwerin und seine Vorganger (Leipzig, 1891); Volz, Friedrick Franz II. (Wismar, 1893); C. Schroder, Friedrick Franz III. (Schwerin, 1898); Bartold, Friedrick Wilhelm, Grossherzog von Mecklenburg-Strelitz und Augusta Carolina (New Strelitz, 1893); and H. Sachsse, Mecklenburgische Urkunden und Daten (Rostock, 1900).

PRINTED IN U.S.A.

VOL18_MEDAL-MUMPS

Britannica

THE

ENCYCLOPAEDIA BRITANNICA

ELEVENTH EDITION

FIRST

SECOND

THIRD

FOURTH

FIFTH

SIXTH

SEVENTH

EIGHTH

NINTH

TENTH

ELEVENTH

edition, published in three

volumes, 1768 — 1771.

ten „ 1777— 1784.

eighteen „ 1788 — 1797.

twenty „ 1801 — 1810.

twenty „ 1815 — 1817.

twenty „ 1823 — 1824.

twenty-one „ 1830 — 1842.

twenty-two „ 1853 — 1860,

twenty-five „ 1875 — i88o. !

ninth edition and eleven

supplementary volumes, 1902 — 1903.

published in twenty-nine volumes, 1910 — 1911.

COPYRIGHT

in all countries subscribing to the

Bern Convention

by

THE CHANCELLOR, MASTERS AND SCHOLARS

of the UNIVERSITY OF CAMBRIDGE

All rights reserved

THE

ENCYCLOPAEDIA BRITANNICA

DICTIONARY

OF

ARTS, SCIENCES, LITERATURE AND GENERAL

INFORMATION

ELEVENTH EDITION

VOLUME XVIII

MEDAL to MUMPS

New York

Encyclopaedia Britannica, Inc.

342 Madison Avenue

Copyright, in the United States of America, 1911,

by

The Encyclopaedia Britannica Company.

INITIALS USED IN VOLUME XVIII. TO IDENTIFY INDIVIDUAL CONTRIBUTORS, 1 WITH THE HEADINGS OF THE ARTICLES IN THIS VOLUME SO SIGNED.

A.

Ca

•

A.

E.

G.

A.

E.

S.

A

F.

P.

A.

Go.*

A.

G. D.

A.

Ha.

A.

H.-S.

A

J. G,

A. J. L.

A.

L.

A.

M. C

A.

N.

A.

Se.*

A.

v. G.

A

Wa.

Arthur Cayley, LL.D., F.R.S.

See the biographical article, Cayley, Arthur.

Monge, Gaspard.

Rev. Alfred Ernest Garvie, M.A., D.D. f

Principal of New College, Hampstead. Member of the Board of Theology and the J]irj|. ae i e Board of Philosophy, London University. Author of Studies in the inner Life of ■ nur * re * Jesus; &c. L

Arthur Everett Shipley, M.A., D.Sc, F.R.S. f

Master of Christ's College, Cambridge. Reader in Zoology, Cambridge University, 1 Mesozoa* Joint-editor of the Cambridge Natural History. I

Alfert Frederick Pollard, M.A., F.R.Hist.S.

Professor of English History in the University of London. Fellow of All Souls' College, Oxford. Assistant Editor of the Dictionary of National Biography, 1893- 1901. Lothian Prizeman (Oxford), 1892; Arnold Prizeman, 1898. Author of England under the Protector Somerset; Henry VIII.; Life of Thomas Cranmer; &c.

Morton, John.

Rev. Alexander Gordon, M.A.

Lecturer on Church History in the University of Manchester.

i Millennium; Montanism.

\ Meshed.

(Menius; Mennonites; Menno, Simons; Morone.

Arthur George Doughty, M.A., Litt.D., C.M.G. f"

Dominion Archivist of Canada. Member of the Geographical Board of Canada. J „ . „ Author of The Cradle of New France; &c. Joint-editor of Documents relating to the\ "WCier, Honore. Constitutional History of Canada. I

Adolf Harnack.

See the biographical article, Harnack, Adolf.

Sir A. Houtum-Schindler, CLE.

General in the Persian Army. Author of Eastern Persian Irak.

Rev. Alexander James Grieve, M.A., B.D. r

Professor of New Testament and Church History at the United Independent College, J . ,.

Bradford. Sometime Registrar of Madras University and Member of Mysore 1 Missions \m part). Educational Service. (_

Andrew Jackson Lamoureux. f

Librarian, College of Agriculture, Cornell University. Formerly Editor of the -j Mexico: Geography. Rio News, Rio de Janeiro. [

Andrew Lang. f m …

See the biographical article, Lang, Andrew. ‘ MOUere.

Agnes Mary Clerke.

See the biographical article, Clerke, A. M.

{

Mouchez.

Alfred Newton, F.R.S.

See the biographical article, Newton, Alfred.

{Megapode; Merganser; Mocking Bird; Moor-Hen; Morillon; Motmot; Mouse-Bird,

Adam Sedgwick, M.A., F.R.S. f

Professor of Zoology at the Imperial College of Science and Technology, London. J «„*„„„ „_v •„ Fellow, and formerly Tutor, of Trinity College, Cambridge. Professor of Zoology 1 «WiamorpnosiS. in the University of Cambridge, 1907-1909.

Baron Alfred von Gutschmid.

See the biographical article, Gutschmid, Alfred, Baron von.

Arthur Waugh, M.A. r

New College, Oxford. Newdigate Prize, 1888. Author of Gordon in Africa; A Ifred, J m orr j s William Lord Tennyson. Editor of Johnson’s Lives of the Poets; editions of Dickens, Tenny- 1 ‘

son, Arnold, Lamb; &c. |_

1 A complete list, showing all individual contributors, appears in the final volume.

-I Moses of Chorene {in pari).

VI

B.J.

B. M.* C.A.

C. B. W.* C.E1.

INITIALS AND HEADINGS OF ARTICLES

Bernhard Julg (1825-1886).

f

Formerly Professor of Classical Philology in the University of Innsbruck. Author J Mongols: Language. of Mongolische M archensammlung; t)ber Wesen und Aufgabe der Sprachwissenschaft; 5 • s s-

and On the Present Stale of Mongolian Researches. *■

Budgett Meakin (1866-1906). f

Formerly Editor of the Times of Morocco. Author of The Land of the Moors; The\ Morocco (in part), Moorish Empire; Life in Morocco; &c. L

Cleveland Abbe, A.M., LL.D.

Professor of Meteorology, U.S. Weather Bureau, Washington. Director of the

Cincinnati Observatory, 1 863-1 873. Editor of Monthly Weather Review; and -j Meteorology.

Bulletin of Mount Weather Observatory. Author of Meteorological Apparatus and

Methods; &c.

Charles Bertie Wedd, F.G.S.

Joint-author of various memoirs and maps of the Geological Survey.

Millstone Grit; Miocene.

part);

c.

P. A.

c.

P.B.

c.

O.Ala.

c.

J. B.

c.

J.F„*

e.

J. L

Charles Creighton, M.A., M.D. [Monster (in

King’s College, Cambridge. Author of A History of Epidemics in Britain; .Tenner -j Morgagni. and Vaccination ; Plague in India ; &c. I L

Sir Charles Norton Edgcumbe Eliot, K.C.M.G., C.B., M.A., LL.D., D.CL. Vice-Chancellor of Sheffield University. Formerly Fellow of Trinity College, Oxford. H.M.‘s Commissioner and Commander-in-Chief for the British East Africa Protectorate; Agent and Consul-general at Zanzibar; and Consul-general for German East Africa, 1900-1904.

Charles Francis Atkinson. f

Formerly Scholar of Queen’s College, Oxford. Captain, 1st City of London (Royal \ ,. Fusiliers). Author of The Wilderness and Cold Harbour. I \1n4part).

Charles Francis Bastable, M.A., LL.D. r

Regius Professor of Laws and Professor of Political Economy in the University 1 Monetary Conferences! of Dublin. Author of Public Finance; Commerce of Nations; Theory of International] Monev Trade; &c. ‘ I

Mordvinians.

Medal: War Decoration,

{

Money-Lending.

Served through i Mohmand Campaign. I Morelli.

C.Hi.

C. Mo. C. PL

C. R. B.

C. R. W. B. C. S. R.

C. We.

D. B. Ma.

D. F. T. D.GI.

Chaloner Grenville Alabaster. Barrister-at-Law, Inner Temple.

Charles Jasper Blunt, A.O.D.

Major, Royal Artillery. Chief Ordnance Officer, Singapore. Chitral Campaign.

Constance Jocelyn Ffoulkes.

Translator of Morelli's Italian Painters; &c.

Sir Charles James Lyall, K.C.S.I., CLE., LL.D. (Edin.). r

Secretary, Judicial and Public Department, India Office. Fellow of King's College, London. Secretary to Government of India in Home Department, 1889-1894,-1 MofaddallySt. Chief Commissioner, Central Provinces, India, 1 895-1 808. Author of Translations of Ancient Arabic Poetry; &c. L

Chedomille Mijatovich. r Michael Obremovicta III.;

Senator of the Kingdom of Servia. ˆ Envoy Extraordinary and Minister Plenipo- -i MilOSB Obrenovich I

tentiary of the King of Servia to the Court of St James's, 1 895-1900, and 1902-1903.

William Cosmo Monkhouse.

See the biographical article, Monkhouse, William Cosmo.

Christian Pfister, D-es.-L. f”

Professor at the Sorbonne, Paris. Chevalier of the Legion of Honour. Author -< Merovingians, of Htudes sur le regne de Robert le Pieux. [_

Charles Raymond Beazley, M.A., D.Litt., F.R.G.S., F.R.Hist.S.

Professor of Modern History In the University of Birmingham. Formerly Fellow of Merton College, Oxford, and University Lecturer in the History of Geography. Lothian Prizeman, Oxford, 1889. Lowell Lecturer, Boston, 1908. Author of Henry the Navigator ; The Dawn of Modern Geography ; &c.

C, R. W. Biggar, M.A., K.C

J Millais.

Mela, Pomponius

{in part); Mercator; Monte Corvino.

Hon. Charles Stewart Rolls, M.A., F.R.G.S. (1877-1910).

Trinity College, Cambridge. British Pioneer of Motoring and Aviation. Formerly -< Managing Director of Rolls-Royce, Ltd.

Cecil Weatherly.

Formerly Scholar of Queen’s College, Oxford. Barrister-at-Law.

Duncan Black Macdonald, M.A., D.D.

Professor of Semitic Languages, Hartford Theological Seminary, U.S.A. Author of Development of Muslim Theology, Jurisprudence and Constitutional Theory;’ Selections from Ibn Khaldun ; Religious A ttitude and Life in Islam ; &c.

Mowat, Sir 01iver,,

Motor Vehicles:

Light Vehicles.

Monument.

Mufti.

Donald Francis Tovey.

Author of Essays in Musical Analysis: comprising The Classical Concerto, Goldberg Variations, and analyses of many other classical works.

f Melody; The J Mendelssohn-Bartholdy,

I (in part);

{ Motet; Mozart (in par().

Sir David Gill, K.C.B., LL.D., F.R.S., F.R.A.S., D.Sc.

H.M. Astronomer at Cape of Good Hope, 1879-1907. Served on Geodetic Survey of Egypt, and on the expedition to Ascension Island to determine the Solar Parallax by observations of Mars. Directed Geodetic Survey of Natal, Cape Colony, and Rhodesia. Author of Geodetic Survey of South Africa; Catalogues of Stars for the Equinoxes, 1830, i860, 1885, 1890, 1000; &c.

Micrometer.

INITIALS AND HEADINGS OF ARTICLES

vi i

D. G. H.

D. H. D. LI. T.

D. Ma. D. Mn.

D. N. P.

D. R.-M.

D. S. M.*

E. A. M.

E.

B.

T.

E.

C.

B.

E.

E.

A.

E.

F.

S.

D

E. Gr. E. H. B. E. H. M. E. K.

Ed. M.

E. 0.* E.Pr.

Mersina; Miletus.

Meloria; Mina.

David George Hogarth, M.A.

Keeper of the Ashraolean Museum, Oxford. Fellow of Magdalen College Oxford Fellow of the British Academy. Excavated at Paphos, 1888; Naucratis 1890 and 1903; Ephesus, 1904-1905; Assiut, 1906-1907. Director, British School at Athens 1897-1900. Director, Cretan Exploration Fund, 1899.

David Hannay.

Formerly British Vice-Consul at Barcelona. Author of Short History of the Royal ■ Navy; Life of Emilio Castelar; &c.

Daniel Lleufer Thomas.

Barrister-at-Law, Lincoln’s Inn. Rhondda.

David Masson, LL.D.

See the biographical article, Masson, David.

Rev. Dugald Macfadyen, M.A.

Minister of South Grove Congregational Church, Highgate. Congregational Ideals; &c.

Diarmid Noel Paton, M.D., F.R.C.P. (Edin.). r

Regius Professor of Physiology in the University of Glasgow. Formerly Super- intendent of Research Laboratory of Royal College of Physicians, Edinburgh. ˆ Metabolic Diseases. Biological Fellow of Edinburgh University, 1884. Author of Essentials of Human Physiology; &c. ‘ I

David Randall-MacIver, M.A., D.Sc. r

Curator of Egyptian Department, University of Pennsylvania. Formerly Worcester J MonomotaDa Reader in Egyptology, University of Oxford. Author of Medieval Rhodesia; &c. [

David Samuel Margoliouth, M.A., D.Litt. r

Laudian Professor of Arabic, Oxford. Fellow of New College. Author of Arabic Papyri of the Bodleian Library; Mohammed and the Rise of Islam; Cairo, Jerusalem ‘ and Damascus. ,

Edward Alfred Minchin, M.A., F.Z.S., f

Professor of Protozoology in the University of London. Formerly Fellow of Merton \ Medusa.

Stipendiary Magistrate at Pontypridd and \ Merthyr Tydfil.

I Milton {in part). Author of Constructive \ Melville, Andrew.

Meroe.

College, Oxford.

Edward Burnett Tylor, D.C.L., LL.D.

See the biographical article, Tylor, Edward Burnett.

Right Rev. Edward Cuthbert Butler, O.S.B., D.Litt.

Abbot of Downside Abbey, Bath. Author of ” The Lausiac History of

Palladius in Cambridge Texts and Studies, vol. vi.

J” Mexico: Ancient History \ {in part).

(Mendicant Movement and Orders; Monasticism; Monte Cassino.

Ernest E. Austen. r

Assistant in Department of Zoology, Natural History Museum, South Kensington, j Mosquito.

Lady Dilke. f >

See the biographical article, Dilke, Sir C. W., Bart. \ Millet, Jean Francois.

Ernest Arthur Gardner, M.A.

See the biographical article, Gardner, Percy.

Sir Edward Herbert Bunbury, Bart., M.A., F.R.G.S.(d. 1895).

M.P. for Bury St Edmunds, 1847-1852. Author of A History of Ancient Geography; ■

Ellis Hovell Minns, M.A.

University Lecturer in Palaeography, Cambridge. Lecturer and Assistant Librarian – at Pembroke College, Cambridge. Formerly Fellow of Pembroke College.

Edmund Knecht, Ph.D., M.Sc.Tech. (Manchester), F.I.C.

Professor of Technological Chemistry, Manchester University. Head of Chemical Department, Municipal School of Technology, Manchester. Examiner in Dyeing, – City and Guilds of London Institute. Author of A Manual of Dyeing; See. Editor of Journal of the Society of Dyers and Colourists.

Eduard Meyer, Ph.D., D.Litt. (Oxon.), LL.D.

Professor of Ancient History in the University of Berlin. Author of Geschichte des Alterlhums; Geschichte des alien Aegyptens; Die Israeliten und ihre Nachbar- stdmme.

Edmund Owen, M.B., F.R.C.S., LL.D., D.Sc.

Consulting Surgeon to St Mary's Hospital, London, and to the Children's Hospital, Great Ormond Street, London. Chevalier of the Legion of Honour. Late Examiner J in Surgery at the Universities of Cambridge, London and Durham. Author of] A Manual of Anatomy for Senior Students. [

Edgar Prestage.

Special Lecturer in Portuguese Literature in the University of Manchester. Examiner in Portuguese in the Universities of London, Manchester, &c. Commendador, j Portuguese Order of S. Thiago. Corresponding Member of Lisbon Royal Academy " of Sciences, Lisbon Geographical Society ; &c. Editor of Letters of a Portuguese Nun; Azurara's Chronicle of Guinea; &c.

' Megalopolis; Megara Kin part); Melos.

Mela, Pomponius

{in part).

Melanchlaeni.

Mercerizing.

Media;

Memnon of Rhodes;

Menander (Milinda)

{in part); Mentor of Rhodes; Mithradates.

Mortification; Mouth and Salivary Glands {Surgery).

Moraes.

E. R. L.

E.St.

E, S. S.

F. C. C.

F. G. M. B. F. G. P.

F. H. Ne. F. J. H.

F. LI. G.

F.

N.

H.

F.

0.

B.

F.

We.

F.

W

.R.*

G.

A.

B.

G

C.

W.

G. E. D,

G.

F.B.

G.

G. S.

G.

H. Fo.

G.

P.R.

G.

Sa.

G

Sn.

Metamerism; Molluscs (in part).

j Missions (in part).

[Motor Vehicles:

Heavy Commercial Vehicles.

Moses of Chorene

(in part).

Mercia.

J Mouth and Salivary 1 Glands.

j Metallography (in part).

Sir Edwin Ray Lankester, K.C.B., F.R.S., M.A., D.Sc, LL.D.

Hon. Fellow of Exeter College, Oxford. President of the British Association, 1906. Professor of Zoology and Comparative Anatomy in University College. London, 1874-1890. Linacre Professor of Comparative Anatomy at Oxford, 1891-1898. Director of the Natural History Departments of the British Museum, 1898-1907. Vice-President of the Royal Society, 1896. Romanes Lecturer at Oxford, 1905. Author of Degeneration; The Advancement of Science; The Kingdom of Man; &c.

Eugene Stock.

Formerly Editorial Secretary of the Church Missionary Society.

Edward Shrapnell Smith.

Editor of The Commercial Motor. Hon. Treasurer of the Commercial Motor Users -< Association. Organiser of the Lancashire Heavy Motor Trials of 1898, 1 899-1 901.

Frederick Cornwallis Conybeare, M.A., D.Th. (Giessen).

Fellow of the British Academy. Formerly Fellow of University College, Oxford. . Editor of The Ancient Armenian Texts of Aristotle. Author of Myth, Magic and Morals; &c

Frederick George Meeson Beck, M.A.

Fellow and Lecturer of Clare College, Cambridge.

Frederick Gymer Parsons, F.R.CS., F.Z.S., F.R.Anthrop.Inst.

Vice-President, Anatomical Society of Great Britain and Ireland. Lecturer on Anatomy at St Thomas's Hospital and the London School of Medicine for Women, London. Formerly Hunterian Professor at the Royal College of Surgeons.

Francis Henry Neville, M.A., F.R.S.

Fellow and Lecturer in Natural Science, Sidney Sussex College, Cambridge.

Francis John Haverfield, M.A., LL.D., F.S.A. r

Camden Professor of Ancient History in the University of Oxford. Fellow of J M na Brasenose College. Fellow of the British Academy. Author of Monographs on 1 Roman History, especially Roman Britain; &c. L

Francis Llewellyn Griffith, M.A., Ph.D., F.S.A. r Memphis; Menes;

Reader in Egyptology, Oxford University. Editor of the Archaeological Survey] fli oe j.j s Lake of – and Archaeological Reports of the Egypt Exploration Fund. Fellow of Imperial] M ‘ ‘

German Archaeological Institute. I Mummy.

Colonel Frederic Natusch Maude, C.B.

Lecturer in Military History, Manchester University. Policy; The Leipzig Campaign; The Jena Campaign.

Frederick Orpen Bower, M.A., D.Sc, F.R.S.

Regius Professor of Botany in the University of Glasgow. Botany for Beginners; &c.

Frederick Wedmore.

See the biographical article, Wedmore, Frederick.

Frederick William Rudler, I.S.O., F.G.S. C

Curator and Librarian of the Museum of Practical Geology, London, 1879-1902. ■< Moldavite. President of the Geologists' Association, 1887-1889. I

George A. Boulenger. D.Sc, Ph.D., F.R.S. f

In charge of the collections of Reptiles and Fishes, Department of Zoology, British -I Mormyr. Museum. Vice-President of the Zoological Society of London. |_

George Charles Williamson, Litt.D. r

Chevalier of the Legion of Honour. Author of Portrait Miniatures; Life of Richard J Miniature; Cosway, R.A . ; George Engleheart ; Portrait Drawings ; &c. Editor of new edition of 1 Morland, George. Bryan's Dictionary of Painters and Engravers. [

Surgeon-Major George Edward Dobson,M.A.,M.B.,F.Z.S., F.R.S. (1848-1895). f

Army Medical Department, 1 868-1 888. Formerly Curator of the Royal Victoria J Mole (in ■bartS Museum, Netley. Author of Monograph of the Asiatic Chiroptera, &c; A Monograph 1 *

of the Insectivora, Systematic and Anatomical. I .

George F. Barwick. f

Assistant Keeper of Printed Books and Superintendent of Reading-room, British -! Midhat Pasha.

Museum. |_

George Gregory Smith, M.A. r

Professor of English Literature, Queen's University, Belfast. Author of The Days J Montgomerie.

of James IV. ; The Transition Period; Specimens of Middle Scots; &c. [

George Herbert Fowler, F.Z.S., F.L.S., Ph.D. r

Formerly Berkeley Research Fellow, Owens College, Manchester; and Assistant \ Microtomy. Professor of Zoology at University College, London. [

Gerald Philip Robinson. r

President of the Society of Mezzotint Engravers. Mezzotint Engraver to Queen J Mezzotint. Victoria and to King Edward VII. I

Author of War and the World's

Metz.

Author of Practical \ Mohl, Hugo von,

J Meryon.

George Saintsbury, LL.D., D.C.L.

See the biographical article, Saintsbury, G.

rMerimee; Michelet, Jules; J Montaigne; Montesquieu; [Montpensier, Duchesse dft

Grant Showerman, A.M., Ph.D. f

Professor of Latin in the University of Wisconsin. Member of the Archaeological J jun + hrac Institute of America. Member of American Philological Association. Author of | With the Professor ; The Great Mollter of the Gods ; &c. L

G. W. T. H. B. Wo. H. Ch. H.E.

H.Fr. H. F. B.

H. F. G. H. H. L.

H. L. H.

H. L. S. H. H. S.

H. N. D. H.O.

H.St

H.S.

J.

H.S.

M.

H.S.

W

H. T. A.

H. W. H. H. W. C. D.

H. W. R.* I. A. I. A. C.

INITIALS AND HEADINGS OF ARTICLES

Rev. Griffithes Wheeler Thatcher, M.A., B.D f

Warden of Camden College Sydney, N.S.W. Formerly Tutor in Hebrew and Old] Mubarrad. Testament History at Mansfield College, Oxford. j_ ittuualrttu –

Horace Boongbroke Woodward, F.R.S., F.G.S f

PrJc?H rly . ˆ ssi f ta ? t . director of the Geological Survey of England and Wales.] MUler, Hugh. President, Geologists' Association, 1893-1894. Wollaston Medallist, 1908. I 5

Hugh Chisholm M.A [Meredith, George;

„r lh?l y 7 1 ar J 9f Corpus Chnsti College, Oxford. Editor of the nth edition 4 Milan Obrenovitch IV • of the Encyclopaedia Bntanmca. Co-editor of the loth edition. [Morley Viseouilt

Karl Hermann Ethe, M.A., Ph.D. r

Professor of Oriental Languages, University College, Aberystwyth (University of J „. , . . Wales). Author of Catalogue of Persian Manuscripts in the India Office Library 1 Mirkhond London (Clarendon Press) ; &c. •” y ‘ I

Henri Frantz.

Art Critic, Gazette des beaux arts, Paris.

Horatio Robert Forbes Brown, LL.D.

IX

■\ Meissonier.

Editor of the Calendar of Venetian Staie”Pap S rs, for the Public Record Office. Author J „ ‘ ,

ot Life on the Lagoons; Venetian Studies; John Addington Symonds, a Biography; 1 Milan (*» P<"~t).

Hans Friedrich Gadow, F.R.S., Ph.D.

Strickland Curator and Lecturer on Zoology in the University of Cambridge. Author ot Amphibia and Reptiles,” in the Cambridge Natural History.

Henry Harvey Littlejohn, M.A., M.B., CM., F.R.C.S. (Edin) Professor of Forensic Medicine in the University of Edinburgh. ‘

Harriet L. Hennessy, M.D. (Brux.), L.R.C.P.I., L.R.C.S.I.

J Migration: Zoology; [_Moa.

H. Lawrence Swinburne (d. .1907).

Henry Morse Stephens, M.A.

Balliol College, Oxford. Professor of History and Director of University Extension, University of California. Author of History of the French Revolution; Modern’ European History ; &c.

Henry Newton Dickson, M.A., D.Sc, F.R.S. (Edin.), F.R.G S

Professor of Geography at University College, Reading. Formerly Vice-President Royal Meteorological Society. Lecturer in Physical Geography, Oxford. Author’ of Meteorology; Elements of Weather and

Climate; &c.

Hermann Oelsner, M.A., Ph.D.

Taylorian Professor of the Romance Languages in University of Oxford. Member ofCouncil of the Philological Society. Author of A History of Provencal Literature;'

F.R.S. (Edin.) f Medical Jurisprudence

I (in part).

/"Medical Education, U.S.A.

I (in pari).

/Medal: War Decorations X (in part).

Mirabeau, Honored

Mediterranean Sea; Mexico, Gulf of.

Mistral.

Henry Sturt, M.A.

Author of Idola Theatri; The Idea of a Free Church; Personal Idealism

■I Mining.

4 Metempsychosis.

Henry Stuart Jones, M.A. r

Formerly Fellow and Tutor of Trinity College, Oxford, and Director of the British]„.,.,

School at Rome. Member of the German Imperial Archaeological Institute 1 Mosaic: Ancient (in part).

Author of The Roman Empire; &c. L

Henry Smith Munroe, D.Sc, Ph.D.

Professor of Mining, Columbia University, New York.

Henry Spenser Wilkinson, M.A.

rlliwt 16 P A r ˆ f r SOr f °U!™i tal } r H «*»Y. University of Oxford. Fellow of All Souls’ ■! Moltke, Count von. College. Author of The Brain of an Army; &c.]

Rev. Herbert Thomas Andrews. f

Professor of New Testament Exegesis, New College, London. Author of “The Mud™, c j. A Commentary on Acts in the Westminster New Testament; Handbook on the] Mlssi0ns (*» W- Apocryphal Books in the ” Century ” Bible. I

Hope W. Hogg, M.A. r

Professor of Semitic Languages and Literatures in the University of Manchester. \ Mes °P°tamia. Henry William Carless Davis, M.A. r

isfHoˆ T A U ,ˆh r n°/ ? a p Iiol i C f eg ^’ °, x , {or ˆ- Fellow ˆ f . An Souls ‘ Colle s e – 0xf ° r d. I Montfort, Simon de. 1895-1902. Author of England under the Normans and Angevins; Charlemagne. \

Rev. Henry Wheeler Robinson, M.A. r

Professor of Church History in Rawdon College, Leeds. Seniar Kennicott Scholar J „, ul – n

?■ Z A> I i < iJvˆ, utho J of ˆZ™ Ps y ch °l°&y ˆ Relation to Pauline Anthropology] m °* h (*« P art ˆ- (in Mansfield College Essays) ; &c. I

Israel Abrahams, M.A.

Reader in Talmudic and Rabbinic Literature in the University of Cambridee Formerly President, Jewish Historical Society of England. Author of A Sfor’r History of Jewish Literature; Jewish Life in the Middle Ages; Judaism; &c.

Sir Joseph Archer Crowe, K..C.M.G.

See the biographical article, Crowe, Sir J. A.

Meir; Meir of Rothenburg; Menasseh ben Israel; Mendelssohn, Moses; Mocatta; Molko.

S Memlinc (in part).

X

J. A. F.

J. A. S. J. A. V. J.Bt.

J. B. T.

J. D. B.

J. E. H. J. F. K.

J. F. P.

J. G. H. J. 6. R.

J. G. Sc.

J. H. F. J. H. Je.

J. H. M.

INITIALS AND HEADINGS OF ARTICLES

J.

H.

B.

J.

HI

R.

J.

Le

J.

L.

W.

J.

M.

Bu

J. M. M.

Jno. S.

John Ambrose Fleming, M.A., F.R.S., D.Sc.

Pender Professor of Electrical Engineering in the University of London. Fellow of University College, London. Formerly Fellow of St John's College, Cambridge, and Lecturer on Applied Mechanics in the University. Author of Magnets and Electric Currents.

John Addington Symonds, LL.D.

See the biographical article, Symonds, John Addington.

Rev. J. A. Vanes.

. Professor of New Testament Exegesis, Wesleyan College, Richmond.

James Bartlett.

Meter, Electric.

j Metastasis

-! Methodism {in part).

Lecturer on Construction, Architecture, Sanitation, Quantities, &c, at King's College, J „ , London. Member of Society of Architects. Member of Institute of Junior) "^OTia.!.

Engineers.

Sir John Batty Tuke, M.D., F.R.S. (Edin.), D.Sc, LL.D. . f

President of the Neurological Society of the United Kingdom. Medical Director J Medical Education. of New Saughton Hall Asylum, Edinburgh. M. P. for the Universities of Edinburgh | and St Andrews, 1900-1910. t

James David Bourchier, M.A., F.R.G.S. f

King's College, Cambridge. Correspondent of The Times in South-Eastern Europe. J Montenegro. Commander of the Orders of Prince Danilo of Montenegro and of the Saviour of Greece, and Officer of the Order of St Alexander of Bulgaria. *-

Rev. Joseph Edmund Hutton, M.A. J* Moravian Brethren.

Author of History of the Moravian Church. \

James Furman Kemp, D.Sc. f

Professor of Geology, Columbia University, New York. Geologist to United States i Mineral Deposits, and New York Geological Surveys. Author of Handbook of Rocks ; £Tc. I

Joseph Frank Payne, M.A., M.D., F.R;C.P.(i84o-ioio). f

Formerly Harveian Librarian, Royal College of Physicians, London. Hon. Fellow J m .jj„.. A . rr- , /• ., ,\

of Magdalen College, Oxford. Fellow of the University of London. Author of] Medicine. History (m part). Lectures on Anglo-Saxon Medicine; &c. L

Joseph G. Horner, A.M.I.Mech.E.

Author of Plating and Boiler Making; Practical Metal Turning; &c.

John George Robertson, M.A., Ph.D.

Professor of German at the University of London. Formerly Lecturer on the English Language, Strassburg University. Author of History of German Literature; &c.

\ Metal-Work: Industrial. \ Meistersinger.

Sir James George Scott, K.C.I.E. Superintendent and Political Officer, The Upper Burma Gazetteer.

Southern Shan States. Author of Burma; \ Mekong; Minbu.

John Henry Freese, M.A.

Formerly Fellow of St John's College, Cambridge.

f Menander; -i Mirror: Ancient; [Moesia.

James Hopwood Jeans, M.A., F.R.S. C

Stokes Lecturer in the University of Cambridge. Formerly Fellow of Trinity < Molecule. College. Author of Mathematical Theory of Electricity and Magnetism ; &c. ˆ

John Henry Middleton, M.A., Litt.D., F.S.A., D.C.L. (1846-1896).

Slade Professor of Fine Art in the University of Cambridge, 1 886-1895. Director of the Fitzwilliam Museum, Cambridge, 1889-1892. Art Director of the South Kensington Museum, 1 892-1 896. Author of The Engraved Gems of Classical Times; Illuminated Manuscripts in Classical and Mediaeval Times.

Art

Metal-Work:

(in part); Monreale; Mosaic: Ancient {in part).

John Horace Round, M.A., LL.D. fMortain;

Author of Feudal England; Studies in Peerage and Family History; Peerage and\ M 0W nrav Familv

John Holland Rose, M.A. , Litt.D. r

Lecturer on Modern History to the Cambridge University Local Lectures Syndicate. J Mollien, Count; Author of Life of Napoleon I. ; Napoleonic Studies ; The Development of the European] Montholon, Marquis de. Nations ; The Life of Pitt ; &c. I

Rev. James Legge, D.D.

See the biographical article, Legge, James. .

Jessie Latdlay Weston.

Author of Arthurian Romances unrepresented in Malory.

{

Mencius.

J Merlin.

Rev. James Monroe Buckley, D.D., LL.D. Editor of the Christian Advocate, New York. the United States ; &c. ”

Author of History of Methodism in -j Methodism:

United States.

John Malcolm Mitchell.

Sometime Scholar of Queen's College, Oxford. Lecturer in Classics, East London College (University of London). Joint-editor of Grote's History of Greece.

Mill, John Stuart

{in pari); Miltiades; Mnemonics.

Sir John Scott, K.C.M.G., M.A., D.C.L. f

Formerly Deputy Judge-Advocate-General to His Majesty's Forces. Judge, jur-yt t am afterwards Vice-President, International Court of Appeal in Egypt. 1874-1882. 1 MlUiary Law. Judge of High Court, Bombay, 1882-1890. Judicial Adviser to the Khedive of Egypt, 1890-1898. Vice-President, International Law Association. (_

INITIALS AND HEADINGS OF ARTICLES

xi

J. S. BI. J. S. F.

J. S. G. J. S. Ma. J. T. Be. J. T. C.

J. T. S.*

K. A. M.* K. S.

L.B1. L. Bo. L.P.

I. J. S. H. H. C. H. H. S.

M. N. T.

M. 0. B. C

M.P.

M. W. T.

O.Ba.

0. C. W.

John Sutherland Black, M.A., LL.D.

Assistant Editor, 9th edition, Encyclopaedia Encyclopaedia Biblica.

Britannica. Joint-editor of

,f.

theH Missal.

John Smith Flett, D.Sc, F.G.S.

Petrographer to the Geological Survey. Formerly Lecturer on Petrology in Edinburgh University. Neill Medallist of the Royal Society of Edinburgh. Bigsby Medallist of the Geological Society of London.

Metamorphism;

Metasomatism;

Mica-Schist;

Micropegmatite;

Monzonite.

John Starkie Gardner, F.S.A. [„ . . *„„„„„. tr A .,.

Expert Metal Worker. Authorof Armour in England; Ironwork (for the Educationall me«““W0rK. Modern Art. Department) ; &c. <-

Professor of Greek atl Mexico: Modern History.

Merv; Minsk(«i part); Moscow(i« part).

James Saumarez Mann, M.A.

Formerly Fellow and Lecturer of Trinity College, Oxford. Bedford College, London. Joint-editor of Social England.

John Thomas Bealby.

Joint-author of Stanford's Europe. Formerly Editor of the Scottish Geographical – Magazine. Translator of Sven Hedin's Through Asia, Central Asia and Tibet; &c.

Joseph Thomas Cunningham, M.A., F.Z.S. \ ik n c f\

Lecturer on Zoology at the South- Western Polytechnic, London. Formerly Fellow J Mollusea (*» part); of University College, Oxford.

Assistant Professor of Natural History in the J Mullet. University of Edinburgh. Naturalist to the Marine Biological Association. . *■

James Thomson Shotwell, Ph.D.

Professor of History in Columbia University, New York City.

Kate A. Meakin (Mrs Budgett Meakin).

Kathleen Schlesinger. J

Editor of the Portfolio of Musical Archaeology. Author of The Instruments of the\ Monochord; Mouthpiece. Orchestra. L

Louis Bell, Ph.D. f

Consulting Engineer, Boston, U.S.A. Chief Engineer, Electric Power Transmission .

:. Department, General Electric Co., Boston. Formerly Editor of Electrical World, New York. Author of Electric Power Transmission; &c. *-

LUDWIG BOLTZMANN (1844-1906). f

Formerly Professor of Theoretical Physics, Universities of Munich, Vienna and J Model. Leipzig. Author of Lectures on the Theory of Gas; Lectures on Maxwell's Theory of Electricity and Light. "-

Lazarus Fletcher, M.A., F.R.S.

Director of Natural History Departments of the British Museum. Keeper of Minerals, British Museum, 1880-1909. Secretary to the Mineralogical Society. i Meteorite. Formerly Fellow of University College, Oxford. Author of Introduction to the Study of Meteorites ; &c.

\ Middle Ages.

Morocco {in part).

Motors, Electric.

Leonard James Spencer, M.A.

Assistant in Department of Mineralogy, British Museum. Sidney Sussex College, Cambridge, and Harkness Scholar. Icgical Magazine.

Formerly Scholar of . Editor of the Minera-

Melaconite; Mica; Microcline; Miller ite; Mimetite; Mineralogy; Mispickel; Molybdenite; I Monazite.

Montague Hughes Crackanthorpe, M.A., D.C.L., K.C.

Honorary Fellow, St John's College, Oxford. Bencher of Lincoln's Inn. Formerly Member of the General Council of the Bar and of the Council of Legal Education, and Standing Counsel to the University of Oxford. President of the Eugenics Education Society.

Marion H. Spielmann, F.S.A.

Formerly Editor of the Magazine of Art. Member of Fine Art Committee of International Exhibitions of Brussels, Paris, Buenos Aires, Rome, and the Franco- British Exhibition, London. Author of History of "Punch"; British Portrait Painting to the opening of the Nineteenth Century; Works of G. F. Watts, R.A.; British Sculpture and Sculptors of To-Day ; Henriette Ronner ; &c.

Marcus Niebuhr Tod, M.A. f

Fellow and Tutor of Oriel College, Oxford. University Lecturer in Epigraphy.ˆ Messene; Messenia* Joint-author of Catalogue of the Sparta Museum. _

Maximilian Otto Bismarck Caspari, M.A. (

Reader in Ancient History at London University. Lecturer in Greek at Birming- -J Megara {in part). ham University, 1905-1908. [

Mediation.

Medal {in part).

Rev. Mark Pattison.

See the biographical article, Pattison, Mark.

More, Sir Thomas.

Northcote Whitridge Thomas, M.A. ' ("

Government Anthropologist to Southern Nigeria. Corresponding Member of the J Medium. Soci6t6d'Anthropologie de Paris. Author of Thought Transference; Kinship and \ Marriage in A ustralia ; &c. I

Oswald Barron, F.S.A. f Montagu (Family)

Editor of The Ancestor, 1902-1905. Hon. Genealogist to Standing Council of the-‘ •

Honourable Society of the Baronetage.

Owen Charles Whitehouse, M.A., D.D.

Theological Tutor and Lecturer in Hebrew, Cheshunt College, Cambridge.

‘ [Mortimer {Family). i Messiah {in part).

Xll 0. Hr.

P. A. K. P. C. M.

P. Ge.

P. G. K. P. La.

P. V.

R. A S. M.

R. C. P. R. H. C.

R. I. P. R. K. D.

R. L.*

R. M.S. R. N B.

R. P. S.

R. S C. S. A. C.

INITIALS AND HEADINGS OF ARTICLES

Otto Henker, Ph.D.

On the Staff of the Carl Zeiss Factory, Jena, Germany.

Prince Peter Alexeivitch Kropotkin.

See the biographical article, Kropotkin, Prince P. A.

Peter Chalmers Mitchell, M.A., F.R.S., F.Z.S., D.Sc, LL.D.

Secretary to the Zoological Society of London. University Demonstrator Comparative Anatomy and Assistant to Linacre Professor at Oxford, 1888-181 Author of Outlines of Biology ; &c.

\ Microscope.

/Minsk (in part); I Mongolia; Moscow.

Monster (in part); Morphology (in part).

Patrick Geddes, F.R.S. (Edin.). r

Professor of Botany, University College, Dundee. Formerly Lecturer on Natural J Moipholoev (in ■bart) History in School of Medicine, Edinburgh. Part-author of Evolution of Sex. 1 ”

Author of Chapters in Modern Botany. V

Paul George Konody.

Art Critic of the Observer and the Daily Mail. Formerly Editor of The Artist. Author of The Art of Walter Crane; Velasquez, Life and Work; &c.

Philip Lake, M.A., F.G.S.

Memlinc (in part).

Lecturer on Physical and Regional Geography in Cambridge University. Formerly J wr OY j,, n . r„ 1 of the Geological Survey of India. Author of Monograph of British Cambrian 1 raeA1LU – wowgy. Trilobites. Translator and Editor of Keyser’s Comparative Geology. I

i Medici (Family).

Pasquale Villari.

See the biographical article, Villari, Pasquale.

Robert Alexander Stewart Macalister, M.A., F.S.A.

St John’s College, Cambridge, tion Fund.

Director of Excavations for the Palestine Explora-

J Michmash; Mizpah; 1 Moriah.

Reginald Crundall Punnett, M.A.

Professor of Biology in the University of Cambridge. College. Superintendent of the Museum of Zoology.

Fellow of Gonville and Caius -j Mendelism.

Rev. Robert Henry Charles, M.A., D.D., D.Litt. (”

Grinfield Lecturer, and Lecturer in Biblical Studies, Oxford. Fellow of the British J Moses Assumotion of Academy. Formerly Professor of Biblical Greek, Trinity College, Dublin. Author 1 ‘ ‘

of Critical History of the Doctrine of a Future Life ; Book of Jubilees ; &c. I

f Millipede; Mimicry; I Mite.

Mongols.

Reginald Innes Pocock, F.Z.S.

Superintendent of the Zoological Gardens, London.

Sir Robert Kennaway Douglas.

Formerly Keeper of Oriental Printed Books and MSS. at the British Museum; and Professor of Chinese, King's College, London. Author of The Language and' Literature of China; &c. L

Richard Lydekker, M.A., F.R.S., F.G.S., F.Z.S. f Megatherium; Mole (in

Member of the Staff of the Geological Survey of India, 1874-1882. Author of J Monodelphia; Catalogues of Fossil Mammals, Reptiles and Birds in British Museum; The Deer of\ Monotremata; Mouse; All Lands; The Game Animals of Africa; &c. [Multituberculata.

Richmond Mayo-Smith, Ph.D.

See the biographical article, Mayo-Smith, Richmond.

■I Migration (in part).

Robert Nisbet Bain (d. 1909).

Assistant Librarian, British Museum, 1883-1909. Author of Scandinavia, the Political History of Denmark, Norway and Sweden, 1513-1900; The First Romanovs, , 1613-1725; Slavonic Europe, the Political History of Poland and Russia from 1460 to 1796; &c.

R. Phene Spiers, F.S.A., F.R.I.B.A.

Formerly Master of the Architectural School, Royal Academy, London. Past President of Architectural Association. Associate and Fellow of King's College, ■ London. Corresponding Member of the Institute of France. Editor of Fergusson's History of Architecture. Author of Architecture: East and West; &c.

Robert Seymour Conway, M.A., D.Litt. (Cantab.).

Professor of Latin and Indo-European Philology in the University of Manchester. Formerly Professor of Latin in University College, Cardiff; and Fellow of Gonville" and Caius College, Cambridge. Author of The Italic Dialects.

Stanley Arthur Cook, M.A. _

Lecturer in flebrew and Syriac, and formerly Fellow, Gonville and Caius College, Cambridge. Editor for the Palestine Exploration Fund. Examiner in Hebrew and Aramaic, London University, 1904-1908.

Council of Royal Asiatic Society, – 1 904-1905. Author of Glossary of Aramaic Inscriptions; The Law of Moses and the Code of Hammurabi; Critical Notes on Old Testament History; Religion of Ancient Palestine; &c.

f Menshikov; Michael, Tsar; Moltke, Count A. Moltke, Count A.

G.; W.

Mosque; Mouldings.

Messapii.

Melchizedek (in part); Menahem; Midrash; Mizraim; Moab; Moloch (in part); Moses.

S. C. St. C. S.N.

Sidney Colvin, LL.D.

See the biographical article, Colvin, Sidney.

Viscount St. Cyres.

See the biographical article, Iddesleigh, ist Earl of.

Simon Newcomb, D.Sc, LL.D.

See the biographical article, Newcomb, Simon.

-j Michelangelo.

{

Molinos.

-j Mercury; Moon.

INITIALS AND HEADINGS OF ARTICLES

xm

J. As.

T. A, L

T. Ca.

T. C. A. T. H. H.*

T« 1. K.

Th.N. T. S. W.

T. W. R„ » W. A. B. C,

W. A. P.

W. B. Ri.

». B. S.*

W. C. R.-A

W. F. C.

W. F. D.

W. F. Sh.

W. H. F.

ff. H. H.

W. H. M.

W.JL*

Thomas Ashby, M.A., D.Litt. (Oxon.).

Director of British School of Archaeology at Rome. Formerly Scholar of Christ Church, Oxford. Craven Fellow, 1897. Conington Prizeman, 1906. Member of the Imperial German Archaeological Institute. Author of The Classical Topography of the Roman Campagna.

Thomas Allan Ingram, M.A., LL.D. Trinity College. Dublin.

Thomas Case, M.A.

President of Corpus Christi College, Oxford. Formerly Waynflete Professor of Moral and Metaphysical Philosophy in the University of Oxford, and Fellow of ” Magdalen College.

Sir Thomas Clifford Allbutt, K.C.B., M.A., M.D., D.Sc, LL.D., F.R.S.

Regius Professor of Physic in the University of Cambridge. Physician

to Adden- . brooke's Hospital, Cambridge. Fellow of Gonville and Caius College, Cambridge. Editor of Systems of Medicine.

Colonel Sir Thomas Hungerford Holdich, K.C.M.G., K.C.I.E., D.Sc.

Superintendent Frontier Surveys, India, 1892-1898, Gold Medallist, R.G.S. . (London), 1887. Author of The Indian Borderland; The Countries of the King's Award; India; Tibet; &c. L

Thomas Kirke Rose, D.Sc. f"

Chemist and Assay er, The Royal Mint, London. Author of Metallurgy of Gold; The i Mint. Precious Metals; &c. _

Mediolanum; Megara Hyblaea; Messina; Metapontum; Milan (in part); Minturnae; Misenum; Monreale(£« pari); Monteleone Cal&bro; Motya; Monument: Italy. Medical Jurisprudence

{in part); Midwife; Migration (in part).

Metaphysics.

Medicine: Modern Progress.

Mohmand.

{

Mo'allakSt

Theodor Noldeke, Ph.D.

See the biographical article, Noldeke, Theodor.

Theodore Salisbury Woolsey, LL.D. _ r

Professor of International Law, Yale University. Editor of Woolsey's International J Monroe Doctrine. Law. Author of America's Foreign Policy; &c. [

Thomas William Rhys Davids, LL.D.,, Ph.D.

Professor of Comparative Religion, Manchester University. President of the Pali Text Society. Fellow of the British Academy. Secretary and Librarian of Royal Asiatic Society, 1885-1902. Author of Buddhism; Sacred Books of the Buddhists; Early Buddhism; Buddhist India; Dialogues of the Buddha; &c.

Rev. William Augustus Brevoort Coolidge, M.A., F.R.G.S., Ph.D. (Bern). Fellow of Magdalen College, Oxford. Professor of English History, St David's College, Lampeter, 1880-1881. Author of Guide du Haut DauphinS; The Range of the Todi; Guide to Grindelwald; Guide to Switzerland; The Alps in Nature and in History; &c. Editor of The Alpine Journal, 1880-1881 ; &c.

Walter Alison Phillips, M.A.

Formerly Exhibitioner of Merton College and Senior Scholar of St John's College, Oxford. Author of Modern Europe ; &c.

Sir William Blake Richmond, K.C.B.

See the biographical article, Richmond, Sir William Blake.

William Barclay Squire, M.A.

Assistant in Charge of Printed Music, British Museum.

Sir William Chandler Roberts-Austen, K.C.B. , D.C.L., F.R.S. See the biographical article, Roberts-Austen, Sir W. C.

William Feilden Craies, M.A.

Barrister-at-Law, Inner Temple. Lecturer on Criminal Law, King's College, London. Editor of Archbold's Criminal Pleading (23rd edition).

William Frederick Denning, F.R.A.S.

Gold Medallist, R.A.S. President, Liverpool Astronomical Society, 1877-1878. Author of Telescopic Work for Starlight Evenings; The Great Meteoric Shower; &c.

William Fleetwood Sheppard, M.A.

Senior Examiner in the Board of Education. Formerly Fellow of Trinity College, Cambridge. Senior Wrangler, 1884.

Sir William Henry Flower, F.R.S.

See the biographical article, Flower, Sir W. H.

William Henry Howell, M.D., Ph.D., LL.D.

Dean of the Medical Faculty and Professor of Physiology, Johns

Hopkins University, Baltimore. President of the American Physiological Association. Associate-editor of American Journal of Physiology.

William Herrick Macaulay, M.A.

Fellow and Tutor of King's College, Cambridge.

Walter Lehmann, D.M.

Directorial Assistant, Royal Ethnographical Museum, Munich. Author of Methods and Results in Mexican Research; &c.

Medhankara; Menander (Milinda).

Meiringen; Meran;

Merian; Mont Cenis;

Morat;

Mttller, Johannes von.

Mehemet Ali; Mephistopheles; Metternich; Minister; Mitre.

-I Mosaic: Modern. Morley, Thomas. J Metallography (in part).

Misdemeanour.

Meteor.

{

4 Mensuration.

Mink.

{

J Medical Education, UJS A

1 (in part).

/Motion, Laws of.

Mexico: Ancient History (in part).

XIV

w.

M.

w.

M.

C.

w.

M.

S.

w.

P.

A.

w.

R.

M.

W. R. S.

W. R. S.* W. S. R.

INITIALS AND . HEADINGS OF ARTICLES

William Minto, LL.D.

See the biographical article, Minto, William.

Sir W. Martin Conway.

See the biographical article, Conway, Sir W. M.

f Mill, John Stuart

1 (in pari).

< Mountaineering.

William Michael Rossetti. f Moroni.

See the biographical article, Rossetti, Dante, G. \

LlEUT.-COLONEL WlLLIAM PATRICK ANDERSON, M.lNST.C.E., F.R.G.S. [

Chief Engineer, Department of Marine and Fisheries of Canada. Member of the -1 Michigan, Lake. Geographic Board of Canada. Past President of Canadian Society' of Civil Engineers. [

William Richard Morftll, M.A. (d. 1910). r

Formerly Professor of Russian and the other Slavonic Languages in the University J Miolrioiuini jj am of Oxford. Curator of the Taylorian Institution Oxford. Author of Russia; 1 lmcKlewlcz > Adam. Slavonic Literature ; &c. t

William Robertson Smith, LL.D.

See the biographical article, Smith, William Robertson.

William Roy Smith, M.A., Ph.D.

Associate Professor of History, Bryn Mawr College, Pennsylvania. Sectionalism in Pennsylvania during the Revolution ; &c.

Medina;

Melchizedek (in part) ; Messiah (in part); Micah (in part); .Moloch (in part).

Author oH Missouri Compromise.

William Smyth Rockstro. f Mendelssohn-Bartholdy

Author of A General History of Music from the Infancy of the Greek Drama to the J. U n part) •

I Mozart (in part).

Present Period; and other works on the history of music.

PRINCIPAL UNSIGNED ARTICLES

Melbourne.

Melon.

Meningitis.

Mercantile System.

Mercury (Chemistry).

Mermaids.

Metal.

Metallurgy.

Michigan.

Micronesia.

Militia.

Milk.

Mineral Waters.

Ministry.

Minnesingers.

Minnesota.

Mississippi.

Mississippi River.

Missouri.

Monaco.

Monmouthshire.

Monopoly.

Montana.

Moors.

Moravia.

Mormons.

Morphine.

Mortgage.

Mounted Infantry.

ENCYCLOPEDIA BRITANNICA

ELEVENTH EDITION

VOLUME XVIII

MEDAL (Fr. mtdaille, from Lat. metallum), strictly the term given to a memorial piece, originally of metal, and generally in the shape of a coin, used however not as currency but as an artistic product. ” Medallion ” is a similar term for a large medal, but is now usually restricted to a form of bas-relief in sculpture. The term ” medal ” is, artistically, extended by analogy to pieces of the same character not neces- sarily shaped like coins. The history of coins and medals is inseparable, and is treated under the general heading of Numismatics. That article may be supplemented here by an account of (i) the more recent progress in the art of the medallist, and (2) the use of medals for war decorations. ‘

1. The medal — as it is understood to-day — enjoys a life entirely independent of the coin on the one hand, and, on the other, of the sculptured medallion, or bas-relief; and its’ renais- sance is one of the chief phenomena in art during the period since about 1870. It is in France that it has risen to the greatest perfection. Its popularity there is well-nigh universal; it is esteemed not only for memorials of popular events and of public men, but also for private celebrations of all kinds. No other nation approaches in excellence — in artistic feeling* treatment, and sensitiveness of execution — the artists and the achievements of France. In England, although the Royal Academy seeks to encourage its students to practise the art, the prize it offers commonly induces no competition. The art of the medallist is not properly appreciated or understood, and receives little or no support. The prevailing notion concerning it is that it consists in stamping cheap tokens out of white metal or bronze, on which a design, more or less vulgar, stands out in frosty relief from a dazzling, glittering background. These works, even the majority of military and civic medals, demonstrate how the exquisite art of the Renaissance had been degraded in England — almost without protest or even recognition — so that they are, to a work of Roty or Chaplain, what a

nameless daub would be to a picture by Rembrandt or Velasquez.

It is probable that Jacques Wiener (d. 1899), of Belgium, was the last of the medallists of note who habitually cut his steel dies entirely with his own hand without assistance, though others in some measure do so still. Although most modern workers, exclusively medallists, have themselves cut dies, they now take advantage of the newest methods; and the graveur en midailles has become simply a midailleur. His knowledge of effect is the same — though the effect sought is different: in earlier times the artist thought chiefly of his shadows; now he mainly regards his planes. Otherwise his aims are not dissimilar. At the present day the medallist, after making conscientious studies from life (as if he were about to paint a picture), commonly works out his design in wax, or similar substance, upon a disk of plaster about 12 or 14 inches xvta. 1

in diameter. From that advanced model a simple mould, or matrix, is made, and a plaster cast is taken, whereupon the artist can complete his work in the utmost perfection. Then, if a struck medal is required, a steel cast is made, and from that a reduction to the size required for the final work is pro- duced by means of the machine — the tour a riduire. It is this machine which has made possible the modern revival, and has revolutionized the taste of designers and public alike. It was invented by Gontamin, who based it upon that tour a portrait which Houlot produced in 1766, and which helped to fame several engravers now celebrated. This machine was first exhibited in Paris in 1839, and was sold to the Munich Mint; while a similar invention, devised at the same time by the English engraver Hill, was acquired by Wyon for £2000, and was ultimately disposed of to a private mint in Paris. From that city comes the machine, based by the French inventor M. Ledru upon the two already referred to, now in use at the Royal Mint in London. A well-served medallist, therefore, need trouble himself nowadays about little beyond the primary modelling and the final result, correcting with his own hand only the slightest touches — refining, perfecting — but sometimes merely confining himself to giving his directions to the profes- sional engraver. 1

The great majority of the artistic medals at present in the world (in the great, collection of France there is a total of not fewer than 200,000 medals) are cast, not struck. There is in them a charm of surface, of patina, of the metal itself, which the struck medal, with all the added beauties which it allows of delicate finish and exquisite detail, can hardly give. But the production of the cast medal is much slower, much more uncertain, and the number of fine copies that can be produced is infinitely smaller. All the early medals were cast, being

first modelled in wax, and then cast by the cire perdue (waste wax)

1 The method of preparing the dies, &c, is the same for medals as for coins, save that for larger and heavier work more strokes are required, as in the case of L. Coudray's popular " Orphee " — rather a sculpture-relief than a medal. The dies are capable of a great yield before becoming quite worn-out ; it is said that no fewer than three million Copies were struck of Professor J. Tautenhayn's Austrian jubilee medal of the Emperor Francis Joseph. In France, Thonelier's perfected machine, substituting the lever for the screw, has been in use for coins since 1844; but for the striking of medals the same old- fashioned screw-press is retained which had till then been employed both for coins and medals since the time of Louis XIV. In its present form the machine consists of an iron or bronze frame, of which the upper part is fitted with a hollow screw wherein works an inner screw. This screw, moved by steam or electricity, drives the dies, set in iron collars, so that they strike the blank placed between them. This machine can deliver a strong blow to produce a high relief, or a delicate touch tb add the finest finish. In the Paris Mint large medals can be struck with comparative ease and rapidity. A hydraulic press of nearly two million pounds pressure is utilized for testing the dies

process, and were usually worked over by the chaser afterwards; indeed, it was not until the beginning of the 16th century that dies, hitherto used only for coins executed in low relief, were employed for larger and bolder work. The medallists of those days always cast in bronze or lead, and only proceeded to use silver and gold as a luxurious taste began to demand the more precious metals. There is little doubt that the material to be preferred is dull silver (mat or sable — sand-blasted), as the work, with all its variations of light and Shade, can be better seen in the delicate grey of the surface.

The medal, properly considered, is not sculpture. Vasari was happy in his definition when he described the medallic art as the link between sculpture and painting — that is to say, painting in the round with the colour left out. Less severe than sculpture, it need not be less dignified; it is bound down by the conventions of low relief, and by compulsions of com- position and design, dependent on shape, from which sculpture, even when the relief is the lowest, is in a great measure free.' In the medal, otherwise than in sculpture, elaborate perspective and receding planes are not out of place. The genius of the

modern Frenchman rebelled against the rule that commonly governed the medal during the decadence, and has triumphed in his revolt, justifying the practice by his success. The modern medal and the plaquette aim at being decorative yet vigorous, reticent and dignified, delicate and tender, graceful and pure; it may be, and often is, all these in turn. Imagination, fancy, symbolism, may always be brought into play, allied to a sense of form and colour, of arrangement and execution. By the demonstration of these qualities the artist is to be differentiated from the skilful, mechanical die-sinker, who spreads over the art the blight of his heavy and insensitive hand and brain. So with portraiture. Accurate likeness of feature as well as character and expression are now to be found in all fine works, such as are seized only by an artist of keenly sensitive tempera- ment. It is thus that he casts the events and the actions of to-day into metallic history, beautifully seen and exquisitely recorded; thus that the figure on the medal is no longer a mere sculpturesque symbol, but a thing of flesh and blood, suave and graceful in composition, and as pleasing in its purely decora- tive design as imagination can inspire or, example suggest. It is thus that the art, while offering easy means of permanent memorial, has afforded to men of restricted means the eagerly seized opportunity of forming small collections of masterpieces of art at a small outlay.

France. — In France the example of Oudine\ coming after that of David d' Angers, did much to revolutionize the spirit animating the modern medallist, but Chapu, by his essentially modern treat- ment, did more. To Ponscarme (pupil of Oudine) is chiefly due the idea of rendering mat the ground as well as the subject on the medal, the suppression of the raised rim, and the abandonment of the typographic lettering hitherto in vogue, together with the mechanical regularity of its arrangement. Degeorge, with his semi-pictorial treatment, was followed by Daniel Dupuis, whose delicate and playful fancy, almost entirely pictorial, makes us forget alike the material and the die. J. C. Chaplain is unsurpassed as a modeller of noble heads, including those of four presidents of the French Republic — Macmahon, Casimir-Perier, Faure and Loubet — and his allegorical designs are finely imagined and admirably worked out (see Plate) ; but L. Oscar Roty (pupil of Ponscarme) is at the head of the whole modern school, not only by virtue of absolute mastery of the technique of his art, but also of his originality of arrangement, of the poetic charm of his symbolism and his allegories, the delicate fancy, the exquisite touch, the chasteness and purity of taste — wedding a modern sentiment to an obvious feeling for the Greek. Though expressly less virile than Chaplain, Roty is never effeminate. To Roty

belongs the credit of having first revived the form of the plaquette, or rectangular medal, which had been aban- doned and forgotten along with many other traditions of the Renais- sance (see Plate). Alphee Dubois, Lagrange, and Borrel must be mentioned among those who are understood to engrave their own dies. Followers are to be found in Mouchon, Lechevrel, Vernon, Henri Dubois, Patey, Bottee (see Plate) — all sterling artists if not innovators. Medallists of more striking originality but less finish, and of far less elegance are Michel Cazin, Levillain (who loves as much as Bandinelli to make over-display of his knowledge of muscular anatomy), Charpentier, and their school, who aim at a manner which makes less demand of highly educated artistry such as that of Roty or of Chaplain. It is learned and accomplished in

its way, but lumpy in its result; breadth is gained, but refinement and distinction are in a great measure lost. It may be added — to give some idea of the industry of the modern medallist, and the encouragement accorded to him — that between 1879 and 1900 M. Roty executed more than 150 pieces, each having an obverse and a reverse.

Austria. — The two leading medallists of the Austrian school are Josef Tautenhayn (see Plate) and Anton Scharff, both highly accomplished, yet neither displaying the highest qualities of taste, ability and ” keeping,” which distinguishes the French masters. About 330 pieces have come from the hand,of Anton Scharff, Stefan Schwartz, Franz Pawlik, Staniek, Marschall and J. Tautenhayn, junior, are the only other artists who have risen to eminence.

Germany. — A characteristically florid style is here cultivated, such as lends itself to the elaborate treatment of costume, armorial bearings, and the like; but delicacy, distinction, and the highest excellence in modelling and draughtsmanship — qualities which should accompany even the most vigorous or elaborate designs — are lack- ing in a great degree. Professors Hildebrand and Kowarzik have wrought some of the most artistic works there produced.

Belgium. — Although sculpture so greatly flourishes in Belgium, medal work shows little promise of rivalling that of France. The influence of the three brothers Wiener (Jacques, Leopold and Charles) — good medallists of the old school — has not yet been shaken off. The remarkable architectural series by the first-named, and the coinage of the second, have little affinity with the spirit of the modern medal. Lemaire has perhaps done as well as any, followed by Paul Dubois, J. Dillens (a follower of the French), G. Devreese and Vingotte (see Plate)— whose plaquette for the Brussels Exhibition award

(1887) is original, but more admirable in design than in finish. Holland. — In Holland not very much has been done. Patriotism has called forth many medals of Queen Wilhelmina, and the best of them are doubtless those of Bart van Hove and Wortman. Baars is a more virile artist, who follows Chaplain at a distance. Wienecke is interesting for the sake of his early Netherlandic manner; the incongruity is not unpleasant.

Switzerland. — The medal is also popular in Switzerland. Here Bovy is the leader of the French ˆadition and Hans Frei of a more national sentiment. The last-named, however, is more remarkable as a revivalist than as an original artist.

Great Britain. — In England only two medallists of repute can be counted who practically confine themselves to their art — G. W. de Saulles, of the Royal Mint, best known by the Diamond Jubilee medal of Queen Victoria and by his medal of Sir Gabriel Stokes, and Frank Bowcher (see Plate) by that of Thomas Huxley. These artists both cut their own dies when necessary. Emil Fuchs, working in England in the manner of the French medallists, but with greater freedom than is the wont of the older school, has pro- duced several examples of the art: the medals commemorative of the South African War and of Queen Victoria (two versions), all of 1900 ; and many portrait medals and plaquettes of small size have come from the same hand. Besides these, the leading English sculptors have produced medals — Lord LeightOn, Sir Edward Poynter, Hamo Thornycroft, T. Brock, Onslow Ford, G. Framptbn and Goscombe John ; but, practising more continually in sculpture, they do not claim rank as medallists, nor have they sought to acquire that class of dexterity which constant habit alone can give. Alphonse Legros, who has cast a certain number of portrait medals, is usually included in the French school.

United States. — Among American medallists Augustus St Qaudens (see Plate) is perhaps the most prominent; but he is not, strictly speaking, a medallist, but a sculptor who can model in the flat.

Authorities. — F. Parkes Weber, Medals and Medallions of the ZQth Century relating to England by Foreign Artists (London, 1894); Roger Marx, ” The Renaissance of the Medal in France,” The Sluaw (vol. xv. 1898) ; M. H. Spielmann, ” Frank Bowcher, Medallist, with some Comment on the Medallic Art,” The Magazine of Art (February 1900) ; Spink & Son’s Monthly Numismatic Circular {passim}, 1892 onwards (in English, French and German) ; Roger Marx, Les MSdailleurs francais depuis 1780 (Paris, 1897) ; Les Medailleurs francais contemporains (Plates) (Paris, 1899) ; La Monnaie it Paris a V

Exposition Vniverselle (Paris, 1900) ; Cent ans de numis- matique francaise (2 vols., 1893-1895); F. Mazerolle, L. 0. Roty: Biographie et catalogue de son ozuvre (Paris, 1897); J- F. Chaplain: Biographie et catalogue de I'ceuvre (Paris, 1897) ; Dr H. J. de Domptere de Chaufepie, Les Medailles et plaquettes modernes (in Dutch and French) (Haarlem, 1897) ; A. R. v. Loehr, Wiener Medail- leure, i8qq. (Vienna, 1899); A. Lichtwark, " Die Wiedererweckunf der Medaine," Pan, 1895, pp. 34-40; 1896, pp. 311-318; Die Modern. Medaille (a monthly magazine, passim) (Vienna) ; L. Forrer, Bio- graphical Dictionary of Medallists, vol. i. A-D. (London, 1902).

(M. H. S.)

Medals as War Decorations

Although the striking of medals to commemorate important events is a practice of considerable antiquity, yet the custom' of using the medai as a decoration, and especially as a decoratidil to do honour to those who have rendered service to the staW

MEDAL

Plate I.

P**-'.""

DUPLESSIS PLAQUETTE. Rotv.

MAURICE ALBERT PORTRAIT.

ROTY.

STUDY. Rotv.

WEDDING MEDAL.

ROTY.

BOULANGER PLAQUETTE.

ROTY.

AMBROISINE MERLIN

From the Medal by

Michel Cazin.

1

~l^pll

.“‘4

• Pi

tiftl •’

■

<««l

^*.

-Jt*

fp|jtfc

jtPZ-

^

^fcl^t.

!¦:.”

% ■

jit*’ . “*”’’

- *. ‘ *

.....

MEDALS AND PLAQUETTES. Jules Chaplain.

PLATE II.

MEDAL

HENRI DUBOIS.

MEDAL OF AWARD FOR THE COPE AND NICOL SCHOOL OF PAINTING.

F. BoWCHER.

FRANCE, 1870.

ROTY.

GOLD MEDAL, VIENNA

1894.

By Joseph Tautenhayn.

GREAT GOLD MEDAL, BRUSSELS, 1898. Designed by P. Wolfers. Engraved by V1N90TTE.

PARIS UNIVERSAL EXHIBITION, 18 By Louis Bottee.

INTERNATIONAL EXHIBITION, CHICAGO, 1893.

By Augustus St Gaudens.

MEDAL

in time of war, is comparatively modern. It has been supposed that the circular ornaments on the Roman standards had medals in their centres, but there is no evidence to show that this was the case, and the standards shown on the column of Trajan appear only to have had plain bosses in their centres. It is true that the Chinese are said to have used military medals during the Han dynasty (ist century A.D.), but, as far as the West is concerned, we have to come to the 16th century before we find the custom of wearing medals as decorations of honour a recognized institution.

The wearing of decorative medals was common in England in the reign of Henry VIII., but the first medals commemorating a particular event that were evidently intended as a personal decoration, and were in all probability (though there is no absolute proof) bestowed as reward for military services rendered to the Crown, are the ” Armada ” medals of Queen Elizabeth, 1 588-1 589. Of these there are two. The earliest, generally styled the ” Ark in flood ” medal, is a large oval medal of silver (2 by 1-75 in.), and bears on the obverse a profile bust of the queen surrounded by the inscription, ELIZABETH D. G. ANGLIAE. F. ET HI. REG. On the reverse is an ark on waves, with above the rays of the sun, and around the legend, SAEVAS TRANQVILLA PER VNDAS. This medal dates from 1588, and in the following year there was given another medal, a little larger (2-3 by 2-1 in.) and struck in gold, silver and copper. The obverse of this second medal bore a full-face bust of Elizabeth, with the legend,

characteristic both of the monarch and the period, DITIOR IN TOTO NON ALTER CIRCULUS ORBE. The reverse has an island around which ships are sailing and sea-monsters swimming, and on the island there are houses, a flourishing bay-tree, standing uninjured by a storm of wind, and lightning emerging from heavy clouds above. The island is inscribed NON IPSA PERICVLA TANGVNT. These medals are of special interest as demonstrating thus early the existence of a doctrine of sea-power. In fact, in the medals of James I. (1603-1625), none of which have a distinct reference to war services, the ” ark in flood ” design was again reproduced on the reverse, this time with the legend slightly altered, viz. STET SALVVS IN VNDIS.

Other European nationalities were also about this period conferring decorative medals as a reward for war services, as for example, the ” Medal to Volunteers ” issued in Holland in 162 2-1.623 and the ” Military Medal of Gustavus Adolphus ” issued in Sweden in 1630. Here it may be noted that in follow- ing the history of medals as used as a decoration to reward military services, only those of British origin need be dealt with in detail, since Great Britain has utilized them in a much greater degree than any other nationality. The countless minor wars of the 19th century, waged by the forces of the Crown of every class, navy, army and auxiliary, have no equiva- lent in the history of other states, even in that of France, the United States and Russia. The great wars of the 19th century were divided by long intervals of peace, and the result is that with most of the great military powers the issue of campaign medals has been on a small scale, and in the main decorations have taken the form of ” Orders ” (see Knighthood and Chivalry: Orders), or purely personal decorations for some meritorious or exemplary service.

During the reign of Charles I. (1625-1649), we come across numerous medals and badges; a considerable number of these were undoubtedly associated with, and given, even system- atically given, as rewards for war services; for a royal warrant ” given at our Court of Oxford, the eighteenth day of May, 1643,” which directed ” Sir William Parkhurst, Knight, and Thomas Bushell, Esquire, Wardens of our Mint, to provide from time to time certain Badges of silver, containing our Royal image, and that of our dearest son, Prince Charles, to be delivered to wear on the breast of every man who shall be certified under the hands of their Commanders-in-Chief to have done us faithful service in the Forlorn-hope.” From the foregoing it must not be deduced that this medal

was in any way intended to reward special valour. In those days ” forlorn-hopes ” were not volunteers for some desperate enterprise, as

to-day, but a tactical advanced guard which naturally varied, both in numbers and arm of the service, according to ground and circumstances. That a very free distribution of the award was contemplated is evident from the fact that ” soldiers ” alone were specified as recipients and that a clause was inserted in the warrant strictly forbidding the sale of the medal. This letter ran: —

” And we do, therefore, • most straitly command, that no soldier at any time do sell, nor any of our subjects presume to buy, or wear, any of these said Badges, other than they to whom we shall give the same, and that under such pain and punishment as our Council of War shall think fit to inflict, if any shall presume to offend against this our Royal command.” As there are in existence several medals of this period which bear the effigies of both the king and Prince Charles, it is uncertain which in particular was used for the ” forlorn-hope ” award. Very probably it is one, an oval silver-gilt medal (1-7 by 1-3 in.) which bears on the obverse a three-quarters (r.) bust of Charles I., and on the reverse a profile (1.) bust of Prince Charles (see Mayo, Medals and Decorations of the British Army and Navy, vol. 1. No. 16, Plate 5, No. 3). During the Commonwealth (1649-1660), parliament was lavish in the award of medals in recognition of war services, and for the first time we find statutory provision made for their bestowal as naval awards, in the shape of acts of parliament passed Feb. 22, 1648 and April 7, 1649 (cap. 12, 1648 and cap. 21, 1649), and Orders in Council of May 8 and Nov. 19 and 21, 1649, and Dec. 20, 1652. There is no doubt whatever that there was a ” Medal of the Parliament ” for sea service issued in 1649. This medal, oval (-95 by -85 in.) and struck in gold and silver, had on the obverse an anchor, from the stock of which are suspended two shields, one bearing the cross of St George, and the other the Irish harp. The motto is MERVISTI. On the anchor stock, T. S. 1 The reverse has on it the House of Commons with the Speaker in the chair. This medal is referred to in a minute of the Council of State of Nov. 15, 1649: —

” (5) That the Formes of the medalls which are now brought

in to be given to the severall Mariners who have

done good service this last Sumer be approved off,

viz’: the Armes of the Cofhon wealth on one side

with Meruisti written above it, and the picture

of the House of Cofnons on the other.”

That there was a ” Medal of the Parliament ” for land service

as well, is proved by the following extract from the Journals

of the House of Commons (vii. 6, 7) : —

” Resolved, That a Chain of Gold, with the Medal of the Parlia- ment, to the Value of One Hundred Pounds, be sent to Colonel Mackworth, Governor of Shrewsbury, as a mark of the Parliament’s Favour, and good acceptance of his fidelity: And that the Council of State do take care for the providing the same, and sending it forth- with.” This order was duly carried out, as is shown in the minutes of the Council of State, June 2 and July 30, 1652, but there is no trace to-day of either medal or chain. It is not un- likely that this medal is one figured at page 117 of Evelyn’s Numismata (the engraving, unnumbered, is placed between* Nos. 39 and 40, and there is no allusion to it in the text), which has On the obverse a representation of the parliament, and on the reverse a bust of the Protector with a camp and troops in the background.

The most splendid of all the naval awards of this period were those given for the three victories over the Dutch in 1653, namely: —

1 Thomas Simon, master and chief graver of the mint. Most of the medals of this period were his work, and they are considered to be amongst the best specimens of the medallic art that have been produced in the country.

MEDAL

i. The fight of Feb. 18/20, when Blake, Deane and Monk defeated Van Tromp and De Ruyter, the battle beginning off Portland and ending near Calais; (2) the fight of June 2 and 3, off the Essex coast, when Monk, Deane (killed), Penn and Blake, again defeated Van Tromp and De Ruyter; (3) the fight of 31st of July off the Texel, in which Monk, Penn and Lawson beat Van Tromp in what was the decisive action of the war. The authorization for these awards will be found recorded in the Journals of the House of Commons (vii. 296, 297), under date Aug. 8, 1653. The medals, all oval, and in gold, were given in three sizes, as described below: —

A (2-2 by 2 in.). Only four of these medals were issued, to Admirals Blake and Monk, each with a gold chain of the value of £300, and to Vice-Admiral Penn and Rear-Admiral Lawson, each with a gold chain of the value of £100. On the obverse is an anchor, from the stock of which are suspended three shields, bearing respectively St George’s

cross, the saltire of St Andrew, and the Irish harp, the whole encircled by the cable of the anchor. On the reverse is depicted a naval battle with, in the foreground, a sinking ship. Both obverse and reverse have broad, and very handsome, borders of naval trophies, and on the obverse side this border has imposed upon it the arms of Holland and Zeeland. Of these four medals three are known to be in existence. One, lent by the warden and fellows of Wadham College, Oxford (Blake, it may be noted, was a member of Wadham College) was exhibited at the Royal Naval Exhibi- tion of 1891. A second is in the royal collection at Windsor Castle. The third, with its chain, is in the possession of the family of Stuart of Tempsford House, Bedfordshire. This latter medal is known to have been the one given to Vice-Admiral Penn, an ancestor of the Stuart family. The one at Windsor is presumably Blake's, as Tancred states " the medal given to Blake was purchased for William IV. at the price of 150 guineas (Tancred, Historical Records of Medals, p. 30). The medal at Wadham was formerly in Captain Hamilton's collection. He purchased it at a low figure, but secrecy was kept as to the owner, and the original chain that was with it went into the melting-pot: there is therefore nothing to show whether it was Monk's or Lawson's, as the chain would have done. It was sold at Sotheby's in May 1882 for £305.

B (2 by i-8 in.). Four of these medals were issued, each with a gold chain of the value of £40, to the " Flag Officers," i.e. to the flag captains who commanded the four flag-ships. The obverse and reverse of this medal are, with the exception of the borders, precisely as in (A). The borders on both sides are a little narrower than those of (A), and of laurel instead of trophies. One of these medals — that given to Captain William Haddock, who was probably Monk's flag-captain in the " Van- guard," in the February fight, as he had been in that ship in the previous year, and who commanded the " Hannibal," (44) in the June battle — is now (1909) in the possession of Mr C. D. Holworthy, who is maternally descended from Captain Haddock.

C (i-6 by 1-4 in.). This medal is precisely the same as (B). but has no border of any kind, and also was issued without the gold chains. It was in all probability one that was issued in some numbers to the captains and other senior officers of the fleet.

Some of these medals have in the plate of the reverse an inscription: FOR EMINENT SERVICE IN SAVING Y TRIUMPH FIERED IN FIGHT WH Y DVCH IN JULY 1653. The medal so inscribed was given only to those who served in the " Triumph," and commemorates a special service. Blake, incapacitated by wounds received in the fight of February, took no part in this action, but his historic flag-ship, the "

Triumph," formed part of the fleet) and early in the battle was fired by the Dutch fire-ships. Many of the crew threw themselves overboard in a panic, but those who remained on board succeeded by the most indomitable and heroic efforts in subduing the flames, and so saving the vessel.

But undoubtedly the most interesting of all the medals of the Commonwealth period, is that known as the " Dunbar

Medal," authorized by parliament, Sept. 10, 1650, in a resolu- tion of which the following is an extract : —

"Ordered, that it be referred to the Committee of the Army, to consider what Medals may be prepared, both for Officers and Soldiers, that were in this Service in Scotland; and set the Proportions and Values of them, and their number; and present the Estimate of them to the House. (Journals of the House of Commons, vi. 464-465.) So came into being, what, in a degree, may be regarded as the prototype of the " war medal " as we know it to-day, for the " Dunbar Medal" is the very earliest that we know was issued to all ranks alike, to the humblest soldiers as well as to the commander-in-chief. It differed however in one very material point from the war medal of to-day — in that it was issued in two sizes, and in several different metals. There is no evidence to show what Was the method that governed the issue of this medal; but the medal itself undoubtedly varied in size or metal, or both, according to the rank of the recipient. Of the two sizes in which the medal was issued the smaller, 1 by -85 in. was apparently intended for seniors in the respective grades, for it was struck in gold, silver and copper. The larger, 1-35 by 1-15 in. was struck in silver, copper and lead (see Mayo. op. cit. i. 20-21). 1 On the obverse of both issues of the " Dunbar Medal " is a left profile bust of Oliver Cromwell, with, in the distance, a battle. The reverse of the larger medal has the parliament assembled in one House with the Speaker; and, on the left, a member standing addressing the chair. The reverse of the smaller medal is the same as that of the larger, except that the member addressing the House is omitted. Cromwell himself expressed a wish to the " Com- mittee of the Army, at London," in a letter dated the 4th of February 1650/51, that his likeness, to procure which accurately the committee had sent Mr Simon to Scotland, should not appear on the medal. He writes: —

" If my poor opinion may not be rejected by you, I have to offer to which I think the most noble end, to witt, The Commemoracon of that great Mercie att Dunbar, and the Gratuitie to the Army, which might be better expressed upon the Medall, by engraving, as on the one side

the Parliament which I hear was intended and will do singularly well, so on the other side an Army, with this inscription over the head of it, The Lord of Hosts which was our Word that day. Wherefore, if I may beg it as a favour from you, I most earnestly beseech you, if I may do it without offence, that it may be soe. And if you think not ntt to have it as I offer, you may alter it as you see cause ; only I doe think I may truly say, it will be very thankfully acknowledged by me, if you will spare the having my Effigies in it."

In spite of this request Cromwell's " Effigies " is made the prominent feature of the obverse of the medal, to which the representation of the " Army " is entirely subordinated. His wish that the " word " for the day should be commemorated is, however, observed in the legend on the obverse, as is also, on the reverse, his suggestion that on one side of the medal there should be a representation of the parliament.

During the reign of Charles II. the issue of medals was numer- ous, and though we have it on the authority of Evelyn that many of these were bestowed as "gratuities of respect," yet many were given as naval awards; and, for the first time, there appears official authorization for the conferring of particu- lar awards on those who had succeeded in the very hazardous service of destroying an enemy's vessel by the use of fire-ships. In what are probably the earliest " Fighting Instructions " issued- — those of Sir William Penn, in 1653, and again in an abridged form in 1655 — no allusion to these awards is made, but that the custom of rewarding this special service prevailed, there is a piece of strong indirect evidence to show, in the shape of an amusing letter from a certain Captain Cranwill, of " ye Hare Pinke," to the Admiralty Committee, dated Feb. 4, 1655:—

1 An excellent reproduction of this medal, both obverse and re- verse, is given in Plate 8, figs. 4 and 5, of the same work, and pa Plate 9 will be found equally well reproduced facsimiles of the three medals for " Victories over the Dutch, 1653," figs. 1, 2 and 3 and of the " Medal of the Parliament, for Sea Service, 1649," fig. r.

" As for ye Pay yor Honrs were please to order mee for my service in ye Hare Pinke, I return most humble thankes, and am ready to serve yor Honrs and my Country for ye future

Fpr though ye Hare be mewsed in ye sand

yet Cranwell at your mercy still doth stand

A fire Ship now doth hee Crave,

And the Fox fain would he Have,

then has hee had both Fox and Hare,

then Spanish Admirall stand you cleare,

For Cranwell means ye Chaine of goold to ware ;

Sett penn to paper it is done,

for Cranwell still will be your man,"

aD of which goes to show that it had not been unusual to bestow gold chains, with or without medals, on the captains of fire- ships. By the " Fighting Instructions" issued 20th of April, 1665, by James, duke of York, lord high admiral, it was pro- vided as follows. In the case of the destruction of an enemy's vessel of forty guns or more, each person remaining on board the fire-ship till the service was performed was to receive £10, " on board ye Admirall imediately after ye service done," and the captain a gold medal and " shuth other future encourage- ment by preferment and commande as shall be fitt both to reward him and induce others to perform ye like Service." If it was a flag-ship that was fired " ye Recompense in money shall be doubled to each man performing itt, and ye medall to ye Commander shall be shuth as shall particularly ezpress ye Eminensye of ye . Service, and his with ye other officers preferement shalbe suitable to ye meritt of itt." This was followed by an " Oder of the King in Council " dated Whitehall 12th of January 1669-1670, in which the lord high admiral is authorized " to distribute a Medall and Chaine to such Captaines of Fire Shipps as in the last Dutch Warr have burnt any Man of Warr, as also to any of them that shall perform any such service in the present Warr with Algiers. Which Medalls and Chaines are to be of the price of Thirty Pounds each or thereabouts "

To complete the story of fire-ship awards, it may here be noted (though out of chronological order) that in 1703 revised " Fighting Instructions " were issued by Admiral Sir George Rocke, in which it was provided that the captain was to have his choice between a gratuity of £100, or a gold medal and chain of that value. Lastly an order of the king in council, dated, St James's, 16th of December, 1742, ordered that all lieutenants of fire-ships (which originally carried, no officers of this rank) should be entitled to a gratuity of £50

” in all cases where the Captain is entituled to the Reward of £100.” Though probably others were conferred, so thorough an investi- gator as the late John Horsley Mayo, for many years assistant military secretary at the India office, who had special opportun- ities of access to official records,. traced but three authenticated fire-ship awards. Those were: (1) to Captain John Guy, who blew up his fire-ship the ” Vesuvius ” under the walls of St Malo in 1693; (2) to Captain Smith Callis who, with his fire- ship the ” Duke,” in 1742, destroyed five Spanish galleys which had put into St Tropez, to the eastward of Marseilles; (3) to Captain James Wooldridge, who commanded the British fire-ships in Aix Roads on the nth of April 1809, when four French sail of the line were burnt. This latter is believed to be the last award of the kind that was issued. Fire-ships awards are of special interest as affording a precedent, in future naval wars, for the award of special decorations for torpedo services.

It is in this reign also that we first find a case of medals being granted by the Honourable East India Company. The earliest of these would appear to have been a gold medal of the value of £20, conferred on Sir George Oxinden, president at Sural, 1622-1669, in 1668, for considerable civil and military services. Surat was then and until 1687, when Bombay took its place, the seat of government of the Western Presidency, and the most eminent of Sir George’s services was the defence of the Company’s treasures and possessions at that place against Sivajee and the Mahrattas in 1664. It is not known what has become of this medal, but there is indirect evidence to

show that it was a circular medal, three inches in diameter. On the obverse the “Arms of the Governor and Company of Merchants of London trading to the East Indies, with creast, supporters, and mottoes,” and around the legend NON MINOR EST VIRTVS QUAM QVAERERE PARTA TVERI. The reverse was probably blank to admit of an inscription. This award was the forerunner of many given by the H.E.I. Co., several of which were ” general distributions ” of the very highest interest, which will be dealt with together later on.

The awards made in the reigns of James II., William and Mary, William III., Anne, George I., George II., may be very briefly dealt with. Almost without an exception they were either naval or conferred by the Hon. East India Company, and with only perhaps one or two exceptions, they were ” per- sonal ” as distinct from ” general ” awards. Of the very few medals awarded by James II., one was an undoubted military award, though curiously enough the recipient was a bishop. This was Peter Mew, who had been made bishop of Bath and Wells in 1672, was translated to Winchester 1684, ” and next year was

commanded by the king, in compliance with the re- quest of the gentry of Somerset, to go against Monmouth, and did eminent service at the battle of Sedgmoor, where he managed the artillery; for which he was rewarded with a rich medal ” (Hutchins’s History of Dorset, 3rd ed., vol. iv. p. 149).

The possible exceptions in the way of a ” general ” distribu- tion of a medal during the reigns under review are the cases of the medals struck after the battles of La Hogue, 1692, and Culloden, 1746. By an act of parliament passed in 1692 (4 Gul. and Mar. c. 25), it was enacted that a tenth part of the prize money taken by the navy should be set apart ” for Medalls and other Rewards for Officers, Mariners, and Seamen in their Majesties Service at Sea who shall be found to have done any signal or extraordinary service.” (Later a Royal Declaration of Queen Anne, the 1st of June 1702, provided that all medal and monetary awards ” shall be also paid out of Her Majesties Shares of Prizes.”) This is the first case in naval records authorizing the issue of medals to men as well as to officers, and the conferring of the “La Hogue” medal was the first case in which the enactment was carried into effect, at any rate as far as admirals and officers are concerned. Seamen and soldiers had a more substantial reward, for the queen sent £30,000 to be distributed amongst them, whilst gold and silver medals were struck for the admirals and officers. The medal, which was circular, 1-95 in. in diameter, had on the obverse the busts conjoined of William and Mary, r., with around GVL ET MAR D G M B F ET H REX ET REGINA. On the reverse was a representation of the fight, showing the French flag-ship, ” Le Soleil Royal,” in flames, with above the legend, NOX NVLLA SECVTA EST, and, in the exergue, PVGN NAV INT ANG ET FR 21 MAY 1692.

As regards the medal struck after Culloden, fought on the 1 6th of April 1746, and in which the adherents of the young Pretender were completely routed, there is nothing even to show that it was issued even by the authority of the government, though it was undoubtedly worn, and (if a contemporary portrait is to be relied upon, that of an ancestor of Mr W. Chandos-Pole of Radbourne Hall in Derbyshire) around the neck attached to a crimson ribbon with a green edge. There is no doubt it was struck in gold, silver and copper, but how it was awarded there is no proof, probably only to officers. The obverse had an r., bust of the duke of Cumberland, with above CUMBER-LAND, below YEO f (Richard Yeo fecit), and, on the reverse, an Apollo, laureate, leaning upon his bow and pointing to a dragon wounded by his arrow. The reverse legend was ACTUM EST ILICET PERIIT, and, in the exergue PROEL COLOD AP XVI MDCCXLVI. The medal is a strikingly handsome one, with an ornamental border and

ring for suspension, oval, 1-75 by 1 -45 in., but very few specimens are known to exist. Those in gold were probably only given to officers commanding regiments and a very fine specimen of these, originally conferred on Brigadier-General Fleming (at one time in command of the 36th Foot) is now in the collection of Major-General Lord

Cheylesmore. In his monograph, Naval and Military Medals, Lord Cheylesmore mentions another ” Culloden ” medal in his collection, ” a slightly larger one in white metal, which leads one to suppose that it was given in inferior metal to the more junior branches, probably officers; but whether this was the case or no I am unable authoritatively to state.” However, one thing is fairly certain, that the issue of the ” Culloden ” medal was in no sense ” general,” as we now understand the term, nor as were the issues for ” Dunbar ” or the issues of the Honourable East India Company, which will next be dealt with. No medal awards were made to either the naval or military services for the Seven Years’ War, and the American War of Independence. In fact George III. had been more than thirty years on the throne when the first medal award by the Crown was given, in the shape of the navy gold medals, first issued in 1 794. It will however be more convenient to deal later with these medals and the army gold medals and crosses given for services in the long and arduous struggle of 1793-1815, and to describe here in sequence those medals which were issued by the Honourable East India Company, the issue of which was, with certain limitations, ” general,” thus reverting to the precedent first established in the ” Dunbar ” award-, namely an issue to all ranks. They are nine in number, and are described below in the chronological order of the military operations for which they were awarded.

1. The ” DECCAN ” medal. Authorized, first in 1784, and again 1785. Obverse: Figure of Britannia seated on a military trophy, with her right hand holding a wreath of laurel and extended towards a fortress over which the British flag flies. Reverse: Persian in- scriptions — In centre, ” Presented by the Calcutta Government in memory of good service and intrepid valour, a.d. 1784, a.h. i 199 ;” around, ” Like this coin may it endure in the world, and the exer- tions of those lion-hearted Englishmen of great name, victorious from Hindostan to the Deccan, become exalted.” This medal was issued in two sizes, diameters i-6 and 1-25 in. The larger medal was struck both in gold and silver, the smaller in silver only, and both were worn round the neck suspended from a yellow cord. This medal was awarded to two large detachments of the Bengal army, denominated the ” Bombay

Detachment “(authorized 1784), and the ” Carnatic Detachment ” (authorized 1785), which respectively fought in the west of India and Guzerat, 1778-84, and in the south of India, 1780-84. The medal was not given to any Europeans, only to natives; the larger medal in gold to Subadars, and in silver to Jemadars; the smaller silver medal to non-commissioned officers and sepoys. By a minute of council, dated the 15th of July 1784, a further boon was granted to the ” Bombay Detachment,” inasmuch as it exempted all Hindus of that detachment from payment of the duties levied by the authorities on pilgrims to Coya in Behar. As the large majority of the troops were high caste Hindus, and Coya was, and is the Mecca of Hinduism, this favour must have been much appreciated by the recipients of the medal. This is the earliest Anglo-Indian example of a medal issued alike to all ranks.

2. The “MYSORE” medal. Authorized, 1793. Obverse: A sepoy holding in his right hand the British colours, in his left an enemy’s standard reversed, whilst his left foot rests on a dismounted cannon. A fortified town is in the background. Reverse: Within a wreath; “For Services in Mysore, a.d. 1791-1792.” Between wreath and rim is an inscription in Persian: ” A memorial of devoted services to the English government at the war of Mysore. Christian Era, 1791-1792, equivalent to the Mahomedan Era, 1205-1206.” Like the ” Deccan ‘ this medal was in two sizes, diameters 17 in. and 1*5 in., the larger being struck both in gold and silver, the smaller in silver only, and both were worn suspended from the neck by a yellow cord. The medal was awarded for the operations against Tippoo Sultan, and was bestowed on the ” Native Officers and Sepoys of the Infantry and Cavalry, and on the Artillery Lascars, who either marched by land, or proceeded by sea to the Carnatic and returned to Bengal. The large gold medals were given to Subadars, the large silver to ” Jemadars and Serangs,” the small silver medals to ” Havildars, Naicks, Tindals, Sepoys and Lascars.” The award therefore, followed precisely the precedent set in the ” Deccan ” medal. One of the very rare gold specimens of this medal is in the collection of Captain Whitaker, late 5th Fusiliers, whose collection, and that of Lord Cheylesmore, are probably the two finest that have as yet been brought together.

3. The ” CEYLON ” medal. Authorized, 1807. Obverse: An English inscription: ” For Services on the Island of Ceylon, a.d. 1795-6.” Reverse: A Persian inscription: “This Medal was presented to commemorate good services in Ceylon during the years of the Hegira 1209-10.” This medal was issued in only one size, 2 in. diameter, and was awarded to a small force of Bengal native artillery which formed a fraction of a large body of British and native troops (the rest did not receive the medal) which captured Ceylon

from the Dutch in 1795-96. It is the only instance of a war medal that has merely a verbal design on both obverse and reverse, and moreover it sets a precedent that was destined to be followed only too often in that it was only granted twelve years after the services that had earned it had been rendered. Only 123 medals were struck, two in gold for native officers, and 121 in silver for other ranks. Like the two preceding, it was worn from the neck suspended from a yellow cord.

4. The “SERINGAPATAM “medal. Authorized, 1799, for services in Lord Harris’s campaign of that year, and the storm of Seringa- patam. Obverse: A representation of the storming of the breach at Seringapatam, with the meridian sun denoting the time of the storm. In the exergue is a Persian inscription: “The Fort of Seringapatam, the gift of God, the 4th May 1799.” Reverse: A British lion overcoming a tiger, the emblem of Tippoo Sultan. Above is a standard, with, in the innermost part of the hoist im- mediately contiguous to the staff, the Union badge, and, in the fly, an Arabic legend signifying ” The Lion of God is the Conqueror.” Intheexergue: IV. MAY, MDCCXCIX. (the date of the assault). It was in one size, 1-9 in. but of five different kinds. Although the medal was authorized in 1799, it was 1801 before orders, for the preparation of 30 gold medals, 185 silver-gilt, 850 silver, 5006 copper bronzed, and 45,000 pure tin, were given, the artist being C. H. Kuchler, and the medals made by Matthew Boulton at the Soho Mint, Birmingham. It was 1808 before they came out to India for distribution, and it was not till 1815 that the Company’s European officers had the prince regent’s sanction to wearing them on public occasions. For the first time the issue was absolutely ” general,” to Europeans as well as natives, to Crown troops as well as to those of the H.E.I. Co., but it was not till 1851, when the First India G.S. Medal was awarded, that official sanction was given to their being worn by Europeans in uniform. The medal was given in gold to general officers, in silver-gilt to field officers, in silver to captains and subalterns, in copper bronzed to non-commissioned officers, and in pure grain tin to privates and sepoys. With regard to this medal there ,is an incident that is worth recording. The bulk of the troops engaged at Seringapatam were Crown forces, or belonged to the Madras and Bombay presidencies; the only Bengal troops taking part being five battalions of infantry, and artillery detachments. On their return to Bengal no steps were taken with regard to medals till 1807, when medals copied from the Soho Mint one, but 1-8 in. only in diameter, were made at the Calcutta Mint. Following the Bengal precedents as set in the ” Deccan,” ” Mysore ” and ” Ceylon ” medals, the medals were struck in gold for officers, and in silver for the other ranks. A Bengal native officer therefore wore just the same medal as a general

officer of any of the other forces, and similarly a Bengal sepoy wore the same medal as a British captain or subaltern of the Crown. The Bengal medal can easily be distinguished from the others, for in the reverse the artist s initials C.H.K. are rendered “C.5I.H.” Some officers, amongst them Lord Harris himself and h’is second-in-command Sir David Baird, wore the medal with the red, blue-bordered ribbon, which is the same as that worn with the Army Gold Medal (see below) and was in fact the only authorized military ribbon then in use; but though no ribbon was issued with the medal, recipients were given to understand that the ribbon would be of a deep maize colour and watered, the shading on the ribbon symbolizing the stripes in the fur of the tiger, Tippoo Sultan’s favourite emblem. The duke of Wellington’s medal (silver gilt), has the maize (or yellow as it is often termed) ribbon, and the medal was undoubtedly more generally worn with this ribbon than with, the red and blue one. There are also apparently occasional instances of it having been worn with a plain red ribbon.

5. The “EGYPT” medal. Authorized, 1802. Obverse: A Sepoy holding the Union Flag in his right hand ; in the background a camp. In exergue, in Persian: ” This medal has been presented in commemoration of the defeat of the French Army in Egypt by the victorious and brave English Army.” Reverse: A British ship sailing towards the coast of Egypt. In the background, an obelisk and four pyramids. In the exergue, MDCCCI. This medal was only awarded to native officers and men of the small force of Bengal and Bombay troops which formed part of the expeditionary force from India, that co-operated in Sir Ralph Abercromby’s descent on Egypt in 1801 (see Baird, Sir David). This was another case of a belated issue (181 1 for the Bengal troops and two years later for the Bombay troops). The medal was issued in only one size, 1-9 in. in diameter. For the Bengal troops 776 medals were struck, 16 in gold for commissioned officers, 760 in silver for other ranks. The Bombay government obtained the approval of the court of directors for the issue of the medal to their troops in 1803, but apparently did nothing till 1812, when they asked the Calcutta Mint for a copy of the medal to enable them to prepare similar ones. The Bombay Mint would not however appear to have been equal to the occasion, for the sample was returned to Calcutta with the request that 1439 medals might be struck there. This was accordingly done, but ail of these medals were made of silver, and so the medal went to the Bombay troops in all ranks alike. As in the case of the ” Deccan ” medal, Hindu sepoys, who had volunteered for Egypt, were exempted from the duties levied on pilgrims. This medal was worn suspended from the neck by a yellow cord.

MEDALS AND DECORATIONS

Plate I.

Z O

a

§

o

>

«

m

a

OS

B

fa O

s

I

4 PI

- ••i»:; tlj -^ .$1’*l

1

it,,. ..... >.”,-;

If

””•’.....jf h”lj

•

as ■a

■i

09

IS

■ r

■iJ

2~

I

33

■ »ip « ■■!

» . . . . ■ . » ‘

2*

5

I

1

B

a

M

9

!

|

3

-3

MEDALS AND DECORATIONS

Plate I.

ifiiiiJFtBii

o

<

55

§

*-3

o

>

o

25

OS

fa

W

fa o

s

•

I'!

fS

i

'.. •:. ,i;:|'r

!?' , wiii#|.f»

i

fisiil I

.■;ii'i;;'i!-

fSlillllillliU

H

O

60

■a

ft

iiiir

i

‘T

fii’ills i

B

«j

c

.2

1

i?

3 **

£

MEDAL

6. The ” RGDRIGUES, BOURBON AND MAURITIUS ” medal. Authorized, 1811. Obverse: A sepoy, holding in his right hand the British flag, in his left a musket with bayonet fixed, stands with his left foot trampling a French eagle and standard ; beside the figure a cannon, and, in the background the sea and ships. Reverse: Within a wreath, in Persian: ” This medal was conferred in com- memoration of the bravery and devotion exhibited by the Sepoys of the English Company in the capture of the Islands of Rodrigues, Bourbon, and Mauritius, in the year of the Hegira 1226.” In the circumference, in English: RODRIGUES VI. JULY MDCCCIX. BOURBON VIII. JULY AND ISLE OF FRANCE III. DEC. MDCCCX. This medal was awarded to the

native troops of the Bengal Presidency that formed part of the combined naval and mili- tary forces that effected the reduction of these islands in 1809-10. The government of Bengal also suggested " for the consideration of the governments of Fort St George and Bombay, that corre- sponding Medals shall be conferred on the native troops from those Establishments;" but those governments do not appear to have complied with the suggestion, a distinct injustice to the Madras and Bombay troops employed. The medals, struck at the Calcutta Mint for the Bengal troops, were 1-9 in. in diameter, and in gold and silver, 45 gold for native officers, 2156 silver for all other ranks. They were worn as was customary in so many cases with yellow silk cord suspended from the neck.

7. The "JAVA" medal. Authorized, 1812. Obverse: A representation of the storming of Fort Cornelis. On a flag-staff the British flag is shown flying above a Dutch one, and over all is the word Cornelis. Reverse : In Persian : " This medal was conferred in commemoration of the bravery and courage exhibited by the Sepoys of the English Company in the capture of Java, 1228, Hegira." In circumference, in English: "JAVA CONQUERED XXVI. AUGUST MDCCCXI." This medal was awarded to the native troops of the Honourable East India Company (all Bengal), which took part in the expedition under Lieut.-General Sir Samuel Auchmuty which effected the capture of Java from the Dutch in 181 1. The medal, 1-9 in. in diameter, was struck in gold and silver, 133 in the former metal for native officers, and 6519 in silver for other ranks, and was worn in the usual manner with a yellow silk cord.

8. The "NEPAL " medal. Authorized, 18 16. Obverse: Hills crowned with stockades. In right foreground the colours and bayonets of an attacking force, to the left a cannon. Reverse: In Persian : " This Medal was conferred by the Nawab Governor- General Bahadur in testimony of the energy, good service, skill and intrepidity, which were displayed in the Hills in the years of the Hegira 1229 and 1230." This was awarded to the native troops of the East India Company who took part in the arduous operations in Nepal in 1814-16. This medal, 2 in. in diameter, marks a very interesting new departure, for it was struck only in silver, and given to all ranks precisely alike, whether the recipient was commissioned or not. It was worn from the usual yellow silk cord.

9. The "BURMAH" medal. Authorized, 1826. Obverse: Representation of the storming of the great pagoda at: Rangoon ; on the left, a palm tree under which the general and staff, and the river with steamer and boats of the Irrawaddy flotilla joining in the attack. In exergue, in

Persian: ” The Standard of the victorious Army of England upon Ava.” Reverse: The White Elephant of Burma crouching in submission before the British Lion; behind the lion, the British flag flying broad, behind the elephant, the Burma flag drooping and between the two flags palm trees. In the exergue, in Persian: ” The elephant of Ava submits to the lion of England, year 1826.” This, one of the most beautiful of all war medals, was designed by W. Daniell, R.A., and executed by W. Wyon; and was awarded to all the Company’s native troops, that participated in the First Burmese War, 1824-26. The medal, 1-5 in. diameter, was issued in gold to native officers, in silver to other ranks. In all there were struck; for Bengal troops, 308 gold, 13,108 silver; and for those of Madras, 450 gold and 20,025 silver. Of the Madras medals however nearly half were still unclaimed in 1840. It is with this medal that we first find, as regards Indian medals, definite instructions as to the use of a ribbon, and the manner in which medals should be worn. In 1831, it was officially ordered that the colour should be red with blue edges — it was in fact precisely similar to the Waterloo ribbon (for which see Plate I.) — and the instructions were that the medal ” be worn perfectly square upon the centre of the left breast, the upper edge of the ribbon being even with the first button for ranks wearing Sword Belts only, and even with the second button for ranks wearing Cross Belts.” Like the Waterloo medal also, it was_ mounted on a steel clip and ring, and the medals were struck at the Royal Mint instead of, as heretofore, in India. 1

1 Most of the authorities on medals, including Mr Thomas Carter and Captain Tancred, style as the reverse of the medal what above is styled the obverse and vice versa. We, however, prefer to agree with the description of the medal as given by Mayo and for this reason. The side of the medal which is described above as the obverse depicts a chief incident of the war; the allegorical repre- sentation on the other side is after all but the pictorial equivalent of a verbal inscription, and so is properly the reverse of the medal.

This closes the list of the Indian medals, which, with the excep- tion of that for Seringapatam, were issued only to the native troops of the Honourable East India Company. All are now very rare and very highly valued by collectors.

As has already been stated, the first war medals awarded by the Crown in the reign of George III., were the navy gold medals, instituted on the occasion of Lord Howe’s great victory over the French fleet on the 1st of June 1794. On the 26th of that month the king and queen visited Portsmouth, and, on the deck of the ” Queen Charlotte,” Lord Howe’s flag-ship, presented the victorious admiral

with a diamond-hilted sword of the value of three thousand guineas. Gold chains, from which the medals were afterwards to be suspended, were also conferred on Admiral Lord Howe; Vice- Admirals Graves and Sir Alexander Hood; Rear- Admirals Gardner, Bowyer and Pasley; and Captain of the Fleet Sir Roger Curtis. At the same time the king announced his intention of conferring gold medals on each of the officers named, and similar, but smaller medals on the captains. The medals were delivered in 1796, the Admiralty ordering " The Admirals to wear the Medal suspended by a ribband round their necks. The Captains to wear the Medal suspended to a ribband, but fastened through the third or fourth button-hole on the left side. The colour of the ribband, blue and white."

The ribbon, which is white with broad blue borders (see Plate I.), did not of course supersede the gold chain in the case of those officers on whom chains had been conferred. They wore their chain with the ribbon, and the medal of Admiral Bowyer (now in the collection of Lord Cheylesmore) is so sus- pended. The same splendid and intensely interesting medal was later conferred for various fleet and ship actions deemed worthy of special acknowledgment; and so came into being the first " regulation " medal for naval officers.

The two medals are, with but one slight distinction, identical in design, the larger being 2, and the smaller 1-3, in. in diameter. The design is: —

Obverse : The fore part of an antique galley, on the prow of which rests a figure of Victory who is placing a wreath on the head of Britannia who stands on the deck of the galley, her right foot resting upon a helmet, her left hand holding a spear. Behind Britannia is a " union " shield, charged with the Cross of St George and the Saltire of St Andrew. (Ireland had not then been added to the Union). Reverse: Within a wreath of oak and laurel, the name of the re- cipient, the event for which the medal was conferred, and the date. (In the smaller medal the wreath is omitted.)

In all, eighteen actions were recognized by this medal, the complete list of which is as follows:—

The " Glorious First of June " (7 large and 18 small medals); St Vincent (Feb. 14, 1787) (6 large and 15 small medals) ; Camperdown Oct. 11, 1797) (2 large, 15 small medals); The Nile (Aug. 1, 1798) (1 large and 14 small medals); Re-capture of the frigate " Hermione " from the Spaniards by the boats of H.M.S. " Surprise " at Porto Cavallo (Oct. 25, 1799) (1 small medal); Trafal- gar (Oct. 21, 1805) (3 large

and 27 small medals); Action off Ferrol (Nov. 4, 1805) (4 small medals); Action off St Domingo (Feb. 5, 1806) (3 large and .7 small medals); Capture of Curacoa (Jan. 1, 1807) (4 small medals); Capture of the Turkish frigate ” Badere Zaffer ” by H.M.S. ” Seahorse” (July 6, 1808) (1 small medal); Capture of the French frigate “Thetis” by H.M.S. “Amethyst” (Nov. 10, 1808) (1 small medal); Capture of the French frigate ” Furieuse ” by H.M. ship-sloop ” Bonne Citoyenne ” July 6, 1809 (1 small medal) ; Capture of the Island of Banda Neira (Aug. 9, 1810) (1 small medal); Captain W. Hoste’s action off Lissa (March 13, 1811) (4 small medals); Capture of the French 74-gun ship ” Rivoli ” by H.M.S. ” Victorious ” (Feb. 22, 1812) -, (1 small medal); The “Chesapeake” and “Shannon” (June 1, 1813) (1 small medal); Capture of the French frigate ” Etoile ” by H.M.S. ” Hebrus ” (March 27, 1814) (1 small medal) ; Capture of the American frigate ” President ” by H.M.S. ” Endymion ” (Jan. 15, 1 81 5) (1 small medal).

In all 22 large medals, and 117 small, were awarded; but this does not say that all who were entitled to the medal received it. This is most notably the case with regard to the ” Glorious First of June.” When the issue was made, in 1796, the medals were given only to those flag officers who had received gold chains, and to such captains as were specially mentioned in Lord Howe’s despatch of the 21st of June, despite the fact that the admiral specially put it on record that the selection therein made, ” should not be construed to the disadvantage of the other commanders, who may have been equally

deserving of the approbation of the Lords Commissioners of the Admiralty, although I am not enabled to make a particular, statement of their merits.” For this reason the medal was never awarded to Rear-Admiral B. Caldwell, fifth in command on the great day, to his flag-captain, Captain G. B. Westcott, and to seven other captains of line of battle ships engaged. One captain however, who was not mentioned in despatches, succeeded in gaining the medal, by a tour de force eminently characteristic of the superb breed of naval officers that the great wars had brought into being. This was Collingwood, who had been flag-captain to Bowyerinthe” Barfleur.” When Collingwood was awarded the medal for St Vincent, where he commanded the ” Excellent,” he flatly refused to receive it unless that for the First of June was also conferred upon him, which was done. For St Vincent, the Nile and Trafalgar, all flag officers and captains engaged received the medal. At the Nile, Troubridge’s ship, the ”

Culloden," grounded in entering the bay, and so, strictly speaking, he was never engaged in the action; but the king specially included him in the award, " for his services both before and since, and for the great and wonderful exertions he made at the time of the action, in saving and getting off his ship."

For Camperdown, one captain, afterwards found guilty by court-martial of failure in duty, did not receive the medal. Several posthumous awards of the smaller medals were made to the relatives of officers who were either killed in action or died of wounds. These were: on the first of June, Captains Hutt (" Queen "), Montagu (" Montagu "), Harvey (" Brunswick "); at Camperdown, Captain Burgess (" Ardent "); at the Nile, Captain Westcott (" Majestic "); at Trafalgar, Captains Duff (" Mars ") and Cooke (" Bellerophon "). Captain Westcott was doubly unfortunate, for he was one, of the First of June captains who should have received the medal but did not. Captain Miller of the " Theseus " also did not receive his medal for the Nile, for, though not killed in the action, he perished at Acre in an accidental powder explosion the May following, the medal arriving after his death, and being returned to the Admiralty. In only two cases were large medals conferred on officers below flag rank, these being Sir R. Curtis, captain of the fleet to Lord Howe on the First of June, and Nelson, who only flew a commodore's broad pendant at St Vincent. Following this latter precedent Sir R. Strachan should have had the large medal for the action of the 4th of November 1805, for he also was a commodore, but it was denied him for what seems quite an inadequate reason, namely that he was junior in rank to Captain Hervey of the " Temeraire," who was the senior of the Trafalgar captains. Hervey was promoted to rear- admiral for Trafalgar on the 9th of November, and Strachan to the same rank on the following day.

The small medal too was conferred in only three cases on officers below the rank of post captain. These were Commander Mounsey of the " Bonne Citoyenne," fqr the capture of the " Furieuse " and Lieuts. Pilfold and Stockham, who at Trafalgar commanded respec- tively the " Ajax " and the " Thunderer," the captains of those two ships being at the time of the action in England giving evidence at the court-martial of Sir Robert Calder. In all, of the eighteen awards of the Navy Gold Medal, eight were for fleet actions (one of which was between squadrons of frigates), seven for single ship actions, one between line of battleships, six in which frigates were engaged, two for shore operations (in both cases the taking of islands from the Dutch), and lastly the re-capture of the " Hermione " by the " Surprise." This last 'mentioned award is one particularly memorable, not only because it was the first time that the medal was awarded to a frigate captain, but

also because it is the only case in which the medal was awarded for boat service pure and simple.

Nelson's two great victories, the Nile and Trafalgar, also earned a medal for all ranks that participated in them, but these awards were not made by the Crown but by the generosity of two private individuals, though of course with the king's approval and permission. The first of these is " Davison's Nile Medal," which Mr Alexander Davison, Nelson's prize agent and a valued friend, caused to be struck at a cost of near £2000, and one of which was presented to every officer and man engaged at the Nile. The medal, 1-85 in. in diameter, was given in gold to Nelson and his captains, in silver to lieutenants and officers of corresponding rank, in copper gilt to warrant and petty officers, and in copper bronze to seamen and marines: —

Obverse: Hope, standing on a rock in the sea, holding in her right hand an olive branch, and supporting with her left side a shield on which is the bust of Nelson surrounded by the legend : " EUROPE'S HOPE AND BRITAIN'S GLORY." Behind the figure and shield is an anchor, whilst around all is inscribed: " REAR-ADMIRAL LORD NELSON OF THE NILE." Reverse: The French fleet at anchor in Aboukir Bay, the British fleet ad- vancing to the attack : a setting sun denotes the time of the action. Around: " ALMIGHTY GOD HAS BLESSED HIS MAJESTY'S ARMS "; and, in exergue: " VICTORY OF THE NILE AUGUST 1 1798." In the reverse the engraver when sinking the die forgot to transpose the position of the objects, and so the sun is made to set in. the east instead of in the west, and the land which is shown on the right should properly be on the left.

Davison's Nile medal was struck at the Soho Mint, Birmingham, by Boulton, and it was this that probably inspired the latter to present a medal to all who took part in the battle of Trafalgar.

" Boulton's Trafalgar Medal " was 1-9 in. in diameter, and givei in gold to the three admirals, in silver to captains and first-lieuten ants, and in pewter to other ranks. In a very considerable number© cases the pewter medals were either returned, or thrown overboard the recipients being disgusted at what they deemed the paltrines of the reward. Obverse: A bust of Lord Nelson in uniform witl around: HORATIO, VISCOUNT NELSON, K.B. DUKE 01 BRONTE, &c. Reverse: A representation of the battle, witl around on a scroll: ENGLAND EXPECTS EVERY MAN WILI DO HIS DUTY. In exergue: TRAFALGAR OCTr. 21 1805.

Both the Davison and the Boulton medals were worn sus- pended from

a blue ribbon. These are the only two cases ir which officers and men of the navy and army have accepted and worn medals presented by a private individual.

The Gold Medal given by George III. to the superior officers k command at the battle of Maida, in Sicily, on the 4th of July 1806, is an award of special interest, for not only was it the first military award made by the Crown during the reign, but it wis moreover the prototype of the superb army gold medals and crosses which were so widely distributed during the years that fol- lowed. A general order of the duke of York, commander-in-chief, dated Horse Guards, 22nd of February 1808, awarded a gold medal for Maida to Sir John Stuart, K.B., his three brigadiers, and nine other officers. Subsequently four other officers received it, so in all seventeen officers received the award. It was prescribed that the medal ” should be worn suspended by a Ribband of the colour of the Sash, with a blue edge, from a button of the coat on the left side.” It was in fact to be worn in the same way as the small Navy Gold Medal, and as this grant established blue and white as the specific navy ribbon, so did the Maida award establish red with a blue border as the regulation military ribbon. The Maida ribbon is in fact precisely the same as the Waterloo ribbon shown in Plate I. The Maida medal was 1-5 in. in diameter and struck in gold only. It was issued precisely alike, quite irrespective of rank, to each of its seventeen recipients.

Obverse: Head of George III., laureated and facing left, with below the legend: GEORGIUS TERTIUS REX. Reverse: Britannia casting a spear with her right hand, and on her left arm the Union shield, above, and approaching her is a Flying Victory holding out a wreath. In front of Britannia in four lines, is MAI/ DA/IVL IV/MDCCCVI/; behind her the triquetra or tri’nacria, the symbol of the Island of Sicily. In the exergue are crossed spears.

Two and a half years after the Maida award the king author- ized the “Army Gold Medal,” the first grant of which was notified by the commander-in-chief, in a Horse Guards general order dated the 9th of September 1810. This authorized the bestowal of the medal on 107 senior officers mentioned by name. The battles commemorated were Roleia, Vimiera (1808), the cavalry actions of Sahagun and Benevente (1808), Corunha and Talavera (1809). The Army Gold Medal so awarded was in two sizes, large, 2-1 in. in diameter, for general officers, small, 1-3 in. in diameter, for officers of lower rank: and the regulations provided that it should be worn from a red ribbon edged with blue, the larger round the neck, the smaller on the left breast from a button-hole of the uniform. The ribbon was the same width, if

for both ribbons, and precisely the same later on for the Gold Cross. Both large and small medals were of identical design, in fact there was no difference, either in medals or in ribbons, except in size and the style in which they were worn : —

Obverse: Britannia seated on a globe, holding in her right hand a laurel wreath, and in her left, which rests upon a Union shield resting against the globe, a palm leaf; at her feet to her right, a liba. Reverse: A wreath of laurel, encircling the name of the battle or operations for which the medal was granted.

In the following years subsequent orders similar to the original grant extended the award of the Army Gold Medal, until eventually twenty-four distinct awards were made, com- memorating twenty-six actions, or series of operations, which took place not only in the Peninsula, but also in North America, and both the East and the West Indies.

The Peninsula medals were for Roleia and Vimiera, Sahagun and Benevente, Corunna, Talavera, Busaco, Barrosa, Fuentes d'Orior, Albuera, Ciudad Rodrigo (1812), Badajoz (i8ii*i

MEDAL

Salamanca, Vittoria, Pyrenees, St Sebastian, Nivelle, Nive, Orthes, Toulouse. The West Indies medals were for Martinique (Feb. 1809) and Gaudaloupe (Jan.-Feb. 1810), the North American for Fort Detroit (Aug. 16, 1812), Chateauguay (Oct. 26, 1813) and Chrystler's Farm (Nov. 11, 1813), and there was, lastly, a medal awarded for Java (Aug.-Sept. 181 1).

From the above it will be seen that as time went on many officers became entitled to two, three and even more medals, and as this was found inconvenient, the method of granting the award was very materially amended as notified by the commander-in-chief, ir. a general order, dated Horse Guards, October 7, 1813. This order formulated regulations which were as follows: —

1. That one medal only was to be borne by each officer recom- mended for the distinction.

2. That for a second and a third action a gold clasp was to be attached to the ribbon from which the medal was suspended inscribed with the name of the action.

3. When a fourth distinction was earned, the medal and two clasps were to be replaced by a Gold Cross having the four actions for which

it was awarded inscribed upon it, one upon each arm.

4. On every occasion the recipient was awarded the decoration after the fourth a Gold Clasp worn on the ribband was added to the Cross.

The regulations further laid down that only officers should be recommended who had been ” personally and particularly engaged ” on the occasion, and that officers were to be named by ” special selection and report of the Commander of the Forces upon the spot, as having merited the distinction by conspicuous service Further, the Commander of the Forces was restricted in his selection to General Officers, C.Os. of Brigades, C.Os. of Artillery or Engineers, and certain staff officers holding field rank, and Commanding Officers of Units, and Officers succeeding to such command during an engagement. 1 It was also ordered that awards earned by deceased officers should be transmitted “to their respective families.” The Gold Cross that was, under these regulations, instituted is as follows: —

A Maltese Cross, I J inches square, with an ornamental border; in the centre, a lion, facing right ; in each limb of the cross the name of one of the actions for which it was conferred. The back of the cross is the same as the front. The cross was precisely the same irrespective of whether it replaced a large or a small medal.

The clasps were all of the same pattern, whether worn with the cross, the large gold medal, or the small gold medal. They are 2 in. in length by § in. in width, and bear, within a border of laurel, the name of the action for which they were conferred. At the close of the war in the Peninsula the issue of this handsome and much coveted decoration was discontinued, the enlargement of the Order of the Bath (January 1815) affording another method of reward which the Crown deemed more appropriate. On the occasion of this extension all officers who had obtained the cross with one clasp, i.e. who had been decorated for five or more actions, were made Knights Commander of the Bath. In all 847 awards of this superb decoration were made. The medal alone went to 469 officers, whilst 143 received it with one clasp, and 72 with two clasps. The cross was issued singly in 61 cases, with one clasp in 46, with two in 18, with three in 17, with four in 8, and with five clasps in 7 cases. The cross with six clasps was gained by Sir Colin Campbell (Lord Clyde), Sir Alexander Dickson (d. 1840) and Sir George Murray (d. 1846). Two officers, Viscount Beresford and Sir Denis Pack (d. 1823) received it with seven clasps. The duke of Wellington’s had nine, the decoration thus commemorating fourteen out of the twenty-six battles, sieges or operations for which the Gold Medals, Cross and Clasps were awarded. On the limbs of this cross are,

ROLEIA AND VIMIERA, TALAVERA, BUSACO, FUENTES DE ONOR. The clasps are for CITJDAD ROD- RIGO, BADAJOZ, SALAMANCA, VITTORIA, PYRENEES, NIVELLE, NIVE, ORTHES and TOULOUSE. Not until

1 Captain Sayers of the royal navy, who commanded the ” Leda ” 36, and landed in command of the 500 seamen who erected and manned the batteries for the attack of Fort Cornells, received the small medal for Java. This is the only case of the Army Gold Medal having been conferred on a naval officer.

after the close of the Great War, however, do we meet with the real prototype of the war medal as we know it to-day; for the Waterloo Medal of 1815 is the first actual “general” medal that was ever issued, because it was issued precisely alike to all ranks. In the twelve cases in which we have seen that a medal was given to all ranks, the medals differed either in size or in metal, or in both, according to the rank of the recipient, and in eight out of the nine issued by the Hon. East India Company the award was withheld from the British officers and men employed. Again in none of the cases quoted were the awards made by the Crown. The ” Dunbar ” medal was awarded by the Commonwealth parliament. The men of the Nile and Trafalgar wore their medals through the generosity of private individuals. In the other nine cases the award was made by the directors of the, Hon. East India Company. It was with the issue of the Waterloo Medal that all this was changed and for this well-merited and much prized boon the Services owe all gratitude to the duke of Wellington. Writing from Orville on June 28, 181 5, to H.R.H. the duke of York, he says: —

” I would likewise beg leave to suggest to your Royal Highness (the then Commander-in-chief) the expediency of giving to the non-commissioned officers and soldiers engaged in the battle of Waterloo, a medal. I am convinced it would have the best effect in the army ; and, if that battle should settle our concerns, they will well deserve it.”

Again, writing from Paris, Sept. 17, 1815, to Lord Bathurst, then war secretary: —

” I have long intended to write to you about the medal for Water- loo. I recommend that we should all have the same medal, hung to the same ribband as that now used with the medals.”

{i.e. the army gold medals and crosses). It is also fair to point out that in his place in the House of Commons, and on the day after the duke’s

letter to the commander-in-chief had been penned, William Watkins Wynn urged that medals should be given to the survivors of Waterloo, and that they should be the same for both officers and men, ” so that they who had been fellows in danger might bear the same badge of honour.” And so came into being that type of ” general ” medal, which beginning with Waterloo has continued down to the present. The description of these later medals, and the points of interest about them, will now be given as fully as exigencies of space will allow.

1. Waterloo, 1815. — Awarded by the Prince Regent, 1816. Ob- verse: Bust of the Prince Regent. Leg. GEORGE P. REGENT. Reverse: Figure of Victory seated; in her right hand, a palm branch; in her left, an olive branch. Above, WELLINGTON; below, WATERLOO, JUNE 18, 1815. Ribbon: Crimson with blue borders (Place I.).. Clasps: Nil.

The notification of this award was made in a memorandum by H.R.H. the commander-in-chief, dated Horse Guards, March 10, 1816, and it is worth noting that the prince regent commanded that the ribbon ” shall never be worn but with the medal suspended to it.” The medal was conferred on all the British troops, including the King’s German Legion, present on the 16th June at Quatre Bras, on the 17th in the fighting that took place during the retirement through Genappe to Waterloo, and on the 18th at Waterloo. It was also given to four regiments, 2nd Batt. 35th, 1st Batt. 54th, 2nd Batt. 59th, and 1st Batt. 91st Regiments of Foot, which formed Sir Charles Colville’s Brigade, which was detached. The reverse of this medal would appear to have been copied from the Greek Coin of Elis, about 450 B.C., a specimen of which is in the British Museum. The medals most prized by collectors are those of the 1st, 2nd, and 6th Dragoons (the ” Union Brigade “), and the 28th and 42nd Regiments of Foot, as those regiments suffered very severely and consequently fewer survivors received the medal than in other corps.

2. Ghuznee, 1839. — Awarded by the Government of India, 1842. Obverse: The Gateway of the Fortress. Below, GHUZNEE. Reverse: In centre a space for name of recipient; above, 23rd July; below, a mural crown with underneath it 1839; the whole within a wreath of laurel. Ribbon: Particoloured, crimson and green (Plate I.). Clasps: Nil.

This medal originated with Shah Soojah, whose part the Indian government took in the Afghan troubles of the time. His downfall and death having taken place before the medals were ready, the actual award was made by the Government of India. It was origin- ally ordered (Bengal Military Proceedings, May 27, 1842; Nos. 151 and 152) that the ribbon should be green and yellow, and it was

undoubtedly so worn by some recipients; but there is no official record to show why the colours were altered to green and crimson,

The medal was awarded to all troops both of the Crown and of the Company that were actually present at the siege and capture of the fortress, July 21,22, and 23, 1839.

3. Syria, 1840. — Awarded by the Sultan of Turkey, 1 841. Obverse: A fortress on which the Turkish flag is flying, and above six stars ; below, in Turkish, ” The People of Syria; and the Citadel of Acre, A.H. 1258.” Reverse: Cypher of the Sultan, within a laurel wreath. Ribbon : Red with white edges. Clasps : Nil.

The St Jean d’Acre medal, as it is commonly called, was awarded to the officers and men of the British fleet that were engaged in the operations off the coast of Syria, against Mehemet Ali, which culminated in the bombardment and capture of St Jean d Acre; Nov. 3, 1840. The medal, if in. in diameter, is purely a naval medal therefore, although a few artillery and engineer officers doing duty in the fleet received it. It was given in gold to officers of flag rank and captains (or field officers), in silver to quarter-deck and warrant officers, and in copper to other ranks. This is the only instance of there being a difference made according to the rank of the recipient since the ” Burma ” medal.

4. China, 1840-42 (1st Medal); China, 1857-60 (2nd Medal). — -Awarded by Queen Victoria, 1842, 1861. Obverse: Head of Queen Victoria, diademed, 1. Leg. VICTORIA REGINA. Reverse: Naval and military trophy, with behind a palm tree, and in front a shield of the Royal Arms. Above, ARM IS EXPOSCERE PACEM. In exergue, CHINA 1842. 1 Ribbon: Red with yellow borders (Plate I.). Clasps: 1st medal, nil; 2nd medal, six — CHINA 1842; FATSHAN 1857 2 ; CANTON 1857; TAKU FORTS 1858 s ; TAKU FORTS i860; PEKIN i860.

The first China medal was awarded to all the naval and military forces, both of the Crown and of the Hon. East India Company, that took part in the first China War, 1840-42. Another medal was struck, and is to be found in proof, but it was never issued as it was deemed it might give offence to China. Of this the obverse is the same as that described above; but the reverse had, under the same motto, the British lion trampling upon the Chinese dragon, and in the exergue,

NANKING 1842. The second China medal was similarly awarded to both the naval and military forces, British and Indian, that took part in the second China war, 1857-60. To those, however, who were already in possession of the first China medai the second medal was not awarded, they receiving a clasp CHINA 1842 to go on their original medal, together of course with the clasps to which their services in the second war had entitled them. The second medal was in fact not a new decoration but a re-issue. The first China medal was the first to be issued with the effigy of Queen Victoria upon it. The first medal with clasps for the second China war is very rare, and in almost every case would probably be found to be a naval medal. Of the second medal only one was issued with all the five new clasps. This was to a Royal Marine Artillery- man, and it is now in the Cheylesmore collection. Medals specially valued by collectors are those given to the 1st Dragoon Guards with the two clasps TAKU FORTS i860 and PEKIN i860, as only two squadrons of the regiment were present. In a G.O. by Lord Ellen- borough, governor-general of India, dated Simla, Oct. 14, 1842, it was intimated that the Government of India would present to the Indian Army a medal, the design of which was indicated in the order, but this idea was of course abandoned when the queen intimated her intention of making the award.

5. Jellalabad, 1842. — Awarded by the Government of India, 1842. First medal — Obverse: A mural crown; above, JELLALABAD. Reverse: VII April 1842. Second medal — Obverse: Head of Queen Victoria as in China medal, but legend, VICTORIA VINDEX. Reverse : Figure of Victory flying, in her right hand two wreaths, in her left the British flag. Beneath, the town of Jellalabad. Above, JELLALABAD VII APRIL: in exergue, MDCCCXLII. Ribbon (both medals): Military ribbon of India (Plate I.). Clasps: Nil.

In a G.O., dated Allahabad, April 30, 1842, Lord Ellenborough announced that the Government of India would present a medal to the Company's troops, and with the consent of Her Majesty, to those of the Crown, that held Jellalabad, under Sir Robert Sale (Nov. 12, 1842 — April 7, 1842). The queen's consent to her troops (13th Foot, now Somersetshire Light Infantry) receiving the medal was granted in August. The governor-general being dissatisfied with the first medal, made at the Calcutta Mint, the second (generally known as the " Flying Victory ") was ordered in England, and it was notified that on their arrival the first medals, all of which had been distributed, could be exchanged for the second. The new issue was ready by March 13, 1845, but the recipients apparently preferred the original medals, for very few were exchanged. Both are very rare, for only 2596 medals

were issued. The ” military ribbon of India ” is a tri-colour composed of the three primary colours shading into one another. It was designed by Lord Ellenborough, and is intended to symbolize an Oriental sunrise.

6. Afghanistan, 1842 (1st Afghan). — Awarded by Government of India. 1842. Obverse: Head of Queen Victoria as on First China Medal. Reverse: No. I. CANDAHAR 1842 within a laurel wreath; above, a crown. No. 2. GHUZNEE CABUL each within a laurel wreath ; above, a crown ; below, 1842. No. 3. CANDAHAR

1 The second medal has no date.

‘ Royal Navy and Royal Marines only.

GHUZNEE CABUL 1842 all within a laurel wreath ; above, a crown. No. 4. CABUL 1842 within a laurel wreath ; above, a crown. Ribbon: Military ribbon of India (Plate I.). Clasps: Nil.

The authority for this medal is a G.O. of the governor-general dated October 4, 1842. It was awarded to all troops, both of the Crown and the Hon. East India Company, who took part in the operations in Afghanistan in 1842, that is to say the second phase of the First Afghan War. The medal, with reverses 1, 2 and 3, was awarded to those troops that were with Major-General Sir William Nott in Candahar, and took part in the operations around that place, re-captured Ghuznee, and then joined hands with the column under Major-General Pollock at Cabul. The medal with reverse 4 was awarded to the column which advanced from Peshawur on Cabul, being joined en route by the victorious garrison at Jellalabad. This is the first of the four occasions on which the reverse of a medal has been used to denote the actual part taken in the operations by the recipient, in the manner that is now done by clasps. Of these medals the one with the No. 1 reverse is the rarest, as its issue was confined to the small portion of his army that Major-General Nott left behind him in Candahar. The medal with the No. 2 reverse is also rare, as its distribution was very limited.

7. Kelat-i-Ghilzie, 1842. — Awarded by Government of India, 1842. Obverse: A shield inscribed KELAT I GHILZIE encircled by a laurel wreath, and surmounted by a mural crown. Reverse- A military trophy, beneath, on a tablet, INVICTA MDCCCXLII. Ribbon: Military ribbon of India (Plate I.). Clasps: Nil.

The authority for this medal is the same as that for the First Afghan

Medal, and the medal itself was awarded to the troops of the Hon. East India Company, which defended this hill fortress for several months, and finally, before they were eventually relieved from Candahar utterly routed and drove off a force of four thousand men. As the medal was given only to 950 in all (forty being European artillerymen, the remainder native troops), it is naturally very scarce.

8. Sinde, 1843. — Awarded by Queen Victoria to the forces of the Crown, and by the Government of India to the troops of the Company. Obverse: Head of Queen Victoria as on First China Medal. Reverse: 1. MEEANEE 1843. 2. HYDERABAD 1843. 3. MEEANEE HYDERABAD 1843. In each case the inscription is surrounded by a laurel wreath, and surmounted by a crown. Ribbon: Military ribbon of India (Plate I.). Clasps: Nil.

The award of a medal for Sir Charles Napier's conquest of Sinde was first notified, as far as the troops of the Crown were concerned, by a letter from Lord Stanley, then war secretary, to the president of the India Board, dated July 18, 1843, and it is worth noting that this is the only instance of any medals for Indian service being paid for by the Crown. The notification of a similar award by the Govern- ment of India to their own troops, followed in a G.O. by the governor- general, dated September 22, 1843. The award was confined to those who had been present at either Meeanee or Hyderabad, and the medals were issued according as to which actions the recipient had been present, no one of course receiving more than one medal for the campaign. In addition to the land forces of the Hon. East India Company, the medal was also given to the naval officers and crews of the Company's flotilla on the Indus. The only Crown regiment that received this medal was the 22nd Foot.

9. Gwalior, 1843 (" Maharajpoor " and " Punniar " Stars). — Awarded by the Government of India, 1844. This decoration took the form of a bronze star of six points, 2 in. in diameter. Obverse: In centre a silver star, if in. in diameter, around the centre of which is a circle in which is inscribed either MAHARAJPOOR 1843 or PUNNIAR 1843, and in centre of circle the date 29th DECR. Reverse: Plain for name and regiment, or corps, of recipient. Ribbon: Military ribbon of India (Plate I.). Clasps: Nil.

The award of a medal to the troops of the Crown and the Hon. East India Company engaged in the Gwalior Campaign of 1843 was first notified in governor-general's G.O., dated Camp, Gwalior Residency, January 4, 1844; and the queen's permission for it to be worn by Crown troops given June 26, 1844. The force moved in two columns,

the main and larger under Sir Hugh (Viscount) Gough, the smaller under Major-General Gray. Each force fought an action on the same day, December 29, 1843, the former at Maharaj- poor, the latter at Punniar, and the star was inscribed according to which action the recipient was engaged. The stars were manu- factured from the metal of the captured guns. The star given to Sir Hugh Gough had in the centre a silver elephant in lieu of a silver star, and it was originally intended that all should be the same, but the silver star was substituted for reasons of economy. As there were fewer troops at Punniar that star is of course the more un- common.

10. Sutlej, 1845-46 (1st Sikh War). — Awarded by Government of India, 1845. Obverse: Head of Queen Victoria as on First China Medal. Reverse: Figure of Victory, standing, with in right hand outstretched a wreath, in left a palm branch ; at her feet a trophy of captured Sikh weapons and armour. In exergue, name and year of the first battle of the war in which recipient was engaged. These inscriptions are four, viz. MOODKEE 1845, FEROZESHUHUR 1845, ALIWAL 1846, SOBRAON 1846. Ribbon: Blue with crimson borders (Plate I.). Clasps: FEROZESHUHUR, ALIWAL, SOBRAON.

MEDAL

ii

This award, given to all the troops, both Crown and Hon. East India Company engaged in the First Sikh War, was first notified in governor-general's CO., dated Camp, Ferozepore, December 25, 1845, the queen's consent for Crown troops to receive the medal being given six months later. As there was a considerable number of troops engaged in this campaign, the medal is not a very rare one, but a very rare combination is the medal with Ferozeshuhur in the exergue and the clasp for Aliwal, as only half a company of native artillery was present in these two battles and in no other. This is a specially noticeable medal, for it is the first time that " clasps " were issued with a " general " medal, the precedent followed being that of the Army Gold Medal. For every action after his first battle, which was inscribed on the medal itself, the recipient received a clasp. Thus a medal with " Moodkee " in the exergue might carry one, two or three clasps; a " Sobraon " medal could have no clasps. This and the " Punjab " medal, to be described later, are generally considered to be the two finest pieces of medal work by W. Wyon, R.A.

11. Navy General Service, 1793-1840. — Awarded by Queen Victoria, 1847. Obverse: Head of Queen Victoria as on First China Medal; under

head, 1848. Reverse: Britannia seated on a sea horse; in her right-hand, a trident; in her left, a laurel branch. Ribbon: White, with dark blue borders (Plate I.). Clasps: 231 clasps in all were granted, of which 55 were for ” Boat Service.”

An Admiralty memorandum dated June I, 1847, notified the grant of this award to commemorate the services of the fleet ” during the wars commencing in 1793 and ending in 1815,” and this practically confined the award to those operations for which the Navy Gold Medal (see ante) had been conferred. Subsequently, however, a board of admirals was appointed to consider claims, and on their recommendation an Admiralty memorandum dated June 7, 1848, extended the grant. Clasps were to be given for: (1) All Gold Medal actions or operations. (2) AH actions in which first lieutenants or commanders were promoted, as had been customary after important and meritorious engagements. (3) All ” Boat Service ” operations in which the officer conducting the operations was promoted. (4) For, in co-operation with the land forces, the siege and capture of Martinique, 1809, Guadaloupe, 1810, Java, 181 1, and St Sebastian, 1813, for all of which operations the Army Gold Medal had been awarded; and (5) The Bombardment of Algiers, 1816; the Battle of Navarino, 1827; and operations on the coast of Syria, 1840.

Although the medal is purely a naval one, yet it was conferred on a few soldiers who had done duty in the fleet in actions or opera- tions, for which the medal was granted. Forty military officers in all received the Navy G.S. medal, one, Captain Caleb Chute, 69th Foot, with two clasps, viz. ” 14th March, 1795 ” and ” St Vincent.” It is very difficult to compile an absolutely accurate list of all the clasps issued, for in several cases more than one clasp was given for the same action, and there were moreover nine or ten clasps allowed for which no claims appear to have been made good. The combination of the clasps is endless, but it is curious to note that medals with more than one, or two clasps are rare ; with four or five clasps, very rare; and the highest number of clasps issued with any one medal is six. Amongst very rare clasps the follow- ing may be mentioned. One survivor only, Lieut. Baugh, the officer in command, was alive to claim the clasp ” Rapid, 24th April, 1808.” Only two claims were proved for “Surly, 24th April, 1810”; six for “Castor, 17th June, 1809″ ; seven for “Amazon, 13th January, 1797”; eight for “Confiance, 14th January, 1809”; and ten for ” Acheron, 3rd February, 1805.” Of ” Boat Service ” clasps only three were claimed for “20th December, 1799”; four for “9th June, 1799”; and eight for “10th July, 1799.” (All “Boat Service ” clasps are inscribed ” Boat Service ” with the day and month on the left, and the year on the right.) In all nearly thirty thousand claims were proved for

the medal.

12. Army General Service, 1793-18 14. — Awarded by Queen Victoria, 1847. Obverse: Head of Queen Victoria as on First China Medal; under head, 1848. Reverse: Queen Victoria on a dais is placing a wreath on the head of the duke of Wellington, who kneels on his left knee before her, holding in his right hand the baton of a Field Marshal; at the side of the dais is a lion dormant. Legend: TO THE BRITISH ARMY. In exergue: 1793-1814. Ribbon: Crimson with blue borders (Plate I.). Clasps: EGYPT, MAIDA, ROLEIA, VIMIERA, SAHAGUN,* BENEVENTE, 1 SAHAGUN- BENEVENTE, 1 CORUNNA, MARTINIQUE, 2 TALAVERA, GUADALOUPE, 2 BUSACO, BARROSA, FUENTES D'ONOR, ALBUHERA, JAVA, 2 CIUDAD RODRIGO, BADAJOZ, SALA- MANCA, FORT DETROIT, CHATEAUGUAY, CHRYSTLER'S FARM, VITTORIA, PYRENEES, ST SEBASTIAN, 2 NIVELLE, NIVE, ORTHES, TOULOUSE.

This medal, frequently erroneously termed the " Peninsular War " medal, was awarded to the survivors of the military forces of the Crown that had taken part in the Peninsular War, and in contem- poraneous operations in other parts of the world; it was also given with the clasp " Java " to the European troops of the Hon. East India Company; with the clasps " Martinique " and " Guadaloupe " to certain local West Indian Corps; and with the clasps " Fort

1 Whether in one or both actions, only one clasp awarded.

2 A similar clasp was given with the Navy G.S. medal.

Detroit," " Chateauguay," and " Chrystler's Farm," to some Cana- dian militia and local levies, as well as to some Indian auxiliaries. The award of the medal, and all the clasps except " Egypt," bear date June I, 1847, but the clasp " Egypt " was not granted till February 12, 1850. Although the medal is supposed to com- memorate services "during the wars commencing in 1793, and ending in 18 14," the earliest operations for which the medal was awarded did not take place until 1801. No medal was issued without a clasp, and as will be seen the medal was awarded only for those actions or operations for which the Army Gold Medals (including that for Maida) had been awarded; and in addition for the operations in Egypt in 1801. The combination of clasps is endless but only two medals were issued with fifteen clasps, though several survivors proved their claim to fourteen clasps. In fact medals with seven, eight or nine clasps are not common, those with ten, or more, dis- tinctly rare. For example, taking only medals issued to officers (including those of the King's

German Legion), three were issued with 14 clasps, three with 13, nine with 12, twelve with II, thirty-six with 10, fifty-eight with 9, ninety with 8, and one hundred and four- teen with 7. By far the rarest of all clasps is ” Benevente,” as according to the War Office lists only three would appear to have been issued, viz. to Captain Evelegh, R.H.A., Pte. G. Barrett, 10th Hussars, and Pte. M. Gilmour, 18th Hussars, although a medal with this clasp having every appearance of being genuine and issued to Pte. William Lyne, 7th Hussars, was in the collection of Colonel Murray of Polmaise. Sahagun also is a very rare clasp, as it was received only by fifteen men of the 15th Hussars and a few others. The three North American clasps are also very rare, especially Chateauguay. Leaving out awards to Indian warriors, the statistics regarding the issue of the North American clasps are approximately as follows. At Chateauguay some 300 men fought, and 132 survivors proved for the clasp, of which a-11 except three of the Royal Artillery were Canadians. For Chrystler’s Farm, the next rarest clasp, out of about 800 engaged 176 claims were proved: viz. 79 of the 89th Foot, 59 Canadians, 44 of the 49th Foot, and 4 Royal Artillery. At Fort Detroit, 1330 men were engaged, and those who proved for the clasp included 210 Canadians, 52 of the 41st Foot, 5 Royal Artillery, and one man of the 41st Foot (who also got the clasp for Chrystler’s Farm). One man proved for all three clasps, another for ” Fort Detroit ” and “Chateauguay,” a third for “Chateauguay” and ” Chrystler’s Farm.” The former medal is said to be in the cabinet of a New York collector. Two ” regulars ” also proved for the medal with clasps for ” Fort Detroit ” and ” Chrystler’s Farm,” the one belonging to the Royal Artillery, the other to the 49th Foot. The medal of the former sold at the Greg sale, in 1887, for £25 10s.

13. Punjab, 1848-49 (2nd Sikh War). — Awarded by Government of India, 1849. Obverse: Head of Queen Victoria as in First China Medal. Reverse: Sikh chiefs delivering up their arms to Sir Walter Raleigh Gilbert, near Rawal Pindi, March 14, 1849. Above, TO THE ARMY OF THE PUNJAB. In exergue, MDCCCXLIX. Ribbon: Blue with yellow stripes at side (Plate I.). Clasps: MOOLTAN, CHILIANWALA, GOOJERAT.

The aw.ard of this medal was first notified by a G.O. of the governor-general, dated Camp, Ferozepore, April 2, 1849. The medal is one of special interest, for it establishes the principle that now rules, viz. that every one participating in a campaign (including for the first time civilians) was entitled to receive the medal, apart from those who received the medal together with a clasp for a specific action. The medal in fact was granted “to every officer and soldier who has been employed within the Punjab in this campaign to the date of the

occupation of Peshawur." In other words it was granted to all who had served " during this campaign within the territories of Maharajah Duleep Sing," irrespective of whether they had qualified for any of the clasps. A very large number of medals was therefore issued without clasps. Another interesting point about this award is that after its grant it was laid down that in future no medals were to be issued by the Government of India without the consent of the Crown. As a matter of fact the Government of India was for the future only concerned in the grant of the two medals that followed, namely the First and Second India General Service Medals. No medals were issued with more than two of the three clasps, the com- bination being either "Mooltan" and "Goojerat" or "Chilianwala" and " Goojerat." Very rare medals are those of the 24th Foot with the clasp for " Chilianwala," as in that action they lost more than half their strength, their casualties amounting to 497, of whom 250 were killed or died of wounds. Another rare medal is that given without a clasp to the officers and men of the Indian Marine thflt manned the Indus Flotilla; and more rare still is the same medal with the " Mooltan " clasp which was given to a naval brigade landed from the same flotilla.

14. India, 1 799-1826 (1st India G.S., officially styled " India, 1851 "). — Awarded by the Government of India, 1851. Obverse: Head of Queen Victoria as in First China Medal. Reverse : Victory seated, in her right hand a laurel branch, in her left a wreath; on the ground beside her a lotus flower, and in the left background a palm tree and trophy of Eastern arms. Above, TO THE ARMY OF INDIA. In exergue, I799-1826. Kibbon: Sky blue (Plate I.). Clasps: ALLIGHUR, BATTLE " OF DELHI, ASSYE, AS- SEERGHUR, LASWARREE, ARGAUM, GAWILGHUR, DEFENCE OF DELHI, BATTLE OF DEIG, CAPTURE OP

DEIG, NEPAUL, KIRKEE, 1 POONA, 1 KIRKEE-POONA, 1 SEETABULDEE, 1 NAGPORE, 1 SEETABULDEE-NAGPORE, 1 MAHEIDPOOR, CORYGAUM, AVA, BHURTPOOR.

This medal was awarded " to the surviving officers and soldiers of the Crown and of the East India Company " who took part in any one of seventeen specified actions and operations which occurred in India, Nepaul and Burma, during the first twenty-five years of the 19th century, " including the officers and seamen of the Royal Navy and the Company's Marine who took part in the first Burmese War." The queen's consent to the grant of this medal was an- nounced in the

London Gazette by a Notice of the Court of Directors, dated March 21, 185 1. It was subsequently notified to the British Army by a Horse Guards G.O., dated March 21, 1851 ; to the Royal Navy by an Admiralty memorandum of the same date; and to the Army in India by a governor-general's G.O., dated April 14, 1851. In this medal again there is a discrepancy in dating, for though it is dated 1799-1826, the first action for which it was awarded, the storming of Allighur, took place on September 24, 1803. No medals were issued without clasps, the largest combination of clasps known being five. According to the India Office records there were ap- parently men entitled to as many as seven clasps, but whether any medal was issued with more than five is very doubtful. That awarded to the duke of Wellington had three clasps, " Assye," " Argaum " and " Gawilghur." With the exception of medals issued with the Ava and Bhurtpore clasps, this medal is a rare one, and with a large number of the clasps, all except perhaps those for Nepaul and Maheidpore, an extremely rare one. The rarest of all is " Seetabuldee," as only two Europeans and two natives are known to have received it. " Defence of Delhi " is also a very rare clasp, as the garrison only comprised two weak battalions of native infantry ; as is also " Corygaum, ' which was issued to only two Europeans, " both officers," and seventy-five natives. The only European troops present at Corygaum were an officer and twenty-six men of the Madras Artillery, of whom the officer and twelve men were killed and eight wounded. As the " Burma " medal had already been given to the . Company's native officers and soldiers for the First Burmese War, only the European officers and men of the Company's service received the medal with " Ava " clasp; but as the " Nepaul " medal had not been given to all the native troops who actually served " within the hills," the medal with clasp " Nepaul " was granted to those native troops who had not received the Nepaul medal, as well as to all the Company's European officers and men.

15. India, 1852-95 (2nd India G.S., officially styled " India, 1854 "). — Awarded by the Government of India as far as the first two issues with their clasps are concerned, all subsequent issues and clasps, with the exception of the last two, by Queen Victoria; the last two issues and clasps by King Edward VII. Obverse: Head of Queen Victoria as in First China Medal. Reverse: Victory standing, crowning a naked warrior sitting. In exergue, a lotus flower and leaves, symbolizing the connexion of the medal with India. Ribbon: Red, with two blue stripes, forming five J-inch stripes (Plate I.). Clasps: PEGU, 2 PERSIA, 2 NORTH-WEST FRONTIER, UMBEYLA, BHOOTAN, LOOSHAI, PERAK 1875-76, 2 JOWAKI 1877-78, NAGA 1879-80, BURMA 1885-87, 2

SIKKIM 1888, HA2ARA 1888, BURMA 1887-89, CHIN-LOOSHAI 1889-90, SAMANA 1891, HAZARA 1891, N.E. FRONTIER 1891, HUNZA 1891, BURMA 1889-92, LUSHAI i889-92,WAZIRISTAN 1894-95, CHIN HILLS 1892-93, KACHIN HILLS 1892-93.

The queen's assent to this award, to those of H.M.'s Sea and Land Forces, as well as those belonging to the East India Company's Establishment engaged in the Second Burmese War, was first made known to the Government of India in a letter from the Court of Directors, April 6, 1853. In a Minute by Lord Dalhousie, the governor-general, December 9, 1852, it had been suggested " whether it would not be better for the future, instead of issuing a separate Medal for each campaign, to have one Medal, such as the ' Indian Medal ' (i.e. the ' India, 1851 ' Medal), which should be issued once to each individual entitled : the particular service for which it is granted being recorded upon a Bar, and every subsequent service which may be thought to deserve distinction being recorded by an additional Bar. This plan would avoid the multiplication of Medals, which has accumulated of late years, which I humbly think is undesirable." In another letter from the Court of Directors to the Government of India, March 1, 1854, this suggestion is approved, and it was ordered that after " a suitable design " had been procured (L. C. Wyon designed the reverse), "the Medal to be now struck shall be of a general character, the particular service for which it is now granted, viz. ' Pegu,' being recorded on a Bar. In the event of the same soldiers being entitled hereafter to another similar distinction, the service will be recorded by an additional Bar to the same Medal." Occasional mistakes have however been made, for, since the issue with the clasp for the Perak campaign, from which time it has become customary to date the clasp, many instances have occurred of men having received two medals with clasps for different campaigns. The issue to the Persian Expeditionary Force

1 Whether in one or both actions, only one clasp awarded.

2 The Royal Navy or Indian Marine, or both, received the medal with these clasps.

(1856-1857), with the clasp " Persia," was awarded by the Court of Directors January 19, 1858, and sanctioned by the queen in the same month. The first issue of the medal by the Crown was authorized April 15, 1859, with the clasps " North- West Frontier " and " Um- beyla," the former covering various expeditions between 1849 and 1863, the latter the hard-fought Umbeyla Campaign of the latter mentioned year. All subsequent issues of the award were made by Queen

Victoria, with the exception of those that carried with them the clasps ” Chin Hill 1892-93,” and ” Kachin Hills 1892ˆ93,” which were only awarded ten years afterwards by King Edward VII., and notified in Army Order 9 of January 1903; the medal, which had meantime been superseded by the Third India G.S. medal described below, being re-issued with these last two clasps. The combination of clasps with this medal is very numerous, but medals with more than two or three clasps are rare. Seven is probably the greatest number awarded with any one medal, arid a medal with this number, viz. “Umbeyla,” ” North- West Frontier,” ” Jowaki 1877-78,” “Burma 1885-87,” ” Hazara 1888,” ” Samana 1891,” and Hunza 1891,” was granted to Bhanga Singh, Sardar Bahadur, who retired as Subadar-Major of No. 4 (Derajat) Mountain Battery. Sir William Lockhart (q.v.) had the medal with six clasps. The rarest of all the clasps is probably ” Hunza 1891,” as less than a thousand men were employed, and the majority of these were Cashmere Imperial Service Troops. No European troops received the clasps, ” Looshai,” ” Naga 1879-80,” or ” Hunza 1891.” ” Sikkim 1888 ” is also a rare clasp as only some 2000 troops were employed, the only Europeans being two companies of the 2nd Derbyshire Regiment. So also is ” N.E. Frontier 1891,” for in the Manipur expedition for which this clasp was given about 3000 men were employed, the only Europeans being four companies of the King’s Royal Rifle Corps. It was with the issue of this medal with the clasp Burma 1885-87,” that the precedent was set of award- ing the medal and clasp in bronze to ” all authorized followers,” a precedent that was followed in all subsequent issues.

16. South Africa, 1834-35, 1846-47, 1850-53. — Awarded by Queen Victoria, 1854. (South Africa, 1877-79. Re-issue of first medal. Awarded by Queen Victoria, 1880.) Obverse: Head of Queen Victoria as in First China Medal. Reverse: A lion crouching be- hind a sugar bush (Protea mellifera). Above, SOUTH AFRICA. In exergue, 1853. In the exergue of the re-issued medal, the place of the date is taken by a trophy of four assegais and a Zulu shield. Ribbon: Orange watered, with two broad and two narrow blue stripes (Plate II.). Clasps: 1877-78-79, 1878-79, 1877-78, 1878,

1877, 1879.

The command of the queen that a medal should be awarded to the survivors of the forces that had been engaged in the first, second and third Kaffir Wars (1834-35, 1846-47, and 1850-53) was notified by Viscount Hardinge, the commander-in-chief, in a G.O., dated Horse Guards, November 22, 1854. No clasps were issued with this medal. The medal was accorded only to the ” regular forces ” (including the

Cape Mounted Rifles), so local levies did not receive it. In the third Kaffir War a small Naval Brigade and a detachment of Royal Marines took part in the operations, and the survivors received the medal. The award of the re-issue was notified in a G.O. by the duke of Cambridge, commander-in-chief, August I, 1880. It was to ” be granted to Her Majesty’s Imperial Forces, and to such of Her Majesty’s Colonial Forces, European or Native, as were regularly organized and disciplined as combatants, whether raised by the Colonial Government or by the General Officer Commanding.” The operations for which it was given were against the Galekas and Gaikas 1877-78, the Griquas 1878, Basutos 1879, Zulus 1879, and Sekukuni 1878-79. In both the operations against the Galekas and Gaikas, and in the Zulu War of 1879, the Royal Navy and Royal Marines took part and received the medal. The clasps issued with this medal were as noted above and record the year, or years, of service covering all the operations in which the recipient was engaged. No one received a medal with more than one clasp. The medal without a clasp was issued to such troops as were employed in Natal from January to September 1879, but never crossed the border into Zululand.

17. Crimea, 1854-56. — Awarded by Queen Victoria in 1854. Obverse: Head of Queen Victoria as in First China Medal; below, 1854. Reverse: Victory crowning a Roman soldier, who holds a sword in his right hand, and bears on his left arm a shield on which is the figure of a lion. On the left, CRIMEA. Ribbon : Light blue, with narrow yellow borders (Plate I.). Clasps: ALMA, BALA- KLAVA, INKERMANN, SEBASTOPOL, AZOFF. 3

This medal, awarded to both Services, was first notified by a commander-in-chief’s G.O., dated December 15, 1854. The grant was limited to all troops landing in the Crimea up to September 9, 1855 — the day on which Sevastopol fell — ” unless they shall have been engaged after that date in some expedition or operation against the enemy.” This latter proviso applied in the main to the naval clasp ” AZOFF,” the period for which award was extended to the 22nd of November. The clasps for this medal are very ornamental, being in the shape of oak leaves, ornamented with acorns. The Royal Navy and Royal Marines, besides the ” Azoff ” clasp, received the clasps ” Balaklava,” ” Inkermann,” ” Sebastopol.” The

3 Royal Navy and Royal Marines.

largest number of clasps to any one medal is four. Certain non-combatants received the medal without a clasp. >

18. Baltic, 1854-55. — Awarded by Queen Victoria, 1856- Ob- verse : Head of Queen Victoria as in First China Medal. Reverse : Britannia seated and holding a trident in her right hand. In the background forts. Above, BALTIC. In exergue, 1854-1855. Ribbon: Yellow, with pale blue borders (Plate I.). Clasps: Nil.

This award, notified by Admiralty Order, June 5, 1856, was granted ” to the officers and crews of Her Majesty’s ships, as well as to such officers and Men of Her Majesty’s Army as were employed in the operations in the Baltic in the years 1854 and 1855.” The medal is, of course, practically a naval one, but two officers and ninety-nine men of the Royal Engineers were employed in the expedi- tion, especially at Bomarsund, and received it.

19. Turkish Crimea Medal. — Awarded by the Sultan, 1856. Obverse: A trophy composed of a field piece, a mortar, and an anchor, the field piece standing on the Russian Imperial Standard, and having a map of the Crimea spread over the wheel and breech. Behind are the Turkish, British, French and Sardinian flags. The flag of the nation to which the recipient belonged is in the front with that of Turkey, the flags of the other two nationalities behind. In exergue, ” Crimea 1855,” ” La Crimee 1855,” or ” La Crimea 1855,” according as to whether the medal was intended for British, French or Sardinian recipients. Reverse: The Sultan’s cypher, below, in Turkish, “Crimea,” and the year of the Hegira, 1271. Ribbon: Crimson watered, with bright green edges (Plate I.). Clasps: Nil.

This medal was distributed to all of the Allied Forces, both naval and military, which shared in the operations in the Black Sea and the Crimea. As the ship that conveyed a majority of the English medals was sunk, the remainder were issued indiscriminately, and a large number of the British received medals which were originally intended either for the French or Sardinians. 1

20. Arctic, 181 8-1 855 (First Arctic). — Awarded by Queen Victoria, 1857. Obverse: Head of Queen Victoria, wearing a tiara. Legend, VICTORIA REGINA. Reverse: A ship blocked in the ice, icebergs to right and left, and in foreground a sledging party. Above, FOR ARCTIC DISCOVERIES. In exergue, 1818-1855. Ribbon: White (Plate II.). Clasps: Nil.

This award was first notified in an Admiralty Notice dated, January

30, 1857. It was given to the crews of Her Majesty's ships employed in Arctic exploration, and also " to the officers of the French Navy, and to such volunteers as accompanied those expeditions "; also to those engaged in expeditions " equipped by the government and citizens of the United States ": also to the " commanders and crews of the several expeditions which originated in the zeal and humanity of Her Majesty's subjects ": and finally to those who served " in the several land expeditions, whether equipped by Her Majesty's government, by the Hudson's Bay Company, or from private resources." The medal is worn on the left breast and takes rank as a war medal. It is octagonal in shape, I -3 in., and has affixed to the upper edge a five-pointed star to which is attached a ring for suspension. The head of the queen, which is the work of L. C. Wyon, has never been reproduced on any other medal.

21. Indian Mutiny, 1857-58. — Awarded by the Government of India, 1858. Obverse: Head of Queen Victoria as on First China Medal. Reverse: Britannia standing facing left with a lion on her right side ; her right arm is extended holding out a wreath ; on her left arm is the Union shield, and in her left hand a wreath. Above, INDIA. In exergue, 1857-1858. Ribbon: White, with two red stripes, forming five i-inch stripes (Plate I.). Clasps: DELHI (May 30 to Sep. 14, 1857); DEFENCE OF LUCKNOW (June 29 to Sep. 25, 1857); RELIEF OF LUCKNOW (Nov., 1857); LUCK- NOW (March 2 to 21, 1858); CENTRAL INDIA (Jan. to June

1858).

The grant of this award was first notified in a despatch from the Court of Directors to the Government which stated that " the Queen has been graciously pleased to command that a Medal shall be granted to the troops in the Service of Her Majesty, and of the East India Company, who have been, or may be, employed in the suppression of the Mutiny in India." This is the last medal given by the Honourable East India Company. The medal without clasp was awarded to all, including civilians, who had taken part in operations against the mutineers or rebels, and with the clasps enumerated above to those who shared in the operations specified. Some two or three artillery men are known to have received the medal with the clasps " Delhi," " Relief of Lucknow," " Luck- now " and " Central India." The medal with three clasps, viz. " Delhi," " Relief of Lucknow " and " Lucknow " was given only to the 9th Lancers and the Bengal Horse Artillery, and of course

1 In addition to this award the French emperor sent five hundred of

the French ” Military Medal,” to be distributed amongst specially selected non-commissioned officers and men of the army and Royal Marines, and petty officers and seamen of the Royal Navy. Only two of these medals were given to officers, viz. the duke of Cambridge and Sir William Codrington, the latter being presented by Pelissier with his own medal. The king of Sardinia also distributed 450 medals to tbe British forces, of which 50 were given to the Royal Navy and Royal Marines, and 243 to officers and 157 to non-com- missioned officers and privates of the army.

various officers who served on the staff, as, for example, Field Marshals Earl Roberts and Sir Henry Norman. With regard to the Royal Navy and Royal Marines, the ” Shannon’s ” brigade, under Captain Peel, received the medal with one, or both, of the clasps ” Relief of Lucknow,” ” Lucknow,” the ” Pearl’s ” brigade, under Captain Sotheby received the medal without clasp. This is the last medal that had on it the beautiful head of Queen Victoria which was first used for the China Medal of 1842, and of which W. Wyon, R.A., was the artist.

22. Abyssinia, 1867-68. — Awarded by Queen Victoria, 1868. Obverse: Bust of Queen Victoria, with diadem and veil; around an indented border, between the nine points of which are the letters A.B.Y.S.S.I.N.I.A. Reverse: Within a beaded circle the name of recipient, his corps, regiment or ship, the whole surrounded with a wreath of laurel. Ribbon: Red, with broad white borders Plate I.). Clasps: Nil.

The sanction of this award is to be found in a letter from Sir J. S. Pakington, secretary of state for war, to H.R.H. the duke of Cambridge, field-marshal commanding-in-chief, which notifies the queen’s pleasure ” that a medal be granted to all Her Majesty’s Forces and Indian Forces, Naval and Military, employed in the operations in Abyssinia, which resulted in the capture of Magdala.” In all 20,000 medals were struck. The medal is smaller than the usual, i\ in. in diameter, and it is surmounted by an Imperial Crown, and a large silver ring for suspension. It is altogether an unusual type of medal, and in the use of an indented border it follows a very old precedent, that of a medal commemorating the victory of Valens over Procopius, A. n. 365. (See Les Medallions de I’ ‘empire romain, by W. Froehner, Paris, 1878). The artists responsible for this medal are Joseph S. Wyon and Alfred B. Wyon, and this bust of the queen is reproduced on only one other medal, the New Zealand.

23. New Zealand, 1845-47, 1860-66. — Awarded by Queen Victoria, 1869. Obverse: Bust of Queen Victoria as on Abyssinia medal, but

larger. Legend : VICTORIA D :G :BRITT : REG :F :D : Reverse: Dated, within a wreath of laurel, according to the period in which the recipient served. Above, NEW ZEALAND; below, VIRTUTIS HONOR. Ribbon: Blue, with a broad red stripe down centre (Plate I.). Clasps: Nil.

The grant of this award to the Army was notified in an Army Order, dated March 1, 1869, and its extension to the Royal Navy and Royal Marines by an Admiralty Order, dated June 3, 1869. Owing to incompleteness in the returns many medals were issued undated. The dates on the reverse, in those issued dated, varied considerably; for the First Maori War, the medal was issued to the Army with one, and to the Navy with five different dates; for the Second Maori War, the medal was issued to the Army with twenty- one, and to the Navy with five different dates. No medal was dated 1862, though many of the Army medals bore date of a period covering that year, although no naval medals did.

24. West Africa, 1873-1900. — Awarded (originally as the ” Ash-antee ” medal) by Queen Victoria in 1874, with the exception of the last issue, with clasp ” 1900,” which was awarded by H.M. King Edward VII. Obverse: Head of Queen Victoria, with diadem, and veil behind, by L. C. Wyon. Legend: VICTORIA REGINA. Reverse: British soldiers fighting savages in thick bush, by Sir E. J. Poynter. Ribbon: Yellow, with black borders, and two narrow black stripes (Plate II.). Clasps: COOMASSIE, 1887-8, 1891-2, 1892, 1893-94; WITU, 1890;* LIWONDI, 1893;’ WITU, August 1893; 3 JUBA RIVER, 1893; 3 LAKE NYASSA, 1893; 2 GAMBIA, 1894; 2 BENIN RIVER, 1894; 3 BRASS RIVER, 1895;’ MWELE, 1895; 3 ‘NIGER, 1897; BENIN, 1897; 3 SIERRA LEONE, 1898-99; 1896-98, 1807-98, 1898, 1899, 1900.

This medal was first awarded by Army Order 43, dated June I, 1874, to ” all of Her Majesty’s Forces who have been employed on the Gold Coast during the operations against the King of Ashantee,” and in addition a clasp, ” Coomassie,” “in the case of those who were present at Amoaful and the actions between that place and Coomassie (including the capture of the capital), and of those who, during the five days of those actions, were engaged on the north of the Prah in maintaining and protecting the communi- cations of the main army.” In all, with and without the clasp, 11,000 medals were issued for the Ashantee campaign to both Services. Over eighteen years later this same medal was re-issued as a ” general service ” medal, the award being for operations in Central Africa, and on the East and West Coasts, during the period 1887-92, which were covered by the dated, clasps ” i887～‘8 > i’ ” 1891-2,” and ” 1892.” As such the issue was

continued for operations down to the year 1900, although the official title ” West

8 These clasps were all naval awards, but two companies of the West India Regiment took part in the operations for which the clasp ” Gambia, 1894,” was awarded.

3 Were awarded by the Admiralty to certain local forces which oo-operated with the Naval Brigades.

4 ” Mwele, 1895,” is not strictly speaking a clasp, as it is engraved on the edge of the medal. Recipients already in possession of the medal were entitled to have the action and date engraved thereon. It corresponds, however, to a clasp in that it commemorates a particular service, and so has been included.

Africa Medal” (see Army Order 253, of Dec. 1894) is somewhat of a misnomer, for very frequently the medal has been granted for services in Central Africa and in the Hinterland of the East Coast as for services on the West Coast. In all issues since the original ” Ashantee ” medal, the clasp only was given to those who already had the medal, so subsequent issues do not make it a new award. As will be seen later, the same medal was subsequently issued with a different ribbon, and so constituted as an entirely new decoration, that could be worn in conjunction with the older one. With the exception of those issued with ” Mwele, 1895 ” engraved on the medal, none of these medals have been issued without a clasp since the original issue for the campaign of 1873-7ˆ; and the clasp ” Coomassie ” that accompanied the first issue is the only one that has been issued to regimental units of the British Army as apart from the West India Regiment and local troops. The duke of Edinburgh was married in January of the year in which this medal was first awarded, and it is said that yellow and black (the Imperial Russian colours) were chosen as the colours of the ribbon, in compliment to his consort the grand duchess Marie of Russia.

25. Arctic, 1876 (2nd Arctic Medal). — Awarded by Queen Victoria, 1876. Obverse: Bust of Queen Victoria, crowned and with veil by G. G: Adams. Legend: VICTORIA REGINA; underneath bust, 1876. Reverse: A ship packed in floe ice; above, an Arctic sky with fleecy clouds in a clear horizon. Ribbon: White (Plate II.). Clasps: Nil.

The award of this grant was notified in an Admiralty Order, dated Nov. 28, 1876, and the award is specified ” to all persons, of every rank and class, who were serving on board Her Majesty’s ships ‘ Alert ‘ and ‘ Discovery ‘ during the Arctic Expedition of 1875-1876, and on board the yacht ‘ Pandora,’ in her voyage to the Arctic Regions in 1876.” The ‘Pandora’ was owned and sailed by Commander (Sir Allen) Young, R.N.R., whose officers and crew rendered valuable services to Her Majesty’s ships when in the Polar seas. Sixty-three medals were given on board the ” Alert,” fifty- seven on board the ” Discovery.” The bust on the obverse of this medal has not been reproduced on any other. The reverse (by L. C. Wyon) is copied from a photograph taken during the expedition of the ” Alert ‘ and ” Discovery ‘ under Sir George Nares, K.C.B.

26. Afghanistan, 1878-80 (2nd Afghan). Awarded by Queen Victoria, 1880. Obverse: Bust of Queen Victoria, crowned and with veil, by J. E. Boehm. This is the first war medal bearing the imperial title. Legend: VICTORIA REGINA ET IMPERA- TRIX. Reverse: A column of troops emerging from a mountain- pass, headed by a heavy battery elephant carrying a gun; behind, mounted troops. Above, AFGHANISTAN. In exergue, 1878- -79-80. Ribbon: Green, with crimson borders (Plate I.). Clasps: ALI MUSJID, PEIWAR KOTAL, CHARASIA, KABUL, AHMED KHEL, KANDAHAR.

At the conclusion of the first phase of the Second Afghan War, it was proposed that the (Second) India G.S. Medal should be issued for this campaign with clasps ” Afghanistan,” ” AH Musjid,” ” Peiwar Kotal,” but, after the massacre of Sir P. L. N. Cavagnari and the members and escort of the Embassy at Kabul, Sep. 3, 1879, an d the consequent renewal of the war, it was decided to grant a separate medal. The first official intimation of the award is in a telegram from the secretary of state for India to the viceroy, dated Aug. 7, 1880. The award, with the regulations to govern the issue, was promulgated in a G.O. by the governor-general, Dec. 10, 1880, and subsequent G.O.‘s. The medal without clasp was awarded to all who had served across the frontier between Nov. 22, 1878, and May 26, 1879 (first phase of the war), and be- tween Sep. 1879, and Aug. 15, 1880 for the Khyber and Kurram Lines, and Sep. 20, 1880, for Southern Afghanistan (second phase of the war). The ” Kabul ” clasp was awarded to all who had shared in the operations ” at and near that place from the loth to the 23rd Dec, 1879, including the column under the command of Brigadier-General C. J. S. Gough, C.B., which joined Sir Frederick Roberts on the 24th Dec, 1879.” The clasp for ” Kandahar ” did not include the whole garrison of the beleaguered city, but only the troops that were actually ” engaged in the action fought under Sir Frederick

Roberts' command against Sirdar Mahomed Ayub Khan on, the 1st Sep., 1880." The greatest number of clasps with which the medal was issued was four, and the units to which such medals were issued are the 72nd Highlanders, 5th Ghoorkas, 5th Punjab Infantry and 23rd Punjab Pioneers. The bust of the Queen by Sir Edgar Boehm, R.A., has not been re- produced on other war medals.

27. Kabul to Kandahar, 1880. — Awarded by Queen # Victoria, 1880. This decoration took the form of a five-pointed st'ar, 1-9 in. across from point to point, with a ball between the points; between the two topmost points of the star is an Imperial Crown and ring for suspension. Obverse: In the centre the imperial monogram V.R.I. , surrounded by a band inscribed KABUL TO KANDAHAR, 1880. Reverse: Plain, with a hollow centre, round which the recipient's name and regiment are indented in capital letters. The old rainbow-coloured military ribbon is worn with this star.

The grant of this award was first notified in a despatch from the secretary of state for India to the viceroy, dated Nov. 30, 1880. This awarded the decoration " to the force which marched from Kabul to Kandahar," and later, Aug. 26, 1881, a G.O. by the

Governor-General extended the grant " to the troops which then composed the garrison of Kelat-i-Ghilzai, and accompanied the force under the command of Lieutenant-General Sir F. S. Roberts, G.C.B., V.C., from that place to Kandahar."

28. Egypt, 1882-1889. — Awarded by Queen Victoria, 18821 Obverse: Head of Queen Victoria as in the West African Medal; Legend: VICTORIA REGINA ET IMPERATRIX. Reverse: A Sphinx; above, EGYPT; below, 1882. Ribbon: Blue, with two white stripes, forming five J-inch stripes (Plate I.). Clasps: ALEX- ANDRIA, nth July 1 ; TEL-EL-KEBIR, SUAKIN, 1884; EL TEB, TAMAAI, EL-TEB-TAMAAI, 2 THE NILE, 1884-85; ABU KLEA, KIRBEKAN, SUAKIN, 1885; TOFREK, GEMAI- ZAH, 1888; TOSKI, 1889. 3 This medal was first awarded . (Admi- ralty Circular, Oct. 1882; G.O. by the commander-in-chief, Oct. 17, 1882; and G.O. by governor-general of India, Oct. 27, 1882); to all the Forces, naval and military, present and serving in Egypt between July 16, and Sep. 14, 1882. The first two clasps were also given with this issue. One military officer (Major-General Sir A. B. Tulloch, then of the Welsh Regiment) received the clasp " Alexandria, nth July," as he was serving in the fleet as military adviser to Admiral Sir Beauchamp Seymour. A second issue was made in 1884, and with it the next four clasps were given; " Suakin, 1884," for those who landed at Suakin or Trinkitat between Feb. 19 and March 26, 1884, was,

however, only given to those with the 1882 medal, those not so possessed receiving the medal without a clasp. A third issue was made in 1885, the next five clasps accompanying it. ” The Nile, 1884-85,” was given to those who served south of Assouan on or before March 7, 1885; ” Suakin, 1885,” to those who were engaged in the operations at Suakin between March and May 14, 1885; but the former clasp was only to go to those already possessed of the medal, others received the medal only. The medal alone was also given to all on duty at Suakin between March 27, 1884, and May 14, 1885. No medals were issued with single clasps for ” Tofrek,” recipients of which also got clasp ” Suakin, 1885,” or ” Abu Klea ” and ” Kirbekan,” recipients of which got also clasp ” The Nile, 1884-85.” In 1886, the medal without was issued to those who had not previ- ously received it and had served at, and south of Wady Haifa, between Nov. 30, 1885 and Jan. 11, 1886, but no clasps went with this issue, although the operations included the battle of Ginnis, The last issue was made in 1890. The medal with clasp ” Gemaizah, 1888,” to all who were present at that action near Suakin, Dec. 20, 1888; the medal alone to all employed on the Nile at, and south of Korosko, on Aug. 3, 1889, and with clasp ” Toski, 1889,” to aH present at that action, Aug. 3, 1889. Besides those already enumer- ated who received the medal without clasp, it was given to officers of hired transports of the mercantile marine, to some civilians, native and European,, to the Australian contingent that landed at Suakin, and to the Canadian boatmen employed on the Nile, k fact, not far short of fifty thousand of these medals have been struck, and the numbers issued have exceeded that of any other medal with the exception of that given for the South African War. Seven clasps: ” Tel-el-Kebir,” ” Suakin, 1884 “; ” El-Teb-Tamaai”; “The Nile, 1884-85”; “Abu Klea”; “Gemaizah, 1888”; and ” Toski, 1889,” were awarded to one officer, Major Beech, late 20th Hussars, who also received the Bronze Star with the clasp ” Tokar, 1890.” The medal with six clasps was earned by four men of the 19th Hussars who were Lord Wolseley’s orderlies, and who after having earned the first five clasps enumerated in Major Beech’s medal, went with Lord Wolseley to Suakin and so got the ” Suakin, 1885 ” clasp.

29. Egypt Bronze Star, 1882-93. — Awarded by the Khedive 1883. This decoration is in the shape of a five-pointed star (1-9 in. diameter) connected by a small star and crescent to a laureated bar to which the ribbon is attached. Obverse : A front view of the Sphinx, with the desert and pyramids in the rear. Around a double band, upon which are, above, EGYPT, 1882, and below’, in Arabic, ” Khedive of Egypt, 1299 ” (the Hegira date). In the second and third issues the dates are respectively altered to 1884, 1301 and 1884-86 and 1301-4; the

fourth and fifth issues are dateless. Reverse: A large raised circle inside which is thfe Khedivial monogram, T. M. (Tewfik Mahomed), surmounted fcy a Crown and Crescent and Star. Ribbon : Dark blue (Plate 11 Clasps: TOKAR, 1890.

This star was awarded for the same operations as was the British Egyptian medal above described, but, except for a few officers and men of the Royal Navy, the issue of the clasp TOKAR was confined to British and native officers and men of the Egyptian service. • (H. L. S.)

30. Canada, 1885. — Awarded by Queen Victoria, 1885. Obverse: Head of Queen Victoria as on the West African ("Ashantee") Medal. Reverse: NORTH WEST CANADA and date, within a maple leaf. Ribbon: Blue-grey, with a crimson stripe on each side (Plate II.). Clasp: SASKATCHEWAN.

This medal, commemorative of services in the Riel Rebellion:, was awarded to Canadian forces only.

1 Issued to the Royal Navy and Royal Marines only.

2 For combatants present at both actions.

3 Only clasp not issued to Royal Navy and Royal Marines.

MEDALS AND DECORATIONS

Plate II.

Iti 11

- ill

&: SO

•"* ■ ** M

~25

Jf

I

R

00

4 >

o

a –

•s

c a

“8 “8 “J’

a

■H

B

m

in

13

mi

q

■3″ I

a

u

MEDALS AND DECORATIONS

Plate II.

■a.

111

o

II

- a 5.

.22:

5

li

MEDAL

!5

31. Canada (General Service) .—Awarded, 1899. Obverse: Head of Queen Victoria, as in Third India G. S. Medal. Reverse: Within a maple wreath, the Dominion flag, above, CANADA. Ribbon: Red, with white centre (Plate II.). Clasps: FENIAN RAID, 1866; FENIAN RAID, 1870; RED RIVER, 1870. One battalion of the King's Royal Rifles received this medal with the Red River Clasp. Otherwise issue confined to Canadian forces.

32. " Queen's " Sudan, 1896-1898. — Awarded by Queen Victoria, 1899. Obverse: Half-length effigy of Queen Victoria holding sceptre, by De Saulles, as in " Uganda " medal described below. Reverse: A winged Victory, seated, with, on either hand, the Union Jack and the Egyptian flag. The left hand holds a laurel wreath, the right a palm branch. On a tablet below, SUDAN, and below this lotus leaves. Ribbon: Half black, half yellow, divided by a narrow red stripe (Plate I.). Clasps: none.

Given for the operations under the command of Sir Herbert (Lord) Kitchener, which led to the reconquest of the Sudan, 1898; issued in bronze to followers.

33. " Khedive's " Sudan, 1896-1900. — Awarded by the khedive in 1897. Obverse: "Abbas Hilmi II." and date, in Arabic. Re- verse: A trophy of arms with a shield in the centre, on a tablet below " Recovery of the Sudan," in Arabic. Ribbon: Yellow, with blue centre (Plate I.). Clasps: FIRKET, HAFIR, SUDAN, 1897; SUDAN, 1898; ABU HAMED, THE ATBARA, KHAR- TOUM GEDAREF, 1 SUDAN, 1899 ; l SUDAN, 1900 ; l CEDID, 1 BAHR-EL-GHAZAL, 1900-1902; 1 TEROK, 1 NY AM NYAM, 1 TALODI. 1

This medal was awarded to officers and men of the British Navy and Army, to the Egyptian Army engaged in the reconquest of the Sudan and (in bronze without clasps) to followers.

34. Cape Colony General Service, 1900. — Awarded by the govern- ment of Cape Colony. Obverse: Bust of Queen Victoria as on the

Volunteer Long Service Medal. Reverse: Arms of Cape Colony. Ribbon: Dark blue, with yellow centre (Plate II.). Clasps: BASUTOLAND, TRANSKEI, BECHUANALAND. Issued to Colonial troops only, for services in various minor campaigns.

35. Matabeleland, 1893 (called the Rhodesia Medal).— -Awarded by the British South Africa Company, 1896. Obverse: Bust of Queen Victoria. Reverse: A fighting lion. Ribbon: Orange, with three dark blue stripes (Plate II.). Clasps: RHODESIA and MASHONALAND, with dates.

This is the first war medal issued by a chartered company since the close of the Company's rule in India. It was awarded to British officers and men of the British service, to the Cape Mounted Rifles, Bechuanaland police, and the Chartered Company's own forces, engaged in the Matabeleland and Mashonaland Campaigns 1893, 1896 and 1897.

36. East and Central Africa, 1891-98. — Awarded by Queen Victoria in 1895. Obverse and Reverse: as in West African (or original Ashantee) Medal described above. Ribbon: Terra-cotta, white and black stripes (Plate II.). Clasps: CENTRAL AFRICA, 1894-96; CENTRAL AFRICA, 1899.

This medal only differs from the West African in that it has a different ribbon. It is suspended by a ring. Practically only the local forces (and of course their British officers) received this medal. But a few officers and men of the Indian Army and of the Royal Navy have also received it.

37. East and Central Africa, 1899 {the" Uganda" Medal). — Awarded by Queen Victoria in 1899. Obverse: Half-length effigy of Queen Victoria, by De Saulles. Reverse: Britannia with lion, gazing over a desert towards a rising sun. Ribbon: Half red, half yellow (Plate II.). Clasps: LUBWA'S, UGANDA, 1897-98; UGANDA, 1899; UGANDA, 1900.

This medal was awarded to the local forces and also to officers and men of the Indian Army and Royal Navy.

38. Ashanti Star, 1896. — Awarded by Queen Victoria in 1896. Obverse: An imperial crown with " Ashanti, 1896 " round it. Reverse: Inscribed " from the Queen." The star is four-pointed, and is crossed by a saltire or St Andrew's cross. Ribbon: Yellow with black stripes (Plate II.).

This medal was issued for the expedition against Prempeh in 1896. As there was no actual fighting, no medal was given, but sickness claimed many victims, amongst them Prince Henry of Battenberg. The decoration was issued to officers and men of the British Army, Royal Navy and local troops.

39. Ashanti Medal, 1900. — Awarded by King Edward VII. in 1901. Obverse: Head and bust of King Edward VII. in the uniform of a field-marshal, by De Saulles. Reverse: a lion standing on a cliff, in the background the rising sun. Ribbon: Green with black edges and black central stripe (Plate II.). Clasp: KUMASSI.

This medal was the first which was issued with an effigy of King Edward VII. It was given only to local forces, and the British officers employed on the staff or in commands.

40. Africa General Service, 1899- . — Awarded by King Edward VII. in 1902. Obverse: As in Ashanti Medal of 1900. Reverse: As in "Uganda" Medal above described. Ribbon: Yellow, with black edges and two narrow green stripes (Plate II.). Clasps: N. NIGERIA, with various dates ; S. NIGERIA, with various

Awarded to Egyptian Army only.

dates; UGANDA, 1900; JUBALAND, GAMBIA, LANGO, 1901 and 1902; JIDBALLI, KISSI, 1905; SOMALILAND, 1901 and 1902-04; BRITISH CENTRAL AFRICA, 1899-1900; ARO, 1901-02.

This medal represents an almost incessant warfare of a minor, but exacting, nature. In the first eighteen months, eleven clasps were awarded, some awards being of course retrospective. The clasp " Jubaland " is chiefly a naval award, but all the rest are almost exclusively earned by the West African Frontier Force and the King's African Rifles. It is worthy of remembrance, however, that a contingent of Boer mounted riflemen took part in the Somali- land Campaign, within one year of the peace of Vereeniging, and received the medal and clasp. The "Somaliland, 1 902-1904 " clasp represents indeed a considerable campaign in which contingents from Great Britain and India took part.

41. "Queen's" South African, 1899-1902. — Awarded by King Edward VII. in 1901 shortly after Queen Victoria's death. Obverse: Bust of Queen Victoria, by De Saulles. Reverse: Britannia holding an outstretched laurel wreath towards a body of troops, in the background a coast line, the sea and war-ships. Ribbon: Centre orange

bordered with blue, outside edges red (Plate II.). Clasps; see below.

The ” Queen’s ” medal for troops engaged in the South African War was authorized, shortly after Queen Victoria’s death, by Army Order 94 of 1901. It was given “to all officers, warrant officers, non-commissioned officers and men, of the British, Indian and Colonial forces, and to all Nurses and Nursing Sisters, who actually served in South Africa between nth of October 1899, and a date to be fixed hereafter ” (the war not being concluded) ” to all troops stationed in Cape Colony and Natal at the outbreak of hostili- ties, and to troops stationed at St Helena between the 14th of April 1900, and a date to be fixed hereafter.” The last provision shows a widening of the signification hitherto attaching to ” war service,” for the troops at St Helena were employed in guarding Boer prisoners. The A.O. referred to was supplemented by others in iqoi and 1902. Clasps were authorized as follows: BELMONT (Nov. 23, 1899); MODDER RIVER (Nov. 28, 1899): PAARDE- BERG (Feb. 17-26, 1900); DREIFONTEIN (March 10, 1900); WEPENER (April 9-25, 1900); JOHANNESBURG (May 29, 1900); DIAMOND HILL (June 11-12, 1900); BELFAST (Aug. 26-27, 1900); WITTEBERGEN (July 1-29, 1900); DE- FENCE OF KIMBERLEY (Oct. 14, 1899, Feb.. 15, 1900), RELIEF OF KIMBERLEY (Feb. 15, 1900); DEFENCE OF MAFEKING (Oct. 13, 1899— May 17, 1900); RELIEF OF MAFEKING (May 17, 1900) ; TALANA (Oct. 20, 1899) ; ELANDS- LAAGTE (Oct. 21, 1899); DEFENCE OF LADYSMITH (Nov. 3, 1899— Feb. 28, 1900); TUGELA HEIGHTS (Feb. 14- 27, 1900); RELIEF OF LADYSMITH (Dec. 15, 1899— Feb. 28 1900); LAING’S NEK (June 2-9, 1900). Clasps: for CAPE COLONY, NATAL, ORANGE FREE STATE and RHO- DESIA, were given to troops who served within the limits of the respective colonies and states named during the war, without being present at any action, fought inside those limits, for which a clasp was awarded. Non-enlisted men, of whatever nationality, who drew military pay, were awarded the medal in bronze instead of silver and without clasps. Militia units which volunteered and were sent to Mediterranean stations to release the regulars for field service were awarded (Feb. 1902) the medal without clasp,

Mediterranean ” being substituted for ” South Africa ” on the reverse. This was not, of course, issued to any one entitled to the Queen’s Medal for South Africa.

43. The ” King’s ” South African Medal was awarded by King Edward VII. in 1902, to be worn in addition to the “Queen’s ” by those who completed eighteen months’ service in South Africa during the war. On the obverse of the medal is the effigy of King Edward, by De

Saulles (as on the ” Ashanti, 1900,” Medal); the reverse is the same as that of the “Queen’s” Medal. Ribbon: Green, white and orange (Plate II.). The two clasps awarded were, in accordance with the terms of the award, general in character, to wit, SOUTH AFRICA, 1901 and SOUTH AFRICA, 1902.

44. China, 1900. — Awarded by King Edward VII., 1902. Ob- verse: Bust of Queen Victoria as on “Queen’s” South African Medal. Reverse : As on first China Medal, but with date altered. Ribbon: As in first China Medal (Plate I.). Clasps: DEFENCE OF LEGATIONS, RELIEF. OF PEKIN, TAKU FORTS.

This medal was issued to the Royal Navy (including some Naval volunteers), British and Indian Armies, and the (Wei-hai-Wei). Chinese Regiment, for operations during the Boxer rebellion. ” This was the last war medal, as the ” First China ” was the first to bear Queen Victoria’s effigy. Sir E. H. Seymour, the commander of the Tientsin relieving column, who had taken part in the former China War, received the new medal as well as the old.

45. India, 1895 (Third India General Service). — Awarded by Queen Victoria in 1896. Obverse: Bust of Queen Victoria, by T. Brock, R.A. Reverse: A British and Indian soldier supporting a standard; below, INDIA, 1895. Ribbon: Three red and two green stripes of equal width (Plate I.). Clasps: DEFENCE OF CHITRAL, 1895; RELIEF OF CHITRAL, 1895; MALAKAND, 1898; PUNJAB FRONTIER, 1898; TIRAH, 1897: TIRAH 1898; WAZIRISTAN, 1901-02.

The ribbon of this medal is perhaps more frequently seen than

that of any other British war medal except those for South Africa. In 1903 the medal was re-issued with the military effigy of King Edward VII. (as on the Ashanti, 1900, medal) on the obverse, and the date was omitted from the reverse. The medal is issued in bronze, without clasps, to followers.

46. Tibet, 1903-04. — Awarded by King Edward VII in 1905. Obverse: Military effigy of the king as on Ashanti, 1900, medal. Reverse: a representation of the Potala at Lhasa. Ribbon: Purple-red, edged with green and white stripes (Plate II.). Clasp: GYANTSE.

47. India, 1908. — A new India General Service Medal was authorized

in 1908, to take the place of the medal granted by A.O. 43 of 1903. This was to be issued in silver to officers and men, and in bronze to non-enlisted men of all sorts. This medal with clasp bearing the name and date was given to the troops which took part in the North Western Frontier Expedition of 1 908. The ribbon is dark blue edged with green.

48. Transport Medal. — Awarded by King Edward VII. in 1902. Obverse : Head and bust of the king in naval uniform, by De Saulles. Reverse; A steamer at sea, and the five continents. Ribbon: red, with two thin stripes near the edge (Plate II.). Clasps: SOUTH AFRICA, 1899-1902; CHINA, 1900. This medal is restricted to officers of the mercantile marine serving in chartered troop-ships. It is a sort of general service medal, clasps being added as earned. Up to 1910 only the above clasps had been authorized.

49. Polar Medal (or Antarctic Medal). — Awarded by King Edward VII., 1904. Obverse: Naval effigy of the king as on Transport Medal. Reverse : In the foreground a sledge and travel- lers, in the background the steamer ” Discovery ” (Capt. R. F. Scott’s Expedition, 1904). Ribbon: As for 1st and 2nd Arctic Medals, white (Plate I.). The medal, like the 1st Arctic Medal, is octagonal.

First awarded to officers and men of the ” Discovery,” whether belonging to the Royal Navy or not. It is given with a dated clasp for Antarctic exploration service.

Other Medals and Decorations. — The above forty-nine medals are given as rewards for participating in the operations they commemorate, and issued generally to all concerned, irrespective of individual distinction or bravery. There are other classes of medals and decorations, civil as well as military, which must be grouped with them, as being allied in character. These are either (i.) awards personal to the recipient, being an acknow- ledgment of or reward for special individual services or good conduct (these are civil as well as military in respect of awards for bravery), or (ii.) awards that are simply of a commemorative kind, though worn as war medals and for the most part given to officers and soldiers. The more important of these two classes will be named. Orders given for service are dealt with, for the most part in the article Knighthood; but particulars are given here of certain distinctively military orders that have no knighthood rights and duties, and indeed little meaning apart from the deeds or services which led to the award — being so to speak, records of the past, rather than badges of a present membership. Individual decorations for Services may be classed as (i.) for gallantry, (ii.) for

special merit, and (iii.) for long service and good conduct.

1. Indian Order of Merit. — Awarded by H.E.I. Company and notified by G.O. of governor-general, April 17, 1837. Obverse: 1st Class— A Gold Star, ij in. diameter; in the centre, in gold on a ground of dark blue enamel, crossed swords within a circle around which is the legend, REWARD OF VALOUR, the whole encircled by a gold laurel wreath. 2nd Class — Star similar to that of 1st Class, but in silver. Wreath and centre as in 1st Class.. 3rd Class — Star exactly similar to that of 2nd Class, but the wreath and centre in silver, and dark blue enamel and silver, respectively. Reverse: Engraved 1st, 2nd and 3rd Class Order of Merit, respectively, but the name of the recipient is not engraved on the decoration when issued. Ribbon: Dark blue, with red edges. This decoration is to be obtained only by a ” conspicuous act of individual gallantry ” in the field or in the attack or defence of fortified places. It is open to all native officers or soldiers of the Indian Army, ” without distinction of rank or grade.” The 3rd Class is bestowed for the first act of gallantry for which the recipient is recommended. The 2nd Class is given only to those who possess the third, and for a second act of conspicuous gallantry. The 1st Class is given only to those who hold the 2nd, and for a third act of bravery. A recipient of the decoration receives an additional allowance equivalent in the 3rd Class to one-third, in the 2nd to two-thirds, and in the 1st to the whole of the ordinary pay of his rank, over and above that pay or his pension. The widow (in the case of plurality of wives, the first married) receives the pension of the Order for three years after her husband’s death.

2. Victoria Cross. — Instituted by Royal Warrant, January 29, 1856. A bronze Maltese Cross, 1ˆ in. diameter, with, in the centre, the Royal Crest (lion and crown), and below it a scroll

inscribed “FOR VALOUR.” There is a bronze laureated bat for suspension, connected with the cross by a V. The reverse is plain, but the name, rank and corps of the recipient are engraved on the back of the laureated bar. Ribbon: Red for the army; blue for the navy. Clasp: For every additional act of bravery a clasp, bearing the date of such act, may be awarded.

Nothing save ” the merit of conspicuous bravery ” gives claim for the decoration, and it must be evinced by ” some signal act of valour or devotion to their country ” performed ” in me presence of the enemy.” (The regulation italicized was for a short time abrogated, but soon restored to force.) The original Royal Warrant has been supplemented by various Royal Warrants (Oct. 1857, Aug. and Dec. 1858, Jan, 1867,

April and Aug. 1881), and now every grade and rank of all ranks of all branches of His Majesty's Forces, British and Colonial, are eligible, with the single exception of native ranks of the Indian army, who have an equivalent decora- tion in their own Order of Merit. In the case of recipients who are not of commissioned rank, the Cross carries with it a pension of £10 a year, and an additional £5 a year for each clasp. A larger grant is sometimes given to holders of the V.C. who are in need of monetary help. In all, up to 1904, the Cross was awarded to 521 recipients (including 15 posthumous awards).

3. Distinguished Conduct in the Field (Army). — Instituted by Royal Warrant, September 30, 1862. Obverse: A military trophy, with, in the centre, the Royal Arms (as in the Long Service and Good Conduct Medals). Reverse: inscribed " FOR DISTIN- GUISHED CONDUCT IN THE FIELD." Ribbon: Three stripes equal width, outside red, centre blue (Plate II.). Clasp: Royal Warrant, 7th of February 1 881, authorized award of clasps for subsequent acts of gallantry.

" Individual acts of distinguished conduct in the field in any part of the world " entitle to this medal, and only non-commissioned officers and men of the British forces are eligible for the award. Prior to its institution, distinguished gallantry was rewarded by the " Meritorious Service " medal. Single clasps have been con- stantly conferred, and there is more than one case of a recipient having earned two clasps to his medal.

4. Albert Medal (for saving life at sea). — Instituted by Royal Warrant, 7th of March 1866. Gold oval badge, enamelled in dark blue, with a monogram composed of the letters V and A, inter- laced with an anchor erect, all in gold, surrounded with a' garter in bronze, inscribed in raised letters of gold " FOR GALLANTRY IN SAVING LIFE AT SEA," and surmounted by a representation of the crown of the prince consort, the whole edged with gold. Ribbon: dark blue, with two white stripes. Clasps are awarded for any subsequent acts ' of bravery. By a subsequent Royal Warrant of the 12th of April 1867, the decoration was- re-constituted in two classes, as follows. 1st Class — Badge precisely as already described. Ribbon: Dark blue, with four white stripes (if in. wide). Clasps: As authorized in original warrant. 2nd Class-ˆ Badge exactly similar to that of the 1st Class, except that it is entirely worked in bronze, instead of gold and bronze. Ribbon: Dark blue, with too white stripes. Clasps: As authorized for 1st Class.

The decoration is awarded only to those who " have, in saving or endeavouring to save the lives of others from shipwreck or other peril of the sea, endangered their own lives." The 1st Class is confined " to

cases of extreme and heroic daring ” ; the 2nd for acts which, though great courage may be shown, ” are not sufficiently distinguished to deserve ” the 1st Class of the decoration.

5. New Zealand Cross. — Instituted by an Order of the governor of New Zealand in council, 10th of March, 1869. Silver Maltese Cross with gold star on each of the four limbs and in the centre, in a circle within a gold laurel wreath, NEW ZEALAND. Above the Cross a crown in gold, and connected at the top by a V, to a silver bar ornamented with laurel in gold. The name of recipient is engraved on reverse. Width of Cross, 1 1 in. Ribbon : Crimson. Clasps: Authorized for subsequent acts of valour. In authorizing this decoration Sir G. F. Bowen, the then governor, went outside his authority, but the queen ratified the colonial order in council, and intimated ” Her gracious desire that the arrangements made by it may be considered as established from that date by Her direct authority.” It was, however, stipulated that the occasion was in no way to form a precedent. The award was to be for those ” who may particularly distinguish themselves by their bravery in action, or devotion to their duty while on service,” and only local ” Militia, Volunteers or Armed Constabulary ” were to be eligible. In all only nineteen of these decorations were awarded. No clasps were awarded.

6. Conspicuous Gallantry (Navy). — Instituted by an Order of the queen in Council, 7th of July, 1874. Obverse: Head of Queen Victoria, by W. Wyon, R.A. (as on China Medal). 1 Reverse: A laurel wreath, and within FOR CONSPICUOUS GALLANTRY. Above, a crown. Ribbon : Three stripes of equal_ width, outside blue, centre white (Plate II.). Clasps: none authorized.

To reward ” acts of pre-eminent bravery in Action with the Enemy.” Only petty officers and seamen of the Royal Navy,

1 Now naval effigy of King Edward VII., as on Transport Service 1 Medal

MEDAE

*7

and non-commissioned officers and privates of the Royal Marines, are eligible for this decoration. Prior to the institution of this decoration, acts of gallantry by sailors and marines were rewarded by the same medal as that given to the army before the “medal for distinguished conduct in the field ” was instituted, viz. the ” Meritorious Service ”

medal. If the holder be a Chief or First Class Petty Officer, or a Sergeant of Marines, the award carries with it an annuity of £20 per annum; and if a recipient's service ends before his reaching one of those ranks, he may receive a gratuity of £20 on discharge.

7. Albert Medal (for saving life on land).— Instituted by Royal Warrant, 30th of April 1877. 1st Class — Similar to that of the 1st Class for saving life at sea, but the enamelling is in red instead of blue, and there is no anchor interlaced with, the mono- gram V.A. Ribbon: Crimson, with four white stripes. Clasps: for subsequent acts of same character. 2nd Class — Badge similar to that of the 2nd Class for saving life at sea, but the enamelling is in red instead of blue, and there is no anchor interlaced with the monogram V.A. Ribbon: Crimson, with two white stripes. Clasps: As authorized for 1st Class.

The conditions governing the award of this decoration are the same that govern the award for saving life at sea. Originally the award was restricted to acts of gallantry performed within British dominions, but this restriction was removed by Royal Warrant, 5th of June 1905.

8. Distinguished Conduct in the Field {Colonial). — Instituted by a Royal Warrant, 24th of May 1894, which was later cancelled and superseded by Royal Warrant, 31st of May 1895. Obverse: same as " Distinguished Conduct in the Field " (Army). Reverse: same as " Army " medal, but with the name of the colony inscribed above the words " For Distinguished Conduct in the Field." Ribbon : Crimson, with a line of the colonial .colour in the centre. Clasps: Authorized for subsequent acts of valour. Every colony or protectorate, having permanently embodied forces, draws up regulations to govern the issue of these medals as suit its own particular requirements, but in all essentials these regulations are modelled on those that govern the award of the Distinguished Conduct in the Field (Army).

9. Conspicuous Service Cross. — Instituted by an Order in Council, 15th of June 1901. Silver -cross, with the reverse side plain; on the obverse, in the centre, the Imperial and Royal Cypher, E.R.I., surmounted by the imperial crown. Ribbon: Three stripes equal width, outside white, centre blue. Clasps: none authorized.

This award is to recognize "■ Distinguished Service before the Enemy." Its grant is confined to " Warrant Officers or Sub- ordinate Officers " of the Royal Navy. Such, not being of " lower- deck rating," are not eligible for the " Conspicuous Gallantry " medal; also, they, " by reason of not holding a commission in the Royal Navy, are not eligible to any existing Order or Decoration."

10. Edward Medal. — Founded in 1907 to reward acts of courage in saving life in mines, this medal was extended in 1909 (R.W. Dec. 3) so as to be awarded ” to those who in course of industrial employment endanger their own lives in saving or endeavouring to save the lives of others from perils incurred in connexion with such industrial employment.”

Certain important medals and decorations for saving life are not the gift of the Crown. These are allowed to be worn in uniform on the’ right breast. They are the medals of the Royal Humane Society, those given by the Board of Trade for gallantry in saving life at sea, the medals of the Royal National Lifeboat Institution, those of the Shipwrecked Fisher- men and Mariners’ Royal Benevolent Society, Lloyd’s Honorary Silver Medal, Liverpool Shipwrecked and Humane Society’s Medals, and the Stanhope Gold Medal.

AH these are suspended from a dark blue ribbon with the exception of the medals of the S.F. and M. Royal Benevolent Society, which has a light blue ribbon, and the Stanhope Gold Medal which has a broad dark blue centre, edged with yellow, and black borders. These medals are usually struck in silver or bronze, but occasionally gold medals are awarded. The Stanhope Gold Medal is annually awarded for the most gallant of all the acts of rescue for which the society have awarded medals during the year. This award has been frequently earned by officers or men of the Royal Navy. It is, in fact, the ” Victoria Cross ” of awards of this character.

The following are decorations for special merit: —

I. Order of British India. — Instituted by General Order of Governor-General of India, 17th of April 1837. 1st Class— A gold star of eight points radiated, if in. in diameter, between the two top points the crown of England. In the centre, on a ground of light blue enamel, a gold lion statant, within a band of dark blue enamel, containing in gold letters ORDER OF BRITISH INDIA, the whole encircled by a gold laurel wreath. The whole hangs from the ribbon by a gold loop attached by a ring to the top of the crown, and is worn round the neck, outside the uniform. Ribbon: originally sky-blue, changed to crimson 1838. 2nd Class — Gold star similar to that of the 1 st Class, but smaller, I § in. diameter,

and without the crown. The centre also is similar to that of the 1st Class star, but the enamelling is all dark blue. Suspended and worn as in the 1st Class. Ribbon: As in 1st Class.

This, the highest military distinction to which in the ordinary course native officers of the Indian Army can attain, and confined to them, is a reward for long, honourable and specially meritorious service. The 1st Class is composed exclusively of officers of and above the rank of Subadar in the artillery and infantry, or of a corresponding rank in the other branches of the service. The 2nd Class is open to all native commissioned officers, irrespective of their rank. Originally the order was limited to 100 in the 1st Class and the same number in the 2nd, but it now comprises 215 in the 1st Class and 324. in the 2nd Class. Officers in the 1st Class are entitled to the title of ” Sirdar Bahadur,” and receive a daily allowance of two rupees in addition to the pay, allowances or pension of their rank, while those of the 2nd Class are styled ” Bahadur,” and receive an extra one rupee per diem.

2. Ability and Good Conduct. — Instituted in 1842. Obverse: A paddle-wheel steamship. Reverse: Crown and anchor, and inscribed, FOR ABILITY AND GOOD CONDUCT. Ribbon: None authorized.

No official documents as regards the institution of this decoration are now to be found at the Admiralty, but only engineers were eligible for the award, and it carried no gratuity or annuity. Only six were ever awarded. When, in 1847, engineers were raised to the rank of warrant officers, the issue of this decoration was dis- continued. It had a ring for suspension, and was probably worn with the narrow navy blue ribbon of the ” Long Service and Good Conduct ” medal of the period.

3. Meritorious Service {Army and Royal Marines). — Instituted by Royal Warrant, 19th December 1845, for army only; grant extended to Royal Marines by Order in Council, 15th January 1849. Obverse: Head of Queen Victoria as on China medal. 1 Reverse: FOR MERITORIOUS SERVICE, within a laurel wreath. Ribbon: ˆCrimson for army (Plate II.); navy blue for Royal Marines. Only non-commissioned officers of or above the rank of sergeant are eligible for this decoration. It carries with it an annuity not exceeding £20 per annum ; but, as the total sum avail- able is strictly limited, the number of these medals that is issued is small, and a non-commissioned officer who is recommended may have to wait many years before his turn comes and he receives the award. The qualification for recommendation is long, efficient and meritorious service, and need not necessarily, although in many cases it does, include any special display of personal gallantry in action. For many years the ” meritorious service ” medal was considered to cancel the ” long service and good conduct ” medal, but by A.O. 250 of 1902 both medals can be worn together. 2 ;

4. The Distinguished Service Order (see Knighthood) is giyert only to officers (and naval and military officials of officer rank, not including Indian native officers) for services in war. Often it is the reward of actual conspicuous gallantry under fire, but its purpose, as defined in the Royal Warrant instituting the order, is to reward ” individual instances of meritorious or distinguished service, in war; ” and the same document declares that only those shall be eligible who have been mentioned ” in despatches for meritorious or distinguished service in the field, or before the enemy.” In the main, therefore, it is awarded for special services in war, and not necessarily under fire; and although the services rewarded are as a fact generally rendered in action, the order is in no sense a sort of second class of the Victoria Cross. Like the latter, the Dis- tinguished Service Order is generally referred to by its initials.

§. The Royal Red Cross is also an Order. Membership is re- stricted to women (not necessarily British subjects), and is given as a reward for naval or military nursing service. Instituted 1883.

6. The Kaisar-i-Hind Medal is given for public services in India.

7. The Volunteer Officers’ Decoration. — Instituted in 1892. Ah oval of silver, crossed at intervals with gold, in the centre the monogram V.R. and crown in gold. Worn from a ring. Ribbon: Dark green. .

This decoration was instituted in 1892, and is the reward of twenty years’ service in the commissioned ranks of the volunteer force. It is generally called the ” V.D. ” Since the conversion of the Volunteer into the Territorial Force (1908) it has been replaced by THE TERRITORIAL OFFICERS’ DECORATION. Officers of the Royal Naval Reserve and of the Royal Na„val Volunteer Reserve are eligible for a similar decoration (1910).

8. The Long Service and Good Conduct {Army) Medal was instituted in 1833. Obverse: A trophy of arms. 3 Reverse: FOR LONG SERVICE AND GOOD CONDUCT. Ribbon: Crimson, as for ” Meritorious Service ” medal (Plate II.).

This is a reward for ” long service with irreproachable character and conduct,” t he qualifying period of service being 18 years. ,

1 Now naval effigy of King Edward VII., as on Transport Service medal.

s Other ” Meritorious ” or ” Long Service ” medals worn with a crimson ribbon are the former Long Service medal of the H.E.I.

Company's European troops and the Meritorious and Long Service medals of the Indian Native Army.

' Now replaced by military effigy of King Edward VII.

9. The Long Service and Good Conduct (Navy) Medal was in- tituted in 1831. Ribbon: Blue, with white edges (Plate II.).

10. The Volunteer Long Service Medal. — Instituted in 1894 Has a green ribbon. Obverse: Effigj' of Queen Victoria. Reverse: A scroll within a wreath, inscribed FOR LONG SERVICE IN THE VOLUNTEER FORCE. Replaced by the Territorial Long Service Medal (1908), of which the ribbon is green with a yellow centre; And the obverse a bust of the king. The Militia Long Service Medal (1904) has a light blue ribbon, the Imperial Yeomanry Long Service Medal a yellow ribbon, the Honourable Artillery Company's Medal a black, red and yellow ribbon. All these are shown on Plate II. 1

11. The Medal for the Best Shot in the Army was instituted in (869 Obverse: Bust of Queen Victoria (now effigy of King Edward VII.). Reverse: A winged Victory crowning a warrior. Ribbon : Red, with two narrow black stripes on each edge, the two black stripes being divided by a narrow white one. There is also a " Best Shot " Medal for the Indian Native Army, which has an o'range ribbon.

12. The Medal for Naval Gunnery was instituted in 1903. Ribbon: Red centre, flanked by two narrow white stripes, two broad blue stripes at edges (Plate II.).

Amongst medals of the last class may be mentioned the Jubilee Medals of 1887 and. 1897, the Coronation Medal of 1902, the Royal Victorian Medal (this, however, is a sort of sixth class of the Royal Victorian Order, for which see Knighthood) and the medals awarded for Durbars.

United States. — The war medals and decorations of the United States, although few in number, are interesting, as they follow a peculiar system in the colours of the ribbons.

The principal military decoration of the United States is the " Medal of Honor," which was founded for the reward of unusual bravery or special good conduct during the Civil War. In its present form it is a

five-pointed star, with a medallion in the centre bearing a head of Minerva and round it UNITED STATES OF AMERICA in relief. On each ray of the star is an oak-leaf, and the points themselves are trefoil shaped. A laurel wreath, in green enamel, encircles the whole, and this wreath is surmounted by VALOR, which in turn is surmounted by an eagle that attaches the decoration to its ribbon. This last is blue, with thirteen white stars worked on it in silk. Accompanying this decoration there is a badge or lapel button, hexagonal, and made of blue silk with the thirteen stars in white.

The original form of the decoration had no encircling wreath ; on the rays, instead of the oak-leaves, were small wreaths of laurei and oak, and the design in the central medallion was a figure of Minerva standing, with her left hand resting upon a consul's fasces and her right warding off with a shield the figure of Discord. The background was formed by thirty-four stars. The decoration was surmounted by a trophy of crossed guns, swords, &c, with eagle above, and the ribbon was designed of the national colours, as follows: thirteen alternate red and white stripes, and across the ribbon at the top a broad band of blue (palewise gules and argent and a chief azure). The ribbon was attached to the coat by a clasp badge bearing two cornucopias and the arms of the U.S. The present decoration does not have this badge, but is suspended from a concealed bar brooch.

Another special decoration is the " Merit " Medal. This bears on the obverse an eagle, surrounded by the inscription VIRTVTIS ET AVDACIAE MONVMENTVM ET PRAEMIVM, and on the reverse the inscription FOR MERIT, surrounded by an oak-leaf wreath; in the upper part of the exergue is UNITED STATES ARMY, in the lower thirteen stars. The ribbon is red, white and blue, in six stripes, two red stripes divided by a fine white line in the centre, two white on either side of the red and two blue forming the two outer edges.

We come now to the war medals proper, issued generally to all those who took part in the events commemorated.

The Civil War Medal bears on the obverse the portrait of Lincoln, surrounded by an inscription taken from his famous Second Inaugural— WITH MALICE TOWARDS NONE, WITH CHARITY FOR ALL. On the reverse is the inscription THE CIVIL WAR, 1861-1865 surrounded by a wreath of oak leaves and olive branches. The ribbon is somewhat similar to that last described; the blue stripe, however, is in the centre, divided as before by a white line, and the red stripes form the outer edges.

The ” Indian Wars ” Medal is interesting from the fact that its reverse was copied on other medals, this making it, in a sense, a ” general service ” medal. On the obverse is a mounted Indian in war costume bearing a spear, in the upper part of the exergue INDIAN WARS, in the lower a buffalo’s skull with arrow-heads on either side. What we have called the ” general service ” design

1 By Royal Warrant of 31st of May 1895, medals both for distinguished conduct in the field and for long service were authorized to be awarded by the various colonies possessing regular or volunteer troops, ” under regulations similar, as far as circumstances permit, to those now ranking for Our Regular and Auxiliary Forces.”

on the reverse is composed of (a) an eagle perched on a cannon, supported by five standards (typifying the five great wars of the United States), rifles, Indian shield, spear and arrows, Filipino dagger and Cuban machete; (b) below this trophy the words FOR SERVICE; (c) in exergue, above, UNITED STATES ARMY, below, thirteen stars.

Ribbon of the Indian Medal, vermilion, with deep red edges.

The ” War with Spain ” Medal bears on the obverse a castle with two flanking towers; in exergue, above, WAR WITH SPAIN, below, the date 1898, with, on one side of it, a branch of the tobacco- plant, and on the other a sugar-cane. Reverse: As for ” Indian Wars ” Medal. Ribbon: Centre golden-yellow, with two red stripes close to the edges, the edges themselves being narrow stripes of blue.

The ” Philippine Insurrection ” Medal bears on the obverse a coco-nut palm tree, with, on the left of it, a lamp (typifying En- lightenment), and on the right a balance (representing Justice). This is encircled by the inscription PHILIPPINE INSURRECTION 1899. The ribbon is blue, with two red stripes near the edges. Reverse: As in ” Indian Wars ” Medal.

Another medal connected with the Filipino insurrection is the so-called ” Congressional ” Medal, which was designed to commemo- rate the participation in the war of regulars and volunteers, North- erners and Southerners, side by side. On the obverse is a colour- party of infantry with the national flag, the fly of the flag extending almost to the edge of the medal. Below is the date, 1899, and above, in a semicircle, PHILIPPINE INSURRECTION. The reverse has the inscription FOR PATRIOTISM, FORTITUDE AND LOYALTY, surrounded by a wreath of oak-leaves (typifying the North) and palm branches (typifying the South). The ribbon is blue, edged by narrow

stripes of the national colours, the blue being nearest the edge and the red nearest the centre.

The ” China Relief ” Medal bears on the obverse a Chinese dragon, surrounded by the inscription CHINA RELIEF EX- PEDITION, and at bottom, the date 1900-1. Reverse: As for “Indian Wars” medal. Ribbon: Lemon-yellow, with narrow blue edges.

It is interesting to note that in the case of two of these medals the national colours of the enemy (Spain and China) furnish those of the ribbon. The national colours adopted by the Filipinos were red and blue, and these also figure, in spite of their similarity to the U.S. national colours, on the ribbons of the ” Filipino ” and ” Congressional ” Medals. The Indian ribbon is, similarly, of the colour of the enemy’s war paint — vermilion. See, for illustrations and further details of all these medals and decorations, Journal of the [U.S.] Military Service Institution, May-June 1909. Some of the badges of membership of associations of veterans, such as the Loyal Legion, are allowed to be worn as war medals in uniform. The ” Rescue ” Medal, in gold or silver, is awarded for bravery in saving life by land or sea.

Other Countries. — As has been mentioned above, foreign decorations for military service usually take the form of Orders in many classes. There are, however, numerous long service decorations, which need not be specified. The most famous of the European war and service decorations are the Prussian Iron Cross, the French Medaille Militaire, and the Russian St George’s Cross; all these are individual decorations.

The Iron Cross is given to officers and soldiers for distinguished service in war. It was founded, in the enthusiasm of the War of Liberation movement, on the loth of March 1813, and revived at the outbreak of the ” War for Unity ” against France, 19th of July 1870. The cross is a Maltese cross of cast iron edged with silver. The 1813-15 crosses have the initials F. W. (Friedrich Wilhelm) in the centre, a crown in the upper limb of the cross, and the date in the lower. Those of 1870 have W. (Wilhelm) in the centre, crown on the upper and date on the lower limb of the cross. There are certain distinctions between the Grand Cross, which is worn at the neck, the 1st Class Cross which is worn as an Order suspended from a ribbon, and the 2nd Class Cross, which is worn on the breast. In 1870 war medals were given, bearing on the obverse a Maltese cross superposed on a many-pointed star, and having in its centre 1870-1871 within a wreath. The reverse has W. and a crown, with, for combatants the inscription Dem siegreichen Heere, and for non-combatants Fur Pflichttreue im Kriege, in each case sur- rounded by the words Gott

war mit uns. Ihm sei die Ehre. The award of the Iron Cross to the rank and file carries with it an allow- ance of 3-6 marks monthly. (H. L. S. ; C. F. A.)

MEDEA (Gr. MrjSaa), in Greek legend, a famous sorceress, daughter of Aeetes, king of Colchis. Having been thrown into prison by her father, who was afraid of being injured by her witchcraft, she escaped by means of her art and fled to the temple of Helios the Sun-god, her reputed grandfather. She fell in love with Jason the Argonaut, who reached Colchis at this time, and exacted a terrible revenge for his faithlessness (see Argonauts and Jason). After the murder of Jason's

second wife and her own children, she fled from Corinth in her car drawn by dragons, the gift of Helios, to Athens, where she married king Aegeus, by whom she had a son, Medus. But the discovery of an attempt on the life of Theseus, the son of Aegeus, forced her to leave Athens (Apollodorus i. 9, 28; Pausanias ii. 3, 6-11; Diod. Sic. iv. 45, 46, 54-56). Accom- panied by her son, she returned to Colchis, and restored her father to the throne, of which he had been deprived by his own brother Perses. Medus was regarded as the eponymous hero and progenitor of the Medes. Medea was honoured as a goddess at Corinth, and was said to have become the wife of Achilles in the Elysian fields. The chief seat of her cult, however, was Thessaly, which was always regarded as the home of magic. As time went on her character was less favourably described. In the case of Jason and the Argonauts, she plays the part of a kindly, good-natured fairy; Euripides, however, makes her a barbarous priestess of Hecate, while the Alexandrian writers depicted her in still darker colours. Some authorities regard Medea as a lunar divinity, but the ancient conception of her as a Thessalian sorceress is probably correct. The popularity of the story of Jason and Medea in antiquity is shown by the large amount of literature on the subject. The original story was probably contained in an old epic poem called Mivvas ToiT/tns, the authorship of which was ascribed to Prodicus of Phocaea. It is given at some length in the fourth Pythian ode of Pindar, and forms the subject of the Argonautica of Apollonius Rhodius. There is a touching epistle {Medea to Jason) in the Heroides of Ovid. Medea is the heroine of extant tragedies of Euripides and Seneca; those of Aeschylus and Ennius (adapted from Euripides) are lost. Neophron of Sicyon and Melanthius wrote plays of the same name. Among modern writers on the same theme may be mentioned T. Corneille, F. Grillparzer and M.

Cherubini (opera).

The death of Glauce and the murder of her children by Medea Was frequently represented in ancient art. In the famous picture of Tomomachus of Byzantium Medea is deliberating whether or not she shall kill her children; there are copies of this painting in the mural decorations of Herculaneum and Pompeii.

See Leon Mallinger, Medee: etude sur la litlerature comparSe, an account of Medea in Greek, Roman, middle age and modern literature (1898); and the articles in Daremberg and Saglio's Dictionnaire des antiquites and Roscher's Lexikon der Mythologie.

MEDELLIN, a city of Colombia and capital of the department of Antioquia, 1 50 m. N.W. of Bogota, on a plateau of the Central Cordillera, 4823 ft. above sea-level. Pop. (1006 estimate), 50,000. Medellin, the foundation of which dates from 1674, stands in the valley of the Porce, a tributary of the Cauca, and is reputed to be one of the healthiest as well as one of the most attractive cities of the republic. It has a university, national college, school of mines and other educational institutions, assaying and refining laboratories, a public library and a mint. The principal industry of the surrounding country is mining, and gold and silver are exported in considerable quantities. Coffee and hides are also exported, but the trade of the city has been greatly impeded by difficulties of transportation. A railway from Puerto Berrio, on the Magdalena, was begun many years before the end of the 19th century, but political 'and financial difficulties interposed and work was suspended when only 43 m. were finished. The completion of the remaining 80 m. was part of a larger scheme proposed in 1906 for bring- ing the Cauca Valley into railway communication with the national capital.

MEDEMBLIK, a seaport of Holland, on the Zuider Zee, the terminus of a branch railway from Hoorn, 105 m. S. Pop. (1903), 3012. Once the capital of West Friesland and a pro- sperous town, many of its streets and quays are now deserted, though the docks and basins constructed at the end of the 16th and beginning of the 17th centuries could still afford excellent accommodation for many ships. Close to the harbour entrance stands the castle built by Florens V., count of Holland, in 1285. It has been restored, and is used as a court of justice. The

West church, formerly called after St Boniface, the apostle of Germany, was once the richest in Friesland, and belonged from an early date to the cathedral chapter at Utrecht, where, until the Reformation, the pastor of Medemblik had a seat in the cathedral. It

contains the tomb of Lord George Murray (q.v.). Among the public buildings are the town-hall (17th century), weigh-house, orphanage, the old almshouse, the house (1613) of the Water Commissioners, and a large building formerly belonging to the admiralty and now used as a state lunatic asylum. There are many interesting brick houses, dating chiefly from the first half of the 17th century, with curious gables and picturesque ornamentation, carvings and inscriptions.

MEDFORD, a city, including several villages, of Middlesex county, Massachusetts, U.S.A., on the Mystic river and Lakes, 5 m. N. by W. of Boston. Pop. (1900), 18,244, of whom 4327 were foreign-born; (1910 census) 23,150. The city is served by the Southern Division and a branch of the Western Division of the Boston & Maine railroad, and is connected with Boston and neighbouring cities by electric railways. The Mystic River, a tidewater stream, is navigable for small craft as far as the centre of the city. There are manufactures of considerable importance, including bricks and tiles, woollen goods, carriages and wagons, food products, iron and steel building materials and machinery. The city covers a land area of about 8 sq. m., along the Mystic river, and extending to the hills. The western portion borders the Upper and Lower Mystic Lakes, which are centres for boating. In the north-west portion of Medford is a part of the Middlesex Fells, a heavily wooded reserve belonging to the extensive Metropolitan Park System maintained by the state. The broad parkways of this system also skirt the Mystic Lakes, and here is the greater part (1907, 267 out of 291 acres) of the Mystic River Reservation of the Metropolitan System. Among the city parks are Hastings, Brooks, Logan, Tufts and Magoun. Within the city limits are some of the oldest and most interesting examples of colonial domestic architecture in America, including the so-called ” Cradock House ” (actually the Peter Tufts house, built in 1677-1680), the ” Wellington House,” built in 1657, and the ” Royall House.” The last was built originally by Governor John Winthrop for the tenants of his Ten Hills Farm, and was subsequently enlarged and occupied by Lieut.-Governor John Usher, and by Isaac Royall ‘ (c. 1720-1781) and his son, Isaac Royall, Jun.

Medford has a public library of about 35,200 volumes, housed in the colonial residence (reconstructed) of Thatcher Magoun. The city has also a city hall, a high school and manual training school, an opera house, and one of the handsomest armory buildings in the country (the home of the Lawrence Light Guard), presented by General Samuel C. Lawrence (b. 1832), a liberal benefactor of Medford institutions and the first mayor of the city (1892-1894). The Salem St. Burying Ground, dating from 1689, is one of the oldest burial places in America. The Medford Historical Society maintains a library and

museum in the birthplace of Lydia Maria Child. Medford is the seat of Tufts College, planned and founded as a Universalist institu- tion in 1852 by Hosea Ballou, its first president, and others, and named in honour of Charles Tufts (1781-1876), a successful manufacturer, who gave the land on which it stands. The college, which had 1120 students and 217 instructors in 1909, comprises a college of letters, a divinity school, and a school of engineering (all in Medford), and medical and dental schools in Boston; it is now undenominational. Among the twelity college buildings, the Barnum Museum of Natural History (r885) founded by Phineas T. Barnum, and the Eaton Memorial Library (1907), presented by Mrs Andrew Carnegie in memory of her pastor, are noteworthy. The college endowment amounted in 1908 to $2,300,000.

Medford was first settled in 1630. A considerable portion of its area formed the plantation of Matthew Cradock (d. 1641), first governor of the Massachusetts Bay Company, who in 1630 1 A prominent Loyalist, whose estate was seized during the War of Independence, but was restored to his heirs about 1800. He endowed the first professorship of law in America — at Harvard College.

sent out agents to settle his lands. John Winthrop's " Ten Hills Farm," partly within the present limits of Medford, was settled soon afterwards. One of the earliest industries was ship-building, John Winthrop's " Blessing of the Bay," built on the Mystic in 1631-ˆ632, being one of the first keels laid on the continent. In 1802 Thatcher Magoun began building sea-going vessels, and many of the famous privateers of the War of 181 2 were constructed here. By 1845 Medford employed fully a quarter of all the shipwrights of the state. The industry gradually lost its importance after the introduction of steamships, and the last keel was laid in 1873. Another early industry was the distilling of rum; this was carried on for two centuries, especially by the Hall family and, after about 1830, by the Lawrence family, but was discontinued in 1905. The manufac- ture of brick and tile was an important industry in the 17th century. The Cradock bridge, the first toll-bridge in New England, was built across the Mystic in 1638; over it for 1 50 years ran the principal thoroughfare, from Boston to Maine and New Hampshire. The course of Paul Revere's ride lay through Medford Square and High Street, and. within a half- hour of his passage the Medford minute men were on their way to Lexington and Concord, where they took part in the engage- ments with the British. After the Battle of Saratoga many of Burgoyne's officers were quartered here for the winter. The Middlesex Canal was opened through Medford in 1803, and the Boston & Lowell railroad (now the southern division of the Boston & Maine) in i83r. Medford was chartered as a city in 1892.

See Charles Brooks, History of the Town of Medford (Boston, 1855 ; enlarged by J. M. Usher, Boston, 1886); Historical Register of the Medford Historical Society (1898 et seq.); Proceedings of the 2J$th Anniversary of the Settlement of Medford (Medford, 1905) ; S. A. Drake, History of Middlesex County (2 vols., Boston, 1880) and Helen Tilden Wild, Medford in the Revolution (Medford, 1903).

MEDHANKARA, the name of several distinguished members, in medieval times, of the Buddhist order. The oldest flourished about a.d. 1200, and was the author of the Vinaya Artha Samuccaya, a work in the Sinhalese language on Buddhist canon law. Next to him came Arannaka Medhankara, who presided over the Buddhist council held at Polonnaruwa, then the capital of Ceylon, in 1250. The third Vanaratana Medhan- kara, flourished in 1280, and wrote a poem in Pali, Jina Carita, on the life of the Buddha. He also wrote the Payoga Siddhi. The fourth was the celebrated scholar to whom King Parakrama Bahu IV. of Ceylon entrusted in 1307 the translation from Pali into Sinhalese of the Jalaka book, the most voluminous extant work in Sinhalese. The fifth, a Burmese, was called the Sang- haraja Nava Medhankara, and wrote in Pali a work entitled the Loka Padipa Sura, on cosmogony and allied subjects.

See the Journal of the Pali Text Society, 1882, p. 126; 1886, pp. 62, 67, 72; 1890, p. 63; 1896, p. 43; Mahavamsa, ch. xl., verse 85.

(T. W. R. D.)

MEDHURST, WALTER HENRY (1796-1857), English Congregationalist missionary to China, was born in London and educated at St Paul's school. He learned the business of a printer, and having become interested in Christian missions he sailed in 1816 for the London Missionary Society's station at Malacca, which was intended to be a great printing-centre. He became proficient in Malay, in a knowledge of the written characters of Chinese, and in the colloquial use of more than one of its dialects. He was ordained at Malacca in 1819, and engaged in missionary labours, first at Penang, then at Batavia, and finally, when peace was concluded with China in 1842, at Shanghai. There he continued till 1856, laying the foundations of a successful mission. His principal labour for several years, as one of a committee of delegates, was in the revision of existing Chinese versions of the Bible. The result was a version (in High Wen-li) marvellously correct and faithful to the original. With John Stronach he also translated the New Testament into the Mandarin dialect of Nanking. His Chinese-English and English- Chinese dictionaries (each in 2 vols.) are still valuable, and to him the British public owed its understanding of the teaching of Hung-Sew-Tseuen, the leader of the Tai-ping rising (1851-64).

The university of New York conferred upon him in 1843 the degree of D.D. Medhurst left Shanghai in 1856 in failing health, and died two days after reaching London, on the 24th of January 1857. His son, Sir Walter Henry Medhurst (1822- 1885), was British consul at Hankow

and afterwards at Shanghai.

MEDIA, the ancient name of the north-western part of Iran, the country of the Medes, corresponding to the modern provinces of Azerbaijan, Ardelan, Irak Ajemi, and parts of Kurdistan. It is separated from Armenia and the lowlands on the Tigris (Assyria) by the mighty ranges of the Zagros (mountains of Kurdistan; in its northern parts probably called Choatras, Plin. v. 98), and in the north by the valley of the Araxes (Aras). In the east it extends towards the Caspian Sea; but the high chains of mountains which surround the Caspian Sea (the Parachoathras of the ancients and the Elburz, separate it from the coast, and the narrow plains on the border of the sea (Gilan, the country of the Gelae and Amardi, and Mazandaran, in ancient times inhabited by the Tapuri) cannot be reckoned as part of Media proper. The greater par t of Media is a mountain- ous plateau, about 3000-5000 ft. above the sea; but it contains some fertile plains. The climate is temperate, with cold winters, in strong contrast to the damp and unwholesome air of the shores of the Caspian, where the mountains are covered with a rich vegetation. Media contains only one river, which reaches the sea, the Send Rud (Amardus), which flows into the Caspian; but a great many, streams are exhausted after a short course,, and in the north-west is a large lake, the lake of Urumiah or Urmia. 1 From the mountains in the west spring some great tributaries of the Tigris, viz. the Diyala (Gyndes) and the Kerkheh (Choaspes). Towards the south-east Media passes into the great central desert of Iran, which eastwards of Rhagae (mod. Rai, near Teheran), in the region of the ” Caspian gates,” reaches to the foot of the Elburz chain. On a tract of about 150 m. the western part of Iran is connected with the east (Khoiasan, Parthyaea) only by a narrow district (Choarene and Comisene), where human dwellings and small villages can exist.

The people of the Mada, Medes (the Greek form Mrj&oi. is Ionian for Mddoi.) appear in history first in 836 B.C., when the Assyrian conqueror Shalmaneser II. in his wars against the tribes of the Zagros received the tribute of the Amadai (this form, with prosthetic a-, which occurs only here, has many analogies in the names of Iranian tribes). His successors under- took many expeditions against the Medes (Madai). Sargon in 715 and 713 subjected them “to the far mountain Bikni,” i.e. the Elburz (Demavend) and the borders of the desert. They were divided into many districts and towns, under petty local chieftains; from the names which the Assyrian inscriptions mention, we learn that they were an Iranian tribe and that they had already adopted the religion of Zoroaster. In spite of different attempts of some chieftains to shake off the Assyrian yoke (cf. the information

obtained from prayers to the Sun-god for oracles against these rebels: Knudtzon, Assyrische Gebete an den Sonnengott), Media remained tributary to Assyria under Sargon's successors, Sennacherib, Esar-haddon and Assur-bani- pal.

Herodotus, i. 101, gives a list of six Median tribes (yivta), among them the Paraetaceni, the inhabitants of the mountainous highland of Paraetacene, the district of Isfahan, and the Magoi, i.e. the Magians, the hereditary caste of the priests, who in Media took the place of the " fire-kindlers " (athravan) of the Zoroastrian religion, and who spread from Media to Persia and to the west. But the Iranian Medes were not the only inhabitants of the country. The names in the Assyrian inscriptions prove that the tribes in the Zagros and the northern parts of Media were not Iranians nor Indo-Europeans, but an aboriginal population, like the early inhabitants of Armenia, perhaps connected with the numerous tribes of the Caucasus.

1 Anc. Mantiane, Strabo xi. 529; Martiane, Ptol. vi. 2, 5, probably identical with the name Matiane, Matiene, by which Herodotus i. 189, 202, iii. 94, v. 49, 52 (in i. 72 and vii. 72 they seem to be a different people in Asia Minor); Polyb. v. 44, 9; Strabo i. 49, ii. 73, xi. 509, 514, 523, 525; Plin vi. 48, designate the northern part of Media.

We can see how the Iranian element gradually became dominant: princes with Iranian names occasionally occur as rulers of these tribes. But the Gelae, Tapuri, Cadusii, Amardi, Utii and other tribes in northern Media and on the shores of the Caspian were not Iranians. With them Polybius v. 44, 9, Strabo xi. 507, 508, 514, and Pliny vi. 46, mention the Anariaci, whom they consider as a particular tribe; but in reality their name, the " Not-Arians," is the comprehensive designation of all these small tribes.

In the second half of the 7th century the Medians gained their independence and were united by a dynasty, which, if we may trust Herodotus, derived its origin from Deioces (q.v.), a Median chieftain in the Zagros, who was, with his kinsmen, transported by Sargon to Hamath (Hamah) in Syria in 715 b.c. The kings, who created the Median Empire, were Phraortes and his son Cyaxares. Probably they were chieftains of a nomadic Median tribe in the desert, the Manda, mentioned by Sargon; for the Babylonian king Nabonidus designates the Medians and their kings always as Manda. The origin and history of the Median Empire is quite obscure, as we possess almost no contemporary information, and not a single monument or inscription

from Media itself. Our principal source is Herodotus, who wrongly makes Deioces the first king and uniter of the whole nation, and dates their independence from c. 710 — i.e. from the time when the Assyrian supremacy was at its height. But his account contains real historical elements, whereas the story which Ctesias gave (a list of nine kings, begin- ning with Arbaces, who is said to have destroyed Nineveh about 880 B.C., preserved in Diod. ii. 32 sqq. and copied by many later authors) has no historical value whatever, although some of his names may be derived from local traditions. According to, Herodotus, the conquests of Cyaxares were interrupted by an invasion of the Scythians, who founded an empire in western Asia, which lasted twenty-eight years. From the Assyrian prayers to the Sun-god, mentioned above, we learn that the Median dynasts, who tried rebellions against the Assyrians in the time of Esar-haddon and Assur-bani-pal, were allied with chieftains of the Cimmerians (who had come from the northern shore of the Black Sea and invaded Armenia and Asia Minor), of the Saparda, Ashguza and other tribes; and from Jeremiah and Zephaniah we know that a great invasion of Syria and Palestine by northern barbarians really took place in 626 B.C. With these facts the traditions of Herodotus must in some way be connected; but at present it is impossible to regain the history of these times. The only certain facts are that in 606 Cyaxares succeeded in destroying Nineveh and the other cities of Assyria (see Phraortes and Deioces).

From then the Median king ruled over the greatest part of Iran, Assyria and northern Mesopotamia, Armenia and Cappa- docia. His power was very dangerous to their neighbours, and the exiled Jews expected the destruction of Babylonia by the Medes (Isa. xiii., xiv., xxi.; Jerem. 1. Ii.). When, Cyaxares attacked Lydia, the kings of Cilicia and Babylon intervened and negotiated a peace in 585, by which the Halys was established as the boundary. Nebuchadrezzar married a daughter of Cya- xares, and an equilibrium of the great powers was maintained till the rise of Cyrus.

About the internal organization of the Median Empire we know only that the Greeks derive a great part of the ceremonial of the Persian court, the costume of the king, &c, from Media. But it is certain that the national union of the Median clans was the work of their kings; and probably the capital Ecbatana (q.v.) was created by them.

By the rebellion of Cyrus, king of Persia, against his suzerain Astyages, the son of Cyaxares, in 553, and his victory in 550, the Medes were subjected to the Persians. In the new empire they retained a prominent position; in honour and war they stood next to the

Persians; the ceremonial of their court was adopted by the new sovereigns who in the summer months resided in Ecbatana, and many noble Medes were employed as officials, satraps and generals. After the assassination of the usurper Smerdis, a Mede Fravartish (Phraortes), who pretended

to be of the race of Cyaxares, tried to restore the Median kingdom, but was defeated by the Persian generals and executed in Ecbatana (Darius in the Behistun inscr.). Another rebellion in 409, against Darius II. (Xenophon, Hellen. i. 2, 19) was of -short duration. But the non-Aryan tribes of the north, especially the Cadusians, were always troublesome; many abortive expe- ditions of the later kings against them are mentioned.

Under the Persian rule the country was divided into two satrapies. The south, with Ecbatana and Rhagae (Rai) Media proper, or ” Great Media,” as.it is often called, formed in Darius' organization the eleventh satrapy (Herodotus iii. 92), together with the Paricanians and Orthocorybantians; the north, the district of Matiane (see above), together with the mountainous districts of the Zagros and Assyria proper (east of the Tigris) was united with the Alarodians and Saspirians in eastern Armenia, and formed the eighteenth satrapy (Herod, ni. 94; cf. v. 49, 52, vii. 72). When the empire decayed and the Carduchi and other mountainous tribes made themselves independent, eastern Armenia became a special satrapy, while Assyria seems to have been united with Media; therefore Xenophon in the Anabasis ii. 4, 27; iii. 5, 15; vii. 8, 25; cf. iii. 4, 8 sqq. always designates Assyria by the name of Media.

Alexander occupied Media in the summer of 330; in 328 he appointed Atropates, a former general of Darius (Arrian iii. 8, 4), as satrap (iv. 18, 3, vi, 29, 3), whose daughter was married to Perdiccas in 324 (Arrian vii. 4, S). In the partition of his empire, southern Media was given to the Macedonian Peithon; but the north, which lay far off and was of little importance for the generals who fought for the inheritance of Alexander, was left to Atropates. While southern Media with Ecbatana passed to the rule of Antigonus, and afterwards (about 310) to Seleucus I.; Atropates maintained himself in his satrapy and succeeded in founding an independent kingdom. Thus the partition of the country, which the Persian had introduced, became lasting; the north was named Atropatene (in Plin. vi. 42, Atrapatene; in Ptolem. vi. 2, 5, Tropatene; in Polyb s v. 44 and 55 corrupted in ra ffarpajrua KaKov/itva) , after the founder of the dynasty, a name which is

preserved in the modern Azerbaijan; cf. Noldeke, ” Atropatene,” in Zeitschrift der deutscken morgenl. Gesellschaft, 34, 692 sqq. and Marquart, Eranshahr, p. 108 sqq. The capital was Gazaca in the central plain, and the strong castle Phraaspa (Dio Cass. xlix. 26; Plut. Anton. 38; Ptol. vi. 2, 10) or Vera (Strabo xi. 523), probably identical with the great ruin Takhti Suleiman, with remains of Sassanid fire-altars and of a later palace. The kings had a strong and warlike army, especially cavalry (Polyb. v. 55; Strabo xi. 253). Nevertheless, King Artabazanes was forced by Antiochus the Great in 220 to conclude a disadvantageous treaty (Polyb. v. 55), and in later times the rulers became in turn dependent on the Parthians, on Tigranes of Armenia, and in the time of Pompey who defeated their king Darius (Appian, Mithr. 108), on Antonius (who invaded Atropatene) and on Augustus of Rome. In the time of Strabo (a.d. 17), the dynasty existed still (p. 523); in later times the country seems to have become a Parthian province.

Atropatene is that country of western Asia which was least of all influenced by Hellenism; there exists not even a single coin of its rulers. But the opinion of modern authors— that it had been a special refuge of Zoroastrianism— is based upon a wrong etymology of the name (which is falsely explained as ” country of fire-worship “), and has no foundation whatever. There ˆcan be no doubt that the kings adhered to the Persian religiSn; but it is not probable that it was deeply rooted among their subjects, especially among the non-Aryan tribes.

Southern Media remained a province of the Seleucid Empire for a century and a half, and Hellenism was introduced every- where. ” Media is surrounded everywhere by Greek towns, in pursuance of the plan of Alexander, which protect it against the neighbouring barbarians,” says Polybius (x. 27). Only Ecbatana retained its old character. But Rhagae became a Greek town, Europus; and with it Strabo (xi. 524) names Laodicea, Apamea^ Heraclea or Achais (cf. Plin. vi. 48). Most of them were founded

by Seleucus I. and his son Antiochus I. In 221, the satrap Molon tried to make himself independent (there exist bronze coins with his name and the royal title), together with his brother Alexander, satrap of Persis, but they were defeated and killed by Antiochus the Great. In the same way, in 161, the Median* satrap Timarchus took the diadem

and conquered Babylonia; on his coins he calls himself ” the great king Timarchus”; but this time again the legitimate king, Demetrius I., succeeded in subduing the rebellion, and Timarchus was slain. But with Demetrius I. the dissolution of the Seleucid Empire begins, which was brought on chiefly by the intrigues of the Romans, and shortly afterwards, about 150, the Parthian king, Mithradates I. (q.v.), conquered Media (Justin xli. 6). From this time Media remained subject to the Arsacids, who changed the name of Rhagae, or Europus, into Arsacia (Strabo xi. 524), and divided the country into five small provinces (Isidorus Charac). From the Arsacids or Parthians, it passed in a.d. 226 to the Sassanids, together with Atropatene. By this time the old tribes of Aryan Iran had lost their character and had been amalgamated into the one nation of the Iranians. The revival of Zoroastrianism, which was enforced everywhere by the Sassanids, completed this development. It was only then that Atropatene became a principal seat of fire-worship, with many fire-altars. Rhagae now became the most sacred city of the empire and the seat of the head of the Zoroastrian hierarchy; the Sassanid Avesta and the tradition of the Parsees therefore consider Rhagae as the home of the family of the Prophet. Henceforth the name of Media is used only as a geographical term and begins to disappear from the living language; in Persian traditions it occurs under the modern form Mah (Armen. Mai; in Syriac the old name Madai is preserved; cf. Marquart, Eranshahr, 18 seq.).

For Mahommedan history see Caliphate; for later history Seljuks and Persia. (Ed. M.)

MEDIATION (Lat. medius, middle), in the international sense, the intervention of a third power, on the invitation or with the consent of two other powers, for the purpose of arranging differences between the latter without recourse to war. Mediation may also take place after war has broken out, with a view to putting an end to it on terms. In either case the mediating power negotiates on behalf of the parties who invoke or accept its aid, but does not go farther. Unlike an arbitrating power the mediator limits his intervention to suggestion and advice. His action is liable to be arrested at any time at the will of either party unless otherwise agreed, in which case to arrest it prematurely would be a breach of good faith. The difference between mediation and arbitration may be stated in the words of the Digest (lib. iv. tit. 8, § 13): ” Recepisse autem arbitrium videtur, ut ait Pedius, qui judicis partes suscepit finemque se sua sententia controversiis imposi- turum pollicetur. Quod si hactenus intervenit ut experiretur an concilio suo vel auctoritate discuti litem paterentur, non videtur arbitrium recepisse.”

Some writers distinguish mediation from ” good offices,” but the distinction is of little practical value. We may, if we please, regard ” good offices ” as inchoate mediation, and ” mediation ” as good offices brought to the birth. Thus we may say that a third power renders ” good offices ” when it brings the parties together so as to make diplomatic negotia- tions between them possible; whilst if it takes an active part in those negotiations it becomes for the time being a mediator. The spontaneous yet successful effort made by President Roosevelt in 1905 to bring together the Russian and Japanese governments, and to secure their appointing delegates to discuss terms of peace, although not strictly mediation, was closely akin to it.

Of successful mediation in the strict sense there have been many instances: that of Great Britain, in 1825, between Portugal and Brazil; of France, in 1849-1850, when differences arose between Great Britain and Greece ; of the Great Powers, in 1 868-1869, when the relations of Greece and Turkey were strained to breaking-point by reason of the insurrection in Crete; of

Pope Leo XIII., in 1885, between Germany and Spain in the matter of the Caroline Islands. In these cases mediation averted war. The Austro-Prussian War of 1866, the war between Chile and Peru in 1882, and that between Greece and Turkey in 1897, are instances of wars brought to a close through the mediation of neutral powers. Mediation has also been occasion- ally employed where differences have arisen as to the interpreta- tion of treaties or as to the mode in which they ought to be carried out: as when Great Britain mediated between France and the United States with regard to the Treaty of Paris of the 4th of July 1830. In one case at least mediation has been successful after a proposal for arbitration had failed. In 1844, when war between Spain and Morocco was threatened by reason of the frequent raids by the inhabitants of the Rif on the Spanish settlement of Ceuta, Spain declined arbitration on the ground that her rights were too clear for argument. But both she and Morocco subsequently accepted joint mediation at the hands of Great Britain and France.

The cause of mediation was considerably advanced by the Declaration of Paris of 1856. The plenipotentiaries of Great Britain, France, Austria, Russia, Sardinia and Turkey recorded in a protocol, at the instance of Lord Clarendon, their joint wish that ” states between which any misunderstanding might arise should, before appealing to arms, have recourse so far as circum- stances might allow {en tant que les drconstances I’admettraient) to the good offices of a friendly power.” Article 8 of the Treaty of Paris, concluded in the same year, stipulated that ” if there should arise between the Sublime Porte and

one or more of the other signing powers any misunderstanding which might endanger the maintenance of their relations, the Porte and each of such powers, before having recourse to the use of force, shall afford the other contracting parties the opportunity of preventing such as extremity by means of mediation." These precedents (in which it will be seen that " good offices " and " mediation " are used interchangeably) were followed in the general act agreed to at the Conference held at Berlin in 1884-1885 the object of which was to secure religious and commercial liberty and to limit warlike operations in the Congo basin.

A special form of mediation was proposed by a delegate from the United States at the Peace Conference held at the Hague in 1899, and was approved by the representatives of the powers there assembled. The clause in which this proposal was embodied provided in effect that, whenever there is danger of a rupture between two powers, each of them shall choose a third power to which these differences shall be referred, and that, pending such reference, for a period not exceeding thirty days (unless the time is extended by agreement) the powers at issue shall cease to negotiate with each other and leave the dispute entirely in the hands of the mediating powers. The powers thus appealed to occupy a position analogous to that of seconds in a duel, who are authorized to arrange an " affair of honour " between their principals. This novel device has the advantage of toning down, if not of eliminating, personal and national prejudices by which controversy is frequently em- bittered. It also gets over the difficulty, often met with in arbitration, of choosing a referee satisfactory to both parties. The closer the relations between states become, the more their commercial interests are intertwined, the larger the part which mediation seems destined to play. It is true that states which have accepted the intervention of a mediator remain free to adopt or reject any advice he may give, but the advice ef a disinterested power must always add considerable moral weight " to the side towards which it inclines. (M. H. C.)

MEDIATIZATION (Ger. Mediatisierung, from Lat. mediatus, mediate, middle), the process by which at the beginning of the 19th century, a number of German princes, hitherto sovereign as holding immediately of the emperor, were deprived of their sovereignty and mediatized by being placed under that of other sovereigns. This was first done on a large scale in 1803, when by a recess of the imperial diet many of the smaller fiefs were mediatized, in order to compensate those German princes who had been forced to cede their territories on the left bank of the

Rhine to France. In 1806 the formation of the Confederation of the Rhine involved an extension of this mediatizing process, though the abolition of the empire itself deprived the word ” mediatization ” of its essential meaning. After the downfall of Napoleon the powers were besieged with petitions from the mediatized princes for the restoration of their ” liberties “; but the congress of Vienna (181 5) further extended the process of mediatization by deciding that certain houses hitherto immediate (i.e. Salm, Isenburg, Leyen) should only be represented mediately in the diet of the new Confederation. On the other hand, at Aix-la-Chapelle (1818) the powers, in response to the representations of the aggrieved parties, admonished the German sovereigns to respect the rights of the mediatized princes subject to them. Of these rights, which included the hereditary right to a seat in the estates, the most valued is that of Ebenburtigkeit (equality of birth), which, for purposes of matrimonial alliance, ranks the mediatized princes with the royal houses of Europe.

See August Wilhelm Heffter, Die Sonderrechte der Souveranen und der Mediatisirten; vormals reichsstandischen Hduser Deutschlands (Berlin, 1871). The mediatized families are included in the Almanack deGotha.

MEDICAL EDUCATION. Up to 1858 each University, Royal College of Physicians or of Surgeons, and Apothecaries’ areat Hall in Great Britain and Ireland laid down its

Britain and own regulations for study and examination, and ‘ granted its degree or licence without any State supervision. In that year, pursuant to the Medical Act, 21 & 22 Vict. c. 90, the General Medical Council of Medical Education and Registration was established, consisting of twenty-three members, of whom seventeen were appointed by the various licensing bodies and six by the Crown. This number was increased by the amended act of 1886 to twenty nine, three of the six additional members being elected by the profession as ” direct ” representatives. The object of the act was ” to enable persons requiring medical aid to distinguish qualified from unqualified practitioners.” To this end the ” Medical Register ” was established, on which no person’s name could be inscribed who did not hold a diploma or licence from one or more of the licensing bodies after examination. By the 1886 act a qualifying examination was defined as “an examination in medicine, surgery, and midwifery,” conducted by universities or by medical corporations, of which one .must be capable

of granting a diploma in medicine, and one in surgery. The Council is authorized to require from the licensing bodies information as to courses of study and examinations, and generally as to the requisites for obtaining qualifications; and to visit and inspect examinations either personally or by deputy. If the visitors think the course of study and exami- nation of any licensing body is not sufficient to ensure that candidates obtaining its qualification possess the requisite knowledge and skill for the efficient practice of their profession the Council, on a report being made, may represent the same to the Privy Council. The Privy Council may, if it sees fit, deprive the accused body of its power to grant registrable qualifications. From this statement it will be seen that the powers of the Council are limited; nevertheless, by their cautious application, and by the loyal manner in which the licensing bodies have acted on the recommendations and suggestions which have from time to time been made, the condition of medical education has been improved; and although there is not a uniform standard of examination throughout the United Kingdom, the Council has ensured that the minimum require- ments of any licensing body shall be sufficient for the production of trustworthy practitioners.

One of the first subjects to which the Council applied itself was the establishment of a system of examinations in general" knowledge. Such examinations have to be passed before beginning medical study. On presentation of a certificate to the registrars of the Council, and on evidence being produced that the candidate is sixteen years of age, his name is inscribed on the " Students' Register." The subjects of examinations are: (a) English language, including grammar and composition

(marks not exceeding 5% of the total obtainable in this section may be assigned to candidates who show a competent knowledge of shorthand); (b) Latin, including grammar, translation from specified authors, and translation of easy passages not taken from such authors; (e) mathematics, comprising arithmetic; algebra, as far as simple equations inclusive; geometry, the subject-matter of Euclid, Books I., II. and III., with easy deductions; (d) one of the following optional subjects — Greek, French, German, Italian or any other modern language. Certificates are accepted from all the universities of Great Britain and Ireland, from the leading Indian and colonial universities, from government examination boards, and from certain chartered bodies. The German Abiturienten Examen of the gymnasia and reoZ-gymnasia, the French diplomas of Bachelier es Lettres and Bachelier es Sciences, and corresponding entrance examinations to other continental universities are also accepted.

As regards professional education, the Council divided its resolu- tions into “requirements” and “recommendations”; the former consisting of demands on the licensing bodies, non-compliance with which renders them liable to be reported to the Privy Council; the latter are regarded merely as suggestions for the general conduct of education and examination. The requirements may be sum- marized as follows: (a) Registration as a medical student, (b) Five years of bona-fide study between the date of registration and the date of the final examination for any diploma entitling the holder to be registered under the Medical Acts, (c) In every course of professional study and examination the following subjects must be contained, the Council offering no opinion as to the manner in which they should be distributed or combined for the purposes of teaching or examination, this being left to the discretion of the bodies or of the student — (i.) physics, including the elementary mechanics of solids and fluids, and the rudiments of heat, light and electricity ; (ii.) chemistry, including the principles of the science, and the details which bear on the study of medicine; (iii.) elementary biology; (iv.) anatomy; (v.) physiology; (vi.) materia medica and pharmacy; (vii.) pathology; (viii.) therapeutics; (ix.) medicine, including medical anatomy and clinical medicine; (x.) surgery, including surgical anatomy and clinical surgery; (xi.) midwifery, including diseases peculiar to women and to new-born children; (xii.) theory and practice of vaccination; (xiii.) forensic medicine; (xiv.) hygiene; (xv.) mental disease, (d) The first of the four years must be passed at a school or schools of medicine recognized by any of the licensing bodies; provided that the first year may be passed at a university or teaching institution where the subjects of physics, chemistry and biology are taught; and that graduates in arts or science of any university recognized by the Council, who shall have spent a year in the study of these subjects, and have passed in them, shall be held to have completed the first of the five years of medical study, (e) The study of midwifery practice must consist of three months’ attendance on the indoor practice of a lying-in hospital, or the student must have been present at not less than twenty labours, five of which shall have been conducted throughout under the direct supervision of a registered practitioner.

The fifth year of study is intended to be devoted to clinical work and may be passed at any one or more public hospitals or dispen- saries, British or foreign, recognized by the licensing authorities; six months of this year may be passed as a pupil to a practitioner possessing such opportunities of imparting practical knowledge as shall be satisfactory to the medical authorities. This latter method is rarely employed.

The ” recommendations ” of the Council contain suggestions which

may or may not be acted on by the bodies. For the most part they are complied with in connexion with the system of practical and clinical teaching.

The Council satisfies itself that its requirements are acted on, and that the examinations are ” sufficient,” by cycles of inspection about every five years. The examination of each licensing body is visited by an inspector, who forwards his report to the Council, which sends each report to the body for its information and remarks. As yet it has never been the duty of the Council to report to the Privy Council that any examination has not been found sufficient.-,.ˆ

Most universities exact attendance at more classes than the colleges and halls; for instance, botany and natural history are taught to their students, who are also examined in them. But with these exceptions the system of professional education is fairly uniform. Since 1875 attendance on ” practical ” classes has been called for in all subjects. Under this system the larger classes in which the subjects are taught systematically are broken up, and the students are taught the use of apparatus and the employment of methods of investigation and observation. Tutorial instruction is super- imposed on teaching by lecture. Much the same plan is adopted in respect of clinical instruction : not only is the student taught at the bedside by the lecturer, but he receives, either from the house- ‘ surgeon or house-physician or from a specially appointed clinical

tutor, an insight into methods of examination of diseases, and learns practically the use of the stethoscope and other aids to diagnosis, and of surgical and obstetrical instruments. In fact, it may be sa|d that each subject of instruction is duplicated. If this is taken into account, it must be evident that the time of the student is fully occupied, and the belief is rapidly growing that five years is too short a period of study. As a matter of fact, the average time taken to obtain a British licence to practise is upwards of six years. The probability is that the solution of the difficulty will be found in the inclusion of such subjects as physics, biology and chemistry in a ” preliminary scientific ” examination, which may have to be under- taken before registration as a medical student, thus leaving the whole five years to be devoted to purely professional study.

The German regulations in regard to professional study are few. They are those for the Staats Examen, for which the university degree is no longer necessary. The regu- lations for the admission of candidates to the Staats Examen are contained in the royal proclamations of the 22nd of June 1883. They comprise: (a) Certificate of a course of study at a classical gymnasium of the German Empire. In exceptional cases, the same from a classical gymnasium outside the German empire may be considered sufficient. (For details of the course of study and examinations, see Minutes of the General Medical Council, vol. xxvii. appendix 3.) (b) Certificate from a univer- sity, certifying a course of medical study of at least nine half- years at a university of the German empire, (c) Certificate that the candidate has passed, entirely at a German university, the medical Vorprufung, and thereafter has attended for at least four half-years the medical studies of a university, (d) The special testimony of the clinical directors bearing witness that the candidate has taken part as Praktikant (clerk or dresser) during two half-years at the medical, surgical, and gynaeco- logical clinics; has himself delivered two cases of labour in the presence of his teachers or assistant physicians ; and has attended for a half-year as Praktikant the clinic for diseases of the eye.

The medical Vorprufung referred to is necessary alike for the Staats Examen and the degree of Doctor of Medicine. It takes place at the end of the second year (fourth semestre), and includes the subjects of experimental physics, chemistry, botany, zoology, anatomy and physiology. It is conducted by a board appointed yearly by the Minister of Education.

No one can practise medicine in France who does not possess the diploma of Doctor of Medicine of a French university. The

qualification of Officier de sante is no longer granted.

Before he can inscribe as a student of medicine the applicant must have obtained the diplomas of Bachelier es lettres and Bachelier es sciences. Although the course of professional study may be completed in four years, a longer time is generally taken before the student proceeds to the final examination for the doctor’s degree. Each year is divided into four trimestres; at each trimeslre the student must make a new inscription. The trimestres are (1) November and December, 56 days; (2) January, February, March, 86 days; (3) April, May, June, 86 days; (4) July, August, 56 days. Practically there are no regulations determining the division of the various subjects, or the number of lectures in each. course, or requiring the student to attend the courses. The medical faculty of each university puts, before the student a

scheme recommending a certain order of studies (Division des etudes) for each of the four years of the medical course, and, as a matter of fact, this order of study is enforced by the system of intermediate examinations (Examens du fin d'annie). All the lecture courses are free, as also are the clinics and the hospital service, and there is no system of ascertaining the regularity of attendance at lectures, or of certificate of attend- ance. If, however, the student fails to pass the Examen du fin d'annie he is debarred from making the next trimestral inscrip- tion, and thus loses three months. The lectures are, however, closely attended. In contrast to the freedom in regard to atten- dance on systematic lectures, there are strict direction and control in regard to hospital attendance and practical courses. The student is required to sign a register ad hoc each time he goes in and out. From the beginning of the third year, e.g. from the ninth quarterly inscription, hospital attendance is enforced till the end of the fourth year. No one can renew his trimestral inscription without producing a schedule of his last trimestral

stage, showing that during it he had not absented himself more than five times without explanation. Practical work is obliga- tory during each of the four years.

Besides systematic courses of lectures, Conferences are held by the assistant-professors (agreges) in natural history, physiology, general pathology, internal pathology, external pathology. At the end of the first year the student is examined in osteology, myology and the elements of physiology ; at the end of the second year, in anatomy and physiology in all their branches; at the end of the third year, in medicine and surgery ; at the end of the fourth year, an examina- tion is held over the whole field of study.

No one is allowed to enter on the study of medicine without passing the Artium examen of a secondary school. This is the equivalent of the German Abiturienten Examen of enm „ˆ a classical gymnasium. After study for two semestres an examination must be passed in psychology, logic and history. The special professional examinations consist of (1) preliminary scientific, in botany, zoology, physics, chemistry; (2) first special or professional, anatomy (orally and by dissections), physiology, and pharmacology; (3) second special or professional, written examinations in medicine, surgery, medical jurisprudence; practical and oral in operative surgery, in clinical medicine, and clinical surgery; and oral in pathological anatomy, medicine, surgery; and midwifery. The completion of the full medical course takes six

years, of which the first two are devoted to the study of the natural sciences.

Authorities. — The history of the development of medical educa- tion from the earliest times down to 1894 will be found treated of generally in Puschmann's Geschichte des medicinischen Unterrichts (Leipzig, 1889-1905) translated by E. H. Hare (London, 1891). Those desiring more special information on the subject in regard to the details of British institutions should consult the annals of the various universities and colleges of Great Britain and Ireland. The following works supply much interesting information regarding the gradual rise and development of teaching and examination: Annals of the Barber Surgeons, by Sydney Young (1890); History of the Royal College of Surgeons of Ireland, by Cameron (1886); Early Days of the Royal College of Physicians of Edinburgh, by Peel Ritchie (1899); Historical Sketch of the Royal College of Surgeons of Edinburgh, by Gairdner (i860) ; Memorials of the Faculty of Physicians and Surgeons of Glasgow, by Duncan (1896); The Story of the Univer- sity of Edinburgh, by Sir A. Grant (1884); University of Glasgow, by Stewart (1891). (J. B. T.)

As late as 1880 medical education in the United States was in a deplorable condition. In the early history of the country, before and shortly after the beginning of the 19th century, the few medical colleges had shown a dis- states. position to require a liberal education on the part of those who entered upon their courses, and some effort was made, through the agency of state boards, to control the licence to practise. But as the country increased in population and wealth preliminary requirements were practically abolished, the length of the courses given each year was shortened to four or five months or less, and in the second and final year there was simply a repe-r tition of the courses given during the first year. This is to be attributed mainly to the fact that there was no general national or state supervision of medical training. Medical colleges could obtain incorporation under state laws without difficulty, and brought considerable advantages in the way of prestige and increased practice to those concerned. That the existence of a college depended solely upon the fees of the students encouraged the tendency to make both entrance and graduation requirements as easy as possible, especially as there was no state supervision, and the mere possession of a diploma entitled the holder to practise. Fortunately, during this period the practical character of the clinical instruction given in the better colleges fitted tn"»- graduates in some measure for the actual necessities of practice, while the good traditions of medicine as a learned profession stimulated those who adopted it as a career, so that in the main "the

body of practitioners deserved and held the confidence and respect of the community. From the middle of the 15th century there has been constant agitation on the part of the physicians themselves for an improvement in medical education. The first notable result was an increase in the time of instruction from two to three years (Chicago Medical College, 1859; Harvard Medical School, 187 1), the lengthening of each session to six

months or more, and the introduction of graded courses instead of a repetition of the same lectures every year. The improve- ment thus begun became marked during the decade 1 890-1 900, amounting almost to a revolution in the rapidity with which the course of instruction was amplified. Many factors co-oper- ated to produce this result: the general development of scientific instruction in the colleges and secondary schools, the influence of the large number of medical graduates who completed their training by study in European schools, the adoption by many states of stringent regulations regarding the licence to practise within their borders, the good examples set by many leading schools in voluntarily raising their requirements for entrance and graduation, and, perhaps above all in its general effect, the agitation continually maintained by several national or state associations which in a measure have exerted the general regulating control that in other countries has been enforced by national legislation. Among the most influential of these associations are the American Medical Association, the American Academy of Medicine, the Association of American Medical Colleges, the Illinois State Board of Health, and the University of the State of New York.

The different states make their own general regulations as to the practice of medicine within their borders. Certain states recognize the medical diplomas granted by other states having equivalent standards of examination. Such certificates are generally required to be (a) of graduation from a ” reputable medical school,” (b) certificates of moral character, (c) the applicant must be at least twenty-one years of age. These enable the candidate to present himself before the state board for the state examination. In many states the applicant must satisfy the board not only as to his professional, but as to his general education. The standing of the various medical schools is usually left to the state boards, each one determining the matter for its own state, consequently a school may confer a degree recognized as reputable in several states but not in others. Only three or four states regulate the chartering of institutions. In other states any body of men may secure articles of incorporation of a college or school by paying the necessary

state fee, without question as to the ability of the incorporator to furnish an education. So strong, however, has been the growth of American public opinion that a four^years' course of medical training has become the standard in medical schools, and in the majority this is in addition to one or two years' training in the natural sciences. There are some sixty- five state boards, and many have adopted strong medical practice acts.

The standard of preliminary requirements for entrance to the medical schools is being gradually raised, and a large number of the states demand a certificate of a high school education, while the colleges comprising the Association of Medical Colleges, which numbers more than half the American medical schools, accept as an entrance standard a certificate of at least one year's study at a high school. In the report for 1908 of the United States bureau of education of 71 schools, which report the number of theif students having an arts degree, it is stated that a degree was held by only 15% of the candidates in medicine. These students were mostly distributed between the Johns Hopkins Medical School (which from the date of its foundation in 1893 has only admitted college gradu- ates, and has in addition stipulated that candidates shall have a knowledge of French and German and have already completed a year's training in the natural sciences), Harvard Medical School and Columbia University, and the medical departments of the universities of California, Michigan and Chicago (Rush Medical College) require on entrance the equivalent of a two-years' college course, which must include French and German, together with physics, chemistry and biology. This tendency is in accordance with the recommended standard of medical education suggested by the Council of Medical Education and adopted by the House of Delegates of the American Medical Association, of which the following is a summary : —

1. (a) The preliminary of a four-years' high school education or an examination such as would admit to a recognized university.

(4) In addition a year of not less than nine months devoted to chemistry, physics and biology and one language (preferably French or German) to be taken at a college of the liberal arts.

2. Previous to entering a medical college every student should re- ceive from the state board a " medical student's entrance certificate " to be given on the production of credentials of training as above.

3. Four years of study in a medical college having a minimum of a 30-weeks' course each year, with not less than 30 hours' work per week.

4. Graduation from college to entitle a candidate to present himself for examination before a state board.

5. A satisfactory examination to be passed before the state board.

Practically all medical schools admit women, but there are three separate schools of medicine for women: The Women's Medical College of Philadelphia, Pennsylvania; Women's Medical College, Baltimore, Maryland; New York Medical College and Hospital for Women — the last being one of the eighteen homoeopathic colleges of the United States.

Authorities. — J. M. Tower, Contributions to the Annals of Medical Progress and Medical Education in the United States, before and during the War of Independence (Washington Government Printing Office, 1874) ; N. S. Davis, History of Medical Education and Institutions in the United States (Chicago, 1851); Contributions to the History of Medical Education and Medical Institutions in the United States (Washington, Government Printing Office, 1877); J. B. Beck, An Historical Sketch of the State of Medicine in the American Colonies (Albany, 1850); Bulletins of the American Academy of Medicine (The Chemical Publishing Company, Easton, Pa.); H. L. Taylor, " Professional Education in the United States," College Department, University of the State of New York, Bulletin 5, i8qq, and Bulletin 8, iqoo; " Courses of Study in Medical Schools," Report of the Commissioners of Education (Washington, 1908) ; F. R. Packard, M.D., The History of Medicine in the United States (1901); Journal of American Medical Association (Aug. 14, 1909) ; A. Flexner, Medical Education in the U.S. and Canada (19 10). (W. H. H. ; H. L. H.)

MEDICAL JURISPRUDENCE, or Forensic Medicine, that branch of state medicine which treats of the application of medical knowledge to certain questions of civil and criminal law. The term " medical jurisprudence," though sanctioned by long usage, is not really appropriate, since the subject is strictly a branch of medicine rather than of jurisprudence; it does not properly include sanitation or hygiene, both this and medical jurisprudence proper being distinct branches of state medicine. The connexion between medicine and the law was perceived long before medical jurisprudence was recognized, or had obtained a distinct appellation. It first took its rise in Germany, and more tardily received recognition in Great Britain. Forensic medicine, or medical jurisprudence proper as distinguished from

hygiene, embraces all questions which bring the medical man into contact with the law, and embraces (1) questions affecting the civil rights

I. — Questions affecting the Civil or Social Rights of Individuals

1. Development of the Human Frame.— The development of the physical and mental powers of the human being is a factor of great consequence in determining criminal responsibility, civil responsibility, or the power of giving validity to civil contracts, and in determining the personal identity of a living person or of a corpse. Human life is usually divided into the five periods of infancy, childhood, youth, manhood and old age. Some writers increase the number of these unnecessarily to seven periods.

Infancy is the period from birth till the first or milk set of teeth begin to be shed — usually about the seventh year. During this period the body increases in size and stature more, relatively, than at any other period of existence; and the mental faculties undergo great development. The milk teeth, twenty in number, are evolved in a definite order, beginning with the central incisors at about six months, and ending with the second molars about the termination of the second year. From the size and stature of the body, the development of the teeth, and the more or less advanced^ state of ossification or solidification of the bony skeleton, conclusions may be drawn as to the probable age of the infant. v *<

Childhood extends from the commencement of the shedding of the milk teeth to the age of puberty — usually from the seventh to the fourteenth or fifteenth year. During this period the body expands, as well as the bony structures, without any clearly marked difference in structure being observable between the sexes except as regards the genitals, so that it is impossible to distinguish abso- lutely between the male and the female skeleton during this period. The milk teeth are shed, and are replaced by the second or per- manent set, thirty-two in number, though these do not usually all make their appearance during childhood. Marked differences between the proclivities of the sexes are noticeable even at an early period of childhood, arid long before the characteristic functions begin to be developed.

Youth is marked at its commencement by the changes which occur at

puberty — the development of the genitals in both sexes, the appearance of hair on the genitals, the appearance of a beard in the male, the development of the. breasts in the female, the appearance of the monthly flow in the female, and the ability to secrete semen in the male. Marked mental changes now occur, and the generative functions are perfected. Youth terminates at the age of legal majority, twenty-one years, or perhaps the period ought to be extended to twenty-five years of age, as it is with some nations. .

Manhood (or Womanhood) is the period of perfection of all the bodily and mental powers. It ceases in woman with the cessation of the monthly flow at about forty-five years of age ; but in man it often extends to a much later period of life.

Old Age begins with the decay of the bodily and mental faculties, and is characterized by wrinkling of the skin, loss of the teeth, whitening of the hair, and feebleness of the limbs. In its later stages decay of the mental faculties, deafness, obscurity or loss of vision, and bowing of the spine are added.

2. Duration of Human Life. — The chances of human life form an important subject of inquiry, and on deductions from com- parisons of birth and death rates is founded the system of annui- ties, insurance against loss in sickness, and the insurance of lives. Since the establishment of compulsory registration of deaths, our knowledge of the ordinary and extraordinary chances of human life has been extended, and surer data are available for calculations of probabilities of life, of survivorships, and of the payments which ought to be made in benefit clubs (see Insurance).

3. Personal Identity. — Where the identity has to be established or disproved after long absence, exposure to foreign climates and hardships, wounds, &c, the problem has often been extremely difficult. The data for identifying a person are individual and family likeness, stature, the colour of the eyes, peculiarities of garb and manner, recollection of antecedent events, but more especially marks on the persons either congenital or acquired. Such are naevi or mother's marks, scars, and disunited or badly united fractures, known to have existed upon the missing person (see Identification). In the case of the living, identification is more often a matter for the police officer than for the medical man. Bertillon and Galton have each devised methods for the identification of criminals (see Anthropometry, and Finger-prints).

4. Marriage. — Under this head the medical jurist has to deal

principally with the nubile age, viewed in the light of nature and according to legislative enactments, and with such physical circumstances as affect the legality of marriages, or justify divorce.

In Great Britain the age at which the sexes are first capable of propagating the species is later than in more southern climes. Ordinarily it does not occur before fifteen years of age for the male and fourteen for the female; exceptionally it occurs at the ages of thirteen and of twelve (or even less) respectively in the male and female. By law, nevertheless, parents and guardians may, in England at all events, forbid the marriage of young people till the age of legal majority. The only physical circumstances which in Great Britain form a bar to marriage are physical inability to consummate, and the insanity of one of the parties at the time of marriage. Both those circumstances have been pleaded and sustained in the law courts. In other countries minor physical circumstances, as disease, are held to invalidate marriage.

5. Impotence and Sterility. — These are of importance in con- nexion with legitimacy, divorce and criminal assaults. Impo- tence and sterility may arise from organic or from functional causes, and may be curable or incurable. Impotence (q.v.) is taken cognisance of by the law courts as a ground of divorce, and might, of course, be urged as a defence in a case of rape. Sterility is not a ground of divorce, but might be a question of importance in cases of legitimacy.

6. Pregnancy. — This subject presents one of the widest fields for medico-legal evidence. The limits of age between which it is possible, the limits of utero-gestation, and the signs of pregnancy may all in turn be the subjects of investigation.

The limits of age between which pregnancy is possible are usually fixed by the appearance and cessation of the monthly flow; and these ordinarily begin about fourteen and cease at forty-five years of age. Exceptionally they appear as early as the tenth year, and may not cease till the end of the fifth decade of life. Cases, however, have occurred where a woman has conceived before menstruating; and a few doubtful cases of conception are recorded in women upwards

of fifty or even sixty years of age. The general fact of pregnancy being limited by the age of puberty on the one hand and the cessation of the monthly flow — or fifty-three or fifty-four years as the extreme limit of age — must be accepted as the safest guide in practice. _

The limits of utero-gestation are not in England fixed by legisla- tion.

The French code fixes the extreme limit of three hundred days. The ordinary period is forty weeks and a half, or two hundred and eighty-three days from the cessation of the last monthly flux. The limit of three hundred days, as fixed by the French code, is perhaps never exceeded, if ever reached. The uncertainty of females in fixing the exact date of conception has given rise to the discrepant opinions of physiologists on the subject. It is well known, however, that among the higher animals the period is not precise; and impregnation and conception need not necessarily be coincident.

The signs of pregnancy are of the utmost importance to the medical jurist. He may be called upon to pronounce upon the virtue of a female, to sustain or rebut a plea for divorce, to determine whether a capital sentence shall be carried out, or to determine whether it is probable that an heir will be born to an estate. Medical jurists classify the signs of pregnancy as uncertain or certain; it is the former which are most regarded by the public, but the latter are alone of probative value to the jurist. The usual and uncertain signs are the cessation of the monthly flow, nausea, sickness, a darkening of the areola and the formation of a secondary areola around the nipple, enlargement of the breasts, increased size of the abdomen, the formation of a tumour in the womb, quickening, and the motions of the foetus. Also uncertain are the uterine souffle, which is a peculiar soft sound heard over the abdomen and syn- chronous with the maternal pulse and ballottement or the examination for a floating tumour in the abdomen between the fifth and eighth months of pregnancy. The certain signs of pregnancy are the foetal limbs palpated through the abdomen by the physician, the pulsations of the foetal heart heard by means of the stethoscope, the pulsations being much quicker and not synchronous with the maternal pulse. This latter is inapplicable before the fourth month of gestation.

7. Parturition. — The imminence of the process of parturition is of comparatively little interest to the medical jurist; but the signs of recent delivery are all-important. These signs are the bruised, swollen, and lacerated state of the external genitals, relaxation and dilatation of the vagina and womb, the existence of a peculiar vaginal discharge known as the lochia, a relaxed and fissured condition of the abdominal walls, a peculiar aspect of the countenance, and the distended state of the breasts due to the secretion of milk. The lochial discharge is the most character- istic sign. All the signs may disappear within ten days of delivery, though this is not usual.

Connected with parturition, the question of viability (potentiality for life) of the child is not unimportant. _ After the intra-uterine age of

seven months is reached a child is certainly viable. The period at which the foetus becomes viable cannot be stated with certainty ; but five calendar months, or one hundred and fifty days, is perhaps the nearest approximation. The viability of a child is judged by its size and weight, its general state of development^ the state of the skin, hair, and nails; its strength or feebleness,the ability to cry, and its power of taking maternal nourishment. The question of viability has important bearings upon the crime of infanticide. In the case of succession to property the meaning of ” born alive ” is different from the meaning of the same expression as used respect- ing infanticide. In questions of tenancy by the curtesy (q.v.) it has been decided that any kind of motion of the child, as a twitching and tremulous motion of the lips, is sufficient evidence of live-birth. By the French code, however, no child that is born alive can inherit, unless it is born viable. As regards infanticide, proof of a conclu- sive separate existence of the child is demanded before live-birth is admitted. ‘ _ …

The subject of superfoetation and superfecundation, or the possibility of two conceptions having occurred resulting in the birth of twins with a considerable intervening interval, is obscure and has given rise to much controversy. There is much, however (e.g. the existence of a double or bifid uterus), to countenance the view that a double conception is possible.

8. Monsters and Hermaphrodites. — To destroy any living human birth, however unlike a human creature it may be, is to commit a crime. Blackstone states that a monster which hath not the shape of mankind hath no inheritable blood; but the law has not defined a monster, nor what constitutes a human form. The same author states that if, in spite of deformity, the product of birth has human shape, it may be an heir. Hermaphrodites are beings with malformations of the sexual organs, simulating a double sex. Physiologists do not admit, however, the existence of true hermaphrodites with double perfect organs, capable of performing the functions of both sexes.

9. Paternity and Affiliation. — These are often matters of great doubt. A considerable time may elapse between the absence or death of a father and the birth of his reputed child. As has already been said, three hundred days is the utmost limit to which physiologists would extend the period of utero-gestation. This subject involves questions respecting children born during a second marriage of the mother,

posthumous children, bastardy, and alleged cases of posthumous children.

10. Presumption of Survivorship. — When two or more persons perish by a common accident, when a mother and her new-born child are found dead, and in a few analogous cases, important civil rights may depend upon the question which lived the longest; and great ingenuity has been displayed in elucidating the disputes which have arisen in the law courts in such cases.

11. Maladies exempting from Discharge of Public Duties frequently demand the attention of the medical man. He may be called upon to decide whether a man is able to undertake military or naval service, to act as a juryman without serious risk to life or health, or to attend as a witness at a trial.

12. Feigned and Simulated Diseases often require much skill and caution in order to detect the imposture.

13. The Signs of Death. — The determination of the actual existence of death assumes a certain importance in tropical countries, where the necessity for speedy interment may involve a risk of burial alive. Such an accident cannot well occur where a medical man confirms the existence of death, and in the United Kingdom, where burial rarely takes place before the lapse of forty-eight hours, such changes usually occur in the body as to render any error practically impossible. Within a varying period, usually not more than twelve hours, the body becomes rigid, owing to the development of rigor mortis or post mortem rigidity. The blood, which during life is equally distributed throughout the body, gravitates to the most dependent parts and develops a discoloration of the skin which is known as post mortem lividity or post mortem staining. At a variable period of time, dependent on the cause of death, also the tempera- ture and moisture of the air to which the body is exposed, de- composition or putrefaction sets in. These changes after death are of great importance, not only as affording certain proof of death, but also because they furnish valuable information as to the probable time at which it occurred, and from the fact that they may alter or destroy evidence as to the cause of death.*

14. Insanity or Mental Alienation. — A medical man may be required to give evidence in any of the law courts, civil, criminal or ecclesiastical, before commissions de lunatico inquirendo, or before a magistrate, as to the sanity or insanity of an individual; and he may have to sign certificates of unsoundness of mind with the view of

providing for the safe custody and proper treatment of a lunatic. Hence he must be familiar with the chief forms of insanity (see Insanity), and be able to distinguish and treat each of these. He will also be required to detect feigned insanity, and to examine persons charged with crime with the view of preventing real lunatics from being treated as criminals.

II. — Injuries to the Person

1. Defloration. — The signs of defloration are obscure and uncertain; and it is rather by the coexistence of several of the usual marks than the existence of any one sign, that any just

‘ conclusion can be arrived at. .

2. Rape.- — This crime consists in the carnal knowledge of a woman forcibly and against her will. The proofs of rape apart from the consistency of the woman’s story, mainly depend on the presence of marks of violence, stains, &c. In all charges of rape, the woman and her assailant should be examined as soon as possible by a medical man, but such examination, it is important to remember, can only be carried out with the free consent of the party to be examined. It is to be noted that according to English law the slightest degree of penetration is sufficient to constitute the crime of rape.

3. Mutilation. — This may consist in the cutting or maiming of any member; castration is the most important, and perhaps but

rarely effected as a crime. Self-mutilation, giving rise to false accusations, is occasionally resorted to.

4. Criminal Abortion. — This crime consists in unlawfully procuring the expulsion of the contents of the gravid uterus at any period short of full term. It must be noted that while this definition may be held to recognize the induction of premature labour by medical men in certain circumstances, yet, when the operation is necessary, a medical man should always protect himself from possible misconstruction of his action {i.e. criminal intent) by having a consultation with another practitioner. The means employed in criminal abortion to procure the desired result may be classed under three heads: (1) general violence to the body, (2) administration of drugs supposed to have aborti-facient qualities, (3) instrumental interference with the contents of the uterus. Among the drugs frequently employed for the purpose, although by no means always successfully, are ergot, strong purgatives, iron, rue, pennyroyal, savin.

5. Homicide. — The legal sense of the term homicide excludes such injuries as are the result of either accident or of suicide. It embraces murder or wilful homicide, manslaughter or culpable homicide, casual homicide, and justifiable homicide.

Ordinary homicide may be accomplished by several modes that may sometimes be ascertained by examination of the body, e.g. poison.

As a preliminary in all cases of homicide, it is the duty of the medical jurist in the first place to ascertain the fact of death, and to distinguish between real and apparent death; and then to determine, if possible, the period at which death took place.

Infanticide, or child murder, is by the British law treated with the same severity as the murder of an adult. Indeed infanticide as a crime distinct from murder has no legal recognition. Practi* cally this severity defeats itself, and hence an alternative charge of concealment of birth in England, or concealment of pregnancy in Scotland, is usually preferred in such cases.

The iniquity of the old law which threw the onus of proof of still-birth on the mother now no longer exists, and the law demandi strict proof of live-birth at the hands of the prosecution. Hence the subject involves nice points of forensic medicine. The child must be proved to have arrived at the period when there was a probability of its living (proof of viability) ; and as the establishment of respiration is necessary to prove live-birth the evidences of this act must be carefully investigated. The size and position of the lungs, and the state of the vessels concerned in foetal circulation, must be carefully noted. The foetal lungs are dark, dense and liver- like in appearance and consistence, and sink when immersed in water; whilst the fully respired lungs are rosy, marbled, and soft and crepitant when handled. Minor degrees of respiration are recognized by the appearance of little groups of dilated air-vesicles, and by the fact that, although the lungs as a whole may sink in water, certain portions of them, into which respired air has penetrated, float in water even after subjection to firm pressure in the hand. Care must be taken, nevertheless, to exclude buoyancy of the lung due to putrefaction; in this case the air may be expelled by gentle pressure, and the previously buoyant portion of lung now sinks in water. It is impossible, however, to distinguish certainly between a lung naturally inflated and one artificially insufflated.

It must be borne in mind that, although live-birth cannot be affirmed in the absence of signs of respiration, the presence of these signs is not

proof of live-birth in the legal sense of the term. The law demands for live-birth a separate existence of the child after delivery ; and breathing may take place whilst the child is still .either wholly or partially within the maternal passages, and in some special cases whilst still within the uterus itself.

When proofs of respiration — it may be to such an extent as to leave no doubt as to live-birth — have been found, the cause of death is then to be investigated. Wounds, and other forms of injuryˆ must be sought for. There may be signs of strangulation, suffoca- ”” tion, puncture of the fontanelles and consequent injury to the brain, the administration of a poison, or other means of procuring death. It must be borne in mind that some of these causes may be brought about by omission, or even by accident. Thus strangulation may arise from natural and unrelieved pressure of the navel-string on the neck of the child ; suffocation from immersion of the face of the child in the maternal discharges, or by pressure of clothes on the mouth. Death may result from haemorrhage through neglect to tie the navel-string, or the infant may perish from exposure to cold. In the case of exposed infants it is important to ascertain the real mother. As such exposure usually takes place soon after birth, comparison of the age of the infant with the signs of recent delivery in the suspected mother is the best method of proving the relation.

Death from Asphyxia. — Among the forms of violent death due to this cause are drowning, hanging, strangulation, garotting, smothering, suffocation from choking, mechanical interference with the expansion of the chest walls, as when persons are crushed together during a panic in a fire, breathing poisonous gases, such as carbonic acid or carbonic oxide. Suicide and accidental death from these causes are still more common.

Drowning is thought to produce death occasionally by the suddenness of the shock causing suspension of the functions of circulation and respiration — by shock without a struggle. The usual mode of death appears, however, to be by the circulation of unoxygenated blood through the brain acting as a poison upon that organ ; and this is attended with all the phenomena of asphyxia, as in suffocation. The phenomena attending asphyxia are as follows. As soon as the oxygen in the arterial blood, through exclusion of air, sinks below the normal, the respiratory movements grow deeper and at the same time more

frequent; both the inspiratory and expiratory phases are exaggerated, the supplementary respiratory muscles are Drought into play, and the breathing becomes hurried. As the blood becomes more and more venous, the respiratory movements continue to increase both in force and frequency. Very soon the expiratory movements become more marked than the inspiratory, and every muscle which can in any way assist in expiration is brought into play. The orderly expiratory movements culminate in ex- piratory convulsions; these violent efforts speedily exhaust the nervous system, and the convulsions suddenly cease and are followed by a period of calm. The calm is one of exhaustion ; all expiratory active movements have ceased, and all the muscles of the body are flaccid and quiet. But at long intervals lengthened deep inspiratory movements take place ; then these movements become less frequent ; the rhythm becomes irregular, so that each breath becomes a more and more prolonged gasp, which becomes at last a convulsive stretch- ing of the whole body ; and with extended limbs and a straightened trunk, with the head thrown back, the mouth widely open, the face drawn and the nostrils dilated, the last breath is taken. The above phenomena are not all observed except in cases of sudden and entire exclusion of air from the lungs. In slow asphyxia, where the supply of air is gradually diminished (e.g. in drowning), the phenomena are fundamentally the same, but with minor differences. The appearances of the body after death from drowning are various. There may be pallor of the countenance, or this may be livid and swollen. The air passages are filled with frothy mucus, and there may be water in the stomach. The ends of the fingers are often excoriated from grasping at objects; and weeds, &c, are sometimes found grasped in the hands. The distinction between murder and suicide by drowning can rarely be made out by examination of the body alone, and is usually decided from collateral circumstances or marks of a struggle. Attention must also be paid to the existence of wounds on the body, marks of strangulation on the neck, and the like.

Hanging may result in death from asphyxia, or, as is more particu- larly the case in judicial hanging, some injury is inflicted on the upper portion of the spinal cord, resulting in instant death. The ordinary appearances of .death from asphyxia may be found : dark fluid blood, congestion of the brain, intensely congested lungs, the right cavities of the heart full, and the left comparatively empty of blood, and general engorgement of the viscera. Ecchyrnosis may be found beneath the site of the cord, or a mere parchmenty appearance. There may even be no mark of the cord visible. The mark, when present, usually follows an oblique course, and is high up the neck. The fact that a body may

be suspended after death, and that if this be done speedily whilst the body is still warm there may be a post- mortem mark undistinguishable from the mark observed in death from hanging, must not be forgotten.

Suffocation may occur from the impaction of anv substance in the glottis, or by covering up the mouth and nose, it is frequently of accidental origin, as when substances become accidentally impacted in the throat, and when infants are overlaid. The phenomena are those of pure asphyxia, which have already been detailed. On post-mortem examination the surface of the lungs is found covered with minute extravasations of blood, known as punctated ecchyrnosis. Strangulation may be accomplished by drawing a cord tightly round the neck, or by forcibly compressing the windpipe (throttling). Hence there may be either a circular mark round the neck, not so oblique as after hanging, or the marks of the fingers may be found about the region of the larynx. The cartilaginous structures of the larynx and windpipe may be broken. The mark of the ligature is often low down in the neck. The signs of asphyxia are present in a marked degree.

Mephitism. — In the United Kingdom this last form of death usually results accidentally from an escape of lighting gas, the danger has been much increased in many towns owing to the addition of carburetted water-gas to the ordinary supply. Carbonic oxide gas is contained in ordinary lighting gas to the extent of about 6 to 8 %, and is extremely fatal when inhaled. Carburetted water- gas contains about 28 %, and when mixed with ordinary lighting gas the percentage of carbonic oxide is thus very much increased. As a mode of assassination it is seldom employed, but is frequently

resorted to on the continent of Europe by suicides, charcoal fumes being commonly used for the purpose.

6. Death from Starvation. — Cases occur in which it is important to distinguish this from other modes of death. In such cases the skin becomes harsh and dry, and may acquire a peculiar odour; the subcutaneous fat disappears; the gums shrink away from the teeth; the tongue and mouth become dark-coloured and dry; the eyes are bloodshot; the intestines become thin and their coats translucent; the gall-bladder is distended. The period of total abstinence from food required to kill an adult is unknown, and greatly depends upon whether there be access to liquid. In some cases persons have been able to subsist on little or no nourishment for long periods, the body being in a state of quasi-hibernation.

7. Death from Extremes of Temperature. — (1) Death from cold is not often observed in the British Isles. A portion only of the body, as the extremity of a limb, may perish from extreme cold. After the first sensation of tingling experienced on exposure to severe cold, loss of sensation supervenes, with languor and an irresistible propensity to sleep. The tendency to this forms an extreme danger in such cases. (2) Death from extreme heat usually occurs in the form of burning and scalding, attended with destruction of a large portion of the cutaneous structures. Here the cause of death is obvious. The human body is capable of exposure to very hot air — as is seen in Turkish baths— for a considerable period with impunity. Sunstroke is a cerebral affection brought on by too great exposure to a hot atmosphere, especially whilst undergoing fatigue.

8. Death fry Lightning. — Lightning or an electric current may cause instant death. No visible marks of the effects of the electric current may be left, or the body may be singed or discoloured, or the skin may be perforated at one or two spots.

9. Injuries or Wounds.— These include in a medico-legal sense not only those characterized as incised, punctured, contused, lacerated, stab wounds, but also burns, injuries produced by firearms, fractures, dislocations, &c. One of the chief questions which have to be decided in all forms of violent death is whether it was the result of accident, suicide or murder. In cases of fatal wounding, among the points to be noted, which will help to decide the question, are the situation, direction and extent of the wound, the position in which the body and any weapon may be found, together with the presence and distribution of any blood marks and the signs of a struggle. In wounds caused by fire- arms the injury, if suicidal, is usually situated in a vital and acces- sible part of the body, the temple, mouth, and chest being the favourite situations; but such an injury also presents, as a rule, the characteristic appearances resulting from the discharge of the weapon close to the body, viz. besides the wound of entrance of the bullet, there are singeing of the cuticle and hair, and blackening of the area immediately surrounding the wound, from particles of unconsumed powder being driven into the skin and from the smoke of the discharge. These effects are naturally not produced when the weapon is discharged at a distance exceed- ing 2 or 3 ft., as usually happens in cases of homicidal shooting. They may also be wanting in undoubted suicidal wounds produced by revolvers and cartridges filled with amberite or other smokeless powders. Death from burning is generally accidental, very rarely suicidal, and when homicidal is usually employed to conceal traces of other violence inflicted upon the body. In large conflagrations death is not always due to burning. Charred

bodies may be found presenting various injuries due to the fall of beams, crushing, the trampling of others tryifigvto escape, &c, or fractures and lacerations may be due simply to the action of the heat. Death may result from such injuries, or from suffocation by the gases of combustion, before the victim is affected by the actual fire. Spontaneous combustion of the body has been stated to occur, but the evidence upon which the cases rest is not well authenticated.

Punctured wounds or stabs require minute attention; for there have been instances in which death has been produced by an instru- ment so small as a pin thrust into a vital part. Wounds of the head are always dangerous, especially if the blow has been severe. The person so wounded may die without division of the skin, or fracture

of the bones, as happens in what is known as concussion of the brain. Contusions which do not divide the skin may fracture the skull ; or the inner table of the skull may be fractured without the outer being broken or depressed. Even wounds of the scalp may prove fatal, from inflammation extending towards the brain. Punctured wounds of the head are more dangerous than cuts, as more likely to excite fatal inflammation. When the brain and its membranes are injured, all such wounds are generally fatal. Wounds of the face or organs of sense are often dangerous, always disfiguring, and productive of serious inconvenience. Wounds of the neck are always serious whenever more than the skin is divided. The danger of opening large blood-vessels, or wounding important nerves, is imminent ; even the division of a large vein in the neck has proved immediately fatal, from the entrance of air into the vessel, and its speedy conveyance to the heart. A blow on the neck has instantly proved fatal, from injury to an important nerve, generally the pneumogastric or the sympathetic. Dislocations and fractures of the bones of the neck prove instantly fatal. Wounds of the chest are always serious when the cavity is penetrated, though persons may recover from wounds of the lungs, and have even survived for some time considerable wounds of the heart. This last is an important fact ; because we are not always to consider the spot where the body of a person killed by a wound of the heart, and apparently remaining where he fell, is found as that in which the fatal wound was inflicted. Instances have occurred of persons surviving severe wounds of the heart for several days. Broken ribs are never without danger; and the same may be said of severe contusions of the chest, from the chance of inflammation extending inwards. Wounds penetrating both sides of the chest are generally considered as fatal ; but possibly there may be recovery from such. Wounds of the abdomen, when they do not

completely penetrate, may be considered as simple wounds, unless when inflicted with great force, so as to bruise the contents of the abdominal cavity; in that case they may produce death without breach of surface, from rupture of some viscus, as sometimes happens from blows or kicks upon the belly. Wounds injuring the peritoneum are highly perilous, from the risk of severe inflammation. Wounds of the stomach or intestines, or of the gall- bladder, generally prove mortal, from the effusion of their contents into the peritoneal cavity producing fatal inflammation. Wounds of the liver, spleen or kidneys are generally soon mortal, from the great vascularity of those organs. Wounds of the extremities, when fatal, may generally be considered so from excessive haemorrhage, from the consequences of inflammation and gangrene, or from the shock to the system when large portions of the limb are forcibly removed, as in accidents from machinery, and in wounds from firearms. • l..

Blood Stains. — The examination of blood stains is a frequent and important operation in criminal charges. Blood stains when fresh and abundant can be recognized without difficulty, but when old, or after being acted upon by certain substances, their identity is not readily determined.

The tests which may be applied to a suspected stain consist of: (l) The microscopic test. A portion of the stain is soaked in a drop of some fluid which will soften and cause separation of the dried blood corpuscles without altering their characteristic appearance. Such fluids are solutions of glycerine and water of a specific gravity of 1028 or 30 % caustic potash. The recognition of blood corpuscles affords evidence of the nature of the stain. (2) Chemical tests, (a) Heat applied to a solution obtained by soaking some of the stained fabric in cold water. A blood solution is red, and loses its red colour on application of heat, while at the same time a buff-coloured pre-cipitate is formed. (6) On applying a drop of freshly prepared tincture of guaiacum and then some ozonic ether or peroxide of hydrogen to the stain, a blue colour is obtained if blood be present. Many other substances, however, give the same reaction, (c) If, even to the smallest particle of dried blood, a fragment of common salt and some glacial acetic acid be added, and the latter is then heated to ebullition «and allowed to evaporate away, small brown rhomboid crystals — haemin crystals — will be found to have formed, and they can be recognized under the microscope. (3) Spectroscopic test. A solution of blood obtained from a stain will show a spectrum having two dark bands between Fraunhofer's lines D and E (oxy- haemoglobin). On adding ammonium sulphide to the solution the haemoglobin is reduced and only one broad dark band is seen (reduced haemoglobin).

On adding caustic potash to a solution of blood, alkaline haematin is formed, and this again is transformed on the further addition of ammonium sulphide into reduced haematin or haemochromogen, which gives a very characteristic spectrum of two dark bands situated in the yellow part of the spectrum. The production of these three different spectra from a red-coloured solution is characteristic of blood. Old blood stains are insoluble in water, whereas recent stains are readily soluble in cold water, yielding a red solution. The application of hot water or washing with soap tends to fix or render blood stains insoluble. Vegetable dyes may likewise give red solutions, but they may be distinguished from blood by the addition of ammonia, which alters the colour of the former, but rather intensifies the red colour of a blood solution. The differentiation between human blood stains and those pro-

duced by the blood of other animals, more especially domestic animals, is a matter of great importance to the medical jurist. When the blood stain is fresh, measurement of the corpuscles may decide the question, but in the case of dry and old stains it is im- possible to make the distinction. A method has been discovered, however, which enables the distinction to be made not only between human blood and that of other animals (with the exception of Simiidae), but also between the bloods of different animals. The method depends upon the fact that if an animal (A) , such as a dog or rabbit, is inoculated with the blood or serum of another animal (B), then the blood or serum of A is found to produce a specific reaction (namely, the production of a cloudiness or precipitate) when added to a solution of the blood of a similar animal to B, and that species of animal only. If, therefore, human blood serum is injected into an animal, its blood after a time affords an “anti- serum ” which produces the specific reaction only in human blood solutions and not in those formed from the blood of other animals.

10. Poisoning. — There is no exact definition of a poison (q.v.). Popularly, substances which destroy or endanger life when swallowed in small quantity are called poisons, but a scientific definition would also include many substances which are injurious to health in large doses or only after repeated administration, and which act not only when swallowed, but also when taken into the system through other channels, e.g. the skin or the lungs. The branch of science which relates to poisons, their nature, methods of detection, the symptoms produced by them, and treatment of poisoning, is called Toxicology, and is one of the most important subjects included under the term

Medical Jurisprudence.

The medical evidence in cases of poisoning rests upon — (1) the symptoms produced during life; (2) the post mortem appear- ances; (3) the chemical analysis and detection of the substance in the body, or in the excretions and vomited matters, or in articles of food; (4) experiments on animals in the case of certain poisons where other conclusive evidence is difficult to obtain. The treatment of cases of poisoning will vary according to the substance taken, but the general principles which should be followed are: (a) to get rid of the poison by means of the stomach- pump, or by washing out the stomach with water through a soft rubber tube, or by giving an emetic such as mustard, sulphate of zinc, ipecacuanha; (6) to neutralize the poison by giving a substance which will fcrm with it an innocuous compound (e.g. in the case of the strong acids by administering magnesia or common whiting) , or which has an opposite physiological action (e.g. atropine in opium poisoning) ; (c) to promote the elimination from the body of the poison which has been already absorbed; (d) general treatment of any dangerous symptoms which appear, as by stimulation in collapse or artificial respiration in asphyxia.

Food Poisoning (see also Adulteration). — Foods may prove noxious from a variety of causes: (1) The presence of metallic poisons, as in peas artificially coloured with copper salts, in tinned foods from dissolved tin salts, &c. (2) The contami- nation of any food with the specific germs of disease, as for example, milk infected with the germ of enteric fever. (3) The presence in meat of parasites, such as the Trichina spiralis, or of disease in animals, capable of transmission to man, such as tuberculosis, or the presence of poison in the flesh of animals which have fed on substances harmless to them but poisonous to human beings. Grain may be infected with parasitic fungi of a poisonous character, as for example Claviceps purpurea, causing epidemics of ergotism. (4) Foods of various kinds may contain saprophytic bacteria which elaborate certain poisons, either before or after the food is taken. It is chiefly in relation to food- poisoning from the last-mentioned cause that our knowledge has been increased in recent years.

Many cases of food-poisoning, previously of mysterious origin, can now be explained by the action of bacteria and the products which they give rise to — tox-albumoses, ptomaines, ‘toxins — by splitting up proteid substances. It is not necessary that the food should show evident signs of putrefaction. It may not do so, and yet on’ being eaten produce violent symptoms of gastro-intestinal irritation almost immediately, followed by various nervous symp- toms. In such cases a

chemical poison, developed by putrefactive bacteria before the food was eaten, quickly acts upon the system. On the other hand, symptoms may not appear for many hours after ingestion of the food, and then come on suddenly and with great

severity — there has been a period of incubation. In such cases the food when swallowed has contained the bacteria, but the poisonous toxin has been elaborated by them afterwards in the system during the period preceding the onset of symptoms. In both varieties of poisoning the symptoms are similar, consisting of gastro-intestinal irritation — vomiting, purging and pain in the abdomen — together with great prostration, fever, muscular twitchings, disturbances of vision, delirium and coma. The varieties of meat which have most frequently given rise to poisoning (Botulismus) are pork, ham, veal, sausages, brawn, various kinds of meat pies and potted meats. Pig flesh appears to be specially liable to become infected. A point of considerable interest, which has sometimes given rise to doubt as to the poisonous character of meat in certain instances, is, that the same food may be poisonous at one time and not at another. Thus it may be harmless when freshly prepared, cause fatal effects if eaten a day or two afterwards, and shortly after that again prove perfectly innocuous. This is explained by the fact that the toxic substances take some time to develop, and after development are still further split up by the bacteria into other bodies of a harmless nature. In some fish — e.g. Trachinus draco, or sea weaver — the poison is a physiological product of certain glands. In others the poison is not known, as in the family Scombridae, to which the disease Kakke has been attributed. In the United Kingdom the poisonous effects pro- duced by fish are due to bacterial agency after death, and instances have occurred from the eating of herrings, mackerel, dried salt codfish, caviare, tinned salmon and tinned sardines. Shellfish may produce poisonous effects from putrefactive changes or from the development in them (oysters and mussels) of ptomaines. Brieger discovered a ptomaine in poisonous mussels to which he gave the name mytilotoxin. It is now fully proved that oysters and mussels may become contaminated with the organism of typhoid fever if placed in specifically polluted water, and thus transmit the disease to human beings. Milk, as already stated, may be contami- nated and convey the infection of scarlet fever and other diseases. It may also contain substances of bacterial origin, which are possibly the cause of infantile diarrhoea, and others, having a fatal effect upon adults. Cheese has frequently caused poisoning. Vaughan

dis- covered a toxic substance in milk and cheese — tyrotoxicon — but there are other toxic substances of bacterial origin sometimes present in cheese to which poisonous effects have probably been due. Mush- room-poisoning results from the eating of poisonous fungi in mistake for the edible mushroom. The poisonous element in most cases is either muscarin contained in the fungus Amanita muscaria, or phallin in Amanita phalloides.

History of Forensic Medicine The true origin of medical jurisprudence is of comparatively recent date, although traces of its principles may be perceived in remote times. Among the ancient Greeks the principles of medical science appear only to have been applied to legislation in certain questions relating to legitimacy. In the writings of Galen we find, however, remarks on the differences between the foetal and the adult lungs; he also treats of the legitimacy of seven months' children, and discusses feigned diseases. Turning to Rome, we find that the laws of the Twelve Tables fix three hundred days as the extreme duration of utero-gestation. It is doubtful whether the Roman law authorized medical inspec- tions of dead bodies. In the code of Justinian we find De statu kominutn; De poenis et manumissis; De sicariis; De inspiciendo ventre custodiendoque partu; De muliere quae peperit undecimo mense; De impotentia; De hermaphrdditis — titles which show obvious traces of a recognized connexion between medicine and law. It was not, however, by the testimony of living medical witnesses that such questions were to be settled, but on the authority of Hippocrates.

Medical jurisprudence, as a science, dates only from the 16th century. In 1507 the bishop of Bamberg introduced a penal code in which the necessity of medical evidence in certain cases was recognized; and in 1532 the emperor Charles V. persuaded the Diet of Ratisbon to adopt a uniform code of German penal jurisprudence, in which the civil magistrate was enjoined in all cases of doubt or difficulty to obtain the evidence of medical witnesses, — as in cases of personal injuries, infanticide, pretended pregnancy, simulated diseases, and poisoning. The true dawn of forensic medicine dates, however, from the publication in 1553 of the Constitutio criminalis Carolina in Germany. A few years later Weiher, a physician, having undertaken to prove that witches and demoniacs are, in fact, persons subject to hypochondriasis and hysteria, and should not be punished, aroused popular indignation, and was with difficulty rescued from the flames by his patron, William duke of Cleves.

At the close of the 16th century Ambrose Par6 wrote on monsters, on simulated diseases, and on the art of drawing up medico-legal reports;

Pineau also published his treatise on vir- ginity and defloration. About the same time as these stimuli to the study of forensic medicine were being made known in Paris, the first systematic treatise on the science appeared in Sicily in the form of a treatise De relationibus medicorum by Fidele. Paulo Zacchia, the illustrious Roman medical jurist, moreover, published from 1621 to 1635 a work entitled Quaestianes medico-legales, which marks a new era in the history of the science — a work which displays an immense amount of learning and sagacity in an age when chemistry was in its infancy, and physiology very imperfectly understood. The discovery of the circulation of the blood by Harvey soon followed, and gave a new impetus to the study of those branches of forensic medicine having direct relations to physiology; and to Harvey we owe the idea how to apply Galen's observations on the differences between the foetal and the adult lungs to the elucidation of cases of supposed infanticide. About this time, too, Sebiz published two treatises, on the signs of virginity and on the examination of wounds respectively. In the former he contended that the hymen was the real mark of virginity; but this was denied by Augenio and Gassendi. In 1663 Thomas Bartholin investigated the period of human uterine gestation, a subject which had engaged the attention of Aristotle. He also proposed the " hydrostatic test" for the determination of live-birth — a test still in use, and applied by observing whether the lungs of an infant float or sink in water. J. Swammerdam explained the rationale of the process in 1677; but it was not till 1682 that ˆjt_was first practically applied by Jan Schreyer.

Germany, ever the leader in questions of forensic medicine, introduced the first public lectures on medical jurisprudence. Michaelis gave the first course about the middle of the 17th century in the university of Leipzig; and these were followed by the lectures of Bohn, who also published De renunciatione vulnerum; cui accesserunt dissertationes binae de partu enecato, et an quis vivus mortuusve aqttis submersm, slrangulatus, aut vulneralus fuerit, and De officiis medici duplicis, clinici el forensis. Welsch and Amman wrote on the fatality of wounds, and Licetus on monsters.

From the time of Ambrose Pare the mode of conducting investi- gations in forensic medicine had attracted attention in France; and in 1603 Henry IV. authorized his physician to appoint persons skilled in medicine and surgery to make medico-legal inspections and reports in all cities and royal jurisdictions; in 1692, difficulties having arisen, Louis XIV. created hereditary royal physicians and surgeons for the performance of like duties. These, having become a corrupt and venal body, were suppressed in 1790. The only works on forensic medicine which appeared in France during the 17th century, however, were

Gendry's Sur les moyens de bien rapporter a justice and Blegny's Doctrine des rapports en chirurgie. At the beginning of the 18th century the latter was superseded as a text-book by Devaux's L'Art de faire des rapports en chirurgie. Valentini followed with two works, which were finally incorporated in his Corpus juris medico- legale which appeared in 1722. This work is a vast storehouse of medico-legal information, and a summary of the knowledge of the time.

Professorships for teaching the subject were founded in the German universities early in the 18th century, and numerous treatises on forensic medicine were published. Teichmeyer's Institutiones medicinae legalis long formed the text-book of tnfe subject; and Alberti, professor of legal medicine at Halle, in his Systema gave to the world a most complete and laborious treatise on the science. His industrious collection of facts renders his works a precious mine of information. Indeed towards the close of the 1 8th century the Germans were almost the only cultivators of legal medicine. But in France the celebrated case of Ville- blanche attracted attention to the subject, and called forth Louis, who in a memoir on utero-gestation attacked with power- ful arguments the pretended instances of protracted pregnancy, and paved the way for the adoption in the Code NapoUon of

three hundred days as the limit of utero-gestation, a period in precise accordance with the ancient Roman law of the Twelve Tables. Louis also wrote on death from hanging, and pointed out the mode by which we may distinguish murder from suicide under such circumstances. It is he who is credited with having been the first in France to publicly teach the just application of medical knowledge to jurisprudence. Foder6's celebrated Traiti de medecine ligale appeared in 1798, and marks a new era in the annals of legal medicine.

No British author wrote systematically on forensic medicine till 1 788, when Dr Samuel Farr published a short treatise on the Elements of Medical Jurisprudence; but this was merely an abridgment of an earlier work of Fazelius. Previous writers — as Mead, Munro, Denman, Percival and the two Hunters — had, however, dealt with fragments of the subject; nevertheless the science as a whole was little appreciated or recognized in this country during the 18th century.

In the 19th century France took the lead; and the institution of three

professorships of forensic medicine at the end of the 18th century produced excellent fruits. In 1814 Orfila, a Spaniard by birth, but naturalized in France, published his Toxicologic, a work which revolutionized this branch of medical jurisprudence, and first placed the knowledge of poisons upon a scientific basis. Since the time of Orfila, France has never ceased to have one or more living medical jurists, among the most recent of whom we must enumerate Tardieu, whose treatises on abortion, on poisons, on wounds, &c, are justly celebrated. Germany too industri- ously pursued the subject, and Casper's great work on forensic medicine will ever remain a classic in the science. In Russia Dragendorff greatly contributed to our knowledge of poisons.

Though forensic medicine may be said to have been entirely neglected in England till the beginning of the 19th century, its progress has since been by no means slow or unimportant; and the subject now forms a recognized and obligatory portion of medical study. The first lectures delivered in Great Britain were given in the university of Edinburgh in 1801 by the elder Dr Duncan; and the first professorship was held by his son in 1803. Dr Alfred Swaine Taylor gave the first course of lectures delivered in England, at Guy's Hospital in 1831; and in 1863 the university of London made forensic medicine a separate subject for examination and honours for medical graduates. In 1822 there was not in the English language any treatise of authority either on medical juris- prudence or on any important division of the subject ; for it was not till the following year that the useful compendium Of Paris and Fonblanque was published; and even in the middle of the 19th century medical jurisprudence may be said to have been almost in its infancy as compared with what it is now. From 1829 Great Britain produced an abundant crop of literature on forensic medicine. Sir Robert Christison's admirable treatise on Toxicology, Dr A. S. Taylor's Principles and Practice of Medical Jurisprudence (1905 edition, by F. J. Smith), the same author's Elements of Medical Jurisprudence, Dr Guy's Forensic Medicine, and Ogston's Lectures on Medical Jurisprudence have become well-known and widely circu- lated works. The separate memoirs of Taylor, Christison, Guy and others are also storehouses of facts and deductions in the science. America, too, has not been behindhand in the race. F. Wharton and M. Still^'s Manual, Wormley's Toxicology, and the works of Beck and Reese have furthered the study of the science.

See also Dixon Mann, Forensic Medicine and Toxicology (London, 1902); Wynter Blyth, Poisons: their Effects and Detection (London, 1895); Allbutt and Rolleston, A System of Medicine, vol. ii. " Intoxi- cations " (London, 1909); Vaughan, Twentieth Century Practice of

Medicine, vol. xiii. article ” Ptomaines, Toxins and Leucomaines ” (London, 1898) ; Maschka, Handbuch der gerichtlichen Medicin (Tubingen, 1881-1882); Hofmann, Lehrbuch der gerichtlichen Medicin (Wien, 1898); Strassmann, Lehrbuch der gerichtlichen Medicin (Stuttgart, 1895); Xunkel, Handbuch der Toxikologie (Jena, 1899); Brouardel, L’ Infanticide, La Pendaison, &c. (Paris, 1897). (H. H. L.; T. A. I.)

MEDICI, the name of a family renowned in Italian history for the extraordinary number of statesmen to whom it gave birth, and for its magnificent patronage of letters and art. They emerged from private life and rose to power by means of a very subtle policy that was persistently pursued from generation to generation. The origin of the family is buried in obscurity. Some court historians indeed declare it to have been founded by Perseus, and assert that Benvenuto Cellini’s bronze Perseus holding on high the head of Medusa was executed and placed in the Loggia dei Lanzi at Florence to symbolize the victory of the

Salvestro.

Mediaj over the republic. But this only proves that the real origin of the family is unknown, and equally unknown is the precise signification of the Medicean arms — six red balls on a field of gold.

The name appears in Florentine chronicles as early as the close of the 1 2th century, although only casually mentioned in con- nexion with various offices of the republic. The first of the family to be a distinct figure in history ˆ ar,y was Salvestro dei Medici, who, in 1378, took an active the Name. part in the revolt of the Ciompi — so called because it was led by a wool-carder (ciompo) , one Michele di Lando, and because the chief share in it was taken by the populace, who held the reins of government for some time, and sought to obtain extended political rights. Although Michele di Lando was the nominal chief of the revolt, Salvestro dei Medici was its real leader. The latter, although a member of the greater gilds, had joined the lesser and sought to be at their head, in order to lay the foundation of his own power and that of his kindred by attacking the Albizzi, who were the leading men of the greater gilds. The victory of the Ciompi, however, was brief, for the excesses of the lower classes brought about a reaction, in which they were crushed, and Michele di Lando sent into banishment. Nevertheless the lesser gilds had gained some ground by this riot, and Salvestro dei Medici the great popularity at which he had aimed. His policy during that period had traced the sole possible road to power in liberty-loving Florence. This was the road henceforth

pursued by the Medici.

On Salvestro's death in 1388 the Albizzi repossessed them- selves of the government, and conducted the wars of the republic. Vieri dei Medici, who seems to have been the next head of the family, understanding the temper of the times, abstained from becoming a popular leader, and left it to his successors to prosecute the task under easier conditions. Then, in the person of Giovanni, son of Averardo Bicci dei Medici (1360-1429), another branch of the family arose, and became its representative branch. Indeed this Giovanni may be con- sidered the actual founder of Medicean greatness. He took little part in political affairs, but realized an immense fortune by trade — establishing banks in Italy and abroad, which in his successor's hands became the most efficient engines of political power. The Council of Constance (1414-1418) enabled Giovanni dei Medici to realize enormous profits. Besides, like his ancestor Salvestro, he was a constant supporter of the lesser gilds in Florence. Historians record his frequent resistance to the Albizzi when they sought to oppress the people with heavier taxation, and his endeavours to cause the chief weight to fall upon the richer classes. For this reason he was in favour of the so-called law of catasto, which, by assessing the property of every citizen, prevented those in power from arbitrarily imposing taxes that unjustly burdened the people. In this way, and by liberal loans of money to all who were in need of it, he gained a reputation that was practically the foundation-stone of the grand family edifice. Giovanni dei Medici died in 1429 leaving two sons, Cosimo (1389-1464) and Lorenzo (1395-1440). From the former proceeded the branch that held absolute sway for many genera- tions over the nominal republic of Florence, and gave to Italy popes like Leo X. and Clement VII. On the extinction of this elder line in the 16th century, the younger branch derived from Lorenzo, Cosimo's brother, seemed to acqujre new life, and for two centuries supplied grand-dukes to Tuscany.

Cosimo, surnamed Cosimo the Elder, to distinguish hifiKfrom the many others bearing the same name, and honoured after his death by the title of pater patriae, first succeeded in solving the strange problem of becoming absolute ˆ e ™° ruler of a republic keenly jealous of its liberty, with- out holding any fixed office, without suppressing any previous form of government, and always preserving the appearance and demeanour of a private citizen. Born in 1389, he had reached the age of forty at the time of his father's death. He had a certain amount of literary culture, and throughout his life showed much taste and an earnest love both for letters

and art. But his father had mainly trained him to commerce, for which he had a special liking and aptitude. He was devoted to business to the day of his death, and like his forefathers derived pecuniary advantage from his friendly relations with the papal court. He accompanied Pope John XXIII. to the Council of Constance, transacted a vast amount of business in that city, and made very large gains. He then travelled in Germany, and after his return to Florence discharged several ambassadorial missions. At the death of his father he was possessed of a vast fortune and an extended experience, and inherited the leadership of the opposition to the then dominant party of the greater gilds headed by Rinaldo degli Albizzi, Palla Strozzi and Niccold da Uzzano. Of gentle and kindly manners, generous in lending and even in giving money whenever he could gain popularity by that means, at critical moments he frequently came to the succour of the government itself. He was very dexterous in turning his private liberalities to account for the increase of his political prestige, and showed no less acumen and still fewer scruples in making use of his political prestige for purposes of pecuniary profit. Indeed, whenever his own interests were at stake, he showed himself capable of positive villainy, although this was always tempered by calculation. Cosimo proved his skill in these knavish arts during the war between Florence and Lucca. He had joined the Albizzi in urging on this war, and many writers assert that he turned it to much pecuniary advan- tage by means of loans to the government and other banking operations. When, however, military affairs went badly, Cosimo joined the discontented populace in invectives against the war and those who had conducted it. This won him an enormous increase of popularity, but the hatred of the Albizzi and their friends augmented in equal degree, and a conflict became inevitable. The Albizzi, who were far more impetuous and im- patient than Cosimo, were now bent upon revenge. In 1433 one of their friends, Bernardo Guadagni, was elected gonfalonier, and thereupon Cosimo dei Medici was called to the palace and summarily imprisoned in the tower. A general assembly of the people was convoked and a balia chosen, which changed the government and sent Cosimo into exile. Undoubtedly the Albizzi party would have preferred a heavier sentence, but they did not dare to attempt their enemy's life, being well aware of the great number of his adherents. Cosimo had some apprehension that he might be poisoned in prison, but Federigo dei Malavolti, captain of the palace guard, showed him the utmost kindness, and, to soothe his fears, voluntarily shared his meals. On the 3rd of October the prisoner was sent to

Padua, his allotted place of exile.

The Albizzi speedily saw that they had done either too much or too little. While seeking to keep the government entirely in their own hands, they beheld the continual growth of the Medici party. When it was necessary to make a campaign in Romagna against the mercenary captains commanding the forces of the duke of Milan, it was plainly seen that in banishing Cosimo the republic had lost the only citizen banker in a position to assist it with considerable loans. The Florentines were defeated by Piccinino in 1434, and this event greatly increased the public exasperation against the Albizzi. Meanwhile Cosimo, who had gone to Padua as a private individual, was entertained there like a prince. Then, being permitted to transfer his resi- dence to Venice, he entered on a course of lavish expenditure. He was overwhelmed with letters and appeals from Florence. Finally, on the 1st of September 1434, a signory was elected composed of his friends, and his recall was decreed. Rinaldo degli Albizzi determined to oppose it by force, and rushed to the Piazza with a band of armed men; but his attempt failed, and he left the country to return no more. The Medici were now reinstated in all their former dignities and honours, and Cosimo, on the evening of the 6th of September, rode past the deserted mansions of the Albizzi and re-entered his own dwelling after an exile of a year. For three centuries, dating from that moment, the whole history of Florence was connected with that of the house of Medici. Cosimo's first thought was to secure himself against all future

risk of removal from Florence, and accordingly he drove the most powerful citizens into exile to all parts of Italy. Nor did he spare even his former political adversary, Palla Strozzi, although the latter had been favourable to r/,e „?°7""

■ . , . 1 1 t T . ■ 1 • "tent of

him during the , recent changes. His rigour in this Florence. particular case, was universally censured, but Cosimo would tolerate no rivals in the city, and was resolved to abase the great families and establish his power by the support of the lower classes. He was accustomed to say that states could, not be ruled by paternosters. Still, when cruelty seemed requisite, he always contrived that the chief odium of it should fall upon others. When Neri Capponi, the valiant soldier and able diplomatist, gained great public favour by his military prowess, and his influence was further increased by the friendship of Baldaccio d'Anghiari, captain of the infantry, Cosimo jesolved to weaken his position by indirect means. Accordingly, when in 1441 a partisan of

the Medici was elected gonfalonier, Baldaccio was instantly summoned to the palace, imprisoned, murdered, and his body hurled from the window. No one could actually fix this crime upon Cosimo, but the majority believed that he had thus contrived to rid himself of one enemy and cripple another without showing his hand. It was impossible for Cosirno openly to assume the position of tyrant of Florence, nor was it worth his while to become gonfalonier, since the term of office only lasted two months. It was necessary to discover some other way without resorting to violence; he accordingly employed what were then designated ” civil methods.” He managed to attain his object by means of the balie. These magistracies, which were generally renewed every five years, placed in the ballot- bags the names of the candidates from whom the signory and other chief magistrates were to be chosen. As soon as a balia favourable to Cosimo was formed, he was assured for five years of having the government in the hands of men devoted to his interests. He had comprehended that the art of politics depended rather upon individuals than institutions, and that he who ruled men could also dictate laws. His foreign policy was no less astute. His great wealth enabled him to supply money not only to private individuals, but even to foreign potentates. Philippe de Comines tells us that Cosimo frequently furnished Edward IV. of England with sums amounting to many hundred thousand florins. When Tommaso Parentucelli was still a cardinal, and in needy circumstances, Cosimo made him considerable loans without demanding guarantees of payment. On the cardinal’s accession to the tiara as Nicholas V. he was naturally very well disposed towards Cosimo, and employed the Medici bank in Rome in all the affairs of the curia. At the time when Francesco Sforza was striving for the lordship of Milan, Cosimo foresaw his approaching triumph, showed him great friendship, and aided him with large sums of money. Accordingly, when Sforza became lord of Milan, Cosimo’s power was doubled.

Without the title of prince, this merchant showed royal generosity in his expenditure for the promotion of letters and the fine arts. Besides his palace in the city, he constructed noble villas at Careggi, Fiesole and other places. He built the basilica of Fiesole, and that of St Lorenzo

Cosimo’s Patronage of Art.

in Florence, and enlarged the church and monastery of St Mark. Even in distant Jerusalem he endowed a hospice for the use of pilgrims. The artists of the day comprised men like Donatello, Brunelleschi, Ghiberti, Luca della Robbia, and many others, and Cosimo’s

magnificent com- missions not only developed their powers but stimulated other men of wealth to the patronage of art. Without being a scholaT>- Cosimo had a genuine taste for letters. He purchased j,any Greek and Latin manuscripts; he opened the first public library at St Mark's at his own expense, and founded another in the abbey of Fiesole. The Greek refugees from Constantinople found a constant welcome in his palace. During the Council of Florence (1430-1442), Gemistus Pletho spoke to him with enthusi- asm of the Platonic philosophy. Cosimo was so deeply attracted by the theme that he decided to have the young Marsilio Ficino trained in philosophy and Greek learning in order to make a Latin translation of the complete works of Plato. And thus t>

version was produced that is still considered one of the best extant, and that Platonic academy was founded which led to such important results in the history of Italian philosophy and letters. On the ist of August 1464 Cosimo breathed his last, at the age of seventy-five, while engaged in listening to one of Plato's dialogues.

The concluding years of his life had been years of little happi- ness for Florence. Being old and infirm, he had left the govern- ment to the management of his friends, among whom Luca Pitti was one of the most powerful, and they had ruled with disorder, corruption and cruelty. The lordship of Florence accordingly did not pass without some difficulty and danger into the hands of Piero, surnamed the Gouty, Cosimo's only surviving Qoaty. * legitimate son. Afflicted by gout, and so terribly crippled that he was often only able to use his tongue, the new ruler soon discovered that a plot was on foot to overthrow his power. However, showing far more courage than he was supposed to possess, he had himself borne on a litter from his villa to Florence, defeated his enemies' designs, and firmly re-established his authority. But his success may be mainly attributed to the enormous prestige bequeathed by Cosimo to his posterity. Piero died at the end of five years' reign, on the 3rd of December 1469, leaving two sons, Lorenzo (1440-1492) and Giuliano (1453-1478). The younger, the gentler and less ambitious of the pair, was quickly removed from the world. Lorenzo, on the contrary, at once seized the reins of state with a firm grasp, and was, chronologically, the second of the great men bestowed upon Italy by the house of Medici. In literary talent he was immensely superior to Cosimo, but greatly his inferior in the conduct of the commercial affairs of the house. In

politics he had nobler conceptions and higher ambitions, but he was more easily carried away by his passions, less prudent in his revenge, and more disposed to tyranny. He had studied letters from his earliest years under the guidance of Ficino and other leading litterati of the day. At the age of eighteen he visited the different courts of Italy. At his father's death he was only twenty-one years old, but instantly showed his determination to govern Florence with greater despotism than his father or grandfather. He speedily resorted to the system of the balie, and was very dexterous in causing the first to be chosen to suit his purpose. He then proceeded to humiliate the great families and exalt those of little account, and this was the policy he constantly pursued. His younger brother Giuliano, being of a mild and yielding disposition, had only a nominal share in the government.

Lorenzo's policy, although prosecuted with less caution, was still the old astute and fortunate policy initiated by Cosimo. But the grandson bestowed no care upon his commercial interests, although squandering his fortune with far greater lavishness. Accordingly he was sometimes driven to help himself frpm the public purse without ever being able to assist it as Cosimo had done. All this excited blame and enmity against him, while his greed in the matter of the alum mines of Volterra, and the subsequent sack of that unhappy city, were crimes for which chere was no excuse. Among his worst enemies were the Pazzi, and, as they formed a very powerful clan, he sought their ruin by competing with them even in business transactions. They were on the point of inheriting the large property of Giovanni Borromeo when Lorenzo hurriedly caused a law to be passed that altered the right of succession. The hatred of the Pazzi was thereby exasperated to fury. And in addition to these things there ensued a desperate quarrel with Pope Sixtus IV., a man of very impetuous temper, who, on endeavouring to erect a state on the frontiers of the Florentine republic for the benefit of his nephews, found a determined and successful opponent in Lorenzo. Consequently the Pazzi and Archbishop Salviati, another enemy of Lorenzo, aided by the nephews of the pontiff, who was himself acquainted with the whole matter, determined to put an end to the family. On the 26th of April 1478, while Giuliano and Lorenzo were attending high mass in the cathedral of Florence, the former was mortally stabbed by conspirators,

Lorenzo.

but the latter was able to beat back his assailants and escape into the sacristy. His life preserved, and no longer having to share the government with a brother, Lorenzo profited by the opportunity to wreak cruel vengeance upon his foes. Several of the Pazzi and their

followers were hanged from the palace windows; others were hacked to pieces, dragged through the streets, and cast into the Arno, while a great many more were condemned to death or sent into exile. Lorenzo seemed willing and able to become a tyrant. But he stopped short of this point. He knew the temper of the city, and had also to look to fresh dangers threatening him from without. The pope had excommunicated him, put Florence under an interdict, and, being seconded by the Neapolitan king, made furious war against the republic. The Florentines began to tire of submitting to so many hardships in order to support the yoke of a fellow- citizen. Lorenzo's hold over Florence seemed endangered. But he rose superior to the difficulties by which he was encom- passed. He boldly journeyed to Naples, to the court of King Ferdinand of Aragon, who was reputed to be as treacherous as he was cruel, and succeeded in obtaining from him an honourable peace, that soon led to a reconciliation with Sixtus. Thus at last Lorenzo found himself complete master of Florence. But, as the balie changed every five years, it was always requisite, in order to retain his supremacy, that he should be prepared to renew the usual manoeuvre at the close of that term and have another elected equally favourable to his aims. This was often a difficult achievement, and Lorenzo showed much dexterity in overcoming all obstacles. In 1480 he compassed the institution of a new council of seventy, which was practically a permanent balla with extended powers, inasmuch as it no* only elected the chief magistrates, but had also the administration of numer- ous state affairs. This permanent council of devoted adherents once formed, his security was firmly established. By this means, the chroniclers tell us, " liberty was buried," but the chief affairs of the state were always conducted by intelligent and experienced men, who promoted the public prosperity. Florence was still called a republic; the old institutions were still preserved, if only in name. Lorenzo was absolute lord of all, and virtually a tyrant. His immorality was scandalous; he kept an army of spies; he frequently meddled in the citizens' most private affairs, and exalted men of the lowest condition to important offices of the state. Yet, as Guicciardini remarks, " if Florence was to have a tyrant, she could never have found a better or more pleasant one," In fact all industry, commerce and public works made enormous progress. The civil equality of modern states, which was quite unknown to the middle ages, was more developed in Florence than in any other city of the world. Even the condition of the peasantry was far more prosperous than elsewhere. Lorenzo's authority was not confined to Tus- cany, but was also very great throughout the whole of Italy. He was on the friendliest terms with Pope Innocent VIII. , from whom he obtained the exaltation of his son Giovanni to the cardinalate at the age of

fourteen. This boy-cardinal was after- wards Pope Leo X. From the moment of the decease of Sixtus IV., the union of Florence and Rome became the basis of Lorenzo's foreign policy. By its means he was able to prevent the hatreds and jealousies of the Sforzas of Milan and the Aragonese of Naples from bursting into the open conflict that long threatened, and after his death actually caused, the beginning of new and irreparable calamities. Hence Lorenzo was styled the needle of the Italian compass. – ;

But the events we have narrated cannot suffice for trie full comprehension of this complex character, unless we add the record of his deeds as a patron of letters and his achievements as a writer. His palace was the school and resort of illustrious men. Within its walls were trained the two young Medici afterwards known to the world as Leo X. and Clement VII. Ficino, Poliziano, Pico della Mirandola and all members of the Platonic academy were its constant habitues. It was here that Puld gave readings of his Morgante, and Michelangelo essayed the first strokes of his chisel. Lorenzo's intellectual powers were of exceptional strength and versatility. He could speak with

xvm. a

equal fluency on painting, sculpture, music, philosophy, and poetry. But his crowning superiority over every other Maecenas known to history lay in his active participation in the intellectual labours that he promoted.- Indeed at certain moments he was Lorenzo as positively the leading spirit among the litterati of his a Man of time. He was an elegant prose writer, and was Letters. likewise a poet of real originality. At that period Italians were forsaking erudition in order to forward the revival of the national literature by recurring to the primitive sources of the spoken tongue and popular verse. It is Lorenzo's lasting glory to have been the initiator of this movement. Without being — as some have maintained — a poet of genius, he was certainly a writer of much finish and eloquence, and one of the first to raise popular poetry to the dignity of art. In his Ambra, his Caccia del falcone and his Nencia da Barberino, he gives descriptions of nature and of the rural life that he loved, with the graphic power of an acute and tasteful observer, joined to an ease of style that occasionally sins by excess of homeliness. Both in his art and in his politics he leant upon the people. The more oppressive his government, the more did he seek in his verses to incite the public to festivities and lull it to

slumber by sensual enjoyments. In his Ballate, or songs for dancing, and more especially in his carnival songs, a kind of verse invented by himself, Lorenzo displayed all the best qualities and worst defects of his muse. Marvellously and spontaneously elegant, very truthful and fresh in style, fertile in fancy and rich in colour, they are often of a most revolting indecency. And these compositions of one filling a princely station in the city were often sung by their author in the public streets, in the midst of the populace. Lorenzo left three sons — Pietro (1471-1503), Giovanni (1475-1521) and Giuliano (1479-1516). He was succeeded by Pietro, whose rule lasted but for two years. During this brief term he performed no good deeds, and only displayed inordinate vanity and frivolity. His conduct greatly helped to foment the hatred between Lodovico Sforza and Ferdinand of Naples, which hastened the coming of the French under Charles VIII., and the renewal of foreign invasions. No sooner did the. French approach the frontiers of Tuscany than Pietro, crazed with fear, _ fefa ˆ hastened to meet them, and, basely yielding to every demand, accepted terms equally humiliating to him- self and the state. But, returning to Florence, he found that the enraged citizens had already decreed his deposition, in order to reconstitute the republic, and was therefore compelled to escape to Venice. His various plots to reinstate himself in Florence were all unsuccessful. At last he went to the south of Italy with the French, was drowned at the passage of the Garigliano in 1503, and was buried in the cloister of Monte Cassino.

The ensuing period was adverse to the Medici, for a republican government was maintained in Florence from 1494 to 151 2, and the city remained faithful to its alliance with the French, who were all-powerful in Italy. Cardinal Giovanni, the head of the family, resided in Rome, playing the patron to a circle of litterati, artists and friends, seeking to increase his popularity, and calmly waiting for better days. The battle of Ravenna wrought the downfall of the fortunes of France in Italy, and led to the rise of those of Spain, whose troops entered Florence to destroy the republic and reinstate the Medici. Pietro had now been dead for some time, leaving a young son, Lorenzo (149 2-1 5 19), who was afterwards duke of Urbino. The following year (isr3) Cardinal Giovanni was elected pope, and assumed the name of Cardinal ˆ jeo ˆ – ˆ e accor dingly removed to Rome, leaving Giovanni his brother Giuliano with his nephew Lorenzo in (LeoX.), Florence, and accompanied by his cousin Giulio, aiuiiano, wno was a natural son f the Giuliano murdered in the conspiracy of the Pazzi, and was soon destined to be a cardinal and ultimately a pope. Meanwhile his kinsmen in Florence continued to govern that city by means of a bolia. And thus, being masters of the whole of central Italy, the Medici

enjoyed great authority throughout the country and their ambition plumed itself for still higher flights. This was the moment when Niccolo Machiavelli, in his treatise The

Prince, counselled them to accomplish the unity of Italy by arming the whole nation, and expelling its foreign invaders.

Leo X., who is only indirectly connected with the history of Florence, gave his name to the age in which he lived in conse- quence of his magnificent patronage of art and letters in Rome. But he was merely a clever amateur, and had not the literary gifts of his father Lorenzo. He surrounded himself with versi- fiers and inferior writers, who enlivened his board and accom- panied him wherever he went. He liked to lead a gay and untroubled life, was fond of theatrical performances, satires and other intellectual diversions. His patronage of the fine arts, his genuine affection for Raphael, and the numerous works he caused to be executed by him and other artists, have served to confer an exaggerated glory on his name. He had not the remotest idea of the grave importance of the Reformation, which indeed he unconsciously promoted by his reckless and shameless sale of indulgences. The whole policy of Pope Leo X. consisted in oscillating between France and Spain, in always playing fast and loose, and deceiving both powers in turn. Yet the evil results of this contemptible policy never seemed to disturb his mind. He finally joined the side of the emperor Charles V., and in 1521, at the time of the defeat of the French by the Spanish troops on the river Adda, he ceased to breathe at his favourite villa of Magliana.

Giuliano dei Medici had died during Leo's reign, in I5r6, without having ever done anything worthy of record. He was the husband of Philiberta of Savoy, was duke of Nemours, and left a natural son, Ippolito dei Medici (1511-1535), who afterwards became a cardinal. Lorenzo, being of more ambitious temper, was by no means content to remain at the head of the Florence government hampered by many restrictions imposed by republi- can institutions, and subject to the incessant control of the pope. In his eagerness to aggrandize his kinsmen, the latter had further decided to give Lorenzo the duchy of Urbino, and formally invested him in its rights, after expelling on false pretences its legitimate lord, Francesco Maria della Rovere. This prince, however, soon returned to Urbino, where he was joyously welcomed by his subjects, and Lorenzo regained possession only by a war of several months, in which he was wounded. In 15 19 he also died, worn out by disease and excess. By his marriage with Madeleine de la Tour d'Auvergne, he had one daughter, Caterina dei Medici (1519-1589), married in 1533 to Henry, duke of Orleans, afterwards

king of France. She played a long and sinister part in the history of that country. Lorenzo also left a natural son named Alessandro, inheriting the frizzled hair and projecting lips of the negro or mulatto slave who had given him birth. His miserable death will be presently related. Thus the only three surviving representatives of the chief branch of the Medici, Cardinal Giulio, Ippolito and Alessandro were all of illegitimate birth, and left no legitimate heirs.

Cardinal Giulio, who had laboured successfully for the rein- statement of his family in Florence in 151 2, had been long attached to the person of Leo X. as his trusted factotum and com- panion. He had been generally regarded as the mentor of the pope, who had no liking for hard work. But in fact, his frivolity notwithstanding, Leo X. always followed his own inclinations. He had much aptitude for command, and pursued his shuffling policy without any mental anxiety. Giulio, on the contrary, shrank from all responsibility, muddled his brains in weighing the reasons for and against every possible decision, and was therefore a better tool of government in others' hands than he was fit to govern on his own account. When Giuliano a*rld Lorenzo died, the pope appointed the cardinal to the government of Florence. In that post, restricted within the limits imposed by republican institutions, and acting under the continual direction of Rome, he performed his duties fairly well. He caressed the citizens with hopes of extended liberties, cardinal which, although never destined to be fulfilled, long aiuilo served to keep men's minds in a pleasant flutter of (.Clement expectation; and when the more impatient spirits ”’*

attempted to raise a rebellion he speedily quenched it in blood. When, after the death of Leo X. and the very brief pontificate

of Adrian VI., he was elected pope (1523) under the name of Clement VII., he entrusted the government of Florence to Cardinal Silvio Passerini conjointly with Alessandro and Ippo- lito, who were still too young to do much on their own account. The pontificate of Leo X. had been a time of felicity to himself if of disaster to Italy and the Church. The reign of Clement, on the contrary, was fatal to himself as well. His policy, like that of Leo X., consisted in perpetual oscillation between France and Spain. By his endeavours to trick all the world, he fre- quently ended in being tricked himself. In 1525 he was the ally of the French, who then suffered a terrible defeat at Pavia, where their king Francis I. was taken prisoner. The armies of Charles V. triumphantly

advanced, without Clement being able to oppose any effectual resistance. Both Rome and Florence were threatened with a fearful catastrophe.

Thus far we have had no occasion to speak of the younger branch of the Medici, descended from Lorenzo, brother to Cosimo the elder. Always in obscurity, and hitherto held in check by the elder line, it first entered the arena of history when the other was on the point of extinction. In fact the most valiant captain of the papal forces was Giovanni dei Medici, afterwards known by the name of Giovanni delle Bande Nere. His father was Giovanni, son of Pier Francesco, who was the son of Lorenzo, the brother of Cosimo dei Medici. History has little to tell of the elder Giovanni; but his wife Caterina Sforza, of whom he was the third husband, was a woman of more than masculine vigour. Giovanni dei Medici married her in 1497, but died in 1498, leaving her with one son who was christened Lodovico, but after- wards took his father's name of Giovanni (1498- °^ v "" 1526). Trained to arms from his earliest years, this Nere. youth inherited all the energy of his mother, whose

Sforza blood seemed to infuse new life into the younger branch of the Medici. Notwithstanding his extreme youth, he had already achieved the title of the best captain in Italy. He had always fought with immense dash and daring, and was devotedly loved and obeyed by his soldiery. He was the only leader who opposed a determined resistance to the imperial forces. He was seriously wounded at Pavia when fighting on the French side. On his recovery he joined the army of the League, and was much enraged by finding that the duke of Urbino, commander of the Venetian and papal forces, would never decide on attacking. When the imperial troops were struggling through the marshes of Mantua, surrounded on every side, and without stores or ammunition, Giovanni could not resign himself to inactivity like his colleagues in command. He was ignorant that the imperialists had just received supplies and artillery from the duke of Ferrara, and therefore daringly attacked them with a small body of men without taking any, precautions for defence. One of the first shots fired by the enemy injured him so fatally that he died a few days after. He was married to Maria Salviati, by whom he had one son, Cosimo (1510-1574), who became the first grand duke of Tuscany, and indeed the founder of the grand duchy and the new dynasty.

Meanwhile the imperial army pursued its march upon Rome, captured the Eternal City after a few hours' combat, and cruelly sacked it during many days (1527). Thanks to his perpetual shuffling and excessive avarice, the pope found himself utterly forsaken, and was

obliged to seek refuge in the castle of St Angelo, whence he only effected his escape after some months. He then signed a treaty of alliance with the emperor (1529), who sent an army to besiege Florence and restore the Medici, whom the people had expelled in 1527 on the re-establishment of the republic. After an heroic defence, the city was forced to surrender (1530); and, although it was expressly stipulated that the ancient liberties of Florence should be respected, every one foresaw that the conditions would be violated. In fact, pope and emperor immediately began to dispute as to which should be the new lord of the city. Clement VII. had inherited the traditional family dislike for the younger branch of his kin, and so the choice lay between the two bastards Ippolito and Alessandro. The former being a cardinal, the latter was chosen.

Alessandro, who already bore the title of duke of Citta di Penna, came to Florence in 1531, and by imperial patent was nominated head of the republic. According to the terms of this patent, the former liberty enjoyed under the Medicean . . .

rule was to remain intact. But no previous ruler of the city had enjoyed hereditary power confirmed by imperial patent, and such power was incompatible with the existence of a republic. Moreover, Clement VII. showed dis- satisfaction with the uncertainty of the power conferred upon his kinsman, and finally succeeded in obtaining additional privileges. On the 4th of April 1532 a parliament was convoked for the last time in Florence, and, as usual, approved every measure proposed for acceptance. Accordingly a new council was formed of two hundred citizens elected for life, forty-eight of which number were to constitute a senate. Alessandro, as duke of the republic, filled the post of gonfalonier, and carried on the government with the assistance of three senators, changed every three months, who took the place of the suppressed signory.

The duke’s chief advisers, and the contrivers of all these arrangements were Baccio Valori, Francesco Vettori and above all Francesco Guicciardini — men, especially the latter two, of lofty political gifts and extensive influence. The mind and character of Duke Alessandro were as yet comparatively un- known. At first he seemed disposed to rule with justice and prudence. But encountering difficulties that he was unable to overcome, he began to neglect the business of the state, and acted as if the sole function of government consisted in lulling the people by festivities, and corrupting it by the dissolute life of which he set the example. The question of the moment was the transformation of the old republican regime into a princedom; as an unavoidable result of this change it followed that Florence was no longer to be the

ruling city to whose inhabitants alone belonged the monopoly of political office. When the leading Florentine families realized not only that the republic was destroyed, but that they were reduced to equality with those whom they had hitherto regarded as their inferiors and subjects, their rage was indescribable, and hardly a day passed without the departure of influential citizens who were resolved to achieve the overthrow of their new ruler. They found a leader in Cardi- nal Ippolito dei Medici, who was then in Rome, embittered by the preference given to Alessandro, ippolito. and anxious to become his successor with the least possible delay. Under the pressure of terror the duke at once became a tyrant. He garrisoned the different cities, and began the erection in Florence of the Fortezza da Basso, built chiefly at the expense of Filippo Strozzi, who afterwards met his death within its walls.

In 1534 Clement VII. died, and the election fell on Paul III., from whom Cardinal Ippolito hoped to obtain assistance. Accordingly the principal Florentine exiles were despatched to , Charles V. with complaints of Alessandro's tyranny and his shameless violation of the terms upon which the city had surren- dered. Cardinal Ippoloto also represented his own willingness to carry on the government of Florence in a more equitable manner, and promised the emperor a large sum of money. Reply being delayed by the emperor's absence, he became so impatient that he set out to meet Charles in Tunis, but on the 10th of August 1535 died suddenly at Itri, poisoned by order of Alessandro. Such at least was the general belief, and it was confirmed by the same fate befalling other enemies of the duke about the same time. On the emperor's return from Africa, the exiles presented themselves to him in Naples, and the vener- able patriot Jacopo Nardi pleaded their cause. Duke Alessan- dro, being cited to appear, came to Naples accompanied by Francesco Guicciardini, who by speaking in his defence rendered himself odious to all friends of liberty, and irretrievably tarnished his illustrious name. The cardinal being dead, it was hard to find a successor to Alessandro. On this account, and perhaps to some extent through the emperor's personal liking for the duke, the latter rose higher than before in the imperial favour, married Margaret of Austria, the natural daughter of Charles,

and returned to Florence with increased power. And now Alessandro indulged unchecked in the lowest excesses of tyranny, and although so recently a bridegroom gave way to increased libertinism. His whole

time was passed in vicious haunts and in scandalous adventures. In order to conceal the obscurity of his birth, he left his mother to starve, and it was even asserted that he finally got rid of her by poison.

His constant associate in this disgraceful routine was his distant kinsman Lorenzo, generally known as Lorenzino dei Medici. Of the younger branch of the Medici, the del Medld. latter was second cousin of the Cosimo already mentioned as the son of Giovanni delle Bande Nere. He had much culture and literary talent, but led an irregular life, sometimes acting like a madman and sometimes like a villain. He was a writer of considerable elegance, the author of several plays, one of which, the Aridosio, was held to be among the best of his age, and he was a worshipperˆ antiquity. Not- withstanding these tastes, when in Rome he knocked off the heads of some of the finest statues of the age of Adrian, an act by which Clement VII. was so incensed that he threatened to have him hanged. Thereupon Lorenzino fled to Florence, where he became the friend of Duke Alessandro, and his partner in the most licentious excesses. They went together to houses of ill-fame, and violated private dwellings and convents. They often showed themselves in public mounted on the same horse. All Florence eyed them with disgust, but no one foresaw the tragedy that was soon to take place.

On the evening of the 5th of January 1537, after a day passed in the usual excesses, Lorenzino led the duke to his own lodging, and left him there, promising shortly to return with « S fl*o/ i,a ” tne k ° L eonar do Ginori. Alessandro, worn out Alessandro. by the exertions of the day, fell asleep on the couch while awaiting Lorenzino’s return. Before long the latter came accompanied by a desperado known as the Scoron- concolo, who aided him in falling on the sleeper. Roused by their first thrusts, the duke fought for his life, and was only despatched after a violent struggle. The murderers then lifted the body into a bed, hid it beneath the clothes, and, Lorenzino having attached a paper to it bearing the words vincit amor patriae, laudumque immensa cupido, they both fled to Venice. In that city Lorenzino was assassinated some ten years later, in 1548, at the age of thirty-two, by order of Alessandro’s successor. He wrote an Apologia, in which he defended himself with great skill and eloquence, saying that he had been urged to the deed solely by love of liberty. For this reason alone he had followed the example of Brutus and played ‘the part of friend and courtier. The tone of this Apologia is so straightforward, sometimes even so eloquent and lofty, that we should be tempted to give it credence were it possible to believe the assertions of one who not only by his crime but by the infamy of his previous and subse- quent career completely gave the lie to his vaunted nobility of

purpose. By Alessandro's death the elder branch of the Medici became extinct, and thus the appearance of the younger line was heralded by a bloody crime.

When the duke's absence from his own palace was discovered on the morning of the 6th of January he was at first supposed to _ have spent the night with one of his mistresses; but

soon, some alarm being felt, search was made, and Cardinal Cybo was the first to discover the murder. Enjoining the strictest secrecy, he kept the corpse concealed for three days, and then had it interred in the sacristy of San Lorenzo. Mean- while he had hastily summoned Alessandro Vitelli and the other captains, so that, by the time Alessandro's death was made public, the city was already filled with troops. The cardinal then convoked the council of forty-eight to decide upon a suc- cessor. Alessandro's only issue was a natural son named Giulio, aged five. The cardinal favoured his election, in the hope of keeping the real sovereignty in his own hands. But he speedily saw the impossibility of carrying out a design that was ridiculed by all. Guicciardini, Vettori and others of the leading citizens favoured the choice of Cosimo, the son of Giovanni delle Bande Nere. He was already in Florence, was aged seventeen, was

keen-witted and aspiring, strong and handsome in person, heir to the enormous wealth of the Medici, and, by the terms of the imperial patent, was Alessandro's lawful successor. Charles V. approved the nomination of Cosimo, who without delay seized the reins of government with a firm grasp. Like Alessandro, he was named head of the republic; and Guicciardini and others who had worked hardest in his cause hoped to direct him and keep him under their control. But Cosimo soon proved that, his youth notwithstanding, he was resolved to rule unshackled by republican forms and unhampered by advisers disposed to act as mentors. The Florentines had now an absolute prince who was likewise a statesman of eminent ability.

On learning the death of Alessandro and the election of Cosimo, the exiles appreciated the necessity for prompt action, as delay would be fatal to the overthrow of the Medicean rule. They had received money and promises from France; they were strengthened by the adhesion, of Filippo Strozzi and Baccio Valori, who had both become hostile to the Medici through the infamous conduct and mad tyranny of Alessandro; and Strozzi brought them the help of his enormous fortune and the prowess of that very distinguished captain, his son Piero. The exiles assembled their forces at Mirandola. They had about foul thousand infantry and three hundred horse; among them were members of all

the principal Florentine families; and their leaders were Bernardo Salviati and Piero Strozzi. They marched rapidly, and entered Tuscany towards the end of July 1537. Cosimo on this occasion displayed signal capacity and presence of mind. Informed of the exiles' movements by his spies, he no sooner learned their approach than he ordered Alessandro Vitelli to collect the best German, Spanish and Italian infantry at his disposal, and advance against the enejny without delay. On the evening of the 3 1st of July Vitelli marched towards Prato with seven hundred picked infantry and a band of one hundred horse, and on the way fell in with other Spanish foot soldiers who joined the expedition. At early dawn the following morning he made a sudden attack on the exiles' advanced guard close to Montemurlo, an old fortress converted into a villa be- longing to the Nerli. Having utterly routed them, he proceeded to storm Montemurlo, where Filippo Strozzi and a few of his young comrades had taken refuge. They made a desperate resistance for some hours, and then, overwhelmed by superior numbers, were obliged to yield themselves prisoners. The main body of the army was still at some distance, having been detained in the mountains by heavy rains and difficult passes, and, on learning the defeat at Montemurlo, its leade/ turned back by the way he haf 1 come. Alessandro Vitelli re-entered Florence with his victorious army and his fettered captives. Cosimo had achieved his first triumph.

All the prisoners, who were members of great families, were brought before Cosimo, and were received by him with courteous coldness. Soon, however, a scaffold was erected in the Piazza, and on four mornings in succession four of the prisoners were beheaded. Then the duke saw fit to stay the executions. Baccio Valori, however, and his son and nephew were beheaded on the 20th of August in the courtyard of the Bargello. Filippo Strozzi still survived, confined in the Fortezza da Basso, that had been built at his expense.' His family was illustrious, he had numerous adherents, and he enjoyed the protection of the French king. Nevertheless Cosimo only awaited some plausible pretext to rid himself of this dreaded enemy. He brought him to trial and had him put to the question. But this cruelty ie.d to nothing, for Strozzi denied every accusation and bore the torture with much fortitude. On the 18th of December he was found dead in his prison, with a blood-stained sword by his side, and a slip of paper bearing these words: exoriare aliquis nostril, ex ossibus ultor. It was believed that, having renounced all hope of his life being spared, Strozzi had preferred suicide to death at the hands of the executioner. Some, however, thought that Cosimo had caused him to be murdered, and adopted this mode of concealing the crime. The young prince's cold-

blooded massacre of his captives cast an enduring shadow upon his reign and dynasty. But it was henceforward plain to all that he was

a man of stern resolve, who went straight to his end without scruples or half-measures. Before long he was regarded by many as the incarnation of Machiavelli's Prince, " inasmuch as he joined daring to talent and prudence, was capable of great cruelty, and yet could practise mercy in due season." Guicciar- dini, who still pretended to act as mentor, and who on account of his many services had a certain influence over him, was obliged to withdraw from public life and busy himself with writing his History at his villa of Arcetri. He died in this retreat in 1540, and it was immediately rumoured that the duke had caused him to be poisoned. This shows the estimation in which Cosimo was now held. He punished with death all who dared to resist his will. By 1 540 sentence of death had been pronounced against four hundred and thirty contumacious fugitives, and during his reign one hundred and forty men and six women actually ascended the scaffold, without counting those who perished in foreign lands by the daggers of his assassins. He reduced the old republican institutions to empty forms, by making the magis- trates mere creatures of his will. He issued the sternest edicts against the rebels, particularly by the law known as the " Pol- verina," from the name of its proposer Jacopo Polverini. This law decreed not only the confiscation of the property of exiles, but likewise that of their heirs, even if personally acquired by the latter. Cosimo ruled like the independent sovereign of a great state, and always showed the capacity, firmness and courage demanded by that station. Only, his state being small and weak, he was forced to rely chiefly upon his personal talent and wealth. It was necessary for him to make heavy loans to the different European sovereigns, especially to Charles V., the most rapacious of them all, and to give enormous bribes to their ambassadors. Besides, he had to carry on wars for the exten- sion of his dominions; and neither his inherited wealth nor the large sums gained by confiscating the estates of rebellious subjects sufficed for all this outlay. He was accordingly com- pelled to burden the people with taxes, and thus begin at once to diminish its strength.

Cosimo bore a special grudge against the neighbouring republics of Siena and Lucca. Although the latter was small and weak, and the former garrisoned by SJeaa seized. Spaniards, yet the spectacle of free institutions at the frontiers of his own state served as a continual

incitement to subjects disaffected to the new r6gime. In fact Francesco Burlamacchi, a zealous Lucchese patriot, had con- ceived the design of re-establishing republican government in all the cities of Tuscany. Cosimo, with the emperor's help, succeeded in having him put to death. Lucca, however, was an insignificant state making no pretence of rivalry, whereas Siena was an old and formidable foe to Florence, and had always given protection to the Florentine exiles. It was now very reluctantly submitting to the presence of a Spanish garrison, and, being stimulated by promises of prompt and efficacious assistance from France, rose in rebellion and expelled the Span- iards in 1552. Cosimo instantly wrote to the emperor in terms that appealed to his pride, asked leave to attack Siena, and begged for troops to ensure the success of his enterprise. As no immediate answer arrived, he feigned to begin negotiations with Henry II. of France, and, by thus arousing the imperial jealousy, obtained a contingent of German and Spanish infantry. Siena was besieged for fifteen months, and its inhabitants, aided by the valour of Piero Strozzi, who fought under the French flag, made a most heroic resistance, even women and children helping on the walls. But fortune was against them. Piero Strozzi sus- tained several defeats, and finally the Sienese, having exhausted their ammunition and being decimated by famine and the sword, were obliged to capitulate on honourable terms that were shame- lessly violated. By the varied disasters of the siege and the number of fugitives the population was reduced from forty to eight thousand inhabitants. The republicans, still eager to resist, withdrew to Montalcino. Cosimo now ruled the city and territory of Siena in the name of Charles V., who always refused him its absolute possession. After the emperor's abditation, and the succession of Philip II. to the Spanish throne, Cosimo

at last obtained Siena and Porto Ferraio by giving up his claim to a sum of 200,000 ducats that he was to have received from Charles V.

In 1550 Cosimo also captured Montalcino, and thus formed the grand-duchy of Tuscany, but he continued to govern the new state — i.e. Siena and its territories — separately from the old. His rule was intelligent, skilful and des- Grand-Ducby potic; but his enormous expenses drove ham to raise formed. large sums of money by special contrivances unsuited to the country and the people. Hence, notwithstanding the genius of its founder, the grand-duchy held from the first the elements of its future decay. Cosimo preferred to confer office upon men of humble origin in order to have pliable tools, but he also liked to be surrounded by a courtier aristocracy on the Spanish and French pattern. As no Tuscan aristocracy any longer existed, he created new nobles, and tempted foreign ones to come by the

concession of various feudal privileges; and, to turn this artificial aristocracy to some account, he founded the knightly order of St Stephen, charged with the defence of the coast against pirates, which in course of time won much honour by its prowess. He also established a small standing army for the protection of his frontiers; but he generally employed German and Spanish troops for his wars, and always had a foreign body- guard. At the commencement of his reign he opposed the popes in order to maintain the independence of his own state; but later, to obtain help, he truckled to them in many ways, even to the extent of giving up to the Inquisition his own confidant, Piero Carnesecchi, who, being accused of heresy, was beheaded and burnt in 1567. In reward for these acts of submission, the popes showed him friendship, and Pius V. granted him the title of grand-duke, conferring the patent and crown upon him in Rome, although the emperor had always withheld his consent. The measure most injurious to Tuscany was the fiscal system of taxes, of which the sole aim was to extort the greatest possible amount of money. The consequent damage to industry, com- merce and agriculture was immense, and, added to the devasta- tions caused by the Sienese War, led to their utter ruin. Other- wise Cosimo did not neglect useful measures for the interior prosperity of his state. He was no Maecenas; nevertheless he restored the Pisan university, enlarged that of Siena, had the public records classified, and also executed public works like the Santa Trinita. bridge. During the great inundations of 1557 he turned his whole energy to the relief of the sufferers.

In 1539 he had espoused Eleonora of Toledo, daughter of the viceroy 01 Naples, by whom he had several children. Two died in 1562, and their mother soon followed them to the grive. It was said that one of these boys, Don Garcia, had murdered tht other, and then been, killed by the enraged father. Indeed, Cusimo was further accused of having put his own wife to death; but neither rumour had any foundation. He now showed sign? of illness and failure of strength. He was not old, but worn by the cares of state and self-indulgence. Accordingly in i 564 h« resigned the government to his eldest son, who was to act as his lieutenant, since he wished to have power to resume the sceptre on any emergency. In 1570, by the advice of Pope Pius V., he married Camilla Martelli, a young lady of whom he had been long enamoured. In 1574 he died, at the age of fifty-four years and ten months, after a reign of thirty-seven years, leaving three sons and one daughter besides natural children. These sons were Francesco, his successor, who was already at the head of the government, Cardinal Ferdinand, and Piersi,

Francesco I., born in 1541, began to govern as his father’s lieutenant

in 1564, and was married in 1565 to the archduchess Giovanna of Austria. On beginning to reign on his pˆnˆsc, /. own account in 1574, he speedily manifested his real character. His training in the hands of a Spanish mother had made him suspicious, false and despotic. Holding every one aloof, he carried on the government with the assistance of a few devoted ministers. He compelled his step-mother to retire to a convent, and kept his brothers at a distance from Florence. He loved the privileges of power without its burdens. Cosimo had known how to maintain his independence, but Francesco cast

himself like a vassal at Austria's feet. He reaped his reward by-obtaining from Maximilian II. the title of grand-duke, for which Cosimo had never been able to win the imperial sanction, but he forfeited all independence. Towards Philip II. he showed even greater submissiveness, supplying him with large sums of money wrung from his overtaxed people. He held entirely aloof from France, in order not to awake the suspicions of his protectors. He traded on his own account, thus creating a monopoly that was ruinous to the country. He raised the tax upon corn to so high a rate that few continued to find any profit in growing it , and thus the Maremme, already partly devastated during the war with Siena, were converted into a desert. Even industry declined under this system of government; and, although Francesco founded porcelain manufactories and pietra dura works, they did not rise to any prosperity until after his death. His love of science and letters was the only Medicean virtue that he possessed. He had an absolute passion for chemistry, and passed much of his time in his laboratory. Some- times indeed he gave audience to his secretaries of state standing before a furnace, bellows in hand. He took some useful measures to promote the rise of a new city at Leghorn, which at that time had only a natural and ill-sheltered harbour. The improvement of Leghorn had been first projected by Cosimo I., and was carried on by all the succeeding Medici. Francesco was a slave to his passions, and was led by them to scandalous excesses and deeds of bloodshed. His example and neglect of the affairs of the state soon caused a vast increase of crime even among the people, and, during the first eighteen months of his reign, there occurred no fewer than one hundred and sixty-eight murders.

In default of public events, the historians of this period enlarge upon private incidents, generally of a scandalous or sanguinary kind. In 1575 Orazio Pucci, wishing to avenge his father, whom Cosimo had

hanged, determined to get up a conspiracy, but, soon recognizing how firmly the Medicean rule had taken root in the country, desisted from the attempt. But the grand-duke, on hearing of the already abandoned plot, immediately caused Pucci to be hanged from the same window of the Palazzo Vecchio, and even from the same iron stanchion, from which his father before him had hung. His companions, who had fled to France and England, were pursued and murdered by the ducal emissaries. Their possessions were confiscated, and the " Pol- verina " law applied, so that the conspirators' heirs were reduced to penury, and the grand-duke gained more than 300,000 ducats.

Next year Isabella dei Medici, Francesco's sister, was strangled in her nuptial bed by her husband, Paolo Giordano Orsini, whom she had betrayed. Piero dei Medici, Francesco's brother, murdered his wife Eleonora of Toledo from the same motive. Still louder scandal was caused by the duke's own conduct. He was already a married man, when, passing one day through the Piazza of St Mark in Florence, he saw an exceedingly beautiful woman at the window of a mean dwelling, and at once conceived a passion for her. She was the famous Bianca Cappello, a Venetian of noble birth, who had eloped with a young Florentine named Pietro Buonaventuri, to whom she was married at the time that she attracted the duke's gaze. He made her acquaint- ance, and, in order to see her frequently, nominated her husband to a post at court. Upon this, Buonaventuri behaved with so much insolence, even to the nobility, that one evening he was found murdered in the street. Thus the grand-duke, who was thought to have sanctioned the crime, was able to indulge his passion unchecked. On the death of the grand-duchess in 1578 he was privately united to Bianca, and afterwards married her publicly. But she had no children, and this served to poison her happiness, since the next in succession was her bitter enemy, the cardinal Ferdinand. The latter came to Florence in 1587, and was ostentatiously welcomed by Bianca, who was most anxious to conciliate him. On the 18th of October of the same year the grand-duke died at his villa of Poggio a Caiano, of a fever caught on a shooting excursion in the Maremme, and the next day Bianca also expired, having ruined her health by drugs taken to cure her sterility. But rumour asserted that she had

prepared a poisoned tart for the cardinal, and that, when he suspiciously insisted on the grand-duke tasting it first, Bianca desperately swallowed a slice and followed her husband to the tomb.

Such was the life of Francesco dei Medici, and all that can be said in his praise is that he gave liberal encouragement to a few artists, including de Giovanni Bologna (q.v.). He was the founder of the Uffizi

gallery, of the Medici theatre, and the villa of Pratolino; and during his reign the Delia Cruscan academy was instituted.

Ferdinand I. was thirty-eight years of age when, in 1587, he succeeded his brother on the throne. A cardinal from the age of fourteen, he had never taken holy orders. He _ showed much tact and experience in the manage- ment of ecclesiastical affairs. He was the founder of the Villa Medici at Rome, and the purchaser of many priceless works of art, such as the Niobe group and many other statues afterwards transported by him to Florence. After his accession he retained the cardinal's purple until the time of his marriage. He was in all respects his brother's opposite. Affable in his manners and generous with his purse, he chose a crest typical of the proposed mildness of his rule — a swarm of bees with the motto Majeslate tantum. He instantly pardoned all who had opposed him, and left his kinsmen at liberty to choose their own place of residence. Occasionally, for political reasons, he committed acts unworthy of his character; but he re-established the adminis- tration of justice, and sedulously attended to the business of the state and the welfare of his subjects. Accordingly Tuscany revived under his rule and regained the independence and political dignity that his brother had sacrificed to love of ease and personal indulgence. He favoured commerce, and effectually ensured the prosperity of Leghorn, by an edict enjoining tolera- tion towards Jews and heretics, which led to the settlement of many foreigners in that city. He also improved the harbour and facilitated communication with Pisa by means of the Naviglio, a canal into which a portion of the water of the Arno was turned. He nevertheless retained the reprehensible custom of trading on his own account, keeping banks in many cities of Europe. He successfully accomplished the draining of the Val di Chiana, cultivated the plains of Pisa, Fucecchio and Val di Nievole, and executed other works of public utility at Siena and Pisa. But his best energies were devoted to the foreign policy by which he sought to emancipate himself from subjection to Spain. On the assassination (1589) of Henry III. of France Ferdinand supported the claims of the king of Navarre, undeterred by the opposition of Spain and the Catholic League, who were dismayed by the prospect of a Huguenot succeeding to the throne of France. He lent money to Henry IV., and strongly urged his conversion to Catholicism; he helped to persuade the pope to accept Henry's abjuration, and pursued this policy with marvellous persistence until his efforts were crowned with success. Henry IV. showed faint gratitude for the benefits conferred upon him, and paid no attention to the expostulations of the grand-duke, who then began to slacken his relations with France, and showed that he could guard his independence by other alliances. He

gave liberal assistance to Philip III. for the campaign in Algiers, and to the emperor for the war with the Turks. Hence he was compelled to burden his subjects with enormous taxes, forgetting that while guaranteeing the inde- pendence of Tuscany by his loans to foreign powers he was increasingly sapping the strength of future generations.. He at last succeeded in obtaining the formal investiture of Sietta, which Spain had always considered a fief of her own.

During this grand-duke's reign the Tuscan navy was notably increased, and did itself much honour on the Mediterranean. The war-galleys of the knights of St Stephen were despatched to the coast of Barbary to attack Bona, the headquarters of the corsairs, and they captured the town with much dash and bravery. In the following year (1608) the same galleys achieved their most brilliant victory in the archipelago over the stronger fleet of- the Turks, by taking nine of their vessels, seven hundred prisoners, and jewels of the value of 2,000,000 ducats.

MEDICI (FAMILY)

Ferdinand I. died in 1609, leaving four sons, of whom the eldest, Cosimo II., succeeded to the throne at the age of nineteen. Cosimo n. ˆ e was at nrst assisted in the government by his mother and a council of regency. He had a good disposition, and the fortune to reign during a period when Europe was at peace and Tuscany blessed with abundant harvests. Of his rule there is little to relate. His chief care was given to the galleys of St Stephen, and he sent them to assist the Druses against the Porte, On one occasion he was involved in a quarrel with France. Concino Concini, the Marshal d'Ancre, being assassinated in 161 7, Louis XIII. claimed the right of transferring the property of the murdered man to De Luynes. Cosimo, refusing to recognize the confiscation decreed by the French tribunals, demanded that Concini's son should be allowed to inherit. Hence followed much ill-feeling and mutual reprisals between the two countries, finally brought to an end by the intervention of the duke of Lorraine.

Like his predecessors, Cosimo II. studied to promote the prosperity of Leghorn, and he deserves honour for abandoning all commerce on his own account. But it was no praiseworthy act to pass a law depriving women of almost all rights of inheri- tance. By this means many daughters of the nobility were driven into convents against their will. He gave scanty atten- tion to the general affairs of the state. He was fond of luxury, spent freely on public festivities and detested trouble. Tuscany was apparently tranquil and prosperous; but the decay of which the seeds were sown under Cosimo I. and Ferdinand I. was rapidly spreading, and became before long patent to all and beyond

all hope of remedy. The best deed done by Cosimo II. was the protection accorded by him to Galileo Galilei, who had removed to Padua, and there made some of his grandest discoveries. The grand duke recalled him to Florence in 1610, and nominated him court mathematician and philosopher. Cosimo died in February 1621. Feeling his end draw near, when he was only aged thirty and all his sons were still in their childhood, he hastened to arrange his family affairs. His mother, Cristina of Lorraine, and his wife, Maddalena of Austria, were nominated regents and guardians to his eldest son Ferdinand II., a boy of ten, and a council of four appointed, whose functions were regulated b/ law. After Cosimo's death, the young Ferdi- nand was sent to Rome and Vienna to complete his education, and the government of Tuscany remained in the hands of two jealous and quarrelsome women. Thus the administration of justice and finance speedily went to ruin. Out of sub- missiveness to the pope, the regents did not dare to maintain their legitimate right to inherit the duchy of Urbino. They conferred exaggerated privileges on the new Tuscan nobility, which became increasingly insolent and worthless. They resumed the practice of trading on their own account, and, without reaping much benefit thereby, did the utmost damage to private enterprise.

In 1627 Ferdinand II., then aged seventeen, returned to Italy and assumed the reins of government; but, being of a very gentle Ferdinand 11. disposition, he decided on sharing his power with the regents and his brothers, and arranged matters in such wise that each was almost independent of the other. He gained the love of his subjects by his great goodness; and, when Florence and Tuscany were ravaged by the plague in 1630, he showed admirable courage and carried out many useful measures. But he was totally incapable of energy as a states- man. When the pope made bitter complaints because the board of health had dared to subject certain monks and priests to the necessary quarantine, the grand-duke insisted on his officers asking pardon on their knees for having done their duty. On the death in 1631 of the last duke of Urbino, the pope was allowed to seize the duchy without the slighest opposition on the part of Tuscany. As a natural consequence the pretensions of the Roman curia became increasingly exorbitant; ecclesiastics usurped the functions of the state; and the ancient laws of the republic, together with the regulations decreed by Cosimo I. as a check upon similar abuses, were allowed to become obsolete. On the extinction of the line of the Gonzagas at Mantua in 1627,

war broke out between France on the one side and Spain, Germany and Savoy on the other. The grand duke, uncertain of his policy, trimmed his sails according to events. Fortunately peace was re-established in 1631. Mantua and Monferrato fell to the duke of Nevers, as France had always desired. But Europe was again in arms for the Thirty Years' War, and Italy was not at peace. Urban VIII. wished to aggrandize his nephews, the Barberini, by wresting Castro and Ronciglione from Odoardo Farnese, duke of Parma and brother-in-law to Ferdinand. Farnese marched his army through Tuscany into the territories of the pope, who was greatly alarmed by the attack. The grand- duke was drawn into the war to defend his own state and his kinsman. His military operations, however, were of the feeblest and often the most laughable character. At last, by means of the French intervention, peace was made in 1644. But, although the pope was forced to yield, he resigned none of his ecclesiastical pretensions in Tuscany. It was during Ferdinand's reign that the septuagenarian Galileo was obliged to appear before the Inquisition in Rome, which treated him with infamous cruelty. On the death of this great and unfortunate man, the grand-duke wished to erect a monument to him, but was withheld by fear of the opposition of the clergy. The dynasty as well as the country now seemed on the brink of decay. Two of the grand- duke's brothers had already died childless, and Ippolito, the sole survivor, was a cardinal. The only remaining heir was his son Cosimo, born in 1642.

Like nearly all his predecessors, Ferdinand II. gave liberal patronage to science and letters, greatly aided therein by his brother Leopold, who had been trained by Galileo Galilei, and who joined with men of learning in founding the celebrated academy Del Cimento, of which he was named president. This academy took for its motto the words Provando e riprovando, and followed the experimental method of Galileo. Formed in 1657, ˆ was dissolved in 1667 in consequence of the jealousies and dissensions of its members, but during its brief existence won renown by the number and importance of its works.

Cosimo III. succeeded his father in 1670. He was weak, vain, bigoted and hypocritical. In 1661 he had espoused Louise of Orleans, niece of Louis XIV., who, being enamoured Cat i mo ///. of duke Charles of Lorraine, was very reluctant to come to Italy, and speedily detested both her husband and his country, of which she refused to learn the language. She had two sons and one daughter, but after the birth of her third child, Giovan Gastone, her hatred for her husband increased almost to madness. She first withdrew to Poggio a Caiano, and then, being unable to get her marriage annulled, returned to France, where, although supposed to live in conventual seclusion, she passed the

greater part of her time as a welcome visitor at court. Even her testamentary dispositions attested the violence of her dislike to her husband.

Cosimo's hypocritical zeal for religion compelled his subjects to multiply services and processions that greatly infringed upon their working hours. He wasted enormous sums in pensioning converts — even those from other countries — and in giving rich endowments to sanctuaries. Meanwhile funds often failed for the payment of government clerks and soldiers. His court was composed of bigots and parasites; he ransacked the world for dainties for his table, adorned his palace with costly foreign hangings, had foreign servants, and filled his gardens with exotic plants. He purchased from the emperor the title of " Highness " in order to be the equal of the duke of Savoy. He remained neutral during the Franco-Spanish War, and submitted to every humilia- tion and requisition exacted by the emperor. He had vague notions of promoting agriculture, but accomplished no results. At one time he caused eight hundred families to be brought over from the Morea for the cultivation of the Maremme, where all of them died of fever. But when, after the revocation of the Edict of Nantes, French Huguenots offered to apply their labour and capital to the same purpose, the grand duke's religious scruples refused them refuge. So ruin fell upon Tuscany. Crime and misery increased, and the poor, who only asked for work, were given alms and sent oftener to church. This period

witnessed the rise of many charitable institutions- of a religious character under the patronage of the grand-duke, as for instance the congregation of San Giovanni Battista. But these could not remedy the general decay.

Cosimo's dominant anxiety regarded the succession to the throne. His eldest son Ferdinand died childless in 1713. The pleasure-loving Giovan Gastone was married to Anna Maria of Saxe-Lauenburg, widow of a German prince, a wealthy, coarse woman wholly immersed in domestic occupations. After living with her for some time in a Bohemian village, Giovan Gastone yielded to his dislike to his wife and her country, withdrew to France, and ruined his health by his excesses. After a brief return to Bohemia he finally separated from his wife, by whom he had no family. Thus the dynasty was doomed to extinction.

thought on ascending it was to regain strength enough to pass the remainder of his days in enjoyment. He dismissed the spies, parasites and bigots that had formed his father's court, abolished the pensions given to converts, suppressed seve. al taxes, and pro- hibited the organized espionage established in the family circle. He wished to live and let live, and liked the people to be amused. Everything in fact bore a freer and gayer aspect under his reign, and the Tuscans seemed to feel renewed attachment for the dynasty as the moment of its extinction drew near. But the grand-duke was too feeble and incapable to accomplish any real improvement. Surrounded by gay and dissipated young men, he entrusted all the cares of government to a certain Giuliano Dami, who drove a profitable trade by the sale of offices and privileges. In this way all things were in the hands of corrupt

GENEALOGICAL TABLE OF THE MEDICI

Giovanni d'Averardo, known as Giovanni di Bicci, 1360-1429 = Piccarda Bueri.

Cosimo the Elder, 1389-1464 ™ = Contessina de' Bardi.

Piero, 1416-1460 = Lucrezia Tornabuoni, t 1482

Giovanni, 1424-1463 = Ginevra degli Alessandri.

Lorenzo il

Magninco,

144.9-1492

= Clarice Orsini,

ti488.

I

Giuliano,

I453-J478.

Giulio (Clement VII.), I478-I534.

Bianca

= Gugiielmo

dei Pazzi.

Nannina

= Bernardo

Rucellai.

Maria (nat.) = Lionetto de' Rossi.

Pietro,

1471-1503

-=Alfonsina

Orsini,

t 1520-

I

Giovanni

(Leo X.),

1475-15".

Lorenzo,

duke of

Urbino.

1492-1519

«= Madeleine

de la Tour

d'Auvergne t

t T5I9-

Clarice,

I-T528

= Fihppo

Strozzi.

Giuliano, duke of Nemours, I479-I5 16 =»Philiberta of Savoy.

Ippolito

(nat.),

cardinal,

J5II-I535-

Lucrezia

= Giacpmo

Salviati.

Maddalena =Franceschetto Cybo.

I I I

Giovanni Maria Elena

Salviati, =Giovanni = JacopoV.

cardinal, delle Bande Appiani.

Nere.

1

Alessandro

(nat.), t I537-

Caterina,

1519-1589

= Henry II.,

king of

France

Contessina = Piero

Ridolfi.

Niccolo Ridolfi, cardinal.

Innocenzo Cybo,

cardinal.

Lorenzo Cybo Caterina Cybo,

= Ricciarda d-tchess of Malaspina, Camerino.

princess of Massa.

Lorenzo, 1395-1440 — Ginevra Cavalcanti,

Pier Francesco, 1 1467 = Laudomia Acciaiuoli.

Giovanni, 1467-1498 = Caterina Sf orza Riario, t *5Q9-

Giovanni delle Bande Nere,

1498-1526

=Maria Salviati,

t 1543-

I

COSIMO I., I5I9-I574,

= 1. Eieonora of Toledo,

t 1502.

2. Camilla Martelli.

Lorenzo,

1 1503

= Semiramide Appiani.

Pier Francesco, 1 1525 = Maria Soderini.

i r 1 1

Laudomia. Maddalena Giuliano

£ t”* = Piero = Roberto bishop of

Strozzi. Strozzi. Beziers.

*t 2

111 !

Francesco, &OO Ferdinand L,

i54i-i587 &

= 1. Joanna- g £■

of Austria,

tT 5 78;

2. Bianca

Cappello,

1 1587-

TE.-1.

1 549- 1609

= Cristina of

Lorraine,

1 1637.

Pietro,

1554-1604

— Eieonora of Toledo,

t 1576.

Isabella, i54*-i57

- Paolo Giordano

Orsini.

i Virginia, = Cesare d'Este, duke of Modena.

Maria,

1 1642

-Henry IV., king of France.

Cosimo II.,

1500-1621

= Maria Maddalena of Austria, ti6 3 i.

Caterina = Ferdinand Gonzaga, duke of Mantua.

Ferdinand II. ,

1610-1670

=Vittoria della Rovere, 1 1694.

Francesco, t 1634-

Mattia, t 1667.

Leopoldo, Giovanni Anna

cardinal, Carlo, = Ferdinand

t 1675. cardinal, of Austrian

t iC63- Tyrol.

Margherita

= Odoardo

Farnese,

duke 01

Parma.

I

Claudia

= 1. Federigo

della Rovere,

hereditary ,

prince of

Urbino;

2. Leopold of

Austrian

Tyrol.

I

Vittoria

della Rovere.

Cosmo III., 1642-1723 = Marguerite Louise of Orleans, 1 1721.

I

Francesco Maria, 1660-1711 (cardinal until 1709)

=Eleonora Gonzaga.

Ferdinand, 1663-1713 «=Violante of Bavaria, f 1731.

Gtovan Gastone, 1671-1737 =Anna Maria of Saxe-Lauenburg, 1 1741.

Anna Maria Luisa, 1667-1743 = John William of the Palatinate.

Cosimo had a passing idea of reconstituting the Florentine republic, but, this design being discountenanced by the Euro- pean powers, he determined to transfer the succession, after the death of Giovan Gastone, to his sister Anna Maria Louisa, who in fact survived him. For this purpose he proposed to annul the patent of Charles V., but the powers objected to this arrangement also, and by the treaty of ‘1718 the quadruple alliance of Germany, France, England and Holland decided that Parma and Tuscany should descend to the Spanish Infante Don Carlos. The grand-duke made energetic but fruitless protests. Cosimo III. had passed his eightieth year at the time of his decease in October 1723, and was succeeded by his son Giovan

Gastone, then aged fifty-three. The new sovereign aastoae. was m Da< ˆ health, worn out by dissipation, and had

neither ambition nor aptitude for rule. His throne was already at the disposal of foreign powers, and his only

individuals; while the grand-duke, compelled to pass the greater part of his time in bed, vainly sought diversion in the company of buffoons, and was only tormented by perceiving that all the world disposed of his throne without even asking his advice. And when, after prolonged opposition, he had resigned himself to accept Don Carlos as his successor, the latter led a Spanish army to the conquest of Naples, an event afterwards leading to the peace of 1735, by which the Tuscan succession was trans- ferred to Francesco II., duke of Lorraine, and husband of Maria Theresa. Giovan Gastone was finally obliged to submit even to this. Spain withdrew her garrisons from Tuscany, and

Austrian soldiers took their place and swore fealty to the grand-duke on the sth of February 1737. He expired on the oth of July of the same year. Such was the end of the younger branch of the Medici, which had found Tuscany a prosperous country, where art, letters, commerce, industry and agriculture flourished,

and left her poor and decayed in all ways, drained by taxation, and oppressed by laws contrary to every ‘ principle of sound economy, downtrodden by the clergy, and burdened by a weak and vicious aristocracy.

Bibliography. —

MEDICI, 6IAC0M0 (1817-1882), Italian patriot and soldier, was born at Milan in January 1817. Exiled in 1836, he fought in Spain against the Carlists between 1836 and 1840, and in 1846 joined Garibaldi at Montevideo. Returning to Italy with Garibaldi in 1848, he raised a company of volunteers to fight against Austria, and commanded the volunteer vanguard in Lombardy, proceeding thence to Rome, where. he gained dis- tinction by defending the ” Vascello,” a position near the Porta San Pancrazio, against the French. During the siege of Rome he himself was wounded. In the wax of 1859 he commanded a volunteer regiment, and was sent by Cavour into Tirol. In i860 he tried in vain to dissuade Garibaldi from the Marsala expedi- tion, but, after his chief’s departure, he sailed for Sicily with the second expedition, taking part in the whole campaign, during which he forced Messina to capitulate after an eight days’ siege. Joining the regular army, he was appointed military com- mandant of Palermo, in which capacity he facilitated the abortive campaign of Garibaldi in 1862. In 1866 he commanded the division which invaded Tirol, but the effect of his victories was neutralized by the conclusion of peace. Returning to Palermo he did good work in restoring order in Sicily. He became a senator in 1870, and marquis of the ” Vascello ” and first aide-de-camp to the king in 1876. He died on the 9th of March 1882.

MEDICINE. — The science of medicine, as we understand it, has for its province the treatment of disease. The word ” medicine ” (Lat. medicina: sc. ars, art of healing, from mederi, to heal) may be used very widely, to include Pathology (q.v.), the theory of the causation of disease, or, very narrowly, to mean only the drug or form of remedy prescribed by the physician — this being more properly the subject of

Therapeutics (q.v.) and Pharmacology (q.v.). But it is necessary in practice, for historical comprehensiveness, to keep the wider meaning in view. Disease (see Pathology) is the correlative of health, and the word is not capable of a more penetrating definition. From the time of Galen, however, it has been usual to speak of the life of the body either as proceeding in accordance with nature (Kara tpixriv, secundum naturam) or as overstepping the bounds of nature (irapa 4>vcriv, praeter naturam). Taking disease to be a deflexion from the line of health, the first requisite of medicine is an extensive and intimate acquaintance with the norm of the body. The structure and functions of the body form the subject of Anatomy (q.v.) and Physiology (q.v.).

The medical art (ars medendi) divides itself into departments and subdepartments. The most fundamental division is into internal and external medicine, or into medicine proper and surgery (q.v.). The treatment of wounds, injuries and de- formities, with operative interference in general, is the special department of surgical practice (the corresponding parts of pathology, including inflammation, repair, and removable tumours, are sometimes grouped together as surgical pathology) ; and where the work of the profession is highly subdivided,

surgery becomes the exclusive province of the surgeon, while internal medicine remains to the physician. A third great department of practice is formed by obstetric medicine or midwifery (see Obstetrics); and dentistry (q.v.), or dental surgery, is given up to a distinct branch of the profession.

A state of war, actual or contingent, gives occasion to special developments of medical and surgical ■ practice (military hygiene and military surgery). Wounds caused by projectiles, sabres, &c, are the special subject of naval and military surgery; while under the head of military hygiene we may include the general subject of ambulances, the sanitary arrangements of camps, and the various forms of epidemic camp sickness.

The administration of the civil and criminal law involves frequent relations with medicine, and the professional subjects most likely to arise in that connexion, together with a summary of causes cSlebres, are formed into the department of Medical Jurisprudence (q.v.).

In preserving the public health, the medical profession is again brought into direct relation with the state, through the public medical officers.

Medicine as Portrayed in the Homeric Poems. — In the state of society pictured by Homer it is clear that medicine has already had. a history. We find a distinct and organized profession; we find a system of treatment, especially in regard to injuries, which it must have been the work of long experience to frame; we meet with a nomenclature of parts of the body substantially the same (according to Daremberg) as that employed long afterwards in the writings of Hippocrates; in short, we find a science and an organization which, however imperfect as com- pared with those of later times, are yet very far from being in their beginning. The Homeric heroes themselves are repre- sented as having considerable skill in surgery, and as able to attend to ordinary wounds and injuries, but there is also a professional class, represented by Machaon and Podalirius, the two sons of Asclepius, who are treated with great respect. It Would appear, too, from the Aethiopis of Archinus (quoted by Welcker and Haser) that the duties of these two were not precisely the same. Machaon's task was more especially to heal injuries, while Podalirius had received from his father the gift of " recognizing what was not visible to the eye, and tending what could not be healed." In other words, a rough in-r dication is seen of the separation of medicine and surgery. Asclepius appears in Homer as a Thessalian king, not as a god, though in later times divine honours were paid to him. There is no sign in the Homeric poems of the subordination of medicine to religion which is seen in ancient Egypt and India, nor are priests charged, as they were in those countries, with medical functions — all circumstances which throw grave doubts on the commonly received opinion that medicine derived its origin in all countries from religious observances.

Although the actual organization of medicine among the Homeric Greeks was thus quite distinct from religion, the worship of Asclepius (or Aesculapius) as the god of healing demands sortie notice. This cult spread very widely among the Greeks; it had great civil im- portance, and lasted even into Christian times; but there is no reason to attribute to it any special connexion with the development of the science or profession of medicine. Sick persons repaired, or Were conveyed, to the temples of Asclepius in order to be healed, just as in modern times relief is sought by a devotional pilgrimage or from the waters of some sacred spring, and then as now the healing influence was sometimes sought by deputy. The sick person, or his representative, after ablution, prayer and sacrifice, was rhˆde to sleep on the hide of the sacrificed animal, or at the feet of the statue of the god, while sacred rites were performed. In his sleep (incubatio, ijKoljxiiais) the appropriate remedy was indicated by a dream. Moral or dietetic

remedies were more often prescribed than drugs. The record of the cure was inscribed on the columns or walls of the temple; and it has been thought that in this way was introduced the custom of "recording cases," and that the physicians of the Hippocratic school thus learnt to accumulate clinical experience. But the priests of Asclepius were not physicians. Although the latter were often called Asclepiads, this was in the first place to indicate- their real or supposed descent from Asclepius, and in the second place' as a complimentary title. No medical writing of antiquity speaks of the worship of Asclepius in such a way 1 as to'

imply any connexion with the ordinary art of healing. The two systems appear to have existed side by side, but to have been distinct, and if they were ever united it must have been before the times of which we have any record. The theory of a development of Greek medicine from the rites of Asclepius, though defended by eminent names, must accordingly be rejected.

Development of Medicine in Greece. — It is only from non- medical writers that anything is known of the development of medicine in Greece before the age of Hippocrates. The elaborate collections made by Daremberg of medical notices in the poets and historians illustrate the relations of the profession to society, but do little to prepare us for the Hippocratic period. Nor is much importance to be attached to the influence of the philo- sophical sects on medicine except as regards the school of Pythagoras. That philosopher and several of his successors were physicians, but we do not know in what relation they stood to later medical schools. We must therefore hasten onward to the age of Pericles, in which Hippocrates, already called " the Great," was in medicine as complete a representative of the highest efforts of the Greek intellect as were his contemporaries the great philosophers, orators and tragedians. The medical art as we now practise it, the character of the physician as we now understand it, both date for us from Hippocrates. The justification of this statement is found in the literary collection of writings known by his name. Of these certainly many are falsely ascribed to the historical Hippocrates of Cos; others are almost as certainly rightly so ascribed; others again are clearly works of his school, whether from his hand or not. But which are to be regarded as the " genuine works " is still uncertain, and authorities are

conflicting. There are clearly two schools represented in the collection — that of Cnidus in a small pro portion, and that of Cos in far the larger number of the works. The latter was that to which Hippocrates belonged, and where he gave instruction; and accordingly it may be taken that works of this school, when not obviously of a different date, are Hippocratic in doctrine if not in actual authorship.

Hippocratic Medicine. — The first grand characteristic of Hippocratic medicine is the high conception of the duties and status of the physician, shown in the celebrated ” Oath of Hippocrates ” and elsewhere — equally free from the mysticism of a priesthood and the vulgar pretensions of a mercenary craft. So matured a pro- fessional sentiment may perhaps have been more the growth of time and organization than the work of an individual genius, but certainly corresponds with the character universally attributed to Hippocrates himself. The second great quality is the singular artistic skill and balance with which the Hippocratic physician used such materials and tools as he possessed. Here we recognize the true Greek ooxfrpooiivT). But this artistic completeness was closely connected with the third cardinal virtue of Hippocratic medicine— the clear recognition of disease as being equally with life a process governed by what we should now call natural laws, which could be known by observation, and which indicated the spontaneous and normal direction of recovery, by following which alone could the physician succeed. In the fourth place, these views of the ” natural history of disease ” (in modern language) led to habits of minute observation and accu- rate interpretation of symptoms, in which the Hippocratic school was unrivalled in antiquity, and has been the model for all succeeding ages, so that even in these days, with our enormous advances in knowledge, the true method of clinical medicine may be said to be the method of Hippocrates.

The actual science of the Hippocratic school was of course very limited. In anatomy and physiology little advance had been made, and so of pathology in the sense of an explanation of morbid processes or knowledge of diseased structures there could be very little. The most valuable intellectual possession was a large mass of recorded observations in individual cases and epidemics of disease. Whether these observations were systematic or individual, and how they were recorded, are points of which we are quite ignorant, as the theory that the votive tablets in the temples supplied such materials must be abandoned.

Though the Hippocratic medicine was so largely founded on observation, it would be an error to suppose that dogma or theory had

no place. The dominating theory of disease was the humoral, which has never since ceased to influence medical thought and practice. According to this celebrated theory, the body contains four humours—blood, phlegm, yellow bile and black bile, a right proportion and mixture of which constitute health; improper proportions or irregular distribution, disease. It is doubtful whether the treatise in which this theory is fully expounded (irtpl imot AjiBpiyxov) is as old as Hippocrates himself; but it was regarded as a Hippocratic doctrine, and, when taken up and expanded by Galen, its terms not only became the common property of the profession,

but passed into general literature and common language. Another Hippocratic doctrine, the influence of which is not even yet exhausted, is that of the healing power of nature. Not that Hippocrates taught, as he was afterwards reproached with teaching, that nature is sufficient for the cure of diseases; for he held strongly the efficacy of art. But he recognized, at least in acute diseases, a natural process which the humours went through — being first of all crude, then passing through coction or digestion, and finally being expelled by resolution or crisis through one of the natural channels of the body. The duty of the physician was to foresee these changes, ” to assist or not to hinder them,” so that ” the sick man might conquer the disease with the help of the physician.” The times at which crises were to be expected were naturally looked for with anxiety; and it was a cardinal point in the Hippocratic system to foretell them with precision. Hippocrates, influenced as is thought by the Pythagorean doctrines of number, taught that they were to be expected en days fixed by certain numerical rules, in some cases on odd, in others on even numbers — the celebrated doctrine of ” critical days.” This false precision can have had no practical value, but may have enforced habits of minute observation. It follows from what has been said that prognosis, or the art of fore- telling the course and event of the disease, was a strong point with the Hippocratic physicians. In this they have perhaps never been excelled. Diagnosis, or recognition of the disease, must have been necessarily imperfect, when no scientific nosology or system of disease existed, and the knowledge of anatomy was quite in- adequate to allow of a precise determination of the seat of disease ; but symptoms were no doubt observed and interpreted skilfully. The pulse is not spoken of in any of the works now 1 attributed to Hippocrates himself, though it is mentioned in other works of the collection.

In the treatment of disease, the Hippocratic school attached great importance to diet, the variations necessary in different diseases being minutely defined. Medicines were regarded as of secondary importance, but not neglected, two hundred and sixty-five drugs being

mentioned at different places in the Hippocratic works. Blood-letting was known, but not greatly practised. The highest importance was attached to applying all remedies at the right moment, and the general principle enforced of making all influences — internal and external — co-operate for the relief of the patient. The principles of treatment just mentioned apply more especially to the cure of acute diseases ; but they are the most salient character- istics of the Hippocratic school. In chronic cases diet, exercise and natural methods were chiefly relied upon.

The school of Cnidus, as distinguished from that of Cos, of which Hippocrates is the representative, appears to have differed in attach- ing more importance to the differences of special diseases, and to have made more use of drugs. A treatise on the diseases of women, contained in the Hippocratic collection, and of remarkable practical value, is attributed to this school.

The above sketch of Hippocratic medicine will make it less necessary to dwell upon the details relating to subsequent medical schools or sects in ancient times. The general conception of the physician's aim and task remained the same, though, as knowledge increased, there was much divergence both in theory and practice — even opposing schools were found to be developing some part of the Hippocratic system. Direct opponents or repudiators of the autho- rity of Hippocrates were rare, all generally appealing to his authority. But, insensibly, the least valuable part of the Hippocratic work, the theory, was made permanent ; the most valuable, the practical, neglected.

Post-Hippocratic Medicine. — After Hippocrates the progress of medicine in Greece does not call for any special remark in such a sketch as this, but mention must be made of one great name. Though none of Aristotle's writings are strictly medical, he has by his researches in anatomy and physiology contributed greatly to the progress of medicine. It should also be remembered that he was of an Asclepiad family, and received that partly medical education which was traditional in such families, and also himself is said to have practised medicine as an amateur. Moreover, his works on natural history doubtless furthered the progress among the Greeks of sciences tributary to medicine, though the only specimens of such works which have come down to us from the Peripatetic school are those of Theophrastus, who may be considered the founder of the scientific study of botany. Among his encyclopaedic writings were some on medical subjects, of which fragments only have been preserved. The Peripatetic school may have been mo**, favourable to the development of medicine, as of other departments of natural

knowledge, than any other; but there is no evidence that any of the philosophical schools had important influence on the progress of medicine. The fruit of Aristotle's teaching and example was seen later on in the schools of Alexandria.

The century after the death of Hippocrates is a time almost blank in medical annals. It is probable that the science, like others, shared in the general intellectual decline of Greece after the Mace- donian supremacy; but the works of physicians of the period are almost entirely lost, and were so even in the time of Galen. Galen classes them all as of the dogmatic school ; but, whatever may have been their characteristics, they are of no importance in the history of the science.

Alexandrian School of Medicine. — The dispersion of Greek science and intellectual activity through the world by the conquests of Alexander and his successors led to the formation of more than 'one learned centre, in which medicine among other sciences was represented. Pergamum was early distinguished for its medical school; but in this as in other respects its repu- tation was ultimately effaced by the more brilliant fame of Alexandria. It is here that the real continuation and develop- ment of Hippocratic medicine can be traced.

In one department the Alexandrian school rapidly surpassed its Greek original — namely, in the study of anatomy. The dissection of the human body, of which some doubtful traces or hints only are found in Greek times, was assiduously carried out, being favoured or even suggested perhaps by the Egyptian custom of disembowelling and embalming the bodies of the dead. There is no doubt that the organs were also examined by opening the bodies of living persons — criminals condemned to death being given over to the anatomists for this purpose.

Two eminent names stand in the first rank as leaders of the two earliest schools of medicine which arose in Alexandria, Herophilus and Erasistratus.

Herophilus (335-280 B.C.) was a Greek of Chalcedon, a pupil of the schools both of Cos and of Cnidus. He was especially noted for his

profound researches in anatomy (see i. 802), and in the know- ledge and practice of medicine he appears to have been equally renowned. He professed himself a close adherent of Hippocrates, and adopted his theory of the humours. He also made extensive use of drugs and of bleeding. The reputation of Herophilus is attested by the fact that four considerable physicians wrote works about him and his writings, and he is further spoken of with the highest respect by Galen and Celsus. By the general voice of the medical world of antiquity he was placed only second to Hippocrates.

Erasistratus (d. 280 B.C.) was the contemporary and rival of Herophilus. Little is known of his life, except that he spent some time at the court of Seleucus Nicator at Antioch before coming to Alexandria, and that he cultivated anatomy late in life, after he had taken up his abode in the latter city. His numerous works are also almost entirely lost, fragments only being preserved by Galen and others. Erasistratus, instead of following Hippocrates as Herophilus did, depreciated him, and seems to have been rather aggressive and independent in his views. He appears to have leaned to mechanical explanations of the symptoms of disease, as was especially the case with inflammation, of which he gave the first rational, though necessarily inadequate, theory.

The two schools composed of the followers of Herophilus and Erasistratus respectively long divided between them the medical world of Alexandria. The names of many prominent members of both sects have been preserved, but it would be useless to repeat them. The Herophilists still reverenced the memory of Hippocrates, and wrote numerous commentaries on his works. They produced many eminent anatomists, but in the end seem to have become lost in theoretical subtleties, and to have maintained too high a standard of literary cultivation. The school of Erasistratus was less distin- guished in anatomy than that of Herophilus, but paid more attention to the special symptoms of diseases, and employed a great variety of drugs. It was longer-lived than that of Herophilus, for it still numbered many adherents in the 2nd century after Christ, a century after the latter had become extinct.

The Erasistrateans paved the way for what was in some respects the most important school which Alexandria produced, that known as the empiric, which, though it recognized no master by name, may be considered to have been founded by Phillnus of Cos (280 B.C.), a pupil of Herophilus; but Serapion, a great name in antiqwity, and Glaucias of Tarentum, who traced the empirical doctrine back to the writings of Hippocrates, are also named among its founders. The most striking

peculiarity of the empirics was that they rejected anatomy, regarding it as useless to inquire into the causes of things, and thus, as they contended, being the more minute in their observa- tion of the actual phenomena of disease. They professed that their whole practice was based upon experience, to which word they gave a special meaning. Three sources, and three only, could experience draw from: observation, history (i.e. recorded observation), and judgment by analogy. These three bases of knowledge were known as the ” tripod ” of the empirics. It should not, however, be for- gotten that the empirics read and industriously commented on the works of Hippocrates. They were extremely successful in practical matters, especially in surgery and in the use of drugs, and a large part of the routine knowledge of diseases and remedies which became traditional in the times of the Roman empire is believed to have been derived from them. In the 2nd century the school became closely connected with the philosophical sect of the Sceptics, whose leader, Sextus (200 B.C.), was an empirical physician. It lived and flourished far beyond this time, when transplanted to Rome, not

less than in its native Alexandria, and appears to be recognizable even up to the beginning of the middle ages.

If we look at the work of the Alexandrian schools in medicine as a whole, we must admit that the progress made was great and permanent. The greatest service rendered to medicine was undoubtedly the systematic study of anatomy. It is clear that the knowledge of function (physiology) did not by any means keep pace with the knowledge of structure, and this was probably the reason why the important sect of the empirics were able entirely to dispense with anatomical knowledge. The doctrines of Hippocrates, though lightly thought of by the Erasistrateans, still were no doubt very widely accepted, but the practice of the Hippocratic school had been greatly improved in almost every department — surgery and obstetrics being probably those in which the Alexandrian practitioners could compare most favourably with those of modern times. We have now to trace the fortunes of this body of medical doctrine and practice when transplanted to Rome, and ultimately to the whole Roman world.

Roman Medicine. — The Romans cannot be said to have at any time originated or possessed an independent school of medicine. They had from early times a very complicated system of superstitious medicine, or religion, related to disease and the cure of disease, borrowed, as is thought, from the Etruscans; and, though the saying of Pliny that the Roman people got on for six • hundred years without doctors was

doubtless an exaggeration, and not, literally speaking, exact, it must be accepted for the broad truth which it contains. When a medical profession appears, it is, so far as we are able to trace it, as an importation from Greece.

The first Greek physician whose name is preserved as having migrated to Rome was Archagathus, who came over from the Peloponnesus in 218 B.C.; but there were probably others before him. When Greece was made a Roman province, the number of such physicians who sought their fortunes in Rome must have been very large. The bitter words of M. Porcius Cato, who disliked them as he did other representatives of Greek culture, are evidence of this. The most eminent of these earlier Greek physicians at Rome was Asclepiades, the friend of Cicero (born 124 B.C. at Prusa in Bithynia). He came to Rome as a young man, and soon became distinguished both for his medical skill and his oratorical power. He introduced a system which, so far as we know, was his own, though founded upon the Epicurean philosophical creed; on the practical side it conformed pretty closely to the Stoic rule of life, thus adapting itself to the leanings of the better stamp of Romans in the later times of the republic. According to Asclepiades all diseases depended upon alterations in the size, number, arrangement or movement of the ” atoms,” of which, according to the doctrine of Epicurus, the body consisted. These atoms were united into passages (iropoi) through which the juices of the body were conveyed. This doctrine, of which the developments need not further be followed, was important chiefly in so far that it was perfectly distinct from, and opposed to, the humoral pathology of Hippocrates. In the treatment of disease Asclepiades attached most importance to diet, exercise, passive movements or frict : ons, and the external use of cold water — in short, to a modified athletic training. He rejected the vis medicatrix naturae, pointing out that nature in many cases not only did not help but marred the cure. His knowledge of disease and surgical skill were, as appears from the accounts given by Celsus and Caelius Aurelianus, very considerable. Asclepiades had many pupils who adhered more or less closely to his doctrines, but it was especially one of them, Themison, who gave permanence to the teachings of his master by framing out of them, with some modifications, a new system of medical doctrine, and, founding on this basis a school which lasted for some centuries in successful rivalry with the Hippocratic tradition, which, as we have seen, was up to that time the prevailing influence in medicine.

This system was known as methodism, its adherents as the methodici or methodists. Its main principles were that-Tt was useless to consider “the causes of a disease, or even the organ affected by the disease, and

that it was sufficient to know what was common to all diseases, viz. their common qualities (communitates, koiv6ti)tcs). Of these there were three possible forms — (1) relaxation, (2) con- traction of the minute passages or xopoi, and (3) a mixed state, partly lax, partly constricted. The signs of these morbid states were to be found in the general constitution of the body, especially ‘ in the excretions. Besides this it was important only to consider whether the disease was acute or chronic, whether it was increasing, declining or stationary. Treatment of disease was directed not to any special organ, nor to producing the crises and critical discharges of the Hippocratic school, but to correcting the morbid common condition or ” community,” relaxing the body if it was constricted, causing

contraction if it was too lax, and in the ” mixed state ” acting accord- ing to the predominant condition. This simple rule of treatment was the system or ” method ” from which the school took its name.

The methodists agreed with the empirics in one point’, in their contempt for anatomy; but, strictly speaking, they were dogmatists, though with a dogma different from that of the Hippocratic school. Besides Themison, its systematic founder, the school boasted many physicians eminent in their day, among whom Thessalus of Tralles, a half-educated and boastful pretender, was one of the most popular He reversed the Hippocratic maxim ” art is long,” promising his scholars to teach them the whole of medicine in six months, and had inscribed upon his tomb JarpociKijs, as being superior to all living and bygone physicians.

In the 2nd century a much greater name appears among the methodists, that of Soranus of Ephesus, a physician mentioned with praise even by Tertullian and Augustine, who practised at Rome in the reigns of Trajan and Hadrian. Soranus is known by a work, still extant in the Greek original, on the diseases of women, and also by the Latin work of Caelius Aurelianus, three centuries later, on acute and chronic diseases, which is based upon, if not, as some think, an actual translation of, the chief work of Soranus, and which is the principal source of our knowledge of the methodic school. The work on diseases of women is the only Complete work on that subject which has come down to us from antiquity, and shows remarkable fullness of practical

knowledge in relation to its subject. It is notable that an important instrument of research, the speculum, which has been reinvented in modern times, was used by Soranus; and specimens of still earlier date, showing great mechanical perfec- tion, have been found among the ruins of Pompeii. The work on acute and chronic diseases is also full of practical knowledge, but penetrated with the theories of the methodists.

The methodic school lasted certainly for some centuries, and influenced the revival of medical science in the middle ages, though overshadowed by the greater reputation of Galen. It was the first definite product of Greek medicine on Roman soil, but was destined to be followed by others, which kept up" a more or less successful rivalry with it, and with the Hippocratic tradition.

The so-called pneumatic school was founded by Athenaeus, in the 1st century after Christ. According to its doctrines the normal as well as diseased actions of the body were to be referred to the operation of the pneuma or universal soul. This doctrine, crudely transferred from philosophical speculation, was intended to reconcile the humoral (or Hippocratic) and solidist (or methodic) schools; but the methodists seem to have claimed Athenaeus as one of themselves.

The conflicts of the opposing schools, and the obvious deficiencies of each, led many physicians to try and combine the valuable parts of each system, and to call themselves eclectics. Among these were found many of the most eminent physicians of Graeco- Roman times. It may be sufficient to name Rufus or Ephesus (2nd century A.D.), and Archigenes {fi. a.d. 90), who is mentioned by Juvenal.

Although no system or important doctrine of medicine was originated by the Roman intellect, and though the practice of the profession was probably almost entirely in the hands of the Greeks, the most complete picture which we have of medical thought and activity in Roman times is due to a Latin pen, and to one who was, in all probability, not a physician. A. Cornelius Celsus, a Roman patrician, who lived probably in the 1st century, appears to have studied medicine as a branch of general knowledge. Whether he was a practising physician or not has been a matter of controversy. The conclusion supported by most evidence seems to be that he practised on his friends and dependants, but not as a remunerative profession. His well-known work, De medicina, was one of a series of treatises intended to embrace all knowledge proper for a man of the world. It was not meant for the physicians, and was certainly little read by them, as Celsus is quoted by no medical writer, and when referred to

by Pliny, is spoken of as an author not a physician. There is no doubt that his work is chiefly a com- pilation; and Daremberg, with other scholars, has traced a large number of passages of the Latin text to the Greek originals from which they were translated. In the description of surgical operations the vagueness of the language seems sometimes to show that the author had not performed such himself; but in other parts, and especially in his historical introduction, he speaks with more confidence; and everywhere he compares and criticizes with learning and judgment. The whole body of medical literature belonging to the Hippocratic and Alexandrian times is ably summarized, and a knowledge of the state of medical science up to and during the times of the author is thus conveyed to us which can be obtained from no other source. The work of Celsus is thus for us only second in importance to

the Hippocratic writings and the works of Galen; but it is valuable rather as a part of the history of medicine than as the subject of that history. It forms no link in the general chain of medical tradition, for the simple reason that the influence of Celsus (putting aside a few scanty allusions in medieval times) commenced in the 15th century, when his works were first discovered in manuscript or committed to the press. Since then, however, he has been almost up to our own times the most popular and widely read of all medical classics, partly for the qualities already indicated, partly because he was one of the few of those classics accessible to readers of Latin, and partly also because of the purity and classical perfection of his language. Of Pliny, another encyclopaedic writer, a few words must be said, though he was not a physician. In his Natural History we find as complete a summary of the popular medicine of his time as Celsus gives of the scientific medicine. Pliny disliked doctors, and lost no opportunity of depreciating regular medicine; nevertheless he has left many quotations from, and many details about, medical authors which are of the highest value. He is useful to us for what he wrote about the history of medicine, not for what he contributed. Like Celsus, he had little influence on succeeding medical literature or practice.

We now come to the writer who, above all others, gathered up into himself the divergent and scattered threads of ancient medicine, and out of whom again the greater part of modern European medicine has flowed. Galen was a man furnished with all the anatomical, medical and philosophical knowledge of his time; he had studied all kinds of natural curiosities, and had stood in near relation to important political events; he possessed' enormous industry, great practical sagacity and unbounded literary fluency. He had, in fact, every quality necessary for an encyclopaedic writer, or even for a literary and

professional autocrat. He found the medical profession of his time split up into a number of sects, medical science confounded under a multitude of dogmatic systems, the social status and moral integrity of physicians degraded. He appears to have made it his object to reform these evils, to reconcile scientific acquirements and practical skill, to bring back the unity of medicine as jt had been understood by Hippocrates, and at the same time to raise the dignity of medical practitioners.

Galen was as devoted to anatomical and, so far as then understood, physiological research as to practical medicine. He worked enthusiastically at dissection, though, the liberty of the Alexandrian schools no longer existing, he could dissect only animals, not the human body. In his anatomical studies Galen had a twofold object — a philosophical, to show the wisdom of the Creator in making everything fit to serve its purpose; and a practical, to aid the diagnosis, or recognition, of disease. The first led him into a teleological system so minute and. overstrained as to defeat its own end ; the second was successfully attained by giving greater precision and certainty to medical and surgical practice in difficult: cases. His general physiology was essentially founded upon the Hippocratic theory of the four elements, with which he combined the notion of spirit (pneuma) penetrating all parts, and mingled with the humours in different proportions. It was on this field that he most vehe- mently attacked the prevailing atomistic and materialistic views of the methodic school, and his conception of the pneuma became in some respects half metaphysical. His own researches in special branches of physiology were important, but do not strictly belong to our present subject.

The application of physiology to the explanation of diseases, and thus to practice, was chiefly by the theory of the temperaments or mixtures which Galen founded upon the Hippocratic doctrine of humours, but developed with marvellous and fatal ingenuity. The normal condition or temperament of the body depended upon a proper mixture or proportion of the four elements — hot, cold, wej: and dry. From faulty proportions of the same arose the intemperies- (" distempers "), which, though not diseases, were the occasions of disease. Equal importance attached to faulty mixtures or dyscrasiae of the blood. By a combination of these morbid pre- dispositions with the action of deleterious influences from without all diseases were produced. Galen showed extreme ingenuity in explaining all symptoms and all diseases on his system. No pheno- menon was without a name, no problem without a solution. And, though it was precisely in his fine-spun subtlety that he departed furthest from scientific method and practical

utility, it was this very quality which seems in the end to have secured his popularity and established his pre-eminence in the medical world.

Galen's use of drugs was influenced largely by the same theories. In drugs were to be recognized the same elementary qualities — hot.

cold, moist, dry, &c. — as in the human body; and, on the principle of curing by contraries, the use of one or other was indicated. The writings of Galen contain less of simple objective observations than those of several other ancient physicians, all being swept into the current of dogmatic exposition. But there is enough to show the thoroughness and extent of his practical knowledge. Unfortunately it was neither this nor his zeal for research that chiefly won him followers, but the completeness of his theoretical explanations, which fell in with the mental habits of succeeding centuries, and were such as have flattered the intellectual indolence of all ages. But the reputation of Galen grew slowly; he does not appear to have enjoyed any pre-eminence over other physicians of his time, to most of whom he was strongly opposed in opinion. In the next generation he beganto be esteemed only as a philosopher; gradually his system was implicitly accepted, and it enjoyed a great though not exclusive predominance till the fall of Roman civilization. When the Arabs possessed themselves of the scattered remains of Greek culture, the works of Galen were more highly esteemed than any others except those of Aristotle. Through the Arabs the Galenical system found its way back again to western Europe. Even when Arabian medicine gave way before the direct teaching of the Greek authors rescued from neglect, the authority of Galen was increased instead of being diminished ; and he assumed a position of autocracy in medical science which was only slowly undermined by the growth of modern science in the 17th and 1 8th centuries.

The history of medicine in Roman times is by no means the same thing as the history of the fate of the works of Galen. For some centuries the methodic school was popular at Rome, and produced one physician, Caelius Aurelianus, who must be pro- nounced, next to Celsus, the most considerable of the Latin medical writers. His date was in all probability the end of the 4th or the beginning of the 5th century. The works bearing his name are, as has been said, entirely

based upon the Greek of Soranus, but are important both because their Greek originals are lost, and because they are evidence of the state of medical practice in his own time. The popularity of Caelius is evidenced by the fact that in the 6th century an abridgment of his larger work was recommended by Cassiodorus to the Benedictine monks for the study of medicine.

Before quitting this period the name of Aretaeus of Cappadocia must be mentioned. So little is known about him that even his date cannot be fixed more closely than as being between the second half of the 1st century and the beginning of the 3rd. His works have been much admired for the purity of the Greek style, and his accurate descriptions of disease; but, as he quotes no medical author,. and is quoted by none before Alexander of Aphrodisias at the beginning of the 3rd century, it is clear that he belonged to no school and founded none, and thus his position in the chain of medical tradition is quite uncertain. Alexander of Aphrodisias, who lived and wrote at Athens in the time of Septimius Severus, is best known by his commentaries on Aristotle, but also wrote a treatise on fevers, still extant.

Ancient Medicine after Galen. — The Byzantine school of medicine, which closely corresponds to the Byzantine literary and historical schools, followed closely in Galen's footsteps, and its writers were chiefly compilers and encyclopaedists. The earliest is Oribasius (326-403), whose date and position are fixed by his being the friend and court physician of Julian the Apostate. Be was a Greek of Pergamum, educated in Alexandria, and long resident in Byzantium. His great work 'Swayatyal lorputot, of which only about one-third has been preserved, was a medical encyclopaedia founded on extracts from Hippocrates, Galen, Dioscorides (fl. A.D. 50) and certain Greek writers who are otherwise very imperfectly known. The work is thus one of great historical value but of no originality. The next name which requires to be mentioned is that of Aetius (a.d. 550), a compiler who closely followed Oribasius, but with inferior powers, and whose work also has an historical but no original value. A higher rank among medical writers is assigned to Alexander of Tralles (525-605), whose doctrine was that of an eclectic. His practical and therapeutical rules are evidently the fruit of his own experience, though it would be difficult to attribute to him any decided advance in medical knowledge. But the most prominent figure in Byzantine medicine is that of Paul of Aegina (Paulus Aegineta), who lived probably in the early part of the 7th century. His skill, especially in surgery, must have been considerable, and his 'larpuca gives a very complete picture of the achievements of the Greeks in this department. Another work, on obstetrics, now lost, was equally famous, and procured for him,

among the Arabs, the name of ” the Obstetrician.” His reputation lasted through the middle ages, and was not less in the Arabian schools than in the West. In this respect Paulus is a most important influence in the development of medicine. His great work on surgery was early

translated into Arabic, and became the foundation of the surgery of Abulcasis, which in turn (to anticipate) was one of the chief sources of surgical knowledge to Europe in the middle ages. The succeeding period of Byzantine history was so little favourable to science that no name worthy of note occurs again (though many medical works of this period are still extant) till the 13th century, when we meet with a group of writers. Demetrius Pepagomenus, Nicolaus Myrepsus and Johannes, called Actuarius, who flourished under the protection of the Palaeologi. The work of the last has some independent merit ; but all are interesting as showing a fusion of Greek and Arabian medicine, the latter having begun to exercise even in the nth century a reflex influence on the schools of By- zantium. Something was borrowed even from the school of Salerno, and thus the close of Byzantine medicine is brought into connexion with the dawn of science in modern Europe.

In the West the period after Galen affords little evidence of any- thing but a gradual though unvarying decline in Roman medicine. Caelius Aurelianus, already referred to as the follower of Soranus, must be mentioned as showing the persistence of the methodic school. An abridgment of one of his writings, with the title of Aurelius, became the most popular of all Latin medical works. As a writer he was worthy of a better period of medical literature. Little else was produced in these times but compilations, of the most meagre kind, chiefly of the nature of herbals, or domestic receipt- books; among the authors of which it may be sufficient to name Serenus Sammonicus (3rd century), Gargilius Martialis (3rd century) and Marcellus Empiricus (5th century). Certain compilations still extant bear the falsely-assumed names of eminent writers, such as Pliny and Hippocrates. A writer with the (perhaps assumed) name of Apuleius Platonicus produced a herbal which held its ground till the 15th century at least, and was in the 9th translated into Anglo-Saxon. These poor compilations, together with Latin translations of certain works of Galen and Hippocrates, formed 3 medical literature, meagre and unprogressive indeed, but of which a great part survived through the middle ages till the discovery of printing and revival of learning. It is important to remember that this obscure stream of tradition flowed on, only partially affected by the influx of Arabian, or even the early revival of purer classical learning.

Arabian Medicine. — The rise of the Mahommedan Empire, which influenced Europe so deeply both politically and intel- lectually, made its mark also in the history of medicine. As in the parallel case of the Roman conquest of Greece, the superior culture of the conquered race asserted its supremacy over their Arab conquerors. After the Mahommedan conquests became consolidated, and learning began to flourish, schools of medicine, often connected with hospitals and schools of pharmacy, arose in all the chief seats of Moslem power. At Damascus Greek medicine was zealously cultivated with the aid of Jewish and Christian teachers. In Bagdad, under the rule of Harun el Rashid and his successors, a still more flourishing school arose, where numerous translations of Greek medical works were made. The names of Mesua, or Yahya ibn Masawaih (d. a.d. 857-858), celebrated for his knowledge of drugs, and Honein ibn Ishaq el 'Ibadi (d. 873) or Joannitius, the translator and commentator of Hippocrates and Galen, belong to this period. Certain writings of Joannitius, translated into Latin, were popular in the middle ages in Europe, and were printed in the 16th century. At the same time the Arabs became acquainted with Indian medicine, and Indian physicians lived at the court of Bagdad. The Islamite rulers in Spain were not long behind those of the East in encouraging learning and medical science, and developed culture to a still higher degree of perfection. In that country much was due to the Jews, who had already established schools in places which were afterwards the seats of Moslem dominion, From the 10th to the 13th century was the brilliant period of Arabian medicine in Spain. 1

The classical period of Arabian medicine begins with Rhazesˆ (Abu Bakr Muhammad ibn Zakariya el-Razi, a.d. 925-ˆ26), a naftas of Rai in the province of Dailam (Persia), who practised with distinc- tion at Bagdad ; he followed the doctrines of Galen, but learnt much from Hippocrates. He was the first of the Arabs to treat medicine in a comprehensive and encyclopaedic manner, surpassing probably in voluminousness Galen himself, though but a small proportion of his works are extant. Rhazes is deservedly remembered as having first described small-pox and measles in an accurate manner. Hah, i.e. 'Ali ibn el-'Abbas, a Persian, wrote a medical textbook, known as the " Royal Book," which was the standard authority among the Arabs up to the time of Avicenna (a.d. 980-1037) and was more than once translated into Latin and printed. Other

1 See Dozy, Cat. Cod. Or. Lug. Bat. ii. 296.

writers of this century need not be mentioned here; but the next, the nth century, is given as the probable though uncertain date of a writer who had a great influence on European medicine, Mesua the younger of Damascus, whose personality is obscure, and of whose very existence some historians have doubted, thinking that the name was assumed by some medieval Latin writer. The work De isimplicibus, which bears his name, was for centuries a standard authority on what would now be called materia medica, was printed in twenty-six editions in the 15th century and later, and was used in the formation of the first London pharmacopoeia, issued by the College of Physicians in the reign of James I. Either to the 10th ˆor the nth century must be referred the name of another Arabian ‘physician who has also attained the position of a classic, Abu’l Qasim or Abulcasis, of El-Zahra, near Cordova, in Spain. His great work, Altasrif, a medical encyclopaedia, is chiefly valued for its surgical portion (already mentioned), which was translated into Latin in the 16th century, and was for some centuries a standard if not the standard authority on surgery in Europe. Among his own countrymen the fame and position of Abulcasis were soon eclipsed by the greater name of Avicenna.

Avicenna has always been regarded as the chief representative of Arabian medicine. He wrote on philosophy also, and in both subjects acquired the highest reputation through the whole of eastern Islam. In Mahommedan Spain he was leˆs regarded, but in Europe his works even eclipsed and superseded tnose of Hippo- crates and Galen. His style and expository power are highly praised, but the subject-matter shows little originality. The work by which he is chiefly known, the celebrated ” canon,” is an encyclopaedia of medical and surgical knowledge, founded upon Galen, Aristotle, the later Greek physicians, and the earlier Arabian writers, singularly complete and systematic, but is thought not to show the practical experience of its author. As in the case of Galen, the formal and encyclopaedic character of Avicenna’s works was the chief cause of his popularity and ascendancy, though in modern times these very qualities in a scientific or medical writer would rather cause him to become more speedily antiquated.

In the long list of Arabian medical writers none can here be mentioned except the great names of the Hispano-Moorish school, a school both philosophically and medically antagonistic to that of Avicenna. Of these the earliest is Avenzoar or Abumeron, that is, Abu Merwan ‘Abd al-Malik Ibn Zuhr (beginning of 12th century), a member of a family which gave several distinguished members to the

medical profession. His chief work, Al-Teystr (facilitatio), is thought to show more practical experience than the writings of Avicenna, and to be less based upon dialectical subtleties. It was translated into Latin, and more than once printed, as were some of his lesser works, which thus formed a part of the contribution made by the Arabians to European medicine. His friend and pupil Averroes of Cordova (q.v.), so well known for his philosophical writings, was also an author in medical subjects, and as such widely read in Latin. The famous Rabbi Maimonii > es (a.d. 1 135-1204) (q.v.) closes for us the roll of medical writers of the Arabian school. His works exist chiefly in the original Arabic or in Hebrew transla- tions; only some smaller treatises have been translated into Latin, so that no. definite opinion can be formed as to their medical value. But, so far as is known, the independent and rationalistic spirit which the two last-named writers showed in philosophy did not lead them to take any original point of view in medicine.

The works of the Arabian medical writers who have now been mentioned form a very small fraction of the existing literature. Three hundred medical writers in Arabic are enumerated by Ferdi- nand Wiistenfeld (1808-1899), and other historians have enlarged the list (Haser), but only three have been printed in the original; a certain number more are known through old Latin translations, and the great majority still exist in manuscript. It is thus evident that the circumstance of having been translated (which may have been in some cases almost an accident) is what has chiefly determined the influence of particular writers on Western medicine. But it is improbable that further research will alter the general estimate of the value of Arabian medicine. There can be no doubt that it was in the main Greek medicine, modified to suit other climates, habits and national tastes, and with some important additions from Oriental sources. The greater part is taken from Hippocrates, Galen, Dioscorides and later Greek writers. The Latin medical writers were necessarily unknown to the Arabs; and this was partly the cause that even in Europe Galenic medicine assumed such a preponderance, the methodic school and Celsus being forgotten or neglected. In anatomy and physiology the Arabians distinctly went back; in surgery they showed no advance upon the Greeks; in practical medicine nothing new can be traced, except the descrip- tion of certain diseases (e.g. small-pox and measles) unknown or imperfectly known to the Greeks; the only real advance was in pharmacy and the therapeutical use of drugs. By their relations with the farther East, the Arabs became acquainted with valuable new remedies which have held their ground till modern times; and their skill in chemistry enabled them to prepare new

chemical remedies, and form many combinations of those already in use. They produced the first pharmacopoeia, and established the first apothecaries' shops. Many of the names and many forms of medi-

cines now used, and in fact the general outline of modern pharmacy, except so far as modified by modern chemistry, started with the Arabs. Thus does Arabian medicine appear as judged from a modern standpoint ; but to medieval Europe, when Tittle but a tradition remained of the great ancient schools, it was invested with a far higher degree of originality and importance.

It is now necessary to consider what was the state of medicine in Europe after the fall of the Western Empire and before the influence of Arabian science and literature began to be felt. This we may call the pre-Arabian or Salernitan period.

Medicine in the Early Middle Ages: School of Salerno. — In medical as in civil history there is no real break. A continuous thread of learning and practice must have connected the last period of Roman medicine already mentioned with the dawn of science in the middle ages. But the intellectual thread is naturally traced with greater difficulty than that which is the theme of civil history; and in periods such as that from the 5th to the 10th century in Europe it is almost lost. The chief homes of medical as of other learning in these disturbed times were the monasteries. Though the science was certainly not advanced by their labours, it was saved from total oblivion, and many ancient medical works were preserved either in Latin or vernacular versions. The Anglo-Saxon Leechdoms 1 of the nth century, published in the Rolls series of medieval chronicles and memorials, admirably illustrate the mixture of magic and superstition with the relics of ancient science which constituted monastic medicine. Similar works, in Latin or other languages, exist in manuscript in all the great European libraries. It was among the Benedictines that the monastic study of medicine first received a new direction, and aimed at a higher standard. The study of Hippocrates, Galen, and other classics was recommended by Cassiodorus (6th century), and in the original mother-abbey of Monte Cassino medicine was studied; but there was not there what could be called a medical school; nor had this foundation any connexion (as has been supposed) with the famous school of Salerno.

The origin of this, the most important source of medical know- ledge in Europe in the early middle ages, is involved in obscurity. It is known that Salerno, a Roman colony, in a situation noted in ancient times for its salubrity, was in the 6th century at least the seat of a

bishopric, and at the end of the 7th century of a Benedictine monastery, and that some of the prelates and higher clergy were distinguished for learning, and even for medical acquirements. But it has by recent researches been clearly established that the celebrated Schola salernilana was a purely secular institution. All that can with certainty be said is that a s«jool or collection of schools gradually grew up in which especially medicine, but also, in a subordinate degree, law and philosophy were taught. In the oth century Salernitan physicians werf already spoken of, and the city was known as Civitas hippocratica. A little later we find great and royal personages resorting to Salerno for the restoration of their health, among whom was William of Normandy, afterwards the Conqueror. The number of students of medicine must at one time have been considerable, and in a corresponding degree the number of teachers. Among the latter many were married, and their wives and daughters appear also in the lists of professors. The most noted female professor was the celebrated Trotula in the nth century. The Jewish element appears to have been important among the students, and possibly among the professors. The reputation of the school was great till the 12th or r3th century, when the introduction of the Arab medicine was gradually fatgl to it. The foundation of the university of Naples, and the rise of Montpellier, also contributed to its decline.

The teachings of the Salernitan doctors are pretty well known through existing works, some of which have only recently been discovered and published. The best-known is the rhyming Latin poem on health by Joannes de Meditano, Regimen sanitatis Salerni, professedly written for the use of the ” king of England,” supposed to mean William the Conqueror; it had an immense reputation in the middle ages, and was afterwards many times printed, and translated into most European languages. This was a popular work intended for the laity; but there are others strictly professional.

1 Derived from the Anglo-Saxon laece, a physician, and dom, a law.

Among the writers it may be sufficient to mention here Gariopontus ; Copho, who wrote the Anatome porci, a well-known medieval book; Joannes Platearius, first of a family of physicians bearing the same name, whose Practica, or medical compendium, was afterwards

several times printed; and Trotula, believed to be the wife of the last-named. All of these fall into the first period before the advent of Arabian medicine. In the transitional period, when the Arabian school began to influence European medicine, but before the Salerni- tans were superseded, comes Nicolaus Praepositus, who wrote the Antidotarium, a collection of formulae for compound medicines, which became the standard work on the subject, and the foundation of many later compilations. An equally popular writer was Gilles de Corbeil (Aegidius Corboliensis) , at one time a teacher at Salerno, afterwards court physician to Philip Augustus of France, who composed several poems in Latin hexameters on medical subjects. Two of them, on the urine and the pulse respectively, attained the position of medical classics.

None of these Salernitan works rise much above the rank of compilations, being founded on Hippocrates, Galen and later Greek writers, with an unmistakable mixture of the doctrines of the methodists. But they often show much practical experience, and exhibit the naturalistic method of the Hippocratic school. The general plan of treatment is dietetic rather than pharmaceutical, though the art of preparing drugs had reached a high degree of complexity at Salerno. Anatomy was as little regarded as it was in the later ancient schools, the empiric and methodic, but demon- strations of the parts of the body were given' on swine. Although it cannot be said that the science of medicine was advanced at Salerno, still its decline was arrested at a time when every other branch of learning was rapidly falling into decay; and there can be no doubt that the observation of patients in hospitals, and probably clinical instruction, were made use of in learning and teaching. The school of Salerno thus forms a bridge between the ancient and the modern medicine, more direct though less conspicuous than that circuitous route, through Byzantium, Bagdad and Cordova, by which Hippocrates and Galen, in Arabian dress, again entered the European world. Though the glory of Salerno had departed, the school actually existed till it was finally dissolved by an edict of the emperor Napoleon I. in the year 1811.

Introduction of Arabian Medicine: The Scholastic Period. — About the middle of the nth century the Arabian medical writers began to be known by Latin translations in the Western world. Constantinus Africanus, a monk, was the author of the earliest of such versions (a.d. 1050) ; his labours were directed chiefly to the less important and less bulky Arabian authors, of whom Haly was the most noted; the real classics were not introduced till later. For some time the Salernitan medicine held its ground, and it was not till the conquest of Toledo by Alphonso of Castile that any large number of Western scholars came

in contact with the learning of the Spanish Moors, and systematic efforts were made to translate their philosophical and medical works. Jewish scholars, often under the patronage of Christian bishops, were especially active in the work. In Sicily also the Oriental tendencies of Frederick Barbarossa and Frederick II. worked in the same direction. Gerard of Cremona, a physician of Toledo (1114-1187), made translations, it is said by command of Barbarossa, from Avicenna and others. It is needless to point out the influence of the crusades in making Eastern ideas known in the Western world. The influence of Arabian medicine soon began to be felt even in the Hippocratic city of Salerno, and in the 13th century is said to have held an even balance with the older medicine. After this time the foreign influence predominated; and by the time that the Aristo- telian dialectic, in the introduction of which the Arabs had so large a share, prevailed in the schools of Europe, the Arabian version of Greek medicine reigned supreme in the medical world. That this movement coincided with the establishment of some of the older European universities is well known. The history of medicine in the period now opening is closely combined with the history of scholastic philosophy. Both were infected with the same dialectical subtlety, which was, from the nature of the subject, especially injurious to medicine.

At the same time, through the rise of the universities, medical learning was much more widely diffused, and the first definite forward movement was seen in the school of Montpellier, where a medical faculty existed early in the 12th century, afterwards united with faculties of law and philosophy. The medical school owed its foundation largely to Jewish teachers, themselves educated in the Moorish schools of Spain, and imbued with the

intellectual independence of the Averroists. Its rising prosperity coincided with the decline of the school of Salerno. Montpellier became distinguished for the practical and empirical spirit of its medicine, as contrasted with the dogmatic and scholastic teaching of Paris and other universities. In Italy, Bologna and Padua were earliest distinguished for medical studies — the former preserving more of the Galenical tradition, the latter being more progressive and Averroist. The northern univer- sities contributed little — the reputation even of Paris being of later growth.

The supremacy of Arabian medicine lasted till the revival of learning, when the study of the medical classics in their original language worked another revolution. The medical writers of this period, who chiefly drew from Arabian sources, have been called Arabists (though it is difficult to give any clear meaning to this term), and were

afterwards known as the neoterics.

The medical literature of this period is extremely voluminous, but essentially second-hand, consisting mainly of commentaries on Hippocrates, Galen, Avicenna and others, or of compilations and compendia still less original than commentaries. Among these may be mentioned the Conciliator of Peter of Abano (1250-1315), the Aggregator of Jacob de Dondi (1298-1359), both of the school of Padua, and the Pandectae medicinae of the Salernitan Matthaeus Sylvaticus (d. 1342), a sort of medical glossary and dictionary. But for us the most interesting fact is the first appearance of Englishmen as authors of medical works having a European reputation, distinguished, according to the testimony of Haser, by a practical tendency characteristic of the British race, and fostered in the school of Montpellier.

The first of these works is the Compendium medicinae, also called Laurea or Rosa anglicana, of Gilbert (Gilbertus Anglicus, about 1 290) , said to contain good observations on leprosy. A more im- portant work, the Practica seu lilium medicinae, of Bernard Gordon, a Scottish professor at Montpellier (written in the year 1307), was more widely spread, being translated into French and Hebrew, and printed in several editions. Of these two physicians the first pro- bably, the latter certainly, was educated and practised abroad, but John Gaddesden (i28o?i36i), the author of Rosa anglica seu practica medicinae (between 1305 and 1317), was a graduate in medicine of Merton College, Oxford, and court physician. His compendium is entirely wanting in originality, and perhaps unusually destitute of common sense, but it became so popular as to be re printed up to the end of the 16th century. Works of this kind became still more abundant in the 14th and in the first half of the' 15th century, till the wider distribution of the medical classics in the original put them out of fashion.

In surgery this period was far more productive than in medicine, especially in Italy and France, but the limits of our subject only permit us to.mention Gulielmus de Saliceto of Piacenza (about 1275), Lanfranchi of Milan (died about 1306), the French surgeon, Guy de Chauliac (about 1350) and the Englishman, John Ardern (about !35°)- in anatomy also the beginning of a new epoch was made by Mondino de Liucci or Mundinus (1275-1326), and his followers. The medical writings of Arnald de Villanova (c. 1235-1313) (if the Breviarium practicae be rightly ascribed to him) rise above the rank of compilations. Finally, in the 13th and especially the 14th century we find, under the name of consilia, the first medieval reports of medical

cases which are preserved in such a form as to be intelligible. Collections of consilia were published, among others, by Gentilis Fulgineus before 1348, by Bartolomeo Montagnana (d. 1470), and by Baverius de Baveriis of Imola (about 1450). The last-named contains much that is interesting and readable.

Period of the Revival of Learning. — The impulse which all departments of intellectual activity received from the revival of Greek literature in Europe was felt by medicine among the rest. .Not that the spirit of the science, or of its corresponding practice, was at once changed. The basis of medicine through the middle ages had been literary and dogmatic, and it was literary and dogmatic still; but the medical literature_ now brought to light — including as it did the more important w'&Tks of Hippocrates and Galen, many of them hitherto unknown, and in addition the fprgotten element of Latin medicine, especially the work of Celsus — was in .itself far superior to the second-hand compilations and incorrect versions which had formerly been accepted as standards. The classical works, though still regarded with unreasoning reverence, were found to have a germinative and vivifying power that carried the mind out of the region of dogma, and prepared the way for the scientific movement which has been growing in strength up to our own day.

Two of the most important results of the revival of learning were indeed such as are excluded from the scope of this brief sketch — namely, the reawakening of anatomy, which to a large extent grew out of the study of the works of Galen, and the investigation of medicinal plants, to which a fresh impulse was given by the revival of Dioscorides (a.d. 50) and other ancient naturalists. The former brought with it necessarily a more accurate conception of physiology, and thus led up to the great discovery of Harvey, which was the turning point in modern medicine. The latter gave rise, on the one hand, to the modern science of botany, on the other to a more rational knowledge of drugs and their uses. At the same time, the discovery of America, and increased intercourse with the East, by introducing a variety of new plants, greatly accelerated the progress both of botany and pharmacology.

But it was not in these directions that improvement was first looked

for. It was at first very naturally imagined that the simple revival of classical and especially of Greek literature would at once produce the same brilliant results in medicine as in literature and philosophy. The movement of reform started, of necessity, with scholars rather than practising physicians — more precisely with a group of learned men, whom we may be permitted, for the sake of a name, to call the medical humanists, equally enthusiastic in the cause of letters and of medicine. From both fields they hoped to expel the evils which were summed up in the word barbarism. Nearly all medieval medical literature was condemned under this name; and for it the humanists proposed to substitute the originals of Hippocrates and Galen, thus leading back medicine to its fountain-head. Since a knowledge of Greek was still confined to a small body of scholars, and a still smaller proportion of physicians, the first task was to translate the Greek classics into Latin. To this work several learned physicians, chiefly Italians, applied themselves with great ardour. Among the earliest were Nicolaus Leonicenus of Vicenza (1428-1524), Giovanni de Monte or Montanus (1498-1552), and many others in Italy. In northern Europe should be mentioned Gulielmus Copus (1471-1532) and Gtinther of Andernach (1487-1584), better known as Guinterius Andernacensis, both for a time professors at Paris; and, among the greatest, Thomas Linacre (about 1460-1524; see Linacre). A little later Janus Cornarius or Hagenbut (1500-1558) and Leonhard Fuchs (1501-1566) in Germany, and John Kaye of Caius (1510-1572) in England, carried on the work. Symphorien Champier (Champerius or Campegius) of Lyons (1472-1530)ˆ contemporary of Rabelais, and the patron of Servetus, wrote with fantastic enthusiasm on the superiority of the Greek to the Arabian physicians, and possibly did something to enlist in the same cause the two far greater men just mentioned. Rabelais not only lectured on Galen and Hippocrates, but edited some works of the latter; and Michael Servetus (1511-1553),ˆ a little tract Syruporum universa ratio, defended the practice of Galen as compared with that of the Arabians. The great Aldine Press made an important contribution to the work, by editiones principes of Hippocrates and Galen in the original. Thus was the campaign opened against the medieval and Arabian writers, till finally Greek medicine assumed a predominant position, and Galen took the place of Avicenna. The result was recorded in a formal manner by the Florentine Academy, sometime shortly before 1535: ” Quae, excusso. Arabicae et barbarae servitutis medicae jugo, ex professo se Galenicam appellavit et profligato barbaro- rum exercitu unum totum et solum Galenum, ut optimum artis medicae authorem, in omnibus se sequuturam pollicita est.” Janus Cornarius, from whom this is quoted, laments, however, that the Arabians still reigned in most of the schools of medicine, and

that the Italian and French authors of works called Practice were still in high repute. The triumph of Galen- ism was therefore not complete by the middle of the 16th century. It was probably most so, and earliest, in the schools of Italy and in those of England, where the London College of Physicians might be regarded as an offshoot of the Italian schools. Paris was the stronghold of conservatism, and Germany was stirred

by the teachings of one who must be considered apart from all schools — Paracelsus. The nature of the struggle between the rival systems may be well illustrated by a formidable contro- versy about the rules for bleeding in acute diseases. This operation, according to the Arabian practice, was always performed on a vein at a distance from the organ affected. The Hippocratic and also Galenic rule, to let blood from, or near to, the diseased organ, was revived by Pierre Brissot (1470-1522), a professor in the university of Paris. His attempt at reform, which was taken to be, as in effect it was, a revolt against the authority of the Arabian masters, led to his expulsion from Paris, and the formal prohibition by the parliament of his method. Upon this apparently trifling question arose a controversy which lasted many years, occupied several uni- versities, and led to the interposition of personages no less important than the pope and the emperor, but which is thought •to have largely contributed to the final downfall of the Arabian medicine.

Paracelsus and Chemical Medicine. — Contemporary with the school of medical humanists, but little influenced by them, lived in Germany a man of strange genius, of whose character and importance the most opposite opinions have been expressed. The first noticeable quality in Paracelsus (c. 1490-1541) is his revolutionary independence of thought, which was supported by his immense personal arrogance. Himself well trained in the learning and medical science of the day, he, despised and trampled upon all traditional and authoritative teachings. He began his lectures at Basel by burning the books of Avicenna and others; he afterwards boasted of having read no books for ten years; he protested that his shoe-buckles were more learned than Galen and Avicenna. On the other hand, he spoke with respect of Hippocrates, and wrote a commentary on his Aphorisms. In this we see a spirit very different from the enthusiasm of the humanists for a purer and nobler philo- sophy than the scholastic and Arabian versions of Greek thought. There is no record of Paracelsus' knowledge- of Greek, and as, at least in his student days, the most important works of Greek medicine were very imperfectly known, it is probable he had little first hand acquaintance with Galen or Hippocrates, while his breach with the humanists is the more

conspicuous from his lecturing and writing chiefly in his native German.

Having thus made a clean sweep of nearly the whole of the dogmatic medicine, what did Paracelsus put in its place? Certainly not pure empiricism, or habits of objective observation. He had a dogma of his own — one founded, according to his German expositors, on the views of the Neoplatonists, of which a few disjointed specimens must here suffice. The human body was a ” microcosm ” which corresponded to the ” macrocosm,” arid contained in itself all parts of visible nature, — sun, moon, stars and the poles of heaven. To know the nature of man and how to deal with it, the physician should study, not anatomy ; which Paracelsus utterly rejected, but all parts of external nature. Life was a perpetual germinative process controlled by the indwelling spirit or Archeus; and diseases, according to the mystical conception of Paracelsus, were not natural but spiritual. Nature was sufficient for the cure of most diseases; art had only to interfere when the internal physician, the man himself, was tired or incapable. Then some remedy had to be introduced which should be antagonistic, not to the disease in a physical sense, but to the spiritual seed of the disease. These remedies were arcana — a word corresponding partly to what we now call specific” remedies, but implying a mysterious^ connexion between the remedy and the ” essence ” of the disease. Arcana were often shown to be such by their physical properties, not only by such as heat, cold, &c., but by fortuitous reseinblances to certain parts of the body; thus arose the famous doctrine Of ” signatures,” or signs indicating the virtues and uses of natural objects, which was afterwards developed into great complexity. Great importance was also attached to chemically prepared remedies as containing the essence or spiritual quality of the material from which they were derived. The actual therapeutical resources of Paracelsus included a

large number of metallic preparations, in the introduction of some of which he did good service, and, among vegetable preparations, the tincture of opium, still known by the name he gave it, laudanum. In this doubtless he derived much advantage from his knowledge of chemistry ^ though the science was as yet not disentangled from the secret traditions of alchemy, and was often mixed up with imposture.

German historians of medicine attach great importance to the revolt of Paracelsus against the prevailing systems, and trace in his writings anticipations of many scientific truths of later times. That his personality was influential, and his intrepid originality of great value as an example in his own country, is undeniable. As a national reformer he has been not inaptly compared to Luther. But his importance in the universal history of medicine we cannot estimate so highly. The chief immediate result we can trace is the introduction of certain mineral remedies, especially antimony, the use of which became a kind of badge of the disciples of Paracelsus. The use of these remedies was not, however, necessarily connected with a belief in his system, which seems to have spread little beyond his own country. Of the followers of Paracelsus some became mere mystical quacks and impostors. Others, of more learning and better repute, were distinguished from the regular physicians chiefly by their use of chemical remedies. In France the introduction of antimony gave rise to a bitter controversy which lasted into the 17th century, and led to the expulsion of some men of mark from the Paris faculty. In England ” chemical medicine ” is first heard of in the reign of Elizabeth, and was in like manner contemned and assailed by the College of Physicians and the Society of Apothecaries. But it should be remembered that all the chemical physicians did not call Paracelsus master. The most notorious of that school in England, Francis Anthony (1550-1623), never quotes Paracelsus, but relies upon Arnald de Villanova and Raimon Lull. From this time, however, it is always possible to trace a school of chemical

Eractitioners, who, though condemned by the orthodox Galenists, eld their ground, till in the 17th century a successor of Paracelsus arose in the celebrated J. B. Van Helmont.

Consequences of the Revival of Ancient Medicine. — The revival of Galenic and Hippocratic medicine, though ultimately it conferred the greatest benefits on medical sciences, did not immediately produce any important or salutary reform in practical medicine. The standard of excellence in the ancient writers was indeed far above the level of the 16th century; but the fatal habit of taking at second hand what should have been acquired by direct observation retarded progress more than the possession of better models assisted it, so that the fundamental faults of medieval science remained uncorrected.

Nevertheless some progress has to be recorded, even if net due directly to the study of ancient medicine. In the first place the 15th and 16th centuries were notable for the outbreak of certain epidemic diseases, which were unknown to the old physicians. Of these the

chief was the ” sweating sickness ” or ” English sweat,” especially prevalent in, though not confined to, the country whence it is named. Among many descriptions of this disease, that by John Kaye or Caius, already referred to, was one of the best, and of great importance as “showing that the works of Galen did not comprise all that could be known in medicine. The spread of syphilis, a, disease equally unknown to the ancients, and the failure of Galen’s remedies to cure it, had a similar effect.

In another direction the foundations of modern medicine were being laid during the 16th century — namely, by the intro- duction of clinical instruction in hospitals. In this Italy, and especially the renowned school of Padua, took the first step, where Giovanni De Monte (Montanus), (1498-1552), already mentioned as a humanist, gave clinical lectures on the patients in the hospital of St Francis, which may still be read with interest. Pupils flocked to him from all European coun- tries; Germans are especially mentioned; a Polish student reported and published some of his lectures; and the English- man Kaye was a zealous disciple, who does not, however, seem to have done anything towards transplanting this method of instruction to his own country. Inspections of the dead, to ascertain the nature of the disease, were made, though not without difficulty, and thus the modern period of the science of morbid anatomy was ushered in.

Medicine in the 17th Century. — The medicine of the early 17th century presents no features to distinguish it from that

of the preceding century. The practice and theory of medicine were mainly founded upon Hippocrates and Galen, with ever- increasing additions from the chemical school. But the develop- ment of mathematical and physical science soon introduced a fundamental change in the habits of thought with respect to medical doctrine.

These discoveries not only weakened or destroyed the respect for authority in matters of science, but brought about a marked tendency to mechanical explanations of life and disease. When William Harvey by his discovery of the circulation furnished an explanation of many vital processes which was reconcilable with the ordinary laws of mechanics, the efforts of medical theorists were naturally directed to bringing all the departments of medicine under similar laws. It is often assumed that the writings and influence of Bacon did much towards introducing a more scientific method into medicine and physiology. But, without discussing the general philosophical position or historical importance of Bacon, it may safely be said that his direct influence can be little traced in medical writings of the first half of the 17th

century. Harvey, as is well known, spoke slightingly of the great chancellor, and it is not till the rapid development of physical science in England and Holland in the latter part of the century, that we find Baconian principles explicitly recognized.

The dominant factors in the 17th-century medicine were the discovery of the circulation by William Harvey (published in 1628), the mechanical philosophy of Descartes and the contemporary progress of physics, the teaching of Van Helmont and the introduction of chemical explanations of morbid pro- cesses, and finally, combined of all these, and inspiring them, the rise of the spirit of inquiry and innovation, which may be called the scientific movement. Before speaking in detail of these, we may note that by other influences quite independent of theories, important additions were made to practical medicine. The method of clinical instruction in hospitals, commenced by the Italians, was introduced into Holland, where it was greatly developed, especially at Leiden, in the hands of Francis de la Boe, called Sylvius (1641-1672). It is noteworthy that concurrently with the rise of clinical study the works of Hippo- crates were more and more valued, while Galen began to sink into the background.

At the same time the discovery of new diseases, unknown to the ancients, and the keener attention which the great epidemics of plague caused to be paid to those already known, led to more minute study of the natural history of disease. The most important disease hitherto undescribed was rickets, first made known by Arnold de Boot, a Frisian who practised in Ireland, in 1649, and afterwards more fully in the celebrated work of Francis Glisson (1597-1677) in 1651. The plague was carefully studied by Isbrand de Diemerbroek, in his De Peste (1646), and others. Nathaniel Hodges of London (1629- 1688) in 1665 seems to have been the first who had the ‘ courage to make a post mortem inspection of a plague patient. Chris- topher Bennet (1617-1655) wrote an important work on con- sumption in 1654. During the same period many new remedies were introduced, the most important being cinchona-bark, brought to Spain in the year 1640. The progress of pharmacy was shown by the publication of Dispensatories or Pharma- copoeiae — such as that of the Royal College of Physicians of London in 1618. This, like the earlier German works of the same kind (on which it was partly founded), contains both the traditional (Galenical) and the modern or chemical remedies.

Van Helmont. — The medicine of the 17th century was especially distinguished by the rise of sytems ; and we must first speak of an eccentric genius who endeavoured to construct a system for himself, as original and opposed to tradition as that of Paracelsus. J. B. Van

Helmont (1578-1644) was a man of noble family in Brussels, who, after mastering all other branches of learning as then under- stood, devoted himself with enthusiasm to medicine and chemistry. By education and position a little out of the regular lines of the profession, he took up in medicine an independent attitude. Well ac- quainted with the doctrines of Galen, he rejected them as thoroughly as Paracelsus did, and borrowed from the latter some definite ideas as well as his revolutionary spirit. The archeus of Paracelsus

appears again, but with still further complications — the whole body being controlled by the archeus influus, and the organ of the soul and its various parts by the archei insiti, which are subject to the central archeus. Many of the symptoms of diseases were caused by the passions and perturbations of the archeus, and medicines acted by modifying the ideas of the same archeus. These and other notions cannot be here stated at sufficient length to be intelligible. It is enough to say that on this fantastic basis Helmont constructed a medical system which had some practical merits, that his thera- peutical methods were mild and in many respects happy, and that he did service by applying newer chemical methods to the prepara- tion of drugs. He thus had some share, though a share not generally recognized, in the foundation of the iatro-chemical school, now to be spoken of. But his avowed followers formed a small and dis- credited sect, which, in England at least, can be clearly traced in the latter part of the century.

Discovery of the Circulation of the Blood. — The influence of Harvey's discovery began to be felt before the middle of the century. Its merits were recognized by Descartes, among the first, nine years after its publication. For the history of the discovery, and its consequences in anatomy and physiology, we must refer to the article Harvey. In respect of practical medicine, much less effect was at first noticeable. But this example, combined with the Cartesian principles, set many active and ingenious spirits to work to recon- struct the whole of medicine on a physiological or even a mechanical basis — to endeavour to form what we should now call physiological or scientific medicine. The result of this was not to eliminate dogma from medicine, though it weakened the authority of the old dogma. The movement led rather to the formation of schools or systems of

thought, which under various names lasted on into the 1 8th century, while the belief in the utility or necessity of schools and systems lasted much longer. The most important of these were the so-called iatro-physical or mechanical and the iatro-chemical schools.

Iatro-Physical School. — The iatro-physical school of medicine grew out of physiological theories. Its founder is held to have been G. A. Borelli (1608-1679), whose treatise De motu animalium, published in 1680, is regarded as marking an epoch in physiology. The tendency of the school was to explain the actions and functions of the body on physical, and especially on mechanical, principles. The movements of bones and muscles were referred to the theory of levers; the process of digestion was regarded as essentially a process of trituration; nutrition and secretion were shown to be dependent upon the tension of the vessels, and so forth. The developments of this school belong rather to the, history of physiology, where they appear, seen in the light of modern science, as excellent though premature endeavours in a scientific direction. But the influence of these theories on practical medicine was not great. The more judicious of the mechanical or physical school refrained, as a judicious modern physiologist does, from too immediate an application of their principles to daily practice. Mechanical theories were introduced into pathology, in explanation of the processes of fever and the like, but had little or no influence on therapeutics. The most important men in this school after Borelli were Nicolaus Stensen (Steno), (1638-1686), Giorgio Baglivi (1669- 1707) and Lorenzo Bellini (1643-I704). An English physician, William Cole (1635-1716), is also usually ranked with them. One of the most elaborate developments of the system was that of Archibald Pitcairne (1652-1713), a Scottish physician who became professor at Leiden, to be spoken of hereafter.

Iatro-Chemical School. — The so-called iatro-chemical school stood in a much closer relation to practical medicine than the iatro- physical. The principle which mainly distinguished it was not merely the use of chemical medicines in addition to the traditional, or, as they were called in distinction, ” Galenical ” remedies, but a theory of pathology or causation of disease entirely different from the prevailing ” humoral ” pathology. Its chief aim was to reconcile the new views in physiology and chemistry witjh practical medicine. In some theoretical views, and in the use of certain remedies, the school owed something to Van Helmont and Paracelsus, but took in the main an independent position. The founder of the iatro- chemical school was Sylvius (1614-1672), who belonged to a French family settled in Holland, and was for fourteen years professor of medicine at Leiden, where he attracted students from all quarters of Europe. He made a

resolute attempt to reconstruct medicine on the two bases of the doctrine of the circulation of the blood and the new views of chemistry. Fermentation, which was supposed to take place in the stomach, played an important part in the vital processes. Chemical disturbances of these processes, called acridities, &c, were the cause of fevers and other diseases. Sometimes acid sometimes alkaline properties predominated in the juices and secretions of the body, and produced corresponding disturbances. In nervous diseases disturbances of the vital " spirits " were most important. Still in some parts of his system Sylvius shows an anxiety to base his pathology on anatomical changes. The remedies he employed were partly galenical, partly chemical. He was very moderate in the use of bleeding.

The doctrines of Sylvius became widely spread in Holland and Germany; less so in France and Italy. In England they were not

generally accepted till adopted with some modifications by Thomas Willis the great anatomist (1621-1675), who is the chief English representative of the chemical school. Willis was as thorough-going a chemist as Sylvius. He regarded all bodies, organic and inorganic, as composed of the three elements — spirit, sulphur and salt, the first being only found abundantly in animal bodies. The " intestine movement of particles " in every body, or fermentation, was the explanation of many of the processes of life and disease. The sen- sible properties and physical alterations of animal fluids and solids depended upon different proportions, movements and combinations of these particles. The elaborate work Pharmacentice rationalis (1674), based on these materials, had much influence in its time, though it was soon forgotten. But some parts of Willis's works, such as his descriptions of nervous diseases, and his account (the earliest) of diabetes, are classical contributions to scientific medicine. In the application of chemistry to the examination of secretions Willis made some important steps. The chemical school met with violent opposition, partly from the adherents of the ancient medicine, partly from the iatro-mechanical school. Towards the end of the 17th century appeared an English medical reformer who sided with none of these schools, but may be said in some respects to have surpassed and dispensed with them.

Sydenham and Locke. — Thomas Sydenham (1624-1689) was educated at Oxford and at Montpellier. He was well acquainted with the works of the ancient physicians, and probably fairly so with chemistry. Of his knowledge of anatomy nothing definite can be said, as he seldom refers to it. His main avowed principle was to do without hypothesis, and study the actual diseases in an unbiassed manner. As

his, model in medical methods, Sydenham repeatedly and pointedly refers to Hippocrates, and he has not unfairly been called the English Hippocrates. He resembled his Greek master in the high value he set on the study of the ” natural history of disease “; in the importance he attached to ” epidemic constitution “—that is, to the influence of weather and other natural causes in modifying disease; and further in his conception of the healing power of nature in disease, a doctrine which he even expanded beyond the teaching of Hippocrates. According to Syden- ham, a disease is nothing more than an effort of nature to restore the health of the patient by the elimination of the morbific matter. The extent to which his practice was influenced by this and other a priori conceptions prevents us from classing Sydenham as a pure empiric ; but he had the rare merit of never permitting himself to be enslaved even by his own theories. Still less was his mind warped by either of the two great systems, the classical and the chemical, which then divided the medical world. Sydenham’s influence on European medicine was very great. His principles were welcomed as a return to nature by those who were weary of theoretical disputes. He introduced a milder and better way of treating fevers — especially small-pox, and gave strong support to the use of specific medicines — especially Peruvian bark. He was an advocate of bleeding, and often carried it to excess. Another important point in Sydenham’s doctrine is his clear recognition of many diseases as being what would be now called specific, and not due merely to an alteration in the primary qualities or humours of the older schools. From this springs his high appreciation of specific medicines.

One name should always be mentioned along with Sydenham — that of his friend John Locke. The great sensational philosopher was a thoroughly trained physician, and practised privately. He shared and defended many of Sydenham’s principles, and in the few medical observations he has left shows himself to be even more thorough-going than the ” English Hippocrates.” It is deeply to be regretted in the interests of medicine that he did not write more. It is, however, reasonable to suppose that his commanding intellect often makes itself felt in the words of Sydenham. One sentence of Locke’s, in a letter to William Molyneux, sums up the practical side of Sydenham’s teaching : — , .

” You cannot imagine how far a little observation carefully made by a man not tied up to the four humours [Galen], or sal, sulphur and mercury [Paracelsus], or to acid and alcali [Sylvius and Willis] which has of late prevailed, will carry a man in the curing of diseases though very stubborn and dangerous ; and that with very little and common things, and almost no medicine at all.”

We thus see that, while the great anatomists, physicists and chemists — men of the type of Willis, Borelli and Boyle — were laying foundations which were later on built up into the fabric of scientific meiicine, little good was done by the premature application of their half-understood principles to practice. The reform of practical icine was effected by men who aimed at, and partly succeeded Jejecting all hypothesis and returning to the unbiassed study of iral processes, as shown in health and disease, denham showed that these processes might be profitably studied and dealt with without explaining them; and, by turning men's minds away from explanations and fixing them on facts, he enriched medicine with a method more fruitful than any discoveries in detail. From this time forth the reign of canonical authority in medicine was at an end, though the dogmatic spirit long survived.

The 18th Century. — The medicine of the 18th century is notable, like that of the latter part of the 17th, for the striving

after complete theoretical systems. The influence of the iatro-physical school was by no means exhausted; and in England, especially through the indirect influence of Sir Isaac Newton's (1642-1727) great astronomical generalizations, it took on a mathematical aspect, and is sometimes known as iatro-mathematical. This phase is most clearly developed in Archibald Pitcairne (1652-1713), who, though a determined opponent of metaphysical explanations, and of the chemical doctrines, gave to his own rude mechanical explanations of life and disease almost the dogmatic completeness of a theological system. His countryman and pupil, George Cheyne (167 1- I 743)> who lived some years at Bath, published a new theory of fevers on the mechanical system, which had a great reputation. Their English contemporaries and successors, John Freind, William Cole, and Richard Mead, leaned also to mechanical explanations, but with a distrust of systematic theoretical completeness, which was perhaps partly a national characteristic, partly the result of the teaching of Sydenham and Locke. Freind (1675-1728) in his Emmenologia gave a mechanical explanation of the phenomena of menstruation. He is also one of the most distinguished writers on the history of medicine. Cole (163 5-1 7 1 6) (see above) published mechanical hypotheses concerning the causation of fevers which closely agree with those of

the Italian iatro-mechanical school. More distinguished in his own day than any of these was Mead (1673-1754), one of the most accomplished and socially successful physicians of modern times. Mead was the pupil of the equally popular and successful John Radcliffe (1650-1714), who had acquired from Sydenham a contempt for book-learning, and belonged to no school in medicine but the school of common sense. Rad- cliffe left, however, no work requiring mention in a history of medicine. Mead, a man of great learning and intellectual activity, was an ardent advocate of the mathematical doctrines. ” It is very evident,” he says, ” that all other means of improving medicine have been found ineffectual, by the stand it was at for two thousand years, and that, since mathematicians have set themselves to the study of it, men already begin to talk so intelligibly and comprehensibly, even about abstruse matters, that it is to be hoped that mathematical learning will be the distinguishing mark of a physician and a quack.” His Mechanical Account of Poisons, in the first edition (1702), gave an explanation of the effects of poisons, as acting only on the blood. Afterwards he modified his hypothesis, and referred the disturbances produced to the ” nervous liquor,” which he supposed to be a quantity of the ” universal elastic matter ” diffused through the universe, by which Newton explained the phenomena of light — i.e. what was afterwards called the luminiferous ether. Mead’s treatise on The Power of the Sun and Moon over Human Bodies (1704), equally inspired by Newton’s discoveries, was a premature attempt to assign the influence of atmospheric pressure and other cosmical causes in producing disease. His works contain, however, many original experiments, and excellent practical observations. James Keill (1673-1710) applied Newtonian and mechanical principles to the explanation of bodily functions with still greater accuracy and completeness; but his researches have more importance for physiology than for practical medicine.

Boerhaave. — None of these men founded a school — a result due in part to their intellectual character, in part to the absence in England of medical schools equivalent in position and importance to the universities of the Continent. An important academical position was, on the other hand, one of the reasons why a physician not very different in his way of thinking from the English physicians of the age of Queen Anne was able to take a far more predominant position in the medical world. Hermann Boerhaave (1668-1738) was emphatically a great teacher. He was for many years professor of medicine at Leiden, where he lectured five hours a day, and excelled in influence and reputation not only his greatest fore- runners, Montanus of Padua and Sylvius of Leiden, but probably every

subsequent teacher. The hospital of Leiden, though with only twelve beds available for teaching, became the centre of medical influence in Europe. Many of the leading English physicians of the 18th century studied there; Gerard Van Swieten (1700- 1772), a pupil of Boerhaave, transplanted the latter's method of teaching to Vienna, and founded the noted Vienna school of medicine.

As the organizer, and almost the constructor, of the modern method of clinical instruction, the services of Boerhaave to the progress of medicine were immense, and can hardly be overrated. In his teachˆ ing. as in his practice, he avowedly followed the method of Hippocrates and Sydenham, both of whom he enthusiastically admired. In his medical doctrines he must be pronounced an eclectic, though taking his stand mainly on the iatro-mechanical school. The best-known parts of Boerhaave' s system are his doctrines of inflammation, obstruction and " plethora. 'By the last named especially he was long remembered. His object was to make all the anatomical and physiological acquisitions of his age, even microscopical ana- tomy, which he diligently studied, available for use in the practice of medicine. He thus differed from Sydenham, who took almost as little account of modern science as of ancient dogma. Boerhaave may be in some respects compared to Galen, but again differed from him in that he always abstained from attempting to reduce his knowledge to a uniform and coherent system. Boerhaave attached great importance to the study of the medical classics, but rather treated, them historically than quoted them as canonical authorities. It almost follows from the nature of the case that the great task of Boerhaave's life, a synthesis of ancient and modern medicine, and the work in which this is chiefly contained, his celebrated Institutions, could not have any great permanent value. Nearly the same thing is true even of the Aphorisms, in which, following the example of Hippocrates, he endeavoured to sum up the results of his long experience.

Hoffmann and Stahl. — We have now to speak of two writers in whom the systematic tendency of the 18th century showed itself most completely.

Friedrich Hoffmann (1660-1742), like Boerhaave, owed his influence, and perhaps partly his intellectual characteristics, to his academical position. He was in 1693 appointed the first pro- fessor of medicine in the university of Halle, then just founded by the elector Frederick III. Here he became, as did his contemporary and rival Stahl, a popular and influential teacher, though their university had not the European importance of Leiden. Hoffmann's " system " was apparently intended to reconcile the opposing " spiritual " and " materialistic " views of

nature, and is thought to have been much influenced by the philosophy of Leibnitz. His medical theories rest upon a complete theory of the universe. Life depended upon a universally diffused ether, which animals breathe in from the atmosphere, and which is contained in all parts of the body. It accumulates in the brain, and there generates the ” nervous fluid ” or pneuma — a theory closely resembling that of Mead on the ” nervous liquor,” unless indeed Mead borrowed it from Hoffmann. On this system are explained all the phenomena of life and disease. Health depends on the maintenance of a proper “tone” in the body — some diseases being produced by excess of tone, or ” spasm “; others by ” atony,” or want of tone. But it is impossible here to follow its further developments. Independently of his system* which has long ceased to exert any influence, Hoffmann made some contributions to practical medicine; and his great knowledge of chemistry enabled him to investigate the subject of mineral waters. He was equally skilful in pharmacy, but lowered his position by the practice, which would be unpardonable in a modern physician, of trafficking in secret remedies.

George Ernest Stahl (1660-1734) was for more than twenty years professor of medicine at Halle, and thus a colleague of Hoflv mann, whom he resembled in constructing a complete theoretical system, though their systems had little or nothing in common. Stahl’s chief aim was to oppose materialism. For mechanical conceptions he substituted the theory ot ” animism ” — attributing to the soul the functions of ordinary animal life in man, while the life of other creatures was left to mechanical laws. The symptoms of disease were explained as efforts of the soul to rid itself from morbid influences, the soul acting reasonably with respect to the end of self-preservation. The anima thus corresponds partly to the ” nature ” of Sydenham, while in other respects it resembles the archeus of Van Helmont. Animism in its completeness met with little acceptance during the lifetime of its author, but influ- enced some of the iatro-physical school. Stahl, was the author of the theory of ” phlogiston ” in chemistry, which in its day had great importance.

Haller and Morgagni. — From the subtleties of rival systems it is a satisfaction to turn to two movements in the medicine of the 18th century which, though they did not extinguish the spirit of system-making, opened up paths of investigation by which* the systems were ultimately superseded. These are physiology in the modern sense, as dating from Haller, and pathological anatomy, as dating from Morgagni.

Albrecht von Haller (1708-1777) was a man of even more encyclo-

paedic attainments than Boerhaave. He advanced chemistry, botany, anatomy, as well as physiology, and was incessantly occupied in endeavouring to apply his scientific studies to practical medicine, thus continuing the work of his great teacher Boerhaave. Besides all this he was probably more profoundly acquainted with the literature and bibliography of medicine than any one before or since. Haller occupied in the new university of Gottingen (founded 1737) a position corresponding to that of Boerhaave at Leiden, and in like manner influenced a very large circle of pupils*

The appreciation of his work in physiology belongs to the history of that science; we are only concerned here with its influence on medicine. Haller's definition of irritability as a property of muscular tissue, and its distinction from sensibility as a property of nerves, struck at the root of the prevailing hypothesis respecting animal activity. It was no longer necessary to suppose that a half- conscious " anima " was directing every movement. Moreover, Haller's views did not rest on a priori speculation, but on numerous experiments. He was among the first to investigate the action of medicines on healthy persons. Unfortunately the lesson which his contemporaries learnt was not the importance of experiment, but only the need of contriving other " systems " less open to objec- tion; and thus the influence of Haller led directly to the theoretical subtleties of William Cullen and John Brown, and only indirectly and later on to the general anatomy of M. F. X. Bichat. The great name of Haller does not therefore occupy a very prominent place in the history of practical medicine.

The work of Giovanni Battista Morgagni (1682-1771) had and still preserves a permanent importance beyond that of all the contemporary theorists. In a series of letters, De sedibus et causis morborum per anatomen indagatis, published when he was in his eightieth year, he describes the appearances met with at the post mortem examination as well as the symptoms during life in a number of cases of various diseases. It was not the first work of the kind. The Swiss physician, Theophile Bonet (1620-1689) had published his Septdcretum in 1679; and observations of post mortem appearances had been made by Montanus, P. Tulp, Raymond Vieussens, A.M. Valsalva, G. M. Lancisi, Haller and others. But never before was so large a collection of cases brought together, described with such

accuracy, or illustrated with equal anatomical and medical knowledge. Morgagni's work at once made an epoch in the science. Morbid anatomy now became a recognized branch of medical research, and the movement was started which has lasted till our own day.

The contribution of Morgagni to medical science must be regarded as in some respects the counterpart of Sydenham's. The latter had, in neglecting anatomy, neglected the most solid basis for studying the natural history of disease; though perhaps it was less from choice than because his practice, as he was not attached to a hospital, gave him no opportunities. But it is on the combination of the two methods — that of Sydenham and of Morgagni — that modern medicine rests; and it is through these that it has been able to make steady progress in its own field, independently of the advance of physiology or other sciences.

The method of Morgagni found many imitators, both in his own country and in others. In England the first important name in this field is at the same time that of the first writer of a systematic work in any language on morbid anatomy, Matthew Baillie (1761- 1823), a nephew of John and William Hunter, who published his treatise in 1795.

Cullen and Brown. — It remains to speak of two systematic writers on medicine in the 18th century, whose jp-eat reputation prevents them from being passed over, though their real contribur tion to the progress of medicine was not great — Cullen and Brown. William Cullen (1 710-1790) was a most eminent and popular professor of medicine at Edinburgh. The same academical influ- ences as surrounded the Dutch and German founders of systems were doubtless partly concerned in leading him to form the plan of a comprehensive system of medicine. Cullen's system was jargely based on the new physiological doctrine of irritability, but is especially noticeable for the importance attached to nervous action. Thus even gout was regarded as a " neurosis." These pathological principles of Cullen are contained in his First Lines of the Practice of Physic, an extremely popular book, often reprinted and translated. More importance is to be attached to his Nosology or Classification of Diseases. The attempt to classify diseases on a natural-history plan was not new, having been commenced by Sauvages and others, and is perhaps not a task of the highest importance. Cullen drew out a classification of great and needless complexity, the chief part of which is now forgotten, but several of his main divisions are still preserved.

It is difficult to form a clear estimate of the importance of the last

systematizer of medicine — John Brown (1735-1788) — for, though in England he has been but little regarded, the wide though short-lived popularity of his system on the Continent shows that it must have contained some elements of brilliancy, if not originality. His theory of medicine professed to explain the processes of life and disease, and the methods of cure, upon one simple principle — that of the property of ” excitability, in virtue of which the ” exciting powers,” defined as being (1) external forces and (2) the functions of the system itself, call forth the vital phenomena ” sense, motion, mental function and passion.” All exciting powers are stimulant, the apparent debilitating or sedative effect of some being due to a deficiency in the degree of stimulus; so that the final conclusion is that ” the whole phenomena of life, health as well as disease, consist in stimulus and nothing else.” Brown recognized some diseases as sthenic, others as asthenic, the latter requiring stimulating treatment, the former the reverse; but his practical conclusion was that 97% of all diseases required a ” stimu- lating ” treatment. In this he claimed to have made the most

salutary reform because all ” physicians from Hippocrates had treated diseases by depletion and debilitating measures with the object of curing by elimination. It would be unprofitable to attempt a complete analysis of the Brunonian system; and it is difficult now to understand why it attracted so much attention in its day. To us at the present time it seems merely a dialectical construction, having its beginning and end in definitions: the words power, stimulus, &c, being used in such a way as not to correspond to any precise physical conceptions, still less to definite material objects or forces. One recommendation of the system was that it favoured a milder system of treatment than was at that time in vogue; Brown may be said to have been the first advocate of the modern stimulant or feeding treatment of fevers. He advocated the use of ” animal soups ” or beef-tea. Further, he had the discernment to see that certain symptoms — such as convulsions and delirium, which were then commonly held always to indicate inflammation — were often really signs of weakness.

The fortunes of Brown’s system (called, from having been origin- ally, written in Latin, the Brunonian) form one of the strangest chapters in the history of medicine. In Scotland, Brown so far won the sympathy of the students that riotous conflicts took place between his partisans and opponents. In England his system took little root. In Italy, on the other hand, it received enthusiastic support, and, naturally, a corresponding degree of opposition. The most important adherent to Brown’s system was J. Rasori (‘763-1837), who taught it as professor at Pavia, but afterwards substituted his own system of contra-stimulus.

The theoretical differences between tmsand the “stimulus” theory need not be expounded. The practical difference in the corresponding treat- ment was very greˆt, as Rasori advocated a copious use of bleeding and of depressing remedies, such as antimony. Joseph Frank (1774-1841), a German professor at Pavia, afterwards of Vienna, the author of an encyclopaedic work on medicine now forgotten, embraced the Brunonian system, though he afterwards introduced some modifications, and transplanted it to Vienna. Many names are quoted as partisans or opponents of the Brunonian system in Italy, but scarcely one of them has any other claim to be remem- bered. In Germany the new system called forth, a little later, no less enthusiasm and contrpversial heat. C. Girtanner (1760- 1800) first began to spread the new ideas (though giving them out as his own), but Weikard was the first avowed advocate of the system. RSschlaub (1768-1835) modified Brown’s system into the theory of excitement {Erregungstheorie) , which for a time was extremely popular in Germany. The enthusiasm of the younger Brunonians in Germany was as great as in Edinburgh or in Italy, and led to serious riots in the university of Gottingen. In America the system was enthusiastically adopted by a noted physician, Benjamin Rush (1745-1813), of Philadelphia, who was followed by a considerable school. France was not more influenced by the new school than England. In both countries the tendency towards ppsitive science and progress by objective investigation was too marked for any theoretical system to have more than a passing influence. In France, however, the influence of Brown’s theories is very clearly seen in the writings of Frangois J. V, Bfoussais, who, though not rightly classed with the system-makers, since his conclusions were partly based upon anatomical investigation, resembled them in his attempt to unite theory and practice in one comprehensive synthesis. The explanation of the meteoric splen- dour of the Brunonian system in other countries seems to be as follows. In Italy the period of intellectual decadence had set in, and no serious scientific ardour remained to withstand the novelties of abstract theory. In Germany the case was somewhat different. Intellectual activity was not wanting, but the great achievements of the 1 8th century in philosophy and the moral sciences had fostered a love of abstract speculation; and some sort of cosmical or general system was thought indispensable in every department of special science. Hence another generation had to pass away before Germany found herself on the level, in scientific investigationˆ of France and England.

Before the theoretic tendency of the 18th century was quite exhausted, it displayed itself in a system which, though in some respects isolated in the history of medicine, stands nearest to that of

Brown— that, namely, of Hahnemann (see Homoeopathy). S. C. F. Hahnemann (1753-1844) was in conception as revolutionary a reformer of medicine as Paracelsus. He professed to base medicine ; entirely on a knowledge of symptoms, regarding all investigation of the causes of symptoms as useless. While thus rejecting all the lessons of morbid anatomy and pathology, he put forward views respecting the causes of disease which hardly bear to be seriously stated. All_ chronic maladies result either from three diseases — psora (the itch), syphilis or sycosis (a skin disease), or else are maladies produced by medicines. Seven-eighths of all chronic diseases are produced by itch driven inwards. 1 (It is fair to. say that these views were published in one of his later works.) In treatment of disease Hahnemann rejected entirely the notion of a vis medicatrix naturae, and was guided by his well-known principle

1 The itch {scabies) is really an affection produced by the presence in the skin of a species of. mite (Acarus scabiei), and when this is destroyed or removed the disease is at an end ,

” similia similibus curantur,” which he explained as depending on the law that in order to get rid of a disease some remedy must be given which should substitute for the disease an action dynamically similar, but weaker. The original malady being thus got rid of, the vital force would easily be able to cope with and extinguish the slighter disturbance Caused by the remedy. Something very similar was held by Brown, who taught that “indirect debility” was to be cured by a lesser degree of the same stimulus as had caused the original disturbance. Generally, however, Hahnemann’s views contradict those of Brown, though moving somewhat in the same plane. In order to select remedies which should fulfil the indication of producing symptoms like those of the disease, Hahne- mann made many observations of the action of drugs on healthy persons. He did not originate this line of research, for it had been pursued, if not originated, by Haller, and cultivated systematically by Tommasini, an Italian ” contra-stimulist ” ; but he carried it out with much elaboration. His results, nevertheless, were vitiated by being obtained in the interest of a theory, and by singular want of discrimination. In his second period he developed the theory of ” potentiality ” or dynamization— namely, that medicines gained in strength by being

diluted, if the dilution was accompanied by shaking or pounding, which was supposed to ” potentialize ” or increase the potency of the medicine. On this principle Hahnemann ordered his original tinctures to be reduced in strength to one- fiftieth ; these first dilutions again to one-fiftieth ; and so on, even till the thirtieth dilution, which he himself used by preference, and to which he ascribed the highest ” potentiality.”. From a theoretical point of view Hahnemann’s is one of the abstract systems, pretend- ing to universality, which modern medicine neither accepts nor finds it worth while to controvert. In the treatment of disease his practical innovations came at a fortunate time, when the excesses of the depletory system had only partially been superseded by the equally injurious opposite extreme of Brown’s stimulant treatment. Hahne-mann’s use of mild and often quite inert remedies contrasted favourably with both of these. Further, he did good by insisting upon simplicity in prescribing, when it was the custom to give a number of drugs, often heterogeneous and inconsistent, in the same prescription- But these indirect benefits were quite independent of the truth or falsity of his theoretical system.

Positive Progress in the 18th Century.— In looking back on the repeated attempts in the 18th century to construct a uni versal system of medicine, it is impossible not to regret the waste of brilliant gifts and profound acquirements which they involved. It was fortunate, however, that the accumulation of positive knowledge in medicine did not cease. While Germany and Scotland, as the chief homes of abstract speculation, gave birth to most of the theories, progress in objective science was most marked in other countries — in Italy first, and after- wards in England and France. We must retrace our steps a little to enumerate several distinguished names which, from the nature of the case, hardly admit of classification.

In Italy the tradition of the great anatomists and physiolo- gists of the 17th century produced a series of accurate observers and practitioners. Among the first of these were Antonio Maria Valsalva (1666-1723), still better known as an anatomist; Giovanni Maria Lancisi (1654-1720), also an anatomist, the author of a classical work on the diseases of the heart and aneurisms; and Ippolito Francisco Albertini (1662-1738), whose researches on the same class of diseases were no less important.

In France, Jean Baptiste Senac (1693-1770) wrote also an important work on the affections of the heart. Sauvages, otherwise F. B. de Lacroix (1706-1767), gave, under the title Nosologic methodica, a natural-history classification of diseases; Jean Astruc (1684-1766) contributed to the knowledge of general diseases. But the state of

medicine in that country till the end of the 18th century was unsatisfactory as compared with some other parts of Europe.

In England the brilliancy of the early part of the century in practical medicine was hardly maintained to the end, and presented, indeed, a certain contrast with the remarkable and unflagging progress of surgery in the same period. The roll of the College of Physicians does not furnish many distinguished names. Among these should be mentioned John Fothergill (1712-1780), who investigated the ” putrid sore throat ” now called diphtheria, and the form of neuralgia popularly known as tic douloureux. A physician of Plymouth, John Huyham (1694-1768), made researches on epidemic fevers, in the spirit of Sydenham and Hippocrates, which are of the

highest importance. William Heberden (1710-1801), a London physician, called by’ Samuel Johnson ultimus Romanorum, ” the last of our learned physicians,” left a rich legacy of practical observations in the Commentaries published after his death. More important in their results than any of these works were the discoveries of Edward Jenner (q.v.), respecting the preven- tion of small-pox by vaccination, in which he superseded the partially useful but dangerous practice of inoculation, which had been introduced into England in 1721. The history of this discovery need not be told here, but it may be pointed out that, apart from its practical importance, it has had great influence on the scientific study of infectious diseases. The name of John Pringle (1707-1782) should also be mentioned as one of the first to study epidemics of fevers occurring in prisons and camps. His work, entitled Observations on the Diseases of an Army, was translated into many European languages and became the standard authority on the subject.

In Germany the only important school of practical medicine was that of Vienna, as revived by Gerard van Swieten (1700-1772), a pupil of Boerhaave, under the patronage of Maria Theresa. Van Swieten’s commentaries on the aphorisms of Boerhaave are thought more valuable than the original text. Other eminent names of the same school are Anton de Haen (1704-1776), Anton Storck (1731-1803), Maximilian Stoll (1742-1788), and John Peter Frank (1745-1821), father of Joseph Frank, before mentioned as an adherent of the Brownian system, and like his son carried away for a time by the new doctrines. This, the old ” Vienna School,” was not distinguished for any notable discoveries, but for success in clinical teaching, and for its sound method of studying the actual facts of disease during life and after death, which largely contributed to the establish- ment of the ” positive medicine ” of the 19th century.

One novelty, however, of the first importance is due to a Vienna physician of the period, Leopold Auenbrugger (1722- 1809), the inventor of the method of recognizing diseases of the chest by percussion. Auenbrugger's method was that of direct percussion with the tips of the fingers, not that which is now used, of mediate percussion with the intervention of a finger or plessimeter; but the results of his method were the same and its value nearly as great. Auenbrugger's great work, the Inventum novum, was published in 1761. The new practice was received at first with contempt and even ridicule, and afterwards by Stoll and Peter Frank with only grudging approval. It did not receive due recognition till 1808, when J. N. Corvisart translated the Inventum novum into French, and Auenbrugger's method rapidly attained a European repu- tation. Surpassed, but not eclipsed, by the still more important art of auscultation introduced by R. T. H. Laennec, it is hardly too much to say that this simple and purely mechanical invention has had more influence on the development of modern medicine than all the " systems " evolved by the most brilliant intellects of the 1 8th century.

Rise of the Positive School in France. — The reform of medicine in France must be dated from the great intellectual awakening caused by the Revolution, but more definitely starts with the researches in anatomy and physiology of Marie Francois Xavier Bichat (1771-1802). The importance in science of Bichat's classical works, especially of the Anatomie ginerale, cannot be estimated here; we can only point out their value as supplying a new basis for pathology or the science of disease. Among the most -ardent of his followers was Francois Joseph Victor Broussais (1772-1838), whose theoretical views, partly founded on those of Brown and partly on the so-called vitalist school of Theophile Bordeu (1722-1776) and Paul Joseph Barthez (1 734-1806), differed from these essentially in being avowedly based on anatomical observations. 'Broussais's chief aim was to find an anatomical basis for all diseases, but he is especially known for his attempt to explain all fevers as a consequence Of irritation or inflammation of the intestinal canal (gastro- ent6rite). A number of other maladies, especially general diseases and those commonly regarded as nervous, were attri- buted to the same cause. It would be impossible now to trace

the steps which led to this wild and long since exploded theory. It led,

among other consequences, to an enormous misuse of bleeding. Leeches were his favourite instruments, and so much so that he is said to have used 100,000 in his own hospital wards during one year. He was equalled if not surpassed in this excess by his follower Jean Bouiuaud (1796-1881), known for his important work on heart diseases. Broussais's system, to which he gave the name of " Medecine physiologique," did much indirect good, in fixing attention upon morbid changes in the organs, and thus led to the rise of the strongly opposed anatomical and pathological school of Corvisart, Laennec and Bayle.

Jean Nicolas Corvisart (1755-1821) has already been mentioned' as the translator and introducer into France of Auenbrugger's work on percussion. He introduced some improvements in the method, but the only real advance was the introduction of mediate percus- sion by Pierre Adolphe Piorry (1794-1879) in 1828. The discovery had, however, yet to be completed by that of auscultation, or listening to sounds produced in the chest by breathing, the move- ments of the heart, &c. The combination of these methods con- stitutes what is now known as physical diagnosis. Ren6 Theophile Hyacinthe Laennec (1781-1826) was the inventor of this most important perhaps of all methods of medical research. Except for some trifling notices of sounds heard in certain diseases, this method was entirely new. It was definitely expounded in an almost complete form in his work De V auscultation mediate, published in 1819. Laennec attached undue importance to the use of the stethoscope, and laid too much weight on specific signs of specific diseases ; otherwise his method in its main features has remained unchanged. The result of his discovery was an entire revolution in the knowledge of diseases of the chest ; but it would be a mistake to forget that an essential factor in this revolution was the simul- taneous study of the condition of the diseased organs as seen after death. Without the latter, it is difficult to see how the information conveyed by sounds could ever have been verified. This increase of knowledge is therefore due, not to auscultation alone, but to auscultation combined with morbid anatomy. In the case of Laennec himself this qualification takes nothing from his fame, for he studied so minutely the relations of post-mortem appearances to symptoms during life that, had he not discovered auscultation, his researches in morbid anatomy would have made him famous. The pathologico-anatomical method was also followed with great zeal and success by Gaspard Laurent Bayle (1774-1816), whose researches on tubercle, and the changes of the lungs and other organs in consumption, are the foundation of most that has been done since his time. It was of course antecedent to the discovery of auscultation.

Starting from these men arose a school of physicians who endeavoured to give to the study of symptoms the same pre- cision as belonged to anatomical observations, and by the combina- tion of both methods made a new era in clinical medicine. Among these were Auguste Francois Chomel (1788-1858), Pierre Charles Alexandre Louis (1787-1872), Jean Cruveilhier (1791-1874) and Gabriel Andral (1797-1876). Louis, by his researches on pulmo- nary consumption and typhoid fever, had the chief merit of refuting the doctrines of Broussais. In another respect also he aided in establishing an exact science of medicine by the introduction of the numerical or statistical method. By this method only can the fallacies which are attendant on drawing conclusions from isolated cases be avoided; and thus the chief objection which has been made to regarding medicine as an inductive science has been re- moved. Louis's method was improved and systematized by Louis Denis Jules Gavarret (1809-1890); and its utility is now universally recognized. During this brilliant period of French medicine the superiority of the school of Paris could hardly be contested. We can only mention the names of Pierre Bretonneau (1771-1862), Louis Leon Rostan (1790-1866), Jean Louis D'Alibert (1766-1837), Pierre Frangois Olive Rayer (1793-1867) and Armand Trousseau (1801-1866), the eloquent and popular teacher.

English Medicine from 1800 to 1840. — The progress of medicine in England during this period displays the same characteristics as at other times, viz. a gradual and uninterrupted development, without startling changes such as are caused by the sudden rise or fall of a new school. Hardly any theoretical system is of English bkth; Erasmus Darwin (1731-1802), the grand- father of the great Charles Darwin, alone makes an exception. In his Zoonomia (1794) he expounded a theory of life and disease which had some resemblance to that of Brown, though arrived at (he says) by a different chain of reasoning.

Darwin's work shows, however, the tendency to connect medicine with physical science, which was an immediate con- sequence of the scientific discoveries of the end of the 18th century, when Priestley and Cavendish in England exercised

the same influence as Lavoisier in France. The English school of medicine was also profoundly stirred by the teachings of the two brothers William and John Hunter, especially the latter — who must therefore be briefly mentioned, though their own researches were chiefly concerned with subjects lying a little outside the limits of this sketch. William Hunter (1718-1783) was known in London as a brilliant teacher of anatomy and successful obstetric physician; his younger brother and pupil, John Hunter (1728-1793), was also a

teacher of anatomy, and practised as a surgeon. His immense contribu- tions to anatomy and pathology cannot be estimated here, but his services in stimulating research and training investi- gators belong to the history of general medicine. They are sufficiently evidenced by the fact that Edward Jenner and Matthew Baillie were his pupils.

The same scientific bent is seen in the greater attention paid to morbid anatomy (which dates from Baillie) and the more scientific method of studying diseases. An instance of the latter is the work of Robert Willan (1757-1812) on diseases of the skin — a department of medicine in which abstract and hypothetical views had been especially injurious. Willan, by following the natural-history method of Sydenham, at once put the study on a sound basis; and his work has been the starting-point of the most important modern researches. About the same time William Charles Wells (1757-1817), a scientific investigator of remarkable power, and the author of a celebrated essay on dew, published observations on altera- tions in the urine, which, though little noticed at the time, were of great value as assisting in the important discovery made some years afterwards by Richard Bright.

These observers, and others who cannot be mentioned here, belong to the period when English medicine was still little influenced by the French school. Shortly after 181-5, however, when ,the continent of Europe was again open to English travel- lers, many English doctors studied in Paris, and the discoveries of their great French contemporaries began to be known. The method of auscultation was soon introduced into England by pupils of Laennec. John Forbes (1787-1861) in 1824, and William Stokes (1804-1878) of Dublin in 1825, published treatises on the use of the stethoscope. Forbes also translated the works of Laennec and Auenbrugger, and an entire revolution was soon effected in the knowledge of diseases of the chest. James Hope (1801-1841) and Peter Mere Latham (1780-1875) further developed this subject, and the former was also known for his researches in morbid anatomy. The combination of clinical and anatomical research led, as in the hands of the great French physicians, to important discoveries by English investigators. The discovery by Richard Bright (1789-1858) of the disease of the kidneys known by his name proved to be one of the most momentous of the century. It was published in Reports of Medical Cases 1827-1831. Thomas Addison (1793- 1860) takes, somewhat later, a scarcely inferior place. The remarkable physiological discoveries of Sir Charles Bell (1774- 1842) and Marshall Hall (1790-1857) for the first time rendered possible the discrimination of diseases of the spinal cord. Several of these physicians were also eminent for their clinical

teaching — an art in which Englishmen had up till then been greatly deficient.

Although many names of scarcely less note might be mentioned among the London physicians of the early part of the century, we must pass them over to consider the progress of medicine in Scotland and Ireland. In Edinburgh the admirable teaching of Cullen Ead raised the medical faculty to a height of prosperity of which his successor, James Gregory (1758-1821), was not unworthy. His nephew, William Pulteney Alison (1790-1859), was even more widely known. These great teachers maintained in the northern university a continuous tradition of successful teaching, which the difference in academical and other circumstances rendered hardly possible in London. Nor was the northern school wanting in special investigators, such as John Abercrombie (1 780-1 844), known for his work on diseases of the brain and spinal cord, published in 1828, and many others. Turning to Ireland, it should be said that the Dublin school in this period produced two physicians of the highest distinction. Robert James Graves (1 796-1 853) was a most eminent clinical teacher and observer, whose lectures are regarded as the

model of clinical teaching, and indeed served as such to the most popular teacher of the Paris school in the middle of this century, Trousseau. William Stokes (1804-1878) was especially known for his works on diseases of the chest and of the heart, and for his clinical teaching.

German Medicine from 1800 to 1840. — Of the other countries of Europe, it is now only necessary to mention Germany. Here the chief home of positive medicine was still for a long time Vienna, where the ” new Vienna school ” continued and sur- passed the glory of the old. Joseph Skoda (1805-1881) extended, and in some respects corrected, the art of auscultation as left by Laennec. Karl Rokitansky (1804-1878), by his colossal labours, placed the science of morbid anatomy on a permanent basis, and enriched it by numerous discoveries of detail. Most of the ardent cultivators of this science in Germany in the next generation were his pupils. In the other German schools, though some great names might be found, as Moritz Heinrich Romberg (1795-1873), the founder of the modern era in the study of

nervous diseases, the general spirit was scholastic and the result barren till the teaching of one .man, whom the modern German physicians generally regard as the regenerator of scientific medicine in their country, made itself felt. Johann Lucas Schonlein (1703-1864) was first professor at Wurzburg, afterwards at Zurich, and for twenty years at Berlin (from 1839-1859). Schonlein's positive contributions to medical science were not large; but he made in 1839 one discovery, apparently small, but in reality most suggestive, namely, that the contagious disease of the head called favus is produced by the growth in the hair of a parasitic fungus. In this may be found the germ of the startling modern discoveries in parasitic diseases. His systematic doctrines founded the so-called " natural history school " ; but his real merit was that of the founder or introducer of a method. In the words of H. Haser: " Schonlein has the incontestable merit of having been the first to establish in Germany the exact method of the French and the English, and to impregnate this method with the vivifying spirit of German research." (J. F. P.)

Modern Progress. — In recent times the positive bent of modern knowledge and methods in other spheres of science and thought, and especially in biology, has influenced medicine profoundly. Minuter accuracy of observation was inculcated by the labours and teaching of the great anatomists of the 17th century; and, for modern times, experimental physiology was instituted by Harvey, anatomy having done little to interpret life in its dynamic aspects. For medicine in England Harvey did what William Gilbert did for physics and Robert Boyle for chemistry: he insisted upon direct interrogation of natural processes, and thereby annihilated the ascendancy of mere authority, which, while nations were in the making, was an essential principle in the welding together of heterogeneous and turbulent peoples. The degradation of medicine between Galen and Harvey, if in part it consisted in the blind following of the authority of the former physician, was primarily due to other causes; and its new development was not due to the discovery of the experimental method alone: social and political causes also are concerned in the advance even of the exact sciences 1 . Among such contributory causes is the more familiar intercourse of settled nations which we enjoy in our own day; the ideas of one nation rapidly permeate neighbouring nations, and by the means of printed books penetrate into remoter provinces and into distant lands. Hence the description of the advance of medicine in western Europe and America may for the latest stage be taken as a whole, without that separate treatment, nation by nation, which in the history of earlier times was necessary. Italy lost the leading place she had taken in the new development of science. The several influences

of modern Germany, France and America became of the first importance to English medicine; but these tides, instead of pursuing their courses as independent streams, have become confluent. The work of Theodor Schwann (1810-1882), Johannes Muller (1809-1875), Rudolph Virchow and Karl Ludwig (1816-1895) in Germany, of R. T. H. Laennec and Claude Bernard in France, was accepted in England, as that of Matthew Baillie, Charles

Bell, Bright, Graves and others of the British school, quickly made itself felt abroad.

The character of modern medicine cannot be summed in a word, as, with more or less aptness, that of some previous periods may be. Modern medicine, like modern Expert- science, is as boldly speculative as it has been in mental any age, and yet it is as observant as in any natural- Method istic period; its success lies in the addition to these Teco ˆ azea ‘ qualities of the method of verification; the fault of previous times being not the activity of the speculative faculty, without which no science can be fertile, but the lack of methodical reference of all and sundry propositions, and parts of proposi- tions, to the test of experiment. In no department is the experimental method more continually justified than in that of the natural history of disease, which at first sight would seem to have a certain independence of it and a somewhat exclu- sive value of its own. Hippocrates had no opportunity of verification by necropsy, and Sydenham ignored pathology; yet the clinical features of many but recently described diseases, such, for example, as that named after Graves, and myxoedema, both associated with perversions of the thyroid gland, lay as open to the eye of physicians in the past as to our own. Again, to the naturalist the symptoms of tabes dorsalis were distinctive enough, had he noted them. No aid to the trained eye was necessary for such observations, and for many other such; yet, if we take Sir Thomas Watson (1792-1882) as a modern Sydenham, we may find in his lectures no suspicion that there may be a palsy of muscular co-ordination apart from deprivation of strength. Indeed, it does not seem “to have occurred to any one to compare the muscular strength in the various kinds of paraplegia. Thus it was, partly because the habit of acceptance of authority, waning but far from extirpated, dictated to the clinical observer what he should see; partly because the eye of the clinical observer lacked that special training which the habit and influence of experimental verification alone can give, that physicians, even acute and practised physicians, failed to see many and many a sympto-‘ matic series which went through its evolutions conspicuously enough, and needed for its appreciation no unknown aids or methods of research, nor any further advances of patho- logy.

We see now that the practice of the experimental method endows with a new vision both the experimenter himself and, through his influence, those who are associated with him in medical science, even if these be not themselves actually engaged in experiment; a new discipline is imposed upon old faculties, as is seen as well in other sciences as in those on which medicine more directly depends. And it is not only the perceptions of eye or ear which tell, but also the association of concepts behind these adits of the mind. It was the concepts derived from the experimental methods of Harvey, Lavoisier, Liebig, Claude Bernard, Helmholtz, Darwin, Pasteur, Lister and others which, directly or indirectly, trained the eyes of clinicians to observe more closely and accurately; and not of clinicians only, but also of pathologists, such as Matthew Baillie, Cruveilhier, Rokitansky, Bright, Virchow — to name but a few of those who, with (as must be admitted) new facilities for necropsies, began to pile upon us discoveries in morbid anatomy and histology. If at first in the 18th century, ■ and in the earlier 19th, the discoveries in this branch of medical knowledge had a certain isolation, due perhaps to the pre-possessions of the school of Sydenham, they soon became the property of the physician, and were brought into co-ordinatioiF with the clinical phenomena of disease. The great Morgagni, the founder of morbid anatomy, himself set the example of carrying on this study parallel with clinical observation; and always insisted that the clinical story of the case should be brought side by side with the revelations of the necropsy. In pathology, indeed, Virchbw's (1821-1902) influence in the transfiguration of this branch of science may almost be compared to that of Darwin and Pasteur in their respective domains. In the last quarter of the 19th century the conception grew clearer that morbid anatomy for the most part demonstrates

disease in its static aspects only, and also for the most part in the particular aspect of final demolition; and it became manifest as pathology and clinical medicine became more and more thoroughly integrated, that the processes which initiate and are concerned in this dissolution were not revealed by the scalpel.

Again, the physician as naturalist, though stimulated by the pathologist to delineate disease in its fuller manifestations, yet was hampered in a measure by the didactic method of constructing " types

” which should command the attention of the disciple and rivet themselves on his memory; thus too often those incipient and transitory phases which initiate the paths of dissolution were missed. Not only so, but the physician, thus fascinated by ” types,” and impressed by the .silent monu- mentsof the pathological museum, was led to localize disease too much, to isolate the acts of nature, and to forget not only the continuity of the phases which lead up to the exemplary forms, or link them together, but to forget also that even between the types themselves relations of affinity must exist’ — and these oftentimes none the less intimate for apparent diversities of form, for types of widely different form may be, and indeed often are, more closely allied than types which have more superficial resemblance — and to forget, moreover, how largely negative is the process of abstraction, by which types are imagined. Upon this too static a view, both of clinical type and of post-mortem-room pathology, came a despairing spirit, almost of fatalism, which in the contemplation of organic ruins lost the hope of cure of organic diseases. So prognosis became pessimistic, and the therapeutics of the abler men negative, until fresh hopes arose of stemming the tides of evil at their earliest flow.

Such was medicine, statically ordered in pathology, statically ordered in its clinical concepts, when, on the 24th of November 1859, the Origin of Species was published. It is no Darwin?” exaggeration to say that this epoch-making work brought to birth a world of conceptions as new as the work of Copernicus. For the natural philosopher the whole point of view of things was changed; in biology not only had the anthropocentric point of view been banished, but the ancient concept of perpetual flux was brought home to ordinary men, and entered for good into the framework of thought. The study of comparative pathology, yet in an inchoate stage, and of embryology, illuminated and enlarged biological conceptions, both normal and abnormal; and the ens reale subsislens in cor pore disappeared for ever — at any rate from physiology and medicine. Before Darwin — if the name of Darwin may be used to signify the transformation of thought of which he was the chief artificer — natural objects were regarded, not in medicine and pathology only, as a set of hidebound events; and natural operations as moving in fixed grooves, after a fashion which it is now difficult for us to realize. With the melting of the ice the more daring spirits dashed into the new current with such ardour that for them all traditions, all institutions, were thrown into hotchpot; even elderly and sobˆr physicians took enough of the infection to liberate their minds, and, in the field of the several diseases and in that of post-mortem pathology, the hollowness of

classification by superficial resemblance, the transitoriness of forms, and the • flow of processes, broke upon the view. Thus it came about not only that classifications of disease based on superficial like- ness — such as jaundice, dropsy, inflammations-were broken up, and their parts redistributed, but also that even more set dis- eases began to lose their settlements, and were recognized as terms of series, as transitory or culminating phases of perturba- tions which might be traced to their origins, and in their earlier stages perhaps withstood.

The doctrine of heredity in disease thus took a larger aspect; the view of morbid series was no longer bounded even by the life of the individual; and the propagation of taints, and of mor- bid varieties of man, from generation to generation proved to be no mere repetition of fixed features but, even more frequently, to be modes of development or of dissolution betraying them- selves often in widely dissimilar forms, in series often extending

over many lives, the terms of which at first sight had seemed wholly disparate. Thus, for example, as generations succeed one another, nervous disorders appear in various guise; epilepsy, megrim, insanity, asthma, hysteria, neurasthenia, a. motley array at first sight, seemed to reveal themselves as terms of a morbid series; not only so, but certain disorders of other systems also might be members of the series, such as certain diseases of the skin, and even peculiar susceptibilities or immuni- ties in respect of infections from without. On the other hand, not a few disorders proved to be alien to classes to which nar- rower views of causation had referred them; of such are tabes dorsalis, neuritis, infantile palsy or tetanus, now removed from the category of primary nervous diseases and placed in one or other of the class of infections; or, conversely, certain forms of disease of the joints are now regarded with some certainty as members of more than one series of diseases chiefly manifest in the nervous system. In the effects of simpler poisons the recog- nition of unity in diversity, as in the affiliation of a peripheral neuritis to arsenic, illustrated more definitely this serial or etiological method of classifying diseases. On the other hand, inheritance was dismissed, or survived only as a “suscepti- bility,” intr/e cases of tubercle, leprosy and some other maladies now recognized as infectious; while in others, as in syphilis, it was seen to consist in a translation of the infectious element from parent to offspring. These new conceptions of the multi- plicity in unity of disease, and of the fluidity and continuity of morbid processes, might have led to vagueness and over-boldness in speculation and reconstruction, had not the experimental method been a,t hand with clues and tests for the several series. Of this method the rise and wonderful extension of the science of bacteriology also

furnished no inconsiderable part.

In the disease of the scalp called favus, Schonlein had dis- covered a minute mycelial fungus; a remarkable discovery, for it was the first conspicuous step in the attribution of diseases to the action of minute parasites. Schon-

Bacterlo- logy.

lein thus did something to introduce new and positive conceptions and exacter methods into Germany; but unfortu- nately his own mind retained the abstract habit of his country, and his abilities were dissipated in the mere speculations of Schelling. Similarly Karl Hoffmann of Wiirzburg wasted his appreciations of the newer schools of developmental biology in fanciful notions of human diseases as reversions to normal stages of lower animals; scrofula being for him a reversion to the insect, rickets to the mollusc, epilepsy to. the oscillaria, and so forth. Even that distinguished physiologist Johannes Mtiller remained a staunch vitalist. Fortunately Germany, which^at. the begin- ning of the century was delivered over to Brownism and vitalism and was deaf to Bichat, was rescued from this sort of barrenness by the brilliant experimental work of Claude Bernard and Pas- teur in France—work which, as regards the attenuated virus, was a development of that of Edward Jenner, and indeed of Schwann, Robert Koch worthily following Pasteur with his work on the bacillus of anthrax and with his discovery of that of tuber- culosis; and by the cellular doctrine and abundant labours in pathology of Virchow. Ludwig Brieger then discovered the toxins of certain infections; and Emil A. von Behring completed the sphere of the new study by his discovery of the antitoxins of diphtheria and tetanus. In practical medicine the subsequent results of Behring and his followers have in diphtheria attained a signal therapeutical success. If the striking conceptions of Paul Ehrlich and Emil Fischer continue to prove as fertile in inspiring and directing research as at present they seem to “Ens another wide sphere of conceptions will be opened out, not in bacteriology only, but also in biological ., chemistry and in molecular physics. Again, besides giving us the clue to the nature of many diseases and to the continuity of many morbid series, by bacteriology certain diseases, such as actinomycosis, have been recognized for the first time.

As the prevalence of the conceptions signified and inspired by the word ” phlogiston ” kept alive ontological notions of disease, so the dissipation of vitalistic conceptions in the field of physics prepared men’s minds in pathology for the new

views opened by the discoveries of Pasteur on the side of pathogeny, and of J. F. Cohnheim (1839-1884) and of Iliya Metchnikoff on the dynamical side of his- f B « ersam * tology. Of the older ontological notions of disease tkms. the strongest were those of the essence of fever and

of the essence of inflammation. Broussais had done much to destroy the notion of fever as an entity, but by extrava- gances in other directions he had discredited the value of his main propositions. Yet, although, as Andral and other French physicians proved, it was extravagant to say that all fevers take their origin from some local inflammation, it was true and most useful to insist, as Broussais vehemently insisted, that ” fever ” is no substance, but a generalization drawn from sym- ptoms common to many and various diseases springing from many various and often local causes; from causes agreeing perhaps only in the factor of elevation of the temperature of the body. To the establishment of this new conception the improvement and general use of the clinical thermometer gave invaluable ad- vantages. This instrument, now indispensable in our daily work at the bedside, had indeed long been known both to physiolo- gists (Haller) and to clinicians. In the 18th century A. de Haen, and, in the United Kingdom, George Cleghorn (1716-1789) of Dublin and James Currie (1756-1805), carried on the use of the thermometer in fevers; and on the continent of Europe in later years F. G. F. von Barensprung (1822-1865) and Ludwig Traube (1818-1876) did the same service; but it is to the work of Karl August Wunderlich (18 15-1877) that we owe the establishment of this means of precision as a method of regular observation both in pathology and in clinical medicine. By his almost exhaustive comparison of febrile movements as symptomatic processes Wunderlich dealt the last blow to the expiring doctrine of the “entity” of ” fever “; while on the clinical side Breton- neau and Louis, in 1862-1872, by their careful clinical and patho- logical studies of forms of fever, relieved the new doctrine of the extravagances of Broussais, and prepared the way for the important distinction of enteric from typhus fever by A. P. Stewart (1813-1883), William Jenner, William Budd (1811-1880), Charles Murchison (1830-1879), J. H. F. Autenrieth (1772-1835), Heinrich Gustav Magnus (1802-1870), Huss and others. By the learned and accomplished Armand Trousseau British and German influences were

carried into France.

Meanwhile Cohnheim and Metchnikoff were engaged in destroying the ontological conception not of fever only, but also of inflammation, of which, as a local event, an ontological con- ception was no less strongly implanted. By his researches on the migration of the white corpuscles of the blood Cohnheim, on the bases laid by Virchow, brought the processes of inflam- mation within the scope of the normal, seeing in them but a modi- fication of normal processes under perturbations of relatively external incidence; even the formation of abscess was thus brought by him within the limits of perversion of processes not differing essentially from those of health; and ” new formations,” ” plastic exudations,” and other discontinuous origins of an ” essential ” pathology, fell into oblivion. And it is not alien from the present point of view to turn for a moment to the light thrown on the cardio-arterial pulse and the measurement of its motions by the more intimate researches into the phenomena of the circulation by many observers, among whom in the 19th century James Hope, E. J. Marey (1830-1904) and C. F. W. Ludwig will always take a leading place. By them the demon- stration of Harvey that the circulation of the blood is in large part a mechanical process, and nowhere independent of mechani- cal laws, was considerably enlarged and extended. In particular the fluctuations of the pulse in fevers and inflammations were better understood, and accurately registered; and we can scarcely realize now that before Harvey the time of the pulse seems not to have been counted by the watch. Discovery in these various directions then led physicians to regard fever and inflam- mation not as separable entities, but as fluctuating symptom- groups, due to swervings of function from the normal balance under contingent forces.

As to such reforms in our cbnceptions of disease the advances of bacteriology profoundly contributed, so under the stress of consequent discoveries, almost prodigious in their extent and revolutionary effect, the conceptions of the N ˆJ%lf~ Q t etiology of disefse underwent no less a transforma- Etiology. tion than the conceptions of disease itself. It is proper- to point out here how intimately a pathology thus regenerated modified current conceptions of disease, in the linking of disease to oscillations of health, and the regarding many diseases as modifications of the normal set up by the impingement of external causes; not a few of which indeed may be generated within the body itself — ” autogenetic poisoning.” The appreciation of such modifications, and of the working of such causes, has been facilitated greatly by the light thrown upon normal processes by advances in physiology; so dependent is each branch of knowledge upon the

advances of contiguous and incident studies. To biological chemistry we have been deeply indebted during the latter half of the 19th century. In 1872, Hoppe-Seyler (1825-1895) gave a new beginning to our know- ledge of the chemistry of secretion and of excretion; and later students have increased the range of physiological and patho- logical chemistry by investigations not only into the several stages of albuminoid material and the transitions which all food- stuffs undergo in digestion, but even into the structure of proto- plasm itself. Digestion, regarded not long ago as little more than a trituration and ” coction ” of ingesta to fit them for absorption and transfer them to the tissues, now appears as an elaboration of peptones and kindred intermediate products which, so far from being always bland, and mere bricks and mortar for repair or fuel for combustion, pass through phases of change during which they become so unfit for assimilation as to be positively poisonous. The formation of prussic acid at a certain period of the vital processes of certain plants may be given as an example of such phases; and poisons akin to muscarin seem to arise frequently in development or regression, both in animals and plants. Thus the digestive function, in its largest sense, is now seen to consist, not only in preparation and supply, but in no small measure also of protective and antidotal conver- sions of the matters submitted to it; coincidently with agents of digestion proper are found in the circuit of normal digestion ” anti-substances ” which neutralize or convert peptones in their poisonous phases; an autochthonous ferment, such as rennet for instance, calling forth an anti-rennet, and so on. Now as our own bodies thus manipulate substances poisonous and antidotal, if in every hour of health we are averting self- intoxication, so likewise are we concerned with the various intruding organisms, whose processes of digestion are as danger- ous as our own; if these destructive agents, which no doubt are incessantly gaining admission to our bodies, do not meet within us each its appropriate compensatory defensive agent, dissolution will begin. Thus, much of infection and immunity are proving to be but special cases of digestion, and teleological conceptions of protective processes are modified.

Under the name of chemotaxis (W. Pfeffer) are designated certain of the regulative adaptations by which such ends are attained. By chemical warnings the defensive processes seem to be awakened, or summoned; and jjegfeˆnee, when we think of the infinite variety of such possible phases, and of the multitude of corresponding defensive agents, we may form some dim notion of the complexity of the animal blood and tissues, and within them of the organic molecules. Even in normal circumstances their play and counterfllay, attractive and repellent, must be manifold almost beyond con- ception; for the body

may be regarded as a collective organiza- tion consisting of a huge colony of micro-organisms become capable of a common life by common and mutual arrangement and differentiation of function, and by toleration and utilization of each other's peculiar products; some organs, such as the Kver, for example, being credited with a special power of neutralizing poisons, whether generated under normal conditions or under abnormal, which gain entrance from the intestinal tract. As a part of these discoveries has arisen another but kindred doctrine

that of hormones (Starling), juices prepared, not for excretion, not even for partial excretion, but for the fulfilment of physiological equilibrium. Thus the reciprocity of the various organs, main- tained throughout the divisions of physiological labour, is not merely a mechanical stability; it is also a mutUE§ equilibration in functions incessantly at work on chemical levels, and on those levels of still higher complexity which seem to rise as far beyond chemistry as chemistry beyond physics. Not only are the secreted juices of specialized cells thus set one against another in the body, whereby the various organs of the body maintain a mutual play, but the blood itself also in its cellular and fluid parts contains elements potent in the destruction of bacteria and of their secretions. Thus endowed, the blood, unless over- whelmed by extraordinary invasions, does not fail in stability and self-purification. So various are the conditions of self-regulation in various animals, both in respect of their peculiar and several modes of assimilating different foods, and of protect- ing themselves against particular dangers from without, that, as we might have expected, the bloods taken from different species, or even perhaps from different individuals, are found to be so divergent that the healthy serum of one species may be, and often is, poisonous to another; not so much in respect of adventitious substances, as because the phases of physiological change in different species do not harmonize; each by its peculiar needs has been modified until, in their several conditions of life, they vary so much about the mean as to have become almost if not quite alien one to another.

In the preservation of immunity then, in its various degrees and kinds, not only is the chemistry of the blood to be studied, but also its histology. By his eminent labours in cellular pathology, Virchow, and

Metchnikoff later, gave the last blow to the mere humoral pathology which, after an almost unchal- lenged prevalence for some two thousand years, now finds a resting-place only in our nurseries. Now the cellular pathology of the blood, investigated by the aid of modern staining methods, is as important as that of the solid organs; no clinical investigator — indeed, apart from research, no practitioner at this day — can dispense with examination of the blood for purposes of diagnosis; its coagulability and the kinds and the variations of the cells it contains being evidence of many definitely morbid states of the body. Again, not only in certain diseases may strange cells be found in the blood (e.g. in myelogenic leucaemia), but parasites also, both in man, as those of malaria, of sleeping sickness, of kala-azar, and in animals, as redwater, yellow fever, n'gana have been discovered, to the great advantage of preventive medicine. For some of these, as redwater (pyrosoma), antidotes are already found; for others, as for yellow fever — of which the parasite is unknown, but the mode of its transmission, by the mosquito, discovered (Finlay-Reed) — preventive measures are reducing the prevalence.

It is obvious that the results of such advances prescribe for the clinical physician methods which cannot be pursued without ««-w expert assistance; a physician engaged in busy prac-

peaa sm. ˆ ce cannc (_ himself undertake even the verifications required in the conduct of individual cases. Skill in modern laboratory work is as far out of the reach of the untaught as performance on a musical instrument. In spite, therefore, of the encyclopaedic tradition which has persisted from Aristotle through the Arab and medieval schools down to Herbert Spencer, it is forced upon us in our own day that in a pursuit so many- sided as medicine, whether in its scientific or in its practical aspect, we have to submit more and more to that division of labour which has been a condition of advance in all other walks qf life. It is now fully recognized that diseases of infants and children, of the insane, of the generative organs of women, of the larynx, of the eye, have been brought successively into the light of modern knowledge by " specialists," and by them dis- tributed to the profession; and that in no other way could this end have been attained. That the division of labour, which may seem to disintegrate the calling of the physician, really unites it, is well seen in the clinical laboratories which were initiated in the later 19th century, and which are destined to a great

future. By the approach of skilled pathologists to the clinical wards, a link is forged between practitioners and the men of science who pursue pathology disinterestedly. The first clinical laboratory seems to

have been that of Von Ziemssen (1829-1902) at Munich, founded in 1885; and, although his example has not yet been followed as it ought to have been, enough has been done in this way, at Johns Hopkins University and elsewhere, to prove the vital importance of the system to the progress of modern medicine. At the same time provision must be made for the integration of knowledge as well as for the winning of it by several adits. A conspicuous example of the incalculable evil wrought by lack of integration is well seen in the radical divorce of surgery from medicine, which is one of the most mischievous legacies of the middle ages — one whose mischief is scarcely yet fully recognized, and yet which is so deeply rooted in our institutions, in the United Kingdom at any rate, as to be hard to obliterate. That the methods and the subject-matter of surgery and of medicine are substantially the same, and that the advance of one is the advance of the other, the division being purely artificial and founded merely on accidents of personal bent and skill, must be insisted upon at this time of our history. The distinction was never a scientific one, even in the sense in which the word science can be used of the middle ages; it origi- nated in social conceits and in the contempt for mechanical arts which came of the cultivation of ” ideas ” as opposed to converse with ” matter,” and which, in the dawn of modern methods, led to the derision of Boyle by Oxford humanists as one given up to ” base and mechanical pursuits.” Had physicians been brought into contact with facts as hard as those faced by the surgeons of the 1 6th century (cf. Ambrose Pare), their art would not have lain so long in degradation. It is under this closer occupation with mechanical conditions that surgery to-day is said — not without excuse, but with no more than superficial truth — to have made more progress than medicine. Medicine and surgery are but two aspects of one art; Pasteur shed light on both surgery and medicine, and when Lister, his disciple, penetrated into the secrets of wound fevers and septicaemia, he illuminated surgery and medicine alike, and, in the one sphere as in the other, co-operated in the destruction of the idea of ” essential fevers ” and of inflammation as an “entity.” Together, then, with the necessary multiplication of specialism, one of the chief lessons of the latter moiety of the 19th century was the unity of medicine in all its branches — a unity strengthened rather than weakened by special researches, such as those into ” medical ” and ” sur- gical ” pathology, which are daily making more manifest the absurdity of the distinction. Surgeons, physicians, oculists, laryngologists, gynaecologists, neurologists and the rest, all are working in allotments of the same field, and combining to a common harvest.

While pathology then, which is especially the ” science of medicine,”

was winning territory on one side from physiology, of which in a sense it is but an aspect, and on another by making ground of its own in the post mortem room Training. and museum of morbid anatomy, and was fusing these gains in the laboratory so as to claim for itself, as a special branch of science by virtue of peculiar concepts, its due place and provision — provision in the establishment of chairs and of special laboratories for its chemical and biological subdivisions — clinical medicine, by the formal provision of disciplinary classes, was illustrating the truth of the experience that teaching and research must go hand-in-hand, the one reinforcing the other: that no teacher can be efficient unless he be engaged in researchˆ also; nay, that for the most part even the investigator needs the encouragement of disciples. Yet it was scarcely until the last quarter of the 19th century that the apprenticeship system, which was a mere initiation into the art and mystery of a craft, was recognized as antiquated and, in its virtual exclusion of academic study, even mischievous. In place of it, systematic clinical classes have become part of the scheme of every efficient school of medicine. A condition of this reform was the need of a preliminary training of the mind of the pupil in pure science, even in physics and chemistry; that is to say, before introduction

into his professional studies. The founding of new teaching universities, in which England, and even France, had been at some disadvantage as compared with Scotland and Germany, strengthened the movement in favour of enlarging and liberal- izing technical training, and of anticipating technical instruction by some broader scientific discipline; though, as in all times of transition, something was lost temporarily by a departure from the old discipline of the. grammar school before a new scheme of training the mind in scientific habits and conceptions was estab- lished or fully apprehended. Yet on the whole, even from the beginning, the revolt was useful in that it shook the position of the ” learned physician,” who took a literary, fastidious and meditative rather than an experimental interest in his profession, and, as in great part a descendant of the humanists, was never in full sympathy with experimental science. At the risk no doubt of some defects of culture, the newer education cleared the way for a more positive temper, awoke a new sense of accuracy and of verification, and created a sceptical attitude towards all conventions, whether of argument or of practice. Among the drawbacks of this

temper, which on the whole made for progress, was the rise of a school of excessive scepticism, which, forgetting the value of the accumulated stores of empiricism, despised those degrees of moral certainty that, in so complex a study and so tentative a practice as medicine, must be our portion for the present, and even for a long future, however great the triumphs of medicine may become. This scepticism took form in the school, most active between i860 and 1880, known as the school of ” Expectant Medicine.” These teachers, genuinely touched with a sense of the scantiness of our knowledge, of our confidence in abstract terms, of the insecurity of our alleged ” facts,” case-histories and observations, alienated from tradi- tional dogmatisms and disgusted by meddlesome polypharmacy — enlightened, moreover, by the issue of cases treated by means such as the homoeopathic, which were practically ” expectant ” — urged that the only course open to the physician, duly conscious of his own ignorance and of the mystery of nature, is to put his patient under diet and nursing, and, relying on the tendency of all equilibriums to recover themselves under perturbation, to await events (Vis medicatrix naturae). Those physicians who had occupied themselves in the study of the exacter sciences, or more closely or more exclusively of the wreckage of the post mortem room, were the strongest men of this school, whether in England or abroad.

But to sit down helpless before human suffering is an un- endurable attitude. Moreover, the insight into origins, into initial morbid processes revealed by the pathologists, peutic’s. awoke more and more the hope of dealing with the elements of disease, with its first beginnings; and in the field of therapeutics, chemical and biological experiment, as in the case of digitalis, mercury and the iodides, was rapidly sim- plifying remedies and defining their virtues, so that these agents could be used at the bedside with more precision. Furthermore, the aversion from drugging had the advantage of directing men’s minds to remedies taken from the region of the physical forces, of electricity (G. B. Duchenne, 1806-1875), of gymnastics (Ling, 1776-1839), of hydropathy (V. Priessnitz), of massage (Weir Mitchell), of climate (James Clarke), of diet (R. B. Todd, King Chambers, &c), and even of hypnotism (James Braid 1795?- 1860), while with the improvement of the means of locomotion came the renewal of the old faith and the establishment of new methods in the use of mineral springs. These and such means, often in combination, took much of the place formerly given to the use of drugs.

Again, a like spirit dictated the use of the physical or ” natu- ral ” methods on a larger scale in the field of prevention. From the new regard given by physiologists and pathologists to the study of origins,

and in the new hopes of thus dealing with disease at its springs, not in indivi- duals only but in cities and nations, issued the great school of Preventive Medicine, initiated in England — E. A. Parkes (1819-1876), J. Simon, Sir B. W. Richardson (1828-1896), Sir H. W. Acland (1815-1900), Sir G. Buchanan (1831-1895), and

Hygkae,

forwarded in Germany by Max von Pettenkofer (1818-1901). Hygiene became for pathology what ” milieu ” is for physiology. By the modification of physical conditions on a national scale a prodigious advance was made in the art of preventing disease. The ghastly roll of infantile mortality was quickly purged of its darkest features (Ballard and others); aided by bacteriology, sanitary measures attained some considerable degree of exact- ness; public medicine gained such an ascendancy that special training and diplomas were offered at universities; and in 1875 a consolidated act was passed for the United Kingdom establish- ing medical officers of health, and responsible lay sanitary authorities, with no inconsiderable powers of enforcing the means of public health in rural, urban, port and other jurisdic- tions, with summary methods of procedure. A department of public health was formed within the precincts of the Local Gpvernment Board; government laboratories were established, and machinery was devised for the notification of infectious diseases. The enormous growth of towns during the second half of the 19th century was thus attended with comparative safety to these great aggregates of mankind; and the death-rates, so far from being increased, relatively decreased in substantial proportions. In 1878 an act was passed giving like powers in the case of the infectious diseases of animals. The establishment in England of the Register of qualified practitioners and of the General Medical Council (in 1858) did something, however imperfectly, to give unity to the profession, unhappily bisected by ” the two colleges”; and did much to organize, to strengthen and to purify medical education and qualification. In 1876 women were admitted to the Register kept by the Council. In 1871 the Anatomical Act of 1832 was amended; and in 1876 the Vivisection Act was passed, a measure which investigators engaged in the medical sciences of physiology and pathology resented as likely to prevent in England the advance of know- ledge of living function, both in its normal balance and in its aberrancies, and. moreover to slacken that habit of incessant reference of propositions to verification which is as necessary to the clinical observer as to the experimentalist. However the opinion of later generations may stand in respect of the Vivisec- tion Act. it will surely appear to them that the other acts, largely based upon the results of experimental methods, strengthening and consolidating the medical

profession, and fortifying the advance of medical education, led directly to a fundamental change in the circumstances of the people in respect of health. The intelligent classes have become far better educated in the laws of health, and less disposed to quackery; the less intelligent are better cared for and protected by municipal and central authority. Thus the housing of the poor has been improved, though this difficult problem is yet far from solution; not the large towns only, but the larger villages also, are cleansed and drained; food has been submitted to inspection by skilled officers; water supplies have been undertaken on a vast scale; personal cleanliness has been encouraged, and with wonderful success efforts have been made to bring civilized Europe back from the effects of a long wave of Oriental asceticism, which in its neglect and contempt of the body led men to regard filth even as a virtue, to its pristine cleanliness under the Greeks and Romans. During the latter half of the 19th century the death-rate of many towns was reduced by something like 50%. Some plagues, such as typhus fever, have been dispelled; others, such as enteric fever, have been almost banished from large areas; and there is much reason to hope that cholera and plague, if introduced, could not get a footing in western Europe, or in any case coulcl be combated on scientific principles, and greatly reduced. Tem- perance in the use of alcohol has followed the demonstration not only of its unimportance as a food or tonic, but also of its harm- fulness, save in very small quantities. In the earlier part of the 19th century, and in remoter districts even in its later years, the use of alcohol was regarded not as a mere indulgence, but as essential to health; the example of teetotallers, as, seen in private life and in the returns of the insurance offices, has undermined this prepossession. From the time of Plato medicine has been accused of ministering to the survival of unfit persons, and to

ˆ6Di*tM%©GRBSS

their propagation of children. But bodily defect is largely a result of evil circumstances, in the prevention of which the physician is not unsuccessfully engaged, and the growth of sympathy means a stronger cement of the social structure. At any rate the mean standard of health will be raised, perhaps enormously.

In the tropics, as well as in Europe, such methods and Such researches threw new light upon the causes and paths of the terrible infections of

these climates. In 1880, two years before Koch discovered the bacillus of tubercle, C. L. A. Laveran (b. 1845) discovered the parasite of malaria, and truly conceived its relations to the disease; thus within two years were made two discoveries either of which was sufficient to make the honour of a century. Before the end of the 19th century this discovery of the blood parasite of malaria was crowned by the hypothesis of Patrick Manson, proved by Ronald Ross, that malaria is propa- gated by a certain genus of gnat, which acts as an intermediate host of the parasite. Cholera (Haffkine) and yellow fever are yielding up their secrets, and falling under some control. The 20th century, by means of this illumination of one of the darkest regions of disease, may diminish human suffering enor- mously, and may make habitable rich and beautiful regions of the earth's surface now, so far as man's work is concerned, con- demned to sterility. Moreover, freedom of trade and of travel has been promoted by a reform of the antiquated, cumbrous, and too often futile methods of quarantine — a reform as yet very far from complete, but founded upon a better understanding of the nature and propagation of disease.

Special Departments. — Hitherto we have presented a survey

of the progress of the science and practice of medicine on general

, -,, lines; it remains to give some indication of the

Infections, .' .. .. . . , ,..

advance of these subjects of study and practice in

particular departments. As regards infections, it is not to be supposed that our knowledge of these maladies has been ad- vanced by pathology and bacteriology only. In the clinical field also it has received a great enlargement. Diphtheria, long no doubt a plague among mankind, was not carefully described until by Pierre Bretonneau in 1826; and since his time our con- ception of this disease has been extended by the study of later, secondary and incidental phases of it, such as neuritis, which had always formed part of the diphtheritic series, though the con- nexion had not been detected. Influenza, again, was well known to us in 1836-1840, yet clinical observers had not traced out those sequels which, in the form of neuritis and mental disorder, have impressed upon our minds the persistent virulence of this infec- tion, and the manifold forms of its activity. By the discovery of the bacillus of tubercle, the physician has been enabled to piece together a long and varied list of maladies under several names, such as scrofula and lupus, many of them long

suspected to be tuberculous, but now known to belong to the series. It is on clinical grounds that beriberi, scarlet fever, measles, &c, are recognized as belonging to the same class, and evolving in phases which differ not in intimate nature but in the more superficial and inessential characters of time, rate and polymorphism; and the impression is gaining strength that acute rheumatism belongs to the group of the infections, certain sore throats, chorea and other apparently distinct maladies being terms of this series. Thus the field of disease arising not from essential defect in the body, but from external contingencies, is vastly enlarging; while on the other hand the great variability of individuals in susceptibility explains the very variable results of such extrinsic causes. Coincidently therewith, the hope of neutralizing infec- tions by fortifying individual immunity has grown brighter, for it appears that immunity is not a very radical character, but one which, as in the case of vaccination, admits of modifica- tion and accurate adjustment in the individual, in no long time and by no very tedious methods. Evidence is accumulating which may end in the explanation and perhaps in the prevention of the direst of human woes — cancer itself, though at present inquiry is being directed rather to intrinsic than to extrinsic causes.

When, leaving the infections, we look for evidence of progress

in our knowledge of more or less local diseases, we may begin with the nervous system. It is in this department, from its abstruse- ness and complexity, that we should expect the Neurolo -y advance of anatomy and physiology — normal and morbid — to be most delayed. If we consult the medical works even of the middle of the 19th century we shall find that, in the light of the present time, accurate knowledge in this sphere, whether clinical, pathological or therapeutical, could scarcely be said to exist. Even in the hands of J. A. Lockhart Clarke (181 7-1880), one of the earliest investigators of nervous pathology, the improvement of the compound microscope had not attained the achromatism, the penetration and the magnifi- cation which have since enabled J. L. C. Schroeder-van der Kolk (1797-1862), Albert von Kolliker, Santiago Ramon y Cajal, C. Golgi (b. 1844) and others to reveal the minute anatomy of the nervous centres; while the discrimination of tissues and mor- bid products by stains, as in the silver and osmic acid methods, and in those known by the names of Carl Weigert or Marchi, had scarcely begun. In England the Hospital for the Paralysed and Epileptic was founded in 1859, where Charles E. Brown- Sequard (1817-1894), J. Hughlings-Jackson, Thomas Buzzard, Henry C. Bastian (b. 1837), Sir W. R. Gowers and David Ferrier (b. 1843) found an adequate field for the clinical and patho- logical parts of their work. In France, in the wards of the Hdtel

Dieu, Guillaume Benjamin Duchenne (1806-1875), in association with Trousseau and in his private clinic, pursued his memorable clinical and therapeutical researches into the diseases of the nervous system; and Jean M. Charcot (1825-1893) in that great asylum for the wreckage of humanity — the Salpetriere-ˆ-dis- covered an unworked mine of chronic nervous disease. M. H. Romberg (1795-1873) and Theodor Meynert (1833-1892) also were pioneers in the study of nervous diseases, but it was not till later in the century that Germany took a high place in this department of medicine. The discoveries of the separate paths of sensory and motor impulses in the spinal cord, and conse- quently of the laws of reflex action, by Charles Bell and Marshall Hall respectively, in their illumination of the phenomena of nervous function, may be compared with the discovery in the region of the vascular system of the circulation of the blood; for therein a key to large classes of normal and aberrant functions and a fertile principle of interpretation were obtained. Nor was the theory of reflex action confined to the more ” mechan- ical ” functions. By G. H. Lewes and others the doctrine of ” cerebral reflex ” was suggested, whereby actions, at first achieved only by incessant attention, became organized as conscious or subconscious habits; as for instance in the playing on musical or other instruments, when acts even of a very elaborate kind may directly follow the impulses of sensations, conscious adaptation and the deliberate choice of means being thus economized. This law has important ethical and political bearings; but in the province of disease this advance of what may be compared to. the interlocking of points and signals has had wide influence not only in altering our conceptions of disease, but also in enlarging our views of all perturbations of function. The grouping of reflex ” units,” and the paths wherein impulses travel and become associated, have been made out by the physio- logist (Sherrington and others) working on the healthy animal, as well as by the record of disease; and not of spontaneous disease alone, for the artificial institution of morbid processes in animals has led to many of these discoveries, as in the method of A. V. Waller (1816-1870), who tracked the line of nervous strands by experimental sections, and showed that when particular strands* are cut off from their nutritive centres the consequent degenera- tion follows the line of the separated strands. By similar methods nature, unassisted, betrays herself but too often; in many instances — probably originating primarily in the nervous tissues themselves — the course of disease is observed to follow certain paths with remarkable consistency, as for instance in diseases of particular tracts of the spinal cord. In such cases the paths of degeneration are so neatly defined that, when the tissues are prepared after death by modern methods, they are plainly to be seen running along certain

columns, the subdivisions

of which in the normal state may hardly be distinguishable one from another: some run in strips along the periphery of the spinal cord, at its anterior, middle or posterior segments, as the case may be; in other cases such strips occur within its substance, whether along columns of cells or of white matter. It is needless to point out how such paths of disease, in their association with characteristic symptoms, have illuminated the clinical features of disease as well as the processes of normal function.

Not, however, all diseases of the nervous system conduct them- selves on these definite paths, for some of them pay no attention to the geography of structure, but, as one may say, blunder indiscriminately among the several parts; others, again, pick out particular parts definitely enough, but not parts immediately continuous, or even contiguous. Diseases of the latter kind are especially interesting, as in them we see that parts of the nervous structure, separated in space, may nevertheless be asso- ciated in function; for instance, wasting of a group of muscles associated in function may depend on a set of central degenera- tions concurring in parts whose connexion, in spite of dissociation in space, we thus perceive. The undiscriminating diseases, on the other hand, we suspect not to be primarily of nervous origin, but to depend rather on the agency of other constituent tissues of this system, as of the blood-vessels or the connective elements. Thus, arguing inversely, we may learn something of the respective natures of these influences and of the way in which the nervous system is affected secondarily.

Yet even the distribution of toxic matters by the blood is not necessarily followed by general and indiscriminate injury to the nervous elements. In infantile palsy, for example, Anchorage an(j j n ˆ a jj es dorsalis, there is good reason to believe Molecules, that, definitely as the traces of the disease are found in certain physiologically distinct nervous elements, they are due nevertheless to toxic agents arriving by way of the blood. Here we enter upon one of the most interesting chapters of disorders and modes of disorder of this and of other systems. It has come out more and more clearly of late years that poisons do not betray even an approximately

indifferent affinity for all tissues, which indeed a little reflection would tell us to be a priori improbable, but that each tends to fix itself to this cell group or to that, picking out parts for which they severally have affinities. Chemical, physio- logical and pathological research is exploring the secret of these more refined kinds of ” anchorage ” of molecules. In 1868 Drs A. Crum Brown and T. R. Fraser proved that by substitution of molecules in certain compounds a stimu- lant could be converted into a sedative action; thus by the addition of the methyl group CH2 to the molecule of strychnine, thebaine or brucine, the tetanizing action of these drugs is converted into a paralysing action. The number of these instances, and the variety of them, are now known to be very large; and it is supposed that what is true of these simpler agents is true also of far more elaborate phases of vital metabolism. Now, what is remarkable in these and many other reactions is not only that effects apparently very opposite may result from minute differences of molecular con- struction, but also that, whatever the construction, agents, not wholly indifferent to the body or part, tend to anchor themselves to organic molecules in some way akin to them. Highly com- plex as are all animal tissues, or nearly all, yet in this category of high complexity are degrees higher and higher again of which we can form little conception, so elaborate they are, so peculiar in their respective properties, and probably so fugitive. It is this wide range of dynamic peculiarities above the common range of known physical and chemical molecules which excites our wonder; and a reflection of these peculiar properties is seen in their affinities for this or that toxic or constructive agent, whereby the peculiarity, for example, of a particular kind of nerve cell may be altered, antagonized, reinforced or converted. On the other hand, the reagents by which such modifications are apt to be produced are not necessarily simple; many of them likewise are known to be of very high degrees of complexity, approaching perhaps in complexity the molecules to which they

are akin. Of such probably are the toxins and antitoxins of certain infections, which, anchoring themselves not by any means indiscriminately, but to particular and concerted molecules, by such anchorage antagonize them or turn them to favourable or unfavourable issues. Toxins may thus become so closely keyed into their corresponding atom groups, as for instance in tetanus, that they are no longer free to combine with the anti- toxin; or, again, an antitoxin injected before a toxin may antici- pate it and, preventing its mischievous adhesion, dismiss it for excretion. In the mutual behaviour of such cells, toxins, and antitoxins, and again of microbes themselves, we may demon- strate even on the field of the microscope

some of the modes of such actions, which seem to partake in great measure at any rate of a chemical quality (agglutinins, coagulins, chemotaxis). It is convenient here to add that such reactions and modifica- tions, if more conspicuous in the nervous system, are of course not confined to it, but are concerned in their degree in all the processes of metabolism, being most readily traced by us in the blood.

Many other diseases formerly regarded as primarily diseases of the nervous system are not such; but, by means of agents either introduced into the body or modified there, establish themselves after the affinities of these in contiguous associated parts of the structure, as in vascular, membranous or connective elements, or again in distant and peripheral parts; the perturba- tions of nervous function being secondary and consequential. Of such are tetanus and diphtheria, now known to be due to the establishment from without of a local- microbic infection, from which focus a toxin is diffused to the nervous matter. The terrible nervous sequels of some forms of inflammation of the membranes of the brain, again, are due primarily to microbic invasion rather of the membranes than of their nervous contents; and many other diseases may be added to this list. The grave palsies in such diseases as influenza, diphtheria, beriberi, or ensuing on the absorption of lead, are in the main not central, but due to a symmetrical peripheral neuritis.

Among diseases not primarily nervous, but exhibited in certain phenomena of nervous disorder, are diseases of the blood-vessels. Much light has been thrown upon the variations of arterial and venous blood pressures by Karl Ludwig Jf«" vM »« (1816-1895) and his many followers: by them not Disease. only the diseases of the circulatory system itself are elucidated, but also those of other systems — the nervous, for instance — which depend intimately on the mechanical integrity of the circulation of the blood as well as on the chemical integrity of the blood itself. With changes of the pressures of the blood in arteries, veins or capillaries, and in the heart itself and its respective chambers, static changes are apt to follow in these parts; such as degeneration of the coats of the arteries, due either to the silent tooth of time, to persistent high blood pres- sures, or to the action of poisons such as lead or syphilis. Syphi- litic lesion of the arteries, and likewise of other fibrous tissues, often involves grave consequential damage to nervous structures fed or supported by such parts. Some of the most successful of the advances of medicine as a healing art have followed the detection of syphilitic disease of the vessels, or of the supporting tissues of nervous centres and of the peripheral nerves; so thaf> by specific medication, the treatment of paralytic, convulsive, and other terrible manifestations of nervous

disease thus second' arily induced is now undertaken in early stages with definite prospect of cure.

Not of less importance in this respect, and in other disorders many of them of grave incidence, is the knowledge of the pheno- mena of embolism and of thrombosis, also gained during the latter half of the 19th century — W. S. Kirkes (1823-1864), R. Virchow. By embolism is meant the more or less sudden stoppage of a vessel by a plug of solid matter carried thither by the current of the blood; be it a little clot from the heart or, what is far more pernicious, an infective fragment from some focus of infection in the body, by which messengers new foci of infection may be scattered about the body. Thrombosis is an accident

of not dissimilar character, whereby a vessel is blocked not by a travelling particle, but by a clotting of the blood in situ, probably on the occasion of some harm to the epithelial lining of the vessel. Such injuries are apt to occur in syphilitic endarteritis, or senile arterial decay, whereby an artery may be blocked permanently, as if with an embolus, and the area supplied by it, in so far as it was dependent upon this vessel, deprived of nutrition. These events, although far more mischievous in the brain, the functions of which are far-reaching, and the collateral circulation of which is ill-provided, are seen very commonly in other parts.

It is in the structure of the brain itself that modern research has attained the most remarkable success. In 1861 an alleged " centre " of speech was detected, by a combination of clinical and pathological researches, by Paul Broca (1824-1880). By these means also, in the hands of Hughlings- Jackson, and more conclusively by experimental research initiated by G. T. Fritsch (b. 1838) and T. E. Hitzig (b. 1838), but pursued inde- pendently and far more systematically and thoroughly by David Ferrier (b. 1843) and his disciples, it was proved that the cerebrum is occupied by many such centres or exchanges, which preside over the formulation of sensations into purposive groups of motions — kinaesthesis of H. Charlton Bastian (b. 1837). The results of these experimental researches by many inquirers into the constitution of the brain have transformed our conceptions of cerebral physiology, and thrown a flood of light on the diseases of the

brain. Not only so, but this mapping of the brain in areas of function now often enables the clinical physician to determine the position of disease; in a certain few cases of tumour or abscess, so precisely that he may be enabled to open the skull above the part affected and to extirpate it — opera- tions which are surely a triumph of science and technical skill (Lister, W. MacEwen, V. Horsley).

The remarkable discovery of the dual nature of the nervous system, of its duplex development as a lower and upper system of ” neurons,” has shed much light upon the problems of practical medicine, but this construction is described under Brain; Neuropathology; Muscle and Nerve, &c.

In mental diseases little of first-rate importance has been done. The chief work has been the detection of chronic changes in the cortex of the brain, by staining and other histological methods, in degenerative affections of this organ — Theodor Meynert (1833-1892), W. Griesinger (1817-1868), Bevan Lewis — and in the separation from insanity due to primary disease or defect of nerve elements of such diseases as general paralysis of the insane, which probably arise, as we have said, by the action of poisons on contiguous structures — such as blood-vessels and connective elements — and invade the nervous matter second- arily. Some infections, however, seem to attack the mental fabric directly; intrinsic toxic processes which may be suspected on the detection of neurin and cholin in the fluids of the brain (F. W. Mott). Truer conceptions of normal psychology have transformed for us those of the morbid — P. Pinel (1 745-1826), Griesinger, Henry Maudsley (b. 1835), Mercier, Krapelin, Rivers — and indicated more truly the relations of sanity to insanity. In the treatment of insanity little has been done but to com- plete the non-restraint system which in principle belongs to the earlier part of the 19th century (Pinel, Tuke, R. G. Hill, J. Conolly). An enormous accumulation of lunatics of all sorts and degrees seems to have paralysed public authorities, who, at vast expense in buildings, mass them more or less indis- criminately in barracks, and expect that their sundry and difficult disorders can be properly studied and treated by a medical superintendent charged with the whole domestic establishment, with a few young assistants under him. The life of these insane patients is as bright, and the treatment as humane, as a barrack life can be; but of science, whether in pathology or medicine, there can be little. A considerable step in advance is the estab- lishment by the London County Council of a central laboratory for its asylums, with an eminent pathologist at its head: from this laboratory valuable reports are in course of issue. Provision for the reception and treatment of insanity in its earliest and more curable stages can

scarcely be said to exist. Sufferers from

mental disease are still regarded too much as troublesome persons to be hidden away in humane keeping, rather than as cases of manifold and obscure disease, to be studied and treated by the undivided attention of physicians of the highest skill. The care and education of idiots, initiated by Guggenbuhl and others, is making way in England, and if as yet insufficient, is good of its kind.

By the genius of Rene Theophile Laennec (1781-1826), diseases of the lungs and heart were laid on a foundation so broad that his successors have been occupied in detail and refinement rather than in reconstruction. In heart disease the chief work of the latter half of the 19th century was, in the first quarter, such clinical work as that of William Stokes and Peter Mere Latham (1789-1875); and in the second quarter the fuller com- prehension of the vascular system, central and peripheral, with its cycles and variations of blood pressure, venous and arterial. Moreover, the intricacies of structure and function within the heart itself have been more fully discriminated (W. H. Gaskell, Aschoff, A. Keith, Wenkebach, J. Mackenzie). By the greater thorough- ness of our knowledge of the physics of the circulation — Etienne Marey (b. 1830), Karl Ludwig (1816-1895), Leonard Hill — we have attained to a better conception of such events as arterial disease, apoplexy, ” shock,” and so forth; and pharmacologists have defined more precisely the virtues of curative drugs. To the discovery of the parts played in disease by thrombosis and embolism we have referred above. With this broader and more accurate knowledge of the conditions of the health of the circulation a corresponding efficiency has been gained in the manipulation of certain remedies and new methods of treatment, of heart diseases, especially by baths and exercises.

As regards pulmonary disease, pneumonia has passed more and more definitely into the category of the infections: the modes of invasion of the lungs and pleura by tuberculosis has been more and more accurately followed; and the treatment of these diseases, in the spheres both of prevention and of cure, has under- gone a radical change. Instead of the close protection from the outer air, the respirators, and the fancy diets of our fathers, the modern poitrinaire camps out in the open air in all weathers, is fed with solid food, and in his exercise and otherwise is ruled with minute particularity according to the indications of the clinical thermometer and other symptoms. The almost reckless reliance on climate, which, at Davos for instance, marked the transition from the older to the modern methods, has of late been sobered, and supplemented by more systematic attention to

all that con- cerns the mode of life of the invalid. The result is that, both in physicians and in the public, a more hopeful attitude in respect of the cure of phthisis has led to a more earnest grappling with the infection in its earliest stages and in every phase, with a correspondingly large improvement in prevention and treatment. Indeed, in such early stages, and in patients who are enabled to command the means of an expensive method of cure, phthisis is no longer regarded as desperate; while steps are being taken to provide for those who of their own means are unable to obtain these advantages, by the erection of special sanatoriums on a more or less charitable basis. Perhaps no advance in medicine has done so much as the study of tuberculosis to educate the public in the methods and value of research in medical subjects, for the results, and even the methods, of such labours have been brought home not only to patients and their friends, but also to the farmer, the dairyman, the butcher, the public carrier, and, indeed, to every home in the land.

It was in the management of pleurisies that the aid of surgical means first became eminent in inward disease. In the treatment of effusions into the pleura and, though with less advantage, of pericardial effusions, direct mechanical interference was practised by one physician and another, till these means of attaining rapid and complete cure took their places as indispensable, and were extended from thoracic diseases to those of the abdominal and other inner parts formerly beyond the reach of direct therapeutics. Lord Lister's discoveries brought these new methods to bear with a certainty and a celerity previously undreamed of; and many visceral maladies, such as visceral ulcers, disease of the pancreas,

stone of the kidney or gall-bladder, perityphlitis, ovarian dropsy, which in the earlier part of the 19th century were either fatal or crippling, are now taken promptly and safely in hand, and dealt with successfully. Even for internal cancer cure or substantial relief is not infrequently obtained. We have said that this advance is often quoted, not very wisely, to signify that in modern progress " medicine " has fallen behind surgery — as if the art of the physician were not one and indivisible. That certain Fellows of the College of Physicians (especially in gynae- cology) have personally taken operative procedures in hand is some good omen that in time the unreal and

mischievous schism between medicine and surgery may be bridged over.

In the department of abdominal disease progress has been made, not only in this enormous extension of means of cure by operative methods, but also in the verification of diagnosis. The first recognition of a disease may be at a necropsy, but then usually by irresponsible pathologists; it is another matter when the physician himself comes under rebuke for failing to seize a way to cure, while the chance remained to him, by section of the abdomen during life. The abdomen is still ” full of surprises “; and he who has most experience of this deceptive region will have least confidence in expressing positive opinions in particular cases of disease without operative investigation. Besides the attainments mentioned above, in respect of operative progress, many important revisions of older rule-of-thumb knowledge have come about, and not a few other substantial discoveries. Among the revisions may be adduced some addition to our knowledge of dyspepsia, attained by analytic investigations into the contents of the stomach at various stages of digestion, and by examining the passage of opaque substances through the primae viae by the Rontgen rays. Thus the defects, whether of this secretion or of that, and again of motor activity, the state of the valvular junctions, the volume of the cavities, and their position in the abdomen, may be ascertained, and dealt with as far as may be; so that, although the fluctuations of chemical digestion are still very obscure, the application of remedies after a mere tradi- tional routine is no longer excusable. In our conceptions of the later stages of assimilation and of excretion, with the generation of poisons (auto-intoxication) in the intestinal tract, there is still much obscurity and much guess-work; yet in some directions positive knowledge has been gained, partly by the physiologist, partly by the physician himself. Of such are the better under- standing of the functions of the liver in normal catabolism, in the neutralization of poisons absorbed from the intestines or else- where, in the causation of jaundice, and in diabetes [Bernhardt Naunyn (b. 1839) and F. W. Pavy]. Nor must we forget the unfolding of a new chapter of disease, in the nosology of the pancreas. In diabetes this organ seems to play a part which is not yet precisely determined; and one fell disease at least has been traced to a violent access of inflammation of this organ, caused perhaps by entry of foreign matters into its duct. The part of the pancreas in digestion also is better understood. The part of the spleen in the motley group of dyspepsias and anaemias, conspicuous as it often is, still remains very enigmatic.

The peritoneum is no longer regarded with awe as inviolable; by

modern methods, if not as manageable as other lymphatic sacs, it is at any rate accessible enough without considerable risk to life. Not only in its bacteriological relations are the conditions of peritonitis recognized in its various kinds, but also the state known as ” shock ” turns out to be quasi-mechanical, and avoidable by measures belonging in considerable part to this category. Thus, by the avoidance both of toxaemia and of shock, peritonitis and other dangers of the abdomen, such as strangu- lations or intussusceptions of the bowels, formerly desperate, can in many cases be dealt with safely and effectively.

Our knowledge of diseases of the kidneys has made no great advance since the time of Richard Bright. In the sphere of physiology and in the interpretation of associated arterial diseases much obscurity still remains; as, for instance, concerning the nature of the toxic substances which produce those bilateral changes in the kidneys which we’ call Bright’s disease, and bring about the ” uraemia ” which-is characteristic of it. Lardaceous

disease, however, here and in other regions, now appears to be due to the specific toxins of pyogenetic micro-organisms. In stone of the kidney a great advance has been made in treatment by operative means, and the formation of these stones seems to recent observers to depend less upon constitutional bent (gout) than upon unhealthy local conditions of the passages, which in their turn again may be due to the action of micro- organisms.

To Thomas Addison’s descriptions of certain anaemias, and of the disease of the suprarenal capsules which bears his name, something has been added; and W. Hunter’s researches on the severer anaemias are doing much to elucidate these subtle maladies. And on the influence of these inconspicuous bodies and of the pituitary body in sustaining arterial blood pressures physiologists have thrown some important light.

The secret of the terrible puerperal septicaemia was read by J. P. Semmelweiss (g.v.), wherein he proved himself to be the greatest of Lister’s forerunners (see Lister).

The diseases peculiar to -women (see Gynaecology) have received attention from early times, but little progress had been made in their interpretation till the 19th century. In the middle part of the century, by a natural exaggeration of the importance of newly-discovered local changes in the pelvic organs, much harm was done to women by too narrow an atten- tion to the site, characters and treatment of these;

the meddle- someness of the physician becoming in the temperament of woman a morbid obsession. To James Matthews Duncan (1826-1890) we chiefly owe a saner and broader comprehension of the relative importance of the local and the general conditions which enter into the causation of uterine and ovarian disorders. In operations for diseases of the pelvis, ovarian dropsy, cancer of the uterus, and other grave diseases of the region, success has been stupendous.

In the subject of diseases of the skin much has been done, in the minuter observation of their forms, in the description of forms previously unrecognized, and in respect of bacterial and other causation and of treatment. The comparison of observa- tions in various climates and peoples has had some weight; while in the better knowledge of their causes their treatment has found permanent advantage. Not only is the influence of bacteria in the causation of many of them newly revealed, but it is now recognized also that, even in skin diseases not initiated by micro- bic action, microbes play a considerable and often a determining part in their perpetuation; and that the rules of modern aseptic surgery are applicable with no little success to skin therapeutics. We have learned that ” constitutional ” causes play a smaller part in them than was supposed, that a large number of diseases of the skin, even if initiated by general disorder, are or soon become local diseases, being, if not initiated by local infection yet perpetuated thereby, so that, generally speaking, they are to be cured by local means.

The diseases of children have not lacked the renewed attention, the successful investigation, and the valuable new lights which have been given to other departments of medicine. That infan- tile paralysis is an infection, and that its unhappy sequels are now treated with more hope of restoration, has been indicated already. Infantile diarrhoea has also been recognized as a common infection (Ballard), and the means of its avoidance and cure ascertained. The conditions of diet and digestion in children are now far better understood, and many of their maladies, formerly regarded as organic or incomprehensible, are cured ̂or prevented by dietetic rules. Rickets, scurvy and ” marasmus ” may be instanced as diet diseases in children. Acute inflamma- tion of the ear, with its alarming extensions to the cerebral cavity, is now dealt with successfully by surgical means, and infected sinuses or even encephalic abscesses are reached and cleansed. The origins, kinds and processes of meningitis are more clearly distinguished, and referred each to its proper cause — for the most part bacterial.

As by the discovery of stethoscopy by Laennec a new field of medical science and art was opened up, so, more recently, inventions of other

have opened to us other fields of little less interest and im- portance. Of such is the ophthalmoscope, invented by H. von Helmholtz in 1851. By the revelations of this agnos s. j nstrument not on jy have the diseases of the eye been illuminated, but much light has been thrown also upon the part of the eye in more general maladies; as, for instance, in syphilis, in diabetes, in kidney diseases, and in diseases of the brain— F. C. Donders (1818-1889), Alfred von Grafe (1830-1899) and others. A remarkable help to the cure of headaches and wider nervous disorders has come out of the better appreciation and correction of errors of refraction in the eye. Radiography has done great things for surgery; for medicine its services are already appreciable, and may prove more and more valuable hereafter. In 1879 the use of the spectroscope in medicine was pointed out by Dr Charles A. MacMunn (b. 1852). By E. du Bois-Reymond, Robert Remak (181 5-1865), Carlo Matteucci (1811-1868), Guillaume Duchenne (1806-1875), the value of electricity in medicine, greater in diagnosis perhaps' than in therapeutics, was demonstrated. By the sphygmograph (E. J. Marey, 1863) attention was drawn to the physical features of the circulation, to the signs of degeneration of the arterial tree, and less definitely to the fluctuations of blood pressure; but as we have said under the consideration of diseases of the heart, the kymographs of Ludwig and his pupils brought out these fluctuations far more accurately and completely. By these, and other instruments of precision, such as the thermometer, of which we have already spoken, the eminently scientific discipline of the measurement of functional movements, so difficult in the complex science of biology, has been cultivated. By the laryngoscope, invented about 1850 by Manuel Garcia the celebrated singing- master, and perfected by Johann Czermak (1828-1873) and others, the diseases of the larynx also have been brought into the general light which has been shed on all fields of disease; and many of them, previously known more or less empirically, submitted to precise definition and cure. Of such we may cite tuberculosis of the larynx, formerly as incurable as distressing; and " adenoids " — a disease revealed by intrascopic methods — which used grievously to thwart and stifle the growth both of mind and body in children, are now promptly removed, to the infinite advantage of the rising generation. To the value of stains in clinical diagnosis, especially in investigation of perver- sions of the blood in many maladies, we have already made some reference. The discovery

of the Rontgen rays has also extended the physician's power of vision, as in cases of aortic aneurysm, and other thoracic diseases.

By photography and diagrammatic records the clinical work of hospital wards has been brought into some better definition, and teaching made more accurate and more impressive. The separation of the alkaloids belongs rather to the earlier part of the 10th century, but the administration of these more accurate medications by means of hypodermic injection (see Thera- peutics) belongs to the latter. The ancient practice of trans- fusion has been placed on a more intelligible footing, and by the method of saline injections made more manageable as a means of relief or even of cure. Finally, calculation by statistics (William Farr, Karl Pearson, and others) has been brought into line with other scientific methods: the method is a difficult one, and one full of pitfalls for the unwary, yet when by co-operation of physician and mathematician its applications have been perfected its services will appear more and more indispensable.

Among the achievements of the medicine of the 19th century the growth of the medical press must not be forgotten. In England, by the boldness of the Lancet (founded in 1823), the tyranny of prescription, inveterate custom, and privilege abused was defied and broken down; freedom of learning was regained, and promotion thrown open to the competent, independently of family, gild and professional status. For the record and diffusion of rapidly growing knowledge, learned societies, univer- sities and laboratories, greatly increased in number and activity, issue their transactions in various fields; and by means of year- books and central news-sheets the accumulation of knowledge is organized and made accessible.

It is interesting to find that, with all this activity in the present reformed methods of research and verification are not confined to. the work of the passing day; in the brilliant achievements of modern research and reconstruction the maxim that " Truth is the daughter of Time " has not been forgotten. In the field of the History of Medicine the work of scholars such as Francis Adams of Banchory (1796-1861), William A. Greenhill (1814- 1894) and C. Creighton in England, Maximilien P. Littr6 (1801- 1881) and Charles V. Daremberg (1817-1872) in France, and Heinrich Haser (1811-1888) and August Hirsch, Diels, Welt- mann and Julius Pagel in Germany, will prove to our children that tradition was as safe in our hands as progress itself.

(T. C. A.)

Bibliography.— Osier and McCrae, Modem Medicine; F. T Roberts,

The Practice of Medicine (1909); Hermann Nothnagel, Internationale Beitrdge zur inneren Medicin (1902); Ed. Brovardel, Traiti de midecine (1895-1902); T. D. Savill, Clinical Medicine (19O9); W. Osier, The Principles and Practice of Medicine (1909); Allbutt and Rolleston, A System of Medicine (1906-1910) ; Sir Patrick Manson, Tropical Medicine (1907) ; Frederick Taylor, A Manual of the Practice of Medicine (1908).

MEDINA, JOSE TORIBIO (1852-), Chilean bibliographer, was born at Santiago, and was educated for the bar. His first publication, when a very young man, was a metrical translation of Longfellow's Evangeline. When twenty-two he was appointed secretary to the legation at Lima. After his return he published a history of Chilean literature (1878), and a work upon the aboriginal tribes (1884). In this latter year he was appointed secretary of legation in Spain, and availed himself of the oppoiT tunity of examining the treasures of the old Spanish libraries. These researches, repeated on subsequent visits to Spain, and also to France and England, enriched him with a mass of historical and bibliographical material. Among his publications may be mentioned the Biblioteca hispano-americana, a catalogue of all books and pamphlets relating to Spanish America printed in Spain; the Biblioteca hispano-chilena, a similar work, com- menced in 1897; the standard and magnificent history of printing in the La Plata countries (1892); comprehensive works on the Inquisition in Chile, Peru and the Philippines; and the standard treatise on South American medals (1899). In addition, Sefior Medina produced the fullest bibliographies yet attainable of books printed at Lima, Mexico and Manila, and a number of memoirs and other minor writings. No other man had rendered anything like the same amount of service to the literary history and bibliography of the Spanish colonies.

MEDINA, or rather Al-Medina (the city), or Medinat Rasul Allah (the city of the apostle of God), a town of the Hejaz in Arabia, about 820 m. by rail S.S.E. of Damascus, in 25 N., 40 E., 1 the refuge of Mahomet on his emigration from Mecca, and a renowned place of Moslem pilgrimage, consecrated by the possession of his tomb. The name Medina goes back to the Koran (sur. xxxiii. 60) ; the old name was Yathrib, the Lathrippa of Ptolemy and lathrippa of Stephanus Byzantius.

Medina stands in a basin at the northern extremity of an elevated plain, on the western skirt of the mountain range which divides the Red Sea coast-lands from the central plateau of Arabia. At an hour's distance to the north it is dominated by Mount Ohod, an outlying spur of the great mountains, the scene of the well-known battle (see

Mahomet), and the site of the tomb and mosque of the Prophet's uncle Hamza. To the east the plain is bounded by a long line of hills eight or ten hours distant, over which the Nejd road runs. A number of torrent courses (of which Wadi Kanat to the north, at the foot of Mount Ohod, and W. Akik, some miles to the south, are the most important) descend from the mountains, and converge in the neighbourhood of the town to unite farther west at a place called Zaghaba, whence they descend to the sea through the " mountains of the Tehama " — the rough country between Medina and its

1 This is a very rough estimate. The road from Yambu on the Red Sea, which runs somewhat north of east, is by Burton's estimate 132 m. From Medina to Mecca by the inland or high road he makes 248 m. The usual road near the coast by Rabigh and Khulesa and thence to W. Fatima cannot be very different in length. Caravans traverse it in about ten or eleven days.

port of Yambu — under the name of W. Idam. Southwards from Medina the plain extends unbroken, but with a slight rise, as far as the eye can reach. The convergence of torrent-courses in the neighbourhood of Medina makes this one of the best- watered spots in northern Arabia. The city lies close to one of the great volcanic centres of the peninsula, which was in violent eruption as late as a.d. 1266, when the lava stream approached within an hour's distance of the walls, and dammed up W. Kanat. The result of this and older prehistoric eruptions has been to confine the underground water, so important in Arabian tillage, which can be reached at any pojnt of the oasis by sinking deep wells. Many of the wells are brackish, and the natural fertility of the volcanic soil is in many places impaired by the salt with which it is impregnated; but the date-palm grows well everywhere, and the groves, interspersed with gardens and cornfields, which surround the city on all sides except the west, have been famous from the time of the Prophet. Thus situated, Medina was originally a city of agriculturists, not like Mecca a city of merchants; nor, apart from the indispensable trade in provisions, has it ever acquired commercial importance like that which Mecca owes to the pilgrimage. 1 Landowners and cultivators are still a chief element in the population of the city and suburbs. The latter, who are called Nakhawila, and more or less openly profess the Shi'aopinions, marry only among themselves. The townsmen proper, on the other hand, are a very motley race. 2 New settlers remain behind with each

pilgrimage; attracted by the many offices of profit connected with the mosque, the stipends paid by the sultan to every inhabitant, and the gains to be derived by pilgrim-cicerones (Muzawwirs) or by those who make it a business to say prayers at the Prophet's mosque for persons who send a fee from a distance, as well as the alms which the citizens are accustomed to collect when they go abroad, especially in Turkey. The population of the city and suburbs may be from 16,000 to 20,000.

The city proper is surrounded by a solid stone wall, 3 with towers and four massive gateways of good architecture, forming an irregular oval running to a kind of angle at the north-west, where stands the castle, held by a Turkish garrison. The houses are good stone buildings similar in style to those of Mecca; the streets are narrow but clean, and in part paved. 4 There is a copious supply of water conducted from a tepid source (ez- Zarka) at the village of Kuba, 2 m. south, and distributed in under- ground cisterns in each quarter. 5 The glory of Medina, and the only important building, is the mosque of the Prophet, in the eastern part of the city, a spacious enclosed court between 400 and 500 ft. in length from north to south, and two-thirds as much in breadth. The minarets and the lofty dome above the sacred graves are imposing features; but the circuit is hemmed in by houses or narrow lanes, and is not remarkable except for the principal gate (Bab al-Salam) at the southern end of the west front, facing the sacred graves, which is richly inlaid with marbles and fine tiles, and adorned with golden inscriptions. This gate leads into a deep portico, with ten rows of pillars, running along the southern wall. Near the farther end of the portico, but not

1 The pilgrimage to Medina, though highly meritorious, is not obligatory, and it is not tied to a single season: so that there is no general concourse at one time, and no fair like that of Mecca.

2 A small number of families in Medina still claim to represent the ancient Ansar, the “defenders” of Mahomet; there are also some Siddiqiyah, claiming descent from Abu Bekr. But in fact the old population emigrated en masse after the sack of Medina by Moslim in 683, and passed into Spain in the armies of Musa. In the 13th century one old man of the Khazraj and one old woman of the Aus tribe were all that remained of the old stock in Medina (Maqqari, i. 187; Dozy, Mus. d’Espagne, i. in). The aristocratic family of the Beni Hosain, who claim descent from the martyr of Kerbela, and so from the Prophet, have apparently a better estab- lished pedigree.

- According to Ibn Khallikan (Slane’s trans, iii. 927) the walls are of the 12th century, the work of Jamal ud-DIn al-Ispahani.

4 TheBalat or great paved street of Medina, a very unusual feature in an Eastern town, dates from the 1st century of Islam. (See Wiistenfeld’s abstract of Samhudi, p. 115.)

‘ Kuba is famous as the place where the Prophet lived before he entered Medina, and the site of the first mosque in which he prayed. It

lies amidst orchards in the richest part of the oasis.

xvm. 3

adjoining the walls, is a sort of doorless house or chamber hung with rich curtains, which is supposed to contain the graves of Mahomet, Abu Bekr and Omar. To the north of this is a smaller chamber of the same kind, draped in black, which is said to represent the tomb of Fatima. Both are enclosed with an iron railing, so closely interwoven with brass wire- work that a glimpse of the so-called tombs can only be got through certain apertures, where intercessory prayer is addressed to the prophet, and pious salutations are paid to the other saints. 6 The portico in front of the railing is not ineffective, at least by nightlight. It is paved with marble, and in the eastern part with mosaic, laid with rich carpets; the southern wall is clothed with marble pierced with windows of good stained glass, and the great railing has a striking aspect; but an air of tawdriness is imparted by the vulgar painting of the columns, especially in the space between the tomb and the pulpit, which has received, in accordance with a tradition of the Prophet, the name of the Garden (rauda), and is decorated with barbaric attempts to carry out this idea in colour. 7 The throng of visitors passing along the south wall from the Bab al-Salam to salute the tombs is separated from the Garden by an iron railing. The other three sides of the interior court have porticoes of less depth and mean aspect, with three or four rows of pillars. Within the court are the well of the # Prophet, and some palm-trees said to have been planted by Fatima; this ” grove ” is separated from the rest of the court by a wooden partition.

The original mosque was a low building of brick, roofed with palm-branches, and much smaller than the present structure. The wooden pulpit from which Mahomet preached appears to have stood on the same place with the present pulpit in the middle of the south portico. The dwelling of the Prophet and the huts of his women adjoined the mosque. Mahomet died in the hut of Ayesha and was buried where he, died; Abu Bekr and Omar were afterwards buried beside him. In A.D. 711 the mosque, which had previously been enlarged by Omar and Othman, was entirely reconstructed on a grander scale and in. Byzantine style by Greek and Coptic artificers at the command of the caliph Walid and under the direction of Omar Ibn Abd-al-Aziz. The enlarged plan included the huts above named, which were pulled down. Thus the place of the Prophet’s burial was brought within the mosque; but the recorded discontent of the city at this step shows that the feeling which regards the tomb as the great glory of the mosque, and the pilgrimage to it as the most meri- torious that can be

undertaken except that to Mecca, was still quite unknown. It is not even certain what was done at this time to mark off the graves. Ibn ‘Abd Rabbih, in the beginning of the 10th century Clfcd, Cairo ed., iii. 366), describes the enclosure as a hexagonal wall, rising within three cubits of the ceiling of the portico, clothed in marble for more than a man’s height, and above that height daubed with the unguent called khaluk. This may be supplemented from Istakhri, who calls it a lofty house without a door. That there are no gravestones or visible tombs within is certain from what is recorded of occasions when the place was opened up for repairs. Ibn Jubair (p. 193 seq.) and Samhudi speak of a small casket adorned with silver, fixed in the eastern wall, which was supposed to be opposite the head of the Prophet, while a silver nail . in the south wall indicated the point to which the corpse faced, and from which the salutation of worshippers was to be addressed (Burton misquotes). The European fable (mentioned and refuted, e.g. in Histoire des Arabes par l’abb6 de Marigny, t. i. p. 46, Paris,_i75o) of the coffin suspended by magnets is totally unknown to Moslem tradition. The smaller chamber of Fatima is comparatively modern. In the time of Ibn Jubair and of Ibn Batuta (unless

6 The space between the railing and the tomb is seldom entered except by the servants of the mosque. It contains the treasures of the mosque in jewels and plate, which were once very consider- able, but have been repeatedly plundered, last of all by the Wahhabls in the beginning of the 19th, century.

7 The word rauda also means a mausoleum, and is applied by Ibn Jubair to the tomb itself. Thus the tradition that the space between the pulpit and the tomb was called by the Prophet one of

I the gardens of Paradise probably arose from a mistake.

the latter, as is so often the case, is merely copying his prede- cessor) there was only a small marble trough north of the rauda (or grave) which ” is said to be the house of Fatima or her grave, but God only knows.” It is more probable that Fatima was buried in the Baki, where her tomb was also shown in the 1 2th century (Ibn Jubair, pp. 198 seq.).

The mosque was again extended by the caliph Mahdi (a.d. 781) and

was burned down in 1256. Of its appearance before the fire we have two authentic accounts by Ibn ‘Abd Rabbih early in the 10th century, and by Ibn Jubair, who visited it in 1184. The old mosque had a much finer and more regular appearance than the present one; the interior walls were richly adorned with marble and mosaic arabesques of trees and the like, and the outer walls with stone marquetry; the pillars of the south portico (seventeen in each row) were in white plaster with gilt capitals, the other pillars were of marble. Ibn ‘Abd Rabbih speaks of eighteen gates, of which in Ibn Jubair’s time, as at present, all but four were walled up. There were then three minarets. After the fire which took place just at the time of the fall of the caliphate, the mosque long lay in a miserable condition. Its repair was chiefly due to the Egyptian sultans, especially to JCait Bey, whose restoration after a second fire in 1481 amounted almost to a complete reconstruction. Of the old building nothing seems to have remained but some of the columns and part of the walls. The minarets have also been rebuilt and two new ones added. The great dome above the tomb, the railing round it, and the pulpit, all date from K&it Bey’s restoration.

The suburbs, which occupy as much space as the city proper, and are partly walled in, lie south-west of the town, from which they are separated by an open space, the halting-place pi cara- vans. Through the suburbs runs the watercourse called Wadi Buthan, a tributary of W. Kanat, which the Yanbu’ road crosses by a stone bridge. The suburbs are the quarter of the peasants. Thirty or forty families with their cattle occupy a single court- yard (hosh), and form a kind of community often at feud with its neighbours. The several clans of Medina must have lived in much the same way at the time of the Prophet. The famous cemetery called Baki” el-Gharkad, the resting-place of a multi- tude of the ” companions ” of the Prophet, lies immediately to the west of the city. It once contained many monuments, the chief of which are described by Ibn Jubair. Burckhardt in 1815 found it a mere waste, but some of the mosques have since been rebuilt.

History.— The story of the Amalekites in Yathrib and of their conquest by the Hebrews in the time of Moses is purely fabulous (see Noldeke, Uber die Atnalekiler, 1864, p. 36). The oasis, when it first comes into the light of history, was held by Jews, among whom emigrants from Yemen afterwards settled. From the time of the emigration of Mahomet (a.d. 622) till the Omayyads removed the seat of empire from Medina to Damascus, the town springs into historic prominence as the capital of the new power that so rapidly changed the fate of the East. Its fall was not less rapid and complete, and since the battle of Harra and the sack of the city in 683 it has never

regained political importance (see Caliphate, B. §§ 1, 2, &c). Mahomet invested the country round Medina with an inviolable character like that of the Haram round Mecca; but this provision has never been observed with strictness. After the fall of the caliphs, who maintained a governor in Medina, the native amirs enjoyed a fluctuating measure of independence, interrupted by the aggressions of the sherlfs of Mecca, or controlled by an intermittent Egyptian protectorate. The Turks after the conquest of Egypt held Medina for a time with a firmer hand; but their rule grew weak, and was almost nominal long before the Wahhabis took the city in 1804. A Turko-Egyptian force retook it in 181 2, and the Turks now maintain a pasha with a military establishment, while the cadi and chief agha of the mosque (a eunuch) are sent from Constantinople. In late years the influence of the Turkish government has been much strengthened, an important factor in its consideration being the construction of the railway from Syria to the Hejaz. Railway communication between Damascus and Medina was effected in 1908.

Authorities. — Medina has been described from personal observa- tion by Burckhardt, who visited it in 1815, and Burton, who made the pilgrimage in 1853. Sadlier on his journey from Katif to Yambu (1819) was not allowed to enter the holy city. Burckhardt was prevented by ill-health from examining the city and country with his usual thoroughness. Little is added to our information by the report of ‘Abd el-Razzaq, who performed the pilgrimage in 1 878, on a medical commission from the English government. The chief Arabic authority besides Ibn ‘Abd Rabbih and Ibn Jubair is Samhudi, of whose history Wustenfeld published an abstract in the Gottingen Abhandlungen, vol. ix. (1861). It goes down to the end of the 15th century. The topography of the country about Medina is interesting both historically and geographically; Bakrl, Yaqut and other Arabic geographers, supply much material on this topic. Some good information concerning Medina is contained in the 2nd volume of Doughty’s Travels in Arabia Deserta.

(W. R. S.)

MEDINA, a village of Orleans county, in north-west New York, U.S.A., about 40 m. N.E. of Buffalo, and on Oak Orchard Creek. Pop. (1900), 4716, (857 foreign-born); (1905, state census), 5114; (1910) 5683. It is served by the New York Central & Hudson River railroad, by the Buffalo, Lockport & Rochester (inter- urban) railway, and by the Erie Canal. On Oak Orchard Creek and near the city are electric power plants, at the Medina Falls and at a large storage dam (60 ft. high) for water power, built in 1902. In the neighbourhood are extensive apple,

peach and pear orchards; and vegetables, especially beans, are grown. There are valuable quarries of Medina sandstone, a good building-, paving- and flag-stone, varying in colour from light grey to brownish red, readily shaped and split, and less likely than limestone to crack or than granite to wear slippery; it was first found at Medina in 1837. There was a saw-mill on the creek near here in 1805, but the place was little settled before 1824, and its growth was due to the Erie Canal. It was incor- porated in 1832.

MEDINA SIDONIA, DON ALONSO PEREZ DE GUZMAN EL BUENO, 7TH Duke of (1550-1615), the commander-in-chief of the Spanish Armada, was born on the 10th of September 1550. He was the son of Don Juan Claros de Guzman, eldest son of the 6th duke, and of his wife Dona Leonor Manrique de Zuniga y Sotomayor. His father died in 1555, and Don Alonso became duke, and master of one of the greatest fortunes in Europe, on the death of his grandfather in 1539. The family of Guzman was originally lords of Abiados, on the southern slope of the Picos de Europa in the hill country of Leon. The name is believed to be a contraction or corruption of Gundamaris, i.e. son of Gundamar. An early family tradition represents them as having come from Britain, and they may have descended from one of the Scandinavian invaders who attacked the north coast of Spain in the 10th century. It is in the 10th century that they first appear, and they grew great by the reconquest of the country from the Mahommedans. The branch to which the dukes of Medina Sidonia belonged was founded by Alonso Perez de Guzman (1256-1309), surnamed El Bueno, the good, in the sense of good at need, or stout-hearted. In 1296 he defended the town of Tarifa on behalf of Sancho IV., and when the be- siegers threatened to murder one of his sons whom they held as a prisoner if he did not surrender, he allowed the boy to be killed. He was rewarded by great grants of crown land. The duchy of Medina Sidonia, the oldest in Spain, was conferred by John II. in 1445 oh one of his descendants, Juan Alonzo de Guzman, count Of Niebla. The addition ” El Bueno ” to the family name of Guzman was used by several of the house, which included many statesmen, generals and colonial viceroys. 1 The 7_th duke was betrothed in 1565 to Ana de Silva y Mendoza, who waS then four years of age, the daughter of the prince of Eboli. In 1572 when the duchess was a little more than ten years of age, the pope granted a dispensation for the consummation of the marriage. The scandal of the time, for which there appears to be no foundation, accused Philip II. of a love intrigue with the princess of Eboli. The unvarying and unmerited favour he showed the duke has been accounted for on the ground that he

1 The titles and grandeeship passed, in accordance with Castilian law,

by marriage of a daughter and heiress in 1777, to the marquess of Villafranca, and have since remained in that house.

took a paterual interest in the duchess. Don Alonso, though he bore the name of El Bueno, was a man of mean spirit. He made no serious effort to save his mother-in-law from the persecution she suffered at the hands of Philip II. His correspondence is full of whining complaints of poverty, and appeals to the king for pecuniary favours. In 1581 he was created a knight of the Golden Fleece, and was named captain-general of Lombardy. By pressing supplications to the king he got himself exempted on the ground of poverty and poor health. Yet when the marquess of Santa Cruz (q.v.) died, on the 9th of February 1588, Philip insisted on appointing him to the command of the Armada. He was chosen even before Santa Cruz was actually dead, and was forced to go in spite of his piteous declarations that he had neither experience nor capacity, and was always sick at sea. His conduct of the Armada justified his plea. He was even accused of showing want of personal courage, and was completely broken by the sufferings of the campaign, which turned his hair grey. The duke retained his posts of ” admiral of the ocean ” and captain-general of Andalusia in spite of the contempt openly expressed for him by the whole nation. When an English and Dutch armament assailed Cadiz in 1596 his sloth and timidity were largely responsible for the loss of the place. He was held up to ridicule by Cervantes in a sonnet. Yet the royal favour continued unabated even under the successor of Philip II. In 1606 the obstinacy and folly of the duke caused the loss of a squadron which was destroyed near Gibraltar by the Dutch. He died in 161 5.

See Cesario Duro, La Armada invincible (Madrid, 1884), which gives numerous references to authorities.

MEDINA SIDONIA, or Medinasidonia, a town of southern Spain, in the province of Cadiz, 21 m. by road E.S.E. of Cadiz. Pop. (1900), 11,040. Medina Sidonia is built on an isolated hill surrounded by a cultivated plain. It contains a fine Gothic church, several convents, and the ancestral palace of the dukes of Medina Sidonia. It has a small agricultural trade, chiefly in wheat, olives and oats.

Medina Sidonia has been identified by some with the Asido of Pliny, but this is uncertain. Under the Visigoths the place was erected into a

bishopric (Assidonia), and attained some importance; in the beginning of the 8th century it was taken by Tariq. In the time of Idrisi (12th century) the province of Shaduna or Shidona included, among other towns, Seville and Carmona; later Arab geographers place Shadtina in the province of Seville.

MEDIOLANUM, or Mediolanium (mod. Milan, q.v.), an ancient city of Italy, and the most important in Gallia Transpadana. Livy attributes its foundation to the Galli Insubres under Bellovesus after their defeat of the Etruscans, in the time of the older Tarquin. According to other authorities, the Etruscan city of Melpum which preceded it was destroyed in 396 B.C. Objects of the Bronze age have been found outside the city on the south. The name itself is Celtic. The Romans defeated the Insubres in 225-222 B.C., and stormed Mediolanum itself in the latter year. Its inhabitants rebelled some twenty years later in the Hannibalic War, but were defeated and finally reduced to obedience in 196 B.C. They probably acquired Latin rights in 89, and full civic rights in 49 B.C., as did those of the other towns of Gallia Transpadana. It appears later on (but not before the 2nd century a.d.) to have become a colony. It acquired a certain amount of literary eminence, for we hear of youths going from Comum to Mediolanum to study. In Strabo's time it was on an equality with Verona, but smaller than Patavium, but in the later times of the empire its importance increased. At the end of the 3rd century it became the seat of the governor of Aemilia and Liguria (which then included Gallia Transpadana also, thus consisting of the 9th and nth regions of Augustus), and at the end of the 4th, of the governor of Liguria only, Aemilia having one of its own thenceforth. From Diocletian's time onwards the praefectus praetorio and the imperial vicar of Italy also had their seat here: and it became one of the principal mints of the empire. The emperors of the West resided at Mediolanum during the 4th century, until Honorius preferred

Ravenna, and in 402 transferred his court there. Its importance, described in the poems of Ausonius, is demonstrated by its many inscriptions, and the interest and variety of their contents, In these the rarity of the mention of its chief magistrates is surprising: and it is not impossible that owing to its very impor-. tance the right of appointing them had been taken from it (as Mommsen thinks). The case of Ravenna is not dissimilar. The inscriptions indicate a strong Celtic character in the popular tion. Procopius speaks of it as the first city of the West, after Rome, and says that when it was captured by the Goths in 539, 300,000 of the inhabitants were killed. It was an important centre of traffic, from which roads radiated in several directions — as railways do to-day — to Comum, to the foot of the Lacus Verbanus

(Lago Maggiore) , to Novaria and Vercellae, to Ticinum, to Laus Pompeia and thence to Placeritia and Cremona, and to Bergomum. None of these roads had an individual name, so far as we know. To its secular power corresponds the indepen- dent position which its Church took in the time of St Ambrose (q.v.), bishop of Milan in 374-397, who founded the church which bears his name, and here baptized St Augustine in A.D. 387, and whose rite is still in use throughout the diocese. Theo- dosius indeed did penance here at Ambrose's bidding for his slaughter of the people of Thessalonica. After his death the period of invasions begins; and Milan felt the power of the Huns under Attila (452), of the Heruli under Odoacer (476) and of the .Goths under Theodoric (493). When Belisarius was sent by Justinian to recover Italy, Datius, the archbishop of Milan, joined him, and the Goths were expelled from the city. But Uraia, nephew of Vitigis the Gothic king, subsequently assaulted and retook the town, after a brave resistance. Uraia destroyed the whole of Milan in 539; and hence it is that this city, once so important a centre of Roman civilization, possesses so few remains of antiquity. Narses, in his campaigns against the Goths, had invited the Lombards to his aid. They came in a body under Alboin, their king, in 568, and were soon masters of north Italy. They entered Milan in the next year, but Pavia became the Lombard capital.

Of Roman remains little is to be seen above ground, but a portico of sixteen Corinthian columns near S. Lorenzo, which may belong to the baths of Hercules, mentioned by Ausonius, or to the palace of Maximian. Close to the Torre del Carrobio remains of an ancient bridge and (possibly) of the walls of Maximian were found: and many remains of ancient buildings, including a theatre, have been dis- covered below ground-level. The objects found are preserved in the archaeological museum in the Castello Sforzesco. (See Milan.)

See Th. Mommsen in Corp. inscript. Latin. (Berlin, 1883), v. 617 sqq. (with full bibliography) ; Notizie degli Scavi, passim.

(T.As.)

MEDITERRANEAN SEA. The Mediterranean is all that remains of a great ocean which at an early geological epoch, before the formation of the Atlantic, encircled half the globe along a line of latitude. This ocean, already diminished in area, retreated after Oligocene times from the Iranian plateau, Turkestan, Asia Minor and the region of the north-west Alps. Next the plains of eastern Europe were lost, then the Aralo- Caspian region, southern Russia and finally the valley of the Danube. The " Mediterranean region," as a geographical unit, includes

all this area; the Black Sea and the Sea of Marmora are within its submerged portion, and the climate of the, whole is controlled by the oceanic influences of the Mediterranean Sea. Professor Suess, to whom the above description is due, finds that the Mediterranean forms no exception to the rule in affording no evidence of elevation or depression within historic times; but it is noteworthy that its present basin is remarkable in Europe for its volcanic and seismic activity. Submarine earthquakes are in some parts sufficiently frequent and violent as seriously to interfere with the working of telegraph cables. Suess divides the Mediterranean basin into four physical regions, which afford probably the best means of description : (1) The western Mediterranean, from Gibraltar to Malta and Sicily,

enclosed by the Apennines, the mountains of northern Africa, and of southern and south-eastern Spain (Cordillere bitique). (2) The Adriatic, occupying the space between the Apennines and the Dinaric group (Suess compares the Adriatic to the valley of the Brahmaputra). (3) A part surrounded by the fragments of the Dinaro-Taurus arch, especially by Crete and Cyprus. This includes the Aegean and the Black Sea, and its margin skirts the south coast of Asia Minor. These three parts belong strictly to Eurasia. (4) Part of the coastal region of Indo- Africa, terraced downwards in successive horizontal planes from the Shot, reaching the sea in the Little Syrte, and con- tinuing to the southern depressions of Syria. Malta and Gozo are the only islands of the Mediterranean which can be associated with this section, and, per contra, the mountain chain of north-west Africa belongs to Eurasia. Murray (1888) estimates the total area of the Mediterranean at 813,000 sq. m. Karstens (1894) breaks it up into parts as follows: —

Western Mediterranean . . 841,593 sq. km. Sicilian-Ionian basin . . . 767,658 „ Greece and Levant basin . . 769,652 „ Adriatic Sea …. 130,656 „

Total

2,509.559

A more recent calculation by Krummel gives the total area as 2,967,570 sq. km. or 1,145,830 sq. m. (See Ocean.) Murray estimates the total surface of the Mediterranean drainage area, with which must be included the Black Sea, at 2,934,500 sq. m., of which 1,420,800 are

Eurasian and 1,513,800 are African. The principal rivers entering the Mediterranean directly are the Nile from Africa, and the Po, Rhone and Ebro from Europe.

The physical divisions of the Mediterranean given above hold gOod in describing the form of the sea-bed. The western Mediterranean is cut off by a bank crossing the narrow strait between Sicily and Cape Bon, usually known as the Adventure Bank, on which the depth is nowhere 200 fathoms. The mean depth of the western basin is estimated at 881 fathoms, and the deepest sounding recorded is 2040 fathoms. In the eastern Mediterranean the mean depth is nearly the same as in the western basin. The Sicilian-Ionian basin has a mean depth of 885 fathoms, and the Levant basin, 793 fathoms. Deep water is found close up to the coast of Sicily, Greece, Crete and the edge of the African plateau. The steepest slope observed occurs off the island of Sapienza, near Navarino, where 1720 fathoms has been obtained only 10 miles from land. In 1897 the ship ” Washington ” obtained depths of 2220 fathoms in the middle of the eastern Mediterranean; and the Austrian expeditions in the ” Pola ” discovered in the ” Pola Deep ” (35 44′ N., 21 45′ E.), south-west of Cape Matapan, a maximum depth of 2046 fathoms. Between these two deep areas a ridge runs in a north-westerly direction 550 fathoms from the surface — possibly a projection from the African plateau. Another bank 1100 fathoms from the surface runs south from the east end of Crete, separating the Pola Deep from the depths of the Levant basin, in which a depth of i960 fathoms was recorded near Makri on the coast of Asia Minor. The later expedition of the ” Pola ” discovered the ” Rhodes Deep ” (36 5′ N., 28 36′ E.), with a maximum depth of 2 no fathoms: this deep is closed to the south-east by a ridge running south-east, over which the depth is 1050 fathoms. Off the coast of Syria the ” Pola ” obtained four soundings of more than 1 100 fathoms, and between Cyprus and the coast of Asia Minor only two over 550 fathoms. Murray gives the following figures for the areas and volumes of the Mediterranean at different depths: —

Depth.	Area.	Volume.
Fathoms.	Sq. Miles.	Cub. Miles.
o- 100 . .	201,300	80,950
100- 500 . .	251,650	220,850
500-1000 .	81,300	189,200

1000-2000 . . 263,250 217,050

Over 2000 . . 15.500 1,750

which gives a mean depth over all of 768 fathoms. The following

table is due to Karstens :- —

Western Mediterranean Sicilian- Ionian basin Levant Adriatic Sea .

Volume.

Mean Depth

Cub. Km.

Fathoms.

1.356,512

881

1,242,549

885

1,116,599

793

31,844

133

813,000

709,800

Krummel gives the total volume of the basin as 4,249,020 cubic kilometres or 1,019,400 cubic statute miles, and the mean depth as 782 fathoms. (See Ocean.)

Meteorology. — As already stated, the ” Mediterranean region ” forms a distinct climatic unit, chiefly due to the form and position of the Mediterranean Sea. The prevailing winds in this region, which the sea traverses longitudinally, are westerly, but the sea itself causes the formation of bands of low barometric pressure during the winter season, within which cyclonic disturbances frequently develop, while

in summer the region comes under the influence of the polar margin of the tropical high pressure belt. Hence the Mediterranean region is characteristically one of winter rains, the distinctive feature becoming less sharply defined from south to north, and the amount of total annual fall increasing in the same direction. The climate becomes more continental in type from west to east, but there are great local irregularities — the ele- vated plateaus of Algeria and Spain cause a rise of pressure in winter and delay the rainy seasons: the rains set in earlier in the west than in the east, and the total fall is greater. Temperature varies greatly, the annual mean varying from 56° F. to 77 F. In the west the Atlantic influence limits the mean annual range to about io" — 12 F., but in the east this increases to 36 and even 40 . Autumn is warmer than spring, especially in the coastal regions, and this is exaggerated in the eastern region by local land winds, which replace the cool sea-breezes of summer: overcoats are ordi- narily worn in Spain and Italy till July, and are then put aside till October. Local winds form an important feature in nearly all the coast climates of the Mediterranean, especially in winter, where they are primarily caused by the rapid change of temperature from the sea to the snow-clad hinterlands. Cold dry winds, often of great violence, occur in the Rhone valley (the Mistral), in Istria, and Dalmatia (the Bora), and in the western Caucasus. In summer a north-west "trade" wind, the Maestro, occurs in the Adriatic. The Sirocco is a cyclonic wind characteristic of the winter rainy season; in the Adriatic it is usually accompanied by cloud and moisture, often by rain. In Sicily and southern Italy the Sirocco occurs at all seasons; it is a dry, dusty wind from south-east or south-west. The dust is chiefly of local origin, but partly comes from the Sahara. Similar winds are met with in Spain (the Leveche), but they reach their greatest development in the Simooms of Algeria and Syria, and the Khamsin of Egypt.

Temperature. — The mean surface temperature of the waters of the Mediterranean falls from south-east, where it is over 70° F., to north-west, the average at the coast of the Gulf of Lyons being. 60°. The isothermal of 65 ° runs from Gibraltar to the north of Sardinia, and thence by the Strait of Messina to the Gulf of Corinth. A similar distribution is found 100 fathoms from the surface, tempera- ture falling from 60° in the Levant to 55″ east of Gibraltar. At 200 fathoms temperature falls in the same way from 58° to 55 , but below 250 fathoms temperatures are practically uniform to the bottom, 55-5° in the western basin and 56-5° in the eastern. The bottom temperature observed in the Pola Deep was 56-3°.

Salinity. — In the extreme west the salinity of the surface water is about 36-3 per mille, and it increases eastwards to 37-6 east of

Sardinia and 39-0 and upwards in the Levant. Observations of salinity in the depths of the western Mediterranean are very deficient, but the average is probably between 38-0 and 38-5. In the eastern basin the " Pola " expedition observed salinities of 38-7 to 39-0 to the east of a line joining Cape Matapan with Alexandria, and 38-2 to 38-7 to the west of it. The salter waters apparently tend to make their way westwards close to the African coast, and at the bottom the highest salinities have been observed south of Crete. Evnitzki states that the saltest water of the whole basin occurs in the Aegean Sea.

Circulation. — There is little definite circulation of water withj{i the Mediterranean itself. In the straits joining it with the Atlantic- and the Black Sea the fresher surface waters of these seas flow inwards to assist in making good the loss by evaporation at the surface of the Mediterranean, and in both cases dense water makes its way outwards along the bottom of the channels, the outflowing currents being less in volume and delivery than the inflowing. Elsewhere local surface currents are developed, either drifts due to the direct action of the winds, or streams produced by wind action heaping water up against the land ; but these nowhere rise to the dignitv of a distinct current system, although they are often sufficient to obliterate the feeble tidal action characteristic of the Mediterranean. Dr Natterer, the chemist of the " Pola " expeditions, has expressed the opinion that the poverty of the pelagic fauna is solely due to the want of circulation in the depths.

Deposits. — A great part of the bottom of the Mediterranean is covered with blue muds, frequently with a yellow upper layer containing a considerable proportion of carbonate of lime, chiefly shells of pelagic Foraminifera. In many parts, particularly in the eastern basin, a calcareous or siliceous crust, from half an inch to three inches in thickness, is met with; and Natterer suggested that the formation of this crust may be due to the production of carbonate of ammonium where deposits containing organic matter are undergoing oxidation, and the consequent precipitation of carbonate of lime and other substances from the waters nearer the surface. This view, however, has not met with general acceptance. , (H. N. D.)

MEDIUM, primarily a person through whom, as an inter- mediate, communication is deemed to be carried on between living men and spirits of the departed, according to the spiritistic hypothesis; such a person is better termed sensitive or auto- matist. The phenomena of

mediumship fall into two classes, (i) ” physical phenomena ” (q.v.) and (2) trance and automatic phenomena (fitterances, script, &c); both these may be mani- fested by the same person, as in the case of D. D. Home and Stainton Moses, but are often independent.

I. No sufficient mass of observations is to hand to enable us to distinguish between the results of trickery or hallucination on the one hand, and genuine supernormal phenomena on the other; but the evidence for raps and lights is good; competent observers have witnessed supposed materializations and there is respectable evidence for movements of objects.

Mediumship in the modern sense of the term may be said to have originated with the Rochester rappings of 1848 (see Spiritualism); but similar phenomena had been reported by such authors as Apollonius of Tyana; they figure frequently in the lives of the saints; and the magician in the lower stages of culture is in many respects a counterpart of the white medium. Among physical mediums who have attained celebrity may be mentioned D. D. Home (q.v.), Stainton Moses and Eusapia Palladino; the last has admittedly been fraudulent at times, but no deceit was ever proved of Home; Stainton Moses sat in a private circle and no suspicion of his good faith was ever aroused.

W. Stainton Moses (1839-1892) was a man of university educa- tion, a clergyman and a schoolmaster. In 1872 he became interested in spiritualism and soon began to manifest medium- istic phenomena,which continued for some ten years. These included, besides trance communications, raps, telekinesis, levitation, production of lights, perfumes and musical sounds, apports and materialized hands. But the conditions under which the experiments were tried were not sufficiently rigid to exclude the possibility of normal causes being at work; for no amount of evidence that the normal life is marked by no lapse from rectitude affords a presumption that uprightness will characterize states of secondary personality.

Eusapia Palladino has been observed by Sir O. Lodge, Pro- fessor Richet, F. W. H. Myers, and other eminent investigators; the first named reported that none of the phenomena in his presence went beyond what could be accomplished in a normal manner by a free and uncontrolled person; but he was convinced that movements were produced without apparent contact. Among other phenomena asserted to characterize the medium- ship of Eusapia are the production of temporary prolongations from the medium’s body; these have been seen in a good light by competent witnesses. It was shown in some

sittings held at Cambridge in 1895 that Eusapia produced phenomena by fraudulent means: but though the evidence of this is conclusive it has not been shown that her mediumship is entirely fraudulent. Automatic records of seances can alone solve the problems raised by physical mediumship. It has been shown in the Davey- Hodgson experiments that continuous observation, even for a short period, is impossible, and that in the process of recording the observations many omissions and errors are inevitable. Even were it otherwise, no care could provide against the possibility of hallucination.

II. The genuineness of trance mediumship can no longer be called in question. The problem for solution is the source of the information. The best observed case is that of Mrs Piper of Boston; at the outset of her career, in 1884, she did not differ

from the ordinary American trance medium. In 1885 the attention of Professor William James of Harvard was attracted to her; and for twenty years she remained under the supervision of the Society for Psychical Research. During that period three phases may be distinguished: (1) 1884-189ˆ trance utterances of a ” control ” calling himself Dr Phinuit, a French physician, of whose existence in the body no trace can be found; (2) 1892-1896, automatic writing by a ” control ” known as ” George Pelham,” the pseudonym of a young Ameripan author; (3) 1896 onwards, supervision by ” controls ” purporting to be identical with those associated with Stainton Moses. There is no evidence for regarding Mrs Piper as anything but absolutely honest. Much of the Piper material remains unpublished, partly on account of its intimate character. Many of those to whom the communications were made have been convinced that the ” controls ” are none other than discarnate spirits. Probably no absolute proof of identity can be given, though the reading of sealed letters would come near it; these have been left by more than one prominent psychical researcher, but so far the ” controls ” who claim to be the writers of them have failed to give their contents, even approximately.

Professor Flournoy has investigated a medium of very differ- ent type, known as Helene Smith; against her good faith nothing can be urged, but her phenomena — trance utterance and glosso- lalia — have undoubtedly been produced by her own mind. These represent her to be the reincarnation of a Hindu princess, and of Marie Antoinette among others, but no evidence of identity has been produced. The most striking phenomenon of her trance was the so-called Martian language, eventually shown by analysis to be a derivative of French, comparable to the languages invented by children in the nursery, but more elaborate.

Authorities.— F. W. H. Myers, Human Personality; F. Podmore, Modern Spiritualism; the Proceedings and Journal of the Society for Psychical Research, passim; for a convenient survey of the Piper case, see F. Sage, Madame Piper; J. Maxwell, Les Phi- nomenes psychiques (1903 ; Eng. trans. 1905) ; Th. Flournoy, Des Indes it la planete Mars. For fraudulent methods, see Confessions of a Medium (London, 1882) ; Truesdell, Bottom Facts of Spiritualism, and works cited by Myers, II., 502-503. (N. W. T.)

MEDJIDIE, or Mejidie, the name of a military and knightly order of the Turkish Empire, and also of a silver Turkish coin, worth twenty piastres. The coin was first struck in 1844, and the order was instituted in 1852 by the sultan Abd-ul-Mejid, whose name was therefore given to them. (See Knighthood and Chivalry: § Orders of Knighthood.)

MEDLAR, Mespilus germanica, a tree of the tribe Pomeae of the order Rosaceae, closely allied to the genus Pyrus, in which it is sometimes included; it is a native of European woods, &c, from Holland southwards, and of western Asia. It occurs in hedges, &c, in middle and south England, as a small, much- branched, deciduous, spinous tree, but is not indigenous. The medlar was well known to the ancients. Pickering (Chron. Hist. PI. p. 201) identifies it with a tree mentioned in a Siao-ya ode {She-King, ii. 1, 2), 827 B.C. It is the juecrjriXrj of Theophrastus and Mespilus of Pliny. The Latin mespilus or mespilum became in Old French mesle or medle, ” the fruit,” meslier, medlier, ” the tree.” The modern French nefie is from a corruption nespilum of the Latin. The German Mispel preserves the original more closely. The well-known fruit is globular, but depressed above, with leafy persistent sepals, and contains stones of a hemispherical shape. It is not fit to eat until it begins to decay and becomes- ” bletted,” when it has an agreeable acid and somewhat astrin- gent flavour. Several varieties are known in cultivation. The large Dutch medlar, which is very widely cultivated, has a naturally crooked growth; the large, much-flattened fruit is inferior in quality to the Nottingham, which is a tree of upright habit with fruits of about 1 in. diameter, superior to any other variety. There is also a stoneless variety with still smaller fruits, but the quality is not so good.

The medlar is propagated by budding or grafting upon the white-thorn, which is most suitable if the soil is dry and sandy, or on the quince if the soil is moist; the pear stock also succeeds

well on ordinary soils. It produces the best fruit in rich, loamy, somewhat moist ground. The tree may be grown as a standard, and chiefly requires pruning to prevent the branches from rub- bing each other. The fruit should be gathered in November, on a dry day, and laid out upon shelves. It becomes ” bletted ” and fit for use in two or three weeks. The Japanese medlar is Eriobotrya japonica (see Loquat), a genus of the same tribe of Rosaceae.

MEDOC, a district in France adjoining the left bank of the Gironde from Blanquefort (N. of Bordeaux) to the mouth of the Gironde. Its length is about 50 m., its breadth averages between 6 and 7 m. It is formed by a number of low hills, which separate the Landes from the Gironde, and is traversed Only by small streams; the Gironde itself is muddy, and often enveloped in fog, and the region as a whole is far from picturesque. Large areas of its soil are occupied by vineyards, the products of which form the finest growths of Bordeaux. (See Wine.)

MEDUSA, the name given by zoologists to the familiar marine animals known popularly as jelly-fishes; or, tˆ be more accurate, to those jelly-fishes 1 in which the form of tje body resembles that of an umbrella, bell or parachute. The name medusa is suggested by the tentacles, usually long and often numerous, implanted on the edge of the umbrella and bear the stinging organs of which sea-bathers are often disagreeably aware. The tentacles serve for the capture of prey and are very contractile, being often protruded to a great length or, on the other hand, retracted and forming corkscrew-like curls. Hence the animals have suggested to vivid imaginations the head of the fabled Gorgon or Medusa with her chevelure of writhing snakes.

The medusa occurs as one type of individual in the class Hydrozoa (q.v.), the other type being the polyp (q.v.). In a typical medusa we can distinguish the following parts. The umbrella-like body bears a circle of tentacles at the edge, whereby the body can be divided into a convex exumbrella or exumbral surface and a concave subumbrella or subumbral surface. The vast majority of jelly-fish float in the sea, with the exumbrella upwards, the subumbrella downwards. A few species, however, attach themselves temporarily or permanently to some firm object by the exumbral surface of the body, and then the sub- umbral surface is directed upwards. From the centre of the subumbral surface hangs down the manubrium, like the handle of an umbrella or the clapper of a bell, bearing the mouth at its extremity. In addition to the tentacles, the margin of the umbrella bears sense-organs, which may be of several kinds and may attain a high degree of complexity.

Medusae capture their prey, consisting of small organisms of various kinds, especially Crustacea, by means of the tentacles which hang out like fishing-lines in all directions. When the prey comes into contact with the tentacles it is paralysed, and at the same time held firmly, by the barbed threads shot out from the stinging organs or nematocysts. Then by contraction of the tentacles the prey is drawn into the mouth. Medusae thus form an important constituent of the plankton or floating fauna of the ocean, and compete with fish and other animals for the food-supply furnished by minuter forms of life.

A medusa has a layer of muscles, more or less strongly developed, running in a circular direction on the surface of the subumbrella, the contractions of which are antagonized by the elasticity of the gelatinous substance of the body. By the con- traction of the subumbral circular muscles the concavity of the subumbrella is increased, and as water is thereby forced out'of the subumbral cavity the animal is jerked upwards. In this way jelly-fish progress feebly by the pumping movements of the umbrella. Besides the circular subumbral muscles, there may be others running in a radial direction, chiefly developed as the longitudinal retractor muscles of the manubrium. In some cases the circular subumbral muscles form a rim known as the velum (v., see fig. 1), projecting into the subumbral cavity just within the ring of marginal tentacles. The two principal

1 The gooseberry-like or band-shaped jelly-fishes belong to the class Ctenophora (q.v.).

divisions of the medusae are characterized by the presence 01 absence of a velum.

Correlated with the well-developed muscular system and sense-organs of the medusa, we find also a distinct nervous system, either, when there is no velum, in the form of concentra- tions of nervous matter in the vicinity of each sense-organ, or, when a velum is present, as two continuous rings running round the margin of the umbrella, one external to the velum (exumbral nerve-ring, n.r 1 , see fig. 1), the other internal to it (subumbral nerve-ring, n.r 2 .). The exumbral nerve-ring is the larger and supplies the tentacles; the subumbral ring supplies the velum.

Every possible variety of body-form compatible with the fore- going description may be exhibited by different species of medusae. The body may show modifications of form which can be compared to a shallow saucer, a cup, a bell or a thimble. The marginal tentacles may be very numerous or may be few in number or even absent altogether;

and they may be simple filaments, or branched in a complicated manner. The manubrium maytlfce excessively long or very short, and in rare cases absent, the mouth then being flush with the subumbral surface. The mouth may be circular or four-cornered, and in the latter case the manubrium at the angles of the mouth may become drawn out into four lappets, the oral arms, each with a groove on its inner side continuous with the corner

Fig. 1. Diagram of the structure of a medusa ; the ectoderm is left clear, the endoderm is dotted, the .mesogloea is shaded black; a-b, principal axis (see Hydrozoa) ; to the left of this line the section is supposed to pass through an inter-radius (I.R.); to the right through a radius ®. The exumbral surface is uppermost, the subumbral surface, with the manubrium and mouth, is facing downwards.

St. Stomach.

r.c. Radial canal.

c.c. Circular or ring-canal.

e.l. Endoderm-lamella.

v. Velum.

G. Gonads. n.r. 1 Exumbral (so-called

upper) nerve-ring. n.r? Subumbral (so-called

lower) nerve-ring.

(For other figures of medusae see Hydrozoa.)

of the mouth. The oral arms are the starting-point of a further series of variations; they may be simple flaps, crinkled and folded in various ways, or they may be subdivided, and then the branches may simulate tentacles in appearance. In the genus Rhizostoma, common on the British coasts and conspicuous on account of its large size, the oral arms, originally distinct and four in number, undergo concrescence, so that the entrance to the mouth is reduced to numerous fine pores and canals. 2

Like the external structure, the internal anatomy of the medusa shows a complete radial symmetry, and is simple in plan but often complicated in detail (see fig. i). As in all Hydrozoa (q.v.) the body wall is composed of two cell-layers, the ectoderm and endoderm.

between which is a structureless gelatinous secreted layer, the mesogloea. As the name jelly-fish implies, the mesogloea is greatly developed and abundant in quantity. It may be traversed by processes of the cells of the ectoderm and endoderm, or it may contain cells which have migrated into it from these two layers. The ectoderm covers the whole external surface of the animal, while the endoderm lines the coelenteron or gastrovascular space; the two layers meet each other, and become continuous, at the edge of the mouth.

The mouth leads at once into the true digestive cavity, divisible into an oesophageal region in the manubrium and a more dilated cavity, the stomach (st.), occupying the centre of the umbrella. From the stomach, canals arise termed the radial canals (r.c.) ; typically four in number, they run in a radial direction to the edge

2 For other variations of the medusa, often of importance for systematic classification, see Hydromedusae and Scyphomedusae.

of the umbrella. There the radial canals are joined by a ring- canal {c.c.) which runs round the margin of the umbrella. From the ring-canal are given off tentacle-canals which run down the axis of each tentacle; in many cases, however, the cavity of the tentacle is obliterated and instead of a canal the tentacle contains a solid core of endoderm. Oesophagus, stomach, radial canals, ring-canal and tentacle-canals, constitute together the gastro- vascular system and are lined throughout by endoderm, which forms also a flat sheet of cells connecting the radial canals and ring canal together like a web ; this is the so-called endoderm-lamella (e.l.), a most important ‘feature of medusan morphology, the nature of which will be apparent when the development is described. As a general rule the mouth is the only aperture of the gastrovascular system; in a few cases, however, excretory pores are found on the nng-canal, but there is never any anal opening.

The sense-organs of medusae are of two classes: (i) pigment spots, sensitive to light, termed ocelli, which may become elaborated into eye-like structures with lens, retina and vitreous body; (2) organs of the sense of balance or orientation, commonly termed otocysts or statocysts. The sense-organs are always situated at the margin of the unbrella and may be distinguished from the morpho- logical point of view into two categories, according as they are, or are not, derived

from. modifications of tentacles; in the former case they are termed ientaculocysts. (For fuller information upon the sense-organs see Hydromedusae.)

Medusae are nearly always of separate sexes, and instances of hermaphroditism are rare. The gonads or generative organs may be produced either in the ectoderm or the endoderm. When the gonads are endodermal, they are formed on the floor of the stomach ; when ectodermal (G, see fig. i), they are formed on the subumbral surface, either on the manubrium or under the stomach or under the radial canals, or in more than one of these regions. Medusae often have the power of budding, and the buds are formed either on the manubrium, or at the margin of the umbrella, or on an out- growth or ” stolon ” produced from the exumbral surface.

The internal anatomy of the medusa is as variable as its external features. The mouth may lead directly into the stomach, without any oesophagus. The stomach may be situated in the disk, or may be drawn out into the base of the manubrium, so that the disk is occupied only by the radial canals. On the other hand the stomach may have lobes extending to the ring-canal, so that radial canals may be very short or absent. The radial canals may be four, rarely six, or a multiple of these numbers, and may be very numerous. They may be simple or branched. (For other ana- tomical variations see Hydromedusae and Scyphomedusae.)

In development the medusa can be derived easily by a process of differential growth, combined with concrescence of cell-layers, from the actinula-larva. (For figures see Hydrozoa.) The actinula is polyp-like, with a sack-like or rounded body; a crown of tentacles surrounds a wide peristome, in the centre of which is the mouth, usually raised on a conical process termed the hypostome. To produce a medusa the actinula grows greatly along a plane at right angles to the vertical axis of the body, whereby the aboral surface of the actinula becomes the exumbrella, and the peristome becomes the subumbrella. The crown of tentacles thus comes to form a fringe to the margin of the body, and the hypostome becomes the manubrium. As a result of this change of form the gastric cavity or coelenteron becomes of compressed lenticular form, and the endoderm lining it can be distinguished as an upper or exumbral layer and a lower or subumbral layer. The next event is a great growth in thickness of the gelatinous mesogloea, especially on the exumbral side; as a result the flattened coelenteron is still further compressed so that in certain spots its cavity is obliterated, and its exumbral and subumbral layers of endoderm come into contact and undergo concrescence. As a rule four such areas of

concrescence or cathammaia (E. Haeckel) are formed. The cathammal areas may remain very small, mere wedge-shaped partitions dividing up the coelenteron into a four-lobed stomach, the lobes of which communicate at the periphery of the body by a spacious ring-canal. More usually each cathamma is a wide triangular area, reducing the peripheral portion of the coelenteron to the four narrow radial canals and the ring-canal above described. The two apposed layers of endoderm in the cathammal area undergo complete fusion to form a single layer of epithelium, the endoderm-lamella of the adult medusa.

Medusae, when they reproduce themselves by budding, always produce medusae, but when they reproduce by the sexual method the embryos produced from the egg' grow into medusae in some cases, in other cases into polyps which bud medusae in their turn. In this way complicated cycles of alternating generations arise, which are described fully in Hydromedusae and Scyphomedusae. Medusae are exclusively aquatic animals and for the most part marine, but at least two fresh-water species are known. 1 Limno- codium sowerbyi was first discovered swimming in the tank in which the water-lily, Victoria regia, is cultivated in Kew Gardens, and

1 C. L. Boulenger (Proc. Zool. Soc. of London, 1907, p. 516) recorded the discovery of a third species by himself and W. A. Cunnington, in the brackish water of lake Birket el Kerun in the Egyptian Fayum.

has since been found sporadically in a similar situation in other botanical gardens, its most recent appearance being at Lille. These jelly-fishes are probably budded from a minute polyp-stock introduced with the roots of the lily. Another fresh-water form is Limnocnida tanganyicae, discovered first in lake Tanganyika, and now known to occur also in the Victoria Nyanza and in the Niger. A medusa with a remarkable habit of life is Mnestra parasites, which is parasitic on the pelagic mollusc Phyllirrhoe, attaching itself to the host by its subumbral surface ; its tentacles, no longer required for obtaining food, have become rudimentary. A parasitic mode of life is also seen in medusae of the genus Cunina during the larval condition, but the habit is abandoned, in this case, when the medusae become adult.

For figures of medusae see (1) E. Haeckel, " Das System der Medusen," Denkschriften med-natwiss. Ges. Jena (1879, 2 vols.); (2) Id., " Deep-Sea Medusae," Challenger Reports, Zoology, IV. pt. ii. (1882); (3) 0. Maas, " Die craspedoten Medusen," Ergebn. Plankton-Expedition, II. (1893); (4) id., "Die Medusen," Mem. Mus. Comp. Zool. Harvard, XXIII. (1897); (§) G. J. Allman, "A Monograph of the Gymnoblastic or Tubulanan Hydroids," Ray. Soc. (1871-1872). (E. A. M.)

MEDWAY, a river in the south-east of England. It rises in the Forest Ridges, S.W. of East Grinstead in Sussex, and, increased by many feeders from these picturesque hills, has an easterly course to the county boundary, which it forms, turning northward for a short distance. Entering Kent near Ashurst, its course becomes north-easterly, and this direction is generally maintained to the mouth. The river passes Tonbridge, receiving the Eden from the west, and later the Teise and Beult from the south and east, all these streams watering the rich Weald (q.v.) to the south of the North Downs. These hilts are breached by the Medway in a beautiful valley, in which lies Maidstone, generally much narrower than the upper valley. The charac- teristic structure of this part of the valley is considered under the heading Downs. Below Maidstone the valley forms a perfect basin, the hills descending upon it closely above Rochester. Below this city the river enters a broad, winding estuary, passing Chatham, and at Sheerness joining that of the Thames, so that the Medway may be considered a tributary, and its drainage area of 680 sq. m. reckoned as part of that of the greater river. The length of the Medway is about 60 m., excluding its many lesser windings. The estuary is navigable for sea-going vessels drawing 24 ft. up to Rochester Bridge. A considerable traffic is carried on by small vessels up to Maidstone, and by barges up to Tonbridge, the total length of the navigation being 43 m. The marshy lowlands along the course of the river have yielded exten- sive remains of Roman pottery, a plain ware of dark slate-colour. MEEANEE, or Miani, a village in Sind, India, on the Indus 6 m. N. of Hyderabad. Pop. (1901), 962. It is famous as the scene of the battle in which Sir Charles Napier, with only 2800 men, broke the power of the mirs of Sind on the 17th of February 1843. The result of this victory was the conquest and annexation of Sind.

MEEK, FIELDING BRADFORD (1817-1876), American geologist and palaeontologist, the son of a lawyer, was born at Madison, Indiana, on the 10th of December 181 7. In early life he was in business as a merchant, but his leisure hours were devoted to collecting fossils and studying the rocks of the neigh- bourhood of Madison. Being unsuccessful in business he turned his whole attention to science, and in 1848 he gained employ- ment on the U.S. Geological Survey in Iowa, and subsequently in Wisconsin and Minnesota. In 1852 he became assistant to Pro- fessor James Hall at Albany, and worked at palaeontology with him until 1858. Meanwhile in 1853 he accompanied Dr F. V. Hayden in an exploration of the ” Bad Lands ” of Dakota>ˆ.nd brought back valuable collections of fossils. In 1858 he went to Washington, where he devoted his time to the palaeontological work of the United States geological and

geographical surveys, his work bearing ” the stamp of the most faithful and con- scientious research,” and raising him to the highest rank asa palaeontologist. Besides many separate contributions to science, he prepared with W. M. Gabb (1839-1878), two volumes on the palaeontology of California (1864-1869); and also a Report on the Invertebrate Cretaceous and Tertiary Fossils of the U ; pper Missouri Country (1876). He died at Washington, on the 22nd of December 1876.

MSER, JAN VAN DER (1632-1675), more often called Vermeer of Delft — not to be confounded with the elder (1628- 1691) or younger (1656-1705) Van der Meer of Haarlem, or with Van der Meer of Utrecht — is one of the excellent Dutch painters about whom the Dutch biographers give usr little information. 1 Van der Meer, or Vermeer, was born in Delft, and was a pupil of Carel Fabritius, whose junior he was by only eight years. The works by Fabritius are few, but his contemporaries speak of him as a man of remarkable power, and the paintings now ascertained to be from his hand, and formerly ascribed to Rem- brandt, prove him to have been deeply imbued with the spirit and manner of that master. Whether Van der Meer had ever any closer relation to Rembrandt than through companionship with Fabritius remains uncertain. In 1653 he married Catherine Bolenes, and in the same year he entered the gild of St Luke of Delft, becoming one of the heads of the gild in 1662 and again in 1670. He died at Delft in 1675, leaving a widow and eight children. His circumstances cannot have been flourishing, for at his death he left twenty-six pictures undisposed of, and his widow had to apply to the court of insolvency to be placed under a curator, who was Leeuwenhoek, the naturalist.

For more than two centuries Van der Meer was almost com- pletely forgotten, and his pictures were sold under the names and forged signatures of the more popular De Hooch, Metsu, Ter Borch, and even of Rembrandt. The attention of the art- world was first recalled to this most original painter by Thore, an exiled Frenchman, who described his then known works in Musies de la Hollande (i8s8-r86o), published under the assumed name of W. Burger. The result of his researches, continued in his Galerie Suermondt and Galerie d’Arenberg, was afterwards given by him in a charming, though incomplete, monograph {Gazette des beaux-arts, 1866, pp. 297, 458, 542). The task was prosecuted with success by Havard (Les Artistes hollandais),

and by Obreen (Nederlandsche Kunstgeschiedenis, Dl. iv.), and we are now in a position to refer to Van der Meer's works. His pictures are rarely dated, but one of the most important, in the Dresden Gallery, bears the date 1656, and thus gives us a key to his styles. With the exception of the " Christ with Martha and Mary " in the Coats collection at Glasgow, it is perhaps the only one, hitherto recognized, that has figures of life size, though his authorship is claimed for several others. The Dresden picture of a " Woman and Soldier," with other two figures, is painted with remarkable power and boldness, with great command over the resources of colour, and with wonderful expression of life. For strength and colour it more than holds its own beside the neighbouring Rembrandts. To this early period of his career belong, from internal evidence, the "Reading Girl " of the same gallery, the luminous and masterly " View of Delft " in the museum of the Hague, the " Milk- Woman " and the small street view, both identified with the Six collection at Amsterdam, the former now in the Rijksmuseum; the magnifi- cent "The Letter" also at Amsterdam, "Diana and the Nymphs" (formerly ascribed to Vermeer of Utrecht) at the Hague Gallery, and others. In all these we find the same brilliant style and vigorous work, a solid impasto, and a crisp, sparkling touch. His first manner seems to have been influenced by the pleiad of painters circling round Rembrandt, a school which lost favour in Holland in the last quarter of the century. During the final ten or twelve years of his life Van der Meer adopted a second manner. We now find his painting smooth and thin, and his colours paler and softer. Instead of masculine vigour we have refined delicacy and subtlety, but in both styles beauty of tone and perfect harmony are conspicuous. Through all his work 1 This undeserved neglect seems to have fallen on him at an early period, for Houbraken (Groote Schouburgh, 1718), writing little more than forty years after his death, does not even mention him. The only definite information we have from a contemporary is given by Bleyswijck (Beschrijving der Stad Delft, 1687), who tells us that he was born in 1632, and that he worked with Carel Fabritius, an able disciple of Rembrandt, who lost his life by an explosion of a powder magazine in Delft in 1654. I* ' s to tn e patient researches of W. Burger (Th. Thor6), Havard, Obreen, Soutendam, and others, that we owe our knowledge of the main facts of his life, discovered in the archives of his native town.

may be traced his love of lemon-yellow and of blue of all shades. Of his second style typical examples are to be seen in " The Coquette" of the Brunswick Gallery, in the "Woman Reading" in the Van der Hoop collection now at the Rijksmuseum at Amsterdam, in the "Lady at a Casement " belonging to Lord Powerscourt (exhibited at the Royal

Academy, 1878) and in the ” Music Master and Pupil ” belonging to the King (exhibited at the Royal Academy, 1876).

Van der Meer’s authentic pictures in public and private collections amount to about thirty. There is but one in the Louvre, the “Lace Maker”; Dresden has the two afore- mentioned, while Berlin has three, all acquired in the Suermondt collection, and the Czernin Gallery of Vienna is fortunate in possessing a fine picture, believed to represent the artist in his studio. In the Arenberg Gallery at Brussels there is a remark- able head of a girl, half the size of life, which seems to be inter- mediate between his two styles. Several of his paintings are in private foreign collections. In all his work there is a singular completeness and charm. His tone is usually silvery with pearly shadows, and the lighting of his interiors is equal and natural. In all cases his figures seem to move in light and air, and in this respect he resembles greatly his fellow-worker De Hooch. It is curious to read that, at one of the auctions in Amsterdam about the middle of the 18th century, a De Hooch is praised as being ” nearly equal to the famous Van der Meer of Delft.”

See also Havard, Van der Meer (Paris, 1888) ; Vanzype, Vermeer de Delft (Brussels, 1908), and Hofstede de Groot, Jan Vermeer von Delft (Leipzig, 1909).

MEERAKE, a town in the kingdom of Saxony, 9 m. N. of Zwickau and 37 S. of Leipzig by rail. Pop. (1905), 26,005. Itcon- tains a fine medieval church (Evangelical) . It is one of the most important industrial centres of Germany for the manufacture of woollen and mixed cloths, and in these products has a large export trade, especially to America and the Far East. There are also extensive dyeworks, tanneries and machine factories. See Leopold, Chronik und Beschreibung der Fabrik- und HanieU sladt Meerane (1863).

MEERSCHAUM, a German word designating a soft white mineral sometimes found floating on the Black Sea, and rathel suggestive of sea-foam (Meerschaum), whence also the French name for the same substance, ecume de mer. It was termed by E. F. Glocker sepiolite, in allusion to its remote resemblance; to the ” bone “« of the sepia or cuttle-fish. Meerschaum is opaque mineral of white, grey or cream colour, breakup

with a conchoidal or fine earthy fracture, and occasionally though rarely, fibrous in texture. It can be readily scratched with the nail, its hardness being about 2. The specific gravity varies from 0-988 to r-279, but the porosity of the mineral ma)r lead to error. Meerschaum

is a hydrous magnesium silicate, with the formula H 4 Mg 2 Si30io, or Mg 2 Si 3 08-2H20.

Most of the meerschaum of commerce is obtained from Asia Minor, chiefly from the plain of Eski-Shehr, on the Haidar Pasha-Angora railway, where it occurs in irregular nodular masses, in alluvial deposits, which are extensively worked for its extraction. It is said that in this district there are 4000 shafts leading to horizontal galleries for extraction of the meerschaum. The principal workings are at Sepetdji-Odjaghi and Kemikdji-Odjaghi, about 20 m. S.E. of Eski-Shehr. The mineral is associated with magnesite (magnesium carbonate), the primitive source of both minerals being a serpentine. When first extracted the meerschaum is soft, but it hardens on exposure to solar heat or when dried in a warm room. Meerschaum is found also, though less abundantly, in Greece, as at Thebes, and in the islands of Euboea and Samos; it occurs also in serpentine at Hrubschitz near Kromau in Moravia. It is found to a limited extent at certain localities in France and Spain, and is known in Morocco. In the United States it occurs in serpentine in Pennsylvania (as at Nottingham, Chester county) and in South Carolina and Utah.

Meerschaum has occasionally been used as a substitute for soap and fuller's earth, and it is said also as a building material; but its chief use is for tobacco-pipes and cigar-holders. The

natural nodules are first scraped to remove the red earthy matrix, then dried, again scraped and polished with wax. The rudely shaped masses thus prepared are sent from the East to Vienna and other manufacturing centres, where they are turned and carved, smoothed with glass-paper and Dutch rushes, heated in wax or stearine, and finally polished with bone-ash, &c. Imitations are made in plaster of Paris and other preparations.

The soft, white, earthy mineral from Langbanshyttan, in Vermland, Sweden, known as aphrodite {a

MEERUT, a city, district and division of British India, in the United Provinces. The city is half-way between the Ganges and the Jumna, and has two stations on the North- western railway, 37 m. N.E. from Delhi. Pop. (1901), 118,129. The city proper lies south of the cantonments, and although dating back to the days of the Buddhist

emperor Asoka (c. 250 B.C.) Meerut owes its modern importance to its selection by the British government as the site of a great military station. In 1805 it is mentioned as ” a ruined, depopulated town.” The cantonment was established in 1806, and the population rose to 29,014 in 1847, and 82,035 in I 8S3- The town is an important centre of the cotton-trade. It is the headquarters of the 7th division of the northern army, with accommodation for horse and field artillery, British and native cavalry and infantry. It was here that the first outbreak of the Mutiny of 1857 took place. (See Indian Mutiny.)

The District of Meerut forms part of the upper Doab, or tract between the Ganges and the Jumna, extending from river to river. Area, 2354 sq. m. Though well wooded in places and abundantly supplied with mango groves, it has but few patches of jungle or waste land. Sandy ridges run along the low watersheds which separate the minor channels, but with this exception the whole district is one continuous expanse of careful and prosperous tillage. Its fertility is largely due to the system of irrigation canals. The Eastern Jumna canal runs through the whole length of the district, and supplies the rich tract between the Jumna and the Hindan with a network of distributary streams. The main branch of the Ganges canal passes across the centre of the plateau in a sweeping curve and waters the midland tract. The Anupshahr branch supplies irrigation to the Ganges slope, and the Agra canal passes through the southern comer of Loni pargana from the Hindan to the Jumna. Besides these natural and artificial channels, the country is everywhere cut up by small water-courses. The Burh Ganga, or ancient bed of the Ganges, lies at some distance from the modern stream; and on its bank stood the abandoned city of Hastinapur, the legendary capital of the Pandavas at the period of the Mahabharata, said to have been deserted many centuries before the Christian era, owing to the encroachments of the river.

The comparatively high latitude and elevated position of Meerut make it one of the healthiest districts in the plains of India. The average temperature varies from 57° F. in January to 87 in June. The rainfall is small, less than 30 in. annually. The only endemic disease in the district is malarial fever; but small-pox and cholera occasionally visit it as epidemics. The population in 1901 was 1,540,175, showing an increase of io-6% in the decade. The principal crops are wheat, pulse, millet, sugar-cane, cotton and indigo, but this last crop has declined of late years almost to extinction. The district is traversed by the North-Western railway, and also contains Ghaziabad, the terminus of the East Indian system, whence a branch runs to Delhi, while a branch of the Oudh & Rohil- khand railway from Moradabad to Ghaziabad was opened in

1900.

The authentic history of the district begins with the Moslem invasions. The first undoubted Mahommedan invasion was that of Kutbeddin in 1191, when Meerut town was taken and all the Hindu temples turned into mosques. In 1398 Timur captured the fort of Lord after a desperate resistance, and put all his Hindu

prisoners to death. He then proceeded to Delhi, and after his memorable sack of that city returned to Meerut, captured the town, razed all the fortifications and houses of the Hindus, and put the male inhabitants to the sword. The establishment of the great Mogul dynasty in the 16th century, under Baber and his successors, gave Meerut a period of internal tranquillity and royal favour. After the death of Aurangzeb, however, it was exposed to alternate Sikh and Mahratta invasions. From 1707 till 1775 the country was the scene of perpetual strife, and was only rescued from anarchy by the exertions of the military adventurer Walter Reinhardt, afterwards the husband of the celebrated Begum Samru, who established himself at Sardhana in the north, and ruled a large estate. The southern tract, however, remained in its anarchic condition under Mahratta exactions until the fall of Delhi in 1803, when the whole of the country between the Jumna and the Ganges was ceded by Sindhia to the British. It was formed into a separate district in 1818. In the British period it has become memorable for its connexion with the Mutiny of 1857.

The Division of Meerut comprises the northern portion of the Doab. It consists of the six districts of Dehra Dun, Saharanpur, Muzaffarnagar, Meerut, Bulandshahr and Aligarh. Area, 11,302 sq. m.; pop. (1901), 5,979,711, showing an increase of 12-3% in the decade.

See Meerut District Gazetteer (Allahabad, 1904).

MEETING (from ” to meet,” to come together, assemble, O. Eng. metan ; cf. Du. moelen, Swed. mota, Goth, gamotjan, &c, derivatives of the Teut. word for a meeting, seen in O. Eng. mot, moot, an assembly of the people; cf. witanagemoi) , a gathering together of persons for the purpose of discussion or for the transaction of business. Public meetings may be either those of statutory bodies or assemblies of persons called together for social, political or other purposes. In the case of statutory bodies, by-laws usually fix the quorum necessary to constitute a legal meeting. That of limited companies may be either by reference to the capital held, or by a fixed quorum or one in proportion to the number of shareholders. It has been held that in the case of a company it takes at least two persons to

constitute a meeting {Sharp v. Daws, 1886, 2 Q.B.D. 26). In the case of public meetings for social, political or other purposes no quorum is necessary. They may be held, if they are for a lawful purpose, in any place, on any day and at any hour, provided they satisfy certain statutory provisions or by-laws made under the authority of a statute for the safety of persons attending such meetings. If, however, a meeting is held in the street and it causes an obstruction those convening the meeting may be proceeded against for obstructing the highway. The control of a meeting and the subjects to be discussed are entirely within the discretion of those convening it, and whether the meeting is open to the public without payment, or subject to a charge or to membership of a specified body or society, those present are there merely by virtue of a licence of the conveners, which licence may be revoked at any time. The person whose licence is revoked may be requested to withdraw from the meeting, and on his refusal may be ejected with such force as is necessary. If he employs violence to those removing him he commits a breach of the peace for which he may be given into custody. An important English act has dealt for the first time with the disturbance of a public meeting. The Public Meeting Act 1908 enacted that any person who at a lawful public meeting acts in a disorderly manner for the purpose of preventing the trans- action of the business for which the meeting was called together shall be guilty of an offence, and if the offence is committed at a political meeting held' in any parliamentary constituency between the issue and return of a writ, the offence is made an illegal practice within the meaning of the Corrupt and Illegal Practices Prevention Act 1883. Any person who incites another to commit the offence is equally guilty. A public meeting is usually controlled by a chairman, who may be appointed by the conveners or elected by the meeting itself. On the chairman falls the duty of preserving order, of calling on persons to speak, deciding points of order, of putting questions to the meeting

for decision, and declaring the result and other incidental matters.

In England it is illegal, by a statute of George III. (Seditious Meetings Act 1817), .to hold a public meeting in the open air within 1 m. of Westminster Hall during the sitting of Parliament.

See C. P. Blackwell's Lav) of Meetings (1910).

MEGALOPOLIS, an ancient city of Arcadia, Greece, situated in a plain

about 20 m. S.W. of Tegea, on both banks of the Helisson, about 2§ m. above its junction with the Alpheus. Like Messene, it owed its origin to the Theban general Epaminondas, and was founded in 370 B.C., the year after the battle of Leuctra, as a bulwark for the southern Arcadians against Sparta, and as the seat of the Arcadian Federal Diet, which consisted of ten thousand men. The builders were protected by a Theban force, and directed by ten native oecists (official ” founders “),

an attempt to reduce Megalopolis; but the Thebans sent assistance and the city was rescued. Not sure of this assist- ance, the Megalopolitans had appealed to Athens, an appeal which gave occasion to the oration of Demosthenes, Ilepi MeyaKordXiTwv. The Spartans were now obliged to conclude peace with Megalopolis and acknowledge her autonomy. Nevertheless their feeling of hostility did not cease, and Megalopolis consequently entered into friendly relations with Philip of Macedon. Twenty years later, when the Spartans and their allies rebelled against the power of Macedon, Megalopolis remained firm in its allegiance, and was subjected to a long siege. After the death of Alexander, Megalopolis was governed by native tyrants. In the war between Cassander and Polyperchon it took part with the former and was besieged by the latter. On this occasion it was able to send into the field an army of fifteen thousand.

MEGALOPOLIS.

By permission from plans by R.‘W.Schultz & W.Loring in “Excavations at Megalopolis.” (Society for the Promotion of Hellenic Studies.}

Walker & CockejeU sc

who likewise attended to the peopling of the new city, which apparently drew inhabitants from all parts of Arcadia, but especially from the neighbouring- districts of Maenalia and Parrhasia. Forty townships are mentioned by Pausanias (viii. 27, 3-5) as having been incorporated in it. It was 50 stadia in circumference, and was surrounded with strong walls. Its territory was the largest in Arcadia, extending northward 24 rn. The city was built on a magnificent scale, and adorned with many handsome buildings, both public and private. Its temples contained many ancient statues brought from the towns incorporated in it. After the departure of Epaminondas, Lycomedes of Mantineia succeeded in drawing the Arcadian federation away from its alliance with Thebes, and it was consequently obliged to make common cause with Athens. An attempt on the part of the federation to use the treasures of the temple of Zeus at Olympia led to internal

dissensions, so that in the battle of Mantineia (362) one half of the Arcadians fought on the side of the Spartans, the other on that of the Thebans. After this battle many of the inhabitants of Megalopolis sought to return to their former homes, and it was only by the assistance of three thousand Thebans under Pammenes that the authorities were able to prevent them from doing so. In 353, when Thebes had her hands full with the so-called Sacred War, the Spartans made

In 234 B.C. Lydiades, the last tyrant of Megalopolis, voluntarily resigned his power, and the city joined the Achaean League. In consequence of this it was again exposed to the hatred of Sparta. In 222 Cleomenes plundered it and killed or dispersed its inhabitants, but in the year following it was restored and its inhabitants reinstated by Philopoemen, a native of the city. After this, however, it gradually sank into insignificance. The only great men whom it produced were Philopoemen and Polybius the historian. Lycortas, the father of the latter, may be accounted a third. In the time of Pausanias the city was mostly in ruins.

The site of Megalopolis was excavated by members of the British School at Athens in the years 1800-1892. The description of Pausanias is so clear that it enabled Curtius, in his Peloport*- nesos, to give a conjectural plan that was found to tally in most respects with the reality. The town was divided into two approximately equal parts by the river Helisson, which flows through it from east to west. The line of the walls may be traced, partly by remains, partly by the contours it must have followed, and confirms the estimate of Polybius that they had a circuit of 5° stades, or about 5J m. It is difficult to see how the river bed, now a broad and shingly waste, was dealt with in ancient times ; it must have been embanked in some way, but there are no remains to show whether the fortification wall

was carried across the river at either end or along the parallel embankments so as to make two separate enclosures. There must have been, in all probability, a bridge to connect the two halves of the city, but the foundations seen by Leake and others, and commonly supposed to belong to such a bridge, proved to be only the substructures of the precinct of Zeus Soter. The buildings north of the river were municipal and were grouped round the square agora. One, of which the complete plan has been recovered, is tbe portico of

Philip, a splendid building, which bounded the agora on the north; it was 300 ft., long, with three rows of columns running its whole length, three in the outer line to each one in the two inner lines; it had a slightly projecting wing at either end. At the south-west of the agora was found the precinct of Zeus Soter: it consists of a square court surrounded by a double colonnade, and faced on the west side. by a small temple; on the east side was an entrance or propylaeum approached by a ramp. In the midst of the court was a substructure which has been variously interpreted as an altar or as the base of the great group of Zeus and Megalopolis, which is recorded to have stood here. North of this was the Stoa Myropolis, forming the east boundary of the agora, and, between this and the Stoa of Philip, the Archeia or municipal offices. These buildings were of various dates, but seem all to fit into an harmonious plan. The buildings on the south and west of the agora have been almost entirely destroyed by the Helisson and a tributary brook. On the south bank of the river were the chief federal buildings, the theatre (noted by Pausanias as the largest in Greece), and the Thersilion or parliament hall of the ten thousand Arcadians. These two buildings form part of a common design, the great portico of the Thersilion facing the orchestra of the theatre. As a consequence of this arrangement, the plan of the theatre is abnormal. The auditorium has as its lowest row of seats a set of ” thrones ” or ornamental benches, which, as well as the gutter in front, were dedicated by a certain Antiochus; the orchestra is about 100 ft. in diameter; and in place of the western parados is a closed room called the Scanotheca. The chief peculiarity, however, lies in the great portico already mentioned, which has its base about 4 ft. 6 in. above the level of the orchestra. It was much too lofty to serve as a proscenium; yet, if a proscenium of the ordinary Greek type were erected in front, it would hide the lower part of the columns. Such a proscenium was actually erected in later times; and beneath it were the foundations for an earlier wooden proscenium, which was probably erected only when required. In later times steps were added, leading from the base of the portico to the level of the orchestra. The theatre was probably used, like the theatre at Athens, for political assemblies; but the adjoining Thersilion provided covered accommodation for the Arcadian ten thousand in wet weather. It is a building unique in plan, sloping up from the centre towards all sides like a theatre. The roof was supported by columns that were placed in lines radiating from the centre, so as to obscure as little as possible the view of an orator in this position from all parts of the building; there were two entrances in each side.

See Excavations at Megalopolis (E. A. Gardner, W. Loring, G. C.

Richards, W. J. Woodhouse; Architecture, by R. W. Schultz) ; Supplementary Paper issued by the Society for the Promotion of Hellenic Studies, 1892; Journal of Hellenic Studies, xiii. 328, A. G. Bather; p. 319, E. F. Benson ("Thersilion"); 1898, p. 15, J. B. Bury (" Double City ") ; W. Dorpfeld (" Das griechische Theater "); O. Puchstein, " Griechische Buhne " (Theatre).

(E. Gr.)

MEGANUCLEUS (also called Macronucletjs), in Infusoria (q.v.)., the large nucleus which undergoes direct (amitotic) division in fission, and is lost during conjugation, to be replaced by a nucleus, the result of the karyogamy of the tnicronuclei.

MEGAPODE (Gr. juˆyos, great and tovs, foot), the name given generally to a small but remarkable family of birds, characteristic of some parts of the Australian region, to which it is almost peculiar. The Megapodiidae, with the Cracidae and Phasianidae, form that division of the sub-order Galli named by Huxley

Peristeropodes (Proc. Zool. Soc, 1868, p. 296). Their most remarkable habit is that of leaving their eggs to be hatched without incubation, burying them in the ground (as many reptiles do), or in a mound of earth, leaves and rotten wood which they scratch up. This habit attracted attention nearly four hundred years ago, 1 but the accounts given of it by various travellers were generally discredited, and as examples of the birds, probably from their unattractive plumage, appear not to have been brought to Europe, no one of them was seen by any ornithologist or scientifically described until near the end of the first quarter of the 19th century. The first member of the family to receive authoritative recognition was one of the largest, inhabiting the continent of Australia, where it is known as the brush-turkey, and was originally described by J. Latham in 1821 under the misleading name of the New Holland vulture. It is the Catheturus lathami of modern ornithologists, and is nearly the size of a hen turkey. This East Australian bird is of a sooty-brown colour, relieved beneath by the lighter edging of some of the feathers, but the head and neck are nearly bare, beset with fine bristles, the skin being of a deep pinkish-red, passing above the breast into a large wattle of bright yellow. The tail is commonly carried upright and partly folded, some- thing like that of a domestic fowl. Allied to it are three or four species of Talegattus, from New Guinea and adjacent islands.

Another form, an inhabitant of South and West Australia, commonly known in England as the mallee-bird, but to the colonists as the "

native pheasant ” — the Lipoa ocellata, as described by J. Gould in the Proc. Zool. Soc. (1840), p. 126, has much shorter tarsi and toes, the head entirely clothed, and the tail expanded. Its plumage presents a combination of greys and browns of various tints, interspersed with black, white and buff, the wing-coverts and feathers of the back bearing each near the tip an oval or subcircular patch, whence the scientific name of the bird is given, while a stripe of black feathers with a median line of white extends down the front of the throat from the chin to the breast. There is but one species of this genus known, as is also the case with the next to be mentioned, a bird long known to inhabit Celebes, but not fully 1 Antonio Pigafetta, one of the survivors of Magellan’s voyage, records in his journal, under date of April 1521, among the peculia- rities of the Philippine Islands, then first discovered by Europeans, the existence of a bird there, about the size of a fowl, which laid its eggs, as big as a duck’s, in the sand, and left them to be hatched by the heat of the sun {Premier voyage autour du monde, ed. Amor- etti, Paris, A.R. ix. 88). More than a hundred years later the Jesuit Nieremberg, in his Historia naturae, published at Antwerp in 1635, described (p. 207) a bird called ” Daie,” and by the natives named ” Tapun,” not larger than a dove, which, with its tail (!) and feet excavated a nest in sandy places and laid therein eggs bigger than those of a goose. The publication at Rome in 1651 of Hernan- dez’s Hist, avium novae Hispaniae shows that his papers must have been accessible to Nieremberg, who took from them the passage just mentioned, but, as not unusual with him, misprinted the names which stand in Hernandez’s work (p. 56, cap. 220) ” Daic ” and ” Tapum ” respectively, and omitted his predecessor’s important addition ” Viuit in Philippicis.” Not long after, the Dominican Navarrete, a missionary to China, made a considerable stay in the Philippines, and returning to Europe in 1673 wrote an account of the Chinese empire, of which Churchill {Collection of Voyages and Travels, vol. i.) gave an English translation in 1704. It is therein stated (p- 45) that in many of the islands of the Malay Archipelago ” there is a very singular bird call’d Tabon” and that ” What I and many more admire is, that it being no bigger in body than an ordinary chicken, tho’ long legg’d, yet it lays an egg larger than a gooses,, so that the egg is bigger than the bird itself. ... In order to lay its eggs, it digs in the sand above a yard in depth; after laying, it fills up the hole and makes it even with the rest; there the eggs hatch with the heat of the sun and sand.” Gemelli Careri, who travelled from 1663 to 1699, and in the latter year published an account of his voyage round the world, gives similar evidence respecting this bird, which he calls ” tavon,” in the Philippine Islands {Voy. du tour du monde, ed. Paris, 1727, v. 157, 158). The megapode of Luzon is fairly described by Camel or Camelli

in his observations on the birds of the Philippines communicated by Petiver to the Royal Society in 1703 {Phil. Trans, xxiii. 1398). In 1726 Valentyn published his elaborate work on the East Indies, wherein (deel iii. bk. v. p. 320) he correctly describes the megapode of Amboina under the name of ” malleloe,” and also a larger kind found in Celebes.

described until 1846, 1 when it received from Salomon Mtiller (Arch. f. Naturgeschichte, xii. pt. 1, p. 116) the name of Macrocephalon maleo, but, being shortly afterwards figured by Gray and Mitchell (Gen. Birds, iii. pi. 123) under the generic term of Megacephalon, has since commonly borne the latter appellation. This bird bears a helmet-like protuberance on the back of its head, all of which, as well as the neck, is bare and of a bright red colour; the plumage of the body is glossy black above, and beneath roseate-white.

Of the megapodes proper, constituting the genus Megapodius, about fifteen species are admitted. The birds of this genus range from the Samoa Islands in the east, through the Tonga group, to the New Hebrides, the northern part of Australia, New Guinea and its neighbouring islands, Celebes, the Pelew Islands and the Ladrones, and have also outliers in detached portions of the Indian Region, as the Philippines (where indeed they were first discovered by Europeans), Labuan, and even the Nicobars — though none is known from the intervening islands of Borneo, Java or Sumatra. Within what may be deemed their proper area they are found, says A. R. Wallace (Ceogr. Distr. Animals, ii. 341), ” on the smallest islands and sandbanks, and can evidently pass over a few miles of sea with ease.” Indeed, proof of their roaming disposition is afforded by the fact that the bird described by Lesson (Voy. Coquille: Zoologie, p. 703) as Alecthelia urvillii, but now considered to be the young of Megapodius freycineti, flew on board his ship when more than 2 m. from the nearest land (Guebe), in an exhausted state, it is true, but that may be attributed to its youth. The species of Megapodius are about the size of small fowls, the head generally crested, the tail very short, the feet enormous, and, with the exception of M. wallacii (Proc. Zool. Soc, i860, Aves, pi. 171), from the Moluccas, all have a sombre plumage.

Megapodes are shy terrestrial birds, of heavy flight, and omnivorous diet. In some islands they are semi-domesticated, although the flesh is dark and generally unpalatable. (A. N.)

MEGARA, an ancient Greek town on the road from Attica to Corinth. The country which belonged to the city was called Meyapts or i) Meyapi/oJ; it occupied the broader part of the isthmus between Attica, Boeotia, Corinth, and the two gulfs, and its whole area is estimated by Clinton at 143 sq. m. The range of Mount Geraneia extends across the country from east to west, forming a barrier between continental Greece and the Peloponnesus. The shortest road across this range passes along the eastern side of the mountains, and the most difficult part is the celebrated Scironian rocks, the mythic home of the robber Sciron. The only plain in the rugged little country was the White Plain, in which was situated the only important town, Megara. The modern town of Megara is situated on two low hills which formed part of the ancient site; it is the chief town of the eparchy of Megaris; pop. about 6400. It contains few remains of antiquity, except of the aqueduct and basin, said to have been made by the architect Eupalinus for the tyrant Theagenes. (E. Gr.)

From the somewhat conflicting evidence of mythology it may be gathered that in prehistoric days Megara had maritime intercourse with the southern Aegean. The early inhabitants, whose race is unknown, were extirpated or absorbed in the Dorian migration, for in historic times the city had a homogeneous Dorian population. Favoured by its proximity to two great waterways and by its two ports, Nisaea on the Saronic and Pegae on the Corinthian Gulf, Megara took a prominent part in the commercial expansion of Greece from the 8th century onwards, and for two hundred years enjoyed prosperity out of proportion to the slight resources of its narrow territory. Its trade was mainly directed towards Sicily, where Megarian colonies were established at Hybla (Megara Hyblaea) and Selinus, and towards the Black Sea, in which region the Megarians were probably

1 As we have seen, it was mentioned in 1726 by Valentyn, and a young example, was in 1830 described and figured by Quoy and Gaimard (Voy. de V Astrolabe: Oiseaux, p. 239, pi. 25) as the Megapodius rubripes of Temminck, a wholly different bird.

pioneers of Greek commerce. In the Sea of Marmora they had to face the competition of the Samians, with whom they waged a war concerning the town of Perinthus, and of Miletus; but on the Bosporus they established themselves by means of settlements at Chalcedon and, above all, Byzantium (founded, according to tradition, 675 and 658 respectively). In the Black Sea they exploited the shores of Pontus and Scythia, whose products they exchanged for textiles spun from the wool of their own country. Their chief colonies in this sea •were Astacus and Heraclea in Bithynia, and another Heraclea in the Crimea.

In the later 7th century this current of trade dwindled in face of the great commercial and colonizing activity of Miletus; it probably received further injury through the subsequent interference of Athens on the Hellespont. Simul- taneously Megarian commerce in Sicily began to be supplanted by Corinth and Corcyra. •

Megara's economic development entailed a change in the dis- tribution of wealth, and consequently of political power, which is commented upon in the elegies of Theognis (q.v.). The original land- holding aristocracy, which had probably initiated and for a time monopolized commerce, was partly supplanted by prosperous upstarts, and with the general increase of prosperity began to lose its hold upon the community of artisans. In the ensuing party struggles the city passed under a tyrant, Theagenes (about 640), whose rule was too brief to produce great changes. The power of the nobles would seem to have been more effectively broken in a war with Athens, in which Megara ultimately lost the island of Salamis (about 570, see Solon), for shortly afterwards the con- stitution was changed to a democracy, and eventually was fixed as an oligarchy of a moderate type.

During the Persian wars the state, which had recently joined the Peloponnesian League, could still muster 3000 hoplites. But the subsequent expansion of Athens ruined the commerce of Megara, and the town itself was threatened with absorption by some powerful neighbour. In 459 an attack by Corinth, which had always coveted Megara's territory, induced the people to summon the aid of the Athenians, who secured Megara in battle' and by the construction of long walls between the capital and its port Nisaea. In 445 a revulsion of feeling led the Megarians to massacre their Athenian garrison. The Athenians retaliated by placing an embargo upon Megarian trade throughout their empire (432), and in the Pelopon- nesian War, which the Megarians had consequently striven to hasten on, reduced their neighbours to misery by blockade and devastations, In 424 they nearly captured Megara, in collusion with a democratic party within the town, and succeeded in securing Nisaea, which they held till 410. In the 4th century Megara re- covered some measure of prosperity, but played an insignificant part in politics, its only notable move being the participation in the final conflict against Philip II. of Macedon (338). During the Macedonian supremacy the town passed in turn from Cassander and Demetrius Poliorcetes to Antigonus Gonatas, and finally was incorporated in the Achaean League. Megara suffered severely during the Civil War of 48 B.C., but seems at some later period to have received new settlers. It maintained itself as a place of some size in subsequent centuries, but was depopulated by the

Venetians in a.d. 1500. The inhabitants of the modern village are mostly of Albanian origin.

In literature Megara figures as the reputed home of the comedian Susarion, and in the 4th century gave its name to a school of philosophy founded by Euclid.

See Strabo ix. 391-395; Theognis; Thucydides i.iv.; Aristo phanes, Acharnians, 729-835; F. Cauer, Parteien und Politiker in Megara und Athen (Stuttgart, 1890), pp. 1-44; B. V. Head, Hisloria numorum (Oxford, 1887), pp. 329-330; R. Delbriick and K. G. Vollmoller, “Das Brunnenhaus des Theagenes,” in Mitteil. d. deutsch. Inst. Athen. XXV. (1900). (M. O. B. C.)

MEGARA HYBLAEA (perhaps identical with Hybla Major), an ancient city of Sicily, on the E. coast, 12 m. N.N.W. of Syracuse, founded in 728 B.C. by Megarean colonists, who had previously settled successively at Trotilon, Leontini -and Thapsus. A hundred years later it founded Selinus, apparently because it had no room for development. It never seems to have been a town of great importance, and had no advantages of position. It was destroyed by Gelon about 481 B.C., and its walls seem to have been razed to the ground. In the Athenian expedition against Syracuse (415-413) Lamachus proposed (it being then deserted) to make it the Athenian base of opera- tions; but his advice was not taken, and in the next spring the Syracusans fortified it. In 309 it was still fortified; but, after Marcellus captured it, in 214, we hear little more of it. Excavations carried on in 1891 led to the discovery of the

northern portion of the western town wall, which in one section served at the same time as an embankment against floods (it was apparently more conspicuous in the time of P. Cluver, Sicilia, p. 133), of an extensive necropolis, about 1000 tombs of which have been explored, and of a deposit of votive objects from a temple. The harbour lay to the north of the town.

See P. Orsi in Monumenti dei Lincei (1891), i. 689-950; and Atti del congresso delle scienze storiche, v. 181 (Rome, 1904). (T. As.)

MEGARIAN SCHOOL OF PHILOSOPHY. This school was founded by Euclides of Megara, one of the pupils of Socrates. Two main ele- ments went to make up the Megarian doctrine. Like the Cynics and the

Cyrenaics, Euclides started from the Socratic principle that virtue is know- ledge. But into combination with this he brought the Eleatic doctrine of Unity. Perceiving the difficulty of the Socratic dictum he endeavoured to give to the word ” knowledge ” a definite content by divorcing it absolutely from the sphere of sense and experience, and confining it to a sort of transcendental dialectic or logic. The Eleatic unity is Goodness, and is beyond the sphere of sensible apprehension. This goodness, therefore, alone exists; matter, motion, growth and decay are figments of the senses; they have no existence for Reason. ” Whatever is, is ! ” Knowledge is of ideas and is in conformity with the necessary laws of thought. Hence Plato in the Sophist describes the Megarians as ” the friends of ideas.” Yet the

Megarians were by no means in agreement with the Platonic idealism. For they held that ideas, though eternal and im- movable, have neither life nor action nor movement.

This dialectic, initiated by Euclides, became more and more opposed to the testimony of experience; in the hands of Eubulides and Alexinus it degenerated into hairsplitting, mainly in the form of the reductio ad absurdum. The strength of these men lay in destructive criticism rather than in construction: as dialecticians they were successful, but they contributed little to ethical speculation. They spent their energy in attacking Plato and Aristotle, and hence earned the opprobrious epithet of Eristic. They used their dialectic subtlety to disprove the possibility of motion and decay; unity is the negation of change, increase and decrease, birth and death. None the less, in ancient times they received great respect owing to their intellectual pre-eminence. Cicero (Academics, ii. 42) describes their doctrine as a nobilis disciplina,” and identifies them closely with Parmenides and Zeno. But their most immediate in- fluence was upon the Stoics (q.v.), whose founder, Zeno; studied under Stilpo. This philosopher, a man of striking and attractive personality, succeeded in fusing the Megarian dialectic with Cynic naturalism. The result of the combination was in fact a juxtaposition rather than a compound; it is manifestly impos- sible to find an organic connexion between a practical code like Cynicism and the transcendental logic of the Megarians. But it served as a powerful stimulus to Zeno, who by descent was imbued with oriental mysticism.

For bibliographical information about the Megarians, see Euclides; Eubulides; Diodorus Cronus; Stilpo. See also Eleatic School; Cynics; Stoics; and, for the connexion between the Megarians and the Eretrians, Menedemus and Phaedo. Also Zeller, Socrates and the Socratic Schools; Dyeck, De Megaricorum doctrina (Bonn, 1827);

Mallet, Histoire de Vicole de Migare (Paris, 1845); Ritter, Ober die Philosophie der'meg. Schule; _ Prantl, Geschichte der Logik, i. 32; Henne, L'icole de Migare (Paris, 1843); Gomperz, Greek Thinkers (Eng. trans. 1905), ii. 170 seq.

HEGARON, the principal hall of the ancient Greek palace, situated in the andron or men's quarter. Examples have

been found at Tiryns and Mycenae, and references are made to it in the Iliad and the Odyssey.

MEGATHERIUM (properly Megalotherium), a huge extinct edentate mammal from the Pleistocene deposits of Buenos Aires, typifying the family Megatheriidae (or Megalotheriidae), and by far the largest representative of the Edentata. Except, indeed, for its relatively shorter limbs Megatherium americanum rivalled an elephant in bulk, the total length of the skeleton being 18 feet, five of which are taken up by the tail. The Megatheriidae, which include a number of genera, are collectively

Fig. 1. — Skeleton of the Megatherium, from the specimen in the Museum of the Royal College of Surgeons of England.

known as ground-sloths, and occupy a position intermediate between the sloths and the ant-eater: their skulls being of the type of the former, while their limbs and vertebrae conform in structure to those of the latter. As in the other typical South American edentates, there are no teeth in the front of the jaws, while those of the cheek-series usually comprise five pairs in the upper aiid four in the lower. In nearly all the other Pleistocene forms these teeth were subcylindrical in shape, with the summit of the crown (except sometimes in the first pair) forming a cup-like depression; enamel being in all cases absent. From all these Mega- therium differs in the form and struc- ture of the teeth.

In form, as shown in fig. 2, the teeth are quadrangular prisms, each of which is surmounted by a pair of transverse ridges. They grew apparently throughout life, and were implanted to a great depth in the jaws, being 7 or 8 in.' in length, with a cross-section of at least an inch and a half. The ridges on the crown are due to the arrangement of the vertical layers of hard dentine (fig. 3, &), softer vaso- dentine (») and cement ©. The skull is relatively small, with the lower jaw very deep in its central portion, and pro- duced in part into a long snout-like symphysis for the reception, doubtless, of a large and fleshy tongue (fig. 2). Unlike sloths, the megatherium has seven cervical vertebrae ;

and the spines of all the trunk-vertebrae incline backwards. The pelvis and hind-limbs are much more powerful than the fore-quarters; thereby enabling these animals, in all probability, to rear themselves on their hind-quarters, and thus pull down the branches of trees : if not, indeed, in some cases to bodily uproot the trees them- selves. Large chevron-bones are sus- pended to the vertebrae of the tail,

which was massive, and probably afforded a support when the monster was sitting up. The humerus has no foramen, and the

(From Owen.)

Fig. 2. — Lower Jaw and Teeth of Megatherium.

whole fore-limb was very mobile. The first front toe was rudimen- tary, having no phalanges, but the fifth was rather less aborted, al- though clawless; the other three carried enormous claws, protected by reflected sheaths. The hind-foot is remarkable for the great back- ward projection of the calcaneum, and likewise for the peculiar shape of the astragalus; the middle toe alone carries a claw, this being of huge size, and ensheathed like those of the fore foot. No trace

(From Owen.) Fig. 3. — Section of Upper Molar Teeth of Megatherium.

of a bony armour in the skin has been detected; but, from the evidence of other genera, it may be assumed that the body was clothed in a coat of long, coarse hair. Although similar teeth occur in the phosphorite beds of South Carolina, which may have been transported from elsewhere, no undoubted remains of Mega- therium are known from North America.

The typical species ranged from Argentina and Chili to Brazil, for certain small ground-sloths from Patagonia with Megatherium- like teeth, see Mylodon. . (R. L.*)

MEGHNA, a river of India. It forms, in the lower part of its course, the great estuary of the Bengal delta, which conveys to the sea the main body of the waters of the Ganges and the Brahmaputra, which unite at Goalanda in Faridpur district. The united waters, turbid and of great depth, are sometimes split into half a dozen channels by sand-banks, sometimes spread into a wide sheet of water. The river enters the sea

by four principal mouths, enclosing the three large islands of Dakshin Shahbazpur, Hatia and Sandwip. It is navigable by native boats and river steamers all the year; but the navigation is difficult and sometimes dangerous on account of shifting sand-banks and snags, and boisterous weather when the monsoon is blowing. The most favourable season is between November and February. Alluvion and diluvion are constantly taking place, especially along the seaboard, and in Noakhali district the land is said to have made rapid advance on the sea; while the islands fringing the mouth are annually being cut away and redeposited in fresh shapes. The regular rise of the tide is from 10 to 18 ft., and at springs the sea rushes up in a dangerous bore. It is greatest at the time of the biennial equinoxes, when navigation is sometimes impeded for days together. The tidal wave advances like a wall topped with foam of the height of nearly 20 ft., and at the rate of 15 m. an hour; in a few minutes it is past, and the river has changed from ebb to flood tide. A still greater danger is the ” storm wave ” which occasionally sweeps up the Meghna under a cyclone.

MEHADIA, a market town of Hungary, in the county of Krass6-Szoreny, 287 m. S.E. of Budapest by rail. Pop. (1900), 2492. The town is the site of the ancient Roman colony Ad Mediant, near which passed the Roman road from the Danube to Dacia. It contains the ruins of a fortress, and other Roman remains. In its neighbourhood are the famous Hercules baths (Hungarian, Herkulesfurdo). These are situated in a narrow rocky ravine in the valley of the Cserna, where there are 22 hot springs, of which nine are in use, the most powerful being the Hercules spring. The springs are all strongly impregnated with

salts of sulphur, iodine, bromine and chlorine, and their average temperature is 70 to 145° F. They were famous in the Roman period under the name of Thermae Herculis or F antes Herculis. Their popularity is attested by numerous inscriptions and relics. After the fall of the Roman Empire they fell into disuse until 1 73 5, but in modern times they have been much frequented.

MEHEMET ALI (1 760-1849), pasha and afterwards viceroy of Egypt, was born at Kavala, a small seaport on the frontier of Thrace and Macedonia. His father, an Albanian, was an aga, a small yeoman farmer, and he himself lived in his native town for many years as a petty official and trader in tobacco. In 1798 he became second in command of a regiment of bashi-bazouks, or volunteers, recruited in his neighbourhood to serve against Napoleon in Egypt. He took part in the battle of Aboukir (July 25, 1799), was driven into the sea with the routed Turks, and was saved from drowning by the gig of the British

admiral, Sir Sidney Smith. In 1801 he returned to Egypt, in command of his regiment, and on the 9th of May distinguished himself by heading a bold cavalry charge at the battle of Rahmanieh. In the troubled years that followed, Mehemet Ali, leader of a compact body of Albanian clansmen, was in the best position to draw advantage from the struggle for power between the Mame- lukes and the representatives of the Porte. In 1803 he cast in his lot with the former; in 1804 he turned against them and proclaimed his loyalty to the sultan; ina8o5 the sheiks of Cairo, in the hope of putting a stop to the intolerable anarchy, elected him pasha, and a year later an imperial firman confirmed their choice. The disastrous British expedition of 1807 followed; and while at Constantinople the prestige of the sultan was being undermined by the series of revolutions which in 1808 brought Mahmud II. to the throne, that of Mehemet Ali was enhanced by the exhibition at Cairo of British prisoners and an avenue of stakes decorated with the heads of British slain.

The situation revealed to the astute Albanian boundless possibilities for gratifying his ambition. In spite of his chance victories, he was too shrewd an observer not to recognize the superiority of European methods of warfare; and as the first step towards the empire of which he dreamed he determined to create an army and a fleet on the European model. In 1808 the build- ing and organization of the navy was begun with the aid of French officers and engineers. In 181 1 the massacre of the Mamelukes left Mehemet Ali without a rival in Egypt, while the foundations of his empire beyond were laid by the war against the Wahhabls and the conquest of the holy cities of Mecca and Medina. The Wahhabi War, indeed, dragged on till 1818, when Ibrahim (q.v.), the pasha's son, who in 1816 had driven the remnant of the Mamelukes into Nubia, brought it to an end. This done, the pasha turned his attention southward to the vast country watered by the Upper Nile. In 1820 the oasis of Siwa was subdued by his arms; in 1823 he laid the foundations of Khartum.

By this time Mehemet Ali was the possessor of a powerful fleet and of an army of veterans disciplined and drilled by European officers. To obtain these money had been necessary; and to raise money the pasha had instituted those internal " reforms " — the bizarre system of state monopolies and the showy experi- ments in new native industries which are described in the article Egypt (q.v.). The inherent viciousness of these expedients had, however, not as yet been revealed by their inevitable results, and Mehemet Ali in the eyes of the world was at once the most enlightened and the most powerful of the sultan's valis. To Mahmud II., whose whole policy was directed to strengthening v – the authority of the central power, this fact would

have sufficed to make him distrust the pasha and desire his overthrow; and it was sorely against his will that, in 1822, the ill-success of his arms against the insurgent Greeks forced him to summon Mehemet Ali to his aid. The immediate price was the pashalik of Crete; in the event of the victory of the Egyptian arms the pashaliks of Syria and Damascus were to fall to Mehemet Ali, that of the Morea to his son Ibrahim. The part played by Mehe- met Ali in the Greek War is described elsewhere (see Turkey: History; Greece: History; Greek Independence, War or;

Ibrahim). The intervention of the powers, culminating in the shattering of the Egyptian fleet at Navarino (q.v.), robbed him of his reward so far as Greece was concerned; the failure of his arms in face of this intervention gave Sultan Mahmud the excuse he desired for withholding the rest of the stipulated price of his assistance.

This disappointment of his ambition would not perhaps in itself have sufficed to stir Mehemet Ali to revolt against his master; but it was ominous of perils to come, which the astute pasha thought it wise to forestall. The sultan's policy had been consistently directed to crushing the overgrown power of his vassals; in the spring of 1831 two rebellious pashas, Hussein of Bosnia and Mustafa of Scutari, had succumbed to his arms; and, since he was surrounded and counselled by the personal enemies of the pasha of Egypt, it was likely that, so soon as he should feel himself strong enough, he would deal in like manner with Mehemet Ali. It was to anticipate this peril that Mehemet Ali determined himself to open the struggle: on the 1st of Novem- ber 1 83 1 a force of 9000 Egyptian infantry and 2000 cavalry crossed the frontier into Syria and met at Jaffa the fleet which brought Ibrahim as commander-in-chief. The combined forces at once laid siege to St Jean d'Acre.

The stubborn resistance of the garrison delayed Ibrahim's progress; and, meanwhile, wild rumours went abroad as to Mehe- met Ali's intentions. He was master of the holy cities, and the official Moniteur Ottoman denounced his supposed plan of aiming at the caliphate in collusion with the sherif of Mecca. As for the pasha himself, he loudly disclaimed any such disloyal pre- tensions; his aim was to chastise Abdulla, pasha of Acre, who had harboured refugees from his " reforms "; to overthrow Khusrev, who had encouraged him in his refusal to surrender them; to secure the fulfilment of the sultan's

promise with regard to Syria and Damascus. Mahmud, on the other hand, was torn between hatred of the pasha and hatred of the Christian powers which had forced him to make concessions to the Greeks. Voices urged him to come to terms with Mehemet Ali, secure peace in Islam, and turn a united face of defiance against Europe; and for a while he harboured the idea. He was conscious of his own intense unpopularity, the outcome of his efforts at reform; he knew that in popular opinion Mehemet Ali was the champion of Islam against the infidel caliph, and that the issue of a struggle with him was more than doubtful. He was hampered by the unpaid debt to Russia; by unrest in Bosnia and Albania; above all, by the revolt of the Greek Islands, which had left his navy, deprived of its best sailors, in no condition to dispute the Egyptian com- mand of the sea. In the end, however, his pride prevailed; in April 1833 the Turkish commander-in-chief Hussein Pasha left Constantinople for the front; and in the third week in May the ban of outlawry was launched against Mehemet Ali.

Meanwhile, Ibrahim had occupied Gaza and Jerusalem as well as Jaffa; on the 27th of May, a few days after the publication of the ban, Acre was stormed; on the 15th of June the Egyptians occupied Damascus. Ibrahim pressed on with characteristic rapidity, his rapid advance being favoured by the friendly attitude of the various sections of the Syrian population, whom he had been at pains to conciliate. He defeated the Ottoman advance-guard at Horns on the oth of July and at Hamah on the nth, entered Aleppo on the 17th, and on the 29th inflicted a crushing defeat on the main Turkish army under Hussein Pasha at the pass of Beilan. All Syria was lost to the sultan, and the Egyptian advance-guard passed the mountain defiles into Adana in Asia Minor.

Mahmud, in desperation, now turned for help to the powers. Russian aid, though promptly offered, was too double-edged a weapon to be used save at the last extremity. Austrian diplo- macy was, for the moment, that of Russia. France had broken her long traditioh of friendship for Turkey by the occupation of Algiers. Great Britain, prodigal of protestations of goodwill, alone remained ; and to her Mahmud turned with a definite offer of an offensive and defensive alliance. Stratford Canning, who was at Constantinople for the purpose of superintending the negotiations for the delimitation of the frontiers of Greece, wrote

home urging the government to accept, and suggesting a settle- ment of the Egyptian question which foreshadowed that of 1841. Palmerston, however, did not share Canning's belief in the possible

regeneration of Turkey; he held that an isolated inter- vention of Great Britain would mortally offend not only Russia but France, and that Mehemet Ali, disappointed of his ambitions, would find in France a support that would make him doubly dangerous. 1

In the autumn Sultan Mahmud, as a last independent effort, despatched against Ibrahim the army which, under Reshid Pasha, had been engaged in pacifying Albania. The result was the crowning victory of the Egyptians at Konia (Dec. 21). The news reached Constantinople at the same time as Count Muraviev arrived on a special mission from the tsar. The Russian offers were at once renewed of a squadron of battleships and of a land force for the protection of the capital. Efforts were made to escape the necessity of accepting the perilous aid. • Ottoman agents, backed by letters from the French charge d'affaires, were sent to Mehemet Ali and to Ibrahim, to point out the imminence of Russian intervention and to offer modified terms. Muraviev himself went to Alexandria, where, backed by the Austrian agent, Count Prokesch-Osten, he announced to the pasha the tsar's immutable hatred of rebels. Mehemet Ali merely protested the complete loyalty of his intentions; Ibrahim, declaring that as a soldier he had no choice but to obey his father's orders, advanced to Afium-Karahissar and Kutaiah, whence he wrote to the sultan asking his gracious permission to advance to Brusa. He was at the head of 100,000 men, well organized and flushed with victory; the Ottoman army survived only as demoralized rabble. Panic seized the Seraglio; and at the beginning of February the assis- tance of Russia was formally demanded. The representatives of France and Great Britain made every effort to secure a reversal of this fatal step; but, while they were threatening and promising, Russia was acting, and on the 20th of February a Russian squadron entered the Bosporus.

In view of this it became necessary for the objecting powers to take a new line. The new French ambassador, Admiral Roussin, had arrived on the 17th; he now, with the full concurrence of Mandeville, the British charge d'affaires, persuaded the Porte to invite the Russians to withdraw, undertaking that France would secure the acceptance by Mehemet Ali of the sultan's terms. A period of suspense followed. The Russian squadron was detained by contrary winds, and before it could sail peremptory orders arrived from the tsar for it to remain until Ibrahim should have repassed the Taurus mountains. Meanwhile, Mehemet Ali had scornfully rejected the offers of the Porte; he would be con- tent with nothing but the concession of his full demands — Syria, Icheli, Aleppo, Damascus and Adana. France and Great Britain now urged the sultan to yield, and in March a Turkish agent was sent to Ibrahim to offer the pashaliks of Syria, Aleppo and Damascus. The

crisis was precipitated by the arrival on the 5th of April of a second division of the Russian fleet in the Bosporus, and of a Russian force of 6000 men, which landed on the Asiatic shore. The Porte now tried once more to modify its terms; but the Western powers were now intent on getting rid of the Russians at all costs, and as a result of the pressure they brought to bear on both parties the preliminary convention of Kutaiah, conced- ing all the Egyptian demands, was signed on the 8th of April, and Ibrahim began his withdrawal. The convention stipulated for the bestowal of the pashalik of Adana on Ibrahim ; but when on the 16th he received the official list of appointments, he found-, that Adana had been expressly reserved by the sultan. He at once arrested his march ; but the pressure of famine in the capital, caused by the cutting off of supplies from Asia and the presence of the large Russian force, compelled Mahmud to yield, and on the 3rd of May a firman ceded Adana to Ibrahim under the pretext of appointing him muhassil, or collector of the revenue.

When Lord Ponsonby, the new British ambassador, arrived at

1 Canning's original memorandum is in the Foreign Office Records in the volume marked F.O., Turkey: From Sir Stratford Canning (August to December, 1832). It bears elaborate pencil notes in Palmerston's handwriting, in part already obliterated.

Constantinople on the ist of May he found Russia practically in possession. Sultan Mahmud was to the last degree embittered against the powers which, with lively protestations of friendship, had forced him to humiliate himself before his hated vassal. Russia had given him deeds, not words; and to Russia he com- mitted himself. A further contingent of six or seven thousand Russians had arrived on the 22nd of April; Russian engineers were busy with the fortifications along the Straits; Russian agents alone were admitted to the sultan's presence. "It is manifest," wrote Lord Ppnsonby, " that the Porte stands in the relation of vassal to the Russian government." 1 The relation was soon to be yet more manifest. Before, on the 9th of July, the Russian fleet, with the Russian troops on board, weighed anchor for the Black Sea, there was signed at the palace of Unkiar Skelassi the famous treaty (July 8, 1833) which, under the guise of an offensive and defensive alliance, practically made Russia the custodian of the gates of the Black Sea. (See Turkey: History.)

Mehemet Ali had triumphed, but he was well aware that he held the fruits of his victory by a precarious tenure. He was still but a vali among the rest, holding his many pashaliks nominally by the sultan's will and subject to annual re- appointment; and he knew that both his power and his life would be forfeit so soon as the sultan should be strong enough to deprive him of them. To achieve this one end had, indeed, become the overmastering passion of Mahmud's life, to defeat it the object of all Mehemet Ali's policy. So early as 1834 it seemed as though the struggle would be renewed; for Mehemet Ali had extended to his new pashaliks his system of monopolies and conscription, and the Syrians, finding that they had exchanged Turkish whips for Egyptian scorpions, rose in a passion of revolt. It needed the intervention of Mehemet Ali in person before, in the following year, they were finally subdued. Meanwhile it had needed all the diplomatic armoury of the powers to prevent Mahmud hastening to the assistance of his " oppressed subjects." The threats of Great Britain and France, the failure of Russia to back him up, induced him to refrain; but sooner or later a renewalof the war was inevitable; for the sultan, with but one end in view, was reorganizing his army, and Mehemet Ah, who in the autumn of 1834 had assumed the style of viceroy and sounded the powers as to their attitude in the event of his declaring his complete independence, refused to continue to pay tribute which he knew would be used against himself.

The crisis came in 1838. In March the Egyptians were severely defeated by the revolted Arabs of the Hauran; and the Porte, though diplomatic pressure kept it quiet, hurried on prepara- tions for war. Mehemet Ah, too, had small reason for post- poning the conflict. The work of Moltke, who with other German officers who had been engaged in organizing the Turkish army, threatened to destroy his superiority in the field; the commercial treaty signed by the Ottoman government with Great Britain (Aug. 16), which applied equally to all the territories under his rule, threatened to destroy at a blow the lucrative monopolies which supplied him with the sinews of war. Months of suspense followed; for the powers had threatened to cast their weight into the scale against whichever side should prove the aggressor, and Mehemet Ali was too astute to make the first move. In the end Mahmud's passion played into his hands. The old sultan thirsted to crush his rebellious vassal, at any cost; and on the 21st of April 1839 the Ottoman army, stationed at Bir on the Euphrates, crossed the stream and invaded Syria. On the 23rd of June it was attacked and utterly routed by Ibrahim at Nezib. On the ist of July the old sultan died, unconscious of the fatal news, leaving his throne to Abd- ul-Mejid, a lad of sixteen. To complete the desperateness of the

situation the news reached the capital that Ahmed Pasha, the Ottoman admiral-in-chief, had sailed to Alexandria and surrendered his fleet to Mehemet Ali, on the pretext that the sultan's advisers were sold to the Russians.

So far as the forces of the Ottoman Empire were concerned, 1 From Lord Ponsonby, F.O., Turkey, May 22, 1833.

Mehemet Ah was now absolute master of the situation. The grand vizier, in the sultan's name, wrote beseeching him to avoid the further shedding of Mussulman blood, offering him a free pardon, the highest honours of the state, the hereditary pashalik of Egypt for himself, and Syria for Ibrahim until he should succeed his father in Egypt. Mehemet Ali replied diplo- matically; for, though these offers fell far short of his ambitions, a studious moderation was essential in view of the doubtful attitude of the European powers.

On the 27th of July the ambassadors of the five powers pre- sented to the Porte a joint note, in which they declared that an agreement on the Eastern Question had been reached by the five Great Powers, and urged it " to suspend all definite decision made without their concurrence, pending the effect of their interest in its welfare." The necessity for showing a united front justified the diplomatic inexactitude; but the powers were agreed on little except the need for agreement. Especially was this need realized by the British government, which feared that Russia would seize the occasion for an isolated intervention under the treaty of Unkiar Skelessi. On the ist of August Palmerston wrote to Ponsonby impressing upon him that the representatives of the powers, in their communications with the Porte, " should act not only simultaneously in point of time, but identically in point of manner "—a principle important in view of later develop- ments. Yet it was a task all but impossible to preserve this appearance of unanimity in view of the divergent views within the concert. France and Great Britain had hitherto acted together through common opposition to the supposed designs of Russia. Austria, too, now that the revolutionary spectres of 1830 had been laid, was reverting to her traditional opposition to Russia in the affairs of the Near East, and Metternich sup- ported Palmerston's proposal of an international conference at Vienna. Everything depended on the attitude of the emperor Nicholas. This was ultimately determined by his growing dis- trust of Austria and his perennial hatred of the democratic regime of France. The first caused him to reject the idea of a conference of which the activities would have been primarily directed against Russia; the second led him to drive a wedge into the Anglo- French entente by making direct overtures to Great Britain. Palmerston

listened to the tsar's proposals, conveyed through Baron Brunnow, " with surprise and admiration." The emperor Nicholas was prepared to accept the views of Great Britain on the Turco-Egyptian question; to allow the Treaty of Unkiar Skelessi to lapse; to act henceforth in the Ottoman Empire only in concert with the other powers, in return for an agreement closing the Dardanelles to the war-ships of all nations and to extend the same principle to the Bosporus. Finally, Brunnow was empowered to arrange a coalition of the great powers with a view to the settlement of the Egyptian question; and in this coalition the tsar was willing, for political reasons, that France should be included, though he stated his personal preference for her exclusion.

To these views Austria and, as a natural consequence, Prussia acceded without difficulty. The attitude of France was a more doubtful quantity. In France Mehemet Ali had become a popular hero; under him French civilization had gained a foothold in Egypt; he was regarded as invincible; and it was hoped that in alliance with him French influence in the Mediterranean would be supreme. Palmerston, on the other hand, believed that the Ottoman empire would never be secure until " the desert had been placed between " the pasha of Egypt and the sultan; and the view that the coalition should be directed against Mehemet Ali was shared by the other powers. In the circumstances France should either have loyally accepted the decision of the majority of the concert, to which she had committed herself by signing the joint note of the 27th of July, or should have frankly stated her intention of taking up a position outside. The fact that she did neither led to a crisis that for a moment threatened to plunge Europe into war.

For nearly a year the diplomatic pourparlers continued without an agreement being reached; France insisted on Mehemet Ali's receiving the hereditary pashalik of Syria as well as that of

Egypt, a proposition to which Palmerston, though sincerely- anxious to preserve the Anglo-French entente, refused to agree. The tension of the situation was increased when, on the 20th of February 1840, Thiers came into power. The diplomacy of Guizot, backed now by Austria and Prussia, had succeeded in persuading Palmerston to concede the principle of allowing Mehemet Ah to receive, besides Egypt, the pashalik of Acre as far as the frontiers of Tripoli and Damascus (May 7). Thiers, however, refused to listen to any

suggestion for depriving him of any part of Syria; but, instead of breaking off the corre- spondence and leaving the concert, he continued the negotiations, and before long circumstances came to the knowledge of the British government which seemed to prove that he was only doing so with a view to gaining time in order to secure a separate settlement in accordance with French views.

The opportunity for this arose from a change in the situation at Constantinople, where the dismissal of Khusrev Pasha had, in Mehemet Ali's view, removed the main obstacle to his reconcilia- tion with the sultan. He proposed to the French consul-general at Alexandria to make advances to the Porte, and suggested sending back the Ottoman fleet as an earnest of his good inten- tions, a course which, it was hoped, " would lead to a direct and amicable arrangement of the Turco-Egyptian question." On the 21st of June his envoy, Sami Bey, actually arrived at Con- stantinople, ostensibly to congratulate the sultan on the birth of a daughter, really to make use of the French influence now supreme at the Porte in order to effect a settlement. In the circumstances the proper course for Thiers to have pursued would have been to have communicated to the powers, to whom he was bound by the moral engagement of the 27th of July 1839, the new conditions arising out of Mehemet Ali's offer. Instead he wrote to Guizot, on the 30th of June, saying that the situation argued strongly in favour of postponing any decision in London, adding: " I have written to Alexandria and Constantinople to counsel moderation on both sides; but I have been careful to forbid the agents to enter on their own account, and as a French under- taking, on a negotiation of which the avowed aim is a direct arrangement. If such an enterprise is imputed to us, you will be in a position to deny it."

The discovery of what seemed an underhand intrigue on the part of France produced upon the powers exactly the effect that Thiers had foreseen and deprecated. They regarded it as an attempt to ruin the work of the concert and to secure for France a " complete individual triumph " at Alexandria and Constanti- nople, and their countermove was to sign at London on the 15th of July, without the concurrence of France, a convention with the Porte for the settlement of the affairs of the Levant. By this instrument it was agreed that the terms to be offered to Mehemet Ali having been concerted with the Porte, the signatory powers would unite their forces in order to compel the pasha to accept the settlement. As to the terms to be offered, it was arranged that, in the event of Mehemet Ali yielding within ten days, he should receive the hereditary pashalik of Egypt and the admini- stration for life of southern Syria, with the title of Pasha of Acre and the possession of the fortress of St Jean d'Acre. At the end of ten days,

should he remain obdurate, the offer of Syria and Acre would be withdrawn; and if at the end of another ten days he was still defiant, the sultan would hold himself at liberty to withdraw the whole offer and to take such measures as his own interests and the counsels of his allies might suggest to him.

The news of this ” mortal affront ” to the honour of France caused immense excitement in Paris. The whole press was clamorous for war; Thiers declared that the alliance with Great Britain was shattered, and pressed on warlike preparations; even Louis Philippe was carried away by the fever. The immediate effect was that Mehemet Ali, confident of French assistance, maintained a defiant attitude. The situation, however, was rapidly changed by the unexpected results of the armed intervention of the Allies. The appearance of the com- bined British, Austrian and Russian fleets, under Sir Charles Napier, off Beirut (Aug. n) was the signal for a general rising of the Syrians against Ibrahim’s tyranny. On the nth of

Septernber, Suleiman Pasha not having obeyed the summons to evacuate the town, the bombardment was begun, and Otto- man troops were landed to co-operate with the rebels. On the 3rd of October Beirut fell; and Ibrahim, cut off from his com- munications by sea, and surrounded by a hostile population, began a hurried retreat southward. On the 3rd of November Acre surrendered to the allied fleet. Mehemet Ali’s power in Syria had collapsed like a pricked bubble; and with it had gone for ever the myth of his humane and enlightened rule. The sole question now was whether he should be allowed to retain Egypt itself.

On the 15th of September the sultan, who had broken off all negotiations with Mehemet Ah on receipt of the news of the Syrian revolt, acting on the advice of Lord Ponsonby, declared the pasha deposed, on the ground that the term allowed by the Convention of London had expired, and nominated his successor. Mehemet Ah received the news with his accustomed sang-froid, observing to the consuls of the four powers, who had come to notify their own removal, that ” such denunciations were nothing new to him; that this was the fourth, and that he hoped to get over it as well as he had done the other three, with the help of God and the Prophet.” In the end his confidence proved to be justified. The news of the events in Syria and especially of the deprivation of Mehemet Ali had produced in France what appeared to be an exceedingly dangerous temper; the French government declared that it regarded the maintenance of Mehe- met Ah in Egypt as essential to the European balance of power; and Louis Philippe sought to make it clear to the British govern- ment, through

the king of the Belgians, that, whatever might be his own desire to maintain peace, in certain events to do so would be to risk his throne. Palmerston, indeed, who did not believe that under the Bourgeois Monarchy France would trans- late her brave words into action, was in favour of settling the Turco-Egyptian question once for all by depriving Mehemet Ali of Egypt as well. The influences against him, however, were too powerful. Metternich protested against a course which would result, in his opinion, either in a war or a revolution in France; King Leopold enlarged on the wickedness and absurdity of risking a European war for the sake of putting an end to the power of an old man who could have but few years to live; Queen Victoria urged her ministers to come to terms with France and relieve the embarrassments of the " dear King "; and Lord Melbourne, with the majority of the cabinet, was in favour of compromise. When therefore, on the 8th of October, Guizot, in an interview with Palmerston, presented what was practically an ultimatum on the part of France, " it was determined that this intimation should be met in a friendly spirit, and that Lord Palmerston should seethe Ministers of the other powers and agree with them to acquaint the French that they with England would use their good offices to induce the Porte not to insist on the deprivation of Mehemet Ali so far as Egypt is concerned." In accordance with this Palmerston instructed Ponsonby to press upon the sultan, in the event of Mehemet Ali's speedy submission, not only to withdraw the sentence of deprivation but to confer upon him the hereditary pashalik of Egypt.

For a while it seemed that even this would not avert a Euro- pean war. Thiers still maintained his warlike tone, and the king's speech prepared by him for the opening of the Chambers on the 28th of October was in effect a declaration of defiance to Europe. Louis Philippe himself, however, was not prepared to use this language; whereupon Thiers resigned, and a~mew cabinet was formed under Marshal Soult, with Guizot as foreign secretary. The equivocal tone of the new speech from the Throne raised a storm of protest in the Chambers and the country. It was, however, soon clear that Palmerston's diagnosis of the temper of the French bourgeois was correct ; the clamour for war subsided; on the 4th of December the address on the Egyptian Question proposed by the government was carried, and peace was assured. Nine days earlier Sir Charles Napier had appeared with a British squadron off Alexandria and, partly by persuasion, partly by threats; had induced Mehemet Ali to submit to the sultan and to send back the Ottoman fleet, in return for a guarantee

of the hereditary pashalik of Egypt. This arrangement was ratified by Palmerston; and all four powers now combined to press it on the reluctant Porte, pointing out, in a joint note of the 30th of January 1841, that ” they were not conscious of advising a course out of harmony with the sovereignty and legitimate rights of the sultan, or contrary to the duties imposed on the Pasha of Egypt as a subject appointed by His Highness to govern a province of the Ottoman Empire.” This principle was elabor- ated in the firman, issued on the 13th of February, by which the sultan conferred on Mehemet Ali and his heirs by direct descent the pashalik of Egypt, the greatest care being taken not to bestow any rank and authority greater than that enjoyed by other viziers of the empire. By a second firman of the same date Mehemet Ah was invested with the government of Nubia, Darfur, Khordofan and Sennaar, with their dependencies. On the 10th of June the firman was solemnly promulgated at Alexandria.

Thus ended the phase of the Egyptian Question with which the name of Mehemet Ali is specially bound up. The threatened European conflict had been averted, and presently the wounded susceptibilities of France were healed by the invitation extended to her to take part in the Straits Convention. As for Mehemet Ah himself, he now passes off the stage of history. He was an old man; his mind was soon to give way; and for some time before his death on the 2nd of August 1849 the reins of power were held by his son and successor Ibrahim.

Probably no Oriental ruler, not even excepting Ali of Iannina, has ever stirred up so much interest among his contemporaries as Mehemet Ali. The spectacle of an Eastern despot apparently advancing on the lines of European progress was in itself as astonishing as new. Men thought they were witnessing the dawn of a new era in the East; Mehemet Ali was hailed as the most beneficent and enlightened of princes; and political philo- sophers like Jeremy Bentham, who sent him elaborate letters of good advice, thought to find in him the means for developing their theories in virgin soil. In fact the pasha was an illiterate barbarian, of the same type as his countryman Ah of Iannina, courageous, cruel, astute, full of wiles, avaricious and boundlessly ambitious. He never learned to read or write, though late in life he mastered colloquial Arabic; yet those Europeans who were brought into contact with him praised alike the dignity and charm of his address, his ready wit, and the astonishing perspicacity which enabled him to read the motives of men and of governments and to deal effectively with each situation as it arose.

The latest account of Mehemet Ali and the European crisis arising out of his revolt is that by W. Alison Phillips in vol. x. ch. xvii. of the Cambridge Modern History (1907). The biblio- graphy attached to this chapter (p. 852) gives a list of all the principal published documents and works, together with some analysis of the unpublished Foreign Office records bearing on the subject. Of the works mentioned C. de Freycinet's La Question d'£gypte (Paris, 1905) gives the most authoritative account of the diplomatic developments. (W. A. P.)

MEHIDPUR, or Mahidpur, a town of India, in Indore state of Central India, on the right bank of the Sipra, 1543 ft. above the sea, and 24 m. N. of Ujjain. Pop. (1901), 6681. Though of some antiquity and frequented by Hindu pilgrims, it is best known for the battle fought in the neighbourhood on the 20th of December 181 7, in which Sir John Malcolm defeated the army of Holkar. The result was the Treaty of Mandasor and the pacification of Malwa. Mehidpur was again the scene of some sharp fighting during the Mutiny. The British cantonment, placed here in 181 7, was removed in 1882.

MEHUL, ETIENNE HENRI (or Etienne Nicolas) (1763- 1817), French composer, was born at Givet in Ardennes, on the 24th of June 1763. His father being too poor to give him a regular musical education, his first ideas of art were derived from a poor blind organist of Givet; yet such was his aptitude that, when ten years old, he was appointed organist of the con- vent of the Recollets. In 1775 an able German musician and organist, Wilhelm Hauser, was engaged for the monastery of Lavaldieu, a few miles from Givet, and M6hul became his

occasional pupil. In 1778 he was taken to Paris by a military officer, and placed himself under Edelmann, a good musician and harpsichord player. His first attempts at instrumental com- position in 1 781 did not succeed, and he therefore turned his attention to sacred and dramatic music. Gluck gave him advice in his studies. After various disappointments during his efforts for six years to obtain, at the Grand Opera, a representa- tion of his Cora et Alonzo, he offered to the Opera Comique his Euphrosine et Coradin, which, being accepted and performed in 1790, at once fixed his reputation. His opera of Stratonice was also received with enthusiasm in 1792. After several unsuccessful operas, his Adrien appeared, and added much to his fame, which was further increased by his three best works, Le Jeune Henri, Uthal and Joseph, the finest of the series. Uthal was written for an orchestra without violins. Mehul held a post as one of the four inspectors of the Paris Conservatoire, but this office made him feel continually the insufficiency of his early studies, a want which he

endeavoured to remedy by incessant application. TimoUon, Ariodant and Bion followed. Epicure was composed by Mehul and Cherubini jointly; but the superiority of the latter was evident. Mehul's next opera, L'Irato, failed. After writing forty-two operas, besides a number of songs for the festivals of the republic, cantatas, and orchestral pieces of various kinds, his health gave way, from an affection of the chest, and he died on the . 18th of October 181 7 in Paris.

See Lives by Pougin (1889), Viellard (1859), and Quatremere de Quincey (1818).

MEIBOM, HEINRICH (1555-1625), German historian and poet, was born at Lemgo on the 4th of December 1555, and died on the 20th of September 1625, at Helmstedt, where he had held the chair of history and poetry since 1583. He was a writer of Latin verses (Parodiarum horatianarum libri III. et sylvarum libri II., 1588); and his talents in this direction were recognized by the emperor Rudolph II., who ennobled him; but his claim to be remembered rests on his services in elucidat- ing the medieval history of Germany.

His Opuscula historica ad res germanicas spectantia was edited and published in 1660 by his grandson, Heinrich Meibom (1638- 1700), who was professor of medicine and then of history and poetry at Helmstedt, and incorporated his grandfather's work with his own Rerum germanicarum scriptores (1688).

MEIDERICH, a town of Germany, in the Prussian Rhine province, 23 m. by rail N.E. of Ruhrort, whose river harbour is in great part within its confines. Pop. (1905), 40,822. Iron and steel works, coal-mines, saw-mills, brickworks, and machine- shops furnish the principal occupations of the inhabitants. Meiderich, which is first mentioned in 874, was united with Duisburg in 1905.

See Graeber, Tausendjahrige Geschichte von Meiderich (1893).

MEIKTILA, a district and division in Upper Burma. The district is the most easterly of the districts in the dry zone, and has an area of 2183 sq. m. It lies between KyauksS, Myingyan, Yamethin, and on the east touches the Shan States. It is a slightly undulating plain, the gentle slopes of which are composed of black " cotton " soil and are somewhat arid. The only hills above 300 ft. are on the slopes of the Shan hills. The lake is the chief feature of the district. It is artificial, and according to Burmese legend was begun 2400 years ago by the grandfather of Gautama Buddha. It is 7 m. long, averages half a mile broad, and covers an area of 35 sq. m< With the Minhla and other

connected lakes it irrigates a large" extent of country.

There are small forest reserves, chiefly of cutch. Large numbers of cattle are bred. The chief agricultural products are rice, sesamum, cotton, peas, maize, millet and gram. Pop. (1901), 252,305. Famines in 1891, 1895 and 1896 led to con- siderable emigration. The climate is healthy except in the submontane townships. The temperature rises to ioo° F. and over between the months of March and June, and the mean minimum in January is about 61°. The rainfall is uncer- tain (36-79 in. in 1893, 25-59 in 1891). The vast majority

of the population are Buddhists. The headquarters town, Meiktila, stands on the banks of the lake, which supplies good drinking water. Pop. (1001), 7203. A wing of a British regiment is stationed here. A branch railway connects it at Thazi station with the Rangoon-Mandalay line, and continues westward to its terminus on the Irrawaddy at Myingyan.

The division includes the districts of Meiktila, Kyaukse, Yamethin and Myingyan, with a total area of 10,852 sq. m., and a population (1901) of 992,807, showing an increase of 10-2% in the preceding decade, and giving a density of 91 inhabitants to the square mile. All but a small portion of the division lies in the dry zone, and cultivation is mainly dependent on irrigation.

MEILHAC, HENRI (1831-1897), French dramatist, was born in Paris on the 21st of February 1831, and while a young man began writing fanciful articles for the newspapers and vaudevilles for the theatres, in a vivacious boulevardier spirit which brought him to the front. About i860 he met Ludovic Halevy, and the two began a collaboration in writing for the stage which lasted for twenty years. An account of their work is given under Halevy. Meilhac wrote a few pieces with lesser collaborators. In 1888 he was elected to the Academy. He died at Paris in 1897.

MEINBERG, a village and watering-place of Germany, in the principality of Lippe Detmold, situated in a pleasant valley under the Teutoburger Wald, 12 m. S.E. from Detmold by the railway to Altenbeken. Pop. (1905), 1300. The waters of Meinberg, which attract annually about 1200 visitors, are sulphur springs, and are used for drinking, bathing and inhala- tion. They became known in the 18th

century.

See Gilbert and Meissner, Bad Meinberg und seine Kurmitlel (Berlin, 1902).

HEINEKE, JOHANN ALBRECHT FRIEDRICH AUGUST

(1790-1870), German classical scholar, was born at Soest in Westphalia on the 8th of December 1790. After holding educational posts at Jenkau and Danzig, he was director of the Joachimsthal gymnasium in Berlin from 1826 to 1856. He died at Berlin on the 12th of December 1870. He was distinguished in conjectural criticism, the comic writers and Alexandrine poets being his favourite authors.

His most important works are: Graecorum comicorum fragmenta (1839-1857, the first volume of which contains an essay on the development of Greek comedy and an account of its chief representatives) ; Aristophanes (i860) ; Analecta alexandrina (1843, containing the fragments of Rhianus, Euphorion, Alexander of Aetolia, and Parthenius) ; Callimachus (1861); Theocritus, Bion, Moschus (3rd ed., 1856); Alciphron (1853); Strabo (2nd ed., 1866) and Vindiciae slrabonianae (1852) ; Stobaeus > (1855-1863) ; Athenaeus (1858-1867). See monographs by F. Ranke (1871), H. Sauppe (1872), and E. Forstemann in Allgemeine deutsche Biographie, XXI. (1885) ; also Sandys, Hist. Class. Schol. (1908), iii. 117.

HEININGEN, a town of Germany, capital of the duchy of Saxe-Meiningen, romantically situated in forests on the right bank of the Werra, 40 m. S. of Eisenach by rail. Pop. (1905), 15,989. It consists of an old town and several handsome suburbs, but much of the former has been rebuilt since a fire in 1874. The chief building is the Elisabethenburg, or the old ducal palace, containing several collections; it was built mainly about 1680, although part of it is much older. Other buildings are the Henneberger Haus with a collection of antiqui- ties, and the town church, with twin towers, built by the emperor Henry II. in the nth century. The theatre enjoyed for many years (1875-1890) a European reputation for its actors and scenic effects. The English garden, a beautiful public park, contains the ducal mortuary chapel and several monuments, including busts of Brahms and Jean Paul Richter.

Meiningen, which was subject to the bishops of Wiirzburg (1 000-1542), came into the possession of the duke of Saxony in 1583, having in the meantime belonged to the counts of Henneberg. At the partition of 1660 it fell to the share of Saxe-Altenburg, and in 1680

became the capital of Saxe- Meiningen.

See E. Dobner, Bausteine zu einer Geschichte der Sladt Meiningen (Meiningen, 1902).

MElR, Jewish rabbi of the 2nd century, was born in Asia Minor and according to legend was a descendant of the family of Nero. He was the most notable of the disciples of Aqiba {q.ii.), and after the Hadrianic repressions of a.d. 135 was instrumental in refounding the Palestinian schools at Usha. Among his teachers was also Elisha ben Abuya (q.v.), and. Mei'r continued his devotion to Elisha after the latter's apostasy. He is said to" have visited Rome to rescue his wife's sister. His wife, Beruriah, is often cited in the Talmud as an exemplar of generosity and faith. She was a daughter of the martyr Hananiah ben Teradion. On one occasion Meir, who had been frequently troubled by his ungodly neighbours, uttered a prayer for their extinction. " Nay," said Beruriah, " it is written (Ps. civ. 35) let sins be blotted out, not sinners "; whereupon Mei'r prayed for the evildoers' conversion. But she is best known for her conduct at the sudden death of her two sons. It was the Sabbath, and Meir returned home towards sunset. He repeatedly asked for the children, and Beruriah, after parrying his question, said: " Some time ago a precious thing was left with me on trust, and now the owner demands its return. Must I give it back ? " " How can you question it?" rejoined her husband. Beruriah then led him to the bed whereon were stretched the bodies of the children. Mei'r burst into tears. But the wife explained that this was the treasure of which she had spoken, adding the text from Job: " The Lord gave and the Lord hath taken away; blessed be the name of the Lord." Meir himself was the author of many famous sayings: " Look not to the flask, but to its contents. Many a new vessel contains old wine, but there are old casks which do not contain even new wine." " Condole not with a mourner while his dead is laid out before him." " Man cometh into the world with closed hands as though claiming the ownership of all things; but he departeth hence with hands open and limp, as if to show that he taketh naught with him." " What God does is well done." " The tree itself supplies the handle of the axe which cuts it down." His wisdom was proverbial, and to him was in particular assigned an intimate acquaintance with fables, and he is reported to have known 300 Fox-Fables. " With the death of Rabbi Meir," says the Mishnah (Sota ix. 15), " Fabulists ceased to be."

Meir's wide sympathies were shown in his inclusion of all mankind in the hopes of salvation (Sifra to Leviticus xviii. 5). He was certainly on friendly terms with heathen scholars. Meir contributed largely to the material from which finally emerged the Mishnah. His dialectic skill

was excessive, and it was said jestingly of him that he could give 150 reasons to prove a thing clean, and as many more to prove it unclean. His balanced judgment fitted him to carry on Aqiba's work, sifting and arranging the oral traditions, and thus preparing the ground for the Mishnaic Code.

Meir left Palestine some time before his death, owing to disagreements between him and the Patriarch. He died in Asia Minor, but his love for the Holy Land remained dominant to the last. " Bury me," he said, " by the shore, so that the sea which washes the land of my fathers may touch also my bones." The tomb shown as that of Meir at Tiberias is inauthentic. ■■■

See Bacher, Agada der Tannaiten, vol. n. ch. i. ; Graetz, History of the Jews (Eng. trans.), vol. n. ch. xvi.; Jewish Encyclopedia (whence some of the above cited sayings are quoted), viii. 4.32-435. On Meir's place in the history of the fable, see J. Jacobs, The Fables of Aesop, i. in, &c. (see Index s.v.). (I. A.)"\

MEIR OF ROTHENBURG (c. 1215-1293), German rabbi and poet, was born in Worms c. 121 5. He played a great part in organizing the Jewish communal life of the middle ages. In 1286 for some unknown reason he was thrown into prison in Alsace, where he remained until his death in 1293. His friends offered to find a ransom, but he declined the suggestion, fearing that the precedent would lead to extortion in other cases. He wrote glosses to the Talmud (tosaphot) and many Responsa of the utmost value for historical research. Through his disciples Asher ben Yehiel and Mordecai ben Hillel, Meir exercised much

influence on subsequent developments of Judaism. He was also a liturgical poet of considerable merit. One of his finest elegies is translated into English in Nina Davis's Songs of Exile. See L. Ginzberg, Jewish Encyclopedia, viii. 437-440. (I. A.) MEIRINGEN, the principal village on the Hasle (or the upper Aar) valley in the Swiss canton of Bern. It is built at a height of 1969 ft. on the right bank of the Aar and on the level floor of the valley, but is much exposed to the south wind (or Fokn), and has several times been in great part destroyed by fire (1632, 1879 and 1891). It has 3077 inhabitants, all German-speaking and Protestants. The parish church is ancient, and above it are the ruins of the medieval castle of Resti. Meiringen is frequented by

travellers in summer, as it is the meeting-point of many routes: from Interlaken by the lake of Brienz and Brienz, from Lucerne by the Briinig railway (28 m.), from Engelberg by the Joch Pass (7267 ft.), from the upper Valais by the Grimsel Pass (7100 ft.), and from Grindelwald by the Great Scheidegg Pass (6434 ft.). Many waterfalls descend the hill-sides, the best known being the Reichenbach and the Alpbach, while the great gorge pierced by the Aar through the limestone barrier of the Kirchet is remarkable. The village and valley belonged of old to the emperor, who in 1234 gave the advowson to the Knights of St Lazarus, by whom it was sold in 1272 to the Austin Canons of Interlaken, on the sup- pression of whom in 1528 it passed to the state. In 1310 the emperor mortgaged the valley to the lords of Weissenburg, who sold it in 1334 to the town of Bern. (W. A. B. C.)

MEISSEN, a town of Germany, in the kingdom of Saxony, on both banks of the Elbe, 15 m. N.W. from Dresden, on' the railway to Leipzig via Dobeln. Pop. (1905), 32,336. The old town lies on the left bank of the river, between the streams Meisse and Triebisch, and its irregular hilly site and numerous fine old buildings make it picturesque. Most of its streets are narrow and uneven. The cathedral, one of the finest early Gothic buildings in Germany, stands on the Schlossberg, 160 ft. above the town. It is said to have been founded by the emperor Otto the Great, but the present building was .begun in the 13th century and was completed about 1450. Here are tombs of several rulers and princes of Saxony, including those of Albert and Ernest, the founders of the two existing branches of the Saxon house. The cathedral also contains works by Peter Vischer and Lucas Cranach and several other interesting monu- ments. A restoration, including the rebuilding of the two towers, was carried out in 1903-1908. Adjoining the cathedral is the castle, dating from 1471-1483, but restored and named the Albrechtsburg about 1676. Another restoration was undertaken after i860, when a series of historical frescoes was painted upon its walls. A stone building of the 13th century connects the Schlossberg with the Afraberg, which owes its name to the old convent of St Afra. The convent was suppressed by Duke Maurice in 1543, and was by him converted into a school (the Fursten Schule), one of the most renowned classical schools in Germany, which counts Lessing and Gellert among its former pupils. Other public buildings of interest are the town-hall, built in 1479 and restored in 1875;- the fine town church, called the Frauenkirche or Marienkirche; the Nikolaikirche and the Afrakirche. The Franciscan church is now used as a museum of objects connected with the history of Meissen. Since 17 10 Meissen has been the seat of the manufacture of Dresden china. Till i860 the royal porcelain factory was in the Albrechtsburg, but in that year it

was transferred to a large new building in the Triebischtal, near the town. Meissen also contains iron foundries, factories for making earthenware stoves and pottery* sugar refineries, breweries and tanneries. A considerable trade is carried on in the wine produced in the surrounding vineyards, and other industries are spinning and weaving.

Meissen was founded about 920 by Henry the Fowler (see Meissen, Margraviate). From 968 to 1581 Meissen was the seat of a line of bishops, who ranked as princes of the empire. During the 15th century the town suffered greatly from the Hussites, and it was captured by the imperial troops during

the war of the league of Schmalkalden, and again in the Thirty Years' Waf. In 1637 it suffered much from the Swedes, and in 1745 it fell into the hands of the Prussians. The bridge over the Elbe was destroyed by the French in 1813, and again by the Saxons in June 1866 in order to impede the march of the Prussians on Dresden. Colin on the right bank of the Elbe was incorporated with Meissen in 190 1.

See Reinhard, Die Stadt Meissen, ihre Merkwurdigkeiten (Meissen, 1829); Loose, Alt-Meissen in Bildern (Meissen, 1889); Jaschke, Meissen und seine Kirchen (Leipzig, 1902) ; and Gersdorf, Urkunden-buch der Stadt Meissen (Leipzig, 1873).

MEISSEN, a German margraviate now merged in the kingdom of Saxony. The mark of Meissen was originally a district centring round the castle of Meissen or Misnia on the Middle Elbe, which was built about 920 by the German king Henry I., the Fowler, as a defence against the Slavs. After the deatt of Gero, margrave of the Saxon east mark, in 965, his territory was divided into five marks, one of which was called Meissen. In 985 the emperor Otto III. bestowed the office of margrave upon Ekkard I., margrave of Merseburg, and the district com- prising the marks of Meissen, Merseburg and Zeitz was generally known as the mark of Meissen. In 1002 Ekkard was succeeded by his brother Gunzelin, and then by his sons Hermann I. and Ekkard II. Under these margraves the area of the mark was further increased, but when Ekkard II. died in 1046 it was divided, and Meissen proper was given successively to William and Otto, counts of Weimar, and Egbert II., count of Brunswick. Egbert was a rival of the emperor Henry IV. and died under the imperial ban in 1089, when Meissen was bestowed upon H enr y I-, count of Wettin, whose mother was a sister of the margrave Ekkard II. Henry, who already ruled lower Lusatia and the new and smaller Saxon east mark, was succeeded in 1103 by his cousin Thimo, and in 1104 by his son Henry II., whose claim on the

mark was contested by Thimo's son Conrad. When Henry died without issue in 11 23 Meissen was given by the emperor Henry V. to Hermann II., count of Wintzenburg; but, renewing his claim, Conrad won the support of Lothair, duke of Saxony, afterwards the emperor Lothair II., and obtained possession in 1130. Conrad, called the Great, extended the boundaries of Meissen before abdicating in 1156 in favour of his son Otto, known as the Rich. Otto appointed his younger son Dietrich as his successor and was attacked and taken prisoner by his elder son Albert ; but, after obtaining his release by order of the emperor Frederick I., he had only just renewed the war when he died in n 90. During his reign silver mines were opened in the Harz Mountains, towns were founded, roads were made, and the general condition of the country was improved. Otto was succeeded by his son Albert, called the Proud, who was engaged in warfare with his brother Dietrich until his death in 1195. As Albert left no children, Meissen was seized by the emperor Henry VI. as a vacant fief of the empire; but Dietrich, called the Oppressed, secured the mark after Henry's death in 1197. Dietrich married Jutta, daughter of Hermann I., landgrave of Thuringiaj and was succeeded in 1221 by his infant son Henry, surnamed the Illustrious; who on arriving at maturity obtained as reward for supporting the emperor Frederick II. against the pope a promise to succeed his uncle, Henry Raspe IV., as land- grave of Thuringia. In 1243 Henry's son Albert was betrothed to Margaret, daughter of Frederick II.; and Pleissnerland, a district west of Meissen, was added to his possessions. Having, gained Thuringia and the Saxon palatinate on his uncle's death in 1247, he granted sections of his lands to his three sons in 1265, but retained Meissen. A series of family feuds followed His second son Dietrich died in 1285, and on Henry's own death in 1288 Meissen was divided between his two remaining sons, Albert (called the Degenerate) and Frederick, and his grandson Frederick Tutta, the son of Dietrich. Albert was engaged in struggles with his three sons, who took him prisoner in 1288; but he was released the following year by order of the German king Rudolph I. About this time he sold his portion of Meissen to his nephew Frederick Tutta, who held the title

of margrave and ruled the greater part of the mark until his death in 1291. Albert's two remaining sons, Frederick and Dietrich or Diezmann, then claimed Meissen; but it was seized by King Adolph of Nassau as a vacant fief of the empire, and was for some time retained by him and his successor King Albert I. In the course of constant

efforts to secure the mark the brothers Frederick and Dietrich defeated the troops of King Albert at Lucka in May 1307 and secured partial possession of their lands. In this year Dietrich died and Frederick became reconciled with his father, who, after renouncing his claim on Meissen for a yearly payment, died in 1314. Having obtained possession of the greater part of the mark, Frederick was invested with it by the German king Henry VII. in 13 10. During these years the part of Meissen around Dresden had been in the possession of Frederick, youngest son of the margrave Henry the Illustrious, and when he died in 13 16 it came III. in 1381 adivision was made by which Meissenfell to his youngest son William I. In 1407 William was succeeded by his nephew Frederick, called the Warlike, who in 1423 received from the emperor Sigismund the electoral duchy of Saxe- Wittenberg. The mark then became merged in the duchy of Saxony, and at the partition of 1485 fell to the Albertine line. As Meissen was relieved from the attacks of the Slavs by the movement of the German boundary to the east, its prosperity increased. Many towns were founded, among which were Dresden, Leipzig and Freiburg; Chemnitz began its textile industry; and although the condition of the peasants was wretched, that of the townsmen was improving. The discoveries of silver brought great wealth to the margraves, but they resorted at times to bedes, which were contributions from the nobles and ecclesiastics who met in a kind of diet. During this period the mark of Meissen lay on both banks of the Elbe, and stretched from Bohemia to the duchy of Saxe-Wittenberg, embracing an area of about 3000 sq. m.

See O. Posse, Die Markgrafen von Meissen und das Hans Wettin (Leipzig, 188 1) ; F. W. Tittmann, Geschichte Ileinrichs des erlauchlen Markgrafen zu Meissen (Dresden, 1845-1846); C. F. von Posern- Klett, Zur Geschichte der Verfassung der Markgrafschaft Meissen im ij. Jahrhundert (Leipzig, 1863). See also Urkunden der Markgrafen von Meissen und Landgrafen von Thiiringen, edited by E. G. Gersdorf (Leipzig, 1864); and H. B. Meyer, Hof- und Zentralverwaltung der We.ttiner (Leipzig, 1902).

MEISSONIER, JEAN LOUIS ERNEST (1815-1891), French painter, was born at Lyons on the 21st of February 1815. From his schooldays he showed a taste for painting, to which some early sketches, dated 1823, bear witness. After being placed with a druggist, he obtained leave from his parents to become an artist, and, owing to the recommendation of a painter named Potier, himself a second class Prix de Rome, he was admitted to Leon Cogniet's studio. He paid short visits to Rome and to Switzerland, and exhibited in the Salon of 183 1 a picture then called " Les Bourgeois Flamands " (" Dutch Burghers "), but also known as " The Visit to the Burgomaster," subsequently

purchased by Sir Richard Wallace, in whose collection (at Hertford House, London) it is, with fifteen other examples of this painter. It was the first attempt in France in the particular genre which was destined to make Meissonier famous: microscopic painting — miniature in oils. Working hard for daily bread at illustrations for the publishers — Curmer, Hetzel and Dubocher — he also exhibited at the Salon of 1836 the ” Chess Player ” and the ” Errand Boy.” After some not very happy attempts at religious painting, he returned, under the

influence of Chenavard, to the class of work he was born to excel in, and exhibited with much success the ” Game of Chess ” (1841), the ” Young Man playing the ‘Cello ” (1842), ” The Painter in his Studio ” (1843), ” The Guard Room,” the ” Young Man looking at Drawings,” the ” Game of Piquet ” (1845), and the ” Game of Bowls ” — works which show the finish and certainty of his technique, and assured his success. After his ” Soldiers ” (1848) he began ” A Day in June,” which: was never finished, and exhibited ” A Smoker ” (1849) and ” Bravos” (” Les Bravi,” 1852). In 1855 he touched the highest mark of his achievement with ” The Gamblers ” and ” The Quarrel ” (” La Rixe”), which was presented by Napoleon III. to the English Court. His triumph was sustained at the Salon of 1857, when he exhibited nine pictures, and drawings; among them the ” Young Man of the Time of the Regency,” ” The Painter,” “The Shoeing Smith,” “The Musician,” and “A Reading at Diderot’s.” To the Salon of 1861 he sent ” The Emperor at Solferino,” ” A Shoeing Smith,” ” A Musician,” ” A Painter,” and ” M. Louis Fould “; to that of 1864 another version of ” The Emperor at Solferino,” and ” 1814.” He subsequently exhibited “A Gamblers’ Quarrel ” (1865), and ” Desaix and the Army of the Rhine ” (1867). Meissonier worked with elaborate care and a scrupulous observation of nature. Some of his works, as for instance his ” 1807,” remained ten years in course of execution. To the great Exhibition of 1878 he contributed sixteen pictures: the portrait of Alexandre Dumas which had been seen at the Salon of 1877, ” Cuirassiers of 1805,” ” A Venetian Painter,” ” Moreau and his Staff before Hohenlinden,” a ” Portrait of a Lady,” the ” Road to La Salice,” ” The Two Friends,” ” The Outpost of the Grand Guard,” ” A Scout,” and ” Dictating his Memoirs.” Thence- forward he exhibited less in the Salons, and sent his work to smaller exhibitions. Being chosen president of the Great National Exhibition in 1883, he was represented there by such works as ” The Pioneer,” ” The Army of the Rhine,” ” The Arrival of the Guests,” and ” Saint Mark.” On the 24th of May 1884 an exhibition was opened at the Petit Gallery of Meissonier’s collected works, including 146 examples. As president of the jury on painting at the Exhibition of 1889 he contributed some new pictures. In the following

year the New Salon was formed (the National Society of Fine Arts), and Meissonier was-president. He exhibited there in 1890 his picture ” 1807 “; and in 1891, shortly after his death, his” Barricade ” was displayed there. A less well-known class of work than his painting is a series of etchings: ” The Last Supper,” ” The Skill of Vuillaume the Lute Player,” ” The Little Smoker,” ” The Old Smoker,” the ” Preparations for a Duel,” ” Anglers,” ” Troopers,” ” The Reporting Sergeant,” and ” Polichinelle,” in the Hertford House collection. He also tried lithography, but the prints are now scarcely to be found. Of all the painters of the century, Meissonier was one of the most fortunate in the matter of payments. His ” Cuirassiers,” now in the late due d’Aumale’s collection at Chantilly, was bought from the artist for £10,000, sold at Brussels for £11,000, and finally resold for £16,000. Besides his genre portraits, he painted some others: those of “Doctor Lefevre,” of “Chenavard,” of ” Vanderbilt,” of ” Doctor Guyon,” and of ” Stanford.” He also collaborated with the painter Francais in a picture of ” The Park at St Cloud.” In 1838 Meissonier married the sister of M. Steinheil, a painter. Meissonier was attached by Napoleon III. to the imperial staff, and accompanied him during the campaign in Italy and, at the beginning of the war in 1870. During the siege of Paris * in 1871 he was colonel of a marching regiment. In 1840 he was awarded a third-class medal, a second-class medal in 1841, first-class medals in 1843 and 1844 and medals of honour at the great exhibitions. In 1846 he was appointed knight of the Legion of Honour and promoted to the higher grades in 1856, 1867 (June 29), and 1880 (July 12), receiving the Grand Cross in 1889 (Oct. 29). He nevertheless cherished certain ambitions which remained unfulfilled. He hoped to become a professor at the Ecole des Beaux Art= h”f the appoint- ment he desired was never given to him. On various occasions.

too, he aspired to be chosen deputy or made senator, but he was not elected. In 1 86 1 he succeeded Abel de Pujol as member of the Academy of Fine Arts. On the occasion of the centenary festival in honour of Michelangelo in 1875 he was the delegate of the Institute of France to Florence, and spoke as its represen- tative. Meissonier was an admirable draughtsman upon wood, his illustrations to Les Conies Remois (engraved by Lavoignat), to Lamartine’s Fall of an Angel, to Paul and Virginia, and to The French Painted by Themselves being among the best known. The leading engravers and etchers of France have been engaged upon plates from the works of Meissonier, and many of these plates command the highest esteem of collectors.

Meissonier died in Paris on the 21st of January 1801. His son, Jean Charles Meissonier, also a painter, was his father's pupil, and was admitted to the Legion of Honour in 1889.

See Alexandre, Histoire de la peinlure militaire en France (Paris, 1891); Laurens, Notice sur Meissonier (Paris, 1892); Greard, Meissonier (Paris and London, 1897); T. G. Dumas, Maitres modernes (Paris, 1884); Ch. Formentin, Meissonier, sa vie — son osuvre (Paris, 1901); J. W. Mollett, Illustrated Biographies of Modern Artists:- Meissonier (London, 1882). (H. Fr.)

MEISSONIER, JUSTE AURELE (1695-1750), French gold- smith, sculptor, painter, architect, and furniture designer, was born at Turin, but became known as a worker in Paris, where he died. His Italian origin and training were probably responsible for the extravagance of his decorative style. He shared, and perhaps distanced, the meretricious triumphs of Oppenard and Germain, since he dealt with the Baroque in its most daring and flamboyant developments. Rarely does he leave a foot or two of undecorated space; the effect of the whole is futile and fatiguing. It was because Meissonier carried the style of his day to its extreme that he acquired so vast a popularity. Like the English brothers Adam at a later day he not only as architect built houses, but as painter and decorator covered their internal walls; he designed the furniture and the candlesticks, the silver and the decanters for the table; he was as ready to produce a snuff-box as a watch case or a sword hilt. Not only in France, but for the nobility of Poland, Portugal and other countries who took their fashions and their taste from Paris, he made designs, which did nothing to improve European taste. Yet his achievement was not wholly without merit. His work in gold and silver-plate was often graceful and some- times bold and original. He was least successful in furniture, where his twirls and convolutions, his floral and rocaille motives were conspicuously offensive. He was appointed by Louis XV. Dessinateur de la chambre et du cabinet du roi; the post of designer pour les pompes funebres et galantes was also held along with that of Orfevre du roi.

For our knowledge of his work we are considerably indebted to his own books of design: Livre . d' 'ornements en trente pieces; Livre d 'orfevrerie d'iglise en six pieces, and Ornements de la carte chronologique.

MEISTERSINGER (Ger. for " master-singer "), the name given to the German lyric poets of the 14th, 15th and 16th centuries, who carried on and developed the traditions of the medieval Minnesingers (q.v.).

These singers, who, for the most part, belonged to the artisan and trading classes of the German towns, regarded as their masters and the founders of their gild twelve poets of the Middle High German period, among whom were Wolfram von Eschenbach, Konrad von Wiirzburg, Reinmar von Zweter and Frauenlob. The last mentioned of these, Frauenlob, is said to have established the earliest Meistersinger school at Mainz, early in the 14th century. This is only a tradition, but the institution of such schools originated undoubtedly in the upper Rhine district. In the 14th century there were schools at Mainz, Strassburg, Frankfort, Wty-zburg, Zurich and Prague; in the 15th at Augsburg and Nuremberg, the last becoming in the following century, under Hans Sachs, the most famous of all. By this time the Meistersinger schools had spread all over south and central Germany; and isolated gilds were to be found farther north, at Magdeburg, Breslau, Gorlitz and Danzig.

Each gild numbered various classes of members, ranging from beginners, or Schiller (corresponding to trade- apprentices), and Schulfreunde (who were equivalent to Gesellen or journey- men), to Meister, a Meister being a poet who was not merely able to write new verses to existing melodies but had himself invented a new melody. The poem was technically known as a Bar or Gesetz, the melody as a Ton or Weis. The songs were all sung in the schools without accompaniment. The rules of the art were' set down in the so-called Tabulatur or law-book of the gild. The meetings took place either in the Rathaus, or town hall, or, when they were held^-as was usually the case — on Sunday, in the church; and three times a year, at Easter, Whitsuntide and Christmas, special festivals and singing competitions were instituted. At such competitions or Schulsingen judges were appointed, the so-called Merker, whose duty it was to criticize the competitors and note their offences against the rules of the Tabulatur.

The literary value of the Meistersinger poetry was hardly in proportion to the large part it played in the life of the German towns of the 15th and 16th centuries. As the medieval lyric decayed, more and more attention was given to the externals of poetic composition, the form, the number of syllables, the melody; and it was such externals that attracted the interest of these burgher-poets. Poetry was to them a mechanical art that ' could be learned by diligent application, and the prizes they had to bestow were the rewards of ingenuity, not of genius or inspiration. Consequently we find an extraordinary development of strophic forms corresponding to the many new " tones " which every Meistersinger regarded it as his duty to invent — tones which bore the most remarkable and often ridi- culous names, such as Gestreijtsafranblumleinweis, Fettdachsweis,

Vielfrassweis, gebliimte Paradiesweis, &c. The verses were adapted to the musical strophes by a merely mechanical counting of syllables, regardless of rhythm or sense. The mean- ing, the sentiment, the thought, were the last things to which the Meistersingers gave heed. At the same time there was a certain healthy aspect in the cultivation of the Meistergesang among the German middle classes of the 15th and 16th centuries; the Meistersinger poetry, if not great or even real poetry, had — especially in the hands of a poet like Hans Sachs — many germs of promise for the future. It reflected without exaggeration or literary veneer the faith of the German burgher, his blunt good sense and honesty of purpose. In this respect it was an important factor in the rise of that middle-class literature which found its most virile expression in the period of the Reformation. The Meistergesang reached its highest point in the 16th century; and it can hardly be said to have outlived that epoch, although the traditions of the Meistersinger schools lingered in south German towns even as late as the 19th century.

Specimens of Meistersinger poetry will be found in various collections, such as J. J. Gorres, Altdeutsche Volks- und Meisterlieder (1817); K. Bartsch, Meisterlieder der Kolmarer Handschrifl (Publ. of the Stuttgart Literarischer Verein, vol. Ixviii. ; 1862). Of the older sources of information about the Meistersinger the most important are Adam Puschmann, Grundlicher Bericht des deutschen Meister- gesangs zusamt der Tabulatur (1571 ; reprinted in W. Braune's Neudruche deutscher Literaturwerke des 16. und 17. Jahrh., 73, 1888), and J. C. Wagenseil, De civitate Noribergensi (1697). See further J. Grimm, Uber den altdeutschen Meistergesang (181 1); F. Schnorr von Carolsfeld, Zur Geschichte des deutschen Meister gesangs (1872); R. von Liliencron, t)ber den Inhalt der allgemeinen Bildung in der Zeit der Scholastik (1876); G. Jacobsthal, " Die musikalische Bildung der Meistersinger " (Zeitschriftfur deut. Altertum, xx., 1876) ; O. Lyon, Minne- und Meistergesang (1882) ; K. Mey, Der Meister gesang-ty Geschichte und Kunst (1892). The art of the Meistersingers has been immortalized by Richard Wagner in his music drama, Die Meistersinger (1868). (J. G. R.)

MEKONG, or Me Nam Kong (pronounced Kawng), sometimes known as the Cambodia River, the great river of Indo-China, having its origin in the Tibetan highlands. It is the third or fourth longest river in Asia and the seventh or eighth in the world. It is about 2800 m. in length, of which 1 200 flow through portions of the Chinese Empire and Tibet and 1600 through French territory. Its sources are not definitely settled, but it is supposed to rise on the slopes of Dza-Nag-Lung-Mung in about

33 N., 93 E., at an altitude of 16,700 ft. above sea-level. Throughout the greater part of its course in Tibet, where it is called the Dza-Chu, it flows south-eastwards to Chiamdo, on the great east and west caravan route from China to Lhasa. At this point it is about 10,000 ft. above sea-level. From here it flows southwards through little-known mountain wastes. Below Dayul in lat. 20° it is known by the Chinese name of Lantsan Kiang. For the next 300 m. of its course the Lantsan Kiang, or, as it soon becomes known among the Thai peoples inhabiting its rugged valley, the Mekong, is very little known to us. The river flows beneath bare and rocky walls. A few scat- tered villages of Lusus and Mossos exist in this region; there is no trade from north to south. In 25° 18′ N. the Tali-Bhamo caravan route, described by Colborne Baker, crosses the river by one of those iron suspension bridges which are a feature of Yun-nan, at a height of 4700 ft. above sea-level. From this point to Chieng or Keng Hung, the head of the old confederacy of the Sibsawng Punna or Twelve States, it is little known; the fact that it falls some 900 ft. for each degree of latitude indi- cates the character of the river. Under the provisions of the Anglo-French agreement of January 1896, from the Chinese frontier southwards to the mouth of the Nam Hok the Mekong forms the frontier between the British Shan States on the west and the territories acquired from Siam by France in 1893. By the treaty of 1893, from that point southwards to about 13 30′ N. it is also the frontier between French Indo-China and Siam, and a zone extended 25 kilometres inland from the right bank, within which the Siamese government agreed not to construct any fortified port or maintain any armed force. This 25 kilo- metre neutral zone was abolished in 1905 when France surren- dered Chantabun to the Siamese, who in their turn ceded the port of Krat and the provinces of Melupre and Bassac, together with various trading concessions to France on the right bank of the Mekong. Below the Siamese Shan town of Chieng Sen the river takes its first great easterly bend to Luang Prabang, being joined by some important tributaries. This portion is obstructed by rapids. The country is mountainous, and the vegetation of the lower heights begins to assume a tropical aspect. From Luang Prabang the river cuts its way southwards for two degrees through a lonely jungle country among receding hills of low elevation. From Chieng Khan the river again turns eastwards along the 18th parallel, forcing its way through its most serious rapid-barrier, and receiving some important tribu- taries from the highlands of Tung Chieng Kum and Chieng Kwang, the finest country in Indo-China. In 104° E. the river resumes a southerly

course through a country thinly peopled. At Kemarat (16 N.) the fourth serious rapid-barrier occurs, some 60 m. in length, and the last at Khong in 14 N. From here to its outfall in the China Sea the river winds for some 400 m. through the French territories of Cambodia and Cochin China, and to its annual overflow- these countries owe their extraordinary fertility. The French have done much to render the river navigable. Steamers ply regularly from Saigon through Mytho to Pnompenh, and launches proceed from this place, the capital of Cambodia, to the Preapatano rapids, and beyond this a considerable portion of the distance to Luang Prabang, the journey being finished in native boats. (J. G. Sc.)

MELA, POMPONIUS (ft. c. a.d. 43), the earliest Roman geographer. His little work (De situ orbis libri III.) is a mere compendium, occupying less than one hundred pages of ordinary print, dry in style and deficient in method, but of pure Latinity, and occasionally relieved by pleasing word-pictures. Except- ing the geographical parts of Pliny's Historia naturalis (where Mela is cited as an important authority) the De situ orbis is the only formal treatise on the subject in classical Latin. Nothing is known of the author except his name and birthplace — the small town of Tingentera or Cingentera in southern Spain, on Algeciras Bay (Mela ii. 6, § 96; but the text is here corrupt). The date of his writing may be approximately fixed by his allusion (iii. 6 § 49) to a proposed British expedition of the reigning emperor, almost certainly that of Claudius in a.d. 43. That this passage cannot refer to Julius Caesar is proved by

several references to events of Augustus's reign, especially to certain new names given to Spanish towns. Mela has been without probability identified by some with L. Annaeus Mela of Corduba, son of Seneca the rhetorician, and brother of the great Seneca.

The general views of the Be situ orbis mainly agree with those current among Greek writers from Eratosthenes to Strabo; the latter was probably unknown to Mela. But Pomponius is unique among ancient geographers in that, after dividing the earth into five zones, of which two only were habitable, he asserts the existence of antickthones, inhabiting the southern temperate zone inaccessible to the folk of the northern temperate regions from the unbearable heat of the intervening torrid belt. On the divisions and bound- aries of Europe, Asia and Africa, he repeats Eratosthenes; like all classical geographers from Alexander the Great (except Ptolemy) he regards the Caspian Sea as an inlet of the Northern Ocean, corresponding to the Persian and Arabian (Red Sea) gulfs on the south. His Indian conceptions are inferior to those of some earlier Greek writers; he follows Eratosthenes

in supposing that country to occupy the south-eastern angle of Asia, whence the coast trended northwards to Scythia, and then swept round westward to the Caspian Sea. As usual, he places the Rhipaean Mountains and the Hyperboreans near the Scythian Ocean. In western Europe his knowledge (as was natural in a Spanish subject of Imperial Rome) was somewhat in advance of the Greek geographers. He defines the western coast-line of Spain and Gaul and its indentation by the Bay of Biscay more accurately than Eratosthenes or Strabo, his ideas of the British Isles and their position are also clearer than his predecessors'. He is the first to name the Orcades or Orkneys, which he defines and locates pretty correctly. Of northern Europe his knowledge was imperfect, but he speaks vaguely of a great bay (" Codanus sinus ") to the north of Germany, among whose many islands was one, " Codanovia," of pre-eminent size; this name reappears in Pliny as " Scandinavia." Mela's descriptive method is peculiar and inconvenient. Instead of treating each continent separately he begins at the Straits of Gibraltar, and describes the countries adjoining the south coast of the Mediterranean; then he moves round by Syria and Asia Minor to the Black Sea, and so returns to Spain along the north shore of the Euxine, Propontis, &c. After treating the Mediterranean islands, he next takes the ocean littoral — to west, north, east and south successively — from Spain and Gaul round to India, from India to Persia, Arabia and Ethiopia; and so again works back to Spain round South Africa. Like most classical geographers he conceives the Dark Continent as surrounded by sea and not extending very far south.

The first edition of Mela was published at Milan in 1471 ; the first good edition was by Vadianus (Basel, 1522), superseded by those of Voss (1658), J. Gronovius (1685 and 1696), A. Gronovius (1722 and 1728), and Tzschucke (1806-1807), in seven parts (Leipzig; the most elaborate of all); G. Parthey's (Berlin, 1867), gives the best text. The English trans, by Arthur Golding (1585), is famous; see also E. H. Bunbury, Ancient Geography, ii. 352-368, and D. Detlefsen, Quellen und Forschungen zur alien Gesch. und Geog. (1908). (E. H. B.;C. R. B.)

MELACONITE, a mineral consisting of cupric oxide, CuO, and known also as black copper ore. In appearance it is strikingly different from cuprite (q.v.) or red copper ore, which is cuprous oxide. Crystals are rare; they belong to the mono- clinic, or possibly to the anorthic system, and have the form of thin triangular or hexagonal scales with a steel-grey colour and brilliant metallic lustre. More often the mineral is massive, earthy or pulverulent, and has a dull iron-black colour. Hence the name melaconite, from the Greek ne\as, black and kovk, dust, which was originally given by F. S. Beudant in 1832 in the form melaconise. The crystallized Vesuvian mineral was later named

tenorite, a name commonly adopted for the species. The hardness of the crystals is 3-4, but the earthy and powdery forms readily soil the fingers; the spec. grav. is 5-9. Crystals have been found only at Mt Vesuvius, where they encrust lava, and in Cornwall. The other forms of the mineral, however, are common in copper mines, and have resulted by the alteration”* of chalcocite, chalcopyrite and other copper ores, on which they often form a superficial coating. (L. J. S.)

MELAMPUS, in Greek legend, a celebrated seer and physician, son of Amythaon and Eidomene, brother of Bias, mythical eponymous hero of the family of the Melampodidae. Two young serpents, whose life he had saved, licked his ears while he slept, and from that time he understood the language of birds, and beasts. In the art of divination he received instruction from Apollo himself. To gain the consent of Neleus, king of Pylos, to the marriage of his daughter Pero with Bias, Melampus

undertook to obtain possession of the oxen of the Thessalian prince Iphiclus. As Melampus had foretold, he was caught and imprisoned, but was released by Phylacus (the father of Iphiclus) on giving proof of his powers of divination, and was finally presented with the oxen as a reward for having restored the virility of the son. Melampus subsequently obtained a share in the kingdom of Argos in return for having cured the daughters of its king Proetus, who had been driven mad for offering resis- tance to the worship of Dionysus or for stealing the gold from the statue of Hera. At Aegosthena in Megara there was a sanctuary of Melampus, and an annual festival was held in his honour. According to Herodotus, he introduced the cult of Dionysus into Greece from Egypt, and his name (” black foot “) is probably ” a symbolical expression of his character as a Bacchic propitiatory priest and seer ” (Preller). According to the traditional explanation, he was so called from his foot having been tanned by exposure to the sun when a boy. In his character of physician, he was the reputed discoverer of the herb melampodium, a kind of hellebore. Melampus and Bias are symbolical representatives of cunning and force.

See Apollodorus i. 9, 11, 12; ii. 2, 2; Odyssey, xv. 225-240; Diod. Sic. iv. 68; Herodotus ii. 49; ix. 34; Pausanias ii. 18, 4; lv – 3 6 > 3; scholiast on Theocritus iii. 43; Ovid, Metam. xv. 325; C. Eckermann, Melampus und sein Geschlecht (1840).

Melampus is also the name of the author of a short extant treatise of little value on Divination by means of Palpitation (HaX/uSr) and Birthmarks CEXatuv). It probably dates from the time of Ptolemy Philadelphus (3rd cent. B.C.). Edition by J. G. Franz in Scriptores physiognomiae veteres (1780).

MELANCHLAENI (from Gr. /ˆ\as, and xXafra, “Black- cloaks”), an ancient tribe to the north of Scythia, probably about the modem Ryazan and Tambov (Herodotus iv. 106). They have been identified with the Finnish tribes Merja (now extinct) and Cheremis, now driven north-east on to the middle Volga, These, till recently, wore black. There has been confusion between this tribe and another of the same name mentioned by Pliny (N. H. vi. 15), and Ptolemy in the Caucasus. (E. H. M.)

MELANCHOLY (Gr. fiekayxoXia, from /teXas, black, and x˚M, bile), originally a condition of the mind or body due to a supposed excess of black bile, also this black bile itself, one of the chief ” humours ” of the body, which were, according to medieval physiology, blood, phlegm, choler and melancholy (see Humour) ; now a vague term for desponding grief. From the 17th century the name was used of the mental disease now known as ” melancholia ” (see Insanity), but without any reference to the supposed cause of it.

MELANCHTHON, PHILIPP (1497-1550), German theologian and reformer, was born at Bretten in Baden on the 16th of February 1497. His father, George Schwartzerd, was an armourer under the Palatinate princes. His mother, Barbara Reuter, a niece of Johann Reuchlin, was shrewd, thrifty and affectionate. 1 Her father, Johann Reuter, long burgomaster of Bretten, supervised the education of Philipp, who was taught first by Johannes Hungarus and then by Georg Simler at the academy of Pfortzheim. Reuchlin took an interest in him, and, following a contemporary custom, named him Melanchthon (the Greek form of Schwartzerd, black earth). In October 1509 he went to Heidelberg, where he took the B.A. degree, afterwards proceeding M.A. at Tubingen. The only other academic distinction he accepted was the B.D. of Wittenberg (1519). He would never consent to become a “doctor,” be- cause he thought the title carried with it responsibilities to which he felt himself unequal. At Tubingen he lived as student and teacher for six years, until on Reuchlin’s advice, the elector of Saxony called him to Wittenberg as professor of Greek in 1518.

1 Her character is evidenced by the familiar proverb — Wer mehr will verzehren Denn sein Pflug kann erehren, Der muss zuletzt verderben

Und vielleicht am Galgen sterben — of which Melanchthon said to his students ” Didici hoc a mea matre, vos etiam observate.” (For Melanchthon’s Latin version of the saying see Corpus reformatorum, x. 469.)

This appointment marked an epoch in German university education; Wittenberg became the school of the nation; the scholastic methods of instruction were set aside, and in a Dis- course on Reforming the Studies of Youth Melanchthon gave proof, not only that he had caught the Renaissance spirit, but that he was fitted to become one of its foremost leaders. He began to lecture on Homer and the Epistle to Titus, and in con- nexion with the former he announced that, like Solomon, he sought Tyrian brass and gems for the adornment of God’s Temple. Luther received a fresh impulse towards the study of Greek, and his translation of the Scriptures, begun as early as 1517, now made rapid progress, Melanchthon helping to collate the Greek versions and revising Luther’s translation. Melanchthon felt the spell of Luther’s personality and spiritual depth, and seems to have been prepared on his first arrival at Wittenberg to accept the new theology, which as yet existed mainly in sub- jective form in the person of Luther. To reduce it to an objective system, to exhibit it dialectkally, the calmer mind of Melanchthon was requisite.

Melanchthon was first drawn into the arena of the Reforma- tion controversy through the Leipzig Disputation (June 27-July 8, 1519), at which he was present. He had been reproved by Johann Eck for giving aid to Carlstadt (” Tace tu, Philippe, ac tua studia cura nee me perturba”), and he was shortly after- wards himself attacked by the great papal champion. Melanch- thon replied in a brief and moderately worded treatise, setting forth Luther’s first principle of the supreme authority of Scrip- ture in opposition to the patristic writings on which Eck relied. His marriage in 1520 to Catharine Krapp of Wittenberg gave a domestic centre to the Reformation. In 1521, during Luther’s confinement in the Wartburg, Melanchthon was leader of the Reformation cause at the university. He defended the action of Carlstadt, when he dispensed the Eucharist in an ‘■ evangelical fashion.” 2

With the arrival of the Anabaptist enthusiasts of Zwickau, he had a more difficult task, and appears to have been irresolute; Their attacks on infant baptism seemed to him not altogether irrational, and in regard to their claim to personal inspiration he said ” Luther alone can decide; on the one hand let us beware of quenching the Spirit of God, and on the other of being led astray by the spirit of Satan.” In the same year, 1521, he published his Loci communes rerum

theologicarum, the first systematized presentation of the reformed theology. From 1522 to 1524 he was busy with the translation of the Bible and in publishing commentaries. In 1524 he went for reasons of health into southern Germany and was urged by the papal legate Campegio to renounce the new doctrines. He refused, and maintained his refusal by publishing his Summa doctrinae Lutheri.

After the first Diet of Spires (1526), where a precarious peace was patched up for the reformed faith, Melanchthon was deputed as one of twenty-eight commissioners to visit the reformed states and regulate the constitution of churches, he having just published a famous treatise called the Libellus visitalorius, a directory for the use of the commissioners. At the Marburg con- ference (1529) between the German and Swiss reformers, Luther was pitted against Oecolampadius and Melanchthon against Zwingli in the discussion regarding the real presence in the sacra- ment. How far the normally conciliatory spirit of Melanchthon was here biased by Luther's intolerance is evident from the exaggerated accounts of the conference written by the former to the elector of Saxony. He was at this time even more embit- tered than Luther against the Zwinglians. At the Diet of Augs- burg (1530) Melanchthon was the leading representative of the reformation, and it was he who prepared for that diet the seven- teen articles of the Evangelical faith, which are known as the "Augsburg Confession." He held conferences with Roman divines appointed to adjust differences, and afterwards wrote an Apology for the Augsburg Confession. After the 1 Augsburg

2 He read the usual service, but omitted everything that taught a propitiatory sacrifice; he did not elevate the Host, and he gave both the bread and the cup into the hands of every communicant.

conference further attempts were made to settle the Reformation controversy by a compromise, and Melanchthon, from his concili- atory spirit and facility of access, appeared to the defenders of the old faith the fittest of the reformers to deal with. His historical instinct led him ever to revert to the original unity of the church, and to regard subsequent errors as excrescences rather than proofs of an essentially anti-Christian system. He was weary of the rabies theoldgorum, and dreamed that the evan- gelical leaven, if tolerated, would purify the church's life and doctrine. In 1537, when the Protestant divines signed the Lutheran Articles of Schmalkalden, Melanchthon appended to his

signature the reservation that he would admit of a pope provided he allowed the gospel and did not claim to rule by divine right.

The year after Luther's death, when the battle of Miihlberg (1547) had given a seemingly crushing blow to the Protestant cause, an attempt was made to weld together the evangelical and the papal doctrines, which resulted in the compilation by Pflug, Sidonius and Agricola of the Augsburg " Interim." This was proposed to the two parties in Germany as a provisional ground of agreement till the decision of the Council of Trent. Melanchthon, on being referred to, declared that, though the Interim was inadmissible, yet so far as matters of indifference (adiaphora) were concerned it might be received. Hence arose that " adiaphoristic " controversy in connexion with which he has been misrepresented as holding among matters of indifference such cardinal doctrines as justification by faith, the number of the sacraments, as well as the dominion of the pope, feast-days, and so on. The fact is that Melanchthon sought, not to minimize differences, but to veil them under an intentional obscurity of expression. Thus he allowed the necessity of good works to salvation, but not in the old sense; proposed to allow. the seven sacraments, but only as rites which had no inherent efficacy to salvation, and so on. He afterwards retracted his compliance with the adiaphora, and never really swerved from the views set forth in the Loci communes; but he regarded the surrender of more perfect for less perfect forms of truth or of expression as a painful sacrifice rendered to the weakness of erring brethren. Luther, though he had probably uttered in private certain expressions of dissatisfaction with Melanchthon, maintained unbroken friendship with him; but after Luther's death certain smaller men formed a party emphasizing the extremest points of his doctrine. 1 Hence the later years of Melanchthon were occupied with controversies within the Evangelical church, and fruitless conferences with his Romanist adversaries. He died in his sixty-third year, on the 19th of April 1560, and his body was laid beside that of Martin Luther in the Schlosskirche at Wittenberg.

His ready pen, clear thought and elegant style, made him the

scribe of the Reformation, most public documents on that side

being drawn up by him. He never attained entire independence

of Luther, though he gradually modified some of his positions

from those of the pure Lutherism with which he set out. His

development is chiefly noteworthy in regard to these two leading points — the relation of the evangelium or doctrine of free grace (1) to free will and moral ability, and (2) to the law and poenitentia or the good works connected with repentance. At first Luther's cardinal doctrine of grace appeared to Melanchthon inconsistent with any view of free will; and, following Luther, he renounced Aristotle and philosophy in general, since " philosophers attribute everything to human power, while the sacred writings represent all moral power as lost by the fall." In the first edition of the Loci (1521) he tfeld, to the length of fatalism, the Augustinian

doctrine of irresistible grace, working according to God's immutable decrees, and denied freedom of will in matters civil and religious alike. In the Augsburg Confession (1530), which was largely due to him, freedom is claimed for the will in non-religious matters, and in the Loci of 1533 he calls the denial of freedom Stoicism, and holds that in justification there is a certain causality, though not worthiness, in the recipient, subordinate to the Divine causality. In 1535, combating Laurentius Valla, he did not deny the spiritual incapacity of the will per se, but held that this is strengthened by the word of God, to which it can cleave. The will co-operates witn the word and the Holy Spirit. Finally, in 154.3, he says that the ca use of the difference of final destiny among men lies in the

1 It must be admitted, however, that Matthias Flacius saved the Reformation.

different .method of treating grace which is pdssible to believers as to others. Man may pray for help and reject grace. This he calls free will, as the power of laying hold of grace. Melanchthon's doctrine of the three concurrent causes in conversion, viz. the Holy Spirit, the word, and the human will, suggested the semi- Pelagian position called Synergism, which was held by some of his immediate followers.

. In regard to the relation of grace to repentance and good works, Luther was disposed to make faith itself the principle of sanctification. Melanchthon, however, for whom ethics possessed a special interest, laid more stress on the law. He began to do this in 1527 in the Libettus visitatorius, which urges pastors to instruct their people' in the necessity of repentance, and to bring the threatenings of the law to bear upon men in order to faith. This brought down upon him the opposition of the Antinomian Johannes Agricola. In the Loci of 1535 Melanchthon sought to put the fact of the co-existence of justification and good works in the believer on a secure basis by declaring the latter necessary to eternal life, though the believer's destiny thereto is already fully guaranteed in his justification. In the Loci of 1543 he did

not retain the doctrine of the necessity of good works in order to salvation, and to this he added, in the Leipzig Interim, ” that this in no way countenances the error that eternal life is merited by the worthiness of our own works.” Melanchthon was led to lay more and more stress upon the law and moral ideas; but the basis of the relation of faith and good works was never clearly brought out by him, and he at length fell back on his original position, that we have justification and inheritance of bliss in and by Christ alone, and that good works are necessary by reason of immutable Divine command.-

Bibliography. — The principal works of Melanchthon, with the bulk of his correspondence, are contained in the Corpus reforma- torum (vols, i.-xxviii. ; Halle, 1834-1850), edited by Bretschneider and Bindseil, to which must be added Bindseif’s Supplementa (Halle, 1874). Melanchthon’s earliest and best biographer was his friend Joachim Camerarius (1566), a new annotated edition of which is much needed. The best modern life is that by Georg Ellinger (Berlin, 1902) ; next is that of Karl Schmidt (Elberfeld, 1 861). The celebration in 1897 of the 400th anniversary of Melanch- thon’s birth produced many short biographies and Festreden, among them works by J. W. Richard (New York and London, 1898); George Wilson (London, 1897) ; Karl Sell (Halle, 1897) ; Ferdinand Cohrs (Halle, 1897); Beyschlag and Harnack (1897). Richard Rothe’s Festrede (i860) also is good. The most learned of modern Melanchthon scholars was probably Karl Hartfelder, who wrote Philipp Melanchthon als Praeceptor Germaniae (Berlin, 1899); Melanchthoniana paedagogica (Leipzig, 1892), giving in the first named two full bibliographies, one of all works written on Melanch- thon, the other of all works written by him (in chronological order). Hartfelder believed that a good deal of unpublished material is still left in German and foreign libraries. Thus three long unknown letters are published in the Quellen und Forschungen of the Konigl. Preuss. Inst. Hist, at Rome, vol. ii. Two are to the Cardinal of Augsburg and one to Lazarus von Schwendi. Melanchthon was on his way to the Council of Trent as delegate of the elector of Saxony and the cardinal had offered to meet him at Dillingeri. He writes ” ingeminating peace,” deploring that the council was not a national synod, which would have been a better means of arriving at the truth.

MELANESIA, one of the three great divisions of the oceanic islands in the central and western Pacific. It embraces the Bismarck Archipelago, N.E. of New Guinea, the Louisiade, Solomon, Santa Cruz, New Hebrides and Loyalty islands, New Caledonia, Fiji and intervening small groups. The name (Gr. jueXas, black, and vrjaos, island) is derived from the black colour of the prevailing native race, the Papuan and its allied tribes. Many of these differ widely from the

parent race, but all the Melanesian peoples have certain common characteristics which distinguish them sharply from the inhabitants of Poly* nesia and Micronesia. Their civilization is lower. The Melanesians are mostly ” negroid,” nearly black, with crisp, curly hair elaborately dressed; their women hold a much lower position than among the Polynesians; their institutions, social, political and religious, are simpler, their manners ruder; they have few or, no traditions; cannibalism, in different degrees, is almost universal; but their artistic skill and taste, as with some of the lower African negroes, are remarkable, and they are amenable to discipline and fair treatment. Their languages, which exhibit considerable difference among themselves, have features which mark them off clearly from the Polynesian, notwithstanding certain, fundamental relations with the latter.

See R. H. Codrington, The Melanesian Languages (Oxford, 1885) and The Melanesians (Oxford, 1891); the articles Papuans and Pacific Ocean ; also those on the several island-groups, &c.

MELANTHIUS, a “noted Greek painter of the 4th century B.C. He belonged to the school of Sicyon, which was noted for fine drawing.

HELBA [Nellie Porter Armstrong] (1859-), British operatic soprano, ne’e Nellie Porter Mitchell, was born at Burnley, near Melbourne, Australia, her father being a contractor, of Scottish blood. She sang at a local concert when six years old, and was given a good musical education. In 1882 she married Captain Charles Armstrong, and in 1886 went to study singing in Paris under the famous teacher, Madame Mathilde Marchesi, whose daughter, Madame Blanche Marchesi, also a famous singer, was associated with her. In 1887 she made her d6but in opera at Brussels, taking the stage-name of Madame Melba from her connexion with Melbourne. In the next year she sang the part of Lucia, which remained one of her famous roles, at Covent Garden, London; and, though critics complained of her coldness as an actress, her liquid voice and brilliant execution hence- forth made her famous as the greatest successor to Patti, in pure vocalization, on the operatic stage. She maintained this position for over twenty years, her triumphs being celebrated in every country.

See the ” authorized ” biography by Agnes G. Murphy (1909).

MELBOURNE, WILLIAM LAMB, 2nd Viscount (1779-1848), English statesman, second son of the 1st Viscount Melbourne, by his marriage with the daughter of Sir Ralph Milbanke, bart., was born on the 15th of March 1779. His father, Peniston Lamb (1748-1829), was the son of Sir Matthew Lamb, bart. (d. 1768), who made a large fortune out of the law, and married Miss Coke of Melbourne Hall; in 1770 he was made baron and in 1781 Viscount Melbourne in the Irish peerage, and in 1815 was created an English peer. After completing his course at Trinity College, Cambridge, William Lamb studied law at the university of Glasgow, and was called to the bar in 1804. In 1805 he married Lady Caroline Ponsonby (1785-1828), daughter of the 3rd earl of Bessborough. She was, however, separated from him in 1825. Lady Caroline Lamb acquired some fame as a novelist by her romance of Glenarvon, which was published anonymously in 1816 and was afterwards (1865) re-issued under the title of The Fatal Passion. On entering parliament in 1806 the Hon. William Lamb (as Lord Melbourne then was) joined the opposi- tion under Fox, of whom he was an ardent admirer; but his Liberal tendencies were never decided, and he not infrequently supported Lord Liverpool during that statesman's long tenure of office. During the short ministry of Canning in 1827 he was chief secretary for Ireland, but he afterwards for a time adhered to the small remnant of the party who supported the duke of Wellington. The influence of Melbourne as a politician dates from his succeeding to the peerage in 1829. Disagreeing with the duke of Wellington on the question of parliamentary reform, he entered the ministry of Grey, as home secretary in 1830. For the duties of this office at such a critical time he was deficient in insight and energy, but his political success was independent of his official capacity; and when the ministry of Grey was wrecked on the Irish question in July 1834 Melbourne was chosen to succeed him as prime minister. In November follow- ing he had to give place to a Conservative ministry under Peel; but he resumed office in April 1835, and remained prime minister till 1841. He died at Melbourne House, Derbyshire, on the 24th of November 1848.

Lord Melbourne was without the qualification of attention to details, and he never displayed those brilliant talents which often form a substitute for more solid acquirements. Though he possessed a fine and flexible voice, his manner as a speaker was ineffective, and his speeches were generally ill-arranged and destitute of oratorical point. His political advancement was due to his personal popularity. He had a thorough knowledge of the private and indirect motives which influence politicians, and his genial attractive manner, easy temper and vivacious, if occasionally coarse, wit helped to confer on him a

social distinc- tion which led many to take for granted his eminence as a statesman. His favourite dictum in politics was, “Why not

leave it alone?” His relations with women gave opportunity

for criticism though not open scandal; but the action brought against him in 1836 by Mr George Chappie Norton in regard to the famous Mrs Caroline Norton (q.v.) was deservedly unsuccess- ful. The most notable and estimable feature of his political conduct was his relation to Queen Victoria (q.v.), whom he initi- ated into the duties of sovereign with the most delicate tact and the most paternal and conscientious care.

Melbourne was succeeded as 3rd viscount by his brother, Frederick James Lamb (1782-1853), who was British ambas- sador to Vienna from 1831 to 1841. On the 3rd viscount’s dea’th the titles became extinct, but the estates passed to his sister Emily Mary (1787-1869), the wife of Lord Palmerston.

See W. McC. Torrens, Memoirs of Lord Melbourne (1878); Lloyd Sanders, Lord Melbourne’s Papers (1889); A. Hayward’s essay (from the Quarterly Review, 1878) in ” Eminent Statesmen ”

(1880).

MELBOURNE, the capital of Victoria, and the most populous city in Australia. It is situated on Hobson’s Bay, a northern bend of the great harbour of Port Phillip, in Bourke county, about 500 m. S.W. of Sydney. The suburbs extend along the shores of the bay for more than 10 m., but the part distinct- ively known as the ” city ” occupies a site about 3 m. inland on the north bank of the Yarra river. The appearance of Melbourne from the sea is by no means picturesque. The busy shipping suburbs of Port Melbourne and Williamstown occupy the flat alluvial land at the mouth of the Yarra. But the city itself has a different aspect; its situation is relieved by numerous gentle hills, which show up its fine public buildings to great advantage; its main streets are wide and well kept, and it has an air of prosperity, activity and comfort. The part especially known as the ” city ” occupies two hills, and along the valley between them runs the thoroughfare of Elizabeth Street. Parallel to this is Swanston Street, and at right angles to these, parallel to the river, are Bourke Street, Collins Street sad Flinders Street — the first being the busiest in Melbourne, the second the most fashionable with the best shops, and the third, which faces the river, given up to the maritime trade. These streets are an eighth of a mile apart, and between each is a narrower

street bearing the name of the wider, with the prefix ” Little.” The original plan seems to have been to construct these narrow streets to give access to the great business houses which, it was foreseen, would be built on the frontage of the main streets. This plan, however, miscarried, for space grew so valuable that large warehouses and business establishments have been erected in these lanes. Little Flinders Street, in which the great importers’ warehouses are mainly situated, is locally known as ” the Lane.” In the centre of the city some oi the office buildings are ten, twelve or even fourteen storeys high. The main streets are 99 ft. wide, and the lanes somewhat less than half that width. Round the city lies a circle of popu- lous suburbs — to the north-east Fitzroy (pop. 31,687) and Collingwood (32,749), to the east Richmond (37,824), to the south-east Prahran (40,441), to the south South Melbourne (40,619), to the south-west Port Melbourne (12,176), and to the north-west North Melbourne (18,120). All these suburbs he within 3 m. of the general post office in Elizabeth Street; but outside them and within the 5 m. radius is another circle — tc the east Kew (9469) and Hawthorne (21,430), to the south-east St Kilda (20,542) and Brighton (10,047), to the south-west Williamstown (14,052) and Footscray (i8,3i8),*to the north-west Essenden (17,426), and Flemington and Kensington (10,94$), and to the north Brunswick (24,141). Numerous small suburbs fill the space between the two circles, the chief being Northcote, Preston’, Camberwell, Toorak, Caulfield, Elsternwick and Coburg. Some of these suburbs are independent cities, others separate municipalities. In spite of the value of land, Melbourne is not a crowded city.

The Parliament House, standing on the crown of the eastern hill, is a massive square brick building with a pillared freestone facade approached by a broad flight of steps. The interior is lavishly decorated and contains, besides the legislative chambers, a magnificent library of over 52,000 volumes. At the top of

BRAY BRQ@

MELBOURNE and Environs.

Natural Scale. 1*70.000 English Miles ? % % % ;

Reference.

L Parliament House* 10. Victoria Markets

X Treasury Buildings 11. Princess Theatre

3. Law Courts 12. Theatre Royal

4. Hint 13. St. Patrick’s Cathedral

5. Town Hall It. Independent Congl. Ch S. General Post Office 15. Scots Church

7. Custom House IS. Anglican Cathedral

S. fret />i/»/ic Library 17. Melbourne Hospital

and Art Gallery IS. >»//r«-> Hospital

•. Trades Hall 19. Homoeopathic Hospital

MELBOURNE

91

Collins Street a building in brown freestone is occupied by the Treasury, behind which and fronting the Treasury Park another palatial building houses the government offices. A little further on is St Patrick’s Roman Catholic cathedral, the seat of the archbishop of Melbourne, a building of somewhat sombre blue- stone. Two striking churches face each other in Collins Street, the Scots church, a Gothic edifice with a lofty spire, and the Independent church, a fine Saracenic building with a massive campanile. The seat of the Anglican bishop, St Paul’s cathe- dral, has an elegant exterior and a wealth of elaborate workman- ship within, but stands low and is obscured by surrounding warehouses. On the western hill are the law courts, a fine block of buildings in classic style surmounted by a central dome. In Swanston Street there is a large building where under one roof are found the public library of over 100,000 volumes, the museum of sculpture, the art gallery, and the museums of ethnology and technology. In connexion with the art gallery there is a travel- ling scholarship for art students, endowed by the state. The Exhibition Buildings are situated on a hill in Carlton Gardens; they consist of a large cruciform hall surmounted by a dome and flanked by two annexes. Here on the 9th of May 1901 the first federal parliament of the Australian commonwealth was opened by King George V. (as duke of Cornwall and York). The Trades Hall at Carlton is the meeting-place of the trades-union societies of Victoria, and is the focus of much political influence. The Melbourne town hall contains a central chamber capable of accommodating 3000 people. The suburban cities and towns have each a town hall. The residence of the governor of the colony is in South Melbourne, and is surrounded by an extensive domain. The university is a picturesque mass of buildings in large grounds about a mile from the heart of the city. It com- prises the

university buildings proper, the medical school, the natural history museum, the Wilson Hall, a magnificent building in the Perpendicular style, and the three affiliated colleges, Trinity College (Anglican), Ormond College (Presbyterian) and Queen's College (Wesleyan) . The university, established in 1 8 5 5 , is undenominational, and grants degrees in the faculties of arts, law, medicine, science, civil engineering and music; instruction in theology is left to the affiliated colleges. Melbourne has numer- ous state schools, and ample provision is made for secondary education by the various denominations and by private enter- prise. Of theatres, the Princess and the Theatre Royal are the most important. Other public buildings include the mint, the observatory, the Victoria markets, the Melbourne hospital, the general post office, the homoeopathic hospital, the custom house and the Alfred hospital. Many of the commercial buildings are of architectural merit, notably the banks, of which the bank of Australasia, a massive edifice of the Doric order, and the Gothic Australian bank are the finest examples.

The public gardens and parks of Melbourne are extensive. Within the city proper the Fitzroy Gardens are a network of avenues bordered with oak, elm and plane, with a " fern- tree gully " in the centre; they are ornamented with casts of famous statues, and ponds, fountains and classic temples. The Treasury, Flagstaff and Carlton Gardens are of the same class. Around the city lie five great parks — Royal Park, in which are excellent zoological gardens; Yarra Park, which contains the leading cricket grounds; the Botanical Gardens, sloping down to the banks of the river; Albert Park, in which is situated a lake much used for boating; and Studley Park on the Yarra river, a favourite resort which has been left in a natural state. Besides these parks, each suburb has its public gardens, and at Fleming- ton there is a fine race-course, on which the Melbourne cup races are run every November, an event which brings in a large influx of visitors from all parts of Australia. Melbourne has a complete tramway system; all the chief suburbs are connected with the city by cable trams. The tramways are controlled by a trust, representing twelve of the metropolitan municipalities. The chief monuments and statues of the city are the statue of Queen Victoria in the vestibule of the Houses of Parliament, and a colossal group commemorating the explorers Robert O'Hara Bourke (b. 1820) and William John Wills (b. 1834), who died of

starvation in 1861 on an expedition for the crossing of Australia from south to north. There are also the statue to Sir Redmond Barry, first chancellor of the university, outside the public library, the Gordon statue in Spring Street, a replica of that in Trafalgar Square, London, and a statue of Daniel O'Connell, outside St Patrick's cathedral.

Port Melbourne, originally called Sandridge, is about 2ˆ m. distant from the city, with which it is connected by rail and tramway. It has two large piers, alongside of which vessels of almost any tonnage can lie. One of these piers is served by the railway, and here most of the great liners are berthed. Vessels drawing 22 ft. of water can ascend the river Yarra to the heart of the city. There are 2 m. of wharves along each bank of the river, with two large dry-docks and ship-repairing yards and foundries. Below Queen's Bridge is an expansion of the river known as the Pool, in which the largest ships using the river can turn with ease. Leading from a point opposite the docks is the Coode canal, by means of which the journey from the city to the mouth of the river is shortened by over a mile. As a port Melbourne takes the first place in Australia as regards tonnage. It is also a great manufacturing centre, and both city and suburbs have their distinctive industries. The chief are tanning, fellmongery, wool-washing, bacon-curing, flour milling, brewing, iron-founding, brick-making, soap-boiling, the manufacture of pottery, candles, cheese, cigars, snuff, jams, biscuits, jewelry, furniture, boots, clothing and leather and woollen goods.

The climate of Melbourne is exceptionally fine; occasionally hot winds blow from the north for two or three days at a time, but the proportion of days when the sky is clear and the air dry and mild is large. Snow is unknown, and the average annual rainfall is 25-58 in. The mean annual temperature is 57-3° F., corresponding to that of Washington in the United States, and to Lisbon and Messina in Europe. . The city is supplied with water from the Yan Yean works, an artificial lake at the foot of the Plenty Range, nearly 19 m. distant.

The little settlement of the year 1835, out of which Melbourne grew, at first bore the native name of Dootigala, but it was presently renamed after Viscount Melbourne, premier of Great Britain at the time of its foundation. In June 1836 it consisted of only thirteen buildings, eight of which were turf huts. For two years after that date a constant stream of squatters with their sheep flowed in from around Sydney and Tasmania to settle in the Port Phillip district, and by 1841 the population of the town had grown to 11,000. The discovery of gold at Ballarat in 1851 brought another influx of population to the district, and the town grew from 30,000 to 100,000 in the course of two or three years. In 1842 Melbourne was incorporated and first sent members to the New South Wales parliament. A strong popular agitation caused the Port Phillip district to be separated from New South Wales in 1851, and a new colony was formed with the name of Victoria, Melbourne becoming its capital. In 1901 Melbourne became the temporary capital of the Australian commonwealth pending the

selection of the permanent capital in New South Wales. The population of the city proper in 1901 was 68,374, and that of " greater Melbourne " was 496,079. MELBOURNE, a market town in the southern parliamentary division of Derbyshire, England, 8 m. S.S.E. of Derby, on the Midland railway. Pop. (1901), 3580. It lies in an undulating district on a small southern tributary of the Trent, from which it is about 2 m. distant. The church of St Michael is a fine example of Norman work, with certain late details, having clerestoried nave, chancel and aisles, with central and two western towers. Melbourne Hall, a building of the time of William III., surrounded by formal Dutch gardens, stands in a domain owned at an early date by the bishops of Carlisle, whose tithe barn remains near the church. They obtained the manor in 1133. In 1311 Robert de Holland fortified a mansion here, and in 1327 this castle belonged to Henry, earl of Lancaster; but it was dismantled in 1460, and little more than the site is now traceable. The title of Viscount Melbourne was taken from this town. There are manufactures of silk, and boots and shoes.

MELCHERS, (JULIUS) GARI (i860-), American artist, was born at Detroit, Michigan, on the nth of August i860. The son of a sculptor, at seventeen he was sent to Diisseldorf to study art under von Gebhardt, and after three years went to Paris, where he worked at the Acad6mie Jiilien and the Ecole des Beaux Arts. Attracted by the pictorial side of Holland, he settled at Egmond. His first important Dutch picture, " The Sermon," brought him honourable mention at the Paris Salon of 1886. He became a member of the National Academy of Design, New York; the Royal Academy of Berlin; Societe Nationale des Beaux Arts, Paris; International Society of Painters, Sculptors and Engravers, London, and the Secession Society, Munich; and, besides receiving a number of medals, his decorations include the Legion of Honour, France; the order of the Red Eagle, Germany; and knight of the Order of St Michael, Bavaria. Besides portraits, his chief works are: " The Supper at Emmaus," in the Krupp collection at Essen; " The Family," National Gallery, Berlin; " Mother and Child," Luxembourg; and the decoration, at the Congressional Library, Washington, " Peace and War."

MELCHIADES, or Miltiades (other forms of the name being Meltiades, Melciades, Milciades and Miltides), pope from the 2nd of July 310, to the nth January 314. He appears to have been an African by birth, but of his personal history nothing is known. The toleration edicts of

Galerius and of Constantine and Licinius were published during his pontificate, which was also marked by the holding of the Lateran synod in Rome (313) at which Caecilianus, bishop of Carthage, was acquitted of the charges brought against him and Donatus condemned. Melchiades was preceded and followed by Eusebius and Silvester I. respectively.

MELCHITES (lit. Royalists, from Syriac melcha, a king), the name given in the 5th century to those Christians who adhered to the creed supported by the authority of the Byzantine emperor. The Melchites therefore are those who accept the decrees of Ephesus and Chalcedon as distinguished from the Nestorians and Jacobite Church (qq.v.). They follow the Orthodox Eastern liturgy, ceremonial and calendar, but acknow- ledge the papal and doctrinal authority of Rome. They number about 80,000, are found in Syria, Palestine and Egypt, and are under the immediate rule of the patriarch of Damascus and twelve bishops.

MELCHIZEDEK (Heb. for “king of righteousness”; or, since Sedek is probably the name of a god, ” Sedek is my king”), 1 king of Salem and priest of ” supreme El ” (El x elyon), in the Bible. He brought forth bread and wine to Abraham on his return from the expedition against Chedorlaomer, and blessed him in the name of the supreme God, possessor (or maker) of heaven and earth; and Abraham gave him tithes of all his booty (Gen. xiv. 18-20). Biblical tradition tells us nothing more about Melchizedek (cf. Heb. vii. 3); but the majestic figure of the king-priest, prior to the priesthood of the law, to whom even the father of all Israel paid tithes (cf. Jacob at Bethel, Gen. xxviii. 22), suggested a figurative or typical application, first in Psalm ex. to the vicegerent of Yahweh, seated on the throne of Zion, the king of Israel who is also priest after the order of Melchizedek, and then, after the Gospel had ensured the Messianic interpretation of the Psalm (Matt. xxii. 42 seq.), to the kingly priesthood of Jesus, as that idea is worked out at length in the Epistle to the Hebrews.

The theological interest which attaches to the idea of the pre- Aaronic king-priest in these typical applications is practically independent of the historical questions suggested by the narrative of Gen. xiv. The episode of Melchizedek, though connected with the main narrative by the epithets given to Yahweh in Gen. xiv. 22, breaks the natural connexion of verses 17 and 21, and may perhaps have come originally from a separate source. As the narrative now stands Salem must be sought in the vicinity of ” the kingls dale,” which from 2 Sam. xviii. 18, probably, but not necessarily, lay near Jerusalem. That Salem is Jerusalem, as in Psalm lxxvi. 2,

1 It is to be noted also that the name is of the same form as Adoni-zedek, king of Jerusalem (Josh. x. 1), and that the un- Hebraic Araunah of 2 Sam. xxiv. 16 is probably a corruption of the similar compound Adonijah (so Cheyne, Ency. Bib. col. 290).

is the ancient and common view; but even in the 15th century B.C. Jerusalem was known as Uru-salim. Jerome and others have identified Salim with one or other of the various places which bear that name, e.g. the XaXeln of John iii. 23, 8 m. south of Beth- shean. In a genuine record of extreme antiquity the union of king and priest in one person, the worship of El as the supreme deity by a Canaanite, 2 and the widespread practice of the consecra- tion of a tithe of booty can present no difficulty ; but, if the historical character of the narrative is denied, the date of the conception must be placed as late as the rise of the temporal authority of the high priests after the exile. So far no evidence has been found in the cuneiform inscriptions or elsewhere in support either of the genuineness of the episode in its present form, or of the antiquity which is attributed to it (see further, J. Skinner, Genesis, pp. 269 sqq.). An ancient legend identifies Melchizedek with Shem (Palestinian Targum, Jerome on Isa. xli., Ephraem Syrus in loco).

See further the literature on Gen. xiv., and the articles Abraham, Genesis. (W. R. S. ; S. A. C.)

MELCOMBE, GEORGE BUBB DODDINGTON, Baron (1601- 1762), English politician. His father's name was Bubb, but the son took the name of Doddington on inheriting a large property by the death of an uncle of that name (1720). He was educated at Oxford. In 171 5 he was returned to parliament as member for Winchelsea, and was sent as envoy extraordinary to Spain. He carried on a scandalous traffic in the five or six parliamentary votes which he controlled, his tergiversation and venality furnishing food for the political satirists and caricaturists of the day. His most estimable political action was his defence of Admiral Byng in the House of Commons (1757). From 1722 to 1754 he sat in parliament for Bridge- water; from 1724 to 1740 was a lord of the treasury; and, in 1744, became treasurer of the navy under Henry Pelham, and, again in 1755, under Newcastle and Fox. In April 176 1 he was raised to the peerage as Baron Melcombe of Melcombe Regis in' Dorsetshire. He died at La Trappe, his Hammersmith house, on the 28th of July 1762. His wife, acknowledged only after the death of another lady to whom he had given a bond that he would marry no one else, died without issue. He was a wit and a friend of wits, a good scholar, and something of a Maecenas; Thomson's " Summer " was dedicated to him, Fielding

addressed to him an epistle and Edward Young a satire. He was a leading spirit of the ” Hell-fire ” Club, whose members, called ” Franciscans,” from their founder Sir Francis Dashwood (d. 1781), held their revels in the ruined Cistercian abbey of Medmenham, Bucks.

His diary, published in 1784, reveals him in. his character of place-hunter and throws a curious light on the political methods of the time.

MELEAGER (Gk. Mekkaypos), in Greek legend, the son of Oeneus, king of Calydon, and Althaea. His father having neglected to sacrifice to Artemis, she sent a wild boar to ravage the land, which was eventually slain by Meleager. A war broke out between the Calydonians and Curetes (led by Althaea’s brothers) about the disposal of the head and skin, which Meleager awarded as a prize to Atalanta, who had inflicted the first wound; the brothers of Althaea lay in wait for Atalanta and robbed her of the spoils, but were slain by Meleager. When Althaea heard this, she cursed Meleager, who withdrew, and refused to fight until the Curetes were on the point of capturing the city of Calydon. Then, yielding to his wife’s entreaties, he sallied forth and defeated the enemy, but was never seen again, having been carried off by the Erinyes, who had heard his mother’s curse (or he was slain by Apollo in battle). According to a later tradition, not known to Homer, the Moerae appeared to Althaea when Meleager was seven days old, and announced”*- that the child would only live as long as the log blazing on the hearth remained unconsumed. Althaea thereupon seized the log, extinguished the flames, and hid it in a box. But, after her brothers’ death, she relighted the log, and let it burn away until Meleager died. 3 Then, horrified at what she had done, she hanged herself, or died of grief. The sisters of Meleager were

2 The god ‘TSXiovv was also Phoenician ; see Driver, Genesis, p. 165; Lagrange, Religions Simitiques, Index, s.v.

3 On the torch as representing the light of life, see E. Kuhnert in Rheinisches Museum, xlix., 1894, and J. Grimm, Teutonic Mytho- logy (Eng. trans, by J. Stallybrass, 1880), ii. 853.

changed by Artemis out of compassion into guinea fowls and removed to the island of Leros, where they mourned part of the year for their brother. The life and adventures of Meleager were a favourite subject in ancient literature and art. Meleager is represented as a tall,

vigorous youth with curly haif , holding a javelin or a boar's head, and accompanied by a dog.

See R. Kekul6, De fabula meleagrea dissertatio (1861) ; Surber, Die Meleagersage (Zurich, 1880); articles on "Meleager" and " Meleagrides " in Roscher's Lexikon der Mythologie; L. Preller, Griechische Mylhologie; Apollodorus i. 8; Homer, Iliad, ix. 527; Diod. Sic. iv. 34; Dio Chrysostom, Or. 67; Hyginus, Fab. 171; Ovid, Metam. viii. 260-545. In the article Greek Art (fig. 41) the hunting of the Calydonian boar is represented on a fragment of a frieze from a heroum,

HELEDA (Serbo-Croatian, Mljet; Lat. Melita), the most southerly and easterly of the larger Adriatic islands of the Austrian province of Dalmatia. Pop. (1900), 1617; Meleda lies south of the Sabioncello promontory, from which it is divided by the Meleda Channel. Its length is 23 m.; its average breadth 2 m. It is of volcanic origin, with numerous chasms and gorges, of which the longest, the Babinopolje, connects the north and south of the island. Port Palazzo, the principal harbour, on the north, is a port of call for tourist steamers. Meleda has been regarded as the Melita on which St Paul was shipwrecked, this view being first expounded, in the 10th century, by Con- stantine Porphyrogenitus. As at Malta, a " St Paul's Bay " is still shown.

MELEGNANO (formerly Marignano), a town of Lombardy, Italy, in the province of Milan, n m. S.E. of that city by the railway to Piacenza, 289 ft. above sea-level. Pop. (1901), 6782. There are remains of a castle of the Visconti. Its military importance is due to its position at the crossing of, the river Lambro. It was a stronghold of Milan in her great struggle against Lodi, and is famous for the victory of Francis 1. of France over the Swiss in 1515, known as the battle of Marignan, and for the action between the French and Austrians in 1859.

MELENDEZ VALDES, JUAN (1754-1817), Spanish poet, was born at Ribera del Fresno, Badajoz, on the nth of March 1754. Destined by his parents for the priesthood, he graduated in law at Salamanca, where he became indoctrinated with the ideas of the French philosophical school. In 1780 with Batilo, a pastoral in the manner of Garcilaso de la Vega, he won a prize offered by the Spanish academy, next year he was intro- duced to Jovellanos, through whose influence he was appointed to a professorship at Salamanca in 1783. The pastoral scenes in Las Bodas de Camacho (1784) do not compensate for its undramatic nature, but it gained a prize from the municipality of Madrid. A volume of verses, lyrical and pastoral, published in 1785, caused Melendez Valdes to be hailed as the first Spanish poet of his

time. This success induced him to resign his chair at Salamanca, and try his fortune in politics. Once more the friendship of Jovellanos obtained for him in 1789 a judgeship at Saragossa, whence he was transferred two years later to a post in the chancery court at Valladolid. In 1797 he dedicated to Godoy an enlarged edition of his poems, the new matter consisting principally of unsuccessful imitations of Milton and Thomson; but the poet was rewarded by promotion to a high post in the treasury at Madrid. On the fall of Jovellanos in 1798 Melendez Valdes was dismissed and exiled from the capital; he returned in 1808 and accepted office under Joseph Bonaparte. He had previously denounced the French usurper in his verses. He now outraged the feelings of his countrymen by the grossest flattery of his foreign master, and in 1813 he fled to Alais. Four years later he died in poverty at Montpellier. His remains were removed to Spain in 1900. In natural talent and in acquired accomplishment Melendez Valdes was not surpassed by any contemporary Spaniard; he failed from want of character, and his profound insincerity affects his poems. Yet he has fine moments in various veins, and his imitation of Jean Second's Basia is notable.

MELETIUS OF ANTIOCH (d. 381), Catholic bishop and saint, was born at Melitene in Lesser Armenia of wealthy and noble parents. He first appears (c. 357) a? a supporter of Acacius,

bishop ttf Caesarea, the leader of that party in the episcopate which supported the Homoean formula by which the emperor Constantius sought to effect a compromise between the Homoe- usians and the Homousians. Meletius thus makes his debut as an ecclesiastic of the court party, and as such became bishop of Sebaste in succession to Eustathius, deposed as an Homousian heretic by the synod of Melitene. The appointment was resented by the Hombeusian clergy, and Meletius retired to Berpea- According to Socrates he attended the synod of Seleucia in the autumn of 359, and then subscribed the Acacian formula. Early in 360 he became bishop of Antioch, in succession to Eudoxius, who had been raised to the see of Constantinople. Early in the following year he was in exile. According to an old tradition, supported by evidence drawn from Epiphanius and Chrysostom, this was due to a sermon preached before the emperor Constantius, in which he revealed Homousian views. This explanation, however, is rejected by Loofs; the sermon contains nothing inconsistent with the Acacian position favoured by the court party; on the other hand, there is evidence of conflicts with the clergy, quite apart from any questions of orthodoxy, which may have led to the bishop's deposition.

The successor of Meletius was Euzoeus, who had fallen with Arius under the ban of Athanasius; and Loofs explains the subita fidei mutafio which St Jerome (ann. Abr. 2376) ascribes to Meletius to the dogmatic opposition of the deposed bishop to his successor. In Antioch itself Meletius continued to have adherents, who held separate services in the ” Apostolic ” church in the old town. The Meletian schism was complicated, moreover, by the presence in the city of another anti-Arian sect, stricter adherents of the Homousian formula, maintaining the tradition of the deposed bishop Eustathius and governed at this time by the presbyter Paulinus. The synod of Alexandria sent deputies to attempt an arrangement between the two anti-Arian Churches; but before they arrived Paulinus had been consecrated bishop by Lucifer of Calaris, and when Meletius — free to return in consequence of the emperor Julian’s contemp- tuous policy — reached the city, he found himself one of three rival bishops. Meletius was now between two stools. The orthodox Nicene party, notably Athanasius himself, held communion with Paulinus only; twice, in 365 and 371 or 372, Meletius was exiled by decree of the Arian emperor Valens. A further complication was added when, in 375, Vitalius, one of Meletius’s presbyters, was consecrated bishop by the heretical bishop Apollinaris of Laodicea.

Meanwhile, under the influence of his situation, Meletius had been more and more approximating to the views of the newer school of Nicene orthodoxy. Basil of Caesarea, throwing over the cause of Eustathius, championed that of Meletius who, when after the death of Valens he returned in triumph to Antioch, was hailed as the leader of Eastern orthodoxy. As such he presided, in October 379, over the great synod of Antioch, in which the dogmatic agreement of East and West was estab- lished; it was he who helped Gregory of Nazianzus to the see of Constantinople and consecrated him ; it was he who presided over the second oecumenical council at Constantinople in 381. He died soon after the opening of the council, and the emperor Theodosius, who had received him with especial distinction, caused his body to be carried to Antioch and buried with the honours of a saint. The Meletian schism, however, did not end with his death. In spite of the advice of Gregory of Nazianzus . and of the Western Church, the recognition of Paulirius’s sole episcopate was refused, Flavian being consecrated as Meletius’s successor. The Eustathians, on the other hand, elected Evagrius as bishop onPaulinus’s death, and it was not till 415 that Flavian succeeded in re-uniting them to the Church.

Meletius was a holy man, whose ascetic life was all the more remarkable in view of his great private wealth. He was also a man of

learning and culture, and widely esteemed for his honourable, kindly and straightforward character. He is venerated as a saint and confessor in both the Roman Catholic and Orthodox Eastern Churches.

See the article G. F. Loofs in Herzog-Hauck, RealencyUopddie (ed. 1897, Leipzig), xii. 552, and authorities there cited.

MELETIUS OF LYCOPOLIS (4th century), founder of the sect known after him as the ” Meletians,” or as the ” Church of the Martyrs,” in the district of Thebes in Egypt. With Peter, archbishop of Alexandria, he was thrown into prison during the persecution under Diocletian. His importance is due to his refusal to receive, at least until the persecution had ceased, those Christians who during the persecutions had renounced their faith, and then repented. This refusal led to a breach with Peter, and other Egyptian bishops who were willing to grant absolution to those who were willing to do penance for their infidelity. Meletius, after regaining his freedom, held his ground and drew around him many supporters, extending his influence even so far away as Palestine. He ordained 29 bishops and encroached upon Peter’s jurisdiction. The Council of Nicaea in 325 upheld the bishops, but Meletius was allowed to remain bishop of Lycopolis though with merely nominal authority. His death followed soon after. His followers, however, took part with the Arians in the controversy with Athanasius and existed as a separate sect till the 5th century.

See Achelis in Herzog-Hauck, Realencyk. xii. (1903) 558, with the authorities there quoted, and works on Church History.

HELFI, a city and episcopal see of Basilicata, Italy, in the province of Potenza, 30 m. by rail N. of the town of that name. Melfi is picturesquely situated on the lower slopes of Monte Vulture, 1591 ft. above sea-level. Pop. (1901), 14,547. The castle was originally erected by Robert Guiscard, but as it now stands it is mainly the work of the Doria family, who have possessed it since the time of Charles V. ; and the noble cathedral which was founded in 11 53 by Robert’s son and successor, Roger, has had a modern restoration (though it retains its campaniles) in consequence of the earthquake of 1851, when the town was ruined, over one thousand of the inhabitants perishing. It is the centre of an agricultural district which produces oil and wine. In the town hall is a fine Roman sarcophagus found 6 m. W. of Venosa.

Melfi does not seem to occupy an ancient site, and its origin is uncertain. By the Normans it was made the capital of Apulia in 1041, and fortified. The council held by Nicholas I. in 1059, that of Urban II. in 1089, the rebellion against Roger in 1133 and the subsequent punishment, the plunder of the town by Barbarossa in 1 167, the attack by Richard, count of Acerra in 11 90, and the parliament of 1223, in which Frederick II. established the constitu- tion of the kingdom of Naples, form the principal points of interest in the annals of Melfi. In 1348 Joanna I. of Naples bestowed the city on Niccolo Acciajuoli; but it was shortly afterwards captured, after a six months' siege, by the king of Hungary, who transferred it to Conrad the Wolf. In 1392 Goffredo Marzano was made count of Melfi; but Joanna II. granted the lordship to the Caracciolo family, and they retained it for one hundred and seven years till the time ot Charles V. An obstinate resistance was offered by the city to Lautrec de Foix in 1528; and his entrance within its walls was followed by the massacre, it is said, of 18,000 of its citizens.

See G. de Lorenzo, Venosa e la regione del Vulture (Bergamo,

1906).

MELICERTES, in Greek legend, the son of the Boeotian prince Athamas and Ino, daughter of Cadmus. Ino, pursued by her husband, who had been driven mad by Hera because Ino had brought up the infant Dionysus, threw herself and Melicertes into the sea from a high rock between Megara and Corinth. Both were changed into marine deities — Ino as Leucothea, Melicertes as Palaemon. The body of the latter was carried by a dolphin to the Isthmus of Corinth and deposited under a pine tree. Here it was found by his uncle Sisyphus, who had it removed to Corinth, and by command of the Nereids instituted the Isthmian games and sacrifices in his honour. There seems little doubt that the cult of Melicertes was of foreign, probably Phoenician, origin, and introduced by Phoenician navigators on the coasts and islands of the Aegean and Mediterranean. He is a native of Boeotia, where Phoenician influences were strong; at Tenedos he was propitiated by the sacrifice of children, which seems to point to his identity with Melkart. The premature death of the child in the Greek form of the legend is probably an allusion to this.

The Romans identified Palaemon with Portunus (the harbour god). No satisfactory origin of the name Palaemon has been given. It has been suggested that it means the " wrestler " or

straggler " (iraKalw) and is an epithet of Heracles, who is often

identified with Melkart, but there does not appear to be any traditional connexion between Heracles and Palaemon. Meli- certes being Phoenician, Palaemon also has been explained as the ” burning lord ” (Baal-haman), but there seems little in common between a god of the sea and a god of fire.

See Apollodorus iii. 4, 3; Ovid, Metam. iv. 416-542, Fasti, vi. 485 ; Hyginus, Fab. 2 ; Pausanias i. 44, ii. 1 ; Philostratus, Icones, ii. 16; articles by Toutain in Daremberg and Saglio’s Diction- naire des antiquitis and by Stoll in Roscher’s Lexikon der Mythologies L. Preller, Griechische Mythologie; R. Brown, Semitic Influence in ■ Hellenic Mythology (1898).

MELILLA, a Spanish fortified station and penal settlement on the north coast of Morocco, south of Cape Tres Forcas and 135 m. E.S.E. of Ceuta. Pop. about 9000. The town is built on a huge rock connected with the mainland by a rocky isthmus. There is a harbour, only accessible to small vessels; the roadstead outside is safe and has deep water a mile to the east of the fortress. From the landing-place, where a mole is cut out of the rock, there is a steep ascent to the upper town, charac- teristically Spanish in appearance. The town is walled, and the isthmus protected by a chain of small forts. A Moorish custom-house is placed on the Spanish border beyond the fort of Santa Isabel, and is the only authorized centre of trade on the Riff coast between Tetuan and the Algerian frontier. It thus forms the entrepot for the commerce of the Riff district and its hinterland. Goat skins, eggs and beeswax are the principal exports, cotton goods, tea, sugar and candles being the chief imports. For the period 1 900-1 905 the annual value of the trade was about £200,000. Melilla, the first place captured by Spain on the African mainland, was seized from the Moors in 1490. The Spaniards have had much trouble with the neighbouring tribes — turbulent Riffians, hardly subject to the sultan of Morocco. The limits of the Spanish territory round the fortress were fixed by treaties with Morocco in 1859, i860, 1861 and 1894. In 1893 the Riffians besieged Melilla and 25,000 men had to be despatched against them. In 1908 two companies, under the protection of El Roghi, a chieftain then ruling the Riff region, started mining lead and iron some 15 m. from Melilla and a railway to the mines was begun. In October of that year the Riffians revolted from the Roghi and raided the mines, which remained closed until June 1909. On the 9th of July the workmen were again attacked and several of them killed. Severe fighting between the Spaniards and the tribesmen followed. The Riffians having submitted, the Spaniards, in 1 910, restarted the mines and undertook harbour works at Mar Chica.

See Budgett Meakin, The Land of the Moors (London, 1901), ch. xix., and the authorities there cited; P. Barre, “Melilla et les presides espagnols,” Rev. franQaise (1908).

MllLINE, FELIX JULES (1838-), French statesman, was born at Remiremont on the 20th of May 1838. Having adopted the law as his profession, he was chosen a deputy in 1872, and in 1879 he was for a short time under-secretary to the minister of the interior. In 1880 he came to the front as the leading spokesman of the party which favoured the protection of French industries, and he had a considerable share in fashioning the protectionist legislation of the years 1890-1902. From 1883 to 1885 Meline was minister for agriculture, and in 1888-1889 he was president of the Chamber of Deputies. In 1896 he became premier (president du conseil) and minister for agriculture, offices which he vacated in 1898. At one time he editecfta Republique franqaise, and after his retirement from public life he wrote Le Retour A la terre et la surproduction industrielle, tout enfaveur de V agriculture (1905).

MELINGUE, ETIENNE MARIN (1808-1875), French actor and sculptor, was born in Caen, the son of a volunteer of 1792. He early went to Paris and obtained work as a sculptor on the church of the Madeleine, but his passion for the stage soon led him to join a strolling company of comedians. Finally chance gave him an opportunity to show his talents, and at the Porte Saint Martin he became the popular interpreter of romantic

drama of the Alexandre Dumas type. One of his greatest successes was as Benvenuto Cellini, in which he displayed his ability both as an actor and as a sculptor, really modelling before the eyes of the-audience a statue of Hebe. He sent a number of statuettes to the various exhibitions, notably one of Gilbert Louis Duprez as William Tell. Melingue’s wife, Theodorine Thiesset (1813-1886), was the actress selected by Victor Hugo to create the part of Guanhumara in Burgraves at the Comedie Francaise, where she remained ten years. See Dumas, Une Vie d’artisle (1854).

MELIORISM (Lat. tnelior, better), in philosophy, a term given to that view of the world which believes that at present the sum of good exceeds the sum of evil and that, in the future, good will continually gain upon evil. The term is said to have been invented by George Eliot

to express a theory mediating between optimism and pessimism. The pragmatic movement in philo- sophy which puts stress upon the duty and value of effort is naturally favourable to the melioristic view: the best things that have been said recently in favour of it are found in books such as William James's Pragmatism.

MELISSUS OF SAMOS, Greek philosopher of the Eleatic School (q.v.), was born probably not later than 470 B.C. Accord- ing to Diogenes Laertius, ix. 24, he was not only a thinker, but also a political leader in his native town, and was in command of the fleet which defeated the Athenians in 442. The same authority says he was a pupil of Parmenides and of Heraclitus, but the statement is improbable, owing to discrepancy in dates. His works, fragments of which are preserved by Simplicius and attested by the evidence of Aristotle, are devoted to the defence of Parmenides' doctrine. They were written in Ionic and consist of long series of argument. Being, he says, is eternal. It cannot have had a beginning because it cannot have begun from not-being (cf. ex nihilo nihil), nor from being (efoj yap av ovrw kcu ov yevoiro). It cannot suffer destruction; it is impossible for being to become not being, and if it became another being, there would be no destruction. According to Simplicius (Physica, f. 22b), he differed here from Parmenides in distinguishing being and absolute being (to cbrAws kbv). He goes on to show that eternal being must also be unlimited in magnitude, and, therefore, one and unchangeable. Any change whether from internal or external source, he says, is unthinkable; the One is unvarying in quantity and in kind. There can be no division inside this unity, for any such division implies space or void; but void is nothing, and, therefore, is not. It follows further that being is incorporeal, inasmuch as all body has size and parts. The fundamental difficulty underlying this logic is the paradox more clearly expressed by Zeho and to a large extent represented in almost all modern discussion, namely that the evidence of the senses contradicts the intellect. Abstract argument has shown that change in the unity is impossible; yet the senses tell us that hot becomes cold, hard becomes soft, the living dies, and so on. From a comparison of Melissus with Zeno of Elea, it appears that the spirit of dialectic was already tentatively at work, though it was not conscious of its own power. Neither Melissus nor Zeno seems to have observed that the application of these destructive methods struck at the root not only of multiplicity but also of the One whose existence they maintained. The weapons which they forged in the interests of Parmenides were to be used with equal effect against them- selves.

See Ritter and Preller, §§ 159-166; Brandis, Commentationum eleaticarum, pt. I, p. 185; Mullach, Arisiotelis de Melisso, Xenophane,

Gorgia ; Pabst, De Melissi samii fragments (Bonn, 1889), and histories of philosophy.

MELITO, bishop of Sardis, a Christian writer of the 2nd century, mentioned by Eusebius {Hist. Eccl. iv. 21) along with Hegesippus, Dionysius of Corinth, Apollinaris of Hierapolis, Irenaeus, and others, his contemporaries, as a champion of orthodoxy and upholder of apostolic tradition. Of his personal history nothing is known, and of his numerous works (which are enumerated — with quotations — by Eusebius) only a few fragments are extant. They included an Apologia addressed to

Antoninus some time between a.d. 169 and i8o> two books relating to the paschal controversy, and a work entitled ‘EkXoyai (selections from the Old Testament), which contained the first Christian list of ” the books of the Old Covenant.” It excludes Esther, Nehemiah and the Apocrypha. The fragments have been edited with valuable notes by Routh (Reliquiae sacrae, vol. i., 1814). These are sufficient to show that Melito was an important figure in Asia Minor and took much part in the paschal, Marcionite and Montanist controversies.

It seems more than doubtful whether the Apologia of Melito ” the Philosopher,” discovered in a Syriac translation by Henry Tattam (1789-1868), and subsequently edited by W. Cureton and by Pitra-Renan, ought to be attributed to this writer and not to another of the same name. The KXeis (clavis), edited by Pitra- Renan, is a much later Latin collection of mystical explanations of Scripture.

See A. Harnack, Texte und Untersuchungen,‘i. 240-278 (Leipzig, 1882); Erwin Preuschen, s.v. “Melito” in Herzog-Hauck, Real-encyklopadie, xii., 1903, giving full list of works and bibliography.

MELKSHAM, a market town in the Westbury parliamentary division of Wiltshire, England, 934 m. W. of London by the Great Western railway. Pop. of urban district (1901), 2450. It lies in a valley sheltered by steep chalk hills on the east, its old-fashioned stone houses lining a single broad street, which crosses the Upper Avon by a bridge of four arches. The church preserves some remnants of Norman work and a Perpendicular south chapel of rare beauty. Melksham possesses cloth-mills where coco-nut fibre and hair cloth are woven, flour-mills and dye-works. On the discovery of a saline spring in 1816, baths and a pump-room were opened, but although two other springs were found later, the attempt to create a fashionable health resort failed. The surrounding deer-forest was often visited by Edward I. Lacock Abbey, 3 m. distant, was founded in 1232 for Austin

canonesses, and dissolved in 1539. Portions of the monastic buildings remain as picturesque fragments in and near the modern mansion called Lacock Abbey.

MELLE, a town of western France, capital of an arrondisse- ment in the department of Deux-Sevres, on the left bank of the Beronne, 21 m. E.S.E. of Niort by rail. Pop. (1906), 2231. Melle has two churches in the Romanesque style of Poitou, St Pierre and St Hilaire, the latter ornamented with sculptured arcading. The hospital has a richly carved doorway of the 17th century. The church of St Savinien (nth century) serves as a prison. The town has trade in farm-produce, mules and other live stock; distilling is carried on. Melle (Metallum) derives its name from the lead mine worked here during the Roman occupation and in the early middle ages. At the latter period it had a mint. In later times it was a possession of the counts of Maine.

MELLITIC ACID (benzene hexacarboxylic acid), C 6 (COOH) 6 , was first discovered in 1799 by M. H. Klaproth in the mineral honeystone, which is the aluminium salt of the acid. The acid may be prepared by warming honeystone with ammonium carbonate, boiling off the excess of the ammonium salt and adding ammonia to the solution. The precipitated alumina is filtered off, the filtrate evaporated and the ammonium salt of the acid purified by recrystallization. The ammonium salt is then converted into the lead salt by precipitation with lead acetate and the lead salt decomposed by sulphuretted hydrogen.

The acid may also be prepared by the oxidation of pure carbon, or of hexamethyl benzene, in the cold, by alkaline potassium permanganate (F. Schulze, Ber., 1871, 4, p. 802; C. Friedel and J. M. Crafts, Ann. Mm. phys., 1884 [6], 1, p. 470). It crystallizes in fine silky needles and is soluble in water and alcohol. It is a very stable compound, chlorine, concentrated nitric acid and hydriodic acid having nO action upon it. It is decomposed, on dry distillation, into carbon dioxide and pyromellitic acid, CioH 6 8 ; when distilled with lime it gives carbon dioxide and benzene. Long digestion of the acid with excess of phosphorus pentachloride results in the formation of the acid chloride, C6(COCl)e, which crystallizes in needles, melting at 190° C. By heating the ammonium salt of the acid to 150-160 C. as long as ammonia is evolved, a mixture of

paramide (mellimide), C«(qq > NH J 3 , and ammonium euchroate is

obtained. The mixture may be separated by dissolving out the ammonium euchroate with water. Paramide is a white amorphous

powder, insoluble in water and alcohol.

MELLITUS (d. 624), bishop of London and archbishop of Canterbury, was sent to England by Pope Gregory the Great in 601. He was consecrated by St Augustine before 604, and a church was built for him in London by Aethelberht, king of Kent ; this church was dedicated to St Paul, and Mellitus became first bishop of London. About ten years later the East Saxons reverted to heathenism and the bishop was driven from his see. He took refuge in Kent and then in Gaul, but soon returned to England, and in 619 became archbishop of Canterbury in succession to Laurentius. He died on the 24th of April 624.

MELLONI, MACEDONIO (1798-1854), Italian physicist, was born at Parma on the nth of April 1798. From 1824 to 1831 he was professor at Parma, but in the latter year he was compelled to escape to France, having taken part in the revolution. In 1839 he went to Naples and was soon appointed director of the Vesuvius observatory, a post which he held until 1848. Melloni received the Rumford medal of the Royal Society in 1834. In 1835 he was elected correspondent of the Paris Academy, and in 1839 a .foreign member of the Royal Society. He died at Portici near Naples of cholera on the nth of August 1854. Melloni's reputation as a physicist rests especially on his dis- coveries in radiant heat, made with the aid of the thermo- multiplier or combination of thermopile and galvanometer, which, soon after the discovery of thermoelectricity by T. J. Seebeck, was employed by him jointly with L. Nobili in 1831. His experiments were especially concerned with the power of transmitting dark heat possessed by various substances and with the changes produced in the heat rays by passage through different materials. Substances which were comparatively transparent to heat he designated by the adjective " diather- mane," the property being " diathermaneite," while for the heat- tint or heat-coloration produced by passage through different materials he coined the word " diathermansie." In English, however, the terms were not well understood, and " diather- mancy," was generally used as the equivalent of " diatherma- neite." In consequence Melloni about 1841 began to use " diathermique " in place of " diathermane," " diathermasie " in place of "diathermaneite," and " thermocrose " for " diather- mansie." His most important book, La thermocrose ou la coloration calorifique (vol. i., Naples, 1850), was unfinished at bis death. He studied the

reflection and polarization of radiant heat, the magnetism of rocks, electrostatic induction, daguer- rotypy, &c.

MELODRAMA (a coined word from Gr. /ieXos, music, and 8pS.ua, action), the name of several species of dramatic com- position. As the word implies, ” melodrama ” is properly a dramatic mixture of music and action, and was first applied to a form of dramatic musical composition in which music accompanied the spoken words and the action, but in which there was no singing. The first example of such a work has generally been taken to be the Pygmalion of J. J. Rousseau, produced in 1775. This is the source of romantic dramas depending on sensational incident with exaggerated appeals to conventional sentiment rather than on play of character, and in which dramatis personae follow conventional types— the villain, the hero wrongfully charged with crime, the persecuted heroine, the adventuress, &c. At first the music was of some importance, forming practically a running accompaniment suitable to the situations — but this has gradually disappeared, and, if it remains, is used mainly to emphasize particularly strong situations, or to bring on or off the stage the various principal characters. Such plays first became' popular in France at the beginning of the 19th century. One of the most prolific writers of melodramas at that period was R. C. G. de Pixericouit (1 773-1844). The titles of some of his plays give a sufficient indication of their character; e.g. Victor, ou V enfant de la foret (1797); Carlina, ou V enfant du mystere (1801); Le Monastere abandonni, ou la maltdiction paternelle (1816). Another form of melodrama came from the same source, but developed on lines which laid more emphasis on the music, and is of some importance in the history of opera. Probably the first of this

type is to be found in Georg Benda's Ariadne auf Naxos (15*74). The most familiar of such melodramas is Gay's Beggar's Opera. In these the dialogue is entirely spoken. In true opera the spoken dialogue was replaced by recitative. It may be noticed that the speaking of some parts of the dialogue is not sufficient to class an opera as a ” melodrama ” in this sense, as is proved by the spoken grave-digging scene, accompanied ‘ by music, in Fidelio, and the incantation scene in Der FreischUtz. To this' the English term “declamation” is usually applied; the Germans use Melodram. But see Opera.

MELODY (Gr. jte\co5ia, a choral song, from n&x>s, tune, and ($17, song). In musical philosophy and history the word “melody “must be used in a very abstract sense, as that aspect of music which is concerned only with the pitch of successive notes. Thus a ” melodic scale ” is a scale of a kind of music that is not based on an harmonic

system; and thus we call ancient Greek music “melodic.” The popular conception : of melody is that of ” air ” or ” tune,” and this is so far from being a primitive conception that there are few instances of such melody in recorded music before the 17th century; and even folk songs, unless they are of recent origin, deviate markedly from the criteria of tunefulness. The modern conception of melody is based on the interaction of every musical category. For us a melody is the surface of a series of harmonies!, and an unac- companied melody so far implies harmony that if it so behaves that simple harmonies expressing clear key-relationships would be difficult to find for it, we feel it to be strange and vague, Again, we do not feel music as melodious unless its rhythm is symmetrical; and this, taken together with the harmonic rationality of modern melody, brings about an equally intimate connexion between melody on a large scale and form on a small scale.. In the article on Sonata Forms it is shown that there are gradations between the form of some kinds of single melody like ” Barbara Allen ” (see Ex. 1) and the larger dance forms of the suite, and then, again, gradations between these and the true sonata forms with their immense range of expression and development. Lastly, the element that appears at first sight most strictly melodic, namely, the rise and fall of the pitch, is intimately connected by origin with the nature of the human voice, and in later forms is enlarged fully as much by the char- acteristics of instruments as by parallel developments in rhythm, harmony and form. Thus modern melody is the musical surface of rhythm, harmony, form and instrumentation; and, if we take Wagnerian Leitmotif into account, we may as well add drama to the list. In short, melody is the surface of music.

We may here define a few technicalities which may be said to come more definitely under the head of melody than any ,other; but see also Harmony and Rhythm.

1. A theme is a melody, not necessarily or even usually complete, except when designed for a set of variations {q.v.), but of sufficient independent coherence to be, so to speak, an intelligible musical sentence. Thus a fugue-subject is a theme, and the first and second subjects in sonata form are more or less complex groups of themes.

2. A figure is the smallest fragment of a theme that can be recognized when transformed or detached from its surroundings. The grouping of figures into new melodies is the: most obvious resource of ” development ” or ” working-out ” in the sonata-forms (see Ex. 2-7), besides being the main resource by which fugues are carried on at those moments in which the subjects and couhter- subjeets are not present as wholes, In 16th-century polyphony melody consists mainly

of figures thus broken off from a canto fermo (see Contrapuntal Forms).

3. Polyphony is simultaneous multiple melody. In 16th-century music and in fugue-writing every part is as melodious as eVftry other. The popular cry for melody as an antidote to polyphony is thus really a curious perversion of the complaint that one may have too much of a good thing. Several well-known classical melodies are polyphonically composite, being formed by an inner melody appearing as it were through transparent places In the outer melody, which it thus completes. This is especially common in music for the pianoforte, where the tone of long notes rapidly fades; and the works of Chopin are full of examples. In Bach a works for keyed instruments figures frequently have a double mean- ing on this principle, as, for instance, in the peculiar kind of counter-; subject in the 15th fugue of the 2nd book of the Wohltemperirtlst Klavier. A good familiar example of a simple melody which, as written by the composer, would need two voices to sing it, is that

which begins the second subject of Beethoven's Waldstein Sonata (Op. 53, first movement* bars 35-42, where at the third bar of the melody a lower voice enters and finishes the phrase).

4 (a) Conjunct movement is the movement of melody along adjacent degrees of the scale. A large proportion of Beethoven's melodies are conjunct (see Ex. 2, fig. B).

4 (6) Disjunct movement, the opposite of conjunct, tends, though by no means always, to produce arpeggio types of melody, i.e. melodies which move up and down the notes of a chord. Certain types of such ntelody are highly characteristic of Brahms; arid

Wagner, whose melodies are almost always of instrumental origin, is generally disjunct in diatonic melody and conjunct in chromatic (Ex. 2, fig. C, is a disjunct figure not forming an arpeggio).

For various other melodic devices, such as inversion, augmenta- tion and diminution, see Contrapuntal Forms.

We subjoin some musical illustrations showing the treatment of figures in melody as a means of symmetry (Ex. 1), and "develop- ment (Ex. 2-7), and (Ex. 8-13) some modern melodic transforma- tions,

differing from earlier methods in being immediate instead of gradual. (D. F. T.)

Ex. 1. “Barbara Allen” (showing the germ of binary form in the balance between A 1 on the dominant and A 8 on the tonic).

A 1

A»

ES

m

=te£

^

m

— »-

H”=?

ess

E^3

I

• ○ - 4

Ex.2. Mainthemeof the first movement of Beethoven’s Trio in Bb, Op. 97.

-*-• — 3^ 1 — — V-

I _B2 I I C

*=£=

m

£

$=&££££

-=£ n –

$

_ , , B 1 i_!_i 1 ct ‘ 1

Ex. 3. Figure A of above developed in a new polyphonic 4-bar phrase.
Ex. 4. Further sequential developments of A.

‘■ .. £ = -!— P-F = = = t = = ¥^ = = W

§£

rtWf^ = ^

&c.

,__^ = r j- ^ I = 3tt = $$? — “*”

Ex. 5. Development of C with B.

ncir

fr^ , ^ f”J~p* ^Tfr H-

S

jnzz.

s

f

J-^& Tf

S I » * V c

:k > p:

C 1

C a ir

Ex. 6. Further development of B by diminution, in combination with the trills derived from C C* < *r tr

m

B diminished.

Ex. 7. Further development of B by diminution and contrary motion (inversion).

•*SPf

B invert ed.

Ex. 9. A and B 2 diminished.

_&o.

£*

g&

iilˆlfe

&fe*

rr

Ex. 8. Brahms, Quintet, Op. 34.

PE£

3 =

§bˆˆSPlPˆi

‘ˆf s

Ex – Ia -fUˆ ˆˆ

w

Ex. 11. rfee Rheindaughter’s Toy. Wagner, Das Rheingold.

4 =

Hilˆpiˆˆˆ

Ex. 12. The Nibelung’s Talisman.

Z5 — ˆ *”

6 3

iS-s-

gˆEˆ

7£ J

Ex. 13ˆ Walhalla.

w*

p$f

Nfˆffffi

OTTTT 4

9 8

MELON— MELORIA

Transverse section of the fruit of the melon (Cucumis meld) , showing the placentas (pi) , with the seeds attached to them. The three carpels forming the pepo are separated by partitions (cl). From the centre, processes (s) go to circumference(Z), ending in curved placentaries bearing the ovules.

MELON (Late Lat. melo, shortened form of Gr. firjkvireiruv, a kind of gourd; nffhov, apple, and ;reirtoi>, ripe), Cucumis melo, a polymorphic species of the order Cucurbitaceae, including numerous varieties. 1 The melon is an annual trailing herb with palmately-lobed leaves, and bears tendrils by means of which it “is readily trained over trellises, &c. It is monoecious, rt having male and female flowers

on the same plant; the flowers have deeply five-lobed campanu- ˆlate corollas and three stamens. Naudin observed that in some varieties (e.g. of Cantaloups) fertile stamens sometimes occur in the female flowers. It is a native of south Asia ” from the foot of the Himalayas to Cape Comorin,” 2 where it grows spon- taneously, but is cultivated in the temperate and warm regions of the whole world. It is vari- able both in diversity of foliage and habit, but much more so in the fruit, which in some varieties is no larger than an olive, while in others it rivals the gourd (Cucurbita maxima). The fruit is globular, ovoid, spindle-shaped, or serpent-like, netted or smooth-skinned, ribbed or furrowed, variously coloured externally, with white, green, or orange flesh when ripe, scented or scentless, sweet or insipid, bitter or even nauseous, &c. . Like the gourd, the melon undergoes strange meta- morphoses by crossing its varieties, though the latter preserve, their characters when alone. The offspring of all crossings are fertile. As

remarkable cases of sudden changes produced by artificially crossing races, M. Naudin records that in 1859 the offspring of the wild melons m. sauvage de I'Inde (C. melo agrestis) and m. s. d'Afrique, le petit m. de Figari bore different fruits from their parents, the former being ten to twelve times their size, ovoid, white-skinned, more or less scented, and with reddish flesh ; though another individual bore fruits no larger than a nut. The offspring of m. de Figari after being crossed bore fruits of the serpent-melon. On the other hand, the serpent-melon was made to bear ovoid and reticulated fruit.

Naudin thinks it is probable that the culture of the melon in Asia is as ancient as that of all other alimentary vegetables. The Egyptians grew it, or at least inferior races of melon, which were either indigenous or introduced from Asia. The Romans and doubtless the Greeks were familiar with it, though some forms may have been described as cucumbers. Columella seems to refer to the serpent-melon in the phrase ut coluber . . . ventre cubat flexo. Pliny describes them as pepones (xix. 23 to xx. 6) and Columella as melones (xi. 2, 53). The melon began to be extensively cultivated in France in 1629, according to Olivier de Serres. Gerard (Herball, 772) figured and described in 1597 several kinds of melons or pompions, but he has included gourds under the same name.

The origin of some of the chief modern races, such as " Canta- loups," " Dudaim," and probably the netted sorts, is due to Persia and the neighbouring Caucasian regions. The first of these was brought to Rome from Armenia in the 1 6th century, and supplies the chief sorts grown for the French markets; but many others are doubtless artificial productions of west Europe.

The water-melon (Citrullus vulgaris) is a member of a different genus of the same order. It has been cultivated for its cool refreshing fruit since the earliest times in Egypt and the Orient, and was known before the Christian era in southern Europe and Asia. The melon requires artificial heat to grow it to perfection, the

1 For a full account of the species of Cucumis and of the varieties of melon by Charles Naudin, see Annates des sciences naturelles, ter 4, vol. xi. p. 34 (1859).

1 Naudin, loc. cit. pp. 39, 76.

rock and cantaloup varieties succeeding with a bottom heat of 70 and an atmospheric temperature of 75 °, rising with sun heat to 80°, and the Persian varieties requiring a bottom heat of 75°, gradually

increasing to 8o°, and an atmospheric temperature ranging from 75° to 8o° when the fruit is swelling, as much sun heat as the plants can bear being allowed at all times. The melon grows best in rich turfy loam, somewhat heavy, with which a little well-rotted dung, especially that of pigeons or fowls, should be used, in the proportion of one-fifth mixed in the compost of loam. Melons are grown on hotbeds of fermenting manure, when the soil should be about a foot in thickness, or in pits heated either by hot water or fermenting matter, or in houses heated by hot wafer, in which case the soil bed should be 15 or 18 in. thick. The fer- menting materials should be well prepared, and, since the heat has to be kept up by linings, it is a good plan to introduce one or two layers of faggots in building up the bed. A mixture of dung and leaves gives a more subdued but more durable heat.

For all ordinary purposes February is early enough for sowing the first crop, as well-flavoured fruits can scarcely be looked for before May. The seeds may be sown singly in 3-in. pots in a mixture of leaf-mould with a little loam, the pots being plunged in a bottom heat of 75 to 80°, and as near the glass as possible, in order that the young plants may not be drawn up. The hill or ridge of soil should be about a foot in thickness, the rest of the surface being afterwards made up nearly to the same level. If the fruiting-bed is not ready when the roots have nearly filled the pots, they must be shifted into 4-inch pots, for they must not get starved or pot -bound. Two or three plants are usually planted in a mound or ridge of soil placed in the centre of each light, and the rest of the surface is covered over to a similar depth as soon as the roots have made their way through the mound.

The melon being one of those plants which produce distinct male and female flowers, it is necessary to its fertility that both should be produced, and that the pollen of the male flower should, either naturally by insect agency, or artificially by the cultivator's manipulation, be conveyed to the stigma of the female flower; this setting of the fruit is often done by stripping a male flower of its corolla, and inverting it in the centre of the fruit-bearing flower. After the fruit has set and has grown to the size of an egg, it should be preserved from contact with the soil by placing it on a piece of tile or slate; or if grown on a trellis by a little swinging wooden shelf, just large enough to hold it. In either case the material used should be tilted a little to one side, so as to permit water to drain away. Before the process of ripening commences, the roots should have a sufficient supply of moisture, so that none may be required from that time until the fruit is cut.

When the melon is grown in a house there should be a good depth of drainage over the tank or other source of bottom heat, and on this should be placed turfs, grass side downwards, below the soil, which should not be less than 15 and need not be more than 18 in. in thickness. The compost should be made moderately firm, and only half the bed should be made up at first, the rest being added as the roots require it. The melon may also be grown in large pots, supplied with artificial manure or manure water. The stems may be trained up the trellis in the usual way, or the rafters of a pine stove may be utilized for the purpose. If the trellis is constructed in panels about the width of the lights, it can be taken down and conveniently stowed away when not in use.

The presence of too much moisture either in the atmosphere or in the soil is apt to cause the plants to damp off at the neck, but the evil may be checked by applying a little fresh-slaked lime round the stem of the plant. ‘

Melons are liable to the attack of red spider, which are best removed by syringing with rain-water, and prevented by keeping a fairly humid atmosphere; green or black fly should also be watched for and removed by fumigation with tobacco smoke or by ” vaporizing.”

The varieties of melon are continually receiving additions, and as newer varieties spring into favour, so the older ones drop out of cultivation. A great deal depends on getting the varieties true to name, as they are very liable to get cross-fertilized by insect agency. Some of the best at present are :

Scarlet-fleshed. — Blenheim Orange, Frogmore Orange, Invincible, Sutton’s Scarlet, and Triumph.

White-fleshed. — Golden Orange, Hero of Lockinge, Longleat Perfection, Royal Favourite.

Green-fleshed. — British Queen, Epicure, Exquisite, MonaTrch, Ringleader.

The market-gardeners round Paris and other parts of France chiefly cultivate varieties of Cantaloup melon known as the Prescott hatif a chassis and Prescott fond blanc — both excellent in flavour. The plants are grown in frames on hotbeds, and only one large fruit is allowed to mature on each plant. If secured early in the season : — say in June — from 25 to 35 francs can be obtained for each fruit in the Paris markets; later fruits, however, drop down to 2 francs each,

or even less when there is a glut (see J. Weathers, French Market-Gardening).

MELORIA, a rocky islet, surrounded by a shoal, almost opposite Leghorn. It was the scene of two naval battles of the

middle ages. The first, on the 3rd of May 1241, was fought between the fleet of the emperor Frederick II. Hohenstaufen, surnamed Stupor Mundi, in alliance with Pisa, against a Genoese squadron bringing a number of English, French and Spanish prelates to attend the council summoned to meet at the Lateran by Gregory IX. Three Genoese galleys were sunk and twenty- two taken. Several of the prelates perished, and many were carried prisoners to the camp of the emperor. The second, fought on Sunday the 6th of August 1 284, was of higher historical importance. It was a typical medieval sea-fight, and accom- plished the ruin of Pisa as a naval power. The long rivalry of that city and of Genoa had broken out for the last time in 1282, the immediate cause being the incompatible claims of the two cities to sovereignty over the islands of Sardinia and Corsica. The earlier conflicts of the war in 1282, 1283 and the spring of 1284, had been unfavourable to Pisa. Though the city was united with the Catalans and with Venice in hostility to Genoa, and though it had chosen a Venetian, Alberto Morosini, as its Podesta, it received no help from either. The Genoese, who had the larger and more efficient fleet, sent their whole power against their enemy. When the Genoese appeared off Meloria the Pisans were lying in the river Arno at the mouth of which lay Porto Pisano the port of the city. The Pisan fleet represented the whole power of the city, and carried members of every family of mark and most of the great officers of state. The Genoese, desiring to draw their enemy out to battle, and to make the action decisive, arranged their fleet in two lines abreast. The first was composed according to Agostino Giustiniani of fifty- eight galleys, and eight panfili, a class of light galleys of eastern origin named after the province of Pamphylia. Uberto Doria, the Genoese admiral, was stationed in the centre and in advance of his line. To the right were the galleys of the Spinola family, and of four of the eight ” companies ” into which Genoa was divided — Castello, Piazzalunga, Macagnana and Son Lorenzo. To the left were the galleys of the Dorias, and of the other four companies, Porta, Soziglia, Porta Nuova and II Borgo. The second line of twenty galleys, under the command of Benedetto Giacaria (or Zaccharie), was placed so far behind the first that the

Pisans could not see whether it was made up of war-vessels or of small craft meant to act as tenders to the others. Yet it was near enough to strike in and decide the battle when the action had begun. The Pisans, commanded by the Podesta Morosini and his lieutenants Ugolino della Gherardescha and Andreotto Saraceno, came out in a single body. It is said that while the archbishop was blessing the fleet the silver cross of his archi- episcopal staff fell off, but that the omen was disregarded by the irreverence of the Pisans, who declared that if they had the wind they could do without divine help. They advanced in line abreast to meet the first line of the Genoese, fighting according to the medieval custom to ram and, board. The victory was decided for Genoa by the squadron of Giacaria which fell on the flank of the Pisans. Their fleet was nearly annihilated, the Podesta was taken, and Ugolino fled with a few vessels. As Pisa was also attacked by Florence and Lucca it could never recover the disaster. Two years later Genoa took Porto Pisano, and filled up the harbour. The count Ugolino was afterwards starved to death with several of his sons and grandsons in the manner made familiar by the 3 2nd canto of Dante's Inferno.

See Annali della republica di Genova, by Agostino Giustiniani (ed. Canepa, Genoa, 1854). (D. H.)

HELOS (mod. Milo), an island of the Aegean Sea (Cyclades group), at the S.W. corner of the archipelago, 75 m. due E. from the coast of Laconia. From E. to W. it measures about 14 m., from N. to S. 8 m., and its area is estimated at 52 Sq. m. The greater portion is rugged and hilly, culminating in Mount Elias in the west (2538 ft.). Like the rest of the cluster, the island is of volcanic origin, with tuff, trachyte and obsidian among its ordinary rocks. The natural harbour, which, with a depth diminishing from 70 to 30 fathoms, strikes in from the north- west so as to cut the island into two fairly equal portions, with an isthmus not more than ij m. broad, is the hollow of the prin- cipal crater. In one of the caves on the south coast the heat is

still great, and on the eastern shore of the harbour there are hot sulphurous springs. Sulphur is found in abundance on the top of Mount Kalamo and elsewhere. In ancient times the alum of Melos was reckoned next to that of Egypt (Pliny xxxv. 15 [52]), and millstones, salt (from a marsh at the east end of the harbour), and gypsum are still exported. The Melian earth (717 MˆXtas) was employed as a pigment by ancient artists. Orange, olive, cypress and arbutus trees grow throughout the island, which, however, is too dry to have any profusion of vegetation. The vinej the cotton plant and barley are the main objects of culti- vation. Pop. (1907), 4864 (commune), 12,774 (province).

The harbour town is Adamanta; from this there is an ascent to the plateau above the harbour, on which are situated Plaka, the chief town, and Kastro, rising on a hill above it, and other villages. The ancient town of Melos was nearer to the entrance of the harbour than Adamanta, and occupied the slope between the village of Trypete and the landing-place at Klima. Here is a theatre of Roman date and some remains of town walls and othei buildings, one with a fine mosaic excavated by the British school at Athens in 1896. Numerous fine works of art have been found on this site, notably the Aphrodite of Melos in the Louvre, the Asclepius in the British Museum, and the Poseidon and an archaic Apollo in Athens. The position of Melos, between Greece and Crete, arid its possession of obsidian, made it an important centre of early Aegean civilization. At this time the chief settlement was at the place now called Phylakopi, on the north-east coast. Here the excavations of the British school cleared many houses, including a palace of ” Mycenaean” type; there is also a town wall. Part of the site has been washed away by the sea. The antiquities found were of three main periods, all preceding the Mycenean age of Greece. Much pottery was found, including examples of a peculiar style, with decorative designs, mostly floral, and also considerable deposits of obsidian. There are some traditions of a Phoenician occupa- tion of Melos. In historical times the island was occupied by Dorians from Laconia. In the 6th century it again produced a remarkable series of vases, of large size, with mythological subjects and orientalizing ornamentation (see Greek Art, fig. 9), and also a series of terra-cotta reliefs.

Though Melos inhabitants sent a contingent to the Greek fleet at Salamis, it held aloof from the Attic league, and sought to remain neutral during the Peloponnesian War. But in 416 B.C. the Athenians, having attacked the island and compelled the Melians to surrender, slew all the men capable of bearing arms, made slaves of the women and children, and introduced 500 Athenian colonists. Lysander restored the island to its Dorian possessors, but it never recovered its former prosperity. There were many Jewish settlers in Melos in the beginning of the Christian era, and Christianity was early introduced. During the ” Frankish ” period the island formed part of the duchy of Naxos, except for the few years (1341-1383) when it was a separate lordship under Marco Sanudo and his daughter.

Antimelos or Antimilo, 55 m. north-west of Milo, is an un- inhabited mass of trachyte, often called Eremomilo or Desert Melos. Kimolos, or Ar gentler a, less than 1 m. to the north-east, was famous in antiquity for its figs and fuller’s earth (KijucoXia 717), and contained a considerable city, the remains of which cover the cliff of St Andrews.

Polinos, Polybos or Polivo (anc. Polyaegos) lies rather more than a mile south-east of Kimolos. It was the subject of dispute between the Melians and Kimolians. It has long been almost uninhabited.

See Leycester, ” The Volcanic Group of Milo, Anti-Milo, &c,” in Jour. Roy. Geog. Soc. (1852) ; Tournefort, Voyage; Leake, Northern Greece, iii. ; Prokesch von Osten, Denkwiirdigkeiten, &c. ; Bursian, Geog. von Griechenland, ii. ; Journ. Hell. Stud, xvi., xvii., xviii.; Excavations at Phylakopi; Inscr. graec. xii. iii. 197 sqq. ; on coins found in 1909, see Jameson in Rev. Num. 1909; 188 sqq. (E. Gr.)

MELOZZO DA FORLi (c. 1438-1494), Italian painter, the first who practised foreshortening with much success, was born at Forli about 1438; he came, it is supposed, of a wealthy family named Ambrosi. In all probability, Melozzo studied pointing under Piero de’ Franceschi, of Borgo St Sepolcro; he seems also to have been well acquainted with Giovanni Santi, the father of

Raphael. It has been said that he became a journeyman and colour-grinder to some of the best masters, in order to prosecute his studies; this lacks confirmation. Only three works are extant which can safely be assigned to Melozzo: those in the Louvre, the National Gallery, London, and the Barberini Palace, Rome, are disputable, (i) He painted in 1472 the vault of the chief chapel in the church of the Apostoli in Rome, his subject being the ” Ascension of Christ “; the figure of Christ is so boldly and effectively foreshortened that it seems to ” burst through the vaulting ” ; this fresco was taken down in 1 7 n, and the figure of Christ is now in the Quirinal Palace, not worthy of special admiration save in its perspective quality; while some of the other portions, almost Raphaelesque in merit, are in the sacristy of St Peter’s. (2) Between 1475 and 1480 he executed a fresco, now transferred to canvas, and placed in the Vatican picture- gallery, representing the appointment of Platina by Pope Sixtus IV. as librarian of the restored Vatican library. (3) In the Collegio at Forli is a fresco by Melozzo, termed the ” Pestapepe,” or Pepper-grinder, originally painted as a grocer’s sign; it is an energetic specimen of rather coarse realism, now much damaged. Melozzo also painted the cupola of the Capuchin church at Forli, destroyed in 1651; and it has been said that he executed at Urbino some of the portraits of great men (Plato, Dante, Sixtus IV., &c.) which are now divided between the Barberini Palace and the Campana collection in Paris; this, however, is doubtful,

and it is even questionable whether Melozzo was ever at Urbino. In Rome he was one of the original members of the academy of St Luke, founded by Sixtus IV. He returned to Forli, probably towards 1480, and died in November 1494. He contributed sensibly to the progress of pictorial art; and, without being re- markable as a colourist, gave weH graded lights, with general care and finish, and fine dignified figures. His works bear a certain resemblance to those of his contemporary Mantegna. Marco Palmezzano was his pupil; and the signature " Marcus de Melotius " on some of Palmezzano's works, along with' the general affinity of style, has led to their being ascribed to Melozzo, who has hence been incorrectly called " Marco Melozzo."

MELROSE, a city of Middlesex county, Massachusetts, U.S.A., about 7 m. N. of Boston. Pop. (1800), 8519; (1900), 12,962, of whom 2924 were foreign-born and 130 were negroes; (1916 cen- sus) 15,715. It is served by the Boston &; Maine railroad, and by inter-urban electric railways. The city covers 4-8 sq. m. of broken, hilly country, in which is a part of the state park of Middlesex Fells; it includes the villages of Melrose, Melrose High- lands, Wyoming and Fells. In 1905 the total factory product was valued at $9,450,929 (an increase of 176-6% over the value of the factory product in 1900). The principal products are rubber shoes (at the village of Fells), skirts (at the village of Wyoming), and leather and silverware (at Melrose Highlands). The water supply of Melrose, like that of Stoneham and of Med- ford, is derived from the metropolitan reservoir called Spot Pond in Stoneham, immediately, west of Melrose. The city was the home of Samuel Adams Drake (1833-1905), American historian, whose History of Middlesex County (Boston, 1880; vol. 2, "Mel- rose," by E. H. Goss) should be consulted; and of William Frederick Poole (1821-1894), the librarian and the originator of indexes of periodical literature. Melrose was settled about 1633, and was a part of Charlestown until 1649, and of Maiden until 1850. The eastern part of Stoneham was annexed to it in 1853. In 1899 it was chartered as a city; the charter came into effect in 1 900. The name is said to be due to a resemblance of the scenery to that of Melrose, Scotland.

MELROSE, a police burgh of Roxburghshire, Scotland. Pop. (1901), 2195. It lies on the right bank of the Tweed, 375 m: S-E. of Edinburgh, and 19 m. N.W. of Jedburgh, via St Boswells and Roxburgh, by the North British railway. The name — which Bede (730) wrote Mailros and Simeon of Durham (1130) Melros — is derived from the Celtic maol ros, " bare moor," and the town figures in Sir Waltei Scott's Abbot and Monastery as " Kennaquhair." In consequence of the beauty of its situa- tion between the Eildons and the Tweed, the literary and historical associations ot the district, and the famous ruin of

Melrose Abbey, the town has become residential and a holiday resort. , There is a hydropathic establishment on Skirmish Hill, the name commemorating the faction fight pn the 25th of July 1526, in which the Scotts defeated, the Douglases and Kers. Trade is almost wholly agricultural. The main streets run from the angles of the triangular market-place, in which stands the market , cross, dated 1642, but probably much older. Across the river are Gattonside, with numerous orchards, and Allerly, the home of Sir David Brewster from 1827 till his death in

1868.

The original Columban monastery was founded in the 7th century at Old Melrose, about 2§ m. to the east, inthe loop of a great bend of. the Tweed. It was colonized from Lindisfarne, Eata, a disciple of Aidan, being the first abbot (651), and Boisil and Cuthbert being priors here. It. was burned by Kenneth Macalpine in 839 during the wars between Scot and Saxon, and, though rebuilt, was deserted in the middle pf the nth century. The chapel, dedicated to St Cuthbert, continued for a period to attract many pilgrims, but this usage gradually declined and the building was finally destroyed by English invaders. Meanwhile in 1 136 David I. and founded an abbey dedicated to the Virgin, a little higher up the Tweed, the first Cistercian settlement in Scotland, with monks from Rievaulx in Yorkshire. Lying in the direct road from England, the abbey was frequently assaulted and in 1322 was destroyed by Edward II. Rebuilt, largely by means of a gift of. Robert Bruce, it was nearly burned-down in 1385 by Richard II. Erected once more, it was reduced to; ruin by the earl of Hertford (afterwards the Protector Somerset) in 1545. Later the Reformers dismantled much of what was left. The adaptation of part of the nave to the purposes of a parish church and the use of the building as a quarry did further damage. The ruins, however, now the property of the duke of Buccleuch, are carefully preserved. Of the conventual buildings apart from the church nothing has survived but a fragment of the cloister with a richly-carved round-headed doorway and some fine arcading. The abbey, cruciform, is in the Decorated and Per-r pendicular styles, with pronounced French influence, due probably to the master mason John Morow, or Morreau, ; who, according to an inscription on the south transept wall, was born in Paris, The south front is still beautiful. The west front and a large portion of the north half of the nave and aisle have perished, but the remains include the rest of the nave, the two transepts, the chancel and choir, the two western piers of the tower and the sculptured roof of the east end. From east to west it measured 258 ft., the nave is 69 ft. wide and the width of the transepts from north to south is n 55 ft. The nave had an aisle on each

side, the north noticeably the narrower, the south furnished with eight chapels, one in each bay. Both transepts contained an eastern aisle, and the chancel a square chapel at its west end 09 each side. Over the south transept aisle, which was the chapel of St Bridget, is tfie clerestory passage, which ran all round the church. The choir extended westwards for three bays beyond the tower and terminated in a stone rood-screen. Sir Walter Scott has immortalized the east window, in The Lay of : the Last Minstrel, but the south window with .its flowing tracery is even finer. In the carving of windows, aisles, cloister, capitals, bosses and doorheads no design is repeated. The heart of Robert Bruce was buried at the high altar,- and in the chancel are the tombs of Sir William Douglas, the Knight of Liddesdale (1300-I 353) ! James 2nd earl of Douglas (1358-1388), the victor of Otterburn; Alexander II.; and Michael Scot "the Wlˆd " (1175-1234) — though some authorities say that this is the tomb of Sir Brian Layton, who.fell in the battle of Ancrum Moor (1544)1 At the door leading from the north transept to the sacristy is the grave of Joanna (d. 1 238), queen of Alexander II.

The muniments of the abbacy, preserved in the archives of the earl of Morton, were edited by Cosmo Innes for the Bannatyne Club and published in 1837 under the title of Liber saticte Marie de Melros. Among the documents is one of, the earliest specimens of the Scots dialect. The Chronica de Mailros, preserved among the Cotton MSS., was printed at Oxford in 1684 by Williain Futnjan and by the Bannatyne Club In 1835 under the editorship of John Stevenson.

MELTON MOWBRAY, a market town in the Melton parlia- mentary division of Leicestershire, England, pleasantly situated in a fertile vale, at the confluence of the Wreake and the Eye. Pop. of urban district (1901), 7454. It is 105 m. N.N.W. from London by the Midland railway, and is served by a joint branch of the London & North Western and Great Northern railways. The church of St Mary, a fine cruciform structure, Early English and later, with a lofty and richly ornamented central tower, was enlarged in the reign of Elizabeth. Melton is the centre of a celebrated hunting district, in connexion with which there are large stables in the town. It is known for its pork pies, and has a trade in Stilton cheese. There are breweries and tanneries and an important cattle market. There are blast furnaces in the neighbouring parish of Asfordby for the smelting of the abun- dant supply of iron ore in the district. During the Civil War Melton was in

February 1644 the scene of a defeat of the parlia- mentary forces by the royalists. It is the birthplace of John Henley the orator (1692-1759).

MELUN, a town of northern France, capital of the department of Seine-et-Marne, situated north of the forest of Fontainebleau, 28 m. S.S.E. of Paris by rail. Pop. (1906), 11,219. The town is divided into three parts by the Seine. The principal portion lies on the slope of a hill on the right bank; on the left bank is the most modern quarter, while the old Roman town occupies an island in the river. On the island stands the Romanesque church of Notre-Dame (nth and 12th centuries), formerly part of a nunnery, the site of which is occupied by a prison. The other public buildings are on the right bank of the river. Of these, the most striking is the church of St Aspais, an irregularly shaped structure of the 15th and 16th centuries, on the apse of which may be seen a modern medallion in bronze, the work of the sculptor H. Chapu, representing Joan of Arc as the liberator of Melun. The h6tel-de-ville (1847) — in the construction of which an old mansion and turret have been utilized — and the tower of St Bartholomew of the 16th and 18th centuries are also of interest. In the courtyard of the former there is a monument to Jacques Amyot, the translator of Plutarch, who was born at Melun in 1513. Among the rich estates in the neighbourhood the most remarkable is the magnificent chateau of Vaux-le- Vicomte, which belonged to Nicholas Fouquet, intendant of finances under Louis XIV. Melun is a market for grain and farm produce, and its industries include brewing, tanning, distilling, sawing and the manufacture of agricultural implements, clogs, fur garments, lime, cement and plaster.

In Caesar's Gallic wars Melun (Melodunum) was taken by his lieutenant Labienus, in order to facilitate the attack of Lutetia by the right bank of the Seine. It was pillaged by the Normans, and afterwards became the favourite residence of the first kings of the race of Capet; Robert and Philip I. both died here. In 1359 Melun was given up by Jeanne of Navarre to her brother, Charles the Bad, but was retaken by the dauphin Charles and Bertrand Duguesclin. In 1420 it made an heroic defence against Henry V. of England and his ally the duke of Burgundy. Ten yeajs later the people of Melun, with the help of Joan of Arc, drove out the English. It was occupied by the League in 1589, and retaken by Henry IV. in the following year.

MELUSINE, the tutelary fairy of the house of Lusignan, was the eldest daughter of the fairy Pressine, to avenge whose wrongs she shut up her father in a mountain in Northumberland. For this she was condemned to be metamorphosed every Saturday into a woman-

serpent— that is, to be a serpent from the hips downwards. She might, however, be eventually saved from this punishment if she could find a husband who would never see her on a Saturday. Such a husband was found in Raymond, nephew of the count of Poitiers, who became rich and powerful through the machinations of his wife. She built the castle of Lusignan and many other of the family fortresses. When at length her husband gave way to his curiosity, and saw her taking the bath of purification on a Saturday she flew from the castle in the form of a serpent. Thenceforward the death of a member of the house of Lusignan was heralded by the cries of the fairy serpent. ” Pousser des cris de Melusine ” is still a popular saying.

This history is related at length, with the adventures of

Melusine’s numerous progeny, by Jean d’ Arras, in his Chroniqut de la princesse, written in 1387 at the desire of John, duke of Berry, for the amusement of the duke and of his sister Marie of France, duchess of Bar. It is one of the most charming of the old prose romances in manner and style, and is natural in spite of the free use of the marvellous. An attempt has been made by Jules Baudot in Les Princesses Yolande et les dues de Bar\ Paris, 1900) to make it a roman a cli and to identify the personages. Melusine, Mellusine or Merlusine is, however, simply the spirit of the fountain of Lusignan, and the local Poitevin myth is attached to the origin of the noble house. The etymology of the word ha? been variously and fancifully given. Some writers have supposed Merlusine to be a corruption of mere Lucine {mater Lucina), the deity invoked in child-birth. She has been identified with Melisende, widow of a king of Jerusalem, and with Mervant, wife of Geoffroi de Lusignan.

The MSlusine of Jean d’Arras was printed by Adam Steinschaber at Geneva in 1478, and was reprinted many times in the 15th and 16th centuries. It has been translated into Spanish, English, German and Flemish. Modern editions are by J. C. Brunet (Paris, 1854), and by E. Lecesne for the Academy of Arras (Arras, 1888). The English translation was edited from a unique MS. in the British Museum by A. K. Donald for the E.E.T.S. (1895). The tale was versified in the 14th century by a poet called Couldrette, whose poem was published in 1854 by Francisque Michel. See further J. C. Dunlop, Hist, of Fiction, ii. 491-493 (new ed., 1888); S. Baring-Gould, Curious Myths of the Middle Ages, pp. 470 seq. (new ed., 1881) ; and J. C. Brunet, Manuel du libraire (vol. iii., 1862, s.v. Jean d’Arras).

MELVILLE, ANDREW (1545-1622), Scottish scholar, theo- logian and religious reformer, was the youngest son of Richard Melville (brother

to Melville of Dysart), proprietor of Baldovy near Montrose, at which place Andrew was born on the 1st of August 1545. His father fell at the battle of Pinkie (1547), fighting in the van of the Scottish army, and, his wife having died soon after, the orphan was cared for by his eldest brother Richard (1522-157 5). At an early age Melville began to show a taste for learning, and his brother did everything in his power to give him the best education. The rudiments of Latin he obtained at the grammar school of Montrose, after leaving which he learned Greek for two years under Pierre de Marsilliers, a Frenchman whom John Erskine of Dun had induced to settle at Montrose; and such was Melville's proficiency that on going to the university of St Andrews he excited the astonishment of the professors by using the Greek text of Aristotle, which no one else there understood. On completing his course, Melville left St Andrews with the reputation of " the best poet, philosopher, and Grecian of any young master in the land." He then, in 1564, being nineteen years of age, set out for France to perfect his education at the university of Paris. He there applied himself to Oriental languages, but also attended the last course of lectures delivered by Turnebus in the Greek chair, as well as those of Peter Ramus, whose philosophical method and plan of teaching he afterwards introduced into the universities of Scot' land. From Paris he proceeded to Poitiers (1566) to study civil law, and though only twenty-one he was apparently at once made a regent in the college of St Marceon. After a residence of three years, however, political troubles compelled him to leave France, and he went to Geneva, where he was welcomed by Theodore Beza, at whose instigation he was appointed to the chair of humanity in the academy of Geneva. In addition to his teaching, however, he also applied himself to studies in Oriental literature, and in particular acquired from Cornelius Bertram, one of Jjis brother professors, a knowledge of Syriac. While he resided at? Geneva the massacre of St Bartholomew in .1572 drove an immense number of Protestant refugees to that city, including several of the most distinguished French men of letters of the time. Among these were several men learned in civil law. and political science, and their society increased Melville's knowledge of the world and enlarged his ideas of civil and ecclesiastical liberty. In 1574 Melville returned to Scotland, and almost immediately received the appointment of principal of Glasgow University, which had fallen into an almost ruinous state, the college having been shut and the students dispersed. Melville,

however, set himself to establish a good educational system. He enlarged the curriculum at the college, and established chairs in languages, science, philosophy and divinity, which were confirmed by charter in 1577. His fame spread through the kingdom, and students flocked from all parts of Scotland and even beyond, till the class-rooms could not contain those who came for admission. He assisted in the reconstruction of Aberdeen University in 1575, and in order that he might do for St Andrews what he had done for Glasgow, he was appointed principal of St Mary's College, St Andrews, in 1580. His duties there comprehended the teaching, not only of theology, but of the Hebrew, Chaldee, Syriac and Rabbinical languages. The ability of his lectures was universally acknowledged, and he created a taste for the study of Greek literature. The reforms, however, which his new modes of teaching involved, and even some of his new doctrines, such as the non-infallibility of Aristotle, brought him into collision with other teachers in the university. He was moderator of the General Assembly in 1582, and took part in the organization of the Church and the Presbyterian method. Troubles arose from the attempts of the court to force a system of Episcopacy upon the Church of Scotland (see Scot- land, Church of), and Melville prosecuted one of the " tulchan " bishops (Robert Montgomery, d. 1609). In consequence of this he was summoned before the Privy Council in February 1584, and had to flee into England in order to escape an absurd charge of treason which threatened imprisonment and not improbably his life. After an absence of twenty months he returned to Scotland in November 1585, and in March 1586 resumed his lectures in St Andrews, where he continued for twenty years; he became rector of the university in 1590. During the whole time he protected the liberties of the Scottish Church against all encroachments of the government. That in the main he and his coadjutors were fighting for the constitutionally guaranteed rights of the Church is admitted by all candid inquirers (see in particular The History of England from 1603 to 1616, by S. R. Gardiner, vol. i. chap. ix.). The chief charge against Melville is that his fervour often led him to forget the reverence due to an " anointed monarch." Of this, however, it is not easy to judge. Manners at that time were rougher than at present. When the king acted in an arbitrary and illegal manner he needed the reminder that though he was king over men he was only " God's silly vassal." Melville's rudeness (if it is to be called so) was the outburst of just indignation from a man zealous for the purity of religion and regardless of consequences to himself. In 1599 he was deprived of the rectorship, but was made dean of the faculty of theology. The close of Melville's career in Scotland was at length brought about by James in characteristic fashion. In 1606 Melville and seven other clergymen of

the Church of Scotland were summoned to London in order ” that his majesty might treat with them of such things as would tend to settle the peace of the Church.” The contention of the whole of these faithful men was that the only way to accomplish that purpose was a free Assembly. Melville delivered his opinion to that effect in two long speeches with his accustomed freedom, and, having shortly afterwards written a sarcastic Latin epigram on some of the ritual practised in the chapel of Hampton Court, and some eavesdropper having conveyed the lines to the king, he was committed to the tower, and detained there for four years. On regaining his liberty, and being refused permission to return to his own country, he was invited to fill a professor’s chair in the university of Sedan, and there he spent the last eleven years of his life. He died at Sedan in 1622, at the age of seventy-seven.

See McCries, Andrew Melville (ed. 1819); Andrew Lang, History of Scotland (1902). (D. Mn.)

MELVILLE, ARTHUR (1858-1904), British painter, was born in Scotland, in a village of Haddingtonshire. He took up paint- ing at an early age, and though he attended a night-school and studied afterwards in Paris and Grez, he learnt more from practice and personal observation than from school training. The remarkable colour-sense which is so notable a feature of his work, whether in oils or in water-colour, came to him during his

travels in Persia, Egypt and India. Melville, though compara- tively little known during his lifetime, was one of the most powerful influences in contemporary art, especially in his broad decorative treatment with water-colour. • Though his vivid impressions of colour and movement are apparently recorded with feverish haste, they are the result of careful deliberation and selection. He was at his best in his water-colours of Eastern life and colour and his Venetian scenes, but he also painted several Striking portraits in oils and a powerful colossal composition of ” The Return from the Crucifixion ” which remained unfinished at his death in 1904. At the Victoria and Albert Museum is one of his water-colours, ” The Little Bull-Fight- — Bravo, Toro! ” and another, ” An Oriental Goatherd,” is in the Weimar Museum. But the majority of his pictures have been absorbed by private collectors.

A comprehensive memorial exhibition of Melville’s works was held at the Royal Institute Galleries in London in 1906.

MELVILLE, HENRY DUNDAS, ist Viscount (1742-1811), British

statesman, fourth son of Robert Dundas (1685-1753), lord president of the Scottish court of session, was born at Edinburgh in 1742, and was educated at the high schooland university there. Becoming a member of the faculty of advo- cates in 1763, he soon acquired a leading position at the bar; and he had the advantage of the success of his half-brother Robert (17 13-1787), who had become lord president of the court of session in 1760. He became solicitor-general to Scotland in 1766; but after his appointment as lord-advocate in 1775, he gradually relinquished his legal practice to devote his attention more exclusively to public business. In 1774 he was returned to parliament for Midlothian, and joined the party of Lord North; and notwithstanding his provincial dialect and ungraceful manner, he soon distinguished himself by his clear and argumentative speeches. After holding subordinate offices under the marquess of Lansdowne and Pitt, he entered the cabinet in 1791 as home secretary. From 1794 to 1801 he was secretary at war under Pitt, who conceived for him a special friendship. In 1802 he was elevated to the peerage as Viscount Melville and Baron Dunira. Under Pitt in 1804 he again entered office as first lord of the admiralty, when he introduced numerous improvements in the details of the department. Suspicion had arisen, however, as to the financial management of the admiralty, of which Dundas had been treasurer between 1782 and 1800; in 1802 a commission of inquiry was appointed, which reported in 1805. The result was the impeachment of Lord Melville in 1806, on the initiative of Samuel Whitbread, for the misappropriation of public money; and though it ended in an acquittal, and nothing more than formal negligence lay against him, he never again held office. An earldom was offered in 1809 but declined; and he died on the 28th of May 1811.

His son Robert, 2nd Viscount Melville (1771-1851),. filled various political offices and was first lord of the admiralty from 1812 to 1827 and from 1828 to 1830; his name is perpetuated by that of Melville Sound, because of his interest in Arctic exploration. His eldest son, Henry Dundas, 3rd Viscount (1801-1876), a general in the army, played a distinguished part in the second Sikh War.

See Hon. J. W. Fortescue, History of the British Army, vol. iv.

(1907).

MELVILLE, HERMAN (1819-1891), American author, was born in New York City on the ist of August 1819. He shipped as a cabin-boy at the age of eighteen, thus being enabled to .make his first visit to England, and at twenty-two sailed for a long whaling cruise in the Pacific. After

a year and a half he deserted his ship at the Marquesas Islands, on account of the cruelty of the captain; was captured by cannibals on the island of Nukahiva, and detained, without hardship, four months; was rescued by the crew of an Australian vessel, which he joined, and two years later reached New York. Thereafter, with the exception of a passenger voyage around the world in i860, Melville remained in the United States, devoting himself to literature — though for a considerable period (1866-1885) he held a post in the New York custom-house — and being perhaps Hawthorne's most intimate

friend among the literary men of America. His writings are numerous, and of varying merit; his verse, patriotic and other, is forgotten; and his works of fiction and of travel are of irregular execution. Nevertheless, few authors have been enabled so freely to introduce romantic personal experiences into their books: in his first work, Typee: A Peep at Polynesian Life, or Four Months' Residence in a Valley of the Marquesas (1846), he described his escape from the cannibals; while in Omoo, a Narra- tive of Adventures in the South Seas (1847), White Jacket, or The World in a Man-of-War (1850), and especially Moby Dick, or The Whale (1851), he portrayed seafaring life and character with vigour and originality, and from a personal knowledge equal to that of Cooper, Marryat or Clark Russell. But these records of adventure were followed by other tales so turgid, eccentric, , opinionative, and loosely written as to seem the work of another author. Melville was the product of a period in American literature when the fiction written by writers below Irving, Poe and Hawthorne was measured by humble artistic standards. He died in New York on the 28th of September 1801.

MELVILLE, JAMES (1556-1614), Scottish reformer, nephew of Andrew Melville (q.v.), was born on the 26th of July 1556. He was educated at Montrose and St Leonard's College, St Andrews. In 1574 he proceeded to the university of Glasgow, of which his uncle was principal, and within a year became one of the regents. When his uncle was appointed, in 1580, principal of the New (later, St Mary's) College, St Andrews, he was transferred to the chair of Oriental languages there. For three and a half years he lectured in the university, chiefly on Hebrew, but he had to flee to Berwick in May 1584 (a few months after his uncle's exile) to escape the attacks of his ecclesiastical enemy, Bishop Adam- son. After a short stay there and at Newcastle-on-Tyne, and again at Berwick, he proceeded to London, where he joined some

of the leaders of the Scottish Presbyterian party. The taking of Stirling Castle in 1585 having changed the political and ecclesiastical positions in the north, he returned to Scotland in November of that year, and was restored to his office at St Andrews. From 1586 to his death he took an active part in Church controversy. In 1589 he was moderator of the General Assembly and on several occasions represented his party in conferences with the court. Despite his antagonism to James's episcopal schemes, he appears to have won the king's respect. He answered, with his uncle, a royal summons to London in 1606 for the discussion of Church policy. The uncompromising attitude of the kinsmen, though it was made the excuse for send- ing the elder to the Tower, brought no further punishment to James than easy detention within ten miles of Newcastle-on- Tyne. During his residence there it was made clear to him by the king's agents that he would receive high reward if he supported the royal plans. In 1613 negotiations were begun for his return to Scotland, but his health was broken, and he died at Berwick in January 1614.

Melville has left ample materials for the history of his time from the Presbyterian standpoint, in (a) correspondence with his uncle Andrew Melville (MS. in the library of the university of Edinburgh), and (b) a diary (MS. in the Advocates' Library, Edinburgh). The latter is written in a vigorous, fresh style, and is especially direct in its descriptions of contemporaries. His sketch of John Knox at St Andrews is one of his best passages.

As a writer of verse he compares unfavourably with his uncle. All his pieces, with the exception of a " libellus supplex " to King James, are written in Scots. He translated a portion of the Zodiacus vitae of Palingenius, and adapted some passages from Scaliger under the title of Description of the Spainyarts naturall. His Spiritual Propine of a Pastour to his People (1598), The Black Bastill, a lamentation for the kirk (161 1), Thrie may keip Counsell, give Twa be away, The Beliefe of the Singing Soul, David's Tragique Fall, and a number of Sonnets show no originality and indifferent technical ability.

The Diary was printed by the Bannatyne Club in 1829, and by the Wodrow Society in 1842. Large portions of it are incorpor- ated in David Calderwood's (1575-1650) History of the Kirk of Scotland (first printed in 1678). For the life and times, see Thomas M'Crie's Life of Andrew Melville.

MELVILLE, SIR JAMES (1535-1617), Scottish diplomatist and memoir writer, was the third son of Sir John Melville, laird of Raith in the

county of Fife, who was executed for treason in

1548. One of his brothers was Robert, 1st Baron Melville of Monimail (1527-1621). James Melville in 1549 went to France to become page to Mary Queen of Scots. Serving on the French side at the battle of St Quentin in 1557 Melville was wounded and taken prisoner. He subsequently carried out a number of diplomatic missions for Henry II. of France. On Mary's return to Scotland in 1561 she gave Melville a pension and an appointment in her household, and she employed him as special emissary to reconcile Queen Elizabeth to her marriage with Damley. After the murder of Darnley in February 1567, Melville joined Lord Hemes in boldly warning Mary of the danger and disgrace of her projected marriage with Bothwell, and was only saved from the latter's vengeance in consequence by the courageous resolution of the queen. During the troubled times following Mary's imprisonment and abdication Melville con- ducted several diplomatic missions of importance, and won the confidence of James VI. when the king took the government into his own hands. Having been adopted as his heir by the reformer Henry Balnaves, he inherited from him, at his death in 1579, the estate of Halhill in Fife; and he retired thither in 1603, refusing the request of James to accompany him to London on his acces- sion to the English throne. At Halhill Melville wrote the Memoirs of my own Life, a valuable authority for the history of the period, first published by his grandson, George Scott, in 1683. Sir James Melville died at Halhill on the 13th of November 161 7. By his wife, Christina Bpswell, he had one son and two daughters; the elder of these, Elizabeth, who married John Colville, de jure 3rd Baron Colville of Culross, has been identified with the authoress of a poem published in 1603, entitled Ane Godlie Dreame.

See the Memoirs mentioned above, of which the most modern edition is that prepared by T. Thompson for the Bannatyne Club (Edinburgh, 1827).

MELVILL VAN CARNBEE, PIETER, Baron (1816-1856), Dutch geographer, was born at the Hague on the 20th of May 181 6. He traced his descent from an old Scottish family, originally, it is said, of Hungarian extraction. Destined for the navy, in which his grandfather Pieter Melvill van Carnbee (1743-1810) had been admiral, he imbibed a taste for hydro- graphy and cartography as a student in the college of Medemblik, and he showed his capacity as a surveyor on his first voyage to the Dutch Indies (1835). I n **839 he was again in the East, and was attached to the hydrographical bureau at Batavia. With the assistance of documents collected by the old East India Company, he completed a map of Java in five sheets,**

accompanied by sailing directions (Amsterdam, 1842). He remained in the East till 1845 collecting materials for a chart of the waters between Sumatra and Borneo (two sheets, 1845 and 1846). On his return to Holland he was attached to the naval department with the charge of studying the history of the hydrography of the Dutch East Indies. He also undertook, in connexion with P. F. von Siebold, the publication of the Moniteur des Indes, a valuable series of scientific papers, mainly from his own pen, on the foreign possessions of Holland, which was continued for three years. In 1850 Melvill returned to India as lieutenant of the first class and adjutant to Vice- Admiral van den Bosch; and after the premature death of this commander he was again appointed keeper of the charts at Batavia. In 1853 he obtained exemption from active naval service that he might devote himself to a general atlas of the Dutch Indies. But in 1856 he fell a victim to climate, dying at Batavia on the 24!] ˆ of October. In spite of delays in engraving, twenty-five sheets of the atlas were already finished, but it was not till 1862 that the whole plan, embracing sixty sheets, was completed by Lieut.-Colonel W. F. Versteeg. In 1843 Melvill received the decoration of the Netherlands Lion, in 1849 that of the Legion of Honour.

MEMBRANELLE, an organ in Ciliate Infusoria (q.v.), a flat- tened assemblage of adherent cilia, like the plates of Ctenophora (q.v.) : such are arranged in a series in the adoral wreath of the Heterothrichaceae Oligotrichaceae and Hypotriehaceae and constitute the posterior girdle of Peritricha.

MEMEL, a town of Germany, in the kingdom of Prussia, the most northerly town of the German empire, 91 m, by rail N.E. of Konigsberg, at the mouth of the Dange, and on the bank of a sound, called the Memeler Tief, which connects the Kurische Haff with the Baltic. Pop. (1905), 20,687. On the side next the sea the town is defended by a citadel and other fortifications, and the entrance to the harbour is protected by a lighthouse. Memel has been largely rebuilt since a destructive fire in 1854. It possesses iron-foundries, shipbuilding yards, breweries, distilleries, and manufactories of chemicals, soap and amber wares. By far the most important interest of the town, however, is its transit trade in timber and the grain and other agri- cultural products of Lithuania, and also herrings and other kinds of fish. The timber is brought by river from the forests of Russia,

and is prepared for export in numerous saw-mills. The annual value of timber exported is above £1,000,000. A Prussian national memorial was unveiled here in the presence of the emperor William II. in September 1907.

Memel was founded in 1252 by Poppo von Osterna, grand master of the Teutonic order, and was at first called New Dortmund and afterwards Memelburg. It soon acquired a considerable trade, and joined the Hanseatic League. During the 13th, 14th and 15th centuries it was repeatedly burned by its hostile neighbours, the Lithuanians and Poles, and in the 17th century it remained for some time in the possession of Sweden. In 1757, and again in 1813, it was occupied by Russian troops. After the battle of Jena, King Frederick William III. retired to Memel; and here, in 1807, a treaty was concluded between England and Prussia. The poet Simon Dach was a native of Memel.

See J. Sembritzki, Gesckichte der kdniglich preussischen See- und Handelsstadt Memel (Memel, 1900); and Memel in 19 Jahrhundert (Memel, 1902).

HEMEL, or Niemen, a river of Russia and Prussia, rising in the middle of the Russian government of Minsk at an altitude of 580 ft. and flowing generally west as far as Grodno. Thence it runs north to Kovno, separating Poland from Russia, and at Kovno it turns west again, still dividing Poland from Russia, until it enters the Prussian province of East Prussia, through which it flows west and north-west past Tilsit for a distance of 70 m. and finally enters the Kurisches Haff by several arms. Of these, those principally used for navigation are the Russ, and its chief branch the Atmat. The Russ is connected with the outlet of the Kurisches Haff at Memel by a canal, while another canal links the Gilge arm southward with the Pregel. Consider- able quantities of timber are floated down the Memel, and large amounts of corn shipped down it and its navigable tributary the Viliya. The lowlands of Tilsit are protected against inun- dation by dikes. Total length of the river, 490 m. ; area of its basin, 34,950 sq. m. It is navigable for large vessels as far as Grodno. (

See H. Keller, Memel, Pregel und Weichselstrom (2 vols., Berlin, 1900); and Schickert, Wasserwege und Deichwesen in der Memel-niederung (Konigsberg, 1901).

MEMLINC, HANS (c. 1430-1494), Flemish painter, whose art gave lustre to Bruges in the period of its political and commercial decline. Though much has been written respecting the rise and fall of the school which made this city famous, it remains a moot question

whether that school ever truly existed. Like Rome or Naples, Bruges absorbed the talents which were formed and developed in humbler centres. Jan Van Eyck first gained repute at Ghent and the Hague before he acquired a domicile elsewhere, and Memlinc, we have reason to think, was a skilled artist before he settled at Bruges. The annals of the city are silent as to the birth and education of a painter whose name was in- accurately spelt by different authors, and whose identity was lost under the various appellations of Hans and Hausse, or Hemling, Memling, and Memlinc. But W. H. J. Weale mentions a con- temporary document discovered in 1889, according to which Memlinc " drew his origin from the ecclesiastical principality of Mayence," and died at Bruges on the nth of August 1494. He probably served his apprenticeship at Mayence or Cologne, and later worked under Rogier van der Weyden. He did not come to Bruges until about 1467, and certainly not as a wounded fugitive from the field of Nancy, The story is fiction, as is also

the report that he was sheltered and cured by the Hospitallers at Bruges, and, to show his gratitude, refused payment for a picture he had painted. Memlinc did indeed paint for the Hospitallers, but he painted not one but many pictures, and he did so in 1479 and 1480, being probably known to his patrons of St John by many masterpieces even before the battle of Nancy. Memlinc is only connected with military operations in a mediate and distant sense. His name appears on a' list of sub- scribers to the loan which was raised by Maximilian of Austria to push hostilities against France in the year 1480. In 1477, when he is falsely said to have fallen, and when Charles the Bold was killed, he was under contract to furnish an altarpiece for the gild-chapel of the booksellers of Bruges; and this altarpiece, now preserved, under the name of the " Seven Griefs of Mary," in the gallery of Turin, is one of the fine creations of his riper age, and not inferior in any way to those of 1479 m the hospital of St John, which for their part are hardly less interesting as illustrative of the master's power than.the " Last Judgment " in the cathedral of Danzig. Critical opinion has been unanimous in assigning the altarpiece of Danzig to Memlinc; and by this it affirms that Memlinc was a resident and a skilled artist at Bruges in 1473 ; for there is no doubt that the " Last Judgment. " was painted and sold to a merchant at Bruges, who shipped it there on board of a vessel bound to the Mediterranean, which was captured by a Danzig privateer in that very year. But, in order that Memlinc's repute should be so fair as to make his pictures purchasable, as this had been, by an agent of the Medici at Bruges, it is incum- bent on us to acknowledge that he had furnished sufficient proofs before that time of the skill which excited the wonder of such

highly cultivated patrons.

It is characteristic that the oldest allusions to pictures con- nected with Memlinc's name are those which point to relations with the Burgundian court. The inventories of Margaret of Austria, drawn up in 1524, allude to a triptych of the "God of Pity " by Rogier van der Weyden, of which the wings containing angels were by " Master Hans." But this entry is less impor- tant as affording testimony in favour of the preservation of Memlinc's work than as showing his connexion with an older Flemish craftsman. For ages Rogier van der Weyden was ac- knowledged as an artist of the school of Bruges, until records of undisputed authenticity demonstrated that he was bred at Tour- nai and settled at Brussels. Nothing seems more natural than the conjunction of his name with that of Memlinc as the author of an altarpiece, since, though Memlinc's youth remains obscure, it is clear from the style of his manhood that he was taught in the painting-room of Van der Weyden. Nor is it beyond the limits of probability that it was Van der Weyden who received com*- missions at a distance from Brussels, and first took his pupil to Bruges, where he afterwards dwelt. The clearest evidence of the Connexion of the two masters is that afforded by pictures, particularly an altarpiece, which has alternately been assigned to each of them, and which may possibly be due to their joint labours. In this altarpiece, which is a triptych ordered for a patron of the house of Sforza, we find the style of Van der Weyden in the central panel of the Crucifixion, and that of Memlinc in the episodes on the wings. Yet the whole piece was assigned to the former in the Zambeccari collection at Bologna, whilst it was attributed to the latter at the Middleton sale in London in 1872. At first, we may think, a closer re- semblance might be traced between the two artists than that disclosed in later works of Memlinc, but the delicate organization of the younger painter, perhaps also a milder appreciation" of the duties of a Christian artist, may have led Memlinc to realise a sweet and perfect ideal, without losing, on that account, the feeling of his master. He certainly exchanged the asceticism of Van der Weyden for a sentiment of less energetic con r centration. He softened his teacher's asperities and bitter hardness of expression.

In the oldest form in which Memlinc's style is displayed, or rather

in that example which represents the Baptist in the gallery of

Munich, we are supposed to contemplate an effort of the year I4_70.

The finish of this piece is scarcely surpassed, though the subject

‘is more important, by that of the “Last Judgment” of Danzig

But the latter is more interesting than the former, because it tells how Memlinc, long after Rogier’s death and his own settlement at Bruges, preserved the traditions of sacred art which had been applied in the first part of the century by Rogier van der Weyden to the ” Last Judgment ” of Beaune. All that Memlinc did was to purge his master’s manner of excessive stringency, and add to his other qualities a velvet softness of pigment, a delicate transparence of colours, and yielding grace of slender forms. That such a beautiful work as the ” Last Judgment ” of Danzig should have been bought for the Italian market is not surprising when we recollect that picture-fanciers in that country were familiar with the beauties of Memlinc’s compositions, as shown in the preference given to them by such purchasers as Cardinal Grimari and Cardinal Bembo at Venice, and the heads of the house of Medici at Florence. But Memlinc’s reputation was not confined to Italy or Flanders. . The ” Madonna and Saints ” which passed out of the Duchatel collection into the gallery of the Louvre, the ” Virgin and Child ” painted for Sir John Donne and now at Chatsworth, and other noble speci- mens in English and Continental private houses, show that his work was as widely known and appreciated as it could be in the state of civilization of the 16th century. It was perhaps not their sole attraction that they gave the most tender and delicate possible impersonations of the ” Mother of Christ ” that could suit the taste of that age in any European country. But the portraits of the donors, with which they were mostly combined, were more charac- teristic, and probably more remarkable as likenesses, than any that Memlinc s contemporaries could produce. Nor is it unreason- able to think that his success as a portrait painter, which is manifested in isolated busts as well as in altarpieces, was of a kind to react with effect on the Venetian school, which undoubtedly was affected by the partiality of Antonello da Messina for trans- Alpine types studied in Flanders in Memlinc’s time. The portraits of Sir John Donne and his wife and children in the Chatsworth altarpiece are not less remarkable as models of drawing and finish than as refined pre- sentations of persons of distinction; nor is any difference in this respect to be found in the splendid groups of father, mother, and children which fill the noble altarpiece of the Louvre. As single portraits, the busts of Burgomaster Moreel and his wife in the museum of Brussels, and their daughter the ” Sibyl Zambetha ” (according to the added description) in the hospital at Bruges, are the finest and most interesting of specimens.

The ” Seven Griefs of Mary ” in the gallery of Turin, to which we may add the ” Seven Joys of Mary ” in the Pinakothek of Munich, are illustrations of the habit which clung to the art of Flanders of representing a cycle of subjects on the different planes of a single picture, where a wide expanse of ground is “covered with incidents from the Passion in the form common to the action of sacred plays.

The masterpiece of Memlinc’s later years, a shrine containing relics of St Ursula in the museum of the hospital of Bruges, is fairly supposed to have been ordered and finished in 1480. The delicacy of finish in its miniature figures, the variety of its landscapes and costume, the marvellous patience with which its details are given, are all matters of enjoyment to the spectator. There is later work of the master in the ” St Christopher and Saints ” of 14.84 in the academy, or the Newenhoven ” Madonna ” in the hospital of Bruges, or a large ” Crucifixion,” with scenes from the Passion, of 1491 in the cathedral of Liibeck. But as we near the close of Memlinc’s career we observe that his practice has become larger than he can compass alone; and, as usual in such cases, the labour of disciples is substituted for his own. The registers of the painters’ corporation at Bruges give the names of two apprentices who served their time with Memlinc and paid dues on admission to the gild in 1480 and i486. These subordinates remained obscure.

The trustees of his will appeared before the court of wards at Bruges on the 10th of December 1495, and we gather from records of that date and place that Memlinc left behind several children and a considerable property.

Authorities. — A. Michiels, Memlinc: sa vie el ses ouvrages (Ver- viers, 1881) ; T. Gaedertz, Hans Memling und dessen Altarschrein im Dont zu Liibeck (Leipzig, 1883); Jules du Jardin, L’£cole de Bruges. Hans Memling, son temps, sa vie et son wuvre (Antwerp, 1897) ; Ludwig Kammerer, Memling (Leipzig, 1899) ; W. H. J. Weale, Hans Memlinc (London, 1901), Hans Memlinc: Biography (Bruges, 1901).

(J. A. C.;P. G. K.) MEMMINGEN, a town of Germany, in the kingdom of Bavaria, on the Ach, a tributary of the Iller, 35 m. S.W. of Augsburg on the railway to Ulm. Pop. (1905), 11,618. . It is partly surrounded with walls, and has some interesting old gates and houses. It contains the fine Gothic church of St Martin, which contains 67 beautifully carved choir-stalls, and a town hall dating from about 1580. Its industrial products are yarn, calico, woollen goods, thread. A considerable trade is carried on in hops, which are extensively cultivated in the neighbourhood, and in cattle, wool, leather and

grain.

Memmingen, first mentioned in a document of 1010, belonged originally to the Guelf family, and later to the Hohenstaufens. In 1286 it became a free city of the empire, a position which it main-

tained down to 1802, when it was allotted to Bavaria. In 1331 it was a member of the league of Swabian towns; in 1530 it was one of the four towns which presented the Confessio Tetrapolitana to the emperor Ferdinand I. ; and a few years later it joined the league of Schmalkalden. During the Thirty Years' War it was alternately occupied by the Swedes and the Imperialists. In May 1800 the French gained a victory over the Austrians near Memmingen.

See Dobel, Memmingen im Reformationszeitalter (Augsburg, 1877-1878), and Clauss, Memmingen Chronik, 1826-1892 (Memmingen, 1894).

MEMMIUS, GAIUS (incorrectly called Gemellus, " The Twin "), Roman orator and poet, tribune of the people (66 B.C.), friend of Lucretius and Catullus. At first a strong supporter of Pompey, he quarrelled with him, and went over to Caesar, wliom he had previously attacked. In 54, as candidate for the consulship, he lost Caesar's support by revealing a scandalous transaction in which he and his fellow candidate had been implicated (Cic. Ad Alt. iv. 15-18). Being subsequently condemned for illegal practices at the election, he withdrew to Athens, and afterwards to Mytilene. He died about the year 49. He is remembered chiefly because it was to him that Lucretius addressed the De rerun, natura, perhaps with the idea of making him a convert to- the doctrines of Epicurus. It appears from Cicero (Ad Fam. xiii. 1) that he possessed an estate on which' were the ruins of Epicurus' house, and that he had determined to build on the site a house for himself. According to Ovid (Trist. ii. 433) he was the author of erotic poems. He possessed considerable oratorical abilities, but his contempt for Latin letters and preference for Greek models impaired his efficiency as an advocate (Cic. Brut. 70).

Another Gaius Memmius, tribune in m B.C., attacked the. aristocrats on a charge of corrupt relations with Jugurtha. Memmius. subsequently stood for the consulship in 99, but was slain in a riot . stirred up by his rival the praetor Glaucia. Sallust describes him as an orator, but Cicero {De oratore, ii. 59, 70) had a poor opinion of him.

MEMNON, in Greek mythology, son of Tithonus and Eos (Dawn), king of the Aethiopians. Although mentioned in Hesiod and the Odyssey,

he is rather a post-Homeric hero. After the death of Hector he went to assist his uncle Priam against the Greeks. He performed prodigies of valour, but was slain by Achilles, after he had himself killed Antilochus, the son of Nestor and the friend of Achilles. His mother, Eos, removed ‘ his body from the field of battle, and it was said that Zeus, moved by her tears, bestowed immortality upon him. According to another account, Memnon was engaged in single combat with Ajax Telamonius, when Achilles slew him before his warriors had time to come to his aid (Dictys Cretensis iv. 6; Quintus Smyrnaeus ii.; Pindar, Pythia, vi. 31). His mother wept for him every morning, and the early dew-drops were said to be her tears. His companions were changed into birds, called Memnonides, which came every year to fight and lament over his grave, which was variously located (Ovid, Metam. xiii. 576-622; Pausanias x. 31). The story of Memnon was the subject of the lost Aethiopis of Arctinus of Miletus; the chief source from which our knowledge of him is derived is the second book of the Posthomerica of Quintus Smyrnaeus (itself probably an adaptation of the works of Arctinus and Lesches), where his exploits and death are described at length. As an Aethiopian, Memnon was described as black, but was noted for his beauty. The fight between Achilles and Memnon was often represented by Greek artists, as on the chest of Cypselus, and more than one Greek play was written bearing his name as a title. In later^, times the tendency was to regard Memnon as a real historical figure. He was said to have built the royal citadel of Susa, called after him the Memnonion, and to have been sent by Teutamus, king of Assyria, to the assistance of his vassal Priam (Diod. Sic. ii. 22). In Egypt, the name of Memnon was con- nected with the colossal statues of Amenophis (Amenhotep) III. near Thebes, two of which still remain. The more northerly of these was partly destroyed by an earthquake (27 B.C.) and the upper part thrown down. A curious phenomenon then occurred. Every morning, when the rays of the rising sun touched the statue, it gave forth musical sounds, like the

t

moaning noise or the sharp twang of a harp-string. This was supposed to be the voice of Memnon responding to the greeting of his mother Eos. After the restoration of the statue by Sep- timius Severus (a.d. 170) the sounds ceased. The sound, which has been heard by modern travellers, is generally attributed to the passage of the air through the pores of the stone, chiefly due to the change of temperature at sunrise.

Others have held that it was a device of the priests. Strabo (xvii. 816), the first to mention the sound, declares that he himself heard it, and Pau- sanias (i. 42, 3) says ” one would compare the sound most nearly to the broken chord of a harp or a lute ” (Juvenal xv. 5, with Mayor’s note; Tacitus, Annals, ii. 61).

The supporters of the solar theory look upon Memnon as the son of the dawn, who, though he might vanish from sight for a time, could not be destroyed; hence the immortality bestowed upon him by Zeus. He comes from the east, that is, the land of the rising sun. On early Greek vases he is represented as borne through the air; this is the sun making his way to his place of departure in the west. Both Susa and Egyptian Thebes, where there was a Memnonion or temple in honour of the hero, were centres of sun-worship. ” Eos, the mother of Memnon, is so transparently the morning, that her child must rise again as surely as the sun reappears to run his daily course across the heavens ‘ (G. W. Cox, Mythology and Folklore, p. 267).

See J. A. Letronne, La Statue vocale de Memnon (1833); C. R. Lepsius, Briefe aus Agypten (1852); “The Voice of Memnon” in Edinburgh Review (July 1886); article by R. Holland in Roscher’s Lexikon der mythologie.

MEMNON OF RHODES, brother of Mentor (q.v.), with whom he entered the services of the rebellious satrap Artabazus of Phrygia, who married his sister. Mentor after the conquest of Egypt rose high in the favour of the king, and Memnon, who had taken refuge with Artabazus at the Macedonian court, became a zealous adherent of the Persian king; he assisted Mentor in subduing the rebellious satraps and dynasts in Asia Minor, and succeeded him as general of the Persian troops. In the pseudo-Aristotelian Oeconomica, ii. 28, stories are told of his methods of obtaining money and evading his obligations; thus he extorted a large sum of money from the conquered inhabitants of Lampsacus and cheated his soldiers out of a part of their pay. He owned a large territory in eastern Troas (Arrian i. 17, 8; Strabo xiii. 587). He gained some successes against Philip II. of Macedon in 336 (Diod. xvii. 6; Polyaen. v. 44, 4, 5) and commanded the Persian army against Alexander’s invasion. Convinced that it was impossible to meet Alexander in a pitched battle, his plan was to lay waste the country and retire into the interior, meanwhile organizing resistance on sea (where the Persians were far superior to the Macedonians) and carrying the war into Greece. But his advice was overridden by the Persian satraps, who forced him to fight at the Granicus. After his defeat he tried to organize the maritime war and occupied the Greek islands, but in the beginning of 333 he fell ill and died (Arrian ii. 1,

1). ‘ (Ed. M.)

MEMORANDUM OF ASSOCIATION, in English company law, a document subscribed to by seven or more persons associated for any lawful purpose, by subscribing to which, and otherwise complying with the, requisitions of the Companies Acts in respect of registration, they may form themselves into an incorporated company, with or without limited liability (see Company).

MEMORIAL DAY (or Decoration Day), a holiday observed in the northern states of the United States on the 30th of May, in honour of soldiers killed in the American Civil War, and espe- cially for the decoration of their graves with flags and flowers. Before the close of the Civil War the 30th of May was thus celebrated in several of the southern states; in the North there was no fixed day commonly celebrated until 1868, when (on the 5th of May) Commander-in-Chief John A. Logan, of the Grand Army of the Republic, issued a general order designating the 30th of May 1868 ” for the purpose of strewing with flowers or otherwise decorating the gravef of comrades who died in defense of their country during the late rebellion”; Logan did this ” with the hope that it will be kept up from year to year.” In 1882 the Grand Army urged that the ” proper designation of May 30 is Memorial Day ” — not Decoration Day. Rhode Island

made it a legal holiday in 1874, Vermont in 1876, and New Hamp- shire in 1877; and by 1910 it was a legal holiday in all the states and territories save Alabama, Alaska, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina and Texas. In Virginia the 30th of May is observed as a Confederate Memorial Day. The 3rd of June (the biithday of Jefferson Davis) is observed as Confederate Memorial Day in Louisiana and Tennessee; the 26th of April in Alabama, Florida, Georgia and Mississippi; and the 10th of May in North Carolina and South Carolina.

MEMPHIS, the capital of Egypt through most of its early history, now represented by the rubbish mounds at Bedreshen on the W. bank of the Nile 14 m. S. of Cairo. As the chief seat of the worship of Ptah, the artisan god (Hephaestus), Memphis must have existed from a very remote time. But its greatness probably began with Menes (q.v.), who united the kingdoms of Upper and Lower Egypt, and is said to have secured the site for his capital near the border of the two lands by diverting the course of the river eastward. Memphis was the chief city of the 1st nome of Lower Egypt; in its early days it was known as ” the white walls ” or the ” white wall,” a name which clung to its citadel down to Herodotus’s day. The. residence here of Pepi I. of the Vlth

Dynasty, as well as his pyramid in the necropolis, was named Mn-nfr, and this gradually became the usual designation of the whole city, becoming Menfi, Membi in late Egyptian, i.e. Memphis. It was also called Hakeptah, ” Residence of the ka of Ptah,” and this name furnishes a possible origin for that of Egypt (AlyvTrros). Various dynasties had their ancestral seats elsewhere and individual kings built their palaces and pyramids at some distance up or down the valley, but Mem- phis must have been generally the centre of the government and the largest city in Egypt until the New Empire (Dyns. XVIII.XX.), when Thebes took the lead. In the succeeding period it regained its ancient position. The government of the Persian satrap was seated in Memphis. After the conquest of Alexander the city quickly lost its supremacy to his new founda tion, and although it remained the greatest native centre, its population was less than that of Alexandria. In the time of Strabo (xvii. 807) it was the second city of Egypt, inferior only to Alexandria, and with a mixed population like the latter. Memphis was still important though declining at the time of the Moslem conquest. Its final fall was due to the rise of the Arabic city of Fostat on the right bank of the Nile almost oppo- site the northern end of the old capital; and its ruins, so far as they still lay above ground, gradually disappeared, being used as a quarry for the new city, and afterwards for Cairo. The remains of ” Menf ” were still imposing late in the 12th century, when they were described by “Abdallatif. Now the ruins of the city, the great temple of Ptah, the dwelling of Apis, and the palaces of the kings, are traceable only by a few stones among the palm trees and fields and heaps of rubbish. But the necro- polis has been to a great extent protected by the accumulations of blown sand. Pyramids of the Old and Middle kingdoms form a chain 20 m. long upon the edge of the valley from Giza to Dahshur. At Saqqara, opposite Memphis itself, the step-pyramid of Zoser of the IHrd Dynasty, several pyramids of the Vth and Vlth Dynasties, and innumerable mastaba-tombs of the Old Kingdom, are crowded together in the cemetery. Later tombs are piled upon and cut through the old ones. One of the chief monuments is the Serapeum or sepulchre of the Apis bulls, discovered by Mariette in 1851. From 1905 J. E. Quibell was charged by the Service des Antiquites solely with the* excavations in this vast necropolis. His principal discovery has been the extensive remains of the Coptic monastery of St Jeremias, with remarkable sculptures and frescoes. Flinders Petrie began the systematic exploration of the ruins of Bed- reshen, and in three seasons cleared up much of the topography of the ancient city, identifying the mound of the citadel and palace, a foreign quarter, &c. Among his finds not the least interesting is a large series of terra-cotta heads representing the characteristic features of the foreigners who

thronged the bazaars of Memphis. They date from the Persian rule down to

the Ptolemaic period and are evidently modelled by Greek workmen. In the Old Testament Memphis is mentioned under the names of Moph (Hos. ix. 6) and Noph (Isa. xix. 13; Jer. ii. 16; Ezek. xxx. 13, 16).

See J. de Morgan, Carte de la nicropole memphite (Cairo, 1897); Baedeker's Egypt; J. E. Quibell, Excavations at Saqqara (2 vols., Cairo, 1908-1909) ; W. M. Flinders Petrie, Memphis I. and The Palace of A pries {Memphis II.) (London, 1909). (F. Ll. G.)

MEMPHIS, a port of entry and the largest city of Tennessee, U.S.A., and the county-seat of Shelby county, on the Mississippi river, in the S.W. corner of the state. Pop. (i860), 22,623; (1870), 40,226; (1880), 33.592; (1890), 64,49s; (1900), 102,320, of whom 5110 were foreign-born and 49,910 were negroes; (1910 census) 131,105. It is served by the Chicago, Rock Island & Pacific, the St Louis & San Francisco, the Illinois Central, the Southern, the Louisville & Nashville, the Nashville, Chattanooga & St Louis, the St Louis South- Western, the St Louis, Iron Mountain & Southern and the Yazoo & Mississippi Valley railways, and by steamboats on the Mississippi. The river is spanned here by a cantilever railway bridge 1895 ft. long, completed in 1892. The city is finely situated on the fourth Chickasaw Bluffs, more than 40 ft. above high water; the streets are broad, well paved and pleasantly shaded; and a broad levee overlooks the river. In Court Square, in the heart of the city, are many fine old trees and a bust of President Andrew Jackson. In 1909 the city had about 1000 acres of parks and 115 m. of parkways, besides two race-courses. Overton Park has beautiful playgrounds and a good zoological collection. Five miles from Memphis is a National Cemetery. Among the prominent build- ings are the United States Government building, the county Court house, Cotton Exchange, Business Men's Club, Goodwyn Institute, containing an auditorium and the public library, the Cossett Free Library, Grand Opera House, Lyceum Theatre, Auditorium, Gayoso Hotel, Memphis Evening Scimitar building, the Union and Planters' Bank and Trust Company building, Equitable building, Memphis Trust building, Tennessee Trust building, the Bank of Commerce, Woman's building (containing offices for business women), Masonic Temple, Odd Fellows' building and the Commercial Appeal building. Among educa- tional institutions are the College of Christian Brothers (Roman

Catholic, opened in 1871), Memphis Hospital Medical College, College of Physicians and Surgeons, Hannibal Medical College for negroes and Le Moyne Normal Institute, also for negroes. Memphis is the see of a Protestant Episcopal bishopric. The city is supplied with water from more than eighty artesian wells, having an average depth of about 400 ft.

Owing to its situation at the head of deep water navigation on the Mississippi, Memphis has become a leading commercial city of the southern states; its trade in cotton, lumber, groceries, mules and horses is especially large. The city also manufactures large quantities of cotton-seed oil and cake, lumber, flour and grist-mill products, foundry and machine-shop products, confec- tionery, carriages and wagons, paints, furniture, bricks, cigars, &c. The Illinois Central and the St Louis & San Francisco railways have workshops here. The total value of the city's manufactures increased from $13,244,538 in 1890 to $17,923,059 ($14,233,483 being factory product) in 1900, and to $21,346,817 (factory product) in 1905, an increase of 50% over the value of the factory product in 1900.

Chickasaw Bluffs were named from the Chickasaw Indians, who were in possession when white men first came to the vicinity. Late in the 17th century the French built a fort on the site of Memphis, and during most of the 18th Century this site was held either by the French or the Spanish. In 1797 it passed into the possession of the United States. By a treaty of the 19th of October 1818, negotiated by General Andrew Jackson and General Isaac Shelby, the Chickasaws ceded all their claims east of the Mississippi, and early in 1819 Memphis was laid out in accordance with an agreement entered into by John Overton (1766-1833), Andrew Jackson and James Winchester (1752- 1826), the proprietors of the land. Its name was suggested from the similarity of its situation on the Mississippi to that of

the Egyptian city on the Nile. Memphis was incorporated as a town in 1827, and in 1849 was chartered as a city. Near Memphis, on the 6th of June 1862, a Union fleet of 9 vessels and 68 guns, under Commander Charles Henry Davis (1807-77), defeated a Confederate fleet of 8 vessels and 28 guns under Commander J. E. Montgomery after a contest of little more than one hour, three of the Confederate vessels being destroyed and four of them captured, and from this victory until the close of the war the city was in possession of the Union forces. In August 1864, however, a Confederate force under General N. B. Forrest raided it and captured several hundred prisoners. The decrease of population between 1870 and 1880 was due to the ravages of yellow feverin 1873, 1878 and 1879. The

epidemic of 1873 resulted in over two thousand deaths, and that of 1878 in a total of 5150, of whom 4250 were whites and 900 negroes. At the return of the fever in 1879 better care and strict quaran- tine arrangements prevailed, but there were 497 deaths. During the epidemics of 1878 and 1879 fully two-thirds of the popula- tion fled from the city, many of whom died of the fever at other places, and a still larger number did not return. For three months during each year business was suspended, and all ingress or egress except for the most necessary purposes was forbidden. The city was left almost bankrupt, and as a means of relief the legislature of the state in January 1879 repealed the city's charter, and, assuming exclusive control of its taxation and finances, con- stituted it simply a " taxing district," placing its government in the hands of a " legislative council." This anomalous proceeding was declared constitutional by the supreme court of Tennessee. Subsequently the streets were cleansed and repaved, an improved sewer system was put in operation, and the water supply was obtained from artesian wells. In 1891 a new city charter was obtained, and in 1907 the " Houston plan " (see Houston, Texas) was adopted for Memphis by the state legislature. The act, however, was declared unconstitutional by the state supreme court, on the ground that it would force elected officers out of office before the expiration of their constitutional terms; and in 1909 a new charter on the Houston plan was adopted by the legislature, to become effective on the 1st of January 1910, providing for a government by five commissioners, each having charge of a separate department.

See J. M. Keating, History of the City of Memphis and Shelby County, Tennessee (Syracuse, 1888) ; James Phelan, History of Tennessee (Boston, 1889).

MENA, JUAN DE (1411-1456), Spanish poet, was born at Cordova in 141 1. In his twenty-fourth year he matriculated at the university of Salamanca, and studied later at Rome. His scholarship obtained for him the post of Latin secretary at the court of Castille; subsequently he became historiographer to John II. and magistrate at Cordova. According to the Epicedio of Valerio Francisco Romero, Mena died from natural causes in 1456; popular tradition, however, ascribes his death to a fall from his mule. Though nominally the king's chronicler, Mena had no share in the Crdnica de Don Juan II. ; the statement that he wrote the first act of the Celestina (q.v.) is rejected; but three authentic specimens of his cumbrous prose exist in the com- mentary to his dull poem entitled La Coronacion or Calamacileos, in the Iliada en romance (an abridged version of Homer), and in the unpublished Memorias de algunos linajes antiguas i nobles de Castilla. He is conjectured to be the author of the satirical Coplas de la panadera;

but, apart from the fact that these verses are ascribed by Argote de Molina to Inigo Ortiz de Zuniga, they are instinct with a tart humour of which Mena was destitute. His principal work is his allegorical poem, El Laberinto de Fortuna, dedicated to John II.; in the oldest manuscripts it consists of 297 stanzas, but three more stanzas were added to it later, and hence the alternative, popular title of Las Trezientas. The Laberinto is modelled on Dante, and further contains remin- iscences of the Roman de la rose, as well as episodes borrowed from Virgil and Lucan. It is marred by excessive emphasis and pedantic diction, and the arte mayor measure in which it is written is monotonous; but many octaves are of such excellence that the arte mayor metre continued in fashion for nearly a

century. The poem, as a whole, is tedious; yet its dignified expression of patriotic spirit has won the admiration of Spaniards from Cervantes' time to our own.

A critical edition of the Laberinto has been issued by R. Foulch£-Delbosc (Macon, 1904).

MENA, PEDRO DE (d. 1693), Spanish sculptor, was born in Adra. He was a pupil of his father as well as of Alonzo Cano. His first conspicuous success was achieved in work for the con- vent El Angel at Granada, including figures of St Joseph, St Antony of Padua, St Diego, St Pedro Meantara, St Franciscus and Santa Clara. In 1658 he signed a contract for sculptural work on the choir stalls of the cathedral at Malaga — this work extending over four years. Other works are, statues of the Madonna and child and of St Joseph in Madrid, the polychro- matic figures in the church of St Isodoro, the Magdalena and the Gertrudis in the church of St Martin (Madrid), the crucifixion in the Nuestra Senora de Gracia (Madrid), the statuette of St Francis of Assisi in Toledo, and of St Joseph in the St Nicholas church in Murcia. Between 1673 and 1679 Mena worked at Cordova. About 1680 he was in Granada, where he executed a half-length Madonna and child (seated) for St Dominicos. Mena died in Malaga in 1693. He and Mora (g.v.) may be regarded as artistic descendants of Montafies and Alonzo Cano, but in tech- nical skill and the expression of religious motive his statues are unsurpassed in the sculpture of Spain. His feeling for the nude was remarkable. Like his immediate predecessors he excelled in the portrayal of contemplative figures and scenes; Mena's drawing of Santiago leaping upon his charger is good,

and the carving admirable, but the necessary movement for so spirited an action is lacking.

See B. Haendcke, Studien zur Geschichte der spanischen- Plastik (Strassburg, 1900).

MENABREA, LUIGI FEDERICO, Marquis of Valdora (1809- 1896), Italian general and statesman, was born at Chambery on the 4th of September 1809. He was educated at the university of Turin, where he qualified as an engineer and became a doctor of mathematics. As an officer of engineers he replaced Cavour in 1 83 1 at the fortress of Bardo. He then became professor of mechanics and construction at the military academy and at the university of Turin. King Charles Albert sent him in 1848 on diplomatic missions to secure the adhesion of Modena and Parma to Sardinia. He entered the Piedmontese parliament, and was attached successively to the Ministries of War and Foreign Affairs. He belonged to the right centre, and until the events of 1859 he believed in the possibility of a compromise between the Vatican and the state. He was major-general and commander- in-chief of the engineers in the Lombard campaign of 1859. He superintended the siege works against Peschiera, was present at Palestro and Solferino, and repaired the fortifications of some of the northern fortresses. In i860 he became lieutenant- general and conducted the siege of Gaeta. He was appointed senator and received the title of count. Entering the Ricasoli cabinet of 1861 as minister of marine, he held the portfolio of public works until 1864 in the succeeding Farini and Minghetti cabinets. After the war of 1866 he was chosen as Italian plenipotentiary for the negotiation of the treaty of Prague and for the transfer of Venetia to Italy. In October 1867 he suc- ceeded Rattazzi in the premiership, and was called upon to deal with the difficult situation created by Garibaldi's invasion of the Papal States and by the catastrophe of Mentana. Menabrea disavowed Garibaldi and instituted judicial proceedings against him; but in negotiations with the French government he pro- tested against the retention of the temporal power by the pope and insisted on the Italian right of interference in Rome. He was in the secret of the direct negotiations between Victor Emanuel and Napoleon III. in June 1869, and refused to enter- tain the idea of a French alliance unless Italy were allowed to occupy the Papal States, and, on occasion, Rome itself. On the eve of the assembly of the Oecumenical Council at Rome Mena- brea reserved to the Italian government its right in respect of any measures directed against Italian institutions. He with- drew from seminary students in 1869 the exemption from mili-

tary service which they had hitherto enjoyed. Throughout his term of

office he was supported by the finance minister Count Cambray Digny, who forced through parliament the grist tax proposed by Quintino Sella, though in an altered form from the earlier proposal. After a series of changes in the cabinet, and many crises, Menabrea resigned in December 1869 on the election of a new chamber in which he did not command a majority. He was made marquis of Valdora in 1875. His successor in the premiership, Giovanni Lanza, in order to remove him from his influential position as aide-de-camp to the king, sent him to London as ambassador, where he remained until in 1882 he replaced General Cialdini at the Paris Embassy. Ten years later he withdrew from public life, and died at Saint Capin on the 24th of May 1896.

MENAGE, GILLES (1613-1692), French scholar, son of Guillaume Menage, king's advocate at Angers, was born in that city on the 15th of August 1613. A tenacious memory and an early enthusiasm for learning carried him speedily through his literary and professional studies, and he practised at the bar at Angers as early as 1632. In the same year he pleaded several causes before the parlement of Paris, but illness induced him to abandon the legal profession for the church.. He became prior of Montdidier without taking holy orders, and lived for some years in the household of Cardinal de Retz (then coadjutor to the archbishop of Paris), where he had leisure for literary pur- suits. Some time after 1648 he quarrelled with his patron and withdrew to a house in the cloister of Notre-Dame, where he gathered round him on Wednesday evenings those literary assemblies which he called " Mercuriales." Chapelain, Pellisson, Conrart, Sarrazin and Du Bos were among the habitues. He was admitted to the Delia Cruscan Academy of Florence, but his caustic sarcasm led to his exclusion from the French Academy. M6nage made many enemies and suffered under the satire of Boileau and of Moliere. Moliere immortalized him as the pedant Vadius in Les Femmes savanles, a portrait Menage pretended to ignore. He died in Paris on the 23rd of July 1692.

Of his works the following may be mentioned: Poemata latina, gallica, graeca, et italica (1656); Origini della lingua italiana (1669); Dictionnaire etyntologique (1650 and 1670); Observations sur la langue franQaise (1672-1676), and Anti-Baillet (1690).

MENAGERIE, a collection of wild animals kept for show or exhibition. The word is particularly applied to travelling exhibitions of wild animals, attached to a circus or other show, " zoological gardens "(q.v.) being the term generally applied to large stationary and permanent exhibitions, arranged on a scientific system. The French minagerie (from menage, O. Fr. mesnage, Lat. mansionaticum,

mansio, house, cf. ” manage “) originally meant the administration of a household or farm, with special reference to the live stock.

MENAHEM (Hebrew for ” consoler “), a king of Israel. He was the son of Gadi {i.e. perhaps, a man of Gad), and during the disturbances at the death of Jeroboam II. seized the throne and reigned ten years (2 Kings xv. 14-18). The scene of his revolt was Tirzah, the old seat of the kings of Israel between Jeroboam I. and Omri (which period the present closely resembles), and it was only after perpetrating nameless cruelties at Tappuah 1 on the border of Ephraim and Mannasseh that the counter revolt of Shallum, son of Jabesh (perhaps a Gileadite), was suppressed. Towards the end of his reign Tiglath- Pileser IV. marched against north Syria, and among his tributaries mentions Menahem 2 together with ReZia of Damascus, and kings of Tyre, Gebal, &c. (c. 738 B.C.). According to the Old Testament account the Assyrian king even advanced against Israel, and only withdrew in con- sideration of a tribute amounting to about £400,000. A thousand talents (i.e. about 3,000,000 shekels) was raised by assessing every wealthy person at 50 shekels. The act was hardly popular, and the internal troubles which he had quelled

1 Scarcely Tiphsah (2 Kings xv. 16) on the Euphrates.

s The identification of the Israelite king with Me-ni-hi-(im)-mi of Sa-me-ri-na-ai on the Ass. inscription has been unnecessarily doubted.

broke out again at or shortly after his death. The Gileadites again conspired, and having slain his son Pekahiah set up Pekah the son of Remaliah in his place. 1 This meant a return to an anti- Assyrian policy. (See Ahaz.) > (S. A. C.)

MENAI STRAITS, a channel of the Irish Sea, separating Anglesea from Carnarvonshire, N. Wales, extending 14 m. from Beaumaris to Abermenai, and varying in breadth from 200 yds. to 2 m. It is famous for the suspension and tubular bridges which cross it. The suspension bridge carries the Holyhead road from Bangor. Designs were prepared by T. Telford. It was begun in 1819; the first chain carried over in April 1825; the last in July of the same year, and the bridge opened to the public the 30th of January 1826. The cost was £120,000. The length of the chains (from rock-fastenings) is 1715 ft., and be- tween the piers 590 ft.; the length of the roadway between the piers is 550 ft. and the total roadway length 1000 ft.; the height of the roadway from the spring tide high- water level is 100 ft.; the breadth of the roadway including two carriage-ways and a footpath is 30 ft. The sixteen suspending chains are carried 60 ft. through rock. Their sustaining power has been calculated at 2016 tons, while the whole weight of the suspended part of the bridge is only 489 tons. During a gale a slight oscillation is noticeable on the bridge itself and from the shore. The tubular bridge carries the London & North Western railway. Here the channel is about 1100 ft. wide, and divided in the middle by the Britannia Rock, bare at low water. The tide generally rises 20 ft., with great velocity. The principal measure- ments are: each abutment 176ft.; from abutment to side tower, 230 ft.; from side tower to central tower, 460 ft.; breadth of each side tower at road-level, 32 ft.; breadth of centre tower, 45 ft. s in. The total length of the roadway is 1841 ft. 5 in. The Britannia tower measures at its base 62 by 525 ft.; with a total height of 230 ft. There are 101 ft. between the sea at high tide and the bridge roadway bottom. The limestone used is from Penmon, 4 m. from Beaumaris. Four stone lions couchant guard the approaches to the bridge. The first tube of the tubular bridge was deposited in its place on the 9th of November 1849, the last on the 13th of September 1850. The total cost was £621,865. The engineer of the tubular bridge was Robert Stephenson, who was assisted by Sir William Fairbairn and Eaton Hodgkinson.

MKNAM, or Me Nam (literally the ” mother water ” or ” main river “), a river of Siam, the chief highway of the interior, on whose yearly rise and fall depends the rice crop of Lower Siam. Rising in the Lao or

Siamese Shan state of Nan, at a height of 1400 ft. upon the shoulders of the mountain mass of Doi Luang, it is first known as the Nam Ngob, after a village of that name. As the Nam Nan, still a mountain stream, it flows southward through the state so named between high forested ranges, and, notwithstanding the frequent rapids along its course, the natives use it in dug-outs for the transport of hill produce. From Utaradit, where it leaves the hills of the Lao country, it flows southward through the plain of Lower Siam, and is navi- gable for flat-bottomed native craft of considerable capacity. It is here known as the Nam, or Menam Pichai. Below Pichai the river flows through forest and swamp, the latter providing vast overflow basins for the yearly floods. Thousands of tons of fish are caught and cured here during the fall of the river after the rains. Below Pitsunalok the waters of the Menam Yom, the historic river of Siam, upon which two of its ancient capitals, Sawankalok and Sukotai, were situated, meander by more than one tortuous clayey channel to the main river, and combine to form the Nam Po. At Paknam Po the main western tributary comes in, the shallow Me Ping, the river of Raheng and Chieng Mai, bringing with it the waters of the Me Wang. As the chief duty-station for teak, which is floated in large quantities down all the upper branches of the river and as a place of transshipment for boats, Paknam Po is 1 an important and growing town. From this point southwards the river winds by many channels

1 The chronology in xv. 2, 23, 32, appears to confuse Pekah and Pekahiah, and the view has been held that they were originally one and the same; cf. Cheyne, Ency. Bib., col. 3643.

through the richest and most densely populated portion of Siam. About Chainat the Tachin branches off, forming the main western branch of the Menam, and falling into the gulf at a point about 24 m. west of the bar of the main or Bangkok river. At Ayuthia, another of the ancient capitals of Siam, the Nam Sak flows in from the north-east, an important stream affording communication with the rich tobacco district of Pecha- bun, and draining the western slopes of the Korat escarpment. MENANDER (342-291 B.C.), Greek dramatist, the chief repre- sentative of the New comedy, was born at Athens. He was the son of well-to-do parents; his father Diopeithes is identified by some with the Athenian general and governor of the Thracian Chersonese known from the speech of Demosthenes De Cher- soneso. He doubtless derived his taste for the comic drama from his uncle Alexis (q.v.). He was the friend and associate, if not the pupil, of Theophrastus, and was on intimate terms with Demetrius of Phalerum. He also enjoyed the patronage of Ptolemy Soter, the son of Lagus, who invited him to his court. But Menander, preferring independence and the com- pany

of his mistress Glycera in his villa in the Peiraeus, refused. According to the note of a scholiast on the Ibis of Ovid, he was ‘ drowned while bathing; his countrymen built him a tomb on the road leading to Athens, where it was seen by Pausanias. A well-known statue in the Vatican, formerly thought to represent Marius, is now generally supposed to be Menander (although some distinguished archaeologists dispute this), and has been identified with his statue in the theatre at Athens, also mentioned by Pausanias.

Menander was the author of more than a hundred comedies, but only gained the prize eight times. His rival in dramatic art and also in the affections of Glycera was Philemon (q.v.), who appears to have been more popular. Menander, however, believed himself to be the better dramatist, and, according to Aulus Gellius, used to ask Philemon: ” Don’t you feel ashamed whenever you gain a victory over me? ” According to Caecilius of Calacte (Porphyry in Eusebius, Praep. evan. x. 3, 13) he was guilty of plagiarism, his Aeicndalnuv being taken bodily from the Owovtorˆs of Antiphanes. But, although he attained only moderate success during his lifetime, he subsequently became the favourite writer of antiquity. Copies of his plays were known to Suidas and Eustathius (10th and nth centuries), and twenty-three of them, with commentary by Psellus, were said to have been in existence at Constantinople in the 16th century. He is praised by Plutarch (Comparison of Menander and Aristophanes) and Quintilian (Instit. x. 1. 69), who accepted the tradition that he was the author of the speeches published under the name of the Attic orator Charisius. A great admirer and imitator of Euripides, he resembles him in his keen observa- tion of practical life, his analysis of the emotions, and his fondness for moral maxims, many of which have become proverbial: ” The property of friends is common,” ” Whom the gods love die young,” ” Evil communications corrupt good manners ” (from the Thais, quoted in 1 Cor. xv. 33). These maxims (chiefly monostichs) were afterwards collected, and, with addi- tions from other sources, were edited as M.evhvb’pov yva>ncu Itovdcmxoi; a kind of moral textbook for the use of schools.

Menander found many Roman imitators. The Eunuchus, Andria, Heautonlimorumenos and Adelphi of Terence (called by Caesar ” dimidiatus Menander “) were avowedly taken from Menander, but some of them appear to be adaptations and combi- nations of more than one play; thus, in the Andria were combined Menander’s ‘AvSpla and Uepivdiia, in the Eunuchus the Eiivovxo? and K6\af, while the Adelphi was compiled partly from Menan- der and partly from Diphilus. The original of Terence’s Hecyra (as of the Phormio) is generally supposed to be, not Menander, but Apollodorus of Carystus.

The Bacchides and Stichus of Plautus were probably based upon Menander's Aw 'Eˆa-jtarcav and 3>i\a8eKi, but the Poenulus, does not seem to be from the KapxrjSovios, nor the Mostellaria from the <£>&07xa, in spite of the similarity of titles. Caecilius Statius, Luscius Lavinius, Tur- pilius and Atilius also imitated Menander. He was further credited with the authorship of some epigrams of doubtful

no

authenticity; the letters addressed to Ptolemy Soter and the discourses in prose on various subjects mentioned by Su'idas are probably spurious.

Till the end of the 19th century, all that was known of Menander were the fragments collected by A. Meineke (1855) and T. Kock, Comicorum atticorum fragmenta, iii. (1888). They consist of some 1650 verses or parts of verses, in addition to a considerable number of words quoted expressly as from Menander by the old lexico- graphers. From 1897 to 1907 papyri were discovered in different parts of Egypt, containing fragments of considerable length, amounting to some 1400 lines. In 1897, about eighty lines of the Ttupy6s; in 1899, fifty lines of the IUpiiceipojxf vtj ; in 1903, one hundred lines (half in a very mutilated condition) from the K6Xa£; in 1906, two hundred lines from the middle of the II«puc«poM«»"), the part previously discovered containing the denouement; five hundred lines from the 'EwiTpkirovrts, generally well preserved; sixty-three lines (the prologue, list of characters, and the first scene), from the "Hpus; three hundred and forty lines from the Xa/tLa (the identification of the two last plays is not considered absolutely certain) ; and twenty lines from an unknown comedy. Subsequently, part of a third copy of the HepiKapoiiivr) was found in Egypt, some one hundred and forty lines, half of which were already known, while the remainder were new (Abhandlungen der kbnigl.-sdchsischen Gesellschaft der Wissenschaften, Leipzig), 1908.

It is doubtful whether these fragments, which are of sufficient length to afford a, basis for the consideration of the merits of Menander as a writer of comedies, justify the great reputation enjoyed by him in ancient times. With the exception of a scene in the 'ExiTpeiroeres, which would appeal to the litigious Athenians, they contain little that is witty or humorous; there is little variety in the characters, the situations are conventional, and the plots, not of a highly edifying character, are lacking in originality. Menander's chief excellences

seem to be facility of language, accurate portrayal of manners, and naturalness of the sentiments which he puts into the mouth of his dramatis personae. It is remarkable that the maxims, which form the chief part of the earlier collections of fragments, are few in the later.

On Menander generally see monographs by C. Benolt (1854) and G. Guizot (1855) ; J. Geffcken, Studia zu Menander (1898) ; H. Lubke, Menander und seine Kunst (1892); J. Denis, La Comidie grecque' (1886), vol. ii. ; H. Weil, £tudes sur I'antiquM grecque (1900). Editions of the fragments: Ttwpybt, by J. Nicole, with translation and notes . (1898) and by B. P. Grenfell and A. S. Hunt, with revised text and translation (1898); the "Upon, 'EiriTp€7rovTcs, nepuceipo/iepq, 2aju£a, by G. Lefebvre and M. Croiset, with introduction, notes and translation (Cairo, 1907); J. van Leeuwen, with Latin notes (2nd ed., 1908); L. Bodin and P. Mazon, Extraits de Menandre (Samia and Epitrepontes, 1908); E. Croiset, L' Arbitrage, critical ed. and translation (1908) ; C. Robert, Der neue Menander (text reconstructed, 1908) ; Wilamowitz-Mollendorff, " Der Menander von Kairo " in Neue Jahrbucher fur das klassische AUertum (1908), pp. 34-62; German trans, by C. Robert, Szenen aus Menander (1908); English by Unus Multorum (1909). See also Wilamowitz- Mollendorff, " Der Landmann des Menandros " in Neue Jahrbucher (1899), p. 513; C. Dziatzko, "Der Inhalt des Georgos von Menander," in Rhein. Mus. liv. 497, lv. 104; F. Leo, " Der Neue Menander" in Hermes, xliii. 120; E. Capps, " The Flot of Menander's Epitre- pontes " in Amer. Journ. of Philology (1908), p. 410; A. Kretschmar, De Menandri reliquiis nuper repertis (1906) ; F. G. Kenyon in Quarterly Review (April, 1908) ; The Times Literary Supplement (Sept. 20, 1907); Athenaeum (Oct. 23, 1897; Aug. I, 1908; Oct. 24, 1908) ; and list of articles in periodicals in Van Leeuwen's edition. (J. H. F.)

MENANDER (Milinda), a Graeco-Indian dynast. When the Graeco-Indian king Demetrius had been beaten by Eucratides of Bactria, about 160 B.C., and the kingdom of Eucratides (q.v.) dissolved after his assassination (c. 150 B.C.), a Greek dynasty maintained itself in the Kabul Valley and the Punjab. The only two kings of this dynasty mentioned by classical authors are Apollodotus and Menander, who conquered a great part of India. Trogus Pompeius described in his forty-first book (see the prologue) " the Indian history of these kings, Apollodotus and Menander," and Strabo, xi. 316, mentions from Apollodotus of Artemita, the historian of the Parthians, that Menander " conquered more tribes than Alexander, as he crossed the Hypanis to the east and advanced to the Isamus; he and other kings (especially Demetrius) occupied also Patalene (the district of Patala near Hyderabad on the head of the delta of the Indus) and the coast which

is called the district of Saraostes (i.e. Syrastene, in mod. Gujarat, Brahman Saurashtra) and the kingdom of Sigerdis (not otherwise known); and they extended their dominion to the Seres (i.e. the Chinese) and Phryni (?).” The last statement is an exaggeration, probably based upon the fact that from the mouth of the Indus trade went as far as China.

That the old coins of Apollodotus and Menander, with Greek legends, were still in currency in Barygaza (mod. Broach), the great port of Gujarat, about a.d. 70 we are told by the Periplus maris Erythraei, 48. We possess many of these coins, which follow the Indian standard and are artistically degenerate as compared with the earlier Graeco-Bactrian and Graeco-Indian coins, with bilingual legends (Greek and Kharoshti, see Bactria). Apollodotus, who must have been the earlier of the two kings, bears the titles Soter, Philopator, and ” Great King “; Menander, who must have reigned a long time, as his portrait is young on some coins and old on others, calls himself Soter and ” Just ” (Sikcuos). Their reigns may be placed about 140-80 B.C. Menander appears in Indian traditions as Milinda; he is praised by the Buddhists, whose religion he is said to have adopted, and who in the Milindapanha or Milinda Panho (see below), ” the questions of Milinda ” (Rhys Davids, Sacred Books of the East, xxxv., xxx vi.) relate his discourses with the wise Nagasena. According to the Indians, the Greeks conquered Ayodhya and Pataliputra (Palimbothra, mod. Patna); so the conjecture of Cunningham that the river Isamus of Strabo is the Son, the great southern tributary of the Ganges (near Patna), may be true. The Buddhists praise the power and military force, the energy and wisdom of ” Milinda “; and a Greek tradition preserved by Plutarch (Praec. reip. ger. 28, 6) relates that ” when Menander, one of the Bactrian kings, died on a campaign after a mild rule, all the subject towns disputed about the honour of his burial, till at last his ashes were divided between them in equal parts.” (The Buddhist tradition relates a similar story of the relics of Buddha.) Besides Apollodotus and Menander, we know from the coins a great many other Greek kings of western India, among whom two with the name of Straton are most con- spicuous. The last of them, with degenerate coins, seems to have been Hermaeus Soter. These Greek dynasts may have maintained themselves in some part of India till about 40 B.C. But at this time the west, Kabul and the Punjab were already in the hands of a barbarous dynasty, most of whom have Iranian (Parthian) names, and who seem therefore to have been of Arsacid origin (cf. Vincent A. Smith, ” The Indo-Parthian Dynasties from about 120 B.C. to a.d. 100,” in Zeilschrift der deutschen morgenldndischen Gesellschaft, 1906, lx. 69 sqq.). Among them

Manes, two kings named Azes, Vonones and espe- cially Gondophares or Hyndophares are the most conspicuous. The latter, whose date is fixed by an inscription from the Kabul Valley dated from the year 103 of the Samvat era (= a.d. 46), is famous by the legend of St Thomas, where he occurs as king of India under the name of Gundaphar. Soon afterwards the Mongolian Scyths (called Saka by the Indians), who had con- quered Bactria in 139 B.C., invaded India and founded the great Indo-Scythian kingdom of the Kushan dynasty. (See Bactria; and Persia: Ancient History.) (Ed. M.)

The Milinda Panho is preserved in Pali, in Ceylon, Burma and Siam, but was probably composed originally in the extreme north- west of India, and in a dialect spoken in that region. Neither date nor author is known; but the approximate date must have been about the 2nd century of our era. The work is entitled Milinda Panho — that is, The Questions of King Milinda. In it the king is represented as propounding to a Buddhist Bhikshu named Nagasena a number of problems, puzzles or questions in religion and philosophy ; and as receiving, in – ach case, a convincing reply. It is a matter of very little importance whether a tradition of some such conversations having really taken place had survived to the time when the author wrote his book. In any case he composed both problems and answers; and his work is an historical romance, written to discuss certain points in the faith, and to invest Wie discussion with the interest arising from the story in which it is set. This plan is carried out with great skill. An introduction, giving the past and present lives of Milinda and Nagasena, is admir- ably adapted to fill the reader with the idea of the great ability and distinction of the two disputants. The questions chosen are just those which would appeal most strongly to the intellectual taste of the India of that age. And the style of the book is very attractive. Each particular point is 1 kept within easy limits of space, and is treated in a popular way. But the earnestness of the author is not concealed ; and he occasionally rises into a very real eloquence. The work is several times quoted as authority by Buddhaghosa, who wrote about A.D. 450, and it is the only work, not in the canon, which receives this honour.

MENANDER— MENASHA

in

The Milinda has been edited in Pali by V. Trenckner, and trans- lated into English by the present writer, with introductions in which the historical and critical points made in this article are discussed in detail. There is space here to mention only one further fact. M. Sylvain

LeVy, working in collaboration with M. Specht, has shown that there are two, if not three, Chinese works, written between the 5th and 7th centuries, on the Questions of Milinda. They purport to be translations of Indian works. They are not, however, translations of the Pali text. They give, with alterations and additions, the substance of the earlier part of the Pali work; and are probably derived from a recension that may be older than the Pali.

Authorities. — V. Trenckner, Milinda-panho (London, 1880); Rhys Davids, Questions of King Milinda (2 vols., Oxford, 1890- 1894); R. Garbe, Beitrdge zur indischen Kulturgeschichte (Berlin, 1903, ch. 3, Der Milinda-pahha) ; Milinda Prashnaya, in Sinhalese, (Colombo, 1877); R. Morns, in the Academy (Jan. 11, 1881); Sylvain L6vy, Proceedings of the Qth International Congress of Orientalists (London, 1892), i. 518-529, and Journal of the Royal Asiatic Society (1891), p. 476. (T. W. R. D.)

MENANDER, of Laodicea on the Lycus, Greek rhetorician and commentator. Two incomplete treatises on epideictic (or show) speeches have been preserved under his name, but it is generally considered that they cannot be by the same author. Bursian attributes the first to Menander, whom he placed in the 4th century, and the second to an anonymous rhetorician of Alexandria Troas, who possibly lived in the time of Diocletian. Others, from the superscription of the Paris MS., assign the first to Genethlius of Petrae in Palestine. In view of the general tradition of antiquity, that both treatises were the work of Menander, it is possible that the author of the second was not identical with the Menander mentioned by Suidas; since the name is of frequent occurrence in later Greek literature. The first treatise, entitled Aiaiptais tSjv eiri&uKTiKuv , discusses the different kinds of epideictic speeches; the second, TLepl ‘eiri&UKTiK&v, has special titles for each chapter.

Text in L. Speneel’s Rhetores graeci, iii. 329-446, and in C. Bursian’s ” Der Rhetor Menandros und seine Schriften ” in Abhandl. der bayer. Akad. der Wissenschaften, xvi. (1882); see also W. Nitsche, Der Rhetor M. und die Scholien zu Demosthenes; J. E. Sandys, Hist, of Classical Scholarship (1906), i. 338; W. Christ, Gesch. der griechischen Litteratur (1898), § 550.

MENANDER PROTECTOR (UporiKTup, i.e. one of the imperial bodyguards), Byzantine historian, was born in Constantinople in the middle of the 6th century a.d. The little that is known of his life is contained in the account of himself quoted by Suidas. He at first took up the study of law, but abandoned it for a life of pleasure. – When his

fortunes were low, the patronage accorded to literature by the emperor Maurice (582) encouraged him to try writing history. He took as his model Agathias (?.».), who like him had been a jurist, and his history begins at the point where Agathias leaves off. It embraces the period from the arrival of the Cotriguri Hunni in Thrace during the reign of Justinian in 538 down to the death of the emperor Tiberius in 582. Considerable fragments of the work .are preserved in the excerpts of Constantine Porphyrogenitus and in Suidas. Although the style is sometimes bombastic, he is considered trustworthy and is one of the most valuable authorities for the history of the 6th century, especially on geographical and ethnographical matters. He was an eye-witness of some of the events he describes. Like Agathias, he wrote epigrams, one of which, on a Persian magus, who became a convert to Christianity and died the death of a martyr, is preserved in the Greek anthology {Anth. Pal. i. 101).

The fragments will be found in C. W. Muller, Frag. hist, graec. iv. 200; J. P. Migne, Patrologia graeca, cxiii., and L. Dindorf, Historici graeci minores, ii. ; see also C. Krumbacher, Geschichte der byzan- tinischen Litteratur (1897).

MENANGKABOS, the most civilized of all the true Malays of Sumatra, inhabiting the mountains above Padang. Their district is regarded as the cradle of the Malay race, and thence began, about 1160, those migrations which ended in the true Malays becoming the dominant race throughout the peninsula and the Malay Archipelago. The Menangkabos are said to be the original conquerors of the island, and the real form of the word is Menang-Karbau (” victory of the buffalo “), in reference to a local legend of a fight between a Sumatran and Javanese

buffalo, ending in victory for the former. Though converts to Islam, the ancient confederate village communes and the matri- archal system still exist. The people are divided into clans, the chiefs together forming the district council. Early in the 19th century a religious sect Was founded among the Manang- kabos, known as ” Padris ” from its zealous proselytism, or Orang puti (white men) from the converts being dressed in white. The tendency was towards asceticism, the chief tenet being the prohibition of opium, the use of which was made a capital offence. The sect brought a large portion of the interior of Sumatra under its rule, but the neighbouring tribes asked the Dutch to protect them, and this led to the Netherlands government acquiring the Menangkabo territory.

MENANT, JOACHIM (1820-1899), French magistrate and orientalist,

was born at Cherbourg on the 16th of April 1820. He was educated for the law, and became vice-president of the civil tribunal of Rouen in 1878, and a member of the cour d'appel three years later. But he became best known by his studies on the cuneiform inscriptions. Among his works on the subject of Assyriology are: Recueil a" alphabets des Scritures cuniiformes (i860); Expose des iliments de la grammaire assyrienne (1868); Le Syllabaire assyrien (2 vols., 1869-1873); Les Langues perdues de la Perse el de I'Assyrie (2 vols., 1 885-1886); Les Pierres gravies de la Haute- Asie (2 vols., 1883-1886). He also collaborated with Julius Oppert. He was admitted to the Academy of Inscrip- tions in 1887, and died in Paris on the 30th of August 1899.

His daughter Delphine (b. 1850) received a prize from the Academy for her Les Parsis, histoire des communautis zoro- astriennes de I'Inde (1898), and was sent in 1900-1901 to British India on a scientific mission, of which she published a report in 1903.

MENARD, LOUIS NICOLAS (1822-1901), French man of letters, was born in Paris on the 19th of October 1822. His versatile genius occupied itself in turn with chemistry, poetry, painting and history. In 1843 he published, under the pseudo- nym of L. de Senneville, a translation of Promithie delivri. Turning to chemistry, he discovered collodion in 1846, but its value was not recognized at the time; and its application later to surgery and photography brought him no advantage. Louis Menard was a socialist, always in advance of the reform move- ments of his time. After 1848 he was condemned to imprison- ment for his Prologue d'une revolution. He escaped to London, returning to Paris only in 1852. Until i860 he occupied himself with classical studies, the fruits of which are to be seen in his Poemes (1855), Polythtisme helUnique (1863), and two academic theses, De sacra poesi graecorum and La Morale avant les philo- sophes (i860). The next ten years Menard spent chiefly among the Barbizon artists, and he exhibited several pictures. He was in London at the time of the Commune, and defended it with his pen. In 1887 he became professor at the Ecole des Arts decoratifs, and in 1895 professor of universal history at the H6tel de Ville in Paris. His Rfoeries d'un paten mystique (1876), which contained sonnets, philosophical dialogues and some stories, was followed in 1896 by Poemes et reveries d'un paten mystique. Menard died in Paris on the 12th of February 1901.

His works include: Histoire des anciens peuples de V Orient (1882); Histoire des Israelites d'apres I'exSgbse biblique (1883), and Histoire des Grecs (1884-1886). There is an appreciation of Menard in the

opening chapter of Maurice BarreVs Voyage de Sparte.

MENASHA (an Indian word meaning ” thorn ” or ” island “), a city of Winnebago county, Wisconsin, U.S.A., 88 m. N. 6I» Milwaukee, and 14 m. N. of Oshkosh, attractively situated at the N. extremity of Lake Winnebago at its outlet into the Fox river. Pop. (1890), 4581; (1900), 5589 (1535 foreign-born); (1905, state census), 5960; (1910), 6081. Menasha is served by the Minneapolis, St Paul & Sault Ste Marie, the Chicago, Milwaukee & St Paul, and the Chicago & North-Western railways, and by an inter-urban electric railway system. Several bridges across the Fox River connect Menasha with Neenah, with which it really forms one community industrially. Doty Island, at the mouth of the river and divided about equally between the cities, is a picturesque and popular summer resort.

Menasha had good water power and among its . manufactures are paper and sulphite pulp, lumber, wood en- ware and cooperage products, woollen and knit goods, leather, boats and bricks. The first white man to visit the site of Menasha was probably Jean Nicolet, who seems to have come in the winter of 1634-1635 and to have found here villages of Fox and Winnebago Indians. Subsequently there were French and English trading posts here. The city was settled permanently in 1848, and was chartered in 1874.

MENASSEH BEN ISRAEL (c. 1604-1657), Jewish leader, was born in Lisbon about 1604, and was brought up in Amsterdam. His family had suffered under the Inquisition, but found an asylum first in La Rochelle and later in Holland. Here Menasseh rose to eminence riot only as a rabbi and an author, but also as a printer. He established the first Hebrew press in Holland. One of his earliest works El Conciliador won immediate reputaˆ tion. It was an attempt at reconciliation between apparent discrepancies in various parts of the Old Testament. Among his correspondents were Vossius, Grotius and Huet. In 1638 he decided to settle in Brazil, as he still found it difficult to pro- vide in Amsterdam for his wife and family, but this step was rendered unnecessary by his appointment to direct a college founded by the Pereiras.

In 1644 Menasseh met Antonio de Montesinos, who persuaded him that the North-American Indians were the descendants of the lost ten tribes of Israel. This supposed discovery gave a new impulse to

Menasseh's Messianic hopes. But he was con- vinced that the Messianic age needed as its certain precursor the settlement of Jews in all parts of the known world. Filled with this idea, he turned his attention to England, whence the Jews had been expelled since 1290. He found much Christian support in England. During the Commonwealth the question of the readmission of the Jews was often mooted under the growing desire for religious liberty. Besides this, Messianic and other mystic hopes were current in England. In 1650 appeared an English version of the Hope of Israel, a tract which deeply impressed public opinion. Cromwell had been moved to sympathy with the Jewish cause partly by his tolerant leanings, but chiefly because he foresaw the importance for English com- merce of the presence of the Jewish merchant princes, some of whom had already found their way to London. At this juncture Jews received full rights in the colony of Surinam, which had been English since 1650. In 1655 Menasseh arrived in London. It was during his absence that the Amsterdam Rabbis excom~ municated Spinoza, a catastrophe which would probably have been avoided had Menasseh — Spinoza's teacher — been on the spot. One of his first acts on reaching London was the issue of his Humble Addresses to the Lord Protector, but its effect was weakened by the issue of Prynne's able but unfair Short Demurrer. Cromwell summoned the Whitehall Conference in December of the same year. To this conference were summoned some of the most notable statesmen, lawyers and theologians of the day. The chief practical result was the declaration of Judges Glynne and Steele that " there was no law which forbade the Jews' return to England." Though, therefore, nothing was done to regularize the position of the Jews, the door was opened to their gradual return. Hence John Evelyn was able to enter in his Diary under the date Dec- 14, 1655, "Now were the Jews admitted." But the attack on the Jews by Prynne and others could not go unanswered. Menasseh replied in the finest of his works, Vindiciae judaeorum (1656). " The best tribute to its value is afforded by the fact that it has since been frequently reprinted in all parts of Europe when the calumnies it denounced have been revived " (L. Wolf). Among those who used in this way Menasseh's Vindiciae was Moses Mendelssohn (q.v.). Soon after Menasseh left London Cromwell granted him a pension, but he died before he could enjoy it. Death overtook him at Middleburg, as he was conveying the body of his son Samuel home for burial,

Menasseh ben Israel was the author of many works, but his English tracts remain the only ones of importance. His De termino vitae was translated into English by Pococke, and his

Conciliator by G. H. Lindo. Among his other works were a ritual

compendium Tesoro dos dinim, and a treatise in Hebrew on immortality (Nishmaih hayim). He was a friend of Rem- brandt, who painted his portrait and engraved four etchings to illustrate his Piedra gloriosa. These are preserved in the British Museum.

See Graetz, History of the Jews, vol. v. ch. ii. ; Lucien Wolf, Menasseh ben Israel's Mission to Oliver Cromwell, with a reprint of the English pamphlets (London, 1901) ; H. Adler, " A Homage to Menasseh ben Israel," in Transactions of the Jewish Historical Society of England, i. 25-54. (L A.)

MENCIUS, the latinized form of Mang-tsze, " Mr Mang," or " Mang the philosopher," a Chinese moral teacher whose name stands second only to that of Confucius. His statue or spirit- tablet (as the case may be) has occupied, in the temples of the sage, since our nth century, a place among " the four assessors," and since a.d. 1530 his title has been " the philosopher Mang, sage of the second degree."

The Mangs or Mang-suns had been in the time of Confucius one of the three great clans of Lu (all descended from the marquis Hwan, 711-694 B.C.), which he had endeavoured to curb. Their power had subsequently been broken, and the branch to which Mencius belonged had settled in Tsau, a small adjacent principality, the name of which remains in Tsau hsien, a district of Yenchau Shan-tung. A magnificent temple to Mencius is the chief attraction of the district city. The large marble statue of Mencius in the courtyard shows much artistic skill, and gives the impression of a man strong in body and mind, thoughtful and fearless. His lineal representative lives in the city, and thousands of Mings are to be found in the neigh- bourhood.

Mencius, who died in the year 289 B.C., had lived to a great age — some say to his eighty-fourth year, placing his birth in 372 B.C., and others to his ninety-seventh, placing it in 385. All that we are told of his father is that he died in the third year of the child, who was thus left to the care of his mother. Her virtues and dealings with her son were celebrated by a great writer in the 1st century before our era, and for two thousand years she has been the model mother of China.

Mencius is more than forty years old when he comes before us as a public character. He must have spent much time in study, investigating questions as to the fundamental principles of morals and society, and brooding over the condition of the country. The history, the poetry, the institutions and the great men of the past had received his attention. He intimates that he had been in communication with men who had been disciples of Confucius. That sage had become to

him the chief of mortal men, the object of his untiring admiration; and in the doctrines which he had taught Mencius recognized the truth for want of an appreciation of which the bonds of order all round him were being relaxed; and the kingdom hastening to anarchy.

When he first comes forth from Tsau, he is accompanied by several eminent disciples. He had probably imitated Confucius in becoming the master of a school, and encouraging the reso.t to it of inquiring minds that he might resolve their doubts and unfold to them the right methods of government. One of his sayings is that it would.be a greater delight to the superior man to get the youth of brightest promise around him and to teach and train them than to enjoy the revenues of the kingdom. His intercourse' with his followers was not sb intimate as that of Confucius had been with the members of his selected circle; and, while he maintained his dignity among them, he was not aide to secure from them the same homage and reverent admiration. More than a century had elapsed since the death of Confucius, and during that period the feudal kingdom of Chau had been showing more and more of the signs of dissolution, and porten-, tous errors that threatened to upset all social order were widely disseminated. The sentiment of loyalty to the dynasty had disappeared. Several of the marquesses and other feudal princes of earlier times had usurped the title of king. The smaller fiefs had been absorbed by the larger ones, or reduced to helpless dependence on them. Tsin, after greatly extending its territory,

had broken up into three powerful kingdoms, each about as large as England. Mencius found the nation nominally one, and with the traditions of two thousand years affirming its essential unity, but actually divided into seven monarchies, each seeking to subdue the others under itself. The consequences were constant warfare and chronic misery.

In Conf ucius's time we meet with recluses who had withdrawn in disgust from the world and its turmoil; but these had now given place to a class of men who came forth from their retire- ments provided with arts of war or schemes of policy which they recommended to the contending chiefs, ever ready to change their allegiance as they were moved by whim or interest. Mencius was once asked about two of them, "Are they not really great men? Let them be angry, and all the princes are afraid. Let them live quietly, and the flames of trouble are

everywhere extinguished.” He looked on them as little men, and delighted to proclaim his idea of the great man in such language as the following: —

” To dwell in love, the wide house of the world, to stand in propriety, the correct seat of the world, and to walk in righteous- ness, the great path of the world; when he obtains his desire for office, to practise his principles for the good of the people, and when that desire is disappointed, to practise them alone; to be above the power of riches and honours to make dissipated, of poverty and mean condition to make swerve from the right, and of power and force to make bend — these characteristics constitute the great man.”

Most vivid are the pictures which Mencius gives of the con- dition of the people in consequence of the wars of the states. ” The royal ordinances were violated; the multitudes were oppressed; the supplies of food and drink flowed away like water.” It is not wonderful that, when the foundations of government were thus overthrown, speculations should have arisen that threatened to overthrow what he considered to be the foundations of truth and all social order. ” A shrill-tongued barbarian from the south,” as Mencius called him, proclaimed the dissolution of ranks, and advocated a return to primitive simplicity. He and his followers maintained that learning was quackery, and statesmanship craft and oppression, that prince and peasant should be on the same level, and every man do everything for himself. Another, called Yang-chd, denied the difference between virtue and vice, glory and shame. It was the same with all at death. The conclusion there- fore was: ” Let us eat and drink; let us gratify the ears and eyes, get servants and maidens, , beauty, music, wine; when the day is insufficient, carry it on through the night. Each one for himself.” Against a third heresiarch, of a very different stamp, Mencius felt no less indignation. This was Mo Ti, who found the source of all the evils of the time and Of all time in the want of mutual love. He taught, therefore, that men should love others as themselves; princes, the states of other princes as much as their own; children, the parents of others as much as their own. Mo, in his gropings, had got hold of a noble principle, but he did not apprehend it distinctly nor set it forth with discrimination. To our philosopher the doctrine appeared contrary to the Confucian orthodoxy about the five relations of society; and he attacked it without mercy and with an equal confusion of thought. ” Yang’s principle,” he said, ” is ‘each one for himself,’ which does not acknowledge theclaims of the sovereign. Mo’s is ‘ to love all equally,’ which does not acknowledge the peculiar affection due to a father. But to acknowledge neither king nor father is to be in the state of a beast. Theway of benevolence and righteousness

is stopped up," On this ocean of lawlessness, wickedness, heresies and misery Mencius looked out from the quiet of his school, and his spirit was stirred to attempt the rescue of the people from misrule and error. "If Heaven," he said, "wishes that the kingdom should enjoy tranquillity and good order, who is there besides me to bring it about? " He formed his plan, and proceeded to put it in execution. He would go about among the different kings till he should find one among them who would follow his counsels and commit to him the entire administration of his government. That obtained, he did not doubt that in a

few years there would be a kingdom so strong and so good that all rulers would acknowledge its superiority, and the people hasten from all quarters to crown its sovereign as monarch of the whole of China. This plan was much the same as that of Confucius had been; but, with the bolder character that belonged to him, Mencius took in one respect a position from which "the master" would have shrunk. The former was always loyal to Chau, and thought he could save the country by a reformation; the latter saw the day of Chau was past, and the time was come for a revolution. Mencius's view was the more correct, but he was not wiser than the sage in fore- casting for the future. They could think only of a reformed dynasty or of a changed dynasty, ruling according to the model principles of a feudal constitution, which they described in glowing language. They desired a repetition of the golden age in the remote past; but soon after Mencius disappeared from the stage of life there came the sovereign of Ch'in, and solved the question with fire and sword, introducing the despotic empire which has since prevailed.

The question may be asked, " How, in the execution of his plan, was Mencius, a scholar, without wealth or station, to find admission to the courts of lawless, and unprincipled kings, and acquire the influence over them which he expected? " The answer can only be found by bearing in mind the position accorded from the earliest times in China to men of virtue and ability. The same written character denotes both scholars and officers. They are at the top of the social scale — the first of the four classes into which the population has always been divided. This appreciation of learning or culture has exercised a powerful influence over the government under both conditions of its existence; and out of it grew the system of making literary merit the passport to official employment. The ancient doctrine was that the scholar's privilege was from Heaven as much as the sovereign's right; the modern system is a device of the despotic rule to put itself in Heaven's place, and have the making of the scholar in its own hands. The feeling and conviction out of which the system grew prevailed in the

time of- Mencius. The dynasties that had successively ruled over the kingdom had owed their establishment not more to the military genius of their founders than to the Wisdom and organizing ability of the learned men, the statesmen, who were their bosom friends and trusted counsellors. Why should not he become to one of the princes of his day what 1 Yin had been to Tharig, and Thai-kung Wang to King W&n, and the duke of Chau to Wu and Ch'ang? But, though Mencius might be the equal of any of those worthies, he knew of no prince like Thang and the others, of noble aim and soul, who would adopt his lessons. In his eagerness he overlooked this condition of success for his enterprise. He might meet with such a ruler as he looked for, or he might reform a bad one, and make him the coadjutor that he required. On the strength of these peradventures, and attended by several of his disciples, Mencius went for more than twenty years from one court to another, always baffled, and always ready to try again. He was received with great respect by kings and princes. He Would not 1 enter into the service of any of them, but he occasionally accepted honorary offices of distinction; and he did not scruple to receive large gifts which enabled him to live and move about as a man of wealth. In delivering his message he was as fearless and outspoken as John Knox. He lectured great men, and ridiculed them. He unfolded the ways of the old sage kings, and pointed out the path to universal sway; but it was all in vain. He* could not stir any one to honourable action. He confronted heresy with strong arguments and exposed it with withering sarcasm; but he could work no deliverance in the earth. The last court at which we find him was that of Lft, probably in 3 10 B.C. The marquis of that state had given office to Yo-changj one of Mencius's disciples, and he hoped that this might be the means of a favourable hearing for himself. So it had' nearly happened. On the suggestion of Yo-chang the marquis had ordered his carriage to be yoked, and was about to step into it 1 and proceed to bring Mencius to his palace, when an unworthy

favourite stepped in and diverted him from his purpose. The disciple told his master what had occurred, reproaching the favourite for his ill-timed intervention; Mencius, however, said to him," A man's advancement or the arresting of it may seem to be effected by others, but is really beyond their power. My not finding in the marquis of Lu a ruler who would confide in me and put my lessons in practice is from Heaven."

Mencius accepted this incident as a final intimation to him of the will of Heaven. He had striven long against adverse circumstances, but now he bowed in submission. He withdrew from courts and the public arena. According to tradition he passed the last twenty years of his life in the society of his disciples, discoursing to them, and giving the finishing touches to the record of his conversations and opinions, which were afterwards edited by them, and constitute his works. Mencius was not so oracular, nor so self-contained, as Confucius; but his teachings have a vivacity and sparkle all their own.

Mencius held with Confucius — and it was a doctrine which had descended to them both from the remotest antiquity — that royal government is an institution of God. An ancient sovereign had said that ” Heaven, having produced the people, appointed for them rulers, and appointed for them teachers, who should be assist- ing to God.” Our philosopher, adopting this doctrine, was led by the manifest incompetency Qf all the rulers of his time to ask how it could be known on what individual the appointment of Heaven had fallen or ought to fall, and he concluded that this could be ascertained only from his personal character and hit conduct of affairs. The people must find out the will of Heaven as to who should be their ruler for themselves. There was another old saying which delighted Mencius — ” Heaven sees as the people see; Heaven hears as the people hear.” He taught accordingly that, while government is from God, the governors are from the people; — vox populi vox Dei. No claim then of a ” divine right ‘ should be allowed to a sovereign if he were not exercising a rule for the good of the people. ” The people are the most important element in a nation ; the altars to the spirits of the land and grain are the second ; the sovereign is the lightest.” Mencius was not afraid to follow this utterance to its consequences. The monarch whose rule is injurious to the people, and who is deaf to remonstrance and counsel, should be dethroned. In such a case ” killing is no murder.” But who is to remove the sovereign that thus ought to be removed ? Mencius had three answers to this difficult question. First, he would have the members of the royal house perform the task. Let them disown their unworthy head, and appoint some better individual of their number in his room. If they could not or would not do this, he thought, secondly, that any high minister, though not allied to the royal house, might take summary measures with the sovereign, assuming that he acted purely with a view to the public weal. His third and grand device was what he called ” the minister of Heaven.” When the sovereign had become a pest instead of a blessing, he believed that’ Heaven would raise up some one for the help of the people, some one who should so conduct himself in his original

subordinate position as to draw all eyes and hearts to himself. Let him then raise the standard not of rebellion but of righteousness, and he could not help attaining to the highest dignity. Mencius hoped to find one among the rulers of his day who might be made into such a minister, and he counselled one and another to adopt measures with that object. It was in fact counselling rebellion, but he held that the house of Chau had forfeited its title to the throne.

A good government according to his ideal must be animated by a spirit of benevolence, and ever pursue a policy of righteousness. Its aims must be, first, to make the people well off, and next, to educate them. No one was fit to occupy the throne who could be happy while any of the people were miserable, who delighted in war, who could indulge in palaces and parks which the poorest did not in a measure share with him. Game laws received his emphatic condemnation. Taxes should be light, and all the regula- tions for agriculture and, commerce of a character to promote and encourage them. The rules which he suggested to secure those objects had reference to the existing condition of his country, but they are susceptible of wide application. They cafry in them schemes of drainage and irrigation for. land, and of free trade for commerce. But it must be, he contended, that a sufficient and certain livelihood be secured for all the people. Without this their minds would be unsettled, and they would proceed to every form of wild licence. They would break the laws, and the ruler would punish them — punish those whom his neglect of his own duties had plunged into poverty, of which crime was the consequence. He would be, not their ruler, but their ” trapper.”

Supposing the people to be made well off, Mencius taught that education should be provided for them all. He gave the marquis of Thang a programme of four kinds of educational institutions, which he wished him to establish in his state — in the villages and the towns, for the poor as well as the rich, so that none might be

ignorant of his duties in the various relations of society. But after all, unless the people could get food and clothing by their labour, he had not much faith in the power of education to make them virtuous. Give him, however, a government fulfilling the conditions that he laid down, and he was confident there would soon be a people, all contented, all virtuous. And he saw nothing to prevent the realization of such a government. Any ruler might become, if he would, ” the minister of Heaven,” who was his ideal, and the influence of his example and administration would be all- powerful. The people would flock to him as their parent, and help him to do justice on the foes of

truth and happiness. Pulse and grain would be abundant as water and fire, and the multitudes, well clothed, and well principled, would sit under the shade of their mulberry trees, and hail the ruler " king by the grace of Heaven." Opinions were much divided among his contemporaries on the subject of human nature. Some held that the nature of man is neither good nor bad ; he may be made to do good and also to do evil. Others held that the nature of some men is good, and that of others bad ; thus it is that the best of men sometimes have bad sons, and the worst of men good sons. It was also maintained that the nature of man is evil, and whatever good appears in it is the result of cultivation. In opposition to all these views Mencius contended that the nature of man is good. " Water," he said, " will flow indifferently to the east or west; but will it flow indifferently up or down ? The tendency of man's nature to goodness is like the tendency of water to flow downwards. By striking water you may make it leap over your forehead; and by damming and leading it you may make it go up a hill. But such movements are not according to the nature of water; it is the force applied which causes them. When men do what is not good, their nature has been dealt with in this way." With various, but equally felicitous, illustration he replied to his different oppo- nents. Sometimes he may seem to express himself too strongly, but an attentive study of his writings shows that he is speaking of our nature in its ideal, and not as it actually is— as we may ascertain, by an analysis of it, that it was intended to be, and not as it has been made to become.

Mencius insists on the constituents of human nature, dwelling especially on the principles of benevolence, righteousness, propriety, and wisdom or knowledge, the last including the judgment of conscience. " These," said he, " are not infused into us from without. Men have these four principles just as they have their four limbs." But man has also instincts and appetites which seek their own gratification without reference to righteousness or any other control. He met this difficulty by contending that human nature is a constitution, in which the higher principles are designed to rule the lower. " Some constituents of it are noble and some ignoble, some great and some small. The great must not be injured for the small, nor the noble for the ignoble."

One of his most vigorous vindications of his doctrine is the following: " For the mouth to desire flavours, the eye colours, the ear sounds, and the four limbs ease and rest belong to man's nature. An individual's lot may restrict him from the gratification of them; and in such a case the superior man will not say, ' My nature demands that pleasure, and I will get it.' On the other hand, there are love between

father and son, righteousness between ruler and minister, the rules of ceremony between host and guest, and knowledge seen in recognizing the able and virtuous, and in the sage's fulfilling the heavenly course; — these are appointed (by Heaven). But they also belong to our nature, and the superior man will not say, ' The circumstances of my lot relieve me from them.' " When he proceeded from his ideal of human nature to account for the actual phenomena of conduct, he was necessarily less success- ful. "There is nothing good," he said, "that a man cannot do; he only does not do it." But why does he not do it ? Against the stubborn fact Mencius beats his wings and shatters his weapons — all in vain. He mentions a few ancient worthies who, he con- ceived, had always been, or who had become, perfectly virtuous. Above them all he extols Confucius, taking no notice of that sage's confession that he had not attained to conformity to his own rule of doing to others as he would have them do to him. No such acknowledgment about himself ever came from Mencius. Therein he was inferior to his predecessor: he had a subtler faculty of thought, and. a much more vivid imagination ; but he did not know himself nor his special subject of human nature so well.

A few passages illustrative of his style and general teachings will complete all that can be said of him here. His thoughts, indeed, were seldom condensed like those of " the master " into aphorisms, and should be read in their connexion; but we have from him many words of wisdom that have been as goads to millions for more than two thousand years. For instance : —

" Though a man may be wicked, yet, if he adjust his thoughts, fast, and bathe, he may sacrifice to God."

" When Heaven is about to confer a great office on any man, it first exercises his mind with suffering, and his sinews and bones with toil. It exposes his body to hunger, subjects him to extreme poverty, and confounds his undertakings. In all these ways it stimulates his mind, strengthens his nature, and supplies his incompetencies."

" The great man is he who does not lose his child-heart."

" The sense of shame is to a man of great importance. When one is ashamed of having been without shame, he will afterwards not have occasion for shame."

” To nourish the heart there is nothing better than to keep the desires few. Here is a man whose desires are few; in some things he may not be able to keep his heart, but they will be few. Here is a man whose desires are many; in some things he may be able to keep his heart, but they will be few.”

” Benevolence is the distinguishing characteristic of man. As embodied in his conduct, it may be called the path of duty.”

” There is an ordination for everything; and a man should receive submissively what may be correctly ascribed thereto. He who has the correct idea of what Heaven’s ordination is will not stand beneath a tottering wall. Death sustained in the discharge of one’s duties may be correctly ascribed to Heaven. Death under handcuffs and fetters cannot be correctly so ascribed.”

” When one by force subdues men, they do not submit to him in heart. When he subdues them by virtue, in their hearts’ core they are pleased, and sincerely submit.”

Two translations of the works of Mencius are within the reach of European readers: that by Stanislaus Julien, in Latin (Paris, 1824-1829); and that forming the second volume of Legge’s Chinese Classics (Hong-Kong, 1862). The latter has been published at London (1875) without the Chinese text. See also E. Faber, The Mind of Mencius, or Political Economy founded on Moral Philo- sophy, translated from the German by A. B. Hutchinson (London, 1882). (J. Le.)

MENDE, a town of south-eastern France, capital of the department of Lozere, 59 m. N.N.E. of Millau by rail. Pop. (1906), town 5246; commune 7007. Mende is picturesquely situated on the left bank of the Let, and at the foot of the Mimat cliff, which rises 1000 ft. above the town, and terminates the Causse de Mende. The town is the seat of a bishopric. Its cathedral of St Peter was founded in the 14th century by Pope Urban V., a native of the district, but the two towers, respectively 280 and 210 ft. high, were added by Bishop Francois de la Rovere in the early part of the 16th century. Partly destroyed during the devastation of the town by the Protestants in 1579 and 1580, it was rebuilt in the 17th century, and in 1874 a statue of Urban V. was erected in front of it. A Renais- sance tower of the ancient citadel now serves as the belfry of the church of the Penitents, and a 14th-century bridge crosses the Lot. The town is a convenient centre for visitors to the gorges of the Tarn. It is the seat of a prefect and a court of assizes, and has a tribunal of first instance and a chamber of

commerce. The chief industry is the manufacture of serges and shalloons, known as Mende stuffs, exported to Spain, Italy and Germany.

Mende (Mimate) grew up around the hermitage, partly excavated in the side of the Mimat cliff, to which St Privat, bishop of Javols, retreated after the destruction of that town, and where he was subsequently slain by the Vandals, who had pursued him thither, about 408. In the 14th century the new town became the civil, as it had previously been the ecclesiastical, capital of the Gevaudan district.

MENDELEEFF, DMITRI IVANOVICH (1834-1907), Russian chemist, the youngest of a family of seventeen, was born at Tobolsk, Siberia, on the 7th of February (n.s.) 1834. After attending the gymnasium of his native place, he went to study natural science at St Petersburg, where he graduated in chemistry in 1856, subsequently becoming privatdozent. In i860 he went to Heidelberg, where he started a laboratory of his own, but returning to St Petersburg in 1861, he became professor of chemistry in the technological institute therein 1863, and three years later succeeded to the same chair in the university. In 1890 he resigned the professorship, and in 1893 he was appointed director of the Bureau of Weights and Measures, a post which he occupied till his death.

Mendeleeff ‘s original work covered a wide range, from questions in applied chemistry to the most general problems of chemical and physical theory. His name is best known for his work on the Periodic Law. Various chemists had traced numerical sequences among the atomic weights of some of the elements and noted connexions between them and the properties of the different substances; but it was left to him to give a full expression to the generalization, and to treat it not merely as a system of classify- ing the elements according to certan observed facts, but as a ” law of nature” which could be relied upon to predict new -facts

and to, disclose errors in what were supposed to be old facts. Thus in 1871 he was led by certain gaps in his tables to assert the existence of three new elements so far unknown to the chemist, and to assign them definite properties These three he called ekaboron, ekaaluminium, and ekasilicon; and his prophecy was completely vindicated within fifteen years by the discovery of gallium in 1871, scandium in 1879, and germanium in 1886. Again, in several cases he ventured to question the correctness of the ” accepted atomic weights,” on the ground that they did not correspond with the Periodic Law, and here also he was

justified by subsequent investigation. In 1902, in an ” attempt at a chemical conception of the ether,” he put forward the hypothesis that there are in existence two elements of smaller atomic weight than hydrogen, and that the lighter of these is a chemically inert, exceedingly mobile, all-pene- trating and all-pervading gas, which constitutes the aether. Mendeleeff also devoted much study to the nature of such ” indefinite ” compounds as solutions, which he looked upon as homogeneous liquid systems of unstable dissociating com- pounds of the solvent with the substance dissolved, holding the opinion that they are merely an instance of ordinary definite or atomic compounds, subject to Dalton’s laws. In another department of physical chemistry he investigated the expansion of liquids with heat, and devised a formula for its expression similar to Gay-Lussac’s law of the uniformity of the expansion of gases, while sc^far back as 1861 he anticipated T. Andrews’s conception of the critical temperature of gases by defining the absolute boiling-point of a substance as the temperature at which cohesion and heat of vaporization become equal to zero and the liquid changes to vapour, irrespective of the pressure and volume. Mendeleeff wrote largely on chemical topics, his most widely known book probably being The Principles of Chemistry, which was written in 1868-1870, and has gone through many subsequent editions in various languages. For his work on the Periodic Law he was awarded in 1882, at the same time as L. Meyer, the Davy medal of the Royal Society, and in 1905 he received its Copley medal. He died at St Petersburg on the 2nd of February 1907.

See W. A. Tilden, ” Mendeleeff Memorial Lecture,” Jour. Chem. Soc, 95, p. 2077.

MENDELISM. To define what some biologists call Men- delism briefly is not possible. Within recent years there has come to biologists a new idea of the nature of living things, a new conception of their potentialities and of their limitations; and for this we are primarily indebted to the work of Gregor Mendel. Peasant boy, monk, and abbot of Brunn, this remark- able man at one time interested himself in the workings of heredity, and the experiments devised by him and carried out in his cloister garden are to-day the foundation of that exact knowledge of the physiological process of heredity which bio- logists are rapidly extending in various directions. This extension Mendel never saw. Born in 1822 he published the account of his experiments in 1865, but it was not until 1900, eighteen years after his death, that biologists came to appreciate what he had accomplished. That year marked the simultaneous rediscovery of his work by three distinguished botanists: Hugo de Vries, C. Correns and E. Tschermak. Thenceforward Mendel’s ideas have steadily gained ground, and, as

the already strong body of evidence in their favour grows, they must come to exert upon biological conceptions an influence not less than those associated with the name of Darwin.

Dominant and Recessive. — Mendel chose the common pea (Pisum sativum) as a subject for experiment, and investigated the effects of crossing different varieties. In his method he differed from previous investigators in concentrating his atten- tion on the mode of inheritance of a single pair of alternative characters at a time. Thus on crossing a tall with a dwarf and paying attention to this pair of characters alone, he found that the hybrids (or Fi generation) were all tall and that no intermediates appeared. Accordingly he termed the tall character dominant and the dwarf character recessive. On allowing these hybrids to fertilize themselves in the ordinary

way he obtained a further generation which on the average was composed of three tails to one dwarf. Subsequent experi- ment showed that the

Tx D- P dwarfs always bred true,

as did also one out of

pi.-, p every three tails; the two

• ‘ remaining tails behaved

~m

— i —

[T]

T I

•fFflmr)

Fig. i.

as the original hybrids in

..- p s giving three tails to one

dwarf. Having regard to

_p the characters, tallness

3 and dwarf ness, three and only three kinds of peas exist, viz. dwarfs which breed true, tails which give a fixed proportion of tails between these three forms may the subjoined scheme, in which

Parents

breed true, and tails which and dwarfs. The relation be briefly summarized in pure tall and dwarf are represented by T and D respectively, while [T] denotes the tails which do not breed true. Experi- ments were also made with several other pairs of characters, and the same mode of inheritance was shown to hold good throughout.

Unit-Characters. — As Mendel clearly perceived, these definite results lead inevitably to a precise conception of the consti- tution of the reproductive cells, or gametes; and to appreciate fully the change wrought in our point of view necessitates a brief digression into the essential features of the reproductive process. A sexual process (see Sex) is almost universal among animals and plants, and consists essentially of the union of two gametes, of which one is produced by either parent. Every gamete contains small definite bodies known as chromosomes, and the number of these is, with few known exceptions, con- stant for the gametes of a given species. On the fusion of two gametes the resulting cell or zygote has therefore a double structure, for it contains an equal number of chromosomes brought in by the paternal and by the maternal gamete — in the case of a plant by the pollen grain as well as by the

ovule. By a process of re- peated division the zygote gives rise to a plant (or an animal) whose cells appar- ently retain the double structure throughout. Cer- tain of the cells of such a zygote become the germ cells and are set apart, as it were, for the formation of gametes. Histology has shown that when this occurs -the cells lose the double structure which they had hitherto possessed, and that as the result of a process known as the reduction division gametes are formed in which the number of chromosomes is one half of that which characterizes the cells of the zygote. It is generally acknowledged that the chromosomes play an important part in the hereditary process, and it is possible that the divisions which they undergo in gametogenesis are connected with the observed inheritance of characters. We shall refer later to the few observations which seem to

connect the two sets of phenomena.

Our conception of what occurs when a cross is made between two individuals may be illustrated by the diagram which forms fig. 2. Zygotes are here represented by squares and gametes by circles. The dominant and recessive characters are indicated

Parental /£2\ GameteaVˆ;

by small plain and black rectangles. Each zygote must con- tain two and each gamete but one of these unit-characters. Zygotes such as the original parents which breed true to a given character are said to be homozygous for that character, and from their nature such homozygotes must produce identical gametes. Consequently when a cross is made only one kind of zygote can be formed, viz. that containing both the dominant and recessive unit-characters. When the germ-cells of such a heterozygote split to form gametes, these, as indicated in fig. 2, will be of two sorts containing the dominant and re- cessive characters respectively, and will be produced in equal numbers. If we are dealing with a hermaphrodite plant such as the pea the ovules will consist of one half bearing only the dominant character and one half bearing only the recessive character; and this will be true also of the pollen grains. Consequently each dominant ovule has an equal chance of being fertilized by a dominant or by a recessive pollen grain, and the dominant ovules must therefore give rise to equal numbers of dominant homozygous and of heterozygous plants. Similarly the recessive ovules must give rise to equal numbers of recessive homozygotes and of heterozygotes. Hence of the total offspring of such a plant one quarter will be pure dominants, one quarter recessives, and one half heterozygotes as indicated in fig.'- 2.' Where one character is completely dominant over the other, heterozygotes will be indistinguish- able in appearance from the homozygous dominant, and the F2 generation will be composed of three plants of the domi- nant form to each recessive. These are the proportions actually found by Mendel in the pea and by many other more recent observers in a number of plants and animals. The experi- mental facts are in accordance with the conception of unit- characters and their transmission from zygote to gamete in the way outlined above; and the numerical results of breeding experiments are to be regarded as proving that in the forma- tion of gametes from the heterozygote the unit-characters are treated as unblending entities separating cleanly, or segregating, from one another. From this it follows that any gamete can carry but one of a pair of unit-characters and must therefore be pure for that character. The principle of the segregation of characters in gametogenesis with its natural corollary,

the purity of the gametes, is the essential part of Mendel's discoveries. The quite distinct phenomenon of dominance observed by him in Pisum occurs in many other cases, but, as will appear below, is by no means universal.

Illustrations. — Mendelian inheritance in its simplest form, i.e. for a single pair of characters, has already been shown to occur in many species of animals and plants, and for many very diverse characters. In some cases complete dominance of one of the pair of unit-characters occurs; in others the form of heterozygote is more or less intermediate. Fresh cases are continually being recorded and the following short list can but serve to give some idea of the variety of characters in which Mendelian inheritance has been demonstrated.

A. Dominance nearly or quite complete. (The dominant

character is given first). Tall and dwarf habit (pea, sweet pea). Round seed and wrinkled seed (pea). Long pollen and round pollen (sweet pea). Starch and sugar endosperm (maize). Hoariness and absence of hairs (stocks, Lychnis). Beardless and bearded condition (wheat). Prickliness and smoothness of fruits {Datura). Palm and fern leaf (Primula). Purple and red flowers (sweet pea, stocks, &c). Fertility and sterility of anthers (sweet pea). Susceptibility and immunity to rust (wheat). Rose comb and single comb (fowls). Black and white plumage (Rosecomb bantams). Grey and black coat colour (rabbits, mice). Bay and chestnut coat colour (horses). Pigmentation and albinism (rabbits, rats, mice). Polled and horned condition (cattle). Short and long " Angora " coat (rabbits). Normal and waltzing habit (mice). Deformed hand with but two phalanges in digits and normal

hand (man).

Nt

B. Absence of dominance, the heterozygote being more or less intermediate in form. Black and white splashed plumage (Andalusian fowls). Lax and dense ears (wheat). Six rowed and two rowed ears (barley).

Dominance. — The meaning of this phenomenon is at present obscure, and we can make no suggestion as to why it should be complete in one case, partial in another, and entirely absent in a third. When

found it is as a rule definite and orderly, but there are cases known where irregularity exists. The extra toe characteristic of certain breeds of fowls, such as Dork- ings, behaves generally as a dominant character, but in certain cases it has been ascertained that a. fowl without an extra toe may yet carry the extra toe character. It is possible that in some cases dominance may be conditioned by the presence of other features, and certain crosses in sheep lend colour to the supposition that sex may be such a feature. A cross between the polled Suffolk and the horned Dorset breeds results in horned rams and polled ewes only, though in the F 2 generation both sexes appear with and without horns. At present the simplest hypothesis which fits the facts is that horns are domi- nant in the male and recessive in the female. It is important not to confuse cases of apparent reversal of ‘dominance such as the above with cases in which a given visible character may be the result of two entirely different causes. One white hen may give only colour chicks by a coloured cock, whilst the same cock with another white hen, indistinguishable in appear- ance from the former, will give only white chickens containing a few dark ticks. There is here no reversal of dominance, but, as has been abundantly proved by experiment, there are two entirely distinct classes of white fowls, of which one is dominant and the other recessive to colour.

The Presence and Absence Hypothesis. — Whether the pheno- menon of dominance occur or not, the unit-characters exist in pairs, of which the members are seemingly interchangeable. In virtue of this behaviour the unit-characters forming such a pair have been termed allelomorphic to one another, and the question arises as to what is the nature of the relation between two allelomorphs. The fact that such cases of heredity as have been fully worked out can all be formulated in terms of allelomorphic pairs is suggestive, and has led to what may be called the ” presence and absence ” hypothesis. An allelo- morphic pair represents the only two possible states of any given unit-character in its relation to the gamete, viz. its pre- sence or its absence. When the unit-character is present the quality for which it stands is manifested in the zygote: when it is absent some other quality previously concealed is able to appear. When the unit-character for yellowness is present in a pea the seeds are yellow, when it is absent the seeds are green. The green character is underlying in all yellow seeds, but can only appear in the absence of the unit-character for yellowness, and greenness is allelomorphic to yellowness because it is the expression of absence of yellowness.

Dihybridism. — The instances hitherto considered are all simple cases in which the individuals crossed differ only in one pair of unit-characters. Mendel himself worked out cases in which the parents

differed in more than one allelomorphic pair, and he pointed out that the principles involved were capable of indefinite extension. The inheritance of the various allelomorphic pairs is to be regarded as entirely independent. For example, when two individuals A A and aa are crossed the composition of the F 2 generation must be A A + 2Aa--aa. If we suppose that the two parents differ also in the allelomorphic pair B-b, the composition of the F 2 generation for this pair will be BB + 2Bb + bb. Hence of the zygotes which are homozygous for A A one quarter will carry also BB, one quarter bb, and one half Bb. And similarly for the zygotes which carry A a or aa. The various combinations possible together with the relative frequencies of their occurrence may be gathered from fig. 3. Of the 16 zygotes there are:
— 9 containing A and B 3 containing B but not A

3 „ A but not B 1 „ neither A nor B

In a case of dihybridism the Fi zygote must be heterozygous for

AA BB

AA

Bb

Aa

BB

AA.

Bb

AA

KB

AA

bb

Aa bB

Aa bb

BB

aA Bb

aa BB

aa Bb

aA bB

aA bb

aa. bB

aa bb

Fig. 3.

the two allelomorphic pairs, i.e. must be of the constitution Aa Bb. It is obvious that such a result may be produced in two ways, either by the union of two gametes, Ab and aB, or of two gametes AB and ab. In the former case each parent must be homozygous for one dominant and one recessive character; in the latter case one parent must be homo- zygous for both the dominant and the other for both recessive characters. The results of a cross involving, dihybridism may be complicated in several ways by the reaction upon one another of the unit-characters belonging to the separate allelomorphic pairs, and it will be convenient to consider the various possibilities apart.

1. The simplest case is that in which the two allelomorphic pairs affect entirely distinct characters. In the pea tallness is dominant to dwarfness and yellow seeds are dominant to green. When a yellow tall is crossed with A green dwarf the Fi generation consists entirely of tall yellows. Precisely the same result is obtained by crossing a tall green with a dwarf yellow. In either case all the four characters involved are visible in one or other of the parents. Of every 16 plants produced by the tall yellow Fi, 9 are tall yellows, 3 are tall greens, 3 are dwarf yellows, and 1 is a dwarf green. If we denote the tall and dwarf characters by A and a, and the yellow

WALNUT fig. 4. (SINGLE

The four types of comb referred to in the text are shown here. All the drawings were made from male birds. . In the hens the combs are smaller. All four types of comb are liable to a certain amount of minor variation, and the walnut especially so. The presence of minute bristles on its posterior portion, however, serves at once to distinguish it from any other comb. –

and green seed characters by B and b respectively, then the

constitution of the F 2 generation can be readily gathered from

fig- 3-

2. When the two allelomorphic pairs affect the same structure we may get the phenomenon of novelties appearing in Fi and F 2 . Certain breeds of fowls have a ” rose ” and others a ” pea *’ comb (fig. 4). On crossing the two a ” walnut ” comb results, and the offspring of such walnuts bred together consist of 9 walnuts, 3 roses, 3 peas, and 1 single comb in every 16 birds. This case may be brought into line with the scheme in fig. 3 if we consider the allelomorphic pairs concerned to

be rose (.4) and absence of rose (a), and pea (B) and absence of pea (6). The zygotic constitution of a rose is therefore A Abb, and of a pea aaBB. A zygote containing both rose and pea is a walnut: a zygote containing neither rose nor pea is a single. The peculiar feature of such a case lies in the fact that absence of rose and absence of pea are the same thing, i.e. single; and this is doubtless owing to the fact that the characters rose and pea both affect the same structure, the comb.

3. Cases exist in which the characters due to one allelo- morphic pair can only become manifest in the presence of a particular member of the other pair. If in fig. 3 the characters due to B-b can only manifest themselves in the presence of A, it is obvious that this can happen in twelve cases out of sixteen, but not in the remaining four, which are homozygous for aa. An example of this is to be found in the inheritance of coat colour in rabbits, rats and mice where the allelomorphic pairs concerned are wild grey colour (B) dominant to black (b) and pigmentation (A) dominant to albinism (a). Certain albinos (aaBB) crossed with blacks (A Abb) give only greys (AaBb), and when these are bred together they give 9 greys, 3 blacks and 4 albinos. Of the 4 albinos 3 carry the grey character and 1 does not, but in the absence of the pigmenta- tion factor (A) this is not visible. The ratio 9:3:4 must be regarded as a 9 : 3 : 3 : 1 ratio, in which the last two terms are visibly indistinguishable owing to the impossibility of telling by the eye whether an albino carries the character for grey or not.

4. The appearance of a zygotic character may depend upon the coexistence in the zygote of two unit-characters belonging to different

allelomorphic pairs. If in the scheme shown in fig. 3 the manifestation of a given character depends upon the simultaneous presence of A and B, it is obvious that 9 of the 16 zygotes will present this character, whilst the remaining 7 will be without it. This is shown graphically in fig. 5, where the 9 squares have been shaded and the 7 left plain. The sweet pea offers an example of this phenom- enon. White sweet peas breed true to whiteness, but when certain strains of whites are crossed the offspring are all coloured.. In the next genera- tion (F 2) these Ft plants give rise to 9 coloured and 7 whites in every 16 plants. Colour here is a compound character whose manifestation depends upon the co-existence of two factors in the zygote, and each of the original parents was homozy- gous for one of the two factors necessary to the production of colour. The ratio 9 : 7 is in reality a 9:3:3:1 ratio in which, owing to special conditions,- the zygotes represented by the last three terms are indistinguishable from one another by the eye.

The phenomena of dihybridism, as illustrated by the four examples given above, have been worked out in many other cases for plants and animals. Emphasis must be laid upon the fact that, although the unit-characters belonging to two pairs may react upon one another in the zygote and affect its character, their inheritance is yet entirely independent. Neither grey nor black can appear in the rabbit unless the pigmentation factor is also present; nevertheless, gametic segregation of this pair of characters takes place in the normal way among albino rabbits, though its effects are never visible until a suitable cross is made. In cases of trihybridism the Mendelian ratio for the forms' appearing in F2 is 27 : 9 :.g : 9: 3 : 3 : 3 : 1, i.e. 27 showing dominance of three characters, three groups of 9 each showing dominance of two characters, three groups of 3 each showing dominance of one character, and a single individual out of 64 which is homozygous for all three recessive characters. It is obvious that the system can be indefinitely extended to embrace any number of allelomorphic pairs.

Reversion. — Facts such as those just dealt with in connexion with certain cases of dihybridism throw an entirely new light upon the phenomenon known as reversion on crossing. This is now seen to consist in the meeting of factors which had in some way or other become separated in phylogeny. The albino rabbit when crossed with the black " reverts " to the wild grey colour, because each parent supplies one of the two factors upon which the manifestation of the wild colour depends. So also the wild purple sweet pea may come as a reversion on crossing two whites. In such cases the reversion appears in the Fx generation, because the two factors upon which it depends are the dominants of their respective allelomorphic pairs. Where the

reversion depends upon the simultaneous absence of two characters it cannot appear until the F2 genera- tion. When fowls with rose and pea combs are crossed the reversionary single comb characteristic of the wild Gallus bankiva first appears in the F 2 generation.

Gametic Coupling. — In certain cases the distribution of char- acters in heredity is complicated by the fact that particular unit-characters tend to become associated or coupled together during gametogenesis. In no case have we yet a complete explanation of th'e phenomenon, but in view of the important

Fig. 5.

Fig. 6. bearing which these facts must eventually have on our ideas of the gametogenic process an illustration may be given. The case in which two white sweet peas gave a coloured on crossing has already been described, and it was seen that the production of colour was dependent upon the meeting of two factors, of which one was brought in by each parent. If the allelomorphic pairs be denoted by C-c and R-r, then the zygotic constitution of the two parents must have been CCrr and ccRR respectively. The Fi plant may be either purple or red, two characters which form an allelomorphic pair in which the former is dominant, and which may be denoted by the letters B-b. If B is brought in by one parent only the Fi plant will be heterozygous for all three allelomorphic pairs, and therefore of the constitution CcRr Bb. In the F 2 generation the ratio of coloured to white must be 9 : 7, and of purple to red 3:1; and experiment has shown that this generation is composed on the average of 27 purples, 9 reds and 28 whites out of every 64 plants. The exact composition of such a family may be gathered from the accompanying table (fig. 6). So far the case is perfectly smooth, and it is only on the introduction of another character that the phenomenon of partial coupling is witnessed. Two kinds of pollen grain occur in the sweet pea. In some plants they are oblong in shape, whilst in others they are round, the latter condition being recessive to the former. If the original white parents were homozygous for long and round respectively the Fi purple must be heterozygous, and in the F2 generation, as experiment has shown, the ratio of longs to rounds for the whole family is 3 : 1. But among the purples there are about twelve longs to each round, the excess of longs here being balanced by the reds, where the proportion

is 1 long to about 3-5 rounds. There is partial coupling of long pollen with the purple colour and a complementary coupling of the red colour with round pollen. This result would be brought about if it were supposed that seven out of every eight purple gametes produced by the Fi plant carried the long pollen character, and that seven out of every eight red gametes carried the round pollen character. The facts observed fit in with the supposition that the gametes are pro- duced in series of sixteen, but how such result could be brought about is a question which for the present must remain open.

Spurious Allelomorphism. — Instances of association between characters are known in which the connection is between the dominant member of one pair and the recessive of another. In many sweet peas the standard folds over towards the wings, and the flower is said to be hooded. This ” hooding ” behaves as a recessive towards the erect standard. Red sap colour is also recessive to purple. In families where purples and reds as well as erect and hooded standards occur it has been found, as might be expected, that erect standards are to hooded ones, and that purples are to reds as 3:1. Were the case one of simple dihybridism the F 2 generation should be composed of 9 erect purples, 3 hooded purples, 3 erect reds and 1 hooded red in every 16. Actually it is composed of 8 erect purples, 4 hooded purples and 4 erect reds. The hood will not associate with the red, but occurs only on the purples. Cases like this are best interpreted on the assumption that during gametogenesis there is some form of repulsion between the members of the different pairs — in the present instance between the factor for purple and that for the erect standard — so that all the gametes which contain the purple factor are free from the factor for the erect standard. To the process involved in this assumption the term spurious allelomorphism has been applied.

Sex. — On the existing evidence it is probable that the in- heritance of sex runs upon the same determinate lines as that of other characters. Indeed, there occurs in the sweet pea what may be regarded as an instance of sex inheritance of the simplest kind. Most sweet peas are hermaphrodite, but some are found in which the anthers are sterile and the plants function only as females. This latter condition is recessive to the hermaphrodite one and segregates from it in the ordinary way. Most cases of sex inheritance, however, are complicated, and it is further possible that the phenomena may be of a different order in plants and animals. Instructive in this connexion are certain cases in which one of the characters of an allelomorphic pair may be coupled with a particular sex. The pale lacticolor variety of the currant moth {Abraxas grossulariata) is recessive to, the normal form, and in families produced by heterozygous parents one quarter of

the offspring are of the variety. Though the sexes occur in approximately equal numbers, all the lacticolor ill such families are females; and the association of sex with a character exhibiting normal segregation is strongly suggestive of a similar process obtaining for sex also. ‘ Castle has worked out similar cases in other Lepidoptera and has put forward an hypothesis of sex in- heritance on the basis of the Mendelian segregation of sex determinants. An ovum or spermatozoon can carry either the male or the female character, but it is essential to Castle’s hypothesis that a male spermatozoon should fertilize only a female ovum and vice versa, and consequently on his view all zygotes are heterozygous in respect of sex. Whether any such gametic selection as that postulated by Castle occurs here or elsewhere must for the present remain unanswered. Little evidence exists for it at present, but the possibility of its occurrence should not be ignored.

More recently evidence has been brought forward by Bateson and others (3) which supports the view that the inheritance of sex is on Mendelian lines. The analysis of cases where there is a closer association between a Mendelian character and a particular sex has ‘suggested that femaleness is here dominant to maleness, and that the latter sex is homozygous while the former is heterozygous.

Chromosomes and Unit-Characters. — Breeding experiments have established the conception of definite unit-characters existing in the cells of an organism: in the cell histology has demonstrated the existence of small definite bodies — the chromosomes. During gametogenesis there takes place what many histologists regard as a differentiating division of the chromosomes: at the same period occurs the segregation of the unit-characters. Is there a relation between the postulated unit-character and the visible chromosome, and if so what is this relation? The researches of E. B. Wilson and others have shown that in certain Hemiptera the character of sex is definitely associated with a particular chromosome. The males of Pro- tenor possess thirteen chromosomes, and the qualitative division on gametogenesis results in the production of equal numbers of spermatozoa having six and seven chromosomes. The somatic number of chromosomes in the female is fourteen, and consequently all the mature ova have seven chromosomes. When a spermatozoon with seven chromosomes meets an ovum the resulting zygote has fourteen chromosomes and is a female; when a spermatozoon with six chromosomes meets an ovum the resulting zygote has thirteen chromosomes and is a male. In no other instance has any such definite relation been established, and in many cases at any’ rate it is certain that it could not be a simple one. The gametic number of chromosomes in wheat is eight, whereas the work of R. H. Biffen and others has shown that the number of unit-

characters in this species is considerably greater. If therefore there exists a definite relation between the two it must be supposed that a chromosome can carry more than a single unit-character. It is not impossible that future work on gametic coupling may throw light upon the matter.

Heredity and Variation. — It has long been realized that the problems of heredity and variation are closely interwoven, and that whatever throws light upon the one may be expected to illuminate the other. Recent as has been the rise of the study of genetics, it has, nevertheless, profoundly influenced our views as to the nature of these phenomena. Heredity we now perceive to be a method of analysis, and the facts of heredity constitute a series of reactions which enable us to argue towards the constitution of living matter. And essential to any method of analysis is the recognition of the individuality of the individual. Constitutional differences of a radical nature may be concealed beneath apparent identity of external form. Purple sweet peas from the same pod, indistinguishable in appearance and of identical ancestry, may yet be funda- mentally different in their constitution. From one may come purples, reds and whites, from another only purples and reds, from another purples and whites alone, whilst a fourth will breed true to purple. Any method of investigation which fails to take account of the radical differences in constitution which may underlie external similarity must necessarily be doomed to failure. Conversely, we realize to-day that indivi- duals identical in constitution may yet have an entirely different ancestral history. From the cross between two fowls with rose and pea combs, each of irreproachable pedigree for genera- tions, come single combs in the second generation, and these singles are precisely similar in their behaviour to singles bred from strains of unblemished ancestry. In the ancestry of the one is to be found no single over a long series of years, in the ancestry of the other nothing but singles occurred. The creature • of given constitution may often be built up in many ways, but once formed it will behave like others of the same constitu« tion. The one sure test of the constitution of a living thing lies in the nature of the gametes which it carries, and it is the analysis of these gametes which forms the province of heredity.

The clear cut and definite mode of transmission of characters first revealed by Mendel leads inevitably to the conception of a definite and clear-cut basis for those characters. Upon this structural basis, the unit-character, are grounded certain of the phenomena now termed variation. Varieties exist as such in virtue of differing in one or more unit-characters from

what is conventionally termed the type; and since these unit-characters must from their behaviour in transmission be regarded as discontinuous in their nature, it follows that the variation must be discontinuous also. A present tendency of thought is to regard the discontinuous variation or mutation as the material upon which natural selection works, and to consider that the process of evolution takes place by definite steps. Darwin's opposition to this view rested partly upon the idea that the discontinuous variation or sport would, from the rarity of its occurrence, be unable to maintain itself against the swamping effects of intercrossing with the normal form. Mendel's work has shown that this objection is not valid, and the precision of the mode of inheritance of the discontinuous variation leads us to inquire if the small or fluctuating variation can be shown to have an equally definite physiological basis before it is admitted to play any part in the production of species. Until this has been shown it is possible to consider the discontinuous variation as the unit in all evolutionary change, and to regard the fluctuating variation as the unin- herited effect of environmental accident.

The Human Aspect. — In conclusion we may briefly allude to certain practical aspects of Mendel's discovery. Increased knowledge of heredity means increased power of control over the living thing, and as we come to understand more and more the architecture of the plant or animal we realize what can and what cannot be done towards modification or improvement. The experiments of Biff en on the cereals have demonstrated what .may be done with our present knowledge in establishing new, stable and more profitable varieties of wheat and barley, and it is impossible to doubt that as this knowledge becomes more widely disseminated it will lead to considerable improve- ments in the methods of breeding animals and plants.

It is not, however, in the economic field, important as this may be, that Mendel's discovery is likely to have most meaning for us: rather it is in the new light in which man will come to view himself and his fellow creatures. To-day we are almost entirely ignorant of the unit-characters that go to make the difference between one man and another. A few diseases, such as alcaptonuria and congenital cataract, a digital mal- formation, and probably eye colour, are as yet the only cases in which inheritance has been shown to run upon Mendelian lines. The complexity of the subject must render investigation at once difficult and slow; but the little that we know to-day offers the hope of

a great extension in our knowledge at no very distant time. If this hope is borne out, if it is shown that the qualities of man, his body and his intellect, his im- munities and his diseases, even his very virtues and vices, are dependent upon the ascertainable presence or absence of definite unit-characters whose mode of transmission follows fixed laws, and if also man decides that his life shall be ordered in the light of this knowledge, it is obvious that the social system will have to undergo considerable changes.

Bibliography. — In the following short list are given the titles of papers dealing with experiments directly referred to in this article. References to most of the literature will be found in (n), and a complete list to the date of publication in (3).

(1) W. Bateson, Mendel's Principles of Heredity (Cambridge, 1902), contains translation of Mendel's paper. (2) W. Bateson, An Address on Mendelian Heredity and its Application to Man, " Brain," pt. cxiv. (1906). (3) W. Bateson, Mendel's Principles of Heredity (1909). (4) R. H. Biffen, " Mendel's Laws of In- heritance and Wheat Breedings," Journ. Agr. Soc, vol. i. (1905) (5) W. E. Castle, " The Heredity of Sex," Bull. Mus. Comp. Zool. (Harvard, 1903). (6) L. Cu6not, " L'HeV&iite' de la pigmentation cheˆ les souris," Arch. Zool. Exp. (1903-1904). (7) H. de Vries, Die Mutationstheorie (Leipzig, 1901-1903). (8) L. Doncaster and G. H. Raynor, " Breeding Experiments with Lepidoptera," Proc. Zool. Soc. (London, 1906). (9) C. C. Hurst, " Experimental Studies on Heredity in Rabbits," Journ. Linn. Soc. (1905). (10) G. J. Mendel, Versuche uber Pflanzen-Hybriden, Verh. nalur. f. ver. in Briinn, Bd. IV. (1865). (11) Reports to the Evolution Committee of the Royal Society, vols, i.-iii. (London, 1902-1906, experiments by W. Bateson, E. R. Saunders, R. C. Punnett, C. C. Hurst and others). (12) E. B. Wilson, " Studies in Chromosomes," vols, i.-iii. Journ. Exp. Zool. (1905-1906). (13) T. B. Wood, " Note on the Inheri- tance of Horns and Face Colour in Sheep," Journ. Agr. Soc. vol. i. (loot). (R. C. P.)

MENDELSSOHN, MOSES (1720-1786), Jewish philosopher, was born in Dessau in 1729. His father's name was Mendel, and he was later on surnamed Mendelssohn (= son of Mendel). He was the foremost Jewish figure of the 18th century, and to him is attributable the renaissance of the House of Israel. With this third Moses (the other two being the Biblical lawgiver and Moses Maimonides) a new era opens in the history of the Jewish people. Mendel Dessau was a poor scribe — a writer of scrolls — and his son Moses in his boyhood developed curvature of the spine. His early education was cared for by his father and by the local rabbi, David Frankel. The latter, besides

teaching him the Bible and Talmud, introduced to him the philosophy of Maimonides (q.v.). Frankel received a call to Berlin in 1743. Not many months later a weakly lad knocked at one of the gates of Berlin. He was admitted after an alterca- tion, and found a warm welcome at the hands of his former teacher. His life at this period was a struggle against crushing poverty, but his scholarly ambition was never relaxed. A refugee Pole, Zamosz, taught him mathematics, and a young Jewish physician was his tutor in Latin. He was, however, mainly self-taught. " He learned to spell and to philosophize at the same time " (Graetz). With his scanty earnings he bought a Latin copy of Locke's Essay concerning the Human Understanding, and mastered it with the aid of a Latin dictionary. He then made the acquaintance of Aaron Solomon Gumperz, who taught him the elements of French and English. In 1750 he was appointed by a wealthy silk-merchant, Isaac Bernhard, as teacher to his children. Mendelssohn soon won the confidence of Bernhard, who made the young student successively his book-keeper and his partner.

Gumperz or Hess rendered a conspicuous service to Mendels- sohn and to the cause of enlightenment in 1754 by introducing him to Lessing. Just as the latter afterwards makes Nathan the Wise and Saladin meet over the chess-board, so did Lessing and Mendelssohn actually come together as lovers of the game. The Berlin of the day — the day of Frederick the Great — was in a moral and intellectual ferment. Lessing was the great liberator of the German mind. He had already begun his work of toleration, for he had recently produced a drama {Die Juden, 1749), the motive of which was to prove that a Jew can be possessed of nobility of character. This notion was being generally ridiculed as untrue, when Lessing found in Mendels- sohn the realization of his dream. Within a few months of the same age, the two became brothers in intellectual and artistic cameraderie. Mendelssohn owed his first introduction to the public to Lessing's admiration. The former had written in lucid German an attack on the national neglect of native philosophers (principally Leibnitz.), and lent the manuscript to Lessing. Without consulting the author, Lessing published anonymously Mendelssohn's Philosophical Conversations (Philo- sophische Gesprache) in 1755. In the same year there appeared in Danzig an anonymous satire, Pope a Metaphysician (Pope ein Metaphysiker) , the authorship of which soon transpired. It was the joint work of Lessing and Mendelssohn. From this time Mendelssohn's career was one of ever-increasing brilliance. He became (1756-1759) the leading spirit of Nicolai's important literary undertakings, the Bibliothek and the Literalur- briefe, and ran some risk (which Frederick's good nature obviated) by somewhat freely criticizing the

poems of the king of Prussia. In 1762 he married. His wife was Fromet Gugenheim, who survived him by twenty-six years. In the. year following his marriage Mendelssohn won the prize offered by the Berlin Academy for an essay on the application of mathe- matical proofs to metaphysics, although among the competitors were Abbt and Kant. In October 1763 the king granted Mendelssohn the privilege of Protected Jew (Schutz-Jude) — which assured his right to undisturbed residence in Berlin.

As a result of his correspondence with Abbt, Mendelssohn resolved to write on the Immortality of the Soul. Materialistic views were at the time rampant and fashionable, and faith in immortality was at a low ebb. At this favourable juncture appeared the PhOdon (1767). Modelled on Plato's dialogue

of the same" name, Mendelssohn's work possessed some of the charm of its Greek exemplar. What most impressed the German world was its beauty and lucidity of style — features to which Mendelssohn still owes his popularity as a writer. The Phadon was an immediate success, and besides being often reprinted in German was speedily translated into nearly all the European languages, including English. The author was hailed as the " German Plato," or the " German Socrates "; royal and other aristocratic friends showered attentions on him, and it is no exaggeration to assert with Kayserling that " no stranger who came to Berlin failed to pay his personal respects to the German Socrates."

So far, Mendelssohn had devoted his talents to philosophy and criticism; now, however, an incident turned the current, of his life in the direction of the cause of Judaism. Lavater was one of the most ardent admirers of Mendelssohn. He described him as " a companionable, brilliant soul, with piercing eyes, the body of an Aesop — a man of keen insight, exquisite taste and wide erudition . . . frank and open-hearted." Lavater was fired with the ambition to convert his friend to Christianity. In the preface to a German translation of Bonnet's essay on Christian Evidences, Lavater publicly challenged Mendelssohn to refute Bonnet or if he could not then to " do what wisdom, the love of truth and honesty must bid him, what a Socrates would have done if he had read the book and found it unanswer- able." This appeal produced a painful impression. Bonnet resented Lavater's action, but Mendelssohn was bound to reply,

though opposed to religious controversy. As he put it: ” Suppose there were living among my contemporaries a Confucius or a Solon, I could, according to the principles of my faith, love and admire the great man without fall- ing into the ridiculous idea that I must convert a Solon or a Confucius.”

Here we see the germs of Mendelssohn’s Pragmatism, to use the now current term. He shared this with Lessing; in this case, at all events, it is probable that the latter was indebted to Mendelssohn. But before discussing this matter, we must follow out the consequences of Lavater’s intrusion into Mendels- sohn’s affairs. The latter resolved to devote the rest of his life to the emancipation of the Jews. Among them secular studies had been neglected, and Mendelssohn saw that he could best remedy the defect by attacking it on the religious side. A great chapter in the history of culture is filled by the influence of translations of the Bible. Mendelssohn added a new section to this chapter by his German translation of the Pentateuch and other parts of the Bible. This work (1783) constituted Mendelssohn the Luther of the German Jews. From it, the Jews learned the German language; from it they imbibed culture; with it there was born a new desire for German nationality; as a result of its popularity was inaugurated a new system of Jewish education. Some of the conservatives among the Jews opposed these innovations, but the current of progress was too strong for them. Mendelssohn was the first great champion of Jewish emancipation in the 18th century. He it was who induced C. W. Dohm to publish in 1781 his epoch-making work, On the Civil Amelioration of the Condition of the Jews, a memorial which played a great part in the triumph of tolerance. Mendelssohn himself published a German translation of the Vindiciae judaeorwn by Menasseh ben Israel. The excitement caused by these proceedings led Mendelssohn to publish his most important contribution to the problems connected with the position of Judaism in relation to the general life.

This work was the Jerusalem (1783; Eng. trans. 1838 and 1852). It is a forcible plea for freedom of conscience. Kant described it as ” an irrefutable book.” Its basic idea is that the state had no right to interfere with the religion of its citizens. As Kant put it, this was ” the proclamation of a great reform, which, however, will be slow in manifestation and in progress, and which will affect not only your people but others as well.” Mendelssohn asserted the pragmatic principle of the possible plurality of truths: that just as various nations need different constitutions — to one a monarchy, to

another a republic, may be the most congenial to the national genius — so individuals may need different religions. The test of religion is

its effect on conduct. This is the moral of Lessing's Nathan the Wise, the hero of which is undoubtedly Mendelssohn. The parable of the three rings is the epitome of the pragmatic position. One direct result of this pragmatism was unexpected. Having been taught that there is no absolutely true religion, Mendelssohn's own descendants — a brilliant circle, of which the musician Felix was the most noted — left the Synagogue for the Church. But despite this, Mendelssohn's theory was found to be a strengthening bond in Judaism. For he maintained that Judaism was less a " divine need, than a revealed life." In the first part of the 19th century, the criticism of Jewish dogmas and traditions was associated with a firm adhesion to the older Jewish mode of living. Reason was applied to beliefs, the historic consciousness to life. Modern reform in Judaism is parting to some extent from this conception, but it still holds good even among the liberals.

Of Mendelssohn's remaining years it must suffice to say that he progressed in fame numbering among his friends more and more of the greatest men of the age. His Morgenstunden appeared in 1785, and he died as the result of a cold contracted while carrying to his publishers in 1786 the manuscript of a vindication of his friend Lessing, who had predeceased him by five years.

Mendelssohn had six children. His sons were: Joseph (founder of the Mendelssohn banking house, and a friend and benefactor of Alexander Humboldt), whose son Alexander (d. 1871) was the last Jewish descendant of the philosopher; Abraham (who married Leah Bartholdy and was the father of Fanny Hensel and J. L. Felix Mendelssohn-Bartholdy) ; and Nathan (a mechan- ical engineer of considerable repute). His daughters were Dorothea, Recha and Henriette, all brilliantly gifted women.

Bibliography. — An edition of Mendelssohn's works was published in 1843-1845, with a biography by his son Joseph; another edition of his Schnften zur Philosophic Aesthetik und Apologetik, appeared (ed. Brasch) in 2 vols, in 1880. For Mendelssohn's biography the chief sources are Graetz, History of the Jews, vol. v., and Kayser- ling's M. Mendelssohn's Leben und Wirken (1887). Much interesting material on the Mendelssohn family is given in Hensel's Die> Familie Mendelssohn (translated into English, 1881). Much general comment on Moses Mendelssohn appeared in the press of the world on occasion of the centenary of the birth of the composer Mendels- sohn in 1909. (I. A.)

MENDELSSOHN-BARTHOLDY, JAKOB LUDWIG FELIX

(1800-1847), German composer, grandson of Moses Mendelssohn (q.v.), was born in Hamburg on the 3rd of February 1809. In consequence of the troubles caused by the French occupation of Hamburg, Abraham Mendelssohn, his father, migrated in 181 1 to Berlin, where his grandmother Fromet, then in the twenty-fifth year of her widowhood, received the whole family into her house, No. 7 Neue Promenade. Here Felix and his sister Fanny received their first instruction in music from their mother, under whose care they progressed so rapidly that their exceptional talent soon became apparent. Their next teacher was Madame Bigot, who, during the temporary residence of the family in Paris in 181 6, gave them valuable instruction. On their return to Berlin they took lessons in thoroughbass and composition from Zelter, in pianoforte-playing from Ludwig Berger, and in violin-playing from Henning — the care of their general education being entrusted to the father of the novelist Paul Heyse.

Felix first played in public on the 24th of October 1818, taking the pianoforte part in a trio by Woelfl. On the nth" of April 1 81 9 he entered the Berlin Singakademie as an alto, and in the following year began to compose with extraordinary rapidity. His earliest dated work is a cantata, In rUhrend feierlichen Tbnen, completed on the 13th of January 1820. During that year alone he produced nearly sixty movements, including songs, pianoforte sonatas, a trio for pianoforte, violin and violoncello, a sonata for violin and pianoforte, pieces for the organ, and even a little dramatic piece in three scenes. In 1821 he wrote five symphonies for stringed instru- ments, each in three movements; motets for four voices, an

opera, in one act, called Soldatenliebschajt; another, called Die beiden Piidagogen; part of a third, called Die wandernden Comodi- anten; and an immense quantity of other music of different kinds, all showing the precocity of his genius. The original autograph copies of these early productions are preserved in the Berlin Library, where they form part of a collection which fills forty-four large volumes, all written with infinite neatness, and for the most part carefully dated — a sufficient proof that the methodical habits which distinguished his later life were formed in early childhood.

In 1 82 1 Mendelssohn paid his first visit to Goethe, with whom he spent sixteen days at Weimar, in company with Zelter. From this year

also dates his first acquaintance with Weber, who was then in Berlin superintending the production of Der Freischiitz; and from the summer of 1822 his introduction, at Cassel, to another of the greatest of his contemporaries, Ludwig Spohr. During this year his pen was even more prolific, producing, among other works, an opera, in three acts, entitled Die beiden Nejjen, oder der Onkel aus Boston, and a pianoforte concerto, which he played in public at a concert given by Frau Anna Milder.

It had long been a custom with the Mendelssohn family to give musical performances on alternate Sunday mornings in their dining-room, with a small orchestra, which Felix always conducted, even when he was not tall enough to be seen without standing upon a stool. For each of these occasions he produced some new work — playing the pianoforte pieces himself, or entrusting them to Fanny, while his sister Rebecka sang, and his brother Paul played the violoncello. In this way Die beiden Neffen was first privately performed, on-the fifteenth anniversary of his birthday, the 3rd of February 1824. Between the 3rd and the 31st of March in this year he composed his fine sym- phony in C minor, now known as Op. 10, and soon afterwards the quartet in B minor, Op. 3, and the (posthumous) pianoforte sestet, Op. no. In this year also began his lifelong friendship with Moscheles, who, when asked to receive him as a pupil, said, “If he wishes to take a hint from me, as to anything new to him, he can easily do so; but he stands in no need of lessons.”

In 1825 Abraham Mendelssohn took Felix to Paris, where among other musicians then resident in the French capital he met the two most popular dramatic composers of the age, Rossini and Meyerbeer, and lived on terms of intimacy with Hummel, Kalkbrenner, Rode, Baillot, Herz, and many other artists of European celebrity. On this occasion also he made his first acquaintance with Cherubini, who, though he rarely praised any one, expressed a high opinion of his talent, and recommended him to write a Kyrie, for five voices, with full orchestral accompaniments, which he himself described as ” exceeding in thickness ” anything he had attempted. From letters written at this period we learn that Felix’s estimate of the French school of music was far from flattering; but he formed some friendships in Paris, which were renewed on later occasions. He returned to Berlin with his father in May 1825, taking leave of his Parisian friends on the 19th of the month, and interrupting his journey at Weimar for the purpose of paying a second visit to Goethe, to whom he dedicated his quartet in B minor. On reaching home he must have worked with greater zeal than ever; for on the 10th of August in this same year he completed an opera, in two acts, called Die Hochzeit des Camacho, a work of

considerable importance.

No ordinary boy could have escaped uninjured from the snares attendant upon, such a life as that which Mendelssohn now lived. Notwithstanding his overwhelming passion for music, his general education had been so well cared for that he was able to hold his own, in the society of his seniors, with the grace of an accomplished man of the world. He was already recognized as a leading spirit by the artists with whom he asso- ciated, and these artists were men of acknowledged talent and position. The temptations to egoism by which he was surrounded would have rendered most clever students intoler- able. But the natural amiability of his disposition, and the

healthy influence of his happy home-life, counteracted aH tendencies towards self-assertion.

Soon after his return from Paris, Abraham Mendelssohn removed from his mother's residence to No. 3 Leipziger Strasse, a roomy, old-fashioned house, containing an excellent music- room, and in the grounds adjoining a " Gartenhaus " capable of accommodating several hundred persons at the Sunday performances. 1 In the autumn of the following year this " garden-house " witnessed a memorable private performance of the work by means of which the greatness of Mendelssohn's genius was first revealed to the outer world — the overture to Shakespeare's Midsummer Night's Dream. The finished score of this famous composition is dated " Berlin, August 6, 1826 " — its author was only seventeen and a half years old. Yet in no later work does he exhibit more originality of thought, more freshness of conception, or more perfect mastery over the details of technical construction, than in this delightful inspiration. The overture was first publicly performed at Stettin, in February 1827, under the direction of the young composer, who was at once accepted as the leader of a new and highly characteristic manifestation of the spirit of progress. Henceforth we must speak of him, not as a student, but as a mature and experienced artist.

Meanwhile Camacho' s Wedding had been submitted to Spontini, with a view to its production at the opera. The libretto, founded upon an episode in the history of Don Quixote, was written by Klingemann, and Mendelssohn threw himself into the spirit of the romance with a keen perception of its peculiar humour. The work was put into rehearsal soon after the com- poser's return from Stettin, produced on the 29th of April 1827, and received with great apparent enthusiasm; but a cabal was formed against it, and it never reached a second performance. The critics abused it mercilessly; yet it exhibits merits of

a very high order. The solemn passage for the trom- bones, which heralds the first appearance of the knight of La Mancha, is conceived in a spirit of reverent appreciation of the idea of Cervantes, which would have done honour to a composer of lifelong experience.

Mendelssohn was annoyed at this injustice, and some time elapsed before his mind recovered its usual bright tone; but he continued to work diligently. Among other serious undertakings, he formed a choir for the study of the choral works of Sebastian Bach, then unknown to the public; and, in spite of Zelter's opposition, he succeeded, in 1829, in inducing the Berlin Singakademie to give a public performance of the Passion according to St Matthew, under his direction, with a chorus of between three and four hundred voices. The scheme succeeded beyond his warmest hopes, and proved the means of restoring to the world great compositions which had never been heard since the death of Bach. But the obstructive party were offended; and at this period Mendelssohn was far from popular among the musicians of Berlin.

In April 1829 Mendelssohn paid his first visit to London. His reception was enthusiastic. He made his first appearance before an English audience at one of the Philharmonic Society's concerts — then held in the Argyll Rooms — on the 25th of May, conducting his symphony in C minor from the pianoforte, to which he was led by John Cramer. On the 30th he played Weber's Concertstiick, from memory, a proceeding at that time extremely unusual. At a concert given by Drouet, on the 24th of June, he played Beethoven's pianoforte concerto in E flat, which had never before been heard in the country;*- and the overture to A Midsummer Night's Dream was also, for the first time, presented to a London audience. On returning home from the concert, Attwood, then organist of St Paul's Cathedral, left the score of the overture in a hackney coach, whereupon Mendelssohn wrote out another, from memory, without an error. At another concert he played, with Moscheles, his still unpublished concerto in E, for two pianofortes and

1 After Mendelssohn's death this house was sold to the Prussian government; and the " Herrenhaus " now stands on the site of the garden-house.

orchestra. After the close of the London season he started with Klingemann on a tour through Scotland, where he was inspired with

the first idea of his overture to The Isles of Fingal, returning to Berlin at the end of November. Except for an accident to his knee, which lamed him for some time, his visit was highly successful and laid the foundation of many friendships and prosperous negotiations.

The visit to England formed the first division of a great scheme of travel which his father wished him to extend to all the most important art centres in Europe. After refusing the offer of a professorship at Berlin, he started again, in May 1830, for Italy, pausing on his way at Weimar, where he spent a fortnight with Goethe, and reaching Rome, after many pleasant interruptions, on the 1st of November. No excitement prevented him from devoting a certain time every day to composition; but he lost no opportunity of studying either the countless treasures which form the chief glory of the great city or the manners and customs of modern Romans. He attended, with insatiable curiosity, the services in the Sistine Chapel; and his keen power of observation enabled him to throw much interesting light upon them. His letters on this subject, however, lose much of their value through his incapacity to comprehend the close relation existing between the music of Palestrina and his contemporaries and the ritual of the Roman Church. His Lutheran education kept him in ignorance even of the first principles of ordinary chanting; and it is amusing to find him describing as enormities peculiar to the papal choir customs familiar to every village singer in England, and as closely connected with the structure of the ” Anglican chant ” as with that of ” Gregorian music.” Still, though he could not agree in all points with Baini, the greatest ecclesiastical musician then living, he shared his admiration for the Improperia, the Miserere, and the cantus planus of the Lamentationes and the Exullet, the musical beauty of which he could understand, apart from their ritual significance.

In passing through Munich on his return in October 1831 he composed and played his pianoforte concerto in G minor, and accepted a commission (never fulfilled) to compose an opera for the Munich theatre. Pausing for a time at Stuttgart, Frankfort and Dusseldorf he arrived in Paris in December, and passed four pleasant months in the renewal of acquaintances formed in 1825, and in close intercourse with Liszt and Chopin. On the 19th of February 1832 the overture to A Midsummer Night’s Dream was played at the conservatoire, and many of his other compositions were brought before the public; but he did not escape disappointments with regard to some of them, especially the Reformation symphony, and the visit was brought to a premature close in March by an attack of cholera, from which, however, he rapidly recovered.

On the 23rd of April 1832 he was again in London, where he twice played his G minor concerto at the Philharmonic concerts, gave a performance on the organ at St Paul's, and published his first book of Lieder ohne Worte. He returned to Berlin in July, and during the winter he gave public perform- ances of his Reformation symphony, his concerto in G minor, and his Walpurgisnacht. In the following spring he paid a third visit to London for the purpose of conducting his Italian symphony, which was played for the first time, by the Phil- harmonic Society, on the 13th of May 1833. On the 26th of the same month he conducted the performances at the Lower Rhine festival at Dusseldorf with such brilliant effect that he was at once offered, and accepted, the appointment of general- music-director to the town, an office which included the manage- ment of the music in the principal churches, at the theatre, and at the rooms of two musical associations.

Before entering upon his new duties, Mendelssohn paid a fourth visit to London, with his father, returning to Dusseldorf on the 27th of September 1833. His influence produced an excellent effect upon the church music and in the concert-room ; but his relations with the management of the theatre were not altogether pleasant; and it was probably this circumstance which first led him to forsake the cultivation of the opera for

that of sacred music. At Dusseldorf he first designed his famous oratorio St Paul, in response to an application from the Cacilien- Verein at Frankfort, composed his overture to Die schbne Melusine, and planned some other works of impor- tance. He liked his appointment, and would probably have retained it much longer had he not been invited to undertake the permanent direction of the Gewandhaus concerts at Leipzig, and thus raised to the highest position attainable in the German musical world. To this new sphere of labour he removed in August 1835, opening the first concert at the Gewandhaus, on the 4th of October, with his overture Die Meeresstille, a work possessing great attractions, though by no means on a level with the Midsummer Night's Dream, The Isles of Fingal, or Melusine.

Mendelssohn's reception in Leipzig was most enthusiastic; and under their new director the Gewandhaus concerts prospered exceedingly. Meanwhile- St Paul steadily progressed, and was first produced, with triumphant success, at the Lower Rhine festival at DUsseldorf, on the 22nd of May 1836. On the 3rd of October it was first sung in English, at Liverpool, under the direction of Sir George Smart; and on the 16th of March 1837 Mendelssohn again directed it at Leipzig.

The next great event in Mendelssohn's life was his happy marriage, on the 28th of March 1837, to Cecile Charlotte Sophie Jeanrenaud. The honeymoon was scarcely over before he was again summoned to England to conduct St Paul, at the Birming- ham festival, on the 20th of September. During this visit he played on the organ at St Paul's and at Christ Church, Newgate Street, with an effect which exercised a lasting influ- ence upon English organists. It was here also that he first contemplated the production of his second oratorio, Elijah.

Passing over the composition of the Lobgesang in 1840, a sixth visit to England in the same year, and his inauguration of a scheme for the erection of a monument to Sebastian Bach, we find Mendelssohn in 1841 recalled to Berlin by the king of Prussia, with the title of Kapellmeister. Though his appoint- ment resulted in the production of Antigone, Oedipus Coloneus, Athalie, the incidental music to the Midsummer Night's Dream, and other great works, it proved an endless source of vexation, and certainly helped to shorten the composer's life. In 1842 he came to England for the seventh time, accompanied by his wife, conducted his Scotch symphony at the Philharmonic, again played the organ at St Peter's, Cornhill, and Christ Church, Newgate Street, and was received with honour by the queen and the prince consort. He did not, however, permit his new engagements to interfere with the direction of the Gewandhaus concerts; and in 1843 he founded in Leipzig the great conservatoire which soon became the best musical college in Europe, opening it on the 3rd of April in the buildings of the Gewandhaus. In 1844 he conducted six of the Phil- harmonic concerts in London, producing his new Midsummer Night's Dream music, and playing Beethoven's pianoforte concerto in G with extraordinary effect. He returned to his duties at Berlin in September, but succeeded in persuading the king to free him from his most. onerous engagements.

After a brief residence in Franfort, Mendelssohn returned to Leipzig in September 1845, resuming his old duties at the Gewandhaus, and teaching regularly in the conservatoire. Here he remained, with little interruption, during the winter — introducing his friend Jenny Lind, then at the height of her popularity, to the critical frequenters of the Gewandhaus, and steadily working at Elijah, the first performance of wKwh he conducted at the Birmingham festival, on the 2 6th of August 1846. The reception of this great work was enthusiastic. Unhappily, the excitement attendant upon its production, added to the irritating effect of the worries at Berlin, made a serious inroad upon the composer's health. On his return to Leipzig he worked on as usual, but it was clear that his health was seriously impaired. In 1847 he visited England for the tenth and last time, to conduct four

performances of Elijah at Exeter Hall, on the 16th, 23rd, 28th and 30th of April, one at Manchester on the 20th, and one at Birmingham on the 27th.

But the exertion was beyond his strength. He witnessed Jenny Lind's first appearance at Her Majesty's Theatre, on the 4th of May, and left England on the oth, little anticipating the trial that awaited him in the tidings of the sudden death of his sister Fanny, which reached him only a few days after his arrival in Frankfort. The loss of his mother in 1842 had shaken him much, but the suddenness with which this last intelligence was communicated broke him down. He fell to the ground insensible, and never fully recovered. In June he was so far himself again that he was able to travel, with his family, by short stages, to Interlaken, where he stayed for some time, illustrating the journey by a series of water-colour drawings, but making no attempt at composition for many weeks. He returned to Leipzig in September, bringing with him fragments of Christus, Loreley, and some other unfinished works, taking no part in the concerts, and living in privacy. On the oth of October he called on Madame Frege, and asked her to sing his latest set of songs. She left the room for lights, and on her return found him in violent pain and almost insen- sible. He lingered for four weeks, and on the 4th of November he passed away, in the presence of his wife, his brother, and his three friends, Moscheles, Schleinitz, and Ferdinand David. A cross marks the site of his grave, in the Alte Dreifaltigkeits Kirchhof , at Berlin.

Mendelssohn's title to a place among the great composers of the century is incontestable. His style, though differing little in technical arrangement from that of his classical pre- decessors, is characterized by a vein of melody peculiarly his own, and easily distinguishable by those who have studied his works, not only from the genuine effusions of contemporary writers, but from the most successful of the servile imitations with which, even during his lifetime, the music-shops were deluged. In less judicious hands the rigid symmetry of his phrasing might, perhaps, have palled upon the ear; but under his skilful management it serves only to impart an additional charm to thoughts which derive their chief beauty from the evident spontaneity of their conception. In this, as in all other matters of a purely technical character, he regarded the accepted laws of art as the medium by which he might most certainly attain the ends dictated by the inspiration of his genius. Though caring nothing for rules, except as

means for producing a good effect, he scarcely ever violated them, and was never weary of impressing their value upon the minds of his pupils. His method of counterpoint was modelled in close accordance with that practised by Sebastian Bach. This he used in combination with an elastic development of the sonata-form, similar to that engrafted by Beethoven upon the lines laid down by Haydn. The principles involved in this arrangement were strictly conservative; yet they enabled him, at the very outset of his career, to invent a new style no less original than that of Schubert or Weber, and -no less remarkable as the embodiment of canons already consecrated by classical authority than as a special manifestation of individual genius. It is thus that Mendelssohn stands before us as at the same time a champion of conservatism and an apostle of progress; and it is chiefly by virtue of these two apparently incongruous though really compatible phases of his artistic character that his influence and example availed, for so many years, to hold in check the violence of reactionary opinion which injudicious partisanship afterwards fanned into revolutionary fury.

Concerning Mendelssohn's private character there have never been two opinions. As a man of the world he was more than ordinarily accomplished — brilliant in conversation, and in his lighter moments overflowing with sparkling humour and ready pleasantry, loyal and unselfish in the more serious business of life, and never weary of working for the general good. As a friend he was unvaryingly kind, sympathetic and true. His earnestness as a Christian needs no stronger testimony than that afforded by his own delineation of the character of St Paul; but it is not too much to say that his heart and life were pure as those of a little child. (W. S. R.)

This article has the unique value of being the record of an eminent musical scholar who was an actual pupil of Mendelssohn. No change of reputation can alter the value of such a record of a man whom even his contemporaries knew to be greater than his works. Mendelssohn's aristocratic horror of self-advertisement unfitted him for triumph in a period of revolution; he died, most inopportunely, when his own powers, like Handel's at the same age, were being wasted on pseudo-classical forms; the new art was not yet ripe ; and in the early Wagner-Liszt reign of terror his was the first reputation to be assassinated. That of the too modest and gentle " Romantic " pioneer Schumann soon followed; but, as being more difficult to explain away, and more embarrassing to irreverence and conceit, it remains a subject of controversy. Meanwhile Mendelssohn's reputation, except as the composer of a few inexplicably beautiful and original orchestral pieces, has vanished and been replaced by a pure fiction known as the

” Mendelssohn tradition ” of orchestral conducting. This fiction is traceable to some characteristic remarks made by Wagner on his experiences of English orchestral playing, remarks which, though not very good-natured, do not bear the full construction popularly imputed to them. If Beethoven had come and conducted in England, Mendelssohn’s expostulations with careless players would have been met by references to the ” Beet- hoven tradition ” ; and, if Wagner had shared Mendelssohn’s reluctance to putting on record remarks likely to wound individual, professional and national sensibilities, it might not have been im- possible that reproaches against slipshod and mechanical playing might nowadays be met by references to the ” Wagner tradition, ‘ for Wagner also found himself compelled to concentrate his care on the main items in the overloaded English orchestral programmes, to the detriment of the rest.

Mendelssohn’s influence on the early career of Joachim is, next to his work in the rediscovery of Bach, his greatest bequest to later musical history. Those many profound and sincere admirers to Joachim to whom the name of Mendelssohn calls up only the Widow in Elijah and the weaker Songs without Words, may find the idea strange; but there is no doubt that Joachim regarded the continuation of a true Mendelssohn tradition as identical with his own efforts to ” uphold the dignity of art.” (D. F. T.)

MENDES, CATULLE (1 841-1909), French poet and man of letters, of Jewish extraction, was born at Bordeaux on the 22nd of May 1 84 1. He early established himself in Paris, attaining speedy notoriety by the publication in the Revue fanlaisiste (1861) of his ” Roman d’une nuit,” for which he was condemned to a month’s imprisonment and a fine of 500 francs. He was allied with the Parnassians from the beginning of the movement, and displayed extraordinary metrical skill in his first volume of poems, Philomila (1863). In later volumes — Poesies, /** sirie (1876), which includes much of his earlier verse, ” Soirs moroses,” Conies ipiqUes, Philomela, &c; Poesies (7 vols., 1885), a new edition largely augmented; Les Poesies de Catulle Mendbs (3 vols., 1892); La Grive des vignes (1895), &c. — his critics have noted that the elegant verse is distinguished rather by dexterous imitation of different writers than by any marked originality. The versatility and fecundity of Mendes’s talent is shown in a series of his critical and dramatic writings, and of novels and short stories, in the latter of which he continues the French tradition of the licentious conte. For the theatre he wrote: La Part du roi (1872), a one-act verse comedy; Les Freres d’armes (1873), drama; Justice (1877), in three acts, characterized by a hostile critic as a hymn in praise of suicide; the libretto of a light opera, Le Capitaine Fracasse (1878), founded on

Theo- phile Gautier's novel; La Femmede Tabarin (1887) ; MH&e (1898), in three acts and in verse; La Reine Fiammette (1898), a conte dramatique in six acts and in verse, the scene of which is laid in the Italy of the Renaissance; Le Fils de I'etoile (1904), the hero of which is Bar-Cochebas,' the Syrian pseudo-Messiah, for the music of C. Erlanger; Scarron (1905); Ariane (1906), for the music of Massenet; and Glatigny (1906). His critical work includes: Richard Wagner (1886); L 'Art au theatre (3 vols.";* 1896-1900), a series of dramatic criticisms reprinted from newspapers; and a report addressed to the minister of public instruction and of the fine arts on Le Mouvement poetique franiais de 1867 a iqoo (newed., 1903), which includes a biblio- graphical and critical dictionary of the French poets of the 19th century. Perhaps the most famous of his novels are: Le Roi vierge (1880) in which he introduces Louis II. of Bavaria and Richard Wagner; La Maison de la vielle (1894), and Gog (1897). He married in 1866 Mile Judith Gautier, younger daughter of the poet, from whom he was subsequently separated.

On the 9th of February 1909, early in the morning, his dead body was discovered in the railway tunnel of Saint Germain. He had left Paris by the midnight train on the 7th, and it is supposed that, thinking he had arrived at the station, he had opened the door of his compartment while still in the tunnel.

MENDICANCY (from Lat. mendicus, in a condition of beggary, a word of unknown origin) , a state or condition of being a beggar, the practice of obtaining a livelihood by asking alms. The word " mendicant," also found in the French form " mendiant," appears to have come into use through the begging friars.

MENDICANT MOVEMENT AND ORDERS. The facts con- cerning the rise of the Orders of Mendicant Friars are related in the articles on the several orders (Franciscans, Dominicans, Carmelites, Augustinian Hermits), and in that on Monasti- cism (§ n), where the difference between friars and monks is explained. The purpose of this article is to characterize the movement as a whole, and to indicate the circumstances that produced it. The most striking phenomenon in connexion with the beginnings of the mendicant orders is the rapidity with which the movement spread. Within a generation of the death of the two great founders, Dominic (1221) and Francis (1226), their institutes had spread all over Europe and into Asia, and their friars

could be numbered by tens of thousands. In all the great cities of Western Europe friaries were established, and in the universities theological chairs were held by Dominicans and Franciscans. And when at the middle of the century the other great mendicant orders of Carmelites and Austin Friars, and also Servites (q.v.) arose their propagation showed that the possibilities of the mendicant movement had not been exhausted by the Dominicans and Franciscans. Lesser mendicant orders sprang up in all directions — Gasquet mentions half a dozen such that found their way into England (English Monastic Life, p. 241) — in such numbers that the Council .of Lyons in 1274 found it necessary to suppress all except the orders already named. Moreover, besides the various orders of friars, there were the lay Tertiaries that arose and spread far and wide in connexion with the Franciscans and other mendicants, and the similar institute of the Humiliati (see Tertiaries). These facts clearly show that the Mendicant Movement re- sponded to widely spread and deeply felt needs of the time. These needs found expression not only in the Mendicant orders within the Church, but also in a number of more or less heretical and revolutionary religious sects. There was this in common among the Cathari, Waldenses, Albigenses and other heretical bodies that overran so many parts of Western Europe in the second half of the 12th century and the beginning of the 13th, that they all inveighed against the wealth of the clergy, and preached the practice of austere poverty and a return to the simple life of Christ and the Apostles. Thus the sectaries no less than the Mendicant orders bear witness to the existence of spiritual needs in Western Christendom, which the Mendicant orders went a long way towards satisfying. Probably the most crying need was that of priests to minister to the great city populations, at that time growing up with such rapidity, especially in Italy. During the 10th, nth and 12th centuries the Church had been organized on the lines of the prevailing feudal system — the bishops and abbots were feudal barons, and the effects of the system were felt throughout the ranks of the lower clergy. The social fabric was built up not on the towns, but on the great landlords; and when the centre of gravity began to move, first of all in Italy, to the towns, and crowded populations began to be massed together in them, the parochial systems broke down under the weight of the new conditions, and the people were in a state of spiritual and moral no less than physical destitution. So, when the friars came and established themselves in the poorest localities of the towns, and brought religion to the destitute and the outcasts of society, assimilat- ing themselves to the conditions of life of those among whom they worked, they supplied a need with which the parochial clergy were unable to cope.

The friars responded not only to the new needs of the age,

but to its new ideas — religious, intellectual, social, artistic.

It was a period of religious revival, and of reaction against abuses that followed in the wake of the feudal system; and this religious movement was informed by a new mysticism— a mysticism that fixed its attention mainly on the humanity of Christ and found its practical expression in the imitation of His life. A new intellectual wave was breaking over Western Europe, symbolized by the university and the scholastic movements; and a new spirit of democratic freedom was making itself felt in the growing commercial towns of Italy and Germany. There is no need to labour the point that the Mendicants responded to all these needs and interpreted them within the pale of Catholic Christianity, for the fact lies upon the surface of history. But a few words are necessary on the central idea from which the Mendicants received their name — the idea of poverty. This was St Francis's root idea, and there is no doubt — though it has been disputed — that it was borrowed from him by St Dominic and the other Mendicant founders. St Francis did not intend that begging and alms should be the normal means of sustenance for his friars; on the contrary, he intended them to live by the work of their hands, and only to have recourse to begging when they could not earn their livelihood by work. But as the friars soon came nearly all to be priests devoted to spiritual ministrations, and the communities grew larger, it became increasingly difficult for them to support themselves by personal work; and so the begging came to play a greater r61e than had been contemplated by St Francis. But his idea certainly was that his friars should not only practise the utmost personal poverty and simplicity in their life, but that they should have the minimum of possessions — no lands, no funded property, no fixed sources of income. The maintaining of this ideal has proved unworkable in practice. In the Dominican Order and the others that started as mendicant it has been mitigated or even abrogated. Among the Franciscans them- selves it has been the occasion of endless strife, and has been kept alive only by dint of successive reforms and fresh starts, each successful for a time, but doomed always, sooner or later, to yield to the inexorable logic of facts. The Capuchins (q.v.) have made the most permanently successful effort to maintain St Francis's ideal; but even among them mitigations have had to be admitted. In spite, however, of all mitigations the Franciscans have nearly always presented to the world an object lesson in evangelical poverty by the poorness and simplicity of their lives and surroundings.

On the subject-matter of this article the best thing in English is the

Introductory Essay by the Capuchin Fr. Cuthbert on ” The Spirit and Genius of the Franciscan Friars,” in The Friars and how (key came to England (1903) ; see also the earlier chapters of Emil Gebhard’s Italie mystique (1899). (E. C. B:)

MENDIP HILLS, a range in the north of Somersetshire, England. Using the name in its widest application, the eastern boundary of the range may be taken to be formed, by the upper valleys of the rivers Frome and Brue, and the depres- sion between them. The range extends from these north- westward with a major axis of about 23 m., while the outliers of Wavering Down and Bleadon Hill continue it towards the shore of the Bristol Channel. The range is generally about 6 m. in width, and its total area about 130 sq. m. Its south- western face descends to the low ” moors ” or marshes drained by the Axe and other streams, the small towns of Axbridge, Cheddar and Wells lying at the foot of the hills. Towards the north-east its limits are less clearly defined, for high ground, intersected by narrow vales, extends as far as the valley of the “* Avon. A depression, followed by the road between Radstock and Wells, strikes across the range about its centre; the principal elevations lie west of this, and to the area thus defined the name of the Mendips is sometimes restricted. The summit of the hills is a gently swelling plateau, which reaches its extreme height in the north — 1068 ft. The Mendips consist principally of Carboniferous Limestone. Fine cliffs and scars occur on the flanks of the plateau, as in the gorge of Cheddar, and there is a wonderful series of caverns, the result of water action. The surface of the plateau is often broken by deep holes

(” swallets “) into which streams flow. Some of the caves, such as those at Cheddar, are easy of access, and attract many visitors owing to the beauty of the stalactitic formations; others, of greater extent and grandeur, have only been explored, or partly explored, with great difficulty. Some caves have yielded large quantities of animal remains (hyaenas, bears and others) together with traces of prehistoric human occupation. Among such Wookey Hole, where the river Axe issues from the foot of a cliff, may be mentioned. Lead was worked among the Mendips at a very early period. Some of the Roman workings, especially in the neighbourhood of Charterhouse-on- Mendip, have yielded pigs of lead inscribed with the names of emperors of the ist and 2nd centuries A.D., together with an abundance of smaller objects.

See E. Baker and H. Balch, The Netherworld of Mendip (Clifton,

1907).

MENDOZA, ANTONIO HURTADO DE (iS93?i6 4 4), Spanish dramatist, was born about the end of the 16th century in the province of Asturias, became page to the count de Saldana (son of the duke de Lerma), and was recognized as a rising poet by Cervantes in the Viaje del Parnaso (1614). He rose rapidly into favour under Philip IV., who appointed him private secretary, commissioned from him comedias palaciegas for the royal theatre at Aranjuez, and in 1623 conferred on him the orders of Santiago and Calatrava. Most of his contemporaries and rivals paid court to " el discreto de palacio," and Mendoza seems to have lived on the friendliest terms with all his brother dramatists except Ruiz de Alarcon. He is said to have been involved in the fall of Olivares, and died unexpectedly at Saragossa on the 19th of September 1644. Only one of his plays, Querer por s6lo querer, was published with his consent; it is included in a volume (1623) containing his semi-official account of the performances at Aranjuez in 1622. The best edition of Mendoza's plays and verses bears the title of Obras liricas y cdmicas, divinas y humanas (1728). Much of his work does not rise above the level of graceful and accomplished verse; but that he had higher qualities is shown by El Marido hace mujer, a brilliant comedy of manners, which forms the chief source of Moliere's £cole des maris.

The Fiesta que se hizo en Aranjuez and Querer por solo querer were translated into English by Sir Richard Fanshawe, afterwards ambassador at Madrid, in a posthumous volume published in 1671.

MENDOZA, DIEGO HURTADO DE (1503-1575), Spanish novelist, poet, diplomatist and historian, a younger son of the count of Tendillas, governor of Granada, was born in that city in 1503. The celebrated marquis of Santillana was his great-grandfather. On leaving the university of Salamanca, Mendoza abandoned his intention of taking orders, served under Charles V. in Italy, and attended lectures at the uni- versities of Bologna, Padua and Rome. In 1537 he was sent to England to arrange a marriage between Henry VIII. and the duchess of Milan, as well as a marriage between Prince Louis of Portugal and Mary Tudor. Despite the failure of his mission, he preserved the confidence of the emperor, and in 1539 was appointed ambassador at Venice; there he patronized the Aldi, procured copies of the Greek manuscripts belonging to Cardinal Bessarion, and acquired other rare codices from the monastery of Mount Athos. The first edition of Josephus was printed (1544) from the texts in Mendoza's collection.

He acted for some time as military governor of Siena, represented Spain diplomatically at the council of Trent, and in 1547 was nominated special plenipotentiary at Rome, where he remained till 1554. He was never a favourite with Philip II., and a quarrel with a courtier resulted in his banishment from court (June 1568). The remaining years of his life, which were spent at Granada, he devoted to the study of Arabic, to poetry, and to his history of the Moorish insurrection of 1568-1570. He died in 1575. His Guerra de Granada was published at Lisbon by Luis Tribaldos de Toledo in 1627; the delay was doubtless due to Mendoza's severe criticism of contemporaries who survived him. In some passages the author deliberately imitates Sallust and Tacitus; his style is, on the whole, vivid and trenchant,

his information is exact, and in critical insight he is not inferior to Mariana. The attribution to Mendoza of Lazarillo de Tormes is rejected by all competent scholars, but that he excelled in picaresque malice is proved by his indecorous verses written in the old Castilian metres and in the more elaborate measures imported from Italy. Mendoza is believed to be the author of the letters to Feliciano de Silva and to Captain Salazar, published by Antonio Paz y Melia in Sales Espanolas (Madrid, 1900).

See A. Senan y Alonso, D. Diego Hurtado de Mendoza, apuntes biogrdfico-crUicos (Granada, 1886) ; Calendar of Letters and Paper's foreign and domestic, Henry VIII., vols. xii. and xiii. ; C. Graux, Essai sur Vorigine du fonds grec de VEsctirial (Paris, 1880); R. Foulchˆ-Delbosc, " Etude sur la Guerra de Granada " in the Revue hispanique (Paris, 1894), vol. i.

MENDOZA, PEDRO GONZALEZ DE (1428-1495), Spanish cardinal and statesman, was the fourth son of Inigo Lopez de Mendoza, marquess of Santillana, and duke of Infantado. He was born at Guadalajara in New Castile, the chief lordship of his family, on the 3rd of May 1428. The house of Mendoza claimed to descend from the lords of Llodio in Alava, and to have been settled in Old Castile, in the nth century. One chief of the house had been greatly distinguished at the battle of the Navas de Tolosa in 1212. Another had been Admiral of Castile in the reign of Alphonso the Wise. Peter the Cruel had endowed them with the lordships of Hita and Buitrago. The greatness of the Mendozas was completed by Pedro Gonzalez, who sacri- ficed his life to save King John I. at the battle of Aljubarrota in 1385. The cardinal's father, the marquis of Santillana — to use the title he bore for the greater part of his life — was a poet, and was conspicuous during the troubled reign of John II. Loyalty to the Crown was the traditional and prevailing

policy of the family. Pedro Gonzalez, the future cardinal, was sent into the Church mainly because he was a younger son and that he might be handsomely provided for. He had no vocation, and was an example of the worldly, political and martial prelates of the 15th century. In 1452 at the age of twenty- four, he was chosen by the king John II. to be bishop of Cala- horra, but did not receive the pope's bull till 1454. As bishop of Calahorra he was also senor, or civil and military ruler, of the town and its dependent district. In his secular capacity he led the levies of Calahorra in the civil wars of the reign of Henry IV. He fought for the king at the second battle of Olmedo on the 20th of August 1467, and was wounded in the arm. During these years he became attached to Dona Mencia de Lemus, a Portuguese lady-in-waiting of the queen. She bore him two sons, Rodrigo, who was once selected to be the husband of Lucrezia Borgia, and Diego, who was the grandfather of the princess of Eboli of the reign of Philip II (see Perez, Antonio.) By another lady of a Valladolid family he had a third son who afterwards emigrated to France. In 1468 he became bishop of Siguenza. In 1473 he was created cardinal, was promoted to the archbishopric of Seville and named chancellor of Castile. During the last years of the reign of King Henry IV. he was the partisan of the Princess Isabella, afterwards queen. He fought for her at the battle of Toro on the ist of March 1476; had a prominent part in placing her on the throne; and served her indefatigably in her efforts to suppress the disorderly nobles of Castile. In 1482 he became archbishop of Toledo. During the conquest of Granada he contributed largely to the maintenance of the army. On the 2nd of January 1492 he occupied the town in the name of the Catholic sovereigns. Though his life was worldly, and though he was more soldier and statesman than priest, the " Great Cardinal," as he was" commonly called, did not neglect his duty as a bishop. He used his influence with the queen and also at Rome to arrange a settlement of the disputes between the Spanish sovereigns and the papacy. Though he maintained a splendid household as archbishop of Toledo, and provided handsomely for his children, he devoted part of his revenue to charity, and with part he endowed the college of Santa Cruz at Valladolid. His health broke down at the close of 1493. Queen Isabella visited and nursed him on his deathbed. It is said that he recommended her to choose as his successor the Franciscan Jimenez de Cisneros,

a man who had no likeness to himself save in political faculty and devotion to the authority of the Crown. He died at Guadalajara on the

nth of January 1495.

The life of the cardinal, by Salazar de Mendoza, Cronica del gran cardinal Don Pedro Gonzalez de Mendoza (Toledo, 1625), is discursive and garrulous but valuable. See also Prescott, History of Ferdinand and Isabella.

MENDOZA,- a province of western Argentina, bounded N. by San Juan, E. by San Luis and the territory of La Pampa, S. by the territories of La Pampa and Neuquen, and W. by the republic of Chile. Area, 56,502 sq. m.; pop. (1895), 116,136; (1904, estimate), 159,780. The Andes form the western boun- dary, and a considerable part of the territory is covered by the great Cordillera, its foothills and flanking ranges. The eastern part is an arid, sandy, level plain, with extensive saline basins, having no vegetation other than coarse grasses and thickets of low, spiny mimosas and ” chanar ” (Gourliaea decorticans). The fertile, populated districts of the province border on the Cordillera, particularly in the north where numerous streams from the snow-clad summits supply water for irrigation. The secondary ranges in this part of Mendoza are the Sierra de los Paramillos, which encloses the Uspallata Valley, and the Sierra del Tunuyan, which encloses a number of populous valleys drained by the Tunuyan river and its tributaries. One of the largest of these is the Yuco Valley. Farther south the country becomes more arid and sparsely populated, and unsub- dued tribes of Indians for a long time prevented its exploration. In this region the Sierra de Payen and Sierra del Nevado (otherwise known as the Sierra Quero Matro Pellon) extend in a north-easterly direction. With the exception of the Rio Grande in the south-west part of the province, which forms the principal source of the Colorado, all the rivers of the province flow easterly and southerly into the great saline depression of western Argentina, which includes a great part of Mendoza, San Luis and La Pampa. The Andean streams rise in the higher snow-clad elevations, but their waters become impregnated with saline matter soon after reaching the plain, and are even- tually lost in the saline marshes and lagoons of southern Mendoza and La Pampa. These Andean rivers are the Mendoza, Tunuyan, Diamante and Atuel, with their numerous tributaries, all of which discharge into the sluggish river which flows from the Huanacache lagoons, on the San Juan frontier, southward to the marshes and lagoons of La Pampa. The upper part of this brackish, swampy stream is called the Desaguadero, and the lower the Salado. It forms the eastern boundary line of the province down to the 36th parallel. With the exception of the elevated districts of the Andes, the climate of Mendoza is hot and dry. On the plains the rainfall is insignificant, but on the slopes of the Cordillera rains are frequent and

winter cold is severe. Agriculture is the principal occupation where irrigation can be used, the province having a high reputation for its raisins and wines. Alfalfa is an important product, being grown for fattening the cattle driven through the province to the Chilean markets. The mineral resources of the province are said to be good, but receive little attention. Petroleum is found in the vicinity of San Rafael, on the Diamante river, and it is claimed that coal exists in the same region. Although Mendoza was settled by Spanish colonists from Chile as far back as 1559, its development has been hindered by its isolated position. This isolation was broken in 1884 by the completion of the Argentine Great Western railway to the provincial capital. Since then a railway has been built northward to San Juan, and another line was in 1908 under construction through the Andes to connect with the Chilean railway system. In addition to Mendoza, the capital of the province, the principal towns (hardly more than villages) are Guaymallen, Maipu, San Martin, Lujan and San Rafael. The provinces of Mendoza, San Juan and San Luis, which were settled from Chile and were for a long time governed from Santiago, were at first called the province of Cuyo, and are still spoken of as the ” Cuyo provinces.”

MENDOZA, a city of Argentina, capital of Mendoza province, 632 m. by rail W.N.W. of Buenos Aires. Pop. (1904, estimate),

32,000. It stands on a plain near the foot of a secondary Andean range called the Sierra de los Paramillos, at an elevation of 2320 ft. The surrounding district is arid, but has been irrigated and is covered with gardens, orchards and cultivated fields. The city is about 15 m. N. of the Mendoza, or Lujan river, whose waters are utilized for irrigation and for the requirements of the city by means of a channel which leaves the main river a little above the town of Lujan and runs to the Tulumaya river and the lagoons of Huanacache. This channel is called El Zanj6n, and is believed to have been opened by Guaymallen, the chief of the Guarpes who inhabited this district at the time of the Spanish conquest, but it is more probably natural. The city is laid out in a regular manner with broad well-paved streets and numerous public squares. The Zanjon and another stream called the Guaymallen traverse the city, and the principal streets have water flowing through them and are shaded by poplars. Because of earthquake risks, the public buildings are neither costly nor imposing. The private residences are commonly of one storey, built with wooden frames filled in with adobes. The climate is hot, dry and enervating, not-withstanding the elevation and the proximity of the Andes. The surrounding districts produce fruit, vegetables, alfalfa and cereals. The vineyard industry is prominent, and raisins and wine are exported. The position on the main route across the Andes into Chile, by way of

the Uspallata or Cumbre pass (highest point 12,870 ft.), has given the city commercial im portance. It has railway connexion with the principal cities of the republic, including the ports of Rosario, Buenos Aires and Bahia Blanca, and also with the capital of San Juan.

Mendoza was founded by Captain Pedro del Castillo, who had been sent from Santiago across the Andes in 1559 by Garcia Hurtado de Mendoza, the governor of Chile, to conquer and annex the territory extending N.E. to Tucuman. The city was named after Mendoza. It was made the capital of the province of Cuyo, and belonged to Chile down to 1776, when the province was transferred to the newly created viceroyalty of La Plata. It was the headquarters of General San Martin while he was organizing an army for the liberation of Chile, and greatly assisted him with men and money. Under re- publican administration Mendoza suffered much from revolu- tions. Moreover, on the 20th of March 1861, the city was destroyed by an earthquake and a fire which followed. Not a building was left standing, and the loss of life was estimated at 10,000 to 12,000. The French geologist Bravard, who had predicted the catastrophe, was one of its victims. The poplars in the streets, together with some species of fruit-trees, were first planted in Mendoza by a Spaniard, Juan Cobos, in 1809, who thus became one of its greatest benefactors.

MENEDEMUS, Greek philosopher, and founder of the Eretrian school of thought, was born at Eretria about 350 and died between 278 and 275 b.c. Though of noble birth, he worked as builder and tentmaker until he was sent with a military expe- dition to Megara, where, according to Diogenes Laertius, he heard Plato and resolved to devote himself to philosophy. It is more likely that he heard one of Plato's followers, inasmuch as Plato died when he was only four years old, if the above dates are correct. At Megara he formed a life-long friendship with Asclepiades, with whom he toiled in the night that he might study philosophy by day. He was subsequently a pupil first of Stilpo and then of Phaedo of Elis, whose school he transferred to Eretria, by which name it was afterwards known. -Jn addition to his philosophical work, he took a leading part in the political affairs of his city from the time of the Diadochi until his death, and obtained a remission of the tribute to Demetrius. His friendship with Antigonus Gonatas seems to have roused suspicion as to his loyalty, and he sought safety first in the temple of Amphiaraus at Oropus, and later with Antigonus, at whose court he is said to have died of grief. Other accounts say that he starved himself to death on failing to induce Antigonus to free his native city. His philosophical views are known only in part. Athenaeus quotes Epicrates as stating that he was a Platonist, but other accounts credit

him with haying preferred Stilpo to Plato. Diogenes Lagrtius (ii. 134 and 135) says that he declined to identify the Good with the Useful, and that he denied the value of the negative proposition on the ground that affirmation- alone can express truth. He probably meant to imply that qualities have no existence apart from the subject to which they belong. In ethics we learn from Plutarch {De virt. mor. 2) and from Cicero {Acad. ii. 42) that, he regarded Virtue as one* by whatever name it be called, and maintained that it is intellectual. Cicero's evidence is the less valuable in that he always assumed that Menedemus was a follower of the Megarians. Diogenes says that he left no writings, and the Eretrian school disappeared after a short and unobtrusive existence.

Beside the ancient sources quoted above, see H. Mallett, Histoire de I'ecole de Megare et des holes d'Elis et d'Eretrie (1845). Also the articles Mega man School; Phaedo; Stilpo.

MENELAUS, in Greek legend, son of Atreus (or Pleisthenes); king of Sparta, brother of Agamemnon and husband of Helen. He was one of the Greeks who entered Troy concealed in the wooden horse (Virgil, Aeneid, ii. 264) and recovered his wife at the sack of the city. On the voyage homewards his fleet was scattered off Cape Malea by a storm, which drove him to Egypt. After eight years' wandering in the east, he landed on the island of Pharos, where Proteus revealed to him the means of appeasing the gods and securing his return. He reached Sparta on the day on which Orestes was holding the funeral feast over Aegisthus and Clytaemnestra. After a long and happy life in Lacedaemon, Menelaus, as the son-in-law of Zeus, did not die but was translated to Elysium (Homer, Odyssey, iii. iv.). His grave and that of Helen were shown at Therapnae, where he was worshipped as a god (Pausanias iii. 10, 9). He was represented in works of art as carrying off the body of the dead Patroclus or lifting up his hand to slay Helen.

MENELEK II. (Sahala Mariem), emperor of Abyssinia, officially negus negusti (king of kings) of Ethiopia (1844-)> son of Haeli Melicoth, king of Shoa, was born in 1844, and claimed to be a direct descendant of Solomon by the queen of Sheba. On the death of his father in 1855 he was kept a prisoner at Gondar by Kassai, the governor, who had seized the throne under the title of Theodore III. But having succeeded in effecting his escape he was acknowledged king of Shoa, and at once attacked the usurper. These campaigns were unsuccessful, and he

turned his arms to the west, east and south, and annexed much territory to his kingdom, still, however, maintaining his divine right to the crown of Ethiopia. After the death of Theodore in 1888 he continued to struggle against his successor, the emperor Johannes (better known to Europeans- as King John of Abyssinia). Being again unsuccessful, he resolved to await a more propitious occasion; so, acknowledging the supre- macy of Johannes, in 1886 he married his daughter Zeodita (b. 1876) to the emperor's son, the Kas Area; he was thereupon declared heir to the empire, and on his side acknowledged the Ras Area as his successor. Ras Area died in May 1888, and the emperor Johannes was killed in a war against the dervishes at the battle of Gallabat (Matemma) on the 10th of March 1889. The succession now lay between the late emperor's natural son, the Ras Mangasha, and Menelek, but the latter was elected by a large majority on the 4th of November, and consecrated shortly afterwards. Menelek had married in 1883 Taitu (b. 1854) a princess of Tigre, a lady who had been married four times previously and who exercised considerable influence. Menelek's clemency to Mangasha, whom he compelled to submit and then made viceroy of Tigre, was ill repaid by a long series of revolts. In 1889, at the time when he was claiming the throne against Mangasha, Menelek signed at Uccialli a treaty with Italy acknowledging Italian claims to the Asmara district. Finding, however, that according to the Italian view of one of its articles the treaty placed his empire under Italian domination, Menelek denounced it; and after defeating the Italians at Amba-Alagi, he compelled them to capitulate at Adowa in February 1896, and a treaty was signed recognizing the absolute independence of Abyssinia. His French sympathies were shown in a reported

official offer of treasure towards payment of the indemnity at the close of the Franco-Prussian War, and in February 1897 he concluded a commercial treaty with France on very favourable terms. He also gave assistance to French officers who sought to reach the upper Nile from Abyssinia, there to join forces with the Marchand Mission; and Abyssinian armies were sent Nilewards. A British mission under Sir Rennell Rodd in May 1897, however, was cordially received, and Menelek agreed to a settlement of the Somali boundaries, to keep open to British commerce the caravan route between Zaila and Harrar, and ta prevent the transit of munitions of war to the Mahdists, whom he proclaimed enemies of Abyssinia. In the following year the, Sudan was reconquered by an Anglo-Egyptian army and there- after cordial relations between Menelek and the British author- ities were established. In 1889 and subsequent years, Menelek sent forces to co-operate with the British troops engaged against the Somali mullah,

Mahommed Abdullah. Menelek had in 1898 crushed a rebellion by Ras Mangasha (who died in 1906) and he directed his efforts henceforth to the consolidation of his authority, and in a certain degree, to the opening up of his country to western civilization. He had granted in 1894 a concession for the building of a railway to his capital from the . French port of Jibuti, but, alarmed by a claim made by France in 1902 to the control of the line in Abyssinian territory, he stopped for four years the extension of the railway beyond Dire Dawa. When in 1906 France, Great Britain and Italy came to an agreement on the subject, Menelek officially reiterated his full sovereign rights over the whole of his empire. In May 1909 the emperor's grandson Lij Yasu, or Jeassu, then a lad of thirteen, was married to Romanie (b. 1902), granddaughter of the negus Johannes. Two days later Yasu was publicly pro- claimed at Adis Ababa as Menelek's successor. At that time the emperor was seriously ill and as his ill-health continued, a council of regency — from which the emperor was excluded — was formed in March 1910. (See also Abyssinia.)

MENENDEZ Y PELAYO, MARCELINO (1856-), Spanish scholar and critic, was born at Santander on the 3rd of November 1856. In 1871-1872 he studied under Milay Fontanals at the university of Barcelona, whence he proceeded to the central university of Madrid. His academic successes had never been surpassed; a special law was passed by the Cortes' to enable him to become a professor at the age of twenty-two, and three years later he was elected a member of the Spanish Academy. But before this date (1882) he was well known throughout Spain. His first volume, Estudios crtticos sobre escritores montaHeses (1876), had attracted little notice, and his scholarly Horatio en Espafia (1877) appealed only to students. He became famous through his Ciencia espaiiola (1878), a collection of polemical essays defending the national tradition against the attacks of political and religious reformers. The unbending orthodoxy of this work is, if possible, still more pronounced in the Historia de los heterodoxos espafioles (1 880-1 886), and the writer was hailed as the champion of the ultramontane party. His lectures (1881) on Calder6n established his reputation as a literary critic; and his work as an historian of Spanish literature was continued in his Historia de las ideas estiticas en Espafia (1881-1891), his edition (1890-1903) of Lope de Vega, his Antologla de poetas llricos castellanos (1890-1906), and his Origenes de la novela

(1905).

MENENIUS LANATUS, AGRIPPA, Roman patrician and statesman, consul 503 B.C. On the occasion of the first secession- of the people to

the Sacred Mount, Agrippa, who was known to be a man of moderate views, was one of the commissioners empowered by the senate to treat with the seceders. On this occasion he recited the well-known fable of the belly and the members.

Livy ii. 16, 32, 33; Dion. Halic. v. 44-47; vi. 49-88, 96; Val. Max. iv. 4, 2.

MENES. the. name of the founder of the 1st Dynasty of historical kings of Egypt. He appears at the head of the lists not only in Herodotus and Manetho, but also in the native Turin Papyrus of Kings and the lists of Abydos, while the Est

of Sakkara begins with the sixth king of the 1st Dynasty, a fact which may throw some doubt on the supposed foundation of Memphis by Menes. Until recently he was looked upon as semi-mythical, but the discovery of the tombs of many kings of the 1st Dynasty including probably that of Menes himself, as well as an abundance of remains of still earlier ages in Egypt has given him a personality. He was probably ruler of Upper Egypt and conquered the separate kingdom of Lower Egypt.

See Egypt ; K. Sethe, ” Menes und die Grundung von Memphis,” in his Untersuchungen zur Geschichle und Alterthumskunde Aegyptens, iii. 121. (F. Ll. G.)

MENGS, ANTONY RAPHAEL (1728-1779), German painter, was born in 1728 at Aussig in Bohemia, but his father, Ismael Mengs, a Danish painter, established himself finally at Dresden, whence in 1741 he took his son to Rome. The appointment of Mengs in 1749 as first painter to the elector of Saxony did not prevent his spending much time in Rome, where he had married in 1748, and abjured the Protestant faith, and where he became in 1754 director of the Vatican school of painting, nor did this hinder him on two occasions from obeying the call of Charles III. of Spain to Madrid. There Mengs produced some of his best work, and specially the ceiling of the banqueting-hall, the subject of which was the Triumph of Trajan and the Temple of Glory. After the completion of this work in 1777, Mengs returned to Rome, and there he died, two years later, in poor circumstances, leaving twenty children, seven of whom were pensioned by the king of Spain. Besides numerous paintings in the

Madrid gallery, the Ascension at Dresden, Perseus and Andromeda at St Petersburg, and the ceiling of the Villa Albani must be mentioned among his chief works. In England, the duke of Northumberland possesses a Holy Family, and the colleges of All Souls and Magdalen, at Oxford, have altar-pieces by his hand. In his writings, in Spanish, Italian and German, Mengs has put forth his eclectic theory of art, which treats of perfection as attainable by a well-schemed combination of diverse excellences — Greek design, with the expression of Raphael, the chiaroscuro of Correggio, and the colour of Titian. His intimacy with Winckelmann — who constantly wrote at his dictation — has enhanced his historical importance, for he formed no scholars, and the critic must now concur in Goethe's judgment of Mengs in Winckelmann und sein Jahrhundert; he must deplore that so much learning should have been allied to a total want of initiative and poverty of invention, and embodied with a strained and artificial mannerism.

See Opere di Antonio Raffaello Mengs (Parma, 1780) ; Mengs Werke, iibersetzt v. G. F. Prange (1786); Zeilschrift fiir bildende Kunst (1880); Bianconi, Elogio storico di Mengs (Milan, 1780); Woermann, Ismael und Raphael Mengs (Leipzig, 1893).

MENGTSZE, a city in the S.E. of the province of Yunnan, China. Pop. about 12,000. It was selected by the French convention of 1886 as the seat of the overland trade between Tongking and Yunnan, and opened two years later. It is beautifully situated in the centre of a valley basin on a plateau 3500 ft. above sea-level. The country round is fertile and well cultivated, aifd the place must have been one of considerable wealth before the T'aip'ing rebellion, as the ruins of many fine temples attest. A considerable overland trade has sprung up since the opening of Mengtsze. Of the import trade Hong-Kong supplied 86%, and of the export trade 70%, Cochin-China, Tongking and Annam claiming the remainder. Tin (68) and opium (27-8) are the principal exports, and textiles (71%), mostly cottons, and tobacco (4%) are the chief imports. On the Tongking side this trade follows the Red River route as far as Manhao, which is distant from Mengtsze about 40 m., though the navigation of the river is difficult. From Manhao the transit is by coolies or pack animals. Concessions have been obtained by the French government to build a line of railway from the Tongking frontier at the town of Laokay via Mengtsze to Yunnan-fu. The climate is equable and healthy.

MENHADEN, economically one of the most important fishes of the United States, known by a great number of local nafties, " menhaden " and " mossbunker " being those most generally

in use. The Indians and white settlers used it as a manure, and the name is Narragansett for ” fertilizer.” Its scientific name is Clupea (or Alosa) menhaden and Brevoorlia lyrannus. It is allied to the European species of shad and pilchard, and, like the latter, approaches the coast in immense shoals, which are found throughout the year in some part of the littoral waters between Maine and Florida, the northern shoals retiring into deeper water or to more southern latitudes with the approach of cold weather. The average size of the menhaden is about 12 in. It is too bony and oily for a table-fish, but is used as bait for cod and mackerel. A large fleet is engaged in the fishery; and a great number of factories extract the oil for tanning and currying, and for adulterating other more expensive oils, and manufacture the refuse into a valuable guano. MENIAL, that which belongs to household or domestic ser- vice, hence, particularly, a domestic servant. The idea of such service being derogatory has made the term one of contempt. The word is derived from an obsolete meinie or meyney, the company of household servants or retainers; a Scottish form is menzie. The origin is to be found in the O.Fr. mesnie, popular Lat. mansionata, from mansio, mansion, from which comes Fr. maison, house.

MENIER, EMILE JUSTIN (1826-1881), French manufacturer and politician, was born at Paris in 1826. In 1853, on the death of his father, Antoirie Brutus Menier, he became proprietor of a large drug factory, founded in 18 15 by the latter at Saint Denis, Paris, and in 1825 at Noisiel-sur-Marne. Antoine Brutus Menier had also manufactured chocolate in a small way, but Emile Justin from the first devoted himself specially to chocolate. He purchased cocoa-growing estates in Nicaragua and beet-fields in France, erected a sUgar-mill, and equipped himself in other ways for the production of chocolate on a large scale. In 1864 he sold his interest in the drug-manufacturing business, and thenceforth confined himself to chocolate, building up an immense trade. Menier was a keen politician, and from 1876 till his death had a seat in the French Chamber, his general views being strongly Republican, while he consistently opposed protection. He was the author of several works on fiscal and economic questions, notably L’Impdt sur le capital (1872), La RSforme fiscale (1872), £conomie rurale (1875), L’Avenir Sconomique (1875-1878), Atlas de la production de la richesse (1878). He died at Noisiel-sur-Marne in 1881, his sons succeeding to the business.

MENIERE’S DISEASE, a form of auditory vertigo, first described by a French physician, Emile Antoine Meniere, in 1 86 1. It usually attacks persons of middle age whose hearing has been previously normal. A.

Politzer gives the following as the principal causes: intense heat and exposure to the sun, rheumatism, influenza, venereal diseases, anaemia and leukaemia. The disease presents itself in various forms, but the most usual is the apoplectoform, due to haemorrhage into the laby- rinth, followed by more or less complete deafness in either or both ears. The attack usually sets in with dizziness, noises in the ears, nausea, vomiting and staggering gait, and the patient may suddently fall down with loss of consciousness. The seizures are usually paroxysmal, occurring at irregular intervals of days or weeks. Between the attacks the equilibrium may be disturbed, there being marked nystagmus and unsteadi- ness of gait. The attacks of vertigo tend to become less frequent and may entirely pass away, but the deafness may remain permanent. The treatment is directed towards relieving the- troublesome head symptoms by the application of cold com- presses. The drug that has proved most serviceable in dimin- ishing the dizziness is potassium iodide, administered daily for at least a month. Politzer considers that the attacks may be averted by producing rarefaction of the air in the external meatus of the ear by means of a specially devised aspirating tube.

MENIN (Flemish Meenen), a town of Belgium in the province of West Flanders situated on the Lys 7 m. S. of Courtrai. Pop. (1004), 19,377. It manufactures linen and flannel, and in the neighbourhood are extensive tobacco plantations. It was first

fortified in 1578, and in 1685 Vauban made it one of the strongest places on the French frontier, but the fortifications were razed in 1748 by the treaty of Aix-la-Chapelle.

MENINGITIS (from Gr. nrjvtyt;, a membrane), a term in medicine applied to inflammation affecting the membranes of the brain (cerebral meningitis) or spinal cord (spinal meningitis) or both.

Tubercular cerebral meningitis (or Acute Hydrocephalus) is a disease due to inflammation of the meninges of the brain produced by the presence of a tubercle bacillus. This disease is most common in children under ten years of age, but may affect adults. The tubercular constitution is an important factor in this malady. In numerous cases it is manifestly connected with bad hygienic conditions, with insufficient or improper feeding, or with over exercise of the mental powers, all of which will doubtless more readily exert their influence

where an inherited liability exists, and the same may be said regarding its occasional occurrence as one of the after consequences of certain of the diseases of childhood, especially measles and whooping-cough.

There are certain typical features characterizing the disease in each of its stages. The premonitory symptoms are mostly such as relate to the general nutrition. A falling off in flesh and failure of strength are often observed for a considerable time before the characteristic phenomena of the disease appear. The patient, if a child, becomes listless and easily fatigued, loses appetite, and is restless at night. There is headache after exertion, and the child becomes unusually irritable. These symptoms may persist during many weeks; but on the other hand such premonitory indications may be entirely wanting, and the disease be developed to all appearance suddenly.

The onset is in most instances marked by the occurrence of vomit- ing, often severe, but sometimes only slight, and there is in general obstinate constipation. In not a few cases the first symptoms are convulsions, which, however, may in this early stage subside, and remain absent, or reappear at a later period. Headache is one of the most constant of the earlier symptoms, and is generally intense and accompanied with sharper paroxysms, which cause the patient to scream, with a peculiar and characteristic cry. There is great intolerance of light and sound, and general nervous sensitiveness. Fever is present to a greater or less extent, the temperature ranging from loo to 103 F. ; yet the pulse is not quickened in proportion, being on the contrary rather slow, but exhibiting a tendency to irregularity, and liable to become rapid on slight exertion. The breathing, too, is somewhat irregular. Symptoms of this character, constituting the stage of excitement, continue for a period varying from one to two weeks, when they are succeeded by the stage of depression. There is now a marked change in the symptoms, which is apt to lead to the belief that a favourable turn has taken place. The patient becomes quieter and inclines to sleep, but it will be found on careful watching that this quietness is but a condition of apathy or partial stupor into which the child has sunk. The vomiting has ceased, and there is less fever; the pulse is slower, and shows a still greater tendency to irregularity than before, while the breathing is of markedly unequal character, being rapid and shallow at one time, and long drawn out and sinking away at another. There is manifestly little suffering, although the peculiar cry may still be uttered, and the patient lies prostrate, occasionally rolling the head uneasily upon the pillow, or picking at the bedclothes or at his face with his fingers. He does not ask for food, but readily swallows what is offered. The countenance is pale, but is apt to flush

up suddenly for a time. The eyes present important alterations, the pupils being dilated or unequal, and scarcely responding to light. There may be double vision, or partial or complete blindness. Squinting is common in this stage, and there may also be drooping of an eyelid, due to paralysis of the part, and one or more limbs may be likewise paralysed.

To this succeeds the third or final stage, in which certain of the former symptoms recur, while others become intensified. There is generally a return of the fever, the temperature rising sometimes very high. The pulse becomes feeble, rapid, and exceedingly irre- gular, as is also the case with the breathing. Coma is profound, but yet the patient may still be got to swallow nourishment, though not so readily as before. Convulsions are apt to occur, while para- lysis, more or less extensive, affects portions of the body or groups of muscles. The pupils are now widely dilated, and there is gener- ally complete blindness and often deafness. In this condition the patient's strength undergoes rapid decline, and the body becomes markedly emaciated. Death takes place either suddenly in a fit, or more gradually from exhaustion. Shortly before death it is not uncommon for the patient, who, it may be for many days previously, lay in a state of profound stupor, to awake up, ask for food, and talk to those around. The duration of a case varies somewhat, ' but in general death takes place within three weeks from the onset of the symptoms. The disease may be said to be

almost invariably fatal, yet cases presenting all the principal symptoms occasionally recover.

Much may be done in the way of prevention of this disease, and, in its earlier stages, even in the way of cure. It is most im- portant in families where the history indicates a tuberculous or scrofulous tendency, and particularly where acute hydrocephalus has already occurred, that every effort should be used to fortify the system and avoid the causes already alluded to as favouring the development of the disease during that period in which children are liable to suffer from it. With this view wholesome food, warm clothing, cleanliness, regularity,, and the avoidance of over-exertion, physical and mental, are of the utmost consequence.

Timely use of remedies may mitigate and even occasionally remove the symptoms when they arise. The maintenance of the patient's strength by light nourishment and the use of sedatives to compose the nervous system are the measures most likely to be attended with success. Bromide, combined with iodide of potassium, is the medicinal agent of most value for this purpose. Should convulsions occur, they

are best treated by chloral or chloroform.

In what is known as suppurative, or simple acute meningitis (non-tubercular), the disease arises from various causes, and the symptoms are similar to those described above.

In posterior-basic meningitis, inflammation of the membranes investing the posterior basic spinal cord, the chief symptoms are fever, with severe pain in the back or loins shooting down- wards into the limbs (which are the seat of frequent painful involuntary startings), accompanied with a feeling of tightness round the body.

The local symptoms bear reference to the portion of the cord the membranes of which are involved. Thus when the inflamma- tion is located in the cervical portion the muscles of the arms and chest are spasmodically contracted, and there may be difficulty of swallowing or breathing, or embarrassed heart's action, while when the disease is seated in the lower portion, the lower limbs and the bladder and rectum are the parts affected in this way. At first there is excited sensibility (hyperaesthesia) in the parts of the surface of the body in relation with the portion of cord affected. As the disease advances these symptoms give place to those of partial loss of power in the affected muscles, and also partial anaes- thesia. These various phenomena may entirely pass away, and the patient after some weeks or months recover; or, on the other hand, they may increase, and end in permanent paralysis.

Some observers regard these forms as sporadic cases of cerebro- spinal fever; and Still, William Hunter and George Nuttall have isolated an organism similar to the diplococcus intracellularis, while Henry Koplik in New York found cases of typical posterior- basic meningitis due to the diplococcus intracellularis.

The treatment is directed to allaying the pain and inflammatory action by opiates. Ergot is recommended by many physicians. The patient should have perfect rest in the recumbent, or better still in the prone, position. Cold applications to the spine may be of use, while attention to the functions of the bladder and bowels, and to the condition of the skin with the view of preventing bed- sores, is all-important.

Cerebrospinal fever or epidemic cerebrospinal meningitis, popularly called " spotted fever," is an infectious disease occur- ring sporadically or in epidemics, and due to the diplococcus intracellularis discovered by Weichselbaum in 1887. This disease was not recognized until the 19th century. It was first described at Geneva in 1805 and small

outbreaks followed in Paris (1814), Metz and Genoa (1815), and Westphalia (1822), but in the United States there was a widespread epidemic, including New England and spreading as far as Kentucky and Ohio. Fresh outbreaks in Europe took place between 1837 and 1850. In 1837 it prevailed in the south of France chiefly amongst troops in garrison, and fresh outbreaks continued throughout France in 1846 with epidemics in Algiers, Italy and Sicily. In Great Britain it first showed itself in the Irish workhouses in 1846, where it was known as ” the black death ” or ” malignahf- purpuric fever.” After 1866 except for sporadic cases it dis- appeared from Great Britain, but small outbreaks took place in 1885 to 1900 in Dublin. In 1905 there was an extensive epidemic in New York, followed by an outbreak in Scotland in 1906, and in Scotland and Ireland in 1907-1908. The registrar- general’s returns for 1907 give 1018 deaths in Scotland due to the disease, of which 711 were at Glasgow and 148 at Edinburgh. In the same year Belfast was visited by a severe epidemic, 495 deaths out of the total death-rate of 631 taking place in that district.

The mode of infection is obscure, but the organism is thought to gain access to the circulation through the mucous membrane of the nose and conjunctiva, as the organism has been isolated from the mucous membrane of the nose, not only of those suffering from the disease but from healthy persons who have been in contact with cases. Cerebro-spinal fever has an undoubted tendency to follow bad sanitary conditions and to prevail in damp, sunless houses. It is a disease of temperate climates, and the outbreaks usually take place in the spring of the year. The victims are mostly children and young adults, and Koplik states that few recoveries take place in children under two years of age.

The onset of symptoms is sudden, as contrasted with tubercular meningitis, in which the onset is gradual. The attack comes on sharply with intense headache, rigors and vomiting. The pain soon localizes itself in the back of the neck and occiput, and may thence radiate down the spine, limbs and abdomen. The pain is soon followed by a characteristic symptom, namely retraction of the head. The head is drawn back and rigidly fixed, the spine arched and the limbs drawn up, and muscular spasms may take place. There is general hyperaesthaesia, the slightest contact producing pain. More or less fever is present, but the temperature is not characteristic. The headache continues with great severity and restlessness and delirium

supervene, or there may be long periods when the patient is comatose. Twitching of the limbs and general convulsions may occur and facial paralysis is frequent. Paralysis of the ocular nerves causing squint, dilatations and con- tractions of the pupil are common as in other varieties of meningitis. Some of the most striking symptoms are the rashes. These usually occur about the fourth day of illness and vary widely in character, resembling erythema, urticaria, rose spots, or purpuric spots. The rashes have usually no relation to the gravity of the disease, but severe cutaneous haemorrhages usually indicate a severe form of illness. Should the patient survive the first shock of the attack serious complications may arise; the eyes may be attacked by severe conjunctivitis, iritis or keratitis or inflammation of the deeper parts may take place leading to detachment of the retina. More frequent even is disease of the auditory apparatus, and purulent otitis media or disease of the labyrinth may lead to permanent deafness. Serous effusion may take place into joints which are painful, red and swollen as in acute rheumatism.

Certain forms of the disease are rapidly fatal, these are known as the fulminant type, and death may take place within 12 to 24 hours of the onset. Death usually occurs between the fifth and the eighth day, but many cases drag on for weeks with rapid and pro- gressive emaciation, and recovery is slow. The mortality has varied in different epidemics. Hirsch's tables of forty-one epidemics give a mortality of from 25 to 75%, and Koplik rates it at 48 to 90%. During 1907, 623 cases of cerebro-spinal fever were notified in Belfast, and the deaths numbered 495. During that year the disease was made notifiable in 48 Irish urban and 55 rural districts. The mortality in Dublin was 75 . Osier states that in children under one year (in New York) the mortality reached 87-6.

The changes found after death from cerebro-spinal fever are an acute inflammation of the pia-arachnoid membrane both of the brain and spinal cord, with effusion of serum or pus into the ven- tricular and subarachnoid spaces. With such rapidity may the effusion become purulent that it has been found purulent in a case where death took place within five hours from the apparent onset. The operation of lumbar puncture (or puncture of the spinal canal between the lumbar vertebrae) has enabled the physician to make an accurate diagnosis by bacteriological examination of the contents of the spinal fluid. Lumbar puncture_ too has been found to be of eminent service in many cases, the withdrawal of from 30 to 50 cc. of the spinal fluid serving to relieve pressure and at least temporarily ameliorate the symptoms.

Up to a few years ago it may be said that there was no effective

treatment for cerebro-spinal fever but that of endeavouring to alleviate pain by the administration of opium, but with the recent introduction of serum therapy the future is full of hope. In the epidemic in New York (1905) the serum of Flexner and Jobling was used, and the most striking results were seen in young patients, the death-rate where the serum was used sinking to 46-3% as against 90% without. Like other serum treatments, to get the best results the serum must be administered early in the disease. Of 221 patients injected during the first week of illness the mortality was only 18%, while of 107 others injected after the first week of the disease the mortality was double that amount. When given subcutaneously, as in diphtheria, the serum has little or no effect, and to obtain good results it must be injected directly into the spinal canal after the removal of a certain amount of the spinal fluid. The injections are then continued daily as required according to the severity of the case. Dr Robb of Belfast reports that during the epidemic there, of 275 cases treated by ordinary means, the death-rate was 72-3%, but in 90 cases treated with injec- tions of Flexner and Jobling's serum the death-rate was only 30%. Dr Ivy McKenzie and Dr W. B. Martin of Glasgow have published a series of cases treated with the highly immune serum of patients who have recovered from the disease with encouraging results.

MENIPPUS, of Gadara in Coele-Syria, Greek cynic and satirist, lived during the 3rd century B.C. According to Diogenes Laertius (vi. 8) he was originally a slave, amassed a fortune as a money-lender, lost it, and committed suicide through grief. His works (written in a mixture of prose and verse) are all lost. He discussed serious subjects in a spirit of raillery, and especially delighted in attacking the Epicureans and Stoics. His writings exercised considerable influence upon later literature. One of the dialogues attributed to Lucian, his avowed imitator, who frequently mentions him, is called Menippus. But this dialogue is regarded with suspicion, and since the sub-title (" The Oracle of the Dead ") resembles that of a work ascribed to Menippus by Diogenes Laertius, it has been suggested that it is really the work of Menippus himself, or at any rate imitated from his Nexuia by the author, whether Lucian or another. It is well known that the Menippean satires of M. Terentius Varro, the fragments of which give an idea of this kind of composition, were called after Menippus of Gadara (see Teuffel-Schwabe, Hist, of Roman Literature, § 165, 3).

Bibliography. — F. Ley, De vita scriptisque Menippi cynici (Cologne, 1843); R. Helm, Lucian und Menipp (1906); C. Wachs- muth, Sillographorum graecorum reliquiae (1885), with an account of Menippus and similar writers. Menippus found an imitator in later

times in Justus Lipsius, author of a Satyra menippaea (1637) in which he ridiculed certain literary men of his age, especially the poet laureate; and in the authors of the famous Satyre Menippie (1593 ; latest editions by C. Marcilly, Paris, 1882 ; J. Frank, Oppeln, 1884), written against the Holy League during the reign of Henri IV.

MENIUS, JUSTUS (1499-1558), Lutheran theologian, whose name is Latinized from Jost or Just (i.e. Jodocus) Menig, was born at Fulda, of poor but respectable parents, on the 13th of December 1499. Entering the university of Erfurt in 1514, he took the bachelor's degree in 1515, the master's in 1516. At this time, in association with the keen humanists Conrad Mutian, Crotus Rubeanus and Eoban Hess, he was of sceptical tendency; moving to Wittenberg in 1519, he became evangelical under the teaching of Melanchthon and the preaching of Luther. After travel in Italy (1521-1522) he was appointed (1523) town's preacher at Wittenberg, but was soon transferred to the charge of Muhlberg, under Erfurt. Here he published his commentary on Acts (1524) and married. He resigned his charge (1525) and opened a school at Erfurt, but the town council insisted on his resuming his ministry, appointing him preacher in St Thomas', Erfurt. He worked in conjunction with Luther's friend, John Lange, and was opposed by the Franciscans under Conrad Kling. Hence he left for Gotha (1528), resumed teaching, and enjoyed the friendship of Friedrich Myconius. Duke John of Saxony had placed him on the commission for church visitation in Thuringia, and in 1529 appointed him pastor and superin- tendent at Eisenach, where for eighteen years he administered church affairs with tact, and fostered the spread of education. In 1529 he brought out his Oeconomia Christiana (a treatise in German, on the right ordering of a Christian household) with a dedication to the duchess Sybil of Saxony and a preface by Luther. His tractate, written in concert with Myconius, con- troverting Der Wiedertaufer Lehre und Geheimniss (1530) was also prefaced by Luther. The reversion to the Roman com- munion of his old friend Crotus led to his mordant Responsio amid (1532, anon.) to the Apologia (1531) of Crotus. He took his part in the theological disputations of the time, at Marburg (1529), the Concordia at Wittenberg (1536), the Convention at Schmalkalden (1537), the discussions at Hagenau and Worrrts (1540). His tractate (1542) against the permission of bigamy in"*' the case of Philip of Hesse was not allowed to be printed (the manuscript is in the Heidelberg university library). In 1542 he removed to Muhlhausen, being appointed by Duke Henry of Saxony for the ordering of the church there. On the death of Myconius (1546) he was entrusted with the oversight of Gotha, in addition to that of Eisenach; to Gotha he

returned in 1547. The remainder of his life was not happy. He was against the Leipzig Interim (1548) with its compromise on some Catholic usages, and was involved in controversies and quarrels; with Georgius Merula, against whom he maintained the need of exorcism in

baptism; with Osiander's adherents in the matter of justification; with his colleague, Nicholas von Amsdorf, to whom he had resigned the Eisenach superintendency; with Flacius Illyricus, and others. He lost favour with Duke John Frederic of Saxony, fell into bad health, was deposed (1555) from his offices, and was disappointed in his hopes of being reinstated, after the colloquy at Eisenach (1556). He died at Leipzig on the nth of August 1558. He was twice married, and had several sons, of whom Eusebius held a chair of philosophy at Wittenberg, and married Melanchthon's grand-daughter, Anna Sabinus. Schmidt gives a full bibliography of the numerous writings of Menius, who translated several of Luther's biblical commentaries into German. His Oeconomia was reprinted in 1855.

See G. L. Schmidt, Justus Menius, der Reformator Thuringens (1867) ; Wagenmann, in Allgemeine deutsche Biog.(l88$) ; G. Kawerau, in Hauck's Realencyklopddie (1903). (A. Go.*)

MENKEN, ADAH ISAACS (183 5-1 868), American actress, was born in New Orleans, the daughter of a Spanish Jew, her name being Dolores Adios Fuertes. Left in poverty at the age of thirteen, she made her first appearance as a dancer in her native city. She had a great success there and in other southern cities, including Havana, and she afterwards aspired to act in serious parts. In 1856 she married John Isaacs Menken, translated Adios to Adah, and thus took the name she there- after bore through various matrimonial ventures. In 1864 she appeared at Astley's in London as Mazeppa, a performance of an athletic dramatic type suited to her fine physique. In England and France she became intimate with many literary men — Swinburne, Charles Reade, Dickens (to whom she dedicated in 1868 a volume of verse, Infelicia), Gautier and Dumas the elder. Paris saw her for a hundred nights in Les Pirates de la Savane, and she also played in Vienna and again in London. She died in Paris on the 10th of August 1868.

HENNONITES, a body of religionists who take their name from Menno Simons (see below), the most valued exponent of their principles.

They maintain a form of Christianity which, discarding the sacerdotal idea, owns no authority outside the Bible and the enlightened conscience, limits baptism to the believer, and lays stress on those precepts which vindicate the sanctity of human life and of a man's word. The place of origin of the views afterwards called Mennonite (see Baptists)' was Zurich, where in 1523 a small community left the state church and (from Jan. 18, 1525) adopted the tenet of believers' baptism. Unlike other Reformers, they denied at once the Christian character of the existing church and of the civil authority, though, in common with the first Christians, it was their duty to obey all lawful requirements of an alien power. By Protestants as much as by Catholics this position was not unnaturally regarded as subversive of the established founda tions of society. Hence the bitter persecutions which, when the safety of toleration was not imagined, made martyrs of these humble folk, who simply wished to cultivate the religious life apart from the world. There was something in this ideal which answered to that medieval conception of separation from the world which had leavened all middle-class society in Europe; and the revolt from Rome had prepared many minds to accept the further idea of separation from the church, for the pursuit of holiness in a society pledged to primitive discipline. Hence the new teaching and praxis spread rapidly from Switzer- land to Germany, Holland and France. While the horrors of the Miinster fanaticism, which culminated in 1534, made Ana*- baptism a byword, and increased the severity of a persecution directed against all Baptists indiscriminately, the reaction against the fatal errors of the Miinster experiment increased also the adherents of communities which discarded the swOrd; thus Menno was brought into their ranks. Each community was independent, united with others only by the bond of love. There was no hierarchy (as with the Familists), but " exhorterS " chosen by the members, among them " elders " for administering baptism and the Lord's Supper; an arrangement so readily renewed that the sure way of putting down such a body was the execution of all its constituents, often by drowning, an

appropriate end, according to Zwingli's quip. The remnant of the Swiss Mennonites (not tolerated till 1710) broke in 1620 into two parties, the Uplanders (or Amish, from their leader Jacob Amen) holding against the Lowlanders that excommunication of husband or wife dissolved marriage, and that razors and buttons were unlawful. In Holland the Mennonites have always been numerous. An offshoot from them at Rhijnsburg in 1619, founded by the four brothers, farmers, Van der Kodde, and named Collegianten from their meetings, termed collegia (thus, as not churches, escaping the penal laws), has

been compared to the Plymouth Brethren, but differed in so far as they required no conformity of religious opinion, and recognized no office of teacher. With them, as Martineau notes, Spinoza had ” an intense fellow-feeling.” Later, the exiled Socinians from Poland (1660) were’ in many cases received into membership. There had previously been overtures, more than once, for union with Mennonites on the part of Polish Socinians, who agreed with them in the rejection of oaths, the refusal to take human life, the consequent abstinence from military service and magisterial office, and in the* Biblical basis of doctrine; differences of doc- trinal interpretation precluded any fusion. In Holland the Mennonites were exempted from military service in 1575, from oath-taking in 1585, from public office in 1617. In Zeeland exemption from military service and oaths was granted in 1577; afterwards, as in Friesland, a heavy poll tax was the price of exemption from military service; but since 1795 they have enjoyed a legal exemption from oath-taking. In France the Mennonites of the Vosges were exempted from military service in 1793, an exemption confirmed by Napoleon, who employed them in hospital service on his campaigns. That he did not exempt the Dutch Mennonites is due to the fact that ” they had ceased to present a united front of resistance to military claims ” (Martineau) ; in fact they sent a large band of volunteers to Waterloo (Barclay). While in Germany the Mennonites exist in considerable numbers, more important are the German Mennonite colonies in southern Russia, brought there in 1786 by Catherine II., and freed, by the grant of complete religious liberty, from the hardships imposed by Prussian military law. These colonies have sent many emigrants to America, where their oldest community was settled (1683) at Germantown, Pennsylvania. Their settlement in. Canada dates from 1786. Among the American Mennonites there are three sections, and a progressive party, known as New School Mennonites.

S. Cramer gives (1903) the following statistics: in all, some 250,000 members, of whom over 80,000 are in the United States, 70,000 in Russia, 60,000 in Holland, 20,000 in Canada, 18,000 in Germany, 1500 in Switzerland, 800 in France, and the same number in Poland and Galicia. (A. Go.*)

MENNO SIMONS (1492-1559), religious leader, was born in 1492 at Witmarsum in Friesland. Of his parentage (apart from his patronymic) and education nothing is known. He was not a man of learning, nor had he many books; for his knowledge of early Christian writers he was partly indebted to the Chronica or compilations of Sebastian Franck. At the age of twenty-four he entered the priesthood, becoming one of two curates under the incumbent of Pingjum, a village near his

birthplace. He accused himself, with the other clergy, of lax and self-indulgent living. Doubts about transubstantiation made him uneasy; some of Luther's tracts fell in his way, and he was comforted by Luther's dictum that salvation does natˆ depend on human dogmata. Hence he began to study the New Testament. The question as to the right age for baptism came up; he found this an open matter in the early church. Then the execution, in March 1531, at Leeuwarden, of the tailor Sicke Freerks, who had been rebaptized in the previous December at Emden, introduced further questions. Menno was not satisfied with the inconsistent answers which he got from Luther, Bucer and Bullinger; he resolved to rely on Scripture alone, and from this time describes his preaching as evangelical, not sacramental. In 1532 he exchanged his curacy for a living at Witmarsum, in response to a popular call. Anabaptism of the Miinster type

repelled him. His first tractate (1535, first printed 1627) is directed against the " horrible and gross blasphemy of John of Leiden " — though the genuineness of this tract has been doubted. A brother of Menno joined the insurgent followers of John Matthyszoon, and was killed at Bolsward (April 1535). Blaming the leaders by whom these poor people had been misled, Menno blamed himself for not having shown them a straight course. Accordingly on the 12th of January 1536, he left the Roman communion. There were now among the so-called Anabaptists four parties, the favourers of the Minister faction, the Baten- burgers, extremists, the Melchiorites and the Obbenites. For a time Menno remained aloof from both Melchior Hofman and Obbe Philipsz. Before the year was out, yielding to the prayer of six or eight persons who had freed themselves from the Minister spell, he agreed to become their minister, and was set apart (January 1537) to the eldership at Groningen, with im- position of hands by Obbe Philipsz, who is regarded as the actual founder of the Mennonite body. In fact, Obbe left the body and is stigmatized as its Demas. Menno repudiated the forma- tion of a sect; those who had experienced the " new birth " were to him the true Christian church, which was limited by no decree of reprobation. His Christology was in the main orthodox, though he rejected terms (such as Trinity) which he could not find in Scripture, and held a Valentinian doctrine of the celestial origin of the flesh of Christ. His church discipline was drawn from the Swiss Baptists. Silent prayer was a feature of the worship; sermons were without texts. Neither baptism (by pouring on the head) nor the Lord's Supper (with the accompaniment of feet- washing) conferred grace; the-J were

divine ordinances which reflected the believer's toward state. Marriage with outsiders was prohibited; women had no part in church government. Oaths and the taking ri Me were absolutely forbidden; hence the magistracy and thn army were for the Mennonite unlawful callings; but magistrates were to be obeyed in all things not prohibited by Scripture. The subsequent career of Menno was that of an active missioner; his changes of place, often compulsory, are difficult to trace. He was apparently much in East Friesland till 1541; in North Holland, with Amsterdam as centre, from 1541 to 1543; again till 1 545 in East Friesland (where he held a disputation at Emden with John a. Lasco in January 1544); till 1547 in South Holland; next, about Liibeck; at Wismar in'1553-1554 (he held two disputations with Martin Micronius at Norden in February 1554); lastly at Wustenfelde, a village near Oldesloo, between Hamburg and Liibeck, where he died on the 13th of January 1559. He had married one Gertrude at Groningen, and left a daughter, by whom the dates of his birth and death were communicated to P. J. Twisch, for his Chronyk (r6ro).

Menno's writings in Plattdeutsch, printed at various places, are numerous, with much sameness, and what an unfriendly critic would call wool-gathering ; through them shines a character attrac- tive by the sincerity of its simple and warm spirituality, the secret of Menno's influence. The collection of his Opera Omnia Theologica (Amsterdam, 1681), folio, in a Dutch version, comprises twenty-three tractates, with reference to nine unprinted. His main principles will be found in his Dot Fundament des Christelycken Leers (1539, 8vo). A selection (Gedenkblatter) from his writings, in a German version, in honour of the (supposed) tercentennial of his death was edited by J. Mannhardt (Danzig, 1861) with an appendix from the writings of Dirk Philipsz (1504-1570), brother of Obbe, and Menno's henchman. His writings are published in English at Elkhart, Indiana.

Since the publication of the Leven (1837) by A. M. Cramer, light has been thrown on the period by the researches of de Hoop Scheffer; see Van der Aa, Biographisch woordenboek der Nederlanden (1869); R. Barclay, Inner Life of Religious Societies of the Commonwealth (1876) for a good account of Mennonite anticipations of Quaker views and practices; F. C. Fleischer, Menno Simons, eene Levensschets (1892); V. M. Reimann, Mennonis Simonis qualisfueritvita (1894); S. Cramer, in Hauck's Realencyklopddie (1903) ; a separate article in the same, Mennoniten, by S. Cramer, gives a survey of the origin and ramifications of the movement in Europe and America. (A. Go. *)

MENOMINEE, a city and the county-seat of Menominee county, Michigan, U.S.A., on Green Bay, at the mouth of the Menominee river,

opposite Marinette, Wisconsin, at the southern extremity of the upper peninsula. Pop. (1890), 10,630; (1900), 12,818, of whom 4186 were foreign-born; (1910 census),

10,507. It is served by the Chicago & North-Western, the Chicago, Milwaukee & St Paul, the Wisconsin & Michigan, and the Ann Arbor railways, and is connected by five bridges with Marinette, Wisconsin. Menominee has several parks, and harbour and dock facilities for the heaviest lake vessels. It is one of the largest lumber centres in the United States; it has excellent water power, and there are manufactures of wire, steel, electrical appli- ances, mill and mining machinery, shoes, beet sugar and paper. The use of beet-pulp instead of Indian corn ensilage for dairy cows has promoted the dairying industry in the city.

A trading post was established here in 1799, but settlement was not begun until 1833. Menominee became the county-seat in 1874, was chartered as a city in 1883, and in 1891 and in 1901 it was re-chartered; in 1903 an amendment to the charter created a municipal court. The city is named after the Menominee Indians, 1 an Algonquian tribe formerly ranging over a consider- able territory in Wisconsin and Michigan, who seem to have been first visited by whites in 1634, when Nicolet found them at the mouth of the Menominee river, and now number about 1600, most of them being under the Green Bay' school superintendency, Wisconsin. The name is the Chippewa word for wild rice, which formed part of the food of the tribe.

MENOMONIE, a city and the county-seat of Dunn county, Wisconsin, U.S.A., about 64 m. E. of St Paul, Minnesota, on the Red Cedar river. Pop. (1890), 5491; (1900), 5655, of whom 1772 were foreign-born; (1905)* 5473; (1910), 5036. It is served by the Chicago, Milwaukee & St. Paul, and the Chicago, St Paul, Minneapolis & Omaha railways. The city is widely known for its institutions, for the most part founded or supported by James Huff Stout (1848-1910), a prominent local lumberman. Among them are the Mabel Tainter Memorial Library, the Dunn County School of Agriculture, the Dunn County Normal Training . School, the Stout Institute for the training of teachers of domestic science &c, institutions in which public school children receive physical training. The city has grain elevators, and manufac- tures of bricks and tiles, foundry and machine shop products, carriages and wagons and flour. Menomonie is an important market for dairy products and livestock. Menomonie was settled about 1846 and was chartered as a city in 1882. The first free travelling library in the state was established here in 1 896 by James Huff Stout.

MENSA and MAREA, semi-nomad pastoral tribes of Africans occupying part of the Abyssinian highlands included in the Italian colony of Eritrea, and the adjacent coast plains of the Red Sea. They have for neighbours the Habab and Beni- Amer tribes, as well as Abyssinians. The Marea are found chiefly in the valley of the Khor Anseba, the Mensa dwelling farther north. These tribes claim Arajp origin, tracing their descent from an uncle of the Prophet. Under Abyssinian rule they were Christians, but became Mahommedans in the 19th century. They speak a dialect of Tigrin (Abyssinian). On the death of a Marea the head of every dependent tigre or slave family must give his heirs a cow. The tribes avenge an illegiti- mate birth by putting parents and child to death.

MENSHIKOV, ALEXANDER DANILOVICH, Prince (1663?- 1729), Russian statesman, was born not earlier than 1660 nor later than 1663. It is disputed whether his father was an ostler or a bargee. At the age of twenty he was gaining his livelihood in the streets of Moscow as a vendor of meat-pies. His hand- some looks and smart sallies attracted the attention of Francois Lefort, Peter's first favourite, who took him into his service and finally transferred him to the tsar. On the death of Lefort*. in 1699, Menshikov succeeded him as prime favourite. Ignorant, brutal, grasping and corrupt as he was, he deserved the confid- ence of his master. He could drill a regiment, build a frigate, administer a province, and decapitate a rebel with equal facility. During the tsar's first foreign tour, Menshikov worked by his side in the dockyard? of Amsterdam, and acquired a thorough knowledge of colloquial Dutch and German. He took an active

1 See W. L. Hoffman in the Fourteenth Report (Washington, 1896) of the Bureau of American Ethnology and A. E. Jenks in the Nine- teenth Report (1 900) .

part in the Azov campaigns (1695-96), and superseded Ogilvie as commander-in-chief during the retreat before Charles XII. in 1708, subsequently participating in the battle of Holowczyn, the reduction of Mazepa, and the crowning victory of Poltava (June 26, 1709), where he won his marshal's baton. From 1709 to 1 7 14 he served during the Courland, Holstein and Pomeranian campaigns, but then, as governor-general of Ingria, with almost unlimited powers, was entrusted with a leading part in the civil administration. Menshikov understood perfectly the principles on which Peter's reforms were

conducted, and was the right hand of the tsar in all his gigantic undertakings. But he abused his omnipotent position, and his depredations fre- quently brought him to the verge of ruin. Every time the tsar returned to Russia he received fresh accusations of peculation against " his Serene Highness." Peter's first serious outburst of indignation (March 1711) was due to the prince's looting in Poland. On his return to Russia in 171 2, Peter discovered that Menshikov had winked at wholesale corruptions in his own governor-generalship. Peter warned him " for the last time " to change his ways. Yet, in 1713, he was implicated in the famous Solov'ey process, in the course of which it was demon- strated that he had defrauded the government of 100,000 roubles. 1 He only owed his life on this occasion to a sudden illness. On his recovery Peter's fondness for his friend overcame his sense of justice. In the last year of Peter's reign fresh frauds and defal- cations of Menshikov came to light, and he was obliged to appeal for protection to the empress Catherine. It was chiefly through the efforts of Menshikov and his colleague Tolstoi that, on the death of Peter, in 1725, Catherine was raised to the throne. Menshikov was committed to the Petrine system, and he recog- nized that, if that system were to continue, Catherine was, at that particular time, the only possible candidate. Her name was a watchword for the progressive faction. The placing of her on the throne meant a final victory over ancient prejudices, a vindication of the new ideas of progress. During her short reign (February 172 5 — May 1727), Menshikov was practically absolute. On the whole he ruled well, his difficult position serving as some restraint upon his natural inclinations. He contrived to prolong his power after Catherine's death by means of a forged will and a coup d'etat. While his colleague Tolstoi would have raised Elizabeth Petrovna to the throne, Menshikov set up the youthful Peter II., son of the tsarevich Alexius, with himself as dictator during the prince's minority. He now aimed at establishing himself definitely by marrying his daughter Mary to Peter II. But the old nobility, represented by the Dolgorukis and the Golitsuins, united to overthrow him, and he was deprived of all his dignities and offices and expelled from the capital (Sept. 9, 1727). Subsequently he was deprived of his enormous wealth, and he and his whole family were banished to Berezov in Siberia, where he died on the 12th of November 1729.

See G. V. Esipov, Biography of A. D- Menshikov (Rus.) (St. Petersburg, 1875); N. I. Kostomarov, The History of Russia in the biographies of her great Men (Rus.), vol. ii. (St Petersburg, 1888, fife.) ; R. Nisbet Bain, The First Romanovs (London, 1905); ibid. The Pupils of Peter the Great, ch. 2-4 (Westminster, 1897). (R. N. B.)

MENSHIKOV, ALEXANDER SERGEIEVICH, Prince (1787- 1869), great-grandson of the preceding, was born on the nth of September 1787, and entered the Russian service as attache to the embassy at Vienna. He accompanied the emperor Alexander throughout his campaigns against Napoleon, and retired from army service in 1823. He then devoted himself

1 The Solov'evs were three brothers ostensibly employed by the Russian government to ship corn from Russia and sell it at Amsterdam. As a matter of fact they were at the head of a combination for selling Menshikov's corn in preference to the corn of the Russian government and the bulk of the proceeds went into Menshikov's pockets. From 1709 to 171 1 they had exported almost as much of Menshikov's corn as of that of the government, though the export of any corn from Russia, except in account of the Treasury, was a capital offence. The affair dragged on from 1713 to 1716, when the examination of the Solov'evs' books, and the subsequent applica- tion of torture, revealed the fact that the Solov'evs had systema- tically robbed the Treasury of 675,000 roubles (1 rouble then = 5s.) and had accumulated a fortune of half a million. For full details see Nisbet Bain, The first Romanovs, pp. 327-329.

to naval matters, became an admiral in 1834, and put the Russian navy, which had fallen into decay during the reign of Alexander, on an efficient footing. At the time of the dispute as to the Holy Places he was sent on a special mission to Constantinople, and when the Crimean war broke out he was appointed com- mander-in-chief by land and sea. He commanded the Russian army at the Alma and in the field operations round Sevastopol. In March 1855 he was recalled, ostensibly and perhaps really, on account of failing health. He died on the 2nd of May 1869 at St Petersburg.

MENSURATION (Lat. mensura, a measure), the science of measurement ; or, in a more • limited sense, the science of numerical representation of geometrical magnitudes.

1. Scope of the Subject. — Even in the second sense, the term is a very wide one, since it comprises the measurement of angles (plane and solid), lengths, areas and volumes. The measure- ment of angles belongs to trigonometry, and it is convenient to regard the measurement of the lengths of straight lines (i.e. of distances between points) as belonging to geometry or trigo- nometry; while the measurement of curved lengths, except in certain special cases, involves the use of the integral calculus. The term " mensuration " is therefore ordinarily restricted to the measurement of areas and

volumes, and of certain simple curved lengths, such as the circumference of a circle.

2. This restriction is to a certain extent arbitrary. The statement that, if the adjacent sides of a rectangle are repre- sented numerically by 3 and 4, the diagonal is represented by 5. is as much a matter of mensuration as the statement that the area is represented by 12. The restriction is really determined by a difference in the methods of measurement. The distance between two points can, at any rate in theory, be measured directly, by successive applications of the unit of measurement. But an area or a volume cannot generally be measured by successive applications of the unit of area or volume; inter- mediate processes are necessary the result of which is expressed by a formula. The chief exception is in the use of liquid measure; this is of importance from the educational point of view (§ 12).

3. The measurement is numerical, i.e. it is representation in terms of a unit. The process of determining the area or volume of a given figure therefore involves two separate processes; viz. the direct measurement of certain magnitudes (usually lengths) in terms of a unit, and the application of a formula for determin- ing the area or volume from these data. Mensuration is not concerned with the first of these two processes, which forms part of the art of measurement, but only with the second. It might, therefore, be described as that branch of mathematics which deals with formulae for calculating the numerical measurements of curved lengths, areas and volumes, in terms of numerical data which determine these measurements.

4. It is also convenient to regard as coming under mensuration the consideration of certain derived magnitudes, such as the moment of a plane figure with regard to a straight line in its plane, the calculation of which involves formulae which are closely related to formulae for determining areas and volumes.

5. On the other hand, the scope of the subject, as described in ,§ 3, is limited by the nature of the methods employed to obtain formtdae which can be applied to actual cases. Up to a certain point, formulae of practical importance can be obtained by the use of elementary arithmetical or geometrical methods. Beyond this point, analytical methods must be adopted, and the student passes to trigonometry and the infinitesimal calculus. These investigations lead, in turn, to further formulae, which, though^- not obtainable by elementary methods, are nevertheless simple in themselves and of practical utility. If these are included in the description ” mensuration,” the subject thus consists of two heterogeneous portions — elementary mensuration, comprising

methods and results, and advanced mensuration, comprising certain results intended for practical application.

6. Mensuration, then, is mainly concerned with quadrature- formulae and cubature-formulae, and, to a not very clearly de- fined extent, with the methods of obtaining such formulae; a quadrature-formula being a formula for calculating the numerical

representation of an area, and a cubature-formula being a formula for calculating the numerical representation of a volume, in terms, in each case, of the numerical repre- sentations of particular data which determine the area or the volume.

7. This use of formulae for dealing with numbers, which express magnitudes in terms of units, constitutes the broad difference between mensuration and ordinary geometry, which knows nothing of units. Mensuration involves the use of geometrical theorems, but it is not concerned with problems of geometrical construction. The area of a rectangle, for instance, is found by calculation from the lengths of the sides, not by construction of a square of equal area. On the other hand, it is worth noticing that the words ” quadrature ” and ” cubature ” are originally due to geometrical rather than numerical con- siderations; the former implying the construction of a square whose area shall be equal to that of a given surface, and the latter the construction of a cube whose volume shall be equal to that of a given solid.

8. There are two main groups of subjects in which practical needs have tended to develop a separate science of mensuration. The first group comprises such subjects as land-surveying; here the measurements in the elementary stages take place in a plane, and the consideration of volumes necessarily constitutes a later stage ; and the figures to be measured are mostly not movable, so that triangulation plays an important part. The second group comprises the mechanic arts, in which the bodies to be measured are solid bodies which can be handled; in these cases plane figures appear mainly as sections of a solid. In develop- ing a system of mensuration-formulae the importance of this latter group of cases must not be overlooked.

A third group, of increasing importance, comprises cases in which curves or surfaces arise out of the application of graphic methods in

engineering, physics and statistics. The general formulae applicable to these cases are largely approximative.

9. Relation to other Subjects.— As a result of the importance both of the formulae obtained by elementary methods and of those which have involved the previous use of analysis, there is a tendency to dissociate the former, like the latter, from the methods by which they have been obtained, and to regard mensuration as consisting of those mathematical formulae which are concerned with the measurement of geometrical magnitudes (including lengths), or, in a slightly wider sense, as being the art of applying these formulae to specific cases. Such a body of formulae cannot, of course, be regarded as constituting a science; it has no power of development from within, and can only grow by accretion. It may be of extreme importance for practical purposes; but its educational value, if it is studied apart from the methods by which the formulae are obtained, is slight. Vitality can only be retained by close, association with more abstract branches of mathematics.

10. On the other hand, mensuration, in its practical aspect, is of importance for giving reality to the formulae themselves and to the principles on which they are based. This applies not only to the geometrical principles but also to the arithmetical prin- ciples, and it is therefore of importance, in the earlier stages, to keep geometry, mensuration and arithmetic in close association with one another; mensuration forming, in fact, the link between arithmetic and geometry.

11. It is in reference to the measurement of areas and volumes that it is of special importance to illustrate geometrical truths by means of concrete cases. That the area of a parallelogram is equal to the area of a rectangle on the same base and between the same parallels, or that the volume of a cone is one-third that of a cylinder on the same base and of the same height, may be established by a proof which is admitted to be rigorous, or be accepted in good faith without proof, and yet fail to be a matter of conviction, even though there may be a clear conception of the relative lengths of the diagonal and the side of a square or of the relative contents of two vessels of different shapes. The failure seems (§ 2) to be due to difficulty in realizing the numerical expression of an area or a solid in terms of a specified unit, while

the same difficulty does not arise in the case of linear measure or liquid measure, where the number of units can be ascertained by direct counting. The difficulty is perhaps less for volumes than for areas, on account of the close relationship between solid and fluid measure.

12. The main object to be aimed at, therefore, in the study of elementary mensuration, is that the student should realize the possibility of the numerical expression of areas and volumes. The following are some important points.

(i) The double aspect of an area should be borne in mind ; i.e. area should be treated not only as length multiplied by length, but also as volume divided by thickness. There are, indeed, certain advan- tages in preferring the latter to the former, and in proceeding from volumes to areas rather than from areas to- volumes. While, for instance, it may be difficult to realize the equality of area of two plots of ground of different shapes, it may be easy to realize the equality of the amounts of a given material that would be required to cover them to a particular depth. This method is unconsciously adopted by the teacher who illustrates the equality of area of two geometrical figures by cutting them out of cardboard of uniform thickness and weighing them.

(ii) The very earliest stages of mensuration should be directly associated with simple arithmetical processes.

(iii) Association of solid measure with liquid measure, presenting numerical measurement in a different aspect, should be retained by testing volumes as found from linear dimensions with the volumes of the same bodies as found by the use of measures of capacity. Here, as usual, the British systems of measures produce a difficulty which would not arise under the metric system.

(iv) Solids of the same substance should be compared by measur- ing and also by weighing; the comparison being then extended to areas of uniform thickness (see (i) above).

(v) The idea of an average may be introduced at an early stage, methods of calculating an average being left to a later stage.

13. Classification. — The methods of mensuration fall for the most part under one or other of three main heads, viz. arith- metical mensuration, geometrical mensuration, and analytical mensuration.

14. The most elementary stage is arithmetical mensuration, which comprises the measurement of the areas of rectangles and parallelepipeds. This may be introduced very early; square tablets being used for the mensuration of areas, and cubical blocks for the mensuration of volumes. The measure of the area of a rectangle is thus presented as the product of the measures of the sides, and arithmetic

and mensuration are developed con- currently. The commutative law for multiplication is directly illustrated; and subdivisions or groupings of the units lead to such formulae as (a + a) (6 + /3) = a& + a/? + ab + afi. Associ- ation with other branches of science is maintained by such methods as those mentioned in § 12.

The use of the square bricks familiarizes the scholar with the ideas of parallel lines, of equality of lengths, and of right angles. The conception of the right angle is strengthened, by contrast, by the use of bricks in the form of a rhombus.

15. The next stage is geometrical mensuration, where geo- metrical methods are applied to determine the areas of plane rectilinear figures and the volumes of solids with plane faces. The ordinary process involves three separate steps. The first step is the establishment of the exact equality of congruence of two geometrical figures. In the case of plane figures, the congruence is tested by an imaginary superposition of one figure on the other; but this may more simply be regarded as the super- position, on either figure, of the image of the other figure on a contiguous plane. In the case of solid figures a more difficult geometrical abstraction is involved. The second step is thecon- version of one figure into another by a process of dissection, followed by rearrangement of parts; the figure as rearranged being one whose area or volume can be calculated by methods already established. This is the process adopted, for instance, for comparison of the area of a parallelogram with that of a rectangle on the same base and of the same height. The third step is the arithmetical calculation of the area or volume of the rearranged figure. These last two steps may introduce magnitudes which have to be subtracted, and which therefore have to be treated as negative quantities in the arithmetical calculation. ,

The difficulties to which reference has been made in § 11 are largely due to the abstract nature of the process involved in the second of the above steps. The difficulty should, wherever possible, be removed by making the process of dissection and rearrangement complete. This is not always done. To say, for instance, that the area of a right-angled triangle is half the area of the rectangle contained by the two sides, is not to say what the area is, but what it is the half of. The proper statement is that, if a and b are the sides, the area is equal to the area of a rectangle whose sides are a and %b; this being, in fact, a

particular case of the proposition that the area of a trapezium is equal to the area of a rectangle whose sides are its breadth and the arithmetic mean of the lengths of the two parallel sides. This mode of statement helps to establish the idea of an average. The deduction of the formula lab, where a and b are numbers, should be regarded as a later step.

Elementary trigonometrical formulae, not involving the conception of an angle as generated by rotation, belong to this stage; the additional geometrical idea involved being that of the proportionality of the sides of similar triangles.

16. The third stage is analytical mensuration, the essential feature of which is that account is taken of the manner in which a figure is generated. To prevent discontinuity of results at this stage, recapitulation from an analytical point of view is desirable. The rectangle, for instance, has so far been regarded as a plane figure bounded by one pair of parallel straight lines and another pair at right angles to them, so that the conception of ” rectan- gularity ” has had reference to boundary rather than to content; analytically, the rectangle must be regarded as the figure generated by an ordinate of constant length moving parallel to itself with one extremity on a straight line perpen- dicular to it. This is the simplest case of generation of a plane figure by a moving ordinate; the corresponding figure for generation by rotation of a radius vector is a circle.

To regard a figure as being generated in a particular way is essentially the same as to regard it as being made up of a number of successive elements, so that the analytical treatment involves the ideas and the methods of the infinitesimal calculus. It is not, however, necessary that the notation of the calculus should be employed throughout.

A plane figure bounded by a continuous curve, or a solid figure bounded by a continuous surface, may generally be most con- veniently regarded as generated by a straight line, or a plane area, moving in a fixed direction at right angles to itself, and changing as it moves. This involves the use of Cartesian co-ordinates, and leads to important general formulae, such as Simpson’s formula. The treatment of an angle as geneiated by rotation, the investigation of the relations between trigonometrical ratios and circular measure, the application of interpolation to trigono- metrical tables, and the general use of graphical methods to represent continuous variation, all imply an analytical onlook, and must therefore be deferred to this stage.

17. There are certain special cases where the treatment is really

analytical, but where, on account of the simplicity or importance of the figures involved, the analysis does not take a prominent part.

(i) The circle, and the solid figures allied to it, are of special importance. The ordinary definition of a circle is equivalent to definition as the figure generated by the rotation of a radius of constant length in a plane, and is thus essentially analytical. The ideas of the centre and of the constancy of the radius do not, however, enter into the elementary conception of the circle as a round figure. This elementary conception is of the figure as already existing, rather than of its method of description; the test of circularity being the possibility of rotation within a surrounding figure so as to keep the two boundaries always completely in contact. In the same way, the elementary conception of the sphere involves the idea of sphericity, which would be tested in a similar way, and is in fact , so tested, at an early stage by tactual perception, and at a more advanced stage by mechanical methods; the next step being the circularity of the central section, as roughly tested (where the sphere is small) by visual perception, i.e. in effect, by the circularity of the cross-section of a circumscribing cylinder; and the ideas of the centre and of non-central sections follow later.

It seems to follow that the consideration of the area of a circle shoujd precede the consideration of its perimeter, and that the

consideration of the volume of a sphere should precede the consideration of its surface-area. The proof that the area of a circle is proportional to the square of its diameter would therefore precede the proof that the perimeter is proportional to the diameter ; the former property is the easier to grasp, since the conception of the length of a curved line as the limit of the sum of a number of straight lengths presents special difficulties. The ratio |jt would thus first appear as the ratio of the average breadth of a circle to the greatest breadth; the interpretation of w as the ratio of the circumference to the diameter being a secondary one. This order follows, in fact, the historical order of development of the subject.

(ii) Developable surfaces, such as the cylinder and the cone, form a special class, so far as the calculation of their area is concerned. The process of unrolling is analytical, but the unrolled area can be measured by methods not applicable to other surfaces.

(iii) Solids of revolution also form a special class, which can be conveniently treated by the two theorems of Pappus (§ 33).

18. The above classification relates to methods. The classifi- cation of results, i.e. of formulae, will depend on the purpose for which the collection of formulae is required, and may involve the grouping of results obtained by very different methods. A collection of formulae relating to the circle, for instance, would comprise not only geometrical and trigonometrical formulae, but also approximate formulae, such as Huygens's rule (§ 91), which are the result of advanced analysis.

The present article is not intended to give either a complete course of study or a complete collection of formulae, and there- fore such only of the ordinary formulae are given as are required for illustrating certain general principles. For fuller discussion reference should be made to Geometry and Trigonometry, as well as to the articles dealing with particular figures, such as Triangle, Circle, &c.

19. The most important formulae are those which correspond ,to the use of rectangular Cartesian co-ordinates. This implies the treatment of a plane or solid figure as being wholly comprised between two parallel lines or planes, regarded by convention as being vertical; the figure being generated by an ordinate or section moving at right angles to itself through a distance which is called the breadth of the figure. The length or area obtained by dividing the area or the volume of the figure by its breadth is the mean ordinate (mean height) or mean section (mean sectional area) of the figure.

Quadrature-formulae or cubature-formulae may sometimes be conveniently replaced by formulae giving the mean ordinate or mean section. In the early stages it is best to use both methods, so as to develop the idea of an average (§ 12). In the present article the formulae for area or volume will be used throughout.

20. Approximation. — The numerical result obtained by apply- ing a formula to particular data will generally not be exact. There are two kinds of causes producing want of exactness.

(i) The formula itself may not be numerically exact. This may happen in either of two ways.

(a) The formula may involve numbers or ratios which cannot be expressed exactly in the ordinary notation. This is the case, for instance, with formulae which involve v or trigonometrical ratios. This inexactness may, however, be ignored, since the numbers or ratios in question can generally be obtained to a greater degree of accuracy than the other numbers involved in the calculation (see (ii)

(b) below).

(b) The formula may only be approximative. The length of the arc of a circle, for instance, is known if the length of the chord and its distance from the middle point of the arc are known; but it may be more convenient in such a case to use a formula such as Huygens's rule than to obtain a more accurate result by means of trigono- metrical tables.

(ii) The data may be such that an exact result is impossible.

(a) The nature of the bounding curve or surface may not be exactly known, so that certain assumptions have to be made, a formula being then used which is adapted to these assumptions. The application of Simpson's rule, for instance, to a plane figure implies certain assumptions as to the nature of the bounding curve. Such a formula is approximative, in that it is known that the result of its application will only be approximately correct ; it differs from an approximative formula of the kind mentioned in (i) (6) above, in that it is adopted of necessity, not by choice.

(b) It must, however, be remembered that in all practical applications of formulae the data have first to be ascertained by direct or indirect measurement; and this measurement involves a certain

I margin of error.

The two sources of error mentioned under (a) and (6) above are closely related. Suppose, for instance, that we require the area of a circular grass-plot of measured diameter. As a matter of fact, no grass-piot is truly circular; and it might be found that if the breadth in various directions were measured more accurately the want of circularity would reveal itself. Thus the inaccuracy in taking the measured diameter as the datum is practically of the same order as the inaccuracy in taking the grass-plot to be circular.

(iii) In dealing with cases where actual measurements are involved, the error (i) due to inaccuracy of the formula will often be negligible in comparison with the error (ii) due to inaccuracy of the data. For this reason, formulae which will only give approximate results are usually classed together as rules, whether the inaccuracy lies (as in the case of Huygens's rule) in the formula itself, or (as in the case of Simpson's rule) in its application to the data.

21. It is necessary, in applying formulae to specific cases, not only, on the one hand, to remember that the measurements are only approximate, but also, on the other hand, to give to any ratio such as ir a value which is at least more accurate than the measurements. Suppose, for instance, that in the example given in § 20 the diameter as measured is 15 ft. 3 in. If we take tt = 3 • 14 and find the area to be 26288-865 sq. in. = 182 sq. ft. 80-865 S Q- in., we make two separate mistakes. The main mistake is in giving the result as true to a small fraction of a square inch; but, if this degree of accuracy had been possible, it would have been wrong to give w a value which is in error by more than 1 in

2000.

Calculations involving feet and inches are sometimes performed by means of duodecimal arithmetic; i.e., in effect, the tables of square measure and of cubic measure are amplified by the insertion of intermediate units. For square measure —

12 square inches = 1 superficial prime, 12 superficial primes = 1 square foot; while for cubic measure —

12 cubic inches = 1 solid second,

12 solid seconds = 1 solid prime,

12 solid primes = 1 cubic foot. When an area has been calculated in terms of square feet, primes and square inches, the primes and square inches have to be reduced to square inches; and similarly with the calculation of volumes. The value of *• for duodecimal arithmetic is 3 + 1/12+8/12 2) 4/i2 3 +8/i2 4 + . . . ; so that, marking off duodecimal fractions by commas, the area in the above case is J of 3, I, 8, 4, 8X15, 3X15, 3 sq. ft. = 182, 7, 10 sq. ft. = 182 sq. ft. 94 sq. in. (or 182J sq. ft. approximately).

MENSURATION OF SPECIFIC FIGURES (GEOMETRICAL)

22. Areas of Plane Rectilinear Figures. — The following are expressions for the areas of some simple figures; the expressions in (i) and (ii) are obtained arithmetically, while those in (iii)-(v) involve dissection and rearrangement.

(i) Square: side a. Area = a 2 .

(ii) Rectangle : sides a and b. Area =0 b.

(iii) Right-angled triangle: sides a and b, enclosing the right angle. Area. = $ab.

(iv) Parallelogram: two opposite sides a and a, distance between them h. Area = ha.

(v) Triangle: one side a, distant h from the opposite angle. Area = \ha.

If the data for any of these figures are other than those given above, trigonometrical ratios will usually be involved. If, for instance, the data for the triangle are sides a and 6, enclosing an angle C, the area is \ab sin C.

23. The figures considered in § 22 are particular cases of the trapezium, which is a quadrilateral with two parallel sides. If these sides are a and b, at distance h from one another, the area is h.%(a+ b). In the case of the triangle, for instance, b is zero, so that the area is JAa.

The trapezium is also sometimes called a ” trapezoid,” but it will be convenient to reserve this term for a different figure (§ 24).

The most important form of trapezium is that in which one of the two remaining sides of the figure is at right angles to the two parallel sides. The trapezium is then a right trapezium; the two parallel sides are called the sides, the side at right angles to them the base, and the fourth side the top.

By producing the two parallel sides of any trapezium (e.g. a para- lellogram), and drawing a line at right angles to them, outside the figure, we see that it may be treated as the difference of two right trapezia.

It is, however, more simple to convert it into a single right trapezium. Let CABD (fig. 1) 1 be a trapezium, the sides CA and DB being parallel. Draw any straight line at right angles to CA and DB (produced if necessary), meeting them in M and N. Along CA and DB, on the same side of MN, take MA’ = CA, NB’ = DB; and

join A’B’. Then MA’B’N is a right trapezium, whose area is equal to that of CABD; and it is related to the latter in such a way that, if any two lines parallel to AC and BD meet AB, CD, MN, A’B’, in Eˆ Jˆ P, E’, and F, H, Q, F’, respectively,

M

2…

Fig. 1.

the area of the piece PE’F’Q of the right trapezium

is equal to the. area of the piece GEFH of the original , t

trapezium. The right trapezium so constructed _ > ?»’

may be called the equivalent right trapezium. In

the case of a parallelogram, the equivalent right

trapezium is a rectangle; in the case of a triangle,

it is a right-angled triangle.

24. If we take a series of right trapezia, such that one side (§ 23) of the first is equal to one side of the second, the other side of the second is equal to one side of the third, and so on, and place them with their bases in a straight line and their equal sides adjoining each other, we get a figure such as MABCDEFS (fig. 2), which has two parallel sides MA and SF, a base MS at right angles to these, and the remainder of its boundary from A to F recti- linear, no part of the figure being outside the space between MA (produced) and SF (produced). A figure of this kind will be called a trapezoid.

(i) If from the other angular points B, C, D, E, perpendiculars BN, CP, DQ, ER, are drawn to the base MS (fig. 2), the area is MN.|(MA + NB) + NP.i(NB + PC)+. . . . + RS.f(RE+SF) = i(MN. MA + MP. NB + NQ. PC+ . . . . + RS . SF). The lines MA, NB, PC, ... are called the ordinates of the points A, B,C, ... from the base MS, and the portions MN, NP, PQ, ... of the base are the projections of the sides AB, BC, CD, ... on the base.

(ii) A special case is that in which A coincides with M, and F with S. The figure then stands on a base MS, the remainder of its boundary being a broken line from M to S. The formula then becomes

area = |(MP.NB+NQ . PC+ . – . +QS . RE),

i.e. the area is half the sum of the products obtained by. multiplying each ordinate by the distance between the two adjacent ordinates. It would be possible to regard this form of the figure as the general one;

the figure considered in (i) would then represent the special case in which the two end-pieces of the broken line are at right angles to the base.

(iii) Another special case is that in which the distances MN, NP, PQ, . . . RS are all equal. If this distance is h, then area = A(iMA + NB + PC-f-. . . + JSF).

25. To find the area of any rectilinear figure, various methods are available.

(i) The figure may be divided into triangles. The quadrilateral, for instance, consists of two triangles, and its area is the product of half the length of one diagonal by the sum of the perpendiculars drawn to this diagonal from the other two angular points.

For figures of more than four sides this method is not usually convenient, except for such special cases as that of a regular polygon, which can be divided into triangles by radii drawn from its centre.

(ii) Suppose that two angular points, A and E, are joined (fig. 3) so as to form a diagonal AE, and that the whole cf the figure lies between lines through A and E at right angles to AE. Then the figure is (usually) the sum of two trapezoids on base AE, and its area can be calculated as in § 24. If BN, CP, Fig. 3.

DQ, ... FS, GT are the perpen- diculars to AE from the angular points, the ordinates NB, PC, ... are called the offsets from the diagonal to the angular points.

The area of the polygon in fig. 3 is given by the expression i(AP . NB + NQ . PC + PE . QD + ET . SF + SA . TG).

It should be noticed (a) that AP , NQ SA are taken in tnte*

cyclical order of the points ABC . . . GA, and (6) that in fig. 3, if AN and NB are regarded as positive, then SF, TG, ET and SA are negative, but the products ET . SF and SA . TG are positive. Negative products will arise if in moving from A to E along the perimeter of either side of the figure the projection of the moving point does not always move in the direction AE.

(iii) Take any straight line intersecting or not intersecting the figure, and draw perpendiculars Aa, Bb, Cc, V > d, . . . Ff, Gg to this line. Then, with proper attention to signs,

area = K2& • aA + ac'. bB + bd . cC-f. .. + / < *. gG). (iv) The figure may be replaced by an equivalent trapezoid, on the system explained in § 23. Take any base X'X, and draw lines at right angles to this base through all the angular points of the figure.

Volume = height X J . area

Let the lines through B, G, C, D and F (fig. 4) cut the boundary of the figure again in B', G', C, D' and F , and meet the base

X'X in K, L, M, N and P; the points A and E being at the extremities of the figure, and the lines through them meeting the base in a and e. Then, if we take ordinates Kb, Lg, Me, Ni, P/, equal to B'B, GG', C'C, D'D, FF', the figure abgcdfe will be the equivalent trapezoid, and any ordinate drawn from the base to the top of this trapezoid will be _ equal to the portion of this

*' IG – 4- ordinate (produced) which falls

within the original figure.

26. Volumes of Solids with Plane Faces— The following are expressions for the volumes of some simple solid figures, (i) Cube: side a. Volume = a 3 .

(ii) Rectangular parallelepiped : sides a, 6, c. Volume = abc. (iii) Right prism. Volume = length of edge X area of end. (iv) Oblique prism. Volume = height X area of end = length of edge X area of cross-section; the " height " being the perpendicular distance between the two ends.

The parallelepiped is a particular case, (v) Pyramid with rectilinear base, of base.

The tetrahedron is a particular case.

(vi) Wedge: parallel edges a, b, c; area of cross-section S. Volume = i(a + b + c)S.

This formula holds for the general case in which the base is a trapezium; the wedge being thus formed by cutting a triangular prism by any two planes.

(vii) Frustum of pyramid with rectilinear base: height h; areas of ends (i.e. base and top) A and B. Volume = fc. KA + VAB+B). 27. The figures considered in § 26 are particular cases of the pristnoid (or prismatoid), which may be defined as a solid figure with two parallel plane rectilinear ends, each of the other (i.e. the lateral) faces being a triangle with an angular point in one end of the figure and its opposite side in the other. Two adjoining faces in the same plane may together make a trapezium. More briefly, the figure may be defined as a polyhedron with two parallel faces containing all the vertices.

If R and S are the ends of a prismoid, A and B their areas, h the

Cerpendicular distance between them, and C the area of a section y a plane parallel to R and S and midway between them, the volume of the prismoid is

ifc(A+4C+B). This is known as the prismoidal formula.

The formula is a deduction from a general formula, considered later (§ 58), and may be verified in various ways. The most instructive is to regard the prismoid as built up (by addition or subtraction) of simpler figures, which are particular cases of it.

(i) Let R and S be the vertex and the base of a pyramid. Then A = O, C = iB, and volume = \hB = JA(A + 4C + B). The tetrahedron is a particular case.

(ii) Let R be one edge of a wedge with parallel ends, and S the face containing the other two edges. Then A = 0, C = §B, and volume = JAB = I/HA+4C+B).

(iii) Let R and S be two opposite edges of a tetrahedron. Then che tetrahedron may be regarded as the difference of a wedge with parallel ends, one of the edges being “R, and a pyramid whose base is a parallelogram, one side of the parallelogram being S (see fig. 9, § 58). Hence, by (i) and (ii), the formula holds for this figure.

(iv) For the prismoid in general let ABCD ... be one end, and abed . . . the other. Take any point P in the latter, and form triangles by joining P to each of the sides AB, BC, . . . ab, be, . . . of the ends, and also to each of the edges. Then the prismoid is divided into a pyramid with vertex P and base ABCD . . ., and a series of tetrahedra, such as PABa or PAo&. By (i) and (iii), the formula holds for each of these figures; and therefore it holds for the prismoid as a whole. Another method of verifying the formula is to take a point Q in the mid-section, and divide up the prismoid into two pyramids with vertex Q and bases

ABCD . . . and abed . . . respectively, and a series of tetra- hedra having Q as one vertex.

28. The Circle and Allied Figures. — The mensuration of the circle is founded on the property that the areas of different circles are , proportional to the squares on their diameters.

Denoting the constant ratio by iir, the area of a circle is ira 2 , where a is the radius, and =-14159 approximately. The expression 2ra for the length of the circumference can be deduced by consider- ing the limit of the area cut off from a circle of radius a by a concentric circle of radius — 0, when a becomes indefinitely small; this is an elementary case of differentiation. The lengths of arcs of the same circle being proportional to the

angles subtended by them at the centre, we get the idea of circulai measure.

Let O be the common centre of two circles, of radii a and b, and let radii enclosing an angle (circular measure) cut their circum- ferences in A, B and C, D respectively (fig. 5). Then the area of ABDC is

ib*0-ia?0 = (b-a)-i(b+a)6.

If we bisect AB and CD in P and Q respectively, and describe the arc PQ of a circle with centre O, the length of this arc is h(b+a)B; and 6-a=AB. Hence area ABDC=ABX arc PQ. The figure ABDC is a sector of an annulus, which is the portion of a circle left after cutting out a concentric circle.

29. By considering the circle as the limit of a polygon, it follows that the formulae (iii) and (v) of § 26 hold for a right circular cylinder and a right circular cone ; i.e.

volume of right circular cylinder = length X area of base; volume of right circular cone = height X 5 area of base. These formulae also hold for any right cylinder and any cone.

30. The curved surfaces of the cylinder and of the cone are developable surfaces; i.e. they can be unrolled on a plane. The curved surface of any right cylinder (whether circular or not) be- comes a rectangle, and therefore its area = length .X perimeter of base. The curved surface of a right circular cone becomes a sector of a circle, and its area = J-slant height X perimeter of base.

31. If a is the radius of a sphere, then (i) volume ol sphere = \ira z ;

(ii) surface of sphere = 4«j 2 = curved surface of circum- scribing cylinder.

The first of these is a particular case of the prismoidal formula (§ 58). To obtain (i) and (ii) together, we show that the volume of a sphere is proportional to the volume of the cube whose edge is the diameter; denoting the constant ratio by fX, the volume of the sphere is Xa 3 , and thence, by taking two concentric spheres (cf. § 28), the area of the surface is 3Xa 2 . This surface may be split up into elements, each of which is equal to a corresponding element of the curved surface of the circumscribing cylinder, so that 3Xa 2 = curved surface of cylinder = 20. 27ra = 47ra 2 . Hence X = |7r.

The total surface of the cylinder is 4xa 2 +7ra 2 +7rff 2 = 6xd 2 , and its volume is 2a. 5ra 2 =2ira 3 . Hence

volume of sphere =

surface

These latter formulae are due to Archimedes.

32. Moments and Centroids. — For every material body there is a point, fixed with regard to the body, such that the moment of the body with regard to any plane is the same as if the whole mass were collected at that point; the moment being the sum of the products of each element of mass of the body by its distance from the plane. This point is the centroid of the body.

The ideas of moment and of centroid are extended to geometrical figures, whether solid, superficial or linear. The moment of a figure with regard to a plane is found by dividing the figure into elements of volume, area or length, multiplying each element by its distance from the plane, and adding the products. In the case of a plane area or a plane continuous line the moment with regard to a straight line in the plane is the same as the moment with regard to a per- pendicular plane through this line; i.e. it is the sum of the products of each element of area or length by its distance from the straight line. The centroid of a figure is a point fixed with regard to the figure, and such that its moment with regard to any plane (or, in the case of a plane area or line, with regard to any line in the plane) is the same as if the whole volume, area or length were concen- trated at this point. The centroid is sometimes called the centre of volume, centre of area, or centre of arc. The proof of the existence of the centroid of a figure is the same as the proof of the existence of the centre of gravity of a

body. (See Mechanics.)

The moment as described above is sometimes called the first moment. The second moment, third moment, ... of a plane or solid figure are found in the same way by multiplying each element by the square, cube, ... of its distance from the line or plane with regard to which the moments are being taken.

If we divide the first, second, third, . . . moments by the total volume, area or length of the figure, we get the mean distance, mean square of distance, mean cube of distance. ... of the figure from the line or plane. The mean distance of a plane figure from a line in its plane, or of any figure from a plane, is therefore the same as the' distance of the centroid of the figure from the line or plane.

We sometimes require the moments with regard to a line or plane through the centroid. If No is the area of a plane figure, and Ni, N 2 , . . . are its moments with regard to a line in its plane, the moments Mi, M 2 , . . . with regard to a parallel line through the centroid are given by

Mi = N> — zNo = o,

Mi = Nj – 2*Ni + ˆNo = N s – * 2 N ,

of sphere = § volume of circumscribing cylinder; of sphere = f surface of circumscribing cylinder.

M, = N, – gxN g _i. + g(g 2! 'W ,, ()<*N„;

. +()« 1 2 »«->Ni +

MENSURATION

*39

where * = the distance between the two lines = Ni/No. These formulae also hold for converting moments of a solid figure with regard to a plane into moments with regard to a parallel plane through the centroid ; x being the distance between the two planes. A line through the centroid of a plane figure (drawn in the plane of the figure) is a central line, and a plane through the centroid of a solid figure is a central plane, of the figure.

The centroid of a rectangle is its centre, i.e. the point of intersec- tion of its diagonals. The first moment of a plane figure with regard to a

line in its plane may be regarded as obtained by dividing the area into elementary strips by a series of parallel lines indefinitely close together, and concentrating the area of each strip at its centre. Similarly the first moment of a solid figure may be regarded as obtained by dividing the figure into elementary prisms by two sets of parallel planes, and concentrating the volume of each prism at its centre. This also holds for higher moments, provided that the edges of the elementary strips or prisms are parallel to the line or plane with regard to which the moments are taken.

33. Solids and Surfaces of Revolution. — The solid or surface generated by the revolution of a plane closed figure or a plane continuous line about a straight line in its plane, not intersecting it, is a solid of revolution or surface of revolution, the straight line being its axis. The revolution need not be complete, but may be through any angle.

The section of a solid of revolution by a plane at right angles to the axis is an annulus or a sector of an annulus (fig. 5), or is composed of two or more such figures. If the solid is divided into elements by a series of such planes, and if k is the distance between two consecutive planes making sections such as ABDC in fig. 5, the volume of the element between these planes, when h is very small, is approximately iXAB X arc PQ = h. AB.OP.0. The corresponding element of the revolving figure is approximately a rectangle of area A.AB, and OP is the distance of the middle point of either side of the rectangle from the axis. Hence the total volume of the solid is M.0, where M is the sum of the quantities Zt.AB.OP, i.e. is the moment of the figure with regard to the axis. The volume is there- fore equal to S.y.S, where S is the area of the revolving figure, and y is the distance of its centroid from the axis.

Similarly a surface of revolution can be divided by planes at right angles to the axis into elements, each of -which is approximately a section of the surface of a right circular cone. By unrolling each such element (§ 30) into a sector of a circular annulus, it will be found that the total area of the surface is M'.0 = L.z.0, where M' is the moment of the original curve with regard to the axis, L is the total length of the original curve, and z is the distance of the centroid of the curve from the axis. These two theorems may be stated as follows : — (i) If any plane figure revolves about an external axis in its plane, the volume of the solid generated by the revolution is equal to the product of the area of the figure and the distance travelled by the centroid of the figure.

(ii) If any line in a plane revolves about an external axis in the plane, the area of the curved surface generated by the revolution is equal to the product of the length of the line and the distance travelled by the centroid of the line.

These theorems were discovered by Pappus of Alexandria (c. a.d. 300), and were made generally known by Guldinus (c. a.d. 1640). They are sometimes known as Guldinus ‘s Theorems, but are more properly described as the Theorems of Pappus. The theorems are of use, not only for finding the volumes or areas of solids or surfaces of revolution, but also, conversely, for finding centroids or centres of gravity. They may be applied, for instance, to finding the centroid of a semicircle or of the arc of a semicircle.

34. Segment of Parabola. — The parabola affords a simple example of the use of infinitesimals. Let AB (fig. 6) be any arc of a parabola; and suppose we require the area of the figure bounded by this

arc and the chord AB.

Draw the tangents at A and B, L meeting at T; draw TV parallel to the axis of the parabola, meeting the arc in C and the chord in V; and M draw the tangent at C, meeting AT and BT in a and 6. Then (see Parabola) TC = CV, AV = VB, and K ab is parallel to AB, so that aC = Cb. Hence area of triangle ACB = twice area of triangle aTb. Repeating the process with the arcs AC and CB, and continuing the repetition indefi- nitely, we divide up the required area and the remainder of the triangle ATB into corresponding elements, each element of the former being double the corresponding elements of the latter. Hence the required area is double the area of the remainder of the triangle, and therefore it is two-thirds of the area of the triangle.

The line TCV is parallel to the axis of the parabola. If we draw a line at right angles to TCV, meeting TCV produced in M and parallels through A and B in K and L, the area of the triangle ATB is JKL.TV = KL.CV; and therefore the area of the figure bounded by AK, BL, KL and the arc AB, is

KL . i(AK + BL) + |KL (CM -*(AK + BL)1 , = JKL.

l’

By

*.-/\

M

,

lc

V

T’

V

Fig.

area ABCD = -

Fig. 7.

Similarly, for a corresponding figure K’L’BA outside the parabola, the area is

JK’L’(K’A + 4 M’C + L’B).

35. The Ellipse and the Ellipsoid. — For elementary mensuration the ellipse is to be regarded as obtained by projection of the circle, and the ellipsoid by projection of the sphere. Hence the area of an ellipse whose axes are 2a and ib is nab ; and the volume of an ellipsoid whose axes are 2a, 26 and 2c is &irabc. The area of a strip of an ellipse between two lines parallel to an axis, or the volume of the portion (frustum) of an ellipsoid between two planes parallel to a principal section, may be found in the same way.

36. Examples of Applications. — The formulae of § 24 for the area of a trapezoid are of special importance in land-surveying. The measurements of a polygonal field or other area are usually taken as in § 25 (ii) ; a diagonal AE is taken as the base-line, and for the points B, C, D, . . . there are entered the distances AN, AP, AQ, . . . along the base-line, and the lengths and directions of the offsets NB, PC, QD, . . . The area is then given by the formula of § 25 (ii).

37. The mensuration of earthwork involves consideration of quadrilaterals whose dimensions are given by special data, and of prismoids whose sections are such quadrilaterals. In the ordinary case three of the four lateral surfaces of the prismoid are at right angles to the two ends. In special cases two of these three lateral surfaces are equally inclined to the third.

(i) In fig. 7 let base BC = 2a, and let h be the distance, measured at right angles to BC, from the middle point of BC to AD. Also, let angle ABC=jr-0, angle BCD=7r-<£, angle between BC and AD = ˆ. Then (as the difference of two triangles)

(h cot ˆ+a)' _ (h cot lfr-a) 2

2(C0t ˆ — COt <(>) 2(C0t ˆ+COt 6)'

(ii) If 4> =6, this becomes

area " tanˆ-tan 2 ˆ + a tan B ˆ ~ ° 2 tan 9- (iii) If ˆ = 0, so that AD is parallel to BC, it becomes

area = 2ah +i (cot 8 + cot)h 2 . (iv) To find the volume of a prismoidal cutting with vertical ends, and with sides equally inclined to the vertical, so that =8, let the values of h, $ for the two ends be hi, fa, and hz, fa, and write

m = cot C fa~ cot 8 (a + h cot 6) ' w <= cot T + 'cot 9 < a + hl cot •>•

cot fa , , ... cot fa , , 1 ˆ „\

W2 = cot fa- cot 8 (° + hi cot e) ' "*= cot fa + cot 8 < a + fe cot *>• Then volume of prismoid = length Xj(»ziMi -f-j» 2 W2 +

himinz + W2W1) —3a 2 } tan B.

MENSURATION OF GRAPHS

38. (A) Preliminary. — In § 23 the area of a right trapezium has been expressed in terms of the base and the two sides; and in § 34 the area of a somewhat similar figure, the top having been replaced by an arc of a parabola, has been expressed in terms of its base and of three lengths which may be regarded as the sides of two separate figures of which it is composed. We have now to consider the extension of formulae of this kind to other figures, and their application to the calculation of moments and volumes.

39. The plane figures with which we are concerned come mainly under the description of graphs of continuous variation. Let E and F be two magnitudes so related that whenever F has any value (within certain limits) E has a definite corresponding value. Let u and x be the numerical expressions of the magnitudes of E and F. On any line OX take a length ON equal to xG, and from N draw NP at right angles to

OX and equal to wH; G and H being convenient units of length. Then we may, ignoring the units_G and H, speak of ON and NP as being equal to x and u respec* tiyely. Let KA and LB be the positions of NP corresponding to the extreme values of x. Then the different positions of NP will (if x may have any value from OK to OL) trace out a figure on base KL, and extending from KA to LB; this is called the graph of E in respect of F. The term is also sometimes applied to the line AB along which the point P moves as N moves from K to L.

To illustrate the importance of the mensuration of graphs, suppose that we require the average value of w with regard to x. It may be shown that this is the same thing as the mean distance

of elements of the graph from an axis through O at right angles to OX. Its calculation therefore involves the calculation of the area and the first moment of the graph.

40. The processes which have to be performed in the mensuration of figures of this kind are in effect processes of integration ; the distinction between mensuration and integration lies in the different natures of the data. If, for instance, the graph were a trapezium, the calculation of the area would be equivalent to finding the integral, from $x = a$ to $x = b$, of an expression of the form px--q. This would involve p and q; but, for our purposes, the data are the sides $pa + q$ and pb--q and the base b— a, and the expression of the integral in terms of these data would require certain eliminations. The province of mensuration is to express the final result of such an elimination in terms of the data, without the necessity of going through the intermediate processes.

41. Trapezettes and Briquettes. — A figure of the kind described in § 39 is called a trapezette. A trapezette may therefore be defined as a plane figure bounded by two straight lines, abase at right angles to them, and a top which may be of any shape but is such that every ordinate from the base cuts it in one point and one point only; or, alternatively, it may be defined as the figure generated by an ordinate which moves in a plane so that its foot is always on a straight base to which the ordinate is at right angles, the length of the ordinate varying in any manner as it moves. The distance between the two straight sides, i.e. between the initial and the final position of the ordinate, is the breadth of the trapezette. Any line drawn from the

base, at right angles to it, and terminated by the top of the trapezette, is an ordinate of the figure. The trapezium is a particular case.

Either or both of the bounding ordinates may be zero; the top, in that case, meets the base at that extremity. Any plane figure might be converted into an equivalent trapezette by an extension of the method of § 25 (iv).

42. The corresponding solid figure, in its most general form, is such as would be constructed to represent the relation of a magnitude E to two magnitudes F and G of which it is a function; it would stand on a plane base, and be comprised within a cylindrical boundary whose cross-section might be of any shape. We are not concerned with figures of this general kind, but only with cases in which the base is a rectangle. The figure is such as would be produced by removing a piece of a rectangular prism, and is called a briquette. A briquette may therefore be defined as a solid figure bounded by a pair of parallel planes, another pair of parallel planes at right angles to these, a base at right angles to these four planes (and therefore rectangular), and a top which is a surface of any form, but such that every ordinate from the base cuts it in one point and one point only. It may be regarded as generated either by a trapezette moving in a direction at right angles to itself and changing its top but keeping its breadth unaltered, or by an ordinate moving so that its foot has every possible position within a rectangular base.

43. Notation and Definitions. — The ordinate of the trapezette will be denoted by u, and the abscissa of this ordinate, i.e. the distance of its foot from a certain fixed point or origin O on the base (or the base produced), will be denoted by x, so that u is some function of x. The sides of the trapezette are the ” bounding ordinates”; their abscissae being Xo and xo + H, where H is the breadth of the trapezette.

The ” mid-ordinate ” is the ordinate from the middle point of the base, i.e. the ordinate whose abscissa is tfo + jH.

The ” mean ordinate ” or average ordinate is an ordinate of length / such that HI is equal to the area of the trapezette. It therefore appears as a calculated length rather than as a definite line in the figure ; except that, if there is only one ordinate of this length, a line drawn through its extremity is so placed that the area of the trape- zette lying above it is equal to a corresponding area below it and outside the trapezette. Formulae giving the area of a trapezette should in general also be expressed so as to state the value of the mean ordinate (§§ 12 (v), 15, 19).

The ” median ordinate ” is the ordinate which divides the area of the trapezette into two equal portions. It arises mainly in statistics, when the ordinate of the trapezette represents the relative frequency of occurrence of the magnitude represented by the abscissa x; the magnitude of the abscissa corresponding to the median ordinate is then the ” median value of x.”

The ” central ordinate ” is the ordinate through the centroid of the trapezette (§ 32). The distance of this ordinate from the axis of u (i.e. from a line drawn through O parallel to the ordinates) is equal to the mean distance (§ 32) of the trapezette from this axis; moments with regard to the central ordinate-are therefore sometimes described in statistics as ” moments about the mean.”

The data of a trapezette are usually its breadth and either the bounding ordinates or the mid-ordinates of a series of minor trapezettes or strips into which it is divided by ordinates at equal distances. If there are m of these strips, and if the breadth of each is h, so that H = mh, it is convenient to write x in the form xo + 8h, and to denote it by x#, the corresponding value of u being u e . The data are then either the bounding ordinates Wo,_ #1, . . . «m-i, u m of the strips, or their mid-ordinates u\, u\, . . . u m l.

44. In the case of the briquette the position of the foot of the ordinate u is expressed by co-ordinates x, y, referred to a pair of axes

parallel to a pair of sides of the base of the briquette. If the lengths of these sides are H and K, the coordinates of the angles of the base — i.e. the co-ordinates of the edges of the briquette — are (xo, y a), (*o + H, ye), (x , yo + K), and (*o + H, yo + K).

The briquette may usually be regarded as divided into a series of minor briquettes by two sets of parallel planes, the planes of each set being at successively equal distances. If the planes of one set divide it into m slabs of thickness h, and those of the other into n slabs of thickness k, so that H = mh, K = nk, then the values of x and of y for any ordinate may be denoted by xo + Bh and yo + k, and the length of the ordinate by ug, $.

The data are usually the breadths H and K and either (i) the edges of the minor briquettes, viz. «o,o, Uo,u ■ ■ ■ «i,o, «i,i, ... or (ii) the mid-ordinates of one set of parallel faces, viz. «o,j, wos, . . . «i,j, ... or wj,o, Ms.o, . . . «j,i, . . ., or (iii) the ” mid-ordinates ” «i,}, «j,f, . . . Mg,j, ... of the minor briquettes, i.e. the ordinates from the centres of their bases.

A plane parallel to either pair of sides of the briquette is a ” principal plane.” The ordinate through the centroid of the figure is the ” central ordinate.”

45. In some cases the data for a trapezette or a briquette are not only certain ordinates within or on the boundary of the figure, but also others forming the continuation of the series outside the figure. For a trapezette, for instance, they may be . . . «_ 2 , m_i, « , «i . . . Um, « m + i Wm+j . . ., where u$ denotes the same function of x= =Xo+6h, whether 8h lies between the limits o and H or not. These cases are important as enabling simpler fbrmulae, involving central differences, to be used (§ 76).

46. The area of the trapezette, measured from the lower bounding ordinate up to the ordinate corresponding to any value of x, is some function of x. In the notation of the integral calculus, this area is

equal to I * udx; but the notation is inconvenient, since it implies

a division into infinitesimal elements, which is not essential to the idea of an area. It is therefore better to use some independent notation, such as A, . u. It will be found convenient to denote

4>(b)—(x) is any function of *, by \

area of the trapezette whose bounding ordinates are «o and u m may

then be denoted by \h x . «^^ **orfA** . tAll? <

instead of

tyfl:

udx.

In the same way the volume of a briquette between the planes x = xo, y = yo, x = a, y = b may be denoted by

47. The statement that the ordinate u of a trapezette is a function of the abscissa x, or that u=f(x), must be distinguished from u =f(x) as the equation to the top of the trapezette.

In elementary geometry we deal with lines arid curves, while in mensuration we deal with areas bounded by these lines or curves. The circle, for instance, is regarded geometrically as a line described in a particular way, while from the point of view of mensuration it is a

figure of a particular shape. Similarly, analytical plane geometry deals with the curve described by a point moving in a particular way, while analytical plane mensuration deals with the figure generated by an ordinate moving so that its length varies in a particular manner depending on its position.

In the same way, in the case of a figure in three dimensions, analytical geometry is concerned with the form of the surface, while analytical mensuration is concerned with the figure as a whole.

48. Representation of Volume by Area. — An important plane graph is that which represents the volume of a solid figure.

Suppose that we take a pair of parallel planes, such that the solid extends from one to the other of these planes. The section by any intermediate parallel plane will be called a ” cross-section.” The solid may then be regarded as generated by the cross-section moving parallel to itself and changing its shape, or its position with regard to a fixed axis to which it is always perpendicular, as it moves.

If the area of the cross-section, in every position, is known in terms of its distance from one of the bounding planes, or from a fixed plane. A parallel to them, the volume of the solid can be expressed in terms of the area of a trapezette. Let S be the area of the cross-‘ – section at distance x from the plane A. On a straight line OX in any plane take a point N at distance x from O, and draw an ordinate NP at right angles to OX and equal to S/l, where / is some fixed length (e.g. the unit of measurement), if this is done for every possible value of x, there will be a series of ordinates tracing out a trapezette with base along OX. The volume comprised between the cross-section whose, area is S and a consecutive cross-section at distance 8 from it is ultimately S0, when 8 is indefinitely small; and the area between the corresponding ordinates of the trapezette is (S/l) . 8 = S8/l. Hence the volume of each element of the solid figure is to be found by multiplying the area of the correspond- ing element of the trapezette by /, and therefore the total vulume is / X area of trapezette.

The volume of a briquette can be found in this way if the area of the section by any principal plane can be expressed in terms of the distance of this plane from a fixed plane of the same set. The result of treating this area as if it were the ordinate of a trapezette leads to

special formulae, when the data are of the kind mentioned in § 44.

49. (B) Mensuration of Graphs of Algebraical Functions. — The first class of cases to be considered comprises those cases in which « is an algebraical function (i.e. a rational integral algebraical func- tion) of x, or of x and y, of a degree which is known.

50. The simplest case is that in which u is constant or is a linear function of x, i.e. is of the form px + q. The trapezette is then a right trapezium, and its area, if m=l, is %h(u<> + «i) or hu.

51. The next case is that in which « is a quadratic function of x, i.e. is of the form px 2 + qx + r. The top is then a parabola whose axis is at right angles to the base; and the area can therefore (§ 34) be expressed in terms of the two bounding ordinates and the mid-ordinate. If we take these to be «o and «2, and «i, so that m = 2, we have

area = |H(«o + 4«i + «j) = \h(uo + 4«i + «>)•

This is Simpson's formula.

If instead of uo, «i, and Ui, we have four ordinates uo, Mi, «2, and us, so that m = 3, it can be shown that

area = %h(uo -f 3«i + 3«2 + ««)•

This is Simpson's second formula. It may be deduced from the formula given above. Denoting the areas of the three strips by A, B, and C, and introducing the middle ordinate u\, we can express A f B; B + C; A + B +C; and B in terms of uo, «i, Ui; Ui, u%, Ms ; ut, ui, u 3 ; and «i, u\, u% respectively. Thus we get two expressions for A + B + C, from which we can eliminate u%.

A trapezette of this kind will be called a parabolic trapezette.

52. Simpson's two formulae also apply if u is of the form px z + qx 2 + rx + s. Generally, if the area of a trapezette for which u is an algebraical function of x of degree ?.n is given correctly by an expres- sion which is a linear function of values of « representing ordinates placed symmetrically about the mid-ordinate of the trapezette (with or without this mid-ordinate), the same expression will give the area of a trapezette for which u is an algebraical function of x of degree 2n f 1. This will be seen by taking the mid-ordinate as the ordinate for which x = o, and noticing that the odd powers of x introduce positive and negative terms which balance one another when the whole area is

taken into account.

53. When u is of degree 4 or 5 in x, we require at least five ordinates. If m = 4, and the data are «o, Ui, %, u 3 , ui, we have

area = f S k(7Uo + 32M1 + i2w 2 + 32W3 + 7«<)-

For functions of higher degrees in x the formulae become more complicated.

54. The general method of constructing formulae of this kind involves the use of the integral calculus and of the calculus of finite differences. The breadth of the trapezette being mh, it may be shown that its area is

mH \ U W +h, mVW “^ + ^ mihiU “~ +

I

1920

322560 W ‘

92897280 m ° h * u Z +

where u, m , u, m , «,„, . . . denote, the values for x = x\ m of the

successive differential coefficients of w with regard to x ; the series continuing until the differential coefficients vanish. There are two classes of cases, according as m is even or odd; it will be con- venient to consider them first for those cases in which the data are the bounding ordinates of the strips.

(i) If m is even, u\ m will be oneof the given ordinates, and we

can express h 2 u, m , h*u*? m , ... in terms of u\ m and its even central

differences (see Differences, Calculus of). Writing m = 2p, and grouping the coefficients of the successive differences, we shall find

3P l ~ 5^

area = 2ph

■b 2

Up + tz-S'Up

360

■S 4 u p +

15120 "^ y

If u is of degree 2/ or 2/ + 1 in x, we require to go up to & 2, u p , so that m must be not less than 2/. Simpson's (first) formula, for instance, holds for / = I, and is obtained by taking p = I and ignoring differences after b 2 u p .

(ii) If m is odd, the given ordinates are «o, . . . u\m-\, «jm + J, . . . Um. We then have

area = mh J nu$ m +

Vhere uu\„, iii 2 u\n

^5*«jm +

3W« – 5 ow 2 + 135 , 24 —*"• ' 5760^ MS " lm

3 w° – i 47 ot < + 1813M' – 4725 ^3. 1

]•

967680

denote i («!».-} + wj» + i). K« 2 MJ™-S +

Fig. 8.

& 2 u\ m + i), . . . 'Simpson's second formula is obtained by taking m = 3 and ignoring differences after n& 2 ui m .

55. The general formulae of § 54 (p being replaced in (i) by \m) may in the same way be applied to obtain formulae giving the area of the trapezette in terms of the mid-ordinates of the strips, the series being taken up to & ! u\ m or iiZ 2t u\ m at least, where u is of degree 2/ or 2/ + 1 in x. Thus we find from (i) that Simpson's second formula, for the case where the top is a parabola (with axis, as before, at right angles to the base) and there are three strips of breadth h, may be replaced by

area = f A(3«j + 2w ? + 3«s).

This might have been deduced directly from Simpson's first formula, by a series of eliminations.

56. Hence, for the case of a parabola, we can express the area in terms of the bounding ordinates of two strips, but, if we use mid-ordinates, we require three strips; so that, in each case, three ordinates are required. The question then arises whether, by removing the limitation as to the position of the ordinates, we can reduce their number.

Suppose that in fig. 6 (§ 34) we draw ordinates QD midway between KA and MC, and RE midway between MC and LB, meeting the top in D and E (fig. 8), and join DE, meeting KA, LB, and MC in H, J, and W. Then it may be shown that DE is parallel to AB, and that the area of the figure between chord DE and arc DE is half the sum of the areas DHA and EJB. Hence the area of the right tra- pezium KHJL is greater than the area of the trapezette KACBL.

If we were to take QD and RE closer to MC, the former area would be still greater. If, on the other hand, we were to take them very close to KA and LB respectively, the area of the trapezette would be the greater. There is therefore Some intermediate position such that the two areas are equal ; i.e. such that the area of the trapezette is represented by KL . £(QD + RE).

To find this position, let us "write QM = MR = B . KM. Then WC=9». VC, VW = (1 – S 2) VC;

curved area ACB = f of parallelogram AFGB = f KL . VC ; parallelogram AHJB = KL . VW = (1 – P) KL . VC. Hence the areas of the trapezette and of the trapezium will be equal

1 -e» = f,0 = 1/V3.

This value of is the same for all parabolas which pass through D and E and have their axes at right angles to KL. It follows that, by taking two ordinates in a certain position with regard to the bounding ordinates, the area of any parabolic trapezette whose top passes through their extremities can be expressed in terms of these ordinates and of the breadth of the trapezette.

The same formula will also hold (§ 52) for any cubic trapezette through the points.

57. This is a particular case of a general theorem, due to Gauss, that, if u is an algebraical function of x of degree 2p or 2p-- 1, the area can be

expressed in terms of p + 1 ordinates taken in suitable positions.

58. The Prismoidal Formula. — It follows from §§ 48 and 51 that, if V is a solid figure extending from a plane K to a parallel plane L, and if the area of every cross-section parallel to these planes is a quadratic function of the distance of the section from a fixed plane parallel to them, Simpson's formula may be applied to find the volume of the solid. If the areas of the two ends in the planes K and L are So and S2, and the area of the mid-section (i.e. the section by a plane parallel to these planes and midway between them) is Si, the volume is |H(So + 4S1 + S 2 _), where H is the total breadth.

This formula applies to such figures as the cone, the sphere, the ellipsoid and the prismoid. In the case of the sphere, for instance, whose radius is R, the area of the section at distance x from the centre is ir(R 2 # 2), which is a quadratic function of x\ the values of So Si, and S2 are respectively o, irR 2 , and o, and the volume is therefore J . 2R . 4xR 2 = JxR 3 .

To show that the area of a cross-section of a prismoid is of the form ax 2 + bx + c, where x is the distance of the section from one end, we may proceed as in § 27. In the case of a pyramid, of height h, the area of the section by a plane parallel to the base and at distance x from the vertex is clearly x 2 /h 2 X area of base. In the case of a wedge with parallel ends the ratio x 2 jh 2 is re- placed by x/h. For a tetrahedron, two of whose opposite edges are AB and CD, we require the area

A

B

/&***» P

/ '• sx **•.

/ \V -I

/ * \ /

/ .'''*" \ /

y

c! D

Fig. 9.

of the section by a plane parfi-llel to AB and CD. Let the distance between the parallel planes through AB and CD be h, and let a plane at distance x from the plane through AB cut the edges AC,

BC, BD, AD, in P, Q, R, S (fig. 9). Then the section of the pyramid by this plane is the parallelogram PQRS. By drawing Ac and Ad parallel to BC and BD, so as to meet the plane through CD in c and d, and producing QP and RS to meet Ac and Ad in q and r, we see that the area of PQRS is (x/h—x'/hˆX area of cCDd; this also is a quadratic function of x. The proposition can then be established for a prismoid generally by the method of § 27 (iv). The formula is known as the prismoidal formula.

59. Moments. — Since all points on any ordinate are at an equal distance from the axis of u, it is easily shown that the first moment (with regard to this axis) of a trapezette whose ordinate is u is equal to the area of a trapezette whose ordinate is xu ; and this area can be found by the methods of the preceding sections in cases where u is an algebraical function of x. The formulae can then be applied to finding the moments of certain volumes.

In the case of the parabolic trapezette, for instance, xu is of degree 3 in x, and therefore the first moment is lh{x Uo + 4XiUi + X2Ui). in the case, therefore, of any solid whose cross-section at distance x from one end is a quadratic function of x, the position of the cross- section through the centroid is to be found by determining the position of the centre of gravity of particles of masses proportional to So, S2, and 4S1, placed at the extremities and the middle of a line drawn from one end of the solid to the other. The centroid of a hemisphere of radius R, for instance, is the same as the centroid of particles of masses o, 7rR 2 , and 4 . JttR 2 , placed at the extremities and the middle of its axis; i.e. the centroid is at distance |R from the plane face.

60. The method can be extended to finding the second, third, . . . moments of a trapezette with regard to the axis of u. If u is an algebraical function of x of degree not exceeding p, and if the area of a trapezette, for which the ordinate v is of degree not exceeding p + q. may be expressed by a formula Xoflo + yifi-f . . . ˆ“m, the qth moment of the trapezette is Xo3Co'«oˆiˆi'Mi + . • • + X m #m“'m, and the mean

value of xfl is

(Xo*o«tto + Xl*l*«l .... X m * m «M m)/(X tto + X1M1 + . . . + \mU m).

The calculation of this last expression is simplified by noticing that we are only concerned with the mutual ratios of Xo, Xi, . . . and of «o, tti, . . , not with their actual values.

61. Cubature of a Briquette. — To extend these methods to a bri-

Suette, where the ordinate u is an algebraical function of x and y, le axes of x and of y being parallel to the sides of the base, we consider that the area of a section at distance x from the plane x = o is expressed in terms of the ordinates in" which it intersects the series of planes, parallel to y = o, through the given ordinates of the briquette (§ 44) ; and that the area of the section is then represented by the ordinate of a trapezette. This ordinate will be an algebraical function of x, and we can again apply a suitable formula.

Suppose, for instance, that u is of degree not exceeding 3 in x, and of degree not exceeding 3 in y, i.e. that it contains terms in x 3 y 3 , x 3 y 2 , x 2 y 3 , &c. ; and suppose that the edges parallel to which x and y are measured are of lengths 2h and 3k, the briquette being divided into six elements by the plane x = x +h and the planes y=yn--k, y — yo--2k, and that the 12 ordinates forming the edges of these six elements are given. The areas of the sides for which x = Xo and x=*xo+2h, and of the section by the plane x — xo--h, may be found by Simpson's second formula; call these A and A 2 , and Ai. The area of the section by a plane at distance x from the edge x = x

The process is simplified by writing down the general formula first and then substituting the values of u. The formula, in the above case, is

iA|p(Mo,o + 3«o.i+3«o-2 + u «.s) +4X|*(mi,o + . . .) + |*(«s,o + . .)}.

where u*, denotes the ordinate for which x = xo+8k, y = yo+4>k.

The result is the same as if we multiplied

%k(v + Wi+SVi + Vi) by \h{u<, + 4M1

+ut), and then replaced Wo, 1W1, . . .

by uo,o, Mo,i . . . The multiplication is

shown in the adjoining diagram; the

factors J and | are kept outside, so that

the sum Mo,o + 3«o,i + . . . 4«i,o. ... .

can be calculated before it is multiplied

by J* .p.

62. The above is a particular case of a general principle that the obtaining of an expression such as Ihitto + ˆUi + Ui) or f£(»o-f3t)i-|-31/2 + 1)3) is an operation performed on « or z > o, and that this operation is the sum of a number of operations such as that which obtains \hu,i or %kv . The volume of the briquette for which u is a function of x and y is found by the operation of double integration, consisting of two successive operations, one being with regard to x, and the other with regard to y; and these operations may (in the cases with which we are concerned) be performed in either order. Starting from any ordinate w«,

4X1

I 41

1

3 3 1

1 4 1 3 12 3

3 12 3 1 4 1

of). The integration with regard to y may similarly (in the particular example) be replaced by the operation p(i + 3E'-r-3E' 2 + E' 3), where E' denotes the change of y into y + k. The result of per- forming both operations, in order to obtain the volume, is the result of the operation denoted by the product of these two expressions; and in this product the powers of E and of E' may be dealt with according to algebraical laws.

The methods of §§59 and 60 can similarly be extended to finding the position of the central ordinate of a briquette, or the mean a™ distance of elements of the briquette from a principal plane.

63. (C) Mensuration of Graphs Generally.— -We have next to consider the extension of the preceding methods to cases in which u is not necessarily an algebraical function of x or of x and y.

The general principle is that the numerical data from which a particular result is to be deduced are in general not exact, but are given only to a certain degree of accuracy. This limits the accuracy of the result; and we can therefore replace the figure by another figure which coincides with it approximately, provided that the further inaccuracy so introduced is comparable with the original inaccuracies of measurement.

The relation between the inaccuracy of the data and the additional inaccuracy due to substitution of another figure is similar to the relation between the inaccuracies in mensuration of a figure which is supposed to be of a given form (§ 20). The volume of a frustum of a cone, for instance, can be expressed in terms of certain magni- tudes by a certain formula ; but not only will there be some error in the measurement of these magnitudes, but there is not any material figure which is an exact cone. The formula may, however, be used if the deviation from conical form is relatively less than the errors of measurement. The conditions are thus similar to those which arise in interpolation (q.v.). The data are the same in both cases. In the case of a trapezette, for instance, the data are the magnitudes of certain ordinates; the problem of interpolation is to determine the values of intermediate ordinates, while that of men- suration is to determine the area of the figure of which these are the ordinates. If, as is usually the case, the ordinate throughout each strip of the trapezette can be expressed approximately as an alge- braical function of the abscissa, the application of the integral calculus gives the area of the figure.

64. There are three classes of cases to be considered. In the case of mathematical functions certain conditions of continuity are satisfied, and the extent to which the value given by any particular formula differs from the true value may be estimated within certain limits; the main inaccuracy, in favourable cases, being due to the fact that the numerical data are not absolutely exact. In physical and mechanical applications, where concrete measurements are involved, there is, as pointed out in the preceding section, the additional inaccuracy due to want of exactness in the figure itself. In the case of statistical data there is the further difficulty that there is no real continuity, since we are concerned with a finite number, of individuals.

The proper treatment of the deviations from mathematical accu- racy, in the second and third of the above classes of cases, is a special

matter. In what follows it will be assumed that the condi- tions of continuity (which imply the continuity not only of u but also of some of its differential coefficients) are satisfied, subject to the small errors in the values of u actually given ; the limits of these errors being known.

_ 65. It is only necessary to consider the trapezette and the briquette, since the cases which occur in practice can be reduced to one or other of these forms. In each case the data are the values of certain equidistant ordinates, as described in §§ 43-45. The terms quad- rature-formula and cubature-formula are sometimes restricted to formulae for expressing the area of a trapezette, or the volume of a briquette, in terms of such data. Thus a quadrature-formula is a formula for expressing [Aˆ.m] or Judx in terms of a series of given values of u, while a cubature-formula is a formula for express- ing [[V*,»-«]] or ffudxdy in terms of the values of u for certain values of * in combination with certain values of y; these values riot”

necessarily lying within the limits of the integrations. •

66. There are two principal methods. The first, which is the best known but is of limited application, consists in replacing each successive portion of the figure by another figure whose ordinate is an algebraical function of x or of x and y, and expressing the area or volume of this latter figure (exactly or approximately) in terms of the given ordinates. The second consists in taking a comparatively, simple expression obtained in this way, and introducing corrections which involve the values of ordinates at or near the boundaries of the figure. The various methods will be considered first for the trapez- ette, the extensions to the briquette being only treated briefly.

67. The Trapezoidal Rule. — The simplest method is to replace the trapezette by a series of trapezia. If the data are #0, «i, . . . u m , the figure formed by joining the tops of these ordinates is a trapezoid whose area is h(\ut + ui %... +M m _i +J« m >. This is called the trapezoidal or chordal area, and will be denoted by Ci. If the data are «j, ttj, . . . M m _j, we can form a series of trapezia by drawing the tangents at the extremities of these ordinates; the sum of the areas of these trapezia will be A(«j+«j+. . . -t-iˆ.j). This is called the tangential area, and will be denoted by Ti. The

tangential area may be expressed in terms of chordal areas. If we write Cj for the chordal area obtained by taking ordinates at intervals \h, then Ti = 2Cj-Ci. If the trapezette, as seen from above, is everywhere convex or everywhere concave, the true area lies between Ci and Ti.

68. Other Rules for Trapezettes. — The extension of this method consists in dividing the trapezette into minor trapezettes, each consisting of two or more strips, and replacing each of these minor trapezettes by a new figure, whose ordinate » is an algebraical function of x; this function being chosen so that the new figure shall coincide with the original figure so far as the given ordinates are concerned. This means that, if the minor trapezette consists of k strips, v will be of degree k or k — I in x, according as the data are the bounding ordinates or the mid-ordinates. If A denotes the true area of the original trapezette, and B the aggregate area of the substituted figures, we have A = 2 = B, where = 2 = denotes approximate equality. The value of B is found by the methods of §§ 49-55. The following are some examples.

(i) Suppose that the bounding ordinates are given, and that m is a multiple of 2. Then we can take the strips in pairs, and treat each pair as a parabolic trapezette. Applying Simpson's formula to each of these, we have

A = 3 = \h{uo 4. 4% + «j) -f \h{ui + 4M3 + Ui) + . . .

= 3 = \Kua + 4Ml + 2% + 4M3 + 2M 4 + . . . + 2« m _ 2 + 4« m - l + «m).

This is Simpson's rule.

(ii) Similarly, if m is a multiple of 3, the repeated application of Simpson's second formula gives Simpson's second rule

A = a §/j(mo + 3Ml + 3% + 2tt 3 + 3«4 + . . . + 3"m_4 + 2M m _ 3 + 3"m-2 + 3«m-l + U m).

(iii) If mid-ordinates are given, and m is a multiple of 3, the repeated application of the formula of § 55 will give

A = 0 = p(3«j + 2M ? + 3M| + 3 « 5 + . . . + 2 « m _ | + 31^).

69. The formulae become complicated when the number of strips in each of the minor trapezettes is large. The method is then modified by replacing B by an expression which gives the areas of the sub- stituted figures approximately. This introduces a further inaccuracy ; but this

latter may be negligible in comparison with the main in- accuracies already involved (cf. § 20 (iii)).

Suppose, for instance, that m = 6, and that we consider the trapezette as a whole; the data being the bounding ordinates. Since there are seven of these, v will be of degree 6 in x; and we shall have (§ 54 (i))

B =6fc(!/ 3 + l&h), + U&*v 3 + fji&ov,) =6fe(«3+t« 2 M3+H« 4 «3+»V!r8 8 «3).

If we replace sVjS'mj in this expression by ffis&ut, the method of § 68 gives

A — M («o + 5«i + «2 + 6« 3 + u* + 5«6 + «0 ; the expression on the right-hand side being an approximate expres- sion for B, and differing from it only by j1 ? H8 6 m 3 . This is Weddle's rule. If m is a multiple of 6, we can obtain an expression for A by applying the rule to each group of six strips.

70. Some of the formulae obtained by the above methods can be expressed more simply in terms of chordal or tangential areas taken in various ways. Consider, for example, Simpson's rule (§68 (i)). The expression for A can be written in the form

IKitto + «1 + «2 + «3 + . . . + «m_2 + ttm-1 + 5«m) -P(|«0 + lh + «4 + . . . + Um-2 + iUm).

Now, if p is any factor of m, there is a series of equidistant ordinates Uo, u p , u %p , ... w m _ p , 14; and the chordal area as determined by these ordinates is

M(i«0 + U p + Ulp + ... + U m – P + Jttm).

which may be denoted by C„. With this notation, the area as given by Simpson's rule may be written in the form tCi — id or Ci + J(Ci — Cj). The following are some examples of formulae of this kind, in terms of chordal areas.

(i) m a multiple of 2 (Simpson's rule).

Aˆjˆd-CˆC, + KC1-CO. (ii) m a multiple of 3 (Simpson's second rule).

A =0= K9C1 – C) =2= C, + i(d – C,). (iii) m a multiple of 4.

A =0= MHCi – 2od + d) =2= Ci-HCd – C.) – MCi – d). (iv) m a multiple of 6 (Weddle's rule, or its repeated application).

A = S = A(i5Ci-6C,-|-C,) = Q = d + KCi – d) -A(d – d). (v) m a multiple of 12.

A =2= 3 l t (56Ci – 28C, + 8d – d) = ac, + i(C, – d) – l(C – CO + A(C, – CO. There are similar formulae in terms of the tangential areas Ti, T 2 , T,. Thus (iii) of § 68 may be written A =0= K9T1 – T 3).

71. The general method of constructing the formulae of § 70 for chordal areas is that, if p, q, r, . . . are k of the factors (including 1) of m, we take

AˆPd + Qd + RC,. + . . .,

where P, Q, R, . . . satisfy the k equations

P + Q + R + ... Pp 2 + Q

= 1,

= o>

PpUc-2 | Q g 2*-2 + Rr 2*-2 + . . . =0.

The last k — 1 of these equations give

i/P : i/Q : i/R : . . . = p*(p – f){p* – r **) . . . _ -tftf-fM-r**) ... : r\r* – p*) (r* – 2 2) ...:.. . Combining this with the first equation, we obtain the values of P, Q, R, • • • The same method applies for tangential areas, by taking A =2= PT P + QT g + RT r + • . . provided that p, q, r, . . . are odd numbers.

72. The justification of the above methods lies in certain properties of the series of successive differences of u. The fundamental assumption is that each group of strips of the trapezette may be replaced by a figure for which differences of u, above those of a certain order, vanish (§ 54). The legitimacy of this assumption, and of the further assumption which enables the area of the new figure to be expressed by an approximate formula instead of by an exact formula, must be verified in every case by reference to the actual differences.

73. Correction by means of Extreme Ordinates. — The preceding methods, though apparently simple, are open tq various objections in practice, such as the following: (i) The assignment of different coefficients of different ordinates, and even the selection of ordinates for the purpose of finding d, C 8 , &c. (§ 70), is troublesome, (ii) This assignment of different coefficients means that different weights are given to different ordinates; and the relative weights may not agree with the relative accuracies of measurement, (iii) Different formulae have to be adopted for different values of m ; the method is therefore unsuitable for the construction of a table giving successive values of the area up to successive ordinates. (iv) In order to find what formula may be applied, it is necessary to take the successive differences of u; and it is then just as easy, in most cases, to use a formula which directly involves these differences and therefore shows the degree of accuracy of the approximation.

The alternative method, therefore, consists in taking a simple-formula, such as the trapezoidal rule, and correcting it to suit the mutual relations of the differences.

74. To illustrate the method, suppose that we use the chordal area Ci, and that the trapezette is in fact parabolic. The difference between Ci and the true area is made up of a series of areas bounded by chords and arcs; this difference becoming less as we subdivide the figure into a greater number of strips.

The fact that Ci does not give the true area is due to the fact that in passing from one extremity of the top of any strip to the other extremity -the tangent to the trapezette changes its direction. We have therefore in the first place to see whether the difference can be expressed in terms of the directions of the tangents.

Let KABL (fig. 10) be one of the strips, of breadth h. Draw the tangents at A and B, meeting at T; and through T draw a line parallel to KA and LB, meeting the arc AB in C and the chord AB in V. Draw AD and BE perpendicular to this line, and DF and TG perpendicular to LB. _ Then AD = EB = P, and the triangles K AVD and BVE are equal.

The area of the trapezette is less (in fig. 10) than the area of the trapezium KABL by two-thirds of the area of the triangle ATB (§34). This latter area is ABTE – AATD = ABTG-AATD = |fe 2 tan GTB – Jft* tan DAT. Hence, if the angle which the tangent at the extremity of the ordinate u e makes with the axis of * is denoted by \j/ 9 , we have area from «o to «i = |fe(«o + «i) — iV& 2 (tan \pi — tan ifo), «i to U2 = %h(ui + ui) — i> 2 *(tan ˆ 2 – tan ˆ1),

ttm-i to u m = |fe(«m_i + u m) — iV/j 2 (tan i/, m — tan ˆm_i) ; and thence, by summation,

A = Ci — T yt 2 (tanˆ m — tan 1ˆ0). This, in the notation of §§ 46 and 54, may be written

A = ci + [-ˆv: r .

Since h = H/m, the inaccuracy in taking Ci as the area varies as 1/m 2 . It might be shown in the same way that

A = T! + ˆ 2 (tan * B – tan „) = T, + [&‘«’]* = ;£•.

75. The above formulae apply only to a parabolic trapezette Their generalization is given by the Euler-Maclaurin formula

i + 4

Xo ‘

A= /*r udx = Ci + [~ A * v + rivw – ™hi*M +

Tnrhira A 8 «™ – • • ■] * Z %

and an analogous formula (which may be obtained by substituting \h and C, for h and Ci in the above and then expressing Ti as

2C 4 -d) J

A -jlydx = Ti + [a*V – iAu* V’+Trfi TO A 6 «” –

To apply these, the differential coefficients have to be expressed in terms of differences.

76 If we know not only the ordinates «o, «i,

or «., «j,

but also a sufficient number of the ordinates obtained by continuing the series outside the trapezette, at both extremities, we can use central-difference formulae, which are by far the most convenient. The formulae of § 75 give

A C.+A [A**»+tWi n»’«-iitt,|rf , «+,AWbii«‘ii-. ..] *”£\

77. If we do not know values of « outside the figure, we must use advancing or receding differences. The formulae usually employed are

A = C 1 A|^AMo-AA !i Wo^,A 3 «(,- 1 | Tr A%o+ • • •

+^A’u m -AA’ 2 « m +^jA’ 3 « m – T |T [A’«M ra + . . . J ,

A = Ti+A J – Amj + j”jA*«} – W&A’mj + jVftA – . . .

-^iA’m ot _J+ AA’ s «^j – ,%4”(M + ^^A’ 4 « m -l – ... \ ,

. have the usual meaning (Amo = «i— mo, A 2 mo = and A’, A’ 2 , . . . denote differences read back-

A’ttm=«m_i— Um, A’ 2 « m = «m- 2 — 2Mm_i + Mm, . . .

where A, A 2 , . .

A«i — Ako),

wards, so that The calculation of the expressions in brackets may be

simplified by taking the pairs in terms from the outside; i.e. by finding the successive differences of Ho + «m, #1 + «m-i, . . ., or of Mj + Km-$,

Mj + K«-}, ...

An alternative method, which is in some ways preferable, is to complete the table of differences by repeating the differences of the highest order that will be taken into account (see Interpolation), and then to use central-difference formulae.

78. In order to find the corrections in respect of the terms shown in square brackets in the formulae of § 75, certain ordinates other than these used for Ci or Ti are sometimes found specially. Par- mentier's rule, for instance, assumes that in addition to **ji **j . . . » "m-n we know «o and «„; and u i — «o and « m — «m-j are taken

-1′

These methods are

to be equal to $hu't> and \hu' m respectively, not tc be recommended except in special cases.

79. By replacing h in § 75 by 2A, 3A, . . . and eliminating A 2 u', h*u'", . . . , we obtain exact formulae corresponding to the ap- proximate formulae of § 70. The following are the results (for the formulae involving chordal areas), given in terms of differential coefficients and of central differences. They are not so convenient as the formulae of § 76, but they serve to indicate the degree of accuracy of the approximate formulae. The expressions in square brackets are in each case to be taken as relating to the extreme values x = xo and x = x m , as in §§ 75 and 76. (i) A = H4C.-C 2)-H-TˆAV"-KˆA°»v_ Tliire ; l SuvH + . . .]

= K4Ci—C,) + ;C,)4[-ˆftV" + lr hˆ«'-TWWˆM vii +. • .]

= i(9Ci-C3) + A[-ˆ/t« 3 » + ilhM« 5 »-jˆ 2 , in)/*« 7 M + - • •]• (iii) A = &(6 4 C 1 -2oC 2 C4)[-5f 1 rA 8 M* + 1 rkA 8 « vii – • ■ •]

= ¥ Vˆ4Ci-2oQ + C <) + A[- 5 lirM8 5 «-|-5inTrˆ , «- • • •]• (iv) A = TV(i5C l 6C,C,)[lr b* , « T riEATrA 8 W va_ ... 1

= TMi5Ci-6C 2 4-C 3) + A[- li i U M3 6 w + !ˆjW'S'M- • • •]•

(v) A = ˆ(56C,-28C 2 8C 8 -C4)[-irrW* 8 « vi M • • •]

= A(5°C l -28C 2 +8C8-C4)+A[- r rW 7 «+ –• •]■ The general expression, if p, q, r, . . . are k of the factors of m, is

(–)* W^pF? +

( )^ 1 a- 2 +...]:^,

where P, Q, R, . . . have the values given by the equations in § 71, and the coefficients 6*, bt+i, . . . are found from the corresponding coefficients in the **5uler-Maclaurin formula (§ 75) by multiplying them by Pp** +Qq* +Rr* + . . ., Pp*-u+Qq»°+2+Rr a – K +. . . ,

80. Moments of a Trapezette. — The above methods can be applied, as in §§ 59 and 60, to finding the moments of a trapezette, when the

data are a series of ordinates. To find the pth moment, when Mo, »ii u-z, ■ ■ ■ are given, we have only to find the area of a trapezette whose ordinates are Xo"Uo, Xi p Ui, x-Pu.%, . . .

81. There is, however, a certain set of cases, occurring in statistics, in which the data are not a series of ordinates, but the areas Aj, Aa, . . . A m _j of the strips bounded by the consecutive ordin- ates «o, iii, ■ • • u m . The determination of the moments in these cases involves special methods, which are considered in the next two sections.

82. The most simple case is that in which the trapezette tapers out in such a way that the curve forming its top has very close contact, at its extremities, with the base; in other words, the differ- ential coefficients u', u", u'", . . . are practically negligible for x — xo and for x = x m . The method adopted in these cases is to treat the areas Ai, As, ... as if they were ordinates placed at the points for which x=x,, x=Xs, . . . , to calculate the moments on this assumption, and then to apply certain corrections. If the first, second, . . . moments, so calculated, before correction are denoted by pi, P2, . . . , we have

pi = xjAj+ *|A| + . . . + * m _jA m _j pj= r'jAj + * 2 fAs -f . . . + * 2 m -$Am-i

Pp = **»jA}** +*jA|-|- . . . +*P m _ } A m _}- These are called the raw moments. Then, if the true moments are denoted by vi, ? 2 , . . . , their values are given by

V1^=P1

j> 2 =a P2 — ,^a 2 po

1 > 3 = 2:P3 — kh 2 pi

mJlPi — iWpz + sfohipo

!> 6 =&p 6 -P 2 P3 + i 7 3A 4 Pl

where po (or m >) is the total area A3 + Aj + . . . + Am-} ; the general expression being

*’ p 1 ■

””P” Xl 2 ! (£- 2) ! fe2p? – 2 + Xi i!(i-i)! *Vj-4- .... where

Ni = A > **2 = dhr > x 3 = xirk. ˆ4 = 8**ˆ0-. ˆsWirV. ...

The establishment of these formulae involves the use of the integral calculus.

The position of the central ordinate is given by x — vi/pv, and therefore is given approximately by x—pi/po. To find the moments with regard to the central ordinate, we must use this approximate value, and transform by means of the formulae given in § 32. This can be done either before cr after the above corrections are made. If the transformation is made first, and if the resulting raw moments with regard to the (approximate) central ordinate are o, ?r 2 , ir a , . . . , the true moments m, /»2, M3 > • ■ • with regard to the central ordinate are given by

ui = o

p,4 = 2 = JT4 — Wn + iitsWpo

83. These results may be extended to the calculation of an expres- sion of the form (‘ m u{x)dx, where 4 > (x) is a definite function of *,

J Xq

and the conditions with regard to u are the same as in § 82. (i) If (x) is an explicit function of x, we have

Jx where

JˆW*(*)&fcˆK*i) + Ai*(*j) + ■ • • + Am-jˆˆm-j),

*() |jAV() + **%h V”()**

the coefficients Xi, X 2 , having the values given in § 82.

(ii) If {x) is not given explicitly, but is tabulated for the values . . Xi, X3, . . . of x, the formula of (i) applies, provided we take

*()• The formulae can be adapted to the case in which (x) is tabulated for x = xo, xi, . . . -,^

84. In cases other than those described in § 82, the pth moment with regard to the axis of u is given by

Vp^xPrnA-pSp-.!,

where A is the total area of the original trapezette, and Sj^i is the area of a trapezette whose ordinates at successive distances h, beginning and ending with the bounding ordinates, are o, **i**-> Ai, x^-HAi + M), ■ ■ ■ x p m t{(Ai + Aj + • • • + Am_f), x'-iA. The value of Sp_i has to be found by a quadrature-formula. The generalized formula is

ff£u4 > (x)dx = A(x m) – T,

where T is the area of a trapezette whose ordinates at successive distances h are o, Ai' (*i), (Aj + Ajto'fo). • . • (A5 + A3 + . . . + A„_3)'(xm); the accents denoting the first differential coefficient.

85. Volume and Moments of a Briquette. — The application of the methods of §§ 75-79 to calculation of the volume of a briquette leads to complicated formulae. If the conditions are such that the methods of § 61 cannot be used, „«r are undesirable as giving too much weight to particular ordinates, it is best to proceed in the manner indicated at the end of § 48 ; i.e. to find the areas of one set of parallel sections, and treat these as the ordinates of a trapezette whose area will be the volume of the briquette.

86. The formulae of § 82 can be extended to the case of a briquette whose top has close contact with the base all along its boundary; the data being the volumes of the minor briquettes formed by the planes * = *o, x — xi, . . . and y = yo, y = °yi, • . . The method of constructing the formulae is explained in § 62. If we write

S-o^SlUPyl*"**' we first calculate the raw values

Si,i = Q = (ti,i

52,1 = 0 = 0-2,! — }Ms 2

Si,2 = Q =

S2,2 = Q =

Sj,i = Q =

S 3 ,2 = S = ffs,2 — i*Vi,j — AiV.,0 + £*hWauo where

87. If the data of the briquette are, as in § 86, the volumes of the ■ minor briquettes, but the condition as to close contact is not satisfied, we have

f*Z f^P" dxdy**K + L + R- x v m yW

and R is the volume of a briquette whose ordinate at (jtr.y.) is found by multiplying by pq Xt"" **1 y.** 1 the volume of that portion of the original briquette which lies between the planes * = *o, x = Xr, y = yo, y = y The ordinates of this new briquette at the points of intersection of * = *o, x = xi, . . . with y = yo, y = yi, ■ ■ • are obtained from the data by summation and multiplication; and the ordinary methods then apply for calculation of its volume. Either or both of the expressions K and L will have to be calculated by means of the formula of § 84 ; if this is applied to both expressions, we have a formula which may be written in a more general form

ff q wt > (.x, y)dx dy = | 6 / 5 udxd y ■ (b – 2)

The second and third expressions on the right-hand side represent areas of trapezettes, which can be calculated from the data; and the fourth expression represents the volume of a briquette, to be calculated in the same way as R above.

88. Cases of Failure. — When the sequence of differences is not such as to enable any of the foregoing methods to be applied, it is sometimes possible to amplify the data by measurement of intermediate ordinates, and then apply a suitable method to the amplified series.

There is, however, a certain class of cases in which no subdivision of intervals will produce a good result ; viz. cases in which the top of the figure is, at one extremity (or one part of its boundary), at right angles to the base. The Euler-Maclaurin formula (§ 75) assumes that the bounding values of «', «'", . . . are not infinite; this condition is not satisfied in the cases here considered. It is also clearly impossible to express u as an algebraical function of * and y if some value of du/dx

or dujdy is to be infinite.

No completely satisfactory methods have been devised for dealing with these cases. One method is to construct a table for interpola- tion of * in terms of u, and from this table to calculate values of x corresponding to values of u, proceeding by equal intervals; a quadrature-formula can then be applied. Suppose, for instance, that we require the area of the trapezette ABL in fig. 11; the curve being at right angles to the base AL at A. If QD is the bounding ordinate of one of the component strips, we can calculate the area of QDBL in the ordinary way. The data for the area AI > Q are a series of values of « corresponding to equidifferent values of x; if we denote by y the distance of a point

Fig. 11.

on the arc AD from QD, we can from the series of values of w construct a series of values of y corresponding to equidifferent values of u, and thus find the area of ADQ, treating QD as the base. The process, however, is troublesome.

89. Examples of Applications. — The following are some examples of cases in which the above methods may be applied to the calcula- tion of areas and integrals.

(i) Construction of Mathematical Tables. — Even where u is an explicit function of x, so that j x udx may be expressed in terms ‘of’*, it is often more convenient, for construction of a table of values of such an integral, to use finite-difference formulae. The formula of § 76 may (see Differences, Calculus of) be written

/x udx = h .jucrM + h(— -^ ftSu + fVj m^ 3 w — . . .)

= n

/x udx = h.

= a (hu + £1 8*hu — sHn si ku + . . .). The second of these is usually the more convenient Thus, to construct a table of values of f x udx by intervals of h in *, we first form a table of values of hu for the intermediate values of x-, from this obtain a table of values of (1 + 2 1 4 6 2 — ^^Id s4 + – • ■) hu lor these values of **, and then construct the table of f’udx by succes- sive additions. Attention must be given to the possible accumula- tion of errors due to the small errors in the values of u. Each of the above formulae involves an arbitrary cpnstant; but this disappears when we start the**

additions from a known value of f udx.

The process may be repeated. Thus we-have

$* f udx dx = (« + && -dhP + ■ ■ -YWu

= (* 2 + A – ih S 2 + WAtj S 4 – mrf !W + ...)Vu =

The formulae may be used for extending the accuracy of tables, in cases where, if v represents the quantity tabulated, hdvjdx or. Wdhijdxˆ can be conveniently expressed in terms of v and * to a greater degree of accuracy than it could be found from the table. The process practically consists in using the table as it stands for improving the first or second differences of v and then building up the table afresh.

(ii) Life Insurance. — The use of quadrature-formulae is important in actuarial work, where the fundamental tables are based on experience, and the formulae applying these tables involve the use of the tabulated values and their differences.

90. The following are instances of the application of approximative formulae to the calculation of the Volumes of solids.

(i) Timber Measure. — To find the quantity of timber in a trunk with parallel ends, the areas of a few sections must be calculated as accurately as possible, and a formula applied. As the measure- ments can only be rough, the trapezoidal rule is the most appropriate in ordinary cases.

(ii) Gauging.- — To measure the volume of a cask, it may be assumed that the interior is approximately a portion of a spheroidal figure. The formula applied can then be either Simpson s rule or a rule based on Gauss's theorem for two ordinates (§56). In the latter case the twosectionsaretakenat distances = > = JH/V 3 = =*= -2887ˆ! from the middle section, where H is the total internal length; and their arithmetic mean is taken to be the mean section of the cask. Allowance must of course be made for the thickness of the wood.

91. Certain approximate formulae for the length of an arc of a circle are obtained by methods similar to those of §§ 71 and 79. Let a be the radius of a circle, and 6 (circular measure) the un- known angle subtended by an arc. Then, if we divide 6 into m equal parts, and Li denotes the sum of the corresponding chords, so that Li = 2ma sin (f)/2m), the true length of the arc is

Li + 00 \ !n — Tt + ,,.(, where 4 > ~8J2m. Similarly, if L 2 repre-

sents the sum of the chords when m (assumed even) is replaced by \m, we have an expression involving L2 and 20. The method of § 71 then shows that, by taking J(4Li — L2) as the value of the arc, we get rid of terms in 2 . If we use Ci to represent the chord of the whole arc, ci the chord of half the arc, and c t the chord of one N quarter of the arc, then corresponding to (i) and (iii) of § 70 or § 79 we have $(8cz— Ci) and a 1 s(256£4— 40C2-K1) as approximations to the length of the arc. The first of these is Huygens's rule.

References. — For applications of the prismoidal formula, see Alfred Lodge, Mensuration for Senior Students (1895). Other works on elementary mensuration are G. T. Chivers, Elementary Mensura- tion (1904) ; R. W. K. Edwards, Elementary Plane and Solid Mensura- tion (1902); William H. Jackson, Elementary Solid Geometry (1907); P. A. Lambert, Computation and Mensuration (1907). A. E. Pier- point's Mensuration Formulae (1902) is a handy collection. Rules for calculation of areas are also given in such works as F. Castle, Manual of Practical Mathematics (1903) ; F. C. Clarke, Practical 1 Mathematics (1907) ; C. T. Millis, Technical Arithmetic and Geometry

('9°3)- F° r examples of measurement of areas by geometrical construction, see G. C. Turner, Graphics applied to Arithmetic, Mensuration and Statics (1907). Discussions of the approximate calculation of definite integrals will be found in works on the in- finitesimal calculus; see e.g. E. Goursat, A Course in Mathematical Analysis (1905; trans, by E. R. Hedrick). For the methods involv- ing finite differences, see references under Differences, Calculus of; and Interpolation. On calculation of moments of graphs, see W. P. Elderton, Frequency- Curves and Correlation (1906) ; as to the formulae of §82, see also Biomeirika, v. 450. For mechanical methods of calculating areas and moments see Calculating Machines. (W. F. Sh.)

MENTAWI, a chain of islands in the Dutch East Indies, off the west coast of Sumatra, between i° and 3 30′ S. There are twenty-one islands in all, of which the majority lie close to or between the four largest — Siberut, Sikaban or Sipora, North Pageh and South Pageh. The two last (also called Pagi or Poggy) are sometimes termed the Nassau Islands. The total land area is 1224 sq. m. The islands are included in

the admini- stration of Padang, Sumatra. They are apparently volcanic. Coral reefs lie off the coasts and render them difficult of access. The natives in language and customs present affinities with some Polynesians, and have been held to be a survival of the eastward immigration of people of Caucasian stock which took place before those which established the ” pre-Malay ” peoples (such as the Dyaks and Battas) in the Malay Archipelago. The islands produce some coco- nuts “sago, trepang and timber.

MENTEITH, or Monteith, a district of south Perthshire, Scotland, roughly comprising the territory between the Teith and the Forth. Formerly it was a stewartry and gave the title to an earldom. The title was first held by Gilchrist, a Celtic chief ennobled by Malcolm IV., and passed successively to Walter Comyn (d. 1258), to a branch of the Stewarts, and finally to the Grahams, becoming extinct in 1694. The lake of Menteith, situated 2% m. S. of Loch Vennachar measures 13 m. long by 1 m. broad, and contains three islands. On Inchmahome (Gaelic, ” the Isle of Rest”) are the ruins of an Augustinian priory founded in 1238 by Walter Comyn. It is Early English, with an ornate western doorway. The island was the residence of Queen Mary, when a child of five, for a few months before her departure to France in 1548. On Inch Talla stands the ruined tower of the earls of Menteith, dating from 1428. The village of Port of Monteith (pop. of parish, 1088), on the north shore of the lake, is 3 j m. north by west of the station of the same name on the North British Railway Company’s Forth & Clyde line.

MENTONE (Fr. Menton), a town in the department of the Alpes Maritimes in south-east France, situated on the shore of the Mediterranean, about 15 m. by rail E. of Nice. Pop. (1901), 9944. It is built in the form of an amphitheatre on a rocky promontory, which divides its semicircular bay into two portions. The main town is composed of two parts. Below, along the sea- shore, is the town of hotels and foreigners, while above, and inaccessible to wheeled vehicles, is that of the native Mentonese, with steep, narrow and dark streets, clinging to the mountain side around the strong castle which was once its protection against pirates. In the old town is the church of St Michel, rebuilt in great part since an earthquake in 1887, while below, in the principal street, the Corniche road, is the monument set up in 1896 to commemorate the union (in i860) of Men tone with France. East of the main town is the suburb of Garavan, sheltered by cliffs, and filled with hotels. A mile and a half far- ther on is the Pont St Louis, which marks the frontier between France and Italy, while beyond it Sir Thomas Hanbury’s villa at La Murtola is soon reached, with its marvellous gardens of 250 acres. West of the main town more

hotels and villas are scattered along the coast towards Cap Martin. This is a pine- covered promontory which shelters the Bay of Mentone on the west, and is crowned by a great hotel, not far from which is the villa of the ex-empress Eugenie. Facing south-east, and sheltered on the north and west by mountains, the Bay of Mentone has a delicious climate and is frequented by invalids. The mean for the year is 6i° F., while that for the winter is 7 2° in the sun, and 55° in the shade. Frost occurs on the average only once in ten years. Besides the charms of its climate Mentone

offers those of an almost tropical vegetation. Lemon-trees, olive- trees and pines rise in successive stages on surrounding slopes. The district produces 40,000,000 lemons yearly, and this is its principal natural wealth. In the east bay is the harbour, con- structed in 1890. It has a depth of about 26 ft., and is sheltered by a jetty about 400 yds. in length. The harbour is frequented by pleasure yachts and a few coasting vesssls-

Mentone was probably the Lumone of the Itineraries, but no Roman remains exist. After having belonged to the counts of Ventimiglia and a noble Genoese family, it was purchased about the middle of the 14th century by the Grimaldis, lords of Monaco. During the First Republic and the First Empire it belonged to France, but in 1815 it reverted to the prince of Monaco, who subjected it to such exactions that in 1848 its inhabitants proclaimed the town (with Roquebrune on the west) independent, under the protection of Sardinia. In i860 both Mentone and Roquebrune were purchased by France from the prince of Monaco, and added to the department of the Alpes Maritimes then formed out of the county of Nice, ceded the same year to France by Sardinia.

MENTOR, in Greek legend, the son of Alcimus and the faithful friend of Odysseus. During the absence of the latter, Mentor was entrusted with the care of his household and the guardian- ship of his son Telemachus. The word ” mentor ” is now used in the sense of a wise and trustworthy adviser, a meaning probably connected with the etymology of the name, from the root mon-, seen, in Lat. monere, to advise, monitor, adviser.

The New English Dictionary points out that the transferred use is due less to Homer’s Odyssey than to Fenelon’s TeUmaque, in which Mentor is a somewhat prominent character.

MENTOR OF RHODES, brother of Memnon (5.11.), a Greek condottiere who appears first in the service of the rebellious satrap

Artabazus of Phrygia in 363. When Artabazus had rebelled a second time and was in 353 forced to flee with Memnon into Macedonia, Mentor entered the service of the Egyptian king Nectanebus, and was sent by him with a body of Greek mercenaries to support the rebellious king Tennes (Tabnit) of Sidon against Artaxerxes III. But Tennes and Mentor betrayed the besieged town to the Persians (344 B.C.). Tennes was killed after his treason, but Mentor gained the favour of the king. It was due largely to him that Egypt was conquered in 343 (Diod. xvi. 45 sqq.). He now closely allied himself with the eunuch Bagoas (q.v.), the all-powerful vizier of Artaxerxes III. He was appointed general in Asia Minor, and with the help of Artabazus and Memnon, whose pardon and recall he obtained from the king, subdued the rebels and local dynasts. The most famous among them was Hermias of Atarneus, the protector of Aristotle, who had become master of some towns of Aeolis and Troas. By treachery he made him prisoner and occupied his towns (342 B.C.) ; Hermias was executed by order of the king (Diod. xvi. 52; Polyaen. vi. 48; pseudo-Arist. Oecon. ii. 27; Strabo xiii. 610; Didymus' commentary on Demosthenes Phil. 4, p. 6; cf. Diog. Laert. vi. 9). Shortly afterwards Mentor died, and was succeeded by his brother Memnon. His son Thymondas commanded in the naval war against Alexander and at Issus (Arrian ii. 2, 1; 13, 2). (Ed. M.)

MENZEL, ADOLPH FRIEDRICH ERDMANN VON (1815- 1905), German artist, was born at Breslau on the 8th of December 18 1 5. His father was at the head of a school for girls, and intended to educate his son as a professor; but he would not thwart his taste for art. Left an orphan in 1832, Menzel had to maintain his family. In 1833 Sachse of Berlin published his first work, an album of pen-and-ink drawings reproduced on stone, to illustrate Goethe's little poem, " Kiinstlers ErdenwallenJ' He executed lithographs in the same manner to illustrate* Denkwiirdigkeiten aus der brandenburgisch-preussischen Geschichte, pp. 834-836; " The Five Senses " and " The Prayer," as well as diplomas for various corporations and societies. From 1839 to 1842 he produced 400 drawings, reviving at the same time the technique of engraving on wood, to illustrate the Geschichte Friedrichs des Grossen (" History of Frederick the Great ") by Franz Kugler. He subsequently brought out Friedrichs des Grossen Artnee in ihrer Unijormirung (" The Uniforms of the Army under Frederick the Great "), Soldaten Friedrichs des Grossen (" The Soldiers of Frederick the Great ") ; and finally, by

order of the king Frederick William IV., he illustrated the works of

Frederick the Great, Illustrationen zu den Werken Friedrichs des Grossen (1843-1849). By these works Menzel established his claim to be considered one of the first, if not actually the first, of the illustrators of his day in his own line. Meanwhile Menzel had set himself to study unaided the art of painting, and he soon produced a great number and variety of pictures, always showing keen observation and honest workman- ship— subjects dealing with the lif e and achievements of Frederick the Great, and scenes of everyday life, such as ” In the Tuileries,” ” The Ball Supper,” and ” At Confession.” Among the most important of these works are ” The Forge ” (1875) and ” The Market-place at Verona.” Invited to paint ” The Coronation of William I. at Koenigsberg,” he produced an exact representation of the ceremony without regard to the traditions of official painting. Menzel died at Berlin on the oth of February 1905. In Germany he received many honours, and was the first painter to be given the order of the Black Eagle.

MENZEL, WOLFGANG (1798-1873), German poet, critic and literary historian, was born on the 21st of June 1798, at Walden- burg in Silesia, studied at Breslau, Jena and Bonn, and after living for some time in Aarau and Heidelberg finally settled in Stuttgart, where, from 1830 to 1838, he had a seat in the Wiirt- temberg Diet. His first work, a clever and original volume of poems, entitled Streckverse (Heidelberg, 1823), was followed in 1824-1825 by a popular Geschichte der Deutschen in three volumes and in 1829 and 1830 by Rubezahl and Narcissus, the dramatized fairy-stories upon which his reputation as a poet chiefly rests. In 1851 he published the romance of Furore, a lively picture of the period of the Thirty Years’ War; his other writings include Geschichte Europas, 1789-1815 (2 vols. Stuttgart, 1853), and histories of the German War of 1866 and of the Franco-German War of 1870-71. From 1826 to 1848 Menzel edited a ” Litera- turblatt ” in connexion with the Morgenblatt; in the latter year he transferred his allegiance from the Liberal to the Conservative party, and in 1852 his ” Literaturblatt ” was revived in that interest. In 1866 his political sympathies again changed, and he opposed the ” particularism ” of the Prussian ” junkers ” and the anti-unionism of south Germany. He died on the 23rd of April 1873 at Stuttgart. His library of 18,000 volumes was afterwards acquired for the university of Strassburg.

MENZELINSK, a town of eastern Russia, in the government of Ufa, 142 m. N.W. of the town of Ufa, and 10 m. from the left bank of the Kama. Pop. (1897), 7542. Its fair is one of the most important in the southern Ural region for cattle, hides, furs, grain, tea, manufactured articles, crockery, &c, which are sold to the annual value of £500,000. The

town was founded in 1584. MEPHISTOPHELES, 1 in the Faust legend, the name of the evil spirit in return for whose assistance Faust signs away his soul. The origin of the conception and name of Mephistopheles has been the subject of much learned debate. In Dr Fausts Hbllenzwang ” Mephistophiel ” is one of the seven great princes of hell; ” he stands under the planet Jupiter, his regent is named Zadkiel, an enthroned angel of the holy Jehovah . . .; his form is firstly that of a fiery bear, the other and fairer appearance is as of a little man with a black cape and a bald head.” The origin of the idea of Mephistopheles in Faust’s mind is thus clear. He was one of the evil demons of the seven planets, the Maskim of the ancient Akkadian religion, a conception transmitted through the Chaldeans, the Babylonians and the Jewish Kabbala to medieval and modern astrologers and magicians. This fact suggests a plausible theory of the origin of the name. In the ancient Mesopotamian religion the Intelligence of Jupiter was Marduk, ” the lord of light,” whose antithesis was accordingly conceived as the lord of darkness. Mephistopheles, then (or rather Mephostophiles, as the Faust-books spell the name) is ” he who does not love light “(Gr./iiJ, #os, <#Xjj S). 2

»/ J i}- the f9, usib ˆ ch of r 587 it is spelt Miphostophiles; by Marlowe Mephistophihs; by Shakespeare {Merry Wives of Windsor, Act i) Mephostophilus. The form Mephistopheles adopted by Goethe first appears in the version des Christlich Meinenden, c. 1712

- Kiesewetter, p. 163. To Schroer this derivation seems improb- able, and he appears to prefer that from Hebrew Mephiz, destroyer

To Faust himself, somnambulist and medium, Mephistopheles had— according to Kiesewetter— a real existence: he was ” the objectivation of the transcendental subject of Faust,” an experi- ence familiar in dreams and, more especially, in the visions of mediums and clairvoyants. He was thus a ” familiar spirit,” akin to the ” daemon ” of Socrates; and if he was also half the devil of theology, half the kobold of old German myth, this was only because such ” objectivations ” are apt to clothe themselves in forms borrowed from the common stock of ideas current at the time when the seer lives; and Faust lived in an age obsessed with the fear of the devil, and by no means sceptical of the existence of kobolds. It is suggested, then, in the light of modern psychical research, that Mephistopheles, though (as the Faust-books record) invisible to any one else, was visible

enough to Faust himself and to Wagner, the famulus who shared his somnambu- listic experiences. He was simply Faust's " other self," appear- ing m various guises— as a bear, as a little bald man, as a monk, as an invisible presence ringing a bell— but always recognizable as the same " familiar."

The Mephostophiles of the Faust-books and the puppet plavs passed withhtt e or no modification into literature as the Mephisto- phihs of Marlowe s Faustus. Mephistophihs has the kobold qualities: he not only waits upon Faustus arid provides him with sumptuous fare ; he indulges in horse-play and is addicted to practical joking of a homely kind. He is, however, also the devil, as the age ot the Reformation conceived him: a fallen angel who has not for- gotten the splendour of his first estate, and who pictures to Faust the glories of heaven, in order to accentuate the horrors of the hell to which he triumphantly drags him. Goethe's Mephistopheles is altogether another conception. Some of the traditional qualities are indeed preserved: the practical joke, for instance, in the scene in Auerbach s Keller shows that he has not altogether shed his character as kobold; and, like the planet-spirits of the old magic ˆf appears alternately in animal and human shape. He is also identified with the devil; thus, in accordance with old German tradi- tion he is dressed as a nobleman (ein edler Junker), all in red, with a little cape of stiff silk, a cock's feather in his hat, and a long pointed sword; at the witches' Sabbath on the Brocken he is hailed aV" the knight with the horse's hoof," and Sybel in Auerbach's Keller is not too drunk not to notice that he limps. But his limp is the only indication that he is Lucifer fallen from heaven. He could not, like Marlowe s Mephistophihs or Milton's Satan, regretfully paint the glories of the height from which he has been hurled; for he denies the distinction between high and low, since " everything that comes into being deserves to be destroyed." " He is, in short, not the devil 01 Christian orthodoxy, a spirit conscious of the good against which he is in revolt, but akin to the Evil Principle of the older dualistic systems with their conception of the eternal antagonism between good and evil, light and darkness, creation and destruction. (See *aust.) (W.AP.)

MEPPEL, a town in the province of Drente, Holland, i6£ m. by rail N. by E. of Zwolle. Pop. (1903), 10,470. It is favourably situated at the confluence of a number of canals and rivers which communicate hence with the Zuider Zee by the Meppeler Diep, and rose rapidly into prominence in the 19th century. The chief business is in butter, eggs, cattle and pigs, while bleaching, dyeing and shipbuilding are also carried on here.

MEQUINEZ (the Spanish form of the Arabic Miknasa), a city of

Morocco, situated 1600 ft. above the sea, about 70 m from the west coast and 36 m. W.S.W. of Fez, on the road to Rabat in 33 56′ N., 5 50′ W. The town wall with its four-cornered towers is pierced by nine gates, one, the Bab Bardain, with fine tile-work. A lower wall of wider circuit protects the luxuriant gardens in the outskirts. Mequinez at a distance appears a city of palaces, but it possesses few buildings of any note except the palace and the mosque of Mulai Ismail, which serves as the royal burying-place. The palace, founded in 1634, was described io 1821 by John Windus in his Journey to Mequinez (London 1825) as ‘ about 4 m. in circumference, the whole building exceeding massy, and the walls in every part very thick; the outward one about a mile long and 25 ft. thick.” The interior is composed of oblong court-yards surrounded by buildings and arcades. These buildings are more or less square with pyramidal roofs ornamented outside with green glazed tiles, and inside with and Itophel, liar (Faust, ed. 1886, i. 25), which is certainly supported by the fact that almost all the names of devils in the magic-books

, TVi centur y ar e derived from the Hebrew.

Alles was entsteht ist werth dass es zu Grunde geht.

richly carved and painted woodwork in Mauresque style. The walls are tiled to a height of 4 or 5 ft., and above they are finished in plaster, whitewashed or carved into filigree work. The popu- lation numbers being between thirty and forty thousand. Idrisi, writing in a.d. iioo, calls the place Takarart, and describes it as an ordinary citadel, from which the town gradually developed, taking its name from the Miknasa Berbers.

MERAN, the chief town of the administrative district of the same name in the Austrian province of the Tirol, 20 m. by rail N.W. of Botzen.on the Brenner line, while the Vintschgau railway connects it with Mais, 37 m. N.W. It is the chief town in the upper Adige valley, a region which bears the special name of the Vintschgau, and is on the high road either to Landeck and the Lower Engadine by the Reschen Scheideck Pass (4902 ft.), or more directly to the Lower Engadine by the Minister valley and the Ofen Pass (7071 ft.). In 1900 Meran had 9284 inhabitants (or, with the neighbouring villages of Untermais and Obermais, 13,201), mainly German-speaking and Romanist. The town is picturesquely situated, at a height of 1001 ft., at the foot of the

vine-clad Kiichelberg, and on the right bank of the Passer River, just above its junction with the Adige or Etsch. Meran proper consists mainly of one long narrow street, the Laubengasse, flanked by covered arcades, but the name is often used to include several adjacent villages, Untermais and Obermais being on the left bank of the Passer, while Gratsch is on its right bank and north-west of the main town. The most noteworthy buildings are the parish church (14th to 15th centuries) and the old residence (15th century) of the counts of the Tirol. Meran is best known as a much frequented resort for consumptive patients, for whom it is well suited by reason of the purity of the air and the compara tive immunity of the place from wind and rain in the winter. It is also visited in spring for the whey cure and in autumn for the grape cure.

To the north-west, on the Kiichelberg, is the half-ruined castle of Tirol (2096 ft.), the original seat of the family which gave its name to the county. Meran may have been built on the site of a Roman settlement, but is first mentioned in 857. From the 12th century to about 1420 it was the capital of the ever-extending land named after it Tirol, but then had to give way to Innsbruck, while the building of the Brenner railway (1864-1867) and the rise of Botzen have decreased its commercial importance.

(W. A. B. C.) MERBECK (or Marbeck), JOHN (d. c. 1585), English theo- logical writer and musician, was organist of St George's, Windsor, about 1540. Four years later he was convicted of heresy and sentenced to the stake, but received a pardon owing to the intervention of Gardiner, bishop of Winchester, though Gardiner had himself censured Merbeck for compiling an English Con- cordance of the Bible. This work, the first of its kind in English, was published in 1550 with a dedication to Edward VI. In the same year Merbeck published his annotated Book of Common Prayer, intended to provide for musical uniformity in the use of the First Prayer Book of Edward VI., which was several times reprinted in the 19th century. Merbeck wrote several devo- tional and controversial works of a strongly Calvinistic character, and a number of his musical compositions are preserved in manu- script in the British Museum, and at Oxford and Cambridge. He died, probably while still organist at Windsor, about 1585. His son, Roger Merbeck (1536-1605), a noted classical scholar, was appointed public orator in the university of Oxford in 1564, and in 1565 became a canon of Christ Church and was elected provost of Oriel; he left Oxford on account of an unfortunate marriage, and took to medicine as a profession, becoming the first registrar of the College of Physicians in London, and chief physician to Queen Elizabeth.

MERCADIER (d. 1200), French warrior of the 12th century, and chief of freebooters in the service of Richard I. of England. In 1 183 he operated for Richard, then duke of Aquitaine, in the Limousin and the Angoumois, taking castles and laying waste the country. We know nothing of him during the ten years 1184-1194, but after Richard's return from Palestine, Mercadier accompanied him everywhere, travelling and fighting by his

side. Richard eulogized Mercadier's exploits in his letters, and gave him the estates left by Ademar de Bainac, who died without heirs about 1190. During the various wars between Richard and Philip Augustus of France, Mercadier fought successively in Berry, Normandy, Flanders and Brittany. When Richard was mortally wounded at the siege of Chalus in March 1199, Mercadier avenged him by hanging the defenders of the chateau and flaying the crossbowman who had shot the king. Mercadier then entered the service of John, and ravaged Gascony. On Easter Monday, the 10th of April 1 200, he was assassinated while on a visit to Bordeaux to pay his respects to Eleanor of Aquitaine, who was bringing from Spain Blanche of Castile. His murderer was an agent of Brandin, another freebooter in the service of John. See Geraud, Mercadier, in Bibliotheque de 1'Ecole des Chartes, 1st series, t. iii., pp. 417-443.

MERCANTILE (or Commercial) AGENCIES, the name given in America to organizations designed to collect, record and distribute to regular clients information relative to the standing of commercial firms. In Great Britain and some European coun- tries trade protective societies, composed of merchants and trades- men, are formed for the promotion of trade, and members ex- change information regarding the standing of business houses. These societies had their origin in the associations formed in the middle of the 19th century for the purpose of disseminating information regarding bankruptcies, assignments and bills of sale. The mercantile agency in the United States is a much more comprehensive organization. It came into existence after the financial crisis of 1837. Trade in the United States had become scattered over a wide territory. Communication was slow, and the town merchant was without adequate information as to the standing of many business men seeking credit. Un- doubtedly the severity of the collapse of 1837 was due in part to the insufficiency of this information. New York merchants, who had suffered so severely, determined to organize a head- quarters where reports regarding the standing of customers could be exchanged. Lewis Tappan (1788-1873), founder of the Journal of Commerce (1828) and a prominent anti-slavery leader, undertook the work, and established in New York, in 1841, the Mercantile Agency, the first organization of its

kind. The system has been wonderfully developed and extended since.

MERCANTILE SYSTEM, the name given to the economic policy which developed in Europe at the close of the middle ages. The doctrine of the mercantile system, stated in its most extreme form, made wealth and money identical, and regarded it there- fore as the great object of a community so to conduct its dealings with other nations as to attract to itself the largest possible share of the precious metals. Each country's interest was to export the utmost possible quantity of its own manufactures and tc import as little as possible of those of other countries, receiving the difference of the two values in gold and silver. This differ- ence is called the balance of trade, and the balance is favourable when more money is received than is paid. Governments might resort to all available expedients — prohibition of, or high duties on, the importation of foreign wares, bounties on the export of home manufactures, restrictions on the export of the precious metals — for the purpose of securing such a balance.

But this statement of the doctrine, though current in text- books, does not represent correctly the views of all who belonged to the mercantile school. Many members of that school were much too clear-sighted to entertain the belief that wealth consists exclusively of gold and silver. The mercantilists may be best described, as W. G. F. Roscher remarked, not by any definite economic theorem which they held in common, but by a set of theoretic tendencies, commonly found in combination, though severely prevailing in different degrees in different minds. The underlying principles may be enumerated as follows: (1) the importance of possessing a large amount of the precious metals; (2) an exaltation (a) of foreign trade over domestic, and (6) of the industry which works up materials over that which provides them; (3) the value of a dense population as an element of national strength; and (4) the employment of state action in furthering artificially the attainment of the ends proposed.

The discoveries in the New World had led to a large develop- ment of the European currencies. The old feudal economy, founded principally on dealings in kind, had given way before the new " money economy," and the dimensions of the latter were everywhere expanding. Circulation was becoming more rapid, distant communications more frequent, city life and movable property more important. The mercantilists were impressed by the fact that money is

wealth sui generis, that it is at all times in universal demand, and that it puts into the hands of its possessor the power of acquiring all other commodities. The period, again, was marked by the formation of great states, with powerful governments at their head. These governments required men and money for the maintenance of permanent armies, which, especially for the religious and Italian wars, were kept up on a great scale. Court expenses, too, were more lavish than ever before, and a larger number of civil officials was employed. The royal domains and dues were insufficient to meet these require- ments, and taxation grew with the demands of the monarchies. Statesmen saw that for their own political ends industry must flourish. But manufactures make possible a denser population and a higher total value of exports than agriculture; they open a less limited and more promptly extensible field to enterprise. Hence they became the object of special governmental favour and patronage, whilst agriculture fell comparatively into the back- ground. The growth of manufactures reacted on commerce, to which a new and mighty arena had been opened by the establish- ment of colonies. These were then viewed simply as estates to be worked for the advantage of the mother countries, and the aim of statesmen was to make the colonial trade a new source of public revenue. Each nation, as a whole, working for its own power, and the greater ones for predominance, they entered into a competitive struggle in the economic no less than in the political field, success in the former being indeed, by the rulers, regarded as instrumental to pre-eminence in the latter. A national economic interest came to exist, of which the government made itself the representative head. States became a sort of artificial hothouse for the rearing of urban industries. Production was subjected to systematic regulation, with the object of securing the goodness and cheapness of the exported articles, and so maintaining the place of the nation in foreign markets. The industrial control was exercised, in part directly by the state, but largely also through privileged corporations and trading companies. High duties on imports were resorted to, at first perhaps mainly for revenue, but afterwards in the interest of national production. Commercial treaties were a principal object of diplomacy, the end in view being to exclude the competition of other nations in foreign markets, whilst in the home market as little room as possible was given for the introduction of anything but raw materials from abroad. The colonies were prohibited from trading with other European nations than the parent country, to which they supplied either the precious metals or raw produce purchased with home manufactures.

That the efforts of governments for the furtherance of manu- factures

and commerce under the mercantile system were really effective towards that end is admitted by Adam Smith, and cannot reasonably be doubted, though doctrinaire free-traders have often denied it. Technical skill must have been promoted by their encouragements; whilst new forms of national produc- tion were fostered by attracting workmen from other countries, and by lightening the burden of taxation on struggling industries. Communication and transport by land and sea were more rapidly improved; and the social dignity of the industrial professions was enhanced relatively to that of the classes before exclusively dominant.

The foundation of the mercantile system was at the time when it took its rise inspired by the situation of the European nations. Such a policy had been already in some degree practised in the 14th and 15th centuries, thus preceding any formal exposition or defence of its speculative basis. At the commencement of the 16th century it began to exercise a widely extended influence. Charles V. adopted it, and his example contributed much to its predominance. Henry VIII. and Elizabeth conformed their

measures to it. The leading states soon entered on a universal competition for manufacturing and commercial preponderance. Through almost the whole of the 17th century the prize, so far as commerce was concerned, remained in the possession of Holland, Italy having lost her former ascendancy by the opening of the new maritime routes, and Spain and Germany being depressed by protracted wars and internal dissensions. The admiring envy of Holland felt by English politicians and economists appears in such writers as Raleigh, Mun, Child and Temple. Cromwell, by his Navigation Act, which destroyed the carrying trade of Holland and founded the English empire of the sea, and Colbert, by his whole economic policy, domestic and inter- national, were the chief practical representatives of the mercantile system.

See G. Schmoller, The Mercantile System (Eng. trans., 1896) ; also the articles, Balance of Trade ; Free Trade ; Protection ; Physiocratic School, &c.

MERCAPTANS (Thio-alcohols), organic chemical compounds of the type R.SH (R = an alkyl group). The name is derived from mercurium captans, in allusion to the fact that these compounds react readily with mercuric oxide to form crystalline mercury derivatives. The mercaptans may be prepared by the action of the alkyl halides on an alcoholic solution of potas- sium hydrosulphide; by the reduction of the sulpho-chlo rides, e.g. C2H5SO2CI (chlorides of sulphonic acids),

by heating the salts of esters of sulphuric acid with potassium hydrosulphide, and by heating the alcohols with phosphorus pentasulphide. They are colourless liquids, which are insoluble in water and possess a characteristic offensive smell. On oxidation by nitric acid they yield sulphonic acids. They combine with aldehydes and ketones, with elimination of water and formation of mer- captals and mercaptols. (See Sulphonal.)

Methyl mercaptan, CH3.SH, is a liquid which boils at 5-8° C. (752 mm.), and forms a crystalline hydrate with water. Ethyl mercaptan, C 2 H 6 .SH, is a colourless liquid which boils at 36-2° C. It is used commercially in the preparation of sulphonal (?.».). The mercury salt, Hg(SC2H 6) 2 , crystallizes from alcohol in plates. When heated with alcohol to 190 C. it decomposes into mercury and ethyldisulphide.

MERCATOR, GERARDUS [latinized form of Gerhard Kremer] (1512-1594), Flemish mathematician and geographer, was born at Rupelmonde, in Flanders, on the 5th of March 151 2. Having studied at Bois-le-Duc and Louvain (where he matricu- lated on the 29th of August 1530, and became licentiate in October 1532), he met Gemma Frisius, a pupil of Apian of Ingolstadt, who at the request of the emperor Charles V. had settled in Louvain. From Frisius young Kremer derived much of his inclination to cartography and scientific geography. In 1534 he founded his geographical establishment at Louvain; in 1537 he published his earliest known map, now lost {Terr tie sanctae descriptio). In 153 7-1 540 he executed his famous survey and map of Flanders {Exactissima Flandriae descriptio), of which a copy exists in the Musee Plantin, Antwerp. At the order of Charles V. Mercator made a complete set of instruments of observation for the emperor's campaigns: when these were destroyed by fire, in 1546, another set was ordered of the same maker. In 1538 appeared Mercator's map of the world in (north and south) hemispheres, which was rediscovered in 1878 in New York; this work shows Ptolemy's influence still dominant over Mercatorian cartography. In 1541 he issued the celebrated terrestrial globe, which he dedicated to Nicolas Perrenot, father of Cardinal Granvelle: this was accompanied by his Libellus de usu globi, which is said to have been presented to Charles V. In 1 5 51 a celestial globe followed. Mercator early began to inclirie towards Protestantism; in 1533 he had retired for a time from Louvain to Antwerp, partly to avoid inquiry into his religious beliefs; in 1544 he was arrested and prosecuted for heresy, but escaped serious consequences (two of the forty-two arrested with him were burnt, one beheaded, two buried alive). He now thought seriously of emigrating; and when in 1552 Cassander, ordered by the duke of Juliers, Cleves and Berg to organize a university at Duisburg, offered Mercator the

chair of cosmo- graphy the offer was accepted. The organization of the

university was adjourned, and never completed in Mercator's lifetime; but he now became cosmographer to the duke and permanently settled on the German soil to which many of his ancestors and relatives had belonged. Soon after this, however, he paid a visit to Charles V. at Brussels, and presented the emperor with a cosmos, a celestial sphere enclosing a terres- trial, together with an explanatory Declaratio: this work marks an era in the observation of longitude by magnetic declination, perfected by Halley. Charles rewarded the author with the title of imperalorii domeslicus {H of rath in the epitaph at Duisburg). In 1 554 Mercator published his great map of Europe in six sheets, three or four of which had already been pretty well worked out at Louvain; a copy of this was rediscovered at Breslau in 1889. Herein, though still greatly under Ptolemy's influence, Mercator begins to emancipate himself; thus Ptolemy's 62°for the length of the Mediterranean, reduced to 58 in the globe of 1541, he now cuts down to 53 . On the 28th of October 1556 he observed an eclipse at Duisburg; in 1563 he surveyed Lorraine, at the request of Duke Charles, and completed a map of the same (Lotharingiae descriptio) ; but it is uncertain if this was ever published. In 1564 he engraved William Camden's map of the British Isles; in 1568 he brought out his Ckronologia, hoc est temporum demonstratio . . . ab initio mundi usque ad annum domini 1568, ex eclipsibus et observationibus astronomicis. In the same year was published his memorable planisphere for use in navigation, the first map on " Mercator's projection," with the parallels and meridians at right angles (Nova et aucta orbis terrae descriptio ad usum naviganlium accommodata) . Improvements were introduced in this projection by Edward Wright in 1590; the more general use of it dates from about 1630, and largely came about through Dieppese support. In 1572 Mercator issued a second edition of his map of Europe; in 1578 appeared his Tabulae geographicae ad mentem Ptolemaei restitutae et emendatae; and in 1585 the first part (containing Germany, France and Belgium) of the Atlas, she cosmographicae meditationes defabrica mundi, in which he planned to crown his work by uniting in one volume his various detailed maps, so as to form a general description of the globe In 1585 he adapted his Europe to the Atlas; in 1587, with the help of his son Rumold, he added to the same a world- map (Orbis terrarum compendiosa descriptio), followed in 1590 by a second series of detailed maps (Italy, Slavonia, Greece and Candia). The rest of the

regional and other plans in this under- taking, mostly begun by Gerard, were finished by Rumold; they include Iceland and the Polar regions, the British Isles (dedicated to Queen Elizabeth), the Scandinavian countries (dedicated to Henr. Ranzovius), Prussia and Livonia, Russia, Lithuania, Transylvania, the Crimea, Asia, Africa and America (in the last Michael Mercator, in Asia and Africa Gerard Mercator the younger, assisted) The designs are accompanied by cosmo- graphical and other dissertations, sflme of the theological views in which were condemned as heretical (see the Duisburg edition ol 1594, folio). In 1592 Mercator published, two years after his first apoplectic stroke, a Harmonia evangeliorum. He died on the 5th of December 1594, and was buried in St Saviour's church, Duisburg. Besides his famous projection, he did ex- cellent service with Ortelius in helping to free the geography of the 1 6th century from the tyranny of Ptolemy; his map and instrument work is noteworthy for its delicate precision and admirable execution in detail.

See the Vita Mercatoris by Gualterus Ghymnius in the Latin editions of the Atlas; Gerard Mercator, sa vie et ses ceuvres, by Dr J. van Raemdonck (St Nicolas, 1869); A. Breusing, Gerhard Kremer (Duisburg, 1878), and article " Mercator " in Allgemeine deutsche Biographie; General Wauwermans, Hisloire de I'ecole cartographique beige … at* XVI.-siecle, and article "Mercator" in Biographie nationale (de Belgique), vol. xiv. (Brussels, 1897). Also the lesser studies of Dr J. van Raemdonck, Sur les exemplaires des grandes cartes de Mercator; Carte de Flandre de Mercator; Relations entre

. . Mercator et . . . Plantin … (St Nicolas, 1884); La Geo- graphie ancienne de la Palestine: Lettre de Girard Mercator . . . mat 22, 1567 (St N.. 1884) ; Les Spheres terrestre et cttestc de Mercator, 1541 . . . 1551 (St N., 1885); Van Ortroy, L'CBuvre giographique de Mercator. (C. R. B.)

MERCENARY (Lat. mercenarius, from merces, reward, gain), one who serves or acts solely for motives of personal gain, particu- larly a soldier who offers himself for service in any army which may hire him. The name is sometimes used as a term of reproach by nations who raise their armies by conscription, of armies raised by voluntary enlistment whose members are paid a more or less living wage.

MERCER (through Fr. mercier, from popular Lat. mercerius, a dealer, merx, merces, merchandise), a dealer in the more costly textiles, especially in silks and velvets. The word formerly had a wider meaning. Mercery, according to W. Herbert (History of the Twelve Great Livery Companies, 1834), " compre- hended all things sold by

retail by the ‘ little balance ‘ or small scales (in contradistinction to the things sold by the ‘ beam ‘ or in gross), and included not only toys, together with haber- dashery and various other articles connected with dress, but also spices and drugs.” Many of the articles in which they dealt fell later within the sphere of other trades; thus the trade in the smaller articles of dress was taken over by the haberdashers (q.v.). The trade in silk seems to have been originally in the hands of the ” silkmen and throwsteres.” The Mercers’ Com- pany is the first in precedence of the twelve great livery com- panies of the city of London, and is also the wealthiest both in trust and corporate property. The first charter was obtained in 1393, but the mercers appear to have been formed into a gild much earlier. Herbert finds the mercers as patrons of a charity a few years after n 72, and one Robert Searle, who was mayor in 1214, was a ” mercer.” A further charter was granted in 1424, with the right to use a common seal. The history of the company is closely connected with the name of Richard Whittington (q.v.), and later with that of Dean Colet, who chose the company as the manager of St Paul’s School. (See Livery Companies.)

MERCERIZING, the term applied to a process, discovered in 1844 by John Mercer, a Lancashire calico printer, which consists in treating cotton (and to a limited extent other plant fibres) with strong caustic soda or certain other reagents, where- by morphological and chemical changes are brought about in the fibre. Thus, if a piece of bleached calico be immersed in caustic soda of 50 Tw. strength (sp. gr. 1-25), it rapidly changes in appearance, becoming stiff and translucent, but when taken out and well washed in running water it loses these properties and apparently reverts to its original condition. On closer examination, however, the fabric is found to have shrunk con- siderably both in length and breadth, so as to render the texture quite different in appearance to that of the original calico; it is also considerably stronger, and if dyed in the same bath along with some of the untreated fabric is found to have acquired a greatly increased affinity for colouring matters. This peculiar action is not restricted to caustic soda, similar effects being obtained with sulphuric acid of 105° Tw., nitric acid of 83 Tw., zinc chloride solution of 145 Tw., and other reagents. Mercer assumed that a definite compound, corresponding to the formula Ci2H2oOio.Na20 is formed when the cotton is steeped in caustic soda, and that this is decomposed by subsequent washing with water into a hydrated cellulose C12H20O10.H2O, which would account for the fact that in the air-dried condition mercerized cotton retains about 5% more hygroscopic moisture than ordinary cotton. This view is strengthened by the observation that when cotton is immersed in nitric acid of 83 Tw. it acquires similar properties to

cotton treated with caustic soda. If, after immersion in the nitric acid, it is squeezed and then dried (without washing) in a vacuum over burnt lime, it is found to” have formed a compound which corresponds approximately to the formula CeHioOg.HNOs, which is decomposed by water into free nitric acid and a hydrated cellulose.

When viewed under the microscope, mercerized cotton is seen to have undergone considerable morphological changes, inas- much as the lumen or central cavity is much reduced in size, while the fibre has lost its characteristic band-shaped appearance and becomes rounded.

In Mercer’s time the process, which he himself termed ” sodaizing ” or ” fulling,” never acquired any degree of com-

mercial success, partly on account of the expense of the caustic soda required, but mainly on account of the great shrinkage (20 to 25%) which took place in the cloth. An important application of the process in calico printing for the production of permanent crimp or ” crepon ” effects, which was originally devised by Mercer, was revived in 1890-1891 and is still largely practised by calico printers (see Textile Printing). Another application, also dependent upon the shrinking action of caustic soda on cotton, was patented in 1884 by Depoully, and has for its object the production of crimp effects on piece-goods consist- ing of wool and cotton or silk and cotton. In the manu- facture of such goods cotton binding threads are introduced at definite intervals in the warp or weft, or both, and the piece is passed through cold caustic soda, washed, passed through dilute sulphuric acid, and washed again till neutral. The cotton con- tracts under the influence of the caustic soda, while both wool and silk remain unaffected, and the desired crimped or puckered effect is thus obtained.

By far the most important application of the mercerizing process is that by which a permanent lustre is imparted to cotton goods; this was discovered in 1889 by H. A. Lowe, who took out a patent for his process in that year, this being supple- mented by a further patent in 1890. Since Lowe’s invention did not receive sufficient encouragement, he allowed his patents to lapse and the process thus became public property. It was not until 1895, when Messrs Thomas & Prevost repatented Lowe’s invention, that actual interest was aroused in the new product and the process became a practical success. Their patent was subsequently annulled on the ground of having been

anticipated.

The production of a permanent lustre on cotton by mercerizing is in principle a very simple process, and may be effected in two ways. According to the first method, the cotton is treated in a stretched condition with strong caustic soda, and is then washed, while still stretched, in water. After the washing has been continued for a short time the tension relaxes, and it is then found that the cotton has acquired a permanent lustre or gloss similar in appearance to that of a spun silk though not so pronounced. According to the second method, which constitutes but a slight modification of the first, the cotton is immersed in caustic soda of the strength required for mercerizing, and is then taken out, stretched slightly beyond its original length, and then washed until the tension slackens.

Not all classes of cotton are equally suited for being mercerized. Thus, in the case of yarns the most brilliant lustre is always obtained on twofold or multifold yarns spun from long-stapled cotton (Egyptian or Sea Island). Single yarns made from the same quality of cotton are only slightly improved in appearance by the process, and are consequently seldom mercerized; and the same applies to twofold yarns made from ordinary American cotton. In piece-goods, long-stapled cotton also gives the best results, but it is not necessary that the yarn used for weaving should be twofold. In the great majority of cases, the mercerizing of cotton, whether it be in the yarn or in the piece, is done before bleaching, but sometimes it is found preferable to mercerize after bleaching, or even after bleaching and dyeing. The strength of the caustic soda employed in practice is generally between 55 ° and 60″ Tw. The temperature of the caustic soda hasj a material influence on its action on the cotton fibre, very much stronger solutions being required to produce the same effect at elevated temperatures than at the ordinary temperature, while, on the contrary, by lowering the temperature it is possible to obtain a good lustre with considerably weaker lyes.

Cotton yarn may be mercerized either in the hank or in the warp, and a great number of machines have been patented and constructed for the purpose. The simplest form of machine for hanks consists essentially of two superposed strong steel rollers, on which the hanks are placed and spread out evenly. The upper roller, the bearings of which run in a slotted groove, is then raised by mechanical means until the hanks are taut. Caustic soda of 60° Tw. is now applied, and the upper roller is caused to revolve slowly, the hanks acting as a belt and causing the lower roller to revolve simultaneously. After about three minutes the caustic soda is allowed to drain off and the hanks

are washed by spurt pipes until they slacken, when they are taken off and rinsed, first in dilute sulphuric acid (to neutralize the alkali and facilitate washing), and then in water till neutral. The hanks are then bleached in the ordinary way and may be subsequently dyed, no diminution being brought about in the lustre by these operations. Cotton warps are usually mercerized on a machine similar in construction to a four box dyeing machine (see Dyeing), but with the guiding rollers and their bearings of stronger construction and the squeezers at each end of the first box with a double nip (three rollers). The first box con- tains caustic soda, the second water, the third dilute sulphuric acid, and the fourth water.

For the continuous mercerizing of cotton in the piece much more complicated and expensive machinery is required than for yarn, since it is necessary to prevent contraction in both length and breadth. The mercerizing range in most common use for pieces is constructed on the same principle as the stentering machine used in stretching pieces after bleaching, dyeing or printing, and consists essentially of two endless chains carried at either end by sprocket wheels. The chains carry clips which run in slotted grooves in the horizontal frame of the machine, which is about 40 ft. in length. The clips close automatically and grip the cloth on either side as it is fed on to the machine from the mangle, in which it has been saturated with caustic soda. The stretching of the piece begins immediately on entering the machine, the two rows of clips being caused to diverge by setting the slotted grooves in such a manner that when the piece has travelled about one-third of the length of the machine it is stretched slightly beyond its original width. At this point the piece meets with a spray of water, which is thrown on by means of spurt pipes ; and in consequence the tension slackens and the mercer- izing is effected. When the piece arrives at the end of the machine the clips open automatically and release it. Thence it passes through a box containing dilute sulphuric acid, and then through a second box where washing with water is effected.

In most large works the caustic soda washings, which were formerly run to waste or were partly used up for bleaching, are evaporated down in multiple effect evaporators to 90 ° Tw., and the solution is used over again for mercerizing.

Cotton mercerized under tension has not as much affinity for colouring matters as cotton mercerized without tension, and although the amount of hygroscopic moisture which it retains in the air-dried condition is greater than in the case of ordinary untreated cotton, it is not so great as that held by cotton which has been mercerized without

tension. By drying cotton which has been mercerized with or without tension at temperatures above 100° C. its affinity for colouring matters is materially decreased.

The cause of the lustre produced by mercerizing has been variously explained, and in some cases antagonistic views have been expressed on the subject. When viewed under the microscope by reflected light, the irregularly twisted band-shaped cotton fibre is seen to exhibit a strong lustre at those points from which the light is reflected from the surface. Cotton mercerized without tension shows a similar appearance. In the .yarn or piece the lustre is not apparent, because the innumerable reflecting surfaces disperse the light in all directions. If, however, the cotton has been mercerized under tension, being plastic while still containing the caustic soda, it is stretched and is set in this condition by the washing. Thus in the finished product a large proportion of the rounded fibres are laid parallel to each other, as in the case of spun silk, and the lustre inherent to the fibre becomes visible to the naked eye.

See The Life and Labours of John Mercer, by E. A. Parnell (Long- mans Green & Co) ; Die Mercerisation ier Baumwolle, by Paul Gardner (Julius Springer, Berlin) ; Mercerisation, by the editors of The Dyer and Calico Printer (Heywood & Co.). (E. K.)

MERCHANT (O. Fr. marcheant, modern marchand; from Lat. mercari, to trade, rnerx, goods, merchandise), a trader, one who buys and sells goods for profit. The term is now usually confined to a wholesale dealer or one who trades on an extended scale with foreign countries.

MERCIA, one of the kingdoms of Anglo-Saxon England. The original kingdom seems to have lain in the upper basin of the Trent, comprising the greater part of Derbyshire and Staffordshire, the northern parts of Warwickshire and Leicester- shire,, and the southern part of Nottinghamshire. The name (Merce) seems to denote men of the March, and presumably was first applied when this district bordered upon the Welsh. In later times Mercia successively absorbed all the other terri- tories between the Humber and the Thames except East Anglia, and some districts even beyond the Thames.

The origin of the kingdom is obscure. The royal family, according to Felix, Life of St Guthlac (Anglo-Saxon version), were called Iclingas. Icel, their ancestor, may have been the founder of the kingdom, but nothing is known of him. Theˆ family, however, claimed descent from the ancient kings of Angle (cf. Offa I. and Wermund). The first Mercian king of whom we have any record was Cearl, who apparently

reigned about the beginning of the 7th century, and whose daughter Coenburg married Edwin, king of Deira. During Edwin's reign Mercia was subject to his supremacy, though it may have been governed throughout by princes of its own royal family. Its first prominent appearance in English history may be dated in the year 633, when the Mercian prince Penda joined the Welsh king Ceadwalla in overthrowing Edwin. According to the Saxon Chronicle, Penda began to reign in 626, and fought against the

West Saxons at Cirencester in 628. In the Mercian regnal tables, however, he is assigned a reign of only twenty-one years, which, as his death took place in 654 or 655, would give 634 as the date of his accession, presumably on the overthrow of Edwin, or perhaps on that of Ceadwalla. During the reign of Oswald Penda clearly reigned under the suzerainty of that king. In 642, however, Oswald was slain by Penda in a battle at a place called Maserfeld, which has not been identified with certainty. During the early part of Oswio's reign the North- umbrian kingdom was repeatedly invaded and ravaged by the Mercians, and on one occasion (before 651) Penda besieged and almost captured the Northumbrian royal castle at Bamborough. At the same time he extended his influence in other directions, and expelled from the throne of Wessex Coenwalh, who had divorced his sister. Indeed, at this time nearly all the English kingdoms must have acknowledged his supremacy. The king- dom of Middle Anglia, which appears to have included the counties of Northampton, Rutland, Huntingdon, and parts of Bedfordshire, Cambridgeshire, Leicestershire and Lincolnshire, was formed into a dependent principality under his son Peada. At this time also the territory corresponding to the modern counties of Cheshire, Shropshire and Herefordshire seems to have been occupied. The last of these counties is said some time later to have been under the government of another son of Penda, named Merewald. In 654 or 655 Penda again invaded North- umbria, with a huge army divided into thirty legiones, each under a royal prince, among whom were ˆEthelhere, king of East Anglia, and several Welsh kings. He was defeated and slain, however, by Oswio, at a river called the Winwaed. Mercia then came again under Northumbrian rule. Peada, the eldest son of Penda, was allowed to govern the part south of the Trent, while north Mercia was put in charge of Northumbrian officials. Penda, although he did not prohibit the preaching of Christianity, had remained a heathen to the end of his life. His death was followed by the conversion of his kingdom. Peada had embraced

Christianity on his marriage with a daughter of Oswio, and under him the first Mercian bishopric was founded. Shortly afterwards Peada was murdered; but in 658 the Mercians rose under his younger brother Wulfhere and threw off the Northumbrian supremacy.

Wulfhere seems to have been a vigorous ruler, for he extended the power of Mercia as far as it had reached in the days of his father, and even farther. According to the Chronicle he invaded Wessex as far as Ashdown in Berkshire in the year 661. At the same time he conquered the Isle of Wight, which he gave to iEthelwalh, king of Sussex. .Between the years 661 and 665 he was defeated by the Northumbrian king Ecgfrith and had to give up Lindsey. In 675 he again fought with the West Saxons under Aescwine, and shortly afterwards died. His brother ˆEthelred, who succeeded him, invaded Kent in the following year, and in 679 fought a battle on the Trent against Ecgfrith, by which he recovered Lindsey. After this, however, we hear little of Mercian interference with the other kingdoms for some time; and since it is clear that during the last 1 5 years of the 7th cen- tury Wessex, Essex, Sussex and Kent were frequently involved in strife, it seems likely thatthe Mercian king had somewhat lost hold over the south of England. In 704 jEthelred resigned the crown and became a monk, leaving his kingdom to Coenred, the son of Wulfhere. Coenred also abdicated five years later and went to Rome. Ceolred, the son of iEthelred, who succeeded, fought against the West Saxon king Ine in 715. On his death in the following year ˆEthelbald, a distant relative, came to the throne, and under him Mercian supremacy was fully restored over all the kingdom south of the Humber. He reigned for 41 years. After his murder in 757 the Mercian throne was held for a short time by Beornred. He was expelled the same year by Offa, who soon restored the power of Mercia, which seems to have suffered some diminution during the later years of Ethel- _ Koi Offa's policy was apparently the extinction of the depen- ngdoms. In his reign the dynasties of Kent, Sussex and icce seem to have disappeared, or at all events to have p the kingly title. In 787 he associated his son Ecgfrith

with him in the kingdom, and after his death (796) Ecgfrith reigned alone for a few months. On the death of Ecgfrith the. throne passed to Coenwulf, a descendant of Pybba, father of Penda. In 821 Coenwulf was succeeded by his brother Ceolwulf, who was deprived of the throne in 823, being succeeded by Beornwulf. In 825 Beornwulf was defeated by Ecgberht, king of Wessex, and in the same year he was overthrown and slain by the East Angles. The supremacy now passed to Wessex.

In 827 Ludeca, the successor of Beornwulf, was slain in battle with

five of his earls. Wiglaf, who succeeded him, was expelled two years later by Ecgberht, but regained the throne in the following year. He died, probably in 839, and was succeeded by Berhtwulf, who reigned until 852. Under these later kings Mercia seems to have extended from the Humber to the Thames, including London, though East Anglia was independent, and that part of Essex which corresponds to the modern county of that name had been annexed to Wessex after 825. Berhtwulf was succeeded in 852 by Burgred, who married ˆEthelswith, daughter of jEthelwulf. His power seems to have been more or less dependent on the West Saxons. In 853, with the assistance of vEthelwulf he reduced North Wales to subjection. Again in 868 he called upon the West Saxon king ˆEthelred for assist- ance against the Danes under LoSbrok's sons, who at this time invaded Mercia after their overthrow of the Northumbrians at York. No battle took place, and the Mercians subsequently made peace with the Danes. In 872 the Danes occupied London on their return from invading Wessex, after which a truce was again made. In 873 the Danes encamped at Torksey in Lincoln- shire, and although another truce ensued, they advanced in the following year to Repton, and Burgred was driven from the kingdom. He went to Rome, where he remained until his death. In 874 Ceolwulf, a king's thegn or baron, was made king by the Danes, and definitely acknowledged their overlordship. In 877, after the second invasion of Wessex, the Danes seem to have taken the eastern part of Mercia into their own hands. How long Ceolwulf reigned over the western portion is unknown. About the year 884 the most important person in English Mercia was an earl, /Ethelred, who accepted the suzerainty of Alfred, and in or before the year 887 married his daughter ˆEthelflaed. ˆEthelred and ˆEthelflaed appear to have had practically regal power, though they did not use the royal title. In 886 London, which had been recovered by Alfred from the Danes, was re- stored to ˆthelred. During the invasion of 893-97 English Mercia was again repeatedly ravaged by the Danes; but in the last of these years, by the united efforts of Alfred and Mthtlxtd, they were at length expelled. With this exception, Watling Street, the Ouse and the Lea, continued to be the boundary between Mercia and the Danish kingdom of East Anglia down to the death of ˆEthelred, between 910 and 912. The government was then carried on by ˆEthelflaed, who built a number of fort- resses, and in conjunction with her brother, King Edward the Elder, succeeded in expelling the Danes from Derby and Leicester by the year 917-18. After her death in the latter year her daughter ˆElfwyn was soon deprived of the government by Edward, and Mercia was definitely annexed to Wessex.

From this time onwards its existence as a separate kingdom was at an

end, though during the last years of Eadwig's reign the Mercians and Northumbrians set up Eadgar as king. In the last century of the Saxon period the earls of Mercia frequently occupied a semi-royal position. The most important of thgse were ˆElfhere under Eadgar, Edward and iEthelred, Eadrlftt Streona, under the last-mentioned king, and Leofric, under the Danish kings.

Authorities. — Bede, Historia ecclesiastica (ed. C. Plummer, Oxford, 1896); Anglo-Saxon Chronicle (ed. Earle and Plummer, Oxford, 1899); W. de G. Birch, Cartularium saxonicum (London, 1885-1893). (F. G. M. B.)

MERCI& MARIUS JEAN ANTONIN (1845-), French sculptor and painter, was born in Toulouse on the 30th of October 1845. He entered the ficole des Beaux Arts, Paris, and studied under Falguiere and Jouffroy, and in 1868 gained the Grand Prix

de Rome. His first great popular successes were the " David " and " Gloria Victis," which was shown and received the medal of honour of the Salon. The bronze was subsequently placed in the Square Montholon. " The Genius of the Arts " (1877), a relief, is in the Tuileries, in substitution for Barye's " Napoleon III."; a similar work for the tomb of Michelet (1879) is in the cemetery of Pere la Chaise; and in the same year Mercie produced the statue of Arago with accompanying reliefs, now erected at Perpignan. In 1882 he repeated his great patriotic success of 1874 with a group " Quand Meme!" replicas of which have been set up at Belfort and in the garden of the Tuileries. " Le Souvenir " (1885), a marble statue for the tomb of Mme Charles Ferry, is one of his most beautiful works. " Regret," for the tomb of Cabanel, was produced in 1892, along with " William Tell," now at Lausanne. Mercie also designed the monuments to " Meissonier " (1895), erected in the Jardin de l'lnfante in the Louvre, and " Faidherbe " (1896) at Lille, a statue of " Thiers " set up at St Germain-en-Laye, the monument to " Baudry " at Pere-la-Chaise, and that of " Louis-Philippe and Queen Amelie " for their tomb at Dreux. His stone group of " Justice " is at the Hdtel de Ville, Paris. Numerous other statues, portrait busts, and medallions came from the sculptor's hand, which gained him a medal of honour at the Paris Exhibi- tion of 1878 and the grand prix at that of 1889. Among the paintings exhibited by the artist are a " Venus," to which was awarded a medal in 1883, " Leda " (1884), and " Michael- angelo studying Anatomy " (1885) —

his most dramatic work in this medium. Merci6 was appointed professor of drawing and sculpture at the Ecole des Beaux Arts, and was elected a member of the Academie Francaise in 1891, after being awarded the biennial prize of the institute of £800 in 1887.

MERCIER, HONORS (1840-1894), Canadian lawyer and statesman, was the son of Jean Baptiste Mercier, fanner, and of Marie Kimener, his wife. He was born in the village of St Athanase d'Iberville on the 15th of October 1840. The family came from France, and settled in the district of Mont- magny, and later removed to Iberville. Mercier entered the Jesuit College of St Mary, Montreal, at the age of fourteen, and throughout his life retained a warm friendship for the society. He married, firstly in 1866 Leopoldine Boivin, and secondly in 1871 Virginie St Denis. On the completion of his course at St Mary's he studied law in the office of Laframboise and Papineau, in St Hyacinthe, and was admitted to the bar of the province in April 1865. At the age of twenty-two he became the editor of the Conservative Courrier de St Hyacinthe, and in this journal supported the policy of the Sicotte administration, which then represented the interests of Quebec, under the Act of Union (1840); but when Sicotte accepted a seat on the bench Mercier joined the Opposition, and contributed largely to the defeat of the Ministerial candidate. In 1864 he vigorously opposed the scheme of confederatfon, on the ground that it would prove fatal to the distinctive position held by the French Canadians. He resumed the editorship of the Courrier in 1866; but after a few months retired from journalism, and for the next five years devoted all his energy to his profession. At the commencement of the year 1871 the national party was organized in Quebec, and Mercier supported the candidates of the party on the platform. In August 1872 he was elected as a member of the House of Commons for the county of Rouville, and proved a vigorous opponent of Sir John A. Macdonald on the question of separate schools for New Brunswick. He was a candidate at the general elections in 1874; but retired on the eve of the contest in favour of another candidate of his own party. Mercier entered the arena of provincial politics in May 1879 as solicitor-general in the Joly government, representing the county of St Hyacinthe; and on the defeat of the ministry in October he passed, with his leader, into opposition. On the retirement of M. Toly from the leadership of the Liberal party in Quebec in 1883 Mercier was chosen as his successor. Towards the close of 1885 the French-Canadian mind was greatly agitated over the execution of Louis Riel, leader of the north-west rebellion, and in consequence of the attitude of Mercier on this Question the

Liberal minority in the Legislative Assembly, which had been reduced

to fifteen, rapidly gained strength, until at the general elections held in October 1886 the province was carried in the Liberal interest. In January 1887 Mercier was sworn in as premier and attorney-general, and from this moment he exer- cised an extraordinary influence in the province. He succeeded in passing without opposition the Jesuit Estates Act, a measure to compensate the order for the loss of property confiscated by the Crown. This act came before the Federal House for disallow- ance, but, was carried on division. When Mercier appealed to the electorate in 1890, his policy was endorsed, and he was able to give effect to many important measures. Early in 1891 he negotiated a loan in Europe for the province, and whilst on a visit to Rome he was created a count of the Roman Empire by Leo XIII., who three years previously had conferred upon him the rank of a commander of the order of St Gregory the Great. Of commanding presence, firm, decisive, courteous in manner, convincing in argument, and deeply attached to his native province, he had all the qualities of a popular leader. For a few years he was the idol of the people of Quebec, and French Canada loomed large in the public eye; but towards the end of 1891 serious charges were preferred against his ministry, on the ground that subsidies voted for railways had been diverted to political use, and he was dismissed by the lieutenant-governor. At the subsequent elections held in March 1892 he was returned for the county of Bona venture, but his party was hopelessly defeated. On the formation of a new government he was brought to trial, and declared not guilty; his health, however, gave way, and he never regained his former influence.

See Biographie, discours, conferences, &c, de VHon. Honorb Mercier, by J.-O. Pelland (Montreal, 1893). (A. G. D.)

MERCIER, LOUIS SEBASTIEN (1 740-1814), French drama- tist and miscellaneous writer, was born in Paris on the 6th of June 1740. He began his literary career by writing heroic epistles, but early came to the conclusion that Boileau and Racine had ruined the French language, and that the true poet was he who wrote in prose. The most important of his miscel- laneous works are L' An 2440 (1770); L' Essai sur I' art dramatique (1773); NSologie (1801); Le Tableau de Paris (1781-1788); Le nouveau Paris (1799); Histoire de France (1802) and Satire contre Racine et Boileau (1808). He decried French tragedy as a caricature of antique and foreign customs in bombastic verse, and advocated the com&die larmoyante as understood by Diderot. To the philosophers he was entirely hostile. He denied that modern science had made any real advance; he even carried his conservatism so far as to maintain that the earth was a circular flat plain around which revolved the sun. Mercier wrote some sixty dramas, among which may

be mentioned Jean Hennuyer (1772); La Destruction de la ligue (1782); Jennival (1769); Le Juge (1774); Natalie (1775) and La Brouette du vinaigrier (1775). In politics he was a Moderate, and as a member of the Convention he voted against the death penalty for Louis XVI. During the Terror he was imprisoned, but was released after the fall of Robespierre. He died in Paris on the 25th of April 1814.

See Leon Bechard, Sebastien Mercier, sa vie, son ceuvre (Paris, 1903); R. Doumic in the Revue des deux mondes (15th July 1903).

MERCK, JOHANN HEINRICH (1741-1791), German author and critic, was born at Darmstadt on the nth of April 1741, a few days after the death of his father, a chemist. He studied law at Giessen, and in 1767 was given an appointment in the paymaster's department at Darmstadt, and a year later himself became paymaster. For a number of years he exercised con- ” siderable influence upon the literary movement in Germany; he helped to found the Frankfurter gelehrte Anzeigen in 1772, and was one of the chief contributors to Nicolai's Allgemeine Bibliothek. In 1782 he accompanied the Landgravine Karoline of Hesse-Darmstadt to St Petersburg, and on his return was a guest of the duke Charles Augustus of Weimar in the Wartburg, Unfortunate speculations brought him into pecuniary embarrass- ment in 1788, and although friends, notably Goethe, were ready to come to his assistance, his losses — combined with the death of five of his children — so preyed upon his mind that he committed

suicide on the 27th of June 1701. Merck distinguished himself mainly as a critic; his keen perception, critical perspicacity and refined taste made him a valuable guide to the young writers of the Sturm und Drang. He also wrote a number of small treatises, dealing mostly with literature and art, especially painting, and a few poems, stories, narratives and the like; but they have not much intrinsic importance'. Merck's letters are particularly interesting and instructive, and throw much light upon the literary conditions of his time.

Merck's Ausgewdhlte Schriften zur schonen Literatur und Kunst were published by A. Stahr in 1840, with a biography. See Brief e an J. H. Merck von Goethe, Herder, Wieland und andern bedeutenden Zeitgenossen (1835), Briefe an und von J. H. Merck (1838) and Briefe aus dent Frcundeskreise von Goethe, Herder, Hopfner und Merck

(1847), all edited by K. Wagner. Cf. G. Zimmermann, /. H. Merck, seine Umgebung und seine Zeit (1871).

MERCCEUR, SEIGNEURS AND DUKES OF. The estate of Mercceur in Auvergne, France, gave its name to a line of powerful lords, which became extinct in the 14th century, and passed by inheritance to the dauphins of Auvergne, counts of Clermont. In 1426 it passed to the Bourbons by the marriage, of Jeanne de Clermont, dauphine of Auvergne, with Louis de Bourbon, count of Montpensier. It formed part of the, confis- cated estates of the Constable de Bourbon, and was given by Francis I. and Louise of Savoy to Antoine, duke of Lorraine, and his wife, Renee de Bourbon. Nicolas of Lorraine, son of Duke Antoine, was created duke of Mercceur and a peer of France in 1569. His son Philippe Emmanuel (see below) left a daughter, who married the due de Vendome in 1609.

MERCCEUR, PHILIPPE EMMANUEL DE LORRAINE, Due de (1558-1602), French soldier, was born on the 9th of Septem- ber 1558, and married Marie de Luxemburg, duchesse de Pen- thievre. In 1582 he was made governor of Brittany by Henry III., who had married his sister. Mancceur put himself at the head of the League in Brittany, and had himself proclaimed protector of the Roman Catholic Church in the province in 1588. Invoking the hereditary rights of his wife, who was a descendant of the dukes of Brittany, he endeavoured to make himself independent in that province, and organized a government at Nantes, calling his son ” prince and duke of Brittany.” With the aid of the Spaniards he defeated the due de Montpensier, whom Henry IV. had sent against him, at Craon in 1592, but the royal troops, reinforced by English contingents, soon re- covered the advantage. The king marched against Mercceur in person, and received his submission at Angers on the 20th of March 1598. Mercceur subsequently went to Hungary, where he entered the service of the emperor Rudolph II., and fought against the Turks, taking Stuhlweissenburg (Szekes-Fehervar) in 1 599. Mercceur died on the 19th of February 1602.

MERCURY (Mercurius), in Roman mythology, the god of merchandise (merx) and merchants; later identified with the Greek Hermes. His nature is more intelligible and simple than that of any other Roman deity. In the native Italian states no trade existed till the influence of the Greek colonies on the coast introduced Greek customs and terminology. It was no doubt under the rule of the Tarquins that merchants began to ply their trade. Doubtless the merchants practised their religious ceremonies from the first, but their god Mercurius was not officially recognized by the state till the year 495 B.C. Rome

frequently suffered from scarcity of grain during the unsettled times that followed the expulsion of the Tarquins. Various religious innovations were made to propitiate the gods; in 496 the Greek worship of Demeter, Dionysus and Persephone was established in the city, and in 495 the Greek god Hermes was introduced into Rome under the Italian name of Mercurius (Livy ii. 21, 27), as protector of the grain trade, especially with Sicily. Preller thinks that at the same time the trade in grain was regulated by law and a regular college or gild of merchants instituted. This college was under the protection of the god; its annual festival was on the 1 5th (the ides) of May, on which day the temple of the god had been dedicated at the southern end of the Circus Maximus, near the Aventine; and the members were called mercuriales as well as mercatores. Mommsen, however^

considers the mercuriales to be a purely local, gild — the paganiot the Circus valley. The 15th of May was chosen as the feast of Mercury, obviously because Maia was the mother of Hermes, that is of Mercury; and she was worshipped along with her son by the mercuriales on this day. According to Preller, this religious foundation had a political object: it established on a legitimate and sure basis the trade between Rome and the Greek colonies of the coast, whereas formerly this trade had been exposed to the capricious interference of government officials. Like all borrowed religions in Rome, it must have retained the rites and the terminology of its Greek original (Festus p. 257). Mercury became the god, not only of the mercatores and of the grain trade, but of buying and selling in general; and it appears that, at least in the streets where shops were common, little chapels and images of the god were erected. There was a spring dedicated to Mercury between his temple and the Porta Capena; every shopman drew water from this spring on the 15th of May, and sprinkled it with a laurel twig over his head and over his goods, at the same time entreating Mercury to remove from his head and his goods the guilt of all his deceits (Ovid, Fasti, v. 673 seq.). The word mercurialis was popularly used as equivalent to cheat. . im

Roman statuettes of bronze, in which Mercury is represented, like the Greek Hermes, standing holding the caduceus or staff in the one hand and a purse in the other (an element very rare in purely Hellenic representations), are exceedingly common.

MERCURY, in astronomy, the smallest major planet and the nearest to the sun; its symbol is g. Its proximity to the sun makes the telescopic study of its physical constitution extremely difficult. The result is that less is known on this subject than in the case of any other planet. Even the time of rotation on its axis is uncertain. J. H. Schroter inferred a

period of rotation of 24 h. 5m. 30s., which was in seeming agreement with the obser- vations of K. L. Harding. This period was generally accepted, though Herschel had been unable to see any changes indicating rotation. In 1882 G. Schiaparelli began a careful study of the face of the planet with a refractor of 8 in. aperture, subse- quently replaced by one of 18 in. His unexpected conclu- sion was that the rotation of Mercury resembles that of the moon, in having its period equal to that of its orbital revolution. As the moon always presents the same face to the earth, so Mercury must, in this case, always present very nearly the same face to the sun. Schiaparelli also announced that the axis of rotation of the planet is nearly perpendicular to the plane of its orbit. The rotation being uniform, while the orbital motion, owing to the great eccentricity of the orbit, is affected by a very large inequality, it would follow that there is a libration in longitude of nearly 24 on each side of the mean position. Peraival Lowell in 1897 took up the question anew by combining a long series of measured diameters of the planet with drawings of its apparent surface. The seeming constancy of the surface appearance was considered to confirm the view of Schiaparelli as to the slow rotation of the planet. But there is wide room for doubt on the question.

The period of orbital revolution of Mercury is nearly 88 days, or somewhat less than three months. Consequently, the period of synodic revolution is less than four months, during which the entire round of phases is completed. When near greatest elongation Mercury shines as a star of the first magnitude, or brighter; but in the latitudes of central and northern Europe it is so near the horizon soon after sunset as to be generally obscured by vapours or clouds. >

The eccentricity of the orbit, 0-20, is far greater than that of any major planet, and nearly the average of that of the minor planets. Consequently, its distance and its greatest elongation from the sun vary widely with its position in its orbit at the time.

The mass of Mercury can be determined only from its action upon Venus; this is so small that the result is doubtful. Leverrier adopted in his tables 1: 3,000,000 as the ratio of the mass of Mercury to that of the sun. S. Newcomb, from the action upon Venus, reduced this to one-half its amount, or 1 : 6,000,000.

G. W. Hill, basing his conclusions on the probable density of the

planet, estimated the mass to be less than 1 : 10,000,000 The adoption of a mass even as large as that of Newcomb implies a greater density than that of the earth, but it is not possible to estimate the probability that such is the case.

The most interesting phenomenon connected with Mercury is that of its occasional transit over the disk of the sun at inferior conjunction. These occur only when the planet is near one of its nodes at the time. The earth, in its orbital revolution, passes through the line of the nodes of Mercury about the 8th of May and the 10th of November of each year. It is only near one of these times that a transit can occur. The periodic times of Mercury and the earth are such that the transits are generally repeated in a cycle of 46 years, during which 8 transits occur in May and 6 in November. The following table shows the Green- wich mean time of the middle of all the transits from 1677, the date of the first one accurately observed, until the end of the present century.

Transits of Mercury from 1677

to 2003.

h.

8

1677

Nov.

7

1845

May 8

1690

Nov.

9

18

1848

Nov. 9

2

1697

Nov.

2

18

1861

Nov. 11

20

1707

May

5

11

1868

Nov. 4

19

1710

Nov.

6

11

1878

May 6

7

1723

Nov.

9

5

1881

Nov. 7

“3

1736

Nov.

10

22

1891

May 9

H

1740

May

2

11

1894

Nov. 10

7

1743

Nov.

4

22

1907

Nov. 14

1753

May

5

18

1914

Nov. 7

1756

Nov.

6

16

1924

May 7

»4

1769

Nov.

9

10

1927

Nov. 9

18

1776

Nov.

2

10

1940

Nov. 11

11

1782

Nov.

12

3

1953

Nov. 14

5

1786

May

3

18

1957

May 5

13

1789

Nov.

5

3

i960

Nov. 7

5

1799

May

7

1

1970

May 8

20

1802

Nov.

8

21

1973

Nov. 9

23

1815

Nov.

11

15

1986

Nov. 12

16

1822

Nov.

4

14

1993

Nov. 5

16

1832

May

5

j 1999 1

Nov. 15

9

1835

Nov.

7

8

1 2003

May 6

19

of the node of Mercury is somewhat less than that computed from the gravitation of the known planets. The same is true of the node of Venus, which might also be affected by the same attraction. To produce the observed result, the inclination of the ring would have to be greater than that of the orbit of either Mercury or Venus. In 1895 Newcomb showed that the observed motions, both of the perihelion of Mercury and of the nodes of Mercury and Venus, could be approximately represented by the attraction of a ring of inter-mercurial bodies having a mean inch- nation of 9 and the mean node in 48 longitude. He also showed that if the ring was placed between the orbits of Mercury and Venus, the inclination would be 7-5° and the longitude of the node 35°. The fact that the zodiacal light appears to be near the ecliptic, and the belief that, if it were composed of a lens of discrete particles, their nodes would tend to scatter themselves equally around the invariable plane of the solar system, led him to drop these explanations as unsatisfactory, and to prefer provisionally the hypothesis that the sun's gravitation is not exactly as the inverse square. (See Gravitation.)

In 1896 H. H. Seeliger made a more thorough investigation than his predecessor had done of the attraction of the matter producing the zodiacal light, assuming it to be formed of a series of ellipsoids. He showed that the motions of the nodes and perihelion could be satisfactorily represented in this way. The following are the three principal elements of the hypothetical orbits as found by the two investigators: —

A perplexing problem is offered by the secular motion of the perihelion of Mercury. In 1845 Leverrier found that this motion, as derived from observation of the transits, was greater by 35″ per century than it should be from the gravitation of all the other planets. This conclusion has been fully confirmed by subsequent investigations,

a recent discussion showing the excess of motion to be 43′ per century. It follows from this either that Mercury is acted upon by some unknown masses of matter, or that the intensity of gravitation does not precisely follow Newton's law. The most natural explanation was proposed by Leverrier, who attributed the excess of motion to, the action of a group of intra- Mercurial planets. At first this conclusion seemed to be con- firmed by the fact that occasional observations of the transit of a dark object over the sun had been observed. But no such observation was ever made by an experienced astronomer, and the frequent photographs of the sun, which have been taken at the Greenwich observatory and elsewhere since 1870, have never shown the existence of any such body. We may therefore regard it as certain that, if a group of intra-Mercurial planets exists, its members are too small to be seen when projected on the sun's disk. During the eclipses of 1900 and 1905 the astronomers of the Harvard and Lick Observatories photographed the sky in the neighbourhood of the sun so fully that the stars down to the 7th or 8th magnitude were imprinted on the plates. Careful examination failed to show the existence of any unknown body. It follows that if the group exists the members must be so small as to be entirely invisible. But in this case they must be so numerous that they should be visible as a diffused illumination on the sky after sunset. Such an illumination is shown by the zodiacal light. But such a group of bodies, if situated in the plane of the ecliptic, would produce a motion of the node of Mercury equal to that of its perihelion, while the observed motion 1 Mercury grazes sun's limb.

Newcomb.

Seeliger.

Intra- Mercurial Ring.

Ring between

Mercury and

Venus.

Zodiacal Light Matter.

Inclination . Node

Mass

jf1

7-5°

, 35 1/37,000,000

6-95°

40-0* 1/2,860,000

The demonstration by E. W. Brown that the motion of the moon's perigee is exactly accordant with the Newtonian law of gravitation, seems to preclude the possibility of any deviation from that law, and renders the hypothesis of Seeliger the most probable one in the present state of knowledge. But the ques- tion is still an open one whether the zodiacal light has an inclina- tion of the ecliptic as great as that computed by Seeliger. This is a difficult one because the action on Mercury is produced by the inner portions of the matter producing the zodiacal light. These are so near the sun that they cannot be observed, unless possibly during a total eclipse. (S. N.)

MERCURY (symbol Hg, atomic weight = 200) ,'in chemistry, a metallic element which is easily distinguished from all others by its being liquid at even the lowest temperatures naturally occur- ring in moderate climates. To this exceptional property it owes the synonyms of quicksilver in English (with the Germans Queck- silber is the only recognized name) and of hydrargyrum (from v8a>p, water, and apyvpos, silver) in Graeco-Latin. This metal does not appear to have been known to the ancient Jews, nor is it mentioned by the earlier Greek writers. Theophrastus (about 300 B.C.) mentions it as prepared from cinnabar by treatment with copper and vinegar; Dioscorides obtained it from the same mineral with the aid of iron, employing at the same time a primitive distillation apparatus. With the alche- mists it was a substance of great consequence. Its appearance commended it as a substance for investigation; many of its compounds, especially corrosive sublimate and calomel, were' studied, and improved methods for extracting and purifying the metal were devised. Being ignorant of its susceptibility of freezing into a compact solid, they did not recognize it as a true metal, and yet, on the authority of Geber, they held that mercury (meaning the predominating element in this metal) enters into the composition of all metals, and is the very cause of their metallicity (see Element). When, about the beginning of the 16th century, chemistry and scientific medicine came to merge into one, this same mysterious element of " mercury " played a great part in the theories of pathology; and the metal,

in the free as in certain combined states, came to be looked upon as a powerful medicinal agent.

Occurrence. — Mercury occurs in nature chiefly in the form of a red sulphide, HgS, called cinnabar (q.v.), which, as a rule, is accompanied by more or less of the reguline metal — the latter being probably derived from the former by some secondary reaction. The most important mercury mines in Europe are those of Almaden in Spain and of Idria in Illyria; and in America those of California and Texas. Deposits also occur in Russia, the Bavarian palatinate, in Hungary, Italy, Transylvania, Bohemia, Mexico, Peru and in some other countries.

Mercury occurs in formations of all ages from the Archean to the Quaternary, and it has been found in both sedimentary and eruptive rocks of the most varied character, e.g. conglomerates, sandstones, shales, limestones, quartzites, slates, serpentines, crystalline schists, and eruptive rocks from the most acid to the most basic. It appears that nearly all known deposits occur along lines of continental uplift, where active shearing of the formations has occurred. Large deposits are seldom found in eruptive rocks, but generally near such formations or near active or extinct hot springs. The deposits are of many types, simple fissure veins being less usual than compound, reticulated, or linked veins. Segregations and impregnations are very common. The form of the deposit seems to depend chiefly on the physical properties and structure of the enclosing rocks and the nature of the fissure systems that result from their disturbance. The principal ore is cinnabar, though metacinnabarite and native mercury are often abundant; the selenide (tiemannite), chloride, and iodide are rare. Of the associated heavy minerals, pyrite (or marcasite) is almost universal, and chalcopyrite, tetrahedrite, blende and realgar are frequent. Many deposits contain traces of gold and silver, and some deposits, as the Mercur in Utah, are more valuable for their gold than their mercury content. The usual gangue-forming minerals are quartz, dolomite, calcite, barite, fluorspar and various zeolites. Some form of bituminous matter is one of the most universal and intimate associates of cinnabar. Formerly quicksilver deposits were supposed to be formed by sublimation, but from a careful study of the California occurrences S. B. Christy was convinced as early as 1875 that this was unlikely, and that deposition from hot alkaline sulphide solutions was more probable. By treating the black mercuric sulphide with such solutions, hot and under pressure, he succeeded in producing artificial cinnabar and metacinnabarite. He also showed that the mineral water at the

New Almaden mines, when charged with sulphydric acid and heated under pressure, was capable of effecting the same change, and that this method of pro- duction agreed better with all the facts than the sublimation theory. (See ” Genesis of Cinnabar Deposits,” Amer. Jour. Science, xvii. 453.) The investigations of Dr G. F. Becker on the ” Quicksilver Deposits of the Pacific ” (U.S. Geol. Survey, Mon. xiii., 1888) estab- lished the correctness of these views beyond doubt.

Production. — At one time the world’s supply of mercury was almost entirely derived from the Almaden and Idrian mines; but now the greater proportion is produced in California and Texas, where cinnabar was used by the Indians as a pigment, and first turned to metallurgical purpose in 1845 by Castellero. In the United States mercury has also been found in Utah, Nevada, Oregon and Arizona. In the 16th century the Almaden and Idrian mines were practically the only producers of this metal; statistics of Almaden dating from 1564 and of Idria since 1525 are given in B. Neumann, Die Metalle (1904). Spain produced 1151 metric tons in 1870, and in 1889 its maximum of 1975 tons; since then it has, on the whole; been decreasing. The Austria-Hungary output steadily increased to about 550-600 tons at which it appears to remain. In 1887 Russia produced 64 tons, and has steadily improved. The United States output was over 1000 tons, in 187 1, and declined to 800-900 in the period 1889-1892; it has since increased and surpassed the supply from Spain. The following table gives the production in various countries for selected years: —

Spain.

United States.

Russia.

Austria- Hungary.

Italy.

Mexico.

Total

(Metric Tons).

1901 1902

1903 1904 1905

754

H25

914 1020

800

1031 1208 1288 1 192 1043

368 416 362 393

3i8

558 556 567

58i

564

278 259 314 357 370

128 191 188

190 l

190 1

3120 4056 3633 3733 3285

1 Estimated.

Mercury is transported in steel bottles closed by a screw stopper; the Almaden and Idrian bottles contain 76 lb; and until the 1st of June 1904, the Californian bottles contained 76§ lb of mercury; they now hold 75 lb. From the smaller works the metal is sometimes sent out in sheepskin bags holding 55 lb of mercury.

Metallurgy. — Chemically speaking, the extraction of mercury from its ores is a simple matter. Metallic mercury is easily volati- lized, and separated from the gangue, at temperatures far below redness, and cinnabar at a red heat is readily reduced to the metallic state by the action of iron or lime or atmospheric oxygen, the sulphur being eliminated, in the first case as iron sulphide, in the second as calcium sulphide and sulphate, in the third as sulphur dioxide. A close iron retort would at first suggest itself as the proper kind of apparatus for carrying out these operations, and this idea was,' at one time, acted

upon in a few small establishments — for instance, in that of Zweibriicken in the Palatinate, where lime was used as a decomposing agent; but the method has now been discarded. In all the large works the decomposition of the cinnabar is effected by the direct exposure of the ore to the oxidizing flame of a furnace, and the mercury vapour, which gets diffused through an immense mass of combustion gases, is recovered in more or less imperfect condensers.

With the exception of the massive deposits of Almaden in Spain and a few of those in California and Idria, cinnabar occurs in forms so disseminated as to mate its mining very expensive. Rude hand- sorting of the ores is usually practised. Wet concentration has not been successful, because it necessitates ore crushing and extensive slime losses of the brittle cinnabar. As a rule low-grade ores can be roasted directly with less loss and expense. At Almaden in Spain the ores average from 5 to 7 %, but in other parts of the world much poorer ores have to be treated. In California, in spite of the high cost of labour, improved furnaces enable ores containing not more than § % to be mined and roasted at a profit.

The furnaces originally used at Almaden and Idria differ only in the condensing plant. The roasting was carried out in internally fired, vertical shafts of brickwork, and, at Almaden, the vapours were led through a series of bottles named aludels, so arranged that the neck of one entered the sole of the next ; and at Idria the vapours were led into large brickwork chambers lined with cement, and there condensed. The aludel furnace, which was designed in 1633 by Lopez Saavedra Barba in Huancavelica, Peru (where cinnabar was discovered in 1566), and introduced at Almaden in 1646 by Busta-mente, by whose name it is sometimes known, has now been entirely given up. The Idrian furnace was designed in 1787 by von Leithner; it was introduced at Almaden in 1800 by Larrafiaga, and used side by side with the aludel furnace. The crude mercury is purified by straining through dense linen or chamois leather bags.

The most important improvements in the metallurgy of mercury are the introduction of furnaces for treating coarse ores, and the replacement of the old discontinuous furnaces by those which work continuously. The most successful of these continuous furnaces was a modification of Count Rumford's continuous lime- kiln. This furnace was introduced at New Almaden by J. B- Randol, the author of many improvements in the metallurgy of mercury. The success of the continuous coarse-ore furnace at New Almaden led Randol to attempt the continuous treatment of fine ores also, and the Huettner and Scott continuous fine-ore furnace, which was the result of these experiments

solved the problem com- pletely. It contains several vertical shafts in which the descending ore is retarded at will by inclined shelving, which causes it to be exposed to the flames as long as may be necessary to roast it thor- oughly. The time of treatment is determined by the rapidity with which the roasted ore is withdrawn at the bottom. Several similar furnaces are in use, as the Knox and Osborne, the Livermore and the Cormak-Spirek. The fumes from the roasting furnaces are received in masonry chambers, usually provided with water-cooled pipes; from these they pass through earthenware pipes, and finally through others of wood and glass. Not all the yield is in liquid mercury ; much of it is entangled in masses of soot that cover the condenser walls, and this is only recovered after much labour.

The conditions for effective condensation are: (1) The furnace gases should be well oxidized, to avoid the production of an excess of soot. Gas firing would meet this requirement better than the use of wood or coal. (2) The volume of permanent gases passing through the furnace should be reduced to a minimum consistently witrr complete oxidation. (3) The cross-section of the condensers should be sufficient to reduce the velocity of the escaping gases, and the surface large enough for cooling and for the adhesion of condensed mercury. The latter requirement is best provided for by hanging wooden aprons in the path of the cooled gases. (4) The temperature of the escaping gases should not exceed 15 to 20° C, but cooling below this temperature would not give any adequate return for the expense. Cooling by water is quicker, but more expensive than by air. Water sprays, acting directly on the fumes, have not given good results, on account of the difficulty of recovering ” floured ” quicksilver from the water. (5) The use of an artificial inward draught is absolutely necessary to control the operation of the

furnaces and condensers and to avoid the salivation of the workmen. (6) The condenser should be easily and quickly cleaned during the operation of the furnace. (7) Both furnaces and condensers should have inclined iron plates in their foundations to prevent the infiltra- tion of mercury. (8) There is a great need of some substance for the construction of quicksilver condensers which shall be strong enough to be made thin, be a good conductor of heat, and resistant to abrasion and the alternate action of heat and cold. It should also resist the action of mercury and warm dilute sulphuric acid, and be not too expensive.

Quicksilver is best removed from the ” soot,” not by pressure, but by the opposite treatment. A machine in use for this purpose at New Almaden, devised by Colonel von Leicht, consists of an iron bowl, perforated at the bottom, in which revolves a vertical shaft carrying a propeller blade which tosses the soot (mixed with wood ashes and a little coal oil) into the air, so that the entangled mercury is free to run out through the bottom of the bowl. The residue from which no more mercury can be extracted mechanically is returned to the roasting furnace.

The losses of treatment are: (1) Furnace loss, which is easily reduced to nothing, and (2) condenser loss, which can never be zero. The latter consists of mercury lost as vapour and as mist, and its minimum amount is determined not by the richness of the ore but by the volume of escaping gases, their velocity and temperature. The percentage of loss will be higher with a poor than a rich ore. On a 3 % ore the losses need not exceed 3 or 4 % ore content. On a 1 % ore they will run from 5 to 10 %. But in poorly arranged plants under bad management they may easily be doubled or even trebled. The Huettner and Scott fine-ore furnace costs with condensers in California about $30,000, and roasts from 30 to 45 tons of ore (from 2 J in. to dust) in- 24 hours at a cost of from $1 to $0-62 per ton.

Purification. — Commercial mercury, as a rule, only needs to be forced through chamois leather or allowed to run though a very fine hole to become fit for all ordinary applications; but the metal, having the power of dissolving most other metals, is very liable to get contaminated, and requires then to be purified. For this purpose many chemical methods have been proposed; the commonest consist in allowing the metal to fall in a very fine stream through a column of a mixture of nitric acid and mercurous nitrate, or of sulphuric acid, or of potassium bichromate and sulphuric acid; the metal being subsequently dried and filtered through a perforated paper filter. The only really exhaustive method is distillation in a vacuum out of a glass apparatus. Many forms of apparatus have been devised to effect this. Recent researches have shown, however, that the metal so obtained is not chemically pure, there being found in the distillate traces of other metals. Absolutely pure mercury does not at all adhere to any surface which does not consist of a metal soluble in mercury. Hence the least quantity of it, when placed on a sheet of paper, forms a neatly rounded-off globule, which retains its form on being rolled about, and, when subdivided, breaks up into a number of equally perfect globules, which tend to coalesce when sufficiently near to each other. The presence in it of the minutest trace of lead or tin causes it to ” draw tails.” A very impure metal may adhere even to glass, and in a glass

vessel, instead of the normal convex, form an irregular flat meniscus.

Properties. — Pure mercury is a freely flowing liquid, which does not wet objects placed in it, and has a silvery white colour and perfect metallic lustre; in very thin layers it transmits a bluish-violet light. It freezes at about – 39° C. (Mallet gives – 38-85°; Hutchins, – 39-44°) with contraction, and the forma- tion of a white, very ductile and .malleable mass, easily cut with a knife, and exhibiting crystals belonging to the cubic system. When heated the metal expands very uniformly, and vaporizes at about 360°; the volatility is generally increased by the presence of impurities; its high expansion and the wide range of temperature over which it is fluid render it especially valuable as a thermometric fluid (see Thermometry). The vapour is colourless, and its density points to the conclusion that the mole-* cules are monatomic. Its specific gravity at 0° is 13-5959, i.e. it is about half as heavy again as copper volume for volume, a quarter as heavy again as lead, and nearly twice as heavy as zinc; this property is turned to account in the construction of barometers and air-pumps. Its specific heat is about 0-0333 (see Calorimetry) ; its electrical conductivity is involved in the definition of the ohm (see Conduction, Electric) ; and its thermal conductivity is about two thirds that of silver.

Pure mercury remains unchanged in dry air, oxygen, nitrous oxide, carbon dioxide, ammonia and some other gases at ordinary temperatures; hence its application for collecting and measuring gases. In damp air it slowly becomes coated with a film of mercurous oxide; and when heated for some time in air or oxygen it becomes transformed into the red mercuric oxide, which decomposes into mercury and oxygen when heated to

a higher temperature; this reaction is of great historical impor- tance, since it led to the discovery of oxygen at the hands of Priestley and Scheele. The halogen elements and sulphur combine directly with the metal. Mercuty is unattacked by dilute sulphuric acid; the strong acid, however, dissolves it on heating with the formation of sulphur dioxide and mercurous or mercuric sulphate according as mercury is in excess or not. Hydrochloric acid has no action. Dilute nitric add readily attacks it, mercurous nitrate being formed in the cold with excess of mercury, mercuric nitrate with excess of acid, or with strong acid, in the warm. The metal dissolves in solutions containing chlorine or bromine, and consequently in aqua regia.

Mercury readily dissolves many metals to form a class of com- pounds termed amalgams, which have considerable applications in the arts.

Compounds of Mercury.

Mercury forms two well-defined series of salts — the mercurous salts derived from the oxide Hg20, and the mercuric salts from the oxide HgO; the existence of these salts can hardly be inseparably connected with a variable valency, i.e. that mercury is monovalent in mercurous, and divalent in mercuric compounds, for according to Baker mercurous chloride or calomel (g.f.) has the formula Hg 2 Cl 2 .

Mercurous Oxide, HgjO, is an unstable dark-brown powder formed when caustic potash acts on calomel; it is decomposed by light or on trituration into mercury and mercuric oxide Mercuric oxide, HgO, occurs in two forms : it is obtained as a bright-red crystalline powder (also known as ” red precipitate,” or as mercurius praecipi- tatus per se) by heating the metal in air, or by calcining the nitrate, and as an orange-yellow powder by precipitating a solution of a mercuric salt with potash ; the difference is probably one of subdivi- sion. The yellow form is the most reactive and is transformed into the red when heated to 400 °. If the red oxide be heated it becomes black, regaining its colour on cooling, and on further heating to 630° it decomposes into, mercury and oxygen. It is slightly soluble in water, to which it imparts an alkaline reaction and strongly metallic taste. A peroxide is obtained as a brown solid from mercury and slightly acid 30 % hydrogen peroxide at low temperatures.

Mercurous and mercuric chlorides, known respectively as calomel (q.v.) and corrosive sublimate (q.v.), are two of the most important salts of mercury. Mercurous bromide, Hg 2 Br2, is a yellowish- white powder, insoluble in water. Mercuric bromide, HgBft, forms white crystals, sparingly soluble in cold water, readily in hot, and prepared by the direct union of its components. Mercurous iodide, Hg2la, is a yellowish-green powder obtained by heating its components to about 250°, or by triturating them with a little alcohol; it is also obtained by precipitating a solution of mercurous nitrate with potassium iodide. It is blackened by exposure to light. Mercuric iodide, Hgl2, exists in two crystalline forms. By mixing solutions of mercuric chloride and potassium iodide under a microscope, yellow rhombic plates are seen to be formed which are transformed very quickly into scarlet quadratic octahedra. On heating to about 126 the red form is transformed into the yellow modification; on cooling the reverse gradually occurs, and immediately if the yellow iodide be touched. Mercuric iodide is insoluble in water, but soluble in absolute alcohol; and also in potassium iodide solution, with the formation of KjHgl4, which may be obtained in lemon-yellow crystals. A strongly alkaline solution of this salt is known as Nessler’s reagent, and is specially used

for determining traces of ammonia (see below). Mercuric iodide dissolves in other iodide solutions to form similar compounds; these solutions are characterized by their exceptionally high specific gravity, and hence are employed in density deter- minations (see Density). It also forms many other double salts. Oxidation with strong nitric acid gives the iodate, Hg(IOs)s. An iodide, Hg2l 8 , intermediate between mercurous and mercuric iodides, is obtained as a yellow insoluble powder by precipitating mercurous nitrate with a solution of iodine in potassium iodide. Mercurous fluoride, HgjF2, and mercuric fluoride, HgF2, are unstable substances obtained from the corresponding oxide and hydrofluoric acid.

Mercurous Nitrate, Hg2(N0s)2 • 2H2O, is obtained as a white crystalline salt soluble in water by dissolving the metal in cold dilute nitric acid; if the metal be in excess a basic salt Hg 2 (NOa)2 . 2HG2O. 3H2O is obtained. Several other basic salts are known. By adding ammonia to a solution of mercurous nitrate a black precipitat* of variable composition, known in pharmacy as mercurius solubilis Hahnemanni, is obtained.

Mercuric Nitrate. — By dissolving mercuric oxide in strong nitric acid there is obtained a thick liquid which will not crystallize, and which gives on the addition of strong nitric acid a white precipitate of 2Hg(N0 3) 2 . H 2 0. Water decomposes it to_ give basic salts of variable composition. By dissolving the oxide in dilute nitric acid, the basic salt Hg(N0 3)2 ■ HgO . H 2 0, crystallizing in needles, is obtained.

Mercurous Sulphide, HgzS, is an unstable black powder obtained by acting with sulphuretted hydrogen, diluted with carbon dioxide, on calomel at -10°. It decomposes into mercuric sulphide and mercury at 0°. Mercuric sulphide, HgS, is one of the most important

mercury compounds; it is the principal ore, occurring in nature as the mineral cinnabar (q.v.), and is extensively used as a pigment, vermilion (q.v.). It is obtained as a black powder by triturating mercury with sulphur, the compound thus formed being known in pharmacy as Aethiops mineralis, and also by precipitating a mercuric salt with sulphuretted hydrogen. It is only slightly acted upon by nitric acid; it dissolves in aqua regia; chlorine gives a yellow compound, 2HgS . HgCl 2 ; and it dissolves in potassium sulphide solutions to

form double salts of variable composition.

Mercurous Sulphate, Hg 2 S04, is a white, sparingly soluble, crystalline substance obtained by adding sodium sulphate to a solution of jnercurous nitrate. Mercuric sulphate, HgS04, is a white, soluble salt obtained by dissolving mercury in hot strong sulphuric acid; on digestion with water, it decomposes into a basic salt HgSO< . 2HgO known as turbith or turpeth mineral, and into an acid salt, HgSO< . 2SO3.

Mercury Phosphide, Hg 3 P 2 , is obtained as brilliant red, hexagonal crystals by heating mercury with phosphorus iodide to 300 and removing the mercuric iodide simultaneously formed by means of potassium iodide solution. Mercurous phosphate, Hg 3 P04, and mercuric phosphate, Hg 3 (P04) 2 , are obtained as white precipitates by adding sodium phosphate to solutions of mercurous and mercuric nitrates respectively.

Mercurammonium Compounds. — By the action of ammonia and ammonium salts mercury compounds yield a number of substances, many of which have long been used in medicine. By the action of dry ammonia on calomel mercuroso-ammonium chloride, NH 3 HgCl, is obtained; aqueous ammonia on calomel gives di- mercuroso-ammonium chloride, NH 2 Hg 2 Cl. By adding ammonia to a solution of mercuric chloride, mercurammonium chloride, known in pharmacy as ” infusible white precipitate,” NH 2 HgCl, is obtained; “fusible white precipitate” is mercuro-diammonium chloride, Hg(NH 3 Cl) 2 , and is obtained by adding a solution of mercuric chloride to hot solutions of ammonium chloride and ammonia so long as the precipitate first formed redissolves; the substance separates out on cooling. By precipitating a strongly alkaline solution of mercuric iodidejn potassium iodide (Nessler’s solution) there is obtained a yellow precipitate of NH 2 Hg 2 OI ; this reaction is the most delicate test for ammonia, a yellow coloration being given by minute traces. By passing dry ammonia over pre- cipitated mercuric oxide at 130 , a nitride N 2 Hg 3 is obtained. The oxide and ammonia solution gives the stable and basic mercur- hydroxylamine, NHg 2 OH. The constitution of these compounds has been especially studied by K. A. Hofmann and E. C. Marburg (Zeit. Anorg. Chem. 23, p. 126); these chemists formulate ” infusible precipitate ” as Hg(NH 2)Cl, ” fusible precipitate ” as Hg(NH 3 Cl) 2 ” Millon’s base” as (HO . Hg) 2 :NH 2 OH, thus postulating three distinct types of compounds, (1) amidochlorides ; (2) amines; (3) substituted ammonium derivatives.

Analysis. — Mercury compounds, when heated in a closed tube with

sodium carbonate, yield a grey to black sublimate of metallic mercury, which readily unites to form visible globules. The metal is precipitated from solutions by digestion with bright copper-foil, a coating being formed on the copper, which becomes silvery on rubbing, and disappears when the quicksilvered copper is heated irt a sublimation tube.

Solutions of mercurous salts with hydrochloric acid give a white precipitate of calomel, which becomes jet-black on treatment with ammonia. Stannous chloride, in its twofold capacity as a chloride and a reducing agent, precipitates both mercurous and mercuric solutions, at first as calomel, and on addition of an excess of reagent the precipitate becomes grey through-conversion into finely-divided quicksilver. Sulphuretted hydrogen, when added very gradually to an acid mercuric solution, gives at first an almost white pre- cipitate, which, on addition of more and more reagent, assumes successively a yellow, orange and at last jet-black colour. The black precipitate is HgS, which is identified by its great heaviness, and by being insoluble in boiling nitric and in boiling hydrochloric acid. A mixture of the two (aqua regia) dissolves it as chloride.

” Mercurous ” mercury is quantitatively estimated by precipitat- ing as calomel and weighing the precipitate on a tared filter at 100 . The metal may also be estimated by distillation in a closed tube with lime, the metal being collected and weighed, or by precipitating the solution with an excess of stannous chloride. More convenient is the method of precipitating as sulphide by an excess of sulphuretted hydrogen, and weighing the precipitate on a tared filter; or by means of a Gooch crucible.

Pharmacology and Therapeutics The use of mercury as a therapeutic agent is of comparatively recent date. To the Greeks and Romans its value was unknown, and the Arabian physicians only used it for skin affections. It was not till the middle of the 16th century that the special pro- perties of mercury were fully appreciated, but since that time the metal has continued to hold a high though fluctuating value as a medicine. At first the metal in a finely divided state or in vapour was used; but very soon its various compounds were

found to be endowed with powers even greater than those of the metal itself, and with the discovery of new compounds the number of mercurial medicines has largely increased.

The British Pharmacopeia contains some twenty-five mercurial preparations, including those of calomel (q.v.). Only the useful

preparations will be mentioned here. Free mercury is contained in Hydrargyrum cum Creta, or ” grey powder,” which consists of one part of mercury to two of prepared chalk. The power of this valuable and widely used preparation varies somewhat with its age, as old specimens contain some mercuric oxide, which makes them more active. The dose is 1-5 gr., and the preparation is usually employed for children. The Pilula Hydrargyri, or ” blue pill, ‘ contains one part of mercury in three, and the dose is 4-8 gr. It is usually employed for adults. There are also five preparations of free mercury for external use. Of these the most useful is the Unguentum Hydrargyri, ” or blue ointment,” which contains one part of mercury in two. Weaker ointments are also prepared from the red and the yellow forms of mercuric oxide. The perchloride of mercury or corrosive sublimate is therapeutically the most im- portant salt of mercury. The dose is sˆ-A gr. It is incompatible with alkalies, alkaline carbonates, potassium iodide, albumen and many other substances, and should therefore be prescribed alone. It is decomposed by impure water, and distilled water is therefore used in making the Liquor Hydrargyri Perchloridi, in which form it is usually prescribed. This contains half a grain of the perchloride to the fluid ounce and its dose is 30-60 minims. The perchloride is also compounded with lime-water to form the Lotio Hydrargyri Flava, or yellow wash,” which contains two grains of the salt to the fluid ounce. Mercuric iodide is an equally potent salt and has come into wide use of late years. It has the same dose as the perchloride and is largely prescribed in the Liquor Arsenii et Hydrargyri Iodidi, or Donovan’s solution, which contains I % of arsenious iodide and I % of mercuric iodide, the dose being 5-20 minims. An ointment widely used is prepared from the mercur-ammonium chloride (Unguentum Hydrargyri ammoniatum) of which it contains one part in ten. It is known as ” white precipitate ointment.”

In discussing the pharmacology of mercury and its compounds, it is of the first importance to observe that metallic mercury is inert as such, and that the same may practically be said of mercurous salts generally. Both mercury itself and mercurous salts tend to be converted in the body into mercuric salts, to which the action is due. When metallic mercury is triturated or exposed to air it is partly oxidized, the first stage of its transformation to an active condition being thus reached.

Metallic mercury can be absorbed by the skin, passing in minute globules through the ducts of the sweat-glands. The mercury contained in ” blue ointment ” is certainly thus absorbed, actually circulating in the blood in a very different form, as described below.

There is no local action on the skin. The mercuric salts, and especially the chloride and iodide, are probably the most powerful of all known antiseptics. One part of the perchloride in 500,000 will prevent the growth of anthrax bacilli, and one part in 2000 — the strength commonly employed in surgery — kills all known bacteria. The action is apparently specific and not due to the fact that per- chloride of mercury precipitates albumen, including the albuminous bodies of bacteria, for the iodide is still more powerful as a germicide, though it does not coagulate albumen. These salts cannot be employed for sterilizing metallic instruments, which they tarnish. As these drugs are essentially poisons they must be used with the greatest care in surgical practice, and as they are particularly dele- terious to the secreting structure of the kidney they must not be employed as antiseptics in diseases where renal inflammation is already present or probable. They are therefore contra-indicated for application to the throat in scarlet-fever or to the uterus in eclampsia. The stronger mercurial ointments kill cutaneous para- sites and also possess some degree of antipruritic action, especially when the cause of the itching is somewhat obscure. Mercuric salts, when in strong solution, are caustic. It is important to observe •that the volatility of metallic mercury and many of its compounds causes their absorption by the lungs even when no such effect is intended to follow their external application. This fact explains the occurrence of chronic mercurial poisoning in certain trades.

Single doses of mercury or its compounds have no action upon the mouth, the characteristic salivation being produced only after many doses. Their typical action on the bowel is purgative, the effect varying with the state of the mercury. So relatively inert is metallic mercury that a pound of it has been given without ill effects in cases of intestinal obstruction, which it was hoped to relieve by the mere weight of the metal. Half a grain of the perchloride, on the other hand, is a highly toxic dose. The action of mercurials on the bowel is mostly exerted on the duodenum and jejunum, though the lower part of the bowel is slightly affected. Hence a dose of mercury usually needs a saline aperient to complete its action, as in the ” blue pill and black draught ” of former days. Mercurials do not cause, in therapeutic doses, much increase in the intestinal secretion, the action being mainly exerted on the muscular wall of the bowel. The bile is rapidly removed from the duodenum, before any re-absorption can occur, and the bacterial action which

decomposes the bile-pigment is arrested by the antiseptic power of the drug, so that the excreta are of a very dark colour. The classical experiments of William Rutherford (1839-1899), of Edinburgh, showed that calomel does not increase the amount of bile formed by the liver. Corrosive sublimate does, however, stimulate the liver to a slight degree. The value of calomel in hepatic torpor is as an excretory, not a secretory, cholagogue, the gall-bladder being stimulated to expel its stagnant contents. In large doses mercurials somewhat diminish the secretion of bile. The greater part of the mercury administered by the mouth, in whatever form, is excreted as mercuric sulphide. Prior to this decomposition the mercury exists as a complex soluble compound with sodium, chlorine and albumen. When perchloride of mercury is injected subcutaneously the sodium chloride in the blood similarly prevents the precipitation of the albuminate of mercury, and it is therefore desirable to add a little sodium chloride to the solution for injection of mercuric chloride. Some observers assert that mercury is a haematinic, increasing, like iron, the amount of haemoglobin in the blood. Whilst this is doubtful it is certain that large doses, when continued, produce marked anaemia. The excretion of the drug is accomplished by all the secreting glands, including the breasts, if these are functioning. All the secretions of the body, except that of the peptic glands of the stomach, are stimulated, but the excretion of mercury is slow, and it is typically one of the drugs that are cumulative, like arsenic and digitalis.

Mercury is largely used in affections of the alimentary canal, and has an obscure but unquestionable value in many cases of heart- disease and arterial degeneration. But its value in syphilis (see Venereal Diseases) far outweighs all its other uses.

Toxicology. — Acute poisoning by mercurials usually occurs in the case of corrosive sublimate. There is intense gastro-intestinal inflammation, with vomiting, frequent ” rice-water ” stools and extreme collapse. The treatment, except when the case is seen at once, is very difficult, but white-of-egg or other form of albumen is the antidote, forming an insoluble compound with the perchloride. Chronic poisoning (hydrargyrism or mercurialism) is of great importance, since any indication of its symptoms must be closely watched for in patients who are under mercurial treatment. Usually the first symptom is slight tenderness of the teeth whilst eating, and some foetor of the breath. These symptoms become more marked and the gums become the seat of severe inflammation, being spongy, vascular and prone to bleed. The salivary glands are swollen and tender, and the saliva pours from the mouth, “and may amount to pints in the course of a day. The teeth become quite loose and may fall

out. The symptoms are aggravated until the tongue and mouth ulcerate, the jaw-bone necroses, haemorrhages occur in various parts of the body, and the patient dies of anaemia, septic inflamma- tion or exhaustion. The treatment consists, besides stopping the intake of poison and relieving the symptoms, in the administration of potassium iodide in small, often repeated doses.

Bibliography. — For the history of mercury see B. Neumann, Die Metalle (1904); A. Rossing, Geschichte der Metalle (1901). The general chemistry is treated in detail in O. Dammer, Handbuch der anorganischen Chemie, and H. Moissan, Traili de chimie min&rale. For the metallurgy reference may be made to Carl Schnabel, Hand-book of Metallurgy, vol. ii. (1906), translated by H. Louis.

MERCY (or Merci), FRANZ, Freiherr von, lord of Mandre and Collenburg (d. 1645), German general in the Thirty Years' War, who came of a noble family of Lorraine, was born at Longwy between 1590 and 1598. From 1606 to 1630 he was engaged in the imperial service. By the latter year he had attained high military rank, and after distinguishing himself at the first battle of Breitenfeld (1631) he commanded a regiment of foot on the Rhine and defended Rheinfelden against the Swedes with the utmost bravery, surrendering only after endur- ing a five-months' siege. He now became a general officer of cavalry (General-Feldwachtmeister), and in 1635, 1636 and 1637 took part in further campaigns on the Rhine and Doubs. In September 1638 he was made master-general of ordnance in the army of Bavaria, then the second largest army in Germany. In the next campaign he was practically commander-in-chief of the Bavarians, and at times also of an allied army of Imperialists and Bavarians. He was now considered one of the foremost soldiers in Europe, and was made general field marshal in 1643, when he won his great victory over the French marshal Rantzau at Tuttlingen (Nov. 24-25), capturing the marshal and seven thousand men. In the following year Mercy opposed the French armies, now under the duke of Enghien (afterwards the great Conde) and the vicomte de Turenne. He fought, and in the end lost, the desperate bat le of Freiburg, but revenged himself next year by inflicting upon Turenne the defeat of Mergentheim (Marienthal) . Later in 1 645 , fighting once more against Enghien and Turenne, Mercy was killed at the battle of Nordlingen (or

Allerheim) at the crisis of the engagement, which, even without Mercy's guiding hand, was almost a drawn battle. He died on the 3rd of August 1645. On the spot where he fell, Enghien erected a memorial, with the inscription Sta viator, heroem caicas. His

grandnephew Claudius Florimond, Count Mercy de Villets (1666-1734), Imperial field marshal, son of his brother Kaspar, who fell at Freiburg, was born in Lorraine, and entered the Austrian army as a volunteer in 1682. He won his com- mission at the great battle of Vienna in the following year; and during seven years of campaigning in Hungary rose to the rank of Rittmeister. A wound sustained at this time permanently injured his sight. For five years more, up to 1697, he was employed in the Italian campaigns, then he was called back to Hungary by Prince Eugene and won on the field of Zenta two grades of promotion. He displayed great daring in the first campaigns of the Spanish Succession War in Italy, twice fell into the hands of the enemy in fights at close quarters and for his conduct at the surprise of Cremona (Jan. 31, 1702) received the emperor's thanks and the proprietary colonelcy of a newly raised cuirassier regiment. With this he took part in the Rhine campaign of 1703, and the battle of Friedlingen, and his success as an intrepid leader of raids and forays became well known to friend and foe. He was on that account selected early in 1704 to harry the elector of Bavaria's dominions. He was soon afterwards promoted General-Feldwachtmeister, in which rank he was engaged in the battle of the Schellenberg (July 2, 1704). In the rest of the war he was often distinguished by his fiery courage. He rose to be general of cavalry in the course of these ten years. His resolute leadership was conspicuous at the battle of Peterwardein (1716) and he was soon afterwards made commander of the Banat of Temesv&r. At the great battle of Belgrade (1717) he led the second line of left wing cavalry in a brilliant and decisive charge which drove the Turks to their trenches. After the peace he resumed the administra- tion of the Banat, which after more than 150 years of Turkish rule needed a humane and capable governor. But before his work was done he was once more called away to a command in the field, this time in southern Italy, where he fought the battle of Franca villa (June 20, 1719), took Messina and besieged Palermo. For eleven years more he administered the Banat, reorganizing the country as a prosperous and civilized com- munity. In 1734 he was made a general field marshal in the army, but on the 29th of June was killed at the battle of Parma while personally leading his troops. He left no children, and his name passed to Count Argenteau, from whom came the family of Mercy-Argenteau (see below).

MERCY (adapted from Fr. merci, Lat. merces, reward), compassion, pardon, pity or forgiveness. The Latin word was used in the early Christian ages for the reward that is given in heaven to those who have shown kindness without hope of return. The French word, except in such phrases as Dieu merci, sans merci, is principally used in the

sense of ” thanks,” and is seen in the old English expression ” gramercy,” i.e. grant merci, great, many thanks, which Johnson took for ” grant me mercy.” In the medieval Church there were seven ” corporal ” and seven “spiritual works of mercy” (opera misericordiae); these were

(a) the giving of food to the hungry and drink to the thirsty, the clothing of the naked, the visitation of the sick and of prisoners, the receiving of strangers, and the burial of the dead;

(b) the conversion of sinners, teaching of the ignorant, giving of counsel to the doubtful, forgiveness of injuries, patience under wrong, prayer for the living and for the dead. The order “bf the Sisters of Mercy is a religious sisterhood of the Roman Church. It is found chiefly in England and Ireland, but there are branches in the United States of America, in South America and in Aus- tralia and New Zealand. It was founded in 1827 in Dublin by Miss Catherine McAuley (1787-1841). The object was to per- form the corporal and spiritual works of mercy.

MERCY-ARGENTEAU, FLORIMOND CLAUDE, Comte de (1727-1794), Austrian diplomatist, son of Antoine, comte de Mercy-Argenteau, entered the diplomatic service of Austria, going to Paris in the train of Prince Kaunitz. He became

Austrian minister at Turin, at St Petersburg, and in 1766 at Paris, where his first work was to strengthen the alliance between France and Austria, which was cemented in 1770 by the marriage of the dauphin, afterwards Louis XVI., with Marie Antoinette, daughter of the empress Maria Theresa. When four years later Louis and Marie Antoinette ascended the throne, Mercy-Argen- teau became one of the most powerful personages at the French court. He was in Paris during the turbulent years which heralded the Revolution, and his powerful aid was given first to Lomenie de Brienne, and then to Necker. In 1702 he became governor-general of the Belgian provinces, which had just been reduced to obedience by Austria, and here his ability and experi- ence made him a very successful ruler. Although at first in favour of moderate courses, Mercy-Argenteau supported the action of Austria in making war upon his former ally after the outbreak of the Revolution, and in July 1794 he was appointed Austrian ambassador to Great Britain, but he died a few days after his arrival in London.

See T. Juste, Le Comte de Mercy-Argenteau (Brussels 1863); A. von Arneth and A. Geoffroy, Correspondances secretes de Marie Thirese avec le comte de Mercy (Paris 1874) ; and A. von Arneth and J. Flammermont, Correspondance secrete de Mercy avec Joseph II. et Kaunitz (Paris 1889-1891). Mercy-Argenteau's Correspondances secretes de Marie There.se has been condensed and translated into English by Lilian Smythe under the title of A Guardian of Marie Antoinette {2 vols., London 1902).

HERE. 1. (From Lat. merus, pure, unmixed; O. Fr. mier), an adjective primarily indicating something pure and unmixed; thus " mere wine " implied pure and unadulterated wine, as " mere folly " expressed folly pure and simple. Modern usage has, however ; given both to the adjective " mere " and the adverb " merely " a deprecatory and disparaging idea, so that expressions like " the mere truth," a " mere statement of fact," &c, often convey the impression that they are far from being " mere " in the sense of " entire " or " absolute," but are, on the contrary, fragmentary and incomplete. The earlier idea of the word is retained in some legal phrases, especially in the phrase " mere motion,'' that is, of one's own initiative without help or sugg^tion from the outside. Another legal phrase is " mere right" (law Latin jus merum), i.e. right without possession.

2. A word which appears in various forms in several Teutonic and other languages ; cf. Dutch and Ger. Meer. From the cognate Lat. mare are derived the Romanic forms, e.g. Fr. mer, Span, mar, &c; the word appears also in the derivative "marsh" for " marish "; the ultimate origin has been taken to be an Indo- European root, meaning " to die," i.e. to lie waste; cf. Sansk. maru, desert), an arm of the sea or estuary; also the name given to lakes, pools and shallow stretches of water inland. In the Fen countries a mere signifies a marsh or a district nearly always under water.

3. (Derived from an O. Eng. source, maere, a wall or boundary; cognate with Lat. murus, a wall), a landmark or boundary, also an object indicating the extent of a property without actually enclosing it. A special meaning is that of a road, which forms a dividing line between two places. A " meresman " is an official appointed by parochial" authorities to ascertain the exact boundaries of a parish and to report upon the condition of the roads, bridges, waterways, &c, within them. In the mining districts of Derbyshire a mere is a certain measurement of land in which lead-ore is found.

MEREDITH, GEORGE (1828-1909), British novelist and poet, was born at Portsmouth, Hampshire, on the 12th of Feb- ruary 1828; the

parish church register records his baptism on the 9th of April. About his early life' few details are recorded, but there is a good deal of quasi-autobiography, derived appar- ently from early associations and possibly antipathies, in some of his own novels, notably Evan Harrington and Harry Rich- mond, as to which the judicious may speculate. He had, as he used to boast, both Welsh (from his father) and Irish blood {from his mother) in his veins. His father, Augustus Armstrong Meredith, was a naval outfitter at Portsmouth (mentioned as such in Marryat's Peter Simple); and his grandfather, Mel- chisedek Meredith, clearly suggested the " Old Mel " of Evan

Harrington. Melchisedek was 35 when in 1796 he was initiated as a freemason at Portsmouth ; and he appears to have been known locally as " the count," because of a romantic story as to an adventure he once had at Bath; he was churchwarden in 1801 and 1804; and some of the church plate still bears his name.

Meredith's mother died when he was three years old, and he was made a ward in chancery. He was sent to school at Neuwied on the Rhine, and remained in Germany till he was sixteen. During these impressionable years he imbibed a good deal of the German spirit; and German influence, especially through the media of poetry and music, can often be traced in the cast of his thought and sentiment, as well as in some of the intricacies of his' literary style. Returning to England he was at first articled to a solicitor in London, but he had little inclina- tion for the law, and soon abandoned it for the more congenial sphere of letters, of which he had become an eager student. At the age of twenty-one he began to contribute poetry to the maga- zines, and he eked out a livelihood for some years by journalism, for the Daily News and other London papers, and for the Ipswich Journal, for which he wrote leaders; a certain number of his more characteristic fugitive writings are collected in the memo- rial edition of his works (1910). In London he became one of the leading spirits in the group of young philosophical and positivistic Radicals, among whom were John (afterwards Lord) Morley, Frederic Harrison, Cotter Morison and Admiral Maxse. But during the years when he was producing his finest novels he was practically unknown to the public. In 1849 fle married Mrs Nicholls, daughter of Thomas Love Peacock, the novelist, a widow, eight years his senior, whose husband had been acciden- tally drowned a few months after her first marriage (1844), and who had one child, a daughter; but their married life was broken by separation; she died in 1861, and in 1864 Meredith married Miss Vulliamy, by whom he had a son and daughter. His second wife died in 1885. Up to that time there is little to record in the incidents of his life; he had not been " discovered " except by an " honourable minority " of readers

and critics. It must suffice to note that during the Austro-Italian War of 1866 he acted as special correspondent for the Morning Post; and though he saw no actual fighting, he enjoyed, particularly at Venice, opportunities for a study of the Italian people which he turned to account in several of his novels. Towards the close of 1867, when his friend John Morley paid a visit to America, Meredith undertook in his absence the editorship of the Fort- nightly Review for Messrs Chapman & Hall. They were not only the publishers of his books, but he acted for many years as their literary adviser, in which capacity he left a reputation for being not only eminently wise in his selection of the books to be published, but both critical and encouraging to authors of promise whose works he found himself obliged to reject. Thomas Hardy and George Gissing were among those who expressed their grateful sense of his assistance. He was indeed one of the last of the old school of " publishers' readers." In his early married life he lived near Weybridge, and later at Copsham between Esher and Leatherhead, while soon after his second marriage he settled at Flint Cottage, Mickleham, near Dorking, where he remained for the rest of his life.

Meredith's first appearance in print was in the character of a poet, and his first published poem " Chillian Wallah," may be found in Chambers's Journal for the 7th of July 1849. Two years later he put forth a small volume of Poems (1851), which was at least fortunate in eliciting the praise of two judges^ whose opinion was of the first importance to a beginner. Tenny- son was at once struck by the individual flavour of the verse, and declared of one poem, " Love in the Valley," that he could not get the lines out of his head. Charles Kingsley's eulogy was at once more public and more particular. In Fraser's Magazine he subjected the volume to careful consideration, praising it for richness and quaintness of tone that reminded him of Herrick, for completeness and coherence in each separate poem, and for the animating sweetness and health of the general atmosphere. At the same time he censured the laxity of I rhythm, the occasional lack of polish, and the tendency to

overload the description with objective details to the con- fusion of the principal effect. No doubt as a result of Kingsley's introduction, two poems by Meredith appeared in Fraser's Magazine shortly afterwards; but with the exception of these, and a sonnet in the Leader, he did not publish anything for the next five years. In the

meanwhile he was busy upon his first essay in prose fiction. It was early in 1856 that the Shaving of Shagpat, a work of singular imagination, humour and romance, made its appearance. Modelled upon the stories of the Arabian Nights, it catches with wonderful ardour the magical atmosphere of Orientalism, and in this genre it remains a unique triumph in modern letters. Though unappreciated by the multitude, its genius was at once recognized by such contemporaries as George Eliot and Dante Gabriel Rossetti, the latter of whom was one of Meredith's intimate friends. For his next story it occurred to Meredith to turn his familiarity with the life and legendary tradition of the Rhinelander into a sort of imitation of the grotcsquerie of the German romanticists, and in 1857 he put forth Farina, a Legend of Cologne, which sought to transfer to English sympathies the spirit of German romance in the same way that Shagpat had handled Oriental fairy-lore. The result was less successful. The plot of Farina lacks fibre, its motive is insufficient, and the diverse elements of humour, serious narrative, and romance scarcely stand in proportion to one another. But the Ordeal of Richard Feverel, which followed in 1859, transferred Meredith at once to a new sphere and to the altitude of his accomplishment. With this novel Meredith deserted the realm of fancy for that of the philosophical and psychological study of human nature, and Richard Feverel was the first, as it is perhaps the favourite, of those wonderful studies of motive and action which placed him among the demigods of English literature. The essential theme of this fine criticism of life is the question of a boy's education. It depicts the abortive attempt of a proud and opinionated father, hide-bound by theory and precept, to bring up his son to a perfect state of manhood through a " system " which controls all his early circumstances and represses many of the natural and wholesome instincts and impulses of adolescence. The love scenes in Richard Feverel are gloriously natural and full of vitality, and the book throughout marked a revolution in the English treatment of manly passion. Those who have not read this novel in the original form, with the chapters which were afterwards omitted, have lost, however, the key to many passages in the story: In the following year Meredith contributed to Once a Week, and in 1861 published as a book the second of his novels of modern life, Evan Harrington, originally with the sub-title " He Would be a Gentleman " — in allusion to the hero being the son of " Old Mel," the tailor — which contains a richly humorous — in its unrevised form, splendidly farcical — plot, with some magnificent studies of character. Afterwards revised, a" certain amount of the farcical element was cut out, with the result that, considered as comedy, it has weak spots; but the Countess de Saldar remains a genuine creation. A year later he produced his finest

volume of poems, entitled Modern Love, and Poems of the English Roadside, with Poems and Ballads. An attack upon the dramatic poem which gives the volume its title appeared in the Spectator, and is memorable for the fact that Meredith's friend, the poet Swinburne, with one of his characteristically generous impulses, replied (Spectator, June 7, 1862) in a spirit of fervent eulogy. Some of the individual " sonnets " (of sixteen lines) into which Modern Love is divided are certainly worthy of being ranked with the most subtle and most intense poetic work of the 19th century. Returning to fiction, Meredith next published Emilia in England (1864), afterwards renamed Sandra Belloni. His powerful story Rhoda Fleming (1865) followed soon afterwards. Vittoria, published in the Fortnightly Review in 1866, and in book form in 1867, is a sequel to Emilia in England. Four years later appeared The Adventures of Harry Richmond in the pages of Cornhill (1870-1871). Its successor was Beauchamp's Career (Fortnightly Review, 1874-1875), the novel which Meredith usually described as his own favourite. Its hero's character is supposed xvm. 6

to have been founded upon that of Admiral Maxse. Sandra Belloni, Rhoda Fleming, Vittoria and Beauchamp are all master- pieces of his finest period, rich in incident, character and work- manship. " The House on the Beach " and " The Case of General Opie and Lady Camper " (New Quarterly Magazine, 1877) were slight but glittering exercises in comedy; the next important novel was The Egoist (1879), which shows an increase in Meredith's twistedness of literary style and is admittedly hard to read for those who merely want a " story," but which for concentrated analysis and the real drama of the human spirit is an astounding production. In an interesting series of lectures which Meredith delivered at the London Institution in 1877 his main thesis was that a man without a sense of comedy is dead to the finer issues of the spirit, and the conception of Sir Willoughby Patterne, the central figure of The Egoist, is an embodiment of this idea in the flesh. The Tragic Comedians (1880), the next of Meredith's novels, slighter in texture than his others, combines the spirits of comedy and tragedy in the story of the life of Ferdinand Lassalle, the German Socialist. The appearance of Diana of the Crossways (1885), a brilliant , book, full of his ripest character-drawing, though here and there tormenting the casual reader by the novelist's mannerisms of expression, marks an epoch in Meredith's career, since it was the first of his stories to strike the general public. Its heroine was popularly identified with Sheridan's granddaughter, Mrs Norton, and the use made in it of the contemporary story of that lady's communication to The Times of the cabinet secret of Peel's conversion to Free Trade had the effect of

producing explicit evidence of its inaccuracy from Lord Dufferin and others. As a matter of historical fact it was Lord Aberdeen who himself gave Delane the information, but the popular acceptance of the other version of the incident gave a factitious interest to the novel. ,

Meanwhile further instalments of poems — Poems and Lyrics of the Joy of Earth (1883) — had struck anew the full, rich note of natural realism which is Meredith's chief poetic characteristic. " The Woods of Westermain," in particular, has a sense of the mysterious communion of man with nature unapproached by any English poets save Wordsworth and Shelley. Ballads ind Poems of Tragic Life (1887) and A Reading of Earth (1888) gave further evidence of the wealth of thought and vigour of expression which Meredith brought to the making of verse. To "the general," no doubt, Meredith's verse is prohibitive, or nearly so — for, after all, he has written some poems, like " Martin's Puzzle," " The Old Chartist," and " Juggling Jerry," which anybody can read with ease. But his most characteristic , style in verse is so concentrated that any one accustomed to " straightforward " writing, and unwilling to read with the mind rather than with the eye, must needs, to his loss, be put off. His readers, of the verse even more than of the prose, must be prepared to meet him on a common intellectual footing. When once that is granted, however, the music and magic of such poems as " Seed-time," " Hard Weather," " The Thrush in February," " The South- Wester," " The Lark Ascending," " Love in the Valley," " Melampus," "A Faith on Trial," are very real, amid all their occasional obscurities of diction.

Meredith had now Completed his sixtieth year, and with his advancing years the angles of his individuality began to grow sharper, while the difficulties of his style became accentuated. The increase in mannerism was marked in One of Our Conquerors (1891), otherwise a magnificent rendering of a theme fulft>f both tragedy and comedy, and in the poem of " The Empty Purse " (1892). Neither Lord Ormont and His Aminta (1894) nor The Amazing Marriage (1895) reached the level of the earlier novels, though in the latter he seemed to catch an after- glow of genius. In 1898 appeared his Odes in Contribution to the Song of French History, consisting of one ode (" France, December 1870") reprinted from Ballads and Poems (187 1), and three others previously unpublished; a fine example of his lofty thought, and magnificent — if often difficult — and individual diction. In 1901 another volume of verse, A Reading

tt

of Life, appeared. In later years too he contributed occasional poems to newspapers and reviews and similar publications, which were collected after his death (Last Poems, 1910). His comedy, The Sentimentalists, was performed on the 1st of March 1910; his early but unfinished novel, Celt and Saxon, was also posthumously published in that summer.

From the early 'nineties onward Meredith's fame had been firmly established. His own literary contemporaries still living could join hands with the younger generation of enthusiastic admirers in insisting on a greatness of which they themselves had been unable to persuade the public. He was chosen to succeed Tennyson as president of the Authors' Society; on his seventieth birthday (1898) he was presented with a congratulatory address by thirty of the most prominent men of letters of the day; before he died he had been included by the king in the Order of Merit; and in various other ways his position as the chief living English writer had come to be popu- larly recognized. The critics discussed him; and new editions of his books (both prose and verse), for which there had long been but scanty demand, were called for. One of the iresults was that Meredith, with very doubtful wisdom, recast some of his earlier novels; and in the sumptuous " authorized edition " of 1897 (published by the firm of Constable, of which his son, William Maxse Meredith, was a member) very large alterations are made in some of them. In fact, a reader who compares the first and last editions either of Richard Feverel or Evan Harrington will notice changes little short of revolutionary. Even in the previously current editions of 1878 onwards, pub- lished by Chapman & Hall, Richard Feverel had been consider- ably shortened as compared with the original three-volume edition; but it was now robbed again of some of its best-known passages. It is no doubt competent to an author himself to revise his earlier published work even to the extent to which Meredith in the 1897 edition revised these novels; but certainly it is not necessary to accept his judgment when this involves the excision in old age of some of the most virile passages of books that were written in the full glow and vigour of his prime. In Constable's memorial edition (19 10) of his complete works the excisions were published separately, and are therefore on record for those to consult who care. But the wise will read Richard Feverel and Evan Harrington in the original versions.

Meredith's literary quality must always be considered in the light of the Celtic side of his temperament and the peculiar- ities of his mental equipment. His nature was intuitive rather than ratiocinative; his

mental processes were abrupt and far- reaching; and the suppression of connecting associations fre- quently gives his language, as it gave Browning's, but even to a greater extent, the air of an impenetrably nebulous obscurity. This criticism applies mainly to his verse, but is also true of his prose in many places, though there is much exaggera- tion about the difficulties of his novels. When once, however, his manner has been properly understood, it is seen to be insepar- able from his method of intellection, and to add to the narrative of description both vividness of delineation and intensity of realization. The essential respect in which Meredith's method of describing action and emotion in narrative differs from that of convention is that, while the ordinary method is to relate what happens from the point of view of the onlooker, Meredith frequently describes it from the point of emotion of the actor; and his influence in this direction has largely modified the art of fiction. Herein lies the secret of the peculiar brilliancy of his style, derived from his combination of the narrator with the creator, or — in its strict sense — the seer. The reader, by the transference of the interest from the audience to the stage, is transported into the very soul of the character, and made to feel as he feels and act as he acts. Moreover, Mere- dith's instinct for psychology is so intimate, and his sense of motive and action so true, that the interaction of character and character directly dominates the sequence of events depicted in his imaginary world, and discloses the moral idea or criticism of life, instead of the preconceived " moral " being merely illustrated by the plot. In building up the minds, actions,

creeds, and tragedies or comedies of his imaginary personalities amid the selected circumstances, and inspiring them with the identical motives and educational influences of life itself, Mere- dith spent an elaboration and profundity of thought and an originality and vigour of analysis upon his novels which in explicitness go far beyond what had previously been attempted in fiction, and which give to his works a philosophical value of no ordinary kind. Simplicity can scarcely be expected of his language, for the interplay of ideas is in itself original and complex, and their interpretation is necessarily original and complex too. But when Meredith is at his best he is only involved with the involution of his subject; the aphorisms that decorate his style are simple when the idea they convey is simple, elaborate only in its elaboration. Pregnant, vividly graphic, capable of infinite shades and gradations, his style is a much finer and subtler instrument than at first appears, and must be judged finally by what it conveys to the mind, and not by its superficial sound upon the conventional ear. It owes something to Jean Paul Richter; something, too, to Carlyle, with whose methods of narrative and indebtedness to the apparatus of

German metaphysics it has a good deal in common. To the novelist Richardson, too,, a careful reader will find that Meredith, both in manner and matter (notably in The Egoist and in Richard Feverel), owes a good deal; in ” Mrs Grandison ” in Richard Feverel he even recalls ” Sir Charles Grandison ” by name; and nobody can doubt that Sir Willoughby Patterne, both in idea and often in expression, was modelled on Richardson’s creation. Careful students of the early 19th-century English novel will find curious echoes again in Meredith of Bulwer-Lytton’s (Baron Lytton’s) literary manner and romantic outlook. 1 But he was, after all, an originator, and at first suffered in esti- mation on that score; he wrote in his own way, and what is most characteristic in Meredith remains individual. Like all the great masters, he has his own tone of voice, his own fashion of expressing an idea. Feeling, perception, reflection, judgment, have equal shares in determining his architectonic relation to a problem or a situation. He rings changes on the changing emotions of humanity, but every chime rings true. He is a literary artist. He takes great themes, not little ones; the characters in his fiction are personalities, human beings, neither “heroes” nor “sports”; and he does not descend to pander to lubricity or cater for the ” reading public.” His gallery of portraits of real human women, not dolls, would alone place him among the few creators in English literature. It is beyond our scope here to enter into details concerning the philosophy which represents Meredith’s ” criticism of life.” Broadly speaking, it is a belief in the Tightness and wholesome- ness of Nature, when Nature — ” Sacred Reality ” — is lovingly and faithfully and trustfully sought and known by the pure use of reason. Man must be ” obedient to Nature, not her slave.” Mystical as this philosophy occasionally becomes, it is yet an inspiring one, clean, austere and practical; and it is always dominated by the categorical imperative of self-know- ledge and the striving after honesty of purpose and thought. A strong vein of political Radicalism runs through Meredith’s creed. It is, however, a Radicalism allied to that of the French philosophes, rather than to the contemporary developments of British party politics, though in later life he gave his open support to the Liberal party. In spite of his German upbringing Meredith was always strongly French in his sympathies, arid his appreciation of French character at its best and at its worst* is finely shown in his Napoleon odes. In the main his politics may be summed up as a striving after liberty for reason and conscience and the constant progress of humanity —

The cry of the conscience of life ; Keep the young generations in hail, And, bequeath them no tumbled house.

1 The fact that Bulwer-Lytton’s son, the 1st Earl of Lytton, Meredith’s

junior by three years, took the pen-name of ” Owen Meredith,” led occasionally to some confusion among uninstructed contemporaries, and even the suggestion of a family connexipn.

It is part of Meredith’s philosophy — and this must be remem- bered in considering his diction — that verbal expression is itself a test of right thought and action. Hence is derived his passion for verbal analysis. Hence also his impulse towards and vindication of poetry— meaning still ” the best words in the best order “; and hence his own dictum, otherwise perhaps hard to undiscerning minds, that Song itself is the test by which truth may be tried. The passage occurs in ” The Empty Purse ” — a poem which throughout is a careful though mannered exposition of Meredith’s general views on life —

Ask of thyself : This furious Yea

Of a speech I thump to repeat,

In the cause I would have prevail,

For seed of a nourishing wheat,

Is it accepted of Song ?

Does it sound to the mind through the ear,

Right sober, pure sane ? has it disciplinedfeet ?

Thou wilt find it a test severe ;

Unerring whatever the theme.

Rings it for Reason a melody clear,

We have bidden old Chaos retreat,

We have called on Creation to hear;

All forces that make us are one full stream.

Meredith is generally ranked far less high as a poet than as a novelist. But he can only be understood and appreciated properly by those who realize that not prose (in the ordinary sense) but poetry was to him

the highest form of expression, and that only in it could he fully deliver his message, as a writer who aspired to contribute something more to the common stock of ideas than could be embodied dramatically in prose fiction.

On Meredith's 80th birthday in 1908, the homage of the English literary world was again paid in an address of con- gratulation. But his health, which for many years had been precarious, was now failing. He died at Flint Cottage, Box Hill, Surrey, on the 18th of May 1909. A strong feeling existed that he should be buried in Westminster Abbey, and a petition to that effect, which was approved by the prime minister, Mr Asquith, was signed by a large number of men of letters. But this was not to be. A memorial service was held in the abbey, but Meredith's own remains, after cremation, were interred at Dorking by the grave of his second wife. He had died only a brief span after his old friend Swinburne, his affection for whom had never suffered abatement, and it was felt that, with them, a great epoch in English literary history had closed. They were the last of the great Victorians; and in Meredith went the writer who had raised the creative art of the novel, as a vehicle of character and constructive philosophy, to its highest point — a point higher indeed than most contem- porary readers were prepared for. The estimate of his genius formed by " an honourable minority," who would place him in the highest class of all, by Shakespeare, has yet to be confirmed by the wider suffrage of posterity.

A carefully compiled bibliography by John Lane was included in George Meredith: Some Characteristics, by R. Le Gallienne (1890). This sympathetic essay in criticism was the first substantial publi- cation addressed to that stimulation of a wider appreciation of Meredith which was carried on by several later books, perhaps the best of which is M. Sturge Henderson's George Meredith: Novelist Poet, Reformer (1908) ; but such earlier testimonies to Meredith's importance as Justin McCarthy's, in his History of Our Own Times, must not be forgotten. See also J. A. Hammerton, George Mere- dith in Anecdotes and Criticism (1909). (H. Ch.)

MEREJKOVSKY (or Merezhkovskiy), DMITRI SERGYEE-

VICH (1865-), Russian novelist and critic, was born at St Petersburg in 1865. His trilogy of historical romances, collectively entitled Christ and Antichrist, has been translated into many European languages, notably English and French. It comprises Smert Bogov (Eng. trans. " The Death of the Gods," London, 1901), the central figure in which is Julian the Apostate; Voskresenie Bogi (" The Forerunner," London,

1902), which describes the life and times of Leonardo da Vinci; and Antikhrist: P'etr i Aleksyey (" Peter and Alexis," London, 1903), which is based on the tragic story of the relations between Peter the Great and his son. The influence of Sienkiewicz can be traced in many of Merejkovsky's writings, which include

critical studies of Pliny the Younger, Calderon, Montaigne, Ibsen, Tolstoy {Tolstoy as Man and Artist, London, 1902), and of Gorki and other Russian writers. Merejkovsky married Zinaida Nikolaevna, known in Russia for her poems, essays and short stories written under the pseudonym of Zinaida Hippius (or Gippius); her collected poems (1889-1903) were published in Moscow in 1904.

MERES, FRANCIS (1565-1647), English divine and author, was born at Kirton in the Holland division of Lincolnshire in 1565. He was educated at Pembroke College, Cambridge, where he graduated B.A. in 1587, and M.A. in 1591. Two years later he was incorporated M.A. of Oxford. His kinsman, John Meres, was high sheriff of Lincolnshire in 1596, and appar- ently helped him in the early part of his career. In 1602 he became rector of Wing in Rutland, where he had a school. He died on the 29th of January 1647. Meres rendered immense service to the history of Elizabethan literature by the publication of his Palladis Tamia, Wits Treasury (1598). It was one of a series of volumes of short pithy sayings, the first of which was Politeuphuia: Wits Commonwealth (1597), compiled by John Bodenham or by Nicholas Ling, the publisher. The Palladis Tamia contained moral and critical reflections borrowed from various sources, and embraced sections on books, on philosophy, on music and painting, and a famous " Comparative Discourse of our English poets with the Greeke, Latin, and Italian poets." This chapter enumerates the English poets from Chaucer to Meres's own day, and in each case a comparison with some classical author is instituted. The book was issued in 1634 as a school book, and has been partially reprinted in the Ancient Critical Essays (1811-1815) of Joseph Haslewood, Professor E. Arber's English Garner, and Gregory Smith's Elizabethan Critical Essays (1904). A sermon entitled Gods Arithmetiche (1597), and two translations from the Spanish of Luis de Granada entitled Granados Devotion and the Sinners Guide (1598) com- plete the list of his works.

MERGANSER, a word due to C. Gesner {Hist, animalium iii. 129) in 1555, and for long used in English as the general name for a group of fish-eating ducks possessing great diving powers, and forming .the genus Mergus of Linnaeus, now regarded by ornithologists as a sub-family, Merginae, of the family Anatidae. The mergansers have a long, narrow bill, with a small but evident hook at the tip, and the edges of

both mandibles beset by numerous horny denticulations, whence in English the name of “saw-bill ” is frequently applied to them. Otherwise their structure does not much depart from the Anatine or Fuliguline type. All the species bear a more or less developed crest or tuft on the head. Three of them, Mergus merganser or castor, M. senator, and M. albellus, are found over the northern parts of the Old World, and of these the first two also inhabit North America, which has besides a fourth species, M. cucullatus, said to have occasionally visited Britain. M. merganser, commonly known as the goosander, is the largest species, being nearly as big as the smaller geese, and the adult male in breeding- attire is a very beautiful bird, conspicuous with his dark glossy- green head, rich salmon-coloured breast, and the upper part of the body and wings black and white. This full plumage is not assumed till the second year, and in the meantime, “as well as in the post-nuptial dress, the male much resembles the female, having, like her, a reddish-brown head, the upper parts grey and the lower white. In this condition the bird is often known as the ” dun diver.” This species breeds abun- dantly in many parts of Scandinavia, Russia, Siberia and North America, and occasionally in Scotland. M . senator, commonly called the red-breasted merganser, is a somewhat smaller bird; and, while the fully-dressed male wants the delicate hue of the lower parts, he has a gorget of rufous mottled with black, below which is a patch of white feathers, broadly edged with ■black. Both these species have the bill and feet of a bright reddish-orange, while the much smaller M . albellus, known as the smew, has these parts of a lead colour, and the breeding plumage of the adult male is white, with quaint crescentic markings of black, and the flanks most beautifully vermiculated.

M. cucullatus, the hooded merganser of North America, is in size intermediate between M . albellus and M. senator; the male is easily recognizable by his broad semicircular crest, bearing a fanshaped patch of white, and his elongated subscapulars of white edged with black. The conformation of the trachea in the male of M. merganser, M. senator and M. cucullatus is very like that of the ducks of the genus Clangula, but M . albellus has a less exaggerated development more resembling that of the ordinary Fuligula. 1 From the southern hemisphere two species of Mergus have been described, M. octoseta- ceus or brasilianus, L. P. Vieillot (N. Diet. a” Hist, naturelle, ed. 2, vol. xiv. p. 222; Gal. des oiseaux, torn. ii. p. 209, pi. 283), inhabiting South America, of which but few specimens have been obtained,

having some general resemblance to M . senator, but much more darkly coloured, and M. australis, Hombron and Jacquemont {Ann. sc. nat. zoologie, ser. 2, vol. xvi. p. 320; Voy. au Pol Sud, oiseaux, pi. 31, fig. 2), known only by the unique example in the Paris Museum procured by the French Antarctic expedition in the Auckland Islands.

Often associated with the mergansers is the genus Merganetla, the so-called torrent-ducks of South America, of which six species have been described; but they possess spiny tails and have their wings armed with a spur. These with Hymenolaemus Malacorhynchus, the blue duck of New Zealand, and Salvadorina waigiuensis of Waigiou are placed in the sub-family Mergan- ettinae. (A. N.)

MERGENTHEIM, a town of Germany, in the kingdom of Wiirttemberg, situated in the valley of the Tauber, 7 m. S. from Lauda by rail. Pop. (1905), 4535. It contains an Evan- gelical and three Roman Catholic churches, a Latin and other schools, and a magnificent castle with a natural history collection and the archives of the Teutonic order. This is now used as barracks. The industries of the town include tanning, the manufacture of agricultural machinery and wine-making. Near the town is a medicinal spring called the Karlsbad.

Mergentheim (Mariae downs) is mentioned in chronicles as early as 1058, as the residence of the family of the counts of Hohenlohe, who early in the 13th century assigned the greater part of their estates in and around Mergentheim to the Teutonic order. It rapidly increased in fame, and became the most important of the eleven commanderies of that society. On the secularization of the Teutonic Order in Prussia in 1525, Mergentheim became the residence of the grand master, and remained so until the final dissolution of the order in 1809.

See Horing, Das Karlsbad bet Mergentheim (Mergentheim, 1887); and Schmitt, Garnisongescb.icb.te der Stadt Mergentheim (Stuttgart,

1895).

MERGER (Fr. merger, to sink), in law, the sinking or ” drowning ” of a lesser estate in a greater, when the two come together in one and the same person without any intervening estate. In order to effect a merger the two estates must vest in the same person at the same time, must be immediately expectant one on the other, and the expectant estate must be larger than the preceding estate. The term is also used for the extinguishment of any right, contract, &c, by absorption in another, e.g. the acceptance of a higher security for a lower, or the embodying of a simple contract in a deed.

MERGUI, the southernmost district of Lower Burma, in the Tenasserim division, bounded on the W. by the Bay of Bengal and on the E. by Siam. Area 9789 sq. m. Two principal ranges cross the district from north to south, running almost

Hybrids between, as is presumed, M. albellus and Clangula elaucion, the common golden-eye, have been described and figured (Eimbeck, Isis, 1831, 300, tab. iii.; Brehm, Naturgesch. oiler Vog. Deutschlands, p. 930; Naumann, Vog. Deutschlands, xii. 194, frontispiece; Kjserbolling, Jour, fur Ornithologie, 1853, Extraheft, p. 29, Naumannia, 1853, p. 337, Ornithol. danica, tab. lv., suppl. tab. 29) under the names of Mergus anatarius, Clangula angustirostris, and Anas (Clangula) mergoides, as though they were a distinct species; but the remarks of De Selys-Longchamps (Bull. Ac. Sc. Bruxelles, 1845, pt. ii. p. 354, and 1856, pt. ii. p. 21) leave little room for doubt as to their origin, which, when the cryptogamic habit and common range of their putative parents, the former unknown to the author last-named, is considered, will seem to be still more likely.

parallel to each other for a considerable distance, with the Tenasserim river winding between them till it turns south and flows through a narrow rocky gorge in the westernmost range to the sea. The whole district, from the water's edge to the loftiest mountain on the eastern boundary, may be regarded as almost unbroken forest. The timber trees found towards the interior, and on the higher elevations, are of great size and beauty, the most valuable being teak (Tectona grandis) , then-gan (Hopea odorata), ka-gnyeng (Dipterocarpus laevis), &c. " The coast-line of the district, off which lies an archipelago of two hundred and seven islands, is much broken, and for several miles inland is very little raised above sea-level, and is drained by numerous muddy tidal creeks. Southwards of Mergui town it consists chiefly of low mangrove swamps alternating with small fertile rice plains. After passing the mangrove limits, the ground to the east gradually rises till it becomes mountainous, even to the banks of the rivers, and finally cul- minates in the grand natural barrier dividing Burma from Siam. The four principal rivers are the Tenasserim, Le-nya, Pakchan and Palauk, the first three being navigable for a considerable distance. Coal is found on the banks of the Tenasserim and its tributaries, but is still unworked. Gold, copper, iron and manganese are also found in various parts of the district, and there are tin mines at Maliwun, upon which European methods have been tried without much profit, owing to the cost of labour.

From the notices of early travellers it appears that Mergui, when under Siamese rule, before it passed to the Burmese, was a rich and

densely peopled country. On its occupation by the British in 1824-1825 it was found to be almost depopulated — the result of border warfare and of the cruelties exercised by the Burmese conquerors. At that time the entire inhabitants numbered only 10,000. It had a population of 88,744 in 1901, showing an increase of 20% in the decade and giving a density of 9 inhabitants to the sq. m. Mergui carries on a flourish- ing trade with Rangoon, Bassein and the Straits Settlements. The chief exports consist of rice, rattans, torches, dried fish, areca-nuts, sesamum seeds, molasses, sea-slugs, edible birds' nests and tin. The staple imports are piece goods, tobacco, cotton, earthenware, tea and sugar. The climate is remarkably healthy, the heat due to its tropical situation being moderated by land and sea breezes. The rainfall is very heavy and usually exceeds 150 inches.

Mergui town has risen into prominence in recent years as the centre of the pearling trade in the neighbouring archipelago. The pearling grounds were practically unknown in 1890, but in the following decade they produced pearls and mother-of- peal shell of considerable value. In 1901 the population was 11,987; but the census is taken at a time when many of the fishermen and their families are away in the islands. There is a considerable coasting trade with other Burmese ports and with the Straits Settlements.

MERGUI ARCHIPELAGO, a cluster of islands in the Bay of Bengal, near the southern coast of Lower Burma. They are chiefly noted for their picturesque beauty, some of them rising to 3000 ft. They are only sparsely inhabited by the island race of Selungs.

MERIAN, MATTHEW (1593-1650), Swiss engraver, was born in Basel, on the 25th of September 1593. The family came originally from near Delemont, but in his grandfather's time settled in Basel, where in 1553 it obtained the burghershjp of the city. As Matthew early showed signs of artistic tastes, he was placed (1609) under the care of Dietrich Meyer, a painter and engraver of Zurich (1572-1658). He went on to Nancy in 1613, where he already displayed considerable talents as an engraver on copper. After studying in Paris, Stuttgart (1616) and the Low Countries, he came to Frankfort, where in 1618 he married the eldest daughter of J. T. de Bry, who was a publisher and bookseller as well as an engraver. Merian worked for some time with his father-in-law in Oppenheim, but then returned to Basel, whence he came back (1624) to Frankfort after Bry's death (1623), in order to take over his business;

this remained in his family till 1726, when, after a great fire that destroyed most of the books in stock, it came to an end. In 1625 Merian became a burgher of Frankfort, then the great centre of the book trade in Germany, and lived there till his death on the 22nd of June 1650. Among his many works two deserve to be specially mentioned. The first is the long series of works, each entitled Topographia, which contained descrip- tions of various countries, illustrated by copper plates, largely done by Merian himself, while the accompanying text was due to Martin Zeiller (1580-1661), an Austrian by birth. The first volume was published in 1642 and described Switzerland, with the Grisons and the Valais; it contains the first known view of the glaciers of Grindelwald. ” Austria ” appeared in 1649, but the volume relating to Upper Saxony and Bohemia (1650) was the last issued by Merian himself. ” France ” appeared in 1655-1656, while in 1688 the series (extending to 30 parts, in 18 vols.) came to an end with ” Italy,” the volume as to Rome having appeared in 1681. The other great enter- prise of Merian was the series entitled Thealrum Europaeutn, which appeared in 21 parts between 1635 an d 1738 — it is a historical chronicle of events in Europe from 161 7 onwards. In 162 5-1630 Merian published a series of illustrations to the Bible, and in 1649 a Dance of Death. But he is best remembered by his views of towns, which have very considerable historical value. His best pupil, Wenceslaus Hollar (1607-1677), of Prague, settled in London (1635-1643, i652-i677),and worthily carried on the Merian tradition. (W. A. B. C.)

See Life, by H. Eckardt (Basel, 1887).

MERIDA, a city of Mexico and capital of the state of Yucatan, 23 m. by rail S. of Progreso, its port on the Gulf of Mexico. Pop. (1900), 43,630, the Maya element being predominant. Merida is the centre of an isolated railway system, connected with the ports of Progreso and Campeche, and having short lines radiating in all directions to Peto, Valladolid and Izamal. It stands on a broad, partly open plain near the northern border of the peninsula, where the thin loose soil covering a limestone foundation permits the rapid percolation and evaporation of the rainfall, and therefore supports a compara- tively scanty vegetation. It is highly favourable to maguey cultivation, however, and Merida is the centre of the henequen, or sisal fibre, industry. There is an imposing 16th-century cathedral facing upon the principal plaza, together with the government and episcopal palaces. There are also an old university, with schools of law, medicine and pharmacy, an episcopal seminary and other educational institutions. The most

interesting building in the city is a Franciscan convent, dating from 1547, which covers an area of 6 acres and is sur- rounded by a wall 40 ft. high and 8 ft. thick. It once harboured no less than 2000 friars, but has been allowed to fall into com- plete decay since the expulsion of the order in 1820. The manufactures include straw hats, hammocks, cigars, soap, cotton fabrics, leather goods, artificial stone, and a peculiar distilled beverage called estabentun. The exports are henequ6n, or sisal fibre, hides, sugar, rum, chicle and indigo — all products of the vicinity. Merida was founded in 1542 by the younger Francisco de Montejo on the site of a native city called Tihoo, or Tho, whose stone pyramids furnished building material in abun- dance for the invaders. It became an episcopal see in 1561.

MERIDA (anc. Augusta Emerita, capital of Lusitania), a town of western Spain, in the province of Badajoz, on the right bank of the river Guadiana, 30 m. E. of Badajoz. Pop. (1900), 11,168. Merida is an important railway junction, for here the Madrid-Badajoz railway meets the lines from Seville, Huelva and Caceres. No Spanish town is richer in Roman antiquities. Most of these are beyond the limits of modern Merida, which is greatly inferior in area to the ancient city. Chief among them is the Roman bridge, constructed of granite under Trajan, or, according to some authorities, under Augustus, and restored by the Visigoths in 686 and by Philip III. in 1610. It comprised 81 arches, 17 of which were destroyed during the siege of Badajoz (1812), and mea- sured 2575 ft. in length. There are a few remnants of Roman

temples and of the colossal wall which encircled the city, besides a Roman triumphal arch, commonly called the Arco de Santiago, and a second Roman bridge, by which the road to Salamanca was carried across the small river Albarregas {Alba Regia). The Moorish alcdzar or citadel was originally the chief Roman fort. From the Lago de Proserpina, or Charca de la Albuera, a large Roman reservoir, 3 m. north, water was conveyed to Merida by an aqueduct, of which 37 enormous piers remain standing, with ten arches in three tiers built of brick and granite. The massive Roman theatre is in good preservation; there are also a few vestiges of an amphitheatre and of a circus which measured 485 yds. by 120. Other Roman remains are exhibited in the archaeological museum, and much Roman masonry is incorporated in the 16th century Mudejar palace of the dukes of La Roca, the palace of the counts of Los Corbos, and the convent of Santa Eulalia, which is said by tradition to mark the spot where St Eulalia was martyred (c. 300).

Augusta Emerita was founded in 25 B.C. As the capital of Lusitania it

soon became one of the most splendid cities in Iberia, and was large enough to contain a garrison of 90,000 men. Under the Visigoths it continued to prosper, and was made an archbishopric. Its fortifications included five castles and eighty-four gateways; but after a stubborn resistance it was stormed by the Moors in 713. Its Moorish governors frequently, and sometimes successfully, asserted their indepen- dence, but Menda was never the capital of any large Moorish- state. In 1 1 29 its archbishopric was formally transferred to Santiago de Compostela, and in 1228, when Alphonso IX. of Leon expelled the Moors, Merida was entrusted to the order of Santiago, in whose keeping it soon sank into decadence. MERIDEN, a city of New Haven county, Connecticut, U.S.A., in the township of Meriden, S.W. of the centre of the state, about 18 m. N.N.E. of New Haven and about the same distance S.S.W. of Hartford. Pop. of the township, including the city (1900), 38,695; (1910), 32,066; of the city (1900), 24,296, of whom 7215 were foreign-born; (1910), 27,265. Meriden is served by the New York, New Haven & Hartford railway and by an inter-urban electric line. The city is bisected by Harbor Brook, a small stream, and through the S.W. part of the township flows the Quinnipiac river. A short distance N.W. of the city, in Hubbard Park, an attractive reservation of more than 900 acres, are the Hanging Hills, three elevations (West Mountain, South Mountain and Cat-Hole Mountain) in a broken range of trap ridges, which have resisted the erosion that formed the lowlands of the Connecticut valley; they rise to a height of about 700 ft. above the sea. In their vicinity, near the boundary of Berlin township, is Merimere, one of the city's four reservoirs. Meriden is the seat of the Connecticut School for Boys (Reform- atory). There are also a public library (1899), a state armoury, a hospital, the Curtis Home for orphans and aged women, and a tuberculosis sanitarium supported by the city. Meriden is one of the most important manufacturing cities of Connecticut, and in 1905 produced 59-9% of the plated ware manufactured in the state, and much sterling silver. In 1905 the factory product was valued at $13,763,548, an increase of 17-1% over that of 1900. Meriden was originally a part of the township of Wallingford, but a tract in the northern part of this township was designated as Merideen by an Indian deed of 1664. It was made a separate parish under that name in 1728, but did not become a separate township until 1806. The city Tjtas chartered in 1867. ˆ

See G. W. Perkins, Historical Sketches of Meriden (West Meriden, 1849); C. H. S. DaVis, History of Wallingford (Meriden, 1870), and G. M. Curtis and C. Bancroft Gillespie, A Century of Meriden (Meriden, 1906).

MERIDIAN, a city and the county-seat of Lauderdale county,

Mississippi, U.S.A., about qo m. E. of Jackson. Pop. (1890), 10,624; (1900), 14,050, of whom 5787 were negroes; (1910 census), 23,285. It is served by the Southern, the Alabama Great Southern, the Mobile & Ohio, and the New Orleans & North Eastern and the Alabama & Vicksburg (Queen &

Crescent Route) railways. It is the seat of the East Mississippi Insane Hospital, of the state Masonic Widows and Orphans' Home and of the Meridian Women's College (non-sectarian, opened in 1903), the Meridian Male College (opened in 1001), and, for negroes, the Lincoln School (Congregational) and Meridian Academy (Methodist Episcopal) . The city is an impor- tant market for cotton grown in the surrounding country, and is the principal manufacturing city in the state. Its factory products, chiefly railway supplies and cotton products, increased in value from $1,924,465 in 1900 to $3,267,600 in 1905, or 69-8% in five years. Mineral waters (especially lithia) are bottled in and near the city. Meridian was laid out in 1854 at a proposed railway crossing, and was chartered as a city in i860. In February 1864 General William Tecumseh Sherman, with an army of about 20,000, made an expedition from Vicks- burg to Meridian, then an important railway centre and dep6t for Confederate supplies, chiefly for the purpose of making inoperative the Mobile & Ohio and the Jackson & Selma railways; on the 14th of the month his army entered Meridian, and within a week destroyed nearly everything in the city except the private houses, and tore up over no m. of track. In the " Meridian riot " of 1871 — a prominent episode of recon- struction — -when one of several negroes on trial for urging mob violence had shot the presiding judge, the whites, especially a party from Alabama interested in the trial, killed a number of negroes and burned a negro school. On the 2nd of March 1906 a cyclone caused great loss of life and property.

MERIDIAN (from the Lat. meridianus, pertaining to the south or mid-day), in general a direction toward the south or toward the position of the sun at mid-day. The terrestrial meridian of a place is the great circle drawn on the earth's surface from either pole through the place. As determined astronomically the celestial meridian is the great circle passing through the celestial pole and the zenith. The terrestrial meridian as practically determined is the circle on the earth's surface in which the plane of the celestial meridian cuts that surface. Owing to local deviations of the plumb-line the meridian thus determined

does not strictly coincide with the terrestrial meridian as ordinarily defined, but the deviation, though perceptible in mountainous regions, is so minute that it is generally ignored. >

MERIM&E, PROSPER (1803-1870), French novelist, archaeo- logist, essayist, and in all these capacities one of the greatest masters of French style during the 19th century, was born at Paris on the 28th of September 1803. His grandfather, of Norman abstraction, had been a lawyer and steward to the marechal de Broglie. His father, Jean Francois Leonor Merimee (1757-1836), was a painter of repute. Merimee had English blood in his veins on the mother's side, and had English pro- clivities in many ways. He was educated for the bar, but entered the public service instead. A young man at the time of the Romantic movement, he felt its influence strongly, though his peculiar temperament prevented him from joining any of the c6teries of the period. Nothing was more prominent among the romantics than the fancy, as Merimee himself puts it, for " local colour," the more unfamiliar the better. He exhibited this in an unusual way. In 1825 he published what purported to be the dramatic works of a Spanish lady, Clara Gazul, with a preface stating circumstantially how the supposed translator, one Joseph L'Estrange, had met the gifted poetess at Gibraltar. This was followed by a still more audacious and still more successful supercherie. In 1827 appeared a small book entitled la Guzla (the anagram of Gazul), and giving itself out as translated from the Illyrian of a certain Hyacinthe Maglanovich. This book, which has greater formal merit than Clara Gazul, is said to have taken in Sir John Bowring, a competent Slav scholar, the Russian poet Poushkin, and some German authorities, although not only had it no original, but, as Merimee declares, a few words of Illyrian and a book or two of travels and topography were the author's only materials. In the next year appeared a short dramatic romance, La Jacquerie, in which are visible M6rimee's extraordinary

faculty of local and historical colour, his command of language, his grim irony, and a certain predilection for tragic and terrible subjects, which was one of his numerous points of contact with the men of the Renaissance. This in its turn was followed by a still better piece, the Chronique de Charles IX. (1829), which stands towards the 16th century much as the Jacquerie does towards the middle ages. All these works were to a certain extent second-hand. But they exhibited all the future literary qualities of the author save the two chiefest, his wonder- fully severe and almost classical style, and his equally classical solidity and statuesqueness of construction.

He had already obtained a considerable position in the civil service,

and after the revolution of July he was chef de cabinet to two different ministers. He was then appointed to the more congenial post of inspector-general of historical monuments. Merimee was a born archaeologist, combining linguistic faculty of a very unusual kind with accurate scholarship, with remark- able historical appreciation, and with a sincere love for the arts of design and construction, in the former of which he had some practical skill. In his official capacity he published numerous reports, some of which, with other similar pieces, have been republished in his works. He also devoted himself to history proper during the latter years of the July monarchy, and pub- lished numerous essays and works of no great length, chiefly on Spanish, Russian and ancient Roman history. He did not, however, neglect novel writing during this period, and numerous short tales, almost without exception masterpieces, appeared, chiefly in the Revue de Paris. The best of all, Colomba, a Corsican story of extraordinary power, appeared in 1840. He travelled a good deal; and in one of his journeys to Spain, about the middle of Louis Philippe's reign, he made an acquaint- ance destined to influence his future life not a little — that of Mme de Montijo, mother of the future empress Eugenie. Merimee, though in manner and language the most cynical of men, was a devoted friend, and shortly before the accession of Napoleon III. he had occasion to show this. His friend, Libri Carucci dalla Sommaja, was accused of having stolen valuable manuscripts and books from French libraries, and Merimee took his part so warmly that he was actually sentenced to and underwent fine and imprisonment. He had been elected of the Academy in 1844, and also of the Academy of Inscriptions, of which he was a prominent member. Between 1840 and 1850 he wrote more tales, the chief of which were Arsene Guillot and Carmen (1847), this last, on a Spanish subject, hardly ranking below Colomba.

The empire made a considerable difference in Merimee's life. His sympathies were against democracy, and his habitual cynicism and his irreligious prejudices made legitimism dis- tasteful to him. But the marriage of Napoleon III. with the daughter of Mme de Montijo at once enlisted what was always strongest with Merimee — the sympathy of personal friendship — on the emperor's side. He was made a senator, but his most important role was that of a constant and valued private friend of both the " master and mistress of the house," as he calls the emperor and empress in his letters. He was occasionally charged with a kind of irregular diplomacy, and once, in the matter of the emperor's Caesar, he had to give literary assistance to Napoleon. But for the most part he was strictly the ami de la maison. At the Tuileries, at Com- piegne, at Biarritz, he was a constant though not

always a very willing guest, and his influence over the empress,was very considerable and was fearlessly exerted, though he usecito call himself, in imitation of Scarron, ” le bouffon de sa majeste.” He found, however, time for not a few more tales, of which more will be said presently, and for correspondences, which are not the least of his literary achievements, while they have an extraordinary interest of matter. One of these consists of the letters which have been published as Lettres a une inconnue, another of the letters addressed to Sir Anthony Panizzi, librarian of the British Museum. After various conjectures it seems that the inconnue just mentioned was a certain Mile Jenny I Daqin of Boulogne. The acquaintance extended over many

years; it partook at one time of the character of love, at another of that of simple friendship, and Merimee is exhibited in the letters under the most surprisingly diverse lights, most of them more or less amiable, and all interesting. The correspondence with Panizzi has somewhat less personal interest. But Merimee often visited England, where he had many friends (among whom the late Mr Ellice of Glengarry was the chief), and certain similarities of taste drew him closer to Panizzi personally, while during part of the empire the two served as the channel for a kind of unofficial diplomacy between the emperor and certain English statesmen. These letters are full of shrewd aperQus on the state of Europe at different times. Both series, and others since published, abound in gossip, in amusing anec- dotes, in sharp literary criticism, while both contain evidences of a cynical and Rabelaisian or Swiftian humour which was very strong in Merimee. This characteristic is said to be so prominent in a correspondence with another friend, which now lies in the library at Avignon, that there is but little chance of its ever being printed. A fourth collection of letters, of much inferior extent and interest, has been printed by Blaze de Bury under the title of Lettres a une autre inconnue (1873), and others still by d’Haussonville (1888), and in the Revue des Deux Monies (1896). In the latter years of his life Merimee suffered very much from ill-health. It was necessary for him to pass all his winters at Cannes, where his constant companions were two aged English ladies, friends of his mother. The Terrible Year found him completely broken in health and anticipating the worst for France. He lived long enough to see his fears realized, and to express his grief in some last letters, and he died at Cannes on the 23rd of September 1870.

Merimee's character was a peculiar and in some respects an unfortunate one, but by.no means unintelligible. Partly by temperament, partly it is said owing to some childish experi- ence, when he discovered that he had been duped and determined never to be so again, not least owing to the example of Henri Beyle (Stendhal), who was a friend of his family, and of whom he saw much, Merimee appears at a comparatively early age to have imposed upon -himself as a duty the maintenance of an attitude of sceptical indifference and sarcastic criticism. Although a man of singularly warm and affectionate feelings, he obtained the credit of being a cold-hearted cynic; and, though both independent and disinterested, he was abused as a hanger-on of the imperial court. Both imputations were wholly undeserved, and indeed were prompted to a great extent by political spite or by the resentment felt by his literary equals on the other side at the cool ridicule with which he met them. But he deserved in some of the bad as well as many of the good senses of the term the name of a man of the Renaissance. He had the warm partisanship and amiability towards friends and the scorpion-like sting for his foes, he had the ardent delight in learning and especially in matters of art and belles lettres, he had the scepticism, the voluptuousness, the curious delight in the contemplation of the horrible, which marked the men of letters of the humanist period. Even his literary work has this Renaissance character. It is tolerably extensive, amount- ing to some seventeen or eighteen volumes, but its bulk is not great for a life which was not short, and which was occupied, at least nominally, in little else. About a third of it consists of the letters already mentioned. Rather more than another third consists of the official work which has been already alluded to — reports, essays, short historical sketches, the chief of which latter is a history of Pedro the Cruel (1843), and another of the curious pretender known in Russian story as the false Demetrius (1852). Some of the literary. essays, such as those on Beyle, on Turgueniev, &c, where a personal element enters, are excellent. Against others and against the larger historical sketches — admirable as they are — Taine's criticism that they want life has some force. They are, however, all marked by Merimee's admirable style, by his sound and accurate scholar- ship, his strong intellectual grasp of whatever he handled, his cool unprejudiced views, his marvellous faculty of designing and proportioning the treatment of his work. In purely archaeo-

logical matters his Description des peinlures de Saint-Savin is very noteworthy. It is, however, in the remaining third of his work, consisting entirely of tales either in narrative or in dramatic form, and especially in the former, that his full power is perceived. He translated

a certain number of things (chiefly from the Russian); but his fame does not rest on these, on his already-mentioned youthful supercheries, or on his later semi-dramatic works. There remain about a score of tales, extending in point of composition over exactly forty years and in length from that of Colomba, the longest, which fills about one hundred and fifty pages, to that of V Enlevement de la redoute (1829), which fills just half a dozen. They are unquestionably the best things of their kind written during the century, the only nouvelles that can challenge comparison with them being the very best of Gautier, and one or two of Balzac. The motives are sufficiently different. In Colomba and Mateo Falcone (1829), the Corsican point of honour is drawn on; in Carmen (written apparently after reading Borrow's Spanish books), the gipsy character; in la Venus d'llle (1837) and Lokis (two of the finest of all), certain grisly superstitions, in the former case that known in a milder form as the ring given to Venus, in the latter a variety of the were- wolf fancy. Arsene Guillot is a singular satire, full of sarcastic pathos, on popular morality and religion; la Chambre bleue, an 18th-century conte, worthy of C. P. J. Crebillon for grace and wit, and superior to him in delicacy; The Capture of the Redoubt just mentioned is a perfect piece of description; I' Abbe au bain is again satirical; la Double miprise (the authorship of which was objected to Merimee when he was elected of the Academy) is an exercise in analysis strongly impregnated with the spirit of Stendhal, but better written than anything of that writer's. These stories, with his letters, assure Merimee's place in literature at the very head of the French prose writers of the century. He had undertaken an edition of Brantome for the Bibliotheque Elzevirienne, but it was never completed.

M6rim6e's works have only been gradually published since his death. There is no uniform edition, but almost everything is obtainable in the collections of MM. Charpentier and Calmann Levy. Most of the sets of letters above referred to from those to the first inconnue, where the introducer was Taine, have essay- prefaces on Merimee. Maurice Tourneux's Prosper Merimie, sa bibliographic (1876) and Prosper Merimee, ses portraits (1879), are useful, while Emile Faguet and many other critics have dealt with him incidentally. But the best single book on him by far is the Merimee et ses amis of Augustin Filon (1894). M. F. Chambon's Correspondence inedite (1897) gives little that is substantive, but supplies and corrects a good many gaps or faults in earlier editions. English translations, especially of Colomba and Carmen, are numer ous. The Chronique de Charles IX. was translated by G. Saintsbury in 1889 with an introduction; and the same writer has also prefixed a much more elaborate essay, containing

a review of Merimfe's entire work, to an American translation. (G. Sa.)

MERINO, the Spanish name for a breed of sheep, and hence applied to a woollen fabric. The Spanish word is generally taken to be an adaptation to the sheep of the name of an official {merino) who inspected sheep pastures. This word is from the medieval Latin majorinus, a steward, head official of a village, &c, from major, greater.

The merino is a white short-wool sheep, the male having spiral horns, the ewes being generally hornless. It is bred chiefly for its wool, because, though an excellent grazer and very adaptable, it matures slowly and its mutton is not of the best quality. The wool is close and wavy in staple, reaching 4 in. in length, and surpasses that of all other sheep in fineness; it is so abundant that little but the muzzle, which should •be > of an orange tint, and hoofs, are left uncovered. The best wool is produced on light sandy soils.

The merino is little known in Great Britain, the climatic moisture of which does not favour the growth of the finest wools, but it predominates in all regions where sheep are bred for their wool rather than their mutton, as in the western United States, Cape Colony, Australia, New Zealand and Argentina. In Australasia, especially in New Zealand, the merino has been crossed with Lincolns, Leicesters, Shropshires and other breeds, with the result of improving the quality

of the mutton while sacrificing to some extent that of the wool.

The merino sheep appears to have originated in Africa, whence it was brought by the Moors to Spain and thence spread over Europe, especially to Austria-Hungary, Germany and France. The best-known breeds are the Rambouillet, a large merino named after the village near Paris, to which it was imported towards the end of the 18th century, and the Negretti, which stands in closer relationship to the old Spanish stock and has shorter wool but a more wrinkled fleece. Importations to America began about the beginning of the 19th century. The so-called American merino, the Delaine, the Vermont and the Rambouillet, are well-known breeds in the United States.

The term " merino " is widely employed in the textile in- dustries with very varied meanings. Originally it was restricted to denote the wool of the merino sheep reared in Spain, but owing to the superiority of

the wools grown on merino sheep and shipped from Botany Bay, the name as applied to wool was replaced by the term ” botany.” In the dress-goods and knitting trades the term ” merino ” still implies an article made from the very best soft wool. The term ” cashmere,” however, is frequently confused with it, although cashmere goods should be made from true cashmere and not, as is often the case, from the finest botany wool. In the hosiery and remanufactured materials trades the term ” merino ” is applied to fibre-mixtures of cotton and wool in contradistinction to ” all wool ” goods.

MERIONETH (Welsh, Meirionydd), a county of North Wales, bounded N. by Carnarvon and Denbigh, E. by Denbigh and Montgomery, S.E. by Montgomery, S. by the Dovey (Dyfi) estuary, dividing it from Cardigan, and W. by Cardigan Bay. It is nearly triangular, its greatest length from N.E. to S.W. being about 45 m., its greatest breadth about 30 m. The relief is less bold than that of Carnarvon, but the scenery is richer and more picturesquely varied. The highest summits are the peaks of Cader Idris (q.v.) including Pen y gader (the head of the chair; 2927 ft.); Aran Fawddwy (2970 ft.); Arenig fawr (2600 ft.); Y Llethr (2475 ft.), and Rhobell fawr (2313 ft.). Perhaps the finest of the valleys are those of Dyfi (Dovey) Dysyni, Tal y llyn (forehead of the lake), Maw (Mawddach), and Festiniog. The Dyfrdwy (Dee) drains Bala Lake (Llyn Tegid or Pimblemere), which is fed by two brooks rising at the foot of the Berwyn Hills. The Dyfrdwy leaves the lake at the north-east corner, near Castell Goronwy (erected 1202, hardly traceable), flowing slowly to Corwen, after which it is rapid, and receives the tributaries Alwen, Ceiriog, Clywedog and Alun. The Dyfi (Dovey) rising in a small lake near Aran Fawddwy, passes Machynlleth, and expands into an estuary of Cardigan Bay. Rising north of the Aran, the Mawddach (Maw) runs south-west some 12 m., being joined by rivulets. Traeth bach is formed by the Dwyryd streamlet among others. Other streams are the Wnion, Eden, Cain (variously spelled). Besides Bala and Tal y llyn lakes, there are among the hills over fifty more, e.g. Llyn Mwyngil. Among the waterfalls may be mentioned Rhaiadr y glyn (cascade of the glen), near Corwen, Rhaiadr du (black), and Pistyll Cain (Cain’s waterspout), some 150 ft. high.

A mountain tract of the county, 15 m. from north to south by io from east to west, stretching from the coast inland, is of the Cambrian age, composed of grits, quartzites and slates, and com- prising the Merionethshire anticlinal. The central portion of this tract is occupied mainly by Harlech Grits and Menevian beds; it is bordered on the north, east and south by the Lingula, Tremadoc and Arenig beds, which are pierced by numerous dikes and intrusive masses, mostly

greenstone. The andesitic rock of Rhobell-fawr is one of the greatest igneous masses in the whole area of the Lingula beds. The Lingula beds are quarried and mined for slate at Festiniog, and near Dolgelly gold is obtained from a quartz vein, while near Bar- mouth manganese has been worked. Bordering the Cambrian area are the Ordovician rocks. The Arenig beds are interstratified with and overlaid by accumulations of volcanic ashes, felspathic traps or lava-flows, which form the rugged heights of Cader Idris, the Arans, the Arenigs, Manod and Moelwyn; and these are in turn overlaid by the Llandeilo and Bala beds, the latter including the Bala lime- stone. Lead and copper ores have been worked near Towyn.

Here and there along the eastern boundary Llandovery and Wenlock strata are included. The structure of the Silurian tract is synclinal; in the Berwyn mountains the Ordovician rocks again appear with associated andesitic and felsitic lavas and tuffs. West of Llangar, near Corwen, is a small patch of Carboniferous limestone. Glacial drift with boulder clay is a prominent feature in the valleys and on the mountain sides. A good deal of blown sand fringes the coast north and south of Harlech. At the Llyn Arenig Bach a deposit of kieselguhr has been found.

The climate varies much with the elevation, from bleak to genial, as at Aberdyfi (Aberdovey). Grain crops cover a small area only, green crops being poor, and fruits practically nil. While the soil is generally thin, there are fertile tracts in the valleys, and there is some reclaimed land. The small, hardy ponies (known as of Llanbedr, Conway Valley) are now almost restricted to this county and Montgomeryshire. Manufactures include woollen stockings, &c, at and near Bala, flannels at Dolgellau (Dolgelley), Towyn, and a few other places. Slate is the chief staple. The Cambrian railway skirts the coast from Portmadoc to Aberdyfi. At Barmouth junction a branch crosses to Dolgelley, where it is joined by a branch of the Great Western railway. Bala and Festiniog are also united by the Great' Western, and Festiniog is further joined with Llandudno junction by the London & North Western railway, and with Portmadoc (Minffordd) by the narrow gauge railway, a light line, opened in 1865, running between Portmadoc and Duffws, rising 700 ft. in 13 m. The tourist traffic is a source of livelihood to many of the inhabitants. The coast is almost unnavigable, owing to sand- banks, and the only havens are Barmouth and Aberdyfi.

The area of the ancient county is 427,810 acres or 670 sq. m., with a population in 1891 of 49,212 and 1901 of 49,149. In the 19th century, however, the population nearly doubled. The area of the administrative county is 422,018 acres. Welsh is the tongue par

excellence of Merionethshire. The county returns one member to parliament, and has neither parliamentary nor municipal borough. The urban districts are: Bala (pop. 1544), Barmouth (Abermaw, 2214), Dolgelley (Dolgellau, 2437), Festiniog (11,435), Mallwyd' (885), Towyn (3756). The shire is in the north-west circuit, and assizes are held at Dolgellau. It is partly in the diocese of St Asaph and partly in that of Bangor, and has 37 ecclesiastical parishes and districts, with parts of four others.

History and Antiquities. — This is the only Welsh county retaining in English its primitive British name, latinized 'into Mervinia, a subdivision of Britannia Secunda, and in the Ordo-vices' territory. The poet Churchyard in 1587 described the county as remote and difficult of access in his day, and it was never made the field of battle in Saxon, Danish or Norman times, nor indeed until close on the period of Welsh loss of independence. There are not many remains, Celtic, Roman or medieval. Caer Drewyn, a British fort on the Dee, is near Corwen, where Owen Gwynnedd was posted to repel Henry II. and whither Owen Glendower retired before Henry IV. The numerous cromlechs are chiefly near the coast. The Roman via occidentalis ran through the county from south to north and was joined by a branch of Watling Street at Tomen y mur (perhaps Heriri Mons) on Sam Helen, not far from Castell Prysor. Tomen y mur {detritus of the wall) and Castell Prysor have yielded Roman bricks, tiles, urns and coins. Castell y bere, an extensive ruin, and once one of Wales's largest castles, has not been inhabited since the time of Edward I. Cymmer Abbey (F Fanner) near Dolgellau, a Cistercian establishment

founded about 1200, and dissolved by Henry VIII., is mo§t perfect at the east end, with lancet windows, and against the south wall there are a few Gothic pillars and arches. The architecture varies from Norman to Perpendicular. Towen y Bala, east of Bala, is supposed to be a Roman encampment. It was afterwards occupied by the Welsh, to check the English lords marchers. Moel Offrwm is near Dolgellau. Among the county families may be mentioned that of Hengwrt, since the Hengwrt Welsh MSS. are famous in north Wales and among all Celtic scholars.

MERISTEM (Gr. fiepiarbs, divided or divisible), a botani- ‘ cal term for tissue which has the power of developing new

forms of tissue, such as the cambium from which new wood is developed.

MERIVALE, CHARLES (1808-1893), English historian and dean of Ely, the second son of John Herman Merivale and Louisa Heath Drury, daughter of Dr Drury, head master of Harrow, was born on the 8th of March 1808. His father (1 770-1844) was an English barrister, and, from 1831, a com- missioner in bankruptcy; he collaborated with Robert Bland (1770-1825) in his Collections from the Creek Anthology, and published some excellent translations from Italian and German. Charles Merivale was at Harrow School (1818 to 1824) under Dr Butler. His chief friends were Charles Wordsworth, after- wards bishop of St Andrews, and Richard Chenevix Trench, afterwards archbishop of Dublin. In 1824 he was offered a writership in the Indian civil service, and went ‘for a short time to Haileybury College, where he was distinguished for proficiency in Oriental languages. But he eventually decided against an Indian career, and went up to St John’s College, Cambridge, in 1826. Among other distinctions he came out as fourth classic in 1830, and in 1833 was elected fellow of St John’s. He was a member of the Apostles’ Club, his fellow- members

including Tennyson, A. H. Hallam, Monckton Milnes, W. H. Thompson, Trench and James Spedding. He was fond of athletic exercises, had played for Harrow against Eton in 1824. and in 1829 rowed in the first inter-university boat-race, when Oxford won. Having been ordained in 1833, he undertook college and university work successfully, and in 1839 was appointed select preacher at Whitehall. In 1848 he took the college living of Lawford, near Manningtree, in Essex; he married, in 1850, Judith Mary Sophia, youngest daughter of George Frere. In 1863 he was appointed chaplain to the Speaker of the House of Commons, declined the professorship of modern history at Cambridge in 1869, but in the same year accepted from Mr Gladstone the deanery of Ely, and until his death on the 27th of December 1893 devoted himself to the best interests of the cathedral. He received many honorary academical distinctions. His principal work was A History of the Romans under the Empire, in seven volumes, which came out between 1850 and 1862; but he wrote several smaller historical works, and published sermons, lectures and Latin verses. Merivale as a historian cannot be compared with Gibbon for virility, but he takes an eminently common-sense and appreciative view. The chief defect of his work, inevitable at the time it was composed, is that, drawing the materials from contemporary memoirs rather than from inscriptions, he relies on literary gossip rather than on numismatics and epigraphy. The dean was an elegant scholar, and his rendering of the Hyperion of Keats into Latin verse (1862) has received high praise.

See Autobiography of Dean Merivale, with selections from his correspondence, edited by his daughter , Judith A. Merivale (1899) ; and Family Memorials, by Anna W. Merivale (1884).

MERIVALE, HERMAN (1806-1874), English civil servant and author, elder brother of the preceding, was born at Dawlish, Devonshire, on the 8th of November 1806. He was educated at Harrow School, and in 1823 entered Oriel College, Oxford. In 1825 he became a scholar of Trinity College and also won tbe Ireland scholarship, and three years later he was elected fellow of Balliol College. He became a member of the Inner Temple and practised on the western circuit, being made in 1 84 1 recorder of Falmouth, Helston and Penzance. From 1837 to 1842 he was professor of political economy at Oxford. In this capacity he delivered a course of lectures on the British Colonies in which he dealt with questions of emigration, employ- ment of labour and the allotment of public lands. The reputation he secured by these lectures had much to do with his appointment in 1847 as assistant under-secretary for the colonies, and in the next year he became permanent under-secretary. In 1859 he was transferred to the permanent under-

secretaryship for India, receiving the distinction of C.B. In 1870 Merivale was made D.C.L. of Oxford. He died on the 8th of February 1874. Besides his Lectures on Colonization and Colonies (1841),

he published Historical Studies (1865), and completed the Memoirs of Sir Philip Francis (1867); he wrote the second volume of the Life of Sir Henry Lawrence (1872) in continuation of Sir Herbert Edwardes's work.

A tribute to his powers as an original thinker by his chief at the Colonial Office, Sir Edward Bulwer-Lytton, is printed with a notice of his career which his brother contributed to the Transactions (1884) of the Devonshire Association.

MERKARA, the capital of the province of Coorg, in Southern India, situated on a plateau about 4000 ft. above the sea. Pop. (1901), 6732. It consists of two quarters: the fort, containing the public offices, the old palace, and the residence of the com- missioner; and the native town of Mahadevapet. Here are the headquarters of the Coorg and Mysore Rifles, a body of volunteers chiefly composed of coffee planters.

MERLIN, ANTOINE CHRISTOPHE (1762-1833), French revolutionist, called " of Thionville " to distinguish him from his namesake of Douai (see below), was born at Thionville on the 13th of September 1762, being the son of a procureur in the bailliage of Thionville. After studying theology, he devoted himself to law, and in 1788 was an avocat at the parlement of Metz. In 1790 he was elected municipal officer of Thionville, and was sent by the department of Moselle to the Legislative Assembly. On the 23rd of October 1791 he moved and carried the institution of a committee of surveillance, of which he became a member. It was he who proposed the law sequestrat- ing the property of the e'migre's, and he took an important part in the emeute of the 20th of June 1792 and in the revolution of the 10th of August of the same year. He was elected deputy to the National Convention, and pressed for the execution of Louis XVI., but a mission to the army prevented his attendance at the trial. He displayed great bravery in the defence of Mainz. He took part in the reaction which followed the fall of Robespierre, sat in the Council of the Five Hundred under the Directory, and at the coup d'itat of the 18th Fructidor (Sept. 4, 1797) demanded the deportation of certain repub- lican members. In 1798 he ceased to be a member of the Council of Five Hundred, and was appointed director-general of posts, being sent subsequently to organize the army of Italy. He retired into private life at the proclamation of the con- sulate, and lived in retirement under the

consulate and the empire. He died in Paris on the 14th of September 1833.

See J. Reynaud, Vie et correspondance de Merlin de Thionville (Paris, i860).

MERLIN, PHILIPPE ANTOINE, Count (1754-1838), French politician and lawyer, known as Merlin ” of Douai,” was born at Arleux (Nord) on the 30th of October 1754, and was called to the Flemish bar in 1775. An indefatigable student, he collaborated in the Repertoire de jurisprudence published by J. N. Guyot, the later editions of which appeared under Merlin’s superintendence, and also contributed to other important legal compilations. Elected to the states-general as deputy for Douai, he was one of the chief of those who applied the principles of liberty and equality embodied in the decree of the 4th of August 1789 to actual conditions. On behalf of the committee appointed to deal with feudal rights, he presented to the Convention reports on the seignorial rights which were subject to compensation, on hunting and fishing rights, forestry, and kindred subjects. He carried legislation for the abolition of primogeniture, secured equality of inheritance between relations of the same degree, and between men and wbmea», His numerous reports to the Constituent Assembly were supple-ˆ mented by popular exposition of current legislation in the Journal de legislation. On the dissolution of the Constituent Assembly he became judge of the criminal court at Douai. He was no advocate of violent measures; but, as deputy to the Convention, he voted for the death of Louis XVI., and as a member of the council of legislation he presented to the Convention on the 17th of September 1793 the infamous law permitting the detention of suspects. He was closely allied with his namesake Merlin ” of Thionville,” and, after the counter-revolution which brought about the fall of Robespierre,

he became president of the Convention and a member of the Committee of Public Safety. His efforts were primarily directed to the prevention of any recrudescence of the tyranny exercised by the Jacobin Club, the commune of Paris, and the revolution- ary tribunal. He persuaded the Committee of Safety to take upon itself the closing of the Jacobin Club, on the ground that it was an administrative rather than a legislative measure. He recommended the readmission of the survivors of the Girondin party to the Convention, and drew up a law limiting the right of insurrection; he had also a considerable share

in the foreign policy of the victorious republic. With Cambaceres he had been commissioned in April 1794 to report on the civil and criminal legislation of France, with the result that after eighteen months' work he produced his Rapport et projet de code des delils et des peines (10 Vendemiaire, an. IV.). Merlin's' code abolished confiscation, branding and imprisonment for life, and was based chiefly on the penal code drawn up in September 1791. He was made minister of justice (Oct. 30, 179s) under the Directory, and showed excessive rigour against the emigrants. After the coup d'Uat of the 18th Fructidor he became (Sept. 5, 1797) one of the five directors, and was accused of the various failures of the government. He retired into private life (June 18, 1799), and had no share in the revolution of the 18th Bru- maire. Under the consulate he accepted a modest place in the court of cassation, where he soon became procureur-general. Although he had no share in drawing up the Napoleonic code, he did more than any other lawyer to fix its interpretation. He became a member of the council of state, count of the empire, and grand officer of the Legion of Honour; but having resumed his functions during the Hundred Days, he was one of those banished on the second restoration. The years of his exile were devoted to his Repertoire de jurisprudence (5th ed., 18 vols., Paris, 1827-1828) and to his Recueil alphabetique des questions de droit (4th ed., 8 vols., Paris, 1827-1828). At the revolution of 1830 he was able to return to France, when he re-entered the Institute of France, of which he had been an original member, being admitted to the Academie des Sciences Morales et Poli- tiques. He died in Paris on the 26th of December 1838.

His son, Antoine Franqois Eugene Merlin (1778-1854), was a well-known general in the French army, and served through most of Napoleon's campaigns.

See M. Mignet, Portraits et notices historiques (1852), vol. i. MERLIN (Welsh, Myrddhin), the famous bard of Welsh tradition, and enchanter of Arthurian romance. His history as related in this latter may be summarized as follows. The infernal powers, aghast at the blow to their influence dealt by the Incarnation, determine to counteract it, if possible, by the birth of an Antichrist, the offspring of a woman and a devil. As in the book of Job, a special family is singled out as subjects of the diabolic experiment, their property is destroyed, one after the other perishes miserably, till one daughter, who has placed herself under the special protection of the Church, is left alone. »The demon takes advantage of an unguarded moment of despair, and Merlin is engendered. Thanks, however, to the prompt action of the mother's confessor, Blayse, in at once baptizing the child of this abnormal birth,

the mother truly protesting that she has had intercourse with no man, Merlin is claimed for Christianity, but remains dowered with demoniac powers of insight and prophecy. An infant in arms, he saves his mother's life and confounds her accusers by his knowledge of their family secrets. Meanwhile Vortigern, king of the Britons, is in despair at the failure of his efforts to build a tower in a certain spot; however high it may be reared in a day, it falls again during the night. He consults his diviners, who tell him that the foundations must be watered with the blood of a child who has never had a father; the king accordingly sends messengers through the land in search of such a prodigy. They come to the city where Merlin and his mother dwell at the moment when the boy is cast out from the companionship of the other lads on the ground that he has had no father. The messengers take him to the king, and on the way he astonishes them by certain prophecies which

are fulfilled to their knowledge. Arrived in Vortigern's presence, he at once announces that he is aware alike of the fate destined for him and of the reason, hidden from the magicians, of the fall of the tower. It is built over a lake, and beneath the waters of the lake in a subterranean cavern lie two dragons, a white and a red; when they turn over the tower falls. The lake is drained, the correctness of the statement proved, and Merlin's position as court prophet assured. Henceforward he acts as adviser to Vortigern's successors, the princes' Ambrosius and Uther (subsequently Uther-Pendragon) . As a monument to the Britons fallen on Salisbury Plain he brings from Ireland, by magic means, the stones now forming Stonehenge. He aids Uther in his passion for Yguerne, wife to the duke of Cornwall, by Merlin's spells Uther assumes the form of the husband, and on the night of the duke's death Arthur is en- gendered. At his birth the child is committed to Merlin's care, and by him given to Antor, who brings him up as his own son. On Arthur's successful achievement of the test of the sword in the " perron," Merlin reveals the truth of his parentage and the fact that he is by hereditary right, as well as by divine selection, king of the Britons. During the earlier part of Arthur's reign Merlin acts as counsellor; then he disappears mysteriously from the scene. According to one account he is betrayed by a maiden, Nimue or Niniane (a king's daughter, or a water-fairy, both figure in different versions), of whom he is enamoured, and who having beguiled from him a knowledge of magic spells, casts him into a slumber and imprisons him living in a rocky tomb. This version, with the great cry, or Brait, which the magician uttered before his death, appears to have been the most popular. Another represents his prison as one of air; he is invisible to all, but can see and hear, and occasionally speak to passers by; thus he

holds converse with Gawain. In the prose Perceval he retires voluntarily to an ” Esplumeor ” erected by himself, and is seen no more of. man. The curious personality of Merlin is now generally recognized as being very largely due to the prolific invention of Geoffrey of Monmouth. Nennius, upon whose Historia Geoffrey enlarged and ” improved,” gives indeed the story of Vortigern and the tower, but the boy’s name is Ambrosius. Geoffrey calls him Merlin-Ambrosius, a clear proof that he was adapting Nennius’ story. He represents the sage in his role of court diviner, his ” Prophecies ” being incorporated in later manuscripts of the Historia. Subsequently Geoffrey enlarged on the theme, com- posing a Vita Merlini in which we find the magician in the r61e of a ” possessed ” wood-abider, fleeing the haunts of men, and consorting with beasts. This gave rise to the idea that there had originally been two Merlins, Merlin-Ambrosius and Merlin-Sylvester, a view now discarded by the leading scholars. The Vita was so successful that Geoffrey obtained as reward the bishopric of St Asaph.

Welsh vernacular literature has preserved a small but interest- ing group of poems, strongly national and patriotic in character, which are attributed to Merlin (Myrddhin).

A few years after Geoffrey’s death Merlin’s adventures were amplified into a romance, the first draft of which is attributed to Robert de Borron, and which eventually took the form of a lengthy introduction to the prose Lancelot and cyclic redaction of the Arthurian legend.

The romantic, as distinguished from legendary or historical Merlin, exists in the following forms: (a) a fragmentary poem pre- served in a unique manuscript of the Bibl. nat. (this gives no more than the introduction to the story) ; (b) a prose rendering oftlje above, of which a fair number of copies exist, generally found, as in the original poem, coupled with a version of the early history of the Grail, known as Joseph of Arimathea, and in two cases followed by a Perceval and Mort Artus, thus forming a small cycle; (c) the Ordinary or Vulgate Merlin, a very lengthy romance, of which numerous copies exist (see Dr Sommer’s edition) ; (d) and (e) two continuations to the above, each represented by a single manu- script — (d) the ” Huth ” Merlin, which was utilized by Malory for his translation, and also formed a part of the compilation used by the Spanish and Portuguese translators, and (e) a very curious manuscript, 337, Bibl. nat. (fonds Francais), which Paulin Paris calls the Livre Artus, containing much matter not found elsewhere.

M. La Villemarqu6’s ” critical study ” (Myrdhinn, ou I’enchanteur

Merlin, 1861) cannot be regarded as much more trustworthy than Geoffrey himself. The story of the tower, and the Boy without a Father, has been critically examined by Dr Gaster, in a paper read before the Folk-lore Society and subsequently published in Folk-lore (vol. xvi.). Dr Gaster cites numerous Oriental parallels to the tale, and sees in it the germ of the whole Merlin legend. Alfred Nutt (Revue celtique, vol. xxvii.) has since shown that Aengus, the magician of the Irish Tuatha de Danaan, was also of unknown parentage, and it seems more probable that the Boy without a Father theme was generally associated with the Celtic magicians, and is the property of no one in particular. Some years ago the late Mr Ward of the British Museum drew attention to certain passages in the life of St Kentigern, relating his dealings with a ” possessed ” being, a dweller in the woods, named Lailoken, and pointed out the practical identity of the adventures of that personage and those assigned by Geoffrey to Merlin in the Vita; the text given by Mr Ward states that some people identified Lailoken with Merlin (see Romania, vol. xxvii.). Ferd. Lot, in an examination of the sources of the Vita Merlini (Annates de Bretagne, vol. xv.), has pointed out the more original character of the ” Lai- loken ” fragments, and decides that Geoffrey knew the Scottish tradition and utilized it for his Vita. He also comes to the con- clusion that the Welsh Merlin poems, with the possible exception of the Dialogue between Merlin and Taliessin, are posterior to, and inspired by, Geoffrey’s work. So far the researches of scholars appear to point to the result that the legend of Merlin, as we know it, is of complex growth, combined from traditions of independent and widely differing origin. Most probably there is a certain substratum of fact beneath all; there may have been, there very probably was, a bard and soothsayer of that name, and it is by no means improbable thatj’curious stories were told of his origin. It is worth noting that Layamon, whose translation of Wace s Brut is of so much interest, on account of the variants he introduces into the text, gives a much more favourable form of the ” Birth ” story; the father is a glorious and supernatural being, who appears to the mother in her dreams. Layamon lived on the Welsh border, and the possibility of his variants being drawn from genuine British tradition is generally recognized. The poem relating a dialogue between Merlin and his brother bard, Taliessin, may also derive from genuine tradition. Further than this we can hardly venture to go; the probability is that anything more told of the character and career of Merlin rests upon the imaginative powers and faculty of combination of Geoffrey of Monmouth.

See also G. Paris and Ulrich (Sociite des anciens textes francais, 1886); Merlin, ed. Wheatley (Early English Text Society, 1899); Arthour and Merlin, ed. Kdlbing. (J. L. W.)

MERLON, in architecture, the solid part of an embattled parapet between the embrasures, sometimes pierced by loop- holes. The word is French, adapted from Ital. merlone, possibly a shortened form of mergola, connected with Lat. mergae, pitchfork, or from a diminutive moerulus, from murus (moerus). a wall.

*MERMAIDS and MERMEN, in the folk-lore of England and Scotland, a class of semi-human beings who have their dwelling in the sea, but are capable of living on land and of entering into social relations with men and women. 1 They are easily identified, at least in some of their most important aspects, with the Old German Meriminni or Meerfrau, the Icelandic Hafgufa, Margygr, and Marmennill (mod. Marbendill), the Danish Hafmand or Maremind, the Irish Merrow or Merruach, the Marie-Morgan of Brittany and the Morforwyn of Wales ; 2 and they have various points of Tesemblance to the vodyany or water-sprite and the rusalka or stream-fairy of Russian mythology. The typical mermaid has the head and body of a woman, usually of exceeding loveliness, but below the waist is fashioned like a fish with scales and fins. Her hair is long and beautiful, and she is often represented, like the Russian rusalka, as combing it with one hand while in the other she holds a looking-glass. For a time at least a mermaid may become to all appearance an ordinary human being; and an Irish legend (" The Overflowing of Lough Neagh and Liban

1 The name mermaid is compounded of mere, a lake, and nuegd, a maid ; but, though mere wif occurs in Beowulf, mere-maid does not appear till the Middle English period (Chaucer, Romaunt of the Rose, &c). In Cornwall the fishermen say merry-maids and merry-men. The connexion with the sea rather than with inland waters appears to be of later origin. " The Mermaid of Martin Meer " (Roby's Traditions of Lancashire, vol. ii.) is an example of the older force of the word ; and such " meer-women " are known to the country-folk in various parts of England (e.g. at Newport in Shropshire, where the town is some day to be drowned by the woman's agency).

'See Rhys, " Welsh Fairy Tales," in Y Cymmrodor (1881, 1882).

the Mermaid," in Joyce's Old Celtic Romances) represents the temporary transformation of a human being into a mermaid. The mermaid legends of all countries may be grouped as follows, (a) A mermaid or mermaids either voluntarily or under compulsion reveal

things that are about to happen. Thus the two mermaids (merewip) Hadeburc and Sigelint, in the Nibelungen- lied, disclose his future course to the hero Hagen, who, having got possession of their garments, which they had left on the shore, compels them to pay ransom in this way. According to Resenius, a mermaid appeared to a peasant of Samsoe, foretold the birth of a prince, and moralized on the evils of intemperance, &c. (Kong Fredericks den andens Kronike, Copen- hagen, 1680, p. 302). (b) A mermaid imparts supernatural powers to a human being. Thus in the beautiful story of ” The Old Man of Cury ” (in Hunt’s Popular Romances of the West oj England, 187 1) the old man, instead of silver and gold, obtains the power of doing good to his neighbours by breaking the spells of witchcraft, chasing away diseases, and discovering thieves, (c) A mermaid has some one under her protection, and for wrong done to her ward exacts a terrible penalty. One of the best and most detailed examples of this class is the story of the ” Mermaid’s Vengeance ” in Hunt’s book already quoted, (d) A mermaid falls in love with a human being, lives with him as his lawful wife for a time, and then, some compact being unwittingly or intentionally broken by him, departs to her true home in the sea. Here, if its mermaid form be accepted, the typical legend is undoubtedly that of MSlusine (q.v.), which, being made the subject of a romance by Jean d’ Arras, became one of the most popular folk-books of Europe, appearing in Spanish, German, Dutch and Bohemian versions, (e) A mermaid falls in love with a man, and entices him to go to live with her below the sea; or a merman wins the affection or captures the person of an earthborn maiden. This form of legend is very common, and has naturally been a favourite with poets. Macphail of Colonsay successfully rejects the allurements of the mermaid of Corrievrekin, and comes back after long years of trial to the maid of Colonsay. 3 The Danish ballads are especially full of the theme; as ” Agnete and the Merman,” an antecedent of Matthew Arnold’s ” Forsaken Merman “; the ” Deceitful Merman, or Marstig’s Daughter “; and the finely detailed story of Rosmer Hafmand (No. 49 in Grimm). In relation to man the mermaid is usually of evil issue if not of evil intent. She has generally to be bribed or compelled to utter her prophecy or bestow her gifts, and whether as wife or paramour she brings disaster in her train. The fish-tail, which in popular fancy forms the characteristic feature of the mermaidˆ is really of secondary importance; for the true Teutonic mermaid — probably a remnant of the great cult of the Vanir — had no fish-tail; 4 and this symbolic appendage occurs in the mythologies of so many countries as to afford no clue to its place of origin. The Tritons, and, in the later representations, the Sirens of classical antiquity, the Phoenician Dagon, and the Chaldaean Oannes’ are all well-known examples; the

Ottawas and other American Indians have their man-fish and woman-fish (Jones, Traditions of the North American Indians, 1830) ; and the Chinese tell stories not unlike our own about the sea-women of their southern seas (Dennis, Folklore of China, 1875).

Quasi-historical instances of the appearance or capture of mermaids are common enough, 5 and serve, with the frequent use of the figure on signboards and coats of arms, to show how thoroughly the myth had taken hold of the popular imagination. 6

• See Leyden's " The Mermaid," in Sir Walter Scott's Border,, Minstrelsy. . ,

4 Karl Blind, " New Finds in Shetlandic and Welsh Folk-iote," in Gentleman's Magazine (1882).

6 Compare the strange account of the quasi-human creatures found in the Nile given by Theophylactus, Historiae, viii. 16, pp. 299-302, of Bekker's edition.

6 See the paper in Journ. Brit. Arch. Assoc., xxxviii., 1882, by H. S. Cuming, who points out that mermaids or mermen occur in the arms of Earls Caledon, Howth and Sandwich, Viscounts. Boyne and Hood, Lord Lyttelton and Scott of Abbotsford, as well as in those of the Ellis, Byron, Phen6, Skeffington and other families. The English heralds represent the creatures with a single tail, the French and German heralds frequently with a double one.

A mermaid captured at Bangor, on the shore of Belfast Lough, in the 6th century, was not only baptized, but admitted into some of the old calendars as a saint under the name of Murgen (Notes and Queries, Oct. 21, 1882); and Stowe (Annates, under date 1 187) relates how a man-fish was kept for six months and more in the castle of Orford in Suffolk. As showing how legendary material may gather round a simple fact, the oft-told story of the sea- woman of Edam is particularly interesting. The oldest authority, Joh. Gerbrandus a Leydis, a Carmelite monk (d. 1504), tells (Annates, &c, Frankfort, 1620) how in 1403 a wild woman came through a breach in the dike into Purmerlake, and, being found by some Edam milkmaids, was ultimately taken to Haarlem and lived there many years. Nobody could understand her, but she learned to spin, and was wont to adore the cross. Ocka Scharlensis (Chronijk van Friesland, Leeuw., 1597)

reasons that she was not a fish because she could spin, and she was not a woman because she could live in the sea; and thus in due course she got fairly established as a genuine mermaid. Vosmaer, who has carefully investigated the matter, enumerates forty writers who have repeated the story, and shows that the older ones speak only of a woman (see ” Beschr. van de zoogen. Meermin der stad Haarlem,” in Verh. van de Holl. Maatsch. van K. en Wet., part 23, No.

1786).

The best account of the mermaid-myth is in Baring-Gould’s Myths of the Middle Ages. See also, besides works already men- tioned, Pontoppidan, who in his logically credulous way collects much matter to prove the existence of mermaids; Maillet, Telliamed (Hague, 1755); Grimm, Deutsche Mythologie, i. 404, and Altddri. Helaenlieder (1811); Waldron’s Description and Train’s Hist, and Stat. Ace. of the Isle of Man; Folk-lore Society’s Record, vol. ii.; Napier, Hist, and Trad. Tales connected with the South of Scotland; S6billot, Traditions de la haute Bretagne (1882), and Contes des marins (1882).

MEROBAUDES, FLAVIUS (5th century a.d.), Latin rhetori- cian and poet, probably a native of Baetica in Spain. He was the official laureate of Valentinian III. and Aetius. Till the beginning of the 19th century he was known only from the notice of him in the Chronicle (year 443) of his contemporary Idacius, where he is praised as a poet and orator, and mention is made of statues set up in his honour. In 18.13 the base of a statue was discovered at Rome, with a long inscription belong- ing to the year 435 (C.I.L. vi. 1724) upon Flavius Merobaudes, celebrating his merits as warrior and poet. Ten years later, Niebuhr discovered some Latin verses on a palimpsest in the monastery of St Gall, the authorship of which was traced to Merobaudes, owing to the great similarity of the language in the prose preface to that of the inscription. Formerly the only piece known under the name of Merobaudes was a short poem (30 hexameters) De Christo, attributed to him by one MS., to Claudian by another; but Ebert is inclined to dispute the claim of Merobaudes to be considered either the author of the De Christo or a Christian.

The ” Panegyric ” and minor poems have been edited by B. G. Niebuhr (1824); by I. Bekker in the Bonn Corpus scriptorum hist. Byz. (1836) ;the ” De Christo ” in T. Birt’s Claudian (1892), where the authorship of Merobaudes is upheld; see also A. Ebert, Geschichte ier Literatur des Mittelalters im Abendlande (1889).

HEROE, the general name (as Island of Meroe) ; for the region

bounded on three sides by the Nile (from Atbara to Khartum), the Atbara, and the Blue Nile; and the special name of an ancient city on the east bank of the Nile, 877 m. from Wadi Haifa by river, and 554 by the route across the desert, near the site of which is a group of villages called Bakarawiya. The site of the city is marked by over two hundred pyramids in three groups, of which many are in ruinous condition. After these ruins had been described by several travellers, among whom F. Cailliaud (Voyage d, MSroS, Paris, 1826-1828) deserves special mention, some excavations were executed on a small scale in 1834 by G. Ferlini (Cenno sugli scavi Operati nella Nubia e cat ah go degli oggetti ritrovati, Bologna, 1837), who discovered (or professed to discover) various antiquities, chiefly in the form of jewelry, now in the museums of Berlin and Munich. The ruins were examined in 1844 by C. R. Lepsius, who brought

many plans, sketches and copies, besides actual antiquities, to Berlin. Further excavations were carried on by E. W. Budge in the years 1902 and 1905, the results of which are recorded in his work, The Egyptian Sudan: its History and Monuments (London, 1907). Troops were furnished by Sir Reginald Wingate, governor of the Sudan, who made paths to and between the pyramids, and sank shafts, &c. It was found that the pyramids were regularly built over sepulchral chambers, containing the remains of bodies either burned or buried without being mummi- fied. The most interesting objects found were the reliefs on the chapel walls, already described by Lepsius, and containing the names with representations of queens and some kings, with some chapters of the Book of the Dead; some steles with inscriptions in the Meroitic language, and some vessels of metal and earthenware. The best of the reliefs were taken down stone by stone in 1005, and set up partly in the British Museum and partly in the museum at Khartum. In 1910, in consequence of a report by Professor Sayce, excavations were commenced in the mounds of the town and the necropolis by J. Garstang on behalf of the university of Liverpool, and the ruins of a palace and several temples were discovered, built by the Meroite kings. (See further Ethiopia.)

Meroe was probably also an alternative name for the city of Napata, the ancient capital of Ethiopia, built at the foot of Jebel Barkal. The site of Napata is indicated by the villages of Sanam Abu Dom on the left bank of the Nile and Old Merawi on the right bank of the river. New Merawi, 1 m. east of Sanam Abu Dom and on the same side of the river, was founded by the Sudan govern- ment in 1905 and made the capital of the mudiria of Dongola.

(D. S. M.*)

MEROPE, the name of several figures in Greek mythology. The most important of them are the following: (1) The daughter of Cypsel'us, king of Arcadia, and wife of Cresphontes, ruler of Messenia. During an insurrection Cresphontes and two of his sons were murdered and the throne seized by Polyphontes, who forced Merope to marry him. A third son, Aepytus, contrived to escape, and, subsequently returning to Messenia, put Polyphontes to death and recovered his father's kingdom (Apollodorus ii. 8, 5; Pausanias iv. 3, 6). The fortunes of Merope have furnished the subject of tragedies by Euripides (Cresphontes, not extant), Voltaire, Maffei and Matthew Arnold. (2) The daughter of Atlas and wife of Sisyphus. She was one of the seven Pleiades, but remained invisible, hiding her light for shame at having become the wife of a mortal (Apollo- dorus i. 9,3; iii. 10, r; Ovid, Fasti, iv. 17s). –

MEROVINGIANS, the name given to the first dynasty which reigned over the kingdom of the Franks. The name is taken from Merovech, one of the first kings of the Salian Franks* who succeeded to Clodio in the middle of the 5th century, and soon became the centre of many legends. The chronicler known as Fredegarius Scholasticus relates that a queen was once sitting by the seashore, when a monster came out of the sea, and by this monster she subsequently became the mother of Merovech, but this myth is due to an attempt to explain the hero's name, which means " the sea-born." At the great battle of Mauriac (the Catalaunian fields) in which Aetius checked the invasion of the Huns (451), there were present in the Roman army a number of Frankish foederati, and a later document, the Vita lupi, states that Merovech (Merovaeus) was their leader. Merovech was the father of Childeric I. (457-481), and grandfather of Clovis (481-511), under whom the Salian Franks conquered the whole of Gaul, except the kingdom! of Burgundy, Provence and Septimahia. The 'sens of Clovis divided the dominions of their father between them, made themselves masters of Burgundy (532), and in addition received Provence from the Ostrogoths (535); Septimania was not taken. from the Arabs till the time of Pippin, the founder of the Carolingian dynasty. From the death of Clovis to that of Dagobert (639), the Merovingian kings displayed considerable energy, both in their foreign wars and in the numerous wars against one another in which they found an outlet for their barbarian instincts. After 639, however, the race began to decline, one after another the kings succeeded to the throne,

but none of them reached more than the age of twenty or twenty- five; this was the age of the " rois faineants." Henceforth the real sovereign

was the mayor of the palace. The mayors of the palace belonging to the Carolingian family were able to keep the throne vacant for long periods of time, and finally, in 751 the mayor Pippin, with the consent of the pope Zacharias, sent King Childeric III. to the monastery of St Omer, and shut up his young son Thierry in that of St Wandrille. The Merovingian race thus came to an end in the cloister.

Bibliography —See Petigny, Ztttdes sur Vepoque merovingienne (rans, 1 85 1) ; G. Richter, Annalen des frankischen Reichs im Zeitalter der Merowinger (Halle, 1873); F. Dahn, Die Konige der Germanen, vn. (Leipzig, 1894); by the same author, Urgeschichte der germamschen und romanischen Volker, iii. (Berlin, 1883); W Schultze, Deutsche Geschichte von der Urzeit bis zu den Karolimern 11. (Stuttgart, 1896).
*

Merovingian Legend.— It has long been conceded that the great Jrench national epics of the nth and 12th centuries must have been founded on a great fund of popular poetry, and that many of the episodes of the chansons de geste refer to historical events anterior •to the Carolingian period, , Floovant is obviously connected with the GestaVagoberti, and there are traces of the influence of popular songs on the Prankish heroes in Gregory of Tours and other chroniclers. See G. Kurth, Hist. poit. des Merovingians (Paris, Brussels and Leipzig, 1893); A. Darmesteter, De Floovante vetustiore galbco poemate (Paris, 1877) I Floovant (Paris, 1859); ed. MM. F Guessard and H. Michelant; P. Rajna, Delle Origine delV epopea francese (Florence, 1884), with which cf. G.Paris in Romania, * m – ° 02 . se 9-: F – Settegast, QueUenstudien mr gaUo-romanischen Epik (Leipzig, 1904) ; C. Voretzsch, Epische Studien (Halle, 1900) ; H. Groeber, Grundriss d. roman. Phil. (Bd. II., abt. i. pp 447 seq)

(C?Pf.)” MERRILL, a city and the eounty-seat of Lincoln county, Wisconsin, U.S.A., 185 m. N.W. of Milwaukee, on both sides of the Wisconsin river. Pqp. (19×0 census), 8689. It is served by the Chicago, Milwaukee & St Paul railroad. The city is situated about 1 270 ft. above the sea and has an invigorat- ing climate. Brook trout and various kinds of game, including deer, abound in the vicinity. Grandfather Falls and the Defies of the Prairie river are picturesque places near the city, and furnish good water-power. The principal public building is the Lincoln county court house, and the city contains the T. B. Scott free library, a fine high-school, and the Ravn hospital, a private institution. Riverside Park is maintained by a corporation, and a park along the Prairie river is owned and maintained by the city. MerriU is an important hardwood lumber market, and its principal industry is the manufacture of lumber and

lumber products. The manufacture of paper and paper pulp and of lathes is also important. In 1905 the factory products were valued at $3,260,638. There are granite quarries and brickyards in the vicinity. Merrill was settled in 1875, incorporated as a village in 1880, and chartered as a city in 1883.

MERRIMAC, 1 a river in the north-eastern part of the United States, having its sources in the White Mountains of New Hamp- shire, and flowing south into Massachusetts, and thence east and north-east into the Atlantic Ocean. With its largest branch it has an extreme length of about 183 m. The Merrimac proper is formed at Franklin, New Hampshire, by the junction of the Pemigewasset and Winnepesaukee rivers. The former is the larger branch and rises in the White Mountains in Grafton county; the latter is the outlet of Lake Winnepesaukee. The valley of the Merrimac was formed before the glacial period and was filled with drift as the ice retreated; subsequently the high flood plain thus formed has been trenched, terraces have been formed, and at different places, where the new channel did not conform to the pre-glacial channel, the river has come upon buried ledges, relatively much more resistant than the drift below, and waterfalls have thus resulted. The river falls 269 ft. in a distance of no m. from Franklin to its mouth. The greater part of the total fall is at six points, and at each of four of these is a city which owes its importance in great measure to the water-power thus provided, Lowell and 1 The name is an Indian word said to mean ” swift water ” In popular usage the spelling ” Merrimack ” is used at places alone the river above Haverhill. B

Lawrence in Massachusetts, and Manchester and Concord in New Hampshire; at Lowell there is a fall of 30 ft. (Pawtucket Falls), and at Manchester there is a fall of 55 ft. (Amoskeag Falls). The region drained by the river is 4553 sq. m. in extent, and contains a number of lakes, which together with some artificial reservoirs serve as a storage system. On the navigable portion of the river, which extends 17! m. above its mouth, are the cities of Newburyport, near its mouth, and Haverhill’ at the head of navigation. In 1899-1908 the Federal govern- ment dredged a channel from Newburyport to Haverhill (14-5 m.) 7 ft. deep and 150 ft. wide at mean low water; vessels having a draft of 12-5 ft. could then pass over the outer bar of Newburyport.

MERRIMAN, HENRY. SETON (d. 1903), the pen-name of Hugh Stowell Scott, English novelist. He was a member of the firm of Henry Scott & Sons, and was for some years as underwriter at Lloyd's. His literary career began in 1889 with The Phantom Future, and he made his first decided hit with his Russian story, The Sowers (1896), which was followed by many other well-constructed novels remarkable for excellence of plot and literary handling. The author was an enthusiastic traveller, many of his journeys being undertaken with his friend Stanley Weyman. He was about forty when he died at Melton, near Ipswich, on the 19th of November 1903. Among his most successful books were Roden's Corner (1898); The Isle of Unrest (1899); In Kedar's Tents (1897); The Velvet Glove (1901); The Vultures (1902); Barlasch of the Guard (1903); and The Last Hope (1904).

MERRITT, WESLEY (1836-), American soldier, was born in New York City on the 16th of June 1836. He graduated at West Point in i860, and was assigned to the cavalry service. He served in Utah (1861) and in the defences of Washington (1861-62); learnt the field duties of his arm as aide (1862) to General Philip St George Cooke, who then commanded the cavalry of the Army of the Potomac; became brigadier-general, United States Volunteers, in June 1863; and in September 1863 was placed in command of a brigade of regular cavalry in the Army of the Potomac. He won great distinction in the Virginian campaigns of 1864-65 and in Sheridan's Valley campaign, being brevetted major-general of volunteers for his conduct at Winchester and Fisher's Hill, and brigadier-general of the regular army for his services at Five Forks. In the final campaign about Richmond he did such good service in command of a cavalry division that he was brevetted major- general in the regular army and was promoted major-general of volunteers. With two other Federal commissioners he arranged with the Confederate commanders for the surrender of the Army of Northern Virginia. He was mustered out of the Volunteer Service in February 1866, and in July became lieutenant-colonel of the 9th cavalry in the regular army, being promoted gradually to major-general (1895). He served in the Big Horn and Yellowstone Indian campaigns (1876) and in the expedition to relieve the command of Major Thornburgh, who was killed in 1879 by the Utes; was superintendent at West Point (1882-87); and commanded the military department of Missouri in 1887-95, and that of the Atlantic in 1897-98. He was assigned in May 1898 to the command of the United States forces that were sent to the Philippines, after Admiral Dewey's victory; stormed Manila on the 13th of August; and was military governor of the islands until the 30th of August,

when he left Manila for Paris to join the peace commission. From 1899 until his retirement from active service in June” 1900 he commanded the Department of the East.

MERSEBURG, a town of Germany, in the Prussian province of Saxony, on the river Saale, 10 m. by rail S. of Halle and 15 m. W. of Leipzig. Pop. (1905), 20,024. It consists of a quaint and irregularly built old town, a, new quarter, and two extensive suburbs, Altenburg and Neumarkt. The cathedral, which was restored in 1884-1886, has a choir, a crypt and two towers of the nth, a transept of the 13th and a late Gothic nave of the 16th century. Among its numerous monuments is one’ to Rudolph of Swabia, the rival of the emperor Henry IV. It contains

a great organ dating from the 17th century. Near the cathedral is the Gothic palace, formerly the residence of the bishops of Merseburg, and now used as public offices. The town hall and the Standehaus, where the meetings of the provincial estates were held, are also noteworthy buildings. The industries include the manufacture of machinery, paper and celluloid, and tanning and brewing.

Merseburg is one of the oldest towns in Germany. From 968 until the Reformation, it was the seat of a bishop, and in addition to being for a time the residence of the margraves of Meissen, it was a favourite residence of the German kings during the 10th, nth and 12th centuries. Fifteen diets were held here during the middle ages, when its fairs enjoyed the Importance which was afterwards transferred to those of Leipzig. The town suffered severely during the Peasants’ War and also during the Thirty Years’ War. From 1657 to 1738 it was the residence of the dukes of Saxe-Merseburg.

See E. Hoffmann, Ilistorische Nachrichten aus Alt-Merseburg (Mers2burg, 1903).

MERSEN (Meerssen), TREATY OF, a treaty concluded on the 8th of August 870 at Mersen, in Holland, between Charles the Bald and his half-brother, Louis the German, by which the kingdom of their nephew Lothair II. (d. 869) was divided between them. Charles received a portion of the kingdom of Lothair afterwards called Lorraine, extending from the mouths of the Rhine to Toul, together with the town of Besancon, the Lyonnais, the Viennais, the Vivarais,

and ‘ the Uzege, i.e. the lands acquired by Lothair II. in 863 at the death of his brother Charles of Provence; while Louis had the cities of Cologne, Trier and Metz, together with Alsace, the Escuens, and the Varais, i.e. the greater part of the diocese of Besancon. The boundary between the two realms was marked approxi- mately by the valleys of the Meuse and Moselle and by the Jura. Great importance has been attached to the determina- tion of this frontier by some historians, who consider that it coincided with the dividing line between the Teutonic and Romance races and languages; but nothing is known of the bases upon which the negotiations were effected, and the situation created by this treaty came to an end in 879.

MERSENNE, MARIN (1588-1648), French philosopher and mathematician, was born of peasant parents near Oize (Sarthe) on the 8th of September 1588, and died in Paris on the 1st of September 1648. He was educated at the Jesuit College of La Fleche, where he was a fellow-pupil and friend of Descartes. In 161 1 he joined the Minim Friars, and devoted himself to philosophic teaching in various convent schools. He settled eventually in Paris in 1620 at the convent of L’Annonciade. For the next four years he devoted himself entirely to philosophic and theological writing, and published Quaestiones celeberrimae in Genesim (1623); UlmpiUi des deistes (1624); La Viritt des sciences (1624). These works are characterized by wide scholar- ship and the narrowest theological orthodoxy. His greatest service to philosophy was his enthusiastic defence of Descartes, whose agent he was in Paris and whom he visited in exile in Holland. He submitted to various eminent Parisian thinkers a manuscript copy of the Meditations, and defended its orthodoxy against numerous clerical critics. In later life, he gave up speculative thought and turned to scientific research, especially in mathematics, physics and astronomy. Of his works in this connexion the best known is L’Harmonie universelle (1636), dealing with the theory of music and musical instruments.

Among his other works are: Euclidis elementorum libri, &c. (Paris, 1626) ; Universae geometriae synopsis (1644) ; Les Michdniques de Galilee (Paris, 1634) ; Questions inouies ou recreations des savants (1634); Questions theologiques, physiques, &c. (1634); Nouvelles decouvertes de Galilee (1639) ; Cogitata physico-mathematica (1644).

See Baillet, Vie de Descartes (1691); Pot6, ILloge de Mersenne

(1816).

MERSEY, a river in the north-west of England. It is formed by the

junction of the Goyt and the Etherow a short distance below Marple in Cheshire on the first-named stream. The Goyt rises in the neighbourhood of Axe Edge, south-west of Buxton, and the Etherow in the uplands between Penistone

and Glossop, watering the narrow Longdendale in which are several reservoirs for the Manchester, water supply. The Mersey thus drains a large part of the Peak district of Derby- shire and of the southern portion of the Pennine system. The general direction from Marple is westerly. At Stockport the river Tame joins from the north, rising in the moors to the north-east of Oldham, and the Mersey soon afterwards debouches upon the low plain to the west of Manchester, which lies on its northern tributary the Irwell. The Bollin joins from the south-east near Heatley, and the main river, passing Warrington, begins to expand into an estuary before reaching Runcorn and Widnes, which face each other across it. The estuary, widening suddenly at the junction of the Weaver from the south- east, 2\ m. below Runcorn, is 3 m. wide off Ellesmere Port, but narrows to less than f m. at Liverpool, and hardly exceeds a mile at the mouth in the Irish Sea. The fall of the Mersey is about 1600 ft. in all and about 300 from Marple; its length, including the Goyt, is 70 m. exclusive of lesser windings, and it drains an area of 1596 sq. m. The estuary is one of the most important commercial waterways in the world. (See Liverpool and Birkenhead.) The Manchester Ship Canal (q.v.) joins the estuary through Eastham Locks, skirts its southern shore up to Runcorn, and crosses the river several times. From the name of the river was taken the title of Lord Mersey in 1910 by Sir John Bigham (b. 1840), on his elevation to the peerage after serving as a judge of the high court from 1897 to 1909 and president of the divorce court 1909- 19 10.

MERSINA, a town on the south-eastern coast of Asia Minor, and capital of a sanjak in the vilayet of Adana. Pop. about 15,000 including many Christians, Armenian, Greek and European. Its existence as a port began with the silting up of the harbour of Tarsus and Pompeiopolis, east and west, in the early middle ages; but it did not rise to importance till the Egyptian occupation of Cilicia (1832). It is now the busiest port on the south coast, being the terminus of the railway from Tarsus and Adana, by which (but still more by road) the produce of the rich ” Aleian ” plain comes down. It is served by most of the Levantine steamship companies, and is the best point of departure for visitors desiring to see Tarsus, the Cilician remains, and the finest scenery of the East Taurus. There is, however, no enclosed harbour, but only a good jetty. The making of a breakwater has long been under consideration. The anchorage in the roadstead is good, but

the bay shoals for a long way out, and is exposed to swell from south-west and south. Mersina is an American mission centre, and the seat of a British vice-consul. Like all lowland Cilicia, it has a notoriously bad summer climate, and all inhabitants, who can do so, migrate to stations on the lower slopes of Taurus.

(D. G. H.) MERTHYR TYDFIL, or Merthyr Tydvil, a municipal, county and parliamentary borough, and market-town of Glamor- ganshire, south Wales, situated in a bleak and hilly region on the river Taff, on the Glamorganshire Canal, and the Brecon and Merthyr, Great Western, North Western, Taff Vale and Rhymney railways, 25 m. N.N.W. of Cardiff, 30 E.N.E. of Swansea, and 176 from London. Pop. (1901), 69,228. The town is said to have derived its name from the martyrdom of St Tydfil, daughter of Brychan, who was put to death by Saxons in the 5th century. It is for the most part irregularly built and was formerly subject to severe epidemics due to defective sanitation; but it now possesses a supply of the purest water from the lesser Taff on the southern slope of the Brecon- shire Beacons. The town owes its early industrial prosperity to the abundant ironstone and coal of the district, and it thus became at an early date the chief seat of the iron industry in Wales. Four great ironworks were established here between 1759 and 1782. With the earliest, that of Dowlais, the Guest family were associated, first as partners and later as sole owners from 1782 to 1901 when the works were disposed to the company of Guest, Keen and Nettlefold. In 1765, Cyfarthfa was started by Anthony Bacon, and when firmly established, sold in 1794 to Richard Crawshay by whose descendants the works were

carried on till the owners formed themselves in 1890 into a limited company (Crawshay Brothers Cyfarthfa Limited), the controlling interest in which has since been acquired by the Dowlais Company. The Plymouth works, started soon after Cyfarthfa, by Wilkinson and Guest, passed later into the hands of Anthony Hill from whose descendants they were purchased in 1863. They were closed down in 1882, but the collieries belonging to them continue to be worked on a large scale, yielding over 2000 tons of coal a day. The fourth great ironworks were those of Pen-y-darran which were carried on from 1782 to 1859. It was at Dowlais (in 1856) that Bessemer steel was first rolled into rails, but the use of puddled iron was not wholly abandoned at the works till 1882. It has now eighteen blast furnaces, and extensive collieries are also worked by the company, and large

branch works were opened on the sea-board at Cardiff in 1891. Cyfarthfa was converted into steel works in 1883. The iron ore used is mainly imported from Spain. Merthyr Vale is almost entirely dependent on coal-mining and has one of the largest collieries in south Wales (Nixon's Navigation). The population of this district more than quintupled between 1881 and 1901.

From 1850 the government of the town was vested in a local board of health which in 1894 became an urban district council; by charter granted on the 5th of June 1905, it was vested in a corporation consisting of a mayor, 8 aldermen and 24 councillors. It was made a county borough from the 1st of April 1908. It comprises about 17,759 acres, is divided into eight wards and besides the older town, it includes Penydarran (1 m. N.E.), Dowlais (2 m. N.E.), Plymouth (1 m. S.) and Merthyr Vale (5 m. S.). It has a separate commission of the peace, and in conjunction with Aberdare and Mountain Ash, has had a stipendiary magistrate since 1829. The parliamentary borough which was created and given one member in 1832 and a second in 1867, includes the parish of Aberdare and parts of the parishes of Llanwonno, Merthyr Tydfil and Vainor (Brecon).

There is an electric tramway (completed in 1901) from the town to Cefn and Dowlais. In 1901 about 50% of the population above three years of age spoke both Welsh and English, 71% spoke Welsh only, and the remainder English only. The ancient parish of Merthyr Tydfil has been divided into five ecclesiastical parishes (Merthyr, Cyfarthfa, Dowlais, Pentre- bach, and Penydarran) and part of another parish (Treharris). These six parishes form the rural deanery of Merthyr in the archdeaconry and diocese of Llandaff, and in 1906 had nine churches and fifteen mission rooms. An inscribed stone (Artbeu) has been built into the east wall of the parish church; and two other inscribed stones removed from Abercar Farm in the greater Taff valley now he in the parish churchyard. The old structure of the parish church has been entirely removed except the base of the tower. There is a Roman Catholic church in Penydarran Park and 'another at Dowlais. The Nonconformists, of which the chief denominations are the Baptists, Congregationalists and Methodists — Wesleyan and Calvinistic — had in rgo6 82 chapels, 49 of which were used for Welsh services and 33 for English.

The public buildings include, besides the churches, a town hall and law courts (1898), drill hall (1866), library, market house, a county intermediate school, general hospital built in 1887 and enlarged in 1897, and an isolation fever hospital, a theatre (1894) and a fountain presented by Sir W. T. Lewis as a memorial to the pioneers of the

town's industry. At Dowlais there are public baths (1900) and a free library which have been provided by the owners of the Dowlais Works, Oddfellows' hall (187.8), and a fever hospital (1869). At Thomas Town there is a recreation ground of 16 acres, formed in 1902. In 1908 the corporation purchased Cyfarthfa Castle (formerly the residence of the Crawshay family) with a park of 62 acres including a lake of 6 acres.

The Roman road from Cardiff and Gelligaer to Brecon passed through Merthyr and the remains of a supposed fort were discovered in Penydarran park in 1902. Three miles to the north of Merthyr, on a limestone rock about 470 ft. above the lesser (eastern) Taff are the ruins of Morlais Castle, built about 1286 by Gilbert de Clare

on the northern limits of his lordship of Glamorgan, its erection causing a serious feud between him and de Bohun, earl of Hereford, who claimed its site as part of the lordship of Brecknock.

(D. Ll. T.)

MERULA, GEORGIUS (the Latinized name of Giorgio Mirlani; c. 1430-1494), Italian humanist and classical scholar, was born at Alessandria in Piedmont. The greater part of his life was spent at Venice and Milan, where he held a professorship and continued to teach until his death. To Merula we are indebted for the editio princeps of Plautus (147 2) , of the Scriplores rei ruslicae, Cato, Varro, Columella, Palladius (1472) and possibly of Martial (1471). He also published commentaries on portions of Cicero (especially the De finibus), on Ausonius, Juvenal, Curtius Rufus, and other classical authors. He wrote also Bellum scodrense (1474), on account of the siege of Scodra (Scutari) by the Turks, and Anliquitates vicecomitum, the history of the Visconti, dukes of Milan, down to the death of Matteo the Great (1322). He violently attacked Politian (Poliziano), whose Miscellanea (a collection of notes on classical authors) were declared by Merula to be either plagiarized from his own writings or, when original, to be entirely incorrect.

See monograph by F. Gabotto and Badini-Gonfalonieri (1894) with bibliography; for the quarrel with Politian 'see also C. Meiners Lebensbeschreibungen der berilhmten Manner (1796), ii. 158.

MERV, Meru or Maur, an oasis and town of Asia, in the

Transcaspian province of Russia. The oasis is situated on the

S. edge of the Kara-kum desert, in 37 30′ N. and 62 E. It is

about 230 m. N. from Herat, and 280 S.S.E. from Khiva. Its area is about 1900 sq. m. The great chain of mountains which, under the names of Paropamisus and Hindu-Kush, extends from the Caspian to the Pamirs is interrupted some 180 m. south of Merv. Through or near this gap flow northwards in parallel courses the rivers Heri-rud (Tejend) and Murghab, until they lose themselves in the desert of Kara-kum. Thus they make Merv a sort of watch tower over the entrance into Afghanistan on the north-west and at the same time create a stepping-stone or Uape between north-east Persia and the states of Bokhara and Samarkand. The present inhabitants of the oasis are Turkomans of the Tekke tribe. In 1897 they numbered approximately 240,000. The oasis is irrigated by an elaborate system of canals cut from the Murghab. The country has at all times been renowned throughout the East for its fertility. Every kind of cereal and many fruits grow in great abundance, e.g. wheat, millet, barley and melons, also rice and cotton. Silkworms are bred. The Turkomans possess a famous breed of horses and keep camels, sheep, cattle, asses and mules. They are excellent workers in silver and noted as armourers, and their carpets are superior to the Persian. They also make felts and a rough cloth of sheep's wool. The heat of summer is most oppressive. The least wind raises clouds of fine dust, which fill the air, render it so opaque

as to ohscure the noonday sun, and make respiration difficult.

In winter the climate is very fine. Snow falls rarely, and when

it does, it melts at once. The annual rainfall rarely exceeds

5 in., and there is often no rain from June till October.' While

in summer the thermometer goes up to 97 F., in winter it

descends to 19-5°. The average yearly temperature is 6o°.

Here is a Russian imperial domain of 436 sq. m., artificially

irrigated by works completed in 1895.

History. — In Hindu (the Pur anas), Parsi and Arab tradition, Merv is looked upon as the ancient Paradise, ■ the cradle of the Aryan families of mankind, and so of the human race. UndeT-ˆ the name of Mouru this place is mentioned with Bakhdi (Balkh) in the geography of the Zend-Avesta (Vendidad, ed. Spiegel, 1852-1863), which dates probably from at least 1.200 B.C. Under the name of Margu it occurs in the cuneiform (Behistun) inscrip- tions of the Persian monarch Darius Hystaspis, where it is referred to as forming part of one of the satrapies of the ancient Persian Empire. It afterwards became a province (Margiana) of the Graeco-Syrian, Parthian and Persian kingdoms. On the Margus — the Epardus of Arrian and now the Murghab — stood the capital of the district, Antiochia Margiana, so called after Anti- ochus Soter, who rebuilt the city founded by Alexander the Great.

About the 5th century, during the rule of the Persian Sassanian dynasty, Merv was the seat of a Christian archbishopric of the Nestorian Church. The town was occupied (a.d. 646) by the lieutenants of the caliph Othman, and was constituted the capital of Khorasan. From this city as their base the Arabs, under Kotaiba (Qotaiba) ibn Moslim, early in the 8th century brought under subjection Balkh, Bokhara, Ferghana and Kashgaria, and penetrated into China as far as the province of Kan-suh. In the latter part of the 8th century Merv became obnoxious to Islam as the centre of heretical propaganda preached by Mokanna (q.v.). In 874 Arab rule in Central Asia came to an end. During their dominion Merv, like Samarkand

and Bokhara, was one of the great schools of learning, and the celebrated historian Yaqut studied in its libraries. In 1040 the Seljuk Turks crossed the Oxus from the north, and having defeated Masud, sultan of Ghazni, raised Toghrul Beg, grandson of Seljuk, to the throne of Persia, founding the Seljukian dynasty, with its capital at Nishapur. A younger brother of Toghrul, Daud, took possession of Merv and Herat. Toghrul was succeeded by his nephew Alp Arslan (the Great Lion), who was buried at Merv. It was about this time that Merv reached the zenith of her glory. During the reign of Sultan Sanjar or Sinjar of the same house, in the middle of the nth century, Merv was overrun by the Turkish tribes of the Ghuzz from beyond the Oxus. It eventually passed under the sway of the rulers of Khwarizm (Khiva).

In 1 22 1 Merv opened its gates to Tule, Son of Jenghiz Khan, chief of the Mongols, on which occasion most of the inhabitants are said to have been butchered. From this time forward the city began to decay. In the early part of the 14th century the town was made the seat of a Christian archbishopric of the Eastern Church. On the death of the grandson of Jenghiz Khan Merv was included (1380) in the possessions of Timur-i- Leng (Tamerlane), Mongol prince of Samarkand. In 1505 the city was occupied by the Uzbegs, who five years later were expelled by Ismail Khan, the founder of the Safawid dynasty of Persia. Merv remained in the hands of Persia until 1787, when it was captured by the emir of Bokhara. Seven years later the Bokharians razed the city to the ground, broke down the dams, and converted the district into a waste. When Sir Alexander Burnes traversed the country in 1832, the Khivans were the rulers of Merv. About this time the Tekke Turkomans, then living on the Heri-rud, were forced by the Persians to migrate northward. The Khivans contested the advance of the Tekkes, but ultimately, about 1856, the latter became the sovereign power in the country, and remained so until the Russians occupied the oasis in 1883.

The ruins of Old Merv cover an area of over 15 sq. m. They consist of a square citadel (Bairam Ali Khan kalah), 15 m. in circuit, built by a son of Tamerlane and destroyed by the Bokharians, and another kalah or walled inclosure known as Abdullah Khan. North from these lies the old capital of the Seljuks, known as Sultan Kalah, and destroyed by the Mongols in 1 2 19. Its most conspicuous feature is the burial mosque of Sultan Sanjar, reputedly dating from the 12th century. East of the old Seljuk capital is Giaur Kalah, the Merv of the Nestorian era and the capital of the Arab princes. North of the old Seljuk capital are the ruins of Iskender Kalah, probably to be identified with the ancient Merv of the Seleucid dynasty.

New Merv, the present chief town of the oasis, founded in the first quarter of the 19th century, is on the Transcaspian railway, 380 m. by rail south-west from Samarkand. It stands on both banks of the Murghab, 820 ft. above the Caspian. Pop. (1897), 8727, including Russians, Armenians, Turkomans, Persians and Jews. It has a meteorological observatory. Corn, raw cotton, hides, wool, nuts and dried fruit are exported.

See E. O'Donovan, The Merv Oasis (2 vols., London, 1882) ; C. Marvin, Merv (London, 1880); and H. Lansdell, The Russians at Merv and Herat (London, 1883). (J. T. Be.)

MERX, ADALBERT (1838-1909), German theologian and orientalist, was born at Bleicherode near Nordhausen on the 2nd of November 1838. He studied at Jena, where he became extraordinary professor in 1869. Subsequently he was ordinary

professor of philosophy at Tubingen, and in 1873 professor of theology at Giessen. From 1875 till his death he was professor of theology of Heidelberg. In the course of his researches he made several journeys in the East. Among his many works are: Grammatica syriacd (1867-1870); Vocabulary of the TigrS language (1868); Das Gedicht vom Hiob (1871); Die Prophetie des Joel una 1 ihre Ausleger (1879); Die Saadjanische Ubersetzung der Hohenlieder ins A'rabische (1882); Chrestomathia targumica (1888) ; Historia artis grammaticae apud Syros (1889)', Ein samari- tanisches Fragment (1893); Idee und Grundlinien einer allgemeiner Geschichte der Mystik (1893). Merx devoted much of his later research to the elucidation of the Sinaitic palimpsest discovered in 1892 by Mrs Agnes Smith Lewis (see Bible, iv. 321, ad fin:), the results being embodied in Die vier kanonischen Evangelien nach ihrem iiltesten bekannten Texte (1897-1905). His last work was an edition of the books of Moses and Joshua. He died at Heidelberg on the 6th of August 1009.

MERYON, CHARLES (1821-1868), French etcher, was born in Paris in 182 1. His father was an English physician, his mother a French dancer. It was to his mother's care that Meryon's childhood was confided. But she died when he was still young, and M6ryon entered the French navy, and in the corvette " Le Rhin "made the voyage round the world. He was already a draughtsman, for on the coast of New Zealand he made pencil drawings which he was able to employ, years afterwards, as studies for etchings of the landscape of thbse regions. The artistic instinct developed, and, while he was yet a lieutenant; Meryon left the havy. Finding that he was colour-blind, he determined to devote himself to etching. He entered the work room of

one Blery, from whom he learnt something of technical matters, and to whom he always remained grateful. Meryon was by this time poor. It is understood that he might have had assistance from his kindred, but he was too proud to ask it. And thus he was reduced to the need of executing for the sake of daily bread much work that was mechanical and irksome. Among learners' work, done for his own advantage, are to be counted some studies after the Dutch etchers such as Zeemanand Adrian van de Velde. Having proved himself a surprising copyist, he proceeded to labour of his own, and began that series of etchings which are the greatest embodiments of his greatest conceptions — the series called " Eaux-fortes sur Paris." These plates, executed from 1850 to 1854, are never to be met with as a set; they were never expressly published as a set. But they none the less constituted in Meryon's mind an harmonious series.

Besides the twenty-two etchings " sur Paris," characterized below, Meryon did seventy-two etchings of one sort and another — ninety-four in all being catalogued in Wedmore's Miryon and Meryon's Paris; hut these include the works of his apprentice- ship and of his decline, adroit copies in which his best success was in the sinking of his own individuality, and more or less dull portraits. Yet among the seventy-two prints outside his pro- fessed series there are at least a dozen that will aid his fame. Three or four beautiful etchings of Paris do not belong to the series at all. Two or three etchings, again, are devoted to the illustration of Bourges, a city in which the old wooden houses were as attractive to him for their own sakes as were the stone- built monuments of Paris. But generally it was when Paris engaged him that he succeeded the most. He would have done more work, however — though he could hardly have done better work — if the material difficulties of his life had not pressed,upbn him and shortened his days. He was a bachelor, unhappJMn love, and yet, it is related, almost as constantly occupied with love as with work. The depth of his imagination and the sur- prising mastery which he achieved almost from the beginning in the technicalities of his craft were appreciated only by a few artists, critics and connoisseurs, and he could not sell his etchings, or could sell them only for about iod. apiece. Disappointment told upon him, and, frugal as was his way of life, poverty must have affected him. He became subject to hallucinations. Enemies, he said, waited for him at the corners of the streets; his few friends robbed him or owed him that which they would

never pay. A few years after the completion of his Paris series he was lodged in the madhouse of Charenton. Its order and care restored him for a while to health, and he came out and did a little more work, but at bottom he was exhausted. In 1867 he returned to his asylum, and died there in 1868. In the middle years of his life, just before he was placed under confinement, he was much associated with Bracquemond and with Flameng, — skilled practitioners of etching, while he was himself an unde- niable genius — and the best of the portraits we have of him is that one by Bracquemond under which the sitter wrote that it represented ” the sombre Meryon with the grotesque visage.”

There are twenty-two pieces in the Eaux-fortes sur Paris. Some of them are insignificant. That is because ten out of the twenty-two were destined as headpiece, tailpiece, or running commentary on some more important plate. But each has its value, and certain of the smaller pieces throw great light on the aim of the entire set. Thus, one little plate — not a picture at all — is devoted to the record of verses made by Meryon, the purpose of which is to lament the life of Paris. The misery and poverty of the town Meryon had to illustrate, as well as its splendour. The art of Meryon is completely misconceived when his etchings are spoken of as views of Paris. They are often ” views,” but they are so just so far as is compatible with their being likewise the visions of a poet and the compositions of an artist. It was an epic of Paris that Meryon determined to make, coloured strongly by his personal sentiment, and affected here and there by the occurrences of the moment — in more than one case, for instance, he hurried with particular affection to etch his im- pression of some old-world building which was on the point of destruction. Nearly every etching in the series is an instance of technical skill, but even the technical skill is exercised most happily in those etchings which have the advantage of impressive subjects, and which the collector willingly cherishes for their mysterious suggestiveness or for their pure beauty. Of these, the Abside de Notre Dame is the general favourite; it is com- monly held to be Meryon’s masterpiece. Light and shade play wonderfully over the great fabric of the church, seen over the spaces of the river. As a draughtsman of architecture, Meryon was complete; his sympathy with its various styles was broad, and his work on its various styles unbiased and of equal perfec- tion — a point in which it is curious to contrast him with Turner, who, in drawing Gothic, often drew it with want of appreciation. It is evident that architecture must enter largely into any representation of a city, however much such representation may be a vision, and however little a chronicle. Besides, the archi- tectural portion even of Meryon’s labour is but indirectly imaginative; to the imagination he has given freer play in his dealings with the

figure, whether the people of the street or of the river or the people who, when he is most frankly or even wildly symbolical, crowd the sky. Generally speaking, his figures are, as regards draughtsmanship, ” landscape-painter’s figures.” They are drawn more with an eye to grace than to academic correctness. But they are not ” landscape-painter’s figures ” at all when what we are concerned with is not the method of their representation but the purpose of their introduction. They are seen then to be in exceptional accord with the sentiment of the scene. Sometimes, as in the case of La Morgue, it is they who tell the story of the picture. Sometimes, as in the case of La Rue des Mauvais Garcons — with the two passing women bent together in secret converse — they at least suggest it. And sometimes, as in L’Arche du Pont Notre Dame, it is their expres- sive gesture and eager action that give vitality and animation to the scene. Dealing perfectly with architecture, and perfectly, as far as concerned his peculiar purpose, with humanity in his art, Meryon was little called upon by the character of his subjects to deal with Nature. He drew trees but badly, never represent- ing foliage happily, either in detail or in mass. But to render the characteristics of the city, it was necessary that he should know how to portray a certain kind of water — river-water, mostly sluggish — and a certain kind of sky — the grey obscured and lower sky that broods over a world of roof and chimney.

This water and this sky Meryon is thoroughly master of; he notes with observant affection their changes in all lights.

Meryon’s excellent draughtsmanship, and his keen apprecia- tion of light, shade and tone, were, of course, helps to his beconv ing a great etcher. But a living authority, himself an eminent etcher, and admiring Meryon thoroughly, has called M6ryon by preference a great original engraver— so little of M6ryon’s work accords with Sir Seymour Haden’s view of etching. Meryon was anything but a brilliant sketcher; and, if an artist’s success in etching is to be gauged chiefly by the rapidity with which he records an impression, Meryon’s success was not great. There can be no doubt that his work was laborious and deliberate, instead of swift and impulsive, and that of some other virtues of the etcher — ” selection ” and ” abstraction ” as Hamerton has defined them — he shows small trace. But a genius like Meryon is a law unto himself, or rather in his practice of his art he makes the laws by which that art and he are to be judged.

It is worth while to note the extraordinary enhancement in the value of Meryon’s prints. Probably of no other artist of genius, not even of Whistler, could there be cited within the same period a rise in prices of at all the same proportion. Thus the first state of the Stryge ” —

that “with the verses,” — selling under the hammer in 1873 for £5, sold again under the hammer in 1905 for £100. The first state of the ” Galerie de Notre Dame,” selling in 1873 for £5, and at M. Wasset’s sale in 1880 for £11, fetched in !9 5> £5 2 – A ” Tour de l’horloge,” which two or three years after it was first issued sold for half a crown, in May 1903 fetched £70. A first state (Wedmore’s, not of course M. Delteil’s ” first state,” which, like nearly all his first states, is in fact a trial proof) of the ” Saint Etienne du mont,” realizing about £2 at M. Burty’s sale in 1876, realized £60 at a sale in May 1906. The second state of the ” Morgue ” (Wedmore) sold in 1905 for £65; and Wedmore’s second of the ” Abside,” which used to sell throughout the ‘seventies for £4 or £5, reached in November 1906 more than £200. At no period have even Durers or Rembrandts risen so swiftly and steadily. Bibliography. — Philippe Burty, Gazette des beaux arts (1865); Descriptive Catalogue of the Works of Meryon (London, 1879); Aglaus Bouvenne, Notes et souvenirs sur Charles Meryon; P. G. Hamerton, Etching and Etchers (1868) ; F. Seymour Haden, Notes on Etching; H. Beraldi, Les Peintres graveurs du dix-neuvieme siecle; Baudelaire, Lettres de Baudelaire (1907); L. Delteil, Charles Mtryon (1907); Frederick Wedmore, M&ryon and Meryon’s Paris, with a descriptive catalogue of the artist’s work (1879; 2nd ed., 1892); and Fine Prints (1896; 2nd ed., 1905). ‘ (F. We.)

MESA (Span, mesa, from Lat. mensa, a table), in physical geography, a high table-land capped with hard rock, being the remnant of a former plateau. This type is general where strata are horizontal. In the process of denudation the hard rock acts as a flat protective cap preserving the regions between stream valleys or other places where denudation is especially active, in the form of .,” table-mountains ” or “fortress-hills.” Many examples are found in Spain, North and South Africa, the Bad Lands and Colorado regions of North America, in Arabia, India and Australia.

MESHCHERYAKS, or Meshchers, a people inhabiting eastern Russia. Nestor regarded them as Finns, and even now part of the Mordvinians (of Finnish origin) call themselves Meshchers. Klaproth, on the other hand, supposed they were a mixture of Finns and Turks, and the Hungarian traveller Reguli discovered that the tatarized Meshchers of the Obi closely resembled Hungarians. They formerly occupied the basin of the Oka (where the town Meshchersk, now Meshchovsk, has maintained their name) and Of the Sura, extending north-east to the Volga. After the conquest of the Kazan Empire by Russia, part of them migrated north-eastwards to the basins of the Kama and Byelaya, and thus the Meshchers divided into two branches. The western branch became russified, so that the Meshcheryaks of the govern*- ments of

Penza, Saratov, Ryazan and Vladimir have adopted the customs, language and religion of the conquering race; but their ethnographical characteristics can be easily distin- guished in the Russian population of the governments of Penza and Tambov, The eastern branch has taken on the customs, language and religion of Bashkirs, with whom their fusion is still more complete.

MESHED (properly Mash-had, ” the place of martyrdom “), capital of the province of Khorasan in Persia, situated in a plain watered by the Kashaf-rud (Tortoise river), a tributary of the

Hari-rud (river from Herat, which after its junction with the Kashaf is called Tejen), 460 m. E. of Teheran (550 by road) and 200 m. N.W. of Herat, in 36 17′ N., 50° 36′ E., at an elevation of 3800 ft. Its population is about 70,000 fixed and 10,000 floating, the latter consisting of pilgrims to the shrine of Imam Reza. 1

The town is of irregular shape, about 6 m. in circumference and surrounded by a mud wall flanked with towers. In the south-western corner of the enclosure stands the citadel (ark), within a wall 25 ft. high and a broad dry ditch which is 40 ft. deep in parts and can be flooded from neighbouring water- courses. The city has five gates, and from one of them, called Bala Khiaban gate (upper Khiaban), the main street (Khiaban), 25 yds. broad, runs in a north-west-south-east direction, forming a fine avenue planted with plane and mulberry trees and with a stream of water running down its middle. The shrine of Imam Reza is the most venerated spot in Persia, and yearly visited by more than 100,000 pilgrims. Eastwick thus describes it (Journal of a Diplomat’s Three Years’ Residence in Persia, London, 1864) : —

” The quadrangle of the shrine seemed to be about 150 paces square. It was paved with large flagstones and in the centre was a beautiful kiosk or pavilion, covered with gold and raised over the reservoir of water for ablutions. This pavilion was built by Nadir Shah. All round the northern, western and southern sides of the quadrangle ran, at some 10 ft. from the ground, a row of alcoves, similar to that in which I was sitting, and filled with mullas in white turbans and dresses. In each of the sides was a gigantic archway, the wall being raised in a square from above the entrance. The height to the top of this square wall must have been 90 or 100 ft. The alcoves were white, seemingly of stone or plaster; but the archways were covered with blue varnish

or blue tiles, with beautiful inscriptions in white and gold. Over the western arch- way was a white cage for the muazzin, and outside it was a gigantic minaret 120 ft. high, and as thick as the Duke of York's column in London. The beauty of this minaret cannot be exagger- ated. It had an exquisitely carved capital, and above that a light pillar, seemingly 10 ft. high ; and this and the shaft below the capital, ■or about 20 f t. , were covered with gold. All this part of the mosque (shrine) was built by Shah Abbas. In the centre of the eastern side of the quadrangle two gigantic doors were thrown open to admit the people into the adytum or inner mosque (shrine) where is the marble tomb of Imam Reza, surrounded by a silver railing with knobs of gold. There was a flight of steps ascending to these doors, and beyond were two smaller doors encrusted with jewels — ■ the rubies were particularly fine. The inner mosque would contain 3000 persons. Over it rose a dome entirely covered with gold, with two minarets at the sides, likewise gilt all over, On the right of the Imam's tomb is that of Abbas Mirza, grandfather of the reigning Shah. 2 Near him several other princes and chiefs of note are buried. Beyond the golden dome, in striking and beautiful contrast with it, was a smaller dome of bright blue. Here begins the mosque of Gauhar Shad. 3 The quadrangle is larger than that of Shah Abbas; and at the eastern side is an immense blue dome, out of which quantities of grass were growing, the place being too sacred to be disturbed. In front of the dome rose two lofty minarets covered with blue tiles. In the boulevard of the Bala Khiaban is a kitchen supported by the revenues of the shrine, where 800 persons are fed daily."

The buildings of the shrine together with a space extending to about one hundred yards beyond the gates of the shrine on each side is sanctuary (bast). Within it are many shops and lodgings, and criminals, even murderers, may live there in safety. The only other notable buildings in the place are some colleges (medresseh), the oldest being the M. Do-dar, i.e. " college of two doors," built in 1439 by Shah Rukh, and some fine caravan- serais, two dating from 1680.

1 Abul Hassan AH, al Reza, commonly known as Imam Reza, the eighth imam of the Shiites, a son of Musa al Kazim, the seventh imam, was the leader from whom the party of the Alids (Shiites) had such hopes under the caliphate of Mamfln. Gold coins (dinars) of this caliph are extant on which al Reza's name appears with the title of heir-apparent. The imam died in March 819 in the village Sanabad near Tus, some miles north-west of Meshed. To the Shiites he is a martyr, being believed to have been poisoned by Mamun.

2 This refers to Nasr-ud-din (d. 1896), grandfather of Shah

Mahommed Ali (1907).

8 Gauhar Shad was the wife of Shah Rukh (1404-1447), and was murdered by that monarch's successor Abu Said, August 1, 1457. Her mosque was built in 1418.

Without the pilgrims who come to visit it, Meshed would be a poor place, but lying on the eastern confines of Persia, close to Afghanistan, Russian Central Asia and Transcaspia, at the point where a number of trade routes converge, it is very important politically, and the British and Russian governments have main- tained consulates-general there since 1889. Meshed had formerly a great transit trade to Central Asia, of European manufactures, mostly Manchester goods, which came by way of Trebizond, Tabriz and Teheran; and of Indian goods and pro- duce, mostly muslins and Indian and green teas, which came by way of Bander Abbasi. With the opening of the Russian railway from the Caspian to Merv, Bokhara and Samarkand in 1886-1887, Russian manufacturers were enabled to compete in Central Asia with their western rivals, and the value of European manufactures passing Meshed in transit was much reduced. In 1894 the Russian government enforced new customs regula- tions, by which a heavy duty is levied on Anglo-Indian manufac- tures and produce, excepting pepper, ginger and drugs, imported into Russian Asia by way of Persia; and the importation of green teas is altogether prohibited except by way of Batum, Baku, Uzunada and the Transcaspian railway. Since then the transit trade has been practically nil. In 1890 General Maclean, the British consul-general, reported that there were 650 silk, 40 carpet and 320 shawl looms at work. The carpet-looms at work now number several hundreds, while looms of silk and shawl number less than half what they did in 1890.

Meshed has telegraph (since 1876) and post (since 1879) offices, and the Imperial Bank of Persia opened a branch here in 1 89 1. The climate is temperate and healthy. The coldest month is January, with a mean temperature of about 32 F., while the hottest month is July, with a mean of 78 . The highest temperature recorded in a period of six years was 91 , the lowest 15°. The mean annual rainfall during nine years (1899-1907) was nearly 95 in., about one-eighth of it being represented by snow. (A. H.-S.)

MESHREBIYA (drinking places), the Arabic term given to the projecting oriel windows in Cairo, enclosed with lattice- work, through which a good view of the street can be obtained by the occupants without being seen; the term was derived from the small semicircular bows, in which porous water- bottles are placed to cool

by evaporation in the air.

MESMER, FRIEDRICH (or Franz) ANTON (1733-1815), Austrian doctor,' from whose name the word " Mesmerism " was coined (see Hypnotism), was born at Weil, near the point at which the Rhine leaves the Lake of Constance, on the 23rd of May 1733. He studied medicine at Vienna under the eminent masters of that day, Van Swieten and De Haen, took a degree, and commenced practice. Interested in astrology, he imagined that the stars exerted an influence on beings living on the earth. He identified the supposed force first with electricity, and then with magnetism; and it was but a short step to suppose that stroking diseased bodies with magnets might effect a cure. He published his first work (De planetarum influxu) in 1766. Ten years later, on meeting with J. J. Gassner in Switzerland, he observed that the priest effected cures by manipulation alone. This led Mesmer to discard the magnets, and to suppose that some kind of occult force resided in himself by which he could influence others. He held that this force permeated the universe, and more especially affected the nervous systems of men. He re- moved to Paris in 1778, and in a short time the French capital was thrown into a state of great excitement by the marvellous effects of mesmerism. Mesmer soon made many converts; controversies arose; he excited the indignation of the medical faculty of Paris, who stigmatized him as a charlatan; still the people crowded to him. He refused an offer of 20,000 francs from the government for the disclosure of his secret, but it is asserted that he really told all he knew privately to any one for 100 louis. He received private rewards of large sums of money. His consulting apartments were dimly lighted and hung with mirrors; strains of soft music occasionally broke the profound silence; and the patients sat round a kind of vat in which various chemical ingredients were concocted. Holding each others'

hands, or joined by cords, the patients sat in expectancy, and then Mesmer, clothed in the dress of a magician, glided amongst them, affecting this one by a touch, another by a look, and making " passes " with his hand towards a third. Nervous ladies became hysterical or fainted; some men became convulsed, or were seized with palpitations of the heart or other bodily disturbances. The government appointed a commission of physicians and members of the Academy of Sciences to investi- gate these phenomena; Franklin and Baillie were members of this commission, and drew up an elaborate report admitting many of

the facts, but contesting Mesmer's theory that there was an agent called animal magnetism, and attributing the effects to physiological causes. Mesmer himself was undoubt- edly a mystic; and, although the excitement of the time led him to indulge in mummery and sensational effects, he was honest in the belief that the phenomena produced were real, and called for further investigation. For a time, however, animal magnetism fell into disrepute; it became a system of downright jugglery, and Mesmer himself was denounced as a shallow empiric and impostor. He withdrew from Paris, and died at Meersburg in Switzerland on the 5th of March 1815. He left many disciples, the most distinguished of whom was the marquis de Puysegur.

MESNAGER (or Le Mesagner), NICOLAS (1658-1714), French diplomatist, belonged to a wealthy merchant family. He gave up a commercial career for the law, however, and became advocate before the parlement of Rouen. In 1700 he was sent as deputy of Rouen to the council of commerce which was established in Paris for the extension of French trade. Here he made his mark, and was chosen to go on three missions to Spain, between the years 1704 and 1705, to negotiate financial arrangements. In August 171 1 he was sent on a secret mission to London to detach England from the alliance against France, and succeeded in securing the adoption of eight articles which formed the base of the later Treaty of Utrecht. As a reward for his skill he was made one of the three French plenipotentiaries sent to Utrecht in January 17 12, and had the honour of signing the treaty the next year. As he had used much of his own large fortune to keep up his state as ambassador, he was granted a pension by the grateful king of France. His portrait by Hyacinthe Rigaud is in the gallery of Versailles.

MESNE (an Anglo-French legal form of the O. Fr. meien, mod. moyen, mean, Med. Lat. medianus, in the middle, cf. " mean "), middle or intermediate, an adjective used in several legal phrases. A mesne lord is one who has tenants holding under him, while himself holding of a superior lord. Mesne process was such process as intervened between the beginning and end of a suit (see Process). Mesne profits are profits derived from land whilst in wrongful possession, and may be claimed in damages for trespass' either in a separate action or joined with an action for the recovery of the land. The plaintiff must prove that he has re-entered into possession, his title during the period for which he claims, the fact that the defendant has been in possession during that period, and the amount of the mesne profits. The amount recovered as mesne profits need not be limited to the rental value of the land, but may include a sum to cover such items as deterioration or reasonable costs of getting possession, &c.

MESOCEPHALIC, a term applied by anthropologists to those skulls which exhibit a cephalic index intermediate between the dolichocephalic and brachycephalic crania (see Craniometry). Taking the longer diameter of a skull, i.e. the one from front to back, as 100, mesoceˆhalic skulls are those of which the trans- verse diameter varies between 75 to 80.

MESOMEDES of Crete, Greek lyric poet, who lived during the 2nd century a.d. He was a freedman of the emperor Hadrian, on whose favourite Antinous he is said to have written a panegyric. Two epigrams by him in the Greek anthology (Anthol. pal. xiv. 63, xvi. 323) and a hymn to Nemesis are extant. The hymn is of special interest as preserving the ancient musical notation written over the text. Two other hymns — to the muse Calliope and to the sun — formerly

Name.

assigned to Dionysius of Alexandria, have also been attributed to him.

See J. F. Bellermann, Die Hymnen des Dionysius und Mesomed.es (1840); C. de Jan, Musici scriptores graeci (1899); S. Reinach in Revue des etudes grecques, ix. (1896); Suidas, s.v.

MESONERO ROMANOS, RAM6N DE (1803-1882), Spanish prose-writer, was born at Madrid on the 19th of July 1803, and at an early age became interested in the history and topography of his native city. His Manual de Madrid (183 1) was published when literature was at a low ebb in Spain; but the author's curious researches and direct style charmed the public, and next year, in a review entitled Cartas espanolas, under the pseudonym of " El Curioso parlante," he began a series of articles on the social life of the capital which were subsequently collected and called Panorama matritense (1833-1836). Mesonero Romanos was elected to the Spanish Academy in 1838 and, though he continued to write, had somewhat outlived his fame when he issued his pleasing autobiography, Memorias de un setentdn, natural y vecino de Madrid (1880). He died at Madrid on the 30th of April 1882, shortly after the publication of his Obras completas (8 vols., 4to, 1881).

MESOPOTAMIA (Meowrorajuia, sc. x&pa or 2upta, from iikoos, middle, irorafibs, river), one of the Greek renderings of the earlier Semitic names for the river-country that stretches eastward from northern maritime Syria. The earliest appearance of a Semitic name of this kind is in the last para- graph of the biography of Ahmose of el-

Kab, the aged officer of Tethmosis (Thutmose) I. As early therefore as the late 16th century B.C. the name Naharin (N'h'ryn') was in use. That the name was connected with nahar (a river) was plain to some of the Egyptian scribes, who wrote the word with determinative for " water " in addition to that for " country."

The scribes show no suspicion, however, of the name's being anything but a singular. 1 Is it possible that a consciousness that the word was not a plural can have survived till the early Christian centuries, when the Targum of Onqelos (Ohkelos) rendered Naharaim by " the river Euphrates " (Pethor of Aram which is on the Euphrates: Deut. xxiii. 4 [5])? The Naharin or Naharen of the Egyptian texts appears some five generations later in the Canaanitic of the Amarna letters in the form Najjrim(a), which Would seem therefore to be the pronunciation then prevalent in Phoenicia (Gebal) and Palestine (Jerusalem). About the same time Naharin (N-h-ry-n) is given as the northern boundary of Egypt's domain (year 30 of Amenhotep or Amenophis III.), over against Kush in the south (tomb of Khamhet: Breasted, Anc. Rec. ii. 350).

The origin of the name is suggested by the Euphrates being called " the water of Naharin,"— on the Karnak stele more fully " the water of the Great Bend (phr wr) of Naharin (N-h-r-n) " (Breasted, Anc. Rec. ii. 263), or on the Constantinople obelisk simply "the Great Bend of Naharin " (Joe. cit. note d). The precise mean- ing of phr wr is not certain. When Breasted renders " Great Bend " of the Euphrates he is probably thinking of the great sweep round between Birejik-Zeugma and Raljlja-Nicephorium. W. M. Miiller, on the other hand, rendering Kreislauf, explains it of the Euphrates water system as a whole, thought of as encom- passing Naharin. The Sea of the Great Bend would seem to be the sea fed by the north-to-south waters of Naharin, just as the Mediterranean, fed by the south-to-north' waters of the Nile, is called the Great Circle (Ire wr).

For many centuries after Amenophis IV. the name cannot be found. The next occurrence is in Hebrew (Gen. xxiv. 10 = J), where the district from which a wife for Isaac is brought is called Aram-Naharaim. The diphthongal pronunciation of the termina- tion aim is probably a much later development. We should probably read something like Aram-Naharfm. The meaning is: the Nanarim portion of the Aramaic speaking domain. 2 Probably the author thought primarily of the district of Harran. 3 Some generations later Aram-Naharim is used of the district including Pethor, a town on the west bank of the Euphrates 4 (Deut. xxiii.

1 The threefold re after Nahar in a stele of Persian or GreeTs* times (healing of Bentresh) is probably only the determinative for ” water,” a fourth re being accidentally omitted (Breasted, Ancient Records, iii. § 434).

2 Cf . Aram-Damascus, which means, the Damascus portion of the Aramaic domain; and har-Ephraim t which means, the Ephraim portion of the (Israelitish) highlands— EV ” Mount Ephraim.”

3 HaleVy’s suggestion that we are to look towards the Haurari, and think of the rivers of Damascus, has not met with favour.

4 Padan-Aram (Rev. Vers, better Paddan-Aram), Gen. xxv. 20, &c, rendered by the Septuagint ” Mesopotamia of Syria,” is obscure. Paddan has been connected phonetically with Patin, west of the Euphrates, and explained by others as a synonym for Harran.

4 = D). The Syriac version of the Old Testament (2nd cent. a.d. ?) uses B6th Nahrin. This may or may not imply the belief that NahriH is a plural. Eventually that belief was general, as is proved by the substitution of the normal feminine plural (for the supposed masculine) in the alternative form Beth Nahrawatha (e.g. Wright, Chron. Joshua Styl. §§ 49, 50). Beth is probably the Syriac equivalent of the Assyrian Bit as in Bit-Adini (see below, § 3 viii.), as is shown by such names as Beth ‘Arbaye, ” district of Arabians,” Beth Armaye, ” district of Aramaeans.” The Parapolamia of Strabo xvi. 2. 1 1 , would be a suitable Greek equivalent. Mesopotamia seems to imply the view that beth is the preposition ” amid, which has the same form, 1 but need not imply the meaning ” between,” that is, the idea that there were precisely two rivers. There is evidence of the use of this form as early as the Septuagint transla- tion of the Pentateuch (3rd cent. B.C.). It is natural to suppose it was adopted by the Greeks who accompanied Alexander’s expedi- tion. Xenophon does not use it.

As early as the time of Ephraem (d. a.d. 373) the use of the Syriac GezirthB,, ” island,” had come in, and over a century earlier Philostratus reported (Life of Apollonius, i. 20) that the Arabs designated Mesopotamia as an island. 3 This term in the form al-Gazira became, and still is, the usual Arabic name.

The absence of any equivalent names in Babylonian or Assyrian documents is noteworthy, 8 especially as the Babylonians spoke of the

” Sea-Country ” (mat Tamtim). The name was not dis- tinctive enough from the point of view of Babylonia, which belonged to the same water system. Tiglath-pileser I. (Octagon Prism, 6, 40, 42 seq.) sums up the results of the military operations of his first five years as reaching from the Lower Zab Riviera to the Euphrates Riviera (ebirtan Puratti, well rendered ” Parapotamia ” by Winckler 4) and Qatte-land; but this is obviously not a proper name in the same sense as Naharin. 6 That probably originated in the maritime district of Syria.

Whilst the names we have mentioned are derived from physical geography, there are related names the meaning and origin of which are not so clear. Tethmosis III. is said, in a tomb which contains a picture of ” the chief of Kheta,” to have ” overthrown the lands of My-tn” (Breasted, Anc. Rec. ii. § 773), which lands are mentioned also in his hymn of victory (Breasted, Anc. Rec. ii- § 659). Amenophis II. receives tribute from the ” chiefs of My-tn (Breasted, Anc. Rec. ii. § 804). In the bilingual Hittite inscription of Tarqudimme the land is called ” the land of the city of Metan,” just as in the Hittite documents the Hittite country in Asia Minor is called ” the land of the city of Khatti.” Metan is clearly the same as Mitanni, over against Khatti, mentioned e.g. by Tiglath-pileser I. (vi. 63), which is the same as Mitanni, several letters from which are in the Amarna collection. Since a Mitanni princess of these letters is called in Egyptian scarabs a princess of Naharin, it is clear that Mitanni and Naharin are more or less equivalent, whilst in the Amarna letters even Tushratta, the king of Mitanni, seems to use in the same way the name Khani- galbat. A shorter form of this name is Khani, which it is difficult not to connect with Khana, the capital of which at one time was Tirqa, on the Euphrates, below the Khabur (see § 4). The slowly accumulating data have not yet made it possible to determine precisely the probably varying relations of these various names. The great astrological work uses a term of still wider signification, Subartu, eventually Suri (written Su. Edin ; see especially Winckler’s discussion in Or. Lit.Zeit., 1907). This represented one of the four quarters of the world in the early Babylonian view, the other three being Akkad (i.e. Babylonia) in the ” north,” Elam in the ” south,” and Amurru in the ” west.” It appears to have denoted the territory above Babylonia stretching from Anshan in the south east north-westwards, across the Tigris-Euphrates district, inde- finitely towards Asia Minor. At an early time it seems to have formed along with Anshan a distinct kingdom.

Strabo (xvi. 746) makes the south limit of Mesopotamia the Median wall; Pliny (v. 24 § 21) seems to extend it to the Persian Gulf. The Latin term naturally varied in meaning ■with the changing extent of Roman authority. For example, under Trajan Mesopotamia reached

the gulf and was bounded by Assyria and Armenia. In modern times it is often 1 There may be further evidence of the prevalence of the inter- pretation ” amid ” if the difficult bainath athrawatha of Cureton, Anc. Syr. Doc. p. 112, 1. 21, is correctly rendered in Payne Smith, Thesaurus Syr. 469, ” Mesopotamia,” and if we may assume a reading Nahrawatha for Athrawatha.

- Compare the use of the adjective, Ephr. Op. Gr. ii. 403 (cf. B. 0. i. 145, 168, 169), and the noun, B. 0. ii. 108, 109.

- Mesopotamian personal names like Na-ha-ra-a-u occur (cf. Johns, Duds and Documents, iii. 127) ; but these may be connected with a divine name Nachor.

4 Auszug vorderas. Gesch. 34; on the meaning see AU.-orient. Forsch. iii. 349.

6 It seems worth considering, however, whether ebir nari (see Johns, Assyr. Doomsday Book, 69; Winckler, AU.-or. Forsch. 212; Hommel, Anc. Heb. Trad., index) is not in origin practically a Begriff equivalent to Naharin.

Extent.

used for the whole Euphrates-Tigris country.’ That would pro- vide a’ useful name for an important geographical unit, but is too misleading. In view of historical and geographical facts there is much to be said for applying the name Mesopotamia to the country drained by the Khabur, the Bellkh, and the part of the Euphrates connected therewith. It would thus include the country lying between Babylonia on the south and the Armenian Taurus highlands on the north, the maritime Syrian district on the west, and Assyria proper on the east. That is practically the sense in which it is treated in this article. 6 We may begin, however, with the definition of Jezira by the Arabic geographers, who take it as representing the central part of the Euphrates-Tigris system, the part, namely, lying between the alluvial plains in the south and the mountainous country in the north. Measured on the Euphrates, this would be from the place where the river, having bored its way through the rocks, issues on to the high plain a little above Samsat (Samosata) only 1500 ft. above the sea, to somewhere about Hit (Is = Id), where, probably less than 150 ft. above the sea, it begins to make its way through the alluvial deposits of the last ‘few’ millenniums. In these 750 m. it has descended less than 1400 ft. Measured on the Tigris Mesopotamia would stretch from some- where between Jeziret-ibn-‘Omar and Mosul to somewhere

below Tekrit.

In the tract defined, physical changes unconnected with; civilization have been slight as compared with those in Baby- lonia; the two great rivers, having cut themselves deep channels, could not shift their courses far.

i. Natural Divisions. — The stretch from Samsat and Jeziret-ibn-‘Omar to the alluvial plain seems to divide itself naturally into three parallel belts, highland watershed district, un- ^_ ‘ . dulating plains and steppe. (1) The Taurus foothill ue °Z ra P y- barrier that shuts off the east to west course of the Euphrates ind. Tigris culminates centrally in the rugged volcanic Karaja-DSgh (6070 ft.) which blocks the gap between the two rivers, continued eastwards by the mountainous district of Tur-‘Abdin (the modern capital Midyat is at a height of 3500 ft.) and westwards by the elevated tract that sends down southwards the promontory of J. Tektek (c. 1950 ft.). (2) At the line where this east to west wall ends begins the sea of undulating plains where there is enough rain for abundant wheat and barley. (3) From the alluvial flats upwards toward these undulating plains is an extensive stretch of steppe land almost destitute of rain. Not far above the transi- tion from the barren steppe is a second mountain wall (125 in. between extremities) roughly parallel with the first, consisting of the Sinjar chain (about 3000 ft., limestone, 50 m. long, 7 m. broad), continued westwards after a marshy break by the volcanic Tell Kokab (basalt, about 1300 ft.), and then the ‘Abd al-‘Aziz range (limestone), veering upwards towards its western end as if to meet the Tektek promontory from the north.

ii. Drainage. — The water system is thus determined. West of Tektek drains into the Belikh, east of Tektek into the Khabur. All this drainage, collected into two rivers, the Belikh arid the Khabur, is towards the left bank of the Euphrates, for the Meso- potamian watershed seems to be only some 15 m. or less from the Tigris until, south of the Sinjar range, it lies farther west, and the Tharthar river is possible. The Belikh (Balich, Bilechas, B’aXWos 7). a stream some 30 ft. wide, has its main source some 50 m. north in the ‘Ain Khalil ar-Rahman, but receives also the waters of the united Nahr al-Kut (in its upper course formerly the Daisan, SieipTos) from Edessa and Kopru Dagh, and the Jullab from Tektek Dagh about as much farther north. The Khabur (Ch’abur, Chab5ras s), 80-100 ft. wide, before its last 40 m. reach in a south- west direction, has a 70 m. reach due north and south from Tell Kokab (about 1300 ft.), near which are united the Jaghjagh (earlier, Hirmas, 20 ft. in width), which has come 50 m. from Nasibln in the north-east, bringing with it the waters of the many

streams from theTQr ‘Abdin highlands; the north ‘Awij, which at certain seasons brings much water due south from Mardin, and the main strea«n of the Khabur, which has come 60 m. from Ras al-‘Ain-in the north-; west, after flowing 50 m. by way of WSranshahr from Karaja Dagh in the north. The Tharthar (Assyrian Tartar, in Tukulti-Ninib II.‘s inscription) begins in the Sinjar range and runs southwards, to lose itself in the desert a little above the latitude of Hit. So it was two generations before Ahab (Annates de Tukulti Ninip, V, Scheil, 1909),. The Arabian geographers represent the Tharthar as connected at its upper end (by a canal?) with the Khabur system.

6 In general the Tigris is considered to belong to Assyria or Babylonia, and all west of the Euphrates to Arabia or Syria. ‘ Cf. Ritter, Erdkunde, v. 250-253. 1 8 Ibid. xi. 253-265.

MESOPOTAMIA

*k m “ir Character °J Surface. 1 — (i) The tract between the Belikh and tne Euphrates is in its middle section exceedingly fertile, as is ‘ m P’ le ° ln „ the name Anthemusia, and according to v. Oppenheim (Z .d Gesellsch. f. Erdkunde, 36, 1901, p. 80) the same is true of the southern portion also. The plain extending from Urfa to a dozen miles below Harran has a rich red-brown humus derived from the fl’S 1 R a § h ˆ of Edessa – (2) The rolling plains north of the Abd al Aziz Sinjar mountain wall are intersected by the many streams of the Khabur system (the Arab geographer Mustaufi speaks of 30a feeders), which under favourable political and admini- strative conditions would produce a marked fertility. At Nasibin (Nisibis) rice is cultivated with success. (3) The country south of the mountain range is steppe land, imperfectly known, and of little use except for nomadic tribes, apart from the banks of the rivers (on which see Euphrates, Tigris). It consists mainly of grey dreary flats covered with selenite; and a little below the surface, gypsum. Bitumen is found at Hit, whence perhaps its name (Babylonian Id in Tukulti Ninib II.‘s inscription referred to above), and near the Tigris. 2

lv. Climate. 3 — Mesopotamia combines strong contrasts of climate, and is a connecting link between the mountain region of western Asia and the desert of Arabia. At Der ez-Zor, for example, the heat is intense. (1) In the steppe, during the sandstorms which frequently blow from the West Arabian desert the temperature may rise to 122 F. On the other hand, in winter the warm currents coming in from the Persian Gulf being met to a large ex- tent by northerly currents from the snow-covered tracts of Armenia are condensed down on to the plain and discharge moisture enough to cover the gravel steppes with

spring herbage. (2) In the higher plains, in mid winter, since the high temperature air from the gulf is drawn up the valleys of the Euphrates and the Tigris there may be, e.g. at Mosul, a ” damp mildness.” In spring the grass on the rolling plains is soon parched. So when the hot sandstorms blow in the lower steppe the scorching heat is carried right up to the foot ot the mountains. On the other hand, since the spurs of the 1 aurus bring the winter cold a long way south, and the cold increases trom west to east as we leave the mild coast of the Mediterranean, tar down into the Mesopotamian plain the influence of the snow- covered ridges can be felt, and in the higher parts of the plain snow and ice are not infrequent ; and although there is no point of sufficient altitude to retain snow for long, the temperature may fall as low as 14 F., especially if the cold north winds are blowing.

The cycle of vegetation begins in November. The first winter rains clothe the plain with verdure, and by the beginning of the year various bulbous plants are in bloom. The full summer develop- ment is reached in June. By the end of August everything is burnt up; August and September are the low- water months in the nvers, March to May the time of flood.

v. Flora.*— (1) Botanical lists have been published by von Oppenheim (Vom Mittelmeer zum Persischen Golf, ii. 373-388) of a collection made in 1893 containing 43 entries for Mesopotamia, ?d -, y .r Herzfeld {Herbaraufnahmen aus Kal’at-Serkaf-Assur, in Beiheft II. zur Or. Lit.-Zeit, 1908, pp. 29-37) of a collection made ‘/V3?!? I r 9 ?i 5 ’” neighbourhood of Assur, containing 181 entries. (2) lhe following are among the more important products of the Cent t r ?,!?)ne of Mes °P °tamia: wheat, barley, rice (e.g. at Saruj, the Khabur), millet, sesemum (for oil, instead of olive), dura (Holcus sorghum and H. btcolor) ; lentils, peas, beans, vetches; cotton, hemp, safflower, tobacco; Medicago sativa (for horses) ; cucumber, melons, water-melons, figs (those of Sinjar famed for sweetness), dates (below, ‘Ana and Tekrit); a few timber trees; plane and white poplar (by streams), willow and sumach (by the Euphrates). The sides of Karaja-Dagh, J. ‘Abd eW’Aziz and Sinjar are wooded, but not now the neighbourhood of Nisibis. (3) In the steppe the vegetation is that which prevails in similar soil from Central Asia to Algeria; but many of the arborescent plants that grow in the rockier and more irregular plateaux of western Asia, and especially ot Persia, have been reported as missing. Endless masses of tall weeds, belonging to a few species, cover the face of the country- large Cruciferae, Cynareae and Umbelliferae—a\so large quantities of liquorice : (Glycyrrhtza glabra and echinata) and Lagonychium, and the white ears of the Imperata. In autumn the withered weeds are torn up by the wind and driven immense distances.

vi. Fauna. 6 — The following abound : wild swine, hyaena, jackal, cheetah, fox; gazelle (in herds), antelope species (in the steppe); jerboa, mole, porcupine, and especially the common European rat (in the desert); bat, long-haired desert hare. The following are rare: wild ass; beaver, said to have been observed on the Euphrates- wolf, among others a variety of black wolf (Canis lycaori), said to be found in the plains; lion, said to roam as far as the Khabur. On the Euphrates are the following: vulture, owl, raven, &c, also the falcon {Ttnnanculus alaudarius), trained to hunt. Amone game birds are: wild duck and goose, partridge, francolin, soml kinds of dove, and in the steppe the buzzard. The ostrich seems almost to have disappeared. Large tortoises abound, and, in the Ain el-'Arus pool, fresh-w ater turtles and carp. Of domestic

1 Ritter, Erdkunde, xi. 493-498. 'See Geog. Journ. lx. 528-532 (with map). litter, xi. 198-499. * Ibid., xi. 499~502. J Ibid., xi. 502-510.

animals in the steppe the first place belongs, to the camel; next come goat and sheep (not the ordinary fat-tailed variety) ; the common buffalo is often kept by the Arabs and the Turkomans' on the Euphrates and the Tigris; on the Euphrates is found the Indian zebu.

vii. Towns. 6 — The towns that have survived are on the rivers Such are Samsat: (see Samosata), Rakka (Nicephorium) above the mouth ot the Belikh, Der ez-Zor, a rising town on the right bank where there is (since 1897) a stone bridge, "Ana (on an island; see A , N – A –) '. , y s £ ."• Id > > on the Euphrates; Jezlret ibn 'Omary Mosul (q.v.), Tekrit, on the Tigris; Edessa (q.v.), Harran (g.z,.); on confluents of the Belikh; Veranshehr (Tela), Ras al-'Ain (Rhesae- na),Mardin (half-way up the mountain wall), and Nasibin

At one time, however, Mesopotamia was teeming with life. The lines of the rivers are marked at frequent intervals by the ruins of flourishing towns of Assyrian, Roman and Caliphate times. Such are Birejik, Jerablus, Tell Ahmar, Kal 'at en-Najm, Balis, Karkisiya (garqisiya, Circesium), on the Euphrates; Kuyunjik, " Nimrud ontheligns; Khorsabad on a small tributary ; 'Arban, Tell Khalaf on the Khabur. The interesting oasis town el-Hadr (Hatra) is near the TharthSr. Excavation has hardly begun. The country is covered with countless mounds (tells), each of which marks the site of a town. The documents from the ancient Tirqa said to have been found at 'Ishara, a few miles belowKarkisiya, are referred to below (8 4) At Anaz(= Dur of Tiglathp'ileser IV.) was found in 1901 a slab (Pognon, Inscript. sem.

de la Syrie, Plate xxvi. No. 59)' with a bas-relief and an inscription of the governor of Dur, Mushezib- Shamash.' The stele referred to below (§ 7, end) as being probably 8 IMabomduss was found in 1906 some 15-20′ W. of Eski-Harran a little nearer to it thin to Hmeira, which is west of Eski-Harran' an "our and a half north-east of the ruins of Harran.' Parts of Mesopotamia have probably always harboured wandering tribes. Exactly how far the intervening lands beyond reach of the streams have done so it is difficult to make out. Fraser {Short Cut to India, p. 134) insists that in the undulating plains the direct rainfall is quite sufficient for agricultural purposes.

viii. Political Divisions.— On the whole the natural lie of the country has been reflected in the political divisions, which have of course varied in detail. We only mention some of those most often occurring. In the pre-Persian period, besides those referred to elsewhere, we may cite Kashyari (Tur 'Abdin), Guzanu (Gozan of 2 Kings xvii, 6; in the Khabur district), Bit Adini (Osroene), Kummukh (north-west corner and beyond) ; in the Roman period, Osroene (q.v,),_ Mygdonia (in the east), and in Syriac usage Beth 1 ,ˆ ba y A e (between Nisibis and Mosul) ; in the Arab period, Diarbekr (Tur Abdin), Diar Rebl'a (Mygdonia), Diar Mudar (Osroene).

ix. Roads. 3 — The routes of communication have probably changed httle in the last 5000 years. It has not yet been proved that Edessa is an ancient city (see Edessa: § 2) but it probably was, and its neighbour Harran, the tower of which can be seen from it bears a name which seems to indicate its position as a highway centre. (1) An obvious series of routes followed the course of the nvers: from Thapsacus (Dibse) down the Euphrates, from Jeziret ibn Omar down the Tigris, from Circesium up the Khabur. The Euphrates was crossed at Birejik (Til Barsip?), or Jerablus (Car- chemish?), or Tell Ahmar (unidentified), or Thapsacus. 10 (2) Probably the modern route from Samosata eastwards behind the Karaja Dagh to Diarbekr was also well known. The same is doubt- less true of the route from Osroene by Ras al-'Ain and Nasibin, and that by Veranshehr and Mardln to the Tigris. About other cross-roads, such as those_from Harran to Tell Shaddada on the lower Khabur, or from 'Ana by al-Hadr to Mosul it is difficult to say.

Functionally, Mesopotamia is the domain that lies between Babylonia and the related trans-Tigris districts on the one hand, and the west Asian districts of Maritime Syria and History's Asia Minor on the other. Its position has given it a Earliest long, complicated and exciting history. The great Times. rivers, in later times theoretically regarded as its boundaries, have never really been barriers (cf. e.g.

Winckler, Allorient. Forschungen, iii. 348), whence the vagueness of the geographic^ terminology in all times. Its position, along with its character, has prevented it often or long, if ever, playing a really indepen- dent part.

Who the earliest inhabitants of Mesopotamia in approximately, historical times were is not yet clear. It is possible that its-

6 Ritter, Erdkunde, xi. 279-492.

7 For the interpretation cf. Or. Lit.-Zeit. xi. 242-244.

8 On the interpretation see P. Dhorme, Rev. Bibl. (Jan., 1908).

9 Ritter, Erdkunde, xi. 265-278.

10 On these and other crossing plates, see Ritter, Erdkunde, x.

959-1004.

connexion with the north, and Asia Minor, goes back to a very early date. It may be that some of the early north Babylonian kingdoms, such as Kish, extended control thither. The earliest Babylonian monarch of whose presence in Mesopotamia there is positive evidence is Lugalzaggisi (before 2500 B.C.), who claims, with the help of En-lil, to have led his countless host victorious to the Mediterranean. His empire, if he founded one, was before long eclipsed, however, by the rising power of the Semites. Excavation in Mesopotamia may in time cast some light on the questions whether the Semites really reached Babylonia by way of Mesopotamia, 1 when, and whom they found there, and whether they partly settled there by the way. Whether Sharru-GI, Manishtusu and Remush (often called Uru-mush) really preceded, and to some extent anticipated, ” Sargon ” i.e. Shargani-sharri, as L. W. King now 2 plausibly argues, is not certain; nor* whether the 32 kings who revolted and were con- quered by Manishtusu, as we now learn, were by the Mediter- ranean, as Winckler argued, or by the Persian Gulf, as King holds. That -Sargon was or became supreme in Mesopotamia cannot be doubted, since there is contemporary evidence that he conquered Amurru. The three versions of the proceedings of Sargon (Sharru-GI-NA) in Suri leave us in doubt what really happened. As he must have asserted himself in Mesopotamia before he advanced into the maritime district (and

perhaps beyond: see Sargon), what is referred to in the Omens and the Chronicle 26,472 may be, as Winckler argued {Or. Lit.-Zeit. 1007, col. 296), an immigration of new elements into Suri — in that case perhaps one of the early representatives of the ” Hittite ” group. According to the Omens text Sargon seems to have settled colonies in Suri, and suggestions of an anticipation of the later Assyrian policy of transportation have been found by King {op. cit.) under the rulers of this time, and there are evidences of lively intercommunication. Mesopotamia certainly felt the Sumero-Babylonian civilization early. It was from the special type of cuneiform developed there, apparently, that the later Assyrian forms were derived (Winckler, AUorient. Forsch. i. 86 seq.). What the ” revolt of all lands ” ascribed to the later part of Sargon’s reign means is not yet clear; but he or his son quickly suppressed it. Mesopotamia would naturally share in the wide trade relations of the time, probably reaching as far as Egypt. The importance of Harran was doubtless due not only to its fame as a seat of the Moon-god Sin, honoured also west of the Euphrates, and to its political position, but also to its trade relations. Contemporary records of sales of slaves from Amurru are known.

When the Semitic settlers of the age of Sargon, whom it is now common with some justice to call Akkadians (see Sumer), had become thoroughly merged in the population, there appeared a new immigrant element, the Amurru, whose advance as far as Babylonia is to be traced in the troubled history of the post- Gudean period, out of the confusion of which there ultimately emerged the Khammurabi dynasty. That the Amurru passed through Mesopotamia, and that some remained, seems most probable. Their god Dagan had a temple at Tirqa (near Tshara, a little below Circesium), the capital of Khana (several kings of which we now know by name), probably taking the place of an earlier deity. At Tirqa they had month names of a peculiar type. It is not improbable that the • incorporation of this Mesopotamian kingdom with Babylon was the work of Kham- murabi himself.

Not quite so successful eventually was the similar enterprise farther north at Asshur [or Assur {q.v.)] on the east margin of Mesopotamia, although we do not know the immediate outcome of the struggle between Asshur and the first Babylonian king, Sumu-abi. Possibly the rulers of Babylon had a freer hand in a city that they apparently raised to a dominant position than the Semitic rulers of Asshur, who seem to have succeeded to men of the stock which we have hitherto called Mitanni, if we may judge

1 On the theory that it was climatic changes in Arabia that drove the

Semites to seek new homes along the route mentioned above, see L. W. King, History of Sumer and Akkad (1910), which appeared after this article was written.

- See the preceding note.

from the names of Ushpia who, according to Shalmaneser I. and Esarhaddon, built the temple, and Kikia who, according to Ashur-rem-nisheshu, built the city wall. 3 The considerable number of such names already found in First Dynasty records seems to show that people of this race were to be found at home as far south as Babylonia. Whether they were really called Shubaru, as Ungnad suggests, we may know later.

When Khammurabi's fifth successor saw the fall of the Amorite dynasty in consequence of an inroad of " Hittites," these may have been Mesopotamian Shubaru-Mitanni; but they may, as Ungnad suggests, represent rather an- rimes. cestors of the Hittites of later times. It is difficult • in any case not to connect with this catastrophe the carrying away to Khani of the Marduk statue afterwards recovered by Agum, one of the earlier kings of the Kassite dynasty. Whether Hittites were still resident at Khana we do not know. The earlier Kassite kings of Babylon still maintained the Amorite claim to " the four quarters; " but it is improbable that there was much force behind the claim, although we have a document from Khana dated under Kashtiliash. It is just as uncertain how long Asshur remained under the Babylonian suzerainty of which there is evidence in the time of Khammurabi, and what the relation of Asshur to western Mesopotamia was under the early kings whose names have lately been recovered. All these matters will no doubt be cleared up when more of the many tells of Mesopotamia are excavated. Only two have been touched: 'Arban on the Khabur, where remains of a palace of uncertain date, among other things an XVIII. dynasty scarab, were found by Layard in 1851, and Tell Khalaf, where the con- fluents join, and remains of the palace of a certain Kapar, son of Hanpan of " Hittite " affinities but uncertain date, were found by von Oppenheim in 1899. A long inscription of a certain Shamshi-Adad [Samsi-Hadad], extracts from which are quoted byDelitzsch {Mitt. d. Deutsch Or.-Gesellschaft No. 21 p. 50), unfortunately cannot be dated exactly, or with certainty even approximately; but if Delitzsch and Ed. Meyer are right, it belongs to a time not many generations after Agum recovered the Marduk statue. Shamshi-Adad's claims extend over the land between the Tigris and the Euphrates, and he says that he erected memorials of himself on the shore of the Great Sea.

The mystery of theHyksoshas not yet been solved; but it is not impossible that they had relations with Mesopotamia. After they had been driven out of Egypt {q.v.), when Ahmose, the officer of Tethmosis (Thutmose) I., mentions Naharin (late 16th century), he does not say anything about the inhabitants. He seems to imply, however, that there was more than one state. The first mention of Mitanni, as we saw, is under Tethmosis III., who clearly crossed the Euphrates. It is at least possible that common enmity to Mitanni led to a treaty with Assyria (under Ashur-nadin-akhe) . 4 Victorious expeditions into Naharin are claimed for Amenophis II., Tethmosis IV. and Amenophis III. The Egyptian references are too contemptuous to name the rulers; but Shaushatar may have begun his reign during the life- time of Tethmosis III., and from cuneiform sources we know the names of six other Mitanni rulers. As they all bear Aryan names, and in some of their treaties appear Aryan deities (Indra, Varuna, Mithra, &c), it is clear that Mesopotamia had now a further new element in its population, bearing apparently the name Kharri. 5 Many of the dynasts in North Syria and Palestine in the time of Tushratta bear names of the same type. The most natural explanation is that Aryans had made their way into the highlands east of Assyria, and thence bands had pene- trated into Mesopotamia, peacefully or otherwise, and then, like the Turks in the days of the Caliphate, founded dynasties. The language of the Mitanni state, however, was neither Aryan nor Semitic, and may very well be that of the mysterious ” Hittite ” hieroglyphic inscriptions (see Hittites). Mitanni was one of the great powers, alongside of Egypt and Babylonia, able to send to Egypt the Ninevite Tshtar; and at this time as much as at any

3 Ungnad, Beitr. z. Assyr. VI. v. 13.

4 See e.q. P. Schnabel, Stud. z. bab.-ass. Chron. p. 25 (1908).

6 Winckler has identified the Kharri with the Aryans, to whom he assigns a state in Armenia {Or. Lit.-Zeit., July 1910).

Aramaeans.

other, we must think of common political relations binding the districts east and west of the Euphrates. The king mentioned above (Shaushatar) conquered Asshur (Assur), and Assyria remained subordinate to Mitanni till near the middle of the 14th century, when,

on the death of Tushratta, it overthrew Mitanni with the help of'Alshe, a north Mesopotamian state, the allies dividing the territory between them. The Hittite king's inter- ference restored the Mitannite state as a protectorate, but with a smaller territory, probably in the north-west, where it may have survived long.

Assyria was now free, and Ashur-uballit [Assur-yuballidh ace. to Sayce] knew how to make use of his opportunities, and, in the words of his great grandson, " broke up the forces of the widespread Shubari " (AKA, p. 7, 1. 32 seq.). Knowing what we know of the colonizing power of the Assyrians, we may assume that among the " Mitanni " and other elements in the Mesopo- tamian population there would now be an increase of people of " Assyrian " origin. On the tangled politics of this period, especially Mesopotamia's relations with the north-west, the Boghaz-Keui documents may be expected to throw a great deal <*f light. We know already a little more of the chequered history of the Amorites in the Naharin district, beset by great powers on three sides. When Mitanni fell Babylon no doubt adhered to its older claims on Mesopotamia; but the Kassite kings could do little to contest the advance of Assyria, although several rectifica- tions of the boundary between their spheres are reported.

Mitanni's fall, however, had opened the way for others also. Hence when Ashur-uballit's grandson, Arik-den-ili (written PU.DI.ili), carried on the work of enforcing Assyria's claim to the heirship of Mitanni, he is described as conquering the warriors * (?) of the Akhlame and the Suti. The references to these people, who practically make their first appearance in the Amarna correspondence, 2 show that they were unsettled bands who took advantage of the loosening of authority to introduce themselves into various parts of the country, in this case Mesopotamia. Gradually settlements were made, the names of many of which are given by the various Assyrian kings who had at one time or another to assert or reassert supremacy over them — such as Chindanu, Laqe, Suhi along the South Euphrates boundary of Mesopotamia, and various districts bearing names compounded with Bit = settlement (see above), such as Bit-Adini (nearly equal the later Osroene; see Edessa), or Bit-Zamani in the north near Diarbekr. The specific name Aramaean first appears in the annals of Tiglath-pileser I., unless we identify the Arimi of Shalmaneser I. in Tur "Abdin with the Aramu; 3 but the name may probably with fitness be applied to a very large number of the communities mentioned from time to time. Their position in Mesopotamia must have been very like that of the Shammar at the present time (see ad fin.). As they gradually adopted settled life in various parts of the country the" use of Aramaic spread more and more (see below, § " Persians ").

Meanwhile Mesopotamia continued to be crossed and re- crossed by the endless marches of the Assyrian kings (such as Adad-nirari, Shalmaneser I. and his son), building empfre.” an d rebuilding the Assyrian empire (see Babylonia and Assyria), and eventually pushing their con- quests towards Asia Minor at the expense of the Hittite domain. If, on the fall of the Kassites, Nebuchadrezzar I. established more direct relations between Mesopotamia and Babylon, his work was presently undone by the vigorous campaigns of Tiglath-pileser I., who seems to have even won Egypt’s sanction of his succession to the Hittite claims. The newly recovered (1909) tablet of Tukulti-Ninib, the grandfather of Shalmaneser II., is interesting from its account of an expedition down the course of the Tharthar to Hit = Id (river and town now first mentioned in cuneiform sources) and up the Euphrates to the Khabur district.

1 See M. Streck, Zeit. Assyr., 18, 157.

2 On a wrongly supposed much earlier occurrence of the name Achlamu, see Klio, vi. 193 n. 3.

- So for example A. Sanda, Die Aramder, 5 (1902).

Now that Mesopotamia had passed out of the hands of Babylon, all that the later kings could do was to encourage local Mesopotamian rulers in their desire for independence (Nabu- apluiddin). These were convinced that Assyria was master, but refused their tribute when they thought they dared. To thoroughly overpower the troublesome Bit-Adini (see above, § 3, viii.), which had naturally been aided by the states west of the Euphrates, Shalmaneser II. (860-825) settled Assyrians in their midst. Harran was one of the few places that remained on his side during the great insurrection that darkened his last days. Similarly the province of Guzanu (Heb. Gozan,rouf wms), on the Kahbur, held with the capital Asshur in the insurrection that occurred in 763 (the year of the eclipse), when evidently some one (an Adad-nirari ?) wore the crown, at least for a time. Harran was clearly closely associated with Asshur in the rights and institutions that were the subject of so much party struggle in the new Assyrian empire that began with Tiglath-pileser IV. (see Babylonia and Assyria). When the policy of transporting people from one, part of the empire to another was developed, new elements were introduced into Mesopotamia, amongst them Israelites, of whom perhaps traces have been found in the neigh- bourhood of Harran at Kannu’. 4 These new elements may have been more organically attached to the Assyrian state as such than the older inhabitants, to whom the affairs of state at Nineveh would be of little interest. On the conditions at Harran some light is

thrown by the census partly preserved in Ashurbanipal's library. 5 The governors of several Mesopotam- ian cities, such as Nasibin, Amid, took their turn as eponyms; but this would not have much significance for the people. Hence even the fall of Nineveh (607 B. a), apart from what such cities in Mesopotamia as held by its last kings suffered through the invasion, first perhaps of Nabopolassar, who in 609 B.C. claims to be lord of Shubaru, and then of the Medes, would be a matter of comparative indifference; tribute paid to Babylon was just as hard to find as if it were going to Nineveh. Necho did not succeed, like his great XVIIIth dynasty predecessor, in crossing the Euphrates, He was defeated by Nebuchadrezzar at Carchemish (605 B.C.), and Mesopotamia was confirmed to B abylon. Its troubles began again shortly after Nebuchadrezzar's death; the Medes seized Mesopotamia and besieged Harran. Before long, however, the overthrow of Astyages by Cyrus cleared Mesopotamia, and Nabonidus (Nabu-naid) was able, drawing on the resources of the whole of Syria for the purpose, to restore the famous temple of Sin at Harran, where a few years later he erected in memory of his mother, who seems to have been a priestess there, the stele published in 1907 by Pognon.

The fragmentary nature of the records does not enable us to follow the steps by which Cyrus became master of Mesopotamia, dn which he probably met with little or no resistance. Persians. How much of Mesopotamia was involved in the revolt of what the Persian inscription calls Assyria (Athur), is not clear. Nor does it appear with certainty to which of the twenty satrapies into which, according to Herodotus, the Persian empire was divided, Mesopotamia belonged; probably it was included in ' Abar nah&ra. The fact is, we have no infor- mation from native sources. 6 The probability is that conditions ' remained very much what they had been; except that the policy of transportation was not continued. The satraps and other high officials would naturally be of Persian extraction; but local affairs were probably managed in the old way, and there was no important shift of population. The large Aramaic infusion had by this time been merged in the general body of the people. These settlers doubtless influenced the " Assyrian " language; 7 but gradually, especially in the west, their own language more

4 S. Schiffer, Keilinschriftliche Spuren der in der zweiten H&lfte des 8. Jahrhunderts von den Assy rem nach Mesopetamien depprtierten Samarier (10 Stamme) (1907); C. H. W. Johns in Proc. So,c. Bib. Arch. (March, May, 1908).

6 C. H. W. Johns, An Assyrian Doomsday Book (1901).

6 For the history from the time of Herodotus onwards, see Ritter, Erdkunde, x. 6-284.

7 M. Streck, Klio, vi. 222 seq.

and more prevailed. Although Aramaic inscriptions of the Assyrian period, like those of Zanjirli or that of King ZKR of Hamath, have not been found in Mesopotamia, already in the time of Shalmaneser II. mention is made of an Aramaean letter (Harper, Ass. Bab. Letters, No. 872, obv. 1. 10), and Aramaic notes on cuneiform documents begin to appear. Weights with Aramaic inscriptions (the oldest from the reign of Shalmaneser IV., 727-22) were found at Calah. By the Achaemenian period Aramaic had become the international language, and was adopted officially.

How Mesopotamia was affected by the passing of Persian armies on their way to suppress revolts in Syria or Egypt, or to conquer Greece, we do not know; on the whole it probably enjoyed unwonted peace. The expedition of Cyrus the Younger, with which Xenophon has made us so familar, only skirted the left bank of the Euphrates. The route followed by Alexander, though he also crossed at Thapsacus, took him unresisted across the northern parts; but the poor people of Mesopotamia suffered from the measures taken by their satrap Mazaeus to impede Alexander's progress. In spite of this, where Cyrus failed Alexander succeeded.

What would have happened had Alexander lived we can only guess. Under the Seleucids Babylon was moved across the u » . _ plain to Seleucia; but before long the central author- lty was transferred to the other side of Mesopotamia, Antioch or elsewhere — a fateful move. It is improbable that cuneiform and the Babylonion language continued to be used in Mesopotamia during the Hellenistic period, as it did in Babylonia, where it was certainly written as late as the last century B.C.; 1 and may have been a learned language till the second Christian century. 2 Unfortunately there are no native documents from the pre-Christian Hellenistic period. That the Hellenizing process went as far as it did in Syria is unlikely; and even there Aramaic remained the language of the people, even in the towns (cf. Edessa). Still, Greek influence was con- siderable. This would be mainly in the towns, the growth of which was quite a feature of the Macedonian -rule in Mesopotamia (Pliny, vi. 30, § 117).' This is seen in the Greek names

which now appear: such are Seleucia opposite Samosata, Apamea (= Birejik) opposite Zeugma, Hierapolis (= Membij), Eurdpos, Nicatoris, Amphipolis (= Thapsacus, or near it), Nicephorium (er-Rakka,) Zenodotium (stormed by Crassus), all on or by the Euphrates; Edessa (q.v.) on the upper waters of the Bellkh, Ichnae (perhaps Khnes, above the junction of the Qaramuch with the Bellkh). These are all in the Osroene district; but Nasibln became an Antioch, and as its district was known as Mygdonia (from Macedon) there were doubtless many other Greek settlements. To a less extent the same influences would be at work in towns called even by Western writers by their real names, such as Batnae, Carrhae (Charr'an), Rhesaena.

Mesopotamia naturally had its share of suffering in the struggles that disturbed the time, when Eumenes or Seleucus traversed it or wintered there. It was invaded and temporarily annexed in 243 by Ptolemy III. Euergetes in his rapid expedition to beyond the Tigris. When Molon revolted on the accession of the youthful Antiochus III. (224 B.C.) he entered Mesopotamia from the south. Antiochus skirted the northern highlands by way of Nasibln. How far the natives of Mesopotamia shared the desire of the Greek settlers (Joseph. Antiq. xiii. 5, n, § 184-186) to help Demetrius II. Nicator in checking the aggressions of the rising power of Parthia under Mithradates I. we do not know. It was in Mesopotamia that a large part of the army of Antiochus VII. Sidetes was destroyed in 130 B.C., and the Syrian kings did not again seriously attempt to assert their rule beyond the Euphrates. When Phraates II. turned the Scythians against himself, however, even Mesopotamia suffered from the plunderers (Joh. Antioch, in Miiller iv. 561). The immigration of Arabs

1 Probably the latest cuneiform document of certain date is a contract of 68 B.C. (cf. Klio, vi. 223 n. 3).

2 See G. J. F. Gutbrod, Zeitsch. f. Assyr. vi. 26-33; cf. M. Streck, Klio, vi. 223 n. 1.

3 See E. R. Bevan, House of Seleucus, i. 210-222, and references given there.

must have been going on for long. About this time they even founded a dynasty in Aramaean Osroene (see Edessa).

Under Mithradates II. Mesopotamia was a definite part of the Parthian empire, of which the Euphrates became the western boundary; but in 92 B.C. on that river his period" ambassador met Sulla, though the long duel did not begin immediately.

It was perhaps a Parthian governor of Mesopotamia that was called in to help Strato of Beroea against Demetrius III.; but before long Mesopotamia (especially the district of Nislbis) was attached to the growing dominions of Armenia under its ambitious king Tigranes, perhaps with the consent of Sinatruces (Sanatruces). The lost territory, however, was recovered by Phraates III., and Mesopotamia was guaranteed to Parthia by the treaties of Lucullus and Pompey (66 b.c). It was traversed, however, several times by Roman troops crossing from Armenia to Syria, and Parthia's declaration of war against Armenia involved it with Rome. Gabinius crossed the Euphrates (54) ; but the command was assumed by Crassus, who, though he seized Ichnae, &c, and Raqqa (Rakka), fell near Carrhae (53), and the Parthian dominion was confirmed. The tragedy of the Ides of March saved Mesopatamia and the East from a great campaign by Julius Caesar, and it was at the hands •f VentidiusBassus, and west of the Euphrates, at Gindarus (north east of Antioch), that the Parthians received the check that put an end to any real rivalry with Rome. Mesopotamia narrowly escaped being the scene of the struggle when Antonius in 36 finally decided to make his disastrous attempt against Phraates IV. by way of Armenia. In a.d. 36, Tiridates found support in his attempt to secure the throne of Artabanus III. in Mesopatamia, and it was there that he saw his army melt away. The affairs of Armenia continued to be the source of friction between Parthia and Rome, and Nislbis changed hands several times. The expedition against Rome of Vologaeses I. (q.v.) of a.d. 62 reached no further west- wards than Nisibis, and in 66 a peaceable arrangement was come to. Of the half-century that preceded Trajan's great oriental undertaking not much is known. When in 115 Trajan entered Mesopotamia from the north no serious resistance was offered, and it became a province as far as Singara. The woods at Nijibis, the headquarters, provided material for the boats with which in 116 he crossed the Tigris. Hatra, an interesting fortress which seems to have been Aramaean, fell, and the army advanced to Hit, where it found the fleet that was subsequently transferred to the Tigris. For the revolt that occurred while Trajan was on the Persian Gulf, in which the Jews had an important hand, Nislbis and Edessa suffered capture and destruction. Hatra successfully withstood siege, however, and Hadrian abandoned Mesopotamia, setting the boundary at the Euphrates. Again for half a century there is not much to relate. . Then, when Vologaeses, yielding to his growing discontent, took advantage of the death of Antoninus to invade Armenia the Romans were victorious (164), and after the storming of places such as Nicephorium, Edessa, Nisibis, western Mesopotamia was once more Roman as far as the Khabiir, Carrhae becoming a free city and Osroene a dependency.

By this time Christianity had secured a foothold, perhaps first among the Jews (see Edessa), and we enter upon the earliest period from which documents in the Edessan dialect of Aramaic, known as Syriac, have been preserved. Unfortunately they contain practically nothing that is not of Christian origin. 4 On the death of Aurelius Hatra aided Niger against Septimius Severus in 194; Osroene rose against Rome, and Nislbis was besieged and other Roman places taken; but Septimius Severus appeared in person (195), and from Nislbis as headquarters subdued the whole country, of which he made Nislbis metropolis, ■raising it to the rank of a colony, the Sin jar district, where Arabs from Yemen had settled, being incorporated. On his retiring everything was undone, only Nislbis holding out; but on his reappearance in 198 the Parthians withdrew. Again the Euphrates bore a Roman fleet. Hatra, however, was besieged twice in vain. Peace then prevailed till Carcalla's unprovoked attack on Parthia in 216, after he had reduced Osroene to a province. On his assassination near Carrhae (21ˆ, Macrinus was defeated at Nislbis- and had to purchase peace, though he retained Roman Mesopotamia, reinstating the princely house in Osroene.

The power of Ardashir, the Sassanian, however, was already rising, and the Parthian Artabanus died in battle in 224 (or 227) ; and Ardashir proposed to prove himself the successor of the Achaemenidae. Hatra resisted the first Persian attack as it

- The earliest inscription in Syriac yet known dates from A.D. 77, and was found at Serrin (opposite I£al'at en-Najm) by von Oppenheim.

had resisted Rome; but Mesopotamia was overrun, Nislbis and Carrhae being taken (233). It was immediately, indeed, recov- ered by Alexander Severus, and retained, whatevef Period. was *- Be precise success of the war; but Nislbis and Carrhae were retaken by the Persians in the reign of Maximin. Under Gordian III. in 242 Mesopotamia was entered by a great Roman army which recovered Carrhae and Nislbis, and defeated the Persians at Rhesaena; but when Gordian, after a difficult march down the Khabur, was murdered at Zaitha below Circesium, Philip the Arabian (244) made the best terms he could with Shapur I. Whatever they were, the Roman garrisons seem not to have been really withdrawn. A rest for Mesopotamia seems to have followed; but in 258 Shapur, tempted by the troubles in

the Roman empire, overran the country taking Nislbis and Carrhae, and investing Edessa, and when Valerian invaded Mesopotamia he was eventually made prisoner, by Edessa (260). After Shapur's cruel victories in Syria, however, he was defeated by Odaenathus, who relieved Edessa, and Mesopotamia became for ten years practically part of an Arabian Empire (see Palmyra), as it was to be four centuries later. In consequence of the revolt of Zenobia Mesopotamia was lost to Rome, and the Euphrates became the frontier. Aurelian overthrew the Palmyran rule^ but he was assassinated ' before he could carry out his intended expedition against Persia, Probus was assas- sinated before he was able to do anything (or much), and although Carus easily overran Mesopotamia, which became Roman again, and even took Ctesiphon, the Romans retreated on his death (283-4). The next incident is the defeat of Galerius, between Carrhae and Callinicus, where he had entered Mesopotamia (about 296), in the war provoked by Narses in consequence of his relations with Armenia. When it was retrieved by a signal victory, Diocletian advanced to Nislbis. and thence dictated terms of peace by which Mesopotamia to the Tigris was definitely ceded to Rome (298).

One result of the connexion with Rome was, naturally, that Mesopotamia came within the range of the Decian, and later the Diocletian persecutions (see Edessa: § Sassanian Period). At the Nicene Council there were bishops from Nislbis (Jacob), Rhesaena, Macedonopolis (on the Euphrates, west of Edessa), and Persia (Harnack, Mission and Expansion of Christianity, ii. 146; see generally 142-152).

After a forty years' peace the struggle was resumed by Shapur II. Nislbis thrice endured unsuccessful siege (338, 346, 350), although meanwhile Constantine had suffered defeat at Singara (348). Then Mesopotamia enjoyed two short rests (separated by a sharp struggle) while the rivals were engaged elsewhere, when in 363 Julian (q.v.) made his disastrous attempt, and Jovian bought peace at the price, among other things, of Singara and Nislbis — i.e. practically all eastern Mesopotamia.

The surrender of Nislbis, which had been in the possession of Rome for so many generations", caused consternation among the Christians, and Ephraem {q.v.) moved to Edessa, where his "school of the Persians " soon became famous (see Edessa). In the war of 42 r, in which the north-east of Mesopotamia was chiefly concerned, the Romans failed to take Nislbis, and it became a natural rallying point for the Nestorians after the decision of Ephesus (431). Matters were st'ill more complicated when the Western Christians of Edessa found

themselves unable to accept the ruling of Chalcedon against Monophysitism in 451 (see Monophysites), and there came to be three parties: Nestorians (q.v.), Jacobites (see Jacobite Church) and Melchites (q.v.).

In the beginning of the 6th century there was another severe struggle in Mesopotamia, which found an anonymous Syriac historian (see Edessa), and in infringement of agreement the Romans strongly fortified Dara against Nislbis. The Persian invasion of Syria under Kavadh I. (q.v.) was driven back by Belisarius; but the latter was defeated in his pursuit at Rakka (53 1)- The peace begun by Chosroes I. (532) was not long kept, and Roman Mesopotamia, except the pagan Harran, suffered severely (540), Edessa undergoing a trying siege (S44)-

The fiftv vears' n**Ar*» alco (ef\i\ mio eTiˆi-f !Nt a J . +U~ t>~—
~ — «

again failed in* an attempt to recover Nislbis (573), whilst Chosroes' siege of D&ra was successful. Mesopotamia naturally suffered during the time of confusion that preceded and followed the accession of Chosroes II., and the Romans recovered their old frontier (591).

With the accession of Phocas (602) began the great war which shook the two kingdoms. The loss of Edessa, where Narses revolted, was temporary; but the Roman fortress of Dara fell after nine months' siege (c. 605) ; Harran, Ras al-' Ain and Edessa followed in 607, many of the Christian inhabitants being trans- ported to the Far East, and Chosroes carried the victorious arms of Persia far into the Roman Empire. Finally Heraclius turned the tide, and Kavadh II. restored the conquests of his pre- decessor. The Syrian Christians, however, found that they had only exchanged the domination of a Zoroastrian monarch for an unsympathetic ecclesiastical despotism. In the confusion that followed, when men of letters had to five and work in exile, Nislbis set up for a time (631-632) a grandson of Chosroes II. Finally all agreed on Yazdegerd III.; but, while Chosroes II. and Heraclius had been at death grips with each other a great invasion had been preparing in Arabia.

The Arab tribes in Mesopotamia were Christian, and Heraclius at Edessa hoped for their support; but Karkisiya and Hit succumbed (636), and then Tekrlt; and Heraclius retired to Samosata. When in 638 he made another caliphate. attempt, it is said at the entreaty of the Mesopotamian Christians, Arab forces appeared before Rakka, Edessa, Nasibin and other places, and all Mesopotamia was soon in

the hands of the Arabs. Henceforth it looked to Damascus and to Kiifa and Basra, instead of to Constantinople or Ctesiphon. The new r6gime brought welcome relief to the Christian part of the population, for the Arabs took no note of their orthodoxies or heterodoxies. (Moawiya is said to have rebuilt the dome of the great church at Edessa after an earthquake in 678.) Fortunately for Mesopotamia the seats of the factions which immediately broke the peace of Islam were elsewhere; but it could not escape the fate of its geographical position.

The men of Rakka were compelled to help ‘AH, after his march across Mesopotamia from near Mosul, in getting a bridge made at Rakka to convey his men to Siffin. Not long afterwards there was a new excitement in Moawiya’s incursion across to the Tigris. The discontent under Yazid III. was keen in Mesopotamia, where Merwan in fact got a footing, and when the troubles increased after he became caliph he abandoned Damascus in favour of his seat at ftarran. His son was besieged by Dabbak and his Kharijites and Saffarids in Nasibin; but a fierce battle at Mardln ended in Merwan’s favour (745). The cruelties that accompanied the over- throw of the Omayyad dynasty excited a revolt, wMch spread to Mesopotamia, and Harran had to undergo a siege by one of Merwan’s generals. It was next besieged by al-Mansur’s brother; but the battle between the brothers was fought at Nasibin. It was decisive, but there were further risings, involving Mesopotamia. 1

An inevitable effect of the reign of Islam had been that the kindred language of the Arabs gradually killed the vernacular Syriac of Mesopotamia (see Edessa) as the alien Greek and Persian had shown no tendency to do, and the classical period (4th to 8th centuries) of the only Mesopotamian literature we know, such as it is, useful but uninviting, came to an end (see Syriac Literature). This naturally encouraged grammatical study. Among the Aramaic-speaking people the revolution which displaced the Arabian court of Damascus in favour of a cosmopolitan world centred at the Babylonian seat of the civilizations dealt with in the preceding paragraphs naturally gave an impulse to the wider scholarship. Translations were made from Greek, as, e.g. by Thabit b. Qurra of Tfaxmn (d. 901), and from Pahlavi.
-.’.■”

Mansur built a castle at Rafiqa opposite Rakka tojcbntrol the country round, and his son Harfln al-RasMd actually” resided during most of his reign, not at Bagdad hSt’ i)t Rakfcia, where two generations later al-Battani of Harrin was making the’ astronomical observations on which his tables were based (see Albatecjnius) Abu Qurra, bishop of Harran, atid acquaintance of the caliph Ma’mun, who was one of the earlier Aramaean Christians to use Arabic, has been thought to have

contributed to the influences

1 For thus and following section see further Cauphate and

that developed the Mutazilite (Motazilite) sect. Nasibin was the scene of another revolt (793) under a Kharijite leader. Harun's son Motasim displeased the people by creating a bodyguard of Turks, and therefore transferred his seat to SEmarra. This put the caliphs fatally at the mercy of their guards.

Mesopotamia fell partly under the power of Ahmad ibn'fuhln of Egypt and his son; but before the end of the 9th century the Decline t Hamdanids, descendants of the Arab tribe of Taghlib, cˆuhata were ' n P ossess i° n °f Mardin, and in 919 one of them ˆaupoau. wag g 0vernor f D; ar Rabi'a, Later the brothers

Nasir ad-Daula and Saif ad-Daula ruled over Mesopotamia and North Syria respectively. Meanhwile the caliph Mottaqi appeared as a fugitive at Mosul, _ Nasibin, Rakka (944). The Hamdanids were followed by the 'Oqaylids, who had their seats at various places, such as Mosul, Nasibin, Rakka, Hardin, between 996 arid 1096. By 1055 the Seljuks had taken the caliph under their charge. They arrived at Jerusalem in 1076, the first crusaders reached Asia in 1097, and Bit Adini became the countship of Edessa (q.v.). The power of the Seljuks quickly disintegrated. The son of a slave of the third Seljfik sultan, Zangi, governor of 'Irak, made himself gradually (Mosul, Sinjar, Jezira, Harran) master of Meso- potamia (1128), capturing Edessa in 1144. Mesopotamia fell to one of his sons, Saif ad-Din, and branches sprang up, at Sinjar and Jezira. To the same period belong other Atabeg dynasties; Begtigmids at tfarran, Tekrit, &c. ; Ortokids at Edessa, 'Ana, &c., with Mardin as their headquarters. By 1185-1186 Saladin had made Egypt supreme over all these principalities, thus achieving what the XVIIIth and XlXth Egyptian dynasties had attempted in vain. Mesopotamia remained in the hands of the Ayyubite family till the appearance of the Mongols. The petty principalities were unable to unite to resist the terribla attack, and Jezira, Edessa, Nasibin, Maridin, &c., fell in 1259-60. The 'leading men of Harran emigrated into Syria, the rest were carried into slavery, and the ancient town was laid in ruins. It was the Mamluk rulers of Egypt that checked the death-bringing flood. Near Bira was the scene of one of their victories (in 1273), and their authority extended to

Karkisiya. The Ortokid dynasty survived the Mongol inundation, and it was in the 14th century that its laureate Safiy ad-Din al-rˆilli flourished. From the Mongol invasions of the 13th century western Asia has never recovered. Then, before the next century was out, came the invasion of Timur (1393-94). The Ortokids were followed by the Karakuyunli. In 1502 Meso- potamia passed for a time into the hands of the Safawid shah, Ishmael ; but in 1516 it came under the Osmanli Turks, to whom it has belonged ever since. The inroad of the Persians in the 17th century was confined to the south.

Since Mesopotamia finally came into the power of the Ottoman sultans considerable changes in the population have occurred. About that time parts of a confederation of tribes Arabs which had taken the name of Shammar from a moun- tain in their neighbourhood, moved northwards from Central Arabia in search of better pasture, &c. Successfully displacing their forerunners, they made themselves at home in the Syrian steppe — until their possession was in turn disputed by a later emigrant from Arabia, for whom they finally made room by moving on into Mesopotamia, over which they spread, driving before them their predecessors the Tai (whose name the Mesopotamian Aramaeans had adopted as a designation for Arab in general), partly north of the Sinjar, partly over the Tigris. Others they forced to abandon the nomadic life, and settle by the Khabur (e.g. the Jebur) or the Euphrates. These adjustments, it is supposed, had been effected by 1 700.

In 1831 “Ali, a newly appointed Turkish governor of. Bagdad, induced Suftig the chief of the Jerba, the more important division of the Shammar, to help him to dislodge his predecessor, Daud, who would not Vacate his position, but then refused them the promised payment. To defend himself from the enraged Shammar “Ali summoned the “Anaza from across the Euphrates. Having also succeeded in detaching part of the Shammar under Shlosh, he told the ‘Anaza he no longer needed their help. In the futile attempt of the three parties to dislodge the ‘Anaza Shlosh lost his life; but with the’ help of the Zubeid the other two succeeded, and Sufug was now supreme ” King of the Steppe,” levying blackmail as he pleased. Other methods of disposing of him having failed, the Porte made his nephew a rival sheikh; but he basely assassinated him. Sufug then suffered the same fate himself at the hands of the pasha, but has since become a hero. Two of his sons became involved in a quarrel, with the government, in consequence of which for years all Mesopotamia was in danger, till the second was put to- death in 1868, and Ferljan, the eldest son, a peaceable man who had been made pasha, became supreme. One of Sufug’s widows had fled to her Tai kindred in Central Arabia with her youngest son

Paris ; but when he grew up she brought him back in the seven- ties, and he immediately attracted a great following. He kept to the far north of Mesopotamia to avoid his brother Ferhan; but

finally half-sedentary tribes on the Khabur and the Belikh became tributary tp him, and a more or less active warfare sprang up between the brothers, which ended in a partition of Mesopotamia.

Ferhan and the South Shammar claimed the steppe south-east of a line from MSsul to Mayadin (just below JCarkisiya), and Fans and the North Shammar the north-west. Since Ferhan's death the Porte has favoured one after another of his many sons, hoping to keep the South Shammar disunited, especially as they are more than the others. The Shammar have been in undis- puted mastery from Urfa to the neighbourhood of Bagdad, practically all tribes paying khuwwa to them, and even the towns, till the government garrisoned them. Some 60 of these more or less nomadic communities, of one or two thousand tents (or houses) each, representing a population of several hundred thousands are described by Oppenheim. Each has its recognized camping ground, usually one for summer and another for winter. Most of them are Arab and Mahommedan. Some are Christian and some are not Arab: viz. Kurds, Turkomans or Circassians. For some years the Porte has been applying steady pressure on the nomads to induce them to settle, by increasing the number of military posts, by introducing Circas- sian colonies, as at Ras al-'Ain, sometimes by forcible settlement. More land is thus being brought under cultivation, the disturbing elements are being slowly brought under control, and life and property are becoming more secure.

Security is what the country chiefly needs. Hence its primary interest in the railway scheme, with a view to agri- cultural development and perhaps the growth of cotton; Sir W. Willcocks' irrigation schemes had Time"

not up to 1910 affected " Mesopotamia " directly. Apparently the real problem is one of population adequate to effect the improvements demanded. The new regime introduced in 1908 seems to justify a hopeful attitude. Apart from the disturbing effects of recent events in Persia, an exposition of present conditions would show progress. Exact statistics are not available because the vilayet of Mosul (3 5 , 130 sq. m. , 3 5 1 , 200 pop.) takes in on the east territory with which we are not concerned, and omits the Osroene district, which goes with Aleppo. Urfa is a 'town of 55,000; Mosul, 61,000, Bagdad, 145,000. The exports of Mosul for 1908 were (in thousands of pounds sterling): United Kingdom 195, India 42, other countries 52, parts of Turkey

218; the imports: United Kingdom 56, India 16, other countries 35, parts of Turkey 24. The language is in most parts Arabic; but Turkish is spoken in Birejik and Urfa, Kurdish and Armenian south of Dlarbekr, and some Syriac in Tur ‘Abdln. There are Christian missionary institutions of European origin in various places, such as Urfa, Mardin, Mosul. An interesting survival of early faiths is to be found in the Yezidls of the Sinjar district.

Authorities — Land and People : full references to Greek, Latin, Arabic and other writers are given in Ritter, Erdkunde x. 6-284, 921-1149; xi. 247-510, 660-762; for the conditions since the Arab conquest, Guy le Strange, Lands of the Eastern Caliphate (1905), chiefly pp. 86-114, is especially useful. Of recent works the follow- ing are valuable: E. Sachau, Reise in Syrien u. Mesopotamien (1883) ; M. v. Oppenheim, Vom Mittelmeer zum Persischen Golf, vol. ii (1889). We may mention further D. G. Hogarth, The Nearer East (1902), passim; K. Regling, ” Zur historischen Geographie des meso- potamischen Parallelograms” (Sarug district), in Klio, I. 443-476; M. Sykes, ” Journeys in North Mesopotamia ” in Geog. Journal, xxx. 237-254, 384-395; “The Western Bend of the Euphrates, op. cit. xxxiv. 61-65 (plans of two castles) ; D. Fraser, Short Cut to India (1909); W. Kurz, ” Beurteilung der Aussichten auf eine Wiederbelehung der Kuitur der Euphrat- und Tigrisniederung,” in Deutsche geographische Blatter, xxxi. 147-179 (1908); E. Peass, ” The Bagdad Railway,” in Contemp. Rev., iqo8, 570-591 ; K. Baedeker, Palestine and Syria (1906), pp. 389-412. The annual Consular Reports most nearly bearing on Mesopotamia are those for Aleppo, Mosul, Bagdad and Basra.

Maps. — The following deserve special mention: v. Oppenheim, op. cii., a most valuable large scale folding map in pockets of volumes; Sachau. op. cit.; M. Sykes, Geog. Journ. xxx. opp. p. 356, and xxxiv. opp. p. 120; Hogarth, op. cit., orographic, &c.

Excavations at ‘Arban: A. H. Layard, Nineveh and Babylon (1849-1851), pp. 230-242; at Tell Khalaf: M. v. Oppenheim, Der Tell Halaf (1908), in the Der alte Orient series (see an account by J. L. Myres in Annals of Archaeology and Anthropology, ii. 139-144; at Asshur: Sendschriften der deutsch. or. Gesellsch., and W. Andrae,

Der Ann Adad Tetnpel (1909). See also D. G. Hogarth, ” Car- chemesh and its Neighbourhood ” {Annals, &c. ii. 165-184), arid W. Andrae’s

Die Ruinen von Hatra (1908).

History. — Early period : besides the histories of Babylonia and AssjWia see Winckler, various essays in his Altor. Forschungen, ” Vorlaufige Nachrichten uber die Ausgrabungen in Boghaz-koi im Sommer, 1907,” in Mitteilungen der Deutsch. Orient. Gesellschaft, No. 35, and ” Suri ” in Oriental. Lit.-Zeit, x. 281-299, 345~357, 401-412, 643; O. Weber/ the notes to Knudtzon’s Die El-Amarna Tafeln; A. Ungnad, Vntersuchungen zu den . . . Urkunden aus Dilbat (1909), pp. 8-21; P. Schnabel, Studien zur bab.-assyrischen Chronologie (1908); A. Sanda, Die Aramaer (1902) in the Der Alle Orient series; M. Streck, ” Ober die alteste Geschichte der Aramaer” in Klio, vi. 185-225. For the later periods see Persia: History; Hellenism; Rome: History ;P \kthia;Sykiac Literature; Cali- phate and authorities there given. (H. W. H.)

MESOXALIC ACID (dioxymalonic acid), (H0 2 C) 2 C(OH) 2 or C3H4O6, is obtained by hydrolysis of alloxan with baryta water (J. v. Liebig, Ann., 1838, 26, p. 298), by warming caffuric acid with lead acetate solution (E. Fischer, Ann., 1882, 215, p. 283), or from glycerin diacetate and concentrated nitric acid in the cold (E. Seelig, Ber., 1891/24ˆ.3471). It crystallizes in delique- scent prisms and melts with partial decomposition at 110-120 C. It behaves as a ketonic acid, being reduced in aqueous solution by sodium amalgam to tartronic acid, and also combining with phenylhydrazine and hydroxylamine. It reduces ammo- niacal silver solutions. When heated with urea to ioo° ,C. it forms allantoin. By continued boiling of its aqueous solution it is decomposed into carbon dioxide and glyoxylic acid, C2H4O4.
MESOZOA. Van Beneden 1 gave this name to a small group of minute and parasitic animals which he regarded as inter- mediate between the Protozoa and the Meta- zoa. TheMesozoa.com- prise two classes: (1) the Rhombozoa, which are found only in the kidneys of CephalopodSj and(2)the Orthonectida, which infest specimens of Ophiurids, Poly- chaets,Nemertines,Tur- bellaria and possibly other groups.

Class I. Rhombozoa (E.vanBenedeh). — These animals consist of a central cell from which certain reproductive cells arise, enclosed in a single layer of flattened and for the most part ciliated cells; some of them are modified at the anterior end and form the polar cap. The Rhombozoa comprises two orders : (a) Dicyemida, ciliated ver- miform creatures Whose polar cap has 8 or 9 cells arranged in two rows (Dicyema, Koll., Dicye- mennea, Whitm.) ; {b)He- terocyemida, non-ciliated animals with no, polar cap, but whose anterior ectodermal cells contain refringent bodies and may be produced into wart-like processes (Con- pcyema, v. Ben. in Octopus vulgaris;

Microcyema in Sepia officinalis). Unlike the Dicyemida, which are fixed in the renal cells of their host by their polar cap, the Heterocyemida are free. The number of ectoderm cells apart from the polar cap is few, some fourteen to twenty-two.

(From Cambridge Natural History, vol. ii. “Worms, &c,” by permission of Macmillan & Co. Ltd. After Gamble.)

Fig. i. — Dicyemennea eledones Wag. from the kidney of Eledone moschata.

A. Full-grown Rhombogen with in- fusoriform embryos (emb).

g. Part of endoderm cell where forma- tion of the embryos is actively proceeding. n. eel. Nucleus of ectoderm cell. n.end. Nucleus of endoderm cell. p. ” Calotte.”

B. Developing infusoriform embryo.

C. One fully developed.

D. ” Calotte ” of nine cells;

1 Bull. Ac. Belgique (1876), p. 35.

The central cell is formed by the layer of the first two blastomeres, and remains quiescent until surrounded by the micromeres or products of division of the smaller blastomere. It then divides unequally, and of the two cells thus formed the larger repeats the process. Each of the two small cells are now called primary germ cells,” and they enter into and lie inside the large central cell. The primary germ cells divide until there are eight of them all lying within the axial cell. At this stage the future of the parasite may take one of two directions. Following one path, the animal (now called a ” Nematogen “) gives rise by the segmenta- tion of its primary germ cells to vermiform larvae which, though smaller, are but replicas of the parent form. Following the other path, the animal (now termed a ” Rhombogen “) gives origin to a number of ” infusoriform larvae,”, several of these arising from each primary germ-cell. The vermiform larvae leave their Nematogen parent and swimming through the renal fluid attach themselves to the renal cells. They never leave their host, and die in sea-water. The infusoriform larvae have a very complicated structure; they escape from the Rhombogen, and, unlike the vermiform larvae they can live in sea- water. They possibly serve to infect new hosts. Some authorities look upon these infusoriform larvae as males, and consider that they fertilize some of the Nematogens,

(From Cambridge Natural History, vol. ii., “Worms, &c,” by permission of Macmillan & Co. Ltd. After Julin.) .’ .

Fig. 2.—Rhopalura giardii Metschn. from Amphiura squamata.

cf • Full grown male.

¥ I- Flattened form of female.

$2. Cylindrical female.

which then give rise to males again, whereas the females which produce the vermiform embryos arise from unfertilized vermiform larvae. , After the infusoriform larvae have jeft the parent’s body, theJRhombogen takes to producing vermiform offspring, and thus becoines a secondary Nematogen. Thus, if the above views’ be correct, a Rhombogen is a protandrous hermaphrodite.

E. Nerescheimer has recently described under the name of Iˆohmanella, catenata an organism parasitic in Frititaria which shows marked affinities with the Rhombozoa. The genus Haplozoon of which two species have been found in the worms’ Travisia and Clymene by Dogiel is classed as a new group of Mesozoa. ‘ ”■”■■

Class 1 1. Orthonectida (A. Giard). 1 — The Orthonectida contain animals with a central mass of eggs destined to form male and female reproductive cells surrounded, by a single layer of ciliated ectoderm cells arranged in regular rings which contain varying numbers *b£. rows of cells. Muscular fibrils occur between the outer and inner cells. The sexes are separate and unlike, and there are two .kinds of females, cylindrical and flat. There are but two genera, Rhopalura and Staecharthrum, the latter found in a Polychaet. The male R. giardii lives in the body-Cavity of Amphiura squamata, has six rings of ectodermal cells all ciliated except the second, whose cells contain refringent granules. The ectoderm encloses the testis, a mass of cells which have arisen from a single axial cell in the embryo, The female differs from the male in appearance, and in size it is larger. It occurs in two forms: (1) The cylindrical with 8 (or 9) rows of ectoderm cells; here as in the male the second ring is devoid of cilia : . (2) The flat females’are broader, Uniformly ciliated, and have not rings of ectoderm cells. The central mass of cells forms

ova which are free in the cylindrical forms ; they leave the mother through the dehiscing of the cells of the non-ciliated ring, are fertilized and develop parthenogenetically into females both flat and cylindrical.

R. pelseneeri and 5. giardi are said to be hermaphrodite. The parasites first make their appearance ‘in a host in the form of a Plasmodium comparable with the spdrocyst of a Trematode. By the segregation of nuclei and some of the surrounding protoplasm; germ cells arise which develop into ciliated larvae and ultimately into males and females which only discharge their spermatozoa and ova when they reach sea-water. The product of the consequent fertilization is unknown ; presumably it infects new hosts, entering them in the form of a nucleated plasmodium.

The original idea that in the Rhombozoa and Orthonectida we had animals intermediate between the Protozoa and Metazoa is no longer widely held. The modern view is that the simplicity of their structure is secondary and not primary, and is correllated with their parasitic habit of life. They are probably derived from some Platyhelminthine ancestor and perhaps come nearer to the Trematoda than to any other group.

Literature. — E. van Beneden, Bull. Ac. Belgique (2), (1876) xli. 85, 116; (1876), xlii. 35; also Arch. Biol. (1882), iii. 197; C. O. Whitman, Mt. Stat. Neapel. (1883), iv. 1; W. M. Wheeler, Zool. Anz., (1899), xxii. 169; A. Giard, Jour. anal, physiol. (1879), xv – 449; Quart. Jour. Micr. Sci. (1880), xx. 225; St Joseph, Bull. Soc. Zool. France (1896), xxi. 58; Caullery and Mesnil, C. R. ac. sci. (1899), cxxviii. 457 and 516; C. Julin, Arch. Biol. (1882), iii. 1; E. Nerescheimer, Zeitschr. wiss. Zool. (1904), lxxvi. 137; V. A. Dogiel, Trav. soc. imp. natur. St Phtersbourg (1907), xxxviii. 28, and Zool. Anz. (1906), xxx. 895. (A. E. S.)

HESOZOIC ERA, in geology, the name given to the period of time between the Palaeozoic and Cainozoic eras; it is synony- mous with the older and less satisfactory term ” Secondary ” as applied to the major divisions of geological time and with the ” Flozgebirge ” of the Wernerian school. This era is sub- divided into a lower, Triassic, a middle, Jurassic, and an upper, Cretaceous period or epoch. The duration of the Mesozoic era was not more than one fourth of that of the Palaeozoic era, measured by the thickness of strata formed during these periods. It was an era marked by peaceful conditions in the earth’s crust and by a general freedom from volcanic activity. The sediments as a whole are characterized by the prevalence of

limestones as compared with those of the preceding era; they are seldom much altered or disturbed except in the younger mountain regions. Mammals, represented by small marsupials, and primitive forms of birds and bony fishes make their first appear- ance in rocks of Mesozoic age. Saurian reptiles played an extremely prominent part; ammonites and belemnites lived in extraordinary variety in the seas along with the echinoids and pelecypods, which had to a great extent supplanted the crinoids and brachiopods of the preceding periods. The first clear indications of monocotyledonous and dicotyledonous angio-sperms made their appearance, while Cycads and Conifers constituted the bulk of the land flora.

MESQUITE, or Honey Locust, in botany, a tree, native of the southern United States and extending southwards through Mexico and the Andean region to Chile and the Argentine Republic. It is known botanically as Prosopis juliflora, and belongs to the natural order Leguminosae (suborder Mimoseae). It reaches 40 or 50 ft. in height with a trunk usually not more than 6 to 12 in. in diameter, and divided a short distance above the ground into numerous irregular ‘crooked branches forming a loose straggling head. The remarkable development of its main root in relation to water-supply renders it most valuable as a dry ˆcountry plant; the root descends to a great • depth in search of water, and does not branch or decrease much in diameter till this is reached. It can thus flourish where.no other woody plant can exist, arid its presence and condition afford almost certain indications of the depth of the water-level. When the plant attains the size of a tree, water, will be found within 40 or 50 ft. of the surface; when it grows as a bush, between 50 or 60 ft.; while, when the roots have to descend below 60 ft., the stems are only 2 or 3 ft. high. These woody roots supply valuable fuel in regions where no wood, of fuel value is produced above ground.’ The leaves are compound, the main axis bearing two or sometimes four secondary axes on which are borne a number of pairs of narrow bluntish leaflets. The minute greenish-white fragrant flowers are densely crowded

on slender cylindrical spikes from i| to 4 in. long; the long narrow pods are constricted between the seeds, of which they contain from ten to thirty surrounded by a thick spongy layer of sweet pulp. The wood is heavy, hard and close-grained,*’ but not very strong; it is almost indestructible in contact with soil, and is largely used for fence-posts and railway ties. The ripe pods supply the Mexicans and Indians with a nutritious food; and a gum resembling gum arabic exudes from the stem.

An allied species Prosopis pubescens, a small tree or tall shrub, native

of the arid regions of the south-western United States, is known as the screw-bean or screw-pod mesquite from the fact that the pods are twisted into a dense screw-like spiral; they are used for fodder and are sweet and nutritious, but smaller and less valuable than those of the mesquite.

For a fuller account of these trees see Charles Sprague Sargent, Silva of North America, iii. p. 99 (1892).

MESS (an adaptation of O. Fr. mes, mod. meis; Ital. messo; derived from the Late Lat. missum, past participle of mitiere ” to send or place in position “), a service of meat, a dish sent to table. The term is also used of the persons who are in the habit of eating their meals together, and thus particularly of the parties into which a ship’s company or a regiment is divided, either according to their rank, or for convenience in catering. Originally, a mess in this sense was a group of four persons sitting at one table and helped from the same dishes. In the Inns of Court, London, the original number is preserved, four benchers or four students dining together.

In early times the word mess was applied to food of a more or less liquid character, as soup, porridge, broth, &c. It is probably in allusion to the sloppy nature of semi-liquid messes of food that a mess has come also to mean a state of disorder, confusion and discomfort. Skeat takes the word in this sense to be a variant of ” mash,” originally to mix up.

MESSAGE (a word occurring in slightly different forms in several languages, e.g. Fr. message, Span, mensaje, Ital. messagio; adapted from the Low Lat. missaticum, from mittere), a com- ntuftication either verbal, written or printed, sent from one person to another. Message is the term generally applied to the official communications addressed by the heads of states to their legislatures at the opening of the session or at other times. These also, though written, are borne and delivered by special messen- gers and have the force of a face to face speech. The sessional and other messages to Congress of the president of the United States of America are printed state documents. Washington and John Adams delivered them in person but the practice was discontinued by Jefferson.

” Messenger ” is of the same derivation; the earlier form of the word was messager (cf. passenger, scavenger). In ordinary language the word means one who is charged with the delivery of a message. In Scottish law a messenger-at-arms is an official appointed by Lyon-King-at-Arms to execute summonses and letters of diligence connected

with the Court of Sessions and Court of Justiciary (see Writ: § Scotland). Technically the term “messenger” is given to an endless rope or chain, passing from the capstan to the cable so that the latter may be hauled in when the messenger is wound round the capstan; also to a similar contrivance for hauling in a dredge.

MESSAGER, ANDRE CHARLES PROSPER (1853-), French musician, was born at Montlugon on the 30th of December 1853; he studied at Paris, and in 1874 became organist at St Sulpice. He was for some time a pupil of Saint-Safins. „In 1876 he won the gold medal of the Societe des Compositeurˆ With a symphony. In 1880 he was appointed music director at Ste Marie-des-Batignolles. In 1883 he completed Firmin Bernieat’s comic opera Francois des has bleus; and in 1885 produced his own operettas, La Fauvette du temple and La BSarriaise, the latter being performed in London in 1886. His ballet.XfeS Deux pigeons was produced at the Paris Opera in‘1886. But it was the production of his comic opera La Basoche in 1890 at’ the Opera Comique (English version in London the following year) that established his reputation; and subse- quently this was increased by such tuneful and tasteful light

operas as Madame Ckrysantheme (1893), Mirette (1894), Les Petites Michus (1897), and Veronique (1898), the latter of which had a great success in London. Besides conducting for some years at the Opera Comique in Paris, Messager’s services were also secured in London in 1901 and later years as one of the directors of the Covent Garden opera.

MESSALLA CORVINUS, MARCUS VALERIUS (64 b.C.a.D. 8), Roman general, author and patron of literature and art. He was educated partly at Athens, together with Horace and the younger Cicero. In early life he became attached to republican principles, which he never abandoned, although he avoided offending Augustus by too open an expression of them. He moved that the title of pater patriae should be bestowed upon Augustus, and yet resigned the appointment of praefect of the city after six days’ tenure of office, because it was opposed to his ideas of constitutionalism. In 43 B.C. he was proscribed, but managed to escape to the camp of Brutus and Cassius. After the battle of Philippi (42) he went over to Antony, but subsequently transferred his support to Octavian. In 31 Messalla was appointed consul in place of Antony, and took part in the battle of

Actium. He subsequently held commands in the East, and suppressed the revolted Aquitanians; for this latter feat he celebrated a triumph in 27.

Messalla restored the road between Tusculum and Alba, and many handsome buildings were due to his initiative. His influence on literature, which he encouraged after the manner of Maecenas, was considerable, and the group of literary persons whom he gathered round him — including Tibullus, Lygdamus and the poet Sulpicia — has been called ” the Messalla circle.” With Horace and Tibullus he was on intimate terms, and Ovid expresses his gratitude to him as the first to notice and encourage his work. The two panegyrics by unknown authors (one printed among the poems of Tibullus as iv. 1, the other included in the Catalepton, the collection of small poems attributed to Virgil) indicate the esteem in which he was held. Messalla was himself the author of various works, all of which are lost. They included Memoirs of the civil wars after the death of Caesar, used by Suetonius and Plutarch; bucolic poems in Greek; translations of Greek speeches; occasional satirical and erotic verses; essays on the minutiae of grammar. As an orator, he followed Cicero instead of the Atticizing school, but his style was affected and artificial. Later critics considered him superior to Cicero, and Tiberius adopted him as a model. Late in life he wrote a work on the great Roman families, wrongly identified with an extant poem De progenie Augusti Caesaris bearing the name of Messalla, but really a 15th-century production.

Monographs by L. Wiese (Berlin, 1829), J. M. Valeton (GrSningen, 1874), L. Fontaine (Versailles, 1878); H. Schulz, De M. V. aelate (1886); “Messalla in Aqiiitania ” by J. P. Postgate in Classical Review, March 1903; W. Y. Sellar, Roman Poets of the Augustan Age. Horace and the Elegiac Poets (Oxford, 1892), pp. 213 and 221 to 258 ; the spurious poem ed. by R. Mecenate (1820).

Two other members of this distinguished family of the Valerian gens may be mentioned: —

1. Marcus Valerius Messalla, father of the preceding, consul in 53 B.C. He was twice accused of illegal practices in connexion with the elections; on the first occasion he was acquitted, in spite of his obvious guilt, through the eloquence of his uncle Quintus Hortensius; on the second he was con- demned. He took the side of Caesar in the civil war. Nothing appears to be known of his later history. He was augur for fifty-five years and wrote a work on the science of divination.

Cicero, Ad Fam. vi. 18, viii. 4, ad Alticum, iv. 16; Dio Cassius xl. 17, 45; Bellum africanum, 28; Macrobius, Saturnalia, i. 9, 14; Aulus Gellius xiii. 14, 3.

2. Manius Valerius Maxtmus Corvlnus Messalla, consul 263 B.C. In this year, with his colleague Manius Otacilius (or Octacilius) Crassus, he gained a brilliant victory over the Carthaginians and Syracusans; the honour of a triumph was decreed to him alone. His relief of Messana obtained him the cognomen Messalla, which remained in the family for nearly 800 years. To commemorate his Sicilian victory, he caused it to be pictorially represented on the wall of the Curia Hostilia,

the first example of an historical fresco at Rome. He is said also to have brought the first sun-dial from Catana to Rome, where it was set up on a column in the forum.

Polybius i. 16; Diod. Sic. xxiii. 4; Zonaras viii. 9; Pliny, Nat. Hist., vii. 60, xxxv. 4 (7).

MESSALLINA, VALERIA, the third wife of the Roman emperor Claudius (q.v.). She was notorious for her profligacy, avarice and ambition, and exercised a complete ascendancy over her weak-minded husband, with the help of his all-powerful freedmen. During the absence of Claudius from the city, Messallina forced a handsome youth named Gaius Silius to divorce his wife and go through a regular form of marriage with her. The f reedman Narcissus, warned by the fate of another freedman Polybius, who had been put to death by Messallina, informed Claudius of what had taken place, and persuaded him to consent to the removal of his wife. She was executed in the gardens of Lucullus, which she had obtained on the death of Valerius Asiaticus, who through her machinations had been condemned on a charge of treason. She was only twenty-six years of age. By Claudius she was the mother of the unfortunate Britannicus, and of Octavia, wife of Nero.

See Tacitus, Annals, xi. 1.-38; Dio. Cassius lx. 14-31; Juvenal vi. IIS – ‘ 1 ˆ}! x – 333. x ‘ v – 33 1 ; Suetonius, Claudius; Merivale, Hist, of the Romans under the Empire ch. 50; A. Stahr, ” Agrippina ” in Bilder aus demAlterthume, iv. (1865).

MESSAPII, an ancient tribe which inhabited, in historical times, the south-eastern peninsula or ” heel ” of Italy, known variously in ancient times as Calabria, Messapia and Iapygia. Their chief towns were Uzentum, Rudiae, Brundisium and Uria. They are mentioned (Herod,

vii. 1 70) as having inflicted a serious defeat on the Greeks of Tarenttim in 473 b.c. Herodotus adds a tradition which links them to the' Cretan subjects of "King Minos." Their language is preserved for us in a scanty group of perhaps fifty inscriptions of which only a few contain more than proper names, and in a few glosses in ancient writers collected by Mommsen {Unteritalische Dialekte, p. 70). Unluckily very few originals of the inscriptions are now in existence, though some few remain in the museum at Taranto. The only satisfactory transcripts are those given by (1) Mommsen (loc. cit.) and by (2) I. P. Droop in the Annual of the British School at Athens (1905-1906), xii. 137, who includes, for purposes of comparison, as the reader should be warned, some specimens of the unfortunately numerous class of forged inscriptions. A large number of the inscriptions collected by Gamurrini in the appendices to . Fabretti's Corpus inscriptionum ilalicdrum are forgeries, and the text of the rest is negligently reported. It is therefore safest to rely on the texts collected by Mommsen, cumbered though they are by the various readings given tq 'him by various . authorities. In spite, however, of these difficulties some facts of considerable importance have been established.

The inscriptions, so far as it is safe to judge from the copies of the older finds and from Droop's facsimiles of the newer, are all in the Tarentine-Ionic alphabet (with [for v and (-for h). For limits of date 400-150 B.C. may be regarded as approxi- mately probable; the two most important inscriptions— those of Bindisi arid Vaste — may perhaps be assigned provisionally to the 3rd century B.C.

Mo'mms'en's first attempt at dealing with the inscriptions and the language attained solid, if not very numerous, results, chief of which were the genitival character of the endings — aihi and ihi; and the conjunctional value of inOi {loc. cit. 79-84 sqˆ) f Since that time (1850) very little progress has been mad < £ There is, in fact, only one attempt known to the present writer to which the student can be referred as proceeding; upon thoroughly' scientific lines, that of Professor Alf Torp in Indoger- manische Forschungen (1895), v > *95 > which deals fully with the two inscriptions just mentioned, and practically sums up all that is either certain or probable in the conjectures of his' pre decessors. Hardly more than a few words can be said to have been separated and translated with certainty— kalatoras (masc. gen. sing.) "of a herald ." (written upon a herald's staff which was once in the Naples Museum); aran (ace. sing, fern.) " arable

land”; mazzes, “greater” (neut. ace. sing.), the first two syllables of the Latin maiestas; while tepise (3rd sing, aorist indie.) ” placed ” or ” offered “; and forms corresponding to the article (ta- = Greek to) seem also reasonably probable.

Some phonetic characteristics of the dialect may be regarded as quite certain; (1) the change of the original short d to & (as in the last syllable of the genitive kalatoras) ; (2) of final -m to -n (as in arari) ;, (3) of ni ti si respectively to nn td and ss as in dazohonnes ” Dasonius,” dazohonnihi ” Das5nii “; dazetdes, gen. dazetdihi “Dazetius, Dazetii,” from the shorter stem dazet-; Vallasso for Vallasio (a derivative from the shorter name Valla) ;

(4) the loss of final d (as in tepise), and probably of final t (as in -des, perhaps meaning “set,” from the root of Gr. tWtuii);

(5) the change of original dh to d [anda = Gr. evda, and bh to b (beran = Lat. ferant) ; (6) an before (at least some) consonants becomes a (Bdsta, earlier (Savcra). (7) Very great interest attaches to the form penkaheh — which Torp very probably identifies with the Oscan stem pompaio — which is a derivative of the Indo-European numeral *penque ” 5.”

If this last identification be correct it would show that in Messapian (just as in Venetic and Ligurian) the original velars were retained as gutturals and not converted into labials. The change of to a is exceedingly interesting as being a phenomenon associated with the northern branches of Indo-European such as Gothic, Albanian and Lithuanian, and not appearing in any other southern dialect hitherto known. The Greek ‘A

It should be added that the proper names in the inscriptions show the regular Italic system of gentile nomen preceded by a personal praenomen; and that some inscriptions show the inter- esting feature which appears in the Tables of Heraclea of a crest or coat of arms, such as a triangle or an anchor, peculiar to particular families. The same reappears in the Iovilae (q.v.) of Capua and Cumae.

For further information the student must be referred to the sources already mentioned and further to W. Deecke in a series of articles in the Rheinisches Museum, xxxvi. 576 sqq. ; xxxvii. 373 sqq. ; xl. 131 sqq.; xlii. 226 sqq.; S. Bugge, Bezzenbergers Beitrdge, vol. 18. A newly discovered inscription has been published by L. Ceci Notizie degli

Scavi (1908), p. 86; and one or two others are recorded by Professor Viola, ibid. 1884, p. 128 sqq. and in Giornale degli Scavi di Pompei, vol. 4 (1878), pp. 70 sqq. The place-names of the district are collected by R. S. Conway, The Italic Dialects, p. 31 ; for the Tarentine-Ionic alphabet see ibid, ii., 461.

For a discussion of the important ethnological question of the origin of the Messapians see W. Helbig, Hermes, xi. 257; P. Kretschmer, Einleitung in die Geschichte der griechischen Sprache, pp. 262 sqq., 272 sqq. ; H. Hirt, Die sprachliche Stellung der Illyrischen (Festschrift fiir H. Kiepert, pp. 179-188). Reference should also be made to the discussion of their relation to the Veneti by C. Pauli in Die Veneter, p. 413 sqq., especially p. 437; and also to R. S. Conway, Italic Dialects, i. 15. (R. S. C.)

MESSENE, an ancient Greek city, the capital of Messenia, founded by Epaminondas in 369 B.C., after the battle of Leuctra and the first Theban invasion of the Peloponnese. The town was built by the combined Theban and Argive armies and the exiled Messenians who had been invited to return and found a state which should be independent of. Spartan rule. The site was chosen by Epaminondas and lay on the western slope of the mountain which dominates the Messenian plain and cul- minates in the two peaks of Ithome and Eua. The former of these (2630 ft.) served as che acropolis, and was included within the same system of fortifications as the lower city. Messene remained a place of some importance under the Romans, but we hear nothing of it in medieval times and now the hamlet of Mavromati occupies a small part of the site.

Pausanias has left us a description of the city (iv. 31-33), its chief temples and statues, its springs, its market-place and gymnasium, its place of sacrifice {Upodvaiov) , the tomb of the hero Aristomenes {q.v.) and the temple of Zeus Ithomatas on the

summit of the acropolis with a statue by the famous Argive sculptor Ageladas, originally made for the Messenian helots who had settled at Naupactus at the close of the third Messenian War. But what chiefly excited his wonder was the strength of its fortifications, which excelled all those of the Greek world. Of the wall, some si m – m extent, considerable portions yet remain, especially on the north and north-west, and almost the entire circuit can still be traced, affording the finest extant example of Greek fortification. The wall is flanked by towers about 31 ft. high set at irregular intervals: these have two storeys with loopholes in the lower and windows in the upper, and are entered by doors on a level with the top of the wall which is reached

by flights of steps. Of the gates only two can be located, the eastern or Laconian, situated on the eastern side of the saddle uniting Ithome and Eua, and the northern or Arcadian gate. Of the former but little remains: the latter, however, is excellently preserved and consists of a circular court about 20 yds. in diameter with inner and outer gates, the latter flanked by square towers some n yds. apart. The Hntel of the inner gate was formed by a single stone 18 ft. 8 in. in length, and the masonry of the circular court is of astonishing beauty and accuracy. The other buildings which can be identified are the theatre, the stadium, the council chamber or Bouleuterion, and the propylaeum of the market, while on the shoulder of the mountain are the foundations of a smaE temple, probably that of Artemis Laphria.

See E. Curtius, Peloponnesos, ii. 138 sqq. ; W. M. Leake, Travels in the Morea, i. 366 sqq.; J. G. Frazer, Pausanias's Description of Greece, iii. 429 sqq.; W. G. Clark, Peloponnese, 232 sqq.; A. Blouet, Exped. scient. de Moree: Architecture, 1. 37-42, Plates 38-47 ; E. P. Boblaye, Recherches geogr. sur les mines de la Moree, 107 sqq. ; C. Bursian, Geographie von Griechenland, ii. 165 sqq. (M. N. T.)

MESSENIA (Gr. Mecrarivr] or Meacrrivia), the S.W. district of the Peloponnese, bounded on the E. by Mt Taygetus, on the N. by the river Neda and the Arcadian Mountains, on the S. and W. by the sea. Its area is some 825,000 acres, considerably less than that of Shropshire or Wiltshire. Historically and economically its most important part is the great plain, consisting of two distinct portions, watered by the river Pamisus (mod. Pirnatza) and its affluents. This is the most fertile tract in Greece, and at the present day produces oranges, citrons, almonds, figs, grapes and olives in great abundance and of excellent quality. The plain is bounded on the north by the Nomian Mountains (mod. Tetrasi, 5210 ft.) and their westerly extension, on the west by the mountains of Cyparissia (4000 ft.), a southern continuation of which forms the south-west peninsula of the Morea, attaining its greatest height in Mt Mathia (mod. Lykodimo 3160 ft.). Off the south coast of this peninsula lie the three Oenussae islands and the islet of , Theganussa (Venetiko). In spite of its long coast-line, Messenia has no good harbours except the Bay of Pylos (Navarino), and has never played an important part in Greek naval history.

The earliest inhabitants of Messenia are said to have been Pelasgians and Leleges (qq.v.), of whom the latter had their capital at Andania. Then came an Aeolo-Minyan immigration, which apparently extended to Messenia, though the Pylos of Nestor almost certainly lay in Triphylia, and not at the site which in historic times bore that name.

In the Homeric poems eastern Messenia is represented as under the rule of Menelaus of Sparta, while the western coast is under the Neleids of Pylos, but after Menelaus's death the Messenian frontier was pushed eastwards as far as Taygetus. A body of Dorians under Cresphontes invaded the country from Arcadia, and, takings their capital Stenyclarus in the northern plain, extended first their suzerainty and then their rule over the whole district. The task apparently proved an easy one, and the Dorians blending with the previous inhabitants produced a single Messenian race with a strong national feeling. But the fertility of the soil, the warm and genial climate, . the mingling of races arid the absence of opposition, combined to render the Messenians no match for their hardy and warlike neighbours of Sparta. War broke out — in consequence, it was said, of the murder of the Spartan king Teleclus by the Messenians — which, in spite of

the heroism of King Euphaes and his successor Aristodemus (q.v.) ended in the subjection of Messenia to Sparta (e. 720 B.C.). Two generations later the Messenians revolted and under the leadership of Aristomenes (q.v.) kept the Spartans at bay for some seventeen years (648-631 B.C., according to Grote): but the stronghold of Ira (Eira) fell after a siege of eleven years, and those Messenians who did not leave the country were reduced to the condition of helots. The next revolt broke out in 464, when a severe earthquake destroyed Sparta and caused great loss of life; the insurgents defended themselves for some years on the rock-citadel of Ithome, as they had done in the first war; but eventually they had, to leave the Peloponnese and were settled by the Athenians at Naupactus in the territory of the Locri Ozolae. After the battle of Leuctra (371 B.C.) Epaminondas invited the exiled Messenians scattered in Italy, Sicily, Africa and elsewhere to return to their country: the city of Messene (q.v.) was founded in 369 to be the capital of the country and, like Megalopolis in Arcadia, a powerful check on Sparta. Other towns too were founded or rebuilt at this time, though a great part of the land still remained very sparsely peopled. But though independent Messenia never became really powerful or able to stand without external support. After the fall of the Theban power, to which it had owed its foundation, it became an ally of Philip II. of Macedon and took no part in the battle of Chaeroneia (338 B.C.). Subsequently it joined the Achaean League, and we find Messenian troops fighting along with the Achaeans and Antigonus Doson at Sellasia in 222 B.C. Philip V. sent Demetrius of Pharos to

seize Messene, but the attempt failed and cost the life of Demetrius: soon afterwards the Spartan tyrant Nabis succeeded in taking the city, but was forced to retire by the timely arrival of the Philo- poemen and the Megalopolitans. A war afterwards broke out with the Achaean League, during which Philopoemen was captured and put to death by the Messenians (183 B.C.), but Lycortas took the city in the following year, and it again joined the Achaean League, though much weakened by the loss of Abia, Thuria and Pherae, which broke loose from it and entered the League as independent members (see Achaean League). In 146 B.C. the Messenians, together with the other states of Greece, were brought directly under Roman sway by L. Mum- mius. For centuries there had been a dispute between Messenia and Sparta about the possession of the Ager Dentheliates on the western slope of Taygetus: after various decisions by Philip of Macedon, Antigonus, Mummius, Caesar, Antony, Augustus and others, the question was settled in a.d. 25 by Tiberius and the Senate in favour of the Messenians (Tac. Ann. iv. 43).

In the middle ages Messenia shared the fortunes of the rest of the Peloponnese. It was overrun by Slavic hordes, who have left their traces in many village names, and was one of the chief battlefields of the various powers — Byzantines, Franks, Vene- tians and Turks — who struggled for the possession of the Morea. Striking reminders of these conflicts are afforded by the extant ruins of the medieval strongholds of Kalamata, Coron (anc. Asine, mod. Korone), Modon (Methone) and Pylos. At the present day Messenia forms a department with its capital at Kalamata, and a population numbering (according to the census of 1907), 127,991.

See W. M. Leake, Travels in the Morea (London, 1830), i. 324 sqq. ; E. Curtius, Peloponnesos (Gotha, 1852), ii. 121 sqq.; C. Bursian, Geographic von Griechenland (Leipzig, 1868), |ii. 155 sqq. ; E. P. Bob- laye, Recherches giographiques sur les mines de la Morie (Paris, 1835), 103 sqq. ; Strabo viii. 358 sqq. ; Pausaniasiv., and the commentary in J. G . Frazer, Pausanias's Description of Greece, vol. iii. ; and articles by W. Kolbe, Athenische Mitteilungen (1904), 364 sqq., and M. N. Tod, Journal of Hellenic Studies, xxv. 32 sqq. Physical features: A. Philippson, Der Peloponnes (Berlin, 1892), 340-381. Inscriptions: Inscriptions graecae, v.; Le Bas-Foucart, Voyage archiologique: Inscriptions, Nos. 291-326 A; Collitz-Bechtel, Samm- lung der griech. Dialektinschriften, iii. 2, Nos. 4637-4692.

" (M.-N .T.)

MESSIAH (Dan. x. 25, 26), and Messias (John i. 41; iv. 25),

transcriptions (the first form modified by reference to the etymology) of the Greek Meffoxas, (Meaias, Mecetas), which in

turn represents the Aramaic «?'$? (mSshiha), answering to the Hebrew O'VWJ, " the anointed." L There can be no doubt that a magical power was ascribed to the anointing oil (cf.Frazer, Golden Bough, 2nd ed., ii. 364 sqq.). The. king was thereby rendered sacrosanct (1 Sam. xxiv. 6 sqq.; 2 Sam. i. 14 sqq.; iv. 9 sqq.), and he was considered to be endowed with a special virtue. Thus whosoever curses the king is stoned as though God Himself had been cursed (2 Sam. xix. 22). In ancient Egyptian cultus the priest, after he has solemnly saluted the gods, begins the daily toilet of the god, which consists in sprinkling his image, clothing it with coloured cloths, and anointing it with oil (Erman, Die aegyptische Religion, p. 49). In the magical texts of Babylonia a similar virtue was attached to oil: " bright oil, pure oil, resplendent oil that bestows magnificence on the Gods . . . the oil for the conjuration (siptu) of Marduk" (Tallquist, MaklH series, tablet vii. col. 1, 31 sqq.; cf. Gressmann, Der Ursprung der israelitisch-judischen Eschatologie, p. 258, sqq.). We have, in Schrader's K.I.B. v. letter 37 (p. 98), evidence from the Tell el-Amarna tablets that the anointing of kings was practised in Egypt or Syria in 1450 B.C. (c.) in a'letter addressed to the Egyptian king by Ramman-nirari of Nuhassi. On the intimate relation which in primitive times subsisted between the sorcerer and the king see the citation from Frazer's Early History of Kingship, p. 127, in the article Priest, and cf. p. 29: " Classical evidence points to the conclusion that in prehistoric ages . . . the various tribes or cities were ruled by kings who discharged priestly duties " (p. 31). Thus the early kings of Assyria were priests of Assur (Asur), the tutelary deity of Assyria. Tiglath-Pileser I. (c. 1 100 B.C.) calls his predecessors, Samsi-Ramman and Ismi-Dagan, iisakku (pa-te-si) of the God Assur (Prism-insc. col. vii. 62, 63). Later kings, e.g. Shal- maneser II. (Nimrud-obeiisk, line 15, monolith, line n) and Assur-bani-pal (Rassam cyl. col. vii. 94) call themselves by the more definite title of Sangu of Assur. The Hebrew word with the article prefixed occurs in the Old Testament only in the phrase " the anointed priest " (Lev. iv. 3, 5, 16; vi. 22 [15]), but " Yahweh's anointed " is a common title of the king of Israel, applied in the historical books to Saul and David, in Lam. iv. 20 to Zedekiah, and in Isa. xlv. 1 extended to Cyrus. In the Psalms corresponding phrases (My, Thy, His anointed) 2 occur nine times, to which may be added the lyrical passages 1 Sam. ii. 10, Hab. iii. 13.

In the present attitude of literary criticism it would be most difficult to assert, as Robertson Smith did in the 9th edition of this work, that " in the intention of the writers it [i.e. the term messiah or " anointed "]

refers to the king then on the throne.” Nor would most recent critics agree with Professor Driver (L.O.T., 8th ed. p. 385) in considering Pss. ii. and lxxii. as ” pre- sumably pre-exilic.” G. Buchanan Gray (J.Q.R., July 1895, p. 658 sqq.) draws a parallel between the “king ” in the Psalms and the “servant” in Deutero-Isaiah or Yahweh’s “Son” (in Hos. xi. 1, &c.) which is applied to Israel either actual or idealized. It would be possible so to interpret ” king ” or ” anointed ” in some Psalms, e.g. lxi., lxiii. and lxxxiv., but hardly in Pss. ii., lxxii. and lxxxix., where the Messianic reference is strongly personal. 3 In the Psalms the ideal aspect of the kingship, its religious importance as the expression and organ of Yahweh’s sovereignty, is prominent. When the Psalter became a liturgical book the historical kingship had gone by, and the idea alone remained, no longer as the interpretation of a present political fact but as part of Israel’s religious inherit ance. It was impossible, however, to think that a true idea had become obsolete merely because it found no expression on earth for the time being; Israel looked again for an anointed king to whom the words of the sacred hymns should apply with a force

1 The transcription is as in rWo-oup rWo-ip for sx>}, Onomastica, ed. Lag., pp. 247, 28I, Bao-. /3 ii. 3. For the termination -as for ten, see Lagarde, Psalt. Memph., p. vii. . .

2 The plural is found in Ps. cv. 15, of the patriarchs as conse- crated persons.

3 In Ps. lxxxiv. 9 [10] it is disputed whether the anointed one is the king, the priest, or the nation as a whole. The second view is perhaps the best.

never realized iH the imperfect kingship of the past. Thus the Psalms were necessarily viewed as prophetic; and meantime, in accordance with the common Hebrew representation of ideal things as existing in heaven, the true king remains hidden with God. The steps by which this result was reached must, however, be considered in detail.

The hope of the ˆdyent. of an ideal king was only one feature of that larger hope of the salvation of Israel from all .evils, which was constantly held forth by all the prophets, from the time when the seers of the 8th century B.C. proclaimed that the true conception of Yahweh’s relation to His people could become a practical reality only

through a great deliverance following a sifting judgment of the most terrible kind. The idea of a judgment so severe as to render possible an entire breach with the guilty past is common to all the prophets, but is expressed in a great variety of forms and images. As a rule the prophets directly connect the final restoration with the removal of the sins of their own age; to Isaiah the last troubles are those of Assyrian invasion,, to Jeremiah the restoration follows on the exile to Babylon, to Daniel on the overthrow of the Greet monarchy. But all agree in giving the central place to the realization of a real effective kingship of Yahweh; in fact the conception of the religious subject as the nation of Israel, with a national organization under Yahweh as king, is common to the whole Old Testament, and connects prophecy proper with the so-called Messianic psalms and similar passages which speak of the religious relations of the Hebrew commonwealth, the religious meaning of: national institutions* and so necessarily contain ideal elements reaching beyond the empirical present. All such passages are frequently called Messianic; but the term is more properly reserved as the specific designation of one particular branch of the Hebrew hope of salvation, which, becoming prominent in post-canonical Judaism, used the name of the Messiah as a technical term (which it never is in the Old Testament), and exercised a great influence on. New Testament thought — the term ” the Christ ” (6 xP’otoj), being itself nothing more than the translation of ” the Messiah.”

In the period of the Hebrew monarchy the thought that Yahweh is the divine king of Israel was associated with the conception that the human king reigns by right only if he reigns by commission or ” unction ” from Him. Such was the theory of the kingship in Ephraim as well as in Judah (Deut. xxxiii. ; 2 Kings ix. 6), till in the decadence of the northern state Amos (ix. 11) foretold 1 the redintegration of the Davidic kingdom, and Hosea (iii. 5 ; viii. 4) expressly associated a similar prediction with the condemnation of the kingship of Ephraim as illegitimate. So the great Judaean prophets of the 8th century connect the salvation of Israel with the rise of a Davidic king, full of Yahweh ‘s Spirit, in whom all the energies of Yahweh’s transcendental kingship are as it were incarnate (Isa.ix. 6 seq. ; xi. 1 seq. ; Micah v.) . This conception, however, ,is not one of the constant elements of prophecy; other prophecies of Isaiah look for the decisive interposition of Yahweh in the crisis of history without a kingly deliverer. Jeremiah again speaks of the future David or righteous sprout of David’s stem (xxiii. 5 seq.; xxx. 0) and Ezekiel uses similar language (xxxiv., xxxvii.) ; but that such passages do not necessarily mean more than that the Davidic dynasty shall be continued in the time of restoration under worthy princes seems clear from the way in which Ezekiel speaks of

the prince in chs. xlv., xlvi. As yet we have no fixed doctrine of a personal Messiah, but only material from which such a doctrine might be drawn. The religious view of the kingship is still essentially the same as in 2 Sam. vii., where

1 Most recent critics regard Amos ix.9-15 as a later addition, and the same view is held by Nowack, Harper and others respecting Hos. iii. 5, though on grounds which seem questionable. Isa. ix. 1-7, xi. 1 sqq. are held by Hackmann, Cheyne, Marti, and other critics to be post-exilian. Duhm and others hold that they are genuine. It may be admitted that Isa. xi. 1 seq. might be held to be contemporary with Isa. lv. 3, 4, and to refer to Zerubbabel. Cf. Haggai ii. 21-23, composed seventeen years afterwards. Mic. v. 1-8 can with difficulty be regarded as genuine.

the endless duration of the Davidic dynasty is set forth as part of. Yahweh's plan. •

There are other parts of the Old Testament — notably 1 Sam. viii., xii. (belonging to the later stratum)— in which the very existence of a human kingship is represented as a departure from the theocratic ideal, and after the exile, .when the monarchy had come to an end, we find pictures of the latter days in which its restoration has no place., Such is the great prophecy of Isa. xl.-xlviii. , in which Cyrus is the anointed of Yahweh. So too there is no allusion to a human kingship in Joel or in Malachi; the old forms of the Hebrew state were broken, and religious hopes expressed themselves in other shapes. 2 In the book of Daniel it is collective Israel that, under the symbol of a " son of man," receives the kingdom (vii. 13, 18, 22ˆ 27).

Meantime, however; the decay and ultimate silence of the ris- ing prophetic word concurred with prolonged political servitude to produce an important change in Hebrew religion. To the prophets the kingship of Yahweh was not a mere ideal, but an actual reality. Its full manifestation indeed, to the eye of sense and to. the unbelieving, world, lay in the future; but true faith found a present stay in the sovereignty of Yahweh, daily exhibited in providence and interpreted to each generation by the voice of the prophets. And, while Yahweh's kingship was a living and present fact, it refused to be. formulated in fixed invariable shape.

But when the prophets were succeeded by the scribes, the interpreters of the written word, and the yck& Of foreign oppres- sors rested on the land, Yahweh's kingship, which presupposed a living nation, found not even the most inadequate expression in daily political life. Yahweh was still the lawgiver of Israel, but His, law was written in a

book, and He was not present to administer it. , He was still the hope of Israel, but the hope too was only to be read in books, and these were interpreted of a future which was no longer the ideal development of forces already a,t work, but wholly new and supernatural. The present was a blank, in which religious duty was summed up in patient Obedience to the law and penitent submission :to the • Divine chastisements. The scribes were mainly busied with the law; but no religion can subsist on mere law; and the systematization of the prophetic hopes, and of those more ideal parts of the other sacred literature which, because ideal and dissevered from the present, were now set on one line with .the prophecies, went on side by side with the systematization of the law, by meansof a harmonistic exegesis, which sought to gather up every prophetic image in one grand panorama of the issue of Israel's and the world's history. The beginnings of this process can probably be traced within the canon itself, in the book of Joel and the last, chapters of Zechariah; 3 and, if this be so, we see from Zech. ix. that the picture of the ideal king claimed a place in such constructions. The full development of the method belongs, however, to the post-canonical literature, and was naturally much less regular and rapid than the growth of the legal tradi- tions of the scribes. It was in crises of national anguish that men turned most eagerly to the prophecies, and sought to construe their teachings as a promise of speedy deliverance (see ApcJcalyptic Literature)., But these books, however influen- tial, had ho public authority, and when the yoke of oppression was lightened but a little their enthusiasm lost much of its contagious power. It is not therefore safe to measure the general growth of eschatological doctrine by the apocalyptic books, of which Daniel alone attained a canonical position, fe. the Apocrypha eschatology has a relatively small place; but there is enough to show that the hope of Israel was never forgotten, and that the imagery of the prophets was accepted with a literalness not contemplated by the prophets themselves.

It was, however, only very gradually that the figure and name of the Messiah acquired the prominence which they have in

2 The hopes which Haggai and Zechariah connect with the name of Zerubbabel, a descendant of David, hardly form an exception to.this statement. There may even be a reference to him in Isa. lv. 3v4ˆ

3 See Stade's articles " Deuterozacharja," Z.f. A.-T.-liche Wtis., 1881-1882. Cf. Dan. ix. 2 for the use of the older prophecies

later Jewish doctrine of the last things and in the official exegesis of the Targums. In the very developed eschatology of Daniel they are, as we have seen, altogether wanting, and in the Apocrypha, both before and after the Maccabean revival, the everlasting throne of David's house is a mere historical reminis- cence (Ecclus. xlvii. 11; 1 Mace. ii. 57). So long as the wars of independence occupied the Palestinian Jews, and the Hasmo- naean sovereignty promised a measure of independence and felicity under the law, the hope that connected itself with the House of David was not likely to rise to fresh life, especially as a considerable proportion of the not very numerous passages of Scripture which speak of the ideal king might with a little straining be applied to the rising star of the new dynasty (cf. 1 Mace. xiv. 4-15). It is only in Alexandria, where the Jews were still subject to the yoke of the Gentile, that at this time (c. 140 B.C.) we find the oldest Sibylline verses (iii. 652 seq.) proclaiming the approach of the righteous king whom God shall raise up from the East (Isa. xli. 2.) The name Messiah is still lacking, and the central point of the prophecy is not the reign of the deliverer but the subjection of all nations to the law and the temple. 1

With the growing weakness and corruption of the Hasmonaean princes, and the alienation of a large part of the nation from their cause, the hope of a better kingship begins to appear in Judaea also; at first darkly shadowed forth in the Book of Enoch (chap, xc), where the white steer, the future leader of God's herd after the deliverance from the heathen, stands in a certain contrast to the actual dynasty (the horned lambs) ; and then much more clearly, and for the first time with use of the name Messiah, in the Psalter of Solomon, the chief document of the protest of Pharisaism against its enemies the later Hasmonaeans. The struggle between the Pharisees and Sadducees, between the party of the scribes and the aristocracy, was a struggle for mastery between a secularized hierarchy whose whole interests were those of their own selfish politics, and a party to which God and the exact fulfilment of the law according to the scribes were all in all. This doctrine had grown up under Persian and Grecian rule, and no government that possessed or aimed at political independence could possibly show constant deference to the punctilios of the schoolmen. The Pharisees themselves could not but see that their principles were politically impotent; the most scrupulous observance of the Sabbath, for example — and this was the culminating point of legality — could not thrust back the heathen. Thus the party of the scribes, when they

came into conflict with an active political power, which at the same time claimed to represent the theocratic interests of Israel, were compelled to lay fresh stress on the doctrine that the true deliverance of Israel must come from God.

But now the Jews were a nation once more, and national ideas came to the front. In the Hasmonaean sovereignty these ideas took a political form, and the result was the secularization of the kingdom of God for the sake of a harsh and rapacious aristocracy. The nation threw itself on the side of the Pharisees ; not in the spirit of punctilious legalism, but with the ardour of a national enthusiasm deceived in its dearest hopes, and turning for help from the delusive kingship of the Hasmonaeans to the true kingship of Yahweh, and to His vicegerent the kihg of David's house. It is in this connexion that the doctrine and name of the Messiah appear in the Psalter of Solomon. The eternal kingship of the House of David, so long forgotten, is seized on as the proof that the Hasmonaeans have no divine right. " Thou, Lord, art our king For ever and ever. . . . Thou didst choose David as king over Israel, arid swarest unto him concerning his seed for ever that his kingship should never fail before Thee. And for our sins sinners (the Hasmonaeans) have risen up over us, taking with force the kingdom which Thou didst not promise' to them, profaning the throne of David in their pride. But Thou, O Lord, will cast them down and root out their seed from the' land, when a man not of our race (Pompey) rises up against _them. . . . . Behold, O Lord, and raise up their king the Son of David at the time that Thou hast appointed, to reign over Israel Thy servant ; and gird him with strength to crush unjust rulers; to cleanse Jerusalem from the heathen that tread it under foot, to cast out sinners from Thy

1 In Sibyll. iii. 775, vnbv must undoubtedly be read for vl6v.

inheritance; to break the pride of sinners and all their strength as potter's vessels with a rod of iron (Ps. ii. 9) ; to destroy the law- less nations with the word of his mouth (Isa. xi. 4); to gather a holy nation and lead them in righteousness. . . . He shall divide them by tribes in the land, and no stranger and foreigner shall dwell with them; he shall judge the nations in wisdom and righteousness. The heathen nations shall serve under his yoke; he shall glorify the Lord before all the earth, and cleanse Jerusalem in holiness, as m the beginning. From the ends of the earth all nations shall come to see his glory and bring the weary sons of Zion as gifts (Isa. lx.'3;seq.); to see the, glory of the Lord with which God hath crowned him, for he is over them a righteous king taught of God. In his days there shall be no unrighteousness in their midst; for they are all holy and their king the anointed of the

Lord (xptoris Kvpios, mistranslation of mnvrt'E'D); — Psalt. Sol. xvii.

This conception is traced in lines too firm to be those of a first essay; it had doubtless grown up as an integral part of the religious protest against the Hasmonaeans. And while the polemical motive is obvious, and the argument from prophecy against the legitimacy of a non-Davidic dynasty is quite in the manner of the scribes, the spirit of theocratic fervour which inspires the picture of the Messiah is broader and deeper than their narrow legalism. In a word, the Jewish doctrine of the Messiah marks the fusion of Pharisaism with the national religious feeling of the Maccabean revival. ' This national feeling, claiming a leader against the Romans as well as deliverance from the Sadducee aristocracy, again sets the idea of the kingship rather than that of resurrection and individual retribution in the central place. Henceforward the doctrine of the Messiah is the centre of popular hope and the object of theological culture. . The New Testament is the best evidence of its influence on the , masses (see Especially Matt. xxi. 9) ; and the exegesis of the Targums, which: in its beginnings doubtless reaches back before the time of Christ, shows how it was fostered by the Rabbins and preached, in the synagogues. 2 Its diffusion far beyond Palestine, and in circles least accessible to such ideas, is proved by the fact that Philo himself (De praem. et poen. § 16) gives a Messianic interpretation of Num. xxiv. 27 (LXX). It must not! indeed be supposed that the, doctrine 'was as yet the undisputed part of Hebrew faith which it becarjie when the fall of the state and the antithesis to Christianity threw all Jewish thought into the lines of the Pharisees. It has, for example, no place in the Assumption of Moses or the Book of Jubilees. But, as the fatal struggle with Rome became more and more imminent, the eschatological hopes which increasingly absorbed the Hebrew mind all group themselves round the person of the Messiah. In the' later parts of the Book of Enoch (the " symbols " of chap. xlv. seq.) the judgment day of the Messiah (identified with Daniel's " Son of Man ") stands in the .fore- front of the eschatological picture. Josephus (B. J. vi. 5, § 4) testifies that the belief it) the immediate appearance of the Messianic king gave the chief impulse to the war that ended in the destruction of the Jewish state; after the fall of the, temple the last apocalypses (Baruch, 4 Ezra) still loudly proclaim the near victory df trie God-sent king; and Bar Cochebas; the leader of the revolt against Hadrian, was actually greeted as the Messiah by Rabbi Aqiba (cf. Luke xxi. 8). These hopes were again quenched in blood; the political idea of the Messiah, the restorer of the Jewish staˆe, still finds utterance in the daily prayer of every Jew (the Shemone Esre), and is enshrined in the system of Rabbinical theology; but its historical significance was buried in the

ruins of Jerusalem. 3

2 The Targumic passages that speak of the Messiah are registered by Buxtorf, Lex. Cho2d., h s.v. _ “^

3 False Messiahs have continued from time to time to appear among the Jews. Such was Serenus of Syria if. 720. a.d.). Soon after, Messianic hopes were active at the time of the fall of the Omayyads, and led to a serious rising under Abu ‘Isa of Ispahan, who called himself forerunner of the Messiah.. The false Messiah David Alrui (Alroy) appeared among the warlike Jews in Azerbijan in the middle of the 12th century. The Messianic claims of Abraham Abulafia of Saragossa (born 1246) had a cabalistic basis, and the same studies encouraged the wildest hopes at a later time. Thus Abarbanel calculated the coming of the Messiah for 1503 a.d.; the year 1500 was in maiiy places observed as a preparatory season of penance; and throughout the 16th century the Jews were much stirred -and more than one false Messiah appeared.

‘ Sabbatai; Sebi.

II

See also

But this proof that the true kingdom of God could not be realized in an earthly state, under the limitations of national particularism, was not the final refutation of the pld Testament hope. Amidst the last convulsions of political Judaism a new spiritual conception of the kingdom of God, of salvation, and of the Saviour of God’s anointing, had shaped itself through the preaching, the death, and the resurrection of Jesus of Nazareth. As applied to Jesus the name of Messiah lost all its political and national significance. Between the Messiah of the Jews and the Son of Man who came to give His life a ransom for many there was on the surface little resemblance; and from their standpoint the Pharisees reasoned that the marks of the Messiah were conspicuously absent from this Christ. But when we look, at the deeper side of the Messianic conception in the Psalter of Solomon, at the heartfelt longing for a leader in the way of righteousness and acceptance with God which underlies the aspirations after political deliverance, we see that it was in no mere spirit of accommodation to prevailing language that Jesus did not disdain the name in which all

the hopes of the Old Testament were gathered up.

Messianic Parallels. — Within the limits of this article it is im- possible to attempt any extended survey of parallels to Hebrew Messianic conceptions drawn from other religions. One interest- ing analogy communicated by Professor Rapson, may, however, be cited from the Bhagavad-glta., iv. 5-8, in which Krishna says: — •

5 ” Many are the births that have passed of me arid of thee

Arjuna. All these I know: thou knowest them not, O conqueror of thy foes.

6 Unborn, of imperishable soul, the Lord of all creatures, Taking upon me mine own nature, I arise by my own power.

7 For whensoever, O son of Bharata, there is decay of righteous-

ness And a rising up of unrighteousness, then I create myself,

8 For the protecting of the good and for the destroying of

evil-doers, . And for the establishing of righteousness I arise from age to age.”

” Somewhat similar are the avatars of Vishnu, who becomes incarnate in a portion of his essence on ten occasions to deliver, mankind frorii certain great dangers. Krishna himself is usually regarded as one of these avatars.” This we may consider as one of the striking parallels which meet us in other religions to that ” hope of the advent of an ideal king which was one of the features of that larger hope of the salvation of Israel from all evils, the reali- zation of perfect reconciliation with Jehovah and the felicity of the righteous in Him,” to which reference was made in an early portion of this article and which constitutes the essential meaning of Messiah- ship. The form in which the Indian conception presents itself in the above quoted lines is more closely analogous amid many differ- ences to the later and apocalyptic type of the Messianic idea as it appears in Judaism.

The interesting parallels between the Babylonian Marduk (Merodach) god of light and Christ as a world saviour are ingeniously set forth by Zimmern in K.A.T., 3rd ed., pp. 376-391, but the total impression which they leave is vague.

It would carry us too far to consider in this place the details of the Jewish conception of the Messiah and the Messianic times as they

appear in the later apocalypses or in Talmudic theology. See for the former the excellent summary of Schiirer, Geschichte des judischen Volkes im Zeitalter Jesu Christi, 3rd ed., vol. ii. pp. 497- 556. See also Weber, Judische Theologie, ch. xxiii. For the whole subject see also Drummond, The Jewish Messiah, and Kuenen, Religion of Israel, ch. xii. For the Messianic hopes of the Pharisees and the Psalter of Solomon see especially Wellhausen, Pharisder und Sadducder (Greifswald, 1874). In its ultimate form the Messianic hope of the Jews is the centre of the whole eschatology, embracing the doctrine of the last troubles of Israel (called by the Rabbins the ” birth pangs of the Messiah “), the appearing of the anointed king, the annihilation of the hostile enemy, the return of the dispersed of Israel, the glory and world-sovereignty of the elect, the new world, the resurrection of the dead and the last judgment. But even the final form of Jewish theology shows much vacillation as to these details, especially as regards their sequence and mutual relation, thus betraying the inadequacy of the harmonistic method by which they were derived from the Old Testament and the stormy excitement in which the Messianic idea was developed. It is, for example, an open question among the Rabbins whether the days of the Messiah belong to the old or to the new world (n»n n?ij;n or x?n ojiyij), whether the resurrection embraces all men or only the righteous, whether it precedes or follows the Messianic age. Compare Millennium.

We must also pass over the very important questions that arise as to the gradual extrication of the New Testament idea of the

Christ from the elements of Jewish political doctrine which had so strong a hold of many of the first disciples — the relation, for example, of the New Testament Apocalypse to contemporary Jewish thought. A word, however, is necessary as to the Rabbinical doctrine of the Messiah who suffers and dies for Israel, the Messiah son of Joseph or son of Ephraim, who in Jewish theology is dis- tinguished from and subordinate to the victorious son of David. The developed form of this idea is almost certainly a product of the polemic with Christianity, in which the Rabbins were hard pressed by arguments from passages (especially Isa. liii.) which their own exegesis admitted to be Messianic, though it did not accept the Christian inferences as to the atoning death of the Messianic king. That the Jews in the time of Christ believed in a suffering and atoning Messiah is, to say the least, unproved and highly improbable. See, besides the books above cited, De Wette, Opuscula; Wiinsche, Die Leiden des Messias (1870).

See the articles on ” Messiah ” in Hastings’s D. B. (together with Fairweather’sart., ” Development of Doctrine,” in extra vol., pp. 295-302) in Ency. Bibl. Also P.R.E. 3rd ed., as well as Hastings’s Diet, of Christ and the Gospels, should be consulted. Comp. Edersheim, Life and Times of Jesus the Messiah, 2nd ed., i. 160-179, ii. 434 sqq., 710-741; Stanton, The Jewish and the Christian Messiah (1886); Wendt, Teaching of Jesus, i. 60-84, 176-181, ii. 122-139; Holtz- mann, N.‘T. Theologie (1897), pp. 81-85, 234-304; Baldensperger, Das Selbstb&wusstsein Jesu; Wellhausen, Israel, u. jud. Geschichte (1895), pp. 198-204; Charles’s Book of Enoch and Apocalypse of Baruch (especially the introductions) ; Bousset, Religion des Juden- tums, 2nd ed., pp. 245-277; Volz, Judische Eschatdogie von Daniel bis Akiba, pp. 55-68, 213-237; Dalman; Der leidende u. sterbende Messias; Gressmann, Ursprung der israelitisch-jiidischen Eschato- logie, pp. 250-345. A fuller survey of literature will be found in Schiirer. op. cit., p. 496 sqq. (W. R. S. ; O. C. W.)

MESSINA, a city of Sicily, 7 m. S.S.W. of the promontory of Faro (anc. Promontorium Pelorum), which forms the north- eastern angle of the island, the capital of the province of Messina and the seat of an archbishop. Pop. (1850), 97,074; (1881), 126,497; (1901), 149,778; (1905), 158,812. The site of the town curves round the harbour, between it and the strongly fortified hills of Antennamare, the highest point of which is 3707 ft. The straits, which take their name from the town, are here about 35 m. wide, and only a little over 2 m. at the

promontory of Faro. The numerous earthquakes from which the city had suffered, notably that in 1783, had left it few remains of antiquity. But it was a flourishing and beautiful city when in 1908 one of the most disastrous earthquakes ever recorded destroyed it totally. The earthquake occurred early in the morning of December 28, . and so far as Messina was concerned the damage was done chiefly by the shock and by the fires which broke out afterwards; the seismic wave which followed was comparatively innocuous. But it did vast damage elsewhere along the strait, notably at Reggio, Calabria, which was also totally destroyed. Many other smaller towns suffered both in Sicily and in Calabria; the loss of life was appalling and the distress widespread, in spite of the prompt assistance rendered by Italian naval and military forces and by the crews of British, Russian and German warships and other vessels, and the contribution of funds for relief works from every part of the world. The immediate seismic focus appeared to be in the straits, but Dr E. Suess pointed out that it was surrounded by a curved line of earth-fracture, following an arc drawn from a centre in the Lipari Islands, from Catanzaro to Etna, and so westward; within this arc he held that the crust of the earth is gradually sinking, and is in an unstable condition. According to an official estimate the earthquake caused the loss of 77,283 lives. 1 (See also Earthquake.)

The facades of buildings at Messina in great part withstood the earthquake, but even when they did so the remainder of the buildings was destroyed. The cathedral, which was completely wrecked, was begun in 1098 and finished by Roger II, It had* a fine Gothic f acade : the interior had mosaics in the apses dating from 1330, and the nave contained 26 granite columns, said to have been brought from a temple of Poseidon near Faro, and had a fine wooden roof of 1260. The rest of the edifice was in the baroque style; the high altar (containing the supposed letter of the Virgin Mary to the people of Messina), richly decorated with marbles, lapis lazuli, &c., was begun in 1628 and completed in 1726. The importance of Messina was almost entirely due to its

1 See S. Franchij ” II Terremoto … a Messina . . . ,” in Boll. R. Comit. geologico d’ltal., 4th series, vol. x. (1909).

harbour, a circular basin open on the north only, formed by a strip of land curving round like a sickle, from which it took its original name,

Zancle (f kyickDv, or rather 8ayK\ov, the Sicilian equivalent of the Greek Spiiravov, 1 according to Thucydides, vi. 4).

Zancle was first founded, no doubt on the site of an earlier settlement, by pirates from Cumae, and again more regularly settled, after an unknown interval, by settlers from Cumae under Perieres, and from Chalcis under Crataemenes, in the first quarter of the 8th century B.C. Mylae must have been occupied as an outpost very soon afterwards, but the first regular colony of Zancle was Himera, founded in 648 B.C. After the capture of Miletus by the Persians in 494 B.C. Skythes, king of Zancle, invited the Ionians to come and settle at KaXi) 'Aktij, then in the occupation of the Sicels (the modern Marina di Caronia, 25 m. east of Cefalu) ; but at the invitation of Anaxilas of Regium the Samians proceeded instead to the latter place. About 488 B.C. Anaxilas and the Samians occupied Zancle in the absence of Skythes, and it was then that the name was changed to Messene, as the existence of coins of the Samian type, bearing the new name, proves. About 480, however, Anaxilas thoroughly estab- lished his authority at Messene, and the types of coinage intro- duced by him persevere down to about 396 B.C., 2 when Anaxilas himself zealously supported his son-in-law Terillus in inviting the Carthaginians' invasion of 480 B.C. In 426 the Athenians gained the alliance of Zancle, but soon lost it again, and failed to obtain it in 415.

Messina fell into the hands of the Carthaginians during their, wars with Dionysius the elder of Syracuse (397 B.C.). The Carthaginians destroyed the city, but Dionysius recaptured and rebuilt it. During the next fifty years Messina changed masters several times, till Timoleon finally expelled the Carthaginians in 343 B.C. In the wars between Agathocles of Syracuse and Carthage, Messina took the side of the Carthaginians. After Agathocles' death, his mercenaries, the Mamertines, treacher- ously seized the town about 282 B.C. and held it. They came to war with Hiero II. of Syracuse and appealed for help to Rome, which was granted, and this led to a collision between Rome and Carthage, which ended in the First Punic War. Messina was almost at once taken by Rome. At the close of the war, in 241 B.C., Messina became a free and allied city {civitas foederata) , and obtained Roman citizenship before the rest of Sicily, probably from Caesar himself. During the civil wars which followed the death of Caesar, Messina held with Sextus Pompeius; and in 35 B.C. it was sacked by Octavian's troops. After Octavian's proclamation as emperor he founded a colony here; and Messina continued to flourish as a trading port. In the division of the Roman empire it belonged to the emperors of the East; and in a.d. 547 Belisarius collected his fleet here before crossing into Calabria. The Saracens took the-city in a.d. 831;

and in 1061 it was the first permanent conquest made in Sicily by the Normans. In 1 190 Richard I. of England, with his crusaders, passed six months in Messina. He quarrelled with Tancred, the last of the Hauteville dynasty, and sacked the town. In 1194 the city, with the rest of Sicily, passed to the house of Hohenstaufen under the emperor Henry VI., who died there in 1197; and after the fall of the Hohenstaufen was contended for by Peter I., king of Aragon, and Charles I., count of Anjou. At the time of the Sicilian Vespers (1282), which drove the French out of Sicily, Messina bravely defended itself against Charles of Anjou, and repulsed his attack. Peter I., through his commander Ruggiero di Loria, defeated the French off the Faro; and from 1282 to 17 13 Messina remained a possession of the Spanish royal house. In 1 571 the fleet fitted out by the Holy League against the Turk assembled at Messina, and in the same year its commander, Don John of Austria, celebrated a triumph in the city for his victory at Lepanto. Don John's statue stands in the Piazza dell' Annuziata. For one hundred years, thanks to the favours and

1 From this word Trapani derives its name.

2 This account is at variance with the literary evidence and refts on that of the coins, as set forth by I. H. Dodd in Journal of Hellenic Studies, xxviii. (1908) 56 sqq.

the concessions of Charles V., Messina enjoyed great prosperity. But the internal quarrels between the Merli, or aristocratic faction, and the Malvezzi, or democratic faction, fomented as they were by the Spaniards, helped to ruin the city (1671-1678). The Messinians suspected the Spanish court of a desire to destroy the ancient senatorial constitution of the city, and sent to France to ask the aid of Louis XIV. in their resistance. Louis despatched a fleet into Sicilian waters, and the French occupied the city. The Spaniards replied by appealing to Holland, who sent a fleet under Ruyter into the Mediterranean. In 1676 the French admiral, Abraham Duquesne, defeated the combined fleet of Spain and Holland; but, notwithstanding this victory, the French suddenly abandoned Messina in 1678, and the Spanish occupied the town once more. The senate was suppressed, and Messina lost its privileges. This was fatal to the importance of the city. In 1743 the plague carried off 40,000 inhabitants. The city was partially destroyed by earthquake in 1783. During the revolu- tion of 1848 against the Bourbons of Naples, Messina was bom- barded for three consecutive days. In 1854 the deaths from cholera numbered about 15,000. Garibaldi landed in Sicily in i860, and Messina was the last city in the island taken from the Bourbons and made a part of united ' Italy under Victor

Emmanuel.

Messina was the birthplace of Dicaearchus, the historian {c. 322 B.C.) ; Aristocles, the Peripatetic ; Euhemerus, the rationalist [c. 316 B.C.) ; Stefano Protonotario, Mazzeo di Ricco and Tommaso di Sasso, poets of the court of Frederick II. (a.d. 1250) ; and Anto- nello da Messina, the painter (1447-1499), of whose works one is preserved in the museum. During the 1 5th century the grammarian, Constantine Lascaris, taught in Messina; and Bessarion was for a time archimandrite there. (T. As.)

MESSUAGE (from Anglo-French mesuage, probably a cor- ruption of mesuage, mSnage, popular Lat. mansionaticum, from mansio, whence mod. Fr. maison, from manere, to dwell), in law, a term equivalent to a dwelling-house, and including out- buildings, orchard, curtilage or court-yard and garden. ■ At one? time ” messuage ” is supposed to have had a more extensive meaning than that comprised in the word ” house,” but such: distinction, if it ever existed, no longer survives.

MESTIZO (adopted from the Spanish, the Portuguese form being mestico, from Lat. miscere, to mix), a term originally meaning a half-breed, one of whose parents was Spanish, and now used occasionally of any half-breed, but especially to denote persons of mixed Spanish (or Portuguese) and American Indian blood. The offspring of such half-breeds are also called mestizoes. The feminine form is mestiza.

MESUREUR, GUSTAVE EMIL EUGENE (1847-), French politician, was born at Marcq-en-Baroeul (Nord) on the 2nd of April 1847. He worked as a designer in Paris, and became prominent as a member of, the municipal council of Paris, rousing much angry discussion by a proposal to rename the Parisian streets which bore saints’ names. In 1887 he became president of the council. The same year he entered the Chamber of Deputies, taking his place with the extreme left. He joined theL. Bourgeois ministry of 1895-1896 as minister of commerce, industry, post and telegraphs, was vice-president of the Chamber from 1898 to 1902, and presided over the Budget Commission of 1899, 1901 and 1902. He was defeated at the polls in, 1902, but became director of the Assistance Publique. His wife, Amelie de Wailly (b. 1853), is well known as a writer of light verse and of some charming children’s books.

META, the Latin word for the goal which formed the turrirsg- point for the chariot races in the Roman circus. The metae consisted of three conical pillars resting on a single podium. None have been preserved, but they are shown on coins, gems and terra-cotta bas-reliefs.

METABOLIC DISEASES. All disease is primarily due to alterations (Gr. iierafioKr), change), quantitative or qualitative, in the chemical changes in the protoplasm of some or all of the tissues of the body. But while in some pathological states these modifications lead to structural changes, in others they do not produce gross lesions, and these latter conditions are commonly classified as Functional Diseases. When such

functional disturbances affect the general nutrition of the body they have been termed Metabolic Diseases (Stoffwechselkrank- heiten). It is impossible to draw a hard and fast line between functional and organic disease, since the one passes gradually into the other, as is well seen in gout. Nor is it always easy to decide how far the conditions are due merely to quantitative alterations in the metabolism and how far to actual qualitative changes, for it is highly probable that many of the apparently qualitative alterations are really quantitative disturbances in one part of the protoplasmic mechanism, leading to an apparent qualitative change in the total result of the ˆactivity.

Obesity. — It is as fat that the surplus- food absorbed is stored in the body; but the power of storing fat varies enormously in different individuals, and in some it may be considered patho- logical. The reasons of this are very imperfectly understoodi One undoubted cause of obesity is taking a supply of food in excess of the energy requirements of the individual. The amount of food may be absolutely large, or large relatively to the muscular energy evolved in mechanical work or in heat->produc- tion; but in either case, when fat begins to be deposited, the muscular activity of the body tends to diminish and the loss of heat from the surface is reduced; and thus the energy require- ments become less, and a smaller diet is sufficient to yield the surplus for further storage of fat. Fat is formed from carbo- hydrates, and possibly indirectly from proteids (see Nutrition). Individuals probably vary in their mode of dealing With these substances, some having the tendency to convert them to fat, some to burn them off at once. Carl von Noorden, however, who has studied the metabolism in cases of obesity, finds no marked departure from the normal. It may be that in some persons there is a very perfect absorption of food, but so far ho scientific evidence for this view is forthcoming. In all cases the fat stored is available as a source of energy, and this circum- stance is taken advantage of in the various'fat " cures," which consist

in giving a diet containing enough proteids to cover the requirements of the body, with a supply of fats and carbohydrates insufficient to meet the energy requirements of the individual. This is illustrated by the dietaries of some of the best known of these ” cures ” : —

In Grms. per Diem.

Proteid.

Fat.

Carbo- hydrates.

Calories.

Banting’s cure Oertel’s ,, Ebstein’s ,,

172

156-170

102

8 25-45 85

81

75-120

47

1112

1 180-1608

1 40 1

In a normal individual in moderate muscular activity about 3000 Calories per diem are required (see Dietetics), and there- fore under the diets of these ” cures,” especially when accom- panied by a proper amount of muscular exercise, the fats stored in the body are rapidly used up. .

Diabetes, as distinguished from transitory glycosuria, is pro- duced by a diminution in the power of the tissues to use sugar, which thus accumulates in the blood and escapes in the urine. One great source of energy being unavailable, the tissues have to use more fats and more

proteids to procure the necessary energy, and hence, unless these are supplied in very large quantities, there is a tendency to emaciation.

The power of storing and using sugar in the tissues is strictly limited, and varies considerably in healthy individuals. Normally, when about 200 grms. of glucose are taken at one time, some of it appears in the urine within one hour. In some individuals the taking of even 100 grms. leads to a transient glycosuria, while others can take 250 grms. or more and use it all. But even in the same healthy, individual the power of using sugar varies at different times and in different conditions, muscular exercise markedly increasing the combustion. Again, some sugars are more readily used than others, and therefore have a less tendency to appear in the urine when taken in the food. Milk-sugar and laevulose appear in the urine more readily than glucose. This power of using sugar possessed by an individual may depend to a

small extent on the capacity of the liver to store as glycogen any excess of carbohydrates absorbed from the food, and some slight cases of transient glycosuria may be accounted for by a dimi- nution of this capacity. But the typical form of diabetes cannot be thus explained. It has been maintained that increased production of sugar is a cause of some cases of the disease, and this view has been supported by Claude Bernard's classical experiment of producing glycosuria by puncturing the floor of the fourth ventricle in the brain of the rabbit. But after such puncture the glycosuria occurs only when glycogen is present in the liver. It is transient and has nothing to do with true diabetes. The fact that various toxic substances, e.g. carbon monoxide, produce glycosuria has been used as an argument in support of this view, but they too seem to act by causing a conversion of glycogen to glucose, and are effective only when the liver is charged with the former substance. At one time it was thought that the occurrence of glycosuria under the admini- stration of phloridzin proved that diabetes is due to a poison. But the fact that, while sugar appears abundantly in the urine under phloridzin, it is not increased in the blood, shows that the drug acts not by diminishing the power of the tissues to use sugar, but by increasing the excretion of sugar through the kidneys and thus causing its loss to the body. Hence the tissues have 1 to fall back upon the proteids, and an increased excretion of nitrogen is produced. This, however, is a totally different condition from diabetes. •

Anything which produces a marked diminution in the normally limited power of the tissues to use sugar will cause the disease in a lighter or graver form. As age advances the activity of the various

metabolic processes inay diminish irregularly in certain individuals, and it is possible that the loss of the power of using sugar may be sooner impaired in some than in others, and thus diabetes be produced. But Minkowski and von Mering have demonstrated, by experiments upon animals, that pathological changes in the pancreas have probably a causal relationship with the disease. They found that excision of that organ in dogs, &c, produced all the symptoms of diabetes — the appear- ances of sugar in the urine, its increased amount in the blood, the rapid breaking-down of proteids, and the resulting emaciation and azoturia. At the same time the absorption from the intestine of proteids, fats and carbohydrates was diminished. ■ How this pancreatic diabetes is produced has not been explained. It has been suggested that the pancreas forms an internal secretion which stimulates the utilization of sugar in the tissues. Though in a certain number of cases of diabetes disease of the pancreas has been found, other cases are recorded where grave disease of that organ has not produced this condition. But the apparent extent of a lesion is often no measure of the depth to which the functions of the structure in which it is situated aire altered, and it is very possible that the functions of the pancreas may in many cases be profoundly modified without our methods of research being able to detect the change. The pancreas consists of two parts, the secreting structure and the epithelial islets, and one or other of these may be more specially involved, and thus alteration in digestion and absorption on the one hand, and changes in the utilization of carbohydrates on the other, may be separately produced. The subcutaneous injection of large doses of extracts of the supra-renal bodies causes glycosuria and an increase of sugar in the blood, but the relationship of this con- dition to diabetes has not yet been investigated.

The disease may be divided into two forms : —

1. Slight Cases. — The individual can use small quantities of sugar, but the taking of larger amounts causes glycosuria. Supposing that the energy requirements of an individual are met by a diet

Proteid .

100 grms.

410 Calories.

Fat

100 „. .

930 . „

Carbohydrate

400 „ .

. 1640 „

of—

2980 „ then if only 100 grms. of glucose can be used, the energy value of 300 grms., i.e. 1230 Calories, must be supplied from proteids and fats. To yield this, 300 grms. of proteids or 132 grms. of fats would be required. If these are not forthcoming in the diet, they must

be supplied from the tissues, and the individual will become emaciated; hence a diabetic on an ordinary diet is badly nourished, and hence the huge appetite characteristic of the disease.

2. Grave Cases. — From the products of the splitting of proteids sugar can be formed, probably in the liver, and in the more serious form of the disease, even when carbohydrates are excluded from the food, a greater or lesser quantity of the sugar thus formed escapes consumption and may be excreted. Theoretically, ioo grms. of proteid can yield 113-6 grms. of glucose, i.e. 1 grm. of nitrogen will be set free for each 7-5 grms. of glucose formed. In the urine of grave cases of diabetes on a proteid diet, the proportion of nitrogen to sugar is about 1 to 2. This may mean that the theoretically possible amount of sugar is not yielded, or that some of the sugar formed is used in the economy. Both hypotheses may be correct, but the latter is supported by the fact that even in grave cases the decomposition of proteid may be diminished by giving sugar, and that in muscular exercise the proportion of sugar may fall.

In the course of the disease the amount of sugar which the tissues can use varies from day to day. It is in the utilization of glucose — the normal sugar of the body — that the tissues chiefly fail. Many diabetics are able to use laevulose, or the inulin from which it is derived, and lactose (milk-sugar) to a certain extent. It has, however, been observed that under the administration of these sugars the excretion of glucose may be increased, the tissues, apparently by using the foreign sugar, allowing part of the glucose which they would have

consumed to escape.

The increased decomposition of proteid, rendered necessary to supply the energy not forthcoming in the sugar, leads to the appear- ance of a large quantity of nitrogen in the urine — azoturia — and it also leads to the formation of various acids. Sulphuric acid and phosphoric acid are formed by oxidation of the sulphur and phos- phorus in the proteid molecule. Organic acids of the lower fatty acid series f> oxybutyric and aceto-acetic acid with their derivative acetone also appear in the course of diabetes. They are in part formed from the disintegration of proteids and in part from fats, as the result of a modified metabolism induced by the withdrawal of carbohydrates. To neutralize them ammonia is developed and hence the proportion of ammonia in the urine is increased. By the development of these various acids the alkalinity of the blood is diminished. The development of these acids in large quantities is associated with extensive decomposition of proteid, and is some- times indicative of the onset of a comatose condition, which seems to be due rather to an acid intoxication than to the special toxic action of any particular acid.

Myxoedema. — The thyroid gland forms a material which has the power of increasing the metabolism of proteids and of fats; and when the thyroid is removed, a condition of sluggish metabol- ism, with low temperature and a return of the connective tissues to an embryonic condition, supervenes, accompanied by the appearance of depression of the mental functions and by other nervous symptoms. The disease myxoedema, which was first described by Sir William Gull in 1873, was shown by Ord in 1878 to be due to degenerative changes in the thyroid gland. It affects both sexes, but chiefly females, and is characterized by a peculiar puffy appearance of the face and hands, shedding of the hair, a low temperature, and mental hebetude. The symptoms are similar to those produced by removal of the thyroid, and are indicative of a condition of diminished activity of metabolism. The nervous symptoms may be in part due to some alteration in the metabolism, leading to the formation of toxic substances. The administration of thyroid gland extract causes all the symptoms to disappear.

Cretinism may now be defined as myxoedema in the infant, and it has been definitely proved to be associated with non- development or degeneration of the thyroid gland. The char- acters of the disease are all due to diminished metabolism, leading to retarded development, and the treatment which has proved of service, at least in some sporadic cases, is the administration of various thyroid preparations.

Exophthalmic Goitre — Graves's Disease or Basedow's Disease. — This disease chiefly affects young women, and is characterized by three main symptoms: increased rate and force of the heart's action, protrusion of the eyeballs, and enlargement of the thyroid gland. The patient is nervous, often sleepless, and generally becomes emaciated and suffers from slight febrile attacks. The increased action of the heart is the most constant symptom, and the enlargement of the thyroid gland may not be manifest. Various theories as to- the pathology of the condition have been advanced, but in the light of our knowledge of the physio- logy of the thyroid the most probable explanation is an increased functional activity of that gland or of changes in the parthyroids.

Gout has often been divided into the typical and atypical forms. The first is undoubtedly a clinical and pathological entity, but the second, though containing cases of less severe forms of true gout, is largely constituted of imperfectly diagnosed morbid conditions. The accumulation of urate of soda in the tissues in gout formerly led physicians to believe in a causal relationship between an increased formation of that substance and the onset of the disease. Sir A. Garrod's investigations, however, seemed to indicate that diminished excretion rather than : increased production is the cause of the condition. He found an accumulation of uric acid in the blood and a diminution in its amount in the urine during the attack. That uric acid is increased in the blood is undoubted, but the changes described by Garrbd in the urine, and considered by him as indicative of diminished excretion and retention, are rendered of less value by the imperfections of the analytic method employed. More recent work with better methods has thrown still further doubt upon the existence of such a relationship, and points rather to the accumulation of uric acid being, like the other symptoms of the condition, a result of some unknown modification in the metabol ism, and a purely secondary phenomenon. The important fact that in leucaemia (von Jaksch), in lead-poisoning (Garrod), and in other pathological conditions, uric acid may be increased in the blood and in the urine without any gouty symptoms supervening, is one of the strongest arguments against the older views. That the gouty inflammation is not caused by the deposit of urate of soda, seems to be indicated by the occurrence of cases in which there is no such deposition. The source of the uric acid which is so widely deposited in the gouty is largely the phosphorus containing nucleins of the food and tissues. These in their decomposition yield a series of di-ureides, the purin bodies, of which uric acid is one. Their excretion is increased when substances rich in nuclein, e.g. sweetbreads, &c, are ad- ministered. While uric acid itself has. not

been demonstrated to have any injurious action, the closely allied adenin has been found to produce toxic symptoms. After the discovery of this source of uric acid, physiologists for a time inclined to regard it as the only mode of production. ‘ But it must be remembered that in birds uric acid is formed from the ammonia compounds coming from the intestine and muscles, just as urea is formed from the same substance in mammals. Uric acid is a di-ureide — a body composed of two urea molecules linked by acrylic acid— an unsaturated propionic acid. It is therefore highly probable that in many conditions the conversion of ammonia compounds to urea is not complete, and that a certain amount of uric acid is formed apart from the decomposition of nucleins.

Sir William Roberts has adduced evidence to shpw that uric acid circulates in the blood in a freely soluble combination or quadurate— that is, a compound in which one molecule of an acid salt BHU is linked to a molecule of the acid BHU. H 2 U. These compounds are said to be readily decomposed and the bi-urates formed, which are at first gelatinous but become crystalline. The deposition of urate of soda in joints, &c, has been ascribed to this change. Francis Tunnicliffe, however, has published the results of certain investigations which throw doubt upon this explanation. The most recent investigations on the metabolism of the gouty have shown that there is undoubtedly a slowing in the rate of elimination of uric acid and also of the total nitrogen of the urine with occasional sudden increases sometimes connected with a gouty paroxysm, sometimes independent of it. Whether this is due to the action of Some toxin developed in the body or is caused bya constitutional renal inadequacy is difficult to decide. Certain it is these renal diseases often develop in the course of gout.

Rheumatism. — Rheumatic fever was formerly regarded as due to some disturbance in the metabolism, but it is now known to be a specific micro-organismal disease. The whole clinical picture is that of an infective fever, and it is closely related to gonor- rhoeal rheumatism and to certain types of pyaemia. A number of independent observers have succeeded in isolating from cases of rheumatic fever a diplococcus which produces similar

symptoms in the rabbit to those which characterize the disease in man.

Excluding the peculiar changes in the joints which occur in rheumatoid arthritis and in Charcot's disease, and which are almost certainly primary affections of the nervous system, it is found that a large number of individuals suffer from pain in the joints, in the muscles, and in the fibrous tissues, chiefly on exposure to cold and damp or after indiscretions of diet. This so-called chronic rheumatism appears to be a totally distinct condition from rheumatic fever; and although its pathology is not deter- mined, it looks as if it were due either to a diminished elimina- tion or an increased production of some toxic substance or substances, but sb far we have no evidence as to their nature.

Rickets is undoubtedly a manifestation of a profound alteration of the metabolism in childhood, but how far it is an idiopathic condition and how far a result of the action of toxins introduced from without is not yet definitely known. Kassowitz long ago showed that the bone changes are similar to those which can be produced in animals by chronic phosphorus poisoning, and that they are really irritative in nature. Spillmann, in his work Le Rachitisme, discusses the evidence as regards the action of various conditions, arid comes to the conclusion that there is no evidence that it is due to a mere primary disturbance of the metabolism, or to excessive production of lactic acid, or to any specific micro-organismal poisoning. But he adduces evidence, perhaps not very convincing, that in the disease there is a specific intoxication derived from the alimentary canal and provoking inflammatory lesions in the bones.

See generally Carl von Noorden, Metabolism and Practical Medicine (1907). (D. N. P.)

METABOLISM (from Gr. nerafioXr], change), the biological term for the process of chemical change in a living cell (see Physiology).

METAL (through Fr. from Lat. metallum, mine, quarry, adapted from Gr. ju«raXXof, in the same sense, probably con- nected with neToXKav, to search after, explore, ixera., after, aXXos, other). Originally applied to gold, silver, copper, iron, tin, lead and bronze, i.e. substances having high specific gravity, malleability, opacity, and especially a peculiar lustre, the term " metal " became generic for all substances with these properties. In modern chemistry, however, the metals are a division of the elements, the members of which may or may not possess all these characters. The progress of science has, in fact, been accompanied by the discovery of some 70 elements, which may be arranged in order of their " metallic " properties as above indicated, and it is found that while the end members of the scale are

most distinctly metallic (or non-metallic), certain central members, e.g. arsenic, may be placed in either division, their properties approximating to both metallic and non-metallic. One chemical differentia utilizes the fact that metals always form at least one basic oxide which yields salts with acids, while non- metals usually form acidic oxides, i.e. oxides which yield acids with water. This definition, however, is highly artificial' and objectionable on principle, because when we speak of metals we think, not of their chemical relations, but of a certain sum of mechanical and physical properties which unites them all into one natural family.

All metals, when exposed in an inert atmosphere to a sufficient temperature, assume the form of liquids, which all present the following characteristic properties. They are (at least practically) non-transparent; they reflect light in a peculiar manner, produc- ing what is called " metallic lustre." When kept in non-metallic vessels they take the shape of a convex meniscus. These liquids, when exposed to higher temperatures, some sooner than others, pass into vapours. What these vapours are like is not known in many cases, since, as a rule, they can be produced only at very high temperatures, precluding the use of transparent vessels. Silver vapour is blue, potassium vapour is green, many others (meicury vapour, for instance) are colourless. The liquid metals, when cooled down sufficiently, some at lower, others at higher, temperatures freeze into compact solids, endowed with the (relative) non-transparency and the lustre of their liquids. These

frozen metals in general form compact masses consisting of aggregates of crystals belonging to the regular or rhombic or (more rarely) the quadratic system. Compared with non- metallic solids, they in general are good conductors of heat and of electricity. But their most characteristic, though not perhaps their most general, property is that they combine in themselves the apparently incompatible properties of elasticity and rigidity on the one hand and plasticity on the other. To this remarkable combination of properties more than to anything else the ordinary metals owe their wide application in the mechanical arts. In former times a high specific gravity used to be quoted as one of the characters of the genus; but this no longer holds, since we now know a series of metals lighter than water.

Non-Transparency. — This, in the case of even the solid metals, is perhaps only a very low degree of transparency. In regard to gold this has been proved to be so; gold leaf, or thin films of gold produced chemically on glass plates, transmit light with a green colour. On the other hand, infinitely thin films of silver which can be produced

chemically on glass surfaces are absolutely opaque. Very thin films of liquid mercury, according to Melsens, transmit light with a violet-blue colour; also thin films of copper are said to be translucent.

Colour. — Gold is yellow; copper is red; silver, tin, and some others are pure white; the majority are greyish.

Reflection of Light. — Polished metallic surfaces, like those of other solids, divide any incident ray into two parts, of which one is refracted while the other is reflected — with this difference, however, that the former is completely absorbed, and that the latter, in regard to polarization, is quite differently affected. The following values are due to Rubens and Hagen {Ann. der Phys., 1900, p. 352) ; they express the percentage of incident light reflected. The superiority of silver is obvious.

Name of Metal.

Violet.

Yellow.

Red.

A = 450

- = 55o

X = 65o

Nickel

Gold

Glass backed with silver Glass backed with mercury .

906

55-8 58-5 58-6 36-8 48-8

79-3-85-7 72-8

9?-5 6i-i

62-6 59-4 74-7 59-5 82-88 71-2

93-6 66-3 65-9

6o-i

88-2 89

83-89 71-5

Crystalline Form and Structure. — Most (perhaps all) metals are capable of crystallization. The crystals belong to the following systems: regular system — silver, gold, palladium, mercury, copper, iron, lead; quadratic system — tin, potassium; rhombic system — antimony, bismuth, tellurium, zinc, magnesium. Per- haps all metals are crystalline, only the degree of visibility of the crystalline arrangement is very different in different metals, and even in the same metal varies according to the slowness of solidification and other circumstances.

Antimony, bismuth and zinc exhibit a very distinct crystalline structure: a bar-shaped ingot readily breaks, and the crystal faces are distinctly visible on the fracture. Tin also is crystalline: a thin bar, when bent, “creaks” audibly from the sliding of the crystal faces over one another; but the bar is not easily broken, and exhibits an apparently non-crystalline fracture. — Class I.

Gold, silver, copper, lead, aluminium, cadmium, iron (pure), nickel and cobalt are practically amorphous, the crystals (where they exist) being so closely packed as to produce a virtually homo- geneous mass. — Class II.

The great contrast in apparent structure between cooled ingots of Class I. and of Class II. appears to be owing chiefly to the fact that, while the latter crystallize in the regular system, metals of Class I. form rhombic or quadratic crystals. Regular crystals expand equally in all directions; rhombic and quadratic expand differently in different directions. Hence, supposing the crystals immediately after their formation to be in absolute contact with one another all round, then, in the case of Class II., such contact will be maintained on cooling, while in the case of Class I. the contraction along a given straight line will in general have different values in any two neighbouring crystals, and the crystals con- sequently become slightly detached from one another. The crystal- line structure which exists on both sides becomes visible only in the metals of the first class, and only there manifests itself as brittleness.

Closely related to the structure of metals is their degree of ” plasticity ” (susceptibility of being constrained into new forms without breach of continuity). This term of course includes as special cases the qualities of ” malleability ” (capability of being flattened out under the hammer) and ” ductility ” (capa- bility of being drawn into wire) ; but these two special qualities do not always go parallel to each other, for this reason amongst others — that ductility in a higher degree than malleability is determined by the tenacity of a metal. Hence tin and lead, though very malleable, are little ductile. The quality of plasticity is developed to very different degrees in different metals, and even in the same species it depends on temperature, and may be modified by mechanical or physical operations. ‘ A bar of zinc, for instance, as obtained by casting, is very brittle; but when heated to ioo° or 150° C. it becomes sufficiently plastic to be rolled into the thinnest sheet or to be drawn into wire. Such sheet or wire then remains flexible after cooling, the originally only loosely cohering crystals having got intertwisted and forced into absolute contact with one another — an explanation supported by the fact that rolled zinc has a. somewhat higher specific gravity (7-2) than the original ingot (6-9). The same metal, when heated to 205° C, becomes so brittle that it can be powdered in a mortar. Pure iron, copper, silver and other metals are easily drawn into wire, or rolled into sheet, or flattened under the hammer. But all these operations render the metals harder, and detract from their plasticity. Their original softness can be restored to them by ” annealing,” i.e. by heating them to redness and then ouenching them in cold water. In the case of iron, however, this applies only if the metal is perfectly pure. If it contains a few parts of carbon per thousand, the annealing process, instead of softening the metal, gives it a ” temper,” meaning a higher degree of hardness and elasticity (see below).

What we have called plasticity must not be confused with the notion of ” softness,” which means the degree of facility with which the plasticity of a metal can be discounted. Thus lead is far softer than silver, and yet the latter is by far the more plastic of the two. The famous experiments of H. E. Tresca show that the plasticity of certain metals at least goes consider- ably farther than had before been supposed.

He operated with lead, copper, silver, iron and some other metals. Round disks made of these substances were placed in a closely fitting cylindrical cavity drilled in a block of steel, the cavity having a circular aperture of two or four centimetres below. By an hydraulic press a pressure of 100,000 kilos was made to act upon the disks, when the metal was seen to ” flow ” out of the hole like a viscid

liquid. In spite of the immense rearrangement of parts there was no breach of continuity. What came out below was a compact cylinder with a rounded bottom, consisting of so many layers super- imposed upon one another. Parallel experiments with layers of dough or sand plus some connecting material proved that the particles in all cases moved along the same tracks as would be followed by a flowing cylinder of liquid. Of the better known metals potassium and sodium are the softest ; they can be kneaded between the fingers like wax. After these follow first thallium and then lead, the latter being the softest of the metals used in the arts. Among these the softness decreases in about the following order: lead, pure silver, pure gold, tin, copper, aluminium_platinum, pure. iron. As liquidity might be looked upon as the ne plus ultra of softness, this is the right place for stating that, while most metals, when heated up to their melting points, pass pretty abruptly from the solid to the liquid state, platinum and iron first assume, and throughout a long range of temperatures retain, a condition of viscous semi-solidity which enables two pieces of them to be ” welded ” together by pressure into one continuous mass.

According to Prechtl, the ordinary metals, in regard to the degree of facility or perfection with which they can be hammered flat on the anvil, rolled out into sheet, or drawn into wire, form the following descending series: — ■

Hammering. Lead. Tin. Gold. Zinc. Silver. Copper. Platinum. Iron.

Rolling into Sheet. Gold. Silver. Copper. Tin. Lead. Zinc.

Platinum. Iron.

Drawing into Wire. Platinum. Silver. Iron. Copper. Gold. Zinc. Tin. Lead.

To give an idea of what can be done in this way, it may be stated that gold can be beaten out to leaf of the thickness of uˆnr mr n. ; and that platinum, by judicious work, can be drawn into wire a i mm. thick.

By the “hardness ” of a metal we mean the resistance which it offers to the file or engraver’s tool Taking it in this sense, it does not necessarily measure, e.g. the resistance of a metal to abrasion by friction. Thus, for instance, 10% aluminium bronze is scratched by an ordinary steel knife-blade, yet the sets of needles used for perforating postage stamps last longer if made of aluminium bronze than if made of steel.

Elasticity. — All metals are elastic to this extent that a change of form, brought about by stresses not exceeding certain limit values, will disappear on the stress being removed. Strains exceeding the “limit of elasticity” result in permanent deformation or (if suffi- ciently great) in rupture. Referring the reader to the article Elasti- city for the theoretical and to the Strength of Materials for the practical aspects of this subject, we give here a table of the ” modulus of elasticity, ‘ E (column 2), for millimetre and kilogramme. Hence 1000/E is the elongation in millimetres per metre length per kilo. Column 3 shows the charge causing a permanent elongation of 0-05 mm. per metre, which, for practical purposes, Wertheim takes as giving the limit of elasticity ; column 4 gives the breaking strain. These values may vary within certain limits for different specimens.

For Wire of 1 sq. mm.

Section, Weight (in

Kilos) causing

E

Permanent

Elongation

Breakage.

°f ~ZTSOTSV-

Lead, drawn ….

1,803

0-25

2.1

„ annealed

1.727

0-20

1-8

Tin, drawn. .

4,148

o-45

2 -45

„ annealed .

1,700

0-20

Cadmium .

7,070

2-24

Gold, drawn

8,131

13-5

27

,, annealed .

5.585

30

10

Silver, drawn .

7.357

n-3

29

„ annealed .

7,140

2-6

16

Zinc, pure, cast in mould

9,021

„ ordinary, drawn

8.735

o-75

13

Palladium, drawn .

1 1.759

18

„ annealed .

9.709

under 5

27

Copper, drawn.

12.449

12

40

„ annealed .

10.519

under 3

30

Platinum wire, mediun

1

thickness,’ drawn

17,004

26

34

Platinum, annealed

I5.5I8

14

23

Iron, drawn

20,869

32

61

,, annealed .

20,794

under 5 .

47

Nickel, drawn .

23.950

1X61

Aluminium

7,200

„ bronze

10,700

Brass (ZnCu 2) .

8.543

German silver (ZmCuisNis)

10,788

Specific Gravity. — This varies in metals from -594 (lithium) to 22-48 (osmium), and in one and the same species is a function of temperature and of previous physical and mechanical treatment. It has in general one value for the powdery metal as obtained by reduction of the oxide in hydrogen below the melting point of the metal, another for the metal in the state which it assumes spon- taneously on freezing, and this latter value, in general, is modified by hammering, rolling, drawing, &c. These mechanical operations do not necessarily add to the density; stamping, it is true, does so necessarily, but rolling or drawing occasionally causes a diminution of the density. Thus, for instance, chemically pure iron in the ingot has the specific gravity 7-844; when it is rolled out into thin sheet, the value falls to 7-6; when drawn into thin wire, to 7-75. The following table gives the specific gravities of many metals. Where special statements are not made, the numbers hold for the ordinary temperature (15 to 17° or 20 C), referred to water of the same temperature as a standard, and to hold for the natural frozen metal.

Name of Metal.

Specific GravHy.

Potassium

Sodium

Strontium

Aluminium, pure, ingot . : ” ordinary, hammered . . , .

•594

•875

■978

1-52 1-578 1-743 1-88

2-1

2-583 at 4

2-67

200

METAL

Name of Metal.

Barium . ...

Zirconium .

Vanadium, powder

Gallium

Lanthanum . . . . . .

Cerium

Antimony

Chromium .

Zinc, ingot

„ rollei iut

Manganese . . .

Tin, cast

„ crystallized by electrolysis from solutions

Indium

Iron, chemically pure, ingot

,, thin sheet

,, wrought, high quality .....

Nickel, ingot .

,, forged .

Cadmium, ingot . . . . . .

„ hammered

Cobalt

Molybdenum, containing 4 to 5 % of carbon .

Copper, native

„ cast

„ wire or thin sheet

„ electrotype, pure

Bismuth

Silver, cast

,, stamped

Lead, very slowly frozen . .

„ quickly frozen in cold water

Palladium

Thallium

Rhodium

Ruthenium

Mercury, liquid

„ solid

Tungsten, compact, by H 2 from chloride I

vapour \

,, as reduced by hydrogen, powder

Uranium

Gold, ingot

„ stamped

„ powder, precipitated by ferrous sul-) phate …….. 5

Platinum, pure . .

Iridium .

Osmium .

Specific Gravity.

3-75

4-15

5-5

5-95

6-163

6-68

662

6-50

6-915 . 7-2

7-39

7-29 to 7-299

7-178

7-42

7-844

7-6

7-8 to 7-9

8-279 8-666 8.546 8667 8-6 8-6 8-94 .8-92

8-94 to 8-95

8-945

9-823 at 12 10-4 to 10-5

10-57 11-254

11-363

1 1 -4 at 22-5°

n-86

I2-I

12-26 at 0° 13-595 ato° 14-39 below -40 °

16-54

19-13

187

19-265 at 13

19-31 to 19-34

19-55 to 19-72

21-50

22-2

22-477

Thermal Properties. — The specific heats of most metals have been determined. The general result is that, conformably with Dulong and Petit's law, the " atomic heats " all come to very nearly the same value (of about 6-4) ; i.e. atomic weight by specific heat =6-4. Thus we have for silver by theory 6-4/108- 0593, and by experi ment -0570 for io" to 100° C.

The expansion by heat varies greatly. The following table gives the linear expansions from 0° to ioo° C. according to Fizeau {Comptes rendus, brviii. 1125), the length at 0° being taken as unity.'

Name of Metal.

Platinum, cast

Gold, cast

Silver, cast

Copper, native, from Lake Superior

,, artificial

Iron, soft, as used for electromagnets

„ reduced by hydrogen and compressed Cast steel, English annealed . . Bismuth, in the direction of the axis

„ at right angles to axis . . . .

„ mean expansion, calculated . Tin, of Malacca, compressed powder .

Lead, cast

Zinc, distilled, compressed powder … Cadmium, distilled, compressed powder .

Aluminium, cast

Brass(7l-5%copper,28-5%zinc) ... Bronze (86-3 % copper, 9-7 % tin, 4-0 % zinc)

Expansion 0° to 100°.

•000 907 •001 451 •001 936 •001 708 •001 869 •001 228 •001 208 •001 no •001 642 •001 239 ■001 374 ■002 269 •002 948 •002 905 ■003 102 •002 336 •001 879 •001 802

uncertainty these metals were employed as compressed powders. The cubical expansion of mercury from 0° to ioo° C. is -018153 — spW (Regnault). (See Thermometry.)

Fusibility and Volatility. -r-The fusibility in different metals is very different, as shown by the following table, which, besides including all the fusing points (in degrees C.) of metals which have been determined numerically, indicates those of a selection of other metals by the positions assigned to them in the table.

Name of Metal.

Mercury . . . .

Caesium . . . . .

Gallium

Rubidium …. Potassium ….

Sodium

Indium

Lithium . .

Tin

Bismuth . . . Thallium . . . . Cadmium . . .

Lead

Zinc

Incipient red heat Antimony …. Magnesium . . . . Aluminium . . . .
Cherry red heat . Calcium …’.. Lanthanum ..-.’. Barium . . . . .

Silver

Gold

Copper . . . . . Yellow heat . . .

Iron

Nickel . . . . . Cobalt . . . . . Dazzling white heat . Palladium . . . . Platinum . . . . Rhodium. . . . .

Iridium

Ruthenium . . . . Tantalum . . . . Osmium . . .

Melting Point. Boiling Point-

-38-8

357-3

26-27

30-1

38-5

62-5

719-731

95-6

861-954

155

180-0

231-9

1 450-1 600

269*2

1090-1450

290

320-7

780

327-7

1 450- 1 600

419

929-954

525

629-5

632-6

about 1100

655

700

780 ■

810

850

962

1064

1082

2100

IIOO

1300-1400

1427

1800 (?)

I 500- I 600

1500

1760

above Pt.

„ 2200

„ Ir-

Indectric

furnace

For practical purposes the volatility of metals may be stated as follows: —

1. Distillable below redness:, mercury.

2. IJistillable at red heats: cadmium, alkali metals, zinc, mag- nesium.

3. Volatilized more or less readily when heated beyond their fusing points in open crucibles: antimony (very readily), lead, bismuth, tin, silver.

4. Barely so: gold, (copper).

5. Practically non- volatile : (copper), iron, nickel, cobalt, aluminium; also lithium, barium, strontium and calcium.

In the oxyhydrogen flame silver boils, forming a blue vapour, while platinum volatilizes slowly, and osmium, though infusible, very readily.

Latent Heats of Liquefaction. — Of these we know little. The following numbers are due to Person — ice, it may be stated, being 80.

Name of Metal.

Latent Heat.

Name of Metal.

Latent Heat.

Mercury ….

Lead

Bismuth ….

2-82

5-37 12-4

Cadmium . . . .

Silver

Zinc

13-6

2I-I

28-1

The coefficient of expansion is constant for such metals only as crystallize in the regular system; the others expand differently in the directions of the different axes. To eliminate this source of

The latent heat of vaporization of mercury was found by MarignaEx to be 103 to 106.

Conductivity. — Conductivity, whether thermic or electric, is very differently developed in different metals; and, as an exact knowledge of these conductivities is of great importance, much attention has been given to their numerical determination (see Conduction, Electric; and Conduction of Heat).

The following table gives the electric conductivities: of a number of metals as determined by Matthiesen, and the relative internal thermal conductivities of (nominally) the same metals as determined by Wiedemann and Franz, with rods about 5 mm. thick, of which one end was kept at ioo C, the rest of the rod in a ” vacuum ■ ‘ (of 5 mm. tension) at 12 C. Matthiesen’s results, except in the two cases noted, are from his memoir in Pogg. Ann., 1858, ciii. 42S

METAL

20 1

Name of Metal.

Copper, commercial, No. 3 . . . No. 2 . . . ,, chemically pure, hard drawn

Copper

Gold, pure

„ absolutely pure ….

Brass

Tin, pure

Pianoforte wire

Iron rod

Steel

Lead, pure

Platinum

German silver

Bismuth

Aluminium

Mercury

Silver, pure

Relative Conductivities.

Electric.

•774 •721

•93 1

•552

•73 l

•US •144

•0777 , •105 , •0767 •01 19 •196 •0163 i-ooo

at 18-8′

„ 22-6

21-8

19-0

21-0

20-4

17-3 20-7

i8- 7

13-8 19-6

22-8

Thermic.

•748 •548

•25 •154

• 101 •103 •079 •094 •073

Magnetic Properties. — Iron, nickel and cobalt are the only metals which are attracted by the magnet and can become magnets themselves. But in regard to their power of retaining their magnetism none of them comes at all up to the compound metal steel. See Magnetism.

Chemical Changes. — Metals may unite chemically both with metals and with non-metals. The compounds formed in the first case, which may be either definite chemical compounds or solid solutions, are discussed under Alloys; in this place only com- binations with non-metals are discussed, it being premised that the free metal takes part in the reaction.

Metallic Substances Produced by the Union of Metals with Small Proportions of Non-Metallic Elements. Hydrogen, as was shown by Graham, is capable of uniting with or being occluded by certain metals, notably with palladium (q.v.), into metal-like compounds.

Oxygen. — Mercury and copper and some other metals are capable of dissolving their own oxides. Mercury, by, doing so, becomes viscid and unfit for its ordinary applications. Copper, when pure to start with, suffers considerable deterioration in plasticity. But the presence of moderate proportions of cuprous oxide has been found to correct the evil influence of small contaminations by arsenic, antimony, lead and other foreign metals. Commercial coppers sometimes owe their good qualities to this compensating influence.

Arsenic combines readily with all metals into true arsenides, which

latter, in general, are soluble in the metal itself. The presence in a metal of even small proportions of arsenide generally leads to considerable deterioration in mechanical qualities.

Phosphorus. — The remark just made might be said to hold for phosphorus were it not for the existence of what is called ” phosphorus-bronze,” an alloy of copper with phosphorus (i.e. its own phosphide), which possesses valuable properties. According to Abel, the most favourable effect is produced by from 1 to i| / of phosphorus. Such an alloy can be cast like ordinary bronze, but excels the latter in hardness, elasticity, toughness and tensile strength.

Carbon. — Most metals when malten are capable of dissolving at least small proportions of carbon, which, in general, leads to a deterioration in metallicity, except in the case of iron, which by the addition of small percentages of carbon gains in elasticity and tensile strength with little loss of plasticity (see Iron).

Silicon, so far as we know, behaves to metals pretty much like carbon, but our knowledge of facts is limited. What is known as cast iron is essentially an alloy of iron proper with 2 to 6 % of carbon and more or less of silicon (see Iron). Alloys of copper and silicon were prepared by Deville in 1863. The alloy with 12 % of silicon is white, hard and brittle. When diluted down to 4-8 %, it assumes the colour and fusibility of bronze, but, unlike it, is tenacious and ductile like iron.

Action of the More Ordinary Chemical Agents on Simple Metals. The metals to be referred to are always understood to be given in the compact (frozen) condition, and that, wherever metals are enumerated as being similarly attacked, the degree of readiness in the action is indicated by the order in which the several members are named — the more readily changed metal always standing first.

Water, at ordinary or slightly elevated temperatures, is decom- posed more or less readily, with evolution of hydrogen gas and forma- tion of a basic hydrate, by (1) potassium (formation of KHO), sodium (NaHO), lithium (LiOH), barium, strontium, calcium (BaHiOj, &c.) ; (2) magnesium, zinc, manganese (MgQ 2 H 2 , &c).

In the case of group 1 the action is more or less violent, and the hydroxides formed are soluble in water and very strongly basic; metals of group 2 are only slowly attacked, with formation of rela- tively feebly basic and less soluble hydroxides. Disregarding the rarer elements, the metals not named so far may be said to be proof against the action of pure water in the absence of free oxygen (air).

By the joint action of water and air, thallium, lead, bismuth are oxidized, with formation of more or less sparingly soluble hydroxides (ThHO, PbH 2 2 , BiH s 3), which, in the presence of carbonic acid, pass into still less soluble basic carbonates. ‘ Iron, when exposed to moisture and air, ” rusts “; but this process never takes place in the absence of air, and it is questionable whether it ever sets in in the absence of carbonic acid (see Rust).

Copper, in the present connexion, is intermediate between iron and the following group of metals.

Mercury, if pure, and all the ” noble ” metals (silver, gold, plati- num and platinum- metals), are absolutely proof against water even in the presence of oxygen and carbonic acid.

The meta.ls grouped together above, under I and 2, act on steam pretty mucK as they do on liquid water. Of the rest, the following are readily oxidized by steam at a red heat, with formation of hydrogen gas — zinc, iron, cadmium, cobalt, nickel, tin. Bismuth is similarly attacked, but slowly, at a white heat. Aluminium is barely affected even at a white heat, if it is pure; the ordinary impure metal is liable to be very readily oxidized.

Aqueous Sulphuric or Hydrochloric Acid readily dissolves groups I and 2, with evolution of hydrogen and formation of chlorides or sulphates. The same holds for the following group (A) : [mangaˆ nese, zinc, magnesium] iron, aluminium, cobalt, nickel, cadmium. Tin dissolves readily in strong hot hydrochloric acid as SnCl 2 ; aqueous sulphuric acid does not act on it appreciably in the cold; at 150 it attacks it more or less quickly, according to the strength of the acid, with evolution of sulphuretted hydrogen or, when the acid is stronger, of sulphurous acid gas and deposition of sulphur (Calvert and Johnson). A group (B), comprising copper, is, substantially, attacked only in the presence of oxygen or air. Lead, in sufficiently dilute acid, or in stronger acid if not too hot, remains unchanged. A group © may be formed of mercury, silver, gold and platinum, which are not touched by either aqueous acid in

1 Published in i860, and declared by Matthiesen to be more exact than the old numbers.

pi; any circumstances.

Hot (concentrated) sulphuric acid does not attack gold, platinum and platinum-metals generally ; all other metals (including silver) are

converted into sulphates, with evolution of sulphur dioxide. In the case of iron, ferric sulphate, Feˆ$SO^{\wedge}$, is produced; tin yields a somewhat indefinite sulphate of its oxide $Sn0_2$.

Nitric Acid (Aqueous.) — Gold, platinum, iridium and rhodium only are proof against the action of this powerful oxidizer. Tin and antimony (also arsenic) are converted by it (ultimately) into hydrates of their highest oxides $Sn0_2$, $Sb_2 6$ (Asˆs) — the oxides of tin and antimony being insoluble in water and in the acid itself. All other metals, including palladium, are dissolved as nitrates, the oxidizing part of the reagent being generally reduced to oxides of nitrogen. Iron, zinc, cadmium, also tin under certain conditions, reduce the dilute acid, partially at least, to nitrous oxide, $N_2 0$, or ammonium nitrate, NH_4NO_3.

Aqua Regia, a mixture of nitric and hydrochloric acids, converts all metals (even gold, the ” king of metals,” whence the name) into chlorides, except only rhodium, iridium and ruthenium, which; when pure, are not attacked.

Caustic Alkalis. — Of metals not decomposing liquid pure water, only a few dissolve in aqueous caustic potash or soda, with evolution of hydrogen. The most important of these are aluminium and zinc, which are converted into aluminate, $Al(OK,Na)_s$, and zincate, $Zn(OK,Na)_2$, respectively. But of the rest the majority, when treated with boiling sufficiently strong alkali, are attacked at least superficially; of ordinary metals only gold, platinum, and silver are perfectly proof against the reagents under consideration, and these accordingly are used preferably for the construction of vessels intended for analytical operations involving the use of aqueous caustic alkalis. For commercial purposes iron is universally em- ployed and works well ; but it is not available analytically, because a superficial oxidation of the empty part of the vessel (by the water and air) cannot be prevented. Basins made of pure malleable nickel are free from this drawback; they work as well as platinum, and rather better than silver ones do. There is hardly a single metal which holds out against the alkalis themselves when in the state of r fiery fusion; even platinum is most violently attacked. In chemical laboratories fusions with caustic alkalis are always effected in vessels made of gold or silver, these metals holding out fairly well even in the presence of air. Gold is the better of the two. Iron, which stands so well against aqueous alkalis, is most violently attacked by the fused reagents. Yet tons of caustic soda are fused daily in chemical works in iron pots without thereby suffering contamination, which seems to show that (clean) iron, like gold and silver, is at- tacked only by the joint action of fused alkali

and air, the influence of the latter being of course minimized in large-scale operations.

Oxygen or Air. — The noble metals (from silver upwards) do not combine directly with oxygen given as oxygen gas (0 2), although, like silver, they may absorb this gas largely when in the fused condition, and may not be proof against ozone, 8 . Mercury, within

a certain range of temperatures situated close to its boiling point, combines slowly with oxygen into the red oxide, which, however, breaks up again at higher temperatures. All other metals, when heated in oxygen or air, are converted, more or less readily, into stable oxides. Potassium, for example, yields peroxide, K2O2 or KjOˆ; sodium gives Na 2 2 ; the barium-group metals, as well as magnesium, cadmium, zinc, lead, copper, are converted into their monoxides MeO. Bismuth and antimony give (the latter very readily) sesquioxide (Bi 2 3 and Sb 2 3 , the latter being capable of passing into SbjOˆ. Aluminium, when pure and kept out of contact with siliceous matter, is only oxidized at a white heat, and then very slowly, into alumina, A1 2 3 . Tin, at high temperatures, passes slowly into oxide, Sn02.

Sulphur. — Amongst the better known metals, gold and aluminium are the only ones which, when heated with sulphur or in sulphur vapour remain unchanged. All the rest, under these circumstances, are converted into sulphides. The metals of the alkalis and alkaline earths, also magnesium, burn in sulphur vapour as they do in oxygen. Of the heavy metals, copper is the one which exhibits by far the greatest avidity for sulphur, its subsulphide CU2S being' the stablest of all heavy metallic sulphides in opposition to dry reactions.

Chlorine. — All metals, when treated with chlorine gas at the proper temperatures, pass into chlorides. In some cases the chlorine is taken up in two instalments, a lower chloride being produced first, to pass ultimately into a higher chloride. Iron, for instance, is converted first into FeCl 2 , ultimately into FeCl 3 , which practically means a mixture of the two chlorides, or pure FeCl 3 as a final product. Of the several products, the chlorides of gold and platinum (AuCl 3 and PtCU) are the only ones which when heated beyond their temperature of formation dissociate into metal and chlorine. The ulti- mate chlorination product of copper, CuCU, when heated to redness, decomposes into the lower chloride, CuCl, and chlorine. All the rest,

when heated by themselves, volatilize, some at lower, others at higher temperatures.

Of the several Individual chlorides, the following are liquids or solids, volatile enough to be distilled from glass vessels: AsCli, SbCl 3 , SnCl 4 , BiCl 3 , HgCl 2 , the chlorides of arsenic, antimony, tin, bismuth, mercury respectively. The following are readily volatilized in a current of chlorine, at a red heat: A1C1 3 , CrCl 3 , FeCl 3 , the chlorides of aluminium, chromium, iron. The following, though volatile at higher temperatures, are not volatilized at dull redness: KC1, NaCl, LiCl, NiCl,, C0CI2, MnCl 2 , ZnCl 2 , MgCU, PbCl 2 , AgCl, the chlorides of potassium, sodium, lithium, nickel, cobalt, manganese, zinc, magnesium, lead, silver. Somewhat less volatile than the last-named group are the chlorides (MCI2) of barium, strontium and calcium.

Metallic chlorides, as a class, are readily soluble in water. The following are the most important exceptions: silver chloride, AgCl, and mercurous chloride, HgCl, are absolutely insoluble; lead chloride, PbCl 2 , and cuprous chloride, CuCl, are very sparingly soluble in water. The chlorides AsCl 3 , SbCl 3 , BiCl 3 , are at once decomposed by (liquid) water, with formation of oxide (As 2 3) or oxychlorides (SbOCl,.BiOCl) and hydrochloric acid. The chlorides MgCl 2 , A1C1 3 , CrCl 3 , FeCl 3 , suffer a similar decomposition when evaporated with water in the heat. The same holds in a limited sense for Z11CI2, CoClj, NiCl 2 , and even CaCl 2 . All chlorides, except those of silver and mercury (and, of course, those of gold and platinum), are oxidized by steam at high temperatures, with elimination of hydro- chloric acid.

For the characters of metals as chemical elements see the special articles on the different metals.

See generally A. Rossing Geschichte der Metalle (1901); B. Neumann, Die Metalle (1904) ; also treatises on chemistry.

METALLOGRAPHY. — The examination of metals and alloys by the aid of the microscope has assumed much importance in comparatively recent years, and it might at first be considered to be a natural development of the use of the microscope in determining the constitution of rocks, a study to which the name petrography has been given. It would appear, however, that it is an extension of the study of the structure of meteoric irons. There can be no question that in the main it was originated by Dr H. C. Sorby, who in 1864 gave the British Association an account of his work. Following the work of Sorby came that of Professor A. Mar' ens of Charlottenburg, presenting many features of originality. F. Osmond has obtained results in

connexion with iron and steel which are of the highest interest. A list of the more important papers by these and other workers will be found in the appended bibliography.

Preparation of the Specimen. — Experience alone can enable the operator to determine what portion of a mass of metal or alloy will afford a trustworthy sample of the whole. In studying a series of binary alloys it has been found advantageous in certain cases to obtain one section which will show in a general way the variation in structure from one end of the series to the other.

This has been effected by pouring the lighter constituent carefully on the surface of the heavier constituent, and allowing solidificar tion to take place. A section through the culot so obtained will show a gradation in structure from pure metal on one side to pure metal on the other. A thin slice of metal is usually cut by means of a hack-saw driven by mechanism. The thickness of the piece should not be less than J in. and in order that it may be firmly held between the fingers it should not be less than 1 in. square. The preliminary stages of polishing are effected by emery paper placed preferably on wooden disks capable of being revolved at a high rate of speed. The finest grade of emery paper that can be obtained is used towards the end of the operation. Before use the finer papers should be rubbed with a hard steel surface to remove any coarse particles. The completion of the operation of polishing is generally effected on wet cloth or parchment covered with a small amount of carefully washed jeweller's rouge. Various mechanical appliances are employed to minimize the labour and time required for the polishing. These usually consist of a series of interchangeable revolving disks, each of which is covered with emery paper, cloth or parchment, according to the particular stage of polishing for which it is required. In the case of brittle alloys and of alloys having a very soft constituent, which during polishing tends to spread over and obliterate the harder constituents, polishing is in many cases altogether avoided by casting the alloy on the surface of glass or mica. In this way, with a little care, a perfect surface is obtained, and it is only necessary to develop the structure by suitable etching. In adopting this method, however, instances have occurred in which the removal of the cast surface has shown a structure differing considerably from the original.

Polishing in Bas-Relief. — If the polishing be completed with fine rouge on a sheet of wet parchment, placed upon a compara- tively soft base such as a piece of deal, certain soft constituents of an alloy may often be eroded in such a manner as to leave the hardest portions in relief. For the later stages of polishing H. L. Le Chatelier recommends

the use of alumina obtained by the calcination of ammonium alum; and for the final polish of soft metals, chromium oxide.

Although in some cases a pattern becomes visible after polish- ing, yet more frequently a mirror-like surface is produced in which no pattern can be detected, or if there is a pattern it is blurred, as if seen through a veil or mist. This is due to a thin layer of metal which has been dragged, or smeared, uniformly over the whole surface by the friction of the polishing process. Such a surface layer is formed in all cases of polishing, and the peculiar lustre of burnished silver or steel is probably due to this layer. But to the metallographist it is an inconvenience, as it conceals scratches left by imperfect polishing, and also hides the pattern. It is therefore desirable to conduct the polishing so as to make this layer as thin as possible: it is claimed for alumina that it can be so used as to produce a much thinner surface layer than that due to the employment of rouge. The surface layer is very readily removed by appropriate liquid reagents, and, the true surface of the metal having been laid bare, the etching reagent acts differently on the individual substances in the alloy and the pattern can thus be emphasized to any required extent. Osmond divides etching reagents into three classes— acids, halogens and salts. As regards acids, water containing from 2 to 10% of hydrochromic acid is useful. It is made by mixing 10 grams of potassium bichromate with 10 grams of sulphuric acid in 100 grams of water. The use of nitric acid requires much experience. It is frequently employed in the examination of* steels, Sir W. C. Roberts-Austen preferred a 1% solution in alcohol, but many workers use concentrated acid, and effect the etching by allowing a stream of water to dilute the film of acid left on the surface of the specimen after dipping it. Of the halogens, iodine is the most useful. A solution in alcohol is applied, so that a single drop covers half a square inch of surface. The specimen is then washed with alcohol, and dried with a piece of fine linen or chamois leather. Tincture of iodine also affords a means of identifying lead in certain alloys by the formation of a yellow iodide of lead, while the vapour of iodine has in certain cases been

used to tint the constituents. Thin coloured films may often be produced by the oxidation of the specimen when heated in air. This, as a means of developing the structure, in the case of the copper alloys is specially useful. Tinted crystals may thus be distinguished from the investing layer caused by the presence of a minute quantity of another

constituent. The temper colours produced by heating iron or steel in air are well known. Carbide of iron is less oxidizable than the iron with which it is intimately associated, and it assumes a brown tint, while the iron has reached the blue stage. These coloured films may be fixed by covering with thin films of gelatine.

In some cases the alloy may be attacked electrolytically by exposing it for a few minutes to a weak electric current in a bath of very dilute sulphuric acid. Certain organic bodies give very satisfactory results. The Japanese, for instance, produce most remarkable effects by simple reagents of which an infusion of certain forms of grass is a not unimportant constituent. In the case of iron and steel a freshly prepared infusion of liquorice root has been found to be most useful for colouring certain constituents of steel. Osmond, who was the first to use this reagent, insisted that it should be freshly prepared and always used under identical conditions as regards age and concentration. His method of applying it was to rub the specimen on parchment moistened with it, but he has subsequently modified this " polish attack " by substituting a 2 % solution of ammonium nitrate for the liquorice infusion. In each case a small quantity of freshly precipitated calcium sulphate is used on the parchment to assist the polishing.

Appliances used in Micrography. — The method of using the microscope in connexion with a camera for photographic purposes will now be considered. Every micrographer has his own views as

Micrographic Apparatus.

to the form of an installation to be adopted, and it will therefore be well to give an illustration of a definite apparatus which has been found to give satisfactory results. It consists of a micro- scope A with a firm base placed in a horizontal position. The microscope can be connected by a tube] B with the expanded camera CC, at the end of which is the usual frame to receive the photographic plate. A practised observer can focus on a plate of clear glass by the aid of a subsidiary low-power microscope lens. If a semi-transparent plate is employed it should be as fine as possible. The surface of the table is cut in such a way near H that the observer who is seated may conveniently examine the object on the stage of the microscope, the portion B turning aside for this purpose. The subsequent focusing is effected by a rod, FFF, and gearing attached to the fine adjustment of the microscope, GA; flap J when raised forms the support of the lamp used for illumination. As an illuminant an arc light has many advantages, as the exposure of the plate used will seldom exceed 10 seconds. The

filament of a Nernst lamp can be used as the source of light; though not so brilliant as the arc it pos- sesses the great advantage of perfect immobility. For the best results, especially with high powers, the source of light must be small, so that its image can be focussed on to the surface of the object ; this advantage is possessed by both of these illuminants. Next in value comes the acetylene flame, and an incandescent lamp or a gas lamp with a mantle will give good results, but with much longer exposure. Actual illumination is best effected by a Beck vertical illuminator or a Zeiss prism. It is necessary that the lens used for concentrating the light on the illuminator

should be an achromatic one, as colour effects cause trouble in photographing the objects. For lower powers the Lieberkuhn parabolic illuminator is useful. Certain groups of alloys show better under oblique illumination, which may be effected by the aid of a good condensing lens, the angle of incidence being limited by the distance of the object from the objective in the case of high magnification. As regards objectives, the most useful are the Zeiss 2 mm., 4 mm. and 24 mm.; two other useful objectives for low powers being 35 mm. and 70 mm., both of which are projecting objectives. A projecting eye-piece, prefer- ably of low power, should be employed with all but the two latter objectives. The immersion lens, the Zeiss 2 mm., is used with specially thickened cedar oil, and if the distance from the objective to the plate is 7 feet, magnifications of over 2000 diameters can easily be obtained. As regards sensitized plates, excellent results have been obtained with Lumiere plates sensitive to yellow and green. The various brands of ” process ” plates are very serviceable where the contrasts on the specimen are not great. Some reproductions of photo- micrographs of metals and alloys will be found in the plate accompanying the article Alloys.

Authorities. — H. C. Sorby, ” On Microscopical Photographs of Various Kinds of Iron and Steel,” Brit. Assoc. Report (1864), pt. ii. p. 189; ” Microscopical Structure of Iron and Steel,” Journ. Iron and Steel Inst. (1887), p. 255; A. Martens, ” Die mikroskopische Untersuchung der Metalle,” Glaser’s Annalen (1892), xxx. 201; H. Wedding, ” Das Gefiige der Schienenkopfe,” Stahl und Eisen (May 15, 1892), xii. 478; F. Osmond, ” Sur la metallographie microscopique,” Rapport presents a la commission des methodes d’essai des materiaux de construction le 10 fevrier 1892; et ii. 7-17 (Paris, 1895); “Microscopic Metallography,” Trans. Ainer. Inst. Mining Eng. xxii. 243; J. E. Stead, ” Methods of preparing Speci- mens for Microscopic Examination,” Journ. Iron and Steel Inst.

(i894),pt.i.p.292); W. C. Roberts-Aus- ten and F. Osmond, ” On the

Structure of Metals, its Origin and Causes," Phil. Trans. Roy. Soc. clxxxvii. 417-432; and Bull, de la Soc. a" encouragement pour Vindustrie na- tionals 5 e serie, i. 1 136 (Aout 1896); G. Charpy, " Micro- scopic Study of Me- tallic Alloys," Bull.

de la soc. d' encouragement pour Vindustrie nationals (March, 1897) ; A. Sauveur, " Constitution of Steel," Technology Quarterly (June, 1898); Metallographist, vol. i. No. 3; " Metallography applied to Foundry Work," The Iron and Steel Magazine, vol. ix. No. 6, and vol. x. No. 1 ; J. E. Stead, " Crystalline Structure of Iron and Steel," Journ. Iron and Steel Inst. (1898), i. 145; "Practical Metallography," Proc. Cleveland Inst, of Engineers (Feb. 26, 1900) ; Ewing and Rosenhain, " Crystalline Structure of Metals," Phil. Trans. Roy. Soc. cxciii. 353 and cxcv. 279; F. Osmond, " Crystallography of Iron," Annates des Mines (January 1900) ; Le Chatelier, " Technology of Metallo- graphy," Metallographist, vol. iv. No. 1 ; Contribution a V'etude des alliages. Societe d 'encouragement pour Vindustrie nationale (1901); Smeaton, " Notes on the Etching of Steel Sections," Iron and Steel Magazine, vol. ix. No. 3. (W. C. R.-A.; F. H. Ne.)

METALLURGY, the art of extracting metals from their ores; the term being customarily restricted to commercial as opposed to laboratory methods. It is convenient to treat electrical processes of extraction as forming the subjects of Electro- chemistry and Electrometallurgy (qq.v.). The following table enumerates in the order of their importance the metals whicTvpur subject at present is understood to include; the second column gives the chemical characters of the ores utilized, italics indicat- ing those of subordinate importance. The term " oxide " includes carbonate, hydrate, and, when marked with*, silicate. Metal. Character of Ores.

Iron Oxides, sulphide. .

Copper Complex sulphides, also oxides, metal.

Silver Sulphide and reguline metal, chloride.

Gold Reguline metal.

Lead Sulphide and basic carbonate, sulphate, &c.

Zinc Sulphide, oxide.*

Tin Oxide.

METALLURGY

Metal. Character of Ores.

Mercury Sulphide, reguline metal.

Antimony …. Sulphide.

Bismuth Reguline metal.

Nickel and cobalt . . Arsenides.

Platinum, iridium, &c. . Reguline.

General Sequence of Operations. — Occasionally, but rarely, metallic ores occur as practically pure compact masses, from which the accompanying matrix or ” gangue ” can be detached by hand and hammer. In most cases the ” ore ” (see Mineral Deposits; Veins), as it comes out of the mine or quarry, is simply a mixture of ore proper and gangue, in which the latter not unfrequently predominates. Hence it is generally necessary to purify the ore before the liberation of the metal is attempted. Most metallic ores are specifically heavier than the accompanying impurities and their purification is generally effected by reducing the crude ore to a fine enough powder to detach the metallic from the earthy part, and then washing away the latter by a current of water, as far as possible (see Ore-dressing).

The majority of ores being chemical compounds, the extraction of their metals demands chemical treatment. The chemical operations involved may be classified as follows: —

i. Fiery Operations. — The ore, generally with some ” flux,” is exposed to the action of fire. The fire in most cases has a chemical, in addition to its physical, function. Moreover the furnace (

2. Amalgamation. — The ore by itself (if it is a reguline one), or with certain reagents (if it is not), is worked up with mercury so that the metal is obtained as an amalgam, which can be separ- ated mechanically from the dross. The purified amalgam is distilled, when the mercury is recovered as a distillate while the metal remains.

3. Wet Processes. — Strictly speaking, certain amalgamation methods fall under this head; but, in its ordinary acceptance, the term refers to processes in which the metal is extracted either from the natural ore, or from the ore after roasting or other preliminary treatment, by an acid or salt solution, and from this solution precipitated — generally

in the reguline form — by some suitable reagent.

Few methods of metal extraction at once yield a pure product. What as a rule is obtained is a more or less impure metal, which requires to be ” refined ” to become fit for the market.

Chemical Operations. — Amalgamation and wet-way processes have limited applications, being practically confined to copper, gold and silver. We therefore here confine ourselves, in the main, to pyro-chemical operations.

The method to be adopted for the extraction of a metal from its ore is determined chiefly, though not entirely, by the nature of the non-metallic component with which the metal is combined. The simplest case is that of the reguline ores where there is no non- metallic element. The important case is that of gold.

Oxides, Hydrates, Carbonates and Silicates. — All iron and tin ores proper fall under this heading, which, besides, comprises certain ores of copper, of lead and of zinc. The first step consists in subjecting the crude ore to a roasting or calcining process, the object of which is to remove the water and carbon dioxide, and burn away, to some extent at least, the sulphur, arsenic or organic matter. The residue consists of an impure oxide of the respective metal, which in all cases is reduced by treatment with fuel at a high temperature. Should the metal be present as a silicate, lime must be added in the smelting to remove the silica and liberate the oxide.

The temperature required for the reduction of zinc lies above the boiling point of the metal; hence the mixture of ore and reducing agent (charcoal is generally used) must be heated in aˆ retort combined with condensing apparatus. In all the other cases the reduction is effected in the fire itself, a tower-shaped blast furnace being pre- ferably used. The furnace is charged with alternate layers of fuel and ore (or rather ore and flux, see below), and the whole kindled

from below. The metallic oxide, partly by the direct action of the carbon with which it is in contact, but principally by that of the carbon monoxide produced in the lower strata from the oxygen of the blast and the hot carbon there, is reduced to the metallic state; the metal fuses and runs down, with the slag, to the bottom of the furnace, whence both are withdrawn by opening plug-holes.

Sulphides. — Iron, copper, lead, zinc, mercury, silver and antimony very frequently present themselves in this state of combination, as

components of a family of ores which may be divided into two sections: (1)' such as substantially consist of simple sulphides, as iron pyrites (FeS2), galena (PbS), zinc blende (ZnS), cinnabar (HgS) ; and (2) complex sulphides, such as the various kinds of sulphureous copper ores (all substantially compounds or mixtures of sulphides of copper and iron) ; bournonite, a complex sulphide of lead, anti- mony and copper; rothgiltigerz, sulphide of silver, antimony 1 and arsenic ; fahlerz, sulphides of arsenic and antimony, combined with sulphides of copper, silver, iron, zinc, mercury, silver; and mixtures of these and other sulphides with one another.

In treating a sulphureous ore, the first step as a rule is to subject it to oxidation by roasting it in a reverberatory or other furnace, which leads to the burning away of at least part of the arsenic and part of the sulphur. The effect on the several individual metallic sulphides (supposing only one of these to be present} is as follows :—

1. Those of silver (Ag 2 S) and mercury (HgS) yield sulphur dioxide gas and metal; in the case of silver, sulphate is formed at low temperatures. Metallic mercury, in the circumstances, goes off as a vapour, which is collected and condensed; silver remains as a regulus, but pure sulphide of silver is hardly ever worked.

2. Sulphides of iron and zinc yield the oxides Feˆ Oz and ZnO as final products, some basic sulphate being formed at the earlier stages, especially in the case of zinc. The oxides can be reduced by carbon.

3. The sulphides of lead and copper yield, the former a mixture of oxide and normal sulphate, the latter one of oxide and basic sulphate. Sulphate of lead is stable at a red heat ; sulphate of copper breaks up into oxide, sulphur dioxide and oxygen. In practice, neither oxidation process is ever pushed to the end; it is stopped as soon as the mixture of roasting-product and unchanged sulphide contains oxygen and sulphur in the ratio of O2 : S. The access of air is then stopped and the whole heated to a higher temperature, when the whole of the sulphur and oxygen is eliminated. This method is largely utilized in the smelting of lead from galena and of copper from copper pyrites.

4. Sulphide of antimony, when roasted in air, is converted into a kind of alloy of sulphide and oxide; the same holds for iron, only its oxysulphide is quite readily converted into the pure oxide Fe 2 Os by further roasting. Oxysulphide of antimony, by suitable processes can be reduced to metal, but these processes are rarely used ; because the same end is far more easily obtained by " precipitation," i.e. withdrawing the sulphur by fusion with metallic iron, forming

metallic antimony and sulphide of iron. Both products fuse, but readily part, because fused antimony is far heavier than fused sulphide of iron. A precisely similar method is used occasionally for the reduction of lead from galena. Sulphide of lead, when fused together with metallic iron in the proportion of 2Fe : iPbS yields a regulus (= iPb)and a ” mat ” Fe 2 S, which, however, on cooling, decomposes into the ordinary sulphide FeS, and finely divided iron. What we have been explaining are special cases of a more general metallurgic proposition: Any one of the metals, copper, iron, tin, zinc, lead, silver, antimony, arsenic, in general, is capable of de- sulphurizing (at least partially) any of the others that follows it in the series just given, and it does so the more readily and completely the greater the number of intervening terms. Hence, supposing a complete mixture of these metals to be melted down under circum- stances admitting of only a partial sulphuration of the whole, the copper has the best chance of passing into the ” mat,” while the arsenic is the first to be eliminated as such, or, in the presence of oxidants, as oxide.

, Arsenides. — Although arsenides are amongst the commonest impurities of ores generally, ores consisting essentially of arsenides are comparatively rare. The most important are certain double arsenides of cobalt and nickel, which in practice are always con- taminated with the arsenides or other compounds of foreign metals, such as iron, manganese, &c. The general mode of working these ores is as follows. The ore is first roasted by itself, when a part of the arsenic goes off as such and as oxide, while a complex of lower arsenides remains. This residue is now subjected to careful oxictiz, ing fusion in the presence of some solvent for metallic bases. The effect is that the several metals are oxidized away and pass into the slag (as silicates) in the following order — manganese, iron, cobalt, nickel ; and at any stage the as yet unoxidized residue of arsenide assumes theform of a fused regulus, which sinks down through the slag as a ” speis.” (This term has the same meaning in reference to arsenides as ” mat ” has in regard to sulphides.) By stopping the process at the right moment, we can produce a speis which contains only cobalt and nickel, and if at this stage also the flux is renewed we can further produce a speis which contains only nickel and a slag which substantially is one of cobalt only. The composi- tion of the speises generally varies from AsMe 3/2 to AsMej, where ” Me ” means one atomic weight of metal in toto, so that in general iMe = xFe + yCo + zNi, where x + y + z = 1. ‘ The siliceoui

cobalt is utilized as a blue pigment called ” smalt ” ; the nickel-speis is worked up for metal.

Minor Reagents. — Besides the oxidizing and reducing agents present in the fire, and the ” fluxes ” added for the production of slags, various minor reagents may be noticed. Metallic iron as a desulphurizer has already been referred to.

Oxide of lead, PbO (litharge), is largely used as an oxidizing agent. At a red heat, when it melts, it readily attacks all metals, except silver and gold, the general result being the formation of a mixed oxide and of a mixed regulus, a distribution, in other words, of both the lead and the metal acted on between slag and regulus. More important is its action on metallic sulphides, which, in general, results in the formation of three things besides sulphur dioxide, viz. a mixed oxide slag including the excess of litharge, a regulus of lead (which may include bismuth and other more readily reducible metals), and, if the litharge is not sufficient for a complete oxidation, a ” mat ” comprising the more readily sulphurizable metals. Oxide of lead, being a most powerful solvent for metallic oxides generally, is also largely used for the separation of silver or gold from base metallic oxides.

Metallic lead is to metals generally what oxide of lead is to metallic oxides. It accordingly is available as a solvent for taking up small particles of metal diffused throughout a mass of slag, and uniting them into one regulus. This leads us to the process of ” cupellation,” which serves for the extraction of gold (q.v. ; see also Assaying) and silver from their alloys with base metals.

Fluxes. — All ores are contaminated with more or less gangue, which in general consists of infusible matter, and if left unheeded in the reduction of the metallic part of the ore would retain more or less of the metal disseminated through it, or at best foul the furnace. To avoid this, the ore as it goes into the furnace is mixed with ” fluxes ” so selected as to convert the gangue into a fusible ” slag,” which readily runs down through the fuel with the regulus and separates from the latter. The quality and proportion of flux should, if possible, be so chosen that the formation of the slag sets in only after the metal has been reduced and molten ; or else part of the basic oxide of the metal, to be extracted may be dissolved by the slag and its reduction thus be prevented or retarded. Slags are not a necessary evil ; if an ore were free from gangue we should add gangue and flux from without to produce a slag, because one of its functions is to form a layer on the regulus which protects it against the further action of the blast or

furnace gases. Fluxes may be arranged under the three heads of (1) fluor-spar, (2) basic fluxes and (3) acid fluxes.

Fluor-spar fuses up at a red heat with silica, sulphates of calcium and barium, and a few other infusible substances into homogeneous masses. It shows little tendency to dissolve basic oxides, such as lime, &c. One part of fluor-spar liquefies about half a part of silica, four parts of calcium sulphate and one and a half parts of barium sulphate. Upon these facts its extremely wide application in metallurgy is founded. Carbonate of soda (or potash) is the most powerful basic flux. It dissolves silica and all silicates into fusible glasses. On the other hand, borax may be taken as a type for the acid fluxes. At a red heat, when it forms a viscid fluid, it readily dissolves all basic oxides into fusible complex borates. Now the gangue of an ore in general consists either of some basic material such as carbonate of lime (or magnesia), ferric oxide, alumina, &c, or of silica (quartz) or some more or less acid silicate, or else of a mixture of the two classes of bodies. So any kind of gangue might be liquefied by means of borax or by means of alkaline carbonate ; but neither of the two is used otherwise than for assaying; what the metal-smelter does is to add to aˆbasic gangue the proportion of silica, and to an acid ore the proportion of lime, or, indirectly, of ferrous or perhaps manganous oxide, which it may need for the formation of a slag of the proper qualities. The slag must possess the proper degree of saturation. In other words, taking Si02+ nMeO (where MeO means an equivalent of base) as a formula for the potential slag, » must have the proper value. If n is too small, i.e. if the slag is too acid, it may dissolve part of the metal to be recovered; if n is too great, i.e. the slag too basic, it may refuse to dissolve, for instance, the ferrous oxide which is meant to go into it, and this oxide will then be reduced, and its metal (iron in our example) contaminate the regulus. In reference to the problem under discussion., it is worth noting that oxides of lead and copper are more readily reduced to metals than oxide of iron FejOs is to FeO, the latter more readily to FeO than FeO itself to metal, and FeO more readily to metal than manganous oxide is. Oxide of calcium (lime) is not reducible at all. The order of basicity in the oxides (their readiness to go into the slag) is precisely the reverse. Most slags being, as we have seen, complex silicates, it is a most important problem of scientific metallurgy to determine the relations in this class of bodies between chemical composition on the one hand and fusibility and solvent power for certain oxides (CaO, FeO, FesOs, AI2O3, Si02, &c.) on the other. Their general composition may be expressed as n(MO +*Si02)-|-»»[(fe or al)0 + *SiO a] (M=Ca, Mg, Fe, K 2 , &c; fe = | Fe, al = fAl.) The following mode of classifying and naming

composition in silicates is metallurgi- cal; scientific chemists designate Class I. as orthosilicates, Class II. as metasilicates, Class III. as sesquisilicates. In the formulae M stands for K 8 , Ca, Fe, &c, or for al = |Al, fe = |Fe, &c.

Name.

Formula.

Oxygen Ratio.

•

I. Singulo-silicates . II. Bi-silicates III. Tri-silicates .

‘jSiOj + iMO lSi0 2 -r-iMO tSi0 2 + iM0

Base. Acid.

1 : 1 1 : 2 1 : 3

r

1

t

It should be possible to represent each quality of a silicate as a function of x, n/m, and of the nature of the individual bases that make up the MO and (fe or al) O respectively. Our actual knowledge falls far short of this possibility. The problem, in fact, is very diffi- cult, the more so as it is complicated by the existence of aluminates, compounds such as A1 2 3 . 3CaO, in which the alumina plays the part of acid, and the occasional existence of compounds of fluorides and silicates in certain slags. The formation of slags, or, what comes to the same thing, of metallic silicates, was especially studied by Percy, Smith, Bischof, Plattner and others, and in more recent times by Vogt, Doelter, and at the Geophysical laboratory of the Carnegie Institution, Washington.

Bibliography. — W. Roberts-Austen, Introduction to the Study of Metallurgy ; J . A. Phillips and H. Bauerman, Elements of Metallurgy (1885); and L. Babu, MUallurgie ginirale (Paris, 1906), deal with the principles of metallurgy. A standard work treating the metal- lurgy of various metals is Carl Schnabel, Handbuch der Metall- hiittenkunde, i. (1901), ii. (1904), Eng. trans, by H. Louis, i. (1905), ii. (1907).

METAL-WORK. Among the many stages in the develop- ment of primeval man, none can have been of greater moment in his struggle for existence than the discovery of the metals, and the means of working them. The names generally given to the three prehistoric periods of man's life on the earth — the Stone, the Bronze and the Iron age — imply the vast importance of the progressive steps from the flint knife to the bronze celt, and lastly to the keen-edged elastic iron weapon or tool.

The metals chiefly used in the arts have been gold, silver, copper and tin (the last two generally mixed, forming an alloy called bronze), iron and lead (see the separate articles on these metals). Their peculiarities have naturally marked out each of them for special uses and methods of treatment. The durability and the extraordinary ductility and pliancy of gold, its power of being subdivided, drawn out or flattened into wire or leaf of almost infinite fineness, have led to its being used for works where great minuteness and delicacy of execution were required; while its beauty and rarity have, for the most part, limited its use to objects of adornment and luxury, as distinct from those of utility. In a lesser degree most of the qualities of gold are shared by silver, and consequently the treatment of these two metals has always been very similar, though the greater abundance of the latter metal has allowed it to be used on a larger scale and for a greater variety of purposes. The great fluidity of bronze when melted, the slightness of its contraction on solidifying, together with its density and hardness, make it especially suitable for casting, and allow of its taking the impress of the mould with extreme sharp- ness and delicacy. In the form of plate it can be tempered and annealed till its elasticity and toughness are much increased, and it can then be formed into almost any shape under the ham- mer and punch. By other methods of treatment, known to the ancient Egyptians, Greeks and others, but now forgotten, it could be hardened and formed into knife and razor edges of the utmost keenness. In many specimens of ancient bronze, small quantities of silver, lead and zinc have been found, but their presence is probably accidental. In modern times brass has been much used, chiefly for the sake of its cheapness as compared with bronze. In beauty, durability and delicacy of surface it is very inferior to bronze, and, though of some commercial importaTKe, has been of but little use in the production of works of art. To some extent copper was used in an almost pure state during medieval times, especially from the 12th to the 15th century, mainly for objects of ecclesiastical use, such as pyxes, mon- strances, reliquaries and croziers, partly on account of its soft- ness under the tool, and also because it was slightly easier to apply enamel and gilding to pure copper than to bronze (see fig. 1). In

the medieval period it was used to some extent in the shape of thin sheeting for roofs, as at St Mark's, Venice; while during the 16th and 17th centuries it was largely employed for ornamental domestic vessels of various sorts.

Iron. 1 — The abundance in which iron is found in so many places, its great strength, its remarkable ductility and malleability in a red-hot state, and the ease with which two heated surfaces of

iron can be welded together under the hammer com- bine to make it specially suitable for works on a large scale where strength with lightness are required — things such as screens, window-grills, ornamental hinges and the like. In its hot plastic state iron can be formed and modelled under the hammer to almost any degree of re- finement, while its great strength allows it to be beaten out into leaves and ornaments of almost paper- like thinness and delicacy. With repeated hammering, drawing out and annealing, it gains much in strength and toughness, and the addition of a very minute quantity of carbon con- verts it into steel, less tough, but of the keenest hardness. The large em- ployment of cast iron is comparatively modern, in England at least only dat- ing from the 16th century; it is not, however, in- capable of artistic treat- ment if due regard be paid to the necessities of casting, and if no attempt is made to imitate the fine- drawn lightness to which wrought iron so readily lends itself. At the best, however, it is not generally suited for the finest work, as the great contraction of iron in pass- ing from the fluid to the solid state renders the cast somewhat blunt and spirit- less.

Among the Assyrians, Egyptians and Greeks the use of iron, either cast or wrought, was very limited, bronze being the favourite metal almost for all purposes. The difficulty of smelting the ore was probably one reason for this, . as well as the now forgotten skill which enabled bronze to be tempered to a steel-like edge. It had, however, its value, of which a proof occurs in Homer (77. xxiii.), where a mass of iron is mentioned as being one of the prizes at the funeral games of Patroclus.

Methods of Manipulation in Metal-Work. — Gold, silver and bronze may be treated in various ways, the chief of which are (i) casting in a mould, and (2) treatment by hammering and punching (Fr. repousse).

The first of these, casting is chiefly adapted for bronze, or 1 Analyses of the iron of prehistoric weapons have brought to light the interesting fact that many of these earliest specimens of iron manufacture contain a considerable percentage of nickel. This special alloy does not occur in any known iron ores, but is invariably found in meteoric iron. It thus appears that iron was manufactured from meteorolites which had fallen to the earth in an almost pure metallic state, possibly long before prehistoric man had learnt how to dig for and smelt iron in any of the forms of ore which are found on this planet.

Fig. 1. — Monstrance of Copper Gilt ; Italian work of the 15th century.

in the case of the more precious metals only if they are used on a very small scale. The reason of this is that a repousse relief is of much thinner substance than if the same design were cast, even by the most skilful metal-worker, and so a large surface may be produced with a very small expenditure of valuable metal. Casting is probably the most primitive method of metal-work. This has passed through three stages, the first being represented by solid castings, such as are most celts and other implements of the prehistoric time; the mould was formed of clay, sand or stone, and the fluid metal was poured in till the hollow was full. The next stage was, in the case of bronze, to introduce an iron core, probably to save needless expenditure of the more valuable metal. The British Museum possesses an interesting Etruscan or Archaic Italian example of this primitive device. It is a bronze statuette from Sessa on the Volturno, about 2 ft. high, of a female standing, robed in a close-fitting chiton. The presence of the iron core has been made visible by the splitting of the figure, owing to the unequal contraction of the two metals. The forearms, which are extended, have been cast separately and soldered or brazed on to the elbows. The third and last stage in the progress of the art of casting was the employment of a core, generally of clay, round which the metal was cast in a mere skin, only thick enough for strength, without waste of metal. The Greeks and Romans attained to the greatest possible skill in this process. Their exact method is not certainly known, but it appearsprobable that they were acquainted with the process now called d cire perdue — the same as that employed by the great Italian artists in bronze. Cellini, the great Florentine artist of the 16th century, has described it fully in his Tratlato delta Scultura. If a statue was to be cast, the figure was first roughly modelled in clay — only rather smaller in all its dimensions than the future bronze; all over this a skin of wax was laid, and worked by the sculptor with modelling tools to the required form and finish. A mixture of pounded brick, clay and ashes was then ground finely in water to the

consistence of cream, and successive coats of this mixture were then applied with a brush, till a second skin was formed all over the wax, fitting closely into every line and depression of the modelling. Soft clay was then carefully laid on to strengthen the mould, in considerable thickness, till the whole statue appeared like a shapeless mass of clay, round which iron hoops were bound to hold it all together. The whole was then thoroughly dried, and placed in a hot oven, which baked the clay, both of the core and the outside mould, and melted the wax, which was allowed to run out from small holes made for the purpose. Thus a hollow was left, corresponding to the skin of wax between the core and the mould, the relative positions of which were preserved by various small rods of bronze, which had previously been driven through from the outer mould to the rough core. The mould was now ready, and melted bronze was poured in till the whole space between the core and the outer mould was full. After slowly cooling, the outer mould was broken away from outside the statue and the inner core as much as possible broken up and raked out through a hole in the foot or some other part of the statue. The projecting rods of bronze were then cut away, and the whole finished by rubbing down and polishing over any roughness or defective places. The most skilful sculptors, however, had but little of this after-touching to do, the final modelling and even polish which they had put upon the wax being faithfully repro- duced in the bronze casting. The further enrichment of the objects by enamels and inlay of other metals was practised at a very early period by Assyrian, Egyptian and Greek metal-workers, as well as by the artists of Persia and medieval Europe.

The second chief process, that of hammered work (Gr. vpij\aT(x; Fr. repousse), was probably adopted for bronze- work on a large scale before the art of forming large castings was dis- covered. In the most primitive method thin plates of bronze were hammered over a wooden core, rudely cut into the required shape, the core serving the double purpose of giving shape to and strengthening the thin metal. A further development in the art of hammered work consisted in laying the metal plate on a soft

and elastic bed of cement made of pitch and pounded brick. The design was then beaten into relief from the back with hammers and punches, the pitch bed yielding to the protuberances which were thus formed, and serving to prevent the punch from break- ing the metal

into holes. The pitch was then melted away from the front of the embossed relief, and applied in a similar way to the back, so that the modelling could be completed on the face of the relief, the final touches being given by the graver. This process was chiefly applied by medieval artists to the precious metals, but by the Assyrians, Greeks and other early nations it was largely used for bronze. The great gates of Shalmaneser II., 858-823 B.C., from Balawat, now in the British Museum, are a remarkable example of this sort of work on a large scale, though

Fig. 2. — One of the Siris Bronzes.

the treatment of the reliefs is minute and delicate. The ” Siris bronzes,” in the same museum, are a most astonishing example of the skill attained by Greek artists in this repousse work (see Bronsted’s Bronzes of Siris, 1836). They are a pair of shoulder- pieces from a suit of bronze armour, and each has in very high relief a combat between a Greek warrior and an Amazon. No work of art in metal has probably ever surpassed these little figures for beauty, vigour and expression, while the skill with which the artist has beaten these high reliefs out of a flat plate of metal appears almost miraculous. The heads of the figures are nearly detached from the ground, their substance is little thicker than paper, and yet in no place has the metal been broken through by the punch. They are probably of the school of Praxiteles, and date from the 4th century B.C. (see fig. 2).

Copper and tin have been but little used separately. Copper in its pure state may be worked by the same methods as bronze, but it is inferior to it in hardness, strength and beauty of surface. Tin is too weak and brittle a metal to be employed alone for any but small objects. Some considerable number of tin drinking- cups and bowl* of the Celtic period have been found in Cornwall

in the neighbourhood of the celebrated tin and copper mines, which have been worked from a very early period. The use of lead has been more extended. In sheets it forms the best of all coverings for roofs and even spires. In the Roman and medieval periods it was largely used for coffins, which were often richly ornamented with cast work in relief. Though fusible at a very low temperature, and very soft, it has great power of resisting decay from damp or exposure. Its most important use in an artistic form has been in the shape of baptismal fonts, chiefly between the nth and the 14th centuries. The superior beauty of colour and durability of old specimens of lead is owing to the natural presence of a small proportion of silver. Modern smelters carefully extract this silver from the lead ore, thereby greatly

impairing the durability and beauty of the metal.

As in almost all the arts, the ancient Egyptians excelled in their metal-work, especially in the use of bronze and the precious metals. These were worked by casting and hammering, and ornamented by inlay, gilding and enamels with the greatest possible skill. From Egypt perhaps was derived the early skill of the Hebrews. Further instruction in the art of metal-working came probably to the Jews from the neighbouring country of Tyre. The description of the great gold lions of Solomon's throne, and the laver of cast bronze supported on figures of oxen, shows that the artificers of that time had overcome the difficulties of metal-working and founding on a large scale. The Assyrians were perhaps the most remarkable of all ancient nations for the colossal size and splendour of their works in metal; whole circuit walls of great cities, such as Ecbatana, are said to have been covered with metal plates, gilt or silvered. Herodotus, Athenaeus and other Greek and Roman writers have recorded the enormous number of colossal statues and other works of art for which Babylon and Nineveh were so famed. The numerous objects of bronze and other metals brought to light by the excavations in the Tigris and Euphrates valleys, though mostly on a small scale, bear witness to the great skill and artistic power of the people who produced them; while the discovery of some bronze statuettes, shown by inscriptions on them to be not later than 2200 B.C., proves how early was the development of this branch of art among the people of Assyria.

The 'Metal-Work of Greece. — The early history of metal- working in Greece is extremely obscure, and archaeologists are divided in opinion even on so important a question as the relative use of bronze and iron in the Homeric age. The evidence of Mycenaean remains, as compared with the literary evidence of Homer, is both inadequate and inconclusive (see Aegean Civilization; Greek Art; Arms and Armour, Ancient; Plate; &c). The poems of Homer are full of descriptions of elaborate works in bronze, gold and silver, which, even when full allowance is made for poetic fancy, show clearly enough very advanced skill in the working and ornamenting of these metals. Homer's description of the shield of Achilles, made of bronze, enriched with bands of figure reliefs in gold, silver and tin, could hardly have been written by a man who had not some personal acquaintance with works in metal of a very elaborate kind. Again, the accuracy of his descriptions of brazen houses — such as that of Alcinous, Od. vii. 81 — is borne witness to by Pausanias's mention of the bronze temple of Athena XaXdoiicos in Sparta, and the bronze chamber dedicated to Myron in 648 B.C., as well as by the dis- covery of the stains and bronze nails, which show that the whole interior of

the so-called treasury of Atreus at Mycenae was once covered with a lining of bronze plates. Of the two chief methods of working bronze, gold and silver, it is probable that.the hammer process was first practised, at least for statues, among the Greeks, who themselves attributed the invention of the art of hollow casting to Theodorus and Rhoecus, both Samian sculptors, about the middle of the 6th century B.C. Pausanias specially mentions that one of the oldest statues he had ever seen was a large figure of Zeus in Sparta, made of hammered bronze plates riveted together. With increased skill in large castings, and the dis- covery of the use of cores, by which the fluid bronze was poured into a mere skin-like cavity, hammered or repousse work was only used in the case of small objects in which lightness was

desirable, or for the precious metals in order to avoid large expenditure of metal. The colossal statues of ivory and gold by Pheidias were the most notable examples of this use of gold, especially his statue of Athena in the Parthenon, and the one of Zeus at Olympia. The nude parts, such as face and hands, were of ivory, while the armour and drapery were of beaten gold. The comparatively small weight of gold used by Pheidias is very remarkable when the great size of the statues is considered.

A graphic representation of the workshop of a Greek sculptor in bronze is given on a fictile vase in the Berlin Museum (see Gerhard's Trinkschalen, plates xii., xiii.). One man is raking out the fire in a high furnace, while another behind is blowing the bellows. Two others are smoothing the surface of a statue with scraping tools, formed like a strigil. A fourth is beating the arm of an unfinished figure, the head of which lies at the workman's feet. Perhaps the most important of early Greek works in cast bronze,, both from its size and great historical interest, is the bronze pillar (now in the Hippodrome at Constantinople) which was erected to commemorate the victory of the allied Greek states over the Persians at Plataea in 479 B.C. (see Newton's Travels in the Levant). It is in the form of three serpents twisted together, and before the heads were broken off was at least 20 ft. high. It is cast hollow, all in one piece, and has the names of the allied states engraved on the lower part of the coils. Its size and the beauty of its surface show great technical skill in the founder's art. On it once stood the gold tripod dedicated to Apollo as a tenth of the spoils. It is described by both Herodotus and Pausanias.

Marble was comparatively but little used by the earlier Greek sculptors, and even Myron, a rather older man than Pheidias,

•Boss front the Milanese Candelabrum.

seems to have executed nearly all his most important statues in metal. Additional richness was given to Greek bronze-work by gold or silver inlay on lips, eyes and borders of the dress; ; one remarkable statuette in the British Museum has eyes inlaid with diamonds and fret-work inlay in silver on the border of the chiton. The mirrors of the Greeks are among the most important speci- mens of their artistic metal-work. These are bronze disks, one side polished to serve as a reflector, and the back ornamented with engraved outline drawings, often of great beauty (see Gerhard, Etruskische Spiegel, 1843-1867). In metal-work, as in other arts, the Romans were pupils and imitators of the Greeks. Owing to the growth of the spirit of luxury, a considerable demand arose for magnificent articles of gold and silver plate. The finest specimens of these that still exist are the very beautiful set of silver plate found buried near Hildesheim in 1869, now in the Berlin Museum. They consist of drinking vessels, bowls, vases, ladles and other objects of silver, parcel-gilt, and exquisitely decorated with figures in relief, both cast and repousse. There are electrotypes of these in the Victoria and Albert Museum. When the seat of the empire was changed, Byzantium became the chief centre for the production of artistic metal-work. From Byzantium the special skill in this art was transmitted in the

9th and 10th centuries to the Rhenish provinces of Germany and to Italy, and thence to the whole of western Europe; in this way the 1 8th century smith who wrought the Hampton Court iron gates was the heir to the mechanical skill of the ancient metal- workers of Phoenicia and Greece. In that period of extreme degradation into which all the higher arts fell after the destruc- tion of the Roman Empire, though true feeling for beauty and knowledge of the subtleties of the human form remained for centuries almost dormant, yet at Byzantium at least there still survived great technical skill and power in the production of all sorts of metal-work. In the age of Justinian (first half of the 6th century) the great church of St Sophia at Constantinople was adorned with an almost incredible amount of wealth and splen- dour in the form of screens, altars, candlesticks and other ecclesi- astical furniture made of massive gold and silver.

Metal-Work in Italy. — It was therefore to Byzantium that Italy turned for metal-workers, and especially for goldsmiths, when, in the 6th to the 8th centuries, the basilica of St Peter's in Rome was enriched with

masses of gold and silver for decor- ations and fittings, the gifts of many donors from Belisarius to Leo III., the mere catalogue of which reads like a tale from the Arabian Nights. The gorgeous Pala d'oro, still in St Mark's at Venice, a gold retable covered with delicate reliefs and enriched with enamels and jewels, was the work of Byzantine artists during the nth century. This work was in progress for more than a hundred years, and was set in its place in 1106 a.d., though still unfinished (see Bellomo, Pala d'oro di St Marco, 1847). It was, however, especially for the production of bronze doors for churches, ornamented with panels of cast work in high relief, that Italy obtained the services of Byzantine workmen (see Garrucci, Arte cristiana, 1872-1882). One artist, named Staurachios, produced many works of this class, some of which still exist, such as the bronze doors of the cathedral at Amalfi, dated 1066 a.d. Probably by the same artist, though his name was spelled differently, were the bronze doors of San Paolo fuori le Mura, Rome, careful drawings of which exist, though the originals were destroyed in the fire of 1824. Other important examples exist at Ravello (1197), Salerno (1099), Amalfi (1062), Atrani (1087); and doors at Monreale in Sicily and at Trani, signed by an artist named Barisanos (end of the 1 2th century) ; the reliefs on these last are remarkable for expression and dignity, in spite of their early rudeness of modelling and ignorance of the human figure. Most of these works in bronze were enriched with fine lines inlaid in silver, and in some cases with a kind of niello or enamel. The technical skill of these Byzantine metal-workers was soon acquired by native Italian artists, who produced many important works in bronze similar in style and execution to those of the Byzantine Greeks. Such, for example, are the bronze doors of San Zenone at Verona (unlike the others, of repousse] not cast work); those of the Duomo of Pisa f cast in 11 80 by Bonannus, and of the Duomo of Troia, the last made in the beginning of the 1 2th century by Oderisius of Benevento. Another artist, named Roger of Amalfi, worked in the same way; and in the year 1219 the brothers Hubertus and Petrus of Piacenza cast the bronze door for one of the side chapels in San Giovanni in Laterano. One of the most important early specimens of metal-work is the gold and silver altar of Sant' Ambrogio [in Milan. In character of work and design it resembles the Venice Pala d'Oro, but is still earlier in date, being a gift to the church from Archbishop Angilbert II. in 835 a.d. (see Du Sommerard, and D'Agincourt, Moyen Age). It is signed wolvinivs magister PHABER;nothiiig is known of the artist, but he probably belonged to the semi-'* Byzantine school of the Rhine provinces; according to Dr Rock he was an Anglo-Saxon goldsmith. It is a very sumptuous work, the front of the altar being entirely of gold, with repousse reliefs and cloisonne enamels; the back and ends are of

silver, with gold ornaments. On the front are figures of Christ and the twelve apostles; the ends and back have reliefs illustrating the life of St Ambrose.

The most important existing work of art in metal of the 13th century is the great candelabrum now in Milan Cathedral. It is of gilt bronze, more than 14 ft. high ; it has seven branches for

candles, and its upright stem is supported on four winged dragons. For delicate and spirited execution, together with refined grace- fulness of design, it is unsurpassed by any similar work of art. Every one of the numerous little figures with which it is adorned is worthy of study for the beauty and expression of the face, and the dignified arrangement of the drapery (see fig. 3). The semi- conventional open scroll-work of branches and fruit which wind around and frame each figure or group is devised with the most perfect taste and richness of fancy, while each minute part of this great piece of metal-work is finished with all the care that could have been bestowed on the smallest article of gold jewellery. Though something in the grotesque dragons of the base recalls the Byzantine school, yet the beauty of the figures and the keen feeling for graceful curves and folds in the drapery point to a native Italian as being the artist who produced this wonderful work of art. There is a cast in the Victoria and Albert Museum.

Fig. 4. — Silver Repousse Reliefs from the Pistoia Retable. During the 13th and 14th centuries in Italy the widespread influence of Niccola Pisano and his school encouraged the sculptor to use marble rather than bronze for his work. At this period wrought iron came into general use in the form of screens for chapels and tombs, and grills for windows. These are mostly of great beauty, and show remarkable skill in the use of the ham- mer, as well as power in adapting the design to the requirements of the material. Among the finest examples of this sort of work are the screens round the tombs of the Scala family at Verona, 1350-1375, — a sort of network of light cusped quatrefoils, each filled up with a small ladder (scala) in allusion to the name of the family. The most elaborate specimen of this wrought work is the screen to the Rinuccini chapel in Santa Croce, Florence, of 137 1, in which moulded pillars and window-like tracery have been wrought and modelled by the hammer with extraordinary skill (see Wyatt, Metal-Work of Middle Ages). Of about the same date are the almost equally magnificent screens in . Sta Trinita, Florence, and at Siena

across the chapel in the Palazzo Pubblico. The main part of most of these screens is filled in with quatrefoils, and at the top is an open frieze formed of plate iron pierced, repouss6, and enriched with engraving. In the 14th century great quantities of objects for ecclesiastical use were

produced in Italy. The silver altar of the Florence baptistery was begun in the first half of the 14th century, and not completed till after 1477 (see Gaz. des beaux-arts, Jan. 1883). The greatest artists in metal laboured on it in succession, among them Orcagna, Ghiberti, Verrocchio, Ant. Pollaiuolo and many others. It has elaborate reliefs in repousse work, cast canopies and minute statuettes, with the further enrichment of translucent coloured enamels. The silver altar and retable of Pistoia Cathedral (see fig. 4), and the great shrine at Orvieto, are works of the same class, and of equal importance.

Whole volumes might be devoted to the magnificent works in bronze produced by the Florentine artists of this century, works such as the baptistery gates by Ghiberti, the statues of Verroc- chio, Donatello and many others, the bronze screen in Prato cathedral by Simone, brother of Donatello, in 1444-1461, and the screen and bronze ornaments of the tomb of Piero and Giovanni dei Medici in San Lorenzo, Florence, by Verrocchio, in 1472. At the latter part of the 15th century and the beginning of the 1 6th the Pollaiuoli, Ricci and other artists devoted much labour and artistic skill to the production of candlesticks and smaller objects of bronze, such as door-knockers, many of which are works of the greatest beauty. The candlesticks in the Certosa near Pavia, and in the cathedrals of Venice and Padua, are the finest examples of these. Nic- colo Grossi, who worked in wrought iron under the patronage of Lorenzo dei Medici, produced some wonderful specimens of metal-work, such as the ‘ candlesticks, lanterns, and rings fixed at intervals round the outside of the great palaces (see fig. 5). The Strozzi palace in Florence and the Palazzo del Magnifico at Siena have fine specimens of these — the former of wrought iron, the latter in cast bronze. At Venice

fine work in metal, such as salvers and vases, was being produced, of almost Oriental design, and in some cases the work of resident Arab artificers. In the 16th century Benvenuto Cellini was supreme for skill in the production of enamelled jewellery, plate and even larger works of sculpture (see Plon’s Ben. Cellini, 1882), and Giovanni de Bologna in the latter part of the same century inherited to some extent the skill and artistic power of the great 15th-century artists.

Spain. — From a very early period the metal-workers of Spain have

been distinguished for their skill, especially in the use of the precious metals. A very remarkable set of specimens of goldsmith's work of the 7th century are the eleven votive crowns, two crosses and other objects found in 1858 at Guar- razar, and now preserved at Madrid and in Paris in the Cluny Museum (see Du Sommerard, Muste de Cluny, 1852). Magnifi- cent works in silver, such as shrines, altar crosses and chu*ch vessels of all kinds, were produced in Spain from the 14th to the 1 6th century — especially a number of sumptuous tabernacles (custodia) for the host, magnificent examples of which still exist in the cathedrals of Toledo and Seville. The bronze and wrought-iron screens — rejas, mostly of the 15th and 16th centuries— to be found in almost every important church in Spain are very fine examples of metal-work. They generally have moulded rails or balusters, and rich friezes of pierced and repousse work, the whole being often thickly plated with silver. The common use of metal for pulpits is a peculiarity

Fig. 5. — Wrought-iron Candle Pricket; late 15th-century. Florentine work.

of Spain; they are sometimes of bronze, as the pairs in Burgos and Toledo cathedrals, or in wrought iron, like those at Zamora and in the church of San Gil, Burgos. The great candelabrum or tenebrarium in Seville Cathedral is the finest specimen of 16th-century metal- work in Spain; it was mainly the work of Bart. Morel in 1562. It is of cast bronze enriched with delicate scroll-work foliage, and with numbers of well-modelled statuettes. Especially in the art of metal- work Spain was much influenced in the 15th and 16th centuries by both Italy and Germany, so that numberless Spanish objects produced at that time owe little or nothing to native designers. At an earlier period Arab and Moorish influence is no less apparent.

produced by these varying planes. The screen by Henry V.'s tomb at Westminster is a good early specimen of this kind of work. The screen to Bishop West's chapel at Ely, and that round Edward VI. 's tomb at Windsor, both made towards the end of the 15th century, are the most magnificent English examples of wrought iron; and much wrought-iron work of great beauty was produced at the beginning of the 18th century, especially under the superintendence of Sir Christopher Wren (see Ebbetts, Iron Work of 17th and 18th Centuries, 1880). Large flowing leaves of acanthus and other plants were beaten out with

wonderful spirit and beauty of curve. The gates from Hampton Court are the finest examples of this class of work (see fig. 7).

From an early period bronze and latten (a variety of brass) were much used in England for the smaller objects both of ecclesiastical and domestic use, but except for tombs and lecterns were but little used on a large scale till the 16th century. The full-length recumbent effigies of Henry III. and Queen Eleanor at Westminster, cast in bronze by the " tire perdue " process, and thickly gilt, are equal, if not superior, in artistic beauty to any sculptor's work of the same period (end of the 13th century) that was produced in Italy or elsewhere. These

Fig. 6. — Part of the " Eleanor Grill."

England. — In Saxon times the English metal-workers, especially of the precious metals, possessed great skill, and appear to have produced shrines, altar-frontals, retables and other ecclesiastical furniture of considerable size and magnifi- cence. Dunstan, archbishop of Canterbury (925-988), like Bernward, bishop of Hildesheim a few years later, and St Eloi of France three centuries earlier, was himself a skilful worker in all kinds of metal. The description of the gold and silver retable given to the high altar of Ely by Abbot Theodwin in the nth cehtury, shows it to have been a large and elaborate piece of work decorated with many reliefs and figures in the round. In 1241 Henry III. gave the order for the great gold shrine to contain the bones of Edward the Confessor. It was the work of members of the Otho family, among whom the goldsmith's and coiner's crafts appear to have been long heredi- tary. Countless other imporant works in the precious metals adorned every abbey and cathedral church in the kingdom. In the 13th century the English workers in wrought iron were especially skilful. The grill over the tomb of Queen Eleanor at Westminster, by Thomas de Leghton, made about 1294, is a remarkable example of skill in welding and modelling with the hammer (see fig. 6). The rich and graceful iron hinges, made often for small and out-of-the-way country churches, are a large and important class in the list of English wrought- iron work. Those on the refectory door of Merton College, Oxford, are a beautiful and well-preserved example dating from the 14th century. More mechanical in execution, though still very rich in effect, is that sort of iron tracery work produced by cutting out patterns in plate, and superimposing one plate over the other, so as to give richness of effect by the shadows

Fig. 7. — Part of one of the Hampton Court Gates.

effigies are the work of an Englishman named William Toreˆ The gates

to Henry VII. ‘s chapel, and the screen round his tomb at Westminster (see fig. 8), are very elaborate and beautiful examples of ” latten” work, showing the greatest technical skill in the founder’s art. In latten also were produced the numerous monumental brasses of which a large number still exist in England (see Brasses, Monumental) .

In addition to its chief use as a roof covering, lead was some- times used in England for making fonts, generally tub-shaped, with figures cast in relief. Many examples exist: e.g. at Tidenham, Gloucestershire; Warborough and Dorchester Oxon; Chirton, Wilts; and other places.

Germany. — Unlike England, Germany in the ioth and nth centuries produced large and elaborate works in cast bronze, especially doors for churches, much resembling the contemporary doors made in Italy under Byzantine influence. Bernward, bishop of Hildesheim, 992-1022, was especially skilled in this

various metals. Hermann Vischer, in the 15th century, and his son and grandsons were very remarkable as bronze founders. The font at Wittenberg, decorated with reliefs of the apostles, was the work of the elder Vischer, while Peter and his son pro- duced, among other important works, the shrine of St Sebald at Nuremberg, a work of great finish and of astonishing richness of fancy in its design. The tomb of Maximilian I., and the statues round it, at Innsbruck, begun in 1521, are perhaps the most meritorious German work of this class in the 16th century, and show considerable Italian influence. In wrought iron the German smiths, especially during the 15th century, greatly excelled. Almost peculiar to Germany is the use of wrought iron for grave-crosses and sepulchral monuments, of which the Nuremberg and other cemeteries contain fine examples. Many elaborate well-canopies were made in wrought iron, and gave

Fig. 8. — Part of Henry VII. ‘s Bronze Screen.

work, and was much influenced in design by a visit to Rome in the suite of Otho III. The bronze column with winding reliefs now at Hildesheim was the result of his study of Trajan’s column, and the bronze door which he made for his own cathedral shows classical influence, especially in the composition of the drapery of the figures in the panels. The bronze doors of Augsburg (1047-1072) are similar in style. The bronze tomb of Rudolph of Swabia in Merseburg

Cathedral (1080) is another fine work of the same school. The production of works in gold and silver was also carried on vigorously in Germany. The shrine of the three kings at Cologne is the finest surviving example. At a later time Augsburg and Nuremberg were the chief centres for the production of artistic works in the

Fig. 9. — Brass Vase, pierced and gilt; 17th century Persian work.

full play to the fancy and invention of the smith. The celebrated 15th-century example over the well at Antwerp, attributed to Quintin Matsys, is the finest of these.

France. — From the time of the Romans the city of Limoges has been celebrated for all sorts of metal- work, and especially for brass enriched with enamel. In the 13th and 14th centuries many life-size sepulchral effigies were made of beaten copper or bronze, and ornamented by various-coloured ” champleve ” enamels. The beauty of these effigies led to their being Ira- ported into England; most are now destroyed, but a fine specimen still exists at Westminster on the tomb of William de Valence (1296). In the ornamental iron-work for doors the French smiths were pre-eminent for the richness of design and skilful treatment of their metal. Probably no examples surpass those on the west doors of Notre Dame in Paris — unhappily much falsified by restoration. The crockets and finials on the fleches of Amiens and Rheims are beautiful specimens of a highly orna- mental treatment of cast lead, for which France was especially celebrated. In most respects, however, the development of

the various kinds of metal-working went through much the same stages as in England.

Persia and Damascus. — The metal-workers of the East, especially in brass and steel, were renowned for their skill even in the time of Theophilus, the monkish writer on the subject in the 13th century. But it was during the reign of Shah Abbas I. (d. 1628) that the greatest amount of skill both in design and execution was reached by the Persian workmen. Delicate pierced vessels of gilt brass, enriched by tooling and* inlay of gold and silver, were among the chief specialties of the Persians (see fig. 9). A process called by Europeans ” damascening ” (from Damascus, the chief seat of the export) was used to produce very delicate and rich surface ornament. A pattern was

incised with a graver in iron or steel, and then gold wire was beaten into the sunk lines, the whole surface being then smoothed and polished. In the time of Cellini this process was copied in Italy, and largely used, especially for the decoration of weapons and armour. The repousse process both for brass and silver was much used by Oriental workers, and even now fine works of this class are. produced in the East, old designs still being adhered to. (J. H. M.)

Modern Art Metal-Work. — The term ” art metal-work ” is applied to those works in metal in which beauty of form or decorative effect is the first consideration, irrespective of whether the object is intended for use or is merely ornamental; and it embraces any article from a Birmingham brass bedstead to works of the highest artistic merit. The term, as definitely distinguishing one branch of metal-working from another, is objected to by many on the ground that no such prefix was required in the best periods of art, and that allied crafts continue to do without it to the present day. Indeed, as long as metal- working remained a handicraft — in other words, until the introduction of steam machinery — every article, however humble its purpose, seems to have been endowed with some traditional beauty of form. The robust, florid and distinctly Roman rendering of the classic, which followed the refined and attenuated treatment associated with the architecture of the brothers Adam, who died in 1792 and 1794, is the last development in England which can be regarded as a national style. The massively moulded ormolu stair balustrade of Northumberland House, now at 49 Prince’s Gate; the cande- labra at Windsor and Buckingham Palace, produced in Birmingham by the firm of Messenger; the cast-iron railings with javelin heads and lictors’ fasces, the tripods, Corinthian column standard lamps and candelabra, boat-shaped oil lamps and tent-shaped lustres with classic mountings, are examples of the metal-work of a style which, outside the eccentric Brighton Pavilion and excursions into Gothic and Elizabethan, was universally accepted in the United Kingdom from the days of the Regency until after the accession of Victoria. Except perhaps the silversmiths, no one was conscious of being engaged in ” art metal-working,” yet the average is neither vulgar nor in bad taste, and the larger works are both dignified and suited to their architectural surroundings.

The introduction of gas as an illuminant, about 1816, at once induced a large demand and a novel description of metal fitting; and the craft fell under the control of a new commercial class, intent on breaking with past traditions, and utilizing steam power, electjp-deposition, and every mechanical and scientific invention tending to economize metal or labour. But when all artistic perception in Great Britain appeared

lost in admira- tion of the triumphs of machinery and the expansion of trade, a new influence in art matters, that of the prince consort, began to make itself felt. The Great Exhibition, state-aided schools of design, the South Kensington Museum, and the establishment of a Science and Art Department under Government, were among the results of the important art revival which he inaugurated. He is credited with having himself designed candelabra and other objects in metal, and he directly encouraged the production of the sumptuous treatise on metal-work by Digby Wyatt, which laid the foundations of the revival. To this work, and that of Owen Jones, can be traced the origin of the

eclecticism which has laid all past styles of art under contri- bution. The Gothic revival also helped the recognition of art, without very directly affecting the movement. It was valuable in teaching how to work within definite limitations, but without slavish copying; it also emancipated a considerable body of craftsmen from the tyranny of manufacturers whose sole idea was that machine-work should supersede handicraft. Its greatest efforts were the metal chancel-screens designed by Sir G. G. Scott, that for Hereford Cathedral having been exhibited in 1862, It does not appear that the influence either of Owen Jones or Digby Wyatt on metal-working extended beyond bringing the variety and beauty of past styles to the direct notice of designers. Neither can the London silversmiths, though they employed the best talent available, particularly in the decade following the Great Exhibition of 1851, be credited with much influencing the art metal revival. They were rivalled by Elkington of Birmingham, who secured the permanent assistance of at least one fine artist, Morel Ladeuil, the producer of the Elcho Challenge Shield. Perhaps the first actual designer to make a lasting impression on the crafts was Thomas Jeckyll, some of whose work, including gates for Sandringham, was exhibited in 1862. Infinitely greater as a designer was Alfred Stevens, whose influence on English craftsmen might be regarded as almost comparable to that of Michelangelo on that of his Italian contemporaries. Stevens's designs certainly directly raised the standard of production in several metal-working firms by whom he was employed; whilst in the Wellington Memorial in St Paul's Cathedral, and in Dorchester House, his work is seen unfettered by commercial considerations. Omitting many whose occasional designs have had little influence on the development of the metal crafts, we come to Alfred Gilbert, whose influence for a time was scarcely less than that of Stevens himself. Monumental works, such as his statue of Queen Victoria at Winchester and his work at Windsor, may be handed down as his greatest achievements, but judged as art metal-work, his smaller productions, such as the centre- piece presented by

the army and navy to Queen Victoria on her Jubilee, have been more important.

The charming bronze statuettes of Onslow Ford, the most representative of which are in the Tate Gallery; the work of George Frampton, as seen in the Mitchell Memorial; and the beautiful bas-reliefs of W. Stirling Lee, examples of which are the bronze gates of the Adelphi Bank at Liverpool, have all contributed, especially when applied to architectural decoration, to a high standard of excellence. Painters also have frequently designed and modelled for metal-work, for example, Lord Leighton, who produced bronze statuettes of most refined character; and Sir L. Alma-Tadema, who designed the grilles for his studio and entrance hall; but none so conspicuously as Professor H. von Herkomer, who, whether working in gold and enamel, iron, or his favourite alloy, pewter, infuses a fresh- ness into his designs and methods which displays an unusual mastery over materials.

The gift of reproducing effects of nature or art by brush or chisel is not necessarily accompanied by power to design; but a noteworthy exponent of the dual faculty is G. C. Haite, whose designs are widely applied.

It is chiefly to architecture that metal- work owes its permanent artistic improvement. In England buildings of Norman Shaw and Ernest George demanded quiet and harmonious metal- work; and the custom of these architects of superintending and designing every detail, even for interiors, created the supply. The work of every worthy architect raises the standard of the crafts; but beyond others Messrs Ashbee, Lethaby and Wilson have taken an active personal interest in schools of metal- work. The technical schools have also been of immense service in creating a class of self-respecting craftsmen, whose wages enable them to regard their work as worthy occupation abound- ing in interest. Home industries such as the metal-working round Keswick (founded in 1884 by Canon and Mrs Rawnsley), executed during hours of idleness by field labourers and railway porters, educate the passer-by as well as the worker.

METAL-WORK

Plate X

CAST BRONZE GATES, ADELPHI BANK, LIVERPOOL. Designed by W. D. Caroe, the figures by Stirling Lee, executed by Starkie Gardner and Co.

PlATE IL

ik

f^

METAL-WORK

A

4*^^

■:■ ■■”.’■ , . u .;.

RAIN-WATER HEAD, IN LEAD, FOR THE VICTORIA LAW COURTS, BIRMINGHAM. Designed by Aston Webb and Ingres Bell, and executed by Dent and Hellier.

COVERED BRIDGE OF IRON, SHEATHED IN CAST LEAD, GRAND HOTEL, LONDON. Designed by William Woodward, and executed by Starkie Gardner and Co.

METAUWGRK

213

British architects and artists who design for the principal decorating firms are to-day as conversant with the Renaissance and succeeding styles of France and Italy as medieval revival- ists were familiar with the Gothic styles with which they made us so well acquainted. Metal-work more or less based upon every kind of past style is produced in vast quantities, and in some cases so skilful are the workers that modern forgeries and reproductions are almost beyond the power of experts to detect. This large class of designers and craftsmen, to whom a thorough knowledge of the history of design is a necessity, follows and develops traditional lines. The new art school, on the contrary, breaks wholly with tradition, unless uncon- sciously influenced by the Japanese, and awards the highest place to originality in design. It is not to be expected that an art-revival following on, and in possession 01, all the results of a period of unprecedented activity in scientific research should proceed with the same restraint as heretofore; but the unfettered activity, and the general encouragement to abandon the traditions of art, have no exact parallel in the past, and may yet prove a danger. It is perhaps the very Tapidity of the movement that is likely to retard its progress, and to fail to carry with it the wealthy clients and the decorators they employ, or perhaps even to increase the

disposition to cling to the reproductions of the styles of the 17th and 18th centuries. The multiplication of art periodicals, lectures, books, photo- graphs, meetings of societies and gilds, museums, schools of arts and crafts, polytechnics, scholarships, facilities for travel, exhibitions, even those of the Royal Academy, to which objects of applied art are now admitted, not only encourages many persons to become workers and designers in the applied arts, but exposes everything to the plagiarist, who travesties the freshest idea before it has well left the hands of its originator. Thus the inspirations of genius, appropriated by those who imperfectly appreciate their subtle beauty and quality, become hackneyed and lose their charm and interest. The keen desire to be unconventional in applied art has spread from Great Britain and the United States to Germany, Austria and other countries, but without well-defined first principles, or limita- tions It seems agreed in a general way that the completed work in metal is to be wholly the conception and, as far as possible, the actual handiwork of the designer: casting by the cire-perdue process, left practically untouched from the mould, and embossing, being the two most favoured processes. The female figure is largely made use of, and rich and harmonious colours are sought, the glitter of metal being invariably sub- dued by deadening its lustre, or by patinas and oxides. Gilding, stains and lacquers, electro-plating, chasing, ” matting,” frosting, burnishing, mechanically produced mouldings and enrichments, and the other processes esteemed in the 19th century, are disused and avoided. New contrasts are formed by the juxtaposition of differently toned metals; or these with an inlay of haliotis shell, introduced by Alfred Gilbert; or of coloured wax, favoured by Onslow Ford; or enamelling, per- fected by Professor von Herkomer; or stained ivory, pearls, or semi-precious stones. The quality of the surface left by the skilled artist or artisan is more regarded than symmetry of design, or even than correct modelling. Frequently only the important parts in a design are carefully finished and the rest merely sketched: the mode of working, whether by model- ling-tools or hammer, being always left apparent.

The newer kinds of art metal-work have, until recently, reached the purchaser direct from the producer’s workshop; but they may now also be seen in the shops of silversmiths, jewellers, and general dealers, who are thus helping to transfer production from large commercial manufactories to smaller ateliers under artistic control. The production of the larger household accessories, such as bedsteads, fenders, gas and electric fittings, clocks, &c, has hardly as yet come under the influence of the art movement. The services rendered by Mr W. A. S. Benson of Chiswick, who commenced about 1886 to

revolutionize the production of sheet-brass and copper utensils, cannot be passed over. The average ecclesiastical

metal-work has rather receded than progressed in merit, except when designed by architects and executed under their super- vision. Though the demand for good domestic wrought-iron work has enormously increased, adaptations from the beautiful work of the 17th and 18th centuries have been found so suited to their architectural surroundings, that new departures have been relatively uncommon. Of such the gates for Sandringham, by Jeckyll; for Crewe Hall, by Charles Barry; and for the Victoria and Albert Museum, by Gamble, are the earliest and best known. Of the vast number designed upon traditional lines may be cited those for Lambton Castle, Welbeck, Eaton Hall, Twicken- ham, Clieveden, and the Astor Estate Office on the Victoria Embankment. Cast iron, brought to perfection by the Coal- brookdale Company about i860, but now little esteemed, owing to the poverty of design which so often counterfeits smiths' work, presents great opportunities to founders possessing taste or willing to submit to artistic control. A very large field is also opening for cast-lead work, whether associated with archi- tecture, as in the leaden covered-way over Northumberland Street, in London (see Plate), and the fine rain-water heads of the Birmingham Law Courts (see Plate), or with the revival of the use of metal statuary and vases in gardens. The subdued colour and soft contours of pewter render it once more a favoured material, peculiarly adapted to the methods of the art revival, and perhaps destined to supersede electro-plate for household purposes. In silver-work the proportion of new art designs exhibited by dealers and others is still relatively small; but jewellers, except when setting pure brilliants and pearls, are becoming more inclined to make their jewels of finely modelled gold and enamel enriched with precious and semi-precious stones, than of gems merely held together by wholly subordinate settings.

On the continent of Europe, France was the first to recognize the merits of its bygone designers and craftsmen, and even antecedent to the Exhibition of 1851, when art in Great Britain was dormant, it was possible to obtain in Paris faithful reproˆ ductions of the finest ormolu work of the 18th century. At the same time a most active production of modern designs was proceeding, stimulated by rewards, with the result that the supply of clocks, lamps, candelabra, statuettes, and other ornaments in bronze and zinc to the rest of Europe became a monopoly of Paris for nearly half a century. In all connected with their own homes the French adhere to their traditions far more than other nations, and the attempt at originality in the introduction of metal-work into the scheme of decoration of a room is almost

unknown. In the domain of bronze and imitation bronze statuary the originality of the French is abso- lutely unrivalled. And not only in bronze, but in Paris jewellery, enamels, silver, pewter and iron work a cultured refinement is apparent, beside which other productions, even the most finished, appear crude. The French artist attains his ideal, and it is difficult to imagine, from his standpoint, that the metal-work of the present can be surpassed. The best English metal-worker, on the contrary, is probably not often quite satisfied with the results he attains, perhaps because in Great Britain the pursuit of art has for centuries been fitful and individual, while in France art traditions are hereditary. The metal-work of Belgium is based at > present entirely on that of France, without attaining the same standard, unless designed for ecclesiastical uses. In Holland these v crafts have not pro- gressed. Italian metal-workers are mainly employed in repro- duction; but traditions linger in some remote parts, whiles the sporadic appearance of craftsmen of a high order is eviderfte that the ancient artistic spirit is not wholly extinct. Similarly, the surprising damascening by Messrs Zuluaga of Madrid in the monument to General Prim, and that of Alvarez of Toledo, give hope that the Spanish craftsman only needs to be properly directed. German and Austrian workers had for years shown more energy than originality, but they have recently embraced the newest English developments and carried them to extremes of exaggeration. For really fresh and progressive indigenous art we may perhaps have, in the near future, to turn to America

and to Russia, where, having little artistic past to refer to, designers and craftsmen display unequalled individuality and force. It is from the Far East, however, that the most serious rivalry may be anticipated. The metal-work of China and Japan, so pleasantly naive and inexpensive, though becoming undesirably modified as to design through contact with European buyers, is losing none of its matchless technique, which indeed in Japan is still being developed. In any history of the art revival the influence of such firms as Barbedienne and Christofle in Paris and Tiffany in New York cannot be ignored.

(J.S.G.) Industrial Metal-Work. The malleability and ductility of metals lie at the basis of the work of the gold- and silver-smiths at one extreme, and of the boiler-maker at the other. Sheet metals can be made to assume almost any shape under the hammer, or by pressure, provided they are subjected to annealing to restore the property of

malleability. The most awkward shapes, involving excessive extensions of metal, are pro- duced by drawing processes between dies of iron and steel in power presses. All the common domestic utensils in tinned and enamelled ware, and all the ordinary patterns of the silversmiths, are similarly done. Frequent annealings are necessary to prevent fracture of the metal ; but with these and the observance of certain other pre- cautions of a practical character the degree of extension possible is enormous. Another illustration of the malleability of metal is afforded by metal spinning. A sheet of metal set revolving at a high speed in a lathe is bent over into cup-shaped forms, with numerous mouldings, by a blunt hardened tool. A great deal of work is done in this way, though this sphere has also been invaded by the draw presses, whose output would seem incredible to those not familiar with the work. Objects that do not require annealing are produced by dozens per minute, and all the movements of feeding and stamping and removal are often automatic. The ductility of metals and alloys is utilized in wire and tube-drawing through dies on long benches. This work also requires frequent annealing, for otherwise the wires or tubes would rupture. Even hard steel is treated in this way tc form tubes for the highest hydraulic and steam pressures.

Platers' Work (see Boiler) is distinguished from work in sheet metals by the fact that plates have considerable thickness, which sheets have not. Plates range in thickness from J in. to 2 in., but for most purposes they do not go beyond f in. or 1 in. Over these thicknesses they are used chiefly for the largest marine boilers. Armour plates which are several inches in thickness do not come in this group, being a special article of manufacture. Sheets are of thicknesses of less than J in. This distinction of thickness is of importance in its bearing on workshop practice. A thin sheet requires a very different kind of treatment from a thick plate. Not only is more powerful machinery required for the latter, but in bending it allowance has to be made for the difference in radius of outer and inner layers, which increases with increase of thickness. Short, sharp bends which are readily made in thin sheets cannot be done in thick plates, as the metal would be stressed too much in the outer layers. The methods of union also differ, riveting being adopted for thick plates, and soldering or brazing generally for thin. Coppersmiths' Work is an important section of sheet-metal working. It is divided into two great departments; the domestic utensil side, on which the brazier's craft is exercised; and the engineering side, which is concerned in some engine-work, locomotive and marine, and in the manufacture of brewers' utensils. The methods of the first are allied to those of the tinman, those of the second to the methods of the plater. Tinsmiths' work resembles the lighter part of

the work of the coppersmith. There is no essential difference in dealing with tin (i.e. sheets of iron or steel coated with tin) and copper of the same thickness. Hence the craft of tinmen and braziers is carried on by the same individuals. There are, however, differences of treatment in detail, because copper is more malleable and softer than tin plate. The geometry of sheet-metal work and of platers' and boiler-makers' work is identical up to a certain stage. The divergence appears when plates are substituted for sheets. A thin sheet has for all practical purposes no thickness — that is, the geometrical pattern marked on it will develop the object required after it is bent. Nearly all patterns are the developments of the envelopes of geometrical solids of regular or irregular outlines, few of plane faces ; when they are made up of combinations of plane faces, or of faces curved in one plane only, there is no difference in dealing with thin sheets or thick plates. But when curving occurs in different planes at right or other angles (hollowing), the metal has to be drawn or extended on the outside, and important differ- ences arise. A typical form is the hemisphere, from which many modified forms are derived. The production of this is always a tedious task. It involves details of " wrinkling " and " razing," if done by hand-work in copper. In thick plates it is not attempted by hand, but pressing is done between dies, or segments of the sphere are prepared separately and riveted together. In tin it is effected by stamping. In all work done in thick plates the dimensions marked out must have reference to the final shape of the article. Generally

the dimensions are taken as in the middle of the plate, but they may be on the inside or outside according to circumstances. But in any case the thickness must enter into the calculations, whereas in thin sheets no account is taken of thickness.

Raised Work. — All the works in sheet metal that are bent in one plane only are easily made. The shapes of all polygonal and all cylindrical and conical forms are obtained by simple development — that is, the envelopments of these bodies are marked out on a flat

glane, and when cut, are bent or folded to give the required envelopes, inly common geometrical problems are involved in the case of sheets of sensible thickness, and allowances are made for thickness. But in those forms where curving must take place in different directions the layers or fibres of metal are made to glide over one another, extension taking place in some layers but not in others, and this goes on without producing much reduction in the thickness. This is only possible with malleable and ductile metals and alloys. As a general rule it is restricted to metals which are not cast, for, with

some sligkt exceptions, it is impossible to produce relative movements of the layers in cast iron, steel or cast brass. But most rolled metals and alloys can be so treated, copper being the best for the purpose. The methods employed are ” raising ” by the hammer, and pressing in dies. But the severity of the treatment would tear the material' asunder if rearrangement of the particles were not obtained by frequent annealing (g.f.).

If an object has to be beaten into concave form from a flat thin sheet, the outer portions must be hammered until they occupy smaller dimensions than on the flat sheet. If a circular disk is wrought into a hemisphere and the attempt is made to hammer the edges round, crumpling must occur. This in fact is the first opera- tion, termed wrinkling, the edge showing a series of flutes. These flutes have to be obliterated by another series of hammerings termed razing. The result is that the object assumes a smooth concave and convex shape, without the thickness of the metal becoming reduced.

Cast Work. — The metals and alloys which are neither malleable nor ductile can only be worked into required shapes by melting and casting in moulds. Abundance of remains which date from the Neolithic period testify to the high antiquity of this class of work, and also to the great skill which the ancient founders had acquired. Statue-founding is a highly specialized department of metal-work, in which the artists of the middle ages excelled. Two methods have been employed, the cire-perdue, or wax process (see above), and the present, or all sand method. In the latter the artist provides a model in plaster from which the founder takes a mould within an encircling box. This mould must obviously be made in scores of little separate sections (false cores or drawbacks) to permit of their removal from the model without causing fracture of the sand. These are subsequently replaced piece by piece in the encircling frame, and a core made within it, leaving a space of | in. or there- abouts into which the metal is poured. The advantage of this process is that the artist's model is not destroyed as in the cire-perdue, and if a ” waster ” results, a second mould can be taken. A large statue occupies from one to three months in the moulding.

The extreme tenuity of objects whiqh are hammered, drawn or rolled cannot for obvious reasons be attained by casting. Casting also is complicated by the shrinkage which occurs in cooling down from the molten state, and in some alloys by the formation of eutectics, and the liquation of some constituents. The temperature of pouring is now known to be of more importance than was formerly suspected. The after-treatment of castings by annealing exercises great influence on

results in malleable cast iron and steel.

There are many metals and alloys which are malleable and ductile, and also readily fused and cast. This is the case with gold, silver, copper, tin, lead and others, and especially with low carbon steel, which is first cast as an ingot, then annealed and rolled into plates as well as the thinnest sheets. The ancient wootz, and the products of the native furnaces of Africa are first cast, then hammered out thin. Many of the patent bronzes are by slight variations in the proportions of the constituents made suitable for casting, for forging, and for rolling into sheets. But in all the great modern manu- facturing processes it is true that metals and alloys, though of the same name, have a different composition according as they are intended for casting on the one hand, or for forging, rolling and drawing on the other. Wrought or malleable iron has less of carbon and other elements in its composition than has cast iron. Steel intended for castings has slightly more carbon and other elements than the cast-steel ingot intended for rolling into plates. So also* with the numerous bronzes, the phosphor, the delta, the aluminium and other alloys of copper; each is made in several grades to render it suitable for different kinds of treatment.

There are no materials used in manufacture of which the crafts- man is able to vary the composition and physical qualities so ex- tensively as the metals and their alloys. Much light has been thrown on facts which have long been known in a practical way, by the labours of the Alloys Research Committee of the Institution of Mechanical Engineers (England). These, together with independent researches into the heat treatment of steel and iron, have opened up many unsolved problems fraught with deepest interest and importance.

One of the most difficult problems with which the metal-worker

who handles constructional forms has to deal is the maintenance of a due relation between absolute strength and a useful degree of elasticity. Only after many failures has the fact been grasped that a very high degree of strength is inconsistent with a trustworthy degree of elasticity. The reasons were not understood until the researches of VVohler demonstrated the difference between the effects of merely dead loads and of live loads, and between repetitions of stress of one kind only, and the vastly more destructive effects of both kinds alternating.

The texture of metals and alloys is related to the character of the operations which can be done upon them. Broadly the malle- able and ductile metals and alloys show a fibrous character when ruptured, the fusible ones a crystalline fracture. The difference is seen both in the workshop and in the specimens ruptured in testing-machines. A piece of wrought iron, or mild steel or copper, if torn asunder shows long lustrous fibres, resembling a bundle of threads in appearance. A piece of cast iron, or steel or bronze, shows on rupture a granular, crystalline surface destitute of any fibre. The ductile metals and alloys also extend from 10 to 30 % with reduction of area before they fracture, the crystalline ones snap shortly without warning. In some instances, however, the method of application of stress exercises an influence. Wrought iron and mild steel may be made to show a short and crystalline fracture by a sudden application of stress, while if drawn asunder slowly they develop the silky, fibrous appearance. The men who design and work in metals have to take account of these vital differences and characteristics, and must be careful not to apply treatment suitable to one kind to another of a dissimilar character. Tools, appliances and methods have little in common. Between the work of the smith, the sheet-metal worker and the founder, there is a great gulf. An artistic taste will recognize the essential differences, and not endeavour, apart from questions of strength, to graft a design suitable for one on another. It is bad taste to imitate the tracery of the ductile wrought iron in cast designs, the foliations of ancient wrought-iron grilles and screens in heavy cast iron. Severe simplicity is also most in harmony with con- structional designs in plated work, where stresses occur in straight lines. From this point of view the lattice-girder bridge is an ideal design in steel.

One of the most valuable characteristics of the iron alloys is their capacity for hardening, which they owe in the main to the presence of certain small percentages of carbon relatively to minute quantities of other elements: as manganese, tungsten, nickel and others of less importance. The capacity for hardening is an in- valuable property not only in regard to cutting-tools, but also in prolonging the life of parts subjected to severe friction. Great advances have been made in the utilization of this property as a result of the growth of the precision grindihg-machines, which are able to correct the inaccuracies of hardened work as effectually as those of soft materials. It is utilized in the spindles of machine- tools, in the balls and rollers for high-speed bearings, slides, pivots and such like.

Methods of Union. — The methods of union of works in metal are extremely varied. An advantage in casting is that the most complicated shapes are made in one piece. But all other compli- cated

forms have to be united by other means — as welding, soldering, riveting or bolting. The two first-named are trustworthy, but are evidently unsuitable for the greater portion of engineers' work, for which riveting and bolting are the methods adopted. Even the simple elements of rivets and bolts have produced immense developments since the days when bolts were made by hand, holes cored or hand-drilled, and rivets formed and closed by hand labour. Nut- and bolt-making machinery, both for forging and screw cutting, operates automatically, and drilling machinery is highly specialized. Hand-riveting on large contracts has been wholly displaced by power-riveting machines. The methods of union adopted are- not allowed to impair the strength of structures, which is calculated on the weakest sections through the rivet or bolt holes. Hence much ingenuity is exercised in order to obtain the strongest joint which is consistent with security of union. This is the explanation of all the varied forms of riveted joints, which to casual observers often appear to be of a fanciful character.

Protection of Surfaces. — -The protection and coloration of metals and alloys includes a large number of industries. The engineer uses paints for his iron and steel. A small amount of work is treated by the Bower-Barff and allied processes, by which a coating of magnetic oxide is left on the metal. Hot tar— Angus Smith's process — is used for water-pipes. Boiled linseed-oil is employed as a non-corrosive coating preceding the application of the lead and iron oxide paints. In steam boilers artificial galvanic couples are often set up by the suspension of zinc plates in the boiler, so that the corrosion of the zinc may preserve the steel boiler plates from waste. Various artificial protective coatings are applied to the plates of steel ships. Bright surfaces are protected with oil or with lacquer. The ornamental bronzes and brasses are generally lacquered, though in engineers' machinery they are as a rule not protected with any coating. For ornamental work lacquering divides favour with colouring — sometimes done with coloured lacquers, but often with chemical colourings, of which the copper and iron salts are the chief basis. (J. G. H.)

Literature.— Prehistoric : Worsaae, Nordiske Oldsager i Kjoben- havn (1854); Perrin, &ude prihistorique — Age du bronze (1870). Classical: Layard, Nineveh and Babylon (1853); Pliny, Natural History, bk. xxxiv. ; Brondsted, Den Fikoroniske Cista (1847); Gerhard, various monographs (1843-1867); Muller, Etrusker, &c, and other works; Ciampi, Dell' Antica toreutica (1815); Von Bibra, Die Bronzen und Kupfer-Legirungen der alien und altesten Vblker (1869); C. Bischoff, Das Kupfer in der vorchristlichen Zeit (1865) Medieval, &c. : Digby Wyatt, Metal-Work of the Middle Ages (1849); Shaw, Ornamental

Metal-Work (1836); Drury Fortnum, S.K.M. Handbook of Bronzes (1877) ; King, Orfevrerie et ouvrages en mital du moyen Age (1852-1854); Hefner-Alteneck, Serrurerie du moyen Age (i860) ; Viollet-le-duc, Diet, du mobilier, ” Serrurerie ” and “Orfevrerie, (1858 &c); Lacroix, Tresor de S. Denis, and V Art du moyen Age (various dates) ; Karch, Die Rdthselbilder an der Broncethiire zu Augsburg (1869); Krug, Entwiirfe fur Gold-, Silber-, und Bronze-Arbeiteri Linas, Orfevrerie merovingienne (1864), and Orfevrerie du XI II™ siecle (1856); Bordeaux, Serrurerie du moyen Age (1858); Didron, Manuel des wuvres de bronze et d’ orfevrerie da moyen Age (1859); Du Sommerard, Arts au moyen dge (1838-1846), and Musie de Cluny (1852) ; Rico y Sinobas, Trabajos de metales (1871); Bock, Die Goldschmiedekunst des Mittelalters (1855), and Kleinodien des heil.romischen Reiches; Jouy, Les gemmes et les joyaux (1865); Texier, Dictionnaire a” orfevrerie (1857); Virgil Solis, Designs for Gold and Silversmiths (1512), (facsimile reproduction, 1862); Molinier, Les Bronzes de la Renaissance (1886); Servant, Les bronzes d’art (1880); Wilhelm Bode, Italian Bronze Statuettes of the Renaissance (Eng. trans, by W. Gretor, first 2 vols., 1909). Practical Treatises: Theophilus, Diversarum artium schedula (12th cent.), (see Quellenschriften fur Kunstgeschichte, VII., Vienna 1877); Cellini, Trattati dell’ oreficeria e della scultura (ed. Milanesi, Florence, 1856); Vasari, Tre arti del disegno, pt. ii. (Milanesi’s ed., 1882); Gamier, Manuel du ciseleur (1859) ; Haas, Der Metallarbeiter (1902).

METAMERISM (Gr. /jerd, after, fiepos, a part), a technical term used in natural science.- In chemistry it denotes the existence of different substances containing the same elements in the same proportions and having the same molecular weight; it is a form of isomerism.

In zoology, metamerism is the repetition of parts in an orga- nized body, a phenomenon which is, as E. Haeckel, W. Bateson and others have recognized, only a special case of a tendency to repetition of structural units or parts Which finds one expres- sion in bilateral symmetry. It occurs in almost every group of the animal kingdom, but is most conspicuous in segmented worms, arthropods and vertebrates. In certain worms (the Cestoidea and some Planarians) metameric segmentation is accompanied by the separation of the completed metameres one by one from the older (anterior) extremity of the chain (strobilation) , but it by no means follows that metameric seg- mentation has a necessary origin in such completion and separa- tion of the ” meres.” On the contrary, metamerism seems to arise from a property of organisms which is sometimes more (eumerogenesis) and sometimes less (dysmerogenesis) fully exhibited, and in some groups not exhibited at all. The most complete and, at the same time,

simplest instances of metameric segmentation are to be seen in the larger Chaetopods, -where some hundreds of segments succeed one another — each practically indistinguishable in structure from the segment in front or from that behind; muscles, right and left appendage or para podium, colour-pattern of the skin, gut, blood-vessels, coelom, nephridia, nerve-ganglion and nerves are precisely alike in neighbouring segments. The segment which is least like the others is the first, for that carries the mouth and a lobe projecting beyond it — the prostomium. If (as sometimes happens) any of the hinder segments completes itself by developing a pro- stomium, the chain breaks at that point and the segment which has developed a prostomium becomes the first or head-bearing segment of a new individual. Compare such an instancENpf metameric segmentation with that presented by one of the higher Arthropods — e.g. the crayfish. Here the somites are not so clearly marked in the tegumentary structures; neverthe- less, by examining the indications given by the paired parapodia, we find that there are twenty-one somites present — a limited definite number which is also the precise number found in all the higher Crustacea.

We can state as a First Law 1 of metamerism or somite formation

1 The word ” Law ” is used in this summary merely as a convenient heading for the statement of a more or less general proposition.

that it is either indefinite in regard to number of metameres or somites produced, or is definite. Animals in the first case we call anomomeristic; those in the second case, nomomeristic. The nomomeristic condition is a higher development, a specialization, of the anomomeristic condition.

The Second Law, or generalization, as to metamerism which must be noted is that the meres or somites (excepting the first with its prostomium) may be all practically alike or may differ from one another greatly by modification of the various constituent parts of the mere or somite. Metamerized animals are either homoeomeric or heteromeric. The reference of the variation in the form of the essential parts contained in a ” metamere ” or ” somite ” intro- duces us to the necessity of a general term for these constituent or subordinate parts; they may be called ” meromes ” (jufyws). The meromes present in a metamere or somite differ in different annulate or segmented animals

according to the general organization of the group to which the animal belongs. As a matter of convenience we distinguish in the Arthropod as meromes, first, the tegumentary chitinized plates called terga, placed on the dorsal aspect of the somites ; second, the similar sternal plates. In Chaetopods we should take next to these the masses of circular and logitudinal muscular fibres of the body-wall and the dorso-ventral muscles. The latter form the third sort of merome present in the Arthropods. The fourth kind of merome is constituted by the parapodia or appen- dages ; the fifth by the coelomic pouches and their ducts and external apertures (coelomo-ducts), whether renal or genital. The sixth by the blood-vessels of the somite; the seventh by the bit of alimentary tract which traverses it; and the eighth by the neuromere (nerve ganglion pair, commissures, connectives and nerve branches).

The Third Law of metamerism is that heteromerism may operate in such a way. as to produce definite regions of like modification of the somites and their appendages, differing in their modification from that observed in regions before and behind them. It is convenient to have a special word for such regions of like meres, and we call each a tagma {rayiia., a regiment). The word ” tagmosis ” is applicable to the formation of such regions. In the Chaetopods tagmosis always occurs to a small extent so as to form the head. In some Chaetopods, such as Chaetopterus and the sedentary forms, there is marked tagmosis, giving rise to three or even more tagmata. In Arthropods, besides the head, we find very frequently other tagmata developed. But it is to be noted that in the higher members of each great class or line of descent, the tagmosis becomes definite and characteristic just as do the total number of meres or somites, whilst in the lower grades of each great class we find what may be regarded as varying examples of tentative tagmosis. The terms nombtagmic and anomotagmic are applicable with the same kind of implication as the terms nomomeristic and anomomeristic.

The Fourth Law of metamerism (auto-heterosis of the meromes) is that the meromes of a somite or series of somites may be separately and dissimilarly affected by heteromerism. It is common enough for small changes only to occur in the inner visceral meromes whilst the appendages and terga or sterna are largely changed in form. But of equal importance is the independent ” heterosis ” of these visceral meromes without any corresponding heterosis of the body wall. As instances, we may cite the gizzards of various earthworms and the special localization of renal, genital and gastric meromes, with obliteration elsewhere, in a few somites in Arthropoda.

The Fifth Law, relating also to the independence of the meromes as compared with the whole somite, is the law of autorhythmus of the meromes. Metamerism does not always manifest itself in the formation of complete new segments; but one merome may be repeated so as to suggest several metameres, whilst the remaining meromes are, so to speak, out of harmony with it and exhibit no repetition. Thus in the hinder somites of the body of Apus the Crustacean we find a series of segments corresponding apparently each to a complete single somite; but when the appendages are examined we find that they have multiplied without relation to the other meromes of a somite : we find that the somites carry from two to seven pairs of appendages, increasing in number as we pass backwards from the genital segment. The appendages are autorhythmic meromes in this case. They take on a quasi-independent metamerism and are produced in numbers which have no relation to the numbers of the body-rings, muscles and neuro- meres. This possibility of the independent metameric multiplication of a single merome must have great importance in the case of dislocated meromes, and no doubt has application to some of the metameric phenomena of Vertebrates.

The Sjxth Law is the law of dislocation of meromes. This is a very important and striking phenomenon. A merome, such as a pair of appendages (Araneae) or a neuromere or a muscular mass (frequent), may (by either a gradual or sudden process, we cannot always say which) quit the metamere to which it belongs, and in which it originated, and pass by actual physical transference to another metamere. Frequently this new position is at a distance of several metameres from that to which the wandering merome belongs in origin. The movement is more usual from behind forwards than in the reverse direction; but this, probably, has no profound significance and depends simply on the fact that, as a rule, the head must be the chief region of development on account of its containing the sense organs and the mouth.

In the Vertebrata the independence of the meromes is ftiore fully developed than in other metamerized animals. Not only do we get auto-heterosis of the meromes on a most extensive scale, hut the dislocation of single meromes and of whole series (tagmata) of meromes is a common phenomenon. Thus, in fishes the pelvic fins may travel forwards to a thoracic and even jugal position in front of the pectoral fins; the branchiomeromes lose all relation to the position of the meromes of muscular, skeletal, coelomic and nervous nature, and the heart and its vessels may move backwards from their original metameres in higher Vertebrates carrying nerve-loops with them.

The Seventh Law of metamerism is one which has been pointed out to the writer by E. S. Goodrich. It may be called the law of ” translation of heterosis.” Whilst actual physical transference of the substance of meromes undeniably takes place in such a case as the passage of the pelvic fins of some fishes to the front of the pectorals, and in the case of the backward movement of the opis- thosomatic appendages of spiders, yet the more frequent mode in which an alteration in the position of a specialized organ in the series or scale of metameres takes place is not by migration of the actual material organ from somite to somite, but by translation of the quality or morphogenetic peculiarity from somite to somite, accompanied by correlative change in all the somites of the series. The phenomenon may be compared to the transposition of a piece of music to a higher or lower key. It is thus that the lateral fins of fishes move up and down the scale of vertebral somites; and thus that whole regions (tagmata), such as those indicated by the names cervical, thoracic, lumbar and sacral, are translated (accom- panied by terminal increase or decrease in the total number of somites) so as to occupy differing numerical positions in closely allied forms (cf. the varying number of cervical somites in allied Reptiles and Birds).

What, in this rapid enumeration, we will venture to call the Eighth Law of metamerism is the law of homoeosis, as it is termed by W. Bateson. Homoeosis is the making of a merome into the likeness of one belonging to another metamere, and is the opposite of the process of “heterosis” — alrea.dy mentioned. We cite this law here because the result of its operation is to simulate the occur- rence of dislocation of meromes and has to be carefully distinguished from that process. A merome can, and does in individual cases of abnormality, assume the form and character of the corresponding merome of a distant somite. Thus the antenna of an insect has been found to be replaced by a perfectly well-formed walking leg. After destruction of the eye-stalk of a shrimp a new growth appears, having the form of an antenna. Other cases are frequent in Crusta- cea, as individual abnormalities. They prove the existence in the mechanism of metamerized animals, of structural conditions which are capable of giving these results. What those structural con- ditions are is a matter for separate inquiry, which we cannot even touch here.

We now come to the questions of the production of new somites or the addition of new somites to the series, and the converse problem of the suppression of somites, whole or partial. We state as the Ninth Law of metamerism ” that new somites or metameres are added to a chain consisting of two or more somites by growth and gradual elaboration — what is called ‘ budding ‘ — of the anterior border of the

hindermost somite. This hindermost somite is therefore different from all the other somites and is called the ‘ telson.’ However long or short or heteromerized the chain may be, new metameres or somites are only produced at the anterior border of the telson, except in the Vertebrata.” That is the general law. But amongst some groups of metamerized animals partial exceptions to it occur. It is probably absolutely true for the Arthropoda from lowest to highest. It is not so certain that it is true for the Chaetopoda, and would need modification in statement to meet the cases of fissiparous multiplication occurring among Syllids and Naidids. In the Vertebrata, where tagmosis and heterosis of meromes and dislocation of merones and tagmata are, so to speak, rampant, new formation of metameres (at any rate as represented by important meromes) takes place at more than one point in the chain. Such points are found where two highly diverse ” tagmata ” abut on one another. It is possible, though the evidence at present is entirely against the supposition, that at such points in Arthropoda new somites may be formed. Such new somites are said to be ” intercalated.” The question of the inter- calation of vertebrae in the Vertebrata has received some attentipn. It must be remembered that a vertebra even taken with its muscular* vascular and neural accessories is only a partial metamere — a merome — and that, so far as complete metameres are concerned, the Vertebrata do conform to the same law as the Arthropods. Inter- calation of meromes, branchial, vertebral and dermal (fin-supports) seems to have taken place in Vertebrata in the fishes, while in higher groups intercalation of vertebrae in large series has been accepted as the only possible explanation of the structural facts established by the comparison of allied groups. The elucidation of this matter forms a very important part of the work lying to the hand of the investigator of vertebrate anatomy, and it is possible that the application of Goodrich’s law (the seventh of our list) may throw new light on the matter.

In regard to the diminution in the number of somites in the

course of the historical development of those various groups of metamerized animals, which have undoubtedly sprung from ancestors with more numerous somites than they themselves possess, it appears that we may formulate the following laws as the tenth, eleventh, twelfth and thirteenth laws of metamerism.

The Tenth Law is that individual somites tend to atrophy and finally disappear as distinct structures, most readily at the anterior and the posterior ends of the series constituting an animal body. This is very generally exhibited in the head of Arthropoda, where, however, the operation of the law is largely modified by fusion (see below). With regard to the posterior end of the body, the atrophy of segments does not, as a rule, affect the telson itself so much as the somites in front of it and its power of producing new somites. Sometimes, however, the telson is very minute and nonchitinized (Hexapoda).

The Eleventh Law may be stated thus: any somite in the series which is the anterior or posterior somite of a tagma may become atrophied, reduced in size or partially aborted by the sup- pression of some of its meromes; and finally, such a somite may disappear and leave no obvious trace in the adult structure of its presence in ancestral forms. This is called the excalation of a somite. Frequently, however, such " excalated " somites are obvious in the embryo or leave some merome (e.g. neuromere, muscle or chitin-plate) which can be detected by minute observa- tion (microscopic) as evidence of their former existence. The somite of the maxillipede (third post-oral appendage) of Apus cancriformis is a good example of a somite on its way to excalation. The third prae-oral and the praemaxillary somites of Hexapod insects are instances where the only traces of the vanished somite are furnished by the microscopic study of early embryos. The praegenital somite of the Arachnida is an example of a somite which is preserved in some members of the group and partially or entirely excalated in other cases, sometimes with fusion of its remnants to neighbouring somites.

The Twelfth Law of metamerism might very well be placed in logical order as the first. It is the law of lipomerism, and asserts that just as the metameric condition is produced by a change in the bodies of the descendants of unisegmental ancestors, so highly metamerized forms — i.e. strongly segmented forms with specialized regions of differentiated metameres — may gradually lose their metamerized structure and become apparently and practically unisegmental

animals. The change here contemplated is not the atrophy of terminal segments one by one so as to reduce the size of the animal and leave it finally as a single somite. On the contrary, no loss of size or of high organization is necessary. But one by one, and gradually, the metameric grouping of the bodily structures disappears. The cuticle ceases to be thickened in rings — the muscles of the body- wall overrun their somite boundaries. Internal septa disappear. The nerve-ganglia concentrate or else become diffused equally along the cords; one pair of renal coelomoducts and one pair of genital coelomoducts grow to large size and remain — the rest disappear. The appendages atrophy or become limited to one or two pairs which are widely dislocated from their ancestral position. The animal ceases to present any indication of meta- meric repetition of parts in its entire structure. Degrees in this process are frequently to be recognized. We certainly can observe such a change in the posterior region of some Arthropods, such as the hermit-crabs and the spiders. Admitting that the Echiurids are descended from Chaetopoda, such a change has taken place in them, amounting to little short of complete lipomerism, though not absolutely complete.

Recent suggestions as to the origin of the Mollusca involve the supposition that such an effacement- of once well-marked meta-merism has occurred in them, leaving its traces only in a few structures such as the multiple gill-plumes and shell-shields of the Chitons and the duplicated renal sacs of Nautilus.

A further matter of importance in this connexion is that when the old metameres have been effaced a new secondary segmentation may arise, as in the jointed worm-like body of the degenerate Acarid, Demodex folliculorum.

Such secondary annulation of the soft body ‘calls to mind the secondary annulation of the metameres of leeches and some earth-worms. Space does not permit of more than an allusion to this subject; but it is worth while noting that the secondary annuli marking the somites of leeches and Lumbricidae in definite number and character are perhaps comparable to the redundant pairs of appendages on the hinder somites of Apus, and are in both cases examples of independent repetition of tegumentary meromes — a sort of ineffectual attempt to subdivide the somite which only pre- vails on the more-readily susceptible meromes of the integument.

The last law of metamerism which we shall attempt to formulate here, as the Thirteenth, relates to the fusion or blending of neigh- bouring somites. Fusion of adjacent somites has often been errone- ously

interpreted in the study of Arthropoda. There are, in fact, very varying degrees of fusion which need to be carefully distin- guished. The following generalization may be formulated. ” The homologous meromes of two or more adjacent somites tend to fuse with one another by a blending of their substance: _ Very generally, but not invariably, the fused meromes are found as distinct separated structures in the embryo of the animal, in which they unite at a

later stage of growth.” The fusion of neighbouring meromes is often preceded by more or less extensive atrophy of the somites concerned, and by arrest of development in the individual ontogeny. Thus, a case of fusion of partially atrophied somites may simulate the appearance of incipient merogenesis or formation of new somites, and, vice versa, incipient merogenesis may be misinterpreted as a case of fusion of once separate and fully-formed somites.

A very .complete fusion of somites is that seen on the head of Arthropoda. The head or prosoma of Arthropoda is a tagma consisting of one, two, or three prosthomeres or somites in front of the mouth and of one, two, three, up to five or six opisthomeres. The cephalic tagma or prosoma may thus be more or less sharply divided into two subtagmata, the prae-oral and the post-oral.

(E. R.L.)

METAMORPHISM (Gr. /nerd, change of, and yopM, shape), in petrology, the alteration of rocks in their structural or mineral characters by which they are transformed into new types. In the history of rock masses changes of many kinds are inevitable. Loose sands, clays and heaps of shells are gradually converted into sandstones, shales and lime- stones by the action of percolating water and the pressure of over-lying accumulations. All rocks exposed at the earth’s surface or traversed by waters circulating through the earth’s crust, undergo changes in their component minerals due to weathering and the chemical action of the atmo- sphere and of rain. These processes of cementation and decomposition, though not unlike those of metamorphism, are not regarded as essentially the same. They are considered, so to speak, normal episodes in the history of rocks to which all are subject. When rocks, however, are exposed to the heat of intrusive masses (granite, &c.) or have been compressed, folded, crushed, and more or less completely recrystallized, they assume new characters so different from their original ones that they are ascribed to a quite distinct class, namely, the metamorphic rocks. ‘ •

The transformation is always gradual, so that in suitable districts

every stage can be followed from an unaltered or nearly unaltered sedimentary or igneous rock to a perfectly metamorphic one. The transition may be slow or rapid, and the abundance of intermediate forms renders it impossible to lay down any hard and fast lines of distinction. A black shale with fossils may in two or three feet pass into a splintery hornfels; a sandstone or grit becomes a sheared grit, a granulitic gneiss, and a completely recrystallized gneiss sometimes within a few hundred yards; in a thoroughly metamorphic hornblende- schist or chlorite-schist small kernels sometimes occur which can easily be recognized as little modified dolerites or diabases. Still, the metamorphic rocks as a class have many well-defined characteristics, and in perfectly typical development cover enormous areas of the earth's surface and must be, in the aggregate, of vast thickness. A great number of them are recognizably of igneous origin; others are equally certainly sedimentary. Hence some writers have suggested that they are not entitled to rank as a separate class, but only as states or conditions of other rocks. It is generally agreed, however, that when the primitive structures and the original minerals of sedimentary or igneous rocks are so transformed as to be no longer easily recognizable the rock should be included in the metamorphic class.

Only rarely, however, does metamorphism produce much difference in the chemical composition of the rocks affected. Sandstones become quartzites and quartz schists, limestones are converted into marbles, granite passes into gneiss, and so on, without their bulk composition being greatly modified!- From all that we know it seems established that however great the heat and pressure to which metamorphic rocks have been exposed they have very rarely been melted or reduced to the liquid state. Hence there has been no opportunity for inter-mixture by solution or diffusion; the changes, including . the growth of crystals of new-formed minerals, have gone on in the solid rocks. The chemical molecules already present have aggregated into new combinations and have built up new minerals without travelling for more than infinitesimal distances from the places they occupied in the original rock, Exceptions to this occur, but they are so few that they do not

invalidate the general rule. Thin bands of limestone, for example, may be followed for miles in belts of mica-schist or gneiss, never losing their identity by blending with the rocks on either side of them. By

tracing out zones such as these it is often possible to unravel the highly complicated strati- graphy of metamorphic regions where the rocks have been greatly folded and displaced. Another important consequence of the persistence of the chemical individuality of metamorphosed rocks is that very often an analysis indicates in the clearest possible fashion what was the original nature of the rock mass. Sandstones, limestones, ironstones, shales, granites, dolerites and serpentines may be totally changed in structure and very completely also in mineral composition, but their chemical characters are practically indelible. Confusion arises sometimes from the fact that two rocks of different origin may have much the same composition, e.g. a felspathic sandstone may closely approach a granite, or an impure dolomite may simulate a basic igneous rock. Individual specimens, consequently, cannot always be relegated with perfect certainty to sediments or igneous rocks; but in dealing with a complex containing a variety of types the geologist is rarely long in doubt as to their original nature.

Two distinct kinds of metamorphism are recognized, namely contact or thermal metamorphism, and folding or regional metamorphism. The former is associated with intrusive masses of molten igneous rock which were injected at a very high temperature and produced extensive changes in the surrounding rocks. The second occurs in districts where earth folding and the movements attendant on the formation of mountain ranges have flexured and crushed the strata, probably at the same time considerably raising their temperature. Although these processes are very different in their origin, and in the great majority of cases produce quite different effects on the rocks they involve, there are instances in which the results are closely comparable. A sandstone may be converted into quartzite and a limestone into marble by either kind of meta- morphism. It is best, however, to describe them as phenomena essentially different from one another.

Contact Metamorphism (thermo-metamorphism). — Any kind of rock — igneous or sedimentary — which has come in contact with an igneous molten magma is likely to show alteration of this type. The extent and intensity of the changes depend principally on two factors: (i) the nature of the rock concerned, and (2) the magni- tude of the igneous mass. It is to be expected that a great intrusion of granite will produce more extensive effects of this kind than a narrow dike a few inches or a few feet broad. At the edges of such dikes only a slight induration may be noticeable in the country rock, or there may be recrystallization with formation of new minerals for a few inches. Rarely does the alteration extend beyond this. Shales are baked and

hardened, sandstones are rendered more compact or occasionally are partly fused, limestones may be converted into marble containing garnet, wollastonite, augite or other calc-silicates. A great granite boss, which may be ten or twenty miles broad, is often surrounded by a wide aureole of contact alteration. This may be a few hundred yards broad or a couple of miles ; in rare cases the breadth of the aureole is only a few yards. These variations may have structural causes; thus when the aureole is narrow the junction of granite with country rock may be vertical ; when the aureole is broad the granite may be a flat-topped mass which dips at low angles outwards on each side. When a broad aureole accompanies a vertical junction we may suppose that molten rock has flowed upwards along this boundary line for a prolonged period, and has gradually raised the rocks to a very high temperature, even at some distance away from the contact. Where the alteration is slight and local there is usually something in the composition of the rocks or in their crystalline state to account for this.

No less important is the nature of the rocks involved. Where a granite intrudes into a succession of various types of sedimentary and igneous rocks the differences in their behaviour are often very marked. Sandstones alter less readily than shales or slates, and limestones, especially if they be marly or argillaceous, are often full of new minerals, when purer shales on each side of them are not visibly affected. Schists and gneisses, being already highly crystalline, are very resistant to thermal alteration, and may show it only for a few inches where they are in actual contact with the granite, or in minute fragments which have been broken off and surrounded by the invading magma. Igneous rocks, since they consist of minerals which have formed at very high temperatures, may show no change whatever. If they are decomposed, however,

their secondary products, including those ‘which fill veins and amygdaloidal cavities, are often entirely recrystallized in new combinations. Instances of this will be given later.

The intensity of the alteration depends very greatly on the proximity to the intrusive rock. A typical aureole surrounding a granite boss, for example, consists of rocks in all stages of altera- tion, the most affected being nearest the granite, while as we travel outwards we pass over zones of successively diminishing meta- morphism. Around the granites of Cornwall, the Lake District and Ireland there are tracts of altered slate which show these stages very well. The first sign of metamorphism is a slight increase in hardness and glossiness, making the slate a little brighter and more brittle. This is due to the formation

of mica in small crystalline plates mostly parallel to the cleavage of the rock. Nearer the granite a faint spotting is visible on broken surfaces of the slates, -■ and this becomes more pronounced as we enter the middle part of the aureole. These spotted slates, in Cornwall for instance, often occupy a zone a mile in breadth. They are less fissile than the unaltered slates and have rounded or elliptical spots about a quarter of an inch across. The spots are usually darker than the body of the slate, though sometimes paler. Angular, branched, lenticular and rhomboidal spots sometimes occur. Under the microscope these rocks consist mainly of brown mica, quartz and organic matters, iron oxides, &c. ; the spots may be due to aggregation of biotite or of quartz, but often differ little in composition from the surrounding rock. Their dark colour is due to .abundance of iron oxides or graphite, with chlorite and biotite. Still closer to the granite a development of crystals takes place in the slates; the commonest are andalusite, chiastolite (with cross-shaped dark enclosures), cordierite, staurolite and garnet. At the same time the minerals formerly enumerated crystallize in larger individuals (biotite, quartz, iron oxides, &c.) , so that the rock becomes rather more coarse-grained. At this stage the fissility and cleavage structures of the slate tend to be obliterated, and the rocks are dark, lustrous (from the abun- dance of mica), hard and splintery. To this type the name hornfels is given. The innermost zones of the aureole consist mainly of hornfelses, and where there are slate fragments enclosed in the granite they usually show these characters in their most pronounced form.

The nature of the new minerals produced depends principally, of course, on the chemical composition of the rocks affectecL In pure sandstones only quartz is formed, and pure limestones merely recrystallize as marbles. Argillaceous rocks are characterized by abundance of alumina; hence, when thermally altered, they may contain corundum, or silicates of alumina such as sillimanite, kyanite, andalusite and chiastolite. Most rock masses, however, are far from pure and hence the variety of minerals which may arise in them from contact alteration is very great. Argillaceous limestones, for example, very frequently contain garnet, vesuvianite, wollaston- ite, diopside, tremolite, sphene, epidote and feldspar; that is to say, minerals in which lime is present along with silica, alumina, magnesia and other substances. Calcareous sandstones yield augite, garnet, sphene, epidote; argillaceous sandstones are characterized rather by biotite, sillimanite and spinel.

In each case the materials already present in the rock have united to form 1 new mineral combinations. Crystallization has been stimulated by the rise of temperature, aided, no doubt, by moisture. Water

vapour, even at comparatively low temperatures when the pressure is considerable, is a powerful mineralizing agent and greatly facilitates crystallization. Often the rocks acquire ultimately a pseudoporphyritic or porphyro-blastic structure, as they contain large or conspicuous crystals scattered through a finer grained ground-mass; not only these porphyritic ingredients but the body of the rock shows increased crystallization, for contact alteration as a rule makes rocks more coarse-grained than before.

In rare instances fusion may take place, but this must be excep- tional, as the finest original structures are often very perfectly preserved by rocks which have been in great measure recrystallized. Finely laminated argillaceous sandstones, for example, may pass into cordierite — or andalusite — hornfelses showing a mineral banding which corresponds exactly with the original lamination. For this reason the newly developed minerals are not frequently of good crystalline form. When weathered out of the rock they have mostly rough, imperfect faces, but exceptions to this occur in garnet, staurolite, tourmaline and a few others which often produce good crystals even in these adverse circumstances.

It is only true in a general way that the rocks which are thermally altered experience no change in their chemical composition. The new minerals which are substituted for the original ones are such as are stable at high temperatures. Many of the silicates which forma large part of sedimentary rocks contain combined water; examples are chlorite, kaolin and clay. The water, or part of it, is expelled, forming silicates with little or no water, e.g. biotite, felspar, andalusite. Carbonic acid may be retained or driven out; in a siliceous limestone the silica tends to combine with the lime producing calc-silicates by replacing the carbonic acid. In a pure limestone the carbonate merely recrystallizes as marble. This loss of volatile ingredients must occasion a diminution in the bulk of the sedi- mentary mass involved; in cooling there will be contraction, and fissures are produced which may be filled with igneous dikes or with

veins deposited by ascending hot waters. Hence contact aureoles are common sites for mineral deposits of economic value.

In some aureoles the sediments or schists have their bedding and foliation planes wedged apart by the intrusive force of the granite, and

are permeated by igneous material invading them along these fissures. In this way a melange is produced of sedimentary rock with threads and veinlets of igneous nature, and to some extent a blending of the two rocks takes place, though usually each preserves its identity however intimately mixed. In microscopic sections veins of granite not more than a tenth of an inch in width may be traced, sharply distinct from the slate or schist they penetrate. Cases, however, are described in which the rocks of the aureole have been felspathized or filled with new felspar derived from the granite ; this, however, is not common. Shales are often converted, when in contact with diabase, into pale-coloured, flinty-looking rocks known as adinoles. These are exceptionally rich in albite and contain as much as 10 % of soda, an amount which is not met with in unaltered shales. It seems probable that alkalis have been transferred from the igneous rock to the sedimentary, perhaps through the medium of the vapours exhaled. The breadth of the adinole belt is as a rule only a few inches or a foot or two.

The vapours given off by intrusive igneous masses may contain substances which combine v/ith the ingredients of the surrounding rocks and thus modify their composition. Boron, fluorine and phosphorus are the principal elements which are transferred in this way, and minerals such as tourmaline, topaz and mica are the characteristic products in quartzose or argillaceous rocks; while apatite, fluorspar, axinite, datolite and chondrodite are commonest in limestones. This is a form of pneumatolytic action (see Pneumatolysis).

Extreme cases of the mutual interaction of the intrusive rock with the masses invaded by it are provided by the fragments enclosed in the molten magma (known as xenoliths). These are often rounded and eroded, as if softened or partly fused and dissolved. Similar changes are found in the rocks of the aureole for a few feet or yards where in actual contact with the granite. This belt of indurated hornfelses often weathers much more slowly than the igneous rock, and stands out as a prominent, sharp-edged ridge running round the granite margin.

Where sediments are dissolved in igneous rock we may expect to find modifications in the chemical composition and in the minerals produced on crystallization of the magma. Some granites, for example, which contain many rounded, partly dissolved enclosures of slate are themselves full of corundum, andalusite, cordierite and other minerals, which appear to indicate the effect of absorbed slate material. Much discussion has taken place as to the importance of such processes in modifying the facies presented by igneous rocks.

Granites are alleged to have absorbed impure limestones and thus to be changed to diorites (Pyrenees). At the contact of the two rocks a narrow zone of diorite intervenes between the granite and the limestone. In this case an acid rock has become basic (or intermediate) in character; similarly, basic rocks — such as gabbro — are said to become granitic where they have melted down large quantities of felspathic quartzite. On the other side it is argued that as precisely the same modifications of the igneous rocks are known to occur where these explanations cannot possibly hold good — e.g. zones of diorite at the contact of granite with quartzite or mica schist — they are really due to chemical segregation or differentiation • in the magma and not to any admixture with foreign material.

Such modifications in the igneous rock at its contacts are often said to be endomorphic, while those which take place in the aureole or country rocks are exomorphic. The endomorphic changes are not always strictly of the nature of contact alteration. The commonest are the presence of a fine-grained, sometimes glassy, chilled edge due to rapid solidification from sudden cooling of the magma. The fine-grained marginal facies is often porphyritic, while the interior of the mass is granular or eugranitic. There is often a tendency to the development of special minerals in the edge of intrusive masses. Some of these arise probably from absorption of country rock, e.g. cordierite, andalusite, iron oxides (in granite). At the same time there may be a great abundance of angular or rounded enclosures, so that the marginal,rock is brecciform. Where granite penetrates gabbro the fragments of the latter are sometimes melted down and digested in the granite till only the crystals of their augite or diallage are left (Skye). Granite margins are not always more basic than the average of the mass; they may be ex- ceedingly rich in quartz and at the same time very coarse-grained or pegmatitic. This seems to arise from the production of fissures at the contact after the granite has to a large extent solidified. In these fissures the pegmatites are laid down by escaping vapours. Metasomatic changes are especially common also in this situation, and have often formed very valuable mineral deposits along igneous contacts. There also pneumatolytic processes often concentrate their attack; schorl-rock, greisen, topaz-rock and china-stone (or kaolinized granite) are characteristic products, and the active vapours often transform the sediments around, forming schorl-schist, calc-silicate rocks and sericite-schists.

Regional Metamorphism. — The second kind of metamorphism is known as ” regional ” because it is not confined to narrow areas like contact metamorphism, but affects wide tracts of country.

Metamorphic rocks of this kind often cover a large part of a continent (e.g. the centre of Africa or Scandinavia and Finland). Whatever the causes be which produced it, they must have been of widespread operation and connected either with great geophysical processes or with definite stages of the earth's development. Where such rocks occur there is generally much evidence of earth movement accompanied by crushing and folding. They are very characteristic of the central axes of great mountain chains, especially when these have been denuded and their deeper cores exposed. Most geologists believe that this connexion is causal, holding that the contraction of the outer layers of the earth's crust, due to shrinkage of a nearly rigid shell upon a cooling and contracting interior, has bent and folded the rocks, and at the same time has crushed and largely recrystallized them. According to this view regional metamorphism is the result of pressure and folding; hence the name dynamo-metamorphism is frequently applied to it.

A great number of observations collected in all regions of the globe may be adduced in support of this hypothesis, forming a mass of evidence so strong as to be almost overwhelming. The structural features which prove that there has been great folding in these rocks are accompanied by microscopic and lithological characters which demonstrate that extensive crushing has taken place. Through progressive stages a slate with fossils may be traced into a phyllite, which becomes a mica-schist, or, in places, a micaceous gneiss. At first the fossils are distorted or torn apart, but they disappear as crystallization advances. Limestones under great pressure flow almost like plastic masses, losing their fossils and becoming crystalline. Grits, quartzites and granites show the effects of crushing in the pulverization of their minerals and the breaking down of their original clastic or.igneous textures, fine slabby mylo- nites (q.v.) and granulites being produced. Moreover, the degree of metamorphism in the rock can often be shown to correspond closely to the extent to which it has been folded and crushed.

Another argument in favour of dynamo-metamorphism, which has been urged with much insistence by the extreme supporters of these theories, is the retention of original chemical characters in the metamorphic rocks. Some of them bear unmistakably the stamp of sedimentary origin, e.g. the limestones and marbles, quartzites, graphite-schists and aluminous mica-schists. Others have the normal composition of granites, diorites, gabbros and other types of plutonic igneous rocks. This leads to the inference that these were originally normal sediments and intrusives or lavas, and that their present crystalline state and foliated structure are the result of agencies which

operated on them subsequently to their formation. Where the degree of metamorphism is not too high, and the folding and dislocation not too complex, the sand- stones, shales and limestones may be mapped out, and igneous bosses, dikes and sills, with their contact aureoles, veins, pegmatites and segregations, convincingly delineated on the maps. This shows that a whole complex or terrane, consisting of diverse peno- logical types of normal sediments and igneous rocks, may be con- verted by metamorphism into a great series of gneisses and schists. Although recrystallization has been complete, the original rock masses still retain their identity in their new state.

The metamorphism in a rock series may be of nearly uniform intensity over a large area; the sediments, for example, may have all their clastic and organic structures effaced, and in the igneous rocks the porphyritic, ophitic, graphic and other textures may have completely disappeared. This, however, is not always the case, especially when the metamorphism is not of very intense degree. Parts of the rock may retain original structures, while others are typical crystalline schists and gneisses. Kernels, lumps or phacoids of massive rock are often found embedded in schists, and it is clear upon inspection that the phacoids represent the original state of the rock, while the schist is the effect of meta- morphism. At other times a rock mass, such as an intrusive sill, is schistose at its edges and surrounded by schistose sediments, while near its centre, it is almost entirely massive. The hard igneous rock has proved more rigid than the soft and plastic sedi- ments; in folding, the latter have yielded to the stresses, and internal movement has produced foliation. The crystalline rock of the intrusive sheet has been strong enough to withstand the pres- sures and has folded like a rigid mass. At the junctions the effect of differential movement is shown by the presence of a belt of rock which often has a most pronounced schistosity. Some intrusive dikes show foliation especially marked along their edges ; or they , may be traversed by planes of movement, running obliquely or directly across them, and characterized by the development of very marked schistosity. Exceedingly sudden transitions between normal igneous rocks and schists or gneisses have been described in sheared dikes. A normal dolerite, with ophitic structure and abundant augite, has been shown to pass in a few feet or inches into an epidiorite, where hornblende has replaced the primary augite, and lastly into a perfectly typical hornblende-schist, com- pletely recrystallized* with development of epidote, green horn- blende, sphene and other minerals of metamorphic facies from the original constituents of the dolerite. These phenomena are regarded as establishing that the rock had consolidated as a normal dolerite before the processes which caused

the metamorphism began to act; that these processes resulted in internal movement in the rock

mass along certain narrow belts; and that recrystallization was set up along with the development of schistose structure. The operat- ing cause cannot have been anything but pressure, especially as the foliated rocks occur not infrequently in lines of dislocation u ˆ\ eaT; in other cases tne foliated types are at the margins of the dike, and the transition from massive igneous rock to meta- morphic schist may take place within the space of one inch. The best examples of phenomena of this order are those described by J. J. H. Teall from Scourie in the north- west of Scotland.

Where rocks of any kind are traversed by powerful dislocations or thrusts they often present a schistose facies in the immediate vicinity of the planes of movement. In the Highlands of Scotland great thrusts occur, along which the rocks are displaced for distances which may be as much as ten miles; and immediately adjoining these thrust-planes very perfect foliation is induced in all kinds of rocks, sedimentary, igneous or metamorphic, which have been involved in the movements. The minute structure of these rocks is generally of the mylonitic, granulitic or finely crushed type. In the same way the serpentine of the Lizard in Cornwall passes into fine talcose and tremolitic schists along narrow zones of displacement. Many other examples of this might be cited from regions where folding and crushing have taken place on a large scale. As a rule, almost without exception, the foliation thus produced is parallel to the direction of movement in the rock masses.

In the mineral transformations which accompany metamorphism the operation of pressure is no less clearly indicated. There are for example, three minerals which consist of silicate of alumina' viz andalusite, sillimanite and kyanite. The last of these has the highest specific gravity. In andalusite-bearing rocks which have been sheared, with production of foliation, we sometimes find pseudomorphs of kyanite after andalusite, retaining the character- istic torm of the original mineral. Compression, it seems reasonable to suppose, would produce that one of the three crystalline silicates ot alumina which has its molecules most closely packed, and con- sequently the highest specific gravity. This explains the conversion of andalusite into kyanite. The principle that substances tend to assume that mineral

form which has the least molecular volume is ot wide application among metamorphic rocks. It has been calculated, for example, that when olivine and anorthite felspar are replaced by garnet (a change which takes place not infrequently when basic igneous rocks are metamorphosed) the molecular volume ot the mineral aggregate diminishes from 145 to 121 or about 17% On the other hand, when garnet is fused it recrystallizes as a mixture of olivine and anorthite. This has led to the generalization that all minerals formed by the crystallization of a fused magma at high temperatures have a large molecular volume, while those which are produced in rocks at temperatures below their fusion points and under great pressures have smaller molecular volumes Loewinson Lessing pointed out that some minerals have a greater molecular volume than the oxides which enter into their composi- tion; in other minerals the reverse holds good. The former group are, on the whole, characteristic of igneous rocks and products of contact alteration, both of which classes have been formed at high temperatures (e.g. wollastonite, spinel, nepheline, leucite and andalusite). The mmerals of the second group are often of common occurrence in metamorphic schists and gneisses (e.g. staurolite kyanite, hornblende, talc, epidote and garnet). Although there are exceptions to this rule, there can be no doubt that it expresses a generalization which is of great value in the study of mineral paragenesis.

The mineral changes are usually not of so simple a kind as those above enumerated. Mutual interaction takes place between adjacent components of the rocks. Titaniferous iron oxides, for example, obtain silica and lime from such minerals as augite or lime felspar and sphene results. Felspar often breaks up into epidote, quartz and albite; the epidote obtains its iron from adjacent crystals of augite or hornblende. Equations can be written to show the transformation of one rock to another; thus, diabase (labradonte, augite, ilmemte) may be converted into amphibolite (acid plagioclase, hornblende, garnet, sphene and quartz). In this case the molecular volumes are for diabase 671 and for amphi- bolite 635-6, indicating a diminution on metamorphism. Many striking illustrations of this principle have been adduced. Caution however, is required in applying it to concrete cases; if it was always strictly correct the metamorphic rocks should have higher iˆnn° a g r £r t,eS v tha V heir representatives among sediments and igneous rocks. Very frequently this is not the case, and there must be some counteracting process at work. We find this antago- nistic principle in the tendency for the minerals of metamorphic rh\ k V°, co nt ˆ, m . water , of combination, e.g. .epidote, muscovite, chlorite, hornblende, talc. This indicates that they

Were formed at comparatively low temperatures.

We arrive then by many independent lines of reasoning (strati-graphical microscopical, chemical and minerafogical evidence being abundantly available) at the conclusion that pressure acting on sedimentary and igneous rocks at temperatures below their fusion points has been able to change them into metamorphic rocks. This is the theory of dynamo-metamorphism, which has won acceptance trom the majority of geologists who have made the petrology of

metamorphic rocks their special study. It has still, however many incisive critics, and in recent years dissent has on the whole gained strength.

One of the principal objections is that by these processes it is possible to destroy original structures and to break down the ra ‘ n ™ of whlc h a rock consists, but not to induce crystallization and build up rock structures of a new type. It is pointed out that in many regions the rocks though intensely folded are not highly metamorphic; in other places immense dislocations can be proved to exist, yet the rocks are only slightly altered or are converted into nne-grained mylomtes and not into typical schists and gneisses Conversely, it is argued, there are many districts where meta- morphism is very intense, yet evidence of folding and pressure is only slight It seems clear that another factor must be taken into account, and in all probability that factor is the action of water in rocks at a comparatively high temperature. All rock masses contain interstitial water, and many also consist of minerals in some ot which water exists in combination. Hence all meta- morphism must be regarded as taking place in presence of water It is almost equally certain that metamorphism must be accom- panied by a rise of temperature in nearly every case— in fact it is dimcult to imagine such a process going on without considerable heat. Now heated water (or water vapour) is a most potent mmerahzer Crystals of quartz, for example, have been produced in glass tubes containing a little water, heated in a furnace to a temperature of about 300° C.

The heat required for the more intense stages of metamorphism may be derived from more than one source. Most regions of gneiss and schists contain igneous rocks in the form of great intrusive masses These rocks themselves are frequently gneissose, and the possibility must not be overlooked that they were injected into the older rocks at a time when folding was going on. The meta- morphism would then be partly of the contact type and partly the effect of pressure and movement, ” pressure-contact-metamorphism.” I he vapours already present would be augmented by those given out from the igneous rock

and intensely crystalline, foliated masses, otten containing minerals found in contact zones (andalusite cordiente sillimanite, staurolite, &c), would be produced. Cases are now known where it is in every way probable that the meta- morphism is the result of a combination of causes of this order borne of the Alpine schists which surround the central granite gneisses have been referred to this group.

Heat must also have been produced by the crushing of the rock components. In many metamorphic rocks we find hard minerals possessing little cleavage (such as quartz) reduced to an exceedingly fine state of _division, and it is clear that the stresses which have acted on regions of metamorphic rocks are often so powerful that all the minerals may have been completely shattered. The inter- stitial movement of the particles must also have generated heat I here are no experimental data to enable us to say what rise of temperature may have been produced in this way, but we cannot doubt that it was considerable. If the crushing was slow the heat generated may have been conducted away to the surface almost as fast as it was produced. If the belt of crushing was narrow, heat would rapidly pa.ss away into the colder rocks beyond. This mav explain why in some rocks there has been much grinding down but little crystallization. The heat also may be absorbed in promoting chemical combinations of the endothelial type, but it is not likely that much was used up in this way. With rising temperature the rocks would become more plastic and fold more readily. Then if the crushing and folding ceased, a long period would follow in which the temperature gradually fell. The minerals would crystallize in larger grains after the well-known law that the larger particles tend i iI 0W . at the , ˆ ense , of t he L smaller ones, andˆfinely granulitic aggregates would be replaced by mosaics of coarser structure If there has been a considerable rise of temperature we might exoect analogies in structure and constitution between the folded rocks and those which come from a contact aureole; this has in fact been noted by many geologists.

Another factor which must have been of importance is the depth below the surface at which the rocks lay at the time when they were folded In the deeper zones the pressures must have been greater and the escape of the heat generated must have been less rapid 1 he uppermost members of a complex which was undergoing foldine are under the lowest pressures, are at the lowest temperatures and probably also contain most moisture. Hence minerals such as epidote chlorite, albite, sericite and carbonates, which are often” produced by weathering alone, might be expected to prevail In the deepest zones the temperature and pressure are high from the hrst and are increased by folding; such minerals as biotite, augite garnet, felspar, sillimanite,

kyanite and staurolite might be produced under these conditions. The earth's crust might in this way be divided into bathymetnc zones, each of which was characterized by distinctive types of mineral paragenesis. Some geologists ascribe the greatest importance to this conception; they establish two or three types of metamorphism, each of which belongs, in their opinion, to a definite horizon. This is to some extent a resuscitation of the old idea, now discarded, that the Archean rocks are sediments of a. peculiar kind formed only in the heated waters of the primal globe- the hrst deposits were laid down un<1er great heat and pressure and

are typical gneisses which may resemble igneous rocks; the schists of later origin exhibit a progressive transition to normal sediments. Without admitting that it is possible to classify metamorphic rocks according to the depth at which they were situated when meta- morphosed, we may admit that there is much reason to believe that the more intense stages of alteration characterize as a rule the rock masses which were oldest or most deeply situated during the epoch of folding.

While rocks near the surface which are under comparatively slight pressures yield to stress by fracturing, it is conceivable that at greater depths the minerals would become plastic and suffer deforma- tion without rupture. For this zone of " flowage," as he terms it, van Hise estimates a depth of not more than 12 kilometres, depend- ing on many factors such as the strength of the rocks and nature of the minerals concerned, thq temperature, amount of moisture and rapidity of the deformation. -Between it and the zone of fracture, which lies above*, a gradual transition must take place. Doelter, on the other hand, believes that the depth at which plastic flow begins must be at least 35 kilometres; it is difficult to imagine that rocks which have been so profoundly buried can now be exposed at any part of the earth's, surface.

In the attempt to' explain, the existence of large masses of meta- morphic rocks which are perfectly foliated, but at the same time coarsely crystalline, and show no grinding down of their components, as might be expected on the hypothesis of pure dynamo-meta- morphism, F. Becke brought into prominence another principle which may prove to be widely applicable. Although known as Riecke's law, it was advanced many years ago by Sorby. It enunci- ates that when

minerals are subjected to unilateral pressure (acting in a definite direction and not like hydrostatic pressure, equally in all directions) they tend to be dissolved on those sides which face the pressure, while the sides which are not compressed tend to grow by additional deposit. Minerals having platy or rod-like forms will thus be produced, all having a parallel orientation, and the rock will be schistose, with foliation corresponding in direction to the extension of the mineral plates, and perpendicular to the stresses which were in action. The solvents which dissolve the mineral on one side and deposit it on the other side are the interstitial moisture and vapours present in the rock. By this means schists and gneisses will be produced, which are perfectly foliated yet have their minerals homogeneous and uncrushed. Experimental data are at present wanting to show how far this principle is operative and what are its limits, but as a supplementary contribution to the theory of dynamo- metamorphism it may prove to be of great importance. This has been described as the development of " schistosity by crystalliza- tion."

More interesting still are E. Weinschenk's theories of pressure-crystallization and piezo-crystallization (pressure-contact action). He adduces evidence to show that many gneisses are igneous rocks which were foliated from the first, and a large body of observations in many European countries confirms his statement. In his opinion plutonic rocks crystallizing under certain conditions of pressure necessarily assume a banded structure, and contain minerals which are not identical with those of igneous rocks but with the components o.f schists and gneisses. In the surrounding rocks there is contact alteration but not of the ordinary type as the recrystallized products also have a banding or foliation owing to the pressure acting on them during metamorphism. Bonney urged tha hypothesis that many gneisses are merely plutonic igneous rocks which exhibit a flow banding and an imperfect idiomorphism of their minerals owing to their having been injected in a half solid state; the component crystals by mutual attrition assume rounded or lenticular forms. Undoubtedly there: is much truth in ■these hypotheses, yet in both cases they seem to necessitate the presence of extraordinary earth pressures such as accompany mountain building. We know that heat greatly increases the plasticity of rocks. Assuming that intrusions take placd during an epoch of earth movement, we may be certain that as solidification goes on the pressures will force the rock forward, and the structures will be very different from those assumed by a rock which has crystallized in a condition of rest.

Lastly, there are many geologists who hold that certain kinds of gneiss are due to the injection of plutonic igneous rocks as masses of all sizes

into sedimentary schists forming a melange. The igneous rock veins the sediment in every direction; the veins are often exceedingly thin and nearly parallel or branch again and again. In this way a banding or foliation is set up, and the mixed rock has the appearance of a gneiss. In the sediment, intensely heated, new minerals are set up. The igneous rock digests or absorbs the materials which it penetrates; and it is often impossible to say what is igneous and what is sedimentary. Acid intrusions may in this way break up and partly assimilate older basic rocks. Very good examples of this process are known, and they may be much more common than is at present suspected. Conditions which favour assimilation at great depths are the enormous pressures and the high temperature of the earth's crust; the igneous rocks may also be much above their consolidation points. It is quite reasonable 1 to believe that at deep levels absorption of sediments by igneous masses goes on extensively, while in higher zones there is little or none of this action. (J. S. F.)

METAMORPHOSIS, a term used in zoology in different senses by different authors, and sometimes in different senses by the same author. E. Korschelt and K. Heider, in their work on the development of the Invertebrata, usually apply it to the whole of the larval development. For instance, in their account of the Bryozoa, they say (p. 18, part 2, of the English translation) : " The metamorphosis of a Bryozoan larva comprises a more or less protracted free-swimming stage during which no perceptible advance is made in the development of the larva, and the subsequent somewhat complicated changes which bring about its transformation into the first primary zooid of the young Bryozoan colony." Throughout their account of the Crustacea they use the word in the same sense, i.e. as applied to the whole of the changes which the larva undergoes in passing into the adult. On the other hand, in their account of Mollusca they seem to restrict the term to the final change by which the larva passes into the adult form (op. cit., part 4, p. 14). F. Balfour in his great work on Compara- tive Embryology seems to limit the word to a sudden change in the larval history. For instance, he says: " The chief point of interest in the above development is the fact of the primitive nauplius form becoming gradually converted without any special metamorphosis into the adult condition " (Comparative Embryology, 1885, i. 463). " By the free Cypris stage into which the larva next passes a very complete metamorphosis has been effected " (op. cit. i. 490). " The change under- gone by the Tadpole in its passage into the Frog is so con- siderable as to deserve the name of a metamorphosis " (op. cit. ii. 137). Finally and most decisively he says in his general account of larvae: " In the larval type [of develop- ment] they are

born at an earlier stage of development, in a condition differing to a greater or less extent from the adult, and reach the adult state either by a series of small steps or by a more or less considerable metamorphosis ” (op. cit. ii. 360). Here the term will be used in the sense of the last quota- tions from Balfour and will be regarded as applicable only to those cases of sudden and marked change which fre- quently occur at the end of the larval period and sometimes at more or less frequent intervals during its course (Crustacea).

Some authors (see H. G. Bronn, Thierreich, ” Myriapoda,” Bd. 5, Abth. 2, p. 113) have applied the term ” metamorphosis ” only to those cases of larval development in which the young leaves the egg with provisional organs which are lost in the later development. Such authors apply the term ” anamorphosis ” to cases in which the just-hatched young is without provisional organs but differs from the adult in size, and in the number of segments and joints, &c. Such writers apply the term ” epimorphosis ” when there is merely an acquisition of sexual maturity and increase in size after birth or hatching.

The essential feature of metamorphosis is the sudden bursting into function of new organs, whether these organs suddenly arise or have been gradually formed, without becoming func- tional in preceding larval stages. Another feature of it is the disappearance of organs which have been of use to the larva but which are not required at all or are not required in the same form in the new environment. The term is only used in connexion with larval development and is not applied to the sudden changes, due to a change of environment (e.g. the passage of the mammalian embryo from the oviduct into the uterus), which sometimes occur in embryos. Neither is it used in connexion with the suddeti changes of conditions which occur at the birth or hatching of an embryo, although, especially* in the case of birth, this event is frequently accompanied by profound morphological alteration.

The most familiar examples of metamorphosis are the abrupt changes which occur at the end of the larval history of the frog and of many insects. In both these cases there is a sudden and great change of environment; there is a sudden demand for new organs which would have been quite useless in the old environment, and organs which were of use in the old environ- ment and are of no use in the new have to be eliminated. The two examples we have chosen have the advantage of showing us the two methods by which the crisis in the life-history is met.

In the frog (fig. i) the structural changes which obtain full fruition at the metamorphosis take place gradually during the previous tadpole life. They relate mainly to the alterations of the respiratory organs and vascular system which are required for the purely terrestrial life of the frog, and to the appearance of the paired limbs. The changes in the respiratory and vascular

After Leuckart and Nitsche's Wandtafeln, by permission of T G. Fisher & Co.

Fig. i. — Drawings illustrating the metamorphosis of the frog (Rana lemporaria).

A, Side view of an advanced tadpole with well-developed posterior limbs; the anterior limbs are present but hidden beneath the operculum.

B, Ventral view of the same with operculum removed showing the anterior limbs in situ; the ventral body wall has also been removed and the heart (hi) and intestine exposed, (br) Gills; (KL) spiracle.

C, A frog after the metamorphosis but before the absorption of the tail.

organs are led up to in the tadpole, which during the greater part of its aquatic life is a truly amphibious animal, breathing by lungs as well as by gills; but a sudden change occurs in these organs at the metamorphosis. The limbs which were slowly formed during tadpole life — the posterior pair visibly, the anterior under cover of the operculum (fig. i, B) — are of no use to the tadpole and must constitute a pure burden to it. The principal events of the metamorphosis are the sudden appear- ance of the anterior limbs, and the complete closure of the gill aperture (fig. i, C). The appearance of the anterior limbs and the acquisition of functional importance by both pairs enable the frog to leave the water and pass on to the land to lead its terrestrial life. The other larval organs, such as the gills and the tail, gradually shrink in size and ultimately vanish. In the case of the gills this shrinkage had begun before the meta- morphosis, but the tail shows no sign of diminution until the frog is ready to pass on to the land.

The distinguishing feature of this type of metamorphosis is that the animal is burdened for a certain period, both before and after, with organs which are useless to it. In the next type, which is exemplified

by the metabolous Insecta, this occurs to a much smaller extent, although the changes of habitat and the cor- responding changes of structure are more remarkable. In insecta the change is usually from a terrestrial or aquatic habitat to an aerial one. The larva of a butterfly is a worm-like organism which creeps on and voraciously devours the foliage of certain plants (fig. 2, C). During its life it undergoes much growth, but no important change in structure. When it leaves the egg

After Leuckart and Nitsche's Wandtafeln, by per- mission of T. G. Fisher & Co.

it is adapted to live and feed on a particular species of plant, on or near which the eggs are deposited by the parent butterfly. It has powerful biting jaws by which it procures its veg'etable food. The adult, on the other hand, is a winged creature which also lives on plants but in quite a different way to the larva (fig. 2, A). It flies from plant to plant and obtains its food by sucking the juices of flowers and other parts. The power- ful mandibles of the larva have disappeared and in their place we find a suctorial proboscis formed by the first maxillae [fig. 2, A (4)]. Between the larva and the adult insect there is interposed a resting stage, the so-called pupa (fig. 2, B), during which no food is taken, but very important changes of structure occur. These Fig. 2.— Three stages in the life- changes consist of two history of the cabbage butterfly, Pieris processes: (1) histolysis, brassicae, L.

hv which most of the A ' Ima S° (female), side view.

by wnicti most ot tne B p fixed by a cord across the

larval organs are de- middle of the body and by the tail, stroyed by the action of C, Caterpillar.

phagocytes; and (2) his- (1) Forewing; (5) thoracic legs;

tOgenesis by which the gj «*««£ gj hawing;

corresponding organs of $ first maxilla; (8) the thorax; the imago are developed (9) the abdomen, some of the segments from the imaginal disks. of which in the caterpillar carry a pair The imaginal disks ap- of prolegs (10). pear to arise in the embryo in which they develop, some of them from the epiblast and some from the hypoblast. They persist practically unchanged through larval life and become active as centres of growth in the pupa. The pupal stage in such a metamorphosis may be compared to a second embryonic stage in whith the organs of the adult assume their final shape. In this kind of metamorphosis the larval organs are entirely got rid of in the pupal stage, during which

the insect is as a rule incapable of locomotion and takes no food; and the new formation of organs — especially those of locomotion and alimentation — which is necessitated by the totally different habits of the larva and mature insect, is also accomplished at the same period, largely, no doubt, at the expense of the material afforded by the disrupted larval organs. The larva itself does not form any of these organs and carry them about during its active life, though it does possess the very minute centres of growth known as the imaginal disks which burst into activity after the larval life is over. It must not be sup- posed that in all insects in which the sexual animal has a different habitat from the young form, there is a metamorphosis of the kind just described. In the may-flies and dragon-flies, in which the larva is aquatic, the change is prepared for some time before the actual metamorphosis, the organs which afe» necessary for the aerial existence being gradually acquired during larval life. In such cases, the metamorphosis belongs to our first type and consists of the act by which the organs previously and gradually acquired suddenly become functional. We have now considered in detail two typical cases of meta- morphosis. In the first the change is gradually led up to and the larva is burdened, in its later stages at least, with organs which are of no use to it and only become functional at the metamorphosis. In the other, the change is not led up to. It is sudden, and a kind of second embryonic period is established

to enable the important and far-reaching transformation to be accomplished. It is clear that the two kinds of metamorphosis

AandB after Fritz Miiller in Archiv.fUr Naturgeschichte, vol. xxix., 1863; C, D t and E after C. Claus, Untersuch. zur Erforschung Crustaceen-Systems.

Fig. 3. — Drawings showing various stages in the larval history of Penaeus.

A, Nauplius larva, dorsal v ; ew, showing the three pairs of appendages and the simple median eye.

B, Protozoaea larva, dorsal view, the rudiments of the paired eyes are visible through the cuticle, by which the rudiments of the maxillae are still covered.

C, Older Protozoaea, dorsal view; the six posterior thoracic segments

are distinct, but the five abdominal segments are still hidden beneath the skin.

D, Zoaea larva, ventral view, with the rudiments of the thoracic limbs and the appendages of the sixth abdominal segment.

E, Mysis stage, side view; the thoracic and abdominal appendages have been developed.

(1) first antenna; (9) thorax;

(2) second „ (10) abdomen;

(3) mandible; (11) liver;

(4) first maxilla; (12) frontal sense organ, just be-

(5) second „ hind which are the compound

(6) first maxilliped; eyes;

(7) second ,, (ai) to (a6) the six abdominal

(8) third „ appendages.

only differ in degree and that no line can be drawn between them.

In the Crustacea, as has already been pointed out, many authors apply the term metamorphosis to the whole larval development, which consists of a series of changes leading to the adult form. But this is in our opinion an incorrect use of the word. The typical larval development of a Crustacean consists of a series of small metamorphoses. At each moult new organs which have been developed since the preceding moult become manifest and some of them functional. For instance, the prawn Penaeus leaves the egg as a nauplius larva (fig. 3, A). It issues from the first moult as a metanauplius which has a forked tail, a beginning of the cephalo-thoracic shield, and a large helmet-shaped upper lip. It also possesses stump-like rudiments of the maxillae and two anterior pairs of maxillipeds. After the next moult it is known as a protozoaea (fig. 3, B), in which a cephalo-thoracic shield is well developed, the posterior part of the body is prolonged into a tail, in the anterior part of which the thoracic segments are obscurely indicated, and the four pairs of stump-like rudiments have become functional appendages [fig. 3, B (4), (5), (6), (7)]. This passes into a later protozoaea stage © in which the rudiments of the compound eyes and of the abdominal segments

are visible beneath the cuticle and in which certain functional changes (jointing, &c.) have appeared in the limbs. This is succeeded by the zoaea stage (fig. 3, D), characterized by the stalked and functional condition of the eyes, the increased size of the abdominal segments, and the appearance of appen- dages on the sixth of them, the increase of size in the third pair of maxillipeds (8) which had appeared as small rudiments in the preceding stage, and the appearance of the five pairs of posterior thoracic limbs as small biramous appendages. The zoaea stage is followed by the mysis stage (fig. 3, E) in which the thoracic feet are biramous, as in Mysis. From this the adult form proceeds. The transformation is more gradual than would be gathered from this short description, because moults

Aftei C. Claus, Untersuch. zur Erforschung Crustaceen-Systems .

Fig. 5. — M etanauplius larva of Bal- anus (Naples), immediately pre- ceding the Cypris larva; ventral view. The six pairs of biramous appendages of the Cypris stage are visible beneath the cuticle. The median simple eye and the compound eye are both visible.

(1) first antenna;

(2) second ,,

(3) mandibles;

(4) rudiment of the maxilla ;

(5) first pair of biramous limbs.;

(6) sixth ,, „

(7) upper lip;

(8) frontal sense organs.

occur during the later stages from each of which the larva comes with some slight transformation.

In the life-history of a typical Cirripede there may be said to be two distinct metamorphoses, with gradual developmental stages taking place between them. The animal is hatched as a nauplius. This undergoes a series of moults during which increase in size and slight changes in form occur (fig. 4, A, B). At the last of them several organs characteristic of the second

After Spence Bate in Annals and Magazine of Nat. History, vol. 8, 2nd series, 1851.

Fig. 4. — Nauplius of Balanus balanoides.

A, As just hatched;

B, After the first moult.

(1) first pair of nauplius ap- pendages ;

(2) second „ ,,

(3) third „ ” „

(4) upper lip ;

(5) frontal sense organ.

or Cypris stage are discernible [fig. 5 (5), (6)] beneath the cuticle. When this is moulted the free-swimming cypris larva is liberated with its six pairs of biramous thoracic legs, its bivalve shell, and its paired compound eyes (fig. 6). This is the first metamor- phosis. After a certain period of free life the Cypris larva attaches itself by its anterior antennae to some foreign object and enters upon the pupal stage (fig. 7). During this the larva takes no food and ceases to move, and undergoes important changes of structure and form beneath the larval cuticle, which invests it like a pupal case. These changes lead to the

After C. Claus, Schriflm der Gesetlsch. tur Beford. der gesamtnten Naturwissen. %u Marburg.

Fig. 6. — Cypris larva fascicularis.

(1) first antenna;

(2) compound eye;

(3) simple eye;

(4) biramous appendages

After C. Claus, Untersuch. zur Erfor- scfiung Cruslaceen-Syslems.

Fig. 7. — Pupa of Lepas pedinata in optical section, of Lepas (1) first antenna ; (6) tergum:

(2) compound (7) biramous eye ; feet ;

(3) liver; (8) carina;

(4) simple eye ; (9) cement

(5) scutum; gland.

attainment of the adult form and structure. When they are completed the cuticle, including the shell- valves, is cast off and the young cirriped emerges. This is the second and final metamorphosis, which resembles in its main features the meta- morphosis of the metabolous Insecta.

Metamorphosis occurs in most groups of the animal kingdom. It is generally found in attached organisms, for these nearly always have free-swimming larvae and the metamorphosis occurs when the change of habit is effected. For the details of the process the reader is referred to systematic works on zoology. Here only the most striking instances of it can be mentioned. It occurs in a remarkable form in some sponges, in which at the metamorphosis the larval epidermis, which acts as a locomotive organ, is said to become transformed into the collared flagellated cells of the canal system, the adult epidermis being a new formation. It occurs in the Polyzoa, and is, in some of these, characterized by an almost complete disruption of the larval organs and a subsequent new formation of the organs of the adult. The metamorphosis in such cases belongs to our second type, the new organs being new forma- tions at the metamorphosis and not developed from rudiments which make their appearance in the earlier larval history. In Phoronis the metamorphosis of the larva (Actinotrocha); which occurs on fixation, is gradually led up to, but the mode of destruc- tion of some of the larval organs is peculiar; the brain and sense organs of the larva pass into the stomach and are digested. In the Tunicata, in which fixation of the free larva is effected by the head, as in Cirripedia and some, if not all, Polyzoa, the metamorphosis occurs entirely after fixation as a rapid series of developmental changes which occur ad hoc and are not prepared for by preceding changes. In Am- phioxus there is no metamorphosis though the larval changes are most remarkable and extensive, but the larval life is a long one and the development very gradual, the new organs coming into function as soon as they are formed.

In most Mollusca there is also a prolonged and important larval life, marked by very interesting stages of structure (trochosphere, veliger, &c), but it is not usual to speak of a metamorphosis for the changes are gradual, each organ developing with great rapidity and coming into function at once. In certain forms, however, a metamorphosis occurs, e.i. in the glochidium larva of Anodonla, which embeds itself in the skin of a fish and there metamorphoses into the adult.

In the Echinodermata there is a particular stage in the larval history, when the ciliary locomotive apparatus breaks up and is ab- sorbed and the animal takes to its creeping adult life. This metamorphosis is gradually prepared for in the precedent larval development by changes which ultimately lead to the complete establishment of the adult radial symmetry. The metamorphosis belongs therefore to our first

(After J. Muller.)

Fig. 8. — A ventral view of a bipinnaria carrying the body of the young star-fish.

type, but it is remarkable for the heavy burden of adult structures which the larva, in its later stages at least, carries about (fig. 8). The adult body is, in the main, fashioned out of the larval body, and it takes over most of the organs of the latter; but as a rule the adult mouth, oesophagus and anus are new formations, and the central nervous system of the larva when present shares the fate of the larval locomotory apparatus. In Asteroids and Crinoids the metamorphosis is accompanied by fixation to foreign objects, the fixation being effected as in Cirripedes by the preoral lobe.

In the Vertebrata a metamorphosis occurs in the lamprey and the Amphibia. The metamorphosis of the lamprey is peculiar. It lives for three or four years as a sexless larva, known as the ammo- coete. It then quite rapidly (in three or four days) undergoes a series of changes and becomes converted into the adult. The metamorphosis affects the alimentary canal, the eyes, the respiratory apparatus and other organs, and especially the reproductive organs, which become mature. The adult lives for a few months only, spawning soon after the metamorphosis. This metamorphosis belongs to our second type, but there does not appear to be any resting stage during the few “days in which it is effected. In the Amphibia the metamorphosis is fairly exemplified by that of the frog. In many fishes there is a considerable larval development, but this is perfectly gradual and there does not appear to be any- thing of the nature of a metamorphosis.

In most cases of metamorphosis those organs of the larva, which are found also in the adult, persist through the transformation, undergoing merely the ordinary modifications of development. But it sometimes happens that such organs are completely destroyed and rebuilt during the metamorphosis. This is conspicuously the case in the metabolous Insecta, in some of which all the internal organs undergo disruption and are reformed. It happens also in those nemertine worms which develop by a larva ; in these the larval epidermis is cast off, a new one having been formed. It is possible that the same phenomenon occurs in sponges. In most Echino- derms a similar phenomenon is observed with regard to the oeso- phagus and the mouth and anus. The probable explanation of this remarkable phenomenon would appear to be that in certain cases the larval organs become so highly specialized in connexion with the larval life that they are unable to undergo further change; new formation is therefore necessary. The phenomenon is one of con- siderable interest, for it is found in the case of the blastopore, in cases in which there is no metamorphosis, sometimes even in embry- onic development. There can be little doubt that the mouth and anus are both genetically connected with the earlier blastopore and that the blastopore is homologous in most animals; and yet how seldom does the blastopore become transformed into the adult openings and how various is its fate. The hypothesis suggested above applies' completely to this behaviour of the blastopore; that is to say, it is suggested that the primitive mouth or blastopore becomes, or has become in some vanished larval history, so highly specialized in connexion with larval needs that it is unable to give rise to both mouth and anus, and in some cases to either. (A. Se.*)

METAPHOR (Gr. juera^opa, transfer of sense, from nera^kp^v, to carry over), a figure of speech, which consists in the trans- ference to one object of an attribute or name which strictly and literally is not applicable to it, but only figuratively and by analogy. It is thus in essence an emphatic comparison, which if expressed formally is a " simile " (Lat. similis, like) ; thus it is a metaphorical expression to speak of a ship ploughing her way through the waves, but a simile when it takes the form of " the ship, like a plough, moves," &c. The " simple " metaphor, such as the instance given, becomes the " continued " metaphor when the analogy or similitude is worked out in a series of phrases and expressions based on the primary metaphor; it is in such " continued metaphors " that the solecism of " mixed " metaphors is likely to occur.

METAPHYSICS, or Metaphysic (from Gr. i*era, after, 4>v{xtls, i.e. the natural universe) , the accepted name of one of the four great

departments of philosophy iq.v.). The term was first applied to one of the treatises of Aristotle on the basis of the arrangement of the Aristotelian canon madˆ by Andronicus of Rhodes, in which it was placed ” after the physical treatises ” with the description to. ixerb. to. vaiKa. The term was used not in the modern sense of above or transcending nature (a sense which jjierk cannot bear), but simply to convey the idea that the treatise so-called comes ” after ” the physical treatises. 1 It is therefore nothing more than a literary accident that the term has been applied to that department or discipline of philosophy which deals with first principles. Aristotle himself described the subject matter of the treatise as “First

1 On the true order of the Aristotelian treatises see Aristotlb.

Philosophy ” or ” Theology,” which deals with being as being (Metaph. Y. i., harlv eiricrrˆij r« rj Beupet t6 ov fi bv Kal rd. Toinq imapxovTo. naff’ avrb). From this phrase is derived the later term ” Ontology ” (q.v.). The misapprehension of the significance of /uera led to various mistaken uses of the term ” metaphysics,” e.g. for that which is concerned with the supernatural, not only by the schoolmen but even as late as 17th-century English writers, and within narrower limits the term has been dangerously ambiguous even in the hands of modern philosophers (see below). In the widest sense it may include both the ” first philosophy ” of Aristotle, and the theory of knowledge (in what sense can there be true knowledge?), i.e. both ontology and epistemology (q.v.), and this is perhaps the most convenient use of the term; Kant, on the other hand, would represent metaphysics as being ” nothing more than the inventory of all that is given us by pure reason, systematically arranged” (i.e. epistemology). The earliest “metaphysicians” concerned themselves with the nature of being (ontology), seeking for the unity which they postulated behind the multi- plicity of phenomena (see Ionian School of Philosophy and articles on the separate thinkers); later thinkers tended to inquire rather into the nature of knowledge as the necessary pre-requisite of ontologicaJ investigation. The extent to which these two attitudes have been combined or separated is discussed in the ensuing article which deals with the various schools of modern metaphysics in relation to the principles of the Aristotelian ” first philosophy.” 1 (X)

1. — The Science of Being Side by side with psychology, the science of mind, and with logic, the science of reasoning, metaphysics is tending gradually to reassert its ancient Aristotelian position as the science of being in general. Not long ago, in England at all events, metaphysics was merged in psychology. But with the decline of dogmatic belief and the spread of religious doubt — as the special sciences also grow more general, and the natural sciences become more speculative about matter and force, evolution and teleology — men begin to wonder again about the nature and origin of things," just as it was the decay of polytheism in Greek religion and his own discoveries in natural science which impelled Aristotle to metaphysical questions. There is, however, a certain difference in the way of approaching things. Aristotle emphasized being as being, without always sufficiently asking whether the things whose existence he asserted are really knowable. We, on the contrary, mainly through the influence of Descartes, rather ask what are the things we know, and there- fore, some more and some less, come to connect ontology with epistemology, and in consequence come to treat metaphysics in relation to psychology and logic, from which epistemology is an offshoot.

To this pressing question then— What is the world as we know it? — three kinds of definite answers are returned: those of materialism, idealism and realism, according to the emphasis laid by metaphysicians on body, on mind, or on both. Meta- physical materialism is the view that everything known is body or matter; but while according to ancient materialists soul is only another body, according to modern materialists mind with- out soul is only an attribute or function of body. Metaphysical idealism is the view that everything known is mind, or some mental state or other, which some idealists suppose to require a substantial soul, others not; while all agree that body has no different being apart from mind. Metaphysical realism is the intermediate view that everything known is either body or soul, neither of which alone exhaust's the universe of being. Aristotle, the founder of metaphysics as a distinct science, was also the founder of metaphysical realism, and still remains its main authority. His view was that all things are substances, in the sense of distinct individuals, each of which has a being of its

1 The article is supplemented by e.g. Idealism; Pragmatism; Relativity of Knowledge, while separate discussions of ancient and medieval philosophers will be found in biographical articles and articles on the chief philosophical schools, e.g. Scholasticism ; Neoplatonism.

own different from any other, whereas an attribute has only the being of its substance (Met. Z 1-3; Post. An. i. 4); that bodies in nature are obviously natural substances, and as obviously not the only kind of substance; and that there is supernatural substance, e.g. God, who is an eternal, perfect, living being, thinking, but without matter, and therefore not a body.

At the present day realism is despised on the ground that its differentiation of body and soul, natural and supernatural, ignores the unity of being. Indeed, in order to oppose this unity of being to the realistic duality, both materialists and idealists describe themselves as monists, and call realists dualists by way of disparagement. But we cannot classify metaphysics by the antithesis of monism and dualism without making confusion worse confounded. Not to mention that it has led to another variety, calling itself pluralism, it confuses materialism and idealism. Extremes meet; and those who believe only in body and those who believe only in mind, have an equal right to the equivocal term ” monist.” Moreover, there is no real opposition between monism and dualism, for there can very well be one kind of being, without being all body or all soul; and as a matter of fact, Aristotelian realism is both a monism of substance and a dualism of body and soul.

It is in any case unfair to decide questions by disparaging terms, and to argue as if the whole choice were between material- istic or idealistic monism, leaving realism out of court. In this case it would also hide the truth of things, which requires two different kinds of substance, body and soul. The strength of materialism consists in recognizing nature without explaining it away, its weakness in its utter inability to explain conscious- ness either in its nature or in its origin. On the other hand, it is the virtue of idealism to emphasize the fact of consciousness, but its vice to exaggerate it, with the consequence of resorting to every kind of paradox to deny the obvious and get rid of bodies. There are in reality two species of substances, or entirely distinct things, those which are impenetrably resisting, and those which are conscious substances; and it is impossible to reduce bodies and souls to one another, because resistance is incompatible with the attributes of spirit, and conscious- ness inexplicable by the attributes of body. So far true metaphysics is a dualism of body and soul. But this very dualism is also monism: both bodies and souls are substances, as Aristotle said; and we can go farther than Aristotle. Men are apt to dwell too much on the co-existence and too little on the inclusiveness of substances. The fact is that many sub- stances are often in one; e.g. many bodies in the one body, and both body and soul in the one substance, of man. So far true metaphysics is a monism

of substance, in the sense that all things are substances and that all substances, however different, are members of one substance, the whole universe of body and spirit. In this case metaphysics generally will have to recognize three monisms, a materialistic monism of body, an idealistic monism of soul, and a realistic monism of substance, which is also a dualism of substances. But a term so equivocal, leading to an antithesis so misleading as that between monism and dualism, can never represent the real difference between meta- physical schools. We shall return, then, to the clearer and more authoritative division, and proceed to discuss materialism; idealigm and realism in their order.

2. — Materialism 1. Materialism Proper. — Materialism in its modern sense is the view that all we know is body, of which mind is an attribute or function. Several causes, beginning towards the end* of the 1 8th century, gradually led up to the materialism of Mole- schott, Vogt and Biichner, which flourished in the middle of the 19th century. The first cause was the rapid progress of natural science, e.g. the chemistry of Lavoisier, the zoology of Lamarck, the astronomy of Laplace and the geology of Lyell. These advances in natural science, which pointed to a unity and gradual evolution in nature, were accompanied by a growth in commerce, manufactures and industrialism; the same kind of spirit showed itself in the revolutionary upheaval of 1848, and in the mate- rialistic publications which immediately followed, while these

Molcschott.

publications have reacted on the industrial socialism of our own time. Meanwhile, philosophic forces to counteract materialism were weak. Realism was at a low ebb. Idealism was receding for the moment. Hegelianism had made itself unpopular, and its confusion of God, nature and man had led to differences within the school itself (see Hegel).

These causes, scientific, industrial and philosophical, led to the domination of materialism in the middle of the 19th century in Germany, or rather to its revival; for in its main position, that matter and motion are everything and eternal, it was a repetition of the

materialism of the 18th century in France. Thus Karl Christoph Vogt (q.v.) repeated the saying of the French physician Cabanis, ” The brain is determined to thought as the stomach is to digestion, or the liver to the secretion of bile,” in the form, ” Thought stands in the same relation to the brain as the bile to the liver or the urine to the kidneys.” But the new materialism was not mere repetition. J. Moleschott (1822-1893) made a diligent use of the science of his day in his Kreislauf des Lebens (1852). Starting from Lavoisier’s discoveries, he held that life is metabolism, a perpetual circulation of matter from the inorganic to the organic world, and back again, and he urged this metabolism against the hypothesis of vital force. Aristotle had imputed to all living beings a soul, though to plants only in the sense of a vegetative, not a sensitive, activity, and in Moleschott’s time many scientific men still accepted some sort of vital principle, not exactly soul, yet over and above bodily forces in organisms. Moleschott, like Lotze, not only resisted the whole hypothesis of a vital principle, but also, on the basis of Lavoisier’s discovery that respiration is combustion, argued that the heat so produced is the only force developed in the organism, and that matter therefore rules man. He put the whole materialistic view of the world into the following form: Without matter no force, without force no matter. L. Buchner (q.v.) himself said that he owed to Moleschott the first impulse to composing his important work Kraft und Stoff (1855), which became a kind of textbook of materialism, Passing from Moleschott to LyelPs view of the evolution of the earth’s crust and later to Darwin’s theory of natural selection and environment, he reached the general inference that, not God but evolution of matter, is the cause of the order of the world; that life is a com- bination of matter which in favourable circumstances is spon- taneously generated; that there is no vital principle, because all forces, non-vital and vital, are movements; that movement and evolution proceed from life to consciousness; that it is foolish for man to believe that the earth was made for him, in the face of the difficulties he encounters in inhabiting it; that there is no God, no final cause, no immortality, no freedom, no substance of the soul; and that mind, like light or heat, electri- city or magnetism, or any other physical fact, is a movement of matter. Sometimes he spoke of -mind as an effect of matter; but, though his expressions may be careless, nothing is to be made of the difference, for he called it movement and effect indifferently in the same context. His definitely expressed view was that psychical activity is ” nothing but a radiation through the cells of the grey substance of the brain of a motion set up by external stimuli.”

E. Haeckel belongs to a slightly later time than the materi- alists

hitherto mentioned. His book Die WeltriUhsel (Eng. trans. J. M'Cabe, The Riddle of the Universe) identifies substance with body. Starting like his predecessors, with the indestructibility of matter, Haeckel makes more than they do of the conservation of energy, and merges the persistence of matter and energy in one universal law of substance, which, on the ground that body is subject to eternal transformation, is also the universal law of evolution. His strong point consists in inferring the fact of evolution of some sort from the considera- tion of the evidence of comparative anatomy, palaeontology and embryology. On the strength of the consilience of arguments for evolution in the organic world, he carries back the process in the whole world, until he comes to a cosmology which recalls the rash hypotheses of the Presocratics.

Buchner.

Haeckel.

He supposes that all organisms have developed from the simple cell, and that this has its origin by spontaneous generation, to explain which he propounds the " carbon-theory," that protoplasm comes from inorganic carbonates. He not only agrees with Laplace and Lyell about the evolution of the solar system, but also supposes that the affinities, pointed out by Lothar Meyer and Mendeleeff, between groups of chemical elements prove an evolution of these elements from a primitive matter (prothyl) consisting of homogeneous atoms. These, however, are not ultimate enough for him ; he thinks that everything, ponderable and imponderable or ether, is evolved from a primitive substance, which condenses first into centres of condensation (pyknatoms), and then into masses, which when they exceed the mean consistency become ponderables, and when they fall below it become imponderables. Here he stops; according to him substance is eternal and eternally subject to the law of substance; and God is the eternal force or energy of substance. What, then, is the origin of mind or soul? Haeckel answers that it has no origin, because sensation is an inherent property of all substance. He supposes that aesthesis and tropesis, as rudimentary sensation and will, are the very causes of condensation; that they belong to pyknatoms, to ponderables and imponderables, to chemical atoms and molecules. Hence, when he returns to organisms, it does not sur- prise us that he assigns to ova and spermatozoa cell-souls, to the impregnated ovum germ-soul, to plants tissue-souls, to animals nerve-souls; or that he regards man's body and soul as born together in the impregnated ovum, and gradually evolved from the bodies and souls of lower animals. It appears to his imagination that the affinity of two atoms of hydrogen

to one of oxygen, the attraction of the spermatozoon to the ovum, and the elective affinity of a pair of lovers are all alike due to sensation and will.

But has Haeckel solved the problems of mind? When he applies sensation and will to nature, and through plants to the lowest animals, he considers their sensation and will to be rudimentary and unconscious. Consciousness, according to his own admission, is not found even in all animals, although it is present not only in the highest vertebrates — men, mammals, birds — but also in ants, spiders, the higher crabs and molluscs. He holds indeed that, in accordance with the law of substance, consciousness must be evolved from unconsciousness with the development of sense organs and a central nervous organ. At the same time he admits, firstly, that to mark the barrier between unconscious and conscious is difficult; secondly, that it is impossible to trace the first beginning of consciousness in the lower animals; and, thirdly, that ” however certain we are of the fact of this natural evolution of consciousness, we are, unfortunately, not yet in a position to enter more deeply into the question ” {Riddle of the Universe, 191). Thus in presence of the problem which is the crux of materialism, the origin of consciousness, he first propounds a gratuitous hypothesis that everything has mind, and then gives up the origin of conscious mind after all. He is certain, however, that the law of substance somehow proves that conscious soul is a mere function of brain, that soul is a function of all substances, and that God is the force or energy, or soul or spirit, of nature. He, in fact, returns to ai cient hylozoism (q.v.), which has tended to revive from time to time in the history of thought. He believes that mind and soul are inherent attributes of all bodies. Curiously enough, he supposes that by making mind a universal attribute of matter he has made his philosophy not materialism, but monism. It is really both: monistic, because it reduces substance to one kind; materialistic, because it identifies that one kind of substance with body or matter, and reduces mind to an attribute 01 matter. It makes no difference to attribute mind to all matter, so long as it is attributed as an attribute. It is at least as materialistic to say that unconscious mind is an attribute of nature as to say that conscious mind is an attribute of brain; and this is the position of Haeckel. Materialists seem to dread the word ” materialism.” Buchner also entreats us ” to abaS** don the word ‘ materialism,’ to which (it is not clear why) a certain scientific odium attaches, and substitute ‘ monism ‘ for it ” (Last Words on Materialism, 273). His reason, however, is different: it is that a philosophy, not of matter as such, but of the unity of force and matter, is not materialism. But if a philosophy makes

force an attribute of matter only, as his does, it will recognize nothing but matter possessing force, and will therefore be materialism as well as monism, and in short material- istic monism. The point is that neither Buchner nor Haeckel could on their assumptions recognize any force but force of

body, or any mind but mind of body, or any distinct thing or substance except body. This is materialism.

2. Materialistic Tendencies. — Besides these direct instances of materialism, there are philosophers to whom the scientific tendencies of the age have given a materialistic tendency. In Germany, for example, Eugen Duhring (q.v.) was a realist, whose intention is to prove against Kant a knowledge of the thing in itself by attributing time, space and categories generally to the real world. But, under the influence of Trendelenburg's attempt to reconcile thought and being by assigning motion to both, his Wirklickkeilsphilosophie, in a similar effort after a unity of being, lands him in the contention that matter is absolute being, the support of all reality underlying all bodily and mental states. So Avenarius (q.v.) was no materialist, but only an empiricist anxious to reclaim man's natural view of the world from philosophic incrustations, yet when his Empiriokrilicismus ends in nothing but environment, nervous system, and state- ments dependent on them, without soul, though within experi- ence, he comes near to materialism, as Wundt has remarked. In France, again, positivism is not materialism, but rather the refusal to frame a metaphysical theory. Comte tells us that man first gets "over theology, then over metaphysics, and finally rests in positivism. Yet in getting over theology he ceases to believe in God, and in getting over metaphysics he ceases to believe in soul. As Paul Janet truly remarked, positivism contains an unconscious metaphysics in rejecting final causes and an imma- terial soul. Now, when in surrendering theology and meta- physics we have also to surrender God and the soul, we are not free from materialism. Positivism, however, shelters itself behind the vague word " phenomena." Lastly, in England* we have not only an influence of positivism, but also, what is more important, the synthetic philosophy of Herbert Spencer. The point of this philosophy is not materialism, but realism. The author himself says that it is trans- figured realism — which is realism in asserting objective existence as separate from subjective existence, but anti-realism in denying that objective existence is to be known. In his Principles of Psychology he twice quotes his point that " what we are conscious of as properties of matter, even down to its weight and resistance, are but subjective affections produced by objective agencies which are unknown and unknowable." This then is his trans- figured realism, which, as far as what is known goes, is idealism, but as far as what exists goes, realism

— of a sort. His First Principles, his book on metaphysics, is founded on this same point, that what we know is phenomena produced by an un- known noumenal power. He himself identifies phenomenon, appearance, effect or impression produced on consciousness through any of the senses. He divides phenomena into impres- sions and ideas, vivid and faint, object and subject, non-ego and ego, outer and inner, physicaland psychical, matter and spirit; all of which are expressions of the same antithesis among phenomena. -He holds that all the time, space, motion, matter known to us are phenomena; and that force, the ultimate of ultimates, is, as known to us, a phenomenon, ” an affection of consciousness.” If so, then all we know is these phenomena, affections of consciousness, subjective affections, but produced by an unknown power. So far as this main point of transfigured realism is steadily maintained, it is a compound of idealism and realism, but not materialism. But it is not maintained, on the side either of phenomena or of noumena; and hence its tendency to materialism.

In the first place, the term “phenomenon ” is ambiguous, some- times meaning a conscious affection and sometimes any fact whatever. Spencer sets himself to find the laws of all phenomena. He finds that throughout the universe there is an unceasing redis- tribution of matter and motion, and that this redistribution consti- tutes evolution when there is a predominant integration of matter and dissipation of motionˆ and constitutes dissolution where there is a predominant absorption of motion and disintegration of matter. He supposes that evolution is primarily integration, from the inco- herent to the coherent, exemplified in the solar nebula evolv- ing into the solar system; secondly differentiation, from the more homogeneous to the more heterogeneous, exemplified by the solar system evolving into different bodies; thirdly determina- tion, from the indefinite to the definite, exemplified by the

solar system with different bodies evolving into an order. He supposes that this evolution does not remain cosmic, but becomes organic. In accordance with Lamarck’s hypothesis, he supposes an evolution of organisms by hereditary adaptation to the environment (which he considers necessary to natural selection), and even the possibility of an evolution of life, which, according to him, is the continuous adjustment of internal to external relations. Next, he supposes that mind obeys the same law of evolution, and exemplifies integration by generalization, differen- tiation by the development of the five senses, and determination by the development of the order of consciousness. He holds that we pass without break from the phenomena of bodily life to the phenomena of mental life, that consciousness arises in the course of the living being’s adaptation to its environment, and that

there is a continuous evolution from reflex action through instinct and memory up to reason. He throws out the brilliant suggestion that the experi- ence of the race is in a sense inherited by the individual ; which is true in the sense that animal organisms become hereditarily better adapted to perform mental operations, though no proof that any elements of knowledge become a priori.

Now, Spencer has clearly, though unconsciously, changed the meaning of the term ” phenomenon ” from subjective affection of consciousness to any fact of nature, in regarding all this evolution, cosmic, organic, mental, social and ethical, as an evolution of phenomena. The greater part of the process is a change in the facts of nature before consciousness; and in all that part, at all events, the phenomena evolved must mean physical facts which are not conscious affections, but, as they develop, are causes which gradually produce life and consciousness. Moreover, evolution is defined universally as an ” integration of matter and dissipation of motion,” and yet mental, social and moral developments are also called evolu- tion, so that, in accordance with the definition, they are also integra- tions of matter and dissipations of motion. It is true that the author did not see that he was passing from transfigured realism into materialism. He thinks that he is always speaking of phenomena in the sense of subjective affections; and in spite of his definition, he half unconsciously changes the meaning of evolution from a change in matter and motion, first into a change in states of con- sciousness, then to a change in social institutions, and finally into a change in moral motives. He also admits himself that mental evolution exemplifies integration of matter and dissipation of motion only indirectly. But here he becomes hopelessly inconsistent, because he had already said, in defining it, that ” evolution is an integration of matter and concomitant dissipation of motion ” (First Principles, § 145). However, with all the author’s disclaimers, the general effect left on the reader’s mind is that throughout the universe there is an unceasing change of matter and motion, that evolution is always such a change, that it begins with phenomena in the sense of physical facts, gradually issues in life and conscious- ness, and ends with phenomena in the sense of subjective affections of consciousness.

In the second place, having declared the noumenal power, which causes phenomena, or conscious affections, to be unknowable, and having left anybody who pleased to make it a god and an object of religion, he proceeds to describe it as if it were known force, and known in two respects as persistent and as resistant force. He supposes that the law of evolution is deducible from the law of per- sistent force, and includes in force what is now called energy. Then having

discussed force as something thoroughly material, and laying special emphasis on resistance, he tells us that ” the force of which we assert persistence is that Absolute Force of which we are indefinitely conscious as the necessary correlate of the force we know ” (First Principles, § 62). Similarly, both in First Principles and in the Principles of Psychology, he assigns to us, in addition to our definite consciousness of our subjective affections, an indefinite consciousness of something out of consciousness, of something which resists, of objective existence. Thus it turns out that the objective agency, the noumenal power, the absolute force, declared unknown and unknowable, is known after all to exist, persist, resist and cause our subjective affections or phenomena, yet not to think or to will. Such a noumenon looks very like body or matter. Lastly, when a theory of the world supposes a noumenal power, a resistent and persistent force, which results in an evolution, defined as an integration of matter and a dissipation of motion, which having resulted in in- organic nature and organic nature, further results without break in consciousness, reason, society aftd morals, then such a theory will be construed as materialistically as that of Haeckel by thelieader, whatever the intention of the author.

It may be urged in reply that the synthetic philosophy could be made consistent by transferring the knowable resistance and persis- tence of the unknowable noumenon to knowable phenomena on the one hand, and on the other hand by maintaining that all phenomena from the original nebula to the rise of consciousness are only ‘.* impressions produced on consciousness through any of the senses, ‘ after all. But in that case what will become of Spencer’s theory of evolution? It will have asserted the evolution of man and his consciousness out of the phenomena of his consciousness. The truth is that his theory of evolution can be carried through the whole process without a break, only by giving the synthetic philosophy a materialistic interpretation, and by adhering consistently to

Spencer’s own materialistic definition of evolution; otherwise there will be a break at least between life and mind. If everything know- able is an example of evolution, and evolution is by definition a transformation of matter and motion, then everything knowable is an example of a transformation of matter and motion. As an exponent of

universal evolution Haeckel is more consistent than Spencer.

Huxley (1825-1895) developed views very like those of Spencer, and similarly materialistic without being materialism, because inconsis- liaxky. tent. He regarded everything known as evolved from

matter, and reduced consciousness to a mere collateral product (" epiphenomenon ") of cerebral operations without any power of influencing them. Matter, according to him, impresses the afferent nervous system, this the brain, this the efferent nervous system, while consciousness remains a mere spectator. " In man, as in brutes," said he, " there is no proof that any state of consciousness is the cause of change in the nature of the matter of the organism "; so that " we are conscious automata." But, in spite of these materialistic tendencies, he followed Hume in reducing matter and everything knowable to phenomena of consciousness; and, supposing that nothing is knowable beyond phenomena, concluded that we can neither affirm nor deny that anything exists beyond, but ought to take up an attitude which the ancient sceptics called Aphasia, but he dubbed by the new name of. Agnosticism. Thus Huxley first reduced consciousness to a product of matter, and then matter to a phenomenon of consciousness. By combining materialism with idealism he made consciousness a product of itself. Tyndall (1820- TyadaJI. J 893)> again, came still nearer to materialism, and yet

avoided it. In his Belfast address (1874), while admits ting that matter as understood by Democritus is insufficient, because atoms without sensation cannot be imagined to produce sensation, he contended, nevertheless, that matter properly understood is " the promise and potency of all terrestrial life." In thus endow- ing all matter with sensation like Haeckel he' was not avoiding materialism. But in the very same address, as well as on other occa- sions, he did not identify mind with' matter, but regarded them as concomitant.

All these materialistic tendencies seem to have one expla- nation. They emanate from scientific writers who rightly try to rise from science to metaphysics, but, as Bacon says, build a universal philosophy on a few experiments. The study of evolution, without considering how many conditions are required for " the integration of matter and the dissipation of motion " to begin, and the undoubted discoveries which have resulted from the study of inorganic and organic evolution, have led men to expect too much from this one law of Nature. This tendency especially prevails in biology, which is so far off the general principles of natural philosophy that its votaries are often ignorant of the real nature of body as matter and force. The

close dependency of all mental operations on brain also tempts them to the conclusion that brain is not only an organ, but the whole organ of conscious mind. 1 It appears also that Darwin, having extended his theory of evolution as far as the rational and moral nature of man, in the Descent of Man, ended in his Autobiography by declaring his attitude to first and final causes to be that of an agnostic. Not that he was a materialist, and shortly before his death, in a conversation with Buchner, he maintained his agnosticism against his opponent's atheism. Still, his agnosticism meant that, though he did not assert that there is no God, he did assert that we cannot know whether there is or is not. To the evolutionary biologist brain is apt to appear to be the crowning object of knowledge. On the other hand, scientific men, such as Herschel, Maxwell and Stokes, who approach nature from mathematics and mechanics, and there- fore from the universal laws of motion, have the opposite tendency, because they perceive that nature is not its own explanation. In order to exert force, or at all events that force of reciprocal pressure which we best understand, and on which, in impact, the third law of motion was founded, there are always at least two bodies, enduring, triply extended, mobile, each inert, mutually impenetrable or resistent, different yet similar; and in order to have produced any effect but equilibrium, some bodies must at some time have differed either in mass or in velocity, otherwise forces would only have neutralized one another. Why do bodies exist, with all these conditions, so similar yet different — that is, in so harmonious an order? Natural science has no answer: natural theology has an answer. This essence of bodies, this resemblance in difference, this prevailing

1 Cf. H. Maudesley, Lessons of Materialism (1879).

order of Nature, is the deepest proof of God; and it cannot be the result of evolution, because it is the condition of natural force, and therefore of natural evolution. A second argument for God is the prevailing goodness or adaptation of Nature to the ends of conscious beings, which might conceivably be explained by Lamarckian evolution, but has not yet been so explained, and if it were, would not be inconsistent with a divine design in evolution. Further, the very existence of conscious beings is the best proof of the distinct or substantial being of the soul, existing in man with body, in God as pure spirit. It seems hope- less to expect that natural science, even with the aid of evolution, can explain by mere body the origin and nature of this fact of consciousness. If so, materialism is not the whole truth of metaphysics.

3. — The Rise of Metaphysical Idealism

1. Descartes to Leibnitz.— Metaphysical arises from psycho- logical idealism, and always retains more or less of an epistemo- logical character. Psychological idealism assumes without proof that we perceive nothing but mental objects, and meta- physical idealism draws the logical but hypothetical conclusion that all we can know from these mental objects of sense "is mental objects of knowledge. But at first this logical conclusion was not drawn. Descartes, the founder of psychological idealism, having proceeded from the conscious fact, cogito ergo sum, to the non sequitur that I am a soul, and all a soul can perceive is its ideas, nevertheless went on to the further illogical a escartes conclusion that from these mental ideas I can (by the grace of God) infer things which are extended substances or bodies, as well as thinking substances or souls. He was a psycho- logical idealist and a metaphysical realist. This illogicality could not last. Even the Cartesian school, as it came more and more to feel the difficulty of explaining the interaction of body and mind, and, indeed, any efficient causation whatever, gradually tended to the hypothesis that the real cause is God, who, on the occasion of changes in body, causes corresponding changes in mind, and vice versa. This occasionalism is not idealism, but its emphasis on the will of God gave it an idealistic tendency. Thereupon Spinoza advanced a pantheism which supposed that bodies and souls are not, as Descartes thought,' different sub- stances, but merely attributes-— the one the extension and the other the thought of one substance, Nature or God. Taking the Aristotelian theory that a substance is a thing in Spinoza. itself , not in Aristotle's sense of any individual existing differently from anything else, but in the novel meaning of some- thing existing alone, he concluded, logically enough from this mere misunderstanding, that there can be only one substance, and that, as no finite body or soul can exist alone, everything finite is merely a mode of one of the attributes of the orie infinite substance which alone can exist by itself. Spinozism, however, though it tramples down the barrier between body and soul, is not yet metaphysical idealism, because it does not reduce extension to thought, but only says that the same substance is at once extended and thinking — a position more akin to material- ism. At the same time Spinoza maintained a parallelism between extension and thinking so close as to say that the order; of ideas is the same as the order of things, so that any mode of extension and the idea of it are the same thing expressed in two ways, under the attribute of extension and under the attribute of thought (see H. H. Joachim's Study of the Ethics of Spinoza, iqoi, p. 72). It remained, however, for Schelling to convert this parallelisjm into identity by identifying motion with the intelligence of Gpd, and so to transform the pantheism of Spinoza into pantheistic idealism. Leibnitz, again,

having become equally dissatisfied with Cartesianism, Spinozism and the Epicurean realism of Gassendi, in the latter part of his life came still jˆ e ibnUt. nearer than Spinoza to metaphysical idealism in his monadology, or half-Pythagorean,half-Brunistic analysis of bodies into monads, or units, or simple substances, indivisible and unextended, but endowed with perception and appetite.

He gradually fell under the dominion of two false assumptions. On the one hand, essentially a mathematician; he supposed that

unity is indivisibility, whereas everything known to be one is merely-undivided or individual, and that there must be simple because there are compound substances, although composition only requires simpler or relatively simple elements. On the other hand, under the influence of the mechanics of his day, which had hardly distin- guished between inertia, or the inability of a body to change itself, and resistance or the ability of bodies to oppose one another, he concluded that, as inertia is passive, so is resistance, and refused to recognize that in collision the mutual resistance of moving bodies is a force, or active power, of changing their movements in opposite directions. From these two arbitrary hypotheses about corporeal motion, that it requires indivisibly simple elements, and that it offers only passive resistance, he concluded that behind bodies there must be units, or monads, which would be at once substantial, simple, indivisible and active. He further supposed that the monads are ” incorporeal automata,” not interacting like bodies, but each perceiving what was passing in the other, and acting in consequence by appetite, or self-acting. Such mentally endowed substances might be called souls ; but, as he distinguished between perception and apperception or consciousness, and considered that perceptions are often unconscious, he preferred to divide monads into un- conscious entelechies of inorganic bodies, sentient souls of animals, and rational souls, or spirits, of men; while he further concluded that all these are derivative monads created by God, the monad of monads. All derivative monads, he allowed, are accompanied by bodies, which, however, are composed of other monads dominated by a central monad. Further, he explained the old Cartesian difficulty of the relation of body and mind by transforming the Spinozistic parallelism of extension and thought into a parallelism between the motions of bodies and the perceptions of their monads ;

motions always proceeding from motions, and perceptions from perceptions; bodies acting according to efficient causes, and souls according to final causes by appetition, and as if one influenced the other without actually doing so. Finally, he explained the concomitance of these two series, as well as that between the perceptions of different monads, by supposing a pre-established harmony ordained by the primitive monad, God.

Up to this point, then, Leibnitz opened one of the chief avenues to metaphysical idealism, the resolution of the material into the immaterial, the analysis of bodies into mental elements. His theory of bodies involved an idealistic analysis neither into bodily atoms nor into mathematical units, but into mentally endowed simple substances. There remained, however, his theory of the nature of bodies'; and here he hesitated between two alternatives. According to one alternative, which con- sistently flowed from the psychological idealism of Descartes, as well as from his own monadism, he suggested that bodies are real phenomena; phenomena, because they are aggregates of monads, which derive their unity only from appearing together to our perceptions; real phenomena well founded, because they result from real monads. In support of this view, he said that bodies are not substances, though substantiata; that their apparent motion and resistance are results of the passions of their monads ; that their primary matter is nothing but passive power of their monads; that the series of efficient causes between them is merely phenomenal. According to this alternative, then, there is nothing but mental monads and mental phenomena; and Leibnitz is a metaphysical idealist. According to the other alternative, however, he suggested that at least organic bodies are compound or corporeal substances, which are not pheno- mena; but something realizing or rather substantializing pheno- mena, and not mere aggregates of monads, but something substantial beyond their monads, because an organic body, though composed of monads, has a real unity (unio realis). From this point of view he believed that the real unity of a body is a vinculum substantiate, which gives it its real continuity and is the principle of its actions; that its primary matter is its own principle of resistance; and that it has not only this passive, but also an active, power of its own. He suggested that this theory of the substantial unity of a body might explain transubstantia- tion, by supposing that, while the monads and phenomena of bread remain, the vinculum substantiate of the body of Christ is substituted. He feared also whether we can explain the mystery of the Incarnation, and other things, unless real bonds or unions are added to monads and phenomena. According to this alternative, these organic bodies are compound or corporeal

substances, between monads and phenomena; and Leibnitz is a metaphysical realist. He was held to this belief in the sub- stantiality of bodies by his Christianity, by the influence of

Aristotle, of scholasticism and of Cartesianism, as well as by his own mechanics. But the strange thing is that at the very end of his life and at the very same time, in 1714-1716, he was writing the idealistic alternative to Remond de Montmort and Dangicourt, and the realistic alternative to Father des Bosses. He must have died in doubt. We cannot, therefore, agree with many recent idealists who regard Leibnitz as one of themselves, though it is true that, when stripped of its realism, his meta- physics easily passed into the metaphysical idealisms of Lotze and of Fechner. It is true, also, that on its idealistic side the philosophy of Leibnitz is the source of many current views of panpsychism, of psychophysical parallelism as well as of the phenomenalism of bodies, and of the analysis of bodies into mental elements.

2. Locke to Hume. — Meanwhile in England, Locke, though differing from Descartes about the origin of ideas, followed him in the illogical combination of psychological idealism with metaphysical realism. He thought that we perceive nothing but ideas both of primary and of secondary qualities, and yet that somehow we are able to infer that, while our ideas of secondary qualities are not, those of primary qualities are, like the real qualities of external things. Berkeley saw the in- consistency of this position, and, in asserting that all we perceive and all we know is nothing but ideas in ” mind, spirit, soul, or myself,” has the merit of having made, as Paulsen remarks, ” epistemological idealism the basis of metaphysical idealism.” According to him, a body such as the sun is my idea, your idea, ideas of other minds, and always an idea of God’s mind; and when we have sensible ideas of the sun, what causes them to arise in our different minds is no single physical substance, the sun, but the will of God’s spirit. Hume saw that in making all the objects of perception ideas Berkeley had given as little reason for inferring substantial souls as substantial bodies. He there- fore concluded that all we know from the data of psychological idealism is impressions or sensations, ideas, and associations of ideas, making us believe without proof in substances and causes, together with ” a certain unknown, inexplicable something as the cause of our preceptions.” We have here, in this sceptical idealism, the source of the characteristically English form of idealism still to be read in the writings of Mill and Spencer, and still the starting-point of more recent works, such as Pearson’s Grammar of Science and James’s Principles of Psychology.

3. Kant and Fichte. — Lastly, in Germany, partly influenced by Leibnitz and partly roused by Hume, Kant elaborated his transcendental or critical idealism, which if not, as he thought, the prolegomena to all future metaphysics, is still the starting-point of most metaphysical idealists. Kantism consists of four main positions, which it will be well to lay out, as follows: — •

a. As to the origin of knowledge, Kant's position is that sense, outer and inner, affected by things in themselves, receives mere sensations or sensible ideas (Vorstellungen) as the matter which sense itself places in the a priori forms of space and time ; that thereupon understanding, by means of the synthetic unity of apperception, " I think " — an act of spontaneity beyond sense, in all consciousness one and the same, and combining all my ideas as mine in one univer- sal consciousness — and under a priori categories, or fundamental notions, such as substance and attribute, cause and effect, &c, unites groups of sensations or sensible ideas into objects and events, e.g. a house, one ball moving another; and that, accordingly, per- ception and experience, requiring both sense and understanding, are partly a posteriori and partly a priori, and constitute a knowledge of objects which, being sensations combined by synthetic unity under a priori forms, are more than mere sensaˆ tions, but less than things in themselves. This first position is psychological idealism in a new form and supported by new reasons; for, if experience derives its matter from mental sensations and its form from mental synthesis of sensations, it can apprehend nothing but mental objects of sense, which, according to Kant, are sensible ideas having no existence outside our thought, not things in them- selves ; or phenomena, not noumena. ,

b. As to the known world, Kant's position was the logical deduc- tion that from such phenomena of experience all we can know by logical reason is similar phenomena of actual or possible experience; and therefore that the known world, whether bodily or mental, is not a Cartesian world of bodies and souls, nor a Spinozistic world of one substance, nor a Leibnitzian world of monadic substances

created by God, but a world of sensations, such as Hume supposed, only combined, not by association, but by synthetic understanding into phenomenal objects of experience, which are phenomenal substances and causes — a world of phenomena not noumena. This second position is a new form of metaphysical idealism, contain- ing the supposition, which lies at the foundation of later German philosophy, that since understanding shapes the objects out of sensations, and since nature, as we know it, consists of such objects, ” understanding, though it does not make, shapes nature,” as well as our knowledge. Known nature is a mental construction in part, according to Kant.

c. As to existence, Kant’s position is the wholly illogical one that, though all known things are phenomena, there are things in them- selves, or noumena; things which are said to cause sensations of outer sense and to receive sensations of inner sense, though they are beyond the category of causality which is defined as one of the notions uniting phenomena; and things which are assumed to exist and have these causal attributes, though declared unknowable by any logical use of reason, because logical reason is limited by the mental matter and form of experience to phenomena ; and all this- according to Kant himself. This third position isa relic of ancient metaphysical realism; although it must be remembered that Kant does not go to the length of Descartes and Locke, who supposed that from mere ideas we could know bodies and souls, but suggests that beneath the phenomena of outer and inner sense the thing in itself may not be heterogeneous (ungleichartig). In this form we shall find the thing in itself revived by A. Riehl.

d. As to the use of reason beyond knowledge, Kant’s position is that, in spite of its logical inability to transcend phenomena, reason in its pure, or a priori use, contains necessary a priori ” ideals ” (Ideen), and practical reason, in order to account for moral respon- sibility, frames postulates of the existence of things in themselves, or noumena, corresponding to these ” ideals “; postulates of a real free-will to practise morality, of a real immortality of soul to perfect it, and of a real God to crown it with happiness.

The fourth position is the coping-stone of Kant’s metaphysics. It is quite inconsistent with its foundation and structure. Kant first deduced that from the experience of mental phenomena all logical use of reason is limited to mental phenomena, and then maintained that to explain moral responsibility practical reason postulates the existence of real noumena. But what is a postu- late of practical reason to explain moral responsibility except a logical use of reason ?

Nevertheless, in his own mind Kant's whole speculative and practical philosophy was meant to form one system. In the preface to the second edition of the Kritik he says that it was necessary to limit speculative reason to a knowledge of phenomena, in order to allow practical reason to proceed from morality to the assumption of God, freedom, and immortality, existing b.eyond phenomena: " Ich musste also das Wissen aufheben, um zum Glauben Platz zu machen." He forgot that he had also limited all logical use of reason, and therefore of practical reason, to phenomena, and thereby undermined the rationality not only of knowledge, but also of faith.

Fichte now set himself in the Wissensckaftslehre (1794) to make transcendental idealism into a system of metaphysical ideal- ism without Kant's inconsistencies and relics of realism. His point was that there are no things in themselves different from minds or acting on them ; that man is no product of things; nor does his thinking arise from passive sensations caused by things; nor is the end of his existence attainable in a world of things; but that he is the absolute free activity constructing his own world, which is only his own determination, his self-imposed limit, and means to his duty which allies him with God. In order to prove this novel conclusion he started afresh from the Cartesian " I think " in the Kantian form of the synthetic unity of apperception acting by a priori categories; but instead of allowing, with all previous metaphysicians, that the Ego passively receives sensations from something different, and not contenting himself with Kant's view that the Ego, by synthetically combining the matter of sensations with a priori forms, partially constructs objects, and therefore Nature as we know it, he boldly asserted that the Ego, in its synthetic unity, entirely constructs things; that its act of spontaneity is not mere synthesis of passive sensations, but construction of sensations into an object within itself; and that therefore under- standing makes as well as shapes Nature.

Fichte.

This construction, or self-determination, is what Fichte called positing (setzen). According to him, the Ego posits first itself

(thesis) ; secondly, the non-Ego, the other, opposite to itself (anti- thesis) ; and, thirdly, this non-Ego within itself (synthesis), so that all reality is in consciousness. But, he added, as the Ego is not conscious of this self-determining activity, but forgets itself, the non-Ego seems to be something independent, a foreign limit, a thing in itself, or per se. Hence it is the office of the theory of know- ledge to show that the Ego posits the thing per se as only existing for itself, a noumenon in

the sense of a product of its own thinking. Further, according to Fichte, on the one hand the Ego posits itself as determined through the non-Ego — no object, no subject; this is the principal fact about theoretical reason; on the other hand, the Ego posits itself as determining the non-Ego — no subject, no object; this is the principal fact about practical reason. Hence he united theoretical and practical reason, which Kant had separated, and both with will, which Kant had distinguished; for he held that the Ego, in positing the non-Ego, posits both its own limit and its own means to the end, duty, by its activity of thinking which re- quires will. The conclusion of his epistemology is that we start with ourselves positing subjective sensations — e.g.. sweet, red' — and refer them as accidents to matter in space, which, though mental, is objective, because its production is grounded on a law of all reason. The metaphysics resulting from this epistemology is that the so- called thing in itself is not a cause of our sensations, but a product of one's own thinking, a determination of the Ego, a thing known to the Ego which constructs it. Fichte thus transformed the tran- scendental idealism of Kant by identifying the thing with the object, and by interpreting noumenon, not in Kant's sense of something which speculative reason conceives and practical reason postulates to exist in accordance with the idea, but in the new meaning of a thought, a product of reason. This change led to another. Kant had said that the synthetic unity " I think " is in all consciousness one and the same, meaning that I am always present to all my ideas. Fichte transformed this unity of the conscious self into a unity of all conscious selves, or a common consciousness ; and this change enabled him to explain the unity of anything produced by the Ego by con- tending that it is not the different objects of different thinkers, but the one object of a pure Ego or consciousness common to them all. According to Kant, the objective is valid for all consciousnesses; according to Fichte it is valid for one consciousness. Here he was for the first time grappling with a fundamental difficulty in meta- physical idealism which is absent from realism, namely, the difficulty of explaining the identity of a thing, e.g. the sun. As long as even the meagre realism of the Kantian thing in itself is maintained, the account of there being one. sun is simply that one thing causes different phenomena in different minds. But as soon as the thing in itself is converted into something mental, metaphysical idealists must either say that there are as many suns as minds, or that there is one mind and therefore one sun. The former was the alternative of Berkeley, the latter of Fichte.

Thus the complete metaphysical idealism of Fichte's Wissen- schaftslehretormed out of the incomplete metaphysical idealism of

Kant's Kritik, is the theory on its epistemological side that the Ego posits the non-Ego as a thing in itself, and yet as only a thing existing for it as its own noumenon, and on its metaphysical side that in consequence all reality is the Ego and its own determinations, which are objective, or valid for all, as determinations, not of you or of me, but of the consciousness common to all of us, the pure or absolute Ego. Lastly, Fichte called this system realism, in so far as it posits the thing in itself as another thing; idealism, in so far as it posits it as a noumenon which is a product of its own thinking ; and on the whole real idealism or ideal realism.

God does not seem to find much place in the Wissensckaftslehre, where mankind is the absolute and nature mankind's product, and where God neither could be an absolute Ego which posits objects in the non-Ego to infinity without ever completing the pro- cess, nor could be even known to exist apart from the moral order which is man's destination. Hence in his Philosophical Journal in 1798 Fichte prefaced a sceptical essay of Forberg by an essay of his own, in which he used the famous words, " The living moral order is God ; we need no other God, and can comprehend no other." Having, however, in consequence, lost his professorship at Jena, he gradually altered his views, until at length he decided that God is not mere moral order, but also reason and will, yet without consciousness and personality; that not mankind but God is the absolute; that we are only its direct manifestations, free but finite spirits destined by God to posit in ourselves Nature as the material of duty, but blessed when we relapse** into the absolute; that Nature, therefore, is the direct manifes- tation of man, and only the indirect manifestation of God; and, finally, that being is the divine idea or life, which is the reality behind appearances. In this extension of metaphysical idealism he was influenced by his disciple, Schelling. Nevertheless, he refused to go as far as Schelling, and could not bring himself to. iden- tify either man or nature with Absolute God. He wanted to believe in the absolute without sacrificing personality and freedom. God determines man, and man determines Nature: this is the final out- come of Fichte's pure idealism.

Fichte completed the process from psychological and epistemo- logical to metaphysical idealism, which it has been necessary to

recall from its beginnings in France, England and Germany, in order to understand modern idealism. The assertion of absolute substance by Spinoza incited Schelling and Hegel. The analysis of bodies into immaterial elements by Leibnitz incited Lotze. The Spinozistic parallelism of extension and thought, and the Leibnitzian parallelism of bodily motion and mental action, incited Schelling and Fechner. Berkeley and Hume produced the English idealism of Mill and Spencer, with their successors, and occasioned “the German idealism of Kant. Kant’s a priori synthesis of sensations into experience lies at the root of all German idealism. But Fichte was the most fertile of all. He carried metaphysical idealism to its height, by not only resolving the bodily into the mental, but also elevating the action of mind into absolute mental construction; not inferring things in them- selves beyond, but originating things from within, mind itself. By changing the meaning of ” noumenon ” from the thing apprehended (voovftevov) to the thought (vbrina), and in the hypothesis of a common consciousness, he started the view that a thing is not yours or my thought, but a common thought of all mankind, and led to the wider view of Schelling and Hegel that the world is an absolute thought of infinite mind. In making the essence of mind activity and construction, in destroying the separa- tion of theoretical and practical reason, in asserting that mind thinks things as means to ends of the will, he prepared the way for Schopenhauer and other voluntarists. In making the essence of the Absolute not mere reason, but will, action and life, he anticipated Lotze. In reducing the thing in itself to a thought he projected the neo-Kantism of Lange and Cohen. In the doctrine — no object, no subject — no subject, no object — that is, in the utter identification of things with objects of subjects, he anticipated not only Schelling and Hegel, but also Schuppe and Wundt with their congeners. In expanding Kant’s act of synthesis till it absorbed the inner sense and the innermost soul, he started the modern paradox that soul is not substance, but subject or activity, a paradox which has been gradually handed down from Schelling and Hegel to Fechner, and from Fechner to Paulsen and Wundt. Meanwhile, through holding with Kant that man is not God, but a free spirit, whose destiny it is to use his intelligence as a means to his duty, he is still the resort of many who vindicate man’s independence, freedom, conscience, and power of using nature for his moral purposes, e.g. of Eucken and Miinsterberg (qq.v.). Kant and Fichte together became the most potent philosophic influences on European thought in the 19th century, because their emphasis was on man. They made man believe in himself and his mission. They fostered liberty and reform, and even radicalism. They almost avenged man on the astronomers, who had shown that the world is not made for earth,

and therefore not for man. Kant half asserted, and Fichte wholly, that Nature is man's own construction. The Kritik and the Wissenschaftslehre belonged to the revolu- tionary epoch of the " Rights of Man," and produced as great a revolution in thought as the French Revolution did in fact. Instead of the old belief that God made the world for man, philosophers began to fall into the pleasing dream, I am every- thing, and everything is I — and even I am God.

4. — Noumenal Idealism in Germany Noumenal idealism is the metaphysics of those who suppose that all known things are indeed mental, but not all are pheno- menal in the Kantian sense, because a noumenon is knowable so long as by a noumenon we mean some mental being or other which we somehow can discover beyond phenomena. The noumenal idealists of Germany assumed, like all psychological idealists, the unproved hypothesis that there is no sense of body, but there is a sense of sensations; and they usually accepted Kant's point, that to get from such sensations to knowledge there is a synthesis contributing mental elements beyond the mental data of sense. They saw also the logic of Kant's deduction, that all we can know from such mental data and mental categories must also be mental. This was the starting-point of their metaphysical idealism. But they disagreed with Kant, and agreed with Fichte about 'things in themselves or noumena, and

contended that the mental things we know are not mere pheno- mena of sense, but noumena, precisely because noumena are as mental as phenomena, and therefore can be known from similar data: this was the central point of their noumenal idealism. They rightly revolted against the inconsistencies of Kant's third and fourth positions about the existence of unknown but postu- lated things in themselves, hidden from theoretical, but revealed to practical, reason. In a way they returned to the wider opinions of Aristotle, which had come down to Descartes and Locke, that reason in going beyond sense knows more* things than phenomena; yet they would not hear of external bodies, or of bodies at all. No realists, they came nearer to Spinozistic pantheism and to Leibnitzian monadism, but only on their idealistic side; for they would not allow that extension and body are different from thinking and mind. Their real founder was Fichte, on account of his definite reduction of the noumenal to a mental world. This was indeed the very point — the knowability of a noumenal mental world. At the same time it soon appeared that they could not agree among themselves when they came to ask what it is, but in attempting to define it seem to have gone through the whole gamut of mind. Schelling and Hegel thought it was infinite reason; Schopenhauer, unconscious will; Hart- mann, unconscious intelligence

and will; Lotze, the activity or life of the divine spirit ; Fechner, followed by Paulsen, a world of spiritual actualities comprised in the one spiritual actuality, God, in whom we live and move and have our being.

1. Of these noumenal idealisms the earliest in time and the nearest to Fichte's philosophy was the panlogism, begun by Schelling (1775-1854), completed by his disciple ^^j,,,^ Hegel (1770-1831), and then modified by the master himself. Starting from Fichte's " Wissenschaftslehre," Schelling accepted the whole process of mental construction, and the deduction that noumena aire knowable products of universal reason, the Absolute Ego. But from the first he was bolder than Fichte, and had no doubt that the Absolute is God. God, as he thought, is universal reason, and Nature a product of universal reason, a direct manifestation, not of man, but of God. How is this Absolute known? According to Schelling it is known by intellectual intuition. Kant had attributed to God, in distinction from man's understanding, an intellectual intuition of things. Fichte had attributed to man an intellectual intuition of himself as the Absolute Ego. Schelling attributes to man an intellectual intuition of the Absolute God; and as there is, according to him, but one universal reason, the common intelli- gence of God and man, this intellectual intuition at once gives man an immediate knowledge of God, and identifies man with God himself.

On Schelling's idealistic pantheism, or the hypothesis that there is nothing but one absolute reason identifying the opposites of subjectivity and objectivity, Hegel based his ,

panlogism. But, while he fully recognized his indebtedness to his master, he differed from him profoundly in one fundamental respect. He rightly objected that the system was wanting in logical proof: He rightly, therefore, rejected the supposed intellectual intuition of the Absolute. He rightly contended that, if we are to know anything beyond sense, we must know it by a process of logical reason. But, unfortunately, he did not mean the logical inferences described in the Organon and the Novum organum. He meant a new " speculative " method, dialectic, founded on an assumption which he had already learnt from Schelling, namely, that things which are different but similar can have the same attribute, and therefore be also the same. With this powerful instrument of dialectic in hand, he attempted to show how absolute reason differentiates itself into subjective and objective, ideal and real, and yet is the identity of both — an identity of opposites, as Schelling had said. By the same dialectic Hegel was able to justify the gradual transformation of transcendental into

noumenal ideal- ism by Fichte and Schelling. If things different but similar have the same attributes, and are thereby the same, then in the first place the Kantian categories, though thoughts of mental origin and therefore confined to mind, are nevertheless applicabls

to things, because things, though different from, are the same as, thoughts, and have the categories of thoughts; in the second place, the Fichtian Ego of mankind is not the Absolute Reason of God, and yet is the same Absolute Reason; in the third place, the Schellingian Nature is the “other ” of Spirit, and yet, being a mere reflex of the Idea of Nature, is identical with Spirit; and as this Spirit is everywhere the same in God and men, Nature is also identical with our Spirit, or rather with the Infinite Spirit, or Absolute Reason, which alone exists. The crux of all meta- physical idealism is the difficulty of reconciling the unity of the object with the plurality of subjects. Hegel’s assumption of identity in difference at once enabled him to deal with the whole difficulty by holding that different subjects are yet one subject, and any one object, e.g. the sun, is at once different from, and identical with, the one subject which is also many. By the rough magic of this modern Prospero the universe of being is not, and yet is, thought, idea, spirit, reason, God. So elastic a solution established a dominant Hegelian school, which is now practically extinct, in Germany, and from Germany spread Hegelianism to France, England, America, and, in fact, diffused it over the civilized world to such an extent that it is still a widespread fashion outside Germany to believe that the world of being is a world of thought.

The plain answer is to contest the whole assumption. Different things, however similar, have only similar attributes, and therefore CrHlci* t are never the same. God created man in His own Pantottiam ‘ ma S e > an d the world in the image of the Divine Idea; p ‘ but I am not God, and the transitory sun is not the same as God’s eternal idea of it. The creatures, however like, are not the same as the Creator and His thoughts. Each is a distinct thing, as Aristotle said. Reality is not Reason. It is strange that the underlying assumption of panlogism was not at once contested in this plain way. Nevertheless, objection was soon taken to the unsatisfactoriness of the system reared upon it. Schelling himself, as soon as he saw his own formulae exposed in the logic or rather dialectic of his disciple, began to reconsider his

philosophy of identity, and brought some powerful objections against both the conclusions and the method of Hegel. Schelling perceived that Hegel, in reducing everything to infinite mind, absorbed man's free but finite personality in God, and, in declaring that everything real is rational, failed to explain evil and sin: indeed, the English reader of T. H. Green's Prolegomena to Ethics can see how awkward is the Hegelian transition from " one spiritual principle" to different men's individual freedom of choice between good and evil. Again, Schelling urged that besides the rational element there must be something else; that there is in nature, as natura naturans, a blind impulse, a will without intelligence, which belongs to the existent; and that even God Himself as the Absolute cannot be pure thought, because in order to think He must have an existence which cannot be merely His thought of it, and therefore pure being is the prior condition of thought and spirit. Hence Schelling objected to the Hegelian dialectic on the ground that, although reason by itself can apprehend notions or essences, and even that of God, it cannot deduce a priori the existence either of God or of Nature, for the apprehension of which experience is required. He now distinguished two philosophies: negative philosophy starting froni notions, and positive philosophy starting from being; the former a philosophy of conditions, the latter of causes, i.e. of existence. Hegel, he said, had only supplied the logic of negative philosophy ; and it must be confessed that the most which could be extracted from the Hegelian dialectic would be some connexion of thoughts without proving any existence of corresponding things. Schelling was right ; but he had too much affinity with Hegelian assumptions, e.g. the panlogistic confusion of the essences of things with the notions of reason, to "onstruct a positive philosophy without falling into fresh mysticism, which failed to exorcise the effect of his earlier philosophy of identity in the growing materialism of the age.

2. Meanwhile, by the side of panlogism arose the panthelism of Schopenhauer (1788- 1860). This new noumenal idealism

began, like the preceding, by combining psycho- haaer. ' logical idealism with the transcendentalism of Kant

and Fichte. In Die Welt als Wille und Vorstellung Schopenhauer accepted Kant's position that the world as phenomenal is idea (Vorstellung) ; but he added that the world as noumenal is will {Wille). He got the hint of a noumenal will from Kant; but in regarding the noumenal as knowable, because mental, as well as in the emphasis he laid on the activity of will, he resembled Fichte. His theory of the nature of will was his own, and arrived at from a voluntaristic

psychology leading to a voluntaristic metaphysics of his own. His psychological

starting-point was the unproved assumption that the only force of which we are immediately aware is will; his metaphysical goal was the consistent conclusion that in that case the only force we can know, as the noumenal essence of which all else is phenomenal appearance, is will. But by this noumenal will he did not mean a divine will similar to our rational desire, a will in which an inference and desire of a desirable end and means produces our rational action. He meant an unintelligent, unconscious, restless, endless will. In considering the force of instinct in animals he was obliged to divest will of reason. When he found himself confronted with the blind forces of Nature he was obliged to divest irrational will of feeling. As he resolved one force after another into lower and lower grades of will he was obliged to divest will of all consciousness. ‘ In short, his metaphysics was founded on a misnomer, and simply con- sisted in calling unconscious force by the name of unconscious will {Unbewusster Wille). This abuse of language brought him back to Leibnitz. But, whereas Leibnitz imputed uncon- scious perception as well as unconscious appetition to monads, Schopenhauer supposed unconscious will to arise without per- ception, without feeling, without ideas, and to be the cause of ideas only in us. Hence he rejected the infinite intelligence sup- posed by Fichte, Schelling and Hegel against whom he urged that blind will produces intelligence, and only becomes conscious in us by using intelligence as a means to ends. He also rejected the optimism of Leibnitz and Hegel, and placed the most irra- tional of wills at the base of the worst possible of worlds (see further Schopenhauer). This pessimistic panthelism gradually won its way, and procured exponents such as J. Frauenstadt, J. Bahnsen, and, more recently, P. Deussen. The accident of its pessimism attracted F. W. Nietzsche, who afterwards, passing from the philosophy of will to the theory of evolution, ended by imagining that the struggle of the will to live produces the survival of the fittest, that is, the right of the strongest and the will to exercise power, which by means of selection may here- after issue in a new species of superior man — the U ebermensch. Finally, Schopenhauer’s voluntarism has had a profound effect on psychology inside and outside Germany, and to a less degree produced attempts to deduce from voluntaristic psychology new systems of voluntaristic metaphysics, such as those of Paulsen and Wundt.

3. The first to modify the pure voluntarism of Schopenhauer was E. von Hartmann, who {Die Philosophic des Unbewussten, 1869, 1st ed.), advanced the view that the world „ as noumenal is both unconscious intelligence and unconscious will, thus founding a

panpneumatism which forms a sort of reconciliation of the panlogism of Hegel and the panthel- ism of Schopenhauer. In his tract entitled' Schelling's positive Philosophie als Einheit von Hegel und Schopenhauer (1869) be further showed that, in his later philosophy, Schelling had already combined reason and will in the Absolute. Indeed, Fichte had previously characterized the life of the Absolute by reason and will without consciousness; and, before Fichte, Leibnitz had asserted that the elements of Nature are monads with unconscious perception and appetition. Hartmann has an affinity with all these predecessors, and with Spinoza, with whom he agrees that there is but one substance unaltered by the plurality of individuals which are only its modifications. Following, however, in the footsteps of Schelling, he idealizes the one extended and thinking substance into one mental being; but he thinks that its essence consists in unconscious intelli- gence and will, of which all individual intelligent wills are only* activities. The merit of this fresh noumenal idealism consists in its correction of the one-sidedness of Schopenhauer: intelli- gence is necessary to will. But Hartmann's criticism does not go far enough. He ends by outdoing the paradox of Schopenhauer, concluding that Nature in itself is intelligent will, but unconscious, a sort of immanent unconscious God.

As with his master, his reasons for this view are derived, not from a direct proof that unconscious Nature has the mental attributes supposed, but from human psychology and epistemology.' Like Leibnitz, he proceeds from the fact that our perceptions are

Latze.

sometimes conscious, sometimes unconscious, to the inconsequent conclusion, that there are beings with nothing but unconscious perceptions; and by a similar non sequitur, because there is the idea of an end in will, he argues that there must be an unconscious idea of an end in instinctive, in reflex, in all action. Again, in his Grund- problem der Erkenntnisstheorie (1889) he uses without proof the hypothesis of psychological idealism, that we perceive psychical effects, to infer with merely hypothetical consistency the conclusion of noumenal metaphysical idealism that all we can thereby know is psychical causes, or something transcendent, beyond phenomena indeed, yet not

beyond mind. But, according to him, this transcen- dent is the unconscious (Kraflvotles unbewusst ideates Geschehen). He calls this epistemology “transcendent realism”; it is really ” transcendent idealism. ‘ On these foundations he builds the details of his idealistic metaphysics, (a) He identifies matter with mind by identifying atomic force with the striving of unconscious will after objects conceived by unconscious intelligence, and by defining causality as logical necessity receiving actuality through will. (6) He contends that, when matter ascends to the evolution of organic life, the unconscious has a power, over and above its atomic volitions, of introducing a new element, and that in conse- quence the facts of variation, selection and inheritance, pointed out by Darwin, are merely means which the unconscious uses for its own ends in morphological development, (c) He explains the rise of consciousness by supposing that, while it requires brain as a condi- tion, it consists in the emancipation of intelligence from will at the moment when in sensation the individual mind finds itself with an idea without will. Here follows his pessimism, like to, but differing from, that of his master. In his view consciousness begins with want, and pain preponderates over pleasure in every individual life, with no hope for the future, while the final end is not consciousness, but the painlessness of the unconscious (see Pessimism). But why exaggerate? The truth of Nature is force; the truth of will is rational desire ; the truth of life is neither the optimism of Leibnitz and Hegel, nor the pessimism of Schopenhauer and Hartmann, but the moderatism of Aristotle. Life is sweet, and most men have more pleasures than pains in their lives.

4. Lotze (1817-1881) elaborated a very different noumenal idealism, which perhaps we may express by the name ” Pan- teleologism,” to express its conclusion that the known world beyond phenomena is neither absolute thought nor unconscious will, nor the unconscious at all, but the activity of God; causing in us the system of phenomenal appearances, which we call Nature, or bodies moving in time and space; but being in itself the system of the universal reciprocal actions of God’s infinite spirit, animated by the design of the supreme good. The Metaphysik of Lotze in its latest form (1879) begins with a great truth: metaphysics must be the foundation of psychology. He saw that the theories of the origin of knowledge in idealistic epistemology are unsound. Like Aristotle, then, he proposed anew the question, What is being? Nevertheless he was too much a child of his age to keep things known steadily before him; having asked the metaphysical question he proceeded to find a psychological answer in a theory of sensation, which asserted the mere hypothesis that the being which we ascribe to things on the evidence of sensation consists in their being felt. He

really accepted, like Kant, the hypothesis of a sense of sensations which led to the- Kantian conclusion that the Nature we know in time and space is mere sensible appearances in us. Further, from an early period in his Medicinische Psycho- logie (1852) he reinforced the transcendental idealism of Kant by a general hypothesis of ” local signs,” containing the sub- ordinate hypotheses, that we cannot directly perceive extension either within ourselves or without; that spatial bodies outside could not cause in us spatial images either in sight or in touch; but that besides the obvious data of sense, e.g. pressure, heat and colour, there must be other qualitative different excitations of different nerve-fibres, by means of which, as non-local signs of localities, the soul constructs in itself an image of extended space containing different places. This hypothesis of an ac- quired perception of a space mentally constructed by ” local signs ” supplied Lotze and many succeeding idealists, including Wundt, with a new argument for metaphysical idealism. Lotze concluded that we have no more reason for supposing an external space like space constructed out of our perceptions, than we have for supposing an external colour like perceived colour. Agreeing, then, with Kant that primary qualities are as mental as secondary, he agreed also with Kant that all the Nature wt; know as a system of bodies moving in time and space is

sensible phenomena. But while he was in fundamental agree- ment with the first two positions of Kant, he differed from the third; he did not believe that the causes of sensible phenomena can be unknown things in themselves. What then are they? In answering this question Lotze regarded Leibnitz as his guide. He accepted the Leibnitzian fallacy that unity is indivisibility, which led to the Leibnitzian analysis of material bodies into immaterial monads, indivisible and therefore unextended, and to the theory of monadic souls and entelechies. Indeed, from the time of Leibnitz such attempts either to analyse or to con- struct matter had become a fashion. Lotze agreed with Leibnitz that the things which cause phenomena are immaterial elements, but added that they are not simple substances, self-acting, as Leibnitz thought, or preserving themselves against disturbance, as Herbart thought, but are interacting modifications of the one substance of God.

In the first place, he resolved the doubt of Leibnitz about bodies by deciding entirely against his realistic alternative that an organic body is a substantia realizans phaenomena, and for his idealistic alternative that every body is a phenomenon and not a substance at all. Secondly, he accepted the Leibnitzian hypothesis of immaterial elements without accepting their self-action. He believed in recipro- cal action ; and the very essence of his metaphysics consists in sub- limating the

interaction of bodies into the interaction of immaterial elements, which produce effects on one another and on the soul as one of them. According to the mechanics of Newton, when two bodies collide each body makes the other move ˆequally and oppositely; but it has become a convenient habit to express this concrete fact in abstract language by calling it the conservation of momentum, by talking of one body communicating its motion to the other; as if bodies exchanged motion as men do money. Now Lotze took this abstract language literally, and had no difficulty in showing that, as an attribute is not separated from its substance, this supposed communication of motion does not really take place : nothing passes. But instead of 1 ˆturning to the concrete fact of the equivalence of momentum, by which each body moving makes the other move oppositely, he denied that bodies do reciprocally act on one another, and even that bodies as mutually resisting substances press one another apart in collision. Having thus rejected all bodily mechanism, he had to suppose that reciprocal action somehow takes place between immaterial elements. This brought him to another difference from Leibnitz as well as from Newton. According to Leibnitz, while each immaterial element is a monadic substance and self-acting secondary cause, God is the primary cause of all. According to Lotze, the connexion required by reciprocity requires also that the whole of every reciprocal action should take place within one substance; the immaterial elements act on one another merely as the modifications jf that substance interacting within itself; and that one substance is God, who thus becomes not merely the primary but the sole cause, in scholastic language a causa im- manens, or agent of acts remaining within the agent's being. At this point, having rejected both the Newtonian mechanism of bodily substances and the Leibnitzian automatism of monadic substances, he flew to the Spinozistie unity of substance ; except that, according to him, the one substance, God, is not extended at all, and is not merely thinking, but is a thinking, willing and acting spirit,

Lotze's metaphysics is thus distinguished from the theism of Newton and Leibnitz by its pantheism, and from the panthe- ism of Spinoza by its idealism. It is an idealistic pantheism, which is a denial of all bodily mechanism, a reduction of every- thing bodily to phenomena, and an assertion that all real action is the activity of God. At the same time it is a curious attempt to restore mechanism and reconcile it with teleology by using the word " mechanism " in a new meaning, according to which God performs His own reciprocal actions within Himself by uniform laws, which are also means to divine ends. It is also an attempt to reconcile this divine mechanism with freedom. In

his Metaphysik (1879), as in his earlier M ikrokosmus{\&5(t-i§§4), Lotze vindicated the contingency of freedom by assigning ““to God a miraculous power of unconditional, commencement, whereby not only at the very beginning but in the course of nature there may be new beginnings, which are not effects of previous causes, though once started they produce effects according to law. Thus his pantheistic is also a teleological idealism, which in its emphasis on free activity and moral order recalls Leibnitz and Fichte, but in. its emphasis on the infinity of God has more affinity to Spinoza, Schelling and Hegel. Hence his philosophy, like the Hegelian, continually torments one with the difficulty that its sacrifice of the distinct being of

xvm. 8 a

all individual substances to the universality of God entails the sacrifice of the individual personality of men. Our bodies were reduced by Lotze to the general ruck of phenomenal appear- ances. Our souls he tried his best to endow with a quasi – existence, arguing that the unity of consciousness requires an indivisible subject, which is distinct from the plurality of the body but interacting with it, is in a way a centre of independent activities, and is so far a substance, or rather able to produce the appearance of a substance. But at the end of his Metaphysik, from the conclusion that everything beyond phenomena is divine interaction, he drew the consistent corollary that individual souls are simply actions of the one genuine being. ‘ His final view was that certain actions of the divine substance are during consciousness gifted with knowledge of themselves as active centres, but during unconsciousness are non-existent. If so, we are not persons with a permanent being of our own distinct from that of God. But in a philosophy which reduces everything to phenomenal appearance except the self-interacting substance of God, there is n& room for either the bodies or the souls of finite substances or human persons.

5. Fechner (1801-1887) affords a conspicuous instance of the idealistic tendency to mysterize nature in his Panpsychism, or Fechner ˆat f orm of noumenal idealism which holds that the universe is a vast communion of spirits, souls of men, of animals, of plants, of earth and other planets, of the sun, all embraced as different members in the soul of the world, the high- est spirit — God, in whom we live and

move and have our being; that the bodily and the spiritual, or the physical and the psychical, are everywhere parallel processes which never meet to interact; but that the difference between them is only a difference between the outer and inner aspects of one identical psychophysical process; and yet that both sides are not equally real, because while psychical and physical are identical, the psychical is what a thing really is as seen from within, the physical is what it appears to be to a spectator outside; or spirit is the self-appear- ance of matter, matter the appearance of one spirit to another. Fechner's panpsychism has a certain affinity both to Stahl's animism and to the hylozoism of materialists such as Haeckel. But, while it differs from both in denying the reality of body, it differs from the former in extending conscious soul not only to plants, as Stahl did, but to all Nature; and it differs from the latter in the different consequences drawn by materialism and idealism from this universal animism. According to Haeckel, matter is the universal substance, spirit its universal attribute. According to Fechner, spirit is the universal reality, matter the universal appearance of spirit to spirit; and they are identical because spirit is the reality which appears. Hence Fechner describes himself as a twig fallen from Schelling's stem. Schel- ling's adherent Oken by his Lehrbuch der Natur philosophic conveyed to his mind the life-long impression that God is the universe and Nature God's appearance. At the same time, while accepting the Schellingian parallelistic identity of all things in God, Fechner was restrained by his accurate knowledge of physics from the extravagant construction of Nature, which had failed in the hands of Schelling and Hegel. Besides, he was deeply impressed by the fact of man's personality and by the problem of his personal immortality, which brought him back through Schelling to Leibnitz, whose Monadologie throughout maintains the plurality of monadic souls and the omnipresence of perception, sketches in a few sections (§§ 23, 78-81) a pan- psychic parallelism, though without identity, between bodily motions and psychic perceptions, and, what is most remarkable, already uses the conservation of energy to argue that physical energy pursues its course in bodies without interacting with souls, and that motions produce motions, perceptions produce perceptions. Leibnitz thus influenced Fechner, as in other ways he influenced Lotze. Both, however, used this influence freely; and, whereas Lotze used the Leibnitzian argument from indivisibility to deduce indivisible elements and souls, Fechner used the Leibnitzian hypotheses of universal perception and parallelism of motions and perceptions, in the light of the Schellingian identification of physical and psychical, to evolve

a world-view (Weltansicht) containing something which was neither Leibnitz nor Schelling.

Fechner's first point was his panpsychism. Emphasizing the many real analogies between physical and mental agency, but under- rating the much stronger evidences that all the mental operations of men and animals require a nervous system, he flew to the paradox that soul is not limited to men and animals, but extends p aa . to plants, to the earth and other planets, to the psychlsm. sun, to the world itself, of which, according to him, God is the world-soul. In this doctrine of universal animation he was like Leibnitz, yet very different. Whereas Leibnitz confined a large area of the world to wholly unconscious perceptions, and therefore preferred to call the souls of inorganic beings " Entelechies," Fechner extended consciousness to the whole world ; and accordingly, whereas Leibnitz believed in a supramundane Creator, " au dessus du Monde " and " dans le Monde," Fechner, in the spirit of Schelling, identified God with the soul of the world. Fechner's second point was that, throughout the animated universe, physical processes accompany psychical processes without interaction. In this pan- psychistic parallelism he was again like Leibnitz, and he developed his predecessor's view, that the conservation of energy prevents interaction, into the supposition that alongside the physical there is a parallel psychical conservation of energy. Here, again, he went much further than Leibnitz, but along with Schelling, in identi- fying the physical and the psychical as outer and inner sides of the same process, in which the inner is the real and the outer the appa- rent. Fechner's third point carried him beyond all his predecessors, containing as it does the true originality of his " world- view." He advanced the ingenious suggestion that, as body is in body and all ultimately in the world-body, so soul is in soul and all ultimately in the world-soul. By this means he explained immortality and vindicated personality. His fourth point was connected with this inclusion of personal spirits in higher spirits and in the highest. It is his so-called " synechological view " of the soul. Herbart and" Lotze, both deeply affected by the Leibnitzian hypothesis of indivisible monads, supposed that man's soul is seated at a central point in the brain; and Lotze supposed that this supposition is necessary to explain the unity of consciousness. Fechner's supposi- tion was that the unity of consciousness belongs to the unity of the whole body; that the seat of the soul is the living body; that the soul changes its place as in different parts a process rises above the " threshold of consciousness "; and that soul is not substance but the single psychical life which has its physical manifestation in the single bodily life. Applying this " synechological view " to the supposed inclusion of soul in soul, he

deduced the conclusion that, as here the nature of one's soul is to unite one's little body, so here- after its essence will be to unite a greater body, while God's spirit unites the whole world by His omnipresence; and he pertinently asked, in opposition to the " punctual " view, whether God's soul is centred in a point. Lastly, the whole of this " world-view " was developed by Fechner in early life,!'under the influence of his religious training, and out of a pious desire to understand those main truths of Christianity which teach us that we are children of God, that this natural body will become a spiritual body, and that, though we are different individual members, we live and move and are in God: " in Deo vivimus, movemus, et sumus." It is important to notice that Fechner maintained this " world-view " in a little book, Das Buchlein vom Leben nach dem Tode, which he originally published in 1836 under the pseudonym of Dr Mises, but which he afterwards republished in his own name in 1866, and again in 1887, as a sketch of his Weltansicht. Afterwards in Nanna (1848) he discussed the supposed souls of plants, and in Zendavesta (1851) the supposed souls of the earth and the rest of the world. Then in 1855 he published his Atomenlehre, partly founded on his physics, but mainly on his metaphysics. Under the influence of Leibnitz, Boscovich, Kant and Herbart, he supposed that bodies are divisible into punctual atoms, which are not bodies, but centres of forces of attraction and repulsion; that impenetrability is a result of repulsive force; and that force itself is only law — taking as an instance that Newton- ian force of attraction whose process we do not understand, and neglecting that Newtonian force of pressure and impact whose process we do understand from the collision of bodies already ex- tended and resisting. But, in thus adapting to his own purposes the Leibnitzian analysis of material into immaterial, he drew his own conclusions according to his own metaphysics, which required that the supposed centres of force are not Leibnitzian " monadsˆ' nor Herbartian " reals," nor divine modifications such as Lotze afterwards supposed, but are elements of a system which in outer aspect is bodily and in inner aspect is spiritual, and obeying laws of spirit. At the same time his synechological view prevented him from saying that every atom has a soul, because according to him a soul always corresponds to a unity of a physical manifold. Thus his metaphysics is Leibnitzian, like that of Lotze, and yet is opposed to the most characteristic feature of monadology— the percipient indivisible monad.

In i860 appeared Fechner's Elemente der Psychophysik, a work which deeply affected subsequent psychology, and almost revolu- tionized metaphysics of body and soul, and of physical and psychical relations generally. It becomes necessary, therefore, to determine

how far Fechner derived his psychophysics from experience, how far from fallacies of inference, from his romantic imagination and from his theosophic metaphysics, which indeed coloured his whole book on psychophysics. At the very outset he started with his previous metaphysical hypothesis of parallelistic identity without interaction. He now compared the spiritual and bodily sides of a man to the concave and convex sides of a circle, as inner and outer sides of the same process, which is psychical as viewed from within and physical as viewed from without. He also maintained throughout the book that physical and psychical energy do not interfere, but that the psychical is, like a mathematical quantity, a function of the physical, depending upon it, and vice versa, only in the sense that a constant relation according to law exists, such that we may conclude from one to the other, but without one ever being cause of the other. By his psychophysics he meant the exact doctrine of the relations of dependency between physical and psychical. The name was new, but not the doctrine. From antiquity men had applied themselves to determine the relations between the physical stimuli and the so- called ” quality ” of sensations. But what was new was the applica- tion of this doctrine to the relations between the stimuli and the so- called “intensity ” of sensations. He generalized Weber’s law (q.v.) in the form that sensation generally increases in intensity as the stimulus increases by a constant function of the previous stimulus; or increases in an arithmetical progression as the stimulus increases in a geometrical ratio ; or increases by addition of the same amount as the stimulus increases by the same multiple; or increases as the logarithm of the stimulus. There are then, at least within the limits of moderate sensations, concomitant variations between stimuli and sensations, not only in ” quality,” as in the intervals of sounds, which were understood long ago, but also in ” intensity “; and the discovery of the latter is the importance of Weber’s and Fechner’s law. By the rules of induction from concomitant variations, we are logically bound to infer the realistic conclusion that outer physical stimuli cause inner sensations of sensible effects. But, unfortunately for Fechner, the very opposite conclusion followed from the pre- suppositions of his parallelistic metaphysics, and from the Leibnitz- ian view of the conservation of energy, which he was the first in our time to use in order to argue that a physical cause cannot produce a psychical effect, on the ground that physical energy must be exactly replaced by

physical energy.

Having satisfied himself in what he called ” outer psychophysics,” that the stimulus causes only the nervous process and not sensation, he passed to what he called ” inner psychophysics,” or the theory of the relation between nervous and psychical processes. He rightly argued against the old theory that the continuity of nervous processes in the brain is interrupted by mental processes of thought and will : there is a nervous process for every mental process. But two questions then arose. What is the relation between nervous process and sensation? What causes sensation? The first question he answered from his imagination by supposing that, while the external world is stimulus of the nervous process, the nervous process is the immediate stimulus of the sensation, and that the sensation increases by a constant fraction of the previous stimulus in the nervous system, when Weber’s law proves only that it increases by a constant fraction of the previous stimulus in the external world. The second question he answered from his parallelistic metaphysics by deducing that even within the organism there is only a constant dependency of sensation on nervous process without causation, because the nervous process is physical but the sensation psychical. This answer supposed that the whole physical process from the action of the external stimulus on the nervous system to the reaction of the organism on the external world is one series, while the con- scious process beginning with sensation is only parallel and as it were left high and dry. What then is the cause of the sensation ? Huxley, it will be remembered, in similar circumstances, answered this question by degrading consciousness to an epiphenomenon, or bye-product of the physical process. Fechner was saved from this absurdity, but only to fall into the greater absurdity of his own panpsychism. Having long assumed that the whole world is animated throughout, and that there are always two parallel series, physical and psychical, he concluded that, while a physical stimulus is causing a physical nervous process, a psychical accompaniment of the stimulus is causing the sensation, which, according to him, is the psychical accompaniment of the nervous process; and that, as the whole physical and the whole psychical series are the same, differing only as outer and inner, this identity holds both of stimulus and its psychical accompaniment and of nervous process and its accompanying sensation. Accordingly, he calls these and all other processes “psychophysical”; and as he recognized two parallel energies, physical and psychical, differing only as outer and inner aspects of the same energy, he called this “psychophysical energy.” In such a philosophy all reality is ” psychophysical.” At the same time Fechner would not have us suppose that the two sides are equal ;

according to him, the psychical, being the psychophysical as viewed from within, is real, the physical, being the psychophysical viewed from without, is apparent; so in oneself, though nervous process and psychical process are the same, it is the psychical which is the reality of which the nervous is mere appearance ; and so everywhere, spirit is the reality, body the appearance of spirit to spirit. Finally, he

supposed that one spirit is in another, and all in the highest spirit, God. By this means also he explained unconsciousness. In point offact, many stimuli are beneath the ” threshold ” of a man’s con- sciousness. Leibnitz, in the Nouveaux Essais, ii. 11, had also said that we have many ” petites perceptions,” of which we are un- conscious, and had further suggested that a perception of which we are, is composed of a quantity of ” petites perceptions ” of which we are not, conscious. Proceeding on this suggestion, and misled by the mathematical expression which he had given to Weber’s law, Fechner held that a conscious sensation, like its stimulus, consists of units, or elements, by summation and increments of which conscious sensations and their differences are produced; so that consciousness, according to this unnecessary assumption, emerges from an integration of unconscious shocks or tremors. But by the hypothesis of the inclusion of spirit in spirit, he was further able to hold that what is unconscious in one spirit is conscious in a higher spirit, while everything whatever is in the consciousness of the highest spirit of God, who is the whole of reality of which the spirits are parts, while the so-called physical world is merely outer appear- ance of one spirit to another.

Fechner first confused physics and metaphysics in psychophysics, and next proceeded to confuse them again in his work on evolution {Minige Ideen zur Schopfungs und Entwicklungs-geschichte der Organis- men, 1873). He perceived that Darwinism attributed too much to accident, and was also powerless to explain the origin of life and of consciousness. But his substitute was his own hypothesis of panpsychism, from which he deduced a ” cosmorganic ” evolution from a ” cosmorganic ” or original condition of the world as a living organism into the inorganic, by the principle of tendency to stability. The world, as he thought, on its physical side, always was a living body; and on its psychical side God always was its conscious spirit; and, so far from life arising from the lifeless, and consciousness from unconsciousness, the life and consciousness of the whole world are the origin of the lifeless and the unconscious in parts of it, by a kind of secondary automatism, while we ourselves are developed from our own mother-earth by differentiation. By thus supposing a psychical basis to evolution, Fechner, anticipating Wundt, substituted a psychical development of organs for Darwinian accidental variation.

The difficulty of such speculations is to prove that things apparently dead and mindless are living souls. Their interest to the metaphysician is their opposition to physics on the one hand and to theism on the other. Shall we resign our traditional belief that the greater part of the world is mere body, but that its general adaptability to conscious organisms proves its creation and government by God, and take to the new hypothesis, which, by a transfer of design from God to Nature, supposes that everything physical is alive, and con- ducts its life by psychical impulses of its own? Fechner himself went even further, and together with design transferred God Himself to Nature. This is the subject of his last metaphysical work, Die Tagesansicht gegeniiber der Nachtansicht (1879). The " day- view " (Fechner's) is the view that God is the psychophysical all-embracing being, the law and consciousness of the world. It resembles the views of Hegel and Lotze in its pantheistic tendency. But it does not, like theirs, sacrifice our personality; because, according to Fechner, the one divine consciousness includes us as a larger circle includes smaller circles. By this ingenious suggestion of the membership of one spirit in another, Fechner's " day- view " also puts Nature in a different position ; neither with Hegel sublimating it to the thought of God's mind, nor with Lotze degrading it to the phenomena of our human minds, but identifying it with the outer appearance of one spirit to another spirit in the highest of spirits.

. We have dwelt on this curious metaphysics of Fechner because" it contains the master-key to the philosophy of the present moment. When the later reaction to Kant arose against both Hegelianism and materialism, the nearly contemporary appear- ance of Fechner's Psychophysics began to attract experimental psychologists by its real as well as its apparent exactness, and both psychologists and metaphysicians by its novel way of putting the relations between the physical and the psychical in man and in the world. Fechner saw psychology deriving advantage from the methods, as well as the results, of his experiments, and in 1879 the first psychological laboratory was erected by Wundt at Leipzig. But he had also to endure comn>*" less objections to his mathematical statement of Weber's law, to his unnecessary assumption of units of sensation, and to his unjustifiable transfer of the law from physical to physiological stimuli of sensations, involving in his opinion his parallelistic view of body and mind. Among psychologists Helmholtz, Mach, Brentano, Hering, Delboeuf, we're all more or less against him. Sigwart in his Logic has also opposed the parallelistic view itself; and James has criticized it from the point of view that the soul selects out of the possibilities of the brain means to its own ends. Nevertheless, largely under the

influence of the exaggeration

of the conservation of energy, many psychologists — Wundt, Paulsen, Riehl, Jodl, Ebbinghaus, Munsterberg, and in England Lewes, Clifford, Romanes, Stout — have accepted Fechner's psychophysical parallelism, as far at least as men and animals are concerned. Most stop here, but some go with Fechner to the full length of his metaphysical parallelism of the physical and psychical, as psychophysical, throughout the whole world. This influence extended from Germany to Denmark, where it was embraced by Hoff ding, and to England, where it was accepted by Romanes, and in a more qualified manner as " a working hypothesis " by Stout. But the most thorough and most eloquent of Fechner's metaphysical disciples was F. Paulsen (q.v.), who spread panpsychism far and wide in his Einleitung in die Philosophic

Here reappear all the characteristic points of Fechner's " world- view " — the panpsychism, the universal parallelism with the identi- Paulsea fication of physical and psychical, the inclusion of spirit in spirit, the synechological view of spirit, and the final " day-view " that all reality is spirit, and body the appearance of spirit to spirit. But Paulsen tries to supply something wanting in Fechner. The originality of Paulsen consists in trying to supply an epistemological explanation of the metaphysics of Fechner, by recon- ciling him with Kant and Schopenhauer. He borrows from Kant's "rationalism " the hypothesis of a spontaneous activity of the subject with the deduction that knowledge begins from sense, but arises from understanding ; and he accepts from Kant's metaphysical idealism the consequence that everything we perceive, experience and know about physical nature, and the bodies of which it consists, is phenomena, and not bodily things in themselves. But he has a different theory of human nature and soul, and so does not accept the Kantian conclusion that things in themselves, in the sense of things beyond phenomena, are all unknowable. On the contrary, his contention is that of Fechner — that all knowable things are inner psychical realities beneath outer physical appearances — the invisible symbolized by the visible. Kant, however, had no epistemology for such a contention, because according to him both outer and inner senses give mere appearance, from which we could not know either body in itself, or soul in itself.

Parting, then, from Kant, Paulsen resorts to a paradox which he shares with Fechner and Wundt. He admits, indeed, Kant's hypothesis that by inner sense we are conscious only of mental states, but he contends that this very consciousness is a knowledge of a thing in itself. He agrees with Fechner and Wundt that there is no substantial soul, and that soul is nothing but the mental states, or rather their unity — thus identifying it with Kant's synthetic unity. On this assumption he deduces that in being conscious of our mental states we are conscious of soul not merely as it appears, but as it is in itself, and therefore can infer similar souls, other psychical unities, which are also things in themselves.

But what is the essence of this psychical reality which we thus immediately and mediately know? Here he appeals to Schopenhauer's doctrine that will of some sort is the fundamental fact of mental life. Taking, then, will to be the essential thing in itself of which we are conscious, he deduces that we can infer that the psychical things in themselves beyond ourselves are also essentially " wills." Combining with this the central dogma of Fechner that spirit extends throughout the'world of bodily appearance, he con- cludes that the realities of the world are " wills," that bodies are mere appearances of " wills," and that there is one universal and all-embracing spirit which is " will." His ultimate metaphysics, then, is this: Everything is spirit, and spirit is " will." Lastly, by " will " he does not mean " rational desire," which is its proper meaning, but inapplicable to Nature ; nor unconscious irrational will, which is Schopenhauer's forced meaning ; nor unconscious intelligent will, which is Hartmann's more correct meaning, though inapplicable to Nature. His " will " is instinct, impulsive feeling, a " will to live," not indeed unconscious, but often subconscious, without idea, without reasoning about ends and means, yet pursuing ends — in short, what he calls, after K. E. von Baer, Zielstrebigkeit. How persistent is ancient animism! Empedocles, Plato and Aristotle; Telesio, Bruno and Campanella; Leibnitz; the idealists, Schopen- hauer and Hartmann, Fechner and Paulsen; and the materialist, Haeckel — all have agreed in according some sort of appetition to

Nature. So prone are men to exaggerate adaptation into aim! So prone are they to transfer to Nature the part played by the providence of God! (see Bacon, De augmentis, iii. 4, sub fin.).

Noumenal idealism is not dead in Germany. It died down for a time in the decline of Hegelianism and the rise of materialism. It has since revived. The pure idealism of Fichte is at the bottom of it all. The panlogism of Schelling and Hegel survives in its influence. So still,

more does the pantheism of Schopen- hauer. The three most vital idealisms of this kind at the moment are the panpneumatism of Hartmann, combining Hegel with

Schopenhauer; the panteleologism of Lotze, reviving Leibnitz; and the panpsychism of Paulsen, continuing Fechner, but with the addition of an epistemology combining Kant with Schopen- hauer. All these systems of metaphysics, differ as they may, agree that things are known to exist beyond sensible phenomena, but yet are mental realities of some kind. Meanwhile, the natural substances of Aristotelian realism are regarded with common aversion.

5. — Phenomenal Idealism in Germany

Phenomenal idealism is the metaphysics which deduces that, as we begin by perceiving nothing but mental phenomena of sense, so all we know at last from these data is also phenomena of sense, actual or possible. So far it is in general agreement not only with Hume, but also with Kant in his first two positions. But it follows Fichte in his revolt against the unknown thing in itself. On the other hand, as the speculative systems of nou- menal idealism, starting from Fichte, succeeded one another, like ghosts who ” come like shadows, so depart,” without producing conviction, and often in flagrant opposition to the truths of natural science, and when, in consequence, a wave of materialism threatened to submerge mind altogether by reducing it to a function of matter, many philosophers began to despair of the ambitious attempts which had been made to prove that there is a whole world of mind beyond phenomena, as the noumenalists had supposed. Thus they were thrown back on the limits of human knowledge prescribed by Kant, but purged of the un- known thing in itself by Fichte. Phenomenal idealism is the Kantian contention that Nature, as known to science, is pheno- mena of experience. Unfortunately, the word ” phenomenon ” is equivocal (see Mind, xiv. 300). Sometimes it is used for any positive fact, as distinguished from its cause. But sometimes also it means what appears, or can appear, to the senses, as distinguished from what does not appear, but can be inferred to exist. Now, Kant and his followers start from this second and narrower meaning, and usually narrow it still more by assuming that what appears to the senses is as mental as the sensation, being undistinguishable from it or from the idea of it, and that an appearance is a mental idea(Vorstellung) of sense; and then they conclude that we can know by inference nothing but such mental appearances, actual and possible, and therefore nothing beyond sensory experience. When, on the other hand, the objects of science are properly described as phenomena, what is meant is not

this pittance of sensible appearances, but positive facts of all kinds, whether perceptible or imperceptible, whether capable of being experienced or of being inferred from, but beyond, experience, e.g. the farther side of the moon, which is known to exist only by inference. Hence the doctrine of Kant, that Nature as known to science is phenomena, means one thing in Kantism and another thing in science. In the former it means that Nature is mental phenomena, actual and possible, of sensory experience; in the latter it means that Nature is positive facts, either experienced or inferred. It is most impor- tant also to notice that Kantism denies, but science asserts, the logical power of reason to infer actual things beyond experience. But the phenomenal idealists have not, any more than Kant, noticed the ambiguity of the term ” phenomenon “; they fancy that, in saying that all we know is phenomena in the Kantian sense of mental appearances, they are describing all the positive facts that science knows; and they follow Kant in suppos- ing that there is no logical inference of actual things beyojid . experience. ””*

1. The Reaction to Kant. — The reaction to Kant(” Zuriick zu Kant!”) was begun by O. Liebmann in Kant und die Epigonen (1865). Immediately afterwards, in 1866, appeared Lange’s Geschichte des Materialismus. In 1870 J. B. Meyer published bis Kants Psychologie, and in 187 1 H. Cohen his more important Kants Theorie der Erfahrung, which led Lange to modify his interpretation of Kant in the second edition of his own book. Lange (q.v.) by his History of Materialism has exercised a pro- found influence, which is due partly to its apparent success in answering materialism by Kantian arguments, and partly to

Laage.

its ingenious attempt to give to Kantism itself a consistency, which, however, has only succeeded in producing a new philosophy of Neo-Kantism, differing from Kantism in modifying the a priori and rejecting the thing in itself. Lange to some extent modified the transcen- dentalism of Kant’s theory of the origin of knowledge. A priori forms, according to Kant, are contributions of the mental powers of sense, understanding, and reason; but, accord- ing to Lange, they are rooted in ” the physico-psychical organi- zation.” This

modification was the beginning of a gradual lessening of the antithesis of a priori to a posteriori, until at last the a priori forms of Kant have been transmuted into ” auxiliary conceptions,” or ” postulates of experience.” But this modification made no difference to the Kantian and Neo-Kantian deduction from the epistemological to the meta-physical. Lange entirely agreed with Kant that a priori forms can have no validity beyond experience when he says: ” Kant is at any rate so far justified as the principle of intuition in space and time a priori is in us, and it was a service to all time that he should in this first great example, show that what we possess a priori, just because it arises out of the disposition of our mind, beyond our experience has no longer any claim to validity ” {Hist, of Materialism, trans. E. C. Thomas, ii. 203). Hence he deduced that whatever we know from sensations arranged in such a priori forms are objects of our own experience and mental phenomena. Hence also his answer to materialism. Science, says the mate- rialist, proves that all known things are material phenomena. Yes, rejoins Lange, but Kant has proved that material are merely mental phenomena; so that the more the materialist proves his case the more surely he is playing into the hands of the idealist — an answer which would be complete if it did not turn on the equivocation of the word ” phenomenon,” which in science means any positive fact, and not a mere appearance, much less a mental appearance, to sense and sensory experience. Having, however, made a deduction, which is at all events consistent, that on Kantian assumptions all we know is mental phenomena, Lange proceeded to reduce the rest of Kantism to consistency. But his ardent love of consistency led him far away from Kant in the end; for he proceeded consistently from the assumption, that whatever we think beyond mental phenomena is ideal, to the logical conclusion that in practical matters our moral responsi- bility cannot prove the reality of a noumenal freedom, because, as on Kant’s assumption we know ourselves from inner sense only as phenomena, we can prove only our phenomenal freedom. Lange thus transmuted inconsistent Kantism into a consistent Neo-Kantism, consisting of these reformed positions: (1) we start with sensations in a priori forms; (2) all things known from these data are mental phenomena of experience; (3) everything beyond is idea, without any corresponding reality being knowable. ” The intelligible world,” he concluded,. ” is a world of poetry.” Our reflection is that there is a great difference between the essence and the consistency of Kant’s philosophy. Its essence, as stated by Kant, was to reduce the logical use of reason to mental phenomena of experience in speculation, in order to extend the practical use of reason to the real noumena, or things in themselves, required for morality. Its consistency, as deduced by Lange, was to reduce all use of reason, speculative and. practical, to its logical use of

proceeding from the assumed mental data of outer and inner sense, arranged a priori, to mental phenomena of experience, beyond which we can conceive ideas but postulate nothing. As H. Vaihinger, himself a profound Kantian of the new school, says: ” Critical scepticism is the proper result of the Kantian theory of knowledge.”

There is only one Neo-Kantian way out of this dilemma, but it is to alter the original assumptions of Kant’s psychological idealism. This is the alternative of A. Riehl, who in Der philosophische Kriticis- _ mus (1876, &c.) proposes the non-Kantian hypothesis

H/uu. that, though things in themselves are unknowable

through reason alone, they are knowable by empirical intuition, and therefore also by empirical thought starting from intuition. Like all true followers of Kant, Riehl prefers epistemology to metaphysics; yet in reality he founds a metaphysics on epistemology, which he calls ” critical realism,” so far as it asserts a knowledge of things

beyond phenomena, and ” critical monism,” so far as it holds that these things are unlike both physical and psychical phenomena, but are nevertheless the common basis of both. He accepts the Kantian positions that unity of consciousness combines sensations by a priori synthesis, and that therefore all that natural science knows about matter moving in space is merely phenomena of outer sense; and he agrees with Kant that from these data we could not infer things in themselves by reason. But his point is that the very sensation of phenomena or appearances implies the things which appear. ” Sensory knowledge,” he says, ” is the knowledge of the relations of things through the relations of the sensations of things.” Further, holding that, ” like every other perception, the perception of a human body immediately involves the existence of that body,” and, like Fichte, believing in a ” common consciousness,” he con- cludes that the evidence of sense is yerined by ” common conscious- ness ” of the external world as objective in the Kantian sense of universally valid. He interprets the external world to be the com- mon basis of physical and psychical phenomena. He rightly relies on the numerous passages, neglected by Lange, in which Kant regards things in themselves as neither phenomena nor ideas, but things existing beyond both. But his main reliance is on the passage in the Kritik, where Kant, speaking cf the Cartesian difficulty of communication between body and soul, suggests that, however body and soul appear to be different in the phenomena of outer and inner sense, what lies as thing in itself at the basis of the phenomena of both may perhaps be not so heterogeneous (ungleichartig) after all. Riehl elaborates this bare suggestion into the

metaphysical theory that the single basis of physical and psychical phenomena is neither bodily nor mental, nor yet space and motion. In order to establish this paradox of ” critical monism,” he accepts to a certain extent the psychophysical philosophy of Fechner. He agrees with Fechner that physical process of nerve and psychical process of mind are really the same psychophysical process as appearing on the one hand to an observer and on the other hand to one’s own consciousness; and that physical phenomena only produce physical phenomena, so that those materialists and realists are wrong who say that physical stimuli produce sensations. But whereas Fechner and Paulsen hold that all physical processes are universally accom- panied by psychical processes which are the real causes of psychical sensations, Riehl rejects this paradox of universal parallelism in order to fall into the equally paradoxical hypothesis that something or other, which is neither physical not psychical, causes both the physical phenomena of matter moving in space and the psychical phenomena of mind to arise in us as its common effects. In supposing a direct perception of such a nondescript thing, he shows to what straits idealists are driven in the endeavour to supplement Kant’s limitation of knowledge to phenomena by some sort of knowledge of things.

2. The Reaction to Hume. — When the Neo-Kantians, led by Lange, had modified Kant’s hypothesis of a priori forms, and retracted Kant’s admission and postulation of things in them- selves beyond phenomena and ideas, and that too without proceeding further in the direction of Fichte and the noumenal idealists, there was not enough left of Kant to distinguish him essentially from Hume. For what does it matter to meta- physics whether by association sensations suggest ideas, and so give rise to ideas of substance and causation a posteriori, or synthetic unity of consciousness combines sensations by a priori notions of substance and causation into objects which are merely mental phenomena of experience, when it is at once allowed by the followers of Hume and Kant alike that reason in any logical use has no power of inferring things beyond the experience of the reasoner? In either case, the effective power of inference, which makes us rational beings, is gone. Naturally then the reaction to Kant was followed by a second reaction to Hume, partly under the name of ” Positivism,” which has attracted a number of adherents, such as C. Goring (1841-1879), author of an incomplete System der Kritischen Philosophie (1874-1875) and E. Laas (q.v.), and partly under the name of the “physical phenomenology ” of E. Mach.

Ernst Mach (q.v.) is a conspicuous instance of a confusion of physics and psychology ending in a scepticism like that of Hume. He tells us how from his youth he pursued physical and psychological studies,

how at the age of fifteen he read Kant's Prolegomena, and later rejected the thing in itself, and came to the conclusion that the world with his ego is one mass of sensations. For a time, under the influence of Fechner's Psychophysics, he thought that Nature has two sides, a physical and a psychological, and added that all atoms have feeling. But in the progress of his physical work, which taught him, as he thought, to distinguish between what we see and what we

mentally supply, he soon passed from this noumenalism to a " universal physical phenomenology." It retains some relics of Fechner's influence; first, the theory of identity, according to which the difference between the physical and psychical is not a dualism, but everything is at once both; and secondly, the substi- tution of mathematical dependence for physical causality, except that, whereas Fechner only denied causality between physical and psychical, Mach rejects the entire distinction between causality and dependence, on the ground that " the law of causality simply asserts that the phenomena of Nature are dependent on one another." He comes near to Hume's substi- tution of succession of phenomena for real causality. He holds, like Hume, that nothing is real except our sensations and com- plexes of sensory elements; that the ego is not a definite, unalter- able, sharply bounded unity, but its continuity alone is important ; and that we know no real causes at all, much less real causes of our sensations; or, as he expresses it, bodies do not produce sensations, but complexes of sensations form bodies. If he has any originality, it consists in substituting for the association of ideas the " economy of thinking," by which he means that all theoretical conceptions of physics, such as atoms, molecules, energy, &c, are mere helps to facilitate our consideration of things. But he limits this power of mind beyond sensations to mere ideas, and like Hume, and also like Lange,, holds at last that, though we may form ideas beyond sensations or pheno- mena, we cannot know things. If we ask how Mach arrived at this scepticism, which is contained in his well-known scientific work Die Mechanik in ihrer Entwickelung (1883; ed. 1908) as well as in his psychological work on the Analysis of Sensations (Beitr&ge zur Analyse der Empfindungen, 1886), we find two main causes, both psychological and epistemological; namely, his views on sense and on

inference. In the first place, he displays in its most naked form the common but unproved idealistic paradox of a sense of sensations, according to which touch apprehends not pressure but a sensation of pressure, sight apprehends not colour but a sensation of colour, and there is no difference between the sensory operation and the sensible object apprehended by any sense, even within the sentient organism. Hence, according to him, sensations are not appre- hensions of sensible objects (e.g. pressures felt) from which we infer similar objects beyond sense (e.g. similar pressures of outside, things), but are the actual elements out of which everything known is made; as if sensations were like chemical elements. Within the limits of these supposed sensory elements he accords more than many psychologists do to sense; because, following the nativists, Johannes Miiller and Hering, he includes sensations of time and space, which, however, are not to be regarded as ” pure intuitions ” in the style of Kant. But here again he identifies time and space with the sensations of them (Zeit-empfindungen and Raumempfindtmgen) . On the assumption, then, that time and space are not objects, but systems, of sensa- tions, he concludes that a body in time and space is ” a relatively constant sum of touch-and-light-sensations, joined to the same time-and-space-sensations,” that each man’s own body is included in his sensations, and that to explain sensations by motions would only be to explain one set of sensations from another. In short, sensations are elements and bodies complexes of these elements. Secondly, his theory of inference contains the admis- , sion that we infer beyond sensations: he remarks that the space of the geometer is beyond space-sensations, and the time of the physicist does not coincide with time-sensations, because it uses measurements such as the rotation of the earth and the vibrations of the pendulum. But by inference beyond sense he does not mean a process of concluding from sensible things to similar things, e.g. from tangible pressures to other similar pressures in the external world. Inference, according to him, is merely mental completion of sensations; and this mental completion has two characteristics: it only forms ideas, and it proceeds by an ” economy of thought.” In the course of his learned studies on the history of mechanics he became deeply impressed with Galileo’s appeals to simplicity as a test of truth, and converted what is at best only one characteristic of thinking

into its essence. According to him, whatever inferences we make, certain or uncertain, are mere economies of thought, adapting ideas to sensations, and filling out the gaps of experience by ideas; whatever we infer, whether bodies, or molecules, or atoms, or space of more than three dimensions, are all without distinction equally provisional

conceptions, things of thought; and ” bodies or things are compendious mental symbols for groups of sensations — symbols which do not exist outside thought.” Moreover, he applies the same scepticism to cause and effect. ” In Nature,” says he, ” there is no cause and no effect. ” He thinks that repetitions of similar conjunctions occur in Nature, the connexion of cause and effect only in abstrac- tion. He refers to Hume as recognizing no causality but only a customary and habitual succession, but adds that Kant rightly recognizes that mere observation cannot teach the necessity, of the conjunction. But in reality his theory is neither Hume’s theory of association nor Kant’s of an a priori notion of under- standing under which a given case is subsumed. . He thinks that there is a notion of understanding (Verstandesbegriff), under which every new experience is subsumed, but that it has been developed by former experience, instinctively, and by the development of the race, as part of the economy of thinking. ” Cause and effect are therefore,” he concludes, ” thought-things of economical function (Gedankendinge von okonomischer Function).” His philosophy, therefore, is that all known things are sensations and complexes of sensory elements, supplemented by an economy of thinking which cannot carry us beyond ideas to real things, or beyond relations of dependency to real causes.

It is important to understand that Mach had developed this economical view of thought in 1872, more than ten years before the appearance of his work on the history of mechanics icirchhoft. as he tells us in the preface, where he adds that at a later date similar views were expressed by Kirchhoff in his Vorle- sungen iiber mathematische Physik (1874). Kirchhoff asserted that the whole object of mechanics is ” to describe the motions occur- ring in Nature completely in the simplest manner.” This view involves the denial of force as a cause, and the assertion that all we know about force is that the acceleration of one mass depends on that of another, as in mathematics a function depends on a variable; and that even Newton’s third law of motion is merely a description of the fact that two material points determine in one another, without reciprocally causing, opposite accelerations. It is evident that Kirchhoff’s descriptive is the same as Mach’s economical view. ” When I say,” says Mach, ” that a body A exerts a force on a body B, I mean that B, on coming into contra- position with A, is immediately affected by a certain acceleration with respect to A.” In a word, Mach and Kirchhoff agree that force is not a cause, convert Newtonian reciprocal action into mere interdependency, and, in old terminology, reduce mechanics from a natural philosophy of causes to a natural history of mere facts. Now, Mach applies these preconceived

opinions to ” mechanics in its development,” with the result that, though he shows much skill in mathematical mechanics, he misrepresents its development precisely at the critical point of the discovery of Newton’s third law of motion.

The true order of discovery, however, was as follows: —

(a) Sir ChristoDher Wren made many experiments before the Royal Society, which were afterwards repeated in a corrected form by Sir Isaac Newton in the Principia, experimentally proving that bodies of ascertained comparative weights, when suspended and impelled against- one another, forced one another back by impressing on one another opposite changes of velocity inversely as their weights and therefore masses ; that is, by impressing on one anOtijer equal and opposite changes of momentum.

(b) Wallis showed that such bodies reduce one another to a joint mass with a common velocity equal to their joint momentum divided by their joint weights or masses. This result is easily deducible also from Wren’s discovery. If m and m’ are the masses, v and v’ their initial velocities, and V the common velocity, then $m(v - V) = m'(V - v')$, therefore $mv + m'v' = (m + m')W$, and hence $(mv + m'v')/(m + m') = V$.

(c) Wren and Huygens further proved that the law of equal action and reaction, already experimentally established by the former, is deducible from the conservation of the velocity of the common centre of gravity, which is the same as the common velocity of the bodies, that is, deducible from the fact that their common centre

of gravity does not change its state of motion or rest by the actions of the bodies between themselves; and they further extended the law to bodies, qua elastic.

(d) Hence, first inductively and then deductively, the third law was originally discovered only as a law of collision or impact between bodies of ascertained weights and therefore masses, impressing on one another equal and opposite changes of momentum, and always reducing one another to a joint mass with a common velocity to begin with, apart from the subsequent effects of elasticity.

(e) Newton in the Principia, repeating and correcting Wren's experiments on collision, and adding further instances from attractive forces of magnetism and gravity, induced the third law of motion as a general law of all forces.

This order of discovery shows that the third law was generalized from the experiments of Wren on bodies of ascertained comparative weights or masses, which are not material points or mass-points. It shows that the bodies impress on one another opposite changes of velocity inversely as their weights or masses; and that in doing so they always begin by reducing one another to a joint mass with a common velocity, whatever they may do afterwards in consequence of their elasticities. The two bodies therefore do not penetrate one another, but begin by acting on one another with a force precisely sufficient, instead of penetrating one another, to cause them to form a joint mass with a common velocity. Bodies then are triply extended substances, each occupying enough space to prevent mutual penetration, and by this force of mutual impenetrability or inter- resistance cause one another to form a joint mass with a common velocity whenever they collide. Withdraw this foundation of bodies as inter-resisting forces causing one another in collision to form a joint mass with a common velocity but without penetration, and the evidence of the third law disappears; for in the case of attrac- tive forces we know nothing of their modus operandi except by the analogy of the collision of inter-resisting bodies, which makes us believe that something similar, we know not what, takes place in gravity, magnetism, electricity, &c. Now, Mach, though he occasionally drops hints that the discovery of the law of collision comes first, yet never explains the process of development from it to the third law of motion. On the contrary, he treats the law of collision with other laws as an application of the third law of motion, because it is now unfortunately so taught in books of mechanics. He has therefore lost sight of the truths that bodies are triply extended, mutually impenetrable substances, and by this force causes which reduce one another to a joint mass with a common velocity on collision, as for instance in the ballistic pendulum; that these forces are the ones we best understand; and that they are reciprocal causes of the common velocity of their joint mass, what- ever happens afterwards. In the case of this one force we know far more than the interdependence supposed by Mach and Kirch- hoff ; we know bodies with impenetrable force causing one another to keep apart. It might have been expected that scepticism on this subject would not have had much effect. But the idealists are only too glad to get any excuse for denying bodily substances and causes ; and, while Leibnitz supplied them with the fancied analysis of material into

immaterial elements, and Hume with the reduction of bodies to assemblages of sensations, Mach adds the additional argument that bodily forces are not causes at all. In Great Britain Mach's scepticism was welcomed by Karl Pearson to support an idealistic phenomenalism derived from Hume, and by Ward to sup- port a noumenal idealism derived from Lotze. No real advance in metaphysics can take place, and natural science itself is in some danger, until the true history of the evidences of the laws of mechani- cal force is restored ; and then it will soon appear that in the force of collision what we know is not material points determining one another's opposite accelerations, but bodies by force of impene- trable pressure causing one another to keep apart. Mechanics is a natural philosophy of causes.

3. Dualism within Experience. — Besides those philosophies which are reactions to Kant or to Hume, there are a number of other modern systems which start with the common hypothesis that knowledge is experience. The consequence is that whatever is true of experience they transfer to all knowledge. One of the characteristics of actual experience is that its object is, or has been, present to an experiencing subject; and of possible experi- ence that it can be present. As a matter of fact, this character- istic differentiates experience from inference. By inference we know that things, such as the farther side of the moon, which neither are, nor have been, nor can be, present to an experiencing subject on the earth, nevertheless exist. But, on the hypothesis that knowledge contains no inferences beyond experience, it follows that all the objects of knowledge, being objects of experience, are, or have been, or can be, present to an experiencing subject. Hence it is common nowadays to hold that there is indeed a difference between knower and known, ego and non-ego, subject and object, but that they are inseparable; or that all known things are objects and subjects inseparably connected in

experience. This view, however, is held in different forms; and two opposite forms have arisen in Germany, " immanent philo- sophy " and " empirio-criticism," the former nearer to Kant, the latter to Hume.

Immanent Philosophy is the hypothesis that the world is not transcendent, but immanent in consciousness. Among the up- holders of this view are Anton von Leclair, who expresses i mmageai it in the formula — " Denken eines Seins = gedachtes phii OSOO hy Sein," and R. von Schubert-Soldern, who says that *'

every fragment of the pretended transcendent world belongs to the

immanent. But the best known representative of Immanent Philosophy is W. Schuppe, who, in his Erkenntnistheoretische Logik (1878), and in his shorter Grundriss der Erkenntnistheorie und Logik (1894), gives the view a wider scope by the contention that the real world is the common content or object of common conscious- ness, which, according to him, as according to Fichte, is one and the same in all individual men. Different individual consciousnesses plainly differ in having each its own content, in which Schuppe includes each individual's body as well as the rest of the things which come within the consciousness of each ; but they also as plainly agree, e.g. in all admitting one sun. Now, the point of Schuppe is that, so far as they agree, individual consciousnesses are not merely similar, but the same in essence ; and this supposed one and the same essence of consciousness in different individuals is what he calls consciousness in general (Bewusstsein uberhaupt). While in this identification he follows Fichte, in other respects he is more like Kant. He supposes that the conscious content is partly a posteriori, or consisting of given data of sense, and partly a priori, or consisting of categories of understanding, which, being valid for all objects, are contributed by the common consciousness. He differs, however, from Kant, not only because he will not allow that the given data are received from things in themselves, but also because, like Mach, he agrees with the nativists that the data already contain a spatial determinacy and a temporal determinacy, which he regards as a posteriori elements of the given, not like Kant, as a priori forms of sense. He allows, in fact, no a priori forms except categories of the understanding, and these he reduces, considering that the most important are identity with difference and causality, which in his view are necessary to the judgments that the various data which make up a total impression {Gesammteindrtick, Totaleindruck) are each different from the others, together identical with the total impression, and causally connected in relations of necessary sequence and coexistence. At the same time, true to the hypothesis of " immanence," he rigidly confines these categories to the given data, and altogether avoids the inconsistent tendency of Kant to transfer causality from a necessary relation between phenomena to a neces- sary relation between phenomena and things in themselves as their causes. Hence he strictly confines true judgment and knowledge to the consciousness of the identity or difference, and the causal relations of the given content of the common consciousness. From this epistemology he derives the metaphysical conclusion that the things we know are indeed independent of my consciousness and of yours, taken individually, or, to use a new phrase, are " trans- subjective"; but, so far from being independent of the common consciousness, one and the same in all of

us, they are simply its con- tents in the inseparable relation of subject and object. To the objection that there are objects, e.g. atoms, which are never given to any consciousness, he returns the familiar Kantian answer that, though unperceived, they are perceptible. The whole known world, then according to him, is the perceived and the perceptible content of common consciousness.

The ” empirio-criticism ” of R. Avenarius (q.v.) is the hypothesis of the inseparability of subject and object, or, to use his own phraseo- logy, of ego and environment, in purely empirical, or a EmaM posteriori form. It is like ” immanent philosophy,” criticism in opposing experience to the transcendent; but it also opposes experience to the transcendental, or a priori. It opposes ” pure experience ” to ” pure reason,” while it agrees with Kant’s limitation of knowledge to experience. Avenarius held a view of knowledge very like that of Mach’s view of the economy of thinking. In his first philosophical treatise, Philosophie als Denken der Welt gemdss dem Princip des kleinsten Kraftmaasses, Prolegomena zu einer Kritik der reinen Erfahrung (1876), he based his views on the principle of least action, contending that, as in Nature the force which produces a change is the least that can be, so in mind belief tends in the easiest direction. In illustration of this tendency, he pointed out that mind tends to assimilate a new impression to a previous content, and by generalization to bring as many impressions under as few general conceptions as possible, and succeeds so far as it generalizes from pure experience of the given. Nor is there any objection to this economical view of thought, as long as we remember what Avenarius and Mach forget, that the essence of thought is the least action neither more nor less than necessary to the point, which is the reality of things. Afterwards, in his Kritik der reinen Erfahrung (1888-1890), Avenarius aimed at giving a description of pure experience which he identified with the natural view of the world held by all unprejudiced persons. What, then, is this pure experience? ” Every human individual,” says he,

” originally accepts over against him an environment with manifold parts, other individuals making manifold statements, and what is stated in some way dependent upon the environment.” Statements dependent upon the environment are what he means by pure

experience. At first this starting-point looks like dualistic realism, but in reality the author only meant dualism within experience. By the environment he meant not a thing existing in itself; but only a counterpart (Gegenglied) of ourselves as central part (Centralglied). “We cannot,” he adds, “think ourselves as central part away.” He went so far as to assert that, where one assumes that at some time there was no living being in the world, all one means is that there was besides oneself no other central part to whom one’s counterparts might also be counterparts. The consequence is that all the world admitted into his philosophy is what he called the ” empirio-critical essential co-ordination ” (empirio-kritische Prin- zipialkoordination) , an inseparable correlation of central part and counterpart, of ego and environment. Within this essential co-ordination he distinguished three values: R-values of the envi- ronment as stimulus ; C-values of the central nervous system ; and E-values of human statements — the latter being characterized by that which at the time of its existence for the individual admits of being named, and including what we call sensations, &c, which depend indirectly on the environment and directly on the central nervous system, but are not, as the materialist supposes, in any way reducible to possessions of the brain or any other part of that system. This division of values brings us to the second point in his philosophy, his theory of what he called ” vital series,” by which he assayed to explain all life, action and thought. A vital series he supposed to be always a reaction of C against disturbance by R, consisting in first a vital difference, or diminution by R of the maintenance-value of C, and then the recovery by C of its maintenance-value, in accor- dance with the principle of least action. He further supposed that, while this independent vital series of C is sometimes of this simple kind, at other times it is complicated by the addition of a dependent vital series in E, by which, in his fondness for too general and far- fetched explanations, he endeavoured to explain conscious action and thought. (Thus, if a pain is an E-value directly dependent on a disturbance in C, and a pleasure another E-value directly depen- dent on a recovery of C, it will follow that a transition from pain to pleasure will be a vital series in E directly dependent on an indepen- dent vital series in C, recovering from a vital difference to its main- tenance-maximum.) Lastly, supposing that all human processes can in this way be reduced to vital series in an essential co-ordination of oneself and environment, Avenarius held that this empirio-critical supposition, which according to him is also the natural view of pure experiences, contains no opposition of physical and psychical, of an outer physical and an inner psychical world — an opposition which seemed to him to be a division of the inseparable. He considered that the whole hypothesis that an outer physical thing

causes a change in one's central nervous system, which again causes another change in one's inner psychical system or soul, is a departure from the natural view of the universe, and is due to what he called " intro- jection," or the hypothesis which encloses soul and its faculties in the body, and then, having created a false antithesis between outer and inner, gets into the difficulty of explaining how an outer physical stimulus can impart something into an inner psychical soul. He concluded therefore that, having disposed of this fallacy of intro-jection, we ought to return to the view of reality as an essential co-ordination of ego and environment, of central part and counter- part, with R-values, C-values and E-values.

It is curious that Avenarius should have brought forward this artificial hypothesis as the natural view of the world, without reflecting that on the one hand the majority of mankind believes that the environment ® exists, has existed, and will exist, without being a counterpart of any living being as central part © ; and that on the other hand it is so far from being natural to man to believe that sensation and thought (E) are different from, and merely depen- dent on, his body ©, that throughout the Homeric poems, though soul is required for other purposes, all thinking as well as sensation is regarded as a purely bodily operation. It is indeed difficult to assign any rational place to the empirio-criticism of Avenarius. It is materialistic without being materialism; it is realistic without being realism. Its rejection of the whole relation of physical and psychical makes it almost too indefinite to classify among philo sophical systems. But its main point is the essential co-ordination of ego and environment, as central part and counterpart, in experi- ence. It is therefore nearly connected with " immanent philosophy." Schuppe, indeed, wrote an article in the Vierteljahrsschrtfl of Avenarius to prove their essential agreement. At the same time Schuppe's hypothesis of one common consciousness uniting the given by a priori categories could hardly be accepted by Avenarius as pure experience, or as a natural view of the world. His " empirio- criticism " is idealistic dualism within experience in an a posteriori form, but with a tendency towards materialism.

4. V olnntaristic Phenomenalism of Wundt. — Wundt's meta- physics will form an appropriate conclusion of this sketch of German idealism, because his patient industry and eclectic spirit have fitted him to assimilate many of the views of his

Wundt.

predecessors. Wundt proves that all idealisms are in a way one. He starts as a phenomenalist from the hypothesis, which we have just

described, that knowledge is ex- perience containing subject and object in inseparable connexion, and has something in common with the premature attempt of Avenarius to develop the hypbthesis of dualism in experience into a scientific philosophy comprehending the universe in the simplest possible manner. Again he agrees with the reaction both to Hume and to Kant in limiting knowledge to mental phenomena, and has affinities with Mach as well as with Lange. His main sympathies are with the Neo-Kantians, and especially with Lange in modifying the a priori, and in extending the power of reason beyond phenomena to an ideal world; and yet the cry of his phenomenalism is not " back to Kant," but " beyond Kant." Though no noumenalist, in many details he is with noumenalists; with Fechner in psycho- physics, in psychophysical parallelism, in the independence of the physical and the psychical chains of causality, in reducing physical and psychical to a difference of aspects, in substituting impulse for accident in organic evolution, and in wishing to recognize a gradation of individual spiritual beings; with Schopenhauer and Hartmann in voluntarism; and even with Schelling and Hegel in their endeavour, albeit on an artificial method, to bring experience under notions, and to unite subject and object in one concrete reality. He has a special relation to Fichte in developing the Kantian activity of Consciousness into will and substituting activity for substantiality as the essence of soul, as well as in breaking down the antithesis between phenomena and things in themselves. At the same time, in spite of his sympathy with the whole development of idealism since Kant, which leads him to reject the thi.cn; in itself, to modify a priorism, and to stop at transcendent " ideals," without postulates of practical reason, he nevertheless ˆas so much sympathy with Kant's Kritik as on its theories ot sense and understanding to build up a system of phenomenalism, according to which knowledge begins and ends with ideas, and finally on its theory of pure reason to accord to reason a power of logically forming an " ideal " of God as ground of the moral " ideal " of humanity — though without any power of logically inferring any corresponding reality. He constructs his system on the Kantian order — sense, understanding, reason — and exhibits most clearly the necessary consequence from psychological to metaphysical idealism. His philosophy is the best exposition of the method and argument of modern idealism — that we perceive the mental and, therefore, all we know and conceive is the mental.

Wundt founds his whole philosophy on four psychological positions: his phenomenalistic theory of unitary experience, his voluntarism, his actualistic theory of soul, and his psycho- logical theory of parallelism. They are positions also which deeply affect, not only the

psychological, but also the meta- physical idealisms of our time, in Germany, and in the whole civilized world.

i. His first position is his phenomenalistic theory of unitary experience. According to him, we begin with an experience of ideas, in which object and idea are originally identical (Vorstellungs- objecf) ; we divide this unitary experience into its subjective and objective factors; and especially in natural science we so far abstract the objects as to believe them at last to be independent things ; but it is the office of psychology to warn us against this popular dualism, and to teach us that there is only a duality of psychical and physical, which are divisible, not separable, factors of one and the game content of our immediate experience; and experience is our whele knowledge. His metaphysical deduction from this psychological view is that all we know is mental phenomena, ” the whole outer world exists for us only in our ideas,” and all that our reason can logically do beyond these phenomena is to frame transcendent ” ideals.”

ii. His second position is his voluntarism. He agrees with Schopenhauer that will is the fundamental form of the spiritual. He does not mean that will is the only mental operation ; for he recognizes idea derived from sensation, and feeling, as well as will. Moreover, he contends that we can neither have idea without feeling and will, nor will without idea and feeling; that idea alone wants activity, and will alone wants content; that will is ideating and activity (vorstellende Thdtigkeil), which always includes motives

and ends and consequently ideas. He is therefore a follower of Schopenhauer as corrected by Hartmann. Like these predecessors, and like his younger contemporary Paulsen, in calling will funda- mental he includes impulse (Trieb). Accordingly he divides will into two species: on the one hand, simple volition, or impulse, which in his view requires as motive a feeling directed to an end, and therefore an idea, e.g. the impulse of a beast arising from hunger and sight of prey; on the other hand, complex volition issuing in a voluntary act requiring decision (Entscheidung) or conscious adoption of a motive, with or without choice. Like other German voluntarists, he imputes ” impulsive will ” to the whole organic world. He follows Fechner closely in his answer to Darwin. If he is to be believed, at the bottom

of all organic evolution organic impulses becoming habits produce structural changes, which are transmitted by heredity; and as an impulse thus gradually becomes secondarily automatic, the will passes to higher activities, which in their turn become secondarily automatic, and so on. As now he supposes feeling even in ” impulsive will ” to be directed to an end, he deduces the conclusion that in organic evolution the pursuit of final causes precedes and is the origin of mechanism. But at what a cost ! He has endowed all the plants in the world with motives, feelings directed to an end, and ideas, all of which, according to him, are required for impulse! He apparently forgets that mere feelings often produce actions, as when one writhes with pain. But even so, have plants even those lowest impulses from feelings of pain or pleasure? Wundt, however, having gone so far, there stops. It is not necessary for him to follow Schopenhauer, Hartmann and Fechner in endowing the material universe with will or any other mental operation, because his phenomenalism already reduces inorganic nature to mere objects of experiencing subjects. Wundt’s voluntarism takes a new departure, in which, however, he was anticipated by the paradox of Descartes: that will is required to give assent to anything perceived (Principia philosophiae, i. 34). Wundt supposes not only that all organisms have outer will, the will to act, but also that all thinking is inner will — the will to think. Now there is a will to think, and Aristotle pointed out that thinking is in our power whenever one pleases, whereas sense depends on an external stimulus (De anima, ii. 5). There is also an impulse to think, e.g. from toothache. But it does not follow that thought is will, or even that there is no thinking without either impulse or will proper. The real source of thinking is evidence. Wundt, however, having supposed that all thinking consists of ideas, next supposes that all thinking is willing. What is the source of this paradox ? It is a confusion of impulse with will, and activity with both. He supposes that all agency, and therefore the agency of thinking, is will. In detail, to express this supposed inner will of thinking, he borrows from Leibnitz and Kant the term ” apper- ception,” but in a sense of his own. Leibnitz, by way of distinction from unconscious perception, gave the name ” apperception ” to consciousness. Kant further insisted that this apperception, ” I think,” is an act of spontaneity, distinct from sense, necessary to regarding all my ideas as mine, and to combining them in a synthetic unity of apperception; which act Fichte afterwards developed into an active construction of all knowledge, requiring; will directed to the end of duty. Wundt, in consequence, thinking with Kant that apperception is a spontaneous activity, and with Fichte that this activity requires will, and indeed that all activity is will, infers that apperception is inner will. Further, on his own account, he

identifies apperception with the process of attention, and regards it as an act necessary to the general formation of compound ideas, to all association of ideas, to all imagination and understanding. According to him, then, attention, even involuntary attention, requires inner will; and all the functions imputed by Hume to association, as well as those imputed to understanding by Kant, require apperception, and therefore inner will. At the same time he does not suppose that they all require the same kind of will. In accordance with his previous division of outer will into impulsive and decisive, he divides the inner will of apperception into passive apperception and active apperception. Apperception in general thus becomes activity of inner will, constituting the process of atten- tion, passive in the form of impulsive will required for association, and active in the form of decisive will required for understanding and judgment. Now, beneath these confusing phrases the point to be regarded is that, in Wundt's opinion, though we can receive sensations, we cannot think at all beyond sense, without some will. This exaggeration of the real fact of the will to think ignores through- out the position of little man in the great world and at the mercy of things which drive him perforce to sense and from sense to thought. Ft is a substitution of will for evidence as ground of assent, and a neglect of our consciousness that we often believe against our will (e.g. that we must die), often without even an impulse to believe, often without taking any interest, or when taking interest in something else of no importance. " The Dean is dead (Pray, what is trumps?)." Yet many psychologists accept the universality of this will to believe, and among them James, who says that " it is far too little recognized how entirely the intellect is built up of practical interests." We should rather say " far too much." Wundt, however, goes still farther. According to him, that which acts in all organisms, that which acts in all thinking, that which divides unitary experience into subject and object,

the source of self-consciousness, the unity of our mental life, " the most proper being of the individual subject is will." In short, his whole voluntarism means that, while the inorganic world is mere' object, all organization is congealed will, and all thinking is apperceptive will. But it must be remembered that these con- clusions are arrived at by confusing action, reaction, life, excita- bility, impulse, and rational desire, all under the one word " will," as well as by omitting the involuntary action of intelligence under the pressure of evidence. It may well be that impulsive feeling is the beginning of minfl; but then the order of mind is feeling, sense, inference, will, which instead of first is last, and implies the others. To proceed, however, with voluntarism, Wundt, as we have seen, makes personality turn on will.

He does not accept the universal voluntarism of Schopenhauer and Hartmann, but believes in individual wills, and a gradation of wills, in the organic world. Similarly, he supposes our personal individual will is a collective will containing simpler will-unities, and he thinks that this conclusion is proved by the continuance of actions in animals after parts of the brain have been removed. In a similar way he supposes our wills are included in the collective will of society. He does not, however, think with Schuppe that there is one common consciousness, but only that there is a collective consciousness and a collective will; not perceiving that then the sun — in his view a mere object in the experience of every member of the collection — would be only a collective sun. Lastly, he believes that reason forms the " ideal " of God as world- will, though without proof of existence. Gn the whole, his vol- untarism, though like that of Schopenhauer and Hartmann, is not the same; not Schopenhauer's, because the ideating will of Wundt's philosophy is not a universal irrational will; and not Hartmann's, because, although ideating will, according to Wundt's phenomenalism, is supposed to extend through the world of organisms, the whole inorganic world remains a mere object of unitary experience.

iii. His third position is his actualistic theory of soul, which he shares with Fichte, Hegel, Fechner and Paulsen. When Fichte had rejected the Kantian soul in itself and developed the Kantian activity of apperception, he considered that soul consists in con- structive activity. Fechner added that the soul is the whole unitary spiritual process manifested in the whole unitary bodily process without being a substance. Wundt accepts Fichte's theory of the actuality, and Fechner's synechological view, of the soul. Taking substance entirely in the sense of substrate, he argues that there is no evidence of a substantial substrate beneath mental operations; that there is nothing except unitary experience consisting of ideas, feelings, volitions, and their unity of will; and that soul in short is not substantia, but actus. He does not see that this unity is only apparent, for men think not always, and will not always. Nor does he see that a man is conscious not of idea, feeling, will, experience, but of something conceiving, feeling, willing and experiencing, which he gradually learns to call himself, and that he is never conscious of doing all this " minding " without his body. If, then, these mental operations were merely actuality, they would be actuality of a man's bodily substance. In truth there is no sound answer to Materialism, except that, besides bodily substance, psychical substance is also necessary to explain how man performs mental actualities consciously (see case Physical Realism, ch. v.). Wundt, however, has satisfied himself, like Fechner, that there is

no real opposition of body and soul, and concludes, in accordance with his own phenomenalism, that his body is only an object abstracted from his unitary experience, which is all that really is of him.

iv. Hence his fourth point is his psychological theory of parallel- ism of physical and psychical reduced to identity in unitary experi- ence. Here his philosophy is Fechnerism phenomenalized. He accepts Fechner's extension of Weber's law of the external stimuli of sense, while judiciously remarking that "the physiological inter- pretation is entirely hypothetical." He accepts psychophysical parallelism in the sense that every psychical process has a physical accompaniment, every physiological function has a psychical meaning, but neither external stimulus nor physiological stimulus is cause of a psychical process, nor vice versa. Precisely like Fechner, he holds that there is a physical causality and energy and there is a psychical causality and energy, parallels which never meet. He uses this psychical causality to carry out his voluntarism into detail, regarding it as an agency of will directed to end*, causing association and understanding, and further acting on a"* principle which he calls the heterogony of ends; remarking very, truly that each particular will is directed to particular ends, but that beyond these ends effects follow as unexpected consequences, and that this heterogony produces social effects which we call custom. But while thus sharply distinguishing the physical and the psychical in appearance, he follows Fechner in identifying them in reality;- except that Fechner's identification is noumenal, Wundt's phenomenal. Wundt does not allow that we know beyond experience any souls of earth, or any other inorganic being. He does not, therefore, allow that there is a universal series of physical and psychical parallels. According to his phenomenalism, the external stimulus and the physiological stimulus are both parallels of the same psychical process; the external body, as well as

my body, is merely an object abstracted from an idea of my experience; and what is really known in every case is a unitary experience ; divisible, but not separable, into body and soul, physical and psychical factors of one and the same unitary experience. Wundt is confined by his starting-point to his deduction that what we know is mental phenomena, ideas regarded as objects and subjects of

experience.

With these four positions in hand, Wundt's philosophy consecu- tively follows, beginning with his psychology. He begins with psychical elements, sensations and feelings, but he asserts that these always exist in a psychical compound, from which they can be discovered only by analysis and abstraction; and his paradox that a pure sensation is an abstraction is repeated by W. James. Further, Wundt declares that the psychical compound of sensations, with which, according to him, we actually start, is not a complex sensation, but a compound idea; so that I am expected to believe that, when I hear the chord of D, I am not conscious of single sensa- tions of D, F, A, and have only a compound idea of the chord — as if the hearing of music were merely a series of ideas! Wundt, how- ever, has a reason for substituting compound idea for sensation : he accepts Lotze's hypothesis of local signs, and adds a hypothesis of temporal signs. He supposes that we have no sensations of space and time, as the nativists suppose, but that, while local signs give us spatial ideas, feelings ot expectation are temporal signs giving us temporal ideas, and that these ideas enter into the psychical com- pound, which is our actual starting-point. It follows that every psychical compound into which temporal and spatial ideas enter must itself be an idea ; and, as time at any rate accompanies all our sensations, it follows that every psychical compound of sensations, containing as it does, always temporal, if not also spatial, ideas, must be a compound idea, and not, as nativists suppose, Schuppe for in- stance, a compound sensation. The next question is, how com- pounded? Wundt's answer is that inner impulsive will, in the form of passive apperception, forms compound ideas by association ; so that all these operations are necessary to the starting-point. He prefixes to the ordinary associations, which descend from Hume, an associa- tion which he calls fusion (Verschmelzung) , and supposes that it is a fundamental process of fusing sensations with spatial and temporal ideas into a compound idea. But he also recognizes association by similarity, or assimilation, or " apperception " in Herbart's more confined sense of the word, and association by contiguity, or complication. Recognizing, then, three kinds of association in all, he supposes that they are the first processes, by which inner will, in the form of passive apperception, generates ideas from sense. So far his psychology is a further development of Hume's. But he does not agree with Hume that mind is nothing but sensations, ideas, and associations, but with Kant, that there are higher combinations. According to him, inner decisive will, rising to active apperception, proceeds to what he calls "apperceptive combinations" {Apperceptionverbindungen) ; first to simple com- binations of

relating and comparing, and then to complex combina- tions of synthesis and analysis in imagination and understanding ; in consequence of which synthesis issues in an aggregate idea {Gesammt-vorstettung), and then at last analysis, by dividing an aggregate idea into subject and predicate, forms a judgment (see further Logic). The main point of this theory is that, if it were true, we should be for ever confined to a jumble of ideas. Wundt, indeed, is aware of the consequences. If judgment is an analysis of an aggregate idea into subject and predicate, it follows, as he says, that " as judgment is an immediate, so is inference a mediate, reference of the members of any aggregate of ideas to one another " {System der Philosophie, 66, first ed.). He cannot allow any inference of things beyond ideas. His psychology poisons his logic.

In his logic, and especially in his epistemology, Wundt appears as a mediator between Hume and Kant, but with more leaning to the latter. While he regards association as lying at the basis of all knowledge, he does not think it sufficient, and objects to Hume that he does not account for necessity, nor for substance and causation as known in the sciences. He accepts on the whole the system of synthetic understanding which Kant superimposed on mere association. Yet he will not proceed to the length of Kant's transcendentalism. Between Hume's a posteriori and Kant's a priori hypothesis he proposes a logical theory of the origin of notions beyond experience. He explains that the arrange- ment of facts requires " general supplementary notions {Hiilfs- oegriffe), which are not contained in experience itself, but are gained by a process of logical treatment of this experience." Of these supplementary notions he holds that the most general is that of causality, coming from the necessity of thought that all our experi- ences shall be arranged according to ground and consequent. That sense only gives to experience coexistences and sequences of appear- ances, as Hume said and Kant allowed, is also Wundt's starting- point. How then do we arrive at causality? Not, says Wundt, by association, as Hume said, but by thinking; not, however, by a priori thinking, as Kant said, but by logical thinking, by applying the logical principle of ground and consequent (which Leibnitz had called the principle of sufficient reason) as a causal law to empirical appearances. Now, Wundt is aware that this is not always possible, for he holds that the logical principle of ground belongs generally to the connexion of thoughts, the causal law to

the combination of empirical appearances. Nevertheless he believes that, when we can apply measures to the combination of empirical appearances, then we can apply the logical principle as causal law to

this cornbination, and say that one appearance is the cause of another, thus adding a notion of causality not contained in the actual observations, but specializing the general notion of causality. He quotes as an instance that Newton in this way added to the planetary appearances contained in Kepler's laws the gravitation of the planets to the sun, as a notion of causality not contained in the appearances, and thus discovered that gravitation is the cause of the appearances. But Newton had already discovered before- hand in the mechanics of terrestrial bodies that gravitation con- stantly causes similar facts on the earth, and did not derive that cause from any logical ground beyond experience, any more than he did the third law of motion. Wundt does not realize that, though we can often use a cause or real ground (principium essendi) as a logical ground {principium cognoscendi) for deducing effects, we can do so only when we have previously inferred from experience that that kind of cause does produce that kind of effect (see Logic). Otherwise, logical ground remains logical ground, as in any non- causal syllogism, such as the familiar one from " All men are mortal," which causes me to know that I shall die, without telling me the cause of death. Wundt, however, having satisfied himself of the power of mere logical thought beyond experience, goes on to further apply his hypothesis, and supposes that, in dealing with the physical world, logical thinking having added to experience the " supple- mentary notion " .of causality as the connexion of appearances which vary together, adds also the " supplementary notion " of substance as substratum of the connected appearances. But, using substance as he does always in the Kantian sense of permanent substratum beneath changi.ig phenomena, and never in the Aris- totelian sense of any distinct thing, he proceeds to make distinctions between the applications of causality and of substance. Even in the physical, he confines substance to matter, or what Aristotle would call material causes, thus makes its power to be merely passive, and limits substantial causality to potential energy, while he supposes that actual causality is a relation not of substances but of events. On this false abstraction Sigwart has made an excellent criticism in an appendix at the end of his Logic, where he remarks that we cannot isolate events from the substances of which they are attributes. Motions do not cause motions; one body moving causes, another body to move: what we know is causal substances. Secondly, when Wundt comes to the psychical, he naturally infers from his narrow Kantian definition of substance that there is no proof of a substrate over and above all mental operations, and falsely thinks that he has proved that there is no substance mentally operating in the Aristotelian sense. Thirdly, on the grounds that logical thinking adds the notion of substance, as substrate, to experience of the physical, but

not of the psychical, and that the most proper being of mind is will, he concludes that wills are not active substances, but substancergenerating activities (" nicht thatige Substanzen sondern substanzerzeugende Thatigkeiten," System, 429).

What kind of metaphysics, then, follows from this compound of psychology and epistemology? As with Kant against Hume, so with Wundt against Mach and Avenarius, the world we know will contain something more than mere complexes of sensations, more than pure experience: with Wundt it will be a world of real causes and some substances, constituted partly by experience and partly by logical thinking, or active inner will. But as with Kant, so with Wundt, this world will be only the richer, not the wider, for these notions of understanding; because they are only contributed to the original experience, and, being mentally contributed, only the more surely confine knowledge to experience of mental phenomena. Hence, according to Wundt, the world we know is still unitary experience, distin- guished, not separated, into subject and object, aggregates of ideas analysed by judgment and combined by inference, an object of idea elaborated into causes and substances by logical thinking, at most a world of our ideas composed out of our sensations, and arranged under our categories of our under- standing by our inner wills, or a world of our ideating willS"; but nothing else. It is Wundt's own statement of his solution of the epistemological problem " that on the one hand the whole outer world exists for us only in our ideas, and that on the other hand a consciousness without objects of idea is an empty abstrac- tion which possesses no actuality " {System, 212-213). There remains his theory of reason. His pupil, Oswald Kiilpe (1862-), who bases his Grundriss der Psychologie on the hypothesis of unitary experience, says in his Einleitung in die Philosophie (1895; 4th ed. 1907) that Wundt in his System derives the right of metaphysics to transcend experience from similar procedure

within the limits of the special sciences. This is Wundt's view, but only in the sense that reason passes from ideas to " ideals," whether in the special sciences or in metaphysics. Reason, as in most modern psychologies and idealisms, is intro- duced by Wundt, after all sorts of operations, too late; and, when at length introduced, it is described as going beyond ideas and notions to " ideals " (Ideen), as an ideal

continuation of series of thoughts beyond given experience — nothing more. Reason, according to Wundt, is like pure reason according to Kant; except that Wundt, receiving Kantism through Neo- Kantism, thinks that reason arrives at ” ideals ” not a priori, but by the logical process of ground and consequent, and, having abolished the thing in itself, will not follow Kant in his inconsequent passage from pure to practical reason in order to postulate a reality corresponding to ” ideals ” beyond experience. Wundt, in fact, agrees with Lange: that reason transcends experience of phenomena only to conceive ” ideals.” This being so, he finds in mathematics two kinds of transcendence — real, where the transcendent, though not actual in experience, can become partly so, e.g. the divisibility of magnitudes; imaginary, where it cannot, e.g. w-dimensions. He supposes in metaphysics the same transcendence in forming cosmological, psychological, and ontological ” ideals.” He supposes real as well as imaginary transcendence in cosmological “ideals”; the former as to the forms of space and time, the latter as to content, e.g. atoms. But he limits psychological and ontological ” ideals ” entirely to imaginary transcendence. The result is that he confines metaphysical transcendence to ” a process into the imaginary ” as regards the substantial and causal content of cosmological ” ideals,” and altogether as regards psychological and ontological ” ideals.” Thus, according to him, in the first place reason forms a cosmological ” ideal ” of a multitude of simple units related; secondly, it forms a psycho- logical ” ideal ” of a multitude of wills, or substance-generating activities, which communicate with one another by ideas so that will causes ideas in will, while together they constitute a collective will, and it goes on to form the moral ideal of humanity (das sittliche Menschheitsideal); and, thirdly, it forms an ontologi- cal ” ideal ” of God as ground of this moral ” ideal,” and there- with of all being as means to this end, and an ” ideal ” of God as world-will, of which the world is development, and in which individual wills participate each in its sphere. ” Herein,” says Wundt, ” consists the imperishable truth of the Kantian proposition that the moral order of the world is the single real proof of the existence of God ” {System, 405; cf. 439). ” Only,” he adds, ” the expression proof is here not admissible. Rational ‘ ideals ‘ are in general not provable.” As the same limit is applied by him to all transcendent rational ” ideals,” and especially to those which refer to the content of the notion of the world, and, like all psychological and ontological “ideals,” belong to the imaginary transcendent, his conclusion is that reason, in transcending experience, logically conceives ” ideals,” but never logically infers corresponding realities.

The conclusion that reason in transcending experience can show no

more than the necessity of ” ideals ” is the only con- clusion which could follow from Wundt’s phenomenalism in psychology, logic, and epistemology. If knowledge is experience of ideas distinguished by inner will of apperception into subject and object in inseparable connexion, if the starting-point is ideas, if judgment is analysis of an aggregate idea, if inference is a mediate reference of the members of an aggregate of ideas to one another, then, as Wundt says, all we can know, and all reason can logically infer from such data, is in our ideas, and consciousness without an object of idea is an abstraction; so that reason, in transcending experience, can show the necessity of ideas and ” ideals,” but infer no corresponding reality beyond, whether in nature, or in Man, or in God. Wundt, starting from a psychology of unitary experience, deduces a consistent meta- physics of no inference of things transcending experience through- out — or rather until he came to the very last sentence of his System der PhUosophie (1889), where he suddenly passes from a necessity of ” ideals ” {Ideen), to a necessity of ” faith ”

(Glauben), without ” knowledge ” (Wissen). He forgets appar- ently that faith is a belief in things beyond ideas and ideals, which is impossible in his psychology of judgment and logic of inference. The fact is that his System may easily seem to prove more than it does. He describes it as idealism in the form of ideal realism, because it recognizes an ideating will requiring substance as substratum or matter for outer relations of pheno- mena. But when we look for the evidence of any such will beyond ourselves and our experience, we find Wundt offering nothing but an ontological ” ideal ” of reason, and a moral ” ideal ” requiring a religious ” ideal,” but without any power of inferring a corresponding reality. The System then ends with the necessity of an ” ideal ” of God as wo rid- will, but provides no ground for the necessity of any belief whatever in the being of God, or indeed in any being at all beyond our own unitary experience.

Wundt, however, afterwards wrote an Einleitung in die PhUosophie (1901; 4th ed., 1906), in which he speaks of realism in the form of ideal realism as the philosophy of the future. It is not to be idealism which resolves everything into spirit, but realism which gives the spiritual and the material each its own place in harmony with scientific consciousness. It is not to be dualistic but monistic realism, because matter is not separate from spirit. It is not to be materialistic but ideal realism, because the physical and the psychical are inseparable parallels inexplicable by one another. It is to be monistic ideal realism, like that of Fichte and Hegel; not, however, like theirs idealistic in method, a Phantaslisches Begriffsgebaude, but realistic in method, a Wissenschaftliche PhUosophie. It is to be ideal realism, as

in the System. It is not to be a species of idealism, as in the System — but of realism. How are we to understand this change of front? We can only explain it by supposing that Wundt wishes to believe that, beyond the ” ideal,” there really is proof of a transcendent, ideating, sub- stance-generating will of God; and that he is approaching the noumenal voluntarism of his younger contemporary Paulsen. But to make such a conversion from phenomenalism plausible, it is necessary to be silent about his whole psychology, logic, and epistemology, and the consequent limitation of knowledge to experience, and of reason to ideas and ” ideals,” without any power of inferring corresponding things.

What a pity it is that Wundt had committed himself by his psychology to phenomenalism, to unitary experience, and to the limitation of judgment and reason to ideas and ideals! For his phenomenalism prevents him from consistently saying the truth inferred by reason — that there is a world beyond experience, a world of Nature, and a will of God, real as well as ideal. To understand Wundt is to discover what a mess modern psychology has made to metaphysics. To understand pheno- menal idealism in Germany is to discover what a narrow world is to be known from the transcendental idealism of Kant shorn of Kant’s inconsistencies. To understand noumenal idealism in Germany and the rise of metaphysical idealism in modern times is to discover that psychological is the origin of all meta- physical idealism. If we perceive only what is mental, all that we know is only mental. But who has proved that psychological starting-point? Who has proved that, when I scent an odour in my nostrils, I apprehend not odour but a sensation of odour; and so for the other senses? Sensation, as Aristotle said, is not of itself: it is the apprehension of a sensible object in the organism. I perceive pressure, heat, colour, sound, flavour, odour, in my five senses. Having felt reciprocal pressures ˆh touch, I infer similar pressures between myself and the external world.

6. — English Idealism 1. The Followers of Hume's Phenomenalism. — Compared with the great systems of the Germans, English idealism in the 19th century shows but little originality. It has been largely borrowed either from previous English or from later German idealism, and what originality it has possessed has been mainly shown in that spirit of eclectic compromise which is so dear to the English mind. The predominant influence, on the whole,

has been the phenomenalism of Hume, with its slender store of sensations, ideas and associations, and its conclusion that all we know is sensations without any known thinkers or any other known things. This phenomenalism was developed by James Mill (i 773-1836) and J. S. Mill (1806-1873), and has since been continued by A. Bain. It also became the basis of the philosophies of Huxley and of Spencer on their phenomenalistic side. It is true that Spencer's " transfigured realism " contains much that was not dreamt of by Hume. Spencer widens the empirical theory of the origin of knowledge by his brilliant hypothesis of inherited organized tendencies, which has influ- enced all later psychology and epistemology, and tends to a kind of compromise between Hume and Kant. He describes his belief in an unknowable absolute as " carrying a step farther the doctrine put into shape by Hamilton and Mansel." He develops this belief in an absolute in connexion with his own theory of evolution into something different both from the idealism of Hume and the realism of Hamilton, and rather falling under the head of materialism. Nevertheless, as he believes all the time that everything knowable throughout the whole world of evolution is phenomena in the sense of subjective affections of consciousness, and as he applies Hume's distinction of impressions and ideas as a distinction of vivid and faint states of consciousness to the distinction of ego and non-ego, spirit and matter, inner and outer phenomena, his philosophy of the world as knowable remains within the limits of phenomenal- ism. Nothing could be more like Hume than his final statement that what we are conscious of is subjective affections produced by objective agencies unknown and unknowable. The " anti- realism," which takes the lion's share in " transfigured realism," is simply a development of the phenomenalism of Hume. Hume was also at the bottom of the philosophies of G. H. Lewes, who held that there is nothing but feelings, and of W. K. Clifford. Nor is

Hume yet dethroned, as we see from the works of Karl Pearson and of William James, who, though an American, has exercised a considerable influence on English thought. The most flourishing time of phenomenalism, however, was during the lifetime of J. • S. Mill. It was counteracted to some extent by the study at the universities of the deductive logic of Aristotle and the inductive logic of Bacon, by parts of Mill's own logic, and by the natural realism of Reid, Stewart, and Hamilton, which met Hume's scepticism by asserting a direct perception of the external world. But natural realism, as finally interpreted by . Hamilton, was too dogmatic, too unsystematic, and too confused with . elements derived from Kantian idealism to withstand the brilliant criticism of Mill's Examination of Sir William Hamilton's Philosophy (1865), a work which for a time almost persuaded us that Nature as we know it from sensations is nothing but per- manent possibilities of sensation, and oneself only a series of states of consciousness.

a. The Influence of Kant and Hegel. — Nevertheless, there have never been wanting more soaring spirits who, shocked at the narrowness of the popular phenomenalism of Hume, have tried to find a wider idealism. They have, as a rule, sought it in Germany. Before the beginning of the 19th century, Kant had made his way to England in a translation of some of his works, and in an account of the Elements of the Critical Philosophy by A. F. M. Willich, both published in 1798. After a period of struggle, the influence of Kant gradually extended, and, as we see in the writings of Coleridge and Carlyle, of Hamil- ton and Mansel, of Green and Caird, of Laurie, Martineau and others, has secured an authority over English thought almost equal to that of Hume (see Idealism). Both philosophers appeal to the English love of experience, and Kant had these advantages over Hume: that within the narrow circle of sensible phenomena his theory of understanding gave to experience a fuller content, and that beyond phenomena, however incon- sistently, his theory of reason postulated the reality of God, freedom and immortality. Other and wtoer German philo- sophies gradually followed that of Kant to England. Coleridge (1772-1834) not only called attention to Kant's distinction

between understanding and reason, but also introduced his countrymen to the noumenal idealism of Schelling. In the Biographia Literaria (181 7) he says that in Schilling's Natur- philosophie and System des transcendentalen Idealismus he first found a general coincidence with much that he had toiled out for himself, and he repeated some of the main tenets of Schelling. Carlyle (1 795-1881) laid more emphasis on Fichte. At the height of his career, when between 1840 and 1850 many of Fichte's works were being translated

in the Catholic Series, he called attention to Fichte's later view that all earthly things are but as a vesture or appearance under which the Divine idea of the world is the reality. Extravagant as this noumenalism is, it was a healthy antidote to the phenomenalism of the day. Among other followers of German idealism were J. F. Ferrier (q.v.), who adopted the hypothesis of Schelling and Hegel that there is one absolute intelligence (see his Lectures and Philo- sophical Remains, 1866, i. 1-33; ii. 545-568), and J. Hutchison Stirling (q.v.). About the same time Benjamin Jowett (q.v.) had been studying the philosophy of Hegel; but, being a man endowed with much love of truth but with little belief in first principles, he was too wise to take for a principle Hegel's assump- tion that different things are the same. He had, however, sown seeds in the minds of two distinguished pupils, T. H. Green and E. Caird (q.v.). Both proceeded to take Hegelian- ism seriously, and between them spread a kind of Hegelian orthodoxy in metaphysics and in theology throughout Great Britain. Green (Prolegomena to Ethics, 1 ˆ 8 3)t h Green tried to effect a harmony of Kant and Hegel by proceeding from the epistemology of the former to the metaphysics of the latter. Taken for granted the Kantian hypothesis of a sense of sensations requiring synthesis by under- standing, and the Kantian conclusion that Nature as known consists of phenomena united by categories as objects of experi- ence, Green argued, in accordance with Kant's first position, that knowledge, in order to unite the manifold of sensations by relations into related phenomena, requires unifying intelli- gence, or what Kant called synthetic unity of apperception, which cannot itself be sensation, because it arranges sensations; and he argued, in accordance with Kant's second position, that therefore Nature itself as known requires unifying intelligence to constitute the relations of its phenomena, and to make it a connected world of experience. When Green said that " Nature is the system of related appearances, and related appearances are impossible apart from the action of an intelligence," he was speaking as a pure Kantian, who could be answered only by the Aristotelian position that Nature consists of related bodies beyond appearances, and by the realistic supposition that there is a tactical sense of related bodies, of the inter-resisting members of the organism, from which reason infers similar related bodies beyond sense. But now, whatever opinion we may have about Nature, at all events, as Green saw, it does not come into exist- ence in the process by which this person or that begins to think. Nature is not my nature, nor your nature, but one. From this fact of unity of Nature and of everything in Nature, combined with the two previous positions accepted, not from Nature, but from Kant, Green proceeded to argue, altogether beyond Kant, that Nature, being one, and also requiring unifying intelligence,

requires one intelligence, an eternal intelligence, a single spiritual principle, prior to, and the condition of, our individual knowledge. According to him, therefore, Nature is one system of phenomena united by relations as objects of experience, one system of relaxed appearances, one system of one eternal intelligence which reproduces itself in us. The ” true account “. of the world in his own words is ” that the concrete whole, which may be de- scribed indifferently as an eternal intelligence realized in the related facts of the world, or as a system of related facts rendered possible by such an intelligence, partially and gradually repro- duces itself in us, communicating piecemeal, but in inseparable correlation, understanding and the facts understood, experience and the experienced world.” Nobody can mistake the Schellin- gian and Hegelian nature of this conclusion. It is the Hegelian view that the world is a system of absolute reason. But it is

not a Kantian view; and it is necessary to correct two confusions of Kant and Hegel, which have been imported with Hegelianism by Green and Caird. Ferrier was aware that in Kant’s system ” there is no common nature in all intelligence ” {Lectures, ii. 568). Green, on the other hand, in deducing his own conclusion that the world is, or is a system of, one eternal intelligence, incautiously put it forward as ” what may be called broadly the Kantian view ” {Prolegomena, § 36), and added that he follows Kant ” in maintaining that a single active conscious principle, by whatever name it be called, is necessary to consti- tute such a world, as the condition under which alone phenomena, i.e. appearances to consciousness, can be related to each other in a single universe” (§ 38). He admitted, however, that Kant also asserted, beyond this single universe of a single principle, a world of unknowable things in themselves, which is a Kantian not a Hegelian world. But Caird endeavoured to break down even e. Caird *^ s secon d barrier between Kant and Hegel. Accord- ing to Caird, Kant ” reduces the inaccessible thing in itself (which he at first speaks of as affecting our sensibility) to a noumenon which is projected by reason itself ” {Essays, ii. 405); and in the Transcendental Dialectic, which forms the last part of Kant’s Kritik, the noumenon becomes the object of an intuitive understanding ” whose thought,” says Caird, “is one with the existence of the objects it knows” (ibid. 412, 413). Kant, then, as interpreted by English Hegelians, already believed, before

Hegel, that there is one intelligence common to all individuals, and that a noumenon is a thought of this common intelligence, ” an ideal of reason “; so that Kant was trying to be a Hegelian, holding that the world has no being beyond the thoughts of one intelligence. But history repeats itself; and these same two interpretations of Kant had already been made in the lifetime of Kant by Fichte, in the two Introductions to the ” Wissenschaftslehre,” which he published in his Philosophical Journal in 1797. Now, the curious fact is, that Kant himself wrote a most indignant letter, dated 7th August 1799 {Kant’s Werke, ed. Hartenstein, viii. 600-601), on purpose to repudiate all connexion with Fichte. Fichte’s ” Wissen- schaftslehre,” he said, is a completely untenable system, and a metaphysics of fruitless apices, in which he disclaimed any participation; his own Kritik he refused to regard as a pro- paedeutic to be construed by the Fichtian or any other stand- point, declaring that it is to be understood according to the letter; and he went so far as to assert that his own critical philosophy is so satisfactory to the reason, theoretical and practical, as to be incapable of improvement, and for all future ages indispensable for the highest ends of humanity. After this letter it cannot be doubted that Kant not only differed wholly from Fichte, both about the synthetic unity of appercep- tion and about the thing in itself, but also is to be construed literally throughout. When he said that the act of consciousness ” I think,” is in allem Bewusstsein ein und dasselbe, he meant, as the whole context shows, not that it is one in all thinkers, but only that it accompanies all my other ideas and is one and the same in all my consciousness, while it is different in different thinkers. Though again in the Transcendental Dialect he spoke of pure reason conceiving ” ideals ” of noumena, he did not mean that a noumenon is nothing but a thought arising only through thinking, or projected by reason, but meant that pure reason can only conceive the “ideal” while, over and above the ” ideal ” of pure reason, a noumenon is a real thing, a thing in itself, which is not indeed known, but whose existence is postu- lated by practical reason in the three instances of God, freedom, and immortality. Consequently, Kant’s explanation of the unity of a thing is that there is always one thing in itself causing in us many phenomena, which as understood by us are objectively valid for all our consciousnesses. What Kant never said and what his whole philosophy prevented his saying, was that a single thing is a single thought of a single consciousness; either of men, as in Fichte’s philosophy, or of God and man, as in Hegel’s. The passage from Kant to Hegel attempted by Green, and the harmony of Kant and Hegel attempted by Green and Caird, are unhistorical, and have caused much confusion of

thought. The success, therefore, of the works of Green and Caird must stand or fall by their Hegelianism, which has indeed secured many adherents, partly metaphysical and partly theo- logical. Among the former we may mention W. Wallace, the translator of most of Hegel's Encyklopadie, who had previously learnt Hegelianism from Ferrier; W. H. Fairbrother, who has written a faithful account of The Philosophy of Thomas Hill Green (1896); R. L. Nettleship, D. G. Ritchie, J. H. Muirhead, J. S. Mackenzie, and J. M. E. M'Taggart, who closes his acute Studies in Hegelian Cosmology (1901) with " the possibility of finding, above all knowledge and volition, one all-embracing unity, which is only not true, only not good, because all truth and all goodness are but distorted shadows of its absolute perfection — ' das Unbegreifliche, weil es der Begriff selbst ist.'"

There are still to be mentioned two English Hegelians, who have not confused Kant and Hegel as Green did: namely, Simon Somerville Laurie (1829-1909) and F. H. Bradley (b. 1846), fellow of Merton College, Oxford.

Laurie wrote Metaphysica, nova et vetusta, a Return to Dualism, by Scotus Novanticus (1884; 2nd ed., enlarged, 1889). His attitude to Green is expressed towards the end of his book, where Laurie he says: " The more recent argument for God which resolves itself into the necessity of a self-distinguishing one basis to which nature as a mere system of relations must be referred, is simply the old argument of the necessity for a First Cause dressed up in new clothes. Not by any means an argument to be despised, but stopping short of the truth through an inadequate analytic of knowledge." His aim is to remedy this defect by psychology, under the conviction that a true metaphysics is at bottom psychology, and a true psychology fundamentally metaphysics. His psychology is founded on a proposed distinction between " attuition " and reason. His theory of " attuition," by which he supposes that we become conscious of objects outside ourselves, is his " return to dualism," and is indeed so like natural realism as to suggest that, like Ferrier, he starts from Hamilton to end in Hegel. As, however, he does not suppose that we have a direct perception of something resisting the organism, such as Hamilton maintained, it becomes necessary to state exactly what he means by " attuition." It is, according to him, something more than sensation, but less than perception; it is common to us with lower animals such as dogs; its operation consists in co-ordinating sen- sations into an aggregate which the subject throws back into space, and thereby has a consciousness of a total object outside itself, e.g. a stone or a stick, a man or a moon. He carries its operation before reason still farther, supposing that " attuition " makes particular inferences about outside

objects, and that a man, or a dog, through association ” attuites ” sequence and invariable- ness of succession, and, in fact, gets as far in the direction of causation as Hume thought it possible to go at all. Laurie’s view is that a dog who has no higher faculty than ” attuition,” can go no farther; but that a man goes farther by reason. He thinks that ” attuition ” gives us consciousness of an object, but without knowledge, and that knowledge begins with reason. His theory of reason brings him into contact with the German idealists: he accepts from Kant the hypothesis of synthesis and a priori categories, from Fichte the hypothesis that will is necessary to reason, from Schelling and Hegel the hypothesis of universal reason, and of an identity between the cosmic reason and the reason of man, in which he agrees also with Green and Caird. But he has a peculiar view of the powers of reason; that (1) under the law of excluded middle it states alterna- tives, A or B or C or D ; (2) under the law of contradiction it negates B, C, D; (3) under the law of sufficient reason it says ” therefore “; and (4) under the law of identity it concludes, A is A. In working out this process he supposes that reason throws into consciousness a priori categories, synthetic predicates a priori, or, as he also calls them, ” dialectic percepts.” Of these the most important is cause, of which his theory, in short, is that by this a priori category and the process of reason we go on from sequence to consequence; first stating that an effect may be caused by several alternatives, then negating all but one, next concluding that this one as sufficient reason is cause, and finally attaining the necessity of the causal nexus by.con- verting causality into identity, e.g. instead of ” Fire burns wood,” putting ” Fire is comburent, wood is combustible.” Lastly, while he agrees with Kant about a priori categories, he differs about the knowledge to be got out of them. Kant, applying them only to sensations, concluded that we can know nothing beyond by their means. But Laurie, applying them to ” attuitions ” of objects out- side, considers that, though they are ” reason-born,” yet they make us know the objects outside to which they are applied. This is the farthest point of his dualism, which suggests a realistic theory of knowledge, different in process from Hamilton’s, but with the same result. Not so : Laurie is a Hegelian, using Kant’s categories, as Hegel did, to argue that they are true not only of thoughts but of things; and for the same reason, that things and thoughts are the same. At first in his psychology he speaks of the ” attuition”

and the rational perception of an outside object. But in his metaphysics founded thereon he interprets the outside object to mean an object outside you and me, but not self-subsistent ; not outside universal reason, but only ” Be’ent reason.” He quotes with approval Schelling’s phrase, ” Nature is visible Intelligence and Intelligence visible Nature.” He agrees with Hegel that there are two fundamental identities, the identity of all reason, and the identity of all reason and all being. Hence he explains, what is a duality for us is only a ” quasi-duality ” from a universal standpoint. In fact, his dualism is not realism, but merely the distinction of subject and object within idealism. Laurie’s meta- physics is an attempt to supply a psychological propaedeutic to Hegelian metaphysics.

Bradley’s Appearance and Reality (1893) is a more original performance. It proceeds on the opposite method of making metaphysics independent of psychology. ” Meta- physics,” says he, ” has no direct interest in the origin of ideas ” (254), and ” we have nothing to do here with the psychological origin of the perception ” (35). This metaphysical method, which we have already seen attempted by Lotze, is the true method, for we know more about things than about the beginnings of our knowledge. Bradley is right to go straight to reality, and right also to inquire for the absolute, in order to take care that his meta- physical view is comprehensive enough to be true of the world as a whole. He is unconsciously returning to the meta- physics of Aristotle in spirit; yet he differs from it Mo coelo in the letter. His starting-point is the view that things as ordinarily understood, and (we may add) as Aristotle understood them (though with important qualifications) are self-contradic- tory, and are therefore not reality but appearances. If they were really contradictory they would be non-existent. However, he illustrates their supposed contradictoriness by examples, such as one substance with many attributes, and motion from place to place in one time. But he fails to show that a substance is one and many in the same respect, and that motion requires a body to be in two places at the same moment of one time. There is no contradiction (as Aristotle said) between a man being determined by many attributes, as rational, six-foot-high, white, and a father, and yet being one whole substance distinct from any other, including his own son; nor is there any contradiction between his body being in bed at 8.15 and at breakfast at 8.45 within the same hour. Bradley’s supposed contradictions are really mere differences. So far he reminds one of Herbart, who founded his ” realistic ” metaphysics on similar misunder- standings; except that, while Herbart concluded that the world consists of a number of simple ”

reals," each with a simple quality but unknown, Bradley concludes that reality is one absolute experience which hartnonizes the supposed contra- dictions in an unknown manner. If his starting-point recalls Herbart his method of arriving at the absolute recalls Spinoza. In his Table of Contents, ch. xiii., on the General Nature of Reality, he says, in true Spinozistic vein, "The Real is one substantially. Plurality of Reals is not possible." In the text he explains that, if there were a plurality of reals, they would have to be beings independent of each other, and yet, as a plurality related to each other — and this again seems to him to be a contra- diction. Throughout the rest of the work he often repeats that a thing which is related cannot be an independent thing. Now, if " independent " means " existing alone " and unrelated the same thing could not be at once related and independent; and, taking substance as independent in that sense, Spinoza concluded that there could only be one substance. But this is not the sense in which a plurality of things would have to be independent in order to exist, or to be substances in the Aristotelian sense. "Independent" (xupwrbv), or "self-subsistent" (ko9′ ainb) means " existing apart," i.e. existing differently: it does not mean " existing alone," solitary, unrelated. This existing apart is the only sense in which a plurality of things need be indepen- dent in order to be real, or in order to be substances; and it is a sense in which they can all be related to each other, as I am not you, but I am addressing you. There is no contradiction, then, though Bradley supposes one, between a thing being an indivi- dual, independent, self-subsistent substance, existing apart as a

distinct thing, and being also related to other things. Accord- ingly, the many things of this world are not self-discrepant, as Bradley says, but are distinct and relative substances, as Aristotle said. The argument, therefore, for one substance in Spinoza's Ethics, and for one absolute, the Real, which is one substantially, in Bradley's Appearance and Reality, breaks down, so far as it is designed to prove that there is only one substance, or only one Real. Bradley, however, having satisfied himself, like Spinoza, by an abuse of the word " independent," that " the finite is self discrepant," goes on to ask what the one Real, the absolute, is; and, as he passed from Herbart to Spinoza, so now he passes from Spinoza to Kant. Spinoza answered realistically that the one substance is both extended and thinking. Bradley answers idealistically that the one Real is one absolute experience, because all we know is experience. "This absolute," says he, "is experience, because that is really what we mean when we predicate or speak of anything." But in order to identify the absolute with experience he is obliged, as he before abused the words "

contradictory ” and ” indepen dent,” so now to abuse the word ” experience.” ” Experience,” says he, ” may mean experience only direct, or indirect also. Direct experience I understand to be confined to the given simply, to the merely felt or presented. But indirect experience includes all fact that is constructed from the basis of the ‘ this ‘ and the ‘ mine.’ It is all that is taken to exist beyond the bare moment ” (248). This is to substitute ” indirect experience ” for all inference, and to maintain that when, starting from any ” direct experience,” I infer the back of the moon, which is always turned away from me, I nevertheless have experience of it; nay, that it is experience. Having thus confused contradiction and differ- ence, independence and solitariness, experience and inference, Bradley is able to deduce finally that reality is not different substances, experienced and inferred, as Aristotle thought it, but is one absolute super-personal experience, to which the so- called plurality of things, including all bodies, all souls, and even a personal God, is appearance — an appearance, as ordinarily understood, self-contradictory, but, as appearing to one spiritual reality, somehow reconciled. But how ?

3. Other German Influences. — Brief reference only can be made to four other English idealists who have quarried in the rich mines of German idealism: G. H. Lewes, W. K. Clifford, G. J. Romanes and Karl Pearson. Lewes (g.v.), starting from the phenomenalism of Hume, fell under the spell of Kant and his successors j and produced a compromise between QH r ewes- Hume and Kant which recalls some of the later German phenomenalisms which have been described (see his Problems of Life and Mind). Rejecting everything in the Kritik which savoured of the ” metempirical,” he yet sympathized so far with Hegel’s noumenalism as to accept the identification of cause and effect, though he interpreted the hypothesis pheno- menalistically by saying that cause and effect are two aspects of the same phenomenon. But his main sympathy was with Fechner, the gist of whose ” inner psychophysics ” he adopted, without, however, the hypothesis that what is conscious in us is conscious in the all-embracing spirit of God. His phenomenal- ism also compelled him to give a more modified adhesion to Fechner’s ” outer psychophysics.” It will be remembered that Fechner regarded every composite body as the appearance of a spirit; so that when, for example, molecular motion of air is said to cause a sensation of sound in me, it is really a spirit appearing as air which causes the sensation in m%. spirit. This noumenalism would not do for Lewes, who says that air is a group of qualities, and qualities are feelings, and motion is a mode of feeling. What, then, could he make of the external stimulus ? He was obliged by his phenomenalism to say that it is only one feeling causing another in me. He ingeniously

suggested that the external agent is one feeling regarded objectively, and the internal effect another feeling regarded subjectively; ” and therefore,” to quote his own words, ” to say that’ it is a molecular movement which produces a sensation of sound, is equivalent to saying that a sensation of sight produces a sensation of hearing.” Accordingly,

his final conclusion is that ” existence — the absolute — is known to us in feeling,” and ” the external changes are symbolized as motion, because that is the mode of feeling into which all others are translated when objectively considered: objective consider- ation being the attitude of looking at the phenomena, whereas subjective consideration is the attitude of any other sensible response.” He does not say what happens when we use vision alone and still infer that an external stimulus causes the internal sensation. But his metaphysics is an interesting example of a phenomenalist, sympathizing with noumenalists so different as Hegel and Fechner, and yet maintaining his phenomenalism. In this feature the phenomenalism of Lewes is the English parallel to the German phenomenalism of Wundt. At the same time, and under the derivative influence of Wundt, rather than the more original inspiration of Fechner, W. K. Clifford (q.v.) was working out the hypothesis of psychophysical parallelism to a conclusion different from that of Lewes, and more allied to that of Leibnitz, the prime originator of all these hypotheses. Clifford W. K. advanced the hypothesis that the supposed un- cilfford. conscious units of feeling, or psychical atoms, are the ” mind-stuff ” out of which everything physical and psychical is composed, and are also things in themselves, such as Kant supposed when he threw out the hint that after all ” the Ding-an- sich might be of the nature of mind ” (see Mind, 1878, p. 67). As a matter of fact, this ” mind-stuff ” of Clifford is far more like the ” petites perceptions ” of Leibnitz, from which it is indirectly derived. This hypothesis Clifford connected with the hypothesis of psychophysical parallelism. He maintained that the physical and the psychical are two orders which are parallel without interference; that the physical or objective order is merely phenomena, or groups of feelings, or ” objects,” while the psychical or subjective order is both a stream of feelings of which we are conscious in ourselves, and similar streams which we infer beyond ourselves, or, as he came to call them, ” ejects “; that, if we accept the doctrine of evolution at all, we must

carry these ejective streams of feelings through the whole organic world and beyond it to the inorganic world, as a ” quasimental fact “; that at bottom both orders, the physical phenomena and the psychical streams, are reducible to feelings; and that therefore there is no reason against supposing that they are made out of the same ” mind-stuff,” which is the thing-in-itself. The resem- blance of this noumenal idealism to that of Fechner is unmistak- able. The difference is that Clifford considers ” mind-stuff ” to be unconscious, and denies that there is any evidence of con- sciousness apart from a nervous system. He agrees with du Bois-Reymond in refusing to regard the universe as a vast brain animated by conscious mind. He disagrees with Fechner’s hypothesis of a world-soul, the highest spirit, God, who embraces all psychophysical processes. Curiously enough, his follower G. J. Romanes (q.v.) took the one step needed to bring Cliffordism completely back to Fechnerism” In his Rede Lecture on Mind and Motion (1885), he said that Clifford’s deduction, that the a. j. universe, although entirely composed of ” mind-stuff,”

Romanes. j s itself mindless, did not follow from his premisses. Afterwards, when the lecture was published in Mind and Motion and Monism (1895), this work also contained a chapter on ” The World as an Eject,” in which Romanes again contended against Clifford that the world does admit of being regarded as an eject, that is, as a mind beyond one’s own. At the same time, he refused to regard this ” world-eject ” as personal, because personality implies limitation. He concludes that the integrating principle of the whole — the Spirit, as it were, of the Universe — must be something akin to, but immeasurably superior to, the ” psychism ” of man. Nothing can be more curious than the way in which a school of English philosophers, which originally started from Hume, the most sceptical of phenomenalists, thus gradually passed over to Leibnitz and Fechner, the originators of panpsychistic noumenalism. The Spirit of the Universe contemplated by Romanes is identical with the World-soul contemplated by Fechner.

Karl Pearson (The Grammar 0} Science, 1892, 2nd enlarged ed., 1900), starting from Hume’s phenomenal idealism, has developed

James Ward.

Views closely allied to Mach’s universal physical phenomenology. What Hume called repeated sequence Pearson calls ” routine ” of perceptions, and, like his master, holds that cause is an ante- cedent stage in a routine of perceptions; while he also acknow- ledges that his account of matter leads him very near to John Stuart Mill’s definition of matter as ” a permanent possibility of sensations.” His views, in his

chapter on the Laws of Motion, that the physicist forms a conceptional model of the universe by aid of corpuscles, that these corpuscles are only symbols for the component parts of perceptual bodies, and that force is a measure of motion, and not its cause, are the views of Mach. At the end of this chapter he says that the only published work from the perusal of which he received any help in working out his views in 1882 and 1884, was Mach's Die Mechanik in ihrer Entwicklung (1883). Mach had begun to put them forward in 1872, and Kirchhoff in 1874. But they may very well have been developed independently in Germany and in England from their common source in Hume. Their point is to stretch Hume's phenomenalism so as to embrace all science, by con- tending that mechanism is not at the bottom of phenomena, but is only the conceptual shorthand by aid of which men of science can briefly describe phenomena, and that all science is description and not explanation. These are the views of Mach and of Pearson, as we read them in the latter's Preface. Nor can we find any difference, except the minute shade that Pearson takes up a position of agnosticism between Clifford's assertion of " mind-stuff " and Mach's denial of things in themselves.

James Ward (q.v.), in Naturalism and Agnosticism (1899), starts from the same phenomenalistic views of Mach and Kirch- hoff about mechanics; he proceeds to the hypothesis of duality within experience, which we have traced in the phenomenalisms of Schuppe, Avenarius and Wundt, and to the hypothesis of one consciousness, which appears variously in the German idealisms, not of Kant, as Ward thinks, but of Fichte, Hegel and Schuppe; and somehow he manages to end with the noumenalistic conclusion that Nature is God's Spirit. Though this work evinces a thoroughly English love of compromise, yet it is not merely eclectic, but is animated throughout by the inspiration of his " old teacher, Lotze." Lotze, as we saw, rejected bodily mechanism, reduced known bodies to phenomena, and concluded that reality is the life of God. Ward on the whole follows this triple scheme, but modifies it by new arguments founded on later German phenomenalism.

Under the first head he attacks mechanics precisely as Mach had done (see above) ; if this attack had been consistently carried out it would have carried him no further than Mach. Under the second head, according to Ward, as according to Wundt, knowledge is experience; we must start with the duality of subject and object, or perpetual reality, phenomenon, in the unity of experience, and not believe, as realists do, that either subject or object is distinct from this unity; moreover, experience requires " conation," because it is to interesting objects that the subject attends; conation is required for all synthesis, associative and intellective; thinking is doing; presentation, feeling,

conation are one inseparable whole; and the unity of the subject is due to activity and not to a sub- stratum. But, in opposition to Wundt and in common with Schuppe, he believes that experience is (1) experience of the in- dividual, and (2) experience of the race, which is but an extension of individual experience, and is variously called, in the course of the discussion, universal, collective, conceptual, rational experience, consciousness in general,' absolute consciousness, intelligence, and even, after Caird, " a perfect intelligence." He regards this uni- versal experience as the result entirely of intersubjective inter- course, and concludes that its subject is not numerically distinct from the subject of individual experience, but is one and continuous with it, and that its conceptions depend on the perceptions of individual experience. He infers the corollary that universal • experience contains the same duality of subjective and objective factors without dualism. He thinks that it is the origin of the categories of causality, which he refers to " conation," and sub- stance, which he attributes to the interaction of active subjects with their environment and to their intercourse with each other. He applies universal experience, as Schuppe does, to explain the unity of the object, and its independence of individual but not o! universal _ experience, holding that the one sun, and the whole world of intersubjective intercourse, or the " trans-subjective " world, though " independent of the individual percipient as such," is " not independent of the universal experience, but the object of that experience " (ii. 196-197). He applies universal experience

to explain how we come, falsely in his opinion, to believe that the object of experience is an independent thing; and he uses three arguments, which are respectively those of Schuppe, Avenarius and Wundt. He supposes first, that we falsely conclude from the sun being independent of each to being independent of all; secondly, that by " introjection " we falsely conclude that another's experience is in him and therefore one's own in one- self, while the sun remains outside; and thirdly, that by " reifi- cation " of abstractions, natural science having abstracted the object and psychology the subject, each falsely bejieves that its own abstract, the sun or the subject, is an independent thing. What, then, could we know from this "duality in experience"? He hardly has a formal theory of inference, but implies through- out that it only transcends perceptions, and perceptual reali-

ties or phenomena, in order to conclude with ideas, not facts. When we combine his view of Nature under the first head that whatever is inferred in the natural sciences is ideas, with his view of knowledge under the second head that knowledge is experience, and experience, individual or universal, is of duality of subject and object in the unity of experience, it follows that all we could know from the data would be one experience of the race, one subject consisting of individual subjects, and in Nature single objects in the unity of this universal experience; and beyond we should be able to form conceptions dependent on the perceptions of individual experience in the unity of universal experience: that is all. There can be no doubt that Mach, Schuppe and Wundt drew the right phenomenalistic conclusions from such phenomenalistic data. Not so Ward, who proceeds to a Natural Theology, on the ground that " from a world of spirits to a Supreme Spirit is a possible step." He had definitely confined universal experience to the one experience of the race. But perhaps Caird's phrase " a perfect intelligence " has beguiled him into thinking that the one subject of universal experience is not mere mankind, but God Himself. Under the third head, however, his guide is Lotze. The argument may be shortly put as follows: As the Nature which is the object of mechanics and all natural sciences, is not natural substances, but phenomena and ideas ; as mass is not substance, and force is not cause ; as activity is not in the physical but in the psychical world ; as the laws of Nature are not facts but teleological conceptions, and Nature is teleological, as well as not mechanical but kine- matical ; as the categoiy of causality is to be referred to " conation " ; as, in short, " mind is active and matter inert," what then? One subject of universal experience, one with the subjects of individual experience, you would suppose, and that Nature as a whole is its one object. Not so, according to Ward; but " God as the living unity of all," and " no longer things, but the connecting conserving acts of the one Supreme." What, then, is the relation of God to the one universal experience, the experience of the race, which was under the second head the unity in duality of all know- ledge ? He does not say. But instead of any longer identifying the experience of the race and universal experience, he concludes his book by saying " our reason is confronted and determined by universal reason." This is his way of destroying Naturalism and Agnosticism.

4. Personal Idealism. — The various forms of idealism which have been described naturally led in England, even among idealists themselves, to a reaction against all systems which involve the denial of personality. English moral philosophy cannot long tolerate a metaphysics which by merging all minds in one would destroy

personality, personal causation and moral responsibility, as James Martineau well said. A new school, therefore, arose of which the protagonist was Andrew Seth Pringle-Pattison (b. 1856; professor of logic and metaphysics at Edinburgh University from 1880) in his Scottish Philosophy (1885), and Hegelianism and Personality (1887).

" Each of us is a self," he says, and in another passage, " The real self is one and indivisible, and is unique in each individual. This is the unequivocal testimony of consciousness." What makes his vindication of conscious personality all the more inter- esting is that he has so much in common with the Hegelians ; agree- ing as he does with Hegel that self-consciousness is the highest fact, the ultimate category of thought through which alone the universe is intelligible, and an adequate account of the great fact of exist- ence. He agrees also that there is no object without subject. It is difficult to see exactly where he begins to differ from Hegel ; but at any rate he believes in different self-conscious persons; he does not accept the dialectical method, but believes in beginning from the personal experience of one's own self consciousness ; and, though he is not very clear on the subject, he would have to admit that a thing, such as_ the sun, is a different object in each person's con sciousness. He is not a systematic thinker, but is too much affected by the eclectic notion of reconciling all philosophies. F. C. S. Schiller (b. 1864, fellow of Corpus Christi College, Oxford), in Riddles of the Sphinx (1891), is a more systematic thinker. He rejects the difference between matter and spirit. He agrees with Leibnitz in the analysis of the material into the immaterial, but with

Lotze in holding that the many immaterial elements coexist and interact. At the same time he differs from Lotze's conclusion that their union requires one absolute substance. Again, he thinks that substance is activity; differing from both Leibnitz and Lotze herein, and still more in not allowing the existence of the many beyond experience. Hence his personal or pluralistic idealism is the view that the world is a plurality of many coexisting and inter- acting centres of experience, while will is the most fundamental form of experience. 1 In connexion with these views reference should be made to a work entitled Personal Idealism, Philosophical Essays by Eight Members of the University of Oxford (1902), edited by H. Stmt, and numbering Schiller, as well as G. F. Stout, H. Rashdall and others among its contributors (cf. also H. Sturt, Idola theatri, 1908). They do not all agree with one another, or perhaps even with the title. Nevertheless, there is a common ten- dency in them, and in the university of Oxford, towards the belief that, to use the words of the editor, " We are free moral agents in a sense which cannot apply to what is merely natural." There is indeed

much more activity of thought at Oxford than the world sus- pects. Mansel and Jowett, Green and Caird, Bradley and Bosanquet arose in quick succession, the predecessors of a generation which aims at a new metaphysics. The same sort of antithesis between the one and the many has appeared in the United States. Josiah Royce (b. 1855, professor of philosophy, Harvard) believes in the absolute like Green and Bradley, in ” the unity of a single self-consciousness, which includes both our own and all finite conscious meanings in one final eternally present insight,” as he says in The World and the Individual (1900; see also later works). G. T. Ladd (q.v.) also believes in ” a larger all-inclusive self,” and goes so far as the paradox that perfect personality is only recon- cilable with one infinite being. While Royce is Hegelian, Ladd prefers Lotze, but both believe in one mind. William James (q.v.), on the other hand, in his psychological works shows that the tendency of recent psychology is to personality, interpreted ideal- istically ; though without a very clear appreciation of what a person is, and personality means. By a curious coincidence, almost at the time of the appearance of the Essays on Personal Idealism, an American writer, G. H. Howison, published The Limits of Evolu- tion, and other Essays illustrating the Metaphysical Theory of Personal Idealism (1901). In fact there has been an increase of philosophical intercourse between English and American universities, which is a hopeful sign of progress.

The advent of personal idealism is a welcome protest against the confusion of God and man in one mind, and against the confusion of one man’s mind with another’s. The school undoubtedly tends towards realism. I am conscious only of myself as a person, and of my bodily signs. I know the existence of other human persons and minds only through their giving similar bodily signs. If the personal idealist consistently denies other bodies, then the bodily signs become, according to him, only part of his experience, which can prove only the existence of himself. To infer another mind he must infer another body, and the bodily environment including his and other bodies. Again, in being conscious of myself, I am not conscious of my mind in the abstract without my body. I cannot separate touching from my tactile organs, seeing from my eyes, or hearing from my ears. I cannot think my body away. Moreover, I am not conscious of my whole personal life at all. How do I know that I was born, though I cannot remember it, and that I shall die, though I am not now conscious of death ? How do I know that I am the same person from birth to death ? Not by my consciousness, but by knowing the bodies of others — of babies on the one hand, and of old men on the other hand. It is usual to say that the body has not enough unity to be part of the person: the

objection is much more true of conscious mind. The truth is that not the unity of consciousness but the fact of its existence is the important point. The existence of my consciousness is my evi- dence for my soul. But it does not prove that I am nothing but soul. As a human person, I am body and soul; and the idealisljic identification of the Ego with soul or mind, involving the corollar)?*' that my body belongs to the non-Ego and is no part of myself, is the reductio ad absurdum of idealism. Lastly, though the personal idealists are right in rejecting the hypothesis of one mind, they are too hasty in supposing that the hypothesis is useless for idealistic purposes. No idealism can explain how we all know one sun, except by supposing that we all have one mind. The difficulty of personal idealism, on the other hand, is to reconcile the unity of the thing with the plurality of thinkers. The unity of the sun can only be explained either idealistically 1 For Dr Schiller's views, see further Pragmatism.

by supposing it to be one object of one mind, or realistically by supposing it to be one thing distinct from the many minds which think about it. The former alternative is false, the latter true. Personal idealism, therefore, must end in personal realism.

7. — Realism

1. Metaphysical and Psychological Realism. — Realism is the view that some known things are bodily, and some are mental. At its best, it is the Aristotelian view that both are substances. The modern misunderstanding of " substance " has been a main cause of the confusion of modern thought. Aristotle meant by it any distinct thing; e.g. I, you, an animal, a plant, the earth, the moon, the sun, God. He calls each of these, as existing apart, a thing per se (koB' abro). It is true that, having divided a natural substance into form and matter, he called each element " sub- stance." But these are not primary meanings; and matter, or supposed substratum, in particular, he says, is not actually substance (Met. Z 3) or is only potentially substance (Met. H 1-2). In modern times, Spinoza, by a mere mistake, changed the meaning of " substance " from " existing apart " to " existing alone," and consistently concluded that there is only one. Locke mistook it to mean " substratum," or support of qualities, and naturally concluded that it is unknown. Kant, taking it in the mistaken

meaning of Locke, converted it into the a priori category of the permanent substrate beneath the changes of phenomena, and even went so far as to separate it from the thing in itself, as substantia phenomenon from noumenon. When it had thus lost every vestige of its true meaning, Kant's successors naturally began to speak of things as being distinct without being substances. Fichte began this by saying that ego is activity, and being is life. Hegel said that spirit is not substance but subject, which to Aristotle would have meant that it is not a distinct thing, yet is a distinct thing. Fechner, Wundt and Paulsen have fixed the conclusion in psychology that soul is not substance but unity of mental life; and Wundt concludes from the modern history of the term that substance or " substrate " is only a secondary conception to that of causality, and that, while there is a physical causality distinct from that of substance, psychical causality requires no sub- stance at all.

The result of this confusion is that the moderns have no name at all for a distinct thing, and, being mere slaves of abstract terms, constantly speak of mere attributes, such as activity, life, will, actuality, unity of mental operations, as if they were distinct things. But an attribute, though real, is not a distinct reality, but only a determinant of a substance, and has no being of its own apart from the substance so determined; whereas a substance, determined by all its attributes, is different from everything else in the world. Though, for simplicity and universality of thought, even in science, we must use the abstraction of attri- butes, and, by the necessity and weakness of language, must signify what are not substances by nouns substantive, we must guard against the over-abstraction of believing that a thing exists as we abstract it. The point of true realism is Aristotle's point that the world consists of such distinct, though related, things, and therefore of substances, natural and supernatural. Again, the method of true realism is that of Aristotle, and consists in recognizing the independence of metaphysics. The contrary method is psychological metaphysics, which makes metaphysics dependent on psychology, on the ground that the origin of know- ledge determines its limits. This is the method which, as we have seen, has led from psychological to metaphysical idealism, by the argument that what we begin by perceiving is mental, and, therefore, what we end by knowing is mental. Now, there is no principle of method superior to that of Aristotle — we must begin with what is known to us. The things best known to man are the things which he now knows as a man. About these known things there is some agreement: about the beginnings of knowledge there is nothing but controversy. We do not know enough about the origin of knowledge to determine its limits.

Hence, to proceed from psychology to metaphysics is to proceed from the less to the more known; and the

paradoxes of psychological have caused those of metaphysical idealism.

The realist, then, ought to begin with metaphysics without psychological prejudices. He must ask what are known things, and especially what has been discovered in the sciences; in mechanics, in order to find the essence of bodies which is neglected by idealism; in mental science, in order 'to understand con- sciousness which is neglected by materialism. With the con- viction that the only fair way of describing metaphysics has been to avoid putting forward one system, and even to pay most attention to the dominant idealism, we have nevertheless been driven occasionally to test opinions by this independent meta- physical method. The chief results we have found against idealism are that bodies have not been successfully analysed except into bodies, as real matter; and that bodies are known to exert reciprocal pressure in reducing one another to a joint mass with a common velocity by being mutually impenetrable, as real forces. The chief results we have found against materialism are that bodies evolving account neither for the origin of them- selves, their nature, and their fundamental order of resemblance and difference, nor for the nature and origin of consciousness, nor even as yet for their becoming good for conscious beings. Hence we come to the realistic conclusions that among known substances some are bodies, others are souls; that man is body and soul; and that God is a pure soul or spirit. At the same time, while the independence of metaphysics leads us to metaphysical realism, this is not to deny the value of psychology, still less of logic. Besides the duty of determining what we know, there is the duty of determining how we know it. But in order to discharge it, a reform of psychology as well as of metaphysics is required. Two psychological errors, among many others, constantly meet us in the history of idealism — the arbitrary hypothesis of a sense of sensations, or of ideas, and the intolerable neglect of logical inference. Logical inference from sense is a process from sensible to insensible existence. The former error needs something deeper than a Kantian critique of reason, or an Avenarian criticism of experience; it needs a criticism of the senses. We want an answer to this question — What must we know by the senses in order to enable us to know what we infer by reason in the sciences? Without here aiming at exhaustiveness, we may bring forward against the dominant idealism a psychological theory of sense and reason. By touch I perceive one bodily member reciprocally pressing another in myself, e.g. lip pressing lip; by touch again I perceive one bodily member similarly pressing but not another

member in myself, e.g. only one lip pressing; by inference from touch I infer that it is reciprocally pressing another body similar to my other bodily member, i.e. another body similar to my other lip. On this theory, then, founded on the conscious facts of double and single pressure in touch, and on the logic of inference, we have at once a reason for our know- ledge of external bodies, and an explanation of the early appear- ance of that knowledge. The child has only to have its mother's nipple in its mouth in order to infer something very like the mutually pressing parts of its own mouth. Having thus begun by touch and tactile inference, we confirm and extend our inferences of bodies in Nature by using the rest of the senses. This is not to forget that the five senses are not our whole stock or to confine inference to body. We have also the inner sense of consciousness which is inexplicable by body alone. By combin- ing, moreover, our knowledge of Nature with our consciousness of our own works, we can infer that Nature is a work of God. Next, finding that He gives signs of bodily works, but no signs of bodily organs, we can infer that God is a Spirit. Finally, returning to ourselves, we can conclude that, while the conscious in God is Spirit without Body, in us it is spirit with body. This final distinction between bodily and spiritual substances we owe to Descartes.

2. The Undercurrent of Modem Realism. — Coming after the long domination of Aristotelian realism, Descartes and Locke, though psychological idealists, were metaphysical realists. Their position was so illogical that it was easily turned into metaphysical idealism. But their psychological method and

idealism produced another mistake— the tendency to a modicum of realism, as much as seemed to this or that author to follow from psychological idealism. In Germany, since the victory of Kant over Wolff, realism has always been in difficulties, which we can appreciate when we reflect that the Germans by preference apply the term " realism " to the paradoxes of Herbart (1776- 1841), who, in order*to avoid supposed contradictions, supposed that bodies are not substances, but show (Schein), while " reals" are simple substances, each with a simple quality, and all preserv- ing themselves against disturbance by one another, whether physically or psychologically, but not known to be either material or spiritual because we do not

know the simple quality in which the nature of the real consists. There have indeed been other realisms in Germany. Trendelenburg (1802-1872), a formidable opponent of Hegel, tried to surmount Kant's transcendental idealism by supposing that motion, and therefore time, space and the categories, though a priori, are common to thought and being. Duhring, with a similar object, makes matter a common basis. While these realisms come dangerously near to materialism, that of the Roman Catholic A. Gtinther (1783-1863), " Cartesius cor- rectus," erected too mystical an edifice on the psychological basis of Descartes to sustain a satisfactory realism. Yet Guntherism has produced a school, of which the most distinguished repre- sentative is the Old Catholic bishop in Bonn, Th. Weber, whose Melaphysik, completed in 1891, starting from the ego and the analysis of consciousness, aims at arriving at the distinction between spirit and nature, and at rising to the spirit of God the Creator. Other realistic systems are those of J. H. von Kirch- mann (1802-1884), author, among other works, of Die Philosophic des Wissens (1864) and Ueber die Principien des Realismus (1875) ; Goswin Uphues (b. 1841; professor of philosophy at Halle), directed against the scepticism of Shute's Discourse on Truth; and Hermann Schwarz (born 1864), who completes the psycho- logical view of Uphues that we can know objects as they are, by the metaphysical view that they can be as we know them. But German realism lacks critical power, and is little better than a weed overshadowed by the luxuriant forest of German idealism. In France, the home of Cartesian realism, after the vicissitudes of sensationalism and materialism, which became connected in French the French mind with the Revolution, the spirit of Realism. Descartes revived in the 19th century in the spiritual- istic realism of Victor Cousin. But Cousin's psychological method of proceeding from consciousness outwards, and the emphasis laid by him on spirit in comparison with body, pre- vented a real revival of realism. He essayed to answer Locke by Kant, and Kant by Reid, Maine de Biran and Schelling. From Reid he adopted the belief in an external world beyond sensation, from Biran the explanation of personality by will, from Schelling the identification of all reason in what he called " impersonal reason," which he supposed to be identical in God and man, to be subjective and objective, psychological and ontological. We start, according to him, from a psychological triplicity in consciousness, consisting of sensation, personal will and impersonal reason, which by a priori laws of causality and substance carries us to the ontological triplicity of oneself as ego willing, the non-ego as cause of sensation, and God as the abso- lute cause beneath these relative causes. So far this ontological triplicity is realism. But when we examine his theory of

the non-ego, and find that it resolves matter into active force and this into animated activity, identifies law with reason, and calls God absolute substance, we see at once that this spiritual realism is not very far from idealism. About 1840, owing largely to the teaching of E. Saisset in the spiritualistic school, the influence of Descartes began to give way to that of Leibnitz. Leibnitz has been used both realistically and idealistically in France. He was taken literally by spiritual realists, e.g. by Paul Janet (q.v.). Janet accepted the traditional ontological triplicity — God, souls and bodies — and, in answer to Ravaisson, who called this realism " demi-spiritualisme," rejoined that he was content to accept the title. At the same time, like Cousin, his works show a tendency to underrate body, tending as they do to the Leibnitzian analysis of the material into the immaterial, and to the supposition that

the unity of the body is only given by the soul. His emphasis is on spirit, and he goes so far as to admit that "no spiritualist is engaged to defend the existence of matter." The strength of Janet's position is his perception that the argument from final causes is in favour of an omnipresent rational will making matter a means to ends, and not in favour of an immanent mind of Nature working out her own ends.

The psychological metaphysics of Cousin and of Janet was, how- ever, too flimsy a realism to withstand its passage into this very idealism of matter which has become the dominant French meta- physics. Etienne Vacherot (q.v.) deserted Descartes for Hegel. He accepted from Hegel " the real is rational " without the Hegelian method, for which he substituted conscious experience as a revelation of the divine. Matter he held to be mind at the minimum of its action, and evolution the " expansion de l'activite incessante de la cause finale." God, according to his latest view, is the absolute being as first cause and final end. " Let us leave," says he in defer- ence to Janet, " the category of the ideal, which applies to nothing real or living." But the most noticeable passage in Le Nouveau spiritualisme (1884) is its contrast between the old and the new; where he says that the old spiritualism opposed spirit to matter, God to Nature, the new spiritualism places matter in spirit, Nature in God (p. 377). F. Ravaisson (see Ravaisson-Mollien), by his Rapport (prepared for the Exhibition of 1867) on philosophy in France, gave a fresh impulse to the transition from spiritual realism to idealism, by developing the Aristotelian ?

In England, the land of Bacon and Locke, the realistic tendency has been more active, and is exhibited in Bacon's Novum organum and De Augmentis scientiarum, English as well as to a less degree in the Fourth Book of Realism. Locke's Essay. After the metaphysical

idealism, begun by Berkeley, had eventuated in Hume's reduction of the objects of knowledge to sensations, ideas and associations, the Scottish school, applying the Baconian method to the study pf mind, began to inquire once more for the evidences of our*' knowledge, and produced the natural or intuitive realism of T. Reid, Dugald Stewart and Sir William Hamilton, who, having been followed by H. L. Mansel, as well as by J. Veitch, H. Calderwood and J. M'Cosh, prolonged the existence of the school, in which we may venture to place L. T. Hobhouse and F. W. Bain, author of The Realization of the Possible (1899), down to our own time.

Its main tenet, that we have an immediate perception of the external world, is roughly expressed in the following words of Reid: "I do perceive matter objectively — that is, something

which is extended and solid, which may be measured and weighed, Reid ls tne i mme diate object of my touch and sight. And

this object I take to be matter, and not an idea. And, though I have been taught by philosophers that what I immediately "touch is an idea, and not matter, yet I have never been able to dis- cover this by the most accurate attention to my own perceptions." No opposition to idealism could be more distinct. Reid, however, did not always express himself so distinctly. Moreover, he and his successors mixed up so many accidents with the essence of their realism that the whole system broke down under its own weight. Their psychology contained valuable points. It also contained much that was doubtful, and much that was ill-adapted to the metaphysics of realism. Yet they thought it the only avenue to metaphysics. It is full of appeals to common sense, and of prin- ciples of common sense, which Reid also called intuitive first prin- ciples, and self-evident truths. It is spoilt by Locke's hypothesis that we do not perceive things but qualities implying things. While it asserted a realism of individuals, it admitted a conceptualism of universals. Stewart also said that our knowledge of matter and mind is merely relative. Hamilton went still further; he tried toi combine the oil of Reid with the water of Kant; and converting HamUtoa tne mtu iti ve mto the a priori, he found a further reason for the relativity of knowledge. " Our knowledge is relative," said he, " first, because existence is not cognizable abso-

lutely and in itself, but only in special modes; second, because these modes thus relative to our faculties are presented to and known by the mind, only under modification, determined by these faculties themselves." Not only so, but in his review of Cousin (" Philosophy of the Unconditioned," in Discussions, pp. 12-15), he made concep- tion the test of knowledge, argued that " the mind can conceive, and consequently can know, only the limited, and the conditionally limited," that " to think is to condition," that all we know either of mind or matter is " the phenomenal," that " we can never in our highest generalizations rise above the finite," and concluded that we cannot conceive or know the unconditioned, yet must believe in its existence. Nevertheless, in spite of all this Kantism, he adhered to his natural realism. He vacillated a great deal about our mode of perceiving the external world; but his final view (edition of Reid's works, note D*) consisted in supposing that (1) sensation is an apprehension of secondary qualities purely as affections of the organism viewed as ego ; (2) perception in general is an apprehension of primary qualities as relations of sensations in the organism viewed as non-ego; while (3) a special perception of a so-called " secundo-primary " quality consists in " the consciousness of a resisting something external to our organism." Hamilton's views both on the absolute and on perception affected Mansel and Spencer. They were not, however, received without question even by his followers. H. Calderwood, in his Philosophy of the Infinite (1854), made the pertinent objection that, though thought, conception and Cald rw od knowledge are finite, the object of thought may be e ° ' infinite. Hamilton, in fact, made the double mistake of limiting knowledge to what we can conceive, and confusing the determinate with the finite or limited. We never know anything except as determined by its attributes; but that would not prevent us from inferring something determined as unconditioned, whether infinite or absolute. J. M'Cosh again, in The Prevailing Types of Philosophy: Can they logically reach reality? (1 891), rightly protests against Hamilton's combination of Scottish and German schools M'Cash which will not coalesce, and exhorts the former " to throw away its crutches of impressions, instincts, sug- gestions, and common sense, and give the mind a power of seeing things directly." He has the merit of presenting natural or intuitive realism in its purity.

The common tenet of the whole school is that without inference we immediately perceive the external world, at all events as a resisting something external to our organism. But is it true ? There are three reasons against it, and for the view that we perceive a sensible object within, and infer an external object withput, the organism. In the first

place, there are great differ- ences between the sensible and the external object; they differ in secondary qualities in the case of all the senses; and even in the case of touch, heat felt within is different from the vibra- ting heat outside. Secondly, there are so-called ” subjective sensations,” without any external object as stimulus, most commonly in vision, but also in touch, which is liable to formi- cation, or the feeling of creeping in the skin, and to horripilation, or the feeling of bristling in the hair; yet, even in ” subjective sensations,” we perceive something sensible, which, however, must be within, and not outside, the organism. Thirdly, the external world and the senses always act on one another by cause and effect and by pressure, although we only feel pressure by touch. Now, when the thing with which touch is in a state of reciprocal pressure is external, e.g. a table, we feel our organism pressed and pressing; we do not feel the table pressing and

pressed, but infer it. The Scottish School never realized that every sensation of the five senses is a perception of a sensible object in the bodily organism; and that touch is a perception, not only of single sensible pressure, but also of double sensible pressure, a perception of our bodily members sensibly pressing and pressed by one another, from which, on the recurrence of a single sensible pressure, we infer the pressure of an external thing for the first time. Intuitive Realism is to be replaced by Physical Realism.

3. Reaction to Hypothetical Realism. — The three evidences, which are fatal to intuitive realism, do not prove hypothetical realism, or the hypothesis that we perceive something mental, but infer something bodily. This illogical hypothesis, which consists of incautiously passing from the truth that the sensible object perceived is not external but within the organism to the non-sequitur that therefore it is within the mind, derived what little plausibility it ever possessed from three prejudices: the first, the scholastic dogma that the sensible object is a species sensibilis, or immaterial sensible form received from the external thing; the second, the Cartesian a priori argument that the soul as thinking thing can perceive nothing but its own ideas; the third, the common assumption of a sense of sensations. But notwithstanding its illogicality, its tendency to underrate Nature as inferred from such idealistic premises, and its certain transi- tion into a consistent idealism, hypothetical realism has, with little excuse, revived among us in the writings of Shadworth Hodgson, James Martineau and A. J. Balfour. The cause of this anachronism has been the failure of intuitive realism and the domination of idealism, which makes short-sighted men suppose that at all events they must begin with the psychology and the psychological idealism of the day, in the false hope that on the sands of psychological idealism they may build

a house of metaphysical realism.

Shadworth Holloway Hodgson (born 1832; hop. fellow of Corpus Christi College, Oxford), whose chief work is The Metaphysic of Experience (4 vols., 1898), believing that philosophy is an analysis of the contents of consciousness, or experience, and that this is metaphysics, begins, like Kant, with an analysis of experience. Like Kant, he supposes that experience is concerned with sensations, distinguishes matter and form in sense, identifies time and space, eternal time and infinite space, with the formal element, and/ substitutes 'synthesis of sensations of touch and sight for association and inference, as the origin of our knowing such a solid material object as a bell. Although he does not agree with Kant that either the formal element in sense or the synthesis of sensations is a priori, yet in very Kantian fashion, through not distinguishing between operation and object, he holds that, in synthetically combining sensations of touch and sight, we not only have a complex perception of a solid body, but also know this " object thought of " as itself the complex of these sensations objectified. Hence he concludes that " matter is the name for the sensation-elements derived from both senses, abstracting in thought, so far as possible, from the extension-elements of both " (i. 296).

Here you would expect him to stop, as the German Neo-Kantism of Lange stops, with the consistent conclusion that all we know of Nature from such data is these complexes of sensation-elements, or phenomena in the Kantian meaning. Not so ; like Kant himself, Hodgson supposes something beyond ; not, however, an unknown thing in itself causing sensations, but a condition, or sine qua non, of their existence, without being a cause of their nature. In order to majce this leap he supposes that we have beyond perceptions a conception of condition. His account of the origin of this conception is puzzling, (i. 380). Whatever its origin may be, it could not, any more than a Kantian category of cause, justify us in concluding anything more than a relation of perceptions as conditions of one another, seeing that they were supposed to be the whole data, and matter itself to be " sensation-elements." But what he proceeds to suppose is that, having the conception, and finding that the complex of per- ceptions needs accounting for, we infer a real condition, e.g. the solid interior of a bell. What we know, however, of this condition, according to him, has two limits: on the one hand, it is the condition only of the existence of our perceptions; on the Other hand, all we know of its nature is our perceptions. Matter thus, which had at first been defined as a complex of perceptions obiectified, now turns

out to be a condition without which perceptions would not exist, but whose nature is known only as a complex of perceptions. Finally, according to him, having inferred matter as the condition of our perceptions, we are entitled to infer that the condition of the existence of matter is God, whose nature, however, can be inferred only by practical reason from conscience. He avers that this ” meta- physic of experience ” is not idealism, or the tenet that consciousness is the only reality. It is realism — but inconsequent and inadequate realism, something like that of Spencer; according, indeed, more knowledge of the distinction between Nature as condition of sensa- tions and God as condition of Nature ; but very like in holding that all we know of natural forces is our perceptions. We know more, however, about a body, such as a bell, than either Spencer or Hodgson allows. We know, from the concomitant variations between its vibrations and our perceptions, that its vibrations are not mere conditions but real causes of our perceptions ; and that those vibra- tions are not our perceptions, because we cannot perceive them, but are real attributes of the bell. It will be objected that they are merely possible perceptions. But as they really produce our real perceptions, they are themselves not merely possible, but real or actual. A possible cause could not actually produce an actual effect. James Martineau (q.v.) in A Study of Religion (1888), like Shadworth Hodgson, started from Kant, and tried to found on _ˆ transcendental idealism “a return to dualism.” If there is one thing certain’ in the Kantian philosophy, it is its author’s perception that what is contribute’d by mind must not be extended to things beyond mind. Hegel only extended a priori forms to things by resolving things into thoughts. Mill also protested ” against adducing, as evidence of the truth of a fact in external nature, the disposition, however strong or how- ever general, of the human mind to believe it.” Yet Martineau adopted, as his view of the limits of human intelligence, that Kant was right in making space and time a priori forms of sense, but wrong in limiting them to sensations. But in order to make space a form of external things, Martineau had to take the external in space, by which Kant meant one sensation out of another, in the very different meaning of the self here and the not-self there. He facilitated this awkward transition by adding to Kant’s a priori forms of space and time an ” a priori form of alternative

causality," or, as he also called it, " an intuition of causality involved in the elementary exercise of perception," which is the key to his whole philosophy. He supposed that this intuition of causality arises when will is resisted, and, further supposing that causality requires decision between alternatives, concluded that the intuition of will resisted is an intuition of will against will, mine against other (i. 65). To pass over its confusion of a priori and intuitive, there are two fatal objections to this view. In the first place, the intuition of causality does not require will at all, because we often perceive one bodily member pressing another involuntarily; a man suffering from lockjaw neither wills nor can avoid feeling the pressure of his upper and lower jaws against one another. Secondly, though causality requires alternatives in the material cause, e.g. wax may or may not be melted, the determination between them is not always a decision of will, but in physical causation depends on the efficient cause, e.g. the fire: as Aristotle says, when the active and passive powers approach, the one must act and the other suffer, and it is only in rational powers that will decides (Met. &s)-

A. J. Balfour, in The Foundations of Belief, being Notes Intro- ductory to the Study of Theology (1895), begins by maintaining A. J. that the evidence of the senses is not a foundation Balfour. f belief, and then expects us to believe in Nature and in God. He revives the " Acatalepsia " of the New Academy. In Part II., ch i., he makes three assumptions about the senses, and, without stopping to prove them, or even to make them consistent, deduces from them his thesis that the evidence of the senses is not a foundation of belief in Nature. He first assumes an immediate experience of a body, e.g. a green tree; and then deduces that the evidence of the senses proves now and then to be fallacious, because we may have an experience indistinguishable from that of a tree but incorrect; and further, that our perceptions are habitually mendacious, because all visual experiences are erroneous, as colour is a sensa- tion while the thing consists of uncoloured particles. This argument from a pure assumption is a confusion of sense and

inference. In no case is the evidence of the senses fallacious or mendacious; the fallacy is in the inference.

He next assumes that we have no immediate experience of independent things — that sense perceives sensations, feelings, or ideas; while all else, e.g. a tree, is a matter of inference. On this quite new assumption of a sense of sensations he deduces that, from a perception of these mental facts, we could not infer material facts, e.g. a tree; so that again the evidence of the senses does not afford

trustworthy knowledge of the material universe. His deduction is logical; but he has forgotten to prove the assumption, and now confuses sensory operation with sensible object. Vision does not perceive a sensation of colour; it perceives a visible picture, e.g. green, which is in the organism, but has never been proved to be a mental fact, or not to be a material fact. So touch perceives not a sensation of pressure, but a pressure which is a material fact in the organism. From a material pressure within we logically infer a material pressure outside. He thirdly assumes an appendix to the second assump- tion: he assumes that sense perceives mental sensations with succession but without causality, because no kind of cause is open to observation. On this assumption of a sense of sensations, but not of causality, he deduces that we could not from such data infer any particular kind of cause, or a bodily cause, e.g. a tree, or indeed any cause at all, or any event beyond perception, without assuming the principle of causation that Nature is uniform in cause and effect over great intervals of time and space. Nevertheless he gives absolutely no proof of the assump- tion that there is no sense of causality. There is none in the subsidiary senses, because none of them perceives the pressures exerted on them. But the primary sense of touch perceives one bodily member causing pressure on another, reciprocally, within the organism, from which we infer similar particular pressures caused between the organism and the external world; but without needing the supposed stupendous belief and assump- tion of the uniformity of Nature, which is altogether ignored in the inferences of the ordinary man. Finally, as touch per- ceives reciprocal pressure within, and tactile inference infers it without, touch is the primary evidence of the senses which is the foundation and logical ground of our belief in Nature as a system of pressing bodies. Balfour, however, having from unproved assumptions denied the evidence of the senses, and the rational power of using them to infer things beyond oneself, has to look out for other, and non-rational, foundations of belief. He finds them in the needs of man. According to him, we believe in Nature because it satisfies our material needs, and in God because he satisfies our spiritual needs. But bare need, e.g. a pang of hunger, is no cause of belief beyond itself; and desire, or need of something prospective, e.g. a desire of food, is effect, not cause, of a previous belief that there is such a thing, and of a present inference that it may again be realized. Moreover, when the belief or inference is uncertain, need even in the shape of desire is not in itself a foundation of belief in the thing desired: to need a dinner is not to believe in getting it; and, as Aristotle said, ” there is a wish for impossibilities.” It is fair, however, to add that Balfour has a further foundation for the belief in Nature, the survival of the fittest, by which those only would survive who possessed and

could transmit the belief. But.here he fails exactly as Darwin himself failed. Darwin said, given that organisms are fit, they will tend to survive; but he failed to show how they become fit. Balfour says, given that men believe in Nature, they will survive; but he fails to show how they come to believe in it. Inference from sense is the oiie condition of all belief in anything beyond oneself, whether it be Nature, or Authority, or God; and it is the one condition of all needs, which are not mere feelings, but desires of things. The result of undermining this sure foundation emerges in Balfour's attitude to the beliefs themselves. He holds that spacej time, matter, motion, force, are all full of the insoluble contradictions supposed by Spencer; and that all our beliefs, in Nature and in God, stand on the same footing of approximations. Hence his really valuable arguments from Nature to God sink to • the problematic form— there may be Nature; if so, there is God.

Such is the modern " Acatalepsia," which arises from denying the evidence of the senses, and from citing the transfigured realism of Spencer instead of the original realism of Aristotle, about whom Balfour speaks as follows: " It would be diffi- cult, perhaps impossible, to sum up our debts to Aristotle. But assuredly they do not include a tenable theory of the universe."

4. The Past and Future of Metaphysics. — Aristotelian realism is the strong point of Roman Catholic philosophy. As inter- preted by Thomas Aquinas, it is now in danger of becoming a dogma. In 1879 Pope Leo XIII. addressed to the bishops the Encyclica aeterni patris, which contained the words, " Sancti Thomae sapientiam restituatis et quam latissime propagetis." From the Roman Catholic point of view this reaction to " Thomism " was a timely protest against modern metaphysics. It was founded upon a feeling of uneasiness at a growing tendency among Roman Catholic writers not only to treat theology freely, but to corrupt it by paradoxes. One cannot but feel regret at seeing the Reformed Churches blown about by every wind of doctrine, and catching at straws now from Kant, now from Hegel, and now from Lotze, or at home from Green, Caird, Martineau, Balfour and Ward in succession, without ever having considered the basis of their faith; while the Roman Catholics are making every effort to ground a Universal Church on a sane system of metaphysics. However this may be, the power of the movement is visible enough from the spread of

Thomism over the civilized world, and in England from the difference between the freer treatment of metaphysics by some Roman Catholic writers and that which has arisen under the immediate influence of Thomism. J. H. Newman (1801-1890), maintaining the authority of conscience and the probabilism of the under- standing, concluded to the necessity of a higher authority in the primitive church. W. G. Ward was a philosophical critic of Mill. St George Mivart, in The Ground-work of Science (1898), maintained the reality of an active causative power uhderlying Nature, and the dignity of human reason, from an independent point of view. On the other hand, more under the influence of the Thomist reaction, Thomas Harper published The Metaphysics of the School (1879, &c.), describing scholasti- cism, as it appears in the works of Aquinas; and The Manuals of Catholic Philosophy, edited by R. F. Clarke, include General Metaphysics (1890), by John Rickaby, who effectively criticizes Hegel by precise distinctions, which, though scholastic, did not deserve to be forgotten.

The Thomist reaction has had a good effect in the way of encour- aging the study of Aristotelian philosophy in itself, and as modified by Aquinas. Nevertheless, the world cannot afford to surrender itself to Aristotle, or to Aquinas. Aristotle could not know enough, physically, about Nature to understand its matter, or its motions, or its forces; and consequently ‘ he fell into the error of supposing a primary matter with four contrary primary qualities, hot and cold, dry and moist, forming by their combinations four simple bodies, earth, water, air and fire, with natural rectilineal motions to or from the centre of the earth ; to which he added a quintessence of ether composing the stars, with a natural circular motion round the earth. Metaphysically, he did not, indeed, as is often supposed, think the nature of substance to be matter and form, because in his view God is a substance, yet with no matter; but he did think that every natural substance or body is a concrete whole, composed of matter and form different from matter. He thought that besides proximate matter, or one body as matter of another, there is a primary formless matter beneath all bodies, capable of becoming all in turn, but itself potentially, not actually, substance. He thought not only that a form, or essence, is something different from, and at most conjoined with, matter in a concrete body, but also that in all the bodies of one kind, e.g. in all men, there is one undivided form or essence, e.g. rational animal, communicated from one member to another member of the kind, e.g. from father to son, by what we still call, though without any meaning, the propagation of the species. He thought, in consequence, that the principium individua- tion’s, which differentiates two members of the kind, e.g. Socrates and Callias, is their one form or essence only as conjoined

with different matters, e.g. different bones and flesh. He thought, moreover, that the one form of ‘a kind is an original essence (to tI Ijv ttrai), which is uncreate; and, in order to avoid the ” separate forms ” supposed by Plato, he concluded that the world of Nature must be eternal, in order that each original essence may from eternity always be in some individual or another of its kind. On this assumption of the

eternity of the world, God could not be a Creator. Aristotle thought that God is only prime mover, and that too only as the good for the sake of which Nature moves; so that God moves as motive. Psychologically, Aristotle applied his dualism of matter and form to explain the antithesis of body and soul, so that the soul is the form, or entelechy, of an organic body, and he applied the same dualism to explain sensation, which he supposed to be reception of the sen- sible form or essence, without the matter, of a body, e.g. of the form of white, withbut the matter, of a white stone. He thought that in the soul there is a productive intellect and a passive intellect, and that, when we rise from sense by induction, the productive causes the passive intellect to receive the universal form or essence, e.g. of all white things; and he thought that this productive intellect is our immortal faculty. Lastly, he thought that, while other operations have, intellect (yovi) has not, a bodily organ; and hence he became responsible for the fancy that there is a break in bodily continuity, between sense and will, while intellect is working out a purely immaterial operation of soul, resulting from the former and tending to the latter. It is evident that a philosophy containing so many questionable opinions is not fit to be made into an authorita- tive orthodoxy in metaphysics.

Now these, on the whole, are the very opinions of Aquinas, except so far as they were clearly inconsistent with the Christian faith. Aquinas thought, as an article of faith, that the world began, and that God is its Creator. This involved a change of detail in the theory of essences and of universals generally. Aquinas thought that before the creation the one eternal essence of any kind was an abstract form, an idea in the intellect of God, like the form of a house in the.mind of a builder, ante rem ; that after the creation of any kind it is in re, as Aristotle supposed; and that, as we men think of it, it is post rem, as Aristotle also supposed. Of this view the part which was not Aristotle’s, the state of ” universalia ante rem,” was due to the Neoplatonists, who interpreted the ” separate forms ” of Plato to be ideas in intellect, and handed down their interpreta- tion through St Augustine to the medieval Realists like Aquinas, who thus combined Neoplatonism with Aristotelianism. Hence too Aquinas opposed essence to existence much more than Aristotle did. Lastly, as a Christian, he supposed the

whole soul to be im- mortal, and to form for itself a new body after death. But, with these modifications he accepted the general physics of Aristotle, the metaphysical dualism of matter and form, and the psychology founded upon it. The Thomism, therefore, of our day is wrong, from a metaphysical point of view, so far as it elevates Aristotelian- ism, as seriously modified but not fundamentally corrected by Aquinas, into an authoritative orthodoxy in metaphysics.

Centuries elapsed after Aquinas before Galileo and his suc- cessors reformed natural science, and before Bacon destroyed the metaphysical dualism of matter and form by showing that a form in Nature is only a law of the action of matter, and that, as the action of a body is as individual as the body, the form is eternal only in thought (ratione). The psychology of Aristotle and Aquinas thus became impossible; for, if the form of a body is only a mode of matter, to call one's soul the form of one's body is to reduce it to only a mode of matter, and fall into materialism. HenCe Descartes began the reform of psychology not only by the appeal to consciousness, " I think," but also by opposing body and soul, no longer as matter and form, but as different substances. These great improvements, due to the genius of Galileo, of Bacon, of Descartes, are the fresh beginnings of modern thought, from which we dare not turn back without falling into obscurantism. What, then, is the future of meta- physics? We must return not to the authority but to the study of Aristotle. The independence of metaphysics as the science of being, the principles of contradiction and excluded middle with their qualifications, the distinction without separation between substance and attributes, the definition of substance as a distinct individual thing, the discovery that the world consists of substances existing apart but related to one another, the distinction between material and efficient causes or matter and force, the recognition both of the natural and of the super- natural — 'all these and many other half-forgotten truths are the reasons why we must always begin with the study of Aristotle's Metaphysics. But their incompleteness shows that we must go forward from Aristotle to Bacon and modern science, and even pass through the anarchy of modern metaphysics, in the hope that in the future we may discover as complete an answer as possible to these two questions: —

1. What is the world of things we know?

2. How do we know it?

For authorities see the works quoted above,- and the references in the articles on philosophers and philosophical subjects. (T. Ca.)

METAPONTUM (Gr. Meravovriov, mod. Metaponto), an ancient city of Magna Graecia situated on the Gulf of Tarentum, near the mouth of the river Bradanus, and distant about 24 m. from Tarentum and 14 m. from Heraclea. It was founded by an Achaean colony from Sybaris and Crotona about 700 B.C. Metapontum was one of the cities that played a conspicuous part in the troubles arising from the introduction of the Pytha- gorism into Magna Graecia, and it was there that Pythagoras died in 497 B.C. His tomb was still shown in the time of Cicero.

At the time of the Athenian expedition to Sicily (415 B.C.) Metapontum appears to have been an opulent and powerful city, whose alliance was courted by the Athenians; but it con- tented itself with a very trifling support. In 332 B.C., at the time of the expedition of Alexander, king of Epirus, into Italy, it was one of the first cities to enter into an alliance with him. The Second Punic War gave a fatal blow to its prosperity. After the battle of Cannae in 216 B.C. it was among the first cities in the south of Italy to declare in favour of Hannibal, and became for some years the headquarters of Hannibal. Hence, when the defeat of Hasdrubalat the Metaurus(207 B.C.) compelled him to abandon this part of Italy, the inhabitants of Metapontum abandoned their city, and followed him in his retreat. From this time Metapontum sank; though it was still existing in the days of Cicero, Pausanias tells us that in his time nothing remained of it but a theatre and the circuit of the walls.

Metapontum has the remains of two temples, both of which seem to belong to the period 510-480 B.C. (Koldewey and Puch- stein, Die griechischen Tempel in Unteritalien und Sicilien, Berlin, 1899, PP- 35-4 1)- The so-called Chiesa di Sansone, which lay within the ancient town, and was probably dedicated to Apollo Lycius, was a peripteros measuring 186 by 91 J ft., of which only the foundations are left. The capitals were 3ˆ ft. in diameter. The temple was decorated with finely painted terra-cotta§. Of the other temple, the so-called Tavole Paladine, which lay outside the area of the ancient city, and was a perip- teros with 6 columns, 3 J ft. in diameter, in front and 12 ft. at the sides, 15 columns are standing, with the lower portion of the epistyle. It measured 105 ft. by 49 ft. without the steps. There are also traces of the town walls, which have served for the construction of farmhouses, of tombs, and of a harbour by the shore. Pliny speaks of a temple of Juno at Metapontum supported by columns of vinewood (Hist. nat. xiv. 9). An archaic treasure-house dedicated at

Olympia by the people of Metapontum has been discovered there. The railway station is the junction of the line from Battipaglia (and Naples) with that from Taranto to Reggio. (T. As.)

See M. Lacava, Topografia e storia di Metaponto (Naples, 1891).
METASOMATISM (Gr. nera, change, aw/ia, body), in petro- logy, a process of alteration of rocks by which their chemical composition is modified, new substances being introduced while those originally present are partly or wholly removed in solution. For example a limestone may be converted into a siliceous chert, a dolomite, an ironstone, or a mass of metalli- ferous ores by metasomatic alteration. The process is usually incomplete, greater or smaller portions of the original rock remaining. The agencies of metasomatism are in nearly all cases aqueous solutions; probably they were often at a high temperature, as metasomatic changes are especially liable to occur in the vicinity of igneous intrusions (laccolites, dikes and necks) where large quantities of water were given off by the volcanic magma at a time when it had solidified but was not yet cold. Metasomatism also usually goes on at some depth, so that we may readily believe that it is favoured by increase of pressure. On the other hand, there are many instances in which these processes cannot be shown to have taken place at temperatures or pressures above those which normally exist in the upper part of the earth's crust (e.g. dolomitization and silicification of many limestones). There are also cases of metasomatism in which steam and other vapours are supposed to have been operative; the temperatures were probably above the critical temperature of water. Changes of this sort are

described as pneumatolytic, being induced by gases (see Pneumatolysis).

By metasomatism new minerals replace the primitive ones; at the same time the original rock-structures may be completely obliterated. An igneous rock for example may be entirely replaced by crystalline massive quartz, a fossiliferous limestone by granular crystalline dolomite. It is equally common, however, to find that the structure of the original rock is preserved though its substance has been entirely altered. An oolitic limestone may become an oolitic ironstone or chert (see Petrology, PI. IV. fig. 5.) and casts of the fossils which the limestone contained may be formed of siderite or of chalcedony. In this case the rock resembles a pseudomorph, which is the term applied to a mineral which has been entirely replaced by another mineral without losing its original crystalline form. As a result of metasomatism rocks usually become more crystalline, especially those which have been in large part built up of fossil organic remains; this is

a consequence of the new substances having been deposited by purely inorganic processes from solution in water.

The chemical change is often complete, as when a limestone is replaced by chert or otherwise silicified, but it is probably more usually incomplete, part of the substance of the original rock having been retained though possibly in new mineral combinations. When a limestone is replaced by ironstone (e.g. carbonate of iron or siderite) part at least of the carbonic acid may be that of the limestone. A dolomite, formed from a limestone, contains more than one-half of its weight of car- bonate of lime presumably derived from the limestone itself; yet in this case the mineral transformation may be perfect, as the dolomite retains none of the calcite of which the lime- stone was formed; it is all present as the double carbonate of lime and magnesia (or dolomite). When a granite is con- verted by emanations containing fluorine and boron into a quartz-tourmaline rock (schorl rock, q.v.) or a quartz mica rock (greisen, q.v.) it can be proved by analysis that thefe has been very little modification of the chemical composition of the original mass. This resembles paramorphism in minerals, in which one mineral is substituted for another having the same chemical composition (e.g. kyanite for andalusite) .

The relations between metamorphism and metasomatism are very close; in fact some authors regard metasomatism as a variety of metamorphism. It is generally true, however, that in meta- morphic changes there is little chemical alteration; sandstones pass into quartzites, clays into mica-schists and gneisses, limestones into marbles without any essential modification in chemical composition, for the original minerals new ones being substituted and new structures being produced at the same time. In metasomatism, on the other* hand, chemical alteration is supposed by most geologists to be an essential feature; new minerals appear, but the original structures are sometimes retained.

The facility with which a rock undergoes metasomatism depends partly on its nature, and partly on the circumstances in which it is placed. Limestones, being readily soluble under natural conditions, are especially liable. The Cleveland iron ores of Yorkshire are limestones replaced by siderite and limonite; the Whitehaven iron ores are metasomatic replacements of limestone by haematite. The former are of Mesozoic, the latter of Palaeozoic age, but both have been changed in very much the same way by percolating solutions containing salts of iron. In some cases limonite and magnetite are the principal ores. Often the changes have taken place very irregularly, along bedding planes, faults and fractures. An ironstone may in many places be

traced laterally into a limestone, the amount of iron in the rock gradually diminishing. Some iron- stones (Carboniferous, Jurassic, &c.) retain the oolitic structures of the original limestone ; others show corals, shells and other calcare- ous fossils replaced by iron ores. When beds of shale or sandstone are intercalated among the limestones they usually show little change, a fact which indicates that the ready solubility of the calcareous rocks was a dominating factor in determining the metasomatic deposits. It is believed that the Whitehaven iron ores may be derived from the ironstones of the Coal-Measures which once covered the limestone districts.

Dolomitization of limestones is even more common than replace- ment by iron ores. That it is going on at the present day is evident from the fact that cores obtained by boring in recent coral reefs have shown that these may be extensively dolomitized in their deeper parts, and the older limestones such as the Triassic of the Alps, the Carboniferous Limestone of England and the Cambrian

Limestone of Scotland are sometimes converted into dolomite over wide areas. There has been an introduction of magnesia, with sometimes a little silica and iron; the rock recrystallizes owing to the formation of small rhombohedra . of dolomite; it frequently becomes porous and full of drusy cavities, owing to the contraction in volume which takes place, and the fossils and other organic structures of the original rock disappear. The change proceeds outwards from fissures and bedding planes and spreads gradually through the mass of the limestone; often the transformation is complete and no unaltered rock remains. Silicification or the replacement of limestone by chalcedony, chert or quartz, is often exhibited on a large scale. The formation of flint nodules and chert bands is of this nature ; the silica is not really an introduction from without, but is merely the material of the fine siliceous skeletons of sponges, radiolaria and other organisms, which at first were widely scattered through the limestone and at a later time were dissolved by percolating waters, percolated through the rock and were deposited in certain situations as bands, nodules and tabular masses of crypto- crystalline silica. In limestones extensive deposits of zinc ore may occur, usually calamine. These are important sources of the metal and there is little room for doubt that they have formed by a process of metasomatic replacement, e.g. Carthagena, Raibl (in Carinthia) and Belgium. In many parts of western North America (Nevada, Arizona, &c.) great deposits of copper, lead and silver ores

are worked in crystalline limestones. They are often highly silicified, and as- sociated with them are intrusive igneous rocks such as granite, dacite, porphyry and diabase. The ores occur not only in veins and shoots, but also in great masses replacing the limestone, and the geologists who have examined these mining districts are nearly unanimous as to the metasomatic nature of a large part of these deposits. Other rocks such as tuff, volcanic breccia, shale, porphyry and granite may also be impregnated with metalliferous ores, but the largest ore bodies are found in the limestones. Secondary enrichment has often taken place on a considerable scale. The constant presence of igneous rocks indicates that they are connected with the introduction of the metals, and the deposits are often of such a kind as to show that post-volcanic discharges of magmatic gases and water have been the actual mineralizing agents. Bisbee, Clifton and the Globe district in Arizona, Flagstaff in Utah, and the Eureka district in Nevada are good examples of the deposits in question.

As indicated above, shales, sandstones and igneous rocks may be silicified and mineralized under suitable conditions. Rhyolites and rhyolitic tuffs are often impregnated with silica to such an extent that they become almost massive quartz, and the fluidal, porphy- ritic, spheroidal and other igneous structures of the original rock may be retained in the siliceous pseudomorph. There are many examples of this in North Wales and the Pentland Hills. In andesites, serpentines and trachytes silicification is frequently found in circum- stances indicating that the changes are not due to weathering but are the effect of post-volcanic emanations of heated waters. Silicified shales may accompany mineral deposits, e.g. in the Cornish tin mines the killas or grey slate may be converted into quartz and brown tourmaline and contains small quantities of tin stone. In the copper mines of Parys Mountain, Anglesey, formerly of great importance as producers of this metal, there are large areas of silicified slate and silicified porphyry. White mica, kaolin, gilbertite, chlorite and epidote are frequently present in silicified igneous rocks. As a further instance of mineral deposition in metasomatized igneous rocks we may quote the Cripple Creek gold- field in Colorado, where syenites, latites, phonolites, breccias, &c, have been filled with pyrite, dolomite, fluorite, calaverite and other new minerals together with quartz.

Another type of metasomatic alteration is phosphatization. This is most common in limestones, and many of the most im- portant bedded phosphate deposits are of this origin. Trachytes and other igneous rocks are occasionally phosphatized. The source of the phosphate is for the most part the skeletons of animals, vertebrate bones and teeth, shells of certain brachiopods, trilobites and other organisms. Guano,

the excreta of birds, is rich in phos- phates and these are washed downwards by rain producing meta- somatic changes in the underlying rocks. Phosphatized limestones are obtained in great quantities in Christmas Island, Sombrero, Curagoa and other uninhabited limestone islands. (J. S. F.)

METASTASIO (1698-1782). Pietro Trapassi, the Italian poet who is better known by his assumed name of Metastasio, was born in Rome on the 13th of January 1698. His father, Felice Trapassi, a native of Assisi, came to Rome and took service in the Corsican regiment of the papal forces. He subsequently married a Bolognese woman, called Francesca Galasti, and established himself in business as a grocer in the Via dei Cap- pellari. Two sons and two daughters were the fruit of this marriage. The eldest son, Leopoldo, must be mentioned, since he played a part of some importance in the poet's life. Pietro, while quite a child, often held a crowd attentive in the streets while he recited impromptu verses on a given subject. It so

happened that, while he was thus engaged one evening in the year 1709, two men of distinction in Roman society stopped to listen to his declamation. These were Gian Vincenzo Gravina, famous for legal and literary erudition, famous no less for his dictatorship of the Arcadian Academy, and Lorenzini, a critic of some note. Gravina was at once attracted by the boy's poetical talent and charm of person, interested himself in the genius he had accidentally discovered, made Pietro his protege, and in the course of a few weeks adopted him. Felice Trapassi was glad enough to give his son the chance of a good education and intro- duction into the world under auspices so favourable. Gravina hellenized the boy's name Trapassi into Metastasio; and intended his adopted son to be a jurist like himself. He there- fore made the boy learn Latin and begin the study of law. At the same time he cultivated his literary gifts, and displayed the youthful prodigy both at his own house and in the Roman coteries. Metastasio soon found himself competing with the most celebrated improvisatori of his time in Italy. Days spent in severe studies, evenings devoted to the task of improvising eighty stanzas at a single session, were fast ruining Pietro's health and overstraining his poetic faculty. At this juncture Gravina had to journey into Calabria on business. He took Metastasio with him, exhibited him in the literary circles of Naples, and then placed him under the care of his kinsman Gregorio Caroprese at a little place called Scalea. In country air and the quiet of the southern seashore Metastasio's health revived. It was decreed by Gravina that he should never improvise again, but should be reserved for nobler efforts, when, having completed his education, he might enter into competition with the greatest poets.

Metastasio responded to his patron's wishes. At the age of twelve he translated the Iliad into octave stanzas; and two years later he composed a tragedy in the manner of Seneca upon a subject chosen from Trissino's Italia liberata — Gravina's favourite epic. It was called Giustino. Gravina had it printed in 1 7 13; but the play is lifeless; and forty-two years afterwards we find Metastasio writing to his publisher, Calsabigi, that he would willingly suppress it. Caroprese died in 1714, leaving Gravina his heir; and in 17 18 Gravina also died. Metastasio inherited house, plate, furniture and money, which amounted to 15,000 scudi, or about £4000. At a meeting of the Arcadian Academy, he recited an elegy on his patron, and then settled down, not it seems without real sorrow for his loss, to enjoy what was no inconsiderable fortune at that period. Metastasio was now twenty. During the last four years he had worn the costume of abb6, having taken the minor orders without which it was then useless to expect advancement in Rome. His romantic history, personal beauty, charming manners and distinguished talents made him fashionable. That before two years were out he had spent "his money and increased his reputa- tion for wit will surprise no one. He now very sensibly deter- mined to quit a mode of life for which he was not born, and to apply himself seriously to the work of his profession. Accord- ingly he went to Naples, and entered the office of an eminent lawyer named Castagnola. It would appear that he articled himself as clerk, for Castagnola exercised severe control over his time and energies. While slaving at the law, Metastasio in 1 721 composed an epithalamium, and probably also his first musical serenade, Endimione, on the occasion of the marriage of his patroness the Princess Pinelli di Sangro to the Marchese Belmonte Pignatelli. But the event which fixed his destirryˆ was the following. In 1722 the birthday of the empress had to be celebrated with more than ordinary honours, and the viceroy applied to Metastasio to compose a serenata for the occasion. He accepted this invitation, but it was arranged that his author- ship should be kept secret. Under these conditions Metastasio produced Gli orti esperidi. Set to music by Porpora, it won the most extraordinary applause. The great Roman prima donna, Marianna Bulgarelli, called La Romanina from her birth- place, who had played the part of Venus in this drama, spared no pains until she had discovered its author. La Romanina forthwith took possession of him, induced him to quit his

lawyer's office, and promised to secure for him fame and indepen- dence, if he would devote his talents to the musical drama. In La

Romanina's house Metastasio became acquainted with the greatest composers of the day — with Porpora, from whom he took lessons in music; with Hasse, Pergolese, Scarlatti, Vinci, Leo, Durante, Marcello, all of whom were destined in the future to set his plays to melody. Here : too he studied the art of singing, and learned to appreciate the style of such men as Farinelli. Gifted himself with extraordinary facility in compo- sition, and with a true poetic feeling, he found no difficulty in producing plays which, while beautiful in themselves, judged merely as works of literary art, became masterpieces as soon as their words were set to music, and rendered by the' singers of the greatest school of vocal art the world has ever seen. Reading Metastasio in the study, it is impossible to do him justice. But the conventionality of all hk plots, the absurdities of many of his situations, the violence he does to history in the persons of some leading characters, his " damnable iteration " of the theme of love in all its phases, are explained and justified by music.

Metastasio resided with La Romanina and her husband in Rome. The generous woman, moved by an affection half maternal half romantic, and by a true artist's admiration for so rare a talent, adopted him more passionately even than Gravina had done. She took the whole Trapassi family-ˆ father, mother, brother, sisters — into her own house. She fostered the poet's genius and pampered his caprices: Under her influence he wrote in rapid succession the Didone abbah-donala, Calone in Utica, Ezie, Alessandro nelV Indie, Semiramide riconosciuta, Siroe and Artaserse. These dramas were set to music by the chief composers of the day, and performed in the chief towns of Italy. But meanwhile La Romanina was growing older; she had ceased to sing in public; and the poet felt himself more and more dependent in an irksome sense upon her kindness. He gained 300 scudi (about £60) for each opera; this pay, though good, was precarious, and he longed for some fixed engagement. In September 1729 he received the offer of the post of court poet to the theatre at Vienna, with a stipend of 3000 florins. This he at once accepted. La Romanina unselfishly sped him on his way to glory. She took the charge of his family in Rome, and he set off for Austria.

In the early summer of 1730 Metastasio settled at Vienna in the house of a Spanish Neapolitan, Niccolo Martinez, where he resided until his death. This date marks a new period in his artistic activity. Between the years 1730 and 1740 his finest dramas, Adriano, Demetrio, Issipile, Demofoonte, Olimpiade, Clemenza di Tito, AchilleinSciro, Temistocle and Attttio Regolo, were produced for the imperial theatre. Some of them had to be composed for special occasions, with almost incredible rapidity — the Achtile in eighteen days, the Ipermnestra in

nine. Poet, composer, musical copyist and singer did their work together in frantic haste. Metastasio understood the technique of his peculiar art in its minutest details. The experience gained at Naples and Rome, quickened by the excitement of his new career at Vienna, enabled him almost instinctively, and as it were by inspiration, to hit the exact mark aimed at in the opera.

At Vienna Metastasio met with no marked social success. His plebeian birth excluded him from aristocratic circles. But, to make up in some measure for this comparative failure, he enjoyed the intimacy of a great lady, the Countess Althann, sister-in-law of his old patroness the Princess Belmonte Pigna- telli. She had lost her husband, and had some while occupied the post of chief favourite to the emperor. Metastasio's liaison with her became so close that it was even believed they had been privately married. The even tenor of his existence was broken in the year 1734 by the one dark and tragic incident of his biography. It appears that La Romanina had at last got tired of his absence. Gould not Metastasio get her an engagement at the court theatre? The poet at this juncture revealed his own essential feebleness of character. To La Romanina he owed almost everything as a man and as an artist. But he was ashamed of her and tired of her. He vowed she should not come to Vienna, and wrote dissuading her from the projected, visit.

The tone of his letters alarmed and irritated her. It is probable that she set out from Rome, but died suddenly upon the road. All we know is that she left him her fortune after her husband's life interest in it had expired, and that Metastasio, overwhelmed with grief and remorse, immediately renounced the legacy. This disinterested act plunged the Bulgarelli-Metastasio house- hold at Rome into confusion. La Romanina's widower married again. Leopoldo Trapassi, and his father and sister, were thrown upon their own resources.

As time advanced the life which Metastasio led at Vienna, together with the climate, told upon his health and spirits. From about the year 1745 onward he wrote but little, though the cantatas which belong to this period, and the canzonet Ecco quel fiefo istante, which he sent to his friend Farinelli, rank among the most popular of his productions. It was clear, as Vernon Lee has phrased it, that " what ailed him was mental and moral ennui." In 1755 the Countess Althann died, and Metastasio was more than ever reduced to the society which gathered round him in the bourgeois house of the Martinez. He sank rapidly into the habits of old age; and, though his life was prolonged till the year 1782, very little can be said about it. On the 1 2th of April he died, bequeathing his whole fortune of some 130,000 florins to the

five children of his friend Martinez. He had survived all his Italian relatives.

During the long period of forty years in which Metastasio overlived his originality and creative powers his fame went on increasing. In his library he counted as many as forty editions of his own works. They had been translated into French, English, German, Spanish, even into modern Greek. They had been set to music over and over again by every composer Of distinction, each opera receiving this honour in turn from several of the most illustrious men of Europe. They had been sung by the best virtuosi in every capital, and there was not a literary academy of note which had not conferred on him the honour of membership. Strangers of distinction passing through Vienna made a point of paying their respects to the old poet at his lodgings in the Kohlmarkt Gasse. But his poetry was intended for a certain style of music — for the music of omnipotent vocalists, of thaumaturgical soprani. With the changes effected in the musical drama by Gluck and Mozart, with the development of orchestration and the rapid growth of the German manner, a new type of libretto came into request. Metastasio's plays fell into undeserved neglect, together with the music to which he had linked them. Farinelli, whom he styled " twin-brother," was the true exponent of his poetry; and, with the abolition of the class of singers to which Farinelli belonged, Metastasio's music suffered eclipse. It was indeed a just symbolic instinct which made the poet dub this unique soprano his twin-brother.

The musical drama for which Metastasio composed, and in working for which his genius found its proper sphere, has so wholly passed away that it is now difficult to assign his true place to the poet in Italian literary history. His inspiration was essentially emotional and lyrical. The chief dramatic situations are expressed by lyrics for two or three voices, embodying the several contending passions of the agents brought into conflict by the circumstances of the plot. The total result is not pure literature, but literature supremely fit for musical effect. Language in Metastasio's hands is exquisitely pure and limpid. Of the Italian poets, he professed a special admiration for Tasso and for Marini. But he avoided the conceits of the latter, and was no master over the refined richness of the former's diction. His own style reveals the improvisatore's facility. Of the Latin poets he studied Ovid with the greatest pleasure, and from this predilection some of his own literary qualities may be derived. For sweetness of versification, for limpidity of diction, for delicacy of sentiment, for romantic situations exquisitely rendered in the simplest style, and for a certain delicate beauty of imagery sometimes soaring to ideal sublimity, he deserves to be appreciated so long as the Italian language lasts.

There are numerous editions of Metastasio's works. That by Calsabigi (Paris, 1755, vols. 8vo) published under his own superin- tendence, was the poet s favourite. Another of Turin (1757) and a

third of Paris (1780) deserve mention. The posthumous works were printed at Vienna, 1795. The collected editions of Genoa (1802) and Padua (181 1) will probably be found most useful by the general student. An edition of the letters, by Cardacci, was published at Bologne in 1883. Metastasio's life was written by Aluigi (Assisi, 1783)'; by Charles Burney (London, 1796); and by others; but by far the most vivid sketch of his biography will be found in Vernon Lee's Studies of the 18th Century in Italy (London, 1880) a work which throws a flood of light upon the 'development of Italian dramatic music, and upon the place occupied by Metastasio in the artistic movement of the last century. (J. A. S.)

•METAURUS (mod. Metauro; the form Mataurus is later, and is more frequent in inscriptions of the imperial period), a river of Italy, which flows into the sea a little south-east of Fanum Fortunae (mod. Fano). On its banks Hasdrubal, while marching to the aid of Hannibal in 207 B.C., was defeated and slain by the Roman army, this being the decisive battle of the Second Punic War. The exact site of the battle is uncertain; tradition places it between Fossombrone and the Furlo Pass, but it is probable that it occurred nearer the sea-coast.

METAXAS, ANDREAS (1 786-1860), Greek politician, was born in the island of Cephalonia. During the latter part of the War of Independence (1824-1827) he accompanied Capo dTstria to Greece, and was appointed by him minister of war. When Capo d'Istria was murdered in 1831 Metaxas became a member of the provisional government which held office till the accession of King Otho in 1833. During the minority of Otho he was named privy councillor and minister at Madrid and Lisbon. In 1840 he was recalled and appointed minister of war. In 1843- 1844 he was president of the council of ministers, and he subsequently held the post of ambassador at Constantinople from 1850 to 1854. He died at Athens on the 19th of September i860.

METAYAGE SYSTEM, the cultivation of land for a proprietor by one who receives a proportion of the produce. The system has never existed in England and has no English name, but in certain provinces

of Italy and France it was once almost univer- sal, and is still very common. It is also not unusual in Portugal, in Greece, and in the countries bordering on the Danube. In Italy and France, respectively, it is called mezzeria and mitayage, or halving — the halving, that is, of the produce of the soil between landowner and landholder. These expressions are not, however, to be understood in a more precise sense than that in which we sometimes talk of a larger and a smaller half. They merely signify that the produce is divisible in certain definite proportions, which must obviously vary with the varying fer- tility of the soil and other circumstances, and which do in prac- tice vary so much that the landlord's share is sometimes as much as two-thirds, sometimes as little as one-third. Sometimes the landlord supplies all the stock, sometimes only part — the cattle and seed perhaps, while the farmer provides the implements; or perhaps only half the seed and half the cattle, the farmer finding the other halves — taxes too being paid wholly by one or the other, or jointly by both.

English writers were unanimous, until J. S. Mill adopted a different tone, in condemning the metayer system. They judged it by its appearance in France, where it has never worn a very attractive aspect. Under the ancien regime not only were all direct taxes paid by the metayer, the noble landowner being exempt, but these taxes, being assessed according to the visible produce of the soil, operated as penalties upon all endeavours to augment its productiveness. No wonder, then, if the metayer fancied that his interest lay less in exerting himself to augment the total to be divided between himself and his landlord, than in studying how to defraud the latter part of his rightful share; nor if he has not yet got rid of habits so acquired, especially when it is considered that he still is destitute of the fixity of tenure without which metayage cannot prosper. French mdtayers, in Arthur Young's time, were " removable at pleasure, and obliged to conform in all things to the will of their landlords," and so in general they are still. Yet even in France, although mitayage and extreme rural poverty usually coincide, there are provinces where the contrary is the fact, as it is also in Italy. Indeed, to every tourist who has passed through the plains of xvni. §

Lombardy with his eyes open, the knowledge that metayage has for ages been there the prevailing form of tenure ought to suffice for the triumphant vindication of metayage in the ab- stract. An explanation of the contrasts presented by metayage in different regions is not far to seek. Metayage, in order to be in any measure Worthy of commendation, must be a genuine partnership, one in which there is no sleeping partner, but in the affairs of which the landlord, as well as the tenant, takes an active part. Wherever this applies, the results of

metayage appear to be as eminently satisfactory, as they are decidedly the reverse wherever the landlord holds himself aloof.

In France there is also a system termed mitayage par groupes, which consists in letting a considerable farm, not to one metayer, but to an association of several, who work together for the general good, under the supervision either of the landlord him- self, or of his bailiff. This arrangement gets over the difficulty of finding tenants possessed of capital enough for any but very small farms.

See further the section Agriculture in the articles France, Greece, Italy, &c; and consult J. Cruveilhier, IZtude sur le mStayage (Paris,

1894). ,

METCALF, WILLARD LEROY (1858-), American artist, was born at Lowell, Massachusetts, on the 1st of July 1858. He was a pupil of the Boston Normal Art School, of the Boston Art Museum School, and of the Academie Julien, Paris. After early figure-painting and iEustration, he became prominent as a land- scape painter. He was one of the " Ten American Painters " who in 1897 seceded from the Society of American Artists. For some years he was an instructor in the Woman's Art School, Cooper Union, New York, and in the Art Students' League, New York. In 1893 he became a member of the American Water Colour Society, New York.

METCALFE, CHARLES THEOPHILUS METCALFE, Baron (1 785-1846), Indian and colonial administrator, was born at Calcutta on the 30th of January 1785; he was the second son of Thomas Theophilus Metcalfe, then a major in the Bengal army, who afterwards became a director of the East India Company, and was created a baronet in 1802. Having been educated at Eton, he in 1800 sailed for India as a writer in the service of the Company. After studying Oriental languages as the first: student at Lord Wellesley's College of Fort William, he, at the age of nineteen, was appointed political assistant to General Lake, who was then conducting the final campaign of the Mabratta war against Holkar. In 1808 he was selected by Lord Minto for the responsible post of envoy to the court of Ranjit Singh at Lahore; hjre, on the 25th of April 1809, he con- cluded the important treaty securing the independence of the Sikh states between the Sutlej and the Jumna. Four years afterwardshe was made resident at Delhi, and in 1819 he received from Lord Hastings the appointment of secretary in the secret and political department. From 1820 to 1825 Sir Charles (who succeeded his brother in the baronetcy in 1822) was resident at the court of the nizam, and afterwards was summoned in an emergency to

his former post at Delhi. In 1827 he obtained a. seat in the supreme council, and in March 1835, after he had acted as the first governor of the proposed new presidency of Agra, he provisionally succeeded Lord William Bentinck in the governor-generalship. During his brief tenure of office (it lasted only for one year) he carried out several important measures, including that for the liberation of the press, which, while almost universally popular, complicated his relations with the directors at home to such an extent that he resigned the service of the Company in 1838. In the following year he was appointed by the Melbourne administration to the governor- ship of Jamaica, where the difficulties created by the recent passing of the Negro Emancipation Act had called for a high degree of tact and ability. Sir Charles Metcalfe's success in this delicate position; was yery marked, but unfortunately his health compelled his resignation and return to England in 1842. Six months afterwards he was appointed by the Peel ministry to the governor-generalship of Canada, and his success in carrying out the policy of the home government was rewarded with a

[i

peerage shortly after his return in 1845. He died at Malshanger, near Basingstoke, on the 5th of September 1846.

See J. W. Kaye's Life and Correspondence of Charles Lord Metcalfe (London, 1854).

METELLUS, the name of a distinguished family of the Caecilian (plebeian) gens in ancient Rome. The following are the most important: —

1. Lucius Caecilius Metellus, general during the first Punic War. Consul in 251 B.C., he was sent to Sicily, and gained a decisive victory over Hasdrubal, who, trusting to his numeri- cally superior forces and the alarm inspired by his elephants, ventured to attack him. Metellus's victory was in great measure due to a panic caused amongst the elephants by his clever manoeuvring. A number of these animals were sent in specially constructed rafts to adorn his triumph, and from this time the elephant frequently occurs as a device on the coins of the Metelli. In 241, when the temple of Vesta was destroyed by fire, Metellus succeeded in bringing out the Palladium uninjured, but lost his eyesight. As a reward, he was granted permission to ride to the

senate-house in a carriage, a privilege hitherto unheard of. But the story of his blindness is doubtful, since it is hardly consistent with his appointment as dictator in 224 ” for the purpose of holding the comitia,” nor is any mention made of it in the extract [Pliny, Nat. Hist. vii. 43 (45)] from the funeral oration pronounced over him by his son.

2. Quintus Caecilius Metellus, son of (1), became consul in 206 as a reward for his services at the Metaurus. In 205 he was dictator for holding the comitia; in 201 one of the com- missioners for dividing the public land in Samnium and Apulia amongst the Roman veterans; in 186 he conducted an embassy to Macedonia, afterwards proceeding to Peloponnesus to inves- tigate the quarrel between Sparta and the Achaeans. He is the Metellus who caused the poet Naevius (g.v.) to be imprisoned and exiled for having attacked him on the stage.

3. Lucius Caecilius Metellus, possibly son of (1), when the disastrous news of the battle of Cannae (216) reached Rome, proposed to a number of young nobles that they should leave Italy and offer their services to some foreign ruler, but they were prevented by the threats of the younger Scipio from carry- ing out their purpose. For this offence, when quaestor two years later, he was degraded by the censors from his tribe to the class of aerarii. Nevertheless, he was elected one of the tribunes for the following year, but his attempt to call the censors to account for their action proved unsuccessful in the face of the opposition of his colleague.

4. Quintus Caecilius Metellus Macedonicus (d. 115 B.C.), praetor 148 B.C., defeated the usurper Andriscus (q.v.) in Mace- donia and forced him to surrender. Under his superintendence the country was made a Roman province. In 146, he attacked the Achaeans to avenge an insult offered to a Roman embassy at Corinth. He gained decided successes over them at Scarpheia and Chaeroneia, but was superseded by L. Mummius. On his return to Italy he received the honour of a triumph and the title of Macedonicus. Consul in 143, he reduced the Celti- berians in northern Spain to obedience. In 131, when censor with Q. Pompeius (they were the first two plebeian censors), he proposed that all citizens should be compelled to marry. He expelled a number of senators, one of whom, the tribune C. Atinius Labeo, proposed that he should be hurled from the Tarpeian rock; his life was only saved through the intervention of another tribune. He was an opponent of the Gracchi, although not averse from moderate reform. He was a strict disciplinarian, a good general, and a type of the ancient Roman both in public and private life. He erected a splendid colonnade in. the Campus Martius, and two temples dedicated to Jupiter Stator and

Juno.

5. Quintus Caecilius Metellus Numidicus, consul 109, and commander in the Jugurthine War. He defeated Jugurtha {q.v.) by the river Muthul, and after a difficult march through the desert took his stronghold, Thala. Marius, however, who had been intriguing for the command, accused Metellus of protracting the war, and received the consulship for 107 with the province

of Numidia. Metellus received a splendid triumph and the title of Numidicus. Saturninus, whom as a censor he tried to remove from the senate, passed in 100 an agrarian law, inserting a provision that all senators should swear to it within five days. All complied but Metellus, who retired to Asia. After Saturn- inus was killed he returned, and died (probably in 91). He was a man -of the highest integrity, a strict and efficient general, and one of the chief leaders of the aristocratic party. He was a man of education and learning, and Cicero speaks highly of him as an orator.

6. Quintus Caecilius Metellus Pius, so called from his efforts to bring about the recall of his father Numidicus from exile. He was one of the commanders in the Social War, and defeated Q. Pompaedius Silo, the Marsian leader (88). Sulla, on his departure for Asia, gave him proconsular command over south Italy. When Marius returned to Italy and joined Cinna, the soldiers, who had no confidence in the consul Gnaeus Octa- vius, wished Metellus to take command, but he refused. The soldiers deserted in large numbers, and considering it impossible to defend Rome, Metellus retired to Africa and afterwards to Liguria, resuming his former proconsular command on Sulla's return. In the war against Marius he gained several important successes, and after his victory over C. Norbanus at Faventia (82) he subdued the whole of upper Italy. Consul in 80 with Sulla, he went to Spain next year against Sertorius, who pressed him hard till the arrival of Pompey in 76. Next year Metellus defeated Sertorius's lieutenant Hirtuleius at Italica and Segovia, and joining Pompey rescued him from the consequences of a check at Sucro. From this time Sertorius grew weaker till his murder in 72. In 71 Metellus returned to Rome and triumphed. He became pontifex maximus, and died probably at the end of 64. He was an upright man, of moderate ability.

7. Quintus Caecilius Metellus Celer, legate of Pompey in Asia 65 B.C., praetor 63. He was despatched to cut off the retreat of Catiline to the north by blocking the passes, and in 62 went into the province of Cisalpine Gaul with the title of proconsul, although he did not become consul till 60. A strong supporter of the optimates and an enemy of

Pompey, he strenu- ously opposed the agrarian law brought forward by the tribune Lucius Flavius, to provide for Pompey's veterans, and stood firm even though imprisoned; the law had to be given up. He also tried, though fruitlessly, to obstruct Caesar's agrarian law in 59. He died suddenly in the same year — it was usually supposed from poison administered by his wife Clodia.

8. Quintus Caecilius Metellus Nepos, son of a Metellus of the same name, so called because he was the grandson of (4) . He was legate to Pompey in the war against the Mediterranean pirates (67), and took part in the Syrian campaign. In 63 he returned to Rome, to assist Pompey in carrying out his plans. He violently attacked Cicero, and refused to allow him to deliver the customary speech on laying down office as consul; he even threatened to impeach him for having executed Roman citizens (referring to the Catilinarian conspirators) without a trial. In 62 his proposal that Pompey should be summoned to Italy to restore order was bitterly opposed by Cato, and on the day set down for the bill a fight took place in the forum. Metellus fled to Pompey, but soon returned with him to Rome. In 60, when praetor, he proposed a law for the abolition of the vectigalia in Italy. In 57 ne was consul, but offered no opposition to the return of Cicero from exile. In 56 he was governor of Hither Spain, where he was engaged in hostilities against the Vaccaei with indifferent success. He appears to have died in Rome in* the following year. He was a mere creature of Pompey.

9. Quintus Caecilius Metellus Pius Scipio, son of P. Scipio Nasica, was adopted by (6). He was accused of bribery in 60 B.C., and defended by Cicero, to whom he had rendered valuable assistance during the Catilinarian conspiracy. In August 52, he became consul through the influence of Pompey, who had married his daughter Cornelia. In 49 he proposed that Caesar should disband his army within a definite time, under pain of being declared an enemy of the state. After the

I outbreak of the civil war, the province of Syria was assigned to

him, and he was about to plunder the temple of Artemis at Ephesus when he was recalled by Pompey. He commanded the centre at Pharsalus, and afterwards went to Africa, where by Cato's influence he received the command. In 46 he was defeated at Thapsus; while endeavouring to escape to Spain he fell into the hands of P. Sittius,

and put himself to death. His connexion with two great families gave him importance, but he was selfish and licentious, wanting in personal courage, and his violence drove many from his party.

10. Quintus Caecilius Metellus, surnamed Creticus, Roman general. Consul in 69 B.C., he was appointed to the command of the war against Crete, the headquarters of the pirates of the Mediterranean. Its subjugation proceeded slowly but surely until 67, when Pompey claimed the control of affairs in virtue of the powers conferred upon him by the Gabinian law. Thereupon the Cretans, who had been treated with great harshness by Metellus, offered to surrender to Pompey, who enjoyed a reputation for leniency towards the conquered. Pompey accepted the offer and sent instructions to Metellus to suspend operations. Metellus refused and completed the conquest of the island, which was annexed to Cyrene and became a Roman province. On Metellus's return to Rome the partisans of Pompey succeeded in keeping him out of a triumph until after the Catilinarian conspiracy, when he made his entry into the city and received the name Creticus in honour of his achieve- ments. Metellus naturally joined the senatorial party in their opposition to Pompey, and had the satisfaction of preventing the ratification of what he had done in Asia. He was one of a commission of three sent (60) to investigate the state of affairs in Gaul, where disturbances were apprehended. He appears to have been alive in 54, but nothing further is known of him.

On the family of the Metelli generally, see M. Wende, De Caeciliis Metellis, i. (Bonn, 1875), for its history up to the time of the Gracchi the new edition by P. Grobe of Drumann's Geschichte Roms, ii. ; and the article s.v. " Caecilius " by F. Milnzer in Pauly-Wissowa's Realencyclopddie der classischen Altertumswissenschaft, iii. pt. I (1897).

METEMPSYCHOSIS (Gr. ixertiiivxˆais) , or Transmigration or the Soul, the doctrine that at death the soul passes into another living creature, man, animal, or even plant. This doctrine, famous in antiquity and still held as a religious tenet by certain sects of the civilized world, has its roots far back in primitive culture. It is developed out of three universal savage beliefs: (1) that man has a soul, connected in some vague way with the breath, which can be separated from his material body, temporarily in sleep, permanently at death; (2) that animals and even plants have souls, and are possessed to a large extent of human powers and passions; (3) that souls can be transferred from one organism to another. Innumerable examples might be mentioned of the notion that a new-born child is the reincarnation of someone

departed, as in Tibet the soul of the Dalai-Lama is supposed to pass into an infant born nine months after his decease. Transmigration of human souls into non-human bodies is implied in totemism (q.v.), for, as Professor Frazer says, ” it is an article of faith that as the clan sprang from the totem, so each clansman at death reassumes the totem form.” All these savage notions are to be regarded as presuppositions of metempsychosis, rather than identified with that doctrine itself as a reasoned theory.

Till full investigation of Egyptian records put us in possession of the facts, it was supposed that the Egyptians believed in metempsychosis, and Herodotus (ii. 123) explicitly credits them with it. We now know that he was wrong. All that they believed was that certain privileged souls might in the other world be able to assume certain forms at pleasure, those of a sparrow-hawk, lily, &c. Herodotus misunderstood the Egyp- tians to hold beliefs identical with those which were current in his day in Greece. In India, on the contrary, the doctrine was thoroughly established from ancient times; not from the most ancient, as it is not in the Vedas; but onwards from the Upahi- shads. In them it is used for moral retribution: he who kills a Brahman is, after a long progress through dreadful hells, to be reborn as a dog, pig, ass, camel, &c. This we always find in metempsychosis as a reasoned theory. It is formed by combina-

tion of two sets of ideas which belong to different planes of culture: the ideas of judgment and punishment after death elaborated in a relatively cultured society by a priestly class are combined with ideas, like that of totem-transmigration, proper to a savage society. In India we may explain the whole phenomenon as an infusion of the lower beliefs of the non-Aryan conquered races into the higher religious system of their Aryan conquerors. In later Hinduism metempsychosis reached a monstrous development; according to Monier- Williams it was believed that there were 8,400,000 forms of existence through which all souls were liable to pass before returning to their source in the Deity. Buddhism appeared as a reaction against all this, and sought by a subtle modification to harmonize the theory with its own pessimistic view of the world. According to Buddhism there is no soul, and consequently no metem- psychosis in the strict sense. Something, however, is trans- mitted, i.e. Karma (character), which passes from individual to individual, till in the perfectly righteous man the will to live is extinguished and that particular chain of lives is brought to an end.

We do not know exactly how the doctrine of metempsychosis arose in Greece; it cannot, as was once supposed, have been borrowed from

Egypt and is not likely to have come from India. It is easiest to assume that savage ideas which had never been extinguished were utilized for religious and philosophic purposes. The Orphic religion, which held it, first appeared in Thrace upon the semi-barbarous north-eastern frontier. Orpheus, its legen*- dary founder, is said to have taught that " soul and body are united by a compact unequally binding on either; the soul is divine, immortal and aspires to freedom, while the body holds it in fetters as a prisoner. Death dissolves this compact, but only to re-imprison the liberated soul after a short time: for the wheel of birth revolves inexorably. Thus the soul continues its jour- ney, alternating between a separate unrestrained existence and fresh reincarnation, round the wide circle of necessity, as the companion of many bodies of men and animals. To these unfortunate prisoners Orpheus proclaims the message of libera- tion, that they stand in need of the grace of redeeming gods and of Dionysus in particular, and calls them to turn to God by ascetic piety of life and self -purification: the purer their lives the higher will be their next reincarnation, until the soul has completed the spiral ascent of destiny to live for ever as God from whom it comes." Such was the teaching of Orphism which appeared in Greece about the 6th century B.C., organized itself into private and public mysteries at Eleusis and elsewhere, and produced a copious literature.

The earliest Greek thinker with whom metempsychosis is connected is Pherecydes; but Pythagoras, who is said to have been his pupil, is its first famous philosophic exponent. Pytha- goras probably neither invented the doctrine nor imported it from Egypt, but made his reputation by bringing Orphic doctrine from North-Eastern Hellas to Magna Graecia and by instituting societies for its diffusion.

The real weight and importance of metempsychosis is due to its adoption by Plato. Had he not embodied it in some of his greatest works it would be merely a matter of curious investiga- tion for the anthropologist and student of folk-lore. In the eschatological myth which closes the Republic he tells the story how Er, the son of Armenius, miraculously returned to life on the twelfth day after death and recounted the secrets of the other world. After death, he said, he went with others to the place of Judgment and saw the souls returning from heaven and from purgatory, and proceeded with them to a place where they chose new lives, human and animal. " He saw the soul of Orpheus changing into a swan, Thamyras becoming a nightingale, musical birds choosing to be men, the soul of Atalanta choosing the honours of an athlete. Men were seen passing into animals and wild and tame animals changing into each other." After their choice the souls drank of Lethe and then shot away like stars to their birth. There

are myths and theories to the same effect in other dialogues, the Phaedrus, Meno, Phaedo, Timaeus and Laws. In Plato's view the number of souls was fixed;

birth therefore is never the creation of a soul, but only a trans- migration from one body to another. Plato's acceptance of the doctrine is characteristic of his sympathy with popular beliefs and desire to incorporate them in a purified form into his system. Aristotle, a far less emotional and sympathetic mind, has a doc- trine of immortality totally inconsistent with it. In later Greek literature the doctrine appears from time to time; it is mentioned in a fragment of Menander (the Inspired Woman) and satirized by Lucian (Gallus § 18 seq.). In Roman literature it is found as early as Ennius, who in his Calabrian home must have been familiar with the Greek teachings which had descended to his times from the cities of Magna Graecia. In a lost passage of his Annals, a Roman history in verse, Ennius told how he had seen Homer in a dream, who had assured him that the same soul which had animated both the poets had once belpnged to a pea- cock. Persius in one of his satires (vi. 9) laughs at Ennius for this: it is referred to also by Lucretius (i. 124) and by Horace {Epist. II. i. 52). Virgil works the idea into his account of the Underworld in the sixth book of the Aeneid (vv. 724 sqq.). It persists in antiquity down to the latest classic thinkers, Plotinus and the other Neoplatonists.

Attempts have been made with little success to find metem- psychosis in early Jewish literature. But there are traces of it in Philo, and it is definitely adopted in the Kabbala. Within the Christian Church it was held during the first centuries by isolated Gnostic sects, and by the Manichaeans in the 4th and 5th centuries, but was invariably repudiated by orthodox theologians. In the middle ages these traditions were continued by the numerous sects known col- lectively as Cathari. At the Renaissance we find the doctrine in Giordano Bruno, and in the 17th century in the theosophist van Helmont. A modified form of it was adopted by Swedenborg. During the classical period of German literature metempsychosis attracted much attention: Goethe played with the idea, and it was taken up more seriously by Lessing, who borrowed it from Charles Bonnet, and by Herder. It has been mentioned with respect by Hume and by Schopenhauer. Modern theosophy, which draws its inspiration from India, has taken metempsychosis as a cardinal tenet; it is, says a recent theosophical writer, " the master-key to modern problems," and among them to the

problem of heredity.

Outside the somewhat narrow circle of theosophists there is little disposition to accept the doctrine r but it may be worth while, to point out that there are two fatal objections to it. The first is that personal identity depends oh memory, and we do not remember our previous incarnations. The second is that the soul, whatever' it may be, is influenced throughout all its qualities by the qualities of the body: modern psychology discredits the idea that the soul is a metaphysical essence which can pass indifferently from one body to another. If (to suppose the impossible) the soul of a dog were to pass into a man's body it would be so changed as to be no longer the same soul; and so, in a less degree, of change from one human body to another.

See A. Bertholet, The Transmigration of Souls (trans, from the German by H. J. Chaytor) ; E. Rohde, Psyche. (H. St.)

METEOR (Gr. fierioipa, literally " things in the air," from itera, beyond, and aeipav, to lift up), a term originally applied by the ancient Greeks to many atmospheric phenomena — rainbows, halos, shooting stars, &c— but now specially restricted to those luminous bodies known as shooting stars, falling stars, fireballs and bolides. Though these objects only become visible in the atmosphere they are extra-terrestrial planetary bodies, and properly belong to the domain of astronomy. The extra- terrestrial bodies which happen to find a resting-place on the earth are studied under the name of meteorites (q.v.).

In ancient times meteors were supposed to be generated in the air by inflammable gases. Isolated fireballs and star showers had been occasionally observed, but instead of being attentively watched they had been neglected, for their appari- tions had filled mankind with dread, and superstition attributed to them certain malevolent influences. It was the brilliant exhibition in November 1833 that, in modern times particularly, attracted earnest students to investigate the subject of meteors generally, and to make systematic observations of their appari- tions on ordinary nights of the year. Historical records were searched for references to past meteoric displays, and these were tabulated and compared. The attention devoted to the matter soon elucidated the phenomena of meteors, and proved them to be small planetary bodies, practically infinite in numbers and illimitable in the extent and variety of their orbits.

The various kinds of meteors are probably but different manifestations of similar objects. Perhaps the most important meteors are those

which, after their bright careers and loud detonations, descend upon the earth's surface and can be sub- mitted to close inspection and analysis (see Meteorites). The fireball or bolide (Gr. j3oXw, a missile) comes next in order from its size and conspicuous effects. It may either be interspersed with many smaller meteors in a shower or may be isolated. The latter usually move more slowly and approach rather near to the earth. The ordinary shooting stars vary from the brilliancy of a first- to a sixth-magnitude star. They exhibit a great dissimilarity in paths, motions and colours. The smallest and most numerous class are the telescopic meteors invisible to the naked eye. They range from the 7th magnitude to the smallest object perceptible in large telescopes.

The altitudes at which these bodies are visibly presented to us differ in individual cases. More than a thousand observations in duplicate have been made of the paths of identical meteors seen from two stations many miles apart. These pairs of obser- vations have shown a parallax from which the elevation of the objects above the earth, the lengths and directions of their courses, &c. could be computed. The average heights are from 80 to 40 m. A few, however, first appear when higher than 80 m. and some, usually slow-moving meteors, descend below 40 m. But altitudes beyond 100 and within 20 m. are rare: —

Average

Heights.

Length of Path.

Velocity per sec.

Beginning.

Ending.

Swift fireballs

85 m.

50 m.

55 m.

38 m.

Slow fireballs.

66 „

25 „

116 ,,

15 ..

Slow fireballs

(radiants near

horizon) . .

59 ..

48,,

121 „

13 ..

Swift shooting

stars ….

81 „

56,,

42 „

41 .,

Slow shooting

stars ….

63,,

49 „

36,,

17 „

30 of the November Leonids give a mean height of 84ˆ to 57! m. 40 of the August Perseids ,, „ ,, 80 to 54 m.

When the length of a meteor's"" course is .known and the duration of its flight has been correctly estimated it is easy to compute the velocity in miles. The visible life of an ordinary shooting star is, however, comprised within one second, and it is only rarely that such short time intervals can be accurately taken. The real velocities derived from good observations are rarely, if ever, under 7 or 8 m. per second, or over 60 or 70 m. per second. In a few exceptional cases abnormal speed has been indicated on good evidence. The slower class of meteors overtaking the earth (like the Andromedids of November) have a velocity of about 8 or 10 m. per second, while the swifter class (meeting the earth like the Leonids of November) have a velocity of about 44 m. per second.

When the members of a shower are observed with special regard to their directions it is seen that they diverge from a common focus. The apparent scattering or diversity of the flights is merely an effect of perspective upon objects really traversing parallel lines. The centre upon which the observed paths converge is called the radiant point or, shortly, the radiant. On every night of the year there are a great number of these radiants in action, but the large majority represent very attenu- ated showers. In 1876 the number of radiants known was 850/* but about 5000 have been determined up to the present time. These are not all the centres of separate systems, however: many of the positions being multiple observations of the same showers. Thus the August Perseids, the returns of which have been witnessed more frequently than those of any other meteoric stream have had their radiant point fixed on more than 250 occasions.

There appear to be moving and stationary radiants, contracted and diffused radiants, and long-enduring and brief radiants. The Perseids are visible from about the nth of July to the 20th

of August, the radiant having a daily motion of about i° R.A. to E.N.E. The Lyrids also vary in the position of their radiant, but the Orionids form a stationary position from about the 9th to the 24th of October. A large proportion of the ordinary feeble showers also appear to be stationary.

Solid bodies (chiefly stone or stone and iron) enter the atmo- sphere from without at all conceivable angles and at a velocity of about 26 m. per second, while the earth's orbital velocity is about i8j m. per

second. In thus rapidly penetrating the air heat is generated, the meteor becomes incandescent, and the phenomena of the streak or train is produced. Before the object can pierce the dense lower strata of air its material is usually exhausted, but on rare occasions it withstands the fiery ordeal, and fragments of the original mass fall upon the earth.

Multitudes of meteors infest space. On a clear moonless night one person may count eight or ten shooting stars in an hour. But there are more than twice as many visible in the early morning hours as in the evenings, and during the last half of the year there are also more than twice as many visible as during the first half. It is computed that twenty millions of meteors enter the atmosphere every day and would be visible to unassisted vision in the absence of sunlight, moonlight and clouds, while if telescopic meteors are included the number will be increased twentyfold. Ordinary meteors, in the region of the earth's orbit, appear to be separated by intervals of about 250 m. In special showers, however, they are much closer. In the rich display of the 12th of November 1833, the average distance of the particles was computed as about 15 m., in that of the 27th of November 1885 as about 20 m., and in that of the 27th of November 1872 as about 35 m.

The meteors, whatever their dimensions, must have motions around the sun in obedience to the law of gravitation in the same manner as planets and comets — that is, in conic sections of which the sun is always at one focus. The great variety in the apparent motions of meteors proves that they are not directed from the plane of the ecliptic; hence their orbits are not like the orbits of planets and short-period comets, which are little inclined, but like the orbits of parabolic comets, which often have great inclinations.

Historical records supply the following dates of abundant meteoric displays: —

902, Oct. 13.

1101, Oct. 17.

1602, Oct. 28.

1833, Nov. 13.

931, Oct. 14.

1202, Oct. 19.

1698, Nov. 9.

1866, Nov. 14.

934, Oct. 14.

1366, Oct. 23.

1799, Nov. 12.

1867, Nov. 14.

1002, Oct. 15.

1533. Oct. 25.

1832, Nov. 13.

1868, Nov. 14.

as they have to overtake the earth, and their apparent velocity is only about 9 m. per second. They are directed from a point in the sky near the star y Andromedae. Biela's comet of 1826, which had a period of 6-7 years, presented a significant resem- blance of orbit with that of the meteors, but the comet has not been seen since 1852 and has probably been resolved into the meteoric stream of Andromedids.

Rich annual displays of meteors have often been remarked on about the 10th of August, directed from Perseus, but they do not appear to have exhibited periodical maxima of great strength. They are probably dispersed pretty evenly along a very extended ellipse agreeing closely in its elements with comet 1862 : III. But the times of revolution are doubtful; the probable period of the comet is 121 years. and that of the meteors 1055 years. This shower of Perseids is notable for its long duration in the months of July and August and for its moving radiant.

There was a brilliant exhibition of meteors on the 20th of April 1803, and in other years meteors have been very abundant on about the 19th to the 21st of April, shooting from a radiant a few degrees south-west of a Lyrae. The display is appar- ently an annual one, though with considerable differences in intensity, and the Cycle of its more abundant returns has not yet been determined. A comet which appeared in 1861 had a very suggestive agreement of orbit when compared with that of the meteors, and the period computed for it was 41 5 years.

Apart from the instances alluded to there seem few coinci- dences between the orbital elements of comets and meteors. Halley's comet conforms very well, however, with a meteoric shower directed from Aquarius early in May. But there are really few comets which pass sufficiently near the earth to give rise to a meteoric shower. Of 80 comets seen during the 20 years ending 1893, Professor Herschel found that only two, viz. Denning's comet of 1881 and Finlay's of 1886, approached comparatively near to the earth's path, the former within 3,000,000 m. and the latter within 4,600,000 m.

Radiants of Principal Showers. — The following is a list of the chief radiant points visible during the year: —

These showers occurred at intervals of about one-third of a century, while the day moved along the calendar at the rate of one month in a thousand years. The change of style is, however, responsible for a part of the alteration in date. The explanation of these recurring phenomena iff that a great cloud or distended stream of meteors revolves around the sun in a period of 333 years, and that one portion of the elliptical orbit intersects that of the earth. As the meteors have been numerously visible in five or six successive years it follows they must be pretty densely distributed along a considerable arc of their orbit. It also follows that, as some of the meteors are seen annually, they must be scattered around the whole orbit. Travelling at the rate of 26 m. per second, they encounter the earth moving i8j m. per second in an opposite direction, so that the apparent velocity of the meteors is about 44 m. per second. They radiate from a point within the Sickle of Leo and are termed Leonids. In 1867 the remarkable discovery was made that Tempel's comet (1866 : 1.) revolved in an orbit identical with that of the Leonids. That the comet and meteors have a close physical association seems certain. The disintegrated and widely dispersed material of the comet forms the meteors which embellish our skies on mid-November nights.

Fine meteoric showers occurred in 1798 (Dec. 7), 1838 (Dec. 7), 1872 (Nov. 27), 1885 (Nov. 27), 1892 (Nov. 23) and 1899 (Nov. 23 and 24), and the dates indicate an average period of 6- 7 years for fifteen returns. The meteors move very slowly,

Date.

Radiant R.A. Dec.

Date.

Radiant R.A. Dec.

Jan. 2-3

230° + 53°

July-Sept.

47 o + 43 o

Feb. 10-15

75° + 4i°

Sept. 5-15 .

62° + 37°

March 1-4 .

166° + 4°

Sept. 3-22

74° + 41°

March 24

i6i° + 58°

Oct. 2

230° + 52°

April 19-22 .

27i° + 33°

Oct. 4 .

3io° + 79°

April-May .

i93° + 58°

Oct. 15-24 .

92 ° + I5 °

May 1-6

338°- 2°

Oct. 20-25 •

Ioo° + i3°

May 11-18 .

23i° + 27°

Oct. 30-Nov. 1

43° + 22°

May- July

252°-2I°

Nov. 2 .

58° + 9°

June 13 .

3io° + 6i°

Nov. 14-16 .

I5I° + 22°

July 15-19 •

3i4° + 48°

Nov. 16-28 .

1 54° + 40°

July 28-30

339°-n°

Nov. 20-23 .

63° + 22°

Aug. 9-13

45° + 57°

Nov. 17-23 .

2 5! + 43°

Aug. 10-15 ■

290° + 53

Dec. 4 .

l62° + 58°

Aug. 21-25 ■

29i° + 6o°

Dec. 9-12

io8° + 33°

Many meteors exhibit the green line of magnesium as a principal constituent. Professor N. von Konkoly remarked in the fireball of 1873 (July 26) the lines of magnesium and sodium. Other lines in the red arid green have been detected and found by comparison with the lines of marsh gas. Bright meteors often emit the bluish-white light suggestive Of burning magnesium. In addition to magnesium and sodium the lines of potassium, lithium and also the carbon flutings exhibited in cometary spectra, have been seen- g “ >

Meteoric observation has depended upon rough and hurried eye estimates in past years, but the importance of attaining greater accuracy by means of photography has been recognized. At several American observatories, and at Vienna, fairly suc- cessful attempts were made in November 1898 to photograph a sufficient number of meteor-trails to derive the Leonid radiant, and the mean position was at R.A. 151° 33′ Dec. + 22 12’. But the materials obtained were few, the shower having proved inconspicuous. The photographic method appears to have practically failed during recent years, since there has

been no brilliant display upon which to test its capacity. Really large meteors can be satisfactorily photographed, but small ones leave no impression on the plates.

Meteors look larger than they are, from the glare and naming effect due to their momentary combustion. The finer meteors on entering the air only weigh a few hundred or, at most, a few thousand pounds, while the smallest shooting stars visible to the eye may probably be equal in size to coarse grains of sand, and still be large enough to evolve all the light presented by them. (W- F. D.)

METEORA, a group of monasteries in Thessaly, in the northern side of the Peneius valley, not quite 20 m. N.E. of Trikkala, and near the village of Kalabaka (the ancient Aeginium, medieval Stagus or Stagoi). From the Cambunian chain two masses of rock are thrust southward into the plain, surmounted by isolated columns from 85 to 300 ft. high, " some like gigantic tusks, some like sugar-loaves, and some like vast stalagmites," but all consisting of iron-grey or reddish- brown conglomerate of gneiss, mica-slate, syenite and green- stone. The monasteries stand on the summit of these pinnacles; they are accessible only by aid of rope and net worked by a windlass from the top, or by a series of almost perpendicular ladders climbing the cliff. In the case of St Stephen's, the peak on which it is built does nor rise higher than the ground behind, from which it is separated by a deep, narrow chasm, spanned by a drawbridge. Owing to the confined area, the buildings are closely packed- together; but each monastery contains beside the monks' cells and water-cisterns, at least one church and a refectory, and some also a library. At one time they were fourteen in number, but now not more than four (the Great Monastery, Holy Trinity, St Barlaam's and St Stephen's) are inhabited by more than two or three monks. The present church of the Great Monastery was erected, according to Leake's reading of the local inscription, in 1388 (Bjornstahl, the Swedish traveller, had given 1371), and it is one of the largest and hand- somest in Greece. A number of the manuscripts from these monasteries have now been brought to the National Library at Athens: Aeginium is described by Livy as a strong place, and is frequently mentioned during the Roman wars; and Stagus appears from time to time in Byzantine writers.

See W. M. Leake, Northern Greece (4 vols., London, 1835) ; Professor Kriegk in Zeitschr. f. allg. Erdk. (Berlin, 1858); H. F. Tozer, Researches in the Highlands of Turkey (1869) ; L. Heuzey and H. Daumet, Mission archiologique de Macedoine (Paris, 1876), where

there is a map of the monasteries and their surroundings; Guide-Joanne; Grece, vol. ii. (Paris, 1891).

METEORITE, a mass of mineral matter which has reached the earth's surface from outer space. Observation teaches that the fall of a meteorite is often preceded by the flight of a fireball (see Meteor) through the sky, and by one or more loud detonations. It was inferred by Chladni (1794) that the fire- ball and the detonations result from the quick passage of the meteorite through the earth's atmosphere.

The fall of stones from the sky, though not credited by scientific men till the end of the 18th century, had been again and again placed on record. One of the most famous of meteor- ites fell in Phrygia and was worshipped there for many generaˆ tions under the name of Cybele, the mother of the gods. After an oracle had declared that possession of the stone would secure to the Romans a continual increase of prosperity, it was demanded by them . from King Attalus about the year 204 B.C., and taken with great ceremony to Rome. It is described by the historian as "a black stone, in the figure of a cone, circular below and ending in an apex above." Plutarch relates the fall of a stone in Thrace about 470 B.C., during the time of Pindar, and according to Pliny the stone was still preserved in his day, 500 years afterwards. Both Diana of the Ephesians " which fell down from Jupiter," and the image of Venus at Cyprus, appear to have been conical or pyramidal stones. One of the holiest relics of the Moslems is preserved at Mecca, built into a corner of the Kaaba; its history goes back far beyond the 7th century; the description of it given to Dr Partsch suggests that the stone had fallen from the sky. The oldest existing meteorite of which

the fall is known to have been observed is that which fell at Ensisheim in Elsass on the 10th of November 1492. It was seen to strike the ground and was immediately dug out; it had penetrated to a depth of 5 ft. and was found to weigh 260 lb. It was long suspended by a chain from the roof of the parish church, and is now kept in the Rathhaus of the town.

It was not till scientific men gave credence to the reports of the fall of heavy bodies from the sky that steps were taken for the formation of meteorite collections. The British Museum (Natural History) at South Kensington now contains specimens belonging to 566 distinct falls; of these falls 325 have been actually observed; the remaining specimens are inferred to have come from outer space, because their characters are similar to those of the masses which have been seen to fall. Of these meteorites the following twelve have fallen within the British

Isles : —

In England.

Place.

Date.

Wold Cottage, Thwing, York-

shire …..

Dec. 13, 1795.

Launton, Oxfordshire

Feb. 15, 1830.

Aldsworth, Gloucestershire

Aug. 4, 1835.

Rowton, Shropshire

April 20, 1876.

Middlesbrough, Yorkshire

March 4, 1881.

In Scotland.

High Possil, Glasgow

April 5, 1804.

Perth

May 17, 1830.

In Ireland.

Mooresfort, Tipperary .

Aug. 1810.

Adare, Limerick .

Sept. 10, 1813.

Killeter, Tyrone

April 29, 1844.

Dundrum, Tipperary

Aug. 12, 1865.

Crumlin, Antrim . . ■ .

1 Sept. 13, 1902.

Meteoritic falls are independent of thunderstorms and all other terrestrial circumstances; they occur at all hours of the day and night, and at all seasons of the year; they favour no particular latitudes. The number of stones which reach the ground from one fireball is very variable. In each of the two Yorkshire falls only one stone was found; the Guernsey County meteor yielded 30; at Toulouse, as many as 350 are estimated to have fallen; at Hessle, over 500; at Knyahinya, more than 1000; at L'Aigle, from 1000 to 2000; at both Pultusk and Mocs no fewer than 100,000 are estimated to have reached the earth's surface. The largest single mass seen to fall is one of those which came down at Knyahinya, Hungary, in 1866, and weighed 547 lb; but far larger masses, inferred from their char- acters to be meteorites, have been met with. The larger of the Cranbourne masses, now in the British Museum (Natural History), before rusting weighed 3I tons; the largest of the masses brought by Lieut. Peary from western Greenland weighs 36! tons. A mass found at Bacubirito in Mexico is 13 ft. long, 6 ft. wide and 5 ft. thick, and is estimated to weigh 50 tons.

From observations of the path and time of flight of the lumi- nous meteor it is calculated that meteorites enter the earth's atmosphere with absolute velocities ranging from 10 to 45 m. a second; but the speed of a meteorite after the whole of the resisting atmosphere has been traversed is extremely small and ■comparable with that of an ordinary falling body. According to Professor A. S. HerscheTs experiments, the meteorite which fell at Middlesbrough must have struck the ground with a velocity of only 412 ft. a second. In the case of the Hessle fall, several stones fell on the ice, which was only a few inches thick, and rebounded without breaking the ice or being broken themselves. The depth to which a meteorite penetrates depends on the speed N form, weight and density of the meteorite and on the nature of the ground. At Stannern a meteoric stone weighing 2 lb entered to a depth of only 4 in.; the large Knyahinya stone already mentioned

made a hole n ft. deep.

The area of the earth's surface occupied by towns and villages being comparatively small, the probability of a shower of stones falling within a town is extremely minute; the likelihood of a living creature being struck is still more remote. The first Yorkshire stone, that of Wold Cottage, struck the ground only 10 yds. from a labourer; the second, that of Middlesbrough, fell on the railroad only 40 yds. away from some platelayers at

work; a stone completely buried itself in the highway at Kaba; one fell between two carters on the road at Charsonville, throwing the ground up to a height of 6 ft.; the Tourinnes-la-Grosse meteorite broke the pavement and was broken itself; the Krahenberg stone fell within a few paces of a little girl; the Angers stone fell close to a lady standing in her garden; the Braunau mass went through the roof of a cottage; at Macao, in Brazil, where there was a shower of stones, some oxen are said to have been killed; at Nedagolla, in India, a man was so near that he was stunned by the shock; while at Mhow, also in India, a man was killed in 1827 by a stone which is a true meteorite, and is represented by fragments in museum collections. Though the surface of a meteoric stone becomes very hot during the early part of the flight through the air, it is cooled again during the later and slower part of the flight. Meteorites are generally found to be warm to the touch if immediately dug out; at the moment of their impact they are not hot enough to char woody fibre on which they chance to fall, nor is the surface then soft, for terrestrial matter with which the surface comes into contact makes no impression upon the meteorite. Where many stones fall at the same time they are generally distributed over a large area elongated in the direction of the flight of the luminous meteor, and the largest stones generally travel farthest. At Hessle, for instance, the stones were distributed over an area of 10 m. long and 3 m. broad.

Meteorites are almost invariably found to be completely covered with a thin crust such as would be caused by intense heating of the material for a short time; its thinness shows the slight depth to which the heat has had time to penetrate. They are presumably cojd and invisible when they enter the earth's atmosphere, and become heated and visible during their passage through the air; doubtless the greater part of the superficial material flicks off as the result of the sudden

heating and is left behind floating in the air as the trail of the meteor. The crust varies in aspect with the mineral composition of the meteorite; it is generally black; it is in most cases dull but is sometimes lustrous; more rarely it is dark-grey in colour. Each stone of a shower is in general completely covered with crust ; but occasionally, as in the case of the Butsura fall, stones found some miles apart fit each other closely and the fitting surfaces are uncrusted, showing that a meteorite may break up during a late and cool stage of the flight through the atmosphere. A meteorite is generally covered with pittings which have been compared in size and form to thumbmarks; the pittings are probably caused by the unequal conductivity, fusibility and frangibility of the superficial material. As picked up, complete and covered with crust, meteorites are always irregularly-shaped fragments, such as would be obtained on breaking up a rock presenting no regularity of structure.

About one-third, and those the most common, of the chemical elements at present recognized as constituents of the earth's crust have been met with in meteorites; no new chemical element has been discovered. The most frequent or plentiful in their occurrence are: aluminium, calcium, carbon, iron, magnesium, nickel, oxygen, phosphorus, silicon and sulphur; while less frequently or in smaller quantities are found antimony, arsenic, chlorine, chromium, cobalt, copper, hydrogen, lithium, manganese, nitrogen, potassium, sodium, strontium, tin, titanium, vanadium. The existence of minute traces of several other elements has been announced; of these special mention may be made of gallium, gold, iridium, lead, platinum and silver. Iron occurs chiefly in combination with nickel, and phosphorus almost always in combination with both nickel and iron (schreibersite) ; carbon occurs both as indistinctly crystallized diamond and as graphitic carbon, the latter generally being amorphous, but occasionally having the forms of cubic crystals (clif tonite) ; free phosphorus has been found in one meteorite; free sulphur has also been observed, but may have resulted from the decomposition of a sulphide since the fall of the stone.

Of the mineral constituents of meteorites, the following are by many mineralogists regarded as still unrepresented among native

terrestrial products: clif tonite, a cubic form of graphitic carbon; phosphorus; various alloys of nickel and iron; moissanite, silicide of carbon; cohenile, carbide of iron and nickel (corresponding to cementite, carbide of iron, found in artificial iron); schreibersite, phosphide of iron and nickel ; troilite, protosulphide of iron ; oldhamite, sulphide of calcium : osbornite, oxysulphide of calcium

and titanium or zirconium ; daubreelite, sulphide of iron and chromium ; lawrencite, protochloride of iron; asmanite, a species of silica; maskelynite, a singly refractive mineral with the chemical composition of labrador- ite; weinbergerite, a silicate intermediate in chemical composition to pyroxene and nepheline.

Of these troilite is perhaps identical with some varieties of terrestrial pyrrhotite; asmanite has characters which approach very closely to those of terrestrial tridymite ; maskelynite, according to one view, is the result of fusion of labradorite, according to another view, is an independent species chemically related to leucite. Other compounds are present corresponding to the follow- ing terrestrial minerals: olivine and forsterite; enstatite and bronzite ; diopside and augite ; anorthite, labradorite and oligoclase ; magnetite and chromite; pyrites; pyrrhotite; breunnerite. Quartz (silica), the most common of terrestrial minerals, is absent from the stony meteorites; but from the Toluca meteoric iron microscopic crystals have been obtained of which some have certain resem- blances to quartz, and others to zircon. Free silica is present in the Breitenbach meteorite but as asmanite. In addition to the above there are several compounds or mixtures of which the nature has not yet been satisfactorily ascertained.

Meteorites are conveniently distributed into three classes, which pass more or less gradually into each other: the first (siderites or meteoric irons) includes all those which consist mainly of metallic iron alloyed with nickel; only nine of them have been actually seen to fall; the second (siderolites) includes those in which metallic iron (alloyed with nickel) and stony matter are present in large proportion; few of them have been seen to fall; those of the third class (aerolites or meteoric stones) consist almost entirely of stony matter; nearly all have been seen to fall.

In the meteoric irons the iron generally varies from 80 to 95% and the nickel from 6 to 10%; the latter is generally alloyed with the iron, and several alloys or mixtures have been distin- guished by special names (kamacite, taenite, plessite). Troilite is frequently present as plates, veins or large nodules, sometimes surrounded by graphite; schreibersite is almost always present, and occasionally also daubreelite. The compositeness and the structure of meteoric iron are well shown by the figures generally called into existence when a polished surface is etched by means of acids or bromine- water; they are due to the inequality of the etching action on thick and thin plates of various con- stituents, the plates being composed chiefly of two nickel-iron materials (kamacite and taenite). A third nickel-iron material (plessite) fills up the spaces formed by the intersection of the

joint plates of kamacite and taenite; it is probably not an independent substance but an intimate intergrowth of kamacite and taenite. The figures were first observed in 1808 and are generally termed ” Widmanstatten figures ” in honour of their discoverer; the plates which give rise to them are parallel to the faces of the regular octahedron, and such masses have therefore an octahedral structure. A small number of the remaining masses have cubic cleavage; instead of Widmanstatten figures they yield fine linear furrows when etched; the furrows were found by Neumann in 1848 to have directions such as would result from twinning of the cube about an octahedral face; they are known as ” Neumann lines.” For meteoric irons of cubic structure the percentage of nickel is lower than 6 or 7; for those of octahedral structure it is higher than 6 or 7; the plates of kamacite are thinner, and the structure therefore finer the higher the percentage of that metal. A considerable number of meteoric irons, however, show no crystalline structure at all, and have percentages of nickel both below and above 7; it has been suggested that each of these masses may once have had crystalline structure and that it has disappeared as a result of prolonged heating throughout the mass while the meteorite has been passing near a star.

An investigation of the changes of the magnetic permeability of the Sacramento meteoric iron with changing temperature led Dr S. W. J. Smith to infer that the magnetic behaviour can only be explained by imagining the meteorite to consist

largely of plates of nickel-iron containing about 7% of nickel (kamacite), separated from each other by thin plates of a nickel-iron constituent (taenite), containing about 27% of nickel and having different thermomagnetic characters from those of kamacite; he suggests, however, that taenite is not a definite chemical compound but a eutectic mixture of kamacite and a nickel-iron compound containing not less than 37% of nickel.

About eleven out of every twelve of the known meteoric stones belong to a division to which Rose gave the name ” chon- dritic ” (x6v5pos, a grain) ; they present a very fine-grained but crystalline matrix or paste, consisting of olivine and enstatite or bronzite, with more or less nickel-iron, troilite, chromite, augite and triclinic feldspar; through this paste are disseminated round chondrules of various sizes and generally with the same mineral composition as the matrix; in some

cases the chondrules consist wholly or in great part of glass. Some meteorites consist almost solely of chondrules; others contain only few; in some cases the chondrules are easily separable from the surrounding material. In mineral composition chondritic meteorites approximate more or less to terrestrial lherzolites.

A few meteorites belonging to the chondritic division are remarkable as containing carbon in combination with hydro- gen and oxvgen; those of Alais and Cold Bokkeveld are good examples.

The remaining meteoric stones are without chondrules and contain little or no nickel-iron; of these the following may be mentioned as illustrative of the varieties of mineral composition: Juvinas, consisting essentially of anorthite and augite; Petersburg, of anor- thite, augite and olivine, with a little chromite and nickel-iron (both Juvinas and Petersburg may be compared to terrestrial basalt) ; Sherghotty, chiefly of augite and maskelynite ; Angra dos Reis, almost wholly of augite, but olivine is present in small proportion; Bustee, of diopside, enstatite and a little triclinic feldspar, with some nickel- iron, oldhamite and osbornite ; Bishopville, of enstatite and triclinic feldspar, with occasional augite, nickel-iron, troilite and chromite; Roda, of olivine and bronzite; and Chassigny, consisting of olivine with enclosed chromite, and thus mineralogically identical with terrestrial dunite.

Almost all meteoric stones appear to be made up of irregular angular fragments, and some of them bear a close resemblance to volcanic tuffs. In the large group of chondritic stones, chondrules or spherules, some of which can only be seen under the microscope while others reach the size of a walnut, are embedded in a matrix apparently made up of minute splinters such as might result from the fracture of the chondrules them- selves. In fact, until recently it was thought by some mineralo- gists that the chondrules owe their form, not to crystallization, but to friction, and that the matrix was actually produced by the wearing down of the chondrules through frequent collision with each other as oscillating components of a comet or during repeated ejection from a volcanic vent of some small celestial body. Chondrules have been observed, however, presenting forms and crystalline surfaces incompatible with such a mode of formation, and others have been described which exhibit features resulting from mutual interference during their growth. The chondritic structure is different from anything which has yet been observed in terrestrial rocks, and the chondrules are distinct in character from those observed in perlite and obsidian. It is now generally believed that the structural features of meteoric stones are the result of hurried crystallization.

No organized matter has been found in meteorites and they have brought us, therefore, no evidence of the existence of living beings outside our own world.

Authorities. — The literature consists chiefly of memoirs dis- persed through the journals of scientific societies. The following separate works may be consulted: A. Brezina, Die Meteoriten- Sammlung d. k-k. min. Hofkabinetes in Wien (Vienna, 1896); A. Brezina u. E. Cohen, Die Structur und die Zusammensetzung der Meteoriten (Stuttgart, 1886-1887) ; P. S. Bigot de Morogues, Memoire historique et physique sur les chutes des pierres (Orleans, 1812); Chladni, Ueber den Ursprung der von Pallas gefundenen und anderer ihr dhnlicher Eisenmassen (Riga, 1794), and Ueber Feuer-Meteore, und iiber die mil denselben herabgefallenen Massen (Vienna, 1819) ; E. Cohen, Meleoritenkunde (Stuttgart, 1894-1905); L. Fletcher, An Introduction to the Study of Meteorites, 10th ed. (London, 1908);

E. King, Remarks concerning Stones said to have fallen from the Clouds both in these Days and in Ancient Times (London, 1796) ; S. Meunier, MSiiorites (Paris, 1884) ; C. Rammelsberg, Die chemiscte Natur der Meteoriten (Berlin, 1870-1879); G. Rose, Beschreibung und Ein- theilung der Meteoriten (Berlin, 1864) ; G. Tscherrnak, Die mikro- skopische Beschaffenheit der Meteoriten (Stuttgart, 1883-1885) ; E. A. Wulfing, Die Meteoriten in Sammlungen und thre Literalur (Tubingen, 1897)- (L. F.)

METEOROLOGY (Gr. iterkupa, and X670S, i.e. the science of things in the air), the modern study of all the pheno- mena of the atmosphere of gases, vapours and dust that surrounds the earth and extends to that unknown outer surface which marks the beginning of the so-called interstellar space. These phenomena may be studied either individually or col- lectively. The collective study has to do with statistics and general average conditions, sometimes called normal values, and is generally known as Climatology (see Climate, where the whole subject of regional climatology is dealt with). The study of the individual items may be either descriptive, explanatory, physical or theoretical. Physical meteorology is again sub- divided according as we consider either the changes that depend upon the motions of masses of air or those that depend upon the motions of the gaseous molecules; the former belong to hydrodynamics, and the latter are mostly comprised under thermodynamics, optics and electricity.

History. — The historical development of meteorology from the most ancient times is well presented by the quotations from classic authors compiled by Julius Ludwig Ideler (Meteoro- logia veterum graecorum

et romanorum, Berlin, 1832). We owe to the Arabian philosophers some slight advance on the know- ledge of the Greeks and Romans; especially as to the optical phenomena of the atmosphere. The Meteorologia of Aristotle (see Zeller, Phil, der Griecheri) accords entirely with the Philosophica of Thomas Aquinas, the poetic songs of the troubadours, and the writings of Dante (see Kuhn's Treatment of Nature in Dante's Divina Commedia; London, 1897). Dante's work completed the passage from the ancient mythological treatment of nature to the more rational recognition of one creator and lawgiver that pervades modern science. The progress of meteorology has been coincident with the progress of physics and chemistry in general, as is shown by considering the works of Alhazen (1050) on twilight, Vitellio (1250) on the rainbow, Galileo (1607) on the thermometer and on the laws of inertia, on attractions and on the weight of the air, Toricelli (1642) on the barometer, Boyle (1659) on the elastic pressure of the air in all directions, Newton (1673) on optics; Cavendish (1760), elastic pressure of aqueous vapour; Black (1752), separa- tion of carbonic ac;d gas from ordinary air; Rutherford (1772), separation of nitrogen; Priestley and Scheele (1775) and Caven- dish (1777), separation of oxygen; Lavoisier (1783), general establishment of the character of the atmosphere as a simple mixture of gases and vapour; De Saussure's measurement of relative humidity by the accurate hair hygrometer (1780), Dalton's measurement of vapour tension at various temperatures (1800), Regnault's and Magnus's revision of Dalton's tension of water vapour (1840), Marvin's and Juhlins's measurements of tension of ice vapour (1891), and the isolation of argon by Rayleigh and Ramsay (1894).

Theoretical meteorology has been, and always must be, wholly dependent on our knowledge of thermodynamics and on mathe- matical methods of dealing with the forces that produce the motions within the atmosphere. Progress has been due to, the most eminent mathematicians at the following approxi- mate dates: Sir Isaac Newton (1670), Leonhard Euler (1736), Pierre Simon Laplace (1780), Jean Baptiste Joseph Fourier (1785), Simon Denis Poisson (1815), Sir George Gabriel Stokes (1851), Hermann von Helmholtz (18.57), Lord Kelvin (i860), C. A. Bjerknes (1868), V. Bjerknes (1906), and to their many distinguished followers.

The earliest systematic daily record of local weather

phenomena that has survived is that kept by William Merle,

j rector of Driby, during seven years 1331-1338: the manuscript

is preserved in the Digby MS., Merton College, Oxford, and

was published in facsimile by George G. Symonsin 1891. Doubt- less many similar monastic diaries have been lost to us. In 1653 Ferdinand II. of Tuscany organized a local system of stations and daily records which extended over and beyond northern Italy. This was the first fairly complete meteorological system in Europe. The records kept during the years 1655-1670 at the Cloister Angelus near Florence were reduced by Libri, professor of mathematics at Pisa, and published in 1830.

The history of meteorology is marked by the production of comprehensive treatises embodying the current state of our knowledge. Such were Louis Cotte's Traile de metSorologie (Paris, r774) and his Mtmoires sur la meteorologie, supplement au trait6 (1788); Ludwig Kamtz's Lehrbuch der Meteor ologie (Halle, 1831-1836) and his Vorlcsungen (1840; French 1842, English 1845); Sir John Herschel's Meteorology (London, 1840); the splendid series of memoirs by H. W. Brandes in Gehleris Physikalisches Worterbuch (Leipzig, 1820-1840); E. E. F. W. Schmid's Grundriss • der Meteor ologie (Leipzig, 1862); FerreFs Recent Advances in Meteorology (Washington, 1885); the great works of Julius Hann, as summarized in his Handbuch der Klimatologie (1883; 2nd ed., Stuttgart, 1897; vol. i.. English 1903) and his Lehrbuch der Meteorologie (Leipzig, i90i,»2nd ed. 1906); the extensive studies of J. E. Woeikoff (Voeikof), as presented in his Klima der Erde (Russian 1883, German 1885) and his Meteorologie (Russian 1904).

The development of this science has been greatly stimulated by the regular publication of special periodicals such as the Zeilschrift of the Austrian Meteorological Society, 1866-1885, vol. 21 appearing with vol. 3 of the Meteor ologische Zeitschrift of the German Meteorological Society in 1886, and since that date this journal has been jointly maintained by the two societies. The analogous journals of the Royal Meteorological Society, London, 1850 to date, the Scottish Meteorological Society, i860 to date, the Meteorological Society of France, 1838 to date, the Italian Meteorological Society, and the American Meteorological Journal, 1885-1895, have all played important parts in the history of meteorology. On the other hand, the

Annals of the Central Meteorological Office at Paris, the Archiv of the Deutsche Seewarte at Hamburg, the Annals and the Repertorium of the Central Physical Observatory at St Peters- burg, the Annates of the Central Meteorological Office at Rome, Bulletin of International Simultaneous Met. Obs. and the Monthly Weather Review of the Weather Bureau at Washington, the Abhandlungen of the Royal Prussian Meteorological Institute at Berlin, the Meteorological Papers of the Meteorological Office, London, and the transactions of numerous scientific societies, have represented the important official contributions of the respective national governments to technical meteorology. The recent international union for aerial exploration by kites and balloons has given rise to two important publications, i.e. the Veroffenllichungen of the International Commission for Scientific Aerostatics (Strassburg, 1905, et seq.), devoted to records of observations, and the Beilrage zur Physik der freien Atmosphdre (Strassburg, 1904, et seq.), devoted to research.

The necessity of studying the atmosphere as a unit and of securing uniform accuracy in the observations has led to the formation of a permanent International Meteorological Com- mittee (of which in 1909 the secretary was Professor Dr G. Hell- mann of Berlin, and the president Dr W. N. Shaw of London). Under its directions conferences and general congresses have been held, beginning with that of 1872 at Leipzig. Its Inter- national Tables, Atlas of Clouds, Codex of Instructions, and Forms for Climatological Publications illustrate the activity and usefulness of this committee.

Modern meteorology has been developed along two lines of study, based respectively on maps of monthly and annual averages and on daily weather maps. The latter study seems to have been begun by H. W. Brandes in Leipzig, who first, about 1820, compiled maps for 1783 from the data collected in the Ephemerides mannheimensis, and subsequently published maps of the European storms of 1820 and 1821. Simultane- ously with Brandes we find William C. Redfield in New York

compiling a chart of the hurricane of 182 1, which was published in 1 83 1, and was the first of many memoirs by him on hurricanes that completely established their rotary and progressive motion. Soon after this Piddington and Sir William Reid began their great works on the storms of the Orient. About 1825 James Pollard Espy, in Philadelphia, began the publication of his views as to the motive power of thunderstorms and tornadoes, and in 1842 was appointed ” meteorologist to the U.S. govern- ment ” and assigned to work in the office of the surgeon-general of the army, where he prepared daily

weather maps that were published in his four successive ” Reports.” In 1848 the three American leaders united in letters to Professor Joseph Henry, secretary of the Smithsonian Institution, urging that the telegraph be used for collecting data for daily maps and weather predictions. Favourable action was taken in 1849, the Smithsonian maps began to be compiled about 1851 and were displayed in public from 1853 onwards. Meanwhile in England James Glaisher, with the help of the daily press, carried out similar work, publishing his first map in 1851 as soon as daily weather maps of sufficient extent could be promptly prepared by the help of the telegraph. The destructive storm of the 14th of November 1854, in the Crimea gave U. J. J. Le Ver- rier, at Paris, an opportunity to propose the proper action, and his proposals were immediately adopted by the secretary of war, Marshal Vaillant. On the 17th of February 1855 the emperor ordered the director-general of government telegraph lines to co-operate completely with Le Verrier in the organization of a bureau of telegraphic meteorology. The international daily bulletin of the Paris Observatory began to be printed in regular form on the 1st of January 1858, and the daily map of isobars was added to the text in the autumn of 1863. The further development of this bulletin, the inclusion of British and ocean reports in 1861, the addition of special storm warnings in 1863, the publication of the Atlas des mouvements ginlraux covering the Atlantic in 1865, the study of local thunderstorms by Hippolyte Marie-Davy, Sonrel, Fron, Peslin, in France, and the work of Fitzroy, Buys-Ballot, Buchan, Glaisher and Thomson in Great Britain, parallel the analogousˆ works of the American students of meteorology and form the beginnings of our modern dynamic meteorology.

The details of the historical development of this subject are well given by Hugo Hildebrand-Hildebrandsson and Leon Teisserenc de Bort in their joint work, Les Bases de la meteorologie dynamique (Paris, 1898-1907). The technical material has been collected by Hann in his Lehrbuch. Many of the original memoirs have been reproduced by Brillouin in his Memoires originaux (Paris, 1900), and in Cleveland Abbe’s -Mechanics 0/ the Earth’s Atmosphere (vol. i., 1891 ; vol. ii., 1909).

The publication of daily weather charts and forecasts is now carried on by all civilized nations. The list of government bureaux and their publications is given in Bartholomew’s Atlas (vol. iii., London, 1899). Special establishments for the exploration of the upper atmospheric conditions are maintained at Paris, Berlin, Copenhagen, St Petersburg, Washington and Strassburg.

The general problems of climatology (1900) are best presented in the Handbook of Dr Julius Hann (2nd ed., Stuttgart, 1897). The general distribution of temperature, winds and pressure over the whole globe was first given by Buchan in charts published by the Royal Society of Edinburgh in 1868, and again greatly revised and improved in the volume of the Challenger reports devoted to meteoro* logy. The most complete atlas of meteorology is Buchan and Herbertson's vol. iii. of Bartholomew's A tlas (London, 1899). Exten- sive works of a more special character have been published by the London Meteorological Office, and the Deutsche Seewarte for the Atlantic, Pacific and Indian Oceans. Daily charts of atmospheric conditions of the whole northern hemisphere were published by the U.S. Weather Bureau from 1875 to 1883 inclusive, with monthly charts; the latter were continued through .1889. The physical problems of meteorology were discussed in Ferrel's Recent Advances in Meteorology (Washington, 1885). Mathematical papers on this subject will be found in the author's collection known as The Mechanics of the Earth's Atmosphere; the memoirs by Helmholtz and Von Bezold contained in this collection have been made the basis of a most important work by Brillouin (Paris, 1898), entitled Vents contigus et nuages. A general summary of our knowledge of the mechanics and physics of the atmosphere is contained in the Report on the International Cloud Work, by F. H. Bigelow (Washing- ton, 1900). The extensive Lehrbuch (Leipzig, 1901 ; 2nd ed., 1906) by Dr Julius Hann is an authoritative work. The optical

phenomena of the atmosphere are well treated by E. Mascart in his Traite d'optique (Paris, 1891-1898), and by J. M. Penter, Meteoro- logische Optik (1904-1907). Of minor treatises especially adapted to collegiate courses of study we may mention those by Sprung (Berlin, 1885) ; W. Ferrel (New York, 1890) ; Angot (Paris, 1898) ; W. M.Davis, (Boston, 1893); Waldo (New York, 1898); Van Bebber (Stuttgart, 1890); Moore (London, 1893); T. Russell (New York), 1895. The brilliant volume by Svante Arrhenius, Kosmische Fhysik (Leipzig, 1900) contains a section by Sandstrom on meteorology, in which the new hydrodynamic methods of Bjerknes are developed.

I. — Fundamental Physical Data There can be no proper study of meteorology without a consideration of the various physical

properties of the atmo- spheric gases and vapours, each of which plays an independent part, and yet also reacts upon its neighbours.

Atmospheric air is a mixture of nitrogen, oxygen, aqueous vapour, carbonic acid gas (carbon dioxide), ammonia, argon, neon, helium, with slight traces of free hydrogen and hydro-carbons. The proportions in which these gases are present are quite constant, except that the percentage of aqueous vapour is subject to large variations. In an atmosphere that is saturated at the temperature of 90 F., as may occur in such a climate as that of Calcutta, the water may be 2%% of the whole weight of any given volume of air. When this aqueous vapour is entirely abstracted, the remaining dry gas is found to have a very uniform constitution in all regions and at all altitudes where examination has been carried out. In this so-called dry atmosphere the relative weights are about as follows: Oxygen, 23-16; nitrogen and argon, 76-77; carbonic acid, 0-04; ammonia and all other gases, less than o-oi in the lower half of the atmosphere but probably in larger percentages at great altitudes. Of still greater rarity are the highly volatile gases, argon (q.v.), neon, krypton and helium (q.v.).

Outer Limit. — These exceedingly volatile components of the atmo- sphere cannot apparently be held down to the earth by the attraction of gravitation, but are continually diffusing through the atmosphere outwards into interstellar space, and possibly also from that region back into the atmosphere. There are doubtless other volatile gases filling interstellar space and occasionally entering into the atmosphere of the various planets as well as of the sun itself ; possibly the hydro- gen and hydro-carbons that escape from the earth into the lower atmosphere ascend to regions inaccessible to man and slowly diffuse into the outer space. The laws of diffusion show that for each gas there is an altitude at which as many molecules diffuse inwards as outwards in a unit of time. This condition defines the outer limit of each particular gaseous atmosphere, so that we must not imagine the atmosphere of the earth to have any general boundary. The only intimation we have as to the presence of gases far above the surface of the globe come from the phenomena of the Aurora, the refraction of light, the morning and evening twilight, and especially from the shooting stars which suddenly become luminous when they pass into what we call our atmosphere. (See C. C. Trowbridge, On Luminous Meteor Trains ” and ” On Movements of the Atmosphere at Very Great Heights,” Monthly Weather Review, Sept. 1907.)

Such observations are supposed to show that there is an appreci- able quantity of gas at the height of. 100 m., where it may have a density of a millionth part of that which prevails at the earth’s surface. Such

matter is not a gas in the ordinary use of that term, but is a collection of particles moving independently of each other under those influences that emanate from sun and earth, which we call radiant energy. According to Stormer this radiant energy is that of electrons from the sun, and their movements in the magnetic field surrounding the earth give rise to our auroral phenomena.

According to Professor E. W. Morley, of Cleveland, Ohio, the rela- tive proportions of oxygen and nitrogen vary slightly at the surface of the earth according as the areas of high pressure and low pressure alternately pass over the point of observation ; his remarkably exact work seems to show a possible variation of a small fraction of 1 %, and he suggests that the air descending within the areas of high pressure is probably slightly poorer in oxygen. The proportion of carbonic acid gas varies appreciably with the exposure of the region to the wind, increasing in proportion to the amount of the shelter; it is greater over the land than over the sea, and it also slightly increases by night-time as compared with day, and in the summer and winter as compared with the spring and autumn months. During the year 1896 Professor S. Arrhenius in the Phil. Mag., and in 1899 Professor T. C. Chamberlin in the Amer. Geol. Jour. , published memoirs in which they argued that a variation of several per cent, in the proportion of carbonic acid gas is quite consistent with the existence of animal and vegetable life and may explain the variations of climate during geological periods. But the specific absorption of this gas for solar radiations is too small (C. G. Abbot, 1903) to

support this argument. The question whether free ozone exists in the atmosphere is still debated, but there seems to be no satis- factory evidence of its presence, except possibly for a few minutes in the neighbourhood of, and immediately after, a discharge of lightning. The general proportions of the principal gases up to considerable altitudes can be calculated with close approximation by assuming a quiescent atmosphere and the ordinary laws of diffusion and elastic pressure ; on the other hand, actual observations show that the rapid convection going on in the atmosphere changes these proportions and brings about a fairly uniform percentage of oxygen, nitrogen and carbonic acid gas up to a height of 10 m.

Aqueous Vapours.— The distribution of aqueous vapour is controlled by temperature quite as much as by convection and has very little to do With diffusion ; the law of its distribution in altitude has been well expressed by Hann by the simple formula: log e = log e — A/6517 where h is the height expressed in metres and e and eo are the vapour pressures at the upper station and sea-level respectively. Hann’s

formula applies especially to observations made on moun- tains, but R. J. Siiring, Wissenschaftliche Luftfahrten, III. (Berlin, 1900) has deduced from balloon observations the following formula for the free air over Europe —

log e = log e — &(i +&/2000o)/6ooo. He has also computed the specific moisture of the atmosphere or the mixing ratio, or the number of grams of moisture mixed with 1 kilogram of dry air for which he finds the formula

logw = log m — 7i(l +3ˆ/40) /9000. The relative humidity varies with altitude so irregularly that it cannot be expressed by any simple formula. The computed values of e and m are as given in the following table : —

Altitude

Relative

Relative

Metres.

Vapour Pressure.

Specific Moisture.

h.

eje .

m/mo.

1000

1000

1000

665

759

2000

431

555

3000

266

391

4000

158

264

5000

91

172

6000

50

108

7000

27

65

8000

14

38

In addition to the gases and vapours in the atmosphere, the motes of dust and the aqueous particles that constitute cloud, fog and haze are also important. As all these float in the air, slowly de- scending, but resisted by the viscosity of the atmosphere, their whole weight is added to the atmosphere and becomes a part of the baro- metric record. When the air is cooled to the dew-point and con- densation of the vapour begins, it takes place first upon the atoms of dust as nuclei ; consequently, air that is free from dust is scarcely to be found except within a mass of cloud or fog.

Mass. — According to a calculation published in the U.S. Monthly Weather Review for February 1899, the total mass of the atmo- sphere is 1/1,125,000 of the mass of the earth itself but, according to Professor R. S. Woodward (see Science for Jan. 1900), celestial dynamics shows that there may possibly be a gaseous envelope whose weight is not felt at the earth's surface, since it is held in dynamic equilibrium above the atmosphere; the mass of this outer atmosphere cannot exceed iˆuth f the mass of the earth, and is probably far less, if indeed it be at all appreciable. '■

Conductivity. — Dry air is a poor conductor of heat, its co- efficient of conduction being expressed by the formula: 0-0000568 (1 + 0-00190 t) where the temperature (t) is expressed in centigrade degrees. This formula states the fact that a plate of air 1 centimetre thick can conduct through its substance for every square centimetre of its area, in one second of time, when the difference of tempera- ture between two faces of the plate is 1° C, enough heat to warm 1 gram of water o-ooo 0568 C, or 1 gram of air o-ooo 239 C.,or a cubic centimetre of air 0-1850° C, if that air is at the standard density for 760 millimetres of pressure and o° C. The figure 0-1850° C. is the thermometric coefficient as distinguished from the first or calorimetric coefficient (o-ooo 0568° C), and shows what great effect on the air itself its poor conductivity may have.

Diathermancy. — Dry air is extremely diathermanous or transparent- to the transmission of radiant heat. For the whole moist atmo- sphere the general coefficient of transmission increases as the waves become longer: and for a zenithal sun it is about 0-4 at the violet end of the spectrum and about o-8 at the red. By specific absorp- tion many specific wave-lengths are entirely cut off by the vapours and gases, so that in general the atmosphere may appearto be more transparent to the short wave-lengths or violet end of the spectrum, but this is not really so. When the zenithal sun's rays fall upon a station whose barometric pressure is 760 mm., then only from 50 to 80% of the total heat reaches the earth's surface, and thus the general coefficient of transmission for the thickness of one atmosphere is usually estimated at about 60%. Of course when the rays are more oblique, or when haze, dust or cloud interfere, the transmission

is still further diminished. In general one half of the heat received from the sun by the illuminated terrestrial hemisphere is absorbed by the clearest atmosphere, leaving the other half to reach the surface of the ground, provided there be no intercepting clouds. The thermal conditions actually observed at the immediate surface of the globe during hazy and cloudy weather are therefore of minor importance in the mechanism of the whole atmosphere, as compared with the influence of the heat retained within its mass.

The transmission of solar radiation through the earth's atmosphere is the fundamental problem of meteorology, and has been the subject of many studies, beginning with J. H. Lambert and P. Bouguer. The pyrheliometer of C. S. M. Pouillet gave us our first idea of the thermal equivalent of solar radiation outside of our atmosphere or the so-called " solar constant," the value of which has been variously placed at from 2 to 4 calories per sq. cm. per minute. At present the weight of the argument is in favour of 2-1, with a fair presumption that both the intensity and the quality of the solar radiation as it strikes the upper layers of our atmosphere are slightly variable. It is also likely that this " constant " does not represent the sun proper, but the remaining energy after the sunbeam has sifted through masses of matter between the sun and our upper atmosphere, so that it may thus come to have appreciable variations.'

The coefficients of absorption for specific wave-lengths were first determined by L. E. Jewell, of Johns Hopkins University, for numerous vapour lines in 1892 (see W. B. Bulletin, No. 16). In 1904 C. G. Abbot published a table based on holograph work at Washington showing the coefficient of atmospheric transmission for solar rays passing through a unit mass of air — namely, from the zenith to the ground. He showed that this coefficient increased with the wave-length ; hence any change in the quality of the solar radiation will affect the general coefficient of transmission. The following table gives his averages for the respective wave-lengths, as deduced from ten clear days in 1901-1902 and nine clear days in 1903 : —

Wave Length.

Coefficient of Atmospheric Transmission (Abbot) .

1901-1902.

1903.

Mean by Weights.

microns.

040 violet

—

0-484

—

o-45

—

o-557

—

0-50

0-765

0-627

0-700

o-6o

0-769

0-692

0-730

0-70

0-857

0-753

0-808

o-8o red

0-897

0-797

0-847

090

0-910

0-825

0-856

1-00

0-921

0-847

0-884

1-20

0-933

0-874

0-903

i-6o

0930

0-909

0-920

2-CO

0-950

0-912

0919

Any variation in the energy that the atmosphere receives from the sun will have a corresponding influence on meteorological phenomena. Such variations were simultaneously announced in 1903 by Charles Dufour in Switzerland and H. H. Kimball in Wash- ington (Monthly Weather Review, May 1903) ; the latter was then conducting a series of observations with Angstrom's electric com- pensation

pyrheliometer, and his conclusions have been confirmed by the work of L. Gorczynski at Prague (1901-1906) and C. G. Abbot at Washington. Kimball's pyrheliometric work on this problem is still being continued ; but meanwhile Abbot and Fowle from their bolometric observations at the Smithsonian Astrophysical Observatory have deduced preliminary values of the observed total energy, or the solar constant, for numerous dates when the sky was very clear, as follows (see Smithsonian Mis. Coll., xlv, 78 and xlvii. 403, 1905) : —

Date.

Abbot. Calories.

Fowle, Calories.

1902 Oct. 9

2-19

2-19

„ 15

2-19

- —

,, ,, 22

2-16

—

1903 Feb. 19

2-28

2-27

„ 19 ,, March 3

2-25

2-26

„ 25

2-27

2-23

„ 26

2-10

—

„ 26

,, April 17

„ 28

2-07

199 2-27

2-09

2-i8

„ 29

„ July 7

Oct. 14

,, Dec. 7

1-97

1-96 2-14 1-96 1-94

„ „ 23

—

1-99

1904 Jan. 27

—

2-02

„ Feb. 11

—

2-26

„ May 28 „ Oct. 5

2-09 2-32

,, Nov. 16

—

1-98

If the relative accuracy of these figures is 1 %, as estimated by Abbot, then they demonstrate irregular fluctations of 5 . But different observers and localities vary so much that Abbot estimates the reliability of the mean value, 2-12, to be about 10. The causes of this variation apparently lie above our lower atmosphere and move slowly eastward from day to day, and as the variability is comparable with that of other atmospheric data, therefore con- servative meteorologists at present confine their attention to the explanation of terrestrial phenomena under the assumption of a constant solar radiation. The large local changes of weather and climate are not due to changes in the sun, but to the mechanical and thermodynamic interactions of earth and ocean and atmosphere. Excellent illustrations of this principle are found in the studies of Blanford, Eliot and Walker on the monsoons of India, of Sieger (1892) on the contrasts of temperature between Europe and North America, of Hann (1904) on the anomalies of weather in Iceland, of Meinardus (1906) on periodical variations of the icedrift near Iceland.

The absorption of solar radiation by the atmosphere is apparently explained by the laws of diffuse reflection, selective diffusion and fluorescence in accordance with which each atom and molecule and particle becomes a new centre for the diffusion in all directions of the energy represented by some specific wave-length. The specific influences of carbon dioxide and water vapour are less than those of the liquid particles (and of cloud and rains) and of the great mass of oxygen and nitrogen that make up the atmosphere.

Specific Heat. — The capacity of dry air for heat varies according as the heat increases the volume of the air expanding under constant pressure, or the pressure of the air confined in constant volume. The specific heat under constant pressure is about 1 -4025 times the specific heat under constant volume. The numerical value of the

specific heat under constant pressure is about 0-2375 — that is to say, that number of gram-calories, or units of heat, is required to change the temperature of 1 gram of air by 1° C. This coefficient holds good, strictly speaking, between the temperatures — 30° and +io°C., and there is a very slight diminution for higher temperatures up to 200°. The specific heat of moist air is larger than that of dry air, and is given by the expression C p ” = (0-2375 + 0-4805 x) where x is the number of kilograms of vapour associated with I kilogram of dry air. As x does not exceed 0-030 (or 30 grams) the value of C p “, may increase up to 0-2519. The latent heat evolved in the condensation of this moisture is a matter of great importance in the formation of cloud and rain.

Radiating Power. — The radiating power of clean dry air is so small that it cannot be measured quantitatively, but the spectroscope and bolometer demonstrate its existence. The coefficient of radia- tion of the moisture diffused in the atmosphere is combined with that of the particles of dust and cloud, and is nearly equal to that of an equal surface of lamp-black. From the normal diurnal change in temperature at high and low stations, it should be possible to deter- mine the general coefficient of atmospheric radiation for the average condition of the air in so far as this is not obscured by the influence of the winds. This was first done by J. Maurer in 1885, who obtained a result in calories that may be expressed as follows: the total radiation in twenty-four hours of a unit mass of average dusty and moist air towards an enclosure whose temperature is 1° lower is sufficient to lower the temperature of the radiating air by 3-31° C. in twenty-four hours. This very small quantity was confirmed by the studies of Trabert, published in 1892, who found that I gram of air at 278° absolute temperature radiates 0-1655 calories per minute toward a black surface at the absolute zero. The direct observations of C. C. Hutchins on dry dusty air, as published in 1890, gave a much larger value — evidently too large. Slight changes in water, vapour and carbon dioxide affect the radiation greatly. The investigation of this subject prosecuted by Professor F. W. Very at the Allegheny Observatory, and published as ” Bulletin G ” of the U.S. Weather Bureau, shows the character and amount of the radiation of several gases, and especially the details of the process going on under normal conditions in the atmosphere.

Density. — The absolute density or mass of a cubic centimetre of dry air at the standard pressure, 760 millimetres, and temperature 0° C. , is o-oo I 29305 grams ; that of a cubic metre is I -29305 kilograms ; that of a cubic foot is 0-08071 lb avoirdupois. The variations of this density with pressure, temperature, moisture and gravity are given in

the Smithsonian meteorological tables, and give rise to all the movements of the atmosphere; they are, therefore^pf fundamental importance to dynamic meteorology. x *

Expansion. — The air expands with heat, and the expansion of aqueous vapour is so nearly the same as that of dry air that the same coefficient may be used for the complex atmosphere itself. The change of volume may be expressed in centigrade degrees by the formula V = Vo (i + o-ooo 3665O, or in Fahrenheit degrees V = V (i + o-ooo 2370-

Elasticity. — The air is compressed nearly in proportion to the pressure that confines it. The pressure, temperature and volume of the ideal gas are connected by the equation pv = KT, where T is the absolute temperature or 273° plus the centigrade temperature p is the barometric pressure in millimetres and v the volume of a unit mass of gas, or the reciprocal of the density of the gas. The constant R is 29-272 for dry atmospheric air when the centimetre,

the gram, the second and the centigrade degrees are adopted as units of measure, and differs for each gas. For aqueous vapour in a gaseous state and not near the point of condensation R has the value 47-061. For ordinary air in which x is the mass of the aqueous vapour that is mixed with the unit mass of dry air, the above equation becomes pv = (29-272 + 47-061*) T. This equation is sometimes known as the equation of condition peculiar to the gaseous state. It may also be properly called the equation of elasticity or the elastic equation tor gases, as expressing the fact that the elastic pressure p depends upon the temperature and the volume. The mose exact equations given by Van der Waals, Clausius, Thiesen, are not needed by us for the pressures that occur in meteorology.

Diffusion. — In comparison with the convective actions of the winds, it may be said that it is difficult for aqueous vapour to diffuse in the air. In fact, the distribution of moisture is carried on principally by the horizontal convection due to the wind and the vertical convection due to ascending and descending currents. Diffusion proper, however, comes into play in the first moments of the process of evaporation. The coefficient of diffusion for aqueous vapour from a pure water surface into the atmosphere is 0-18 according to Stefan, or 0-1980

according to Winkelmann; that is to say, for a unit surface of 1 sq. centimetre, and a unit gradient of vapour pressure of one atmosphere per centimetre, as we proceed from the water surface into the still dry air, at the standard pressure and temperature, and quantity of moisture diffused is 0-1980 grams per second. This coefficient increases with the temperature, and is 0-2827 at 49‘5° C. But the gradient, of vapour pressure, and therefore rate of diffusion, diminishes very rapidly at a small distance from the free surface of the water, so that the most important condition facilitating evaporation is the action of the wind.

Viscosity. — When the atmosphere is in motion each layer is a drag upon the adjacent one that moves a little faster than it does. This drag is the so-called molecular or internal friction or viscosity. The coefficient of viscosity in gases increases with the absolute temperature, and its value is given by an equation like the follow- ing; o-ooo 248 (1 + 0-00ˆ665/) ij, which is the formula given by Carl Barus {Ann. Phys., 1889, xxxvi.). This expression implies that for air whose temperature is the absolute zero there is no viscosity, but that at a temperature (t) of o° C, or 273 on the absolute scale, a force of o-ooo 248 grams is required in order to push or pull a layer of air 1 centimetre square past another layer distant from it by 1 centimetre at a uniform rate of 1 centimetre per second.

Friction. — The general motions of the atmosphere are opposed by the viscosity of the air as a resisting force, but this is an exceed- ingly feeble resistance as compared with the obstacles encountered on the earth’s surface and the inertia of the rising and falling masses of warm and cold air. The coefficient of friction used in meteoro- logy is deduced from the observations of the winds and results essentially not from viscosity, but from the resistances of all kinds to which the motion of the atmosphere is subjected. The greater part of these resistances consists essentially in a dissipation of the energy of the moving masses by their division into smaller masses which penetrate the quiet air in all directions. The loss of energy due to this process and the conversion of kinetic into potential energy or pressure, if it must be called friction, should perhaps be called convective friction, or, more properly, convective- resistance.

The coefficient of resistance for the free air was determined by Mohn and Ferrel by the following considerations. When the winds, temperatures and barometric .pressures are steady for a considerable time, as in the trade winds, monsoons and stationary cyclones, it is the barometric gradient that overcomes the resist- ances, while the resulting wind is deflected to the right (in the northern hemisphere)

by the influence of the centrifugal force of the diurnal rotation (a) of the earth. The wind, therefore, makes a constant angle (o) with the direction of the gradient (G). There is also a slight centrifugal force to be considered if the winds are circulating with velocity v and radius ® about a storm centre, but neglecting this we have approximately for the latitude G sin o = 2uv sin , G cos a = kv,

where (k) is the coefficient connecting the wind-velocity (n) with the component of the gradient pressure in the direction of the wind. These relations give sin <£/tan o. The values of o and v as read off from the map of winds and isotherms at sea level give us the data for computing the coefficients for oceanic and continental surfaces respectively, expressed in the same units as those used for G and v. The extreme values of this coefficient of friction were found by Guldberg and Mohn to be 0-00002 for the free ocean and o-ooi2 for the irregular surface of the land. For Norwegian land stations Mohn found = 61° o = 56-5° k = 0-0000845. For the interior of North America EliasLoomis founds = 37-5° o = 42-2° x = 0-0000803.

Gravity. — The weight of the atmosphere depends primarily upon the action of gravity, which gives a downward pressure to every particle. Owing to the elastic compressibility of the air, this downward pressure is converted at once into an elastic pressure

in all directions. The force of gravity varies with the latitude and the altitude, and in any exact work its variations must be taken into account. Its value is well represented by the formula due to Helmert, g = 980-6 (1 — 0-0026 cos 2) X (1 — fh), where 4> represents the latitude of the station and h the altitude. The coefficient /is small and has a different value according as the station is raised above the earth's surface by a continent, as, for instance, on a mountain top, or by the ocean, as on a ship sailing over the sea, or in the free air, as in a balloon. Its different values are sufficiently well known for meteorological needs, and are utilized most discreetly in the elaborate discussion of the hypsometric formula published by Angot in 1899 in the memoirs of the Central Meteorological Bureau of France.

Temperature at Sea-Level. — The temperature of the air at the surfaces of the earth and ocean and throughout the atmosphere is the fundamental element of dynamic meteorology. It is best exhibited by means of isotherms or lines of equal temperature drawn on charts of the globe for a series of level surfaces at or above sea-level. It can also be expressed analytically by spherical harmonic functions, as was first done by Schoch. The normal distribution of atmospheric temperature for each month of the year over the whole globe was first given by

Buchan in his charts of 1868 and of 1888 (see also the U.S. Weather Bureau " Bulletin A," of 1893, and Buchan's edition of Bartholomew's Physical Atlas, London, 1899). The temperatures, as thus charted, have been corrected so as to represent a uniform special set of years and the conditions at sea-level, in order to constitute a homogeneous system. The actual temperature near the ground at any altitude on a continent or island may be obtained from these charts by subtracting o-5°C. for each 100 metres of elevation of the ground above sea-level, or i" F. for 350 ft. This reduction, however, applies specifically to temperatures observed near the surface of the ground, and cannot be used with any confidence to determine the temperature of points in the free air at any distance above the land or ocean. On all such charts the reader will notice the high temperatures near the ground in the interior of each of the con- tinents in the summer season and the low temperatures in the winter season. In February the average temperatures in the northern hemisphere are not lowest near the North Pole, but in the interiors of Siberia and North America; in the southern hemi- sphere they are at the same time highest in Australia, and Africa and South America. In August the average temperatures are unexpectedly high in the interior of Asia and North America, but low in Australia and Africa.

Temperature at. Upper Levels. — The vertical distribution of temperature and moisture in the free air must be studied in detail in order to understand both the general and the special systems of circulation that characterize the earth's atmosphere. Many observations on mountains and in balloons were made during the 19th century in order to ascertain the facts with regard to the decrease of temperature as we ascend in the atmosphere; but it is now recognized that these observations were largely affected by local influences due to the insufficient ventilation of the thermo- meters and the nearness of the ground and the balloon. Strenuous efforts are being directed to the elimination of these disturbing elements, and to the continuous recording of the temperature of the free air by means of delicate thermographs carried up to great heights by small free "sounding balloons," and to lesser heights by means of kites. Many international balloon ascents have been made since 1890, and a large amount of information has been secured. The development of kite-work in the United States began in October 1893, at the World's Columbian Congress at Chicago, when Professor M. W. Harrington ordered Professor C. F. Marvin of the Weather Bureau to take up the development of the Hargrave or box kite for meteorological work. At that time W. A. Eddy of Bayonne, New Jersey, was applying his " Malay " kite to raising and displaying heavy objects, and in August

1894 (at the suggestion of Professor Cleveland Abbe) he visited the private observatory of A. L. Rotch at Blue Hill and demonstrated the value of his Malay kite for aerial research. The first work done at this observatory with crude apparatus was rapidly improved upon, while at the same time Professor Marvin at Washington was developing the Hargrave kite and auxiliary apparatus, which he brought up to the point of maximum efficiency and trustworthiness. When he reported his apparatus as ready to be used by the Weather Bureau on a large scale, Professor Willis L. Moore, as the successor of Professor Har-” rington, ordered its actual use at seventeen kite stations in July 1898. This was the first attempt to prepare isotherms for a. special hour over a large area at some high level, such as I m., in the free air. Daily meteorological charts were prepared for the region covered by these observations; but it became necessary to discontinue them, and nothing more was done by the Weather Bureau in this line of work until the inauguration of kite work at Mount Weather in 1906. Meanwhile a special method for the reduction arid study of such observations was devised by Bjerknes and Sandstrom, and was published in the Trans. American Philosophical Society (Philadelphia, 1906). The general average results as to temperature gradients were compiled by Dr H. G. Frankenfield and published u> I the United States Weather Bureau ” Bulletin F.”. from tiKsv

PHYSICAL DATA]

were deduced the following tables, published in the Monthly Weather Review: —

Mean Temperature Gradients in degrees Fahrenheit per iooo ft. from the ground up to the respective altitudes.

METEOROLOGY

269

Stations.

IOOO

ft.

1500

ft.

2000

ft.

3000

ft.

4000

ft.

5000

ft.

6000

ft.

O

O

O

O

O

O

Washington, D.C. .

.V6

4.4

4-0

,V5

3-2

3-o

3-1

Cairo, 111

9-7

6-6

6-o

4-9

4-7

4-3

Cincinnati, O. . . .

r3-o

6-3

6-q

,V8

,V6

4-7

4-2

Fort Smith, Ark.

7-2

7-0

67

5-8

3-8

Knoxville, Tenn.

8-4

6-2

6-6

5-4

S-o

—

—

Memphis, Tenn.

7-8

6-8

5-0

3-8

3-7

3-5

—

Springfield, 111. .

7-6

5-7

5-1

4-4

4-0

3-7

3-6

Cleveland, O. . . .

5-7

4-1

,V6

3*S*

4-1

4-1

4-3

Duluth, Minn. .

5-2

4-8

4-6

4-6

4-3

3-8

4-6

Lansing, Mich. .

7-5

6-0

47

4-1

3-9

3-8

Sault Ste Marie, Mich. .

6-6

6-2

5-2

4-5

3-9

3-0

—

Dodge, Kans.

6-3

5-2

4-8

37

3-1

3-2

3-2

Dubuque, Iowa

6-9

5-9

4-6

,V5

3-2

3-3

—

North Platte, Neb. . .

6-8

6-5

,S-9

5-2

4.4

47

5-4

Omaha, Neb.

—

5-4

4-9

3-6

3-2

3-.S

3-8

Pierre, S. Dak. .

5-o

5-1

4-8

4-3

3-7

4-4

4-0

Topeka, Kans. .

7-4

6-2

4.9

4-0

3-8

3-9

4-5

Average

7-4

5‘8

5-2

4.4

4-0

3-8

4-1

Stations

Washington

Cairo .

Cincinnati

Fort Smith

Knoxville

Memphis

Springfield

Cleveland

Duluth . .

Lansing

Sault Ste Marie

Dodge

Dubuque

North Platte

Omaha

Pierre

Topeka

Altitude.

Feet.

210

315 940

527 990

319 684

705 1197

869

722 2473

894 281 1 1241

1595 972

Temperature.

Gradient. Reduction.

˚F. —3-00 —4-30

-5-15

—5-00 —3-50

-3-85

— 4-10 —4-30

-3-85

—3-45 — 4-10 —3-30 —5-40 —3-20 —3-90 —3-83

°F. —15-2 —25-6 —27-5

—21-5 —17-3 —17-7 — 18-8 —17-6 — 17-0

—15-7 — n-6 —H-5 —13-3 — 12-9 —14.4

—i6-5

11 and 14 km.; this is the ” thermal zone ” as discovered and so called by him.

Altitude.

Km.

Ground

o-5 i-o

i-5

2-0

2-5 3-0

3-5 4-0

4‘5 5-0 6-0 7-0 8-0 9-0

10-0

II-O

12-0 13-0

I4-0

Winter. Dec, Jan., Feb.

°C.

+ 1-9

+ i-4

— 0-2

— 0-2

- 1-4

- 3-7

- 6-o

- 8-7

— 10-9

— 14-2 — 17-0

-237 -31-5 -39-0 -46-9 -54-6 -57-9 -57-9 -56-9 -55-5

Spring. Mar.,Apl., May.

°C.

+ 5-1 + 4-7 + 2-4

+ 01

- 2-1

- 4-3

- 6-4

- 9-3

- 12-2

-1.5-2 -18-5 -25-2 -32-0 -39-0 -46-7 -52-7 -53-6

-53-i

-52-2

-52-5

Summer. June, July, Aug.

+ 13-0

+ 13-6

+ II-8

97

7-3

5-0

2-1

+ 0-2

- 2-7

- 5-3

- 8-3 -14-8 -217 -29-3 -38-0

45-3 50-3 52-7 51-5 -51-3

Autumn. Sept., Oct., Nov.

+ + + +

+

>C.

7-5 7-7 6-1 4-0

2-2

+ 0-4

- 1-7

- 4-2

- 6-5

- 9-3

- 12-4 -18-7 -25-8

-33-5 -41.4

-48-3 -54-4

-57-i

-57-1 -57-1

In this table the second column gives the altitude of the ground at the reel on which the kite wire was wound. The third column shows the average gradient in degrees Fahrenheit, per 1000 ft. between the reel at the respective stations, and a uniform altitude 5280 ft. above sea-level. The fourth column shows the total reduction to be applied to the temperature at the reel in order to obtain the temperature at the 1 m. level above sea. These gradients and reductions are based upon observations made only during the six warm months from May to October 1898.

The kite-work at the Blue Hill, Observatory has been published in full in the successive Annals of the Harvard College Observatory, beginning with 1897, vol. xlii. It has been discussed especially by H. H. Clayton with reference to special meteorological phenomena, such as areas of high and low pressure, fair and cloudy weather, the winds and their velocities at different elevations, insolation, radi- ation, &c, and has served as a stimulus and model for European meteorologists. Kite-work has also been successfully prosecuted at Trappes, Hamburg, Berlin, St Petersburg, and many other European stations. The highest flights that have been attained have been about 8000 metres.

The great work of L. Teisserenc de Bort began with 1897, when he founded his private observatory at Trappes near Paris devoted to the problems of dynamic meteorology. His results are pub- lished in full in the Memoirs of the Central Meteorological Bureau of France for 1897 and subsequent years. Beginning with the sounding balloons devised by Hermite, he subsequently added kite work as supplementary to these. In the Comptes rendus (1904), he gives the mean temperatures as they result from five years of work, 1 899-1903, at Trappes. Out of 581 ascensions of sounding balloons there were 141 that attained 14 km. or more, and the following table gives the average temperatures recorded in these ascensions. It will be seen that there is a slow decrease in temperate up to 2 km.; a rapid decrease thence up to 10 km., and a slow decrease, almost a stationary temperature, between

It is evident that the annual average vertical gradient of tempera- ture

over Paris is between 4 and 6° C. per 1000 metres of ascent in the free air, agreeing closely with the value 5° per 1000 metres, which has come into extensive use since the year 1890, on the recommendation and authority of Hann, for the reduction of land observations to sea-level. The winter gradients are less than those for summer, possibly owing to the influence of the condensa- tion into cloud and rain during the winter season in France; the same value may not result from observations in the United States, where the clouds and precipitation of winter do not so greatly exceed those of summer. The work at Trappes is therefore not necessarily representative of the general average of the northern hemisphere, but belongs to a coastal region in which during the summer time, at great heights, the air is cooler than in the winter time, since during the latter season there is an extensive flow of warm south winds from the ocean over the cold east winds from the land. Sounding balloons have also been used elsewhere with great success. The greatest heights attained by them have been 25,989 metres at Uccle, Belgium, on the 5th of September 1907, and 25,800 metres at Strassburg, August 1905.

The most extensive meteorological explorations of the free atmosphere have been those accomplished in Germany by Richard Assmann and Arthur Berson, beginning (1887) in co-operation with the German Verein for the Promotion of Aeronautics and the Aero- nautic Section of the German Army, afterwards under the auspices of the Prussian Meteorological Office, but later as a wholly inde- pendent institution at Lindenberg. All the details of the work during 1887-1889 and the scientific results of seventy balloon voyages were published in three large volumes, Wissenschaftliche Luftschiffahrten (Berlin, 1900). The work done at Tegel at the Aeronautical Observatory of the Berlin Meteorological Office, the 1st of October 1899 to April 1905, was published in three volumes of Ergebnisse. But the location at Tegel had to be given up and

Annual Temperatures and Wind.

Tegel,

1903.

Tegel, 1904.

Lindenberg, 1905.

Lindenberg, 1905.

•Altitude.

Days.

°C.

Days.

°C.

Days.

°C.

Days,

Metres per sec.

Ground

3 6 5

9-2

366

9-1

365

8-5

36.5

4-65

500 m.

363

6-7

364

6-5

365

6-2

362

8-6 5

1,000 „

344

4-3

361

4-2

352

4-0

35b

8-85

i > 500„

252

2-0

279

2-2

294

2-6

306

8-55

2,000 ,,

170

0-0

186

— 0-2

242

o-5

257

9-5

2,500 „

98

-1-8

132

-1-7

179

— i-i

195

IO-O

3,000 ,,

55

-3-9

79

-3-b

119

-2-8

I27 j

10-7

a new independent establishment, the ” Royal Prussian Aeronautic Observatory,” was founded at Lindenberg, under the direction erf Dr

Assmann, who has published the results of his work in annual volumes of the Ergebnisse of that institution, considering it as a continuation of the work done at Berlin and Tegel. In addition to these elaborate official publications various summaries have been published, the most instructive of which is the chart embodying daily observations ; with corresponding isotherms at all attainable altitudes, published monthly since January 1903 in Das Wetter. The growth of this aerial work and the reliability of the results may be inferred from a statement of the number of ascensions madeeachyear: 1899,6; 1900,39; 1901,169; 1902,261; 1903,481; I 9°5> 5 X 3- This large number, combined with 581 voyages of Teisserenc de Bort at Trappes and many others made in England,

Holland and Russia, amounting in all to over 2000, enabled Assmann to compute the monthly and annual means of temperature and wind velocity for each altitude; the German results are given in table at foot of page 269.

The results of these numerous ascents, during these six years, have also been grouped into monthly means that have a reliability proportionate to the number of days on which observations were obtained at a given level, and we are now able to speak of the annual and even of the diurnal periodicity of temperature at different altitudes in the free air with considerable confidence.

Some of the most important conclusions to be drawn from the best recent work were published by Hann either in special memoirs or in his Lehrbuch, from which we take the following table. The actual temperatures given in this table have only local importance, but the differences or the vertical gradients doubtless hold good over a large portion of Europe if not of the world.

Temperature in

Free Air over

Europe 1899-1904.

Annual Averages.

Altitude.

International.

All countries

Inter-

Manned

Trappes. 581 Ascents.

15 Ascents.

national. 130 Ascents.

balloons. 36 Ascents.

Feb.

Aug.

combined.

Km.

°C.

°C.

°C.

°C.

°C.

°c.

•c.

O

—

8-3

—

—

+ 0-3

+ 18-2

—

I

+ 5-4

6-0

+ 5-5

+ 5-3

- 1-4

+ 15-1

50

2

+ 0-5

i-7

+ 0-3

+ 0-7

- 3.6

+ 10-2

o-5

3

- 5-0

- 3-3

- 4-4

- 4-0

- 8-7

＋ 4-8

- 4-0

4

-10-3

- 9-0

-10-3

- 9-4

-14.7

— I-O

- 9-2

5

-16-6

-15-3

-165

-15-4

—21-9

- 7’i

-15-4

6

— 24-2

— 22-1

-23-0

— 21-9

-28-9

-13-3

— 22-0

7

-30-2

— 29-1

-30-2

—29-0

-36-1

-19-5

— 29-0

8

-37-4

-36-2

-37-0

-36-2

-43-7

—27-1

-36-2

9

-46-4

-43-2

—

-43-5

-50-1

-33-8

-43-2

10

1 –

-49-0

—

-49-3

-55-4

-39-5

-49-2

The differences of temperature between any layer and those above it and below it, or the vertical gradients at each level go through annual periodical changes quite analogous to those derived from mountain observations; the most rapid falls of temperature, or the largest vertical gradients in the free air occur on the following dates over Europe : —

Altitude.

Over Germany.

Over Trappes.

1, 2, 3 km.

3. 4, 5 5. 6, 7 7, 8, 9 9, 10, 11

May, June March April July

May 15 Feb. 15 Jan. 27 July 28 Sept. 14

the highest cirrus, from which Cleveland Abbe inferred that it had something to do with the absorption of the solar and terrestrial heat by dissolving cirri. But the most plausible explanation is that

published simultaneously in September 1908 by W. J. Humphreys of Washington, and Ernest Gold of London.

The daily diagrams in Das Wetter show that both the irregular and the periodic and the geographic variations of temperature in the upper strata are unexpectedly large, almost as large as at the earth's surface, so that the uniform temperature of space that was formerly supposed to prevail in the upper air must be looked for, if at all, far above the level to which sounding balloons have as yet attained. It is evident that both horizontal and vertical convection currents of great importance really occur at these great altitudes. These upper currents cannot be due to any very . local influence at the earth's surface, but only to the interchange of the air over the oceans and continents or between the polar and equa- torial regions. They constitute the important feature ol the so-called general circulation of the atmo- sphere, which we have hitherto mistakenly thought of as confined to lower levels; their general direc- tion is from west to east over all parts of the globe as far as yet known, showing that they are con- trolled by the rotation of the earth. It is likely that masses of air having special temperature conditions or clouds of vapour dust such as came from Krakatoa, may be carried in these high currents around the globe perhaps several times before being dissipated.

The average eastward movement or the west wind at 3 km. above Germany is 10-7 m. per sec. or 1° of longitude (at 45° latitude) in 42-4 minutes, or such as to describe the whole circumference of this small circle in 10-5 days. At the equator above the calm belt the velocity westward or the east wind as given by Krakatoa volcanic-dust phenomena was 34-5 m per sec, on 30 of a great circle daily, or around the equator in 12-5 days, while its poleward movement was only i" per day or 1-3 metre per second. The average motion of the storm centres moving westward in northern tropical and equatorial regions but eastward in the north temperate zone is at the rate of one circum- ference or a small circle at latitude 45 ° in 19 days. Observations of the cloud movements gave Professor Bigelow the following results for the United States: —

The values above given as deduced from I41.high ascensions at Trappes show that between 1 1 and 14 km. there was no appreciable diminution of temperature, in other words, the air is warmer than could be expected and therefore has a higher potential temperature. This fact was first confirmed by the Berlin ascensions, and is now recognized as wellnigh universal. The altitude of the base of this warm stratum is about 12 km. in areas of high pressure and 10 km. in areas of low pressure. It is higher as we approach the tropics and above

ordinary balloon work near the equator if indeed it exists there. At first this unexpected warmth was considered as possibly a matter of error in the meteorographs, but this idea is now abandoned. Assmann suggested that the altitude is that of

Altitude.

io-o km.

7-5 5-0 3-0

i-o o

Moving eastward.

36 m. p.s.

35 26 20

Moving westward.

2-0 m. p.s.

2-0

i-5 i-o

o-5

Evidently, therefore, the great west wind (that James H. Coffin deduced from' his work on the winds of the northern hemisphere and that William Ferrel deduced from his theoretical studies) repre- sents with its gentle movement poleward a factor of fundamental importance. We must consider all our meteorological phenomena except at the equator as existing beneath and controlled, if not

Month.

Average temperature gradient per 100 metres.

Altitudes.

From o to 1000 metres.

From 1000 to 2000 metres.

Altitude (metres).

Total Fall of Temperature from Ground upward.

October to March.

Cloudiness

0-7.

Cloudiness

8-10.

April to September.

Cloudiness

0-7.

Cloudiness

8-10.

January.

February

March .

April

May

June

July . >

August . 1

September

October

November

December

Year .

°C. o-u o-39 o-33 o-73

0-90 0-99 0-96 0-86 0-77

o-57

0-36 0-30

o-6i

°C.

0-58

0-30

0-40

0-48

o-66

0-72

0-67

0-62

0-58

o-43

o-53

o-53

o-53

2000

1800

1600

1400

1200

1000

800

600

400

200

o

°C.

8-24 7-22 6-28

5-35 4-48 3-62

2-20

i-54

0-65

o-35

O-OO

°C.

7-63

6-6o

6-04 5-15 4-35 3-52 2-82

2-33 1-85 1-05

o-oo

°C.

15-33

14-20

13-01

n-66

10-32

9-13

7-55

5-77

3-88

i-88

o-oo

°C.

14-18 12-97

n-75

10-59 9.32 7-96 6-65 5-23 3-63 1-76

o-oo

PHYSICAL DATA]

METEOROLOGY

271

caused, by this general deep swift upper current of air that began as an ascending east wind above the calm equatorial air but speedily over- flowed as west wind settling down to the sea-level in the temperate and polar regions as great areas of high pressure and dry clear cool weather containing air on its return passage to the equator. The upper air is thrown easily into great billows, and wherever it rises the warm equatorial wind flows in beneath it, but when it descends we have blizzards and dry clear weather. It is a covering for the lower strata of air, it flows over them in standing waves and sometimes mixes with them at the • surface of contact. It receives daily accessions from below and gives out corresponding accessions to the lower strata, by a process of overturning such as has been studied theoretically by Margules and Bigelow.

At the fifth conference of the International Committee on Scientific

Aeronautics (Milan, October 1906) Rykatchef presented the results of kite-work during 1904 and 1905 at Pavlosk, near St Petersburg, from which we select the results for these two years given in table at foot of page 270.

Many inversions occur during January below 1000 metres. The decrease is more rapid in summer than in winter and in clear weather than in cloudy, but of course these observations did not extend above the upper ievel of the cumulus cloud layer. A general survey of the existing state of knowledge of the upper atmosphere is given in the Report of the British Association for 1910.

Distribution of Aqueous Vapour. — The distribution of aqueous vapour is best shown by lines of equal dew-point or vapour tension, though for some purposes lines of equal relative humidity are convenient. The dew-point lines are not usually shown on charts, partly because the lines of vapour pressure are approximately parallel to the lines of mean temperature of the air, and partly because the observations are of very unequal accuracy in different portions of the globe. In general we may consider any isotherm as agreeing with the dew-point line for dew-points a few degrees, lower than the temperature of the air. The distribution of moisture is quite irregular both in a horizontal and in a vertical direction. On charts of the world we may draw lines based on actual observa- tions to represent equal degrees of relative humidity, or equal dew- points and vapour pressures; but as regards the distribution of moisture in a vertical direction we are, in the absence of specific obser- vations, generally forced to assume that the vapour pressure at any altitude h follows the average law first deduced from a limited num- ber of observations by Hann, and expressed by the logarithmic equation, log e = log e — A/6517, which is quite analogous to the elementary hypsometric formula, log p = log p — A/18400. Therefore, in general, the ratio between the pressure of the vapour and the pressure of the atmosphere at any altitude is represented by the approximate formula, log [e/p = log et>/p<,— ft/10091. Of course these relations can only represent average or normal conditions, which may- be departed from very widely at any moment; they have, however, been found to agree remarkably with all observations which have as yet been published. The average results are given in the following table, which is abbreviated from one published by Hann, but with the addition of the work done by the U.S. Weather Bureau, as reduced by Dr Frankenfield in 1899. The vapour constituent of the atmosphere is not distributed accord- ing to the law of gaseous diffusion, but, like temperature and the ratio between oxygen and nitrogen, is controlled by other laws prescribed by the winds and currents, namely —

convection.

Diminution of the Relative Vapour Pressure with Altitude.

the first line of the table at foot of this page (see Wissenschaftliche Luftffahrten, Bd. III. , and Hann, Lehrbuch, 1906, p. 169). The observations on mountains gave Hann the pressures in the second line. Siiring's figures result from the use of Assmann's ventilated psychrometer and are therefore very reliable.

The vapour pressure in mm. in free air over Europe is best given by Siiring's formula

loge A = loge -|(i + 4)

where the altitude is to be expressed in kilometres. From this formula we derive the " specific moisture " or the mass of vapour contained in a kilogram of moist air as given in the following table whose numbers do not appreciably differ from " the mixing ratio " or quantity of moisture associated with a kilogram of dry air. The relative humidities vary irregularly depending on convection currents, but in clear weather when descending currents prevail they have been observed in America and over Berlin as shown in the third and fourth columns of the following table : —

Observed Specific Moisture and Relative Humidity.

Authority.

Kites. (U.S.W.B.)

Balloons. (Hammon.)

Balloons.

(Hazen.)

Balloons.

(Hann.)

Mountains

(Hann.)

Computed

by Hann.

I5°0

ft.

0-82 0-97 089 0-84 083

0-85

2000

ft.

0-78 0-96 0-83

o-8o o-8i

o-8i

3000

. ft.

0-70 0-87

o-8o o-66 o-8o

0-72

4000

ft.

o-6i

0-68

0-78

o-6i

o-66

5000

ft.

0-52 0-44 0-67 0-50

0-6l

6000

ft.

0-49

o-59

0-46

o-54

0-58

7000

ft.

o-39

0-44 0-41

o-55

8000

ft.

0-65 0-58 0-52 b-47

0-44

o-37

0-47

0-42

No. Obs.

1 123

15

Note. — The vapour pressure at any altitude is supposed to be expressed as a fraction of that observed at the ground. When the altitudes are given in ft. Hann's formula becomes log e/e = A/29539.

From 78 high balloon voyages in Germany, 1 887-1 899, Siiring deduced the average vapour pressure in millimetres as found in

Alt.

Specific moisture.

Relative Humidity.

U.S.A.

Berlin.

Km.

%

%

0-0

I -00

—

77

0‘5

—

65

71

1-0

0-76

65

71

i-5

065

59

62

2-0

o-55

59

57

2-5

0-47

45

58

3-0

o-39

—

55

3-5

—

—

49

4-0

0-26

—

53

4-5

—

—

54

5-0

0-17

—

—

5-6

O-II

—

—

5-7

0-07

—

—

5-8

0-04

—

—

The total amount of vapour in the atmosphere, according to Hann's formula, is between one-fourth and one-fifth of the amount re- quired by Dalton's hypothesis, as is illustrated by the following table taken from an article by Cleveland Abbe in the Smithsonian Report for 1888, p. 410: —

Total Vapour in a

Vertical Column that

is saturated at its base.

Altitude.

Relative

Total Vapour in the

Feet.

Tension

Columns expressed as

= e/eo.

Inches of Rain.

I-0OO

(80° F.

1 io-95

70°F.

7-99

6o° F.

5-76

50° F.

4-09

80° F.

0-0

70° F.

0-0

6o°F.

0-0

5°°F. O-O

6000

0-524

575

4-19

3-02

2-14

i-3

1-0

o-7

o-5

12,000

0-275

3-01

2-20

i-5«

I-I2

2-1

1-5

i-i

o-8

18,000

0-144

1-58

1 -15

0-83

0-59

2-5

1-8

i-3

0-9

24,000

0-075

0-82

0-62

o-43

0-31

2-7

2-0

1-4

1-0

30,000

0-040

o-43

0-32

0-23

0-16

2-8

2-1

1-5

l-i

Diminution

of Pressure of A queous

Vapour in the Free Air.

Alt. .

km. o-5

km.

1-0

km. i-5

km.

2-0

km.

2-5

km.

3-0

km.

3-5

km.

4-0

km.

4-5

km.

5-0

km. 6-o

km.

7-0

km.

8-0

Siiring .

Hann .

c — —

mm.

0-83 0-83

mm. o-68

0-70

mm.

051 0-58

mm.

0-41 0-48

mm.

0-34 0-40

mm.

0-26

o-34

mm.

0-20

0-28

mm.

0-17 0-23

mm.

0-14 0-19

mm.

O-II

0-16

mm.

0-054

mm.

0-028

mm.

0-013

A heavy rainfall results from the precipitation of only a small percentage of the water contained in the fresh supplies of air brought by the wind; if all moisture were abstracted from the atmosphere it could only affect the barometer throughout the equatorial regions by

2-8/13-6 inches, or about two-tenths of an inch, while at the polar regions the diminution would be much less than one-tenth. Evidently, therefore, it is idle to argue that the fall of pressure in an extensive storm is to be considered as the simple result of the condensation of the vapour into rain.

Barometric Pressure. — The horizontal distribution of barometric pressure over the earth's surface is shown by the isobars, or lines of equal pressure at sea-level; it can also be expressed by a system of complex spherical harmonics. As the indications of the mercurial barometer must vary with the variation of apparent gravity, whereas those of the aneroid barometer do not, it has been agreedˆ by the International Meteorological Conventions that for scientific* purposes all atmospheric pressures, when expressed as barometric readings, must be reduced to one standard value of gravity, namely, its value at sea-level and at 45 of latitude. In this locality its value is such as to give in one second an acceleration of 980-8 centimetres, or 32-2 English ft. per second. The effect of the variation of apparent gravity with latitude is therefore to make the mercurial barometer read too high, between 45 and the equator, and too low, between 45 and the pole. The gravity-correction to be applied to any mer- curial barometric-reading at or near sea-level, in order to get the atmospheric pressure in

Btandard units, should be given on the edge of a meteorological chart, unless the isobars shown thereon already contain this correc- tion. On such charts it will be perceived that the barometric pressure at sea-level is by no meansjuniform over the earth's surface, and daily weather charts show very great fluctuations in this respect, the lowest .pressures being storm centres and the highest pressures areas of clear cool dry weather. But even the normal average charts show high pressures over the continents in the winter and low pressures over the oceans, these conditions being reversed in the summer time; moreover, Schouff (Pogg. Ann., 1832) first demon- strated that the average pressure in the neighbourhood of the equator is slightly less than under either tropic, and that' there is a still more remarkable diminution of pressure from either tropic towards its pole. The exact statement of these variations of pressure with latitude was subsequently worked out very precisely by Ferrel, and forms the basis

of his explanation of the general circulation of the earth's atmosphere and its influence on the barometer. The series of monthly charts for the whole globe, compiled by Buchan and published by the Royal Society of Edinburgh in 1868, as well as Buchan's later and more perfect charts in the meteorology of the " Challenger " Expedition, Edinburgh, 1889, and in Bartholomew's Atlas, first revealed clearly the fact that the distinct areas of high and low pressure which are located over the continents and the oceans vary during the year in a fairly regular manner, so that the pressure is higher over the continents in the winter season and lower in the summer season, the amount of the change depending principally upon the size of the continent. A part of this annual variation in pressure is undoubtedly introduced by the methods of reduction to sea-level; indeed, if the data of the lower stations are reduced up to the level of 10,000 or 15,000 ft., we sometimes find the barometric conditions quite reversed. These annual changes are intimately connected as cause and effect with the annual changes of temperature, moisture and wind ; it is quite errcneous to say that the observed charted pressures control the winds; there is a reaction going on between the wind and the barometric gradient, the resistance and rotation of the earth's surface, such that the true relation between these factors is a complex but funda- mental problem in the mechanics of the atmosphere.

The vertical distribution of pressure as deduced from observation shows a rate of diminution with increasing altitude very closely but not entirely accordant with the laws of static equilibrium, as first elaborated by Laplace in his hypsometric formula. The departures from this law of static equilibrium are sufficient to show that, if our atmosphere is really in a state of equilibrium, it must be a matter of dynamics and not of statics. The general average relation of the density of the air to the altitude and temperature, and the total pressure of the superincumbent atmosphere, are shown in the accompanying diagram (fig. 1), which is taken from a memoir on the equations of motion by Joseph Cottier, published in the U.S. Monthly Weather Review for July 1897. The diminu- tion of pressure with altitude, as shown in this diagram for average conditions, but not for the temporary conditions that continually occur, follows a logarithmic law, and can undoubtedly be extended upwards for the normal atmosphere only to a height of 20 or 30 m., owing to our uncertainty as to the actual conditions in the upper portions of the atmosphere. This diagram is based upon the assumption that the atmosphere is in a state of convective equilibrium such that the ascending and descending masses expand and cool as they ascend, or contract and warm up as they descend, nearly but not quite in accordance with the

adiabatic law of the change of temperature in pure gases.

The departure of atmospheric temperatures from the strictly adiabatic law, as shown bv Cottier, is- undoubtedly due largely to the heat absorbed by and radiated from moist or hazy or dusty air. In 1890, Abbe showed that a very moderate rate of radiation from the atmosphere suffices to explain the coolness of slowly descending air. The absorption by the atmosphere of radiations from the earth and sun, or the balance between warming by absorption and cooling by radiation, is the basis of the arguments of W. J. Humphreys {Astrophysics, Jan. 1909), and E. Gold (Proc. Roy. Soc, 1908, lxxxii., 45 A.), explaining the existence of the ” thermal layer.”

The direct evaluation of this radiation and absorption has been attempted by many. The genuine law a(q-p) is adopted by Gold as closely representing nature, whence it follows that (1) the adiabatic rate of cooling in convection currents must cease at a height corresponding to one-half of the barometric pressure at sea-level; (2) an isothermal layer must exist at the level where the absorption of solar radiation equals that of the terrestrial and atmospheric radia- tion ; (3) within this thermal layer convection is difficult or impossible ; (4) above this region the vertical temperature gradient must depend essentially on radiation and is less than that needed for convective equilibrium ; (5) below this level the atmospheric radiation exceeds the atmospheric absorption and vertical currents can only be kept up by the convection of heat or aqueous vapour from the earth’s surface to the adjacent layer of air.

Limit of the Atmosphere. — The limiting height of the atmosphere must be at some unknown elevation above 20 m. where the temperature falls to absolute zero. But the uncertainty of the various hypotheses as to the physical properties of the upper atmosphere

KU

to

16 14 13

212

> e

ˆ 8

7 6

5

Aa

—

Va

%

\%

t£&

2t

^

~v

^

3

3

pS

^

>^

r

1^

Fractional Parts of Normal Prttsur* aid Qen&tty at Saa-ltvil

Fig. 1.

forbids us to entertain any positive ideas on this subject at the present time. If we define the outer limit of the atmosphere as that point at which the diffusion of gases inwards just balances the diffusion outwards, then this limit must be determined not by the hypsometric formula, but by the properties of gases at low temperatures and pressures under conditions as yet uninvestigated by physicists.

Cloudiness. — It is evident that the clouds (q.v.) are formed from clear

transparent air by the condensation of the invisible moisture therein into numerous mi-nute par- ticles of water, ice or snow. Not-withstanding their transparency, these individual globules and crystals, when collected in large masses, disperse the solar rays by reflection to such an extent that direct light from the sun is unable to penetrate fog or cloud, and partial darkness results. In a general survey of the atmosphere the geographical distribution of the amount of cloudy sky is im- portant. When the solar heat falls upon the surface of the cloud it is so absorbed and. reflected that, on the one hand, scarcely any penetrates to the ground beneath, while on the other hand the upper surface of the cloud becomes unduly heated. Even if this upper surface is completely evaporated, it may continually be renewed from below, and, more- over, the evaporated moisture mixing with the air renders it very much lighter specifically than it would otherwise be. Hence the upper surface of the cloud replaces the surface of the ground and of the ocean; the air. in contact with it acquires a higher temperature and greater buoyancy, while the ground and air beneath it remain colder than they would be in sunshine. The average cloudiness over the globe is therefore intimately related to the density and circulation of the atmosphere ; it was first charted in general terms by L. Teisserenc de Bort of Paris, about 1886. The manifold modifications of the clouds impress one with the conviction that, when properly understood and interpreted, they will reveal to us the most important features of the processes going on in the atmo-sphere. If the farmer and sailor can correctly judge of the weather several hours in advance by a casual glance at the clouds, what may not the professional meteorologist hope to do by a more careful study? Acting on this idea, in 1868 Abbe asked from all of his correspondent observers full details as to the quantity, kind and direction of motion of each layer of clouds; these were telegraphed daily for publication in the Weather Bulletin of the Cincinnati Observatory, and for use in the weather predictions made at that time. Since January 1872 similar data have been regularly tele- graphed for the use of the U.S. Weather Bureau in preparing fore- casts, although the special cloud maps that were compiled thrice daily have not been published, owing to the expense. These data were also published in full in the Bulletin of the International Simul- taneous Meteorological Observations for the whole northern hemi- sphere during the years 1 875-1 884. Abbe's work on the U.S. Eclipse Expedition to the West Coast of Africa in 1889-1890 was wholly devoted to the determination of the height and motions of the clouds by the use of his special form of the marine nephoscope. The use of such a nephoscope is to be strongly recommended, as it gives the navigator a means of determining the bearing of a storm centre at sea by studying the lower clouds, better

than he can possibly do by the observation of the winds alone. The im- portance of cloud study has been especially emphasized by the International Meteorological Committee, which arranged for a complete year of systematic cloud-work by national weather bureaus and individual observatories throughout the world from May 1896 to June 1897. In this connexion H. H. Clayton of Blue Hill Observatory published a very comprehensive report on. cloud forms in 1906. The complete report by Professor F. H. Bigelow on the work done by the U.S. Weather Bureau forms a part of the annual report for 1899, and constitutes a remarkable addition to our knowledge of the subject. Some preliminary account of this work was published in the American Journal of Science for December 1899.

Although all the international cloud- work of 1 896-1 897 has now been published in full by the individual institutions, as in the case of the International Polar Research Work of 1883, yet a compre- hensive study of the results still remains to be made. Some of these have, however, been brought together in Mohn's discussion of the observations by Nansen during the voyage of the ' ' Fram ' ' and also in Hann's Lehrbuch and in Bigelow's Report on Cloud-work. The mean altitudes of cirrus and strato-cumulus clouds resulted as follows.

Place.

Cape Thordsen.

Bossekop, 1 838-1 842

Storlien.

Upsala, 1 884-1 885.

„ I 896-1 897. Pavlosk. Dantzig.

Irkutsk …. Blue Hill, 1890-1891 Potsdam, summer.

„ winter Blue Hill, summer. „ „ winter . Toronto, summer .

,, winter Washington, summer

„ winter

Allahabad . Manila ….

Lati- tude.

78-5

79

63-5

60

60

60

54-5

52-3

42-5

52

52

42-5

42-5

43-6

39

25-5 15

Cirrus.

kil.

7-3 8-3 8-3 8-9

8-2

8-8

io-o

10-9 90 9-1 8-1

9-5

8-6

10-9

10-0

10-4

9‘5 12-4 10-9

St. cu.

kil.

2-5

i-3

1-8

2-3 i

1-8

1-9

2-2

2-3

32 2-2 1-4 1-2

1-6

2-0

i-5

2-9 2-4 3-5

2-0

Highest Cirrus.

kil. n-8

13-4

II-7

150

165

180

Lowest Cirrus.

kil. ‘5ˆ5

3-6

4-7

5-4

5-0 4-0

The annual average velocity of hourly movement in metres per second without regard to direction may be summarized as follows : —

500—2000.

2-4000.

4-6000.

5—8000.

3-10,000.

10-12,000.

12-14,000.

■ m.

m.

m.

m.

m.

m.

Bossekop .

6-5

7-3

12-5

15-4

19-0

24-4

—

Upsala

91

8-7

16-0

20-4

26-6

- —

—

Potsdam .

9-3

10-3

16-9

20-8

25-4

—

—

Blue Hill . .

9-8

14-2

17-1

34-3

34-2

(33)

—

Toronto .

9.4

17-1

18-4

32-0

30-8

28-8

—

Washington ‘

(8-6)

14-6

17-3

20-3

25-8

(28-9)

26-8

Allahabad

3-4

6-4

130

17-6

22-3

20-7

34-o

Manila

5-5

7-1

6-5

8-0

13-6

13-0

13-4

The movements of the upper clouds are more rapid in winter than in summer at these northern stations, but among the median and lower clouds a retardation takes place apparently due to the ascending currents that form rain and snow. Above 8000 metres at Upsala the average velocity in winter exceeds 30 metres per second, whereas in summer it is 20; at Toronto and Blue Hill the absolute velocities are larger but in the same ratio. In the United States the maximum velocities from the west attain 100 metres per second and over 80 or 70 metres per second are not rare, but in Europe the corresponding figures are 70, 60, 50. (See also Cloud.)

II. — Meteorological Apparatus and Methods

The observational basis of meteorology is the frequent and, if possible, continuous record of the temperature, moisture and barometric pressure at different altitudes in the free atmosphere, the direction and velocity of the wind, the rain and snow-fall, and the kind, amount and motion of the clouds. For Europe these data have been furnished with more or less accuracy and continuity by thousands of observers ever since 1653, when Ferdinand II., grand .duke of Tuscany, organized a system of daily observations in Italy under the general super- vision of Luigi Antinori. During the 19th century great efforts were made to obtain equally full records from all parts of the land and ocean, and thousands of navigators were added to the great corps of observers. Other matters have also been investi- gated, the most important being the intensity of radiation from the earth at night-time and from the sun by day-time, the optical phenomena of the sky, the amount of dust in the air, the electrical condition and the chemical constitution of the atmosphere. Although all the instruments used belong to the category of physical apparatus, yet certain points must be considered as peculiar to their use in connexion with meteorology.

Thermometer. — In using the thermometer to determine ,the temperature of the free air it is necessary to consider not merely its intrinsic accuracy as compared with the standard gas thermometer of the International Bureau of Weights and Measures at Paris, but especially its sluggishness, the influence of noxious radiations, the gradual change of its zero point with time, and the influence of atmospheric pressure.

[* We have here inserted the Washington data as interpolated from the figures given by Hann, Lehrbuch, 1906, p. 282.]

Sensitiveness. — The thermometer indicates the temperature of the outside surface of its own bulb only when the whole mass of the instrument has a uniform temperature. Assuming that by appropriate convection we can keep the surface of the thermometer at the temperature of the air, we have still to remember that ordin- arily this itself is perpetually changing both in rapid oscillations of several degrees and in diurnal periods of many degrees, while the thermometer, on account of its own mass or thermal inertia, always lags behind the changes in the temperature of its own surface. On the other hand, radiant heat passes easily through the air, strikes the thermometer, and raises its temperature quite independently of the influence of the air whose temperature we wish to measure. The internal sluggishness or the sensitiveness of the thermometer is usually

different for rising and for falling temperatures, and is measured by a coefficient which must be deter- mined experimentally for each instrument by observing the rate at which its indications change when it is plunged into a well-stirred bath of water whose temperature is either higher or lower than its own. This coefficient indicates the rate per minute at which the readings change when the temperature of the surface of the bulb is one degree warmer or colder than the temperature of the bath. Such coefficients usually vary between 5*5 th of a degree centigrade for sluggish thermometers, and one or two degrees for very sensitive thermometers. Suppose, for instance, that the coefficient is one- half degree, then when the rate of change in the temperature of the air is one degree per minute this is exactly the same as the rate of change which the thermometer itself undergoes when its own temperature is two degrees different from that of the air; conse- quently, the thermometer will lag behind the air temperature to that extent and by the corresponding amount of time, assuming that the air itself flows fast enough to keep the surface of the bulb at the air temperature. When the air temperature ceases to rise or fall, and begins to change at the same rate in the opposite direc- tion, the thermometer will fail to record the true maximum or minimum temperature by an appreciable error depending upon the rapidity of the change, and will follow the new temperature changes with the same lag. For example, in the case just quoted, if a rising temperature suddenly changes to a falling temperature, the error of the thermometer at the maximum temperature will be two degrees, and yet the thermometer may be absolutely correct as compared with the standard when it is allowed five -or ten minutes' time to overcome the sluggishness. It is very difficult to obtain the temperature of the free air at any moment within jˆth of a degree Centigrade, owing to the sluggishness of all ordinary thermo meters and the perpetual variations in the temperatures of the atmospheric currents.

Radiation. — When a thermometer bulb is immersed in a bath of liquid all radiant heat is cut off, but when hung in the open air it is subject to a perpetual interchange of radiations between itself and all its surroundings ; consequently its own temperature has only an indirect connexion with that of the air adjacent to it. One of the most difficult problems of meteorology is so to expose a thermometer as to cut off noxious radiations and get the true temperature of the atmosphere at a specific place and time. The following are a few of the many methods that have been adopted to secure this end : Melloni put the naked glass bulbs within open sheltering caps of perforated silver paper. Flaugergues used a protection consisting of a simple vertical cylinder of two sheets of silver paper enclosing a thin layer of

non-conducting substance, like cotton or wool. The influence of radiation upon a thermometer depends upon the radiating and absorbing powers of its own surface ; a roughened surface of lamp-black radiates and absorbs perfectly; one of chalk powder does nearly as well; glass much more im- perfectly; white a polished silver surface reflects with ease, but radiates and absorbs with the greatest difficulty. Fourier pro- posed to use two thermometers side by side, one of plain glass and the other of blackened glass; the difference of these would indicate the effect of radiation at any moment; but instead of plain glass he should have used polished silver. His method was quite independently devised and used by Abbe in 1865 and 1866 at Poulkova, where the thermometers were placed within a very light shelter of oiled paper. In order to use this method successfully, both the black and the silvered thermometers should be whirled side by side inside the thermometer shelters (see Bulletin of the Philosophical Society of Washington for 1883). Various forms of open lattice-work and louvre screens have been devised and usfd by Glaisher, Kupffer, Stevenson, Stowe, Dove, Renou, Josephˆ Henry and others, in all of which the wind is supposed to blow freely through the screens, while the latter cut off' the greater part of the direct sunshine and other obnoxious radiations by day, and also prevent obnoxious radiation from the thermometer to the sky by night. The Italian physicist Belli first proposed a_ special artificial ventilation drawing the fresh air from the outside and making it flow rapidly over the thermometer. Even before his day de Saussure, Espy, Arago and Bravais whirled the thermometer rapidly either by a small whirling machine, or by attaching it to a string and swivel and whirling it like a sling. When this whirling is done in a shady place excellent results are obtained. Renou and Craig placed the thermometer in a thin metallic enclosure or shelter, and whirled the latter. Wild established the thermometer

in a fixed louvre shelter, but by means of a ventilating apparatus drew currents of fresh air from below into the shelter, where they circulated rapidly and passed out. In Germany, since 1885, Dr Assmann has developed the apparatus known as the ventilated psychrometer, in which the dry-bulb thermometer is placed within a double shelter of thin metallic tubing, and the air is drawn in rapidly by means of a small ventilating fan. In the observations made by Abbe on the cruise of the " Pensacola " to the West Coast of Africa, the dry- and wet-bulb

thermometers were enclosed within bamboo tubes and rapidly whirled. The inside of the wet-bulb tube was kept wet, so that its surface, being cooled by evaporation, could not radiate injuriously to the thermometer. In the system of exposure adopted by the U.S. Weather Bureau the dry and wet bulbs are whirled by a special apparatus fixed within the louvred shelter, which is about 3I ft. cube, and is placed far enough above the ground or building to ensure free exposure to the wind. In using the whirling and ventilating methods it is customary to take a reading after whirling one minute, and a second reading at the end of the second minute, and so on until no appreciable changes are shown in the thermometer. Of course in perfectly calm weather these methods can only give the tempera- ture of the air for the exact locality of the thermometer. On the other hand, when a strong wind is blowing the indicated tempera- ture is an average that represents the long narrow stream of air that has blown past the thermometer during the few minutes that are necessary in order that its bulb may obtain approximately the temperature of the air.

Change of Zero.— AW thermometers having glass bulbs, especially those of cylindrical shape, are sensitive to changes of atmospheric pressure. The freezing-point, determined under a barometric pressure of 30 in., or at sea-level, stands higher on the glass tube than if it had been determined under a lower pressure on a mountain top. Therefore delicate thermometers, when transported to great heights, or even during the very low pressure of a storm centre, read too low and need a correction for pressure. The zero- point also changes with time and with the method of treatment that the bulb has received as to temperature. Owing to the slow ad- justment of the molecules of the glass bulb to the state of stable equilibrium, their relations among themselves are disturbed when- ever the bulb is freshly heated. At this time the freezing-point is temporarily depressed to an amount nearly proportional to the heating. The normal method of treatment consists in first deter- mining the boiling-point of the thermometer, and, after a few minutes, the freezing-point. If this method is uniformly followed the two fiducial points will stay in permanent relation to each other. A thermometer that has been used for many years by a faithful meteorological observer has almost inevitably been going through a steady series of changes; in the course of ten years its freezing- point may have risen by 2° or 3 F., and, moreover, it changes by fully a tenth of a degree between summer and winter. The only way completely to eliminate this source of error from meteorological work is to discard the mercurial thermometer altogether; but instead of adopting that course, the use is generally recommended of

thermometers whose bulbs are made of a special glass, upon which heating and cooling have comparatively very little influence. Any argument as to secular changes in the temperature of the atmosphere is likely to be greatly weakened by the unknown influ- ence of this source of error, as well as by changes in the methods of exposure and in the hours of observation.

Barometer. — The barometer (q.v.) indicates the elastic pressure prevailing in gas or liquid at the surface of the mercury in the open tube or cistern, provided that the fluid at that point is in a state of quiet relative to the mercury.

Any motion of the air will have an influence upon the reading quite independently of the prevailing elastic pressure. The pressure within a mass of gas at any point is the summation of the effects due to the motions of the myriad molecules of the gas at that point ; it is the kinetic energy of the molecules striking against each other and the sides of the enclosure, which in this case is the surface of the mercury in the cistern of the instrument. If the barometer moves with respect to the general mass of the gas there is a change in the pressure on the mercurial surface, although there may be none in the general mass of the free gas, and a barometer giving correctly the pressure of the air at rest within a room will give a different indication if the instrument or the air is set in rapid motion so that the air strikes violently against it. If the barometer moves with the air it will indicate the elastic pressure within the air. When the wind blows against an obstacle the air pressure is increased slightly on the windward side and diminished on the leeward side. It is thus obvious that in determining the pressure within the free atmosphere the exposure of the barometer must be carefully con- sidered. The influence of a gale of wind is to raise the elastic pressure within a room whose window faces to the windward, but to lower the pressure if the window faces to the leeward. The influence of the draught up chimney, produced by the wind blowing over its summit, is to lower the pressure within the room. The maximum effect of the wind in raising the pressure is given by the formula. $P - P_o = 0{\cdot}000\,038\,3 \times V^2$, where the pressure is given

in inches and the velocity in miles per hour. This amounts to about one-tenth of an inch in a 50-m. wind, and to nearly four- tenths in a 100-m. wind. The diminution by a leeward window or a draught up chimney is usually less than this amount. This alteration in pressure, due to the local effect of wind, does not belong to the free atmosphere but to the method of exposure of the barometer, and can be eliminated only by methods first de- scribed by Abbe in 1882: it is a very different matter from the general diminution of pressure in the

atmosphere produced by the movement of the wind over a rotating earth and by the centrifugal force within a vortex. The latter is an atmospheric phenomenon, independent of instruments and locality, which in hurricanes and tornadoes may amount to several inches of the mercurial column. It is, however, quite common to find in the continuous records of pressure during a hurricane evidence of the fact that the low pressure due to the hurricane and the special diminution due to the exposure of the barometer are combined together, so that when the calm centre of a hurricane passes over a station the pressure temporarily rises by the amount due to the sudden stoppage of the wind and the local exposure effect.

The other sources of error that give rise to discrepancies in meteorological work relate to the temperature of the instrument, the sluggishness of the movement of the mercury, and the inevitable large secular changes in the correction for capillarity, due principally to the changes in the condition of the surfaces of the glass and the mercury, especially those that are exposed to the open air. The international comparisons of barometers show that discrepancies exist between the best normals or standards, and that ordinary barometers must always be compared with such standards at the temperatures and pressures for which they are to be used.

Anemometer. — The wind is measured either by means of its pressure against any obstacle or by revolving apparatus that gives some idea of the velocity of its movement. The pressure is supposed to interest the engineer and navigator, but the velocity is the fundamental meteorological datum; in fact, the pressure of the wind varies with the nature of the obstacle, the method of exposure, the density of the air, and even the mass of rain carried along with it.

Pressure anemometers date from the pendulous tablet devised by Sir Christopher Wren about 1667, and such pressure plates continue to be used in an improved form by Russian observers. Normal pressure plates are used at a few English and Continental stations. The windmill anemometers devised by Schober and Woltmann were modified by Combes and Casella so as to make an exceedingly delicate instrument for laboratory use ; another modifi- cation by Richard is extensively used by French observers. In the early part of the 19th century Edgeworth devised and Robinson perfected a windmill system in which hemispherical cups revolved around a vertical axis, and these have come into general use in both Europe and America. Many studies have been made of the exact ratio between the velocity of the wind and the rotations of the Robinson anemometer. The factor 3 is usually adopted and in- corporated into the mechanism of the apparatus, but

in ordinary circumstances this factor is entirely too large, and the recorded velocities are therefore too large. The whirling cups do not revolve with any simple relation to the velocity of the wind, even when this is perfectly steady. The relation varies with the dimensions of the cups and arms and the speed of the wind, but especially with the steadiness or gustiness of the wind. The exact ratio must always be determined experimentally for each specific type of instrument ; in most instruments in actual use the factor for steady wind varies between 2 ; 4 and 2-6. When the wind is gusty the moment of inertia of the moving parts of the instrument necessitates an appreciable correction; thus, when the gust is at its height the re- volving parts receive an impetus that lasts after the gust has gone down, so that the actual velocity of the cups is too high. For this reason, also, comparisons and studies of anemometers made in the irregular natural winds of a free air are unsatisfactory. For the average natural and gusty winds at Washington, D.C., and on Mount Washington, N.H., and the small type of Robinson's anemometer used in the U.S. Weather Bureau Service, Professor C. F. Marvin deduced the table (see p. 275) for reduction from recorded to true velocity. This table involves the moment of inertia of the revolving parts of the instrument and the gustiness of the wind^ at Washington, and will therefore, of course, not apply strictly to other types of instruments or winds, for which special studies must be made.

About 1842 a committee of the American Academy of Arts and Sciences experimentally determined, for a large variety of chimney caps, or cowls, or hoods, the amount of suction that produces the draught up a chimney, and shortly afterwards a similar committee made a similar investigation at Philadelphia (see Proc. Amer. Acad. i. 307, and Journal of Franklin Institute, iv. 101). These investi- gations showed that the open end of the chimney, acting as an obstacle in the wind, is covered by a layer of air moving more rapidly than the free air at a little distance, and that therefore between this layer and the aperture of the chimney there is a space

within which barometric pressure is less than in the neighbouring free air. The draught up the chimney is due to the pressure of the air at the lower end or fireplace pushing up the flue into this region of low pressure, quite as much as it is due to the buoyancy of the heated air

within the flue. From such experiments as these there has been developed the vertical suction-tube anemometer, as devised by Fletcher in 1867, re-invented by Hagemann in 1876, and intro- duced into England by Dines. In his Meteorological Apparatus

Marvin's Table for the Reduction of Velocities, given by the small-sized Robinson's Anemometer in gusty winds.

Indicated Velocity.

True Velocity.

Miles.

1

2

3

4

s

6

7

■8

9

O

—

—

—

—

5-1

6-0

6-9

7-8

87

10

9-6

10-4

“\3

I2’I

I2‘9

13-8

14-6

15-4

l6‘2

17-0

20

17-8

18-6

19-4

20-22

21-0

21-8

22-6

23-4

24-2

24-9

30

2.V7

20-5

27-5

28-0

28-8

29-6

30-3

3i-i

31-8

32-6

40

3.V3

54- 1

34-8

35-0

3

37-1

37-8

3«-5

39-3

40-0

50

40-8

4 » -5

42-2

43-0

43-7

44.4

45-1

45-9

46-6

47-3

60

480

4»-7

49-4

50-2

50-9

SI “6

52-3

53-0

53-8

54-5

70

55 -2

55-9

56-6

57-3

58-0

58-7

59-4

6o-i

6o-8

61.5

80

62-2

62-9

63-6

64-3

65-0

65-8

66-4

6 7 -i

67-8

68-5

90

69-2

and Methods (Washington, 1887) Abbe gives the theory of this class of anemometers and develops the following additional forms: Two vertical tubes, whose apertures are respectively directed to the windward and the leeward, and within which are two independent barometers, give the means of determining the barometric pressure plus the wind pressure and minus the wind pressure respectively, so that both the velocity of the wind and the true barometric pressure can be determined. If instead of a simple opening at the top of the

tube we place there horizontally the contracted Venturi's tube, we obtain a maximum wind effect, which gives an accurate measure of the wind velocity, and is the form recommended by Bourdon as an improvement on that of Arson. In all anemometers of this class the inertia of the moving parts is reduced to a minimum, and the measurement of rapid changes in velocity and of the maxi- mum intensity of gusts becomes feasible. On the other hand, these researches have shown how to expose a barometer so that it shall be free from the dynamic or wind effect even in a gale. It has only to be placed within a room or box that is connected with the free air by a tube that ends in a pair of parallel plane plates. When the wind blows past the end of this tube it flows between these plates in steady linear motion, and can produce no disturbance of pressure at the mouth of the tube if the plates are at a suitable distance apart. This condition of stable flow, as contrasted with permanent flow, was first defined by Sir William Thomson (Lord Kelvin) (see Phil. Mag., Sept. 1887). Such a pair of small circular plates can easily be applied to a tube screwed into the air-hole at the back of any aneroid barometer, and thus render it independent of the influence of the wind.

As to the exposure of the anemometer, no uniform rules have as yet been adopted. Since the wind is subject to exceedingly great disturbances by the obstacles near the ground, an observer who estimates the force of the wind by noticing all that goes on over a large region about him has some advantage over an instrument that can only record the wind prevailing at one spot. The practice of the U.S. Weather Bureau has been to insist upon the perfectly free exposure of all anemometers as high as can possibly be attained above buildings, trees and hills; but, of course, in such cases they give records for an elevated point and not for the ground. These are therefore not precisely appropriate for use in local climatological studies, but are those needed for general dynamic meteorology, and proper for comparison with the isobars and the movements of the clouds shown on the daily weather map.

Hygrometer. — Moisture floats in the atmosphere either as invisible vapour or as visible haze, mist and cloud. The presence of the latter generally assures us that the air is fully saturated. The total amount of both visible and invisible vapour contained in a unit volume of cloud or mist is directly determined by the Schwackhofer or Svenson hygrometer, or it may be ascer- tained by warming a definite portion of the air and fog and measuring the tension of the vapour by Edelmann's apparatus. Both these methods, however, are in practice open to many sources of error. If only invisible aqueous vapour is present we may determine its amount by several methods: (a) the

chemical method, by absorbing and weighing it; (6) the dew- point method, by cooling the air down to the temperature where condensation begins; (c) Edelmann's method, by absorbing the moisture chemically and measuring the change in vapour

tension; (d) by adding vapour until the air is saturated, and measuring either the increased tension or the quantity of evaporation; (e) the psychrometric method, by determining the temperature of evaporation.

The wet-bulb thermometer, which is the essential feature of the last method, was used by Baume in 1758 and de Saussure in 1787, but merely as giving an index of the dryness of the air. The correct theory of its action was elaborated by many early investigators: Ivory, 1822; August, 1825; Apjohn, 1834; Belli, 1838; Regnault, 1845. From the last date until recent years no important progress was made in our knowledge of the subject, and it was supposed that the psychrometer was necessarily crude and unsatisfactory; but in its modern form it has become an instrument of much greater orecision, probably quite as trustworthy as the dew-point apparatus or other method of determining atmospheric moisture. In order to secure this accuracy the two bulbs must be of the same size, style and sensitiveness ; the wet bulb must be covered with thin muslin saturated with pure water; both thermometers must be whirled or ventilated rapidly, but at the definite prearranged rate for which the tables of reduction have been computed ; and, finally, both thermometers must be carefully sheltered against obnoxious radiations. In order to attain these conditions European observers tend to adopt Assmann's ventilated psychrometer, but American observers adopt Arago's whirled psychrometer, set up within an ordinary thermometer shelter. By either method the dew-point should be determined with an accuracy of one-tenth degree C. or two-tenths F. As a crude approximation, we may assume that the temperature of the dew-point is below the temperature of the wet bulb as far as that is below the dry bulb. A greater accuracy can be attained by the use of Ferrel's or Marvin's psychro- metric tables or Grossman's formula. But the vapour tension over ice and over water as measured by Marvin and by Juhlin must be carefully distinguished and allowed for. The Smithsonian Meteorological Tables (ed. of 1908) and the new psychrometer tables by Bjerkeland for temperatures below freezing (Christiania, 1907) represent the present condition of our knowledge of this subject. Glaisher deduced empirically from a large mass of ob- servations certain factors for computing the dew-point, but these do not represent the accuracy that can be attained with the whirled psychrometer, nor are they thoroughly satisfactory when used with

Regnault's tables and the stationary psychrometer. Especially should their use be discarded when the wet bulb is greatly depressed below the dry bulb and the atmosphere correspondingly dry. For occasional use at stations, and especially for daily use by travellers and explorers, nothing can exceed the convenience and accuracy of the sling psychrometer, especially if the bulbs are protected from radiation by a slight covering of non-conducting material, or even metal, as was done by Craig in 1866-1869 for the stations of the U.S. Army Surgeon-General. The hair hygrometer gives directly the relative humidity or the ratio between the moisture in the air and that which it would contain if saturated. The very best forms perform very well for a time, and are strongly recommended by Pernter, and must be used in self-recording apparatus for balloons and kites; they are standardized by com- parison with the ventilated psychrometer, which itself must be dependent on the standard dew-point apparatus.

Rain and Snow Gauge. — The simple instrument for catching and measuring the quantity of rain, snow or hail that falls upon a definite horizontal area consists essentially of a vertical cylinder and the measuring apparatus. The receiving mouth of the cylinder is usually terminated by a cone or funnel, so that the water running down through the funnel and stored in the cylinder is protected from evaporation or other loss. The cylinder is firmly attached to the ground or building, so that the mouth is held permanently at a definite altitude.

The sources of error in its use are the spattering into it from the ground or neighbouring objects, and the loss due to the fact that when the wind blows against the side of the cylinder it produces eddies and currents that carry away drops that would otherwise fall into the mouth, and even carries out of the cylinder drops that have fallen into it. As a consequence all the ordinary rain- gauges catch and measure too little rainfall. The deficit increases with the strength of the wind and the smallness or lightness ̂pf the raindrops and snowflakes. If we assume that the correct rainfall is given by a gauge whose mouth is flush with the level of the ground and is surrounded by a trench wide enough to prevent any spatter, then, on the average of many years and numerous observations with ordinary rain-gauges in western Europe, and for the average character of the rain in that region and the average strength of the attending winds, the deficit of rain caught by a rain-gauge whose mouth is 1 metre above the ground is 6 % of the proper amount; if its elevation is 1 ft. above ground, the deficit will be 3§ %, This deficit increases as the gauges are higher above the ground in proportion approximately to the square root of the altitude, provided that they are fully exDosed to the increase of wind that

prevails at those altitudes. It is evident that even for

altitudes of 5 or 10 ft. the records become . appreciably discrepant from those obtained at the surface of the ground. The following table shows in the last column the observed ratio between the catches of gauges at various altitudes and those of the respective standards at the level of the ground. Unfortunately, there are no records of the force of the wind to go with these measurements; but we know that in general, and on the average of many years, corresponding with those here tabulated, the velocity of the wind increases very nearly as the square root of the altitude. Although this deficit with increasing altitude has been fully recognized for a century, yet no effort has been made until recent years to make a proper correction or to eliminate this influence of the wind at the mouth of the gauge. Professor Joseph Henry, about 1856, recommended to the observers of the Smithsonian Institution the use of the ” pit-gauge.” About 1858 he recommended a so-called shielded gauge, namely — a simple cylindrical gauge 2 in. in diameter, having a wide horizontal sheet of metal like the rim of an inverted hat soldered to it. This would undoubtedly diminish the obnoxious currents of air around the mouth of the gauge, but the suggestion seems to have been overlooked by meteorologists. In 1878 Prof. F. E. Nipher of St Louis, Missouri, constructed a much more efficient shield, consisting of an umbelliform screen of wire-cloth having about sixty-four meshes to the square inch. This shield seems to have completely annulled the splashing, and to have broken up the eddies and currents of wind. With Nipher’s shielded gauges at different altitudes, or in different situations at the same altitude, the rain catch becomes very nearly uniform; but the shield is not especially good for snow, which piles up on the wire screen. Since 1885 numerous comparative observations have been made in Europe with the Nipher gauge, and with the ” protected gauge ” devised by Boernstein, who sought to prevent injurious eddies about the mouth of the gauge by erecting around it at a distance of 2 or 3 ft. an open board fence with its top a little higher than the mouth of the gauge. The boards or slats are not close together, but apparently afford as good a protection as the shield of Professor Nipher, and give good results with both snow and rain.

Altitude and Relative Catch of Ram.

Situation and Size of Gauge.

Years of Record.

Calne, 5-in. and 8-in. . Castleton, 5-in. and 8-in. .

Rotherham, 5-in

St Petersburg : Central Physical Observatory, 10-in. .

London: Westminster Abbey

Emden

St Petersburg: Central Physi- cal Observatory ….

York: Museum

Calcutta : Alipore Observatory Woodside : Walton-on-Thames Philadelphia : Frankford

Arsenal

Sheerness: Waterworks Whitehaven : St James's

Church

St Petersburg : Central Physical

Observatory

Paris : Astronomical Observa- tory

Dublin: Monkstown Oxford : Radcliffe Observatory Copenhagen : Observatory London: Westminster Abbey . Chester: Lead works Wolverhampton : Waterworks

York Minster

Boston: St Botolph's Church

1 2

1 3 7 1

3 3

10

Altitude.

Metres, o

1 2

^3

4 5 6

9-1 11

13 13 15 15

16 21

24

25

Relative Catch.

40

27

6

27

8

34

4

36

1

46

2

49

3

55

3

65

2

79

%

IOO

90

88 86 85 85 84

77 72

68 80 87 73

95 52

66

59

81 64 59 67 52 61 69 60 47

In general it is now conceded by several high authorities that the measured rainfall must be corrected for the influence of the wind at the gauge, if the latter is not annulled by Nipher's or Boernstein's methods. A practicable method of measuring and allowing for the influence of the wind, without introducing any very hazardous hypothesis, was explained by Abbe in 1888 (see Symons's Meteorological Magazine for 1889, or the U.S. Monthly Weather Review for 1899). This method consists simply in establishing near each other several similar gauges at different heights above the ground, but in otherwise similar circumstances. On the assumption that for small elevations the diminution of the wind, like that of the rainfall, is very nearly in proportion to the square root of the altitude, the difference between the records for two different altitudes may be made the basis of a calculation which gives the correction to be applied to the record of the lower gauge.

in order to obtain the rainfall that would have been caught if there

were no wind. It is only when the catch of the gauge has been properly corrected for the effect of the wind on the gauge that we obtain numbers that are proper to serve for the purpose of determining the variation of the rainfall with altitude and locality, the influence of forests and the periodical changes of climate. Methods of measuring dew, frost, hail, sleet, glatteis and other forms of precipitation still remain to be devised ; each of these has its thermodynamic importance and must eventually enter into our calculations.

It has been common to consider that the rain-gauge cannot be properly used on ships at sea, owing to the rolling and pitching of the vessel and the interference of masts and rigging; but if gauges are mounted on gimbals, so as to be as steady as the ordinary mariner's compass, their records will be of great importance. Experimental work of this sort was done by Mohn, and afterwards in 1882 by Professor Frank Waldo; but the most extensive inquiry has been that of Mr W. G. Black (see Journal Manchester Geographical Society, 1898, vol. xiv.), which satisfactorily demonstrates the practicability and importance of the marine rain-gauge.

Evaporometer. — The moisture in the atmosphere comes from the surface of the earth or ocean by evaporation, a process which goes on continually, replacing the moisture that is pre- cipitated as rain, hail, snow and dew, and maintaining the total quantity of the moisture in the atmosphere at a very uniform figure. The rate of evaporation depends on the temperature, the dryness, and the velocity of the wind. It is not so important to meteorologists to know where the moisture comes from as to know its amount in the atmosphere, and in fact no method has yet been devised for determining how much moisture is given up by any specific portion of the earth, or ocean, or forest. Our evaporometers measure the quantity of moisture given off by a specific surface of water, but it is so difficult to maintain this water under conditions the same as obtain in nature that no conclusions can be safely deduced as to the actual evaporation from natural surfaces. The proper meteorological use of these evaporometers is, as integrating hygrometers, to give the average humidity of the air, the psychrometer giving the conditions prevailing at any moment.

Among the many forms of evaporometer the most convenient is that devised by Piche, which may be so constructed as to be ex- ceedingly accurate. The Piche evaporometer consists essentially of a glass tube, whose upper end is closed hermetically, whereas the lower end is covered by a horizontal disk of bibulous paper, which is kept wet by absorption from the water in the tube. As the water evaporates its

descent in the tube is observed, whence the volume evaporated in a unit of time becomes known. So long as the paper remains clean, and the water is pure, the records of the instrument depend entirely upon the evaporating surface, the dryness of the air, and the velocity of the wind. Careful com- parisons between the Piche and the various forms of absolute evaporometers were made by Professor Thomas Russell, and the results were published in the U.S. Monthly Weather Review for September 1888, pp. 235-239. By placing the Piche apparatus upon a large whirling machine he was able to show the effect of the wind upon the amount of evaporation. This important datum enabled him to explain the great differences recorded by the apparatus established at eighteen Weather Bureau stations; based upon these results, he prepared a table of relative evaporation within thermometer shelters at all stations. The actual evapora- tions from ground and water in the sunshine may run parallel to these, but cannot be accurately computed. It is probable that Professor Russell's computations are smaller than the evaporations from shallow bodies of water in the sunshine, but larger than for deep bodies, like the great lakes, and for running rivers. Recent elaborate studies of evaporation have been undertaken in Egypt and in South Africa — but perhaps the most interesting case occurs in southern California. Here the Colorado river, having broken through its bounds, emptied itself into a great natural depression and formed the so-called " Salton Sea," about 80 m. long, 20 wide and 100 ft. deep, before it could be brought under control. This sea is now isolated, and will, it is hoped, dry up in eight or ten years" Meanwhile the U.S. Weather Bureau has established a large number of evaporation stations in and around, it, and has begun the study not only of the relation between evaporation, wind and temperature, but of the eventual disposition of this evaporation throughout the atmosphere in the neighbourhood of the sea (see the Reports of Professor F. H. Bigelow in U.S. Monthly Weather Review, 1907-1909, as also the elaborate biblio- graphy of evaporation in the same volumes). Although _ the influence of the evaporation on local climate is scarcely appreciable to our hygrometric apparatus, yet it is said to be so in the develop- ment and ripening and drying of the dates raised on the U. S. government experimental " date farm " a few miles north-east of the Salton Sea.

APPARATUS AND METHODS)

METEOROLOGY

277

Nephoscope. — The direction and apparent velocity of the motion of a

cloud are best observed by means of the nephoscope, which has now become a necessary item in the outfit of any first-class meteorological station. Among the various forms of this instrument are the nephodoscope of Fornioni, the marine nephoscope of Fineman, the simple mirror with attachments used by Clayton, the cloud camera of Vettin, and the alt- azimuths of Mohn and Lettry. The most perfect form for use on land is that devised by Professor Marvin in 1896 for the U.S. Weather Bureau stations (see fig. 2); while the most convenient for use at sea is that devised and used

Fig. 2. — Marvin's Nephoscope.

in 1889 by Professor Abbe on the cruise of the U.S. ship " Pensacola " to the west coast of Africa, but first described in the report of the International Meteorological Congress held at Chicago in August 1893.

The construction of this instrument is shown in figs. 3, 4, 5. In using it the observer looks down upon a horizontal mirror and observes the reflection of the cloud. By moving his eye he brings any cloudy point into coincidence with the reflection of a small fixed spherical knob K above the mirror, and keeps the images of the knob and_ the cloud coincident as they pass from the centre of the mirror t> its edge. This line of motion shows the azimuth of the horizontal component of the cloud's motion. The course of the vessel is shown by the compass card and lubber line AF seen below the mirror. The apparent angular velocity of the cloud, as it would be if the cloud started from the zenith, is obtained by counting the seconds that elapse between its passage from the centre to the edge, or to a small circle inscribed within the edge. With Marvin's nephoscope two observers a short distance apart may easily determine the apparent altitude, and azimuth, and motion of any cloud, whence its true altitude and velocity may be computed. But when the observer uses Abbe's marine nephoscope on a vessel which is itself in motion he observes the resultant of his own motion and that of the cloud. If his vessel is under his control, so that he may change its velocity or direction at will, he easily determines this resultant for two different courses, and obtains data by which he is enabled to calculate the real altitude and velocity of the cloud in terms of his own velocity. As the marine nephoscope can be used on a wagon moving rapidly over a smooth road, or in a small boat on a smooth pond, almost as well as on a larger sea-going vessel, it becomes an instrument of universal application for cloud study. It is also equally convenient for observing the positions of auroras, halos, meteors, and other special phenomena. For the international work undertaken during the year 1898 the photographic camera established upon an alt-azimuth mounting, or the so-called

photo- gram-meter, was especially developed. In this apparatus photographs of the clouds are taken simultaneously at two or more stations, and in each case the centre of the photographic plate has its altitude and azimuth determined. From this centre one can measure on the plate the additional angles required in order to fix the altitude and azimuth of any point that is photographed, and thus the dimensions of the whole visible cloud and its internal or differential motions can be determined, as well as its general motion. During the years 1 896-1 898 about twenty stations were occupied throughout the world for the purpose of determining accurately the altitudes and motions of every layer of cloud.

Sunshine Recorder. — The ordinary meteorological record specifies the proportion of sky that appears to be covered with cloud, or the so-called cloudiness, usually expressed in tenths. The observer generally confines his attention to that portion of the sky within sixty degrees of the zenith, and ignores the lower zone, since the clouds that are found therein are often

at so great a distance from him that their record is not supposed to belong to his locality. As the cloudiness — or its reciprocal, the sunshine — is supposed to be the most important item in agricultural climatology, and is certainly very important for dynamic meteorology, it is usually considered desirable to obtain more complete records than are given by only one or two specified hours of observation. To this end apparatus for recording sunshine, or, rather, the effect of cloudiness, is widely adopted. At least three forms are worth describing as being extensively used.

The Jordan photographic sunshine recorder consists of a cylinder enclosing a sheet of sensitive paper; the sun's rays penetrate through a small aperture, and describe a path from sunrise to sunset, which appears on this sheet after it has been properly washed with the fixing solution. Any interruption in this path, due to cloudiness or haze, is of course clearly shown, and gives at once the means of estimating what percentage of the day was clear and what cloudy. The modified form of the instrument devised by Professor Marvin has been used for many years at about forty Weather Bureau stations, but the original construction is still employed by other observers throughout the world. The Stokes-Campbell recorder consists of a globe of glass acting as a burning-glass. A sheet of pasteboard or a block of wood at the rear receives the record, and the extent of the Charring gives a crude measure of the percentage of full or strong sunshine. Many of these instruments are used at stations in Great Britain and the British colonies. The Marvin thermometric sunshine recorder consists of a

thermometer tube, having a black bulb at the lower end and a bright bulb at the other. The excess of temperature in the black bulb causes a thread of mercury to move upwards, and for a certain standard difference of temperature of about 5° F., such as would be produced by the sun shining through a very thin cloud or haze, a record is made by an electric current on a revolving drum, and simply shows when during the day sunshine of a certain inten- sity prevailed, or was prevented by cloudiness. D. T. Maring, in the U.S. Monthly Weather Review for 1897, described an ingenious combination of the thermometer and the photographic register of cloudiness which is worthy of further development. It gives both the quantity of cloudiness and intensity of the sunshine on some arbitrary relative scale.

The intensity of the sunshine, as sometimes employed in general agricultural studies, is crudely shown by Violle's conjugate bulbs, which are thin copper balls about 3 in. in diameter, one of them being blackened on the outside and the other gilded. When exposed to the sunshine the difference in temperature of the two bulbs in- creases with the intensity of the sunshine, but as the difference is dependent to a considerable extent on the wind, the Violle bulbs have not found wide application. The Arago-Davy actinometer, or bright and black bulbs in vacuo, constitutes a decided improve- ment upon the Violle bulbs, in that the vacuous space surrounding the thermometers diminishes the effect of the wind. The physical theory involved in the use of the Arago-Davy actinometer was fully developed by Ferrel, and he was able to determine the coefficient of absorption of the earth's atmosphere and other data, thereby showing that this apparatus has considerable pretensions to accuracy. In using it as contemplated by Arago and Davy and by Professor Ferrel, we read simply the stationary temperature attained by the bright and black thermometers at any moment, whereas the best method in actinometry consists in alternately shading and exposing any appropriate apparatus so as to determine the total effect of the solar radiation in one minute, or some shorter unit of time; this method of using the Arago-Davy actinometer was earnestly recom- mended by Abbe in 1883, and in fact tried at that time; but the apparatus and records were unfortunately burned up. This so-called dynamic, as distinguished from the static, method was first applied by Pouillet in 1838 in using his pyrheliometer, which was the first apparatus and method that gave approximate measures of the radiant heat received from the sun. In order to improve upon Pouillet's work more delicate apparatus has been constructed, but the fundamental methods remain the same. Thus Angstrom has applied both Langley's bolometer and his own still more sensitive

thermoelectric couple and balance method ; Violle uses his absolute actinometer, consisting of a most delicate thermometer within a polished metal sphere, whose temperature is kept uniform by the 1 flow of water; while Crova, with a thermometer within an enclosure! of uniform temperature, claims to have attained an accuracy of one (part in a thousand. Chwolson has reviewed the whole subject' of actinometry, and has shown the greater delicacy of his own ap- •paratus, consisting of two thin plates alternately exposed to and shielded from sunshine, whose differences of temperature are measured by electric methods.

As none of the absolute methods for determining the solar radia- tion in units of heat lend themselves to continuous registration, it is important to call attention to the possibility of accomplishing this by chemical methods. The best of these appears to be that devised by Marchand, by the use of a device which he calls the Phot- antitupimeter. In this the action of the sunlight upon a solution of ferric-oxalate and chloride of iron liberates carbonic acid

gas, the amount of which can be measured either continuously or every hour; but in its present form the apparatus is affected by several serious sources of error.

Fig. 3.-

-Abbe's Marine Nephoscope. Mirror.

Horizontal Projection of

The electric compensation pyrheliometer, as invented by Knut Angstrom (Ann. Phys., 1899), offers a simple method of determin- ing accurately the quantity of radiant energy. He employs two blackened platinum surfaces, one of which receives the radiations to

Fig. 4. — Abbe's Marine Nephoscope, Horizontal Projection of Compass, be measured, while the other is heated by an electric current. The difference of temperature between the two disks is determined by a thermocouple, and they are supposed to receive and lose the same amount of energy when their temperatures are the same. A Hefner

Fig

Abbe's Marine Nephoscope. Vertical Section.

lamp is used as an intermediate standard source of radiation, and alternate observations on any other source of radiant heat give the means of determining their relation to each other. By means of two such instruments Angstrom secured simultaneous observations

on the intensity of the solar radiation at two points, respectively, 360 and 3352 metres above sea-level, and determined the amount of heat absorbed by the intermediate atmosphere. An accuracy of 1-1000 appears to be attainable, and this apparatus is now being widely used. The records of 1901-1905 have already given rise to the belief that there is a variation in our insolation that may eventually be traced back to the sun's atmosphere.

Meteorograph. — The numerous forms of apparatus designed to keep frequent or continuous register of the prevailing pressure, temperature, moisture, wind, rainfall, sunshine, evaporation, and other phenomena are instruments that belong peculiarly to meteorology as distinguished from laboratory physics. Such apparatus may be broadly divided into several classes according as the records are obtained by the help of photography, or electricity, or by direct mechanical action. The prevailing tendency at present is in favour of apparatus in which the work of the recording pen is done by a falling weight, whose action is timed and limited by the making and breaking of electric currents by the meteorological apparatus proper. The most serious defect in such instruments, even when kept in good working order, is a want of sensitiveness commensurate with the desired openness of scale. It is very important that a fraction of a minute of time should be as recognizable as one-tenth of a degree of temperature; one thousandth of an inch of barometric pressure, and velocities of one hundred miles per hour, as well as rapid changes in all these elements, must be measurable. But instruments whose scales are large enough- to record all these quantities are usually so sluggish as regards time that the comparison of the records is very unsatisfactory. In order to study the relationships between temporary and fleeting phenomena, it js necessary that all instruments should record upon the same sheet of paper, so that the same time-scale will answer for all.

The instruments that respond most nearly to the general needs of meteorology are the various forms of meteorographs devised by Wild for use at St Petersburg, by Sprung and Fuess for use at Hamburg and

Berlin, and by Marvin for Washington. The photo- graphic systems for pressure and temperature introduced many years ago at stations in Great Britain and the British colonies are not quite adequate to present needs. The portable apparatus manufactured by Richard Freres at Paris is in use at a very large number of land stations and on the ocean, and by giving special care to regular control-observations of time, pressure and tempera- ture, important results may be obtained; but in general the time- scales are too small, and the unknown sources of error too uncertain, to warrant implicit reliance upon the records.

Polarimeter. — The brightness and blueness of the sky light, and especially its polarization, have been observed with increasing interest, as it seems possible from these elements to ascertain something with regard to the condition and amount of the moisture of the air. With 'a simple Nicol's prism held in the hand and turned slowly about the axis of vision one can quickly recognize the fact that the sky light is polarized, and that the polarization is largely due to the air or dust lying between us and the clouds in the distant horizon. Arago, with a more delicate form of polariscope, determined the existence of a so- called neutral region near the sun. Babinet located a neutral point or zone about as far from the anti-sun as was Arago's from the sun itself. Brewster discovered a neutral point near the sun and horizon, disappearing when the sun is more than 1 5° above the horizon. Finally, Brewster explored the sky sufficiently to draw lines of equal polarization, which he published in Johnston's Physical Atlas, and which were confirmed by Zantedeschi in 1849. Since those days far more delicate work has been done — first by Bosanquet of Oxford, afterwards by*- Prof. E. C. Pickering of Harvard University and Prof. A. W. Wright of Yale University. A later contribution to the subject is by Jensen (see Met. Zeit. for Oct.-Dec. 1899), who has observed the brightness as well as the polarization, and thus completed the data necessary for testing the various physical theories that have been proposed for the explanation of this phenomenon. We owe to Tyndall the discovery that when a beam of white light penetrates a mass of fine aqueous mist the latter sends off at right angles a delicate blue light, which is almost wholly polarized in a plane at right angles to the plane

of reflection. As the particles of mist grow larger, the blue light

becomes whiter and the polarization disappears. The original vapour particles are undoubtedly so small as to be comparable in size with a fraction of the wave-length of ordinary- light, and Rayleigh was able to show that molecular as well as minute particles must have a power of selection, and that the diffused sky light comes to us by selective reflection. On this basis we should expect that in the driest air at great heights, where the temperature is low and condensation has but just begun, and the dust particles are rare, there would occur the smallest aqueous particles reflecting light of the feeblest intensity but the largest percentage of polarization. Rayleigh has shown that it is quite possible that the molecules of oxygen and nitrogen constituting the atmosphere may also exercise a diffuse selective reflection, and contribute to the brightness and polarization that are mainly due to aqueous vapours. (See Sky.)

We thus see the theoretical importance of adding photometry and polarimetry to the work of a meteorological observatory. The apparatus to be used in this connexion will vary somewhat with the exact character of the observations to be made. The most extensive researches that have yet been carried out in this line with a meteorological application in view are those of Jensen, Crova, Cornu, Pickering, Kimball, Nichols, and especially Rubenson, who in fact recommended that polarimetry and photometry should go hand in hand. In order to measure the position of the plane of polarization the Arago polariscope may be used, but, in order to measure the percentage of polarized light, Mascart's modification of the Savart is better. In order to measure the general brightness of a spot in the sky, Jensen has used a slight modification of the Weber photometer, and in fact Weber himself has applied the same method to the measurement of the daylight. The complete work of Jensen was published in the Schriften of the Scientific Association of Schleswig-Holstein in 1890, and, like the memoir published by Rubenson in 1863, it gives the meteorological conditions in full as a basis for the investigation of the connexion between sky light and the moisture in the atmosphere. In his work during 1906-1909 with Angstrom's pyrheliometer Mr A. H. Kimball of Washington has advantageously used the Pickering polarimeter, and has shown that the transparency of the air and the polarization of light go hand in hand.

Cyanometer. — The cyanometer devised by Arago to measure the blueness of the sky consisted of an arbitrary scale of blues on a strip of porcelain, with which one could compare the blue of the sky. This comparison, however, is open to many sub- jective errors. A more satisfactory apparatus is Zollner's photometer, or some equivalent, in which a patch of white surface is illuminated by any particular tint or

combination that may be desired. In fact, Maxwell's colour-box admits of ready application to the analysis of sky light, and reveals at once the proportions of red, yellow, and blue that may be contained therein.

Dust-counter. — The importance of observing the dustiness of the atmosphere has been especially realized since the invention and use of various forms of apparatus for counting the number of particles of dust in a small volume of air. These inventions are due to Mr John Aitken, of Edinburgh.

The latest form of his apparatus is the very convenient " pocket dust-counter." In this the air contained in a small receiver is rendered dustless by repeated expansions; the cooling due to expan- sion forces the vapour to condense upon the dust, which, becoming heavy, falls to the bottom, so that in a short time all is removed. A small stop-cock is now turned, so as to allow a definite small quantity of air to enter and mix with the dustless air in the receiver. The dusty and the dustless airs are now thoroughly mixed, and again the whole quantity within the receiver is expanded, and the dust nuclei fall down by the condensation of vapour upon them. Assuming that every particle of dust is represented by a minute droplet of water, we have but to count the latter; this is easily done by causing all the drops to fall upon a polished plate of black glass, which is divided into small squares by fine lines ruled with a diamond point. Usually each of these squares represents a small fraction of a cubic centimetre of air; thus in one case the number of fog particles averaged 2-6 per square millimetre of the glass plate, and, as the multiplying factor was 100, this corresponded to 260 particles of dust in a cubic centimetre of air. The cleanest air has been found in the West Highlands of Scotland, where 16 particles per cubic centimetre was once recorded as the minimum, while 7600 was the maximum. On the Rigi Kulm, in Switzerland, the cleanest air gave 210, and the dustiest 16,500. On comparing the records of the dust-counter with the record of the apparent state of the air,

Mr Aitken found that 500 particles per cubic centimetre corresponded to clear air, and 1900 to a thick haze in which distant mountain tops were hidden. In the cities the particles of soot and effluvia of all kinds act as dust, and both in London and Paris the numbers ran as high as 80, 1 16, 150 and 210 thousand per cubic centimetre.

Electrical Apparatus. — The electrical phenomena of the atmo- sphere undoubtedly belong to meteorology, and yet the methods of observation have been so unsatisfactory and the difficulty of

interpreting the results has been so baffling that regular observations in electricity are only carried out at a very few meteorological institutions. A general summary of our know- ledge of the subject was prepared by J. Elster and H. Geitel for the International Congress held at Chicago in 1893, but since that date the methods and apparatus of observation have received important modifications.

In general the water-dropping collector of Lord Kelvin, arranged for continuous record by Mascart, continues to be the best apparatus for continuous observation at any locality, and a portable form of this same apparatus is used by explorers and in special series of local observations. In order to explore the upper air the kite continues to be used, as was done by A. J. McAdie for the Weather Bureau in 1885 and by Weber at Kiel in 1889. The difference of potential between the upper and lower end of a long vertical wire hanging from a balloon has been measured up to considerable altitudes by Elster and Tuma. In general it is known that negative electricity must be present in the upper strata just as it is in the earth, while the intervening layer of air is positively electrified. The explanation of the origin of this condition of affairs is given in the recent researches of Sir J. J. Thomson (Phil. Mag., Dec. 1899), an d his interpretation

1

■HMH

BHHBBBI

P

■Hi 1 i- r'lll ;lilT* > htJ*" f/ -l : ‘”“ftif4ˆfe—

dffiˆ. ‘fOs‘i iˆˆ. \„.iitf'iVˆI

BOMM

E : ~JHfl

s B H

JS = *r* – ‘ , «? = = fi = ˆˆ

Fig. 6. — Marvin-Hargrave Kite, with Meteorograph in position.

is almost identical with that now recognized by Elster (see Terrestrial Magnetism, Jan. 1900, iv. 213). According to these results, if positive

and negative ions exist in the upper strata and are carried up with the ascending masses of moist air, then the condensation of the moisture must begin first on the negative ions, which are brought down eventually to the earth's surface; thus the earth receives its negative charge from the atmosphere, leaving a positive charge or an excess of positive ions in the middle air. (See G. C. Simpson, " Atmospheric Electricity," Monthly Weather Review, Jan. 1906, p. 16.)

The observations of atmospheric electricity consist essentially in determining the amount and character of the difference of potential between two points not very far distant from each other, as, for instance, the end of the pipe from which the water-drops are discharged, and the nearest point of the earth or buildings resting on the earth. The record may have only an extremely local value, thus the investigations of Professor John Trowbridge of Harvard University, made in conjunction with the U.S. Weather Bureau in 1882-1885, show that the differences vary so much with the winds, the time of day, and the situation of the water-dropper that the mere comparison of records gives no correct idea of the general electrical relationships. It has been suggested that possibly daily telegrams of electric conditions and daily maps of equipotential curves over the North American continent would be of help in the forecasting of storms, but it is shown to be useless to attempt any such system until some uniform normal exposure can be devised. Indeed itfias not yet been shown that atmospheric electricity is of importance*in dynamic meteorology. (See Atmospheric Electricity.)

Aerial Research. — The exploration of the upper atmosphere is to be regarded as the most important field of research at the present time; the kite and the balloon enable ob- servers and apparatus to be carried to considerable heights, though by no means so far as is desirable. The kite was first used in meteorological work by Alexander Wilson at or near Glasgow in 1749, and has since then been frequently used by English observers. It was used in 1867 by Abbe in studying the winds under a thundercloud, and in 1877 in

Kites.

studying the depth of the ocean breeze on the coast of New Jersey, but

the later revival of interest in the subject

dates from the work done in England in 1882 by E. D. Archibald, who used the kite to carry up anemo- meters to very considerable heights, and thereby deter- mined the relative move- ment of the air in the free atmosphere. In 1883 Alex- ander McAdie used the kite in his studies of atmospheric electricity, Professor Cleve- land Abbe proposed to use it for a complete explora- tion as to temperature, moisture and wind, but W. A. Eddy of New York first forced its varied capa- bilities upon public atten- tion, and accepted the suggestion of Professor Cleveland Abbe to employ it for meteorological work. Having flown his kites at the Blue Hill Observatory, and having carried up with them the self-registering apparatus devised by Mr Ferguson, Eddy left the further prosecution of this work to Mr Rotch, who has made this a prominent feature of the work at his observatory, having carried up meteorographs to the height of 15,000 feet by means of a series of kites flying in tandem. The officials of the U.S. Weather Bureau have developed the admirable cellular kite, invented by Hargrave of Australia, and Professor Marvin's works on the theory and construction of this form are well known.

The general appearance of the Marvin or Weather Bureau kite, his reel and other apparatus that go with it, and his meteorograph, are shown in Figs. 6, 7, 8. The size ordinarily used carries about 68 sq. ft. ot supporting surface of muslin tightly stretched on a light wooden frame. The line, made ot the best steel piano-wire, is wound and unwound from a reel which keeps an automatic record

Fig. 7.-

-Marvin Kite Reel for hand power.

Fig. 8. — Marvin Kite Meteorograph.

of the intensity and direction of the pull. The reeling in and out may be done by hand, but ordinarily demands a small gas-engine. The observer at the reel makes frequent records of the temperature, pressure and wind, the apparent angular elevation of the kite, and the length of wire that is played out. At the kite itself the Marvin meteorograph keeps a continuous record of the pressure, tempera-

ture, humidity and velocity of the wind. The meteorograph, with its aluminium case, weighs about two pounds, and is so securely lashed behind the front cell of the kite that no accident has ever happened to one, although the kites sometimes break loose and settle to the ground

in a broken country many miles away from the reel. On four occasions the line has been completely destroyed by slight discharges of lightning; but in no case has the kite, the observer, or the reel been injured thereby. Of course, such lightning is preceded by numerous rapidly increasing sparks of electricity from the lower end of the wire, which warn the observer of danger. During the six months from May to October 1898, seventeen kite stations were maintained by the U.S. Weather Bureau in the region of the lakes, the Upper Mississippi and the Lower Missouri valleys, in order to obtain data for the more thorough study of atmospheric conditions over this particular part of the country. During these months 1217 ascents were made, and as no great height was attempted they were mostly under 7000 or 8000 feet. There was thus obtained a large amount of information relating to the air within a mile of the earth's surface. The general gradients of temperature, which were promptly deduced and published by H. C. Frankenfield in 1899 in a bulletin of the Weather Bureau, gave for the first time in the history of meteorology trustworthy observations of air temperatures in the free atmosphere in numbers sufficient to indicate the normal condition of the air.

The kite and meteorograph have now been adopted for use by all meteorologists. The highest flight seems to be that of the 3rd of October 1907, at Mt Weather in Virginia, when 23,110 ft. above sea-level or 21,385 ft. above the reel was attained by the use of 37,300 ft. of wire and 8 kites tandem.

The balloon was used for the scientific exploration of the atmosphere quite freely during the 19th century. The first important voyages were those of Gay-Lussac and Biot at Paris in August and September of 1804. The next important ascent was that of Bixio and Barral in 1850 at Paris. The most remarkable high ascents have been those of James Glaisher, 2nd of September 1862, and Berson at Berlin in 1889; on both of these occasions the aeronauts attained altitudes of from 30,000 to 35,000 feet. Systematic ascents at many points in Europe simultaneously on pre-arranged dates were made during the years 1895-1899, and led to the development of a general international system of ascension on pre-arranged days of the year that is now a very important feature in the study of the atmosphere.

Balloon.

■s

5 . .'

“■’■ . r ” „ A .•■

„”’”* 1 * »” « .‘.. **v** ji » • ‘

1 1 .»* /”[“*** ‘ – +!~”\ *»\ ”

° /V’’ -.’ a \/\ 7 v v f^y\

• tf V- ^r=3f \r – ***-

A^ t-it it ‘«-

ft T II -jC’v

3 k W-A 5 -j,— A <\ 4

2 ^^j\Lv jmitA/i/^

uftlZO ^ AA ^ A

• ○ ■ + ♦** + t«444+*

TV?

jt i a j j < * »■ «.- * «s e

t

“£ b a s

Ittxit

i J « « t s *

2 2 Si

Hi

^(Sa&SSfcfcfcDO c”4

1A£££££±

—

22 3 S <<<« < ■?< <

ES * Z K^^

•S ■ˆ•5«;

S = S£S2SS’-SS”

= & = = ***■■

2

sasa

- x £355

ciS

CS83

Fig. 9. — Chart of Isotherms in Free Air above Trappes. This diagram shows the height at which the isotherms of 0°, — 25 , — 40 , — 50 ° C. were encountered on the respective dates. Below the ground-line are given both the dates and the tempera- tures of the air observed at the ground when the balloon started on each ascent. The isotherms of — 40 ° and —50° are not given for certain ascents, because in these the balloon did not rise highˆ enough to encounter those temperatures.

Owing to the great risk of human life in these high ascents and especially to the fact that we desire records from still greater heights, efforts have been made to devise self-recording apparatus that may be sent up alone to the greatest heights attainable by free hydrogen balloons carrying the least possible amount of ballast. The pioneer in this new field of work was L&>n Teisserenc de Boit of Paris. As these ascensions are made with great velocity, and therefore as nearly vertical as possible, he called them “soundings,” because of their analogy to the mariner’s usage at sea, and his balloon is called a ” sounding balloon.” The balloons of silk collapse, those of india-rubber explode, and descend about as rapidly as thpy ascended,

Such balloon soundings have been made not only individually, but, by pre-arranged system, simultaneously in combination with the ascent of free-manned balloons above referred to ; and at some places kites have been simultaneously used in order to obtain records for the

lower atmosphere. The first experiments in simultaneous work were made in 1896 and 1897, when ascents were made at eight or more points in France, Germany and Russia. These experiments and the discussions to which they gave rise have emphasized the importance of increasing the sensitiveness of the self-recording apparatus, and as far as practicable the rapidity of the ventilation of the thermometers, and of providing more perfect protection against radiation from the sun or to the sky. It is believed that accurate records may be attained up to at least 30,000 metres, but as yet only 26,000 has been attained, and the records brought back are still under considerable criticism on account of instrumental defects. In general the wind that supports a kite also furnishes sufficient ventilation for the thermometer; but in the case of the sounding balloon, which as soon as its rapid rate of ascent diminishes floats along horizontally in the full sunshine, a strong artificial ventilation must be provided. Moreover, the sluggishness of the best thermometers is such that during the rapid rise the records of temperature that are being made at any moment really belong to some altitude considerably below the balloon, and a most critical interpretation of the records is required. Notwithstanding all criticisms, however, the balloon work in all localities agrees in showing the existence of a region above the 10,000- metre level, where tempera- tures cease to diminish rapidly, and may even become stationary.

III. — Physical and Theoretical Meteorology The ultimate aim of those who are devoted to any branch of science is to penetrate beyond the phenomena observed on the surface to their ultimate causes, and to reduce the whole complex of observations and empirical rules based upon limited experiences to a simple deductive system of mechanics in which the phenomena observed shall be shown to flow naturally from the few simple laws that underlie the structure of the universe. A correct ” theoria ” or physical and logical argumentation deducing from primary laws all the phenomena constitutes the noblest achievement of man in science. It is by such works that Newton and Laplace distinguished themselves in astronomy. The development of the true physical and mechanical theories of atmospheric phenomena has made great progress, but is still inferior in completeness to astronomical work, owing to the great complexity of the meteorological problems. The optical and the thermal phenomena have been very satisfactorily elucidated, the electrical phenomena promise to become clear, but the phenomena of motion or aerodynamics have only been elucidated to a limited extent. We must, however, introduce the reader to some of the works that have been published on the subject, in the hope that thereby he will himself be

persuaded to further study and stimulated to contribute to our knowledge. Between the years 1 853 and 1861 Professor William Ferrel pub- lished in Gould's Astronomical Journal, Runkle's Mathematical Monthly, and the American Journal of Science several treatises on the motions of solids and fluids relative to the earth's surface. His work resulted in the elucidation of the problems of the atmosphere, and in ingenious ways, applicable approximately to such complex cases, and analytically equivalent to the arithmetical method of quadratures or the graphic methods of geometry, he deduced im- portant relations between the density of the air, the barometric pressure, and the attending winds. His essays seemed to show that it might be possible to treat the complex problems of meteorology logically and deductively by analytical, numerical and graphic processes, and his memoirs were the first in which observed average meteorological conditions were properly co-ordinated with the fundamental formulae of mechanics. A beautiful memoir on the steady motions of the atmosphere was published in 1868 in the Astronomische Nachrichten by Professor Adolph Erman, and is now reprinted in vol. ii. of Abbe's Mechanics of the Earth's Atmosphere. Espy's, Coffin's, Henry's and Ferrel's ideas were made the basis of the system of daily weather predictions published by the present writer in 1869 in the Daily Weather Bulletin of the Cincinnati Observatory. Subsequently this work was taken up by the govern- ment, and greatly enlarged during 1871-1891 by the chief signal officers of the army, and after 189 1 by the chiefs of the U.S. Weather Bureau. Ferrel's writings first attracted the attention of European meteorologists in consequence of reviews published by Hann in the Zeitschrift of the Austrian Meteorological Society in January 1875, but especially after they had been reprinted in a convenient form by the U.S. Signal Office as " Bulletin No. VIII." In 1881 Ferrel, after finishing his works on the tides for the U.S. Coast and Geodetic Survey, began a new and extensive series of meteorological con- tributions, three of which were published by the U.S. Coast Survey and the rest by the Signal Office. Stimulated by the urgent needs

of the modern weather bureaus throughout the world, and by the beauty of the mathematical problems presented, numerous mathe- maticians have lately taken up the study of the earth's atmosphere, so that the literature of the subject is now far more extensive than is generally supposed, including memoirs by Helmholtz, Kelvin, Bjerkneg and other famous men.

In addition to the purely mechanical problems, the numerous physical problems have also been carefully treated, both experi- mentally and mathematically. The problems of radiation have been elucidated by

Langley, Hutchins, Angstrom, Paschen, Violle, Maurer, Crova, Chwolson, Very, Homin, Tamura, Trabort and Coblendz. The thermodynamic problems have been especially developed by Kelvin, Hertz, von Bezold, Ferrel, Brillouin, Neuhoff, Bigelow and Margules. The physical problems involved in the formation of rain-drops have been studied by an optical method by Carl Barus, and with brilliant success, from an electrical point of view, by C. T. R. Wilson and Sir J. J. Thomson at the Cavendish Laboratory, Cambridge, England.

In a complete study of the mechanics of the earth's atmosphere we naturally begin by expressing in simple analytic formulae all the various conditions and laws according to which every particle of the air must move. Some of these conditions are local, depending Upon the resistances at various points of the earth's surface; others are of the nature of discontinuous functions, as, for instance, when the ascent of moist air above a certain level suddenly gives rise to condensation and clouds, to the evolution of latent heat, to the precipitation of rain, to the shading of the air and the ground below the clouds, and to the sudden interception of all the solar heat at the upper surface of the cloud. It seems, therefore, incredible that the problems of the atmosphere can ever be resolved by purely analytical methods ; there must be devised combinations of numerical and graphical, and possibly even mechanical methods to reproduce the conditions and give us special solutions adapted to particular cases. But even these special methods can only be perfected in proportion as we attain approximate solutions of the simpler problems, and it is in this preliminary work that a good beginning has already been made.

The present state of theoretical physical and mechanical meteorology cannot be fully presented in non-technical English text. It is necessary to employ algebraic formulae, or numerical tables, or graphic diagrams, the former being certainly the least cumbersome and the most generally available. The uniform system of notation devised by Professor F. H. Bigelow, and a very complete summary of the formulae of physical meteorology expressing the results of many recent students will be found in chapters x. and xi. of his Report on the International Cloud Observations, published as vol. ii. of the annual report of the chief of the U.S. Weather Bureau for 1898-1899.

The fundamental laws to which the atmosphere is subject are as follows: —

A. The Equation of Elastic Pressure. — The pressure shown and measured by the barometer is an elastic pressure acting in all directions equally at the point where it is measured. By virtue of this elastic

pressure a unit volume of air will expand in all directions if not rigidly enclosed, but will cool in so doing. On the other hand, if forcibly compressed within smaller dimensions, it will become warmer. For a given temperature and pressure a unit volume of air of a prescribed chemical constitution will have a prescribed definite weight. The general relations between absolute temper- ature, pressure and volume are expressed by the formula

$$pv = RT \quad (1)$$

where T expresses the absolute temperature, p the elastic pressure, i> the volume, and R is a constant which differs for each gas, being 29-2713 for ordinary pure dry air and 47-060 for pure aqueous vapour, if we use as fundamental units the kilogram, metre and centigrade degree. This equation is sometimes called the law of Boyle and Charles, or of Gay-Lussac and Marriotte, and it is also known as the equation of condition for true gases, meaning thereby that it expresses the fact that the ideal gas would change its volume directly in proportion .to its absolute temperature and inversely in proportion to its elastic pressure. All gases depart from this lawˆ in proportion as they approach the vaporous condition on the one v ‘ hand, which is brought about by great pressure and low temperature, or the ultra-gaseous condition on the other hand, which obtains under high temperatures and low pressures. The more accurate law of Van der Waals would complicate our problems too much. In place of the absolute temperature T we may substitute the expression 273° C. X (i + a t), where o is the coefficient of volu metric expansion of the gas for a unit degree of temperature = 0-00367 and t is the temperature expressed on the centigrade scale.

B. Hypsometric Conditions. — The pressure of the atmosphere at any place depends primarily on the weight of the superincumbent mass of air, and therefore diminishes as we ascend to greater heights. If the air is in motion, that and other considerations come in to affect the pressure; but if the air is quiet relative to the earth’s

surface, then the pressure at any altitude is expressed by the so-called barometric or hypsometric formula

where a is the density and g the apparent gravity for each layer of air

whose vertical thickness is dh. The integral of this formula depends upon the vertical distribution of temperature, and moisture, and gravity; but under the simplest possible assumptions as to these vertical gradients, the following formula was deduced by Laplace and is generally known as his hypsometric formula: —

h — fc„ = 18400(1 +0-00367/) (1 +0-378 |j (1 + 0-0026 cos 2)

(I +63Wi)(I +°- OOI 57)l°g

(2a)

In this formula / is the average temperature, e the average vapour tension of the layer of air, p the barometric pressure at the top of the layer, p„ the pressure at the bottom, the latitude of the station, h the elevation above sea-level of the lower limit of the stratum, and ho that of the upper limit. The modifications which this formula needs in order to adapt it to other hypotheses representing more nearly the actual distribution of temperature, moisture and gravity, have been elaborately investigated by Angot in a memoir published in 1899 in Part I. of the Memoirs of the Central Meteorological Bureau of France for the year 1896. Angot, Hergesell and Rykat- cheff have also shown that for hypsometric work of any pretensions to accuracy it is simplest and best to use Laplace's formula for successive thin strata of air, and add together the individual results, rather than attempt a more complex single formula for the whole stratum; yet the latter seems to be essential for work in aero- dynamics.

C. Thermodynamic Relations. — The temperature of the air is due to the quantity of molecular energy that is present in the form of heat, but usually there is also present a quantity of molecular energy that is spoken of as latent heat. This latent heat is said to do internal work, such as melting ice or boiling water, while the sensible heat does external work, such as expanding and pushing in all directions. These molecular energies can be transformed into each other over and over again without appreciable loss, and this power of transformation is expressed by the various equations of thermo- dynamics, of which the fundamental one for our purpose is

dQ = C v dt + Apdv = C v dt + ART dv/v. (3)

This equation expresses the fact that when a quantity of heat measured in calories, dQ, is added to or taken from a mass of dry air, there may result both a change of temperature, dt, corresponding to one portion of the heat, Cvdt, and a quantity of external work

corresponding to the remaining portion of the heat (Apdv). It usually happens that the quantity of heat in a given mass of air does not remain the same for any length of time; it is diminished by radiation or is increased by absorption, and a certain quantity is lost when rain, snow or hail drops down from the air, while a quantity is added to the atmosphere when moisture evaporates and mixes with the dry air as invisible vapour, even the passage of rain-drops down through a lower layer alters the thermal con- ditions appreciably. The changes due to increase and diminution of moisture are usually small as compared with the great gain due to absorption and convection of solar heat or with the loss by radiation. If these losses and gains are to be taken account of, then the quantity dQ in the above equation is finite and important. On the other hand, in some cases atmospheric processes go on so rapidly or under such peculiar circumstances — for instance, in the interior of a cloud — that the change in the quantity of heat may be considered as temporarily negligible. In these cases dQ is zero; the changes in temperature balance the changes in external work, and the thermal process is said to be adiabatic.

D. The Condition of Continuity. — When a mass of liquid or gas goes through several motions and changes without being disrupted or otherwise broken into smaller portions, and without the formation of either local condensations into solid or liquid masses or of bubbles and vacuous spaces in its interior, and when all the changes that go on proceed by gradual continuous processes as to time, then the mass of the fluid is subject to the law of continuity as to mass, and the motion of the fluid is continuous as to velocity. These condi- tions are assumed in elementary hydrodynamics, and are implied in the process of integration, and in the equation of continuity

dt dx dy dz v ˆ

where p is the density, / is the time and d the ordinary symbol for partial differentiation. But the fact is that meteorologists have – to deal entirely with discontinuous external forces such as insolation ceasing at sunset and renewed daily; radiations of heat changing abruptly with land and ocean and cloudiness and snow covering; discontinuous boundary conditions and resistances at the earth's surface altering at every change from mountains to plains; dis- continuous masses changing with additions and abstractions of moisture, rain and snow — all which lead to discontinuous vortex motions and overturnings and rearrangements of the atmospheric strata. The only factors that are continuous for any length of time

or extent of area are the rotation of the earth and the attraction of

gravitation. In the presence of such difficulties as these we must at present confine ourselves to the solution of very special local definite problems or to the general statistical problems of our atmosphere.

E. Conditions as to Energy and Motion. — When the total quantity of heat, both latent and sensible, remains constant or changes in a continuous manner, and when the motions are continuous, the mechanical and thermal processes are expressible by ordinary differentials and integrals. Motions of fluids involve both energy and inertia, and are subject to conditions expressed by the following equations of hydrodynamics: —

a. Equations of energy. Let the kinetic energy be T, the potential energy V, the intrinsic energy W: /, m, n, be cosines of the angle between the pressure p, and S the inwardly directed normal to the boundary surface. Then will

diT + J t + W) = ffP(l« + ™ + nv)dS., (5)

6. Equations of acceleration and inertia. Let P be the potential of the external forces acting on a unit mass of the atmosphere; ju, be the coefficient of viscosity or internal friction. Then will

du ,

+ v.

dP I dp = du , dx pdx dt

dx

du . du dy dz

3P I aˆ = 3w , dy p dy dt

dv 1 dv 1 dw

■ V + V.-ˆ + W.r

dx dy dz

rshi , a% , dha

“Uk 2 + dy 2 + dz 2 J

dw

“•-3- dz

_ ra 2 D , dh . dH~\ ■ M Ld* 2 dy 2 dz 2]

dw

dw

dw

r- (6)

dP I dp dw , «/«, , 17U, .

— 5 T?- = -^r+U. -^ -V. -r -W.r

dz p dz dt dx dy dz

[d 2 w , d 2 w , d 2 w l dx 2 + dy 2 ~ t ~ dz 2]

Approximate Assumptions and Solutions. — After introducing into the preceding system of fundamental equations (1-6) the actual conditions as accurately as they are known relative to gravity, solar radiation, the rotation of the earth, the viscosity of the air, its mass or inertia, its absorption and radiation of heat, its variable content of moisture, the precipitation of rain and cloud, the mutual inter- conversions of latent and sensible heat, a special difficulty occurs when we attempt to integrate these equations, because we have still to express analytically the initial conditions of the atmosphere as to pressure and temperature, and its boundary conditions as between the rough earth surface on its lower side and the unknown outward surface on its upper side. As the true earth’s surface cannot be represented by any simple algebraic formula, it is customary to assume that it is a uniform sphere, neglecting at least partially, if not wholly, the spheroidal shape. We may first assume that there is no friction between the earth and the air, but must afterwards make allowance for its influence. Thirdly, we assume that the action of the earth’s surface to heat the air and to throw moisture by evaporation into the atmosphere is perfectly uniform. Finally, in many cases we go so far as to assume that the atmosphere is an incompressible rare liquid having a uniform density and a uniform depth of about 8000 metres, corresponding to the average standard density of dry air under a pressure of 760 millimetres and a temper- ature of 0° C. Even under these simplifications the analytic diffi- culties have been too great to admit of rigorous solutions, except in a few of the simplest cases.

The treatment of atmospheric problems by Ferrel was followed by an equally ingenious mathematical treatment by Professors Guldberg and Mohn, of Christiana, in two papers published by them in 1876 and 1880 respectively. These authors, like Ferrel, treat isolated portions of the atmosphere and obtain special solutions, which, however, have not the generality that must eventually be demanded in a rigorous and general discussion of the atmosphere movements. Elegant mathematical solutions of our problems were first given in 1882 by Oberbeck, of the university of Halle, in the Ann. Phys. xvii. 128. But even Oberbeck's solutions are obtained under various simplifying assumptions that restrict their satisfactory application to the daily weather conditions. Oberbeck's first memoir treats of the mechanics of stationary cyclonic movements. Assuming that the isobars are concentric circles, and that in the outer portion of a cyclone the air has only horizontal movements, while in th(* inner portion it has only vertical movements, he solves his system of equations for the inner and outer regions of the cyclone separately. He shows that in general the pressure increases on all sides out- wards from the centre; the gradient also increases from the centre outwards to the limit of the inner region, whence it diminishes in the outer region and at a great distance becomes inappreciable. In both regions the paths of the wind are curved lines, logarithmic spirals, which cut the isobars or the radial gradient everywhere at the same angle; therefore the movement of the air can be considered as a spiral inflow from all sides towards the centre. But the angle between the wind and the gradient follows different laws in the outer and inner regions, depending in the former on the rotation of the

earth and the friction, but in the latter also on the intensity of the ascending current of air. In passing from the outer to the inner surface the wind experiences a sudden change of angle, so that the directions of the winds are not continuous, although the movement and the barometric pressures are assumed to be continuous. This latter peculiarity does not occur in nature, and is undoubtedly an analytical result peculiar to Oberbeck's method of treating the fundamental equations.

An improvement in the mathematical analysis was introduced by Dr F. Pockels of Gottingen in a memoir published in the Met. Zeit., 1893,

pp. 9-19. He deduces equations showing the continuous changes of temperature, pressure, gradient, wind direction, and velocity from the centre of the cyclone to the outer edge of the anti- cyclone, or, more properly, the peri-cyclone; these, therefore, may reasonably be supposed to have their counterparts in nature. Such mathematical solutions, however, are based upon the assumption that we are dealing with a comparatively small portion of the earth's surface, which may be considered as a plane having a uniform diurnal rbtation and a uniform coefficient of friction. Moreover, the move- ments in the cyclones and anti-cyclones are assumed to be steady and permanent by reason of the perfect balance of all the forces involved therein. Of course these conditions are not exactly fulfilled, but in general Pockels shows that his theoretical results agree fairly well with the observed conditions as to wind and pressure. He computes the actual distribution of these elements under the assumption that the centre of the anti-cyclone is at latitude 55-5, and that the coefficient of friction is 0-00008, whereas viscosity proper would require only 0-0002. An elegant mathematical pre- sentation of these studies in cyclonic motion is given by W. Wien, Lehrbuch der Hydrodynamik (Leipzig, 1900).

Notwithstanding the fact that these difficult mathematical investigations still lead us to unsatisfactory results, they are yet eminently instructive as showing the methods of interaction of the various forces involved in the motions of the atmosphere. We must therefore mention the interesting attack made by Oberbeck upon the problem of the general circulation of the atmosphere. His memoir on this subject was published in the Sitzungsberichte of the Academy of Sciences at Berlin in 1888. The fundamental assumption in this memoir implies that there is a general and simple system of circulation between the equatorial and the polar regions, but the eventual solution of the problem leads Oberbeck to two independent systems of winds, an upper and a lower, without any well-defined connexion at the polar and equatorial ends of these two currents, so that after all they are not rigorously re-entrant. Among the hypotheses introduced in the course of his mathematical work, the most important, and perhaps the one most open to objec- tion, is that the distribution of temperature throughout the atmo- sphere in both the upper and lower strata can be represented by the equation $T = A + B (1 — 3 \cos^* 0)$. Undoubtedly this equa- tion represents observations in the lower strata near the surface of the earth, but the constants that enter into it, if not the form itself, must be changed for the upper strata. The solution arrived at by Oberbeck gives the following equations representing the components of the movement of the

atmosphere toward the zenith V, toward the north N, and toward the east O: — V = C (1-3 cos 2 ?) f a O = D [sin 0(1—3 cos 2 0) g

Contemporary with Oberbeck's admirable memoirs are those by Professor Diro Kitao, of the university of Tokyo, who, as a student of mathematics in Germany, had become an expert in the modern treatment of hydrodynamic problems. In three memoirs published by the Agricultural College of the university of Tokyo in the German language in the years 1887, 1889 and 1895, he develops with great patience many of the minutiae of the movement of the earth's atmosphere and cyclonic storms. The assumptions under which

he conducts his investigations do not depart from nature quite so far as those adopted by other mathematicians. Like Ferrel, he adheres as closely as possible to the results of physical and meteoro- logical observations; and although, like all pure mathematicians, he considers Ferrel as having departed too far from rigorous mathe- matical methods, yet he also unites with them in acknowledging that the results attained by Ferrel harmonize with the meteorology of the earth.

The fact is that the solution of the hydrodynamic equations is not single, but multiplex. Every system of initial and boundary conditions must give a solution appropriate and peculiar to itself. The actual atmosphere presents us with the solution or solutions peculiar to the conditions that prevail on the earth. Entirely different conditions prevail on Jupiter and Saturn, Venus and Mars, and even on the earth in January and July, and therefore a wholly new series of solutions belongs to each case and to each planet of the solar system. It matters not whether we attempt to resolve our equations by introducing terrestrial conditions expressed by means of analytical algebraic formulae, and integrate the equations that result, or whether we adopt a graphic process for the repre- sentation of observed atmospheric conditions and integrate by arithmetical, geometrical or mechanical processes. In all cases we must come to the same result, namely, our resulting expressions for the distribution of pressure and wind will agree with observations just as closely as our original equations represented the actual temperatures, resistances and other attending conditions.

In the last portion of Kitao's third memoir he gives some attention to the interaction of two cyclonic systems upon each other when they are not too far apart in the atmosphere, and shows how the influence of one system can be expressed by the addition of a certain linear function to the equations representing the motions of the other. He

even gives the basis for the further study of the extension of cyclonic storms into higher latitudes where conditions are so different from those within the tropics. Finally, he suggests in general terms how the resistances of the earth's surface, in connexion with the internal friction or viscosity of the air, are to be taken into considera- tion, and shows under what conditions the assumptions that underlie his own solutions may, and in fact must, very closely represent the actual atmosphere.

The General Circulation of the Atmosphere. — If the meteorologist had a sufficient number of observations of the motions of the air to represent both the upper and lower currents, he would long since have been able to present a satisfactory scheme showing the average movement of the atmosphere at every point of its course, and the paths of the particles of air as they flow from the poles to the equator and return, but hitherto we have been somewhat misled by being forced to rely mainly on the observed movements of clouds. This motion has been called the general circulation of the atmosphere; it would be a complex matter even if the surface of the earth were homogeneous and without special elevations, but the actual problem is far different. Something like this general circulation is ordinarily said to be shown by the monthly and annual charts of pressure, winds and temperature, such as were first prepared and published by Buchanin 1868, and afterwards in Bartholomew's Physical Atlas of 1899. We must not, however, imagine that such charts of averages can possibly give us the true path of any small unit mass of air. The real path is a complex curve, not re-entrant, never described twice over, and would not be so even if we had an ideal atmosphere and globe. It is a compound of vertical and undulatory movements in three dimensions of space, variable as to time, which cannot properly be combined into one average.

The average temperatures, winds and pressures presented on these charts suggest hypothetical problems to the student's mind quite different from the real problems in the mechanics of the atmosphere — problems that may, in fact, be impossible of solution, whereas those of the actual atmosphere are certainly solvable. The mo- mentary condition presented on any chart of simultaneous obser- vations constitutes the real, natural and impotent problems of meteorology. The efforts of mathematicians ancT physicists have been devoted to the ideal conditions because of their apparent simplicity, whereas the practical problems offered by the daily weather chart are now so easily accessible that attention must be turned towards them. The most extensive system of homogeneous observations appropriate to the study of the dynamics of the atmo- sphere is that shown in the

Daily Bulletin of International Simultane- ous Observations, published by the U.S. Signal Service in the ye~a»s 1875-1384, with monthly and annual summaries, and a general summary in ” Bulletin A,” published by the U.S. Weather Bureau in 1893. The study of these daily charts for ten years shows how the general circulation of the atmosphere differs from the simple problems presented in the idealized solutions based on monthly and annual averages. The presence of a great and a small continent, and a great and small ocean, and especially of the moisture, with its consequent cloud and rain, must enter into the study of the problem of the general circulation. The most prominent features of the general circulation of the atmosphere are the system of trade winds, north-easterly in the northern tropics and south-easterly in the southern tropics, the system of westerly winds beyond the trade- wind region, namely, north-westerly in the north temperate and south-westerly in the south temperate zone, and again the system

of upper winds shown by the higher clouds, namely, south-westerly in the northern hemisphere and north-westerly in the southern.

Halley in 1680, ana: Hadley in 1735, gave e/roneous or imperfect explanations of the mechanical principles that bring about these winds. As some errors in regard to this subject are still current, it is necessary to say that it is erroneous to teach that atmospheric air weighs less on being heated, or by reason of the infusion of more moisture, and that therefore the barometer falls. The addition of more moisture must increase its weight as a whole; heat, being imponderable, cannot directly affect its weight either way. We are liable to disseminate error by the careless use of the world ” lighter,” since it means both a diminution in absolute weight and a diminution in relative weight or specific gravity. Heat and moisture may diminish the specific gravity of a given mass of air by increasing its volume, or of a given volume by diminishing its mass, but neither of them can of themselves affect the pressure shown by the barometer so far as that is due to the weight of the atmosphere. It is not proper to say that by warming the air, thereby diminishing its specific gravity and causing it to rise, so that colder air flows in to take its place, we thereby diminish the barometric pressure. It is easily seen that in the expression £ = RT/», which, as we have before said, is the law of elasticity, T and v may so vary as to counterbalance each other, and

allow the pressure p to remain the same. Within any given room or other enclosure hot air may rise on one side, flow over to the opposite, cool and return, and the circulation be kept up indefinitely without any necessary change in pressure. The problem of the relation between wind and pressure in the free atmosphere is more complex than this, and involves the considera- tion of the inertia of the masses of air that are in motion with the earth around its axis. The air is so extremely mobile that it moves quickly in response to slight differences in pressure that cannot be detected by ordinary barometric measurement. The gradients or differences of pressure that are shown on meteorological charts are not directly, but only very indirectly, due to buoyancy, as caused by heat and moisture. The pressure gradients, so-called, are not merely the prime causes of the winds, but are equally and essentially the results of the winds. They are primarily due to the fact that the atmosphere is rapidly revolving with the surface of the earth around the earth's axis, while at the same time it may be circulating about a storm centre. Inappreciable differences of pressure start the winds in motion, and the air moves towards the region of low pressure, just as in the pneumatic despatch tubes the flow of air towards the low pressure carries the packages along. But in the free air, where there are less important resistances to be overcome, the freedom of motion is greater than in these pneumatic tubes. No sooner is the atmosphere thus set in motion by pressure from all sides towards the central low pressure than it rapidly acquires a spiral circulation, and thereby there is superimposed (in the northern hemisphere) a decided diminution of pressure on the left hand side of the wind, and an equally rapid increase on the right hand side. The gradient of pressure in the direction of the wind overcomes resistances, but the gradient of pressure, perpendicular to the direction of the wind, is far greater than that in the direction of the wind, and is that which produces the areas of decided low pressures that appear as storm centres on the daily weather map. Therefore, in general, the wind cuts across the charted isobars in oblique directions and at angles which are nearly 90° for the feeble winds far removed from the centres, but which are almost zero for the most violent winds near the low centre. The winds acquire this spiral circulation for two reasons — (a) all straight Hnej gusts or jets in fluids, subject to any form of resistance, necessarily break up into rotating spirals whenever the velocity exceeds a certain limit, because the resistances deprive some particles of the fluid of a little more of their original velocity and energy than the other particles near by them, and thus the whole series is drawn away from linear into curvilinear paths ; (6) in addition to their rectilinear motions the particles of air have a rapid circular motion in common with the whole atmosphere diurnally

around the earth's axis. Therefore every particle of moving air comes under the influence of a set of forces depending on its own rate of motion relative to the earth's surface and its position relative thereto. If the particles are moving eastward, viz. in the same direction as the earth's diurnal rotation, then the result is as though the atmosphere were rotating more rapidly than does the earth at present; consequently the particles of wind push toward the equator as though the atmosphere were trying to adopt a more flattened spheroidal figure corresponding to its greater velocity of rotation. If the particles are moving westward, on the other hand, it is as though the atmosphere were revolving less rapidly than the earth, and as though the flattened spheroid of revolution due to the present rate of rotation were more decidedly flattened than need be; consequently the particles of air push towards the poles. If the winds blow toward either pole, then their initial moment of inertia about the earth's axis, due to the initial radius and the eastward movement of the air, must be re- tained; consequently, as the air advances into higher latitudes and to smaller circles of diurnal rotation its velocity must increase, and must carry the particles to the east of their initial meridians. If the wind blow towards the equator its initial moment of inertia must be applied to a larger radius, and its velocity correspondingly diminished, so that it is left behind or falls away somewhat to the

west. " The reasoning of those who in attempting to explain the trade winds assume that the atmosphere in moving toward or from the equator has a tendency to retain the same original linear velocity is erroneous "(Ferrel's Movements of Fluids, 1859). In general the winds tend to retain their moments of inertia, and in the northern hemisphere must necessarily always be deflected continuously toward the right hand. The exact amount of this deflection was first distinctly stated by Poisson, 1 as applied to the movements of

Crojectiles; it was also announced by Tracy of New Haven in 18ˆ3, ut was first applied to the atmosphere by Ferrel, who deduced its meteorological consequences. This law is not to be confounded with that of Buys Ballot, who in 1861 deduced from his observations in Holland the rule that the gradient of pressure between two stations for any day would be followed in twenty-four hours by a wind perpendicular to that gradient, and having the lower pressure on the left hand. Buys Ballot's law was in the nature of, a rule for prediction, and was modified by Buchan 1868, who enunciated the following: "The wind blows towards the regions of low pressure, but is inclined to the gradient at an angle which is less than 90 ." In this form Buchan's law was an improvement upon the laws current among cyclonologists, who had assumed that, in a rough way, the wind blew

in circles around the low centre, and was there- fore sensibly at right angles to the gradient. It ought, however, to be said that Redfield throughout the whole course of his studies, from 1831 to 1857, never gave adherence to this view, and in fact for the severer portions of hurricanes determined the average inclination of the movements of the lower clouds at New York City to be about 7 inwards as compared with the truly circular theory. Now Ferrel's law explains mechanically the reason why the winds do not blow either radially or circularly, and gives the means for determining their inclination to the isobars in all portions of the cyclone and for various degrees of resistance by the earth's surface. The general proposition that the barometric gradients on the weather map are not those that cause the wind, but are, properly speaking, the result of the combined action of the wind, the rotation of the earth, and the resistances at the earth's surface, as first explained by Ferrel, seems to have been neglected by meteorologists until brought to their attention repeatedly by Professor Abbe between 1869 and 1875, and especially by Professor Hann in a review of Ferrel's work (see Met. Zeit. 1874). The independent investigations of Sprung, Koeppen, Finger, and especially Guldberg and Mohn, confirm in general the correctness of Ferrel's law.

It is quite erroneous to imagine that the low pressures in storm areas and in the polar regions, and especially the belt of low pressure at the equator are due simply to the diminution of the density and weight of the air by the action of its warmth or its moisture, or to the abundant rainfall as relieving the atmosphere of the weight of water. It has been clearly shown that none of these operations can directly affect the barometric pressure to any appreciable extent, but that high and low pressure areas, as we see them on the weather map, owe their existence entirely to the mechanical interaction of the diurnal rotation of the earth and the motions of the atmosphere. The demonstration of this point by Ferrel in 1857 is considered to have opened the way for modern progress in theoretical meteorology. Both Espy and Hann have abundantly shown that the formation and downfall of rain do not produce any low barometric pressure unless they produce a whirling action of the wind — that, in fact, the latent heat evolved by the condensation of vapour into rain may so warm up the cloud as to produce a temporary rise in pressure even at the surface of the ground, due to the outward push produced by the sudden expansion of the cloud. [The details of the thermo- dynamics of this operation have been elucidated by Wm. von Bezold.] The force with which the wind presses to the right of tends to be deflected in that direction is 2« v sin , while the curvature of the path of the wind is measured by its radius of curvature, which is vJ2n sin 4 > > where v is the velocity of

the wind, n is th« equatorial velocity of the earth's rotation, and is the latitude. It will be seen from this that there is no deflection at the equator; therefore, as Ferrel stated, there is no tendency to the formation of great whirlwinds at the equator, hence hurricanes and typhoons are rarely found within Ip° of the equator.

Ferrel frequently speaks of an anti-cyclone, whereby he means the area of high pressure just outside of a strong cyclonic whirl; the expression pen-cyclone would have been more appropriate and is sometimes substituted. The term anti-cyclone, as first introduced by Galton in 1863, is applied to a system of winds blowing out frorn a central area of high pressure, and this is the common usage of tBe term in modern meteorology. The term cyclone among meteorologists and throughout English literature, except only a few cases in the United States, is equivalent to the older usage of whirlwind, and it is unfortunate that misunderstandings often arise because local usages in America apply the word cyclone to what has fof centuries been called a tornado. The mechanical principles discussed by Ferrel led him to an algebraic relation between the barometric gradient G, the wind velocity v, the radius of curvature of the isobar r, and the inclination i between the wind and the isobar, which is

1 Recherche sur le mouvement des projectiles dans I'air en ayant igard a I' influence du mouvement diurne de la terre ; dated 1837, printed Paris, 1839.

expressed by the following formula for the pressures that prevail at sea-level : —

G = [(2n sin<£+cosM)/r)i> sec t]/ [83 ,000,000].

A popular exposition of this and other results of Ferrel's work is given by Archibald in Nature (May 4, 1882), and still better in Ferrel's Treatise on the Winds (New York, 1889, and later editions). The charts of mean annual pressure, temperature and wind above referred to show certain broad features that embrace the whole system of atmospheric circulation, viz. the low pressures at the equator and the poles, the high pressures under the tropics, the trade winds below and the anti-trades above, with comparative calms under the belts of equatorial low pressure and tropical high pressure. The first effort of

the mathematician was to explain how these mean average conditions depend upon each other, and to devise a system of general circulation of the wind consistent with the pressures, resistances and densities. But, as we have already said, such a system may be very far from that presented by the real atmosphere, and little by little we are being led to a different view of the question of the general circulation. The earlier students of storms generally accepted one of two views as to the cause of whirlwinds. They were either (1) formed mechanically between two principal currents of air flowing past each other, the so-called polar and equatorial currents ; or (2) they were due to the ascent of buoyant air while the heavier air flowed in beneath, the whirling motion being communicated by. the influence of the rotation of the earth, or by the greater resistances on one side than on the other. In order to explain why hurricanes and typhoons exist continuously for many days, or even weeks, it is necessary that there should be a source of energy to maintain a continued buoyancy and rising current at the centre, and this was supposed to be fully provided for by Espy's proof of the liberation of latent heat consequent on the formation of cloud and rain. To this latter consideration Abbe in 1 87 1 added the important influence of the sun's heat intercepted at the upper surface of the cloud. At this stage of the investigation the whirlwind is but an incident in the general circulation of the atmosphere, but further consideration shows that it ought rather to be regarded as an essential portion of that circulation, and that when temperature gradients and density gradients exceed a certain limit the formation of great whirlwinds is inevitable. Therefore an atmosphere containing several whirlwinds is just as truly a system of general circulation in the one case as an atmosphere without a whirlwind is in the other. The formation of rain, the evolution of latent heat, and even the absorption of heat at the upper surface of the cloud really constitute a normal general circulation in this special case. We may therefore consider a system of vortices, which is a system of discontinuous motions, as the most natural solution of the equations of motion — but the mathematical treatment of this form of motion has not yet been sufficiently well developed, for the discontinuity relates not only to the motion but to the thermal conditions and the interchange of vapour and water.

In 1890 Professor Hann published a careful analysis of the actual temperature conditions prevailing over an extensive area of high pressure in Europe, and showed that the temperatures of the upper strata in both high and low areas, namely, in anti-cyclones and cyclones are often directly contrary to those supposed to prevail by Espy and Ferrel. This study necessitated a more careful ex- amination

into the radiation of heat from the dust and moisture of the atmosphere, and Professor Abbe seems to have shown that in areas of high pressure and clear weather a very slow descending movement throughout each horizontal layer gives time for a radia- tion of heat that explains the anomalies of temperature, but the dynamic phenomena still remained – unexplained. On the other hand, von Helmholtz in several memoirs of 1888-1891 showed that waves or billows may be formed in the atmosphere of great extent at the dividing surface between upper and lower strata moving in different directions and with different velocities. Under specific conditions these billows may become like the breakers and caps of waves of the ocean when driven by the wind. The hypothesis that these aerial breakers correspond to cmr troughs of low pressure and the storms experienced in the lower atmosphere seemed very plausible. As these billows are formed between upper and lower air currents of great extent, which themselves represent a large portion of the horizontal circulation between the poles and the equator, it results that if von Helmholtz's suggestion and Hann's hypothesis are correct then all general storms must be considered as essentially a part of the general circulation rather than as caused by the vertical circulation over any locality. It must occur to everyone to adopt the intermediate view that, on the one hand, the local vertical circulation, with its clouds, rain, hail and snow, and evolution of latent heat, and, on the other hand the waves and whirls in the general circulation, mutually contribute toward our storms and fair weather. It only remains to allot to each its proper importance in any special case.

Undoubtedly aerial billows, and the clouds that must frequently accompany them, exist everywhere in the earth's atmosphere. Perhaps their extent and importance are not properly appreciated. A voyage around the Atlantic Ocean in 1889-1890, made by Professor Abbe, specifically to study cloud phenomena, revealed many re- markable cases, such as the cumulus rolls that extend in a

remarkably symmetrical series from the island of Ascension west- wards for 100 m. in the south-easterly trades, or the delicate fields of cirro-cumuli that extend from the islands of Santa Lucia and Barbados for 200 m. eastwards under favourable conditions. The mixtures and vorticose motions going on within aerial billows to form these clouds have been interpreted by Brillouin. In the further elucidation of the mechanism of storms Hann showed that every study of observational material confirms the conclusion that the descent of denser cool dry air is as important as the ascent of warm moist air, and that although the evolution of latent heat within the clouds of a storm may explain the local cloud phenomena, yet it will not explain the storm as a

whole. The first ” norther or blizzard ” that was charted at Washington in November 1871 was at once seen to be a case of the underflow of a thin layer of cold dry air descending from high altitudes above Canada on the eastern slope of the Rocky Mountains, but driven southward by an excess of centrifugal energy added to a moderate barometric gradient. It was seen that in such grand overturnings the descent of masses implies energy communicated by the action of gravity, but the whole mechanics of this process was not clear until the publication by Margules of his memoir tJber die Energie der Stilrme (Vienna, 1905), which will be referred to hereafter.

Mathematics have, almost without exception, assumed a so-called steady condition in the motion of the atmosphere in order to achieve a successful integration of the general equations of motion. The restrictions within which Helmholtz and others have worked, and the limits within which their results are to be accepted, have been analysed by Dr E. Herrmann in a memoir of which a translation is published in the bulletin of the American Mathematical Society for June 1896. Of course Herrmann’s own investigation is also based upon certain simplifying hypotheses, such as the absence of outside disturbing forces and of viscosity and friction, a homogeneous ellipsoidal surface, and a uniform initial temperature and rate of revolution corresponding to an initial state of equilibrium. If now the initial static equilibrium be disturbed by introducing a different distribution of temperature, viz. one that varies with altitude and latitude, but is uniform in longitude along any circle of latitude, then the first question is whether the atmosphere can settle down to a new state of static equilibrium. Herrmann shows that in general it cannot do so, but that the new state and the future states can only be those of motion and dynamic equilibrium. If, however, there be no external forces acting on the atmosphere, then in one case static equilibrium relative to the earth can occur, namely, when the new temperatures are so distributed in the atmosphere as to satisfy the equation

/

pr 2 wdV = M,

in addition to the ordinary equations of elasticity, inertia and continuity previously given, and to those. representing the boundary conditions, M being the total amount of inertia of the atmosphere relative to the axis of rotation. In general, the movements in the atmosphere must consist not only of an interchange between the poles and the equator, but also of east and west motions, and there must

therefore be a different rate of diurnal rotation for each stratum. The second step in this inquiry is, Can these movements become perfectly steady with this unvarying or steady distribution of temperature? In other words, Can the temperature and the movements be so adjusted to each other that each shall remain invariable within any given zone of latitude ? The reply to this is, that if they are to become thus adjusted they must satisfy a certain differential equation, which itself shows that steady motions and stationary temperatures cannot exist if there be any north or south component. Apart from the fact that Herrmann assumes no friction, it would seem that he has proved that steady motions and stationary pressures cannot exist in the atmosphere over a homo- geneous spherical surface, and presumably the same result would follow of a rotating globe for the irregular surface of the actual globe. The motions of the real atmosphere must therefore consist of irregular and periodic oscillations and discontinuous whirls and rolls super- imposed upon more uniform, regular progressions, but never repeat- ing themselves. Consequently, the conclusions deduced by those who have assumed that steady conditions are possible must depart more or less from meteorological observations. There is a general impression that the belt of low pressure at the equator and the low areas at the poles and the high pressures under the tropics ate pseudo-stationary, and really represent what would be steady-* conditions if we had an ideal smooth globe ; but Herrmann's researches show that the unsteadiness observed to attach to these areas under existing conditions would also attach to them under ideal conditions. They really have and must have irregular motions, and we, by taking annual averages, obtain an ideal annual distribution of pressure, temperature and wind that does not represent any specific dynamic problem. The averages represent what is considered proper in climatology, but are quite improper and misleading from a dynamic point of view, and have no logical mechanical connexion with each other.

Closely connected with this study of steady motions under a constant supply and steady distribution of solar heat comes the further question as to what regular variations in atmospheric pressure and wind can be produced by regular seasonal variations

in the heat received from the sun; for instance, what varia- tion in the

earth's atmosphere corresponds to the periodic variations of the solar spots. The general current of Helmholtz's investigations shows that no periodic change in the earth's atmo- sphere can be maintained for any length of time by a given periodic influence outside of the atmosphere. On the other hand, it is barely possible that wave and vortex phenomena on the sun's surface may have the same periodicities as regular phenomena in the earth's atmosphere, so that there may be a parallelism without any direct connexion between the two.

An important paper on the application of hydrodynamics to the atmosphere is that by Professor V. Bjerknes, of Stockholm, Sweden, which was read in September 1899 at Munich, and is now published in an English translation in the U.S. Monthly Weather Review, Oct. 1900 (" On the Dynamic Principle of Circulatory Movements in the Atmosphere "). In this memoir Bjerknes applies certain fundamental theorems in fluid motion by Helmholtz, Kelvin and Silberstein, and others of his own discovery to the atmospheric circulation. He simplifies the hydrodynamic concep- tions by dealing with density directly instead of temperature and pressure, and uses charts of " isosteres," or lines of equal density, very much as was proposed by Abbe in 1889 in his Preparatory Studies, where he utilized lines of equal buoyancy or " isostaths," and such as Elkholm published in 1891 as " isodenses " and which were called " isopyks " by Miiller-Hauenfels. Bjerknes has thus made it practicable to apply hydrodynamic principles in a simple manner without the necessity of analytically integrating the equa- tions, at least for many ordinary cases. He also gives an important criterion by which we may judge in any given case between the physi- cal theory, according to which cyclones are perpetually renewed, and the mechanical theory, according to which they are simply carried along in the general atmospheric current. Bjerknes's paper is illustrated by another one due to Mr Sandstrom, of Stockholm, who has applied these methods to a storm of September 1898 in the United States. 1 The further development of Bjerknes's methods promises a decided advance in theoretical and practical meteorology. His profound lectures at Columbia University in New York and in Washington in December 1905 aroused such an interest that the Carnegie Institution at once assigned the funds needed to enable him to complete and publish the applications to meteorology of the methods of analysis given in detail in Bjerknes's Vorlesungen (Leipzig, i. 1900, ii. 1902), and in his Recherche sur les champs de force hydrodynamiques (Stockholm), Acta Matematica (Oct. 1905). In his lectures of 1905 at Columbia University Bjerknes treated the atmosphere as a continuous

hydrodynamic field of aerial sole- noids and forces acting on them, to which vector analysis can be applied, as was done by Heaviside for electric and magnetic problems. Every material point is a small spherical mass of air free to extend or contract with pressure, temperature or moisture; free to rotate about each of three movable axes passing through its centre and to move along and revolve about three fixed axes through the centre of the earth. These numerous degrees of freedom are easily ex- pressed in Bjerknes's notation and by his typical equations of motion. The density at any point is recognized as the fundamental "dimen- sion " controlling inertia and movement. The observed atmospheric condition at any moment is shown by a series of isodense surfaces intersecting potential surfaces of equal gravity and thus forming a continuous mass of unit solenoids. This field becomes either an electric, magnetic or hydrodynamic field according to the interpreta- tion assigned to the notations — in either case the analytical pro- cesses are identical. The analogies or homologies of these tnree sets of phenomena are complete. throughout, and those of one field elucidate or illustrate those of the two other fields. This is the out- come of the study of such analogies begun by Euler, Helmholtz, Hoppe.and extensively furthered by Maxwell and Kelvin, but espe- cially by C. A. Bjerknes. The homologies or analogies by V. Bjerknes are given at p. 122 of his Recherche (1905), and include the following six triads : —

C Hydrodynamics . velocity of unit mass I. < Magnetics . . . magnetic induction

ˆ Electrics . . . electric induction

f Hydrodynamics . intensity of the field II. -j Magnetics … ,, ,, ,,

|ˆ Electrics … ,, ,, ,,

f Hydrodynamics . velocity of energy III. -j Magnetics . . . intrinsic magnetic polarization

[Electrics … ,, electric ,,

f Hydrodynamics . velocity of expansion per unit volume IV. < Magnetics . . . density of the true magnetic mass

ˆElectrics … „ ,, electric ,,

{Hydrodynamics . density of the dynamic vortex Magnetics … „ „ steady magnetic current

Electrics … ,-, „ ,, magnetic ,,

(” Hydrodynamics . specific volume VI. -j Magnetics . . . magnetic permeability

L Electrics . . dielectric constant

1 ” On the Construction of Isobaric Charts for High Levels in the Earth’s Atmosphere and their Dynamic Significance,” Trans. Am. Phil. Soc. (1906).

which have been slightly rectified by Dr G. H. Ling, Am. Jour. Math. (1908). In the application of Bjerknes’s methods of study to the daily weather map Sandstrom draws special maps to represent the solenoids and the forces. Barometric pressures are reduced from the observing stations not only down to sea-level but up to other level surfaces of gravity. The differences between these level surfaces represent the work done in raising a unit mass from one level to the next (see Bjerknes and Sandstrom, A Treatise on Dynamic Meteorology and Hydrography, Washington, 1908).

The Diurnal and Semi-diurnal Periodicities in Barometic Pressure. — For a long time attempts were made to explain the periodic variations of the barometer by a consideration of static conditions, but it is now evident that this problem, like that of the circulation of the atmosphere, is a question of aerodynamics. A most extensive series of researches into the character of the phenomena from an observational point of view has been made by Hann, who gave a summary of our knowledge of the subject in the Met. Zeit. for 1898, translated by R. H. Scott in the Quart. Jour. Roy. Met. Soc. (Jan. 1899) (see also an important addition by Hann and Trabert in the Met. Zeit., Nov. 1899, and the summary of his results as given in his Lehrbuch, 1906). Hann has shown that at the earth’s surface three regular periodic variations are established by observation, viz. the diurnal, semi-diurnal and ter- diurnal. On the higher moun- tains these variations change their character with altitude. (1) At the equator the diurnal variation is represented by the formula 0-30 mm. sin (5° + 3c), where x is the local hour angle of the sun. In higher latitudes either north or south the coefficient Ai = 0-30 mm. diminishes, but the phase angle, 5°, varies greatly, generally growing larger. It is therefore evident that this diurnal oscillation depends directly on the hour angle of the sun, and probably, therefore, principally on the amount of heat and vapour received by the atmo- sphere from the ocean and the ground at any locality and season of the year. It is apparently but little affected by the wind, but some- what by altitude above sea; the amplitude

diminishes to zero at a certain elevation, and then reappears and increases with the opposite sign; the phase angle does not change. (2) Superimposed upon this diurnal oscillation is a larger semi-diurnal one, which goes through its maximum and minimum phases twice in the course of a civil day. The amplitude of this variation is largest in equatorial regions, and is expressed by the formula Ai = (0-988 mm. — 0-573 mm. sin 2) cos 2 as given by Hann, or A2 = ((V92 mm. — C495 sin 2 <£) cos V as revised by Trabert. This amplitude also may be considered as • variable along each zone of latitude having a maximum value on certain central local meridians. The times at which the semi-diurnal phases of maximum and minimum occur are subject to laws different from those for the diurnal period. Within the tropics the phase angle is 160° and at 50 N. it is 147 , and between these limits it seems to be the same over the whole globe, so that the phase does not depend clearly "upon the hour angle of the sun or on the local time. The amplitudes appear to depend on the excess of land in the northern hemisphere as compared with the water and cloud of the southern hemisphere. The amplitude also varies during the year, being greatest at perihelion and least at aphelion. Hann suggests that this is an indirect effect of the sun's heat on the earth, as the northern hemisphere is hotter when the earth is in aphelion than is the southern hemisphere when the earth is in perihelion, owing to the preponderance of land in the north and water in the south. (3) The ter-diurnal oscillation has the approximate value shown by the formula 0-04 mm. sin (355° + 3*). The phase angle is sensibly the same everywhere, and the amplitude varies slightly with the latitude. Both phase and amplitude have a pronounced annual period which is as remarkable as that of the semi-diurnal oscillation ; the maximum amplitude occurs in January in the northern hemi- sphere, and in July in the southern.

The physics of the atmosphere has not yet been explored so exhaustively as to explain fully these three systematic barometric variations, but neither have we as yet any necessity for appealing to some unknown cosmic action as a possible cause of their existence. The action of the solar heat upon the illuminated hemisphere, and the many consequences that result therefrom, may be expected to explain the barometric periods. The variations of sunshine and cloud must inevitably produce periodic variations of temperature, moisture, pressure and motion, whose exact laws we have not as yet fathomed. Among the many methods of action that have been studied or suggested in connexion with the barometric variations the most important of all is the so-called tidal wave of pressure due to temperature. Laplace applied his investigations on the tides to the gravitational tide

of the ocean, and when he passed to the corresponding solar and lunar gravitational tides of the atmosphere he was able to show that they must be inappreciable, unless, indeed, certain remarkable relations existed between the circumference of the earth and the depth of the atmosphere. As these relations do not exist, if is generally conceded as certain that the gravitational tides, both diurnal and semi-diurnal, cannot exceed a few thousandths of an inch of barometric pressure. On the other hand, the same process of mathematical reasoning enables us to investigate the action of the sun's heat in producing a wave of pressure that has been called a pressural tide, due to the expansion of the lower layer of air on the illuminated half of the globe. The laws that must govern these pressural tides have been investigated by Kelvin, Rayleigh (Phil.

Mag., Feb. 1890), and especially by Margules {Vienna Sitz. Ber. 1890-1893). The two latter have shown the truth of a proposition enunciated by Kelvin in 1882, without demonstration, to the effect that the free oscillation produced by a relatively small amount of tide-producing force will have an amplitude that is larger for the half-day term than for the whole-day term. They therefore explain the diurnal and semi-diurnal variations of the barometric pressure as simple pressural tides or waves of expansion, originally produced by solar heat, but magnified by the resonance between forced and free waves in an atmosphere and on a globe having the specific dimensions of our own. The analytical processes by which Laplace and Kelvin arrived at this special solution of the tidal equation were, objected to by Airy and Ferrel, but the matter has been, as we think, most fully cleared up by Dr G. H. Ling, in a memoir published in the Annals of Mathematics in 1896. He seems to have shown that, although a literally correct result was attained by Laplace in his first investigation, yet his methods as presented in the Mecanique cileste were at fault from a rigorous analytical point of view. The process by which a diurnal temperature wave produces a semi- diurnal pressure oscillation, as explained by Rayleigh and Margules, may be stated as follows: The diurnal temperature wave having a twenty-four hours period is the generating force of a diurnal pressure tide, which is essentially a forced and small oscillation. The natural period of the free waves in the atmosphere agrees much more nearly with twelve than with twenty-four hours. In so far as the forced and the free waves reinforce

each other, the semi-diurnal waves are reinforced far more than the other, so that a very small semi-diurnal term in the temperature oscillations will produce a pressure oscilla- tion two or three times as large as the same term would in the diurnal period. These reinforcements, however, depend upon the elastic pressure within the atmosphere, just as does the velocity of sound. If the prevailing barometric pressures were slightly increased, the adjustment of the twelve-hours free wave of pressure to the forced wave of temperature could be so perfect that the barometric wave would increase to an indefinite extent. For the actual temperatures the periodicity of the free wave is about thirteen hours, or somewhat longer than the forced wave of temperature, so that the barometric oscillation does not become excessive. It would seem that we have here a suggestion to the effect that if in past geological ages the aver- age temperature at any time has been about 268° C. on the absolute scale, then the pressure waves could have been so large as to produce remarkable and perhaps disastrous consequences, involving the loss of a portion of the atmosphere. A modification of this idea of resonance has been developed by Dr Jaerisch, of Hamburg (Met. Zeit., 1907), but the general truth of the Kelvin-Margules-Rayleigh theorem still abides.

The Thermodynamics of a Moist Atmosphere. — The preceding section deals with an incompressible gas, and therefore with simple, pure hydrodynamics. If now we introduce the conception ol an atmosphere of compressible gas, whose density increases with alti- tude, so that rising and falling currents change their temperatures by reason of the expansion and compression of the masses of air, we take the first step in the combination of thermodynamic and hydrodynamic conditions. If we next introduce moisture, and take precipitation into consideration, we pass to the difficult prob- lems of cloud and rain that correspond more nearly to those which actually occur in meteorology. This combination has been eluci- dated by the works of Espy and Ferrel in America, Kelvin in England, Hann and Margules in Austria, but especially by Hertz, Helmholtz, and von Bezold in Germany, and by Brillouin in France. A general review of the subject will be found in Professor Bigelow's report on the cloud work of the U.S. Weather Bureau and his subsequent memoirs " On the Thermodynamics ol the Atmosphere " (Monthly Weather Review, 1906-1909).

The proper treatment of this subject began with the memoir of Kelvin on convective equilibrium (see Trans. Manchester Phil. Soc, 1861). The most convenient method of dealing approximately with the problems is graphic and numerical rather than analytical, and in this field the pioneer work was done by Hertz, who published his diagram

for adiabatic changes in the atmosphere in the Met. Zeit. in 1884. He considers the adiabatic changes of a kilogram of mixed air and aqueous vapour, the proportional weights of each being X and n respectively. In a subsequent elaborate treatment of the same subject by von Bezold in four memoirs published during 1889 and 1899, the formulae and methods are arranged so as to deal easily with the ordinary cases of nature which are not adiabatic ; he there- fore prepares diagrams and tables to illustrate the changes going on in a unit mass of dry air to which has been added a small quantity of aqueous vapour, which, of course, may vary to any extent. Both Hertz and von Bezold consider separately four stages or conditions of atmosphere: (A) The dry stage, where aqueous vapour to a limited extent only is mixed with the dry air. (B) The rain stage, where both saturated vapour and liquid particles are simultaneously present. (C) The hail stage, where saturated aqueous vapour, and water, and ice are all three present. (D) The snow stage, where ice vapour and snow itself, or crystals of ice, are present. The expressions aqueous vapour and ice vapour do not occur in Hertz's article, but are now necessary, since Marvin, Fischer and Juhlin have been able to show that vapour from water and vapour from ice exert different elastic pressures, and must therefore represent different modifications of

of Alter Hertz.

Fig. io. — ˆDiagram for Graphic Method of following Adiabatic Changes.

liquid water. According to Hertz, we may easily follow this mass of moist air as it rises in the atmosphere, if by expansion it cools adiabatically so as to go successively through the four preceding stages. For a few thousand feet it remains dry air. It then becomes cloudy and enters the second stage. Next it rises higher until the cloudy particles begin to freeze into snow, sleet or hail, which charac- terizes the third stage. When the water has frozen and the cloud has ascended higher, it contains only ice particles and the vapour of ice, a condition which characterizes the fourth or snow stage. If in this condition we give it plenty of time the precipitated ice or snow may settle down, and the cloudy air, becoming clear, return to the first stage; but the ordinary process in nature is a circulation by which both the cloud and the air descend together slowly, warming up as they descend, so that eventually the mixture returns to the first stage at some level lower than the clouds, though higher than the starting-point.

The exact study of the ordinary non-adiabatic process can be carried

out by the help of Professor Bigelow's tables, and especially by the very ingenious tables published by Neuhoff (Berlin, 1900), but the approximate adiabatic study is so helpful that in fig. 10 we have traced a few lines from Hertz's diagram sufficient to illustrate its use and convenience. The reader will perceive a horizontal line at the base representing sea-level; near the middle of this line is zero centigrade; as we ascend above this base into the upper regions of the air we come under lower pressures, which are shown by the figures on the left-hand side. The scale of pressures is logar- ithmic, so that the corresponding altitudes would be a scale of equal parts. The temperature and pressure at any height in the atmosphere are shown by this diagram. If the air be satur- ated at a given temperature, then the unit volume can contain only a definite number of grams of water, and this condition is repre- sented by a set of moisture lines, indicated by short dashes, show- ing the temperature and pres- sure under which 5, 10 or 20 grams of water may be contained ia the saturated air. Let us now suppose that we are following the behaviour of a kilogram mass of air rising from near sea-level, where it has a pressure of 750 millimetres, a temperature of 27° C., and a relative humidity of 50 %. A pointer pressing down upon the diagram at 750 millimetres and 27 C. will represent this initial con- dition. A line drawn through that point parallel to the moisture lines will show that if this air were saturated it would contain about 22 grams of water; but inasmuch as the relative humidity is only 50 %, therefore it actually contains only 1 1 grams of water,, and an auxiliary moisture line may be drawn for this amount. If how the mass rises and cools by expansion, the relation between pressure and temperature will be shown by the line a a. When this line inter- sects the inclined moisture line for 1 1 grams of water we know that the rising mass has cooled to saturation, and this occurs when the pressure is about 640 millimetres and the temperature l3-2° C. By further rise and expansion a steady condensation continues* but by reason of the latent heat evolved the rate of cooling is dimin- ished and follows the line (S 0. The condensed vapour or cloud particles are here supposed to be carried up with the cooling air,, but the temperature of freezing or zero degrees centigrade is soon attained — as the diagram shows — when the pressure is about 472 millimetres. At this point the special evolution of latent heat of freezing comes into play; and although the air rises higher and more moisture is condensed, the temperature does not fall because the water already converted into vapour and now becoming ice is giving out latent heat sufficient to counteract the cooling due to expansion. This illustration from Hertz's diagram therefore shows that the curve for cooling temperature coincides with the vertical line for freezing, and is represented on the diagram by the

short piece y.. By this expansion due to ascent the volume is increased while theˆ 1 temperature is not changed; therefore, the quantity of aqueous vapour has increased. When the ascending mass has reached the level where the pressure is 463 millimetres it has also reached the moisture line that represents this increase in aqueous vapour. As this shows that the aqueous particles have now all been frozen, and as the air is now continuously rising, while its temperature is always below freezing-point, therefore at levels above this point the vapour that condenses from the air is supposed to pass directly over into the conditionˆ solid ice. Therefore from this point onwards the falling temperatures follow along the line y 7, and continue along it in-definitely. From these considerations it follows that the clouds above the altitude of freezing temperatures are essentially snow crystals, and if the air rises slowly there may be time for the water and ice to settle down towards the ground ; in this case the quantity

of snow left within the clouds must be Very small, and the cloud has the delicate appearance peculiar to cirrus. Hertz's original diagram is quite covered by these systems of a, fi, y and S lines, and the moisture lines. The lines show the density of the moist air at any stage of the process. The improved diagram by Neuhoff , pub- lished in 1900, is reprinted in the second volume of Abbe's Mechanics of the Earth's Atmosphere, and its arrangements help to' solve many problems suggested by the recent progress of aerial research.

In von Bezold's treatment of this subject only illustrative diagrams are published, because the accurate figures, drawn to scale,' are necessarily too large and detailed. He presents graphically the exact explanation of the cooling by expansion, the loss of both mass and neat by the rainfall and snowfall, and the warmth of the remaining air when it descends as foehn winds in Switzerland and chinook winds in Montana. Even in the neighbourhood of a storm over low lands and the ocean, the warm moist air in front, after being carried up to the rain or snow stage, flows away on the upper west wind until a corresponding portion of the latter descends drier and warmer on the opposite side of the central low pressure. In order to have a convenient term expressive of* the fact that two masses of air in different portions of the atmosphere having different pressures, temperatures and moistures, would, if brought to the same pressure,

also necessarily attain the same temperature, von Bezold introduced the expression ” potential temperature,” and devised a simple diagram by which the potential temperature may be determined for any mass of air whose present temperature, pressure and moisture are known. In an ascending mass of air, from the beginning of the condensation onwards, the potential temperature steadily increases by reason of the loss of moisture, but in a descending mass of air it remains constant at the maximum value attained by it at the highest point of its previous path. In general the potential temperatures of the upper strata of the atmosphere are higher than those of the lower. In general the so-called vertical temperature gradient is smaller than would correspond to the adiabatic rate for the dry stage. This latter gradient is 0-993° C. per hundred metres for the dry stage, but the actual atmospheric observations give about o-6°. Apparently this difference represents primarily the latent heat evolved by the condensation of vapour as it is carried into the upper layers, but it also denotes in part the effect of the radiant heat directly retained in the atmosphere by the action of the dust and the surfaces of the clouds. Passing from simple changes due to ascent and descent, von Bezold next investigated the results of the mixture of different masses of air, having different temperatures and humidities, or different potential temperatures. The importance of such mixtures was exaggerated by Hutton, while that of thermo- dynamic processes was maintained by Espy, but the relative significance of the two was first clearly shown by Hann as far as it relates to the formation of rain, and further details have been con- sidered by von Bezold. The practical tables contained in Professor Bigelow’s report on clouds, and those of Neuhoff as arranged for the use of those who follow up von Bezold’s train of thought, complete our methods of studying this subject.

A most important application of the views of von Bezold, Hertz and Helmholtz was published by Brillouin in his memoir of 1898. Just as we have learned that the motions of the atmosphere are not due either to the general distribution of heat or to local influences exclusively, but in part to each, and just as we have learned that the temperature of the air is not due either to radiation and absorption or to dynamic processes exclusively, but to both combined, so in the phenomena of rain and cloud the precipitation is not always due to the cooling by mixture, 01 to the cooling by expansion, or to radia- tion, but is in general a complex result of all. The effect of the evaporation of cloudy particles in the production of descending cold currents has always been understood in a general way, but was first brought to prominence by Espy in 1838, and perhaps equally forcibly by Faye in 1875. Helmholtz, in his memoirs on billows in the atmosphere,

showed how contiguous currents may interact on each other and mix together at their boundary surface; but Brillouin explains how these mixtures produce cloud and rain — not heavy rains, of course, but light showers, and spits of snow and possibly hail. He says: ” When the layers of clear or cloudy air are contiguous, but moving with very different velocities, their motion, relative to the earth because of the rotation of our globe, assumes a- much more complicated character than that which obtains when the air has no horizontal but only a vertical motion. We know in a general manner what apparent auxiliary forces must be introduced in order to take into account this rotation, and numerous meteorolbgists have published important works on the subject since the first memoirs by Ferrel. But their points of view have been very different from mine. The subjects that I desire to study are the surfaces of discontinuity as to velocity, temperature and cloudiness in one special case only. Analytical methods permit us to resblve complex questions only for limited areas in longitude and for contiguous zones within which the movements are steady, but not necessarily uniform nor parallel. But it is evident that one can learn much as to the condition of permanence or destruction of annular zones having uniform and parallel movements. Thus simplified, the questions can be treated by elementary geometric methods, by means of which we at once rediscover and complete the results given by

Helmholtz for zones of clear air and discover a whole series of new results for zones of cloudy air.” Among Brillouin’s results are the following theorems :—

A. If the atmosphere be divided into narrow zonal rings, each extending completely around the globe, thus covering a narrow zone of latitude, and if each is within itself in convective equilibrium so that the surfaces of equal pressure shall be surfaces of revolution around the axis of rotation, then within any such complete ring in convective equilibrium the angular velocity of any particle of the air will vary in inverse ratio of the square of its distance from the axis of rotation, or or 2 is constant ; that is to say, the air will not move like a rotating solid, but will have a variable angular velocity, smaller far from the axis and greater near to it.

B. The surfaces of equal pressure are more concave towards the centre than is the surface of the globe itself, and they are tangent to the latter only along the parallel where calms prevail.

C. A heavy gaseous atmosphere resting upon a rotating friction- less globe divides itself into concentric rings whose angular move- ments increase as we pass from the polar region towards the equa- torial

ring; the central globe rotates more rapidly than the equatorial atmospheric ring.

D. The surface of separation between two contiguous concentric rings must be such that the atmospheric pressure shall have the same value as one approaches this surface from either direction, and the surface of separation is stable if the differences of pressure in different parts of this surface are directed towards the surface of equilibrium. As the distribution of pressure along a line parallel to the axis of rotation is independent of the velocity of rotation, the ordinary condition of stability, viz. that the gas of which the lower ring is composed shall be denser than that above, will hold good for this line. In general, any inclination of the surface of separation to the horizon amounting to io° must be associated with very small differences of density and large differences of velocity; in practice the inclinations are far less than io°.

E. If the surfaces of equal pressure or isobars are nearly horizontal, as in ordinary cases, the calculations are comparatively easy to make. Let the inclination of the isobaric surface ascending towards the pole be ; let hi be a distance counted along the axis of the earth, and Hi the distance measured in the direction of the attraction of gravity ; then the angle of inclination of the isobaric surface is given by the equation

Hi — hi sin X

tail = — — , ,.

«i cos A

where X is the complement of the angle between the direction of gravity and the line drawn to the poles, or the axis oi rotation of the earth. The surface of separation is that over which the pressure is the same in two contiguous masses or zones, and is identical with a vertical plane only when the densities and velocities in the two layers have certain specific relations to each other. It can never lie between the isobaric surfaces that Brillouin designates as 1 and 2. In order that the equilibrium may be stable, it is necessary that when ascending in the atmosphere along a line parallel to the polar axis one should traverse layers of diminishing density. In the midst of any zone there cannot exist another zone of limited altitude; it must extend upwards indefinitely. Whenever there is any zone (of limited altitude it must necessarily have, near its highest or lbwest point, an edge by which it is attached to the surface of separation of two other neighbouring zones. In other words, the surfaces of separation of the three zones, of which one is limited and the other two are indefinite, must all run

together at a common point or edge, very much as in the problem of the equilibrium of thin films.

F. When the contiguous zones are cloudless the mixtures take place under the following conditions: Starting from the stable conditions, the cloudless mixture ascends on the polar side when the west wind which prevails on the equatorial side of the surface of separation is warmer* but descends between the pole and the equa- torial side of the horizon when the west wind which prevails on the equatorial side of the surface of separation is colder. The mixture's of cloudless air rapidly occupy the whole height of the two layers that are mixing. When they form along a surface that becomes unstable the whirlwind that is thus engendered is sensibly cylindrical at first, but finally becomes extremely conical. This whirlwind may be limited as to height when the two contiguous masses that are mixing are surmounted by a third clear or cloudy layer which intersects the other two and whose lower surface is stable. (Brillouin suggests that possibly this corresponds to the formation of water-spouts and\ tornadoes.)

G. When the contiguous zones are cloudy and the mixtures produce decided condensations, and sometimes even precipitation, the study of these must follow closely in the train of thought followed out by von Bezold. When the contiguous winds are feeble, but the temperatures are very different and the zones are near the equator, then the position of the mixture can be inverted by condensation, since the influence of difference of pressure becomes predominant. At the equator, whatever may be the difference of temperature, a mixture that is accompanied by condensation always rises if the surface of separation is stable. The condensation increases by the expansion, each zone of mixture being an outburst of ascend-‘ ing cumuli. At the equator, whatever may be the difference of

temperature, a mixture accompanied by condensation always | descends when the surface of separation is unstable; moreover, the adiabatic compression rapidly evaporates the mixture.

In the last three chapters of his memoir, Brillouin applies these principles and other details to almost every observed variety of mixtures due to the pressure of one current of air against another. Fig. 11, prepared for the U.S. Monthly Weather Review (Oct.

Light fia/n . Very co/d.

Gust-y

Very tvarm Wirfe

C/ear

Co/cf Ware.

After Brillouin.

Fig. 11. — Diagram illustrating Clouds due to Mixture.

‘897), gives five of the cases elucidated by Brillouin. In each of these the left-hand side of the diagram is the polar side, the air being cold above and the wind from the east, while the right-hand side is the equatorial side, the air being warm above and the wind from the west.

The reader will see that in each case, depending on the relative temperatures and winds, layers of cloud are formed of marked individuality. As none of these clouds appear in the International Cloud Atlas or the various systems of notation for clouds, one is all the more impressed with the importance of their study and the success with which Brillouin has opened up the way for future investigators. ” We have no longer to do with perl sonal and local experience, but with an analytical description of a small number of characteristics easy to comprehend and applicable at every locality throughout the globe.”

From a thermodynamic point of view the most important study is that published by Margules, Ueber die Energie der Stilrme (Vienna, 1905). This work considers only the total energy and its adiabatic transformations within a mass of air constituting a closed system. Truly adiabatic changes in closed systems do not occur within any special portion of the earth’s atmosphere, neither can our entire atmosphere be considered as one such system— but Margules’ results are approximately applicable to many observed cases and complete the demonstration of the general truth that we must not confine our studies to the simpler cases treated by Espy, Reye, Sohncke, Peslin, Ferrel, Mohn. All imaginable combinations of conditions exist in our atmosphere, and a method must be found to treat the whole subject 1 comprehensively and rigorously.

The three equations of energy on which Margules bases his work are: —

R + 5(K + P) + «A = o Sl-aA = Q R-r-8(K + P) + «I = Q where R = energy lost by friction or converted into heat; K = kinetic energy due to velocity of moving masses ; P = potential energy due to location and gravity and pressure heat; A = work done by internal forces when air is expanding or contracting; I = internal energy due to the existing pressure and temperature; Q = quantity of heat or thermal energy added or lost during any operation and which is zero during adiabatic processes only.

These equations are applied to cases in which masses of air of different temperatures and moistures are superposed and then left free to assume stable equilibrium. It results in every case that there is no free energy developed. Any condensation of moisture by expan-

xvrn. 10.

sion is counterbalanced by redistribution of potential energy and by the work done in the interchange of locations. The idea that baro-

metric pressure gradients make the storm-winds is seen to be erroneous and the primary importance of gravity gradients is brought to light. ” The source, of a storm is to be sought only in the poten- tial energy of position and in the velocity of ascent and descent, although these are generally lost sight of owing to the great horizon- tal and small vertical dimensions of the storm areas The horizontal distribution of pressure seems to be a forced transformation within the storm areas at the boundary surface of the earth, by reason of which a small part of the mass of air acquires a greater velocity than it could by ascending in the coldest or sinking in the warmest part of the storm areas. But here we come to problems that cannot be solved by considering the energy only.”

This latter quotation emphasizes the necessity of returning to the equations of motion. The thermodynamics and hydrodynamics of the atmosphere must be studied in intimate connexion— they can no longer be studied separately. Apparently we may expect this next step to be taken in the above-mentioned work promised by V. Bjerknes, but meanwhile Professor F. H. Bigelow has success- fully attacked some features of the problem in his ” Studies on the Thermodynamics of the Atmosphere ” (Monthly Weather Review, Jan.Dec. 1906). In ch. iii of his studies (Monthly Weather Review, March 1906) Bigelow establishes a thermodynamic formula applic- able to non-adiabatic processes by introducing a factor n so that the pressure (P) and absolute temperature (T) are connected by the formula

P 2 /*T*\ »”(«-i)

p~\rj

In our fig. 1 above given, Cottier has assumed n = i-2, but as the values have now been computed for all altitudes from the observa- tions given by balloons and kites, and have a very general importance and interest, we copy them from Bigelow’s Table 16 as below: —

The existence of such large values of n shows the great extent to which non-adiabatic processes enter into atmospheric physics. Heat is being radiated, absorbed, transferred and transformed on all occasions and at all altitudes. Knowing thus the thermodynamic structure of areas of high and low pressure we find the modifications needed in the energy formula for non-adiabatic processes — and Bigelow applies the resulting formula most satisfactorily to a famous waterspout of the 19th of August 1896 over Nantucket Sound, for which many photographs and measurements are available. The thermodynamic study of this waterspout being thus accomplished, it was followed by a

combined thermohydrodynamic study of all

Altitudes.

Values of

n between successive levels.

All.

America.

Europe.

Both A.

and E.

Winter.

Summer.

Winter.

Summer.

Winter.

Summer.

kil.

16-14

3-04

2-82

3‘04

3-59

3-04

3-20

3-12

14-12

4-39

2-82

4-39

3-°4

4-39

2-93

3-66

12-10

2-08

1-72

2-08

1-64

2-08

1-68

1-88

10- 9

1-52

1-47

1-52

1-41

1-52

1-44

1-48

9- 8

1-39

1 -41

1 -41

1-32

1-40

1-36

1-38

8- 7

1 -41

1-52

1-41

1-41

1 -41

1-46

1-44

7-6

1-45

1-67

1-41

1-52

1-43

i-6o

1-52

6- 5

1-52

1-52

1-41

1-62

1-46

1-57

1-52

5- 4

1-79

1 41

1-67

1-70

1-73

1-56

1-64

4- 3

1-97

1-32

1-79

1-94

1-88

1-63

1-76

3- 2

2-10

1-65

2-01

2-30

2 “06

1-98

2-02

2- 1

3-52

1-83

2-24

1-67

2-88

1-75

2-32

1-

2-30

1-83

2-47

1-64

2-38

1-74

2-06

storms (Monthly Weather Review, November 1907-March 1909) with considerable success.

We have thus passed in review the steady progress of mathe- matical physicists in their efforts to unravel the complex dynamics of our atmosphere. The profound importance of this subject to governmental weather bureaus, and through them to the whole civilized world, stimulates diligent effort to overcome the inherent difficulties of the problems. An elaborate system of study and laboratory experimentation leading up to research in meteorcjogy has been devised by Cleveland Abbe, culminating in experiments on models of the atmosphere as a whole by which to elucidate both the local and the general circulations on globes whose oro- graphy and distribution of land and water is as irregular as that of the earth.

The Formation of Rain.— Not only has dynamic meteorology made the progress delineated in the previous sections, but one of the most important questions in molecular physics is in process of being cleared up. The study of atmospheric nuclei and con densation and the formation of clouds in their relation to daily meteorological work began with the appointment of Dr Carl Barus in 1891 as physicist to the U.S. Weather Bureau, and his work has been laboriously continued and extended in his laboratory at Providence, Rhode Island. The formation of rain, from a physical point of view,

is the ultimate step in the formation of cloud. The cloud consists, like fog, of extremely small particles, so light that they float in- definitely in the air; rain and snow represent those particles that have grown to be too large and heavy to be any longer sustained by the air — that is to say, their rate of fall through the air is greater than the ascending component of the air in which they float. The process by which larger drops are formed out of the lighter particles that constitute a cloud has not yet been satisfactorily explained. It is probable that either one of several processes contributes to bring about this result, and that in some cases all of these conspire together. The following paragraphs represent the hypotheses that have marked the gradual progress of our knowledge : —

A. Cloud particles may be driven together by the motions imparted to them by the wind, and may thus mechanically unite into larger ones, which, as they descend more rapidly, overtake the smaller ones and grow into rain-drops.

B. The particles on the upper boundary of a cloud may at night- time, or in the shade, cool more decidedly than their neighbours below them, either by radiation or by mixture ; then the air in their immediate vicinity becomes correspondingly cold, the particles and their envelopes of cold air sink more rapidly, overtaking, and there-fore uniting, with other particles until the larg^e rain-drops are formed.

C. Some cloud particles may be supposed to be electrified posi- tively and others negatively, causing them to attract each other and run together into larger ones, or, again, some may be neutral and others charged, which may also bring about attraction and union.

D. When any violent agitation of the air, such as the sound waves due to thunder, or cannonading, or other explosions, sets the particles in motion, they may be driven together until brought into contact, and united into larger drops.

E. The air — or, properly speaking, the vapour — between cloudy particles — that is to say, within fog or cloud, is generally in a state of supersaturation ; but if it is steadily rising to higher altitudes, thereby expanding and cooling, the supersaturation must increase steadily until it reaches a degree at which the molecular strain gives way, and a sudden violent condensation takes place, in which process both the vapour and the cloud particles within a compara- tively large sphere are instantaneously gathered into a large drop. The electricity that may be developed in this process may give rise to the lightning flash, instead of the reverse process described in the preceding paragraphs (C and D).

F. However plausible the preceding five hypotheses have seemed to be, it must be confessed that no one has ever yet observed pre-cipitation actually formed by these processes. The laborious observations of C. T. R. Wilson of Cambridge,' England, probably give us our first correct idea as to the molecular processes involved in the formation of rain. After having followed up the methods inaugurated by Aitken showing that the" particles of dust floating in the air, no matter of what they may be composed, become by pre- ference the nuclei upon which the moisture begins to condense when air is cooled by expansion, Wilson then showed that in absolutely dustless air,

having therefore no nuclei to facilitate condensation, the latter could only occur when the air is cooled to a much greater extent than in the case of the presence of dust ; in fact, dustless air requires to be expanded more than dusty air in the ratio of 4 to 3, or 1 J times more. The amount of this larger expansion may vary somewhat with the temperature, the moisture and the gases. More remarkable still, he showed that dustless air, having no visible or pro- bable nuclei, acquired such nuclei when a beam of ultra-violet light, or of the rontgen rays, or the uranium radiation, or of ordinary sunlight (which possibly contains all of these radiations), was allowed to pass through the moist air in his experimental tube. In other words, these rays produce a change in the mixed gas and vapour similar to the formation of nuclei, and condensation of aqueous vapour takes place upon these invisible nuclei as readily as upon the visible dust nuclei. Further, the presence of certain metals within the experimental tube also produces nuclei; but the amount of expansion, and therefore of cooling, required to produce condensa tion upon these metallic nuclei is rather larger than in the case of dust nuclei. The nuclei thrown into the experimental tube by the discharge of electricity from a pointed metal wire produced very dense fogs by means of expansions slightly exceeding those required for ordinary dust. Finally, Wilson has been able to show that when dust particles are electrified negatively their tendency to condense vapour upon themselves as nuclei is much greater than when they are electrified positively, and he suggests that the descent of the rain-drops to the ground, carrying negative electricity from the atmosphere to the earth, may perhaps explain the negative charge of the earth and the positive electricity of the atmosphere.

At this point we come into contact with the views developed by J. J. Thomson as to the nature of electricity and the presence of negative and positive nuclei in the atmosphere. According to him, ” The molecules made up of what chemists call atoms must be still further subdivided, and the atoms must be conceived as made up of corpuscles ; the mass of a corpuscle is the same as the mass of the negative ion in a gas at low pressure. In the normal atom this assemblage of corpuscles forms a system which is electrical and neutral. Though the individual corpuscles behave like negative

the corpuscles are spread to act as if it had a charge of positive electricity equal in amount to the sum of the negative charges on the corpuscles. I regard electrification of a gas as due to the splitting up of some of the atoms of the gas, resulting in the detachment of a corpuscle from such atoms. The detached corpuscles behave like negative ions, each carrying a constant negative charge which we

shall call the unit charge, while the part of the atom left behind behaves like a positive ion with the units positively charged but with a mass that is large compared with that of the negative ion. In a case of the ionization of the gas by rontgen or uranium rays, the evidence seems to be in favour of the view that not more than one corpuscle can be detached from any one atom. Now the ions by virtue of their negative charges act as nuclei around which drops of water condense when moist dust-free gas is suddenly expanded. . . . C. T. R. Wilson has shown that it requires a con- siderably greater expansion to produce a cloud in dust-free air on positive ions than on negative ones, when the ions are produced by rontgen rays." It would therefore appear that the moist atmo- sphere above us may, through the action of sunlight or the lightning flash as well as by other means, become ionized. The negative ions attract moisture to themselves more readily than the positive ; they grow to be larger drops, and descending to the earth with their negative charges give it negative electricity, while the atmosphere is left essentially either positive or neutral. (See also Atmospheric Electricity.)

IV.ˆ-Qosmical Meteorology

Under this title have been included all possible, plausible or imaginary relations between the earth's atmosphere and interplanetary space or the heavenly bodies. The diffusion to and fro at the outer limit of the atmosphere, the bombard- ment by ions from the sun, the explanation of auroral lights and of magnetic storms, the influence of shooting stars and comet tails, the relation of the zodiacal light and the Gegen- schein to the atmosphere, the parallelisms between terrestrial phenomena and the variations of the solar spots and protuber- ances, the origin of long or short climatic periods, the cause of special widespread cold days, the existence of lunar or solar gravitation tides analogous to oceanic tides, the influence of slow changes in the earth's orbit or the earth's axis of rotation — all are grouped under cosmical meteorology.

But, in the writer's judgment these matters, while curious and interesting, have no appreciable bearing on the current important questions of atmospheric mechanics. There seem to be many widespread delusions and mistakes in regard to these problems, analogous to the popular errors in regard to astrology, and it is hardly necessary to do more than allude to them here. – The leading meteorologists have relegated such questions to the care of theoretical astronomers and physicists until our knowledge is more firmly established. Undoubtedly the earth does come under other influences than that of the radiation from the sun; but in the present stage of

dynamic meteorology we consider only this latter, and, assuming it to be constant as regards quantity and quality, we find the variable selective absorptions and reflections within our own atmosphere, and its complex internal mechanism afford us a bewildering maze of problems such that so long as these are unsolved it would be folly to spend time on those.

V. — Meteorological Organizations During the latter half of the 19th century the prosecution of work in meteorology gradually passed out of the hands of individuals into the control of large national organizations. This was the natural result of the discovery that, by the spread of the electric telegraph and ocean cables, it had become possible to compile daily weather-maps for large portions of the globe and make predictions of the weather and the storms for a dayˆ or two in advance, of sufficient accuracy to be of the greatest importance to the material interests of civilized nations. The development of wireless telegraphy since 1900 has even made it possible for isolated ships at sea to exchange weather telegrams, compile daily maps and study surrounding storms. One by one every civilized nation has established either a weather bureau or a meteorological office, or a bureau of hydrography and marine meteorology, or an elaborate establishment for aerial explorations according as its special interests demanded. These governmental bureaus usually pursue both climatology

ions yet when they are assembled in a neutral atom the negativeˆ ese government uuicaus u=u t”»°™- —”” .,”” — “»’ effect is balanced by something which causes the space through which and theoretical meteorology in addition to their daily practical

work of telegraphy, forecasting, and publication of charts. Although, of course, in most cases, the so-called practical work absorbs the greater part of the labour and the funds, yet every- where it is recognized that research and the development of a correct theory of the motions of the atmosphere are essential to any important progress in the art of forecasting. Among other important general works in which the official weather bureaus have united, we may enumerate the International Meteorological Congresses, of which the first was held in 1853 at Brussels, the second in 1873 at Vienna, and others more frequently since that date; the establishment of an International Com- mittee, to which questions of general interest are referred; the organization of a systematic exploration of the polar regions in the

years 1882 and 1883; the general extension of the meteoro- logical services to include terrestrial magnetism as an essential part of the physics of the globe; the systematic exploration of the upper atmosphere by means of kites and balloons; and the universal co-operation with the U.S. Weather Bureau in the contribution of simultaneous data for its international bulletin and its daily map of the whole northern hemisphere. The hydrographic offices and marine bureaus of the principal commercial nations have united so far as practicable in the daily charting of the weather, but have especially developed the study of the climatology of the ocean, not only along the lines laid down by Maury and the Brussels Conference of 1853, but also with particular reference to the tracks of storm centres and the laws of storms on the ocean. The condition of these governmental organizations was discussed in the annual address of the Hon. F. Campbell Bayard, delivered before the Royal Meteorological Society of London in January 1899, and in tne text accompanying Bartholomew's Physical Atlas, vol. iii.

The development of meteorology, in both its scientific and its practical aspects, is intimately dependent upon the progress of our knowledge of physics, and its study offers innumerable problems that can be solved only by proper combinations of mathematical theory and laboratory experimentation. The professors in colleges and universities who have hitherto lectured on this subject have not failed to develop some features of dynamic meteorology, although most of their attention has been given to climatology. In fact, many of them have been engrossed in the study of general problems in molecular physics, and could give meteorology only a small part of their attention. The early textbooks on meteorology were frequently mere chapters or sections of general treatises on physics or chemistry.' The few prominent early cases of university professorships devoted to meteorology are those of the eminent Professor Heinrich Wilhelm Dove at Berlin, Professor Adolphe Quetelet at Brussels and Professor Ludwig Friedrich Kaemtz at Halle and Dorpat. In modern times we may point to Professor Wilhelm von Bezold and George Hellmann at Berlin, Professor Juttus Hann at Vienna and Gratz, Professor Josef Maria "Pernter at Linz and Vienna, Professor Alexander Woeikof at St Petersburg, Professors Hugo Hildebrand-Hildebrandsson at Upsala, Henrik Mohn at Chris- tiania, Elias Loomis at New Haven, Connecticut, W. M. Davis and R. de C. Ward at Cambridge, Massachusetts, Alfred Angot and Marcel Brillouin at Paris, Hugo Hergesell at Strassburg, Arthur Schuster at Manchester, Peter Polis at Bonn, and Richard Bornstein at the School of Agriculture in Berlin. With these exceptions the great universities of the world have as yet

given but little special encouragement to meteorology; it has even been stated that there is no great demand for higher education on the subject. On the other hand, the existence of thousands of voluntary observers, the profound interest in the weather actually taken by every individual, and the numer- ous schemes for utilizing our very limited knowledge of the subject through the activities of the large weather bureaus of the world demonstrate that there is a demand for knowledge perhaps even higher than the universities can offer It would be very creditable to a nation or to a wealthy patron of science if there should be established meteorological laboratories in connexion with important universities, at which not only in- struction but especially investigation might be pursued, as is

done at the magnificent astronomical observatories that are so numerous throughout the world. Every atmospheric pheno- menon can be materially elucidated by exact laboratory experiments and measurements, theory can be confronted with facts; and the student can become an original investigator in meteorology.

The great difficulties inherent to meteorology should stimulate the devotion of the highest talent to the progress of this branch of science. The practical value of weather predictions justifies the expenditure of money and labour in order to improve them in every detail.

Bibliography. — Those who desire recent additions to our know- ledge should consult first Hann's Lehrbuch der Meteorologie (2nd ed., Leipzig, 1906) as being a systematic encyclopaedia. Of equal impor- tance is the Meteorologische Zeitschrift (Berlin and Vienna, 1866 to date). The Atlas of Meteorology (Bartholomew, 1900), the Quarterly Journal of the Royal Meteorological Society (London) and the Monthly Weather Review (Washington) are the works most con- venient to English readers and abound with references to current literature The Physical Review Science Abstracts and the Fort- schritte der Physik contain short notices of all important memoirs and will serve to direct the student's attention toward any special topic that may interest him. (C. A.)

METER, ELECTRIC. In the public supply of electric energy for lighting and power it is necessary to provide for the measure- ment of the electric energy or quantity by devices which are called electric meters. Those in use may be classified in several ways: (i) according to the kind of electric supply they are fitted to measure, e.g. whether continuous current or alternating current, and if the latter, whether monophase or polyphase; (ii) according to whether they record intermittently or con- tinuously; (iii) according to the principle of

their action, whether mechanical or electrolytic; (iv) according to the nature of the measurement, whether quantity or energy meters. The last subdivision is fundamental. Meters intended to measure electric energy (which is really the subject of the sale and purchase) are called joule meters, or generally watt-hour meters. Meters intended to measure electric quantity are called coulomb meters and also ampere-hour meters; they are employed for the measurement of public electric supply on the assumption that the electromotive force or pressure is constant. Most of the practical meters in use at the present time may be classified under the following five heads: electrolytic meters, motor meters, clock meters, intermittent registering meters and induction meters.

Electrolytic Meters are exclusively ampere-hour meters, measuring electric quantity directly and electric energy only indirectly, on the assumption that the pressure of the supply is constant. The first electrolytic house meter in connexion with public electric supply was described by St. George Lane-Fox. He was followed by F. J. Sprague and T. A. Edison, the last-named inventor elaborating a type of meter which he employed in connexion with his system of electric lighting in its early days. The Edison electric meter, like those of Sprague and Lane-Fox, was based upon the principle that when an electric current flows through an electrolyte, such as sul- phate of copper or sulphate of zinc, the electrodes being plates of copper or zinc, metal is dissolved off one plate (the anode) and deposited on the other plate (the cathode). It consisted of a glass vessel, containing a solution of sulphate of zinc, in which were placed two plates of pure amalgamated zinc. These plates were connected by means of a german-silver shunt, their size and the distance be- tween them being so adjusted that about tsW Pˆt ot the current passing through the meter travelled through the electrolytic cell and ˆjftf of the current passed through the shunt. Before being placed in the cells the zinc plates were weighed. The shunted voltameter was then inserted in series with the electric supply mains leading to the house or building taking electric energy, and the cur- rent which passed dissolved the zinc from one plate and deposited it upon the other, so that after a certain interval of time had elapsea the altered weight of the plates enabled the quantity of electricity to be determined from the known fact that an electric current of ■one ampere, flowing for one hour, removes 1-2133 grammes of zinc from a solution ot sulphate of zinc. Hence the quantity in ampere- hours passing through the electrolytic cell being known and the fraction of the whole quantity taken by the cell being known, the quantity supplied to the house was determined. To prevent tem- perature from affecting the shunt ratio, Edison joined

in series with the electrolytic cell a copper coil the resistance of which increased with a lise of temperature by the same amount that the electrolyte decreased. Owing to the cost and trouble of weighing a large number of zinc plates, this type of meter fell into disuse.

A more modern type of electrolytic meter is that due to C. O. Bastian. 1 The whole current supplied to the house flows through an electrolytic cell consisting of a glass tube containing two platinum electrodes; the electrolyte is dilute sulphuric acid covered with a thin layer of oil to prevent evaporation. As the current flows it decomposes the liquid and liberates oxygen and hydrogen gases, which escape. The quantity of electricity which is passed is esti- mated by the diminution in the volume of the liquid. A third electrolytic meter of the shunted voltameter type is that of A. Wright. In this meter the electrolyte is a solution of mercurous nitrate which is completely enclosed in a glass tube of a particular form, having a mercury anode and a platinum or, carbon cathode. The current is determined by measuring the volume of the mercury delivered at the cathode. In the Long-Schattner electrolytic meter a solution of sulphate of copper is electrolyzed.

Motor Meters.— Amongst motor meters one well-known type be- longing to the ampere-hour species is that of S. Z. Ferranti, who introduced it in 1883. It consists of an electromagnet within the iron core of which is a flat disk-like cavity containing mercury, the sides of the cavity being stamped with grooves. The thin disk of mercury is therefore traversed perpendicularly by lines of magnetic force when the magnet is excited. The current to be measured is passed through the coils of the electromagnet, then enters the mercury disk at the centre, flows through it radially in all direc- tions, and emerges at the periphery. The mass of mercury is thus set in motion owing to the tendency of a conductor conveying an electric current to move transversely across lines of magnetic force; it becomes in fact the armature of a simple form of dynamo, and rotates with a speed which increases with the strength of the current. The roughness of the surface of the cavity serves to retard it. The rotation of the mercury is detected and measured by means of a small vane of platinum wire immersed in it, the shaft of this vane being connected by an endless screw with a counting mechanism. The core of thˆe electromagnet is worked at a point far below magnetic saturation (see Magnetism) ; hence the field is nearly proportional to the square of the current, and

the resistance offered to the rotating mercury by the friction against the sides of the cavity is nearly pro- portional to the square of the speed. It follows that the number of the revolutions the mercury makes in a given time is proportional to the quantity of electricity which is passed through the meter. In order to overcome the friction of the counting train, Ferranti ingeniously gave to the core of the electromagnet a certain amount of permanent magnetism. Another well-known motor meter, working on a somewhat similar principle, is that pf Chamberlain and Hookham. In its improved form this meter consists of a single horseshoe permanent magnet formed of tungsten-steel having a strong and constant field. Two air-gaps are made in this field parallel to each other. In one of these a copper disk, called the brake disk, revolves, and in the other a copper armature disk. The latter is slit radially, and the magnetic field is so arranged that it perforates each half of the disk in opposite directions. The armature is im- mersed in a shallow vessel filled with mercury, which is insulated from the vessel and the armature, except at the ends of the copper strips. The current to be measured passes transversely across the disk and causes it to revolve in the magnetic field ; at the same time the copper brake, geared on the same shaft, revolves in the field and has local or eddy currents produced in it which retard its action. The principle, of the meter is to make the breaking and driving action so strong that the friction of the train becomes immaterial in comparison. This meter is an ampere-hour meter and applicable only to continuous current circu'ts. Another form of motor meter which is much used is that of Elihu Thomson. It takes the form of a small dynamo having an armature and field magnets without any iron core. The armature carries on its shaft a commutator made of silver slips, and the current is fed into the armature by means of brushes of silver wire. The current to be measured passes through the fixed field-coils, whilst through the armature passes a shunt current obtained by connecting the brushes across the supply mains through a constant resistance. The driving force is balanced against a retarding force produced by the rotation of a copper disk fixed on the armature shaft, which rotates between the poles of a permanent magnet. Induced or eddy currents are thus created in the copperdisk, and the reaction of these against the magnetic field offers a resistance to the rotation of the disk. Hence when a current is passed through the meter, the armature rotates and increases its speed until the driving force is balanced against the retarding force due to the eddy currents in the copper brake disk. In these cir- cumstances the number of rotations made by the armature in a given time is proportional to the product of the strength of the ' current flowing through the armature and that flowing through the field-coils, the former being the current to be measured. Hence the

meter is a watt-hour meter and measures electric energy. In order to overcome the friction of the train the field-coils are wound With an auxiliary shunt coil which supplies a driving force sufficient to overcome the friction of the counting train. This last is geared to the shaft of the armature by an endless screw, and the number of revolu- tions of the armature is reckoned by the Counting-dials, which are

‘See Electrician, 41, 112, and Journ. Inst. Elec. Eng. [London,

1898), 27, 547.

so arranged as to indicate the consumption in Board-of-Trade units (1 Board-of-Trade unit = 1000 watt-hours). A modification of the above meter with some mechanical improvements has been devised by S. Evershed. 2

Clock Meters. — Among clock meters the best known is that of H. Aron, which is based upon a principle described by W. E. Ayrton and J. Perry in 1882. It can be constructed to be either an ampere- hour meter or a watt-hour meter, but is usually the latter. Its principle is as follows: Suppose there are two pendulum clocks, one having an ordinary pendulum and the other having a pendulum consisting of a fine coil of wire through which a current is passed, proportional to the potential difference of the supply mains— in other words, a shunt current. Below this pendulum let there be placed another coil through which passes the current to be measured ; then when currents pass through these coils the pendulum of the second clock will be either accelerated or retarded relatively to the other clock, since the action of gravity is supplemented by that of an electric attraction or repulsion between the coils. Hence the second clock will gain or lose on the other. The two clock motions may be geared to a single counting mechanism which records the difference in the rates of going of the two clocks. If the difference of the number of oscillations made by the two pendulums in a given time is small compared to the number made by either of them separ- ately, then it is easy to show that the power given to the circuit is measured by the gain or loss of one clock over the other in a given time, and can therefore be indicated on a counting mechanism or registering dials. By the use of a permanent magnet instead of a shunt coil as the bob of one pendulum, the meter can be made up as an ampere-hour meter. In this form it has the advantage that it can be used for either continuous or alternating currents.

In Intermittent Registering Meters some form of ampere-meter or watt-meter registers the current or power passing into the house ; and

a clock motion electrically driven is made to take readings of the ampere-meter or watt-meter at definite intervals — say, every five minutes — and to add up these readings upon a set of registered dials. The arrangement therefore integrates the ampere-hours or watt-hours. These meters, of which one well-known form is that of Johnson and Phillips, have the disadvantage of being unsuited for the measurement of electric supply in those cases in which it is irregular or intermittent — as in a theatre or hotel.

Induction Meters are applicable only in the case of alternating current supply. One of the most widely used forms is the Westing- house-Shallenberger. It consists of a disk of aluminjum, the axis of which is geared to a counting mechanism and which runs between the poles of permanent magnets that create eddy currents in it and therefore exert a retarding force. In proximity to the upper side of the disk is placed a coil of wire having an iron core, which is a shunt coil, the ends of the coil being connected to the terminals of the supply mains. Under the disk are two other coils which are placed in series with the supply. When these last coils are traversed by an alternating current they induce local or eddy currents in the disk. The current in the shunt coil lags 90 degrees behind the impressed electromotive force of the circuit to be measured; hence if the main current is in step with the potential difference of the terminals of the supply mains, which is the case when the supply is given wholly to electric lamps,- then the field due to the main coil differs from that due to the shunt coil by 90 degrees. Since the eddy currents induced in the disk are 90 degrees in phase behind the inducing field, the eddy currents pro- duced by the main coil are in step with the magnetic field due to the shunt coil, and h»nce the disk is driven round by the revolution due to the action oj the shunt coil upon the induced currents in the disk. Hence the disk will be accelerated until the driving force is balanced by the retarding force due to the induced currents created in the disk by the permanent magnets. When this is the case, the number of revolutions of the meter in a given time is a measure of the watt-hours or energy which is passed through, the meter. The counting mechanism and dials may be so arranged as to indicate this energy directly in watt-hours. The meter is made up also in a form suitable for use with two or three fixed electric currents. (See Electrokinetics.)

Requirements of a good House Meter. — A gas meter which has an error of more than 2 % in favour of the seller or 3 % in favour of the customer is not passed for use. An electricity meter should therefore have approximately the same accuracy. As a matter of fact, it is difficult to rely upon most electric meters to register correctly to less than 4 % even between quarter-load and fWi load. Out of nearly 700

current motor meters of various makes tested at Munich in 1902, only 319 had an error of less than 4%, whilst 259 had errors varying from 4J to 10%. If possible, how- ever, the departures from absolute accuracy should not be more than 2 % at quarter-load, nor more than 3 % at a full load. The accuracy of a meter is tested by drawing calibration curves showing the percentage departure from absolute accuracy in its reading for various decimal fractions of full load. Such a test is made by determining with an accurate ammeter or watt-meter the current or power supplied to a circuit for a period measured by a good clock and comparing with this the actual rea ding of the meter

a See Journ. Inst. Elec. Eng. Lond. (1899), 29, 743.

during the same time. A common source of trouble is the short circuiting of the shunt coils owing to the shellaced cotton covering of the wire becoming moist.

A good meter should start with a current which is not more than 2% of its full load current. With a supply pressure of 200 volts a 5 c.p. carbon filament lamp takes only o-i ampere; hence unless a meter will begin to register with xV ampere it will fail to record the current consumed by a single small incandescent lamp. In a large supply system such failure would mean a serious loss of revenue. The resistance of the meter coils causes a fall in voltage down the series coil which reduces the supply pressure to the con- sumer. On the other hand the resistance of the shunt coil absorbs energy which generally varies from 1 to 3 watts and is a loss either to the consumer or to the supply company, according to the manner in which the shunt coil is connected. In those meters which are compounded — that is, have a shunt coil wound on the field magnets to compensate for the friction of the train— it is important to notice whether the meter will operate or continue operating when there is no current in the series coil, since a meter which ” runs on the shunt ” runs up a debt against the consumer for which it gives no corresponding advantage.

Generally speaking, the price of the meter is a subordinate consideration. Since the revenue-earning power of a supply station depends entirely upon its meters, inaccuracy in meter record is a serious matter. The cost of measuring current by the aid of a meter is made up of three parts: (1) the prime cost of the meter, which varies from £2 to £6 for an ordinary 25-light house electric meter; (2) the

capital value of the energy absorbed in it, which if the cost of the energy is taken at 2d. per Board-of- Trade unit, with interest and depreciation at 6 %, may amount to £10 per customer; and (3) the annual working costs for repairs and also the wages of the staff of meter men, who take the required monthly or quarterly readings. In the case of small and irregular consumers, such as the inhabitants of model dwellings and flats inhabited chiefly by working-class tenants, coin-in-the-slot meters are much employed. The customer cannot obtain current for electric lighting until he has placed in a slit a certain coin — say, a shilling — -entitling him to a certain number of Board-of -Trade units — say, to 2 or 4, as the case may be. In the Long-Schattner electrolytic meter, the insertion of the coin depresses a copper plate or plates into an electrolytic cell containing a solution of sulphate of copper; the passage of the current dissolves the copper off one of the plates, the loss in weight being determined by the quantity of the electricity passed. As soon as the plate has lost a certain amount of weight corresponding to the value of the electric energy represented by the coin, the plate rises out of the liquid and cuts off the current.

Authorities. — H. G. Solomon, Electricity Meters (London, 1906) ; C. H. W. Gerhardi, Electricity Meters: their Construction and Management (London, 1906) ; L. C. Reed, American Meter Practice (New York, 1904); J. A. Fleming, A Handbook for the Electrical Laboratory and Testing Room (London, 1904) ; T. P. Wilmshurst, ” Electricity Meters,” Electrician (1897), 39, 409; G. W. D. Ricks, ” On the Variation of the Constants of Electricity Supply Meters, with Temperature and Current,” Electrician (1897), 39, 573.

G- A. F.) METHODISM, a term 1 denoting the religious organizations which trace their origin to the evangelistic teaching of John Wesley. The name ” Methodist ” was given in derision to those Oxford students who in company with the Wesleys used to meet together for spiritual fellowship ; and later on when John Wesley had organized his followers into ” societies ” the name was applied to them in the same spirit. ‘ It was however accepted by him, and in official documents he usually styles them ” the people called Methodists.” The fact that standards of Methodist doctrine are laid down as consisting of ” Mr Wesley’s Notes on the New Testament and the 1st Series of his Sermons ” (fifty- three in number), might seem to indicate a departure from existing systems, but it was not so. He fully accepted the recognized teaching of the Church of England, and publicly appealed to the Prayer Book and the Thirty-nine Articles in justification of the doctrines he preached. Methodism began in a revival of personal religion, and it professed to have but one aim, viz. ” to spread

Scriptural holiness over the land." Its doctrines were in no sense new. It was the zeal with which they were taught, the clear distinction which they drew between the profession of godliness and the enjoyment of its power — added to the emphasis they laid upon the immediate influence of the Holy Spirit on the consciousness

1 " Methodism " is derived from "method" (Gr. pWo&os), a rule. A " methodist " is one who follows a " method," the term being applied not only to the Wesleyan body, but earlier to the Amvraldists, and in the 17th century to certain Roman Catholic apologists.

of the Christian — which attracted attention, gave them dis- tinction, and even aroused ridicule and opposition. Wesley and his helpers, finding the Anglican churches closed against them, took to preaching in the open air; and this method is still followed, more or less, in the aggressive evangelistic work of all the Methodist Churches. As followers rapidly increased they were compelled to hold their own Sunday services, and this naturally led them to appoint as preachers godly laymen possessing the gift of exhortation. These followed their ordinary avocations on week-days, but on Sundays preached to congregations in their own immediate neighbourhood, and hence were called local preachers as distinguished from travelling preachers. The extent to which the employment of the local preacher is characteristic of Methodism may be seen from the fact that in the United Kingdom while there are only about 5000 Methodist ministers, there are more than 18,000 congregations; some 13,000 con- gregations, chiefly in the villages, are dependent on local preachers.

In the organization adopted to foster spiritual life the very characteristic " Class-meetings for Christian fellowship " take a prominent place. Membership in the church depends solely upon being enrolled as a member of one of these meetings for Christian fellowship, and thus placing oneself under pastoral oversight.

The Wesleyan Methodists now represent the original body as founded by John Wesley in Great Britain and Ireland; but in America those who looked upon him as their founder adopted the episcopal mode of Church government after the War of Independence, and have since that time been known as Episcopal Methodists (see below). It should be noted that the Welsh Caivinistic Methodists are only slightly connected with the original body. They were indirectly the outcome of the evangelistic efforts of Howell Harris and Rowlands. Their work received the sympathy of Wesley and liberal financial help from the Countess of Huntingdon (see Calvinistic Methodists). For a time Whitefield was leader, and we find a reference to the " Whitefieldian

and Wesleyan Methodists ” in the Supplement to the Gentleman’s Magazine for 1747, p. 619. The theological views of these teachers proved quite incompatible with the Arminianism of Wesley, and a definite breach between them and him took place in 1770. The Welsh Calvinistic Methodists are now a branch of the Presbyterian Church. Other divisions have been formed at various times by secessions from the Wesleyan Methodists (see separate articles). They are: Methodist New Connexion (founded 1 797-1 798); Bible Christians (181 5); United Methodist Free Churches 2 (about 1836); Primitive Methodists (founded 1807-1810); Independent Methodist Churches (about 1806); Wesleyan Reform Union (1850, reorganized 1859). These bodies have separated solely on matters of Church govern- ment and not on points of doctrine. The Primitive Methodists in Ireland were a small body who in 181 7 seceded because they wished to maintain that close connexion with the Church of England which existed at the time of Wesley’s death, but in 1878 they rejoined the parent body. Methodism has always been aggressive, and her children on emigrating have taken with them their evangelistic methods. (For the American branches see below.)

The statistics given in the following table (not including Junior Society Classes) are from the Minutes of the Conference of the Wesleyan Methodist Church for 1909. At the death of Wesley the figures were: 313 preachers, 119 circuits and mission stations, and 76,968 members. In the United States : 97 circuits, 198 preachers and 43,265 members. “n.

In 1837 the membership in Great Britain and Ireland was 318,716; in foreign mission stations, 66,007; in Upper Canada, 14,000; while the American Conferences had charge of 650,678 members. Total for the world: 1,049,401, with 4478 ministers.

Three Oecumenical Conferences have been held — two at City Road, London, in 1881 and 1901, and one at Washington in 1891. The statistics presented at the last showed that the Church during the preceding decade had gained about a million members and three million adherents. At the same time there has been a steadily

■ 2 These first three were joined in 1907 under the name of the United Methodist Church.

growing feeling in favour of union. Canada and Australasia led the way, for in these countries the Methodist Church was undivided, and the sentiment was greatly strengthened by the formation in the United Kingdom of the United Methodist Church in 1907.

See A New History of Methodism, ed. W. J. Townsend, H. B. Workman, George Eayrs (2 vols., London, 1909). (J. A. V.)

local and travelling preachers, and the organization of local societies with class leaders, stewards and trustees. The intention ■was to make American Methodism a facsimile of that in England, subject to Wesley and the British Conference — a society and not a Church. Pilmoor and others objected to Asbury's strict

Denomination.

Ministers.

Lay Preachers.

Church Members and Probationers.

Sunday Schools.

Officers

and

Teachers.

Sunday Scholars.

Churches, &c.

Wesleyan Methodists: —

South African Conference .

United Methodist Church Wesleyan Reform Union …. Independent Methodist Churches . Australasian Methodist Church . United States: —

Methodist Episcopal 4 …. Union American Methodist Episcopal

African Methodist Episcopal .

African Union Methodist Protestant

African Methodist Episcopal Zion.

Methodist Protestant ….

Wesleyan Methodist ….

Methodist Episcopal (South) . < Congregational Methodist . (Congregational Methodist(coloured)

New Congregational Methodist .

Zion Union Apostolic ….

Coloured Methodist Episcopal

Primitive Methodist ….

Independent Methodist

Evangelistic Missionary Canadian Methodist Church. Japan Methodist Church 6

Totals ….

2,454 246 617

35

253

1,178

891

21 424 975

19,421

138 6,070

200 3,912

1, 55t

524 6,978

415 5

238

2,673 72

1,126

8

92

2,384 47

19,826

621

4.965

89

5-797

16,158

6,183

527

4,576 14,743

15,885

75°

1,520

i,i35

4,800

2,786

138

1,299

27

3,809

35

520,868

29,531

143,467

1,675

117,146

212,168

186,905

8,489

9,442

I5< >,75i

3,376,888

18,500

850,000

4,000

578,310

183,894

19,064

1,673,892

24,000

319

4,022 2,346

219,739

7,013

31-435

2,569

5,014

329,904 4-083

7,589 353

1.754

70 s

788

4,155

2,404 181

153 3,973

34,619

350 2,034 2,034

465 14,892

4,007

108

I.I75

3,556 121

132,186

2,557

7,65i

142

2.893

59.557

43,i69

2,762

3,041 24,322

361,667

900 14,404 16,680

“1,137

7,098 7.376

35,323 544

987.953

25.969

9I.II3

1,996

39.329

465,531

323.675

22,312

27,219

231,553

3,068,248

2,770 122,467 126,031

18,344 1,084,238

79,876 “,754 40,660

1,200

305,649 11,136

8,606 l

4H S

3,502

127 3,930

5.H8

3,188

196

156 6,418

29,765

255

6,815

125

3,241

2,242

598

15,496

425

5

417

a 32

2,619

104

1,117

15

47

3,789

28

52,978

105,669

8,715,434

84,781

833.409

7,089,023

98,820

Methodism in the United States There are in the United States sixteen distinct Methodist denominations, all agreeing essentially in doctrine. John Wesley had been conducting his United Societies for more than twenty years before the movement took root in North America.

A. — Episcopal Methodist Churches.

Philip Embury (1729-1775), a Wesleyan local preacher, emigrated in 1760 from Limerick to New York. Robert Straw- bridge (?-i78i), a local preacher and native of Ireland, settled in Maryland. In 1766 Embury was stimulated by his relative, Mrs Barbara Heck, to begin Methodist preaching, and a society was soon formed, which grew rapidly. Embury was reinforced by the arrival of Thomas Webb (1724-1796), an English local preacher and a captain in the British army. Webb and Thomas Taylor, a layman of superior ability, appealed to Wesley to send over missionaries, and the 26th annual British Conference, held in 1768, sent to the society in New York £50 and furnished passage money for two missionaries, Richard Boardman and Joseph Pilmoor (1730-1825). Three years later Francis Asbury was sent over, and was made assistant superintendent. Mean- while Strawbridge had been preaching with success in Maryland and in Virginia.

These ” advance agents ” of this spiritual propaganda brought with them Wesley’s Arminian Theology. They brought also ” the means of grace ” on which Wesley placed the greatest stress; such as personal testimony in private and public, class and prayer meetings, watch-nights, love-feasts, the direct and fervent preaching of the Gospel and the singing of Wesleyan hymns, carried on by means of circuits and stations, exhorters,

1 Seating accommodation, 2,374,425.

2 Other preaching-places, 1561. 3 Sunday and Thursday Schools. * Methodism is also represented in several European countries by

Conferences and Missions affiliated to the Methodist Episcopal Church of America, and their membership is included in the figures given

discipline, and Wesley, hearing of the disagreement, in 1773 appointed Thomas Rankin (c. 1 738-1810) superintendent of the entire work of Methodism in America.

The First American Conference. — The first American Confer- ence was held in 1773, and consisted of ten preachers, all of whom were bom in England or Ireland. Asbury came to America to remain permanently; but Rankin, unable to identify himself with its people, to take the test oaths required in the Revolution, or to sympathize with the colonies, returned to England, as did all the English preachers except Asbury. By May 1776 there were 24 preachers and 4921 members; but in the first year of the Revolution there was a loss of 7 preachers and nearly 1000 members. The next year saw extensive revivals, in sections removed from the seat of war, which added more than 2600 to the number of members.

The preachers in the South determined upon administration of the sacraments, an

above. The 1908 returns are: Bulgaria, 546 members; Denmark, 3771; Finland and St Petersburg, 1367; France, 221; Italy, 3669; North Germany, 12,886; Norway, 6054; South Germany, 11,808; Sweden, 15,430; Switzerland, 9419. s Western Conference only.

was furnished by Wesley with a document setting forth the grounds on which he had taken this step. Wesley also appointed Thomas Coke and Francis Asbury ” to be joint superintendents over our brethren in North America.” Soon after Coke and his companions arrived they met Asbury and fifteen preachers, and a special conference was called, which opened on the 24th of December 1784, in the suburbs of Baltimore, Maryland. This convention organized itself into a Methodist Episcopal Church, in which the liturgy sent by Wesley should be read, and the sacra- ments should be administered by superintendents, elders and deacons, these elders and deacons to be ordained by a presbytery using the episcopal form. Coke and Asbury were unanimously elected superintendents, Coke, aided by his clerical companions from England, ordaining Asbury as deacon and elder and formally consecrating him a general superintendent. Several elders were ordained. This convention adopted the first Discipline of the Methodist Episcopal Church. It adopted the existing doctrinal standards, consisting chiefly of Wesley’s Sermons and his Notes on the

New Testament; also twenty-five of the Articles of Religion of the Church of England, modified so as to eradicate all trace of High Church ritualism, Anglican or Roman, and the distinctive doctrines of Calvinism.

The Church thus established began its ecclesiastical career with 18,000 members, 104 travelling preachers, about the same number of local preachers, and more than 200 licensed exhorters. There were 60 chapels and 800 regular preaching places.

The energy of Asbury, and the position of Coke in the Church of England, his wealth, culture, and preaching power, greatly reinforced the efforts of the preachers. The administration of the sacraments brought peace; and many who would not unite with the " Society " asked admission to the Church. Within five years the number of preachers swelled to 227, and the members to 45,949 (white) and 11,682 (coloured).

To bind the whole body the existing method required the con- currence of each Annual Conference with every proposition. This was inconvenient and occasioned much loss of time; there- fore a General Conference was established to meet once in four years. The first was held in 1792, and therein arose a sharp con- flict. James O'Kelly (1735-1826), a Presiding Elder in control of a large district, proposed that, when the list of appointments was read in the Conference, if any preacher was not pleased with his assignment he might appeal to the Conference. The motion being lost, O'Kelly and several other preachers seceded. The Conference in 1804 limited the power of the Bishops by forbidding them to appoint any pastor for more than two con- secutive years in charge of the same church. As all " travelling preachers " were eligible, without election, to seats in General Conferences, widespread dissatisfaction prevailed among the distant Conferences. The era of the steamboat and the railway not having arrived, it was possible for two Annual Conferences, adjacent to the seat of the General* Conference, to out- vote all others combined. This led to a demand for the substitution of a delegated General Conference, which was conceded by the Conference of 1808 to take effect four years later. The office then known as the Presiding Eldership had become powerful: Bishops appointed the pastors to churches, Presiding Elders to districts; but it was the purpose of the majority to transfer to the Annual Conferences the power of appointing Presiding Elders. The change, though discussed for many years, has not been accomplished.

■Several issues had been settled; but one, that of slavery, had to be

faced. The storm burst on the Conference of 1844. Bishop James Osgood Andrew (1 794-1871), a native of the South, had, by inheritance and marriage, become a slaveholder. After debates of many days, he was requested ” to desist from the exercise of the office of Bishop while this impediment remained.” The Southern members declared that the infliction of such a stigma upon Bishop Andrew would make it impossible for them to maintain the influence of Methodism in the South, and a tentative plan of separation was adopted by the Conference by an almost unanimous vote. The result was that the Methodist Episcopal Church was bisected, and when the General Conference

of 1848 convened it represented 780 travelling preachers and 532,290 members fewer than it had numbered four years before.

After the Civil War the increase in membership was note- worthy. The quadrennial Conference of 1868 represented 222,687 members more than its predecessor; of this gain 117,326 were in the Southern States. In 1872 lay representatives were admitted, the Constitution having been amended so as to make it legal. It was not, however, an equal representation, for though ministerial Conferences were represented according to their number, in no circumstances could there be more than two lay representatives from one Annual Conference. Not till 1900 were lay and clerical representation equalized. In 1864 the time limit of pastorates was lengthened to three years, and in 1888 to five years. This limit was taken off in 1900, and pastors can be reappointed at the will of the Bishop.

Five women presented credentials as lay delegates in 1888. Their eligibility was questioned; and they were denied admis- sion. For the next four General Conferences the struggle for the admission of women recurred. In 1900-1904 a general revision of the Constitution took place, and the words ” lay members ” were substituted for ” laymen ” in that part of the Constitution which deals with the eligibility of delegates to the General Conference.

The General Conference has power to make rules and regu- lations for the Church, subject only to restrictions which protect the Standards of Doctrine, the General Rules, the disposition of the property of the Book Concern and its income, the income of the Chartered Fund, and the right of ministers to trial before a jury of their peers, an appeal, and similar rights of the laity. By a two-thirds vote of a General Conference, and two-thirds votes of the members of the Annual Conference, and of the members of the Lay Electoral Conferences, present and voting, what is said in these ” Restrictive Rules ” can be

altered or repealed, except that which deals with the Articles of Religion and ” the present existing and established Standards of Doctrine.” In the Annual Conferences the Bishop is the sole interpreter of law, subject to appeal to the General Conference. When presiding in the General Conference, a Bishop has no authority to decide questions of law, but may decide questions of order subject to an appeal to the body. The district super- intendent visits each charge several times annually, presiding in the Quarterly Conference, the highest local authority in the Church, and he is expected to conserve the unity of the denomin- ation and a regard for laws enacted by the supreme body. In the absence of a Bishop the district superintendent represents him, and may transfer any ministers within the bounds of his district.

Connexional Institutions. — The Book Concern, established in 1789, publishes the necessary devotional books of the Church, such as hymnal, discipline, theological works, religious experience, and numerous magazines and papers.

The Board of Foreign Missions carries on extensive operations in China, Japan, Korea, India and Malaysia, Italy, South America and Mexico. It assists the Methodist Churches organized in Norway, Sweden, Denmark, Finland, Germany and Switzerland, and has recently established missions in Russia and France.

The Board of Home Missions and Church Extension supplies the foreign peoples domiciled in the United States with ministers of their own tongue. It assists all English-speaking churches in need of help, and secures, by gifts and time loans, the erection of churches wherever needed. Invaluable coadjutors of these Boards are the Women’s Foreign Missionary and the Women’s Home Missionary societies.

The Board of Education, with the aid of a University Senate, assists young people to obtain education, and raises the standard of seminaries, colleges and universities. The Church, in the United States, supports 54 colleges and universities and 10 theological seminaries. The Freedmen’s Aid Society is devoted to the educa- tional needs of the negro race in the United States, in which work it has been very successful.

The Sunday School Union, Epworth League, Methodist Brother- hood, hospitals, homes for the aged, deaconess homes and children’s institutions are maintained by -an increasing army of workers.

The whole number of ministers (exclusive of foreign missions) in

1907, was 17,694; churches, 27,691 ; communicants, 2,984,261.

The Methodist Episcopal Church South.— After the adjourn- ment of the General Conference of 1844, the representatives of thirteen Conferences covering the states holding slaves appealed to their constituents to determine what should be done to prevent Methodism in the South from being deprived of its influence over the whites and of the privilege, till then fully accorded, of preach- ing the Gospel and teaching its precepts to slaves. In 1845 a representative Convention was called; this body, with the ap- proval and participation of Bishop Andrew, organized the Metho- dist Episcopal Church South. At its first General Conference, in 1846, the senior Bishop of the Methodist Episcopal Church, Joshua Soule (1781-1867), offered himself to the Church, which accepted him in his episcopal capacity. William Capers (1790- 1855) and Robert Paine (1799-1882) were elected to the Episco- pacy. The Church thus founded began with 460,000 members, of which 2972 were Indians, 124,961 coloured, and 1519 travel- ling ministers.

A difficulty arose on the division of the property of the Book Concerns, which the Methodist Episcopal Church maintained involved a change in the Constitution. A vote to authorize the division failed, and the Methodist Episcopal Church South, hopeless of relief, brought two suits, one against the Book Concern in New York, and the other against the Book Concern in Cincin- nati. The former was decided in favour of the Methodist Epis- copal Church South, and the latter in favour of the Methodist Episcopal Church. In the latter case an appeal was taken by the Methodist Episcopal Church South to the Supreme Court of the United States, which body unanimously decided that the Methodist Episcopal Church South was an integral part of the Methodist Episcopal Church which owned the Book Concerns, and ordered that the Southern Church should receive a pro- portionate part of the property of both Book Concerns. The amount ordered by the Court was in due time received.

The membership of the Church in i860 was more than three- quarters of a million; but the Church was doomed to feel the force of the destructive elements of the Civil War. In April 1862 New Orleans was in possession of the Federal Government, rendering it impossible to hold the General Conference due at that time and place.

At the close of the war the Missionary Society of the Church was $60,000 in debt, the Publishing House practically in ruins, and of the more than 200,000 coloured members in i860 there remained fewer than 50,000. The Conference of 1866 convened in New Orleans. Radical changes in polity were effected. Attendance upon class meetings, which, from the origin of the Church had been obligatory, was made voluntary, and the rule was repealed which required a probation of six months before admission into full membership. The time limit on the con- tinuation of pastorates was extended from two to four years. The most radical change was the introduction into the General Conference of a number of lay representatives equal to the number of clerical, and the admission into each Annual Conference of four lay delegates for each Presiding Elder's district.

The coloured people, with the consent of the Church, withdrew in 1870, and formed a new Church called the Coloured Methodist Episcopal Church.

The most striking denominational effort in its history was the maintenance of the solvency of the Publishing House, which was seized by the Federal Troops, and used as a United States printing office; with the damage done, and debts incurred in rebuilding, after a fire, interest, &c, the liabilities were $35,000, with debts $125,000 in excess of assets. The concern was declared insolvent; but the necessary funds were forthcoming, and the honour of the Church was maintained.

Education has received unceasing attention. The titles to 175 institutions are held by the Church, and the list of colleges and their character is a credit to the denomination. The most important is Vanderbilt University, at Nashville, Tennessee, founded in 1872, and largely endowed by members of the family whose name it bears. The chief foreign missions are in China, Mexico, Brazil, Japan, Korea and Cuba. Its mission in Japan and the mission of the Methodist Episcopal Church and the Methodist Church of

Canada were united in 1907 in a new organization entitled the Methodist Church of Japan. A distinguishing feature of this church is a practical veto power possessed by the bishops, to be exercised when the conference adopts any measure which in their opinion is unconstitutional. They have the right to present written objections and should the General Conference, by two- thirds vote adhere to its action, the proposal is sent down to the Annual Conference for ratification; otherwise it is void. Fraternal relations between the two great Episcopal Methodist Churches were fully established in 1876,

and have broadened in spirit and scope from that time.

The Methodist Episcopal Church South in 1907 had 6774 ministers, 16,156 churches and 1,631,379 communicants.

The African Methodist Episcopal Church. — This body originated in strained relations between the white and coloured Methodists of Philadelphia, Pennsylvania, the result of which was, that the coloured people organized themselves, in 18 16, into an independent body. They adopted as their standards the doctrines of the Methodist Episcopal Church, and, with a few modifications, its form of government. The Church steadily prospered, but for several years not proportionately in the department of education. Daniel Alexander Payne (1811-1893), who had studied in the Gettysburg Theological Seminary, led a reform, which involved a marked elevation of the qualifications for ministers, and from that time the body has constantly risen in public estimation. One of its peculiarities is that the bishops are members of the General Conference. It sustains Wilberforce University (at Wilberforce, Ohio) and other educational institutions, and has missions in Africa, South America, the West Indies and Hawaii. Notable orators have risen up among its members, who have added greatly to the respect felt for their race and Church. The African Methodist Episcopal Church, the largest Christian denomination consisting wholly of the Negro race, in 1907 comprised 6190 ministers, 5321 churches, and 842,023 communicants.

The African Methodist Episcopal Zion Church. — Some of the coloured people in the city of New York, ” feeling themselves oppressed by caste prejudice, and suffering the deprivation of Church privileges permitted to others,” organized among themselves, in 1796, and in the year 1800 built a church and named it Zion. For twenty years the Methodist Episcopal Church supplied this church with pastors. Then the members induced three white ministers to ordain as elders three of their brethren, already deacons. Since they had Methodist precedents for such ordination, these proceeded to ordain others, and established churches in Phila- delphia and New Hampshire. The elders ordained one of their number a bishop. As late as 1863 the Church had only 92 ministers and 5000 members, but in twelve years it doubled its membership more than five times. In this Church the sexes are equally eligible to all positions. Its educational operations at first were failures, but gradually became successful. Its foreign missions were made a separate department in 1884.. This Church had, in 1907, 3871 ministers, 3206 churches and 573,107 communicants.

The Coloured Methodist Episcopal Church. — In 1866 the General Conference of the Methodist Episcopal Church South authorized the bishops to organize its coloured members into an independent ecclesiastical body, if it should appear that they desired it. The bishops formed a number of Annual Conferences, consisting wholly of coloured preachers, and in 1870 these Conferences requested the appointment of five commissioners of the Caucasian part of the Church to meet five of their own number to create an inde- pendent Church. Two Bishops of the Methodist Episcopal Church South presided, and ordained to the Episcopacy two coloured elders, selected by the eight coloured conferences. The coloured people by vote named the organization the Coloured Methodist Episcopal Church.

The Union American Methodist Episcopal Church agrees in doctrines and usages with other Methodist bodies. It is divided into Conferences and elects its Bishops for life. It had in 1907, 18,500 members, 138 ministers and 255 churches.

B. — Non-Episcopal Methodist Churches. The Methodist Protestant Church. — In 1821 ministers and lay- men of the Methodist Episcopal Church began to criticize its polity, and when their utterances became aggressive the ad- herents to the regular order replied with equal vigour. During the General Conference of 1824, held in Baltimore, a Convention of ” Reformers ” met, and established a periodical entitled* The Mutual Rights of the Ministers and Members of the Methodist Episcopal Church, and made arrangements to organize Union Societies. Travelling and local ministers and laymen were expelled for schism and spreading incendiary publications. Prior to the Conference those expelled, and their sympathizers, formed themselves into a society named ” Associate Methodist Reformers.” These sent memorials to the General Conference of 1828, and issued addresses to the public. After a powerful and painful discussion, the appeals of the expelled members of

Conferences were rejected. The controversy centred upon lay representation, the episcopacy and the presiding eldership.

A General Convention was held on the 2nd of November 1830, a Constitution was adopted, and a new organization was estab- lished, styled the Methodist Protestant Church. Within eight years it had accumulated 50,000 members, the majority of whom were in the South and bordering states. The Methodist Protestant Church has a presbyterial form of government, the powers being ui the Conference.

There is no episcopal office or General Superintendent; each Annual Conference elects its own chairman. Its General Conference meets once in four years. Ministers and laymen equal in number are elected by the Annual Conferences, in a ratio of one delegate for 1000 members. The General Conference of the Methodist Episcopal Church of 1008 sent delegates to the Conference of the Methodist Protestant Church, making overtures toward an organic union, but formal negotia- tions have not been instituted. This Church had, in 1907, 1551 ministers, 2242 churches and 183,894 communicants.

The Wesley an Methodist Connection or Church of America.— In the Methodist Episcopal Church slavery was always a cause of contention. In 1842 certain Methodist abolitionists conferred as to the wisdom of seceding. Among the leaders were Orange Scott (1800-1847), JothamHortonandLeRoy Sunderland(i8o2- 1885) and in a paper, which they had established, known as The True Wesley an, they announced their withdrawal from theChurch, and issued a call for a convention of all like-minded, which met on the 31st of May 1843, at Utica, New York, and founded the Wesleyan Methodist Connection or Church of America. The enterprise started with 6000 laymen and 22 travelling ministers of the Methodist Episcopal Church, and nearly as many more from the Methodist Protestant Church and other small bodies of Methodist antecedents. Its General Conference has an equal number of ministers and laymen. In less than eighteen months this body had gained in members 250%; but as the Methodist Episcopal Church had purged itself from slavery in 1844 and slavery itself was abolished in 1862, a large number of ministers and thousands of communicants, connected with this body returned to the Methodist Episcopal Church. It had in 1907 539 ministers, 609 churches and 18,587 communicants.

The Congregational Methodists originated in Georgia in I8S2- but in polity they are not strictly Congregational. Appeals from the decision of the Lower Church may be taken to a District Conference, thence to the State Conference, and ultimately to the General Conference This Church had, in 1907, chiefly in Southern states, 24,000 members, 415 ministers and 425 churches

The Free Methodist Church.— This body was organized in August i860, and was the result of ten years of agitation. A numblr of ministers and members within the hounds of the Genesee Confer- en f/ n .. West . ern New York, ! ” l8 5°- be gan to deplore and denounce the decline of spirituality in the Methodist Episcopal Church. The Kev. a. 1 . Roberts, the ablest among them, was reprimanded by the Bishop presiding in the Annual Conference, and next year he was VSOZia S™

11 ˆ proceedingˆ were taken aga ; nst oth h

appealed to the General Conference of i860, but their expulsion was confirmed. It was the purpose of the founders to conserve the usage and the spirit of primitive Methodism. The government of the Church is simple, in all but the Episcopacy and its adjuncts resembling that of the Church whence it sprangˆ The Free Methodist cZmuniclnts!" I9< >7 ‘ “ˆ mmistMS ‘ II06 church «. and 3 i,376

Minor Methodist Churches.— The Primitive Methodist Church as it exists in the United States, came from England. In 1007 it reported 7013 communicants. The Independent Methodists are composed of congregations in Maryland, Tennessee and the District of Columbia They had fewer than 3000 members in 1907. The Evangelist Missionary Church comprises ministers and members in Ohio whom 1886 withdrew from the African Methodist Episcopal £ion Church They had in 1907 about 5000 members. The New Congregational Methodists in 1881 withdrew from the Methodist

foof P rij ˆf- h ˆ • ‘ m »P e , 0r f- ia – The y had 4022 members in 8?!’ Th / African Union Methodist Protestant Church dates from .1816, and differed from the African Methodist Episcopal Church 1™ˆ?°.?’ˆ ˆˆancy, “paid ministers,” and episcopacy. In 1907 it had 3867 members m eight states. The Zion Union Apos- r,«i”; u™ S organized in 1869, in Virginia. It was reported in 1890 to have 2346 communicants, and shows no gain at the present time. s

pj!, B nW G M PH rˆ r ? t SS / . T AleXa , nder ‘ Histor y °f the Methodist

£%n P %Jru h ‘ u°ˆ (New , X or k; 1894), being vol. xi. of the

American Church History Series”; John Atkinson, Centennial

297

History of American Methodism (New York, 1884); Francis Asburv,

lZ? a J- 3 ˆ°- S – JˆX ˆ’ I 852) ; Nathan B a n gs, A History of the Methodist Episcopal Church from its Origin in 1776 to the General Coherence of 1840(4 vols New York, 1 839-1 842) ; Henry B. Bascom, Methodism and Slavery (Nashville) ; A. H. Bassett, History of the Methodist Protestant Church (Pittsburg, 1878, revised, 1882, 1887) • t nomas E Bond, Economy of Methodism, Illustrated and Defended; J. M. Buckley, History of Methodism in the United States (1897)-

b *i Q ^ r ^'Sf l T 01 i s Forces °f the United Stales (New York, 2nd ed.

a I ‘ Vf • 1 ” Clark > Lt f e and Times of Elijah Hedding (New York 1 »55); Daniel Dorchester, Christianity in the United States (New York, 1895); Edward J. Drinkhouse, History of Methodist Reform V,? ‘ J , Ba , !tl J n0re ,; I – 8 ”) ; Robert Emory, History of the Discipline of the Methodist Episcopal Church (New York, 1843); William L t w S u c °n sMuH < >nal Powers of the General Conference (1860)- I”- W /? ood ,’ ?Z e Hundred Years of the African Methodist Episcopal Zion Church (New York, 1895); Jesse Lee, A Short History of the Methodists in the United States of America (Baltimore, 1810) John Lednum History of the Rise Ond Progress of Methodism in America (1859) ^Alexander McCaine, History and Mystery of Metho-

/J”^ SC f paC ^ B i ltl ^ ore ‘ l82 9); Holland N. McTyeire, A History of Methodism (Nashville, 1884); Joel Martin, The Wesleyan Manual, or History of Wesleyan Methodism (Syracuse, N.Y., 1889); Lucius C Matlack Anti-Slavery Struggle and Triumph in the Methodist

fl S , C ° l £ a i- C J 1 T lrch $ ew , YoTk – l8Sl): Stephen M. Merrill, A Digest of Methodist Law (New York, revised ed., 1888); Thomas D. Neelv • \ ,PJ* th f Origin and Development of the Governing Conference in Methodism _ (New York, 1892); id. The Evolution of Episcopacy and Organic Methodism (New York, 1888); Robert Paine, Life and Times of William McKendree (2 vols., Nashville, 1869; revised ™ 74) L / <" -> t Pay 11 ?; History of the African Methodist Episcopal Church (1891); James Porter Comprehensive History of Methodism { M e % y°, rk ^ l876) ; jM 1 ‘ Redford – History of the Organization of the Methodist Episcopal Church South (Nashville, 1871)- J M Reid Missions and Missionary Society of the Methodist Episcopal’ Church

wf, W Y 7& ‘l 95 ^ revi f d fe y J” T – Grace y: David Sherman, History of the Revisions of the Discipline of the Methodist Episcopal Church (New York, 3rd ed., 1890); Abel Stevens, History of Metho- FwlVrl 8 -‘ w W Y ° rk < T l858); , id - Hist °ry of the Methodist A P 2/r%J; fcV 4 V ?L S f N %f y° rk > l86 4): id – The Centenary of American Methodism (New York, 1866) ; John J. Tigert A Con- ditional History of American Episcopal Methodism (Nashville, 1S94) , J . H. Wakeley, Lost Chapters Recovered from the Early History % ilTX™ T™f h ° dt /% (N ? w Y°ric. 1858); Thomas Ware, Sketches of His Own Life and Travels (New York, 1839); and the Discipline and Journals of the various American Methodist Churches. And the Proceedings of the Centennial Methodist Conference (1884); of the First Ecumenical Conference (1881); of the second Ecumenical Conference (1891); and

of the third Ecumenical Conference (1901).

METHODIST NEW CONNEXION, a Protestant Nolcctformist Church, formed m 1797 by secession from the Wesleyan Metho- dists and merged in 1907 into the United Methodist Church (?.».). The secession was led by Alexander Kilham (q.v.), and resulted from a dispute regarding the position and rights of the laity, Kilham and his party desiring more power for the members of the Church and less for the ministers. In its conferences ministers and laymen were of equal number, the laymen being chosen by the circuits and in some cases by ” guardian repre- sentatives ” elected for life by conference. Otherwise the doctrines and order of the Connexion were the same as those of the Wesleyans. At the time of the union with the Bible Chris- tians and the United Methodist Free Church in 1907 the Methodist New Connexion had some 250 ministers and 45 000 members.

METHODIUS (c. 825-885), the apostle of the Slavs, was a native of fhessalomca, probably by nationality a Graecized Slav. His father’s name was Leo, and his family was socially distinguished- Methodius himself had already attained high official rank in the government of Macedonia before he determined to become a monk. His younger brother Constantine (better known as Cyril the name he adopted at Rome shortly before his death) was- a” friend of Photius, and had earned the surname ” the Philosopher ” in Constantinople before he withdrew to monastic ljfe. Con- stantine about 860 had been sent by the emperor Michael III. to the Khazars, a Tatar people living north-east of the Black Sea, in response to their request for a Christian teacher, but had not remained long among them; after his return to within the limits of the empire, his brother and he worked among the Bulgarians of Thrace and Moesia, baptizing their king Bogoris in 861. About 863, at the invitation of Rastislav, king of “Great Moravia,” who desired the Christianization of his subjects, but

at the same time that they should be independent of the Germans, the two brothers went to his capital (its site is unknown), and, besides establishing a seminary for the education of priests, suc- cessfully occupied themselves in preaching in the vernacular and in diffusing their translations of Scripture lessons and liturgical offices. Some conflict with the German priests, who used the Latin liturgy, led to their visiting Pope Nicholas I., who had just been engaged in his still extant correspondence with the newly converted Bulgarian king; his

death (in 867) occurred before their arrival, but they were kindly received by his successor Hadrian II. Constantine died in Rome (in 869), but Methodius, after satisfying the pope of his orthodoxy and obedience, went back to his labours in ” Moravia ” as archbishop of Syrmia (Sirmium) in Pannonia. His province appears to have been, roughly speaking, co-extensive with the basins of the Raab, Drave and Save, and thus to have included parts of what had previously belonged to the provinces of Salzburg and Passau. In 871 complaints on this account were made at Rome, nominally on behalf of the archbishop of Salzburg, but really in the interests of the German king and his Germanizing ally Swatopluk, Rasti- slav’s successor; they were not, however, immediately successful. In 879, however, Methodius was again summoned to Rome by Pope John VIII., after having declined to give up the practice of celebrating mass in the Slavonic tongue; but, owing to the peculiar delicacy of the relations of Rome with Constantinople, and with the young church of Bulgaria, the pope, contrary to all expectation, ultimately decided in favour of a Slavonic liturgy, and sent Methodius (880) back to his diocese with a suffragan bishop of Neitra, and with a letter of recommendation to Swatopluk. This suffragan, a German named Wiching, unfor- tunately proved the reverse of helpful to his metropolitan, and through his agency, especially after the death of John VIII. in 882, the closing years of the life of Methodius were embittered by continual ecclesiastical disputes, in the course of which he is said to have laid Swatopluk and his supporters under the ban, and the realm under interdict. The most trustworthy tradition says that Methodius died at Hardisch on the March, on the 6th of April 885. He was buried at Welehrad (probably Stuhlweissenburg). The Greek Church commemorates St Cyril on February 14 and St Methodius on May n; in the Roman Church both are com- memorated on March 9. Their canonization (by Leo XIII. in 1 881) is noteworthy, in view of the fact that Gregory VII. and several other popes condemned them as Arians. After the death of Methodius much of his work was undone; his successor Gosrad, a Slav, was expelled, with all the Slav priests, and the Latin language and liturgy supplanted the vernacular. On the 5th of July 1863 a millennial celebration of the two brother apostles was held by the people of Bohemia and Moravia.

See Schafarik’s Slawische Alterthumer; L. K. G6tz, Geschichie der Slavenapostel Konstantinus und Methodius (Gotha, 1897); N. Bonwetsch, Cyrill und Methodius , ‘die Lehrer der Slaven (Erlangen, 1885), and art. in Hauck-Herzog’s Realencyk. fiir prot. Theol. iv. 384, where the literature is cited; G. F. Maclear, Conversion of the Slavs (London, 1879).

METHUEN, BARONY OF. The English title of Baron Methuen of Corsham (Wilts) was created in 1838 for Paul Methuen (1779-1849), who had been a Tory member of parlia- ment for Wilts from 1812 to 1819, and then sat as a Whig for North Wilts from 1833 to 1838. His father, Paul Methuen, was the cousin and heir of the wealthy Sir Paul Methuen (1672-1757), a well-known politician, courtier, diplomatist and patron of art and literature, who was the son of John Methuen (c. 1650-1706), Lord Chancellor of Ireland (1697-1703) and ambassador to Portugal. It was the last-named who in 1703 negotiated the famous ” Methuen Treaty,” which, in return for the admission of English woollens into Portugal, granted differential duties favouring the importation of Portuguese wines into England to the disadvantage of French, and thus displaced the drinking of Burgundy by that of port. He and his son were both buried in Westminster Abbey. The 1st baron was succeeded in the title by his son Frederick Henry Paul Methuen (1818-1891), and the latter by his son Paul, 3rd baron (b. 1845), a distinguished soldier, who became a major-general in 1890, and general officer

commanding-in-chief in South Africa in 1907. The 3rd baron joined the Scots Guards in 1864, served in the Ashanti War of 1874 and the Egyptian War of 1882, and commanded Methuen’s Horse in Bechuanaland in 1884-85, and the first division of the 1st Army Corps in the South African War of 1899-1902. (See Transvaal.)

METHUSELAH, in the Old Testament, the seventh in descent from Adam, and father of Lamech. According to Genesis v. 2 1 he lived 969 years (see Bible: Old Testament, § 5, ” Chronology “). The name itself has been much discussed. Holzinger interprets it as ” man of the javelin “: Hommel prefers ” man of Selah,” Selah being the Hebraized form of the Babylonian Sarrahu (i.e. the god Sin), and identifies it with the ‘A/jejuˆ-iPos of Berossus. The form Methushael, used by the author of Gen. iv. 18 and by some commentators preferred for Gen. v. 21, is variously ex- plained as meaning ” man of El ” (Ball), or as a transcription (Sayce) of the Babylonian Mutu-sa-ili (possibly, ” man of the goddess”).

METHVEN, a village and parish of Perthshire, Scotland, i\ m. W. by N. of Perth by the Caledonian Railway. Pop. of parish (1901), 1699. Only an aisle remains of the collegiate church founded in 1433 by Walter Stewart, earl of Atholl (d. 1437). One mile east of the village, Methven Castle, dating partly from 1680, occupies a fine situation in a park in which stands the Pepperwell oak, 18 ft. in circumference. At Dronach Haugh near the banks of the Almond, which bounds the parish on the N., the earl of Pembroke defeated Robert Bruce in 1306. At Lynedoch,

his estate on the Almond, Thomas Graham (1748- 1843), the Peninsular general, afterwards Lord Lynedoch, carried on many experiments in farming and stock-breeding. He formerly owned Balgowan House, about 3 m. south-west of Methven, where many years after his death the proprietor discovered, during certain alterations, the portrait of Lord Lynedoch's wife, the Hon. Mrs Graham (a daughter of the 9th Lord Cathcart), one of Gainsborough's masterpieces, now in the National Gallery in Edinburgh; 4ˆ m. north-west of Methven, occupying a beautiful position in Glenalmond, is Trinity College, a public school on the English model, the first of its kind in Scotland, founded in 1841 through the efforts of W. E. Gladstone, J. R. Hope-Scott, Dean Ramsay and others, and opened in 1847. In 1851 Charles Wordsworth, the first warden, afterwards bishop of St Andrews, added the chapel. At Tibbermore, or Tippermuir, about 3 m. south-east of Methven, Montrose won the first of a series of battles over the Covenanters on the 1 st of September 1644.

METHYL ALCOHOL (CH 3 OH), the simplest aliphatic alcohol; an impure form is known in commerce as wood-spirit, being produced in the destructive distillation of wood. The name methyl, from Gr. p,k6v, wine, uXtj, wood, explains its origin. Discovered by Boyle in 1661, it was first carefully studied by Dumas and Peligot in 1831; its synthesis from its elements (through methane and methyl chloride) was effected by Berthelot in 1858. It is manufactured by distilling wood in iron retorts at about 500 C, when an aqueous distillate, containing methyl alcohol, acetone, acetic acid and methyl acetic ester, is obtained. This is neutralized with lime and redistilled in order to remove the acetic acid. The distillate is treated with anhydrous calcium chloride, the crystalline compound formed with the alcohol being separated and decomposed by redistilling with water. The aqueous product is then dehydrated with potash or lime. To obtain it perfectly pure the crude alcohol is combined wA oxalic, benzoic or acetic acid, and the resulting ester separated 1 , purified, and finally decomposed with potash. Methyl alcohol is also obtained in the dry distillation of molasses. The amount of methyl alcohol present in wood spirit is determined by con- verting it into methyl iodide by acting with phosphorus iodide; and the acetone by converting it into iodoform by boiling with an alkaline solution of iodine in potassium iodide; ethyl alcohol is detected by giving acetylene on heating with concentrated sulphuric acid, methyl alcohol, under the same circumstances, giving methyl ether.

Pure methyl alcohol is a colourless mobile liquid, boiling at

66°-67 , and having a specific gravity of 6-8142 at o° C. It has a burning taste, and generally a spirituous odour, but when absolutely pure it is said to be odourless. It mixes in all pro- portions with water, alcohol and ether. Its compound with calcium chloride has the formula CaCl 2 -4CH3-OH, and with barium oxide BaO-2CH 3 OH. Oxidation gives formaldehyde, formic acid and carbonic acid; chlorine and bromine react, but less readily than with ethyl alcohol. The chief industrial applications are for making denatured alcohol (q.v.), and as a solvent, e.g. in varnish manufacture; it is also used for a fuel; a purer product is extensively used in the colour and fine chemical industries.

Methyl chloride CH3CI, is a gas, boiling at -23 , obtained by chlorinating methane, or better, from methyl alcohol; wood spirit is treated with salt and sulphuric acid, or hydrochloric acid gas conducted into the boiling spirit in the presence of zinc chloride, the evolved gas being washed with potash and dried by sulphuric acid. It is also prepared by heating trimethylamine hydrochloride. Alcohol dissolves 35 volumes and water 4. Methyl bromide is a liquid, specific gravity 1-73, boiling point 13 ; methyl iodide has a specific gravity of 2-19, and boils at 43°.

METICULOUS (through Fr. mSHculeux, from Lat. meticulosus, timid, cautious; -metus, fear), a term meaning pedantically or excessively careful' of details, over-scrupulous, laying too much stress on minutiae.

METOCHITA, THEODORE [Theodoros Metochites], a Byzantine author, man of learning and statesman, who flourished during the reign of Andronicus II. Palaeologus (1282-1328). After the deposition of his patron by Andronicus III., Metochita was deprived of his office of great logothete (chancellor) and sent into exile. He was soon recalled, but retired from political life to a convent, where he died in 1332. He was a man of very great learning, only surpassed by Photius and Michael Psellus. His pupil Nicephorus Gregoras, who delivered his funeral oration, calls him a " living library."

Only a few of his numerous works have been preserved. The best known is 'TvonvT))iaTi

METONIC CYCLE, in chronology, a period of 19 years during which there are 235 lunations, so called because discovered by Meton.

Computation from modern data shows that 235 luna- tions are 6939 days, 16-5 hours; and 19 solar years, 6939 days, 14-5 hours. The relation between integral numbers of months and years expressed by Meton's rule therefore deviates only two hours from the truth. Since 19 Julian years make 6939 days, 18 hours, the relation errs by only 1-5 hour when the Julian year is taken. Meton was an Athenian astronomer (fl. 432 B.C.).

METONYMY (Gr. perwvvfiia, change of name, from pera denoting change, and 8vona, name), a figure of speech, in which the name of one thing is changed for that of another, to which it is related by association of ideas, as having close re- lationship to one another. Thus " sceptre," ""throne," " crown," are used for royal power or authority, " hearth and home " is used for " country," &c.

" Synecdoche " (Gr. ffvveKSoxV, from avveKSkxeo-dat., to join in receiving) is a rhetorical figure similar to metonymy, in which the part is used for the whole or vice versa, thus " hands " is used for the members of the crew of a vessel; a regiment of infantry is said to number so many " bayonets," &c.

METOPE (Gr. ner&nj, a middle space), a term in archi- tecture for the square recess between the triglyphs in a Doric frieze, which is sometimes filled with sculpture.

METRE (jurpiicr), sc. rkxvri, from Gr. ukrpov, measure), in prosody, the harmonious and regulated disposition of syllables into verse. Metrical form is distinguished from prose by the uniformity of corresponding lines in relation to the number of syllables and the similarity of final sound (rhyme or

assonance) , by the repetition of certain letters at regular intervals (in alliterative measure), or merely by the regular succession of ups and downs of intonation. In ancient classic poetry the measure which creates the metrical form consists only of this last quantitative element, which is rhythm.

For the rules and divisions of the various metrical systems, see Verse. For the restricted use of " metre " as a unit of measure- ment, see Metric System below.

METRIC SYSTEM (adapted from Gr. pkrpov, measure), that system of weights and measures of which the metre is the fundamental unit. The theory of the system is that the metre is a nnnsWor part of a quandrant of the earth through Paris; the litre or unit of volume is a

cube of ■£$ metre side; the gramme or unit of weight is (nominally) tbW of the weight of a litre of water at 4° C. The idea of adopting scientific measurements had been suggested as early as the 17th century, particularly by the astronomer Jean Picard (1620-1682), who proposed to take as a unit the length of a pendulum beating one second at sea- level, at a latitude of 45 . These suggestions took practical shape by a decree of the National Assembly in 1790 appointing a committee to consider the suitability of adopting either the length of the seconds pendulum, a fraction of the length of the equator or a fraction of the quadrant of the terrestrial meridian. The committee decided in favour of the latter and a commission was appointed to measure the arc of the meridian between Dunkirk and Mont Jany, near Barcelona. Another commis- sion was also appointed to draw up a system of weights and measures based on the length of the metre and to fix the nomen- clature, which on the report of the commission was established in 1795. It was not until 1799 that the report on the length of the metre was made. This was followed by the law of the 10th of December 1799 fixing definitely the value of the metre and of the kilogramme, or weight of a litre of water, and the new system became compulsory in 1801. It was found necessary however to pass an act in 1837, forbidding as and from the 1st of January 1840, under severe penalties, the use of any other weights and measures than those established by the laws of 1795 and 1799. The metric system is now obligatory in Argentina, Austria-Hungary, Belgium, Brazil, Chile, France, Germany, Greece, Italy, Mexico, Netherlands, Norway, Peru, Portugal, Rumania, Servia, Spain, Sweden, Switzerland. Its use is legalized in Egypt, Great Britain, Japan, Russia, Turkey and the United States. In 1875 there was constituted at Paris the Inter- national Bureau of Weights and Measures, which is managed by an international committee. The object of the Bureau is to make and provide prototypes of the metre and kilogramme, for the various subscribing countries.

In England action has frequently been taken both by individuals and by associations of commercial men for the purpose of endeavour- ing to make the metric system compulsory. A Decimal Association was formed in 1854, but did not make very much headway. A bill was introduced into parliament in 1864 to make the metric system compulsory for certain purposes, but owing to government objections a permissive bill was substituted and subsequently became law as the Metric Act 1864. It was, however, repealed by the Weights and Measures Act 1878. In 1871 another bill for compulsory adoption was rejected by the House of Commons on the second reading by a majority of five. In 1893 a representative delegation of business men

pressed its adoption on the chancellor of the exchequer (Sir W. V. Harcourt), but he declined. But in 1897 a statute was passed, the Weights and Measures (Metric System) Act, which legalized the use in trade of the metric system, and abolished the penalty for using or having in one's possession a weight or measure of that system.

See also Decimal Coinage and Weights and Measures. "■*

METROCLES, a Greek philosoper of the Cynic school, was a contemporary of Crates, under whose persuasion he deserted the views of Theophrastus. It was his sister, Hipparchia, whose romantic attachment to Crates is a fascinating sidelight on the almost truculent asceticism of the Cynics. He was a man of peculiar strength of character, and esteemed the joys of life so low that he was deterred from an early suicide only by the influence of Crates. His philosophical views, which were identical with those of Crates (q.v.), he expounded by precept and example with great success, and had among his pupils

Menippus of Sinope. Having weighed the probable pains and pleasures of approaching old age, he decided that life had nothing left for which he greatly cared, and drowned himself. He is said to have written several works, which he afterwards burnt. Of one, entitled Xpeiai, Diogenes preserves a single line (vi. 6).

METRODORUS, the name of five philosophers.

i. Metrodorus of Athens was a philosopher and painter who flourished in the 2nd century B.C. It chanced that Paullus Aemilius, visiting Athens on his return from his victory over Perseus in 168 B.C., asked for a tutor for his children and a painter to glorify his triumph. The inhabitants suggested Metrodorus as capable of discharging both duties, and it is recorded that Aemilius was entirely satisfied (see Pliny, Nat. Hist. xxv. 135).

2. Metrodorus of Chios was an important member of the Atomistic school. A pupil of Nessus, or, as some accounts prefer, of Democritus himself, he was a complete sceptic. He accepted the Democritean theory of atoms and void and the plurality of worlds, but held a theory of his own that the stars are formed from day to day by the moisture in the air under the heat of the sun. His radical scepticism is seen in the first sentence of his Hepl cfrvatcos, quoted by Cicero in the

Academics ii- 23 § 73. He says, ” We know nothing, no, not even whether we know or not!” and maintains that everything is to each person only what it appears to him to be. Metrodorus is especially interesting as the teacher of Anaxarchus, the friend of Pyrrho, and, therefore, as the connecting link between atomism proper and the later scepticism. It cannot be decided whether a work entitled the TjxoiKa quoted by Athenaeus (iv. 184 a) is by this, or another, Metrodorus. The same difficulty is found in the case of the Hepl iaropias referred to by the scholiast on Apollonius.

3. Metrodorus of Lampsacus was the disciple and intimate friend of Epicurus, and is described by Cicero (de Fin. ii. 28. 92) as ” almost a second Epicurus.” He died in 277 B.C. at the age of fifty-three, seven years before his master, who adopted his children and in his will commended them to the care of his pupils. The wife of Metrodorus was Leontion, herself, like many other women of the time, a member of the Epicurean society. Athen- aeus (vii. 279 F.) quotes from the words of Metrodorus showing that he was in entire agreement with Epicurus, and was, if possible, even more dogmatic in his doctrine of pleasure. He censures his brother, Timocrates, who, though professedly Epicurean, maintained the existence of pleasures other than those of the body.

4. Another Metrodorus of Lampsacus was a pupil of Anaxagoras, and one of the earliest to attempt to interpret Homer allegorically. He explained not only the gods but also the heroes Agamemnon, Achilles, Hector, as representing primary elements and natural phenomena.

5. Metrodorus of Stratonice was a pupil, first of Apollodorus, and later of Carneades. He flourished about no B.C., and is reputed to have been an orator of great power. His defection from the Epicurean school is almost unique. It is explained by Cicero as being due to his theory that the scepticism of Carneades was merely a means of attacking the Stoics on their own ground. Metrodorus held that Carneades was in reality a loyal follower of Plato.

METRONOME (Gr. pkrpov, measure, and vbpjos, law), an instrument for denoting the speed at which a musical composition is to be performed. Its invention is generally, but falsely, ascribed to Johann Nepomuk Maelzel, a native of Ratisbon (1772-1838). It consists of a pendulum swung on a pivot; below the pivot is a fixed weight, and above it is a sliding weight that regulates the velocity of the oscillations by the greater or less distance from the pivot to which it is adjusted. The silent metronome is impelled by the touch, and ceases to beat when this impulse dies; it has a scale of numbers marked on the

pendulum, and the upper part of the sliding weight is placed under that number which is to indicate the quickness of a stated note, as M.M. (Maelzel's Metronome) f»=6o, or i»= 72, ori»=io8, or the

like. The number 60 implies a second of time for each single

oscillation of the pendulum — numbers lower than this denoting slower, and higher numbers quicker beats. The scale at first extended from 50 to 160, but now ranges from 40 to 208. A more complicated metronome is impelled by clock-work, makes a ticking sound at each beat, and continues its action till the works run down; a still more intricate machine has also a bell which is struck at the first of any number of beats willed by the person who regulates it, and so signifies the accent as well as the time.

The earliest instrument of the kind, a weighted pendulum of variable length, is described in a paper by Etienne Loulie' (Paris, 1696; Amsterdam, 1698). Attempts were also made by Enbrayg (1732) and Gabory (1771). Harrison, who gained the prize awarded by the English government for his chronometer, published a de- scription of an instrument for the purpose in 1775. Davaux (1784), Pelletier, Abel Burja (1790) and Weiske (also 1790) described their various experiments for measuring musical time. In 1813 Gottfried Weber, the composer, theorist and essayist, proposed a weighted ribbon graduated by inches or smaller divisions, which might be held or otherwise fixed at any desired length, and would infallibly oscillate at the same speed so long as the impulse lasted. Stockel and Zmeskall produced each an instrument; and Maelzel made some slight modification of that by the former, about the end of 1812, which he announced as a new invention of his own, and exhibited from city to city on the Continent. It was, as nearly as can be ascertained, in 1812 that Winkel, a mechanician of Amsterdam, devised a plan for reducing the inconvenient length of all existing instruments, on the principle of the double pendulum, rocking on both sides of a centre and balanced by a fixed and a variable weight. He spent three years in completing it, and it is described and commended in the Report of the Netherlands A cademy of Sciences (Aug. 14, 1815). Maelzel thereupon went to Amsterdam, saw Winkel and inspected his invention, and, recognizing its great superiority to what he called his own, offered to buy all right and title to it. Winkel refused, and so Maelzel constructed a copy of the instrument, to which he added nothing but the scale of numbers, took this copy to Paris, obtained a patent for it, and in 1816 estab- lished there, in his own name, a manufactory for metronomes. When the impostor revisited Amsterdam, the inventor instituted proceedings against him for his piracy, and the Academy of Sciences

decided in Winkel's favour, declaring that the graduated scale was the only point in which the instrument of Maelzel differed from his. Maelzel's scale was needlessly and arbitrarily complicated, proceeding by twos from 40 to 60, by threes from 60 to 72, by fours from 72 to 120, by sixes from 120 to 144 and by eights from 144 to 208. Dr Crotch constructed a time measurer, and Henry Smart (the violinist, father of the composer of the same name) made another in 1821, both before that received as Maelzel's was known in England. In 1882 James Mitchell, a Scotsman, made an ingenious amplification of the Maelzel clock-work, reducing to mechanical demonstration what formerly rested wholly on the feeling of the performer.

Although " Maelzel's metronome " has universal acceptance, the silent metronome and still more Weber's graduated ribbon are greatly to be preferred, for the clock-work of the other is liable to be out of order, and needs a nicety of regulation which is almost impossible; for instance, when Sir George Smart had to mark the traditional times of the several pieces in the Dettingen Te Deum, he tested them by twelve metronomes, no two of which beat together. The value of the machine is exaggerated, for no living performer could execute a piece in unvaried time throughout, and no student could practise under the tyranny of its beat; and conductors of music, nay, composers themselves, will conduct the same piece slightly slower or quicker on different occasions, according to the circumstances of performance.

METROPOLIS (Gr. p.r\rt\p, mother, tt6A«, city), properly a mother-city, and so the name of the parent state from which colonies were founded in ancient Greece (see Greece, sect. History, Ancient). The word was used in post-classical Latin for the chief city of a province, the seat of the government, and in particular ecclesiastically for the seat or see of a metropolitan bishop (see Metropolitan). It is thus used now for the capttaJ of a country, which contains the various official buildings of the administrative departments, the Houses of Parliament, &c. In the case of London, the term " metropolitan " is sometimes applied to the whole area including the " City of London," e.g. "Metropolitan Asylums Board"; and sometimes, as in " Metropolitan Police," excludes the City, which has its own police force (see London).

METROPOLITAN (Lat. metropolitanus, Gr. iit]T povo\ln)i) , in the Christian church, the title of a bishop who has the over- sight over bishops of subordinate sees. In the Western church

the metropolitan is practically the same as the archbishop (q.v.); in the Eastern church he ranks above the archbishop, but below the patriarch {q.v.). Metropolitans first appear in the East in the 4th century as presiding over a province (provincia or eirapxia), and their see is fixed in th« principal town (pjrpoiroAis) of the province, which remains the normal custom both in East and West. In Africa, however, the metropolitan jurisdiction was exercised by the senior bishop (primas, primae sedis episcopus, senex) for the time being, a custom which prevailed for a time also in Spain. Thus, too, in the Scottish Episcopal Church and the Protestant Episcopal Church of America there are no metropolitans, the primas being the senior bishop.

METSU, GABRIEL (1630-1667), Dutch painter, was the son of Jacob Metsu, who lived most of his days at Leiden, where he was three times married. The last of these marriages was cele- brated in 1625, and Jacomma Garnijers, herself the widow of a painter, gave birth to Gabriel in 1630. According to Houbraken Metsu was taught by Gerard Dow, though his early works do not lend colour to this assertion. It is certain, however, that he was influenced in turn by Jan Steen, Rembrandt, and Hals. Metsu was registered among the first members of the painters' corpora- tion at Leiden; and the books of the gild also tell us that he remained a member in 1649. In 1650 he ceased to subscribe, and works bearing his name and the date of 1653 give countenance to the belief that he had then settled at Amsterdam, where he probably continued his studies under Rembrandt. One of his earliest pictures is the " Lazarus " at the Strassburg Museum, painted under the influence of Jan Steen. Under the influence of Rembrandt he produced the " Woman taken in Adultery," a large picture with the date of 1653 in the Louvre. To the same period belong the " Departure of Hagar," formerly in the Thore collection, and the " Widow's Mite " at the Schwerin Gallery. But he probably observed that sacred art was ill suited to his temper, or he found the field too strongly occupied, and turned to other subjects for which he was better fitted. That at one time he was deeply impressed by the vivacity and bold technique of Frans Hals can be gathered from Lord Lonsdale's picture of " Women at a Fishmonger's Shop." What Metsu undertook and carried out from the first with surprising success was the low life of the market and tavern, contrasted, with wonderful versatility, by incidents of high life and the drawing-room. In no single instance do the artistic lessons of Rembrandt appear to have been lost upon him. The same principles of light and shade which had marked his schoolwork in the " Woman taken in Adultery " were applied to subjects of quite a different kind. A group in a drawing-room, a series of groups in the

market- place, or a single figure in the gloom of a tavern or parlour, was treated with the utmost felicity by fit concentration and gradation of light, a warm flush of tone pervading every part, and, with that, the study of texture in stuffs was carried as far as it had been by Ter Borch or Dow, if not with the finish or the brio of De Hooch.

Metsu went to Amsterdam before 1655, married in 1658, and became a citizen of that city in 1659. One of the best pictures of Metsu's manhood is the " Market-place of Amsterdam," at the Louvre, respecting which it is difficult to distribute praise in fair proportions, so excellent are the various parts, the characteristic movement and action of the dramatis personae, the selection of faces, the expression and the gesture, and the texture of the things depicted. Equally fine, though earlier, are the " Sportsman " (dated 1661) and the " Tavern " (also 1-661) at the Hague and Dresden Museums, and the " Game-Dealer's Shop," also at Dresden, with the painter's signature and 1662. Among the five examples of the painter at the Wallace Collection, including " The Tabby Cat," " The Sleeping Sportsman," which cost Lord Hertford £3000, is an admirable example technically considered. Among his finest representations of home life are the " Repast " at the Hermitage in St Petersburg; the " Mother nursing her Sick Child " of the Steengracht Gallery at the Hague; the " Amateur Musicians " at the Hague Gallery; the " Duet " and the " Music Lesson " at the National Gallery, and many more examples at nearly all the leading European galleries.

METTERNICH-WINNEBURG, CLEMENS WENZEL LOTHAR,

Prince (1773-1859), Austrian statesman and diplomatist, was born at Coblenz on the 15th of May 1773. His father, Count Franz Georg Karl von Metternich- Winneburg zu Beilstein 1 (d. 1818), was a diplomatist who had passed from the service of the archbishop-elector of Trier to that of the court of Vienna; his mother was Countess Maria Beatrix Aloisia von Kagenegg. At the time of Clemens Metternich's birth, and for some time subsequently, his father was Austrian ambassador to the courts of the three Rhenish electors, and the boy was thus from the first brought up under the influence of the tone and ideas which flourished in the small German courts that lay within the sphere of influence of the France of the ancien r&gime.. In 1788 he went to the university of Strassburg, where he studied German constitutional law; but the outbreak of the French Revolution caused him to leave after two years. Metternich was a witness of the excesses of the mob in Strassburg, and he ascribed his life-long hatred of political innovation to these early experiences of the victory of liberal ideas. In 1790, by way of striking contrast, he was deputed by the Catholic bench of the

West- phalian college of counts to act as their master of the ceremonies at the coronation of the Emperor Leopold II. at Frankfort,' a function which he again performed at the coronation of Francis II. in 1792. The intervening time he spent at Mainz, attending the university and frequenting the court of the archbishop- elector, where his impressions of the Revolution were strength- ened by his intercourse with the French imigr&s who had made it their centre. The outbreak of the revolutionary war drove him from Mainz, and he went to Brussels, where he found employment in the chancery of his father, at that time Austrian minister to the government of the Netherlands. Here, in August 1794, he issued his first publication, a pamphlet in which he denounced the " shallow pates " of the old diplomacy and argued that the only way to combat the French revolution- ary armies was by a levie en masse of the populations on the frontier of France — singular views for the statesman who was destined to be the last great representative of the old diplomacy and the greater part of whose life was to be spent in combating the national enthusiasms by which the revolutionary power of France was ultimately overthrown.

After a long stay in England, where he made the acquaintance of the prince of Wales (afterwards George IV.), Metternich went to Vienna; and on the 27th of September 1795 he married at Austerlitz the Countess Eleonore von Kaunitz, a grand-daughter of that Austrian chancellor who in many respects was his prototype. This alliance not only brought him great estates in Austria, but introduced him into the most exalted circles of Viennese society. Here he was well qualified to hold his own by reason of his handsome presence, the exquisite courtesy of his address and a certain reputation for gallantry. He was far, however, from being a mere carpet diplomatist. His interests were many and varied, and he found time for the serious study of natural science and medicine. In December 1797 he was chosen by the Westphalian counts as their representative at the congress of Rastadt, where he remained till 1799. This was his first experience of the great world of practical politics and especially of those rough diplomatists of the Revolution of whom in his letters he has left so vivid a description. In January 1801 he was appointed Austrian envoy to the elector of Saxony. His two years' stay at the court of Dresden was mainly useful to him by bringing him into touch with the many Russian and Polish families of importance; his serious diplomatic career did not begin till his appointment, in November 1803, as ambassador at Berlin. His instructions at the outset were to

1 The family of Metternich, originally established in the county of Julich, can trace its descent to the middle of the 14th century. In 1637

they received from the archbishop of Trier the countships of Winneburg and Beilstein. These were confiscated in 1803, and the lands of the suppressed abbey of Ochsenhausen, with the title of prince of the Empire, were granted by the edict as compensation. The new principality was ” mediatized ” in 1806 in favour of Wurt-temberg; but in virtue of their short tenure of it the descendants of Prince Metternich enjoy the privileges of mediatized princes.

prevent Prussia from joining the alliance of Russia and Great Britain against the French Republic and to make himself agreeable to the representative of France; but shortly afterwards his part was exactly reversed, owing to the shifting of political forces which led to the war of the third coalition, and he laboured to secure the adhesion of Prussia to the alliance of Austria, Russia and Great Britain against Napoleon. His diplomacy was not successful; for though Prussia ultimately signed the treaty of the 5th of November 1805 with Austria and Russia, the influence of the emperor Alexander and the wound given to her pride by Napoleon’s contemptuous violation of her territory had more to do with Prussia’s decision than Metternich’s veiled threats. His reward was the grand cross of the order of St Stephen and the appointment of ambassador at St Petersburg; but his commission to make himself agreeable to the French ambassador at Berlin was carried out tp such excellent effect that, as a result of M. Laforest’s reports, Napoleon requested that he might be appointed to represent Austria at the Tuileries, and in August 1806 Metternich took up his residence as ambassador in Paris.

This was the beginning of his ever growing influence in European affairs. Established in the diplomatic character of an ” honourable spy ” in the very, centre of Napoleon’s power, he used his exceptional gifts of fascination not only to become a persona grata at the Tuileries, but to establish relations with those elements in the society of the empire which were already intriguing against Napoleon’s power. His intimacy with Talley- rand and with Caroline Murat, Napoleon’s sister, was destined to produce notable results later. Though on the look-out, however, for any chance of weakening the French emperor’s power, Metternich was not at first sanguine of success, for he believed Napoleon to be invincible. For Austria the best policy seemed to him to be to temporize; he was willing, therefore, to co-operate with France in the agreement made between Napoleon and Alexander I. of Russia at Tilsit for the partition of the Ottoman Empire; failing the

success of the efforts of Austrian diplomacy to break the Franco-Russian alliance, this would at least secure for the Habsburg monarchy a share of the spoils. With the postponement of Napoleon's Oriental schemes, however, the situation was once more changed. During the summer of 1808 Metternich had reason to suspect fresh designs of the French emperor against Austria, and his suspicions appeared to be confirmed when, during an interview on the 1 5th of August, Napoleon indulged in one of his violent tirades, denouncing Count Stadion's action in strengthening the Austrian armaments. In November Metternich was at Vienna, urging the Austrian government to an early declaration of war — for which the moment seemed to him opportune owing to the French losses in Spain, of which he had received exaggerated reports. On the 1st of January 1809 he was back in Paris, but no longer as a persona grata. At the outbreak of the war he was placed under arrest, in retaliation for the action of the Austrian government in interning two members of the French embassy in Hungary; and in June, on Napoleon's capture of Vienna, he was conducted there under military guard. In July he was exchanged at Komarom for the French diplomatists, and he was present with the emperor Francis at the battle of Wagram. At a council held on the 7th of July it was decided, on Metternich's initiative, to open negotiations for peace; next day Stadion tendered his resignation, which was provisionally accepted. Stadion was sent as diplomatic adviser to the headquarters of the archduke Charles, while Metternich took his place at the emperor's side. On the 4th of August Metternich was named minister of state, and soon afterwards was sent with Count Nugent to the peace conference at Altenburg, where Chamagny attended as Napoleon 's representative. The conference, however, dragged on without result, and the emperor Francis decided to open negotiations with Napoleon direct. Count Bubna was accordingly sent to Schonbrunn; the result was the French ultimatum which issued in the treaty of Schonbrunn (Vienna) , signed by Prince Liechten stein on behalf of the emperor Francis on the 14th of October 1809. With the negotiation and signature of this humiliating

instrument Metternich therefore had nothing to do, though on the 8th of October he had been definitely appointed minister for foreign affairs, an office he was destined to hold for nearly forty years.

The position of the new minister was no easy one. By the treaty of Schonbrunn Austria was reduced to the position of a second-rate power, and by secret articles undertook during the continuance of the maritime war to limit her force of all arms to 150,000 men, and to dismiss from her service all officers or civil officers born in the territories of ancient France, Piedmont or the former Venetian

republic. Weak as she had become, the menace of the future seemed even more disquieting. To the south she was divided from the French dominions by the Save; to the west and north the vassal states of France, traditionally her enemies, lay along the frontier; to the east was Russia, which as the reward for her alliance with Napoleon had received a portion of East Galicia as her share of the spoils, and to all appearance was firmly established in the Danubian princi- palities. Austria seemed hopelessly cut off by Napoleon from any chance of re-asserting her traditional preponderance in Germany, by Russia from any prospect of obtaining compensa- tion at the expense of the Ottoman Empire. One false move on the part of those who guided its destinies, and the Habsburg monarchy might easily have ceased to exist altogether.

The saving factor in the situation was the improbability of the alliance between Napoleon and Alexander continuing, and the immediate task of Metternich was to hasten its dis- solution, while securing Austria's safety in the East by bringing about the end of the Russo-Turkish War. It was a task of extreme delicacy; for any revelation of its true tendency might have thrown the emperor Alexander into the arms of France and plunged Austria into an unequal struggle for life and death with Russia on the banks of the Danube. Metternich was helped by the rapid development of the causes of disagreement between the French and Russian emperors. Early in 18 10 Europe was full of contradictory rumours of war between France and Russia, of a marriage of Napoleon with a Russian grand duchess. Then suddenly came Napoleon's formal request for the hand of the Austrian archduchess Marie Louise. A proposal so nicely calculated to forward Metternich's plans was suspected of being due to his inspiration; certainly it was his influence that decided the emperor Francis to agree to an alliance which could not but be distasteful to him and was resented as a crowning humiliation by the proud aristocrats of Vienna.

On the 13th of March 1810 Metternich left Vienna for Paris in company with the archduchess. His object was to use so favourable an occasion for obtaining the abrogation of some of the more onerous articles of the treaty of Schonbrunn, and for coming to some arrangement whereby the serious incon- venience caused in Austria by Napoleon's coercion of the pope might be obviated. His diplomacy, however, met with but slight success. His efforts to persuade Pius VII. to purchase a measure of liberty of action by concessions to Napoleon broke down on the gentle old man's refusal to traffic with his principles. From Napoleon he extracted a lame apology for the execution of Andreas Hofer, the reversal of a few sequestrations and, as a crowning grace, the abrogation of the article of the Schonbrunn

treaty limiting Austrian armaments. In the matter of restoring the access of Austria to the Adriatic, Napoleon would make no concession; his answer to Metternich's representations was only a commercial treaty which failed to obtain ratification at Vienna. Anything further, e.g. an exchange of the Illyrian provinces for Galicia, must depend on the attitude of Austria irr the forthcoming Russian war which, in an interview of the 20th of September, Napoleon declared to be now inevitable.

On the 10th of October Metternich was back in Vienna, where his presence was urgently needed. The policy of a Franco- Austrian entente was popular with the public and the army, resentful of the treacherous attitude of Russia in the late war, but in the powerful circlesof the court it had scarce an adherent. Prince Metternich himself, who had acted as foreign secretary during his son's absence, favoured an understanding with Russia,

and was even believed to be intriguing to retain the portfolio of foreign affairs, which would have meant the victory of the Russian party. On the other hand, the French party were clamouring for the speedy conclusion of a .definite alliance with Napoleon. By an admirably clear expose of the situation Metternich won over the emperor Francis to that middle course, the policy of armed abstention, which was to be the basic principle of his diplomatic action during the crisis of the coming years. An alliance with Russia, he argued, would be worse than useless; Austria would at any time obtain better terms from the tsar's growing needs. An alliance with France would be one with " a power whose exclusive object is the destruction of the old order of things, which has hitherto found its defence in Austria." Alone of European Powers Austria still had the possibility of choice; let her work for the preserva- tion of peace and at the same time remain free, should war break out, to make her own terms. It would little serve Austria's interests to become the ally of Russia, merely to serve as a barrier behind which the emperor Alexander could carry out his designs on Turkey in safety. In an interview with Count Shuvalov, the Russian agent, Metternich roundly declared that the maintenance of the integrity of Turkey was for Austria the question of supreme interest.

With the approach of the Russo-French War the situation became increasingly difficult. The partisans of a Russian alliance remained

powerful and clamorous; but Metternich did not share the doubts as to the outcome of Napoleon's invasion of Russia, which he believed would leave Austria, if she remained neutral, isolated amid a huge European confederation. To him the only safe course seemed to be to offer the French emperor substantial assistance, stipulating for some quid pro quo in the settlement to follow the war. The emperor Francis shared this view; and on the 14th of March a treaty of alliance was signed by which Austria agreed to support the French army with an army corps of 30,000 men operating from Galicia. This treaty was ratified at Vienna on the 25th of March, the day of Napoleon's passage of the Niemen. It was characteristic of Metternich's diplomacy that the Austrian generals in Galicia were ordered to act only on the defensive, and that the court of St Petersburg was informed that Austria would only take part in the war as a principal should Russia force her to do so.

This cautious attitude was soon justified by the astounding developments of the Moscow campaign. When the full extent of the catastrophe that had overwhelmed Napoleon's army became known, Metternich realized the advantageous position in which Austria lay for exploiting the changed situation. His first idea was that France should commission Austria to mediate a peace in Russia and in England (Despatch of Otto, Novem- ber 10); but, as affairs developed, this was replaced by the policy of temporizing until Austria should be in a position to intervene with decisive effect. Napoleon's demand that Austria should raise her contingent from 30,000 to 100,000 men was, indeed, from Metternich's point of view doubly opportune: for it enabled him quietly to assume that the treaty of the 14th of March, which stipulated only for an " alliance limitee," had been abrogated by Napoleon's own act; that Austria had reverted to a position of neutrality; and that, should – she take part in the war, it would no longer be in a subordinate character but as a principal. "Le passage de la neutralite a la guerre," said Metternich to the emperor Francis, " ne sera possible que par la mediation armee "; which meant in effect that Austria required time to complete her armaments. To gain this time was. during the weeks that followed, the object of his diplomacy. For this purpose he encouraged Napoleon to believe that Austria was prepared for a settlement on terms very favourable to the French emperor; with the result that Napoleon, though he woujd not hear of a " mediation," not only consented to, but pressed for, Austrian "intervention" (entremise). But Metter- nich had made up his mind that the only chance *of an effective restoration of the Habsburg influence in Europe lay in using this opportunity for destroying or limiting Napoleon's power,

and he had already opened negotiations with the allied courts, with a view to enforcing a common agreement as to a basis of peace, when the indecisive battle of Liitzen (May 2) gave him the opportunity of making his policy of mediation effective. Count Stadion was now sent to the emperor Alexander to lay before him the terms on which Austria was prepared to mediate; he was also to ” agree to the bases of an active military co-opera- tion on our part, in the event of the non-success of our efforts on behalf of peace.” On the 20th of March Napoleon gained another indecisive victory at Bautzen, which still further strengthened Metternich’s position; for Napoleon allowed him-self to be persuaded into signing the ill-omened armistice of Pleiswitz (Poischwitz) , on the 4th of June, and to become en- tangled in the insincere negotiations of the congress of Prague. Austria thus had time to complete her armaments. Meanwhile, on the 14th and 15th of June, were signed at Reichenbach the treaties of alliance between Great Britain, Russia and Prussia, by which the signatory Powers agreed neither to negotiate nor to conclude treaty or truce with Napoleon except by common consent. In an interview with the emperor Alexander, Metter- nich now presented the terms which he proposed to offer to Napoleon, and on this basis a treaty between Austria, Russia and Prussia was agreed to, Austria contracting to put 150,000 men into the field, should Napoleon reject the ultimatum, and not to make peace without the consent of Russia and Prussia — which in effect involved that of Great Britain also.

Before this second treaty of Reichenbach was signed (June 27), Metternich went on Maret’s invitation to Dresden, where on the 26th he had the famous interview with Napoleon. The whole scene was on his part a masterpiece of Machiavellian diplomacy. The terms he offered to the emperor were so favourable that he has been denounced by every Prussian historian since as the enemy of Germany; while French historians have enlarged on Napoleon’s infatuation in rejecting them. In spite of the fact that the draft of the treaty of Reichenbach was in his pocket, he posed as the impartial ” mediator,” with a leaning in favour of Napoleon, assuring the emperor ” on his honour as a German count ” that Austria was still ” free from all engagements,” which was true only in so far as the treaty was not signed till the next day. Metternich’s object was, in fact, only to gain an extension of the armistice till the 10th of August, on which date Schwarzenberg had declared that he would be ready to take the offensive. As for the terms offered to Napoleon his acceptance of them need not hamper the plans of the Allies; for the consent of Great Britain would have to be obtained, and, moreover, Napoleon was sure before long to provide an excuse for a fresh breach; his rejection of

them, on the other hand, would be a blow to his waning popularity in France. The interview was long and stormy; Napoleon struggled vainly in the toils; in his excitement he dropped his hat, which the imperturbable Metternich did not condescend to pick up; ” Napoleon,” he records in his Memoirs, ” seemed to me small.” Metternich, however, gained his immediate point; the armistice was extended to the 10th of August. At midnight on that date, Napoleon not having come to terms, Metternich gave orders for the lighting of the beacons that signalled to the Austrian army in Silesia the outbreak of the war.

Napoleon’s victory at Dresden (Aug. 26 and 27) for the moment brought discord into the counsels of the Allies and threatened the ruin of Metternich and his plans; but the suc- cessive defeats of Vandamme at Kulm (Aug. 28), of Macdonald at Katzbach (Aug. 29) and Oudinot at Grossbeeren (Aug. 30) completely altered the aspect of affairs; and on the 9th of September Metternich signed at Toplitz a treaty with Russia which committed Austria yet more closely to the policy of the Allies. Then followed the battle of Leipzig (Oct. 10-18) and the advance of the Allies into France. The diplomatic situation throughout the campaign was, from the Austrian point of view, one of extreme delicacy. The necessity of curbing the power of Napoleon and rendering him for ever incapable of again oversetting the balance of Europe was practically the only object Austria had in common with her allies. She did not

share the implacable resentment with which Great Britain pursued Napoleon; she watched with alarm the development of the ambitions of Alexander I., which threatened to substitute a Russian for a French supremacy in Europe; she was far from sympathizing with the noisy enthusiasm of the patriots of the War of Liberation for a united Germany, in which the traditional influence of the Habsburgs would be balanced or overshadowed by that of Prussia. Metternich had no wish to see the husband of Marie Louise ousted in favour of the Bourbons, who had little reason to be grateful to Austria; still less did he desire to see on the throne of France Alexander’s protege Bernadotte, whose name was being whispered in the Paris salons as the destined saviour of his native country. But if Napoleon was to remain sovereign of France, it must be not by his own force, but by grace of his father-in-law, and hedged round with limita- tions which would have made him little more than the lieutenant of the Habsburg monarchy. This was the secret of the moderate terms of

accommodation ostentatiously offered by Metternich to Napoleon at various stages of the campaign. From Frankfort he sent, through General de Saint-Aignan, a diplomatist on whose indiscretion he could rely, an informal offer of peace on the basis of France's " natural frontier," the Rhine, the Alps and the Pyrenees. The famous manifesto of Frankfort, issued on behalf of the Allies (Dec. 4, 1813), contained no such offer of acceptable terms; but Metternich's object was attained; for Napoleon refused to be drawn into the trap, and the French people cursed the emperor's infatuation in refusing a settlement which, from what had leaked out of Saint-Aignan's mission, they believed would have satisfied the legitimate ambitions of France. On the other hand, Metternich did his best to oppose a too rapid advance of the allied forces on Paris, which would have played into the hands of Russia and Prussia; and it was to his initiative that the conferences of Chatillon were due. Only when the breakdown of the negotiations made it clear that Napoleon had seen through his plans, and preferred the chances of war to the certainty of ruin or of surviving only as the puppet of Austria, did Metternich join with Castlereagh in pressing upon the tsar the necessity for restoring the Bourbons. On the 1st of March 1814, he set his hand to the treaty of Chaumont, of which the immediate object was the restoration and preservation of the old dynasty in a France reduced to her " legitimate frontier." In other respects, however, the treaty was a triumph for Metter- nich; for it laid down that at the final settlement Germany was to be reconstituted as a confederation of sovereign states, and it also did much to temper the fear of a Russian dictatorship by consecrating the principle of that concerted action of the Great Powers, in affairs of international interest, which after Napoleon's fall was to govern the European system. On the 10th of April Metternich arrived at Paris, ten days after its occupation by the Allies. He was now at the height of his reputation; on the 20th of October 1813, two days after Leipzig, he had been created an hereditary prince of the Austrian Empire; he now received from the emperor Francis a unique honour: the right to quarter the arms of the house of Austria-Lorraine with those of Metternich. At the same time (April 21) the countship of Daruvar was bestowed upon him. On the 30th of May Metternich set his signature to the treaty of Paris, and immediately afterwards accompanied the emperor Alexander and King Frederick William on a visit to England. On the 1 8th of July he was back in Vienna, where the great congress was to meet in the autumn. The dignity of a Hungarian magnate was bestowed upon him before it assembled.

At the congress Metternich's charm of manner and great social gifts gave him much personal influence; the ease and versatility with which

he handled intricate diplomatic questions, too, excited admiration; at the same time he was blamed for his leaning to intrigue and finesse and for a certain calculated disingenuousness which led to an open breach with the emperor Alexander, who roundly called him a liar. In the difficult questions of Poland and Saxony the honest and conciliatory attitude of Castlereagh was of more avail in reaching an accept-

able settlement than all Metternich's cleverness. If in the Italian and German questions, however, Austria's views triumphed, this was due to the foresight displayed in Metternich's diplomacy during the campaigns and to the address with which he handled the questions at issue at the congress. The com- placency of Hardenberg had allowed Austria alone to negotiate with the states of the Confederation of the Rhine with a view to detaching them from Napoleon; and he had used this oppor- tunity to render impossible the idea of a united Germany. On the 8th of October 1813 he had signed with Bavaria the treaty of Ried, which in the event of the liberation of Germany guaranteed to Bavaria a sovereign and independent status. This instrument, which was reinforced by a secret treaty signed at Paris on the 3rd of June 1814, served as a model for similar agreements with other courts; and the principle involved was, as mentioned above, included in the treaty of Chaumont. Thus all the unionist ideals, represented at the congress by Stein, were sterilized from the outset; and the Act of Confederation embodied in the Final Act of Vienna gave to Germany exactly the form desired by Metternich as best calculated to perpetuate Austrian preponderance (see Germany: History). The same was true of the settlement of Italy. The question here was complicated by the treaty of alliance signed by Metternich with Murat as the price of his treason to Napoleon. But Metternich from the first had known that the treaty was but a temporary expedient; that Great Britain would never recognize " the person at the head of the government of Naples "; and that sooner or later Murat himself would afford excuse enough for tearing the treaty up. Not Murat's dream of an Italy united under his own rule, but the traditional Austrian policy of possession in the north and preponderance throughout the Peninsula was Metternich's goal, and this he secured at the congress. Murat, in view of Austria's engagements, was suffered to survive for the time being; he himself shattered the alliance during the Hundred Days; and the Bourbons returned to Naples, pledged by a secret agreement to attune their policy to that of Vienna (see Naples: History).

Metternich, then, emerged from the congress of Vienna confirmed in the confidence of his sovereign, and therefore supreme in Germany and in Italy. To him had been due the marvellous recovery of the

Habsburg monarchy; in spite of Gentz's lament that in the latter stages of the campaign of 1814 "Europe" had been substituted for "Austria" in his diplomacy, Metternich had acted throughout first and foremost in the interests of Austria, as he was bound to do. This, too, gives the key to his policy after 1815, the policy of using the European concert, established by the treaty of Chaumont and the Paris treaty of the 20th of November 1815, as an instrument for ensuring the "stability" of Europe by suppressing any "revolu- tionary " manifestations by which the settlement made at Vienna might be endangered.

After the campaign of Waterloo and Napoleon's second downfall Metternich was again in Paris, where he co-operated with the emperor Alexander and Castlereagh in securing tolerable terms of peace for France. A few days after the signing of the two treaties of the 20th of November 181 5, he left Paris for Milan, where he met the crown prince Louis of Bavaria and Baron von Rechberg, with whom he came to terms on certain outstanding questions between Austria and Bavaria, terms embodied in the treaty of Munich of the 14th of April 1816. During his visit to Italy, which he repeated in 1816 and 1817, Metternich could not but be impressed with the general signs of discontent with Austrian rule. Neither was he blind to the true causes of this discontent: the atrophy of the administration owing to its rigid centralization at Vienna, and the policy of enforcing Germanism on the Italians by a ruthless police system. He made half-hearted proposals for removing something of both these grievances; but his terror of revolution from below made him fearful of reforms from above. While therefore in Prussia king and ministers were labouring hard to remodel and consoli- date the monarchy, Metternich did next to nothing to reform the most obvious abuses of the Austrian Empire. Yet the fault

was not wholly, or mainly, his. Sir Robert Gordon, 1 in a letter to Castlereagh (dated Florence, July n, 18 10), gives the true reason for this attitude: " How much is it to be desired that the superior talents of Prince Metternich were more occupied with the revision and improvement of the administration of affairs in his own country. He is too enlightened not to perceive its most palpable defect . . . He might have courage to sacri- fice himself for the institution of effective remedies, but he fears that the confiding benignity of his Sovereign might afterwards be dissuaded from the just and vigorous application of them." (F.O. Austria. Gordon. Jan.Dec, 1819.) Metternich's power,

after all, was limited by the goodwill of his master, the emperor Francis, and Francis trusted him precisely because he seemed to share his own fanatical hatred of all change. It is this fact that seems to explain Metternich's feverish anxiety to justify his obscurantist attitude to himself and to the world. It suited him to ascribe the general discontent, of which the causes were not obscure, to the wanton agitation of the " sects," and his agents all over Europe earned their pay by supplying him with plentiful proof of the correctness of his contention. The result was well summed up in another letter of Gordon to Castlereagh (ibid. No. 26, Florence, July 12, 1819). "Nothing," he writes, " can surpass Prince Metternich's activity in collecting facts and information upon the inward feelings of the people; with a habit of making these researches he has acquired a taste for them. . . . The secrecy with which this task is indulged leads him to attach too great importance to his discoveries. Phantoms are conjured iip and magnified in the dark, which probably if exposed to light would sink into insignificance; and his informers naturally exaggerate their reports, aware that their profit is to be com mensurate with the display of their phantasmagoria." The judgment is instructive, coming as it does from a diplomatist in intimate touch with Metternich and in general sympathy with his views.

There was, none the less, method in this madness. Behind the agitations of the " sects " loomed the figures of the emperor Alexander and of his confidant Capo d'Istria, " the Coryphaeus of Liberalism," whose agents, official or unoffical, were intriguing in every country in Europe, and not least in Italy. The factor, then, that determined Metternich's attitude was not so much a dread of revolutions in themselves as of revo- lutions exploited by the " Jacobin " tsar to establish his own preponderance in Europe. Metternich's object, then, in respect of the revolutionary agitations, was twofold: he wished to impress Alexander with the peril of this imperial coquetting with democratic forces; he wished to convince the " sects " that they could not rely on the tsar's support. He succeeded in both these objects during the period from the congress of Aix-la-Chapelle in 1818 to that of Verona in 1822. (See Alexander I. of Russia; Europe: History.)

On his way to the congress of Aix, Metternich spent a few days at Frankfort, where his presence was sufficient to settle the difficult question of the constitution of the federal forces. It was a signal triumph. "You can have no idea of the effect produced by my appearance at the diet," he wrote exultingly to his wife, " I have become a species of moral power in Germany and, perhaps, even in Europe" (Mem. iv. 64). This self- complacency was characteristic of the man; but, if we accept his view of " morality," the boast scarce

seems exaggerated. In the main questions debated at Aix, indeed, it was Castlereagh's influence rather than that of Metternich which prevailed; the abolition of the supervision of French affairs by the committee of ambassadors was, for instance, carried against his opinion. But it was at Aix that Metternich was not only reconciled with Alexander, but laid the foundations of that personal influence over the tsar that was to bear notable fruit later; from Aix, too, where he arrived at a complete understanding with King Frederick William III. and the Prussian ministers, dates his preponderant influence in German affairs. The outlook in Europe at the beginning of 1819 seemed to 'Sir Robert Gordon (1791-1847), brother of the 4th earl of Aberdeen, was between 1815 and 1821 associated with Wellington as minister plenipotentiary at Vienna.

Metternich particularly gloomy. In France the ministry of Decazes was, in his opinion, under the inspiration of the Russian ambassador Pozzo di Borgo, heading straight for a new revolu- tion; in Italy Russian agents were openly carrying on a Liberal propaganda; Germany, and notably the Prussian bureaucracy, was honeycombed with revolutionary ideas. Then came the news of the murder of Kotzebue (March 23). Metternich was in Italy at the time; but he determined at once to take advantage of this senseless crime to carry his views in the matter of muzzling the Liberal agitation in Germany. In the summer he met King Frederick William and Prince Hardenberg at Toplitz; a con- ference that resulted in the indefinite postponement of the Prussian constitution and in a secret agreement (Aug. 1) on the proposals to be laid before a conference of German ministers to be held at Carlsbad in the same month. The result of this were the famous Carlsbad Decrees (g.v.), by which liberty of speech and of the press was abolished throughout Germany. The Vienna conferences that followed in November and issued in the Final Act of the 15th of May 1820, was not so complete a triumph for Metternich; but his diplomacy, none the less, had succeeded in riveting on Germany the yoke of the Austrian system, which it was to bear with but partial and temporary relaxations for nearly thirty years (see Germany: History).

The year 1820 was marked by critical events which drew Metternich's attention once more from the affairs of Germany to those of Europe at large. The revolution in Spain, with which Austria had no immediate concern, interested him little; but his attitude towards it is characteristic and illuminating. The emperor Alexander for whom the idea of the confederation of Europe was an article of faith, proposed a European intervention and offered to march a Russian army through northern Italy into Spain. Metternich, to whom the remedy seemed far worse than the disease, covered his dissent from this proposal with a

great display of principle. The ills of Spain were ” material,” those of Europe at large ” moral”; and the European Alliance was there to deal with moral, not material, troubles. The revolution that followed in Naples, however, necessitated a different attitude. Strictly speaking, it concerned Austria alone; but Metternich was anxious to range Alexander openly against Italian Liberalism, and he therefore consented to the question being laid before a congress to be assembled at Troppau. The congresses of Troppau (1820) and Laibach (1821) are dealt with elsewhere (see Europe: History; Italy: History, and the articles s. v.). For Metternich they represented a signal triumph. Not only did he complete his ascendancy over the emperor Alexander; but he openly committed all the Powers to an approval of the Austrian system in Italy, a success that out- weighed his failure to win over Great Britain to the general principle of intervention enunciated in the Troppau Protocol. His attempt, however, to crown his system in Italy by setting up a central committee on the model of the Mainz commission was defeated at the congress of Verona (1822) by the opposition of the Italian princes headed by the pope and the grand duke of Tuscany.

The sort oj* moral dictatorship which Metternich had acquired on the continent was shattered by the developments of the Eastern Question. At first, indeed, the peril of a Russian attack on Turkey had drawn Austria and Great Britain closer together, and in a meeting at Hanover in October 182 1 Metternich and Castlereagh had come to an understanding as to using the Holy Alliance to prevent Alexander from acting independently of the concert. But Metternich’s hope that the Greek revolt would burn itself out ” beyond the pale of civilization ” was belied by events; and even before Castlereagh’s death it was clear that Great Britain would have sooner or later to adopt a policy of intervention opposed to all Metternich’s ideas. The breach was hastened by the accession to office of George Canning, who hated Metternich and all his ways. At Verona in 1822 the withdrawal of Great Britain from the system of the continental Allies was proclaimed to all the world; in March 1823 Canning recognized the Greek flag. This opened up the whole Eastern Question in the precise form that Metternich had sought to

avoid; for the action of Great Britain involved a move on the part of Russia, jealous of her prestige in the Levant, and thus led ultimately to a rearrangement of the relations of the Powers which, so far as the

affairs of the Ottoman empire were concerned, left Austria isolated. It is impossible here even to outline Metternich's diplomacy during the eleven years between the outbreak of the Greek revolt and the signature of the treaty of London (1832) by which the kingdom of Greece was estab- lished. The principles that guided it are, however, sufficiently simple. In common with Great Britain he desired to maintain the integrity of the Ottoman Empire as a barrier against Russian domination in the Balkan peninsula; he wished also to avert a Russo-Turkish war, not only for the above reason, but also because this would involve the breakdown of the system by which he hoped to curb the revolutionary forces in the West. He therefore attempted, and for a while successfully, to persuade the tsar that the Greeks were only " ordinary rebels against legitimate authority." But, when this expedient failed, he was the first to suggest the complete independence of Greece, which seemed to him less dangerous to Austrian interests than a tributary principality on the model of Moldavia and Wallachia. In the end his attitude was one of abstention and protest, since he rightly considered that the action of the Powers which culminated in the treaty of London was fatal to the doctrine of legitimacy, on which his system was based.

The Greek question was not finally settled when the outbreak of the revolutions of 1830 threatened the overthrow of the whole structure of 181 5 in the West. Events which seemed to involve the complete ruin of Metternich's system gave it in effect, however, a new lease of life. Austria, isolated by the events in the East, was once more brought into touch with Russia by a crisis that concerned both Powers equally. On the receipt of the news of the July revolution in Paris Metternich hastened to meet Count Nesselrode at Carlsbad; and, though the Russian statesman refused to commit himself to the idea of an immediate reconstitution of a league of the three autocratic Powers, a common basis of action was agreed upon, and the foundations were laid for that cordial understanding that ripened in the meeting of Munchengratz three years later. Meanwhile, though his language was still " European," Metternich's attitude towards the revolutions was wholly Austrian. He preached the sacred duty of intervention, but he refused to intervene, save where the interests of the Habsburg monarchy were directly concerned. He was even the first to recognize the revolutionary government of Louis Philippe (Sept. 8) ; he answered the appeal of the king of Holland for help with an ironical reference to the geographical situation of Austria; he did not even interfere with the revolutions in Germany and Poland. But when in Italy revolts broke out that threatened the Austrian hegemony, he acted with promptitude and decision, in spite of the threaten- ing

attitude of France; in the spring of 183 1 Austrian bayonets restored order in Parma, Modena and the Papal States. Yet even here Metternich showed an unwonted moderation: not only did he soon withdraw the Austrian troops from Ancona, but he took the initiative in impressing on the papal government the urgent necessity for drastic reform. This attitude was, indeed, mainly determined by the uncertainty as to the relations of the three autocratic courts on whose co-operation the effective- ness of a policy of repression ultimately depended; and Metter- nich's next work was to attempt to re-cement the broken alliance. With Prussia he had little difficulty; the timidity of King Frederick William III. had increased with years and the events of 1830, and the Prussian and Austrian governments tame to complete understanding on a common policy in Germany, tts first fruits were the additional articles appended by the Federal Diet (June 28, 1832) to the Vienna Final Act, by which the control of the diet over the state legislatures was increased. As for Russia, Count Nesselrode at first maintained the reticent attitude he had adopted at Carlsbad; but finally, in 1833, Metternich met the emperor Nicholas I. himself at Munchen- gratz and by adroit flattery won him over to his views. The Berlin convention of the 15th of October 1833, which reaffirmed

the divine right of intervention, was a fresh triumph for Metter- nich's diplomacy. This had been rendered possible by the change in Russia's attitude towards the Turkish question after 1829, which made a co-operation of Austria and Russia possible in the East (see Mehemet Ali) ; and in its turn it made possible the maintenance for a while longer of the Austrian system in Germany.

The convention of Berlin marked the last conspicuous inter- vention of Metternich in the general affairs of Europe. " The Holy Alliance of the East," as Palmerston called it, served the immediate purpose of securing " stability " in the countries immediately subject to the Powers composing it; it made no attempt at more than " moral " intervention in questions, e.g. that of Spain, that lay beyond its own sphere of influence; and the development of the Eastern Question, leading to the rapprochement between Russia and Great Britain, though Austria joined the Quadruple Alliance of 1840, tended to loosen the cordial ties between the courts of Vienna and St Petersburg. The Straits Convention of 1841, by which France was formally readmitted to the concert, was due largely to Metternich's initiative; so, too, was the ill-judged effort of the continental Powers in 1847 to interfere in favour of the Sonderbund in Switzerland. But, on the whole, the growing crisis within the Habsburg monarchy itself was sufficient to deter Metternich from foreign adventures. So long as the emperor Francis lived all question of reform was impossible, and when

he died, in 1835, the rusty machinery of the Austrian administration was too completely out of gear to be set right by anything short of a complete reconstruction, to which Metternich was too old to set his hand, even had he had the inclination to do so. He was too experienced not to realize the sickness of the state, but he was content to veil it from himself and to attempt to veil it from others. The world was not deceived; but it was not until the Vienna mob, in 1848, was thundering at the door of his cabinet that Metternich himself realized the truth to which he had tried to blind himself. With his fall his system also fell; and his flight from Vienna was the signal for the revolutions by which in 1848 all the countries under Habsburg influence were convulsed.

The resignation of Prince Metternich, handed in on the 13th of March 1848, was accepted by the emperor on the 18th, and the prince and his family at once left for England. Here he lived in great retirement, at Brighton and London, until October 1849, whenhe went to Brussels. In May 1851 he went to his estate of Johannesberg, where he was visited by King Frederick William IV. and Bismarck; in September he returned to Vienna. The events of 1848 had not shaken his self-complacency; they seemed to him rather to confirm the soundness of his own political principles, which would have scotched the evil betimes had not the weakness of others allowed the forces of disorder to gather strength. But though, in his own opinion, triumphantly vindicated, he did not again take office; he maintained, none the less, as a critic and adviser no mean influence on the counsels of the Austrian court, though it was contrary to his advice that Austria signed the treaty of the 2nd of December 1854 with France and Great Britain. He lived to see the beginning of the struggle of France and Italy against Austria, dying on the nth of June 1859.

Probably no statesman of all time has, in his own day, been more beslavered with praise and bespattered with abuse than Metternich. By one side he was reverenced as the infallible oracle of diplomatic inspiration, by the other he was loathed and despised as the very incarnation of the spirit of obscurantism and oppression. The victories of democracy brought the latter view into fashion, and to the Liberal historians of the latter part of the 19th century the name of Metternich was synonymous with that of a system in which they could recognize nothing but a senseless opposition to the forces of enlightenment. A juster estimate of the man and his work has, however, become possible as the age has moved farther away from the smoke of controversy. On the whole, history has tended to endorse the sane judgment on Metternich pronounced by Castlereagh when

he was first brought into diplomatic contact with him. Writing from Chaumont to Lord Liverpool, on the 26th of February 1814, he said: ” Austria both in army and government is a timid Power. Her minister is constitutionally temporizing — he is charged with more faults than belong to him, but he has his full share, mixed up, however, with considerable means for carrying forward the machine, more than any other person I have met with at Head Quarters ” (F. O. 2 France, From Lord Castlereagh). This gives the key to Metternich’s character and policy: Austria was a timid Power, and Metternich was an Austrian minister. His policy of ” stability,” so necessary for the Habsburg monarchy, at least secured a long period of peace for Europe at large. Europe, her strength renewed, passed a severe judgment on the statesman who acted on the assumption that what the generality of people wanted was peace, not liberty; and justly, in so far as his pessimism led him to convert what might have been legitimate as a temporary counsel of expediency into an immutable principle. But, as Demelitsch points out, it will be time for Austrians to condemn him when Austria shall have survived half a century of constitutional experiment under the dual monarchy.

Of the technique of diplomacy Metternich was a master. His despatches are models of diplomatic style. If they have any fault, it is that they are often over-elaborate, the work of a man who evidently loves diplomacy for its own sake and glories in the’fine turn of a phrase. In this respect they are comparable to those of Canning, who modelled himself upon Chateaubriand ; they are in vivid contrast to the crabbed businesslike letters of Castlereagh. Metternich almost invariably begins his des- patches and his reports with a broad discussion of the principles involved in the case in point, and argues from these down to the facts. In this again he is in sharp contrast with Castlereagh, who, with characteristic British practical sense, politely sweeps the principles aside and prefers to argue upward from the facts. Yet Metternich’s phrase-making was often the result of astute calculation. His diplomatic genius was never so well displayed as in disguising perilous issues in phrases that soothed even when they did not convince; and, like Gladstone after him, when the occasion demanded it, he was master of the art of appearing to say much when in fact he said nothing. When he wished to make his meaning plain, no one could do so more clearly; when he wished to be reticent, no reticence could have been more pleasingly eloquent.

In private life Metternich was a kind, if not always faithful, husband and a good father, devoted to his children, of whom he had the misfortune to lose several before his death. He was three times married. His second wife, Baroness Antonie von Leykam, Countess von Beilstein, died in 1829; his third wife, Melanie, Countess Zichy-Ferraris, died on the 3rd of March 1854. Of his sons three survived him: Richard Clemens Lothar (1829- 1895), his son by his second marriage, who was Austrian ambas- sador in Paris from 1859 to 1871; Prince Paul (1834-1906), and Prince Lothar (1837-1904), his sons by his third marriage. His grandson Prince Clemens (b. 1869), son of Prince Paul, married in 1905 Isabella de Silva Carvajal, daughter of the marquis de

Santa Cruz.

Bibliography. — A vast mass of unpublished material for the life of Prince Metternich exists in public and private archives; to some of those in the F.O. Records references are given in the biblio- graphy to chap. I. of vol. x. of the Cambridge Mod. Hist. Of published documents the most important are in the collection A us Metternichs nachgelassenen Papieren (8 vols., 1880-1884), edited by his son, Prince Richard Metternich. There is a complete French translation issued contemporaneously, and an English version, of which only five volumes (down to 1835) have been published, under the title Memoirs, &c. (London, 1880-1882). These Memoirs, especially the autobiographical parts, must be read with considerable reserve; even the official letters and documents, which are their most valuable contents, have been to a certain extent ” edited.” See also Count Anton Prokesch-Osten (the younger) Aus dem Nachlass von Prokesch-Osten (2 vols., Vienna, 1881) ; the writings and correspondence of Friedrich von Gentz (g.i>.), especially as collected under the title Oesterreichs Theilnahme an den Befreiungskriegen; Wilhelm Oncken, Osterreich und Preussen im Befreiungskriege (1876-1879); A. Beer, Zehn Jahre bsterreichischer Politik, 1801-1810 (1877); Die Finanzen Osterreichs (1883); Die orientalische Politik

Osterreichs seit 1774 (1883) ; T. T. de Martens, Recueil des traites, &c, vols. iii. and iv. ; Thiers, Hist, du consulat el de {‘empire, which was frequently commended by Metternich himself as giving an accurate account of his policy, a statement, however, contro- verted by Albert Sorel, whose I’Europe et la revolution frangaise, gives a detailed and masterly account of Metternich’s share in the overthrow of Napoleon. Fedor von Demelitsch’s Fursl Metternich und seine auswdrtige Politik, vol. i., to 1812 (Munich, 1898), is an elaborate and useful analysis of Metternich’s foreign policy, based on a large mass of unpublished

archives. The best short biography of Metternich is that by A. Beer in Der neue Plutarch (1877), vol. v. ; but both this and Colonel G. B. Malleson's Life of Metternich (London, 1888) were written before the publication of the important works of Demelitsch and Sorel. (W. A. P.)

METZ, a town, first-class fortress and episcopal see of Germany, in the imperial province of Alsace-Lorraine, capital of (German) Lorraine, on the Moselle, 99 m. N.W. of Strassburg by rail, and at the radiation of lines to Luxemburg, Coblenz and Noveant, on the French frontier (io| m. W.). Pop. (1905), 60,396. The general appearance of the town is quaint and irregular, but there are several handsome modern streets. The Moselle, which is here joined by the Seille, flows through it in several arms, and is crossed by fourteen bridges. In the south- west corner of the town is the esplanade, with an equestrian statue of the emperor William I., and monuments to Prince Frederick Charles and Marshal Ney, commanding a fine view of the " pays messin," a fertile plain lying to the south. Of the ten city gates the most interesting are the Porte d'Allemagne, or Deutsche Tor, on the east, a castellated structure erected in 1445 and still bearing traces of the siege by Charles V.; the Porte Serpenoise, or Rbmer Tor, on the south, and the Porte Francaise, or Franzosische Tor, on the west. Among its ecclesiastical edifices (nine Roman Catholic and four Protestant churches) the most noteworthy is the Roman Catholic cathedral, with huge pointed windows, slender columns and numerous flying but- tresses, which, begun in the 13th century and consecrated in 1 546, belongs to the period of the decadence of the Gothic style. The Gothic churches of St Vincent and St Eucharius, and the handsome Protestant garrison church, completed in 1881, also deserve mention. Among secular buildings the most important are the town-hall, the palace of justice, the theatre, the governor's house, and the various buildings for military purposes. The public library contains 40,000 volumes, including an extensive collection of works relating to the history of Lorraine. In the same building is the museum, which contains a picture gallery, a numismatic cabinet, and a collection of specimens of natural history. Metz also possesses several learned societies, charitable institutions and schools, and a military academy. The cemetery of Chambiere contains the graves of 7200 French soldiers who died here in 1870. The chief industries are tanning and the manufacture of weapons, shoes, cloth, hats and artificial flowers. There is a trade in wine, beer, wood and minerals.

As a fortress, Metz has always been of the highest importance, and throughout history down to 1870 it had never succumbed to an enemy, thus earning for itself the name of La pucelle. It now ranks with Strassburg as one of the two great bulwarks of the west frontier

of Germany. The original town walls were replaced by ramparts in 1550, and the citadel was built a few years later. By 1674 the works had been reconstructed by Vauban. Under Napoleon III. the fortress was strengthened by a circle of detached forts, which, after 1870, were modified and completed by the Germans, who treated the fortress as the principal pivot of offensive operations against France. The plans in Fortification and Siegecraft (fig. 43) show Metz as it was about 1900: in the years following a new outer chain of defences was constructed, which extends as far as Thionville on the north side and has its centre in front of Metz on the Gravelotte battleground. The old enceinte (which includes Cormontaingne's forts — Moselle and Bellevroix) is doomed to demolition, and has in part been already removed. The garrison, chiefly composed of the XVI. Army Corps, numbers about 25,000. (See Germany: Army.)

History. — Metz, the Roman Divodurum, was the chief town of the Mediomatrici, and was also called by the Romans

Mediomatrica, a name from which the present form has been derived by contraction. Caesar describes it as one of the oldest and most important towns in Gaul- The Romans, recognizing its strategical importance, fortified it, and supplied it with water by an imposing aqueduct, the remains of which still exist. Under the Roman emperors Metz was connected by military roads with Toul, Langres, Lyons, Strassburg, Verdun, Reims and Trier. Christianity was introduced in the 3rd century of our era. In the middle of the 5th century the town was plundered by the Huns under Attila; subsequently it came into possession of the Franks, and was made the capital of Austrasia. On the parti- tion of the Carolingian realms in 843 Metz fell to the share of the emperor Lothair I. as the capital of Lorraine. Its bishops, whose creation reaches back to the 4th century, now began to be very powerful. Metz acquired the privileges of a free imperial town in the 13th century, and soon attained great commercial prosperity. Having adopted the reformed doctrines in 1552 and 1553, it fell into the hands of the French through treachery, and was heroically and successfully defended against Charles V. by Francis duke of Guise. It now sank to the level of a French provincial town, and its population dwindled from 60,000 to about 22,000. At the peace of Westphalia in 1648 Metz, with Toul and Verdun, was formally ceded to France, in whose pos- session it remained for upwards of two centuries. The battles of August 1870, and the investment and capture of the army of

Metz which followed, are described below. By the peace of Frankfort on the 10th of May 187 1 Metz was again united to the German Empire.

See Westphal, Geschichte der Stadt Metz (1875-1877); Georg Lang, Metz und seine Vmgebungen (1883), the Statistisch-topograph- isches Handbuch fur Lothringen; Albers, Geschichte der Stadt Metz (Metz, 1902); G. A. Prost, Etudes sur Vhistoire de Metz (1897); and Tauber, Die Schlachtfelder von Metz (Berlin, 1902). (See also Franco-GermanWar: Bibliography.)

Battles around Metz, in the Franco-German War, 1870

1. Colombey-Borny {August 14). — The French army under Marshal Bazaine was in and about Metz. The German I. and II. armies, on the march from the Saar, were heading for the Moselle between Metz and Pont-a-Mousson, and on the morning of the 14th of August the German I. Army (I., VII. and VIII. Corps, under General v. Steinmetz) lay on and east of the French, with outposts well to the front, watching the French camps east of Metz, which were little more than 1 m. to the front. Stein- metz had received from headquarters overnight instructions that on the 14th of August the I. Army Would maintain the positions occupied during the 13th, and merely passed on these orders to his corps commanders. In Metz, meanwhile, Bazaine had decided to retreat, and during the morning orders to that effect reached his corps commanders, who commenced preparations for their execution. The 2nd Corps (Frossard) and 6th (Canrobert) began to retire about midday, the 3rd (Lebceuf), 4th (Ladmirault) and Imperial Guard (Bourbaki) were to follow. These preparations being observed, the German outposts got under arms. General von der Goltz, in command of the VII. Corps (7 battalions, 4 squadrons, 2 batteries) hearing from a passing officer that the I. Corps on his right was preparing to attack, and noting personally signs of retreat in the enemy's lines, determined at 3 p.m. to advance his whole command to the ridge between Colombey and Borny (which was still occupied by French outposts), in order to clear up the situation. The ridge was captured with little resistance, but the sound of the firing at once set all the neighbouring troops in motion, and fortunately so, for the French had immediately retaliated on von der Goltz's audacious attack. Between 4 and 6 p.m. there was continuous heavy fighting on the front from Borny to Mey, as both sides brought fresh troops into the field. The convex slopes falling from the Prussian position towards Metz gave plenty of cover to the French, and the setting sun shone full in the faces of the Prussian artillerymen. Thus the Prussian infantry encountered unusually obstinate resistance and the troops engaged

rapidly slipped from all superior control. The above front was held by the French 3rd Corps. Shortly before 6.30 the 4th Corps (Ladmi-

rault) suddenly began to deploy on the high ground to the north- west beyond M6y, thus threatening the right flank of the Prussian I. Corps (General v. Manteuff el) , To meet this danger Manteuff el was compelled to direct his corps artillery and reserves, which were now rapidly coming up, away from the hard-pressed centre towards the oncoming infantry masses of Ladmirault. These, with the sun now almost at their backs, were shooting better than usual, and Manteuffel was compelled to call on the VIII. Corps for assistance, which its commander, under positive orders from Steinmetz, refused to give. Meanwhile Steinmetz had been sending peremptory orders to the battlefield to stop the battle, but neither of the corps commanders was able to enforce them. Fortunately for the Prussians, Bazaine had issued similar orders to his subordinates, who, having their men better in hand, were able to obey; and as night began to close in the French broke off the action and retired under the guns of the Metz forts, convinced that at last they had ” broken the spell ” of German success.

Finding that, in spite of his orders, the firing at the front continued increasing in intensity, Steinmetz at length rode to the front himself. Meeting Manteuffel near the Brasserie of Noisseville, he overwhelmed him with reproaches, and at the crisis of this scene the bands struck up ” Heil dir im Siegeskranz ” ! In this action the Germans brought 30,500 rifles and 150 guns on to the battlefield only out of more than 100,000 with 300 guns which could have been engaged before darkness. Bazaine actually deployed 50,700 rifles and 206 guns to oppose them. He might, however, had he been so minded, have struck with his whole army — nearly three times this force, and, judging from the course events actually took, we can have little doubt as to the result of such 1 a blow. The losses on either side were in killed and wounded — French about 3600, Germans about 4800.

The chain of causation in this action is particularly worthy of attention: A young reserve officer, seeing some troops of the I. Corps standing to arms, reported to von der Goltz that the corps was standing to arms and about to attack. Von der Goltz thereupon decided to go forward and discover what was actually going on, and this action unchained the whole battle power of all the troops within call. When, on the following morning, Steinmetz reported von der Goltz and the commander of the I. Corps for disobedience, the king thanked Manteuffel warmly for the part he had played, and then turned to the young brigadier who had disobeyed orders and congratulated him on having twice distinguished himself in the first

fortnight of the war.

2. The Battle of Vionville— Mars-la- Tour {August 16). — On the following day (15th) the II. German Army approached the Moselle above and below Pont-a-Mousson, with a view to overtaking and heading off Bazaine in his presumed retreat to the Meuse (see Franco-German War). So far, however, from being ahead of the Germans on the road to Verdun, the French were actually, late in the afternoon of the 15th of August, bivouacked on the plateau of Rezonville, and there their outposts were placed, not where they could see the surrounding country, but at the regulation distances of 600 to 1000 paces. from the bivouacs. Friendly inhabitants kept Bazaine well informed as to the magnitude of the danger threatening him from the south, and a special telegram from Paris, the true origin of which has never been traced, led him to believe that the I. German Army was crossing the Moselle near Thionville and about to descend on him from the north. This telegram might have exercised the most prejudicial influence on the course of the battle had not Ladmirault (4th Corps), nearer to the seat of the imaginary danger, taken upon himself to disregard the warning transmitted to him by headquarters. At daybreak on the 16th, no Prussians being reported in sight by the outposts, the troops began non- chalantly to prepare for the resumption of the march.

On the Prussian side, von Alvensleben's Corps (III.) shortly after daybreak was moving north-westward from the Moselle in two columns, on the right the 5th division, via Gorze and Fla- vigny on Vionville, on the left the 6th division with corps artillery by Arnaville on Mars-la-Tour, von Alvensleben himself riding

a little in advance between the two. The 6th cavalry division was ordered to precede the right column and scout towards Rezonville. No one was aware of the dangerous proximity of the French army.

About 9 a.m. the 5th cavalry division, reinforced by two horse artillery batteries (flank guard of the X. Corps from Thiancourt), and accompanied by von Caprivi (chief of staff, X. Corps, and afterwards chancellor of the German Empire), were trotting up the western slopes of the ridge which runs between Tronville and Vionville. Reaching its summit they

from Gorze towards Vionville, whence he could overlook the whole

country to the north and west, had met von Rheinbaben (commanding the 5th cavalry division) and had seen the surprise of the French camps. The sound of the heavy firing coming from the eastward convinced him of what had been gradually dawning on him — that with barely 30,000 men he was in the presence of the whole French army, whose attitude at this moment suffi- ciently indicated their determination to fight.

In a few moments his decision was taken. Calling on the X. Corps, away to the south-westward, for support, he determined

Emcrv Walker SCa

suddenly found themselves in face of at least 40,000 French troops, which were not under arms, but busied with miscella- neous camp duties. The temptation proved too great for the artillery, who promptly fired into the midst of the cavalry camp (Forton's division) which lay nearest to them. The momentary result was a wild panic, especially among the horses; but this panic gave the alarm to the infantry all along the road, and these (Frossard's 2nd Corps) at once stood to arms and moved forward, deployed for attack — one division to the west, another division, from Rezonville, to the south. The latter almost at once en- countered the heads of the 6th cavalry division, at that moment just clearing the defile leading up to the Rezonville plateau from Gorze. The Prussian cavalry promptly bore away to cover to the westward, and reported what they had seen to superior authority, but not to the advanced guard of the 5th infantry division, which, emerging in its turn from the defile, ran right against the deployed French infantry moving to meet them. So sudden was the collision that the Prussian advanced guard battery had to fire case to clear its own front.

Meanwhile von Alvensleben himself, riding on the field track

to screen his own weakness by a vigorous attack. By universal consent this is approved as the boldest resolution arrived at by an independent commander throughout the war. Orders were forthwith despatched to the 6th infantry division, at that moment between Puxieux and Tronville, to wheel in to their right and attack, and, their movement being still hidden from the enemy, these troops were formally drawn up for action and sent forward as a whole. The French meanwhile had occupied Vionville and Flavigny, and other troops were moving down the slopes from Rezonville to their support, but the united onset of this whole German division overbore all resistance, and the French began to retire eastward, suffering terribly from the shell fire of the

Prussian batteries.

Marshal Bazaine had meanwhile arrived on the scene, and ordering forward fresh troops to relieve (not to reinforce) those already engaged, he rode forward with a horse artillery battery to watch the operations. The retreating French troops belonged to Frossard's command, and as they were in considerable con- fusion Frossard called on du Preuil's brigade of the imperial guard cavalry to charge. He gave no objective, and when the

brigadier pointed out that the enemy was still beyond the striking radius of his horses, Frossard reiterated the order, which was obeyed to the letter.

The result was disastrous. The Prussians, having .seen the cavalry whilst yet at a distance, ceased firing, formed their skirmishers into groups, and the closed supports standing in deployed lines, two deep, shattered the cavalry with volleys and file-firing, as with blown and exhausted horses they endeavoured to close with their adversaries. When in addition two hussar regiments struck them in flank they were driven back in wild disorder upon Rezonville. In the dust and confusion of the charge a group of the hussars approached Bazaine and his horse artillery battery, and almost carried off the marshal.

Alvensleben, mistaking the withdrawal of the French for the beginning of a retreat, had meanwhile sent orders to the 6th cavalry division to charge in pursuit towards Rezonville; but before it could reach the field the French relieving troops had forced their way through the stragglers and showed such a bold front to the Prussian horsemen that an attack held no promise of success, more especially since they had lost their intervals in

their advance and had no room for a proper deployment. To steady the young soldiers, the cavalry commander (Carl von Schmidt) halted his men, made them correct their intervals and dressing as in peace, though under a heavy fire from the French infantry, and then withdrew them behind the cover of the nearest hill at a walk.

The threat of the charge had, however, induced caution on the French side, and for about two hours there was a lull in the fighting, which

the Prussians utilized on their right in bringing up reinforcements through the Bois des Ognons. On their left, however, no fresh troops were as yet available, and on being informed, about 2-30 p.m., that French cavalry seemed to be about to charge the exhausted 6th division, Alvensleben ordered Bredow's cavalry brigade to charge,.and if necessary to sacrifice itself, to save the infantry. Bredow's command (six squadrons of the 16th Ulans and 7th Cuirassiers) was at that moment drawn up under cover about half a mile west of Vionville, and from its position could see nothing of the events in progress on the battle- field. Nettled by the form in which the order was conveyed to him, Bredow drew his sword and ordered his trumpeter to sound the " trot," the brigade moving off in line of squadron columns at close interval in the direction in which they happened at the moment to be facing. Near Vionville they took ground to their left, opening to full intervals as they did so, and then

ascended the gentle incline which still hid them from their enemy.

Arrived at the summit, Bredow sounded " Sine to the front," but at that moment a storm of French bullets swept down on them, and the men, no longer to be restrained, dashed forward, before the line could be completed, almost due east against long lines of infantry and artillery which they now saw for the first time about 1200 yards in front of them.

This distance was covered at the fullest extended speed of the horses, and reaching the infantry they swept over them " like hounds over a fence " — in the words of an eyewitness. So sudden had been their onset that very few were hit until the infantry had been passed; then the latter, recovering from the shock, turned and fired into the cavalry from behind, whilst a whole fresh division of French horsemen charged them in flank. After a desperate melee of some minutes, the rally was sounded, and the survivors of the charge, breaking their way a second time through the French infantry, eventually reached the shelter of their own lines, having lost rather more than half their numbers, but having saved the situation momentarily for their own army. Again there was a lull in the operations.

Meanwhile, unknown to Alvensleben, a fresh storm was brewing on his left rear.

Ladmirault, commanding the French 4th Corps had seen, during the afternoon of the 15 th, the terrible crowd and confu- sion prevailing in the defiles leading to Gravelotte, and resolved to disobey his orders and to move direct from his bivouacs by the road from Woippy to St

Privat, disregarding altogether the alleged danger from the Prussians supposed to be advancing from Thionville. Thus, about noon on the 16th he reached the high ground between St Privat and Amanvillers, and still without instructions he determined to direct his corps on Bruville and Doncourt, whence he could judge from the drift of the smoke- clouds whether he could fall on the Prussian left.

Much time was lost owing to the heat of the day and the fatigue of the troops, but shortly after 3 p.m. he reached a position north of the Tronville copses whence his guns could fire into the left rear of the long line of Prussian guns (6th division and corps artillery) on the heights above Vionville and Flavigny. Their fire threw the latter into serious confusion and he had already decided to attack with his nearest division (de Cissey) in the direction of the steeple of Vionville, when his attention was caught by the outbreak of heavy firing in the copses below him, and the entry of fresh Prussian guns into action.

This diversion was brought about by the arrival of the corps artillery of the X. Corps and of the 40th brigade, which latter had been at once ordered into the Tronville copses to check portions of Tixier's division of the French 3rd Corps, which under cover of these copses had gradually worked round the Prussian flank. Seeing then that the troops before him could hold their own, Ladmirault continued his preparations for his counter- stroke, and Cissey's division had begun to move into its prescribed alignment, facing towards Vionville, when the sudden apparition of a closed mass of Prussian troops detaching itself from the low dust-cloud of a slow-moving infantry column, and forming to the south of Mars-la-Tour, again arrested his attention. Unanimously he and his staff agreed that this fresh enemy could only be the advanced guard of a large Prussian force, possibly, it was suggested., of the crown prince's army, from Alsace and Nancy, and a fresh delay arose while the situation was investigated. Actually this body consisted only of the 38th brigade (von Wedell), forming part of the X. Corps. It had no knowledge of the state of affairs on the battlefield, or in the direction of Bruville, though Prussian cavalry had been observing the approach of Ladmirault's corps for some hours. It was now ordered to deploy and to co-operate with the 40th brigade in an attack on the Tronville copses. This meanwhile had been delivered, and had more or less failed.

The deployment completed, about 4 p.m. the 38th brigade began its advance on the north-west corner of the Tronville copses, this direction taking them diagonally across the front;

of Cissey's division, still out of their sight but moving due south. Hardly had they stepped off when Cissey's first line, catching sight of them, opened a devastating fire upon their left flank, and to meet this fresh danger the Prussians endeavoured to change front half-left whilst still on the move. Without pausing to fire, the men raced onward, but the French striking their outer wing rolled up the whole line in succession, the actual collision occurring in and near the Bruville ravine, a deep-cut natural trench which, starting from the Tronville copses, here intersects the plateau from west to east. Against the weight of French numbers, nearly three to one, the Prussians were unable to stand, and presently they broke and drifted backwards, completely routed. Then the 1st Guard Dragoons (since known as Queen Victoria's regiment), after a brilliant manoeuvre under heavy fire, to get into the best position for delivering a charge, rode down the whole French line of pursuers from left to right, and by their heroic self-sacrifice relieved the remnants of the infantry from further pursuit.

This was the scene which for the moment held the attention of Prince Frederick Charles when at length he reached the battlefield from Pont-a-Mousson. All along the rest of the line the Prussians were still holding their own, and on the extreme right fresh troops from the IX. Corps were streaming up through the woods against the French left wing. But on the left there was every sign of incipient disaster, and to avert this only the cavalry were at hand. Sending, therefore, hasty orders to the 5th and 6th cavalry divisions to concentrate to the west of Mars- la-Tour, the prince ordered them from there to sweep round on the right rear of the French army. The same idea had, however, occurred to Ladmirault, and he had called on the two nearest French cavalry divisions to put it into execution, and as the Prussians began to reach the plateau west of Mars-la-Tour and the Yron brook from the south, the French were deploying across it some two thousand yards to the north.

Then followed a duel — the one great cavalry duel of the war — between upwards of two thousand horsemen a side. But it was delivered by both sides in a series of regimental charges, and in result was singularly indecisive. For about half an hour great crowds of riders, hidden by dense clouds of dust, drifted aimlessly about the plain, till at length the charge of a single squadron of the Oldenburg Dragoons (who had joined in on their own initiative) delivered on the outer French flank, brought the whole mass into motion north-eastward, and, both sides sounding the rally, the engagement

gradually ceased.

It was now about 7 p.m. and night was coming on. Seeing the dust-clouds drifting away northward, and noting the lethargy which seemed to have settled over the whole French line, Prince Frederick Charles decided to assert his own independent will to conquer by a final assault along his whole front. Guns, cavalry, infantry, everything that could still stand were to take part in it. Weary as they all were, his indomitable will put fresh life into the whole army. With drums beating and colours flying, every unit within call went forward for the final effort. It was almost dark when the Prussians approached the French position between Rezonville and the woods to the northward, and the troops soon lost direction in the smoke and became involved in the direst confusion; the firing again blazed out for a few moments, only to die away as utter exhaustion at length put an end to the Prussian advance. Then the wearied troops, for the most part, lay down and slept in the positions they had reached.

Thus closed the hardest fought battle of the Franco-German War. From 9 a.m. to 3 p.m. only 23,700 rifles, 8100 sabres and 126 guns had been brought into action by the Germans against 59,100 rifles, 6700 sabres, and 300 guns on the French side, and even at the close of the day the former had only deployed 47,100 rifles, 8300 sabres and 222 guns against 83,000 rifles, 8000 sabres and 432 guns including 24 mitrailleuses. The chief characteristic of the day's fighting was the terrible effective- ness of the Prussian artillery, which was handled in masses and not, as on the French side, by batteries. The manoeuvring power of the latter attracted the admiration of the Germans, but arriving singly on the field they were generally reduced to silence

in a few minutes. Deprived of their support, not all the gallantry of the French infantry could avail anything. Again and again, particularly on their left wing, they chased the German infantry before them, but the moment the retreat of the latter downhill uncovered the pursuing French to the Prussian guns, a tornado of shells shattered their order and compelled them to retreat. Though the cavalry were freely engaged, the training of both was so far beneath the standard of the present day that the most that can be credited to them in respect of results is that they from time to time averted imminent disaster, but failed altogether to achieve such a decision as was well within their potential capacities.

3. Gravelotte — St Privat {August 18). — The position on to which the French army fell back from the field of Vionville is formed by a ridge some six miles long running from Rozerieulles almost due north to

Roncourt, a little village overhanging the steep and wooded banks of the Orne, and connected with the general plateau between the Meuse and Moselle by a gentle saddle running from about Amanvillers nearly due west through the Bois de la Cusse towards Doncourt. North of this saddle the slopes show a slight concavity, but are passable by troops of all arms in close order. To the south the rivulet of the Mance soon forms a formidable obstacle as its bed cuts its way through the sandstone. Scrub and woods with dense undergrowth line both its banks, and, except by the great chaussee from Metz to Verdun, access to the French side becomes impossible to troops in ordered bodies.

It does not appear that the position had been systematically examined, or apportioned to the several corps in accordance with any predetermined plan. The army merely swung back- wards, pivoting on its left wing, the corps preserving their relative order as it had been on the 16th, with the .exception that the Imperial Guard was withdrawn to the spur on which Fort Plappeville stands, and the 6th Corps (Marshal Canrobert) crossed the line of march of the 3rd and 4th Corps in order to gain St Privat la Montagne. No lines of march were assigned to the several units, consequently the confusion became so great that though the distance to be traversed in no case exceeded six miles, only the right wing and centre reached their destinations as night was falling. Many of them had so little idea of the general situation that they actually placed outposts to the north and east, whilst the whole of the enemy's army lay to the south and west. No attempt was made to entrench the position syste- matically, but on the left the 2nd and 3rd Corps made some disconnected shelter trenches and gun-pits, while the 4th Corps in the centre began to improve available cover about an hour before the battle began, and the 6th corps on the right, not yet having received any entrenching tools, could do no more' than improvise a few loopholes in the walls of the villages of St Privat and Roncourt with such tools as the sappers could obtain from the inhabitants.

Fortunately for the French the Germans were too exhausted by the battle of the 16th to attempt to interfere with these movements. At daybreak on the morning of the 18th the royal headquarters (which now for the first time arrived at the front) still had no certain knowledge as to whether the French main army was in retreat — covered by the force which they could see on the high ground north of the Metz road — or whether they had taken up a position in order to fight.

Hence the orders issued overnight on the presumption that the main force of the French was retreating to the north and west were allowed

to stand, and the whole II. Army (Prince Frederick Charles) moved off in echelon from left to right, the I. army under Steinmetz, consisting for the day of the I., II. and VII. Corps, being left in observation of the troops visible on their front and of the garrison of Metz itself. The I. Corps was kept back beyond the Moselle on the east side of Metz, the II. was not due to arrive at Rezonville before 4 p.m., hence the VII. only was immediately available if the enemy counter-attacked. But Steinmetz had not ordered, nor had von Zastrow, the corps commander, undertaken, any preparations to meet an emergency. About 10 a.m. the corps had reached the following positions:

VIII. Corps, Rezonville; XI. near St Marcel; Guard approaching Doncourt; XII. towards Jarny; the III. and X., which had been so heavily engaged on the i6th, still in their bivouacs preparing to move. The cavalry of the Saxons had established the fact that the French had not retreated northward, but though scouts from the Guard had already seen the enemy on the heights of St Privat, this information had not yet reached headquarters, nor had it been transmitted to the IX. Corps, which it most closely concerned.

Shortly after 10 a.m. Moltke, still under the impression that the French right extended no farther than La Folie (2 m. north of the Metz road), determined to attack with the IX. and VIII. Corps whilst the Guard executed a turning movement via Habonville against the French right. The IX. Corps was to engage, but not to push its attack home until the Guard could co-operate. The XII. Corps was left to its own devices, but for- tunately the crown prince of Saxony, who commanded it, had ridden forward and, seeing the French in force towards Roncourt, had issued orders which in the event proved decisive.

In pursuance of .his instructions von Manstein, commanding the IX. Corps, set his two divisions in motion towards La Folie and the Bois de la Cusse, and advanced to reconnoitre the French position. From the eastern edge of the above-named copses he suddenly descried the camp of a whole French Corps (the 4th), evidently ignorant of their danger, on the slopes trending west- ward from Amanvillers. Unmindful of the experience of the 16th, he decided to execute an artillery surprise on a grand scale, and sent orders to his corps artillery to come into action on the long spur ‘ overlooking the French camps from the westward. At noon, just as the French infantry were

falling in for midday roll-call, sufficient guns were in position, and suddenly opened fire. But the effect was disappointing. The French infantry ran to their arms, piled along the front of their positions, and moved forward to attack, covering their advance by a hail of bullets. Simultaneously the French artillery also took up the challenge, and from the heights near St Privat the 6th Corps, whose presence had been unsuspected by the Prussians, joined in the fight.

In a few minutes the batteries on the extreme Prussian left were completely overwhelmed, and suddenly dense ‘ lines of French skirmishers emerged from a fold in the ground upon their flank and front, and the gunners were compelled to resort to case-shot, so imminent was their danger. But at this critical moment the leading companies of the Hessian infantry arrived, re-established the equilibrium (though not before four Prussian batteries had been temporarily overrun by the enemy), and a most obstinate fight ensued.

Prince Frederick Charles now rode forward to a point north- east of Verneville, whence the southern boundary of St Privat could be seen. But the northern side of the village and the country towards Roncourt was hidden from his view by the high poplars bordering the Metz-Briey road. Seeing the Hessians hard pressed, he now brought forward the 2nd division of the Guard to their assistance, sending in the 3rd brigade immediately, and holding the 4th brigade in reserve. The 1st division, warned by their own scouts that French troops were in Ste Marie, deployed to attack this village, and were assisted in their endeavour by a brigade of Saxons detached by the crown prince of Saxony, who from his position could see behind the poplar screen that limited the view of the commander-in-chief. Hence he was already aware that the French position extended to Ron- court at least, and had despatched a whole division down the valley of the Orne to outflank them. No news of this movement, however, appears to have reached Prince Frederick Charles.

The French troops in Ste Marie were only an outpost of the 6th corps, and seeing themselves outnumbered, they withdrew about 2.30, the Prussians rushing, the village immediately after- wards. Considerable confusion arose from the convergence of these three brigades upon one village, and more than an hour passed before the troops could be disentangled and massed for further operations. The leaders of the two Guard brigades, still ignorant of the extent of the French position, rallied their

men on the main bodies of their commands (which had not been engaged) and then lay down facing exactly as they had done when

brought forward to the attack. Thus the 1st brigade lay, facing about east-south-east, south of the chaussee and some five hundred yards west of the village. The 2nd brigade lay south-west of the village about three hundred yards away from it and facing nearly north-east.

The Saxons were on the left rear of the 1st brigade, but took longer to recover themselves than the Guards. With the Hessians and the IX. Corps the action still dragged; the 3rd brigade of the Guards had become involved in the fight, and notwithstanding the arrival of the corps artillery of the III. Corps in the centre the situation was still critical. From the south also came the thunder of guns and no encouraging news from that quarter had as yet reached the prince's headquarters.

About 4.30 p.m. the prince therefore had to consider how long it would take to obtain a decision. To postpone it till the morrow seemed undesirable: to achieve it before nightfall was only possible at the cost of immediate effort.

He therefore decided to assault St Privat with all the Guards available, and called up the III., X. and Saxons to assist them.

The 4th brigade of the Guards now received their orders to attack Jerusalem (a hamlet a little south of St Privat), and the 1 st division was ordered to assault St Privat itself.

Von Pape, commanding the latter division, pointed out that no artillery force adequate to prepare the way for him was as yet on the ground, and that the Saxons were still a long way to the rear. But his orders were imperative, and the 4th brigade was already moving off and had to be supported at any cost. Actually all available batteries had already been sent for and were trotting forward from every quarter towards the objective. He accordingly transmitted his orders, and the 2nd brigade was the first to attempt their execution. It had to wheel half-right in mass to bring it in the required direction, and then to advance till its rear was clear of the obstruction formed by the gardens of St Marie. By the time (5.30) it had sufficiently cleared this village it became apparent that the 4th brigade in its extension for attack would overlap the front assigned to the 2nd, hence a further (half-left) wheel, still in mass, had to be undertaken before room for deployment could be obtained. Almost as the commands were given, the French suddenly opened an overwhelming long-range fire and their bullets swept like hail through the crowded mass of the German troops. Nevertheless the wheel was effected, the fresh direction taken, the troops extended for attack, and then the whole brigade dashed

towards the houses assigned them as their objective. Meanwhile the 1st brigade had moved round the north of the village and carried out its extension without serious hindrance. But emerging from the hollow running north from St Marie, they came under a heavy fire not only from St Privat but also from Roncourt, which latter village they now saw for the first time. Instinctively a portion of their line worked to the left to face this new menace, and the front thus became dangerously extended. They were, however, now abreast of the 2nd brigade, and the whole line raced forward to reach the effective range of their very inferior weapons, which were about equal at 200 yds. to the French rifle at 600. But the losses of the 2nd brigade, partic- ularly in officers, had been too heavy, and the rush died out whilst still 500 yds. from the two villages.

It was now about 6 p.m. and a long pause ensued, while the 220 guns, which jby degrees had unlimbered behind them, brought St Privat and Roncourt under fire. About 7 p.m. the Saxon turning-movement took effect; their infantry from the Orne valley attacked Roncourt from the north, and about 7.15 the village was carried.

Neither Prince Frederick Charles nor the troops in the fighting- line could see what had taken place; but the former seeing other Saxons moving towards Montois and the masses of the III. and X. Corps approaching, whilst the rain of shells into St Privat exceeded anything hitherto seen on any battlefield, decided to call on the whole of his force to attack. He was in

the act of issuing his orders when a psychological wave swept through the fighting-line, and the men rose and rushed the village at the point of the bayonet. It was now about eight o’clock, and the light was rapidly failing.

The French artillery had already evaded the coming blow, and had changed position, ” right back,” to cover the flank of the rest of the army, and the Prussian and Saxon artillery trotting forward conformed to this new front, their shells sweeping the ground for 2000 yds. to the south of Aman- villers. The confusion in and around St Privat, where troops from four several corps were all intermingled, became so extreme that no further infantry-advance could be attempted; so under cover of the fierce artillery duel the remnants of the unfortunate 6th corps drifted away towards Metz down the many ravines leading into

the river valley. The ” annihilation ” of the Guard at St Privat has become historic. Yet, heavy as were the losses of the 1st Guard division they were not excessive compared to those previously endured. In round numbers one-third of their effectives had fallen—most of them in the first great rush forward at 5.30 p.m.; but actually they had been more or less under fire since about 2 p.m., and many were hit by French shells plunging into the turmoil about St Privat from 8 to 10 p.m. But the legend cannot be justified when the facts are compared with the slaughter of the Seven Years’ War, of Napoleon’s battles, the Crimea, and the American Civil War, or with the horrible punishment of von Wedell’s brigade (38th) only two days before.

It is now time to return to the southern theatre of the battle- field, where an entirely independent engagement had been raging all the afternoon. Von Goeben with the VIII. Corps was standing massed about Rezonville when von Manstein’s guns opposite Amanvillers suddenly made themselves heard. Wheeling his corps to face the French to the eastward he imme- diately sent forward his artillery and prepared to support his comrade. Von Zastrow with the VII. Corps followed his example. ‘ Both corps took as their primary objective the farms of St Hubert and Point du Jour, standing just above the defile made by the Verdun-Metz road where it climbs out of the Mance ravine towards the French position. About 3-30 p.m. St Hubert was carried by a confused mass of some 49 companies, and von Steinmetz, believing the main French position to have been pierced, ordered the 4th cavalry division to cross the ravine by the chaussee and pursue. Simultaneously von Zastrow, under the same impression, had ordered his corps artillery to advance by the same road, and von Goeben, thinking his troops in front required support, had sent forward an infantry brigade by the same line of road.

Presently all these columns converged upon the defile and a hopeless entanglement ensued. Three batteries succeeded in struggling through the mass, and, in coming into action, their left resting on St Hubert. But the remainder of the troops had to be withdrawn, and confusion breaking out in their rear, exposed to all the random bullets and shells of the French, a panic ensued, thousands of men breaking away and flying in wildest confusion through Gravelotte towards the west. Hardly had they melted away when the French made a most brilliant counter-attack from their main position between the farms of Leipzig and Moscow. This was stopped almost entirely by the Prussian artillery fire; but the news of its coming spread through the stragglers in the ravine south of the great road, and a wave of panic again swept through the mass, many thousands bolting right upon the front of

their own batteries, thus masking their fire at the most critical moment, and some- thing like a crisis in the battle arose. Fortunately the II. Corps was now rapidly approaching (about 6 p.m.), and the king, against Moltke's advice, now ordered von Steinmetz (to whom the II. Corps had been allotted for the day) to attack again with all his forces. Meanwhile a third panic broke out which delayed the preliminary movements and it was now growing dark in the ravine. At length the II. Corps, together with all of the VII. that could be collected, moved down into the valley. Just as the leading German troops were approaching

St Hubert the French again began to fire, their bullets plunging down among the fresh arrivals, who knowing nothing of what had taken place about St Hubert (where the remnant of their own infantry were still offering a desperate resistance) opened fire into the backs of their own men, and a fourth panic began which soon spread to the stragglers crowding the Mance ra'vine. Fortunately, by the superb gallantry of some of the company officers and men, the new arrivals were induced to recognize their mistake, and by degrees about 10 p.m. the whole of the II. Corps succeeded in reaching the plateau between St Hubert and Point du Jour, where the debris of the VII. and VIII. Corps had gathered. But in the darkness and confusion no forward movement against the French (only 400 yds. to their front) could be initiated, therefore the whole mass passed the night where they stood until daylight disclosed that the French had retreated.

Meanwhile the king, Moltke, and Bismarck, had ridden back behind Gravelotte where they passed two hours of intense anxiety. From the flash of the rifles, it was clear that the French main position was still intact, and as every body of troops within thirty-six hours' call had been engaged there seemed little prospect of renewing the struggle next morning. No news too had come in from Prince Frederick Charles. Ulti- mately about midnight the welcome tidings of the capture of St Privat arrived, and all anxiety was at an end.

4. The Investment of Metz {Aug. ig-Oct. 14). — During the night following the battle of Gravelotte the French army withdrew within the line of the forts round Metz. The 6th Corps only was severely shaken, the 4th (the best in the whole army), though it had fought hard twice within forty- eight hours, losing nearly 30% of its strength, was still well in hand, and the 3rd, 2nd and Imperial Guards were almost intact. A fresh issue of ammunition and food was all the men needed to make them a thoroughly efficient fighting force comprising some 100,000 troops capable, with a resolute leader and an efficient staff, of crossing over to the right bank of the Moselle, overrunning

the I. German Corps, the only one in their direct path, and then fighting their way across the communications of the II. and III. German Armies until they regained touch with the French railways to the south-west about Troyes.

The mere fact of the effort being made would have given the battle of Gravelotte the moral effect of a victory, and the reaction in the German ranks from the feeling of over-confidence, which had mastered them after the early successes of Spicheren and Woerth, must have had most far-reaching consequences.

Bazaine, however, withdrew entirely under cover of the forts, and set about the reorganization of his troops in the most leisurely manner. The Metz forts, though neither sufficiently armed nor even completely finished in some cases, were never- theless, with their deep ditches and self-protecting bastion trace, far too formidable for any field army to attempt without the aid of a siege train of some 200 guns, which for the moment were not available. Of this fact the Germans were well aware, and hence they decided from the first to reduce the place by hunger, calculating that with the extra 150,000 men thrown back upon the fortress, its food supplies could not last very long. On the morning of the 19th the German army was far too exhausted for further efforts. Except the I. Corps, which had been summoned overnight from its position about Cour- celles towards the battlefield of Gravelotte and had almost reached the Moselle before this move could be counterordered, the remainder kept their places of the previous night, only following the French retreat with a screen of outposts. They were sufficiently occupied in collecting the wounded and clearing up the confusion resulting from an accumulation of trains and transport in the defiles of Gorze and about Noveaut. No eastward movement could have taken place that day. In the course of the afternoon of the 19th the royal headquarters, creating a new army under the crown prince of Saxony (Guard, IV. and XII. (Saxons) Corps) for field operations towards the Meuse, assigned the remainder of the II. Army, and the whole

of the I., to Prince Frederick Charles as commander-in-chief of the army of investment; 1 This brought the strength of his command up to eight corps, numbering some 220,000 men; an enormous mass to feed in a district swept bare of supplies by the operations of the preceding week, and with only one railway line, terminating at Courcelles, to

depend upon.

For the moment the chief care of the Prince was to guard against an attempt of the French army to break out to the westward. The I. Army Corps with Kummer's Landwehr division (which arrived during the night of the ic)th-2oth of August) were to occupy a position to cover the rail head at Courcelles-Remilly, and the remainder were disposed in the following order: The X. Corps was on the north, with a bridge head at Hauconcourt-sur-Moselle, the II., VIII. and VII. along the eastern slopes overlooking the Moselle valley, the latter having also a fortified bridge head at Ars-sur-Moselle. The III. and IX. were cantoned almost on the battlefield of the 1 8th, between Caulre Farm and Roncourt, ready to move off to the left and support the X. Corps in the event of an attempt on the part of the French to break out towards Thionville.

The positions were fortified with a light outpost line, behind which was drawn a main position on which every art of the engineer was expended. Ample arrangements were made for obtaining and circulating intelligence, and all lateral com- munications were improved and supplemented to the utmost. A light field-railway from Remilly to Pont a Mousson (14 m.) was also put in hand, but progress on this was very slow. The water-supply of the town was promptly interrupted, but the river water Was quite drinkable.

Meanwhile, the French in Metz had been diligently at work. There was no real deficiency of ammunition and stores in the fortress, and provisions for forty days were reported in hand. Bazaine was still in communication with the outside world, though return messages came in sparingly. On the afternoon of the 25th he decided to break out to the northward by the right bank of the river, and orders to this effect were duly issued. Many delays arose in their execution, and it was not till 2 p.m. on the 26th that the troops were formed up ready for action. But at the last moment the marshal wavered. Calling a council of war on the heights of Fort St Julien, he asked the opinion of his subordinates, who were unanimously against the proposed sortie, principally because the artillery " had only ammunition enough for a single battle!" Besides, the Germans had long since become aware of the movement in progress, and all chance of surprise was past. It was also raining very heavily. Accord- ingly the scheme was abandoned.

On the 29th of August Bazaine received a despatch, dated the 27th, from MacMahon, according to which his army should have been at Stenay on the Meuse and farther to the south by the 30th. The marshal accordingly determined to renew the attempt of the 26th, and

orders — almost a repetition of those of the previous occasion — were issued.

At this moment (Aug. 31) the positions of von Manteuffel's command (I. Corps and 3rd Landwehr division) were most dangerously extended, and a surprise at daybreak might have had far-reaching results. But the habit of excessive bugling and band-playing betrayed the French design even before daybreak. Not until 1.30 p.m. was the concentration completed, and Bazaine again assembled his commanding officers to give them their final instructions. This time he adhered to his decision, and about 4 p.m. the attack opened (battle of Servigny or Noisseville) ; but his opportunity had been allowed to slip, and though his first onset overwhelmed the German outposts, their main line held good, and masses of guns unlimbering over a front of some 4 m. rendered all further attempts to break the German cordon abortive. Firing only ceased as darkness fell, and next morning the fighting was again renewed. But the whole French army was disheartened. It was obvious that what they had failed to do by surprise was hopeless now that twenty-four hours had been given in which the Germans

JSteinmetz was shortly afterwards relieved of his command and returned to Germany.

could make counter-preparations. Therefore about noon a general retirement under the guns of the forts took place, and the last serious hope of the French army had vanished. Some 120,000 men with 528 guns had been engaged against 60,000 Germans with 222 guns, and had been beaten off with a loss of 3500 men. The Germans had lost about 3000.

The investment now resumed its regular course. The Ger- mans, secure in the strength of their position on the left bank of the Moselle, drew more troops over to the right, and added to their defences and communications. The idea was even mooted of damming up the river near Hauconcourt, and thus flooding out the whole of the civil population of Metz; but expert civil engineers, who were sent for from. Germany, reported against the proposal.

As time wore on the conditions in Metz and the surrounding camps became deplorable. The hospitals and private houses had been crowded with wounded from the first, and now, owing to the persistent wet weather, smallpox and dysentery became epidemic. Towards the close of September rations had to be reduced, and the troops began slaughtering the cavalry horses for food. Probably to

cheer the men by a semblance of activity, Marshal Bazaine attempted a sortie on a large scale on the 1st of October in the direction of Ladorchamps, and fighting continued into the 2nd, but without prospect of success, and the profound depression following on defeat sent up the sick list rapidly. One other sortie towards Noisse- ville followed on the 7th, the alleged reason for which was the hope of obtaining provisions in the neighbouring villages. But it was beaten off with the utmost ease by the investing troops, who were well fed and cared for; and as by this time even the gun-teams had followed the cavalry horses to the slaughter-house, the French army as an army — i.e. a combination of the three arms — had ceased to exist. On the recognition of this fact negotiations for the capitulation of Metz were begun on the 13th of October, and on the 14th the Army of the Rhine sur- rendered. Had it held out even forty-eight hours longer events before Paris and Orleans might have taken a different turn.

The investment of Metz had lasted 54 days, and the death- roll of the civil population had risen to 3587 against 1200 in the corresponding period of a normal year. The army itself had only lost from sickness 2600 men, or barely 2% of its full effective. (F. N. M.)

MEUDON, a town of northern France, in the department of Seine-et-Oise, 6 m. E. of Versailles by rail and about 25 m. S.W. of Paris. Pop. (1906), 9597. The remains of a castle (17th century) burned during the siege of Paris in 1871 have since been adapted as an observatory. Its terrace commands a fine view of Paris. The handsome Galliera Institutions, on the hill of Fleury, were founded by the duchess of Galliera for the reception of aged persons and orphans. The buildings were completed in 1885, at a cost of £560,000. The town has a monument of Rabelais, who was cure there in 1553, and manu- factures munitions of war for the artillery, and in the neighbour- ing park of Chalais is the Government military ballooning establishment. In the 16th century the cardinal, Charles of Lorraine, built at Meudon a magnificent chateau, which was destroyed in 1803. The present remains belong to a building erected by the dauphin, son of Louis XIV. The wood of Meudon lies for the most part to the west of the town.

MEULEN, ANTONY FRANCIS VAN DER (1634-1690), Flemish painter, born in Brussels, was called to Paris about 1666 by Colbert, at the instance of Le Brun, to fill the post of battle painter to Louis XIV. His paintings during the campaigns of Flanders (1667) so delighted Louis that from that date Van der Meulen was ordered to accompany him in all his expeditions. In 1673 he was received into the French Academy, attained the grade of councillor in 1681, and died full of honours in Paris in 1690. He is best represented by the series of twenty-three

paintings, mostly executed for Louis XIV., now in the Louvre. The show that he always retained his Flemish predilections in point of colour, although his style was modified by that of the French school.

MEUNIER— ME USE

3*5

MEUNIER, CONSTANTIN (1 831-1905), Belgian painter and sculptor, was born at Etterbeek, Brussels. His first exhibit was a plaster sketch, ” The Garland,” at the Brussels Salon in 1851. Soon afterwards, on the advice of the painter Charles de Groux, he abandoned the chisel for the brush. His first important painting, ” The Salle St Roch ” (1857), was followed by a series of paintings including ” A Trappist Funeral ” (i860), ” Trappists Ploughing ” (1863), in collaboration with Alfred Verwee, ” Divine Service at the Monastery of La Trappe ” (1871) and episodes of the Peasants’ War (1878). About 1880 he was commissioned to illustrate those parts of Camille Lemonnier’s description of Belgium in Le Tour du monde which referred to miners and factory-workers, and produced ” In the Factory,” ” Smithery at Cockerill’s,” ” Melting Steel at the Factory at Seraing ” (1882), ” Returning from the Pit,” and ” The Broken Crucible ” (1884). In 1882 he was employed by the government to copy Pedro Campana’s ” Descent from the Cross ” at Seville, and in Spain he painted such characteristic pictures as ” The Cafe Concert,” ” Procession on Good Friday,” and ” The Tobacco Factory at Seville ” (Brussels Gallery). On his return to Belgium he was appointed professor at the Louvain Academy of Fine Arts. In 1885 he returned to statuary and produced ” The Puddler,” ” The Hammerer ” (1886), ” Firedamp ” (1889, Brussels Gallery), ” Ecce Homo ” (1891), ” The Old Mine-Horse ” (1891), ” The Mower ” (1892), ” The Glebe ” (1892), the monument to Father Damien at Louvain (1893), ” Puddler at the Furnace ” (1893), the scheme of decora- tion for the Botanic Garden at Brussels in collaboration with the sculptor Charles van der Stappen (1893), ” The Horse at the Pond,” in the square in the north-east quarter of Brussels, and two unfinished works, the ” Monument to Labour ” and the Zola monument, in collaboration with the French sculptor Charpentier. The ” Monument to Labour,” which was acquired by the State for the Brussels Gallery, comprises four stone bas-reliefs, ” In- dustry,” “The Mine,” “Harvest,” and the “Harbour”; four bronze statues, ” The Sower,” ” The Smith,” ” The Miner,” and the ” Ancestor “; and a bronze group, ” Maternity,” Meunier died at Brussels on the 4th of April 1905.

MEURICE, FRANQOIS PAUL (1818-1905), French dramatist, was born

in Paris on the 7th of February 1818. In 1848 he became the editor of the Evenement, founded by Victor Hugo, and in 1869 he was one of the promoters of the Rappel, a journal on similar lines. He was the literary executor of Victor Hugo, and edited his works (1880-1885). In collaboration with Auguste Vacquerie and Theophile Gautier, he produced Falstaff (1842), a play in imitation of Shakespeare, and in 1843 an imita- tion of the Antigone; and with Alexandre Dumas a Hamlet (1847). He also wrote Benvenuto Cellini (1852), Schamyl (1854), Struensee (1893), and dramatic versions of Les Miserables (1878), Notre Dame de Paris (1876), Quatre-vingt-treize (1881). He died on the 12th of December 1905.

MEURSIUS [Johannes van Meurs] (1579-1639), Dutch classical scholar and antiquary, was born at Loosduinen, near the Hague. He was extremely precocious, and at the age of sixteen produced a commentary on the Cassandra of Lyco- phron. In 16 10 he was appointed professor of Greek and history at Leiden, and in the following year historiographer to the states-general. In consequence of the disturbed state of his country he welcomed the offer (1625) of Christian IV. of Denmark to become professor of history and politics at Soro, in Zealand, combined with the office of historiographer royal. He died at Soro on the 20th of September 1639. Meur- sius was the author of classical editions and treatises, many of which are printed in J. F. Gronovius's Thesaurus antiqui- tatum graecarum. Their lack of arrangement detracts from their value, but they are a storehouse of information, and Meursius does not deserve the epithets of " pedant " and " ignoramus " •which Scaliger applied to him. Meursius also wrote on the troubles in the Netherlands and the history of Denmark.

Complete edition of his works by J. Lami (1741-1763). See Van der Aa's Biographisch Woordenboek der Nederlanden (1869), and J E. Sandys, Hist, of Class. Scholarship (1908), ii. 311.

MEURTHE-ET-MOSELLE, a department of north-eastern France, formed in 1871 out of those parts of the old departments of Meurthe and Moselle which continued French. Before 1790 it belonged to Lorraine, or to one or other of the bishoprics of Toul, Metz and Verdun. Pop. (1906), 517,508. Area 2038 sq. m. It is bounded E. by Lorraine, N. by Belgium and the grand-duchy of Luxemburg, W. by the department of Meuse, and S. by that of Vosges. Meurthe-et-Moselle is of a hilly character, the highest elevation, the Grand Rougimont (2041 ft.), being in the Vosges. The valley of the Moselle runs through it from south to north. Extensive forests, the chief of which is the Forest of Haye, are found in the south-western region. Only a small part of the drainage of Meurthe-et-Moselle flows into the Meuse, by far the

greater part reaching the Rhine by way of the Moselle. The principal affluents of the Moselle are the Madon and the Orne on the left, and on the right, besides the Meurthe, the Seille, which in one part of its course forms the boundary of Alsace-Lorraine. The principal tributary of the Meuse within the department is the Chiers. Climatologi- cally Meurthe-et-Moselle belongs to the Vosgian region, and has hot summers and severe winters. Its mean annual tempera- ture is between 48° and 49 F., being 2° lower than that of Paris (which has the same latitude). The annual rainfall averages between 28 and 32 in. The department possesses much fertile land, the chief crops being cereals and potatoes, together with clover, mangel-wurzels, tobacco, hops and beet- root. The vine is also cultivated, its best products being those of the Toul district. The most common fruit trees are the pear, the apple, the walnut, the cherry and the plum. Of forest trees the oak and the wych-elm are most frequent in the west of the department, the beech and the fir in the Vosges. The French school of forestry has its seat at Nancy. The salt- workings (the chief of which lie between Nancy and St Nicolas,) and the iron-mines (round Nancy and Longwy) of Meurthe-et- Moselle are the most productive in France. Other important industries are the manufacture of boots and shoes, straw and felt hats, pottery, and tanning and brewing (at Tantonville). Cotton and wool spinning, and the manufacture of cotton goods, hosiery, embroidery, chemicals (at Dombasle, close to Nancy), soap, tobacco, matches, crystal (at Baccarat, which has a popula- tion of 5617), mirrors (Cirey), glass, army clothing and paper may also be mentioned. The department is served by the Eastern railway, the chief line being that from Paris to Strass burg through Nancy. The main waterway is formed by the canal between the Marne and the Rhine. This canal communi- cates with the Moselle, which is navigable from Frouard down- wards, and with the Eastern canal, which unites the Meuse and the Moselle with the Saone and the Rhone. The depart- ment constitutes the diocese of Nancy, has its court of appeal at Nancy, and forms a part of the district of the VI. army corps (Chalons-sur-Marne), and of the academie (educational division) of Nancy. There are 4 arrondissements (Nancy, Briey, Lune- ville and Toul), 29 cantons and 598 communes. The principal towns of the department are Nancy, the capital, Luneville, Toul, Longwy, Pont-a-Mousson and St Nicolas. Other places of interest are Preny, with ruins of an important stronghold (12th and 13th centuries) of the dukes of Lorraine; and Vaud6- mont, seat of a famous countship, with ruins of a stronghold of the 12th and 14th centuries.

MEUSE (Flem. Maes, Du. Maas), a river rising at Pouilly, in the department of Haute Marne, France. After passing through a great

part of Belgium and Holland it flows into the Waal channel of the Rhine at Fort Loevenstein. A few miles below Gorinchem the Meuse, or Waal as it is then called, divides into two branches. The northern flows almost due west, and joins the Lek (Rhine) above Rotterdam, and enters the North Sea at the Hook of Holland. Ocean-going steamers for Rotterdam use, however, the New Waterway {Nieuwe Waterweg), a little north of the Meuse. The southern branch turns south, crosses the marsh of Biesbosch by the canalized channel of New Merwede, enters the Hollandsch Diep, and reaches the sea by the arms called Haringvliet and Krammer.

The length of the Meuse is nearly 560 m., of which 360 are navigable, and probably its traffic is only exceeded by that of the Rhine. Near Bazeilles it disappears under ground for a distance of over 3 m. The Chiers, the Semois, the Lesse, the Sambre, the Ourthe and the Roer are its most important tributaries. In Belgium it is canalized between Liege and Vise, and the Dutch are engaged on the same operation below Maestricht. The principal towns on the Meuse are: in France, Verdun, Sedan, Mezieres and Givet; in Belgium, Dinant, Namur, Huy, Liege and Maeseyck; in Holland, Maestricht, Roermond, Venlo, Dordrecht and Rotterdam.

MEUSE, a department of north-eastern France, formed out of a part of Lorraine (portions of the Three Bishoprics, and the Barrois and Clermontais) and Champagne. Pop. (1906), 280,220. Area, 2409 sq. m. It is bounded N. by Belgium and the depart- ment of Ardennes, E. by that of Meurthe-et-Moselle, S. by those of Vosges and Haute-Marne, and W. by those of Marne and Ardennes. About one-half belongs to the basin of the river Meuse, which is enclosed oh the west by the wooded region of Argonne, on the east by the hills known as the Cotes de Meuse. On the north-east it is watered by the Orne, a tributary of the Moselle, and the Chiers, which runs by Montmedy to join the Meuse. The other, half sends its waters to the Seine by the Aire, a tributary of the Aisne, both of which take their rise here, and by the Ornain, an affluent of the Saulx, the two last being tributary to the Marne. The highest elevation (1388 ft.) occurs to the south-west, on the line of the ridge which separates the basin of the Meuse from that of the Seine. The heights gradually sink from south to north, but seldom fall below 1000 ft. The hills of the Argonne similarly sink rapidly down to the valley of the Saulx, where the lowest level of the department (377 ft.) is reached. Its winters are less severe than those

of the Vosges, but it is not so temperate as the Seine region. The average annual rainfall is about 30 in. The chief crops of the department are wheat, oats, rye, barley, clover, potatoes and mangel-wurzels. The vine is cultivated to some extent, the best growths being those of Bar. The forests, occupying more than a quarter of the area, are principally of oak, and are rich in game, as are the rivers in fish. Basket- making is prosecuted in the Argonne. The mineral wealth of the department includes good freestone (Euville, Lerouville). It has iron and steel works, wire-works, and manufactories of files, hardware and edge tools. Ligny-en-Barrois (pop. 4879) manufactures scientific instruments. There are cotton-spinning, wool-weaving, and hemp, flax and jute factories, saw-mills, carriage works, leather manufactures, glassworks, paper- mills, distilleries and flour-mills. The department is served by the Eastern railway, the principal lines being that from Paris to Strassburg through Bar-le-Duc and Commercy, that from Paris to Metz through Verdun, and the branch line of the Meuse valley. The chief waterways are the canal connecting the Marne with the Rhine and the Eastern canal along the Meuse valley; the two together have a length of 145 miles. Ecclesiastically the department forms the diocese of Verdun; it has its court of appeal at Nancy, and constitutes part of the district of the army corps of Chalons-sur-Marne, and of the educational division of Nancy. There are 4 arrondissements — Bar-le-Duc, Commercy, Montmedy and Verdun — 28 cantons and 586 communes. The principal places in the department are Bar-le-Duc, the capital, Commercy, Verdun and St Mihiel, which receive separate treatment. Other places of interest are Avioth, which has a church of the 14th and 15th centuries with a beautiful chapel of the 15th century adjoining it, and Rembercourt-aux-Pots with a fine church of the 15th century.

MEUSE-LINE, the chain of French forts closing the passages of the Meuse between Verdun and Toul. The total length of the line is 31 m., and the forts d'arrtt are disposed along the right bank. The forts are: between Verdun and St Mihiel, Genicourt and Troyon; near St Mihiel, Les Paroches (left bank) and Camp des Romains; and near Commercy — Liouville St Agnant, Gironville and Jouy-sous-les-C6tes. Above the circle of the Toul defences there are barrier forts on the Upper Meuse

at Pagny (la-Blanche-Cote) and near Neufchateau; but these last are practically in second line, and between Toul and Epinal the frontier districts are designedly left open. At Epinal the " Moselle-Line " begins. These lines form part of the defensive scheme adopted by France in 1873-1875. Their general design is that of the French fort illustrated in Forti- fication and Siegecraft, fig. 43, though they are varied in accordance with the site.

MEVANIA (mod. Bevagna), an ancient town of Umbria, on the river Clitumnus and on the Via Flaminia, 8 m. W.S.W. of Forum Flaminii, and 5 m. W. of Fulginium (Foligno), 738 ft. above sea-level. There are remains of a temple near the north gate, and of an amphitheatre built into the modern houses. The wails, which have disappeared, were, according to Pliny {Hist. Nat. xxxv. 173), built of unbaked bricks. In 310 B.C. the consul Fabius broke the Umbrian forces here; but otherwise it is not mentioned until the 1st century a.d. In 69 the army of Vitellius awaited here the advance of Vespasian. Its pastures near the river and its white oxen are mentioned by Propertius, whose family belonged to Asisium (mod. Assisi) and after him by Silius Italicus, Lucan and Statius. The town was a municipium. The churches of S. Michele Arcangelo and S. Nicolo are Romanesque buildings of the 12th century.

MEW. (1) An imitative word, also spelled miaou, repre- senting the cry of a cat or of sea-birds. The name mew, usually sea-mew, as applied to the Larus canus, or common sea-gull, is, according to Skeat, also imitative. As the name of the sea-bird it appears in Du. meeuw, Ger. Mowe, and other lan- guages. (2) (Through Fr. muer, from Lat. mutare, to change), a term originally applied in French to the moulting of a hawk or falcon, and then to the caging of the bird during that period; thus ” to mew up ” has come to mean to confine. The English word chiefly survives in the plural form mews, applied to a stable-yard, coach-houses, stalls for horses, and living accommodation, found in narrow streets in large towns. This use was due to the Royal Mews at Charing Cross, where the royal hawks were kept from 1377 to 1537, when the building became the royal stables.

MEWS, PETER (16 19-1706), English royalist and divine, was born at Caundle Purse in Dorset on the 25th of March 1619, and was educated at the Merchant Taylors’ school, and at St John’s College, Oxford, of which he was scholar and fellow. When the Civil War broke out in 1642 he joined the Royalist army, and, having been made a captain, was taken prisoner at Naseby; but he was soon released and in 1648 sought refuge in Holland. He became friendly with Charles I.‘s secretary, Sir Edward Nicholas, and being skilful at disguising himself was very useful to the Royalists during the rule of Oliver Cromwell, undertaking two. journeys to Scotland in 1653. Before this Mews had been ordained. Taking the degree of D.C.L. and regaining his fellowship at Oxford after the Restoration, he became archdeacon of Huntingdon, vicar of St Mary’s, Reading, and chaplain to the king; then, having obtained two other livings, he was made canon of Windsor, canon of St David’s, and archdeacon of Berkshire. In 1667, when at Breda arranging peace between England and Holland, he was

chosen president of St John's College, Oxford, in succession to his father-in-law, Dr Richard Baylie, afterwards becoming vice-chancellor of the university and dean of Rochester. Appointed bishop of Bath and Wells in 1672, Mews resigned his presidency in 1673, and in 1684 he was elected bishop of Winchester, a position which this " old, honest cavalier," as Thomas Hearne calls him, filled until his death on the 9th of November 1706. The bishop is buried in Winchester cathedral. Mews lent his carriage horses to pull the cannon at a critical moment during the battle of Sedgemoor, where he was wounded whilst accompanying the royal army. He was, however, in sympathy with the seven bishops, and was only prevented by illness from attending their meeting; and as visitor of Magdalen College, Oxford, he supported the fellows in their resistance to James II., admitted their nominee, John Hough, to the presidency, and restored the ejected fellows in October 1688.

PHYSIOGRAPHY]

He took the oaths to William and Mary in 1689. In the absence of Compton, bishop of London, Mews took the chief part at the consecration of Tillotson as archbishop of Canterbury in 169 1. See S. H. Cassan, Lives of the Bishops of Winchester (1827) ; and the Nicholas Papers, edited by G. F. Warner (1886-1897).

MEXBOROUGH, an urban district in the West Riding of Yorkshire, England, on the Don, 1 1 m. N.E. of Sheffield on the Great Central and Midland railways. Pop. (1891), 7734; (1901), 10,430. The Don affords water communication with the Humber. The church of St John the Baptist has Early English portions. The large industrial population is mainly employed in glass, pottery and iron works, and in the neighbouring stone-quarries. The Castle Hill is crowned with some fine earthworks of uncertain date.

MEXICO (Span. Mcjico, or Mexico,) officially styled Estados Unidos Mexicanos and Republica Mexicana, a federal republic of North America extending from the United States of America southward to Guatemala and British Honduras, and lying between the Pacific Ocean on the west and the Gulf of Mexico and Caribbean Sea on the east. Its northern boundary line was fixed by the Guadalupe-Hidalgo treaty of 1848 and the Gadsden treaty of 1853; it follows the Rio Grande del Norte from its mouth north-westward to lat. 31° 47′ N., thence on that

parallel W. 100 m., thence S. to lat. 31 20′ N., thence due W. to the inth meridian, thence in a straight line (nearly W.N.W.) to a point on the Colorado river 20 m. below the mouth of the Gila river, thence northward to the mouth of the Gila, and thence, nearly due W., along the old line between Upper and Lower California to a point on the Pacific coast one marine league S. of the southernmost point of San Diego Bay; this line has a total length of 1810 m., of which the Rio Grande comprises 1136 and the land route 674 m. The boundary line with Guatemala, for a long time in dispute, was fixed by the treaties of 1882 and 1895. It i s an arbitrary line and follows only two natural lines of demarcation — the Suchiate river from the Pacific coast to its source, and the Chixoy and Usuma- cinta rivers from near the 16th parallel N.W. to a point on the latter 25 kilometres, S. of Tenosique (Tabasco). Between these rivers the boundary line is determined by the peaks of Tacana, Buenavista and Ixbul, and from the Usumacinta eastward it follows two parallels of latitude, one on the point of departure from that river, and the other, the longer, on that of 17° 49′ to the British Honduras frontier. The boundary with British Honduras was determined by a treaty of 1893 and is formed in great part by the Hondo river down to the head of Chetumal Bay, and thence through that bay to the Boca Bacalar Chica — the channel separating Yucatan from Ambergris Cay. Geo- graphically, Mexico extends from 14 30′ 42″ (the mouth of the Suchiate) to 32° 42′ N. lat., and from 86° 46′ 08″ to 117 07′ 31″ W. long. Approximately its greatest length from N.W. to S.E. is 1900 m., its greatest width 750 m., and its least width a little short of 140 m. In outline it is sometimes compared to a huge cornucopia with its small end curving S.E. and N. The interior curve formed by the Gulf of Mexico is comparatively regular and has a coast-line of about 1400 m. The Caribbean coast-line is about 327 m. long, exclusive of indentations. The outer curve facing the Pacific is less regular, is deeply broken by the Gulf of California, and has a coast-line of 4574 m., including that of the Gulf. The peninsula of Lower California (q.v.) lies parallel with the mainland coast and extends southward to about 22 52’N. lat., a distance of nearly 760 m. The area of Mexico is commonly given by English authorities as 767,005 sq. m., by German statisticians as 1,987,201 sq. kiloms. (767,290 sq. m.), and by H. H. Bancroft, who quotes official figures, as 1,962,899 sq. kiloms. (757,907 sq. m.).

Physiography. — The surface features consist of an immense elevated plateau with a chain of mountains on its eastern and western margins, which extends from the United States frontier southward to the Isthmus of Tehuantepec ; a fringe of lowlands (tierras calientes) between the plateau and coast on either side; a detached, roughly

mountainous section in the south-east, which belongs to the Central American Plateau, and a low sandy plain

covering the greater part of the Isthmus of Yucatan. The peninsula of Lower California is traversed from north to south by a chain of barren mountains which covers the greater part of its surface. The slopes are precipitous on the east coast, but on the west they break down in hills and terraces to the Pacific. This range may be considered a southward continuation of the Californian Sierra Nevada. The great plateau of Mexico is very largely of volcanic origin. Its superstructure consists of igneous rocks of all descrip- tions with which the original valleys between its marginal ranges have been filled by volcanic action. The remains of transverse and other ranges are to be seen in the isolated ridges and peaks which rise above the level of the table-land, in some cases forminp- well-defined basins; otherwise the surface is singularly uniform ir, character and level. The two noteworthy depressions in its sur- face, the Valley of Mexico and Bolson de Mapiml, once contained large bodies of water, of which only small lakes and marshy lagoons now remain. The highest part of this great plateau is to be found in the states of Mexico and Puebla, where the general elevation is about 8000 ft. Southward the slope is broken into small basins and terraces by transverse ranges, and is comparatively abrupt. Northward the slope is gentle, and is broken by several transverse ridges. At Ciudad Juarez (adjoining El Paso, Texas), on the north- ern frontier, the elevation is 3600 ft., which shows a slope of only 4} ft. to the mile. Less is definitely known of the elevated regions of Chiapas, on the border of Guatemala, which are separated from the great Mexican Plateau by the low Isthmus of Tehuantepec (718 ft. at the highest point of the transisthmian railway), but their general elevation is much lower, and they are broken by wooded sierras and eroded by water-courses.

The mountain ranges which form part of the great Mexican Plateau consist of two marginal chains known as the Sierra Mddre Occidental, on the west, the Sierra Madre Oriental, on the east, and a broken, weakly-defined chain of transverse ranges and ridges between the 18th and 20th parallels known as the Cordillera de Anahuac. All these chains are known locally under diverse names. The Sierra Madre Occidental consists of several parallel ranges in the north, where a broad belt of country is covered with a labyrinth of ridges and valleys. The most eastern of these are known as the Sierra Tarahumare and Sierra del Durango, and the most western as the Sierra del Nazareno, Sierra Yaqui and Sierra Fuerte. These converge in southern Sinaloa and Durango to form the Sierra de Nayarit. Near the 20th parallel the great chain again divides, the eastern part crossing the southern end

of the plateau, and the western, or Sierra Madre del Sur, following the shore line closely to Tehuantepec. The Sierra Madre Occidental has but few note- worthy elevations, its culminating points being the Nevado de Colima (14,363 ft.) and Volcan de Colima (12,750 ft.) in the state of Jalisco. In the Sierra de Nayarit the Cerro Pimal rises to an eleva- tion of 11,319 ft., and in the extreme south the Cerro del Leone to 10,302 ft. These sierras lying near the coast have an imposing appearance from the lowlands, but when seen from the plateau their general elevation is so dwarfed as to render them compara- tively inconspicuous. The Sierra Madre Oriental consists of a broken chain of ranges extending along the eastern margin of the plateau from the great bend in the Rio Grande south-eastward to about the 19th parallel. In the north these ranges are low and offer no great impediment to railroad building. South of Tampico, however, they are concentrated in a single lofty range. This range extends south-eastward along the western frontier of Vera Cruz (state) and includes the snow-capped cone of Orizaba or Citlaltepetl (18,209 ft.), and the Cofre de Perote, or Nanchampapetl (13,419 ft.). The eastern slopes are abrupt and difficult, and are a serious impedi- ment to communication with the coast. Rising from the open plateau half way between this range and the city of Mexico is the isolated cone of Malinche, or Malintzin (14,636 ft.). Crossing the highest part of the Mexican Plateau is a broken series of ranges, which form the water-parting between its northern and southern slopes. To a part of these ranges has been given the name cf Cordillera de Anahuac, but there is no true cordillera across this part of Mexico. In a general sense these ranges may be considered part of the eastern branch of the Sierra Madre Occidental, which turns eastward on the 20th parallel and crosses the plateau in a south by east direction. Southward the plateau is traversed by many low ranges and breaks down in terraces, forming one of the most fertile and attractive parts of the republic. Close to the capital are the Sierra de Ajusco, whose highest point is 13,078 ft. above sea-level, the Nevado de Toluca (15,168 ft.), in a range which separates the valleys of Mexico and Toluca; the Montes de las Cruces, and that volcanic, spur-like range, running northward at right angles to the axis of the other ranges;, whose culminating points, some 20 m. south-east of the city, are the gigantic, snow- clad volcanoes of Popocatepetl (Smoking Mountain) and Ixtacci- huatl (White Woman). Both of them are extinct and Popocatepetl no longer smokes. Their elevations, according to the Comision Geografica Exploradora, are 17,888 and 17,343 ft- respectively, that of Ixtaccihuatl being the highest of its three crests. This part of Mexico is highly volcanic in character, the transverse ridge just described having a large number of extinct volcanoes and at least three (Colima, Jorullo and Ceboruco)

that are either active or semi-active. Colima was in a state of eruption as late as 1909,

Jorullo (4262 ft.) is said to date from 1759, when its cone was formed, and Ceboruco (7100 ft.) in the territory of Tepic, shows occasional signs of activity. Near the coast in the state of Vera Cruz is San Martin, or Tuxtla (9708 ft.), which has been quiescent since its violent eruption of the 2nd of March 1793. Orizaba is sometimes included among the semi-active volcanoes, but this is a mistake. It has been quiescent since 1566, and is now completely extinct. Earthquakes are common throughout the greater part of the republic, especially on the western coast. They are most violent from San Bias southward to the Guatemala frontier, and some of the Spanish towns on or near this coast have suffered severely. Chilpancingo, in Guerrero, was badly shattered in 1902, and in 1907, and in 1909 was reduced to a mass of ruins. The earthquake shocks of the 30th and 31st of July 1909 were unusually severe throughout southern Mexico, reducing Acapulco and Chilpancingo to ruins and shaking the city of Mexico severely. In Acapulco a tidal wave followed the shock. Slight shocks, or temblores, are of almost daily occurrence. According to Humboldt's theory there is a deep rent in the earth's crust about the 19th parallel through which at different periods the underground fires have broken at various points between

the largest of this class, and has the town and port of Carmen at its western extremity. On the northern coast of Yucatan is the small, inhabited island of Holbox or Holboy, and on the eastern coast the islands of Mujeres, Cancum and Cozumel, of which the first and last have a considerable population and good ports. On the Pacific coast there are a number of islands off the rocky shores of Lower California and in the Gulf of California — most of them barren and uninhabitable like the adjacent coast. The largest of these, some of them inhabited, are: Guadalupe — about 75 m. west of the coast on the 29th parallel, which is fertile and stocked with cattle ; Cerros, off Viscaino Bay, and Santa Margarita, which partly shelters Magdalena Bay, on the Pacific side ; and Angel de la Guarda, Tiburon, San Marcos, Carmen, Monserrate, Santa Catalina, Santa Cruz, San Jose, Espiritu Santo and Cerralvo in the Gulf. Lying off San Bias in the broad entrance to the Gulf are the Tres Marias, and directly west of

Colima, to which it belongs, is the scattered volcanic group of Revillagigedo.

The peculiar surface formation of Mexico — a high plateau shut in by mountain barriers, and a narrow lowland region between it and the coast — does not permit the development of large river

the Gulf of Mexico and the Revillagigedo Islands. ” Only on the supposition that these volcanoes, which are on the surface connected by a skeleton of volcanic rocks, are also united under the surface by a chain of volcanic elements in continual activity, may we account for the earthquakes which in the direction mentioned cause the American continent, from the Gulf of Mexico to the Pacific Ocean, to oscillate at the same time ” (Egloffstein, p. 37).

The lowland or tierra caliente region, which lies between the sierras and coast on both sides of Mexico, consists of a sandy zone of varying width along the shore-line, which is practically a tide- water plain broken by inland channels and lagoons, and a higher belt of land rising to an elevation of about 3000 ft. and formed in great part by the dSbris of the neighbouring mountain slopes. On the Pacific side there are places where the mountain spurs extend down to the coast, but in general this lowland region ranges from 30 to 40 m. in width, except in southern Vera Cruz, Tabasco, Campeche and Yucatan, where it extends farther into the interior. The talus zone of this region, especially at elevationsof 1000 to 3000 ft., is noted for its great fertility and the luxuriance of its vegetation.

There are no large islands on the coast of Mexico, and most of the smaller ones are unimportant. Many of those that fringe the Gulf coast are sand-keys, or parts of a new coast formation. They are commonly barren and uninhabitable. The Isla del Carmen, which partly shuts in the Laguna de Terminos (Campeche) , is one of

Emery Walktr.Eci

basins. Add to this the light rainfall on the plateau and a lack of forests, and we have conditions which make large rivers impossible. The hydrography of Mexico, therefore, is of the simplest description —a number of small streams flowing from the plateau or mountain slopes eastward to the Gulf of Mexico and westward to the Pacific. Most of these are little more than mountain torrents, but one has a course exceeding 500 m., and few have navigable channels. The principal watershed is formed by the sierras of the state of Mexico, from which streams flow north-east to the Gulf of Mexico, north- west

to the Pacific and south-west to the same coast below its great eastward curve. The Rio Grande del Norte, or Rio Bravo, on the northern frontier, is practically an American river, as it rises in American territory and receives very little water from the Mexican side. Its larger Mexican tributaries are the Rio de los Conchos, Salado and Pesqueria. Of the Suchiate and Hondo, which form part of Mexico's southern boundary, the first is a short, impetuous mountain torrent flowing into the Pacific, and the other a sluggish lowland stream rising in north-eastern Guatemala and flowing north-east through a heavily forested region to Chetumal Bay. The peninsula of Yucatan has no rivers, and that of Lower California only a few insignificant streams in the north. This is due to the porosity of the soil in the former, and the very limited rainfall in the latter. The largest rivers of Mexico are: the Rio Grande de Santiago, called the Lerma above Lake Chapala, rising in the state of Mexico and flowing westward across Guanajuato, Jalisco and

Tepic to the Pacific coast, with a total length of 540 m., celebrated for its deep canyons and waterfalls ; the Rio de las Balsas, or Mescala, which rises in TIaxcala and flows south and west to the Pacific with a course of 426 m. ; the Yaqui, which rises in western Chihuahua and, after breaking through the northern ranges of the Sierra Madre Occidental, flows south-westerly across Sonora to the Gulf of California, with a length of 390 ra. ; the Grijalva, also called the Chiapas on its upper course, which has its sources in the state of Chiapas and flows north-west and north across Tabasco to the Gulf of Mexico, with a total length of 350 m. ; the Fuerte, which rises in southern Chihuahua and, after breaking through the sierras, flows south-west across Sinaloa to the Gulf of California, with a course of 340 ra. ; the Usumacinta, which is formed by the confluence of the Chixoy and Pasion on the east frontier of Chiapas, and flows north-west across Tabasco to the Grijalva, with a course of 330 m. ; and the Panuco, which has its source in the north-west of the state of Mexico and flows north-eastward to the Gulf of Mexico. The rivers of the Pacific coast have no navigable channels worth mention- ing, but many on the Gulf coast are navigable for considerable distances. The more important of these are in Tabasco — the Grijalva, navigable for about 93 m., and the Usumacinta, for about 270 m. The country about the Laguna de Terminos is low and fiat, and is traversed in all

directions by deep, sluggish streams. Many of the rivers crossing the lowlands bordering the Gulf have short navigable channels, the most important of which is the Panuco and its tributaries. The Rio Grande is navigable for small vessels up to Matamoros (31 m.), and for smaller craft 65 ra. farther. Nearly all the Gulf coast rivers, however, are obstructed by bars owing to the quantity of silt brought down from the sierras and the prevailing winds and currents on the coast.

The lakes of Mexico are small and few in number. They may be divided into two classes;. those of the plateau region which occupy lacustrine depressions and receive the drainage of the surrounding country; and the tide-water lagoons of the coast formed by the building up of new sand beaches across the indentations in the coast-line. Of the former, the best known are the lakes of the Valley of Mexico — Texcoco, Chalco, Xochimilco, Zumpango, Xaltocan and San Cristobal — which are probably the remains of a lake once occupying the whole valley. They receive considerable surface drainage, but are slowly diminishing in area. Some of them, like Xochimilco, will eventually disappear. The largest, Texcoco, has an area of about 11 j sq. m. (30 sq. kiloms.), but it covered a much larger area at the time of the Spanish conquest. Its surroundings are bleak and sterile and its waters brackish and polluted with the drainage of the neighbouring city for nearly four centuries. The other lakes are wholly different in character and surroundings, especially Chalco and Xochimilco. Texcoco is now connected with the new drainage works of the capital and is no longer a menace to its population through inundations and pesti- lential fevers. Another group of lakes is to be found in the Laguna district of south-western Coahuila, where the Tlahualila, Mairan, Parras and others occupy a large lacustrine depression and receive the waters of the Nazas and Aguanaval rivers from the south-west (Durango). The size of this isolated drainage basin is very large, the Nazas River alone having a length of about 370 m. The great Mapimi desert of western Coahuila is another lacustrine depression, but only marshy lagoons remain. In eastern Coahuila, near Monclova, are the Agua Verde and Santa Maria lakes, and in eastern Chihuahua there is a similar group. The largest and most attractive of the plateau lakes is Chapala, in the state of Jalisco, about 80 m. long by 10-35 m – wide, which receives the waters of the Lerma and discharges into the Pacific through the Santiago. On the lower terraces of Michoacan are Patzcuaro and Cuitzeo lakes, and elsewhere among the sierras are numerous other small bodies of water. Among the tide-water lagoons, of which there are many along the Gulf coast, the best known are the Laguna de Terminos in Campeche, Tamiahua in Vera Cruz, Madre (130 m. long), Pes- querias (21 m. long) and Chairel (near Tampico)

in Tamaujipas. All these lagoons are navigable, and those of northern Vera Cruz and Tamaulipas, when connected and improved, will afford a safe inland route for some hundreds of miles along the coast. The north coast of Yucatan is remarkable for the extensive banks built up by the Gulf current from 5 to 7 m. from the shore-line. Inside the present sandy coast is a peculiar tide- water channel called the Rio Lagartos, which follows almost the whole northern shore, with occasional openings or bocas, connecting with the open sea. It is apparently of the same character as the lagoons of Tamaulipas. There are a number of these lagoons on the Pacific coast — such as Superior and Inferior near Salina Cruz, Papacayo, near Acapulco, Cayutlan, near Manzanillo, and Tecapan in Tepic — ■ but they are usually shallow, sometimes swampy, and have no value for commerce.

There is a marked difference between the Gulf and Pacific coast- lines of Mexico in regard to their minor indentations and harbours. The south-west part of the Gulf of Mexico is called the Gulf of Campeche (Campeachy), but no distinction is necessary. This coast has no bays of importance, its rivers are obstructed by sand- bars, and it has only one natural harbour— that of Carmen and the Laguna de Terminos, which has sufficient depth for the larger classes of vessels and is sheltered by the islands of Carmen and

Puerto Real. Of the principal ports on this coast, Matamoros, Tampico, Tuxpan, Coatzacoalcos and Frontera are on rivers, which are obstructed by bars. Tampico and Coatzacoalcos, how- ever, have been improved by breakwaters or jetties, and the deep- ening of the Channels across the bars, into safe and commodious harbours. Vera Cruz is an open anchorage inside a series of reefs which afford no protection to vessels from the ” northers.” A breakwater has remedied this defect and Vera Cruz is no longer considered a dangerous port. Campeche has a small artificial harbour, which is so silted up that vessels drawing 9 ft. must anchor I m. outside and larger vessels still farther away. Progreso, Yucatan, has only an open roadstead, and large vessels cannot approach its landing-place nearer than 6 m. On the east coast of Yucatan there are two deep, well-sheltered bays, Ascension and Espiritu Santo, which afford good anchorages, and at the north end of the island of Cozumel the bay of Santa Maria offers an ex- cellent harbour. The Pacific coast has several deep and well-sheltered bays ; but they are separated from the interior by the rough and difficult ranges of the Sierra Madre Occidental. There are two large indentations of the coast — the Gulfs of Tehuantepec and California. The former is opposite the Gulf of Campeche, and possesses no distinguishing characteristic. The Gulf of California, on the other hand, penetrates the continent for a distance of 739 m., from south-

east to north-west, with a maximum breadth of 190 m. Its area is usually restricted to the waters north of the latitude of Cape San Lucas, but it should be extended to the outer waters enclosed by a line from Cape San Lucas to Cape Corrientes. Its upper waters are not much navigated because of the aridity of its coasts, but there are two or three important ports towards the south. The Gulf has a considerable number of islands, most of them near the peninsular coast, and several deep, well-protected bays — those of La Paz and Santa Ines in Lower California, Guaymas in Sonora, Agiobampo, Topolobampo and Altata Salinas in Sinaloa. On the Pacific coast of Lower California are the Ensenada de Todos Santos and the bays of San Quentin, Viscaino and Magdalena. The principal bays on the mainland coast are Olas Atlas, which is the harbour of Mazatlan, San Bias, Banderas, Manzanillo, Acapulco, Salina Cruz and Tonala. Several of these are being improved.

[Geology. — By far the greater part of Mexico is covered by deposits of Cretaceous and later date, the pre-Cretaceous rocks occurring only in comparatively small and isolated patches. At the southern extremity of the great table-land, however, in the state of Puebla, there is a considerable mass of crystalline rocks which is believed to be of Archaean age. Similar rocks occur also in Chiapas, Oaxaca, Guerrero and elsewhere; but owing to the absence of any early fossiliferous deposits, the age of these rocks is very uncertain. Silurian and Devonian fossils have been reported at one or two localities, but for the present the observations are open to doubt. The earliest fossiliferous beds which have been proved to exist in Mexico belong to the Carboniferous system. They are found on the borders of Guatemala and consist of limestones and dolomites with Productus.

The Mesozoic beds are of greater importance. The Triassic and Jurassic systems are met with only in scattered patches. The former consists of sandstones and clays, and the fossils found in them are chiefly plants, including Gangamopteris and Macrotaeni- opteris, two characteristic genera of the Indian Gondwana system. The Jurassic beds are marls, sandstones and limestones, which contain marine fossils. The Cretaceous rocks take a far larger share in the formation of the country. They form the greater part of the Sierra Madre Oriental and also cover most of the central plateau. They contain many fossils, including Hippurites and Ammonites. The sedimentary deposits of the Tertiary era do not occupy a very wide area. They occur, however, along the coasts, where they are marine, and also on the central plateau, where they are of lacustrine origin. But by far the most important of the Tertiary rocks are the volcanic lavas, agglomerates and ashes, which cover so much of the country. It is in the western

half of Mexico that they are most fully developed, but towards the southern extremity of the plateau they spread nearly to the eastern coast. The eruptions are said to have begun with the ejection of syenites, diorites and diabases, which probably took place at the close of the Cretaceous or the beginning of the Eocene period. In the Miocene period andesites of various kinds were erupted, while at the close of the Pliocene began the great eruptions of basalt which reached their maximum in Quaternary times and continue to the present day. 1 (P. La.)]

Climate. — Mexico stretches across 17 parallels of latitude, with the Tropic of Cancer crossing her territory about midway. This implies tropical and sub-tropical conditions. The relief of the land and varying degrees of rainfall and vegetation, however, serve to modify these conditions in many important particulars. The elevation and extent of the great central plateau, which penetrates

1 See J. G. Aguilera, Sinopsis de geologia mexicana; ” Bosquejo geologico de Mexico,” segunda parte, Bol. inst. geol., Mexico, Nos. 4-6 (1897), pp. 189-270, with map — a summary of this paper will be found in Science Progress, new series (1897), vol. i. pp. 609-615. See also the Livret-guide of the Tenth Cong. Geol. Internat.

(1906).

deeply into the tropical half of the country, carry with them’temperate and sub-tropical conditions over much the greater part of the republic. Above the plateau rise the marginal sierras, while a few isolated peaks in the region of perpetual snow give to Mexico a considerable area of cold temperate and a trace of arctic conditions. Descending to the lowlands on either side of the plateau, the temperature rises steadily until the upper limit of the tropical region, called tierras calientes, is reached, where the climate is hot, humid and unhealthy, as elsewhere in the forested coastal plains of tropical America.

The tierras calientes (hot lands) of Mexico include the two coastal zones, the Isthmus of Tehuantepec, the states of Tabasco, Campeche, and part of Chiapas, the peninsula of Yucatan and a part of eastern Oaxaca. The mean temperature ranges from 77° to 82° F., seldom

falling below 6o°, but often rising to 105°, and in the sultry districts of Vera Cruz, Guaymas and Acapulco to and even above 110°. The rainfall is heavy in the south, except Yucatan, but diminishes gradually toward the north, until on the Pacific and Gulf of California coasts it almost disappears. These lowland districts are densely forested in the south, except Yucatan, and large areas are covered with streams, swamps and lagoons, the abode of noxious insects, pestilential fevers and dysentery. On both coasts yellow fever epidemics appear at frequent intervals. The great fertility of these regions and the marvellous wealth of their forests are irresistible attractions to industrial and com- mercial enterprise, but their unhealthiness restricts development and is a bar to any satisfactory increase in population. The heavy rainfall on the Gulf coast, however, which reaches a maximum of 90 to 100 in. in the Huatusco district of Vera Cruz, causes the flooding of large areas of lowlands, and will make improvement very difficult. The peninsula of Yucatan, whose general level does not rise above 130 to 200 ft. above the sea, consists almost wholly of an open, dry, calcareous plain. The temperature ranges from 66° to 89°, but the heat is tempered by the cool sea-breezes which sweep unobstructed across its plains. The rainfall is abundant in the rainy season, but in the long dry season it is extremely rare. In the wet season the rain is quickly absorbed by the dry, porous soil; consequently there are no rivers and no lakes except near the forested region of the south-east. These exceptional conditions give to Yucatan a moderately hot, dry, and comparatively healthful climate. Another hot, dry climate is that of the tierras calientes of Sonora. The coast is low and extremely arid, and would be uninhabitable were it not for the proximity of the Sierra Madre, where a light rainfall is experienced, and for the numerous rivers that cross the arid belt between the mountains and the sea. The maximum temperatures in this region are 98° at Hermosillo and 119° at Guaymas.

To a large extent the climate of Mexico is determined by vertical zones. According to H. H. Bancroft {Resources of Mexico, pp. 3-4), the tierras calientes, which include a coastal zone 30 to 40 m. wide and the low-lying states already mentioned, rise from sea-level to an elevation of 3280 ft. The tierra templada, or sub-tropical zone, rises to an elevation of 5577 ft., and comprises ” the greater portions of Coahuila, Nuevo Leon, San Luis Potosi, nearly half of Tamaulipas, a small part of Vera Cruz, nearly the whole of Chiapas, nearly all of Oaxaca, a large portion of Guerrero, Jalisco, Sinaloa and Sonora,” together with small parts of the inland states of Puebla, Mexico, Morelos and Michoacan. The mean annual temperature is about 75°.

Above this is the tierra fria, which ranges from 5577 to 8200 ft., and includes all the higher portions of the Mexican plateau, and which corresponds to the temperate regions of Central United States where frosts are very rarely experienced. Even here the high sun temperatures give a sub-tropical character to the country. In the sierras, above the tierras frias, which are not ” cold lands ” at all, are the colder climates of the temperate zone, suitable for cereals, grazing and forest industries, and, farther up, the isolated peaks which rise into the regions of snow and ice.

Speaking generally, the four seasons are clearly marked north of lat. 28 N. only. South of that parallel they merge in the esta- cion de las aguas, or rainy season, from May to October, and the estacion seca, or dry season, which prevails for the rest of the year. The rains generally begin on the east coast and gradually move northwards. The windward slopes of the Sierra Madre Oriental receive the greater part of the rainfall, and the winds, deprived of their moisture, pass over the northern plateau without further precipitation. On the Pacific coast the belt of calms, known as the northern horse latitudes, crosses the northern parts of Lower California and Sonora, which accounts for their extreme aridity. The southern terraces of the plateau have no high mountain barriers between them and the moist winds of the Caribbean, and they too receive an abundant rainfall in the wet season, especially during the prevalence of heavy ” northers ” on the Gulf coast. The precipita- tion varies widely, that of the western side of the northern plateau (Chihuahua and Durango) being about 39 in., that of the Valley of Mexico about 25 in., and that of the whole republic 59 in. Long droughts are common in many parts of the country, and on the barren surfaces of the plateau the rains drain away rapidly, leaving but slight beneficial results.

Flora and Fauna. — The types of animal and vegetable life found in Mexico belong, in a general sense, to those of the northern temper-

ate region, and those of the tropical regions of Central and South America. The great central plateau and its bordering lowlands form an intermediate territory in which these dissimilar types are found side by side, the tropical species extending northward along the coast to the United States, while the northern species have found their way to the southern limits of the plateau. The jaguar and puma have found their way into the United States, while the wolf, coyote, bear and beaver have gone far southward on the plateau, and the buffalo was once found in large numbers on its more favoured northern plains. This intermingling of types does not apply to south-eastern Mexico, where animal life is represented by many of the genera and species found in the forested lowlands of the great Amazon basin.

Aside from its origin, the fauna of Mexico includes at least five species of monkey, the jaguar, puma, ocelot (Felis pardalis), wolf, coyote, lynx, badger, otter (Lutra felina), beaver, muskrat, bear, raccoon (Procyon), coati {Nasua), tapir, two species of peccary {Dicotyles torquatus and D. labialus), skunk {Mephitis , Spilogale and Conepatus), marten, several species of opossum (including a pigmy species of the Tres Marias islands), sloth, two species of ant-bear {Myrmecophaga tetradactylus and Cycloihurus didactylus), armadillo [Dasypus novemcinctus) , a small arboreal porcupine (Synetheres mexicanus), the kinkajou (Cercoleptes caudivolvulus) , three species of deer — the white-tailed Cariacus toltecus, the little black-faced brocket, Coassus rufinus, which is also found in Brazil, and the Sonora deer (Odocoileus couesi) — the Mexican bighorn (Ovis mexi- canus) of Chihuahua, at least two species of hare (Lepus calotis and L. palustris), rabbits, black, gray, red and ground squirrels, gophers, and many small rodents. Alligators and crocodiles are numerous in the lagoons and rivers of the coast and the iguana is to be found everywhere throughout the tropical lowlands, the large black Ctenosura acantMnurus being partly arboreal in habit when full grown. Mexico is a paradise of lizards, which are noted for their diversity in form as well as for their remarkable colouration. Frogs and toads are represented by scores of species, some of which, e.g. the tree-frogs {Hylidae), are extremely interesting. The ophidians are also very numerous, ranging from the comparatively harmless boa-constrictor to the deadly ” palanca ” or ” fer de lance ” (Lachesis lanceolatus) and rattlesnake {Crotalus), of which there are several species. In southern Mexico in 1902 and 1904 Hans Gadow collected specimens of 44 different kinds of snakes, which he esti- mated to be only about 45 % of the species in the states visited. The arboreal life of the tropical forests has developed the tree- climbing habit among snakes as well as among frogs and toads, and also the habit of mimicry, their colour

oeing in harmony with the foliage or bark of the trees which form their ” hunting-grounds.” Bats are numerous, both in species and individuals. The sanguinary vampire (Desmodus rufus) has an extensive range through the tierras calientes and tierras templadas of the southern states. The coasts of Mexico, together with their accessible lagoons and rivers, afford innumerable breeding-places for turtles, which include the large green and tortoise-shell species. In some places the capture of the latter is the source of a considerable export trade in tortoise- shell. The coast of Lower California is a favourite resort for the fur-bearing seal, and pearl oysters find a congenial habitat in the south waters of the Gulf. There are some good fishing-grounds on the coasts, but fishing as an organized industry does not exist. The inland waters, with the exception of Lake Chapala, have com- paratively few species, but the government has introduced carp, brook-trout and salmon-trout.

The avifauna of Mexico includes most of the species of the tropical and temperate regions of America — such as parrots (chiefly the yellow-headed Chrysotis), parakeets {Conurus canicula), macaws {Arc, macao and A. inilitaris), toucans, trogons, herons, egrets, ibis, spoonbills, boat-bills {Cancroma), ducks, pelicans, cormorants, bitterns, stilts, sandpipers, curlews, grackles, kingfishers, motmots, ” Chachalacas ” (Ortalida poliocephala) , woodpeckers, jays, cuckoos, ” garrapateroc ” (Crotophaga sulcirostris), the ingenious weaver-bird {Icterus), and another species {Cassicus), whose curiously woven, sack-like nests are suspended from the slender limbs of trees, and sometimes even from telegraph-wires, scarlet-crested fly-catchers {Muscivora mexicana), tanagers, mocking-birds (called ” zenzontl “), turkeys, partridge, quail {Colinus, Lophortyx, Callipepla and Cyr- tonyx), doves, pigeons, eagles, caracara hawks {Polyborus), fish- hawks, falcons, crows, and turkey-buzzards (both the red-faced ” aura ” of North America and the black-faced ” zopilote ” of the tropics), which are the scavengers of the country. The most numer- ous, perhaps, are the humming-birds, of which there are many genera and species, each one distinct in form and colour. They are called ” huitzilin ” (spikelet) by the Aztecs, and ” colibri,” ” chupa- flor ” and ” chupa-miel ” (flower- or honey-sucker), and ” pajaro- mosca ” (fly- bird) by the Spanish-speaking Mexicans. These descriptive names are highly poetic, as also that of the Portuguese, ” beija-flor ” (flower- kisser); but the humming-bird is insectivorous, and thrusts his long bill into flowers in search of insects instead of honey. Mexico is credited with a great variety of song-birds, but these are to be found chiefly in the partly-forested country of the tierras templadas and tierras frias. Her chief distinction, however, is in birds of varied and

gorgeous feathering. The wonderful plu- mage of the ” quetzal ” {Trogon resplendens) was, it is said, reserved

by the Aztec rulers for their own exclusive use. Of the indigenous birds, the turkey has been fully domesticated, and the musk-duck and ” chachalaca ” are easily reared. Sea-fowl are most numerous on the coasts of Lower California, where certain islands in the arid belt are frequented at night by countless numbers of them. It should be added that many of the migrating birds of North America pass the winter 1 in Mexico.

The insect fauna of Mexico covers a very wide range of genera and species which, like the other forms of animal life, is largely made up of migratory types. No complete study has ever been made of this fauna, but much has been, and is being done by the U.S. Biological Survey and Plant Industry Bureau. To the traveller, the most conspicuous among the Mexican insects, perhaps, are the butterflies, beetles, ants and the myriads of mosquitoes, midges, fleas and chinches. Among the mosquitoes, which are extra- ordinarily numerous in some of the hot lowland districts, are the species credited with the spread of malarial and yellow fevers. The midges are even more numerous than the mosquitoes. In pleasing contrast to such pests are the butterflies of all sizes and colours, beetles of an inconceivable variety of size, shape and colouration, and ants of widely dissimilar appearance and habits. An interesting species of the last is the leaf-cutting ant (Eciton) which lives in large underground colonies and feeds upon a fungus produced by leaf-cuttings stored in subterranean passages to pro- mote fermentation. These ants will strip a tree in a few hours and are very destructive to fruit plantations. Some of the native trees have developed ingenious methods of defence, one of which is that of attracting small colonies of another species to drive away the marauders. Most destructive, also, are the termites or white ants, whose ravages are to be seen in the crumbling woodwork and furni- ture of all habitations in the hot zones. Some species build their nests in trees — great globular masses sometimes three feet in diameter, supported on the larger branches, and connected with the ground by covered passages on the outside of the tree. These insects are blind and avoid the light. Bees find a highly congenial habitat in Mexico, and some honey is exported. Spiders are also represented by a

large number of genera and species, the most dreaded being the venomous ” tarantula ” and the savage ” mygale.”

Few countries, if any, can present so great a diversity in plant life as Mexico. This is due not only to its geographical position and its vertical climatic zones, which give it a range from tropical to arctic types, but also to its peculiar combination of humid and arid conditions in which we find an extensive barren table-land interposed between two tropical forested coastal zones. These widely divergent conditions give to Mexico a flora that includes the genera and species characteristic of nearly all the zones of plant life on the western continents — the tropical jungle of the humid coastal plains with its rare cabinet-woods, dye-woods, lianas and palms; the semi-tropical and temperate mountain slopes where oak forests are to be found and wheat supplants cotton and sugar-cane ; and above these the region of pine forests and pasture lands. Then, there are the mangrove-fringed coasts and the dripping wooded slopes where rare orchids thrive, and above these, on the inland side of the sierra, a treeless, sun-scorched table-land where only the cactus, yucca, and other coarse vegetation of the desert can thrive without irrigation.

For convenience of description, the flora of Mexico may be divided into four great divisions: that of the comparatively barren plateau and the arid coast regions, the humid lierras calientes, the intermediate tierras templadas and tierras frias, and the higher regions of the sierras. The line of demarcation cannot be very sharply drawn, as the zones everywhere overlap each other and local climatic conditions greatly modify plant types. In general, the aspect of the great central plateau north of the Anahuac sierras is that of a dusty, treeless plain. There is but little natural vegeta- tion to be seen — ragged yucca trees, many species of agave and cactus, scrubby mesquite bushes, sage bushes and occasional clumps of coarse grasses. The rainy season completely changes the appearance of these plains, new grass appears, and wheat and Indian corn are cultivated. The rains do not last long, however, and some- times fail altogether. The most common plants of the Mexican plateau are the agaves, yuccas and cacti, each of which is repre- sented by a number of species. The first is chiefly known in the south by the ” magueys,” from which the national drinks ” pulque ” and ” mescal ” are extracted. There is some confusion in the specific names of these agaves; the ” pulque “producing plant is usually described as the Agave americana, though A. atrovirens and several others are also credited with the product. The mescal producing magueys have a thinner leaf and are not cultivated, with the exception of the species producing the ” tequila ” mescal. The chief value of the agaves, however, is in their fibres, of which a great variety is

produced. The principal plateau agaves producing fibre are the A. lechuguilla and A. lophantha and A. univittata of the Jaumave Valley, Tamaulipas, which furnish what may be termed the genuine ixtle fibre. The ” tapemete ” fibre of western Mexico is credited by Mr E. W. Nelson to the A. vivipara, which is found chiefly in the warmer and lower elevations of the Pacific slope. There are many other fibre-producing agaves, including some of those from which pulque is derived. The cactus is un- questionably the characteristic plant of Mexico. About one

thousand species have been described, a very large percentage of which are to be found on the Mexican plateau.

Explorations by botanists of the United States Department of Agriculture have been made in many localities, in Jalisco, Zacatecas, Michpacan and Tamaulipas, but many years must elapse before the whole ground can be covered. In central and southern Mexico the mountain slopes are forested up to 12,500 to 13,500 ft., juniper bushes continuing up to 14,000 ft. The forests consist of several species of evergreen and deciduous oaks, ” oyamel ” {Abies religiosa), the arbutus or strawberry tree, the long-leaved Pinus liophytta and the short-leaved ” ocote ” or Pinus montezumae and the alder, with an undergrowth of elder (Sambucus mexicana), broom and shrubby heath. In the Southern Sierra Madre, the ” oyamel ” and ” ocote ” pine are the giants of the forest, sometimes rising to a height of 100 ft. Oaks are to be found over a wide area and at lower eleva- tions of the sub-tropical zone as well. They are represented by a number of species, and are called ” roble ” and ” encina ” by the natives.

In the intermediate zones between the higher sierras and the tierras calientes the flora is very largely composed of species characteristic of the bordering hot and cold regions. Oaks are everywhere common and the ” ocote ” pine on the Gulf coast is found as far down as 6300 ft. In southern Mexico the pine is found at even lower elevations where the tropical growth has been destroyed by cultivation and fire. The lower slopes of the sierras, especially those of southern Mexico, are well forested and include an immense number of species. The most common families on the eastern slopes, where the precipitation is heavy, are the magnolias, crotons, mimosas, acacias, myrtles, oaks, plane-trees and bamboos. Palms are common, the chestnut abounds in many places, the cacti are almost as numerous as on the open plateau. On the southern slopes of the Ajusco and other sierras considerable forests of the ” ahuehuete ” or cypress (Taxodium dislichum) are to be found. The ” higuerilla ”’ or castor-oil plant (Ricinus communis) is widely distributed throughput the plateau and the open plains of the

lower zones. In some localities the characteristic types of the two climatic extremes, the palm and the pine, are to be found growing side by side.

No brief description can adequately portray the marvellous variety and magnificence of the flora of the tierras calientes. Its forests are not composed of one or a few dominating species, as in the cold temperate zone, but of countless genera and species closely interwoven together — a confused mass of giant trees, lianas and epiphytes struggling to reach the sunlight. This struggle for existence has completely changed the habits of some plants, turning the palm andˆ the cactus into climbers, and even some normal species into epiphytes. Among the more important and conspicuous trees of these tropical fprests are mahogany, rosewood, Spanish cedar (Cedrela), cassias, ceibas (Bombax), rubber (Castilloa), palms of many species including the oil-producing Attalea of Manzanillo and Acrocomia of Acapulco, guayacan (Guaiacum), logwood (Haema- toxylon campechianum) , brazilwood (H. boreale) which should not be confounded with the Brazilian Caesalpinia, palo bianco (Lysiloma Candida), the cascalote and divi-divi trees (Caesalpinia Cacalaco and C. coriaria), the ” zapote chico ” (Achras sapota) from which chicle is extracted, ” zapote prieto ” (Diospyros ebenaster), wild fig, myrtles, bamboos and many of the types already mentioned in connexion with the sub-tropical zone. Of the 114 species of trees and cabinet-woods, 17 of oil-bearing plants, and over 60 of medicinal plants and dyewoods indigenous to Mexico, by far the larger part are represented in the tierras calientes. Among the well-known forest products of this zone are arnotto, jalap, ipecacuanha, sarsaparilla, rubber, orchids and a great variety of gums.

Of the economic plants and products of Mexico, the list is sur-prisingly long and interesting. The cereals, fruits and vegetables of Europe have been introduced and some of them have done well. Wheat is widely cultivated and a considerable part of the population depend upon it for their bread, Indian corn, which is believed to have had its origin in Mexico, also provides food for a large part of the population. ” Tunas ” or cactus fruit, red peppers, ” zapotes ” (the fruit of various trees), ” arrayan ” {Myrtus arayan), ” ciruelas ” or Mexican plums (Spondias), guavas, ” huamuchil ” (Pithecolobium duke), tamarinds, aguacates (Persea gratissima), bananas, plantains, pineapples, grapes, oranges, lemons, limes, granadillas, chirimoyas, mammees (Mammea americana), coco-nuts, cacao, mangoes, olives, gourds and melons, are among the fruits of the country, and rice, wheat, Indian corn, beans, yams, sweet potatoes, onions and ” tomatoes ” {Phy sails) are among its better-known food products. The food of the common people is chiefly made up of Indian corn, beans,

red peppers and ” tomatoes,” There are about 50 known species of beans (Phaseolus) in Mexico and Central America, and probably a dozen species of red peppers (Capsicum) which are used both in seasoning and in making chili sauce. The ” tomato ” or ” tomatillo ” mentioned, is the fruit of the Physalis ixocarpa, some- times called the ” strawberry tomato ” and the ” Mexican ground- cherry,” which is used with red peppers to make chili sauce. The common potato (Solanum tuberosum), of which wild varieties are found, is not commonly used as a vegetable, but as a flavouring for soups and other dishes. Among pther economic plants are the fibre-producing agaves, the best known of which is the A. rigida

var. elongata which produces the “henequen” fibre, or sisal hemp, of Yucatan, silk or tree-cotton (Ceiba casearia), sugar-cane, cotton {Gossypium), indigo and ” canaigre ” (Rumex hymenosepalus) whose root contains a large percentage of tannin.

Mexico has suffered much from the reckless destruction of her forests, not only for industrial purposes but through the careless burning of grassy areas. The denuded mountain slopes and plateaus of southern Mexico are due to the prehistoric inhabitants who cleared away the tropical forest for their Indian corn fields, and then left them to the erosive action of the tropical rains and subsequent occupation by coarse grasses. Fire was generally used in clearing these lands, with the result that their arboreal vegetation was ultimately killed and their fertility destroyed. In the valleys of some of these denuded slopes oak and pine are succeeding the tropical species where fires have given them a chance to get a good foothold.

Population. — According to the census of 1900 the population of Mexico numbered 13,607,259, of which less than one-fifth (19%) were classed as whites, 38% as Indians, and 43% as mixed bloods. There were 57,507 foreign residents, including a few Chinese and Filipinos. Since then the Japanese have acquired an industrial footing in Mexico. Under the constitu- tion of 1824 all race distinctions are abolished, and these diverse ethnic elements are nominally free and equal. For many years, however, the Indians remained in subjection and took no part in the political activities of their native country. Since about 1866, spurred on by the consciousness that one of their

own race, Benito Juarez, had risen to the highest positions in the gift of the country, they have taken greater interest in public affairs and are already making their influence felt. In southern Mexico the Zapotecas furnish schoolmasters for the village schools. Peonage, however, is still prevalent on many of the larger estates, and serious cruelties are sometimes reported. The government itself must be held partly responsible, as for the transportation of the mountain-bred Yaquis to the low, tropical plains of Yucatan (see Herman Whitaker's The Planter, 1909), but the influence of three and a half centuries of slavery and peonage cannot be shaken off in a generation.

According to Humboldt, the census of 1810 gave a total population of 6,122,354, of which the whites had 18%, the mestizos 22% and the Indians 60%. The census of 1895 increased the whites to 22%, which was apparently an error, the mixed bloods to 47%, and reduced the Indians to 31%. It is probable that the returns have never been accurate in regard to the mixed bloods and Indians, but it is the general conclusion that the Indians have been decreasing in number, while the mixed bloods have been increasing. Neglect of their children, unsanitary habits and surroundings, tribal intermarriage and peonage are the principal causes of the decreasing Indian popula- tion. Recent observers, however, deny the assertion that the Indians are now decreasing in number except where local conditions are exceptionally unfavourable. The death rate among their children is estimated at an average of not less than 50%, which in families of five and six children, on an average, permits only a very small natural increase. The larger part of the population is to be found in the southern half of the republic, owing to the arid conditions prevailing in the north. The unhealthfulness of the coastal plains prevents their being thickly populated, although Vera Cruz and some other states return a large population. The most favourable regions are those of the tierras templadas, especially on the southern slopes of the great central plateau which were thickly populated in prehistoric times.

The dissimilar races that compose the population of Mexico have not been sufficiently fused to give a representative type, which, it may be assumed, will ultimately be that of the mestizos. Mexico was conquered by a small body of Spanish adventurers, whose success in despoiling the natives attracted thither a large number of their own people. The discovery of rich deposits of gold and silver, together with the coveted commercial products of the country, created an urgent demand for labourers and led to the enslavement of the natives. To protect these adventurers and to secure for itself the largest possible share in these new sources of wealth, the Spanish crown forbade the admission of foreigners into these colonies, and then harassed

them with commercial and industrial restrictions, burdened them with taxes, strangled them with monopolies and even refused to permit the free emigration thither of Spaniards. Out of such adverse conditions has developed the present population of Mexico. It was not till after the. middle of the 19th century that a long and desperate resistance to foreign intervention under the leadership of Benito Juarez infused new life into the masses and initiated the creation of a new nationality. Then came the long, firm rule of Porfirio Diaz, who first broke up the organizations of bandits that infested the country, and then sought to raise Mexico from the state of discredit and disorganization into which it had fallen. Sus- picion and jealousy of the foreigner is disappearing, and habits of industry are displacing the indolence and lawlessness that were once universally prevalent.

The white race is of Spanish descent and has the charac- teristics common to other Spanish-American Creoles. Their political record previous to the presidency of Porfirio Diaz was one of incessant revolutionary strife, in which the idle, unsettled half-breeds took no unwilling part. The Indian element in the population is made up of several distinct races — the Aztec or Mexican, Misteca-Zapoteca, Maya or Yucateco, Otomi or Othomi, and in smaller number the Totonac, Tarasco, Apache, Matlanzingo, Chontal, Mixe, Zoque, Guaicuro, Opata- Pima, Tapijulapa, Seri and Huavi. As the tendency among separated tribes of the same race is to develop dialects and as habitat and customs tend still further to differentiate them, it may be that some of these smaller families are branches of the others. In 1864 Don Manuel Orozco y Berra found no fewer than 51 distinct languages and 69 dialects among the Indian inhabitants of Mexico, to which he added 62 extinct idioms — making a total of 182 idioms, each representing a distinct tribe. Thirty-five of these languages, with 69 dialects, he succeeded in classifying under 1 1 linguistic families. A later investigator, Don Francisco Belmar (Lenguas indigenas de Mexico, Mexico, 1905), has been able to reduce these numerous idioms to a very few groups. None of them were written except through the use of ideographs, in the making of which the Aztecs used colours with much skill, while the Mayas used an abbreviated form, or symbols.

The Aztecs, who called themselves Mejica or Mexicans after they had established themselves on the high table-land of Mexico, belong to a very large family or group of tribes speaking a common idiom called Nahua or Nah6a. These Nahua-speaking tribes were called the Nahuatlaca, and compose a little more than one-fourth of the present Indian population. They inhabit the western Sierra Madre region from Sinaloa southward to Chiapas, the higher plateau states, which region

was the centre of their empire when Cortes conquered them, and parts of Vera Cruz, Tabasco, Oaxaca, Morelos, Aguascalientes and San Luis Potosi. They were energetic and warlike and evidently had not reached the zenith of their power when Cortes came. They had been preceded on the same plateau by the Chichimecs, possibly of the same race, who were conquered by the Aztecs sometime in the 15th century after a supposed occupation of the territory about 400 years. The characteristic civilization of prehistoric Mexico, however, antedates both of these periods.

An Aboriginal race called the Toltecs is said to have occupied Vera Cruz and Tabasco and to have extended its empire west- ward on the plateau to and perhaps beyond the present capital. They were the builders of the pyramids of Cholula and Teotihu- acan, near the city of Mexico, and of Papantla, Huatusco and Tuzapan, in Vera Cruz. One of their towns was Tollan (now Tula) 50 m. north of the national capital, and it is not improb- able that the people of Cholula, Texcoco and Tlaxcala at the time of the Spanish invasion were occupying the sites of older Toltec towns. There has been much discussion in regard to the origin of the Toltecs, some assuming that they were a distinct race, and others that they belonged to the Nahuatlaca. Another and perhaps a better supposition is that they belonged to the Maya group, and represented a much earlier civilization than that of the builders of Palenque, Quirigua and Copan. Confirmatory

evidence of this is to be found, not only in the character of their constructions, but in the circumstance that a tribe closely akin to the Mayas (the Huastecos) still occupies a retired mountain valley of Vera Cruz, entirely separated from their kinsmen of the south, and that a dialect of the Maya language is still spoken in northern Vera Cruz. There is evidence to show that the Aztecs adopted the civilization of the Toltecs, including their religion (Quetzalcoatl being a god of the Toltecs and Mayas), calendar and architecture. Perhaps the most remarkable of the Mexican races are the Mayas, or Maya- Quiche group, which inhabit the Yucatan peninsula, Campeche and parts of Tabasco, Chiapas, and the neighbouring states of Central America (q.v.). The remarkable ruins of Palenque, Uxmal, Chichenitza, Lorillard, Ixinche, Tikal, Copan and .Quirigua, with their carved stonework and astonishing archi- tectural conceptions, show that they

had attained a high degree of civilization. They were agriculturists, lived in large, well- built towns, cultivated the mountain sides by means of terraces, and had developed what must have been an efficient form of government.

The Mistecas, or Mixtecas, and Zapotecas, who occupy the southern slopes of the central plateau, especially Puebla, Morelos, Oaxaca and Guerrero, form another distinct race, whose traditional history goes back to the period when the structures now known as Mitla, Monte Alban, Xochicalco and Zaachila were built. Their prehistoric civilization appears to have been not inferior to that of the Mayas. They were an energetic people, were never subdued by the Aztecs, and are now recov- ering from their long subjection to Spanish enslavement more rapidly than any other indigenous race. The Otomis comprise a large number of tribes occupying the plateau north of the Anahuac sierras. They are a hardy people, and are the least civilized of the four principal native races.

The Totonacs inhabit northern Vera Cruz and speak a language related to that of the Mayas; the Tarascos form a small group living in Michoacan; the Matlanzingos, or Matlaltzincas, live near the Tarascos, the savage Apaches, a nomadic group of tribes ranging from Durango northward into the United States; the Opata-Pima group, inhabiting the western plateau region from Sonora and Chihuahua south to Guadalajara, is sometimes classed as a branch of the Nahuatlaca; the Seris, a very small family of savages, occupy Tiburon Island and the adjacent mainland of Sonora; and the Guaicuros, or Yumas, are to be found in the northern part of the peninsula of Lower California. In southern Mexico, the Chontales, Tapijulapas, Mixes and Zoques inhabit small districts among and near the Zapotecas, the first being considered by Belmar a branch of that family. The Huavis inhabit four small villages among the lagoons on the southern shore of Tehuantepec and have been classed by Belmar as belonging to the Maya stock. The census of 1895 gave these Indian races an aggregate population of nearly 4 000,000, of which nearly 3,4So,ooo belonged to the first four groups Three of these four had made important progress toward civilization. Some of the others had likewise made notable progress, among which were the Tarascos, Totonacs and Zoques.

The builders of Casas Grandes (q.v.), in Chihuahua, evidently belonged to the Pueblo tribes of Arizona and New Mexico. As for the builders of Quemada, in Zacatecas, nothing positive is known. The ruins apparently are of an earlier period than those of Mitla and Xochicalco, and have no inscriptions and architectural decorations,

but the use of dressed stone in the walls, rather than adobe, warrants the conclusion that they belonged to the civilization of southern Mexico.

From the records made at the time of the Spanish conquest, and from the antiquities found in the abandoned cities of prehistoric Mexico, it is certain that the Indians lived in substantial houses, sometimes using dressed stone, inscriptions and ornamental carvings on the more pretentious edifices; they cultivated the soil, rudely perhaps, and produced enough to make it possible to live in large towns- they made woven fabrics for dress and hangings, using colours in their manufacture; they were skilful in making and orna- menting pottery, in making gold and silver ornaments, and in featherwoVk; they used the fibres that Nature lavishly provided

in weaving baskets, hangings, mats, screens and various household utensils. Copper was known to them, and it is possible that they knew how to make cutting instruments from it, but they generally used stone axes, hammers and picks, and their most dangerous weapon was a war-club into which chips of volcanic glass were set. Many of these primitive arts are still to be found in the more secluded districts, and perhaps the best work in pottery moulding in Mexico to-day is that of uneducated Indian artists.

Of the half-oreed element which has become so important a part of the Mexican population, no safe estimate can be made. Education, industrial occupation, commercial training and political responsibility are apparently working a transformation in a class that was once known chiefly for indolence and criminal instincts, and many of the leaders of mcSdern Mexico have sprung from this race. Settled government, settled habits, remunerative employment and opportunities for the improve- ment of their condition are developing in them the virtues of the two parent races. Brigandage was formerly so common that travel without an armed escort was extremely dangerous; under President Diaz, however, not only has such lawlessness been repressed but the brigands themselves have been given regular employment as rural guards under the government. This class is also furnishing the small traders of the towns, overseers on the plantations and public works, petty officials, and to some extent the teachers and professional men of the provincial towns.

Political Divisions. — The republic of Mexico is politically divided into 27 states, one federal district, and three territories. The states are generally subdivided into distritos (districts) or partidos, and these into municipios (municipalities) which correspond to the townships of

the American system. The state of Nuevo Leon, however, is divided into municipios only, while some other states use entirely different titles for the divisions, the larger being described as departamentos, cantons and municipios, and the smaller as partidos, directorias and vecindarios rurales. The Federal District consists of thirteen municipalities. The territory of Lower California is divided into two large districts, northern and southern, and the latter into partidos and municipios — the larger divisions practically forming two distinct territories.

The states and territories, with their areas, capitals and popula- tions, are as follows :-

Name.

Area, sq. m.

Pop.

1900.

Capital.

Pop.

1900.

Aguascalientes .

2,950

102,416

Aguascalientes .

35.052

Campeche .

18,087

86,542

Campeche .

17,109

Chiapas .

27,222

360,799

Tuxtla Gutierrez

9.395

Chihuahua .

87,802

327.784

Chihuahua .

30,405

Coahuila

63.569

296,938

Saltillo … .

23.996

Colima .

2,272

65.“5

Colima .

20,698

Durango

38,009

370,294

Durango

31,092

Guanajuato.

n,370

1,061,724

Guanajuato.

41,486

Guerrero

24,996

479.205

Chilpancingo

7.497

Hidalgo .

8,917

605,051

Pachuca .

37.487

Jalisco .

31.846

1,153.891

Guadalajara. .

101,208

Mexico .

9.247

934.463

Toluca .

25.940

Michoacan .

22,874

935.8o8

Morelia .

37.278

Morelos .

2,773

160,115

Cuernavaca.

9.584

Nuevo Leon

23.592

327.937

Monterrey .

62,266

Oaxaca .

35.382

948,633

Oaxaca .

35.049

Puebla .

12,204

1,021,133

Puebla .

93.152

Queretaro

3.556

232,389

Queretaro

33.152

San Luis Potosi .

25.316

575.432

San Luis Potosi .

61,019

Sinaloa .

33.671

296,701

Culiacan .

10,380

Sonora .

76,900

221,682

Hermosillo .

10,613

Tabasco .

10,072

159.834

San Juan Bau- tista .

io,543

Tamaulipas .

32,128

218,948

Ciudad Victoria .

10,086

Tlaxcala .

1.595

172,315

Tlaxcala .

2,715

Vera Cruz .

29,201

981,030

Jalapa . . .

20,388

Yucatan

35.203

309.652

Menda .

43-630

Zacatecas

24.757

462,190

Zacatecas' .

32,866

Distrito Federal

463

54L5I6

Mexico .

344.721

Territories: — Baja California

58,328

47.624 150,098

La Paz .

5.046

Tepic . . •

11,275

Tepic

15,488

Quintana Roo .

_·

Santa Cruz de Bravo .

276

Islands .

1 1

1,420

~

3*4

MEXICO

[COMMUNICATIONS

The area and population of Yucatan include those of the territory of Quintana Roo, which formed part of that state at the time of the census.

Baja, or Lower California, is divided into two districts for administrative convenience. The Distrito del Norte is credited with a population of 7583 and has its capital at Ensenada (pop. 1026); the Distrito del Sur has a population of 40,041 and has its capital at La Paz.

Tepic was detached from the north-west part of Jalisco and organized as a territory in 1889.

Quintana Roo was detached from the state of Yucatan in 1902 and received a territorial government.

The principal cities of Mexico, other than the capitals above mentioned, are as follows, the populations being those of 1900 except when otherwise stated: Acapulco (pop. 4932), a famous port on the Pacific coast in Guerrero, which was wrecked by the earthquake of 1909; Carmen, or Laguna de Terminos (about 6000), a thriving commercial town and port on the Gulf coast in Campeche; Celaya (25,565), a railway centre and manufacturing town of Guanajuato; Ciudad Guzman, or Zapotlan (about 17,500), an interesting old town of Jalisco; Cholula (about 9000), an ancient native town of Puebla, widely known for its great pyramid ; Comitan (9316), the commercial centre of Chiapas; Cordoba (7974 in 1895), a picturesque Spanish town in the sierras of Vera Cruz; Cuautla (6269), the centre of a rich sugar-producing district of Morelos; Guaymas (8648), a flourish- ing port of Sonora on the Gulf of California ; Leon (62,623), the largest city in Guanajuato and distinguished for its commercial activity, manufactures and wealth; Linares (20,690), the second city of Nuevo Leon in size and importance; Matamoros (8347), a prominent commercial centre and river port of Tamaulipas ; Mazatlan (17,852),

the foremost Mexican port on the Pacific coast; Orizaba (32,894), a city of Vera Cruz famous for its delightful climate and picturesque surroundings; Parral (14,748), a well-known mining centre of southern Chihuahua; San Cristobal (about 16,000), once capital of Chiapas and rich in historical associations; Tampico (16,313), a Gulf port and railway terminus of Tamaulipas; Tehuantepec (10,386), the largest town on the Tehuantepec railway in Oaxaca; Vera Cruz (29,164), the oldest and best known Gulf port of Mexico.

Communications. — Railways began in Mexico with a line of four kilometres between the capital and Guadalupe, which was finished in 1854 and afterwards became a part of the Ferrocarril Mexicano. The latter dates from 1857, when a concession was granted for the construction of a railway from the city of Mexico to Vera Cruz. The French invasion of 1862 found only 10 m. in operation outside of Vera Cruz and military needs led to its immediate extension to Paso del Macho, at the foot of the sierras, about 35 m. At the same time the English company holding the concession extended the Guadalupe line to Puebla. Nothing more was accomplished until after the downfall of Maximilian, and with a liberal subsidy from the Mexican government the Ferrocarril Mexicano was pushed to its completion in 1873. It is celebrated because of the difficulties overcome on the precipitous eastern slopes of the Sierra Madre, the beauties of the mountain scenery through which it passes, and the rapid transition from the hot, humid coastal plain to the cool, arid plateau, 7924 ft. above the sea at Boca del Monte. The railway extends 263 m. between Vera Cruz and Mexico City, to which 58 m. were added in branches from Apizaco to Puebla, and from Ometusco to Pachuca. The line was capitalized at $46,000,000 and has paid a good profit on the investment. The period of active railway con- struction, however, did not begin until 1878, during the first term of President Porfirio Diaz. In 1874 a concession was granted for a line from the port of Progreso to Merida (22 1 m.), and in 1878 four concessions were added under which 806 m. were constructed. The principal of these four concessions v/as the Ferrocarril Inter- oceanico running from Vera Cruz to Mexico City and across the republic toward Acapulco. In 1880 concessions were granted to the F.C. Occidental, F.C. Central Mexicano, F.C. Nacional Mexicano and three others of less importance, aggregating nearly 3500 m. The first three of these have become important factors in the develop- ment of Mexico. The first runs southv/ard from the capital to Oaxaca through the rich sub-tropical states of Puebla and Oaxaca, and the other two run northward from the same point to the American frontier. These two lines, popularly called the Mexican Central and Mexican National, have their northern termini at Ciudad Juarez and

Laredo on the Rio Grande and connect with American trunk lines at El Paso and Laredo. These two great lines were merged in 1908, with an aggregate capital of 8460,000,000 Mexi- can money, of which the Mexican government holds $230,004,580, or a controlling interest. Important branches of these lines extend to Tampico on the Gulf coast, to Manzanillo on the Pacific coast, and westward and southward into Michoacan and Guerrero, with a coast terminus at or near Acapulco. The next important line is the F.C. Internacional Mexicano, running from Ciudad Porfirio Diaz, on the Rio Grande, south-westward across the plateau to Durango, and is to be extended to Mazatlan, on the Pacific coast. This line was built with American capital and without a subsidy. Another line built with American capital and in connexion with American railway interests extends southward from Nogales, on the northern frontier, to Hermosillo, Guaymas and Mazatlan ; it is to be extended to Guadalajara and possibly to other points in southern

Mexico. Monterrey is connected with Tampico by a Belgian line known as the F.C. de Monterrey al Golfo Mexicano, and the capita! is to have direct connexion with the Pacific, other than the F.C. Interoceanico, by a line through Cuernavaca and Iguala to the coast. Indirectly the capital has a Pacific coast connexion by way of Cor- doba and the F.C. Vera Cruz al Pacifico to a junction with the Tehuantepec line. One of the most important railways in Mexico is the F.C. Nacional Interoceanico de Tehuantepec, also called the Tehuantepec National, and the Mexican Isthmus railway, which is 192 m. long and was formally opened in 1907. This line crosses the Isthmus of Tehuantepec from Coatzacoalcos (officially Puerto Mexico) on the Gulf coast to Salina Cruz on the Pacific coast, and has been under construction many years. The railway was first completed in 1894, but light and defective construction, together with lack of shipping facilities at its terminal points, rendered it useless. To correct these defects the line was completely rebuilt and terminal ports constructed. In 1909 the ports were ready to receive large ocean steamships, and regular traffic was begun, including cargoes of Hawaiian sugar for New York. The highest point on the line' (Chivela Pass) is 735 ft. above sea-level. The railway has been buiit by the Mexican government as a transcontinental route for inter- national commerce. Its final construction together with that of its two ports were executed by S. Pearson & Sons, Ltd., of London, who also undertook the working of the line when open. It was estimated in 1907 that the total cost of the railway and ports when completed would be about £13,000,000. The line is connected at the station of Santa Lucrecia (109 m. from Salina Cruz) with the Vera Cruz and Pacific railway which gives an all-rail connexion with Vera Cruz and

Mexico City, the distance between the latter and Salina Cruz being 520 m. According to the President's Message of April 1909, there were 14,857 m. of railway in operation, of which 11,851 m. belonged to or were controlled by the government. It is the evident policy of the Mexican government to prevent the absorption of its railways by private monopolies, and this is effected by state owner- ship of a controlling share in most of the trunk lines.

Mexico is well provided with tramway lines in its larger cities. A British consular report for 1904 stated that Mexico City and Torreon only were using electric traction, but that Guadalajara, Monterrey, Aguascalientes, Lagos, Colima, Vera Cruz and San Luis Potosi would soon be using it. No official reports are available. The telegraph lines had an aggregate length of 35,980 m. at the end of 1907, of which 33,000 m. belonged to the national government. The President reports an addition of 1626 m. in 1908. Wireless tele- graphy was represented in 1908 by a connexion between Mazatlan and Lower California, which was in successful operation. Telephone lines were in use in all the large cities and in connexion with the large industrial enterprises and estates, beside which the government had 500 m. of its own in 1908.

Commerce. — In 1905 the mercantile marine of Mexico comprised only 32 steamers, of 13,199 tons, and 29 sailing vessels, of 8451 tons. The ocean-carrying trade was almost wholly in the hands of foreigners, the government wisely refraining from an attempt to develop an occupation for which its citizens had no natural aptitude. The coastwise trade is principally under the Mexican flag, but the steamers are owned abroad. An official publication entitled " Mexico: Yesterday and To-day, 1876-1904," states that while the number of steamers engaged in the foreign trade increased from 841 to 969 in the 17 years from 1886 to 1903, the number of Mexican steamers decreased from 55 to 4. For the year 1906-1907 the entries of vessels from foreign ports numbered 1697, of 3,282,125 tons, and the clearances were 1669, of 3,257,932 tons. Subventions are paid for regular steamship service at the principal ports, the total expen- diture in 1907-1908 being £42,876. These ports are well served by a large number of foreign steamship companies, which give direct com- munication with the principal ports of the United States, Europe, and the west coast of South America, and the initiation of a Japanese line in 1908 also brings Mexico into direct communication with the far East. The larger ports for foreign trade are Vera Cruz, Tampico, Progreso, Carmen and Coatzacoalcos on the Gulf coast, and Guaymas, La Paz, Mazatlan, Manzanillo, San Bias, Acapulco and Salina Cruz on the Pacific coast. Some of these — Vera Cruz, Tampico, Coatzacoalcos,

Salina Cruz, Manzanillo and Mazatlan — have been greatly improved with costly port works. Among the smaller ports, some of which are open to foreign trade, are Matamoros, Tuxpan, Alvarado, Tlacotalpan, Frontera, Cam- peche and the island of Mujeres (coast of Yucatan) on the Gulf side, and Ensenada, Altata, Santa Rosalia and Soconusco on the Pacific.

The foreign trade has shown a steady increase during the period of industrial development, to which better means of transport have been an invaluable aid. In 1906-1907 the imports were valued at $111,234,968 U.S. gold, and the exports at $123,512,969, of which very nearly one half consisted of precious metals. According to an official report issued early in 1909 there had been a heavy decrease in both imports and exports, the former being returned at $36,195,469 and the latter at $54,300,896 for the six months ending the 31st of December 1908. Too rapid development and overtrading were given as reasons for this decline. Import and export duties are levied, the former in many cases for the protection of national industries. The imports largely consist of railway material, industrial machinery,.

cotton, woollen and linen textiles and yarns for national factories, hardware, furniture, building material, mining supplies, drugs and chemicals, wines and spirits, wheat, Indian corn, paper and military supplies and equipment. The exports include gold, silver, copper, coffee, henequen or sisal, ixtle and other fibres, cabinet woods, chicle, rubber and other forest products, hides and skins, chickpeas, tobacco and sugar.

Agriculture. — The agricultural resources of Mexico are large and unusually varied, as they comprise some of the cereals and other food products of the temperate zone, and most of the leading pro- ducts of the tropics. Agriculture, however, received slight atten- tion, owing to the early development of the mining industries. An indirect result of the industrial development of Mexico, which began during the last quarter of the 19th century, has been an increased interest in agriculture, and especially in undertakings requiring large investments of capital, such as coffee, sugar and rubber planta- tions. A large part of the country is too arid for agriculture, and even with irrigation the water supply is sufficient for only a small part of the dry area. This

region has, for the most part, a temperate climate, and produces wheat, barley, Indian corn and forage crops. Long droughts often destroy the wheat and Indian corn and compel their importation in large quantities to supply the people with food. This uncertainty in the wheat crop extends to the southern limits of the higher plateau, and is a serious obstacle to the increased pro- duction of this cereal. Indian corn, also, is a comparatively uncer- tain product on the plateau, and for the same reason. As it is a staple food with the poorer classes, the deficiency is made up through importation. These drawbacks tend to restrict agriculture on the plateau to comparatively limited areas, and the country people are, in general, extremely poor and badly nourished. A comparatively new product in this region is that of canaigre, which is grown for the tannin found in its root. It is a native of the arid regions and is now cultivated with success. The district about Parras, in southern Coahuila, produces grapes, which are principally used in the manu- facture of wine and brandy. An important product of the plateau and of the open districts of the tierras calientes, growing in the most arid places, is the ” nopal ” or prickly pear cactus (Opuntia ficus indica). Its fruit, called “tuna” by the natives, is refreshing and wholesome and is a staple food in spite of its spiny covering. In the tierras calientes of Mexico, however, better conditions prevail. A fertile soil, abundant rainfall and high temperatures have covered these mountain slopes and lowland plains with a wealth of vegetation. The problem for the agriculturist here is not irrigation, but drainage and keeping down spontaneous growths. In these regions, sugar, tobacco, indigo, cacao, rice, sweet potatoes, alfalfa, beans and cassava are produced, and Indian corn yields two and three crops a year. Fruits also are plentiful, both wild and cultivated. Among them are the banana, plantain, tuna, chili pepper, olive, coco-nut, orange, lemon, lime, mango, pomegranate, ” pifia ” or pineapple (wild and cultivated), fig, ahuacatl (Persea gratissima), chirimoya (Anona ckirimolia), papaya, gourd, melon, guava, ciruela (plum), and the several ” zapote ” fruits, including ” chico zapote ” from the Achras sapota, which produces the ” chicla ” or chicle-gum of commerce, ” zapote bianco ” from the Casimiroa edulis, ” zapote-barracho ” (or ” amarillo “) from the Lucuma salicifolia, ” zapote-prieto ” (or ” negro “) from the Diospyros obtusifolia, and ” zapote-mamey.” The production of rubber is becoming an important industry, large plantations having been set with both Hevea and Castilloa rubber trees. Lying between these two regions is the subtropical belt where coffee of an excellent quality is produced, and where cotton is cultivated. Coffee has become an important article of export, but cotton does not yield enough for the domestic factories. Better cultivation would probably increase the output and make it an article

of export. A peculiar and highly profitable branch of Mexican agriculture is the cultivation of the Agave for two widely different purposes — one for its fibre, which is exported, and the other for its sap, which is manufactured into intoxicating liquors called '.' pulque " and " mescal." In Yucatan immense plantations of the Agave rigida var. elon-gata are cultivated, from which large quantities of " henequen " or " sisal," as the fibre is called, are exported. It is produced on light shallow soils overlying calcareous rock. It is also cultivated in Campeche and Chiapas. The pulque industry is located on the plateau surrounding the city of Mexico, the most productive district being the high, sandy, arid plain of Apam, in the state of Hidalgo, where the " maguey " (Agave americana) finds favourable conditions for its growth — a dry cal- careous surface with moisture sufficiently near to be reached by its roots. Its cultivation is the chief industry of the states of Mexico, Hidalgo, Puebla and Tlaxcala. Of the 208 plantations ifr the state of Hidalgo in 1897, 129 were devoted to maguey. The plant is propagated from suckers and requires very little attention after transplanting to the field where it is to remain, but it takes six to eight years to mature and then yields an average of ten gallons of sap during a period of four or five months, after which it dies. " Pulque " is the fermented drink made from this sap: " mescal " is the distilled spirit made from the leaves and roots of the plant. There are other agaves used both in the production of drinks and fibres, but they are not cultivated. The " ixtle " fibres shipped from Tampico and Chiapas are all obtained from the agaves and yuccas found growing wild.

The natural and forest products of Mexico include the agave and yucca (ixtle) fibres already mentioned; the " ceibon " fibre derived from the silk-cotton tree (Bombax pentandria) ; rubber and vanilla in addition to the cultivated products; palm oil; castor beans; ginger; chicle, the gum extracted from the " chico-zapote " tree (Achras sapota); logwood and other dye-woods; mahogany, rose- wood, ebony, cedar and other valuable woods; " cascalote " or divi-divi ; jalap root (Ipomaea) ; sarsaparilla (Smilax) ; nuts and fruits.

Stock-raising dates from the earliest Spanish settlements in Mexico and received no slight encouragement from the mother country. For this reason much importance has always been attached to the industry, and stock-raising of some sort is to be found in every state of the republic, though not always to a great extent. The Spaniards found no indigenous domestic animals in the country, and introduced their own horses, cattle, sheep and swine. From these are descended the herds and flocks of to-day, with no admix- ture of new blood until toward the end of the 19th century. The horses and cattle are of a

degenerate type, small, ungainly and inured to neglect and hard usage. The horse is chiefly used for saddle purposes and is not reared in large numbers. The mule is more generally used in every part of the country, being hardier, more intelligent and better adapted for service as a draft and pack animal. The transport of merchandise and produce was wholly by means of pack animals before the advent of railways, and is still the common means of transport away from the railway lines. For this purpose the sure-footed mule is invaluable. In some districts, however, oxen and ox-carts are employed, especially in the southern states, and always in the open, level country. The varying climatic conditions of Mexico have produced breeds of cattle that have not only departed from the original Spanish type, but likewise present strikingly different characteristics among .themselves. Those of the northern plateau are small, hardy and long-lived, being bred on extensive ranges in a cooler atmosphere, and accus- tomed to long journeys in search of water and pasture. In the south they are larger and better nourished, owing to the permanent character of the pasturage, but are less vigorous because of the heat and insect plagues. In Yucatan the open plains, rich pasture, and comparative freedom from moist heat, insects and vampire bats, have been particularly favourable to cattle-raising, and the animals are generally rated among the best in Mexico. Notwithstanding the frequency of long, destructive droughts, cattle-raising is a pre- ferred industry among the landowners of the northern states, and especially near the American frontier. Almost total losses are frequently experienced, but the profits of a favourable year are so great that losses seldom deter ranchers from trying again. In the sierra regions of western Chihuahua and Durango, Nuevo Leon, Coahuila, Aguascalientes, San Luis Potosi, and the plateau states farther south, the rainfall is more abundant and the conditions more favourable. The largest herds are to be found in Chihuahua and Durango. Above 5000 ft. the wild pasturage is short, tender and reproduces itself annually. It is exceptionally nutritious, but it disappears altogether in the dry season because of its short roots. The lowland pasture, from 2000 to 5000 ft., is composed of more vigorous grasses, with an undergrowth of an exceptionally succulent character. The stock-raiser on the border pastures his herds on the uplands during the rainy season, and on the lower pastures during the remainder of the year. Next in importance is the breeding of sheep, which is largely confined to the cooler sierra districts. They are commonly of the Spanish merino breed, and suffer in many localities on account of insufficient pasturage. Some attention is given to the breeding of goats because of the local demand for their skins, but the industry is apparently stationary. The raising of swine, however, is increasing. In the last decade of the 19th cen- tury the

capital invested in these live-stock industries was estimated (by Bancroft) to exceed $700,000,000, but an official return of the 30th of June 1902 gave an aggregate valuation of only $120,523,158 (Mexican), or about £12,052,316. According to this report, which is not strictly trustworthy, there were in the republic 5,142,457 cattle, 859,217 horses, 334,435 mules, 287,991 asses, 3,424,430 sheep, 4,206,01 1 goats and 616,139 swine. Two years later home consumption returns noted the slaughter of 958,058 cattle (129,938 in the Federal District), 561,982 sheep, 992,263 goats and 887,130 hogs — the last item being larger than the census return of 1902. The greater part is consumed in the country, but there is a considerable export of cattle to the United States, Cuba and Central America, and of hides and skins to the United States and Europe. A few mules are sent to Central America, but the homedemand usually exceeds the supply.

Other Industries. — There are no fisheries of importance except the pearl fisheries on the eastern coast of Lower California, and the tortoise fisheries on the coasts of Campeche, Yucatan, and some of the states facing the Pacific. The pearl fisheries have been worked since the arrival of the Spaniards, and were once very productive notwithstanding the primitive methods employed. Since the closing years of the last century pearl fishing in the Gulf of California ha; been carried on with modern appliances and better results by an English company under a concession from the government. Mother- of-pearl or abalone and other shells are also found, and, with sponges, are exported. Fishing for the tortoiseshell turtle gives employment

to a large number of natives in the season, and considerable quantities of the shell are exported. Other industries of a desultory oharacter include the collection of archil, or Spanish moss, on the western side of the Californian peninsula, hunting herons for their plumes and alligators for their skins, honey extraction (commonly wild honey), and the gathering of cochineal and ni-in insects. The cochineal insect was once an important commercial product, but the industry has fallen into decay. The ” ni-in ” (also known as ” axe “) is a small scale insect belonging to the genus Coccus, found in Yucatan, Oaxaca, Vera Cruz, Michoacan and other southern states, where it inhabits the spondia trees and produces a greasy substance called ” ni-inea,” which is much used by the natives as a varnish, especially for

domestic utensils, as it resists fire as well as water.

Mining. — The best-known and most productive of the industries of Mexico is that of mining. It was the chief object of Spanish exploration, and the principal occupation of European residents and capital during three centuries of Spanish rule. Agricultural and pastoral industries gradually gained footholds here and there, and in time became important, but mining continued far in advance until near the end of the 19th century. Mines of some description are to be found in 26 of the 31 states and territories, and of these the great majority yield silver. According to the official records, there were registered in September 1906, 23,191 mining properties, of which very nearly five-sixths were described as producing si!ver, either by itself or in combination with other metals. The properties were classed as 1572 gold, 5461 silver, 970 copper, 383 iron, >5I mercury, 94 lead, 86 sulphur, 52 antimony, 49 zinc, 40 tin, 21 opals, 9 manganese, 6 ” sal gema,” 5 tourmalines, I bismuth and I turquoise — ■ the remainder being various combinations of these minerals. The absence of coal from this list is due to the circumstance that coal mines were at that time considered as private property and were not registered under the general mining laws. A comparison with 1888-1889, when 8970 properties were registered, will show how rapidly the mining industries have been developed during that period. Besides the above, the mineral resources of Mexico include coal, petroleum, asphalt, platinum, graphite, soda and marble. In 1906 the productive mines numbered 1786, of which 491 were in Sonora, 282 in Chihuahua, 211 in Durango, 113 in Oaxaca and 105 in Nuevo Leon. Gold is found in Chihuahua, Durango, Guana- juato, Guerrero, Jalisco, Mexico, Morelos, Oaxaca, Puebla, Sinaloa, Sonora, Vera Cruz, Zacatecas, and to a limited extent in other states; silver in every state and territory except Campeche, Chiapas, Tabasco, Tlaxcala and the Yucatan peninsula; copper in Lower ‘ California, Guanajuato, Guerrero, Jalisco, Michoacan, Sonora, Tamaulipas and some other states; mercury chiefly in Guanajuato, Guerrero, San Luis Potosi, Vera Cruz and Zacatecas; tin in Guana- juato; coal, petroleum and asphalt in 20 states, but chiefly in Coahuila, Hidalgo, Michoacan, Oaxaca, Puebla, Sonora, Tabasco, Tamaulipas and Vera Cruz; iron in Durango, Hidalgo, Oaxaca and other states; and lead in Hidalgo, Queretaro and in many of the silver-producing districts. The most celebrated iron deposit is that of the Cerro del Mercado, in the outskirts of the city of Durango — a mountain 640 ft. in height, 1100 in breadth, and 4800 in length, reputed to be almost a solid mass of iron. Large masses of the metal are also said to exist in the sierras of Lower California. The prin- cipal coalfields that have been developed are in the vicinity of

Sabinas, Coahuila. They have been opened up by American capitalists and the coal is used on the railways passing through that region. Mexican coal is of a low grade — similar to that found in Texas, but as an official geological report of 1908 estimates the supply in sight at 300,000,000 tons its industrial value to the country cannot be considered inferior to that of the precious metals. The same is true of the petroleum deposits in Tamaulipas, near Tampico, and in southern Vera Cruz. An investigation by the U.S. Geological Survey in 1909 finds that the crude Mexican oils are of low grade, but that while not equal to those found in the upper Mississippi basin for refining purposes, they furnish an excellent fuel for railway engines and other industrial purposes. Many of the Mexican railways are using these fuel oils, which are superseding imported coal. In 1909 a well was opened in the southern oilfields whose yield was equal to the best American product.

Manufactures. — Although Mexico is usually described as a non-manufacturing country, its industrial development under President Porfirio Diaz will warrant some modification of this characterization. Manufacturing for international trade has not been and may never be reached, but the industry certainly has reached the stage of meet- ing a great part of the home demand for manufactured goods, where the raw material can be produced in the country. There were of course some crude industries in existence before the arrival of the Spaniards, such as weaving and dyeing of fabrics made from various fibres, and making earthenware utensils, images, &c. The Spaniards introduced their own industries, including sugar-making, weaving, tanning, and leather- and metal-working, some of which still exist. The early methods of making cane sugar, clarified with clay and dried in conical moulds, are to be found all over Mexico, and the annual output of this brown or muscovado sugar (called ” panela ” by the natives) is still very large. The sugar crop of 1907- 1908 was reported.as 123,285 metric tons, in addition to which the molasses output was estimated at 70,947-5 metric tons, and ” panela ” at 50,000 tons. Other estimates make the ” panela ” output much

larger, the product being largely consumed in the rural districts and never appearing in the larger markets. The estimated number of sugar mills in 1904 was about 2000, of which only about 300 were important for size and equipment. Merino sheep were intro- duced in 1 541 and woollen manufactures date from that time. Large factories are now to be found in all parts of Mexico, and good and serviceable grades of broadcloths, cassimeres, blankets and other fabrics are turned out. There is also a considerable quantity of carpeting, underwear and hosiery manufactured. An important branch of this

industry is the manufacture of ” zarapes ” (called ” ponchos ” in other parts of Spanish America) — a blanket slit in the centre for the head to pass through, and worn in place of a coat by men of the lower classes. The most important textile industry is cotton manufacture, which has become a highly successful feature in the industrial life of the republic. There were 146 factories in 1905, of which 19 were idle, and these were distributed over a very large part of the country. About one-half the raw cotton con- sumed was produced in Mexico, and the balance imported in fibre or as yarn. The industry is protected by a high tariff, as is also the production of raw cotton, and further encouragement is offered through a remission of internal revenue taxes where Mexican fabrics are exported for foreign consumption. The cotton factories of 1905 were equipped with 22,021 looms having 678,058 spindles, and with 38 stamping machines, employed 30,162 operatives, and turned out 13,731,638 pieces of cloth. Statistical returns, however, are some- what incomplete and conflicting, and cannot be used with confidence. Coarse fabrics chiefly are manufactured, but the product also com- prises percales, fine calicoes, ginghams, shirtings, towelings, sheetings and other kinds of goods. Considerable attention is given to the manufacture of ” rebozos,” the long shawls worn by women. Another very important manufacturing industry is that of tobacco, the consumption of its various products being large among all classes of the population. There were 467 tobacco factories reported in 1905 to be engaged in the manufacture of cigars, cheroots, cigarettes, snuff and cut tobaccos for the pipe. The number of factories reported for 1899 was 743, but as the consumption of leaf tobacco increased from 5,546,677 to 8,587,356 kilogrammes, it may be assumed that the decrease in factories is due to the absorption or disappearance of the small shops using old-fashioned methods. Other important manufactories are flour mills, of which there were over 500 in 1904; iron and steel works, of which there are 7 large establishments, including the immense plant at Monterey; 90 smelters for the reduction of precious metals; tanneries, potteries, and factories for the manufacture of hats, paper, linen, hammocks, harness and saddles, matches, explosives, aerated waters, soap, furniture, chocolate and sweetmeats. There are also a large number of distilleries, breweries, and establishments for the manufacture of ” pulque,” ” mescal,” and imitation or counterfeited liquors. In addition to these are the many small domestic industries, such as the making of straw hats, mats, baskets, pottery, ropes and rough textiles. The policy of the Mexican government is to encourage national manufactures, and protective duties are levied for that purpose. Other favours include exemption from taxation and exemption from import duties on machinery and raw materials. These

inducements have attracted large sums of foreign capital and have brought into the country large numbers of skilled operatives, especially in the cotton, iron and steel, and smelting industries.

Constitution. — Under the Constitution of the 5th of February 1857, subsequently modified in many important particulars, the government of Mexico is described as a federation of free and sovereign states invested with representative and democratic institutions. Practically it is a Federal Republic with central- ized executive powers. Its political divisions consist of 27 states (originally 19) having independent local governments, 3 terri- tQries and 1 federal district in which the national capital stands. The central government consists of three co-ordinate branches — executive, legislative and judicial — each nominally independent of the other. The executive branch consists of a president and vice-president, assisted by a cabinet of 8 secretaries of state: (1) foreign affairs; (2) interior; (3) justice; (4) public instruction and fine arts; (5) fomento, colonization and industry; (6) com-munications and public works; (7) finance and public credit; (8) -war and marine. The president and vice-president are elected indirectly through an electoral college chosen by popular vote, and serve for a period of six years (the term was four years previous to 1904), the vice-president succeeding to the office in case of the death or permanent disability of the president. The office of vice-president was created on the 6th of May, 1904, and that official serves as president of the senate. A constitu- tional amendment of 1890 permits the re-election of the president without limit, the original clause prohibiting such a re-election. A candidate for the presidency must be a native-born Mexican

citizen in the full exercise of his political rights, 35 years of age, not an ecclesiastic, and a resident of the republic at the time of the election. Although the authority of the president is care- fully defined and limited by the Constitution, the exercise of dictatorial powers has been so common that the executive may be considered practically supreme and irresponsible. Previous to the presidency of General Porfirio Diaz in 1877 political disorders and changes in government were frequent.

The legislative branch of government consists of a Congress of two

chambers — a senate and a chamber of deputies. Two ordinary congressional sessions are held each year — April 1 to May 31 and September 16 to December 15 — and a perma- nent committee of 29 members (14 senators and 15 deputies) sits during recess, with the power to confirm executive appoint- ments, to give assent to a mobilization of the national guard, to convene extra legislative sessions, to administer oaths, and to report at the next session on matters requiring congressional action. The senate is composed of 56 members — or two from each state and from the federal district — who are elected by popular vote for a term of four years, one-half the number retiring every two years. A senator must be not under 30 years of age, a Mexican citizen in the full enjoyment of his rights, a resident of the state he represents, and not an ecclesiastic. The chamber of deputies is composed of popular representatives, in the proportion of one deputy for each 40,000 inhabitants or fraction over 20,000, who are elected for a term of two years. A deputy must be not less than 25 years of age, other qualifica- tions being the same as those for a senator. The salary for either senator or deputy is $3000 and that of the president $50,000. Federal officials and ecclesiastics are ineligible for election to either chamber.

Mexican citizenship includes all persons born of Mexican parents, all naturalized aliens, and all foreigners owning real estate in the republic or having children by Mexican mothers unless formal declaration is made of an intention to retain the citizenship of another country. In some cases exemptions are granted from specified taxes and military duties, otherwise naturalized citizens are treated the same as native-born. Aliens are granted the civil rights enjoyed by Mexicans, but the government reserves the right to expel those guilty of pernicious conduct. Suffrage is extended to all Mexican citizens who possess honest means of livelihood, the age limit being 18 for the married and 21 for the unmarried.

The judicial branch of the government consists of a supreme court of justice, three circuit courts, and 32 district courts. The supreme court is composed of 11 ” ministros ” or justices, four alternates, a ” fiscal ” or public prosecutor and the attorney- general — all elected by popular vote for a term of six years. It has jurisdiction in cases arising from the enforcement of the federal laws, except cases involving private interests, in admiralty cases, in cases where the republic is a party, in those between two or more states, or between a state and the citizens of another state, in those originating in treaties with foreign states, and in those affecting diplomatic and consular officials. There are likewise supreme and inferior courts in most of the states, governed by the civil and criminal codes in force in the federal

district. The territories are governed by federal laws. The department of justice has oversight in matters relating to the enforcement of the federal laws and the administration of justice through minor courts. The police service is both muni- cipal and federal in character. In some states a local police service is maintained, but in most states the federal government maintains a very efficient force of mounted " rurales."

The states are organized very much like the federal govern- ment, each with its own governor, legislature, laws and judiciary. Elections are generally indirect, like those for the national executive, and official terms correspond closely to those of similar offices in the national organization. The state is nomi- nally sovereign within its own boundaries, and the authority of its officers and courts in local questions is supreme except in cases where federal intervention or supervision is provided for by the federal constitution. The larger political divisions of the state

(partidos, distritos, &c.) are governed by ajefe politico, or prefect, and the smaller by a municipal council called an ayuntamiento-. Defence. — The Mexican army consisted in 1908 of 2474 officers and 24,132 men, organized on modern lines, and commanded by a general staff at the capital. There were 30 battalions of infantry and 4 battalions cadres with an effective strength of 730 officers and 14,898 men; 14 regiments of cavalry and 4 regimental cadres with 493 officers and 6058 men ; 2 regiments and 3 cadres of field artillery; one regiment and one cadre each of horse and mountain artillery, 4 sections of garrison artillery, and one mitrailleuse com- pany, in all 147 officers and 1647 men; and the remainder divided among other services. Administration and headquarters staffs comprised 885 officers and 531 men. This force represented the peace footing of the army, which is recruited in part by voluntary enlistments and in part by a form of conscription that might be called impressment. Mauser rifles (1901 model) and carbines are used by the infantry and cavalry, and Schneider Canet quick-firing guns by the field and horse artillery. The nominal war strength of the army is rated at 2510 officers and 81,984 men. Factories for arms and ammunition have been established with modern machinery, and uniforms and other equipment are made in the country. The military school in the capital occupies a part of the historic castle of Chapultepec and has been thoroughly reorganized on modern lines. There is also an artillery school at Vera Cruz and subordinate schools in other parts of the republic. The national guard, to which reference is sometimes made, has no effective organization.

Mexico may be said to have no navy, the ten small vessels in com-

mission in 1908 hardly meriting such a designation. There were 2 old despatch boats and 2 old unarmoured gunboats, a steel training cruiser, the ” Zaragoza,” and 5 small modern gunboats. The personnel consisted of 198 officers and 965 men. Six new cruisers were projected, but the republic has no pressing need of a navy. Small naval schools are maintained at Campeche and Mazatlan.

Education, — Education in Mexico may be said to have entered upon a progressive phase. The institutions founded by the Span- iards were wholly under ecclesiastical control. The first college in Mexico was founded during the administration of Viceroy Mendoza (IS35-I550). but it taught very little beyond Latin, rhetoric, gram- mar and theology. The university of Mexico, planned by Mendoza and founded on the 21st of September 1551, was formally opened on the 25th of January 1553, with faculties of law, philosophy and theology. Practically nothing was done for the natives beyond oral instruction in the catechism. The university of Mexico received much support from both church and state, but it never gained a position comparable to the universities of South America — Cor- doba, Lima (San Marcos) and Bogota. The overthrow of Spanish rule in Mexico was the beginning of a new period, and efforts were made to introduce educational reforms, but the colonists and ecclesi- astics were still governed by their fears and prejudices, and little was accomplished. In 1833 the university of Mexico suspended work, and in 1865 passed out of existence altogether. In 1857 the adop- tion of a more liberal and democratic constitution paved the way for a new period in the educational history of the country. Its realiza- tion was delayed by the wars that devastated the country down to the overthrow of Maximilian, but the leaven was at work, and with the return of peace a marked increase in the number of primary and secondary schools was noted. Colleges of law, medi- cine and engineering were created in Mexico City in 1865 in place of the old university and were successful from the beginning. Professional schools were_ also established in several of the more important provincial capitals, and everywhere increasing interest in educational matters was apparent. The best proof of this was to be found in the development of the primary schools, of which there were 8226 in 1874, with an attendance of 360,000 pupils. Of these, 603 were supported by the national government, 5240 by municipali- ties, 2260 by private enterprise, 117 by the Catholic church, andthe remainder by Protestant denominations. Handsome schools were built in the cities and larger towns, and schools were opened in all the villages and hamlets. In some parts the natives made most creditable progress in all branches of learning. This was especially true of the Mixtecos and

Zapotecas of Oaxaca, from whom have come some of the leading men of the republic. The national school laws now in force had their origin in the recommendations made by a national congress of public education convened on the 1st of December 1889, and again on the 1st of December 1890. The first result was a law regulating free and compulsory education in the federal district and national territories, which came into effect on the 17th of January 1892. From 1822 to this time the government primary schools had been under the supervision of the Compania Lancasteriana, but they were now placed under charge of the Department of Public Education. On the 19th of May 1896 a general public education law was promulgated, which provided further regulations for the public schools, and outlined a com- prehensive system. Compulsory attendance had been adopted in 1888, but did not come into effect until after the enactment of the law of 1896. It provides for uniform, free and non-sectarian primary instruction, and compulsory attendance for children of 6 to 12 years of age. Preparatory courses for professional training in the government schools were also made free and secular. As the

states have control of the schools within their own boundaries there was at first a great lack of uniformity, bub the national system is being generally adopted. In the official report for 1904 the num- ber of public schools, exclusive of infant schools, was returned at 9194 (against 5843 in 1874), with an enrolment of 620,476. Of these 6488 were supported by the national and state governments and 2706 by the municipalities. The private, religious and associa- tion schools numbered 2281, with 135,838 pupils. For secondary instruction the national and state schools numbered 36 with 4642 pupils, and for professional instruction 65 with 9018 students, of whom 3790 were women. Normal schools for the training of teachers are also maintained at public expense and are giving good results. Besides these, the government maintains schools of law, medicine, agriculture and veterinary practice, engineering, mining, commerce and administration, music and fine arts. There is also a mechanics' training school (artes y oficios) for men and a similar school for women, schools for the blind and for deaf-mutes, reform schools, and garrison schools for soldiers. Early estimates were that 90% of the population were illiterate. In 1895 this percentage was reduced to about 84 %, and the work of the schools is slowly cutting it down. Mention must

be made of the National Library in Mexico City with about 225,000 volumes, and 138 public libraries (in 1904) in other parts of the republic, 34 museums for scientific, educational and art purposes, and 11 meteorological observatories. Newspapers and periodicals, whose educational value varies widely, numbered 459 in 1904, of which 439 were in Spanish and 12 in English.

Religion. — The people of Mexico are almost wholly of the Roman Catholic faith, the census of 1900 returning 13,533,013 communicants of that church, 51,795 Protestants (in great part foreigners), 381 1 of other faiths, and 18,640 of no faith. The constitution of 1857 grants toleration to all religions, and since 1868 several Protestant denominations have established missions in the towns, but their numbers are still comparatively small. The Roman Catholic religion was enforced at the time of the conquest, but a large percentage of the natives may still be considered semi-pagan, the gods of. their ances- tors being worshipped in secret, and the forms and tenets of the dominant faith, which they but faintly comprehend, being largely adulterated with superstitions and practices of pagan origin. The church hierarchy consists of 3 archbishops and 23 suffragan bishops. It dates from the creation of the bishopric of Mexico in 1530, with Fray Juan de Zumarraga as bishop, although two previous creations had been proclaimed at Rome, that of Yucatan in 151 8 and Puebla in 1525. In 1545 the bishopric of Mexico was elevated to anarch- bishopric, which in 1 863 was divided into three archdioceses — Mexico, Michoacan and Guadalajara. An Inquisition tribunal was estab- lished in the capital in 1571, and in 1574 its first auto-da-fi was celebrated with the burning of ” twenty-one pestilent Lutherans.” The Inquisition was active in Mexico during two and a half centuries, and was finally suppressed on the 3 1 st of May 1 820. The great power exercised by the Roman Catholic church during the colonial period enabled it not only to mould the spiritual belief of the whole people, but also to control their education, tax their industries, and shape the political policies governing their daily life. In this way it ac- quired great wealth, becoming the owner of extensive estates in every part of the country and of highly productive properties in the towns. It was said in 1859 that the church owned one-third of the real and personal property of the republic. The reform laws of that year nationalized its property, abolished its numerous orders and institutions and deprived it of state support and of all participa- tion in political affairs. Subsequent legislation removed clerical influence from public instruction, made marriage a civil ceremony and closed all conventual establishments. The church still exercises a boundless influence over the Mexican lower classes, and is still the most influential organization

in the republic.

Finance. — The national revenues are derived from import and export duties, port dues and other taxes levied on foreign commerce; from excise and stamp taxes and other charges upon internal business transactions; from direct taxes levied in the federal district and national territories, covering a land tax in rural districts, a house tax in the city, commercial and professional licences, water rates, and sundry taxes on bread, pulque, vehicles, saloons, theatres, &c. ; from probate dues and registry fees; from a surcharge on all taxes levied by the states, called the ” federal contribution,” which is paid in federal revenue stamps; from post and telegraph receipts; and from some minor sources of income. The most fruitful revenue is the duty on imports, which is sometimes used for the protection of national industries, and which yields from 40 to 45 % of the total receipts. The excise taxes in 1905 were levied on tobacco, alcohol and alcoholic beverages, and on cotton goods. Mining taxes, which are subject to periodic changes, consist of an initial or registry tax on the claim Cpertenencia) , an annual or rental tax on each claim, and a tax of 33 % (1905) on the export of unrefined gold and silver, 2|% on partially refined ores, and l| % on pure silver. The expen- ditures are chiefly for the services of the public debt, military expenses, public works and internal affairs (Department of the Interior). The public debt service alone required $26,201,873 (£2,620,187) in 1908.

For the fiscal year 1906-1907 the revenue produced a total of 114,286,122 pesos (dollars), or, approximately, £11,428,612, and the expenditure was 85,076,641 pesos, or £8,507,664. The estimates for

I 908-1909 show a marked decline owing to the commercial depression, the revenue being computed at 103,385,000 pesos, and the expenditure at 103,203,830 pesos. Of the former 46,500,000 pesos are credited to import duties, 31,930,000 pesos to stamps, excise taxes, &c, 10,930,000 pesos to direct taxes, and the balance to various sources. Owing to the circumstance that the great majority of the Mexican people own no property, carry on no industry, and are not even to be considered regular productive labourers, the revenues are small in relation to the population and are comparatively inelastic.

_ The revenues and expenditures of the states and municipalities in 1904, the latest date available, aggregated as follows: —

Revenue. Expenditure.

States …. 24,519,926 pesos 23,557,968 pesos Municipalities . .

14,605,022 „ 14,160,132 „

The taxes cover a great variety of occupations and property, often to a minute and vexatious degree, and the expenditure includes the expenses of local administration, schools, police, streets and other objects of purely local interest.

The public indebtedness of Mexico includes a foreign debt payable in gold, an internal debt payable in silver, and a floating debt covering unpaid balances on appropriations, unpaid interest, and other credits and obligations. The paper money issues are by banks and not by the government, and the national treasury keeps no cash in its vaults and has no sinking funds to offset this indebtedness. The foreign debt dates from 1825, when £10,000,000 were borrowed in London through two loans. Interest defaults led to a conversion of the debt in 1851, the interest rate being reduced from 5% to 3%. Further defaults followed and in 1888 another adjustment was made by the issue of 6% gold-bearing bonds. From this time the Mexican government has met its obligations promptly, in conse- quence of which its credit is rated high and its bonds have even been quoted at a premium. In 1899 the government placed a loan of £22,700,000 in Europe at 5% for the conversion of its 6% bonds, securing it by the hypothecation of 62 % of its import and export duties. Further loans have considerably increased the debt since then, but it is still within the normal resources of the country. According to Marias Romero (Mexico and the United States, 1898)! a new type of indebtedness was inaugurated in 1850 in the shape of an internal debt payable in silver. Other loans and obligations con- tracted during periods of disorder were afterwards consolidated under this type, and later on unpaid railway subsidies were also included. The rate of interest is from 3 % to 5 % and both prin- cipal and interest are payable in silver. The rapid development of railway construction has largely increased this part of the public debt, the revenues of the country being insufficient to meet the sub- sidy obligations, but as the railways are built for the development of valuable resources and the opening of needed trade communica- tions, the increase has occasioned no loss of credit. At the end of 1908 the total public indebtedness of the republic was: —

Foreign, or gold debt, including

City of Mexico loan … £30,927-348

Internal, or silver debt . . . $130,892,100 Floating debt 860,495

Ii3i.752,595 or£i 3 , 175,259

Total £44,102,607

The fiscal or tax valuation of property throughout the republic in 1904 was computed to be — the fiscal value being two-thirds of the real value : —

Urban $312,950,983

- u ™ 1 , • : 488,182,009

federal District 252,716,454

Total $1,053,849,446

Previous to 1905 all monetary transactions in Mexico were based in practice on a fluctuating silver standard and free coinage. By a law of the 9th of December 1904, promulgated by an executive decree of the 25th of March 1905, the gold standard was adopted, and the silver .peso, -9027 fine and containing 24-438 grammes of pure silver, was made the monetary unit with a valuation of 75 grammes of gold. At the same time the free coinage of silver was suspended, the government reserving to itself the sole privilege of coining money. The coinage of Mexico, now concentrated at the mint in the capital (all others having been closed) is based (since November 28, 1867) on the decimal system — the peso being divided into 100 centavos — and consists of gold, silver, nickel and bronze coins, whose weight and fineness are determined by the monetary law of 1904. The coins minted under this law are: —

Gold: 10 pesos, -900 fine, weighing 8-333! grammes. 5 pesos, „ „ „ 4-n6f

(the first called a ” hidalgo ” and the second a ” medio hidalgo “).

ANCIENT HISTORY]

MEXICO

Silver

i peso, ‘9027 fine, containing 24-438 grammes of pure silver, 50 centavos, -8oo fine,

329

10 ,, ,. ,,

Nickel: 5 „ Bronze: i and 2 centavos, 95 parts copper , 4 tin, 1 zinc.

Provisions are also made for continuing the coinage of ” trade dollars ” for export, which have a wide circulation in the Orient but are not current at home. Fractional silver coin is not legal tender above 20 pesos, and bronze and nickel coins not above 1 peso, but the government maintains conversion offices where such coins can be converted into silver pesos without loss. The amount of gold in circulation is small, the bank notes convertible into gold taking its place. Foreign coins are permitted to circulate in the republic.

There were 34 chartered banks in Mexico in 1908, of which 29 enjoyed the privilege of issuing bank notes; the total note circulation on the 31st of December 1906 was 97,787,878 pesos. These note issues are everywhere current at full nominal value, being secured under the provisions of the national banking law of 1896 by metallic reserves. The notes are not legal tender, and it is forbidden to count them as ” cash on hand ” in bank returns, but ample safe- guards both as to issue and redemption inspire full confidence in their employment as a substitute for gold. Restrictions on specula- tive operations in real estate and on the use of hypothecated and discounted paper as security for other transactions, together with the publication of detailed monthly balance sheets, have kept these banks free from unsound methods, and their record thus far (1909) has been conspicuously good. Mortgage and loan banks have also been estab- lished in accordance with the law of 1896, and are subject to official supervision. Private banks are numerous, but foreign banks are not encouraged to open agencies. The use of cheques is very limited because of the stamp tax.

Weights and Measures. — Mexico adopted the metric system in 1862, and it is used in all official transactions, land measurements, railway calculations and public school work. The old Spanish weights and measures, modified in many particulars, continued in private use, however, and in T895 it became necessary to declare the metric system the only legal system and to make its use compulsory after the 1 6th of September 1896.

Bibliography. — The historical student will find valuable material in Bernal Diaz del Castillo, Cronica de la conquista de Nueva Espana (Madrid, 1632, and other dates) ; Antonio Herrera Historia general de los hechos de los Castelldnos en las islas y tierra firma del mar ocedno (4 vols., Madrid, 1601) ; F. C. Mac Nutt, Letters of Cortes to Charles V. (London, 1908) ; W. H. Prescott, Conquest of Mexico (3 vols., London, 1845); and the works of Gomara, Helps, Kingsborough, Las Casas,

Sahagun and Justin Winsor.

Among the more popular works on Mexico are Baedeker's The United States, with Excursions to Mexico, &c. (Leipzig, 1909) ; H. H. Bancroft, Resources and Development of Mexico (San Francisco, 1893); M. Chevalier, Le Mexique ancien et moderne (Paris, 1886); A. Garcia Cubas, Htude geographique, slatistique, descriptive et historique des &ats- Unis Mexicains (Mexico, 1889 ; in English, 1893) ; C. B. Dahlgreen, Minas historicas de la Republica Mexicana (tr. from Eng., 1887) ; J. Domenech, Guia general descriptiva de la Repub- lica Mexicana (vol. i., Mexico, 1899); F. W. Egloff stein, Contribu- tions to the Geology and Physical Geography of Mexico (New York, 1864) ; C. Reginald Enock, Mexico, its Ancient and Modern Civiliza- tion, &c. (London, 1909) ; Hans Gadow, Travels in Southern Mexico (London, 1908) ; Ernst von Hesse-Wartegg, Mexico, Land und Leute (Vienna, 1890); W. T. Hornaday, Camp Fires on Desert and Lava (London, 1908) ; Alex, von Humboldt, Voyage aux regions equinoxi- ales du nouveau continent (Paris, 1807 sqq.) ; A. H. Kcane, " Mexico " in Stanford's Compendium of Geography and Travel (London, 1904); H. Kessler, Notizen iiber Mexico (Berlin, 1898); Carl Lumholtz, Unknown Mexico (New York, 1902) ; C. F. Lummis, The Awakening of a Nation (New York, 1898); P. F. Martin, Mexico of the Twentieth Century (London, 1907) ; A. H. Noll, A Short History of Mexico (Chicago, 1903) ; Santiago Ramirez, Noticia historica de la riqueza mineira de Mexico (Mexico, 1884); Friedrich Ratzel, Aus Mexico: Reiseskizzen aus den Jahren 1874-1876 (Breslau, 1878); Matias Romero, Geographical and Statistical Notes on Mexico (New York, 1898); idem, Mexico and the United States (New York, 1898); E. Seler, Mexico und Guatemala (Berlin, 1896) ; Justo Serra (editor), Mexico: Its Social Evolution, afc. (2 vols., Mexico, 1904) ; J. R. South- worth, Mines of Mexico (9 vols., Mexico, 1905) ; Frederick Starr, Indians of Southern Mexico (Chicago, 1899); Sara V. Stevenson, Maximilian in Mexico (New York, 1899) ;T. Philip Terry, Mexico (Boston, 1909; an excellent guide) ; David A. Wells, A Study of Mexico (New York, 1887); W. E. Weyl, Labor Conditions in Mexico (Washington, 1902), Bull. No 38, Bureau of Labor; Nevin O. Winter, Mexico and her People of To-day (Boston, 1907) ; Marie R. Wright, Picturesque Mexico (Philadelphia, 1898); and Rafael de Zayas Enriquez, Les £tats-unis mexicains (Mexico, 1899).

Important works of reference are: Anuario estadistico de la Republica Mexicana (Mexico) ; Mexican Year-book (London, 1908) ; Biological and botanical publications of the U.S. Department of

Agriculture (Washington) ; Statesman's Year-book (London) ; Hand-

book of Mexico (Washington), published by the Bureau of American Republics; Monthly Bulletin of the Bureau of American Republics (Washington) ; British Foreign Office Diplomatic and Consular Reports (London); and the U.S. Consular Reports (Washington) .

(A. J. L.)

History

I. — Ancient Mexico.

The name Mexico is connected with the name of the group of American tribes calling themselves Mexica (sing. Mexicall) or Azteca. The word is related to or derived from the name of the Mexican national war-god, Mexitl, better known as Huitzilo- pochtli. The Aztecs from the 12th century appear to have migrated from place to place over the mountain-walled plateau of Anahuac, the country ” by the water,” so called from its salt lagoons, which is now known as the Valley of Mexico. About 1325 they founded on the lake of Tezcuco the permanent settlement of Mexico Tenochtitlan, which is still represented by the capital city, Mexico. The name Mexico l was given by the Spanish conquerors to the group of countries over which the Aztec power more or less prevailed at the time of the European invasion. Clavigero (Storia antica del Messico, vol. i.) gives a map of the so-called ” Mexican empire,” which may be roughly described as reaching from the present Zacatecas to beyond Guatemala; it is noticeable that both these names are of Mexican origin, derived respectively from words for ” straw ” and ” wood.” Eventually Mexico and New Mexico came to desig- nate the still vaster region of Spanish North America, which (till cut down by changes which have limited the modern republic of Mexico) reached as far as the Isthmus of Panama on the south and took in California and Texas on the north. Mexico in this wide sense is of high interest to the anthropologist from the several native American civilizations which appear within its limits, and which conveniently if loosely group themselves round two centres, the Mexican proper and the Central American.

When early in the 16th century the Spaniards found their way from the West India Islands to this part of the mainland of America, they discovered not rude and simple tribes like the islanders of the Antilles, but nations with armies, official adminis- trators, courts of justice, high agriculture and mechanical arts, and, what struck the white men especially, stone buildings whose architecture and sculpture were often of dimensions and elaborateness to astonish the builders and sculptors of Europe. Here was a problem which excited the liveliest

curiosity and gave rise to a whole literature. Hernandez and Acosta shared the opinion of their time that the great fossil bones found in Mexico were remains of giants, and that, as before the deluge there were giants on the earth, therefore Mexico was peopled from the Old World in antediluvian times. On the other hand the multitude of native American languages suggested that the migration to America took place after the building of the tower of Babel, and fiiguenza arrived at the curiously definite result that the Mexicans were descended from Naphtuhim, son of Mizraim and grandson of Noah, who left Egypt for Mexico shortly after the confusion of tongues. Although such specula- tions have fallen out of date, they induced the collection of native traditions and invaluable records of races, languages and customs, which otherwise would have been lost for ever. Even in the 19th century Lord Kingsborough spent a fortune in printing a magnificent compilation of Mexican picture-writings and documents in his Antiquities of Mexico to prove the theory advocated by Garcia a century earlier, that the Mexicans were the lost tribes of Israel. Modern archaeologists approach the question from a different standpoint, but the origin of the American aborigines and of Mexican civilization remains extremely obscure (see America, where the primitive Mexican cultures are fully illustrated, and Central America).

Real information as to the nations of Mexico before Spanish

1 In this, as in all other Aztec names, the x (or j) represents the English sound sh; hence Mexitli and Mexico should be properly pronounced Meshitli, Meshico. But they do not appear to have ever been so pronounced by the Spaniards, who naturally gave to the * its ordinary Spanish sound of the German ch.

times is very imperfect, but not altogether wanting. The accurate and experienced Alexander von Humboldt considered the native Americans of both continents to be substantially similar in race-characters. Such a generalization will become sounder, if, as is now generally done by anthropologists, the Eskimo with their pyramidal skulls, dull complexion and flat noses are removed into a division by themselves. Apart from these polar nomads, the American indigenes group roughly into a single division of mankind, of course with local variations. If our attention is turned to the natives of Mexico

especially, the unity of type will be found particularly close. The native population of the plateau of Mexico, mainly Aztecs, may still be seen by thousands without any trace of mixture of European blood. Their stature is estimated to be about 5 ft. 3 in., but they are of muscular and sturdy build. Measurements of their skulls show them mesocephalic (index about 78), or intermediate between the dolichocephalic and brachycephalic types of man- kind. The face is oval, with low forehead, high cheek-bones, long eyes sloping outward towards the temples, fleshy lips, nose wide and in some cases flattish but in others aquiline, coarsely moulded features, with a stolid and gloomy expression. Thick- ness of skin, masking the muscles, has been thought the cause of a peculiar heaviness in the outlines of body and face ; the com- plexion varies from yellow-brown to chocolate (about 40 to 43 in the anthropological scale); eyes black; straight coarse glossy black hair; beard and moustache scanty. Among variations from this type may be mentioned higher stature in some districts, and lighter complexion in Tehuantepec and elsewhere. If now the native Americans be compared with the races of the regions across the oceans to their east and west, it will be seen that their unlikeness is extreme to the races eastward of them, whether white Europeans or black Africans. On the other hand they are considerably like the Mongoloid peoples of north and east Asia (less so to the Polynesians); so that the general tendency among anthropologists has been to admit a common origin, however remote, between the tribes of Tartary and of America. This original connexion, if it may be accepted, would seem to belong to a long-past period, to judge from the failure of all attempts to discover an affinity between the languages of Ame- rica and Asia. At whatever date the Americans began to people America, they must have had time to import or develop the numerous families of languages actually found there, in none of which has community of origin been satisfactorily proved with any other language-group at home or abroad. In Mexico itself the languages of the Nahua nations, of which the Aztec is the best-known dialect, show no connexion of origin with the language of the Otomi tribes, nor either of these with the languages of the regions of the ruined cities of Central America, the Quiche of Guatemala and the Maya of Yucatan. The remarkable phenomenon of nations so similar in bodily make but so distinct in language can hardly be met except by supposing a long period to have elapsed since the country was first inhabited by the ancestors of peoples whose language has since passed into so different forms. The original peopling of America might then well date from the time when there was continuous land between it and Asia.

It would not follow, however, that between these remote ages and the

time of Columbus no fresh immigrants can have reached America. We may put out of the question the Scandinavian sea-rovers who sailed to Greenland about the 10th century. But at all times communication has been open from east Asia, and even the South Sea Islands, to the west coast of America. The importance of this is evident when we consider that late in the 19th century Japanese junks still drifted over by the ocean current to California at the rate of about one a year, often with some of the crew still alive. Further north, the Aleutian islands offer a line of easy sea passage, while in north-east Asia, near Bering's Strait, live Chukchi tribes who carry on intercourse with the American side. Moreover there are details of Mexican civilization which are most easily accounted for on the suppo- sition that they were borrowed from Asia. They do not seem ancient enough to have to do with a remote Asiatic origin of the

nations of America, but rather to be results of comparatively modern intercourse between Asia and America. Humboldt (Vues des Cordilleres, PI. xxiii.) compared the Mexican calendar with that in use in eastern Asia. The Mongols, Tibetans, Chinese and other neighbouring nations have a cycle or series of twelve animals, viz. rat, bull, tiger, hare, dragon, serpent, horse, goat, ape, cock, dog, pig, which may possibly be an imita- tion of the ordinary Babylonian-Greek zodiac familiar to our- selves. The Mongolian peoples not only count their lunar months by these signs, but they reckon the successive days by them, rat-day, bull-day, tiger-day, &c, and also, by combining the twelve signs in rotation with the elements, they obtain a means of marking each year in the sixty-year cycle, as the wood- rat year, the fire-tiger year, &c. This method is highly artificial, and the reappearance of its principle in the Mexican and Central American calendar is suggestive of importation from Asia. Humboldt also discussed the Mexican doctrine of four ages of the world belonging to water, earth, air and fire, and ending respectively by -deluge, earthquake, tempest and conflagration. The resemblance of this to some versions of the Hindu doctrine of the four ages or yuga is hardly to be accounted for except on the hypothesis that the Mexican theology contains ideas learnt from Asiatics. Among Asiatic points of resemblance to which attention has since, been called is the Mexican belief in the nine stages of heaven and hell, an idea which nothing in nature would suggest directly to a barbaric people, but which corresponds to the idea of successive heavens and hells among Brahmans and Buddhists, who apparently learnt it (in common with our own ancestors) from the Babylonian-Greek astronomical theory of successive stages or concentric planetary spheres belonging to the planets, &c. The Spanish chronicles also give accounts of a Mexican

game called patolli, played at the time of the conquest with coloured stones moved on the squares of a cross-shaped figure, according to the throws of beans marked on one side; the descriptions of this rather complicated game correspond closely with the Hindu backgammon called pachisi (see Tylor in Jour. Anlhrop. Inst., viii. 116).

The native history of Mexico and Central America is entitled to more respect than the mere recollections of savage tribes. The Mexican pictures so far approached writing proper as to set down legibly the names of persons and places and the dates of events, and at least helped the professional historians to remem- ber the traditions repeated orally from generation to generation. Thus actual documents of native Aztec history, or copies of them, are still open to the study of scholars, while after the conquest interpretations of these were drawn up in writing by Spanish-educated Mexicans, and histories founded on them with the aid of traditional memory were written by Ixtilxochitl and Tezozomoc. In Central America the rows of complex hieroglyphs to be seen sculptured on the ruined temples probably served a similar purpose. The documents written by natives in later times thus more or less represent real records of the past, but the task of separating myth from history is of the utmost difficulty. Among the most curious documents of early America is the Popol-Vuh or national book of the Quiche kingdom of Guatemala, a compilation of traditions written down by native scribes, found and translated by Father Ximenez about 1700, and published by Scherzer (Vienna, 1857) and Brasseur de Bour- bourg (Paris, 1861). This book begins with the time when there was only the heaven with its boundaries towards the four winds, but as yet there was no body, nothing that clung to any- thing else, nothing that balanced itself or rubbed together or made a sound; there was nought below but the calm sea alone in the silent darkness. Alone were the Creator, the Former, the Ruler, the Feathered Serpent, they who give being and whose name is Gucumatz. Then follows the creation, when the crea- tors said ” Earth,” and the earth was formed like a cloud or a fog, and the mountains appeared like lobsters from the water, cypress and pine covered the hills and valleys, and their forests were peopled with beasts and birds, but these could not speak the name of their creators, but could only chatter and croak. So man was made first of clay, but he was strengthless and senseless

and melted in the water; then they made a race of wooden mannikins, but these were useless creatures without heart or mind, and they were destroyed by a great flood and pitch poured down on them from heaven, those who were left of them being turned into the apes still to be seen in the woods. After this comes the creation of the four men and their wives who are the ancestors of the Quiches, and the tradition records the migrations of the nation to Tulan, otherwise called the Seven Caves, and thence across the sea, whose waters were divided for their passage. It is worth while to mention these few early incidents of the national legend of Guatemala, because their Biblical incidents show how native tradition incorporated matter learnt from the white men. Moreover, this Central American document, mythical as it is, has an historical importance from its bringing in names belonging also to the traditions of Mexico proper. Thus Gucumatz, ” Feathered Serpent ” corresponds in name to the Mexican deity Quetzalcoatl; Tulan and the Seven Caves are familiar words in the Aztec migration traditions, and there is even mention of a chief of Toltecat, a name plainly referring to the famed Toltecs. Thus the legends of the Popol-Vuh confirm what is learnt from comparing the culture of Central America and Mexico proper, that, though these districts were not connected by language, the intercourse between them had been sufficient to justify the anthropologist in including both districts in one region. Historical value of the ordinary kind may be found in the latter part of the Popol-Vuh, which gives names of chiefs down to the time when they began to bear Spanish names and the great city of Quiche became the deserted ruin of Santa Cruz. The Maya district of Yucatan has also some vestiges of native traditions in the manuscript translated by D. Pio Perez (in Stephens, Incidents of Travel in Yucatan) and in the remark- able 16th century Relacion de las cosas de Yucatan by Diego de Landa, published by Brasseur de Bourbourg (Paris, 1864). As in the Guatemala traditions, we hear of ancient migration from the Mexican legendary region of Tula; and here the leaders are four famous chiefs or ancestors who bear the Aztec name of the Tutul-Xiu, which means ” Bird-Tree.” Unfortunately for the historical standing of these four ancestors, there are in the Aztec picture-writings representations of four trees, each with a bird perched on it, and placed facing the four quarters, which make it probable that the four Tutul-Xiu of tradition may be only mythic personifications of the four cardinal points (see Schultz- Sellack in Zeitschr.f. Ethn., 1879, p. 209). Nevertheless, part of the later Maya records may be genuine — for instance, when they relate the war about three centuries before the Spanish conquest, when the king of Chichen-Itza destroyed the great city of Maya- pan. Though the Central American native kings have too little interest for traditions of

them to be dwelt on here, they bring into view one important historical point — that the ruined cities of this region are not monuments of a forgotten past, but that at least some of them belong to history, having been inhabited up to the conquest, apparently by the very nations who built them.

Turning now to the native chronicles of the Mexican nations, these are records going back to the 12th or 13th century, with some vague but not worthless recollections of national events from times some centuries earlier. These traditions, in some measure borne out by linguistic evidence of names, point to the immigration of detachments of a widespread race speaking a common language, which is represented by the Aztec, still a spoken language in Mexico. This language was called nahuatl, and one who spoke it as his native tongue was called nahuatlacatl, so that modern anthropologists are following native precedent when they use the term Nahua for the whole series of peoples now under consideration. Earliest of the Nahua nations, the Toltecs are traditionally related to have left their northern home of Huehuetlapallan in the 6th century; and there is other evidence of the real existence of the nation. Their name Toltecatl signifies an inhabitant of Tollan (land of reeds), a place which has a definite geographical site in the present Tulan or Tula, north of the valley of Anahuac, where a Toltec kingdom seems to have had its centre. To this nation was due the introduction

of maize and cotton into Mexico, the skilful workmanship in gold and silver, the art of building on a scale of vastness still witnessed to by the mound of Cholula, said to be Toltec work, and the Mexican hieroglyphic writing and calendar. With the Toltecs is associated the tradition of Quetzalcoatl, a name which presents itself in Mexican religion as that of a great deity, god of the air, and in legend as that of a saintly ruler and civilizer. His brown and beardless worshippers describe him as of another race, a white man with noble features, long black hair and full beard, dressed in flowing robes. He came from Tulan or from Yucatan (for the stories differ widely), and dwelt twenty years among them, teaching men to follow his austere and virtuous life, to hate all violence and war, to sacrifice no men or beasts on the altars, but to give mild offerings of bread and flowers and perfumes, and to do penance by the votaries drawing blood with thorns from their own bodies. Legend tells stories of his teaching men picture-writing and the calendar, and also the artistic work of the silversmith, for which Cholula was long famed; but at last he departed, some say towards the unknown land of Tlapallan, but others to Coatzacoalcos on the Atlantic coast on the confines of Central America, where native tradition still keeps up the divine names of

Gucumatz among the Quiches and Cukulcan among the Mayas, these names have the ‘same meaning as Quetzalcoatl in Aztec, viz. ” Feathered Serpent.” Native tradition held that when Quetzalcoatl reached the Atlantic he sent back his com- panions to tell the Cholulans that in a future age his brethren, white men and bearded like himself, should land there from the sea where the sun rises and come to rule the country. That there is a basis of reality in the Toltec traditions is shown by the word toltecatl having become among the later Aztecs a substan- tive signifying an artist or skilled craftsman. It is further related by the Mexican historians that the Toltec nation all but perished in the nth century by years of drought, famine and pestilence, a few only of the survivors remaining in the land, while the rest migrated into Yucatan and Guatemala. After the Toltecs came the Chichimecs, whose name, derived from chici, dog, is applied to many rude tribes; they are said to have come from Amaquemecan under a king named Xolotl, names which being Aztec imply that the nation was Nahua; at any rate they appear afterwards as fusing with more cultured Nahua nations in the neighbourhood of Tezcuco. Lastly is recorded the Mexican immigration of the seven nations, Xochi- milca, Chalca, Tepaneca, Acolhua, Tlahuica, Tlascalteca, Azteca. This classification of the Nahuatlac tribes has a meaning and value. It is true that Aztlan, the land whence the Aztecs traced their name and source, cannot be identified, but the later stages of the long Aztec migration seem historical, and the map of Mexico still shows the names of several settlements recorded in the curious migration map, published by Gemelli Careri {Giro del mondo, Venice, 1728) and commented on by Humboldt; among these local names are Tzompanco, ” place of skulls,” now Zum- pango in the north of the Mexican valley, and Chapultepec, ” grasshopper hill,” now a suburb of the city of Mexico itself, where the Aztecs are recorded to have celebrated in 1195 the festival of tying up the ” bundle of years ” and beginning a new cycle.

The Aztecs moving from place to place in Anahuac found little welcome from the Nahua peoples already settled there. One of the first clear events of the Aztec arrival is their being made tributary by the Tepanecs, in whose service they showed their warlike prowess in the fight near Tepeyacac, where now stands the famous shrine of Our Lady of Guadalupe. Thus they over- came the Acolhuas, who had made Tezcuco a centre of prosperity. By the 13th century the Aztecs by their ferocity had banded their neighbours together against them; some were driven to take refuge on the reedy lake shore at Acoculco, while others were taken as captives into Culhuacan. The king of this district was Coxcoxtli, whose name has gained an undeserved

reputation even in Europe as ” Coxcox, the Mexican Noah,” from a scene in the native picture-writing where his name appears together with the figure of a man floating in a dug-out tree, which has been mistaken even by Humboldt for a representation of the

Mexican deluge-myth. Coxcoxtli used the help of the Aztecs against the Xochimilco people; ‘but his own nation, horrified at their bloodthirsty sacrifice of prisoners, drove them out to the islands and swamps of the great salt lagoon, where they are said to have taken to making their chinampas or floating gardens of mud heaped on rafts of reeds and brush, which in later times were so remarkable a feature of Mexico. As one of the Aztec chiefs at the time of the founding of their city was called Tenoch, it is likely that from him was derived the name Tenochtitlan or ” Stone-cactus place.” Written as this name is in pictures or rebus, it probably suggested the invention of the well-known legend of a prophecy that the war-god’s temple should be built where a prickly pear was found growing on a rock, and perched on it an eagle holding a serpent; this legend is still commemorated on the coins of Mexico. Mexico-Tenochtitlan, founded about 1325, for many years afterwards probably remained a cluster of huts, and the higher civilization of the country was still to be found, especially among the Acolhuas in Tezcuco. The wars of this nation with the Tepanecs, which went on into the 15th century, were merely destructive, but larger effects arose from the expeditions under the Culhua king Acamapichtli, where the Aztec warriors were prominent, and which extended far outside the valley of Anahuac. Especially a foray southward to Quauh- nahuac, now Cuernavaca, on the watershed between the Atlantic and Pacific, brought goldsmiths and other craftsmen to Tenoch- titlan, which now began to rise in arts, the Aztecs laying aside their rude garments of aloe-fibre for more costly clothing, and going out as traders for foreign merchandise. In the’ 14th cen- tury the last great national struggle took place. The Acolhuas had at first the advantage, but Ixtlilxochitl did not follow up the beaten Aztecs but allowed them to make peace, whereupon, under professions of submission, they fell upon and sacked the city of Tezcuco. The next king of Tezcuco, Nezahualcoyotl, turned the course of war, when Azcapuzalco, the Tepanec stronghold, was taken and the inhabitants sold as slaves by the conquering Acolhuas and Aztecs; the place thus degraded became afterwards the great slave-market of

Mexico. In this war we first meet with the Aztec name Moteuczoma, afterwards so famous in its Spanish form Montezuma. About 1430 took place the triple alliance of the Acolhua, Aztec and Tepanec kings, whose capitals were Tezcuco, Mexico and Tlacopan, the latter standing much below the other two. In fact the rest of native history may be fairly called the Aztec period, notwith- standing the magnificence and culture which make Tezcuco celebrated under Nezahualcoyotl and his son Nezahualpilli. When the first Moteuczoma was crowned king of the Aztecs, the Mexican sway extended far beyond the valley plateau of its origin, and the gods of conquered nations around had their shrines set up in Tenochtitlan in manifest inferiority to the temple of Huitzilopochtli, the war-god of the Aztec conquerors. The rich region of Quauhnahuac became tributary; the Miztec country was invaded southward to the Pacific, and the Xicalanca region to what is now Vera Cruz. It was not merely for conquest and tribute that the fierce Mexicans ravaged the neighbour-lands, but they had a stronger motive than either in the desire to obtain multitudes of prisoners whose hearts were to be torn out by the sacrificing priests to propitiate a pantheon of gods who well personified their bloodthirsty worshippers. (E. B. T.) Ancient Civilization.

While the prairie tribes of America lived under the loose sway of chiefs and councils of old men, the settled nations of Mexico had _ attained to a highly organized government. This may

m g„t ‘ be seen by the elaborate balance of power maintained in the federation of Mexico, Tezcuco and Tlacopan, where each king was absolute in his own country, but in war or other public interests they acted jointly, with powers in something like the proportion in which they divided conquered lands and spoil, which was two-fifths each to Mexico and Tezcuco and one-fifth to Tlacopan. The successor of the Aztec king was customarily a chosen brother or nephew, the eldest having the first claim unless set aside as incompetent; this mode of succession, which has been looked on as an elaborate device for securing practical advantages, seems rather to have arisen out of the law of choice among the descendants of the female line, found in American tribes of much lower culture. Something like this appears in the succession of

kings of Tezcuco and Tlacopan, which went to sons by the principal wife, who was usually of the Aztec royal family. The Mexican chronicles, however, show instances of the king’s son succeeding or of powerful chiefs being elected to the kingship. The term republic is sometimes used to describe the little state of Tlascala, but this was in

fact a federation of four chiefs, with an assembly of nobles. In the Zapotec district the Wiyatao or high-priest of Zopaa was a divine ruler before whom all prostrated themselves with faces to the ground; he was even too sacred to allow his foot to touch the earth, and was only seen carried in a litter.

The accounts of the palaces of the native kings must be taken with some reserve, from the tendency to use descriptive terms not actually untrue, but which convey erroneous ideas taken . .

from European architecture; thus what are called ces ‘ columns of porphyry and jasper supporting marble balconies might perhaps be better described as piers carrying slabs, while the apartments and terraces must have been more remarkable for number and extent than architectural grandeur, being but low one-storied .buildings. The principal palace of Mexico consisted of hundreds of rooms ranged round three open squares, of such extent that one of the companions of Cortes records having four times wandered about till he was tired, without seeing the whole. Not less remarkable was the palace of Tezcuco, surrounded with its groves and pleasure-gardens; and, though now hardly anything remains of the buildings above ground, the neighbouring hill of Tezcotzinco still has its stone steps and terraces; and the immense embankment carrying the aqueduct-channel of hewn stone which supplied water to basins cut in. the solid jock still remains to prove that the chroniclers’ descriptions, if highly coloured, were at any rate genuine. Till the 1 8th century the gigantic figures of Axayacatl and his son Montezuma were to be seen carved in the porphyry hill of Chapultepec, but these as well as the hanging gardens have been destroyed, and only the groves of ahuehuete (cypress) remain of the ancient beauties of the place. That in the palace gardens flowers from the tierra caliente were transplanted, and water-fowl bred near fresh and salt pools fit for each kind, that all kinds of birds and beasts were kept in well-appointed zoological gardens, where there were homes even for alligators and snakes — all this testifies to a cultivation of natural history which was really beyond the European level of the time. From the palaces and retinues of thousands of servants attached to the royal service may be inferred at once the despotic power of the Mexican rulers and the heavy taxation of the people; in fact some of the most remarkable of the picture-writings are tribute-rolls enumerating by hundreds and thousands the mantles, ocelot-skins, bags of gold-dust, bronze hatchets, loads of chocolate, &c, furnished periodically by the towns. Below the king was a numerous and powerful’ class of nobles, the highest of whom {tlatoani) were great vassals owing little more than homage and tribute to their feudal lord, while the natural result of the

unruliness of the noble class was that the king to keep them in check increased their numbers, brought them to the capital as councillors, and balanced their influence by military and household officers, and by a rich and powerful merchant class. The nobles not only had privileges of rank and dignity, but substantial power over the plebeian or peasant class {maeehualli) . The greatest estates be- longed to the king, or had been granted to military chiefs whose sons succeeded them, or were the endowments of temples, but the calpulli or village community still survived, and each freeman of the tribe held and tilled his portion of the common lands. Below the freemen were the slaves, who were war-captives, persons enslaved for punish- ment, or children sold by their parents. Prisoners of war were mostly doomed to sacrifice, but other classes of slaves were mildly treated, retaining civil rights, and their children were born free.

The superior courts of law formed part of the palace, and there were tribunals in the principal cities, over each of which presided a supreme judge or cihuacoatl, who was irremovable, and , .. whose criminal decisions not even the king might reverse ; ce ‘

he appointed the lower judges and heard appeals from them; it is doubtful whether he judged in civil cases, but both kinds of suits were heard in the court below, by the tlacatecatl and his two associ- ates, below whom were the ward-magistrates. Lands were set apart for the maintenance of the judges, and indeed nothing gives a higher idea of the elaborate civilization of Mexico than this judicial system, which culminated in a general court and council of state presided oyer by the king. The laws and records of suits were set down in picture-writings, of which some are still to be seen ; sentence of death was recorded by drawing a line with an arrow across the portrait of the condemned, and the chronicles describe the barbaric solemnity with which the king passed sentence sitting on a golden and jewelled throne in the divine tribunal, with one hand on an ornamented skull and the golden arrow in the other. Among the resemblances to old-world law was the use of a judicial oath, the witness touching the ground with his finger and putting it to his lips, thus swearing by Mother Earth. The criminal laws were of extreme severity, even petty theft being punished by the thief being enslaved to the person he had robbed, while to steal a tobacco pouch or twenty ears of corn was death ; he who pilfered in the market was then and there beaten to death, and he who insulted Xipe, the god of the gold- and silver- smiths, by stealing his precious metal, was skinned alive and sacrificed to the offended deity. Though aloe-beer or ” pulque ” was allowed

for feasts and to invalids in moderation, and old people over seventy seem to be represented in one of the picture-writings as having liberty of drunkenness, young men found drunk were clubbed to death and young women stoned. For such offences as witchcraft, fraud, removing landmarks, and adultery the criminal had his heart cut out on the altar, or his head crushed between two stones, while even lesser punishments were harsh, such as that of slanderers, whose hair was singed with a pine-torch to the scalp.

Based on conquest as the Aztec kingdom was, and with the most bloodthirsty religion the world ever saw, the nation was, above all, „, a fighting community. To be a tried soldier was the road

ar ‘ to honour and office, and the king could not be enthroned

till he had with his own hand taken captives to be butchered on the war-god’s altar at his coronation. The common soldiers were promoted for acts of daring, and the children of chiefs were regularly trained to war, and initiated by being sent into battle with veterans, with whose aid the youth took his first prisoner, but his future rise depended on how many captives he took unaided in fight with warlike enemies; by such feats he gained the dignity of wearing coloured blankets, tassels and lip-jewels, and reached such military titles as that of ” guiding eagle.” The Mexican military costumes are to be seen in the picture-writings, where the military orders of princes, eagles and tigers are known by their braided hair, eagles’ beaks and spotted armour. The common soldiers went into battle brilliant in savage war-paint, but those of higher rank had helmets like birds and beasts of prey, armour of gold and silver, wooden greaves, and especially the ichcapilli, the quilted cotton tunic two fingers thick, so serviceable as a protection from arrows that the Spanish invaders were glad to adopt it. The archers shot well and with strong bows, though their arrows were generally tipped only with stone or bone; their shields or targets, mostly round, were of ordinary barbaric forms ; the spears or javelins had heads of obsidian or bronze, and were sometimes hurled with a spear-thrower or atlatl, of which pictures and specimens still exist, showing it to be similar in principle to those used by the Australians and Eskimo. The most characteristic weapon of the Mexicans was the maquahuitl or ” hand- wood,” a club set with two rows of large sharp obsidian flakes, a well-directed blow with which would cut. down man or horse. These two last-mentioned weapons have the look of

highly developed savage forms, while on the other hand the military organization was in some respects equal to that of an Asiatic nation, with its regular companies commanded each by its captain and provided with its standard. The armies were very large, an expedition often consist- ing of several divisions, each numbering eight thousand men; but the tactics of the commanders were quite rudimentary, consisting merely of attack by arrows and javelins at a distance, gradually closing into a hand-to-hand fight with clubs and spears, with an occasional feigned retreat to draw the enemy into an ambuscade. Fortification was well understood, as may still be seen in the remains of walled and escarped strongholds on hills and in steep ravines, while lagoon-cities like Mexico had the water approaches defended by fleets of boats and the causeways protected by towers and ditches; even after the town was entered, the pyramid-temples with their surrounding walls were forts capable of stubborn resistance. It was held unrighteous to invade another nation without a solemn embassy to warn their chiefs of the miseries to which they exposed themselves by refusing the submission demanded, and this again was followed by a declaration of war, but in Mexico this degenerated into a cere- monial farce, where tribute was claimed or an Aztec god was offered to be worshipped in order to pick a quarrel as a pretext for an invasion already planned to satisfy the soldiers with lands and plunder, and to meet the priests' incessant demands for more human sacrifices.

Among the accounts of the Mexican religion are some passages referring to the belief in a supreme deity. The word teotl, god, has R Ikrl a been thought in some cases to bear this signification, Keugo . j jut j ts meanm g ; s t jj at – f d e ity in general, and it is applied not only to the sun-god but to very inferior gods. It is related that Nezahualcoyotl, the poet-king of Tezcuco, built a nine- storied temple with a starry roof above, in honour of the invisible deity called Tloquenahuaque, " he who is all in himself," or Ipal- nemoani, " he by whom we live," who had no image, and was pro- pitiated, not by bloody sacrifices, but by incense and flowers. These divinities, however, seem to have had little or no place in the popular faith, which was occupied by polytheistic gods of the ordinary barbaric type. Tezcatlipoca was held to be the highest of these, and at the festival of all the gods his footsteps were expected to appear in the flour strewn to receive this sign of their coming. He was plainly an ancient deity of the race, for attributes of many kinds are crowded together in him. Between him and Quetzalcoatl, the ancient deity of Cholula, there had been old rivalry. As is related in the legends, Quetzalcoatl came into the land to teach men to till the soil, to work

metals and to rule a well-ordered state ; the two gods played their famous match at the ball-game, and Tezcatlipoca per- suaded the weary Quetzalcoatl to drink the magic pulque that sent him roaming to the distant ocean, where he embarked in his boat and disappeared from among men. 1 These deities are not easily

1 One of the most important sources for the ancient Mexican traditions and myths is the so-called ” Codex Chimalpopoca,” a manuscript in the Mexican language discovered by the Abbe

analysed, but on the other hand Tonatiuh and Metztli, the sun and moon, stand out distinctly as nature gods, and the traveller still sees in the huge adobe pyramids of Teotihuacan, with their sides oriented to the four quarters, an evidence of the importance of their worship. The war-god Huitzilopochtli was the real head of the Aztec pantheon ; his idol remains in Mexico, a huge block of basalt on which is sculp- tured on the one side his hideous personage, adorned with the humming-bird feathers on the left hand which signify his name, while the not less frightful war-goddess Teoyaomiqui, or ” divine war- death, ” occupies the other side. Centeotl, the goddess of the all- nourishing maize, was patroness of the earth and mother of the gods, while_ Mictlanteuctli, lord of dead-land, ruled over the departed in the dim under-world. There were numbers of lesser deities, such as Tlazolteotl, goddess of pleasure, worshipped by courtesans, Tezcat- zoncatl, god of strong drink, whose garment in grim irony clothed the drunkard’s corpse, and Xipe, patron of the goldsmiths. Below these were the nature-spirits of hills and groves, whose shrines were built by the roadside. The temples were called teocalli or ” god’s house,” and rivalled in size as they resembled in form the temples of ancient Babylon. They were pyramids on a square or oblong base, rising in successive terraces to a small summit-platform. The great teocalli of Huitzilopochtli in the city of Mexico stood in an immense square, whence radiated the four principal thoroughfares, its courtyard being enclosed by a square, of which the stone wall, called the coatepantli or serpent-wall from its sculptured serpents, measured nearly a quarter of a mile on each side. In the centre, the oblong pyramid of rubble cased with hewn stone and cemented 375 X 300 ft. at the base, and rising steeply in five terraces to the height of 86 ft., showed conspicuously to the city the long proces- sions of priests and victims winding along the terraces and up to corner flights of steps. On the paved platform were three-storey tower temples in whose ground-floor stood the stone images and altars, and before that of the war-god the green stone of sacrifice, humped so as to bend upward the body of the victim that the priest might more easily slash open the breast with his obsidian knife, tear out the heart and hold it up before the god,

while the captor and his friends were waiting below for the carcase to be tumbled down the steps for them to carry home to be cooked for the feast of victory. Before the shrines reeking with the stench of slaughter the eternal fires were kept burning, and on the platform stood the huge drum, covered with snakes' skin, whose fearful sound was heard for miles. From the terrace could be seen seventy or more other temples within the enclosure, with their images and blazing fires, and the tzompantli or " skull-place," where the skulls of victims by tens of thousands were skewered on cross-sticks or built into towers. There also might be seen the flat circular temalacatl or " spindle-stone," where captives armed with wooden weapons were allowed the mockery of a gladia- torial fight against well-armed champions. The great pyramid of Cholula with its hemispherical temple of Quetzalcoatl at the top, now an almost shapeless hill surmounted by a church, was about thrice as long and twice as high as the teocalli of Mexico. A large fraction of the Mexican population were set apart as priests or attendants to the services of the gods. The rites performed were such as are found elsewhere — prayer, sacrifice, processions, dances,

Brasseur de Bourbourg. It is the interpretation of different mytho- logical and historical Mexican picture-writings, composed by an anonymous author some time after the conquest and copied by Fernando de Alva (Ixtlilxochitl, 1568-1648). It belonged to the priceless collection of Mexican documents brought together in the 18th century by Lorenzo Boturini (see his " Catalogo del Museo historicoindiano," appendix of his Idea de una nueva historia general de la America septentrional, Madrid, 1746, § viii., No. 13). It is ' named there Historia de los reynos de Colhuacan y de Mexico. Other copies of the same manuscript, made by Leon y Gama, Jose Pichardo, Aubin and Brasseur, exist in the Paris National Library in the Aubin-Goupil collection. Brasseur died before he could realize his plan to publish the whole MS. in Nahuatl with a translation. Some extracts are to be found in his Hisloire des nations civilisees du Mexique, and in Leon y Gama, Dos Piedras . . . , ed. Bustamente (Mexico, 1832). Larger fragments of the Ixtlilxochitl copy were published in the Anales del museo nacional de Mexico, torn, iii., appx. pp. 7-70; but in this edition the Mexican text is very corrupt, and the two Spanish translations are by no means exact. The Paris MSS. and the Ixtlilxochitl copy were carefully collated by Dr Walter Lehmann (see Zeitschrift fur Ethnologie, 1906, pp. 752-760; Journal de la Societe des Americanisms de Paris, now), ser. vol. iii. No. 2; Dr E. Seler, Verhandiungen des XVI. Internationalen Amerikanisten-Kongresses, Vienna, 1909, II., pp. 129-150). The precious Ixtlilxochitl copy was

found by Lehmann in the library of the National Museum of Mexico, and arrangements were made for the publication of the whole MS. by him in conjunction with Professor E. Seler. Another very important MS. was discovered by Dr Lehmann, in Guatemala. It is the MS. of Father Francisco Ximenez, Historia de la Provincia de San Vicente de Chiapa y de Guatemala, in three big volumes in folio, which contain the famous Spanish translation of the Quiche myths or the ” Popol-Vuh.” The MS. was bought at the expense of the duke of Loubat, who decided to present it, after the death of Dr Lehmann, to the Royal Library at Berlin.

chants, fasting and other austerities, but there are some peculiarities of detail. Prayers and other formulas have been copied down by Sahagun and other chroniclers, of endless prolixity, but not without occasional touches of pathos. These prayers seem essentially genuine; indeed there was no European model from which they could have been imitated; but at the same time it must be remem- bered that they come down in Spanish writing, and not untouched by Spanish influence, as in one passage where there is a mention of sheep, an animal unknown to the Mexicans. As to sacrifice, maize and other vegetables were offered, and occasionally rabbits, quails, &c, but, in the absence of cattle, human sacrifice was the chief rite, and cannibalism prevailed at the feasts. Incense was constantly used, especially the copalli (copal) well known to us for varnish; little terra-cotta censers are among the commonest of Mexican antiquities. Long and severe religious fasts were customary at special seasons, and drawing blood from the arms, legs and body, by thrusting in aloe-thorns, and passing sharp sticks through the tongue, was an habitual act of devotion recalling the similar practices of devotees in India. The calendar of religious festivals for the Mexican year has been preserved. Each 20-day period had one or more such celebrations. In the month of the ” diminishing of waters ” the rain gods or Tlalocs were propitiated by a procession of priests with music of flutes and trumpets carrying on plumed litters infants with painted faces, in gay clothing with coloured paper wings, to be sacrificed on the mountains or in a whirlpool in the lake. It is said that the people wept as they passed by; but if so this may have been a customary formality, for the religion of these nations must have quenched all human sympathy. In the next month the god Xipe-totec, already mentioned, had his festival

called the ” flaying of men ” from the human victims being flayed, after their hearts were torn out, for young men to dress in their skins and perform dances and sham fights. The succeeding festival of Camaxtli was marked by a severe fast of the priests, after which stone knives were prepared with which a hole was cut through the tongue of each, and numbers of sticks passed through. For the great festival of Tezcatlipoca, the handsomest and noblest of the captives of the year had been chosen as the incarnate representative of the god, and paraded the streets for public adoration dressed in an embroidered mantle with feathers and garlands on his head and a retinue like a king; for the last month they married him to four girls representing four goddesses; on the last day wives and pages escorted him to the little temple of Tlacochcalco, where he mounted the stairs, breaking an earthenware flute against each step ; this was a symbolic farewell to the joys of the world, for as he reached the top he was seized by the priests, his heart torn out and held up to the sun, his head spitted on the tzompantli, and his body eaten as sacred food, the people drawing from his fate the moral lesson that riches and pleasure may turn into poverty and sorrow. The manner of the victim’s death in these festivals afforded scope for variety; they dressed them and made them dance in character, threw them into the fire for the fire-god, or crushed them between two balanced stones at the harvest-festival. The ordinary pleasures of festivals were mingled with all this, such as dances in beast-masks, sham fights and children’s games, but the type of a religious function was a sickening butchery followed by a cannibal feast.

The Mexican priesthood were much concerned with the art of picture-writing, which they used systematically as a means of record- ing religious festivals and legends, as well as keeping f?” re ” calendars of years and recording the historical events writing. w hich occurred in them. Facsimiles of several of these interesting documents, with their translations, may be seen in . Kingsborough ; splendid reproductions of the beautiful Mexican and Mixteco-Zapotecan codices have also been published at the expense of the duke of Loubat and by the ” Junta Colombina ” (Mexico, 1892). Gods are represented with their appropriate attributes — the fire-god hurling his spear, the moon-goddess with a shell, &c. ; the scenes of human life are pictures of warriors fighting with club and spear, men paddling in canoes, women spinning and weaving, &c. An important step towards phonetic writing appears in the picture-names of places and persons. The simplest forms of these depict the objects signified by the name, as where Chapul- tepec or ” grasshopper-hill ” is represented by a grasshopper on a hill, or a stone with a cactus on it stands for Tenoch

or ” stone- cactus,” the founder of Tenocktitlan. The system had, however, risen a stage beyond this when objects were drawn to represent, not themselves, but the syllables forming their names, as where a trap, an eagle, a pricker, and a hand are put together not to represent these objects, but in order that the syllables of their names mo-quauh- zo-ma should spell the word Moquauhzoma (see Aubin’s intro- duction to Brasseur, Hist, du Mexique, i. 68.). The analogy of this to the manner in which the Egyptian hieroglyphs passed into phonetic signs is remarkable, and writing might have been invented anew in Mexico had it not been for the Spanish conquest. The Aztec numerals, which were vigesimal or reckoned by scores, were depicted by dots or circles up to 20, which was represented by a flag, 400 (a score of scores) by a feather, and 8000 (a score of scores of scores) by a purse ; but for convenience these symbols might be halved and quartered, so that 534 might be shown by one feather, one quarter of a feather, one flag, one-half of a flag, and four dots. The Mexican calendar depended on the combination of numbers with

picture-signs, of which the four principal were the rabbit, reed, flint, house — tochtli, acatl, tecpatl, calli. The cycle of 52 years was reckoned by combining these signs in rotation with numbers up to 13, thus: 1 rabbit, 2 reed, 3 flint, 4 house, 5 rabbit, 6 reed, &c. By accident this calendar may be exactly illustrated with a modern pack of cards laid out in rotation of the four suits, as, ace of hearts, 2 of spades, 3 of diamonds, 4 of clubs, 5 of hearts, 6 of spades, &c. In the Mexican ritual calendar of the days of the year, the same method is carried further, the series of twenty day-signs being combined in rotation with numbers up to 13 ; as this cycle of days only reaches 260, a series of nine other signs are affixed in addition, to make up the 365-day year. It is plain that this rotation of signs served no useful purpose whatever, being less convenient than ordinary count- ing such as the Mexicans employed in their other calendar already mentioned, where the 20-day periods had each a name like our months, and their days had signs in regular order. Its historical interest depends on its resemblance to the calendar-system of centra! and eastern Asia, where among Mongols, Tibetans, Chinese, &c, series of signs are thus combined to reckon years, months and days ; for instance, the Mongol cycle of 60 years is recorded by the zodiac or series of 12 signs— mouse, bull, tiger, &c, combined in rotation with the five male and female elements — fire, earth, iron, water, wood; as ” male-fire-bull” year, &c. This comparison is worked out in Humboldt’s Vues des Cordilleres, as evidence of Mexican civilization being borrowed from Asia. Naturally the Mexican calendar-system lent itself to magic in the same way as the similar zodiac-signs of the Old World, each person’s

fate being affected by the qualities of the signs he was born under, and the astrologer- priests being called in to advise on every event of life. Of all Mexican festivals the most solemn was that of the xiuhmolpilli, or ” year-binding,” when the 52-year cycle or bundle of years came to an end. It was- believed that the destruction of the world, which after the Hindu manner the Mexicans held to have already taken place three or four times, would happen again at the end of a cycle. As the time drew near, the anxious population cleansed their houses and put out all fire, and on the last day after sunset the priests, dressed in the garb of gods, set out in procession for the hill of Huixachtla, there to watch for the approach of the Pleiades to the zenith, which gave the auspicious signal for the lighting of the new fire. The finest of the captives was thrown down and fire kindled on his breast by the wooden drill of the priest; then the victim’s heart was torn out, and his body flung on the pile kindled with the new flame. The people watching from their flat housetops all the country round saw with joy the flame on the sacred hill, and hailed it with a thank-offering of drops of blood drawn from their ears with sharp stone-flakes. Swift runners carried burning brands to re-kindle the fires of the land, the sacred fire on the teocalli of the war-god blazed up again, and the people began with feasting and rejoicing the new cycle.

Mexican education, at any rate that of the upper class, was a systematic discipline much under the control of religion, which here presents itself under a more favourable light. After the birth of a child, the tonalpouhqui or “isun-calculator ” Education. drew its horoscope from the signs it was born under, and fixed the time for its solemn lustration or baptism, performed by the nurse with appropriate prayers to the gods, when a toy shield and bow were provided if it was a boy, or a toy spindle and distaff if it was a girl, and the child received its name. An interesting picture-writing, to be seen in Kingsborough, shows the details of the boy’s and girl’s education, from the early time when three small circles over the child show it to be three years old, and a drawing of half a tortilla or corn-cake shows its allowance for each meal ; as they grow older the lads are seen beginning to carry burdens, paddle the canoe and fish, while the girls learn to spin and weave, grind maize, and cook — good conduct being enforced by punish- ments of increasing seventy, up to pricking their bodies with aloe- thorns and holding their faces over burning chillies. The schools were extensive buildings attached to the temples, where from an early age boys and girls were taught by the priests to sweep the sanctuaries and keep up the sacred fires, to fast at proper seasons and draw blood for penance, and where they received moral teaching in long and verbose formulas. Those fit for a soldier’s life were trained

to the use of weapons and sent early to learn the hardships of war; children of craftsmen were usually taught by their fathers to follow their trade; and for the children of nobles there was elaborate instruction in history, picture-writing, astrology, religious doctrines and laws. Marriages depended much, as they do still in the East, on comparison of the horoscopes of the lnarTia S es – pair to ascertain if their birth-signs were compatible. Old women were employed as go-betweens, and the marriage ceremony was conducted by a priest who after moral exhortations united the young couple by tying their garments together in a knot, after which they walked seven times round the fire, casting incense into it; after the performance of the marriage ceremony, the pair entered together on a four days' fast and penance before the marriage was completed. The funeral rites of the Mexicans are best seen in the _ ceremonies at the death of a king. The corpse laid out " uxera s – in state was provided by the priest with a jug of water for his journey, and with bunches of cut papers to pass him safely through each danger of the road — the place where the two mountains strike

together, the road guarded by. the great snake and the great alligator, the eight deserts and the eight hills; they gave him garments to protect him from the cutting wind, and buried a little dog by his side to carry him across the nine waters. Then the royal body was invested in the mantles of his patron-gods, especially that of the war-god, for Mexican kings were warriors; on his face was placed a mask of turquoise mosaic, and a green chalchihuite-stone as a heart between his lips. In older times the dead king was buried on a throne with his property and dead attendants round him. But after cremation came in a mourning procession of servants and chiefs carrying the body to the funeral pyre to be burnt by the demon- dressed priests, after which the crowd of wives and slaves were exhorted to serve their lord faithfully in the next world, were sacrificed and their bodies burnt. Common people would not thus be provided with a ghostly retinue, but their simpler funeral cere- monies were as far as they went similar to those of their monarch.

The staple food of the Mexicans before the conquest has continued with comparatively little change among the native race, and has Agriculture even been adopted by those of European blood. Maize and

food or Indian corn was cultivated on patches of ground * where, as in the Hindu j4m, the trees and bushes were burnt and the seed planted in the soil manured by the ashes. A sharp-pointed planting stick, a wooden shovel, and a bronze-bladed hoe called a coatl were the simple implements. The Mexicans understood digging channels for irrigation, especially for the cultiva- tion of the cacahuatl, from which they taught the Europeans to prepare the beverage chocollatl; these native names passed into English as the words cacao, or coco and chocolate. Other veget- ables adopted from Mexico are the tomato (tomatl) and the chilli, used as flavouring to native dishes. The maize was ground with a stone roller on the grinding stone or metlatl, still known over Spanish America as the metate, and the meal baked into thin oval cakes called by Aztecs tlaxcalli, and by Spaniards tortilla, which resemble the chapati of India and the oatcake of Scotland. The Mexicans were also skilful makers of earthen pots, in which were cooked the native beans called by the Spanish frijoles, and the various savoury stews still in vogue. .The juice extracted by tapping the great aloe before flowering was fermented into an intoxicating drink about the strength of beer, octli, by the Spaniards called pulque. Tobacco, smoked in leaves or cane-pipes or taken as snuff, was in use, Clothlns and es P ec ‘ a “y at feasts. In old times Mexican clothing _ * , was of skins of woven aloe and palm fibre, but at the time of the conquest cotton was largely cultivated in the hot lands, spun with a spindle, and woven in a rudimentary loom without a shuttle into the mantles and breech-cloths of the men and the chemises and skirts of the women, garments often of fine texture and embroidered in colours. Ornaments of gold and silver, and jewels of polished quartz and green chalchihuite were worn — not only the ears and nose but the lips being pierced for Metal-work ornaments – The artificers in gold and silver melted ‘ the metals by means of a reed-blowpipe and cast them solid or hollow, and were also skilled in hammered work and chasing, as some fine specimens remain to show, though the famous animals modelled with gold and silver, fur, feathers and scales have disappeared. Iron was not known, but copper and tin ores were mined, and the metals combined into bronze of much the same alloy as in the Old World, of which hatchet blades and other instru- ments were made, though their use had not superseded that of obsidian and other sharp stone flakes for cutting, shaving, &c. Metals had passed into a currency for trading purposes, especially quills of gold-dust and T-shaped pieces of copper, while coco-beans furnished small change. The vast size of the market-squares with their surrounding porticos, and the importance of the caravans of merchants who traded with other nations, show that mercantile had risen into some proportion to military interests. Nor was the wealth and luxury of Mexico and

surrounding regions without a corre- sponding development of art. The stone sculptures such as that remaining of Xochicalco, which is figured by Humboldt, as well as the ornamented woodwork, feather-mats, and vases, are not without artistic merit. The often- cited poems attributed to Nezahualcoyotl may not be quite genuine, but at any rate poetry had risen above the barbaric level, while the mention of ballads among the people, court odes, and the chants of temple choirs would indicate a vocal cultivation above that of the instrumental music of drums and horns, pipes and whistles, the latter often of pottery. Solemn and gay dances were frequent, and a sport called the bird-dance excited the admiration of foreigners for the skill and daring with which groups of performers dressed as birds let themselves down by ropes wound round the top of a high mast, so as to fly whirled in circles far above the ground. The ball- game of the Mexicans, called Uachtli, was, like tennis, the pastime of princes and nobles; special courts were built for it, and the ball of india-rubber (perhaps the first object in which Europeans became acquainted with this valuable material) might not be touched by the hands, but was driven against the walls by blows of the knee or elbow, shoulder or buttock. The favourite game of patolli has been already mentioned for its similarity to the pachisi of modern India. The accounts given by Spanish writers of the Central Americans in their state after the Spanish conquest are very scanty in com-

parison with the voluminous descriptions of Aztec life. They bring out perfectly, however, the fact of close connexion between the two civilizations. Some Central-American peoples Central- were actually Mexican in their language and culture, especially the Pipils and a large part of the population of Nicaragua. The investigations made by Dr Walter Lehmann in Central America (1907-1909), prove that these Mexican elements were extended through Guatemala, Salvador, a small part of Nicaragua (the territory of the Nicaraos) and on several places in the peninsula of Nicoya (Costa Rica) amongst the autochthonous Choro- tega or Mangue. It is an error of the Spanish authorities to pretend that the Pipil civilization in Guatemala and Salvador is not older than the time of King Ahuitzotl (c. 1482-IA86). The language spoken by the Pipils of Salvador (Balsam Coast) is a very old dialect of the Mexican language of the highland of Mexico. It has preserved in the conjugation and in the formation of the plural older forma than the classical Nahuatl itself. The separation of the Pipils from the chief tribes of the Nahuatl branch happened centuries before

the conquest, and they developed a singular and characteristic civilization, which can be seen in the wonderful stone-reliefs and sculptures of Sta Lucia de Cozumalhuapa on the Pacific coast of Guatemala.

Dr Lehmann's archaeological and linguistic researches, especially in Salvador and Nicaragua, also enabled him to prove another very important fact, viz. that these Pipils, who may be descendants from the peoples of the Mexican Plateau, migrated into territories previously occupied by an older race of Mayan origin. The archaeological and linguistic evidence proves also that a great part of Salvador and Honduras was once occupied by peoples of the Maya race — Pokomam, Chorti and perhaps other unknown tribes. They left typical Mayan ruins in Honduras (Tenampua) and in Salvador (Opico near Tehuacan, Quelepa near' San Miguel), which seem, however, to be destitute of Mayan hieroglyphic inscriptions. The easternmost limit of prehistoric Mayan civilization, on the Pacific coast of Central America, is Fonseca Bay, with the island of Zacate Grande.

It is noteworthy that archaeological objects of the type character- istic of northern Honduras (Ulloa Valley) have been found on the Pacific coast of Salvador. A strange stone sculpture of the so-called Chac-Mol type, known before only from the country of the Tarascs, from Tlaxcala and Chichen Itza, was discovered in Salvador (Ahuachapan).

In the nearly unexplored central part of Nicaragua Dr Lehmann found fragments of painted polychrome clay pottery similar to objects known from the Ulloa Valley (Honduras) amongst other ceramic pieces which seem to have been left by the ancestors of the Sumo Indians, now extinct in that territory. It is possible that these remains of Mayan pottery came into central Nicaragua as articles of commerce.

It is significant that Mayan civilization cannot be traced in any Other part of Nicaragua or Costa Rica.

The above-mentioned prehistoric Mayan peoples lived in contact with " barbarous " nations and with another little-known civilized race. The barbarians belonged to the great family of the Sumo- Misquito Indians, the civilized race was that of the Chorotega or Mangue (Dirian, Orotinan, &c). The Sumo-Misquito Indians occupied the Atlantic coast and the interior of Nicaragua and Honduras, where they still live in small tribes ; a dialect of the hitherto unknown Sumo languages is the Matagalpan, now extinct in Nicar- agua, and nearly identical with the Matagalpan is the language spoken by the Indians of Cacaopera in Salvador (Ultra-Lempa territory). There is no doubt that,

at the time of the Pipil invasion, tribes of the Sumo-Misquito family were the immediate neighbours of the Pipils towards the east and north. This fact is proved by the names of some places in Salvador, e.g. Santiago Nonohualco, San Juan Nonohualco and San Pedro Nonohualco. The word Nonohualco signifies in the Mexican language a place where a language changes, where another idiom begins. To the east of the three places whose names are compounded with ." Nonohualco," must have dwelt, in the time of the Pipil Indians, the Nonoualca, called also by Mexican tribes Chontales or Popoloca. The western neighbours of the Sumo Indians were and are (though few still survive) the Lenca Indians, who formerly occupied large parts of Honduras. A linguistic rela- tionship can be established between all the Indian languages spoken on the Atlantic coast and in the interior of Nicaragua and Honduras. Several tribes, such as the Paya (or Poya) and the Jicaques, form together with the Lenca, Sumo (Matagalpa, Tauakhca and Ulua) and Misquito one great family.

The position of the isolated Xinca (or Sinca) Indians, regarded from this point of view, becomes very interesting. There are scientific reasons to believe that the Xinca also belong to the same great family as the Lenca, Jicaques, Paya, Misquito-Sumo. It may be possible either that these tribes are the autochthonous inhab- itants who dwelt in Guatemala, Salvador, Honduras and Nicaragua before the immigration of the prehistoric Maya peoples ; or else that they invaded this region after it had been deserted by a prehistoric oriental branch of the Maya family.

The Chorotega race had its centre in Nicaragua (Pacific coast) and at one time extended thence as far as Guanacaste (Costa Rica) ; at

another time it extended as far as Honduras (actual department of Choluteca) and into eastern Salvador as far as the state of Chiapas in Mexico, where the Chorotega penetrated amongst the Mixe. The Chorotega or Mangue language, so closely affiliated to the Chiapanec, is now extinct, but its former extension is to be recog- nized by many Indian local names. It seems that there was formerly a mutual interpenetration between Lenca, Sumo and Chorotega tribes. The territories of all these tribes can be, more or less exactly, calculated by the existence of Indian local names. The Misquito country is characterized by names terminating in laya, water, or auala, river; the Sumo and Ulua country by names in uas, water; the Matagalpan by names in It, water; the Lenca by names in tique, lique, isque and (ai) quin. Such Lenca names occur on the north- eastern boundary of the Ultra-Lempa country of Salvador. It is strange that there is not a single place-name in Salvador either of Mayan origin, or, as it seems, of Chorotegan origin. Probably the Mexican elements superseded the Maya so completely that there remained no trace of the Maya except archaeological objects; it is to be supposed that the Lenca and Sumo tribes superseded the Chorotega in Salvador. If we can be sure — and the linguistic evidence admits of no doubt — that the Chorotega had their centre in Nicaragua and thence extended north-westwards, it may be hoped that Chorotegan remains will be found in the vast territory occupied for many centuries by the Maya peoples in the Pacific part of Guatemala. These remains would, of course, be archaeological or place-names.

How closely related some of the Central-American nations were in institutions to the Mexicans appears, not only in their using the same peculiar weapons, but in the similarity of their religious rites; the connexion is evident in such points as the ceremony of marriage by tying together the garments of the couple, or in holding an offender's face over burning chillies as a punishment; the native legends of Central America make mention of the royal ball-play, which was the same as the Mexican game of tlachtli already men- tioned. At the same time many of the Central-American customs differed from the Mexican; thus in Yucatan we find the custom of the youths sleeping in a great bachelor's house, an arrangement common in various parts of the world, but not in Mexico; the same remark applies to the Maya exogamous law of a man not taking a wife of his own family name (see Diego de Landa, Relation de Yucatan, ed. Brasseur de Bourbourg,

p. 140), which does not correspond with Mexican custom. We have the means of comparing the personal appearance of the Mexicans and Central Americans by their portraits on early sculptures, vases, &c. ; and, though there does not appear any clear distinction of race-type, the extraordinary back-sloping foreheads of such figures as those of the bas-reliefs of Palenque prove that the custom of flattening the skull in infancy prevailed in Central America to an extent quite beyond any such habit in Mexico. The notion that the ruined cities now buried in the Central-American forests were of great antiquity and the work of extinct nations has no solid evidence; some of them may have been already abandoned before the conquest, but others were inhabited by the ancestors of the Indians who now build their mean huts and till their patches of maize round the relics of the grander life of their ancestors. In comparing these ruins in Yucatan, Chiapas, Guatemala and Hon- duras, it is evident that, though they are the work of two or more nations highly distinct in language, yet these nations had a common system of pictorial or written characters. One specimen of a Central- American inscription may give a general idea of them all, whether it be from the sculptured facade of a temple sketched by Catherwood, or from the painted deerskin called the Dresden Codex (reproduced in Kingsborough), or from the chapter of Diego de Landa where he professes to explain and translate the characters themselves. These consist of combinations of faces, circles, lines, &c, arranged in compartments in so complex a manner that hardly two are found alike. How they conveyed their meaning, how far they pictorially represented ideas or spelt words in the different languages of the country, is a question not yet answered in a complete way; Landa's description (p. 320) gives a table of a number of their elements as phonetically representing letters or syllables, but, though there may be a partial truth in his rules, they are insufficient or too erroneous to serve for any general decipherment. One point as to the Central- American characters is clear, that part of them are calendar-signs recording dates. From the accounts given by Landa and other writers it is plain that the Central-American calendar, reckoning the year in twenty-eight periods of thirteen days, was the same in its principle of combining signs as that of Mexico. The four leading Maya signs called kan, muluc, ix, cauac corresponded in their position to the four Aztec signs rabbit, reed, flint, house, but the meanings of the Maya signs are, unlike the Aztec, very obscure. A remarkable feature of the Central-American ruins is the frequency of truncated pyramids built of hewn stone, with flights of steps up to the temple built on the platform at top. The resemblance of these structures to the old descriptions and pictures of the Mexican teocallis is so striking that this name is habitually given to them. The teocallis built by the Nahua

or Mexican nations have been mostly destroyed, but two remain at Huatusco and Tusapan (figured in Bancroft, iv. 443, 456), which bear a strong resemblance to those of Palenque. On the whole it is not too much to say that, in spite of differences in style, the best means of judging what the temples and palaces

of Mexico were like is to be gained from the actual ruins in Central America. On the other hand, there are features in Central-American architecture which scarcely appear in Mexican. Thus at Uxmal there stands on a terraced mound the long narrow building known as the governor's house (Casa del Gobernador), 322 ft. long, 39 ft. wide, 26 ft. high, built of rubble stone and mortar faced with square • blocks of stone, the interior of the chambers rising into a sloping roof formed by courses of stonework gradually overlapping in a " false arch." The same construction is seen in the buildings form- ing the sides of a quadrangle and bearing the equally imaginary name of the nunnery (Casa de Monjas) ; the resemblance of the interior of one of its apartments to an Etruscan tomb has often been noticed (see Fergusson, History of Architecture, vol. i; Viollet-le-Duc, in Charnay).

The explorations made by Dr Lehmann in 1909 in the famous ruins of Teotihuacan, near Mexico city throw new light upon certain chronological problems. Like the excavations made by Dr Max Uhle ,in Peru, they tend to determine the relative antiquity of the different periods of the ancient civilization. They also show that these various culture-periods followed one another among the Mexicans in much the same sequence as among the Peruvians. At a considerable depth below the foundations of a temple-palace at Teotihuacan, Dr Lehmann discovered certain ceramic fragments of a type quite different from any hitherto classed as Mexican. These are painted on a fine stucco in beautiful colours (notably a kind of turquoise-green) and represent archaic forms of flowers and butterˆ flies. The relation between the wall paintings of Teotihuacan and ornaments at Chichen Itza, as also the existence of sculptured stone yokes in Teotihuacan, in the country of the Totonacs, in Guatemala and in Salvador, furnish important material for the investigation of the obscure problems of the Toltecs and Olmecs, and of the exten- sion of Maya peoples on the Atlantic coast of the Mexican Gulf from Campeche as far as Tabasco and Vera Cruz.

Attempts to trace the architecture of Central America directly from Old- World types have not been successful, while on the other hand its decoration shows proof of original invention, especially in the imitations of woodwork which passed into sculptured orna- ment when the material became stone instead of wood. Thus the

architectural remains, though they fail to solve the problem of the culture of the nations round the Gulf of Mexico, throw much light on it when their evidence is added to that of religion and customs. At any rate two things seem probable — first, that the civilizations of Mexico and Central America were pervaded by a common influence in religion, art, and custom; second, that this common element shows traces of the importation of Asiatic ideas into America.

Bibliography. — The most illuminating and fundamental work on Mexican archaeology is the Gesammelte Abhandlungen, of Eduard Seler (vol. i. Berlin, 1902; vol. ii., 1904). For the earliest descriptions of the ancient cities of Mexico the writings of Cogolludo, Landa, Antonio del Rio, Sahagun, Torquemada and others are of the greatest value. The account by Antonio de Leon y Gama, Description historica y cronologica de las dos piedras que . . . se liallaron en la plaza principal de Mexico el ano de 1790 (Mexico, 1792 ; 2nd ed. by C. M. de Mustamentel), may be specially mentioned. Much of this material is to be found in Lord Kingsborough ‘s monumental work in 9 vols., seq., on the Antiquities of Mexico (London, 1831- 1848). Alexander von Humboldt’s Vues des Corditthres et monu- ments des peuples indigenes de V Amerique was published in Paris in 1816. At the beginning of the 19th century the colonial government undertook a comprehensive exploration of the best known groups of ruins and three expeditions were made in 1 805-1 808 under the direction of Captain Guillaume Dupaix, accompanied by Luciano Castaneda as artist. The reports were not published, however, until Kingsborough included them in his work, though some of the draw- ings appeared in other works. In many respects these reports are the best of the early accounts. Another early explorer was the French artist Frederic de Waldeck, who published Voyage pittoresque et archeologique dans la province d’ Yucatan (Paris, 1838), and whose collection of drawings appeared in 1866, with the descriptive text by Brasseur de Bourbourg, under the title Monuments anciens du Mexique. Among other and later works, including some who have devoted themselves more especially to Maya inscriptions, are: Arnold and Frost, The American Egypt (London, 1909) ; H. H. Bancroft, The Native Races of the Pacific States (5 vols., New York, 1874-1876, vol. iv. is devoted to ” Antiquities “) ; A. F. Bandelier, Report on an Archaeological Tour in Mexico, 1881 (Archaeol. Inst, of America, papers, Am. Ser. II.); Leopoldo Batres, Cuadro arqueo- logico y etnogrdfico de la Republica Mexicana (Mexico, n.d.) ; W. W. Blake, Catalogue of the Historical and Archaeological Collections of the National Museum of Mexico (Mexico, 1884); Eug. Boban, Cuadro arqueolbgico y etnogrdfico de la Republica Mexicana (Paris, 1885) ; Daniel G. Brinton, The American

Race (New York, 1891) and Ancient Phonetic Alphabets of Yucatan; Desire Charnay, The Ancient Cities of the New World (Transl. New York, 1887) ;" Charnay and Viollet-le-Duc, Cites et ruines americaines (Paris, 1863) ; Alfredo Chavero (ed.) Antiguedades mexicanas (Mexico, 1892); Dupaix, Antiquites mexicaines (Paris, 1834-1836); E. Forstemann (Numerous articles in Globus and other German publications, 1893-1897, on Maya inscriptions); E. T. Hamy, Decades americanae (Paris, 1888, 1898, 1902) ; Wm. H. Holmes, Archaeological Studies among the

Ancient Cities of Mexico (Parts I. and II. Field Columbian Museum, Chicago, 1895-1897); W. Lehmann, Ergebnisse und Aufgaben der mexikanischen Forschung (Archiv. fur Anthropologic, neue Folge, iii., 2; 1907), Eng. trans.: Methods and Results in Mexican Research, by Seymour de Ricci (Paris, 1909) ; Theobert Maler, Neue Entdeckung von Ruinen-Stddten in Mittel-Amerika (Globus, lxx. 149-150, Braunschweig, 1896), and also contributions to American archaeological publications; A. P. Maudslay, Biologia Centrali-Americana-Archaeology (London, 1897); J. F. A. Nadaillac, Prehistoric America (New York, 1895); Zelia Nuttall, The Fundamental Principles of the Old and New World Civilizations (Arch, and Ethn. Papers, Peabody Museum, Cambridge, 1901); Antonio Penafiel, Monumentos del arte mexicano antiguo (1 vol. text, 2 vols, plates; Berlin, 1890); Carl Sapper, Das nordliche Mittel-Amerika (Braunschweig, 1897) ; Caecilie Saler, Auf alien Wegen in Mexico und Guatemala (Berlin, 1900); Eduard K. Seler, " Der Charakter der aztekischen und Maya-Hand- schriften " [Zeitschrift fur Ethnologic, Berlin, 1888), and other papers in various German publications; John L. Stephens (F. Catherwood, artist), Travels in Central America (2 vols., New York, 1841), and .Incidents of Travel in Yucatan (2 vols., New York, 1843).

(E. B. T.; W. L.*)

II. — Colonial Period. 1520-1821.

The conquest of Mexico by the Spanish forces under Hernando Cortes (q.v.) in 1520, and the death of the last Aztec emperor, , Guatemozin, introduced what is known as the colonial period of Mexican history, which lasted down to the enforced resigna- tion of the last viceroy,

O'Donoju, in 1821. During these three centuries, after a brief but most unsatisfactory experience of government by audiencias (1521-1535), sixty-four viceroys ruled over New Spain. Of these a few were ecclesiastics: two had two terms of office; only two or three were of native birth, and their previous official life had always been passed in other parts of the Spanish dominions.

New Spain was one of four great viceroyalties, the other three being New Granada, Buenos Aires and Peru. Its viceroy _ ruled over districts differing in status and with over- Bxtent. 3 ”' l a PP m g an d conflicting authorities, some of these being appointed directly by the king of Spain, and responsible to him. New Spain in its widest meaning includes the audiencias or judicial districts of Manila, San Domingo and Guatemala, and the viceroy had some sort of authority over them: but in its narrower meaning it comprised the audiencia district of Mexico and the subordinate audiencia district of Guadalajara, which together extended from Chiapas and Guate- mala to beyond the eastern boundary of the modern state of Texas and northwards, eventually, to Vancouver's Island. In the course of the 18th century this came to consist of the follow- ing divisions: (1) the kingdom of Mexico, which included the peninsula of Yucatan but not the present state of Chiapas or a part of Tabasco, these belonging to Guatemala. Approximately its south border ran from a point slightly east of Tehuantepec to the bay of Honduras, and its north limit was that of the modern states of Michoacan and Guanajuato, then cutting across San Luis Potosi to a point just above Tampico. (2) The kingdom of New Galicia, including the present states of Zacatecas, Jalisco and part of San Luis Potosi. (3) The Nuevo Regno de Leon (the present state of that name). (4) The Provincias Internas, i.e. ” interior ” regarded from the capital, viz. Nuevo Santander (Tamaulipas, and Texas to the bay of Corpus Christi, founded 1749), the several provinces of Nuevo Biscaya or Chihuahua, Durango, Sonora with Sinaloa, Coahuila, Texas (from Corpus Christi Bay to the mouth of the Mermenton in the present state of Louisiana), and the two Californias.

The audiencia councils' also advised the viceroy in matters of administration; and, as with other officials, his career was Government subject at its close to a formal examination by a and Organi- commission — a process known as ” taking his zatlon. residencia.” Local government till 1786 was largely

in the hands of alcaldes majores and corregidores, the latter established in 1531 to look after the Indians, and both appointed by purchase. Towns, which were to some extent founded after the conquest as centres of civilization for the Indians, were governed by

civic officials appointed in the first instance by the governor of the province, but subsequently as a rule purchasing their posts.

The church rapidly supplemented the work of the conquerors. The first Franciscan mission arrived in 1524; other orders followed. The announcement of the apparition of The Church the Virgin to an Indian netir Mexico City provided a and the place of pilgrimage and a patroness in Our Lady of People. Guadalupe; and the friars ingeniously used the hieroglyphic writing for instruction in Christian doctrine, and taught the natives trades, for which they showed much aptitude. The university of Mexico was founded in 1553. The Jesuits estab- lished themselves in 1572, devoting themselves actively to the education both of whites and of natives, and were a powerful factor in the exploring and civilizing of the northern districts. The Inquisition was introduced in 1571. With the natives south of the latitude of Tampico there was little trouble after the Mixton War (in Guadalajara) in 1 540-1 562, save for occa- sional risings in Yucatan, Tehuantepec, and in 171 1 in the Nayarit mountain region west of Zacatecas, and Tamaulipas was con- quered in 1748; but the wild Indians of Sonora and New Mexico gave constant trouble to the missions and outlying settlers. There were occasionally riots due to scarcity of corn (notably in Mexico itself in 1692). As in other Spanish possessions, Indian labour was replaced or supplemented by that of negro slaves, but these were almost wholly confined to the coast regions of Vera Cruz and Acapulco, and early in the 19th century there were only some 10,000 in all.

As the Spanish conquerors brought few women, there was much mixture of races. Among the pure whites— who were practically all of Spanish extraction — there were two well-defined classes, the Gachupines or chapetones, castesˆ" Spaniards born in Europe, said to be so named in allusion to their spurs, from Aztec words meaning " prickers with the foot," and the native-born or Creoles: the former, though a small minority, had almost all the higher positions both in the public services and in commerce. Besides these there were five well-defined castas: mestizoes (Indian and white); mulattoes (negro and white); Zambos (negro and Indian), who were regarded as specially vicious and dangerous; native Indians and negroes. But there were about a dozen inter- mediate " named varieties," of which the salto-alras (tending away from white) and tente en I'aire (tending towards white) may be mentioned; and many of the last named eventually passed into the Creole class, sometimes by the decree of a court. The fact that the trade route to Manila passed through Vera Cruz, Mexico City and Acapulco entailed the settlement also of a few Chinese and Malays, chiefly on the Pacific coast.

The natives were subject to tribute and kept in perpetual tutelage: divided at the conquest, with the land, as serfs of the conquerors, in repartimienlos or encomiendas, they were gradually freed at an early date from their ˆNatives. serfage, and allowed to sell their labour as they pleased; they were, however, to a great extent kept in villages or settlements, compelled to cultivate land which they held for their life only, and strictly controlled by the friars or the priests. Their numbers were several times seriously reduced by the matlazhuatl, apparently analogous to yellow fever, but not attacking the whites, and unknown before the conquest. The negroes were allowed to buy their freedom gradually at rates fixed by the judicial authorities, and slavery seems never to have taken much hold except in the coast region.

Of the events of this period only a bare outline can here be given. The term of office of the first viceroy, Antonio de Mendoza, was marked by the Mixton War, by an Leading attempt to suppress the encomienda system, and by Events: a violent epidemic among the natives. Under his 1S3S ‘ 1822 – successor, Velasco, the measures taken for the relief of the natives provoked the landowners to a conspiracy (repressed with great severity) to set up Cortes’ son as king of New Spain. In 1568 the island of Sacrificios, near Vera Cruz, was seized by John Hawkins (q.v.), who was surprised by the Spanish fleet accompanying the new viceroy, de Almansa, and escaped with Sir Francis Drake (q.v.), but without the remaining ships of his squadron. In 1572 and 1578, however, Drake took abundant

vengeance, and in 1587 Cavendish captured the Manila galleon — a success repeated in the next century.

For the next sixty years an urgent question was the prevention of floods in the capital. Situated oh the lowest of four lakes, The Drain-whose waters had only one small outlet from the age of the valley, it was only 4 ft. above the level of the Capital. lowest, and was flooded on an average once in every twenty-five years. It had been protected under the native kings by a system of dikes, which were added to under the earlier viceroys, but serious inundations in 1553 and 1580 flooded the city, and the latter suggested the relief of the highest lake, that of Zumpango, by a tunnel carrying its chief affluent into a tributary of the Panuco, and so to the Atlantic. This, however, was not

then undertaken, and when mooted again in 1603 was opposed as certain to involve a heavy sacrifice of Indian life. Another inundation, in 1604, suggested the transfer of the city to Tacubaya, but the landowners opposing and the city being again inundated in 1607, the Nochistongo tunnel was begun under the auspices of a Jesuit, Enrico Martinez, and roughly completed in eleven months. It passed under a depression in the mountains of the extreme north of the valley. Humboldt states that it was 6600 metres long, 35 wide and 4 high. But it did nothing for the southern lakes, so that a further system of dikes was recommended in preference, in 16 14, by the Dutch engineer Adrian Boot; it was inadequate for its work and, not being lined with masonry, it was liable to be choked by falls. Repairs were suspended in 1623, and a further inundation, with great losses of life, occurred from 1629 to 1634. The removal of the city was again mooted and ; though sanctioned by the king of Spain, successfully opposed by the landowners. Another flood occurred in 1645. After a disastrous attempt to enlarge the tunnel in 1675, it was eventually converted into an open cutting, but the work was not finished till 1789, and the bottom was then 29 ft. 6 in. above the level of the lowest lake. The drainage was only satisfactorily accomplished at the end of the 19th century (see below).

A negro revolt in the Vera Cruz region (1609) and an Indian rebellion in Sinaloa and Durango may be mentioned among the events of the earlier part of the 17th century. The < ˆ a "ˆ haad regular and secular clergy had early come into con- flict, particularly over the tithe and the control of the Indians; and in 162 1, the marquis de delves, an energetic reformer, who as viceroy favoured the appointment of the regulars to deal with the natives, came into conflict with Arch- bishop Serna of Mexico, who placed the city under interdict, excommunicated the viceroy and constrained him to hide from the mob. Some years later the bishop of Puebla, Juan de Palafox y Mendoza, transferred many native congregations from the friars to secular priests, and subsequently, in r647, came into conflict with the Jesuits, whom he excommunicated, but who eventually triumphed with the aid of the Dominicans and the archbishop. The power of the church may be judged from the petition of the Ayuntamiento of Mexico to Philip IV. (1644) to stop the foundation of religious houses, which held half the property in the country, to suspend ordinations because there were 6000 unemployed priests, and to suppress feast days because there were at least two per week.

To check the Dutch and British corsairs the Barlovento (“windward”) squadron had been set up in 1635; but the British capture of Jamaica (1655) aggravated the /tews” 6 ”” d an g er to tne Spanish convoys.

During the rest of the century the ports of Yucatan and Central America were frequently raided, and in 1682 Tampico suffered a like disaster; in May r683 Vera Cruz itself was captured through stratagem by two buccaneers, Van Horn and Laurent, who plundered the town for ten days, committed shocking outrages, and escaped as the Spanish fleet arrived. In 1685-86 the Pacific coast was ravaged by Dampier and Swan, and in r709 Woodes Rogers, with Dampier as pilot, captured the Manila treasure galleon, a feat repeated by Anson in 1743. But the European wars of the 18th century had little effect on Mexico, save that the privileges of trade given to Great Britain

by the treaty of Utrecht facilitated smuggling. In the first half of the 18th century we may note the appearance, intermit- tently at first, of the first Mexican periodical — the Gaceta de Mexico — in 1 722, a severe epidemic of yellow fever in 1 736, and the establishment about r 7 50 of a standing army with a nucleus of Walloons and Swiss, negroes and Indians being excluded and the half-breeds admitted under restrictions. But the great event of the 18th century was the expulsion of the Jesuits from Mexico, as from the other Spanish dominions, in 1767, under orders from Charles III. They were arrested en masse on the night of the 26th of June; their goods were sequestrated, and they themselves deported to Havana, then to Cadiz, Genoa, and even- tually Corsica. They had done much to civilize the natives and to educate the whites, and their expulsion, which was greatly resented by the Creoles, probably tended to increase the popular discontent and prepare for the overthrow of Spanish rule. #

In 1769 Don Jose de Galvez was sent out as special commis- sioner to devise reforms, with powers independent of the then viceroy, but without much immediate result. It .

was, however, a consequence of his work that in Government. 1786 the provinces and kingdoms were replaced by twelve intendencias (Guadalajara, Zacatecas, Durango, Sonora, Puebla, Vera Cruz, Merida, Oaxaca, Valladolid, Guanajato, San Luis Potosi, Mexico), whose governors and minor officials were directly dependent on the viceroy, the former alcaldes, mayores and corregidores, who were very corrupt, being abolished. Possibly it is from this reform that we may date the antithesis of Federals and Centralists, which is so conspicuous in the history of republican Mexico. Among the later viceroys the Conde de Revillagigedo (1789-1794) deserves mention as a progressive ruler who developed commerce and improved administration, and took the first, but very imperfect, census, on which Hum- boldt based his estimate of the population in 1803 at 5,840,000.

The European wars of the French revolutionary period interfered with the traffic with Spain, and so relaxed the bonds of a commercial system which hampered the manu- Beginnings factures of Mexico and drained away its wealth, of Sever- Already in 1783 the Conde de Aranda had suggested aace ‘ to the Spanish king the scheme of setting up three Spanish- American kingdoms bound to Spain by perpetual treaties of alliance and reciprocity and by frequent royal intermarriages, and with the king of Spain as overlord. The plan was devised as a means of rivalling Anglo-Saxon supremacy, but was rejected through fear of the mixed races predominating over the whites. A similar fear helped to keep down the tendencies inspired by French revolutionary literature, though plots occurred against the viceroy Branciforte in 1798 and 1799. But the real causes of the revolution were local. The chief was the Creole jealousy of the Spanish immigrants. There was oppressive taxation, restriction on commerce and manufacture in the interest of Spain, even vineyards having been prohibited; and the courts were very corrupt. But to these grievances was added in 1804 the sequestration, to provide for Spain’s needs, of the benevolent funds (obras pias) in Mexico, amounting to about $45,000,000, and nearly all invested on mortgage. The mortgages were called in: forced sales were necessary, the mortgagers were frequently ruined, and less than a fourth of the total was realized. Other confiscations and exactions followed; and when the rule of Fernando VII. was succeeded by that of Joseph Bonaparte, the municipality of Mexico invited Iturrigaray, the viceroy, to declare the country independent. He proposed the convocation of a national congress, but was overthrown by a conspiracy of Spaniards under one Yermo, who feared that they would lose their privileged position through severance from Spain. The two next viceroys were incompetent; further demands from the Spanish authorities in revolt against Joseph Bonaparte increased the disaffection, which was not allayed by the grant of represen- tation in the Spanish Cortes to the colonies; and, on the demands being repeated by a third viceroy, Venegas, Creole conspiracies arose in Queretaro and Guanajato. Their discovery in i8ro was followed by the outbreak of the revolution. Hidalgo, a parish priest, and Allende, a captain of cavalry, with forces

consisting largely of Indians, captured a stronghold at Guanajato and even threatened the capital; but the revolutionists were defeated in

1811 at Calderon, and the leaders executed. Another priest, however, named Morelos, continued the movement, and, despite defeat in the terrible siege of Cuatla (now Morelos) on the 2nd of May 181 2, raised the south, so that in the next year his forces overran most of the kingdom of Mexico and held its southern parts, and he was able to convoke a congress and issue a constitution. But he also was captured, and executed at Mexico City in 1815. Though revolutionary movements still continued, by 181 7 only one leader, Vincente Guerrero, was left in the field. But in March 1820 the Spanish constitution, repudiated by King Fernando VII. soon after his restoration, was restored after a military rising in Spain. It was promul- gated in Mexico, and the ecclesiastics and Spaniards, fearing that a Liberal Spanish government would force on them disen- dowment, toleration and other changes, induced Augustin de Iturbide, who had already been conspicuous in suppressing the risings, to take the field in order to effect what may be called a reactionary revolution.

III. — Independent Mexico.

Thenceforward, till the second election of Porfirio Diaz to the presidency in 1884, the history of Mexico is one of almost General continuous warfare, in which Maximilian's empire Character- is a mere episode. The conflicts, which may at Istics. £ rst s ight seem to be merely between rival generals,

are seen upon closer examination to be mainly (1) between the privileged classes, i.e. the church and (at times) the army, and the mass of the other civilized population; (2) between Central- ists and Federalists, the former being identical with the army, the church and the supporters of despotism, while the latter represent the desire for republicanism and local self-government. Similar conflicts are exhibited, though less continuously, by most of the other Spanish-American states. On both sides in Mexico there was an element consisting of honest doctrinaires; but rival military leaders exploited the struggles in their own interest, sometimes taking each side successively; and the instability was intensified by the extreme poverty of the peasantry, which made the soldiery reluctant to return to civil life, by the absence of a regular middle class, and by the concentration of wealth in a few hands, so that a revolutionary chief was generally sure both of money and of men. But after 1884 under the rule of Diaz, the Federal system continued in name, but it concealed in fact, with great benefit to the nation, a highly centralized administra- tion, very intelligent, and on the whole both popular and successful — a modern form of rational despotism.

Iturbide eventually combined with Guerrero, and proclaimed the ” Plan of Iguala,” which laid down, as the bases of the new _ . state, the maintenance of the Roman Catholic iturbide religion and the privileges of the clergy, the establish- becomes ment of a limited monarchy, and equality of rights Emperor, f or Spaniards and native-born Mexicans. Iturbide sought the co-operation of the viceroy Apodaca, who, however, refused; but he was presently superseded by General O’Donoju, who, being unable to get beyond Vera Cruz, recog- nized the independence of Mexico. O’Donoju shortly after- wards died; the Spanish government repudiated his act; and Spanish troops held the fortress of San Juan de Ulua, off Vera Cruz, till 1827. A provisional Junta, nominated by Iturbide, issued a declaration of independence (Oct. 1821), and nominated a regency of five, with Iturbide as its president. The first Mexican Congress met on the 24th of February 1822. A section of it favoured a republic; another, monarchy under Iturbide; another, which was broken up by the refusal of Spain (continued until 1836) to recognize Mexican independence, monarchy under a Bourbon prince. A conflict now arose between the republican majority and Iturbide, which was settled by a military pronuncia- miento in his favour, and the Congress elected him emperor. He was crowned on the 21st of July 1822. Fresh conflicts broke out between him and the Congress, and Antonio Lopez de Santa Anna, captain-general of Vera Cruz, proclaimed a republic,

promising to support the Plan of Iguala. He was defeated at Jalapa and driven to Vera Cruz; but the army deserted Iturbide, who was compelled to abdicate (April 19, 1823). The Con- gress deported him to Italy, and granted him a pension. He returned almost immediately, on the pretext that Spain was intriguing against Mexican independence, and on landing (having been previously outlawed) was arrested and executed (July 1, 1824).

The Congress had meanwhile undone much of his work, and had divided into Federalists and Centralists, the latter largely Monarchists and Freemasons. The Federalists were strong enough to secure the adoption of a constitution (Oct. 4, 1824) modelled on that of the United States, with additional clauses, notably one declaring the Roman Catholic religion to be alone recognized. A source of abundant discord was opened by the provision that each state should contribute its quota to the Federal revenues. No proper statistical basis for estimating the quotas existed, and the device gave each state a plausible reason for attempting secession on occasion. Moreover, the capital and some territory round it was made into a ” Federal district ” — another grievance intensi- fying the antagonism of the state to the central power. The Freemasons had been largely instrumental in

overthrowing Iturbide; they now divided into the Escoceses (lodges of the Scottish ritual), who were Monarchist and Centralist, and the Yorkinos, who took their ritual from New York, and their cue, it was alleged, from the American minister, Joel Poinsett. An attempt at revolt, headed by Nicolas Bravo, vice-president, the Grand Master of the Escoceses, was suppressed, but dissensions ensued in the Yorkino party between the followers of President Guerrero (a man largely of native blood, and the last of the revolutionary leaders) and of Gomez Pedraza, the president war minister. A conflict broke out, the Guerrerists Guerrero, were victorious, and the pillage of foreign shops in t82S-i83i. Mexico City (1828), among them that of a French baker, gave a basis for the foreign claims which, ten years later, caused the ” Pastry War ” with France. Meanwhile, attacks on Spanish ships off Cuba by a Mexican squadron, com- manded by an American, David Porter, had induced Spain to send an expedition to reconquer Mexico (1829) which was checked at Tampico by Santa Anna. During the invasion Vice-President Antonio Bustamante declared against President Guerrero; the bulk of the army supported him. Guerrero was deposed, and his partisans in the south were defeated at Chilpan- cingo (Jan. 2, 183 1); and Guerrero, retiring to Acapulco, was enticed on board an Italian merchant-ship, and treacherously seized, tried and executed (Jan.Feb. 1831). Next year, how ever, a revolt broke out against Bustamante, which was joined by Santa Anna, and eventually resulted in a pronunciamiento in favour of Gomez Pedraza. He, and his successor, Vice-President Gomez Farias (1833), assailed the exemption of the clergy and of military officers from the jurisdiction of the civil courts, and the latter attempted to laicize higher education and to relax monastic bonds. Santa Anna took advantage of the situation to assume the presidency. He eventually became Santa Anna, dictator, dissolved Congress (May 31, 1834) and the Dictator, state legislatures, and substituted creatures of his 1834 ‘ own for the governors of the states and mayors of towns, then retiring into private life. A new Congress, having resolved itself into a constituent assembly, followed up this Centralist policy (Dec. 30, 1836) by framing a new constitution, the Siete Leyes or Seven Laws, which converted the states into depart- ments, ruled by governors appointed by the central authority, and considerably reduced popular representation. Antonio Bustamante became the first president under it. Bustamante, The French claims set up by the pillage of loreign President, shops in Mexico had, however, remained unsatisfied, 1837, and in 1838 a French fleet blockaded the coast, bombarded the fortress of San Juan de Ulua, off Vera Cruz, and occupied the town. The Mexican government gave way, threatened by Federalist risings and secessions of states, which culminated in 1841. Santa Anna

appeared, nominally as a

mediator, and put forward the bases of Tacubaya (Sept. 28, 1841), abolishing all the Siete Leyes except the part re- Santa Anna lating to the judicial system, arranging for a new Restored, constituent assembly, and reserving for the presi- ,84U dent (himself) full power of re-organizing the

administration. The Centralist government, after a vain at- tempt to defeat him by professing a more thorough Federalism, gave way to force, and Bustamante was allowed to leave the country. But the new Congress was too Federalist for Santa Anna, and he retired, leaving the reins to Nicolas Bravo, under whom a new Centralist constitution was established (1843). This expressly retained the privileges of the clergy and army, and was in some respects more anti-Liberal than that of 1836.

But new complications were now introduced by the question of Texas. Though a state of the Mexican Union, it had been settled from the United States in consequence of a Question. l an d 8 ran t given by the Spanish viceroy to Stephen Austin in 1820, and had been estranged from Mexico partly by the abolition of slavery under a decree of President Guerrero, and partLy by the prospect of the Centralist constitu- tion of 1836. It then seceded. Santa Anna attempted to reduce it, showing great severity, but was eventually defeated and captured by Houston at the battle of San Jacinto, and compelled to sign a treaty recognizing Texan independence, which was disavowed on his return to Mexico. A state of war thus con- tinued nominally between Mexico and its seceded member, whose independence was recognized by England, France and the United States. The slaveholders in the United States favoured annexation of Texas, and pressed the claims due from Mexico to American citizens, partly perhaps with the aim of forcing war. Most of these claims were settled by a mixed commission, with the king of Prussia as umpire, in 1840-1841, and a forced loan was raised to pay them in 1843, which stimu- lated the revolt of Paredes against Sahta Anna, who had returned to power in 1 844. It resulted in Santa Anna's downfall, imprison- ment at Perote and eventual exile (Dec. 1844 to Jan. 1845), and the election of General Jose Joaquin Herrera as president. But Herrera was displaced

in the last days of 1845 by a pronun- ciamiento in favour of Paredes, who undertook to uphold the national rights against the United States, and who was elected president on the 3rd of January 1846. Texas had meanwhile applied for admission into the American Union. The annexa- tion, rejected in 1844 by the United States Senate, was sanctioned on the 1st of March 1845, and carried out on the 22nd of December 1845. The Mexican minister withdrew from Washington, and both sides made active preparations for war.

The United States forces were ordered by President Polk to advance to the Rio Grande in January 1846. They established a War with depot at Point Ysabel (behind the opening of Brazos United Santiago), and erected a fort in Texan territory, com- ststes, manding Matamoros, on the Mexican side of the Rio Grande. This provoked the Mexican forces into a defensive invasion of Texas, to cut the American communications with Point Ysabel. They were, however, defeated at Palo Alto (May 8) and Resaca de la Palrna (May 9). There was an out- burst of warlike feeling in the United States (with a counter- movement in the North), and an invasion of Mexico was planned by three routes — from Matamoros towards Monterey in New Leon, from San Antonio de Bexar to Chihuahua, and from Fort Leavenworth to New Mexico. Importance attaches chiefly to the movements of the first force under General Zachary Taylor. During the war preparations President Paredes, suspected of intriguing to overthrow the Republic and set up a Spanish prince, had to give place to his vice-president Bravo, who in his turn gave way before Santa Anna, who was hastily recalled from his exile at Havana to assume the presidency and the conduct of the war (Aug. 1846). He was allowed by the American squadron blockading Vera Cruz to pass in without hindrance. Probably it was thought his presence would divide the Mexicans.

The preparations of the United States took some months. It was not till the 5th of September 1846 that General Zachary Taylor could leave his depot at Camargo on the Rio Grande,

and march on Monterey. It was taken by assault on the 23rd of September; Santa Anna was defeated at Buena Vista (near Saltillo) on the 23rd of February 1847, and .forced back on San Luis Potosi. New Mexico was occupied without opposition; Chihuahua was occupied, but not held, owing to the difficulties in maintaining communications; and Upper California was seized in the autumn of 1846 by John C. Fremont, who had been exploring a route across the continent, and by the United States Pacific squadron, and made secure by the aid of the New Mexico expedition. But as Mexico still con- tinued to fight, it was determined to reach the capital via Vera Cruz. That city was taken by

General Scott after a siege and bombardment (March 7 to 29, 1847) ; and after winning the battle of Cerrogordo (April 18), and a long delay at Puebla, Scott marched on Mexico City, stormed its defences against greatly superior forces, and effected an entrance after severe fighting on the 13th of September 1847. This virtually ended the war; Santa Anna was deprived of his command, and the treaty of Guadalupe Hidalgo, concluded on the 2nd of February 1848, ceded to the United States Texas, New Mexico and Upper California, in return for a payment of p£a”a>° $15,000,000 by the United States to Mexico, and the assumption of liability by it for the claims of its subjects which it had hitherto been pressing against Mexico. This payment was doubtless intended to strengthen the United States’ title to the conquered territory. It is generally admitted that Mexico was provoked into aggression in order that additional territory might be available for the extension of slavery.

The American forces were withdrawn in May and June 1848 after the ratification of the treaty by Mexico. Under the presi- dency of Herrera (1848-1851) attempts were made to Herrera, restore order and the public credit. An arrangement President, was effected with English holders of Mexican stock; t848 ‘iSSl. an attempt was made to carry out- a consolidation of the internal debt, which failed; the army was reduced and reorganized, and the northern frontier was defended by military colonies, formed partly of civilized Seminole Indians from the United States. But the financial situation was desperate; the federal revenue, mostly from customs — which were evaded by extensive smug- gling — was not half the expenditure; and Indian revolts in Yucatan (1847-1850) and in the Sierra Gorda had added to the strain. Arista succeeded Herrera as president (Jan. 185 1), but resigned (Jan. 1853).

After a sort of interregnum (Jan.March 1853) Santa Anna was recalled (by a vote of the majority of the states under the Plan of Arroyozarco, on the 4th of February 1853, the result SantaAnna of a pronunciamiento), and made dictator in the in Power, interests of federation. His measures, partly in 1 SS3 1854. spired by an able Conservative leader, Lucas Alaman, proved strongly Centralist: one is especially noteworthy, the establish ment of the ministry of ” fomento,” or encouragement to public works, education, and intellectual and economic development, which is a conspicuous aid to Mexican welfare to-day. He also negotiated (at the end of 1853) the sale of the Mesilla valley (now Arizona) to the United States, but the purchase money- was soon dissipated. On the 16th of December 1853 Santa Anna issued a decree making himself dictator, with the title of serene highness. On the 1st of March 1854, at Ayutla in Guerrero, a

section of the army under Colonel Villareal proclaimed the Plan of Ayutla, demanding Santa Anna's depo- sition and the establishment of a provisional government to secure a new constitution. Among the leaders in the movement were Generals Alvarez and Comonfort, and it is said that Porfirio Diaz, subsequently president, then a young soldier, made his way to Benito Juarez, then in prison, and arranged with him the preliminaries of the revolt. It spread, and Santa Anna left the country (Aug. 1854). 1

Two filibustering expeditions at this time — one by William Walker, afterwards notorious in Nicaragua, in Lower California

1 Santa Anna tried to get back to politics in Mexico afw Maximilian's fall, without success. He was amnestied with other exiles in 1874, and died in obscurity in 1876.

Benito Juarez.

(Dec. 1853), the other by Count Raousset de Boulbon in Sonora (July 1854) — added to the general disorder.

The provisional president, General Carrera, proving too Cen- tralist, was replaced by Alvarez (Sept. 24, 1855), two of whose ministers are conspicuous in later history — Ignacio Comonfort, minister of war, and Benito Juarez, minister of finance. Juarez (b. 1806) was of unmixed Indian blood. The son of a Zapotec peasant in a mountain village of Oaxaca, he was employed as a lad by a bookbinder in Oaxaca city, and aided by him to study for the priesthood. He soon turned to the law, though for a time he was teacher of physics in a small local college; eventually went into politics, and did excellent work in 1847 as governor of his native state. Juarez almost immediately secured the enactment of a law (Ley Juarez, Nov. 23, 1855) subjecting the clergy and the army to the jurisdiction of the ordinary courts. " Benefit of clergy " was the curse of Mexico. Officers and soldiers could be tried only by courts-martial, the clergy (including numbers of persons in minor orders, who were practically-laymen) only by ecclesiastical courts. The proposed reform roused the Clericals to resistance. Alvarez gave place (Dec. 8, 1855) to his war minister Comonfort, who represented the less anti-Clerical Liberals. He appointed a commission to consider the question of draining the

valley of Mexico, which adopted the plan ultimately carried out in 1800- 1900; suppressed a Clerical rising in Puebla (March 1856), which was punished by a considerable confiscation of church property; sanctioned a law releasing church land from mortmain, by pro- viding for its sale, for the benefit, however, of the ecclesiastical owners (called after its author Miguel Lerdo de Tejada, brother of the subsequent president), and a new draft constitution, largely modelled on that of the United States (Feb. 5, 1857). The clergy protested violently, and the Plan of Tacubaya (Dec. 17, 1857), which made Comonfort dictator, provided for the construction of a new constitution under his auspices. He was presently displaced by a thorough reactionary, General Zuloaga, and expelled from Mexico early in 1858; and for three years Mexico was a prey to civil war between two rival governments — the Republicans at Vera Cruz under Juarez, who, as Chief Justice of the Supreme Court, succeeded Comonfort; and the reactionaries at the capital. The latter were at first presided over by Zuloaga, who, proving incompetent, was replaced at the end of 1858 by Pezuela, who early in 1859 gave place to Miguel Miramon, a young, able and unscrupulous soldier who was shortly afterwards accepted as ” constitutional ” president by his party. The Juarists were defeated outside the city of Mexico twice, in October 1858 and on the nth of April 1859, On the second occasion the whole body of officers, who had surrendered, were shot with Miramon’s authority, if not by his express orders, together with several surgeons (including one Englishman, Dr Duval) (the fifty-three ” martyrs of Tacubaya “)• This atrocity caused great indig- nation in Mexico and abroad: the reactionists were divided; their financial straits were extreme, as the Juarists held all the chief ports. Juarez was recognized by the United States, and allowed to draw supplies of arms and volunteers thence; and in July 1859 he published laws suppressing the religious orders, nationalizing ecclesiastical property (of the estimated value of $45,000,000), establishing civil marriage and registration, trans- ferring the cemeteries to civil control, and, in short, disestablish- ing the church. But the apparent hopelessness of any ending to the conflict, together with the frequent outrages of both parties on foreigners, afforded strong reasons for foreign inter- vention. Early in 1859 President Buchanan had recommended the step to Congress, which did not respond. On the 12th of December 1859 the M’Lean- Juarez treaty was concluded, which gave the United States a sort of disguised protectorate over Mexico, with certain rights of way for railroads over the Isthmus of Tehuantepec and between the Rio Grande and Pacific. The American Senate, however, did not ratify the treaty, and a motion for its reconsideration late in i860 came to nothing, owing to the approach of the War of Secession. When

Napoleon III. was in captivity at Ham he dreamed of

Miramon.

a Central America civilized and opened up to modern enterprise by a transoceanic canal: and the clerical refugees in Paris, among them Labastida, archbishop of Mexico, easily influenced the Empress Eugenie, herself a Spaniard, to interest her hus- band in the cause of centralized monarchy and the church: it is said that even in 1859 they had thoughts of setting up the Archduke Maximilian as ruler of Mexico.

The question of a joint intervention of Great Britain, France, Spain and Prussia was mooted between those powers in i860. Early in 1859 the outrages on British subjects had overthrow caused the British minister to break off diplomatic of Miramon, relations. Forced contributions had been levied by 186 °- both sides on goods or bullion, being European property, the reactionaries being the worst offenders; and there were numerous cases of murder and robbery of Europeans. At last, on the 17th of November i860, Miramon, under the plea of necessity, seized $630,000 in specie which had been left under seal at the British Legation and was intended for the bondholders. On the 22nd of December i860 his forces were routed by the Juarist general Ortega at Arroyozarco, and his government was over- thrown.

Juarez entered Mexico City on the nth of January 1861. He soon found that his government was held responsible to Europe for the excesses of its rival as well as its own. Miramon's govern- ment had violated the British Legation; the Spanish minister, the papal legate and the representatives of Guatemala and Ecuador were expelled from the country for undue interference on behalf of the reactionaries; the payments of the European British loan were suspended by Juarez's Congress in Jnterven- July 1 86 1 ; and various outrages had been committed tion ' t86i% on the persons and property of Europeans for which no redress could be obtained. The French charge d'affaires, Dubois de Saligny, who had been sent out in November i860, urged French intervention, and took up the Jecker claims. Jecker, a Swiss banker settled in Mexico, had lent Miramon's government in 1859 $750,000 (subject, however, to various deductions): in return, Miramon gave him 6 % bonds of the nominal value of $1 5,000,000 which were ingeniously disguised as a conversion scheme. Jecker had failed early in i860, Miramon was overthrown a few months later. Jecker's creditors were mostly French, but he still held most of the bonds, and there is reason to believe that he won over Dubois de Saligny by corrupt means to support his claims. Intercepted

correspondence (since confirmed from the archives of the Tuileries) showed that the Due de Morny promised Jecker his patronage in return for 30% of the] profits (De la Gorce, Hist, du Second Empire, IV. c. 1). An imperial decree natural- ized Jecker in France, and Napoleon III. took up his claim. A convention between Great Britain, France and Spain for joint interference in Mexico was signed in London on the 31st of October 1861. A separate arrangement of the British claims was negotiated by Juarez, but rejected by the Mexican Congress, November 1861; and the assistance of the United States with a small loan was declined, Mexican territory being demanded as security. On the 14th of December Vera Cruz was occupied by Spanish troops under General Prim; the French fleet and troops arrived soon after, with instructions to seize and hold the Gulf ports and collect the customs for the three Powers till a settlement was effected; Great Britain sent ships, and landed only 700 marines. In view of the unhealthiness of Vera Cruz, the convention of Soledad was concluded with the Mexican government, permitting the foreign troops to advance to Orizaba and incidentally recognizing Mexican independence. But as the French harboured leaders of the Mexican reactionaries, pressed the Jecker claims and showed a disposition to interfere in Mexican domestic politics, which lay beyond the terms of the joint convention, Great Britain and Spain withdrew their forces in March 1862.

More troops were sent from France. Their advance was checked by Zaragoza and Porfirio Diaz in the battle of Cinco de Mayo, on the 5th of May 1862; and in September of that year 30,000 more French troops arrived under General Forey. Wintering at Orizaba, they recommenced their advance

(Feb. 17, 1863), besieged and reduced Puebla, and entered Mexico City on the 7th of June. A provisional government of Mexicans, Preach nominated directly or indirectly by Dubois de Expedition, Saligny, adopted monarchy, offered the crown to 1862-63. Maximilian of Austria, brother of the Emperor Francis Joseph, and should he refuse, left its disposal to Napoleon III. Maximilian, after some difficulty as to renouncing his right of succession to the throne of Austria, accepted the crown Maximilian subject to the approval of the Mexican people, and Emperor, reached Mexico city on the 12th of

June 1864. Juarez * • meanwhile had set up his capital, first in San Luis

Potosi, then in Chihuahua. The new empire was unstable from the first. Before Maximilian arrived the provisional government had refused to cancel the sales of confiscated Church lands, as the clericals demanded. When he came, a host of new difficulties arose. A new loan, nominally of about eight millions sterling, but yielding little more than four, owing to discount and com- mission, was raised in Europe, but no funds were really available for its service. Maximilian carried the elaborate etiquette of the court of Vienna to Mexico, but favouring toleration of Protestantism, and the supremacy of the Crown over the Church, he was too liberal for the clericals who had set him up. As a foreigner he was unpopular, and the regiments of Austrians and Belgians which were to serve as the nucleus of his own army were more so. His reforms, excellent on paper, could not be carried out, for the trained bureaucracy necessary did not exist. For a time he nominally held sway over about two-thirds of the country — roughly, from lat. 18° to 23 , thus excluding the extreme north and south. Oaxaca city, under Porfirio Diaz, 1 capitulated to Bazaine — who had superseded the too pro-clerical Forey in October 1864 — in February 1865, an d by the autumn of that year the condition of the Juarists in the north seemed desperate. But the towns asked for permanent French garrisons, which were refused, as weakening their own power of self-defense. Instead, the country was traversed by flying columns, and the guerillas dealt with by a French service of ” contre-guerilla,” who fought with much the same savagery as their foes. Directly the French troops had passed, Republican bands sprang up, and the non-combatant Mexicans, to save themselves, could only profess neutrality. Yet on the 3rd of October 1865, Maximilian, misled by a false report that Juarez had left the country, issued a decree declaring the Juarists guerillas, who, whenever captured, were to be tried by court- martial and shot. Mexican generals on both sides had done as much. But Maximilian’s decree prepared his own fate.

The American Civil War ended in the spring of 1865, and a strong popular feeling was at once manifested in favour of asserting the Monroe doctrine against Maximilian’s government. In the summer there were threatening movements of United Maximilian States troops towards the Rio Grande; early in 1866 deserted by Napoleon III. announced his intention of withdrawing France. jjj s f orces . in response to a note of Seward, the United States secretary of state, of the 12th of February 1866, he was induced to promise their return by three instalments — in November 1866, March and November 1867. Maximilian now turned for support to the Mexican clericals;

meditated abdication, but was dissuaded by his wife Charlotte, the daughter of Leopold I. of Belgium (and ” the better man of the two,” as he had once jestingly said), who went to intercede for him with the emperor of the French. Finding him obdurate, she went on to appeal to the pope; while at Rome she went mad (end of September 1866).

Maximilian had meanwhile drawn nearer to the clericals and farther from the French, and, to protect French interests, Napoleon III. had decided to send out General Castelnau to supersede Bazaine, arrange for the withdrawal of the French forces in one body, and restore the Republic under Ortega, who had quarrelled with Juarez, and was therefore, of all republicans, least unacceptable to the clericals. But fearing the prospect, they induced Maximilian, who had retired to Orizaba for his

1 Diaz refused parole, and was confined at Puebla for some months, but made his escape, and was soon in the field again.

health, to remain. He yielded on condition that a congress of all parties should be summoned to decide the fate of the empire. Hereupon he returned to the capital; the Juarist dominion extended rapidly; the French troops left (in one body) on the 5th of February 1867, and shortly after Maximilian took com- mand of the army at Queretaro. Here, with Miramon, he was besieged by the Juarists under Escobedo, and the garrison, when about to make a last attempt to break out, was betrayed 2 by Colonel Lopez to the besiegers (May 15, 1867). Execution of Maximilian, with the Mexican generals Miramon and Maximilian, Mejia, was tried by court-martial, and, refusing (or ,867 – neglecting) to avail himself of various opportunities of escape, was convicted on charges which may be summarized as rebellion, murder and brigandage, on the 14th of June, and shot, with Miramon and Mejia, on the 19th of June 1867, despite many protests from European governments and prominent individuals, including Garibaldi and Victor Hugo. (An effort to save him made by the U.S. Government was frustrated by the dilatoriness of the U.S. Minister accredited to Juarez’s Government.) After considerable difficulty with the Republican Government, his body was brought to Europe.

Meanwhile Porfirio Diaz had captured Puebla (April 2) and besieged Mexico City, which fell on the 21st of June. The last anti- Juarist stronghold (Inayarit) submitted on the 20th of July 1867. A good deal of discontent existed pˆ“a eat among the republican rank and file, and Juarez’s election in October to the presidency was opposed by Diaz’s friends, but without success. But so soon as Juarez was elected, insurrections broke out, and brigandage prevailed throughout the

following year. There were unsuccessful insurrections also in 1869 (clerical) and 1870 (republican), but an amnesty, passed on the 13th of October 1870, helped to restore peace; trouble again arose, however, at the 1871 election, at which the candidates were Juarez, Sebastian Lerdo de Tejada and Diaz. Juarez's continued re-election was regarded as unconstitutional, and no party obtaining a clear majority, the matter was thrown into Congress, which elected him. Diaz's supporters refused to recognize him, and a revolution broke out, which went on sporadically till Juarez's death on the 1 8th. of July Death of 1872. Sebastian Lerdo de Tejada, as president of Juarez, the Supreme Court, succeeded him, and amnestied ,872 – the rebels, but made no further concessions. In the next year, however, laws were passed repeating in a stronger form the attacks of 1857 on the supremacy of the Church, and prohibiting monastic life. The first day of 1873 was marked by the opening of the Vera Cruz & Mexico railway. Protestant A dmlnls- missions established themselves (with some opposi- tration of tion) in the country, and diplomatic relations were Lerdo de renewed with France and Spain (1874). But towards Te}ada – the close of Lerdo de Tejada's term he was suspected of aiming at a dictatorship, and Diaz, whom he had proscribed, made prepara- tions for a rising, then retiring to Texas. At the beginning of 1876 the revolution broke out in Oaxaca with the plan of Tuxtepec, which was adopted by Diaz, and proclaimed as the plan of Palo Blanco (March 21). Diaz's attempt to raise the north, however, failed, and, trying to reach Vera Cruz by sea, he was recognized on the steamer, and recaptured while attempt- ing a four-mile swim ashore. The purser, however, made it appear that he had again jumped overboard, concealed him for some days — generally inside one of the saloon sofas — and helped him to get ashore in disguise at Vera Cruz. He then escaped to Oaxaca and raised a force. Lerdo was declared re-elected, but was overthrown by Diaz after the battle of Tecoac (Nov. 16, 1876) and forced into exile (Jan. 1877), and Diaz was declared president on the 2nd of May PorfMo 1877. A law forbidding the re-election of a presi- Diaz dent till four years had elapsed from his retirement President, from office was passed in the autumn of that year. 1S77 '

2 Lopez said he acted as Maximilian's agent, but his story rested on an alleged letter from Maximilian which was discredited as a forgery. The evidence of his treason was published in El National of Mexico, Sept. 11, 1887.

INDEPENDENT MEXICO]

MEXICO

Diaz's first presidency (1870-1880) was marked by some unsuccessful attempts at revolution notably by Escobedo from Texas in 1878, and by a more serious conspiracy in 1879. Diplomatic relations were resumed with Spain, Germany, Italy and some South American states (1877), and France (1880). There were some frontier difficulties with the United States, and with Guatemala, which revived a claim dropped since 1858 to a portion of the state of Chiapas; and there was considerable internal progress, aided by a too liberal policy of subsidies to railways and even to lines of steamships. The boundary questions were settled under President Gonzalez (1880-1884); relations with Great Britain were renewed in 1884. The claims of the railways, however, necessitated retrenchment on official salaries, and the president's plan for conversion of the debt roused unexpected and successful opposition in an ordinarily sub- servient Congress. At the end of 1884 Porfirio Diaz was again elected president, and was continually re-elected, the constitution being modified expressly to allow him to continue in office.

The history of Mexico from 1884 to 1910 was almost void of political strife. President Diaz's policy was to keep down disorder with a strong hand; to enforce the law; to under Diaz. f° ster railway development and economic progress; to develop native manufactures by protective tariffs; to introduce new industries, e.g. the production of silk and wine, of coca and quinine; to promote forestry; to improve elementary and higher education — for all which purposes the Ministerio del Fomento is a potent engine; to encourage coloniza- tion; and, above all, to place the national credit on a sound basis. The first step in this process was a settlement of the Financial British debt by direct arrangement with the bond- reorganiza- holders. In 1 890 the Spanish bondholders' claims tion. were satisfactorily arranged also. In 1891 the tariff

was made more protectionist. In 1893 the depreciation of silver necessitated stringent retrenchment; but the budget balanced for the first time during many years, the floating debt was converted, and a loan raised for the completion of the Tehuan tepee Railway. After 1896 substantial annual surpluses were spent in reducing taxation and in the extinction of debt. In 1895 the 6% external debt was converted into a 5% debt, the bonds of which remained at a premium for 1902; in 1896 the alcabalas or interstate customs and municipal octrois were abolished, and replaced in part by direct taxation and increased stamp duties.

The institution by Diaz of the guardias rurales, a mounted gendarmerie composed of the class who in former days drifted Pacification into revolution and brigandage, was a potent means ofthe of maintaining order, and the extension of railways Country. anc j t e i e g ra phs enabled the government to cope at once with any disturbance. The old local revolutions practi- cally disappeared. In 1886-1887 there were some disturbances in Coahuila, New Leon, Sinaloa and Tamaulipas; subsequently hardly anything was heard of such disorders except on the Texan frontier, where in 1890 Francisco Ruiz Sandoval and in 1891 Catarino Garza made incursions into Mexico. Occasionally the Church gave trouble — the presence of foreign priests was complained of; attempts to evade the law prohibiting conventual life were detected and foiled (1891, 1894); and there were Indian risings, repressed sometimes with great severity, among the Mayas of Yucatan, whose last stronghold was taken in 1891, and the Yaquis of Sonora (1899-1900). Under federal and democratic forms, Diaz exercised a strictly centralized and personal rule. He was invited to approve the candidates proposed for state governorships; in all law cases affecting the Government or political matters the judges asked his opinion; he drafted bills, and discussed their text with individual members and committees of congress. Similarly, the state legislatures, as well as the judges and municipal officers, were actually or virtually selected by the state governors, who were practically agents of the president. Now and then the old passions broke out: in September 1898 an absurd attempt to assassinate President Diaz was made by a countryman named Arroyo, but discontent with Diaz's rule was apparently confined

to a small minority. 1 In 1909 indeed there were some disquieting symptoms. Owing to Diaz's age the vice-presidency had been revived in 1904, and Don Ramon Corral elected to it; but at the elections of 1909 a movement arose in favour of replacing him by General Bernardo Reyes, Governor of Nuevo Leon, but he was disposed of by an official commission to study the military systems of Europe. It was, therefore, regarded as certain that, should President Diaz die in office, Senor Corral would succeed him without serious difficulty.

In foreign affairs the rule of Diaz was uneventful. There were transient disputes with the United States (1886, 1888). In 1888-1890 and 1894-1895 a boundary dispute with Guatemala became serious. But Guatemala Affair" gave way at the threat of war (Jan. 1895) and a new treaty was made (April 1, 1895). Again in 1907 there was some friction owing to the murder of a Guatemalan ex-president by a compatriot in Mexico: later in the year, however, the Mexican government was active in stopping a war between its Central

American neighbours. In the difficulty between England and the United States over the Venezuelan boundary (Dec. 1895) Mexico expressed strong adherence to the Monroe doctrine in the abstract, and suggested that its maintenance should not be left wholly to the United States, but should be undertaken by all American Powers. The first Pan-American congress met in Mexico City in 1901, and the country was represented at the second, held in Rio Janeiro in 1906. Mexico also took part in establishing the permanent Central American Court of Arbitra- tion, inaugurated on the 25th of May 1908 at Cartago, Costa Rica, under the Washington treaties of December 1907, and showed readiness to associate herself with the Government of her great northern neighbour in preserving peace among the Central American States. On the 17th of October 1909 President Taft and President Diaz exchanged visits at the frontier at El Paso, Texas.

In brief, under President Diaz's rule the history of Mexico is mainly economic. In the six financial years 1 893-1 894 to 1899-1900 inclusive the yield of the import duties increased by upwards of 80%; the revenue from j^^fj" stamps over 60%, though the duties were reduced; the postal revenue from 1895-1896 to 1899-1900 rose 60%; the telegraph revenue over 75%. Again, in 1 898-1 899 the total ordinary revenue of the state was £6,013,921; in 1906- 1907 it had increased to £11,428,612, or by more than 90%, and though 1907-1908 was a year of depression its total revenue (£h, i 77j i 86) exceeded that of any year save its immediate predecessor. The great drainage scheme which completed the works of the 17th century by taking out the surplus waters of the southern lakes of the valley of Mexico was devised in 1856, begun under Maximilian, proceeded with intermittently till 1885, then taken up with improved plans, practically completed by 1896, and inaugurated in 1900; 2 the harbour of Vera Cruz was finished in 1902; the Tehuantepec railway, likely to prove a formidable rival to any interoceanic canal, was opened on the 24th of January 1906. All three were the work of an English firm of contractors, the head of which was Sir Weetman Pearson. American, and later Canadian, capital and enterprise have also been very largely concerned in the development of the country; and its progress was not permanently interfered with by the great earthquakes of April 1907 and July 1909 at Acapulco, and the floods in August 1909 at Monterey. In 1891 elementary education was reorganized, and made compulsory, secular and gratuitous. Great attention has been paid to higher education, and — at least in the hospitals — to modern sanitation and hygiene.

Authorities. — For English readers the standard work is H. H. Bancroft, Collected Works (Histories of the Pacific States, Centra!

America, &c, vols, x.-xiv. (Mexico, 1521-1887) with vols, xv., xvi.

1 Don Augustin Iturbide, grandson of the emperor, godson and (perhaps) at one time the destined heir of Maximilian, was turned out of the army and imprisoned in 1890 for abusing President Diaz.

2 For a full account of the works see J. B. Body in Proceedings of the Institution of Civil Engineers, cxliii. 286, sqq.

(Texas), and vol. xvii. (New Mexico, &c.)- Mention may also be made of Gaston Routier's Histoire de Mexique (1895). Standard Mexican authorities are: C. M. de Bustamante, Quad.ro historico de la revolution mexicana, 6 vols. (Mexico, 1832-1846); Lucas Alaman, Historia de Mexico (Mexico, 1849-1852); N. de Zamacois, Historia de Mexico desde sus tiempos mas remotos hasta nostras dias, 19 vols. (Barcelona, 1876-1882); J. E. Hernandez y Davalos, Colec- cion de documentos para la historia de la Independencia (Mexico, 6 vols). A huge and informative illustrated work, edited by Justo Sierra (3 vols, large 4to), sumptuously produced and badly translated, is Mexico, its Social Evolution (Barcelona, 1900-1904) ; a useful and handy chronicle is Nicolas Leon's Compendio dela historia general de Mexico hasta el ano de 1900 (Mexico and Madrid, 1902). For the colonial period, Alexander . v. Humboldt, Essai politique sur la royaume de la Nouvelle Espagne (Paris, 181 1, 2 vols., and atlas; also an English translation). For the war with the United States see R. S. Ripley, The War with Mexico (New York, 1849) ; E. D. Mans- field, The Mexican War (New York, 1849); and Winfield Scott's Memoirs. For Maximilian, the Blue-books on Mexican affairs contained in Accounts and Papers (presented to parliament), vol. lxv. 1862, and vol. lxiv. 1863, are valuable; E. de Keratry, La Creance Jecker; I'empereur Maximilien, son elevation et sa chute (translated into English by Venables) ; La Contre-guerilla francaise au Mexique, are specially noteworthy; Prince Felix Salm-Salm's Diary gives valuable information as to Maximilian's decline and fall. Also Dela Gorce, His- toire du second empire, vols. iv. v.; J. F. Domenech, L'Empire mexi- cain (Mexico, 1866), and Le Mexique tel qu'il est (Paris, 1867) ; Daran, El General Miguel Miramon (in French) (Rome, 1886) ; Schmidt von Tavera, Gesch. d. Regierung d. Kaisers Maximilian I. (Vienna, 1903). Ulick Ralph Burke's Life of Benito Juarez (London, 1894) is of con- siderable value and interest. For the period since 1887 information in English must be sought chiefly in magazine articles: Matias Romero, " The Garza Raid and its

Lessons," North American Review (Sept. 1892); Don Agustin Iturbide, "Mexico under Diaz, " ibid. (June 1894); Romero, "The Philosophy of Mexican Revolutions," ibid. (Jan. 1896) ; and C. F. Lummis, " The Awakening of a Nation " (New York, 1898, previously in Harper's Magazine), are valuable as giving information (especially the last named) and points of view. Van Dyke, " Politics in Mexico," Harper's Magazine (1885), vol. Ixxi., gives particulars of the opposition to Gonzalez's debt conver- sion scheme of 1884. President Diaz's message of November 1896, giving an account of his stewardship from 1884 to that year, has been translated into French {Rapport du General Porfirio Diaz . . . d, ses compatriotes sur les actes de son administration, &c), edited by Auguste Genin (Paris, 1897). The early constitutions of the Republic have been published (in Spanish) in three volumes; a study of that of 1857 by B. Moses (of the University of California) is in the Annals of the American Academy of Political Science, II. i. 1891. Various books, chiefly American, have been written on Mexico of late years from a tourist's standpoint. Mrs Alec Tweedie's Mexico as I saw it (London, 1901) and Life of Porfirio Diaz (1906) contain valuable information personally obtained from good authorities in Mexico. See also Percy F. Martin, Mexico of the Twentieth Century, 2 vols. (London, 1907) ; and C. R. Enock, Mexico (1909). (J. S. Ma.)

MEXICO, a state of the republic of Mexico, bounded N. by Hidalgo, E. by Tlaxcala and Puebla, S. by Morelos and Guerrero, and W. by Michoacan. Pop. (1900), 934,468, largely Indian. Area, 9247 sq. m., a large part of which lies within that great depression of the Mexican plateau known as the Valley of Mexico. Enclosed within its boundaries, except on the south, is the Federal District and capital city of Mexico with an area of 463 sq. m., which is not included in that of the state. The state is divided into two unequal parts by the Sierra de Ajusco and Montes de las duces, which form a wooded ridge across it from east to west, with a general elevation of about 10,000 ft. above sea-level, or about 2500 above the plateau level. These ranges are part of a broken irregular chain which sometimes bears the name of Anahuac. A considerable part of the northern plateau consists of a broad plain, once the bed of a great lake but now coveted with swamps, sodden meadows and lakes. The surrounding country drains into this depression, but an arti- ficial outlet has been created by the opening of the Tequixquiac tunnel. Beyond its margin the plateau drains westward to the Pacific through the Lerma, aVid north-east to the Gulf through the San Juan and Panuco. South of the Sierra de Ajusco the country is roughly mountainous and drains to the Pacific through tributaries of the Balsas. Within the lacustrine de- pression of

the north are the lakes of Zumpango, San Cristobal, Xaltocan, Chalco, Xochimilco, and Texcoco, the latter three lying partly or wholly in the Federal District. Texcoco has the lowest level and its water is brackish and undrinkable, though that of the streams flowing into it and of the other lakes is sweet.

Lake Xochimilco is celebrated for its ” floating gardens ” or chinampas (see Mexico, Federal District of). The principal industries of the state are agricultural, and the principal pro- ducts are cereals, sugar, maguey (from which ” pulque ” is made), coffee, and fruit. Stock-raising has also had a profitable development, owing to the proximity of the national capital. The manufacturing industries are important; among the manufactures are cotton and woollen fabrics, flour, dairy pro- ducts, glass-ware, pottery, bricks, wines and spirits. The making of ” pulque ” from the sap of the maguey plant {Agave americana) is the chief industry of the state, and the product is exported in large quantities to the national capital. The state is traversed by the Central, National, Mexican International and Interoceanic railways, and by short lines from the national capital to neighbouring towns. The capital is Toluca, and other important towns are Zumpango (pop. 5942 in 1900), 30 m. N. of the national capital, Tenango del Valle (5881 in 1900), 15 m. S.E. of Toluca, and Lerma (estimated, 7200), near the western frontier of the state.

MEXICO, a city and the county-seat of Audrain county, Missouri, U.S.A., N.E. of the centre of the state, and about no m. N.W. of St Louis. Pop. (1890), 4789; (1900), 5099, including 948 negroes and rn foreign-born; (1910), 5939. It is served by the Chicago & Alton, the Chicago, Burlington & Quincy, and the Wabash railway systems. Mexico is the seat of Hardin College and Conservatory of Music (Baptist, 1873), for young women, an institution founded and endowed by Charles H. Hardin (1820-1892), governor of the state in 1872- 1874, and of the Missouri Military Academy (1889). The city is situated in the blue grass region of Missouri, and is a ohipping- point for horses and mules. Among the manufactures are flour, shoes and fire-clay products. Mexico was laid out as ” New Mexico ” in 1836, and became the county-seat under its present name in 1837. It was incorporated as a town in 1855, was entered by the Wabash road in 1858 and by the Alton in 1872, and was first chartered as a city in 1874.

MEXICO CITY, capital of the Republic of Mexico and chief town of the Federal District, near the southern margin of the great central plateau of Mexico, in lat. 19 25′ 45″ N., long. 99 7′ W. It is about 200 m. in a direct line W. by N. of Vera Cruz, its nearest port on the Gulf of

Mexico, with which it is connected by two railway lines, one of which is 264 m. long; and about 181 m. in a direct line N.N.E. of Acapulco, its nearest port on the Pacific, with which it is connected partly by rail and partly by a rough mountain trail (the camino real) to the coast. Pop. (1900), 344,721.

The city stands on a small plain occupying the south-western part of a large lacustrine depression known as the Valley of Mexico {El Valle de Mixico), about 3 m. from the western shore of Lake Texcoco, whose waters once covered a considerable part of the ground now occupied by the city. The Valley, including the drainage basin of Lake Zumpango, has an area of 2219 sq. m. (1627 sq. m. without that basin). The elevation of the city above sea-level is 7415 ft., only a few feet above the level of Lake Texcoco. The general elevation of the Valley is about 7500 ft., that of Lake Zumpango being 7493 ft., and of Lake Chalco 7480 ft. The rim of the Valley is formed by spurs of the transverse cordillera on the north and south sides — the Sierra de Guadalupe (650 to 750 ft. above the city) on the north, and the Sierra Nevada with its snow-clad peaks of Popocatapetl and Ixtaccihuatl farther away to the south-east— and by a part of the Sierra de Ajusco, known as the Montes de las Cruces, from which the greater part of the city's water supply is derived. Lake Texcoco {Tezcoco or Tezcuco) is a compara- tively shallow body of brackish water, with an area of about 11J sq. m., and is fed by a number of small streams from the neighbouring mountains, and by the overflow of the other lakes. Its shores are swampy and desolate and show considerable belts of saline incrustations with the fall in its level. The Aztecs settled there because of the security afforded by its islands and shallow waters — their city, Tenochtitlan, being so completely surrounded by water that a handful of warriors could easily

defend its approaches against a greatly superior force. The Chako and Xochimilco lakes, 8 or 9 m. to the southward, which are separated by a narrow ridge of land, are connected with the lower part of the city by an artificial canal, called " La Viga," 16 m. long and 30 ft. wide, which serves as an outlet for the overflow of those lakes and as a waterway for the natives who bring in flowers and vegetables for sale. Lake Xochimilco, celebrated for its chinampas, or " floating gardens" (see Mexico, Federal District of), is supplied very largely by fresh-water springs opening within the lake itself, which the city has partially diverted for its own water supply. Lake Chalco is also greatly

reduced in size by railway fillings and irrigation works, to the great distress of the natives who have gained their living by fishing in its waters since long before the Spanish conquest.

The climate of the city is temperate, dry and healthful. The temperature ranges from a minimum of 35° F. in winter to a maximum of 79° in summer. The winter range is 35 to 68°, and the summer 50° to 79°. The nights are always cool. The year is divided into a wet and dry season, the former from April to September, the latter from October to March. The rainfall, however, is light, about 20 to 25 in., but, with the assistance of irrigation, it serves to sustain a considerable degree of cultivation in the neighbourhood of the city. The health of the city, unfortunately, does not correspond with its favourable climatic conditions. With a wet, undrained subsoil and a large population of Indians and half-breeds living in crowded quarters, the death-rate has been notoriously high, though the completion of the Valley drainage works in 1900, supplemented by under- ground sewers in the better parts of the city, and by better sanitation, have recently improved matters. The annual death- rate per 1000 was 54 per 1000 for the Federal District in 1901, 50 in 1902, 48 in 1903, 46 in 1904, and 56 in 1905; the increase for the last-mentioned year being due to an epidemic of typhus fever.

The city is laid out with almost unbroken regularity and is compactly built — the streets running nearly with the cardinal points of the compass. The new and better residence sections are on the western side; the poorer districts are on the eastern side nearer the swampy shores of Lake Texcoco. As the name of a street changes with almost every block, according to the old Spanish custom, a list of street names is sometimes mistakenly accepted as the number of continuous thoroughfares in the city, so that it has been said that Mexico has 600 to 900 streets and alleys. An attempt was made in 1889 to rename the streets — all running east and west to be called avenidas, all running north and south calles, and all continuous thoroughfares to have but one name — but the people clung so tenaciously to the old names that the government was compelled to restore them in 1907. Outside the Indian districts of the eastern and southern out- skirts, the streets are paved with asphalt and stone, lighted with electricity and gas, and served with an efficient street railway service. The political and commercial centre of the city is the Plaza Mayor, or Plaza de la Constitution, on which face the cathedral, national palace, and municipal palace. Grouped about the Plaza de Santo Domingo are the old convent and church of Santo Domingo, the court of the Inquisition now occupied by the School of Medicine, the offices of the Department of Communicaciones, and the old custom-house (aduana).

Close by are the old church of the Jesuits and the mechanics' school (artes y oficios) wath its large and well-equipped shops. Among other well-known plazas are: Loreto, on which faces the great enclosed market of the city; Guardiola, in the midst of hand- some private residences; San Fernando, with its statue of Vicente Guerrero; and Morelos, with its marble statue of the national hero of that name. The Paseo de la Reforma, the finest avenue of the city, is a broad boulevard extending from the Avenida Juarez south-west to Chapultepec, a distance of nearly three miles. At intervals are circular spaces, called "glorietas," with statues (the famous bronze equestrian statue of Charles IV., and monuments to Columbus, Cuauhtemoc the last of the Aztec emperors, and Juarez). Other notable avenues are Bucareli and Juarez,, and the Avenida de la Viga, which skirts the canal of

that name. The principal business streets runs westward from the Plaza Mayor toward the Alameda, and is known as the Calls de los Plateros (Silversmiths' Street) for two squares, Calle de San Francisco for three squares, and Avenida Juarez along the south side of the Alameda to its junction with the Paseo. The Alameda, or public garden, \ m. west of the Plaza Mayor, covers an area of 40 acres, and occupies the site of the old Indian market and place of execution, where occurred the first auto-da- fe in Mexico in 1574.

The great cathedral stands on or near the site of the Aztec temple _ (teocalli) destroyed by Cortes in 1 52 1. The foundations were laid in 1573, the walls were completed in 1615, the roof was finished in 1623, its consecration took place in 1645 and its dedica- tion in 1667, the towers were completed in 1791, and the great church was finished about 181 1. It is 426 ft. in length by 197 ft. in width, and its towers rise to a height of 204 ft. Its general plan is that of a Greek cross, with two great naves and three aisles, twenty side-chapels and a magnificent high altar supported by marble columns and surrounded by a tumbago balustrade with sixty-two tumbago statues carrying elaborate candelabra made from a rich alloy of gold, silver and copper. The elaborately carved choir is also enclosed by tumbago railings made in Macao, weighing 26 tons. The vaulted roof is supported by twenty Doric columns, 180 ft. in height, and the whole interior is richly carved and gilded. The walls are covered with rare paintings. Standing close beside the cathedral is the highly ornamented facade of a smaller church called El Sagrario Metropolitano. The city has about sixty church edifices, including La Profesa, Loreto, Santa Teresa, Santo Domingo and San Hipolito. At the time of the secularization of Church properties there were about 120 religious edifices in the city- churches, convents, monasteries, &c. —

many of which were turned over to secular uses.

The national palace, also on the Plaza Mayor, has a frontage of 675 ft. on the east of the Plaza, and covers a square of 47, 840 sq. yds., or nearly 10 acres. It contains the executive offices of the government and those of five cabinet ministers (interior, foreign affairs, treasury, war and justice), the senate chamber, the general archives, national museum, observatory and meteorological bureau. The palace occupies the site of the residence of Moctezuma, which was destroyed by the Spaniards, and that of Hernando Cortes, which was also destroyed in 1692. It has three entrances on the Plaza, and over its main gateway hangs the " liberty bell " of Mexico, first rung by the humble parish priest Hidalgo, on the night of the 1 6th of September 1810, to call the people of Dolores to arms, and now rung at midnight on each recurring anniversary by the president himself. The national museum, which occupies the east side of the national palace, is rich in Mexican antiquities, among which are the famous " calendar stone," 1 supposed to be of Toltec origin, and the " sacrificial stone " found in the ruins of the great teocalli destroyed by Cortes. Near the cathedral is the monte de piedad, or government pawnshop, endowed in 1775 by Pedro Romero de Terreros (conde de Regla) with £75,000, and at one time carrying on a regular banking business including the issue of bank- notes. Its business is now limited to the issue of small loans on personal property — the aggregate sometimes reaching nearly £50,000 a month. The national library, which has upwards of 225,000 volumes, occupies the old St Augustine Church, dedicated in 1692 and devoted to its present use by Juarez in 1867. It contains an interesting collectiun of the busts of Mexican celebrities. The academy of San Carlos and school of fine arts (founded in 1778) likewise contains good collections of paintings and statuary.

Among other institutions are the new post office, begun in 1902 and finished in 1907; the Mineria, occupied by the schools of mining and engineering; the military school, occupying a part of the castle of Chapultepec ; the Iturbide palace, now occupied as a hotel ; the Iturbide theatre, occupied by the chamber of deputies, for which a new legislative palace to cost 2,500,000 pesos was under construction in 1909; the new palace of justice; the old mint, dating from 1537; the new penitentiary, completed in 1900; the PanfaSon, with its monuments to the most celebrated Mexicans; the new general hospital ; the jockey club on Plaza Guardiola, a new university (1910) and new school edifices of modern design. The city is likewise generously provided with hospitals and asylums.

The old Spanish edifices were very solidly constructed of stone, and

private residences were provided with iron gates and window guards strong enough to withstand an ordinary assault. Private nouses were also provided with flat roofs {azoteas) and battlements, which gave them great defensive strength, as well as a cool, secluded retreat for their inmates in the evening. The old Moorish style of building about an open court, or patio, prevails, and the living- rooms of the family are on the second floor. The better residences of the old style were commonly of two storeys — the ground-floor being occupied by shops, offices, stables and servants' quarters. The more modern constructions of the Colonia Juarez and other new residence districts are more attractive and pretentious in appearance, but are less solidly built.

' Bandelier thinks it should be called the " Stone of the Sun."

MEXICO CITY

Mexico was formerly one of the worst drained large cities of the New World, its subsoil being permanently saturated and its artificial drainage being through open ditches into the San Lazaro Canal which nominally discharged into Lake Texcoco. The difference in level between the city and the lake being less than six feet and the lake having no natural outlet, typhus fever became a common epi- demic in its lower and poorer sections. The earliest effort to correct this evil was by the Dutch engineer Maartens (Span., Martinez), who planned a deep cutting through Nochistongo Hill, north of the city, to carry away the overflow of Lake Zumpango (7493 ft. elevation) to the river Tula, a tributary of the Panuco. The cutting was 13 m. long and is known as the Tajo de Nochistongo. It was begun in 1607 — a year when the city was completely flooded— but was not completed until 1789, and then it was found that the city was still subject to partial inundations, although an enormous sum of money and 70,000 lives of Indian labourers had been expended upon it. The worst inundation in the history of the city occurred in 1629, when its streets were covered to a depth of 3 ft. and remained flooded until 1634. In 1856 President Ignacio Comonfort invited tenders for drainage works conditional on the use of waste waters for irrigation purposes, and the plan executed consists of a canal and tunnel 43 m. long, starting from the east side and 4J ft. below the mean level of the city and running north to Zumpango and thence eastward into a tunnel over 6 m. long, which discharges into a small tributary of the Panuco river near the village of Tequixquiac. The greatest depth of the tunnel is 308 ft. below the surface. The works were inaugurated in 1900.

For the water supply the Aztecs used the main causeway through their city as a dam to separate the fresh water from the hills from the brackish water of Texcoco, and obtained drinking water from a spring at the base of the hill of Chapultepec. The Spaniards added three other springs to the supply and constructed two long aqueducts to bring it into the city. Three other sources were added during the 19th century, and in 1899-1900 steps were taken to secure a further supply from the Rio Hondo. Besides these there are 1 1 public and 1375 private artesian wells in the city. All these sources are estimated to yield about 220 to 230 litres per head.

Considerable attention has always been given to education in Mexico, but in colonial times it was limited in scope, and to the dominant classes. The old university of Mexico, with its faculties of theology, law and medicine (founded 1 55 1 and inaugurated 1553), ceased to exist in 1865 and was succeeded by schools of engineering, law and medicine, which have been signally successful. The government also maintains schools of agriculture, commerce, fine arts, music, pharmacy, technology, and an admirable preparatory or high school, besides a large number of primary and secondary schools for which modern school buildings have been erected. Normal and industrial schools for both sexes are maintained, the latter (artes y oficios) performing a very important service for the poorer classes. In 1908 there were 353 government schools in the city, including 13 professional and technical schools, and nearly 200 private schools. There are also several scientific organizations and societies. The Mexican Geographical Society (Sociedad mexi- cana de geografia y estadistica), founded in 1833, has rendered invaluable services in the work of exploration and publication; there are also the Geological Society, the Association of Engineers and Architects, and the Society of Natural History.

Through lack of water-power and cheap fuel Mexico has never been rated as a manufacturing city. However, the development of electric power, and the possibility of transmitting it for long dis- tances, have worked a noteworthy change in this respect, and a large number of industries have been added in recent years. The largest of these electric-power plants is on the Necaxa and Tenango rivers, in the state of Puebla, 92 m. from the city, which is designed to furnish 40,000 horse-power for industrial and lighting purposes, and a duplicate plant was decided upon in 1904. Another plant is in the suburb of San Lazaro, the current being distributed by over 100 m. of underground mains in the city and many miles of overhead wires in its outskirts and suburbs. Other plants are at San Iidefonso, 12 m. distant, and on the Churubusco river, 16 m. south. According to a British consular

report for 1904 there were 153 manufacturing establishments in the city producing cotton, linen and silk textiles, leather, boots and shoes, alcohol and alcoholic beverages, beer, flour, conserves and candied fruits, cigars and cigarettes, Italian pastes, chocolate, starch, hats, oils, ice, furniture, pianos and other musical instruments, matches, beds, ca'hdles, chemicals, iron and steel, printing-type, paint and varnish, glass, looking-glass, cement and artificial stone, earthenware, bricks and tiles, soap, cardboard, papier mache, cartridges and explosives, white lead, perfumery, carriages and wagons, and corks. To these should be added the foundries and iron-working shops which add so much to the prosperity of modern Mexico. Perhaps the most important of these manufactories are the cotton mills, of which there are 13, and the cigar and cigarette factories, of which there are 10. In the suburbs, oils, chemicals, cigarettes and bricks are made at Tacuba; cotton textiles at Contreras, San Angel and Tlalpam; paper and boots at Tacubaya, and bricks at Mixcoac and Coyoacan. A little farther away are the woollen mills of San Iidefonso, the paper-mills of San Rafael, and important •works for the manufacture of railway rolling stock.

The railway connexfons include direct communication with one port on the Gulf coast and with two on the Pacific — lines were under construction in 1909 to two other Pacific ports — and indirect communication with two on the Gulf. The Mexican and Inter- oceanic lines connect with Vera Cruz, the Mexican Central with Manzanillo, via Guadalajara and Colima, and the Vera Cruz & Pacific (from Cordoba) with the Tehuantepec line and the port of Salina Cruz. The last-mentioned line also gives indirect connexion with the port of Coatzacoalcos, and the Mexican Central, via San Luis Potosi, with Tampico. A southern extension of the Mexican Central, via Cuernavaca, has reached the Balsas river and will be extended to Acapulco, once the chief Pacific port of Mexico and the dep6t for the rich Philippine trade. A Mexican extension of the (American) Southern Pacific which has been completed from Nogales to Mazatlan is to be extended to Guadalajara, which will give the national capital direct communication with the thriving ports of Mazatlan and Guaymas. In addition to these, the Mexican Central and Mexican National, now consolidated, give communicaton with the northern capitals and the United States, and the Mexican Southern runs southward, via Puebla, to the city of Oaxaca. These railways, with the shorter lines radiating from the city, connect it with nearly all the state capitals and principal ports.

The population by the census of 1900 was 344,721 — an increase of 14,947 over the returns of 1895. The great majority of the inhabitants is composed of Indians and half-breeds, from whom come the factory

workers, labourers, servants, porters and other menial wage-earners. In former times Mexico was overrun with mendicants (pordioseros), vagrants and criminals (rateros), and the ” Portales de las Flores ” on the east of the Plaza Mayor was a favourite ” hunting-ground ” for them because of its proximity to the cathedral; but modern conditions have largely reduced this evil. The foreign population includes many capitalists and in- dustrial managers who are doing much to develop the country, the American colony being concentrated in a fine modern residential district on the south-western side of the city.

History. — The City of Mexico dates, traditionally, from the year 1325 or 1327, when the Aztecs settled on an island in Lake Texcoco. The Aztec name of the city was Tenochtitlan, derived either from Tenoch, one of their priests and leaders, or from tenuch, the Indian name for the ” nopal,” which is associated with its foundation. The modern name is derived from Mexitli, one of the names of the Aztec god of war Huitzilopochtli, which name was later on applied also to the Aztecs themselves. The island settlement, which was practi- cally a lake-village built on islets — some of them undoubtedly artificial, and perched on stakes — grew rapidly with the in- creasing power and civilization of its inhabitants, who had the remains of an earlier civilization (Tula, Teotihuacan, Cholula, and other older towns) to assist in their development. About the middle of the 15th century their mud-and-rush dwellings were partly replaced by stone structures, grouped around the central enclosure of the great teocalli, and bordering the cause- ways leading to the mainland. The town had reached its highest development when the Spaniards appeared in 1519, when it is said to have had, including suburban towns, a total of 60,000 dwellings, representing about 300,000 inhabitants. It was at that time about 12 m. in circumference, everywhere intersected by canals, and connected with the mainland by six long and solidly constructed causeways, as shown in the plan given in the edition of Cortes’s letters published at Nuremberg in 1524 (reproduced in vol. i. of H. H. Bancroft’s History of Mexico, San Francisco, 1883, p. 280). Allowance should be made for the habit of exaggeration among the Spanish adventurers of that time, and also for the diplomacy of Cortes in magnifying his exploits to win the favour of his king. The truth is, without doubt, that the dwellings of the lower classes were still built of reeds and mud, and covered the greater part of the city’s area, otherwise it is impossible to understand how a mere handful of Spanish soldiers, without tools and explosives, could so easily have levelled it to the ground. After its almost total destruction in November 1521, Cortes employed some 400,000 natives in rebuilding the city on its former site. Since then the lake has decreased greatly in

extent, its area being reduced to n| sq. m. and its shore-line being more than 3 m. distant from the city it once surrounded. During Spanish rule the only break in the ordinary course of events was the revolt of 1692, which resulted in the destruction of the municipal buildings. The city was not much disturbed by the struggle for independence,

but it was afterwards the scene of many a revolution until the dictatorial authority of Porfirio Diaz put an end to petty pronunciamentos and partisan intrigues.

In the war between Mexico and the United States the most decisive campaign was that of General Winfield Scott directed against the Mexican capital. With the advanced guard of an army of about 10,000 men he arrived on the 10th of August 1847 at Ayolta, on the national road 16 m. south-east of the city; but as the approaches from this direction were very strongly fortified he cut a new road southward along the eastern shore of Lake Chalco and westward along the southern shore of lakes Chalco and Xochimilco to San Augustin, where his army arrived on the 17th and 18th of August. The city was now 10 m. distant by a direct road to the northward, but as the village of San Antonio, only 3 m. ahead, was strongly fortified, another short detour was made to the westward by cutting a road through a field of broken lava. This movement brought the Americans to the hill of Contreras, which was held by General Valencia with a force of some 7000 and 22 pieces of artillery, while President Santa Anna was in the neighbourhood with reinforce- ments numbering 12,000 or more. The Mexicans were routed on the morning of the 20th of August after suffering heavy losses. San Antonio was easily taken about noon of the same day, and in the afternoon the main division of the Mexican' army was driven from the stone church and intrenchments at Churubusco. Three days later General Scott agreed to an armistice, but Mexico rejected the terms of peace, and hostilities were resumed on the 7th of September. During the armistice the American troops were quartered in and about the village of Tacubaya, about 2J m. west by south of the city. Near Tacubaya, on the north by west, were some massive stone build- ings known as El Molino del Rey, or the King's Mill, When attacked by the Americans under the immediate command of General W. J. Worth in the early morning of the 8th of September these buildings were defended by more than 10,000 Mexicans under Generals Leon, Alvarez and Perez, and they were captured only after a

most desperate fight, which cost the Americans 787 killed and wounded and the Mexicans at least 2000 killed, wounded, and prisoners. To enter the city by way of the Tacubaya causeway it was still necessary for the Americans to capture Chapultepec. This hill, defended by about 4000 Mexicans under General Nicolas Bravo, was bombarded on the 1 2th of September, and was carried by assault on the 13th. On the following day the City of Mexico surrendered. It was then occupied by the American army under General Winfield Scott, and held by them until the signing of the treaty of Guadalupe-Hidalgo (May 1848).

The French intervention of 1861 led to a second occupation by a foreign power — a French military force under General Forey taking possession in June 1863. Maximilian, archduke of Austria, was crowned emperor of Mexico in the cathedral in June 1864, and held possession of the capital until the 21st of June 1867, when it was captured by General Porfirio Diaz. Earthquake shocks are of frequent occurrence, but the city rarely suffers any material damage. The great earthquake shocks of the 30th and 31st of July 1909, however, caused considerable damage in the city, and a few lives were lost.

For further description see H. H. Bancroft, History of Mexico (6 vols., San Francisco, 1883); Robert S. Barrett, Standard Guide to the City of Mexico and Vicinity (Mexico, 1900) ; Thomas A. Janvier, The Mexican Guide (5th ed., New York, r| i8go) ; D. Charnay, Ancient Cities of the New World (Eng. ver., New York, 1887); and the Piano de la ciudad de Mexico, in the Diccionario enciclopedico hispano-americano (Barcelona, 1893), xii. 740.

MEXICO, FEDERAL DISTRICT OF, a territory set apart for the independent and exclusive use of the Mexican Federal Government, occupying the south-eastern part of the Valley of Mexico, and taken from and lying within the State of Mexico, which forms its boundaries on all sides except the south where it touches the state of Morelos. Pop. (1900), 540,478, largely Indian and half-breeds; area, 463 sq. m., or accordingly to later com- putation 1498! sq. kilom. (578! sq. m.). The district is very irregular in outline, its greatest length (N.W. to S.E.) being 30 m.,

and its greatest breadth 25 m. It was formerly divided into one urban municipality and four rural prefectures, but under the law of the 26th of March 1903 it is divided into 13 municipalities, Mexico, Guadalupe-Hidalgo, Atzcapotzalco, Tacuba, Tacubaya, Mixcoac, Cuajimalpa, San Angel, Coyoacan, Tlalpam, Xochimilco, Milpa Alta and Ixtapalapa; the first of these comprises the national capital and its

immediate suburbs, and the other 12 the unequal divisions of the district with a considerable number of towns and villages. Indians and half-breeds form more than one- half of the rural population engaged in agriculture and gardening, beside which there is a large percentage employed in manufac- turing industries. The government of the district is exercised by the national executive in accordance with the organic law of 1903, though some measure of popular government is vested in municipal councils (ayuntamientos) elected by popular vote for terms of four years. These councils have lost much of their original legislative character, but they must be consulted in matters of local importance, such as water supply, sanitary works, and the exploitation or sale of municipal property, and in regard to all contracts affecting the municipality. They can veto by a two-thirds vote the execution of any contract ‘or administrative project, which then, at the end of four months, if again vetoed must be taken before the President of the Republic for adjudication. The administrative officers, who are appointed by the national executive, consist of a governor of the federal district, the director general of public works, and the president of the superior board of health. The three form a superior council of district government which exercises a supervisory and advisory power, ” revising, confirming, reforming or revoking the acts of each one of the members of the council, whenever these acts are called in question.” The council also exercises a general supervision of the making of contracts. The governor represents the national government, and has special charge of the fire and police departments, prisons, imposition of penalties for violation of ordinances, public diver sions and festivities, civil registry, street traffic, inspection of weights and measures, and the sale of intoxicating liquors. The director-general of public works has special charge of the water supply, streets and roads, parks, monuments, public lighting, drainage, street cleaning, public buildings not under federal control, cemeteries, slaughter-houses and markets, building operations, and all municipal or communal property. The president of the superior board of health has charge of all sanitary works, general sanitary inspection, the sanitary adminis- tration of markets, slaughter-houses and cemeteries, and the introduction of meats from other localities. The government of the district is copied, in part, from that of the District of Columbia in the United States, but its citizens are not dis- franchised. They elect the ayuntamientos, which exercise no slight influence in local affairs, and, like any state, elect senators and deputies to the National Congress.

The principal towns of the district, some of which are merely suburbs of the capital, are Guadalupe, Tacubaya, Tlalpam and Xochimilco.

Within the municipal limits of Mexico City are Chapultepec, Santa Anita and the hot springs of El Pefion, which are popular suburban resorts easily reached by the ordinary urban tramway service. Chapultepec (Grasshopper Hill) is an isolated rock nearly 200 ft. high surrounded by a beautiful park and sur- mounted by a fortified structure called the ” Castle,” containing the summer residence of the president and the national military school. A finely graded road leads to the summit. The park contains a grove of old cypress trees (Taxodium distichum, called ” ahuehuetes ” by the natives), one of which is 45 ft. in circum- ference and nearly 200 ft. high. The hill is nearly 3 m. south-west of the city and once commanded one of its principal causeway approaches. It was assaulted and captured by the American forces under General Winfield Scott on the 13th of September 1847, after a stubborn resistance. A monument to the cadets of the military school who died in this battle stands in the park. The castle, which was built by the viceroys, was greatly embellished by the emperor Maximilian, who planned for it the drive known as the Paseo de la Reforma. Of the neighbouring towns Guadalupe or Guadalupe-Hidalgo (pop. 5834 in 1900), i\ m. north by east from Mexico City, near the shore of Lake Texcoco, is chiefly known for its shrine to Our Lady of Guadalupe, who is said to have appeared there to the Indian Juan Diego in 1531. The shrine stands on the

principal plaza and is visited by many thousands of pilgrims during the year, whose pious contributions have so enriched the church that its sacred vessels, altar-rails, candelabra and other accessories are estimated to contain fifty tons of silver. The treaty of peace between Mexico and the United States was signed here on the 2nd of February 1848. Tacubaya (pop. 18,342 in 1900), on the lower slopes of the Montes de las Cruces, about 5 m. west-south-west of the city, with which it is connected by rail, is noted for its fine old residences and beautiful gardens. The National Astronomical Observatory occupies a fine modern edifice. At Popotla is an aged tree under which, according to tradition, Cortes sat and wept after his terrible retreat from the Aztec capital on the noche trisie. Farther south on the lowest slopes of the mountain range are San Angel and Tlalpam, the latter (pop. 4732 in 1900) standing partly on the plain 12 m. south by west of the capital. In both much attention is given to floriculture, and both are favourite country residences of the richer citizens. Xochimilco (field of flowers), (pop. 10,712 in 1900) on the west shore of the lake of that name and 10 m. south by east of the city, is an Indian town dating

long before the discovery of America. It lies in the midst of a fertile plain devoted to the production of fruit, vegetables and flowers for the city markets. Its gardens are carried out on the shallow lake by floating masses of water-plants covered with soil and secured by poplar stakes, which, taking root, soon surround them with living boundaries. These remarkable and productive gardens, called chinampas, have so increased in number and extent that the lake is practically covered by them, with the exception of the waterways, which are kept open by scooping up mud from the bottom. From the lake a broad canal runs northward to the eastern suburbs of the city. It is known as the Viga, and is believed to have been opened by the Aztecs for the transportation of garden produce to their island capital.

MEXICO, GULF OF, a mediterranean gulf almost surrounded by the coasts of the United States and Mexico, and forming the northern division of the extension westward of the west Atlantic trench (see Atlantic Ocean) . Its southern boundary is defined by the partly submerged ridge which extends eastwards from the peninsula of Yucatan, and on which the island of Cuba is situated: to the east it communicates directly with the Atlantic by the Strait of Florida. On the western side of Yucatan a southerly embayment is formed by the Gulf of Campeachy. The United States coast closely follows the parallel of 30° N., while the parallel of 20 N. cuts across the Gulf of Campeachy: the greatest length — Vera Cruz to. Florida — is 11 20 m., and greatest width — Galveston to Campeachy — 680 m. The total area is approximately 716,000 sq. m.

The deepest part of the Gulf of Mexico, the so-called ” Sigsbee ” deep, lies below the line of 2000 fathoms, between 23° and 255° N., and 845° to 95° W. It is widest to the west, where the breadth is about 120 m., and narrows to 25 m. at its greatest depth (2 1 19 fathoms) between 86° and 88° W., widening again to some 80 m. farther eastward. The continental shelf is for the most part narrow: its breadth is 6 m. at Cape Florida, 120 m. along the west coast of Florida, 10 m. at the south pass of the Mississippi, 130 m. near the boundary of Texas and Louisiana, and 15 m. off Vera Cruz. The shores are low, sandy and marshy, the coast-line being frequently doubled by lagoons. There are no islands except the ” Keys ” of Florida and Yucatan, and Cuba. The tides in the Gulf of Mexico are of comparatively small range (springs rarely exceed 4 ft. and neaps 25 ft.), but a remarkable feature is the exaggeration of the diurnal inequality to such an extent as almost to extinguish the semi-diurnal tide in the inner parts of the gulf, giving high and low water only once daily. The mean level of the water in the Gulf of Mexico was formerly given as about 40 in. above that of mean sea-level at New York, but later reports on precise

levellings from New York to Biloxi through St Louis describe it vaguely as ” some- what higher.” The current movement in the Gulf of Mexico consists of a rotational movement in the direction of the hands of a watch, the branch of the equatorial current which enters the Caribbean Sea passing into the Gulf by the Strait of Yucatan and issuing from it by the Strait of Florida as the Gulf Stream, which unites with the remainder of the northward moving water, forming the Antilles current.

From March to September the prevailing winds are the north- east trades; these undergo considerable modification on account of the configuration of the surrounding land, and the rains ‘ which accompany them are interrupted by spells of calm thick

weather, and rarely by northerly winds known as Norte’s del hueso Colorado and Chocolateros. In the colder dry season, from October to April, the climatic situation is dominated by the relatively high temperature of the surface of the gulf, causing a cyclonic inflow of air which is associated with the strong northerly winds or ” northers ” prevailing on the western side, more particularly along the Mexican coast. The northers sometimes blow with terrific force and are at times accompanied by rain. The form and position of the Gulf of Mexico exercise a profound influence on the climate of the whole of the southern and south-eastern states of the Union, and indeed of the greater part of North America. (H. N. D.)

MEYER, CHRISTIAN ERICH HERMANN VON (1801-1869), German palaeontologist, was bom at Frankfort-on-the-Main, on the 3rd of September 1801. In 1832 he issued a work entitled Palaeologica, and in course of time he published a series of memoirs on various fossil organic remains: mollusca, Crustacea, fishes and higher vertebrata. His more elaborate researches were those on the Carboniferous amphibia, the Permian reptiles, the Triassic amphibia and reptiles, and the reptiles of the Lithographic slates; and the results were embodied in his great work Zur Fauna der Vorwelt (1845-1860), profusely illustrated with plates drawn on stone by the author. He was associated with W. Dunker and K. A. Zittel in the publication of the Palaeontographica, which began in 1851. He was awarded the Wollaston medal by the Geological Society of London in 1858. He died on the 2nd of April 1869.

MEYER, HEINRICH AUGUST WILHELM (1800-1873), German Protestant divine, was born at Gotha on the 10th of January 1800. He studied theology at Jena, and eventually became (1841) pastor, member of the consistory, and super- intendent at Hanover. He died

on the 2 1st of June 1873. He is chiefly noted for his valuable Kritischexegetischer Komptentar zum Neuen Testament (16 vols.), which began to appear in 1832, was completed in 1859 with the assistance of J. E. Huther, Friedrich Dtisterdieck and G. K. G. Liinemann, and has been translated into English. New editions have been undertaken by such scholars as A. B. Ritschl, B. Weiss, H. Wendt, K. F. G. Heinrici, W. Beyschlag and F. A. E. Sieffert.

Meyer also published an edition of the New Testament, with a translation (1829) and a Latin version of the symbolical books of the Lutheran Church (1830).

He is not to be confounded with Johann Friedrich von Meyer (1772-1849), the senator of Frankfort, who published a translation of the Bible in 1819 (Die heilige Schrift in berichtigter Ubersetzung mit kurzen Anmerkungen; 2nd ed., 1823 ; 3rd ed., 1855).

MEYER, JULIUS LOTHAR (1830-1895), German chemist, was born on. the 19th of August 1830, at Varel in Oldenburg. He was the son of a physician, and went to study medicine first at Zurich University in 1851, and then, two years later, at Wiirzburg, where he had R. Virchow as his teacher in pathology. The influence of C. F. W. Ludwig, under whom he studied at Zurich, decided him to devote his attention to physiological chemistry, and therefore he went, after his graduation (1854), to Heidelberg, where R. Bunsen held the chair of chemistry. There he was so influenced by G. R. Kirchhoff's mathematical teaching that he took up the study of mathematical physics at Konigsberg under F. E. Neumann. In 1859 he became privat-docent in physics and chemistry at Breslau, where in the preceding year he had graduated as Ph. D. with a thesis on the action of carbon monoxide on the blood. In 1866 he accepted a post in the School of Forestiy at Neustadt-Eberswalde, but soon moved to Carlsruhe Polytechnic. During the Franco-German campaign the Poly- technic was used as a hospital, and he took an active part in the care of the wounded. Finally, in 1876, he became professor of chemistry at Tubingen, where he died on the nth of April 1895. His name is best known for the share he had in the periodic classification of the elements. He noted, as did J. A. R. New- lands in England, that if they are arranged in the order of their atomic weights they fall into groups in which similar chemical and physical properties are repeated at periodic intervals; and in particular he showed that if the atomic weights are plotted

as ordinates and the atomic volumes as abscissae, the. curve obtained presents a series of maxima and minima, the most electro-positive elements appearing at the peaks of the curve in the order of their atomic weights. His book on Die modernen Theorien der Chemie, which was first published in Breslau in 1864, contains a discussion of relations between the atomic weights and the properties of the elements. In 1882 he received from the Royal Society, at the same time as D. J. Mendeleeff, the Davy medal in recognition of his work on the Periodic Law. A younger brother, O. E. Meyer, became professor of physics at Breslau in 1864.

MEYER, KONRAD FERDINAND (1825-1898), Swiss poet and novelist, was born at Zurich on the nth of October 1825. After studying law at the university, he went for considerable periods to Lausanne, Geneva and Paris, and in Italy interested himself in historical research. In 1875 he settled at Kilchberg near Zurich, was created in 1880 a doctor philosophiae honoris causa by that university, and died at Kilchberg on the 28th of Novem- ber 1898. After Gottfried Keller, Konrad Meyer is the most important Swiss poet of modern times, though as a novelist he was perhaps more successful. His poetical works include Balladen (1867); Romanzen und Bilder (1870); the epic poem, Huttens letzte Tage (1871); and Gedichte (1882; 20th ed., 1901). Among his novels must be specially mentioned Jiirg Jenatsch (1876; 20th ed., 1894); Der Schuss von der Kanzel (1878); Der Heilige (1880; 12th ed., 1894; English by M. von Wendheim, Thomas a Becket, the Saint, 1885); Die Richterin (1885); Die Versuchung des Pescara (1887); Angela Borgia (1891). His shorter stories were collected in two volumes in 1885 (5th ed.,

1892).

See A. Reitler, Konrad Ferdinand Meyer (1885); Lina Frey, K. F. Meyer's Gedichte und Novellen (1892) ; K. E. Kranzos, K. F. Meyer (1899) ; A. Frey, K. F. Meyer (1900) ; H. Kraeger, K. F. Meyer: Quellen und Wandlungen seiner Gedichte (1901); B. Meyer, K. F. Meyer in der Erinnerung seiner Schwester (1904) ; Briefwechsel zwischen Luise von Francois und K. F. Meyer, herausg. von A. Bettelheim (1905); A. Langmesser, K. F. Meyer (1905).

MEYER, [MARIE] PAUL HYACINTHE (1840-), French philologist, was born in Paris on the 17th of January 1840. He was educated at the Ecole des Chartes, and in 1863 was attached to the manuscript department of the Bibliotheque Nationale. In 1876 he became professor of the languages and literatures of southern Europe at the College de France. In 1882 he was made director of the Eco'le des

Chartes, and a year later was nominated' a member of the Academy of Inscriptions. He was one of the founders of the Revue critique, and a founder and the chief con- tributor to Romania (1872). Paul Meyer began with the study of old Provengal literature, but subsequently did valuable work in many different departments of romance literature, and ranks as the chief modern authority on the French language. He is the author of Rapports sur les documents manuscrits de I'ancienne litterature de la France conserves dans les bibliotheques de la Grande Bretagne (1871); Recueil d'anciens textes bas-latins, provencaux et franqais (2 parts, 1874-1876); Alexandre le Grand dans la litera- ture francaise du moyen dge (2 vols., 1886). He edited a great number of old French texts for the Societi des anciens textes jrancais, the SociUi de Vhistoire de France and independently. Among these may be mentioned Aye d' Avignon (1861), with Guessard; Flamenca (1865) ; the Histoire of Guillaume le Marechal (3 vols., 1892-1902); Raoul de Cambrai (1882), with A. Longnon; Fragments d'une vie da Saint Thomas de Cantorbery (1885); Guillaume de la Barre (1894).

MEYER, VICTOR (1848-1897), German chemist, was born at Berlin on the 8th of September 1848, and studied at Heidelberg University under R. W. Bunsen, H. F. M. Kopp, G. R. Kirchhoff and H. L. F. Helmholtz. At the age of twenty he entered J. F. W. A. Baeyer's laboratory at Berlin, attacking among other problems that of the composition of camphor. In 1871, on Baeyer's recommendation, he was engaged by H. von Fehling as his assistant at Stuttgart Polytechnic, but within a year he left to succeed J. Wislicenus at Zurich. There he remained for thirteen years, and it was during this period that he devised his

well-known method for determining vapour densities, and carried out his experiments on the dissociation of the halogens. In 1882, on the death of W. Weith (1844-1881), professor of chemistry at Zurich University, he undertook to continue the lectures on benzene derivatives, and this led him to the discovery of thiophen. In 1885 he was chosen to succeed Hans Hiibner (1837-1884) in the professorship of chemistry at Gottingen, where stereo- chemical questions especially engaged his attention; and in 1889, on the resignation of his old master, Bunsen, he was appointed to the chair of chemistry in Heidelberg. He died on the 8th of August 1897. In recognition of his brilliant experimental powers, and his numerous contributions to chemical science, he was awarded the Davy medal by the Royal Society in 1891.

MEYERBEER, GIACOMO (1791-1863), German composer, first known as Jakob Meyer Beer, was born at Berlin on the 5th of September

1791, 1 of a wealthy and talented Jewish family. His father, Herz Beer, was a banker; his mother, Amalie (nie Wulf), was a woman of high intellectual culture; and two of his brothers distinguished themselves in astronomy and literature. He studied the pianoforte, first under Lauska, and afterwards under Lauska's master, Clementi. When seven years old he played Mozart's Concerto in D Minor in public, and at nine he was pronounced the best pianist in Berlin. For composition he was placed under Zelter, and then under Bernard Weber, director of the Berlin opera, by whom he was introduced to the Abbe Vogler. Vogler invited him to Darmstadt, and in 1810 received him into his house, where he formed an intimate friendship with Karl Maria von Weber, who also took daily lessons in counterpoint, fugue and extempore organ-playing. At the end of two years the grand duke appointed Meyerbeer composer to the court. His first opera, Jephtha's Gelubde, failed lamentably at Darmstadt in 1811, and his second, Wirth und Gast (Alimelek), at Vienna in 1814. These checks discouraged him so cruelly that he feared he had mistaken his vocation. Nevertheless, by advice of Salieri he determined to study vocalization in Italy, and then to form a new style. But at Venice he was so captivated by Rossini that, renouncing all thought of originality, he produced a succession of seven Italian operas — Romilda e Costanza, Semiramide ricono- sciuta, Eduardo e Cristina, Emma di Resburgo, Margherita d'Anjou, L'Esule di Granata and // Crociato in Egitto — which all achieved a success as brilliant as it was unexpected. Against this act of treason to German art Weber protested most earnestly; and before long Meyerbeer himself grew tired of his defection. An invitation to Paris in 1826 led him to review his position dispassionately, and he came to the conclusion that he was wasting his powers. For several years he produced nothing in public; but, in concert with Scribe, he planned his first French opera, Robert le Diable. This gorgeous spectacle was produced at the Grand Opera in 183 1. It was the first of its race, a grand romantic opera, with situations more theatrically effective than any that had been attempted either by Cherubini or Rossini, and with ballet music such as had never yet been heard, even in Paris. Its popularity exceeded all expectations; yet for five years Meyerbeer appeared before the public no more.

His next opera, Les Huguenots, was first performed in 1836. In gorgeous colouring, rhetorical force, consistency of dramatic treatment, and careful accentuation of individual types, it is at least the equal of Robert le Diable. In two points only did its interest fall short of that inspired by the earlier work. Meyerbeer had shown himself so eminently successful in his treatment of the supernatural

that one regretted the omission of that element; and, more important still, the fifth act proved to be an anti-climax. The true interest of the drama culminates at the close of the fourth act, when Raoul, leaping from the window to his death, leaves Valentine fainting upon the ground. The opera now usually ends at the fourth act.

After the production of Les Huguenots Meyerbeer spent many years in the preparation of his next greatest works — L'Africaine and Le Prophete. The libretti of both these operas were furnished

1 Or, according to some accounts, 1794.

by Scribe; and both were subjected to countless changes; in fact, the story of L'Africaine was more than once entirely rewritten.

Meanwhile Meyerbeer accepted the appointment of kapell- meister to the king of Prussia, and spent some years at Berlin, where he produced Ein Feldlager in Schlesien, a German opera, in which Jenny Lind made her first appearance in Prussia. Here also he composed, in 1846, the overture to his brother Michael's drama, Struensee. But his chief care at this period was bestowed upon the worthy presentation of the works of others. He began by producing his dead friend Weber's Euryanthe, with scrupulous attention to the composer's original idea. With equal unselfishness he procured the acceptance of Rienzi and Der fliegende Hollander, the first two operas of Richard Wagner, who, then languishing in poverty and exile, would, but for him, have found it impossible to obtain a hearing in Berlin. With Jenny Lind as prima donna and Meyerbeer as conductor, the opera flourished brilliantly in the Prussian capital; but the anxieties materially shortened the composer's life.

Meyerbeer produced Le Prophete at Paris in 1849. I n 1854 he brought out L'Eloile du nord at the Opera Comique, and in 1859 Le Pardon de Ploermel (Dinorah). His last great work, L'Ajri- caine, was in active preparation at the Academie when, on the 23rd of April 1863, he was seized with a sudden illness, and died on the 2nd of May. L'Africaine was produced with pious attention to the composer's minutest wishes, on the 28th of April 1865.

Meyerbeer's genius was criticized by contemporaries with widely different results. Mendelssohn thought his style exagger- ated; Fetis thought him one of the most original geniuses of the age; Wagner

ungratefully calls him ” a miserable music-maker,” and ” a Jewish banker to whom it occurred to compose operas.” The reality of his talent has been recognized throughout all Europe; and his name will live so long as intensity of passion and power of dramatic treatment are regarded as indispensable characteristics of dramatic music. But his work shows that these qualities, with the aid of an experienced stage-writer, may be entirely independent of genuine musical insight.

MEYNELL, ALICE CHRISTIANA (1850-), English poet and essayist, was the daughter of T. J. Thompson. Her early life was spent chiefly in Italy, and she was educated by her father. Her first volume of verse, Preludes (1875), illustrated by her sister Elizabeth, afterwards Lady Butler, attracted little public notice, but the delicacy and beauty of the poems and especially of the sonnet ” Renunciation,” were warmly praised by Ruskin. She married in 1877 the well-known Roman Catholic journalist and author Wilfrid Meynell, who became proprietor and editor of the Weekly Register. Under W. E. Henley’s editorship she wrote regularly in prose for the National Observer, and also later for the Pall Mall Gazette, the Saturday Review, &c. Her Poems (1893), including much of the earlier volume of Preludes, brought her at last more definitely before the public; and this was followed in 1901 by another slender book of delicate verse, Later Poems. Mrs Meynell also showed herself a fine critic of poetry by her admirable selection, The Flower of the Mind (1897), an anthology of English verse. She edited the Selected Poems (1894) of T. G. Hake, the Poetry of Pathos and Delight (1896) of her intimate friend Coventry Patmore, and the selections from Patmore in the ” Muses’ Library.” Her prose essays, remarkable for fineness of culture and peculiar restraint of style, appeared in successive volumes as The Rhythm of Life (1893), The Colour of Life and other Essays (1896), The Children (1897), and The Spirit of Place (1898). Later books are London Impressions (1898) and The Work of John S. Sargent (1903).

See W. Archer, Poets of the Younger Generation (1902).

MEYR, MELCHOIR (1810-1871), German poet, novelist and philosopher, was born at Ehringen on the 28th of June 1810, and died at Munich on the 22nd of April 1871. He read law and philosophy at Heidelberg and Munich. His greatest success was the Erzdhlungen aus dem Ries (4th ed. Leipzig, 1892), remarkable as an accurate and sympathetic picture of rural life and

character. He wrote also tragedies (Herzog Albrecht, 1851; Karl der Kuhne, 1862), novels (Vier Deutsche, 1861 ; Ewige Liebe, 1864): and, in later life, philosophical works with a strong religious tendency.

Among these were Emilie (philosophical dialogues, 1863), Die Religion des Geistes (187 1), Die Fortdauer nach dem Tode (1869), Die Religion und ihre jetzt gebotene Fortbildung (187 1), and Gedanken Uber Kunst, Religion und Philosophie (1874). In these works he attempted to develop a Deistic system of philosophy. He was the author of an anonymous work entitled Gesprachs mil einem Grobian (1866).

See Melchior Meyr. Biographisches, Brief e und Gedichte, edited by Graf Bothmer and M. Carriere (Leipzig, 1874).

MEYRIFAB, a small semi-nomad tribe of Africans of Semitic stock, settled on the east bank of the Nile near Berber. Con- trary to Arab custom, it is said they never marry slaves.

MEZERAY, FRANCOIS EUDES DE (1610-1683), French historian, was born at Rye near Argentan, where his father was a surgeon. He had two brothers, one of whom, Jean Eudes, was the founder of the order of the Eudists. Francois studied at the university of Caen, and completed his education at the college of Ste Barbe at Paris. His Histoire de France depuis Faramond jusqu' A Louis le Juste (3 vols., 1643-1651), is a fairly accurate summary of French and Latin chronicles. Mezeray was ap- pointed historiographer of France, and in 1649, on the death of Vincent Voiture, was admitted to the Academie Francaise. His AbregS chronologique (3 vols., 1667-1668) went through fifteen editions between 1668 and 1717; but he did not hesitate in this work to attack the financiers, with the result that his salary as historiographer was diminished by Colbert. Mezeray succeeded Conrart as permanent secretary to the Academie Francaise (1675), and died at Paris on the 10th of July 1683. He trans- lated Grotius's Traite de la religion chretienne (1640), and a Histoire des Turcs depuis 1612 jusqu 1 en 164Q (1650), which is an addition to a continuation of Chalcondyles.

See Daniel de Larroque, Vie de Francois Eudes de Mezeray (1720) ; vol. xiii. of Causeries du lundi by Sainte-Beuve, and Levavasseur's Notice sur les trois freres: Jean Eudes, Francois Eudes, et Charles Eudes (1855).

MEZIERES, PHILIPPE DE (c. 1327-1405), French soldier and author, was born at the chateau of Mezieres in Picardy. He belonged to the poorer nobility, and first served under Lucchino Visconti in Lombardy, but within a year he entered the service of Andrew, king of Naples, who was assassinated in September 1345. In the autumn of that year he set out for the East in the French army. After the battle of Smyrna

in 1346 he was made a knight, and when the French army was disbanded he made his way to Jerusalem. He realized the advantage which the dis- cipline of the Saracens gave them over the disorderly armies of the West, and conceived the idea of a new order cf knighthood, but his efforts proved fruitless. The first sketch of the order was drawn up by him in his Nova religio passionis (1367-1368; revised and enlarged in 1386 and 1396). From Jerusalem he found his way in 1347 to Cyprus to the court of Hugo IV., where he found a kindred enthusiast in the king's son, Peter of Lusignan, then count of Tripoli; bat he soon left Cyprus, and had resumed his career as a soldier of fortune when the accession of Peter to the throne of Cyprus (Nov. 1358) and his recognition as king of Jerusalem induced Mezieres to return to the island, probably in 1360, when he became chancellor. He came under the influence of the pious legate Peter Thomas (d. T366), whose friend and biographer he was to be, and Thomas, who became patriarch, of Constantinople in 1364, was one of the chief promoters of the crusade of 1365. In 1362 Peter of Cyprus, with the legate and Mezieres, visited the princes of western Europe in quest of support for a new crusade, and when the king returned to the east he left Mezieres and Thomas to represent his case at Avignon and in the cities of northern Italy. They preached the crusade throughout Germany, and later Mezieres accompanied Peter to Alexandria. After the capture of this city he received the government of a third part of it and a promise for the creation of his order, but the Crusaders, satisfied by the immense booty, refused to continue the campaign. In June 1366 Mezieres was

sent to Venice, to Avignon and to the princes of western Europe, to obtain help against the Saracens, who now threatened the kingdom of Cyprus. His efforts were in vain ; even Pope Urban V. advised peace with the sultan. Mezieres remained for some time at Avignon,* seeking recruits for his order, and writing his Vita S. Petri Thomasii (Antwerp, 1659), which is invaluable for the history of the Alexandrian expedition. The Prefacio and Epistola, which form the first draft of his work on the projected order of the Passion, were written at this time.

Mezieres returned to Cyprus in 1368, but was still at Venice when Peter was assassinated at Nicosia at the beginning of 1369, and he remained there until 1372, when he went to the court of the new pope Gregory XI. at Avignon. He occupied himself with trying to establish

in the west of Europe the feast of the Presen- tation of the Virgin, the office of which he translated from Greek into Latin. In 1373 he was in Paris, and he was thenceforward one of the trusted counsellors of Charles V., although this king had refused to be dragged into a crusade. He was tutor to his son, the future Charles VI., but after the death of Charles V. he was compelled, with the other counsellors of the late king, to go into retirement. He lived thenceforward in the convent of the Celestines in Paris, but nevertheless continued to exert an influ- ence on public affairs, and to his close alliance with Louis of Orleans may be put down the calumnies with which the Burgun- dian historians covered his name. When Charles VI. freed himself from the domination of his uncles the power of Mezieres increased. To this period of his life belong most of his writings. Two devotional treatises, the Contemplalio horae mortis and the Soliloquium peccatoris, belong to 1386-1387. In 1389 he wrote his Songe du vieil pelerin, an elaborate allegorical voyage in which he described the customs of Europe arid the near East, and advocated peace with England and the pursuit of the Crusade. His Oratio tragedica, largely autobiographical, was written with similar aims. In 1395 he addressed to Richard II. of England an Epistre pressing his marriage with Isabella of France. The Crusade of 1396 inspired Mezieres with no enthusiasm. The disaster of Nicopolis on the 28th of September 1396 justified his fears and was the occasion of his last work, the Epistre lamentable et consolaioire, in which he put forward once more the principles of his order as a remedy against future disasters. Mezieres died in Paris on the 29th of May 1405.

Some of his letters were printed in the Revue historique (vol. xlix.) ; the two epistres just mentioned in Kervyn de Lettenhove's edition of Froissart's Chroniques (vols. xv. and xvi.). The Songe du vergier or Somnium viridarii, written about 1376, is sometimes attributed to him, but without definite proofs.

See Antoine Becquet, Gallicae coelestinorum congregationis monasteria, fundationes .... (1719); the Abbe Jean Lebeuf's Memoires in the Memoires of the Academy of Inscriptions, vols. xvi. and xvii. (1752 and 1753) ; J. Delaville le Roulx, La France en Orient au xiv. Steele (1886-1890) ; A. Molinier, Manuel de bibliographie historique vol. iv. (1904) ; and especially the researches of N. Jorga, published in the Bibliothbque de I kcole des haules etudes vol. no (Paris 1896); and the same writer's Philippe de Mezieres, et la croisade au xiv. siecle (1896). Jorga gives a list of his works and of the MSS. in which they are preserved, and analyses many of them. On the Songe du vergier, see P. Paris, in Memoires vol. xv. (1843) of the Academy of Inscriptions.

MEZIERES, a town of northern France, capital of the department of Ardennes, 55 m. N.E. of Reims by the Eastern railway. Pop. (1906), town, 7007; commune, 9393. The town itself, the streets of which are narrow and irregular, is situated on the neck of a peninsula formed by a loop of the Meuse. The river separates it from its suburb of Arches and the town of Charleville on the north and from the suburb of Pierre on the south. Adjoining Pierre is Mohon (pop. 5874), with metallurgical works. The fortifi- cations of Mezieres, as well as the citadel still dominating the town on the east, were built under Vauban's direction, but were dismantled in 1885 and 1886. Immediately to the east of the citadel runs a canal, which provides river-traffic with a short cut across the isthmus. The parish church (16th cent.) contains inscriptions commemorating the raising of the siege of Mezieres in 1521 and the marriage of Charles IX. with the

daughter of the emperor Maximilian II. (1570). The north and south portals, the Renaissance tower at the west end, and the lofty vaultings, are worthy of remark. The church, which suffered severely in 1870-71, has since been restored. The prefecture and the hotel de ville, which contains several interesting pictures relating to the history of the town, belong to the 18th century. Mezieres is the seat of a prefect and of a court of assizes, and there are manufactures of bicycles, and iron and steel castings for motors, railway- carriages, &c.

Founded in the 9th century, Mezieres was at first only a stiong- hold belonging to the bishops of Reims, which afterwards became the property of the counts of Rethel. The town was increased by successive immigrations of the people of Liege, flying first from the emperor Otto, and afterwards from Charles the Bold; and also by concessions from the counts of Rethel. Walls were built in the 13th century, and in 1521 it was defended against the Imperialists by the Chevalier Bayard, to whom a statue was erected in 1893. The anniversary of the deliverance is still observed yearly on the 27th of September. In 181 5 the Germans were kept at bay for six weeks, and in 1871 the town only capitulated after a bombardment during which the greater part of it was destroyed.

MEZOTCfR, a town of Hungary, in the county of Jasz- Nagykun-Szolnok, 88 m. S.E. of Budapest by rail. Pop. (1900), 25,367. It possesses important potteries. Large herds of cattle are reared on the communal lands, which are productive also of wheat, rapeseed and maize. Several well-attended fairs are held here annually.

MEZZANINE (It. mezzano; Fr. entresol; Ger. Zwischengeschoss) , in architecture, a storey of small height introduced between two lofty

storeys, or sometimes employed to allow of the introduction of two storeys equal together in height to lofty rooms on the same floor.

MEZZOFANTI, GIUSEPPE CASPAR (1 774-1849), Italian cardinal and linguist, was born on the 17th of September 1774, at Bologna, and educated there. He was ordained priest in 1797, and in the same year became professor of Arabic in the university, but shortly afterwards was deprived for refusing to take the oath of allegiance to the Cisalpine Republic. In 1803 he was ap- pointed assistant librarian of the institute of Bologna, and soon afterwards was reinstated as professor of oriental languages and of Greek. The chair was suppressed by the viceroy in 1808, but again rehabilitated on the restoration of Pius VII. in 1814, and continued to be held by Mezzofanti until his removal from Bologna to Rome in 1831, as a member of the congregation de propaganda fide. In 1833 he succeeded Angelo Mai as chief keeper of the Vatican library, and in 1838 was made cardinal and director of studies in the Congregation. He died at Rome on the 1 5th of March 1849. His peculiar talent, comparable in many respects to that of the so-called ” calculating boys,” was not combined with any exceptional measure of intellectual power, and pro- duced nothing of permanent value. It seems certain, however, that he spoke with considerable fluency, and in some cases even with attention to dialectic peculiarities, some fifty or sixty languages of the most widely separated families, besides having a less perfect acquaintance with many others.

See Russell, Life of the Cardinal Mezzofanti (London, 1857); A. Bellesheim, Giuseppe Cardinal Mezzofanti (Wiirzburg, 1880).

MEZZOTINT. During the 19th century two revolutions occurred in the British art of mezzotinto engraving—” la maniere anglaise.” The original defect of the method was the incapacity of the mezzotint ” burr ” on copper to yield as many fine impressions as other forms of engraving. To this defect was attributable the introduction, in 1823, of steel instead of the soft copper previously used — a change which, with the endeavour to avoid technical difficulties, led to the ” mixed style,” or com- bination of mezzotint with etching, and a general departure from the traditional form of the art, ” pure mezzotint ” on copper. The affinity of the method to painting in black and white which differentiates it from other kinds of engraving, and was the dis- tinguishing charm of the mezzotints of the 17th and 18th cen- turies, was for a time lost, but a revival of pure mezzotint on

copper, beginning in 1880 — a return, in fact, to the mode in which the classics of the art were engraved in the time of Sir Joshua Reynolds— was made possible by the invention of steel-facing. By this process engraved copper plates are electroplated with a film of steel, renewable when worn in course of printing; and a mezzotint on copper, so protected, yields more fine impressions than if it had been engraved on steel, whilst the painter-like quality remains unimpaired.

In ” pure mezzotint ” the design is evolved from dark to light entirely by scraping away more or less of the previously laid ” ground,” the original ” burr ” of which is left untouched in the extreme darks, and no acid, etching or line-work is used in it at all. The usual short descriptions of the method are misleading, because they fail to explain that it is the ” ground,” and not the ” burr ” of it only, which is scraped away in greater or smaller degree to produce the varying tones of the design. The necessity of realizing that there are two constituents of the ” ground,” the ” burr ” and the indentations out of which the ” burr ” is raised, will be appre- ciated later. The ” rocking-tool,” with which the ” ground ” is laid, somewhat resembles a carpenter’s chisel, but the blade is 3 in. wide and only about 2| in. long, whilst the cutting edge, instead of being straight, is curved in the segment of a circle. One side of the blade is deeply engraved with lines from edge to handle, and the ridges which remain between these lines form teeth at the cutting edge when the unengraved side of the tool is bevelled as an ordinary chisel is sharpened.

The tools contain from 35 to 120 teeth to each inch of their width, those with the most teeth producing grounds of the finest texture. The operator rocks the curved edge of the tool from side to side on the bare copper plate, causing the tool to travel forward, whilst each tooth makes an indentation in the copper and throws up a corresponding particle of metal, which is called the “burr.” When the whole plate has been so rocked across in 45 to 60 different directions, so that no visible speck of the original bright copper surface remains unfretted by the teeth of the ” rocking-tool,” the “ground” is termed “full” and is ready for scraping the design. The innumerable particles of copper forming the raised ” burr ” give to a ” full ground ” much the appearance of copper-coloured plush, and a print from it, taken before any scraping has been done on it, looks not unlike a piece of black velvet. The lights and semi-tones of the design are produced by subsequent scraping and burnishing.

Assuming that a mezzotint is to be scraped from a lady s portrait by

Sir Joshua Reynolds in which a piece of black drapery crosses a white dress — the engraver begins to work on a previously laid ” ground ” which would print uniformly black before scraping commences. In the extreme darks of the black drapery the raised ” burr ” is left untouched by the ” scraper ” — a two-edged steel instrument resembling an ancient Roman sword-blade in miniature, but having a longer point. Working from dark to light, the engraver produces the varying tones of the folds of the black drapery by scraping the raised ” burr ” down more or less, lower- ing it in fact so that it will not hold so much ink as where it is left untouched in the extreme darks. In the highest lights of the black drapery all the raised ” burr ” will have been removed and the original surface of the plate reached, but as yet the engraver has not produced any tone lighter than middle tint (although he has completely modelled up the black drapery), because the in- dentations out of which the ” burr ” was raised still remain in the plate and hold ink in printing. In order to produce the infinite gradation of delicate tones in the white dress, or in a sky, the scraping is continued, the indentations being thus made shallower in the passages scraped, and therefore less capable of holding ink, whilst they are obliterated almost entirely in the highest lights. When the mezzotint is finished the black drapery will stand higher than the surface of the plate modelled in a relief composed of the raised ” burr,” whilst all the tones of the white dress, from middle tint to pure white, will be so many actual depressions in the plate, the highest lights being the deepest. The speck of light in the eye, for instance, is a pit in the plate, surrounded by a tract of more or less raised ” burr,” which provides the intense black of the pupil and the half-tints of the iris. The difference of surface levels is very appreciable where high-lights impinge on strong darks, but it exists in varying degree all over the plate, and the greatest technical difficulty in pure mezzotint is to obtain adequate ” edge ” and definition, because the tendency is to remove too much ” ground ” from the edges of adjacent darks in the course of the constant scrapings necessary to smooth and polish the depressed lights.

In printing a mezzotint a non-fluid ink is thoroughly worked into every part of the plate, and the superfluities wiped off again, leaving as much ink as possible in the darks, the raised ” burr.” If the bottom of the small lights is not quite smooth, the ink sticks in the roughness and they print dark instead of light, or the printer has to wipe so hard to get the ink out of the depressed lights that he removes too much from the raised darks. In either case loss of definition and contrast of effect results. This inherent difficulty of scraping to a sharp edge caused the use of the ” mixed ” methods.

in which the details were sharpened by outlining them with stipple or line etching.

Mezzotint ss the best form of engraving for completeness of representation, but etching is better adapted for sketching from nature or for the expression of any fleeting idea. The two arts have distinct uses and limitations. The art function pf true etching as practised by Rembrandt lies in economy of expressive line to suggest the artist's meaning, and that of mezzotint in completion of tonality to explain it. Artistic suggestion, which is not inherent in the solid tones of mezzotint, has to be imparted to the work entirely by the free play of the " scraper " on the " ground," much as the painter attains it on canvas with the brush.

The first reputed mezzotint was produced at Amsterdam in 1643 by Ludwig von Siegen, an officer in the service of the Land- grave of Hesse, and an amateur artist; but the work History. was a direct drawing on copper with an instrument of comparative precision resembling the roulette rather than a mezzo- tint, ground laid with the rocking-tool and scraped from dark to light in the present manner of the art. Siegen's innovation was led up to by the previous stipple work of Giulio Campagnola and Janus Lutma; the roulette appears to have been used before his time; and though he shared in the evolution of the rocking-tool, he was not the sole inventor of it. The earliest works referable to the method at the print room of the British Museum afford evi- dence,' though inconclusive, that Prince Rupert, to whom Siegen showed his mode of work in 1654, and possibly also their common friend, Th. Caspar von Fiirstenberger, and Rupert's assistant, Vallerant Vaillant, were more or less concerned in the gradual development of mezzotint engraving. The rocking-tool was appa- rently improved by Abraham Blooteling, a Dutch painter and engraver of 'fine portrait mezzotints, who worked in Holland and in England about the year 1680.

Rupert brought the new art over to England at the Restoration, and the portrait of Charles II., dated 1669, by William Sherwin, the first English mezzotinter, bears the engraver's acknowledgment of his indebtedness to Rupert for the secrets of the method. Mezzo- tint continued to be practised for a while on the Continent, but the successors of Sherwin in England so excelled in it that it early acquired abroad the title of " la maniere Anglaise," and has since become an exclusively British art. Though used for transcribing the subject-pictures of the great Italian masters, and of Rembrandt, Vandyck and Rubens, almost every kind of subject being later engraved in it, the staple production in mezzotint has always been the

portrait. Until the middle of the 1 8th century the tools con- tinued somewhat archaic, causing in the prints an appearance of warp and woof, like that of ill-woven material, which detracted from reality of representation. The coarseness and unequal depth of the ” grounds ” offered so much resistance to freedom of execu- tion with the ” scraper ” that, though the early engravers were quite as good artists as their successors, painter-like touch was not conspicuous in the work until M’Ardell and the interpreters of Sir Joshua Reynolds had improved the tools and technique.

Except for the collector, therefore, the chief attraction in the prints of F. Place and Luttrell, Beckett and Williams, and later those of John Simon, John Smith and John Faber, jun., who were the principal exponents of mezzotint in the last years of the seven- teenth and first half of the eighteenth centuries, lies in their long series of portraits after Vandyck, Lely, Kneller and the Dutch painters then practising in England, representing such interesting personages as Charles II. and Nell Gwynn, Addison and Pope, Congreve and Wycherley, Locke and the great duke of Marlborough.

The classics of mezzotint engraving are to be found amongst the best plates after Sir Joshua Reynolds by James M’Ardell, J. R. Smith and Valentine Green, the Watsons, Dickinson, Fisher, Dixon and some others, who worked during the last half of the 1 8th century. The brush work of Reynolds was more in harmony with the mezzotint method than the slighter painting technique of Gainsborough and Romney, who were much less frequently en- graved, perhaps because it is the highest technical difficulty in mezzotint to render the sharp edges of a sketch. For this reason a typical Gainsborough was never successfully engraved in the method. Though professional publishers and printers existed _ at this time and earlier, the word ” excudit ” on an old print, implying ” published,” not ” engraved,” the authors of the ” Sir Joshua ” mezzotints in most cases printed, published and sold their own works, and pure mezzotint, unmixed with etching, was almost exclusively the method they employed. Mezzotints were occasion- ally printed in colours, notably those engraved later after George Morland, the primary object being to conceal the worn-out condition of the plates.

The departure from pure mezzotint and temporary decay of the art began when, towards the end of the 1 8th century, Richard Earlom, otherwise a fine artist in the traditional method, notably in translations of Vandyck and Wright of Derby, began to outline the details of his plates with stipple etching in order to avoid the labour and difficulty of scraping them to a sharp edge, using the ” ground ”

alone. Earlom, however, did not destroy the mystery of the rich velvety darks by etching into them. A demand then arose for larger editions than the soft copper plates would yield, and I the engravers attempted to meet it by combining mezzotint with

positive line-etching throughout the work, thus shortening the labour of scraping the details, and fortifying the darks with lines sunk below the surface of the plate. The harmony of line and tone in some of the prints in this style by S. W. Reynolds and Charles Turner, after Sir Joshua, Hoppner and their contemporaries, was more convincing than the later ” mixed style ” of Samuel Cousins, because there was a certain artistic significance in the etched line itself apart from the mezzotint tone, but every touch of line in a mezzotint does something to destroy the painter-like quality, and a decadence was in progress.

The same mixed method on copper was used by J. W. M. Turner in his Liber Studiorum series of landscape plates, his object being to rival the pen-and-wash drawings of Claude’s Liber Veritatis. Turner, however, was not so practised in etching or mezzotint as the engravers before mentioned, and the etched foundation of the Liber plates was too strong for the mezzotint tone, destroying the breadth of the light, the richness of the darks, and the artistic ” keeping ” of the whole effect. It is the grand design of Turner reflected in the plates, rather than any quality of mezzotint or etching in them, which appeals to the artist and the connoisseur. Perhaps the greatest success in harmonizing line and tone in one plate was achieved by David Lucas in his ” English Landscape ” series of mezzotint after John Constable, in which he sharpened his details with the roulette, or with a slight line put in with the point of the scraper as scraping proceeded, retaining the pure ” burr ” in his darks. Lucas, like Samuel Cousins and his contemporaries, was handicapped by being compelled to work on the steel plates introduced in 1823, and this was the cause of the chief defect of his plates, the excessive opposition of black and white. The warm general tone which assisted the picturesqueness of the 18th century mezzotints was lost by the use of steel, because the ink did not cling to it as it does to the more porous copper. Steel being harder than copper, the rocking-tool penetrated less deeply, raising less ” burr,” and the consequent loss of force in the darks necessitated the scraping up of the lights to a higher key to force contrast of effect, which was also enhanced by the use of very white paper and a coarse black ink. It was soon found that the unfortified ” burr,” even on steel,

would not yield the constantly increasing numbers of impressions demanded. The labour of scraping sharp lights was greatly enhanced, and though some pure mezzotints were engraved on steel, painter-like touch was practically unattainable on it, and the general effect was cold and uninteresting.

The early work of Samuel Cousins after Lawrence in the comparatively pure method, and the final development of the ” mixed style ” on steel in his later plates after Reynolds, Millais and Landseer, are referred to in the article on Samuel Cousins.

For nearly forty years pure mezzotint ceased to be practised altogether, and the revival of it, which began in 1880, was led up to by the invention of steel-facing. The competition of photo- gravure, which steel-facing made a commercial possibility, for a time checked the new movement, but a photogravure, despite a mere surface resemblance to a mezzotint, is a photograph manipulated to imitate an engraving, entirely devoid of artistic individuality. In 1898 for the first time a Society of Mezzotint Engravers was formed to foster the art.

Authorities. — British Mezzotinto Portraits, by John Challoner Smith (London, 1878), a standard book of reference, contains a long list of others at p. xiv., pt. i. See also Lectures on Etching and Mezzotint, by Hubert von Herkomer, R.A. (London, 1890), the most useful work on the technique. Etching, Engraving and other Methods of Printing Pictures, by H. W. Singer and William Strang (London, 1897); On the Making of Etchings, by Frank Short (London, 1898), containing a slight reference to mezzotint technique; Art of En- graving, by T. H. Fielding (London, 1854); Alfred Whitman, Masters of Mezzotint (London, 1898), Valentine Green (1902), Samuel William Reynolds (1903), Samuel Cousins (1904), Charles Turner (1907); Gordon Gordain, James McArdell (1903), Thomas Watson, James Watson, Elizabeth Judkins (1904); W. G. Rawlinson, Turner’s Liber Studiorum, a Description and a Catalogue (2nd ed.’, 1906); F. Wedmore’s catalogue of the David Lucas mezzotints! A little anonymous book, A History of the Art of Engraving in Mezzotinto, from Its Origin to the Present Times [by Dr James Chelsum] (Winchester, 1786), is of considerable interest. Works on the technique are somewhat elementary, and no complete history of the art exists. (G. p. j)

MFUMBIRO, or Kirtjnga, general names for a chain of volcanic mountains extending across the Central African, or Albertine, rift-valley immediately north of Lake Kivu. The range, the result probably of recent geological changes, com- pletely blocks the valley at this

point, forming a divide between the rivers flowing north to the Nile and the waters of Lake Kivu, connected through Tanganyika with the Congo system. The chain consists of two groups of mountains, surrounded by a vast lava field. The western group lies directly north of Lake Kivu, and contains two active volcanoes, Kirunga-cha-gongo, the nearest tn the lake (11,194 ft. high), and Kirunga-namiagira

(9711ft), some 10 m. further north. The eastern group contains several higher peaks— some rising to needle-like points, others being truncated cones. The most lofty, Karissimbi (14,683 ft.), lies in 29 27′ 20″ E., i° 30′ 20″ S. Mikeno, a few miles north and west of Karissimbi, is 14,385 ft. high. The most easterly of the peaks, Muhavuru (13,562 ft.), in 29 40′ 30″ E., i° 23′ S., is an isolated sugarloaf-shaped mass with a crater filled with water on its summit. This is the mountain to which the names Mfumbiro and Kirunga were originally applied. Some 6 m. west and a little north of Muhavuru is Sabyino (Sabinjo), 11,881 ft. high. The eastern peaks are snowclad for a part of the year. North of these high mountains is a district, extending towards Albert Edward Nyanza, containing hundreds of low peaks and extinct volcanoes. It is to this region that the name Umfumbira or Mfumbiro is said properly to belong.

Mfumbiro, i.e. Muhavuru, was first seen by a white man in 1 86 1, J. H. Speke, in his journey to discover the source of the Nile, obtaining a distant view of the cone, which was also seen by H. M. Stanley in 1876. By its Baganda name of Mfumbiro (cook-house mountains) it figured on the maps somewhat east of its true position, first ascertained by Franz Stuhlmann in 1 89 1. In 1894 Count von Gotzen travelled through the volcanic region, and the range was subsequently explored by E. S. Grogan, Major St Hill Gibbons, Captain Herrmann, Dr R. Kandt and others, the principal heights being determined in 1903. In 1907-1908 the range was geologically and topographically examined by the duke of Mecklenberg's expedition. By the Anglo-German agreement of the 1st of July 1890 " Mount Mfumbiro " was included in the British sphere in East Africa.

See Captain Herrmann, " Vulkangebiet des zentralafrikanischen Grabens," in Mitteil. v. Forsch. u. Gelehrten a. d. deutschen Schutz-

febieten, vol. xvii. (Berlin, 1904), and Adolf Friedrich, duke of Mecklenburg, Ins Innerste Afrika (Leipzig, 1909) ; both give maps.

MHOW, a town of Central India, with British military canton- ment, within the native state of Indore, on the Malwa branch of the Rajputana railway, 13 m. S. of Indore. Pop. (1901), 36,039. It is the

headquarters of the 5th division of the southern army, and one of the chief military stations of India. There are two high schools, a Zoroastrian and a Canadian mission, the Dorabji Pestonji dispensary, and a gaol.

MIAGAO, a town on the southern coast of the province of Iloilo, island of Panay, Philippine Islands, about 25 m. W.S.W. of the town of Iloilo, the capital. Pop. (1903), 20,656; in the same year the neighbouring town of San Joaquin (pop. 1903, J 4 > 333) w as incorporated with Miagao. It has a cool and health- ful climate. The neighbouring country is hilly and sterile, but produces sibucao in considerable quantities. The weaving of fabrics of abaca. (Musa textilis), or Manila hemp, and pineapple fibre is the most important local industry. The language is Panay-Visayan.

MIALL, EDWARD (1809-1881), English Nonconformist divine and journalist, was born at Portsmouth on the 8th of May 1809. He was Congregational minister at Ware (1831) and Leicester (1834), and in 1841 founded the Nonconformist, a weekly newspaper in which he advocated the cause of dis- establishment. Miall saw that if the programme of Noncon- formity was to be carried through it must have more effective representation in Parliament. One of the firstfruits of his work was the entrance of John Bright into parliamentary life; and by 1852 forty Dissenters were members of the House of Commons. This was due largely to the efforts of the Anti-State Church Association, afterwards known as the Liberation Society, which Miall had founded in 1844. The long fight for the abolition of compulsory church-rates was finally successful in 1868, and then in 1870 Miall was prominent in the discussions aroused by the Education Bill. He was at this time M.P. for Bradford (1860- 1874), having previously (1852-1867) sat for Rochdale. In 1874 he retired from public life, and received from his admirers a present of ten thousand guineas. He died at Sevenoaks on the 29th of April 1 88 1.

See the Life, by A. Miall (1884).

MIAMI, a city and the county-seat of Dade county, Florida, U.S.A., in the S.E. part of the state, on the N. bank of the Miami river and on Biscayne Bay. Pop. (1900), 1681; (1905), 4733; (1910), 5471. It is served by the Florida East Coast railway and by lines of coastwise steamships, and is the point of departure of the P. & O. steamships for

Nassau and Havana. Miami is the centre of a farming country in which citrus fruits, especially grape-fruit, pineapples and winter vegetables are raised for northern markets. There is excellent rod-fishing; Spanish and king mackerel and blue-fish are shipped from Miami in large quantities; and in Biscayne Bay there are important sponge fisheries. An alligator ” farm ” and the Subtropical Laboratory of the U.S. government are points of interest. In the city is Fort Dallas (now abandoned), where American troops were quartered during the Seminole War; and Miami is still the trading point of the Seminole Indians, being immediately south of the Everglades, their home. In 1909 a project was on foot to cut a channel from Miami to Lake Okecho- bee and from the other side of that lake west to the Gulf at Fort Myers, thus providing an inland waterway and draining much swampy but fertile land. In 1896 there were only two dwellings and one storehouse within the present corporate limits, but in that year the place was chosen as the southern terminal of the Florida East Coast railway, which was afterwards extended towards Key West. Soon afterwards Henry M. Flagler (b. 1830), the owner of the railway, began the construction of the magni- ficent Royal Palm hotel, and Miami became a popular winter resort. Then came the development of commerce by the improve- ment of the harbour, by donations from Mr Flagler and grants by the United States government.

MIAMI, a tribe of North American Indians of Algonquian stock. The English called them Twightwees, a corruption of the native name, which meant the cry of the crane. They were first found in south-eastern Wisconsin, and in 1764 num- bered about 1750. Their civilization was advanced and they lived in stockaded towns. They took part in Pontiac’s con- spiracy in 1764 and in the American War of Independence and American War of 181 2 they fought on the English side. At the close of this war they were greatly reduced in numbers. A few Miami still live on a reservation in Oklahoma and in Wabash county, Indiana.

MIANT0N0MO (? 1643), chief of the Narraganset tribe of North American Indians, nephew of their grand sachem, Cano nicus (d. 1647). He seems to have been friendly to the English colonists of Massachusetts and Connecticut, though he was accused of being treacherous. In 1636, when under suspicion, he went to Boston to prove his loyalty to the colonists. In the following year he permitted John Mason to lead his Connecticut expedition against the Pequot Indians through the Narraganset country, and in 1638 he signed for the Narraganset the tripartite treaty between that tribe, the Connecticut colonists and the Mohegan Indians, which provided for a perpetual peace between the parties, and he agreed to take under his

jurisdiction eighty of the two hundred troublesome Pequot. In 1643 a quarrel broke out between the Mohegan and the Narraganset, and Mian- tonomo led his warriors against those of Uncas, the Mohegan sachem. He was defeated and captured at what is now Norwich, Conn., was turned over to the Connecticut authorities, and was later tried at Boston by the commissioners of the United Colonies of New England. A committee of five clergymen, to whom his case was referred, recommended that he be executed, and the commissioners accordingly sentenced him to death and chose Uncas as his executioner. Miantonomo, who was kept in ignorance of this sentence, was taken to the scene of his defeat and was there tomahawked in cold blood by Wawequa, the brother of Uncas. There is a monument to Miantonomo in Sachem's Park, Norwich, Conn.

MIANWALI, a town and district of India in the Multan division of the Punjab. The town is situated on the left bank of the Indus, 655 ft. above sea-level. Pop. (1901), 3591. The district was formed in 1901, after the creation of the North- West Frontier Province, out of the Cis-Indus portions of Bannu and

Dera Ismail Khan districts. Area 7816 sq. m. Pop. (1901), 424,588, showing an increase of 6-i% in the decade. Aljout three-quarters of the district lies to the east of the Indus. Along the river is a low fertile tract, liable to floods. The remaining upland, known as the Thai, is barren and sandy, cultivable only where irrigation is possible. In the north-east the district includes the western flank of the Salt Range. The part of the district west of the Indus is a level and fairly fertile plain, enclosed by the Chichali and Maidani hills. The chief agricul- tural products are wheat and other grains and oil-seeds. Hides and wool are also exported, together with small quantities of alum (abundant in the Salt Range), salt (from the Salt and Maidani ranges), and coal of poor quality, which is found at several points. Petroleum has been discovered. The district is served by the Multan-Rawalpindi line of the North- Western railway.

MIAOTSZE, or Miautse, one of the aboriginal tribes of southern China. At one time they occupied a considerable portion of the fertile lands which now form the central province of the empire, but as the Chinese advanced southwards they were driven into the mountain districts of the provinces of Yunnan, Kwei-chow, Kwang-si and Kwang-tung, where they are found at the present day. As early as the reign of King Suan (about 800 B.C.) we read of an expedition having been sent to drive them out of Hu-nan. The last important campaign against them was undertaken by the emperor K'ien-lung, who, having completely subjugated the Eleuths, attacked the Miaotsze, who suffered a

crushing defeat, and were compelled to purchase peace by swearing allegiance to their conquerors. They still maintain a semi-independence in their mountain-homes, but are a decaying race, gradually giving way before the Chinese. They are allowed to govern themselves on their own patriarchal system. The Miaotsze of both sexes are shorter and darker-complexioned than the Chinese, their faces are rounder and their features sharper.

See Sketches of the Miau-tsze, trans, by E. C. Bridgman; J. Edkins, The Miautsi Tribes, their History; and ” Quaint Customs in Kwei- chow,” Comhill Magazine (Jan. 1872); Playfair, The Maotzu of Kwei-chow and Yunnan (London, 1877) ; A. R. Colquhoun, Across Chryse (1883).

MIAOULIS, ANDREAS VOKOS or Bokos (1768-1835), Greek admiral and politician, was born in Negropont. The surname Miaoulis, which was added to his family name of Vokos, or Bokos, is said to be derived from the Turkish word miaoul, a felucca. He settled in the island of Hydra on the east of the Morea, and when the Greek War of Independence began was known among his fellow townsmen as a trader in corn who had gained wealth, and who made a popular use of his money. He had been a merchant captain, and was chosen to lead the naval forces of the islands when they rose against the government of the Sultan. The islanders had enjoyed some measure of exemption from the worst excesses of the Turkish officials, but suffered severely from the conscription raised to man the Turkish ships; and though they seemed to be peculiarly open to attack by the Sultan’s forces from the sea, they took an early and active part in the rising. As early as 1822 Miaoulis was appointed navarch,or ad- miral, of the swarm of small vessels which formed the insurgent fleet. He commanded the expedition sent to take revenge for the massacre of Chio (see Kanaris) in the same year. He con- tinued to be the naval chief of the Greeks till Lord Dundonald entered their service in 1827, when he retired in order to leave the English officer free to act as commander. In the interval he had had the general direction of the naval side of the Greek struggle for freedom. He had a share in the successful relief of the first siege of Missolonghi in December 1822 and January 1823. In 1824, after the conquest of Psara by the Turks, he commanded the Greek forces which prevented the further progress of the Sultan’s fleet, though at the cost of the loss of many fire ships and men to themselves. But in the same year he was unable to prevent the Egyptian forces from occupying Navarino, though he harassed them with some success. During 1825 he succeeded in carrying stores and reinforcements into Missolonghi, when it was besieged for the second time, though he could not avert its fall. His efforts to interrupt the sea communications of the Egyptian forces failed, owing to the enormous

disproportion of

the two squadrons in the siege and strength of the ships. As the war went on the naval power of the Greeks diminished, partly owing to the penury of their treasury, and partly to the growth of piracy in the general anarchy of the Eastern Mediterranean. When Miaoulis retired to make room for Dundonald the conduct of the struggle had really passed into the hands of the powers. When independence had been obtained, Miaoulis in his old age was entangled in the civil conflicts of his country, as an opponent of Capodistrias and the Russian party. He had to employ his skill in the employment of fireships against them at Poros in 183 1. He was one of the deputation sent to invite King Otho to accept the crown of Greece, and was made rear-admiral and then vice- admiral by him. He died on the 24th of June 1835 at Athens.

MICA, a group of widely distributed rock-forming minerals, some of which have important commercial applications. The principal members of the group are muscovite, biotite, phlogo- pite and lepidolite (q.v.). The name mica is probably derived from the Latin micare, to shine, to glitter; the German word glimmer has the same meaning. The mineral was probably included with selenite under Pliny's term lapis specularis.

Mineralogical Characters. — The micas are characterized by a very easy cleavage in a single direction and by the high degree of flexibility, elasticity and toughness of the extremely thin cleav- age flakes. They all crystallize in the monoclinic system, often, however, in forms closely resembling those of the rhombohedral or orthorhombic systems. Crystals have usually the form of hexagonal or rhomb-shaped scales, plates or prisms, with plane

tit' —

.»---«■—

Fig. 1.

Fig. 2.

angles of 6o° and 120 , and, with the exception of the basal planes, are only rarely bounded by smooth and well-defined faces. The crystal represented in fig. 1 is bounded by the basal pinacoid c (001) parallel

to which is the perfect cleavage, the clinopinacoid b (010) parallel to the plane of symmetry, and the pyramids m (221) and (112). The angles between these pyra- mids and the basal plane are 855 and 73° respectively. The prism (no) at 90° from the basal plane is not developed as a crystal face, but is a plane of twinning, the two individuals of the twin being united parallel to the basal plane (fig. 2). The different species of mica have very nearly the same forms and interfacial angles, and they not infrequently occur intergrown together in parallel position. The best developed crystals are those of Vesuvian biotite.

When a cleavage flake of mica is struck a sharp blow with a blunt needle-point a six-rayed star of cracks or ” percussion figure ” is developed: the rays intersect at angles of approximately 6o°, and the pair most prominently developed are parallel to the plane of symmetry of the crystal. A similar six-rayed system of cracks, bisecting the angles between the rays of the previous set, is pro- duced when a blunt punch is gradually pressed against a sheet of mica ; this is known as the ” pressure figure.” These cracks coincide with planes of easy separation or of gliding in the crystal ; they are especially useful in helping to determine the crystallographic orienta- tion of a cleavage flake of mica when crystal faces are absent. Sheets of mica which have been subjected to earth-movements are frequently cracked and ridged parallel to these directions, and are then valueless for economic purposes.

In their optical characters the micas exhibit considerable varia- tions. The indices of refraction are not high, the mean index being about I •58-1-60, but the double refraction is very strong (o-04-o-os) and is negative in sign. The angle between the optic axes varies from 70°-50° in muscovite and lepidolite to 10-0° in biotite and phlogopite; the latter are thus frequently practically uniaxial. The acute bisectrix of the optic axes never deviates from the normal to the basal plane by more than a degree or two, hence a cleavage flake of mica will always show an optic figure in convergent light when placed on the stage of a polarizing microscope. The plane of the optic axes may be either perpendicular or parallel to the plane of symmetry of the crystal, and according to its position two classes of mica are distinguished. To the first class, with the optic axial plane perpendicular to the plane of symmetry, belong muscovite, lepidolite, paragonite, and a rare variety of biotite called anomite; the second class includes zinnwaldite, phlogopite, lepidomelane and

most biotites. Dark coloured micas are strongly pleochroic. Ac- curate determinations of the optical orientation, as well as the symmetry of

the etching figures on the cleavage planes, seem to suggest that the micas, except muscovite, may be anorthic rather than monoclinic in crystallization.

The different kinds of mica vary from perfectly colourless and transparent— as in muscovite — through shades of yellow, green, red and brown to black and opaque — as in lepidomelane; the former have a pearly lustre and the latter a submetallic lustre on the cleavage surfaces. Sheets of mica very often show coloured rings and bands (Newton's rings), due to the interference of light at the surfaces of internal cleavage cracks. The spec, grav. varies between 2-7 and 3 – i in the different species. The hardness is 2-3 ; smooth cleavage surfaces can be just scratched with the finger-nail. The micas are bad conductors of heat and electricity, and it is on these properties that many of their technical applications depend.

Inclusions of other minerals are frequently to be observed in mica. Flattened crystals of garnet, films of quartz, and needles of tourmaline are not uncommon. Cleavage sheets are frequently disfigured and rendered of little value by brown, red or black spots and stains, often with a dendritic arrangement of iron oxides. Minute acicular inclusions, probably of rutile, arranged parallel to the rays of the percussion figure, give rise to the phenomenon of " asterism " in some micas, particularly phlogopite: a candle-flame or spot of light viewed through a cleavage sheet of such mica appears as a six-rayed star.

Chemical Composition. — The micas are extremely complex and variable in composition. They are silicates, usually ortho- silicates, of aluminium together with alkalis (potassium, sodium, lithium, rarely rubidium and caesium), basic hydrogen, and, in some species magnesium, ferrous and ferric iron, rarely chromium, manganese and barium. Fluorine is also often an essential constituent, and titanium is sometimes present.

The composition of the several species of mica is given by the following formulae, some of which are only approximate. It will be seen that they may be divided into two groups — alkali-micas (potash-mica, &c.) and ferromagnesian micas — which correspond roughly with the division into light and dark micas.

Muscovite

Paragonite

Lepidolite.

Zinnwaldite

Biotite

Phlogopite

H 2 K Al 3 (Si0 4) 3

H 2 Na Al 3 (Si0 4) 3

KLi[Al(OH,F) 2]Al(Si0 3) 3

(K,Li) 3 [Al(OH,F) 2]FeAl 2 Si 6 I8

(H,K) 2 (Mg,Fe) 2 (Al,Fe) 2 (Si0 4) 3

[H,K,(MgF)] s Mg 3 Al(Si0 4) 8

The water which is present in muscovite to the extent of 4 to 6 %, and rather less in the other species, is expelled only at a high temperature ; it is therefore water of constitution, existing as basic hydrogen or as hydroxyl replacing fluorine.

Roscoelite is a mica in which the aluminium is largely replaced by vanadium (V 2 3 , 30 %) ; it occurs as brownish-green scaly aggregates, intimately associated with gold in California, Colorado and Western Australia.

Various attempts have been made to explain the variations in composition of the micas. G. Tschermak, in 1878, regarded them as isomorphous mixtures of the following fundamental molecules: H 2 KAl 3 (Si0 4) 3 , corresponding with muscovite; Mg 6 Si 3 0i 2 , a hypo- thetical polymer of olivine; and H 4 Si50i 2 , a hypothetical silicic acid. F. W. Clarke (1889-1893) supposes them to be substitution derivatives of normal aluminium orthosilicate Al4(Si0.i) 3 , in which part of the aluminium is replaced by alkalis, magnesium, iron and the univalent groups (MgF), (A1F 2) , (AlO) , (MgOH) ; an excess of silica is explained by the isomorphous replacement of H 4 Si0 4 by the acid HLSisOg.

Artificially formed crystals of the various species of mica have been observed in furnace-slags and in silicate fusions.

Occurrence. — Mica occurs as a primary and essential con- stituent of igneous rocks of almost all kinds; it is also a common product of alteration of many mineral silicates, both by weather- ing and by

contact- and dynamo-metamorphic processes. In sedimentary rocks it occurs as detrital material.

Muscovite and biotite are commonly found in siliceous rocks, whilst phlogopite is characteristic of calcareous rocks. The best crystallized specimens of any mica are afforded by the small brilliant crystals of biotite, which encrust cavities in the limestone blocks ejected from Monte Somma, Vesuvius. Large sheets of muscovite, such as are of commercial value, are found only in the very coarsely crystallized pegmatite veins traversing granite, gneiss or mica- schist. These veins consist of felspar, quartz and mica, often with smaller amounts of other crystallized minerals, such as tourmaline, beryl and garnet; they are worked for mica in India, the United

States (South Dakota, Colorado and Alabama), and Brazil (Goyaz, Bahia and Minas Geraes). The commercially valuable micas of Canada and Ceylon are mainly phlogopite (q.v.), which has a rather different mode of occurrence. The mica mined in India is practically all muscovite. The principal mining districts are those of Hazari- bagh in Bengal and Nellore in Madras; in the former district the mica has usually a ruby tint, whilst in the latter it is more often greenish. In the Inikurti mine, Nellore, ” books ” of mica measur- ing 10 ft. across, and up to 15 ft. across the folia have been found, and rectangular sheets measuring 30 by 24 in. and free from cracks and flaws have frequently been obtained.

Uses. — On account of its transparency and its resistance to fire and sudden changes of temperature, mica has been much used for the windows of stoves and lanterns, for the peep-holes of furnaces, and the chimneys of lamps and gas-burners. At one time it was used for window panes of houses and the port-holes of Russian men-of-war, being commonly known as ” Muscovy glass.” Spangles of mica are much used for decorative purposes of various kinds, and the mineral was formerly known as glades Mariae (Ger., Frauenglas) because of its use for decorating statues of the Virgin. The lapis specularis of Pliny, scattered over the Circus Maximus to produce a shining whiteness, was probably mica. Large quantities of ground mica are used in the manufacture of wall-paper, and to produce a frosted effect on toys, stage scenery, &c. Powdered mica is also used in the manu- facture of paints and paper, as a lubricant, and as an absorbent of nitro-glycerine and disinfectants. Sheets of mica are used as a surface for painting,

especially in India; for lantern slides; for carrying photographic films; as a protective covering for pictures and historical documents; for mounting soft and collap- sible natural history specimens preserved in spirit; for the vanes of anemometers; mirrors of delicate physical instruments; for various optical and many other purposes. Being a bad conductor of heat it is used for the packing and jackets of boilers and steam-pipes. Other applications depend on the strength of its resistance to acids.

The most extensive application of mica at the present day is for electrical purposes. Being a bad conductor of electricity it is of value as an insulator, and the smooth flexible sheets are much used in the construction of armatures of dynamos and in other electrical machinery. For various purposes a manufactured material known as ” micanite ” or ” micanite cloth ” is much used; this consists of small sheets of mica cemented with shellac or other insulating cement on cloth or paper.

Muscovite and phlogopite are practically the only species used commercially, the former being the more common. Phlogopite is rarely found as colourless transparent sheets and is therefore almost exclusively used for electrical purposes. Many other uses of mica might be mentioned. The potassium it contains renders it of value as a manure. The species lepidolite is largely used for the manufacture of lithium and rubidium salts.

Mining, Preparation and Value. — Mica mining is an industry of considerable importance, especially in India; but here the methods of mining are very primitive and wasteful. In working downwards in open quarries and in tortuous shafts and passages much of the mica is damaged, and a large amount of labour is expended in hauling waste material to the surface. Since the mineral occurs in definite veins, a more satisfactory and economi- cal method of working would be that adopted in metalliferous mines, with a vertical shaft, cross-cuts, and levels running along the strike of the vein: the mica could then be extracted by overhead stopping, and the waste material used for filling up the worked-out excavations.

In dressing mica the ” books ” are split along the cleavage into sheets of the required thickness, and the sheets trimmed into rectangles with a sharp knife, shears or guillotine, stained and damaged portions being rejected. The dressed sheets are sorted according to size, transparency, colour and freedom from spots or stains. Scrap mica is ground to powder or used in the manu- facture of micanite.

The price of mica varies very considerably according to the size, transparency and quality of the sheets. .An average price for cut sheets of all sizes is about 4s. per lb, but for large sheets it may be as high as 54s. per lb.

References. — For the mineralogical characters see the text- books of J. D. Dana and C. Hintze; for economic questions, the following: T. H. Holland, ” The Mica Deposits of India,” Memoirs of the Geological Survey of India (1902), xxxiv. 11-121; G. P. Merrill, The Non-Metallic Minerals (New York, 1904), pp. 163- 180; “The Mining and Preparation of Mica for Commercial Purposes,” Bulletin of the Imperial Institute (London, 1904), ii. 278-291; F. Cirkel, “Mica: its Occurrence, Exploitation and Uses ” (Canadian Dept. of the Interior, Mines Branch, Ottawa 1905, 148 pp.). (L. J. S.)

MICAH (™;p), in the Bible, the name prefixed to the sixth in order of the books of the minor prophets. 1 He was a con- temporary and fellow-worker of Isaiah. The name in various modifications — Micaiahil, Micaiehu, Micaiah — is common in the Old Testament, expressing as it does a fundamental point of Hebrew faith: Who is like Yahweh ? 2 It was also borne among others by the Danite whose history is given in Judges xvii. seq. (see separate article), by the prophet who opposed Ahab’s expedition to Ramoth-Gilead (1 Kings xxii.), 3 and by the son of Jonathan (see Saul).

The editorial title of the book of Micah declares that Micah prophesied ” in the days of Jotham (739-734), Ahaz (733-721) and Hezekiah (720-693), kings of Judah.” Nothing in the book itself can claim to belong to the reign of Jotham, but the prophecy against Samaria (i. 5-8) may have been uttered originally before the fall of Samaria in 722, i.e. in the reign of Ahaz. In its present form, however, it has been incorporated in a prophecy against Judah, belonging, most probably, to the years 705-701, when a new Palestinian rising provoked Sennacherib’s campaign of 701 (Nowack; cf. Marti). This prophetic activity of Micah under Hezekiah is confirmed by the direct statement of Jer. xxvi. 17 seq., where Mic. iii. 12 is quoted (” Zion shall be plowed as a field,” &c). The verse quoted forms the climax of Mic. i.-iii., from which chapters only any certain conclusions as to the prophetic message of the historic Micah can be drawn; the remaining sections of the present book (iv.-v., vi.-vii.) consist, in whole or in greater part, of writings belonging to a later period.

Chs. i.-iii. (with the exception of two verses, ii. 12, 13) 4 are a prediction of judgment on the sins of Judah and Ephraim. In a majestic exordium Yahweh Himself is represented as coming forth in

the thunderstorm (cf. Amos i. 2) from His heavenly palace, and descending on the mountains of Palestine, at once as witness against His people, and the executer of judgment on their sins. Samaria is sentenced to destruction for idolatry; and the blow extends to Judah also, which participates in the same guilt (ch. i.). But, while Samaria is summarily dismissed, the sin of Judah is analysed at length in chs. ii. and iii., in which the prophet

1 A confusion between the two prophets of the name has led to the insertion in the Massoretic text of 1 Kings xxii. 28 of a citation from Micah i. 2, rightly absent from the LXX.

2 See, however, Gray, Hebrew Proper Names, p. 157: ” In later times they were perhaps virtually synonymous; but this is not to be assumed for early times. The shorter forms may well have had a purely secular reference, signifying ‘ who is like this child ‘ ? ”

3 He is called ” the Morashtite ” (Mic. i. 1 ; Jer. xxvi. 18) from his birthplace, Moresheth-Gath. That Micah lived in the Shephelah or Judaean lowland near the Philistine country is clear from the local colouring of i. 10 seq., where a number of places in this quarter are mentioned together (in connexion with the war in Philistia), and their names played upon in a way that could hardly have suggested itself to any but a man of the district. The paronomasia makes the verses difficult, and in i. 14 none of the ancient versions recognizes Moresheth-Gath as a proper name. The word Morashtite (Morashti) was therefore obscure to them; but this only gives greater weight to the traditional pronunciation with in the first syllable, which is as old as the LXX., and goes against the view, taken by the Targum both on Micah and on Jeremiah, and followed by some moderns (including Cheyne, E.B., 3198), that Micah came from Mareshah. When Eusebius placed Mapaadd near Eleutheropolis it is not likely that he is thinking of Mareshah (Maresa), for he speaks of the former as a village and of the latter as a ruin 2 m. from Eleutheropolis. Jerome too in the Epit. Paulae (Ep. cviii.), speaking as an eye-witness, distinguishes Morashtim, with the church of Micah’s sepulchre, from Maresa. This indeed was after the pretended miraculous discovery of the relics of Micah in A.D. 385; but the name of the village which then existed (Praef. in Mich.) can hardly have been part of a pious fraud.

4 These two verses are a prophecy of restoration ; they are admittedly an interruption in their present context (so, e.g., Driver, G. A. Smith) ; they bejong in substance to the second section of the book (iv. v.).

no longer deals with idolatry, but with the corruption of society, and particularly of its leaders — the grasping aristocracy whose whole energies are concentrated on devouring the poor and depriv- ing them of their little holdings, the unjust judges and priests who for gain wrest the law in favour of the rich, the hireling and glutton- ous prophets who make war against every one "that putteth not into their mouth," but are ever ready with assurances of Yahweh's favour to their patrons, the wealthy and noble sinners that fatten on the flesh of the poor. The internal disorders of the realm depicted by Micah are also prominent in Isaiah's prophecies; they were closely connected, not only with the foreign complications due to the approach of the Assyrians, but with the break-up of the old agrarian system within Israel, and with the rapid and uncom- pensated aggrandisement of the nobles during those prosperous years when the conquest of Edom by Amaziah and the occupation of the port of Elath by his son (2 Kings xiv. 7, 22) placed the lucrative trade between the Mediterranean and the Red Sea in the hands of the rulers of Judah. On the other hand the democratic tone which distinguishes Micah from Isaiah, and his announcement of the impending fall of the capital (the deliverance of which from the Assyrian appears to Isaiah as the necessary condition for the preservation of the seed of a new and better kingdom), are ex- plained by the fact that, while Isaiah lived in the centre of affairs, Micah, a provincial prophet, sees the capital and the aristocracy entirely from the side of a man of the oppressed people, and fore- tells the utter ruin of both. But this ruin does not present itself to him as involving the captivity or ruin of the nation as a whole; the congregation of Yahweh remains in Judaea when the oppressors are cast out (ii. 5) ; Yahweh's words are still good to them that walk uprightly; the glory of Israel is driven to take refuge in Adullam, 1 as in the days when David's band of broken men was the true hope of the nation, but there is no hint that it is banished from the land.

Our only evidence as to the reception of Micah's message by his contemporaries is that afforded by Jer. xxvi. 17 seq., both directly, in the recorded effect on Hezekiah and the people; and indirectly, in the fact that the impression created was remem- bered a century afterwards. Micah resembles Amos, both in his country origin, and in his general character, which expresses itself in strong emphasis on the ethical side of religion. As the last of the four great prophets of the 8th century he undoubtedly contributed to that religious and ethical reformation whose literary monument is the Book of Deuteronomy. 2

The remainder of the book bearing the name of Micah falls into two main divisions, viz. iv., v. and vi., vii. Each differs from the first division (i.-iii.) in a marked degree. The second consists mainly of prophecies of restoration including eschatological (iv. 1 seq.) 3 and Messianic (v. 2 seq.) hopes. The third is formed of three or four apparently unrelated passages, on the spirituality of true worship (vi. 1-8), social immorality and its doom (vi. 9- 16; vii. i-6) x , and Israel's future recovery from present adversity through Divine grace (vii. 7-20). It is improbable that much, if any, of these chapters can be ascribed to Micah himself, 4 not only because their contents are so different from his undoubted work (i.-iii.), for which he was subsequently remembered (Jer. xxvi. 18), but because they presuppose the historic outlook of the Exile, or a later age (e.g. iv. 6 seq.; vii. 7 seq.). It is neither psychologically nor historically impossible for a prophet of

1 i. 15; the reference is, however, obscure and uncertain.

2 See the Introduction to the Century Bible, " Deuteronomy and Joshua," by H. Wheeler Robinson.

3 Mic. iv. 1-3 and Isa. ii. 2-4 are but slightly modified recensions of the same text, and as Isa. ii. is older than the prophecy of Micah, while on the other hand Mic. iv. 4 seems the natural completion of the passage, it is common to suppose that both copy an older prophet. But the words have little connexion with the context in Isaiah, and may be the quotation of a copyist suggested by ver. 5. On the other hand it has been urged that the passage belongs to a later stage of prophetic thought than the 8th century B.C. Reasons making this view the more probable one are given by Wellhausen (p. 142) and Marti (p. 281).

4 Nowack thinks that iv. 9, 10", 14 and v. 10-14 m ay possibly belong to Micah; Wellhausen recognizes the same possibility, which he extends, however, to vi. 1-8. Marti, who (like Cheyne in Ency. Bib.) finds nothing by Micah in iv.-vii., thinks these chapters have crystallized round two central passages, viz. iv. 1-4, and vi. 6-8, whose addition to the first three chapters formed the second stage in the growth of the present book. More conservative views as to authorship are taken by Driver and G. A. Smith, the former suggesting, however, that " the existing Book of Micah consists only of a collection of excerpts, in some cases fragmentary excerpts, from the entire series of the prophet's discourses " (L. O. T., ch. vi. § 6).

judgment to be also a prophet of comfort; but the internal evidence of composite and (in whole or part) later authorship must outweigh the

traditional attachment of these passages to a MS. containing the work of Micah.

The sequence of thought in chs. iv. v. is really difficult, and has given rise to much complicated discussion. Thus iv. 11-13 stands in direct contradiction to iv. 9, 10, and indeed to iii. 12. The last two passages agree in speaking of the capture of Jerusalem, the first declares Zion inviolable, and its capture an impossible profanation. Such a thought can hardly be Micah's, even if we resort to the violent harmonistic process of imagining that two quite distinct sieges, separated by a renewal of the theocracy, are spoken of in consecutive verses. Another difficulty lies in the words " and thou shalt come even to Babylon " in iv. 10. Micah unquestionably looked for the destruction of Jerusalem as well as of Samaria in the near future and by the Assyrians (i. 9), and this i was the judgment which Hezekiah's repentance averted. If these words, therefore, belong to the original context, they mark it as not from Micah's hand; though they might be a later gloss. The prophetic thought is that the daughter (population) of Zion shall not be saved by her present rulers or defensive strength; she must come down from her bulwarks and dwell in the open field; there, and not within her proud ramparts, Yahweh will grant deliverance from her enemies. Opposition to present tyranny expresses itself in recurrence to the old popular ideal of the first simple Davidic kingdom (iv. 8). These old days shall return once more. A new David, like him whose exploits in the district of Micah's home were still in the mouths of the common people (? i. 15), goes forth from Bethlehem to feed the flock in the strength of Yahweh. The kindred Hebrew nations are once more united to their brethren of Israel (cf. Amos ix. 12, Isa. xvi. I seq.). The remnant of Jacob springs up in fresh vigour, inspiring terror among the surrounding peoples, and there is no lack of chosen captains to lead them to victory against the Assyrian foe. In the rejuvenescence of the nation the old stays of that oppressive kingship which began with Solomon, the strongholds, the fortified cities, the chariots and horses so foreign to the life of ancient Israel, are no more known; they disappear together with the divinations, the soothsayers, the idols, the mazzebah and asherah of the high places. Yahweh is king on Mount Zion, and no inventions of man come between Him and His people.

The sixth chapter of Micah presents a very different situation from that of chs. i.-iii. or iv., v. Yahweh appears to plead with His people for their sins, but the sinners are no longer a careless and oppressive aristocracy buoyed up by deceptive assurances of Yahweh's help, by prophecies of wine and strong drink; they are bowed down by a religion of terror, wearied with attempts to propitiate an angry God by countless offerings, and even by the sacrifice of the first-born.

Meantime the substance of true religion —justice, charity and a humble walk with God — is forgotten, fraud and deceit reign in all classes, the works of the house of Ahab are observed (worship of foreign gods).. Yahweh's judgments are multiplied against the land, and the issue can be nothing else than its total desolation. All these marks may be held to .fit exactly the evil times of Manasseh as described in 2 Kings xxi. Cp. vii. 1-6, in which the public and private corruption of a hopeless age is bitterly bewailed, possibly belongs to the same context.

Micah may very well have lived into Manasseh's reign, but the title in i. 1 does not cover a prophecy which certainly falls after Hezekiah's death, and the style has nothing in common with the earlier part of the book. It is therefore prudent to regard the prophecy, with Ewald, as anonymous. Ewald ascribed the whole of chs. vi., vii. to one author. Wellhausen, however, remarks with justice that the thread is abruptly broken at vii. 6, and that verses 7-20 1 represent Zion as already fallen before the heathen and her inhabitants as pining in the darkness of captivity. The hope of Zion is in future restoration after she has patiently borne the chastisement of her sins. Then Yahweh shall arise mindful of His oath to the fathers, Israel shall be forgiven and restored, and the heathen humbled. The faith and hope which breathe in this passage have the closest affinities with the book of Lamentations and Isa. xl.-lxvi. Indeed, as Marti points out (p. 259) the triple division of the book of Micah (i.-iii.; iv., v.; vi., vii.) corresponds with that of the book of Isaiah (i.-xxxix. ; xl.-lv.; lvi.-lxvi.) in the character of the three divisions (judgment; coming restoration; prayer for help in adversity) respectively, and in the fact that the first alone gives us pre-exilic writing in the actual words of the prophet to whom the whole book is ascribed. In both cases, it need hardly be said, the great literary and spiritual value of the later passages ought in no way

Regarded by Stade (Z. A. T. W., 1903, p. 164 seq.) as an inde pendent psalm.

to suffer prejudice from critical conditions as to their date and authorship.

Literature. — The chief modern commentaries are those of Nowack (Die Kleinen Propheten, 1897; 2nd ed., 1904) and Marti (Dodekapropheton, 1904), where detailed references to the older liter-

ature may be found; cf. Wellhausen, Die Kleinen Propheten (3rd ed., 1898). In English, reference may be made to Cheyne (" Micah," in the Cambridge Bible, i882; > 2nd ed., 1895), and to G. A. Smith (" The Book of the Twelve," vol. i., in The Expositor's Bible, 1896) ; also to the articles on " Micah " by Nowack in Hastings's Diet, of the Bible (1900), iii. 359, 360, and by Cheyne in the Ency. Bibl. . (1902), iii. c. 3068-3074, the latter incorporating most of the original article (Ency. Brit. 9th ed.) by W. Robertson Smith, which has been revised above. For a review of recent criticism see Cheyne, introduction to W. R. Smith's The Prophets of Israel, 2nd ed., pp. xxiii.-xxvii. ; also Ency. Bib. loc. cit. J. M. P. Smith discusses " The Strophic Structure of the Book of Micah " in a volume of Old Test, and Semitic Studies: in memory of W. R. Harper (Chicago, 1908). (W. R. S. ; H. W. R.*)

MICAH, in the Bible, a man of the hill-country of Ephraim whose history enters into that of the foundation of the Israelite sanctuary at Dan (Judges xvii. seq.). He had stolen from his mother eleven hundred pieces of silver (for the number cf . Judges xvi. 5), and when she uttered a curse upon the unknown thief he restored the money and she consecrated it to Yahweh. A carved image was made and set up in his private temple together with an ephod-idol and teraphim (objects used in divination, cf. Gen. xxxi. 19, 30; Hos. iii. 4). He employed one of his sons to serve as priest, but when a Levite from Bethlehem in Judah came along he gladly installed him as " father and priest." When the tribe of Dan subsequently sought new territory and sent men to search for a suitable district they passed by Micah's house, recognized the Levite and requested an oracle from him. When, later, they migrated, they despoiled the sacred place and carried off the gods and priest to their newly won home at Laish.

MICA-SCHIST,, in petrology, a rock composed essentially of mica and quartz, and having a thin parallel-banded or foliated structure, with lamellae rich in mica alternating with others which are principally quartz. They split readily along the micaceous films, and have smooth or slightly uneven surfaces covered with lustrous plates of muscovite or biotite ; the quartzose lamellae are often visible only when the specimens are looked at edgewise. Mica-schists are very common in regions of Archean rocks accompanying gneisses, crystalline limestones and other schists. Some have a flat banding yielding smooth slabs; others are crumpled or contorted with undulating foliation. Occasion- ally the quartz forms elliptical lenticles or " eyes." In some cases mica composes nearly the whole of the rock, in others quartz preponderates so that they approach quartz-schists and quartzites.

The mica may be muscovite or biotite; both are often present, while paragonite and green fuchsite or chrome-mica are not so common. In addition to quartz there may be a small amount of feldspar, usually albite. A great number of accessory minerals are known in mica-schists, and when these are conspicuous or important they may be regarded as constituting special varieties receiving distinctive names. Garnet, in rounded red crystals, not uncommonly idiomorphic, is the most frequent. Brown staurolite, pinkish andalusite, and grey or blue kyanite occur in some kinds of mica- schist, separately or together. The white mica-schist of the St Gothard contains kyanite and staurolite. Graphite (or graphitoid) is also a very frequent ingredient of these rocks, giving them a leaden grey colour and causing them to soil the fingers when handled. In some mica-schists there is much calcite (calc-mica-schists) ; and hornblende, scapolite and augite are often seen in rocks of this sort. Tourmaline occurs, sometimes in large black prisms but more commonly in minute crystals visible only in microscopic sections. Rutile in tiny prisms, ilmenite and hematite in black or brown scales, zircon, apatite, granules of epidote or zoisite chlorite, chloritoid and pyrites occur with more or less frequency in the rocks of this group."

Mica-schists are in nearly all cases sedimentary rocks which have been recrystallized and have obtained a schistose structure during the process. This can be proved by their chemical composition, which is very much the same as that of clays, shales and slates. In some districts it is possible to trace every gradation from a slate (q.v.) to a mica-schist, the intermediate stages being represented by phyllites (q.v.) which consist of quartz, muscovite and chlorite, and are neither so crystalline nor so well foliated as the schists. In a few places, e.g. Bergen in Norway, fossils have been found in mica-

schists. The association of quartzites and quartz-schists, graphite-schists and crystalline limestones with mica-schists in the field is explained by the fact that all these rocks are altered sediments, viz. sandstones, carbonaceous shales and limestones.

Under the microscope the appearance presented by mica-schists differs according to whether the rock is cut parallel to or across the planes of foliation. In the latter case thin alternating bands com- posed of black or brown mica, and of quartz, cross the field of view (see Petrology, Plate 4, fig. 8) . The mica scales have their cleavages and their flat sides parallel; the quartz occurs in rounded, elliptical or irregular grains, with usually a small admixture of feldspar (albite, oligoclase, orthoclase) ; apatite and iron oxides are rarely absent from these rocks. If garnet is present it may form large well-shaped crystals

containing innumerable enclosures of quartz, biotite and iron ores ; in some cases the garnets are cracked as if they had been broken by the pressures to which the rock had been subjected. Often the garnets are surrounded by small ” eyes ” of quartz, and they may be embedded in green chlorite, which is probably a second- ary or decomposition product. Some mica-schists are rich in iron oxides and pass into haematite-schists (itabirites). When graphite occurs in mica-schists its crystals are small flat plates perfectly opaque even in the thinnest sections.

Like all metamorphic rocks, mica-schists are principally found in Archean areas; the great majority of them are of pre-Cambrian age. There are, however, in the Alps, Himalayas, &c, many rocks of this sort which are believed to be secondary or even tertiary ; the evidence for this is not in all cases satisfactory, as of course the fossils, which if preserved would be sufficient to prove it, are nearly always destroyed by the metamorphism. Mica-schists are rarely of economic value, being too fissile for building-stones and too brittle for roofing-slates. They are of wide-spread distribution in the Scottish Highlands, Norway and Sweden, Bohemia, Saxony, Brittany, the Alps, many parts of North America, &c. (J. S. F.)

MICCA, PIETRO, Piedmontese soldier (d. 1706), was born at Andorno, and achieved fame by his death in the defence of Turin. During the siege of that city by the French in 1706 a party of the besiegers had succeeded in penetrating by surprise into the moat of the fortress on the night of August 29-30, and would undoubtedly have captured it had not Micca, a soldier in the engineers, fired a mine, with the result that they were blown into the air and the rest of the force driven back with heavy losses. Micca’s heroism has been the subject of poems, plays and romances. But, according to Count Giuseppe Solaro della Margherita, the commander of the Turin garrison at the time, it was through a miscalculation of the pace of the fuse, and not by deliberate intent, that he sacrificed his life.

See A. Manno Pietro Micca ed il generale conte Solaro della Margherita (Turin, 1883).

MICHAEL (Hebrew •?*;

MICHAEL (1596-1645), tsar of Russia, was the first tsar of the house

of Romanov, being the son of Theodore Nekitich Romanov, afterwards the Patriarch Philaret (q.v.), and Xenia Chestovaya, afterwards the nun Martha. He was elected unanimously tsar of Russia by a national assembly on the 21st of February 1613, but not till the 24th of March did the delegates of the council discover the young tsar and his mother at the Ipatievsky monastery near Kostroma. At first Martha pro- tested that her son was too young and tender for so difficult an office in such troublesome times. At the last moment, however, Michael consented to accept the throne, but not till the weeping boyars had solemnly declared that if he persisted in his refusal they would hold him responsible to God for the utter destruction of Muscovy. In so dilapidated a condition was the capital at this time that Michael had to wait for several weeks at the Troitsa monastery, 75 m. off, before decent accom- modation could be provided for him at Moscow. He was crowned on the 22nd of July. The first care of the new tsar was to clear the land of the robbers that infested it. Sweden and Poland were then got rid of respectively by the peace of Stolbova (March 10, 1617) and the truce of Deulina (Feb. 13, 1619). The most important result of the truce of Deulina was the return from exile of the tsar's father, who henceforth took over the government till his death in October 1633, Michael occupying quite a subordinate position. He was a gentle and pious prince who gave little trouble to any one and effaced himself behind his counsellors. Fortunately for him they were relatively honest and capable men. Michael's failure to wed his daughter Irene with Prince Waldemar of Denmark, in consequence of the refusal of the latter to accept orthodoxy, so deeply afflicted him as to contribute to bring about his death on the 12th of July 1645.

See R. Nisbet Bain, The First Romanovs (Lond., 1905). (R. N. B.)

MICHAEL, the name of nine East-Roman emperors.

Michael I. Rhangabes (d. 845), an obscure nobleman who had married Procopia, the daughter of Nicephorus I., and been made master of the palace. He was made emperor in a revolution against his brother-in-law, Stauracius (811).

Elected as the tool of the bigoted orthodox party in the Church, Michael diligently persecuted the iconoclasts on the northern and eastern frontiers of the empire, but meanwhile allowed the Bulgarians to ravage a great part of Macedonia "and Thrace; having at last taken the field in the spring of 813, he was defeated near Bersinikia, and Leo the Armenian was saluted emperor in his stead in the following summer. Michael was relegated as a monk to the island of Prote,

where he lived unmolested till his death in 845.

Michael II., called Psellus, ” the stammerer,” emperor 820-829, was a native of Amorium in Phrygia, who began life as a private soldier, but rose by his talents to the rank of general. He had favoured the enthronement of his old companion in arms Leo the Armenian (813), but, detected in a conspiracy against that emperor, had been sentenced to death in December 820; his partisans, however, succeeded in assassinating Leo and called Michael from the prison to the throne. The principal features of his reign were a struggle against his brother general, Thomas, who aimed at the throne (822-824); the conquest of Crete by the Saracens in 823; and the beginning of their attacks upon Sicily (827). In spite of his iconoclastic sympathies, he endeavoured to conciliate the image-worshippers, but incurred the wrath of the monks by entering into a second marriage with Euphrosyne, daughter of Constantine VI., who had previously taken the veil.

Michael III. (839-867), “the drunkard,” was grandson of Michael II., and succeeded his father Theophilus when three years old (842). During his minority the empire was governed by his mother Theodora, who in spite of several defeats inflicted upon her generals maintained the frontiers against the Saracens of Bagdad and Crete. The regent displayed her religious zeal by restoring image-worship (842) and persecuting the Paulician heretics, but she entirely neglected the education of her son. As a result Michael grew up a debauchee, and fell under the

sway of his uncle Bardas, who induced him to banish Theodora to a convent and practically assumed the chief control (857). Bardas justified this usurpation by introducing various internal reforms; in the wars of the period Michael himself took a more active part. During a conflict with the Saracens of the Euphrates (856-63), the emperor sustained a personal defeat (860), which was retrieved by a great victory on the part of his uncle Petronas in Asia Minor. In 861 Michael and Bardas invaded Bulgaria and secured the conversion of the king to Christianity. On sea the empire suffered under the ravages of the Cretan corsairs ; and in 865 the first pillaging expedition of the Russians endangered the Bosporus. In 867 Michael was assassinated by Basil the Macedonian, a former groom, who had overthrown the influence of Bardas and in 866 been associated in the Empire.

Michael IV. (d. 1041), ” the Paphlagonian,” owed his eleva- tion to Zoe, daughter of Constantine VIII., who was the wife of Romanus III., but becoming enamoured of Michael, her chamberlain, poisoned her

husband and married her attendant (1034). Michael, however, being of a weak character and subject to epileptic fits, left the government in the hands of his brother, John the Eunuch, who had been first minister of Constantine and Romanus. John's reforms of the army and financial system revived for a while the strength of the Empire, which held its own successfully against its foreign enemies. On the eastern frontier the important post of Edessa was relieved after a prolonged siege. The western Saracens were almost driven out of Sicily by George Maniakes (1038-40); but an expedition against the Italian Normans suffered several defeats, and after the recall of Maniakes most of the Sicilian conquests were lost (1041). In the north the Serbs achieved a successful revolt (1040), but a dangerous rising by the Bulgarians and Slavs which threatened the cities of Thrace and Macedonia was repressed by a triumphant campaign which the decrepit emperor undertook in person shortly before his death (1041).

Michael V. Calaphates, or " the caulker," nephew and successor of the preceding, surnamed after, the early occupa- tion of his father. He owed his elevation (Dec. 1041) to his uncle John, whom along with Zoe he almost immediately banished; this led to a popular tumult in consequence of which he was dethroned after a brief reign of four months, and relegated to a monastery. His unpopularity seems largely due to his attempts at administrative reform, which were strongly resented by the dominant classes.

Michael VI., " the warlike," was already an old man when chosen by the empress Theodora as her successor shortly before her death in 1056. He was unable to check the disaffection of the feudal aristocracy, who combined with an officer named Isaac Comnenus to depose him. After a successful battle in Phrygia, the rebels had no difficulty in dethroning Michael (1057), who spent the rest of his life in a monastery.

Michael VII. Ducas, or Parapinaces, was the eldest son of Constantine X. Ducas. After a joint reign with his brothers, Andronicus Land Constantine XL (1067-1071), he was made sole emperor through his uncle John Ducas. The feebleness of Michael, whose chief interest lay in trifling academic pursuits, and the avarice of his ministers, was disastrous to the empire. As the result of anarchy in the army, the Byzantines lost their last possessions in Italy (107 1), and were forced to cede a large strip of Asia Minor which they were unable to defend against the Seljuk Turks (1074). These misfortunes, which were but partially retrieved by the suppression of a Bulgarian revolt (1073), caused widespread dissatisfaction. In 1078 two generals, Nicephorus Bryennius and Nicephorus Botaniates, simultane- ously revolted.

Michael resigned the throne with hardly a struggle and retired into a monastery. His nickname Para- pinaces (" starver ") was due to his causing the price of wheat to rise.

Michael VIII. Palaeologtjs (1 234-1 282) was the son of Andronicus Palaeologus Comnenus and Irene Angela, the granddaughter of Alexius Angelus, emperor of Constantinople, At an early age he rose to distinction, and ultimately became

commander of the French mercenaries in the employment of the emperors of Nicaea. A few days after the death of Theodore Lascaris II. in 1259, Michael, by the assassination of Muzalon (which he is believed but not proved to have encouraged) became joint guardian with the patriarch Arsenius of the young emperor, John Lascaris, then a lad of eight years. Afterwards invested with the title of " despot," he was finally proclaimed joint-emperor and crowned alone at Nicaea on the 1st of January 1260. In July 1 261 Michael, who had attacked Constantinople with the help of the Genoese, conquered the town through his general Strategopoulos. He thereupon had John Lascaris blinded and banished. For this last act he was excommunicated by Arsenius, and the ban was not removed until six years afterwards (1268) on the accession of a new patriarch. In 1263 and 1264 respectively, Michael, with the help of Urban IV., concluded peace with Villehardouin, prince of Achaia, and Michael, despot of Epirus, who had previously been incited by the pope to attack him, but had been decisively beaten at Pelagonia in Thessaly (1259); Villehardouin was obliged to cede Mistra, Monemvasia and Maina in the Morea. Subsequently Michael was involved in wars with the Genoese and Venetians, whose influence in • Constantinople he sought to diminish by maintaining the balance of strength between them. In 1269 Charles of Sicily, aided by John of Thessaly, made war with the alleged purpose of restoring Baldwin to the throne of Constantinople, and pressed Michael so hard that he consented to send deputies to the council of Lyons (1274) and there accept the papal supremacy. The union thus brought about between the two Churches was, however, extremely distasteful to the Greeks, and the persecution of his " schismatic " subjects to which the emperor was compelled to resort weakened his power so much that Martin IV. was tempted to enter into alliance with Charles of Anjou and the Venetians for the purpose of reconquering Constantinople. The invasion, however, failed, and Michael so far had his revenge in the " Sicilian Vespers," which he

helped to bring about. He died in Thrace in December 1282. In reconstituting the Byzantine Empire Michael restored the old administration without endeavouring to correct its abuses. By debasing the coinage he hastened the decay of Byzantine commerce.

Michael IX. Palaeologus, was the son of Andronicus II. and was associated with him on the throne from 1295, but predeceased him (1.320). He took the field against the Turks (1301, 1310) and against the Grand Catalan Company (1305), but was repeatedly defeated.

See Gibbon's Decline and Fall (ed. Bury, 1896) ; G. Finlay, Hist, of Greece (ed. 1877); G. Schlumberger, VEpopee byzantine (1896); J. Bury, in Eng. Hist. Rev. (1889); Meliarakes, 'Itrropia toD /Sa

MICHAEL OBRENOVICH III. (1823-1868), Prince of Servia, was the youngest son of Prince Milosh, the founder of the Obrenovich dynasty. After the abdication of his father (1839) and the death of his elder brother Milan Obrenovich II. (1840) he ascended the throne of Servia. He wished to continue the work of his father, in liberating all the Servian people, and if possible all other Balkan Christians, from direct Turkish rule. But while this programme made the Sultan hostile, it also failed to win the support of Austria, which did not wish the Eastern Question to be opened by the ambitious Servian. The support which his aspirations found in Russia increased Turkey's and Austria's suspicions of the prince's activity. At the same time the political situation at home was not favourable to his anti- Turkish policy. The power was in the hands of men who had forced Obrenovich I. to abdicate, and feared that Obrenovich III. might avenge his father. They thought it safer for them to replace him on the throne by a man who was not an Obrenovich, and who would be personally obliged to them for his elevation. These motives were at the bottom of the revolt, started and led by Vuchich in August 1842, the outcome of which was that Prince Michael left the country and that his equerry, Alexander Karageorgevich, was elected Prince of Servia. As an exile Prince Michael lived principally in Vienna, improving his educa-

tion by studies and travels, and frequently visiting England. He constantly refused to agree to suggestions for his restoration by forcible means. His device was Tempus et meum jus, " Time and my right." He supported Servian authors and artists, and wrote himself a book in defence of his father Milosh against the attacks of Cyprian Robert. He wrote poetry too, and some of his songs, set to beautiful music, were very popular amongst the Servians. He married in 1856 the beautiful Julia, Countess Hunyadi.

In 1858 the Servians, having dethroned Prince Karageorgevich, recalled Michael's father Milosh Obrenovich I. Michael returned to Servia, and on his father's death (i860) ascended the Servian throne for the second time. ■ His proclamation " that henceforth the law is the highest will in Servia," opened a new era of strict legality and at the same time of entire emancipation from foreign influences, and more especially from Turkey's inter- ference with the internal affairs of Servia. The old constitution, granted to Servia by the sultan as the suzerain and the tsar as the protector of Servia as far back as 1839, was discarded and replaced, by one which limited the power of the oligarchic senate and gave a certain share in legislation to the " Narodna Skupshtina " (the National Assembly). He established the Servian national army and increased the regular army. Reforms in all branches of public administration were introduced, and Servia, until then a half-oriental and half-patriarchal state, was resolutely led to become a civilized country in a European sense. When in 1862 the Turkish garrison bombarded the town of Belgrade from its citadel, Prince Michael, supported by the European diplomacy, succeeded in obtaining evacuation of some of the smaller forts in Servia, but the strong fortress of Belgrade still remained garrisoned by the Turkish troops. Prince Michael now made vigorous political and military preparations for war against Turkey. He made secret arrangements with the Bulgarian, Bosnian and Albanian leaders, an alliance with Montenegro and an understanding with Greece, with the object that they all should rise if Servia declared war on Turkey. He even succeeded in obtaining Austria's promise, that it would observe an attitude of friendly neutrality and would have nothing against an eventual annexation of the largest part of Bosnia to Servia, and he secured to himself the sympathies of Napoleon III. and his government. In the beginning of 1867 he formally asked the Porte to withdraw the Turkish garrisons from the fortress of Belgrade, as well as from other two fortresses of minor importance (Shabats and Smederevo (Semendria)). For some time the chances were that a war would take place that spring (1867) between Servia and Turkey, but peace was kept by the action of Great Britain, who advised the sultan to withdraw the Turkish garrisons from the Servian fortresses; and this advice, backed by Russia, France and Austria, prevailed at last with the sultan. On the 26th of April 1867 the fortresses were delivered over to Prince Michael, who shortly afterwards went to Constantinople to thank the sultan personally.

Prince Michael's policy had triumphed. But his success was short-lived. A group of young men, mostly educated in France and Germany, now started a liberal movement under the leadership of

Yovan Ristich (or Ristitch). They wanted a more liberal constitution than that which Prince Michael had given; and this movement tended to qualify his popularity. Meanwhile the prince contemplated divorce from his wife Princess Julia, by whom he had no children, and marriage with the daughter of his cousin Madame Anka Constanitinovich ; and the adherents of the exiled Karageorgevich dynasty were alarmed at the prospect of his eventually having legal heirs to the throne. A former private secretary to Prince Alexander Karageorgevich, and two of the same prince's brothers-in-law, formed a conspiracy, which resulted in the brutal assassination of Prince Michael on the 29th of May (June 10 (O.S.), 1868), whilst he was walking in the park of Koshutnyak, a few miles distant from Belgrade. (C. Mi.)

MICHAELIS, JOHANN DAVID (1717-1791), German biblical

scholar and teacher, a member of a family which had the chief

I part in maintaining that solid discipline in Hebrew and the

cognate languages which distinguished the university of Halle in the period of Pietism. Johann Heinrich Michaelis (1668-1 738) was the chief director of A. H. Francke's Collegium orientale theologicum, a practical school of biblical and oriental philology then quite unique, and the author of an annotated Hebrew Bible and various exegetical works of reputation, especially the Adnotationes uberiores in hagiographos (1720). In his chief publications J. H. Michaelis had as fellow-worker his sister's son Christian Benedikt Michaelis (1680-1764), the father of Johann David, who was likewise influential as professor at Halle, and a sound scholar, especially in Syriac. J. D. Michaelis was trained for academical life under his father's eye. At Halle he was influenced, especially in philosophy, by Sigmund J. Baumgarten (1706-1757), the link between the old Pietism and J". S. Semler, while he cultivated his strong taste for history under Chancellor Ludwig. In 1 739-1 740 he qualified as university lecturer. One of his dissertations was a defence of the antiquity and divine authority of the vowel-points in Hebrew. His scholarship still moved in the old traditional lines, and he was also much exercised by religious scruples, the conflict of an inde- pendent mind with that submission to authority at the expense of reason encouraged by the Lutheranism in which he had been trained. A visit to England in 1

741-1742 lifted him out of the narrow groove of his earlier education. In passing through Holland he made the acquaintance of Albert Schultens (1686- 1750), whose influence on his philological views became all- powerful a few years later. At Halle Michaelis felt himself out of place, and in 1745 he gladly accepted an invitation to Gottingen as privatdozent. In 1746 he became professor extraordinarius, in 1750 ordinarius, and in Gottingen he remained till his death in 1791.

His intellect was active in many directions; universal learning indeed was perhaps one of his foibles. Literature — modern as well as ancient — occupied his attention; one of his works was a translation of four parts of Clarissa; and translations of some of the then current English paraphrases on biblical books manifested his sympathy with a school which, if not very learned, attracted him by its freer air. His oriental studies were reshaped by diligent perusal of the works of Schultens; for the Halle school, with all its learning, had no conception of the principles on which a fruitful connexion between Biblical and Oriental learning could be established. His linguistic work indeed was always hampered by the lack of manuscript material, which is felt in his philological writings, e.g. in his valuable Supple- menta to the Hebrew lexicons (1 784-1 792). l He could not become such an Arabist as J. J. Reiske (1716-1774); and, though for many years the most famous teacher of Semitic languages in Europe, he had little of the higher philological faculty, and neither his grammatical nor his critical work has left a permanent mark, with the exception perhaps of his text-critical studies on the Peshitta. 2 His tastes were all for such studies as history, antiquities, and especially geography and natural science. He had in fact started his university course as a medicinae cultor, and in his autobiography he half regrets that he did not choose the medical profession. In geography he found a field hardly touched since Samuel Bochart, in whose footsteps he followed in the Spicilegium geographiae hebraeorum exterae post Bochartum (1769-ˆ80); and to his impulse we owe the famous Eastern expedition conducted by Carsten Niebuhr. In spite of his doctrinal writings — which at the time made no little noise, so that his Compendium of Dogmatic (1760) was confiscated in Sweden, and the knighthood of the North Star was afterwards given him in reparation — it was the natural side of the Bible that really attracted him, and no man did more to introduce the modern method of studying Hebrew antiquity as an integral part of ancient Eastern life.

The personal character of Michaelis can be read between the lines

1 By a strange fortune of war it was the occupation of Gottingen by

the French in the Seven Years' War, and the friendly relations he formed with the officers, that procured him the Paris MS. from which he edited Abulfeda's description of Egypt.

2 Curae in actus apostolorum syriacos (1755).

of his autobiography with the aid of the other materials collected by J. M. Hassencamp (1743-1797) the editor (/. D. Michaelis Lebensbeschreibung, &c, 1793). The same volume contains a full list of his works. Besides those already mentioned it is sufficient to refer to his New Testament Introduction (the first edition, 1750, preceded the full development of his powers, and is a very different book from the later editions), his reprint of Robert Lowth's Praelec- tiones with important additions (1758-1762), his German translation of the Bible with notes (1773-1792), his Orientalische und exegetische Bibliothek (1775-1785) and Neue O. and E. Bib. (1786-1791), his Mosaisches Recht (1770-1771) and his edition of E. Castle's Lexicon syriacum (1787-1788). His Litterarischer Briefwechsel (1794-1796) contains much that is interesting for the history of learning in his time.

MICHAUD, JOSEPH FRANQOIS (1 767-1839), French his- torian and publicist, was born of an old family on the 19th of June 1767, at Albens, Savoy, was educated at Bourg-en- Bresse, and afterwards engaged in literary work at Lyons, where the events of 1789 first called out the strong dislike to revolutionary principles which manifested itself throughout the rest of his life. In 1791 he went to Paris, where, not without danger, he took part in editing several royalist journals. In 1796 he became editor of La Quotidienne, for his connexion with which he was arrested after the 13th of Vendemiaire; he succeeded in escaping his captors, but was sentenced to death par contumace by the military council. Having resumed the editorship of his newspaper on the establishment of the Directory, he was again proscribed on the 18th of Fructidor, but at the close of two years returned to Paris when the consulate had superseded the Directory. His Bourbon sympathies led to a brief imprisonment in 1800, and on his release he for the time abandoned journalism, and began to write or edit books. Along with his brother and two colleagues he published in 1806 a Biographie moderne, ou dictionnaire des hommes qui se sont fait un now, en Europe depuis 1789, the earliest work of its kind; and in 181 1 appeared the first volume of his Histoire des croisades and also the first volume of his Biographie universelle. In 1814 he resumed the editorship of La Quotidienne, and in the same year was elected Academician. In 181 5 his brochure entitled Histoire des quinze semaines ou le dernier regne de Bona- parte met with extraordinary success, passing through twenty- seven editions within a

very short time. His political services were now rewarded with the cross of an officer in the Legion of Honour and the modest post of king's reader, of which last he was deprived in 1827 for having opposed Peyronnet's " Loi d' Amour " against the freedom of the Press. In 1830-183 1 he travelled in Syria and Egypt for the purpose of collecting addi- tional materials for the Histoire des croisades; his correspondence with a fellow explorer, J. J. F. Poujoulat, consisting practically of discussions and elucidations of various points in that work, was afterwards published (Correspondance d' orient, 7 vols., 1833-1835). Like the Histoire, it is more interesting than exact. The Bibliotheque des croisades, in four volumes more, contained the " Pieces justificatives " of the Histoire. Michaud died on the 30th of September 1839, at Passy, where his home had been since 1832.

His Histoire des croisades was published in its final form in six volumes in 1840 under the editorship of his friend Poujoulat (9th ed., with appendix, by Huillard-Breholles, 1856). Michaud, along with Poujoulat, also edited Nouvelle collection des memoires pour servir d. I'histoire de France (32 vols., 1836-1844). See Sainte-Beuve, Causeries du lundi, vol. vii.

MICHAUX, ANDRE (1746-1802), French botanist and traveller, was born at Versailles on the 7th of March 1746. In 1779 he spent some time botanizing in England, and in 1780 he explored Auvergne, the Pyrenees and the north of Spain. In 1782 he was sent by the French government on a botanical mission to Persia. His journey began unfavourably, as he was robbed by Arabs of all his equipment except his books; but he gained influential support in Persia, having cured the shah of a dangerous illness. After two years he returned to France with a fine herbarium, and also introduced numerous Eastern plants into the botanic gardens of France. In 1785 he was sent by the French government to North America, and travelled with his son Francois Andre (1770-1855) through Canada,

Nova Scotia and the United States. On his return to France in 1797 he was shipwrecked and lost most of his collections. In 1800 he went to Madagascar to investigate the flora of that island, and died there on the 16th of November 1802. His work as a botanist was chiefly done in the field, and he added largely to what was previously known of the botany of the East and of America.

He wrote two valuable works on North American plants — the Histoire des chines de VAmfoique septentrionale (1801), with 36 plates, and the Flora B or eali- Americana (2 vols., 1803), with 51 plates. His son Francois published a Histoire des arbres forestiers de I'Ame'rique septentrionale (3 vols., 1810-1813), with 156 plates, of which an English translation appeared in 1817-1819 as The North American Sylva.

MICHEL, CLAUDE, known as Clodion (1738-1814), French sculptor, was born on the 20th of December 1738 in Nancy. Here and probably in Lille he spent the earlier years of his life. In 1755 he came to Paris and entered the workshop of Lambert Sigisbert Adam, his maternal uncle, a clever sculptor. He remained four years in this workshop, and on the death of his uncle became a pupil of J. B. Pigalle. In 1759 he obtained the grand prize for sculpture at the Academie Royale; in 1761 he obtained the first silver medal for studies from models; and in 1762 he went to Rome. Here his activity was considerable between 1767 and 1771. Catherine II. was eager to secure his presence in St Petersburg, but he returned to Paris. Among his patrons, which were very numerous, were the chapter of Rouen, the states of Languedoc, and the Direction generate. His works were frequently exhibited at the Salon. In 1782 he married Catherine Flore, a daughter of the sculptor Augustin Pajou, who subsequently obtained a divorce from him. The agitation caused by the Revolution drove Clodion in 1792 to Nancy, where he remained until 1798, his energies being spent in the decoration of houses. Among Clodion's works are a statue of Montesquieu, a " Dying Cleopatra," and a chimney- piece at present in the South Kensington Museum. One of his last groups represented Homer as a beggar being driven away by fishermen (1810). On the 29th of March 1814 Clodion died in Paris, on the eve of the invasion of Paris by the allies.

Thirion's Les Adam et Clodion (Paris, 1885) contains a list of the sculptor's works sold between 1767 and 1884. See also A. Jacquot, Les Adam et les Michel et Clodion (Paris, 1898).

MICHEL, CLEMENCE LOUISE (1830-1905), French anarchist, called la Vierge rouge de Montmartre, was born at the chateau of Vroncourt (Haute-Marne) on the 29th of May 1830, the daughter of a serving-maid, Marianne Michel, and the son of the house, Etienne Charles Demahis. She was brought up by her father's parents, and received a liberal education. After her grandfather's death in 1850 she was trained to teach, but her refusal to acknowledge Napoleon III. prevented her from serving in a state school. She found her way in 1866 to a school in the Montmartre quarter of Paris, where she threw

herself ardently into works of charity and revolutionary politics. She became violently anti-Bonapartist, and is said to have meditated the assassination of Napoleon. During the siege of Paris she joined the ambulance service, and untiringly preached resistance to the Prussians. On the establishment of the Commune she joined the National Guard. She offered to shoot Thiers, and suggested the destruction of Paris by way of vengeance for its surrender. She was with the Communards who made their last stand in the cemetery of Montmartre, and was closely allied with Theodore Ferr6, who was executed in November 187 1. This ardent attachment was perhaps one of the sources of the exaltation which marked her career, and gave many handles to her enemies. When she was brought before the 6th council of war in December 1871 she defied her judges and defended the Commune. She was sent as a convict to New Caledonia, among her companions being Henri Rochefort, who remained her friend till the day of her death. The amnesty of 1880 found her revolutionary ardour unchanged. She travelled throughout France, preaching revolution, and in 1883 she led a Paris mob which pillaged a baker's shop. For this she was condemned to six years' imprisonment, but was released in 1886, at the same

time as Prince Kropotkin and other prominent anarchists. After a short period of freedom she was again arrested for making inflammatory speeches. She was soon liberated, but, hearing that her enemies hoped to intern her in a lunatic asylum, she fled to England. She returned to France in 1895, and in 1902 was back in London. She was touring France and lecturing on behalf of anarchist propaganda when she died at Marseilles on the 10th of January 1905.

Her Mimoires (Paris, 1886) contain accounts of her trials. See also La Bonne Louise (Paris, 1906), by E. Girault.

MICHEL, FRANCISQUE XAVIER (1809-1887), French anti- quary, was born at Lyons on the 18th of January 1809. He became known for his editions of French works of the middle ages, and the French Government, recognizing their value, sent him to England (1833) and Scotland (1837) to continue his researches there. In 1839 he was appointed professor of foreign literature in the Faculte des lettres at Bordeaux. Between 1834 and 1842 he published editions of a large number of works written between the eleventh and fourteenth centuries in French, English and Saxon, including the Roman de la rose and the Chanson de Roland. Subsequently he published French translations of Goldsmith, Sterne, Shake- speare and Tennyson. He died in Paris on the 18th of May

1887.

His original works include Histoire des races maudites de la France et de I'Espagne (1847); Recherches sur le commerce pendant le moyen Age (1852-1854) ; Les Hcossais en France el les francais en Ecosse (1862); Etudes de philologie comparee sur I'argot (1856); Le Pays basque (1857); Histoire du commerce et de la navigation a Bordeaux (1867-1871); and, in conjunction with Edouard Fournier, Histoire des hotelleries, cabarets, hotels garnis (1851-1854).

MICHELANGELO (Michelagniolo Buonarroti) (1475- 1564), the most famous of the great Florentine artists of the Renaissance,* was the son of Ludovico Buonarroti, a poor gentle- man of that city, and of his wife Francesca dei Neri. The Buonarroti Simoni were an old and pure Florentine stock of the Guelf faction: in the days of Michelangelo's fame a connexion of the family with the counts of Canossa was imagined and admitted on both sides, but has no foundation in fact. Ludovico was barely able to live on the income of his estate, but made it his boast that he had never stooped to add to it by mercantile or mechanical pursuits. The favour of the Medici procured him temporary employment in minor offices of state, among them that of podesta. or resident magistrate for six months, from the autumn of 1474, at Castello di Chiusi and Caprese in the Casentino. At Caprese, on the 6th of March 1475, his second son Michelagniolo or Michelangelo was born. Immedi- ately afterwards the family returned to Florence, and the child was put to nurse with a marble-worker's wife of Settignano. His mother's health had already, it would seem, begun to fail; at all events in a few years from this time, after she had

borne her husband three more sons, she died. While still a young boy Michelangelo determined, in spite of his father's opposition, to be an artist. He had sucked in the passion, as he himself used to say, with his foster-mother's milk. After a sharp struggle his stubborn will overcome his father's pride of gentility, and at thirteen he got himself articled as a paid assistant in the workshop of the brothers Ghirlandaio Domenico Ghirlandaio, bred a jeweller, had become by this time the foremost painter of Florence. In his service the young Michelangelo laid the founda- tions of that skill in fresco with which twenty years afterwards he confounded his detractors at Rome. He studied also, like all the Florentine artists of that age, in the Brancacci chapel, where the frescoes of Masaccio, painted some sixty years before, still victoriously held their own; and here, in reply, to a taunt he had flung at a fellow-student, Torrigiano, he received the blow on the nose which disfigured him to his dying day.

Though Michelangelo's earliest studies were directed towards painting, he was by nature and predilection much more inclined to sculpture. In that art he presently received encouragement and training under the eye of an illustrious patron, Lorenzo dei Medici. On the recommendation, it is said, of Ghirlandaio, he was transferred, before the term of his apprenticeship as

a painter had expired, to the school of sculpture established by Lorenzo in the Medici gardens. Here he could learn to match himself against his great predecessor, Donatello, one of whose pupils and assistants, the aged Bertoldo, was director of the school, and to compare the works of that master and his Tuscan contemporaries with the antiques collected for the instruction of the scholars. Here, too, he could listen to discourses on Platonism, and steep himself in the doctrines of an enthusiastic philosophy which sought to reconcile with Christian faith the lore and the doctrines of the Academy. Michelangelo remained a Christian Platonist to the end of his days; he was also from his youth up a devoted student of Dante. His powers of mind and hand soon attracted attention, and secured him the regard and favour of his patrons in spite of his rugged exterior and scornful unsociable temper.

Michelangelo had been attached to the school and household of the Medici for barely three years when, in 1402, his great patron Lorenzo died. Lorenzo's son Piero dei Medici inherited the position but not the

qualities of his father; Florence soon chafed under his authority; and towards the autumn of 1494 it became apparent that disaster was impending over him and his adherents. Michelangelo was constitutionally subject to dark and sudden presentiments : one such seized him now, and without awaiting the popular outbreak, which soon followed, he took horse with two companions and fled to Bologna. There, being now in his twentieth year, he was received with kindness by a member of the Aldovrandi family, on whose commission he executed two figures of saints and one of an angel for the shrine of St Dominic in the church of St Petronius. After about a year, work at Bologna failing, and his name having been included in his absence on the list of artists appointed to provide a new hall of assembly for the great council of Florence, Michelangelo returned home. The strange theocracy established by Savonarola was now in force, and the whole character of civic life at Florence was for the time being changed. The influence of the fervent Dominican upon the mind and character of the young Michelangelo became as profound as that of the Platonists and of Dante. He was not left without employment. He found a friend in another Lorenzo, the son of Pierfrancesco dei Medici, for whom he at this time executed a statue of the boy St John. Having also carved a recumbent Cupid in imitation of the antique, it was suggested to him by the same patron that it should be so tinted and treated as to look like a real antique, and sold accordingly. Without increasing the price he put upon the work, Michelangelo for amusement lent himself to the counterfeit, and the piece was then actually sold for a large sum, as a genuine work of antiquity, to a Roman collector, Raffaelle Riario, cardinal di San Giorgio; the dealer appropriating the profits. When the cardinal discovered the fraud he caused the dealer to refund; but as to Michelangelo himself, it wak represented to the young sculptor that if he went to Rome the amateur who had just involuntarily paid so high a tribute to his skill would certainly befriend him. He set forth accordingly, and arrived at Rome for the first time at the end of June 1496. Such hopes as he may have entertained of countenance from the cardinal di San Giorgio were quickly dispelled. Neither did the banished Piero dei Medici, who also was now living at Rome, do anything to help him. On the other hand Michelangelo won the favour of a Roman nobleman, Jacopo Galli, and through him of the French cardinal Jean de Villiers de la Grolaie, abbot of St Denis. From the former he received a commission for a ” Cupid ” and a” Bacchus,” from the latter for a” Pieta. “or ” Mary lamenting over the body of Christ ” — works of which the two last named only are preserved. Equal originality of conception and magnificence of technical execution mark the two contrasted subjects — one as noble and the other as nearly ignoble as any- thing Michelangelo ever did — of the

mother with the dead son on her lap, indicating with a contained but eloquent gesture of her left hand a tragedy too great for outcries, and the titubant sensual young wine-god (a condition in which ancient art would never have exhibited the god himself, but only his satellites).

Michelangelo's stay in Rome at this time lasted five years — from the summer of 1406 till that of 1501. The interval had been one of extreme political distraction at Florence. The excitement of the French invasion, the mystic and ascetic regimen of Savonarola, the reaction which led to his overthrow, and finally the external wars and internal dissidences which preceded a new settlement, had all created an atmosphere most unfavourable to art. Nevertheless Ludovico Buonarroti, who in the troubles of 1494 had lost a small permanent appoint- ment he held in the customs, and had come to regard his son Michelangelo as the mainstay of his house, had been repeatedly urging him to come home. A spirit of family duty and family pride was the ruling principle in all Michelangelo's conduct. During the best years of his life he submitted himself sternly and without a murmur to pinching hardship and almost super- human labour for the sake of his father and brothers, who were ever selfishly ready to be fed and helped by him. Having now, after an illness, come home in 1501, Michelangelo was requested by the cardinal Francesco Piccolomini to adorn with a number of sculptured figures a shrine already begun in the cathedral of Siena in honour of the most distinguished member of his house, Pope Pius II. Four only of these figures were ever executed, and those not apparently, or only in small part, by the master's hand. A work of greater interest in Florence itself had diverted him from his engagement to his Sienese patrons. This was the execution of the famous colossal statue of David, popularly known as " the Giant." It was carved out of a huge block of marble on which another sculptor, Agostino d' Antonio, had begun unsuccessfully to work forty years before, and which had been lying idle ever since. Michelangelo had here a difficult problem before him. Without much regard to the traditional treatment of the subject or the historical character of his hero, he carved out of the vast but cramped mass of material an adolescent, frowning colossus, tensely watchful and self-balanced in preparation for his great action. The result amazed every beholder by its freedom and science of execution and its victorious energy of expression. All the best artists of Florence were called in council to determine on what site it should be set up, and after much debate the terrace of the palace of the Signory was chosen, in preference to the neighbouring Loggia dei Lanzi. Here accordingly the colossal " David " of Michelangelo took, in the month of May 1 504, the place which it continued to hold until in 1882 it was removed for the sake of

protection to a hall in the Academy of Fine Arts, where it inevitably looks crushed and cabined. Other works of sculpture belong to the same period: among them a second ” David,” in bronze and on a smaller scale, commissioned by the marechal Pierre Rohan and left by the young master to be finished by Benedetto da Rovezzano, who despatched it to France in 1508; a great rough-hewn ” St Matthew ” begun but never completed for the cathedral of Florence; a ” Madonna and Child ” executed on the commission of a merchant of Bruges; and two unfinished bas-reliefs of the same subject.

Neither was Michelangelo idle at the same time as a painter. Leaving disputed works for the moment out of sight, he in these days at any rate painted for his and Raphael’s common patron, Angelo Doni, the ” Holy Family ” now in the Uffizi at Florence. In the autumn of 1504, the year of the completion of the ” David,” he received from the Florentine state a commission for a work of monumental painting on a heroic scale. Leonardo da Vinci had been for some months engaged on his great cartoon of the ” Battle of Anghiari,” to be painted on the wall of the great hall of the municipal council. The gonfaloniere Piero Soderini now procured for Michelangelo the commission to design a companion work. Michelangelo chose an incident at the battle of Cascina during the Pisan war of 1364, when the Florentine soldiery had been surprised by the enemy in the act of bathing. He dashed at the task with his accustomed fiery energy, and had carried a great part of the cartoon to completion when, in the early spring of 1505, he broke off the work in order to obey a call to Rome which reached him from Pope Julius II. His unfinished cartoon, in its power over the varieties and contrasts

of energetic and vitally significant action, showed how greatly Michelangelo had profited by the example of his elder rival, Leonardo, little as, personally, he yielded to Leonardo’s charm or could bring himself to respond to his courtesy. The work of Michelangelo’s youth is for the most part comparatively tranquil in character. His early sculpture, showing a degree of science and perfection unequalled since the antique, has also something of the antique serenity. It bears strongly the stamp of intellectual research, but not by any means that of storm or strain. In the cartoon of the ” Bathers ” the qualities afterwards proverbially associated with Michelangelo — his furia, his UrribilitA, the tempest and hurricane of the spirit which accompanied his unequalled technical mastery and knowledge — first found

expression.

With Michelangelo's departure to Rome early in 1505 the first part of his artistic career may be said to end. It will be convenient here to recapitulate its principal results in sculpture and painting, both those preserved and those recorded but lost.

Sculpture. — Florence, 1489-1494. — " Head of a Faun," marble; lost. Condivi describes Michelangelo's first essay in sculpture as a head of an aged faun with a front tooth knocked out, this latter poinv having been an afterthought suggested by Lorenzo dei Medici. The nead is sometimes identified with one in the National Museum at Florence, which however bears no marks of Michelangelo's early style and is in all probability spurious. — " Madonna seated on a Step," bronze; Casa Buonarroti, Florence. This bas-relief, executed in imitation of the technical style of Donatello, is a genuine example of Michelangelo's early work in the Medicean school under Ber- toldo. — " Centauromachia," marble; Casa Buonarroti. A fine and genuine work in full relief, of probably somewhat later date than the last-mentioned. The subject occurs often in ancient sarcophagus reliefs: Michelangelo has followed the antique in his conception and treatment of the nude, but the arrangement of the subject is his own.

Bologna, 14Q4-14Q5. — Statuettes of " St Petronius," " St Proculus," and a " Kneeling Angel," marble; part of the decorations of the shrine of St Dominic in the church of that saint at Bologna: the style of all three much influenced by the work of Jacopo della Quercia in the same church; the attitude of the kneeling angel with the candelabrum imitated from an ancient bas-relief.

Florence, 1495-1496, — " St John in the Wilderness," executed for Lorenzo di Pierfrancesco dei Medici, marble; probably lost. De- clared in 1874 to have been found again in the possession of Count Gualandi-Rossalmini at Pisa. Vehement and prolonged discussion arose as to the authenticity of this newly-found S. Giovannino, and at last it was bought for the Berlin Museum, where its genuineness is still stoutly maintained. But the finicking and affected elegance of the conception denote a different temperament from Michelangelo's and probably a later date. With this figure must be given up also the restoration of an antique group of " Bacchus and Ampelus " at the Uffizi, which is clearly by the same hand and is claimed also as an early work of Michelangelo. — " Recumbent Cupid," bought by the cardinal San Giorgio as an antique, marble ; lost. The attempts to recognize it in certain extant copies or servile imitations of the antique, especially one now at Turin, must be held mistaken.

Rome, 1495-1501. — ” Virgin lamenting the dead Christ,” commissioned by the abbot de la Grolaie; marble, St Peter’s, Rome. — ” Bacchus and young Faun,” commissioned by Jacopo Galli; marble, National Museum, Florence. (Of these two masterpieces of Michelangelo’s youth enough has been said above). — ” Cupid,” commissioned by the abbot de la Grolaie ; marble ; lost ; has been commonly identified as the ” Kneeling Cupid ” of the Victoria and Albert Museum, but this, if by Michelangelo at all, which is not quite certain, must in all likelihood belong to a later time.

Florence, 1501-1506. — ” Five Saints, in niches decorating the shrine of Pius II.,” commissioned by the Piccolomini family; marble; cathedral of Siena. The contract for the sculptured decoration of this shrine was one of those which the pressure of other work pre- vented the artist from ever taking seriously in hand. Of the five saints in niches, traditionally reputed to be his work, the St Peter alone shows any clear marks of his style ; the other four were probably designed, and certainly carried out, by weaker hands. — ” David ” (the ” Gigante “), commissioned for the city of Florence by Piero Soderini; marble; Florence Academy. Besides what has been said above, it has only to be added that a wax model in the Casa Buonar- roti, showing nearly the same design with a different movement of the legs, is probably Michelangelo’s original sketch for the subject. ” David,” commissioned by Pierre Rohan: bronze, lost; a clay model in the National Museum, Florence, may probably be a sketch for it ; more than one bronze has been brought forward with claims to be the original, but- none has stood the test of criticism. ” Virgin and Child,” commissioned for Taddeo Taddei; circular relief, un- finished, marble; London, Royal Academy. The motive of the Christ-child frightened by the flutterings of the bird held out by St John is the most playful in all Michelangelo’s work; the whole design shows the influence of Leonardo in his gentler, as much as the cartoon of the ” Bathers ” shows it in his more violent, moods.

“Virgin and Child with St John,” commissioned by Bartolommeo Pitti; nearly circular relief, unfinished, marble; Florence, National Museum: a more tranquil and very charming presentment. ” Madonna and Child,” sold to the Mouscron family of Bruges (known in Italy as Moscheroni), and by them presented to the church of Notre Dame in that city; group in the round, marble; church of Notre Dame, Bruges. A meditative seated Virgin with upright head, the naked child seated between her knees, his smoothly rounded form in strong contrast with her complicated draperies. ” St Matthew “: one of a set of twelve statues of Apostles com- missioned by the consuls of the Arte della Lana for the cathedral at Florence; marble; National Museum,

Florence. Unfinished (only roughly blocked out), the other figures of the set never having been so much as begun; the contract was signed in 1503 and cancelled in 1505. There is an early drawing by Raphael from this statue.

Painting. — ” Holy Family*” painted for Angelo Doni; tempera, circular: Florence, Uffizi. The only perfectly well-attested panel painting of Michelangelo which exists. His love of restless and some-what strained actions is illustrated by the gesture of the Madonna, who kneels on the ground holding up the child on her right shoulder; his love of the nude by the introduction (wherein he follows Luca Signorelli) of some otherwise purposeless undraped figures in the background. “Virgin and Child with Four Angels”; tempera; National Gallery, London. This unfinished painting, strongly marked by the influence of Michelangelo in his work at this period, has been confidently claimed for him, but lacks his strength and mastery, and is far more probably the work of his imitator and intimate associate, Francesco Granacci. ” Cartoon of the Bathers ” ; lost and utterly perished. The only authentic records of it are contained in a few early engravings by Marcantonio and Agostino Veneziano and a certain number of sketches and studies by the master himself, chiefly at the Albertina, Vienna, the British Museum and the University Galleries, Oxford. An elaborate drawing of many figures at Holkham Hall, well known and often engraved, seems to be a later cento destitute of real authority.

Michelangelo had not been long in Rome before Pope Julius devised fit employment for him. That capacious and head- strong spirit, on fire with great enterprises, had conceived the idea of a sepulchral monument to commemorate his glory when he should be dead, and to be executed according to his own plans while he was still living. He entrusted this congenial task to Michelangelo. The design being approved, the artist spent the winter of 1 505-1 506 at the quarries of Carrara, superin- tending the excavation and shipment of the necessary marbles. In the spring he returned to Rome, and when the marbles arrived fell to with all his energy at the preparations for the work. For a while the pope followed their progress eagerly, and was all kindness to the young sculptor. But presently his disposi- tion changed. In Michelangelo’s absence an artist who was no friend of his, Bramante of Urbino, had been selected by Julius to carry out a new architectural scheme, commensurate with the usual vastness of his conceptions, viz. the rebuilding of St Peter’s church. To the influence and the malice of Bramante Michel- angelo attributed the unwelcome invitation he now received to interrupt the great work of sculpture which he had just begun in order to decorate the Sixtine chapel with

frescoes. Soon, however, schemes of war and conquest interposed to divert the thoughts of Julius, not from the progress of his own monument merely, but from artistic enterprises altogether. One day Michelangelo heard him say at table to his jeweller that he meant to spend no more money on pebbles, either small or great. To add to the artist's discomfiture, when he went to apply in person for payments due, he was first put off from day to day, and at last actually with scant courtesy dismissed. At this his dark mood got the mastery of him. Convinced that not his employment only but his life was threatened, he suddenly took horse and left Rome, and before the messengers of the pope could overtake him was safe on Florentine territory. Michel- angelo's flight took place in April 1506. Once among his own people, he turned a deaf ear to all overtures made from Rome for his return, and stayed throughout the summer at Florence, how occupied we are not distinctly informed, but apparently, among other things, on the continuation of his great battle cartoon.

During the same summer Julius planned and executed the victorious military campaign which ended with his unopposed entry at the head of his army into Bologna. Thither, under strict safe-conduct and promises of renewed favour, Michelangelo

was at last persuaded to betake himself. Julius received the truant artist kindly, as indeed between these two volcanic natures there existed a natural affinity, and ordered of him his own colossal likeness in bronze, to be set up, as a symbol of his conquering authority, over the principal entrance of the church of St Petronius. For the next fifteen months Michelangelo devoted his whole strength to this new task. The price at which he undertook it left him, as' it turned out, hardly any margin to subsist on. Moreover in the technical art of metal casting he was inexperienced, and an assistant whom he had summoned from Florence proved insubordinate and had to be dismissed. Nevertheless his genius prevailed over every hardship and difficulty, and on the 21st of February 1508 the majestic bronze colossus of the seated pope, robed and mitred, with one hand grasping the keys and the other extended in a gesture of benediction and command, was duly raised to its station over the church porch. Three years later it was destroyed in a revolution. The people of Bologna rose against the authority of Julius; his delegates and partisans were cast out, and his effigy hurled from its place. The work of Michel- angelo, after being trailed in derision through the streets, was broken

up and its fragments cast into the furnace.

Meanwhile the artist himself, as soon as his work was done, had followed his reconciled master back to Rome. The task that here awaited him, however, was after all not the resumption of the papal monument, but the execution of the series of paintings in the Sixtine chapel which had been mooted before his departure. Painting, he always averred, was not his business; he was aware of his enemy's hopes that a great enter- prise in fresco-painting would prove beyond his powers; and he entered with misgiving and reluctance upon his new undertaking. Destiny, however, so ruled that the work thus thrust upon him remains his chief title to glory. His history is one of indomitable will and almost superhuman energy, yet of will that hardly ever had its way, and of energy continually at war with circumstance. The only work which in all his life he was able to complete as he had conceived it was this of the decoration of the Sixtine ceiling. The pope had at first desired a scheme including figures of the twelve apostles only. Michelangelo began accordingly, but could rest content with nought so meagre, and soon proposed instead a design of many hundred figures embodying the story of Genesis from the Creation to the Flood, with accessory personages of prophets and sibyls dreaming on the new dispensa- tion to come, and, in addition, those of the forefathers of Christ. The whole was to be enclosed and divided by an elaborate framework of painted architecture, with a multitude of nameless human shapes supporting its several members or reposing among them — shapes mediating, as it were, between the features of the inanimate framework and those of the great dramatic and prophetic scenes themselves. The pope bade the artist do as he pleased. By May 1508 the preparations in the chapel had been completed and the work begun. Later in the same year Michelangelo summoned a number of assistant painters from Florence. Trained in the traditions of the earlier Florentine school, they were unable, it seems, to interpret Michelangelo's designs in fresco either with sufficient freedom or sufficient uniformity of style to satisfy him. At any rate he soon dismissed them, and carried out the remainder of his colossal task alone, except for the necessary amount of purely mechanical and subordinate help. The physical conditions of prolonged work, face upwards, upon this vast expanse of ceiling were adverse and trying in the extreme. After four and a half years of toil the task was accomplished. Michelangelo had during its progress been harassed alike by delays of payment and by hostile intrigue, his ill-wishers casting doubts on his capacity, and vaunting the superior powers of Raphael. That gentle spirit would by nature have been no man's enemy, but unluckily Michelangelo's moody, self-concentrated

temper prevented the two artists being on terms of amity such as might have stopped the mouths of mischief-makers. Absolute need of funds for the furtherance of the undertaking constrained him at one moment to break off work and pursue his inconsiderate patron

as far as Bologna. This was between September 1510, by which time the whole of the great series of subjects along the centre of the vault were completed, and January 151 1, when the master set to work again and began filling the complicated lateral spaces of his decorative scheme.

The main field of the Sixtine ceiling — in form a depressed barrel vault — is divided in, Michelangelo's scheme into four larger, alternating with five smaller fields. The following is the order of the subjects depicted in them: (1) the dividing of the light from the darkness; (2) the creation of sun, moon and stars; (3) the creation of the waters; (4). the creation of man; (5) the creation of woman; (6) the temptation and expulsion; (7) the sacrifice of Noah; (8) the deluge ; (9) the drunkenness of Noah. The figures in the last three of these scenes are on a smaller scale than those in the first six. In numbers I, 3, 5, 7 and 9 the field of the picture is reduced by thfe encroachments of the architectural framework with its seated pairs of supporters, commonly known as " Slaves " or " Atlases." Flank- ing these smaller compositions, along the lateral spaces between the crown of the vault and the walls on either side, are seated figures of prophets and sibyls alternately; two other prophets are introduced at each extremity of the series — making seven prophets and five sibyls in all. In the triangles to right and left of the pro- phets at the two extremities are the death of Goliath, the death of Holofernes, the brazen serpent and the punishment of Haman. In the twelve lunettes above the windows are groups of the ancestors of Christ, their names designated by inscriptions, and in the twelve triangles above them (between the prophets and sibyls) other kindred groups crouched or sitting. These last are all shown in relatively simple human actions and household relations, heightened but not falsified by the artist's genius, and rising into majestic significance from roots deep in daily human nature. The work represents all the powers of Michelangelo at their best. Disdaining all the accessory allurements of the painter's art, he has concentrated himself upon the exclusive delineation of the human form and face at their highest power. His imagination has conceived, and his knowledge and certainty of hand have enabled him to realize, attitudes and combinations of unmatched variety and grandeur, and countenances of unmatched expressiveness and power. But he has not trusted, as he came later to trust, to science and acquired knowledge merely; neither do his personages, so far as they did afterwards,

transcend human possibility or leave the facts of actual life behind them. The profoundest knowledge and the most search- ing realism serve to embody all this inspiration and sustain all this sublimity; the sublimity, moreover is combined with the noblest elements of grace and even of tenderness. As for the intellectual meanings of his vast design, over and above those which reveal themselves at a first glance or by a bare description, they are from the nature of the case inexhaustible, and can never be per- fectly defined. Whatever the soul of this great Florentine, the spiritual heir of Dante, with the Christianity of the middle ages not shaken in his mind, but expanded and transcendentalized, by the knowledge and love of Plato ; — whatever the soul of such a man, full of suppressed tenderness and righteous indignation, and of anxious questionings of coming fate could conceive — that Michel- angelo has expressed or shadowed forth in this great and significant scheme of paintings. The powers of the artist seem to have expanded with the progress of his work. He seems to have begun (as the spectator entering the chapel has to begin) with what is chrono- logically the last subject of the series, the drunkenness of Noah, and to have worked backwards, increasing the scale of his figures for their better effect from the fourth subject (the Temptation and Expulsion), and rising in ascending scale of majesty through the successive acts of creation from the last to the first.

The Sixtine chapel was no sooner completed than Michelangelo resumed work upon the marbles for the monument of Julius. But four months only had passed when Julius died. His heirs immediately entered (in the summer of 1513) into a new contract with Michelangelo for the execution of the monument on a reduced scale. What the precise nature and extent of the original design had been we do not know, only that the monument was to be detached from the wall, and to stand four-square and free — a thing hitherto unknown in Renaissance sepulchral architecture — in one of the chapels of St Peter's. But the new design was extensive and magnificent enough. It was to consist of a great three-sided structure, two courses high, projecting from the church wall, and decorated on its three unattached sides with statues. On the upper course was to be placed the colossal recumbent figures of the pope, with a vision of the Virgin and Child above him, angels mourning at the sides, and prophetic and allegoric personages at the angles — sixteen figures in all. The lower course was to be enriched with twenty- four figures in niches and on projecting pedestals: in the niches, Victories; in front of terminal pilasters between them,

slaves or captives denoting; it would seem, either conquered provinces or arts and sciences in bondage after their patron's death. A much injured and not indisputable sketch by the master at Berlin, with a copy of the same by Sacchetti, are supposed to show the design at this stage of its reduction. The entire work was to be completed in nine years' time. During the next three years, it would seem, Michelangelo brought to completion three at least of the promised figures, for which the blocks had reached Rome from Carrara as early as July 1508; and they are among the most famous of all existing works of the sculptor's art — namely, the " Moses," now in the church of S. Pietro in Vincoli at Rome and the two " Slaves " at the Louvre.

The " Moses," originally intended for one of the angles of the upper course, is now placed at the level of the eye; in the centre of the principal face of the monument as it was at last finished, on a deplorably reduced and altered scale, by Michelangelo and his assistants in his old age. The prophet, supposed to have just come down from Mount Sinai and found the Israelites worshipping the golden calf, sits, heavily bearded and draped, with only his right arm bare, his left foot drawn back, his head raised and turned to the left, his left hand laid on his lap and his right grasping the tables of the law — an incarnation of majestic indignation and menace. The work, except in one or two places, is of the utmost finish, and the statue looks like one of the prophets of the Sixtine ceiling done in marble. The "Slaves" at the Louvre are youthful male figures of equally perfect execution, nude but for the band which passes over the breast of one and the right leg of the other. One, with his left hand raised to his head and his right pressed to his bosom, his eyes almost closed, seems succumbing to the agonies of death; the other, with his arms bound behind his back, looks upward still hopelessly struggling. All three of these figures were finished between 1513 and 1516.

By 1516 Michelangelo's evil star was again in the ascendant. Julius II. had been succeeded on the papal throne by Cardinal Giovanni de' Medici under the title of Leo X. The Medici, too, had about the same time by force and fraud re-established their sway in Florence, overthrowing the free institutions that had prevailed there since the days of Savonarola. Now, on the one hand, this family were the hereditary friends and patrons of Michelangelo; on the other hand he was a patriotic son of republican Florence; so that henceforward his personal allegiance and his political sympathies were in conflict. Over much of his art, as has been thought, the pain and perplexity of this conflict have cast their shadow. For the present the consequence to

him of the rise to power of the Medici was a fresh interruption of his cherished work on the tomb of Julius. Leo X. and his kinsmen were full of a vast new scheme for the enrichment and adornment of the facade of their own family church of San Lorenzo in Florence. Michelangelo, carried away by the idea and forgetful of his other still great and onerous task, offered his services for the new facade. They were eagerly accepted, although for a moment the idea had been entertained of entrust- ing the work to Leonardo da Vinci. The heirs of Julius on their part showed an accommodating temper, and -at the request of Leo allowed their three-years'old contract to be cancelled in favour of another, whereby the scale and sculptured decora tions of the Julian monument were again to be reduced by nearly a half. Michelangelo soon produced for the San Lorenzo facade a design of combined sculpture and architecture as splendid and ambitious in its way as had been that for the original monu- ment of Julius. The contract was signed in January 1518, and the artist went to Carrara to superintend the excavation of the marbles.

Michelangelo was now in his forty-fourth year. Though half his life was yet to come, yet its best days had, as it proved, been spent. All the hindrances which he had encountered hitherto were as nothing to those which began to beset him now. For the supply of materials for the facade of San Lorenzo he had set a firm of masons to work, and had himself, it seems, entered into a kind of partnership with them, at Carrara, where he knew the quarries well, and where the industry was hereditary and well understood. When all was well in progress there under his own eye, reasons of state induced the Medici and the Florentine magistracy to bid him resort instead to certain new quarries

at Pietrasanta, near Serravalle in the territory of Florence. Hither, to the disgust of his old clients at Carrara and to his own, Michelangelo accordingly had to transfer the scene of his labours. Presently he found himself so impeded and enraged by the mechanical difficulties of raising and transporting the marbles, and by the disloyalty and incompetence of those with whom he had to deal, that he was fain to throw up the commission altogether. The contracts for the facade of San Lorenzo were rescinded in March 1518, and the whole magnificent scheme came to nothing. Michelangelo then returned to Florence, where proposals of work poured in on him from many quarters. The king of France desired something from his hand to place beside the two pictures he possessed by Raphael. The authorities of Bologna wanted him to design a facade for their church of St Petronius; those of Genoa to cast a statue in bronze of their great commander, Andrea Doria. Cardinal Grimani begged hard for any picture or statue he might have to spare; other amateurs importuned

him for so much as a pencil drawing or sketch. Lastly his friend and partisan Sebastian del Piombo at Rome, ever eager to keep up the feud between the followers of Michelangelo and those of Raphael, besought him on Raphael's death to return at once to Rome, and take out of the hands of the dead master's pupils the work of painting still remaining to be done in the Vatican chambers. Michelangelo complied with none of these requests. All that we certainly know of his doing between 1518 and 1522'is the blocking out in the rough of four more of the " Slaves " for the tomb of Julius, and carrying out a commission, which he had received from three citizens of Rome as early as 1 514, for a statue of the risen Christ. The roughed-out " Slaves " now stand immured in a grotto in the Boboli Gardens, Florence; the Christ, practically finished by the master but with the last touches added by pupils, stands in the church, for which it was destined, of Sta Maria sopra Minerva at Rome; there is little in it either of devotional spirit or imaginative power, although, in those parts which Michelangelo himself finished, there is extreme accomplishment of design and workmanship.

The next twelve years of Michelangelo's life (1522-1534) were spent at Florence, and again employed principally in the service of his capricious and uncongenial patrons — the Medici. The plan of a great group of monuments to deceased members of this family, to be set up in a new sacristy or mortuary chapel in San Lorenzo, was first broached to Michelangelo in 1520 by Cardinal Giulio de' Medici. No practical impulse, however, was given to the work until Giulio, after the death of Leo X. and the brief pontificate of the puritanical and iconoclastic Adrian VI., had in his turn become pope in 1523 under the title of Clement VII. Even then the impulse was a wavering one. First Clement proposed to associate another artist, Sansovino, with Michelangelo in his task. This proposal being on Michelangelo's peremptory demand abandoned, Clement next distracted the artist with an order for a new architectural design — that, namely, for the proposed Medicean or " Lauren- tian " library. When at last after many changes of scope and scheme the plans for the sepulchral chapel or " Sagrestia nuova " took shape, they did not include, as had been at first intended, memorials to the founders of the house's greatness, Cosimo (pater patriae) and Lorenzo the Magnificent, or even to Pope Leo X. himself, but only to two younger members of the house lately deceased, Giuliano, duke of Nemours, and Lorenzo, duke of Urbino. Michelangelo brooded long over various designs for this work, and was still engaged on its execution — his time being partly also taken up by the building-plans for the Medicean library — when political revolutions interposed to divert his industry. In 1527 came to pass the

sack of Rome by the Austrians, and the apparently irretrievable ruin of Pope Clement. The Florentines seized the occasion to expel the Medici from their city, and set up a free republican government once more. Naturally no more funds for the works in San Lorenzo were forthcoming, and Michelangelo, on the invitation of the new signory, occupied himself for a while with designs for a group of Hercules and Cacus, and another of Samson

and the Philistines — the latter to be wrought out of a block of marble which had been rough-hewn already for another purpose by Baccio Bandinelli. Soon, however, he was called to help in defending the city itself from danger. Clement and his enemy Charles V. having become reconciled, both alike were now bent on bringing Florence again under the rule of the Medici. In view of the approaching siege, Michelangelo was appointed engineer-in-chief of the fortifications. He spent the early summer of 1529 in strengthening the defences of San Miniato; from July to September he was absent on a diplomatic mission to Ferrara and Venice. Returning in the middle of the latter month, he found the cause of Florence hopeless from internal treachery and from the overwhelming strength of her enemies. One of his dark seizures overcame him, and he departed again suddenly for Venice. There for a while he remained, negotiating for a future residence in France. Then, while the siege was still in progress, he returned once more to Florence; but in the final death-struggle of her liberties he bore no part. When in 1530 the city submitted to her conquerors, no mercy was shown to most of those who had taken part in her defence. Michelangelo believed himself in danger with the rest, but on the intervention of Baccio Valori he was presently taken back into favour and employment by Pope Clement. For four years more he continued to work at intervals on the completion of the Medici monuments, with the help from 1532 of Giovanni Montorsoli and other pupils, and on the building of the Lauren- tian library. In 1531 he suffered a severe illness; in 1532 he made a long stay at Rome, and entered upon yet another contract for the completion of the Julian monument, to be reduced now to a still more shrunken scale and to be placed not in St Peter's but in the church of San Pietro in Vincoli. In the autumn of 1534 he left Florence for good. What remained to be done in the Medici chapel was done by pupils, and the chapel was not finally opened to view until 1545.

The statues of the Medici monument take rank beside the " Moses"

and the ” Slaves ” as the finest work of Michelangelo’s central time in sculpture. They consist of a Madonna and Child and of the two famous monumental groups, each composed of an armed and seated portrait-statue in a niche, with two emblematic figures reclining on each side of a sarcophagus below. The ” Madonna and Child ” (left unfinished because the marble was short in bulk) combines astonishingly the divers qualities of realistic motive and natural animation with learned complexity of design and imposing majesty of effect. It was set up finally — not at all in accordance with the artist’s first intention — against a blank wall of the chapel, and flanked at wide intervals by statues of Sts Cosmo and Damian, the work of pupils. The portraits are treated not realistically but typically. In that of Lorenzo seems to be typified the mood of crafty brooding and concentrated inward thought; in that of Giuliano, the type of alert and confident practical survey immediately preceding action. To this contrast of the meditative and active characters corresponds a contrast in the emblematic groups accompanying the portraits. At the feet of the duke Giuliano recline the shapes of ” Night ” and ” Day ” — the former a female, the latter a male, personification; the former sunk in an attitude of deep but uneasy slumber, the latter (whose head and face are merely blocked out of the marble) lifting himself in one of wrathful and disturbed awakening. But for Michelangelo’s unfailing grandeur of style, and for the sense which his works convey of a compulsive heat and tempest of thought and feeling in the spirit that thus conceived them, both these attitudes might be charged with extravagance. As grand, but far less violent, are those of the two companion figures that recline between sleep and waking on the sarcophagus of the pensive Lorenzo. Of these, the male figure is known as ” Evening,” thefemale as ” Morning” (Crepus culo and Aurora). In Michelangelo’s original idea, partly founded on antique precedent in pedimental and sarcophagus groups, figures of ” Earth ” and ” Heaven ” were to be associated with those of ” Night ” and ” Day ” on the monument of Giuliano, and others — no doubt of a corresponding nature, with those of the Morning and Evening Twilight on that of Lorenzo. These figures afterwards fell out of the scheme and the recesses designed for them remain empty. Michelangelo’s obvious and fundamental idea was, as some words of his own record, to exhibit the elements and the powers of earth and heaven lamenting the death of the princes. River-gods were to recline on the broad bases at the foot of the monuments. These too are lacking. They were never finished, but a bronze cast from a small model of one of them, and the torso of a large model, have lately been identified, the former in the National Museum and the latter in the Academy at Florence.

Other works of 1522-1534. — ” Victory ” marble (National Museum, Florence). A youthful conqueror standing over a bearded enemy,

whose shoulders he crushes down with his left knee. Fine and finished work : whether intended for one of the emblematic Victories of the Julian monument, or having some connexion with the ” Hercules and Cacus ” and ” Samson and the Philistine,” subjects undertaken for the Signory in 1528, must remain uncertain. For the former of these two subjects a wax model at the Victoria and Albert Museum, for the latter a plaster model at the Casa Buonarroti, are claimed, perhaps rightly, as original. ” David ” (formerly called ” Apollo “), marble, unfinished (National Museum, Florence). Both the authenticity and the approximate date of this fine work are beyond doubt : of its origin and destination we are uninformed. ” Crouching boy,” marble, unfinished (the Hermitage, Petersburg). Another masterly sketch in marble; the seated lad stoops forward between his parted knees, having both hands occupied with his left foot; the figure blocked out of the marble, with the least possible sacrifice of the material; the subject and motive enigmatical. ” Cupid,” kneeling, apparently in the act of shooting downward with a bow, marble (Victoria and Albert Museum). Probably, but not quite certainly, authentic; if so, then of 1530 or thereabouts; its identification with the early Cupid done for Jacopo Galli at Rome in 1496 is untenable. ” Leda,” painting, done for the duke of Ferrara, but withheld because of the misconduct of his messenger, and given by the master to his pupil Antonio Mini in 1531; lost. A fine injured tempera painting of the subject in the store-rooms of the National Gallery in London may presumably be an early copy.

Michelangelo had fully purposed, as soon as he could get free of his task on the Medici tombs, to devote all his powers to the completion of the Julian monument in accordance with the new contract of 1532. But his intention was again frustrated. Pope Clement insisted that he must complete his decorations of the Sixtine Chapel by painting anew the great end wall above the altar, adorned until then by frescoes of Perugino. The subject chosen was the Last Judgment; and Michelangelo began to prepare sketches. In the autumn of 1534, in his sixtieth year, he settled finally, and for the remainder of his life, at Rome. Immediately afterwards Clement died, and was succeeded by a Farnese under the title of Paul III. Even more than his predecessor, Paul insisted on claiming the main services of Michelangelo for himself, and forced him to let all other engage- ments drift. For the first seven years after the artist’s return to Rome, his time was principally taken up with the painting of the colossal and multitudinous ” Last Judgment.” This being completed in 1541, he was next compelled to undertake two more great frescoes — one of

the Conversion of Paul and another of the Martyrdom of Peter — in a new chapel which the pope had caused to be built in the Vatican, and named after himself — Capella Paolina.

The fresco of the ” Last Judgment ” in the Sixtine Chapel is probably the most famous single picture in the world. In it Michelangelo shows more than ever the omnipotence of his artistic science, and the fiery daring of his conceptions. But the work, so far as its deplorably deteriorated condition admits comparison, is hardly comparable in the qualities of colour and decorative effect to the earlier and far more nobly inspired frescoes of the ceiling. It is to these and not to the ” Last Judgment ” that the student must turn if he would realize what is best and greatest in the art of Michelangelo.

The frescoes of the Pauline Chapel are on their part so injured as to be hardly susceptible of useful study or criticism. In their ruined state they bear evidence of the same tendencies that made the art of Michelangelo in its latest phase so dangerous an example to weaker men — the tendency, that is, to seek for unqualified energy and violence of action, both in place and out, for ” terribleness ” quand mime, and to design actions not by help of direct study from nature, but by scientific deduction from the abstract laws of structure and movement. At best these frescoes can never have been happy examples of Michelangelo’s art.

Other Work of the years 1534-1549. Sculpture. — During the fifteen years when Michelangelo was mainly engaged on these paintings, he had also at last been enabled to acquit himself, although in a manner that can have been satisfactory to none concerned, of his engagements to the heirs of Julius. Once more the influence of the pope had prevailed on them to accept a compromise alto- gether to their disadvantage. By a final contrast dated 1542, it was agreed that the ” Moses ” executed thirty years before, seated on a low plinth in a central recess, should be the chief figure of the new

scheme ; in niches at either side of him were to be standing: figures of ” Leah “and” Rachel.” These Michelangelo himself executed hastily with the help of assistants. To pupils entirely was left the carrying out of the upper cornice, with the recumbent effigy of the pope occupying the centre of a weak and incongruous’ architectural scheme, a Madonna and Child in a niche above, and a prophet and a sibyl in

recesses at either side. Meantime all idea of incorporating any of the ” Slaves ” in the new design had been abandoned. The master gave the two that had been finished in 1513-1516 to Robert Strozzi, who gave them to Francis I.; while the fourthat had been roughed out between 1518 and 1522 remained at Florence. ” Brutus,” marble (National Museum, Florence). Probably executed soon after 1539, in memory of the tyrannicide Lorenzino de’ Medici. To the end of this period or to a year or two later belongs the infinitely pathetic unfinished sketch in marble of a life-size ” Pietd, ” (Palazzo Rondini, Rome) — the mourning mother, standing on an elevation behind her son, holds his body upright in front of her by the shoulders. Still later, after 1550, is the more complicated and. more finished group of the ” Pieti,” with the corpse of Christ collapsing in utter relaxation through the arms of those who try to uphold it : this Michelangelo destined for his own sepulchre ; it stands now in the cathedral at Florence.

Painting. — “The Entombment of Christ” (National Gallery, London). This unfinished painting bears all the marks of Michel- angelo’s design, and must have been begun from a cartoon by him, probably of about 1 535-1540. The touch of his own hand seems evident in some parts, particularly the body of Christ ; other parts, in various degrees of incompletion, are apparently the work of various pupils or imitators.

For nearly all his great life-works mentioned above, preparatory sketches and studies by the master’s hand exist. These, with a large number of other drawings, finished and unfinished, done for their own sakes and not for any ulterior use, are of infinite value and interest to the student. Michelangelo was the most learned and scientific as well as the most inspired and daring of draughtsmen, and from boyhood to extreme old age never ceased to practise with

Een, chalk or pencil. He is said to have burned vast numbers of is drawings with his own hand and caused others to be burned by friends and pupils to whom he had given them; so that what we possess must be less than a tithe of what he executed. But there are some 250 genuine sheets — enough to let us follow and understand his modes of conceiving, preparing and maturing his designs at all periods of his life. They are scattered amongst various collections, chiefly public; those in England (at the British Museum, the University Galleries, Oxford, and the Royal Library, Windsor), are quite half the whole number; other important examples remain still at what was for centuries the home of his heirs, the Casa Buonarroti at Florence; others at the Uffizi, Florence; the Venice Academy; the Albertina, Vienna; the Louvre; the Cond6 Museum at Chantilly ; the Berlin

Museum ; and, not least, the Teyler Museum at Haarlem. By means of these drawings and the many published facsimiles we are best able to trace the progress of the master's genius and its secrets. We see him diligently copying in youth from the frescoes of Giotto, Masaccio, and his own master Ghirlandaio. At this date his instrument was the pen only, used in a manner of hatching: sometimes extremely careful and close, at others fiercely bold and free, and in either case all his own. Sketches and studies thus drawn with the pen exist for the " David," the " Bathers Surprised," the accessory figures for the tomb of Julius as first conceived, and the great series of the Sixtine Chapel decorations. By, or even before, the date of the Sixtine Chapel, chalk, red or black, comes into use along with the pen, and many of the finest studies for the " Slaves " or " Atlases " and other decorative figures of the ceiling are in the latter material (many more studies are preserved for these subordinate figures than for the main compositions). After the Sixtine Chapel period the pen gives way to red or black chalk almost entirely. Sketches are rare for the great abortive scheme of the Julius monument; almost non-existent for the equally abortive San Lorenzo facade; fairly abundant for the various stages of the iMedici monument scheme in its architectural parts, but not for the great figures. About the time of Michelangelo's .final change of domicile from Florence to Rome (1532-1535) he began the practice of making highly finished and fully shaded drawings of classic or symbolic subjects in red or black chalk for presentation to his friends, especially to young Tommaso Cavalien, the object of his

Passionate Platonic affection, from about 1532. The " Fall of haeton," the " Tityos," the " Ganymede," the " Men shooting at a Mark," are well-known examples ; in this class of work the Windsor collection is far the richest. At the same time or soon afterwards, were produced drawings little less powerful and finished of Christian subjects, especially the " Crucifixion," " Entombment " and " Resur- rection." Then comes the great fresco of the " Last Judgment," for which there exist both general sketches and particular studies. In the few extant drawings for the Cappella Paolina a faltering both of the imagination and of the hand become discernible. To the same or to still later years belong many beautiful but somewhat tentative drawings done either directly for, or nearly in the spirit of, the famous " Crucifixion "which he is recorded to have painted with so much devotion for Vittoria Colonna. About many of these, for all their intensity of feeling, there is a wavering touch betraying the approach

of infirmity; so there is about many of the architectural studies done for the buildings of which he had charge in his last years at Rome; but signs of the old impressive power and penetration are not wanting in

some even of the latest drawings that have come down to us.

During his later years the long-pent, human elements of fervour and tenderness in Michelangelo's nature had found vent and utterance such as they had never found before. He had occasionally practised poetry in youth, and there are signs of some transient love-passages, during his life at Bologna. But it was not until towards his sixtieth year that the springs of feeling were fairly opened in the heart of this solitary, this masterful and stern, life-wearied and labour-hardened man. About 1 533-1 534 we find him beginning to address impassioned sonnets — of which the sentiment is curiously comparable to that expressed in some of Shakespeare's — to a beautiful and gifted youth, the young Roman noble Tommaso Cavalieri. Soon afterwards he made the acquaintance of the pious, accomplished, and high-souled lady, Vittoria Colonna, widow of the Marquess Pescara. For ten years until her death, which happened in 1547, her friendship was the great solace of Michelangelo's life. On her, in all loyalty and reverence, he poured out all the treasures of his mind and all his imprisoned powers of tender- ness and devotion. She was the chief inspirer of his poetry — of which, along with her praises, the main themes are the Christian religion, the joys of Platonic love, and the power and mysteries of art. Michelangelo's poetical style is strenuous and concentrated like the man. He wrote with labour and much self-correction; we seem to feel him flinging himself on the material of language with the same overwhelming energy and vehemence with which contemporaries describe him as flinging himself on the material of marble — the same impetuosity of temperament combined with the same fierce desire of perfec- tion, but with far less either of innate instinct for the material or of trained mastery over its difficulties.

And so the mighty sculptor, painter, and poet reached old age. An infirmity which settled on him in 1544, and the death of Vittoria Colonna in 1547, left him broken in health and heart. But his strength held on for many a year longer yet. His father and brothers were dead, and his family sentiment con- centrated itself on a nephew, Leonardo, to whom he showed unremitting practical kindness, coupled with his usual suspicious- ness and fitfulness of temper. In almost all his relations the old man continued to the end to manifest the same loyal and righteous heart, accompanied by the same masterful, moody, and estranging temper, as in youth. Among the artists of the younger generation he held a position of absolute ascendancy and authority; nor was his example, as we have said, by any means altogether salutary for them. To artists, and to a certain number of chosen friends, belonging chiefly to the lettered, diplomatic, and secretarial

classes, he was more accessible and affable than he had been to any one in earlier days, though still formidable in moods of scorn and scoffing. His great age and fame made him the most honoured citizen of Rome, to whom the highest, both of his fellow countrymen and foreigners, were eager to do homage. During the last years of his life he made but few more essays in sculpture, and those not success- ful, but was much employed in the fourth art in which he excelled — that of architecture. A succession of popes demanded his services for the embellishment of Rome. Between 1536 and 1546 he was engaged on plans for the rearrangement and reconstruction of the great group of buildings on the Capitol- plans which were only partially and imperfectly carried out during his lifetime and after his death. For Paul III. he finished the palace called after the name of the pope's family the Farnese. On the death of Antonio da San Gallo he succeeded to the onerous and coveted office of chief architect of St Peter's church, for which he remodelled all the designs, living to see some of the main features, including the supports and lower portion of the great central dome, carried out in spite of all obstacles, according to his plans. The dome as it stands is his most conspicuous and one of his noblest monuments: the body of the church was completed in a manner quite different from his devising. Other

great architectural tasks on which he was engaged were the reconstruction of the Porta Pia, and the conversion of a portion of the baths of Diocletian into the church of Sta Maria degli Angeli; the great cloister with its hundred columns, now used as the Museo delle Terme, is the only part of this reconstruction which remains as he designed it. At length, in the midst of these vast schemes and responsibilities, the heroic old man's last remains of strength gave way. He died on the threshold of his ninetieth year, on the 18th of February 1564.

Authorities. — For the earlier bibliography of Michelangelo, which is extensive, see the useful though very imperfect compilation of Passerini, Bibliografia di Michelangelo Buonarroti, &c. (Florence, 1875). The most important works, taken in chronological order, are the following: P. Giovio, supplement to the fragmentary Dialogus de viris litteris illustrious, written soon after 1527, first published by Tiraboschi, Storia delta letteratura italiana (Modena, 1 871); G. Vasari, in Vite degli piu eccellenti architettori, pittori, e scullori, &c. (Florence, 1550); A. Condivi, Vita di Michelangelo Buonarroti (1553);

this account, for which the author, a pupil and friend of the master's, had long been collecting materials, was much fuller than that of Vasari, who made use of it in rewriting his own life of Michelangelo for his second edition, which appeared after the master's death (1568). The best edition of Vasari is that by Milanesi (Florence 1878-1883) ; of Condivi, that by Gori and Mariette (Pisa, 1746); for English readers there is a useful translation with notes, by Sir Charles Holroyd. The first additions of importance were published by Bottari, Raccolta di lettere sulla pittura, &c. (Rome, 1754; 2nd ed. by Ticozzi, Milan, 1822); the next by Gaye, Carteggio inedito (1840). Portions of the correspondence preserved in the Buonarroti archives were published by Guasti in his notes to the Rime di Michelangelo Buonarroti (1863), and by Daelli in Carte Michelangelsche inedite (Milan, 1865). Complete biographies of Michelangelo had been meanwhile attempted by J. Harford (London, 1857), and with more power by Hermann Grimm, Leben Michel- angelos (Hanover, 5th ed., 1879). A great increment of biographical material was at length obtained by the publication, in the four- hundredth year after Michelangelo's birth, of the whole body of his letters preserved in the Buonarroti archives, Lettere di Michelangelo Buonarroti, ed. G. Milanesi (Florence, 1875). This material was first employed in a connected but too trivial narrative by A. Gotti, Vita di Michelangelo (Florence, 1875). Next followed C. Heath Wilson, Life and Works of Michelangelo Buonarroti (Florence, 1876), the technical remarks in which, especially as concerns the fresco paintings, are still valuable. Other lives of Michelangelo are by Anton Springer, in his Michelangelo u. Raphael (Leipzig, 1883); J. A. Symonds, The Life of Michelangelo (London, 1893), full of valuable matter on the history and spirit of Michelangelo's times, but not trustworthy in the criticism of his works; H. Mackowksy, Michel- agniolo (Berlin, 1908), excellent in all respects, and in moderate compass; Emile Gebhardt, Michel-Ange, sculpteur et peintre (1808) is a handsome volume of reproductions with text. Michelangelo, by Fritz Knapp, in the Klassiker der Kunst series (Stuttgart, 1906) is a very useful compendium. For the early works of Michelangelo' the standard authority is H. Wqlfflin, Die Jugendwerke Michel- angelos (Munich, 1891, and later editions), a masterly work, though at variance with Berlin official opinion. The most elaborate study of the Sixtine frescoes, magnificently illustrated, is by E. Steinmann, Die Sixtinische Kapelle, vol. ii. (Munich, 1905). Consult also C. Justi, Michelangelo (Leipzig, 1903), and with caution H. Thode, Michelangelo u. das Ende der Renaissance (Berlin, 1902-1903). Of the poems of Michelangelo the first sound edition is that already referred to, G. Guasti, Rime di Michelangelo Buonarroti (1863); in earlier editions the text had been recklessly tampered with,

and the rugged individuality of the master's style smoothed down. An edition with German translations was published by Hasenclever (Leipzig, 1875) ; and a thorough critical edition by Karl Frey (Berlin, 1897) ; for the English student the translations by J. A. Symonds, in Sonnets of Michelangelo and Campanella (London, 1878) are invaluable. On the drawings of Michelangelo see especially B. Berenson, The Drawings of Florentine Painters (London, 1903). A comprehensive work on the same subject, in which the most important examples are reproduced and discussed, unfortunately not arranged chronologically, is Karl Frey, Die Zeichnungen Michelangelos (Berlin, 1908 seq.), still in progress. An elaborate life by the same author (Karl Frey, Michelagniolo Buonarroti, sein Leben und seine Werke) is also in progress, but is more to be prized for documentary fullness and accuracy than for critical insight.

(S. C.)

MICHELET, JULES (1798-1874), French historian, was born at Paris on the 21st of August 1798, of a family which had Huguenot traditions. His father was a master printer, not very prosperous, and the son at an early age assisted him in the actual work of the press. A place was offered him in the imperial printing office, but his father was able to send him to the famous College or Lycee Charlemagne, where he distinguished

himself. He passed the university examination in 182 1, and was shortly after appointed to a professorship of history in the College Rollin. Soon after this* in 1824, he married. The period of the restoration and the July monarchy was one of the most favourable to rising men of letters of a somewhat scholastic cast that has ever been known in France, and Michelet had powerful patrons in Villemain, Victor Cousin and others. But, though he was an ardent politician (having from his childhood embraced republicanism and a peculiar variety of romantic free-thought), he was first of all a man of letters and an inquirer into the history of the past.

His earliest works were school-books, and they were not written at a very early age. Between 1825 and 1827 he produced divers sketches, chronological tables, &c, of modern history. His Precis of the subject, published in the last-men- tioned year, is a sound and careful book, far better than anything that had appeared before it, and written in a sober yet interesting style. In the same year he was appointed maitre de conferences at the ficole normale. Four years later, in 1 83 1, the Introduction a I'histoire universelle showed a very different style, exhibiting no doubt the idiosyncrasy and literary power of the writer

to greater advantage, but also displaying the peculiar visionary qualities which made Michelet the most stimulating, but the most untrustworthy (not in facts, which he never consciously falsifies, but in suggestion) of all historians. The events of 1830 had unmuzzled him, and had put him in a better position for study by obtaining for him a place in the Record Office, and a deputy-professorship under Guizot in the literary faculty of the university. Very soon afterwards he began his chief and monumental work, the Histoire de France. But he accompanied this with numerous other books, chiefly of erudition, such as the (Euvres choisies de Vico, the Memoires de Luther Merits par lui-mtme, the Origines du droit jrancais, and somewhat later the Proces des templiers. 1838 was a year of great importance in Michelet's life. He was in the fullness of his powers, his studies had fed his natural aversion to the principles of authority and ecclesiasticism, and at a moment when the revived activity of the Jesuits caused some real and more pretended alarm he was appointed to the chair of history at the College de France. Assisted by his friend Edgar Quinet, he began a violent polemic against the unpopular order and the principles which it represented, a polemic which made their lectures, and especially Michelet's, one of the most popular resorts of the day. He published, in 1839, his Histoire romaine, but this was in his graver and earlier manner. The results of his lectures appeared in the volumes Le PrUre, la femtne, et la famille and le peuple. These books do not display the apocalyptic style which, partly borrowed from Lamennais, characterizes Michelet's later works, but they contain in miniature almost the whole of his curious ethico- politico-theological creed — a mixture of sentimentalism, com- munism, and anti-sacerdotalism, supported by the most eccentric arguments, but urged with a great deal of eloquence. The principles of the outbreak of 1848 were in the air, and Michelet was not the least important of those who condensed and pro- pagated them: indeed his original lectures were of so incendiary a kind that the course had to be interdicted. But when the actual revolution broke out Michelet, unlike many other men of letters, did not attempt to enter on active political life, and merely devoted himself more strenuously to his literary work. Besides continuing the great history, he undertook and carried out, during the years between the downfall of Louis Philippe and the final establishment of Napoleon III., an enthusiastic Histoire de la revolution franqaise. Despite or because of its enthusiasm, this was by no means Michelet's best book. The events were too near and too well known, and hardly admitted the picturesque sallies into the blue distance which make the charm and the danger of his larger work. In actual picturesqueness as well as in general veracity of picture, the book cannot approach Carlyle's; while as a mere chronicle of the

events it is inferior to half a dozen prosaic histories older and younger than itself.

The coup d'Stat lost Mkhelet his place in the Record Office, as, though not in any way identified with the republic adminis- tratively, he refused to take the oaths to the empire. But the new regime only kindled afresh his republican zeal, and his; second marriage (with Mile Adele Malairet, a lady of some literary capacity, and of republican belongings) seems to have further stimulated his powers. While the history steadily held its way, a crowd of extraordinary little book3 accompanied and diversified it. Sometimes they were expanded versions of its episodes, sometimes what may be called commen- taries or companion volumes. In some of the best of them natural science, a new subject with Michelet, to which his wife is believed to have introduced him, supplies the text. The first of these (by no means the best) was Les Femmes de la rivolution (1854), in which Michelet's natural and inimitable faculty of dithyrambic too often gives way to tedious and not very conclusive argument and preaching. In the next, L'Oiseau (1856), a new and most successful vein was struck. The subject of natural history was treated, not from the point of view of mere science, nor from that of sentiment, nor of anecdote nor of gossip, but from that of the author's fervent democratic pantheism, and the result, though, as was to be expected, unequal, was often excellent. L'Insccte, in the same key, but duller, followed. It was succeeded by L 'Amour (1859), one of the author's most popular books, and not unworthy of its popularity, but perhaps hardly his best. These remarkable works, half pamphlets half moral treatises, succeeded each other as a rule at the twelve months' interval, and the succession was almost unbroken for five or six years. L' Amour was followed by La Femme (i860), a book on which a whole critique of French literature and French character might be founded. Then came La Mer (1861), a return to the natural history class, which, considering the powers of the writer and the attraction of the subject; is perhaps a little disappointing. The next year (1862) the most striking of all Michelet's minor works, La Sorciere, made its appearance. Developed out of an episode of the history, it has all its author's peculiarities in the strongest degree. It is a nightmare and nothing more, but a nightmare of the most extraordinary verisimilitude and poetical power.

This remarkable series, every volume of which was a work at once of

imagination and of research, was not even yet finished, but the later volumes exhibit a certain falling off. The ambi- tious Bible de I'humanitS (1864), an historical sketch of religions, has but little merit. In La Montague (1868), the last of the natural history series, the tricks of staccato style are pushed even farther than by Victor Hugo in his less inspired moments, though — as is inevitable, in the hands of such a master of language as Michelet — the effect is frequently grandiose if not grand. Nosfils (1869), the last of the string of smaller books published during the author's life, is a tractate on education, written with ample knowledge of the facts and with all Michelet's usual sweep and range of view, if with visibly declining powers of expression. But in a book published posthumously, Le Banquet, these • powers reappear at their fullest. The picture of the industrious and famishing populations of the Riviera is (whether true to fact or not) one of the best things that Michelet has done. To complete the list of his miscellaneous works, two collections of pieces, written and partly published at different times, may be mentioned. These are Les Soldats de la revolu- tion and Legendes dSmocratiques du nord.

The publication of this series of books, and the completion of his history, occupied Michelet during both decades of the empire. He lived partly in France, partly in Italy, and was accustomed to spend the winter on the Riviera, chiefly at Hyeres. At last, in 1867, the great work of his life was finished. In the usual edition it fills nineteen volumes. The first of these deals with the early history up to the death of Charlemagne, the second with the flourishing time of feudal France, the third with the 13th century, the fourth, fifth, and sixth with the Hundred Years' War, the seventh and eighth with the establishment of the rural power under Charles VII. and Louis XI. The 16th and 17th centuries have four volumes

apiece, much of which is very distantly connected with French history proper, especially in the two volumes entitled Renaissance and Riforme. The last three volumes carry on the history of the 18th century to the outbreak of the Revolution. Michelet was perhaps the first historian to devote himself to anything like a picturesque history of the middle ages, and his account is still the most vivid that exists. His inquiry into manuscript and printed authorities was most laborious, but his lively imagination, and his strong religious and political prejudices, made him regard all things from a singularly personal point of view. Circumstances which strike his fancy, or furnish convenient texts for his polemic,, are handled at inordinate length, while others are rapidly dismissed or passed over altogether.

Uncompromisingly hostile as Michelet was to the empire, its downfall

and the accompanying disasters of the country once more stimulated him to activity. Not only did he write letters and pamphlets during the struggle, but when it was over he set himself to complete the vast task which his two great histories had almost covered by a Histoire du XIX" siecle. He did not, however, live to carry it farther than Waterloo, and the best criticism of it is perhaps contained in the opening words of the introduction to the last volume — " l'age me presse." The new republic was not altogether a restoration for Michelet, and his professorship at the College de France, of which he contended that he had never been properly deprived, was not given back to him. He died at Hy&res on the 9th of February 1874.

Almost all Michelet's works, the exceptions being his translations, compilations, &c, are published in uniform size and in about fifty volumes, partly by Marpon and Flammarion, partly by Calmann Levy. He has not received much recent attention from critics and monographers, but his Origines du droit fran$ais, cherchies dans les symboles etformules du droit universel was edited by fimile Faguet in 1890 and went into a second edition in 1900. See G. Monod, Jules Michelet; Etudes sur la vie et ses ceuvres (Paris, 1905).

(G. Sa.)

MICHELET, KARL LUDWIG (1801-1893), German philo- sopher, was born on the 4th of December 1801, at Berlin, where he died on the 16th of December 1893. He studied at the gymnasium and at the university of his native town, took his degree as doctor of philosophy in 1824, and became professor in 1829, a post which he retained till his death. Educated in the doctrine of Hegel, he remained faithful to his early teaching and spent his life in defending and continuing the Hegelian tradition. His first notable work was the System der philo- sophischen Moral (Berlin, 1828), an examination of the ethical theory of responsibility. In 1836 he published, in Paris, a treatise on the Metaphysics of Aristotle, written in French and crowned by the Academie des Sciences Morales et Politiques. He wrote also two other treatises on Aristotle. Nikomachische Ethik (2nd ed., 1848) and Die Ethik des Aristoteles in ihrem Verhaltniss zum System der Moral (1827). His own views are best expressed in his Vorlesungen. uber die Personlichkeit Gottes (1841) and Die Epiphanie der ewigen Personlichkeit des Gottes. The philosophical theology developed in these works has been described as a " Neo-Christian Spiritualism."

Among his other publications may be mentioned Geschichte der letzten Systeme der Philos. in Deutschland von Kant bis Hegel (1837-1838); Anthropologie und Psychologie (1840); Esquisse de logique

(Paris, 1856) ; Naturrecht oder Rechtsphilosophie (1866) ; Hegel der unwiderlegte Weltphilosoph (1870), Wahrheit aus meinem Leben (1886). From 1832 to 1842, Michelet was engaged in publishing the complete works of Hegel, and in 1845 he founded the Berlin Philosophical Society, which has continuously represented the Hegelianism of Germany. He was the first editor of Der Gedanke (i860), the official organ of the society.

MICHELL, JOHN (17 24-1 793), English natural philosopher and geologist, was born in 1724, and educated at Queens' College, Cambridge. His name appears fourth in the Tripos list for 1 748-1 749; and in 1755 he was moderator in that examina- tion. He became M.A. in 1752, and B.D. in 1761. He was a fellow of his college, and was appointed Woodwardian professor of geology in 1762, and in 1767 rector of Thornhill in Yorkshire, where he died on the 29th of April 1793. He was

elected a fellow of the Royal Society in the same year as Henry Cavendish (1760). In 1750 he published at Cambridge a work of some eighty pages entitled A Treatise of Artificial Magnets, in which is shown an easy and expeditious method of making them superior to the best natural ones. Besides the description of the method of magnetization which still bears his name, this work contains a variety of accurate magnetic observations, and is distinguished by a lucid exposition of the nature of magnetic induction. He was the original inventor of the torsion balance, which afterwards became so famous in the hands of its second inventor Coulomb. Michell described it in his proposal of a method for obtaining the mean density of the earth. He did not live to put his method into practice; but this was done by Henry Cavendish, who made, by means of Michell's apparatus, the celebrated determination that now goes by the name of Cavendish's experiment {Phil. Trans., 1708). His most important geological essay was that entitled Conjectures concerning the Cause and Observations upon the Phaenomena of Earthquakes (Phil. Trans., li. 1760), which showed a remarkable knowledge of the strata in various parts of England and abroad.

Michell's other contributions to science are: " Observations on the Comet of January 1760 at Cambridge, Phil. Trans. (1760); " A Recommendation of Hadley's Quadrant for Surveying," ibid. (1765) ; " Proposal of a Method for measuring Degrees of Longitude upon

Parallels of the Equator," ibid. (1766); " An Inquiry into the Probable Parallax and Magnitude of the Fixed Stars," ibid. (1767); "On the Twinkling of the Fixed Stars," ibid. (1767), " On the Means of Discovering the Distance, Magnitude, &c, of the Fixed Stars," ibid. (1784).

MICHEL OF NORTHGATE, DAN (fl. 1340), English writer, the author of the Ayenbite of Inwyt. Nothing is known of him except what can be gathered from his work. It is a literal translation in the Kentish dialact of a French treatise entitled Le Somme des vices et des vertues (also known as Le Miroir du monde or Le Livre des commandemens, &c), which was written in 1279 by Laurentius Callus, a Dominican monk and confessor to Philip III. of France. This work was translated into Flemish, Catalonian, Spanish and Italian, and appears in no less than six English translations. Dan Michel's autograph MS. is preserved in Arundel MS. 57, which states that the work was completed in the year 1340 on the eve of the apostles Simon and Jude by Dan Michel of Northgate, a brother of the cloister of St Austin of Canterbury. The value of the book is chiefly philological as an authenticated and dated example of the southern dialect.

The Ayenbite of Inwyt was edited for the Roxburghe Club by the Rev Joseph Stevenson in 1855, and for the Early English Text Soc. by Richard Morris in 1876.

MICHELOZZO DI BARTOLOMMEO (1391-1472?), Italian sculptor, was a Florentine by birth, the son of a tailor, and in early life a pupil of Donatello. He worked in marble, bronze and silver. The statue of the young St John over the door of the Duomo at Florence, opposite the Baptistery, is by him; and he also made the beautiful silver statuette of the Baptist on the altar-frontal of San Giovanni. Michelozzo's great friend and patron was Cosimo dei Medici, whom he accompanied to Venice in 1433 during his short exile. While at Venice, Michelozzo built the library of San Giorgio Maggiore, and designed other buildings there. In 1428, together with Donatello, he erected an open-air pulpit at an angle of the cathedral of St Stephen at Prato. The magnificent Palazzo dei Medici at Florence built by Cosimo, was designed by him; it is one of the noblest specimens of Italian 15th-century architecture, in which the great taste and skill of the architect has combined the delicate lightness of the earlier Italian Gothic with the massive stateliness of the classical style. With great engineering skill Michelozzo shored up, and partly rebuilt, the Palazzo Vecchio, then in a ruinous condition, and added to it many important rooms and staircases. When, in 1437, through Cosimo's liberality, the monastery of San Marco at Florence was handed over to the

Dominicans of Fiesole, Michelozzo was employed to rebuild the domestic part and remodel the

church. For Cosimo I. he designed numerous other buildings, mostly of great beauty and importance. Among these were a guest-house at Jerusalem for the use of Florentine pilgrims, Cosimo's summer villa at Careggi, and the strongly fortified palace of Cafagiuolo in Mugello. For Giovanni dei Medici, Cosimo's son, he built a very large and magnificent palace at Fiesole. In spite of Vasari's statement that he died at the age of sixty-eight, he appears to have lived till 1472. He is buried in the monastery of San Marco, Florence. Though skilled both as a sculptor and engineer, his fame chiefly rests on his architectural works, which claim for him a position of very high honour even among the greatest names of the great 15th-century Florentines.

See Hans Stegmann, Michelozzo di Bartolommeo, eine kunst-geschichtliche Studie (1888); Fritz Wolff, Michelozzo di Bartolommeo (1900) ; cf. also Hans Semper, Donatello (1887).

MICHIGAN, a north central state of the United States, situ- ated between latitudes 41 44′ and 47 30′ N. 1 and longitudes 82° 25′ and 90 31′ W., and consisting of two peninsulas — • the upper or northern and the lower or southern — separated by a strait. The upper or northern peninsula is bounded N. by Lake Superior; E. by lakes Superior, George, Huron, and Michigan, and by St Mary's River, which separates it from the Province of Ontario, Canada; S. by lakes Huron and Michigan and the Straits of Mackinac, which separate it from the lower peninsula; and S. and W. by Wisconsin, and the Menominee, Montreal and Brule Rivers, which separate it in part from Wisconsin. The lower or southern peninsula is bounded N. by lakes Michigan and Huron and the Straits of Mackinac, E. by lakes Huron, St Clair and Erie, and the St Clair and Detroit Rivers, which separate it from Ontario; S- by Ohio and Indiana, and W. by Lake Michigan. In size Michigan ranks eighteenth among the states of the Union, its total area being 57,980 sq. m., of which 500 sq. m. are water surface. 2

Physical Features. — Physiographically the history of the state is similar to that of Minnesota. The northern part is rugged mountainous " old land," not completely worn down by erosion; and the southern part is a portion of the old coastal plain, whose layers contain salt, gypsum and some inferior coal. Lake Huron on the east and Lake Michigan on the west of the lower peninsula are each 581 f ft. above sea-level, and Lake Superior on the north of the upper peninsula is 602 ft. above sea-level. For the most part the surface of the state is gently undulating and at a slight elevation above the lakes,

but low marsh lands are common to many sections ; the north part of the lower peninsula is occupied by a plateau of considerable dimensions, and the north-west part of the upper peninsula is rugged with hills and mountains. Crossing the lower peninsula from Saginaw Bay west by south through the valleys of the Saginaw, Maple and Grand rivers, is a depression — the former channel of an old glacial river — in which elevations for a considerable area are less than 100 ft. above the lakes. To the south-east of this depression a water-parting with summits varying from about 400 to 600 ft. above the lakes extends-, from a point between Saginaw Bay and Lake Huron south by west to the south border of the state and be- yond. The east slope descends quite rapidly to a low flat belt from 5 to 40 m. wide along the east border of the state south from Lake Huron. From Lake Huron to the south-east shore of Saginaw Bay a wide sandy beach is followed northward by precipitous shores abounding in rocks and bluffs. West of the divide and south of the depression, south-west Michigan is occupied by the valleys of the St Joseph, Kalamazoo and Grand rivers, by the gently rolling uplands that form the parting divides between them, and by sand dunes, which here and there rise to a height of from 100 to 200 ft. or more along the shore of Lake Michigan, and are formed on this side (but not on the Wisconsin side) of the lake by the prevailing west winds. The north and north-west portions of the lower peninsula — including the counties of Roscommon and Missaukee, parts of Wexford and Ogemaw, and those to the north and north- west of these — are occupied by a rolling plateau which attains an elevation at its highest point, north of its centre, of upwards of 1 100 ft. above Lake Michigan; to the south of this plateau the land slopes gently down to the depression and to the low shores of Lake Michigan and Saginaw Bay. The surface of the upper

1 This is the northernmost point of the mainland ; the most northerly of the islands north-east of Isle Royal and belonging to Michigan is more than 40′ further north.

2 In addition, within the boundaries of Michigan, are approxi- mately 16,653 s 1- m – ˚f Lake. Superior, 12,992 sq. m. of Lake Michi- gan, 0925 sq. m. of Lake Huron and 460 sq. m. of lakes St Clair and Erie.

peninsula is more irregular than that of the lower peninsula. A portion extending through the middle from east to west and south, from west

of the centre to Green Bay, is either flat and even swampy or only gently undulating. Eastward from Green Bay are two ranges of hills: the one lining the south shore and ranging from ioo to 300 ft. in height, the other close to or touching the north shore and reaching in places an elevation of 600 ft. above Lake Superior. The famous Pictured Rocks in Alger county on the lake shore, east of Munising, form the west portion of this north range ; they are of sandstone formation, extend for several miles along the coast, rise almost perpendicularly from the water's edge, and display an interesting diversity of shapes as well as a great variety of tints and hues, especially of gray, blue, green and yellow. The most rugged portion of the state is farther west. South and south-east of Kewee- naw Bay, in the Marquette iron district, is an irregular area of mountains, hills, swamps and lakes, some of the mountain peaks of the Huron Mountains (in Marquette county) rising to an elevation of 1400 ft. or more above the lake. These and a peak in the Porcupine Mountains (2023 ft. above the sea) in the north-west part of Ontona- gon county are the highest in the state. To the south of this is the Menominee iron district, marked somewhat regularly by east and west ridges. Extending in a general north-east and south-west direction through Keweenaw peninsula to the Wisconsin border and beyond is the middle of three approximately parallel ranges, separ- ated from.jeach other by flat lands, with here and there an isolated peak (in the Porcupine Mountains) having an elevation of from 900 to 1400 ft. above the lake. The north portion of these ranges, together with Isle Royale some distance farther north, which is itself traversed by several less elevated parallel ridges, contains the Michigan copper- bearing rocks; while to the south, along the Wisconsin border, is another iron district, the Gogebic. The rivers of the entire state consist of numerous small streams of clear water. In the interior of the upper peninsula, along the east border of the lower peninsula south from Lake Huron, and in Saginaw valley, they are rather sluggish; but many of the larger streams of the lower peninsula have sufficient fall to furnish a large amount of water-power, while the small streams that flow into Lake Superior from the central portion of the upper peninsula as well as some of the larger ones farther west, have several falls and rapids; in places also they are lined with steep, high banks. Most of the larger rivers of the state — the Muskegon, Grand, St Joseph, Manistee and Kalamazoo — are in the west portion of the lower peninsula. Several thousand lakes of clear water, formed by glacial action, dot the surface of the state, and many of them are lined with picturesque woodland shores. Islands in lakes Superior, Michigan and Huron are scarcely less numerous.

Fauna and Flora. — Michigan, especially the north portion, still abounds in game. The mammals include black bear, deer, lynx, porcupine, fox, squirrels, hares, rabbits, musk rats, minks, weasels, skunks and woodchucks. Among the game birds are quails (" Bob White"), "partridges" (ruffed grouse) , ducks, geese, woodcocks, snipes and plovers. Of song birds the favourites are the robin, thrushes, bobolink, oriole, chickadee, meadow-lark, cat-bird, blue- bird, wrens and warblers. Among fishes, white fish, lake trout, perch, herring, sun-fish, bass, sturgeon, pickerel, suckers, German carp and fresh-water drum abound in the lakes. The speckled trout thrives in many of the streams.

Before it was settled by the whites the area now included in Michigan was a forest, except in the south-west, where there were a few small prairies, possibly cleared by the Indians. The remainder of the south part of this area for about 60 m. along the southern boundary was a part of the great hardwood forest of the Ohio Basin with woods varying with soil and drainage: on the drier gravel lands were oak forests consisting of red, black, and white oak, hickory, ash, cherry, basswood and walnut; in depressions there were maple, elm, ash, beech, sycamore, poplar and willow; and in the south- east there were a few chestnuts and tulip trees. North of this southern hardwood forest there were pine forests on the sandier land, mixed hardwoods and conifers on the loam and clay, and tamaracks and cedar in the swamps. The sandy lands were in part burnt over by Indians, and there was' a growth of scrub oak, aspens and huckleberry bushes. The tamarack and cedar swamps now have a growth, especially on their edges, of spruce, balsam, white pine, soft maple, ash and aspens. In 1909 about 25 % of the area was " cut over " or " burned over " lands, mostly the old pine woods, the region of the old hardwood forest was almost entirely farmland, and about 40 % of the state was still in woods. Red oak, birch, elm, ash, white cedar, hemlock, basswood, spruce, poplar, balsam, fir and several other kinds of trees are found in many sections; but a large portion of the merchantable timber, especially in the lower peninsula, has been cut. 1 Among forest shrubs are the willow, hazel, alder, shrub maple, birch, hawthorn, dogwood, elderberry, viburnum and snowberry. Yews are common in the north, and dwarf juniper in the south. In 1900 the woodland area, including stump lands, was estimated at 38,000 sq. m., or nearly two-thirds of the entire state. Huckleberry, blackberry and rasp- berry bushes are common in the north sections. Smilax, clematis, honeysuckle and woodbine are the common er forest vines.

i ' 1 Under the revised constitution of 1908 the legislature is authorized to provide for the reforestation of state lands.

Soil. — The soil of south-west and south-east Michigan is for the most part a dark clay loam or muck; in the north central part of the lower peninsula it is a light sandy loam, along the Huron shore it is heavy with blue clay, in the mining districts of the north-west the rocks are usually either barren or very thinly covered; and else- where in the state the soil is generally rich in a variety of mineral elements, and varies chiefly in the proportions of vegetable loam, sand or gravel, and clay.

Climate. — Although the temperature of the entire lower peninsula is considerably influenced by the lakes, yet, the prevailing winds being westerly, it is in the west portion of that peninsula that the moderation is greatest, both the summer and winter isotherms being there deflected more than half the length of the peninsula. On the other hand, the prevailing winds of the upper peninsula being north-westerly, the lakes have little effect on the temperature there ; and so, while in the south-west the extremes are not great, in the rest of the state they have ranged within two years from 104 F. at points in the south-east to 49 ° F. in the north-west. Throughout the state July is invariably the warmest month, February the coldest, the mean annual temperature is about ,45° F. The mean annual precipitation is not far from 31 in., a little more than one-half of which falls during the five growing months from May to October; the rain is evenly distributed over all parts of the state, but the snow is exceptionally heavy along the north shore of the upper peninsula.

Productions. — Of the total land surface of the state in I900 48'o8 % (in 1904, 47 'I %) was included in farms and 67-2 % (m 1904, 66 ' 9 %) of the farm land was improved ; the total number of farms was 203,261 (in 1904, 189,167), of which 143,688 contained less than 100 acres, 54,556 others contained less than 260 acres, and 136 contained loco acres or more, the average size being 86 4 acres (in 1904, 91 '"5 acres). Of the total number of farms 168,814 were operated by the owners (in 1904, 161,037 by owners and 914 by managers), 22,482 (in 1904, 19,525) by share tenants, 9731 (in 1904, 7685) by cash tenants; and 312,462 of the inhabitants of the state, or 34′ 5 % of all who were engaged in gainful occupations, were farmers. Of the total acreage in 1900 of all crops 58 • 3 % was in cereals and 28′ 8 % in hay and forage; of the acreage of cereals 40 ' 8 % was in wheat, 31 ■ 8 % in Indian corn, 2 1 " 6 % in oats and 3 ■ 7 % in rye. In 1907 the buckwheat crop was 852,000 bushels; rye, 5,452,000 bushels; the hay crop, 3,246,006 tons; oats, 30,534,000 bushels; barley, 1,496,000 bushels; wheat 12,731,000 bushels; and Indian corn 57,190,000 bushels. Of livestock, sheep are the most numerous (2,130,000 in 1907), and Michigan's wool clip in 1907 was

14,080,500 ft). The number of neat cattle in 1907 was 1,852,000 (849,000 dairy cows). The number of hogs was 1,388,000; and of horses 704,000.

Michigan produces the bulk of the peppermint crop of the United States, and it is in the front rank as a fruit-producing state.

Barley and buckwheat are grown chiefly in the east part of the lower peninsula south of Saginaw Bay. Potatoes are grown in con- siderable quantities in the north : west part of the lower peninsula in the vicinity of Grand Traverse Bay as well as throughout the southern portion of the state ; the largest crops of beans are grown in the south central part of the lower peninsula, and of peas in the counties bordering on Lake Huron. Kalamazoo, Jackson, Washtenaw, Lenawee, Ingham, Bay and Muskegon are the leading celery-produc- ing counties; the peppermint district is in the south-west corner of the state; and market gardening is an important industry both in the south-west and in the south-east counties. All the principal fruits are grown in largest quantities in what is commonly known as the fruit belt in the south-west, particularly in Berrien, the corner county.

The fresh-water fish caught in the Great Lakes by residents in Michigan exceed in value those caught by residents of other states, and in 1907 the catch was valued at $1,806,767. Nearly one-half both in quantity and value are taken from_ Lake Michigan, and, although as many as twenty kinds are caught in considerable quanti- ties, more than 90 % of the value of the catch consists of trout, herring, white fish and perch. Both the state government and the national government have established hatcheries within the state, and state laws protect the industry by regulating the size of mesh in the nets used, prescribing the size of fish that may be taken and kept, establishing close seasons for several kinds of fish, and by other limitations.

Minerals. — Of the mineral products (for which the state is noted) iron is the most valuable. This mineral was discovered in the Marquette district along the shore of Lake Superior early in the 1 8th century, but active operations for mining it did not begin until 1845; in 1877 mining of the same mineral began farther south in the Menominee district, and seven years later farther west along the Wisconsin border in Gogebic county. The annual product steadily increased from 3000 long tons in 1854 to 1 1 ,830,342 in 1907 ; from 1890 to 1901 Michigan ranked first in the union as an iron- producing state, but after 1901 its product was exceeded by that of Minnesota. Up to 1909 it was estimated that 380,417,085 tons of ore were

shipped from the Lake Superior region. Next in value among the mineral products is copper; there are about twenty copper mines in Keweenaw peninsula and its vicinity. The Calumet and Hecla mine, in the central part of that peninsula, is probably the most profitable copper mine in the world; up to 1909 it had paid

Emery Walker Jc»

about $107,850,000 in dividends. Copper mining in the state began about the same time as iron mining, and the quantity mined increased from 12 long tons in 1845 to 102,543 m I 9° 6 (m I 9°7. 97> I 75 long tons). From 1847 to 1887 the product of Michigan exceeded that of any other state; from 1847 to 1883 its copper product was more than one-half that of all the states, but after 1887 (except in 1891) more of that mineral was mined in Montana than in Michigan, and in 1906 and in 1907 the yield in both Arizona and Montana was greater than in Michigan. Fields of bituminous coal extend over an area of over 10,000 sq. m. in the central portion of the lower peninsula; but its quality is inferior. The mining of coal began in Jackson county in 1835 and there was a slow increase in the output until 1882 (135,339 short tons) ; then there was a tendency to decrease until 1897, from which time the product increased from 223,592 short tons to 2,035,858 short tons in 1907. The principal mines are in Saginaw, Bay, Eaton, Jackson, Huron and Shiawassee counties. Salt wells are numerous in the middle and south-east sections of the lower peninsula; the first successful one was drilled in Saginaw county in 1859 and i860. For a number of years prior to 1893 Michigan was the leading salt-producing state, and, though her output was subsequently (except in 1901) exceeded by that of New York, it continued to increase up to 1905, when it was 9,492,173 barrels; in 1907, the product was 10,786,630 barrels. Gypsum is obtained from deposits along the banks of the Grand river in Kent county and in the vicinity of Alabaster along the shore of Lake Huron in Iosco county. Operations on the deposit near Grand Rapids were begun in 1841, and although that near Alabaster was opened in 1862, it was not until 1902 that it became of much im- portance; in that year the output of the state was 208,563 short tons; in 1907 317,261 short tons were mined. Marl is found in the south part of the state; limestone most largely in the north part of the lower peninsula, and the east part of the upper peninsula; and the production of Portland cement increased rapidly from 77,000 barrels in 1898 to 3,572,668 in 1907. Besides

limestones and dolomites, the only building stone of much commercial impor- tance is the Potsdam sandstone, extensive beds of which lie in the north part of the upper peninsula. Grindstones are produced in considerable quantity in Huron county. A small quantity of petroleum is obtained from thirteen wells in St Clair county in the east part of the lower peninsula; and the mineral waters at Mount Clemens, Benton Harbor and Alma are of considerable commercial value for medicinal purposes.

Manufactures. — In 1900 the value of the manufactured products of Michigan amounted to $356,944,082, which was an increase of 28-4% over that of 1890, and by 1904 there was a further increase of 20-19 .* During the same period, however, the value of the products of the lumber and timber industry, which in 1870, 1880 and 1890 was greater than that of any other state, and in 1900 was still more than twice as great as that of the products of any other manufacturing industry in the state and was exceeded only by that of the product of Wisconsin, decreased from $83,121,969 in 1890 to $53,915,647 (35-1) in 1900, and to $40,569,335 in 1 904, this decrease being due to the fact that the large quantities of raw material (both hard wood and pine) formerly found in the forests of Michigan had become so far exhausted that much of it had to be brought in from other states and from Canada. The value of the products of the furniture factories and of the planing mills, neverthe- less, has steadily increased ; that of the furniture factories (of which Grand Rapids is the leading centre not only in Michigan but in the United States) rising from $10,767,038 in 1890 to $14,614,506 in 1900 and $18,421,735 in 1904, and that of the planing mills from $10,007,603 in 1890 to $12,469,532 in 1900 and $14,375,467 in 1904. The total value of the lumber and timber products, the furniture products, and the planing-mill products amounted in 1900 to $80,999,685; the value of those manufactures based upon minerals mined or quarried amounted in the same year to $83,730,930.

Another important class of manufactures is that based on agri- culture: the value of flour and grist mill products amounted to $21,643,547 in 1900, and $26,512,027 in 1904; that of food prepara- tions, for which Battle Creek is noted, to $1,891,516 in 1900 and $6,753,699 in 1904; that of agricultural implements to $6,339,508 in 1900 and $8,719,719 in 1904; and of malt liquors to $5,296,825 in 1900 and $6,999,251 in 1904.

Among other manufactures in which the state ranks high and in which there was a large increase in value during the same period

1 The 1904 census, taken by the Federal Bureau of the Census in co-operation with the secretary of state of Michigan, covered the year ending on the 30th of June 1904, and is thus not strictly com- parable with the " 1905 " census of manufactures for other states, which were for the year ending on the 31st of December 1904. But like the special census of manufactures in other states, it is confined to establishments under the factory system, and hence its figures are considerably less than they would have been had it been taken on the same basis as that of the 1900 census, which included hand trades and other custom work ; for example, on the basis of the 1904 census the value of the manufactured products in 1900 was only $319,691,856, and as that of 1904 was $429,120,060, the real in- crease was 34-2% instead of 20-19%. In the above text from this point the statistics given for 1900 are for factory products only.

are: leather, carnages and waggons, chemicals, paper and wood pulp and beet sugar. In 1904 Michigan manufactured automobiles valued at $6,876,708.

The ten leading manufacturing centres are, in the order of the value of their products in 1904: Detroit, Grand Rapids, Kalamazoo, Battle Creek, Saginaw, Jackson, Lansing, Muskegon, Bay City and Port Huron, all in the south half of the lower peninsula.

Communications. — The building of railways in Michigan began in 1830, but little progress had been made in 1837 when the state began the construction of three railways and two canals across the south half of the lower peninsula. The Michigan Central was completed from Detroit to Ypsilanti in January 1838, a portion of the Michigan Southern was in operation in November 1840, and considerable work was done on the proposed Michigan Northern and the two canals. By 1846, however, the state had proved itself incompetent to carry on the work and sold its interests to private companies. In 1850 there were 342 m. completed, and from then until 1880 the mileage increased to 3938; but the great period of railway building in Michigan was in the .decade from 1880 to 1890, when the mileage was increased to 7108-48. By the close of 1908 it had further increased to 8629-35. The principal lines are the Michigan Central, the Pere Marquette, the Lake Shore & Michigan Southern, the Grand Rapids & Indiana, the Ann Arbor, the Grand Trunk, the Chicago & North-Western, the Duluth South Shore & Atlantic, the Minneapolis, St Paul & Sault Ste. Marie, and the Chicago, Milwaukee & St Paul. A board of railway commissioners, which in 1907 succeeded a commissioner (whose office was created in 1873) hears complaints, has power to issue various orders and permits of minor importance to railway companies,

and reports annually to the governor. 2 The legislature is empowered to appoint a commission to fix transportation rates for railways and express companies. Besides railway communica- tion Michigan has a coast line of about 1600 m., along which vessels of 2000 tons can sail and find several good harbours, the water communication having been extended and improved by several canals, among which are the Sault Ste. Marie, which passes the rapids of St Mary's River; the St Clair Flats, at the north end of Lake St Clair, by which a deeper channel is made through shallow water; and the Portage Lake, in the copper district, which connects that lake with Lake Superior. The state undertook to construct that at Sault Ste. Marie in 1837 but little had been accomplished in 1852 when the national government granted 750,000 acres of land to the state in aid of the enterprise, and three years after that the canal was completed. Since its completion, the national government has enlarged its locks so as to make it navigable for vessels drawing 21 ft. of water. The national government con- structed the canal at the St Clair Flats in 1871 and contributed land for aid in the construction of that connecting lakes Portage and Superior, which was completed in 1873 and passed under national control in 189 1.

Population. — The population of Michigan in 1880 was 1,636,937; in 1890 it was 2,093,889, an increase of 27-9% within the decade; in 1900 it was 2,420,982, a further increase of 15-6% and in 19 10, according to the preliminary returns of the U.S. census, it was 2,810,173. Of the total population in 1900, 2,398,563 or 99-07% were whites, 15,861 were negroes, 6354 were Indians, 240 were Chinese, and 9 were Japanese. 1,879,329 or 77-6% were native born and 541,653 were foreign- born, 184,398 of the foreign-born being natives of Canada (151,915 English; 32,483 French), 125,074 of Germany, 43,839 of England, and 30,406 of Holland. In 1906 982,479 communi- cants of different denominations were reported: of these 492,135 were Roman Catholics, 128,675 Methodists, 105,803 Lutherans, 50,136 Baptists, 37,900 Presbyterians, 28,345 members of Reformed bodies, and 26,349 members of the Protestant Episcopal Church. In 1900 39-3% of the total population lived in places having at least 2500 inhabitants.

Administration. — The constitution under which Michigan is now governed was first adopted in 1850, when it was felt that the powers which the first one, that of 1835, conferred upon the executive and the legislature were too unrestricted. In 1908 it was revised, and many changes were made.

The constitution admits of amendment by an affirmative vote of two-

thirds of the members of each house of the legislature, fol- lowed at the next succeeding spring or autumn election by an affirmative vote of a majority of the electors voting upon the question; or an amendment may be proposed by an initiative petition signed by more than 20% of the total number of electors who voted for secretary of state at the preceding election, and such an amendment (unless disapproved by a majority vote in a joint meeting of the two houses of the legislature) is submitted to popular

meeting 01 the two nouses 01 the legislature) is submitted to popular

2 In 1909 telegraph and telephone companies were put under the supervision of the same board.

vote at the next election and comes into effect only if it receives a favourable majority of the popular vote. Amendments suggested by the legislature have been frequently adopted, and one, adopted in 1862, provided that the question of a general revision of the con- stitution shall be submitted to a popular vote once every sixteen years and at such other times as may be provided by law. When this question was so submitted for the first time, in 1866, the vote was to revise; but the revision prepared by a convention called for the purpose was rejected at the polls The revision by the Con- stitutional Convention of 1907- 1908 was adopted by popular vote in 1908.

In its present form the constitution confers suffrage upon every male citizen of the United States who is twenty-one years of age or over and has resided in the state six months and in his township or ward twenty days immediately preceding an election; and any woman may vote in an election involving the direct expenditure of public money or the issue of bonds if she have the qualifications of male electors and if she have property assessed for taxes in any part of the district or territory affected by the election in question. At the head of the execu- tive department is the governor, who is elected for two years, and who at the time of his election must be at least thirty years of age and must have been for five years a citizen of the United States, and for the two years immediately preceding a resident of the state. A lieutenant-governor, for whom the same qualifications are prescribed, is elected at the same time for the same term. Under the first constitution the secretary of state, treasurer, auditor-general, attorney-general, commis- sioner of the land office, superintendent of public instruction

and the judges were all appointed by the governor, but under the present one they are elected and only minor officers are appointed. In 1893 the legislature created a board of four members to be appointed by the governor, one of whom must be a physician, another an attorney, and made it its duty to investigate the case of every convict for whom a petition for pardon is received and then report and recommend to the governor what it deem expedient. The governor's salary is fixed by the revised constitution of 1908 at $5000 a year. The lieutenant-governor succeeds the governor in case of vacancy, and next in order of succession comes the secretary of state.

The legislature, consisting of a Senate of 32 members, and a House of Representatives of 100 members (according to the constitution not less than 64 and not more than 100), meets biennially, in odd-numbered years, at Lansing. Both senators and representatives are elected for a term of two years by single districts, except that a township or city which is entitled by its population to more than one representative elects its representatives on a general ticket. Beginning in 1913 and at each subsequent tenth year, the legislature, under the revised constitution of 1908, rearranges the senatorial districts and reapportions the representatives among the counties and districts, using as a basis the returns of the next preceding decennial census; the taking of a state census between the decennial periods is discontinued.

No bill can pass either house except by an affirmative vote of a majority of the members elected to that house, and on its third reading the ayes and noes must be taken and recorded ; for appro- priation bills a two- thirds majority of all members elected to each house is required. All legislation must be by bill, legislation by joint and concurrent resolutions thus being prevented. No bill may be passed at a regular session until it has been printed and in posses- sion of each house for five days; no bill may be passed at a special session on any subject not expressly stated in the governor's pro- clamation or submitted by special message. The governor has ten days (Sundays not being counted) in which to exercise his veto power (which may be applied to any item or items of any bill making appropriations of money and embracing distinct items), and an affirmative vote in each house of two-thirds of the members elected is required to pass a bill over his veto. Under the revised constitu- tion of 1908 any bill passed by the legislature and approved by the governor, except appropriation bills, may be referred by the legis- lature to the qualified electors; and no bill so referred shall become law unless approved by a majority of the electors voting thereon; no local or special act, passed by the legislature, takes effect until it is approved by a majority vote of the electors in the affected district.

The administration of justice is entrusted to a supreme court, a continually increasing number of circuit courts (thirty-eight

in 1909), one probate court in each county, and not exceeding four justices of the peace in each township. The supreme court is composed of one chief justice and seven associate justices, all elected for a term of ten years, not more than two retiring every two years; it holds four sessions annually, exercises a general control over the inferior courts, may issue, hear and determine any of the more important writs, and has appel- late jurisdiction only in all other important cases. There is only one circuit court judge for a circuit, unless the legislature provides for the election of more; the term of office is six years. Circuit court judges have original jurisdiction in most matters civil and criminal, hear appeals from the lower courts, and must hold at least four sessions annually in each county of the circuit. Each county elects a judge of probate for a term of four years; he has original concurrent jurisdiction with the circuit court in matters of probate, and has original jurisdiction in all cases of juvenile delinquents and dependents. The legislature may provide for the election of more than one judge of probate in a county with more than 100,000 inhabitants. Justices of the peace are elected by the townships for a term of four years — there are not more than four in each township; in civil matters they have exclusive jurisdiction of cases in which the demand does not exceed $100 and concurrent juris- diction with the circuit courts in contract cases in which the demand does not exceed $300.

For purposes of local government the state is divided into eighty-three counties, each of which is in turn divided regularly by N. and S. and E. and W. lines into several townships. In the more sparsely inhabited counties of the upper peninsula and in the N.E. section of the lower peninsula the townships are much larger than in other parts of the state. The officers of the township are a supervisor, clerk, treasurer, highway- commissioner, one overseer of highways for each highway district, a justice of the peace, and not more than four con- stables, all of whom are elected at the annual township meeting in April. The supervisor, two of the justices of the peace and the clerk constitute the township board, whose duty it is to settle claims against the township, audit accounts, and publish annually an itemized statement of receipts and dis- bursements. The supervisor is also the township assessor, and the several township supervisors constitute the county board of supervisors who equalize property valuations as between townships, authorize townships to borrow money with which to build or repair bridges, are entrusted with the care and management of the property and business of the county, and may borrow or raise by tax what is necessary to meet the more common expenses of the county. Other

county officers are a treasurer, clerk, sheriff, register of deeds, attorney, sur- veyor and two coroners, each elected for a term of two years, a school commissioner elected for a term of four years, and one or more notaries public appointed by the governor.

Under the revised constitution of 1908 the former classifica- tion of cities into four classes and the practice of granting special charters were abolished, and the legislature is required to provide by general laws for the incorporation of cities and villages; " such general laws shall limit their rate of taxation for municipal purposes and restrict their powers of borrowing money and contracting debts." Cities and villages are permitted — upon authorization by the affirmative vote of three-fifths of the electors voting on the question — to own and operate, even outside their corporate limits, public utilities for supplying water, light, heat, power and transportation, and may sell and deliver, outside their corporate limits, water, heat, power and light to an amount not more than one-fourth that furnished by them in each case within their corporate limits; but no city or village of less than 25,000 inhabitants may own or operate transportation facilities. Under the revision of 1908 corporate franchises cannot be granted for a longer term than thirty years.

Law.— A wife in Michigan has the same right to her property acquired either before or after marriage as she would have if single, except that she cannot under ordinary circumstances give, grant or

sell it to another without her husband's consent. Grounds for a divorce are adultery, physical incapacity at the time of marriage, sentence to imprisonment for three years or more, desertion for two years, habitual drunkenness, extreme cruelty, or, in case of the wife, refusal of the husband to provide for her maintenance when suffi- ciently able to do so; but in case the parties were married outside of Michigan the party seeking the divorce must reside within the state at least one year before petitioning for the same. An insolvent debtor's homestead — consisting of not more than 40 acres of land with a house thereon, or a house and lot in a city or village not exceeding $1500 in value, together with not less than $500 of his personal property — is exempt from execution. For several years previous to 1876 a clause of the constitution prohibited the sale of intoxicating liquors within the state. Since then the whole liquor business has been subjected to a heavy tax, and since 1887 the prohibition of it has been left to the

option of each of the several counties. A state court of mediation and arbitration, consisting of three members appointed by the governor with the consent of the senate, was created in 1889 to inquire into the cause of grievances threatening or resulting in any strike or lock-out and to endeavour to effect a settlement.

Charitable and Penal Institutions. — The state supports the Michigan Asylum for the Insane (opened 1859), at Kalamazoo; the Eastern Michigan Asylum for the Insane (opened 1878), at Pontiac; the Northern Michigan Asylum for the Insane (opened 1885), at Traverse City; the Michigan Asylum for the Dangerous and Criminal Insane (established 1885), at Ionia; the Upper Peninsula Hospital for the Insane, at Newberry; a Psychopathic Hospital (established 1907), at Ann Arbor; a State Sanatorium (established 1905), at Howell; the Michigan State Prison (established 1839), at Jackson; the Michigan Reformatory (established 1887), at Ionia; the State House of Correction and Branch Prison (established 1885), at Marquette; the Industrial School for Boys, at Lansing; the Industrial Home for Girls (established 1879), near Adrian; the State Public School (opened 1874), at Coldwater, a temporary home for dependent chil- dren until homes in families can be found for them; the School for the Deaf (established 1854), at Flint; the School for the Blind, at Lansing; an Employment Institution for the Blind (established 1903), at Saginaw; the Home for the Feeble Minded and Epileptic (established 1893), at Lapeer; and the Michigan Soldiers' Home (established 1885), at Grand Rapids. Each of these institutions is under the control of a board of three or more members appointed by the governor with the approval of the Senate, and at the head of the department is the State Board of Corrections and Charities, consisting of the governor and four other members appointed by him, with the approval of the Senate, for a term of eight years, one retiring every two years. This board is required to visit each of the institutions at least once a year to ascertain its condition and needs, and all proposed appropriations for their support, plans of buildings, proposed systems of sewerage, ventilation and heating must be submitted to it.

Education. — Michigan was a pioneer state in creating the American educational system; she began the organization of it at the time of her admission into the Union in 1837, an d nas since been noted for the high standard of her schools. Each township operating under the District Act has two school inspec- tors — one being elected at each town 1 meeting for a term of two years — who with the township clerk constitute the township board of school inspectors, and to this board is given authority to divide the township into school districts and to exercise a general supervision over the several schools within

their jurisdiction; a township may be organized as a single district, called a ” township unit district.” The qualified electors of each district having an ungraded school elect a moderator, a director and a treasurer — one at each annual school meeting — for a term of three years, who constitute the district school board, and this board is entrusted with ample power for direct ing the affairs of the school. In a district having more than 100 children of school age a graded school under the control of five trustees is formed whenever two-thirds of the electors vote for it at a town meeting, and the trustees of a graded school may establish a high school whenever a majority of the electors authorize them to do so. A high school may also be established in any township in which there is no incorporated village or city if when the question is submitted to the electors of that township a majority of the votes cast are in the affirma- tive. Each county has a county school commissioner, elected for a term of four years, who exercises a general supervision over the schools within his jurisdiction, and a board of examiners, consisting of three members (including the commissioner) and appointed by the several boards of county supervisors, from whom teachers receive certificates. Finally, at the head

of all the public elementary and secondary schools of the state is the state superintendent of public instruction, elected for a term of two years; he is ex officio a member and secretary of the, state board of education, and a member, with the right to speak but not to vote, of all other boards having control of public instruc- tion in any state institution. In every district having as many as 800 children between the ages of five and twenty the state requires that the school be taught not less than nine months a year; and a compulsory education law requires the attendance of all children between the ages of eight and fifteen for four months each year, in cities all between the same ages for the full school year, and between the ages of seven and sixteen if found frequenting public places without lawful occupation.

The higher state institutions of learning consist of a university, to which graduates of high schools on an accredited list are admitted without examination, four normal schools, an agricultural college, and a school of mines. The university (at Ann Arbor) was estab- lished in 1837, and is under the control of a board of regents elected by the people for a term of eight years, two every two years; the president of the institution and the superintendent of public instruc- tion are members of the board but without the right to vote. The state normal schools are: the Michigan State Normal College at Ypsilanti (organized in 1849); the Central Michigan Normal School at Mount Pleasant (established in 1895) ; the Northern State Normal School at Marquette

(established in 1899); and the Western State •Normal School at Kalamazoo (established in 1904). All of them are under the state board of education, which consists of the state super- intendent of public instruction and three other members elected, one every two years, for a term of six years. The agricultural college, at East Lansing, 3 m. east of Lansing, is the oldest in the United States; it was provided for by the state constitution of 1850, organ- ized in 1855 and opened in 1857, and is under the control of the state board of agriculture, consisting of the president of the college and six other members elected by popular vote for a term of six years, two every two years. The college of mines, at Houghton, was established in 1885 and is under the control of a board of six members appointed by the governor with the approval of the Senate, two every two years. In 1908 it had 35 instructors, 253 students, and a library of 22,000 volumes. Other important institutions of learning within the state but not maintained by it are: Albion College (Methodist Episcopal; opened in 1843), at Albion; Hillsdale College (Free Bap- tist, 1855), at Hillsdale; Kalamazoo College (Baptist, 1855), at Kalamazoo; Adrian College (controlled by the Methodist Protestant Church since 1867), at Adrian ; Olivet College (Congregational, 1859), at Olivet; Hope College (Reformed, 1866), at Holland; Detroit College , at Detroit; Alma College (Presby terian; incorporated 1886), at Alma; and some professional schools at Detroit (q.v.).

Finance. — The revenue of the state is derived almost wholly from taxes, about 87 % from a direct or general property tax and the rest from various specific or indirect taxes, such as the liquor tax and the inheritance tax. The direct tax, other than that on the property of corporations, is assessed by the township supervisors, or, in cities and incorporated villages by the officer named in the charter for that service, on what is supposed to be the full cash value of the property. The assessment roll thus prepared is reviewed by a local board of review; an equalization between the assessing districts in a county is made annually by the county board of supervisors, and between the counties in the state every five years (and at such other times as the legislature may direct) by the state board of equaliza- tion, which is composed of the lieutenant-governor, auditor-general, secretary of state, treasurer, and commissioner of the land office. But at the head of the whole taxing system is the board of state tax commissioners and ex officio state board of assessors, consisting of three members appointed by the governor with the approval of the senate for a term of six years. It exercises a general supervision over all other taxing officers and is itself the assessor of the property of railroads, express companies and certain car companies. Mainly through the efficiency

of this board the assessed value of the taxable property of the state was increased from $968,189,087 in 1899 to $1,418,251,858 in 1902, or 46-4%, and the taxes levied on railways, which had hitherto been assessed on their gross earnings, were in- creased from $1,483,907 in 1901 to $3,288,162 in 1902, or 121-6%. In entering upon the work of public improvements in 1837 the state borrowed $5,200,000, and the greater portion of the bonds were sold to the Morris Canal and Banking Company and to the Pennsylvania United States Bank, both of which failed when they had only in part paid for the bonds. About this time it was seen that the cost of the improvements undertaken would be much greater than the original estimate and that several of them were impracticable. The difficulty of meeting the interest as it became due soon threat- ened to be insurmountable, but the state finally sold the improve- ments made and came out of the experience with good credit although with a large debt — about two and a half millions of dollars. This was further increased during the Civil War, but after the close of that war it was rapidly diminished and finally was extinguished in

the last decade of the century. The present constitution (as revised in 1908) forbids the contraction of a state debt exceeding $250,000 except for repelling an invasion or suppressing an insurrection, and the borrowing power of the minor civil divisions is restricted by a general law.

The early experience of the state with banks was scarcely less serious than that with public improvements. Although there were already fifteen banks in the state in 1837 yet the cry against mono- poly was loud, and so in that year a general banking law was passed whereby any ten or more freeholders might establish a bank with a capital of not less than fifty thousand nor more than three hundred thousand dollars and begin business as soon as 30% of the capital was paid in in specie. Only a few provisions were made, and those ineffectual, for the protection of the public : later in the same year the legislature passed an act for the suspension of specie payments until the 6th of May 1838, and the consequence was that the state was flooded with irredeemable paper currency. But most of the ” wild cat ” banks had passed out of existence by 1839, and in 1844 the bank act of 1837 was declared unconstitutional. Profiting by this experience, the framers of the constitution of 1850 inserted a provi- sion in that document whereby no general banking law can have effect until it has

been submitted to the people and has been approved by a majority of the votes cast on the question. This provision is included in the revised constitution adopted in 1908, with an addi- tional provision that no amendment shall be made to any banking law unless it shall receive an affirmative two-thirds vote of both branches of the legislature. The present banking law provides that the capital stock of a state bank shall be not less than $20,000 in a city of not more than 1500 inhabitants, not less than $25,000 in a city of not more than 5000, not less than $50,000 in a city of between 5000 and 20,000, not less than $100,000 in a city of between 20,000 and 1 10,000, and not less than $250,000 in all larger cities. Commer- cial banks and savings banks are required to keep on hand at least 15% °f their total deposits. Every stockholder in a bank is made individually liable to the amount of his stock at its par value in addition to the said stock. And all banks are subject to the inspec- tion and supervision of the commissioner of the state banking depart- ment, who is appointed by the governor with the approval of the Senate for a term of four years.

History. — From 1613 until 1760 the territory now within the borders of Michigan formed a part of New France, and the first Europeans to found missions and settlements within those borders were Frenchmen. Two Jesuits, Raymbault and Jogues, visited the site of Sault Sainte Marie as early as 1641 for the conversion of the Chippewas; in 1668 Marquette founded there the first permanent settlement within the state; three years later he had founded a mission among the Hurons at Michilimackinac; La Salle built a fort at the mouth of the Saint Joseph in 1679; and in 1701 Cadillac founded Detroit as an important point for the French control of the fur trade. But the missionaries were not interested in the settlement of the country by Europeans, the fur traders were generally opposed to it, there was bitter strife between the missionaries and Cadillac, and the French system of absolutism in govern- ment and monopoly in trade were further obstacles to progress. Even Detroit was so expensive to the government of the mother country that there was occasional talk of abandoning it; and so during the last fifty-nine years that Michigan was a part of new France there were no new settlements, and little if any growth in those already established. During the last war between the English and the French in America the Michigan settlements passed into the possession of the English, Detroit in 1760 and the others in 1761, but the time had not yet come for much improvement. The white inhabitants, still mostly French, were subjected to an English rule that until the Quebec Act of 1774 was chiefly military, and as a consequence many of the more thrifty sought homes elsewhere, and the Indians, most of whom had been allies of the French, were so ill-treated, both by the officers

and traders, that under Pontiac, chief of the Ottawas, a simultaneous attack on the English posts was planned. Detroit was besieged for five months and both Michilimackinac and Saint Joseph were taken. Moreover, the English policy, which first of all was concerned with the profits of trade and manufacture, gave little more encouragement to the settlement of this section of the country than did the French. By the Treaty of Paris, in 1783, which concluded the American War of Independence, the title to what is now Michigan passed to the United States, and in 1787 this region became a part of the North- West Territory; but it was not until 1796 that Detroit and Mackinac (Michilimackinac), in

accordance with Jay's Treaty of 1794, were surrendered by Great Britain. In 1800, on the division of the North-West Territory, the west portion of Michigan became a part of the newly-established Indiana Territory, into which the entire area of the present state was embodied in 1802, when Ohio was admitted to the Union; and finally, in 1805, Michigan Territory was organized, its south boundary being then described as a line drawn east from the south extremity of Lake Michigan until it intersected Lake Erie, and its west boundary a line drawn from the same starting point through the middle of Lake Michigan to its north extremity and then due north to the north boundary of the United States. In 1812, during the second war between Great Britain and the United States, General William Hull, first governor of the Territory, although not greatly outnumbered, surrendered Detroit to the British without a struggle; in the same year also Mackinac was taken and Michigan again passed under British rule. This rule was of short duration, however, for soon after Commodore Oliver H. Perry's victory on Lake Erie, in September of the next year, Detroit and the rest of Michigan except Mackinac, which was not recaptured until July 1815, were again taken into the pos- session of the United States. Up to this time the Territory had still remained for the most part a wilderness in which the fur trade reaped the largest profits, its few small settlements being confined to the borders; and the inaccurate reports of the surveyors sent out by the national government described the interior as a vast swamp with only here and there a little land fit for cultivation. The large number of hostile Indians was also a factor in making the Territory unattractive. But during the efficient administration of Lewis Cass, governor of the Territory from 1813 to 1 831, the interference of the British was checked and many of the Indians were removed to the west of the Mississippi; printing presses, established during the same period at Detroit, Ann Arbor, Monroe and Pontiac, became largely instrumental in making the country better known; the first steamboat, the " Walk-

in-the-Water," appeared at Detroit in 1818; the Erie canal was opened in 1825; by 1830 a daily boat line was running between Detroit and Buffalo, and the population of Michigan, which was only 4762 in 1810 and 8896 in 1820, increased to 31,639 in 1830 and 212,267 in 1840. In 1819 the Territory had been empowered to send a delegate to Congress. By 1832 the question of admission into the Union had arisen, and in 1835 a convention was called in Detroit, a constitution was framed in May, that constitution was adopted by popular vote in October, state officers were elected, and application for admission was made; but a dispute with Ohio over the boundary between the two caused a delay in the admission by Congress until early in the year 1837. Although the ordinance creating the North-West Territory fixed the boundary line as claimed by Michigan, yet that line was found to be farther south than was at the time expected and when the constitution of Ohio was adopted it was accom- panied with a proviso designed to secure to that state a north boundary that was north of the mouth of the Maumee River. The territory between the two proposed lines was unquestionably of greater economic importance to Ohio than to Michigan, and, besides, at this particular time there were forcible political reasons for not offending the older state. The consequence was that after the bloodless " war " between the two states for the possession of Toledo, Congress settled the dispute in Ohio's favour and gave to Michigan the territory since known as the upper peninsula. The boundaries as fixed by Congress were rejected by a convention which met on the 4th of September at Ann Arbor, but they were accepted by the convention of the Jackson party, which met, also at Ann Arbor, on the 6th of December; the action of this latter convention was considered authoritative by Congress, which admitted Michigan into the Union as a state on the 26th of January 1837. Since admission into the Union the more interesting experiences of the state have been with internal improvements and with banking, which together resulted in serious financial distress; in the utili- zation of its natural resources, which have been a vast source of

wealth; and in the development of its educational system, in which the state has exerted a large influence throughout the Union. From the beginning of its government under its first state constitution in 1835 until 1855 Michigan had a Demo- cratic administration with the exception of the years 1840- 1842, when opposition to the financial measures of the Democrats placed the Whigs in power. But it was in Michigan that the Republican party received its first official

recognition, at a state convention held at Jackson on the 6th of July 1857, and from the beginning of the following year the administration has been Republican with the exception of two terms from 1883 to 1885, and from 1891 to 1893, when it was again Democratic. Governors of Michigan „ .. Territorial.

William Hull 1805-1813

Lewis Cass 1813-1831

Stevens Thompson Mason (acting) 1 83 1

George Bryan Porter . 1 831-1834

Stevens Thompson Mason (acting) 1 834-1 835

John Scott Horner (acting)

State Stevens Thompson Mason . William Woodbridge . James Wright Gordon (acting) John Steward Barry Alpheus Felch William L. Greenly (acting) Epaphroditus Ransom John Steward Barry . Robert McClelland Andrew Parsons (acting) Kinsley S. Bingham Moses Wisner Austin Blair Henry Howland Crapo Henry Porter Baldwin John Judson Bagley Charles Miller Croswell David Howell Jerome Josiah W. Begole Russell Alexander Alger Cyrus Gray Luce Edwin Baruch Winans John T. Rich Hazen Smith Pingree . Aaron Thomas Bliss . Fred M. Warner . Chase S. Osborn . Authorities. — The Puh

Democrat

Whig

Democrat

Republican

Democrat and Greenback Republican

,,

Democrat Republican

1835

I 835-1 840

1840-1841 1841-1842 1 842-1 846

I 846-1 847

1847-1848 1848-1850 1850-1851 1851-1853

I853-I855

1 855-1 859 1 859-1 86 1 1861-1865 1 865-1 869 1869-1873 1873-1877 1877-1881 1881-1883 1 883-1 885 1885-1887 1 887-1 89 1 1891-1893 1893-1897 1 897-1 90 1 1901-1905 1905-1911 1911

ilications of the Michigan Geological Survey (Detroit, Lansing and New York, 1838 seq.) deal largely with the mining districts of the upper peninsula. Alexander Winchell, Michigan: Being Condensed Popular Sketches of the Topography, Climate and Geology of the State (1873), is in large measure restricted to the south half of the state. W. J. Beal and C. F. Wheeler, Michigan Flora (Lansing, 1892), contains the results of an extensive study of the subject. See also the Twelfth Census of the United Slates (Washington, 1901-1902) ; Silas Farmer, Michigan Book: a State Cyclopaedia with Sectional County Maps (Detroit, 1901); Bela Hubbard, Memorials of a Half-Century (New York, 1887), a well written account of obser- vations, chiefly upon scenery, fauna, flora and climate; Webster Cook, Michigan: its History and Government (New York, 1905), written primarily for use in schools and containing a reference bibliography ; A. C. McLaughlin, History of Higher Education in Michigan, in Circulars of Information of the United States Bureau of Education (Washington, 1891), being an account of the origin of the public school system and an individual account of each higher institution of learning » T. M . Cooley , Michigan : a History of Govern- ment (Boston, 1885), a critical but popular narrative by an eminent jurist; J. V. Campbell, Outlines of the Political History of Michigan (Detroit, 1876), also by a jurist of the state; Henry M. Utley and Byron M. Cutcheon, Michigan as a Province, Territory and State (4 vols., New York, 1906) ; Michigan Pioneer and Historical Society, Historical Collections: Collections and Researches (Lansing, 1877 seq.); and Publications of the Michigan Political Science Association (Ann Arbor, 1893).

MICHIGAN, LAKE, the only one of the great lakes of North America wholly within the boundaries of the United States, and the second largest body of fresh water in the world. It lies S. of Lake Superior and W. of Lake Huron, between 41 37′ and 46° 05′ N. and 84 45′ and 88° W.; is bounded on the N. and E. by the state of Michigan, on the W. by Wisconsin, while Illinois and Indiana touch its S. end. It is 320 m. long, and has an average width of 65 m. The maximum depth recorded by the United States Lake Survey is

870 ft.; the mean level of the surface is 581 \ ft. above mean sea-level, being the same as that of Lake Huron and 21 ft. below that of Lake Superior. Its area is 22,400 sq. m., and it has a basin 68,100 sq. m. in area.

The shores of Lake Michigan are generally low and sandy, and the land slopes gradually to the water. The northern shore of the lake is irregular and more rugged and picturesque than the other shores, the summit of the highest peak being about 1400 ft. above the sea. On the eastern side are numerous sand hills, formed by the wind into innumerable fantastic shapes, sometimes covered with stunted trees and scanty vegetation, but usually bare and rising to heights of from 150 to 250 ft. The south-western shore is generally low, with sand hills covered with shrivelled pines and bur oaks. Along the western shore woods and prairies alternate, interspersed with a few high peaks. The cliffs on the east shore of Green Bay form a bold escarpment, and from this ridge the land slopes gradually to the lake. With the exception of Green and Traverse bays, Lake Michigan has few indentations of the coast line, and except at the north end it is free from islands. The waters near shore are shoal, and as there are few harbours of refuge of easy access navigation is dangerous in heavy storms. Around the lake the climate is equable, for, though the winter is cold and the summer hot, the waters of the lake modify the extremes, the mean temperature varying from 40° to 54° F. The average annual rainfall is 33 in. The finest agricultural land in the United States is near the lake, and there is an immense trade in all grains, fruits, livestock and lumber, and in products such as flour, pork, hides, leather goods, furniture, &c. Rich lead and copper mines abound, as also salt, iron and coal. Abundant water power promotes manufactures of all kinds. Beer and distilled liquors are largely manufactured, and fine building stone is obtained from numerous quarries.

The lake is practically tideless, though true tidal pulsations amounting to 3 in. in height are stated to have been ob- served in Chicago. In the water of the lake there is a general set of current towards the outlet at the strait of Mackinac, following the east shore, with slight circular currents in the main portion of the lake and at the northern end around Beaver island. These currents vary in speed from 4 to 10 m. per day. Surface currents are set up by prevailing winds, which also seriously affect water levels, lowering the water at Chicago and raising it at the strait, or the reverse, so as greatly to inconvenience navigation. The level of the lake is subject to seasonal fluctuations, reaching a maximum in midsummer and a minimum in February, as well as to alter- nating cycles of years of high and low water. Standard

high- water of 1838 was 3-36 ft. above mean level and standard low-water of 1895, 2-82 ft- below that datum, giving an extreme recorded range slightly over 6 ft.

The northern portion of the lake only is covered with ice in winter, and ice never reaches as far south as Milwaukee. Milwaukee River remains closed on an average for one hundred days— from the beginning of December to the middle of March. The average date of the opening and closing of navigation at the strait of Mackinac, where the ice remains longest, is the 17th of April and the 9th of January respectively. 1 Regular lines of steamers specially equipped to meet winter conditions, most of them being car ferries, cross the lake and the strait of Mackinac all winter between the various ports.

No notable rivers flow into Lake Michigan, the largest being the Big Manistee and Muskegon on the east shore, and on the west shore the Menominee and the Fox, both of which empty into Green Bay, the most important arm of the lake. The numerous harbours are chiefly artificial, usually located at the mouths of streams, the improvements consisting of two parallel piers extending into the lake and protecting a dredged channel. Sand bars keep filling up the mouths of these channels, necessitating frequent dredging and extension of the breakwaters, work undertaken by the Federal government, which also maintains a most comprehensive and com- plete system of aids to navigation, including lighthouses and light- ships, fog alarms, gas and other buoys, life-saving, storm signal and weather report stations.

1 Report of Deep Waterways Commission (1896).

Chicago, the principal port on the lake, is at its south-west ex- tremity, and is remarkable for the volume of its trade, the number of vessels arriving and departing exceeding that of any port in the United States, though the tonnage is less than that of New York. It is a large railway centre, and the number and size of the grain elevators are noticeable. The port is protected by breakwaters enclosing a portion of the lake front. The level of the city above the lake being only 14 ft., much difficulty arose in draining it. A sanitary and ship canal 34 m. long was therefore completed in 1900 to divert the Chicago river, a small stream that flows into the lake, into the head waters of the Des Plaines river and thence through the river Joliet into the Mississippi at St Louis. The discharge of water is by law so regulated that the

maximum flow shall not exceed 250,000 cub. ft. per minute. The effect upon the permanent level of the lakes of the withdrawal of water through this artificial outlet is receiving much attention. Milwaukee, situated on the shore of Milwaukee Bay, on the western side of the lake, is, next to Chicago, the largest city on the lake, and has a large commerce and a harbour of refuge. Escanaba, on Little Bay de Noc (Noquette), in the northern part of the lake, is a natural harbour and a large iron shipping port. Green Bay and Lake Michigan are connected by a canal extending from the lake to the head of Sturgeon Bay. Lake Michigan is connected at its north-east extremity with lake Huron by the strait of Mackinac, 48 m. long, with a minimum width of 6 m. ; the water is generally deep and the shoals lying near the usually travelled routes are well marked.

Bibliography. — Sailing directions for Lake Michigan, Green Bay, and the Strait of Mackinac, U.S. Navy Hydrographic office publica- tion No. 108 B (Washington, 1906) ; Bulletin No. 17 : Survey of North- ern and North-western Lakes, U.S. Lake Survey Office (Detroit, Michigan, 1907) ; St Lawrence Pilot, 7th ed., Hydrographic Office Admiralty (London, 1906) ; Effect of Withdrawal of Water from Lake Michigan by the Sanitary District of Chicago, U.S. House of Repre- sentatives' Document No. 6, 59th Congress, 1st session (Washington, 1906). (W. P. A.)

MICHIGAN, UNIVERSITY OF, one of the principal educational institutions of the United States, situated at Ann Arbor, Michigan. It embraces a department of literature, science and the arts (including industry and commerce), opened in 1841, and includ- ing a graduate school, organized in 1892; a department of medicine and surgery, opened in 1850; a department of law, opened in 1859; a school of pharmacy, opened as a separate department in 1876; a 'homoeopathic medical college, opened in 1875; a college of dental surgery, opened in 1875; and a department of engineering, separately organized in 1895, which includes courses in marine engineering, architecture, and archi- tectural engineering. The university was one of the first to admit women, having opened its doors to them in 1870 as a natural consequence of its receiving aid from the state (since 1867), and since 1900 they have constituted nearly one-half of the student body in the department of literature, science and the arts. In 1907-1908 there were in all departments 350 instructors and 5013 students (1796 in the department of literature, science and the arts; 1354 in the department of engineering; 391 in the department of medicine and surgery; 791 in the department of law; 101 in the school of pharmacy; 82 in the homoeopathic medical college; 168 in the college of dental surgery; and 1070 in the summer sessions). Besides the several main

department buildings there is a library build- ing, a museum building, several laboratories, a gymnasium for men, and a gymnasium for women. The general library in 1908 contained 172,940 volumes, 3800 pamphlets, and 3370 maps, and the several department libraries brought the total up to 222,600 volumes and 5°°° pamphlets. The general museum contains large zoological collections, geological and anthropo- logical collections, including the exhibit of the Chinese govern- ment at the New Orleans Exposition, which was given by the government to the university in 1885; there are besides several special collections in some of the laboratories. The astronomical observatory is surmounted by a movable dome in which is mounted a refracting telescope having a thirteen-inch object glass. The several laboratories are equipped for use in instruc- tion in physics, chemistry, mineralogy, geology, zoology, psychology, botany, forestry, actuarial work, engineering, histology, physiology, hygiene, electrotherapeutics, pathology, anatomy and dentistry.

The university is governed from without by a board of eight regents elected by popular suffrage, two biennially, at the same time as the election of judges of the supreme court; from

within

The first charter for a university within what is now the state was granted by the governor and judges of the Territory of Michigan in 181 7, for a ” Catholepistemiad,” or University of Michigania, with a remarkable ” Greek ” system of nomenclature for its courses and faculties; this institution did practically no teaching. A second charter was granted in 1821, for a University of Michigan in Detroit; but little was accomplished until the admission of Michigan into the Union as a state in 1837, when by the third charter the aim was to model the institu- tion after the German university minus the theological depart- ment, and the university was entrusted to a board of regents and a chancellor appointed by the governor. Branches to correspond to the German gymnasia were established in the principal towns before any money was spent on the University proper, but the question of the constitutionality of itheir establishment and maintenance arose, and they were soon discon- tinued. Plans for building at Ann Arbor were begun in 1838. The first class graduated in 1845. The department of literature, science and the arts was at first much like a New England college. For some time the prospects did not seem promising; but in 1851 a new state constitution provided that the regents should be elected, and directed them to choose a president; and it was under the administration (1852-1863) of the first incumbent of that office, Henry Philip Tappan (1805-1881), that the present broad and liberal